



**Terry Fox Drive & Cope Drive  
Commercial Shopping Development**

Transportation Impact Assessment  
Strategy Report

September 19, 2018

Prepared for:

98365 Ontario Limited  
c/o Street Properties

Prepared by:

Stantec Consulting Ltd.

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# TERRY FOX DRIVE & COPE DRIVE COMMERCIAL SHOPPING DEVELOPMENT

Screening  
September 19, 2018

## 1.0 SCREENING

### 1.1 SUMMARY OF DEVELOPMENT

Municipal Address	
Description of Location	South Kanata, east of Terry Fox Drive, south of Cope Drive, north of Fernbank Road, and west of an existing residential development
Land Use Classification	Commercial
Development Size (units)	8 buildings
Development Size (m <sup>2</sup> )	8,332 m <sup>2</sup> GFA (89,700 sq.ft. GFA)
Number of Accesses and Locations	1 Full Movement Access on Cope Drive 2 Right-in/Right-out accesses on Terry Fox Drive 1 Right-in/Right-out access on Fernbank Road
Phase of Development	1
Buildout Year	Fall 2020

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

### 1.2 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	Triggered
Single-family homes	40 units	✗
Townhomes or apartments	90 units	✗
Office	3,500 m <sup>2</sup>	✗
Industrial	5,000 m <sup>2</sup>	✗
Fast-food restaurant or coffee shop	100 m <sup>2</sup>	✗
Destination retail	1,000 m <sup>2</sup>	✓
Gas station or convenience market	75 m <sup>2</sup>	✓

\* 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.**

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### 1.3 LOCATION TRIGGERS

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

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

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

### 1.4 SAFETY TRIGGERS

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

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

### 1.5 SUMMARY

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

**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).**

## 2.0 SCOPING

### 2.1 EXISTING AND PLANNED CONDITIONS

#### 2.1.1 Proposed Development

This Transportation Impact Assessment (TIA) is prepared in support of a Zoning By-Law Amendment application for a proposed commercial development located at the southeast corner of Terry Fox Drive and Cope Drive in the Kanata South community of Ottawa, Ontario. The site is bound by Cope Drive to the north, existing residential to the east, Fernbank Road to the south, and Terry Fox Drive to the west.

**Figure 1** illustrates the site location. The site is currently zoned as IP [2411]; the purpose of the IP – Business Park Industrial Zone is to:

- Accommodate mixed office, office-type uses and low impact, light industrial uses in a business park setting, in accordance with the Enterprise Area designations of the Official Plan or, the Employment Area or the General Urban Area designation where applicable;
- Allow in certain Enterprise or General Urban Areas, a variety of complementary uses such as recreational, health and fitness uses and service commercial (e.g. convenience store, personal service business, restaurant, automobile service station and gas bar), occupying small sites as individual occupancies or in groupings as part of a small plaza, to serve the employees of the Enterprise, Employment or General Urban Area, the general public in the immediate vicinity, and passing traffic;

The proposed development plan consists of eight commercial shopping buildings with a combined 89,700 sq.ft. of gross-floor-area (GFA).

A full movement access is proposed on Cope Drive. Three other access, two on Terry Fox Drive and one on Fernbank Road, are proposed as right-in/right-out only access points to the subject site.

A total of 371 vehicle parking spaces are proposed on-site as part of the development.

Buildout and occupancy of the proposed development is anticipated to occur within one development phase in the Fall 2020.

As the proposed development plan is prepared as part of a Zoning By-Law Amendment application, site design details such as the number and location of bicycle parking will be identified and confirmed as part of the Site Plan Control process.

**Table 1** lists the Institute of Transportation (ITE) land uses assumed for the analysis.

**Figure 2** illustrates the proposed site plan.



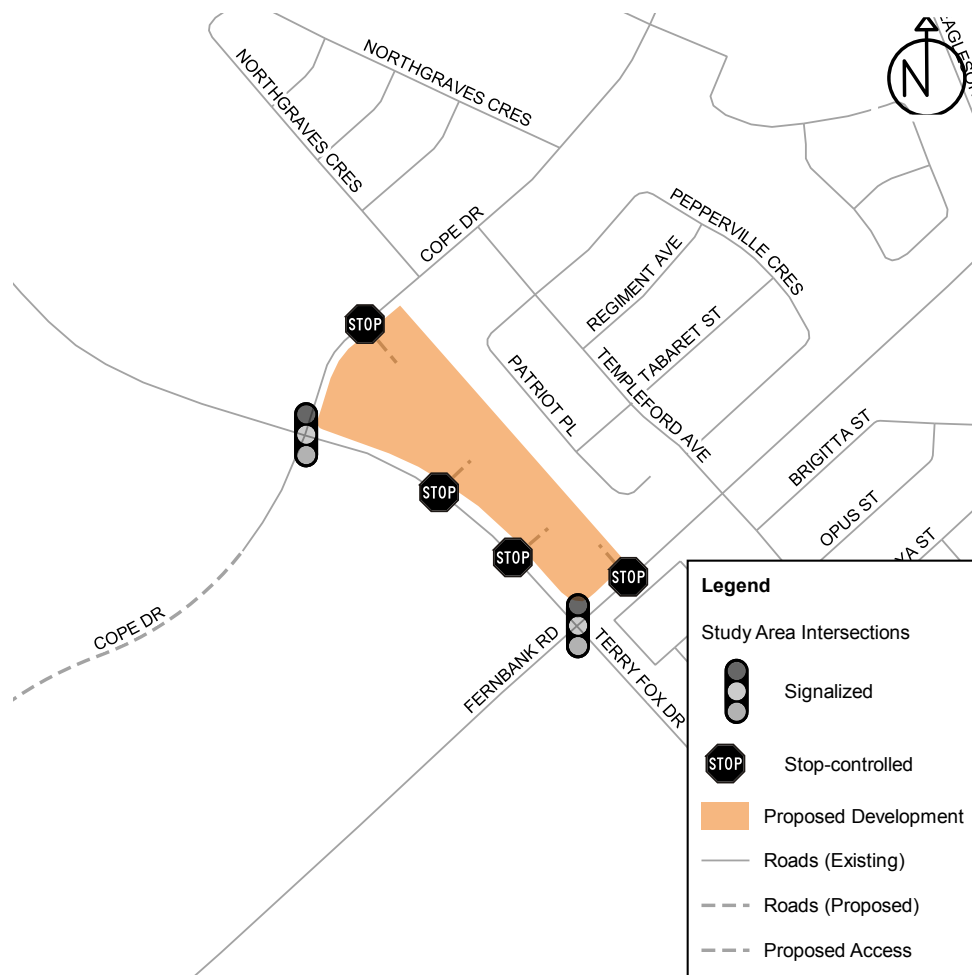
# TERRY FOX DRIVE & COPE DRIVE COMMERCIAL SHOPPING DEVELOPMENT

Scoping  
September 19, 2018

**Table 1 - Assumed Land Uses**

Building	Size (sq.ft. GFA)	LUC	Assumed ITE Land Use
A	35,000	854	Discount Supermarket
B	2,000	932	High-Turnover (Sit-down) Restaurant
	4,100	826	Specialty Retail
C	8,000	826	Specialty Retail
D	12,200	826	Specialty Retail
E	15,200	826	Specialty Retail
F	2,200	932	High-Turnover (Sit-down) Restaurant
	4,000	826	Specialty Retail
G	4,000	912	Drive-in Bank
H	750	937	Coffee / Donut Shop with Drive-Thru Window
	2,250 8 fueling positions	944	Gasoline / Service Station
<b>Total</b>	89,700 sq.ft		

**Figure 1 - Site Location and Proposed Site Accesses**





Scoping  
September 19, 2018

**SYMBOL LEGEND**

- ▶ SHEDDOR LOCATIONS
- ▶ LEADING DOOR LOCATIONS
- ▶ DRIVE-IN LOCATIONS
- ▶ ENTRYWAY & EXIT VERTICES
- ▶ SIDE CURB CUT / TRAIL TO ENTRY
- ▶ LANDSCAPE ISLANDS TO FORM CURB CUTS AROUND EXISTING OR NEW VEHICLES
- ▶ PARKING SPACES
- ▶ C-18 OUTLET FOR ACCESSIBLE ACCESS
- ▶ DRIVEWAY LOCATIONS (SEE PLAN AREA A-18 FOR DETAILS)
- ▶ IMPROVEMENTS
- ▶ EXISTENT
- ▶ PROPOSED LINE
- ▶ 10' BUFFER TO ALL UTILITIES (SEE TYPICAL STANDARD FOR PAVING)
- ▶ ACCESSIBLE TO PARKING

**SITE ANALYSIS (ZBA)**

LOT AREA:	36,750.98 S.M.	(9.08 ACRES)
<b>BUILDING AREA:</b>		
BLDG 'A' (FOOD STORE)	3,248.36 S.M.	(34,996.20 S.F.)
BLDG 'B' (RETAIL)	568.90 S.M.	(6,123.79 S.F.)
BLDG 'C' (RETAIL)	743.20 S.M.	(8,000.00 S.F.)
BLDG 'D' (RETAIL)	1,133.38 S.M.	(12,200.00 S.F.)
BLDG 'E' (RETAIL)	1,412.08 S.M.	(15,200.00 S.F.)
BLDG 'F' (RETAIL)	575.98 S.M.	(6,200.00 S.F.)
BLDG 'G' (RETAIL)	371.60 S.M.	(4,000.00 S.F.)
BLDG 'H' (RETAIL)	276.70 S.M.	(3,000.00 S.F.)
TOTAL GROSS FLOOR AREA:	8,332.20 S.M.	(89,698.99 S.F.)
COVERAGE:	22.67%	
<b>PARKING REQUIRED:</b>		
FOOD STORE	3,248.36 S.M. @ 3.4 CARS / 100 S.M.	111 SPACES
RETAIL	5,083.84 S.M. @ 5 CARS / 100 S.M.	254 SPACES
TOTAL PARKING REQUIRED:		365 SPACES
PARKING PROVIDED:		371 SPACES
PAVED AREA:	--	
LANDSCAPE AREA:	--	

**DRAWING ISSUE**

DATE	PROJECT	BY
	Issued for Design Approval	
	Issued for Site Plan Approval	
	Issued for Planning and Building	
	Issued for Building Permit	
	Issued for Issuance	
	Issued for Construction	
	Issued for Record of Title	

**VGA**  
Verichantoli Gagliardi Architect Inc.  
3511 Sheppard Ave. E., Suite 100, Scarborough, ON M1S 1T5  
Tel: 416-291-1000 Fax: 416-291-1001  
www.vga.ca

**PROJECT**  
**PROPOSED COMMERCIAL DEVELOPMENT**  
TERRY FOX DRIVE & COPE DRIVE  
KANSAS, ONTARIO

**DRAWING NAME**  
**SITE PLAN**  
CITY FILE #

**SCALE**  
1:300

**DATE OF**  
MAY 21, 2016

**PROJECT NO.**  
1-0028

**DRAWN BY**  
DWL

**CHECKED BY**  
RDS

**A-100**

## TERRY FOX DRIVE & COPE DRIVE COMMERCIAL SHOPPING DEVELOPMENT

Scoping  
September 19, 2018

### 2.1.2 Existing Conditions

#### 2.1.2.1 Roads and Traffic Control

The boundary roads are as follows:

Terry Fox Drive	Terry Fox Drive is a municipally-owned, two-lane undivided arterial roadway with a posted speed limit of 80 kph across the frontage of the proposed site.
Fernbank Road	Fernbank Road is a municipally-owned, two-lane undivided arterial roadway with a posted speed limit of 60 kph across the frontage of the proposed site.
Cope Drive	Cope Drive is a municipally-owned, two-lane collector roadway with a posted speed limit of 50 kph across the frontage of the proposed site.

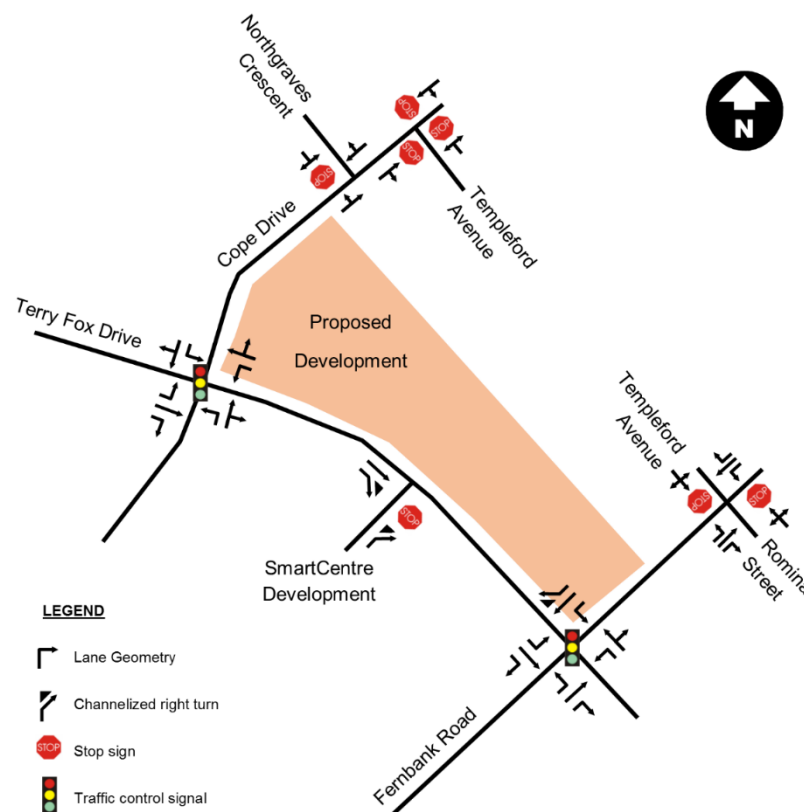
The proposed development is adjacent to the signalized intersections of Terry Fox Drive and Cope Drive, as well as Terry Fox Drive and Fernbank Road.

Nearby intersections also include the intersection of Cope Drive and Northgraves Crescent (Stop-Control on minor approach), Cope Drive and Templeford Avenue (All-Way Stop Control), and the intersection of Fernbank Road at Templeford Ave / Romina Street (Two-Way Stop Control on minor approaches).

The nearby Kanata SmartCentre development is also served by nearby right-in/right-out access on Terry Fox Drive.

**Figure 3** illustrates the existing lane configuration and traffic control.

**Figure 3 - Existing Lane Configuration and Traffic Control**

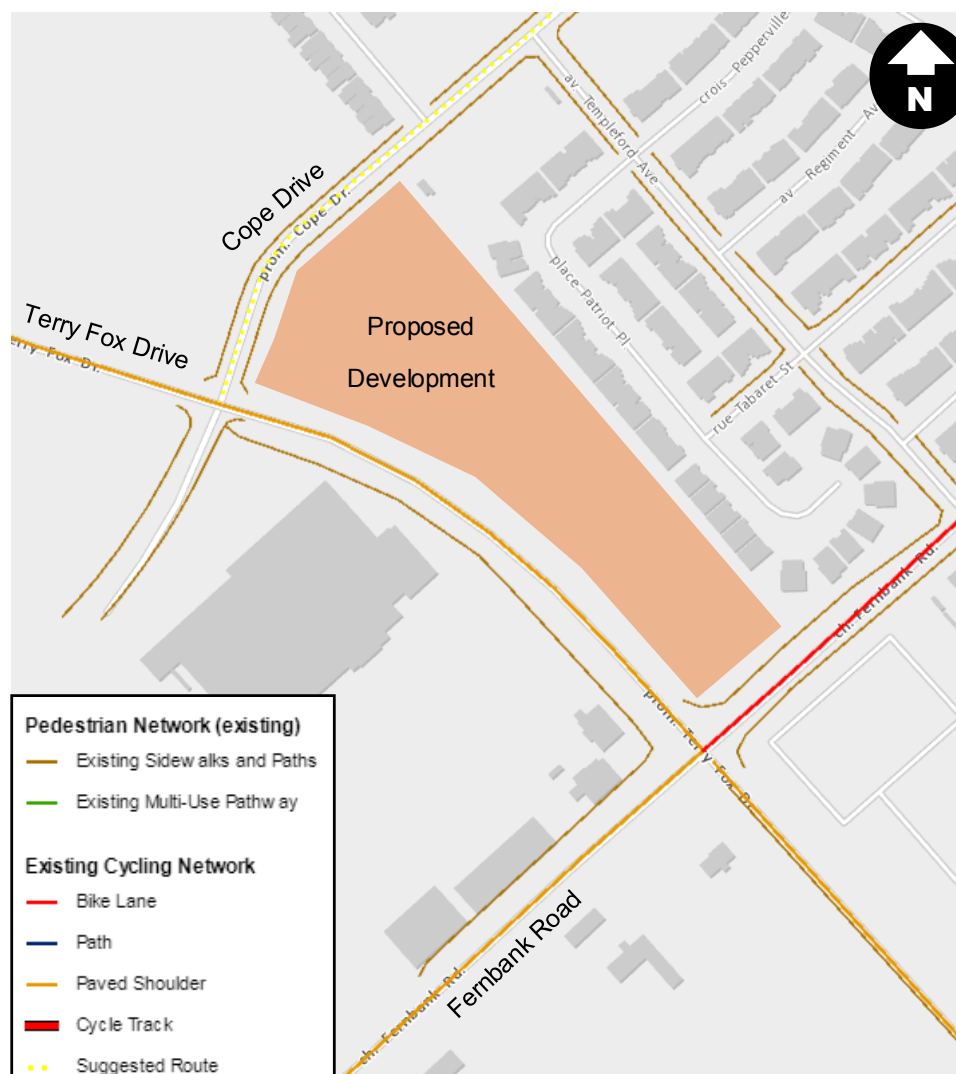


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## 2.1.2.2 Walking and Cycling

Figure 4 illustrates the existing pedestrian and cycling facilities.

**Figure 4 - Existing Pedestrian and Cycling Network**



Source: geoOttawa, accessed March 2018



## TERRY FOX DRIVE & COPE DRIVE COMMERCIAL SHOPPING DEVELOPMENT

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### 2.1.2.3 Transit

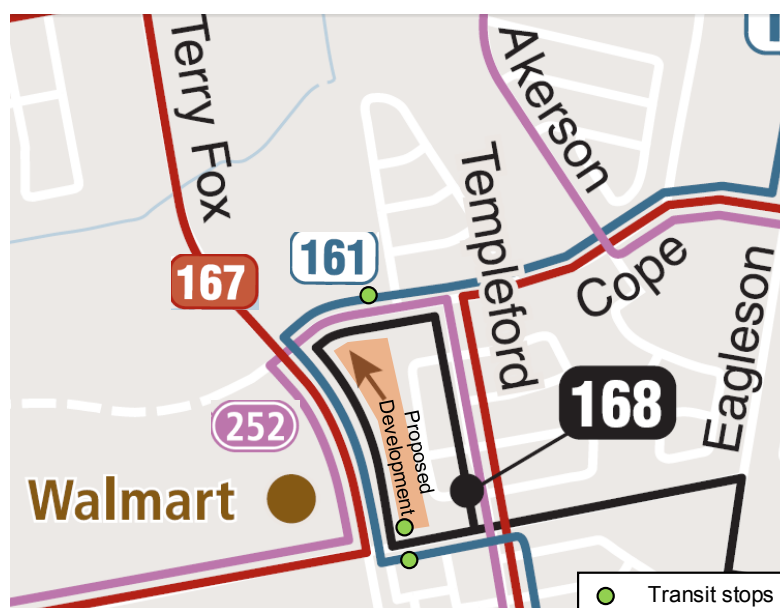
The proposed development is currently serviced by the following routes:

- Route 161     Route 161 is a local route which operates between Terry Fox station and the Bridlewood community.
- Route 167     Route 167 is a local route which operates between Terry Fox Station and the Blackstone community.
- Route 168     Route 168 is a local route which operates between Terry Fox Station and the Bridlewood community during selected time periods.
- Route 252     Route 252 is an express route which operates between Fernbank Road and Mackenzie King Bridge in the downtown core during the weekday peak hours only.

The entire site is located within 400 metres of three existing on-street transit stops.

**Figure 5** illustrates the transit routes and stops.

**Figure 5 - Study Area Transit Routes and Stops**



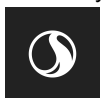
Source: OC Transpo System Map, accessed March 2018

### 2.1.2.4 Traffic Management Measures

No traffic management measures are provided near the site.

### 2.1.2.5 Traffic Volumes

**Figure 6** illustrates the existing traffic volumes at the study area intersections during the weekday AM, weekday PM, and Saturday peak hour, respectively. Traffic counts were obtained from the Van Gaal Lands Community Transportation Study (CTS)(August 2015); the weekday traffic counts were conducted by the City in 2014 and the Saturday traffic counts were conducted by the consultant in 2015.



# TERRY FOX DRIVE & COPE DRIVE COMMERCIAL SHOPPING DEVELOPMENT

Scoping  
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**Figure 6 - Existing Peak Hour Traffic Volumes**

	Weekday AM Peak Hour	Weekday PM Peak Hour	Saturday Peak Hour
Cope Drive	<div> <div> <div>← 172</div> <div>← 15</div> <div>← 17</div> </div> <div> <div>34 267 139</div> <div>↓ ↓ ↓</div> </div> </div>	<div> <div>← 179</div> <div>← 58</div> <div>← 67</div> </div> <div> <div>72 532 197</div> <div>↓ ↓ ↓</div> </div>	<div> <div>← 205</div> <div>← 105</div> <div>← 63</div> </div> <div> <div>144 778 314</div> <div>↓ ↓ ↓</div> </div>
	<div> <div>48 →</div> <div>18 →</div> <div>1 →</div> </div>	<div> <div>78 →</div> <div>76 →</div> <div>2 →</div> </div>	<div> <div>133 →</div> <div>87 →</div> <div>3 →</div> </div>
	<div> <div>↑</div> <div>579 26</div> </div>	<div> <div>↑</div> <div>516 24</div> </div>	<div> <div>↑</div> <div>497 9</div> </div>
	<div> <div>285</div> <div>↓</div> </div>	<div> <div>601</div> <div>↓</div> </div>	<div> <div>844</div> <div>↓</div> </div>
	<div> <div>↑</div> <div>610</div> </div>	<div> <div>↑</div> <div>545</div> </div>	<div> <div>↑</div> <div>507</div> </div>
	<div> <div>285</div> <div>↓</div> </div>	<div> <div>601</div> <div>↓</div> </div>	<div> <div>844</div> <div>↓</div> </div>
Fernbank Road	<div> <div>← 150</div> <div>← 125</div> <div>← 3</div> </div> <div> <div>39 189 57</div> <div>↓ ↓ ↓</div> </div>	<div> <div>← 98</div> <div>← 244</div> <div>← 2</div> </div> <div> <div>74 385 142</div> <div>↓ ↓ ↓</div> </div>	<div> <div>← 9</div> <div>← 246</div> <div>← 108</div> </div> <div> <div>60 631 153</div> <div>↓ ↓ ↓</div> </div>
	<div> <div>123 →</div> <div>122 →</div> <div>88 →</div> </div>	<div> <div>117 →</div> <div>165 →</div> <div>60 →</div> </div>	<div> <div>89 →</div> <div>151 →</div> <div>65 →</div> </div>
	<div> <div>↑</div> <div>337 2</div> </div>	<div> <div>↑</div> <div>330 5</div> </div>	<div> <div>↑</div> <div>409 63</div> </div>
	<div> <div>↑</div> <div>610</div> </div>	<div> <div>↑</div> <div>545</div> </div>	<div> <div>↑</div> <div>507</div> </div>

## 2.1.2.6 Collision History

**Terry Fox Drive at Cope Drive** experienced 27 collisions over a five-year period between 2013 and 2017. Out of the 27 recorded collisions, 11 were classified as rear-end collisions (41%), 9 were classified as turning movement collisions (33%), and 4 were classified as angle collisions (15%). The remaining collisions were classified as sideswipe and single vehicle collisions. None of the recorded collisions involved pedestrians or cyclists.

The recorded collisions involved 22 property damage only (81%) and 5 non-fatal injury (19%) indicating low impact speeds.

**Terry Fox Drive and Fernbank Road** experienced 26 collisions over a five-year period between 2013 and 2017. Out of the 26 recorded collisions, 8 were classified as angle collisions (31%), 8 were classified as rear-end collisions (31%), 4 were classified as turning movement collisions (15%), and 3 were classified as sideswipe collisions (12%).



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The remaining collisions were classified as single vehicle and “other” collisions. One of the recorded collisions involved a cyclist who suffered non-fatal injuries.

The recorded collisions involved 19 property damage only (73%) and seven non-fatal injury (17%) indicating low impact speeds.

Based on the available data, there does not appear to be any prevailing safety issues at study area intersections.

**Appendix A** contains detailed summary reports.

### 2.1.3 Planned Conditions

#### 2.1.3.1 Road Network Modifications

**Table 2** identifies the City of Ottawa Transportation Master Plan projects located near of the study area.

**Table 2 - City of Ottawa Transportation Master Plan Projects**

Project	Description	TMP Phase
Terry Fox Drive Widening	Widen Terry Fox Drive from 2 to 4 lanes between Eagleson Road and Winchester Drive	Network Concept (i.e. Beyond 2031 horizon)
Fernbank Road Widening	Widen Fernbank Road from 2 to 4 lanes between Stittsville Main Street and Terry Fox Drive.	Network Concept (i.e. Beyond 2031 horizon)

#### 2.1.3.2 Future Background Developments

**Table 3** lists the background developments assumed to occur between 2018 and 2025. **Figure 7** illustrates the location of these background developments.

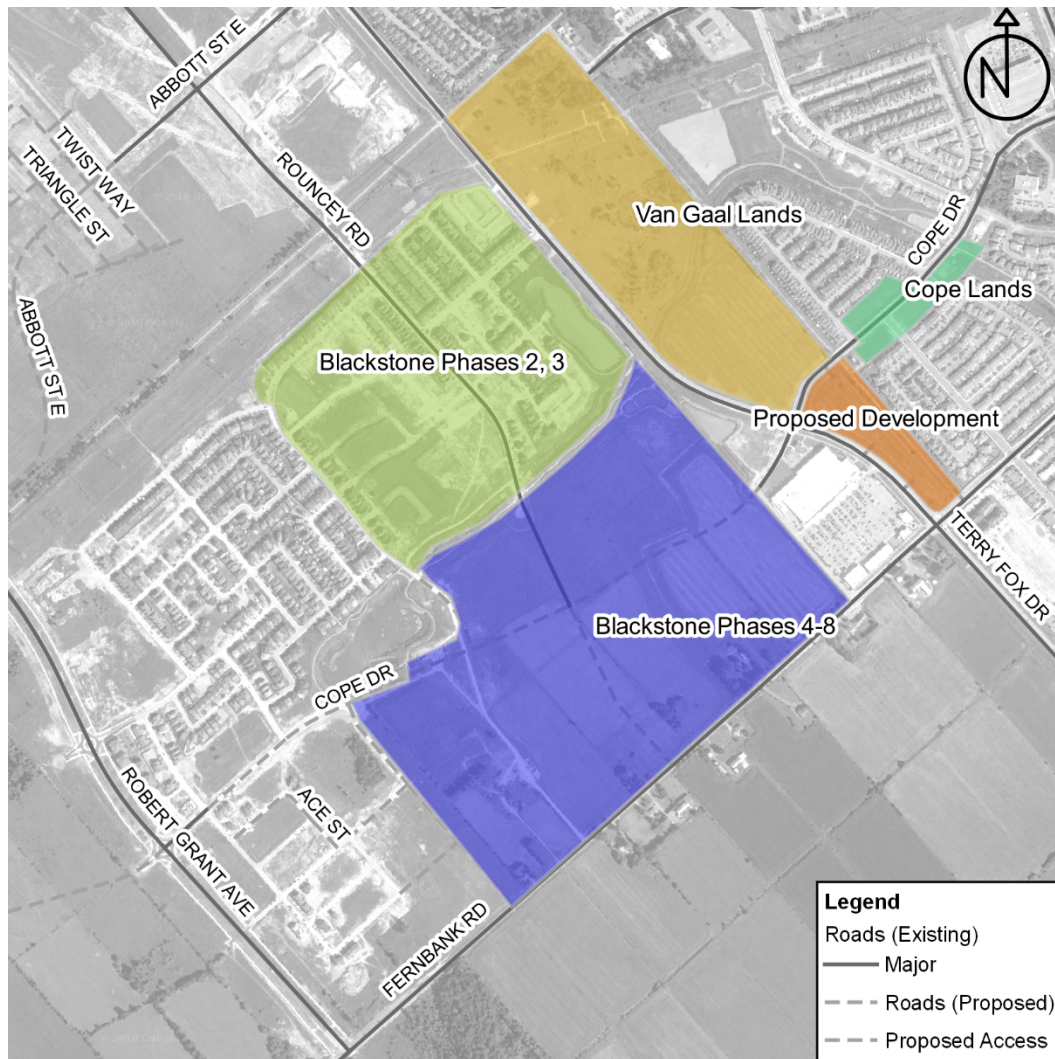
**Table 3 - Background Developments**

Development	Size	Assumed Build-Out
Blackstone Phases 2, 3, and 4	Total: 427 single family homes 285 semis/townhomes Assume 1/3 built-out as of 2018 traffic counts	2020 (2015 originally in TIS)
Cope Lands	260 high-rise residential condo units	2020
Blackstone Phases 4-8	423 single family homes 376 townhomes 156 apartment 1 high school (1,916 students) 1 elementary school (650 students)	2025
Van Gaal Lands (excluding the proposed development)	255 townhomes 600,000 sq.ft. employment/office	2025





**Figure 7 - Background Developments**



## 2.2 STUDY AREA AND TIME PERIODS

### 2.2.1 Study Area

The study area was limited to the following intersections:

- Terry Fox Drive and Fernbank Road;
- Terry Fox Drive and Cope Drive;
- Cope Drive and Site Access; and,
- Fernbank Road and Site Access (right-in/right-out).



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### 2.2.2 Time Periods

The scope of the transportation assessment includes the following analysis time periods:

- Weekday AM peak hour of roadway;
- Weekday PM peak hour of roadway; and,
- Saturday peak hour of generator.

### 2.2.3 Horizon Years

The scope of the transportation assessment includes the following horizon years:

- 2018 existing conditions;
- 2020 future background conditions;
- 2020 total future conditions (site build-out); and
- 2025 total future conditions (5 years beyond build-out).

## 2.3 EXEMPTIONS REVIEW

**Table 4** summarizes the Exemptions Review table from the City of Ottawa's *2017 Transportation Impact Assessment Guidelines*.

**Table 4 - Exemptions Review**

Module	Element	Exemption Considerations	Exempted?
<b>Design Review Component</b>			
4.1 Development Design	4.1.2 Circulation and Access	Only required for site plans	No
	4.1.3 New Street Networks	Only required for plans of subdivision	Yes
4.2 Parking	4.2.1 Parking Supply	Only required for site plans	No
	4.2.2 Spillover Parking	Only required for site plans where parking supply is 15% below unconstrained demand	Yes
<b>Network Impact Component</b>			
4.5 Transportation Demand Management	All Elements	Not required for site plans expected to have fewer than 60 employees and/or students on location at any given time	No
4.6 Neighbourhood Traffic Management	4.6.1 Adjacent Neighbourhoods	Only required when the development relies on local or collector streets for access and total volumes exceed ATM capacity thresholds	Yes
4.8 Network Concept		Only required when proposed development generates more than 200 person-trips during the peak hour in excess of the equivalent volume permitted by established zoning	Yes





## 3.0 FORECASTING

### 3.1 DEVELOPMENT-GENERATED TRAVEL DEMAND

#### 3.1.1 Trip Generation and Mode Shares

**Table 5** outlines the assumed land uses and the vehicle trip generation rates for each land use.

The ITE *Trip Generation Manual*, 9<sup>th</sup> edition, were used to forecast auto trip generation for the proposed development. The average trip generation rate, where available, was adopted for each land use.

As the Specialty Retail land use (LUC 826) does not have an adequate Saturday Peak Hour trip generation rate due to a limited survey size, the adopted rate of 5.18 was derived by extrapolation using the Saturday Total Trip generation rate (42.04) in conjunction with the Weekday Total Trip generation rate (44.04) and the AM Peak Hour of Generator rate (5.43).

The Fitted Trip Generation equations were adopted for the following rates: the PM Peak Hour rate for Discount Supermarket (LUC 854), and the Saturday Peak Hour rate for Coffee/Donut Shop with Drive-Thru (LUC 937).

As per the City of Ottawa TIA Guidelines, the auto trip generation rates of the proposed development were converted to person trip generation rates using a factor of 1.28 representing auto occupancy and transit modal shares.

**Table 6** documents the anticipated development-generated person trips for each land use.

**Table 5 - Vehicle Trip Generation Rates**

LUC	Land Use	Size Independent Variable	Weekday AM Peak Hour			Weekday PM Peak Hour			Saturday Peak Hour		
			In	Out	Rate	In	Out	Rate	In	Out	Rate
826	Specialty retail	43.5 (1000 sq.ft. GFA)	49%	51%	3.37	44%	56%	2.89	50%	50%	5.18
854	Discount supermarket	35.0 (1000 sq.ft. GFA)	58%	42%	2.53	50%	50%	9.28	50%	50%	9.65
912	Drive-in bank	4.0 (1000 sq.ft. GFA)	57%	43%	12.08	50%	50%	24.30	51%	49%	26.31
932	High-Turnover Sit-down Restaurant	4.2 (1000 sq.ft. GFA)	55%	45%	10.81	60%	40%	9.85	53%	47%	14.07
937	Coffee / donut shop with drive-thru window	0.75 (1000 sq.ft. GFA)	51%	49%	100.58	50%	50%	42.8	50%	50%	107.77
946	Service Station with Convenience Market and Car Wash	8 Fueling Positions	51%	49%	11.84	51%	49%	13.86	50%	50%	19.46



# TERRY FOX DRIVE & COPE DRIVE COMMERCIAL SHOPPING DEVELOPMENT

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**Table 6 - Person Trips Generated by Land Use**

LUC	Land Use	Trip Conversion	Weekday AM Peak Hour			Weekday PM Peak Hour			Saturday Peak Hour		
			In	Out	Total	In	Out	Total	In	Out	Total
826	Specialty retail	Auto Trips	72	75	147	55	71	126	113	113	226
		Conversion Factor	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28
		Person Trips	92	96	188	70	91	161	145	145	290
854	Discount supermarket	Auto Trips	52	37	89	162	162	324	169	169	338
		Conversion Factor	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28
		Person Trips	66	48	114	207	207	414	216	216	432
912	Drive-in bank	Auto Trips	27	21	48	49	49	98	54	51	105
		Conversion Factor	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28
		Person Trips	35	26	61	63	63	126	69	66	135
932	High-Turnover (Sit-down) Restaurant	Auto Trips	25	20	45	25	16	41	31	28	59
		Conversion Factor	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28
		Person Trips	32	26	58	31	21	52	40	35	75
937	Coffee / donut shop with drive-thru window	Auto Trips	38	37	75	16	16	32	45	45	90
		Conversion Factor	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28
		Person Trips	49	47	96	20	20	40	58	58	116
946	Gasoline / Service Station with Convenience Market and Car Wash	Auto Trips	48	47	95	57	54	111	78	78	156
		Conversion Factor	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28
		Person Trips	62	60	122	72	70	142	100	100	200
Total		Auto Trips	262	237	499	363	369	732	490	484	974
		Person Trips	336	303	639	464	472	936	628	620	1248

The assumed travel mode shares of the proposed development are consistent with the modal share assumptions adopted in the *Van Gaal Lands Community Transportation Study* report (August 2015).

**Table 7** outlines the anticipated trip generation potential of the proposed development by travel mode based on assumed mode shares.



# TERRY FOX DRIVE & COPE DRIVE COMMERCIAL SHOPPING DEVELOPMENT

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**Table 7 - Trips Generated by Travel Mode**

LUC	Land Use	Trip Conversion		Weekday AM Peak Hour			Weekday PM Peak Hour			Saturday Peak Hour		
				In	Out	Total	In	Out	Total	In	Out	Total
826	Specialty Retail	Auto	55%	51	53	104	39	50	89	80	80	160
		Passenger	15%	14	14	28	11	14	25	22	22	44
		Walk / Bike	10%	9	10	19	7	9	16	15	15	30
		Transit	20%	18	19	37	14	18	32	29	29	58
854	Discount Supermarket	Auto	55%	36	26	62	114	114	228	119	119	238
		Passenger	15%	10	7	17	31	31	62	32	32	64
		Walk / Bike	10%	7	5	12	21	21	42	22	22	44
		Transit	20%	13	10	23	42	42	84	43	43	86
912	Drive-in Bank	Auto	55%	19	15	34	35	35	70	38	36	74
		Passenger	15%	5	4	9	9	9	18	10	10	20
		Walk / Bike	10%	4	3	7	6	6	12	7	7	14
		Transit	20%	7	5	12	13	13	26	14	13	27
932	High Turn-Over Restaurant	Auto	55%	17	14	31	17	12	29	22	19	41
		Passenger	15%	5	4	9	5	3	8	6	5	11
		Walk / Bike	10%	3	3	6	3	2	5	4	4	8
		Transit	20%	6	5	11	6	4	10	8	7	15
937	Coffee / Donut Shop with Drive-Thru Window	Auto	55%	27	26	53	11	11	22	32	32	64
		Passenger	15%	7	7	14	3	3	6	9	9	18
		Walk / Bike	10%	5	5	10	2	2	4	6	6	12
		Transit	20%	10	9	19	4	4	8	12	12	24
946	Gasoline / Service Station with Convenience Market and Car Wash	Auto	75%	47	45	92	54	52	106	75	75	150
		Passenger	15%	9	9	18	11	10	21	15	15	30
		Walk / Bike	5%	3	3	6	4	3	7	5	5	10
		Transit	5%	3	3	6	4	3	7	5	5	10
Total		Auto Trips		197	179	376	270	274	544	366	361	727
		Passenger Trips		50	45	95	70	70	140	94	93	187
		Walk / Bike Trips		34	32	66	46	47	93	64	64	128
		Transit Trips		66	60	126	92	94	186	126	124	250

A portion of the auto trips will be 'pass-by' in nature. Pass-by trips represent intermediate stops between trip origins and destinations that are drawn from existing traffic already on the roadway. While the total number of auto trips generated by a given development remains the same, the turning volumes at site accesses require adjustments to reflect the turning movements of pass-by traffic.

**Table 8** summarizes the adopted pass-by percentages that were obtained from the *ITE Trip Generation Manual*.

**Table 8 - Pass-By Percentages**

LUC	Pass-By %	Notes
826 - Specialty Retail	30%	Average of AM & PM Peaks
854 - Discount Supermarket	23%	PM Peak
912 - Drive-in Bank	47%	PM Peak
932 - High Turn-Over Restaurant	43%	PM Peak
937 - Coffee / Donut Shop with Drive-Thru Window	50%	LUC 934, Average of AM & PM Peaks
946 - Gasoline / Service Station with Convenience Market and Car Wash	59%	LUC 945, Average of AM & PM Peaks



## TERRY FOX DRIVE & COPE DRIVE COMMERCIAL SHOPPING DEVELOPMENT

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Due to the mixed commercial composition of the proposed development, a portion of the trips generated are also anticipated to be captured internally. Internal capture accounts for synergies developed within a mixed-use development, this is particularly prevalent in developments that consist of different commercial retail land uses. An internal capture rate of 15% was assumed for the Specialty Retail (LUC 826), Drive-in Bank (LUC 912), and the Gasoline station (LUC 946) to account for the anticipated synergy developed between these land uses and the assumed anchor, the Discount Supermarket (LUC 854) land use. An internal capture rate of 20% was assumed for the High Turn-Over Restaurant (LUC 932) and Coffee / Donut Shop with Drive-Thru Window (LUC 937) to account for the anticipated synergy developed between these land uses and the assumed anchor, the Discount Supermarket (LUC 854) land use.

**Table 9** outlines the pass-by, internal capture, and new auto trips anticipated for the proposed development.

**Figure 8** illustrates the pass-by trips the proposed development is anticipated to draw from passing traffic.

**Table 9 - Pass-By and Internal Capture Trips**

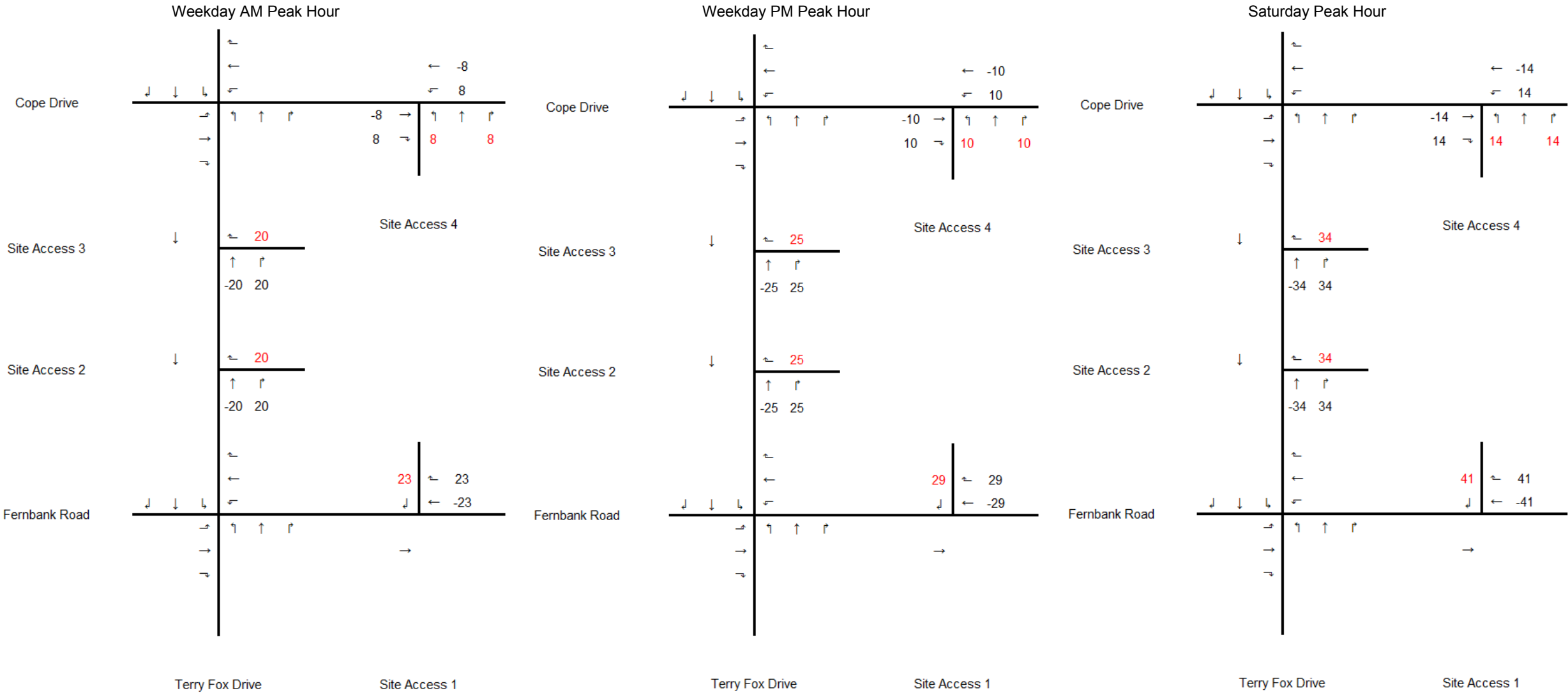
LUC	Land Use	Trip Conversion		Weekday AM Peak Hour			Weekday PM Peak Hour			Saturday Peak Hour		
				In	Out	Total	In	Out	Total	In	Out	Total
826	Specialty Retail	Auto Trips		51	53	104	39	50	89	80	80	160
		Pass-By	30%	16	16	32	13	13	26	24	24	48
		Internal Capture	15%	8	8	16	6	8	14	12	12	24
		New Auto Trips		27	29	56	20	29	49	44	44	88
854	Discount Supermarket	Auto Trips		36	26	62	114	114	228	119	119	238
		Pass-By	23%	7	7	14	26	26	52	27	27	54
		Internal Capture	0%	0	0	0	0	0	0	0	0	0
		New Auto Trips		29	19	48	88	88	176	92	92	184
912	Drive-in Bank	Auto Trips		19	15	34	35	35	70	38	36	74
		Pass-By	47%	8	8	16	16	16	32	17	17	34
		Internal Capture	15%	3	2	5	5	5	10	6	5	11
		New Auto Trips		8	5	13	14	14	28	15	14	29
932	High Turn-Over Restaurant	Auto Trips		17	14	31	17	12	29	22	19	41
		Pass-By	43%	7	7	14	6	6	12	9	9	18
		Internal Capture	20%	3	3	6	3	2	5	4	4	8
		New Auto Trips		7	4	11	8	4	12	9	6	15
937	Coffee / Donut Shop with Drive-Thru Window	Auto Trips		27	26	53	11	11	22	32	32	64
		Pass-By	50%	13	13	26	6	6	12	16	16	32
		Internal Capture	20%	5	5	10	2	2	4	6	6	12
		New Auto Trips		9	8	17	3	3	6	10	10	20
946	Gasoline / Service Station with Convenience Market and Car Wash	Auto Trips		47	45	92	54	52	106	75	75	150
		Pass-By	59%	27	27	54	31	31	62	44	44	88
		Internal Capture	15%	7	7	14	8	8	16	11	11	22
		New Auto Trips		13	11	24	15	13	28	20	20	40
Total		Auto Trips		197	179	376	270	274	544	366	361	727
		Pass-By		78	78	156	98	98	196	137	137	274
		Internal Capture		26	25	51	24	25	49	39	38	77
		New Auto Trips		93	76	169	148	151	299	190	186	376



TERRY FOX DRIVE & COPE DRIVE COMMERCIAL SHOPPING DEVELOPMENT

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Figure 8 - 2020 Pass-By Volumes



## TERRY FOX DRIVE & COPE DRIVE COMMERCIAL SHOPPING DEVELOPMENT

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### 3.1.2 Trip Distribution

Trip distribution assignments take into consideration the location and proximity of existing and planned residential developments in the area. It is assumed that the proposed commercial development will cater to existing nearby residential communities to the east (i.e. Bridelwood-Meadows) and north-east (i.e. Glen Cairn-Kanata South Business Park), as well as to growing communities to the west in Stittsville including the Blackstone residential development.

**Table 10** summarizes the assumed trip distribution for the proposed development. The distribution of traffic to / from the proposed is derived from the *TRANS Committee's 2011 Origin-Destination (O-D) Summary* for the Kanata-Stittsville District, in combination with other sources and engineering judgement.

**Table 10 - Trip Distribution**

Direction		Via (to/from)				
		Terry Fox Drive	Terry Fox Drive	Cope Drive	Fernbank Road	Fernbank Road
		(North)	(South)	(East)	(West)	(East)
North	35%	15%		20% <sup>1</sup>		
East	35%		15%	5%		15%
South	15%		10%			
West	15%				15%	
Total	100%	15%	30%	25%	15%	15%

1. Trips made via Eagleson Drive

### 3.1.3 Trip Assignment

Site generated trips were assigned to the study area road network based on the trip distribution assumptions outlined in **Table 10**. New site trips are assigned to the road network, pass-by trips (as outlined in **Figure 8**), were then added to develop the net site trips generated by the proposed development.

**Figure 9** outlines site assignment assumptions.

**Figure 10** illustrates new site generated trips, prior to accounting for pass-by, during the AM, PM and Saturday peak hours.

**Figure 11** illustrates the net site generated trips for the proposed development after accounting for pass-by trips, during the AM, PM and Saturday peak hours.



# TERRY FOX DRIVE & COPE DRIVE COMMERCIAL SHOPPING DEVELOPMENT

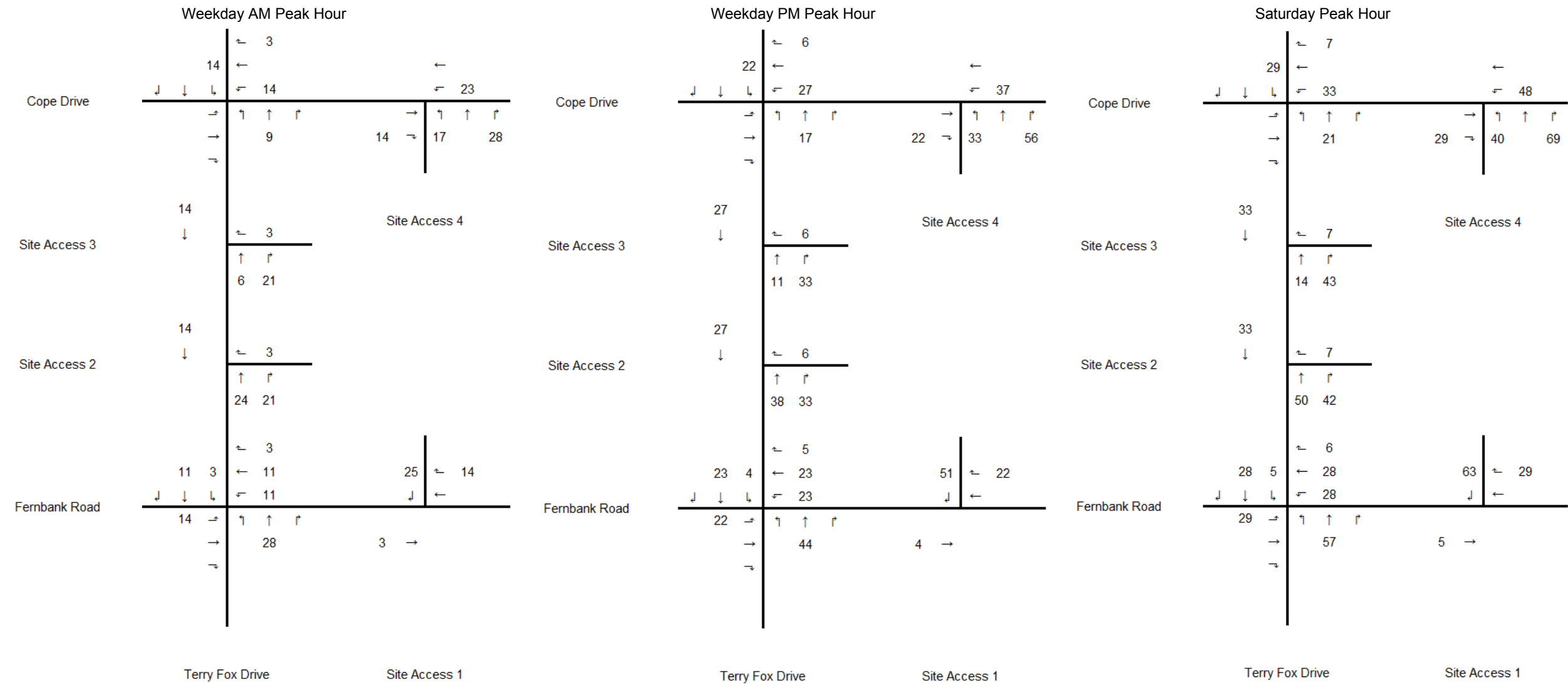
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**Figure 9 - Site Traffic Assignment Assumptions**



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Figure 10 - New Site Generated Volumes

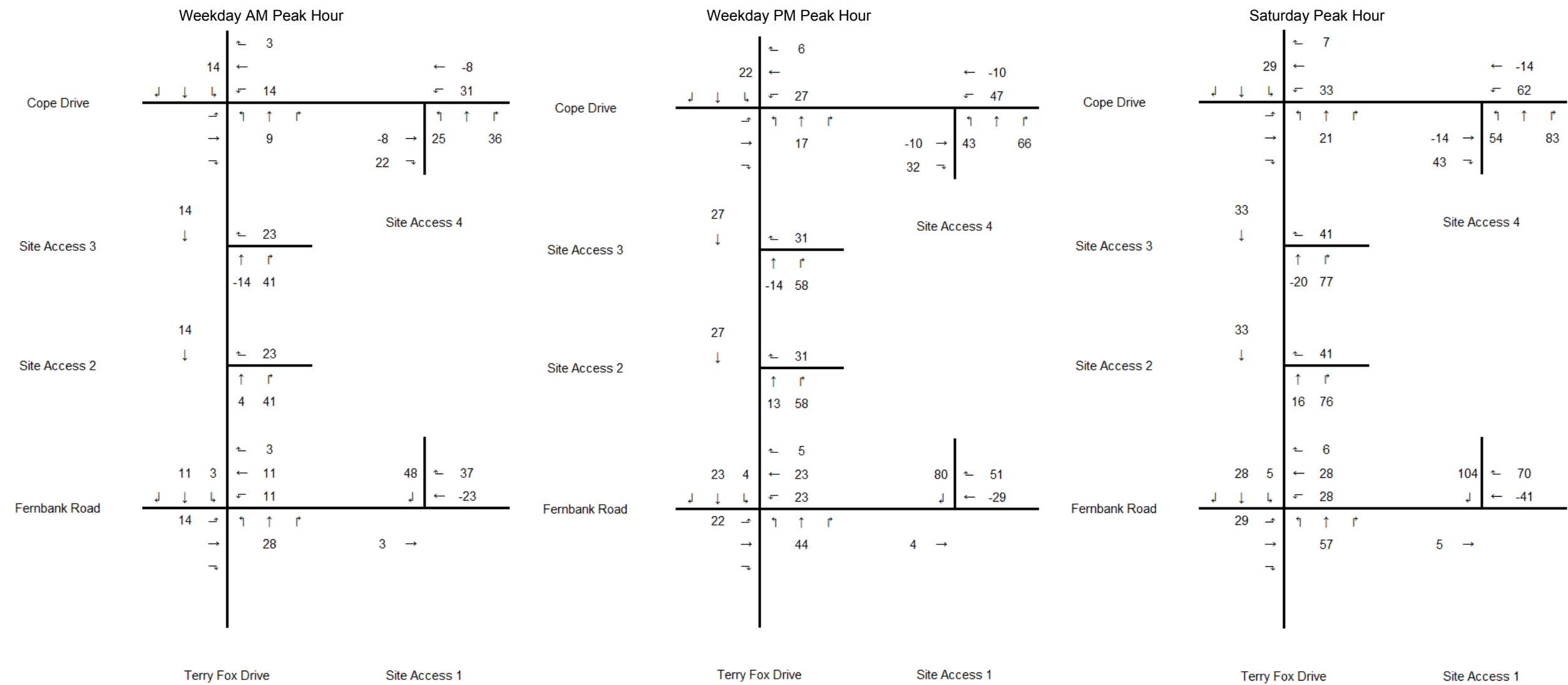




TERRY FOX DRIVE & COPE DRIVE COMMERCIAL SHOPPING DEVELOPMENT

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Figure 11 - Net Site Generated Volumes



## 3.2 BACKGROUND NETWORK TRAVEL DEMAND

### 3.2.1 Transportation Network Plans

As outlined in **Table 2** in **section 2.1.3.1**, a number of road network projects are expected to occur near the proposed development.

Under the TMP Network Concept, Terry Fox Drive is planned to be widened from 2 to 4 lanes between Eagleson Road and Winchester Drive. Under the same Network Concept, Fernbank Road is planned to be widened from 2 to 4 lanes between Stittsville Main Street and Terry Fox Drive. These improvements are currently proposed to be implemented beyond 2031 and were, therefore, not considered in this study.

### 3.2.2 Background Growth

The existing traffic counts were grown at a rate of 1% annually, non-compounding, to represent 2020 background traffic volumes. Through movements at

### 3.2.3 Other Developments

As outlined in **Table 3** in **section 2.1.3.2**, a number of background developments are assumed to occur between 2018 and 2025. The site trips of these background developments were explicitly accounted for in this study.

## 3.3 DEMAND RATIONALIZATION

### 3.3.1 2020 Future Background Traffic

**Figure 12** illustrates the 2020 future background weekday AM, weekday PM, and Saturday peak hour traffic volumes. The background traffic includes traffic from the developments listed in **Table 3**.

The 2020 future background traffic demands are not expected to exceed capacity and therefore demand rationalization was not required.

### 3.3.2 2020 Total Future Traffic

**Figure 13** illustrates the 2020 total future weekday AM, weekday PM, and Saturday peak hour traffic volumes.

The 2020 total future traffic demands are not expected to exceed capacity and therefore demand rationalization was not required.

### 3.3.3 2025 Ultimate Traffic

**Figure 14** illustrates the 2025 ultimate weekday AM, weekday PM, and Saturday peak hour traffic volumes.

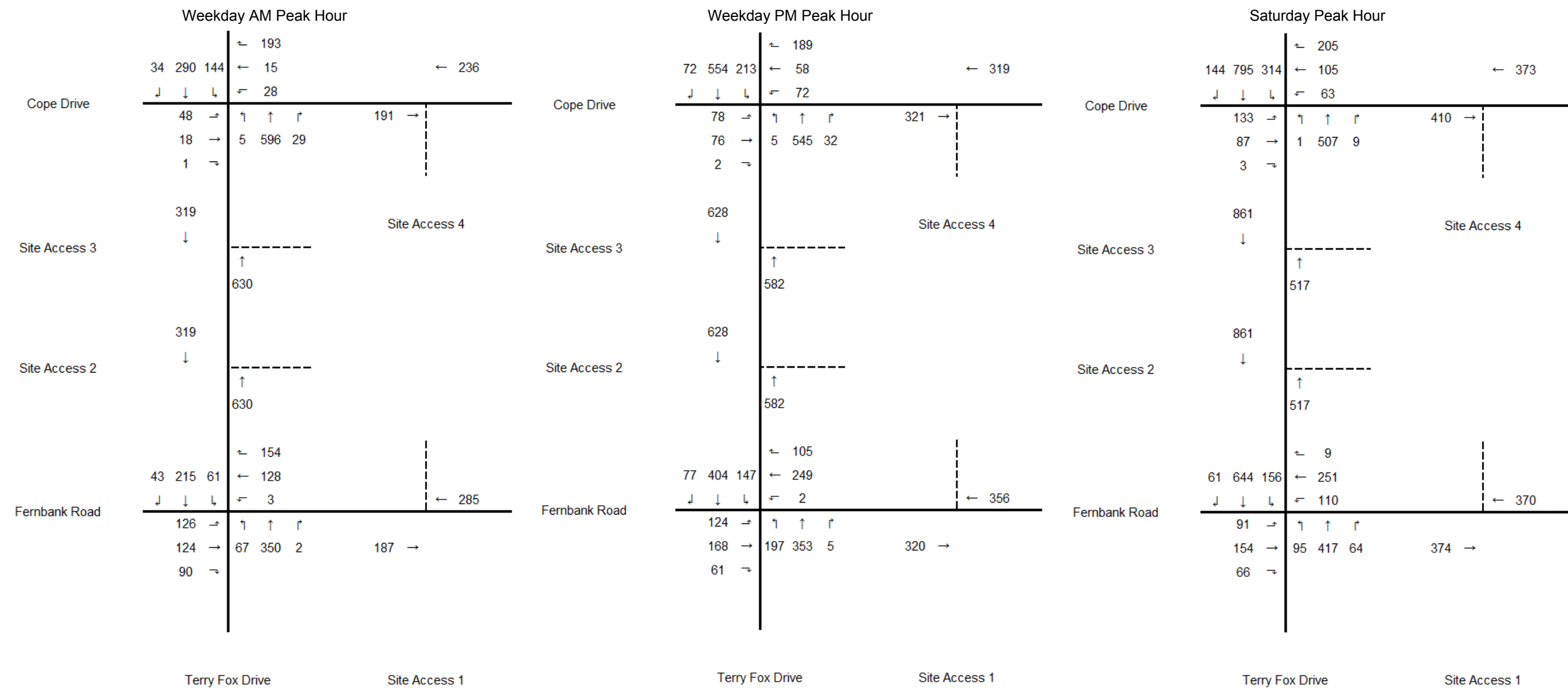
The 2025 ultimate traffic demands are not expected to exceed capacity and therefore demand rationalization was not required.



TERRY FOX DRIVE & COPE DRIVE COMMERCIAL SHOPPING DEVELOPMENT

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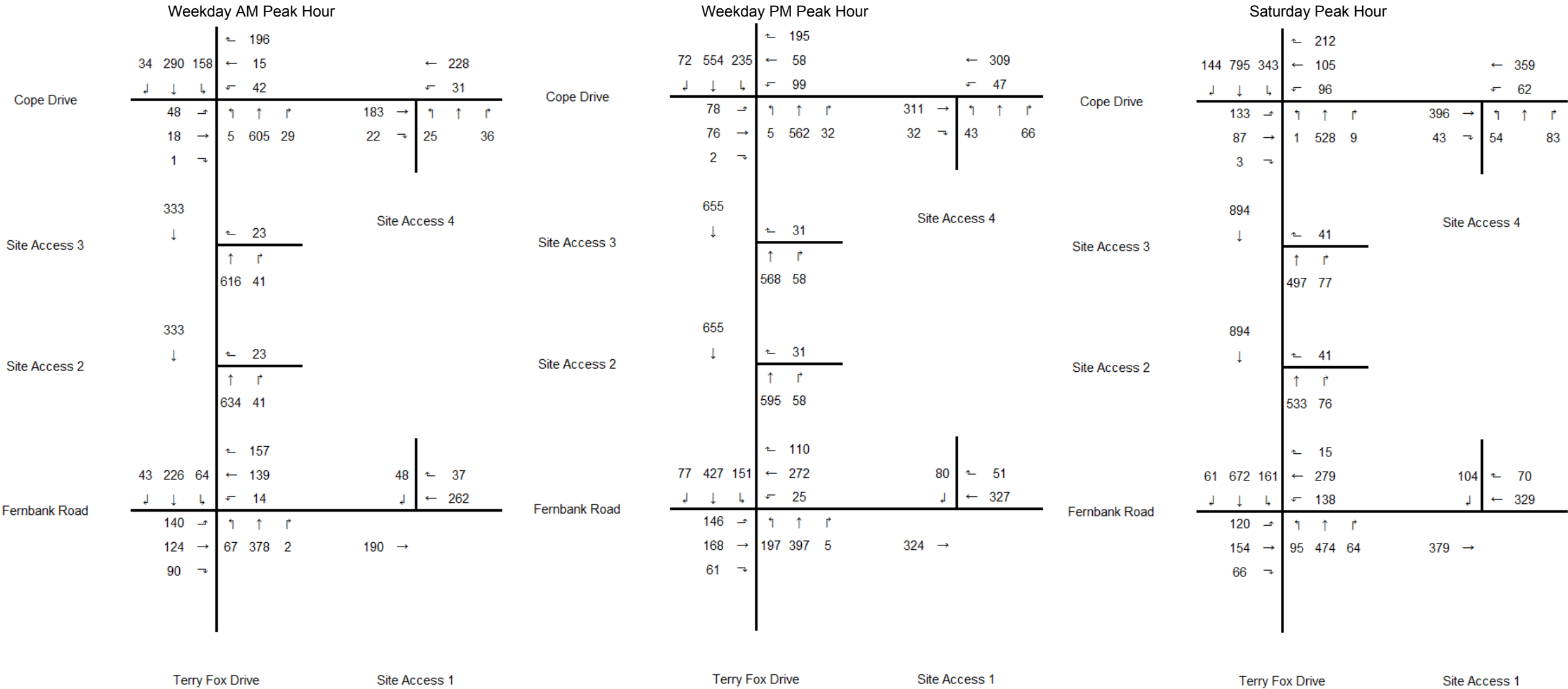
Figure 12 - 2020 Future Background Volumes



TERRY FOX DRIVE & COPE DRIVE COMMERCIAL SHOPPING DEVELOPMENT

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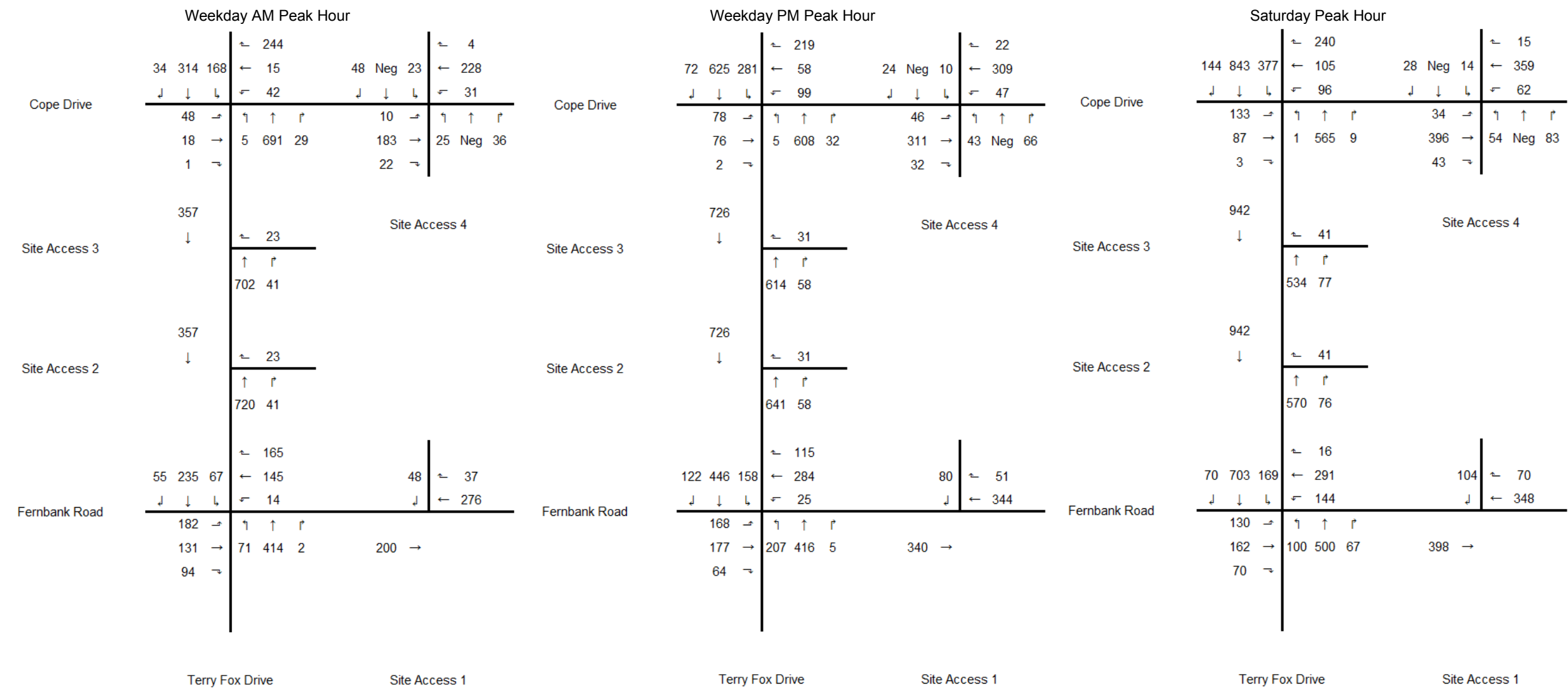
Figure 13 - 2020 Total Future Volumes



TERRY FOX DRIVE & COPE DRIVE COMMERCIAL SHOPPING DEVELOPMENT

Forecasting  
September 19, 2018

Figure 14 - 2025 Ultimate Volumes



## 4.0 STRATEGY

### 4.1 DEVELOPMENT DESIGN

#### 4.1.1 Design for Sustainable Modes

**Bicycle facilities:** The proposed plan is currently being submitted as part of a Zoning By-Law amendment and does identify the number and location of bicycle parking spaces provided on site. It is anticipated that bicycle parking information will be provided in sufficient detail as part of the Site Plan Control process.

The provision of bicycle facilities will need to conform to Section 111 of the City of Ottawa Parking By-Law.

**Parking areas:** A total of 371 parking spaces are provided. Accessible parking spaces are provided adjacent to each building entrance.

**Transit facilities:** Transit stops for OC Transpo Routes 161, 168, and 681 are currently provided at the intersection of Terry Fox Drive and Fernbank Road, and a transit stop for OC Transpo Routes 161, 252, and 681 is provided along Cope Drive north of the proposed development. Pedestrian sidewalks and intersection crossings in the direct vicinity of the proposed development provide convenient access to transit stops.

#### 4.1.2 Circulation and Access

A full movement access is proposed at the Cope Drive access to the site. The other two accesses on Terry Fox Drive, and access on Fernbank Road are proposed as right-in/right-out only intersections.

Pedestrian access to the proposed development is facilitated through the existing sidewalks north and south of the proposed development. It is anticipated that the requirements for a new sidewalk facility along the east side of Terry Fox Drive will be determined as part of the Site Plan Control process.

#### 4.1.3 New Street Networks

Not applicable; exempted during screening and scoping.

### 4.2 PARKING

#### 4.2.1 Parking Supply

**Auto Parking** - As per City of Ottawa Zoning By-law 2016-249 (Sections 101 and 102), the minimum parking space rate requirements is 3.4 spaces per 100 m<sup>2</sup> of gross floor area for general retail and 10 spaces per 100 m<sup>2</sup> of gross floor applies for restaurants. Based on the proposed land uses, a minimum of 305 parking spaces are required. The proposed plan, which is submitted as part of Zoning By-Law Amendment, identifies a total of 371 parking spaces.

**Bicycle Parking** – As per City of Ottawa Zoning By-law 2016-249 (Section 111), the minimum bicycle parking rate of 1 bicycle parking spaces per 250 m<sup>2</sup> of gross floor area applies. A total of 36 bicycle parking spaces are required.

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### 4.2.2 Spillover Parking

Not applicable; exempted during screening and scoping.

## 4.3 BOUNDARY STREET DESIGN

### 4.3.1 Design Concept

The roadway segment multi-modal level of service (MMLOS) was evaluated for Terry Fox Drive, Fernbank Road, and Cope Drive to assist with developing a design concept that maximizes the achievement of the MMLOS objectives. The MMLOS targets for the “General Urban Area” policy area was adopted for the study area roadways.

Terry Fox Drive, Fernbank Road, and Cope Drive are subject to a Pedestrian LOS (PLOS) target of C.

The Ultimate Cycling Network from the City of Ottawa *Transportation Master Plan* (2013) designates Terry Fox Drive and Fernbank Road as Spine Cycling Routes and Cope Drive as a Local Cycling Route. These roads are therefore subject to Bicycle Level of Service (BLOS) targets of C and B, respectively.

Within the study area limits, Terry Fox Drive, Fernbank Road, and Cope Drive do not currently feature any rapid transit or continuous transit priority measures and are therefore subject to a Transit LOS (TLOS) target of D.

Terry Fox Drive is designated as a truck route and is therefore subject to Truck LOS (TrLOS) target of D. None of the other boundary roads are truck routes and are therefore not subject to TrLOS targets.

**Table 10** presents the MMLOS conditions for roadway segments.

Terry Fox Drive and Fernbank road currently exhibit pedestrian levels of service (PLOS) below the PLOS target of C identified for developments in a General Urban Area. Based on the MMLOS guidelines, roadway segment PLOS is largely influenced by motor vehicle traffic volumes (AADT) and operating speeds. Terry Fox Drive and Fernbank Road currently operate with traffic volumes above 3,000 AADT and operating speeds above 30 km/hr, which results in a poor PLOS. Reducing the speeds on Terry Fox Drive and Fernbank Road to 60 km/hr and 50 km/hr, respectively, is expected to result a PLOS that meets the target. Cope Drive currently operates with a PLOS that satisfies the PLOS target.

Terry Fox Drive currently operates with a Bicycle LOS (BLOS) below its respective target. Based on the MMLOS guidelines, road segment BLOS is influenced by the number of travel lanes, operating speeds, the availability and width of dedicated cycling facilities, and roadway operating speeds. Reducing the speed on Terry Fox Drive to 60 km/hr would yield a BLOS that meets the target. Fernbank Road and Cope Drive currently operate with a BLOS that satisfies their respective BLOS targets.

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**Table 11 - MMLOS Conditions (Segments)**

Segment		Terry Fox Drive (arterial, spine cycling route)		Fernbank Road (arterial, spine cycling route)		Cope Drive (Collector, Local cycling route)		Target
		Existing	Build-out	Existing	Build-out	Existing	Build-out	
Pedestrian	Sidewalk width (m)	2	**	2	**	2	**	<b>C</b>
	Boulevard width (m)	~ 6.5	**	None	**	2	**	
	AADT > 3000?	Yes	**	Yes	**	Yes	**	
	On-Street parking	No	**	No	**	No	**	
	Operating speed (kph)	80	**	60	**	50	**	
	<b>Level of Service</b>	<b>D</b>	**	<b>E</b>	**	<b>C</b>	**	
Bicycle	Type of facility	Bike Lane	**	Bike Lane	**	Mixed	**	<b>C/C/B</b>
	Number of travel lanes	2	**	2	**	2	**	
	Bike lane width (m)	2	**	2	**	N/A	**	
	Operating speed (kph)	80	**	60	**	50	**	
	Centreline (yes/no)	Yes	**	Yes	**	No	**	
	Bike lane blockage freq.	Rare	**	Rare	**	N/A	**	
	<b>Level of Service</b>	<b>E</b>	**	<b>C</b>	**	<b>B</b>	**	
Transit	Type of facility	Mixed	**	Mixed	**	Mixed	**	<b>D/D/D</b>
	Parking/driveway friction	Low	**	Low	**	Low	**	
	<b>Level of Service</b>	<b>D</b>	**	<b>D</b>	**	<b>D</b>	**	
Truck	Curb lane width (m)	3.5m	**	Not applicable		Not applicable		<b>D</b>
	Number of travel lanes	2	**					
	<b>Level of Service</b>	<b>C</b>	**					



## 4.4 ACCESS INTERSECTIONS DESIGN

### 4.4.1 Location and Design of Access

A full movement site access is proposed on Cope Drive approximately 125 m east of the intersection of Terry Fox Drive at Cope Drive. This exceeds the City's minimum separation distance requirement of 18 m between the private approach and the nearest intersecting street line, as outlined in the Private Approach By-law (No. 2003-447, S.25, L.) It is anticipated that the location of the Cope Drive site access will be aligned with the site access of the proposed development on the north side.

The two site accesses on Terry Fox Drive are proposed to feature right-in right-out channels similar to those currently provided at the nearby commercial site on the west side of Terry Fox Drive.

The proposed access on Fernbank Road is also proposed to feature a right-in right-out channel. It is recommended that the restricted right-in/right-out operation at this site access location be enforced through the extension of the existing median treatment on the east leg of the Terry Fox Drive and Fernbank Road intersection as opposed to channelization at the site access. The extension of the existing intersection median at the east leg of the intersection is expected to better reinforce the intended right-in/right-out operation at Fernbank Road site access, it is also expected to better accommodate pedestrian crossing at this location.

The location and design treatments of proposed site accesses will be confirmed through the Site Plan Control process.

### 4.4.2 Intersection Control

The site access is a low-volume driveway located on a collector roadway and therefore a stop control on the minor site access approach is appropriate.

### 4.4.3 Intersection Design

**Table 12** summarizes the Synchro intersection analysis results for the site access intersection under 2025 Ultimate Traffic conditions. The analysis indicates that the intersections will operate acceptably with a stop-control on the minor approach.

**Appendix B** contains the intersection performance worksheets.

**Table 12 - 2025 Ultimate Access Intersection Operations (Synchro)**

Intersection	Intersection Control	Approach / Movement		LOS	V/C	Delay (s)	Queue 95 <sup>th</sup> (veh)
Cope Drive at Site Access 4	Minor Approach Stop-Control	EB	Left / Through / Right	A (A) [A]	0.01 (0.04) [0.03]	0.4 (1.0) [0.6]	0 (0.1) [0.1]
		WB	Left / Through / Right	A (A) [A]	0.02 (0.04) [0.06]	0.9 (1.0) [1.2]	0.1 (0.1) [0.2]
		NB	Left / Through / Right	B (B) [C]	0.11 (0.28) [0.43]	12.0 (14.8) [24.0]	0.4 (1.2) [2.1]
		SB	Left / Through / Right	B (C) [C]	0.12 (0.10) [0.15]	11.7 (17.5) [18.2]	0.4 (0.3) [0.5]
		Overall Intersection		A (A) [A]	-	3.2 (3.6) [4.6]	-

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## **4.5 TRANSPORTATION DEMAND MANAGEMENT**

### **4.5.1 Context for TDM**

The proposed development is owned by 98365 Ontario Limited c/o Street Properties. Property management arrangements and tenants are not known at this time. Tenants will comprise of different retailers and restaurant chains and it is anticipated that trips destined to the proposed development will be primarily made by the auto mode, particularly during the AM peak, PM peak, and Saturday peak periods.

### **4.5.2 Need and Opportunity**

In order to support the transit and active modal share targets outline in **Table 7**, cycling and transit modes will need to be supported. This includes the provision of bicycle parking, transit service coverage as well as ensuring convenient pedestrian connections are provided to sidewalk facilities leading to bus stop locations.

### **4.5.3 TDM Program**

The City of Ottawa TDM Checklists were used to determine what TDM measures could be implemented based on the available information. TDM measures and requirements will be verified as part of the Site Plan Control process.

The TDM checklists are contained in **Appendix C**.

## **4.6 NEIGHBOURHOOD TRAFFIC MANAGEMENT**

Not applicable; exempted during screening and scoping.

## **4.7 TRANSIT**

### **4.7.1 Route Capacity**

Assumed transit modal shares of 20% and 5% were adopted for the retail/restaurant and gas station land use components of the development, respectively. The forecasted transit trips generation for the proposed development are 108 trips (AM Peak), 165 trips (PM Peak), and 220 trips (Saturday Peak).

In the short term, transit service headways for OC Transpo Local Routes 161, 167, and 168 are anticipated to remain at 30-minutes during the weekday morning and afternoon peak periods. Standard and Articulated buses have seated capacities of 40 and 60 people; respectively, and therefore the combined hourly transit capacity is estimated at 240 - 360 people per hour during the weekday AM and PM peak periods. Transit service headways for OC Transpo Express Route 252 are anticipated to remain at 15-minutes during the weekday morning and afternoon peak periods. Articulated and Double-Decker buses have seated capacities of 60 and 80 people; respectively, and therefore the combined hourly transit capacity will be 240 - 360 people per hour. OC Transpo Route 252 does not currently provided service on Saturdays. During the Saturday peak period, only OC Transpo Route 168 provides service with a headway of 30-minutes and an hourly transit capacity of 80-120 people per hour. In order to meet anticipated transit demands for the subject site and other background developments, additional transit service coverage may be required for the Saturday peak period.

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### 4.7.2 Transit Priority

The proposed development will be utilizing existing transit stops abutting the subject site and is therefore not expected to impact the transit travel times or trigger the need for transit priority measures.

## 4.8 REVIEW OF NETWORK CONCEPT

Not applicable; exempted during screening and scoping.

## 4.9 INTERSECTION DESIGN

### 4.9.1 Intersection Control

The existing intersection control will be maintained as the default control for the Terry Fox at the Fernbank Road and Terry Fox Drive at Cope Drive. Any intersection improvements triggered through the intersection level of service analysis will be highlighted and adopted accordingly.

### 4.9.2 Intersection Design

An assessment of the study area intersections was undertaken to determine the operational characteristics of the study area intersections under the different horizons identified in the Screening and Scoping report. Intersection operational analysis was facilitated by Synchro 9.0™ software package and the MMLOS analysis was completed for all modes and compared against the City of Ottawa's MMLOS targets.

#### 4.9.2.1 2018 Existing Conditions

**Figure 6** illustrates 2018 Existing AM peak, PM peak, and Saturday peak hour traffic volumes at the study area intersections.

**Table 13** summarizes the results of the Synchro analysis under 2018 existing conditions.

The southbound through movement at the Terry Fox Drive at Fernbank Road is currently operating at or above theoretical capacity during the Saturday peak hour (i.e.  $V/C = 0.99$ ). The eastbound left-turning movement at the Terry Fox Drive at Cope Drive intersection is currently operating at or above theoretical capacity during the PM peak and Saturday peak hours (i.e.  $V/C = 1.05$  &  $1.03$ , respectively). The PM peak and Saturday peak signal timing plans at both intersections were optimized using the Synchro software package to improve operations during these two peak hours. Additionally, a protected/permissive phase was introduced for the eastbound left-turning movement during the PM peak and Saturday peak hours. Protected/permissive phasing was also adopted for the eastbound left-turning movement at the Terry Fox Drive at Cope Drive intersection under the Saturday peak hour scenario.

Both signalized intersections are expected to operate acceptably under these proposed improvements.

**Table 14** summarizes the results of the Synchro analysis under 2018 conditions with improvements.

**Appendix B** contains detailed intersection performance worksheets.

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**Table 13 - 2018 Existing Intersection Operations (Synchro)**

Scenario	Intersection Control	Approach / Movement		LOS	V/C	Delay (s)	Queue 95 <sup>th</sup> (m)
Terry Fox Drive at Fernbank Road	Traffic Signals	EB	Left	A (A) [A]	0.38 (0.54) [0.34]	24.8 (32.7) [26.3]	27.9 (28.2) [25.5]
			Through	A (A) [A]	0.24 (0.31) [0.28]	22.6 (26.0) [25.5]	27.6 (38.2) [40.2]
			Right	A (A) [A]	0.18 (0.12) [0.13]	5.1 (1.6) [3.6]	9.2 (2.9) [6.3]
		WB	Left	A (A) [A]	0.02 (0.01) [0.51]	31.3 (28.0) [46.8]	2.7 (2.0) [41.6]
			Through	A (C) [C]	0.56 (0.74) [0.76]	44.8 (49.2) [54.4]	37.5 (68.5) [84.9]
			Right	A (A) [A]	0.47 (0.24) [0.02]	10.3 (2.0) [0.1]	15.7 (2.3) [0]
		NB	Left	A (A) [A]	0.12 (0.51) [0.44]	12.1 (17.7) [22.0]	14.1 (38.2) [24.7]
			Through / Right	A (A) [A]	0.38 (0.37) [0.53]	14.1 (14.9) [19.7]	61.1 (66.7) [117.2]
		SB	Left	A (A) [A]	0.13 (0.41) [0.51]	12.6 (28.9) [35.4]	13.0 (43.1) [57.7]
			Through	A (A) [E]	0.21 (0.61) [0.99]	12.2 (31.0) [67.5]	33.2 (104.9) [#265.4]
			Right	A (A) [A]	0.05 (0.12) [0.10]	0.1 (0.3) [0.3]	0 (0) [0]
Overall Intersection			A (C) [E]	0.56 (0.74) [0.99]	17.0 (24.8) [40.6]	-	
Terry Fox Drive at Cope Drive	Traffic Signals	SB	Left	A (A) [D]	0.30 (0.44) [0.82]	6.2 (8.5) [35.2]	18.2 (25.7) [#105.7]
			Through	A (A) [C]	0.22 (0.45) [0.78]	4.3 (8.2) [21.5]	24.9 (80.5) [#199.7]
			Right	A (A) [A]	0.03 (0.07) [0.16]	1.4 (1.7) [2.3]	2.4 (4.8) [8.4]
		NB	Left	A (A) [A]	0.01 (0.01) [0]	3.8 (12.8) [10.0]	1.2 (2.4) [0.9]
			Through / Right	A (A) [A]	0.49 (0.58) [0.51]	6.5 (18.7) [13.1]	70.5 (122.1) [90.5]
		EB	Left	B (F) [F]	0.67 (1.05) [1.03]	74.3 (155.8) [114.6]	19.8 (#38.7) [#50.8]
			Through / Right	A (A) [A]	0.11 (0.31) 0.23]	33.9 (37.6) [24.0]	9.2 (25.5) [21.5]
		WB	Left	A (A) [A]	0.12 (0.38) [0.23]	35.8 (41.1) [24.7]	8.6 (23.5) [16.7]
			Through / Right	A (B) [B]	0.60 (0.69) [0.69]	15.1 (25.5) [24.7]	20.8 (40.8) [51.6]
		Overall Intersection			B (F) [F]	0.67 (1.05) [1.03]	10.3 (22.3) [26.2]
Notes: 1. Table format: AM (PM) 2. v/c – represents the anticipated volume divided by the predicted capacity 3. # - 95 <sup>th</sup> percentile volume exceeds capacity, queue may be longer 4. * - Queue lengths for these movements are in vehicles 5. m – Volume for 95 <sup>th</sup> percentile queue is metered by upstream signal							

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**Table 14 - 2018 Existing Intersection Operations with Improvements (Synchro)**

Scenario	Intersection Control	Approach / Movement		LOS	V/C	Delay (s)	Queue 95 <sup>th</sup> (m)
Terry Fox Drive at Fernbank Road	Traffic Signals	EB	Left	A (A) [A]	0.38 (0.58) [0.44]	24.8 (35.9) [28.3]	27.9 (28.8) [23.0]
			Through	A (A) [A]	0.24 (0.32) [0.31]	22.6 (26.8) [24.5]	27.6 (39.2) [36.1]
			Right	A (A) [A]	0.18 (0.12) [0.13]	5.1 (1.7) [2.2]	9.2 (3.0) [4.0]
		WB	Left	A (A) [A]	0.02 (0.01) [0.49]	31.3 (28.5) [38.9]	2.7 (2.0) [34.6]
			Through	A (C) [C]	0.56 (0.74) [0.73]	44.8 (49.7) [45.3]	37.5 (69.0) [69.5]
			Right	A (A) [A]	0.47 (0.24) [0.02]	10.3 (2.1) [0.1]	15.7 (2.3) [0]
		NB	Left	A (A) [A]	0.12 (0.49) [0.47]	12.1 (16.6) [19.4]	14.1 (37.2) [19.1]
			Through / Right	A (A) [A]	0.38 (0.36) [0.52]	14.1 (14.3) [16.4]	61.1 (64.8) [98.6]
		SB	Left	A (A) [A]	0.13 (0.40) [0.43]	12.6 (28.1) [25.1]	13.0 (42.6) [45.4]
			Through	A (A) [D]	0.21 (0.60) [0.84]	12.2 (30.1) [36.4]	33.2 (104.0) [#207.7]
			Right	A (A) [A]	0.05 (0.11) [0.08]	0.1 (0.3) [0.2]	0 (0) [0]
		Overall Intersection			A (C) [C]	0.56 (0.74) [0.84]	17.0 (24.6) [28.0]
Terry Fox Drive at Cope Drive	Traffic Signals	SB	Left	A (A) [D]	0.30 (0.50) [0.82]	6.2 (12.4) [37.6]	18.2 (32.1) [#96.8]
			Through	A (A) [D]	0.22 (0.49) [0.83]	4.3 (11.9) [27.6]	24.9 (101.0) [#226.3]
			Right	A (A) [A]	0.03 (0.08) [0.17]	1.4 (2.2) [2.5]	2.4 (5.5) [9.1]
		NB	Left	A (A) [A]	0.01 (0.01) [0.01]	3.8 (20.0) [24.0]	1.2 (3.1) [1.4]
			Through / Right	A (B) [D]	0.49 (0.70) [0.90]	6.5 (29.5) [52.2]	70.5 (#175.0) [#174.3]
		EB	Left	B (A) [D]	0.67 (0.54) [0.83]	74.3 (41.4) [63.5]	19.8 (22.3) [#43.2]
			Through / Right	A (A) [A]	0.11 (0.23) 0.18]	33.9 (30.5) [24.6]	9.2 (22.7) [23.8]
		WB	Left	A (A) [A]	0.12 (0.44) [0.27]	35.8 (45.9) [34.2]	8.6 (24.1) [21.6]
			Through / Right	A (C) [D]	0.60 (0.75) [0.84]	15.1 (30.9) [44.7]	20.8 (42.1) [73.4]
		Overall Intersection			B (C) [D]	0.67 (0.75) [0.90]	10.3 (22.7) [37.1]
Notes: 1. Table format: AM (PM) 2. v/c – represents the anticipated volume divided by the predicted capacity 3. # - 95 <sup>th</sup> percentile volume exceeds capacity, queue may be longer 4. * - Queue lengths for these movements are in vehicles 5. m – Volume for 95 <sup>th</sup> percentile queue is metered by upstream signal							

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The signalized intersection MMLOS assessment was undertaken for the intersections of Terry Fox Drive at Fernbank Road, and the Terry Fox Drive at Cope Drive. Intersection operations under the AM peak, PM peak, and Saturday peak hours were considered in the assessment. MMLOS targets for areas “General Urban Area” were applied.

### **MMLOS - Terry Fox Drive at Fernbank Road Intersection (2018 Existing):**

Under the current intersection configuration, pedestrian crossings are provided on each leg of the intersection. A PLOS target of C was selected for the intersection.

The Ultimate Cycling Network from the City of Ottawa *Transportation Master Plan* (2013) designates Terry Fox Drive and Fernbank Road as Spine Cycling Routes. These roads are therefore subject to Bicycle Level of Service (BLOS) targets of C.

Transit service travelling on Terry Fox Drive and Fernbank Road currently operate within mixed traffic. Based on the MMLOS targets, a TLOS target of D was selected for the intersection.

Terry Fox Drive is designated as a truck route, therefore the intersection is subject to TrLOS target of D.

**Table 14** presents the MMLOS conditions for the signalized intersection of Terry Fox Drive at Fernbank Road.

As outlined in the summary analysis, the pedestrian level of service at the intersection of Terry Fox Drive at Fernbank Road is currently operating with a PLOS of E. Based on the MMLOS guidelines, intersection PLOS is largely influenced by the number of lanes pedestrians cross, the intersection cycle length and subsequent delay to pedestrians, pedestrian crossing time, and the treatment of right-turn movements at intersections.

The cycling level of service at the intersection is currently operating with a BLOS of F. Based on the MMLOS guidelines, intersection BLOS is influenced by the availability of dedicated cycling amenities, number of lanes cyclists must cross to negotiate a turn at intersections, and roadway operating speeds.

As the intersection of Terry Fox Drive at Fernbank Road is an arterial-arterial intersection, significant capacity is allocated to vehicular demands. Based on a review of the signal timing plans, vehicular demands, and intersection geometry, no short-term improvements were identified to improve the pedestrian LOS at this intersection to meet the PLOS target. The cycling LOS could be improved to meet the BLOS target by reducing the operating speeds along Terry Fox Drive and Fernbank Road.

### **MMLOS – Terry Fox Drive at Cope Drive intersection (2018 Existing):**

Under the current intersection configuration, pedestrian crossings are provided on each leg of the intersection. A PLOS target of C was selected for the intersection.

The Ultimate Cycling Network from the City of Ottawa *Cycling Plan* (2013) designates Terry Fox Drive as a spine cycling route and Cope Drive as a local cycling route. These roads are therefore subject to a BLOS target of C and B, respectively. A BLOS target of B was selected for the intersection.

Transit service at the intersection of Terry Fox Drive at Cope Drive currently operates within mixed traffic. Based on the MMLOS targets, a TLOS target of D was selected for the intersection.

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Terry Fox Drive is designated as a truck route, therefore the intersection is subject to TrLOS target of D.

**Table 15** presents the MMLOS conditions for the signalized intersection of Terry Fox Drive at Cope Drive .

As outlined in the summary analysis, the pedestrian level of service at the intersection of Terry Fox Drive at Cope Drive is currently operating with a PLOS of D. Based on the MMLOS guidelines, intersection PLOS is largely influenced by the number of lanes pedestrians cross, the intersection cycle length and subsequent delay to pedestrians, pedestrian crossing time, and the treatment of right-turn movements at intersections.

The cycling level of service at the intersection is currently operating with a BLOS of F. Based on the MMLOS guidelines, intersection BLOS is influenced by the availability of dedicated cycling amenities, number of lanes cyclists must cross to negotiate a turn at intersections, and roadway operating speeds.

The transit level of service at the intersection is currently operating with a TLOS of E. Based on the MMLOS guidelines, intersection TLOS is influenced by the average intersection delay.

As the intersection of Terry Fox Drive at Cope Drive is an arterial-collector intersection, significant capacity is allocated to vehicular demands. Based on a review of the signal timing plans, vehicular demands, and intersection geometry, no short-term improvements were identified to improve the pedestrian and transit LOS at this intersection to meet the PLOS and TLOS targets. The cycling LOS could be improved to meet the BLOS target by reducing the operating speeds along Terry Fox Drive.

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**Table 15 - 2018 Existing MMLOS (Terry Fox Drive / Fernbank Road)**

Segment		2018 Existing Traffic				Target
		EB	WB	NB	SB	
PLOS	Lanes crossed	3	5	4	4	C
	Median >=2.4m (yes/no)	No	No	No	No	
	Island refuge (yes/no)	No	No	No	No	
	Left turn phasing	Protected / Permissive	Permissive	Protected / Permissive	Permissive	
	Right turn conflict	Yield Control	Yield Control	Yield Control	Yield Control	
	RTOR (yes/no)	Yes	Yes	Yes	NA	
	Leading ped interval (yes/no)	No	No	No	No	
	Right turn corner radius (m)	>15m to 25m	Right-turn Channel	>15m to 25m	>15m to 25m	
	Crosswalk treatment	Standard	Standard	Standard	Standard	
	Cycle length (s)	100	100	100	100	
	Effective walk time (s)	38	27	50	38	
	PETSI Points	68	44	51	51	
	PETSI Points LOS	C	E	D	D	
	Average Pedestrian Delay (s)	19.2	26.6	12.5	19.2	
	Ped Delay LOS	B	C	B	B	
	Level of Service	C	E	D	D	
	Level of Service	E				
BLOS	Type of bike lane	Pocket Bike Lane	Pocket Bike Lane	Mixed	Pocket Bike Lane	C
	Left-turn - lanes crossed	1	1	1	1	
	Left-turn - vehicle operating speed (km/hr)	60	60	80	80	
	Right-turn - number of turn lanes	1	1	0	1	
	Right-turn - turn lane length (m)	100	125	NA (Shared)	150	
	Right-turn - turning speed (km/hr)	15	15	15	15	
	Right-turn - location of bike lane	Left of Right-turn Lane	Left of Right-turn Lane	NA	Left of Right-turn Lane	
	Level of Service	E	E	F	E	
	Level of Service	F				
TLOS	Intersection Average Delay (s)	28.0				D
	Level of Service	D				
TKLOS	Effective corner radius (m)	NA	NA	> 15m	> 15m	D
	Number of receiving lanes	NA	NA	1	1	
	Level of Service	NA	NA	D	D	
	Level of Service	D				
VLOS	Maximum Volume-to-capacity (v/c)	0.58	0.74	0.52	0.84	D
	Level of Service	A	C	A	D	
	Level of Service	C				



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**Table 16 - 2018 Existing MMLOS (Terry Fox Drive / Cope Drive)**

Segment		2018 Existing Traffic				Target
		SB	NB	EB	WB	
PLOS	Lanes crossed	3	3	3	4	C
	Median >=2.4m (yes/no)	No	No	No	No	
	Island refuge (yes/no)	No	No	No	No	
	Left turn phasing	Protected / Permissive	Permissive	Protected / Permissive	Permissive	
	Right turn conflict	Yield Control	Yield Control	Yield Control	Yield Control	
	RTOR (yes/no)	Yes	Yes	Yes	NA	
	Leading ped interval (yes/no)	No	No	No	No	
	Right turn corner radius (m)	>15m to 25m	>15m to 25m	>15m to 25m	>15m to 25m	
	Crosswalk treatment	Standard	Standard	Standard	Standard	
	Cycle length (s)	100	100	100	100	
	Effective walk time (s)	52	31	36	26	
	PETSI Points	68	68	68	51	
	PETSI Points LOS	C	C	C	D	
	Average Pedestrian Delay (s)	11.5	23.8	20.5	27.4	
	Ped Delay LOS	B	C	C	C	
	Level of Service	C	C	C	D	
	Level of Service	D				
BLOS	Type of bike lane	Pocket Bike Lane	Mixed	Mixed	Mixed	B
	Left-turn - lanes crossed	1	1	1	1	
	Left-turn - vehicle operating speed (km/hr)	80	80	50	50	
	Right-turn - number of turn lanes	1	0	0	0	
	Right-turn - turn lane length (m)	125	NA (Shared)	NA (Shared)	NA (Shared)	
	Right-turn - turning speed (km/hr)	15	15	15	15	
	Right-turn - location of bike lane	Left of Right-turn Lane	NA	NA	NA	
	Level of Service	D	F	D	D	
	Level of Service	F				
TLOS	Intersection Average Delay (s)	37.1				D
	Level of Service	E				
TkLOS	Effective corner radius (m)	> 15m	> 15m	NA	NA	D
	Number of receiving lanes	1	1	NA	NA	
	Level of Service	D	D	NA	NA	
	Level of Service	D				
VLOS	Maximum Volume-to-capacity (v/c)	0.83	0.90	0.83	0.84	D
	Level of Service	D	D	D	D	
	Level of Service	D				

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#### **4.9.2.2 2020 Future Background Conditions**

**Figure 12** illustrates 2020 Future Background AM peak, PM peak, and Saturday peak hour traffic volumes at the study area intersections.

The improvements identified in the 2018 Existing conditions were carried forward and assumed to be implemented by the 2020 future background condition horizon.

All study area intersections are anticipated to operate satisfactorily.

**Table 17** summarizes the results of the Synchro analysis for 2020 Future Background conditions.

**Appendix B** contains detailed intersection performance worksheets.

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**Table 17 - 2020 Future Background Intersection Operations (Synchro)**

Scenario	Intersection Control	Approach / Movement		LOS	V/C	Delay (s)	Queue 95 <sup>th</sup> (m)
Terry Fox Drive at Fernbank Road	Traffic Signals	EB	Left	A (A) [A]	0.41 (0.53) [0.40]	28.1 (32.8) [27.3]	28.4 (28.3) [21.8]
			Through	A (A) [A]	0.24 (0.30) [0.29]	25.0 (26.4) [24.5]	27.9 (36.7) [34.1]
			Right	A (A) [A]	0.18 (0.11) [0.13]	5.9 (1.4) [1.9]	9.6 (2.1) [3.0]
		WB	Left	A (A) [A]	0.02 (0.01) [0.47]	31.7 (29.0) [38.7]	2.8 (2.0) [32.7]
			Through	A (C) [C]	0.55 (0.73) [0.71]	44.8 (49.6) [44.7]	36.0 (65.6) [65.4]
			Right	A (A) [A]	0.46 (0.24) [0.02]	10.6 (2.0) [0.1]	15.5 (1.9) [0]
		NB	Left	A (A) [A]	0.10 (0.45) [0.38]	10.3 (15.7) [16.1]	12.2 (35.1) [17.9]
			Through / Right	A (A) [A]	0.34 (0.36) [0.49]	11.9 (14.2) [15.4]	52.8 (63.9) [89.1]
		SB	Left	A (A) [A]	0.11 (0.38) [0.39]	10.6 (27.6) [23.6]	11.6 (41.3) [41.5]
			Through	A (A) [C]	0.21 (0.57) [0.78]	10.6 (29.4) [32.2]	31.6 (101.0) [#187.4]
			Right	A (A) [A]	0.05 (0.11) [0.08]	0.1 (0.3) [0.2]	0 (0) [0]
Overall Intersection			A (C) [C]	0.55 (0.73) [0.78]	16.5 (24.0) [26.0]	-	
Terry Fox Drive at Cope Drive	Traffic Signals	SB	Left	A (A) [C]	0.27 (0.48) [0.71]	5.7 (11.4) [21.1]	16.4 (30.9) [#62.8]
			Through	A (A) [C]	0.22 (0.46) [0.76]	4.2 (10.9) [22.9]	24.3 (91.3) [#204.0]
			Right	A (A) [A]	0.03 (0.07) [0.15]	1.3 (1.8) [2.5]	2.2 (4.5) [8.7]
		NB	Left	A (A) [A]	0.01 (0.01) [0]	3.8 (19.6) [23.0]	1.1 (3.1) [1.3]
			Through / Right	A (B) [C]	0.47 (0.67) [0.75]	6.1 (27.8) [37.5]	64.0 (#172.1) [#155.9]
		EB	Left	B (A) [C]	0.61 (0.50) [0.75]	68.3 (39.9) [52.5]	18.6 (21.4) [#34.8]
			Through / Right	A (A) [A]	0.10 (0.22) 0.18]	33.9 (31.1) [25.3]	8.7 (21.7) [22.3]
		WB	Left	A (A) [A]	0.20 (0.46) [0.27]	38.0 (48.2) [35.1]	11.7 (24.4) [20.3]
			Through / Right	B (C) [D]	0.62 (0.74) [0.81]	15.4 (28.5) [42.9]	20.9 (38.2) [65.6]
Overall Intersection			B (C) [D]	0.62 (0.74) [0.81]	10.1 (21.5) [29.3]	-	
Notes: 1. Table format: AM (PM) 2. v/c – represents the anticipated volume divided by the predicted capacity 3. # - 95 <sup>th</sup> percentile volume exceeds capacity, queue may be longer 4. * - Queue lengths for these movements are in vehicles 5. m – Volume for 95 <sup>th</sup> percentile queue is metered by upstream signal							

## **TERRY FOX DRIVE & COPE DRIVE COMMERCIAL SHOPPING DEVELOPMENT**

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The signalized intersection MMLOS assessment was undertaken for the intersections of Terry Fox Drive at Fernbank Road, and the Terry Fox Drive at Cope Drive. Intersection operations under the AM peak, PM peak, and Saturday peak hours were considered in the assessment. MMLOS targets for areas “General Urban Area” were applied.

### **MMLOS - Terry Fox Drive at Fernbank Road Intersection (2020 Future Background):**

Under the current intersection configuration, pedestrian crossings are provided on each leg of the intersection. A PLOS target of C was selected for the intersection.

The Ultimate Cycling Network from the City of Ottawa *Transportation Master Plan* (2013) designates Terry Fox Drive and Fernbank Road as Spine Cycling Routes. These roads are therefore subject to Bicycle Level of Service (BLOS) targets of C.

Transit service travelling on Terry Fox Drive and Fernbank Road are expected to continue to operate within mixed traffic. Based on the MMLOS targets, a TLOS target of D was selected for the intersection.

Terry Fox Drive is designated as a truck route, therefore the intersection is subject to TrLOS target of D.

**Table 18** presents the MMLOS conditions for the signalized intersection of Terry Fox Drive at Fernbank Road.

As outlined in the summary analysis, the pedestrian level of service at the intersection of Terry Fox Drive at Fernbank Road is expected to operate with a PLOS of E. Based on the MMLOS guidelines, intersection PLOS is largely influenced by the number of lanes pedestrians cross, the intersection cycle length and subsequent delay to pedestrians, pedestrian crossing time, and the treatment of right-turn movements at intersections.

The cycling level of service at the intersection is expected to operate with a BLOS of F. Based on the MMLOS guidelines, intersection BLOS is influenced by the availability of dedicated cycling amenities, number of lanes cyclists must cross to negotiate a turn at intersections, and roadway operating speeds.

As the intersection of Terry Fox Drive at Fernbank Road is an arterial-arterial intersection, significant capacity is allocated to vehicular demands. Based on a review of the signal timing plans, vehicular demands, and intersection geometry, no short-term improvements were identified to improve the pedestrian LOS at this intersection to meet the PLOS target. The cycling LOS could be improved to meet the BLOS target by reducing the operating speeds along Terry Fox Drive and Fernbank Road.

### **MMLOS – Terry Fox Drive at Cope Drive intersection (2020 Future Background):**

Under the current intersection configuration, pedestrian crossings are provided on each leg of the intersection. A PLOS target of C was selected for the intersection.

The Ultimate Cycling Network from the City of Ottawa *Cycling Plan* (2013) designates Terry Fox Drive as a spine cycling route and Cope Drive as a local cycling route. These roads are therefore subject to a BLOS target of C and B, respectively. A BLOS target of B was selected for the intersection.

Transit service at the intersection of Terry Fox Drive at Cope Drive are expected to continue to operate within mixed traffic. Based on the MMLOS targets, a TLOS target of D was selected for the intersection.

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Terry Fox Drive is designated as a truck route, therefore the intersection is subject to TrLOS target of D.

**Table 19** presents the MMLOS conditions for the signalized intersection of Terry Fox Drive at Cope Drive .

As outlined in the summary analysis, the pedestrian level of service at the intersection of Terry Fox Drive at Cope Drive is expected to operate with a PLOS of D. Based on the MMLOS guidelines, intersection PLOS is largely influenced by the number of lanes pedestrians cross, the intersection cycle length and subsequent delay to pedestrians, pedestrian crossing time, and the treatment of right-turn movements at intersections.

The cycling level of service at the intersection is expected to operate with a BLOS of F. Based on the MMLOS guidelines, intersection BLOS is influenced by the availability of dedicated cycling amenities, number of lanes cyclists must cross to negotiate a turn at intersections, and roadway operating speeds.

As the intersection of Terry Fox Drive at Cope Drive is an arterial-collector intersection, significant capacity is allocated to vehicular demands. Based on a review of the signal timing plans, vehicular demands, and intersection geometry, no short-term improvements were identified to improve the pedestrian and transit LOS at this intersection to meet the PLOS and TLOS targets. The cycling LOS could be improved to meet the BLOS target by reducing the operating speeds along Terry Fox Drive.

# TERRY FOX DRIVE & COPE DRIVE COMMERCIAL SHOPPING DEVELOPMENT

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**Table 18 - 2020 Future Background MMLOS (Terry Fox Drive / Fernbank Road)**

Segment		2018 Existing Traffic				Target
		EB	WB	NB	SB	
PLOS	Lanes crossed	3	5	4	4	C
	Median >=2.4m (yes/no)	No	No	No	No	
	Island refuge (yes/no)	No	No	No	No	
	Left turn phasing	Protected / Permissive	Permissive	Protected / Permissive	Permissive	
	Right turn conflict	Yield Control	Yield Control	Yield Control	Yield Control	
	RTOR (yes/no)	Yes	Yes	Yes	NA	
	Leading ped interval (yes/no)	No	No	No	No	
	Right turn corner radius (m)	>15m to 25m	Right-turn Channel	>15m to 25m	>15m to 25m	
	Crosswalk treatment	Standard	Standard	Standard	Standard	
	Cycle length (s)	100	100	100	100	
	Effective walk time (s)	38	27	50	38	
	PETSI Points	68	44	51	51	
	PETSI Points LOS	C	E	D	D	
	Average Pedestrian Delay (s)	19.2	26.6	12.5	19.2	
	Ped Delay LOS	B	C	B	B	
	Level of Service	C	E	D	D	
	Level of Service	E				
BLOS	Type of bike lane	Pocket Bike Lane	Pocket Bike Lane	Mixed	Pocket Bike Lane	C
	Left-turn - lanes crossed	1	1	1	1	
	Left-turn - vehicle operating speed (km/hr)	60	60	80	80	
	Right-turn - number of turn lanes	1	1	0	1	
	Right-turn - turn lane length (m)	100	125	NA (Shared)	150	
	Right-turn - turning speed (km/hr)	15	15	15	15	
	Right-turn - location of bike lane	Left of Right-turn Lane	Left of Right-turn Lane	NA	Left of Right-turn Lane	
	Level of Service	E	E	F	E	
	Level of Service	F				
TLOS	Intersection Average Delay (s)	26.0				D
	Level of Service	D				
TKLOS	Effective corner radius (m)	NA	NA	> 15m	> 15m	D
	Number of receiving lanes	NA	NA	1	1	
	Level of Service	NA	NA	D	D	
	Level of Service	D				
VLOS	Maximum Volume-to-capacity (v/c)	0.53	0.73	0.49	0.78	D
	Level of Service	A	C	A	C	
	Level of Service	C				

# TERRY FOX DRIVE & COPE DRIVE COMMERCIAL SHOPPING DEVELOPMENT

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**Table 19 - 2020 Future Background MMLOS (Terry Fox Drive / Cope Drive)**

Segment		2018 Existing Traffic				Target
		SB	NB	EB	WB	
PLOS	Lanes crossed	3	3	3	4	C
	Median >=2.4m (yes/no)	No	No	No	No	
	Island refuge (yes/no)	No	No	No	No	
	Left turn phasing	Protected / Permissive	Permissive	Protected / Permissive	Permissive	
	Right turn conflict	Yield Control	Yield Control	Yield Control	Yield Control	
	RTOR (yes/no)	Yes	Yes	Yes	NA	
	Leading ped interval (yes/no)	No	No	No	No	
	Right turn corner radius (m)	>15m to 25m	>15m to 25m	>15m to 25m	>15m to 25m	
	Crosswalk treatment	Standard	Standard	Standard	Standard	
	Cycle length (s)	100	100	100	100	
	Effective walk time (s)	52	31	36	26	
	PETSI Points	68	68	68	51	
	PETSI Points LOS	C	C	C	D	
	Average Pedestrian Delay (s)	11.5	23.8	20.5	27.4	
	Ped Delay LOS	B	C	C	C	
	Level of Service	C	C	C	D	
	Level of Service	D				
BLOS	Type of bike lane	Pocket Bike Lane	Mixed	Mixed	Mixed	B
	Left-turn - lanes crossed	1	1	1	1	
	Left-turn - vehicle operating speed (km/hr)	80	80	50	50	
	Right-turn - number of turn lanes	1	0	0	0	
	Right-turn - turn lane length (m)	125	NA (Shared)	NA (Shared)	NA (Shared)	
	Right-turn - turning speed (km/hr)	15	15	15	15	
	Right-turn - location of bike lane	Left of Right-turn Lane	NA	NA	NA	
	Level of Service	D	F	D	D	
	Level of Service	F				
TLOS	Intersection Average Delay (s)	29.3				D
	Level of Service	D				
TkLOS	Effective corner radius (m)	> 15m	> 15m	NA	NA	D
	Number of receiving lanes	1	1	NA	NA	
	Level of Service	D	D	NA	NA	
	Level of Service	D				
VLOS	Maximum Volume-to-capacity (v/c)	0.76	0.75	0.75	0.81	D
	Level of Service	C	C	C	D	
	Level of Service	D				

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#### **4.9.2.3 2020 Total Future Conditions**

**Figure 13** illustrate 2020 Total Future AM peak, PM peak, and Saturday peak hour traffic volumes at the study area intersections.

All study area intersections are anticipated to operate satisfactorily.

**Table 20** summarizes the results of the Synchro analysis for 2020 Total Future conditions.

**Appendix B** contains detailed intersection performance worksheets.



# TERRY FOX DRIVE & COPE DRIVE COMMERCIAL SHOPPING DEVELOPMENT

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**Table 20 - 2020 Total Future Intersection Operations (Synchro)**

Scenario	Intersection Control	Approach / Movement		LOS	V/C	Delay (s)	Queue 95 <sup>th</sup> (m)
Terry Fox Drive at Fernbank Road	Traffic Signals	EB	Left	A (A) [B]	0.45 (0.66) [0.61]	28.3 (40.2) [44.9]	30.2 (32.6) [34.8]
			Through	A (A) [A]	0.24 (0.30) [0.29]	24.2 (26.0) [32.9]	27.0 (36.7) [43.1]
			Right	A (A) [A]	0.18 (0.11) [0.13]	5.6 (1.3) [3.5]	9.3 (2.1) [5.9]
		WB	Left	A (A) [B]	0.08 (0.11) [0.62]	32.4 (30.9) [56.0]	7.0 (10.1) [49.7]
			Through	A (C) [D]	0.56 (0.75) [0.82]	44.2 (50.0) [65.4]	37.9 (71.1) [90.5]
			Right	A (A) [A]	0.45 (0.25) [0.04]	10.1 (2.3) [0.2]	15.1 (3.0) [0]
		NB	Left	A (A) [A]	0.11 (0.48) [0.36]	10.8 (16.6) [15.4]	12.7 (35.1) [18.0]
			Through / Right	A (A) [A]	0.38 (0.40) [0.51]	12.8 (15.1) [16.7]	60.4 (73.2) [105.2]
			SB	Left	A (A) [A]	0.13 (0.41) [0.41]	8.9 (21.4) [10.9]
		Through		B (A) [C]	0.22 (0.61) [0.77]	9.11 (24.2) [18.7]	22.3 (110.0) [141.0]
Right	A (A) [A]	0.05 (0.11) [0.07]		0.3 (0.9) [0.2]	0 (1.6) [m0.0]		
Overall Intersection			A (C) [D]	0.56 (0.75) [0.82]	16.5 (23.5) [26.7]	-	
Terry Fox Drive at Cope Drive	Traffic Signals	SB	Left	A (A) [C]	0.30 (0.54) [0.76]	6.1 (13.0) [24.4]	18.6 (34.2) [64.2]
			Through	A (A) [C]	0.22 (0.47) [0.73]	4.2 (11.5) [22.7]	24.5 (91.7) [189.0]
			Right	A (A) [A]	0.03 (0.07) [0.15]	1.3 (1.8) [2.2]	2.2 (4.6) [8.3]
		NB	Left	A (A) [A]	0.01 (0.01) [0]	2.8 (17.4) [24.0]	m0.5 (m1.4) [m0.2]
			Through / Right	A (C) [C]	0.48 (0.74) [0.72]	4.5 (27.4) [30.1]	33.4 (#176.9) [#169.1]
		EB	Left	B (A) [C]	0.62 (0.50) [0.76]	68.5 (39.3) [59.1]	18.6 (21.3) [#39.7]
			Through / Right	A (A) [A]	0.10 (0.21) [0.18]	33.8 (30.3) [31.1]	8.7 (21.7) [27.5]
		WB	Left	A (A) [A]	0.29 (0.58) [0.41]	40.6 (53.1) [47.5]	15.5 (31.8) [35.6]
			Through / Right	B (C) [D]	0.62 (0.71) [0.87]	15.3 (26.2) [59.6]	21.1 (38.7) [#95.1]
		Overall Intersection			B (C) [D]	0.62 (0.74) [0.87]	9.7 (22.0) [31.4]
Cope Drive at Site Access 4	Minor Stop Control	EB	Through / Right	A (A) [A]	0 (0) [0]	0 (0) [0]	0 (0) [0]
		WB	Left / Through	A (A) [A]	0.02 (0.04) [0.06]	0.9 (1.1) [8.4]	0.1* (0.1*) [0.2*]
		NB	Left / Right	B (B) [C]	0.09 (0.21) [0.32]	10.8 (13.7) [17.2]	0.3* (0.8*) [1.3*]
		Overall Intersection		A (A) [A]	-	1.7 (2.3) [2.9]	-
Notes:							
1. Table format: AM (PM)							
2. v/c – represents the anticipated volume divided by the predicted capacity							
3. # - 95 <sup>th</sup> percentile volume exceeds capacity, queue may be longer							
4. * - Queue lengths for these movements are in vehicles							
5. m – Volume for 95 <sup>th</sup> percentile queue is metered by upstream signal							

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The signalized intersection MMLOS assessment was undertaken for the intersections of Terry Fox Drive at Fernbank Road, and the Terry Fox Drive at Cope Drive. Intersection operations under the AM peak, PM peak, and Saturday peak hours were considered in the assessment. MMLOS targets for areas “General Urban Area” were applied.

### **MMLOS - Terry Fox Drive at Fernbank Road Intersection (2020 Total Future):**

Under the current intersection configuration, pedestrian crossings are provided on each leg of the intersection. A PLOS target of C was selected for the intersection.

The Ultimate Cycling Network from the City of Ottawa *Transportation Master Plan* (2013) designates Terry Fox Drive and Fernbank Road as Spine Cycling Routes. These roads are therefore subject to Bicycle Level of Service (BLOS) targets of C.

Transit service travelling on Terry Fox Drive and Fernbank Road are expected to continue to operate within mixed traffic. Based on the MMLOS targets, a TLOS target of D was selected for the intersection.

Terry Fox Drive is designated as a truck route, therefore the intersection is subject to TrLOS target of D.

**Table 21** presents the MMLOS conditions for the signalized intersection of Terry Fox Drive at Fernbank Road.

As outlined in the summary analysis, the pedestrian level of service at the intersection of Terry Fox Drive at Fernbank Road is expected to operate with a PLOS of E. Based on the MMLOS guidelines, intersection PLOS is largely influenced by the number of lanes pedestrians cross, the intersection cycle length and subsequent delay to pedestrians, pedestrian crossing time, and the treatment of right-turn movements at intersections.

The cycling level of service at the intersection is expected to operate with a BLOS of F. Based on the MMLOS guidelines, intersection BLOS is influenced by the availability of dedicated cycling amenities, number of lanes cyclists must cross to negotiate a turn at intersections, and roadway operating speeds.

As the intersection of Terry Fox Drive at Fernbank Road is an arterial-arterial intersection, significant capacity is allocated to vehicular demands. Based on a review of the signal timing plans, vehicular demands, and intersection geometry, no short-term improvements were identified to improve the pedestrian LOS at this intersection to meet the PLOS target. The cycling LOS could be improved to meet the BLOS target by reducing the operating speeds along Terry Fox Drive and Fernbank Road.

### **MMLOS – Terry Fox Drive at Cope Drive intersection (2020 Total Future):**

Under the current intersection configuration, pedestrian crossings are provided on each leg of the intersection. A PLOS target of C was selected for the intersection.

The Ultimate Cycling Network from the City of Ottawa *Cycling Plan* (2013) designates Terry Fox Drive as a spine cycling route and Cope Drive as a local cycling route. These roads are therefore subject to a BLOS target of C and B, respectively. A BLOS target of B was selected for the intersection.

Transit service at the intersection of Terry Fox Drive at Cope Drive are expected to continue to operate within mixed traffic. Based on the MMLOS targets, a TLOS target of D was selected for the intersection.

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Terry Fox Drive is designated as a truck route, therefore the intersection is subject to TrLOS target of D.

**Table 22** presents the MMLOS conditions for the signalized intersection of Terry Fox Drive at Cope Drive.

As outlined in the summary analysis, the pedestrian level of service at the intersection of Terry Fox Drive at Cope Drive is expected to operate with a PLOS of D. Based on the MMLOS guidelines, intersection PLOS is largely influenced by the number of lanes pedestrians cross, the intersection cycle length and subsequent delay to pedestrians, pedestrian crossing time, and the treatment of right-turn movements at intersections.

The cycling level of service at the intersection is expected to operate with a BLOS of F. Based on the MMLOS guidelines, intersection BLOS is influenced by the availability of dedicated cycling amenities, number of lanes cyclists must cross to negotiate a turn at intersections, and roadway operating speeds.

The transit level of service at the intersection is expected to operate with a TLOS of E. Based on the MMLOS guidelines, intersection TLOS is influenced by the average intersection delay.

As the intersection of Terry Fox Drive at Cope Drive is an arterial-collector intersection, significant capacity is allocated to vehicular demands. Based on a review of the signal timing plans, vehicular demands, and intersection geometry, no short-term improvements were identified to improve the pedestrian and transit LOS at this intersection to meet the PLOS and TLOS targets. The cycling LOS could be improved to meet the BLOS target by reducing the operating speeds along Terry Fox Drive.

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**Table 21 - 2020 Total Future MMLOS (Terry Fox Drive / Fernbank Road)**

Segment		2018 Existing Traffic				Target
		EB	WB	NB	SB	
PLOS	Lanes crossed	3	5	4	4	C
	Median >=2.4m (yes/no)	No	No	No	No	
	Island refuge (yes/no)	No	No	No	No	
	Left turn phasing	Protected / Permissive	Permissive	Protected / Permissive	Permissive	
	Right turn conflict	Yield Control	Yield Control	Yield Control	Yield Control	
	RTOR (yes/no)	Yes	Yes	Yes	NA	
	Leading ped interval (yes/no)	No	No	No	No	
	Right turn corner radius (m)	>15m to 25m	Right-turn Channel	>15m to 25m	>15m to 25m	
	Crosswalk treatment	Standard	Standard	Standard	Standard	
	Cycle length (s)	120	120	120	120	
	Effective walk time (s)	40	27	67.6	55.6	
	PETSI Points	68	44	51	51	
	PETSI Points LOS	C	E	D	D	
	Average Pedestrian Delay (s)	26.6	36.0	11.4	17.3	
	Ped Delay LOS	C	D	B	B	
	Level of Service	C	E	D	D	
	Level of Service	E				
BLOS	Type of bike lane	Pocket Bike Lane	Pocket Bike Lane	Mixed	Pocket Bike Lane	C
	Left-turn - lanes crossed	1	1	1	1	
	Left-turn - vehicle operating speed (km/hr)	60	60	80	80	
	Right-turn - number of turn lanes	1	1	0	1	
	Right-turn - turn lane length (m)	100	125	NA (Shared)	150	
	Right-turn - turning speed (km/hr)	15	15	15	15	
	Right-turn - location of bike lane	Left of Right-turn Lane	Left of Right-turn Lane	NA	Left of Right-turn Lane	
	Level of Service	E	E	F	E	
	Level of Service	F				
TLOS	Intersection Average Delay (s)	26.7				D
	Level of Service	D				
TKLOS	Effective corner radius (m)	NA	NA	> 15m	> 15m	D
	Number of receiving lanes	NA	NA	1	1	
	Level of Service	NA	NA	D	D	
	Level of Service	D				
VLOS	Maximum Volume-to-capacity (v/c)	0.66	0.82	0.51	0.77	D
	Level of Service	B	D	A	C	
	Level of Service	D				

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**Table 22 - 2020 Total Future MMLOS (Terry Fox Drive / Cope Drive)**

Segment		2018 Existing Traffic				Target
		SB	NB	EB	WB	
PLOS	Lanes crossed	3	3	3	4	C
	Median >=2.4m (yes/no)	No	No	No	No	
	Island refuge (yes/no)	No	No	No	No	
	Left turn phasing	Protected / Permissive	Permissive	Protected / Permissive	Permissive	
	Right turn conflict	Yield Control	Yield Control	Yield Control	Yield Control	
	RTOR (yes/no)	Yes	Yes	Yes	NA	
	Leading ped interval (yes/no)	No	No	No	No	
	Right turn corner radius (m)	>15m to 25m	>15m to 25m	>15m to 25m	>15m to 25m	
	Crosswalk treatment	Standard	Standard	Standard	Standard	
	Cycle length (s)	120	120	120	120	
	Effective walk time (s)	70.7	40.7	36.7	26	
	PETSI Points	68	68	68	51	
	PETSI Points LOS	C	C	C	D	
	Average Pedestrian Delay (s)	10.1	26.2	28.9	36.8	
	Ped Delay LOS	B	C	C	D	
	Level of Service	C	C	C	D	
	Level of Service	D				
BLOS	Type of bike lane	Pocket Bike Lane	Mixed	Mixed	Mixed	B
	Left-turn - lanes crossed	1	1	1	1	
	Left-turn - vehicle operating speed (km/hr)	80	80	50	50	
	Right-turn - number of turn lanes	1	0	0	0	
	Right-turn - turn lane length (m)	125	NA (Shared)	NA (Shared)	NA (Shared)	
	Right-turn - turning speed (km/hr)	15	15	15	15	
	Right-turn - location of bike lane	Left of Right-turn Lane	NA	NA	NA	
	Level of Service	D	F	D	D	
	Level of Service	F				
TLOS	Intersection Average Delay (s)	33.1				D
	Level of Service	E				
TkLOS	Effective corner radius (m)	> 15m	> 15m	NA	NA	D
	Number of receiving lanes	1	1	NA	NA	
	Level of Service	D	D	NA	NA	
	Level of Service	D				
VLOS	Maximum Volume-to-capacity (v/c)	0.76	0.74	0.76	0.87	D
	Level of Service	C	C	C	D	
	Level of Service	D				

### 4.9.2.4 2025 Ultimate Conditions

**Figure 14** illustrates 2025 Ultimate AM peak, PM peak, and Saturday peak hour traffic volumes at the study area intersections.

Under the 2025 Ultimate horizon, the intersection of Terry Fox Drive and Fernbank Road is projected to operate acceptably with minimal delays and no movements operating above capacity (i.e.  $v/c > 1.00$ ).

The intersection of Terry Fox Drive at Cope Drive is anticipated to operate near the capacity threshold of  $v/c$  0.90 during the Saturday peak period. In addition, projected 95<sup>th</sup> percentile vehicle queues for the southbound left turn movement are anticipated to exceed the currently available storage length of 75 m. The projected operational deficiencies are attributed to background development growth anticipated by the 2025 time horizon.

The City of Ottawa Transportation Master Plan (TMP) identifies the widening of Terry Fox Drive from 2 lanes to 4 lanes between Eagleson Road to Winchester Drive under the Network Concept (i.e. Beyond 2031). It is anticipated that the widening of Terry Fox Drive from 2 lanes to 4 lanes will address the anticipated operational issues at the intersection of Terry Fox Drive and Cope Drive under projected 2025 conditions.

In the interim, and as the anticipated operational deficiencies are attributed to background development growth anticipated by the year 2025, it is recommended that the City of Ottawa extend the southbound left-turn lane at the intersection of Terry Fox Drive and Cope Drive by the year 2025.

**Table 23** summarizes the results of the Synchro analysis for 2025 Ultimate conditions.

**Appendix B** contains detailed intersection performance worksheets.

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**Table 23 - 2025 Ultimate Intersection Operations (Synchro)**

Scenario	Intersection Control	Approach / Movement		LOS	V/C	Delay (s)	Queue 95 <sup>th</sup> (m)
Terry Fox Drive at Fernbank Road	Traffic Signals	EB	Left	A (B) [B]	0.54 (0.66) [0.67]	29.3 (41.3) [49.4]	37.0 (43.6) [#38.7]
			Through	A (A) [A]	0.23 (0.29) [0.30]	23.0 (29.7) [32.8]	27.3 (45.2) [45.2]
			Right	A (A) [A]	0.17 (0.11) [0.13]	5.2 (2.7) [4.2]	9.2 (5.0) [6.9]
		WB	Left	A (A) [B]	0.08 (0.11) [0.63]	32.1 (38.5) [56.6]	6.9 (12.0) [51.8]
			Through	A (D) [D]	0.57 (0.81) [0.84]	44.2 (63.7) [66.7]	39.0 (90.3) [95.0]
			Right	A (A) [A]	0.46 (0.28) [0.04]	9.8 (4.7) [0.2]	15.5 (8.7) [0]
		NB	Left	A (A) [A]	0.12 (0.52) [0.43]	11.8 (19.3) [17.3]	14.0 (40.9) [18.8]
			Through / Right	A (A) [A]	0.42 (0.42) [0.54]	14.5 (17.8) [17.6]	70.3 (86.5) [113.7]
			SB	Left	A (A) [A]	0.15 (0.42) [0.46]	9.4 (25.6) [11.4]
		Through		A (B) [D]	0.24 (0.62) [0.81]	9.4 (28.7) [20.3]	19.6 (130.4) [#186.2]
		Right		A (A) [A]	0.06 (0.17) [0.09]	0.3 (4.3) [0.3]	0 (10.2) [m0.0]
Overall Intersection			A (D) [D]	0.57 (0.81) [0.81]	17.2 (27.8) [27.9]	-	
Terry Fox Drive at Cope Drive	Traffic Signals	SB	Left	A (B) [D]	0.38 (0.64) [0.87]	8.1 (16.7) [40.7]	25.3 (48.7) [#103.4]
			Through	A (A) [C]	0.24 (0.51) [0.78]	4.8 (12.4) [24.6]	30.3 (120.2) [207.2]
			Right	A (A) [A]	0.03 (0.07) [0.15]	1.5 (2.3) [2.1]	2.5 (5.7) [8.1]
		NB	Left	A (A) [A]	0.01 (0.01) [0.01]	3.2 (18.6) [27.0]	m0.5 (m1.5) [m0.2]
			Through / Right	A (C) [D]	0.55 (0.72) [0.82]	5.6 (26.8) [36.8]	62.6 (#210.5) [#186.7]
		EB	Left	B (A) [D]	0.61 (0.59) [0.86]	66.9 (53.1) [77.7]	18.1 (25.0) [#47.8]
			Through / Right	A (A) [A]	0.09 (0.21) [0.18]	32.2 (37.1) [31.8]	8.3 (25.3) [28.0]
		WB	Left	A (A) [A]	0.27 (0.57) [0.40]	38.1 (59.0) [46.4]	14.9 (36.5) [35.6]
			Through / Right	B (D) [D]	0.68 (0.81) [0.90]	17.1 (40.7) [61.8]	25.8 (56.3) [#107.0]
		Overall Intersection			B (D) [D]	0.68 (0.81) [0.90]	10.4 (25.0) [37.1]
Cope Drive at Site Access 4	Minor Stop Control	EB	Left / Through / Right	A (A) [A]	0.01 (0.04) [0.03]	0.4 (1.0) [0.6]	0 (0.1*) [0.1*]
		WB	Left / Through / Right	A (A) [A]	0.02 (0.04) [0.06]	0.9 (1.0) [1.2]	0.1* (0.1*) [0.2*]
		NB	Left / Through / Right	B (B) [C]	0.12 (0.28) [0.43]	11.7 (17.5) [24.0]	0.4* (1.2*) [2.1*]
		SB	Left / Through / Right	B (B) [C]	0.11 (0.10) [0.15]	12.0 (14.8) [18.2]	0.4* (0.3*) [0.5*]
		Overall Intersection			A (A) [A]	-	3.2 (3.6) [4.6]
Notes:							
1. Table format: AM (PM)							
2. v/c – represents the anticipated volume divided by the predicted capacity							
3. # - 95 <sup>th</sup> percentile volume exceeds capacity, queue may be longer							
4. * - Queue lengths for these movements are in vehicles							
5. m – Volume for 95 <sup>th</sup> percentile queue is metered by upstream signal							

## TERRY FOX DRIVE & COPE DRIVE COMMERCIAL SHOPPING DEVELOPMENT

Strategy

September 19, 2018

The signalized intersection MMLOS assessment was undertaken for the intersections of Terry Fox Drive at Fernbank Road, and the Terry Fox Drive at Cope Drive. Intersection operations under the AM peak, PM peak, and Saturday peak hours were considered in the assessment. MMLOS targets for areas “General Urban Area” were applied.

### **MMLOS - Terry Fox Drive at Fernbank Road Intersection (2025 Ultimate):**

Under the current intersection configuration, pedestrian crossings are provided on each leg of the intersection. A PLOS target of C was selected for the intersection.

The Ultimate Cycling Network from the City of Ottawa *Transportation Master Plan* (2013) designates Terry Fox Drive and Fernbank Road as Spine Cycling Routes. These roads are therefore subject to Bicycle Level of Service (BLOS) targets of C.

Transit service travelling on Terry Fox Drive and Fernbank Road are expected to continue to operate within mixed traffic. Based on the MMLOS targets, a TLOS target of D was selected for the intersection.

Terry Fox Drive is designated as a truck route, therefore the intersection is subject to TrLOS target of D.

**Table 24** presents the MMLOS conditions for the signalized intersection of Terry Fox Drive at Fernbank Road.

As outlined in the summary analysis, the pedestrian level of service at the intersection of Terry Fox Drive at Fernbank Road is expected to operate with a PLOS of E. Based on the MMLOS guidelines, intersection PLOS is largely influenced by the number of lanes pedestrians cross, the intersection cycle length and subsequent delay to pedestrians, pedestrian crossing time, and the treatment of right-turn movements at intersections.

The cycling level of service at the intersection is expected to operate with a BLOS of F. Based on the MMLOS guidelines, intersection BLOS is influenced by the availability of dedicated cycling amenities, number of lanes cyclists must cross to negotiate a turn at intersections, and roadway operating speeds.

As the intersection of Terry Fox Drive at Fernbank Road is an arterial-arterial intersection, significant capacity is allocated to vehicular demands. Based on a review of the signal timing plans, vehicular demands, and intersection geometry, no short-term improvements were identified to improve the pedestrian LOS at this intersection to meet the PLOS target. The cycling LOS could be improved to meet the BLOS target by reducing the operating speeds along Terry Fox Drive and Fernbank Road.

### **MMLOS – Terry Fox Drive at Cope Drive intersection (2025 Ultimate):**

Under the current intersection configuration, pedestrian crossings are provided on each leg of the intersection. A PLOS target of C was selected for the intersection.

The Ultimate Cycling Network from the City of Ottawa *Cycling Plan* (2013) designates Terry Fox Drive as a spine cycling route and Cope Drive as a local cycling route. These roads are therefore subject to a BLOS target of C and B, respectively. A BLOS target of B was selected for the intersection.

Transit service at the intersection of Terry Fox Drive at Cope Drive are expected to continue to operate within mixed traffic. Based on the MMLOS targets, a TLOS target of D was selected for the intersection.



## TERRY FOX DRIVE & COPE DRIVE COMMERCIAL SHOPPING DEVELOPMENT

Strategy

September 19, 2018

Terry Fox Drive is designated as a truck route, therefore the intersection is subject to TrLOS target of D.

**Table 25** presents the MMLOS conditions for the signalized intersection of Terry Fox Drive at Cope Drive.

As outlined in the summary analysis, the pedestrian level of service at the intersection of Terry Fox Drive at Cope Drive is expected to operate with a PLOS of D. Based on the MMLOS guidelines, intersection PLOS is largely influenced by the number of lanes pedestrians cross, the intersection cycle length and subsequent delay to pedestrians, pedestrian crossing time, and the treatment of right-turn movements at intersections.

The cycling level of service at the intersection is expected to operate with a BLOS of F. Based on the MMLOS guidelines, intersection BLOS is influenced by the availability of dedicated cycling amenities, number of lanes cyclists must cross to negotiate a turn at intersections, and roadway operating speeds.

The transit level of service at the intersection is expected to operate with a TLOS of E. Based on the MMLOS guidelines, intersection TLOS is influenced by the average intersection delay.

As the intersection of Terry Fox Drive at Cope Drive is an arterial-collector intersection, significant capacity is allocated to vehicular demands. Based on a review of the signal timing plans, vehicular demands, and intersection geometry, no short-term improvements were identified to improve the pedestrian and transit LOS at this intersection to meet the PLOS and TLOS targets. The cycling LOS could be improved to meet the BLOS target by reducing the operating speeds along Terry Fox Drive.

# TERRY FOX DRIVE & COPE DRIVE COMMERCIAL SHOPPING DEVELOPMENT

Strategy

September 19, 2018

**Table 24 - 2025 Ultimate MMLOS (Terry Fox Drive / Fernbank Road)**

Segment		2018 Existing Traffic				Target
		EB	WB	NB	SB	
PLOS	Lanes crossed	3	5	4	4	C
	Median >=2.4m (yes/no)	No	No	No	No	
	Island refuge (yes/no)	No	No	No	No	
	Left turn phasing	Protected / Permissive	Permissive	Protected / Permissive	Permissive	
	Right turn conflict	Yield Control	Yield Control	Yield Control	Yield Control	
	RTOR (yes/no)	Yes	Yes	Yes	NA	
	Leading ped interval (yes/no)	No	No	No	No	
	Right turn corner radius (m)	>15m to 25m	Right-turn Channel	>15m to 25m	>15m to 25m	
	Crosswalk treatment	Standard	Standard	Standard	Standard	
	Cycle length (s)	120	120	120	120	
	Effective walk time (s)	40	27	67.6	55.6	
	PETSI Points	68	44	51	51	
	PETSI Points LOS	C	E	D	D	
	Average Pedestrian Delay (s)	26.6	36.0	11.4	17.3	
	Ped Delay LOS	C	D	B	B	
	Level of Service	C	E	D	D	
	Level of Service	E				
BLOS	Type of bike lane	Pocket Bike Lane	Pocket Bike Lane	Mixed	Pocket Bike Lane	C
	Left-turn - lanes crossed	1	1	1	1	
	Left-turn - vehicle operating speed (km/hr)	60	60	80	80	
	Right-turn - number of turn lanes	1	1	0	1	
	Right-turn - turn lane length (m)	100	125	NA (Shared)	150	
	Right-turn - turning speed (km/hr)	15	15	15	15	
	Right-turn - location of bike lane	Left of Right-turn Lane	Left of Right-turn Lane	NA	Left of Right-turn Lane	
	Level of Service	E	E	F	E	
	Level of Service	F				
TLOS	Intersection Average Delay (s)	27.9				D
	Level of Service	D				
TKLOS	Effective corner radius (m)	NA	NA	> 15m	> 15m	D
	Number of receiving lanes	NA	NA	1	1	
	Level of Service	NA	NA	D	D	
	Level of Service	D				
VLOS	Maximum Volume-to-capacity (v/c)	0.67	0.84	0.54	0.81	D
	Level of Service	B	D	A	D	
	Level of Service	D				

# TERRY FOX DRIVE & COPE DRIVE COMMERCIAL SHOPPING DEVELOPMENT

Strategy

September 19, 2018

**Table 25 - 2025 Ultimate MMLOS (Terry Fox Drive / Cope Drive)**

Segment		2018 Existing Traffic				Target
		EB	WB	NB	SB	
PLOS	Lanes crossed	3	3	3	4	C
	Median >=2.4m (yes/no)	No	No	No	No	
	Island refuge (yes/no)	No	No	No	No	
	Left turn phasing	Protected / Permissive	Permissive	Protected / Permissive	Permissive	
	Right turn conflict	Yield Control	Yield Control	Yield Control	Yield Control	
	RTOR (yes/no)	Yes	Yes	Yes	NA	
	Leading ped interval (yes/no)	No	No	No	No	
	Right turn corner radius (m)	>15m to 25m	>15m to 25m	>15m to 25m	>15m to 25m	
	Crosswalk treatment	Standard	Standard	Standard	Standard	
	Cycle length (s)	120	120	120	120	
	Effective walk time (s)	70.7	40.7	36.7	26	
	PETSI Points	68	68	68	51	
	PETSI Points LOS	C	C	C	D	
	Average Pedestrian Delay (s)	10.1	26.2	28.9	36.8	
	Ped Delay LOS	B	C	C	D	
	Level of Service	C	C	C	D	
	Level of Service	D				
BLOS	Type of bike lane	Pocket Bike Lane	Mixed	Mixed	Mixed	B
	Left-turn - lanes crossed	1	1	1	1	
	Left-turn - vehicle operating speed (km/hr)	80	80	50	50	
	Right-turn - number of turn lanes	1	0	0	0	
	Right-turn - turn lane length (m)	125	NA (Shared)	NA (Shared)	NA (Shared)	
	Right-turn - turning speed (km/hr)	15	15	15	15	
	Right-turn - location of bike lane	Left of Right-turn Lane	NA	NA	NA	
	Level of Service	D	F	D	D	
	Level of Service	F				
TLOS	Intersection Average Delay (s)	37.1				D
	Level of Service	E				
TkLOS	Effective corner radius (m)	> 15m	> 15m	NA	NA	D
	Number of receiving lanes	1	1	NA	NA	
	Level of Service	D	D	NA	NA	
	Level of Service	D				
VLOS	Maximum Volume-to-capacity (v/c)	0.87	0.82	0.86	0.90	D
	Level of Service	D	D	D	D	
	Level of Service	D				

Conclusion  
September 19, 2018

### 5.0 CONCLUSION

This Transportation Impact Assessment (TIA) was prepared in support of a Zoning By-Law Amendment application for the proposed commercial development located at the southeast corner of Terry Fox Drive and Cope Drive in the Kanata South community of Ottawa, Ontario. The proposed development features four site accesses: a full movements access on Cope Drive, two restricted right-in-right/out accesses on Terry Fox Drive, and a restricted right-in/right out access on Fernbank Road.

Development generated site trips are not anticipated to adversely impact traffic operations at study area intersections. All study area intersections are projected to operate acceptably under the 2020 site build-out time horizon (Total Future Conditions).

Under the 2025 Ultimate Conditions horizon (i.e. site build-out + 5 years), the intersection of Terry Fox Drive at Cope Drive is anticipated to operate near the capacity threshold of v/c 0.90 during the Saturday peak period. In addition, projected 95<sup>th</sup> percentile vehicle queues for the southbound left turn movement are anticipated to exceed the currently available storage length of 75 m. The projected operational deficiencies are attributed to background development growth anticipated by the 2025 time horizon.

The City of Ottawa Transportation Master Plan (TMP) identifies the widening of Terry Fox Drive from 2 lanes to 4 lanes between Eagleson Road to Winchester Drive under the Network Concept (i.e. Beyond 2031). It is anticipated that the widening of Terry Fox Drive from 2 lanes to 4 lanes will address the anticipated operational issues at the intersection of Terry Fox Drive and Cope Drive under projected 2025 conditions. In the interim, and as the anticipated operational deficiencies are attributed to background development growth anticipated by the year 2025, it is recommended that the City of Ottawa extend the southbound left-turn lane at the intersection of Terry Fox Drive and Cope Drive by the year 2025.

It is recommended that the restricted right-in/right-out operation at the proposed Fernbank Road site access be enforced through the extension of the existing median on the east leg of the Terry Fox Drive and Fernbank Road. The extension of the existing median is expected to provide better reinforcement of the intended right-in/right-out operation at the Fernbank Road site access. The location and design treatment details of proposed site accesses will be confirmed through the Site Plan Control process.

The Multi-Modal Level of Service (MMLOS) assessment identified poor pedestrian, cycling, and transit levels of service under existing and future conditions. As Terry Fox Drive is an arterial roadway, significant capacity is allocated to vehicular demands. Based on a review of the signal timing plans, vehicular demands, and intersection geometry, no short-term improvements were at study area intersections. Opportunities to improve the pedestrian and cycling levels of service should be addressed as part of the planned widening of Terry Fox Drive from 2 lanes to 4 lanes.

Based on the transportation evaluation presented in this study, the proposed commercial development located at Terry Fox Drive and Cope Drive can be supported and should be permitted to proceed from a transportation impact perspective.

## **APPENDIX A COLLISION REPORTS**





# City Operations - Transportation Services

## Collision Details Report - Public Version

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

Location: COPE DR @ TERRY FOX

Traffic Control: Traffic signal

Total Collisions: 27

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2013-Aug-26, Mon,19:39	Clear	Rear end	P.D. only	Wet	South	Going ahead	Automobile, station wagon	Other motor vehicle	
					South	Stopped	Automobile, station wagon	Other motor vehicle	
2013-Sep-14, Sat,18:04	Clear	Rear end	P.D. only	Dry	North	Going ahead	Pick-up truck	Other motor vehicle	
					North	Stopped	Automobile, station wagon	Other motor vehicle	
2013-Nov-29, Fri,15:26	Clear	Angle	P.D. only	Dry	North	Going ahead	Pick-up truck	Other motor vehicle	
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2013-Dec-05, Thu,13:16	Clear	Sideswipe	P.D. only	Wet	South	Overtaking	Unknown	Other motor vehicle	
					South	Going ahead	Pick-up truck	Other motor vehicle	
2014-Jun-12, Thu,18:12	Rain	Rear end	Non-fatal injury	Wet	North	Going ahead	Pick-up truck	Other motor vehicle	
					North	Stopped	Automobile, station wagon	Other motor vehicle	
					North	Stopped	Automobile, station wagon	Other motor vehicle	

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2014-Dec-01, Mon,16:58	Clear	Rear end	P.D. only	Dry	South	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
					South	Stopped	Automobile, station wagon	Other motor vehicle	
					South	Stopped	Automobile, station wagon	Other motor vehicle	
2014-Dec-27, Sat,17:10	Rain	SMV other	P.D. only	Wet	West	Turning left	Automobile, station wagon	Ran off road	
2014-Nov-19, Wed,19:33	Clear	Angle	P.D. only	Wet	West	Turning right	Automobile, station wagon	Other motor vehicle	
					North	Going ahead	Pick-up truck	Other motor vehicle	
2015-Feb-26, Thu,11:48	Clear	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-Sep-09, Wed,07:25	Clear	Turning movement	P.D. only	Dry	South	Turning left	Pick-up truck	Other motor vehicle	
					North	Going ahead	Pick-up truck	Other motor vehicle	
2016-Jan-22, Fri,19:12	Clear	Angle	P.D. only	Dry	East	Turning left	Automobile, station wagon	Other motor vehicle	
					South	Going ahead	Pick-up truck	Other motor vehicle	
2016-Feb-22, Mon,16:09	Clear	Turning movement	P.D. only	Dry	North	Turning left	Pick-up truck	Other motor vehicle	
					South	Going ahead	Automobile, station wagon	Other motor vehicle	

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2016-Apr-06, Wed,17:52	Snow	Rear end	P.D. only	Loose snow	North	Slowing or stopping	Pick-up truck	Other motor vehicle
					North	Stopped	Automobile, station wagon	Other motor vehicle
2016-May-01, Sun,15:35	Clear	Rear end	P.D. only	Wet	North	Going ahead	Automobile, station wagon	Other motor vehicle
					North	Stopped	Automobile, station wagon	Other motor vehicle
2016-May-03, Tue,19:43	Clear	Rear end	P.D. only	Dry	West	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					West	Stopped	Automobile, station wagon	Other motor vehicle
2016-Oct-04, Tue,03:47	Clear	SMV other	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Curb
2016-Oct-17, Mon,08:04	Clear	Angle	Non-fatal injury	Wet	North	Going ahead	Automobile, station wagon	Other motor vehicle
					West	Going ahead	Pick-up truck	Other motor vehicle
2016-Oct-18, Tue,19:06	Clear	Rear end	P.D. only	Dry	North	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					North	Stopped	Municipal transit bus	Other motor vehicle
2016-Nov-12, Sat,15:27	Clear	Rear end	Non-fatal injury	Dry	South	Turning left	Pick-up truck	Other motor vehicle
					South	Turning left	Automobile, station wagon	Other motor vehicle
2016-Dec-09, Fri,17:51	Snow	Rear end	P.D. only	Ice	South	Going ahead	Pick-up truck	Other motor vehicle

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					South	Stopped	Automobile, station wagon	Other motor vehicle
2017-Feb-19, Sun,12:15	Clear	Turning movement	Non-fatal injury	Wet	South	Turning left	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Passenger van	Other motor vehicle
2017-Mar-05, Sun,10:33	Clear	Turning movement	Non-fatal injury	Dry	South	Turning left	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Automobile, station wagon	Other motor vehicle
2017-Jun-30, Fri,20:42	Clear	Turning movement	P.D. only	Dry	South	Turning left	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Pick-up truck	Other motor vehicle
2017-Jul-06, Thu,15:16	Clear	Rear end	P.D. only	Dry	South	Turning left	Passenger van	Other motor vehicle
					South	Turning left	Automobile, station wagon	Other motor vehicle
2017-Aug-25, Fri,18:36	Clear	Turning movement	P.D. only	Dry	South	Turning left	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Automobile, station wagon	Other motor vehicle
2017-Nov-05, Sun,12:24	Rain	Turning movement	P.D. only	Wet	East	Turning left	Passenger van	Other motor vehicle
					West	Going ahead	Automobile, station wagon	Other motor vehicle
2017-Nov-28, Tue,17:21	Rain	Turning movement	P.D. only	Wet	North	Turning right	Automobile, station wagon	Other motor vehicle

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## City Operations - Transportation Services

### Collision Details Report - Public Version

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

**Location:** TERRY FOX DR @ FERNBANK RD

**Traffic Control:** Traffic signal

**Total Collisions:** 26

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2013-Jan-23, Wed,08:15	Clear	Rear end	P.D. only	Dry	East	Turning right	Automobile, station wagon	Other motor vehicle	
					East	Turning right	Automobile, station wagon	Other motor vehicle	
2013-May-30, Thu,17:15	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	
2013-Jun-02, Sun,12:45	Clear	Turning movement	P.D. only	Dry	South	Turning left	Passenger van	Other motor vehicle	
					North	Going ahead	Passenger van	Other motor vehicle	
2013-Jul-21, Sun,16:40	Clear	Angle	Non-fatal injury	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle	
					East	Going ahead	Pick-up truck	Other motor vehicle	
2013-Sep-16, Mon,10:23	Clear	Angle	Non-fatal injury	Dry	South	Going ahead	Pick-up truck	Other motor vehicle	
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2013-Oct-25, Fri,18:10	Clear	Turning movement	P.D. only	Dry	East	Turning left	Automobile, station wagon	Other motor vehicle	

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					West	Going ahead	Pick-up truck	Other motor vehicle	
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-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-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-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	

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					North	Going ahead	Automobile, station wagon	Cyclist	
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	
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-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	
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	
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
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	

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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
2017-Jan-13, Fri,18:16	Clear	Turning movement	P.D. only	Dry	South	Turning left	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Automobile, station wagon	Other motor vehicle
2017-Jun-17, Sat,07:59	Clear	Angle	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle
					South	Going ahead	Pick-up truck	Other motor vehicle
2017-Jun-30, Fri,11:34	Rain	Sideswipe	P.D. only	Wet	North	Changing lanes	Automobile, station wagon	Other motor vehicle
					North	Turning left	Pick-up truck	Other motor vehicle
2017-Sep-08, Fri,12:53	Clear	Rear end	P.D. only	Dry	West	Slowing or stopping	Automobile, station wagon	Other motor vehicle
					West	Turning right	Automobile, station wagon	Other motor vehicle
2017-Nov-18, Sat,10:15	Clear	Other	P.D. only	Dry	South	Going ahead	Pick-up truck	Debris falling off vehicle
					South	Going ahead	Unknown	Other

## APPENDIX B INTERSECTION PERFORMANCE WORKSHEETS

### B.1 2018 EXISTING

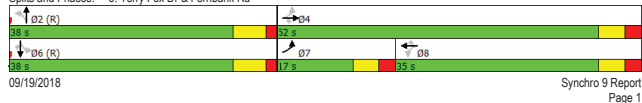


Lanes, Volumes, Timings  
3: Terry Fox Dr & Fernbank Rd

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	→	↱	↰	→	↱	↰	→	↱	↰	→	↱
Traffic Volume (vph)	123	122	88	3	125	150	66	337	2	57	189	39
Future Volume (vph)	123	122	88	3	125	150	66	337	2	57	189	39
Satd. Flow (prot)	1695	1784	1517	1695	1784	1517	1695	1783	0	1695	1784	1517
Flt Permitted	0.441			0.672			0.629			0.495		
Satd. Flow (perm)	787	1784	1517	1199	1784	1517	1122	1783	0	883	1784	1517
Satd. Flow (RTOR)				96			163					113
Lane Group Flow (vph)	134	133	96	3	136	163	72	368	0	62	205	42
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	NA	NA	Perm	Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8		8	2			6		6
Detector Phase	7	4	4	8	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.1	33.2	33.2	33.2	33.2	33.2	29.2	29.2	29.2	29.2	29.2	29.2
Total Split (s)	17.0	52.0	52.0	35.0	35.0	35.0	38.0	38.0	38.0	38.0	38.0	38.0
Total Split (%)	18.9%	57.8%	57.8%	38.9%	38.9%	38.9%	42.2%	42.2%	42.2%	42.2%	42.2%	42.2%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	2.4	2.5	2.5	2.5	2.5	2.5	1.6	1.6	1.6	1.6	1.6	1.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.1	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
Lead/Lag	Lead			Lag			Lag			Lag		
Lead-Lag Optimize?	Yes			Yes		Yes				Yes		
Recall Mode	None	None	None	None	None	None	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	28.5	28.4	28.4	12.2	12.2	12.2	49.2	49.2	49.2	49.2	49.2	49.2
Actuated g/C Ratio	0.32	0.32	0.32	0.14	0.14	0.14	0.55	0.55	0.55	0.55	0.55	0.55
v/c Ratio	0.38	0.24	0.18	0.02	0.56	0.47	0.12	0.38		0.13	0.21	0.05
Control Delay	24.8	22.6	5.1	31.3	44.8	10.3	12.1	14.1		12.6	12.2	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	24.8	22.6	5.1	31.3	44.8	10.3	12.1	14.1		12.6	12.2	0.1
LOS	C	C	A	C	D	B	B	B		B	B	A
Approach Delay		18.8			26.0			13.8			10.7	
Approach LOS		B			C			B			B	

<b>Intersection Summary</b>												
Cycle Length: 90												
Actuated Cycle Length: 90												
Offset: 9 (10%), Referenced to phase 2:NBT and 6:SBTL, Start of Green												
Natural Cycle: 75												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.56												
Intersection Signal Delay: 17.0												
Intersection Capacity Utilization 57.7%												
ICU Level of Service B												
Analysis Period (min) 15												

Splits and Phases: 3: Terry Fox Dr & Fernbank Rd



Queues  
3: Terry Fox Dr & Fernbank Rd

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	134	133	96	3	136	163	72	368	0	62	205	42
v/c Ratio	0.38	0.24	0.18	0.02	0.56	0.47	0.12	0.38		0.13	0.21	0.05
Control Delay	24.8	22.6	5.1	31.3	44.8	10.3	12.1	14.1		12.6	12.2	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	24.8	22.6	5.1	31.3	44.8	10.3	12.1	14.1		12.6	12.2	0.1
Queue Length 50th (m)	16.8	16.6	0.0	0.5	22.3	0.0	5.8	34.9	5.0	17.4	0.0	0.0
Queue Length 95th (m)	27.9	27.6	9.2	2.7	37.5	15.7	14.1	61.1	13.0	33.2	0.0	0.0
Internal Link Dist (m)		304.1			40.1			257.7			88.5	
Turn Bay Length (m)	110.0			110.0	125.0		110.0			125.0		135.0
Base Capacity (vph)	359	907	819	383	570	596	613	974	482	974	880	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.15	0.12	0.01	0.24	0.27	0.12	0.38	0.13	0.21	0.05	
<b>Intersection Summary</b>												

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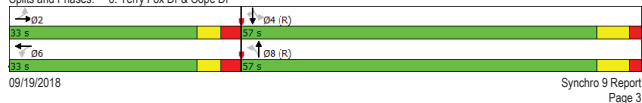
Synchro 9 Report  
Page 2

Lanes, Volumes, Timings  
6: Terry Fox Dr & Cope Dr










Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	→	↱	↰	→	↱	↰	→	↱	↰	→	↱
Traffic Volume (vph)	48	18	1	17	15	172	5	579	26	139	267	34
Future Volume (vph)	48	18	1	17	15	172	5	579	26	139	267	34
Satd. Flow (prot)	1695	1772	0	1695	1538	0	1695	1774	0	1695	1784	1517
Flt Permitted	0.400			0.744			0.582			0.375		
Satd. Flow (perm)	714	1772	0	1328	1538	0	1038	1774	0	669	1784	1517
Satd. Flow (RTOR)				1			187			4		39
Lane Group Flow (vph)	52	21	0	18	203	0	5	657	0	151	290	37
Turn Type	Perm	NA	NA	Perm	NA	Perm	NA	NA	Perm	NA	NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases	2			6		8				4		4
Detector Phase	2	2		6	6	8	8			4	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	32.2	32.2		32.2	32.2		33.5	33.5		33.5	33.5	33.5
Total Split (s)	33.0	33.0		33.0	33.0		57.0	57.0		57.0	57.0	57.0
Total Split (%)	36.7%	36.7%		36.7%	36.7%		63.3%	63.3%		63.3%	63.3%	63.3%
Yellow Time (s)	3.3	3.3		3.3	3.3		4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	2.9	2.9		2.9	2.9		1.8	1.8		1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.2	6.2		6.2	6.2		6.4	6.4		6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	C-Max
Act Effct Green (s)	10.0	10.0		10.0	10.0		67.4	67.4		67.4	67.4	67.4
Actuated g/C Ratio	0.11	0.11		0.11	0.11		0.75	0.75		0.75	0.75	0.75
v/c Ratio	0.67	0.11		0.12	0.60		0.01	0.49		0.30	0.22	0.03
Control Delay	74.3	33.9		35.8	15.1		3.8	6.5		6.2	4.3	1.4
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	74.3	33.9		35.8	15.1		3.8	6.5		6.2	4.3	1.4
LOS	E	C		D	B		A	A		A	A	A
Approach Delay		62.7			16.8			6.5			4.7	
Approach LOS		E			B			A			B	

<b>Intersection Summary</b>												
Cycle Length: 90												
Actuated Cycle Length: 90												
Offset: 55 (61%), Referenced to phase 4:SBTL and 8:NBT, Start of Green												
Natural Cycle: 75												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.67												
Intersection Signal Delay: 10.3												
Intersection Capacity Utilization 79.2%												
ICU Level of Service D												
Analysis Period (min) 15												

Splits and Phases: 6: Terry Fox Dr & Cope Dr



Queues  
6: Terry Fox Dr & Cope Dr

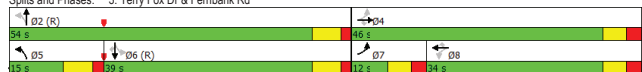
									
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	52	21	18	203	5	657	151	290	37
v/c Ratio	0.67	0.11	0.12	0.60	0.01	0.49	0.30	0.22	0.03
Control Delay	74.3	33.9	35.8	15.1	3.8	6.5	6.2	4.3	1.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	74.3	33.9	35.8	15.1	3.8	6.5	6.2	4.3	1.4
Queue Length 50th (m)	8.8	3.2	2.9	2.5	0.2	35.8	6.8	12.0	0.0
Queue Length 95th (m)	19.8	9.2	8.6	20.8	1.2	70.5	18.2	24.9	2.4
Internal Link Dist (m)		97.2		56.3		119.2		183.3	
Turn Bay Length (m)	40.0		50.0		55.0		75.0		165.0
Base Capacity (vph)	212	528	395	589	777	1330	501	1336	1146
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.04	0.05	0.34	0.01	0.49	0.30	0.22	0.03
Intersection Summary									

Lanes, Volumes, Timings  
3: Terry Fox Dr & Fernbank Rd

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	117	165	60	2	244	98	193	330	5	142	385	74
Future Volume (vph)	117	165	60	2	244	98	193	330	5	142	385	74
Satd. Flow (prot)	1695	1784	1517	1695	1784	1517	1695	1784	0	1695	1784	1517
Flt Permitted	0.286			0.644			0.300			0.544		
Satd. Flow (perm)	510	1784	1517	1149	1784	1517	535	1781	0	971	1784	1517
Satd. Flow (RTOR)				106			172			1		
Lane Group Flow (vph)	127	179	65	2	265	107	210	364	0	154	418	80
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	NA	Perm	Perm
Protected Phases	7	4			8		5	2		6		6
Permitted Phases	4		4	8	8	8	5	2		6	6	6
Detector Phase	7	4	4	8	8	8	5	2		6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	11.1	33.2	33.2	33.2	33.2	33.2	11.5	29.2		29.2	29.2	29.2
Total Split (s)	12.0	46.0	46.0	34.0	34.0	34.0	15.0	54.0		39.0	39.0	39.0
Total Split (%)	12.0%	46.0%	46.0%	34.0%	34.0%	34.0%	15.0%	54.0%		39.0%	39.0%	39.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	2.4	2.5	2.5	2.5	2.5	2.5	1.9	1.6		1.6	1.6	1.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.1	6.2	6.2	6.2	6.2	6.2	6.5	6.2		6.2	6.2	6.2
Lead/Lag	Lead			Lag	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes			Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max		C-Max	C-Max	C-Max
Act Effct Green (s)	32.3	32.2	32.2	20.2	20.2	20.2	55.1	55.4		38.5	38.5	38.5
Actuated g/C Ratio	0.32	0.32	0.32	0.20	0.20	0.20	0.55	0.55		0.38	0.38	0.38
v/c Ratio	0.54	0.31	0.12	0.01	0.74	0.24	0.51	0.37		0.41	0.61	0.12
Control Delay	32.7	26.0	1.6	28.0	49.2	2.0	17.7	14.9		28.9	31.0	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	32.7	26.0	1.6	28.0	49.2	2.0	17.7	14.9		28.9	31.0	0.3
LOS	C	C	A	C	D	A	B	B		C	C	A
Approach Delay		24.0			35.6			15.9			26.7	
Approach LOS		C			D			B			C	

Intersection Summary
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 91 (91%), Referenced to phase 2:NBLT and 6:SBTL, Start of Green
Natural Cycle: 85
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 24.8
Intersection Capacity Utilization 73.9%
ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 3: Terry Fox Dr & Fernbank Rd



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Queues  
3: Terry Fox Dr & Fernbank Rd

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	127	179	65	2	265	107	210	364	154	418	80	
v/c Ratio	0.54	0.31	0.12	0.01	0.74	0.24	0.51	0.37	0.41	0.61	0.12	
Control Delay	32.7	26.0	1.6	28.0	49.2	2.0	17.7	14.9	28.9	31.0	0.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	32.7	26.0	1.6	28.0	49.2	2.0	17.7	14.9	28.9	31.0	0.3	
Queue Length 50th (m)	17.9	26.0	0.0	0.3	48.6	0.0	19.7	37.1	22.0	65.6	0.0	
Queue Length 95th (m)	28.2	38.2	2.9	2.0	68.5	2.3	38.2	66.7	43.1	104.9	0.0	
Internal Link Dist (m)		304.1			40.1		257.7			88.5		
Turn Bay Length (m)	110.0			110.0	125.0		110.0	125.0		135.0		
Base Capacity (vph)	234	710	667	319	495	545	416	987	373	686	689	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.54	0.25	0.10	0.01	0.54	0.20	0.50	0.37	0.41	0.61	0.12	

Intersection Summary

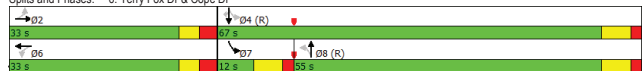
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Lanes, Volumes, Timings  
6: Terry Fox Dr & Cope Dr

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	78	76	2	67	58	179	5	516	24	197	532	72
Future Volume (vph)	78	76	2	67	58	179	5	516	24	197	532	72
Satd. Flow (prot)	1695	1777	0	1695	1583	0	1695	1772	0	1695	1784	1517
Flt Permitted	0.293			0.702			0.447			0.296		
Satd. Flow (perm)	523	1777	0	1253	1583	0	798	1772	0	528	1784	1517
Satd. Flow (RTOR)				1			152			3		
Lane Group Flow (vph)	85	85	0	73	258	0	5	587	0	214	578	78
Turn Type	Perm	NA	NA	Perm	NA	Perm	NA	pm+pt	NA	NA	Perm	Perm
Protected Phases		2			6			8		7	4	
Permitted Phases	2			6	6		8	8		7	4	4
Detector Phase	2	2		6	6		8	8		7	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	32.2	32.2		32.2	32.2		33.5	33.5		11.4	33.5	33.5
Total Split (s)	33.0	33.0		33.0	33.0		55.0	55.0		12.0	67.0	67.0
Total Split (%)	33.0%	33.0%		33.0%	33.0%		55.0%	55.0%		12.0%	67.0%	67.0%
Yellow Time (s)	3.3	3.3		3.3	3.3		4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	2.9	2.9		2.9	2.9		1.8	1.8		1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.2	6.2		6.2	6.2		6.4	6.4		6.4	6.4	6.4
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Recall Mode	None	None		None	None		C-Max	C-Max		None	C-Max	C-Max
Act Effct Green (s)	15.5	15.5		15.5	15.5		56.6	56.6		71.9	71.9	71.9
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.57	0.57		0.72	0.72	0.72
v/c Ratio	1.05	0.31		0.38	0.69		0.01	0.58		0.44	0.45	0.07
Control Delay	155.8	37.6		41.1	25.5		12.8	18.7		8.5	8.2	1.7
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	155.8	37.6		41.1	25.5		12.8	18.7		8.5	8.2	1.7
LOS	F	D		D	C		B	B		A	A	A
Approach Delay		96.7			28.9			18.6			7.7	
Approach LOS		F			C			B			A	

Intersection Summary
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 69 (69%), Referenced to phase 4:SBTL and 8:NBLT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.05
Intersection Signal Delay: 22.3
Intersection Capacity Utilization 82.1%
ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 6: Terry Fox Dr & Cope Dr



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Queues  
6: Terry Fox Dr & Cope Dr

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	85	85	73	258	5	587	214	578	78
v/c Ratio	1.05	0.31	0.38	0.69	0.01	0.58	0.44	0.45	0.07
Control Delay	155.8	37.6	41.1	25.5	12.8	18.7	8.5	8.2	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	155.8	37.6	41.1	25.5	12.8	18.7	8.5	8.2	1.7
Queue Length 50th (m)	~17.9	14.6	12.8	18.8	0.4	70.3	11.5	40.1	0.0
Queue Length 95th (m)	#38.7	25.5	23.5	40.8	2.4	122.1	25.7	80.5	4.8
Internal Link Dist (m)		97.2		56.3		119.2		183.3	
Turn Bay Length (m)	40.0		50.0		55.0		75.0		165.0
Base Capacity (vph)	140	476	335	535	452	1004	482	1281	1112
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.18	0.22	0.48	0.01	0.58	0.44	0.45	0.07

Intersection Summary
Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

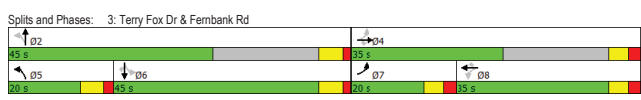
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Lanes, Volumes, Timings  
3: Terry Fox Dr & Fernbank Rd

5331 Fernbank Rd TIA  
2018 Existing - SAT Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	89	151	65	108	246	9	93	409	63	153	631	60
Future Volume (vph)	89	151	65	108	246	9	93	409	63	153	631	60
Satd. Flow (prot)	1695	1784	1517	1695	1784	1517	1695	1749	0	1695	1784	1517
Flt Permitted	0.270			0.653			0.086			0.474		
Satd. Flow (perm)	482	1784	1517	1165	1784	1517	153	1749	0	846	1784	1517
Satd. Flow (RTOR)				88			144			9		144
Lane Group Flow (vph)	97	164	71	117	267	10	101	513	0	166	686	65
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	7	4			8		5	2		6	6	
Permitted Phases	4		4	8	8	8	5	2		6	6	6
Detector Phase	7	4	4	8	8	8	5	2		6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	11.1	33.2	33.2	33.2	33.2	33.2	11.5	29.2		29.2	29.2	29.2
Total Split (s)	20.0	35.0	35.0	35.0	35.0	35.0	20.0	45.0		45.0	45.0	45.0
Total Split (%)	16.7%	29.2%	29.2%	29.2%	29.2%	29.2%	16.7%	37.5%		37.5%	37.5%	37.5%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	2.4	2.5	2.5	2.5	2.5	2.5	1.9	1.6		1.6	1.6	1.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.1	6.2	6.2	6.2	6.2	6.2	6.5	6.2		6.2	6.2	6.2
Lead/Lag	Lead			Lag	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes			Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	Max		Max	Max	Max
Act Effct Green (s)	33.9	33.7	33.7	20.3	20.3	20.3	55.7	56.1		39.7	39.7	39.7
Actuated g/C Ratio	0.33	0.33	0.33	0.20	0.20	0.20	0.54	0.55		0.39	0.39	0.39
v/c Ratio	0.34	0.28	0.13	0.51	0.76	0.02	0.44	0.53		0.51	0.99	0.10
Control Delay	26.3	25.5	3.6	46.8	54.4	0.1	22.0	19.7		35.4	67.5	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	26.3	25.5	3.6	46.8	54.4	0.1	22.0	19.7		35.4	67.5	0.3
LOS	C	C	A	D	D	A	C	B		D	E	A
Approach Delay		21.1			50.7			20.1			57.0	
Approach LOS		C			D			C			E	

Intersection Summary												
Cycle Length: 120												
Actuated Cycle Length: 102.5												
Natural Cycle: 95												
Control Type: Actuated-Uncoordinated												
Maximum v/c Ratio: 0.99												
Intersection Signal Delay: 40.6												
Intersection Capacity Utilization: 80.2%												
Analysis Period (min): 15												



Queues  
3: Terry Fox Dr & Fernbank Rd

5331 Fernbank Rd TIA  
2018 Existing - SAT Peak

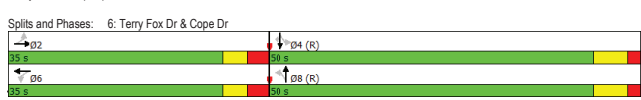
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	97	164	71	117	267	10	101	513	166	686	65
v/c Ratio	0.34	0.28	0.13	0.51	0.76	0.02	0.44	0.53	0.51	0.99	0.10
Control Delay	26.3	25.5	3.6	46.8	54.4	0.1	22.0	19.7	35.4	67.5	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.3	25.5	3.6	46.8	54.4	0.1	22.0	19.7	35.4	67.5	0.3
Queue Length 50th (m)	13.3	23.4	0.0	21.5	52.0	0.0	10.0	65.9	26.2	151.5	0.0
Queue Length 95th (m)	25.5	40.2	6.3	41.6	84.9	0.0	24.7	117.2	57.7	265.4	0.0
Internal Link Dist (m)		304.2			40.0			257.8		88.5	
Turn Bay Length (m)	110.0		110.0	125.0		110.0		125.0		135.0	
Base Capacity (vph)	328	869	784	335	513	539	291	1030	327	691	676
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.19	0.09	0.35	0.52	0.02	0.35	0.50	0.51	0.99	0.10
Intersection Summary											
Volume exceeds capacity, queue is theoretically infinite.											
Queue shown is maximum after two cycles.											
# 95th percentile volume exceeds capacity, queue may be longer.											
Queue shown is maximum after two cycles.											

Lanes, Volumes, Timings  
6: Terry Fox Dr & Cope Dr

5331 Fernbank Rd TIA  
2018 Existing - SAT Peak












Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	133	87	3	63	105	205	1	497	9	314	778	144
Future Volume (vph)	133	87	3	63	105	205	1	497	9	314	778	144
Satd. Flow (prot)	1695	1775	0	1695	1608	0	1695	1779	0	1695	1784	1517
Flt Permitted	0.326			0.694			0.192			0.385		
Satd. Flow (perm)	582	1775	0	1238	1608	0	343	1779	0	687	1784	1517
Satd. Flow (RTOR)				2			125			2		157
Lane Group Flow (vph)	145	98	0	68	337	0	1	550	0	341	846	157
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases		2			6			8		4	4	
Permitted Phases	2		6		8			8		4	4	4
Detector Phase	2	2	6	6	8	8		8		4	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	32.2	32.2	32.2	32.2	33.5	33.5	33.5	33.5		33.5	33.5	33.5
Total Split (s)	35.0	35.0	35.0	35.0	50.0	50.0	50.0	50.0		50.0	50.0	50.0
Total Split (%)	41.2%	41.2%	41.2%	41.2%	58.8%	58.8%	58.8%	58.8%		58.8%	58.8%	58.8%
Yellow Time (s)	3.3	3.3	3.3	3.3	4.6	4.6	4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	2.9	2.9	2.9	2.9	1.8	1.8	1.8	1.8		1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.2	6.2	6.2	6.2	6.4	6.4	6.4	6.4		6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max		C-Max	C-Max	C-Max
Act Effct Green (s)	20.7	20.7	20.7	20.7	51.7	51.7	51.7	51.7		51.7	51.7	51.7
Actuated g/C Ratio	0.24	0.24	0.24	0.24	0.61	0.61	0.61	0.61		0.61	0.61	0.61
v/c Ratio	1.03	0.23	0.23	0.69	0.00	0.51	0.82	0.78		0.82	0.78	0.16
Control Delay	114.6	24.0	24.7	24.7	10.0	13.1	35.2	21.5		21.5	2.3	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	114.6	24.0	24.7	24.7	10.0	13.1	35.2	21.5		21.5	2.3	0.0
LOS	F	C	C	C	A	B	D	C		C	A	A
Approach Delay		78.1			24.7			13.1			22.7	
Approach LOS		E			C			B			C	

Intersection Summary												
Cycle Length: 85												
Actuated Cycle Length: 85												
Offset: 0 (0%), Referenced to phase 4:SBTL and 8:NBTL, Start of Green												
Natural Cycle: 90												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 1.03												
Intersection Signal Delay: 26.2												
Intersection Capacity Utilization: 95.3%												
Analysis Period (min): 15												



Queues  
6: Terry Fox Dr & Cope Dr

5331 Fernbank Rd TIA  
2018 Existing - SAT Peak

											
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR		
Lane Group Flow (vph)	145	98	68	337	1	550	341	846	157		
v/c Ratio	1.03	0.23	0.23	0.69	0.00	0.51	0.82	0.78	0.16		
Control Delay	114.6	24.0	24.7	24.7	10.0	13.1	35.2	21.5	2.3		
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	114.6	24.0	24.7	24.7	10.0	13.1	35.2	21.5	2.3		
Queue Length 50th (m)	23.4	12.3	8.7	30.5	0.1	47.1	40.3	95.5	0.0		
Queue Length 95th (m)	#50.8	21.5	16.7	51.6	0.9	90.5	#105.7	#199.7	8.4		
Internal Link Dist (m)			97.2		56.3		119.2		183.3		
Turn Bay Length (m)	40.0		50.0		55.0		75.0		165.0		
Base Capacity (vph)	197	602	419	627	208	1083	417	1085	984		
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0		
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0		
Storage Cap Reductn	0	0	0	0	0	0	0	0	0		
Reduced v/c Ratio	0.74	0.16	0.16	0.54	0.00	0.51	0.82	0.78	0.16		
Intersection Summary											
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.											

## **TERRY FOX DRIVE & COPE DRIVE COMMERCIAL SHOPPING DEVELOPMENT**

Appendix B Intersection Performance Worksheets  
September 19, 2018

### **B.2 2018 EXISTING WITH IMPROVEMENTS**

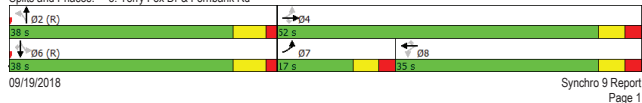


Lanes, Volumes, Timings  
3: Terry Fox Dr & Fernbank Rd

5331 Fernbank Rd TIA 2018 Existing - AM Peak (With Improvements)												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	→	↱	↰	→	↱	↰	→	↱	↰	→	↱
Traffic Volume (vph)	123	122	88	3	125	150	66	337	2	57	189	39
Future Volume (vph)	123	122	88	3	125	150	66	337	2	57	189	39
Satd. Flow (prot)	1695	1784	1517	1695	1784	1517	1695	1783	0	1695	1784	1517
Flt Permitted	0.441			0.672			0.629			0.495		
Satd. Flow (perm)	787	1784	1517	1199	1784	1517	1122	1783	0	883	1784	1517
Satd. Flow (RTOR)				96			163					113
Lane Group Flow (vph)	134	133	96	3	136	163	72	368	0	62	205	42
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8		8	2			6		6
Detector Phase	7	4	4	8	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.1	33.2	33.2	33.2	33.2	33.2	29.2	29.2	29.2	29.2	29.2	29.2
Total Split (s)	17.0	52.0	52.0	35.0	35.0	35.0	38.0	38.0	38.0	38.0	38.0	38.0
Total Split (%)	18.9%	57.8%	57.8%	38.9%	38.9%	38.9%	42.2%	42.2%	42.2%	42.2%	42.2%	42.2%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	2.4	2.5	2.5	2.5	2.5	2.5	1.6	1.6	1.6	1.6	1.6	1.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.1	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
Lead/Lag	Lead			Lag			Lag			Lag		
Lead-Lag Optimize?	Yes			Yes		Yes				Yes		
Recall Mode	None	None	None	None	None	None	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	28.5	28.4	28.4	12.2	12.2	12.2	49.2	49.2	49.2	49.2	49.2	49.2
Actuated g/C Ratio	0.32	0.32	0.32	0.14	0.14	0.14	0.55	0.55	0.55	0.55	0.55	0.55
v/c Ratio	0.38	0.24	0.18	0.02	0.56	0.47	0.12	0.38		0.13	0.21	0.05
Control Delay	24.8	22.6	5.1	31.3	44.8	10.3	12.1	14.1		12.6	12.2	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	24.8	22.6	5.1	31.3	44.8	10.3	12.1	14.1		12.6	12.2	0.1
LOS	C	C	A	C	D	B	B	B		B	B	A
Approach Delay		18.8			26.0			13.8			10.7	
Approach LOS		B			C			B			B	

Intersection Summary												
Cycle Length: 90												
Actuated Cycle Length: 90												
Offset: 9 (10%), Referenced to phase 2:NBLT and 6:SBTL, Start of Green												
Natural Cycle: 75												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.56												
Intersection Signal Delay: 17.0												
Intersection Capacity Utilization 57.7%												
ICU Level of Service B												
Analysis Period (min) 15												

Splits and Phases: 3: Terry Fox Dr & Fernbank Rd



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Queues  
3: Terry Fox Dr & Fernbank Rd

5331 Fernbank Rd TIA 2018 Existing - AM Peak (With Improvements)												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	134	133	96	3	136	163	72	368	0	62	205	42
v/c Ratio	0.38	0.24	0.18	0.02	0.56	0.47	0.12	0.38		0.13	0.21	0.05
Control Delay	24.8	22.6	5.1	31.3	44.8	10.3	12.1	14.1		12.6	12.2	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	24.8	22.6	5.1	31.3	44.8	10.3	12.1	14.1		12.6	12.2	0.1
Queue Length 50th (m)	16.8	16.6	0.0	0.5	22.3	0.0	5.8	34.9	5.0	17.4	0.0	0.0
Queue Length 95th (m)	27.9	27.6	9.2	2.7	37.5	15.7	14.1	61.1	13.0	33.2	0.0	0.0
Internal Link Dist (m)		304.1			40.1		257.8			88.5		
Turn Bay Length (m)	110.0		110.0	125.0		110.0	125.0			135.0		
Base Capacity (vph)	359	907	819	383	570	596	613	974	482	974	880	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.15	0.12	0.01	0.24	0.27	0.12	0.38	0.13	0.21	0.05	
Intersection Summary												

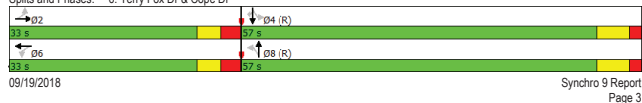
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Lanes, Volumes, Timings  
6: Terry Fox Dr & Cope Dr

5331 Fernbank Rd TIA 2018 Existing - AM Peak (With Improvements)												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	→	↱	↰	→	↱	↰	→	↱	↰	→	↱
Traffic Volume (vph)	48	18	1	17	15	172	5	579	26	139	267	34
Future Volume (vph)	48	18	1	17	15	172	5	579	26	139	267	34
Satd. Flow (prot)	1695	1772	0	1695	1538	0	1695	1774	0	1695	1784	1517
Flt Permitted	0.400			0.744			0.582			0.375		
Satd. Flow (perm)	714	1772	0	1328	1538	0	1038	1774	0	669	1784	1517
Satd. Flow (RTOR)				1			187			4		39
Lane Group Flow (vph)	52	21	0	18	203	0	5	657	0	151	290	37
Turn Type	Perm	NA	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases	2			6		8				4		4
Detector Phase	2	2		6	6	8	8			4	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	32.2	32.2		32.2	32.2		33.5	33.5		33.5	33.5	33.5
Total Split (s)	33.0	33.0		33.0	33.0		57.0	57.0		57.0	57.0	57.0
Total Split (%)	36.7%	36.7%		36.7%	36.7%		63.3%	63.3%		63.3%	63.3%	63.3%
Yellow Time (s)	3.3	3.3		3.3	3.3		4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	2.9	2.9		2.9	2.9		1.8	1.8		1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.2	6.2		6.2	6.2		6.4	6.4		6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	C-Max
Act Effct Green (s)	10.0	10.0		10.0	10.0		67.4	67.4		67.4	67.4	67.4
Actuated g/C Ratio	0.11	0.11		0.11	0.11		0.75	0.75		0.75	0.75	0.75
v/c Ratio	0.67	0.11		0.12	0.60		0.01	0.49		0.30	0.22	0.03
Control Delay	74.3	33.9		35.8	15.1		3.8	6.5		6.2	4.3	1.4
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	74.3	33.9		35.8	15.1		3.8	6.5		6.2	4.3	1.4
LOS	E	C		D	B		A	A		A	A	A
Approach Delay		62.7			16.8			6.5			4.7	
Approach LOS		E			B			A			B	

Intersection Summary												
Cycle Length: 90												
Actuated Cycle Length: 90												
Offset: 55 (61%), Referenced to phase 4:SBTL and 8:NBLT, Start of Green												
Natural Cycle: 75												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.67												
Intersection Signal Delay: 10.3												
Intersection Capacity Utilization 79.2%												
ICU Level of Service D												
Analysis Period (min) 15												

Splits and Phases: 6: Terry Fox Dr & Cope Dr



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Queues  
6: Terry Fox Dr & Cope Dr

5331 Fernbank Rd TIA 2018 Existing - AM Peak (With Improvements)
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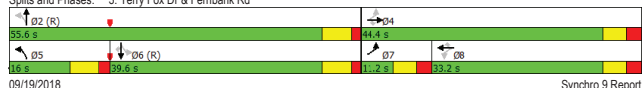
Lanes, Volumes, Timings  
3: Terry Fox Dr & Fernbank Rd

2018 Existing - PM Peak (with Improvements)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	117	165	60	2	244	98	193	330	5	142	385	74
Future Volume (vph)	117	165	60	2	244	98	193	330	5	142	385	74
Satd. Flow (prot)	1695	1784	1517	1695	1784	1517	1695	1784	0	1695	1784	1517
Flt Permitted	0.284			0.644			0.307			0.544		
Satd. Flow (perm)	507	1784	1517	1149	1784	1517	548	1781	0	971	1784	1517
Satd. Flow (RTOR)				106			172			1		172
Lane Group Flow (vph)	127	179	65	2	265	107	210	364	0	154	418	80
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	NA	Perm	Perm
Protected Phases	7	4			8		5	2		6		6
Permitted Phases	4		4	8	8	8	5	2		6	6	6
Detector Phase	7	4	4	8	8	8	5	2		6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	11.1	33.2	33.2	33.2	33.2	33.2	11.5	29.2		29.2	29.2	29.2
Total Split (s)	11.2	44.4	44.4	33.2	33.2	33.2	16.0	55.6		39.6	39.6	39.6
Total Split (%)	11.2%	44.4%	44.4%	33.2%	33.2%	33.2%	16.0%	55.6%		39.6%	39.6%	39.6%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	2.4	2.5	2.5	2.5	2.5	2.5	1.9	1.6		1.6	1.6	1.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.1	6.2	6.2	6.2	6.2	6.2	6.5	6.2		6.2	6.2	6.2
Lead/Lag	Lead			Lag	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes			Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max		C-Max	C-Max	C-Max
Act Effct Green (s)	31.4	31.3	31.3	20.1	20.1	20.1	56.0	56.3		39.3	39.3	39.3
Actuated g/C Ratio	0.31	0.31	0.31	0.20	0.20	0.20	0.56	0.56		0.39	0.39	0.39
v/c Ratio	0.58	0.32	0.12	0.01	0.74	0.24	0.49	0.36		0.40	0.60	0.11
Control Delay	35.9	26.8	1.7	28.5	49.7	2.1	16.6	14.3		28.1	30.1	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	35.9	26.8	1.7	28.5	49.7	2.1	16.6	14.3		28.1	30.1	0.3
LOS	D	C	A	C	D	A	B	B		C	C	A
Approach Delay		25.5			36.0			15.1			26.0	
Approach LOS		C			D			B			C	

Intersection Summary												
Cycle Length: 100												
Actuated Cycle Length: 100												
Offset: 91 (91%), Referenced to phase 2:NBT and 6:SBTL, Start of Green												
Natural Cycle: 85												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.74												
Intersection Signal Delay: 24.6												
Intersection Capacity Utilization 73.9%												
ICU Level of Service D												
Analysis Period (min) 15												

Splits and Phases: 3: Terry Fox Dr & Fernbank Rd



09/19/2018 Synchro 9 Report Page 1

Queues  
3: Terry Fox Dr & Fernbank Rd

2018 Existing - PM Peak (with Improvements)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	127	179	65	2	265	107	210	364	154	418	80	
v/c Ratio	0.58	0.32	0.12	0.01	0.74	0.24	0.49	0.36	0.40	0.60	0.11	
Control Delay	35.9	26.8	1.7	28.5	49.7	2.1	16.6	14.3	28.1	30.1	0.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	35.9	26.8	1.7	28.5	49.7	2.1	16.6	14.3	28.1	30.1	0.3	
Queue Length 50th (m)	18.2	26.3	0.0	0.3	48.6	0.0	19.3	36.3	21.6	64.5	0.0	
Queue Length 95th (m)	28.8	39.2	0.0	2.0	69.0	0.0	37.2	64.8	42.6	104.0	0.0	
Internal Link Dist (m)		304.1			40.1		257.8			88.5		
Turn Bay Length (m)	110.0			110.0	125.0		110.0	125.0		135.0		
Base Capacity (vph)	219	681	645	310	481	535	431	1003	381	700	700	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.58	0.26	0.10	0.01	0.55	0.20	0.49	0.36	0.40	0.60	0.11	

Intersection Summary

09/19/2018 Synchro 9 Report Page 2

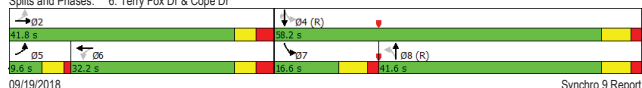
Lanes, Volumes, Timings  
6: Terry Fox Dr & Cope Dr

2018 Existing - PM Peak (with Improvements)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	78	76	2	67	58	179	5	516	24	197	532	72
Future Volume (vph)	78	76	2	67	58	179	5	516	24	197	532	72
Satd. Flow (prot)	1695	1777	0	1695	1583	0	1695	1772	0	1695	1784	1517
Flt Permitted	0.225			0.702			0.447			0.228		
Satd. Flow (perm)	401	1777	0	1253	1583	0	798	1772	0	407	1784	1517
Satd. Flow (RTOR)				1			151			3		84
Lane Group Flow (vph)	85	85	0	73	258	0	5	587	0	214	578	78
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	NA	pm+pt	NA	Perm	NA	Perm
Protected Phases	5	2			6		8			7	4	4
Permitted Phases	2		6	6	8	8	4	4	4	4	4	4
Detector Phase	5	2	6	6	8	8	7	4	4	4	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.5	32.2		32.2	32.2		33.5	33.5		11.4	33.5	33.5
Total Split (s)	9.6	41.8		32.2	32.2		41.6	41.6		16.6	58.2	58.2
Total Split (%)	9.6%	41.8%		32.2%	32.2%		41.6%	41.6%		16.6%	58.2%	58.2%
Yellow Time (s)	3.5	3.3		3.3	3.3		4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	1.0	2.9		2.9	2.9		1.8	1.8		1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.5	6.2		6.2	6.2		6.4	6.4		6.4	6.4	6.4
Lead/Lag	Lead			Lag	Lag		Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes		
Recall Mode	None	None		None	None		C-Max	C-Max		None	C-Max	C-Max
Act Effct Green (s)	22.7	21.0		13.3	13.3		47.6	47.6		66.4	66.4	66.4
Actuated g/C Ratio	0.23	0.21		0.13	0.13		0.48	0.48		0.66	0.66	0.66
v/c Ratio	0.54	0.23		0.44	0.75		0.01	0.70		0.50	0.49	0.08
Control Delay	41.4	30.5		45.9	30.9		20.0	29.5		12.4	11.9	2.2
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	41.4	30.5		45.9	30.9		20.0	29.5		12.4	11.9	2.2
LOS	D	C		D	C		B	C		B	B	A
Approach Delay		36.0			34.2			29.4			11.2	
Approach LOS		D			C			C			B	

Intersection Summary												
Cycle Length: 100												
Actuated Cycle Length: 100												
Offset: 0 (0%), Referenced to phase 4:SBTL and 8:NBT, Start of Green												
Natural Cycle: 90												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.75												
Intersection Signal Delay: 22.7												
Intersection Capacity Utilization 80.7%												
ICU Level of Service D												
Analysis Period (min) 15												










Splits and Phases: 6: Terry Fox Dr & Cope Dr



09/19/2018 Synchro 9 Report Page 3

Queues  
6: Terry Fox Dr & Cope Dr

2018 Existing - PM Peak (with Improvements)

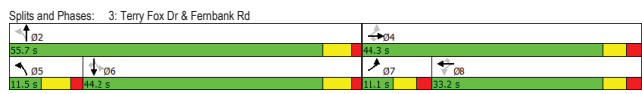
									
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	85	85	73	258	5	587	214	578	78
v/c Ratio	0.54	0.23	0.44	0.75	0.01	0.70	0.50	0.49	0.08
Control Delay	41.4	30.5	45.9	30.9	20.0	29.5	12.4	11.9	2.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.4	30.5	45.9	30.9	20.0	29.5	12.4	11.9	2.2
Queue Length 50th (m)	13.2	13.3	13.3	19.7	0.5	89.4	15.1	52.3	0.0
Queue Length 95th (m)	22.3	22.7	24.1	42.1	3.1	#175.0	32.1	101.0	5.5
Internal Link Dist (m)		97.1		56.3		119.2		183.3	
Turn Bay Length (m)	40.0		50.0		55.0		75.0		165.0
Base Capacity (vph)	156	633	325	523	379	844	435	1184	1035
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.13	0.22	0.49	0.01	0.70	0.49	0.49	0.08
Intersection Summary									

Lanes, Volumes, Timings  
3: Terry Fox Dr & Fernbank Rd

5331 Fernbank Rd TIA  
2018 Existing - SAT Peak (With Improvements)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	89	151	65	108	246	9	93	409	63	153	631	60
Future Volume (vph)	89	151	65	108	246	9	93	409	63	153	631	60
Satd. Flow (prot)	1695	1784	1517	1695	1784	1517	1695	1749	0	1695	1784	1517
Flt Permitted	0.286			0.653			0.136			0.474		
Satd. Flow (perm)	510	1784	1517	1165	1784	1517	243	1749	0	846	1784	1517
Satd. Flow (RTOR)				106			172			11		
Lane Group Flow (vph)	97	164	71	117	267	10	101	513	0	166	686	65
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	7	4			8		5	2			6	
Permitted Phases	4		4	8		8	2			6		6
Detector Phase	7	4	4	8	8	8	5	2		6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	11.1	33.2	33.2	33.2	33.2	33.2	11.5	29.2		29.2	29.2	29.2
Total Split (s)	11.1	44.3	44.3	33.2	33.2	33.2	11.5	55.7		44.2	44.2	44.2
Total Split (%)	11.1%	44.3%	44.3%	33.2%	33.2%	33.2%	11.5%	55.7%		44.2%	44.2%	44.2%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	2.4	2.5	2.5	2.5	2.5	2.5	1.9	1.6		1.6	1.6	1.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.1	6.2	6.2	6.2	6.2	6.2	6.5	6.2		6.2	6.2	6.2
Lead/Lag	Lead			Lag	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes			Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	Max		Max	Max	Max
Act Effct Green (s)	27.1	27.0	27.0	18.5	18.5	18.5	49.8	50.1		41.3	41.3	41.3
Actuated g/C Ratio	0.30	0.30	0.30	0.21	0.21	0.21	0.56	0.56		0.46	0.46	0.46
v/c Ratio	0.44	0.31	0.13	0.49	0.73	0.02	0.47	0.52		0.43	0.84	0.08
Control Delay	28.3	24.5	2.2	38.9	45.3	0.1	19.4	16.4		25.1	36.4	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	28.3	24.5	2.2	38.9	45.3	0.1	19.4	16.4		25.1	36.4	0.2
LOS	C	C	A	D	D	A	B	B		C	D	A
Approach Delay		20.8			42.3			16.9			31.8	
Approach LOS		C			D			B			C	

Intersection Summary												
Cycle Length: 100												
Actuated Cycle Length: 89.7												
Natural Cycle: 95												
Control Type: Actuated-Uncoordinated												
Maximum v/c Ratio: 0.84												
Intersection Signal Delay: 28.0												
Intersection Capacity Utilization 80.2%												
ICU Level of Service D												
Analysis Period (min) 15												



Queues  
3: Terry Fox Dr & Fernbank Rd

5331 Fernbank Rd TIA  
2018 Existing - SAT Peak (With Improvements)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	97	164	71	117	267	10	101	513	166	686	65	
v/c Ratio	0.44	0.31	0.13	0.49	0.73	0.02	0.47	0.52	0.43	0.84	0.08	
Control Delay	28.3	24.5	2.2	38.9	45.3	0.1	19.4	16.4	25.1	36.4	0.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	28.3	24.5	2.2	38.9	45.3	0.1	19.4	16.4	25.1	36.4	0.2	
Queue Length 50th (m)	12.1	21.3	0.0	18.4	44.5	0.0	8.3	54.1	20.8	112.3	0.0	
Queue Length 95th (m)	23.0	36.1	4.0	34.6	69.5	0.0	19.1	98.6	45.4	#207.7	0.0	
Internal Link Dist (m)		304.1			40.1			257.8			88.4	
Turn Bay Length (m)	110.0		110.0	125.0			110.0		125.0		135.0	
Base Capacity (vph)	221	766	712	354	543	582	216	981	389	821	791	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.44	0.21	0.10	0.33	0.49	0.02	0.47	0.52	0.43	0.84	0.08	

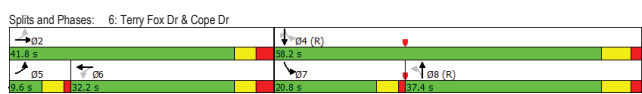
Intersection Summary  
# 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.

Lanes, Volumes, Timings  
6: Terry Fox Dr & Cope Dr

5331 Fernbank Rd TIA  
2018 Existing - SAT Peak (With Improvements)










Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	133	87	3	63	105	205	1	497	9	314	778	144
Future Volume (vph)	133	87	3	63	105	205	1	497	9	314	778	144
Satd. Flow (prot)	1695	1775	0	1695	1608	0	1695	1779	0	1695	1784	1517
Flt Permitted	0.185			0.694			0.263			0.141		
Satd. Flow (perm)	330	1775	0	1238	1608	0	469	1779	0	252	1784	1517
Satd. Flow (RTOR)				2			95			1		
Lane Group Flow (vph)	145	98	0	68	337	0	1	550	0	341	846	157
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	NA	pm+pt	NA	Perm	NA	Perm
Protected Phases	5	2			6			8		7	4	
Permitted Phases	2			6		8				4		4
Detector Phase	5	2		6	6		8	8		7	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.5	32.2		32.2	32.2		33.5	33.5		9.5	33.5	33.5
Total Split (s)	9.6	41.8		32.2	32.2		37.4	37.4		20.8	58.2	58.2
Total Split (%)	9.6%	41.8%		32.2%	32.2%		37.4%	37.4%		20.8%	58.2%	58.2%
Yellow Time (s)	3.5	3.3		3.3	3.3		4.6	4.6		3.5	4.6	4.6
All-Red Time (s)	1.0	2.9		2.9	2.9		1.8	1.8		1.0	1.8	1.8
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.5	6.2		6.2	6.2		6.4	6.4		4.5	6.4	6.4
Lead/Lag	Lead			Lag	Lag		Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes		
Recall Mode	None	None		None	None		C-Max	C-Max		None	C-Max	C-Max
Act Effct Green (s)	31.7	30.0		20.4	20.4		34.4	34.4		59.3	57.4	57.4
Actuated g/C Ratio	0.32	0.30		0.20	0.20		0.34	0.34		0.59	0.57	0.57
v/c Ratio	0.83	0.18		0.27	0.84		0.01	0.90		0.82	0.83	0.17
Control Delay	63.5	24.6		34.2	44.7		24.0	52.2		37.6	27.6	2.5
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	63.5	24.6		34.2	44.7		24.0	52.2		37.6	27.6	2.5
LOS	E	C		C	D		C	D		D	C	A
Approach Delay		47.8			42.9			52.2			27.2	
Approach LOS		D			D			D			C	

Intersection Summary												
Cycle Length: 100												
Actuated Cycle Length: 100												
Offset: 0 (0%), Referenced to phase 4:SBTL and 8:NBTL, Start of Green												
Natural Cycle: 95												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.90												
Intersection Signal Delay: 37.1												
Intersection Capacity Utilization 93.9%												
ICU Level of Service F												
Analysis Period (min) 15												



Queues  
6: Terry Fox Dr & Cope Dr

5331 Fernbank Rd TIA  
2018 Existing - SAT Peak (With Improvements)

									
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	145	98	68	337	1	550	341	846	157
v/c Ratio	0.83	0.18	0.27	0.84	0.01	0.90	0.82	0.83	0.17
Control Delay	63.5	24.6	34.2	44.7	24.0	52.2	37.6	27.6	2.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	63.5	24.6	34.2	44.7	24.0	52.2	37.6	27.6	2.5
Queue Length 50th (m)	20.6	13.6	11.1	45.6	0.1	105.7	40.8	127.1	0.0
Queue Length 95th (m)	#43.2	23.8	21.6	73.4	1.4	#174.3	#96.8	#226.3	9.1
Internal Link Dist (m)		97.1		56.4		119.2		183.3	
Turn Bay Length (m)	40.0		50.0		55.0		75.0		165.0
Base Capacity (vph)	174	633	321	488	161	613	415	1023	937
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.83	0.15	0.21	0.69	0.01	0.90	0.82	0.83	0.17

## **TERRY FOX DRIVE & COPE DRIVE COMMERCIAL SHOPPING DEVELOPMENT**

Appendix B Intersection Performance Worksheets  
September 19, 2018

### **B.3 2020 FUTURE BACKGROUND**

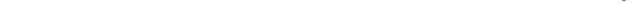


Lanes, Volumes, Timings  
3: Terry Fox Dr & Fernbank Rd

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	126	124	90	3	128	154	67	350	2	61	215	43
Future Volume (vph)	126	124	90	3	128	154	67	350	2	61	215	43
Satd. Flow (prot)	1695	1784	1517	1695	1784	1517	1695	1783	0	1695	1784	1517
Flt Permitted	0.445			0.677			0.624			0.518		
Satd. Flow (perm)	794	1784	1517	1208	1784	1517	1113	1783	0	924	1784	1517
Satd. Flow (RTOR)				90			154					113
Lane Group Flow (vph)	126	124	90	3	128	154	67	352	0	61	215	43
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	NA	NA	Perm	NA	NA	Perm
Protected Phases	7	4			8			2		6	6	
Permitted Phases	4		4	8		8	2			6	6	6
Detector Phase	7	4	4	8	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	11.1	33.2	33.2	33.2	33.2	33.2	29.2	29.2		29.2	29.2	29.2
Total Split (s)	14.0	48.0	48.0	34.0	34.0	34.0	42.0	42.0		42.0	42.0	42.0
Total Split (%)	15.6%	53.3%	53.3%	37.8%	37.8%	37.8%	46.7%	46.7%		46.7%	46.7%	46.7%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	2.4	2.5	2.5	2.5	2.5	2.5	1.6	1.6		1.6	1.6	1.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.1	6.2	6.2	6.2	6.2	6.2	6.2	6.2		6.2	6.2	6.2
Lead/Lag	Lead			Lag		Lag		Lag				
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Recall Mode	None	None	None	None	None	None	C-Max	C-Max		C-Max	C-Max	C-Max
Act Effct Green (s)	25.8	25.7	25.7	11.8	11.8	11.8	51.9	51.9		51.9	51.9	51.9
Actuated g/C Ratio	0.29	0.29	0.29	0.13	0.13	0.13	0.58	0.58		0.58	0.58	0.58
v/c Ratio	0.41	0.24	0.18	0.02	0.55	0.46	0.10	0.34		0.11	0.21	0.05
Control Delay	28.1	25.0	5.9	31.7	44.8	10.6	10.3	11.9		10.6	10.6	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	28.1	25.0	5.9	31.7	44.8	10.6	10.3	11.9		10.6	10.6	0.1
LOS	C	C	A	C	D	B	B	B		B	B	A
Approach Delay		21.1			26.2			11.7			9.2	
Approach LOS		C			C			B			A	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 9 (10%), Referenced to phase 2:NBT and 6:SBT, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.55	
Intersection Signal Delay: 16.5	Intersection LOS: B
Intersection Capacity Utilization 58.8%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 3: Terry Fox Dr & Fernbank Rd



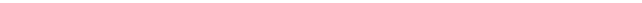
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Lanes, Volumes, Timings  
6: Terry Fox Dr & Cope Dr

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (vph)	48	18	1	28	15	193	5	596	29	144	289	34
Future Volume (vph)	48	18	1	28	15	193	5	596	29	144	289	34
Satd. Flow (prot)	1695	1770	0	1695	1536	0	1695	1772	0	1695	1784	1517
Flt Permitted	0.412			0.745			0.583			0.393		
Satd. Flow (perm)	735	1770	0	1329	1536	0	1040	1772	0	701	1784	1517
Satd. Flow (RTOR)				1			193			4		39
Lane Group Flow (vph)	48	19	0	28	208	0	5	625	0	144	289	34
Turn Type	Perm	NA	NA	Perm	NA	NA	Perm	NA	NA	Perm	NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases	2			6		8				4		4
Detector Phase	2	2		6	6	8	8			4	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	32.2	32.2		32.2	32.2		33.5	33.5		33.5	33.5	33.5
Total Split (s)	33.0	33.0		33.0	33.0		57.0	57.0		57.0	57.0	57.0
Total Split (%)	36.7%	36.7%		36.7%	36.7%		63.3%	63.3%		63.3%	63.3%	63.3%
Yellow Time (s)	3.3	3.3		3.3	3.3		4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	2.9	2.9		2.9	2.9		1.8	1.8		1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.2	6.2		6.2	6.2		6.4	6.4		6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	C-Max
Act Effct Green (s)	9.7	9.7		9.7	9.7		67.7	67.7		67.7	67.7	67.7
Actuated g/C Ratio	0.11	0.11		0.11	0.11		0.75	0.75		0.75	0.75	0.75
v/c Ratio	0.61	0.10		0.20	0.62		0.01	0.47		0.27	0.22	0.03
Control Delay	68.3	33.9		38.0	15.4		3.8	6.1		5.7	4.2	1.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	68.3	33.9		38.0	15.4		3.8	6.1		5.7	4.2	1.3
LOS	E	C		D	B		A	B		A	A	A
Approach Delay		58.6			18.1			6.1			4.4	
Approach LOS		E			B			A			A	

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 55 (61%), Referenced to phase 4:SBT and 8:NBT, Start of Green	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.62	
Intersection Signal Delay: 10.1	Intersection LOS: B
Intersection Capacity Utilization 82.0%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 6: Terry Fox Dr & Cope Dr



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Queues  
3: Terry Fox Dr & Fernbank Rd

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	126	124	90	3	128	154	67	352	0	61	215	43
v/c Ratio	0.41	0.24	0.18	0.02	0.55	0.46	0.10	0.34		0.11	0.21	0.05
Control Delay	28.1	25.0	5.9	31.7	44.8	10.6	10.3	11.9		10.6	10.6	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	28.1	25.0	5.9	31.7	44.8	10.6	10.3	11.9		10.6	10.6	0.1
Queue Length 50th (m)	16.7	16.4	0.0	0.5	21.0	0.0	4.9	29.8		4.5	16.6	0.0
Queue Length 95th (m)	28.4	27.9	9.6	2.8	36.0	15.5	12.2	52.8		11.6	31.6	0.0
Internal Link Dist (m)		304.2			40.0		257.8			88.4		
Turn Bay Length (m)	110.0		110.0	125.0		110.0	125.0			135.0		
Base Capacity (vph)	306	828	752	373	551	575	642	1029		533	1029	923
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.41	0.15	0.12	0.01	0.23	0.27	0.10	0.34		0.11	0.21	0.05

Intersection Summary

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Queues  
6: Terry Fox Dr & Cope Dr

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	48	19	28	208	5	625	144	289	34
v/c Ratio	0.61	0.10	0.20	0.62	0.01	0.47	0.27	0.22	0.03
Control Delay	68.3	33.9	38.0	15.4	3.8	6.1	5.7	4.2	1.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	68.3	33.9	38.0	15.4	3.8	6.1	5.7	4.2	1.3
Queue Length 50th (m)	8.1	2.9	4.5	2.4	0.2	32.6	6.2	11.8	0.0
Queue Length 95th (m)	18.6	8.7	11.7	20.9	1.1	64.0	16.4	24.3	2.2
Internal Link Dist (m)		97.2		56.3		119.3		183.3	
Turn Bay Length (m)	40.0		50.0		55.0	75.0		165.0	
Base Capacity (vph)	218	527	395	592	782	1333	527	1341	1150
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.04	0.07	0.35	0.01	0.47	0.27	0.22	0.03

Intersection Summary

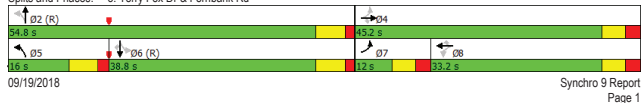
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Lanes, Volumes, Timings  
3: Terry Fox Dr & Fernbank Rd

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	→	↱	↰	→	↱	↰	→	↱	↰	→	↱
Traffic Volume (vph)	124	168	61	2	249	105	197	353	5	147	404	77
Future Volume (vph)	124	168	61	2	249	105	197	353	5	147	404	77
Satd. Flow (prot)	1695	1784	1517	1695	1784	1517	1695	1784	0	1695	1784	1517
Flt Permitted	0.299			0.651			0.321			0.547		
Satd. Flow (perm)	534	1784	1517	1162	1784	1517	573	1781	0	976	1784	1517
Satd. Flow (RTOR)				106			172			1		172
Lane Group Flow (vph)	124	168	61	2	249	105	197	358	0	147	404	77
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	NA	Perm	Perm
Protected Phases	7	4			8		5	2			6	
Permitted Phases	4		4	8		8	5	2		6		6
Detector Phase	7	4	4	8	8	8	5	2		6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	11.1	33.2	33.2	33.2	33.2	33.2	11.5	29.2		29.2	29.2	29.2
Total Split (s)	12.0	45.2	45.2	33.2	33.2	33.2	16.0	54.8		38.8	38.8	38.8
Total Split (%)	12.0%	45.2%	45.2%	33.2%	33.2%	33.2%	16.0%	54.8%		38.8%	38.8%	38.8%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	2.4	2.5	2.5	2.5	2.5	2.5	1.9	1.6		1.6	1.6	1.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.1	6.2	6.2	6.2	6.2	6.2	6.5	6.2		6.2	6.2	6.2
Lead/Lag	Lead			Lag	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes			Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max		C-Max	C-Max	C-Max
Act Effct Green (s)	31.4	31.3	31.3	19.3	19.3	19.3	56.0	56.3		39.5	39.5	39.5
Actuated g/C Ratio	0.31	0.31	0.31	0.19	0.19	0.19	0.56	0.56		0.40	0.40	0.40
v/c Ratio	0.53	0.30	0.11	0.01	0.73	0.24	0.45	0.36		0.38	0.57	0.11
Control Delay	32.8	26.4	1.4	29.0	49.6	2.0	15.7	14.2		27.6	29.4	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	32.8	26.4	1.4	29.0	49.6	2.0	15.7	14.2		27.6	29.4	0.3
LOS	C	C	A	C	D	A	B	B		C	C	A
Approach Delay		24.3			35.4			14.8			25.4	
Approach LOS		C			D			B			C	

<b>Intersection Summary</b>												
Cycle Length: 100												
Actuated Cycle Length: 100												
Offset: 91 (91%), Referenced to phase 2:NBT and 6:SBTL, Start of Green												
Natural Cycle: 85												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.73												
Intersection Signal Delay: 24.0												
Intersection Capacity Utilization 75.9%												
ICU Level of Service D												
Analysis Period (min) 15												

Splits and Phases: 3: Terry Fox Dr & Fernbank Rd



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Queues  
3: Terry Fox Dr & Fernbank Rd

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	124	168	61	2	249	105	197	358	147	404	77	
v/c Ratio	0.53	0.30	0.11	0.01	0.73	0.24	0.45	0.36	0.38	0.57	0.11	
Control Delay	32.8	26.4	1.4	29.0	49.6	2.0	15.7	14.2	27.6	29.4	0.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	32.8	26.4	1.4	29.0	49.6	2.0	15.7	14.2	27.6	29.4	0.3	
Queue Length 50th (m)	17.7	24.6	0.0	0.3	45.7	0.0	17.8	35.5	20.2	61.0	0.0	
Queue Length 95th (m)	28.3	36.7	2.1	2.0	65.6	1.9	35.1	63.9	41.3	101.0	0.0	
Internal Link Dist (m)		304.1			40.1			257.7		88.5		
Turn Bay Length (m)	110.0		110.0	125.0		110.0		125.0		135.0		
Base Capacity (vph)	236	695	656	313	481	535	441	1003	385	704	703	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.53	0.24	0.09	0.01	0.52	0.20	0.45	0.36	0.38	0.57	0.11	

Intersection Summary

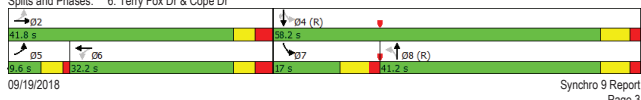
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Lanes, Volumes, Timings  
6: Terry Fox Dr & Cope Dr

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	→	↱	↰	→	↱	↰	→	↱	↰	→	↱
Traffic Volume (vph)	78	76	2	72	58	189	5	544	32	213	553	72
Future Volume (vph)	78	76	2	72	58	189	5	544	32	213	553	72
Satd. Flow (prot)	1695	1777	0	1695	1579	0	1695	1770	0	1695	1784	1517
Flt Permitted	0.237			0.706			0.457			0.245		
Satd. Flow (perm)	423	1777	0	1260	1579	0	815	1770	0	437	1784	1517
Satd. Flow (RTOR)				1			159			3		84
Lane Group Flow (vph)	78	78	0	72	247	0	5	576	0	213	553	72
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	NA	pm+pt	NA	Perm	NA	Perm
Protected Phases	5	2			6		8			7	4	
Permitted Phases	2		6		6		8		4		4	
Detector Phase	5	2	6	6	6	8	8	7	4	4		
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.5	32.2		32.2	32.2		33.5	33.5		11.4	33.5	33.5
Total Split (s)	9.6	41.8		32.2	32.2		41.2	41.2		17.0	58.2	58.2
Total Split (%)	9.6%	41.8%		32.2%	32.2%		41.2%	41.2%		17.0%	58.2%	58.2%
Yellow Time (s)	3.5	3.3		3.3	3.3		4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	1.0	2.9		2.9	2.9		1.8	1.8		1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.5	6.2		6.2	6.2		6.4	6.4		6.4	6.4	6.4
Lead/Lag	Lead			Lag	Lag		Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes		
Recall Mode	None	None		None	None		C-Max	C-Max		None	C-Max	C-Max
Act Effct Green (s)	21.8	20.1		12.4	12.4		48.7	48.7		67.3	67.3	67.3
Actuated g/C Ratio	0.22	0.20		0.12	0.12		0.49	0.49		0.67	0.67	0.67
v/c Ratio	0.50	0.22		0.46	0.74		0.01	0.67		0.48	0.46	0.07
Control Delay	39.9	31.1		48.2	28.5		19.6	27.8		11.4	10.9	1.8
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	39.9	31.1		48.2	28.5		19.6	27.8		11.4	10.9	1.8
LOS	D	C		D	C		B	C		B	B	A
Approach Delay		35.5			33.0			27.7			10.3	
Approach LOS		D			C			C			B	










<b>Intersection Summary</b>												
Cycle Length: 100												
Actuated Cycle Length: 100												
Offset: 0 (0%), Referenced to phase 4:SBTL and 8:NBT, Start of Green												
Natural Cycle: 90												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.74												
Intersection Signal Delay: 21.5												
Intersection Capacity Utilization 84.4%												
ICU Level of Service E												
Analysis Period (min) 15												

Splits and Phases: 6: Terry Fox Dr & Cope Dr



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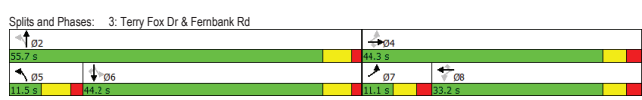
Queues  
6: Terry Fox Dr & Cope Dr

									
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	78	78	72	247	5	576	213	553	72
v/c Ratio	0.50	0.22	0.46	0.74	0.01	0.67	0.48	0.46	0.07
Control Delay	39.9	31.1	48.2	28.5	19.6	27.8	11.4	10.9	1.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.9	31.1	48.2	28.5	19.6	27.8	11.4	10.9	1.8
Queue Length 50th (m)	12.3	12.4	13.3	16.2	0.5	82.7	14.3	46.9	0.0
Queue Length 95th (m)	21.4	21.7	24.4	38.2	3.1	117.2	30.9	91.3	4.5
Internal Link Dist (m)		97.1		56.3		119.2		183.3	
Turn Bay Length (m)	40.0		50.0		55.0		75.0		165.0
Base Capacity (vph)	157	633	327	528	396	863	455	1200	1048
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.12	0.22	0.47	0.01	0.67	0.47	0.46	0.07

# Lanes, Volumes, Timings 3: Terry Fox Dr & Fernbank Rd

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	→	↱	↰	→	↱	↰	→	↱	↰	→	↱
Traffic Volume (vph)	91	154	66	110	251	9	95	417	64	156	644	61
Future Volume (vph)	91	154	66	110	251	9	95	417	64	156	644	61
Satd. Flow (prot)	1695	1784	1517	1695	1784	1517	1695	1749	0	1695	1784	1517
Flt Permitted	0.304			0.659			0.171			0.489		
Satd. Flow (perm)	542	1784	1517	1176	1784	1517	305	1749	0	873	1784	1517
Satd. Flow (RTOR)				106			172			11		172
Lane Group Flow (vph)	91	154	66	110	251	9	95	481	0	156	644	61
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	7	4			8		5	2		6		6
Permitted Phases	4		4	8		8	5	2		6	6	6
Detector Phase	7	4	4	8	8	8	5	2		6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	11.1	33.2	33.2	33.2	33.2	33.2	11.5	29.2		29.2	29.2	29.2
Total Split (s)	11.1	44.3	44.3	33.2	33.2	33.2	11.5	55.7		44.2	44.2	44.2
Total Split (%)	11.1%	44.3%	44.3%	33.2%	33.2%	33.2%	11.5%	55.7%		44.2%	44.2%	44.2%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	2.4	2.5	2.5	2.5	2.5	2.5	1.9	1.6		1.6	1.6	1.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.1	6.2	6.2	6.2	6.2	6.2	6.5	6.2		6.2	6.2	6.2
Lead/Lag	Lead			Lag	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes			Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	Max		Max	Max	Max
Act Effct Green (s)	26.4	26.3	26.3	17.8	17.8	17.8	49.8	50.1		41.3	41.3	41.3
Actuated g/C Ratio	0.30	0.30	0.30	0.20	0.20	0.20	0.56	0.56		0.46	0.46	0.46
v/c Ratio	0.40	0.29	0.13	0.47	0.71	0.02	0.38	0.49		0.39	0.78	0.08
Control Delay	27.3	24.5	1.9	38.7	44.7	0.1	16.1	15.4		23.6	32.2	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	27.3	24.5	1.9	38.7	44.7	0.1	16.1	15.4		23.6	32.2	0.2
LOS	C	C	A	D	D	A	B	B		C	C	A
Approach Delay		20.5			41.8		15.5				28.3	
Approach LOS		C			D		B				C	

<b>Intersection Summary</b>												
Cycle Length: 100												
Actuated Cycle Length: 88.9												
Natural Cycle: 95												
Control Type: Actuated-Uncoordinated												
Maximum v/c Ratio: 0.78												
Intersection Signal Delay: 26.0												
Intersection Capacity Utilization 81.4%												
Analysis Period (min) 15												



# Queues 3: Terry Fox Dr & Fernbank Rd

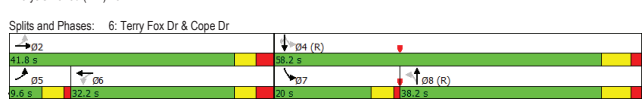
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	91	154	66	110	251	9	95	481	156	644	61	
v/c Ratio	0.40	0.29	0.13	0.47	0.71	0.02	0.38	0.49	0.39	0.78	0.08	
Control Delay	27.3	24.5	1.9	38.7	44.7	0.1	16.1	15.4	23.6	32.2	0.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	27.3	24.5	1.9	38.7	44.7	0.1	16.1	15.4	23.6	32.2	0.2	
Queue Length 50th (m)	11.4	19.9	0.0	17.2	41.3	0.0	7.6	48.2	18.8	99.6	0.0	
Queue Length 95th (m)	21.8	34.1	3.0	32.7	65.4	0.0	17.9	89.1	41.5	187.4	0.0	
Internal Link Dist (m)		304.2			40.0		257.8		88.4			
Turn Bay Length (m)	110.0		110.0	125.0		110.0	125.0		135.0			
Base Capacity (vph)	226	773	717	361	548	585	249	990	405	828	796	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.40	0.20	0.09	0.30	0.46	0.02	0.38	0.49	0.39	0.78	0.08	

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










# Lanes, Volumes, Timings 6: Terry Fox Dr & Cope Dr

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	→	↱	↰	→	↱	↰	→	↱	↰	→	↱
Traffic Volume (vph)	133	87	3	63	105	205	1	507	9	314	794	144
Future Volume (vph)	133	87	3	63	105	205	1	507	9	314	794	144
Satd. Flow (prot)	1695	1775	0	1695	1608	0	1695	1779	0	1695	1784	1517
Flt Permitted	0.203			0.699			0.310			0.222		
Satd. Flow (perm)	362	1775	0	1247	1608	0	553	1779	0	396	1784	1517
Satd. Flow (RTOR)				2			95			1		144
Lane Group Flow (vph)	133	90	0	63	310	0	1	516	0	314	794	144
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	NA	pm+pt	NA	Perm	NA	Perm
Protected Phases	5	2			6		8			7	4	4
Permitted Phases	2		6		8		8			4	4	4
Detector Phase	5	2	6	6	8	8	7	4	4			
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.5	32.2	32.2	32.2	33.5	33.5	9.5	33.5		33.5	33.5	33.5
Total Split (s)	9.6	41.8	32.2	32.2	38.2	38.2	20.0	58.2		58.2	58.2	58.2
Total Split (%)	9.6%	41.8%	32.2%	32.2%	38.2%	38.2%	20.0%	58.2%		58.2%	58.2%	58.2%
Yellow Time (s)	3.5	3.3	3.3	3.3	4.6	4.6	3.5	4.6		4.6	4.6	4.6
All-Red Time (s)	1.0	2.9	2.9	2.9	1.8	1.8	1.0	1.8		1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.5	6.2	6.2	6.2	6.4	6.4	4.5	6.4		6.4	6.4	6.4
Lead/Lag	Lead			Lag	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes			Yes		
Recall Mode	None	None	None	None	C-Max	C-Max	None	C-Max		C-Max	C-Max	C-Max
Act Effct Green (s)	30.3	28.6	19.0	19.0	38.5	38.5	60.7	58.8		58.8	58.8	58.8
Actuated g/C Ratio	0.30	0.29	0.19	0.19	0.38	0.38	0.61	0.59		0.59	0.59	0.59
v/c Ratio	0.75	0.18	0.27	0.81	0.00	0.75	0.71	0.76		0.76	0.15	
Control Delay	52.5	25.3	35.1	42.9	23.0	37.5	21.1	22.9		2.5		
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	52.5	25.3	35.1	42.9	23.0	37.5	21.1	22.9		2.5		
LOS	D	C	D	D	C	D	C	C		A		
Approach Delay		41.5			41.6		37.4			20.1		
Approach LOS		D			D		D			C		

<b>Intersection Summary</b>												
Cycle Length: 100												
Actuated Cycle Length: 100												
Offset: 0 (0%), Referenced to phase 4:SBTL and 8:NBTL, Start of Green												
Natural Cycle: 95												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.81												
Intersection Signal Delay: 29.3												
Intersection Capacity Utilization 94.8%												
Analysis Period (min) 15												



# Queues 6: Terry Fox Dr & Cope Dr

									
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	133	90	63	310	1	516	314	794	144
v/c Ratio	0.75	0.18	0.27	0.81	0.00	0.75	0.71	0.76	0.15
Control Delay	52.5	25.3	35.1	42.9	23.0	37.5	21.1	22.9	2.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.5	25.3	35.1	42.9	23.0	37.5	21.1	22.9	2.5
Queue Length 50th (m)	19.3	12.7	10.5	40.5	0.1	90.6	27.4	107.5	0.0
Queue Length 50th (m)	#34.8	22.3	20.3	65.6	1.3	#155.9	#62.8	#204.0	8.7
Internal Link Dist (m)		97.2		56.3		119.2		183.3	
Turn Bay Length (m)	40.0		50.0		55.0		75.0		165.0
Base Capacity (vph)	177	633	324	488	212	685	458	1049	90
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.75	0.14	0.19	0.64	0.00	0.75	0.69	0.76	0.15

## TERRY FOX DRIVE & COPE DRIVE COMMERCIAL SHOPPING DEVELOPMENT

Appendix B Intersection Performance Worksheets  
September 19, 2018

### B.4 2020 TOTAL FUTURE

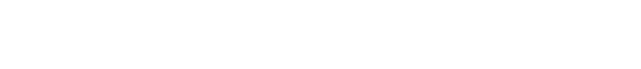


Lanes, Volumes, Timings  
3: Terry Fox Dr & Fernbank Rd

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	140	124	90	14	139	157	67	378	2	64	226	43
Future Volume (vph)	140	124	90	14	139	157	67	378	2	64	226	43
Satd. Flow (prot)	1695	1784	1517	1695	1784	1517	1695	1783	0	1695	1784	1517
Flt Permitted	0.439			0.677			0.617			0.492		
Satd. Flow (perm)	783	1784	1517	1208	1784	1517	1101	1783	0	878	1784	1517
Satd. Flow (RTOR)				90			157					113
Lane Group Flow (vph)	140	124	90	14	139	157	67	380	0	64	226	43
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	NA	NA	Perm	NA	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8		8	2			6		6
Detector Phase	7	4	4	8	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.1	33.2	33.2	33.2	33.2	33.2	29.2	29.2	29.2	29.2	29.2	29.2
Total Split (s)	14.0	48.0	48.0	34.0	34.0	34.0	42.0	42.0	42.0	42.0	42.0	42.0
Total Split (%)	15.6%	53.3%	53.3%	37.8%	37.8%	37.8%	46.7%	46.7%	46.7%	46.7%	46.7%	46.7%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	2.4	2.5	2.5	2.5	2.5	2.5	1.6	1.6	1.6	1.6	1.6	1.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.1	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
Lead/Lag	Lead			Lag		Lag		Lag				
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Recall Mode	None	None	None	None	None	None	C-Max	C-Max		C-Max	C-Max	C-Max
Act Effct Green (s)	26.6	26.5	26.5	12.5	12.5	12.5	51.1	51.1		51.1	51.1	51.1
Actuated g/C Ratio	0.30	0.29	0.29	0.14	0.14	0.14	0.57	0.57		0.57	0.57	0.57
v/c Ratio	0.45	0.24	0.18	0.08	0.56	0.45	0.11	0.38		0.13	0.22	0.05
Control Delay	28.3	24.2	5.6	32.4	44.2	10.1	10.8	12.8		8.9	9.1	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	28.3	24.2	5.6	32.4	44.2	10.1	10.8	12.8		8.9	9.1	0.3
LOS	C	C	A	C	D	B	B	B		A	A	A
Approach Delay		21.1			26.4			12.5			7.9	
Approach LOS		C			C			B			A	

Intersection Summary												
Cycle Length: 90												
Actuated Cycle Length: 90												
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green, Master Intersection												
Natural Cycle: 75												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.56												
Intersection Signal Delay: 16.5												
Intersection Capacity Utilization 61.8%												
ICU Level of Service B												
Analysis Period (min) 15												

Splits and Phases: 3: Terry Fox Dr & Fernbank Rd



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Lanes, Volumes, Timings  
6: Terry Fox Dr & Cope Dr

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	18	1	42	15	196	5	605	29	158	290	34
Future Volume (vph)	48	18	1	42	15	196	5	605	29	158	290	34
Satd. Flow (prot)	1695	1770	0	1695	1536	0	1695	1772	0	1695	1784	1517
Flt Permitted	0.408			0.745			0.582			0.388		
Satd. Flow (perm)	728	1770	0	1329	1536	0	1038	1772	0	692	1784	1517
Satd. Flow (RTOR)				1			196			4		39
Lane Group Flow (vph)	48	19	0	42	211	0	5	634	0	158	290	34
Turn Type	Perm	NA	NA	Perm	NA	Perm	NA	NA	Perm	NA	NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases	2			6		8				4		4
Detector Phase	2	2		6	6	8	8			4	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	32.2	32.2		32.2	32.2	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Total Split (s)	32.2	32.2		32.2	32.2	57.8	57.8	57.8	57.8	57.8	57.8	57.8
Total Split (%)	35.8%	35.8%		35.8%	35.8%	64.2%	64.2%	64.2%	64.2%	64.2%	64.2%	64.2%
Yellow Time (s)	3.3	3.3		3.3	3.3	4.6	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	2.9	2.9		2.9	2.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2	6.2		6.2	6.2	6.4	6.4	6.4	6.4	6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	9.8	9.8		9.8	9.8	67.6	67.6	67.6	67.6	67.6	67.6	67.6
Actuated g/C Ratio	0.11	0.11		0.11	0.11	0.75	0.75	0.75	0.75	0.75	0.75	0.75
v/c Ratio	0.62	0.10		0.29	0.62	0.01	0.48	0.30	0.22	0.03		
Control Delay	68.5	33.8		40.6	15.3	2.8	4.5	6.1	4.2	1.3		
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	68.5	33.8		40.6	15.3	2.8	4.5	6.1	4.2	1.3		
LOS	E	C		D	B	A	A	A	A	A		
Approach Delay		58.7			19.5		4.5		4.6			
Approach LOS		E			B		A		A			

Intersection Summary												
Cycle Length: 90												
Actuated Cycle Length: 90												
Offset: 72 (80%), Referenced to phase 4:SBTL and 8:NBT, Start of Green												
Natural Cycle: 70												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.62												
Intersection Signal Delay: 9.7												
Intersection Capacity Utilization 83.5%												
ICU Level of Service E												
Analysis Period (min) 15												

Splits and Phases: 6: Terry Fox Dr & Cope Dr



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Queues  
3: Terry Fox Dr & Fernbank Rd










Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	140	124	90	14	139	157	67	380	0	64	226	43
v/c Ratio	0.45	0.24	0.18	0.08	0.56	0.45	0.11	0.38		0.13	0.22	0.05
Control Delay	28.3	24.2	5.6	32.4	44.2	10.1	10.8	12.8		8.9	9.1	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	28.3	24.2	5.6	32.4	44.2	10.1	10.8	12.8		8.9	9.1	0.3
Queue Length 50th (m)	18.6	16.3	0.0	2.2	22.8	0.0	4.9	33.4		3.4	12.2	0.2
Queue Length 95th (m)	30.2	27.0	9.3	7.0	37.9	15.1	12.7	60.4		7.0	22.3	0.0
Internal Link Dist (m)		304.2			40.1		257.8			88.4		
Turn Bay Length (m)	110.0		110.0	125.0		110.0		125.0		135.0		
Base Capacity (vph)	311	828	752	373	551	577	625	1012		498	1013	910
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.45	0.15	0.12	0.04	0.25	0.27	0.11	0.38		0.13	0.22	0.05

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

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Queues  
6: Terry Fox Dr & Cope Dr

									
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	48	19	42	211	5	634	158	290	34
v/c Ratio	0.62	0.10	0.29	0.62	0.01	0.48	0.30	0.22	0.03
Control Delay	68.5	33.8	40.6	15.3	2.8	4.5	6.1	4.2	1.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	68.5	33.8	40.6	15.3	2.8	4.5	6.1	4.2	1.3
Queue Length 50th (m)	8.1	2.9	6.8	2.4	0.2	24.2	7.0	11.9	0.4
Queue Length 95th (m)	18.6	6.7	15.5	21.1	m0.5	33.4	18.6	24.5	2.2
Internal Link Dist (m)			97.2	50.5		119.2		163.3	
Turn Bay Length (m)					55.0		75.0		165.0
Base Capacity (vph)	210	512	383	583	780	1332	519	1340	1149
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.04	0.11	0.36	0.01	0.48	0.30	0.22	0.03
Intersection Summary									
m Volume for 95th percentile queue is metered by upstream signal.									



Intersection							
Int Delay, s/veh	1.7						
Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	↱	↱	↱	↱	↱	↱	
Traffic Vol, veh/h	183	22	31	228	25	36	
Future Vol, veh/h	183	22	31	228	25	36	
Conflicting Peds, #/hr	0	0	0	0	0	0	
Sign Control	Free	Free	Free	Free	Stop	Stop	
RT Channelized	-	None	-	None	-	None	
Storage Length	-	-	-	-	0	-	
Veh in Median Storage, #	0	-	-	0	0	-	
Grade, %	0	-	-	0	0	-	
Peak Hour Factor	100	100	100	100	100	100	
Heavy Vehicles, %	2	2	2	2	2	2	
Mvmt Flow	183	22	31	228	25	36	

Major/Minor	Major1	Major2	Minor1	
Conflicting Flow All	0	0	205	0 484 194
Stage 1	-	-	-	- 194 -
Stage 2	-	-	-	- 290 -
Critical Hdwy	-	-	4.12	- 6.42 6.22
Critical Hdwy Stg 1	-	-	-	- 5.42 -
Critical Hdwy Stg 2	-	-	-	- 5.42 -
Follow-up Hdwy	-	-	2.218	- 3.518 3.318
Pot Cap-1 Maneuver	-	-	1366	- 542 847
Stage 1	-	-	-	- 839 -
Stage 2	-	-	-	- 759 -
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	-	-	1366	- 528 847
Mov Cap-2 Maneuver	-	-	-	- 528 -
Stage 1	-	-	-	- 839 -
Stage 2	-	-	-	- 739 -

Approach	EB	WB	NB
HCM Control Delay, s	0	0.9	10.8
HCM LOS		B	

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	679	-	-	1366	-
HCM Lane V/C Ratio	0.09	-	-	0.023	-
HCM Control Delay (s)	10.8	-	-	7.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-

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Queues  
3: Terry Fox Dr & Fernbank Rd

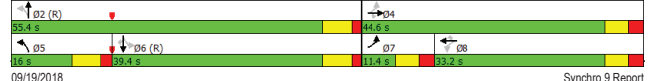
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	146	168	61	25	272	110	197	402	151	427	77		
v/c Ratio	0.66	0.30	0.11	0.11	0.75	0.25	0.48	0.40	0.41	0.61	0.11		
Control Delay	40.2	26.0	1.3	30.9	50.0	2.3	16.6	15.1	21.4	24.2	0.9		
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	40.2	26.0	1.3	30.9	50.0	2.3	16.6	15.1	21.4	24.2	0.9		
Queue Length 50th (m)	20.9	24.3	0.0	4.0	49.8	0.0	18.2	41.9	23.2	71.2	0.7		
Queue Length 95th (m)	32.6	36.7	2.1	10.1	71.1	3.0	35.1	73.2	41.2	110.0	1.6		
Internal Link Dist (m)		304.1			40.1		257.8			88.5			
Turn Bay Length (m)	110.0		110.0	125.0			110.0		125.0		135.0		
Base Capacity (vph)	221	685	647	313	481	535	417	994	367	698	698		
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0		
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0		
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0		
Reduced v/c Ratio	0.66	0.25	0.09	0.08	0.57	0.21	0.47	0.40	0.41	0.61	0.11		

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↱	↱	↱	↱	↱	↱	↱	↱	↱	↱	↱	↱
Traffic Volume (vph)	146	168	61	25	272	110	197	397	5	151	427	77
Future Volume (vph)	146	168	61	25	272	110	197	397	5	151	427	77
Satd. Flow (prot)	1695	1784	1517	1695	1784	1517	1695	1781	0	1695	1784	1517
Flt Permitted	0.278			0.651			0.297			0.526		
Satd. Flow (perm)	496	1784	1517	1162	1784	1517	530	1781	0	939	1784	1517
Satd. Flow (RTOR)				106			172			1		
Lane Group Flow (vph)	146	168	61	25	272	110	197	402	0	151	427	77
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4			8		5	2			6	
Permitted Phases	4		4	8		8	2			6		6
Detector Phase	7	4	4	8	8	8	5	2		6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	11.1	33.2	33.2	33.2	33.2	33.2	11.5	29.2		29.2	29.2	29.2
Total Split (s)	11.4	44.6	44.6	33.2	33.2	33.2	16.0	55.4		39.4	39.4	39.4
Total Split (%)	11.4%	44.6%	44.6%	33.2%	33.2%	33.2%	16.0%	55.4%		39.4%	39.4%	39.4%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	2.4	2.5	2.5	2.5	2.5	2.5	1.9	1.6		1.6	1.6	1.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.1	6.2	6.2	6.2	6.2	6.2	6.5	6.2		6.2	6.2	6.2
Lead/Lag	Lead			Lag	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes			Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max		C-Max	C-Max	C-Max
Act Effect Green (s)	31.9	31.8	31.8	20.4	20.4	20.4	55.5	55.8		39.1	39.1	39.1
Actuated g/C Ratio	0.32	0.32	0.32	0.20	0.20	0.20	0.56	0.56		0.39	0.39	0.39
v/c Ratio	0.66	0.30	0.11	0.11	0.75	0.25	0.48	0.40		0.41	0.61	0.11
Control Delay	40.2	26.0	1.3	30.9	50.0	2.3	16.6	15.1		21.4	24.2	0.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	40.2	26.0	1.3	30.9	50.0	2.3	16.6	15.1		21.4	24.2	0.9
LOS	D	C	A	C	D	A	B	B		C	C	A
Approach Delay		27.5			35.9			15.6			20.8	
Approach LOS		C			D			B			C	

Intersection Summary		
Cycle Length: 100		
Actuated Cycle Length: 100		
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green, Master Intersection		
Natural Cycle: 65		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.75		
Intersection Signal Delay: 23.5		
Intersection LOS: C		
Intersection Capacity Utilization 79.7%		
ICU Level of Service D		
Analysis Period (min) 15		

Splits and Phases: 3: Terry Fox Dr & Fernbank Rd



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Synchro 9 Report  
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Lanes, Volumes, Timings  
6: Terry Fox Dr & Cope Dr

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↱	↱	↱	↱	↱	↱	↱	↱	↱	↱	↱	↱
Traffic Volume (vph)	78	76	2	99	58	195	5	562	32	235	554	72
Future Volume (vph)	78	76	2	99	58	195	5	562	32	235	554	72
Satd. Flow (prot)	1695	1777	0	1695	1577	0	1695	1770	0	1695	1784	1517
Flt Permitted	0.222			0.706			0.457			0.201		
Satd. Flow (perm)	396	1777	0	1260	1577	0	815	1770	0	359	1784	1517
Satd. Flow (RTOR)		1			164			3				84
Lane Group Flow (vph)	78	78	0	99	253	0	5	594	0	235	554	72
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2			6			8		7	4	
Permitted Phases	2		6			8			4		4	
Detector Phase	5	2		6	6	8	8		7	4		
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.5	32.2		32.2	32.2		33.5	33.5		11.4	33.5	33.5
Total Split (s)	9.6	41.8		32.2	32.2		40.8	40.8		17.4	58.2	58.2
Total Split (%)	9.6%	41.8%		32.2%	32.2%		40.8%	40.8%		17.4%	58.2%	58.2%
Yellow Time (s)	3.5	3.3		3.3	3.3		4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	1.0	2.9		2.9	2.9		1.8	1.8		1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.5	6.2		6.2	6.2		6.4	6.4		6.4	6.4	6.4
Lead/Lag	Lead			Lag	Lag		Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes		
Recall Mode	None	None		None	None		C-Max	C-Max		None	C-Max	C-Max
Act Effect Green (s)	22.9	21.2		13.5	13.5		45.1	45.1		66.2	66.2	66.2
Actuated g/C Ratio	0.23	0.21		0.14	0.14		0.45	0.45		0.66	0.66	0.66
v/c Ratio	0.50	0.21		0.58	0.71		0.01	0.74		0.54	0.47	0.07
Control Delay	39.3	30.3		53.1	26.2		17.4	27.4		13.0	11.5	1.8
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	39.3	30.3		53.1	26.2		17.4	27.4		13.0	11.5	1.8
LOS	D	C		D	C		B	C		B	B	A
Approach Delay		34.8			33.7			27.3			11.1	
Approach LOS		C			C			C			B	

Intersection Summary		
Cycle Length: 100		
Actuated Cycle Length: 100		
Offset: 93 (93%), Referenced to phase 4:SBTL and 8:NBT, Start of Green		
Natural Cycle: 90		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.74		
Intersection Signal Delay: 22.0		
Intersection LOS: C		
Intersection Capacity Utilization 87.0%		
ICU Level of Service E		
Analysis Period (min) 15		

Splits and

Queues  
6: Terry Fox Dr & Cope Dr

5331 Fernbank Rd TIA  
2020 Total Future - PM Peak

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	78	78	99	253	5	594	235	554	72
v/c Ratio	0.50	0.21	0.58	0.71	0.01	0.74	0.54	0.47	0.07
Control Delay	39.3	30.3	53.1	26.2	17.4	27.4	13.0	11.5	1.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.3	30.3	53.1	26.2	17.4	27.4	13.0	11.5	1.8
Queue Length 50th (m)	12.0	12.1	18.4	16.1	0.5	64.7	17.0	49.9	0.0
Queue Length 95th (m)	21.3	21.7	31.8	38.7	m1.4	#176.9	34.2	91.7	4.6
Internal Link Dist (m)		97.1		56.3		119.2		183.3	
Turn Bay Length (m)	40.0		50.0		55.0		75.0		165.0
Base Capacity (vph)	156	633	327	531	367	799	436	1181	1032
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.12	0.30	0.48	0.01	0.74	0.54	0.47	0.07

Intersection Summary  
# 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.  
m Volume for 95th percentile queue is metered by upstream signal.

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Lanes, Volumes, Timings  
3: Terry Fox Dr & Fernbank Rd

5331 Fernbank Rd TIA  
2020 Total Future - SAT Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	120	154	66	138	279	15	95	474	64	161	672	61
Future Volume (vph)	120	154	66	138	279	15	95	474	64	161	672	61
Satd. Flow (prot)	1695	1784	1517	1695	1784	1517	1695	1752	0	1695	1784	1517
Flt Permitted	0.231			0.659			0.177			0.453		
Satd. Flow (perm)	412	1784	1517	1176	1784	1517	316	1752	0	808	1784	1517
Satd. Flow (RTOR)				88			144			9		144
Lane Group Flow (vph)	120	154	66	138	279	15	95	538	0	161	672	61
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	NA	Perm	Perm
Protected Phases	7	4			8		5	2		6		6
Permitted Phases	4		4	8		8	2			6		6
Detector Phase	7	4	4	8	8	8	5	2		6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	11.1	33.2	33.2	33.2	33.2	33.2	11.5	29.2		29.2	29.2	29.2
Total Split (s)	13.0	46.2	46.2	33.2	33.2	33.2	12.0	73.8		61.8	61.8	61.8
Total Split (%)	10.8%	38.5%	38.5%	27.7%	27.7%	27.7%	10.0%	61.5%		51.5%	51.5%	51.5%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	2.4	2.5	2.5	2.5	2.5	2.5	1.9	1.6		1.6	1.6	1.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.1	6.2	6.2	6.2	6.2	6.2	6.5	6.2		6.2	6.2	6.2
Lead/Lag	Lead			Lag	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes			Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max		C-Max	C-Max	C-Max
Act Effct Green (s)	36.1	36.0	36.0	23.0	23.0	23.0	71.3	71.6		58.6	58.6	58.6
Actuated g/C Ratio	0.30	0.30	0.30	0.19	0.19	0.19	0.59	0.60		0.49	0.49	0.49
v/c Ratio	0.61	0.29	0.13	0.62	0.82	0.04	0.36	0.51		0.41	0.77	0.07
Control Delay	44.9	32.9	3.5	56.0	65.4	0.2	15.4	16.7		10.9	18.7	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	44.9	32.9	3.5	56.0	65.4	0.2	15.4	16.7		10.9	18.7	0.2
LOS	D	C	A	E	E	A	B	B		B	B	A
Approach Delay		31.4			60.1			16.5			16.0	
Approach LOS		C			E			B			B	

Intersection Summary  
Cycle Length: 120  
Actuated Cycle Length: 120  
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green, Master Intersection  
Natural Cycle: 95  
Control Type: Actuated-Coordinated  
Maximum v/c Ratio: 0.82  
Intersection Signal Delay: 26.7  
Intersection Capacity Utilization: 86.2%  
Analysis Period (min): 15  
ICU Level of Service: E



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HCM 2010 TWSC  
15: Site Access 4 & Cope Dr

5331 Fernbank Rd TIA  
2020 Total Future - PM Peak

Intersection	EBT	EBR	WBL	WBT	NBL	NBR
Int Delay, s/veh	2.3					
Movement						
Lane Configurations						
Traffic Vol, veh/h	311	32	47	309	43	66
Future Vol, veh/h	311	32	47	309	43	66
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	-	0	-
Grade, %	0	-	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	311	32	47	309	43	66

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	343
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	-
Pot Cap-1 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.1	13.7
HCM LOS		B	

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	523	-	-	1216	-
HCM Lane V/C Ratio	0.208	-	-	0.039	-
HCM Control Delay (s)	13.7	-	-	8.1	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %ile Q(veh)	0.8	-	-	0.1	-

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Synchro 9 Report  
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Queues  
3: Terry Fox Dr & Fernbank Rd

5331 Fernbank Rd TIA  
2020 Total Future - SAT Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	120	154	66	138	279	15	95	538	161	672	61	
v/c Ratio	0.61	0.29	0.13	0.62	0.82	0.04	0.36	0.51	0.41	0.77	0.07	
Control Delay	44.9	32.9	3.5	56.0	65.4	0.2	15.4	16.7	10.9	18.7	0.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	44.9	32.9	3.5	56.0	65.4	0.2	15.4	16.7	10.9	18.7	0.2	
Queue Length 50th (m)	21.0	27.4	0.0	29.7	62.9	0.0	9.3	69.7	14.4	138.7	0.0	
Queue Length 95th (m)	34.8	43.1	5.9	49.7	90.5	0.0	18.0	105.2	m18.5	141.0	m0.0	
Internal Link Dist (m)		304.1			40.1			257.8		88.5		
Turn Bay Length (m)	110.0		110.0	125.0		110.0		125.0		135.0		
Base Capacity (vph)	197	594	564	264	401	452	263	1049	394	870	814	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.61	0.26	0.12	0.52	0.70	0.03	0.36	0.51	0.41	0.77	0.07	

Intersection Summary  
m Volume for 95th percentile queue is metered by upstream signal.

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Synchro 9 Report  
Page 2

Lanes, Volumes, Timings  
6: Terry Fox Dr & Cope Dr

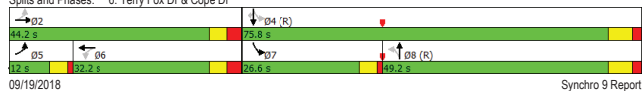
5331 Fernbank Rd TIA  
2020 Total Future - SAT Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	→	↱	↰	→	↱	↰	→	↱	↰	→	↱
Traffic Volume (vph)	133	87	3	96	105	212	1	528	9	343	795	144
Future Volume (vph)	133	87	3	96	105	212	1	528	9	343	795	144
Satd. Flow (prot)	1695	1775	0	1695	1606	0	1695	1779	0	1695	1784	1517
Flt Permitted	0.163			0.699			0.308			0.228		
Satd. Flow (perm)	291	1775	0	1247	1606	0	550	1779	0	407	1784	1517
Satd. Flow (RTOR)		2			77			1				144
Lane Group Flow (vph)	133	90	0	96	317	0	1	537	0	343	795	144
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	Perm
Protected Phases	5	2			6			8		7	4	
Permitted Phases	2			6			8			4		4
Detector Phase	5	2		6	6		8	8		7	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.5	32.2		32.2	32.2		33.5	33.5		9.5	33.5	33.5
Total Split (s)	12.0	44.2		32.2	32.2		49.2	49.2		26.6	75.8	75.8
Total Split (%)	10.0%	36.8%		26.8%	26.8%		41.0%	41.0%		22.2%	63.2%	63.2%
Yellow Time (s)	3.5	3.3		3.3	3.3		4.6	4.6		3.5	4.6	4.6
All-Red Time (s)	1.0	2.9		2.9	2.9		1.8	1.8		1.0	1.8	1.8
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.5	6.2		6.2	6.2		6.4	6.4		4.5	6.4	6.4
Lead/Lag	Lead			Lag	Lag		Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes		
Recall Mode	None	None		None	None		C-Max	C-Max		None	C-Max	C-Max
Act Effct Green (s)	36.1	34.4		22.4	22.4		50.0	50.0		74.9	73.0	73.0
Actuated g/C Ratio	0.30	0.29		0.19	0.19		0.42	0.42		0.62	0.61	0.61
v/c Ratio	0.76	0.18		0.41	0.87		0.00	0.72		0.76	0.73	0.15
Control Delay	59.1	31.1		47.5	59.6		24.0	30.1		24.4	22.7	2.2
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	59.1	31.1		47.5	59.6		24.0	30.1		24.4	22.7	2.2
LOS	E	C		D	E		C	C		C	C	A
Approach Delay		47.8			56.8			30.1			20.8	
Approach LOS		D			E			C			C	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 4:SBTL and 8:NBTL, Start of Green
Natural Cycle: 95
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 31.4
Intersection Capacity Utilization 95.3%
ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 6: Terry Fox Dr & Cope Dr



Queues  
6: Terry Fox Dr & Cope Dr

5331 Fernbank Rd TIA  
2020 Total Future - SAT Peak

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	133	90	96	317	1	537	343	795	144
v/c Ratio	0.76	0.18	0.41	0.87	0.00	0.72	0.76	0.73	0.15
Control Delay	59.1	31.1	47.5	59.6	24.0	30.1	24.4	22.7	2.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	59.1	31.1	47.5	59.6	24.0	30.1	24.4	22.7	2.2
Queue Length 50th (m)	23.1	15.2	19.7	55.2	0.1	92.1	37.4	130.5	0.0
Queue Length 95th (m)	#39.7	27.5	35.6	#95.1	m0.2	#169.1	64.2	189.0	8.3
Internal Link Dist (m)		97.1		56.3		119.2		183.3	
Turn Bay Length (m)	40.0		50.0		55.0		75.0		165.0
Base Capacity (vph)	175	563	270	408	229	742	491	1084	978
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.76	0.16	0.36	0.78	0.00	0.72	0.70	0.73	0.15

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.  
m Volume for 95th percentile queue is metered by upstream signal.

HCM 2010 TWSC  
15: Site Access 4 & Cope Dr

5331 Fernbank Rd TIA  
2020 Total Future - SAT Peak

Intersection						
Int Delay, s/veh	2.9					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰	↱	↰	↱	↰	↱
Traffic Vol, veh/h	396	43	62	359	54	83
Future Vol, veh/h	396	43	62	359	54	83
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	396	43	62	359	54	83

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	439
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	4.12	6.42
Critical Hdwy Stg 1	-	-	5.42
Critical Hdwy Stg 2	-	-	5.42
Follow-up Hdwy	-	2.218	3.518
Pot Cap-1 Maneuver	-	1121	309
Stage 1	-	-	664
Stage 2	-	-	620
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	1121	288
Mov Cap-2 Maneuver	-	-	288
Stage 1	-	-	664
Stage 2	-	-	577

Approach	EB	WB	NB
HCM Control Delay, s	0	1.2	17.2
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	431	-	-	1121	-
HCM Lane v/c Ratio	0.318	-	-	0.055	-
HCM Control Delay (s)	17.2	-	-	8.4	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %ile Q(veh)	1.3	-	-	0.2	-

## **TERRY FOX DRIVE & COPE DRIVE COMMERCIAL SHOPPING DEVELOPMENT**

Appendix B Intersection Performance Worksheets  
September 19, 2018

### **B.5 2025 ULTIMATE**



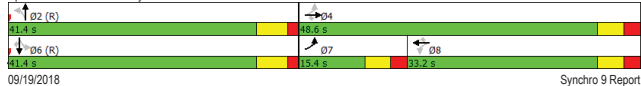
Lanes, Volumes, Timings  
3: Terry Fox Dr & Fernbank Rd

5331 Fernbank Rd TIA  
2025 Ultimate - AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	→	↱	↰	→	↱	↰	→	↱	↰	→	↱
Traffic Volume (vph)	182	131	94	14	145	165	71	414	2	67	235	55
Future Volume (vph)	182	131	94	14	145	165	71	414	2	67	235	55
Satd. Flow (prot)	1695	1784	1517	1695	1784	1517	1695	1783	0	1695	1784	1517
Flt Permitted	0.430			0.673			0.612			0.456		
Satd. Flow (perm)	767	1784	1517	1201	1784	1517	1092	1783	0	814	1784	1517
Satd. Flow (RTOR)				94			165					113
Lane Group Flow (vph)	182	131	94	14	145	165	71	416	0	67	235	55
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8	8		2			6	6	6
Detector Phase	7	4	4	8	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	11.1	33.2	33.2	33.2	33.2	33.2	29.2	29.2		29.2	29.2	29.2
Total Split (s)	15.4	48.6	48.6	33.2	33.2	33.2	41.4	41.4		41.4	41.4	41.4
Total Split (%)	17.1%	54.0%	54.0%	36.9%	36.9%	36.9%	46.0%	46.0%		46.0%	46.0%	46.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	2.4	2.5	2.5	2.5	2.5	2.5	1.6	1.6		1.6	1.6	1.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.1	6.2	6.2	6.2	6.2	6.2	6.2	6.2		6.2	6.2	6.2
Lead/Lag	Lead			Lag			Lag			Lag		
Lead-Lag Optimize?	Yes			Yes			Yes			Yes		
Recall Mode	None	None	None	None	None	None	C-Max	C-Max		C-Max	C-Max	C-Max
Act Effct Green (s)	28.3	28.2	28.2	12.8	12.8	12.8	49.4	49.4		49.4	49.4	49.4
Actuated g/C Ratio	0.31	0.31	0.31	0.14	0.14	0.14	0.55	0.55		0.55	0.55	0.55
v/c Ratio	0.54	0.23	0.17	0.08	0.57	0.46	0.12	0.42		0.15	0.24	0.06
Control Delay	29.3	23.0	5.2	32.1	44.2	9.8	11.8	14.5		9.4	9.4	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	29.3	23.0	5.2	32.1	44.2	9.8	11.8	14.5		9.4	9.4	0.3
LOS	C	C	A	C	D	A	B	B		A	A	A
Approach Delay		21.7			26.2			14.1			8.0	
Approach LOS		C			C			B			A	

<b>Intersection Summary</b>												
Cycle Length: 90												
Actuated Cycle Length: 90												
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green, Master Intersection												
Natural Cycle: 75												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.57												
Intersection Signal Delay: 17.2												
Intersection Capacity Utilization 66.6%												
ICU Level of Service C												
Analysis Period (min) 15												

Splits and Phases: 3: Terry Fox Dr & Fernbank Rd



Queues  
3: Terry Fox Dr & Fernbank Rd

5331 Fernbank Rd TIA  
2025 Ultimate - AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	182	131	94	14	145	165	71	416	67	235	55
v/c Ratio	0.54	0.23	0.17	0.08	0.57	0.46	0.12	0.42	0.15	0.24	0.06
Control Delay	29.3	23.0	5.2	32.1	44.2	9.8	11.8	14.5	9.4	9.4	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.3	23.0	5.2	32.1	44.2	9.8	11.8	14.5	9.4	9.4	0.3
Queue Length 50th (m)	24.1	16.7	0.0	2.1	23.8	0.0	5.5	39.4	3.7	13.1	0.1
Queue Length 95th (m)	37.0	27.3	9.2	6.9	39.0	15.5	14.0	70.3	7.5	19.6	0.0
Internal Link Dist (m)		304.1			40.1			257.8		88.4	
Turn Bay Length (m)	110.0		110.0	125.0			110.0		125.0		135.0
Base Capacity (vph)	336	840	764	360	535	570	599	979	446	979	883
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.16	0.12	0.04	0.27	0.29	0.12	0.42	0.15	0.24	0.06
<b>Intersection Summary</b>											

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Synchro 9 Report  
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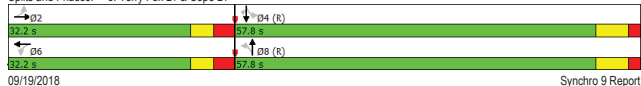
Lanes, Volumes, Timings  
6: Terry Fox Dr & Cope Dr

5331 Fernbank Rd TIA  
2025 Ultimate - AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	→	↱	↰	→	↱	↰	→	↱	↰	→	↱
Traffic Volume (vph)	48	18	1	42	15	244	5	691	29	168	314	34
Future Volume (vph)	48	18	1	42	15	244	5	691	29	168	314	34
Satd. Flow (prot)	1695	1770	0	1695	1533	0	1695	1774	0	1695	1784	1517
Flt Permitted	0.374			0.745			0.570			0.338		
Satd. Flow (perm)	667	1770	0	1329	1533	0	1017	1774	0	603	1784	1517
Satd. Flow (RTOR)				1			225			4		39
Lane Group Flow (vph)	48	19	0	42	259	0	5	720	0	168	314	34
Turn Type	Perm	NA	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases					6			8			4	
Permitted Phases	2			6			8			4		4
Detector Phase	2	2		6	6		8	8		4	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	32.2	32.2		32.2	32.2		33.5	33.5		33.5	33.5	33.5
Total Split (s)	32.2	32.2		32.2	32.2		57.8	57.8		57.8	57.8	57.8
Total Split (%)	35.8%	35.8%		35.8%	35.8%		64.2%	64.2%		64.2%	64.2%	64.2%
Yellow Time (s)	3.3	3.3		3.3	3.3		4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	2.9	2.9		2.9	2.9		1.8	1.8		1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.2	6.2		6.2	6.2		6.4	6.4		6.4	6.4	6.4
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	C-Max
Act Effct Green (s)	10.7	10.7		10.7	10.7		66.7	66.7		66.7	66.7	66.7
Actuated g/C Ratio	0.12	0.12		0.12	0.12		0.74	0.74		0.74	0.74	0.74
v/c Ratio	0.61	0.09		0.27	0.68		0.01	0.55		0.38	0.24	0.03
Control Delay	66.9	32.2		38.1	17.1		3.2	5.6		8.1	4.8	1.5
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	66.9	32.2		38.1	17.1		3.2	5.6		8.1	4.8	1.5
LOS	E	C		D	B		A	A		A	A	A
Approach Delay		57.0			20.0			5.6			5.7	
Approach LOS		E			C			A			A	










<b>Intersection Summary</b>												
Cycle Length: 90												
Actuated Cycle Length: 90												
Offset: 73 (81%), Referenced to phase 4:SBTL and 8:NBT, Start of Green												
Natural Cycle: 80												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.68												
Intersection Signal Delay: 10.4												
Intersection Capacity Utilization 92.0%												
ICU Level of Service F												
Analysis Period (min) 15												

Splits and Phases: 6: Terry Fox Dr & Cope Dr



Queues  
6: Terry Fox Dr & Cope Dr

5331 Fernbank Rd TIA  
2025 Ultimate - AM Peak

									
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	48	19	42	259	5	720	168	314	34
v/c Ratio	0.61	0.09	0.27	0.68	0.01	0.55	0.38	0.24	0.03
Control Delay	66.9	32.2	38.1	17.1	3.2	5.6	8.1	4.8	1.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	66.9	32.2	38.1	17.1	3.2	5.6	8.1	4.8	1.5
Queue Length 50th (m)	8.1	2.9	6.8	5.4	0.2	25.5	8.3	13.6	0.0
Queue Length 95th (m)	18.1	8.3	14.9	25.8	m0.5	62.6	25.3	30.3	2.5
Internal Link Dist (m)		97.2		56.4		119.2		163.3	
Turn Bay Length (m)	40.0		50.0		55.0		75.0		165.0
Base Capacity (vph)	192	512	383	602	753	1315	446	1321	1164
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.04	0.11	0.43	0.01	0.55	0.38	0.24	0.03
Intersection Summary									
m Volume for 95th percentile queue is metered by upstream signal.									

Intersection													
Int Delay, s/veh	3.2												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		↔			↔			↔			↔		
Traffic Vol, veh/h	10	183	22	31	228	4	25	5	36	23	5	48	
Future Vol, veh/h	10	183	22	31	228	4	25	5	36	23	5	48	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop	
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None	
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-	
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-	
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-	
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100	
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	
Mvmt Flow	10	183	22	31	228	4	25	5	36	23	5	48	

Major/Minor	Major1	Major2	Minor1	Minor2									
Conflicting Flow All	232	0	0	205	0	533	508	194	527	517	230		
Stage 1	-	-	-	-	-	214	214	-	292	292	-		
Stage 2	-	-	-	-	-	319	294	-	235	225	-		
Critical Hdwy	4.12	-	-	4.12	-	7.12	6.52	6.22	7.12	6.52	6.22		
Critical Hdwy Stg 1	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-		
Critical Hdwy Stg 2	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-		
Follow-up Hdwy	2.218	-	-	2.218	-	3.518	4.018	3.318	3.518	4.018	3.318		
Pot Cap-1 Maneuver	1336	-	-	1366	-	458	468	847	462	462	809		
Stage 1	-	-	-	-	-	788	725	-	716	671	-		
Stage 2	-	-	-	-	-	693	670	-	768	718	-		
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-		
Mov Cap-1 Maneuver	1336	-	-	1366	-	416	452	847	427	446	809		
Mov Cap-2 Maneuver	-	-	-	-	-	416	452	-	427	446	-		
Stage 1	-	-	-	-	-	782	719	-	710	654	-		
Stage 2	-	-	-	-	-	630	653	-	724	712	-		

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0.9	12	11.7
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	581	1336	-	-	1366	-	-	611
HCM Lane V/C Ratio	0.114	0.007	-	-	0.023	-	-	0.124
HCM Control Delay (s)	12	7.7	0	-	7.7	0	-	11.7
HCM Lane LOS	B	A	A	-	A	-	-	B
HCM 95th %tile Q(veh)	0.4	0	-	-	0.1	-	-	0.4

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Queues  
3: Terry Fox Dr & Fernbank Rd

5331 Fernbank Rd TIA  
2025 Ultimate - PM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	168	177	64	25	284	115	207	421	158	446	122
v/c Ratio	0.66	0.29	0.11	0.11	0.81	0.28	0.52	0.42	0.42	0.62	0.17
Control Delay	41.3	29.7	2.7	38.5	63.7	4.7	19.3	17.8	25.6	28.7	4.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.3	29.7	2.7	38.5	63.7	4.7	19.3	17.8	25.6	28.7	4.3
Queue Length 50th (m)	28.6	30.2	0.0	4.8	64.0	0.0	23.9	55.4	29.1	89.5	5.5
Queue Length 95th (m)	43.6	45.2	0.0	12.0	90.3	0.0	36.5	86.5	52.1	130.4	10.2
Internal Link Dist (m)		304.1			40.1		257.8		88.4		
Turn Bay Length (m)	110.0		110.0	125.0			110.0		125.0		135.0
Base Capacity (vph)	256	680	633	276	428	473	411	995	374	724	701
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.26	0.10	0.09	0.66	0.24	0.50	0.42	0.42	0.62	0.17

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	168	177	64	25	284	115	207	416	5	158	446	122
Future Volume (vph)	168	177	64	25	284	115	207	416	5	158	446	122
Satd. Flow (prot)	1695	1784	1517	1695	1784	1517	1695	1781	0	1695	1784	1517
Flt Permitted	0.231			0.646			0.287			0.516		
Satd. Flow (perm)	412	1784	1517	1153	1784	1517	512	1781	0	921	1784	1517
Satd. Flow (RTOR)				88		144		1				144
Lane Group Flow (vph)	168	177	64	25	284	115	207	421	0	158	446	122
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	NA	Perm	Perm
Protected Phases	7	4			8		5	2			6	
Permitted Phases	4		4	8		8	2			6		6
Detector Phase	7	4	4	8	8	8	5	2		6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	11.1	33.2	33.2	33.2	33.2	33.2	11.5	29.2		29.2	29.2	29.2
Total Split (s)	17.0	52.0	52.0	35.0	35.0	35.0	19.0	68.0		49.0	49.0	49.0
Total Split (%)	14.2%	43.3%	43.3%	29.2%	29.2%	29.2%	15.8%	56.7%		40.8%	40.8%	40.8%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	4.6	4.6		4.6	4.6	4.6
All-Red Time (s)	2.4	2.5	2.5	2.5	2.5	2.5	1.9	1.6		1.6	1.6	1.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.1	6.2	6.2	6.2	6.2	6.2	6.5	6.2		6.2	6.2	6.2
Lead/Lag	Lead			Lag	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes			Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	C-Max	C-Max		C-Max	C-Max	C-Max
Act Effect Green (s)	40.7	40.6	40.6	23.6	23.6	23.6	66.7	67.0		48.7	48.7	48.7
Actuated g/C Ratio	0.34	0.34	0.34	0.20	0.20	0.20	0.56	0.56		0.41	0.41	0.41
v/c Ratio	0.66	0.29	0.11	0.11	0.81	0.28	0.52	0.42		0.42	0.62	0.17
Control Delay	41.3	29.7	2.7	38.5	63.7	4.7	19.3	17.8		25.6	28.7	4.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	41.3	29.7	2.7	38.5	63.7	4.7	19.3	17.8		25.6	28.7	4.3
LOS	D	C	A	D	E	A	B	B		C	C	A
Approach Delay		30.2			46.2			18.3			23.9	
Approach LOS		C			D			B			C	

Intersection Summary												
Cycle Length: 120												
Actuated Cycle Length: 120												
Offset: 0 (0%), Referenced to phase 2:NBLT and 6:SBTL, Start of Green, Master Intersection												
Natural Cycle: 65												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.81												
Intersection Signal Delay: 27.8												
Intersection LOS: C												
Intersection Capacity Utilization 83.3%												
ICU Level of Service E												
Analysis Period (min) 15												

Splits and Phases: 3: Terry Fox Dr & Fernbank Rd



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Lanes, Volumes, Timings  
6: Terry Fox Dr & Cope Dr

5331 Fernbank Rd TIA  
2025 Ultimate - PM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	78	76	2	99	58	219	5	608	32	281	625	72
Future Volume (vph)	78	76	2	99	58	219	5	608	32	281	625	72
Satd. Flow (prot)	1695	1777	0	1695	1572	0	1695	1770	0	1695	1784	1517
Flt Permitted	0.189			0.706			0.428			0.205		
Satd. Flow (perm)	337	1777	0	1260	1572	0	764	1770	0	366	1784	1517
Satd. Flow (RTOR)		1			145			3				72
Lane Group Flow (vph)	78	78	0	99	277	0	5	640	0	281	625	72
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	Perm
Protected Phases	5	2			6			8		7	4	
Permitted Phases	2			6			8			4		4
Detector Phase	5	2		6	6		8	8		7	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.5	32.2		32.2	32.2		33.5	33.5		11.4	33.5	33.5

5331 Fernbank Rd TIA  
2025 Ultimate - PM Peak

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2025 Ultimate - PM Peak

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5331 Fernbank Rd TIA  
2025 Ultimate - SAT Peak

Queues  
3: Terry Fox Dr & Fernbank Rd

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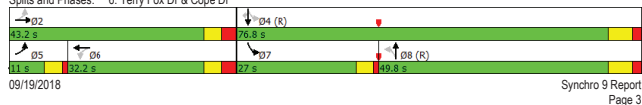
Lanes, Volumes, Timings  
6: Terry Fox Dr & Cope Dr

5331 Fernbank Rd TIA  
2025 Ultimate - SAT Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	←	→	↔	←	→	↔	←	→	↔	←	→	↔
Traffic Volume (vph)	133	87	3	96	105	240	1	565	9	377	843	144
Future Volume (vph)	133	87	3	96	105	240	1	565	9	377	843	144
Satd. Flow (prot)	1695	1775	0	1695	1599	0	1695	1781	0	1695	1784	1517
Flt Permitted	0.143			0.699			0.280			0.170		
Satd. Flow (perm)	255	1775	0	1247	1599	0	500	1781	0	303	1784	1517
Satd. Flow (RTOR)		1			88			1				144
Lane Group Flow (vph)	133	90	0	96	345	0	1	574	0	377	843	144
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	Perm
Protected Phases	5	2		6			8			7	4	
Permitted Phases	2			6			8			4		4
Detector Phase	5	2		6	6		8	8		7	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.5	32.2		32.2	32.2		33.5	33.5		9.5	33.5	33.5
Total Split (s)	11.0	43.2		32.2	32.2		49.8	49.8		27.0	76.8	76.8
Total Split (%)	9.2%	36.0%		26.8%	26.8%		41.5%	41.5%		22.5%	64.0%	64.0%
Yellow Time (s)	3.5	3.3		3.3	3.3		4.6	4.6		3.5	4.6	4.6
All-Red Time (s)	1.0	2.9		2.9	2.9		1.8	1.8		1.0	1.8	1.8
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.5	6.2		6.2	6.2		6.4	6.4		4.5	6.4	6.4
Lead/Lag	Lead			Lag	Lag		Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes		
Recall Mode	None	None		None	None		C-Max	C-Max		None	C-Max	C-Max
Act Effct Green (s)	36.1	34.4		23.4	23.4		47.3	47.3		74.9	73.0	73.0
Actuated g/C Ratio	0.30	0.29		0.20	0.20		0.39	0.39		0.62	0.61	0.61
v/c Ratio	0.86	0.18		0.40	0.90		0.01	0.82		0.87	0.78	0.15
Control Delay	77.7	31.8		46.4	61.8		27.0	36.8		40.7	24.6	2.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	77.7	31.8		46.4	61.8		27.0	36.8		40.7	24.6	2.1
LOS	E	C		D	E		C	D		D	C	A
Approach Delay	58.1			58.4			36.7			26.7		
Approach LOS	E			E			D			C		

<b>Intersection Summary</b>												
Cycle Length: 120												
Actuated Cycle Length: 120												
Offset: 115 (96%), Referenced to phase 4:SBTL and 8:NBLT, Start of Green												
Natural Cycle: 105												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.90												
Intersection Signal Delay: 37.1												
Intersection Capacity Utilization 101.2%												
Analysis Period (min) 15												

Splits and Phases: 6: Terry Fox Dr & Cope Dr



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Queues  
6: Terry Fox Dr & Cope Dr

5331 Fernbank Rd TIA  
2025 Ultimate - SAT Peak

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	133	90	96	345	1	574	377	843	144
v/c Ratio	0.86	0.18	0.40	0.90	0.01	0.82	0.87	0.78	0.15
Control Delay	77.7	31.8	46.4	61.8	27.0	36.8	40.7	24.6	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	77.7	31.8	46.4	61.8	27.0	36.8	40.7	24.6	2.1
Queue Length 50th (m)	23.0	15.2	19.3	59.5	0.1	96.3	52.7	147.3	0.0
Queue Length 95th (m)	#47.8	28.0	35.6	#107.0	m0.2	#186.7	#103.4	207.2	8.1
Internal Link Dist (m)		97.2		56.3		119.2		183.3	
Turn Bay Length (m)	40.0		50.0		55.0		75.0		165.0
Base Capacity (vph)	154	547	270	415	196	702	451	1084	979
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.86	0.16	0.36	0.83	0.01	0.82	0.84	0.78	0.15
<b>Intersection Summary</b>									
# 95th percentile volume exceeds capacity, queue may be longer.									
Queue shown is maximum after two cycles.									
m Volume for 95th percentile queue is metered by upstream signal.									

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HCM 2010 TWSC  
15: Site Access 4 & Cope Dr

5331 Fernbank Rd TIA  
2025 Ultimate - SAT Peak

<b>Intersection</b>												
Int Delay, s/veh 4.6												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Vol, veh/h	34	396	43	62	359	15	54	5	83	14	5	28
Future Vol, veh/h	34	396	43	62	359	15	54	5	83	14	5	28
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	34	396	43	62	359	15	54	5	83	14	5	28

Major/Minor	Major1	Major2	Minor1	Minor2
Conflicting Flow All	374	0	439	0
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy Stg 1	4.12	-	4.12	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	2.218	-	2.218	-
Pot Cap-1 Maneuver	1184	-	1121	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	1184	-	1121	-
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	1.2	24	18.2
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	329	1184	-	-	1121	-	-	320
HCM Lane V/C Ratio	0.432	0.029	-	-	0.055	-	-	0.147
HCM Control Delay (s)	24	8.1	0	-	8.4	0	-	18.2
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	2.1	0.1	-	-	0.2	-	-	0.5



## **APPENDIX C TDM CHECKLISTS**



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

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

<b>TDM-supportive design &amp; infrastructure measures:</b> <i>Non-residential developments</i>		<b>Check if completed &amp; add descriptions, explanations or plan/drawing references</b>
<b>1. WALKING &amp; CYCLING: ROUTES</b>		
<b>1.1 Building location &amp; access points</b>		
<b>BASIC</b>	1.1.1 Locate building close to the street, and do not locate parking areas between the street and building entrances	<input type="checkbox"/> N/A
<b>BASIC</b>	1.1.2 Locate building entrances in order to minimize walking distances to sidewalks and transit stops/stations	<input type="checkbox"/> N/A
<b>BASIC</b>	1.1.3 Locate building doors and windows to ensure visibility of pedestrians from the building, for their security and comfort	<input type="checkbox"/> N/A
<b>1.2 Facilities for walking &amp; cycling</b>		
<b>REQUIRED</b>	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> )	<input checked="" type="checkbox"/>  This item will be confirmed and addressed through the Site Plan Control process.
<b>REQUIRED</b>	1.2.2 Provide safe, direct and attractive pedestrian access from public sidewalks to building entrances through such measures as: reducing distances between public sidewalks and major building entrances; providing walkways from public streets to major building entrances; within a site, providing walkways along the front of adjoining buildings, between adjacent buildings, and connecting areas where people may congregate, such as courtyards and transit stops; and providing weather protection through canopies, colonnades, and other design elements wherever possible ( <i>see Official Plan policy 4.3.12</i> )	<input checked="" type="checkbox"/>  This item will be confirmed and addressed through the Site Plan Control process.

TDM-supportive design & infrastructure measures: <i>Non-residential developments</i>		Check if completed & add descriptions, explanations or plan/drawing references
REQUIRED	1.2.3 Provide sidewalks of smooth, well-drained walking surfaces of contrasting materials or treatments to differentiate pedestrian areas from vehicle areas, and provide marked pedestrian crosswalks at intersection sidewalks ( <i>see Official Plan policy 4.3.10</i> )	<input checked="" type="checkbox"/> This item will be confirmed and addressed through the Site Plan Control process.
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> )	<input checked="" type="checkbox"/> This item will be confirmed and addressed through the Site Plan Control process.
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> )	<input checked="" type="checkbox"/> This item will be confirmed and addressed through the Site Plan Control process.
BASIC	1.2.6 Provide safe, direct and attractive walking routes from building entrances to nearby transit stops	<input checked="" type="checkbox"/>
BASIC	1.2.7 Ensure that walking routes to transit stops are secure, visible, lighted, shaded and wind-protected wherever possible	<input checked="" type="checkbox"/>
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	<input type="checkbox"/> No
<b>1.3 Amenities for walking &amp; cycling</b>		
BASIC	1.3.1 Provide lighting, landscaping and benches along walking and cycling routes between building entrances and streets, sidewalks and trails	<input type="checkbox"/> No
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)	<input type="checkbox"/> No

TDM-supportive design & infrastructure measures: <i>Non-residential developments</i>		Check if completed & add descriptions, explanations or plan/drawing references
<b>2. WALKING &amp; CYCLING: END-OF-TRIP FACILITIES</b>		
<b>2.1 Bicycle parking</b>		
REQUIRED	2.1.1 Provide bicycle parking in highly visible and lighted areas, sheltered from the weather wherever possible ( <i>see Official Plan policy 4.3.6</i> )	<input type="checkbox"/> This item will be confirmed and addressed through the Site Plan Control process.
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 ( <i>see Zoning By-law Section 111</i> )	<input type="checkbox"/> This item will be confirmed and addressed through the Site Plan Control process.
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 ( <i>see Zoning By-law Section 111</i> )	<input type="checkbox"/> This item will be confirmed and addressed through the Site Plan Control process.
BASIC	2.1.4 Provide bicycle parking spaces equivalent to the expected number of commuter cyclists (assuming the cycling mode share target is met), plus the expected peak number of customer/visitor cyclists	<input type="checkbox"/>
BETTER	2.1.5 Provide bicycle parking spaces equivalent to the expected number of commuter and customer/visitor cyclists, plus an additional buffer (e.g. 25 percent extra) to encourage other cyclists and ensure adequate capacity in peak cycling season	<input type="checkbox"/>
<b>2.2 Secure bicycle parking</b>		
REQUIRED	2.2.1 Where more than 50 bicycle parking spaces are provided for a single office building, locate at least 25% of spaces within a building/structure, a secure area (e.g. supervised parking lot or enclosure) or bicycle lockers ( <i>see Zoning By-law Section 111</i> )	<input type="checkbox"/> This item will be confirmed and addressed through the Site Plan Control process.
BETTER	2.2.2 Provide secure bicycle parking spaces equivalent to the expected number of commuter cyclists (assuming the cycling mode share target is met)	<input type="checkbox"/>
<b>2.3 Shower &amp; change facilities</b>		
BASIC	2.3.1 Provide shower and change facilities for the use of active commuters	<input type="checkbox"/> No
BETTER	2.3.2 In addition to shower and change facilities, provide dedicated lockers, grooming stations, drying racks and laundry facilities for the use of active commuters	<input type="checkbox"/> No
<b>2.4 Bicycle repair station</b>		
BETTER	2.4.1 Provide a permanent bike repair station, with commonly used tools and an air pump, adjacent to the main bicycle parking area (or secure bicycle parking area, if provided)	<input type="checkbox"/> No

TDM-supportive design & infrastructure measures: <i>Non-residential developments</i>		Check if completed & add descriptions, explanations or plan/drawing references
<b>3. TRANSIT</b>		
<b>3.1 Customer amenities</b>		
BASIC	3.1.1 Provide shelters, lighting and benches at any on-site transit stops	<input type="checkbox"/> No
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	<input type="checkbox"/> No
BETTER	3.1.3 Provide a secure and comfortable interior waiting area by integrating any on-site transit stops into the building	<input type="checkbox"/> No
<b>4. RIDESHARING</b>		
<b>4.1 Pick-up &amp; drop-off facilities</b>		
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	<input type="checkbox"/> No
<b>4.2 Carpool parking</b>		
BASIC	4.2.1 Provide signed parking spaces for carpools in a priority location close to a major building entrance, sufficient in number to accommodate the mode share target for carpools	<input type="checkbox"/> No
BETTER	4.2.2 At large developments, provide spaces for carpools in a separate, access-controlled parking area to simplify enforcement	<input type="checkbox"/> No
<b>5. CARSHARING &amp; BIKESHARING</b>		
<b>5.1 Carshare parking spaces</b>		
BETTER	5.1.1 Provide carshare parking spaces in permitted non-residential zones, occupying either required or provided parking spaces ( <i>see Zoning By-law Section 94</i> )	<input type="checkbox"/> No
<b>5.2 Bikeshare station location</b>		
BETTER	5.2.1 Provide a designated bikeshare station area near a major building entrance, preferably lighted and sheltered with a direct walkway connection	<input type="checkbox"/> No

TDM-supportive design & infrastructure measures: <i>Non-residential developments</i>		Check if completed & add descriptions, explanations or plan/drawing references
<b>6. PARKING</b>		
<b>6.1 Number of parking spaces</b>		
<b>REQUIRED</b>	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	<input checked="" type="checkbox"/> This item will be confirmed and addressed through the Site Plan Control process.
<b>BASIC</b>	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	<input type="checkbox"/> No
<b>BASIC</b>	6.1.3 Where a site features more than one use, provide shared parking and reduce the cumulative number of parking spaces accordingly ( <i>see Zoning By-law Section 104</i> )	<input type="checkbox"/> No
<b>BETTER</b>	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 ( <i>see Zoning By-law Section 111</i> )	<input type="checkbox"/> No
<b>6.2 Separate long-term &amp; short-term parking areas</b>		
<b>BETTER</b>	6.2.1 Separate short-term and long-term parking areas using signage or physical barriers, to permit access controls and simplify enforcement (i.e. to discourage employees from parking in visitor spaces, and vice versa)	<input type="checkbox"/> No
<b>7. OTHER</b>		
<b>7.1 On-site amenities to minimize off-site trips</b>		
<b>BETTER</b>	7.1.1 Provide on-site amenities to minimize mid-day or mid-commute errands	<input type="checkbox"/> N/A

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

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

<b>TDM measures: <i>Non-residential developments</i></b>		<b>Check if proposed &amp; add descriptions</b>
<b>1. TDM PROGRAM MANAGEMENT</b>		
<b>1.1 Program coordinator</b>		
<b>BASIC</b> ★	1.1.1 Designate an internal coordinator, or contract with an external coordinator	<input type="checkbox"/> No
<b>1.2 Travel surveys</b>		
<b>BETTER</b>	1.2.1 Conduct periodic surveys to identify travel-related behaviours, attitudes, challenges and solutions, and to track progress	<input type="checkbox"/> No
<b>2. WALKING AND CYCLING</b>		
<b>2.1 Information on walking/cycling routes &amp; destinations</b>		
<b>BASIC</b>	2.1.1 Display local area maps with walking/cycling access routes and key destinations at major entrances	<input type="checkbox"/> No
<b>2.2 Bicycle skills training</b>		
<i>Commuter travel</i>		
<b>BETTER</b> ★	2.2.1 Offer on-site cycling courses for commuters, or subsidize off-site courses	<input type="checkbox"/> No
<b>2.3 Valet bike parking</b>		
<i>Visitor travel</i>		
<b>BETTER</b>	2.3.1 Offer secure valet bike parking during public events when demand exceeds fixed supply (e.g. for festivals, concerts, games)	<input type="checkbox"/> N/A

TDM measures: <i>Non-residential developments</i>		Check if proposed & add descriptions
<b>3. TRANSIT</b>		
<b>3.1 Transit information</b>		
BASIC	3.1.1 Display relevant transit schedules and route maps at entrances	<input type="checkbox"/> No
BASIC	3.1.2 Provide online links to OC Transpo and STO information	<input type="checkbox"/> No
BETTER	3.1.3 Provide real-time arrival information display at entrances	<input type="checkbox"/> No
<b>3.2 Transit fare incentives</b>		
<i>Commuter travel</i>		
BETTER	3.2.1 Offer preloaded PRESTO cards to encourage commuters to use transit	<input type="checkbox"/> No
BETTER ★	3.2.2 Subsidize or reimburse monthly transit pass purchases by employees	<input type="checkbox"/> No
<i>Visitor travel</i>		
BETTER	3.2.3 Arrange inclusion of same-day transit fare in price of tickets (e.g. for festivals, concerts, games)	<input type="checkbox"/> No
<b>3.3 Enhanced public transit service</b>		
<i>Commuter travel</i>		
BETTER	3.3.1 Contract with OC Transpo to provide enhanced transit services (e.g. for shift changes, weekends)	<input type="checkbox"/> No
<i>Visitor travel</i>		
BETTER	3.3.2 Contract with OC Transpo to provide enhanced transit services (e.g. for festivals, concerts, games)	<input type="checkbox"/> N/A
<b>3.4 Private transit service</b>		
<i>Commuter travel</i>		
BETTER	3.4.1 Provide shuttle service when OC Transpo cannot offer sufficient quality or capacity to serve demand (e.g. for shift changes, weekends)	<input type="checkbox"/> No
<i>Visitor travel</i>		
BETTER	3.4.2 Provide shuttle service when OC Transpo cannot offer sufficient quality or capacity to serve demand (e.g. for festivals, concerts, games)	<input type="checkbox"/> N/A



TDM measures: <i>Non-residential developments</i>		Check if proposed & add descriptions
<b>4. RIDESHARING</b>		
<b>4.1 Ridematching service</b>		
<i>Commuter travel</i>		
<b>BASIC</b> ★	4.1.1 Provide a dedicated ridematching portal at OttawaRideMatch.com	<input type="checkbox"/> No
<b>4.2 Carpool parking price incentives</b>		
<i>Commuter travel</i>		
<b>BETTER</b>	4.2.1 Provide discounts on parking costs for registered carpools	<input type="checkbox"/> No
<b>4.3 Vanpool service</b>		
<i>Commuter travel</i>		
<b>BETTER</b>	4.3.1 Provide a vanpooling service for long-distance commuters	<input type="checkbox"/> No
<b>5. CARSHARING &amp; BIKESHARING</b>		
<b>5.1 Bikeshare stations &amp; memberships</b>		
<b>BETTER</b>	5.1.1 Contract with provider to install on-site bikeshare station for use by commuters and visitors	<input type="checkbox"/> No
<i>Commuter travel</i>		
<b>BETTER</b>	5.1.2 Provide employees with bikeshare memberships for local business travel	<input type="checkbox"/> No
<b>5.2 Carshare vehicles &amp; memberships</b>		
<i>Commuter travel</i>		
<b>BETTER</b>	5.2.1 Contract with provider to install on-site carshare vehicles and promote their use by tenants	<input type="checkbox"/> No
<b>BETTER</b>	5.2.2 Provide employees with carshare memberships for local business travel	<input type="checkbox"/> No
<b>6. PARKING</b>		
<b>6.1 Priced parking</b>		
<i>Commuter travel</i>		
<b>BASIC</b> ★	6.1.1 Charge for long-term parking (daily, weekly, monthly)	<input type="checkbox"/> No
<b>BASIC</b>	6.1.2 Unbundle parking cost from lease rates at multi-tenant sites	<input type="checkbox"/> No
<i>Visitor travel</i>		
<b>BETTER</b>	6.1.3 Charge for short-term parking (hourly)	<input type="checkbox"/> No

TDM measures: <i>Non-residential developments</i>			Check if proposed & add descriptions
<b>7. TDM MARKETING &amp; COMMUNICATIONS</b>			
<b>7.1 Multimodal travel information</b>			
<i>Commuter travel</i>			
BASIC	★	7.1.1 Provide a multimodal travel option information package to new/relocating employees and students	<input type="checkbox"/> No
<i>Visitor travel</i>			
BETTER	★	7.1.2 Include multimodal travel option information in invitations or advertising that attract visitors or customers (e.g. for festivals, concerts, games)	<input type="checkbox"/> N/A
<b>7.2 Personalized trip planning</b>			
<i>Commuter travel</i>			
BETTER	★	7.2.1 Offer personalized trip planning to new/relocating employees	<input type="checkbox"/> No
<b>7.3 Promotions</b>			
<i>Commuter travel</i>			
BETTER		7.3.1 Deliver promotions and incentives to maintain awareness, build understanding, and encourage trial of sustainable modes	<input type="checkbox"/> No
<b>8. OTHER INCENTIVES &amp; AMENITIES</b>			
<b>8.1 Emergency ride home</b>			
<i>Commuter travel</i>			
BETTER	★	8.1.1 Provide emergency ride home service to non-driving commuters	<input type="checkbox"/> No
<b>8.2 Alternative work arrangements</b>			
<i>Commuter travel</i>			
BASIC	★	8.2.1 Encourage flexible work hours	<input type="checkbox"/> No
BETTER		8.2.2 Encourage compressed workweeks	<input type="checkbox"/> No
BETTER	★	8.2.3 Encourage telework	<input type="checkbox"/> No
<b>8.3 Local business travel options</b>			
<i>Commuter travel</i>			
BASIC	★	8.3.1 Provide local business travel options that minimize the need for employees to bring a personal car to work	<input type="checkbox"/> No
<b>8.4 Commuter incentives</b>			
<i>Commuter travel</i>			
BETTER		8.4.1 Offer employees a taxable, mode-neutral commuting allowance	<input type="checkbox"/> No
<b>8.5 On-site amenities</b>			
<i>Commuter travel</i>			
BETTER		8.5.1 Provide on-site amenities/services to minimize mid-day or mid-commute errands	<input type="checkbox"/> No