FUNCTIONAL SERVICING, STORMWATER MANAGEMENT REPORT & DRAINAGE PROPOSAL

1750 BLOOR STREET

City of Mississauga

counterpoint ENGINEERING

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File Number: 17050

Prepared For:
Timbercreek Asset Management

No.	Revision	Date
7	Issued for OPA and RZ	April 7th, 2020
6	Issued for OPA and RZ	July 24th, 2019
5	Issued for OPA and RZ	January 16th, 2019
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EXECUTIVE SUMMARY

Counterpoint Engineering Inc. has been retained by Timbercreek Asset Management to prepare this Functional Servicing, Stormwater Management Report and Drainage Proposal in support of rezoning application for the 1750 Bloor Street lands.

The servicing strategy for the Site is summarized as follows:

Stormwater Servicing

Under existing conditions, determined through field investigation, a portion of the site discharges storm runoff into the existing 450mmø storm sewer on Kirkwall Crescent, a portion of the site discharges to the existing 450mmø storm sewer on Fieldgate Drive and a portion of the site discharges to the existing 1350mmø storm sewer on Bloor Street. It is proposed that storm water runoff from the new development will discharge to the storm sewers on Kirkwall Crescent and Bloor Street through new connections and the drainage to Fieldgate Drive will be maintained.

Quantity Control will be provided to ensure that the 2 to 100 year post development flows from the site are attenuated to the 2 to 100 year predevelopment flows having a maximum runoff coefficient of 0.50 as required by the City. The required flow attenuation storage will be provided through the use of two StormTech underground storage tanks at the outlets to Bloor Street and Kirkwall Crescent of the new development.

Water quality treatment will be provided through a cash-in-lieu process with the City.

The City's Water Balance requirement of retaining the first 5mm of rainfall across the entire 2.51 ha site will be achieved through the use of green roof, permeable pavers, a bioswale and infiltration trenches.

Sanitary Servicing

Proposed Building C and Amenity Building will have a shared underground garage having shared mechanical piping systems and will therefore be serviced by a new singular sanitary connection to the existing 375mmø sanitary sewer on Bloor Street. The peak sanitary flow to Bloor Street for both the Existing Building A and proposed Building C and Amenity Building has been calculated to be **11.61 L/s**. The existing Building B outletting to Fieldgate Drive will be maintained and will have a peak sanitary flow calculated to be **5.03 L/s.**

Water Servicing

Proposed Building C and Amenity Building will be serviced by an 'h type' connection and an additional domestic connection to the existing 300mmø watermain on Fieldgate Drive. The existing domestic and fire connections to the existing Buildings will be maintained. For proposed Building C and Amenity Building, maximum day demand will be **3 L/s** and Peak Hour Demand was calculated as **5 L/s**. Fire flow demand was estimated using the Fire Underwriters Survey criteria, **100 L/s** was determined as the governing requirement when comparing all Buildings within the development. Maximum Day + Fire Flow governs the water demand for the proposed development which was determined to be **103 L/s.**

The short term water demand for Building C and Amenity Building will be **4 L/s** for maximum day flow and **7 L/s** for peak hour flow. Hydrant pressure and flow information available on Bloor Street revealed a minimum pressure of **55 psi** and **70 psi** which will provide sufficient fire flow.

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1.0 INTRODUCTION

1.1 BACKGROUND

The Site currently has two 11-storey apartment Buildings (Buildings A and B) with a total of 302 units. Currently, there is some underground parking but most parking is provided at grade. The remainder of the site is landscaped with a mix of active and passive uses.

The site is located at the municipal address of 1750 Bloor Street. Refer to **Figure 1** for the location of the site. The proposed development will add one new residential building and a shared amenity building to the existing buildings. Building C will be 17-stories with 243 units and the amenity building will be a single storey building providing the amenity space for the entire development. Parking will be provided in a single level underground garage under both Buildings. As part of the development of the site the existing at grade parking and landscaping will be substantially redesigned with the amount of at grade parking being reduced by over two thirds. The total existing site area is 2.54 ha, a 0.03 ha portion of the site will be dedicated to the City to provide a right turning lane to the site off of Bloor Street, the resulting site area will be **2.51 ha**.

This Functional Servicing, Stormwater Management Report and Drainage Proposal has been prepared to address the site servicing strategy (stormwater, sanitary, water and grading) in support in support a the rezoning application for the site. The objective of the report is to demonstrate that the site can adequately be serviced to allow the rezoning to proceed. More detailed site servicing and grading plans will be submitted at the time of Site Plan application.

1.2 STUDY PARAMETERS

The background documents listed below have been considered in the design for the proposed site and preparation of this report:

- Architectural plans prepared by WZMH Architects;
- City of Mississauga T&W Development Requirement January 2009;
- Region of Peel Public Works Design, Specifications and Procedures Manual July 2009;

- Fire underwriters Survey, 1999;

2.0 STORMWATER MANAGEMENT

2.1 EXISTING CONDITIONS

The existing 2.51 ha site is covered by the roof area of the existing apartment Buildings and existing driveways and parking areas. To determine the existing drainage areas to each municipal storm sewer and the storm service connection locations, field investigations were preformed consisting of dye testing and CCTV of the sewers. Refer to **Appendix A** for the field investigation summaries. Under existing conditions, a 1.42 ha portion of the site having a runoff coefficient of RC=0.53 discharges storm runoff into the existing 1350mmø sewer on Bloor Street, a 0.79 ha portion of the site having a runoff coefficient of RC=0.59 discharges storm runoff into the existing 450mmø sewer on Kirkwall Crescent, and the remaining 0.30 ha portion having a runoff coefficient RC=0.61 portion discharges into the existing 450mmø storm sewer on Fieldgate Drive. This 1350mmø storm sewer runs east on Bloor Street, north on Bridgewood Drive and east on Steepbank Crescent then outfalls to the main branch of Etobicoke Creek. The 450mmø storm sewer runs east on Kirkwall Crescent, and the 450mmø storm sewer runs south on Fieldgate Drive; both storm networks ultimately discharge to Etobicoke Creek. Refer to **Figure 2** for existing site conditions. The existing site currently discharges uncontrolled storm flow as summarized in **Table 1** below.

Table 1 - Existing Site Release Rates

Storm Event	Pre-Development Release Rates to Fieldgate Drive (L/s)	Pre-Development Release Rates to Kirkwall Crescent (L/s)	Pre-Development Release Rates to Bloor Street (L/s)
2-Year	30	77	125
5-Year	41	104	168
10-Year	50	128	207
25-Year	57	147	238
50-Year	64	165	266
100-Year	72	183	297

2.2 ALLOWABLE RELEASE RATE

The Toronto Region Conservation Authority has established unit flow rates for some reaches and tributaries of the Etobicoke Creek watershed. However, this site outfalls to a section of the main branch on which the TRCA requires no stormwater quantity controls. As such, 2 to 100 year post to pre controls having a maximum runoff coefficient of RC=0.50, will be used in order to avoid downstream impacts on the existing storm sewer system. **Table 2** represents the allowable system discharge from the site.

Table 2 - Allowable Site Release Rates

Storm Event	Pre-Development Release Rates to Fieldgate Drive (L/s)	Pre-Development Release Rates to Bloor Street (L/s)	Pre-Development Release Rates to Bloor Street (L/s)
2-Year	25	118	66
5-Year	33	159	88
10-Year	41	196	109
25-Year	47	225	125
50-Year	53	252	140
100-Year	59	281	156

2.3 WATER QUANTITY

It is proposed that storm water runoff from the new development will be directed to the existing 450mmø sewer flowing easterly on Kirkwall Crescent and to the 1350mmø sewer flowing easterly on Bloor Street. The proposed drainage to Fieldgate Drive will be maintained under existing conditions. Stormwater runoff to Kirkwall Crescent will be directed through a new 300mmø connection and stormwater runoff to Bloor Street will be directed through a new 300mmø connection. Refer to **Figure 4** for location of proposed storm connection on Bloor Street.

The post development runoff from the site was modeled and compared to the existing predevelopment runoff from the site to Bloor Street, Fieldgate Drive and Kirkwall Crescent. Quantity control will be provided to ensure that the 2 to 100 year post development flows from the site are attenuated to the 2 to 100 year post development flows using a maximum predevelopment runoff coefficient of RC=0.50. Flow attenuation will be achieved through the

use of two StormTech underground storage units in combination with a 100mmø orifice tube installed at the downstream end of storm MH1 at invert of **128.71m** and a 100mmø orifice tube installed at the downstream end of storm MH10 at invert of **129.09m.** Refer to **Figure 2** for the proposed storm drainage areas, storage unit locations and orifice control locations. **Table 3** below summarizes the post development storage requirements. These calculations have been done for the entire site not just the area of new development.

Table 3 – Peak Flow and Storage Summary - 100-Year Storm Event

Area ID	Area (ha)	Runoff Coefficient	t_c (min)	Storage Available (m^3)	Storage Required (m^3)	Release Rate (m^3/s)	Orifice Size (mm)	Description
KIRKWALL	0.94	0.66	15	213	210	0.042	100	Orifice Control to Kirkwall
UNC KIRKWALL	0.09	0.32	15	0	0	0.011	-	Uncontrolled Kirkwall
Total to Kirkwall Crescent: Allowable 0.156 m3/s						**0.053**		
BLOOR	1.01	0.72	15	243	241	0.051	100	Orifice Control to Bloor
UNC BLOOR	0.20	0.38	15	0	0	0.030	-	Uncontrolled Bloor
Total to Bloor Street: Allowable 0.281 m3/s						**0.081**		
UNC FIELDGATE	0.27	0.54	15	0	0	0.057	-	Fieldgate
Total to Fieldgate Drive: Allowable 0.059 m3/s						**0.057**		
Total	**2.51**			**456**	**451**			

- Refer to **Appendix A** for modified rational calculations

As shown in **Table 3**, the proposed site release rates during the 100-year storm event will be less than the 100-year allowable release. For all other storm events the post development peak flow is less than the allowable predevelopment peak flow. The total required storage within the site will be **456m^3** during the 100-year storm event. A two StormTech underground storage units totalling of **451m^3** will be provided underground at the outlets. Refer to **Appendix A** for storage volume calculations and StormTech details. **Table 4** summarizes the proposed and allowable site flows to Bloor Street and Fieldgate Drive.

Table 4 – Peak Flow Summary – 2 to 100-Year Storm Event

Storm Event	Proposed Release Rates to Fieldgate Drive (L/s)	Allowable Release Rates to Fieldgate Drive (L/s)	Allowable Release Rates to Kirkwall Crescent (L/s)	Proposed Release Rates to Kirkwall Crescent (L/s)	Proposed Release Rates to Bloor Street (L/s)	Allowable Release Rates to Bloor Street (L/s)
2-Year	24	25	47	66	64	66
5-Year	33	33	48	88	68	88
10-Year	40	41	50	109	72	109
25-Year	46	47	51	125	75	125
50-Year	51	53	52	140	78	140
100-Year	57	59	53	156	81	156

- Refer to **Appendix A** for modified rational calculations

As shown in **Table 3**, for all storm events the post development peak flow is less than the allowable peak flow to the Bloor Street, Fieldgate Drive and Kirkwall Crescent storm sewers.

2.4 WATER QUALITY

Water quality treatment will be provided through a cash-in-lieu process with the City.

2.5 WATER BALANCE

The entire 2.51 ha site will require a water balance volume of **251m^3**. The water balance volume will be achieved though, green roof, permeable pavers, a bioswale and two infiltration trenches. Refer to **Figure 5** for proposed low impact development locations.

The proposed green roof areas will be installed on both Buildings C and D. The proposed green roof will be an intensive roof having a total area of 550m^2 providing a total minimum volume of **39m^3** for evapotranspiration. Refer to **Appendix A** for water balance calculations.

A **16m^3** volume will be infiltrated through an infiltration trench located at the northeast corner of the site at the Bloor street outlet and a **14m^3** volume will be infiltrated through an infiltration trench located at the southwest corner of the site at the Kirkwall Crescent outlet. The surrounding area subsurface soils near the proposed infiltration trench location are composed of sandy silt to silty sand which has a reasonable infiltration value. The groundwater elevation

at the infiltration trench locations will be greater than 1.0m below the bottom of the infiltration trench which will allow for infiltration. Refer to **Appendix A** for the Geotechnical Report excerpt.

The infiltration trench at the Bloor Street outlet will have a footprint area of 178m^2. Based on the 0.23m infiltration depth below the StormTech unit outlet, the infiltration trench retains and infiltrates a volume available of **16m^3.** The location of the infiltration trench will be located a minimum of 5m away from the basement foundation to prevent infiltration to the Buildings foundation drainage system. Refer to **Appendix A** for water balance volume calculations.

The infiltration trench at the Kirkwall Crescent outlet will have a footprint area of 158m^2. Based on the 0.23m infiltration depth below the StormTech unit outlet, the infiltration trench retains and infiltrates a volume available of **14m^3.** The location of the infiltration trench will be located a minimum of 5m away from the basement foundation to prevent infiltration to the Buildings foundation drainage system. Refer to **Appendix A** for water balance volume calculations.

The proposed permeable paver areas will have a total area of 186m^2 providing a total volume of **45m^3** for infiltration. Refer to **Appendix A** for water balance calculations. The permeable pavers will be underlain with a 0.60m deep clear stone trench having a void ratio of 0.40. The surrounding area subsurface soils near the proposed permeable pavement areas are composed of sandy silt to silty sand which have a reasonable infiltration value. The groundwater elevation (126.8m) at the permeable pavement locations will be greater than 1.0m below the bottom of the clear stone trench which will allow for infiltration. Refer to **Appendix A** for the Geotechnical Report excerpt.

The proposed bioswale will span the east and south property line accepting flow from a portion of the drive aisle. The bioswale will consist of a 1.0m deep sand/soil layer, and a 0.50m deep clean gravel layer with a void ratio of 0.4. A catch basin will be installed to capture water ponding above 0.10m above the bottom of the swale.

The gravel trenches within the bioswale will provide **158m^3** of storage capacity, and the surface ponding will provide an additional **12m^3** of storage capacity. The total water balance volume

provided in the proposed bioswale is **170m^3**. The plantings within the bioswale will utilize the water captured for evapotranspiration in addition to the infiltration provided.

Though the proposed green roof, permeable pavers, a bioswale and infiltration trenches, a **284m^3** water balance volume will be provided which achieves the required water balance volume of **251m^3**.

3.0 SANITARY SERVICING

3.1 EXISTING SANITARY SERVICING

Under existing conditions, existing Building A outlets to a 375mmø sanitary sewer on Bloor Street. This sewer outfalls to an 825mmø trunk sewer approximately 400m to the east of the site. Note that the Region just recently constructed the section of sewer from Bridgewood Drive to the trunk. The 375mmø had previously gone north on Bridgewood Drive. Existing Building B outlets to a 250mmø sanitary sewer flowing southward on Fieldgate Drive. The site is tributary Lakeview Wastewater Treatment Plant.

Under existing conditions, the peak wastewater flow from the site to Fieldgate Drive has been calculated to be **5.22 L/s** and the peak wastewater flow from the site to Bloor Street has been calculated to be **5.22 L/s.** Refer to **Appendix B** for existing sanitary calculations.

3.2 PROPOSED SANITARY RELEASE RATE

The proposed development is to be serviced by a new 250mmø sanitary connection to the existing 375mmø sanitary sewer on Bloor Street. Refer to **Figure 4** for location of proposed sanitary connection.

Using the Region of Peel Design criteria the equivalent population for the proposed new residential development is **467 persons.** Including the existing Building A, the total population of the site to Bloor Street will be **805 persons**. The resulting peak sanitary flow for the new plus existing development to Bloor Street has been calculated to be **11.61 L/s**. The proposed

increase in sanitary flows from existing conditions to Bloor Street will be **6.39 L/s**. Refer to **Appendix B** for detailed calculations.

The equivalent population for the existing Building B is **330 persons** which will be the same as in existing conditions. The resulting peak sanitary flow for the existing development to Fieldgate Drive has been calculated to be **5.22 L/s**. The sanitary flows to Fieldgate Drive will be maintained from existing to proposed conditions. Refer to **Appendix B** for detailed calculations.

4.0 WATERMAIN SERVICING

4.1 PROPOSED WATER SERVICING STRATEGY

There is an existing 300mmø watermain on the north side of Bloor Street; a 300mmø watermain on the east side on Fieldgate Drive; and a 200mmø Watermain on north side of Kirkwall Crescent.

It is proposed to service all of the Buildings of the new development through two connections utilizing the common underground garage to run the private distribution piping. To avoid having to cross Bloor Street to make the water connection it is proposed to make a 200mmø 'h type' connection and an additional 150mmø domestic connection to the 300mmø watermain on the east side on Fieldgate Drive. Refer to **Figure 4** for the location of proposed watermain connection.

Existing hydrants located Bloor Street and Kirkwall Crescent will provide the required fire coverage.

The expected domestic water usage rate was calculated based on Region of Peel criteria. Maximum day demand for proposed Building C and Amenity Building will be **3 L/s** and Peak Hour Demand was calculated to be **5 L/s**. The water demand for existing Building A along with proposed Building C and Amenity Building (total demand from Bloor Street) will be **5 L/s** for

maximum day flow and **8 L/s** for peak hour flow. The water demand for existing Building B (demand from Fieldgate Drive) will be **2 L/s** for maximum day flow and **3 L/s** for peak hour flow. Refer to **Appendix C** for calculations.

The short-term expected domestic water usage was also calculated, for proposed Building C and Amenity Building the maximum day flow will be **4 L/s** and the peak hour flow will be **7 L/s**. The short-term water demand for existing Building A along with proposed Building C and Amenity Building (total demand from Bloor Street) will be **7 L/s** for maximum day flow and **12 L/s** for peak hour flow. The water demand for existing Building B (demand from Fieldgate Drive) will be **3 L/s** for maximum day flow and **5 L/s** for peak hour flow. Refer to **Appendix C** for calculations.

Fire flow demand was estimated using the Fire Underwriters Survey. It was determined that **100 L/s** would be required as the governing Building for fire flow. Maximum Day + Fire Flow governs the water demand for the proposed development and has been determined to be **107 L/s** for the entire site. Refer to **Appendix C** for detailed watermain calculations. The detailed sprinkler design and fire demand shall be determined by a qualified sprinkler consultant once detailed design of the Building is required.

The Region of Peel Design Criteria sets out watermain pressure requirements. The criteria is summarized below:

1. Maximum Pressure = under normal conditions the maximum static pressure shall not exceed 690 kPa (100 psi).
2. The minimum pressure under any non-fire demand scenario will not be less than 275 kPa (40 psi)

From the Region of Peel data base it was determined that the static pressure in the watermain is **55 psi** and the flow is **2,120 gpm** at Bloor Street. Refer to **Appendix C** for data point information. **1,057 gpm** would be required for fire demand for the site which is a lower demand than the available flow from the Bloor Street watermain; therefore, will be sufficient residual pressure to support the maximum domestic and fire demand for the proposed development.

5.0 EROSION AND SEDIMENT CONTROL

During construction, erosion and sediment control will be implemented on site. This will be achieved through methods such as installation of silt fence/construction fence around the perimeter of the site, placement of mud mats at the site access point to the municipal roadway and the use of sediment control barriers at existing catch basins located in proximity to the site. Erosion and sediment control measure details will be considered as part of the detailed design phase of the development.

6.0 CONCLUSIONS

This Functional Servicing Report presents a site servicing strategy for the proposed development that addresses the requirements of the applicable regulatory agencies and provides the basis for detailed servicing design.

We trust this report sufficiently addresses all aspects of the site servicing.

Sincerely,
Counterpoint Engineering Inc.

Andrea Dasek, P.Eng., LEED® AP
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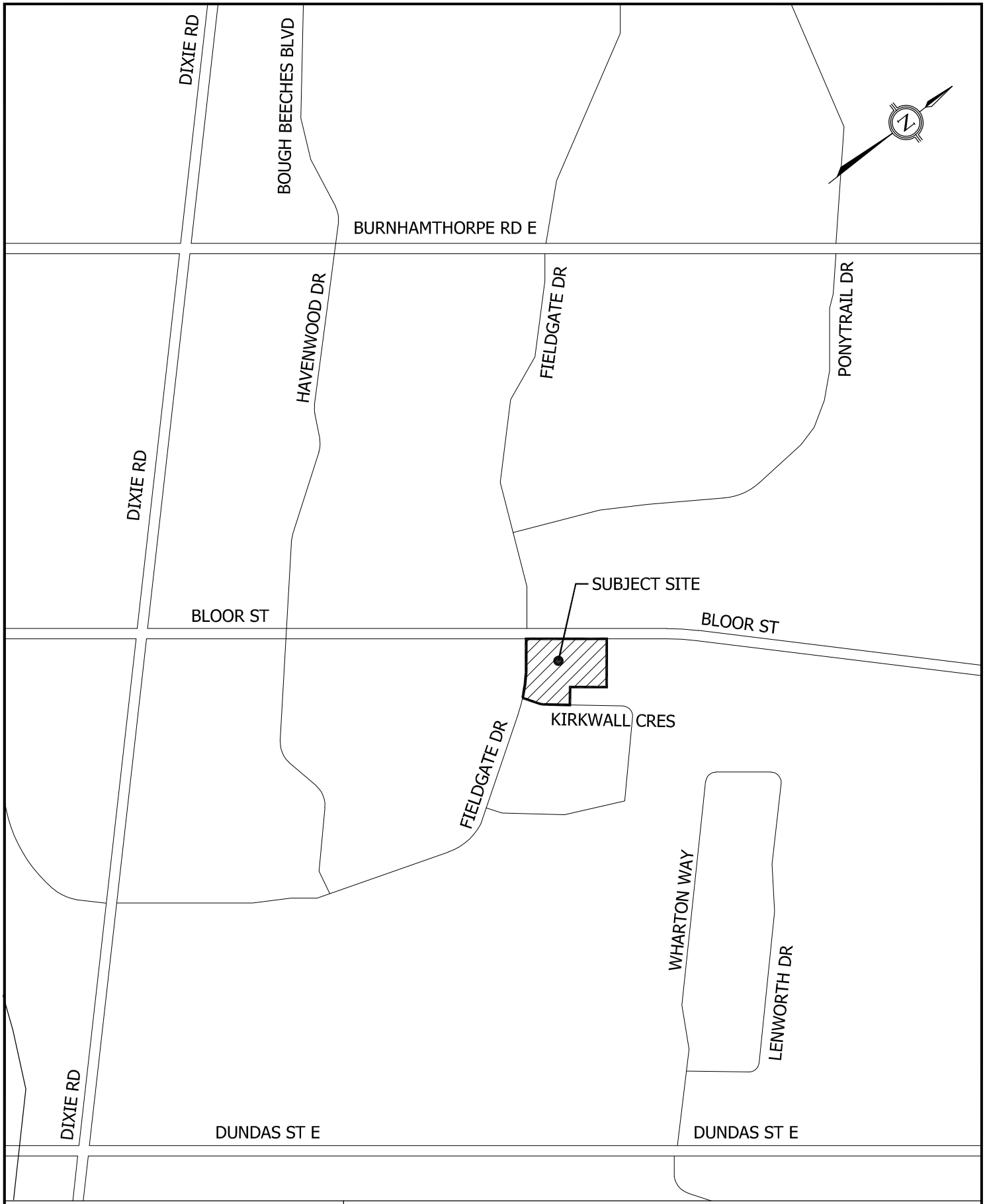

SITE LOCATION PLAN

counterpoint ENGINEERING
COUNTERPOINT ENGINEERING INC.
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PROPOSED RESIDENTIAL RENTAL DEVELOPMENT
1750 BLOOR STREET
MISSISSAUGA, ONTARIO

SCALE: N.T.S.

DATE: APRIL 2020
PROJECT No. 17050
FIGURE No. 1

0.03 ha AREA TO BE DEDICATED TO THE CITY FOR ROAD WIDENING FOR RIGHT TURNING LANE

BLOOR STREET

FIELDGATE DRIVE

KIRKWALL CRESCENT

EX. 300mmø WATERMAIN

EX 375mmø SAN SEWER

EX 375mmø SAN SEWER ABAND'D SAN SEWER

EX 250mmø SAN SEWER

EX SAN MH

EX STM MH

EXISTING STORM CONNECTION TO BE REMOVED

EXISTING CONNECTION TO BE RE-ROUTED

EXISTING SANITARY CONNECTION TO REMAIN

EXISTING WATERMAIN CONNECTION TO REMAIN

EXISTING STORM CONNECTION TO REMAIN

BLOOR
A=1.42
C=0.53

FIELDGATE
A=0.30
C=0.61

KIRKWALL
A=0.79
C=0.59

ABANDONDED 200mmø WATERMAIN

EX. 200mmø WATERMAIN

EX 250mmø SAN SEWER

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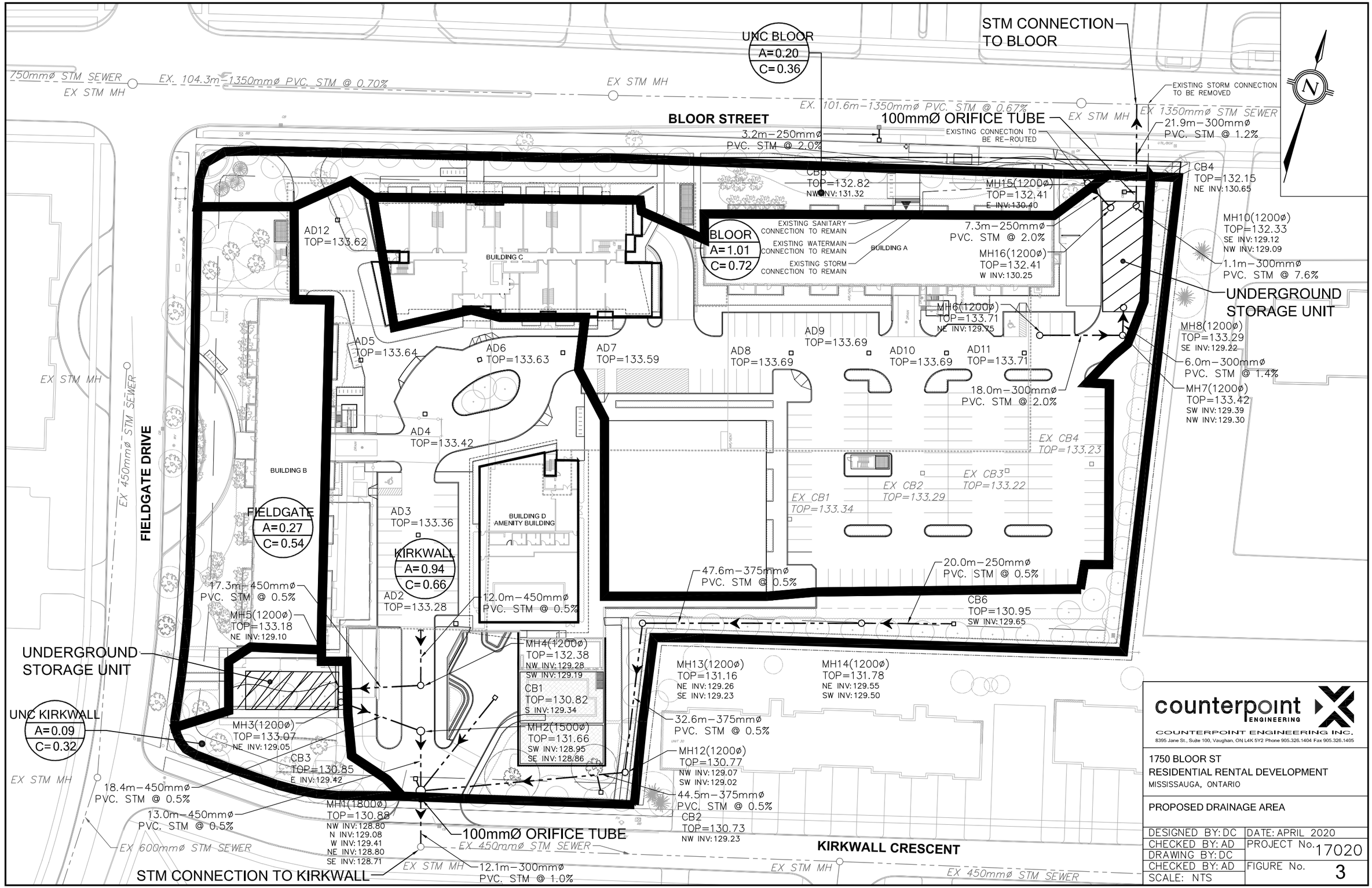
1750 BLOOR ST
RESIDENTIAL RENTAL DEVELOPMENT
MISSISSAUGA, ONTARIO

EXISTING DRAINAGE AREA

DESIGNED BY: DC	DATE: APRIL 2020
CHECKED BY: AD	PROJECT No. 17020
DRAWING BY: DC	
CHECKED BY: AD	FIGURE No. 2
SCALE: NTS	



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1750 BLOOR ST
RESIDENTIAL RENTAL DEVELOPMENT
MISSISSAUGA, ONTARIO

PROPOSED DRAINAGE AREA

DESIGNED BY: DC	DATE: APRIL 2020
CHECKED BY: AD	PROJECT No. 17020
DRAWING BY: DC	
CHECKED BY: AD	FIGURE No. 3
SCALE: NTS	

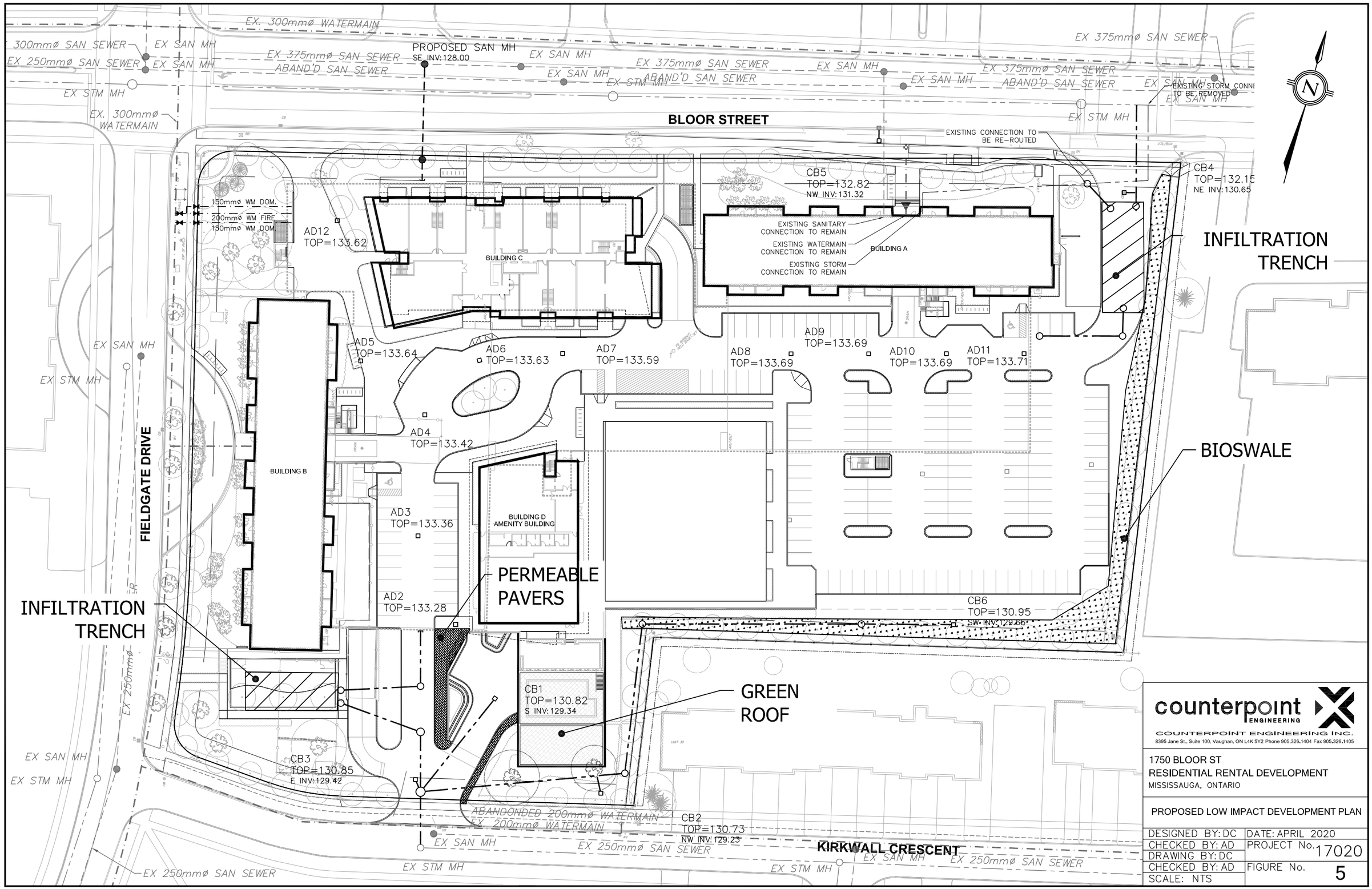
EX. 300mmø WATERMAIN
300mmø SAN SEWER
EX SAN MH
EX 250mmø SAN SEWER
750mmø STM SEWER
EX STM MH
EX. 300mmø WATERMAIN
EX 375mmø SAN SEWER
ABAND'D SAN SEWER
EX. 104.3m–1350mmø PVC. STM @ 0.70%
PROPOSED SAN MH
SE INV:128.00
EX SAN MH
EX SAN MH
EX STM MH
EX 375mmø SAN SEWER
EX SAN MH
EX 375mmø SAN SEWER
ABAND'D SAN SEWER
EX SAN MH
EX 375mmø SAN SEWER
ABAND'D SAN SEWER
EX SAN MH
EX 375mmø SAN SEWER
EXISTING STORM CONNECTION TO BE REMOVED
EX. 101.6m–1350mmø PVC. STM @ 0.67%
EX STM MH
EX 1350mmø STM SEWER
21.9m–300mmø PVC. STM @ 1.2%
20.7m–250mmø PVC. SAN @ 2.0%
BLOOR STREET
3.2m–250mmø PVC. STM @ 2.0%
EXISTING CONNECTION TO BE RE–ROUTED
4.5m–250mmø PVC. SAN @ 2.0%
150mmø WM DOM.
200mmø WM FIRE
150mmø WM DOM.
AD12
TOP=133.62
BUILDING C
250mmø SAN PLUG
INV:130.67
CB5
TOP=132.82
NW INV:131.32
MH15(1200ø)
TOP=132.41
E INV:130.40
EXISTING SANITARY CONNECTION TO REMAIN
EXISTING WATERMAIN CONNECTION TO REMAIN
EXISTING STORM CONNECTION TO REMAIN
BUILDING A
7.3m–250mmø PVC. STM @ 2.0%
MH16(1200ø)
TOP=132.41
W INV:130.25
CB4
TOP=132.15
NE INV:130.65
MH10(1200ø)
TOP=132.33
SE INV:129.12
NW INV:129.09
1.1m–300mmø PVC. STM @ 7.6%
MH6(1200ø)
TOP=133.71
NE INV:129.75
MH8(1200ø)
TOP=133.29
SE INV:129.22
6.0m–300mmø PVC. STM @ 1.4%
MH7(1200ø)
TOP=133.42
SW INV:129.39
NW INV:129.30
AD5
TOP=133.64
AD6
TOP=133.63
AD7
TOP=133.59
AD8
TOP=133.69
AD9
TOP=133.69
AD10
TOP=133.69
AD11
TOP=133.71
18.0m–300mmø PVC. STM @ 2.0%
EX SAN MH
EX STM MH
FIELDGATE DRIVE
EX 450mmø STM SEWER
EX 250mmø SAN SEWER
AD4
TOP=133.42
BUILDING B
AD3
TOP=133.36
BUILDING D
AMENITY BUILDING
EX CB4
TOP=133.23
EX CB2
TOP=133.29
EX CB3
TOP=133.22
EX CB1
TOP=133.34
20.0m–250mmø PVC. STM @ 0.5%
47.6m–375mmø PVC. STM @ 0.5%
17.3m–450mmø PVC. STM @ 0.5%
AD2
TOP=133.28
12.0m–450mmø PVC. STM @ 0.5%
MH5(1200ø)
TOP=133.18
NE INV:129.10
MH4(1200ø)
TOP=132.38
NW INV:129.28
SW INV:129.19
CB1
TOP=130.82
S INV:129.34
CB6
TOP=130.95
SW INV:129.65
MH13(1200ø)
TOP=131.16
NE INV:129.26
SE INV:129.23
MH14(1200ø)
TOP=131.78
NE INV:129.55
SW INV:129.50
32.6m–375mmø PVC. STM @ 0.5%
MH3(1200ø)
TOP=133.07
NE INV:129.05
MH2(1500ø)
TOP=131.66
SW INV:128.95
SE INV:128.86
CB3
TOP=130.85
E INV:129.42
MH12(1200ø)
TOP=130.77
NW INV:129.07
SW INV:129.02
44.5m–375mmø PVC. STM @ 0.5%
CB2
TOP=130.73
NW INV:129.23
EX SAN MH
EX STM MH
18.4m–450mmø PVC. STM @ 0.5%
13.0m–450mmø PVC. STM @ 0.5%
MH1(1800ø)
TOP=130.88
NW INV:128.80
N INV:129.08
W INV:129.41
NE INV:128.80
SE INV:128.71
ABANDONDED 200mmø WATERMAIN
EX 200mmø WATERMAIN
EX SAN MH
EX 450mmø STM SEWER
250mmø SAN SEWER
KIRKWALL CRESCENT
EX SAN MH
EX 250mmø SAN SEWER
EX STM MH
EX 450mmø STM SEWER
EX 600mmø STM SEWER
EX 250mmø SAN SEWER
12.1m–300mmø PVC. STM @ 1.0%

counterpoint ENGINEERING
COUNTERPOINT ENGINEERING INC.
8395 Jane St., Suite 100, Vaughan, ON L4K 5Y2 Phone 905.326.1404 Fax 905.326.1405

1750 BLOOR ST
RESIDENTIAL RENTAL DEVELOPMENT
MISSISSAUGA, ONTARIO

PROPOSED SITE SERVICING

DESIGNED BY: DC	DATE: APRIL 2020
CHECKED BY: AD	PROJECT No. 17020
DRAWING BY: DC	
CHECKED BY: AD	FIGURE No. 4
SCALE: NTS	



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8395 Jane St., Suite 100, Vaughan, ON L4K 5Y2 Phone 905.326.1404 Fax 905.326.1405

1750 BLOOR ST
RESIDENTIAL RENTAL DEVELOPMENT
MISSISSAUGA, ONTARIO

PROPOSED LOW IMPACT DEVELOPMENT PLAN

DESIGNED BY: DC	DATE: APRIL 2020
CHECKED BY: AD	PROJECT No. 17020
DRAWING BY: DC	
CHECKED BY: AD	FIGURE No. 5
SCALE: NTS	

Appendix A

Stormwater Management Calculations

counterpoint engineering

Rational Method - Existing Release Rates to Fieldgate

Project No: 17020
Project Name: 1750 Bloor Street

Event:		**2**	**years**	Event:		**5**	**years**
ABC's:	a	610		ABC's:	a	820	
	b	4.6			b	4.6	
	c	0.78			c	0.78	
Time of Concentration:	t	15	min	Time of Concentration:	t	15	min
Runoff Coefficient:	C	0.61		Runoff Coefficient:	C	0.61	
Site Area	A	0.30	ha	Site Area	A	0.30	ha
Intensity $i=a/(t+b)^c$	i	59.89	mm/hr	Intensity $i=a/(t+b)^c$	i	80.51	mm/hr
Flow	Q	0.03	m^3/s	Flow	Q	0.04	m^3/s
Q=CiA/360		30	l/s	Q=CiA/360		41	l/s
Event:		**10**	**years**	Event:		**25**	**years**
ABC's:	a	1010		ABC's:	a	1160	
	b	4.6			b	4.6	
	c	0.78			c	0.78	
Time of Concentration:	t	15	min	Time of Concentration:	t	15	min
Runoff Coefficient:	C	0.61		Runoff Coefficient:	C	0.61	
Site Area	A	0.30	ha	Site Area	A	0.30	ha
Intensity $i=a/(t+b)^c$	i	99.17	mm/hr	Intensity $i=a/(t+b)^c$	i	113.89	mm/hr
Flow	Q	0.05	m^3/s	Flow	Q	0.06	m^3/s
Q=CiA/360		50	l/s	Q=CiA/360		57	l/s
Event:		**50**	**years**	Event:		**100**	**years**
ABC's:	a	1300		ABC's:	a	1450	
	b	4.7			b	4.9	
	c	0.78			c	0.78	
Time of Concentration:	t	15	min	Time of Concentration:	t	15	min
Runoff Coefficient:	C	0.61		Runoff Coefficient:	C	0.61	
Site Area	A	0.30	ha	Site Area	A	0.30	ha
Intensity $i=a/(t+b)^c$	i	127.64	mm/hr	Intensity $i=a/(t+b)^c$	i	142.37	mm/hr
Flow	Q	0.06	m^3/s	Flow	Q	0.07	m^3/s
Q=CiA/360		64	l/s	Q=CiA/360		72	l/s

AREA ID

Composite RC Value	**Area [ha]**	**RC**	**RC * Area**
Landscaping	0.14	0.25	0.034
Paved Area/Roof	0.16	0.90	0.148
Total	0.30		0.181
	Divided by Total Area =		**0.61**

counterpoint engineering

Rational Method - Existing Release Rates to Bloor Street

Project No: 17020
Project Name: 1750 Bloor Street

Event:		**2**	**years**	Event:		**5**	**years**
ABC's:	a	610		ABC's:	a	820	
	b	4.6			b	4.6	
	c	0.78			c	0.78	
Time of Concentration:	t	15	min	Time of Concentration:	t	15	min
Runoff Coefficient:	C	0.53		Runoff Coefficient:	C	0.53	
Site Area	A	1.42	ha	Site Area	A	1.42	ha
Intensity $i=a/(t+b)^c$	i	59.89	mm/hr	Intensity $i=a/(t+b)^c$	i	80.51	mm/hr
Flow	Q	0.13	m^3/s	Flow	Q	0.17	m^3/s
Q=CiA/360		125	l/s	Q=CiA/360		168	l/s
Event:		**10**	**years**	Event:		**25**	**years**
ABC's:	a	1010		ABC's:	a	1160	
	b	4.6			b	4.6	
	c	0.78			c	0.78	
Time of Concentration:	t	15	min	Time of Concentration:	t	15	min
Runoff Coefficient:	C	0.53		Runoff Coefficient:	C	0.53	
Site Area	A	1.42	ha	Site Area	A	1.42	ha
Intensity $i=a/(t+b)^c$	i	99.17	mm/hr	Intensity $i=a/(t+b)^c$	i	113.89	mm/hr
Flow	Q	0.21	m^3/s	Flow	Q	0.24	m^3/s
Q=CiA/360		207	l/s	Q=CiA/360		238	l/s
Event:		**50**	**years**	Event:		**100**	**years**
ABC's:	a	1300		ABC's:	a	1450	
	b	4.7			b	4.9	
	c	0.78			c	0.78	
Time of Concentration:	t	15	min	Time of Concentration:	t	15	min
Runoff Coefficient:	C	0.53		Runoff Coefficient:	C	0.53	
Site Area	A	1.42	ha	Site Area	A	1.42	ha
Intensity $i=a/(t+b)^c$	i	127.64	mm/hr	Intensity $i=a/(t+b)^c$	i	142.37	mm/hr
Flow	Q	0.27	m^3/s	Flow	Q	0.30	m^3/s
Q=CiA/360		266	l/s	Q=CiA/360		297	l/s

AREA ID

Composite RC Value	**Area [ha]**	**RC**	**RC * Area**
Landscaping	0.81	0.25	0.203
Paved Area/Roof	0.61	0.90	0.549
Total	1.42		0.752
	Divided by Total Area =		**0.53**

counterpoint engineering

Rational Method - Existing Release Rates to Kirkwall Crescent

Project No: 17020
Project Name: 1750 Bloor Street

Event:		**2**	**years**	Event:		**5**	**years**
ABC's:	a	610		ABC's:	a	820	
	b	4.6			b	4.6	
	c	0.78			c	0.78	
Time of Concentration:	t	15	min	Time of Concentration:	t	15	min
Runoff Coefficient:	C	0.59		Runoff Coefficient:	C	0.59	
Site Area	A	0.79	ha	Site Area	A	0.79	ha
Intensity $i=a/(t+b)^c$	i	59.89	mm/hr	Intensity $i=a/(t+b)^c$	i	80.51	mm/hr
Flow	Q	0.08	m^3/s	Flow	Q	0.10	m^3/s
Q=CiA/360		77	l/s	Q=CiA/360		104	l/s
Event:		**10**	**years**	Event:		**25**	**years**
ABC's:	a	1010		ABC's:	a	1160	
	b	4.6			b	4.6	
	c	0.78			c	0.78	
Time of Concentration:	t	15	min	Time of Concentration:	t	15	min
Runoff Coefficient:	C	0.59		Runoff Coefficient:	C	0.59	
Site Area	A	0.79	ha	Site Area	A	0.79	ha
Intensity $i=a/(t+b)^c$	i	99.17	mm/hr	Intensity $i=a/(t+b)^c$	i	113.89	mm/hr
Flow	Q	0.13	m^3/s	Flow	Q	0.15	m^3/s
Q=CiA/360		128	l/s	Q=CiA/360		147	l/s
Event:		**50**	**years**	Event:		**100**	**years**
ABC's:	a	1300		ABC's:	a	1450	
	b	4.7			b	4.9	
	c	0.78			c	0.78	
Time of Concentration:	t	15	min	Time of Concentration:	t	15	min
Runoff Coefficient:	C	0.59		Runoff Coefficient:	C	0.59	
Site Area	A	0.79	ha	Site Area	A	0.79	ha
Intensity $i=a/(t+b)^c$	i	127.64	mm/hr	Intensity $i=a/(t+b)^c$	i	142.37	mm/hr
Flow	Q	0.16	m^3/s	Flow	Q	0.18	m^3/s
Q=CiA/360		165	l/s	Q=CiA/360		183	l/s

AREA ID

Composite RC Value	**Area [ha]**	**RC**	**RC * Area**
Landscaping	0.38	0.25	0.095
Paved Area/Roof	0.41	0.90	0.369
Total	0.79		0.464
	Divided by Total Area =		**0.59**

September 19, 2018

Infrastructure Intelligence Services Inc.

INTEGRITY | COLLABORATION | PERFORMANCE

Counterpoint Engineering Inc.
8395 Jane Street,
Suite 100
Vaughan
ON, L4K 5Y2

Att: Andrea Dasek

RE: Existing Storm Sewer Conditions - 1750 Bloor St
City of Mississauga

Infrastructure Intelligence Services Inc. (I2S Inc.) is pleased to provide Counterpoint Engineering Inc. with the summary results of the storm service connection and location investigation completed at 1750 Bloor Street and 3315 Fieldgate Drive, City of Mississauga. The findings in this report illustrate the connectivity and location of the storm service connections.

The results of the work completed are as follows:

Dye Testing – August 14, 2018

- 3315 Fieldgate Dr
  - All rear parking lot catch basins were dye tested. All dye tests except one outleted to a storm manhole on Kirkwall Cres, closest to the rear entrance. The outlet of the catch basin to the north of the swimming pool on the grass could not be identified
- 1750 Bloor St
  - No dye observed in the storm or sanitary sewers on Bloor St, Fieldgate Dr and Kirkwall Cres. All dye seemed to be retained on the site in some kind of storage. The catch basins are positioned closed to the wall of the underground parking level so dye may have drained to the permeable fill. Dyed water was pumped for three hours without observation in the downstream sewers. All adjacent sewers, internal sump pumps and the eventual outlet at Etobicoke Creek were checked.

CCTV Inspections – Sept 10 & 12, 2018

- 1750 Bloor St
  - The storm sewer mainline was inspected from the intersection at Bloor St and Fieldgate Dr to 1767 Bloor St. One (1) storm service lateral coming for 1750 Bloor was identified three (3) meters downstream of the storm sewer manhole located in front of the rear parking lot entrance.
  - Further lateral push-camera inspection confirmed that this service lead runs along the east boundary of the site. One wye connection, which runs parallel Bloor St, was observed at 18 meters from the storm mainline. The wye connection services catch basin at the rear parking lot entrance

and also appears to service the building. No access intermediate access points, except catch basins, were observed on site.

Drawing markup and video inspections are attached. We trust that the information presented here is satisfactory for your present requirements. If you have any questions or concerns, please do not hesitate to contact the undersigned.

Sincerely,

Niall Quinlan
Manager, Inflow and Infiltration Services
Infrastructure Intelligence Services Inc.
623 Main Street East
Milton, ON L9T 3J2
Tel.: 647-229-9175
Email: niall.quinlan@i2sinc.ca

METRIC: DISTANCES AND ELEVATIONS SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

TOPOGRAPHIC PLAN OF SURVEY OF
BLOCK B
REGISTERED PLAN 723
CITY OF MISSISSAUGA
REGIONAL MUNICIPALITY OF PEEL
SCALE 1:300

10 5 0 10 20 30 METRES

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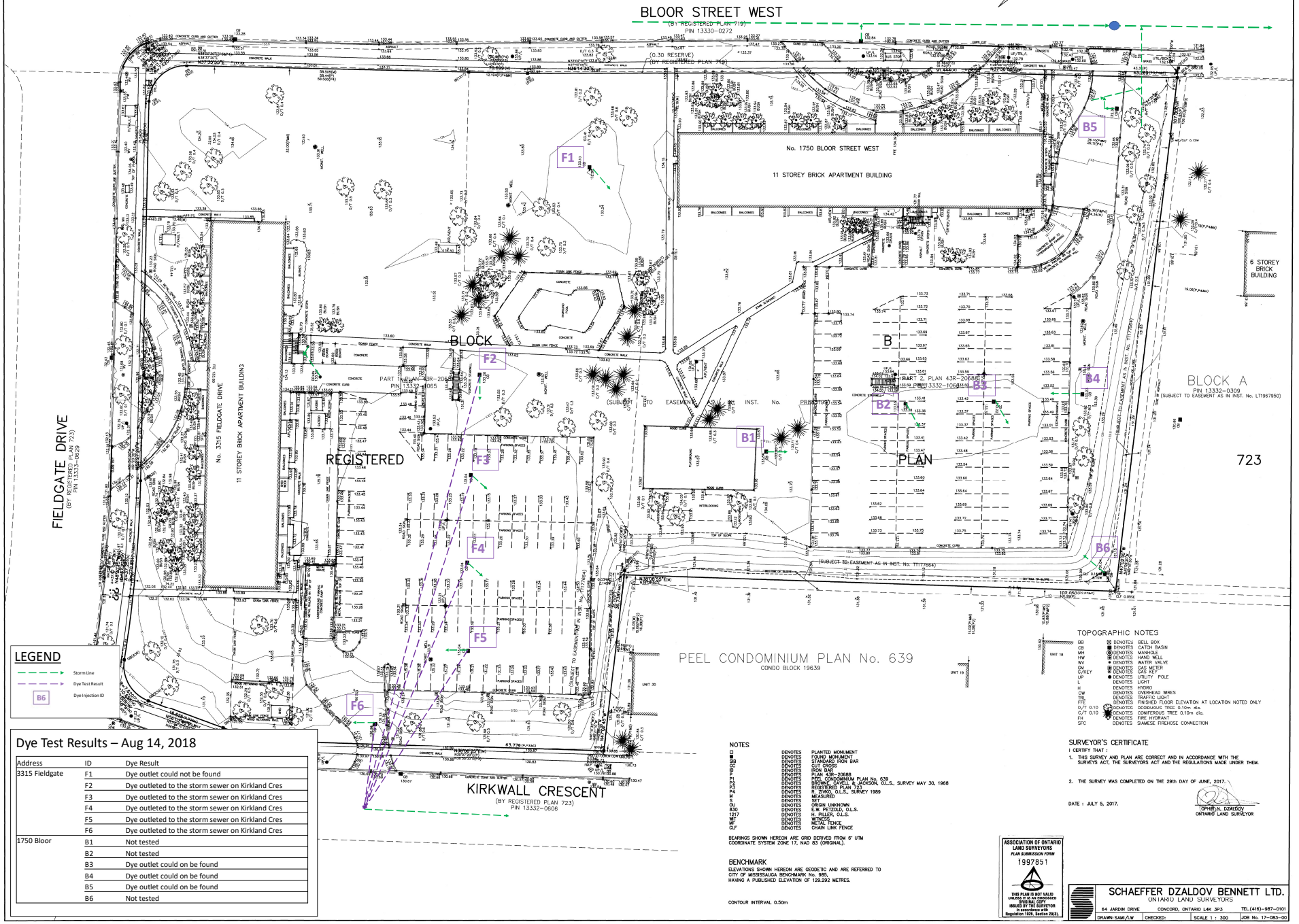

LEGEND

- Storm Line
- Dye Test Result
- B6 — Dye Injection ID

Dye Test Results – Aug 14, 2018

Address	ID	Dye Result
3315 Fieldgate	F1	Dye outlet could not be found
	F2	Dye outleted to the storm sewer on Kirkland Cres
	F3	Dye outleted to the storm sewer on Kirkland Cres
	F4	Dye outleted to the storm sewer on Kirkland Cres
	F5	Dye outleted to the storm sewer on Kirkland Cres
	F6	Dye outleted to the storm sewer on Kirkland Cres
1750 Bloor	B1	Not tested
	B2	Not tested
	B3	Dye outlet could on be found
	B4	Dye outlet could on be found
	B5	Dye outlet could on be found
	B6	Not tested

NOTES

○	DENOTES PLANTED MONUMENT
■	DENOTES FOUND MONUMENT
SIB	DENOTES STANDARD IRON BAR
CC	DENOTES CUT CROSS
IB	DENOTES IRON BAR
20688	DENOTES PLAN 43R-20688
639	DENOTES PEEL CONDOMINIUM PLAN No. 639
965	DENOTES BROWNE, DAVELL & JACKSON, O.L.S., SURVEY MAY 30, 1968
723	DENOTES REGISTERED PLAN 723
1989	DENOTES R. ZIMCO, O.L.S., SURVEY 1989
M	DENOTES MEASURED
P	DENOTES PLAN
OU	DENOTES ORIGIN UNKNOWN
830	DENOTES E.W. PETZOLD, O.L.S.
1217	DENOTES H. PILLER, O.L.S.
WIT	DENOTES WITNESS
MF	DENOTES METAL FENCE
CLF	DENOTES CHAIN LINK FENCE

BEARINGS SHOWN HEREON ARE GRID DERIVED FROM 6° UTM COORDINATE SYSTEM ZONE 17, NAD 83 (ORIGINAL).

BENCHMARK

ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE REFERRED TO CITY OF MISSISSAUGA BENCHMARK No. 985, HAVING A PUBLISHED ELEVATION OF 129.292 METRES.

CONTOUR INTERVAL 0.50m

TOPOGRAPHIC NOTES

BB	DENOTES BELL BOX
CB	DENOTES CATCH BASIN
MH	DENOTES MANHOLE
HW	DENOTES HAND WELL
WV	DENOTES WATER VALVE
GM	DENOTES GAS METER
G/KEY	DENOTES GAS KEY
UP	DENOTES UTILITY POLE
L	DENOTES LIGHT
H	DENOTES HYDRO
OW	DENOTES OVERHEAD WIRES
TRL	DENOTES TRAFFIC LIGHT
FFE	DENOTES FINISHED FLOOR ELEVATION AT LOCATION NOTED ONLY
D/T 0.10	DENOTES DECIDUOUS TREE 0.10m dia.
C/T 0.10	DENOTES CONIFEROUS TREE 0.10m dia.
FH	DENOTES FIRE HYDRANT
SFC	DENOTES SIAMESE FIREHOSE CONNECTION

SURVEYOR'S CERTIFICATE

I CERTIFY THAT :

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON THE 29th DAY OF JUNE, 2017.

DATE : JULY 5, 2017.

CPH&N. DZALDOV
ONTARIO LAND SURVEYOR

ASSOCIATION OF ONTARIO LAND SURVEYORS
PLAN SUBMISSION FORM
1997851
THIS PLAN IS NOT VALID UNLESS IT IS AN EMBOSSED ORIGINAL COPY ISSUED BY THE SURVEYOR In accordance with Regulation 1026, Section 29(3).

SCHAEFFER DZALDOV BENNETT LTD.
ONTARIO LAND SURVEYORS
64 JARDIN DRIVE CONCORD, ONTARIO L4K 3P3 TEL.(416)-987-0101

DRAWN: SAM/LW | CHECKED: | SCALE 1 : 300 | JOB No. 17-083-00

counterpoint engineering

Rational Method - Allowable Release Rates to Kirkwall Crescent

Project No: 17020
Project Name: 1750 Bloor Street

Event:		**2**	**years**	Event:		**5**	**years**
ABC's:	a	610		ABC's:	a	820	
	b	4.6			b	4.6	
	c	0.78			c	0.78	
Time of Concentration:	t	15	min	Time of Concentration:	t	15	min
Runoff Coefficient:	C	0.50		Runoff Coefficient:	C	0.50	
Site Area	A	0.79	ha	Site Area	A	0.79	ha
Intensity $i=a/(t+b)^c$	i	59.89	mm/hr	Intensity $i=a/(t+b)^c$	i	80.51	mm/hr
Flow	Q	0.07	m^3/s	Flow	Q	0.09	m^3/s
Q=CiA/360		66	l/s	Q=CiA/360		88	l/s
Event:		**10**	**years**	Event:		**25**	**years**
ABC's:	a	1010		ABC's:	a	1160	
	b	4.6			b	4.6	
	c	0.78			c	0.78	
Time of Concentration:	t	15	min	Time of Concentration:	t	15	min
Runoff Coefficient:	C	0.50		Runoff Coefficient:	C	0.50	
Site Area	A	0.79	ha	Site Area	A	0.79	ha
Intensity $i=a/(t+b)^c$	i	99.17	mm/hr	Intensity $i=a/(t+b)^c$	i	113.89	mm/hr
Flow	Q	0.11	m^3/s	Flow	Q	0.12	m^3/s
Q=CiA/360		109	l/s	Q=CiA/360		125	l/s
Event:		**50**	**years**	Event:		**100**	**years**
ABC's:	a	1300		ABC's:	a	1450	
	b	4.7			b	4.9	
	c	0.78			c	0.78	
Time of Concentration:	t	15	min	Time of Concentration:	t	15	min
Runoff Coefficient:	C	0.50		Runoff Coefficient:	C	0.50	
Site Area	A	0.79	ha	Site Area	A	0.79	ha
Intensity $i=a/(t+b)^c$	i	127.64	mm/hr	Intensity $i=a/(t+b)^c$	i	142.37	mm/hr
Flow	Q	0.14	m^3/s	Flow	Q	0.16	m^3/s
Q=CiA/360		140	l/s	Q=CiA/360		156	l/s

AREA ID

Composite RC Value	**Area [ha]**	**RC**	**RC * Area**	
Landscaping	0.38	0.25	0.095	
Paved Area/Roof	0.41	0.90	0.369	
Total	0.79		0.464	
Divided by Total Area =			**0.59**	Maximum RC allowed RC=0.50

Project Name:	1750 Bloor Street
Project Number:	17020

Rainfall Data			
Location:	City of Mississauga	a	1450
Event	100-year	b	4.9
		c	0.78

Area ID	Area (ha)	Runoff Coefficient	t_c (min)	Storage Available (m^3)	Storage Required (m^3)	Release Rate (m^3/s)	Orifice Size (mm)	Description
KIRKWALL	0.94	0.66	15	213	210	0.042	100	Orifice Control to Kirkwall
UNC KIRKWALL	0.09	0.32	15	0	0	0.011	-	Uncontrolled Kirkwall
Total to Kirkwall Crescent: Allowable 0.156 m3/s						**0.053**		
BLOOR	1.01	0.72	15	243	241	0.051	100	Orifice Control to Bloor
UNC BLOOR	0.20	0.38	15	0	0	0.030	-	Uncontrolled Bloor
Total to Bloor Street: Allowable 0.281 m3/s						**0.081**		
UNC FIELDGATE	0.27	0.54	15	0	0	0.057	-	Fieldgate
Total to Fieldgate Drive: Allowable 0.059 m3/s						**0.057**		
Total	**2.51**			**456**	**451**			

AREA ID Kirkwall

Composite RC Value		Area [ha]	RC	RC * Area
Landscape/Green Roof		0.25	0.25	0.063
Turf/Permeable Pavement		0.20	0.60	0.120
Paved/Roof		0.49	0.90	0.441
Total		**0.94**		0.624
			Divided by Total Area =	**0.66**

AREA ID Uncontrolled Kirkwall

Composite RC Value		Area [ha]	RC	RC * Area
Landscape		0.08	0.25	0.020
Paved/Roof		0.01	0.90	0.009
Total		**0.09**		0.029
			Divided by Total Area =	**0.32**

AREA ID Bloor

Composite RC Value		Area [ha]	RC	RC * Area
Landscape		0.28	0.25	0.070
Paved/Roof		0.73	0.90	0.657
Total		**1.01**		0.727
			Divided by Total Area =	**0.72**

AREA ID Uncontrolled Bloor

Composite RC Value		Area [ha]	RC	RC * Area
Landscape		0.16	0.25	0.040
Paved/Roof		0.04	0.90	0.036
Total		**0.20**		0.076
			Divided by Total Area =	**0.38**

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Modified Rational **Area:** **Kirkwall**

Project Name: 1750 Bloor Street
Project Number: 17020

Rainfall Data			
Location:	City of Mississauga	a	1450.000
Event	100-year	b	4.900
		c	0.780

Site Data		
Area	0.94	ha
Runoff Coefficient	0.66	
AC	0.62	
Tc	15	
Time Increment	10	
Release Rate	42	l/s
Storage Required	210	m^3

Time	Rainfall Intensity	Storm Runoff	Runoff Volume	Released Volume	Storage Volume	
(min)	(mm/hr)	(m^3/s)	(m^3)	(m^3)	(m^3)	
15	141	0.24	219	37	182	
25	102	0.18	266	62	205	
35	82	0.14	298	87	210	********
45	69	0.12	321	112	209	
55	60	0.10	341	137	204	
65	53	0.09	357	162	195	
75	48	0.08	371	187	184	
85	43	0.08	384	212	172	
95	40	0.07	395	237	158	
105	37	0.06	405	262	144	
115	35	0.06	415	286	128	
125	33	0.06	423	311	112	
135	31	0.05	432	336	95	
145	29	0.05	439	361	78	
155	28	0.05	446	386	60	
165	26	0.05	453	411	42	
175	25	0.04	460	436	24	
185	24	0.04	466	461	5	
195	23	0.04	472	486	-14	
205	22	0.04	478	511	-33	
215	22	0.04	483	535	-53	
225	21	0.04	488	560	-72	
235	20	0.03	493	585	-92	
245	20	0.03	498	610	-112	
255	19	0.03	503	635	-132	
265	18	0.03	507	660	-153	
275	18	0.03	512	685	-173	
285	17	0.03	516	710	-194	
295	17	0.03	520	735	-215	
305	17	0.03	524	760	-235	
315	16	0.03	528	785	-256	
325	16	0.03	532	809	-277	
335	15	0.03	536	834	-299	
345	15	0.03	539	859	-320	
355	15	0.03	543	884	-341	
365	14	0.02	546	909	-363	
375	14	0.02	550	934	-384	
385	14	0.02	553	959	-406	
395	14	0.02	557	984	-427	
405	13	0.02	560	1009	-449	
415	13	0.02	563	1034	-471	
425	13	0.02	566	1059	-493	
435	13	0.02	569	1083	-514	
445	12	0.02	572	1108	-536	
455	12	0.02	575	1133	-558	

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Modified Rational **Area:** **Uncontrolled Kirkwall**

Project Name: 1750 Bloor Street
Project Number: 17020

Rainfall Data			
Location:	City of Mississauga	a	1450.000
Event	100-year	b	4.900
		c	0.780

Site Data		
Area	0.09	ha
Runoff Coefficient	0.32	
AC	0.03	
Tc	15	
Time Increment	10	
Release Rate	11	l/s
Storage Required	0	m^3

Time	Rainfall Intensity	Storm Runoff	Runoff Volume	Released Volume	Storage Volume	
(min)	(mm/hr)	(m^3/s)	(m^3)	(m^3)	(m^3)	
15	141	0.01	10	10	0	********
25	102	0.01	12	17	-4	
35	82	0.01	14	23	-9	
45	69	0.01	15	30	-15	
55	60	0.00	16	36	-20	
65	53	0.00	17	43	-26	
75	48	0.00	17	50	-32	
85	43	0.00	18	56	-38	
95	40	0.00	18	63	-44	
105	37	0.00	19	69	-50	
115	35	0.00	19	76	-57	
125	33	0.00	20	83	-63	
135	31	0.00	20	89	-69	
145	29	0.00	20	96	-75	
155	28	0.00	21	102	-82	
165	26	0.00	21	109	-88	
175	25	0.00	21	116	-94	
185	24	0.00	22	122	-100	
195	23	0.00	22	129	-107	
205	22	0.00	22	135	-113	
215	22	0.00	22	142	-119	

counterpoint engineering

Modified Rational **Area:** **Bloor**

Project Name: 1750 Bloor Street
Project Number: 17020

Rainfall Data			
Location:	City of Mississauga	a	1450.000
Event	100-year	b	4.900
		c	0.780

Site Data		
Area	1.01	ha
Runoff Coefficient	0.72	
AC	0.73	
Tc	15	
Time Increment	10	
Release Rate	51	l/s
Storage Required	241	m^3

Time	Rainfall Intensity	Storm Runoff	Runoff Volume	Released Volume	Storage Volume	
(min)	(mm/hr)	(m^3/s)	(m^3)	(m^3)	(m^3)	
15	141	0.28	256	46	210	
25	102	0.21	310	76	235	
35	82	0.17	347	106	241	********
45	69	0.14	375	137	238	
55	60	0.12	397	167	230	
65	53	0.11	416	197	219	
75	48	0.10	433	228	205	
85	43	0.09	447	258	189	
95	40	0.08	460	288	172	
105	37	0.07	472	319	154	
115	35	0.07	483	349	135	
125	33	0.07	494	379	114	
135	31	0.06	503	410	94	
145	29	0.06	512	440	72	
155	28	0.06	521	470	50	
165	26	0.05	528	501	28	
175	25	0.05	536	531	5	
185	24	0.05	543	561	-18	
195	23	0.05	550	592	-41	
205	22	0.05	557	622	-65	
215	22	0.04	563	652	-89	

counterpoint engineering

Modified Rational **Area:** **Uncontrolled Bloor**

Project Name: 1750 Bloor Street
Project Number: 17020

Rainfall Data			
Location:	City of Mississauga	a	1450.000
Event	100-year	b	4.900
		c	0.780

Site Data		
Area	0.20	ha
Runoff Coefficient	0.38	
AC	0.08	
Tc	15	
Time Increment	10	
Release Rate	30	l/s
Storage Required	0	m^3

Time	Rainfall Intensity	Storm Runoff	Runoff Volume	Released Volume	Storage Volume	
(min)	(mm/hr)	(m^3/s)	(m^3)	(m^3)	(m^3)	
15	141	0.03	27	27	0	********
25	102	0.02	32	45	-13	
35	82	0.02	36	63	-27	
45	69	0.01	39	81	-42	
55	60	0.01	42	99	-57	
65	53	0.01	44	117	-73	
75	48	0.01	45	135	-90	
85	43	0.01	47	153	-106	
95	40	0.01	48	171	-123	
105	37	0.01	49	189	-140	
115	35	0.01	51	207	-156	
125	33	0.01	52	225	-173	
135	31	0.01	53	243	-190	
145	29	0.01	54	261	-207	
155	28	0.01	54	279	-225	
165	26	0.01	55	297	-242	
175	25	0.01	56	315	-259	
185	24	0.01	57	333	-276	
195	23	0.00	58	351	-293	
205	22	0.00	58	369	-311	
215	22	0.00	59	387	-328	

counterpoint engineering

Modified Rational **Area:** **Fieldgate**

Project Name: 1750 Bloor Street
Project Number: 17020

Rainfall Data			
Location:	City of Mississauga	a	1450.000
Event	100-year	b	4.900
		c	0.780

Site Data		
Area	0.27	ha
Runoff Coefficient	0.54	
AC	0.15	
Tc	15	
Time Increment	10	
Release Rate	57	l/s
Storage Required	0	m^3

Time	Rainfall Intensity	Storm Runoff	Runoff Volume	Released Volume	Storage Volume	
(min)	(mm/hr)	(m^3/s)	(m^3)	(m^3)	(m^3)	
15	141	0.06	51	51	0	********
25	102	0.04	62	86	-23	
35	82	0.03	69	120	-50	
45	69	0.03	75	154	-79	
55	60	0.02	80	188	-109	
65	53	0.02	83	222	-139	
75	48	0.02	87	257	-170	
85	43	0.02	90	291	-201	
95	40	0.02	92	325	-233	
105	37	0.02	95	359	-265	
115	35	0.01	97	393	-297	
125	33	0.01	99	428	-329	
135	31	0.01	101	462	-361	
145	29	0.01	102	496	-393	
155	28	0.01	104	530	-426	
165	26	0.01	106	564	-459	
175	25	0.01	107	599	-491	
185	24	0.01	109	633	-524	
195	23	0.01	110	667	-557	
205	22	0.01	111	701	-590	
215	22	0.01	113	735	-623	

counterpoint engineering

Orifice Control & Detention Storage

Job 1750 Bloor Street
Job No. 17020

Orifice Equation: $Q = C_d A(2gh)^{1/2}$ **Area:** **Kirkwall**

Orifice Diameter: 100 mm

Area: 0.008 m^2

g = 9.81 m/s^2

C_d = 0.81 tube coefficient

Underground Storage Tank Provided= 212.89 m^3

counterpoint engineering

Orifice Control & Detention Storage

Job 1750 Bloor Street
Job No. 17020

Orifice Equation: $Q = C_d A(2gh)^{1/2}$

Area: **Bloor**

Orifice Diameter: 100 mm

Area: 0.008 m^2

g = 9.81 m/s^2

C_d = 0.81 tube coefficient

Underground Storage Tank Provided= **242.68** **m^3**

Project Name:	1750 Bloor Street
Project Number:	17020

Rainfall Data			
Location:	City of Mississauga	a	1300
Event	50-year	b	4.7
		c	0.78

Area ID	Area (ha)	Runoff Coefficient	t_c (min)	Storage Available (m^3)	Storage Required (m^3)	Release Rate (m^3/s)	Orifice Size (mm)	Description
KIRKWALL	0.94	0.66	15	213	181	0.042	100	Orifice Control to Kirkwall
UNC KIRKWALL	0.09	0.32	15	0	0	0.010	-	Uncontrolled Kirkwall
Total to Kirkwall Crescent: Allowable 0.140 m3/s						**0.052**		
BLOOR	1.01	0.72	15	243	206	0.051	100	Orifice Control to Bloor
UNC BLOOR	0.20	0.38	15	0	0	0.027	-	Uncontrolled Bloor
Total to Bloor Street: Allowable 0.252 m3/s						**0.078**		
UNC FIELDGATE	0.27	0.54	15	0	0	0.051	-	Fieldgate
Total to Fieldgate Drive: Allowable 0.053 m3/s						**0.051**		
Total	**2.51**			**456**	**387**			

AREA ID Kirkwall

Composite RC Value		Area [ha]	RC	RC * Area
Landscape/Green Roof		0.25	0.25	0.063
Turf/Permeable Pavement		0.20	0.60	0.120
Paved/Roof		0.49	0.90	0.441
Total		**0.94**		0.624
			Divided by Total Area =	**0.66**

AREA ID Uncontrolled Kirkwall

Composite RC Value		Area [ha]	RC	RC * Area
Landscape		0.08	0.25	0.020
Paved/Roof		0.01	0.90	0.009
Total		**0.09**		0.029
			Divided by Total Area =	**0.32**

AREA ID Bloor

Composite RC Value		Area [ha]	RC	RC * Area
Landscape		0.28	0.25	0.070
Paved/Roof		0.73	0.90	0.657
Total		**1.01**		0.727
			Divided by Total Area =	**0.72**

AREA ID Uncontrolled Bloor

Composite RC Value		Area [ha]	RC	RC * Area
Landscape		0.16	0.25	0.040
Paved/Roof		0.04	0.90	0.036
Total		**0.20**		0.076
			Divided by Total Area =	**0.38**

counterpoint engineering

Modified Rational **Area:** **Kirkwall**

Project Name: 1750 Bloor Street
Project Number: 17020

Rainfall Data			
Location:	City of Mississauga	a	1300.000
Event	50-year	b	4.700
		c	0.780

Site Data		
Area	0.94	ha
Runoff Coefficient	0.66	
AC	0.62	
Tc	15	
Time Increment	10	
Release Rate	42	l/s
Storage Required	181	m^3

Time	Rainfall Intensity	Storm Runoff	Runoff Volume	Released Volume	Storage Volume	
(min)	(mm/hr)	(m^3/s)	(m^3)	(m^3)	(m^3)	
15	127	0.22	198	37	161	
25	92	0.16	240	62	178	
35	74	0.13	268	87	181	********
45	62	0.11	289	112	177	
55	54	0.09	306	137	169	
65	47	0.08	321	162	159	
75	43	0.07	333	187	147	
85	39	0.07	345	212	133	
95	36	0.06	355	237	118	
105	33	0.06	364	262	102	
115	31	0.05	372	286	86	
125	29	0.05	380	311	69	
135	28	0.05	387	336	51	
145	26	0.05	394	361	33	
155	25	0.04	401	386	15	
165	24	0.04	407	411	-4	
175	23	0.04	413	436	-23	
185	22	0.04	418	461	-43	
195	21	0.04	423	486	-62	
205	20	0.03	428	511	-82	
215	19	0.03	433	535	-102	
225	19	0.03	438	560	-122	
235	18	0.03	442	585	-143	
245	18	0.03	447	610	-163	
255	17	0.03	451	635	-184	
265	17	0.03	455	660	-205	
275	16	0.03	459	685	-226	
285	16	0.03	463	710	-247	
295	15	0.03	467	735	-268	
305	15	0.03	470	760	-289	
315	14	0.03	474	785	-311	
325	14	0.02	477	809	-332	
335	14	0.02	481	834	-354	
345	13	0.02	484	859	-375	
355	13	0.02	487	884	-397	
365	13	0.02	490	909	-419	
375	13	0.02	493	934	-441	
385	12	0.02	496	959	-463	
395	12	0.02	499	984	-485	
405	12	0.02	502	1009	-507	
415	12	0.02	505	1034	-529	
425	11	0.02	508	1059	-551	
435	11	0.02	510	1083	-573	
445	11	0.02	513	1108	-595	
455	11	0.02	516	1133	-618	

counterpoint engineering

Modified Rational **Area:** **Uncontrolled Kirkwall**

Project Name: 1750 Bloor Street
Project Number: 17020

Rainfall Data			
Location:	City of Mississauga	a	1300.000
Event	50-year	b	4.700
		c	0.780

Site Data		
Area	0.09	ha
Runoff Coefficient	0.32	
AC	0.03	
Tc	15	
Time Increment	10	
Release Rate	10	l/s
Storage Required	0	m^3

Time	Rainfall Intensity	Storm Runoff	Runoff Volume	Released Volume	Storage Volume	
(min)	(mm/hr)	(m^3/s)	(m^3)	(m^3)	(m^3)	
15	127	0.01	9	9	0	********
25	92	0.01	11	15	-4	
35	74	0.01	12	21	-9	
45	62	0.00	13	27	-14	
55	54	0.00	14	33	-19	
65	47	0.00	15	39	-24	
75	43	0.00	16	45	-29	
85	39	0.00	16	51	-35	
95	36	0.00	16	57	-41	
105	33	0.00	17	63	-46	
115	31	0.00	17	69	-52	
125	29	0.00	18	75	-57	
135	28	0.00	18	81	-63	
145	26	0.00	18	87	-69	
155	25	0.00	19	93	-74	
165	24	0.00	19	99	-80	
175	23	0.00	19	105	-86	
185	22	0.00	19	111	-92	
195	21	0.00	20	117	-97	
205	20	0.00	20	123	-103	
215	19	0.00	20	129	-109	

counterpoint engineering

Modified Rational **Area:** **Bloor**

Project Name: 1750 Bloor Street
Project Number: 17020

Rainfall Data			
Location:	City of Mississauga	a	1300.000
Event	50-year	b	4.700
		c	0.780

Site Data		
Area	1.01	ha
Runoff Coefficient	0.72	
AC	0.73	
Tc	15	
Time Increment	10	
Release Rate	51	l/s
Storage Required	206	m^3

Time	Rainfall Intensity	Storm Runoff	Runoff Volume	Released Volume	Storage Volume	
(min)	(mm/hr)	(m^3/s)	(m^3)	(m^3)	(m^3)	
15	127	0.26	231	46	186	
25	92	0.19	280	76	204	
35	74	0.15	312	106	206	********
45	62	0.12	337	137	201	
55	54	0.11	357	167	190	
65	47	0.10	374	197	177	
75	43	0.09	389	228	161	
85	39	0.08	402	258	144	
95	36	0.07	413	288	125	
105	33	0.07	424	319	106	
115	31	0.06	434	349	85	
125	29	0.06	443	379	64	
135	28	0.06	452	410	42	
145	26	0.05	460	440	20	
155	25	0.05	467	470	-3	
165	24	0.05	474	501	-26	
175	23	0.05	481	531	-50	
185	22	0.04	487	561	-74	
195	21	0.04	494	592	-98	
205	20	0.04	500	622	-122	
215	19	0.04	505	652	-147	

counterpoint engineering

Modified Rational **Area:** **Uncontrolled Bloor**

Project Name: 1750 Bloor Street
Project Number: 17020

Rainfall Data			
Location:	City of Mississauga	a	1300.000
Event	50-year	b	4.700
		c	0.780

Site Data		
Area	0.20	ha
Runoff Coefficient	0.38	
AC	0.08	
Tc	15	
Time Increment	10	
Release Rate	27	l/s
Storage Required	0	m^3

Time	Rainfall Intensity	Storm Runoff	Runoff Volume	Released Volume	Storage Volume	
(min)	(mm/hr)	(m^3/s)	(m^3)	(m^3)	(m^3)	
15	127	0.03	24	24	0	********
25	92	0.02	29	41	-11	
35	74	0.02	33	57	-24	
45	62	0.01	35	73	-38	
55	54	0.01	37	89	-52	
65	47	0.01	39	105	-66	
75	43	0.01	41	122	-81	
85	39	0.01	42	138	-96	
95	36	0.01	43	154	-111	
105	33	0.01	44	170	-126	
115	31	0.01	45	186	-141	
125	29	0.01	46	203	-156	
135	28	0.01	47	219	-171	
145	26	0.01	48	235	-187	
155	25	0.01	49	251	-202	
165	24	0.01	50	267	-218	
175	23	0.00	50	284	-233	
185	22	0.00	51	300	-249	
195	21	0.00	52	316	-264	
205	20	0.00	52	332	-280	
215	19	0.00	53	348	-295	

counterpoint engineering

Modified Rational **Area:** **Fieldgate**

Project Name: 1750 Bloor Street
Project Number: 17020

Rainfall Data			
Location:	City of Mississauga	a	1300.000
Event	50-year	b	4.700
		c	0.780

Site Data		
Area	0.27	ha
Runoff Coefficient	0.54	
AC	0.15	
Tc	15	
Time Increment	10	
Release Rate	51	l/s
Storage Required	0	m^3

Time	Rainfall Intensity	Storm Runoff	Runoff Volume	Released Volume	Storage Volume	
(min)	(mm/hr)	(m^3/s)	(m^3)	(m^3)	(m^3)	
15	127	0.05	46	46	0	********
25	92	0.04	56	77	-20	
35	74	0.03	63	107	-45	
45	62	0.02	67	138	-70	
55	54	0.02	71	168	-97	
65	47	0.02	75	199	-124	
75	43	0.02	78	230	-152	
85	39	0.02	80	260	-180	
95	36	0.01	83	291	-208	
105	33	0.01	85	321	-236	
115	31	0.01	87	352	-265	
125	29	0.01	89	383	-294	
135	28	0.01	90	413	-323	
145	26	0.01	92	444	-352	
155	25	0.01	93	474	-381	
165	24	0.01	95	505	-410	
175	23	0.01	96	536	-439	
185	22	0.01	98	566	-469	
195	21	0.01	99	597	-498	
205	20	0.01	100	627	-527	
215	19	0.01	101	658	-557	

counterpoint engineering

Orifice Control & Detention Storage

Job 1750 Bloor Street
Job No. 17020

Orifice Equation: $Q = C_d A(2gh)^{1/2}$ **Area:** **Kirkwall**

Orifice Diameter: 100 mm

Area: 0.008 m^2

g = 9.81 m/s^2

C_d = 0.81 tube coefficient

Underground Storage Tank Provided= 212.89 m^3

counterpoint engineering

Orifice Control & Detention Storage

Job 1750 Bloor Street
Job No. 17020

Orifice Equation: $Q = C_d A(2gh)^{1/2}$

Area: **Bloor**

Orifice Diameter: 100 mm

Area: 0.008 m^2

g = 9.81 m/s^2

C_d = 0.81 tube coefficient

Underground Storage Tank Provided= **242.68** **m^3**

Project Name:	1750 Bloor Street
Project Number:	17020

Rainfall Data			
Location:	City of Mississauga	a	1160
Event	25-year	b	4.6
		c	0.78

Area ID	Area (ha)	Runoff Coefficient	t_c (min)	Storage Available (m^3)	Storage Required (m^3)	Release Rate (m^3/s)	Orifice Size (mm)	Description
KIRKWALL	0.94	0.66	15	213	153	0.042	100	Orifice Control to Kirkwall
UNC KIRKWALL	0.09	0.32	15	0	0	0.009	-	Uncontrolled Kirkwall
Total to Kirkwall Crescent: Allowable 0.125 m3/s						**0.051**		
BLOOR	1.01	0.72	15	243	174	0.051	100	Orifice Control to Bloor
UNC BLOOR	0.20	0.38	15	0	0	0.024	-	Uncontrolled Bloor
Total to Bloor Street: Allowable 0.225 m3/s						**0.075**		
UNC FIELDGATE	0.27	0.54	15	0	0	0.046	-	Fieldgate
Total to Fieldgate Drive: Allowable 0.047 m3/s						**0.046**		
Total	**2.51**			**456**	**327**			

AREA ID Kirkwall

Composite RC Value		Area [ha]	RC	RC * Area
Landscape/Green Roof		0.25	0.25	0.063
Turf/Permeable Pavement		0.20	0.60	0.120
Paved/Roof		0.49	0.90	0.441
Total		**0.94**		0.624
			Divided by Total Area =	**0.66**

AREA ID Uncontrolled Kirkwall

Composite RC Value		Area [ha]	RC	RC * Area
Landscape		0.08	0.25	0.020
Paved/Roof		0.01	0.90	0.009
Total		**0.09**		0.029
			Divided by Total Area =	**0.32**

AREA ID Bloor

Composite RC Value		Area [ha]	RC	RC * Area
Landscape		0.28	0.25	0.070
Paved/Roof		0.73	0.90	0.657
Total		**1.01**		0.727
			Divided by Total Area =	**0.72**

AREA ID Uncontrolled Bloor

Composite RC Value		Area [ha]	RC	RC * Area
Landscape		0.16	0.25	0.040
Paved/Roof		0.04	0.90	0.036
Total		**0.20**		0.076
			Divided by Total Area =	**0.38**

counterpoint engineering

Modified Rational **Area:** **Kirkwall**

Project Name: 1750 Bloor Street
Project Number: 17020

Rainfall Data			
Location:	City of Mississauga	a	1160.000
Event	25-year	b	4.600
		c	0.780

Site Data		
Area	0.94	ha
Runoff Coefficient	0.66	
AC	0.62	
Tc	15	
Time Increment	10	
Release Rate	42	l/s
Storage Required	153	m^3

Time	Rainfall Intensity	Storm Runoff	Runoff Volume	Released Volume	Storage Volume	
(min)	(mm/hr)	(m^3/s)	(m^3)	(m^3)	(m^3)	
15	114	0.20	178	37	140	
25	83	0.14	215	62	153	********
35	66	0.11	240	87	152	
45	55	0.10	258	112	146	
55	48	0.08	274	137	137	
65	42	0.07	287	162	125	
75	38	0.07	298	187	111	
85	35	0.06	308	212	96	
95	32	0.06	317	237	80	
105	30	0.05	325	262	63	
115	28	0.05	332	286	46	
125	26	0.05	339	311	28	
135	25	0.04	346	336	10	
145	23	0.04	352	361	-9	
155	22	0.04	358	386	-28	
165	21	0.04	363	411	-48	
175	20	0.04	368	436	-68	
185	19	0.03	373	461	-88	
195	19	0.03	378	486	-108	
205	18	0.03	382	511	-128	
215	17	0.03	387	535	-149	
225	17	0.03	391	560	-169	
235	16	0.03	395	585	-190	
245	16	0.03	399	610	-211	
255	15	0.03	403	635	-233	
265	15	0.03	406	660	-254	
275	14	0.02	410	685	-275	
285	14	0.02	413	710	-297	
295	14	0.02	416	735	-318	
305	13	0.02	420	760	-340	
315	13	0.02	423	785	-362	
325	13	0.02	426	809	-384	
335	12	0.02	429	834	-405	
345	12	0.02	432	859	-427	
355	12	0.02	435	884	-449	
365	12	0.02	437	909	-472	
375	11	0.02	440	934	-494	
385	11	0.02	443	959	-516	
395	11	0.02	445	984	-538	
405	11	0.02	448	1009	-561	
415	10	0.02	451	1034	-583	
425	10	0.02	453	1059	-606	
435	10	0.02	455	1083	-628	
445	10	0.02	458	1108	-651	
455	10	0.02	460	1133	-673	

counterpoint engineering

Modified Rational **Area:** **Uncontrolled Kirkwall**

Project Name: 1750 Bloor Street
Project Number: 17020

Rainfall Data			
Location:	City of Mississauga	a	1160.000
Event	25-year	b	4.600
		c	0.780

Site Data		
Area	0.09	ha
Runoff Coefficient	0.32	
AC	0.03	
Tc	15	
Time Increment	10	
Release Rate	9	l/s
Storage Required	0	m^3

Time	Rainfall Intensity	Storm Runoff	Runoff Volume	Released Volume	Storage Volume	
(min)	(mm/hr)	(m^3/s)	(m^3)	(m^3)	(m^3)	
15	114	0.01	8	8	0	********
25	83	0.01	10	14	-4	
35	66	0.01	11	19	-8	
45	55	0.00	12	24	-12	
55	48	0.00	13	30	-17	
65	42	0.00	13	35	-22	
75	38	0.00	14	41	-27	
85	35	0.00	14	46	-32	
95	32	0.00	15	51	-37	
105	30	0.00	15	57	-42	
115	28	0.00	15	62	-47	
125	26	0.00	16	68	-52	
135	25	0.00	16	73	-57	
145	23	0.00	16	78	-62	
155	22	0.00	17	84	-67	
165	21	0.00	17	89	-72	
175	20	0.00	17	95	-77	
185	19	0.00	17	100	-83	
195	19	0.00	18	105	-88	
205	18	0.00	18	111	-93	
215	17	0.00	18	116	-98	

counterpoint engineering

Modified Rational **Area:** **Bloor**

Project Name: 1750 Bloor Street
Project Number: 17020

Rainfall Data			
Location:	City of Mississauga	a	1160.000
Event	25-year	b	4.600
		c	0.780

Site Data		
Area	1.01	ha
Runoff Coefficient	0.72	
AC	0.73	
Tc	15	
Time Increment	10	
Release Rate	51	l/s
Storage Required	174	m^3

Time	Rainfall Intensity	Storm Runoff	Runoff Volume	Released Volume	Storage Volume	
(min)	(mm/hr)	(m^3/s)	(m^3)	(m^3)	(m^3)	
15	114	0.23	207	46	162	
25	83	0.17	250	76	174	********
35	66	0.13	279	106	173	
45	55	0.11	301	137	165	
55	48	0.10	319	167	152	
65	42	0.09	334	197	137	
75	38	0.08	347	228	120	
85	35	0.07	359	258	101	
95	32	0.06	369	288	81	
105	30	0.06	379	319	60	
115	28	0.06	387	349	39	
125	26	0.05	396	379	16	
135	25	0.05	403	410	-6	
145	23	0.05	410	440	-30	
155	22	0.04	417	470	-53	
165	21	0.04	423	501	-77	
175	20	0.04	429	531	-102	
185	19	0.04	435	561	-126	
195	19	0.04	441	592	-151	
205	18	0.04	446	622	-176	
215	17	0.03	451	652	-201	

counterpoint engineering

Modified Rational **Area:** **Uncontrolled Bloor**

Project Name: 1750 Bloor Street
Project Number: 17020

Rainfall Data			
Location:	City of Mississauga	a	1160.000
Event	25-year	b	4.600
		c	0.780

Site Data		
Area	0.20	ha
Runoff Coefficient	0.38	
AC	0.08	
Tc	15	
Time Increment	10	
Release Rate	24	l/s
Storage Required	0	m^3

Time	Rainfall Intensity	Storm Runoff	Runoff Volume	Released Volume	Storage Volume	
(min)	(mm/hr)	(m^3/s)	(m^3)	(m^3)	(m^3)	
15	114	0.02	22	22	0	********
25	83	0.02	26	36	-10	
35	66	0.01	29	50	-21	
45	55	0.01	31	65	-33	
55	48	0.01	33	79	-46	
65	42	0.01	35	94	-59	
75	38	0.01	36	108	-72	
85	35	0.01	38	122	-85	
95	32	0.01	39	137	-98	
105	30	0.01	40	151	-112	
115	28	0.01	41	166	-125	
125	26	0.01	41	180	-139	
135	25	0.01	42	194	-152	
145	23	0.00	43	209	-166	
155	22	0.00	44	223	-180	
165	21	0.00	44	238	-193	
175	20	0.00	45	252	-207	
185	19	0.00	45	266	-221	
195	19	0.00	46	281	-235	
205	18	0.00	47	295	-249	
215	17	0.00	47	310	-262	

counterpoint engineering

Modified Rational **Area:** **Fieldgate**

Project Name: 1750 Bloor Street
Project Number: 17020

Rainfall Data			
Location:	City of Mississauga	a	1160.000
Event	25-year	b	4.600
		c	0.780

Site Data		
Area	0.27	ha
Runoff Coefficient	0.54	
AC	0.15	
Tc	15	
Time Increment	10	
Release Rate	46	l/s
Storage Required	0	m^3

Time	Rainfall Intensity	Storm Runoff	Runoff Volume	Released Volume	Storage Volume	
(min)	(mm/hr)	(m^3/s)	(m^3)	(m^3)	(m^3)	
15	114	0.05	41	41	0	********
25	83	0.03	50	69	-19	
35	66	0.03	56	97	-41	
45	55	0.02	60	124	-64	
55	48	0.02	64	152	-88	
65	42	0.02	67	179	-113	
75	38	0.02	69	207	-138	
85	35	0.01	72	235	-163	
95	32	0.01	74	262	-188	
105	30	0.01	76	290	-214	
115	28	0.01	78	317	-240	
125	26	0.01	79	345	-266	
135	25	0.01	81	373	-292	
145	23	0.01	82	400	-318	
155	22	0.01	83	428	-344	
165	21	0.01	85	455	-371	
175	20	0.01	86	483	-397	
185	19	0.01	87	511	-424	
195	19	0.01	88	538	-450	
205	18	0.01	89	566	-477	
215	17	0.01	90	593	-503	

counterpoint engineering

Orifice Control & Detention Storage

Job 1750 Bloor Street
Job No. 17020

Orifice Equation: $Q = C_d A(2gh)^{1/2}$ **Area:** **Kirkwall**

Orifice Diameter: 100 mm

Area: 0.008 m^2

g = 9.81 m/s^2

C_d = 0.81 tube coefficient

Underground Storage Tank Provided= 212.89 m^3

counterpoint engineering

Orifice Control & Detention Storage

Job 1750 Bloor Street
Job No. 17020

Orifice Equation: $Q = C_d A(2gh)^{1/2}$

Area: **Bloor**

Orifice Diameter: 100 mm

Area: 0.008 m^2

g = 9.81 m/s^2

C_d = 0.81 tube coefficient

Underground Storage Tank Provided= **242.68** **m^3**

Project Name:	1750 Bloor Street
Project Number:	17020

Rainfall Data			
Location:	City of Mississauga	a	1010
Event	10-year	b	4.6
		c	0.78

Area ID	Area (ha)	Runoff Coefficient	t_c (min)	Storage Available (m^3)	Storage Required (m^3)	Release Rate (m^3/s)	Orifice Size (mm)	Description
KIRKWALL	0.94	0.66	15	213	125	0.042	100	Orifice Control to Kirkwall
UNC KIRKWALL	0.09	0.32	15	0	0	0.008	-	Uncontrolled Kirkwall
Total to Kirkwall Crescent: Allowable 0.109 m3/s						**0.050**		
BLOOR	1.01	0.72	15	243	142	0.051	100	Orifice Control to Bloor
UNC BLOOR	0.20	0.38	15	0	0	0.021	-	Uncontrolled Bloor
Total to Bloor Street: Allowable 0.196 m3/s						**0.072**		
UNC FIELDGATE	0.27	0.54	15	0	0	0.040	-	Fieldgate
Total to Fieldgate Drive: Allowable 0.041 m3/s						**0.040**		
Total	**2.51**			**456**	**267**			

AREA ID Kirkwall

Composite RC Value		Area [ha]	RC	RC * Area
Landscape/Green Roof		0.25	0.25	0.063
Turf/Permeable Pavement		0.20	0.60	0.120
Paved/Roof		0.49	0.90	0.441
Total		**0.94**		0.624
			Divided by Total Area =	**0.66**

AREA ID Uncontrolled Kirkwall

Composite RC Value		Area [ha]	RC	RC * Area
Landscape		0.08	0.25	0.020
Paved/Roof		0.01	0.90	0.009
Total		**0.09**		0.029
			Divided by Total Area =	**0.32**

AREA ID Bloor

Composite RC Value		Area [ha]	RC	RC * Area
Landscape		0.28	0.25	0.070
Paved/Roof		0.73	0.90	0.657
Total		**1.01**		0.727
			Divided by Total Area =	**0.72**

AREA ID Uncontrolled Bloor

Composite RC Value		Area [ha]	RC	RC * Area
Landscape		0.16	0.25	0.040
Paved/Roof		0.04	0.90	0.036
Total		**0.20**		0.076
			Divided by Total Area =	**0.38**

counterpoint engineering

Modified Rational **Area:** **Kirkwall**

Project Name: 1750 Bloor Street
Project Number: 17020

Rainfall Data			
Location:	City of Mississauga	a	1010.000
Event	10-year	b	4.600
		c	0.780

Site Data		
Area	0.94	ha
Runoff Coefficient	0.66	
AC	0.62	
Tc	15	
Time Increment	10	
Release Rate	42	l/s
Storage Required	125	m^3

Time	Rainfall Intensity	Storm Runoff	Runoff Volume	Released Volume	Storage Volume	
(min)	(mm/hr)	(m^3/s)	(m^3)	(m^3)	(m^3)	
15	99	0.17	155	37	117	
25	72	0.12	187	62	125	********
35	57	0.10	209	87	121	
45	48	0.08	225	112	113	
55	42	0.07	238	137	101	
65	37	0.06	249	162	88	
75	33	0.06	259	187	72	
85	30	0.05	268	212	56	
95	28	0.05	276	237	39	
105	26	0.04	283	262	21	
115	24	0.04	289	286	3	
125	23	0.04	295	311	-16	
135	21	0.04	301	336	-35	
145	20	0.04	306	361	-55	
155	19	0.03	311	386	-75	
165	18	0.03	316	411	-95	
175	18	0.03	321	436	-115	
185	17	0.03	325	461	-136	
195	16	0.03	329	486	-157	
205	16	0.03	333	511	-178	
215	15	0.03	337	535	-199	
225	15	0.03	340	560	-220	
235	14	0.02	344	585	-241	
245	14	0.02	347	610	-263	
255	13	0.02	351	635	-285	
265	13	0.02	354	660	-306	
275	12	0.02	357	685	-328	
285	12	0.02	360	710	-350	
295	12	0.02	363	735	-372	
305	12	0.02	365	760	-394	
315	11	0.02	368	785	-416	
325	11	0.02	371	809	-439	
335	11	0.02	373	834	-461	
345	10	0.02	376	859	-483	
355	10	0.02	378	884	-506	
365	10	0.02	381	909	-528	
375	10	0.02	383	934	-551	
385	10	0.02	386	959	-573	
395	9	0.02	388	984	-596	
405	9	0.02	390	1009	-619	
415	9	0.02	392	1034	-641	
425	9	0.02	394	1059	-664	
435	9	0.02	397	1083	-687	
445	9	0.01	399	1108	-710	
455	8	0.01	401	1133	-733	

counterpoint engineering

Modified Rational **Area:** **Uncontrolled Kirkwall**

Project Name: 1750 Bloor Street
Project Number: 17020

Rainfall Data			
Location:	City of Mississauga	a	1010.000
Event	10-year	b	4.600
		c	0.780

Site Data		
Area	0.09	ha
Runoff Coefficient	0.32	
AC	0.03	
Tc	15	
Time Increment	10	
Release Rate	8	l/s
Storage Required	0	m^3

Time	Rainfall Intensity	Storm Runoff	Runoff Volume	Released Volume	Storage Volume	
(min)	(mm/hr)	(m^3/s)	(m^3)	(m^3)	(m^3)	
15	99	0.01	7	7	0	********
25	72	0.01	9	12	-3	
35	57	0.00	10	17	-7	
45	48	0.00	10	22	-11	
55	42	0.00	11	26	-15	
65	37	0.00	12	31	-20	
75	33	0.00	12	36	-24	
85	30	0.00	12	41	-28	
95	28	0.00	13	46	-33	
105	26	0.00	13	50	-37	
115	24	0.00	13	55	-42	
125	23	0.00	14	60	-46	
135	21	0.00	14	65	-51	
145	20	0.00	14	70	-55	
155	19	0.00	14	74	-60	
165	18	0.00	15	79	-64	
175	18	0.00	15	84	-69	
185	17	0.00	15	89	-74	
195	16	0.00	15	94	-78	
205	16	0.00	15	98	-83	
215	15	0.00	16	103	-88	

counterpoint engineering

Modified Rational **Area:** **Bloor**

Project Name: 1750 Bloor Street
Project Number: 17020

Rainfall Data			
Location:	City of Mississauga	a	1010.000
Event	10-year	b	4.600
		c	0.780

Site Data		
Area	1.01	ha
Runoff Coefficient	0.72	
AC	0.73	
Tc	15	
Time Increment	10	
Release Rate	51	l/s
Storage Required	142	m^3

Time	Rainfall Intensity	Storm Runoff	Runoff Volume	Released Volume	Storage Volume	
(min)	(mm/hr)	(m^3/s)	(m^3)	(m^3)	(m^3)	
15	99	0.20	180	46	135	
25	72	0.15	218	76	142	********
35	57	0.12	243	106	137	
45	48	0.10	262	137	126	
55	42	0.08	278	167	111	
65	37	0.07	291	197	94	
75	33	0.07	302	228	75	
85	30	0.06	312	258	54	
95	28	0.06	321	288	33	
105	26	0.05	330	319	11	
115	24	0.05	337	349	-12	
125	23	0.05	344	379	-35	
135	21	0.04	351	410	-59	
145	20	0.04	357	440	-83	
155	19	0.04	363	470	-107	
165	18	0.04	369	501	-132	
175	18	0.04	374	531	-157	
185	17	0.03	379	561	-182	
195	16	0.03	384	592	-208	
205	16	0.03	388	622	-234	
215	15	0.03	393	652	-260	

counterpoint engineering

Modified Rational **Area:** **Uncontrolled Bloor**

Project Name: 1750 Bloor Street
Project Number: 17020

Rainfall Data			
Location:	City of Mississauga	a	1010.000
Event	10-year	b	4.600
		c	0.780

Site Data		
Area	0.20	ha
Runoff Coefficient	0.38	
AC	0.08	
Tc	15	
Time Increment	10	
Release Rate	21	l/s
Storage Required	0	m^3

Time	Rainfall Intensity	Storm Runoff	Runoff Volume	Released Volume	Storage Volume	
(min)	(mm/hr)	(m^3/s)	(m^3)	(m^3)	(m^3)	
15	99	0.02	19	19	0	********
25	72	0.02	23	32	-9	
35	57	0.01	25	44	-19	
45	48	0.01	27	57	-29	
55	42	0.01	29	69	-40	
65	37	0.01	30	82	-51	
75	33	0.01	32	95	-63	
85	30	0.01	33	107	-74	
95	28	0.01	34	120	-86	
105	26	0.01	34	132	-98	
115	24	0.01	35	145	-110	
125	23	0.00	36	158	-121	
135	21	0.00	37	170	-133	
145	20	0.00	37	183	-145	
155	19	0.00	38	195	-157	
165	18	0.00	39	208	-169	
175	18	0.00	39	221	-181	
185	17	0.00	40	233	-193	
195	16	0.00	40	246	-206	
205	16	0.00	41	258	-218	
215	15	0.00	41	271	-230	

counterpoint engineering

Modified Rational **Area:** **Fieldgate**

Project Name: 1750 Bloor Street
Project Number: 17020

Rainfall Data			
Location:	City of Mississauga	a	1010.000
Event	10-year	b	4.600
		c	0.780

Site Data		
Area	0.27	ha
Runoff Coefficient	0.54	
AC	0.15	
Tc	15	
Time Increment	10	
Release Rate	40	l/s
Storage Required	0	m^3

Time	Rainfall Intensity	Storm Runoff	Runoff Volume	Released Volume	Storage Volume	
(min)	(mm/hr)	(m^3/s)	(m^3)	(m^3)	(m^3)	
15	99	0.04	36	36	0	********
25	72	0.03	44	60	-16	
35	57	0.02	49	84	-35	
45	48	0.02	52	108	-56	
55	42	0.02	56	132	-76	
65	37	0.01	58	156	-98	
75	33	0.01	60	180	-120	
85	30	0.01	63	204	-141	
95	28	0.01	64	228	-164	
105	26	0.01	66	252	-186	
115	24	0.01	68	276	-208	
125	23	0.01	69	300	-231	
135	21	0.01	70	324	-254	
145	20	0.01	71	348	-277	
155	19	0.01	73	372	-299	
165	18	0.01	74	396	-322	
175	18	0.01	75	420	-345	
185	17	0.01	76	444	-368	
195	16	0.01	77	468	-391	
205	16	0.01	78	492	-414	
215	15	0.01	79	516	-437	

counterpoint engineering

Orifice Control & Detention Storage

Job 1750 Bloor Street
Job No. 17020

Orifice Equation: $Q = C_d A(2gh)^{1/2}$ **Area:** **Kirkwall**

Orifice Diameter: 100 mm

Area: 0.008 m^2

g = 9.81 m/s^2

C_d = 0.81 tube coefficient

Underground Storage Tank Provided= 212.89 m^3

counterpoint engineering

Orifice Control & Detention Storage

Job 1750 Bloor Street
Job No. 17020

Orifice Equation: $Q = C_d A(2gh)^{1/2}$

Area: **Bloor**

Orifice Diameter: 100 mm

Area: 0.008 m^2

g = 9.81 m/s^2

C_d = 0.81 tube coefficient

Underground Storage Tank Provided= **242.68** **m^3**

Project Name:	1750 Bloor Street
Project Number:	17020

Rainfall Data			
Location:	City of Mississauga	a	820
Event	5-year	b	4.6
		c	0.78

Area ID	Area (ha)	Runoff Coefficient	t_c (min)	Storage Available (m^3)	Storage Required (m^3)	Release Rate (m^3/s)	Orifice Size (mm)	Description
KIRKWALL	0.94	0.66	15	213	90	0.042	100	Orifice Control to Kirkwall
UNC KIRKWALL	0.09	0.32	15	0	0	0.006	-	Uncontrolled Kirkwall
Total to Kirkwall Crescent: Allowable 0.088 m3/s						**0.048**		
BLOOR	1.01	0.72	15	243	101	0.051	100	Orifice Control to Bloor
UNC BLOOR	0.20	0.38	15	0	0	0.017	-	Uncontrolled Bloor
Total to Bloor Street: Allowable 0.159 m3/s						**0.068**		
UNC FIELDGATE	0.27	0.54	15	0	0	0.033	-	Fieldgate
Total to Fieldgate Drive: Allowable 0.033 m3/s						**0.033**		
Total	**2.51**			**456**	**191**			

AREA ID Kirkwall

Composite RC Value		Area [ha]	RC	RC * Area
Landscape/Green Roof		0.25	0.25	0.063
Turf/Permeable Pavement		0.20	0.60	0.120
Paved/Roof		0.49	0.90	0.441
Total		**0.94**		0.624
			Divided by Total Area =	**0.66**

AREA ID Uncontrolled Kirkwall

Composite RC Value		Area [ha]	RC	RC * Area
Landscape		0.08	0.25	0.020
Paved/Roof		0.01	0.90	0.009
Total		**0.09**		0.029
			Divided by Total Area =	**0.32**

AREA ID Bloor

Composite RC Value		Area [ha]	RC	RC * Area
Landscape		0.28	0.25	0.070
Paved/Roof		0.73	0.90	0.657
Total		**1.01**		0.727
			Divided by Total Area =	**0.72**

AREA ID Uncontrolled Bloor

Composite RC Value		Area [ha]	RC	RC * Area
Landscape		0.16	0.25	0.040
Paved/Roof		0.04	0.90	0.036
Total		**0.20**		0.076
			Divided by Total Area =	**0.38**

counterpoint engineering

Modified Rational **Area:** **Kirkwall**

Project Name: 1750 Bloor Street
Project Number: 17020

Rainfall Data			
Location:	City of Mississauga	a	820.000
Event	5-year	b	4.600
		c	0.780

Site Data		
Area	0.94	ha
Runoff Coefficient	0.66	
AC	0.62	
Tc	15	
Time Increment	10	
Release Rate	42	l/s
Storage Required	90	m^3

Time	Rainfall Intensity	Storm Runoff	Runoff Volume	Released Volume	Storage Volume	
(min)	(mm/hr)	(m^3/s)	(m^3)	(m^3)	(m^3)	
15	81	0.14	126	37	88	
25	58	0.10	152	62	90	********
35	47	0.08	169	87	82	
45	39	0.07	183	112	71	
55	34	0.06	193	137	56	
65	30	0.05	203	162	41	
75	27	0.05	210	187	24	
85	25	0.04	218	212	6	
95	23	0.04	224	237	-13	
105	21	0.04	230	262	-32	
115	20	0.03	235	286	-52	
125	18	0.03	240	311	-71	
135	17	0.03	244	336	-92	
145	16	0.03	249	361	-112	
155	16	0.03	253	386	-133	
165	15	0.03	257	411	-154	
175	14	0.02	260	436	-176	
185	14	0.02	264	461	-197	
195	13	0.02	267	486	-219	
205	13	0.02	270	511	-240	
215	12	0.02	273	535	-262	
225	12	0.02	276	560	-284	
235	11	0.02	279	585	-306	
245	11	0.02	282	610	-328	
255	11	0.02	285	635	-351	
265	10	0.02	287	660	-373	
275	10	0.02	290	685	-395	
285	10	0.02	292	710	-418	
295	10	0.02	294	735	-440	
305	9	0.02	297	760	-463	
315	9	0.02	299	785	-486	
325	9	0.02	301	809	-508	
335	9	0.02	303	834	-531	
345	9	0.01	305	859	-554	
355	8	0.01	307	884	-577	
365	8	0.01	309	909	-600	
375	8	0.01	311	934	-623	
385	8	0.01	313	959	-646	
395	8	0.01	315	984	-669	
405	8	0.01	317	1009	-692	
415	7	0.01	318	1034	-715	
425	7	0.01	320	1059	-738	
435	7	0.01	322	1083	-761	
445	7	0.01	324	1108	-785	
455	7	0.01	325	1133	-808	

counterpoint engineering

Modified Rational **Area:** **Uncontrolled Kirkwall**

Project Name: 1750 Bloor Street
Project Number: 17020

Rainfall Data			
Location:	City of Mississauga	a	820.000
Event	5-year	b	4.600
		c	0.780

Site Data		
Area	0.09	ha
Runoff Coefficient	0.32	
AC	0.03	
Tc	15	
Time Increment	10	
Release Rate	6	l/s
Storage Required	0	m^3

Time	Rainfall Intensity	Storm Runoff	Runoff Volume	Released Volume	Storage Volume	
(min)	(mm/hr)	(m^3/s)	(m^3)	(m^3)	(m^3)	
15	81	0.01	6	5	0	********
25	58	0.00	7	9	-2	
35	47	0.00	8	13	-5	
45	39	0.00	8	16	-8	
55	34	0.00	9	20	-11	
65	30	0.00	9	23	-14	
75	27	0.00	10	27	-17	
85	25	0.00	10	31	-20	
95	23	0.00	10	34	-24	
105	21	0.00	11	38	-27	
115	20	0.00	11	41	-30	
125	18	0.00	11	45	-34	
135	17	0.00	11	49	-37	
145	16	0.00	12	52	-41	
155	16	0.00	12	56	-44	
165	15	0.00	12	59	-47	
175	14	0.00	12	63	-51	
185	14	0.00	12	67	-54	
195	13	0.00	12	70	-58	
205	13	0.00	13	74	-61	
215	12	0.00	13	77	-65	

counterpoint engineering

Modified Rational **Area:** **Bloor**

Project Name: 1750 Bloor Street
Project Number: 17020

Rainfall Data			
Location:	City of Mississauga	a	820.000
Event	5-year	b	4.600
		c	0.780

Site Data		
Area	1.01	ha
Runoff Coefficient	0.72	
AC	0.73	
Tc	15	
Time Increment	10	
Release Rate	51	l/s
Storage Required	101	m^3

Time	Rainfall Intensity	Storm Runoff	Runoff Volume	Released Volume	Storage Volume	
(min)	(mm/hr)	(m^3/s)	(m^3)	(m^3)	(m^3)	
15	81	0.16	146	46	101	
25	58	0.12	177	76	101	********
35	47	0.09	197	106	91	
45	39	0.08	213	137	76	
55	34	0.07	226	167	59	
65	30	0.06	236	197	39	
75	27	0.05	245	228	18	
85	25	0.05	254	258	-4	
95	23	0.05	261	288	-27	
105	21	0.04	268	319	-51	
115	20	0.04	274	349	-75	
125	18	0.04	280	379	-100	
135	17	0.04	285	410	-125	
145	16	0.03	290	440	-150	
155	16	0.03	295	470	-175	
165	15	0.03	299	501	-201	
175	14	0.03	304	531	-227	
185	14	0.03	308	561	-254	
195	13	0.03	311	592	-280	
205	13	0.03	315	622	-307	
215	12	0.02	319	652	-333	

counterpoint engineering

Modified Rational **Area:** **Uncontrolled Bloor**

Project Name: 1750 Bloor Street
Project Number: 17020

Rainfall Data			
Location:	City of Mississauga	a	820.000
Event	5-year	b	4.600
		c	0.780

Site Data		
Area	0.20	ha
Runoff Coefficient	0.38	
AC	0.08	
Tc	15	
Time Increment	10	
Release Rate	17	l/s
Storage Required	0	m^3

Time	Rainfall Intensity	Storm Runoff	Runoff Volume	Released Volume	Storage Volume	
(min)	(mm/hr)	(m^3/s)	(m^3)	(m^3)	(m^3)	
15	81	0.02	15	15	0	********
25	58	0.01	18	26	-7	
35	47	0.01	21	36	-15	
45	39	0.01	22	46	-24	
55	34	0.01	24	56	-33	
65	30	0.01	25	66	-42	
75	27	0.01	26	77	-51	
85	25	0.01	27	87	-60	
95	23	0.00	27	97	-70	
105	21	0.00	28	107	-79	
115	20	0.00	29	117	-89	
125	18	0.00	29	128	-98	
135	17	0.00	30	138	-108	
145	16	0.00	30	148	-118	
155	16	0.00	31	158	-127	
165	15	0.00	31	168	-137	
175	14	0.00	32	179	-147	
185	14	0.00	32	189	-157	
195	13	0.00	33	199	-166	
205	13	0.00	33	209	-176	
215	12	0.00	33	219	-186	

counterpoint engineering

Modified Rational **Area:** **Fieldgate**

Project Name: 1750 Bloor Street
Project Number: 17020

Rainfall Data			
Location:	City of Mississauga	a	820.000
Event	5-year	b	4.600
		c	0.780

Site Data		
Area	0.27	ha
Runoff Coefficient	0.54	
AC	0.15	
Tc	15	
Time Increment	10	
Release Rate	33	l/s
Storage Required	0	m^3

Time	Rainfall Intensity	Storm Runoff	Runoff Volume	Released Volume	Storage Volume	
(min)	(mm/hr)	(m^3/s)	(m^3)	(m^3)	(m^3)	
15	81	0.03	29	30	0	********
25	58	0.02	35	50	-14	
35	47	0.02	40	69	-30	
45	39	0.02	43	89	-46	
55	34	0.01	45	109	-64	
65	30	0.01	47	129	-81	
75	27	0.01	49	149	-99	
85	25	0.01	51	168	-118	
95	23	0.01	52	188	-136	
105	21	0.01	54	208	-154	
115	20	0.01	55	228	-173	
125	18	0.01	56	248	-192	
135	17	0.01	57	267	-210	
145	16	0.01	58	287	-229	
155	16	0.01	59	307	-248	
165	15	0.01	60	327	-267	
175	14	0.01	61	347	-286	
185	14	0.01	62	366	-305	
195	13	0.01	62	386	-324	
205	13	0.01	63	406	-343	
215	12	0.00	64	426	-362	

counterpoint engineering

Orifice Control & Detention Storage

Job 1750 Bloor Street
Job No. 17020

Orifice Equation: $Q = C_d A(2gh)^{1/2}$ **Area:** **Kirkwall**

Orifice Diameter: 100 mm

Area: 0.008 m^2

g = 9.81 m/s^2

C_d = 0.81 tube coefficient

Underground Storage Tank Provided= 212.89 m^3

counterpoint engineering

Orifice Control & Detention Storage

Job 1750 Bloor Street
Job No. 17020

Orifice Equation: $Q = C_d A(2gh)^{1/2}$

Area: **Bloor**

Orifice Diameter: 100 mm

Area: 0.008 m^2

g = 9.81 m/s^2

C_d = 0.81 tube coefficient

Underground Storage Tank Provided= **242.68** **m^3**

Project Name:	1750 Bloor Street
Project Number:	17020

Rainfall Data			
Location:	City of Mississauga	a	610
Event	2-year	b	4.6
		c	0.78

Area ID	Area (ha)	Runoff Coefficient	t_c (min)	Storage Available (m^3)	Storage Required (m^3)	Release Rate (m^3/s)	Orifice Size (mm)	Description
KIRKWALL	0.94	0.66	15	213	56	0.042	100	Orifice Control to Kirkwall
UNC KIRKWALL	0.09	0.32	15	0	0	0.005	-	Uncontrolled Kirkwall
Total to Kirkwall Crescent: Allowable 0.066 m3/s						**0.047**		
BLOOR	1.01	0.72	15	243	63	0.051	100	Orifice Control to Bloor
UNC BLOOR	0.20	0.38	15	0	0	0.013	-	Uncontrolled Bloor
Total to Bloor Street: Allowable 0.118 m3/s						**0.064**		
UNC FIELDGATE	0.27	0.54	15	0	0	0.024	-	Fieldgate
Total to Fieldgate Drive: Allowable 0.025 m3/s						**0.024**		
Total	**2.51**			**456**	**120**			

AREA ID Kirkwall

Composite RC Value		Area [ha]	RC	RC * Area
Landscape/Green Roof		0.25	0.25	0.063
Turf/Permeable Pavement		0.20	0.60	0.120
Paved/Roof		0.49	0.90	0.441
Total		**0.94**		0.624
			Divided by Total Area =	**0.66**

AREA ID Uncontrolled Kirkwall

Composite RC Value		Area [ha]	RC	RC * Area
Landscape		0.08	0.25	0.020
Paved/Roof		0.01	0.90	0.009
Total		**0.09**		0.029
			Divided by Total Area =	**0.32**

AREA ID Bloor

Composite RC Value		Area [ha]	RC	RC * Area
Landscape		0.28	0.25	0.070
Paved/Roof		0.73	0.90	0.657
Total		**1.01**		0.727
			Divided by Total Area =	**0.72**

AREA ID Uncontrolled Bloor

Composite RC Value		Area [ha]	RC	RC * Area
Landscape		0.16	0.25	0.040
Paved/Roof		0.04	0.90	0.036
Total		**0.20**		0.076
			Divided by Total Area =	**0.38**

counterpoint engineering

Modified Rational **Area:** **Kirkwall**

Project Name: 1750 Bloor Street
Project Number: 17020

Rainfall Data			
Location:	City of Mississauga	a	610.000
Event	2-year	b	4.600
		c	0.780

Site Data		
Area	0.94	ha
Runoff Coefficient	0.66	
AC	0.62	
Tc	15	
Time Increment	10	
Release Rate	42	l/s
Storage Required	56	m^3

Time	Rainfall Intensity	Storm Runoff	Runoff Volume	Released Volume	Storage Volume	
(min)	(mm/hr)	(m^3/s)	(m^3)	(m^3)	(m^3)	
15	60	0.10	93	37	56	********
25	43	0.08	113	62	51	
35	35	0.06	126	87	39	
45	29	0.05	136	112	24	
55	25	0.04	144	137	7	
65	22	0.04	151	162	-11	
75	20	0.03	157	187	-30	
85	18	0.03	162	212	-50	
95	17	0.03	167	237	-70	
105	16	0.03	171	262	-91	
115	15	0.03	175	286	-112	
125	14	0.02	178	311	-133	
135	13	0.02	182	336	-154	
145	12	0.02	185	361	-176	
155	12	0.02	188	386	-198	
165	11	0.02	191	411	-220	
175	11	0.02	194	436	-242	
185	10	0.02	196	461	-265	
195	10	0.02	199	486	-287	
205	9	0.02	201	511	-309	
215	9	0.02	203	535	-332	
225	9	0.02	206	560	-355	
235	8	0.01	208	585	-378	
245	8	0.01	210	610	-400	
255	8	0.01	212	635	-423	
265	8	0.01	214	660	-446	
275	8	0.01	215	685	-469	
285	7	0.01	217	710	-493	
295	7	0.01	219	735	-516	
305	7	0.01	221	760	-539	
315	7	0.01	222	785	-562	
325	7	0.01	224	809	-585	
335	6	0.01	226	834	-609	
345	6	0.01	227	859	-632	
355	6	0.01	229	884	-656	
365	6	0.01	230	909	-679	
375	6	0.01	231	934	-702	
385	6	0.01	233	959	-726	
395	6	0.01	234	984	-750	
405	6	0.01	236	1009	-773	
415	5	0.01	237	1034	-797	
425	5	0.01	238	1059	-820	
435	5	0.01	239	1083	-844	
445	5	0.01	241	1108	-868	
455	5	0.01	242	1133	-891	

counterpoint engineering

Modified Rational **Area:** **Uncontrolled Kirkwall**

Project Name: 1750 Bloor Street
Project Number: 17020

Rainfall Data			
Location:	City of Mississauga	a	610.000
Event	2-year	b	4.600
		c	0.780

Site Data		
Area	0.09	ha
Runoff Coefficient	0.32	
AC	0.03	
Tc	15	
Time Increment	10	
Release Rate	5	l/s
Storage Required	0	m^3

Time	Rainfall Intensity	Storm Runoff	Runoff Volume	Released Volume	Storage Volume	
(min)	(mm/hr)	(m^3/s)	(m^3)	(m^3)	(m^3)	
15	60	0.00	4	5	0	********
25	43	0.00	5	8	-2	
35	35	0.00	6	11	-5	
45	29	0.00	6	14	-7	
55	25	0.00	7	17	-10	
65	22	0.00	7	20	-12	
75	20	0.00	7	23	-15	
85	18	0.00	8	26	-18	
95	17	0.00	8	29	-21	
105	16	0.00	8	32	-24	
115	15	0.00	8	35	-26	
125	14	0.00	8	38	-29	
135	13	0.00	8	41	-32	
145	12	0.00	9	44	-35	
155	12	0.00	9	47	-38	
165	11	0.00	9	50	-41	
175	11	0.00	9	53	-43	
185	10	0.00	9	56	-46	
195	10	0.00	9	59	-49	
205	9	0.00	9	62	-52	
215	9	0.00	9	65	-55	

counterpoint engineering

Modified Rational **Area:** **Bloor**

Project Name: 1750 Bloor Street
Project Number: 17020

Rainfall Data			
Location:	City of Mississauga	a	610.000
Event	2-year	b	4.600
		c	0.780

Site Data		
Area	1.01	ha
Runoff Coefficient	0.72	
AC	0.73	
Tc	15	
Time Increment	10	
Release Rate	51	l/s
Storage Required	63	m^3

Time	Rainfall Intensity	Storm Runoff	Runoff Volume	Released Volume	Storage Volume	
(min)	(mm/hr)	(m^3/s)	(m^3)	(m^3)	(m^3)	
15	60	0.12	109	46	63	********
25	43	0.09	132	76	56	
35	35	0.07	147	106	41	
45	29	0.06	158	137	22	
55	25	0.05	168	167	1	
65	22	0.05	176	197	-22	
75	20	0.04	183	228	-45	
85	18	0.04	189	258	-69	
95	17	0.03	194	288	-94	
105	16	0.03	199	319	-119	
115	15	0.03	204	349	-145	
125	14	0.03	208	379	-171	
135	13	0.03	212	410	-198	
145	12	0.02	216	440	-224	
155	12	0.02	219	470	-251	
165	11	0.02	223	501	-278	
175	11	0.02	226	531	-305	
185	10	0.02	229	561	-332	
195	10	0.02	232	592	-360	
205	9	0.02	234	622	-387	
215	9	0.02	237	652	-415	

counterpoint engineering

Modified Rational **Area:** **Uncontrolled Bloor**

Project Name: 1750 Bloor Street
Project Number: 17020

Rainfall Data			
Location:	City of Mississauga	a	610.000
Event	2-year	b	4.600
		c	0.780

Site Data		
Area	0.20	ha
Runoff Coefficient	0.38	
AC	0.08	
Tc	15	
Time Increment	10	
Release Rate	13	l/s
Storage Required	0	m^3

Time	Rainfall Intensity	Storm Runoff	Runoff Volume	Released Volume	Storage Volume	
(min)	(mm/hr)	(m^3/s)	(m^3)	(m^3)	(m^3)	
15	60	0.01	11	12	0	********
25	43	0.01	14	20	-6	
35	35	0.01	15	27	-12	
45	29	0.01	17	35	-19	
55	25	0.01	18	43	-25	
65	22	0.00	18	51	-32	
75	20	0.00	19	59	-39	
85	18	0.00	20	66	-47	
95	17	0.00	20	74	-54	
105	16	0.00	21	82	-61	
115	15	0.00	21	90	-68	
125	14	0.00	22	98	-76	
135	13	0.00	22	105	-83	
145	12	0.00	23	113	-91	
155	12	0.00	23	121	-98	
165	11	0.00	23	129	-105	
175	11	0.00	24	137	-113	
185	10	0.00	24	144	-120	
195	10	0.00	24	152	-128	
205	9	0.00	25	160	-135	
215	9	0.00	25	168	-143	

counterpoint engineering

Modified Rational **Area:** **Fieldgate**

Project Name: 1750 Bloor Street
Project Number: 17020

Rainfall Data			
Location:	City of Mississauga	a	610.000
Event	2-year	b	4.600
		c	0.780

Site Data		
Area	0.27	ha
Runoff Coefficient	0.54	
AC	0.15	
Tc	15	
Time Increment	10	
Release Rate	24	l/s
Storage Required	0	m^3

Time	Rainfall Intensity	Storm Runoff	Runoff Volume	Released Volume	Storage Volume	
(min)	(mm/hr)	(m^3/s)	(m^3)	(m^3)	(m^3)	
15	60	0.02	22	22	0	********
25	43	0.02	26	36	-10	
35	35	0.01	29	50	-21	
45	29	0.01	32	65	-33	
55	25	0.01	34	79	-46	
65	22	0.01	35	94	-58	
75	20	0.01	37	108	-71	
85	18	0.01	38	122	-85	
95	17	0.01	39	137	-98	
105	16	0.01	40	151	-111	
115	15	0.01	41	166	-125	
125	14	0.01	42	180	-138	
135	13	0.01	42	194	-152	
145	12	0.00	43	209	-166	
155	12	0.00	44	223	-179	
165	11	0.00	45	238	-193	
175	11	0.00	45	252	-207	
185	10	0.00	46	266	-221	
195	10	0.00	46	281	-234	
205	9	0.00	47	295	-248	
215	9	0.00	47	310	-262	

counterpoint engineering

Orifice Control & Detention Storage

Job 1750 Bloor Street
Job No. 17020

Orifice Equation: $Q = C_d A(2gh)^{1/2}$ **Area:** **Kirkwall**

Orifice Diameter: 100 mm

Area: 0.008 m^2

g = 9.81 m/s^2

C_d = 0.81 tube coefficient

Underground Storage Tank Provided= 212.89 m^3

counterpoint engineering

Orifice Control & Detention Storage

Job 1750 Bloor Street
Job No. 17020

Orifice Equation: $Q = C_d A(2gh)^{1/2}$

Area: **Bloor**

Orifice Diameter: 100 mm

Area: 0.008 m^2

g = 9.81 m/s^2

C_d = 0.81 tube coefficient

Underground Storage Tank Provided= **242.68** **m^3**

Counterpoint Engineering

LID CALCULATION SHEET

5mm of on-site runoff to be retained

Site 2.51 ha

Total Required Volume to be Retained	**251**	**m^3**
Total Proposed Site Volume to be Retained	**284**	**m^3**

Bioswale

Bioswale (East & South Property Line)

Bioswale Area	789	m^2
Average Ponding Depth below CB top	0.03	m
Gravel Layer Depth	0.50	m
Bottom Layer Gravel Water Storage (0.4 void ratio)	157.8	m^3
Surface Storage (below CB top)	11.8	m^3
Volume Retained	**169.6**	**m^3**

Total Surface Area	**789**	**m^2**
Total Bioswale Volume to be Retained	**170**	**m^3**

Infiltration Trench Bloor St Outlet

Infiltration Trench (Bototm of StomTech Unit)

StormTech Unit Area	178.4	m^2
Attenuation Gallery Depth	0.229	m
Trench Storage (0.4 void ratio)	16.3	m^3
Volume Retained	**16.3**	**m^3**

Total Surface Area	**178**	**m^2**
Total Infiltration Trench Volume to be Retained	**16**	**m^3**

Infiltration Trench Kirkwall Cres Outlet

Infiltration Trench (Bototm of StomTech Unit)

StormTech Unit Area	158	m^2
Attenuation Gallery Depth	0.229	m
Trench Storage (0.4 void ratio)	14.5	m^3
Volume Retained	**14.5**	**m^3**

Total Surface Area	**158**	**m^2**
Total Infiltration Trench Volume to be Retained	**14**	**m^3**

Permeable Pavement

Permeable Pavement (total)

Permeable Pavement Area	186	m^2
Permeable Pavement Depth	0.6	m
Trench Storage (0.4 void ratio)	44.6	m^3

Total Surface Area	**186**	**m^2**
Total Permeable Pavement Volume to be Retained	**45**	**m^3**

Green Roof

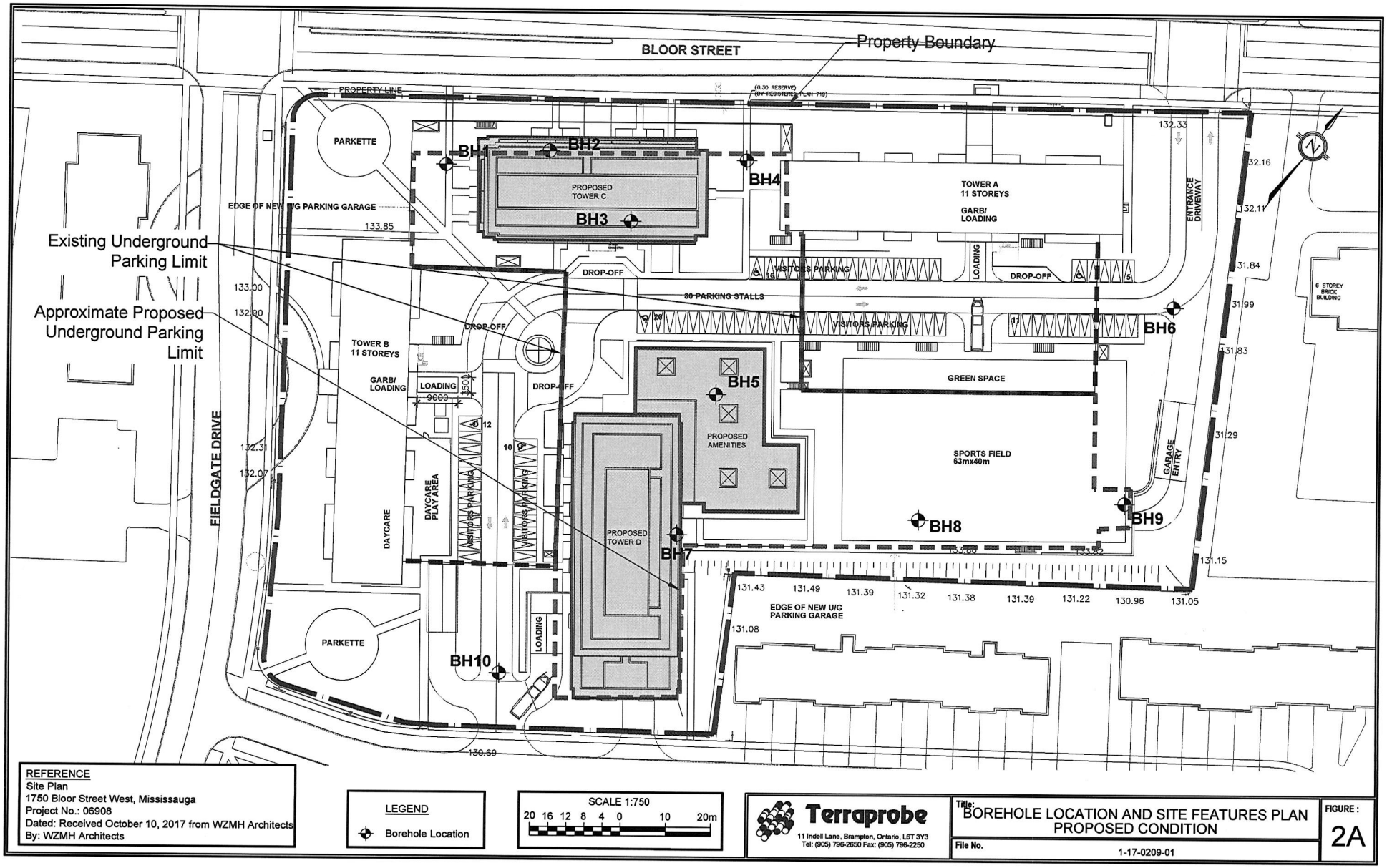
Green Roof (total)

Green Roof Area	550	m^2
Green Roof Storage Depth	0.07	m

Total Surface Area	**550**	**m^2**
Total Permeable Pavement Volume to be Retained	**39**	**m^3**

Borehole No.	Depth of Boring below Grade	Depth to Cave below Grade	Water Level Depth/Elevation at the Time of Drilling	Water Level Depth/Elevation in Monitoring Well on August 14, 2017
Borehole 1	12.2 m	9.1 m	6.1 m/127.7 m	3.6 m/130.2 m
Borehole 2	12.2 m	11.6 m	11.3 m/122.5 m	Monitoring well not installed
Borehole 3	12.2 m	11.9 m	4.6 m/128.8 m	3.1 m/130.3 m
Borehole 4	12.2 m	10.7 m	7.6 m/125.4 m	Monitoring well not installed
Borehole 5	7.9 m	6.8 m	5.8 m/126.6 m	2.6 m/130.8 m
Borehole 6	7.9 m	7.3 m	6.1 m/127.4 m	4.0 m/129.5 m
Borehole 7	7.7 m	7.2 m	6.6 m/126.8 m	Monitoring well not installed
Borehole 8	7.8 m	Open	Dry	Monitoring well not installed
Borehole 9	8.1 m	Open	6.7 m/126.8 m	Monitoring well not installed
Borehole 10	7.9 m	7.3 m	6.4 m/126.8 m	4.0 m/129.2 m

The water levels noted above may fluctuate seasonally depending upon the precipitation and surface runoff. The water levels may be about 600 mm higher than the water levels noted above, where capillary rise may occur in the cohesionless silt/sand soils.



REFERENCE
Site Plan
1750 Bloor Street West, Mississauga
Project No.: 06908
Dated: Received October 10, 2017 from WZMH Architects
By: WZMH Architects

LEGEND
Borehole Location

SCALE 1:750
20 16 12 8 4 0 10 20m

Terraprobe
11 Indell Lane, Brampton, Ontario, L6T 3Y3
Tel: (905) 796-2650 Fax: (905) 796-2250

Title: BOREHOLE LOCATION AND SITE FEATURES PLAN PROPOSED CONDITION

File No. 1-17-0209-01

FIGURE : 2A

T:\1-Project Files\2017\1-17-0209 - 1750 Bloor Street, Mississauga\05 -GEO Investigation\A. Dwgs, Logs\AutoCAD\1-17-0209-01 FIG 2A.dwg

Terraprobe

LOG OF BOREHOLE 6

Project No. : 1-17-0209-01	Client : WZMH Architects	Originated by : SM
Date started : June 7, 2017	Project : 1750 Bloor Street	Compiled by : SZ
Sheet No. : 1 of 1	Location : Mississauga, Ontario	Checked by : BS

Position : E: 614119, N: 4831120 (UTM 17T)
Elevation Datum : Geodetic
Rig type : Track-mounted
Drilling Method : Solid stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value	Elevation Scale (m)
0	133.5	**GROUND SURFACE**					
	133.3 / 0.2	150mm **TOPSOIL**		1	SS	6	133
		FILL, clayey silt, some sand to sandy, trace gravel, trace organics, firm to stiff, brown / dark brown, moist		2	SS	14	132
				3	SS	5	
				4	SS	7	131
	130.5 / 3.0	**SANDY SILT to SILTY SAND**, trace to some clay, trace to some gravel, compact to very dense, brown, moist (GLACIAL TILL)		5	SS	11	130
		...silt and sand, some gravel, trace clay		6	SS	71	129
		...grey below		7	SS	94	128
							127
	125.6 / 7.9			8	SS	50 / 125mm	126

Penetration Test Values (Blows / 0.3m) — Dynamic Cone: 10, 20, 30, 40
Undrained Shear Strength (kPa) — Unconfined, Pocket Penetrometer, Field Vane, Lab Vane: 40, 80, 120, 160
Moisture / Plasticity — Plastic Limit (PL), Natural Water Content (MC), Liquid Limit (LL): 10, 20, 30
Headspace Vapour (ppm)
Instrument Details
Unstabilized Water Level
Lab Data and Comments
GRAIN SIZE DISTRIBUTION (%) (MIT) — GR SA SI CL

Sample 6: 15 37 40 8

END OF BOREHOLE

Unstabilized water level measured at 6.1 m below ground surface; borehole caved to 7.3 m below ground surface upon completion of drilling.

50 mm dia. monitoring well installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Aug 14, 2017	4.0	129.5

file: 1-17-0209-01 bh logs.gpj

Terraprobe

LOG OF BOREHOLE 8

Project No. : 1-17-0209-01
Client : WZMH Architects
Originated by : SM

Date started : June 9, 2017
Project : 1750 Bloor Street
Compiled by : SZ

Sheet No. : 1 of 1
Location : Mississauga, Ontario
Checked by : BS

Position : E: 614129, N: 4831050 (UTM 17T)
Elevation Datum : Geodetic

Rig type : Track-mounted
Drilling Method : Solid stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value	Elevation Scale (m)	Penetration Test Values (Blows / 0.3m) / Undrained Shear Strength (kPa)	Moisture / Plasticity (PL, MC, LL)	Headspace Vapour (ppm)	Instrument Details	Unstabilized Water Level	Lab Data and Comments
0	133.5	**GROUND SURFACE**					133						
	133.1	100mm **ASPHALT**		1	SS	6							
	0.4	300mm **AGGREGATE**											
1		**FILL**, clayey silt, some sand to sandy, trace gravel, trace organics, firm to very stiff, brown / dark brown, moist		2	SS	10	132						
2				3	SS	6							
				4	SS	8	131						
3				5	SS	5							
4				6	SS	28	130						
	128.9												
	4.6	**SANDY SILT to SILTY SAND**, trace to some clay, trace to some gravel, very dense, grey, moist (GLACIAL TILL)		7	SS	50/ 125mm	129						GR SA SI CL 20 38 35 7
5													
							128						
6				8	SS	50 / 140mm							
							127						
7													
	125.7			9	SS	50 / 25mm	126						
	7.8	**END OF BOREHOLE**											

Borehole was dry and open upon completion of drilling.

file: 1-17-0209-01 bh logs.gpj

Terraprobe

LOG OF BOREHOLE 9

Project No. : 1-17-0209-01
Client : WZMH Architects
Originated by : SM

Date started : June 7, 2017
Project : 1750 Bloor Street
Compiled by : SZ

Sheet No. : 1 of 1
Location : Mississauga, Ontario
Checked by : BS

Position : E: 614150, N: 4831086 (UTM 17T)
Elevation Datum : Geodetic

Rig type : Track-mounted
Drilling Method : Solid stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value
	133.5	**GROUND SURFACE**				
0	133.2	100mm **ASPHALT**		1	SS	8
	0.3	200mm **AGGREGATE**				
		FILL, clayey silt, some sand to sandy, trace gravel, trace organics, firm to stiff, brown / dark brown, moist		2	SS	12
1						
				3	SS	6
2						
				4	SS	5
3						
				5	SS	11
	129.7					
	3.8	**SANDY SILT to SILTY SAND**, trace to some clay, trace to some gravel, dense to very dense, brown, moist (GLACIAL TILL)		6	SS	32
4						
				7	SS	52
5						
				8	SS	50 / 125mm
6						
7						
				9	SS	76 / 290mm
	125.4					
8	8.1	**END OF BOREHOLE**				

Elevation Scale (m): 133, 132, 131, 130, 129, 128, 127, 126

Penetration Test Values (Blows / 0.3m)
X Dynamic Cone
10 20 30 40

Undrained Shear Strength (kPa)
O Unconfined + Field Vane
● Pocket Penetrometer ■ Lab Vane
40 80 120 160

Moisture / Plasticity
Plastic Limit | Natural Water Content | Liquid Limit
PL MC LL
10 20 30

Headspace Vapour (ppm)

Instrument Details

Unstabilized Water Level

Lab Data and Comments
GRAIN SIZE DISTRIBUTION (%) (MIT)
GR SA SI CL

...at 6.1m, wet spoon

▽

Unstabilized water level measured at 6.7 m below ground surface; borehole was open upon completion of drilling.

file: 1-17-0209-01 bh logs.gpj

Terraprobe

LOG OF BOREHOLE 10

Project No. : 1-17-0209-01
Client : WZMH Architects
Originated by : SM

Date started : June 9, 2017
Project : 1750 Bloor Street
Compiled by : SZ

Sheet No. : 1 of 1
Location : Mississauga, Ontario
Checked by : BS

Position : E: 614092, N: 4830959 (UTM 17T)
Elevation Datum : Geodetic

Rig type : Track-mounted
Drilling Method : Solid stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value
0	133.2	**GROUND SURFACE**				
	132.8	110mm **ASPHALT**				
	0.4	260mm **AGGREGATE**				
1		**FILL**, clayey silt, some sand to sandy, trace gravel, trace organics, stiff, brown / dark brown, moist		1	SS	10
				2	SS	10
2				3	SS	8
				4	SS	13
3	130.2					
	3.0	**SANDY SILT to SILTY SAND**, trace to some clay, trace to some gravel, compact to very dense, brown, moist (GLACIAL TILL)		5	SS	24
4						
		...silt and sand, some gravel, trace clay		6	SS	50 / 75mm
5						
6		...sand, grey, wet below		7	SS	90
7						
	125.3			8	SS	50 / 100mm
	7.9	**END OF BOREHOLE**				

Elevation Scale (m): 133, 132, 131, 130, 129, 128, 127, 126

Penetration Test Values (Blows / 0.3m) — Dynamic Cone: 10, 20, 30, 40
Undrained Shear Strength (kPa) — Unconfined, Pocket Penetrometer, Field Vane, Lab Vane: 40, 80, 120, 160

Moisture / Plasticity — Plastic Limit (PL), Natural Water Content (MC), Liquid Limit (LL): 10, 20, 30

Headspace Vapour (ppm)

Instrument Details

Unstabilized Water Level

Lab Data and Comments

GRAIN SIZE DISTRIBUTION (%) (MIT)
GR SA SI CL
11 40 41 8

Unstabilized water level measured at 6.4 m below ground surface; borehole caved to 7.3 m below ground surface upon completion of drilling.

50 mm dia. monitoring well installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Aug 14, 2017	4.0	129.2

file: 1-17-0209-01 bh logs.gpj

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER:	VIVEK SHARMA 647-463-9803 VIVEK.SHARMA@ADS-PIPE.COM
ADS SALES REP:	ROBERT HUGHES 416-389-5729 ROBERT.HUGHES@ADS-PIPE.COM
PROJECT NO:	S081195

ADVANCED DRAINAGE SYSTEMS, INC.

1750 BLOOR STREET

MISSISSAUGA, ONTARIO - CANADA

STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH MC-4500.
2. CHAMBERS SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORT PANELS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
4. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE CSA S6 CL-625 TRUCK AND THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
5. CHAMBERS SHALL BE CERTIFIED TO CSA B184, "POLYMERIC SUB-SURFACE STORMWATER MANAGEMENT STRUCTURES", AND MEET THE REQUIREMENTS OF ASTM F2418-16, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
6. CHAMBERS SHALL BE DESIGNED AND ALLOWABLE LOADS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
7. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. THE CHAMBER MANUFACTURER SHALL SUBMIT THE FOLLOWING UPON REQUEST TO THE SITE DESIGN ENGINEER FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE:
   a. A STRUCTURAL EVALUATION SEALED BY A REGISTERED PROFESSIONAL ENGINEER THAT DEMONSTRATES THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY AASHTO FOR THERMOPLASTIC PIPE.
   b. A STRUCTURAL EVALUATION SEALED BY A REGISTERED PROFESSIONAL ENGINEER THAT DEMONSTRATES THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET. THE 50 YEAR CREEP MODULUS DATA SPECIFIED IN ASTM F2418 MUST BE USED AS PART OF THE AASHTO STRUCTURAL EVALUATION TO VERIFY LONG-TERM PERFORMANCE.
   c. STRUCTURAL CROSS SECTION DETAIL ON WHICH THE STRUCTURAL EVALUATION IS BASED.
8. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF MC-4500 CHAMBER SYSTEM

1. STORMTECH MC-4500 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH MC-4500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
   - STONESHOOTER LOCATED OFF THE CHAMBER BED.
   - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
   - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM 9" (230 mm) SPACING BETWEEN THE CHAMBER ROWS.
7. INLET AND OUTLET MANIFOLDS MUST BE INSERTED A MINIMUM OF 300 mm (12") INTO CHAMBER END CAPS.
8. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE MEETING THE AASHTO M43 DESIGNATION OF #3 OR #4.
9. STONE SHALL BE BROUGHT UP EVENLY AROUND CHAMBERS SO AS NOT TO DISTORT THE CHAMBER SHAPE. STONE DEPTHS SHOULD NEVER DIFFER BY MORE THAN 300 mm (12") BETWEEN ADJACENT CHAMBER ROWS.
10. STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
11. THE CONTRACTOR MUST REPORT ANY KNOWN DISCREPANCIES WITH CHAMBER FOUNDATION MATERIAL BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
12. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH MC-4500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
2. THE USE OF EQUIPMENT OVER MC-4500 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADER, DUMP TRUCK, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. FULL 900 mm (36") OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY USING THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

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ADVANCED DRAINAGE SYSTEMS, INC.

1750 BLOOR STREET

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4. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE CSA S6 CL-625 TRUCK AND THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
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7. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. THE CHAMBER MANUFACTURER SHALL SUBMIT THE FOLLOWING UPON REQUEST TO THE SITE DESIGN ENGINEER FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE:
   a. A STRUCTURAL EVALUATION SEALED BY A REGISTERED PROFESSIONAL ENGINEER THAT DEMONSTRATES THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY AASHTO FOR THERMOPLASTIC PIPE.
   b. A STRUCTURAL EVALUATION SEALED BY A REGISTERED PROFESSIONAL ENGINEER THAT DEMONSTRATES THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET. THE 50 YEAR CREEP MODULUS DATA SPECIFIED IN ASTM F2418 MUST BE USED AS PART OF THE AASHTO STRUCTURAL EVALUATION TO VERIFY LONG-TERM PERFORMANCE.
   c. STRUCTURAL CROSS SECTION DETAIL ON WHICH THE STRUCTURAL EVALUATION IS BASED.
8. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - THIS PROJECT REQUIRES COMPACTION OF EMBEDMENT STONE AND REQUIREMENTS FOR STONE HARDNESS AND SHAPE WHICH ARE NOT SPECIFIED IN OTHER STORMTECH DOCUMENTS. CONTRACTORS MUST FOLLOW THE SPECIAL PROVISIONS IN THIS PLAN SET.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF MC-4500 CHAMBER SYSTEM

1. STORMTECH MC-4500 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH MC-4500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
   - STONESHOOTER LOCATED OFF THE CHAMBER BED.
   - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
   - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM 9" (230 mm) SPACING BETWEEN THE CHAMBER ROWS.
7. INLET AND OUTLET MANIFOLDS MUST BE INSERTED A MINIMUM OF 300 mm (12") INTO CHAMBER END CAPS.
8. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE MEETING THE AASHTO M43 DESIGNATION OF #3 OR #4.
9. STONE SHALL BE BROUGHT UP EVENLY AROUND CHAMBERS SO AS NOT TO DISTORT THE CHAMBER SHAPE. STONE DEPTHS SHOULD NEVER DIFFER BY MORE THAN 300 mm (12") BETWEEN ADJACENT CHAMBER ROWS.
10. STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
11. THE CONTRACTOR MUST REPORT ANY KNOWN DISCREPANCIES WITH CHAMBER FOUNDATION MATERIAL BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
12. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH MC-4500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
2. THE USE OF EQUIPMENT OVER MC-4500 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADER, DUMP TRUCK, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. FULL 900 mm (36") OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY USING THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

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PROPOSED LAYOUT NE BED

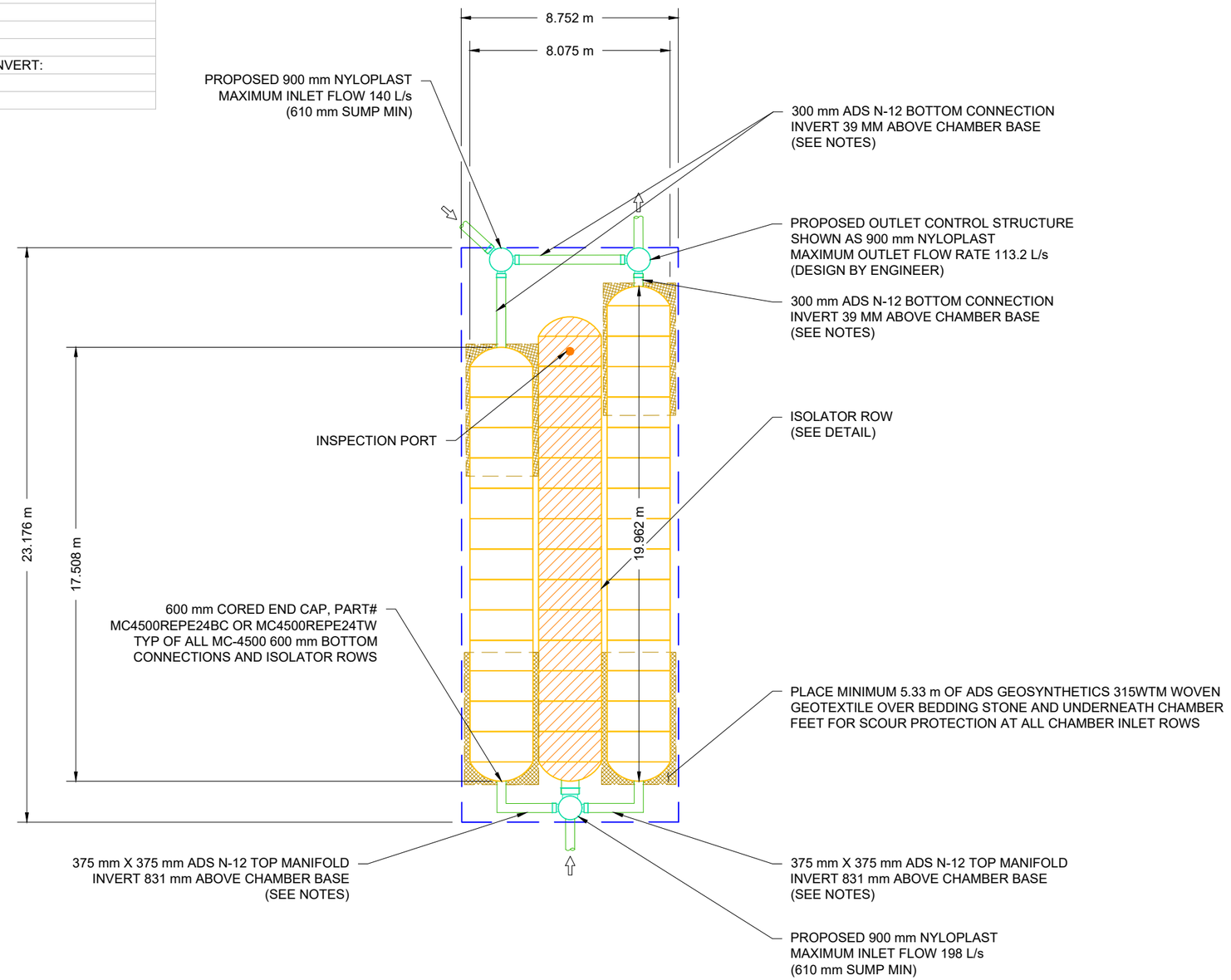
42	STORMTECH MC-4500 CHAMBERS
6	STORMTECH MC-4500 END CAPS
305	STONE ABOVE (mm)
229	STONE BELOW (mm)
40	% STONE VOID
242.680	**INSTALLED SYSTEM VOLUME (m³) VOLUME ABOVE 128.2 (PERIMETER STONE INCLUDED)**
203.16	SYSTEM AREA (m²)
45	SYSTEM PERIMETER (m)

PROPOSED ELEVATIONS NE BED

132.819	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):
131.447	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):
131.295	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):
131.295	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):
131.295	MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT):
130.990	TOP OF STONE:
130.685	TOP OF MC-4500 CHAMBER:
129.992	375 mm TOP MANIFOLD INVERT:
129.218	600 mm ISOLATOR ROW INVERT:
129.200	300 mm BOTTOM MANIFOLD / CONNECTION INVERT:
129.161	BOTTOM OF MC-4500 CHAMBER:
128.932	BOTTOM OF STONE:

NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH SHEET #7 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.



1750 BLOOR STREET
MISSISSAUGA, ONTARIO - CANADA

DATE: 4/25/2018 DRAWN: RJW
PROJECT #: S081195 CHECKED: DAF

REV	DWN	CKD	DESCRIPTION
10/17/18	RJW	AJD	CHANGED BED VOLUMES
01/15/19	LAH	JMQ	ADDED NYLO FOR ROOF DRAIN

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ADS
ADVANCED DRAINAGE SYSTEMS, INC.
4640 TRUEMAN BLVD
HILLIARD, OH 43026

SCALE = 1 : 200

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PROPOSED LAYOUT SW BED

39	STORMTECH MC-4500 CHAMBERS
8	STORMTECH MC-4500 END CAPS
305	STONE ABOVE (mm)
229	STONE BELOW (mm)
40	% STONE VOID
212.890	**INSTALLED SYSTEM VOLUME (m³) ABOVE ELEVATION 129.05 (PERIMETER STONE INCLUDED)**
169	SYSTEM AREA (m²)
43	SYSTEM PERIMETER (m)

PROPOSED ELEVATIONS SW BED

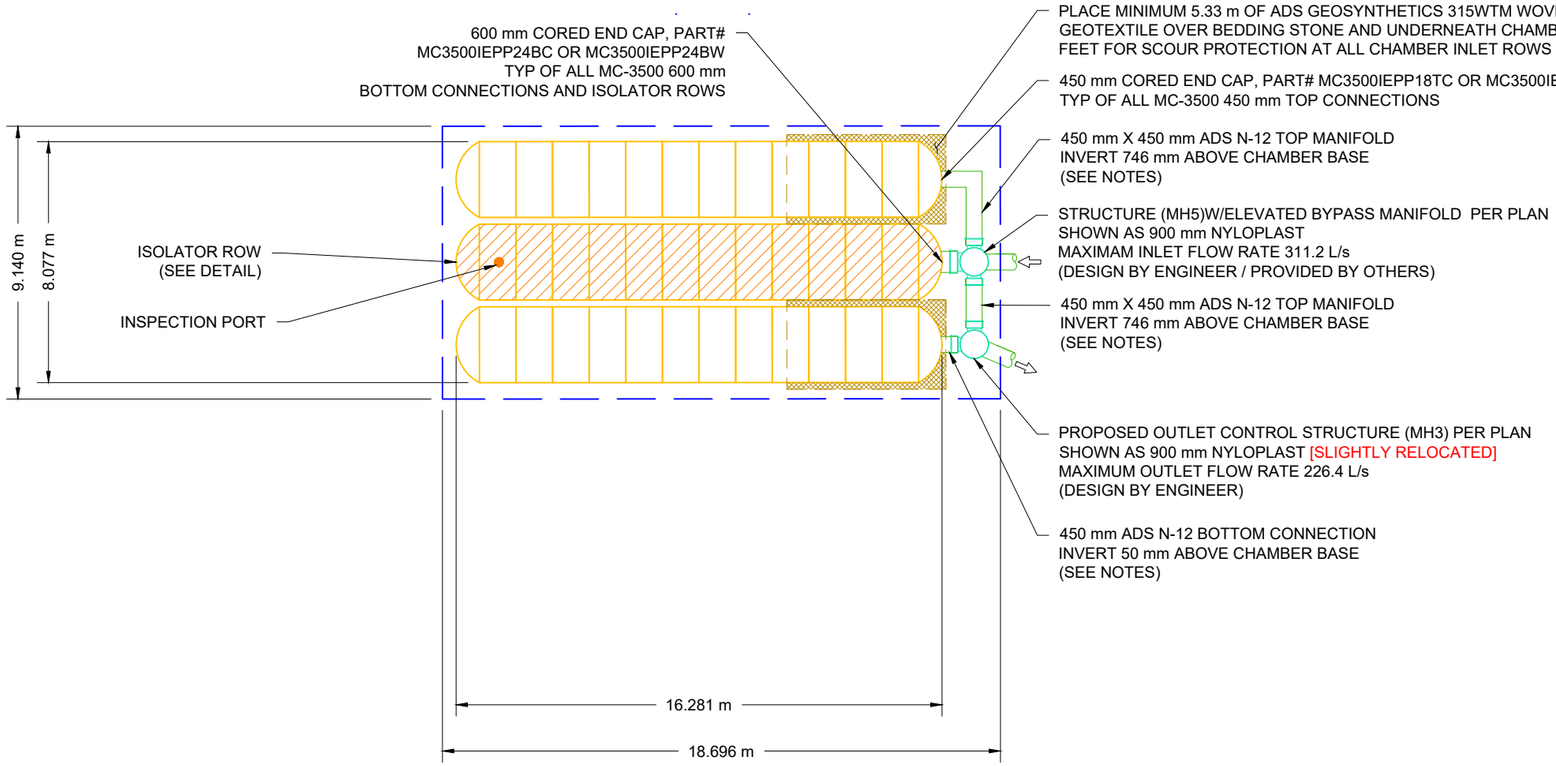
133.210	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):
130.601	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):
130.449	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):
130.449	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):
130.449	MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT):
130.144	TOP OF STONE:
129.839	TOP OF MC-4500 CHAMBER:
129.061	450 mm TOP MANIFOLD/CONNECTION INVERT:
128.372	600 mm ISOLATOR ROW INVERT:
128.365	450 mm BOTTOM CONNECTION INVERT:
128.315	BOTTOM OF MC-4500 CHAMBER:
128.086	BOTTOM OF STONE:

NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH SHEET #7 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.

TIER 1 DEEP COVER SPECIAL PROVISIONS

1. INSTALLATION REQUIREMENTS SHALL BE AS SPECIFIED IN THE STORMTECH DESIGN MANUALS AND CONSTRUCTION GUIDES EXCEPT AS MODIFIED IN THESE SPECIAL PROVISIONS.
2. ATTENTION IS CALLED TO "TABLE 1 - ACCEPTABLE FILL MATERIALS" IN THE STORMTECH CONSTRUCTION GUIDE AND ALL OTHER APPEARANCES OF THE THE "ACCEPTABLE FILL MATERIALS TABLE. FOR AREAS OF THE SYSTEM WITH COVER ABOVE 7 FEET (2.1 m) FOR THE MC-4500 AND ABOVE 8 FEET (2.4 m) FOR THE MC-3500, EMBEDMENT STONE SHALL BE COMPACTED WITH 3 PASSES OF A WALK BEHIND VIBRATORY PLATE COMPACTOR OR JUMPING JACK IN 12" (300 mm) LIFTS.
3. STONE SHALL BE GENERALLY UNIFORM IN SHAPE. FLAT OR ELONGATED STONE IS UNACCEPTABLE. FOR DESCRIPTIONS OF ANGULARITY SEE ASTM D2488 “STANDARD PRACTICE FOR DESCRIPTION AND IDENTIFICATION OF SOILS (VISUAL-MANUAL PROCEDURE)”.
4. STONE SHALL BE HARD AND DURABLE. IT IS THE ENGINEER'S OR CONTRACTOR'S RESPONSIBILITY TO SELECT HARD AND DURABLE STONE. STORMTECH CONSIDERS AN LA ABRASION VALUE OF LESS THAN OR EQUAL TO 30 TO BE HARD STONE.
5. FOUNDATION STONE SHALL BE MECHANICALLY COMPACTED WITH A VIBRATORY ROLLER OR VIBRATORY PLATE IN 6” (152 mm) LIFTS.
6. EMBEDMENT STONE MUST BE DUMPED IN PLACE BY A STONE SHOOTER OR CONVEYOR OR EXCAVATOR.
7. INSPECTION DURING THE INSTALLATION BY THE ENGINEER, OWNER OR OTHER REPRESENTATIVE IS RECOMMENDED. THE INSPECTION SHALL INCLUDE OBSERVATIONS OF THE CHAMBER SYMMETRY DURING BACKFILLING TO ENSURE THE CONTRACTOR'S METHODS ARE NOT CAUSING UNACCEPTABLE DISTORTION OF THE CHAMBERS.
8. AN ADS FIELD TECHNICIAN WILL CONDUCT A PRECONSTRUCTION MEETING TO TRAIN ALL REPRESENTATIVES INSPECTING THE PROJECT AND WILL PERFORM MANDATORY SITE INSPECTIONS.



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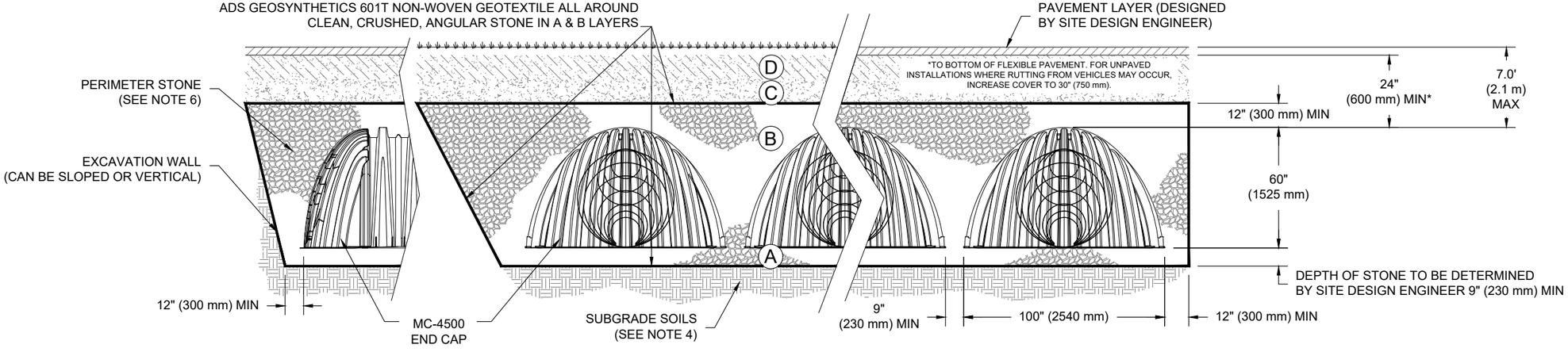
ACCEPTABLE FILL MATERIALS: STORMTECH MC-4500 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 24" (600 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE. [2] [3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9" (230 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.



NOTES:

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6. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.

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A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE. [2] [3]

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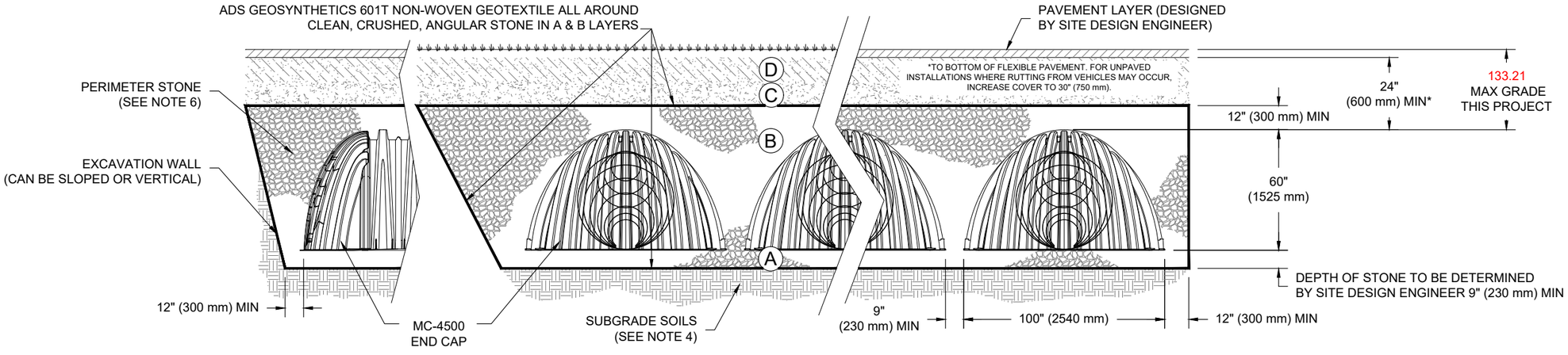

1750 BLOOR STREET SW BED SPECIFIC CROSS SECTION

NOTES:

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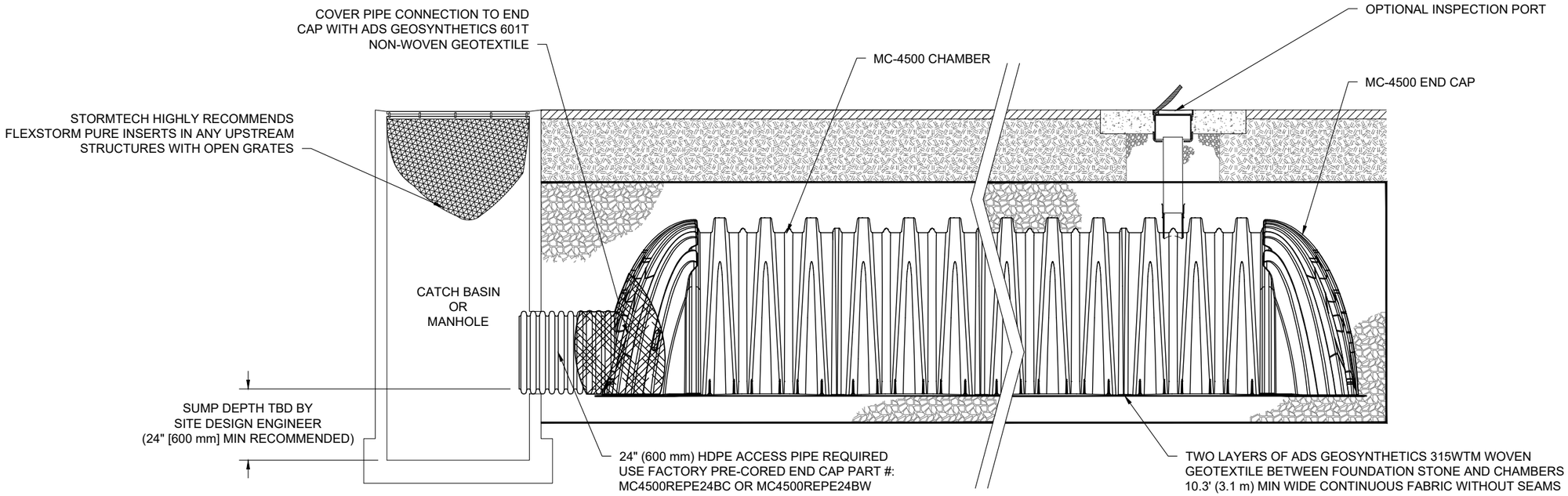


MC-4500 ISOLATOR ROW DETAIL
NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

STEP 2) CLEAN OUT ISOLATOR ROW USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

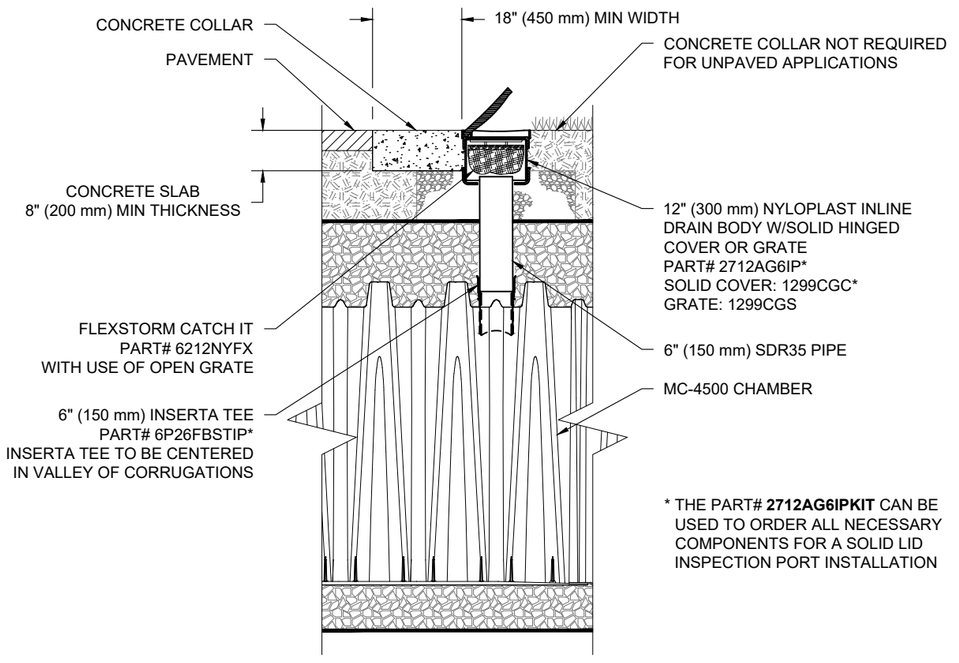
STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.

2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.



MC-4500 6" INSPECTION PORT DETAIL
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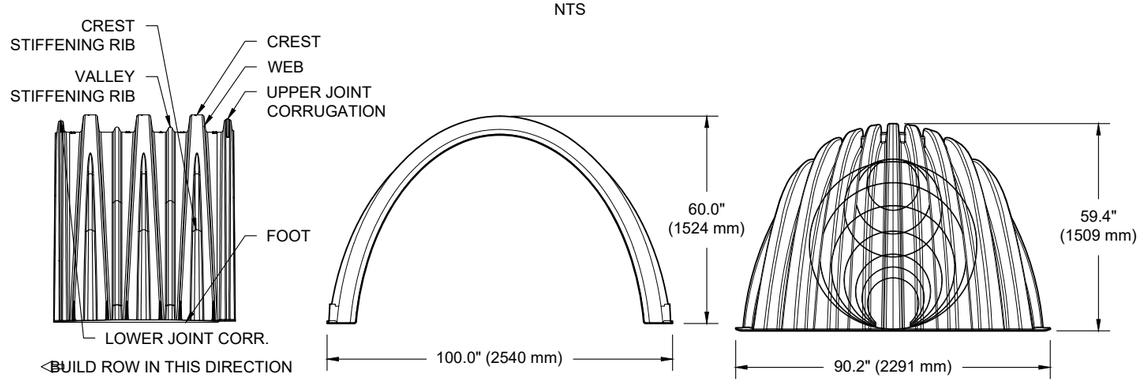
MC-4500 TECHNICAL SPECIFICATION

NTS



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	100.0" X 60.0" X 48.3"	(2540 mm X 1524 mm X 1227 mm)
CHAMBER STORAGE	106.5 CUBIC FEET	(3.01 m³)
MINIMUM INSTALLED STORAGE*	162.6 CUBIC FEET	(4.60 m³)
WEIGHT	130.0 lbs.	(59.0 kg)

NOMINAL END CAP SPECIFICATIONS

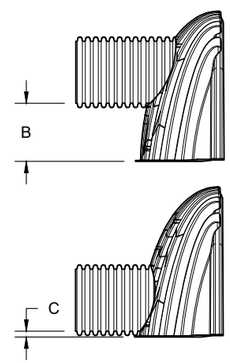
SIZE (W X H X INSTALLED LENGTH)	90.2" X 59.4" X 30.7"	(2291 mm X 1509 mm X 781 mm)
END CAP STORAGE	35.7 CUBIC FEET	(1.01 m³)
MINIMUM INSTALLED STORAGE*	108.7 CUBIC FEET	(3.08 m³)
WEIGHT	135.0 lbs.	(61.2 kg)

*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION AND BETWEEN CHAMBERS, 12" (305 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY.

STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
END CAPS WITH A WELDED CROWN PLATE END WITH "C"
END CAPS WITH A PREFABRICATED WELDED STUB END WITH "W"

PART #	STUB	B	C
MC4500REPE06T	6" (150 mm)	42.54" (1.081 m)	---
MC4500REPE06B		---	0.86" (22 mm)
MC4500REPE08T	8" (200 mm)	40.50" (1.029 m)	---
MC4500REPE08B		---	1.01" (26 mm)
MC4500REPE10T	10" (250 mm)	38.37" (975 mm)	---
MC4500REPE10B		---	1.33" (34 mm)
MC4500REPE12T	12" (300 mm)	35.69" (907 mm)	---
MC4500REPE12B		---	1.55" (39 mm)
MC4500REPE15T	15" (375 mm)	32.72" (831 mm)	---
MC4500REPE15B		---	1.70" (43 mm)
MC4500REPE18TC	18" (450 mm)	29.36" (746 mm)	---
MC4500REPE18TW			
MC4500REPE18BC		---	1.97" (50 mm)
MC4500REPE18BW			
MC4500REPE24TC	24" (600 mm)	23.05" (585 mm)	---
MC4500REPE24TW			
MC4500REPE24BC		---	2.26" (57 mm)
MC4500REPE24BW			
MC4500REPE30BC	30" (750 mm)	---	2.95" (75 mm)
MC4500REPE36BC	36" (900 mm)	---	3.25" (83 mm)
MC4500REPE42BC	42" (1050 mm)	---	3.55" (90 mm)

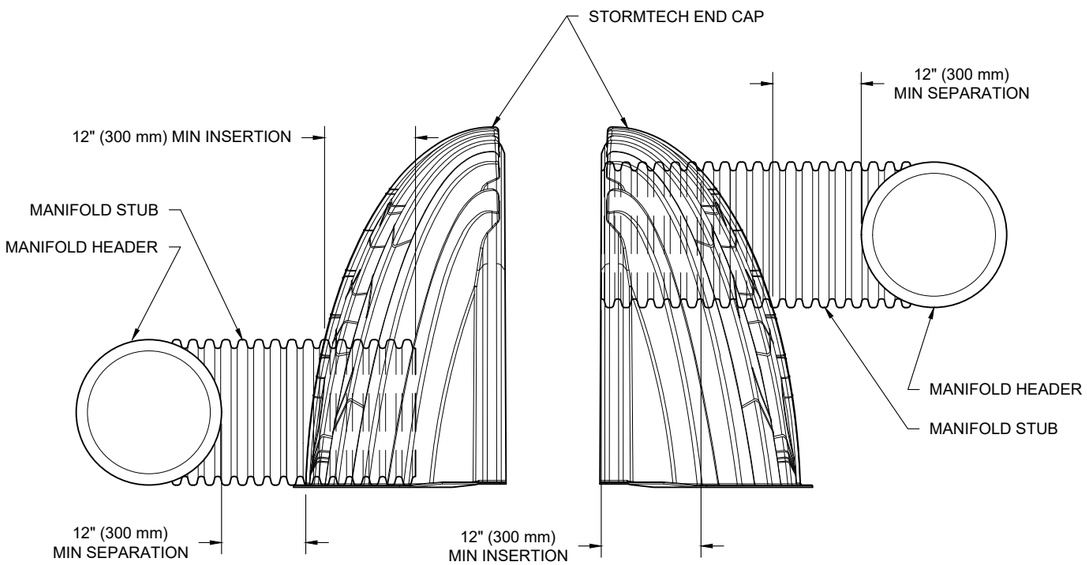
NOTE: ALL DIMENSIONS ARE NOMINAL



CUSTOM PRECORED INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS. CUSTOM INVERT LOCATIONS ON THE MC-4500 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm). THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHEST POSSIBLE FOR THE PIPE SIZE.

MC-SERIES END CAP INSERTION DETAIL

NTS



NOTE: MANIFOLD STUB MUST BE LAID HORIZONTAL FOR A PROPER FIT IN END CAP OPENING.

1750 BLOOR STREET
MISSISSAUGA, ONTARIO - CANADA

DATE: 4/25/2018 | DRAWN: RJW
PROJECT #: S081195 | CHECKED: DAF

REV	DWN	CKD	DESCRIPTION
10/17/18	RJW	AJD	CHANGED BED VOLUMES
01/15/19	LAH	JMQ	ADDED NYLO FOR ROOF DRAIN

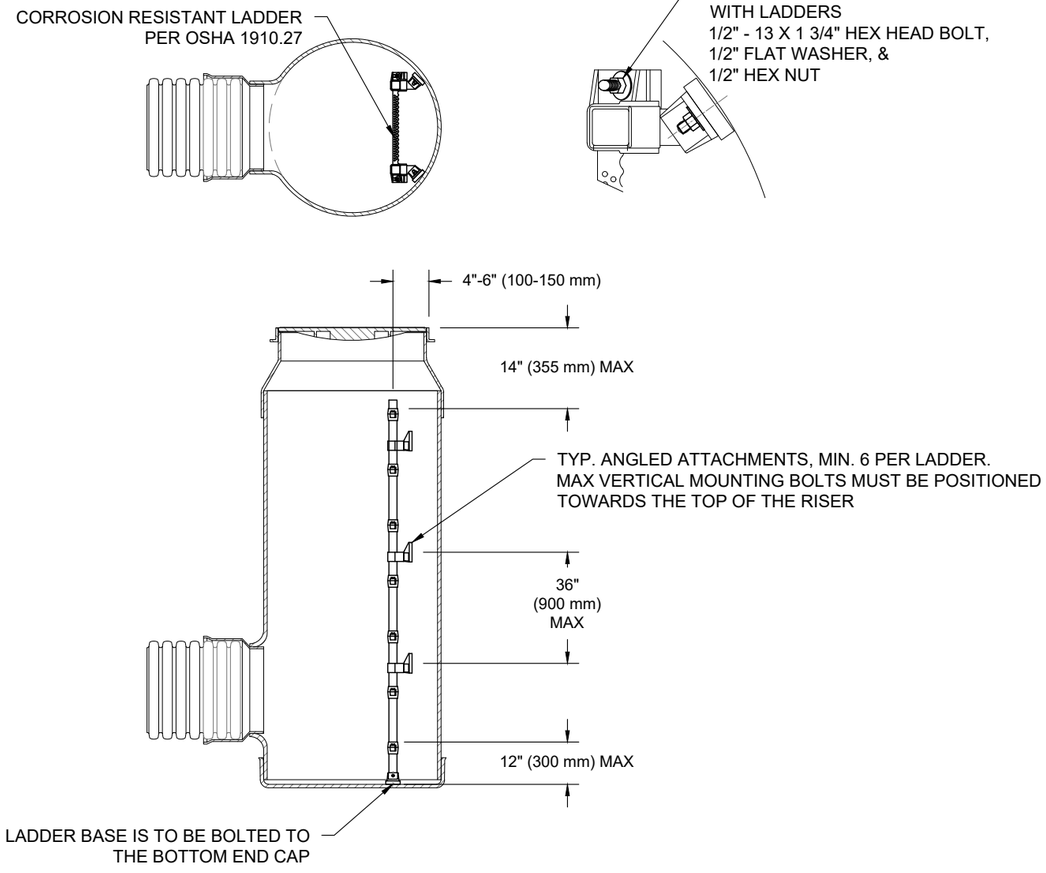
StormTech
Detention•Retention•Water Quality
70 INWOOD ROAD, SUITE 3 | ROCKY HILL | CT | 06067
860-529-8188 | 888-892-2694 | WWW.STORMTECH.COM

ADS
ADVANCED DRAINAGE SYSTEMS, INC.
4640 TRUEMAN BLVD
HILLIARD, OH 43026

THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

NYLOPLAST 36" (900 mm) STRUCTURE WITH LADDER

NTS

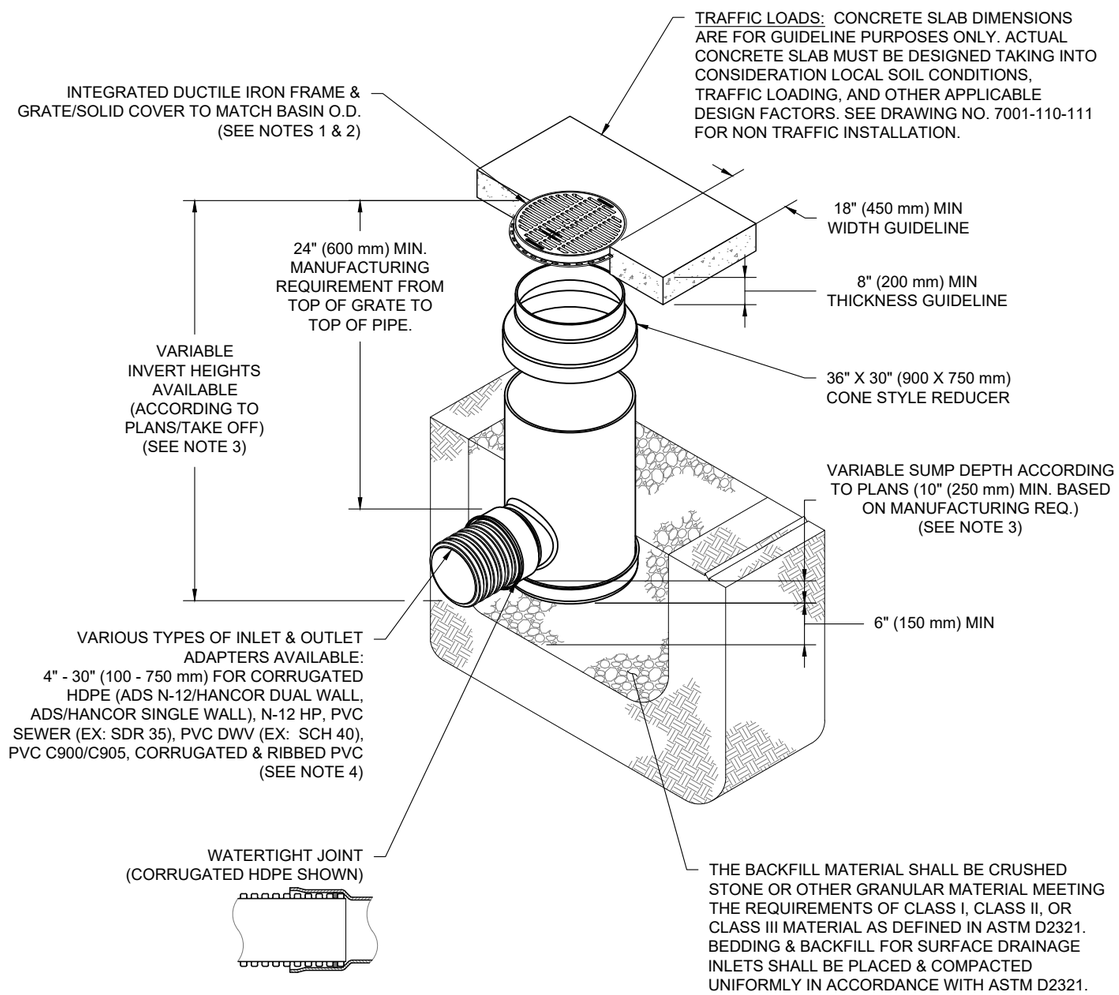


NOTES:

1. LADDERS SERVING MANHOLES CAN USE DEVIATIONS OF OSHA 1910.27 FOUND IN ASTM C478-12. LADDERS ARE TO BE ORDERED FROM LANE INTERNATIONAL CORPORATION ONLY.
2. CORROSION RESISTANT BRACKETS, WITH STAINLESS STEEL HARDWARE, SHALL BE ATTACHED TO THE LADDER BY THE PIPE FABRICATOR. THE HARDWARE IS INCLUDED WITH LADDER.
3. USE STAINLESS STEEL BOLTS, WASHERS, AND NUTS TO ATTACH THE LADDER BRACKETS THROUGH THE PVC DRAIN BASIN SIDE WALL.
4. LADDER SHALL BE PLACED SO THAT TOP RUNG IS LESS THAN 14" (355 mm) FROM BASE SURFACE AND BOTTOM RUNG IS AS LOW AS POSSIBLE.
5. BOTTOM OF LADDER SHALL BE ATTACHED TO BOTTOM END CAP WITH SS HARDWARE SUPPLIED WITH THE LADDER.
6. WEIGHT OF LADDER TO REST ON END CAP.
7. ALL HARDWARE IS TO BE TIGHTENED PRIOR TO SHIPMENT.

36" (900 mm) NYLOPLAST DRAIN BASIN

NTS



NOTES

1. GRATES/SOLID COVER SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05.
2. FRAMES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05.
3. DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS. RISERS ARE NEEDED FOR BASINS OVER 84" (2.13 m) DUE TO SHIPPING RESTRICTIONS. SEE DRAWING NO. 7001-110-065.
4. DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS N-12/HANCOR DUAL WALL), N-12 HP, & PVC SEWER.
5. ADAPTERS CAN BE MOUNTED ON ANY ANGLE 0° TO 360°. TO DETERMINE MINIMUM ANGLE BETWEEN ADAPTERS SEE DRAWING NO. 7001-110-012.

GRATE OPTION	LOAD RATING	PART #	DWG #
PEDESTRIAN	MEETS H-20	3099CGP	7001-110-220
STANDARD	MEETS H-20	3099CGS	7001-110-221
SOLID COVER	MEETS H-20	3099CGC	7001-110-222
DOME	N/A	3099CGD	7001-110-223

1750 BLOOR STREET
MISSISSAUGA, ONTARIO - CANADA

DATE: 4/25/2018 | DRAWN: RJW | CHECKED: DAF

PROJECT #: S081195

REV	DWN	CKD	DESCRIPTION
10/17/18	RJW	AJD	CHANGED BED VOLUMES
01/15/19	LAH	JMQ	ADDED NYLO FOR ROOF DRAIN

3130 VERONA AVE
BUFORD, GA 30518
PHN (770) 932-2443
FAX (770) 932-2490
www.nyloplast-us.com

Nyloplast

ADS
ADVANCED DRAINAGE SYSTEMS, INC.
4640 TRUEMAN BLVD
HILLIARD, OH 43026

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Appendix B

Sanitary Calculations and Analysis

Counterpoint Engineering Inc.

Existing Conditions

Project: 1750 Bloor Street West
Project No: 17020
Location: Toronto
Entire Site Area: 2.51 ha

Region of Peel Sanitary Guidelines

Density	PPU*
Apartment (2 or more bedrooms)	2.54
Apartment (1 bedroom)	1.68

*2015 DC Background Study

Avg. Domestic Flow = 302.8 Lcpd
Infiltration Rate = 0.2 l/s/ha
Peaking Factor $M= 1 +14/(4 + p^{1/2})$
p = populations (in thousands)

Population Calculations for Apartments					
Building	**1B**	**Population**	**2B&3B**	**Population**	**Total Population**
Existing Building 1750 Bloor Street (Tower A)	60	**101**	93	**237**	**338**
Existing Building 3315 Fieldgate Drive (Tower B)	57	**96**	92	**234**	**330**

Building	Area (ha)	Total Population	Average Flow (l/day)	l/s
Existing Building 1750 Bloor Street Tower A	**1.23**	338	102,346	1.18
Existing Building 3315 Fieldgate Drive Tower B	**1.23**	330	99,924	1.16

Harmon Peaking Factor

Sewer	Total Population	Harmon Peak Factor
To Fieldgate Drive (Tower B)	**330**	**4.06**
To Bloor Street West (Tower B)	**338**	**4.06**

Existing Residential To Fieldgate Peak Sanitary Flow	4.70	**l/s**
Infiltration Flows	0.53	**l/s**
Total Sanitary Flows to Fieldgate Drive	5.22	**l/s**

Existing Residential to Bloor Street West Peak Sanitary Flow	4.70	**l/s**
Infiltration Flows	0.53	**l/s**
Total Sanitary Flows to Bloor Street West	5.22	**l/s**

Infiltration Flow is the total of infiltration per area (0.2 L/s/ha.) plus the infiltration allowance of 0.28 L/s/mh (Assume one sanitary manhole per connection to street)

Counterpoint Engineering Inc.

Proposed Conditions

Project: 1750 Bloor Street West
Project No: 17020
Location: Toronto
Entire Site Area: 2.51 ha

Region of Peel Sanitary Guidelines

Density	PPU*
Apartment (2 or more bedrooms)	2.54
Apartment (1 bedroom)	1.68

*2015 DC Background Study

Avg. Domestic Flow =	302.8	Lcpd
Infiltration Rate =	0.2	l/s/ha
Peaking Factor	M= 1 +14/(4 + $p^{1/2}$)	
	p = populations (in thousands)	

Population Calculations for Apartments					
Building	**Bachelor/1B**	**Population**	**2B/3B**	**Population**	**Total Population**
Existing Building 1750 Bloor Street (Tower A)	60	**101**	93	**237**	**338**
Existing Building 3315 Fieldgate Drive (Tower B)	57	**96**	92	**234**	**330**
Proposed Building (Tower C)	176	**296**	67	**171**	**467**

Building	Area (ha)	Total Population	Average Flow (l/day)	l/s
Existing Building 1750 Bloor Street Tower A	**1.21**	338	102346	1.18
Existing Building 3315 Fieldgate Drive Tower B	**0.27**	330	99924	1.16
Proposed Tower C	**1.03**	467	141408	1.64

Harmon Peaking Factor

Sewer	Total Population	Harmon Peak Factor
To Fieldgate Drive (Tower B)	**330**	**4.06**
To Bloor Street West (Tower A and C)	**805**	**3.86**

Existing Residential To Fieldgate Peak Sanitary Flow	4.70	**l/s**
Infiltration Flows	0.33	**l/s**
Total Sanitary Flows to Fieldgate Drive	5.03	**l/s**
Existing Residential to Bloor Street West Peak Sanitary Flow	10.89	**l/s**
Infiltration Flows	0.73	**l/s**
Total Sanitary Flows to Bloor Street West	11.61	**l/s**

Infiltration Flow is the total of infiltration per area (0.2 L/s/ha.) plus the infiltration allowance of 0.28 L/s/mh (Assume one sanitary manhole per connection to street)

Counterpoint Engineering Inc.

EXISTING SANITARY SEWER DESIGN SHEET

Project: 1750 Bloor Street West
Client: Timbercreek Communities
Job No.: 17020
Prepared by: TM
Checked by: AKD
Date: 11-Oct-17
File No. 17020

Minimum Dia. = 150 mm
Mannings "n"= 0.013
Minimum Velocity = 0.6 m/s
Minimum Grade = 0.5 %
Avg. Domestic Flow = 302.8 Lcpd
Infiltration(2) = 0.2 l/s/ha

Max. Peaking Factor= 4.0
Min. Peaking Factor= 2.0
Maximum Velocity = 3 m/s
Peaking Factor M = $1 + 14/(4 + p^{1/2})$
p = populations (in thousands)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
STREET	MANHOLE		AREA (ha)				Proposed Residential 302.8Lpcd		Residential	Average Res. Flow	Residential	Residential	Infiltration	DESIGN PEAK FLOW	SEWER						
			INCREMENT			TOTAL (CUM)	POP. DENSITY	POP. EQUIV.	TOTAL POP.	(L/s)	PEAKING FACTOR	SAN. Flow		Total	SIZE	SLOPE	Capacity	V(m/s)		Flow depth	Qa/Qf
	FROM	TO	RES	COM	IND/INST		Per./Ha	Persons		Total		(L/s)	(L/s)	(L/s)	(mm)	(%)	(L/s)	FULL	ACTUAL	%	%
1750 Bloor Street Tower A	Plug	MH1A	1.42			1.42	475	675	675	2.36	3.90	9.23	0.56	9.79	250	0.50	42.0	0.86	0.69	32.5%	23.3%
To Bloor Street	MH1A	EX.Sewer				1.42	475	675	675	2.36	3.90	9.23	0.56	9.79	250	0.50	42.0	0.86	0.69	32.5%	23.3%
3315 Fieldgate Drive Tower B	Plug	MH2A	1.09			1.09	475	518	518	1.81	3.97	7.20	0.50	7.70	250	0.50	42.0	0.86	0.65	28.5%	18.3%
To Fieldgate Drive	MH2A	EX.Sewer				1.09	475	518	518	1.81	3.97	7.20	0.50	7.70	250	0.50	42.0	0.86	0.65	28.5%	18.3%

Note:

Infiltration Flow is the total of infiltration per area (0.2 L/s/ha.) plus the infiltration allowance of 0.28 L/s/mh (Assume one sanitary manhole per existing connection on site)
Existing sewer connection slopes and sizes are assumptions

Counterpoint Engineering Inc.

PROPOSED SANITARY SEWER DESIGN SHEET

Project: 1750 Bloor Street West
Client: Timbercreek Communities
Job No.: 17020
Prepared by: TM
Checked by: AKD
Date: 17-Mar-20
File No. 17020

Minimum Dia. = 150 mm
Mannings "n"= 0.013
Minimum Velocity = 0.6 m/s
Minimum Grade = 0.5 %
Avg. Domestic Flow = 302.8 Lcpd
Infiltration[(2)] = 0.2 l/s/ha

Max. Peaking Factor= 4.0
Min. Peaking Factor= 2.0
Maximum Velocity = 3 m/s
Peaking Factor M = $1 + 14/(4 + p^{1/2})$
p = populations (in thousands)

1	2	3	4	5	6	7	9	10	11	12	13	14	15	16	17	18	19	20	21	22
STREET	MANHOLE		AREA (ha)				Proposed Residential 302.8Lpcd	Residential	Average Res. Flow	Residential	Residential	Infiltration	DESIGN PEAK FLOW	SEWER						
			INCREMENT			TOTAL (CUM)	POP. EQUIV.	TOTAL POP.	(L/s)	PEAKING FACTOR	SAN. Flow		TOTAL	SIZE	SLOPE	Capacity	V(m/s)		Flow depth	Qa/Qf
	FROM	TO	RES	COM	IND/INST		Persons		Total		(L/s)	(L/s)	(L/s)	(mm)	(%)	(L/s)	FULL	ACTUAL	%	%
1750 Bloor Street Tower A	Plug	MH1A	1.21			1.21	338	338	1.18	4.06	4.80	0.24	5.05	250	0.50	42.0	0.86	0.57	23.0%	12.0%
Tower C	Plug	MH1A	1.03			1.03	498	467	1.64	3.99	6.53	0.21	6.74	250	0.50	42.0	0.86	0.63	27.0%	16.0%
To Bloor Street	MH1A	EX.Sewer				2.24	836	836	2.93	3.85	11.28	0.73	12.00	250	0.50	42.0	0.86	0.74	36.5%	28.5%
3315 Fieldgate Drive Tower B	Plug	MH2A	0.27			0.27	330	330	1.16	4.06	4.70	0.33	5.03	250	0.50	42.0	0.86	0.57	23.0%	12.0%
To Fieldgate Drive	MH2A	EX.Sewer				0.27	330	330	1.16	4.06	4.70	0.33	5.03	250	0.50	42.0	0.86	0.57	23.0%	12.0%

Note:

Infiltration Flow is the total of infiltration per area (0.2 L/s/ha.) plus the infiltration allowance of 0.28 L/s/mh (Assume one sanitary manhole per existing connection on site)
Existing sewer connection slopes and sizes are assumptions

PROPOSED TOWER C								
UNIT MIX	BACHELOR	1B	1B+D	2B	2B+D	3B	TOWNHOME - 2B+D	TOTAL
TOWNHOUSES:								
TOWER C								
GROUND				1			5	6
LEVEL 2		7			4			11
LEVEL 3		9	4		2	1		16
LEVEL 4-9 (6 FLOORS)		2 (12)	10 (60)		3 (18)	1 (6)		96
LEVEL 10-11 (2 FLOORS)	1 (2)	4 (8)	7 (14)	1 (2)	2 (4)			30
LEVEL 12-17 (6 FLOORS)	1 (6)	2 (12)	7 (42)	1 (6)	2 (12)		1 (6)	84
TOTAL UNIT BLDG.	8	48	120	11	40	7	11	243
UNIT TYPE %	3.29%	69.14%		20.99%		2.88%	4.53%	

TOTAL UNITS (Existing to remain + New)	Existing to remain	Proposed building	TOTAL
	302	243	545

Appendix C

Domestic Water and Fire Demand Calculations

Counterpoint Engineering Inc.
Water Demand Calculations

Project: 1750 Bloor Street West
Project No: 17020
Location: Mississauga

Unit Type	PPU*
Apartment (2 or more bedrooms)	2.54
Apartment (1 bedroom)	1.68

*2015 DC Background Study

Population Calculations for Apartments					
Building	1B	Population	2B	Population	Total Population
Existing Building 1750 Bloor Street (Tower A)	60	**101**	93	**237**	**338**
Existing Building 3315 Fieldgate Drive (Tower B)	57	**96**	92	**234**	**330**
Proposed Buildings (Tower C, Tower D, Kirkwall Towns)	176	**296**	67	**171**	**467**

Region of Peel Public Works Watermain Design Criteria
Water Demand = Maximum Day Flow+ Fire Flow or Peak Hour Flow

Average Residential Consumption Rate (Region of Peel)

Population Type	Unit	Average Consumption Rate	Max Day Factor	Peak Hour Factor
Residential	L/cap/day	280	2	3

Potential Short Term Water Demand Criteria for New Development

Population Type	Unit	Average Consumption Rate	Max Day Factor	Peak Hour Factor
Residential	L/cap/day	409	2	3

Water Demand

Land Use	Population	Average Demand (l/s)	Maximum Day Flow (l/s)	Peak Hour Flow (l/s)	Fire Flow (l/s)	Max Day + Fire Flow (l/s)
Existing Tower A	338	1	2	3	67	69
Existing Tower B	330	1	2	3	67	69
Proposed Tower C and Amenity Building	**467**	**2**	**3**	**5**	**100**	**103**

Peak Hour Water Demand for Proposed Development	**11**	**l/s**
Maximum Day Water Demand for Proposed Development	**7**	**l/s**
Fire Flow required	**100**	**l/s**
Maximum Day + Fire Flow	**107**	**l/s**

Water Demand - Short Term

Land Use	Population	Average Demand (l/s)	Maximum Day Flow (l/s)	Peak Hour Flow (l/s)	Fire Flow (l/s)	Max Day + Fire Flow (l/s)
Existing Tower A	338	2	3	5	67	70
Existing Tower B	330	2	3	5	67	70
Proposed Tower C and Amenity Building	**467**	**2**	**4**	**7**	**100**	**104**

Peak Hour Water Demand for Proposed Development	**16**	**l/s**
Maximum Day Water Demand for Proposed Development	**11**	**l/s**
Fire Flow required	**100**	**l/s**
Maximum Day + Fire Flow	**111**	**l/s**

Counterpoint Engineering Inc.

REQUIRED FIRE FLOW WORKSHEET - PROPOSED DEVELOPMENT
Fire Underwriters Survey - Proposed Building

Project : **1750 Bloor Street West**
Project No: **17020**
Tower A

Guide for Determination of Required Flow Copyright I.S.O

$$F = 220C\sqrt{A}$$ 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, masonry or metal walls).
= 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 being considered.

Type of Construction		Class Factor
WF	Wood Frame	1.5
OC	Ordinary Construction	1.0
NC	Non-Combustible	0.8
FC	Fire-Resistive	0.6

Contents		% Reduction
NC	Non-Combustible	25
LC	Limited Combustible	15
C	Combustible	0
FB	Free Burning	15
RB	Rapid Burning	25

Area Notes for Fire Resistive Buildings (from FUS manual, 1999):

If Vertical Openings are inadequately protected (less than 1-hour fire rating): Area is the total of the two largest adjoining floors (above ground level) plus 50% of the area of each of the next 8 adjoining floors above that.

If Vertical Openings are adequately protected (at least 1-hour fire rating): Area is the total of the largest floor (above ground level) plus 25% of the area of each of the next 2 immediately adjoining floors above that.

1) Fire Flow

Type of Construction:	FC
C=	0.6
A*=	1956 m^2
F=	6,000 **L/min** (round to the nearest 1,000L/min)

Note: Assuming fire restive building. Assuming Vertical Openings are adequately protected.
Area is the total of the largest floor (level 3) plus 25% of the next 2 adjoining floors above.

2) Occupancy Reduction/Surcharge

Contents Factor:	LC			
Reduction/Surcharge of	-15%	=	-900	L/min
F=	**6000L/min +**	**-900**	**L/min =**	**5,100** **L/min**

3) System Type Reduction

NFPA 13 Sprinkler:	YES	30%
Standard Water Supply:	YES	10%
Fully Supervised:	NO	0%
Total		40%

Reduction of	40%	L/min =	2,040	L/min
F=	**5100L/min -**	**2,040** **L/min =**	3,060	**L/min**

4) Separation Charge

Building Face	Dist(m)	Charge
North	43	5%
East	90	0%
South	16	15%
West	52	0%
Total		20% **of** **5100** **L/min** = 1,020 **L/min**

(max exposure charge can be 75%)

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

F= **3060L/min +** **1020L/min** **=** 4,080 **L/min** (2,000L/min<F<45,000L/min)

F=	4,000	**L/min**
F=	67	**L/s**
F=	1,057	**gpm**

(round to the nearest 1,000L/min)

Counterpoint Engineering Inc.

REQUIRED FIRE FLOW WORKSHEET - PROPOSED DEVELOPMENT
Fire Underwriters Survey - Proposed Building

Project : **1750 Bloor Street West**

Project No: **17020**

Tower B

Guide for Determination of Required Flow Copyright I.S.O

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

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, masonry or metal walls).
= 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 being considered.

Type of Construction		Class Factor
WF	Wood Frame	1.5
OC	Ordinary Construction	1.0
NC	Non-Combustible	0.8
FC	Fire-Resistive	0.6

Contents		% Reduction
NC	Non-Combustible	25
LC	Limited Combustible	15
C	Combustible	0
FB	Free Burning	15
RB	Rapid Burning	25

Area Notes for Fire Resistive Buildings (from FUS manual, 1999):

If Vertical Openings are inadequately protected (less than 1-hour fire rating): Area is the total of the two largest adjoining floors (above ground level) plus 50% of the area of each of the next 8 adjoining floors above that.

If Vertical Openings are adequately protected (at least 1-hour fire rating): Area is the total of the largest floor (above ground level) plus 25% of the area of each of the next 2 immediately adjoining floors above that.

1) Fire Flow

Type of Construction:	FC
C=	0.6
A*=	1967 m^2
F=	6,000 **L/min** (round to the nearest 1,000L/min)

Note: Assuming fire restive building. Assuming Vertical Openings are adequately protected.
Area is the total of the largest floor plus 25% of the next 2 adjoining floors above.

2) Occupancy Reduction/Surcharge

Contents Factor:		LC		
Reduction/Surcharge of		-15%	=	-900 L/min
F=	6000L/min +	-900 L/min	=	5,100 **L/min**

3) System Type Reduction

NFPA 13 Sprinkler:	YES	30%	
Standard Water Supply:	YES	10%	
Fully Supervised:	NO	0%	
Total		40%	
Reduction of		40% L/min	= 2,040 L/min
F=	5100L/min -	2,040 L/min	= 3,060 **L/min**

4) Separation Charge

Building Face	Dist(m)	Charge
North	29	10%
East	46	0%
South	16	15%
West	74	0%
Total		25% **of** 5100 **L/min** = 1,275 **L/min**

(max exposure charge can be 75%)

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

F= 3060L/min + 1275L/min = 4,335 **L/min** (2,000L/min<F<45,000L/min)

F=	4,000	**L/min**
F=	67	**L/s**
F=	1,057	**gpm**

(round to the nearest 1,000L/min)

Counterpoint Engineering Inc.

REQUIRED FIRE FLOW WORKSHEET - PROPOSED DEVELOPMENT
Fire Underwriters Survey - Proposed Building

Project : **1750 Bloor Street West**
Project No: **17020**

Tower C
Guide for Determination of Required Flow Copyright I.S.O

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

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, masonry or metal walls).
= 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 being considered.

Type of Construction		Class Factor
WF	Wood Frame	1.5
OC	Ordinary Construction	1.0
NC	Non-Combustible	0.8
FC	Fire-Resistive	0.6

Area Notes for Fire Resistive Buildings (from FUS manual, 1999):

If Vertical Openings are inadequately protected (less than 1-hour fire rating): Area is the total of the two largest adjoining floors (above ground level) plus 50% of the area of each of the next 8 adjoining floors above that.

If Vertical Openings are adequately protected (at least 1-hour fire rating): Area is the total of the largest floor (above ground level) plus 25% of the area of each of the next 2 immediately adjoining floors above that.

Contents		% Reduction
NC	Non-Combustible	25
LC	Limited Combustible	15
C	Combustible	0
FB	Free Burning	15
RB	Rapid Burning	25

1) Fire Flow

Type of Construction:	FC
C=	0.6
A*=	2200 m^2
F=	**6,000 L/min** (round to the nearest 1,000L/min)

Note: Assuming fire restive building. Assuming Vertical Openings are adequately protected.
Area is the total of the largest floor (level 3) plus 25% of the next 2 adjoining floors above.

2) Occupancy Reduction/Surcharge

Contents Factor:		LC		
Reduction/Surcharge of		-15%	=	-900 L/min
F=	**6000L/min +**	**-900 L/min**	=	**5,100 L/min**

3) System Type Reduction

NFPA 13 Sprinkler:	YES	30%
Standard Water Supply:	YES	10%
Fully Supervised:	YES	10%
Total		50%

Reduction of		50% L/min	=	2,550 L/min
F=	**5100L/min -**	**2,550 L/min**	=	**2,550 L/min**

4) Separation Charge

Building Face	Dist(m)	Charge
North	15	15%
East	26	10%
South	16	15%
West	55	0%
Total		40% **of** **5100 L/min** = 2,040 **L/min**

(max exposure charge can be 75%)

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

F= **2550L/min +** **2040L/min** = **4,590 L/min** (2,000L/min<F<45,000L/min)

F=	5,000	**L/min**
F=	83	**L/s**
F=	1,321	**gpm**

(round to the nearest 1,000L/min)

Counterpoint Engineering Inc.

REQUIRED FIRE FLOW WORKSHEET - PROPOSED DEVELOPMENT
Fire Underwriters Survey - Proposed Building

Project : **1750 Bloor Street West**
Project No: **17020**
Amenity Building
Guide for Determination of Required Flow Copyright I.S.O

$$F = 220C\sqrt{A}$$ 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, masonry or metal walls).
= 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 being considered.

Type of Construction		Class Factor
WF	Wood Frame	1.5
OC	Ordinary Construction	1.0
NC	Non-Combustible	0.8
FC	Fire-Resistive	0.6

Contents		% Reduction
NC	Non-Combustible	25
LC	Limited Combustible	15
C	Combustible	0
FB	Free Burning	15
RB	Rapid Burning	25

Area Notes for Fire Resistive Buildings (from FUS manual, 1999):

If Vertical Openings are inadequately protected (less than 1-hour fire rating): Area is the total of the two largest adjoining floors (above ground level) plus 50% of the area of each of the next 8 adjoining floors above that.

If Vertical Openings are adequately protected (at least 1-hour fire rating): Area is the total of the largest floor (above ground level) plus 25% of the area of each of the next 2 immediately adjoining floors above that.

1) Fire Flow

Type of Construction:	NC
C=	0.8
A*=	747 m^2
F=	5,000 **L/min** (round to the nearest 1,000L/min)

Note: Assuming fire restive building. Assuming Vertical Openings are adequately protected.
Area is the total of the largest floor (level 3) plus 25% of the next 2 adjoining floors above.

2) Occupancy Reduction/Surcharge

Contents Factor:		LC		
Reduction/Surcharge of		-15%	=	-750 L/min
F=	5000L/min +	-750 L/min	=	4,250 **L/min**

3) System Type Reduction

NFPA 13 Sprinkler:		NO	0%	
Standard Water Supply:		NO	0%	
Fully Supervised:		NO	0%	
Total			0%	
Reduction of		0%	L/min =	0 L/min
F=	4250L/min -	0	L/min =	4,250 **L/min**

4) Separation Charge

Building Face	Dist(m)	Charge
North	27	10%
East	12	15%
South	37	5%
West	26	10%
Total		40% **of** 4250 **L/min** = 1,700 **L/min**

(max exposure charge can be 75%)

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

F= 4250L/min + 1700L/min = 5,950 **L/min** (2,000L/min<F<45,000L/min)

F=	6,000	**L/min**
F=	100	**L/s**
F=	1,585	**gpm**

(round to the nearest 1,000L/min)

https://epal.peelregion.ca/ - WM_HYDRA...

UNITID:	2019986
TYPE:	-
INSP_DATE:	07-Mar-2016
WINT_DATE:	07-Mar-2016
FLUSH_DATE:	-
FLUSH_FREQ:	N/A
ADDRESS:	BLOOR ST
LOC_REF:	1745
STATUS:	A
INSTALLED:	-
DRAWING_NO:	-
T-FILE_NO:	-
PRES_ZONE:	2
BRANCH_DIA:	0
BRANCH_LEN:	0
BRANCH_MAT:	-
MAKE:	DARLING
MODEL_NO:	B50-B18
OUTL_SZ1:	63
OUTL_SZ2:	63
OUTL_SZ3:	0
TILE_NUMBER:	0249
YARD:	W
REG_MAP_NO:	-
COMMENTS:	-
OWNERSHIP:	R
FIRE_FLOW_GPM:	2120.05
FIRE_FLOW_VALID_DATE:	20150923
PRESSURE_MIN:	55.4003
PRESSURE_MAX:	69.4504
PRESSURE_COLOUR:	BLUE
CHLORINE_RES_MODEL_MGPL:	0.9755
PRESSURE_LOGGING_DATA:	
TRAFFIC_CONTROL_LAYOUT_1:	
TRAFFIC_CONTROL_LAYOUT_2:	
SPATIALLY_VERIFIED:	NO
SPATIALLY_VERIFIED_DESC:	Not verified
GPS-EAST:	614001.85
GPS-NORTH:	4831080.64