FUNCTIONAL SERVICING & PRELIMINARY STORMWATER MANAGEMENT REPORT

1840 – 1850 BLOOR STREET EAST

CITY OF MISSISSAUGA
REGION OF PEEL

PREPARED FOR:

RANEE MANAGEMENT

PREPARED BY:

C.F. CROZIER & ASSOCIATES INC.
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FEBRUARY 19, 2020

CFCA FILE NO. 1788-5378

CROZIER
CONSULTING ENGINEERS

Revision Number	Date	Comments
Rev. 0	February 14, 2020	Issued for 1ST Submission
Rev. 1	February 19, 2020	Re-Issued for 1ST Submission

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1.0 Introduction

C.F. Crozier & Associates Inc. (Crozier) was retained by Ranee Management to prepare a Functional Servicing & Preliminary Stormwater Management Report to support the Official Plan and Zoning By-Law Amendment applications for the proposed infill development located at 1840 – 1850 Bloor Street East in the City of Mississauga, Regional Municipality of Peel (Peel Region).

This report provides information about the water and sanitary servicing as well as stormwater management according to the applicable standards and requirements of the City of Mississauga, Peel Region and TRCA.

2.0 Site Description

The subject property in its entirety is approximately 3.93 ha and currently consists of two (2) 14-storey residential apartment buildings with associated underground and surface parking areas, as well as landscaped areas. The site is bound by:

- Bloor Street to the North
- A residential apartment complex to the East beyond a servicing easement
- Commercial/ Industrial buildings to the South
- A Hydro Corridor to the West

The proposed development is an infill in the back of the property. Envisioned for the development are two (2) 18-storey residential towers connected with a 4-storey podium, one level of underground parking and a 3-storey above grade parking structure. The proposed residential development will have an individual municipal address. In addition to the construction of the new buildings, the existing internal roadway, surface parking and associated landscaping will be modified as required to accommodate the development and improve traffic flow.

3.0 Water Servicing

The Region of Peel is responsible for the operation and maintenance of the public water supply and treatment system in the City of Mississauga. Any local water supply system will connect to the Region's municipal water network.

3.1 Existing Water Servicing

A review of City of Mississauga and Peel Region as-constructed drawings indicate that there is an existing 300mm diameter PVC watermain on the north-side of Bloor Street (Peel Region drawing 57349-D dated as-recorded Oct. 24, 2017).

Review of the Subsurface Utility Plan prepared (Onsite Locates, December 16, 2019) shows that existing Building A and B both have individual water connections to the 300mm PVC watermain along Bloor Street. The plan also shows one (1) fire hydrant located on site, approximately half-way between Building A and B, south of the entrance road connecting the two surface parking lots.

3.2 Design Water Demand

The Region of Peel Linear Infrastructure Sanitary Sewer Manual (March 2017) was used to determine the equivalent population estimate for the existing and proposed buildings. Table 1 uses a unit rate occupancy density of 2.7 persons/unit to determine the equivalent population for each building. The detailed calculations are provided in Appendix A.

Table 1: Equivalent Population Estimate

Type	Building	Number of Units	Total Persons
Existing	A	167	451
	B	167	451
Proposed	C & D	433	1169
Site Total	**--**	**767**	**2071**

The total population for the proposed buildings is 1169 persons which brings the site total to 2071 including the existing buildings.

The Region of Peel Linear Infrastructure Watermain Design Criteria (June 2010) was used to determine the maximum domestic water demand generated by the proposed development based on the equivalent population estimate. An average daily water demand of 280 L/cap/day was used. Table 2 summarizes the estimated design water demand. Appendix A contains detailed water demand calculations.

Table 2: Existing/ Proposed Domestic Water Demand

Standard	Building	Average Daily Demand (L/s)	Maximum Daily Demand (L/s)	Peak Hourly Demand (L/s)
Region of Peel Public Works Design, Specification & Procedures Manual – Linear Infrastructure Watermain Design Criteria (June 2010)	Existing Buildings A and B	2.92	5.85	8.77
	Proposed Buildings C and D	**3.79**	**7.58**	**11.37**
	Entire Site Total	*6.71*	*13.42*	*20.13*

Note: Site total domestic water demand is the sum of the existing buildings and proposed buildings.

For this application, the domestic water service for proposed building C & D will be designed to convey a water demand equivalent to the peak hourly demand shown in Table 2.

3.3 Fire Flow Demand

The Fire Underwriters Survey (FUS) method was used to estimate the fire flow demand for each building within the proposed development area. This calculation estimates the preliminary watermain size required to service each building for fire protection and does not provide a recommendation for fire protection. We assume the towers have non-combustible construction and therefore, a construction coefficient of 0.8 was applied to the fire flow calculations (Water Supply for Public Fire Protection by Fire Underwriters Survey, 1999). We assume the proposed residential buildings will be equipped with automatic sprinkler systems which reduces the initial fire flow demand of each building by up to 50%. Each automated sprinkler system is to be designed by the Mechanical Engineer; therefore, the detailed design of the system is not included in this report. Table 3 summarizes the required fire flow demand and duration of flow required for the proposed buildings C & D.

Table 3: Estimated Fire Flow Demand

Method	Demand Flow (L/s)	Duration (h)
Water Supply for Public Fire Protection by Fire Underwriters Survey (1999)	116.7	2.0

Note: Floor area was determined by the largest floor plus 25% of each of the two immediately adjoining floors

As shown in Table 3, the proposed fire line is required to accommodate a fire flow demand of 116.7 L/s for a duration of 2.0 hours. This is based on the fire flow demand of Level 08, with floor area of 1953.6 m^2 and 25% of the adjoining floors, for total area of 2930.4 m^2.

Refer to Appendix A for detailed calculations of the proposed fire flow.

3.4 Proposed Water Servicing

The proposed development will have a single connection into the existing 300mm diameter PVC watermain on the north-side of Bloor Street. The connection will split at the property line into an individual 100mm diameter domestic water service and individual 200mm diameter fire line. The services will extend to the underground parking limit for the new buildings. The existing buildings will continue to use their existing water connections.

The proposed water servicing plan is shown on Figure 1 – Preliminary Site Servicing. The Mechanical Engineer will design the internal private water system including the internal sprinkler system within the building and underground parking structure.

4.0 Sanitary Servicing

Peel Region is responsible for the operation and maintenance of the public sewage collection and treatment system in the City of Mississauga. Any local sewage system will connect to the Region's municipal sanitary sewage network.

4.1 Existing Sanitary Servicing

A review of City of Mississauga and Peel Region as-constructed drawings indicate that there is an existing 375mm diameter PVC sanitary sewer running east-west on the north-side of Bloor Street and an existing 825mm concrete sanitary sewer running north-south adjacent to the property, according to Peel Region drawing 57349-D dated as-recorded Oct. 24, 2017. The 825mm concrete sewer is shown on the as-constructed drawing C-6460, dated December 8, 1964.

Review of the Subsurface Utility Plan prepared by Onsite Locates and dated December 16, 2019 shows that existing Building A and B both have individual sanitary connections. Building A outlets to a manhole at the property line within the site's driveway, which ultimately outlets to the 375mm sanitary sewer on Bloor Street. Building B is assumed to outlet to a manhole adjacent to the surface parking lot, this manhole conveys sanitary flows to the north-south 825mm sanitary sewer in the easement adjacent to the property.

4.2 Design Sanitary Flow

The sanitary design flow for the subject property was calculated using the Region of Peel Public Works Design, Specifications & Procedures Manual – Linear Infrastructure Sanitary Sewer Manual (March 2017) and the equivalent population estimate described in Section 3.2. A unit sewage flow of 302.8 L/cap/d was used, and infiltration flow and a peaking factor were applied to the unit sewage flow to obtain the total estimated design sewage flow.

A summary of the results is presented in 4, and detailed calculations are provided in Appendix B.

Table 4: Existing/Proposed Sanitary Design Flows

Standard	Building	**Average Flow** (L/s)	***Peaking Factor**	**Peak Flow** (L/s)	**Infiltration Flow** (L/s)	**Total Flow** (L/s)
Region of Peel Public Works Design, Specification & Procedures Manual – Linear Infrastructure Sanitary Sewer Manual (March 2017)	Existing Buildings A and B	3.16	3.83	12.10	0.35	12.45
	Proposed Buildings C and D	**4.10**	**3.76**	**15.39**	**0.36**	**15.75**
	Entire Site Total	*7.26*	-	*27.49*	*0.71*	*28.19*

Note: Site total sanitary flow is the sum of the existing buildings and proposed buildings.

The proposed sanitary service for Buildings C and D must convey a total design sanitary demand according to the total flow indicated in Table 4.

4.3 Proposed Sanitary Servicing

The development is proposed to be serviced by a 200mm diameter sanitary sewer at a slope of 2% which has a capacity of 46 L/s. The service lateral capacity exceeds the sanitary design flow and therefore is sufficient to convey the flow. The service lateral with extend from the underground parking structure to the existing 825mm concrete sanitary sewer in the easement. The existing buildings A and B will continue to use their respective individual connections. The proposed sanitary servicing plan is shown on Figure 1 – Preliminary Site Servicing. The internal building plumbing will be designed by the Mechanical Engineer's details and specifications.

5.0 Drainage Conditions

5.1 Existing Drainage

The subject property currently consists of two (2) 14-storey residential apartment buildings with associated underground and surface parking areas, as well as landscaped areas.

According to the Subsurface Utility Plan prepared (Onsite Locates, December 16, 2019) the following storm sewers exist in proximity to the site:

- A 1350mm diameter storm sewer conveys stormwater between Bridgewood Drive and Bloor Street
- A 525mm diameter storm sewers existing on the south side of Bloor Street to convey stormwater east along Bloor Street
- A 375mm diameter storm sewer exists from the site to the existing 525mm storm sewer on Bloor Street

According to the topographic survey completed by Speight, Van Nostrand & Gibson Limited (Ref No. 1-775 PEEL) the existing topography splits the stormwater flows into the following catchments:

- Catchments UC01 and UC02 (0.14ha total): No minor system controls. Conveys major system drainage uncontrolled to the Bloor Street right-of-way
- Catchments 101 and 102 (2.11 ha): Minor system drainage is collected in internal storm sewer networks with respective connections to Bloor Street municipal storm sewer. Major system drainage is conveyed overland to a low-point of 127.31 along the north-east property line and is ultimately conveyed through the easement.
- Catchment UC03: No minor system controls. Conveys major system drainage overland to a low-point of 127.31 along the north-east property line and is ultimately conveyed through the easement
- Catchment UC04: No minor system controls. Conveys major system drainage overland to the south-east property line

A subsurface utility locate survey prepared by Onsite Locates (December 2019) indicates that each existing building has its own individual internal storm sewer network complete with area drains and catch basins. Each building's network has an individual storm outlet to a municipal storm sewer in the Bloor Street R.O.W. Building A (Catchment 101) conveys stormwater from a property line manhole through a 375mm diameter sewer to an existing storm manhole within the Bloor Street R.O.W. Stormwater is then conveyed east through an existing 525mm diameter sewer. Building B (Catchment 102) conveys stormwater via a property line manhole through a 525mm diameter sewer to an existing storm manhole within the Bloor Street R.O.W. Stormwater is then conveyed east through an existing 600mm diameter sewer.

The existing drainage conditions are illustrated on Figure 3 – Pre- Development Drainage Plan.

5.2 Proposed Drainage

The proposed development, as described in Section 2.0 is a residential tower infill complete with two (2) 18-storey residential towers connected with a 4-storey podium, one level of underground parking and a 3-storey above grade parking structure. In addition to the construction of the new buildings, the existing internal roadway, surface parking and associated landscaping will be modified as required to accommodate the development and improve traffic flow.

The proposed drainage design generally maintains the site elevations and the general drainage divide, however due to the new roadway layout and new curbs for the entire site, Catchment 203, as shown on Figure 2 - Post-Development Drainage Plan, will accept stormwater from the existing building catchments now 201 and 202, for Building A and Building B, respectively. A portion of the uncontrolled flow from UC03 will be reduced as it is to be captured in Catchment 203. The uncontrolled areas UC01 and UC02 at the top of the site fronting Bloor Street will remain unchanged. The main overland flow route for the site will continue to utilize the outlet on the east side to the easement adjacent to the property.

The grading of the site results in the following catchments:

- Catchments UC01 and UC02 (0.14ha total): Maintains existing drainage pattern, conveys major system drainage uncontrolled to the Bloor Street right-of-way

- Catchment UC03 (0.24): Maintains existing drainage pattern but reduced catchment area, conveys major system drainage overland to a low-point of 127.31 along the north-east property line and is ultimately conveyed through the easement

- Catchment 201 (0.63 ha) – Maintains existing drainage pattern. Minor system flows are conveyed from Building A through internal storm system and discharge controlled to a 525mm sewer in the Bloor Street R.O.W. Catchment has been reduced in post-development scenario due to site grading.
- Catchment 202 (1.10 ha) – Maintains existing drainage pattern. Minor system flows are conveyed from Building B through internal storm system and discharge controlled to a 600mm sewer in the Bloor Street R.O.W. Catchment has been reduced in post-development scenario due to site grading.

- Catchment 203 (1.81 ha) – Conveys minor system stormwater flows controlled to the existing 525mm storm sewer located in Bloor Street R.O.W. Catchment receives a portion of drainage from existing catchments 101 and 102 due to grading (now 201 and 202, respectively). Major system drainage is maintained, stormwater still flows overland to a low-point of 127.31 along the north-east property line and is ultimately conveyed through the easement.

The proposed conditions are illustrated on Figure 4 – Post-Development Drainage Plan. As shown in Figure 4, stormwater runoff from the proposed development, catchment 203 will be captured in catch basins and area drains located throughout the roadway and parking surfaces. A swale and ditch inlet catch basin will be utilized along the back of the building to collect stormwater. Minor system drainage will be conveyed to a stormwater tank located within the underground parking structure. From the stormwater tank, stormwater will be conveyed via the proposed internal storm sewer system to a property line manhole which will then outlet to a storm manhole in the Bloor Street R.O.W., ultimately discharging into the existing 525mm concrete sewer.

6.0 Stormwater Management

Upon reviewing the Toronto and Region Conservation Authority (TRCA) Regulation Mapping, we found that the site is located within the Etobicoke Creek watershed but is outside TRCA regulated area. Due to the site's proximity to Etobicoke Creek however, the stormwater management quantity control criteria are governed by the 'Etobicoke Creek Stormwater Management Quantity Control Release Rates' document. The site stormwater management criteria for the proposed development will abide by the City of Mississauga standards and the Etobicoke Creek Stormwater Management Quantity Control Release Rates' document. The governing stormwater management criteria include:

<u>Water Quantity Control</u>

Peak flows from the post-development will be controlled to the unit flow rates provided by the TRCA in the Etobicoke Creek Stormwater Management Quantity Control Release Rates, Table 11 for City of Mississauga Catchment ID No. 213.

<u>Water Quality Control</u>

Private stormwater discharging from the proposed development must achieve Ontario Ministry of the Environment, Conservation and Parks (MOECP) Enhanced Level of protection (80% total suspended solids (TSS) removal) for water quality control prior to discharging to the City's storm sewer network.

<u>Water Balance</u>

Retention of the first 5 mm of rainfall for private development areas is required by the City of Mississauga Development Requirements Manual (September 2016) to achieve the water balance criteria.

6.1 Stormwater Quantity Control

The subject site requires that the TRCA's Etobicoke Creek Stormwater Management Quantity Control Release Rates be used to calculate the target release rates for the site. The predicted unit peak runoff rates for Catchment ID No. 213 were used. The pre-development run-off was calculated using the 1.81ha catchment area created in the post-development scenario. This catchment is for the new Buildings C and D, and accepts some drainage that used to be captured in the catchments for Buildings A and B.

Using the City of Mississauga intensity-duration frequency data (IDF), the Modified Rational Method was used to determine the post-development peak flow rates for stormwater runoff for Catchment 203. The amount of on-site storage was determined by comparing the post-development peak flow rates to the maximum allowable release rates for each storm event.

Stormwater runoff for Catchment 203 is proposed to discharge to the municipal storm sewer in Bloor Street via a proposed 300mm diameter storm sewer at a 1% slope that extends from the underground parking for Buildings C and D.

The stormwater runoff from Catchments UC01 and UC02 will remain unchanged, and runoff from Catchments 201, 202 and UC03 will be reduced from their pre-development conditions. Since these catchments are unchanged or reduced from the pre-development scenario, no stormwater management controls were included or revised for these areas.

Table 5: Summary of Peak Flows and Storage Volumes (Catchment 203)

Storm Event (Year)	**Catchment 203 Peak Flow Rate** (L/s) — **Post Development** — **Allowable Release Rate**[1]	**Catchment 203 Peak Flow Rate** (L/s) — **Post Development** — **Provided Release Rate** (100mm orifice)	**Storage Required with 100mm Orifice** (m^3)
2	31.49	20.72	271.88
5	48.15	24.64	375.10
10	61.178	27.75	469.82
25	83.80	31.63	603.83
50	98.46	35.33	747.53
100	113.67	38.31	875.00

1 Based on Etobicoke Creek Unit Flow Rates

As shown in Table 5, using a 100mm orifice tube, the pre-development peak stormwater flows for Catchment 203 are controlled to below the allowable release rate based on the Etobicoke Creek Unit Flow Rates. 875 m^3 of on-site storage is required during the 100-year post-development storm event to meet the Etobicoke Creek Unit Flow Rates. The storage volume will be provided through an orifice tube downstream of an underground stormwater tank. The underground stormwater tank, built into the underground parking structure, will be sized to hold the required storage volume. Detailed tank sizing will be provided by the Architect during detailed design when the underground parking structure design is finalized. Appendix C contains the orifice sizing calculations.

6.2 Stormwater Quality Control

Stormwater quality controls for the site must incorporate measures to provide an Enhanced Level of Protection (Level 1) according to the MOECP (March 2003) guidelines. Enhanced water quality protection involved the removal of at least 80% of TSS from 90% of the annual runoff volume. Water quality control will be provided using an oil/grit separator (OGS).

A treatment train approach including an OGS and LID measures will be used to achieve the stormwater quality control criteria. A Stormceptor EF8 will be provided downstream of the underground stormwater tank and orifice tube, to provide quality control for Buildings C and D prior to discharging to the City's storm sewer network.

The new Stormceptor EF/EFO model's sized for 60% removal of the ETV PSD is comparable to sizing for 80% removal of the Stormceptor Fine PSD. The sizing results in Appendix C reflects this qualification. A technical bulletin explaining the equivalency is included in Appendix C.

In addition, the roof drains will be directed towards a bioswale at the rear of the building. The bioswale will provide pre-treatment of stormwater runoff prior to entering the internal storm sewer network. The bioswale will be detailed during detailed design but will include an underdrain and a flat bottom.

6.3 Water Balance

As stated by the City of Mississauga Development Requirements Manual (September 2016), the minimum requirement to promote water balance is retention of the 5 mm rainfall event. The water balance retention volume was calculated considering initial abstraction of runoff based on impervious areas. Table 6 describes the dead storage volume required below the invert of each underground tank to satisfy the water balance criteria.

Table 6: Water Balance Storage Requirement

Standard	Criteria	Impervious Area (ha)	Storage Required (m^3)
City of Mississauga Development Requirements Manual (September 2016)	Retention of first 5mm	1.81	90.50

Once the final plan area of the underground stormwater tank has been established during detailed design, a depth will be indicated to achieve the required volume. Water in dead storage can be reused throughout the development as grey water or for irrigation purposes. On-site LID's illustrated can also be used for water balance and will be detailed in the detailed design stage.

6.4 Sustainable Stormwater Management

Low Impact Development (LID) strategies will be considered for use throughout the proposed development during the detailed design stage. The following LID strategies may be applicable for this site:

- **Rainwater Harvesting**: With minimal pretreatment, the captured rainwater within the underground storage tanks can be used for outdoor non-potable water uses such as irrigation, or in the buildings as gray water.
- **Green Roofs**: This method is beneficial due to its water quality, water balance, and peak flow control benefits. In addition to water resource management, green roofs improve energy efficiency, reduce urban heat island effects, and create greenspace for passive recreation.
- **Enhanced Grass Swale and Bioretention**: Enhanced grass swales are designed to convey, treat and attenuate stormwater runoff. This feature slows the water to allow sedimentation, filtration through the soil matrix, evapotranspiration, and infiltration into the underlying native soil. Bioretention methods, such as rain gardens and stormwater planters, allow to temporarily store, treat and infiltrate runoff. It is typically designed to capture small storm events. Where underground parking facilities exists, infiltration is not a feasible option.
- **Permeable Pavement**: Porous asphalt, pervious concrete, permeable paver and plastic grid filled with gravel can be used for driveways and walkways to reduce the amount of impervious area throughout the site. This approach encourages infiltration and reduces runoff volumes. Again, where underground parking facilities exists, infiltration is not an option.
- **Enhanced Topsoil**: Enhanced topsoil provides water quality benefits in addition to water balance storage which will reduce the infrastructure required to store the required water balance volume.

LID strategies and an overall treatment train approach, where possible, will be specified during detailed design.

7.0 Conclusions and Recommendations

The proposed development can be serviced for water, sanitary, and stormwater in accordance with the City of Mississauga and TRCA requirements and standards. Our conclusions and recommendations include:

1. Existing buildings A and B will maintain their existing water, storm, and sanitary servicing schemes. Drainage catchments for the existing buildings will be reduces as a result of the site grading.

2. Water demand for proposed Buildings C and D will be provided using a 200 mm diameter fire line and 100 mm diameter domestic line extending from the existing 300mm diameter watermain located in the Bloor Street R.O.W.

3. Sanitary servicing for Buildings C and D will be provided with a 200mm diameter sanitary sewer at a slope of 1% extending from the existing 825mm concrete sanitary sewer in the easement adjacent to the property.

4. Stormwater runoff from Catchment 203 will flow controlled per the TRCA Unit Flow Rates and will outlet to the 525mm storm sewer located in the Bloor Street R.O.W. Quantity control has been provided using an underground stormwater tank and an orifice tube to match the Etobicoke Creek Unit Flow rates.

5. Water quality for Catchment 203 will be provided through a treatment train approach including a bioswale and an OGS (Stormceptor Model EF8 or equivalent) to achieve enhanced protection (80% TSS removal).

6. Water balance for the Site will be provided through the retention of the 5 mm rainfall event as dead storage below the invert in each stormwater tank.

Based on the above conclusions we support the proposed development application from the perspective of water supply, sanitary servicing, and stormwater management.

Respectfully submitted,

C.F. CROZIER & ASSOCIATES INC.

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Land Development

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Land Development

DD/ns

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APPENDIX A

Water Demand Calculations

Connection Demand Table

WATER CONNECTION

Connection point [3]			
Pressure zone of connection point		2	
Total equivalent population to be serviced [1]		1169	
Total lands to be serviced		1.81 ha	
Hydrant flow test			
Hydrant flow test location			
	Pressure (kPa)	Flow (in l/s)	Time
Minimum water pressure			
Maximum water pressure			

No.	**Water demands – Phase 1**		
	Demand type	**Demand**	**Units**
1	Average day flow	3.79	l/s
2	Maximum day flow	7.58	l/s
3	Peak hour flow	11.73	l/s
4	Fire flow [2]	116.70	l/s
Analysis			
5	Maximum day plus fire flow	139.80	l/s

WASTEWATER CONNECTION

Phase 2

Connection point [4]		
Total equivalent population to be serviced		1169 persons
Total lands to be serviced		1.81 ha
6	Wastewater sewer effluent (in l/s)	15.75

[1] Please refer to design criteria for population equivocates
[2] Please reference the Fire Underwriters Survey Document
[3] Please specify the connection point ID
[4] Please specify the connection point (wastewater line or manhole ID)
Also, the “total equivalent population to be serviced” and the “total lands to be serviced” should reference the connection point. (the FSR should contain one copy of Site Servicing Plan)

Please include the graphs associated with the hydrant flow test information table
Please provide Professional Engineer's signature and stamp on the demand table
All required calculations must be submitted with the demand table submission.

CROZIER & ASSOCIATES Consulting Engineers

Project: 1840 - 1850 Bloor Street East
Address: 1840 - 1850 Bloor Street East
Project No.: 1788-5378

Date: 02.14.2020
Revised: -
Design: DD
Check: NS

Existing Population Estimate

Existing Buildings	Residential (# of units)
Building A	167
Building B	167
TOTAL	334

Residential Population:

Apartment:	2.7	persons/unit
Residential Population:	**902**	persons
EXISTING POPULATION	**902**	persons

Source: Peel Region Public Works Design Criteria Manual - Sanitary Sewer, Modified March 2017.

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CROZIER & ASSOCIATES Consulting Engineers

Project: 1840 - 1850 Bloor Street East
Address: 1840 - 1850 Bloor Street East
Project No.: 1788-5378

Date: 02.14.2020
Revised: -
Design: DD
Check: NS

Proposed Population Estimate

	Residential (# of units)
Proposed Buildings	
Building C	218
Building D	215
TOTAL	433

Residential Population:

Apartment:	2.7	persons/unit
Residential Population:	**1169**	persons
PROPOSED POPULATION:	**1169**	persons

Source: Peel Region Public Works Design Criteria Manual - Sanitary Sewer, Modified March 2017.

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CROZIER & ASSOCIATES
Consulting Engineers

Project: 1840 - 1850 Bloor Street East
Address: 1840 - 1850 Bloor Street East
Project No.: 1788-5378

Date: 02.14.2020
Revised: -
Design: DD
Check: NS

Existing Water Demand - Builings A and B

Population Estimate:

Residential: 902 persons

Design Criteria:

Average Consumption Rate:	0.280	m^3/cap.day
Maximum Daily Demand Peaking Factor:	2.00	
Maximum Hourly Demand Peaking Factor:	3.00	

Source: Peel Region Public Works Watermain Design Criteria, June 2010.

Residential Demand:

Average Daily Demand:	252.50	m^3/day
	2.92	L/s
Maximum Daily Demand:	505.01	m^3/day
	5.85	L/s
Maximum Hourly Demand:	757.51	m^3/day
	8.77	L/s

Existing Average Daily Demand:	2.92	L/s
Existing Maximum Daily Demand:	5.85	L/s
Existing Maximum Hourly Demand:	8.77	L/s

CROZIER & ASSOCIATES Consulting Engineers

Project: 1840 - 1850 Bloor Street East
Address: 1840 - 1850 Bloor Street East
Project No.: 1788-5378

Date: 02.14.2020
Revised: -
Design: DD
Check: NS

Proposed Water Demand - Buildings C and D

Population Estimate:

Residential:	1169	persons

Design Criteria:

Average Consumption Rate:	0.280	m^3/cap.day
Maximum Daily Demand Peaking Factor:	2.00	
Maximum Hourly Demand Peaking Factor:	3.00	

Source: Peel Region Public Works Watermain Design Criteria, June 2010.

Residential Demand:

Average Daily Demand:	327.35	m^3/day
	3.79	L/s
Maximum Daily Demand:	654.70	m^3/day
	7.58	L/s
Maximum Hourly Demand:	982.04	m^3/day
	11.37	L/s

Proposed Average Daily Demand:	**3.79**	L/s
Proposed Maximum Daily Demand:	**7.58**	L/s
Proposed Maximum Hourly Demand:	**11.37**	L/s

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CROZIER & ASSOCIATES Consulting Engineers

Project: 1840 - 1850 Bloor Street East
Project No.: 1788-5378

Date: 01.20.2020
Designed By: DD
Checked By: NS

Buildings C and D - Fire Flow Calculations - Fire Underwriters Survey Method

Water Supply for Public Fire Protection (1999)
Fire Underwriters Survey
Notes:

1.) The development will use ordinary construction (C-value = 1.0).
2.) The building is assumed to have no automatic sprinkler protection.
3.) The building is classified as a low hazard occupancy as per the appendix of the Water Supply for Public Fire Protection (1999) by FUS.

Part II - Guide for Determination of Required Fire Flow

1. An estimate of fire flow required for a given area may be determined by the formula:

$$F = 220 * C * \sqrt{A}$$

Where:

F = the required fire flow in litres per minute
C = coefficient related to the type of construction
= 1.5 for wood frame construction (structure essentially all combustible)
= 1.0 for ordinary construction (brick or other masonry walls, combustible floor and interior)
= 0.8 for non-combustible construction (unprotected metal structural components)
= 0.6 for fire-resistive construction (fully protected frame, floors, roof)
A = The total floor area in square metres (including all storeys, but excluding basements at least 50 percent below grade) in the building considered.

Proposed Development

0.8	C-Value	Largest Floor	1953.6 sq.m	Note: Level 08
		(Plus 25% of Adjoining Floors)	976.8 sq.m	
			2930.4 sq.m	

Therefore F = 9,500 L/min

Fire flow determined above shall not exceed:
30,000 L/min for wood frame construction
30,000 L/min for ordinary construction
25,000 L/min for non-combustible construction
25,000 L/min for fire-resistive construction

2. Values obtained in No. 1 may be reduced by as much as 25% for occupancies having low contents fire hazard or may be increased by up to 25% surcharge for occupancies having a high fire hazard.

Non-Combustible	-25%	Free Burning	15%
Limited Combustible	-15%	Rapid Burning	25%
Combustible	0% (No change)		

-15% Reduction(%)
-1,425 L/min reduction

Subtotal = 8,075 L/min

Note: Flow determined shall not be less than 2,000 L/min

3. Sprinklers - The value obtained in No. 2 above may be reduced by up to 50% for complete automatic sprinkler protection.

☒ **Assume complete automatic sprinkler protection (50% reduction)**
-4,038 L/min reduction

Water Supply for Public Fire Protection - 1999
Fire Underwriters Survey

Part II - Guide for Determination of Required Fire Flow

4. Exposure - To the value obtained in No. 2, a percentage should be added for structures exposed within 45 metres by the fire area under consideration. The percentage shall depend upon the height, area, and construction of the building(s) being exposed, the separation, openings in the exposed building(s), the length and height of exposure, the provision of automatic sprinklers and/or outside sprinklers in the building(s) exposed, the occupancy of the exposed building(s) and the effect of hillside locations on the possible spread of fire.

Separation	Charge	Separation	Charge
0 to 3 m	25%	20.1 to 30 m	10%
3.1 to 10 m	20%	30.1 to 45 m	5%
10.1 to 20 m	15%	>45 m	0%

Exposed buildings

Name	Distance (m)	Charge	Surcharge (L/min)
North	30	10%	808
East	n.a	0%	0
South	12	15%	1,211
West	n/a	0%	0
		Total Surcharge	**2,019**

Determine Required Fire Flow

No.1	9,500			
No. 2	-1,425	reduction		
No. 3	-4,038	reduction		
No. 4	2,019	surcharge		
Required Flow:	**6,056**	**L/min**		
Rounded to nearest 1000 L/min:	**7,000**	**L/min**	or	**116.7 L/s**
				1,848.0 USGPM

Note: USGPM = 0.264*(L/min)

Required Duration of Fire Flow	
Flow Required (L/min)	Duration (hours)
2,000 or less	1.00
3,000	1.25
4,000	1.50
5,000	1.75
6,000	**2.00**
8,000	**2.00**
10,000	2.00
12,000	2.50
14,000	3.00
16,000	3.50
18,000	4.00
20,000	4.50
22,000	5.00
24,000	5.50
26,000	6.00
28,000	6.50
30,000	7.00
32,000	7.50
34,000	8.00
36,000	8.50
38,000	9.00
40,000 and over	9.50

APPENDIX B

Sanitary Sewage Demand Calculations

Project: 1840 - 1850 Bloor Street East
Address: 1840 - 1850 Bloor Street East
Project No.: 1788-5378

Date: 02.14.2020
Revised: -
Design: DD
Check: NS

Existing Population Estimate

Existing Buildings	Residential (# of units)
Building A	167
Building B	167
TOTAL	334

Residential Population:

Apartment:	2.7	persons/unit
Residential Population:	**902**	persons
EXISTING POPULATION	**902**	persons

Source: Peel Region Public Works Design Criteria Manual - Sanitary Sewer, Modified March 2017.

I:\1700\1788 - Ranee Management\5378 - 1840 - 1850 Bloor St\Design\Civil_Water\[5378_ Ex_Prop Wtr_San Demand_v2.xlsx]Population Estimates

Project: 1840 - 1850 Bloor Street East
Address: 1840 - 1850 Bloor Street East
Project No.: 1788-5378

Date: 02.14.2020
Revised: -
Design: DD
Check: NS

Proposed Population Estimate

	Residential (# of units)
Proposed Buildings	
Building C	218
Building D	215
TOTAL	433

Residential Population:

Apartment:	2.7	persons/unit
Residential Population:	**1169**	persons
PROPOSED POPULATION:	**1169**	persons

Source: Peel Region Public Works Design Criteria Manual - Sanitary Sewer, Modified March 2017.

I:\1700\1788 - Ranee Management\5378 - 1840 - 1850 Bloor St\Design\Civil_Water\[5378_ Ex_Prop Wtr_San Demand.xlsx]Population Estimates

CROZIER & ASSOCIATES Consulting Engineers	Project: 1840 - 1850 Bloor Street East Address: 1840 - 1850 Bloor Street East Project No.: 1788-5378	Date: 02.14.2020 Revised: - Design: DD Check: NS

Existing Sanitary Flow - Buildings A and B

Infiltration Area:

1.73 ha

Population Estimates:

Residential:	902	persons
TOTAL POPULATION:	902	persons

Design Criteria:

Unit Sewage Flow:	0.3028	m^3/cap.day
Infiltration:	0.200	L/s/ha
Peaking Factor:	**Modified Harmon Formula** $M = 1+\frac{14}{4+\sqrt{Pe}}$	

Source: Peel Region Sanitary Sewer Design Criteria, March 2017. Standard Drawing 2-9-2

Residential Sanitary Flow:

Average Dry Weather Flow:	273.07	m^3/day
	3.16	L/s
Existing Dry Weather Sanitary Flow:	3.16	L/s
Peaking Factor:	3.83	
Existing Peak Sanitary Flow:	12.10	L/s
Inflow/Infiltration Allowance:	0.35	L/s
Existing Design Sanitary Flow:	12.45	L/s

I:\1700\1788 - Ranee Management\5378 - 1840 - 1850 Bloor St\Design\Civil_Water\[5378_ Ex_Prop Wtr_San Demand_v2.xlsx]Sanitary

CROZIER & ASSOCIATES
Consulting Engineers

Project: 1840 - 1850 Bloor Street East
Address: 1840 - 1850 Bloor Street East
Project No.: 1788-5378

Date: 02.14.2020
Revised: -
Design: DD
Check: NS

Proposed Sanitary Flow - Buildings C and D

Infiltration Area:

1.81 ha

Population Estimates:

Residential:	1169	persons
TOTAL POPULATION:	1169	persons

Design Criteria:

Unit Sewage Flow:	0.3028	m^3/cap.day
Infiltration:	0.200	L/s/ha
Peaking Factor:		

Modified Harmon Formula

$$M = 1+\frac{14}{4+\sqrt{Pe}}$$

Source: Peel Region Sanitary Sewer Design Criteria, March 2017. Standard Drawing 2-9-2

Residential Sanitary Flow:

Average Dry Weather Flow:	354.00	m^3/day
	4.10	L/s

Proposed Dry Weather Sanitary Flow:	4.10	L/s
Peaking Factor:	3.76	
Proposed Peak Sanitary Flow:	15.39	L/s
Inflow/Infiltration Allowance:	0.36	L/s
Proposed Design Sanitary Flow:	15.75	L/s

APPENDIX C

Stormwater Management Calculations

Project: 1840-1850 Bloor St
Project No.: 1788-5378
Created By: DD/HL
Checked By: NS
Date: 2020.02.13
Updated: 2020.02.14

Modified Rational Calculations - Input Parameters

Storm Data: Mississauga

Time of Concentration: T_c = 15 min (per city of Mississauga standards)

Return Period	A	B	C	I (mm/hr)
2 yr	610	4.6	0.78	59.89
5 yr	820	4.6	0.78	80.51
10 yr	1010	4.6	0.78	99.17
25 yr	1160	4.6	0.78	113.89
50 yr	1300	4.7	0.78	127.13
100 yr	1450	4.9	0.78	140.69

Pre - Development Conditions (Catchment 103)				
Land Use	**Area** (ha)	**Area** (m^2)	**C**	**Weighted Average C**[1]
Pervious	1.09	10,947	**0.25**	**0.20**
Impervious	0.29	2,883	**0.90**	**0.19**
Total Site	**1.38**	**13,830**	**-**	**0.39**

Post - Development Conditions (Catchment 203)				
Land Use	**Area** (ha)	**Area** (m^2)	**C**	**Weighted Average C**
Pervious	0.54	5,400	0.25	**0.07**
Impervious	1.27	12,700	0.90	**0.63**
Total Site	**1.81**	**18,100**	**-**	**0.71**

Equations:

Peak Flow
$Q_{post} = 0.0028 \cdot C_{post} \cdot i(T_d)$

Intensity
$i(T_d) = A / (T + B)$^C

Note: For city of Mississauga apply adjusment factor to RC as follows

10-year	1.00
25-year	1.10
50-year	1.20
100-year	1.25

Project:	1840-1850 Bloor St
Project No.:	1788-5378
Created By:	DD/HL
Checked By:	NS
Date:	2020.02.13
Updated:	2/14/2020

Modified Rational Calculations - Peak Flows Summary

Unit Flow Rates from Etobicoke Creek Stormwater Management Quantity Control Release Rates (TRCA)				
Return Period	**Site Area (ha)**	**Unit Flow Rate (L/s/ha)**	**Target Peak Flow (L/s)**	**Target Peak Flow (m3/s)**
2 yr	1.81	17.4	31.5	0.03
5 yr		26.6	48.1	0.05
10 yr		33.8	61.2	0.06
25 yr		46.3	83.8	0.08
50 yr		54.4	98.5	0.10
100 yr		62.8	113.7	0.11

Post-Development Peak Flows (L/s)					
Return Period	**Adjustment Factor**	**Adjusted RC**	$Q_{target*}$	$Q_{orifice}$	Q_{203}
2 yr	1.00	0.71	31.5	20.7	214.3
5 yr	1.00	0.71	48.1	24.6	288.1
10 yr	1.00	0.71	61.2	27.7	354.9
25 yr	1.10	0.78	83.8	31.6	448.3
50 yr	1.20	0.85	98.5	35.3	545.9
100 yr	1.25	0.88	113.7	38.3	629.3

*Note Target based on Unit Flow Rates fro Catchment #213 from the Etobicoke Creek Stormwater Management Quantity Control Release Rates

Equations:

Peak Flow

$$Q_{post} = 0.0028 \cdot C_{post} \cdot i(T_d) \cdot A$$

Modified Rational Calculations - 2-Year Storm Event

Control Criteria

2 yr: Control Post-Development Peak Flows to Unit Flow Rate

2 yr: Uncontrolled Post-Development Flow:

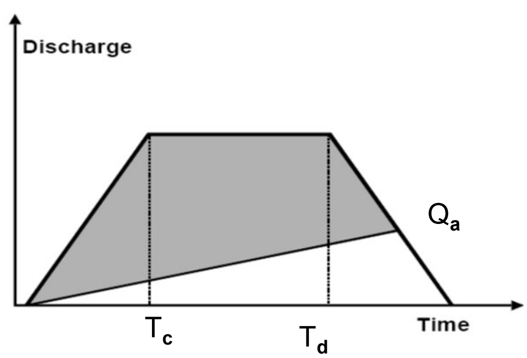
Q_{post}= 214.32 L/s

2 yr: Unit Flow Rate Target

$Q_{orifice}$ = 20.72 L/s

$Q_{unit\ flow}$ = 31.49 L/s

Storage Volume Determination				
T_d (min)	i (mm/hr)	T_d (sec)	Q_{Uncont} (m^3/s)	S_d (m^3)
5	104.51	300	0.374	99.76
10	75.36	600	0.270	146.26
15	59.89	900	0.214	174.24
20	50.16	1200	0.180	193.66
25	43.42	1500	0.155	208.22
30	38.45	1800	0.138	219.67
35	34.60	2100	0.124	228.96
40	31.54	2400	0.113	236.68
45	29.03	2700	0.104	243.19
50	26.94	3000	0.096	248.76
55	25.16	3300	0.090	253.55
60	23.62	3600	0.085	257.71
65	22.29	3900	0.080	261.34
70	21.12	4200	0.076	264.52
75	20.07	4500	0.072	267.30
80	19.14	4800	0.068	269.74
85	18.30	5100	0.065	271.88
Required Storage Volume:				**271.88**



Peak Flow
$$Q_{post} = 0.0028 \cdot C_{post} \cdot i(T_d)$$

Storage
$$S_d = Q_{post} \cdot T_d - Q_{target}\,(T_d + T_c) / 2$$

Modified Rational Calculations - 5-Year Storm Event

Control Criteria

5 yr: Control Post-Development Peak Flows to Unit Flow Rate

5 yr: Uncontrolled Post-Development Flow:

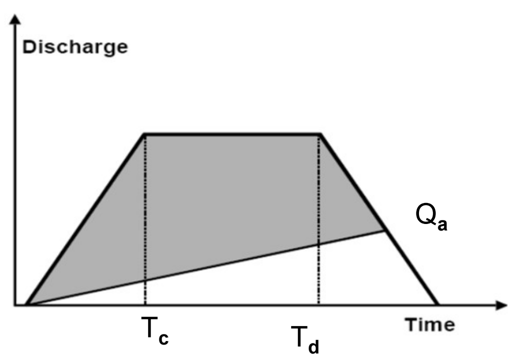
Q_{post} = 288.10 L/s

5 yr: Unit Flow Rate Target

$Q_{orifice}$ = 24.64 L/s

$Q_{unit\ flow}$ = 48.15 L/s

Storage Volume Determination				
T_d (min)	i (mm/hr)	T_d (sec)	Q_{Uncont} (m^3/s)	S_d (m^3)
5	140.49	300	0.503	136.03
10	101.30	600	0.362	199.02
15	80.51	900	0.288	237.11
20	67.43	1200	0.241	263.70
25	58.37	1500	0.209	283.75
30	51.68	1800	0.185	299.62
35	46.52	2100	0.166	312.60
40	42.40	2400	0.152	323.45
45	39.02	2700	0.140	332.69
50	36.21	3000	0.130	340.65
55	33.82	3300	0.121	347.58
60	31.76	3600	0.114	353.65
65	29.96	3900	0.107	359.01
70	28.38	4200	0.102	363.76
75	26.98	4500	0.097	367.98
80	25.73	4800	0.092	371.75
85	24.60	5100	0.088	375.10
Required Storage Volume:				**375.10**



Peak Flow
$$Q_{post} = 0.0028 \cdot C_{post} \cdot i(T_d)$$

Storage
$$S_d = Q_{post} \cdot T_d - Q_{target}\,(T_d + T_c) / 2$$

Modified Rational Calculations - 10-Year Storm Event

Control Criteria

10 yr: Control Post-Development Peak Flows to Unit Flow Rate

10 yr: Uncontrolled Post-Development Flow

Q_{post} = 354.85 L/s

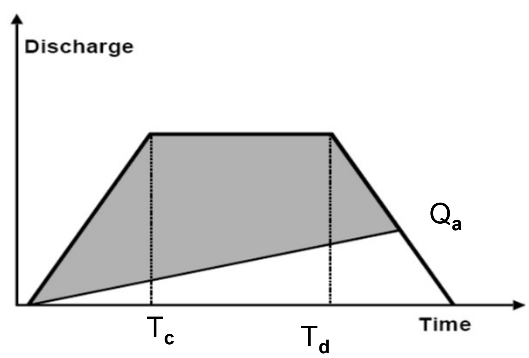
10 yr: Unit Flow Rate Target

$Q_{orifice}$ = 27.75 L/s

$Q_{unit\ flow}$ = 61.18 L/s

Storage Volume Determination

T_d (min)	i (mm/hr)	T_d (sec)	Q_{Uncont} (m^3/s)	S_d (m^3)
5	173.04	300	0.619	169.11
10	124.77	600	0.446	247.08
15	99.17	900	0.355	294.39
20	83.06	1200	0.297	327.53
25	71.90	1500	0.257	352.62
30	63.66	1800	0.228	372.56
35	57.30	2100	0.205	388.93
40	52.22	2400	0.187	402.69
45	48.07	2700	0.172	414.46
50	44.60	3000	0.160	424.65
55	41.65	3300	0.149	433.58
60	39.11	3600	0.140	441.45
65	36.91	3900	0.132	448.44
70	34.96	4200	0.125	454.68
75	33.24	4500	0.119	460.27
80	31.69	4800	0.113	465.30
85	30.31	5100	0.108	469.82
Required Storage Volume:				**469.82**



Peak Flow
$$Q_{post} = 0.0028 \cdot C_{post} \cdot i(T_d)$$

Storage
$$S_d = Q_{post} \cdot T_d - Q_{target} (T_d + T_c) / 2$$

Project: 1840-1850 Bloor St
Project No.: 1788-5378
Created By: DD/HL
Checked By: NS
Date: 2020.02.13
Updated: 2/14/2020

Modified Rational Calculations - 25-Year Storm Event

Control Criteria

25 yr: Control Post-Development Peak Flows to Unit Flow Rate

25 yr: Uncontrolled Post-Development Flow

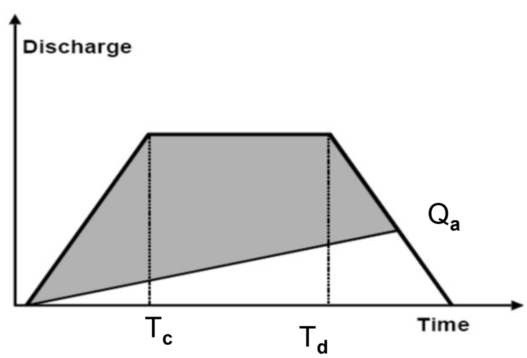
Q_{post}= 448.31 L/s

25 yr: Unit Flow Rate Target

$Q_{orifice}$ = 31.63 L/s

$Q_{unit\ flow}$ = 83.80 L/s

Storage Volume Determination				
T_d (min)	i (mm/hr)	T_d (sec)	Q_{Uncont} (m^3/s)	S_d (m^3)
5	198.74	300	0.782	215.71
10	143.31	600	0.564	314.73
15	113.89	900	0.448	375.01
20	95.40	1200	0.376	417.38
25	82.58	1500	0.325	449.59
30	73.11	1800	0.288	475.30
35	65.80	2100	0.259	496.50
40	59.98	2400	0.236	514.40
45	55.21	2700	0.217	529.78
50	51.22	3000	0.202	543.17
55	47.84	3300	0.188	554.96
60	44.92	3600	0.177	565.42
65	42.39	3900	0.167	574.76
70	40.15	4200	0.158	583.16
75	38.17	4500	0.150	590.73
80	36.40	4800	0.143	597.60
85	34.81	5100	0.137	603.83
Required Storage Volume:				**603.83**



Peak Flow
$$Q_{post} = 0.0028 \cdot C_{post} \cdot i(T_d)$$

Storage
$$S_d = Q_{post} \cdot T_d - Q_{target} (T_d + T_c) / 2$$

Project: 1840-1850 Bloor St
Project No.: 1788-5378
Created By: DD/HL
Checked By: NS
Date: 2020.02.13
Updated: 2/14/2020

Modified Rational Calculations - 50-Year Storm Event

Control Criteria

50 yr: Control Post-Development Peak Flows to Unit Flow Rate

50 yr: Uncontrolled Post-Development Flow

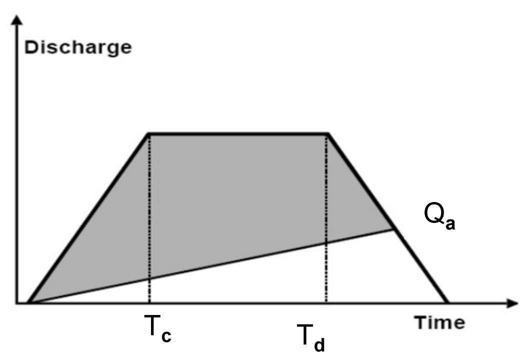
Q_{post} = 545.92 L/s

50 yr: Unit Flow Rate Target

$Q_{orifice}$ = 35.33 L/s

$Q_{unit\ flow}$ = 98.46 L/s

Storage Volume Determination				
T_d (min)	i (mm/hr)	T_d (sec)	Q_{Uncont} (m^3/s)	S_d (m^3)
5	220.93	300	0.949	263.42
10	159.75	600	0.686	385.09
15	127.13	900	0.546	459.54
20	106.57	1200	0.458	512.06
25	92.30	1500	0.396	552.11
30	81.75	1800	0.351	584.18
35	73.60	2100	0.316	610.72
40	67.10	2400	0.288	633.20
45	61.77	2700	0.265	652.59
50	57.32	3000	0.246	669.54
55	53.54	3300	0.230	684.51
60	50.28	3600	0.216	697.86
65	47.45	3900	0.204	709.83
70	44.95	4200	0.193	720.64
75	42.74	4500	0.184	730.45
80	40.76	4800	0.175	739.37
85	38.97	5100	0.167	747.53
Required Storage Volume:				**747.53**



Peak Flow
$$Q_{post} = 0.0028 \cdot C_{post} \cdot i(T_d)$$

Storage
$$S_d = Q_{post} \cdot T_d - Q_{target}\,(T_d + T_c) / 2$$

Modified Rational Calculations - 100-Year Storm Event

Control Criteria

100 yr: Control Post-Development Peak Flows to Unit Flow Rate

100 yr: Uncontrolled Post-Development Flow

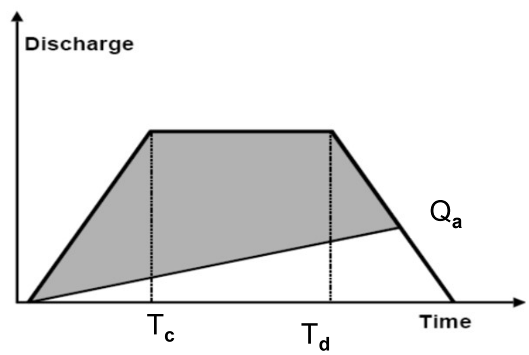
Q_{post} = 629.31 L/s

100 yr: Unit Flow Rate Target

$Q_{orifice}$ = 38.31 L/s

$Q_{unit\ flow}$ = 113.67 L/s

Storage Volume Determination				
T_d (min)	**i** (mm/hr)	**T_d** (sec)	**Q_{Uncont}** (m^3/s)	**S_d** (m^3)
5	242.53	300	1.085	302.47
10	176.31	600	0.789	444.45
15	140.69	900	0.629	531.89
20	118.12	1200	0.528	593.81
25	102.41	1500	0.458	641.15
30	90.77	1800	0.406	679.14
35	81.77	2100	0.366	710.65
40	74.58	2400	0.334	737.41
45	68.68	2700	0.307	760.53
50	63.75	3000	0.285	780.80
55	59.56	3300	0.266	798.75
60	55.95	3600	0.250	814.79
65	52.81	3900	0.236	829.22
70	50.03	4200	0.224	842.29
75	47.58	4500	0.213	854.18
80	45.38	4800	0.203	865.04
85	43.39	5100	0.194	875.00
Required Storage Volume:				**875.00**



Peak Flow
$$Q_{post} = 0.0028 \cdot C_{post} \cdot i(T_d)$$

Storage
$$S_d = Q_{post} \cdot T_d - Q_{target}\,(T_d + T_c) / 2$$

CROZIER & ASSOCIATES
Consulting Engineers

Project: 1840-1850 Bloor St
Project No.: 1788-5378
Created By: DD/HL
Checked By: NS
Date: 2020.02.13
Updated: 2/14/2020

Orifice Design - 100 mm

Depth Increment (m) =	0.05
Inlet Elevation (m) =	125.11

Orifice: $Q=CA(2gH)^{0.5}$	Orifice 1
Discharge Coef., Cd=	0.80
Orifice Diameter (mm) =	100
Area of Orifice (m^2) =	0.0079
Orifice (Side/Bottom) =	Side
Invert (m) =	125.11

Storage Rating Curve

	Water Elev. (m)	Depth (m)	Head 1 (m)	Volume (m3)	Orifice1 Q (Side) L/s
Bottom of Tank (125.11)	125.11	0.00	0.00	0.00	0.00
	125.16	0.05	0.00	22.50	0.00
	125.21	0.10	0.05	45.00	6.22
	125.26	0.15	0.10	67.50	8.80
	125.31	0.20	0.15	90.00	10.78
	125.36	0.25	0.20	112.50	12.45
	125.41	0.30	0.25	135.00	13.92
	125.46	0.35	0.30	157.50	15.24
	125.51	0.40	0.35	180.00	16.47
	125.56	0.45	0.40	202.50	17.60
	125.61	0.50	0.45	225.00	18.67
	125.66	0.55	0.50	247.50	19.68
	125.71	0.60	0.55	270.00	20.64
	125.76	0.65	0.60	292.50	21.56
	125.81	0.70	0.65	315.00	22.44
	125.86	0.75	0.70	337.50	23.29
	125.91	0.80	0.75	360.00	24.10
	125.96	0.85	0.80	382.50	24.89
	126.01	0.90	0.85	405.00	25.66
	126.06	0.95	0.90	427.50	26.40
	126.11	1.00	0.95	450.00	27.13
	126.16	1.05	1.00	472.50	27.83
	126.21	1.10	1.05	495.00	28.52
	126.26	1.15	1.10	517.50	29.19
	126.31	1.20	1.15	540.00	29.85
	126.36	1.25	1.20	562.50	30.49
	126.41	1.30	1.25	585.00	31.12
	126.46	1.35	1.30	607.50	31.73
	126.51	1.40	1.35	630.00	32.34
	126.56	1.45	1.40	652.50	32.93
	126.61	1.50	1.45	675.00	33.51
	126.66	1.55	1.50	697.50	34.09
	126.71	1.60	1.55	720.00	34.65
	126.76	1.65	1.60	742.50	35.20
	126.81	1.70	1.65	765.00	35.75
	126.86	1.75	1.70	787.50	36.29
	126.91	1.80	1.75	810.00	36.82
	126.96	1.85	1.80	832.50	37.34
	127.01	1.90	1.85	855.00	37.85
	127.06	1.95	1.90	877.50	38.36
	127.11	2.00	1.95	900.00	38.86
Top of Tank (127.13)	127.13	2.02	1.97	909.00	39.06

CROZIER CONSULTING ENGINEERS	**Project:** 1840-1850 Bloor St		**Date:** 2020.02.14
	Project No.: 1788-5378		**Created By:** DD/HL
			Checked By: NS

Water Balance Volume Requirement

Water Balance criteria is 5mm across catchment area

Site Area:	1.81	ha
Volume Required:	90.50	m^3

ESTIMATED NET ANNNUAL SEDIMENT (TSS) LOAD REDUCTION STORMCEPTOR®

Province:	Ontario
City:	Mississauga
Nearest Rainfall Station:	TORONTO LESTER B. PEARSON INT'L AP
NCDC Rainfall Station Id:	8733
Years of Rainfall Data:	44
Site Name:	
Drainage Area (ha):	1.81
Runoff Coefficient 'c':	0.71
Particle Size Distribution:	CA ETV
Target TSS Removal (%):	60.0

Project Name:	1840-1850 Bloor Street East
Project Number:	1788-5378
Designer Name:	Daniel Doherty
Designer Company:	Crozier & Associates
Designer Email/Phone:	ddoherty@cfcrozier.ca
EOR Name:	
EOR Company:	
EOR Email/Phone:	

Require Hydrocarbon Spill Capture?	No
Upstream Flow Control?	No
Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	47.82
Peak Conveyance (maximum) Flow Rate (L/s):	
Site Sediment Transport Rate (kg/ha/yr):	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EF4	48
EF6	56
EF8	61
EF10	63
EF12	65

Recommended Stormceptor EF Model:	**EF8**
Estimated Net Annual Sediment (TSS) Load Reduction (%):	**61**
Water Quality Runoff Volume Capture (%):	**> 90**

THIRD-PARTY TESTING AND VERIFICATION

►**Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

►**Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterways.

PARTICLE SIZE DISTRIBUTION (PSD)

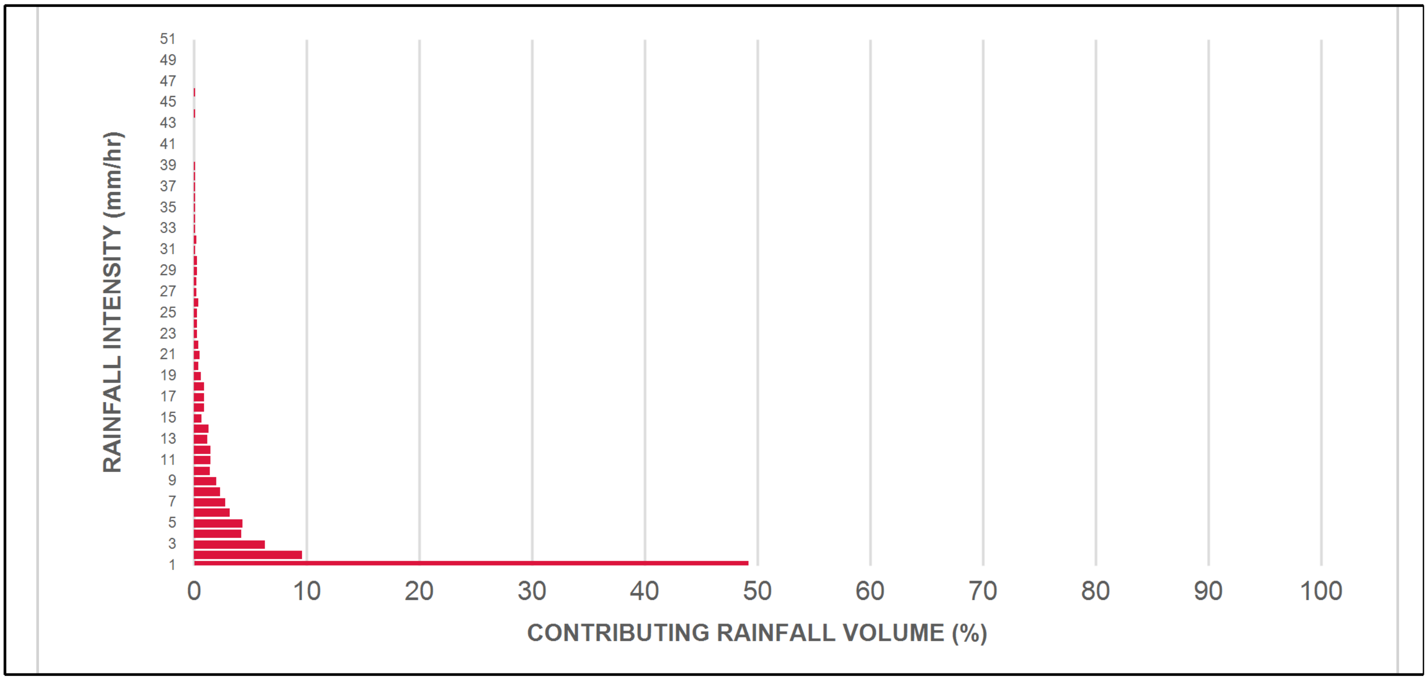
►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

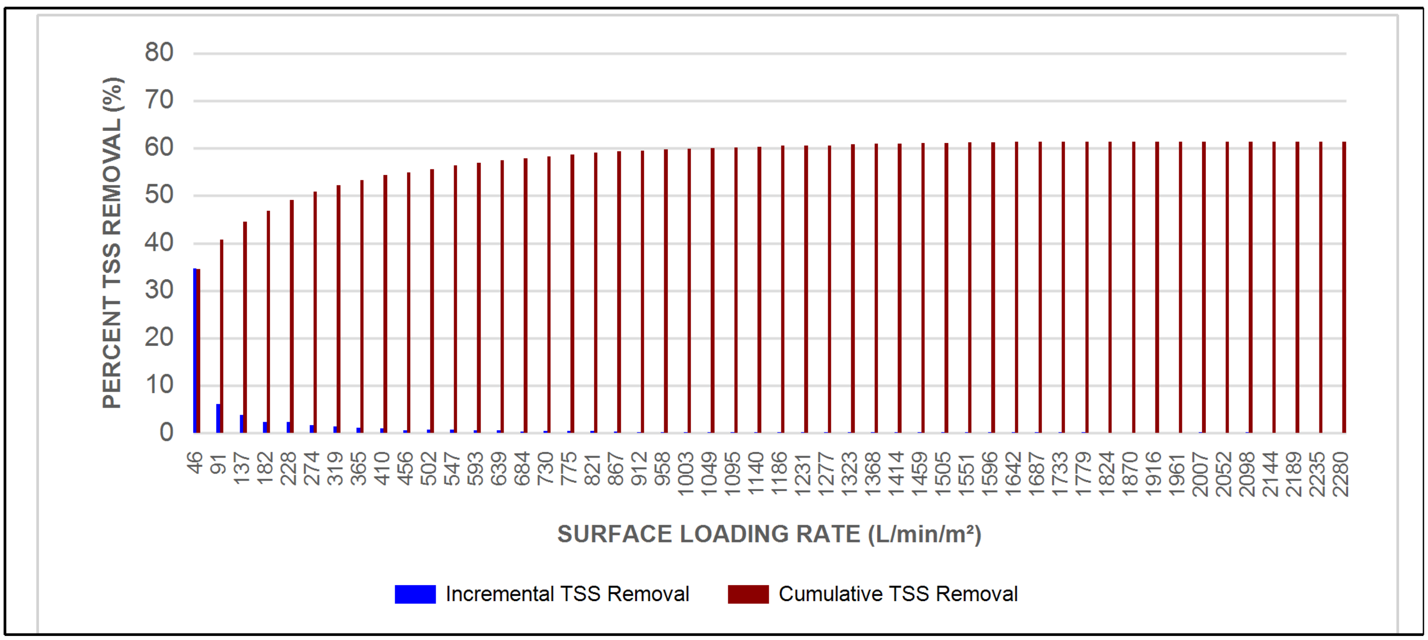
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
1	49.2	49.2	3.57	214.0	46.0	70	34.6	34.6
2	9.6	58.8	7.15	429.0	91.0	63	6.1	40.7
3	6.3	65.1	10.72	643.0	137.0	60	3.8	44.5
4	4.2	69.3	14.29	857.0	182.0	56	2.3	46.8
5	4.3	73.6	17.86	1072.0	228.0	53	2.3	49.1
6	3.2	76.8	21.44	1286.0	274.0	52	1.7	50.8
7	2.8	79.6	25.01	1500.0	319.0	50	1.4	52.2
8	2.3	81.9	28.58	1715.0	365.0	49	1.1	53.3
9	2.0	83.9	32.15	1929.0	410.0	48	1.0	54.3
10	1.4	85.3	35.73	2144.0	456.0	48	0.7	54.9
11	1.5	86.8	39.30	2358.0	502.0	47	0.7	55.6
12	1.5	88.3	42.87	2572.0	547.0	47	0.7	56.3
13	1.2	89.5	46.44	2787.0	593.0	46	0.6	56.9
14	1.3	90.8	50.02	3001.0	639.0	46	0.6	57.5
15	0.7	91.5	53.59	3215.0	684.0	46	0.3	57.8
16	0.9	92.4	57.16	3430.0	730.0	45	0.4	58.2
17	0.9	93.3	60.73	3644.0	775.0	45	0.4	58.6
18	0.9	94.2	64.31	3858.0	821.0	45	0.4	59.0
19	0.6	94.8	67.88	4073.0	867.0	45	0.3	59.3
20	0.4	95.2	71.45	4287.0	912.0	44	0.2	59.5
21	0.5	95.7	75.02	4501.0	958.0	44	0.2	59.7
22	0.4	96.1	78.60	4716.0	1003.0	44	0.2	59.9
23	0.3	96.4	82.17	4930.0	1049.0	45	0.1	60.0
24	0.3	96.7	85.74	5145.0	1095.0	45	0.1	60.1
25	0.3	97.0	89.31	5359.0	1140.0	46	0.1	60.3

Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
26	0.4	97.4	92.89	5573.0	1186.0	46	0.2	60.5
27	0.2	97.6	96.46	5788.0	1231.0	47	0.1	60.6
28	0.2	97.8	100.03	6002.0	1277.0	47	0.1	60.6
29	0.3	98.1	103.60	6216.0	1323.0	48	0.1	60.8
30	0.3	98.4	107.18	6431.0	1368.0	49	0.1	60.9
31	0.1	98.5	110.75	6645.0	1414.0	49	0.0	61.0
32	0.2	98.7	114.32	6859.0	1459.0	47	0.1	61.1
33	0.1	98.8	117.90	7074.0	1505.0	46	0.0	61.1
34	0.1	98.9	121.47	7288.0	1551.0	44	0.0	61.2
35	0.1	99.0	125.04	7502.0	1596.0	43	0.0	61.2
36	0.1	99.1	128.61	7717.0	1642.0	42	0.0	61.3
37	0.1	99.2	132.19	7931.0	1687.0	41	0.0	61.3
38	0.1	99.3	135.76	8145.0	1733.0	40	0.0	61.3
39	0.1	99.4	139.33	8360.0	1779.0	39	0.0	61.4
40	0.0	99.4	142.90	8574.0	1824.0	38	0.0	61.4
41	0.0	99.4	146.48	8789.0	1870.0	37	0.0	61.4
42	0.0	99.4	150.05	9003.0	1916.0	36	0.0	61.4
43	0.0	99.4	153.62	9217.0	1961.0	35	0.0	61.4
44	0.1	99.5	157.19	9432.0	2007.0	34	0.0	61.4
45	0.0	99.5	160.77	9646.0	2052.0	33	0.0	61.4
46	0.1	99.6	164.34	9860.0	2098.0	33	0.0	61.4
47	0.0	99.6	167.91	10075.0	2144.0	32	0.0	61.4
48	0.0	99.6	171.48	10289.0	2189.0	31	0.0	61.4
49	0.0	99.6	175.06	10503.0	2235.0	31	0.0	61.4
50	0.0	99.6	178.63	10718.0	2280.0	30	0.0	61.4
Estimated Net Annual Sediment (TSS) Load Reduction =								**61 %**

RAINFALL DATA FROM TORONTO LESTER B. PEARSON INT'L AP RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

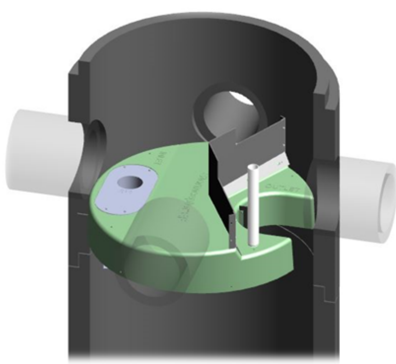
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

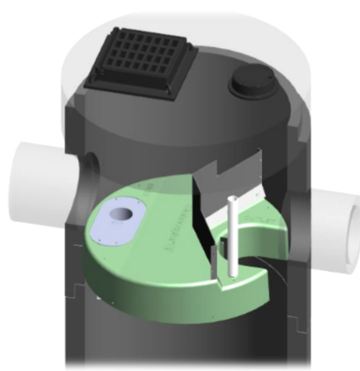
DESIGN FLEXIBILITY

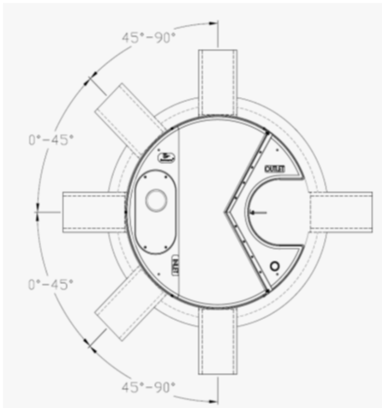
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

►While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.







INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.
0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.
45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	197	52	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	348	92	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	545	144	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	874	231	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	1219	322	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity
** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

For specifications, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

Table of TSS Removal vs Surface Loading Rate Based on Third-Party Test Results
Stormceptor® EF

SLR (L/min/m^2)	TSS % REMOVAL	SLR (L/min/m^2)	TSS % REMOVAL	SLR (L/min/m^2)	TSS % REMOVAL	SLR (L/min/m^2)	TSS % REMOVAL
1	70	660	46	1320	48	1980	35
30	70	690	46	1350	48	2010	34

60	67	720	45	1380	49	2040	34
90	63	750	45	1410	49	2070	33
120	61	780	45	1440	48	2100	33
150	58	810	45	1470	47	2130	32
180	56	840	45	1500	46	2160	32
210	54	870	45	1530	45	2190	31
240	53	900	45	1560	44	2220	31
270	52	930	44	1590	43	2250	30
300	51	960	44	1620	42	2280	30
330	50	990	44	1650	42	2310	30
360	49	1020	44	1680	41	2340	29
390	48	1050	45	1710	40	2370	29
420	48	1080	45	1740	39	2400	29
450	48	1110	45	1770	39	2430	28
480	47	1140	46	1800	38	2460	28
510	47	1170	46	1830	37	2490	28
540	47	1200	47	1860	37	2520	27
570	46	1230	47	1890	36	2550	27
600	46	1260	47	1920	36	2580	27
630	46	1290	48	1950	35		

STANDARD EF FOR
"OIL GRIT SEPARATOR' (OGS) STORMWATER QUALITY TREAMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The **minimum** sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1	4ft (1219mm) Diameter OGS Units:	1.19m3 sediment / 265L oil
	6ft (1829mm) Diameter OGS Units:	3.48m3 sediment / 609LI oil
	8ft (2438mm) Diameter OGS Units:	8.78m3 sediment / 1,071L oil
	10ft (3048mm) Diameter OGS Units:	17.78m3 sediment / 1,673L oil
	12ft (3657mm) Diameter OGS Units:	31.23m3 sediment / 2,476L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing shall be determined using historical rainfall data and a sediment removal performance curve derived from the actual third-party verified laboratory testing data. The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m2.

TECHNICAL BULLETIN

Sizing Stormceptor® EF/EFO for Removal of Canadian ETV and Stormceptor Fine Particle Size Distributions

(Issued April 23, 2018)

The Canadian ETV Particle Size Distribution ("ETV PSD", shown in Table 1 below) is reasonably representative of the PSD of particulates found in typical urban stormwater runoff, and was used in sediment removal and scour performance testing of Stormceptor® EF/EFO in compliance with the provisions of the Canadian ETV protocol titled *Procedure for Laboratory Testing of Oil-Grit Separators*. Municipalities across Canada are increasingly adopting the sediment removal target of 60% removal of the ETV PSD when sizing an oil-grit separator for pretreatment of stormwater runoff, replacing former sediment removal targets that were based on removal of coarser particle size distributions.

Imbrium Systems supports and recommends adoption of 60% removal of the ETV PSD as a Canada-wide standard for sizing of Stormceptor® EF/EFO. However, it is recognized that in some areas there may continue to be sediment removal targets that are based on removal of coarser particle size distributions. Imbrium engineers have performed extensive sizing analyses to determine the estimated removal efficiency of various coarser PSDs as compared to 60% removal of the ETV PSD. Removal efficiencies were calculated for a wide range of influent flow rates, utilizing Stokes' Law for particle settling and the dimensions and hydraulic capacities of each Stormceptor model size.

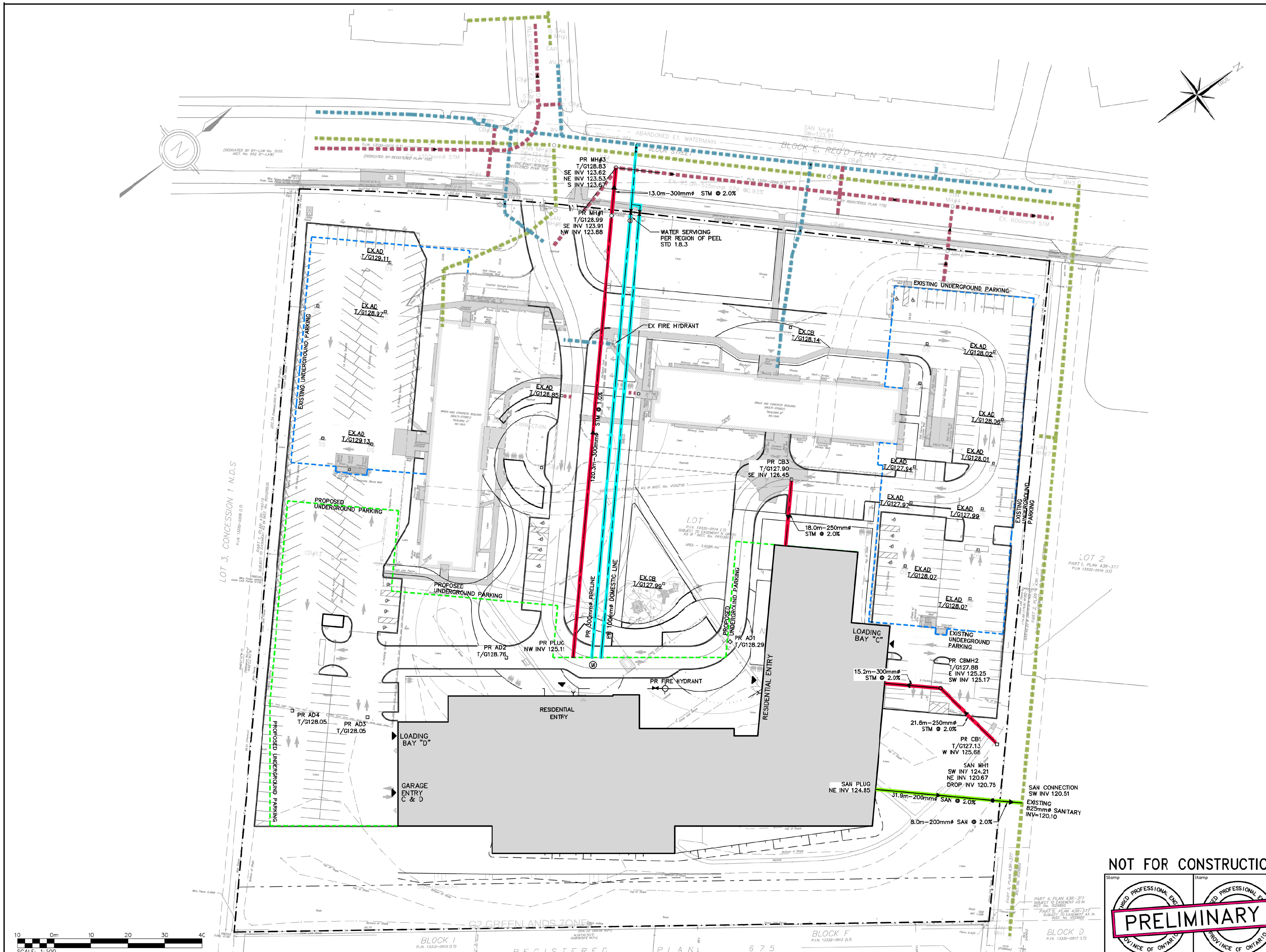
Based on these analyses, sizing Stormceptor® EF/EFO for 60% removal of the ETV PSD is comparable to sizing for 80% removal of the Stormceptor Fine PSD.

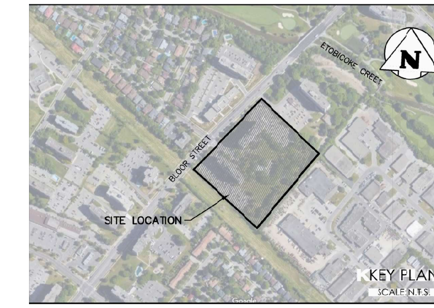
Table 1: Particle Size Distribution of Test Sediment

Particle Size (μm)	Percent Less Than	Particle Size Fraction (μm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

The particle size distribution shown in Table 1 above is the Canadian ETV Particle Size Distribution ("ETV PSD") specified in the Canadian ETV protocol titled *Procedure for Laboratory Testing of Oil-Grit Separators*.

FIGURES





LEGEND

- PROPERTY LINE
- EXISTING WATERMAIN & GATE VALVE
- EXISTING STORM SEWER & MANHOLE
- EXISTING SINGLE / DOUBLE CATCHBASIN
- EXISTING SANITARY SEWER & MANHOLE
- EXISTING FIRE HYDRANT
- PROPOSED WATERMAIN & GATE VALVE
- PROPOSED FIRE HYDRANT & GATE VALVE
- PROPOSED SIAMESE CONNECTION
- PROPOSED WATER METER
- PROPOSED DETECTOR CHECK VALVE IN CHAMBER
- PROPOSED STORM SEWER & MANHOLE
- PROPOSED SINGLE / DOUBLE CATCHBASIN
- PROPOSED SANITARY SEWER & MANHOLE
- PROPOSED UNDERGROUND PARKING
- EXISTING UNDERGROUND PARKING

No.	ISSUE / REVISION	YYYY/MMM/DD
2	RE-ISSUED FOR 1ST SUBMISSION	2020/FEB/19
1	ISSUED FOR 1ST SUBMISSION	2020/FEB/14

ELEVATION NOTE:

ELEVATIONS SHOWN ON THIS PLAN ARE DERIVED FROM ELEVATIONS ARE GEODETIC AND ARE DERIVED FROM THE CITY OF MISSISSAUGA BENCHMARK No. 985. ELEVATION = 129.292m

LOCAL BENCHMARK:

TABLET IS SET HORIZONTALLY AT THE BASE OF A CONCRETE TRAFFIC POLE AT THE NORTH-WEST CORNER OF BLOOR STEET AND BRIDGEWOOD DRIVE.

SURVEY NOTES:

SURVEY COMPLETED BY SPEIGHT, VAN NOSTRAND & GIBSON LIMITED. (2019/MAY/22) REFERENCE No.: 19C-0075

BEARINGS ARE UTM GRID, DERIVED FROM OBSERVED REFERENCE POINTS, BY REAL TIME NETWORK (RTN) OBSERVATIONS, UTM ZONE 17, NAD83 (CSRS) (2010.0).

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.9996781

SITE PLAN NOTES:

DESIGN ELEMENTS ARE BASED ON CONCEPT SITE PLAN BY IBI GROUP. DRAWING No.: A003, RECEIVED FEBRUARY 5, 2020. PROJECT No.: 120303

DRAWING NOTES:

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ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

MISSISSAUGA

Project

1840 & 1850 BLOOR ST.

CITY OF MISSISSAUGA

Drawing

PRELIMINARY SITE SERVICING

NOT FOR CONSTRUCTION

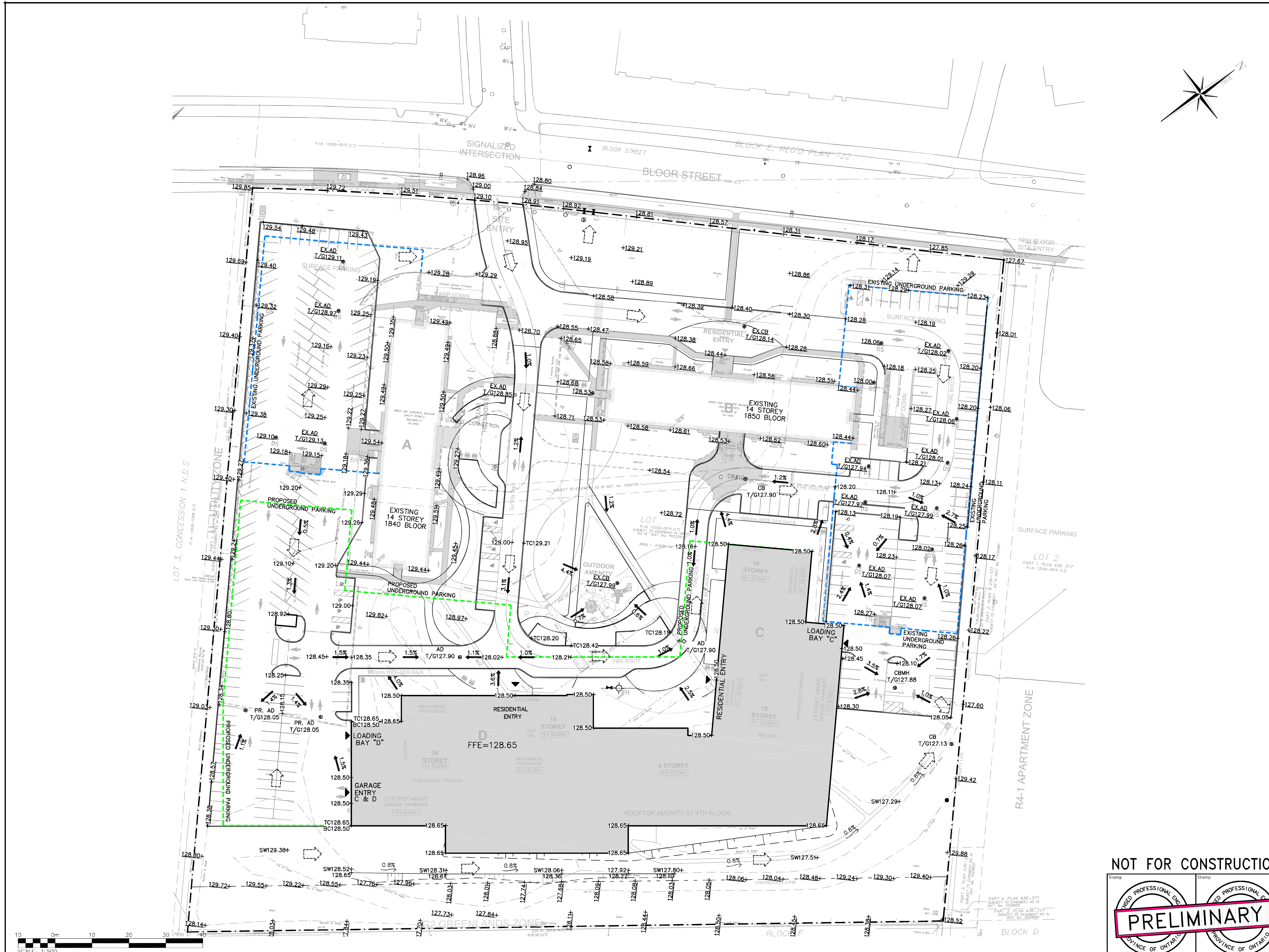
Stamp — PRELIMINARY

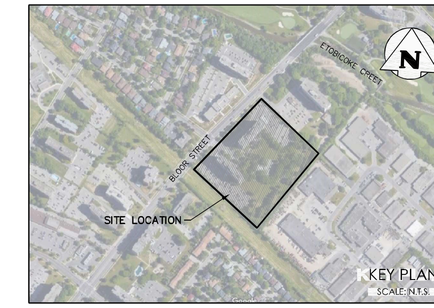
Stamp — PRELIMINARY

CROZIER CONSULTING ENGINEERS

2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
905-875-0026T
905-875-4915F
WWW.CFCROZIER.CA

Drawn	Design	Project No.	
Y.L.	D.D	1788–5378	
Check S.C.	Check J.F.	Scale 1:500	Dwg. FIG1





LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.25m)
- 153.00 EXISTING GRADE
- 153.00 PROPOSED GRADE
- 153.00 PROPOSED GRADE (TO MATCH EXISTING)
- 2.0% PROPOSED MINOR FLOW DIRECTION
- PROPOSED MAJOR OVERLAND FLOW DIRECTION
- PROPOSED UNDERGROUND PARKING
- EXISTING UNDERGROUND PARKING

No.	ISSUE / REVISION	YYYY/MMM/DD
2	RE-ISSUED FOR 1ST SUBMISSION	2020/FEB/19
1	ISSUED FOR 1ST SUBMISSION	2020/FEB/14

ELEVATION NOTE:

ELEVATIONS SHOWN ON THIS PLAN ARE DERIVED FROM ELEVATIONS ARE GEODETIC AND ARE DERIVED FROM THE CITY OF MISSISSAUGA BENCHMARK No. 985. ELEVATION = 129.292m

LOCAL BENCHMARK:

TABLET IS SET HORIZONTALLY AT THE BASE OF A CONCRETE TRAFFIC POLE AT THE NORTH-WEST CORNER OF BLOOR STEET AND BRIDGEWOOD DRIVE.

SURVEY NOTES:

SURVEY COMPLETED BY SPEIGHT, VAN NOSTRAND & GIBSON LIMITED. (2019/MAY/22) REFERENCE No.: 190-0075

BEARINGS ARE UTM GRID, DERIVED FROM OBSERVED REFERENCE POINTS, BY REAL TIME NETWORK (RTN) OBSERVATIONS, UTM ZONE 17, NAD83 (CSRS) (2010.0).

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.9996781

SITE PLAN NOTES:

DESIGN ELEMENTS ARE BASED ON CONCEPT SITE PLAN BY IBI GROUP.
DRAWING No.: A003, RECEIVED FEBRUARY 5, 2020.
PROJECT No.: 120303

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MISSISSAUGA

Project: 1840 & 1850 BLOOR ST.
CITY OF MISSISSAUGA

Drawing: PRELIMINARY SITE GRADING

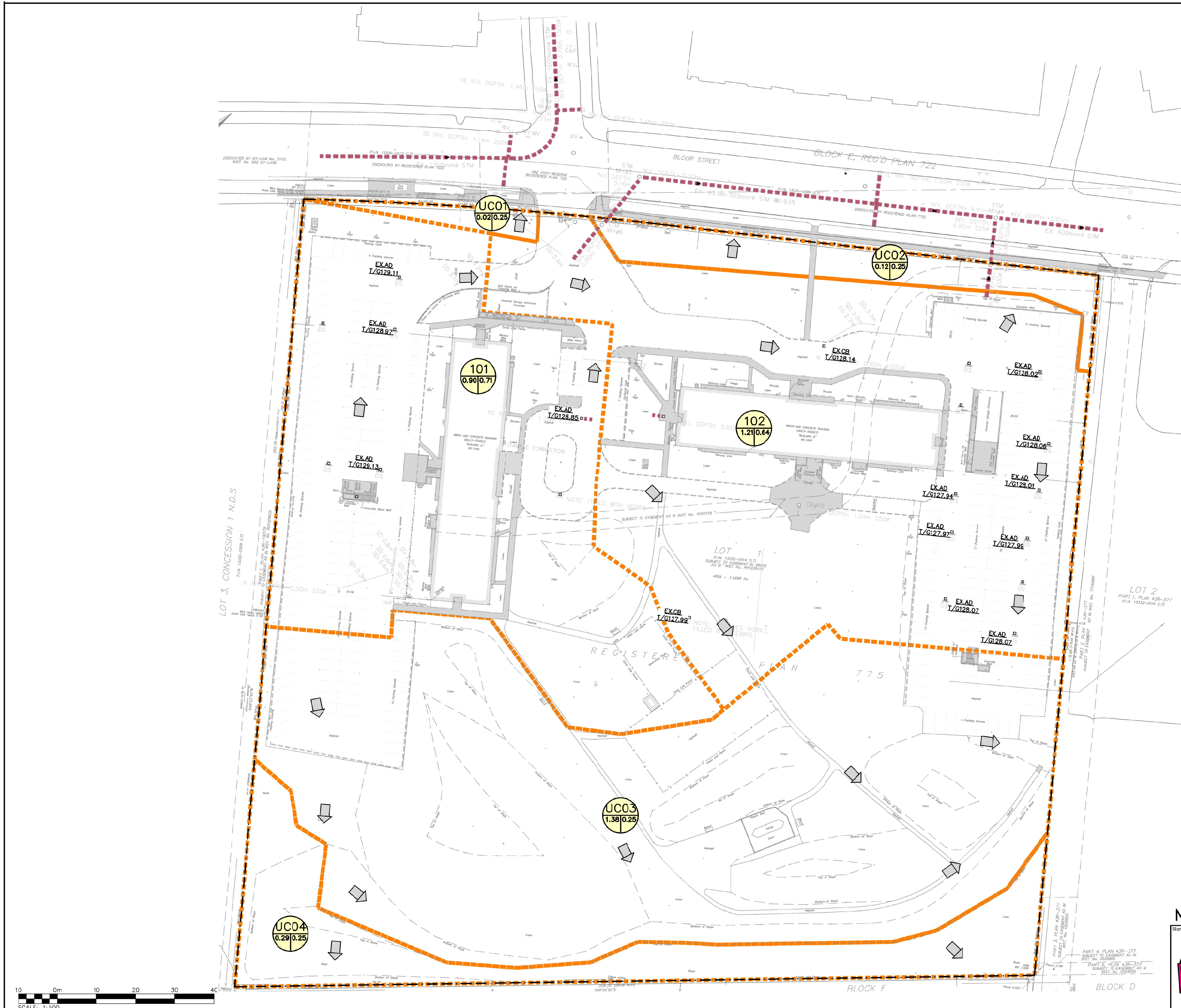
NOT FOR CONSTRUCTION

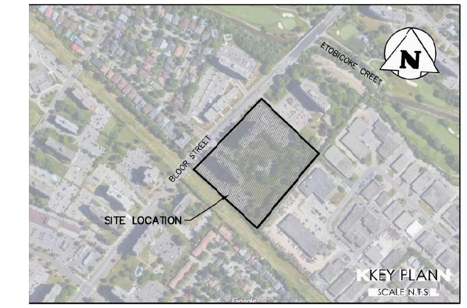
Stamp: LICENSED PROFESSIONAL ENGINEER PROVINCE OF ONTARIO PRELIMINARY

Stamp: LICENSED PROFESSIONAL ENGINEER PROVINCE OF ONTARIO

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
905-875-0026 T
905-875-4915 F
WWW.CFCROZIER.CA

Drawn Y.L.	Design D.D	Project No. 1788–5378	
Check S.C.	Check J.F.	Scale 1:500	Dwg. FIG2





LEGEND

PROPERTY LINE
EXISTING CONTOUR (0.5m)
EXISTING CONTOUR (1.0m)
EXISTING DITCH
EXISTING GRADE
EXISTING OVERLAND FLOW DIRECTION
EXISTING STORM DRAINAGE CATCHMENT
ID / A | RC — CATCHMENT I.D. / AREA (ha) | RUNOFF COEFFICIENT
EXISTING STORM SEWER & MANHOLE
EXISTING SINGLE / DOUBLE CATCHBASIN

No.	ISSUE / REVISION	YYYY/MMM/DD
2	RE-ISSUED FOR 1ST SUBMISSION	2020/FEB/19
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MISSISSAUGA

Project

1840 & 1850 BLOOR ST.

CITY OF MISSISSAUGA

Drawing

PRE-DEVELOPMENT DRAINAGE PLAN

NOT FOR CONSTRUCTION

Stamp

Stamp

PRELIMINARY

CROZIER CONSULTING ENGINEERS

2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
905-875-0026T
905-875-4915F
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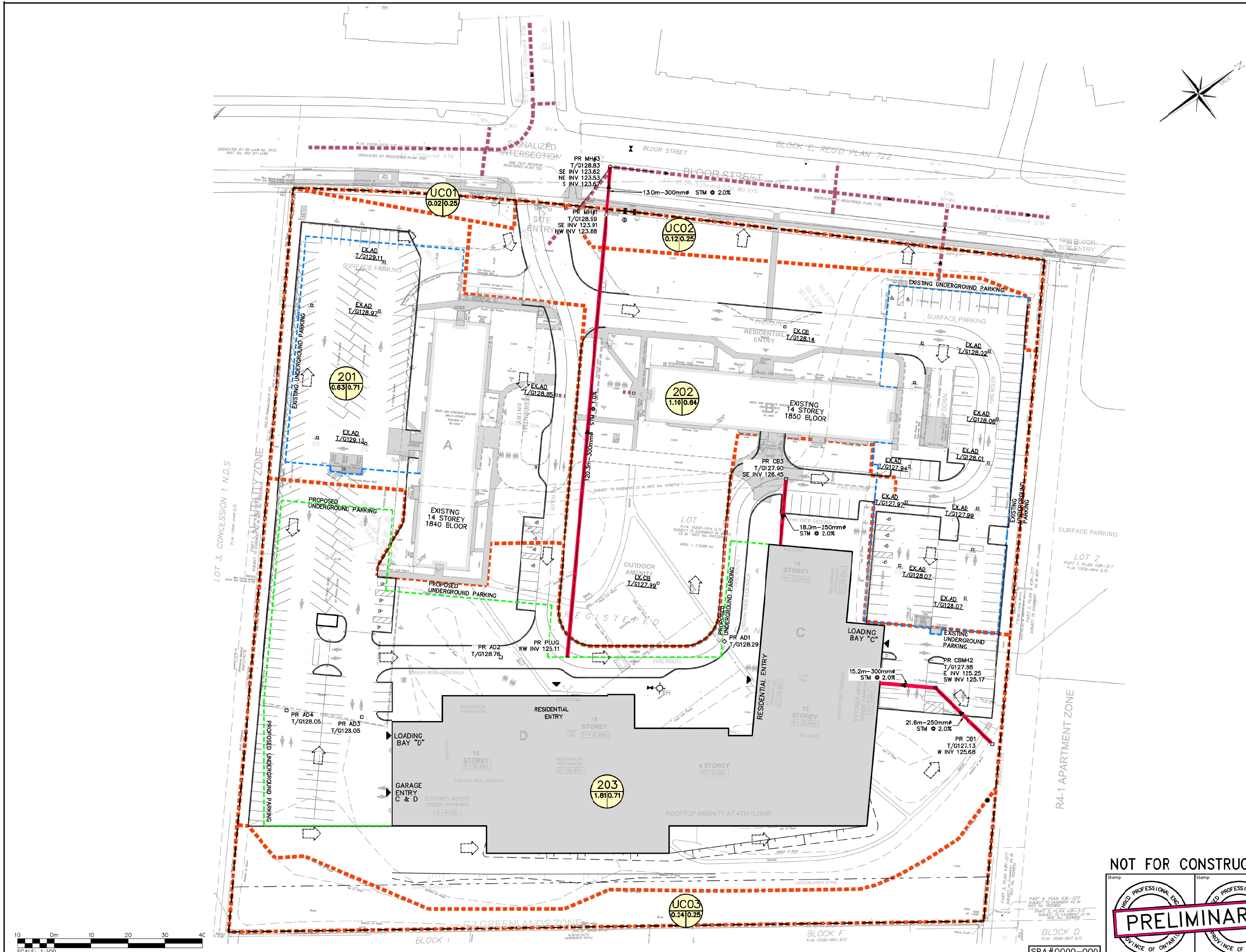
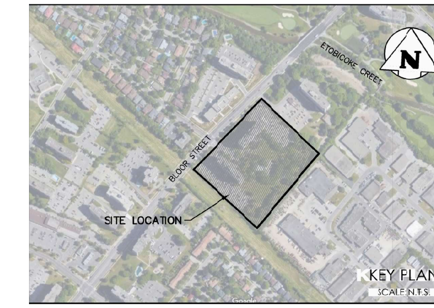
Drawn Y.L.	Design D.D	Project No.	1788-5378
Check S.C.	Check J.F.	Scale 1:500	Dwg. FIG3





LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.5m)
- EXISTING CONTOUR (1.0m)
- EXISTING DITCH
- EXISTING GRADE
- PROPOSED OVERLAND FLOW DIRECTION
- PROPOSED STORM DRAINAGE CATCHMENT
- CATCHMENT I.D.
- AREA (ha) | RUNOFF COEFFICIENT
- EXISTING STORM SEWER & MANHOLE
- EXISTING SINGLE / DOUBLE CATCHBASIN
- PROPOSED STORM SEWER & MANHOLE
- PROPOSED SINGLE / DOUBLE CATCHBASIN

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MISSISSAUGA

Project

1840 & 1850 BLOOR ST.

CITY OF MISSISSAUGA

Drawing

POST–DEVELOPMENT DRAINAGE PLAN

NOT FOR CONSTRUCTION

Stamp | Stamp

PRELIMINARY

CROZIER
CONSULTING ENGINEERS

2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
905-875-0026T
905-875-4915F
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Drawn Y.L.	Design D.D	Project No. 1788–5378	
Check M.C.	Check J.F.	Scale 1:500	Dwg. FIG4