

Final Report

# Transportation Impact Study – Lawrence East Transit Oriented Community

---

# Table of Contents (continued)

---

<b>1</b>	<b>Introduction</b> .....	<b>1</b>
1.1	Study Area .....	2
1.2	Analysis Periods .....	3
1.3	Proposed Development .....	3
<b>2</b>	<b>2023 Existing Conditions</b> .....	<b>4</b>
2.1	Existing Road Network.....	4
2.2	Existing Transit Network .....	5
2.3	Existing Active Transportation Network .....	6
2.4	Turning Movement Counts .....	6
2.5	Signal Timing Plans .....	8
2.6	2023 Existing Conditions Analysis.....	8
2.6.1	Signalized Intersections .....	9
2.6.2	Unsignalized Intersections .....	10
<b>3</b>	<b>Future Background Conditions</b> .....	<b>11</b>
3.1	Future Transportation Network Improvements .....	11
3.2	Horizon Year and Growth Rate.....	13
3.3	Background Development .....	13
<b>4</b>	<b>2041 Future Background Conditions Analysis</b> .....	<b>15</b>
4.1.1	Signalized Intersections .....	17
4.1.2	Unsignalized Intersections .....	18
<b>5</b>	<b>Future Total Conditions</b> .....	<b>19</b>
5.1	Future Site Access.....	19
5.2	Trip Generation .....	19
5.2.1	Trip Reductions .....	19
5.2.2	Gross Trip Generation .....	22
5.2.3	Existing Development - Trip Removals.....	24
5.2.4	Trip Distribution and Assignment.....	27
<b>6</b>	<b>2041 Future Total Conditions Analysis</b> .....	<b>29</b>
6.1	Signalized Intersections.....	31

# Table of Contents (continued)

---

6.2	Unsignalized Intersections .....	32
<b>7</b>	<b>Traffic Analysis Summary.....</b>	<b>32</b>
<b>8</b>	<b>Parking Analysis .....</b>	<b>35</b>
8.1	Zoning By-law Requirements – Automobile Parking .....	35
8.2	Zoning By-law Requirements – Bicycle Parking .....	40
<b>9</b>	<b>Loading Review .....</b>	<b>41</b>
<b>10</b>	<b>Conclusions .....</b>	<b>42</b>
10.1	TIS Findings.....	42
10.2	Parking Analysis .....	42
10.3	Loading Review .....	42
<b>11</b>	<b>Recommendations.....</b>	<b>43</b>
<b>Appendix A – Turning Movement Counts</b>		
<b>Appendix B – Signal Timing Plans</b>		
<b>Appendix C – 2023 Existing Conditions Synchro Reports,</b>		
<b>Appendix D – 2041 Future Background Conditions Synchro Reports</b>		
<b>Appendix E – 2041 Future Total Conditions Synchro Reports</b>		
<b>Appendix F – AutoTURN Site Circulation Drawings</b>		

## List of Exhibits

---

Exhibit 1-1: Development Study Area .....	2
Exhibit 1-2: Proposed Site Plan .....	3
Exhibit 2-1: Study Area Roadway Characteristics .....	4
Exhibit 2-2: Existing Study Area Lane Configurations .....	5
Exhibit 2-3: Existing Transit Network .....	6
Exhibit 2-4: Existing Transit Service Patterns.....	6
Exhibit 2-5: Traffic Data Information .....	7
Exhibit 2-6: 2023 Existing Conditions Traffic Volumes .....	8
Exhibit 2-7: 2023 Existing Conditions Traffic Operations – Signalized Intersections .....	9
Exhibit 2-8: 2023 Existing Conditions Traffic Operations – Unsignalized Intersections ....	11
Exhibit 3-1: Proposed Development Location.....	12

# Table of Contents (continued)

---

Exhibit 3-2: Future SSE Corridor Implementation Map .....	12
Exhibit 3-3: Annual and Total Growth Rates in Study Area .....	13
Exhibit 3-4 City Development Application Website - Screenshots of Study Area .....	14
Exhibit 3-5: City Development Application Website – Status of Study Area Applications .	14
Exhibit 4-1: 2041 Future Background Conditions Traffic Volumes .....	16
Exhibit 4-2: 2041 Future Background Conditions traffic Operations – Signalized intersections .....	17
Exhibit 4-3: 2041 Future Background Conditions traffic operations – Unsignalized Intersections .....	18
Exhibit 5-1: Proposed Development Driveway Placement .....	19
Exhibit 5-2: Parking Supply Residential Supply Comparison to City ZBL Rates .....	20
Exhibit 5-3: Transportation Mode (2016 TTS Data) .....	20
Exhibit 5-4: Proposed Development Trip Generation .....	22
Exhibit 5-5: Existing Development Trip Generation Estimates .....	25
Exhibit 5-6: Trip Distribution and Assignment .....	27
Exhibit 5-7: Existing Development Site Traffic Volumes .....	28
Exhibit 5-8: New Development Site Traffic Volumes .....	29
Exhibit 6-1: 2041 Future Total Conditions Traffic Volumes .....	30
Exhibit 6-2: 2041 Future Total Conditions Traffic Operations – Signalized Intersections .	31
Exhibit 6-3: 2041 Future Total Conditions Traffic Operations – Unsignalized Intersections .....	32
Exhibit 7-1: Comparison of 2041 Future Background and 2041 Future Total Traffic Conditions – Overall Signalized Operations .....	33
Exhibit 7-2: Comparison of 2041 Future Background and 2041 Future Total Traffic Conditions – Signalized Operations .....	34
Exhibit 8-1: City ZBL Parking Requirements .....	35
Exhibit 8-2: Parking Supply Comparison of Other Mixed-Use Developments – Proxy Comparison .....	37
Exhibit 8-3: Parking Rate by Land use - Proxy Sites Versus Proposed Development .....	38
Exhibit 8-4: Existing Cycling Network .....	39
Exhibit 8-5: ZBL Bicycle Parking Rates .....	40
Exhibit 8-6: Proposed Development Bicycle Parking Supply Review .....	40
Exhibit 9-1: ZBL 569-2013 Loading Space Requirements .....	41

## 1 Introduction

Arcadis IBI Group has prepared this transportation impact study (TIS) on behalf of OneT+, the consortium undertaking the conceptualization of Transit-Oriented Communities (TOC) for future subway station sites on the Scarborough Subway Extension (SSE). The subway extension will replace the existing Scarborough RT (Line 3). The two existing low-rise commercial structures on the site will be removed, with the lands used as a staging area during the subway construction. A third-party developer will then construct a three-tower, mixed-use development on the site, once construction is complete.

The existing structures consist of a Canada Post, TD Canada Trust bank, RBC Royal Bank, a Shoppers Drug Mart, and a dental office. Upon demolition, the three towers (the “proposed development”) will be constructed on the lands, containing a proposed 774 units, 1,405 sq.m. GFA of retail space, and 6,444 sq.m. GFA of office space. McCowan Road is planned for realignment near Lawrence Avenue East to accommodate construction and operation of new transit buildings and facilities

Vehicular parking is provided via two underground parking levels, totalling 228 spaces. Bicycle parking will be provided on ground and underground levels, totalling 603 spaces.

The purpose of this report is to analyze the impact that the proposed development may have on the surrounding transportation network. This report takes into consideration the future road configuration (including the future Scarborough Subway Extension), background traffic growth, and other proposed development activity in the area. The study also examines the location of the proposed site accesses, as well as the appropriateness of the proposed parking supply.

This report is outlined with the following sections:

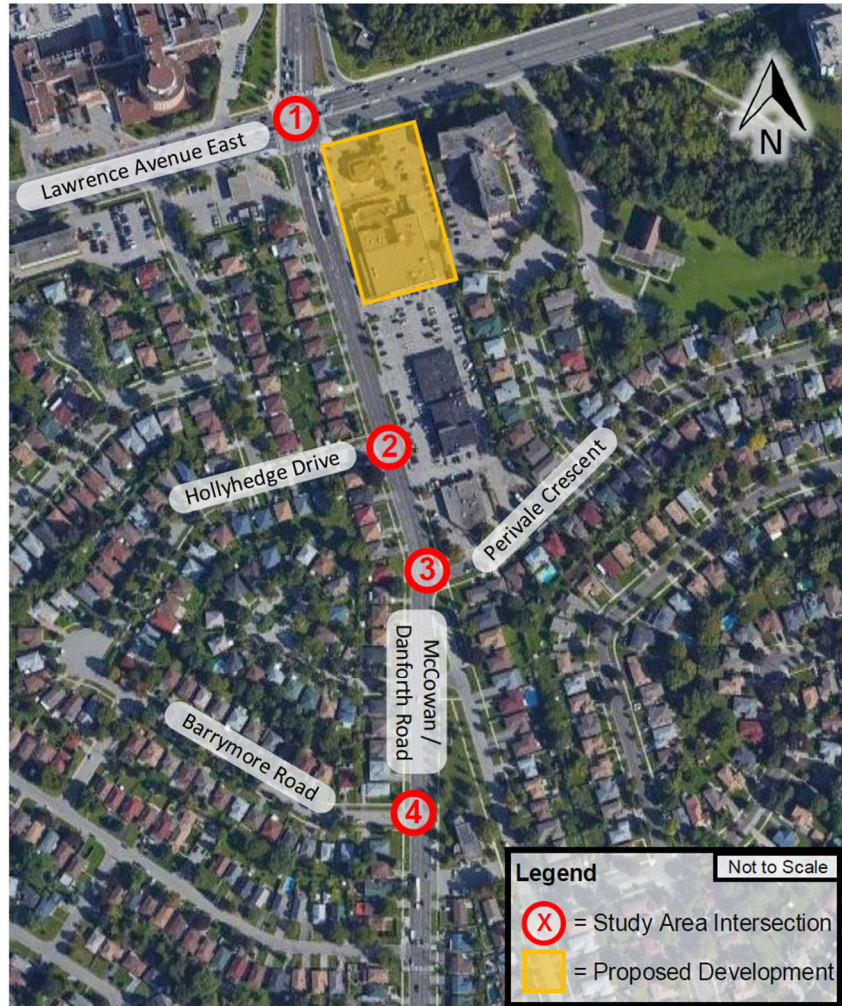
- **Section 1** through **Section 7** discuss the TIS;
- **Section 8** discusses the appropriateness of the proposed parking supply;
- **Section 9** discusses the loading space supply; and
- **Section 10** and **Section 11** discuss the conclusions made and the study recommendations based on the preceding sections.

This report references the City of Toronto (City) Guidelines for the Preparation of Transportation Impact Studies (2013), the City Guidelines for Using Synchro 11 (January 15, 2021), and the City Zoning By-law 89-2022 (a February 3, 2022 amendment to By-law 569-2013 with regards to parking requirements).

## 1.1 Study Area

The proposed development is located on the southeast corner of the Lawrence Avenue East / McCowan Road intersection in the City of Toronto, as illustrated in **Exhibit 1-1**.

**Exhibit 1-1: Development Study Area**



Base Map Source: Google Maps. Retrieved June 8, 2021 from <https://www.google.ca/maps>

The area surrounding the proposed development is primarily low density residential, with some commercial land uses, a gas station, and nursing home to the west; and Scarborough General Hospital to the northwest.

The study area intersections consist of the following locations (as noted in **Exhibit 1-1**):

1. Lawrence Road / McCowan Avenue East (signalized);
2. Hollyhedge Drive / Danforth Road (unsignalized);
3. Perivale Crescent / Danforth Road (unsignalized); and
4. Barrymore Road / Danforth Road (signalized).

## 1.2 Analysis Periods

Based on the proposed development's land uses, the following analysis periods were used in this study:

- AM Peak Period – 7:00 a.m. to 9:00 a.m. on a typical weekday; and
- PM Peak Period – 4:00 p.m. to 6:00 p.m. on a typical weekday.

## 1.3 Proposed Development

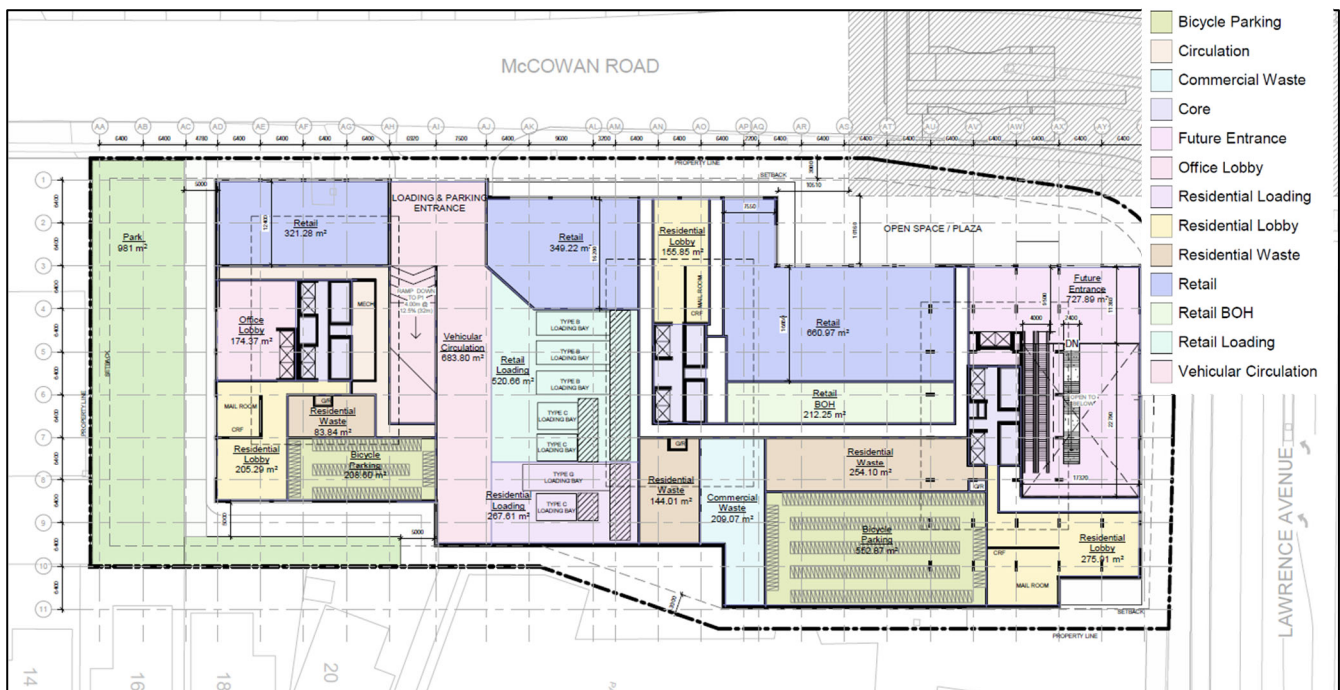
The proponent is proposing to replace two existing low-rise commercial buildings. The existing structures consist of a Canada Post, TD Canada Trust bank, RBC Royal Bank, a Shoppers Drug Mart, and a dental office. Upon demolition, the proposed development will be constructed on the lands. Within three proposed towers, 774 residential units, 1,405 sq.m. GFA of retail space, and 6,444 sq.m. GFA of office space are proposed.

Vehicular parking is provided via two underground parking levels, totalling 228 spaces. Bicycle parking will be provided on ground and underground level 1, totalling 603 spaces.

The proposed site plan is illustrated in **Exhibit 1-2**. One site access is proposed fronting McCowan Road providing access to both the underground garage and loading areas. Site circulation will occur in the midblock of the site for loading, garbage, and underground parking.

It should be noted that small changes in building sizes may occur as this development moves through the approval process. However, the assumptions in this report are conservative, and differences in traffic operations from these changes are anticipated to be negligible.

**Exhibit 1-2: Proposed Site Plan**



## 2 2023 Existing Conditions

This section documents the transportation network in the study area in 2023, including existing roadways, transit services, traffic control measures, and intersection performance.

### 2.1 Existing Road Network

Both McCowan Road and Lawrence Avenue are identified as Major Roads in the Official Plan (Map 3). Lawrence Avenue is six lanes wide at the intersection and McCowan Road is four lanes wide. As McCowan Road has a slight jog north of the intersection (which is expected to be reconfigured during the SSE construction), the right turn off of Lawrence Avenue is a wide, protected turn lane.

The environment is generally auto-oriented, with no bicycle lanes or other major active transportation infrastructure.

The existing study area roadways are illustrated in **Exhibit 2-1**.

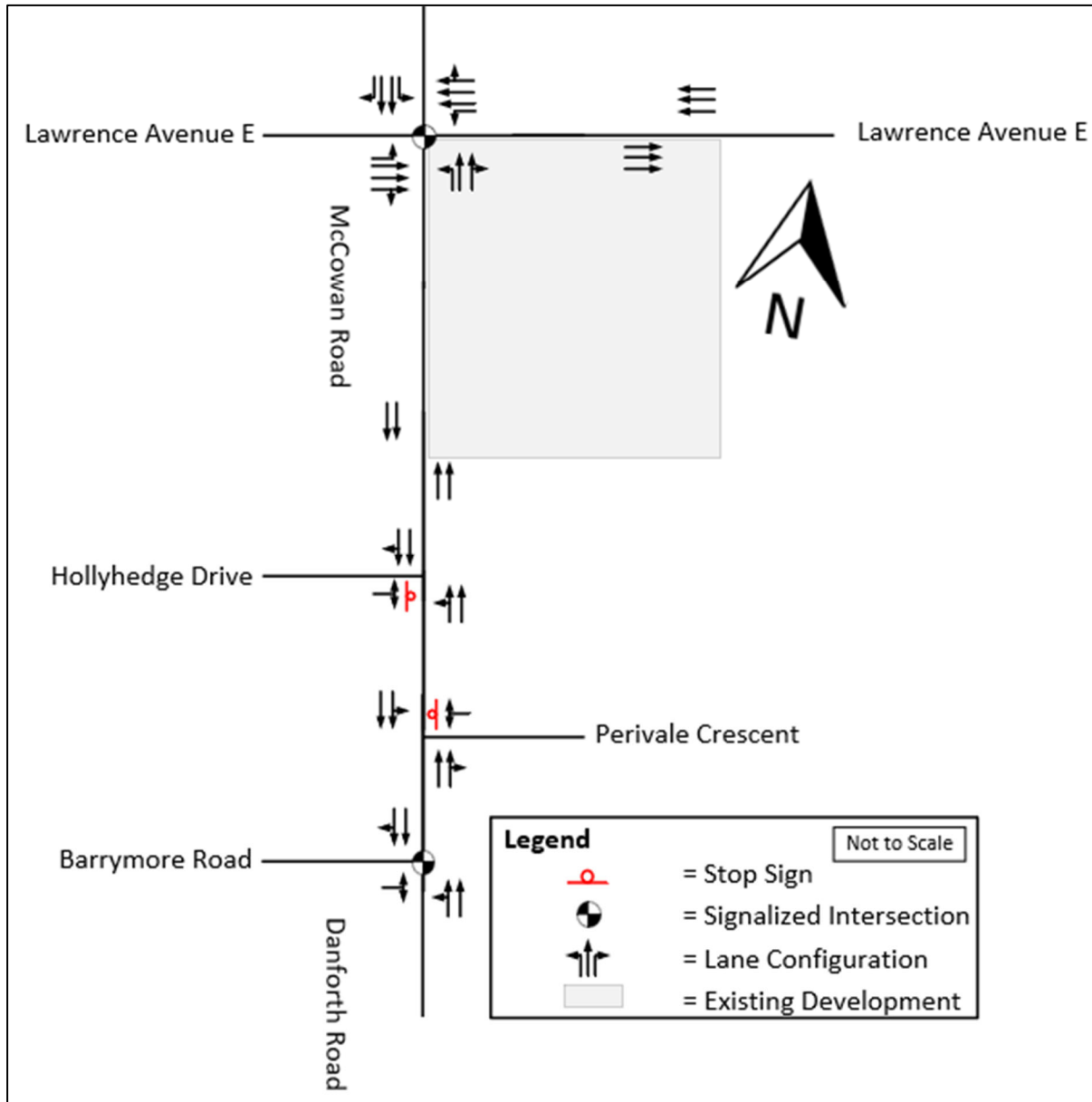
**Exhibit 2-1: Study Area Roadway Characteristics**

Street Name	Class	Orientation	Road Width (Lanes)	Traffic Direction	From	To	On-Street Parking	Speed Limit
Lawrence Avenue E	Major Arterial	East / West	6	Two-way	Yonge Street	Rouge Hills Drive	Prohibited	50 km/h
McCowan / Danforth Road	Major Arterial	North / South	4	Two-way	Danforth Avenue	Baseline Road	Prohibited	50 km/h
Hollyhedge Drive	Local	East / West	2	Two-way	Danforth Road	Danforth Road	Permitted	40 km/h
Perivale Crescent	Local	East / West	2	Two-way	Danforth Road	Bendale Boulevard	Permitted	40 km/h
Barrymore Road	Collector	East / West	2	Two-way	Lawrence Avenue E	Danforth Road	Permitted	40 km/h

Lane configurations for study area roadways are illustrated in **Exhibit 2-2**.



**Exhibit 2-2: Existing Study Area Lane Configurations**



## 2.2 Existing Transit Network

The intersection is serviced by two primary TTC bus routes: the 54 Lawrence East bus travels east-west and the 16 McCowan bus travels north-south. Additionally, the 302 Kingston-McCowan and 354 Lawrence East buses provide late night service and the 954 bus provides express service along Lawrence Avenue.

The east-west routes interface with the existing Lawrence East Line 3 station, approximately 2 km to the west. The SRT and this station will cease operation and be replaced by the new SSE Lawrence East Station on the subject site.

Transit services in the development area are shown in **Exhibit 2-3** and service patterns and destinations of the routes in close proximity are illustrated in **Exhibit 2-4**.



**Exhibit 2-5: Traffic Data Information**

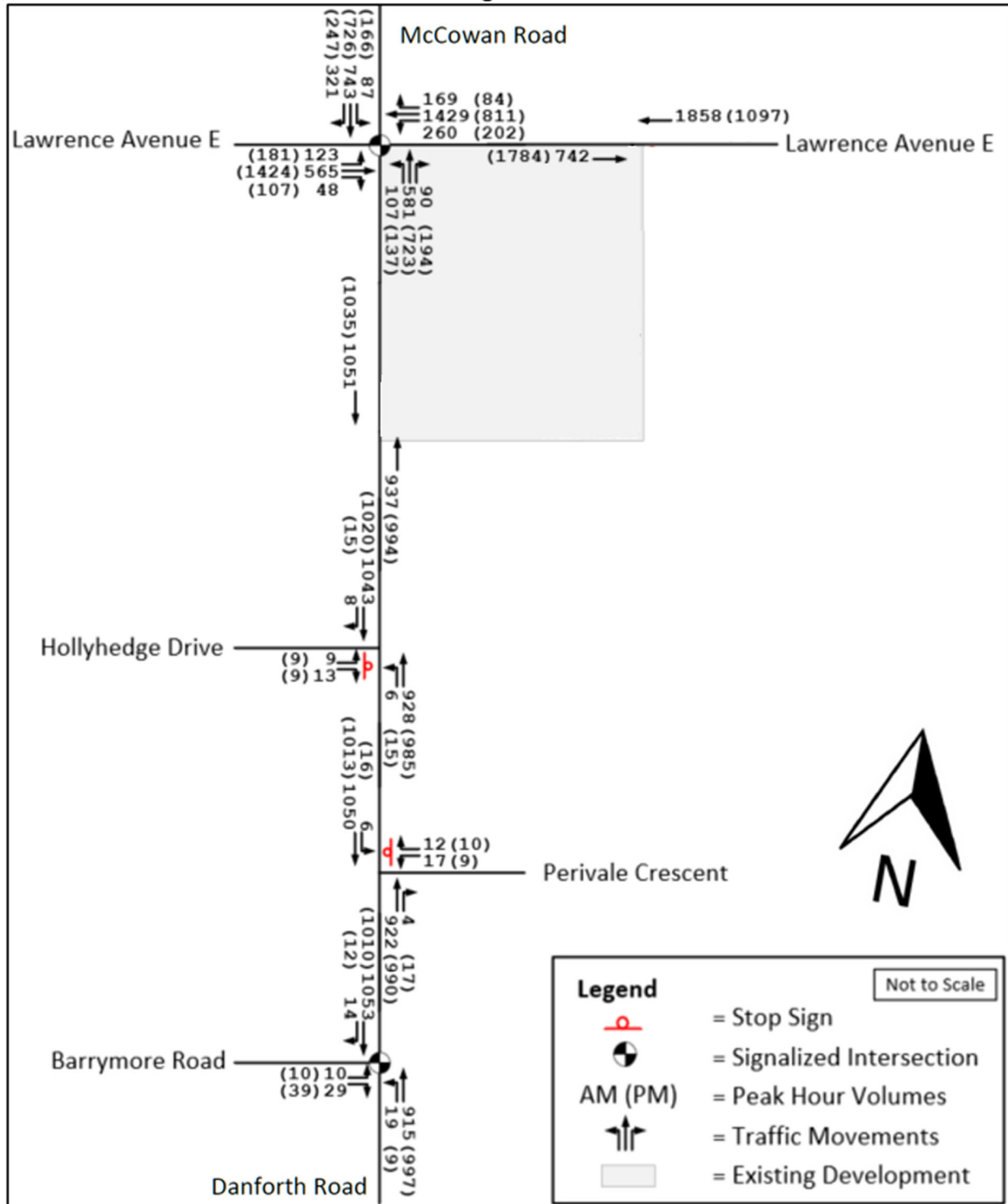
Intersection	Date	Peak Hour	
		AM	PM
Danforth Road & Barrymore Road	Thursday, December 16, 2016	8:00 a.m. – 9:00 a.m.	5:00 p.m. – 6:00 p.m.
McCowan Road & Lawrence Avenue E	Tuesday, February 25, 2020	8:00 a.m. – 9:00 a.m.	4:45 p.m. – 5:45 p.m.

Given the age of the TMC data, all movements at the McCowan Road / Lawrence Avenue East intersection, and north / south movements at the Danforth Road / Barrymore Road intersection were subjected to annual traffic growth rates to estimate typical 2023 conditions. The annual growth rates are explained further in **Section 3.2**.

Trip generation for traffic volumes coming into and out of Hollyhedge Drive and Perivale Crescent were calculated. The weekday AM and PM Peak Hour volumes were balanced southbound along McCowan / Danforth Road and northbound along Danforth Road from Barrymore Road to Hollyhedge Drive. Any unbalanced volumes northbound between Hollyhedge Drive and Lawrence Avenue E were assumed to be due to the Plaza just south of the development site.

A summary of the 2023 Existing Conditions traffic volumes is presented in **Exhibit 2-6**, with full TMC data presented in **Appendix A**.

**Exhibit 2-6: 2023 Existing Conditions Traffic Volumes**



**2.5 Signal Timing Plans**

Signal timing plans for signalized study area intersections were provided by the City of Toronto and are presented in **Appendix B**. Intersections operate using a semi-actuated, coordinated mode of control during the Weekday AM and PM peak periods, with Lawrence Avenue East assigned as the main street.

## 2.6 2023 Existing Conditions Analysis

Using the turning movement counts described in **Section 2.4**, the study area intersections were analyzed using the software package Synchro, which is based on the **Highway Capacity Manual** methodology. Based on the **Guidelines for the Preparation of Transportation Impact Studies** for the City of Toronto, the criteria for identifying critical signalized intersections or movements are as follows:

- Volume to capacity (v/c) ratio exceeds 0.85 for overall intersections operations, through movements, or shared through/turning movements;
- v/c ratio exceeds 1.00 for exclusive movements; or
- 95<sup>th</sup> percentile queues which exceed available storage

Furthermore, the following criteria were used in identifying critical operations at unsignalized intersections:

- 95<sup>th</sup> percentile queue lengths for an individual movement exceed available storage

**Exhibit 2-7** and **Exhibit 2-8** detail existing traffic operations at the signalized intersections, and the unsignalized intersection, respectively, for the Weekday AM and PM peak hours. Full Highway Capacity Manual analysis for the 2023 existing conditions scenario is presented in **Appendix C**.

### 2.6.1 Signalized Intersections

The results of the 2023 Existing Conditions traffic operations analysis for signalized intersections are summarized in **Exhibit 2-7**.

**Exhibit 2-7: 2023 Existing Conditions Traffic Operations – Signalized Intersections**

Intersection	Intersection			Critical Movement					
	LOS	Delay (s)	V/C Ratio	Movement	LOS	Delay (s)	V/C Ratio	95th Percentile Queue (m)	Storage Capacity (m)
<b>Weekday AM Peak Hour</b>									
McCowan Road & Lawrence Avenue East	D	39.5	0.8	EBL	D	48.9	0.80	45	35.8
				EBT	C	31.1	0.47	54	-
				WBL	D	53.0	0.89	79	43.5
				WBT	D	51.5	0.97	154	-
				NBL	C	20.2	0.49	24	69
				NBT	C	30.7	0.63	88	-
				SBL	B	18.9	0.29	19	46.5
				SBT	C	32.3	0.69	100	-
Danforth Road & Barrymore Road/Private Access	A	3.7	0.38	EBT	C	32.6	0.03	7	-
				NBT	A	3.1	0.40	54	-
				SBT	A	3.2	0.42	62	-

Intersection	Intersection			Critical Movement					
	LOS	Delay (s)	V/C Ratio	Movement	LOS	Delay (s)	V/C Ratio	95th Percentile Queue (m)	Storage Capacity (m)
<b>Weekday PM Peak Hour</b>									
Danforth Road/McCowan Road & Lawrence Avenue East	D	51.7	0.92	EBL	D	49.7	0.85	58	35.8
				EBT	F	84.3	1.08	171	-
				WBL	F	113.0	1.08	83	43.5
				WBT	C	31.6	0.51	66	-
				NBL	C	21.7	0.57	29	69
				NBT	D	36.3	0.80	119	-
				SBL	C	28.3	0.70	36	46.5
				SBT	C	30.2	0.61	89	-
Danforth Road & Barrymore Road/Private Access	A	3.8	0.37	EBT	C	32.9	0.10	9	-
				NBT	A	3.2	0.41	58	-
				SBT	A	3.1	0.40	57	-

Note: Red font represents a critical movement.

As shown in **Exhibit 2-7**, the overall intersection operation at the McCowan Road / Lawrence Avenue East intersection was found to operate above the critical capacity threshold during the Weekday PM Peak hour (v/c ratio = 0.92).

The following observations are noted during the Weekday AM Peak hour for individual movements at the McCowan Road / Lawrence Avenue East intersection:

- The westbound through movement was found to operate above critical capacity (v/c ratio = 0.97); and
- The 95<sup>th</sup> percentile queue lengths for the eastbound left-turn and westbound left-turn movements were found to exceed the available storage capacity by approximately two and six car lengths respectively.

The following observations are notes during the Weekday PM Peak hour for individual movements at the McCowan Road / Lawrence Avenue East intersection:

- The eastbound through and westbound left-turn movements were found to operate above capacity (v/c ratios = 1.08); and
- The 95<sup>th</sup> percentile queue lengths for the eastbound left-turn and the westbound left-turn movements were found to exceed the available storage capacity by approximately four and seven car lengths respectively.

### 2.6.2 Unsignalized Intersections

The results of the 2023 Existing Conditions traffic operations analysis for unsignalized intersections are presented in **Exhibit 2-8**.

**Exhibit 2-8: 2023 Existing Conditions Traffic Operations – Unsignalized Intersections**

Intersection	Intersection Delay (s)	Lane	Lane LOS	Lane Delay (s)	Approach Delay (s)	Lane V/C Ratio	Lane 95th Percentile Queue (m)	Lane Storage Capacity (m)
<b>Weekday AM Peak Hour</b>								
Danforth Road & Hollyhedge Drive	0.3	EB	C	22.5	22.5	0.10	3	-
		NB	A	0.3	0.1	0.01	0	-
Danforth Road & Perivale Crescent	0.4	WB	C	21.7	21.7	0.13	3	-
		SB	A	0.3	0.1	0.01	0	-
<b>Weekday PM Peak Hour</b>								
Danforth Road & Hollyhedge Drive	0.4	EB	D	26.1	26.1	0.10	3	-
		NB	A	0.8	0.3	0.03	1	-
Danforth Road & Perivale Crescent	0.3	WB	C	20.1	20.1	0.08	2	-
		SB	A	0.8	0.3	0.03	1	-

Note: *Red font represents a critical movement.*

As shown in **Exhibit 2-8**, no instances of delays, capacity, or queues exceeding critical thresholds are observed at unsignalized intersections during the Weekday AM and PM Peak hours.

### 3 Future Background Conditions

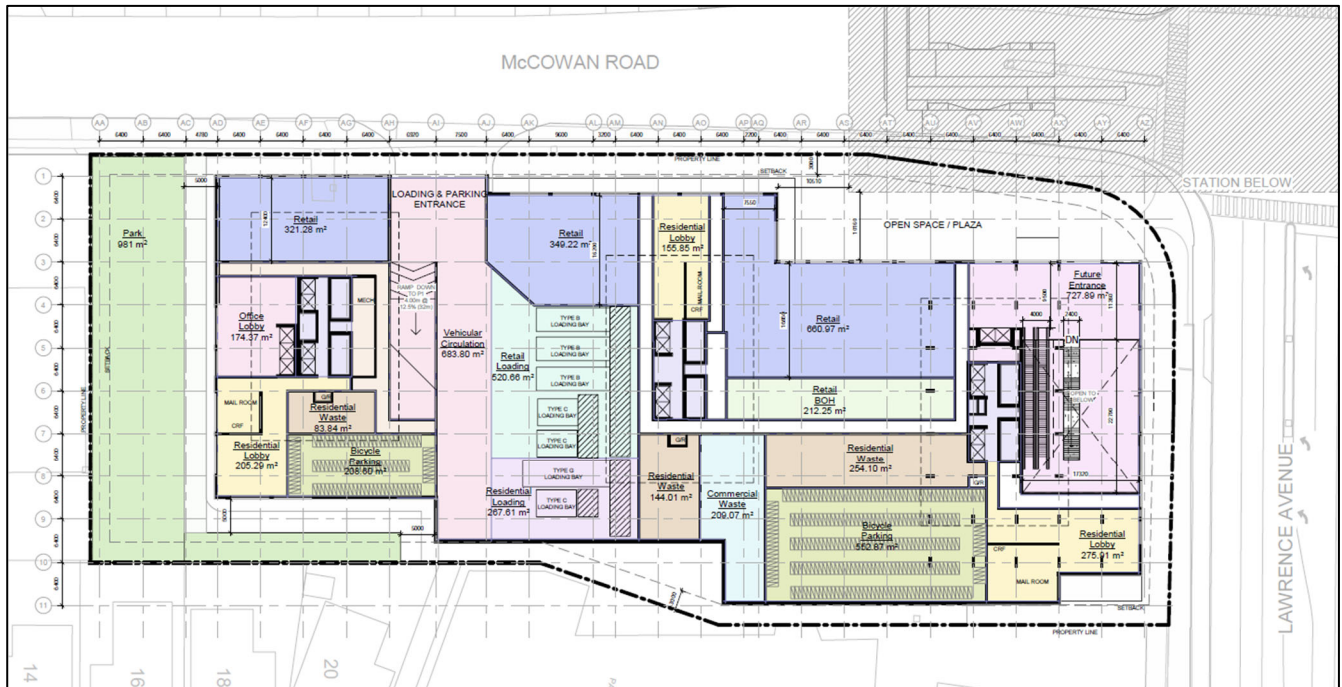
This section discusses the proposed development horizon year, background traffic growth rates, anticipated future road network improvements, and other development-related traffic in the study area under the 2041 horizon year.

#### 3.1 Future Transportation Network Improvements

The proposed development is a Transit-Oriented Community (TOC) being planned in conjunction with the future Lawrence East subway station on the proposed Scarborough Subway Extension (SSE). The significant transit service improvements via the SSE, will have the entrance of the Lawrence East subway station within close walking distance of the proposed development.

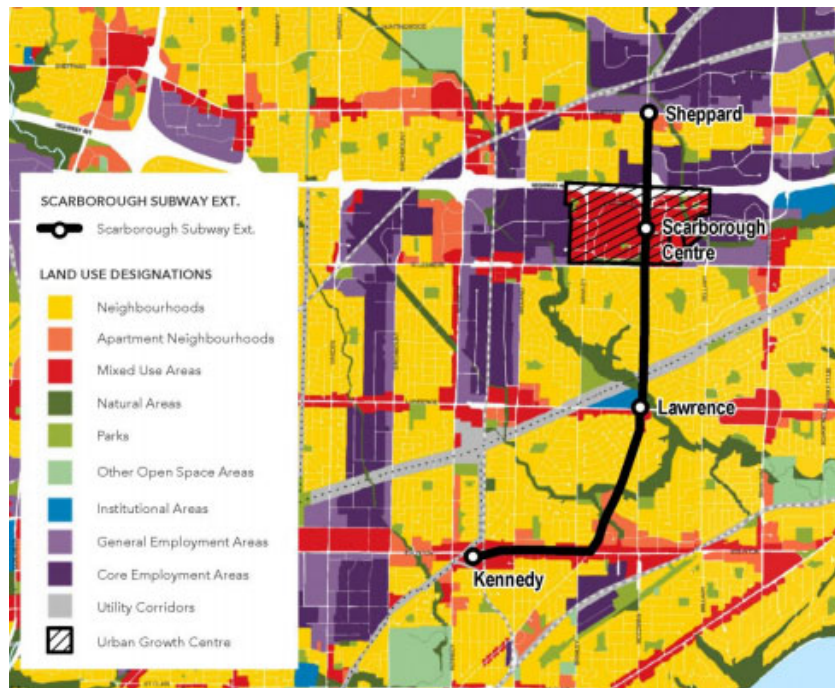
The proposed development TOC is proposed to be constructed on the intersection’s southeast corner, on the other side of the station box from the station, with a potential below-grade knock-out panel to allow for a direct connection to the subway. The proposed development location is illustrated in **Exhibit 3-1**.

**Exhibit 3-1: Proposed Development Location**



The study area in relation to the proposed SSE corridor is illustrated in **Exhibit 3-2** sourced from Figure 5 of the Metrolinx SSE Preliminary Design Business Case Report (February 2020)<sup>1</sup>.

**Exhibit 3-2: Future SSE Corridor Implementation Map**



<sup>1</sup> [http://www.metrolinx.com/en/regionalplanning/projectevaluation/benefitscases/2019-02-28\\_SSE\\_Preliminary\\_Design\\_Business\\_Case.pdf](http://www.metrolinx.com/en/regionalplanning/projectevaluation/benefitscases/2019-02-28_SSE_Preliminary_Design_Business_Case.pdf)  
219214S-OTP-TAT-MEM-00062



### 3.2 Horizon Year and Growth Rate

A 2041 horizon year was selected for the future background and future total analyses to coincide with the SSE being operational and reflect the anticipated changes to travel mode choice. McCowan Road-Danforth Road and Lawrence Avenue East corridor volumes (before and after SSE implementation) were derived from EMME traffic data used in Traffic Impact Assessment Report, “Scarborough Subway Extension TPAP Addendum”, dated April 30, 2021. The EMME data was sourced from the City of Toronto weekday AM/PM peak hours for the 2011 and 2041 (with SSE) scenarios. The annual and total growth rates (from 2023 to 2041) for each direction in the study area are presented in **Exhibit 3-3**.

**Exhibit 3-3: Annual and Total Growth Rates in Study Area**

Peak Period	Annual Growth Rate			
	McCowan Rd - Danforth Rd		Lawrence Ave E	
	Northbound	Southbound	Eastbound	Westbound
AM Peak	0.41%	0.09%	0.81%	0.81%
PM Peak	0.29%	0.44%	1.01%	1.01%
Peak Period	Total Growth Rate (2023 to 2041)			
	McCowan Rd - Danforth Rd		Lawrence Ave E	
	Northbound	Southbound	Eastbound	Westbound
AM Peak	11.44%	3.35%	27.37%	15.57%
PM Peak	9.77%	13.92%	35.17%	14.87%

### 3.3 Background Development

A review of the City Development Application website<sup>2</sup> identified approximately eight applications in the vicinity (i.e., 1000 metre radius) from the study area, as illustrated geographically in **Exhibit 3-4**. Each dot in the exhibit represents a development application on record. Of the ten, three were deemed notable enough to be considered a future generator of traffic activity for background analysis, based on the nature, year / status, and size of the application, as summarized in **Exhibit 3-5**.

<sup>2</sup> <http://app.toronto.ca/AIC/index.do>  
219214S-OTP-TAT-MEM-00062

**Exhibit 3-4 City Development Application Website - Screenshots of Study Area**



**Exhibit 3-5: City Development Application Website – Status of Study Area Applications**

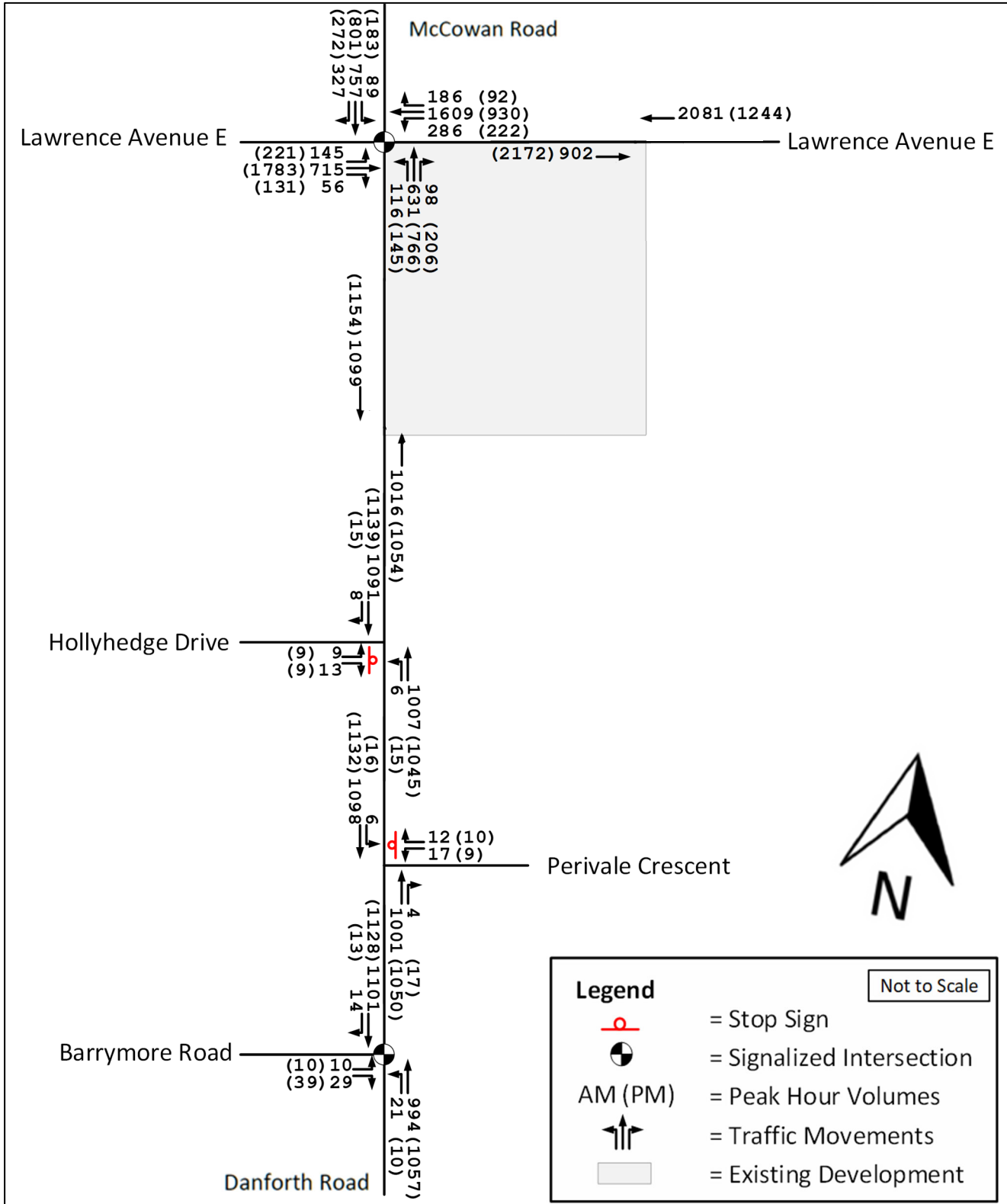
Site Address	Site Details & Date	Status
49 CEDAR BRAE BLVD	To construct a new two-storey detached dwelling with integral two car garage. May 05, 2021	Not included – minimal new traffic generated.
3 BRAEBURN BLVD	Proposal to sever the existing lot into 2 parcels.	Not included – minimal new traffic generated.
62 CEDAR BRAE BLVD	To obtain consent to sever the property into three (3) residential lots. May 29, 2018	Not included – minimal new traffic generated.
1339 DANFORTH RD	Site Plan application for a new gas station with a retail component. Nov 12, 2020	Not included. Gas stations generally only generate pass-by trips. Minimal new traffic generated.
1340 DANFORTH RD	The owners of 1346 Danforth Road are proposing to develop the land with an 18-storey, 277-unit residential apartment building. Jan 26, 2016	Construction completed and occupied in 2018. Danforth Village Estates. Traffic already part of existing conditions.
23 LARKHALL AVE	To construct a second-storey addition over the existing dwelling. Mar 19, 2021	Not included – minimal new traffic generated.
3379 LAWRENCE AVE E	Redevelopment of 6 storey apartment building for 10 storey affordable housing.	Included

Site Address	Site Details & Date	Status
	Aug 2, 2023	
2740 LAWRENCE AVE E	Development comprising of 36 detached dwellings and 9 townhouse blocks with a public road on a new plan of subdivision. Refer to concurrent Plan of Subdivision 19 242185 ESC 21 SB.  Oct 28, 2019	Included
2683 LAWRENCE AVE E	Development comprising of an 11-storey mixed-use building. Commercial uses on the ground floor with residential above.  Nov 12, 2020	Included
799 BRIMLEY RD	Development to replace a low rise commercial plaza and parking area with a 14 storey, 391 unit residential apartment building.  Mar 10, 2023	Included

#### 4 2041 Future Background Conditions Analysis

2023 Existing Conditions scenario was subjected to annual growth rates and new trips from background developments to produce the 2041 background traffic volumes illustrated in **Exhibit 4-1**.

**Exhibit 4-1: 2041 Future Background Conditions Traffic Volumes**



The results of the 2041 Future Background Conditions analysis are summarized in subsections **4.1.1** and **4.1.2**. Full Highway Capacity Manual analysis for the 2041 Future Background Conditions scenario is presented in **Appendix D**.

#### 4.1.1 Signalized Intersections

The results of the 2041 Future Background Conditions traffic operations analysis for signalized intersections is presented in **Exhibit 4-2**.

**Exhibit 4-2: 2041 Future Background Conditions traffic Operations – Signalized intersections**

Intersection	Intersection			Critical Movement					
	LOS	Delay (s)	V/C Ratio	Movement	LOS	Delay (s)	V/C Ratio	95th Percentile Queue (m)	Storage Capacity (m)
<b>Weekday AM Peak Hour</b>									
McCowan Road & Lawrence Avenue East	E	58.7	0.91	EBL	E	78.9	0.94	59	35.8
				EBT	C	33.3	0.59	69	-
				WBL	F	137.8	1.17	109	43.5
				WBT	F	86.5	1.09	187	-
				NBL	C	21.2	0.54	25	69
				NBT	C	32.4	0.70	98	-
				SBL	B	19.4	0.32	20	46.5
				SBT	C	32.8	0.71	103	-
Danforth Road & Barrymore Road/Private Access	A	3.8	0.39	EBT	C	32.6	0.03	7	-
				NBT	A	3.3	0.44	61	-
				SBT	A	3.3	0.44	66	-
<b>Weekday PM Peak Hour</b>									
McCowan Road & Lawrence Avenue East	F	95.1	1.05	EBL	F	146.8	1.18	88	35.8
				EBT	F	197.7	1.35	237	-
				WBL	F	150.9	1.19	95	43.5
				WBT	C	32.8	0.58	76	-
				NBL	C	25.9	0.67	31	69
				NBT	D	39.0	0.84	129	-
				SBL	D	41.7	0.83	56	46.5
				SBT	C	31.8	0.68	101	-
Danforth Road & Barrymore Road/Private Access	A	3.9	0.4	EBT	C	32.9	0.10	9	-
				NBT	A	3.3	0.43	63	-
				SBT	A	3.3	0.44	67	-

The critical traffic operations identified under the 2023 Existing Conditions scenario are expected to be exacerbated with the addition of background traffic growth during the weekday AM and PM Peak hours.

As shown in **Exhibit 4-2**, the overall intersection operation at the McCowan Road / Lawrence Avenue E intersection operates above the critical capacity threshold during the Weekday AM Peak hour (v/c ratio = 0.91) and above capacity during the Weekday PM Peak hour (v/c ratio = 1.05). Generally, this is noted to be a minimal impact compared to existing operations, as demonstrated in the v/c ratio comparison between these two scenarios in **Section 7**, with a change of up to 3%.

The following observations are noted as new critical individual movements during the Weekday AM Peak hour at the McCowan Road / Lawrence Avenue East intersection:

- The westbound through movement v/c ratio increased from above critical capacity (0.97) to above capacity (1.09); and
- The westbound left-turn movement was found to operate above capacity (v/c ratio = 1.16).

The following observations are noted as new critical individual movements during the Weekday PM Peak hour at the McCowan Road / Lawrence Avenue East intersection:

- The eastbound left-turn movement was found to operate above capacity (v/c ratio = 1.17).

#### 4.1.2 Unsignalized Intersections

The results of the 2041 Future Background Conditions traffic operations analysis for unsignalized intersections are presented in **Exhibit 4-3**.

**Exhibit 4-3: 2041 Future Background Conditions traffic operations – Unsignalized Intersections**

Intersection	Intersection Delay (s)	Lane	Lane LOS	Lane Delay (s)	Approach Delay (s)	Lane V/C Ratio	Lane 95th Percentile Queue (m)	Lane Storage Capacity (m)
<b>Weekday AM Peak Hour</b>								
Danforth Road & Hollyhedge Drive	0.3	EB	C	24.8	24.8	0.12	3	-
		NB	A	0.4	0.1	0.01	0	-
Danforth Road & Perivale Crescent	0.4	WB	C	23.4	23.4	0.14	4	-
		SB	A	0.3	0.1	0.01	0	-
<b>Weekday PM Peak Hour</b>								
Danforth Road & Hollyhedge Drive	0.4	EB	D	26.6	26.6	0.11	3	-
		NB	A	0.8	0.3	0.03	1	-
Danforth Road & Perivale Crescent	0.3	WB	C	20.4	20.4	0.08	2	-
		SB	A	0.8	0.3	0.03	1	-

As shown in **Exhibit 4-3**, no instances of delays, capacity or queues exceeding critical thresholds are expected at unsignalized intersections during the weekday AM and PM Peak hours.

## 5 Future Total Conditions

This section of the report analyzes the impact of the proposed development on the future total traffic conditions for 2041.

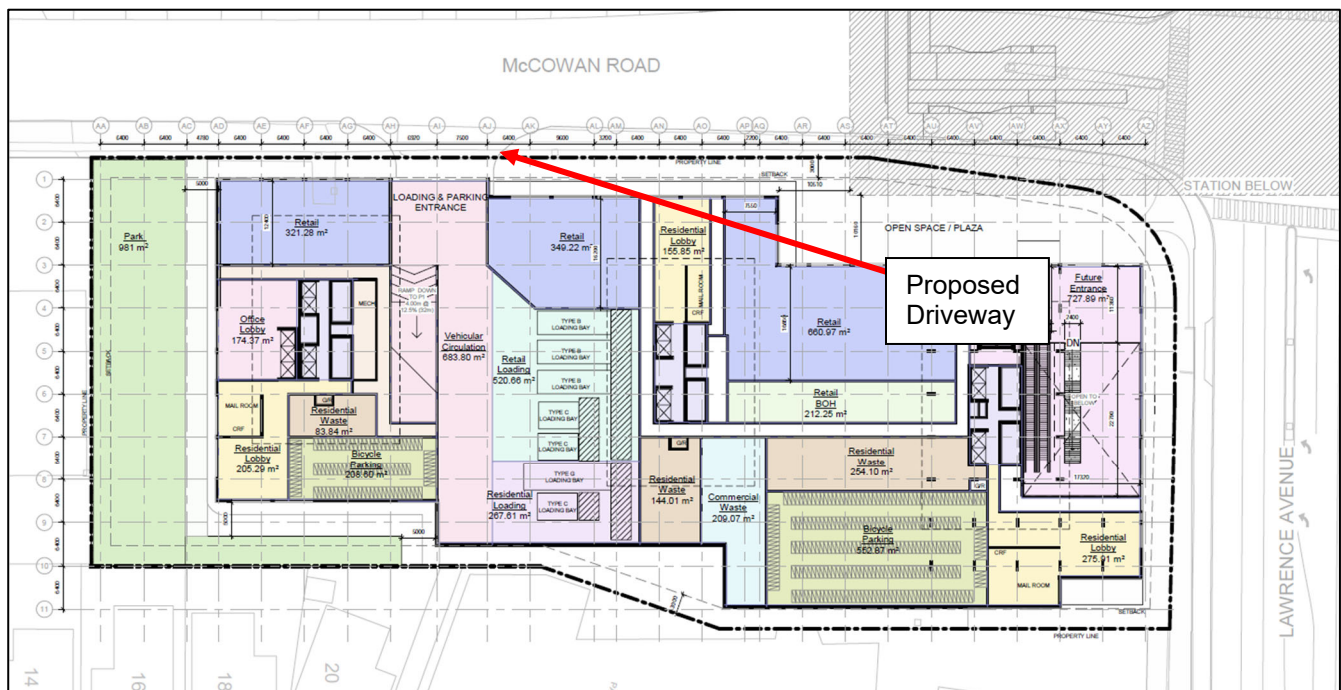
### 5.1 Future Site Access

Vehicular traffic will access the proposed development via one access on McCowan Road. McCowan Road is planned for realignment near Lawrence Avenue East to accommodate construction and operation of new transit buildings and facilities, west and northwest of the proposed development.

The McCowan Road access will be used by commercial vehicles as well passenger vehicles using the pick-up drop-off area and underground parking. It is assumed that all commercial vehicles will access the site during off-peak hours.

The McCowan Road driveway is proposed to be approximately 125 metres south of the McCowan Road / Lawrence Avenue East intersection (measured center to center) as illustrated in **Exhibit 5-1**.

**Exhibit 5-1: Proposed Development Driveway Placement**



### 5.2 Trip Generation

The gross trips expected to be generated by the proposed development are examined in this section. The net trips generated are then assigned and distributed to the study area road network.

#### 5.2.1 Trip Reductions

To more accurately reflect the forecasted vehicle trips to the context of a transit oriented development, a relationship with parking provisions and residential units was created. Based on the City of Toronto Zoning By-law 569-2013 and the 89-2022 amendment (effective February 2022), this site location is generally regarded as situated in Policy Area 4.

It is noted as part of the ZBL amendment, the City has approved the removal of minimum parking requirements and introduced maximum rates, as part of the City’s “Review of Parking Requirements for New Development”<sup>3</sup> and focus on housing affordability and environmental sustainability. The proposed parking rates for this development correspondingly reflects this new intent, leveraging the transit oriented design and amenities. Detailed parking provisions are discussed later in **Section 8** of this report.

The associated parking rate comparison summary is provided in **Exhibit 5-2** based on the residential unit mix.

**Exhibit 5-2: Parking Supply Residential Supply Comparison to City ZBL Rates**

Land Use	Proposed Units	ZBL Parking Rate Maximum (per unit)	Maximum Spaces	Proposed Spaces	Proposed Rate (per unit)
<b>Resident Parking Requirements</b>					
One-Bedroom Unit	466	0.9	419	146	0.20
Two-Bedroom Unit	292	1.0	292		
Three-Bedroom Unit	16	1.2	19		
<b>Total</b>	<b>774</b>	<b>0.94</b>	<b>730</b>		

Using the above parking relationship, it is expected that trip generation rates derived from **Section 5.2.2** for the Multifamily Housing component will correspondingly be lower (i.e., by approximately 80%, from 0.94 spaces / unit to 0.20 spaces / unit) given the increased transit oriented development context.

For more localized transportation mode data, the Transportation Tomorrow Survey (TTS) census based database was used to review historical travel mode preferences in the study area. Based on this data, with the 2016 data set being the most recent, **37% and 38%** of trips in the study area are made via non-automobile travel modes during the weekday AM and PM peak hours, respectively. A conservative assumption was made regarding the non-automobile mode share not increasing upon the completion of the SSE transit service connected to the proposed development.

**Exhibit 5-3: Transportation Mode (2016 TTS Data)**

Transportation Mode	% AM	% PM
Auto Driver	45%	43%
Other (Auto Passenger)	18%	19%
<b>Transit</b>	<b>25%</b>	<b>31%</b>
<b>Walk</b>	<b>12%</b>	<b>7%</b>
<b>Total</b>	<b>100%</b>	<b>100%</b>

Since ITE trip rate data is generally obtained from locations that do not have higher order / frequent transit service, the higher non-automobile transportation mode percentages from **Exhibit 5-3** was

<sup>3</sup> <https://www.toronto.ca/city-government/planning-development/planning-studies-initiatives/review-of-parking-requirements-for-new-development/>



applied to the Shopping Centre and General Office Building components to adjust the trip generation estimates.

The estimated net new inbound and outbound vehicle trips for the proposed development are presented in **Exhibit 5-4**. Pass-by trip reductions were applied to the retail component of the proposed development, and internal trips were calculated to account for interaction between the three proposed uses on-site.

This adjustment percentage (37-38% trips being non-automobile in nature) generally corresponds to the approach taken by other traffic study reports completed for other mixed use developments near higher order transit services, for example:

1. 1910 Eglinton Avenue East, City of Toronto. Mixed-Use Development. TIS submitted BA Group on June 25, 2020.
  - Located within walking distance of the Eglinton Crosstown LRT;
  - Golden Mile Secondary Plan, November 2019 (GMSP) area relies on up to 60% non-auto mode split target;
  - Potential for car share spaces; and
  - Provision of a number of transportation demand management (TDM) measures.
2. 1021-1035 Markham Road, City of Toronto. Mixed-Use Development. TIS submitted by BA Group on October 17, 2020.
  - Residential apartment automobile mode share from TTS 2011 data was 44% and 47% during the AM and PM peak periods, respectively.
  - A 30% reduction in trip generation rates for residential and retail uses was applied.
  - The site is situated in the Markham - Ellesmere Revitalization Study area; and
  - Provision of a number of transportation demand management (TDM) measures, such as one year of prepaid car share membership, unbundled parking, wider sidewalks, TDM related community outreach, and prepaid PRESTO cards (valued at \$100) to each unit.
3. 315-327 Royal York Road, City of Toronto. Mixed-Use Development. TIS submitted by LEA Consulting on October 8, 2019.
  - Located in a multi-modal hub, near the Mimico GO Station;
  - Compared to base ITE trip generation rates, a 40% reduction in trip generation rates for residential uses, and 20% reduction to office uses was applied, to reflect the multi-modal nature of the area; and
  - Potential for a number of TDM measures.

## 5.2.2 Gross Trip Generation

Trip generation rates from the Institute of Transportation Engineers (ITE) Manual, 10<sup>th</sup> edition were used to estimate future automobile trips associated with the proposed development (**Exhibit 5-4**). Based on the nature of the development, the location context, and the data quality, the fitted curve data for vehicle trips, Land Use Code 222: Multifamily Housing (High-Rise) – Dense Multi-Use Urban was used for the residential component.

For the commercial component, average rate data for AM Peak hour trips and fitted curve data for PM Peak hour trips was used with Land Use Code 820: Shopping Centre – General Urban / Suburban.

For the office component, fitted curved data was used with Land Use Code 710: General Office Building – Dense Multi-Use Urban.

**Exhibit 5-4: Proposed Development Trip Generation**

SSE - Lawrence							
LUC 222: Multifamily Housing (High-Rise) - Dense Multi-Use Urban - 774 Units							
Term	Unit	Weekday AM Peak Hour			Weekday PM Peak Hour		
		Inbound	Outbound	Total	Inbound	Outbound	Total
Trip Generation Equation	person trips / unit	Ln(T) = 0.84*Ln(X) - 0.65			Ln(T) = 0.81*Ln(X) - 0.60		
Directional Distribution		12%	88%	100%	70%	30%	100%
Trip Generation Rate	person trips / unit	0.02	0.16	0.18	0.11	0.05	0.16
Total Trips	person trips / hour	17	122	139	84	36	120
Internal Trips	person trips / hour	0	3	3	19	7	26
External Trips	person trips / hour	17	119	136	65	29	94
External Auto Trips with Parking Reduction	vehicle trips / hour	3	24	27	13	6	19
Passby Trip Reduction (0%)	vehicle trips / hour	0	0	0	0	0	0
Net New Auto Trips	vehicle trips / hour	<b>3</b>	<b>24</b>	<b>27</b>	<b>13</b>	<b>6</b>	<b>19</b>
LUC 820: Shopping Centre - General Urban/Suburban - 1,405 m <sup>2</sup> (15,123 ft <sup>2</sup> )							
Term	Unit	Weekday AM Peak Hour			Weekday PM Peak Hour		
		Inbound	Outbound	Total	Inbound	Outbound	Total
Trip Generation Equation	person trips / 1000 ft <sup>2</sup>	-			Ln(T) = 0.74Ln(X) + 2.89		
Directional Distribution		62%	38%	100%	48%	52%	100%
Trip Generation Rate	person trips / 1000 ft <sup>2</sup>	0.58	0.36	0.94	4.25	4.61	8.86

SSE - Lawrence							
Total Trips	person trips / hour	9	5	14	64	70	134
Internal Trips	person trips / hour	4	1	5	11	19	30
External Trips	person trips / hour	5	4	9	53	51	104
External Auto Trips	vehicle trips / hour	3	3	6	33	32	65
Passby Trip Reduction (34%)	vehicle trips / hour	1	1	2	11	11	22
Net New Auto Trips	vehicle trips / hour	<b>2</b>	<b>2</b>	<b>4</b>	<b>22</b>	<b>21</b>	<b>43</b>
LUC 710: General Office Building - General Urban/Suburban - 6,444 m <sup>2</sup> (69,362 ft <sup>2</sup> )							
Term	Unit	Weekday AM Peak Hour			Weekday PM Peak Hour		
		Inbound	Outbound	Total	Inbound	Outbound	Total
Trip Generation Equation	vehicle trips / 1000 ft <sup>2</sup>	0.94(X) + 26.49			T = 0.95Ln(X) + 0.36		
Directional Distribution		86%	14%	100%	16%	84%	100%
Trip Generation Rate	vehicle trips / 1000 ft <sup>2</sup>	1.14	0.19	1.33	0.18	0.97	1.15
Total Trips	vehicle trips / hour	79	13	92	13	67	80
Internal Trips	vehicle trips / hour	3	3	6	2	6	8
External Trips	vehicle trips / hour	76	10	86	11	61	72
External Auto Trips	Vehicle trips / hour	48	6	54	7	38	45
Passby Trip Reduction (0%)	vehicle trips / hour	0	0	0	0	0	0
Net New Auto Trips	vehicle trips / hour	<b>48</b>	<b>6</b>	<b>54</b>	<b>7</b>	<b>38</b>	<b>45</b>
Overall Development							
Term	Unit	Weekday AM Peak Hour			Weekday PM Peak Hour		
		Inbound	Outbound	Total	Inbound	Outbound	Total
Net New Auto Trips	vehicle trips / hour	53	32	85	42	65	107
Transit	transit trips / hour	25	33	58	40	44	84
Walk	walking trips / hour	12	16	28	9	10	19
Total Trips	trips / hour	90	81	171	91	119	210

The trip mode for the study area was based on 2016 Transportation Tomorrow Survey data and is summarized in **Exhibit 5-3**.

### **5.2.3 Existing Development - Trip Removals**

The proposed site is currently occupied by an approximately 2,564 ft<sup>2</sup> gross floor area (GFA) (238 m<sup>2</sup> GFA) general office building, 17,232 ft<sup>2</sup> GFA (1,601 m<sup>2</sup> GFA) retail space and 9,796 ft<sup>2</sup> GFA (910 m<sup>2</sup> GFA) bank space which will be removed and replaced with the proposed residential development.

As a result, trips associated with this facility must be removed from the road network as part of the future total traffic scenario. The trips were estimated based on Land Use Code 720: Medical-Dental Office Building – General Urban / Suburban, Land Use Code 820: Shopping Centre – General Urban / Suburban and Land Use Code 911: Walk-in Banks as illustrated in **Exhibit 5-5**.

**Exhibit 5-5: Existing Development Trip Generation Estimates**

SSE Lawrence - Existing Development Trip Generation							
LUC 911: Walk-in Banks - 910 m <sup>2</sup> (9,796 ft <sup>2</sup> )							
Term	Unit	Weekday AM Peak Hour			Weekday PM Peak Hour		
		Inbound	Outbound	Total	Inbound	Outbound	Total
Trip Generation Equation	person trips / unit	-			-		
Directional Distribution		0%	0%	0%	44%	56%	100%
Trip Generation Rate	person trips / unit	0	0	0	5.34	6.79	12.13
Total Trips	person trips / hour	0	0	0	52	67	119
Internal Trips	person trips / hour	0	0	0	0	0	0
External Trips	person trips / hour	0	0	0	52	67	119
External Auto Trips	vehicle trips / hour	0	0	0	32	42	74
Passby Trip Reduction (0%)	vehicle trips / hour	0	0	0	0	0	0
Net New trips	vehicle trips / hour	<b>0</b>	<b>0</b>	<b>0</b>	<b>32</b>	<b>42</b>	<b>74</b>
LUC 820: Shopping Centre - Dense Multi-Use Urban - 1,601 m <sup>2</sup> (17,232 ft <sup>2</sup> )							
Term	Unit	Weekday AM Peak Hour			Weekday PM Peak Hour		
		Inbound	Outbound	Total	Inbound	Outbound	Total
Trip Generation Equation	person trips / 1000 ft <sup>2</sup>	-			Ln(T) = 0.74Ln(X) + 2.89		
Directional Distribution		62%	38%	100%	48%	52%	100%
Trip Generation Rate	person trips / 1000 ft <sup>2</sup>	0.58	0.36	0.94	4.12	4.47	8.59
Total Trips	person trips / hour	10	6	16	71	77	148
Internal Trips	person trips / hour	0	0	0	2	1	3
External Trips	person trips / hour	10	6	16	69	76	145
External Auto Trips	vehicle trips / hour	6	4	10	43	47	90
Passby Trip Reduction (34%)	vehicle trips / hour	2	1	3	15	16	31
Net New Trips	vehicle trips / hour	<b>4</b>	<b>3</b>	<b>7</b>	<b>28</b>	<b>31</b>	<b>59</b>
LUC 720: Medical-Dental Office Building - General Urban/Suburban - 238 m <sup>2</sup> (2,564 ft <sup>2</sup> )							
Term	Unit	Weekday AM Peak Hour			Weekday PM Peak Hour		
		Inbound	Outbound	Total	Inbound	Outbound	Total
Trip Generation Equation	vehicle trips / 1000 ft <sup>2</sup>	Ln(T) = 0.89Ln(X) + 1.31			T = 3.39(X) + 2.02		
Directional Distribution		86%	14%	100%	16%	84%	100%

SSE Lawrence - Existing Development Trip Generation							
Trip Generation Rate	vehicle trips / 1000 ft <sup>2</sup>	0.15	0.03	0.18	0.04	0.18	0.22
Total Trips	vehicle trips / hour	8	1	9	2	9	11
Internal Trips	vehicle trips / hour	0	0	0	1	2	3
External Trips	vehicle trips / hour	8	1	9	1	7	8
External Auto Trips	Vehicle trips / hour	5	1	6	1	4	5
<i>Passby Trip Reduction (0%)</i>	<i>vehicle trips / hour</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
net new trips	vehicle trips / hour	<b>5</b>	<b>1</b>	<b>6</b>	<b>1</b>	<b>4</b>	<b>5</b>
Overall Existing Development Trips							
Term	Unit	Weekday AM Peak Hour			Weekday PM Peak Hour		
		Inbound	Outbound	Total	Inbound	Outbound	Total
Net New Auto Trips	vehicle trips / hour	<b>9</b>	<b>4</b>	<b>13</b>	<b>61</b>	<b>77</b>	<b>138</b>
Transit	transit trips / hour	5	2	7	38	47	85
Walk	walking trips / hour	2	1	3	9	11	20
Total Trips	trips / hour	16	7	23	108	135	243
Proposed Development Trips <i>Minus</i> Existing Development Trips							
Term	Unit	Weekday AM Peak Hour			Weekday PM Peak Hour		
		Inbound	Outbound	Total	Inbound	Outbound	Total
<b>Net New Auto Trips</b>	<b>vehicle trips / hour</b>	<b>35</b>	<b>27</b>	<b>62</b>	<b>-19</b>	<b>-19</b>	<b>-38</b>
<b>Transit</b>	<b>transit trips / hour</b>	<b>16</b>	<b>32</b>	<b>48</b>	<b>3</b>	<b>-6</b>	<b>-3</b>
<b>Walk</b>	<b>walking trips / hour</b>	<b>8</b>	<b>15</b>	<b>23</b>	<b>0</b>	<b>-2</b>	<b>-2</b>
<b>Total Trips</b>	<b>trips / hour</b>	<b>59</b>	<b>74</b>	<b>133</b>	<b>-16</b>	<b>-27</b>	<b>-43</b>

As illustrated in **Exhibit 5-5**, the existing development is estimated to generate 13 vehicle trips during the Weekday AM peak hour (9 trips inbound and 4 trips outbound). During the Weekday PM peak hour, the existing development is estimated to generate 138 trips (61 trips inbound and 77 trips outbound).

These trips associated with the existing development will be subtracted from the gross new trips forecasted for the proposed development, to obtain the net amount of new trips generated on the proposed development lands. The traffic patterns calculated in the next section was also used during the removal of existing development trips from the study area road network.

#### 5.2.4 Trip Distribution and Assignment

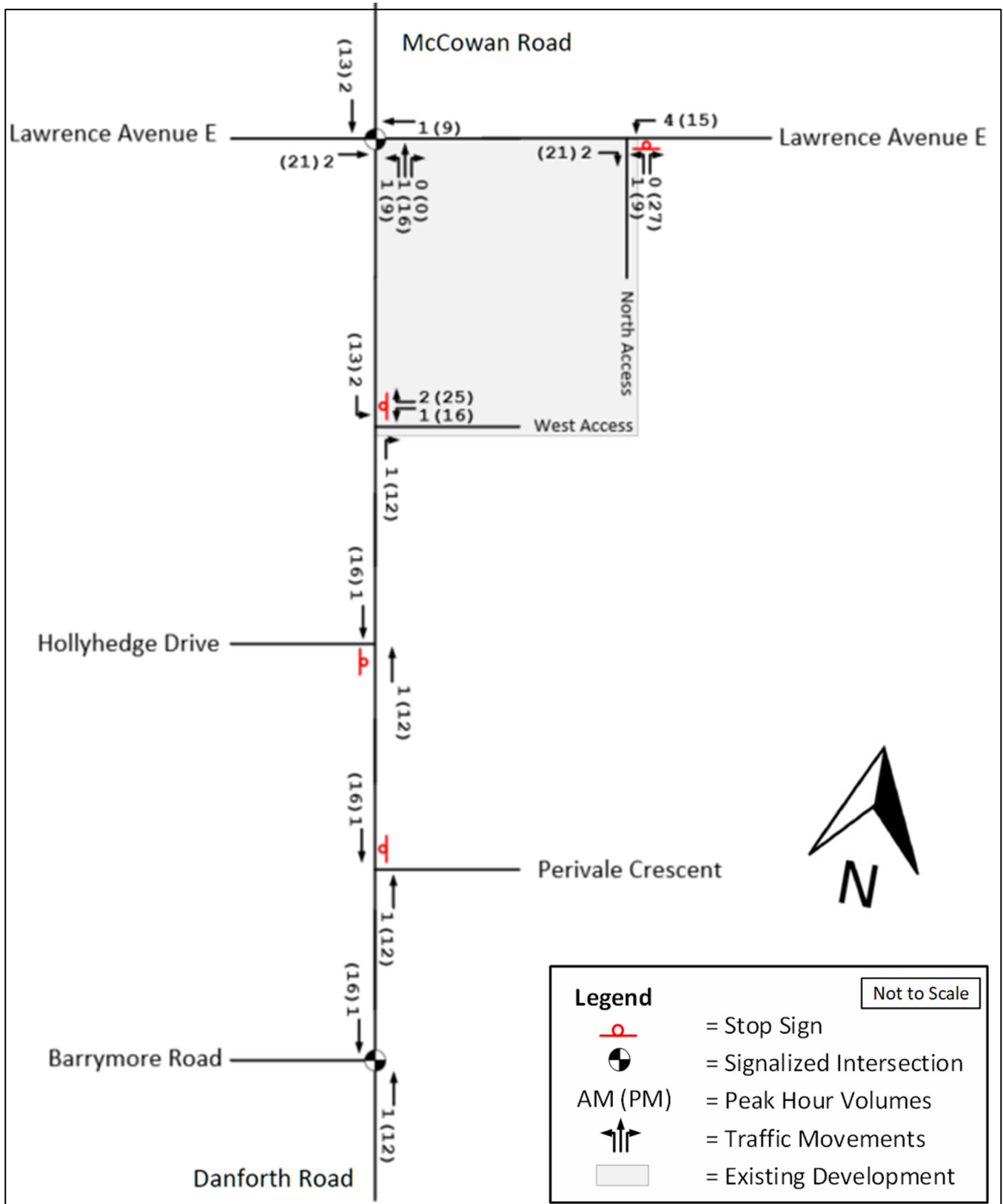
The trip distribution for site trips was determined based on the travel patterns of existing traffic at the study area intersections, and is presented in **Exhibit 5-6**, organized by inbound and outbound trips during the weekday AM and PM peak hours.

**Exhibit 5-6: Trip Distribution and Assignment**

To / From	Inbound Trips		Outbound Trips	
	Weekday AM Peak Hour	Weekday PM Peak Hour	Weekday AM Peak Hour	Weekday PM Peak Hour
McCowan Road (North)	23%	21%	10%	10%
McCowan Road (South)	19%	20%	13%	12%
Lawrence Avenue East (West)	16%	35%	40%	23%
Lawrence Avenue East (East)	42%	24%	37%	55%
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

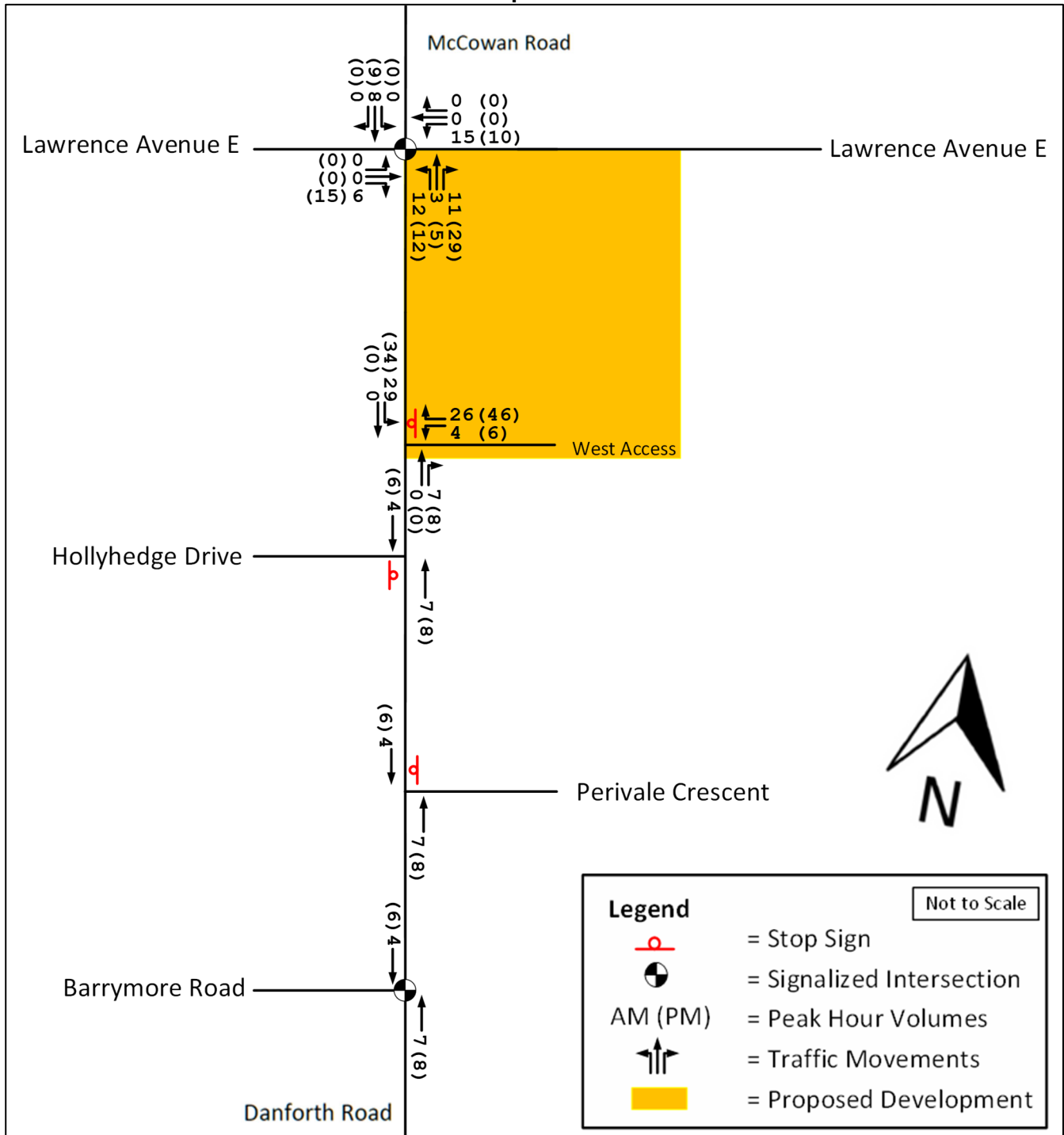
No additional directional distribution was applied at other intersections, all trips were assumed to continue in their original direction of travel. Existing trips were removed from the network to produce Future Background Conditions and new trips were then applied to produce Future Total Conditions. The existing trips and new trips are illustrated in **Exhibit 5-7** and **Exhibit 5-8**.

**Exhibit 5-7: Existing Development Site Traffic Volumes**





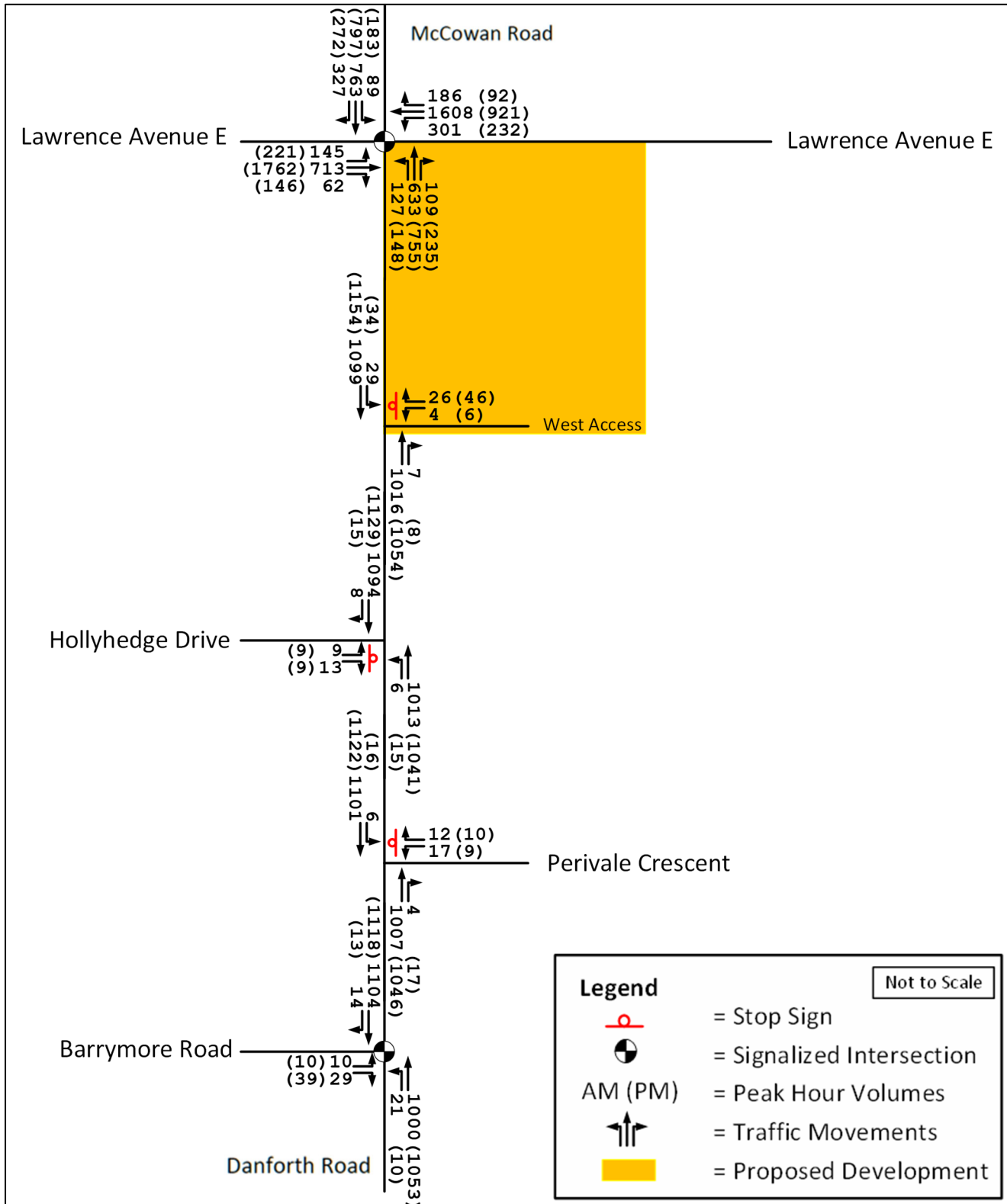
**Exhibit 5-8: New Development Site Traffic Volumes**



**6 2041 Future Total Conditions Analysis**

Existing development trips were removed, and new trips resulting from the construction of the proposed development were added to the 2041 future background conditions scenario, producing the 2041 future total traffic volumes illustrated in **Exhibit 6-1**.

**Exhibit 6-1: 2041 Future Total Conditions Traffic Volumes**



Using these 2041 future total traffic volumes, traffic operations analysis was conducted to determine future intersection performance with the impact of the proposed development. The results of the traffic operations analysis are presented in the following subsections. Synchro model traffic analysis outputs for the 2041 Future Total Conditions scenario is presented in **Appendix E**.

### 6.1 Signalized Intersections

The results of the 2041 Future Total conditions traffic operations analysis for signalized intersections is presented in **Exhibit 6-2**.

**Exhibit 6-2: 2041 Future Total Conditions Traffic Operations – Signalized Intersections**

Intersection	Intersection			Critical Movement					
	LOS	Delay (s)	V/C Ratio	Movement	LOS	Delay (s)	V/C Ratio	95th Percentile Queue (m)	Storage Capacity (m)
<b>Weekday AM Peak Hour</b>									
Danforth Road/McCowan Road & Lawrence Avenue East	E	60.9	0.95	EBL	E	78.9	0.94	59	35.8
				EBT	C	33.6	0.60	70	-
				WBL	F	165.7	1.24	120	43.5
				WBT	F	87.6	1.09	188	-
				NBL	C	22.8	0.60	28	69
				NBT	C	32.9	0.71	100	-
				SBL	B	19.4	0.32	20	46.5
				SBT	C	33.0	0.71	104	-
Danforth Road & Barrymore Road/Private Access	A	3.9	0.39	EBT	C	32.6	0.03	7	-
				WBT	C	32.4	0.00	-	-
				NBT	A	3.3	0.44	62	-
<b>Weekday PM Peak Hour</b>									
Danforth Road/McCowan Road & Lawrence Avenue East	F	101.5	1.08	EBL	F	144.7	1.17	88	35.8
				EBT	F	207.2	1.37	239	-
				WBL	F	170.9	1.24	100	43.5
				WBT	C	32.7	0.58	75	-
				NBL	C	26.3	0.67	33	69
				NBT	D	40.1	0.86	133	-
				SBL	D	45.4	0.85	59	46.5
				SBT	C	31.7	0.67	100	-
Danforth Road & Barrymore Road/Private Access	A	4	0.4	EBT	C	32.9	0.10	9	-
				NBT	A	3.3	0.43	63	-
				SBT	A	3.3	0.44	67	-

Note: *Red font represents a critical movement.*

All critical movements identified under 2041 Future Background Conditions are expected to continue under the 2041 Future Total Conditions.

**Section 7** elaborates on the changes between the Future Background Conditions and Future Total Conditions via percentage differences in v/c ratios and queue lengths for each signalized intersection.

## 6.2 Unsignalized Intersections

The results of the 2041 Future Total Conditions traffic operations analysis for unsignalized intersections are presented in **Exhibit 6-3**.

**Exhibit 6-3: 2041 Future Total Conditions Traffic Operations – Unsignalized Intersections**

Intersection	Intersection Delay (s)	Lane	Lane LOS	Lane Delay (s)	Approach Delay (s)	Lane V/C Ratio	Lane 95th Percentile Queue (m)	Lane Storage Capacity (m)
<b>Weekday AM Peak Hour</b>								
Danforth Road & West Access	0.7	WB 1	C	23.4	23.4	0.14	4	-
		SB 1	A	1.9	0.7	0.06	2	-
Danforth Road & Hollyhedge Drive	0.3	EB 1	C	24.8	24.8	0.12	3	-
		NB 1	A	0.4	0.1	0.01	0	-
Danforth Road & Perivale Crescent	0.4	WB 1	C	23.6	23.6	0.14	4	-
		SB 1	A	0.3	0.1	0.01	0	-
<b>Weekday PM Peak Hour</b>								
Danforth Road & West Access	0.8	WB 1	C	21.0	21.0	0.20	6	-
		SB 1	A	1.8	0.6	0.06	2	-
Danforth Road & Hollyhedge Drive	0.4	EB 1	D	26.7	26.7	0.11	3	-
		NB 1	A	0.8	0.3	0.03	1	-
Danforth Road & Perivale Crescent	0.3	WB 1	C	21.2	21.2	0.09	2	-
		SB 1	A	0.8	0.3	0.03	1	-

As shown in **Exhibit 6-3** the northbound left-turn lane at the North Access has operational constraints during the Weekday PM Peak hour. Although the movement is at LOS F, it is at capacity (v/c ratio: 1.01) and therefore is still operational.

In general, the traffic generated by the proposed development does not have a significant impact on the traffic operation at the signalized intersections within the study area, as the traffic operation under 2041 future background condition and 2041 future total condition are very similar.

## 7 Traffic Analysis Summary

The proposed 774 unit residential development is expected to generate up to 208 and 257 new automobile trips during the AM and PM peak hour, respectively. However, only 195 trips during the AM peak hour and 158 trips during the PM peak hour are new trips – the remaining trips are already being made by patrons of the existing development. The development’s contribution to future traffic volumes is very small, and this is reflected in the very minor changes between the traffic operations results of the respective future background and future total traffic scenarios as shown in **Exhibit 7-1** and **Exhibit 7-2**. The majority of operational issues in 2041 are noted under existing conditions and are expected to persist with the addition of background traffic growth.

Furthermore, the analysis is conservative because the current modal split was used, there will be significant public transportation improvements in the area which is expected to decrease the percentage of vehicle trips. Further analysis may be conducted as part of a future submission.

**Exhibit 7-1** compares the overall operations at the signalized intersections for the 2041 Future Background and Future Total scenarios.

**Exhibit 7-1: Comparison of 2041 Future Background and 2041 Future Total Traffic Conditions – Overall Signalized Operations**

Intersection	2041 Future Background Traffic Conditions		2041 Future Total Traffic Conditions		v/c Ratio Difference	v/c Ratio % Change
	LOS	v/c Ratio	LOS	v/c Ratio		
<b>Weekday AM Peak Hour</b>						
McCowan Road & Lawrence Avenue East	E	0.91	E	0.95	+ 0.04	4%
Danforth Road & Barrymore Road/Private Access	A	0.39	A	0.39	+ 0.00	0%
<b>Weekday PM Peak Hour</b>						
McCowan Road & Lawrence Avenue East	F	1.05	F	1.08	+ 0.3	3%
Danforth Road & Barrymore Road/Private Access	A	0.40	A	0.40	+ 0.00	0%

*Note: Red font represents a v/c ratio that exceeds the governing critical capacity threshold.*

This comparison shows that the v/c ratios for the signalized intersections for both peak hours change less than 3% and that the LOS remains consistent in both scenarios, therefore the proposed development site’s trips have minimal contribution to overall traffic operations.

**Exhibit 7-2** compares the traffic movements at signalized intersections for the 2041 Future Background and 2041 Future Total Conditions scenarios.

**Exhibit 7-2: Comparison of 2041 Future Background and 2041 Future Total Traffic Conditions – Signalized Operations**

Intersection	Movement	2041 Future Background Conditions			2041 Future Total Conditions			Change in Operations (Total – Background)				
		LOS	v/c Ratio	95 <sup>th</sup> %tile Queue (m)	LOS	v/c Ratio	95 <sup>th</sup> %tile Queue (m)	Difference		% Change		
								v/c Ratio	95 <sup>th</sup> %tile Queue (m)	v/c Ratio	95 <sup>th</sup> %tile Queue (m)	
<b>Weekday AM Peak Hour</b>												
McCowan Road & Lawrence Avenue East	EBL	E	0.94	59	E	0.94	59	0.00	0.00	0%	0%	
	EBT	C	0.59	69	C	0.60	70	0.01	1.00	2%	1%	
	WBL	F	1.17	109	F	1.24	120	0.07	11.00	6%	9%	
	WBT	F	1.09	187	F	1.09	188	0.00	1.00	0%	1%	
	NBL	C	0.54	25	C	0.60	28	0.06	3.00	10%	11%	
	NBT	C	0.7	98	C	0.71	100	0.01	2.00	1%	2%	
	SBL	B	0.32	20	B	0.32	20	0.00	0.00	0%	0%	
	SBT	C	0.71	103	C	0.71	104	0.00	1.00	0%	1%	
Danforth Road & Barrymore Road/Private Access	SBR	C	0.47	54	C	0.48	56	0.01	2.00	2%	4%	
	EBT	C	0.03	7	C	0.03	7	0	0	0%	0%	
	NBT	A	0.44	61	A	0.44	62	0	1	0%	2%	
SBT	A	0.44	66	A	0.44	68	0	2	0%	3%		
	<b>Weekday PM Peak Hour</b>											
	McCowan Road & Lawrence Avenue East	EBL	F	1.18	88	F	1.17	88	-0.01	0.00	-1%	0%
EBT		F	1.35	237	F	1.37	239	0.02	2.00	1%	1%	
WBL		F	1.19	95	F	1.24	100	0.05	5.00	4%	5%	
WBT		C	0.58	76	C	0.58	75	0.00	-1.00	0%	-1%	
NBL		C	0.67	31	C	0.67	33	0.00	2.00	0%	6%	
NBT		D	0.84	129	D	0.86	133	0.02	4.00	2%	3%	
SBL		D	0.83	56	D	0.85	59	0.02	3.00	2%	5%	
SBT		C	0.68	101	C	0.67	100	-0.01	-1.00	-1%	-1%	
SBR		C	0.34	35	C	0.34	35	0.00	0.00	0%	0%	
Danforth Road & Barrymore Road/Private Access	EBT	C	0.10	9	C	0.10	9	0	0	0%	0%	
	NBT	A	0.43	63	A	0.43	63	0	0	0%	0%	
	SBT	A	0.44	67	A	0.44	67	0	0	0%	0%	

This comparison illustrates that most impacts to the signalized intersection movements resulting from the proposed development are expected to be minor. Increases to v/c ratios and 95<sup>th</sup> percentile queue lengths due to the additional traffic are under 9% and 7% respectively, with some instances of operations being improved.

Furthermore, the planned Scarborough Subway Extension will potentially reduce the trips made by vehicles and may mitigate existing critical traffic movements.

## 8 Parking Analysis

The purpose of the parking study is to determine if the proposed parking supply, 228 automobile spaces and 603 bicycle spaces – is an appropriate supply to accommodate anticipated demand from the proposed development. This section analyzes the zoning by-law requirements, the sustainable transportation network within the study area and city-wide, transportation demand management opportunities, and parking observations at comparable developments within the city limits.

### 8.1 Zoning By-law Requirements – Automobile Parking

The property is presently governed by the City of Toronto ZBL 89-2022. The proposed development consists of 466 one-bedroom units, 292 two-bedroom units, and 16 three-bedroom units in total. The relevant vehicle parking requirements for the various land uses, as stipulated in the ZBL, are illustrated in **Exhibit 8-1**.

**Exhibit 8-1: City ZBL Parking Requirements**

Land Use	Proposed Units or sq.m. GFA	ZBL Parking Rate (per unit or per 100 sq.m. GFA)	ZBL 89-2022 Maximum Parking Supply	Proposed Spaces	Proposed Rate (per unit or per 100 sq.m. GFA)
<b>Resident Parking Requirements</b>					
One-Bedroom Unit	466	0.9 / unit (max)	420	146	0.20
Two-Bedroom Unit	292	1.0 / unit (max)	292		
Three-Bedroom Unit	16	1.2 / unit (max)	19		
<b>Total</b>	<b>774</b>		<b>730</b>		
<b>Visitor Parking Requirements</b>					
Visitor (resident)	774	5 + 0.1 per unit (max)	82	17	0.02
<b>Commercial Parking Requirements</b>					
Retail	1,405	6 / 100 sq.m. GFA (max)	85	18	1.28
Office	6,444	3.5 / 100 sq.m. GFA (max)	226	47	0.73
<b>Total</b>	<b>7,849</b>		<b>311</b>	<b>65</b>	
<b>Total</b>					
		Residential	730	146	
		Visitor	82	17	
		Non-Residential	311	65	
		Total	1123	228	

As shown in **Exhibit 8-1**, the development's maximum permissible ZBL parking supply is 1123 parking spaces based on ZBL 89-2022. As the development proposes to supply 228 parking spaces, the ZBL maximum supply limits are not exceeded.

There will be 9 accessible parking spaces as per the City of Toronto ZBL 569-2013 Chapter 200.15.10. Section C of the chapter requires 3 accessible residential visitor parking spaces. Section B of the chapter requires 6 accessible parking spaces for the proposed non-residential uses.

Based on ongoing initiatives at the City, it is recognized that City Staff hosted public meetings in June 1-3, 2021 to gather feedback on recommendations for revised parking rates contained in ZBL 569-2013. The review responds to the absence of an update in recent years, as well as a growing interest on parking impacts associated with travel behaviour and housing affordability.

As per the summary contained in the City Planning and Housing Committee item 2021.PH20.4, dated January 19, 2021<sup>4</sup>,

*“The demand for parking is shifting as a result of societal changes and other factors. Decreases in automobile ownership and increases in the popularity of automobile alternatives have influenced parking demand in many new developments.*

*Ongoing significant investments in transit infrastructure are intended to provide travel choices to more people and reduce demand for automobile-based travel. Removing minimum automobile parking requirements from and increasing the use of maximum automobile parking requirements in zoning by-laws would also reduce the risk of a future oversupply of automobile parking.”*

Based on the above, the old ZBL may not accurately represent future parking demand created by the proposed development, due to the increased future transit oriented nature of the area, being situated along the TTC Scarborough Subway Extension corridor (i.e., Lawrence East station).

To determine if this is the case, a comparison of recently assessed proxy developments with similar characteristics near higher order transit service was conducted. These site are summarized below:

- 1 1910 Eglinton Avenue East, City of Toronto. Mixed-Use Development. TIS submitted on June 25, 2020.
  - Located within walking distance of the Eglinton Crosstown LRT;
  - Golden Mile Secondary Plan, November 2019 (GMSP) area relies on up to 60% non-auto mode split target;
  - Potential for car share spaces; and
  - Provision of a number of transportation demand management (TDM) measures.
- 2 1021-1035 Markham Road, City of Toronto. Mixed-Use Development. TIS submitted on October 17, 2020.
  - Residential apartment automobile mode share (TTS-2011) in the morning and afternoon peak periods was found to be 44% and 47%;
  - Compared to base ITE trip generation rates (high-rise and retail), a 30% reduction in trip generation rates for residential and retail uses was applied; and
  - The site is situated in the Markham-Ellesmere Revitalization Study area; and
  - Provision of a number of transportation demand management (TDM) measures, such as one year of pre-paid car share membership, unbundled parking, wider sidewalks, TDM related community outreach, and prepaid PRESTO cards ( valued at \$100) to each unit.
- 3 315-327 Royal York Road, City of Toronto. Mixed-Use Development. TIS submitted on October 8, 2019.
  - Located in a multi-modal hub, near the Mimico GO Station;
  - Compared to base ITE trip generation rates, a 40% reduction in trip generation rates for residential uses, and 20% reduction to office uses was applied; and
  - Potential for a number of TDM measures.
- 4 286-294 Main Street, City of Toronto. Mixed-Use Development. June 28, 2017.

<sup>4</sup> <http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2021.PH20.4>



- Located within a transit-oriented community, Danforth Avenue / Main Street classified as a “Gateway Mobility Hub”;
- Located within 150 metres of a TTC subway station along the Bloor-Danforth subway line, and within 100 metres of a GO station;
- Residential mode choice for auto driver in the area remained in the range of 42% from 1996-2011;
- Provision of a number of transportation demand management (TDM) measures; and
- Cites that the City has “regularly approved resident parking demand in the range of 0.20 to 0.35 spaces per unit in the vicinity of Yonge and Eglinton”.

The parking rates for these proxy sites are displayed in **Exhibit 8-2**.

**Exhibit 8-2: Parking Supply Comparison of Other Mixed-Use Developments – Proxy Comparison**

Proxy Site	Land Use	Proposed Units or GFA	Proposed Parking Supply	Proposed Parking Rate (per unit or per 100 sq.m. GFA)
1910 Eglinton Ave E. City of Toronto Mixed-Use Development June 25, 2020	<b>Resident Parking</b>			
	One-Bedroom Unit	230	160	0.43
	Two-Bedroom Unit	121		
	Three-Bedroom Unit	20		
	Total	371		
	<b>Visitor Parking</b>			
	Visitor (resident)	371	37	0.1
1021-1035 Markham Rd City of Toronto Mixed-Use Development October 17, 2017	<b>Resident Parking</b>			
	One-Bedroom Unit	202	157	0.47
	Two-Bedroom Unit	96		
	Three-Bedroom Unit	35		
	Total	333		
	<b>Visitor Parking</b>			
	Visitor (resident)	333	49	0.1
	<b>Commercial Parking</b>			
Retail	2,229 sq.m.	23	1.0	
315-327 Royal York Rd City of Toronto Mixed-Use Development October 8, 2019	<b>Resident Parking</b>			
	One-Bedroom Unit	499	254 + 5 carshare	0.4
	Two-Bedroom Unit	121		
	Three-Bedroom Unit	67		
	Total	687		
	<b>Visitor Parking</b>			
	Visitor (resident)	687	68	0.1
	<b>Commercial Parking</b>			
Office	8,809 sq.m.	30	0.35	
Retail	276 sq.m.	2	1.0	
286-294 Main St	<b>Resident Parking</b>			

Proxy Site	Land Use	Proposed Units or GFA	Proposed Parking Supply	Proposed Parking Rate (per unit or per 100 sq.m. GFA)	
City of Toronto Mixed-Use Development June 28, 2017	One-Bedroom Unit	106	80 + 2 carshare	0.27	
	Two-Bedroom Unit	195			
	Total	301			
	<b>Visitor &amp; Commercial Parking</b>				
	Visitor (resident)	301	1,371.50 sq.m.	32	N/A
	Office	1,371.50 sq.m.			
Retail	110.30 sq.m.				
Range of Proxy Residential Parking Rates				0.27 - 0.43	
Range of Proxy Visitor Parking Rates				0.1	
Range of Proxy Office Parking Rates				<b>0.35</b>	
Range of Proxy Retail Parking Rates				<b>1.0</b>	

Based on the range of proxy parking rates for the various land uses, a comparison of the proposed development parking rates are summarized in **Exhibit 8-3**.

**Exhibit 8-3: Parking Rate by Land use - Proxy Sites Versus Proposed Development**

Land Use	Vehicular Parking Space Rate (per unit or per 100 sq.m. GFA)	
	Proxy Sites	Proposed Development
High-Rise Residential	0.27-0.43 per unit	0.20 per unit
Residential Visitor	0.1 per unit	0.02 per unit
Office Parking Rates	0.35	0.73
Retail Parking Rates	1.0	1.28

While the proposed residential parking rates are outside the proxy range, none of the proxy sites are in close proximity to a subway corridor. The most comparable proxy site is located at 1910 Eglinton Avenue East, which is in close proximity to the Eglinton Crosstown LRT corridor. Generally, since subway transit service is regarded as higher order than LRT service, such developments near subway stations are generally expected to be the least automobile dependent when compared to other forms of transit service.

It should also be noted that three of these proxy sites were analyzed before the COVID-19 pandemic. Statistics Canada shows that 80% of employees who switched to remote work due to the pandemic would like to work at least half of their hours in a remote working model once the pandemic is over<sup>5</sup>. Those who work remotely are able to complete personal tasks throughout the day, decreasing peak period parking needs, while some will possibly no longer choose to own a personal vehicle. These factors in combination with the rise of other services / lifestyle changes such as online shopping and curbside pickup potentially overall lowers the need for ZBL prescribed levels of office, retail and residential parking supply.

In many cases, compliance with the ZBL parking requirements would likely result in an over-supply of parking in areas with convenient transit service, high-quality active transportation infrastructure, and land use patterns which feature good urban design and a mixture of uses in close proximity.

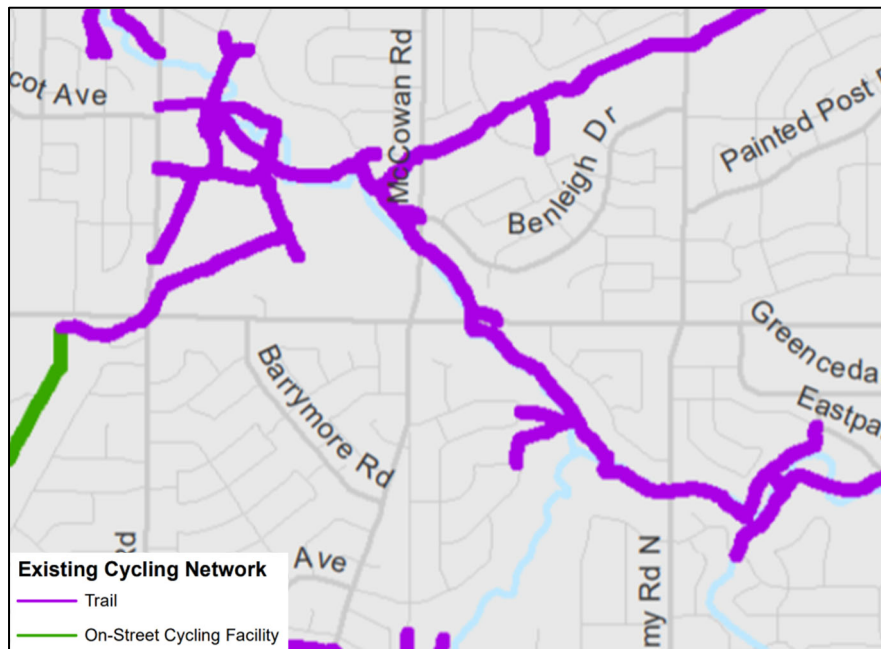
<sup>5</sup> <https://www150.statcan.gc.ca/n1/pub/36-28-0001/2021005/article/00001-eng.htm>

The study area has multiple trails, as seen in **Exhibit 8-4**, which accommodates multiple active transportation modes such as cycling and walking. In addition, attitudes towards automobile usage are changing at both the personal and policy-maker level. Modern consumers are beginning to recognize that alternative forms of transportation are viable for many trips, and that car share systems and traditional taxis and ridesharing is an option for times when automobile travel is unavoidable.

In addition, the high cost of automobile ownership is difficult to justify in the face of rising housing costs in desirable neighbourhoods. High quality walking, cycling, and transit facilities can provide future residents with viable alternatives to automobile ownership, which can in turn result in reduced parking demand. For policy makers, there is a greater awareness of the environmental impact of the car, and a recognition that designing for the automobile is at odds with developing desirable, sustainable urban spaces.

The city has now removed the requirement for minimum parking in the City of Toronto ZBL 569-2013. Therefore, all of the previously mentioned justification to have lower parking rates in this development are supported by the amendments to the ZBL.

**Exhibit 8-4: Existing Cycling Network**



## 8.2 Zoning By-law Requirements – Bicycle Parking

Based on City of Toronto ZBL 569-2013<sup>6</sup>, Section 230.5.1.10 (11), the proposed development lands reside in Bicycle Zone 2. Based on this, and using Section 230.5.10.1 (General), the following required bicycle parking space rates are provided in **Exhibit 8-5**:

**Exhibit 8-5: ZBL Bicycle Parking Rates**

Land Use	Bicycle Space Parking Space Rate (per unit or per 100 sq.m. GFA)	
	Short Term Spaces	Long Term Spaces
Mixed-Use Building	0.07 per unit	0.68 per unit
Office Parking Rates	3 spaces + 0.15 per 100 sq.m. GFA	0.13 per 100 sq.m. GFA
Retail Parking Rates	3 spaces + 0.25 per 100 sq.m. GFA	0.13 per 100 sq.m. GFA

Based on the above bicycle parking rates, the corresponding bicycle space requirements for the proposed development are summarized in **Exhibit 8-6**:

**Exhibit 8-6: Proposed Development Bicycle Parking Supply Review**

Land Use	Proposed Units or GFA	Parking Rate Requirement (per unit or per 100 sq.m. GFA)	Required Spaces		Proposed Spaces	
			Short Term	Long Term	Short Term	Long Term
<b>Resident Parking Requirements</b>						
Mixed-Use	774 units	0.07 per unit (S) & 0.68 (L)	54	526	54	466
<b>Commercial Parking Requirements</b>						
Retail	1,405 sq.m.	3 spaces + 0.15 (S) & 0.13 (L)	5	2	5	2
Office	6,444 sq.m.	3 spaces + 0.25 (S) & 0.13 (L)	68	8	68	8
<b>Total</b>	<b>7,849 sq.m.</b>		<b>73</b>	<b>10</b>	<b>73</b>	<b>10</b>
<b>Total</b>						
Total Required			663			
Proposed Supply					603	
<b>Surplus or (Deficiency)</b>			<b>(60)</b>			

In total, the proposed development supply is 603 bicycle spaces.

In comparison, the ZBL required supply is 127 short term and 536 long term spaces, totalling 663 spaces. This results in the proposed development providing a deficiency of 60 spaces, which may be accommodated by the site's walking distance proximity to higher order transit, along with potential additional bicycle parking installed at the mezzanine level.

<sup>6</sup> [https://www.toronto.ca/zoning/bylaw\\_amendments/ZBL\\_NewProvision\\_Chapter230.htm](https://www.toronto.ca/zoning/bylaw_amendments/ZBL_NewProvision_Chapter230.htm)  
219214S-OTP-TAT-MEM-00062

## 9 Loading Review

A review of loading requirements for the proposed development was assessed based on the City of Toronto Zoning By-law 569-2013. The loading space requirements for each corresponding use contained in the proposed development is summarized in **Exhibit 9-1**. It is noted that loading spaces types are sized, from smallest to largest, as Type 'C', 'B', 'G'.

**Exhibit 9-1: ZBL 569-2013 Loading Space Requirements**

# of Loading Spaces Required by ZBL 569-2013 (Type)				
Land Use	C	B	G	Total
Residential (400 dwelling units or more)	1		1	2
Office (4,000 to 27,999 sq.m. GFA)	2	2		4
Retail (500 to 1,999 sq.m. GFA)		1		1
Total	3	3	1	7
# of Loading Spaces Proposed (Type)				
Residential (400 dwelling units or more)	1		1	3
Office (4,000 to 27,999 sq.m. GFA)	2	2		4
Retail (500 to 1,999 sq.m. GFA)		1		1
Total	3	3	1	7

Based on the ZBL loading space requirements for each land use, it is apparent that the requirements do not consider multiple uses contained within a singular site. Therefore, providing the amount of loading spaces required for each specific land use is expected to result in an oversupply of loading spaces on site.

Given the mixed-use nature of the proposed development lands and close proximity between the various land uses, it is expected that 1 Type 'G', 3 Type 'B', and 3 Type 'C' loading spaces will adequately accommodate all site needs. Coordination of loading activity can be achieved via building property management and loading scheduling.

## 10 Conclusions

This section summarizes the key findings of this transportation impact study (TIS).

### 10.1 TIS Findings

The proposed 774-unit residential development is expected to generate up to 85 and 107 new automobile trips during the weekday AM and PM peak hour, respectively. However, only 62 trips during the AM peak hour are new trips and there is a reduction of 38 trips during the PM peak hour – the remainder are trips already being made by patrons of the existing development.

The analysis is conservative because although the current modal split is used in this report, there will be significant public transportation improvements in the area, which is expected to decrease the percentage of automobile trips.

The proposed development contribution to overall future traffic volumes in the study area is minor, and this is reflected in the minimal changes between the traffic operation results of the respective future background and future total traffic scenarios as shown in **Section 7**. The majority of operational issues in 2041 are noted under existing conditions and are expected to persist with the addition of background traffic growth.

Future traffic volumes in the study area, after the SSE is built, are estimates based on the best available data. It can be expected that the use of transit services will increase from existing conditions after the completion of the SSE. This increase in transit use will decrease the dependency on automobile transportation which could potentially mitigate current and estimated future critical movements.

### 10.2 Parking Analysis

Based on the updates to the City of Toronto ZBL 569-2013, contained in 89-2022, 228 parking spaces is below the maximum permitted in the ZBL and is anticipated to be sufficient for the proposed development. Since the proposed development will be in close proximity to new SSE transit facilities, it can be expected that the reliance on automobiles will be lower in comparison to sites which do not have access to higher order transit.

Furthermore, the proposed development has 603 bicycle spaces. The ZBL required supply is 127 short term and 536 long term spaces, totalling 663 bicycle spaces. The 60 space shortfall is mitigated by the short walking distance to the transit station. Further bicycle parking on the mezzanine level could be considered in future design iterations.

The after-effects of the COVID-19 pandemic is anticipated to reduce automobile activity, especially during typical weekday peak commute hours. Employers are not expecting their workers to return to the office full-time, therefore office spaces are unlikely to be at capacity. Currently employers are not expecting their workers to be back to office full-time. Overall, complying with the ZBL will likely cause a surplus in parking spaces. Therefore, the proposed parking supply of 228 parking spaces is expected to meet the proposed development parking demands.

### 10.3 Loading Review

It is expected that 1 Type 'G', 3 Type 'B', and 3 Type 'C' loading spaces will adequately accommodate all site needs. Coordination of loading activity can be achieved via building property management and loading scheduling. The AutoTURN analysis indicates that the servicing vehicles can access, circulate, and exit the site within the provided driveways and internal roads.

## **11 Recommendations**

The proposed development does not significantly contribute to existing and future traffic capacity concerns of the intersections in the study area. An increase in the eastbound and westbound left-turn advance phase during the weekday PM peak hour at the McCowan Road / Lawrence Avenue East intersection may be considered to address the capacity concerns due to future background traffic conditions.

The northbound left-turn movement at the northeast access is expected to experience traffic operation constraints. It is recommended to encourage development users to use the west access whenever parking is not needed, and to encourage drivers to make a northbound right-turn movement whenever possible.

## **Appendix A**

# **Turning Movement Counts**



**Turning Movement Count Summary Report**

LAWRENCE AVE AT MCCOWAN RD (PX 380)

Survey Date: 2020-Feb-25 (Tuesday)

Survey Type: Routine Hours

Time Period	Vehicle Type	Exits	NORTHBOUND				EASTBOUND				SOUTHBOUND				WESTBOUND				Peds	Bike	Other				
			Left	Thru	Right	Total	Exits	Left	Thru	Right	Total	Exits	Left	Thru	Right	Total	Exits	Left				Thru	Right	Total	
08:00-09:00 AM PEAK	CAR	786	100	514	82	696	672	112	507	39	658	936	83	656	305	1,044	1,724	241	1,319	160	1,720	N	34	0	0
	TRK	59	4	46	4	54	32	8	26	7	41	97	2	76	15	93	82	14	63	5	82	S	60	0	0
	BUS	23	2	18	4	24	33	2	27	2	31	16	2	11	1	14	42	3	39	3	45	E	112	0	0
<b>TOTAL:</b>		<b>868</b>	<b>106</b>	<b>578</b>	<b>90</b>	<b>774</b>	<b>737</b>	<b>122</b>	<b>560</b>	<b>48</b>	<b>730</b>	<b>1,049</b>	<b>87</b>	<b>743</b>	<b>321</b>	<b>1,151</b>	<b>1,848</b>	<b>258</b>	<b>1,421</b>	<b>168</b>	<b>1,847</b>				
16:45-17:45 PM PEAK	CAR	921	131	668	180	979	1,666	169	1,327	102	1,598	964	159	669	233	1,061	1,110	193	746	84	1,023	N	77	0	0
	TRK	56	6	46	12	64	78	10	62	4	76	58	4	46	11	61	61	8	44	0	52	S	81	0	0
	BUS	6	0	6	1	7	24	0	21	0	21	8	2	8	2	12	19	0	17	0	17	E	55	0	0
<b>TOTAL:</b>		<b>983</b>	<b>137</b>	<b>720</b>	<b>193</b>	<b>1,050</b>	<b>1,768</b>	<b>179</b>	<b>1,410</b>	<b>106</b>	<b>1,695</b>	<b>1,030</b>	<b>165</b>	<b>723</b>	<b>246</b>	<b>1,134</b>	<b>1,190</b>	<b>201</b>	<b>807</b>	<b>84</b>	<b>1,092</b>				
OFF HR AVG	CAR	601	105	379	119	603	872	125	638	70	833	620	115	411	274	800	1,051	139	672	97	908	N	50	0	0
	TRK	67	5	48	10	63	64	12	47	7	66	71	7	54	12	73	65	10	48	7	65	S	71	0	0
	BUS	10	1	7	2	10	19	2	15	1	18	11	2	7	1	10	21	3	19	1	23	E	76	0	0
<b>TOTAL:</b>		<b>678</b>	<b>111</b>	<b>434</b>	<b>131</b>	<b>676</b>	<b>955</b>	<b>139</b>	<b>700</b>	<b>78</b>	<b>917</b>	<b>702</b>	<b>124</b>	<b>472</b>	<b>287</b>	<b>883</b>	<b>1,137</b>	<b>152</b>	<b>739</b>	<b>105</b>	<b>996</b>				
07:30-09:30 2 HR AM	CAR	1,433	212	964	160	1,336	1,266	207	946	76	1,229	1,752	160	1,227	573	1,960	3,260	449	2,475	262	3,186	N	88	0	0
	TRK	130	11	105	7	123	61	17	48	11	76	177	6	142	34	182	170	24	125	8	157	S	117	0	0
	BUS	38	6	32	7	45	65	3	53	7	63	35	5	21	4	30	83	7	73	3	83	E	210	1	0
<b>TOTAL:</b>		<b>1,601</b>	<b>229</b>	<b>1,101</b>	<b>174</b>	<b>1,504</b>	<b>1,392</b>	<b>227</b>	<b>1,047</b>	<b>94</b>	<b>1,368</b>	<b>1,964</b>	<b>171</b>	<b>1,390</b>	<b>611</b>	<b>2,172</b>	<b>3,513</b>	<b>480</b>	<b>2,673</b>	<b>273</b>	<b>3,426</b>				
16:00-18:00 2 HR PM	CAR	1,737	240	1,253	374	1,867	3,126	316	2,459	180	2,955	1,838	293	1,291	489	2,073	2,220	367	1,491	168	2,026	N	149	0	0
	TRK	115	11	97	15	123	138	17	115	9	141	117	8	90	25	123	135	18	99	1	118	S	163	1	0
	BUS	18	1	17	5	23	55	1	47	1	49	17	3	16	4	23	55	0	50	0	50	E	119	1	0
<b>TOTAL:</b>		<b>1,870</b>	<b>252</b>	<b>1,367</b>	<b>394</b>	<b>2,013</b>	<b>3,319</b>	<b>334</b>	<b>2,621</b>	<b>190</b>	<b>3,145</b>	<b>1,972</b>	<b>304</b>	<b>1,397</b>	<b>518</b>	<b>2,219</b>	<b>2,410</b>	<b>385</b>	<b>1,640</b>	<b>169</b>	<b>2,194</b>				
07:30-18:00 8 HR SUM	CAR	5,570	873	3,731	1,008	5,612	7,877	1,023	5,955	534	7,512	6,067	914	4,160	2,158	7,232	9,686	1,373	6,655	816	8,844	N	435	0	0
	TRK	509	42	394	60	496	454	80	351	46	477	577	43	448	108	599	565	83	415	35	533	S	562	2	0
	BUS	95	10	77	18	105	191	10	158	10	178	93	15	65	13	93	222	18	199	8	225	E	631	2	0
<b>TOTAL:</b>		<b>6,174</b>	<b>925</b>	<b>4,202</b>	<b>1,086</b>	<b>6,213</b>	<b>8,522</b>	<b>1,113</b>	<b>6,464</b>	<b>590</b>	<b>8,167</b>	<b>6,737</b>	<b>972</b>	<b>4,673</b>	<b>2,279</b>	<b>7,924</b>	<b>10,473</b>	<b>1,474</b>	<b>7,269</b>	<b>859</b>	<b>9,602</b>				

Total 8 Hour Vehicle Volume: 31,906

Total 8 Hour Bicycle Volume: 7

Total 8 Hour Intersection Volume: 31,913

Comment:

**Turning Movement Count Summary Report**

BARRYMORE D AT DANFORTH RD (PX 2310)

Survey Date: 2016-May-26 (Thursday)

Survey Type: Routine Hours

Time Period	Vehicle Type	Exits	NORTHBOUND				Total	Exits	EASTBOUND				Total	Exits	SOUTHBOUND				Total	Exits	WESTBOUND				Total	Peds	Bike	Other
			Left	Thru	Right	Total			Left	Thru	Right	Total			Left	Thru	Right	Total			Left	Thru	Right	Total				
08:00-09:00 AM PEAK	CAR	32	0	0	1	1	859	19	848	0	867	0	10	0	29	39	1,025	0	996	13	1,009	N	15	0	0			
	TRK	0	0	0	0	0	35	0	35	0	35	0	0	0	0	0	25	0	25	0	25	S	8	0	0			
	BUS	1	0	0	0	0	10	0	10	0	10	0	0	0	0	0	11	0	11	1	12	E	20	0	0			
<b>TOTAL:</b>		<b>33</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>904</b>	<b>19</b>	<b>893</b>	<b>0</b>	<b>912</b>	<b>0</b>	<b>10</b>	<b>0</b>	<b>29</b>	<b>39</b>	<b>1,061</b>	<b>0</b>	<b>1,032</b>	<b>14</b>	<b>1,046</b>							
17:00-18:00 PM PEAK	CAR	21	0	0	0	0	966	9	956	0	965	0	10	0	39	49	934	0	895	12	907	N	12	0	0			
	TRK	0	0	0	0	0	17	0	17	0	17	0	0	0	0	0	10	0	10	0	10	S	14	0	0			
	BUS	0	0	0	0	0	7	0	7	0	7	0	0	0	0	0	7	0	7	0	7	E	15	0	0			
<b>TOTAL:</b>		<b>21</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>990</b>	<b>9</b>	<b>980</b>	<b>0</b>	<b>989</b>	<b>0</b>	<b>10</b>	<b>0</b>	<b>39</b>	<b>49</b>	<b>951</b>	<b>0</b>	<b>912</b>	<b>12</b>	<b>924</b>							
OFF HR AVG	CAR	26	0	0	0	0	638	17	628	0	645	0	10	0	27	37	647	0	620	9	629	N	7	0	0			
	TRK	0	0	0	0	0	43	0	43	0	43	0	0	0	0	0	45	0	45	0	45	S	9	0	0			
	BUS	0	0	0	0	0	7	0	7	0	7	0	0	0	0	0	7	0	7	0	7	E	7	0	0			
<b>TOTAL:</b>		<b>26</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>688</b>	<b>17</b>	<b>678</b>	<b>0</b>	<b>695</b>	<b>0</b>	<b>10</b>	<b>0</b>	<b>27</b>	<b>37</b>	<b>699</b>	<b>0</b>	<b>672</b>	<b>9</b>	<b>681</b>							
07:30-09:30 2 HR AM	CAR	52	0	0	1	1	1,571	33	1,555	0	1,588	0	15	0	45	60	1,815	0	1,770	19	1,789	N	24	0	0			
	TRK	0	0	0	0	0	71	0	71	0	71	0	0	0	0	0	70	0	70	0	70	S	11	0	0			
	BUS	1	0	0	0	0	20	0	20	0	20	0	0	0	0	0	20	0	20	1	21	E	24	0	0			
<b>TOTAL:</b>		<b>53</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>1,662</b>	<b>33</b>	<b>1,646</b>	<b>0</b>	<b>1,679</b>	<b>0</b>	<b>15</b>	<b>0</b>	<b>45</b>	<b>60</b>	<b>1,905</b>	<b>0</b>	<b>1,860</b>	<b>20</b>	<b>1,880</b>							
16:00-18:00 2 HR PM	CAR	55	0	0	0	0	1,852	37	1,836	1	1,874	1	16	0	83	99	1,842	0	1,759	18	1,777	N	31	0	0			
	TRK	0	0	0	0	0	56	0	56	0	56	0	0	0	0	0	31	0	31	0	31	S	21	0	0			
	BUS	0	0	0	0	0	16	0	16	0	16	0	0	0	0	0	16	0	16	0	16	E	20	1	0			
<b>TOTAL:</b>		<b>55</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1,924</b>	<b>37</b>	<b>1,908</b>	<b>1</b>	<b>1,946</b>	<b>1</b>	<b>16</b>	<b>0</b>	<b>83</b>	<b>99</b>	<b>1,889</b>	<b>0</b>	<b>1,806</b>	<b>18</b>	<b>1,824</b>							
07:30-18:00 8 HR SUM	CAR	211	0	0	1	1	5,974	139	5,904	1	6,044	1	69	0	234	303	6,241	0	6,007	72	6,079	N	83	0	0			
	TRK	0	0	0	0	0	298	0	298	0	298	0	0	0	1	1	283	0	282	0	282	S	68	0	0			
	BUS	1	0	0	0	0	63	0	63	0	63	0	0	0	0	0	64	0	64	1	65	E	70	1	0			
<b>TOTAL:</b>		<b>212</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>6,335</b>	<b>139</b>	<b>6,265</b>	<b>1</b>	<b>6,405</b>	<b>1</b>	<b>69</b>	<b>0</b>	<b>235</b>	<b>304</b>	<b>6,588</b>	<b>0</b>	<b>6,353</b>	<b>73</b>	<b>6,426</b>							

Total 8 Hour Vehicle Volume: 13,136

Total 8 Hour Bicycle Volume: 5

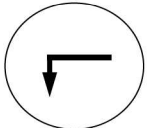
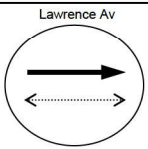
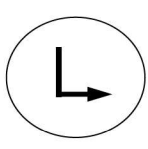
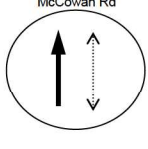
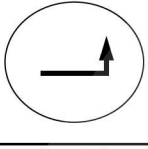
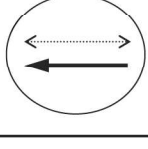
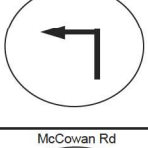
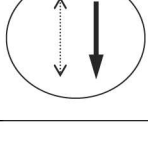
Total 8 Hour Intersection Volume: 13,141

Comment:

## **Appendix B**

### **Signal Timing Plans**

<b>LOCATION:</b>	<b>Lawrence Ave &amp; McCowan Rd</b>	<b>DISTRICT:</b>	<b>Scarborough</b>
<b>MODE/COMMENT:</b>	<b>FXT with Polara 2-wire APS</b>	<b>COMPUTER SYSTEM:</b>	<b>TransSuite</b>
<b>TCS:</b>	<b>380</b>	<b>CONTROLLER/CABINET TYPE:</b>	<b>Econolite ASC/3S-2100 / TS2 T1</b>
<b>PREPARED/CHECKED BY:</b>	<b>MR/AD/DS</b>	<b>CONFLICT FLASH:</b>	<b>Red &amp; Red</b>
<b>PREPARATION DATE:</b>	<b>November 21, 2017</b>	<b>DESIGN WALK SPEED:</b>	<b>0.8m/s (FDW based on full crossing @1.0 m/s)</b>
<b>IMPLEMENTATION DATE:</b>	<b>December 5, 2017</b>	<b>CHANNEL/DROP:</b>	<b>2028/3</b>
		<b>CONTROLLER FIRMWARE:</b>	<b>2.47.10</b>

NEMA Phase	Local Plan System Plan	OFF	AM	PM	OFF 2	Phase Mode (Fixed/Demanded or Callable)	Remarks
		All Other Times	6:45-09:15 M-F	15:00-19:00 M-F	09:15-15:00 M-F		
		Pattern 1	Pattern 2	Pattern 3	Pattern 4		
1 	WLK FDW MIN 6 MAX 1 7 AMB 3 ALR 1 SPLIT					Callable/Extendable by 9m Setback Loop	Pedestrian Minimums: EWWK = 7 sec, EWFD = 25 sec NSWK = 7 sec, NSFD = 32 sec Left Turn Passage Time = 2 sec APS on during WALK periods when no arrows are displayed. Extended Push Activation = 3 secs
2 Lawrence Av 	WLK 7 FDW 25 MIN 32 MAX 1 34 AMB 4 ALR 3 SPLIT					Fixed	
3 	WLK FDW MIN 6 MAX 1 6 AMB 3 ALR 1 SPLIT					Callable/Extendable by 9m Setback Loop	
4 McCowan Rd 	WLK 7 FDW 32 MIN 39 MAX 1 51 AMB 4 ALR 3 SPLIT					Fixed	
5 	WLK FDW MIN 6 MAX 1 7 AMB 3 ALR 1 SPLIT					Callable/Extendable by 9m Setback Loop	
6 Lawrence Av 	WLK 7 FDW 25 MIN 32 MAX 1 34 AMB 4 ALR 3 SPLIT					Fixed	
7 	WLK FDW MIN 6 MAX 1 7 AMB 3 ALR 1 SPLIT					Callable/Extendable by 9m Setback Loop	
8 McCowan Rd 	WLK 7 FDW 32 MIN 39 MAX 1 40 AMB 4 ALR 3 SPLIT					Fixed	
	CL OF	110 109	110 59	120 112	110 109		

NOTES:

<b>LOCATION:</b>	Danforth Rd & Barrymore Rd/Private Access	<b>DISTRICT:</b>	Scarborough	
<b>MODE/COMMENT:</b>	SA2-VMG with PR & 2-Wire Polara APS	<b>COMPUTER SYSTEM:</b>	TransSuite	
<b>TCS:</b>	2310	<b>CONTROLLER/CABINET TYPE:</b>	Peek ATC-1000 / TS2T1	
<b>PREPARED/CHECKED BY:</b>	RZ/HL	<b>CONFLICT FLASH:</b>	Red & Red	
<b>PREPARATION DATE:</b>	January 25, 2018	<b>DESIGN WALK SPEED:</b>	1.0 m/s (FDW based on full crossing @1.2m/s)	
<b>IMPLEMENTATION DATE:</b>	April 27, 2018	<b>CHANNEL/DROP:</b>	4008 / 13	
		<b>CONTROLLER FIRMWARE:</b>	3.018.1.2976	

NEMA Phase	Local Plan Split Table	OFF	AM	PM	NGHT	WKND	Phase Mode  (Fixed / Demanded / Callable)	Remarks
		All Other Times	06:30-09:30 M-F	15:45-19:30 M-F	22:00-06:30 Daily	10:00-19:00 Sat & Sun		
		Pattern 1	Pattern 2	Pattern 3	Pattern 4	Pattern 5		
1 	WLK FDW MIN MAX1 AMB ALR SPLIT							Pedestrian Minimums: NSWK = 7 sec., NSFD = 8 sec. EWWW = 7 sec., EWFD = 14 sec. EW phase is callable by vehicle or pedestrian actuation. If a vehicle call is received, the minimum EWG is 7 seconds. If ongoing vehicle demand exists on the video detection zone, the EWG is capable of providing vehicle extensions up to the maximum green split. If a pedestrian call is received, the pedestrian minimums will be served. The EWWW & EWFD are only displayed on the pedestrian signal heads if a pedestrian call is received. Extension time is based on vehicle/pedestrian demand. Unused extension time is given to the NSG.
2 Danforth Rd 	WLK 7 FDW 8 MIN 15 MAX1 38 AMB 4 ALR 2 SPLIT	43	53	53	33	48	Fixed	Side Street Passage Time = 3 sec Extended Push Activation = 3 sec
3 	WLK FDW MIN MAX1 AMB ALR SPLIT							APS on during 7 sec of NSWK & 7 sec of EWWW when activated by push button.
4 Barrymore Rd 	WLK 7 FDW 14 MIN 7 MAX1 21 AMB 3 ALR 2 SPLIT	27	27	27	27	27	Callable by Traficam Video and/or pushbutton; Extendable by Traficam Video.	
5 	WLK FDW MIN MAX1 AMB ALR SPLIT							
6 Danforth Rd 	WLK 7 FDW 8 MIN 15 MAX1 38 AMB 4 ALR 2 SPLIT	43	53	53	33	48	Fixed	
7 	WLK FDW MIN MAX1 AMB ALR SPLIT							
8 Private Access 	WLK 7 FDW 14 MIN 7 MAX1 21 AMB 3 ALR 2 SPLIT	27	27	27	27	27	Callable by Traficam Video and/or pushbutton; Extendable by Traficam Video.	
	CL OF	70 62	80 72	80 59	60 29	75 14		

NOTES:

## Appendix C

### **2021 Existing Conditions Synchro Report**

# HCM Unsignalized Intersection Capacity Analysis

## 3: Danforth Road & Hollyhedge Drive










AM Peak Period



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	9	13	6	928	1043	8
Future Volume (Veh/h)	9	13	6	928	1043	8
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	14	7	1009	1134	9
Pedestrians	50					
Lane Width (m)	3.5					
Walking Speed (m/s)	1.2					
Percent Blockage	4					
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)				350	236	
pX, platoon unblocked	0.80	0.80	0.80			
vC, conflicting volume	1707	622	1193			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1325	18	734			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	91	98	99			
cM capacity (veh/h)	114	814	673			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	24	343	673	756	387	
Volume Left	10	7	0	0	0	
Volume Right	14	0	0	0	9	
cSH	229	673	1700	1700	1700	
Volume to Capacity	0.10	0.01	0.40	0.44	0.23	
Queue Length 95th (m)	2.6	0.2	0.0	0.0	0.0	
Control Delay (s)	22.5	0.3	0.0	0.0	0.0	
Lane LOS	C	A				
Approach Delay (s)	22.5	0.1		0.0		
Approach LOS	C					
Intersection Summary						
Average Delay	0.3					
Intersection Capacity Utilization	39.8%			ICU Level of Service	A	
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis  
4: Danforth Road & Perivale Crescent

AM Peak Period

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	17	12	922	4	6	1050
Future Volume (Veh/h)	17	12	922	4	6	1050
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	18	13	1002	4	7	1141
Pedestrians	30					
Lane Width (m)	3.5					
Walking Speed (m/s)	1.2					
Percent Blockage	2					
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	255			332		
pX, platoon unblocked	0.83	0.95			0.95	
vC, conflicting volume	1618	533			1036	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1071	404			933	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	90	98			99	
cM capacity (veh/h)	176	558			688	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	31	668	338	387	761	
Volume Left	18	0	0	7	0	
Volume Right	13	0	4	0	0	
cSH	247	1700	1700	688	1700	
Volume to Capacity	0.13	0.39	0.20	0.01	0.45	
Queue Length 95th (m)	3.2	0.0	0.0	0.2	0.0	
Control Delay (s)	21.7	0.0	0.0	0.3	0.0	
Lane LOS	C			A		
Approach Delay (s)	21.7	0.0		0.1		
Approach LOS	C					
Intersection Summary						
Average Delay			0.4			
Intersection Capacity Utilization			43.2%	ICU Level of Service	A	
Analysis Period (min)			15			



Timings

AM Peak Period

380: Danforth Road/McCowan Road & Lawrence Avenue East

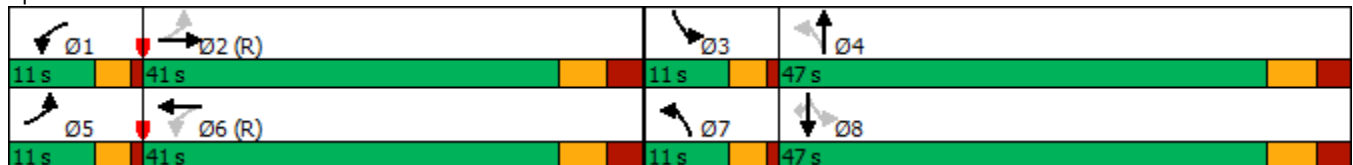


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations	↖	↕↕↕	↖	↕↕↕	↖	↕↕	↖	↕↕	↗
Traffic Volume (vph)	123	565	260	1429	107	581	87	743	321
Future Volume (vph)	123	565	260	1429	107	581	87	743	321
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2	1	6	7	4	3	8	
Permitted Phases	2		6		4		8		8
Detector Phase	5	2	1	6	7	4	3	8	8
Switch Phase									
Minimum Initial (s)	6.0	32.0	6.0	32.0	6.0	39.0	6.0	39.0	39.0
Minimum Split (s)	14.0	39.1	14.0	39.1	14.0	46.5	14.0	46.5	46.5
Total Split (s)	11.0	41.0	11.0	41.0	11.0	47.0	11.0	47.0	47.0
Total Split (%)	10.0%	37.3%	10.0%	37.3%	10.0%	42.7%	10.0%	42.7%	42.7%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	4.0	3.0	4.0	4.0
All-Red Time (s)	1.0	3.0	1.0	3.0	1.0	3.0	1.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	3.0	6.0	3.0	6.0	3.0	6.0	3.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?									
Recall Mode	None	C-Max	None	C-Max	None	Max	None	Max	Max
Act Effct Green (s)	45.9	35.0	46.1	35.1	52.3	41.5	51.7	41.3	41.3
Actuated g/C Ratio	0.42	0.32	0.42	0.32	0.48	0.38	0.47	0.38	0.38
v/c Ratio	0.77	0.47	0.86	0.97	0.47	0.64	0.28	0.69	0.57
Control Delay	49.5	30.8	49.0	51.5	21.5	30.4	16.7	32.8	14.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.5	30.8	49.0	51.5	21.5	30.4	16.7	32.8	14.1
LOS	D	C	D	D	C	C	B	C	B
Approach Delay		33.9		51.2		29.2		26.4	
Approach LOS		C		D		C		C	

Intersection Summary

Cycle Length: 110  
 Actuated Cycle Length: 110  
 Offset: 59 (54%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 115  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.97  
 Intersection Signal Delay: 38.3  
 Intersection LOS: D  
 Intersection Capacity Utilization 94.2%  
 ICU Level of Service F  
 Analysis Period (min) 15

Splits and Phases: 380: Danforth Road/McCowan Road & Lawrence Avenue East



## 380: Danforth Road/McCowan Road &amp; Lawrence Avenue East



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	137	681	289	1776	119	746	97	826	357
v/c Ratio	0.77	0.47	0.86	0.97	0.47	0.64	0.28	0.69	0.57
Control Delay	49.5	30.8	49.0	51.5	21.5	30.4	16.7	32.8	14.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.5	30.8	49.0	51.5	21.5	30.4	16.7	32.8	14.1
Queue Length 50th (m)	17.4	41.8	39.9	123.5	13.3	66.4	10.5	78.1	21.4
Queue Length 95th (m)	#44.9	53.6	#78.6	#154.4	23.7	87.5	19.3	100.1	51.1
Internal Link Dist (m)		483.4		41.4		118.2		152.5	
Turn Bay Length (m)	35.8		43.5		69.0		46.5		55.9
Base Capacity (vph)	178	1444	336	1835	255	1170	358	1191	623
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	0.77	0.47	0.86	0.97	0.47	0.64	0.27	0.69	0.57

## Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

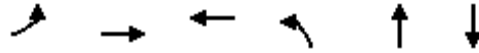
HCM Signalized Intersection Capacity Analysis  
 380: Danforth Road/McCowan Road & Lawrence Avenue East

AM Peak Period

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	123	565	48	260	1429	169	107	581	90	87	743	321
Future Volume (vph)	123	565	48	260	1429	169	107	581	90	87	743	321
Ideal Flow (vphpl)	1900	1900	1900	2200	2150	1900	1900	1900	1900	2400	1900	1900
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0
Total Lost time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	6.0	6.0
Lane Util. Factor	1.00	0.91		1.00	*1.00		1.00	0.95		1.00	0.95	1.00
Frbp, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.99		1.00	1.00	0.93
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00		0.99	1.00	1.00
Frt	1.00	0.99		1.00	0.98		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1560	4512		1812	5709		1585	3071		2014	3175	1296
Flt Permitted	0.11	1.00		0.31	1.00		0.21	1.00		0.25	1.00	1.00
Satd. Flow (perm)	188	4512		600	5709		348	3071		537	3175	1296
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	137	628	53	289	1588	188	119	646	100	97	826	357
RTOR Reduction (vph)	0	9	0	0	15	0	0	11	0	0	0	137
Lane Group Flow (vph)	137	672	0	289	1761	0	119	735	0	97	826	220
Confl. Peds. (#/hr)	34		60	60		34	71		113	113		71
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	8%	9%	19%	7%	7%	5%	6%	11%	9%	5%	12%	5%
Bus Blockages (#/hr)	0	13	13	0	18	18	0	7	7	0	2	7
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)	40.9	34.0		41.1	34.1		47.2	40.5		46.8	40.3	40.3
Effective Green, g (s)	42.9	35.0		43.1	35.1		49.2	41.5		48.8	41.3	41.3
Actuated g/C Ratio	0.39	0.32		0.39	0.32		0.45	0.38		0.44	0.38	0.38
Clearance Time (s)	4.0	7.0		4.0	7.0		4.0	7.0		4.0	7.0	7.0
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	3.0		2.0	3.0	3.0
Lane Grp Cap (vph)	171	1435		323	1821		242	1158		338	1192	486
v/s Ratio Prot	0.06	0.15		c0.07	c0.31		c0.03	0.24		0.02	c0.26	
v/s Ratio Perm	0.25			0.29			0.19			0.11		0.17
v/c Ratio	0.80	0.47		0.89	0.97		0.49	0.63		0.29	0.69	0.45
Uniform Delay, d1	27.1	30.0		28.1	36.9		19.7	28.0		18.8	29.0	25.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	21.8	1.1		24.9	14.6		0.6	2.7		0.2	3.3	3.0
Delay (s)	48.9	31.1		53.0	51.5		20.2	30.7		18.9	32.3	28.9
Level of Service	D	C		D	D		C	C		B	C	C
Approach Delay (s)		34.1			51.7			29.3			30.3	
Approach LOS		C			D			C			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			39.5									HCM 2000 Level of Service D
HCM 2000 Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			110.0									Sum of lost time (s) 18.0
Intersection Capacity Utilization			94.2%									ICU Level of Service F
Analysis Period (min)			15									
c Critical Lane Group												

Timings  
2310: Danforth Road & Barrymore Road/Private Access

AM Peak Period

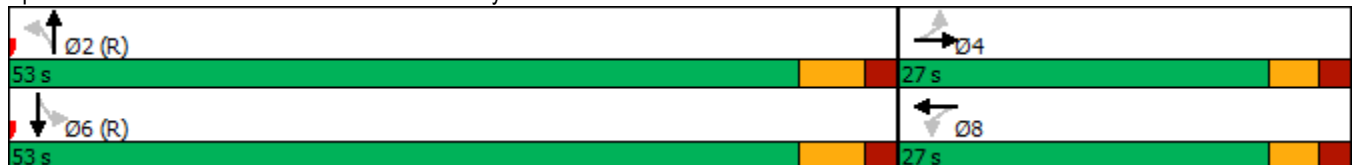


Lane Group	EBL	EBT	WBT	NBL	NBT	SBT
Lane Configurations		↕	↕		↕↕	↕↕
Traffic Volume (vph)	10	0	0	19	915	1053
Future Volume (vph)	10	0	0	19	915	1053
Turn Type	Perm	NA	NA	Perm	NA	NA
Protected Phases		4	8		2	6
Permitted Phases	4			2		
Detector Phase	4	4	8	2	2	6
Switch Phase						
Minimum Initial (s)	7.0	7.0	7.0	15.0	15.0	15.0
Minimum Split (s)	26.0	26.0	26.0	21.0	21.0	21.0
Total Split (s)	27.0	27.0	27.0	53.0	53.0	53.0
Total Split (%)	33.8%	33.8%	33.8%	66.3%	66.3%	66.3%
Yellow Time (s)	3.0	3.0	3.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		-1.0	-1.0		-1.0	-1.0
Total Lost Time (s)		4.0	4.0		5.0	5.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	None	C-Max	C-Max	C-Max
Act Effct Green (s)		10.8	10.8		67.0	67.0
Actuated g/C Ratio		0.14	0.14		0.84	0.84
v/c Ratio		0.17	0.00		0.38	0.39
Control Delay		10.7	0.0		4.1	4.1
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		10.7	0.0		4.1	4.1
LOS		B	A		A	A
Approach Delay		10.7			4.1	4.1
Approach LOS		B			A	A

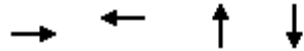
Intersection Summary

Cycle Length: 80  
 Actuated Cycle Length: 80  
 Offset: 72 (90%), Referenced to phase 2:NBTL and 6:SBTL, Start of 1st Green  
 Natural Cycle: 55  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.39  
 Intersection Signal Delay: 4.3  
 Intersection Capacity Utilization 57.9%  
 Analysis Period (min) 15  
 Intersection LOS: A  
 ICU Level of Service B

Splits and Phases: 2310: Danforth Road & Barrymore Road/Private Access



















## 2310: Danforth Road &amp; Barrymore Road/Private Access



Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	42	1	984	1123
v/c Ratio	0.17	0.00	0.38	0.39
Control Delay	10.7	0.0	4.1	4.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	10.7	0.0	4.1	4.1
Queue Length 50th (m)	0.2	0.0	17.6	20.4
Queue Length 95th (m)	7.1	0.0	53.9	61.5
Internal Link Dist (m)	253.9	26.6	253.1	230.7
Turn Bay Length (m)				
Base Capacity (vph)	473	540	2616	2853
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.09	0.00	0.38	0.39
Intersection Summary				

HCM Signalized Intersection Capacity Analysis  
 2310: Danforth Road & Barrymore Road/Private Access

AM Peak Period

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	0	29	0	0	1	19	915	0	0	1053	14
Future Volume (vph)	10	0	29	0	0	1	19	915	0	0	1053	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frbp, ped/bikes		1.00			0.97			1.00			1.00	
Flpb, ped/bikes		0.99			1.00			1.00			1.00	
Frt		0.90			0.86			1.00			1.00	
Flt Protected		0.99			1.00			1.00			1.00	
Satd. Flow (prot)		1660			1569			3399			3406	
Flt Permitted		0.92			1.00			0.92			1.00	
Satd. Flow (perm)		1548			1569			3123			3406	
Peak-hour factor, PHF	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95
Adj. Flow (vph)	11	0	31	0	0	1	21	963	0	0	1108	15
RTOR Reduction (vph)	0	37	0	0	1	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	5	0	0	0	0	0	984	0	0	1122	0
Confl. Peds. (#/hr)	20						20	15		8	8	15
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	5%	0%	0%	3%	7%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	7	7
Turn Type	Perm	NA			NA		Perm	NA			NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		7.0			7.0			62.0			62.0	
Effective Green, g (s)		8.0			8.0			63.0			63.0	
Actuated g/C Ratio		0.10			0.10			0.79			0.79	
Clearance Time (s)		5.0			5.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		154			156			2459			2682	
v/s Ratio Prot					0.00						c0.33	
v/s Ratio Perm		c0.00						0.32				
v/c Ratio		0.03			0.00			0.40			0.42	
Uniform Delay, d1		32.5			32.4			2.6			2.7	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.1			0.0			0.5			0.5	
Delay (s)		32.6			32.4			3.1			3.2	
Level of Service		C			C			A			A	
Approach Delay (s)		32.6			32.4			3.1			3.2	
Approach LOS		C			C			A			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			3.7					HCM 2000 Level of Service			A	
HCM 2000 Volume to Capacity ratio			0.38									
Actuated Cycle Length (s)			80.0					Sum of lost time (s)		9.0		
Intersection Capacity Utilization			57.9%					ICU Level of Service		B		
Analysis Period (min)			15									
c	Critical Lane Group											

# HCM Unsignalized Intersection Capacity Analysis

## 3: Danforth Road & Hollyhedge Drive












PM Peak Period



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	9	9	15	985	1020	15
Future Volume (Veh/h)	9	9	15	985	1020	15
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	10	16	1071	1109	16
Pedestrians	80					
Lane Width (m)	3.5					
Walking Speed (m/s)	1.2					
Percent Blockage	6					
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)				350	236	
pX, platoon unblocked	0.84	0.82	0.82			
vC, conflicting volume	1764	642	1205			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1349	135	818			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	91	99	97			
cM capacity (veh/h)	111	689	630			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	20	373	714	739	386	
Volume Left	10	16	0	0	0	
Volume Right	10	0	0	0	16	
cSH	191	630	1700	1700	1700	
Volume to Capacity	0.10	0.03	0.42	0.43	0.23	
Queue Length 95th (m)	2.6	0.6	0.0	0.0	0.0	
Control Delay (s)	26.1	0.8	0.0	0.0	0.0	
Lane LOS	D	A				
Approach Delay (s)	26.1	0.3		0.0		
Approach LOS	D					
Intersection Summary						
Average Delay	0.4					
Intersection Capacity Utilization	47.8%			ICU Level of Service	A	
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis  
4: Danforth Road & Perivale Crescent

PM Peak Period

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (veh/h)	9	10	990	17	16	1013
Future Volume (Veh/h)	9	10	990	17	16	1013
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	11	1076	18	17	1101
Pedestrians	30					
Lane Width (m)	3.5					
Walking Speed (m/s)	1.2					
Percent Blockage	2					
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	255			332		
pX, platoon unblocked	0.87	0.93			0.93	
vC, conflicting volume	1700	577			1124	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1137	396			984	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	98			97	
cM capacity (veh/h)	163	553			645	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	21	717	377	384	734	
Volume Left	10	0	0	17	0	
Volume Right	11	0	18	0	0	
cSH	259	1700	1700	645	1700	
Volume to Capacity	0.08	0.42	0.22	0.03	0.43	
Queue Length 95th (m)	2.0	0.0	0.0	0.6	0.0	
Control Delay (s)	20.1	0.0	0.0	0.8	0.0	
Lane LOS	C			A		
Approach Delay (s)	20.1	0.0		0.3		
Approach LOS	C					
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization			49.3%	ICU Level of Service	A	
Analysis Period (min)			15			



Timings

PM Peak Period

380: Danforth Road/McCowan Road & Lawrence Avenue East

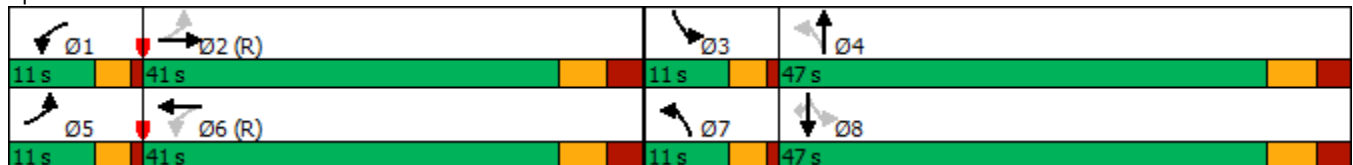


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations	↶	↶↶↶	↶	↶↶↶	↶	↶↶	↶	↶↶	↶
Traffic Volume (vph)	181	1424	202	811	137	723	166	726	247
Future Volume (vph)	181	1424	202	811	137	723	166	726	247
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2	1	6	7	4	3	8	
Permitted Phases	2		6		4		8		8
Detector Phase	5	2	1	6	7	4	3	8	8
Switch Phase									
Minimum Initial (s)	6.0	32.0	6.0	32.0	6.0	39.0	6.0	39.0	39.0
Minimum Split (s)	10.0	39.0	10.0	39.0	10.0	46.0	10.0	46.0	46.0
Total Split (s)	11.0	41.0	11.0	41.0	11.0	47.0	11.0	47.0	47.0
Total Split (%)	10.0%	37.3%	10.0%	37.3%	10.0%	42.7%	10.0%	42.7%	42.7%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	4.0	3.0	4.0	4.0
All-Red Time (s)	1.0	3.0	1.0	3.0	1.0	3.0	1.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	3.0	6.0	3.0	6.0	3.0	6.0	3.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?									
Recall Mode	None	C-Max	None	C-Max	None	Max	None	Max	Max
Act Effct Green (s)	46.0	35.0	46.0	35.0	52.0	41.2	52.0	41.2	41.2
Actuated g/C Ratio	0.42	0.32	0.42	0.32	0.47	0.37	0.47	0.37	0.37
v/c Ratio	0.82	1.08	1.05	0.52	0.55	0.80	0.68	0.61	0.43
Control Delay	49.3	83.2	101.2	31.1	23.7	35.8	29.5	30.6	7.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.3	83.2	101.2	31.1	23.7	35.8	29.5	30.6	7.7
LOS	D	F	F	C	C	D	C	C	A
Approach Delay		79.4		44.6		34.1		25.5	
Approach LOS		E		D		C		C	

Intersection Summary

Cycle Length: 110  
 Actuated Cycle Length: 110  
 Offset: 59 (54%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 105  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.08  
 Intersection Signal Delay: 50.0  
 Intersection LOS: D  
 Intersection Capacity Utilization 96.7%  
 ICU Level of Service F  
 Analysis Period (min) 15

Splits and Phases: 380: Danforth Road/McCowan Road & Lawrence Avenue East



## 380: Danforth Road/McCowan Road &amp; Lawrence Avenue East



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	201	1612	224	942	152	965	184	764	260
v/c Ratio	0.82	1.08	1.05	0.52	0.55	0.80	0.68	0.61	0.43
Control Delay	49.3	83.2	101.2	31.1	23.7	35.8	29.5	30.6	7.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.3	83.2	101.2	31.1	23.7	35.8	29.5	30.6	7.7
Queue Length 50th (m)	26.8	~141.2	~34.6	53.6	17.4	93.4	20.9	69.4	5.7
Queue Length 95th (m)	#57.5	#171.1	#82.5	65.5	29.3	119.2	#36.0	89.2	24.9
Internal Link Dist (m)		483.4		41.4		118.2		152.5	
Turn Bay Length (m)	35.8		43.5		69.0		46.5		55.9
Base Capacity (vph)	245	1497	213	1825	278	1204	273	1244	601
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	0.82	1.08	1.05	0.52	0.55	0.80	0.67	0.61	0.43

## 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.

HCM Signalized Intersection Capacity Analysis  
 380: Danforth Road/McCowan Road & Lawrence Avenue East

PM Peak Period

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		  			  			 			 		
Traffic Volume (vph)	181	1424	107	202	811	84	137	723	194	166	726	247	
Future Volume (vph)	181	1424	107	202	811	84	137	723	194	166	726	247	
Ideal Flow (vphpl)	1900	1900	1900	2200	2150	1900	1900	1900	1900	2400	1900	1900	
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	
Total Lost time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	6.0	6.0	
Lane Util. Factor	1.00	0.91		1.00	*1.00		1.00	0.95		1.00	0.95	1.00	
Frbp, ped/bikes	1.00	0.99		1.00	0.99		1.00	0.99		1.00	1.00	0.89	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		1.00	1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.97		1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00	
Satd. Flow (prot)	1584	4686		1875	5698		1610	3159		2044	3323	1240	
Flt Permitted	0.23	1.00		0.11	1.00		0.24	1.00		0.15	1.00	1.00	
Satd. Flow (perm)	381	4686		226	5698		408	3159		312	3323	1240	
Peak-hour factor, PHF	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95	
Adj. Flow (vph)	201	1499	113	224	854	88	152	761	204	184	764	260	
RTOR Reduction (vph)	0	8	0	0	13	0	0	22	0	0	0	137	
Lane Group Flow (vph)	201	1605	0	224	929	0	152	943	0	184	764	123	
Confl. Peds. (#/hr)	77		82	82		77	124		55	55		124	
Heavy Vehicles (%)	6%	6%	4%	4%	8%	0%	4%	7%	7%	4%	7%	5%	
Bus Blockages (#/hr)	0	12	12	0	15	15	0	5	5	0	2	6	
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	
Protected Phases	5	2		1	6		7	4		3	8		
Permitted Phases	2			6			4			8		8	
Actuated Green, G (s)	41.0	34.0		41.0	34.0		47.0	40.2		47.0	40.2	40.2	
Effective Green, g (s)	43.0	35.0		43.0	35.0		49.0	41.2		49.0	41.2	41.2	
Actuated g/C Ratio	0.39	0.32		0.39	0.32		0.45	0.37		0.45	0.37	0.37	
Clearance Time (s)	4.0	7.0		4.0	7.0		4.0	7.0		4.0	7.0	7.0	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	3.0		2.0	3.0	3.0	
Lane Grp Cap (vph)	236	1491		208	1813		266	1183		261	1244	464	
v/s Ratio Prot	0.06	c0.34		c0.08	0.16		0.04	c0.30		c0.05	0.23		
v/s Ratio Perm	0.27			0.34			0.21			0.26		0.10	
v/c Ratio	0.85	1.08		1.08	0.51		0.57	0.80		0.70	0.61	0.27	
Uniform Delay, d1	26.1	37.5		28.7	30.5		19.8	30.7		21.4	27.9	23.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00	
Incremental Delay, d2	23.6	46.8		84.3	1.0		1.8	5.6		6.9	2.3	1.4	
Delay (s)	49.7	84.3		113.0	31.6		21.7	36.3		28.3	30.2	25.3	
Level of Service	D	F		F	C		C	D		C	C	C	
Approach Delay (s)		80.4			47.2			34.3			28.9		
Approach LOS		F			D			C			C		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			51.7									HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.92										
Actuated Cycle Length (s)			110.0									Sum of lost time (s)	18.0
Intersection Capacity Utilization			96.7%									ICU Level of Service	F
Analysis Period (min)			15										

c Critical Lane Group

Timings  
 2310: Danforth Road & Barrymore Road/Private Access

PM Peak Period

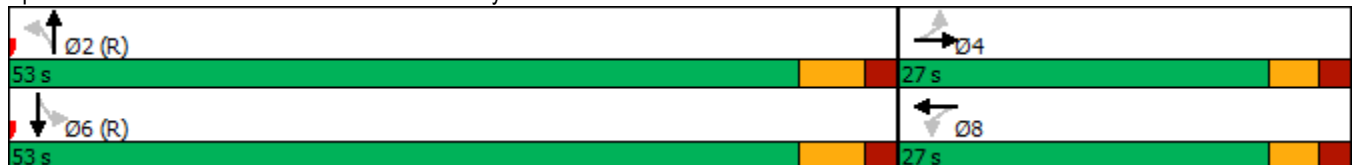


Lane Group	EBL	EBT	NBL	NBT	SBT	Ø8
Lane Configurations		↕		↕	↕	
Traffic Volume (vph)	10	0	9	997	1010	
Future Volume (vph)	10	0	9	997	1010	
Turn Type	Perm	NA	Perm	NA	NA	
Protected Phases		4		2	6	8
Permitted Phases	4		2			
Detector Phase	4	4	2	2	6	
Switch Phase						
Minimum Initial (s)	7.0	7.0	15.0	15.0	15.0	7.0
Minimum Split (s)	26.0	26.0	21.0	21.0	21.0	26.0
Total Split (s)	27.0	27.0	53.0	53.0	53.0	27.0
Total Split (%)	33.8%	33.8%	66.3%	66.3%	66.3%	34%
Yellow Time (s)	3.0	3.0	4.0	4.0	4.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		-1.0		-1.0	-1.0	
Total Lost Time (s)		4.0		5.0	5.0	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max	C-Max	C-Max	None
Act Effct Green (s)		10.9		66.9	66.9	
Actuated g/C Ratio		0.14		0.84	0.84	
v/c Ratio		0.21		0.38	0.37	
Control Delay		13.7		4.1	4.0	
Queue Delay		0.0		0.0	0.0	
Total Delay		13.7		4.1	4.0	
LOS		B		A	A	
Approach Delay		13.7		4.1	4.0	
Approach LOS		B		A	A	

Intersection Summary

Cycle Length: 80  
 Actuated Cycle Length: 80  
 Offset: 59 (74%), Referenced to phase 2:NBT and 6:SBT, Start of 1st Green  
 Natural Cycle: 50  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.38  
 Intersection Signal Delay: 4.3  
 Intersection Capacity Utilization 51.8%  
 Analysis Period (min) 15  
 Intersection LOS: A  
 ICU Level of Service A

Splits and Phases: 2310: Danforth Road & Barrymore Road/Private Access



















## 2310: Danforth Road &amp; Barrymore Road/Private Access

	→	↑	↓
Lane Group	EBT	NBT	SBT
Lane Group Flow (vph)	52	1059	1076
v/c Ratio	0.21	0.38	0.37
Control Delay	13.7	4.1	4.0
Queue Delay	0.0	0.0	0.0
Total Delay	13.7	4.1	4.0
Queue Length 50th (m)	1.6	19.1	19.1
Queue Length 95th (m)	9.0	57.7	57.4
Internal Link Dist (m)	253.9	253.1	230.7
Turn Bay Length (m)			
Base Capacity (vph)	473	2764	2881
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.11	0.38	0.37
Intersection Summary			

HCM Signalized Intersection Capacity Analysis  
 2310: Danforth Road & Barrymore Road/Private Access

PM Peak Period

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	0	39	0	0	0	9	997	0	0	1010	12
Future Volume (vph)	10	0	39	0	0	0	9	997	0	0	1010	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0						5.0			5.0	
Lane Util. Factor		1.00						0.95			0.95	
Frbp, ped/bikes		0.99						1.00			1.00	
Flpb, ped/bikes		1.00						1.00			1.00	
Frt		0.89						1.00			1.00	
Flt Protected		0.99						1.00			1.00	
Satd. Flow (prot)		1632						3499			3443	
Flt Permitted		0.94						0.94			1.00	
Satd. Flow (perm)		1543						3303			3443	
Peak-hour factor, PHF	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95
Adj. Flow (vph)	11	0	41	0	0	0	10	1049	0	0	1063	13
RTOR Reduction (vph)	0	37	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	15	0	0	0	0	0	1059	0	0	1075	0
Confl. Peds. (#/hr)	15		3	3			15	12		14	14	12
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	7	7
Turn Type	Perm	NA					Perm	NA			NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		7.1						61.9			61.9	
Effective Green, g (s)		8.1						62.9			62.9	
Actuated g/C Ratio		0.10						0.79			0.79	
Clearance Time (s)		5.0						6.0			6.0	
Vehicle Extension (s)		3.0						3.0			3.0	
Lane Grp Cap (vph)		156						2596			2707	
v/s Ratio Prot											0.31	
v/s Ratio Perm		c0.01						c0.32				
v/c Ratio		0.10						0.41			0.40	
Uniform Delay, d1		32.6						2.7			2.7	
Progression Factor		1.00						1.00			1.00	
Incremental Delay, d2		0.3						0.5			0.4	
Delay (s)		32.9						3.2			3.1	
Level of Service		C						A			A	
Approach Delay (s)		32.9			0.0			3.2			3.1	
Approach LOS		C			A			A			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			3.8									A
HCM 2000 Volume to Capacity ratio			0.37									
Actuated Cycle Length (s)			80.0							9.0		
Intersection Capacity Utilization			51.8%									A
Analysis Period (min)			15									

c Critical Lane Group

## **Appendix D**

### **2041 Future Background Conditions Synchro Report**

# HCM Unsignalized Intersection Capacity Analysis

## 3: Danforth Road & Hollyhedge Drive

AM Peak Period












Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	9	13	6	1007	1091	8
Future Volume (Veh/h)	9	13	6	1007	1091	8
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	14	7	1095	1186	9
Pedestrians	90					
Lane Width (m)	3.5					
Walking Speed (m/s)	1.2					
Percent Blockage	7					
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)				350	236	
pX, platoon unblocked	0.81	0.79	0.79			
vC, conflicting volume	1842	688	1285			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1375	78	833			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	90	98	99			
cM capacity (veh/h)	103	714	593			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	24	372	730	791	404	
Volume Left	10	7	0	0	0	
Volume Right	14	0	0	0	9	
cSH	205	593	1700	1700	1700	
Volume to Capacity	0.12	0.01	0.43	0.47	0.24	
Queue Length 95th (m)	3.0	0.3	0.0	0.0	0.0	
Control Delay (s)	24.8	0.4	0.0	0.0	0.0	
Lane LOS	C	A				
Approach Delay (s)	24.8	0.1		0.0		
Approach LOS	C					
Intersection Summary						
Average Delay	0.3					
Intersection Capacity Utilization	42.0%			ICU Level of Service	A	
Analysis Period (min)	15					



HCM Unsignalized Intersection Capacity Analysis  
4: Danforth Road & Perivale Crescent

AM Peak Period

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	17	12	1001	4	6	1098
Future Volume (Veh/h)	17	12	1001	4	6	1098
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	18	13	1088	4	7	1193
Pedestrians	45					
Lane Width (m)	3.5					
Walking Speed (m/s)	1.2					
Percent Blockage	4					
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	255			332		
pX, platoon unblocked	0.83	0.93			0.93	
vC, conflicting volume	1746	591			1137	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1129	414			1000	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	89	98			99	
cM capacity (veh/h)	160	532			628	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	31	725	367	405	795	
Volume Left	18	0	0	7	0	
Volume Right	13	0	4	0	0	
cSH	226	1700	1700	628	1700	
Volume to Capacity	0.14	0.43	0.22	0.01	0.47	
Queue Length 95th (m)	3.6	0.0	0.0	0.3	0.0	
Control Delay (s)	23.4	0.0	0.0	0.3	0.0	
Lane LOS	C			A		
Approach Delay (s)	23.4	0.0			0.1	
Approach LOS	C					
Intersection Summary						
Average Delay			0.4			
Intersection Capacity Utilization			44.5%		ICU Level of Service	A
Analysis Period (min)			15			

Queues

AM Peak Period

380: Danforth Road/McCowan Road & Lawrence Avenue East

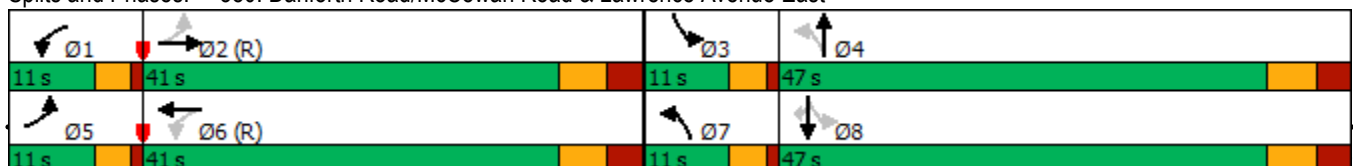


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations	↙	↑↑↑	↙	↑↑↑	↙	↑↑	↙	↑↑	↗
Traffic Volume (vph)	145	711	286	1604	116	631	89	757	327
Future Volume (vph)	145	711	286	1604	116	631	89	757	327
Lane Group Flow (vph)	161	852	318	1989	129	810	99	841	363
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2	1	6	7	4	3	8	
Permitted Phases	2		6		4		8		8
Detector Phase	5	2	1	6	7	4	3	8	8
Switch Phase									
Minimum Initial (s)	6.0	32.0	6.0	32.0	6.0	39.0	6.0	39.0	39.0
Minimum Split (s)	14.0	39.1	14.0	39.1	14.0	46.5	14.0	46.5	46.5
Total Split (s)	11.0	41.0	11.0	41.0	11.0	47.0	11.0	47.0	47.0
Total Split (%)	10.0%	37.3%	10.0%	37.3%	10.0%	42.7%	10.0%	42.7%	42.7%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	4.0	3.0	4.0	4.0
All-Red Time (s)	1.0	3.0	1.0	3.0	1.0	3.0	1.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	3.0	6.0	3.0	6.0	3.0	6.0	3.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?									
Recall Mode	None	C-Max	None	C-Max	None	Max	None	Max	Max
v/c Ratio	0.91	0.60	1.12	1.09	0.52	0.70	0.31	0.71	0.59
Control Delay	73.1	33.2	117.3	84.8	23.2	32.3	17.2	33.3	15.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	73.1	33.2	117.3	84.8	23.2	32.3	17.2	33.3	15.2
Queue Length 50th (m)	20.9	55.3	~53.6	~159.5	14.5	74.6	10.8	80.1	23.8
Queue Length 95th (m)	#59.2	69.1	#109.1	#186.7	25.3	97.6	19.7	102.6	54.2
Internal Link Dist (m)		229.7		41.4		118.2		63.9	
Turn Bay Length (m)	35.8		43.5		69.0		46.5		55.9
Base Capacity (vph)	176	1430	283	1830	249	1160	331	1189	618
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	0.91	0.60	1.12	1.09	0.52	0.70	0.30	0.71	0.59

Intersection Summary




























Cycle Length: 110  
 Actuated Cycle Length: 110  
 Offset: 59 (54%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 115  
 Control Type: Actuated-Coordinated  
 ~ Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 380: Danforth Road/McCowan Road & Lawrence Avenue East



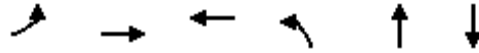
HCM Signalized Intersection Capacity Analysis  
 380: Danforth Road/McCowan Road & Lawrence Avenue East

AM Peak Period

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		  			  			 			 		
Traffic Volume (vph)	145	711	56	286	1604	186	116	631	98	89	757	327	
Future Volume (vph)	145	711	56	286	1604	186	116	631	98	89	757	327	
Ideal Flow (vphpl)	1900	1900	1900	2200	2150	1900	1900	1900	1900	2400	1900	1900	
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	
Total Lost time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	6.0	6.0	
Lane Util. Factor	1.00	0.91		1.00	*1.00		1.00	0.95		1.00	0.95	1.00	
Frbp, ped/bikes	1.00	0.99		1.00	0.99		1.00	0.98		1.00	1.00	0.93	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.98		1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00	
Satd. Flow (prot)	1546	4472		1817	5709		1586	3044		2017	3175	1295	
Flt Permitted	0.11	1.00		0.23	1.00		0.20	1.00		0.22	1.00	1.00	
Satd. Flow (perm)	186	4472		442	5709		334	3044		468	3175	1295	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	
Adj. Flow (vph)	161	790	62	318	1782	207	129	701	109	99	841	363	
RTOR Reduction (vph)	0	8	0	0	15	0	0	11	0	0	0	134	
Lane Group Flow (vph)	161	844	0	318	1974	0	129	799	0	99	841	229	
Confl. Peds. (#/hr)	37		63	63		37	72		121	121		72	
Confl. Bikes (#/hr)												1	
Heavy Vehicles (%)	9%	10%	22%	7%	7%	5%	6%	12%	9%	5%	12%	5%	
Bus Blockages (#/hr)	0	13	13	0	18	18	0	7	7	0	2	7	
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	
Protected Phases	5	2		1	6		7	4		3	8		
Permitted Phases	2			6			4			8		8	
Actuated Green, G (s)	41.0	34.0		41.0	34.0		47.3	40.5		46.7	40.2	40.2	
Effective Green, g (s)	43.0	35.0		43.0	35.0		49.3	41.5		48.7	41.2	41.2	
Actuated g/C Ratio	0.39	0.32		0.39	0.32		0.45	0.38		0.44	0.37	0.37	
Clearance Time (s)	4.0	7.0		4.0	7.0		4.0	7.0		4.0	7.0	7.0	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	3.0		2.0	3.0	3.0	
Lane Grp Cap (vph)	171	1422		272	1816		238	1148		312	1189	485	
v/s Ratio Prot	0.07	0.19		c0.08	0.35		c0.04	0.26		0.02	c0.26		
v/s Ratio Perm	0.30			c0.37			0.20			0.12		0.18	
v/c Ratio	0.94	0.59		1.17	1.09		0.54	0.70		0.32	0.71	0.47	
Uniform Delay, d1	27.6	31.5		29.5	37.5		19.9	28.9		19.1	29.3	26.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00	
Incremental Delay, d2	51.3	1.8		108.3	49.0		1.4	3.5		0.2	3.6	3.3	
Delay (s)	78.9	33.3		137.8	86.5		21.2	32.4		19.4	32.8	29.4	
Level of Service	E	C		F	F		C	C		B	C	C	
Approach Delay (s)		40.6			93.6			30.9			30.9		
Approach LOS		D			F			C			C		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			58.7									HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio			0.91										
Actuated Cycle Length (s)			110.0									Sum of lost time (s)	18.0
Intersection Capacity Utilization			95.9%									ICU Level of Service	F
Analysis Period (min)			15										
c Critical Lane Group													

Queues  
2310: Danforth Road & Barrymore Road/Private Access

AM Peak Period

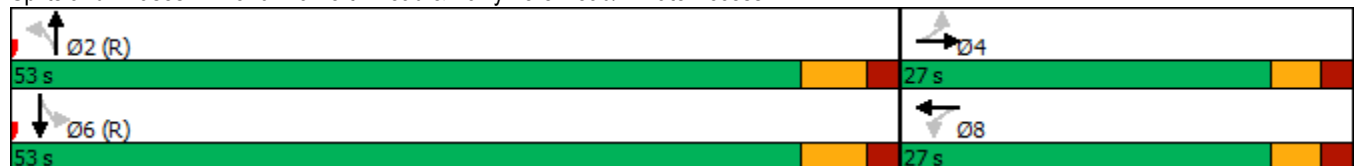


Lane Group	EBL	EBT	WBT	NBL	NBT	SBT
Lane Configurations		↕	↕		↕↕	↕↕
Traffic Volume (vph)	10	0	0	21	994	1101
Future Volume (vph)	10	0	0	21	994	1101
Lane Group Flow (vph)	0	42	1	0	1069	1174
Turn Type	Perm	NA	NA	Perm	NA	NA
Protected Phases		4	8		2	6
Permitted Phases	4			2		
Detector Phase	4	4	8	2	2	6
Switch Phase						
Minimum Initial (s)	7.0	7.0	7.0	15.0	15.0	15.0
Minimum Split (s)	26.0	26.0	26.0	21.0	21.0	21.0
Total Split (s)	27.0	27.0	27.0	53.0	53.0	53.0
Total Split (%)	33.8%	33.8%	33.8%	66.3%	66.3%	66.3%
Yellow Time (s)	3.0	3.0	3.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		-1.0	-1.0		-1.0	-1.0
Total Lost Time (s)		4.0	4.0		5.0	5.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	None	C-Max	C-Max	C-Max
v/c Ratio		0.17	0.00		0.41	0.41
Control Delay		10.7	0.0		4.4	4.3
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		10.7	0.0		4.4	4.3
Queue Length 50th (m)		0.2	0.0		20.0	21.9
Queue Length 95th (m)		7.1	0.0		61.1	65.7
Internal Link Dist (m)		253.9	26.6		253.1	230.7
Turn Bay Length (m)						
Base Capacity (vph)		473	525		2602	2853
Starvation Cap Reductn		0	0		0	0
Spillback Cap Reductn		0	0		0	0
Storage Cap Reductn		0	0		0	0
Reduced v/c Ratio		0.09	0.00		0.41	0.41

Intersection Summary

















Cycle Length: 80  
 Actuated Cycle Length: 80  
 Offset: 72 (90%), Referenced to phase 2:NBT and 6:SBT, Start of 1st Green  
 Natural Cycle: 55  
 Control Type: Actuated-Coordinated

Splits and Phases: 2310: Danforth Road & Barrymore Road/Private Access



HCM Signalized Intersection Capacity Analysis  
 2310: Danforth Road & Barrymore Road/Private Access

AM Peak Period

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	0	29	0	0	1	21	994	0	0	1101	14
Future Volume (vph)	10	0	29	0	0	1	21	994	0	0	1101	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frbp, ped/bikes		1.00			0.97			1.00			1.00	
Flpb, ped/bikes		0.99			1.00			1.00			1.00	
Frt		0.90			0.86			1.00			1.00	
Flt Protected		0.99			1.00			1.00			1.00	
Satd. Flow (prot)		1660			1569			3399			3407	
Flt Permitted		0.92			1.00			0.91			1.00	
Satd. Flow (perm)		1548			1569			3107			3407	
Peak-hour factor, PHF	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95
Adj. Flow (vph)	11	0	31	0	0	1	23	1046	0	0	1159	15
RTOR Reduction (vph)	0	37	0	0	1	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	5	0	0	0	0	0	1069	0	0	1173	0
Confl. Peds. (#/hr)	20						20	15		9	9	15
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	5%	0%	0%	3%	7%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	7	7
Turn Type	Perm	NA			NA		Perm	NA			NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		7.0			7.0			62.0			62.0	
Effective Green, g (s)		8.0			8.0			63.0			63.0	
Actuated g/C Ratio		0.10			0.10			0.79			0.79	
Clearance Time (s)		5.0			5.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		154			156			2446			2683	
v/s Ratio Prot					0.00						c0.34	
v/s Ratio Perm		c0.00						0.34				
v/c Ratio		0.03			0.00			0.44			0.44	
Uniform Delay, d1		32.5			32.4			2.8			2.8	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.1			0.0			0.6			0.5	
Delay (s)		32.6			32.4			3.3			3.3	
Level of Service		C			C			A			A	
Approach Delay (s)		32.6			32.4			3.3			3.3	
Approach LOS		C			C			A			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			3.8					HCM 2000 Level of Service			A	
HCM 2000 Volume to Capacity ratio			0.39									
Actuated Cycle Length (s)			80.0					Sum of lost time (s)		9.0		
Intersection Capacity Utilization			61.5%					ICU Level of Service		B		
Analysis Period (min)			15									
c	Critical Lane Group											

# HCM Unsignalized Intersection Capacity Analysis

## 3: Danforth Road & Hollyhedge Drive












PM Peak Period



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	9	9	15	1045	1139	15
Future Volume (Veh/h)	9	9	15	1045	1139	15
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	10	16	1136	1238	16
Pedestrians	50					
Lane Width (m)	3.5					
Walking Speed (m/s)	1.2					
Percent Blockage	4					
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)				350	236	
pX, platoon unblocked	0.82	0.79	0.79			
vC, conflicting volume	1896	677	1304			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1373	78	867			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	91	99	97			
cM capacity (veh/h)	107	743	599			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	20	395	757	825	429	
Volume Left	10	16	0	0	0	
Volume Right	10	0	0	0	16	
cSH	187	599	1700	1700	1700	
Volume to Capacity	0.11	0.03	0.45	0.49	0.25	
Queue Length 95th (m)	2.7	0.6	0.0	0.0	0.0	
Control Delay (s)	26.6	0.8	0.0	0.0	0.0	
Lane LOS	D	A				
Approach Delay (s)	26.6	0.3		0.0		
Approach LOS	D					
Intersection Summary						
Average Delay	0.4					
Intersection Capacity Utilization	49.5%			ICU Level of Service	A	
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis  
4: Danforth Road & Perivale Crescent

PM Peak Period

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (veh/h)	9	10	1050	17	16	1132
Future Volume (Veh/h)	9	10	1050	17	16	1132
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	11	1141	18	17	1230
Pedestrians	15					
Lane Width (m)	3.5					
Walking Speed (m/s)	1.2					
Percent Blockage	1					
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	255			332		
pX, platoon unblocked	0.84	0.92			0.92	
vC, conflicting volume	1814	594			1174	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1147	374			1006	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	98			97	
cM capacity (veh/h)	159	569			630	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	21	761	398	427	820	
Volume Left	10	0	0	17	0	
Volume Right	11	0	18	0	0	
cSH	255	1700	1700	630	1700	
Volume to Capacity	0.08	0.45	0.23	0.03	0.48	
Queue Length 95th (m)	2.0	0.0	0.0	0.6	0.0	
Control Delay (s)	20.4	0.0	0.0	0.8	0.0	
Lane LOS	C			A		
Approach Delay (s)	20.4	0.0		0.3		
Approach LOS	C					
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization			52.6%	ICU Level of Service	A	
Analysis Period (min)	15					

Queues

PM Peak Period

380: Danforth Road/McCowan Road & Lawrence Avenue East

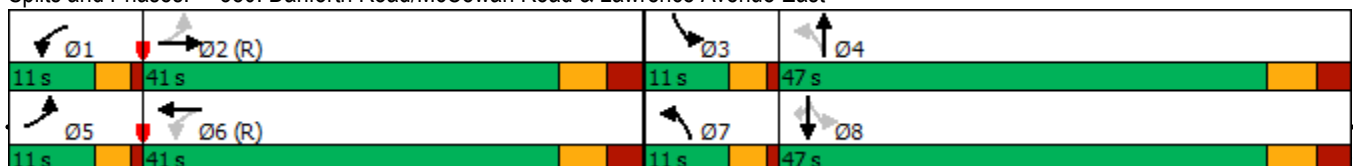


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations	↖	↕↕↕	↖	↕↕↕	↖	↕↕	↖	↕↕	↗
Traffic Volume (vph)	221	1771	222	926	145	766	183	801	272
Future Volume (vph)	221	1771	222	926	145	766	183	801	272
Lane Group Flow (vph)	246	2002	247	1072	161	1023	203	843	286
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm
Protected Phases	5	2	1	6	7	4	3	8	
Permitted Phases	2		6		4		8		8
Detector Phase	5	2	1	6	7	4	3	8	8
Switch Phase									
Minimum Initial (s)	6.0	32.0	6.0	32.0	6.0	39.0	6.0	39.0	39.0
Minimum Split (s)	14.0	39.1	14.0	39.1	14.0	46.5	14.0	46.5	46.5
Total Split (s)	11.0	41.0	11.0	41.0	11.0	47.0	11.0	47.0	47.0
Total Split (%)	10.0%	37.3%	10.0%	37.3%	10.0%	42.7%	10.0%	42.7%	42.7%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	4.0	3.0	4.0	4.0
All-Red Time (s)	1.0	3.0	1.0	3.0	1.0	3.0	1.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	3.0	6.0	3.0	6.0	3.0	6.0	3.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?									
Recall Mode	None	C-Max	None	C-Max	None	Max	None	Max	Max
v/c Ratio	1.14	1.34	1.15	0.59	0.65	0.85	0.81	0.68	0.49
Control Delay	129.4	191.6	133.9	32.5	29.1	38.4	42.4	32.2	10.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	129.4	191.6	133.9	32.5	29.1	38.4	42.4	32.2	10.8
Queue Length 50th (m)	~38.2	~207.1	~44.9	62.9	18.5	101.6	23.4	79.1	11.4
Queue Length 95th (m)	#88.2	#236.9	#94.6	76.0	#30.9	129.1	#56.1	100.6	34.7
Internal Link Dist (m)		229.7		41.4		118.2		63.9	
Turn Bay Length (m)	35.8		43.5		69.0		46.5		55.9
Base Capacity (vph)	216	1489	214	1824	251	1209	251	1244	587
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	1.14	1.34	1.15	0.59	0.64	0.85	0.81	0.68	0.49

Intersection Summary

Cycle Length: 110  
 Actuated Cycle Length: 110  
 Offset: 59 (54%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green  
 Natural Cycle: 145  
 Control Type: Actuated-Coordinated  
 ~ Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.




























Splits and Phases: 380: Danforth Road/McCowan Road & Lawrence Avenue East





HCM Signalized Intersection Capacity Analysis  
 380: Danforth Road/McCowan Road & Lawrence Avenue East

PM Peak Period

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  			  			 			 	
Traffic Volume (vph)	221	1771	131	222	926	92	145	766	206	183	801	272
Future Volume (vph)	221	1771	131	222	926	92	145	766	206	183	801	272
Ideal Flow (vphpl)	1900	1900	1900	2200	2150	1900	1900	1900	1900	2400	1900	1900
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0
Total Lost time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	6.0	6.0
Lane Util. Factor	1.00	0.91		1.00	*1.00		1.00	0.95		1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	1.00	0.87
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	0.99		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1571	4658		1876	5697		1613	3187		2046	3323	1225
Flt Permitted	0.18	1.00		0.11	1.00		0.20	1.00		0.12	1.00	1.00
Satd. Flow (perm)	298	4658		226	5697		342	3187		257	3323	1225
Peak-hour factor, PHF	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95
Adj. Flow (vph)	246	1864	138	247	975	97	161	806	217	203	843	286
RTOR Reduction (vph)	0	8	0	0	12	0	0	22	0	0	0	129
Lane Group Flow (vph)	246	1995	0	247	1060	0	161	1001	0	203	843	157
Confl. Peds. (#/hr)	84		48	48		84	137		5	5		137
Heavy Vehicles (%)	7%	7%	4%	4%	8%	0%	4%	7%	7%	4%	7%	5%
Bus Blockages (#/hr)	0	12	12	0	15	15	0	5	5	0	2	6
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)	41.0	34.0		41.0	34.0		46.8	40.0		47.2	40.2	40.2
Effective Green, g (s)	43.0	35.0		43.0	35.0		48.8	41.0		49.2	41.2	41.2
Actuated g/C Ratio	0.39	0.32		0.39	0.32		0.44	0.37		0.45	0.37	0.37
Clearance Time (s)	4.0	7.0		4.0	7.0		4.0	7.0		4.0	7.0	7.0
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	3.0		2.0	3.0	3.0
Lane Grp Cap (vph)	209	1482		208	1812		241	1187		245	1244	458
v/s Ratio Prot	0.09	c0.43		c0.09	0.19		0.05	c0.31		c0.06	0.25	
v/s Ratio Perm	0.37			0.38			0.25			0.31		0.13
v/c Ratio	1.18	1.35		1.19	0.58		0.67	0.84		0.83	0.68	0.34
Uniform Delay, d1	28.6	37.5		28.7	31.4		20.6	31.6		22.5	28.8	24.7
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	118.2	160.2		122.2	1.4		5.3	7.4		19.2	3.0	2.0
Delay (s)	146.8	197.7		150.9	32.8		25.9	39.0		41.7	31.8	26.7
Level of Service	F	F		F	C		C	D		D	C	C
Approach Delay (s)		192.1			54.9			37.2			32.2	
Approach LOS		F			D			D			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			97.2				HCM 2000 Level of Service			F		
HCM 2000 Volume to Capacity ratio			1.06									
Actuated Cycle Length (s)			110.0			Sum of lost time (s)			18.0			
Intersection Capacity Utilization			105.2%			ICU Level of Service			G			
Analysis Period (min)			15									

c Critical Lane Group

Queues  
2310: Danforth Road & Barrymore Road/Private Access

PM Peak Period

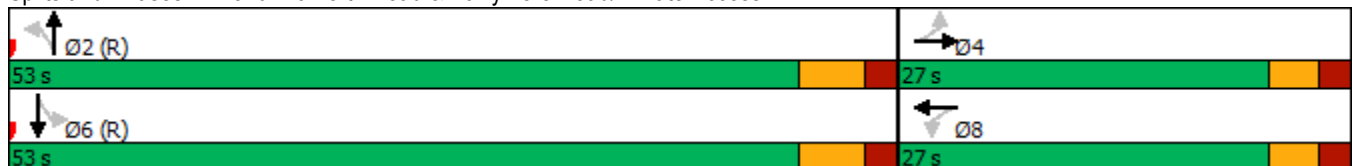


Lane Group	EBL	EBT	NBL	NBT	SBT	Ø8
Lane Configurations		↕		↕	↕	
Traffic Volume (vph)	10	0	10	1057	1128	
Future Volume (vph)	10	0	10	1057	1128	
Lane Group Flow (vph)	0	52	0	1124	1201	
Turn Type	Perm	NA	Perm	NA	NA	
Protected Phases		4		2	6	8
Permitted Phases	4		2			
Detector Phase	4	4	2	2	6	
Switch Phase						
Minimum Initial (s)	7.0	7.0	15.0	15.0	15.0	7.0
Minimum Split (s)	26.0	26.0	21.0	21.0	21.0	26.0
Total Split (s)	27.0	27.0	53.0	53.0	53.0	27.0
Total Split (%)	33.8%	33.8%	66.3%	66.3%	66.3%	34%
Yellow Time (s)	3.0	3.0	4.0	4.0	4.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		-1.0		-1.0	-1.0	
Total Lost Time (s)		4.0		5.0	5.0	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max	C-Max	C-Max	None
v/c Ratio		0.21		0.41	0.42	
Control Delay		13.7		4.3	4.3	
Queue Delay		0.0		0.0	0.0	
Total Delay		13.7		4.3	4.3	
Queue Length 50th (m)		1.6		20.9	22.5	
Queue Length 95th (m)		9.0		63.1	67.4	
Internal Link Dist (m)		253.9		253.1	230.7	
Turn Bay Length (m)						
Base Capacity (vph)		473		2756	2881	
Starvation Cap Reductn		0		0	0	
Spillback Cap Reductn		0		0	0	
Storage Cap Reductn		0		0	0	
Reduced v/c Ratio		0.11		0.41	0.42	

Intersection Summary

















Cycle Length: 80  
 Actuated Cycle Length: 80  
 Offset: 59 (74%), Referenced to phase 2:NBT and 6:SBT, Start of 1st Green  
 Natural Cycle: 55  
 Control Type: Actuated-Coordinated

Splits and Phases: 2310: Danforth Road & Barrymore Road/Private Access



HCM Signalized Intersection Capacity Analysis  
 2310: Danforth Road & Barrymore Road/Private Access

PM Peak Period

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	0	39	0	0	0	10	1057	0	0	1128	13
Future Volume (vph)	10	0	39	0	0	0	10	1057	0	0	1128	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0						5.0			5.0	
Lane Util. Factor		1.00						0.95			0.95	
Frbp, ped/bikes		0.99						1.00			1.00	
Flpb, ped/bikes		1.00						1.00			1.00	
Frt		0.89						1.00			1.00	
Flt Protected		0.99						1.00			1.00	
Satd. Flow (prot)		1632						3499			3443	
Flt Permitted		0.94						0.94			1.00	
Satd. Flow (perm)		1543						3293			3443	
Peak-hour factor, PHF	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95
Adj. Flow (vph)	11	0	41	0	0	0	11	1113	0	0	1187	14
RTOR Reduction (vph)	0	37	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	15	0	0	0	0	0	1124	0	0	1200	0
Confl. Peds. (#/hr)	15		3	3			15	13		15	15	13
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	7	7
Turn Type	Perm	NA					Perm	NA			NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		7.1						61.9			61.9	
Effective Green, g (s)		8.1						62.9			62.9	
Actuated g/C Ratio		0.10						0.79			0.79	
Clearance Time (s)		5.0						6.0			6.0	
Vehicle Extension (s)		3.0						3.0			3.0	
Lane Grp Cap (vph)		156						2589			2707	
v/s Ratio Prot											c0.35	
v/s Ratio Perm		c0.01						0.34				
v/c Ratio		0.10						0.43			0.44	
Uniform Delay, d1		32.6						2.8			2.8	
Progression Factor		1.00						1.00			1.00	
Incremental Delay, d2		0.3						0.5			0.5	
Delay (s)		32.9						3.3			3.3	
Level of Service		C						A			A	
Approach Delay (s)		32.9			0.0			3.3			3.3	
Approach LOS		C			A			A			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			4.0								HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.40									
Actuated Cycle Length (s)			80.0								Sum of lost time (s)	9.0
Intersection Capacity Utilization			54.2%								ICU Level of Service	A
Analysis Period (min)			15									












c Critical Lane Group

## **Appendix E**

### **2041 Future Total Conditions Synchro Report**

HCM Unsignalized Intersection Capacity Analysis  
1: Danforth Road

Am Peak Period

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (veh/h)	4	26	1016	7	29	1099
Future Volume (Veh/h)	4	26	1016	7	29	1099
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	28	1104	8	32	1195
Pedestrians	130					
Lane Width (m)	3.5					
Walking Speed (m/s)	1.2					
Percent Blockage	11					
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	142					
pX, platoon unblocked	0.78					
vC, conflicting volume	1900	686			1242	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1593	686			1242	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	92			94	
cM capacity (veh/h)	65	353			508	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	32	736	376	430	797	
Volume Left	4	0	0	32	0	
Volume Right	28	0	8	0	0	
cSH	228	1700	1700	508	1700	
Volume to Capacity	0.14	0.43	0.22	0.06	0.47	
Queue Length 95th (m)	3.7	0.0	0.0	1.5	0.0	
Control Delay (s)	23.4	0.0	0.0	1.9	0.0	
Lane LOS	C			A		
Approach Delay (s)	23.4	0.0			0.7	
Approach LOS	C					
Intersection Summary						
Average Delay	0.7					
Intersection Capacity Utilization	61.2%		ICU Level of Service		B	
Analysis Period (min)	15					

# HCM Unsignalized Intersection Capacity Analysis

## 3: Danforth Road & Hollyhedge Drive












Am Peak Period



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	9	13	6	1013	1094	8
Future Volume (Veh/h)	9	13	6	1013	1094	8
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	14	7	1101	1189	9
Pedestrians	90					
Lane Width (m)	3.5					
Walking Speed (m/s)	1.2					
Percent Blockage	7					
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)				350	236	
pX, platoon unblocked	0.81	0.79	0.79			
vC, conflicting volume	1848	689	1288			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1376	85	840			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	90	98	99			
cM capacity (veh/h)	103	708	591			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	24	374	734	793	405	
Volume Left	10	7	0	0	0	
Volume Right	14	0	0	0	9	
cSH	205	591	1700	1700	1700	
Volume to Capacity	0.12	0.01	0.43	0.47	0.24	
Queue Length 95th (m)	3.0	0.3	0.0	0.0	0.0	
Control Delay (s)	24.8	0.4	0.0	0.0	0.0	
Lane LOS	C	A				
Approach Delay (s)	24.8	0.1		0.0		
Approach LOS	C					
Intersection Summary						
Average Delay	0.3					
Intersection Capacity Utilization	42.2%			ICU Level of Service	A	
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis  
4: Danforth Road & Perivale Crescent

Am Peak Period

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (veh/h)	17	12	1007	4	6	1101
Future Volume (Veh/h)	17	12	1007	4	6	1101
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	18	13	1095	4	7	1197
Pedestrians	45					
Lane Width (m)	3.5					
Walking Speed (m/s)	1.2					
Percent Blockage	4					
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	255			332		
pX, platoon unblocked	0.84	0.93			0.93	
vC, conflicting volume	1754	594			1144	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1139	414			1004	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	89	98			99	
cM capacity (veh/h)	158	532			625	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	31	730	369	406	798	
Volume Left	18	0	0	7	0	
Volume Right	13	0	4	0	0	
cSH	224	1700	1700	625	1700	
Volume to Capacity	0.14	0.43	0.22	0.01	0.47	
Queue Length 95th (m)	3.6	0.0	0.0	0.3	0.0	
Control Delay (s)	23.6	0.0	0.0	0.3	0.0	
Lane LOS	C			A		
Approach Delay (s)	23.6	0.0			0.1	
Approach LOS	C					
Intersection Summary						
Average Delay			0.4			
Intersection Capacity Utilization			44.6%	ICU Level of Service	A	
Analysis Period (min)	15					

380: Danforth Road/McCowan Road & Lawrence Avenue East



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	161	861	334	1994	141	824	99	848	363
v/c Ratio	0.91	0.61	1.21	1.09	0.58	0.71	0.31	0.71	0.59
Control Delay	73.1	33.4	147.2	85.8	25.5	32.7	17.3	33.5	15.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	73.1	33.4	147.2	85.8	25.5	32.7	17.3	33.5	15.7
Queue Length 50th (m)	20.9	56.1	~62.1	~160.2	16.0	76.4	10.8	81.0	25.0
Queue Length 95th (m)	#59.2	70.0	#120.0	#187.5	27.6	99.8	19.7	103.6	55.6
Internal Link Dist (m)		229.7		8.7		118.2		63.9	
Turn Bay Length (m)	35.8		43.5		69.0		46.5		55.9
Base Capacity (vph)	176	1418	277	1830	247	1156	325	1189	615
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	0.91	0.61	1.21	1.09	0.57	0.71	0.30	0.71	0.59

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.

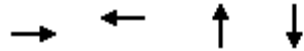


HCM Signalized Intersection Capacity Analysis  
 380: Danforth Road/McCowan Road & Lawrence Avenue East

Am Peak Period

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	145	713	62	301	1608	186	127	633	109	89	763	327	
Future Volume (vph)	145	713	62	301	1608	186	127	633	109	89	763	327	
Ideal Flow (vphpl)	1900	1900	1900	2200	2150	1900	1900	1900	1900	2400	1900	1900	
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	
Total Lost time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	6.0	6.0	
Lane Util. Factor	1.00	0.91		1.00	*1.00		1.00	0.95		1.00	0.95	1.00	
Frbp, ped/bikes	1.00	0.99		1.00	0.99		1.00	0.98		1.00	1.00	0.93	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00		1.00	1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.98		1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00	
Satd. Flow (prot)	1546	4429		1810	5709		1586	3031		2017	3175	1295	
Flt Permitted	0.11	1.00		0.23	1.00		0.20	1.00		0.21	1.00	1.00	
Satd. Flow (perm)	186	4429		432	5709		329	3031		453	3175	1295	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	
Adj. Flow (vph)	161	792	69	334	1787	207	141	703	121	99	848	363	
RTOR Reduction (vph)	0	9	0	0	15	0	0	12	0	0	0	130	
Lane Group Flow (vph)	161	852	0	334	1979	0	141	812	0	99	848	233	
Confl. Peds. (#/hr)	37		149	149		37	72		130	130		72	
Confl. Bikes (#/hr)												1	
Heavy Vehicles (%)	9%	10%	22%	7%	7%	5%	6%	12%	9%	5%	12%	5%	
Bus Blockages (#/hr)	0	13	13	0	18	18	0	7	7	0	2	7	
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	
Protected Phases	5	2		1	6		7	4		3	8		
Permitted Phases	2			6			4			8		8	
Actuated Green, G (s)	41.0	34.0		41.0	34.0		47.3	40.5		46.7	40.2	40.2	
Effective Green, g (s)	43.0	35.0		43.0	35.0		49.3	41.5		48.7	41.2	41.2	
Actuated g/C Ratio	0.39	0.32		0.39	0.32		0.45	0.38		0.44	0.37	0.37	
Clearance Time (s)	4.0	7.0		4.0	7.0		4.0	7.0		4.0	7.0	7.0	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	3.0		2.0	3.0	3.0	
Lane Grp Cap (vph)	171	1409		269	1816		236	1143		307	1189	485	
v/s Ratio Prot	0.07	0.19		c0.09	0.35		c0.04	c0.27		0.02	0.27		
v/s Ratio Perm	0.30			c0.39			0.23			0.12		0.18	
v/c Ratio	0.94	0.60		1.24	1.09		0.60	0.71		0.32	0.71	0.48	
Uniform Delay, d1	27.6	31.7		29.5	37.5		20.1	29.1		19.2	29.4	26.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00	
Incremental Delay, d2	51.3	1.9		136.2	50.1		2.7	3.7		0.2	3.7	3.4	
Delay (s)	78.9	33.6		165.7	87.6		22.8	32.9		19.4	33.0	29.6	
Level of Service	E	C		F	F		C	C		B	C	C	
Approach Delay (s)		40.7			98.8			31.4			31.0		
Approach LOS		D			F			C			C		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			60.9									HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio			0.95										
Actuated Cycle Length (s)			110.0									Sum of lost time (s)	18.0
Intersection Capacity Utilization			97.3%									ICU Level of Service	F
Analysis Period (min)			15										
c Critical Lane Group													

















## 2310: Danforth Road &amp; Barrymore Road/Private Access



Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	42	1	1076	1177
v/c Ratio	0.17	0.00	0.41	0.41
Control Delay	10.7	0.0	4.4	4.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	10.7	0.0	4.4	4.3
Queue Length 50th (m)	0.2	0.0	20.1	22.0
Queue Length 95th (m)	7.1	0.0	61.7	65.7
Internal Link Dist (m)	253.9	26.6	253.1	230.7
Turn Bay Length (m)				
Base Capacity (vph)	473	523	2602	2853
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.09	0.00	0.41	0.41
Intersection Summary				











HCM Signalized Intersection Capacity Analysis  
 2310: Danforth Road & Barrymore Road/Private Access

Am Peak Period

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	0	29	0	0	1	21	1000	0	0	1104	14
Future Volume (vph)	10	0	29	0	0	1	21	1000	0	0	1104	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frbp, ped/bikes		1.00			0.97			1.00			1.00	
Flpb, ped/bikes		0.99			1.00			1.00			1.00	
Frt		0.90			0.86			1.00			1.00	
Flt Protected		0.99			1.00			1.00			1.00	
Satd. Flow (prot)		1660			1569			3399			3407	
Flt Permitted		0.92			1.00			0.91			1.00	
Satd. Flow (perm)		1548			1569			3107			3407	
Peak-hour factor, PHF	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95
Adj. Flow (vph)	11	0	31	0	0	1	23	1053	0	0	1162	15
RTOR Reduction (vph)	0	37	0	0	1	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	5	0	0	0	0	0	1076	0	0	1176	0
Confl. Peds. (#/hr)	20						20	15		9	9	15
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	5%	0%	0%	3%	7%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	7	7
Turn Type	Perm	NA			NA		Perm	NA			NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		7.0			7.0			62.0			62.0	
Effective Green, g (s)		8.0			8.0			63.0			63.0	
Actuated g/C Ratio		0.10			0.10			0.79			0.79	
Clearance Time (s)		5.0			5.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		154			156			2446			2683	
v/s Ratio Prot					0.00						0.35	
v/s Ratio Perm		c0.00						c0.35				
v/c Ratio		0.03			0.00			0.44			0.44	
Uniform Delay, d1		32.5			32.4			2.8			2.8	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.1			0.0			0.6			0.5	
Delay (s)		32.6			32.4			3.3			3.3	
Level of Service		C			C			A			A	
Approach Delay (s)		32.6			32.4			3.3			3.3	
Approach LOS		C			C			A			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			3.9					HCM 2000 Level of Service			A	
HCM 2000 Volume to Capacity ratio			0.39									
Actuated Cycle Length (s)			80.0					Sum of lost time (s)		9.0		
Intersection Capacity Utilization			61.6%					ICU Level of Service		B		
Analysis Period (min)			15									
c	Critical Lane Group											

HCM Unsignalized Intersection Capacity Analysis  
1: Danforth Road

PM Peak Period

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	46	1054	8	34	1154
Future Volume (Veh/h)	6	46	1054	8	34	1154
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	50	1146	9	37	1254
Pedestrians	12					
Lane Width (m)	3.5					
Walking Speed (m/s)	1.2					
Percent Blockage	1					
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	142					
pX, platoon unblocked	0.79					
vC, conflicting volume	1864	590			1167	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1567	590			1167	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	91	89			94	
cM capacity (veh/h)	77	452			600	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	57	764	391	455	836	
Volume Left	7	0	0	37	0	
Volume Right	50	0	9	0	0	
cSH	282	1700	1700	600	1700	
Volume to Capacity	0.20	0.45	0.23	0.06	0.49	
Queue Length 95th (m)	5.6	0.0	0.0	1.5	0.0	
Control Delay (s)	21.0	0.0	0.0	1.8	0.0	
Lane LOS	C			A		
Approach Delay (s)	21.0	0.0			0.6	
Approach LOS	C					
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			66.4%	ICU Level of Service	C	
Analysis Period (min)	15					

# HCM Unsignalized Intersection Capacity Analysis

## 3: Danforth Road & Hollyhedge Drive










PM Peak Period



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	9	9	15	1041	1129	15
Future Volume (Veh/h)	9	9	15	1041	1129	15
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	10	16	1132	1227	16
Pedestrians	50					
Lane Width (m)	3.5					
Walking Speed (m/s)	1.2					
Percent Blockage	4					
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)				350	236	
pX, platoon unblocked	0.83	0.80	0.80			
vC, conflicting volume	1883	672	1293			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1379	99	874			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	91	99	97			
cM capacity (veh/h)	107	727	601			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	20	393	755	818	425	
Volume Left	10	16	0	0	0	
Volume Right	10	0	0	0	16	
cSH	186	601	1700	1700	1700	
Volume to Capacity	0.11	0.03	0.44	0.48	0.25	
Queue Length 95th (m)	2.7	0.6	0.0	0.0	0.0	
Control Delay (s)	26.7	0.8	0.0	0.0	0.0	
Lane LOS	D	A				
Approach Delay (s)	26.7	0.3		0.0		
Approach LOS	D					
Intersection Summary						
Average Delay	0.4					
Intersection Capacity Utilization	49.4%			ICU Level of Service	A	
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis  
4: Danforth Road & Perivale Crescent

PM Peak Period

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	9	10	1046	17	16	1122
Future Volume (Veh/h)	9	10	1046	17	16	1122
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	11	1137	18	17	1220
Pedestrians	30					
Lane Width (m)	3.5					
Walking Speed (m/s)	1.2					
Percent Blockage	2					
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)			255			332
pX, platoon unblocked	0.85	0.92			0.92	
vC, conflicting volume	1820	608			1185	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1181	391			1021	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	93	98			97	
cM capacity (veh/h)	151	549			615	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	21	758	397	424	813	
Volume Left	10	0	0	17	0	
Volume Right	11	0	18	0	0	
cSH	243	1700	1700	615	1700	
Volume to Capacity	0.09	0.45	0.23	0.03	0.48	
Queue Length 95th (m)	2.1	0.0	0.0	0.6	0.0	
Control Delay (s)	21.2	0.0	0.0	0.8	0.0	
Lane LOS	C			A		
Approach Delay (s)	21.2	0.0		0.3		
Approach LOS	C					
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization			52.3%		ICU Level of Service	A
Analysis Period (min)			15			

## 380: Danforth Road/McCowan Road &amp; Lawrence Avenue East



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	246	2009	258	1066	164	1042	203	839	286
v/c Ratio	1.13	1.36	1.21	0.58	0.66	0.86	0.83	0.67	0.49
Control Delay	127.5	199.9	152.4	32.4	29.5	39.4	46.1	32.2	10.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	127.5	199.9	152.4	32.4	29.5	39.4	46.1	32.2	10.9
Queue Length 50th (m)	~37.7	~209.5	~49.9	62.4	18.9	103.8	23.4	78.6	11.5
Queue Length 95th (m)	#87.7	#239.4	#100.1	75.4	#32.6	#132.6	#58.9	100.2	35.0
Internal Link Dist (m)		229.7		8.7		118.2		63.9	
Turn Bay Length (m)	35.8		43.5		69.0		46.5		55.9
Base Capacity (vph)	217	1473	214	1824	253	1207	245	1243	587
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	1.13	1.36	1.21	0.58	0.65	0.86	0.83	0.67	0.49

## 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.

HCM Signalized Intersection Capacity Analysis  
 380: Danforth Road/McCowan Road & Lawrence Avenue East

PM Peak Period

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		  			  			 			 		
Traffic Volume (vph)	221	1762	146	232	921	92	148	755	235	183	797	272	
Future Volume (vph)	221	1762	146	232	921	92	148	755	235	183	797	272	
Ideal Flow (vphpl)	1900	1900	1900	2200	2150	1900	1900	1900	1900	2400	1900	1900	
Lane Width	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.0	
Total Lost time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	6.0	6.0	
Lane Util. Factor	1.00	0.91		1.00	*1.00		1.00	0.95		1.00	0.95	1.00	
Frbp, ped/bikes	1.00	0.98		1.00	0.99		1.00	0.99		1.00	1.00	0.87	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.96		1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00	
Satd. Flow (prot)	1571	4601		1876	5697		1612	3169		2046	3323	1225	
Flt Permitted	0.18	1.00		0.11	1.00		0.20	1.00		0.11	1.00	1.00	
Satd. Flow (perm)	302	4601		226	5697		346	3169		241	3323	1225	
Peak-hour factor, PHF	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95	
Adj. Flow (vph)	246	1855	154	258	969	97	164	795	247	203	839	286	
RTOR Reduction (vph)	0	9	0	0	12	0	0	27	0	0	0	128	
Lane Group Flow (vph)	246	2000	0	258	1054	0	164	1015	0	203	839	158	
Confl. Peds. (#/hr)	84		186	186		84	137		12	12		137	
Heavy Vehicles (%)	7%	7%	4%	4%	8%	0%	4%	7%	7%	4%	7%	5%	
Bus Blockages (#/hr)	0	12	12	0	15	15	0	5	5	0	2	6	
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	
Protected Phases	5	2		1	6		7	4		3	8		
Permitted Phases	2			6			4			8		8	
Actuated Green, G (s)	41.0	34.0		41.0	34.0		46.8	40.0		47.2	40.2	40.2	
Effective Green, g (s)	43.0	35.0		43.0	35.0		48.8	41.0		49.2	41.2	41.2	
Actuated g/C Ratio	0.39	0.32		0.39	0.32		0.44	0.37		0.45	0.37	0.37	
Clearance Time (s)	4.0	7.0		4.0	7.0		4.0	7.0		4.0	7.0	7.0	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	3.0		2.0	3.0	3.0	
Lane Grp Cap (vph)	210	1463		208	1812		243	1181		239	1244	458	
v/s Ratio Prot	0.09	c0.43		c0.09	0.18		0.05	c0.32		c0.06	0.25		
v/s Ratio Perm	0.37			0.39			0.25			0.32		0.13	
v/c Ratio	1.17	1.37		1.24	0.58		0.67	0.86		0.85	0.67	0.34	
Uniform Delay, d1	28.6	37.5		28.7	31.4		20.6	31.8		22.8	28.8	24.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00	
Incremental Delay, d2	116.1	169.7		142.2	1.4		5.7	8.2		22.7	2.9	2.1	
Delay (s)	144.7	207.2		170.9	32.7		26.3	40.1		45.4	31.7	26.8	
Level of Service	F	F		F	C		C	D		D	C	C	
Approach Delay (s)		200.4			59.7			38.2			32.8		
Approach LOS		F			E			D			C		
<b>Intersection Summary</b>													
HCM 2000 Control Delay	101.5			HCM 2000 Level of Service					F				
HCM 2000 Volume to Capacity ratio	1.08												
Actuated Cycle Length (s)	110.0			Sum of lost time (s)					18.0				
Intersection Capacity Utilization	106.3%			ICU Level of Service					G				
Analysis Period (min)	15												

c Critical Lane Group



















## 2310: Danforth Road &amp; Barrymore Road/Private Access

	→	↑	↓
Lane Group	EBT	NBT	SBT
Lane Group Flow (vph)	52	1119	1191
v/c Ratio	0.21	0.41	0.41
Control Delay	13.7	4.3	4.3
Queue Delay	0.0	0.0	0.0
Total Delay	13.7	4.3	4.3
Queue Length 50th (m)	1.6	20.8	22.2
Queue Length 95th (m)	9.0	62.7	66.6
Internal Link Dist (m)	253.9	253.1	230.7
Turn Bay Length (m)			
Base Capacity (vph)	473	2756	2881
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.11	0.41	0.41
Intersection Summary			

HCM Signalized Intersection Capacity Analysis  
 2310: Danforth Road & Barrymore Road/Private Access

PM Peak Period

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	0	39	0	0	0	10	1053	0	0	1118	13
Future Volume (vph)	10	0	39	0	0	0	10	1053	0	0	1118	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0						5.0			5.0	
Lane Util. Factor		1.00						0.95			0.95	
Frbp, ped/bikes		0.99						1.00			1.00	
Flpb, ped/bikes		1.00						1.00			1.00	
Frt		0.89						1.00			1.00	
Flt Protected		0.99						1.00			1.00	
Satd. Flow (prot)		1632						3499			3443	
Flt Permitted		0.94						0.94			1.00	
Satd. Flow (perm)		1543						3293			3443	
Peak-hour factor, PHF	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95	0.90	0.95	0.95
Adj. Flow (vph)	11	0	41	0	0	0	11	1108	0	0	1177	14
RTOR Reduction (vph)	0	37	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	15	0	0	0	0	0	1119	0	0	1190	0
Confl. Peds. (#/hr)	15		3	3			15	13		15	15	13
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	7	7
Turn Type	Perm	NA					Perm	NA			NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		7.1						61.9			61.9	
Effective Green, g (s)		8.1						62.9			62.9	
Actuated g/C Ratio		0.10						0.79			0.79	
Clearance Time (s)		5.0						6.0			6.0	
Vehicle Extension (s)		3.0						3.0			3.0	
Lane Grp Cap (vph)		156						2589			2707	
v/s Ratio Prot											c0.35	
v/s Ratio Perm		c0.01						0.34				
v/c Ratio		0.10						0.43			0.44	
Uniform Delay, d1		32.6						2.8			2.8	
Progression Factor		1.00						1.00			1.00	
Incremental Delay, d2		0.3						0.5			0.5	
Delay (s)		32.9						3.3			3.3	
Level of Service		C						A			A	
Approach Delay (s)		32.9			0.0			3.3			3.3	
Approach LOS		C			A			A			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			4.0								HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.40									
Actuated Cycle Length (s)			80.0								Sum of lost time (s)	9.0
Intersection Capacity Utilization			54.1%								ICU Level of Service	A
Analysis Period (min)			15									

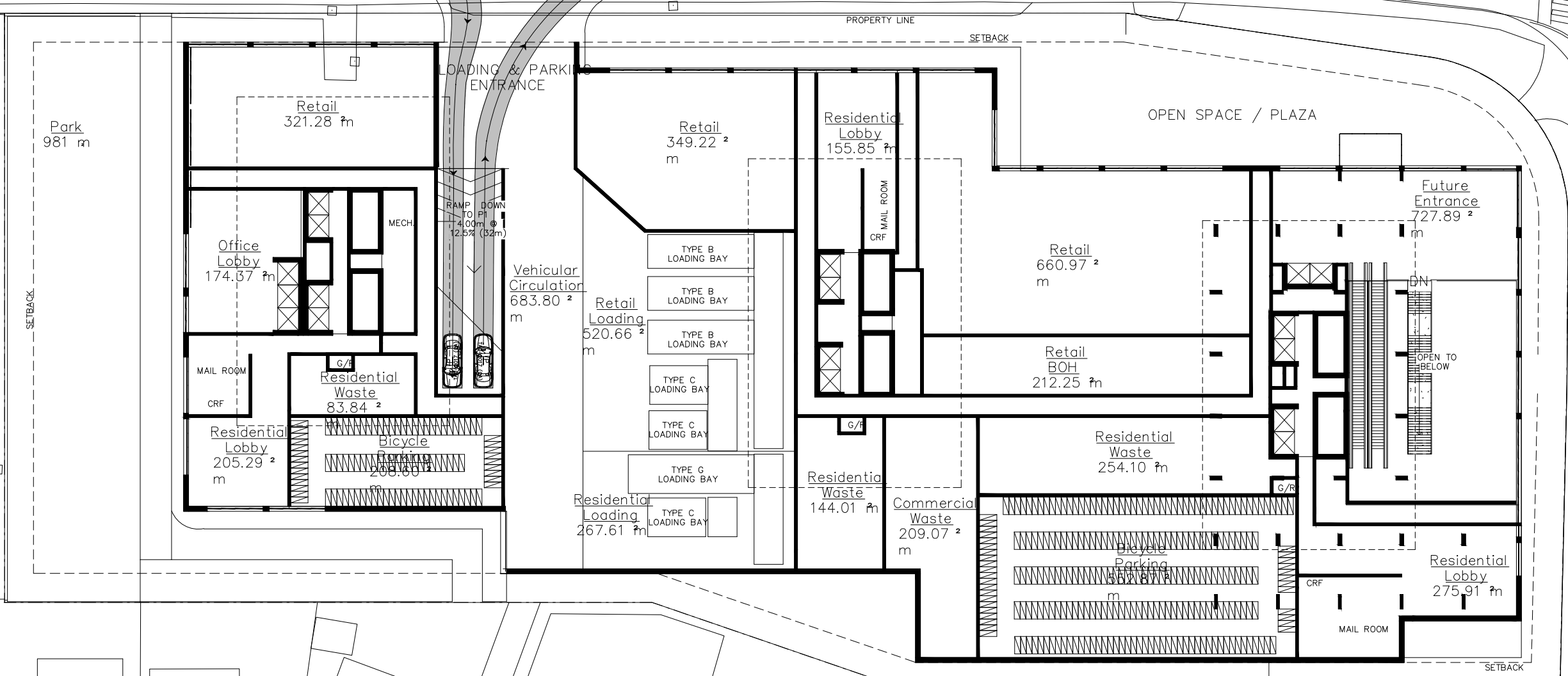
c Critical Lane Group

**Appendix F**  
**AutoTURN Site Circulation Drawings**

McCOWAN ROAD

STATION BELOW

LAWRENCE AVENUE



Park  
981 m

Retail  
321.28 m

Retail  
349.22 m<sup>2</sup>

Residential  
Lobby  
155.85 m

OPEN SPACE / PLAZA

Future  
Entrance  
727.89 m<sup>2</sup>

Office  
Lobby  
174.57 m

Vehicular  
Circulation  
683.80 m<sup>2</sup>

Retail  
Loading  
520.66 m

Retail  
660.97 m

Retail  
BOH  
212.25 m

MAIL ROOM  
CRF

Residential  
Waste  
83.84 m<sup>2</sup>

TYPE B  
LOADING BAY

TYPE B  
LOADING BAY

TYPE B  
LOADING BAY

TYPE C  
LOADING BAY

TYPE C  
LOADING BAY

TYPE C  
LOADING BAY

Residential  
Loading  
267.61 m

Residential  
Waste  
144.01 m

Commercial  
Waste  
209.07 m

Residential  
Waste  
254.10 m

Bicycle  
Parking  
550.87 m

Residential  
Lobby  
275.91 m

MAIL ROOM

14

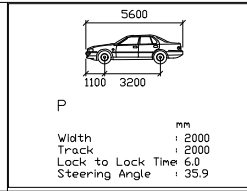
16

18

20

PARKING LOT

REVISIONS



TOC CONCEPT OF DESIGN  
ISSUED FOR COORDINATION

09/06/23

NOT FOR CONSTRUCTION



DRAWN: Simon Hurlburt  
CHECKED: HC  
CORRECT: HC  
SCALE: 1 : 250

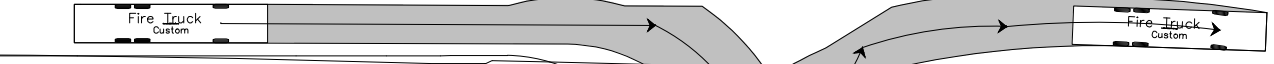
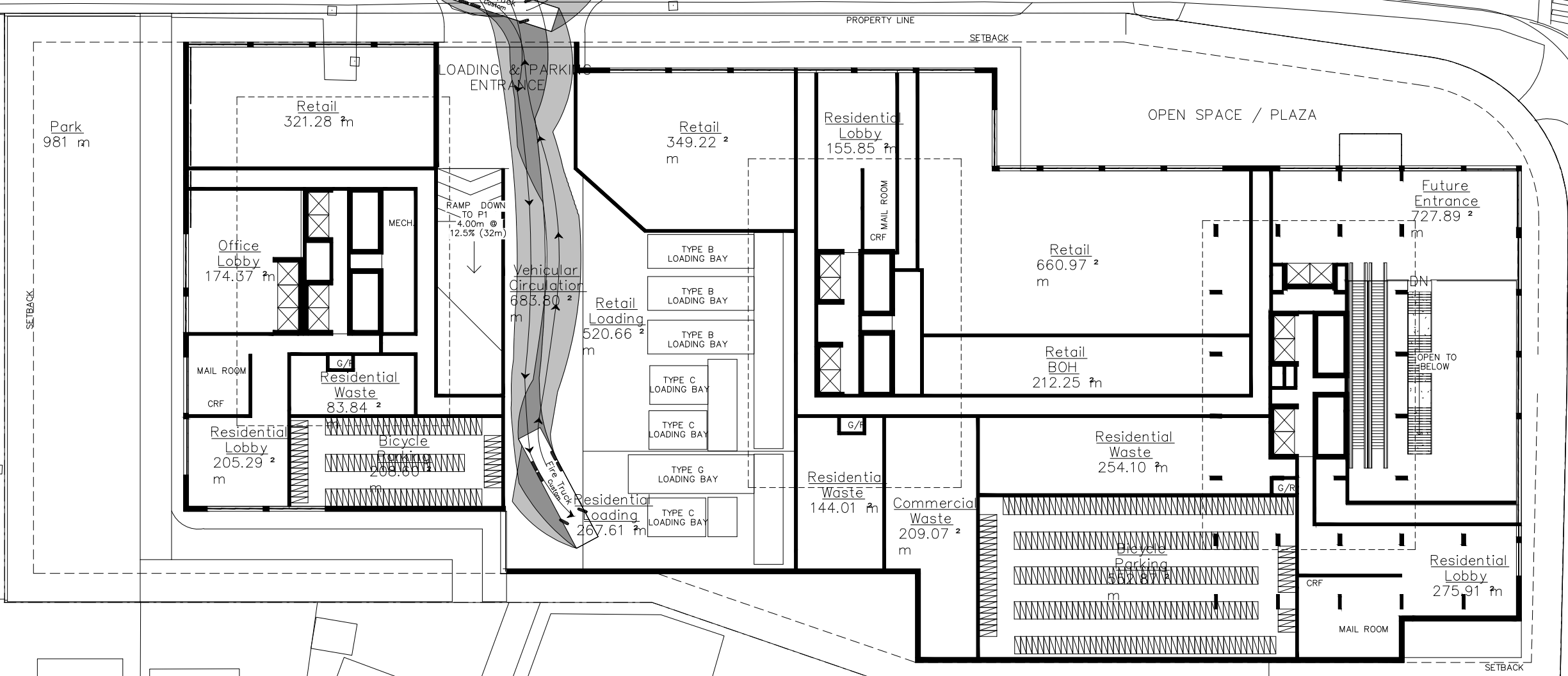
Project: SCARBOROUGH SUBWAY EXTENSION  
LES TOC AUTOTURN - PTAC  
GROUND FLOOR

Contract:		Package:	
Dwg. No. 1.0	Rev. No.	Sheet No. 1.0	

McCOWAN ROAD

STATION BELOW

LAWRENCE AVENUE



Park  
981 m

Retail  
321.28 m<sup>2</sup>

Retail  
349.22 m<sup>2</sup>

Residential  
Lobby  
155.85 m<sup>2</sup>

Office  
Lobby  
174.57 m<sup>2</sup>

Vehicular  
Circulation  
683.80 m<sup>2</sup>

Retail  
Loading  
520.66 m<sup>2</sup>

Retail  
660.97 m<sup>2</sup>

Future  
Entrance  
727.89 m<sup>2</sup>

MAIL ROOM  
CRF

Residential  
Waste  
83.84 m<sup>2</sup>

TYPE B  
LOADING BAY

TYPE B  
LOADING BAY

TYPE C  
LOADING BAY

TYPE C  
LOADING BAY

Retail  
BOH  
212.25 m<sup>2</sup>

Residential  
Lobby  
205.29 m<sup>2</sup>

Bicycle  
Parking  
208.60 m<sup>2</sup>

TYPE C  
LOADING BAY

TYPE C  
LOADING BAY

Residential  
Waste  
144.01 m<sup>2</sup>

Commercial  
Waste  
209.07 m<sup>2</sup>

Residential  
Waste  
254.10 m<sup>2</sup>

Bicycle  
Parking  
550.87 m<sup>2</sup>

Residential  
Lobby  
275.91 m<sup>2</sup>

MAIL ROOM  
CRF

MAIL ROOM  
CRF

14

16

18

20

PARKING LOT

REVISIONS



TOC CONCEPT OF DESIGN  
ISSUED FOR COORDINATION

09/06/23

NOT FOR CONSTRUCTION



DRAWN Simon Hurlburt  
CHECKED HC  
CORRECT HC

SCALE  
1 : 250

Project:  
SCARBOROUGH SUBWAY EXTENSION  
LES TOC AUTOTURN - FIRE

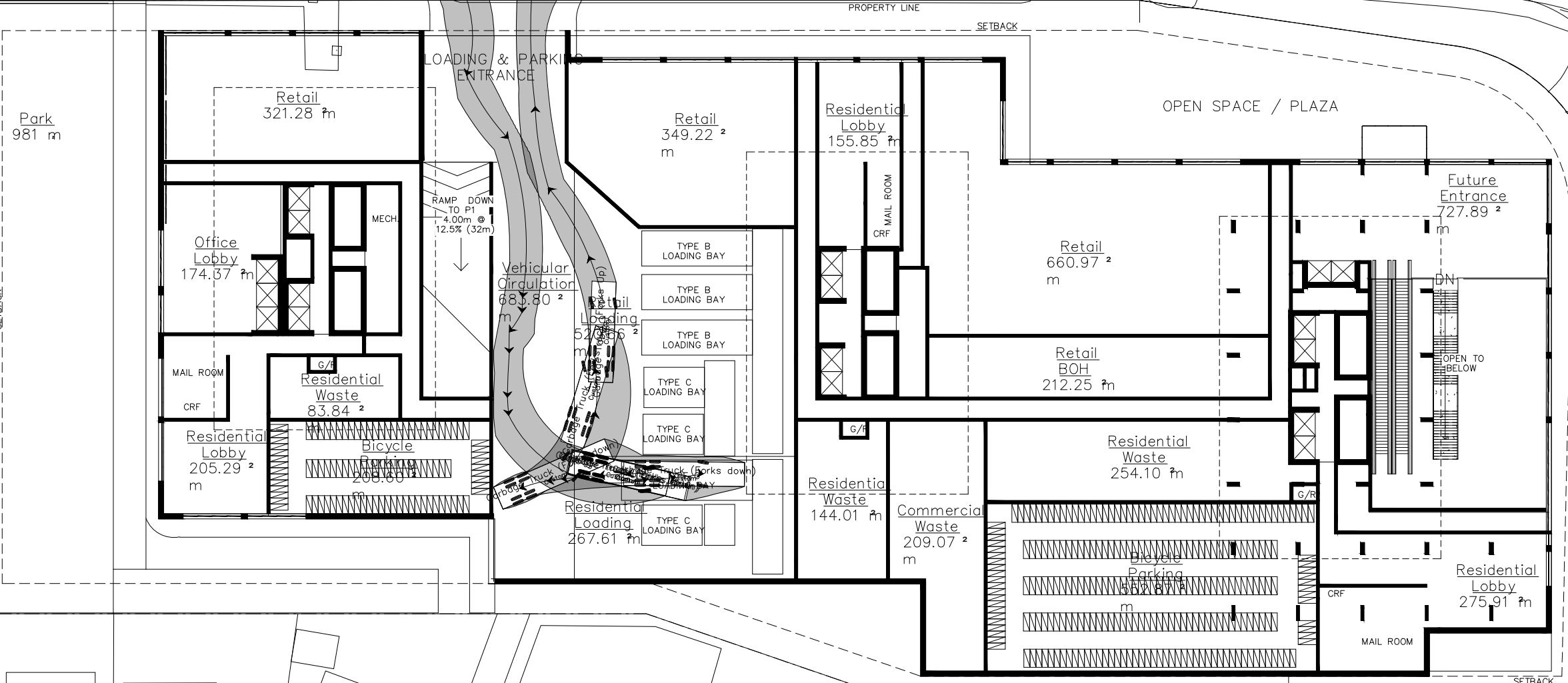
GROUND FLOOR

Contract:		Package:	
Dwg. No. 1.0	Rev. No.	Sheet No. 2.0	

McCOWAN ROAD

STATION BELOW

LAWRENCE AVENUE



Park  
981 m

PROPERTY LINE

PROPERTY LINE  
SETBACK

PROPERTY LINE  
SETBACK

PARKING LOT

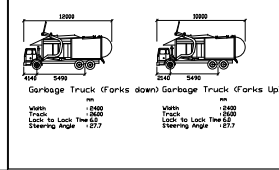
14

16

18

20

REVISIONS



TOC CONCEPT OF DESIGN  
ISSUED FOR COORDINATION

09/06/23

NOT FOR CONSTRUCTION



DRAWN: Simon Hurlburt  
 CHECKED: HC  
 CORRECT: HC  
 SCALE: 1 : 250

Project:  
**SCARBOROUGH SUBWAY EXTENSION**  
**LES TOC AUTOTURN - GARBAGE**

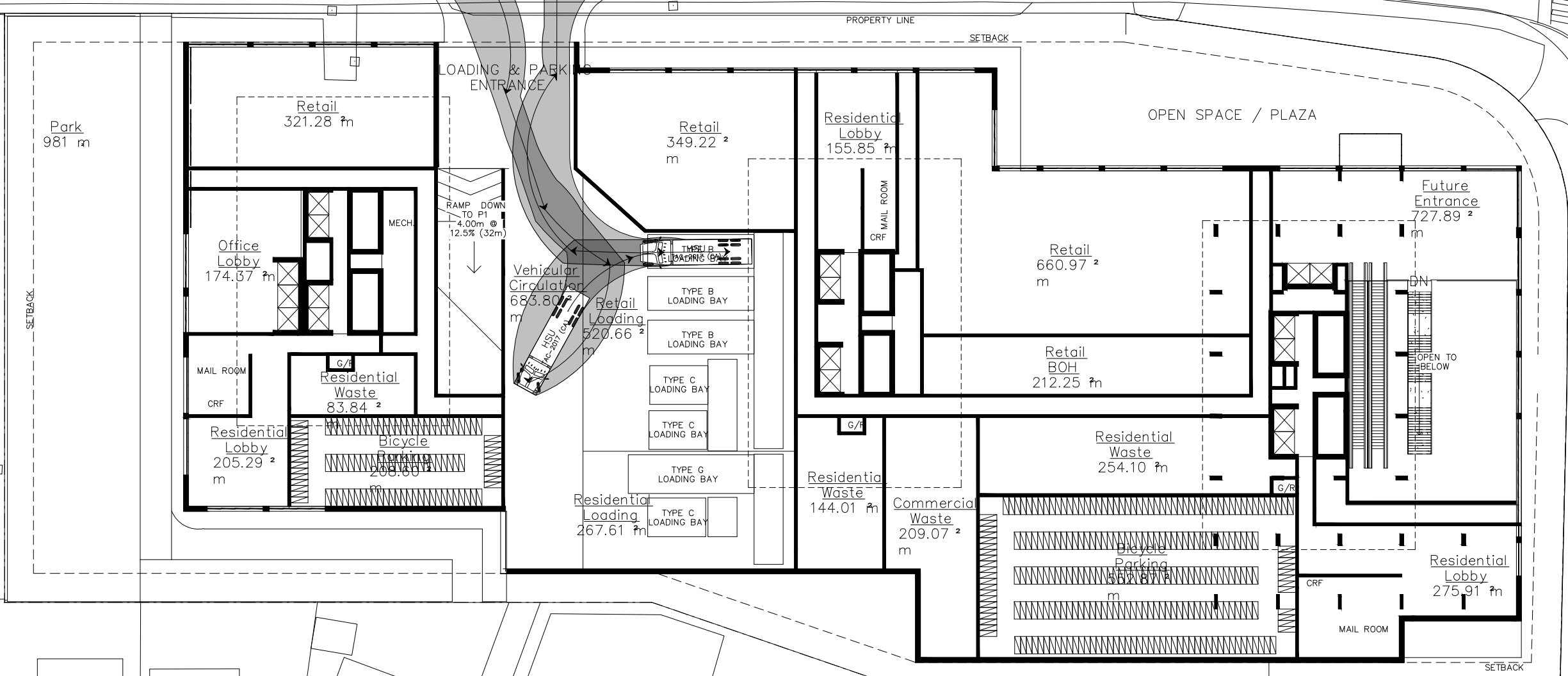
GROUND FLOOR

Contract:		Package:	
Dwg. No. 1.0	Rev. No.	Sheet No. 3.0	

McCOWAN ROAD

STATION BELOW

LAWRENCE AVENUE



Park  
981 m

PROPERTY LINE  
SETBACK

PROPERTY LINE

PARKING LOT

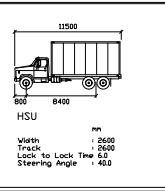
14

16

18

20

REVISIONS



TOC CONCEPT OF DESIGN  
ISSUED FOR COORDINATION

09/06/23

NOT FOR CONSTRUCTION



DRAWN: Simon Hurlburt  
CHECKED: HC  
CORRECT: HC

SCALE  
1 : 250

Project:  
SCARBOROUGH SUBWAY EXTENSION  
LES TOC AUTOTURN - HSU

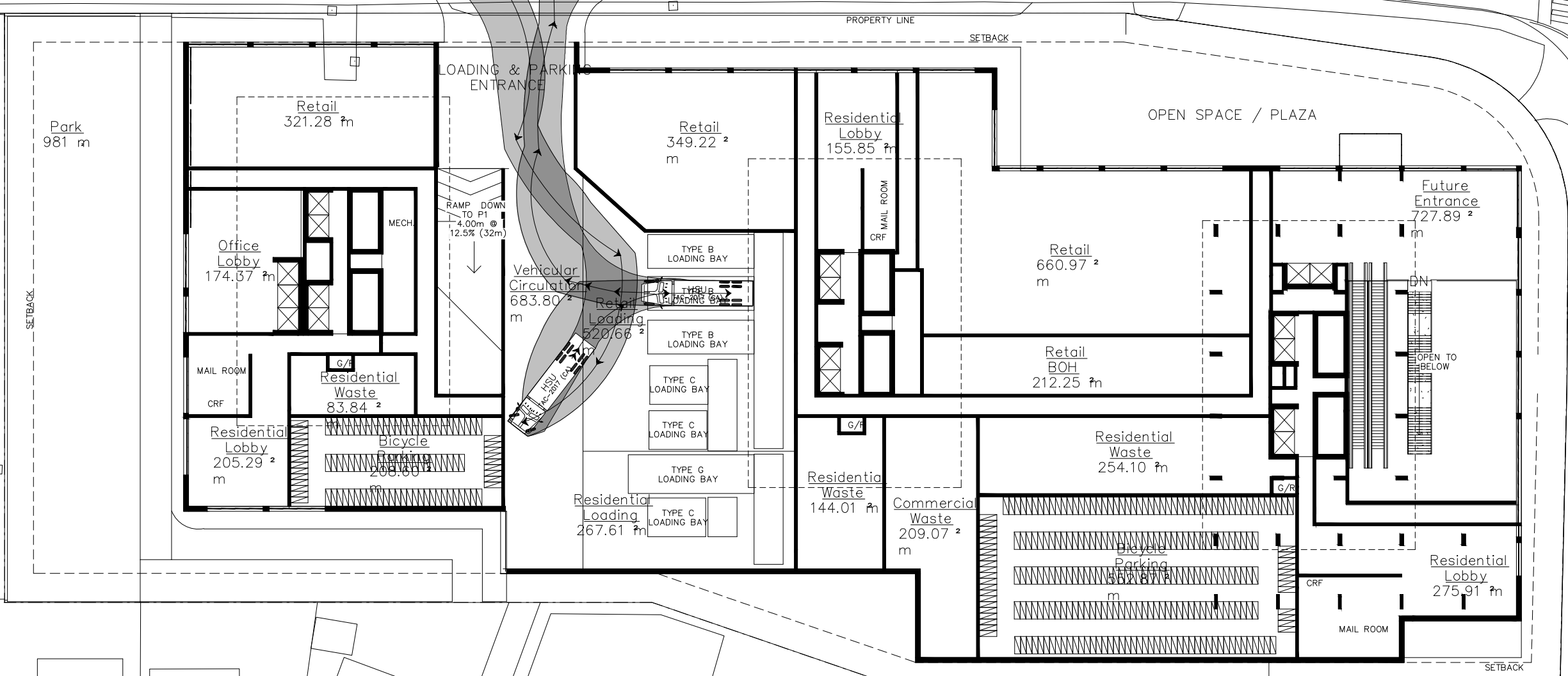
GROUND FLOOR

Contract:		Package:	
Dwg. No. 1.0	Rev. No.	Sheet No. 4.0	

McCOWAN ROAD

STATION BELOW

LAWRENCE AVENUE



Park  
981 m

Retail  
321.28 m

Retail  
349.22 m<sup>2</sup>

Residential  
Lobby  
155.85 m

OPEN SPACE / PLAZA

Future  
Entrance  
727.89 m<sup>2</sup>

Office  
Lobby  
174.57 m

Vehicle  
Circulation  
683.80 m

Retail  
Loading  
520/66 m<sup>2</sup>

Retail  
660.97 m

Retail  
BOH  
212.25 m

Residential  
Waste  
83.84 m<sup>2</sup>

Residential  
Lobby  
205.29 m

Bicycle  
Parking  
208.60 m

TYPE B  
LOADING BAY

TYPE B  
LOADING BAY

TYPE C  
LOADING BAY

TYPE C  
LOADING BAY

TYPE C  
LOADING BAY

Residential  
Loading  
267.61 m

Residential  
Waste  
144.01 m

Commercial  
Waste  
209.07 m

Residential  
Waste  
254.10 m

Bicycle  
Parking  
550/87 m

Residential  
Lobby  
275.91 m

14

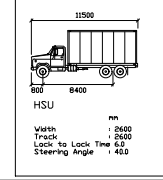
16

18

20

PARKING LOT

REVISIONS



TOC CONCEPT OF DESIGN  
ISSUED FOR COORDINATION

09/06/23

NOT FOR CONSTRUCTION



DRAWN \_\_\_\_\_ Simon Hurlburt  
 CHECKED \_\_\_\_\_ HC  
 CORRECT \_\_\_\_\_ HC

SCALE  
1 : 250

Project:  
**SCARBOROUGH SUBWAY EXTENSION**  
**LES TOC AUTOTURN - HSU**

GROUND FLOOR

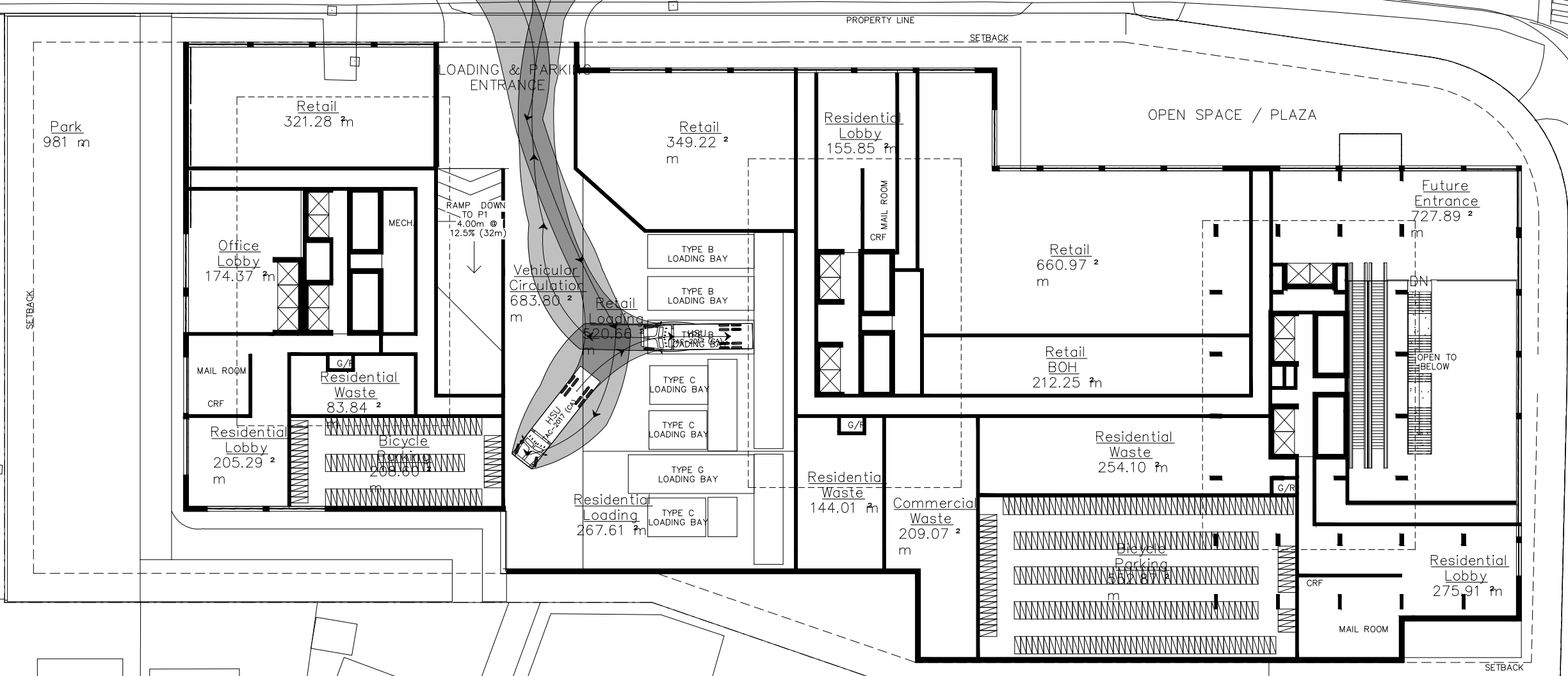
Contract:		Package:	
Dwg. No. 1.0	Rev. No.	Sheet No. 5.0	



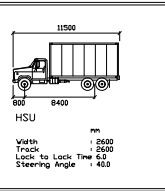
McCOWAN ROAD

STATION BELOW

LAWRENCE AVENUE



REVISIONS



TOC CONCEPT OF DESIGN  
 ISSUED FOR COORDINATION

09/06/23

NOT FOR CONSTRUCTION



DRAWN Simon Hurlburt  
 CHECKED HC  
 CORRECT HC

SCALE  
 1 : 250

Project:  
 SCARBOROUGH SUBWAY EXTENSION  
 LES TOC AUTOTURN - HSU

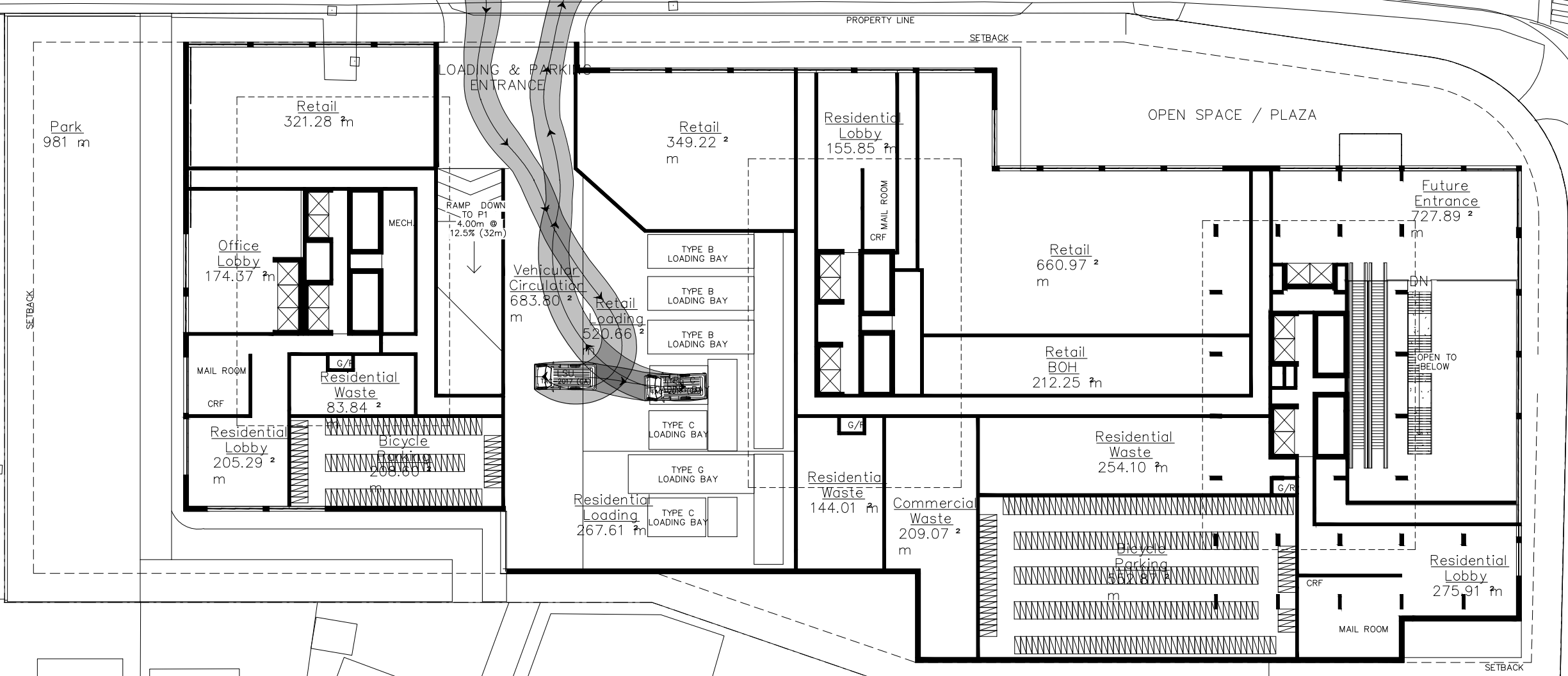
GROUND FLOOR

Contract:		Package:	
Dwg. No. 1.0	Rev. No.	Sheet No. 6.0	

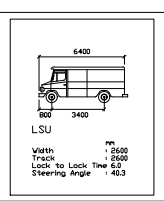
McCOWAN ROAD

STATION BELOW

LAWRENCE AVENUE



REVISIONS

TOC CONCEPT OF DESIGN  
ISSUED FOR COORDINATION

09/06/23

NOT FOR CONSTRUCTION



DRAWN	Simon Hurlburt
CHECKED	HC
CORRECT	HC
SCALE	1 : 250

Project:  
**SCARBOROUGH SUBWAY EXTENSION**  
**LES TOC AUTOTURN - LSU**

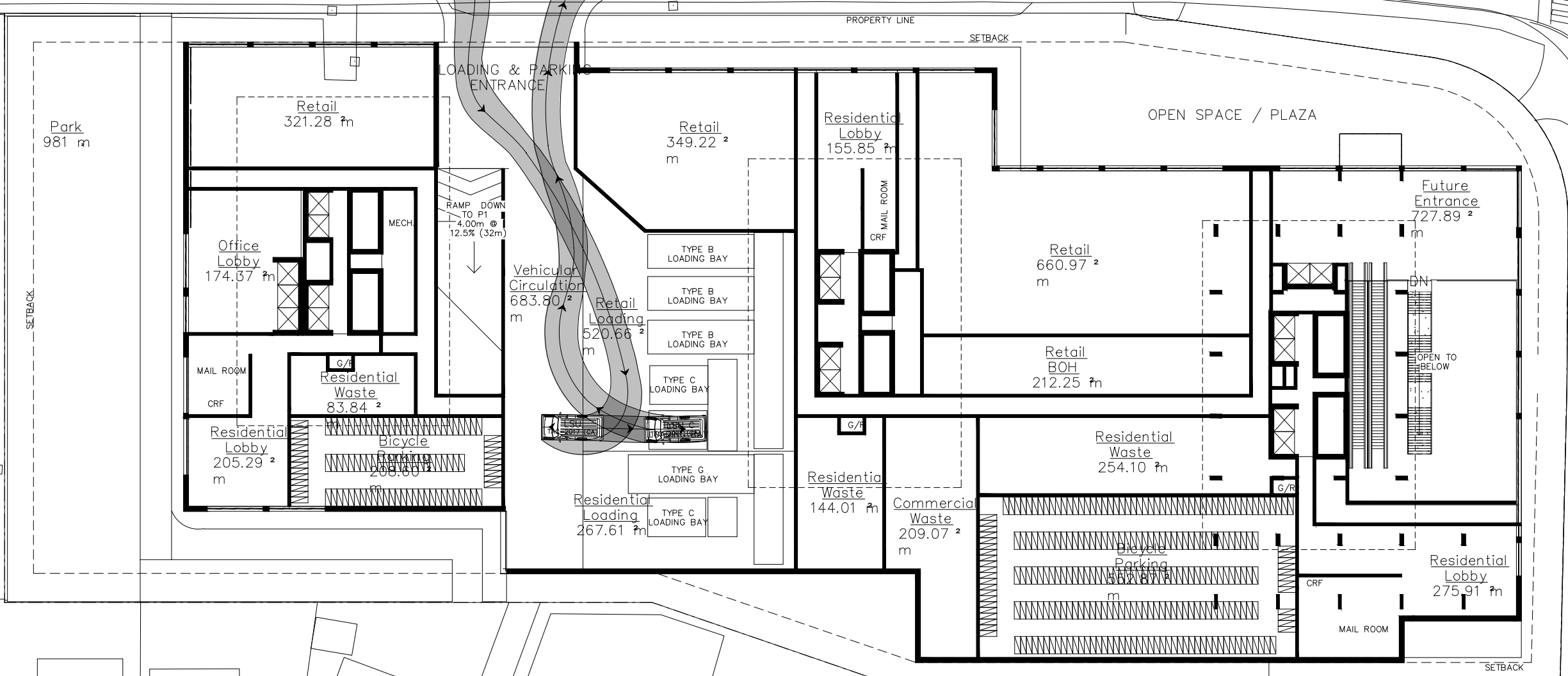
SCALE  
GROUND FLOOR

Contract:	Package:	
Dwg. No. 1.0	Rev. No. 7.0	Sheet No. 7.0

McCOWAN ROAD

STATION BELOW

LAWRENCE AVENUE



Park  
981 m

Retail  
321.28 m<sup>2</sup>

Retail  
349.22 m<sup>2</sup>

Residential  
Lobby  
155.85 m<sup>2</sup>

Office  
Lobby  
174.57 m<sup>2</sup>

Vehicular  
Circulation  
683.80 m<sup>2</sup>

Retail  
Loading  
520.66 m<sup>2</sup>

Retail  
660.97 m<sup>2</sup>

Future  
Entrance  
727.89 m<sup>2</sup>

MAIL ROOM  
CRF

Residential  
Waste  
83.84 m<sup>2</sup>

Residential  
Loading  
267.61 m<sup>2</sup>

Residential  
Waste  
144.01 m<sup>2</sup>

Commercial  
Waste  
209.07 m<sup>2</sup>

Residential  
Waste  
254.10 m<sup>2</sup>

Residential  
Lobby  
275.91 m<sup>2</sup>

14

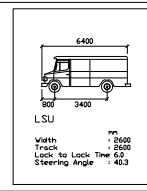
16

18

20

PARKING LOT

REVISIONS



TOC CONCEPT OF DESIGN  
ISSUED FOR COORDINATION

09/06/23

NOT FOR CONSTRUCTION



DRAWN Simon Hurlburt  
CHECKED HC  
CORRECT HC

SCALE  
1 : 250

Project:  
SCARBOROUGH SUBWAY EXTENSION  
LES TOC AUTOTURN - LSU

GROUND FLOOR

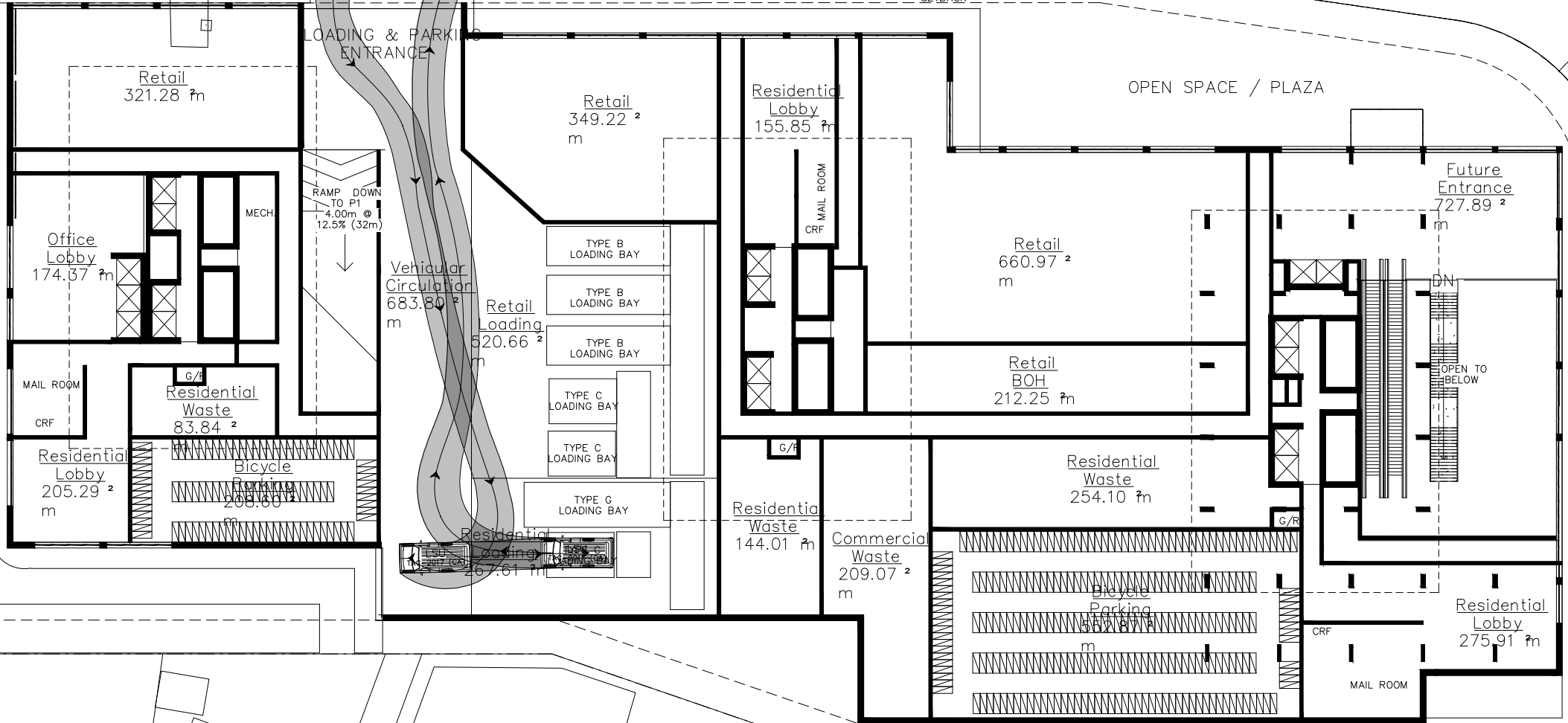
Contract:		Package:	
Dwg. No. 1.0	Rev. No.	Sheet No. 8.0	

McCOWAN ROAD

STATION BELOW

LAWRENCE AVENUE

Park  
981 m



LOADING & PARKING ENTRANCE

Vehicular Circulation  
683.80 m

OPEN SPACE / PLAZA

Future Entrance  
727.89 m

Residential Lobby  
275.91 m

PARKING LOT

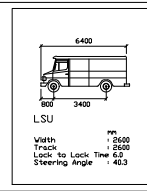
14

16

18

20

REVISIONS



TOC CONCEPT OF DESIGN  
ISSUED FOR COORDINATION

09/06/23

NOT FOR CONSTRUCTION



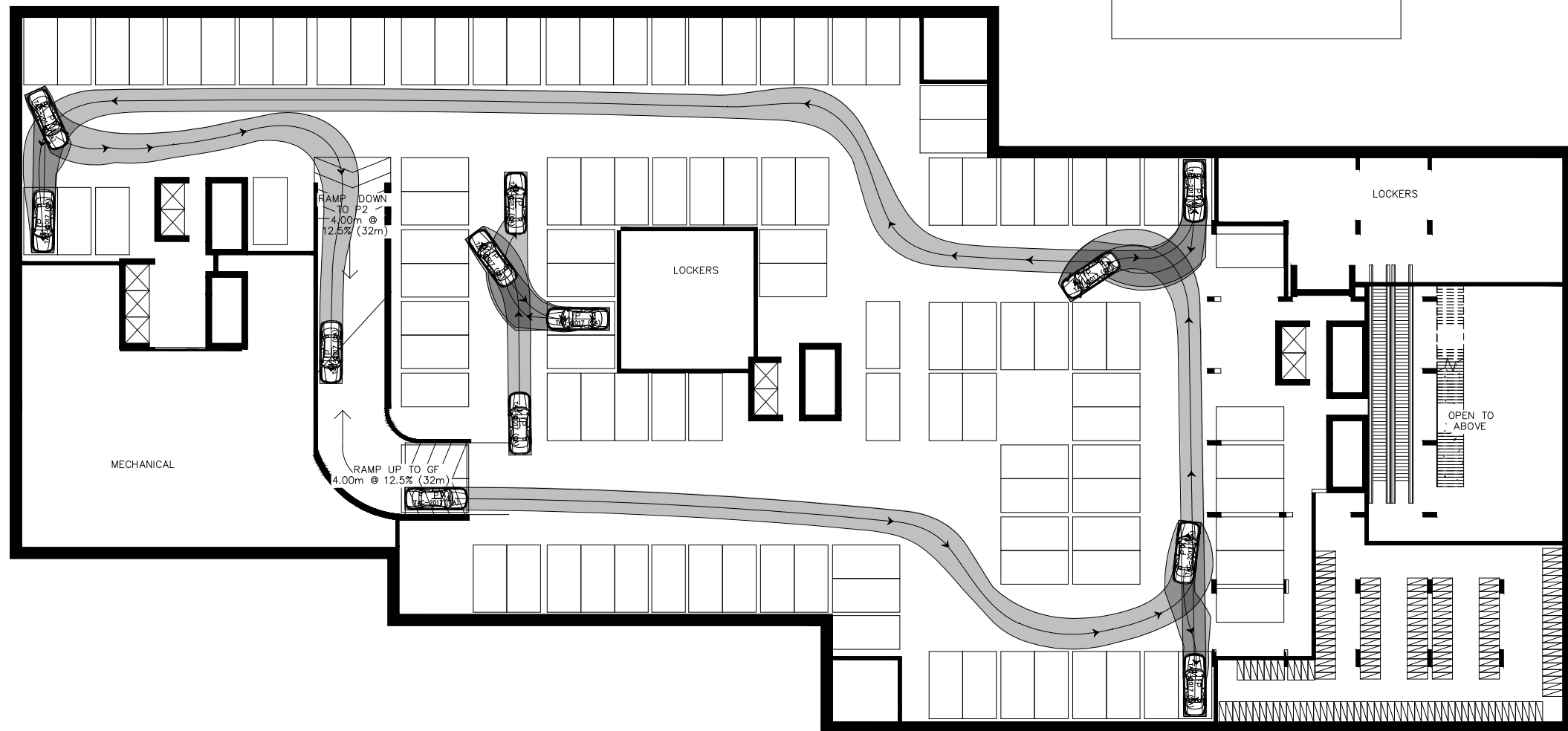
DRAWN Simon Hurlburt  
 CHECKED HC  
 CORRECT HC

SCALE  
1 : 250

Project:  
**SCARBOROUGH SUBWAY EXTENSION**  
**LES TOC AUTOTURN - LSU**

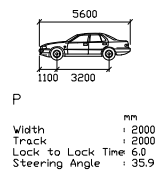
GROUND FLOOR

Contract:		Package:	
Dwg. No. 1.0	Rev. No.	Sheet No. 9.0	



STATION BELOW

REVISIONS



TOC CONCEPT OF DESIGN  
ISSUED FOR COORDINATION

09/06/23

NOT FOR CONSTRUCTION



DRAWN \_\_\_\_\_ Simon Hurlburt  
CHECKED \_\_\_\_\_ HC  
CORRECT \_\_\_\_\_ HC

SCALE  
1 : 250

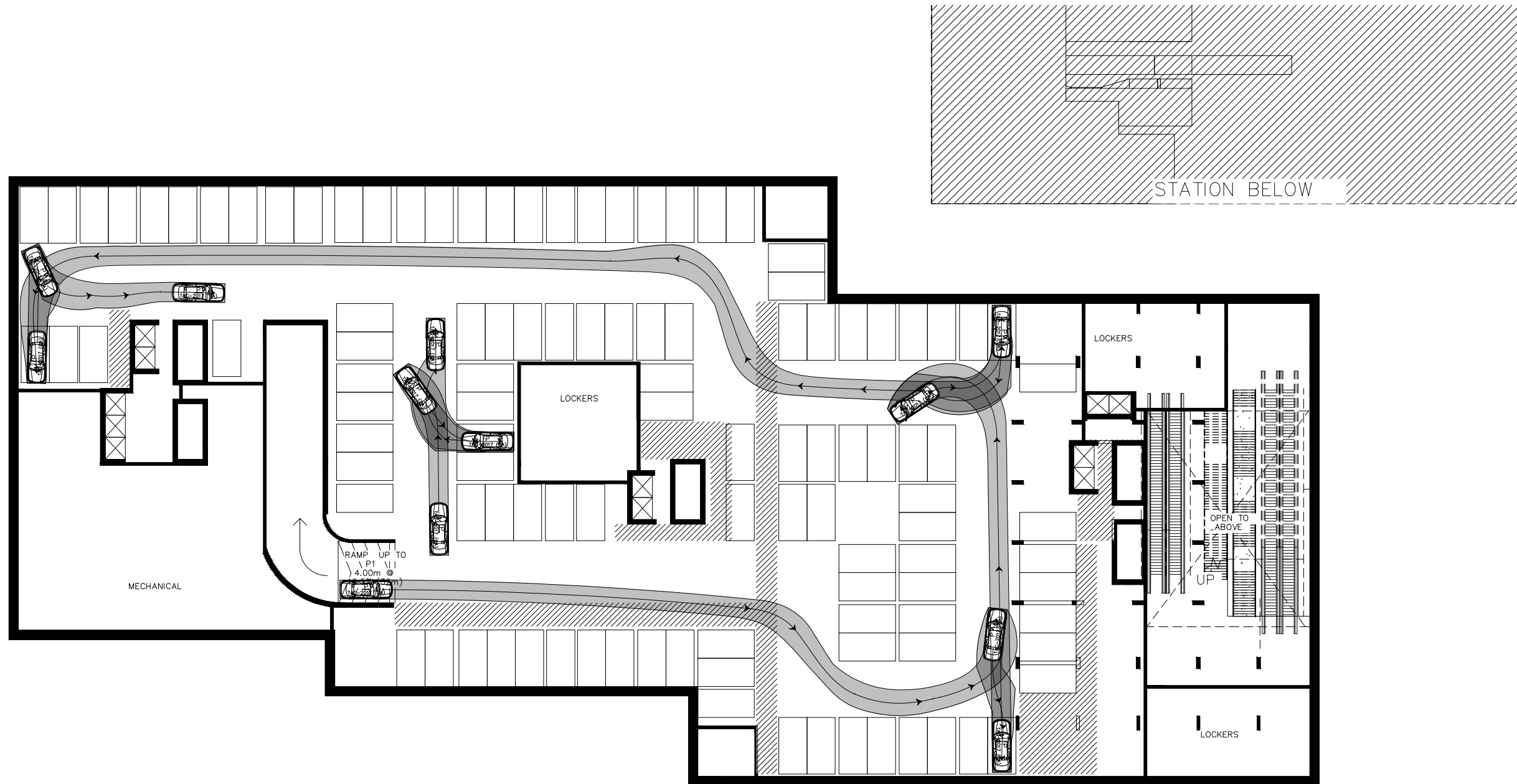
Project:  
SCARBOROUGH SUBWAY EXTENSION  
LES TOC AUTOTURN - PTAC

GROUND FLOOR

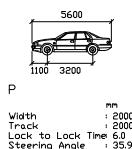
Contract: \_\_\_\_\_ Package: \_\_\_\_\_



Dwg. No. 1.0	Rev. No.	Sheet No. 10.0
-----------------	----------	-------------------



REVISIONS



TOC CONCEPT OF DESIGN  
ISSUED FOR COORDINATION

09/06/23

NOT FOR CONSTRUCTION



DRAWN \_\_\_\_\_ Simon Hurlburt  
CHECKED \_\_\_\_\_ HC  
CORRECT \_\_\_\_\_ HC

SCALE  
1 : 250

Project:  
SCARBOROUGH SUBWAY EXTENSION  
LES TOC AUTOTURN - PTAC

GROUND FLOOR

Contract:		Package:
Dwg. No. 1.0	Rev. No.	Sheet No. 11.0