TABLE OF CONTENTS

1.0 Introduction 1
1.1 Site Description 1
1.2 Report Objectives 1
2.0 Background 2
2.1 Reference Information 2
2.2 Design Criteria and Approach 2
3.0 Proposed Site Conditions 3
4.0 Sanitary Servicing 3
4.1 Existing Sanitary Servicing 3
4.2 Proposed Sanitary Servicing Flows 4
4.3 Preliminary Sanitary Analysis Results (DWF/WWF) 4
4.4 Sanitary Connection Opportunities 5
5.0 Water Servicing 5
5.1 Existing Water Servicing 5
5.2 Future Water Servicing Requirements 6
5.3 Watermain Appurtenances 6
5.4 Future Water Servicing Opportunities 7
6.0 Storm Servicing 7
6.1 Existing Storm Servicing 7
6.2 Existing Storm Servicing Capacity and Requirements 7
6.3 Future Storm Servicing 8
7.0 Conclusions 9

APPENDICES

Appendix A Reference Information
Appendix B Design Sheets

1.0 Introduction

Gannett Fleming Canada ULC as part of the OneT+ Joint Venture group, which also includes IBI Group, was retained by Infrastructure Ontario (IO) and Metrolinx (MX), which are the Contracting Authority (CA) to provide technical advisory services for the Scarborough Subway Extension (SSE) project. As part of the SSE project there is potential for a future development at the various station locations to include a Transit Oriented Community (TOC). For the assessment of a potential TOC, the functional servicing is to be reviewed for the various sites.

The purpose of this report is to review the future functional servicing requirements and background information related to the potential Lawrence East Station (LES) Transit Oriented Community (TOC) development. The functional servicing documented within this report will be a clear documentation of the available site data, design criteria and objectives, as well as the existing and future servicing demand. The report will also highlight at a high level, the impacts associated with the proposed servicing demand from a sanitary, water and storm servicing perspective. Opportunities for potential connections and servicing components will be described. This report will provide context for the future TOC at LES.

1.1 Site Description

The existing LES TOC (1.04ha) is located at the southeast corner of Lawrence Avenue East and McCowan Road at the location of two existing commercial properties (Figure 1 – Existing Site Plan). The commercial properties contain parking lot and building areas. The site is bound by Lawrence Avenue East to the north, McCowan Road to the west, a commercial plaza to the south, and a residential apartment building to the east.

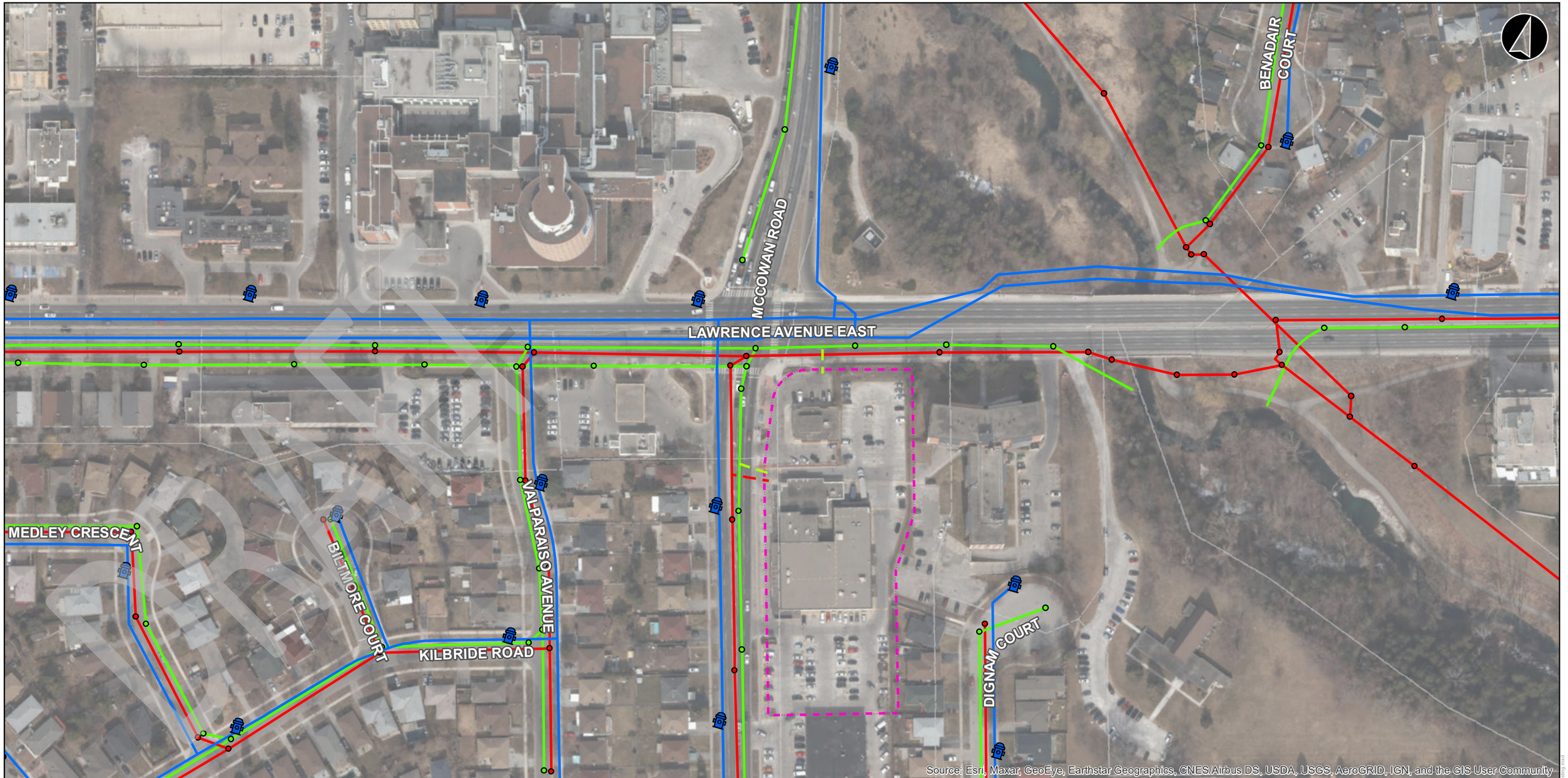
Current access to the site is at both McCowan Road to the west side (three (3) separate accesses) and Lawrence Avenue East on the north side of the site (one (1) access). There is an existing access through the site from the south commercial parking lot to an adjacent private property.

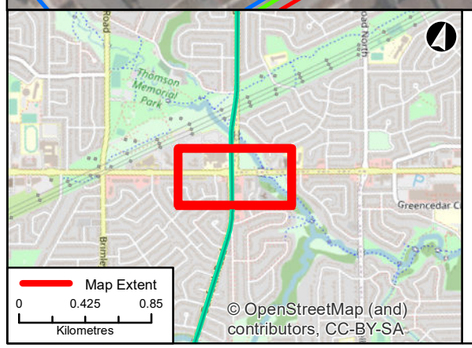
The site currently slopes from south to north towards the Lawrence Avenue East right-of-way.

1.2 Report Objectives

The functional servicing report includes the following goals and objectives:

- Summarize all related background information pertaining to the site development.
- Document relevant design criteria and objectives as well as the approach for the functional servicing of the development.
- Identify and illustrate the sanitary servicing requirements, potential opportunities, and development constraints.
- Discuss and evaluate the storm servicing opportunities and constraints against the identified municipal criteria in terms of the existing contribution and proposed development impacts.
- Document the water servicing demand and opportunities for connections to the local municipal water system.





Legend

- Fire Hydrant
- Sanitary MH
- Storm MH
- Sanitary Services
- Storm Services
- Watermains
- Sanitary Sewer
- Storm Sewer
- TOC Property

Scarborough Subway Extension (SSE)
Functional Servicing Reporting
Existing Site Plan

0 25
Metres
Datum: NAD27 MTM zone 10

Data Sources:

Figure 1

Jun, 2021 | 1:1,750

. | Rev Draft

METROLINX
Infrastructure Ontario
One
Garrett Fleming Canada ULC & IBI Group

DRAFT

- Provide the overall recommendations and opportunities to meet the site servicing requirements for the LES TOC development.

2.0 Background

2.1 Reference Information

The functional servicing review is based on the following reports, standards, and information prepared by others:

Site Design Data:

- LES TOC Site Plan, prepared by OneT+, August 2023.
- Topographic and Land Use data, prepared by City of Toronto Open Data, obtained June 2021.

Reference Standards:

- Design Criteria for Sewers and Watermains Second Edition, City of Toronto, Engineering and Construction Services, dated January 2021.
    - Design criteria used for the preparation of the functional servicing review of the site development.
- Wet Weather Flow Management Guidelines, City of Toronto, Toronto Water, dated January 2021.
    - Design guidelines used for the preparation of the storm drainage review of the site development.

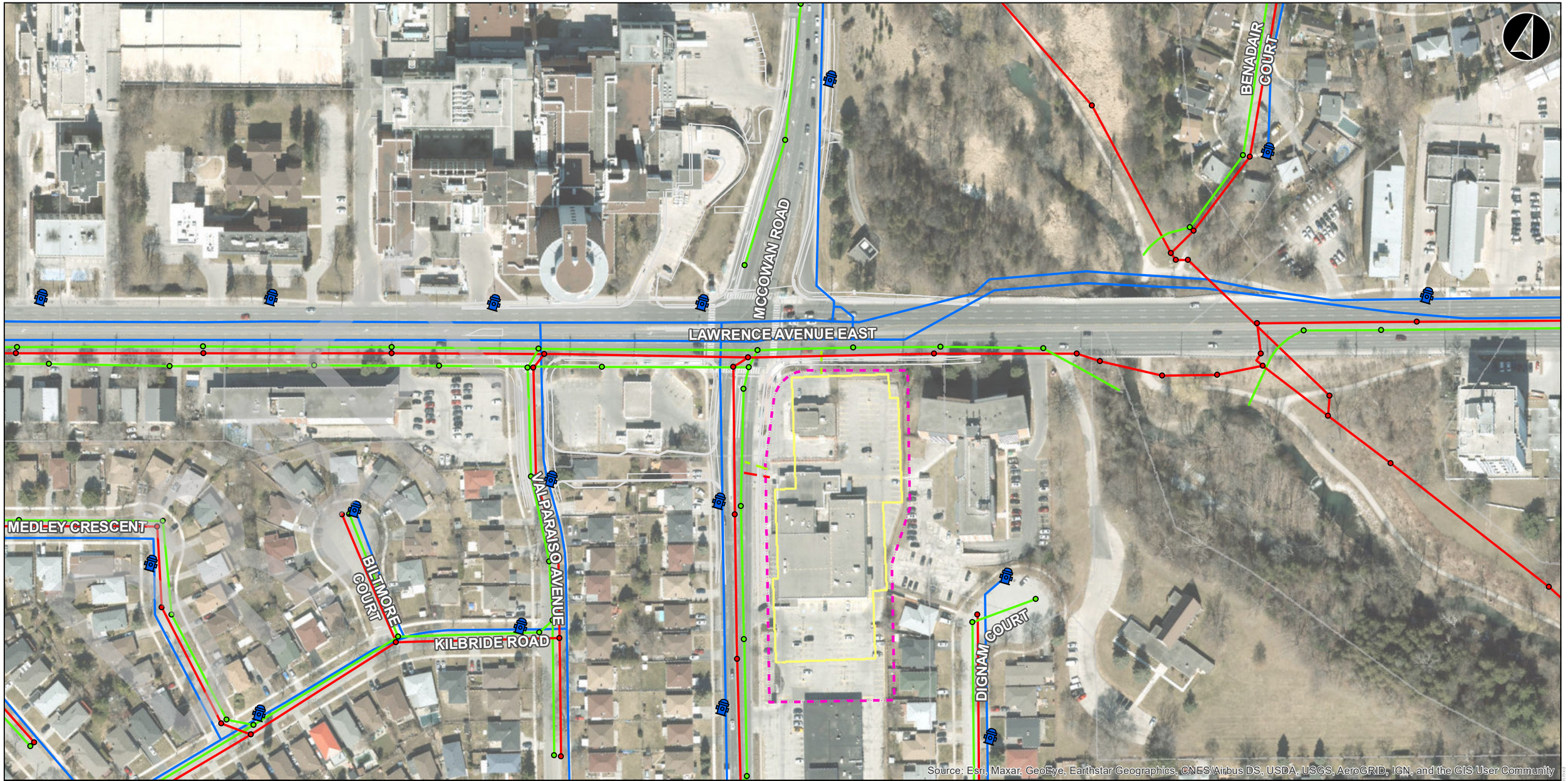
2.2 Design Criteria and Approach

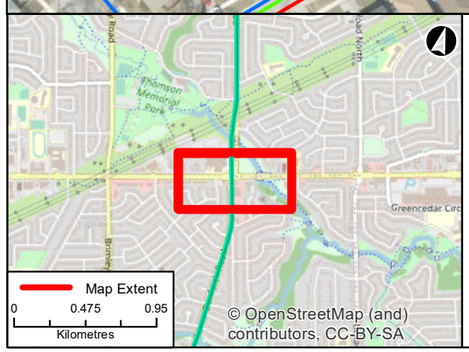
Sanitary Servicing:

The sanitary demands for the proposed development are based on the following municipal design criteria and required assessment parameters:

- 1.1 persons/100 m^2 for commercial or retail space for average daily flow,
- 3.3 persons/100 m^2 for office space for average daily flow,
- 240 L/cap/d average sanitary flow generation for residential uses connecting to existing fully separated sanitary sewer systems,
- 250 L/cap/d average sanitary flow generation for industrial, commercial, and institutional uses connecting to existing fully separated sanitary sewer systems, and,
- The infiltration rate of 0.26 l/s/ha and 3l/s/ha for the new development inflow and infiltration consideration of dry and wet weather flow conditions.
- The goal of the analysis will be to review the capacity under the dry and wet weather flow conditions demonstrating a freeboard during surcharge conditions of less than 1.8m from the surface.
    - The surcharge conditions will be targeted for both, but closely reviewed during wet weather flow conditions.

All factors and peak considerations are based on the City of Toronto Design Criteria for Sewers and Watermains (January 2021).





Legend

- Fire Hydrant
- Sanitary MH
- Storm MH
- Sanitary Services
- Storm Services
- Watermains
- Sanitary Sewer
- Storm Sewer
- Road
- TOC Property
- TOC Building Outline

Scarborough Subway Extension (SSE)
Functional Servicing Reporting
Proposed Site Plan

0 25
Metres
Datum: NAD27 MTM zone 10

Data Sources:

Figure 2

Sep, 2023 | 1:1,821

. | Rev Draft

METROLINX
Infrastructure Ontario

One

Storm Sewer Servicing:

The storm sewer design for the proposed development is based on the City of Toronto Wet Weather Flow Management Guidelines (November 2006):

- On-site minor storm drainage system will be designed to convey the 2-year storm event,
- The municipal system will be evaluated using the minor 2-year storm events, and,
- All stormwater management for the site will be covered under a separate Stormwater Management Report (i.e. water quantity, quality, water balance, etc..).

Water Servicing:

The water servicing requirements for the proposed development are based on the municipal design criteria and following assessment activities:

- The domestic water use for the subject property are 190 l/c/d or 250 l/c/d for either a multi-unit dwelling or commercial/retail/church development respectively,
- The City and Ontario Building Code requires a fire hydrant within 45m of the front entrance of the building, and,
- Evaluate the servicing connection locations and opportunities for fire and domestic water connections.

3.0 Proposed Site Conditions

The proposed LES TOC site development will contain the following elements:

- Three (3) new mixed-use high rise commercial and residential buildings (25+ story's),
- Two (2) levels of underground parking within the centre of the site and associated driveway access off of McCowan Road and Lawrence Avenue East,
- Landscaping and site restoration within the boulevard and yard areas, and,
- Site servicing and stormwater management infrastructure.

Refer to Figure 2 for the Proposed Site Plan.

4.0 Sanitary Servicing

4.1 Existing Sanitary Servicing

The existing commercial properties are serviced by a sanitary service at the property line connecting to the 250mm diameter sanitary sewer along McCowan Road (Refer to Figure 1 for the Existing Site Plan connection locations).

The following are the existing systems adjacent to the subject property:

- 250mm diameter sanitary sewer under the southbound lane of McCowan Road; and,
- 250mm diameter sanitary sewer under the eastbound lane of Lawrence Avenue East.

The 250mm diameter sanitary sewer system along McCowan Road drains to the intersection of McCowan Road and Lawrence Avenue East. At the intersection, the system connects to the 250mm diameter system running from west to east along Lawrence Avenue East towards the Highland Creek valley. The sanitary network ultimately discharges to the 1050mm Highland Creek trunk system flowing from north to south.

Refer to Figure 3 Sanitary Drainage Area Plan or the sanitary drainage areas, land uses, and pipe network.

4.2 Proposed Sanitary Servicing Flows

The sanitary sewer drainage system servicing flow requirements were developed based on the retail/commercial and residential statistics and City of Toronto watermain and sewer design criteria.

The sanitary flows were developed recognizing the 240 l/c/d for Residential and 250l/c/d for commercial/office flow rates.

The flow rate was determined as *3.7 l/s* based on the 357 retail/office employees and 978 people within the residential units.

Refer to Appendix A – Reference Information for the TOC development statistics used for the site servicing reporting.

4.3 Preliminary Sanitary Analysis Results (DWF/WWF)

In accordance with the City of Toronto Design Criteria requirements, the sanitary servicing was reviewed based on the dry weather and wet weather flow conditions.

The proposed sanitary servicing results are as follows:

- Scenario 1 - Existing Dry Weather Flows – Free-flow conditions, highest pipe capacity usage at 72%.
- Scenario 2 - Proposed Dry Weather Flows – Free-flow conditions, highest pipe capacity usage at 81%.
- Scenario 3 - Existing Wet Weather Flows - Surcharge conditions, highest pipe capacity usage at 235%.
- Scenario 4 - Proposed Wet Weather Flows – Surcharge conditions, highest pipe capacity usage at 244%.

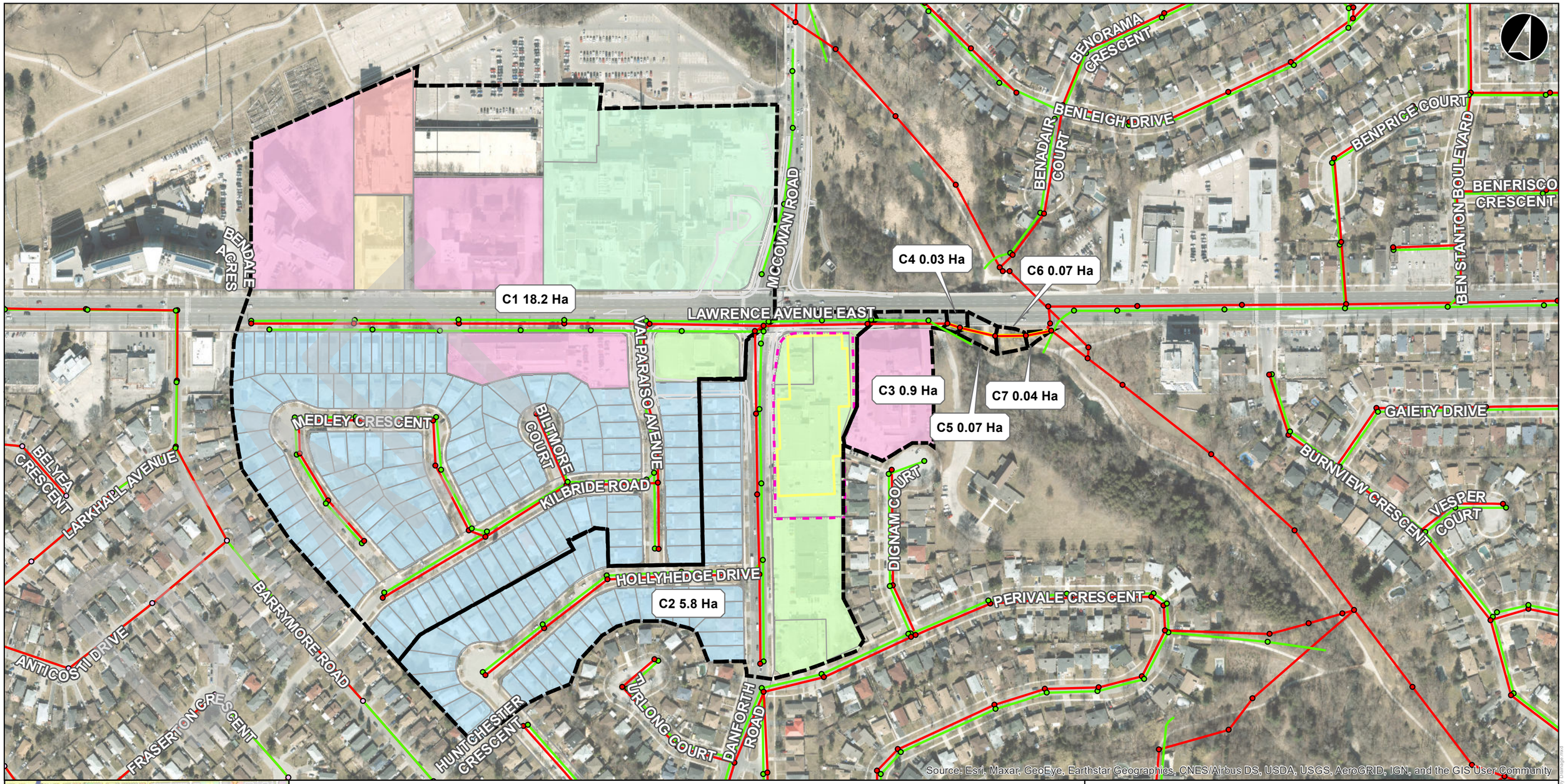
Based on these results, further review is required during subsequent design submissions to evaluate the surcharge condition within the downstream pipe. It should be noted that the surcharge condition exists in both the existing and proposed condition and is well below the 1.8m level of concern for basement flooding. The additional flow adds an increase to the surcharge level of ~9% during the dry and wet weather flow conditions. Additional servicing analysis and design is required to meet the additional flows.

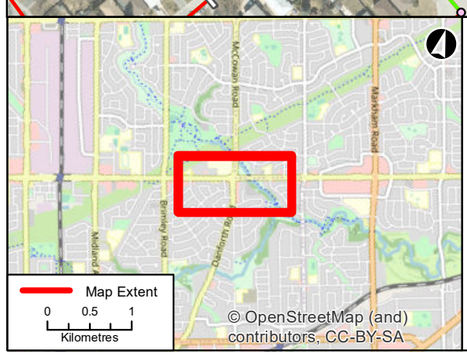
Refer to Appendix B – Design Sheets for Sanitary Sewer Analysis Calculations.

Proposed Servicing Options

Due to the surcharge conditions of the downstream system, an option has been reviewed to eliminate the surcharge conditions within the sanitary sewer network up to the trunk sewer system in order to safeguard for the development.

The following two (2) scenarios were added to illustrate potential improvements to the downstream system:





Legend

- Combined
- Sanitary MH
- Storm MH
- Sanitary Sewer
- Storm Sewer
- Upgrade Sanitary Sewers
- Retail/Commercial
- Apartment Building (<148 units/ha)
- Hospital
- Office
- Apartment Building (>148 units/ha)
- Single Family Residential
- Road
- TOC Property
- TOC Building Outline
- Sanitary Drainage Area
- Property Boundary

Scarborough Subway Extension (SSE)
Functional Servicing Reporting
Sanitary Drainage Area Plan

0 25 50
Metres
Datum: NAD27 MTM zone 10

Data Sources:

Figure 3

Sep, 2023 | 1:3,255

. | Rev Draft

METROLINX
Infrastructure Ontario

One

- Scenario 5 - Proposed Dry Weather Flows – Free-flow conditions, highest pipe capacity usage at 28% to the trunk sewer downstream of the site.
- Scenario 6 - Proposed Wet Weather Flows – Free-flow conditions, highest pipe capacity usage at 83% to the trunk sewer downstream of the site.

The proposed improvements would be to increase the diameter of the sanitary system from the development site to the Highland Creek valley from a 250mm diameter sewer to 300 – 375 mm diameter sewer system for four (4) lengths of pipe at a total length of 97.7m prior to the connection to the trunk system. Note, these improvements present challenges in terms of construction within the Toronto and Region Conservation Authority (TRCA) valley lands and under Highland Creek, which should be reviewed with the TRCA and City of Toronto.

4.4 Sanitary Connection Opportunities

The proposed sanitary servicing impacts the capacity of the municipal system in the order of ~28% increase to the system. Given the constrained network during the wet weather flow conditions, additional modelling and capacity evaluations are required to demonstrate the approach to meeting the future development demands.

In order to satisfy future demand impacts and eliminate surcharge conditions within the system, a 300 – 375mm diameter increase from the existing 250mm diameter from the development site to the valley lands prior to connecting to the trunk system is considered as a potential option for the future development.

Refer to Figure 3 for the Sanitary Drainage Area Plan, which highlights the section under surcharge conditions. Refer to Figure 5 for Servicing Opportunities surrounding the LES TOC development.

5.0 Water Servicing

5.1 Existing Water Servicing

The existing commercial plazas are serviced by a sanitary service connecting to the local 300mm diameter cast iron watermain along McCowan Road (Refer to Figure 1 for Existing Site Plan connection locations).

The following are the existing watermain infrastructure adjacent to the subject property:

- 300mm diameter cast iron watermain under the west boulevard along McCowan Road,
- 400mm diameter cast iron watermain under the westbound lane of Lawrence Avenue East, and,
- 900mm diameter concrete encased transmission watermain under the eastbound lanes of Lawrence Avenue East.

The 300mm diameter watermain along McCowan Road connects to the 400mm diameter watermain at the McCowan Road and Lawrence Avenue East intersection. Both the 400mm and 900mm watermains extend to the east underneath Highland Creek, and to the west of Valparaiso Avenue, beyond the project boundaries, along Lawrence Avenue East.

5.2 Future Water Servicing Requirements

The water servicing for the future LES TOC have been reviewed through domestic and fire flow desktop calculations.

Domestic Servicing Demand

The future domestic water servicing demand can be described as follows:

Employment:

- Water demand rate of 250 l/c/d
- 40 m^2/employee for commercial or retail space,
- 20 m^2/employee for office,
- 1,405m^2 for retail
- 6,444m^2 for office
- Theoretical population of 357
- Peak factor of 0.84, 1.20, and 1.10
    - Flows of 1.03 l/s peaked at 0.87 l/s, 1.24 l/s, and 1.13 l/s

Housing:

- Water demand rate of 190 l/c/d
- Total residential units of 774
- Average household size of 1.74
- Total residential GFA of 50,632 m^2
- Average residential unit size of 90 m^2
- Theoretical population of 978
- Peaking factors of 0.84, 2.50 and 1.30
    - Flows of 2.15 l/s peaked at 1.81 l/s, 5.38 l/s, and 2.80 l/s

Total housing and employment of 1,335.

Based on these flows a future pressure test and hydraulic model of the overall system shall be undertaken to review the capacity and impacts of the overall system.

Fire Flow Analysis

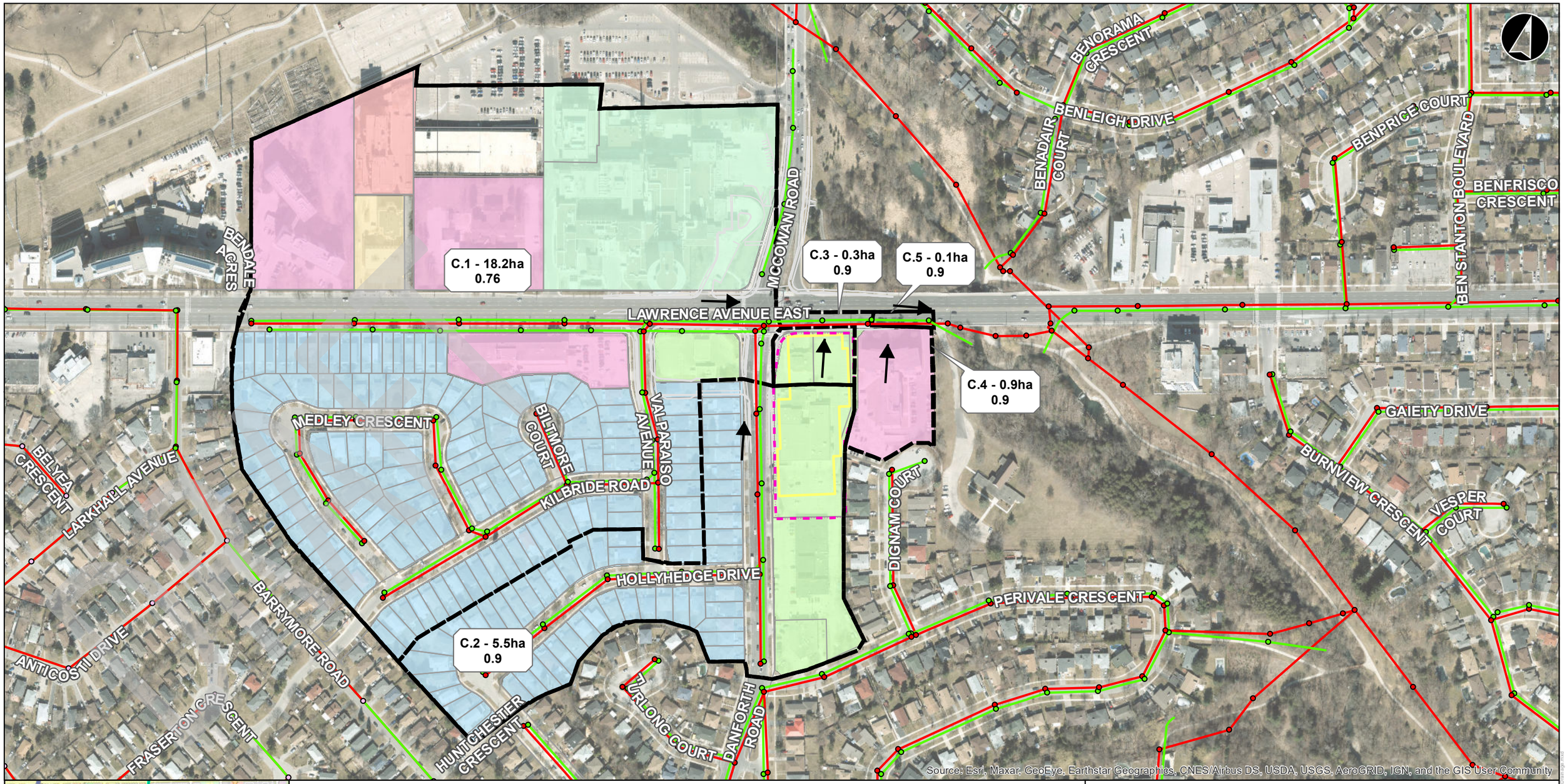
The fire flow analysis has been prepared at a high level based on the Fire Underwriters Survey (FUS) 2019 for the subject development. A preliminary FUS analysis was executed given the OneT+ LES TOC layout.

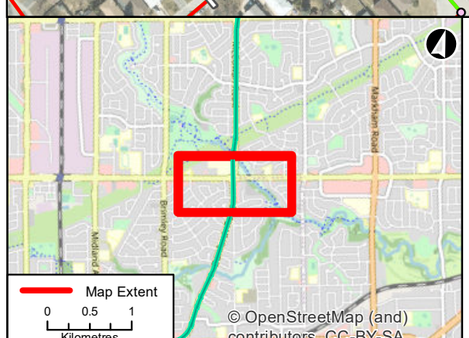
The fire flow requirement for the site has been determined to require 283 l/s, which will necessitate additional fire hydrant coverage and verification of pressure within the system.

Refer to Appendix B – Design Sheets for the Fire Flow Analysis.

5.3 Watermain Appurtenances

The building code requires a fire hydrant within 45m of the front entrance of the building.





Legend

- Combined
- Sanitary MH
- Storm MH
- Sanitary Sewer
- Storm Sewer
- Retail/Commercial
- Apartment Building (<148 units/ha)
- Hospital
- Office
- Apartment Building (>148 units/ha)
- Single Family Residential
- Road
- TOC Property
- TOC Building Outline
- Storm Drainage Area
- Property Boundary
- C.# - Area (ha) Runoff Coefficient (C)
- Overland Flow

Scarborough Subway Extension (SSE)
Functional Servicing Reporting
Storm Drainage Area Plan

0 25 50
Metres
Datum: NAD27 MTM zone 10

Data Sources:

Figure 4

Sep, 2023 | 1:3,255

. | Rev Draft

METROLINX
Infrastructure Ontario

One

300mm WM CI

LOCAL FH

250mm SAN CONC

McCOWAN ROAD

600mm STM CONC

POTENTIAL CONNECTION LOCATIONS AT NEW ENTRANCE TO McCOWAN ROAD

250mm SAN CONC

750mm STM CONC

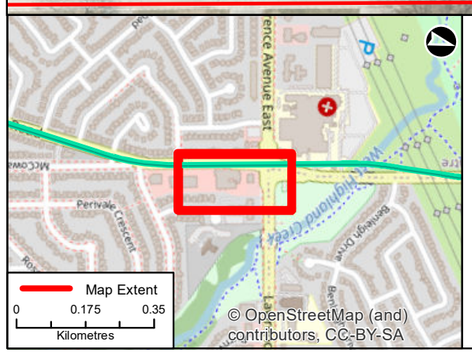
900mm TRANSMISSION STEEL WM

LAWRENCE AVENUE EAST

400mm WM CI

POTENTIAL CONNECTION LOCATIONS AT LAWRENCE AVENUE EAST GRADE AND OUTLET AT NEW ENTRANCE TO LAWRENCE AVENUE EAST

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Legend

- Fire Hydrant
- Sanitary MH
- Storm MH
- Ex Sanitary Services
- Ex Storm Services
- Watermains
- Sanitary Sewer
- Storm Sewer
- Road
- TOC Property
- TOC Building Outline

Scarborough Subway Extension (SSE)
Functional Servicing Reporting
Site Servicing Opportunities

0 10
Metres
Datum: NAD27 MTM zone 10

Data Sources:

Figure 5

Sep, 2023 | 1:693

. | Rev Draft

METROLINX
Infrastructure Ontario
One

The proposed development is directly across from an existing fire hydrant. However, the future development may require additional hydrants (City of Toronto coverage of 5,690 litres/minute for each hydrant) depending on the fire flow and location of the future Siamese connections.

5.4 Future Water Servicing Opportunities

Due to its height (greater than 84m), the future development will require two sources of water supply from the City water network, each contains a fire flow service and/or domestic service connection. It is recommended that one connects to the 300mm diameter local watermain along McCowan Road, and the other connects to the 400mm diameter watermain along Lawrence Avenue East. The exact service connection will be prepared under subsequent detailed design submissions. All future water servicing designs will follow the City of Toronto Design Criteria (January 2021).

Refer to Figure 5 for Servicing Opportunities surrounding the LES TOC development.

6.0 Storm Servicing

6.1 Existing Storm Servicing

The existing commercial properties are serviced by the municipal storm sewer network along both McCowan Road and Lawrence Avenue East. The south portion of the commercial property is connected to the 600mm diameter concrete storm sewer network along McCowan Road. The north commercial property is connected to the 750mm diameter concrete storm sewer along Lawrence Avenue East through a single site catch basin. The following are the existing storm systems adjacent to the subject property:

- 600mm diameter storm sewer under the northbound lane of McCowan Road; and,
- 750mm diameter storm sewer under the eastbound lane of Lawrence Avenue East.

The 600mm diameter concrete storm sewer along McCowan Road drains from south to north to the 750mm diameter concrete storm sewer, which flows easterly down Lawrence Avenue East ultimately discharging to Highland Creek.

6.2 Existing Storm Servicing Capacity and Requirements

The existing storm sewer 750mm diameter storm sewer along Lawrence Avenue East will be assessed as the limiting factor for the capacity of the existing system. The storm drainage area for the areas contributing to the local storm sewer network have been delineated.

Refer to Figure 4 the Storm Drainage Area Plan for the overall drainage area.

Overall the existing system has approximately 2 m^3/s of capacity flowing at ~50% full during the 2-year storm event. A preliminary review of the system under the 100-year storm shows that the system is surcharged.

Based on this assessment, the discharge of the future storm drainage system will need to consider the approximate full flow capacities.

Refer to Appendix B - Design Sheets for the preliminary analysis of the existing storm sewer system.

6.3 Future Storm Servicing

The future storm sewer system for the LES TOC development should be able to safely discharge to the local Lawrence Avenue East storm sewer system at either McCowan Road or Lawrence Avenue East. The future service connection shall be in accordance with the City of Toronto design criteria. Refer to Figure 5 for Servicing Opportunities surrounding the LES TOC development.

Stormwater management and any associated treatment shall follow Wet Weather Flow Management Guidelines. The approach and design for stormwater management is covered under a separate Stormwater Management Report.

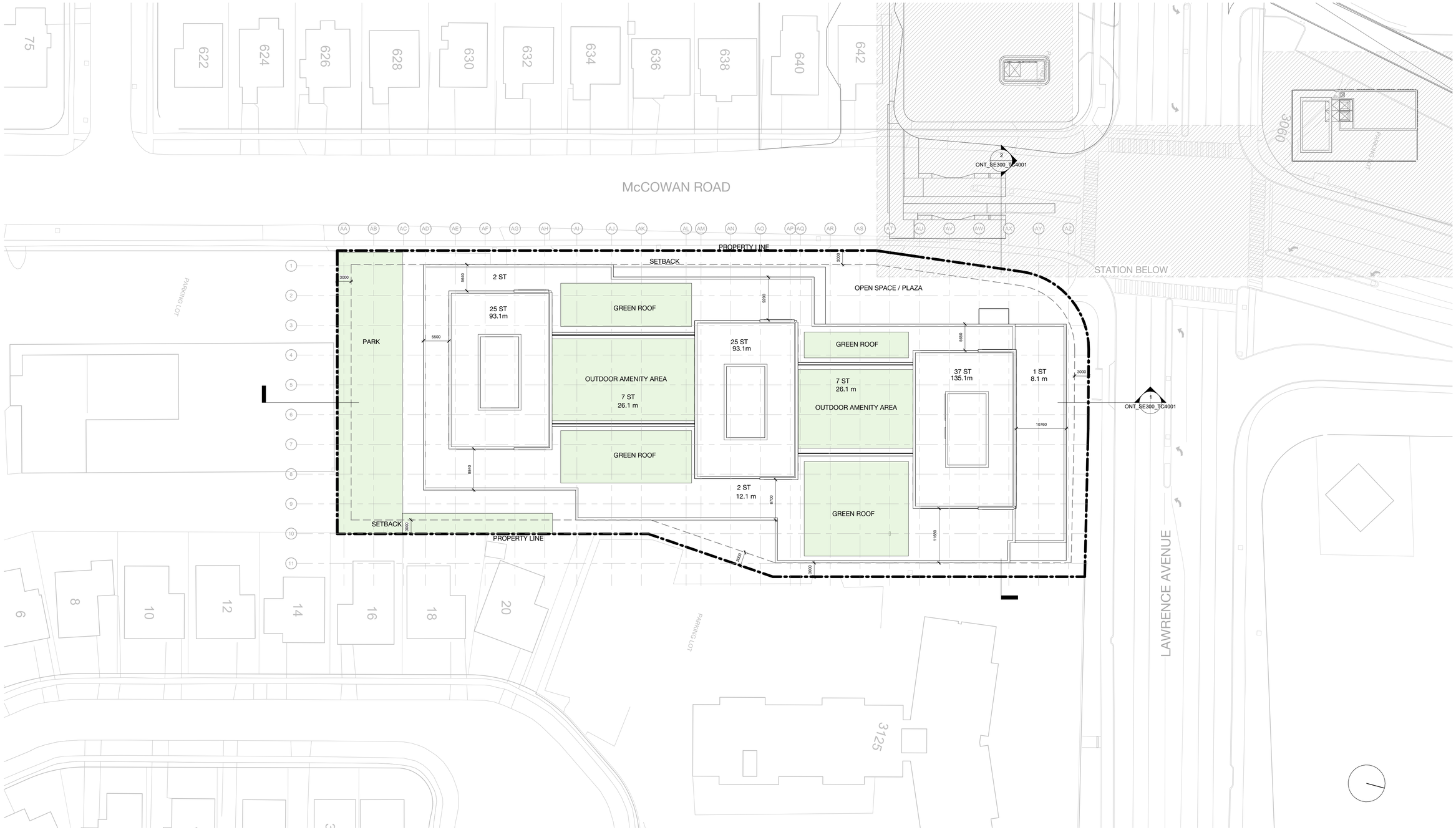
7.0 Conclusions

The future servicing documented for the Lawrence East Station Transit Oriented Community has demonstrated the following servicing elements at a high level:

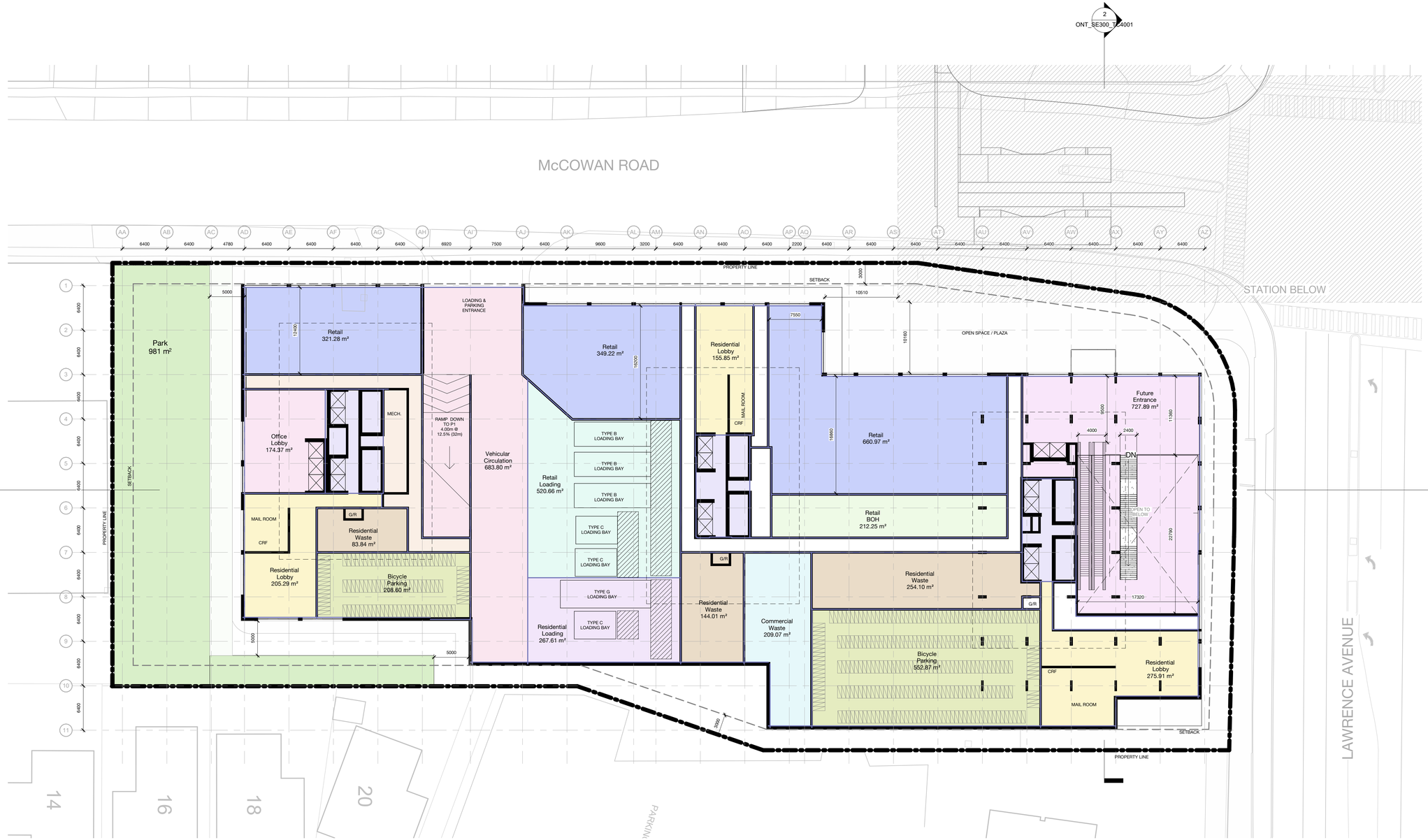
- All pertinent background information pertaining to the site development have been documented including the existing available information and the purpose of the assessment.
- The design criteria and approach for the functional servicing of the development has been developed including the sizing and evaluation approach for the sanitary, storm and preliminary demand for water servicing.
- The existing and proposed impacts of the sanitary servicing has been prepared for the developed including the identification of opportunities and constraints that would need to be further assessed as part of the development process.
    - The sanitary system is surcharged under the dry and wet weather flow conditions, with the new development demand adding an increase of ~9% to the downstream system.
        - Further analysis/modelling is required to review the surcharge conditions, however the approximate HGL below grade is greater than the 1.8m.
        - An option has been developed to illustrate a 97.7m long 300 to 375mm diameter increase in diameter of the sanitary sewer network to meet the future servicing requirements and eliminate the surcharge conditions.
- The storm sewer servicing opportunities were discussed and evaluated to consider the future development conditions.
    - The storm system performance demonstrates that the downstream system has capacity during the minor storm (2-year) to discharge flow under proposed conditions.
- The water servicing for the existing and proposed conditions has identified the demand and future appurtenance requirements.
    - The water demand and opportunities for connections to the local system were identified for McCowan Road and Lawrence Avenue East.
        - Further assessment is required to analyze the system based on the domestic demand; additional fire flow analysis is required for the system.
- Overall the report has provided clear recommendations and opportunities to meet the site servicing requirements for the LES TOC development.

APPENDIX A – REFERENCE INFORMATION

LES TOC - ALL BELOW GRADE PARKING OPTION	
	ONE T+
SITE AREA sqm	10,400
SITE AREA ha	1.04
Parkland AREA sqm	1,047
GFA sqm (Equivalent to Occupiable Area GCA) *to be refined	58,481
BELOW GRADE GCA sqm	14,664
ABOVE GRADE GCA sqm	76,336
TOTAL GCA sqm *	91,000
NET FLOOR SPACE INDEX (FSI)	6.3
PARKING TEST	
STRUCTURED ABOVE GRADE PARKING LEVELS	-
UNDERGROUND PARKING LEVELS	2
STRUCTURED PARKING FOOTPRINT	-
PARKING RAMP (F1)	171
UNDERGROUND PARKING FOOTPRINT (P1)	5,205
UNDERGROUND PARKING FOOTPRINT (P2)	5,380
TOTAL PARKING GCA sqm	10,585
NO. OF PARKING STALLS PROVIDED	228
NO. OF PARKING STALLS NEEDED	310
RESIDENTIAL	
MARKET RESIDENTIAL NET sqm	50,632
AFFORDABLE HOUSING NET sqm	0
TOTAL RESIDENTIAL (GFA) **sqm**	50,632
EMPLOYMENT	
RETAIL sqm	1,405
OFFICE sqm	6,444
TOTAL EMPLOYMENT sqm	7,849
OUTDOOR SPACE	
ROOF AREA sqm	6,730
OUTDOOR AMENITY SPACE AT ROOF sqm	2,166
OUTDOOR AMENITY SPACE AT GRADE sqm	TBD
UNITS, JOBS AND PEOPLE ASSUMPTION	
AVERAGE RESIDENTIAL (MARKET) UNIT SIZE sqm	90
AVERAGE AFFORDABLE UNIT SIZE sqm	50
AVERAGE LIVE-WORK UNIT SIZE sqm	-
AVERAGE HOUSEHOLD SIZE	1.74
(RETAIL) EMPLOYMENT SPACE PER EMPLOYEE sqm	40
(OFFICE) EMPLOYMENT SPACE PER EMPLOYEE sqm	20
NUMBER OF UNITS	774
NUMBER OF PEOPLE	978
NUMBER OF JOBS	357
NUMBER OF JOBS + PEOPLE	1,335
NUMBER OF JOBS + PEOPLE PER ha	1,284
PARKING	228
BIKE PARKING	603
LOADING	7
INDOOR AMENITY	2,160



REVISIONS		TOC CONCEPT OF DESIGN ISSUED FOR COORDINATION 08/25/23 NOT FOR CONSTRUCTION	One+ Gannett Fleming Canada ULC & IBI Group			DRAWN Justin Jones CHECKED TBC CORRECT TBC SCALE 1 : 400	Project: SCARBOROUGH SUBWAY EXTENSION LES TOC SITE PLAN	Contract: Package: METROLINX Dwg. No. ONT_SE300_TC2001 Rev. No. Sheet No.



AREA PLAN LEGEND

- Bicycle Parking
- Circulation
- Commercial Waste
- Core
- Future Entrance
- Office Lobby
- Residential Loading
- Residential Lobby
- Residential Waste
- Retail
- Retail BOH
- Retail Loading
- Vehicular Circulation

REVISIONS

TOC CONCEPT OF DESIGN
ISSUED FOR COORDINATION

08/25/23

NOT FOR CONSTRUCTION

One
Gannett Fleming Canada ULC & IBI Group

DRAWN Justin Jones
CHECKED TBC
CORRECT TBC

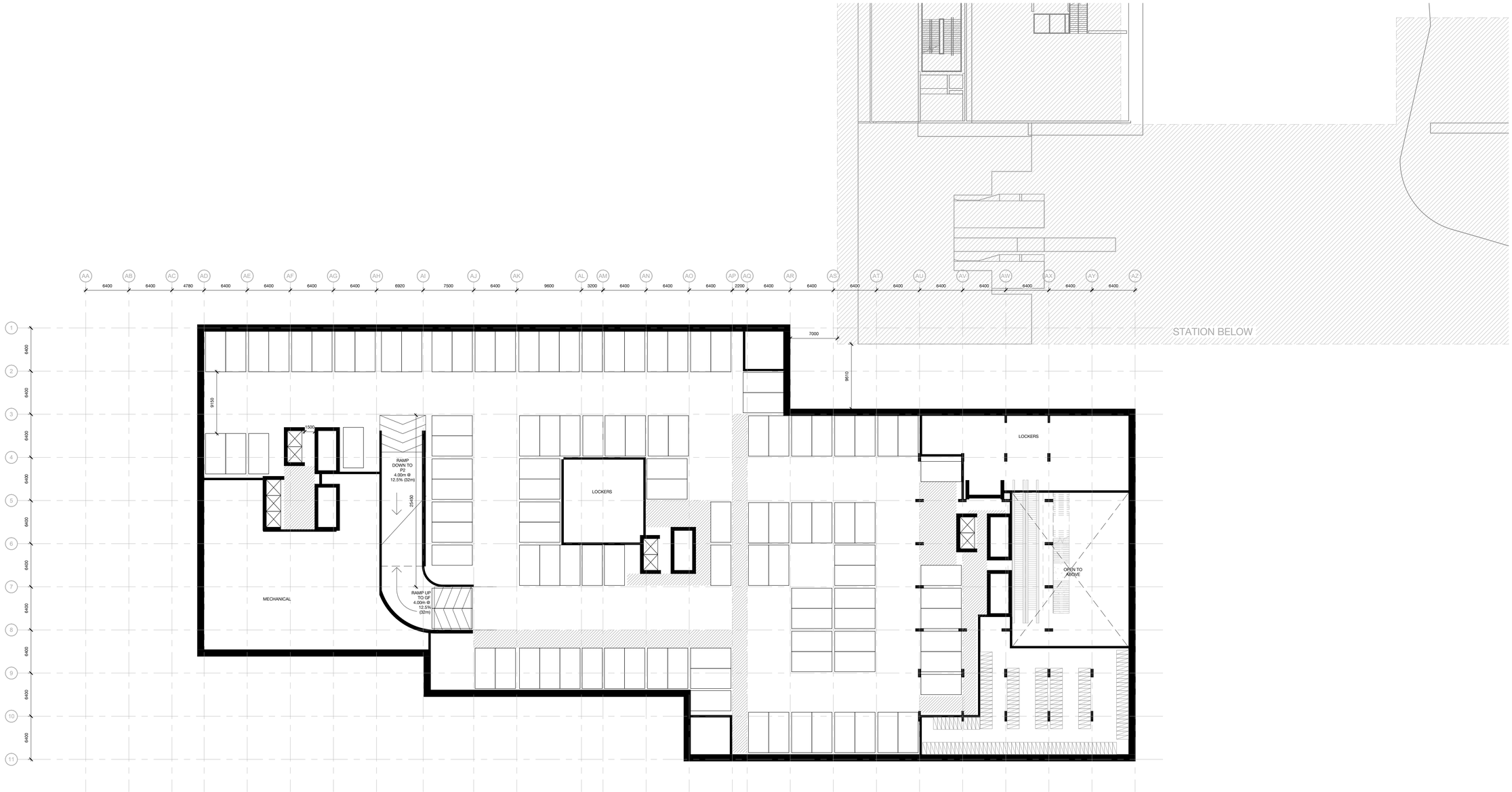
SCALE
1 : 300

Project:
SCARBOROUGH SUBWAY EXTENSION
LES TOC
GROUND FLOOR

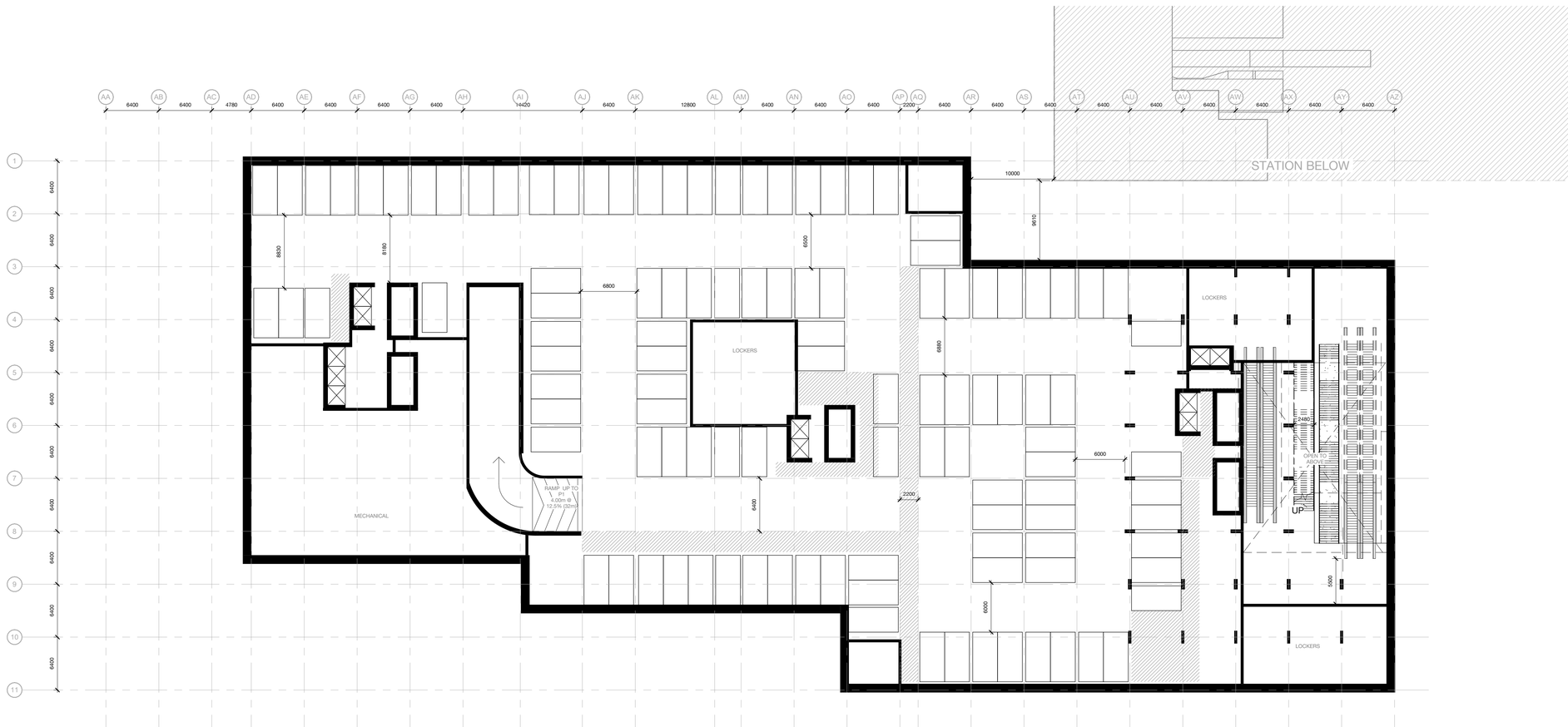
Contract:
Package:

METROLINX

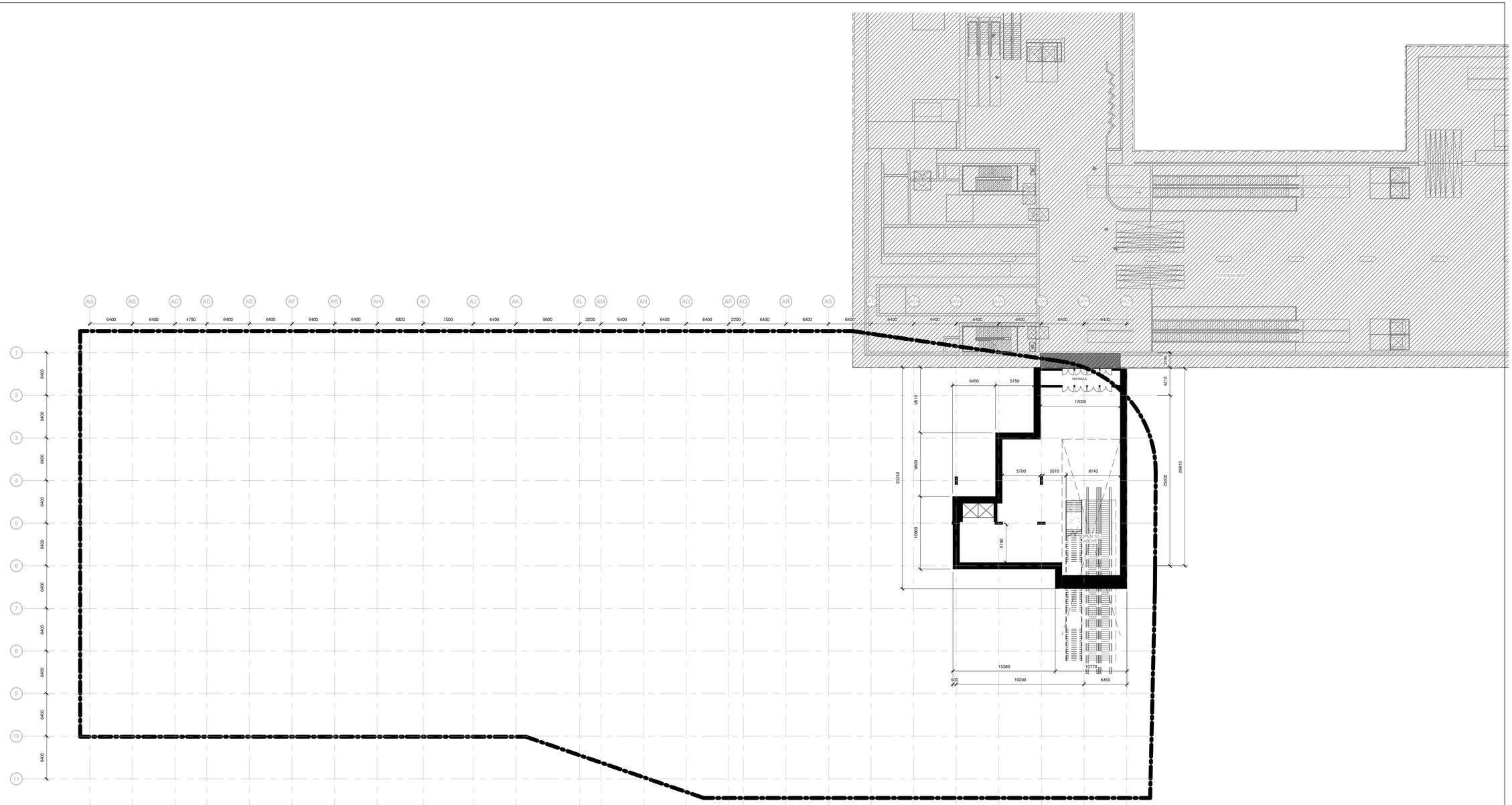
Dwg. No. ONT_SE300_TC2002
Rev. No.
Sheet No.



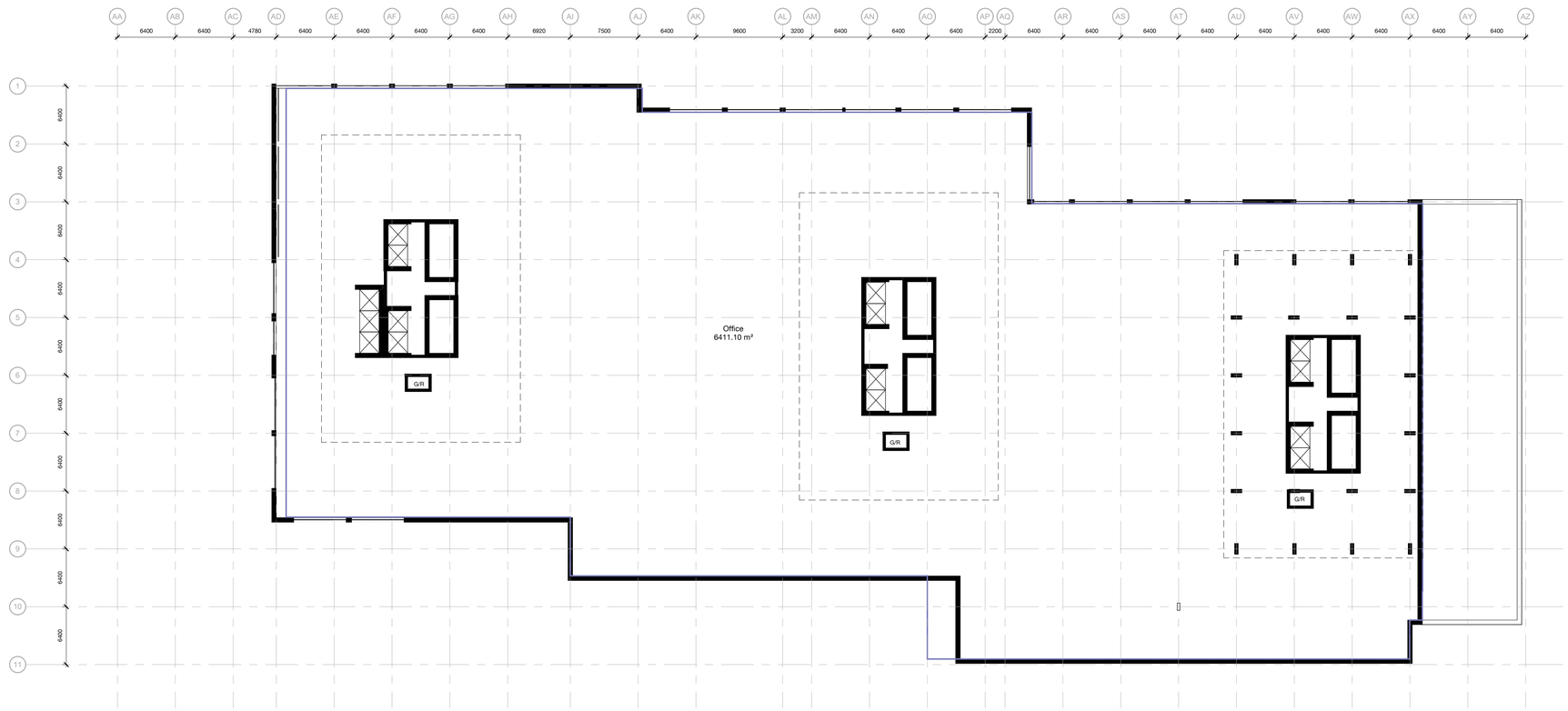
REVISIONS		TOC CONCEPT OF DESIGN ISSUED FOR COORDINATION 08/25/23 NOT FOR CONSTRUCTION	One Gannett Fleming Canada ULC & IBI Group			DRAWN Justin Jones CHECKED TBC CORRECT TBC SCALE 1 : 300	Project: SCARBOROUGH SUBWAY EXTENSION LES TOC BASEMENT B1	Contract: Package: METROLINX Dwg. No. ONT_SE300_TC2003 Rev. No. Sheet No.



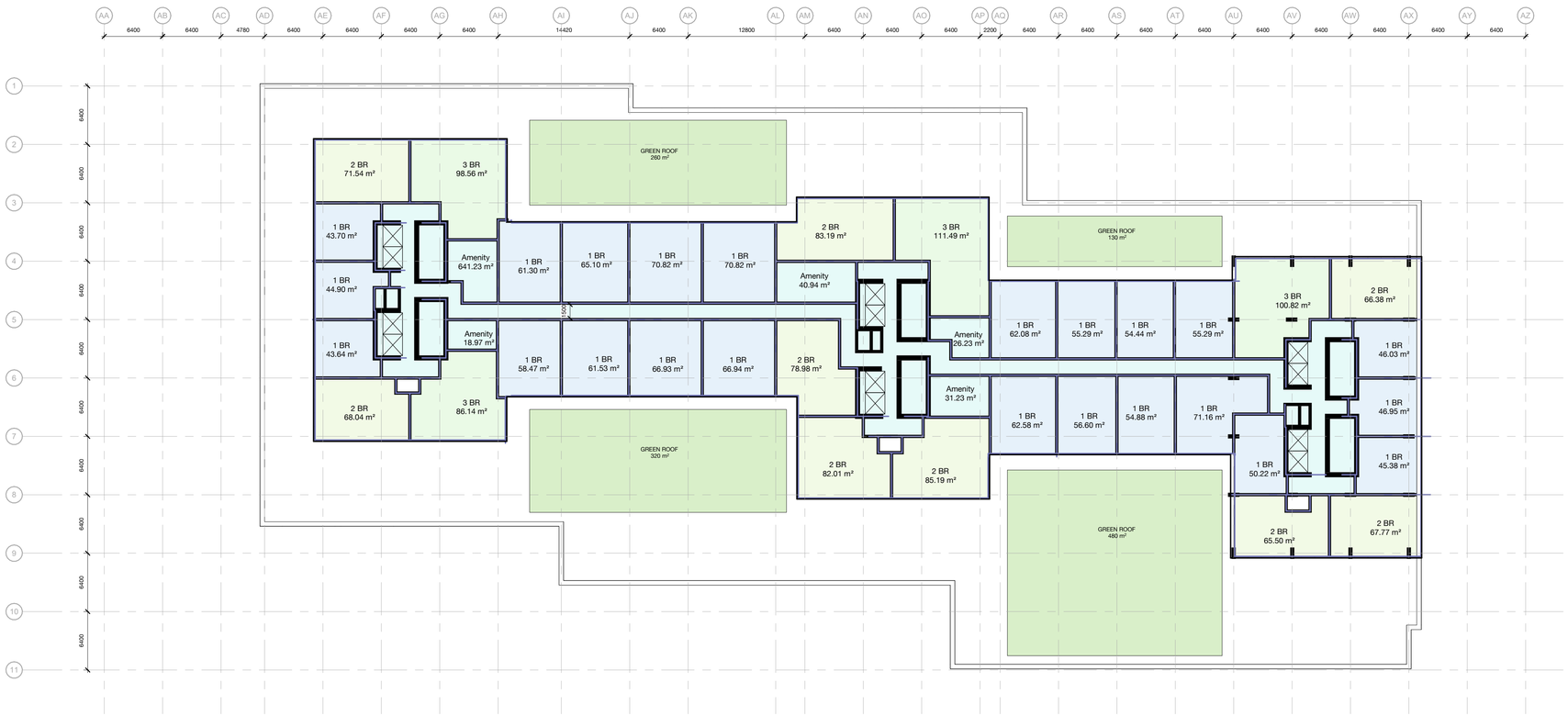
REVISIONS		TOC CONCEPT OF DESIGN ISSUED FOR COORDINATION 08/25/23 NOT FOR CONSTRUCTION	One Gannett Fleming Canada ULC & IBI Group			DRAWN Justin Jones CHECKED TBC CORRECT TBC SCALE 1 : 300	Project: SCARBOROUGH SUBWAY EXTENSION LES TOC BASEMENT B2	Contract: Package: METROLINX Dwg. No. ONT_SE300_TC2004 Rev. No. Sheet No.



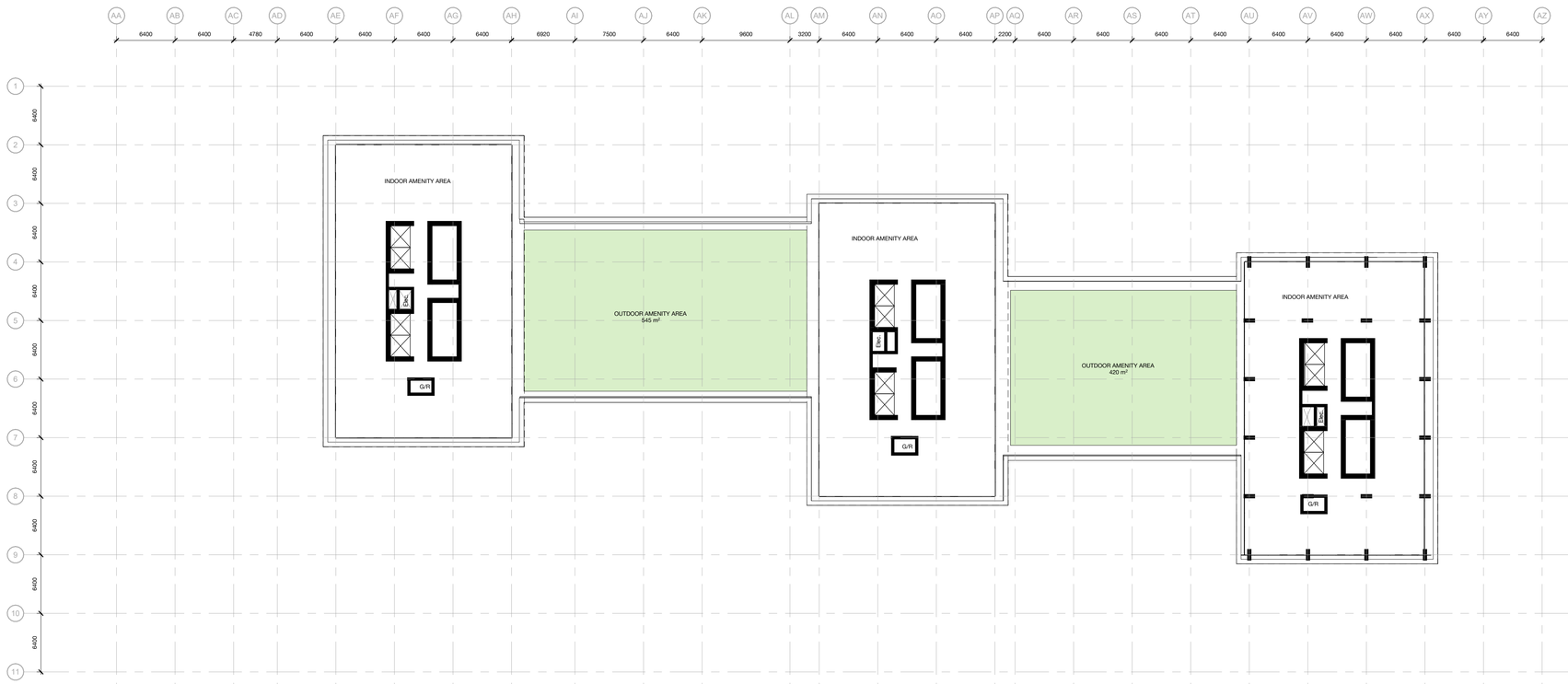
REVISIONS		TOC CONCEPT OF DESIGN ISSUED FOR COORDINATION 08/25/23 NOT FOR CONSTRUCTION	One Gannett Fleming Canada ULC & IBI Group			DRAWN Justin Jones CHECKED TBC CORRECT TBC SCALE 1 : 300	Project: SCARBOROUGH SUBWAY EXTENSION LES TOC BASEMENT B3 - STATION BOX CONNECTION	Contract: Package: METROLINX Dwg. No. ONT_SE300_TC2005 Rev. No. Sheet No.



REVISIONS		TOC CONCEPT OF DESIGN ISSUED FOR COORDINATION 08/25/23 NOT FOR CONSTRUCTION	One Gannett Fleming Canada ULC & IBI Group			DRAWN Justin Jones CHECKED TBC CORRECT TBC SCALE 1 : 300	Project: SCARBOROUGH SUBWAY EXTENSION LES TOC SECOND FLOOR	Contract: Package: METROLINX Dwg. No. ONT_SE300_TC2006 Rev. No. Sheet No.



REVISIONS		TOC CONCEPT OF DESIGN ISSUED FOR COORDINATION 08/25/23 NOT FOR CONSTRUCTION	One Gannett Fleming Canada ULC & IBI Group			DRAWN Justin Jones CHECKED TBC CORRECT TBC SCALE 1 : 300	Project: SCARBOROUGH SUBWAY EXTENSION LES TOC THIRD/FOURTH/FIFTH/SIXTH FLOOR / GREEN ROOF	Contract: Package: METROLINX Dwg. No. ONT_SE300_TC2007 Rev. No. Sheet No.



REVISIONS

TOC CONCEPT OF DESIGN
ISSUED FOR COORDINATION

08/25/23

NOT FOR CONSTRUCTION

One
Gannett Fleming Canada ULC & IBI Group

DRAWN Justin Jones
CHECKED TBC
CORRECT TBC

SCALE
1 : 300

Project:
SCARBOROUGH SUBWAY EXTENSION

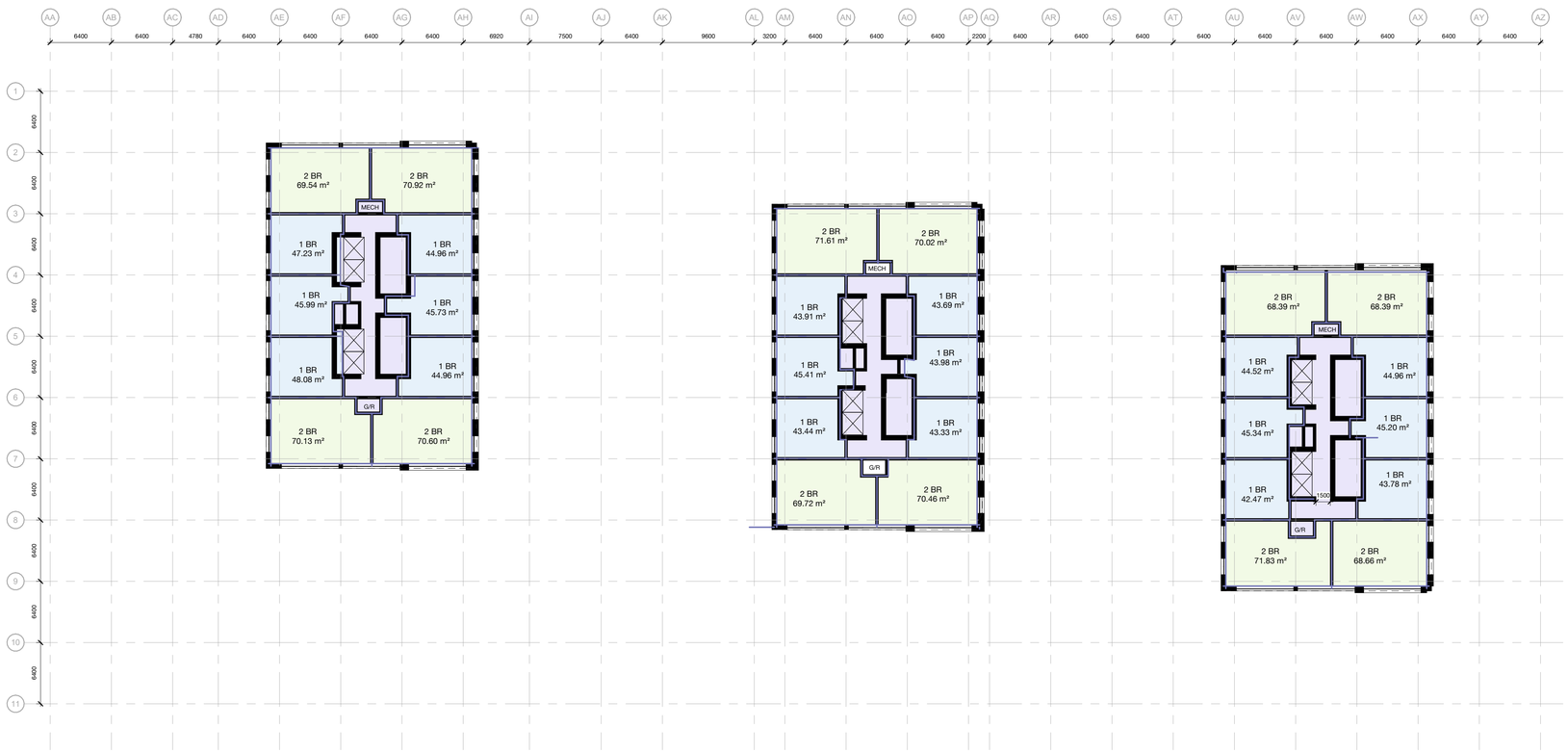
LES TOC

SEVENTH FLOOR AMENITY / GREEN ROOF

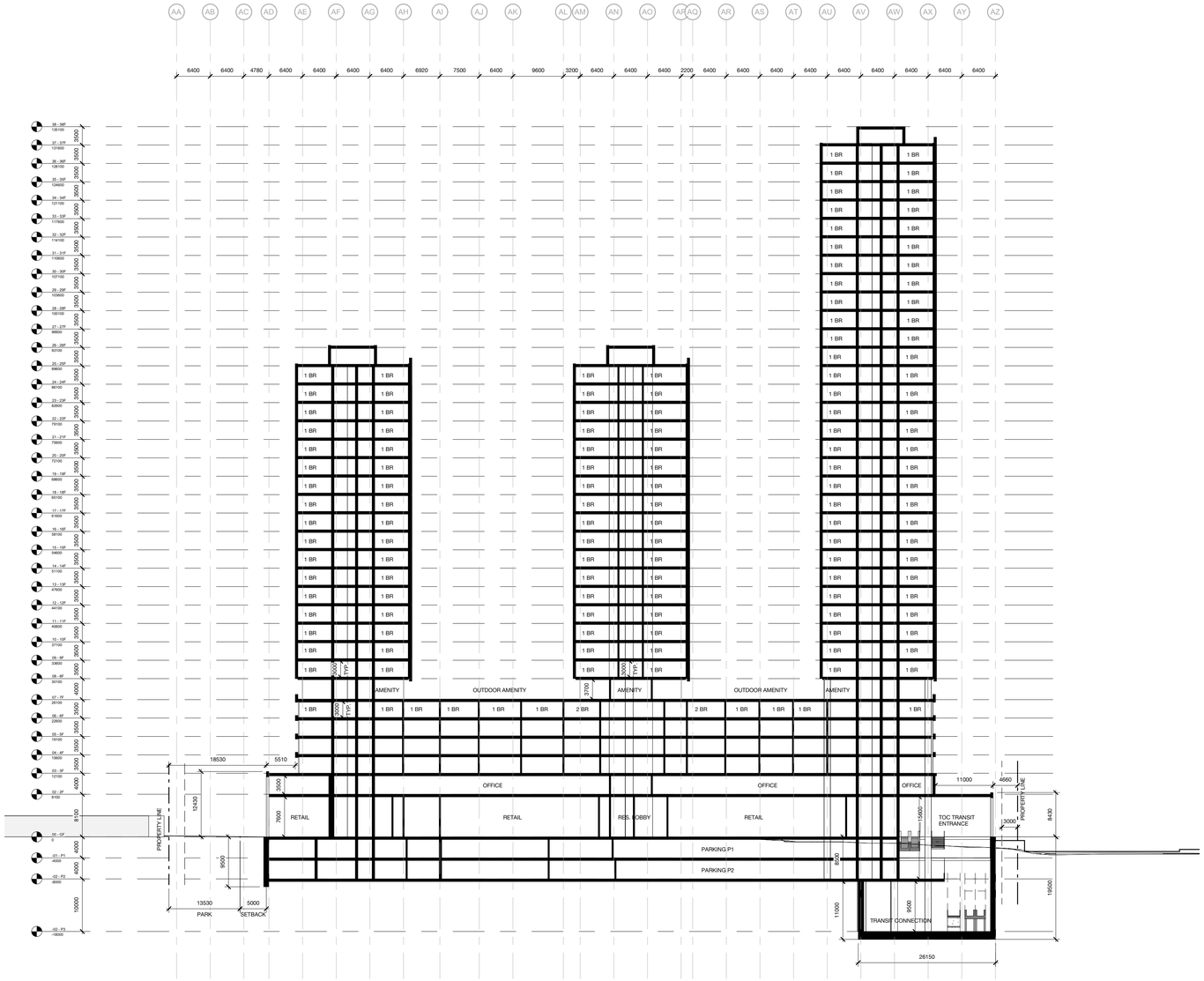
Contract: Package:

METROLINX

Dwg. No. Rev. No. Sheet No.
ONT_SE300_TC2008

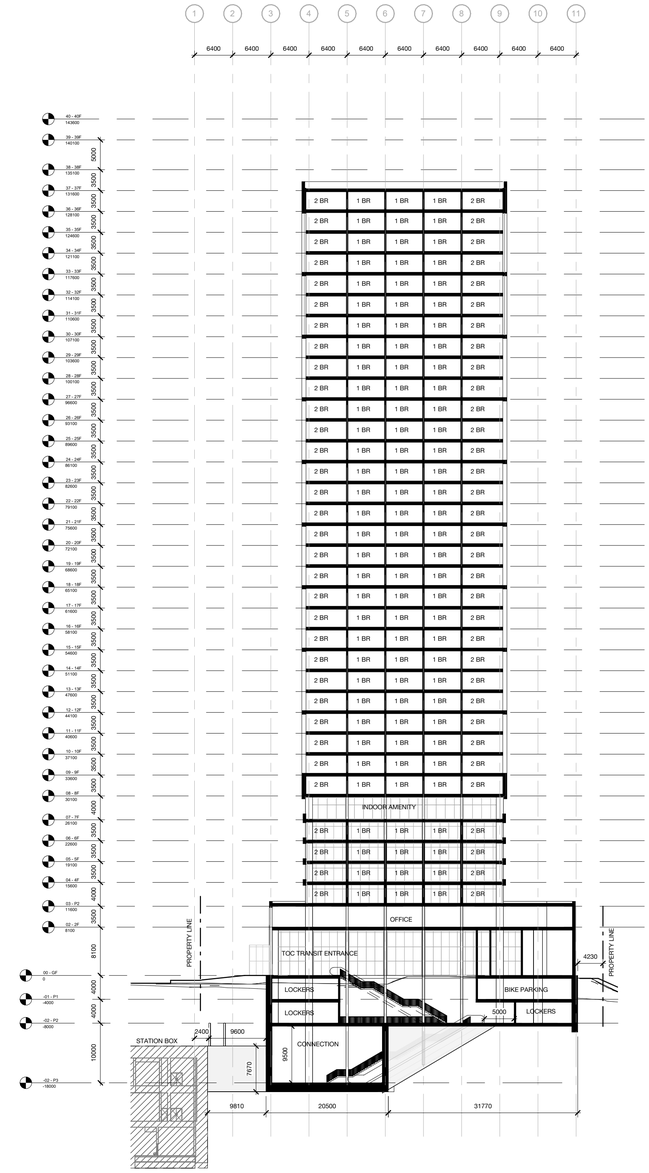


REVISIONS		TOC CONCEPT OF DESIGN ISSUED FOR COORDINATION 08/25/23 NOT FOR CONSTRUCTION	One Gannett Fleming Canada ULC & IBI Group			DRAWN Justin Jones CHECKED TBC CORRECT TBC SCALE 1 : 300	Project: SCARBOROUGH SUBWAY EXTENSION LES TOC TYPICAL TOWER	Contract: Package: METROLINX Dwg. No. ONT_SE300_TC2009 Rev. No. Sheet No.



1 N-S Section

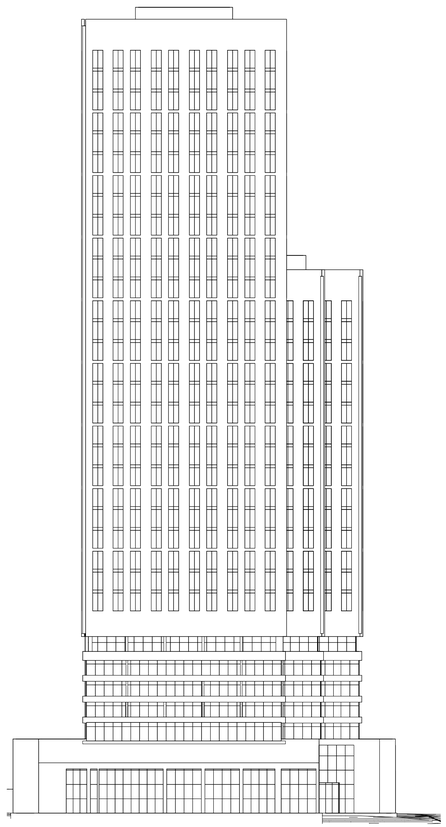
1 : 500



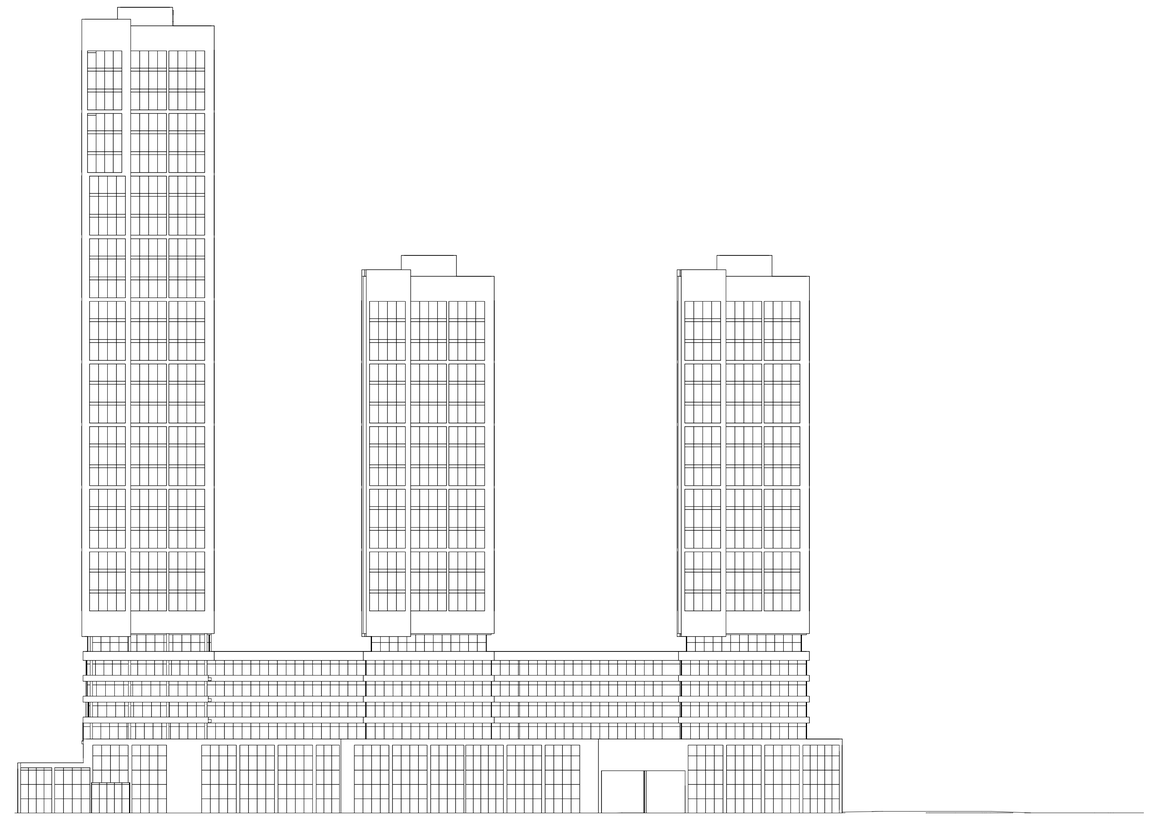
2 E-W Section

1 : 500

REVISIONS		TOC CONCEPT OF DESIGN ISSUED FOR COORDINATION 08/25/23 NOT FOR CONSTRUCTION	One+ Gannett Fleming Canada ULC & IBI Group			DRAWN Justin Jones CHECKED TBC CORRECT TBC SCALE 1 : 500	Project: SCARBOROUGH SUBWAY EXTENSION LES TOC SECTIONS	Contract: Package: METROLINX Dwg. No. ONT_SE300_TC4001 Rev. No. Sheet No.

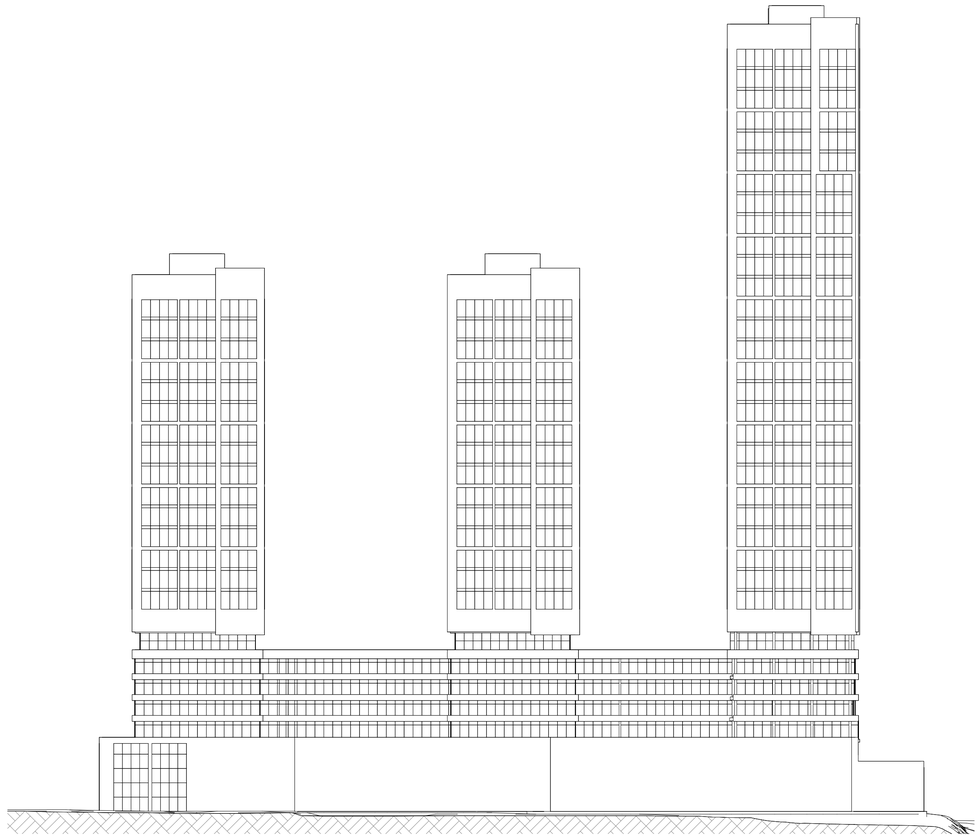


1 **North Elevation**
1 : 500

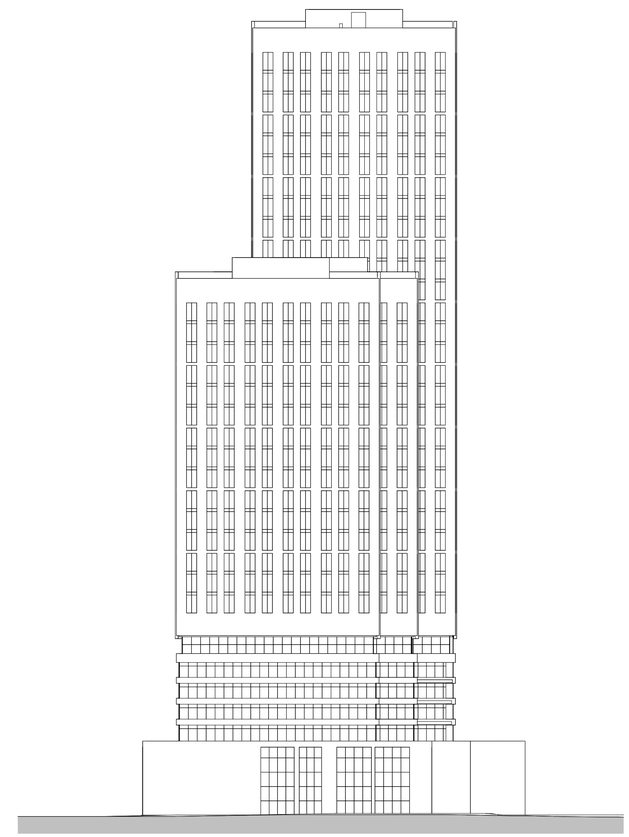


2 **West Elevation**
1 : 500

REVISIONS		TOC CONCEPT OF DESIGN ISSUED FOR COORDINATION 06/30/23 NOT FOR CONSTRUCTION	One Gannett Fleming Canada ULC & IBI Group			DRAWN Justin Jones CHECKED TBC CORRECT TBC SCALE 1 : 500	Project: SCARBOROUGH SUBWAY EXTENSION LES TOC ELEVATIONS	Contract: Package: METROLINX Dwg. No. Rev. No. Sheet No. ONT_SE300_TC4101



1 **East Elevation**
1 : 500



2 **South Elevation**
1 : 500

REVISIONS		TOC CONCEPT OF DESIGN ISSUED FOR COORDINATION 06/30/23 NOT FOR CONSTRUCTION	One Gannett Fleming Canada ULC & IBI Group			DRAWN Justin Jones CHECKED TBC CORRECT TBC SCALE 1 : 500	Project: SCARBOROUGH SUBWAY EXTENSION LES TOC ELEVATIONS	Contract: Package: METROLINX Dwg. No. ONT_SE300_TC4102 Rev. No. Sheet No.

APPENDIX B – DESIGN SHEETS

Consultant: One T+ (Gannett Fleming)

Date: 9/7/2023
Designed By: David Jackson
Checked By: Aimin Wang

CITY OF TORONTO
SANITARY SEWER CAPACITY ASSESSMENT

Lawrence East Station TOC - Scenario 1 - Existing Conditions Dry Weather Flow

File No:

Project Name: Scarborough Subway Extension
Sheet: 1 of 1

Pipe Data

Roughness Coefficient (n): Concrete Pipe: 0.013 Min. Pipe Size: 200 mm

PVC SDR 35: 0.013 Max. Velocity: 3 m/s

Flow Analysis

City of Toronto Analysis Parameters: Residential Flow Rate: 240 (L/C/d) Harmon Peaking Factor

ICI Flow Rate: 250 (L/C/d)

Flow Calculation

Pipe Capacity = $\frac{A * R^{2/3} * S^{1/2}}{n}$ where: A = Area S = Pipe Slope

R = Hydraulic Radius n = Roughness

Pipe Information					Area								Flows							Sewer Data													
			MH			Totals		Residential			ICI												Pipe Data								Pipe Performance				
Location ID	U-ID	Street	U/S	D/S	Catchment	Area	Accumulated Area	Population	Per Cap Flow	Flow	Population	Per Cap Flow	Flow	Total Average DWF Flow	Peaking Factor	Peaked Flow	I-I Flow	Total Flow	Development Flow	Total Flow in Pipe	Type of Pipe	Length	Pipe Diameter	Ground Elv. at U/S MH	U/S Invert	U/S Obvert	D/S Invert	D/S Obvert	Grade	Full Flow Velocity	Pipe Capacity at % Grade	% of Pipe Utilized	U/S Surcharge	U/S Freeboard
						(ha)	(ha)	(C)	(L/C/d)	(L/s)	(C)	(L/C/d)	(L/s)	(L/s)		(L/s)	(L/s)	(L/s)	(L/s)	(L/s)	"n"	(m)	(mm)	(m)	(m)	(m)	(m)	(m)		(m/s)	(l/s)	(%)	(m)	(m)
1	-	Lawrence Ave E	MH4594625189	MH4597225285	C.1	18.17	18.17	2015	240	5.60	1755	250	5.1	10.7	3.4	23.9	4.7	28.6	0	28.6	0.013	99.5	250	158	153.75	154	153.11	153.36	0.64%	1.01	49.6	58%	153.89	Freeflow
2	-	Lawrence Ave E	MH4597225285	MH4599925372	C.2	5.80	23.97	165	240	0.46	69	250	0.2	11.3	3.3	24.1	6.2	30.3	0	30.3	0.013	90.8	250	157.81	152.96	153.21	150.24	150.49	3.00%	2.18	107.0	28%	153.05	Freeflow
3	-	Lawrence Ave E	MH4599925372	MH4601825437	C.3	0.92	24.89	310	240	0.86	0	250	0.0	12.2	3.3	24.1	6.5	30.5	0	30.5	0.013	68.1	250	153.94	150.21	150.46	147.75	148	3.61%	2.39	117.4	26%	150.30	Freeflow
4	-	Lawrence Ave E	MH4601825437	MH4601825450	C.4	0.03	24.92	0	240	0	0	250	0.0	12.2	3.3	24.1	6.5	30.5	0	30.5	0.013	13.3	250	154.95	147.01	147.26	146.73	146.98	2.11%	1.83	89.7	34%	147.11	Freeflow
5	-	Lawrence Ave E	MH4601825450	MH4601525480	C.5	0.07	24.99	0	240	0	0	250	0.0	12.2	3.3	24.1	6.5	30.6	0	30.6	0.013	30.1	250	153.83	140.36	140.61	139.84	140.09	1.73%	1.65	81.2	38%	140.47	Freeflow
6	-	Lawrence Ave E	MH4601525480	MH4601825504	C.6	0.07	25.06	0	240	0	0	250	0.0	12.2	3.3	24.1	6.5	30.6	0	30.6	0.013	23.6	250	144.24	139.76	140.01	139.65	139.9	0.47%	0.86	42.2	72%	139.92	Freeflow
7	-	Lawrence Ave E	MH4601825504	MH4603725527	C.7	0.04	25.10	0	240	0	0	250	0.0	12.2	3.3	24.1	6.5	30.6	0	30.6	0.013	30.7	250	143.95	139.58	139.83	139	139.25	1.89%	1.73	84.9	36%	139.69	Freeflow

Consultant: One T+ (Gannett Fleming)

Date: 9/7/2023
Designed By: David Jackson
Checked By: Aimin Wang

CITY OF TORONTO
SANITARY SEWER CAPACITY ASSESSMENT

Lawrence East Station TOC - Scenario 2 - Proposed Conditions Dry Weather Flow

File No:

Project Name: Scarborough Subway Extension
Sheet: 1 of 1

Pipe Data

Roughness Coefficient (n): Concrete Pipe: 0.013 Min. Pipe Size: 200 mm

PVC SDR 35: 0.013 Max. Velocity: 3 m/s

Flow Analysis

City of Toronto Analysis Parameters: Residential Flow Rate: 240 (L/C/d) Harmon Peaking Factor

ICI Flow Rate: 250 (L/C/d)

Flow Calculation

Pipe Capacity = $\frac{A * R^{2/3} * S^{1/2}}{n}$ where: A = Area S = Pipe Slope

R = Hydraulic Radius n = Roughness

Pipe Information					Area								Flows							Sewer Data													
			MH			Totals		Residential			ICI												Pipe Data								Pipe Performance				
Location ID	U-ID	Street	U/S	D/S	Catchment	Area	Accumulated Area	Population	Per Cap Flow	Flow	Population	Per Cap Flow	Flow	Total Average DWF Flow	Peaking Factor	Peaked Flow	I-I Flow	Total Flow	Development Flow	Total Flow in Pipe	Type of Pipe	Length	Pipe Diameter	Ground Elv. at U/S MH	U/S Invert	U/S Obvert	D/S Invert	D/S Obvert	Grade	Full Flow Velocity	Pipe Capacity at % Grade	% of Pipe Utilized	U/S Surcharge	U/S Freeboard
						(ha)	(ha)	(C)	(L/C/d)	(L/s)	(C)	(L/C/d)	(L/s)	(L/s)		(L/s)	(L/s)	(L/s)	(L/s)	(L/s)	"n"	(m)	(mm)	(m)	(m)	(m)	(m)	(m)		(m/s)	(l/s)	(%)	(m)	(m)
1	-	Lawrence Ave E	MH4594625189	MH4597225285	C.1	18.17	18.17	2015	240	5.60	1755	250	5.1	10.7	3.4	23.9	4.7	28.6	0.0	28.6	0.013	99.5	250	158	153.75	154	153.11	153.36	0.64%	1.01	49.6	58%	153.89	Freeflow
2	-	Lawrence Ave E	MH4597225285	MH4599925372	C.2	5.80	23.97	165	240	0.46	69	250	0.2	11.3	3.3	24.1	6.2	30.3	0.0	30.3	0.013	90.8	250	157.81	152.96	153.21	150.24	150.49	3.00%	2.18	107.0	28%	153.05	Freeflow
3	-	Lawrence Ave E	MH4599925372	MH4601825437	C.3	0.92	24.89	310	240	0.86	0	250	0.0	12.2	3.3	24.1	6.5	30.5	3.7	34.3	0.013	68.1	250	153.94	150.21	150.46	147.75	148	3.61%	2.39	117.4	29%	150.31	Freeflow
4	-	Lawrence Ave E	MH4601825437	MH4601825450	C.4	0.03	24.92	0	240	0	0	250	0.0	12.2	3.3	24.1	6.5	30.5	3.7	34.3	0.013	13.3	250	154.95	147.01	147.26	146.73	146.98	2.11%	1.83	89.7	38%	147.12	Freeflow
5	-	Lawrence Ave E	MH4601825450	MH4601525480	C.5	0.07	24.99	0	240	0	0	250	0.0	12.2	3.3	24.1	6.5	30.6	3.7	34.3	0.013	30.1	250	153.83	140.36	140.61	139.84	140.09	1.73%	1.65	81.2	42%	140.48	Freeflow
6	-	Lawrence Ave E	MH4601525480	MH4601825504	C.6	0.07	25.06	0	240	0	0	250	0.0	12.2	3.3	24.1	6.5	30.6	3.7	34.3	0.013	23.6	250	144.24	139.76	140.01	139.65	139.9	0.47%	0.86	42.2	81%	139.94	Freeflow
7	-	Lawrence Ave E	MH4601825504	MH4603725527	C.7	0.04	25.10	0	240	0	0	250	0.0	12.2	3.3	24.1	6.5	30.6	3.7	34.3	0.013	30.7	250	143.95	139.58	139.83	139	139.25	1.89%	1.73	84.9	40%	139.69	Freeflow

Consultant: One T+ (Gannett Fleming)

Date: 9/7/2023
Designed By: David Jackson
Checked By: Aimin Wang

CITY OF TORONTO
SANITARY SEWER CAPACITY ASSESSMENT

Lawrence East Station TOC - Scenario 3 - Existing Conditions Wet Weather Flow

File No:

Project Name: Scarborough Subway Extension
Sheet: 1 of 1

Pipe Data

Roughness Coefficient (n): Concrete Pipe: 0.013 Min. Pipe Size: 200 mm

PVC SDR 35: 0.013 Max. Velocity: 3 m/s

Flow Analysis

City of Toronto Analysis Parameters: Residential Flow Rate: 240 (L/C/d) Harmon Peaking Factor

ICI Flow Rate: 250 (L/C/d)

Flow Calculation

Pipe Capacity = $\frac{A * R^{2/3} * S^{1/2}}{n}$ where: A = Area S = Pipe Slope

R = Hydraulic Radius n = Roughness

Pipe Information					Area								Flows							Sewer Data												
			MH			Totals		Residential			ICI									Pipe Data									Pipe Performance				
Location ID	U-ID	Street	U/S	D/S	Catchment	Area	Accumulated Area	Population	Per Cap Flow	Flow	Population	Per Cap Flow	Flow	Total Average DWF Flow	Peaking Factor	Peaked Flow	I-I Flow	Total Flow	Development Flow	Total Flow in Pipe	Type of Pipe	Length	Pipe Diameter	Ground Elv. at U/S MH	U/S Invert	U/S Obvert	D/S Invert	D/S Obvert	Grade	Full Flow Velocity	Pipe Capacity at % Grade	% of Pipe Utilized	U/S Surcharge	U/S Freeboard
						(ha)	(ha)	(C)	(L/C/d)	(L/s)	(C)	(L/C/d)	(L/s)	(L/s)		(L/s)	(L/s)	(L/s)	(L/s)	(L/s)	"n"	(m)	(mm)	(m)	(m)	(m)	(m)	(m)		(m/s)	(l/s)	(%)	(m)	(m)
1	-	Lawrence Ave E	MH4594625189	MH4597225285	C.1	18.17	18.17	2015	240	5.60	1755	250	5.1	10.7	3.4	23.9	54.5	78.4	0	78.4	0.013	99.5	250	158	153.75	154	153.11	153.36	0.64%	1.01	49.6	158%	155.73	Surcharge
2	-	Lawrence Ave E	MH4597225285	MH4599925372	C.2	5.80	23.97	165	240	0.46	69	250	0.2	11.3	3.3	24.1	71.9	96.0	0	96.0	0.013	90.8	250	157.81	152.96	153.21	150.24	150.49	3.00%	2.18	107.0	90%	153.15	Freeflow
3	-	Lawrence Ave E	MH4599925372	MH4601825437	C.3	0.92	24.89	310	240	0.86	0	250	0.0	12.2	3.3	24.1	74.7	98.7	0	98.7	0.013	68.1	250	153.94	150.21	150.46	147.75	148	3.61%	2.39	117.4	84%	150.39	Freeflow
4	-	Lawrence Ave E	MH4601825437	MH4601825450	C.4	0.03	24.92	0	240	0	4	250	0.0	12.2	3.3	24.1	74.8	98.8	0	98.8	0.013	13.3	250	154.95	147.01	147.26	146.73	146.98	2.11%	1.83	89.7	110%	147.58	Surcharge
5	-	Lawrence Ave E	MH4601825450	MH4601525480	C.5	0.07	24.99	0	240	0	0	250	0.0	12.2	3.3	24.1	75.0	99.0	0	99.0	0.013	30.1	250	153.83	140.36	140.61	139.84	140.09	1.73%	1.65	81.2	122%	141.09	Surcharge
6	-	Lawrence Ave E	MH4601525480	MH4601825504	C.6	0.07	25.06	0	240	0	10	250	0.0	12.2	3.3	24.1	75.2	99.3	0	99.3	0.013	23.6	250	144.24	139.76	140.01	139.65	139.9	0.47%	0.86	42.2	235%	140.62	Surcharge
7	-	Lawrence Ave E	MH4601825504	MH4603725527	C.7	0.04	25.10	0	240	0	0	250	0.0	12.2	3.3	24.1	75.3	99.4	0	99.4	0.013	30.7	250	143.95	139.58	139.83	139	139.25	1.89%	1.73	84.9	117%	140.53	Surcharge

Consultant: One T+ (Gannett Fleming)

Date: 9/7/2023
Designed By: David Jackson
Checked By: Aimin Wang

CITY OF TORONTO
SANITARY SEWER CAPACITY ASSESSMENT

Lawrence East Station - Scenario 4 - Proposed Conditions Wet Weather Flow

File No:

Project Name: Scarborough Subway Extension
Sheet: 1 of 1

Pipe Data

Roughness Coefficient (n): Concrete Pipe: 0.013 Min. Pipe Size: 200 mm

PVC SDR 35: 0.013 Max. Velocity: 3 m/s

Flow Analysis

City of Toronto Analysis Parameters: Residential Flow Rate: 240 (L/C/d) Harmon Peaking Factor

ICI Flow Rate: 250 (L/C/d)

Flow Calculation

Pipe Capacity = $\frac{A * R^{2/3} * S^{1/2}}{n}$ where: A = Area S = Pipe Slope

R = Hydraulic Radius n = Roughness

Pipe Information					Area								Flows							Sewer Data													
			MH			Totals		Residential			ICI												Pipe Data								Pipe Performance				
Location ID	U-ID	Street	U/S	D/S	Catchment	Area	Accumulated Area	Population	Per Cap Flow	Flow	Population	Per Cap Flow	Flow	Total Average DWF Flow	Peaking Factor	Peaked Flow	I-I Flow	Total Flow	Development Flow	Total Flow in Pipe	Type of Pipe	Length	Pipe Diameter	Ground Elv. at U/S MH	U/S Invert	U/S Obvert	D/S Invert	D/S Obvert	Grade	Full Flow Velocity	Pipe Capacity at % Grade	% of Pipe Utilized	U/S Surcharge	U/S Freeboard
						(ha)	(ha)	(C)	(L/C/d)	(L/s)	(C)	(L/C/d)	(L/s)	(L/s)		(L/s)	(L/s)	(L/s)	(L/s)	(L/s)	"n"	(m)	(mm)	(m)	(m)	(m)	(m)	(m)		(m/s)	(l/s)	(%)	(m)	(m)
1	-	Lawrence Ave E	MH4594625189	MH4597225285	C.1	18.17	18.17	2015	240	5.60	1755	250	5.1	10.7	3.4	23.9	54.5	78.4	0.0	78.4	0.013	99.5	250	158	153.75	154	153.11	153.36	0.64%	1.01	49.6	158%	154.54	Surcharge
2	-	Lawrence Ave E	MH4597225285	MH4599925372	C.2	5.80	23.97	165	240	0.46	69	250	0.2	11.3	3.3	24.1	71.9	96.0	0.0	96.0	0.013	90.8	250	157.81	152.96	153.21	150.24	150.49	3.00%	2.18	107.0	90%	153.15	Freeflow
3	-	Lawrence Ave E	MH4599925372	MH4601825437	C.3	0.92	24.89	310	240	0.86	0	250	0.0	12.2	3.3	24.1	74.7	98.7	3.7	102.5	0.013	68.1	250	153.94	150.21	150.46	147.75	148	3.61%	2.39	117.4	87%	150.40	Freeflow
4	-	Lawrence Ave E	MH4601825437	MH4601825450	C.4	0.03	24.92	0	240	0	4	250	0.0	12.2	3.3	24.1	74.8	98.8	3.7	102.6	0.013	13.3	250	154.95	147.01	147.26	146.73	146.98	2.11%	1.83	89.7	114%	147.58	Surcharge
5	-	Lawrence Ave E	MH4601825450	MH4601525480	C.5	0.07	24.99	0	240	0	0	250	0.0	12.2	3.3	24.1	75.0	99.0	3.7	102.8	0.013	30.1	250	153.83	140.36	140.61	139.84	140.09	1.73%	1.65	81.2	127%	141.09	Surcharge
6	-	Lawrence Ave E	MH4601525480	MH4601825504	C.6	0.07	25.06	0	240	0	10	250	0.0	12.2	3.3	24.1	75.2	99.3	3.7	103.0	0.013	23.6	250	144.24	139.76	140.01	139.65	139.9	0.47%	0.86	42.2	244%	140.62	Surcharge
7	-	Lawrence Ave E	MH4601825504	MH4603725527	C.7	0.04	25.10	0	240	0	0	250	0.0	12.2	3.3	24.1	75.3	99.4	3.7	103.2	0.013	30.7	250	143.95	139.58	139.83	139	139.25	1.89%	1.73	84.9	121%	140.53	Surcharge

Consultant: One T+ (Gannett Fleming)

Date: 9/7/2023
Designed By: David Jackson
Checked By: Aimin Wang

CITY OF TORONTO
SANITARY SEWER CAPACITY ASSESSMENT

Lawrence East Station - Scenario 5 - Proposed Conditions Dry Weather Flow

File No:

Project Name: Scarborough Subway Extension
Sheet: 1 of 1

Pipe Data

Roughness Coefficient (n): Concrete Pipe: 0.013 Min. Pipe Size: 200 mm

PVC SDR 35: 0.013 Max. Velocity: 3 m/s

Flow Analysis

City of Toronto Analysis Parameters: Residential Flow Rate: 240 (L/C/d) Harmon Peaking Factor

ICI Flow Rate: 250 (L/C/d)

Flow Calculation

Pipe Capacity = $\frac{A * R^{2/3} * S^{1/2}}{n}$ where: A = Area S = Pipe Slope

R = Hydraulic Radius n = Roughness

Pipe Information					Area								Flows							Sewer Data													
			MH			Totals		Residential			ICI												Pipe Data								Pipe Performance				
Location ID	U-ID	Street	U/S	D/S	Catchment	Area	Accumulated Area	Population	Per Cap Flow	Flow	Population	Per Cap Flow	Flow	Total Average DWF Flow	Peaking Factor	Peaked Flow	I-I Flow	Total Flow	Development Flow	Total Flow in Pipe	Type of Pipe	Length	Pipe Diameter	Ground Elv. at U/S MH	U/S Invert	U/S Obvert	D/S Invert	D/S Obvert	Grade	Full Flow Velocity	Pipe Capacity at % Grade	% of Pipe Utilized	U/S Surcharge	U/S Freeboard
						(ha)	(ha)	(C)	(L/C/d)	(L/s)	(C)	(L/C/d)	(L/s)	(L/s)		(L/s)	(L/s)	(L/s)	(L/s)	(L/s)	"n"	(m)	(mm)	(m)	(m)	(m)	(m)	(m)		(m/s)	(l/s)	(%)	(m)	(m)
1	-	Lawrence Ave E	MH4594625189	MH4597225285	C.1	18.17	18.17	2015	240	5.60	1755	250	5.1	10.7	3.4	23.9	4.7	28.6	0.0	28.6	0.013	99.5	250	158	153.75	154	153.11	153.36	0.64%	1.01	49.6	58%	153.89	Freeflow
2	-	Lawrence Ave E	MH4597225285	MH4599925372	C.2	5.80	23.97	165	240	0.46	69	250	0.2	11.3	3.3	24.1	6.2	30.3	0.0	30.3	0.013	90.8	250	157.81	152.96	153.21	150.24	150.49	3.00%	2.18	107.0	28%	153.05	Freeflow
3	-	Lawrence Ave E	MH4599925372	MH4601825437	C.3	0.92	24.89	310	240	0.86	0	250	0.0	12.2	3.3	24.1	6.5	30.5	3.7	34.3	0.013	68.1	250	153.94	150.21	150.46	147.75	148	3.61%	2.39	117.4	29%	150.31	Freeflow
4	-	Lawrence Ave E	MH4601825437	MH4601825450	C.4	0.03	24.92	0	240	0	4	250	0.0	12.2	3.3	24.1	6.5	30.6	3.7	34.3	0.013	13.3	300	154.95	147.01	147.31	146.73	147.03	2.11%	2.06	145.8	24%	147.11	Freeflow
5	-	Lawrence Ave E	MH4601825450	MH4601525480	C.5	0.07	24.99	0	240	0	0	250	0.0	12.2	3.3	24.1	6.5	30.6	3.7	34.3	0.013	30.1	300	153.83	140.36	140.66	139.84	140.14	1.73%	1.87	132.1	26%	140.47	Freeflow
6	-	Lawrence Ave E	MH4601525480	MH4601825504	C.6	0.07	25.06	0	240	0	10	250	0.0	12.2	3.3	24.1	6.5	30.6	3.7	34.4	0.013	23.6	375	144.24	139.76	140.135	139.65	140.025	0.47%	1.13	124.4	28%	139.90	Freeflow
7	-	Lawrence Ave E	MH4601825504	MH4603725527	C.7	0.04	25.10	0	240	0	0	250	0.0	12.2	3.3	24.1	6.5	30.6	3.7	34.4	0.013	30.7	375	143.95	139.58	139.955	139	139.375	1.89%	2.27	250.4	14%	139.68	Freeflow

Consultant: One T+ (Gannett Fleming)

Date: 9/7/2023
Designed By: David Jackson
Checked By: Aimin Wang

CITY OF TORONTO
SANITARY SEWER CAPACITY ASSESSMENT

Lawrence East Station - Scenario 6 - Proposed Conditions Wet Weather Flow

File No:

Project Name: Scarborough Subway Extension
Sheet: 1 of 1

Pipe Data

Roughness Coefficient (n): Concrete Pipe: 0.013 Min. Pipe Size: 200 mm

PVC SDR 35: 0.013 Max. Velocity: 3 m/s

Flow Analysis

City of Toronto Analysis Parameters: Residential Flow Rate: 240 (L/C/d) Harmon Peaking Factor

ICI Flow Rate: 250 (L/C/d)

Flow Calculation

Pipe Capacity = $\frac{A * R^{2/3} * S^{1/2}}{n}$ where: A = Area S = Pipe Slope

R = Hydraulic Radius n = Roughness

Pipe Information					Area								Flows							Sewer Data													
			MH			Totals		Residential			ICI												Pipe Data								Pipe Performance				
Location ID	U-ID	Street	U/S	D/S	Catchment	Area	Accumulated Area	Population	Per Cap Flow	Flow	Population	Per Cap Flow	Flow	Total Average DWF Flow	Peaking Factor	Peaked Flow	I-I Flow	Total Flow	Development Flow	Total Flow in Pipe	Type of Pipe	Length	Pipe Diameter	Ground Elv. at U/S MH	U/S Invert	U/S Obvert	D/S Invert	D/S Obvert	Grade	Full Flow Velocity	Pipe Capacity at % Grade	% of Pipe Utilized	U/S Surcharge	U/S Freeboard
						(ha)	(ha)	(C)	(L/C/d)	(L/s)	(C)	(L/C/d)	(L/s)	(L/s)		(L/s)	(L/s)	(L/s)	(L/s)	(L/s)	"n"	(m)	(mm)	(m)	(m)	(m)	(m)	(m)		(m/s)	(l/s)	(%)	(m)	(m)
1	-	Lawrence Ave E	MH4594625189	MH4597225285	C.1	18.17	18.17	2015	240	5.60	1755	250	5.1	10.7	3.4	23.9	54.5	78.4	0.0	78.4	0.013	99.5	250	158	153.75	154	153.11	153.36	0.64%	1.01	49.6	158%	154.54	Surcharge
2	-	Lawrence Ave E	MH4597225285	MH4599925372	C.2	5.80	23.97	165	240	0.46	69	250	0.2	11.3	3.3	24.1	71.9	96.0	0.0	96.0	0.013	90.8	250	157.81	152.96	153.21	150.24	150.49	3.00%	2.18	107.0	90%	153.15	Freeflow
3	-	Lawrence Ave E	MH4599925372	MH4601825437	C.3	0.92	24.89	310	240	0.86	0	250	0.0	12.2	3.3	24.1	74.7	98.7	3.7	102.5	0.013	68.1	250	153.94	150.21	150.46	147.75	148	3.61%	2.39	117.4	87%	150.40	Freeflow
4	-	Lawrence Ave E	MH4601825437	MH4601825450	C.4	0.03	24.92	0	240	0	4	250	0.0	12.2	3.3	24.1	74.8	98.8	3.7	102.6	0.013	13.3	300	154.95	147.01	147.31	146.73	147.03	2.11%	2.06	145.8	70%	147.20	Freeflow
5	-	Lawrence Ave E	MH4601825450	MH4601525480	C.5	0.07	24.99	0	240	0	0	250	0.0	12.2	3.3	24.1	75.0	99.0	3.7	102.8	0.013	30.1	300	153.83	140.36	140.66	139.84	140.14	1.73%	1.87	132.1	78%	140.57	Freeflow
6	-	Lawrence Ave E	MH4601525480	MH4601825504	C.6	0.07	25.06	0	240	0	10	250	0.0	12.2	3.3	24.1	75.2	99.3	3.7	103.0	0.013	23.6	375	144.24	139.76	140.135	139.65	140.025	0.47%	1.13	124.4	83%	140.03	Freeflow
7	-	Lawrence Ave E	MH4601825504	MH4603725527	C.7	0.04	25.10	0	240	0	0	250	0.0	12.2	3.3	24.1	75.3	99.4	3.7	103.2	0.013	30.7	375	143.95	139.58	139.955	139	139.375	1.89%	2.27	250.4	41%	139.75	Freeflow

FUS Calculation

The Fire Underwriters Survey Calculation has been prepared below.

Minimum Fire Flow F= 220C √A **Fire Resistive Construction** Yes

	Description			Value	Unit	Notes
Floor	Largest Floor Area		=	5197	m2	
	Below Grade Floor Area		=	14664	m2	
	Above Grade Floor Area		=	76336	m2	
	Total Floor Area		=	27947	m2	
Flow	C		=	0.6	dimensionless	
	A		=	27947	m2	
	F		=	22000	L/min	
Reduction Factor	F1		=	0.85	dimensionless	
	F'		=	19000	L/min	
Sprinkler Factor	F2		=	40.00%	%	(30% and 10%)
Exposures	North Side		=	0.00%	%	
	East Side		=	15.00%	%	
	South Side		=	15.00%	%	
	West Side		=	0.00%	%	
	F3		=	30.00%	%	
Fire Flow Determination	F'		=	19000	L/min	
	S	(F2)	=	7600	L/min	
	E	(F3)	=	5700	L/min	
	F"		=	17000	L/min	
	F"		=	283	L/s	
	F"		=	4491	USGPM	

Note, all exposure, sprinkler, and reduction factors are assumed based on the current layout of the site
Further review of floor areas and TOC layouts are required during subsequent assessements to confirm the exact fire flow

Consultant: One T+ (Gannett Fleming)

Date: 6/16/2021
Designed By: David Jackson
Checked By: Aimin Wong

CITY OF TORONTO
STORM SEWER CAPACITY ASSESSMENT
Scenario 1 - LES TOC Storm Sewer - Existing Conditions

File No:

Project Name: Scarborough Subway Extension
Sheet: 1 of 1

Pipe Data

Roughness Coefficient (n): Concrete Pipe: 0.013 | PVC SDR 35: 0.013

Min. Pipe Size: 200 mm
Max. Velocity: 3 m/s

Design Storm

IDF Coefficient

Design Storm	Year	A	C
Return Period	2	21.8	-0.78

Inlet Time (min) 10 *City of Toronto WWFM Guidelines*

Flow Calculation

Pipe Capacity = $\frac{A * R^{2/3} * S^{1/2}}{n}$ where:

A = Area
R = Hydraulic Radius
S = Pipe Slope
n = Roughness

Location Information					Runoff Calculation								Sewer Data									Pipe Capacity					
			MH																								
Location ID	U-ID	Street	U/S	D/S	Catchment	Area	C	A*C	Total A*C	Tin (min)	I (mm/hr)	Flow (cms)	Type of Pipe	Length	Pipe Diameter	Ground Elv. at U/S MH	U/S Invert	U/S Obvert	D/S Invert	D/S Obvert	Grade	Full Flow	Full Flow Velocity	Pipe Time	% of Pipe Utilized	U/S HGL	U/S Freeboard
1	STM2	Lawrence Ave	MH4594825186	MH4597725288	C.1	18.20	0.76	13.83	13.83	58.2	22.32	0.86	0.013	106.8	750	158.26	154.16	154.91	153.66	154.41	0.47%	0.76	1.73	1.03	112%	155.32	Surcharge
2	STM2	Lawrence Ave	MH4597725288	MH4599125333	C.2	5.50	0.9	4.95	18.78	59.23	22.02	1.15	0.013	46.7	750	157.33	153.63	154.38	152.08	152.83	3.32%	2.03	4.60	0.17	57%	154.03	Freeflow
3	STM2	Lawrence Ave	MH4599125333	MH4600325374	C.3	0.30	0.9	0.27	19.05	59.40	21.97	1.16	0.013	42.7	750	155.52	152.08	163.89	149.81	150.56	5.32%	2.57	5.82	0.12	45%	152.43	Freeflow
4	STM2	Lawrence Ave	MH4600325374	MH4601625422	C.4	0.90	0.9	0.81	19.86	59.52	21.94	1.21	0.013	50.1	750	153.71	149.81	150.56	147.08	147.83	5.45%	2.60	5.89	0.14	47%	150.17	Freeflow
5	STM2	Lawrence Ave	MH4601625422	OF4600725463	C.5	0.10	0.9	0.09	19.95	59.66	21.90	1.21	0.013	42.1	750	151.11	146.31	147.06	143.40	144.15	6.91%	2.93	6.63	0.11	41%	146.65	Freeflow

Time of Concentration Calculation:

Initial Time =	10	min
Longest Sewer Length =	664.9	m
Weigthed average pipe diameter	403	mm
Average Slope =	1.90%	%
Full Flow Velocity =	0.23	m/s
Time in Pipe=	48.2	min
Total Time =	**58.2**	**min**