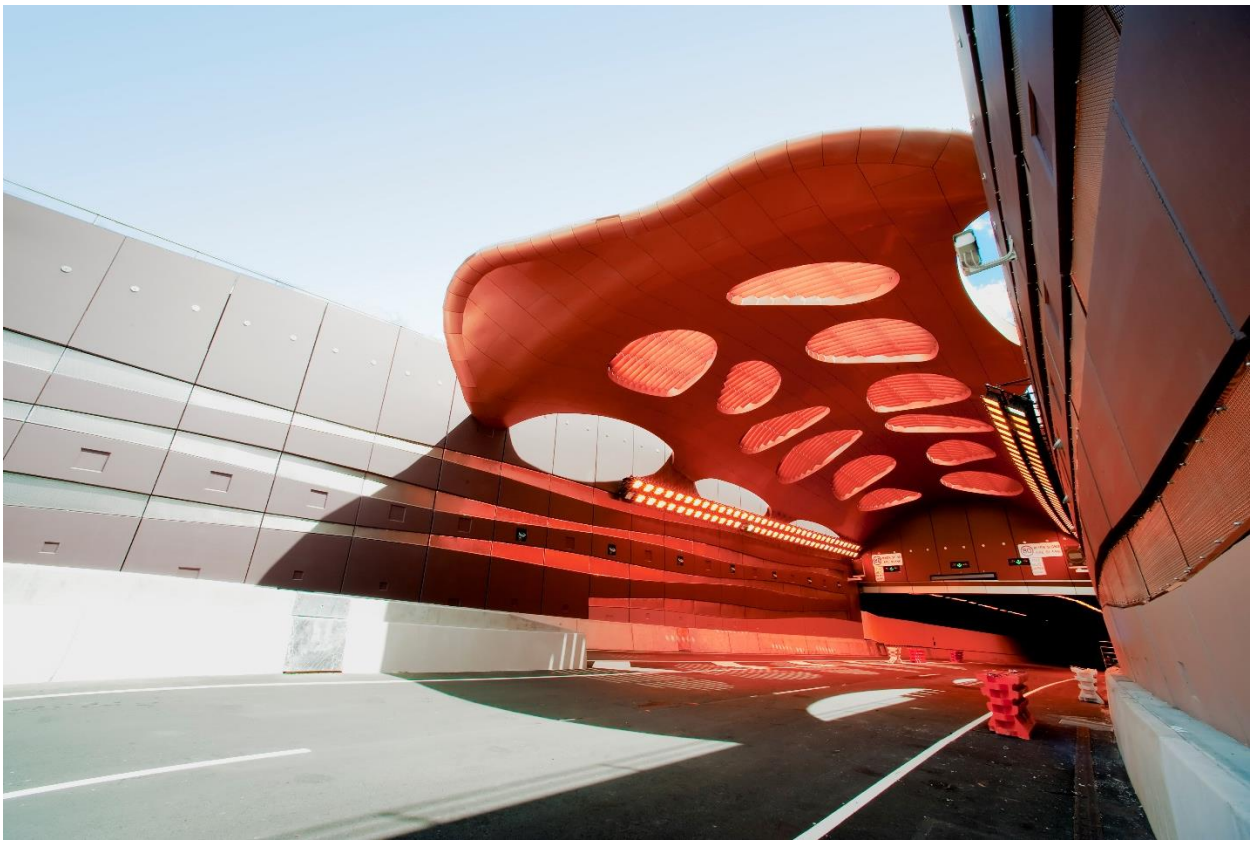
1785 BLOOR HOLDING INC.

STORMWATER MANAGEMENT REPORT

1785 BLOOR STREET, MISSISSAUGA

SEPTEMBER 25, 2023



STORMWATER MANAGEMENT REPORT

1785 BLOOR STREET, MISSISSAUGA

1785 BLOOR HOLDING INC.

REZONING APPLICATION

PROJECT NO.: 211-10685-00
DATE: SEPTEMBER 2023

WSP
100 COMMERCE VALLEY DRIVE WEST
THORNHILL, ON, CANADA L3T 0A1

WSP.COM

QUALITY MANAGEMENT

ISSUE/REVISION	FIRST ISSUE	SECOND ISSUE			
Remarks	Rezoning Application	Rezoning Application			
Date	2022/05/27	2023/09/25			
Prepared by	Ramin Jalalirad, EIT	Stefanie Kurtz			
Signature					
Checked by	Vladimir Nikolic, P. Eng	Vladimir Nikolic, P. Eng			
Signature					
Project number	211-10685	211-10685			

SIGNATURES

PREPARED BY

Stefanie Kurtz

Stefanie Kurtz
Designer, Water Resources

REVIEWED BY

Vladimir Nikolic, P.Eng.
Project Engineer

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PRODUCTION TEAM

CLIENT	1785 BLOOR HOLDING INC.

WSP

Designer	Stefanie Kurtz
Designer	Ramin Jalalirad, EIT
Project Engineer	Vladimir Nikolic, P.Eng.

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1 INTRODUCTION

1.1 SCOPE

WSP has been retained by 1785 Bloor Holding Inc. to prepare a Stormwater Management (SWM) Report to support the rezoning application for the proposed intensification of the property located at 1785 Bloor Street in the City of Mississauga. The proposed development will keep the existing 10-storey building and a 14-storey residential building will be added in the north portion of the site.

This SWM report examines the potential water quality, quantity, balance, and erosion impacts of the proposed residential development and summarizes how each will be addressed in accordance with the City of Mississauga's Development Requirements (2016).

1.2 SITE LOCATION

The site occupies an area of approximately 1.2 ha. It is bound by high density residential development to the north and west, a hydro corridor to the east and Bloor Street to the north. The site is located west of the intersection of Bloor Street and Bridgewood Dr. The location of the proposed re-development is illustrated in Figure 1.

1.3 STORMWATER MANAGEMENT PLAN OBJECTIVES

The objectives of the stormwater management plan are as follows:

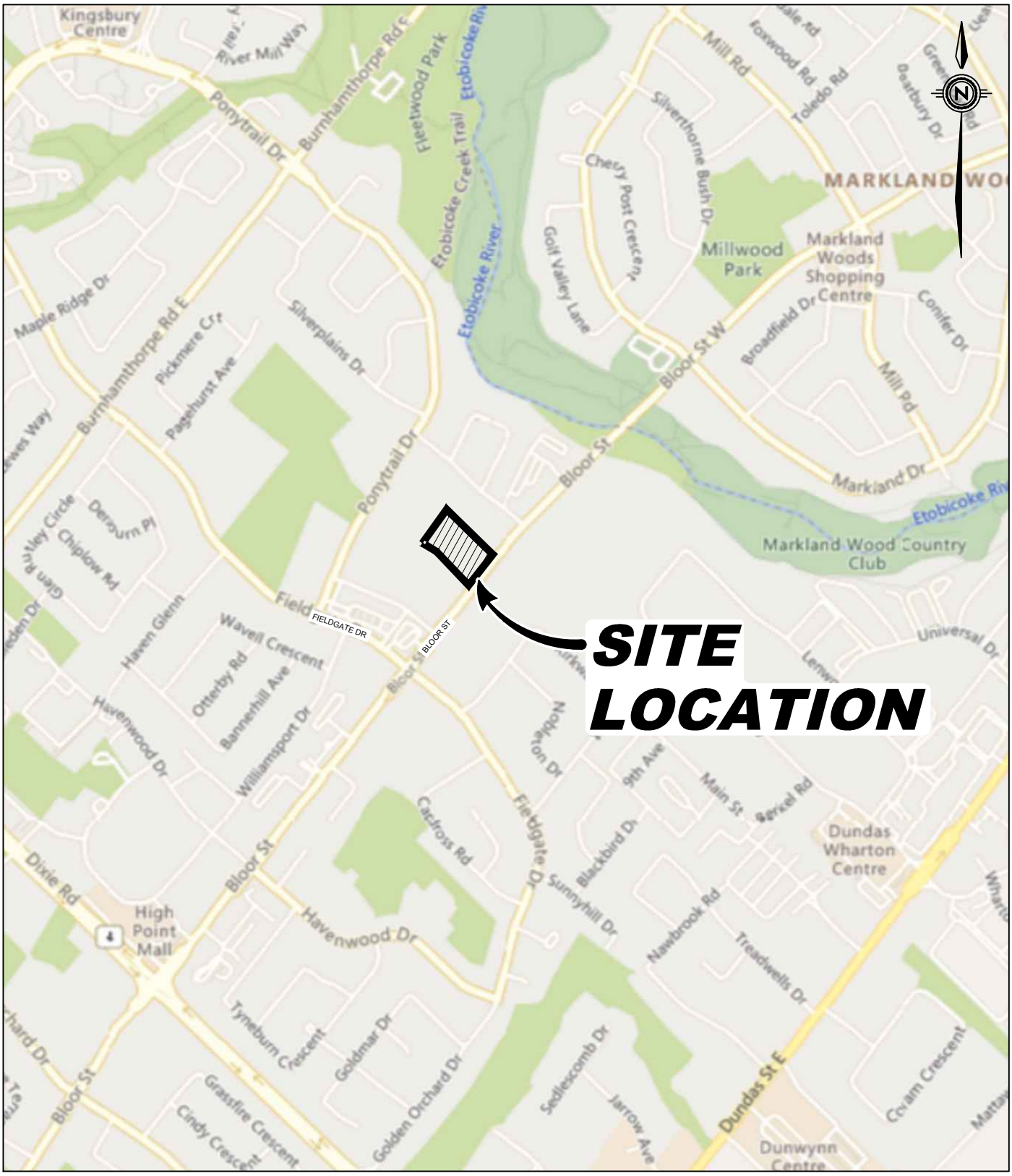
- Determine the site-specific stormwater management requirements to ensure that the development is in conformance with the City of Mississauga criteria;
- Evaluate various stormwater management practices that meet the requirements of the City and recommend a preferred strategy; and,
- Prepare a stormwater management report documenting the strategy along with the technical information necessary for the justification and sizing of the proposed stormwater management facilities.

1.4 DESIGN CRITERIA

The City of Mississauga issued a Development Requirements Manual in 2016 to provide direction on the management of rainfall and runoff inside the City's jurisdiction. A summary of the stormwater management criteria applicable to this project follows:

- **Runoff Volume Reduction** – The City's Design Manual requires the first 5 mm of runoff shall be retained on-site and managed by way of infiltration, evapotranspiration or reuse. There are no applicable subwatershed studies or master drainage plans for the subject site area published that indicates any higher minimum requirement.
- **Water Quality** – The City's Design Requirements specify that water quality control is to be implemented in accordance with the applicable Master Drainage Plan or Subwatershed Plan, the City's Stormwater Quality Control Strategy (January 1996) and the MECP (formerly MOECC) Stormwater Management Practices Planning and Design Manual. Based on the MECP 's Manual, the long-term removal of 80% of the TSS loading is required for this site.
- **Erosion Control** – As indicated in the City of Mississauga's Development Requirements, sites under one hectare are not required to provide long term erosion control measures.

— **Water Quantity Control and Discharge to Municipal Infrastructure** – Through use of Table 2.01.03.03a of The City of Mississauga's Development Requirements and correspondence with City, it has been determined that water quantity control for this site will be limited by the existing storm sewer capacity. The site's post development release rate would be limited to the 2-year pre-development release rate with a runoff coefficient of 0.5 to provide relief to the system.



CLIENT

1785 Bloor Holdings Inc.

TITLE

1785 BLOOR STREET, MISSISSAUGA, ON

LOCATION PLAN

wsp

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Date SEPT 2023	Proj. No. 211-10685
Scale NTS	Figure No. 1

2 PRE-DEVELOPMENT CONDITIONS

2.1 GENERAL

Under pre-development conditions, the approximately 1.2 ha site is currently occupied by one 10-storey apartments at 1785 Bloor Street, a parking lot north of the building and some landscaping areas. The pre-development runoff coefficient is estimated at 0.53. Under pre-development conditions, the site drains to the southeast. Ultimately, all flows from the site are collected by the storm sewer along the Bloor Street. The storm sewer on Bloor Street flows east where it connects to the Bridgewood Dr storm sewer. As such, the entire site effectively discharges to Bloor Street.

The allowable flow rate will be calculated by determining the existing 2-year flows for the site. The existing condition of the site is shown in Figure 2.

2.2 RAINFALL INFORMATION

The rainfall intensity for the site was calculated using the following equation: $I = A/(T + B)^C$

Where;

I = rainfall intensity in mm/hour

T = time of concentration in hours

A, B, and C = constant parameters (see below)

The parameters (A, B, C) for use in the City of Mississauga are summarized in Table 2.1.

Table 2.1 Rainfall Parameters

RETURN PERIOD (years)	2	5	10	25	50	100
A	610	820	1010	1160	1300	1450
B	4.60	4.60	4.60	4.60	4.70	4.90
C	0.78	0.78	0.78	0.78	0.78	0.78

Source: City of Mississauga's Development Requirements (2016)

An initial time of concentration, T_C, of 15 minutes (or 0.25 hours) is recommended in the City of Mississauga's Development Requirements.

2.3 ALLOWABLE FLOW RATES

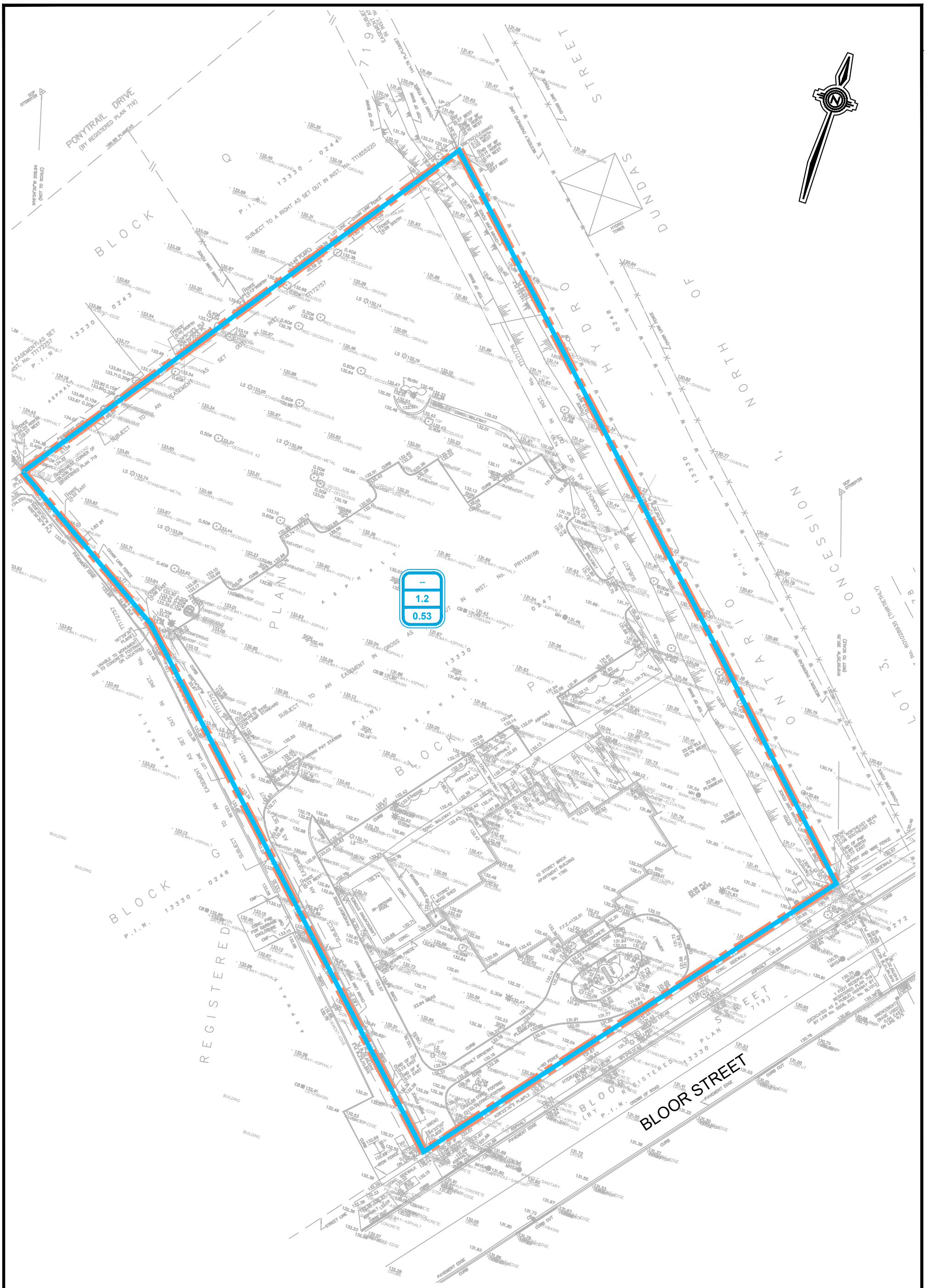
The City of Mississauga requires that the site's post-development discharge rates for the 2-, 5-, 10-, 25-, 50- and 100-year storm events do not exceed the 2-year pre-development flow rates. The 2-year pre-development flow is 99.9 l/s which was calculated with a runoff coefficient value of 0.5.

The calculated peak flow rates for the site under pre-development conditions are summarized below in Table 2.2. Detailed calculations are contained within **Appendix A**.

Table 2.2 Pre-Development Peak Discharge Rates and Allowable Release Rates

RETURN PERIOD (years)	RAINFALL INTENSITY, I (mm/hour)	ALLOWABLE RELEASE RATE, Q_A (L/s)*
2	59.9	**99.9**
5	80.5	134.3
10	99.2	165.4
25	113.9	190.0
50	127.1	212.1
100	140.7	234.7

** Are of 1.2 ha existing site area with a maximum runoff coefficient C=0.5 and time of concentration of 15 minutes*



LEGEND

- PROPERTY BOUNDARY
- SUB-CATCHMENT BOUNDARY

--
1.07
0.47

- SUB-CATCHMENT ID.
- DRAINAGE AREA (ha)
- RUNOFF COEFFICIENT

CLIENT

1785 Bloor Holdings Inc.

TITLE

1785 BLOOR STREET, MISSISSAUGA, ON

PRE DEVELOPMENT PLAN

wsp

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Checked	V. N.	Drawn	AutoCAD/G.W.
Date	APRIL 2022	Proj. No.	211-10685
Scale	1:600	Figure No.	2

FILENAME: C:\Users\CASK008928\DC\ACCDocs\WSP Canada projects (AMER)\Land Development Ontario\Project Files\211-10685_FIG 2.dwg
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3 POST-DEVELOPMENT CONDITIONS

3.1 GENERAL

The proposed development consists of the construction of a new 14-storey residential condominium north of the existing 10-storey building at 1785 Bloor Street. The building provides an estimated 234 residential units and three levels of underground parking. The parking structure underlies the north portion footprint of the site. Vehicular access to the site continues to be provided via the proposed driveway connecting to Bloor Street.

An area breakdown for the proposed site layout is provided below in Table 3.1. Please refer to Figure 3 for details of the post-development conditions.

Table 3.1 Proposed Land-Use Area Breakdown

	LAND-USE	AREA (m^2)	2-YEAR RUNOFF COEFFICIENT, C	IMPERVIOUSNESS
Captured & Controlled	Impervious Roof Area (Proposed Building)	2,577.9	0.90	100%
	Impervious Roof Area (Existing Building)	731.4	0.90	100%
	Pervious Landscaping	3,644.8	0.25	0%
	Controlled at Grade Impervious	3,352.8	0.90	100%
	Uncontrolled Pervious Landscaping	1,559.0	0.25	0%
	Total (or Average):	**11,865.8**	**0.61**	**56%**

3.2 RUNOFF VOLUME REDUCTION

The City of Mississauga requires that the first 5 mm of rainfall shall be retained on-site and managed by way of infiltration, evapotranspiration or re-use. Note that the City of Mississauga does not typically allow initial abstractions when calculating the water balance volume, therefore, they will be disregarded. Since the ground water level is high, infiltration is not feasible for this project. A water reuse volume stored within the stormwater cistern is the mechanism proposed to achieve the water balance requirement.

The total volume of 5 mm runoff from the site is 59.30 m^3 and will be satisfied by the re-use tank. The tank volume is 61.52 m^3. Table 3.2 shows the required storage volume to meet the water balance target for the site. Calculations are provided in **Appendix A**.

Table 3.2 Water Balance Summary

SURFACE TYPE	AREA (m^2)	5 MM VOLUME (M^3)
Impervious Roof Area (Proposed Building)	2,577.9	12.9
Impervious Roof Area (Existing Building)	731.4	3.7
Pervious Landscaping	3,644.8	18.2
Controlled at Grade Impervious	3,352.8	16.8
Uncontrolled Pervious Landscaping	1,559.0	7.8
Total Site Area	**11,866**	**59.3**

The proposed rainwater reuse options may include irrigation of the trees and soft landscaping. The reuse methods for the captured stormwater are still being assessed in conjunction with the mechanical design of the building's water supply systems. It is assumed that with the proposed landscaping, enough opportunities exist to reuse the sump volume within a reasonable time frame.

LEGEND

- PROPERTY BOUNDARY
- SUB-CATCHMENT BOUNDARY
- IMPERVIOUS ROOF
- PERVIOUS AREA
- DRIVEWAY
- UNCONTROLLED

-- SUB-CATCHMENT ID.
1.07 DRAINAGE AREA (ha)
0.67 RUNOFF COEFFICIENT

CLIENT: 1785 Bloor Holdings Inc.

TITLE: 1785 BLOOR STREET, MISSISSAUGA, ON

PROPOSED DEVELOPMENT PLAN

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Checked	V. N.	Drawn	AutoCAD/S.K.
Date	SEPT 2023	Proj. No.	211-10685
Scale	1:600	Figure No.	3

FILENAME: C:\Users\CASK008928\DC\ACCDocs\WSP Canada projects (AMER)\Land Development Ontario\Project Files\211-10685-00 1785 Bloor St\SWM Figures\211-10685_FIG 3.dwg
PLOTDATE: Sep 15, 2023 - 11:08am, CASK008928

3.3 WATER QUALITY CONTROL

As mentioned in Section 1.4 of this report, the WWGMF states that the site is required to target a long-term removal of 80% total suspended solids (TSS) on an annual loading basis.

Architectural plans indicate that the majority of the area will be covered by building rooftop and walkways surfaces. As those areas are free of typical sediment-generating activities (i.e., vehicle traffic) runoff will leave then effectively unchanged and can be considered clean for the purposes of water quality assessment. The site wide area also includes 0.70 ha of driveway, at-grade pervious areas and at-grade impervious areas, and runoff from those areas must be treated to the City of Mississauga standard. As all flows are conveyed to the chamber, which will hold water onsite, an OGS connected upstream of the storm sewer is recommended for the site.

A Stormceptor EFO4 is recommended to meet TSS removal requirements. This oil-grit separator is a filter-based system and has a removal rate of over 86%. The unit is sized to treat the site's uncontrolled driveway / at-grade surfaces. The remainder of the site will be captured and sent to the cistern directly. Treatment unit specifications as provided by Echelon Environmental are located in **Appendix C** of this report.

3.4 EROSION CONTROL

The City of Mississauga Design guidelines do not specify long term erosion control requirements for sites under 1.0 ha. Since the site area for this application is about 1.2 ha and the site will discharge to the municipal sewer system, no additional long-term site-specific erosion controls are recommended. However, proper erosion and sediment control measures during construction should be installed. The details will be outlined in the FSR and Erosion and Sediment Control Plan and should conform to the city requirements. See Functional Servicing Report, for more details.

3.5 GROUNDWATER

A hydrogeological investigation prepared under separate cover was carried out by Pinchin Ltd. in March 2022. It assessed the groundwater conditions, soil characteristics, dewatering requirements and tested for the presence of groundwater contamination.

The City of Mississauga requires that all groundwater be discharged to the storm sewer. The long term (permanent) groundwater flow rate (with a safety factor of 2) is 70,000 L/day which is equivalent to 0.8 L/s. The groundwater will be piped to the proposed cistern; as such, 0.8 L/s has been added as a base flow to the SWM Cistern node in the HydroCAD model. Note that a groundwater treatment system designed by other will be required and should exceed City requirements. Details on the method of treatment can be found in the hydrogeological investigation report, which will be submitted under separate cover.

3.6 WATER QUANTITY CONTROL

The City of Mississauga requires that water quantity control be designed in accordance with the capacity of the local municipal storm sewer. The allowable release rate to the municipal storm sewer system from the development site will be limited to the 2-year pre-development flow rate discussed in Section 2.3.

A HydroCAD model of the project was developed and utilized to determine the required storage volume in the stormwater cistern, and to calculate the discharge rates achieved by the proposed flow controls under all storm events. The Modified Rational Method (an inherent subroutine of the HydroCAD software) has been used for the modelling exercise. The model assumes that the sump volume of the SWM cistern is full at the start of the storm event.

An emergency overflow manhole will be provided at the top of the cistern, with discharge to street level and the adjacent right of way. This will prevent flow backing up into the building pipework if the primary outlet is blocked, or if a storm event in excess of the 100-year return period occurs.

The box culvert (DECAST OPSS Box Culvert)was designed to provide a storage volume of 236.5 m^3, with a length of 40, width of 3 m, and a height of 2.4 m and will be located outside the parking structure (**Appendix D**). Chamber outflow control towards the Bloor Street storm sewer system (existing 1375 mm RCP storm sewer pipe) will be provided by a 125 mm orifice tube outlet installed at the bottom of the box culvert. Moreover, there will be a small re-use cistern in the P1 level of the proposed residential apartment building, which will be used to meet the water balance requirements. The re-use cistern has a footprint of 53.5 m^2, a height of 1.5 m, and the 200 mm orifice tube is placed 1.15 m from the bottom of the cistern. It will collect the roof runoff from proposed 14-storey building. A summary of the modeling result is presented in Table 3.3. Please see the accompanying Functional Servicing Report (FSR) prepared by WSP under separate cover for cistern location details.

Uncontrolled at-grade areas were modelled to ensure they were considered in the allowable release rate. The results show that the site's combined discharge rate does not exceed the allowable release rate. the long-term dewatering rate in the proposed condition will be 0.8 L/s, as such a base flow of 0.8 L/s has been added to the SWM Cistern node in the modelling.

A summary of the modelling results is provided in Table 3.3. Full HydroCAD modelling output is provided in **Appendix B**.

Table 3.3 Summary of Modelling Results

RETURN PERIOD (YEARS)	UTILIZED CULVERT STORAGE (m^3)	PEAK WATER ELEVATION IN CULVERT* (m)	POST-DEVELOPMENT CULVERT DISCHARGE RATE (L/s)	UNCONTROLLED AREA DISCHARGE RATE (L/s)	POST-DEVELOPMENT TOTAL DISCHARGE RATE (L/s)	TARGET RELEASE RATE (L/s)
2	46.2	0.420	26.0	6.5	28.8	**99.9**
5	68.4	0.621	32.5	8.7	35.6	
10	101.4	0.922	40.3	10.7	43.0	
25	152.3	1.384	50.0	13.8	53.5	
50	184.3	1.675	55.2	16.5	59.5	
100	210.2	1.911	59.1	18.9	64.1	

** Depth is from the internal cistern bottom.*

The modelling results demonstrate that the post-development peak flow rates for all events up to the 100-year storm are lower than the target release rate established in accordance with the City of Mississauga's Development Requirements Manual. The maximum required storage volume to control the 100-year post-development runoff is 210.2 m^3. Note that the sump volume is collected in the re-use tank in P1 level which is assumed to be full at the start of each rainfall event in modelling.

The rainfall intensity and storm duration resulting in the site's peak discharge rate has been iteratively determined at t_d = 53 minutes (for the 100-year event).

4 CONCLUSIONS

A stormwater management plan has been prepared to support the rezoning application for the proposed redevelopment of 1785 Bloor Street in the City of Mississauga. The key points are summarized below.

RUNOFF VOLUME REDUCTION

The site is required to retain 5 mm of runoff from each rainfall event to be for reuse on site. Water balance will be addressed through a 61.52 m^3 sump volume (equivalent to the post-development 5 mm runoff volume) within the proposed reuse cistern.

WATER QUALITY

Stormwater runoff from proposed impervious roof areas is considered clean and expected to leave the site effectively unchanged in terms of water quality. The 80% TSS removal of the runoff produced by the at-grade driveway surfaces on the site will be achieved through installation of a filter-based oil and grit separator. The recommended model is a Stormceptor EFO4.

EROSION CONTROL

The 5 mm on-site retention for storage used for water balance will meet The City of Mississauga's minimum 5 mm retention requirement to satisfy erosion control.

WATER QUANTITY

Runoff from all areas of the site will be directed to a 236.5 m^3 DECAST OPSS Box Culvert. Post-development flows have been controlled to below 99.9 L/s in compliance with the target release rate to the municipal storm sewer system.

The report has demonstrated that the proposed stormwater management strategy will address stormwater management related impacts from this project in adherence with The City of Mississauga's Development Requirements Manual (2016).

Respectfully submitted,

WSP Canada INC

BIBLIOGRAPHY

— City of Mississauga. (2016, September). Development Requirements Manual.

— Credit Valley Conservation Authority and Toronto and Region Conservation Authority. (2010). Low Impact Development Stormwater Management Planning and Design Guideline Version 1.0, Toronto, Ontario, Final Report. Ontario, Canada.

APPENDIX

A STORMWATER MANAGEMENT CALCULATIONS

wsp	Stormwater Management Calculations	Project:	1785 Bloor St.	No.:	211-10685
	Area Takeoffs	By:	SK	Date:	2023-09-15
		Checked:	VN	Checked:	2023-09-15

Page: 1

Existing			
Land Use	**Area (m^2)**	**Runoff C**	**% Coverage**
Impervious Roof Area	4,974	0.90	41%
Soft/Pervious Landscaping	7,026	0.25	59%
At-Grade Impervious	-		
Total Site Area:	12,000	0.52	100%

Proposed							
	Land Use	**Area (m^2)**	**Runoff C, 2, 5, 10**	**Runoff C, 25**	**Runoff C, 50**	**Runoff C, 100**	**Imperviousness**
Controlled and Captured	Impervious Roof Area (Proposed Building)	2,577.9	0.90	0.99	1.00	1.00	100%
	Impervious Roof Area (Existing Building)	731.4	0.90	0.99	1.00	1.00	100%
	Soft/Pervious Landscaping	3,644.8	0.25	0.28	0.30	0.31	0%
	Controlled At Grade Impervious	3,352.8	0.90	0.99	1.00	1.00	100%
	Uncontrolled Landscaping	1,559.0	0.25	0.28	0.30	0.31	0%
	Total Site Area:	11,865.8	0.61	0.68	0.69	0.70	56%

	Project:	**1785 Bloor St.**	**No.:**	**211-10685**	
	By:	**RJ**	**Date:**	**2023-09-15**	**Page:**
	Checked:	**VN**	**Checked:**	**2023-09-15**	**2**

Subject: **Stormwater Management Calculations - Existing Site Peak Flows**

Calculation of existing runoff rate is undertaken using the Rational Method: $Q = 2.78CIA$

Where: Q = Peak flow rate (litres/second)
C = Runoff coefficient
I = Rainfall intensity (mm/hour)
A = Catchment area (hectares)

Site Area, A **1.20** hectares

Pre-Development Runoff Coefficient, C 0.52

Rainfall Intensity is calculated based on City of Mississauga Intensity-Duration-Frequency (IDF) Equations:

$$I = \frac{a}{(t+b)^C}$$

Where: I = Rainfall Intensity in mm/hr
T = Time of Concentration in minutes, use
a, b, c = Rainfall parameters used by City of Mississauga

Return Period (Years)	2	5	10	25	50	100
a	610	820	1010	1160	1300	1450
b	4.60	4.60	4.60	4.60	4.70	4.90
c	0.78	0.78	0.78	0.78	0.78	0.78
Runoff Coefficent C*	0.52	0.52	0.52	0.57	0.62	0.65
T (mins) **	15	15	15	15	15	15
T (hrs)	0.250	0.250	0.250	0.250	0.250	0.250
I (mm/hr)	59.9	80.5	99.2	113.9	127.1	140.7
Q (litres/sec)	103.8	139.5	171.8	217.1	264.4	304.7
Q (m^3/sec)	0.104	0.140	0.172	0.217	0.264	0.305

* Note that adjustment factors are applied to the runoff coefficent for larger, less frequent storms for 10 to 100 year events as per City of Mississauga Development Requirements Manual

** Note recommended minimum value for time of concentration for small sites (<2.0ha) is 15 minutes.

	Project: 1785 Bloor St.	**No.:** 211-10685		
	By: RJ	**Date:** 2023-09-15	**Page:**	
	Checked: VN	**Checked:** 2023-09-15	4	

Subject: Stormwater Management Calculations - Allowable Release Rate

Calculation of existing runoff rate is undertaken using the Rational Method: $Q = 2.78CIA$

Where: Q = Peak flow rate (litres/second)
C = Runoff c‹ 721.6783119
I = Rainfall intensity (mm/hour)
A = Catchment area (hectares)

Site Area, A **1.20** hectares

Pre-Development Runoff Coefficient, C* 0.50

This area will be controlled down to its existing 2-year release rate to improve existing conditions. The allowable flow rate will be the sum of the site's 2-year existing flow rate with a runoff coefficient of 0.5 and the existing 2-year external area flow rate.

*Section 2.01.03.03 of The City of Mississauga's Development Requirements Manual (2016) states a maximum of 0.5 may be used for the pre-development runoff coefficient.

Rainfall Intensity is calculated based on City of Mississauga Intensity-Duration-Frequency (IDF) Equations: $I = \frac{a}{(t+b)^C}$

Where: I = Rainfall Intensity in mm/hr
T = Time of Concentration in minutes, use
a, b, c = Rainfall parameters used by City of Mississauga

Return Period (Years)	2	5	10	25	50	100
a	610	820	1010	1160	1300	1450
b	4.60	4.60	4.60	4.60	4.70	4.90
c	0.78	0.78	0.78	0.78	0.78	0.78
T (mins) **	15	15	15	15	15	15
T (hrs)	0.250	0.250	0.250	0.250	0.250	0.250
I (mm/hr)	59.9	80.5	99.2	113.9	127.1	140.7
Q Site (litres/sec)	**99.9**	134.3	165.4	190.0	212.1	234.7
Q (area A) (m3/sec)	0.10	0.13	0.17	0.19	0.21	0.23

* Note that adjustment factors are applied to the runoff coefficent for larger, less frequent storms for 10 to 100 year events as per City of Mississauga Development Requirements Manual

** Note recommended minimum value for time of concentration for small sites (<2.0ha) is 15 minutes.

Through review of the CVC's guidelines, City of Mississauga's Development Requirements Manual (2016), correspondence with City Staff and through downstream analysis, it was determined that the downstream sewer capacity was the governing factor. It was decided that the release rate to the municipal storm sewer system would be limited to the 2 year pre-development release rate to provide relief to the municipal storm sewer system.

Resulting allowable release rate to municipal storm sewer system is therefore 99.9 litres/second.

Subject: **Stormwater Management Calculations - Water Balance Calculations**

In this case, best efforts on-site runoff retention will be provided such that the site retains all runoff from 5 mm storm event for rainwater reuse.

The current area measurements and land use types for the site are as follows:

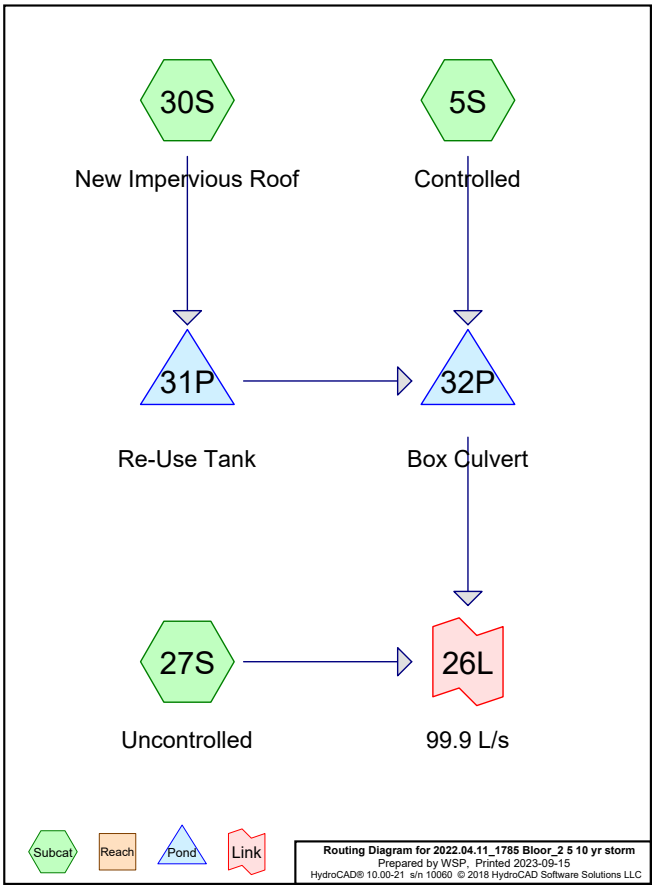
	Land Use	Area (m^2)	2,5,10 Year Runoff C	Imperviousness	CN
Controlled and Captured	Impervious Roof Area (Proposed Building)	2,578	0.90	100%	98
	Impervious Roof Area (Existing Building)	731	0.90	100%	98
	Soft/Pervious Landscaping	3,645	0.25	0%	74
	Controlled At Grade Impervious	3,353	0.90	100%	98
	Uncontrolled Landscaping	1,559	0.25	0%	74
	Total Site Area:	11,866	0.61	56%	87

Surface Type	Area (m^2)	5 mm Volume (m^3)
Impervious Roof Area (Proposed Building)	2,578	12.9
Impervious Roof Area (Existing Building)	731	3.7
Soft/Pervious Landscaping	3,645	18.2
Controlled At Grade Impervious	3,353	16.8
Uncontrolled Landscaping	1,559	7.8
Total Site Area:	**11,866**	**59.3**

Therefore, volume of runoff during a 5 mm storm event: **59.33** **m^3**

APPENDIX

B HYDROCAD MODEL RESULTS



Area Listing (selected nodes)

Area (hectares)	C	Description (subcatchment-numbers)
0.3353	0.90	At Grade Impervious (5S)
0.1559	0.25	At Grade-Pervious (27S)
0.3309	0.90	Impervious Roof (5S, 30S)
0.3645	0.25	Soft Landscaping (5S)
1.1866	**0.61**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (hectares)	Soil Group	Subcatchment Numbers
0.0000	HSG A	
0.0000	HSG B	
0.0000	HSG C	
0.0000	HSG D	
1.1866	Other	5S, 27S, 30S
1.1866		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (hectares)	HSG-B (hectares)	HSG-C (hectares)	HSG-D (hectares)	Other (hectares)	Total (hectares)	Ground Cover	Subcatchment Numbers
0.0000	0.0000	0.0000	0.0000	0.3353	0.3353	At Grade Impervious	5S
0.0000	0.0000	0.0000	0.0000	0.1559	0.1559	At Grade-Pervious	27S
0.0000	0.0000	0.0000	0.0000	0.3309	0.3309	Impervious Roof	5S, 30S
0.0000	0.0000	0.0000	0.0000	0.3645	0.3645	Soft Landscaping	5S
0.0000	**0.0000**	**0.0000**	**0.0000**	**1.1866**	**1.1866**	**TOTAL AREA**	

Time span=0.00-6.00 hrs, dt=0.01 hrs, 601 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment5S: Controlled Runoff Area=7,729.0 m² 0.00% Impervious Runoff Depth=14 mm
Tc=15.0 min C=0.59 Runoff=0.0323 m³/s 0.105 Ml

Subcatchment27S: Uncontrolled Runoff Area=1,559.0 m² 0.00% Impervious Runoff Depth=6 mm
Tc=15.0 min C=0.25 Runoff=0.0028 m³/s 0.009 Ml

Subcatchment30S: New Impervious Runoff Area=2,577.9 m² 0.00% Impervious Runoff Depth=21 mm
Tc=15.0 min C=0.90 Runoff=0.0164 m³/s 0.053 Ml

Pond 31P: Re-Use Tank Peak Elev=10.995 m Storage=0.053 Ml Inflow=0.0164 m³/s 0.053 Ml
Outflow=0.0000 m³/s 0.000 Ml

Pond 32P: Box Culvert Peak Elev=0.420 m Storage=46.2 m³ Inflow=0.0331 m³/s 0.122 Ml
Outflow=0.0260 m³/s 0.130 Ml

Link 26L: 99.9 L/s Inflow=0.0285 m³/s 0.139 Ml
Primary=0.0285 m³/s 0.139 Ml

Total Runoff Area = 1.1866 ha Runoff Volume = 0.167 Ml Average Runoff Depth = 14 mm
100.00% Pervious = 1.1866 ha 0.00% Impervious = 0.0000 ha

Summary for Subcatchment 5S: Controlled

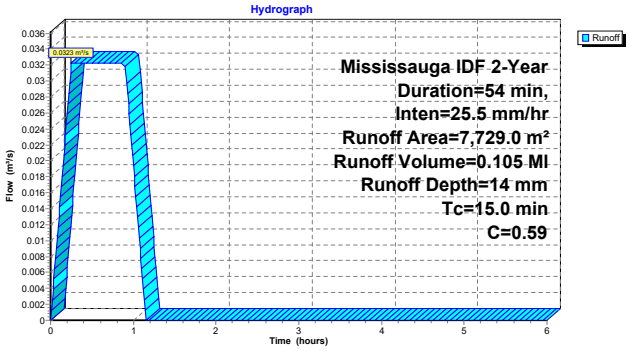
Runoff = 0.0323 m³/s @ 0.25 hrs, Volume= 0.105 Ml, Depth= 14 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Mississauga IDF 2-Year Duration=54 min, Inten=25.5 mm/hr

Area (m²)	C	Description
731.4	0.90	Impervious Roof
3,644.8	0.25	Soft Landscaping
3,352.8	0.90	At Grade Impervious
7,729.0	0.59	Weighted Average
7,729.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
15.0					**Direct Entry,**

Subcatchment 5S: Controlled



Summary for Subcatchment 27S: Uncontrolled

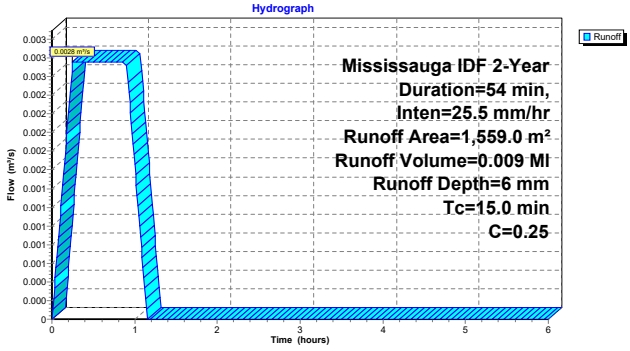
Runoff = 0.0028 m³/s @ 0.25 hrs, Volume= 0.009 Ml, Depth= 6 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Mississauga IDF 2-Year Duration=54 min, Inten=25.5 mm/hr

Area (m²)	C	Description
1,559.0	0.25	At Grade-Pervious
1,559.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
15.0					**Direct Entry,**

Subcatchment 27S: Uncontrolled



Summary for Subcatchment 30S: New Impervious Roof

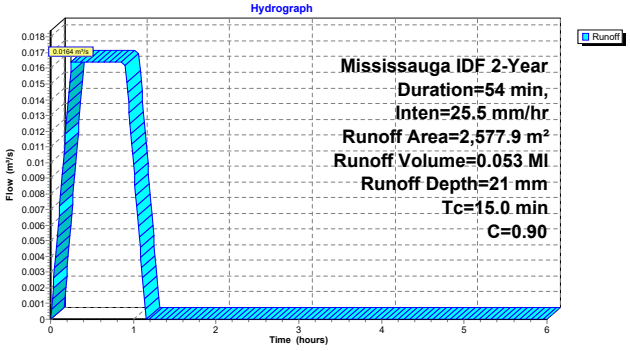
Runoff = 0.0164 m³/s @ 0.25 hrs, Volume= 0.053 Ml, Depth= 21 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Mississauga IDF 2-Year Duration=54 min, Inten=25.5 mm/hr

Area (m²)	C	Description
2,577.9	0.90	Impervious Roof
2,577.9		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
15.0					**Direct Entry,**

Subcatchment 30S: New Impervious Roof



Summary for Pond 31P: Re-Use Tank

Inflow Area = 0.2578 ha, 0.00% Impervious, Inflow Depth = 21 mm for 2-Year event
Inflow = 0.0164 m³/s @ 0.25 hrs, Volume= 0.053 Ml
Outflow = 0.0000 m³/s @ 0.00 hrs, Volume= 0.000 Ml, Atten= 100%, Lag= 0.0 min
Primary = 0.0000 m³/s @ 0.00 hrs, Volume= 0.000 Ml

Routing by Stor-Ind method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Starting Elev= 0.800 m Surf.Area= 0.0000 ha Storage= 0.000 Ml
Peak Elev= 10.995 m @ 1.15 hrs Surf.Area= 0.0054 ha Storage= 0.053 Ml

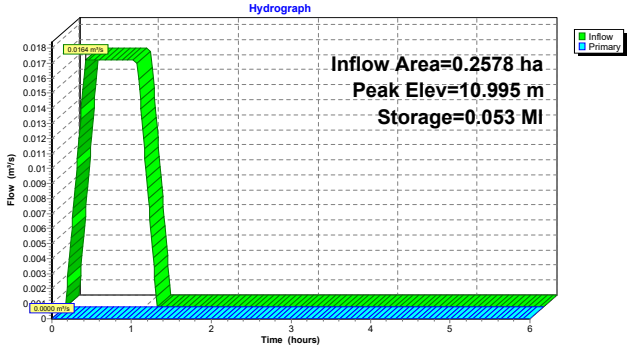
Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	10.000 m	0.080 Ml	**53.50 mW x 1.00 mL x 1.50 mH Prismatoid**

Device	Routing	Invert	Outlet Devices
#1	Primary	11.150 m	**200 mm Vert. Orifice/Grate** C= 0.800

Primary OutFlow Max=0.0000 m³/s @ 0.00 hrs HW=10.000 m (Free Discharge)
1=Orifice/Grate (Controls 0.0000 m³/s)

Pond 31P: Re-Use Tank



Summary for Pond 32P: Box Culvert

Inflow Area = 1.0307 ha, 0.00% Impervious, Inflow Depth > 12 mm for 2-Year event
Inflow = 0.0331 m³/s @ 0.25 hrs, Volume= 0.122 Ml, Incl. 0.0008 m³/s Base Flow
Outflow = 0.0260 m³/s @ 0.96 hrs, Volume= 0.130 Ml, Atten= 21%, Lag= 42.3 min
Primary = 0.0260 m³/s @ 0.96 hrs, Volume= 0.130 Ml

Routing by Stor-Ind method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Starting Elev= 0.100 m Surf.Area= 110.0 m² Storage= 11.0 m³
Peak Elev= 0.420 m @ 0.96 hrs Surf.Area= 110.0 m² Storage= 46.2 m³ (35.2 m³ above start)

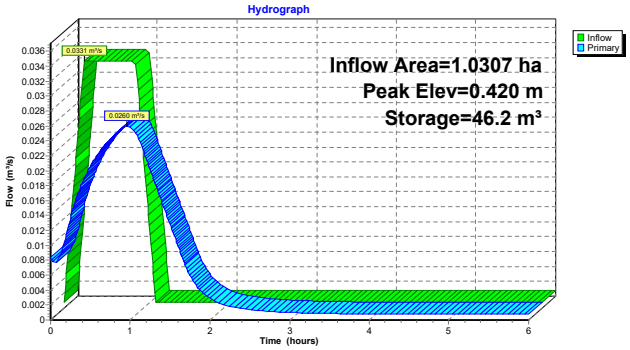
Plug-Flow detention time= 29.6 min calculated for 0.119 Ml (98% of inflow)
Center-of-Mass det. time= 17.5 min (72.7 - 55.2)

Volume	Invert	Avail.Storage	Storage Description
#1	0.000 m	236.5 m³	**2,750 mm W x 2,150 mm H Box Pipe Storage** L= 40.00 m

Device	Routing	Invert	Outlet Devices
#1	Primary	0.000 m	**125 mm Vert. Orifice/Grate** C= 0.800

Primary OutFlow Max=0.0260 m³/s @ 0.96 hrs HW=0.420 m (Free Discharge)
1=Orifice/Grate (Orifice Controls 0.0260 m³/s @ 2.12 m/s)

Pond 32P: Box Culvert

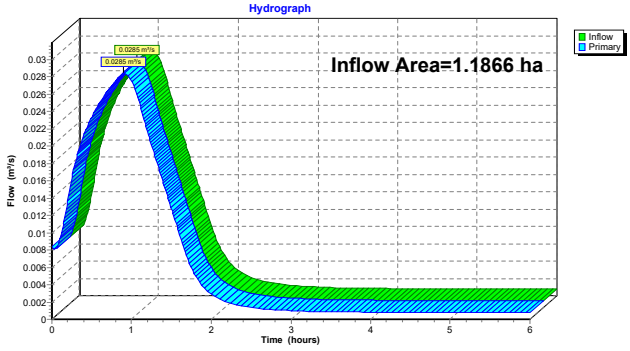


Summary for Link 26L: 99.9 L/s

Inflow Area = 1.1866 ha, 0.00% Impervious, Inflow Depth > 12 mm for 2-Year event
Inflow = 0.0285 m³/s @ 0.90 hrs, Volume= 0.139 Ml
Primary = 0.0285 m³/s @ 0.90 hrs, Volume= 0.139 Ml, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs

Link 26L: 99.9 L/s



Time span=0.00-6.00 hrs, dt=0.01 hrs, 601 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment5S: Controlled Runoff Area=7,729.0 m² 0.00% Impervious Runoff Depth=18 mm
Tc=15.0 min C=0.59 Runoff=0.0434 m³/s 0.141 Ml

Subcatchment27S: Uncontrolled Runoff Area=1,559.0 m² 0.00% Impervious Runoff Depth=8 mm
Tc=15.0 min C=0.25 Runoff=0.0037 m³/s 0.012 Ml

Subcatchment30S: New Impervious Runoff Area=2,577.9 m² 0.00% Impervious Runoff Depth=28 mm
Tc=15.0 min C=0.90 Runoff=0.0221 m³/s 0.072 Ml

Pond 31P: Re-Use Tank Peak Elev=11.241 m Storage=0.066 Ml Inflow=0.0221 m³/s 0.072 Ml
Outflow=0.0105 m³/s 0.010 Ml

Pond 32P: Box Culvert Peak Elev=0.621 m Storage=68.4 m³ Inflow=0.0442 m³/s 0.168 Ml
Outflow=0.0325 m³/s 0.176 Ml

Link 26L: 99.9 L/s Inflow=0.0354 m³/s 0.188 Ml
Primary=0.0354 m³/s 0.188 Ml

Total Runoff Area = 1.1866 ha Runoff Volume = 0.224 Ml Average Runoff Depth = 19 mm
100.00% Pervious = 1.1866 ha 0.00% Impervious = 0.0000 ha

Summary for Subcatchment 5S: Controlled

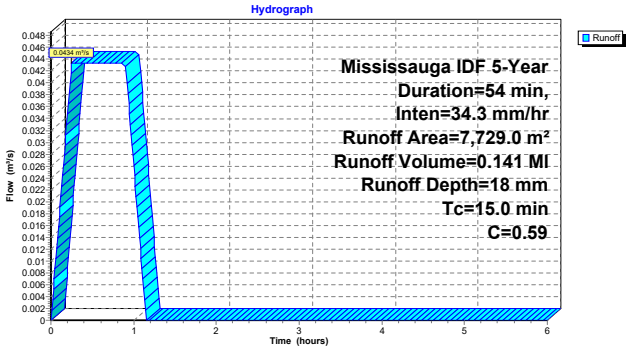
Runoff = 0.0434 m³/s @ 0.25 hrs, Volume= 0.141 Ml, Depth= 18 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Mississauga IDF 5-Year Duration=54 min, Inten=34.3 mm/hr

Area (m²)	C	Description
731.4	0.90	Impervious Roof
3,644.8	0.25	Soft Landscaping
3,352.8	0.90	At Grade Impervious
7,729.0	0.59	Weighted Average
7,729.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
15.0					**Direct Entry,**

Subcatchment 5S: Controlled



Summary for Subcatchment 27S: Uncontrolled

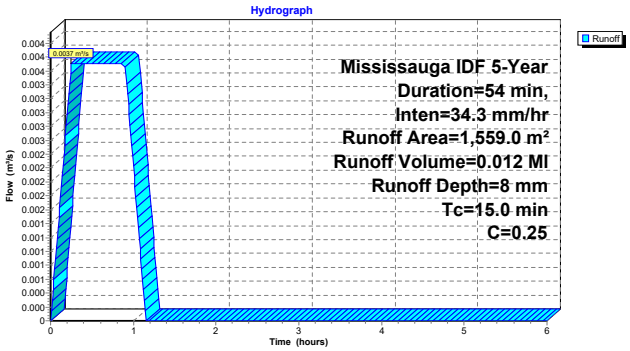
Runoff = 0.0037 m³/s @ 0.25 hrs, Volume= 0.012 Ml, Depth= 8 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Mississauga IDF 5-Year Duration=54 min, Inten=34.3 mm/hr

Area (m²)	C	Description
1,559.0	0.25	At Grade-Pervious
1,559.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
15.0					**Direct Entry,**

Subcatchment 27S: Uncontrolled



Summary for Subcatchment 30S: New Impervious Roof

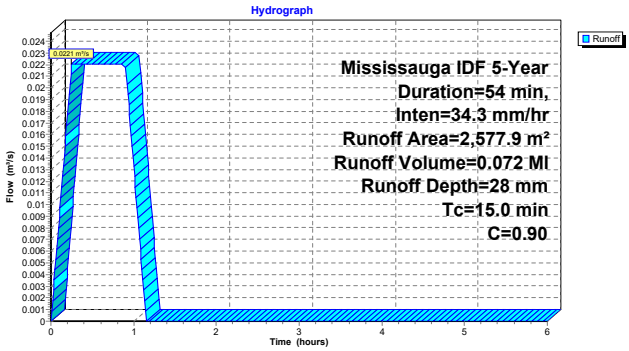
Runoff = 0.0221 m³/s @ 0.25 hrs, Volume= 0.072 Ml, Depth= 28 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Mississauga IDF 5-Year Duration=54 min, Inten=34.3 mm/hr

Area (m²)	C	Description
2,577.9	0.90	Impervious Roof
2,577.9		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
15.0					**Direct Entry,**

Subcatchment 30S: New Impervious Roof



Summary for Pond 31P: Re-Use Tank

Inflow Area = 0.2578 ha, 0.00% Impervious, Inflow Depth = 28 mm for 5-Year event
Inflow = 0.0221 m³/s @ 0.25 hrs, Volume= 0.072 Ml
Outflow = 0.0105 m³/s @ 1.03 hrs, Volume= 0.010 Ml, Atten= 53%, Lag= 46.9 min
Primary = 0.0105 m³/s @ 1.03 hrs, Volume= 0.010 Ml

Routing by Stor-Ind method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Starting Elev= 0.800 m Surf.Area= 0.0000 ha Storage= 0.000 Ml
Peak Elev= 11.241 m @ 1.03 hrs Surf.Area= 0.0054 ha Storage= 0.066 Ml

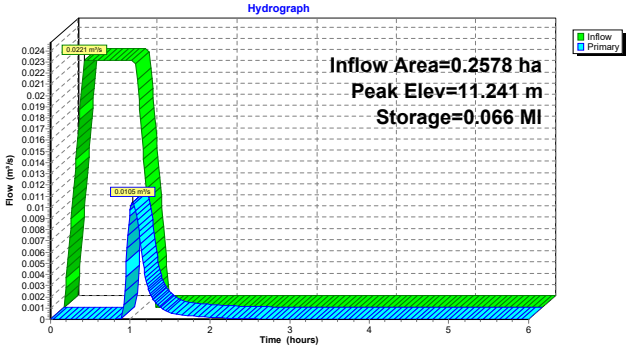
Plug-Flow detention time= 62.6 min calculated for 0.010 Ml (14% of inflow)
Center-of-Mass det. time= 38.6 min (73.1 - 34.5)

Volume	Invert	Avail.Storage	Storage Description
#1	10.000 m	0.080 Ml	**53.50 mW x 1.00 mL x 1.50 mH Prismatoid**

Device	Routing	Invert	Outlet Devices
#1	Primary	11.150 m	**200 mm Vert. Orifice/Grate** C= 0.800

Primary OutFlow Max=0.0104 m³/s @ 1.03 hrs HW=11.241 m (Free Discharge)
↑**1=Orifice/Grate** (Orifice Controls 0.0104 m³/s @ 0.75 m/s)

Pond 31P: Re-Use Tank



Summary for Pond 32P: Box Culvert

Inflow Area = 1.0307 ha, 0.00% Impervious, Inflow Depth > 16 mm for 5-Year event
Inflow = 0.0442 m³/s @ 0.90 hrs, Volume= 0.168 Ml, Incl. 0.0008 m³/s Base Flow
Outflow = 0.0325 m³/s @ 1.03 hrs, Volume= 0.176 Ml, Atten= 26%, Lag= 7.6 min
Primary = 0.0325 m³/s @ 1.03 hrs, Volume= 0.176 Ml

Routing by Stor-Ind method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Starting Elev= 0.100 m Surf.Area= 110.0 m² Storage= 11.0 m³
Peak Elev= 0.621 m @ 1.03 hrs Surf.Area= 110.0 m² Storage= 68.4 m³ (57.4 m³ above start)

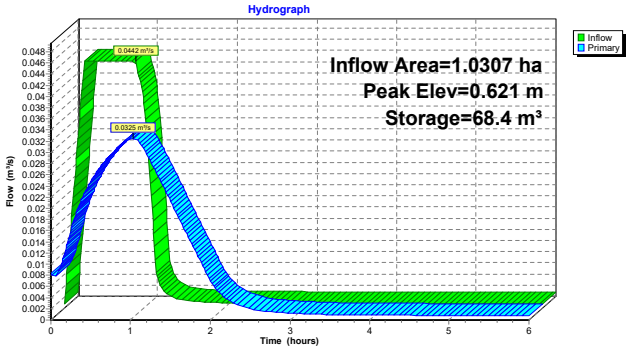
Plug-Flow detention time= 31.6 min calculated for 0.165 Ml (98% of inflow)
Center-of-Mass det. time= 22.7 min (74.5 - 51.8)

Volume	Invert	Avail.Storage	Storage Description
#1	0.000 m	236.5 m³	**2,750 mm W x 2,150 mm H Box Pipe Storage** L= 40.00 m

Device	Routing	Invert	Outlet Devices
#1	Primary	0.000 m	**125 mm Vert. Orifice/Grate** C= 0.800

Primary OutFlow Max=0.0325 m³/s @ 1.03 hrs HW=0.621 m (Free Discharge)
1=Orifice/Grate (Orifice Controls 0.0325 m³/s @ 2.65 m/s)

Pond 32P: Box Culvert

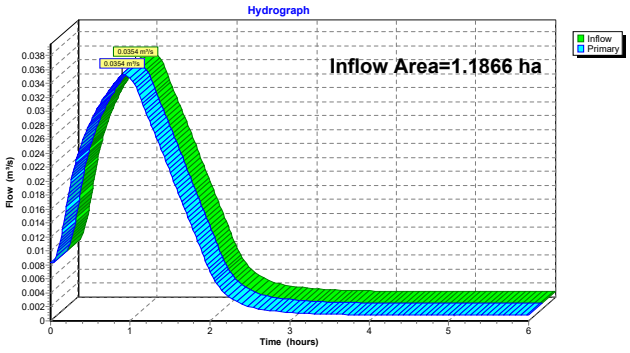


Summary for Link 26L: 99.9 L/s

Inflow Area = 1.1866 ha, 0.00% Impervious, Inflow Depth > 16 mm for 5-Year event
Inflow = 0.0354 m³/s @ 0.90 hrs, Volume= 0.188 Ml
Primary = 0.0354 m³/s @ 0.90 hrs, Volume= 0.188 Ml, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs

Link 26L: 99.9 L/s



Time span=0.00-6.00 hrs, dt=0.01 hrs, 601 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment5S: Controlled Runoff Area=7,729.0 m² 0.00% Impervious Runoff Depth=22 mm
Tc=15.0 min C=0.59 Runoff=0.0535 m³/s 0.173 Ml

Subcatchment27S: Uncontrolled Runoff Area=1,559.0 m² 0.00% Impervious Runoff Depth=9 mm
Tc=15.0 min C=0.25 Runoff=0.0046 m³/s 0.015 Ml

Subcatchment30S: New Impervious Runoff Area=2,577.9 m² 0.00% Impervious Runoff Depth=34 mm
Tc=15.0 min C=0.90 Runoff=0.0272 m³/s 0.088 Ml

Pond 31P: Re-Use Tank Peak Elev=11.298 m Storage=0.069 Ml Inflow=0.0272 m³/s 0.088 Ml
Outflow=0.0241 m³/s 0.027 Ml

Pond 32P: Box Culvert Peak Elev=0.922 m Storage=101.4 m³ Inflow=0.0775 m³/s 0.217 Ml
Outflow=0.0403 m³/s 0.225 Ml

Link 26L: 99.9 L/s Inflow=0.0430 m³/s 0.240 Ml
Primary=0.0430 m³/s 0.240 Ml

Total Runoff Area = 1.1866 ha Runoff Volume = 0.276 Ml Average Runoff Depth = 23 mm
100.00% Pervious = 1.1866 ha 0.00% Impervious = 0.0000 ha

Summary for Subcatchment 5S: Controlled

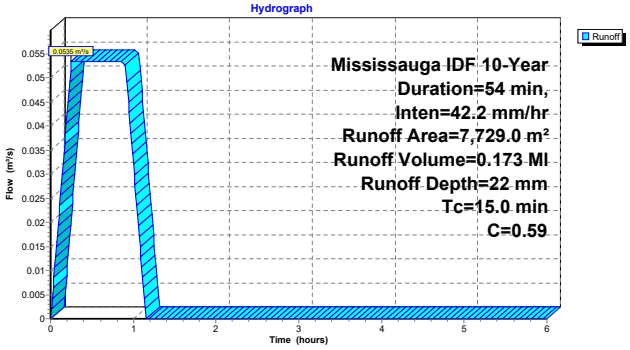
Runoff = 0.0535 m³/s @ 0.25 hrs, Volume= 0.173 Ml, Depth= 22 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Mississauga IDF 10-Year Duration=54 min, Inten=42.2 mm/hr

Area (m²)	C	Description
731.4	0.90	Impervious Roof
3,644.8	0.25	Soft Landscaping
3,352.8	0.90	At Grade Impervious
7,729.0	0.59	Weighted Average
7,729.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
15.0					**Direct Entry,**

Subcatchment 5S: Controlled



Summary for Subcatchment 27S: Uncontrolled

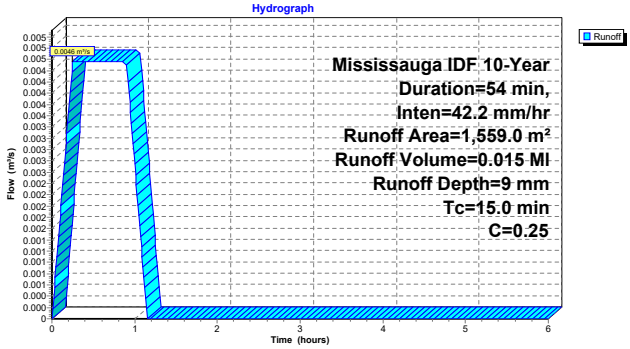
Runoff = 0.0046 m³/s @ 0.25 hrs, Volume= 0.015 Ml, Depth= 9 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Mississauga IDF 10-Year Duration=54 min, Inten=42.2 mm/hr

Area (m²)	C	Description
1,559.0	0.25	At Grade-Pervious
1,559.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
15.0					**Direct Entry,**

Subcatchment 27S: Uncontrolled



Summary for Subcatchment 30S: New Impervious Roof

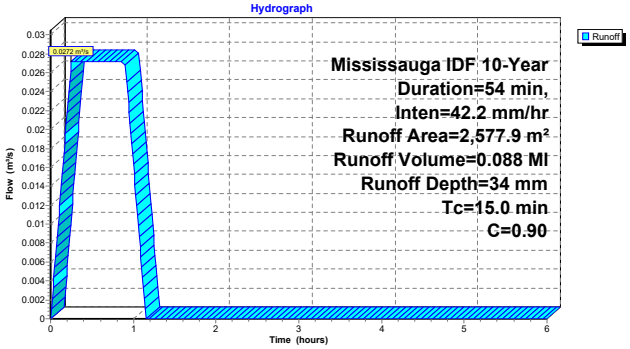
Runoff = 0.0272 m³/s @ 0.25 hrs, Volume= 0.088 Ml, Depth= 34 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Mississauga IDF 10-Year Duration=54 min, Inten=42.2 mm/hr

Area (m²)	C	Description
2,577.9	0.90	Impervious Roof
2,577.9		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
15.0					**Direct Entry,**

Subcatchment 30S: New Impervious Roof



Summary for Pond 31P: Re-Use Tank

Inflow Area = 0.2578 ha, 0.00% Impervious, Inflow Depth = 34 mm for 10-Year event
Inflow = 0.0272 m³/s @ 0.25 hrs, Volume= 0.088 Ml
Outflow = 0.0241 m³/s @ 0.93 hrs, Volume= 0.027 Ml, Atten= 11%, Lag= 40.7 min
Primary = 0.0241 m³/s @ 0.93 hrs, Volume= 0.027 Ml

Routing by Stor-Ind method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Starting Elev= 0.800 m Surf.Area= 0.0000 ha Storage= 0.000 Ml
Peak Elev= 11.298 m @ 0.93 hrs Surf.Area= 0.0054 ha Storage= 0.069 Ml

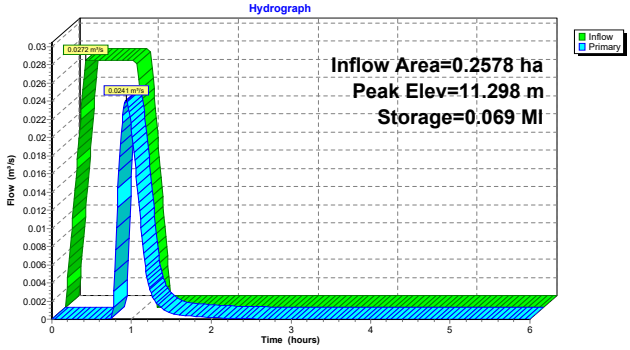
Plug-Flow detention time= 47.1 min calculated for 0.027 Ml (30% of inflow)
Center-of-Mass det. time= 28.1 min (62.6 - 34.5)

Volume	Invert	Avail.Storage	Storage Description
#1	10.000 m	0.080 Ml	**53.50 mW x 1.00 mL x 1.50 mH Prismatoid**

Device	Routing	Invert	Outlet Devices
#1	Primary	11.150 m	**200 mm Vert. Orifice/Grate** C= 0.800

Primary OutFlow Max=0.0241 m³/s @ 0.93 hrs HW=11.298 m (Free Discharge)
↑**1=Orifice/Grate** (Orifice Controls 0.0241 m³/s @ 0.96 m/s)

Pond 31P: Re-Use Tank



Summary for Pond 32P: Box Culvert

Inflow Area = 1.0307 ha, 0.00% Impervious, Inflow Depth > 21 mm for 10-Year event
Inflow = 0.0775 m³/s @ 0.90 hrs, Volume= 0.217 Ml, Incl. 0.0008 m³/s Base Flow
Outflow = 0.0403 m³/s @ 1.04 hrs, Volume= 0.225 Ml, Atten= 48%, Lag= 8.8 min
Primary = 0.0403 m³/s @ 1.04 hrs, Volume= 0.225 Ml

Routing by Stor-Ind method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Starting Elev= 0.100 m Surf.Area= 110.0 m² Storage= 11.0 m³
Peak Elev= 0.922 m @ 1.04 hrs Surf.Area= 110.0 m² Storage= 101.4 m³ (90.4 m³ above start)

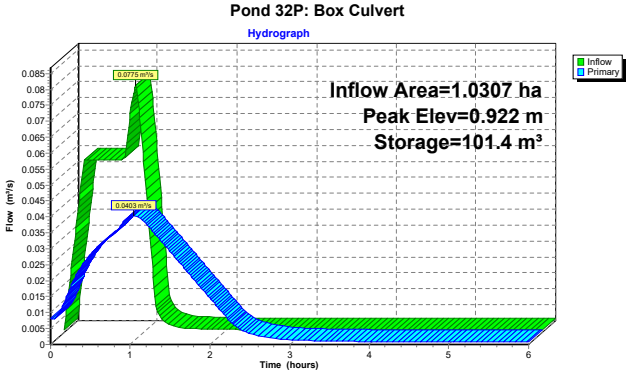
Plug-Flow detention time= 34.7 min calculated for 0.214 Ml (99% of inflow)
Center-of-Mass det. time= 27.6 min (77.2 - 49.5)

Volume	Invert	Avail.Storage	Storage Description
#1	0.000 m	236.5 m³	**2,750 mm W x 2,150 mm H Box Pipe Storage** L= 40.00 m

Device	Routing	Invert	Outlet Devices
#1	Primary	0.000 m	**125 mm Vert. Orifice/Grate** C= 0.800

Primary OutFlow Max=0.0403 m³/s @ 1.04 hrs HW=0.922 m (Free Discharge)
↑**1=Orifice/Grate** (Orifice Controls 0.0403 m³/s @ 3.29 m/s)

Pond 32P: Box Culvert

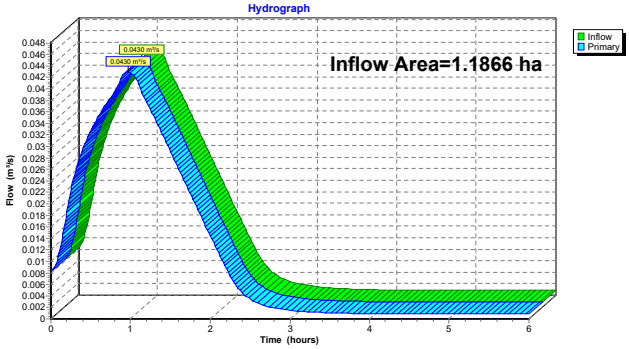


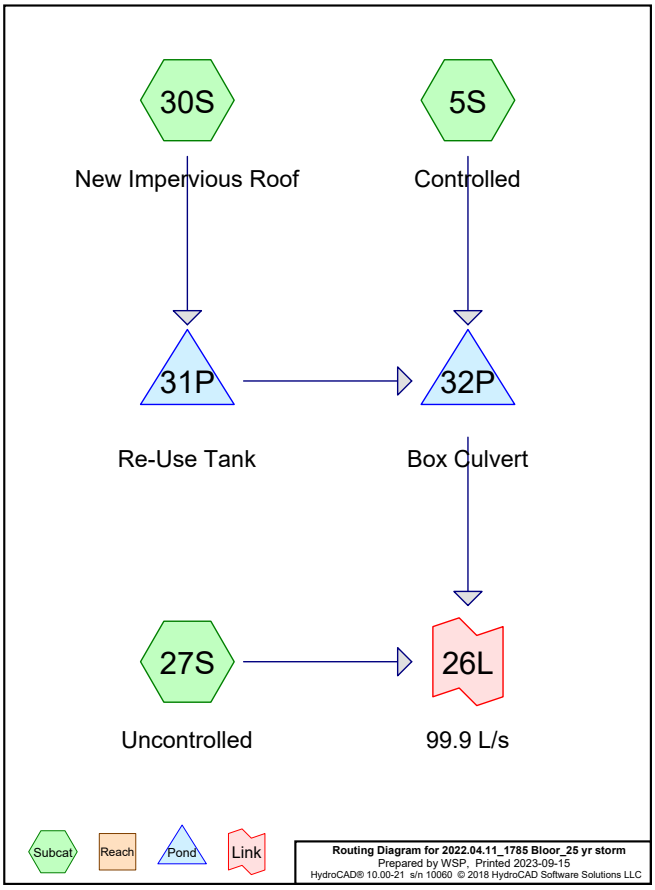
Summary for Link 26L: 99.9 L/s

Inflow Area = 1.1866 ha, 0.00% Impervious, Inflow Depth > 20 mm for 10-Year event
Inflow = 0.0430 m³/s @ 0.97 hrs, Volume= 0.240 Ml
Primary = 0.0430 m³/s @ 0.97 hrs, Volume= 0.240 Ml, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs

Link 26L: 99.9 L/s





Area Listing (selected nodes)

Area (hectares)	C	Description (subcatchment-numbers)
0.3353	0.99	At Grade Impervious / Walkway (5S)
0.1559	0.28	At Grade-Impervious/Driveway (27S)
0.2578	0.99	Impervious At-Grade (30S)
0.0731	0.99	Impervious Roof (5S)
0.3645	0.28	Soft Landscaping (5S)
1.1866	**0.68**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (hectares)	Soil Group	Subcatchment Numbers
0.0000	HSG A	
0.0000	HSG B	
0.0000	HSG C	
0.0000	HSG D	
1.1866	Other	5S, 27S, 30S
1.1866		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (hectares)	HSG-B (hectares)	HSG-C (hectares)	HSG-D (hectares)	Other (hectares)	Total (hectares)	Ground Cover	Subcatc Number
0.0000	0.0000	0.0000	0.0000	0.3353	0.3353	At Grade Impervious / Walkway	
0.0000	0.0000	0.0000	0.0000	0.1559	0.1559	At Grade-Impervious/Driveway	
0.0000	0.0000	0.0000	0.0000	0.2578	0.2578	Impervious At-Grade	
0.0000	0.0000	0.0000	0.0000	0.0731	0.0731	Impervious Roof	
0.0000	0.0000	0.0000	0.0000	0.3645	0.3645	Soft Landscaping	
0.0000	**0.0000**	**0.0000**	**0.0000**	**1.1866**	**1.1866**	**TOTAL AREA**	

Time span=0.00-6.00 hrs, dt=0.01 hrs, 601 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment5S: Controlled Runoff Area=7,729.0 m² 52.84% Impervious Runoff Depth=28 mm
Tc=15.0 min C=0.66 Runoff=0.0716 m³/s 0.219 Ml

Subcatchment27S: Uncontrolled Runoff Area=1,559.0 m² 0.00% Impervious Runoff Depth=12 mm
Tc=15.0 min C=0.28 Runoff=0.0061 m³/s 0.019 Ml

Subcatchment30S: New Impervious Runoff Area=2,577.9 m² 100.00% Impervious Runoff Depth=42 mm
Tc=15.0 min C=0.99 Runoff=0.0358 m³/s 0.110 Ml

Pond 31P: Re-Use Tank Peak Elev=11.346 m Storage=0.072 Ml Inflow=0.0358 m³/s 0.110 Ml
Outflow=0.0345 m³/s 0.048 Ml

Pond 32P: Box Culvert Peak Elev=1.384 m Storage=152.3 m³ Inflow=0.1071 m³/s 0.284 Ml
Outflow=0.0500 m³/s 0.293 Ml

Link 26L: 99.9 L/s Inflow=0.0535 m³/s 0.311 Ml
Primary=0.0535 m³/s 0.311 Ml

Total Runoff Area = 1.1866 ha Runoff Volume = 0.347 Ml Average Runoff Depth = 29 mm
43.86% Pervious = 0.5204 ha 56.14% Impervious = 0.6662 ha

Summary for Subcatchment 5S: Controlled

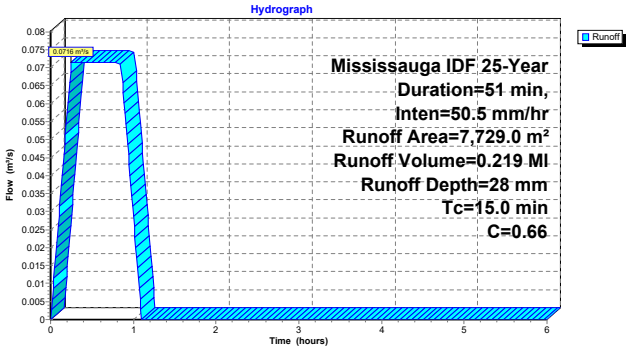
Runoff = 0.0716 m³/s @ 0.25 hrs, Volume= 0.219 Ml, Depth= 28 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Mississauga IDF 25-Year Duration=51 min, Inten=50.5 mm/hr

Area (m²)	C	Description
731.4	0.99	Impervious Roof
3,644.8	0.28	Soft Landscaping
3,352.8	0.99	At Grade Impervious / Walkway
7,729.0	0.66	Weighted Average
3,644.8		47.16% Pervious Area
4,084.2		52.84% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
15.0					Direct Entry,

Subcatchment 5S: Controlled



Summary for Subcatchment 27S: Uncontrolled

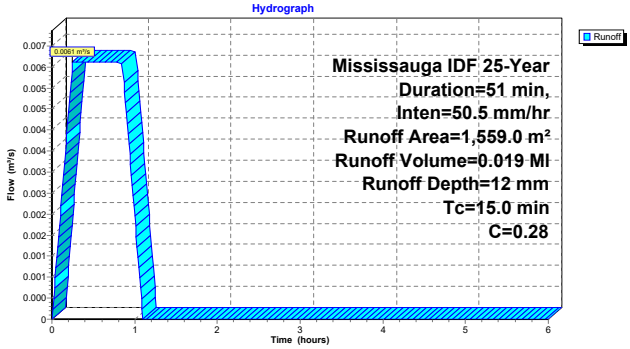
Runoff = 0.0061 m³/s @ 0.25 hrs, Volume= 0.019 Ml, Depth= 12 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Mississauga IDF 25-Year Duration=51 min, Inten=50.5 mm/hr

Area (m²)	C	Description
1,559.0	0.28	At Grade-Impervious/Driveway
1,559.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
15.0					Direct Entry,

Subcatchment 27S: Uncontrolled



Summary for Subcatchment 30S: New Impervious Roof

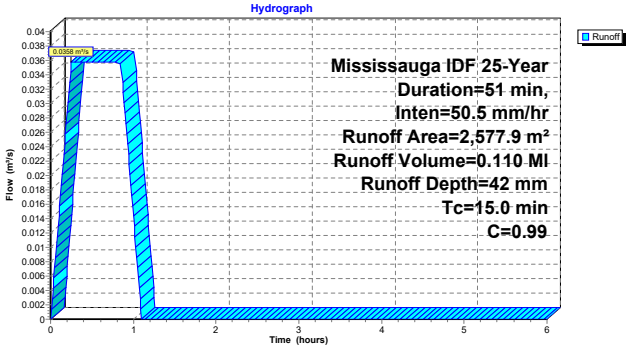
Runoff = 0.0358 m³/s @ 0.25 hrs, Volume= 0.110 Ml, Depth= 42 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Mississauga IDF 25-Year Duration=51 min, Inten=50.5 mm/hr

Area (m²)	C	Description
2,577.9	0.99	Impervious At-Grade
2,577.9		100.00% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
15.0					Direct Entry,

Subcatchment 30S: New Impervious Roof



Summary for Pond 31P: Re-Use Tank

Inflow Area = 0.2578 ha,100.00% Impervious, Inflow Depth = 42 mm for 25-Year event
Inflow = 0.0358 m³/s @ 0.25 hrs, Volume= 0.110 Ml
Outflow = 0.0345 m³/s @ 0.86 hrs, Volume= 0.048 Ml, Atten= 4%, Lag= 36.6 min
Primary = 0.0345 m³/s @ 0.86 hrs, Volume= 0.048 Ml

Routing by Stor-Ind method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Starting Elev= 0.800 m Surf.Area= 0.0000 ha Storage= 0.000 Ml
Peak Elev= 11.346 m @ 0.86 hrs Surf.Area= 0.0054 ha Storage= 0.072 Ml

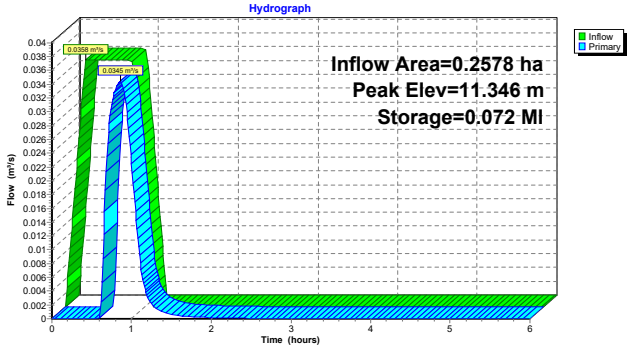
Plug-Flow detention time= 36.0 min calculated for 0.048 Ml (44% of inflow)
Center-of-Mass det. time= 21.6 min (54.6 - 33.0)

Volume	Invert	Avail.Storage	Storage Description
#1	10.000 m	0.080 Ml	**53.50 mW x 1.00 mL x 1.50 mH Prismatoid**

Device	Routing	Invert	Outlet Devices
#1	Primary	11.150 m	**200 mm Vert. Orifice/Grate** C= 0.800

Primary OutFlow Max=0.0346 m³/s @ 0.86 hrs HW=11.346 m (Free Discharge)
1=Orifice/Grate (Orifice Controls 0.0346 m³/s @ 1.11 m/s)

Pond 31P: Re-Use Tank



Summary for Pond 32P: Box Culvert

Inflow Area = 1.0307 ha, 64.64% Impervious, Inflow Depth > 28 mm for 25-Year event
Inflow = 0.1071 m³/s @ 0.85 hrs, Volume= 0.284 Ml, Incl. 0.0008 m³/s Base Flow
Outflow = 0.0500 m³/s @ 1.00 hrs, Volume= 0.293 Ml, Atten= 53%, Lag= 9.5 min
Primary = 0.0500 m³/s @ 1.00 hrs, Volume= 0.293 Ml

Routing by Stor-Ind method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Starting Elev= 0.100 m Surf.Area= 110.0 m² Storage= 11.0 m³
Peak Elev= 1.384 m @ 1.00 hrs Surf.Area= 110.0 m² Storage= 152.3 m³ (141.3 m³ above start)

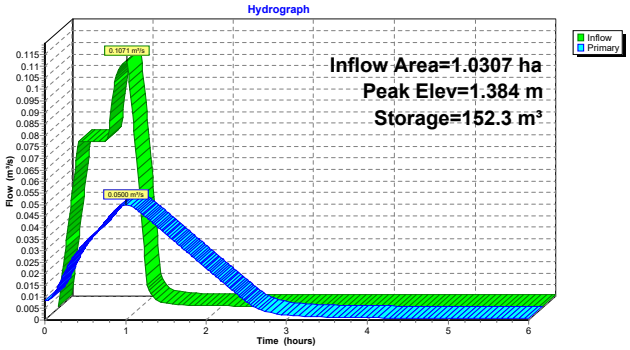
Plug-Flow detention time= 39.6 min calculated for 0.281 Ml (99% of inflow)
Center-of-Mass det. time= 34.1 min (79.7 - 45.6)

Volume	Invert	Avail.Storage	Storage Description
#1	0.000 m	236.5 m³	**2,750 mm W x 2,150 mm H Box Pipe Storage** L= 40.00 m

Device	Routing	Invert	Outlet Devices
#1	Primary	0.000 m	**125 mm Vert. Orifice/Grate** C= 0.800

Primary OutFlow Max=0.0500 m³/s @ 1.00 hrs HW=1.384 m (Free Discharge)
1=Orifice/Grate (Orifice Controls 0.0500 m³/s @ 4.07 m/s)

Pond 32P: Box Culvert

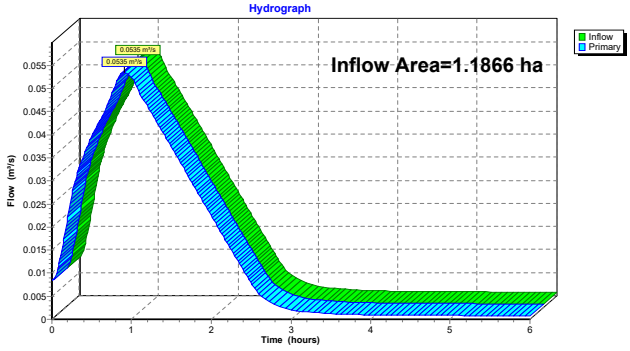


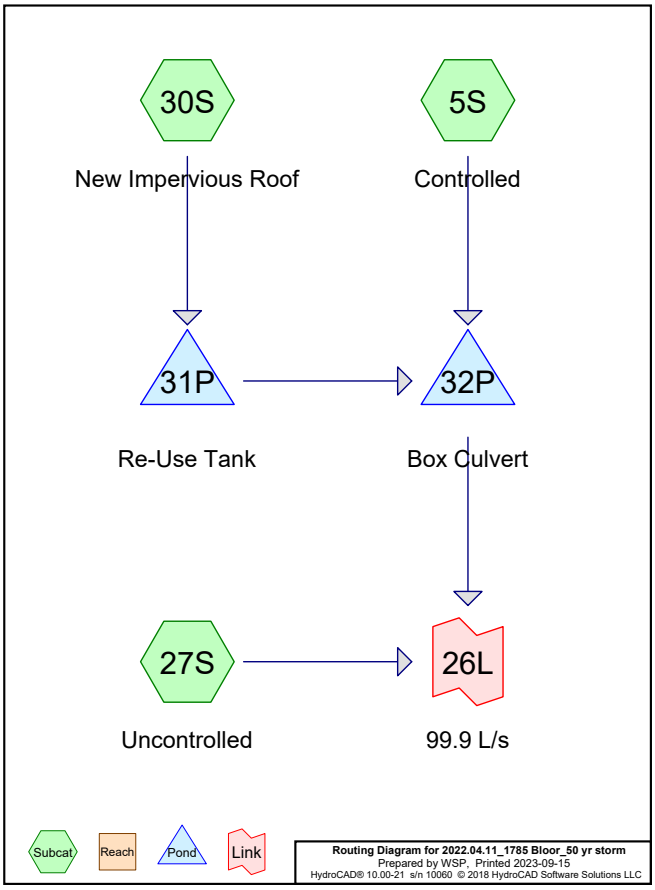
Summary for Link 26L: 99.9 L/s

Inflow Area = 1.1866 ha, 56.14% Impervious, Inflow Depth > 26 mm for 25-Year event
Inflow = 0.0535 m³/s @ 0.91 hrs, Volume= 0.311 Ml
Primary = 0.0535 m³/s @ 0.91 hrs, Volume= 0.311 Ml, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs

Link 26L: 99.9 L/s





Area Listing (selected nodes)

Area (hectares)	C	Description (subcatchment-numbers)
0.3353	1.00	At Grade Impervious / Walkway (5S)
0.1559	0.30	At Grade-Impervious/Driveway (27S)
0.2578	1.00	Impervious At-Grade (30S)
0.0731	1.00	Impervious Roof (5S)
0.3645	0.30	Soft Landscaping (5S)
1.1866	**0.69**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (hectares)	Soil Group	Subcatchment Numbers
0.0000	HSG A	
0.0000	HSG B	
0.0000	HSG C	
0.0000	HSG D	
1.1866	Other	5S, 27S, 30S
1.1866		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (hectares)	HSG-B (hectares)	HSG-C (hectares)	HSG-D (hectares)	Other (hectares)	Total (hectares)	Ground Cover	Subcatc Number
0.0000	0.0000	0.0000	0.0000	0.3353	0.3353	At Grade Impervious / Walkway	
0.0000	0.0000	0.0000	0.0000	0.1559	0.1559	At Grade-Impervious/Driveway	
0.0000	0.0000	0.0000	0.0000	0.2578	0.2578	Impervious At-Grade	
0.0000	0.0000	0.0000	0.0000	0.0731	0.0731	Impervious Roof	
0.0000	0.0000	0.0000	0.0000	0.3645	0.3645	Soft Landscaping	
0.0000	**0.0000**	**0.0000**	**0.0000**	**1.1866**	**1.1866**	**TOTAL AREA**	

Time span=0.00-6.00 hrs, dt=0.01 hrs, 601 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment5S: Controlled Runoff Area=7,729.0 m² 52.84% Impervious Runoff Depth=29 mm
Tc=15.0 min C=0.67 Runoff=0.0707 m³/s 0.225 Ml

Subcatchment27S: Uncontrolled Runoff Area=1,559.0 m² 0.00% Impervious Runoff Depth=13 mm
Tc=15.0 min C=0.30 Runoff=0.0064 m³/s 0.020 Ml

Subcatchment30S: New Impervious Runoff Area=2,577.9 m² 100.00% Impervious Runoff Depth=43 mm
Tc=15.0 min C=1.00 Runoff=0.0352 m³/s 0.112 Ml

Pond 31P: Re-Use Tank Peak Elev=11.344 m Storage=0.072 Ml Inflow=0.0352 m³/s 0.112 Ml
Outflow=0.0342 m³/s 0.050 Ml

Pond 32P: Box Culvert Peak Elev=1.413 m Storage=155.4 m³ Inflow=0.1058 m³/s 0.292 Ml
Outflow=0.0505 m³/s 0.301 Ml

Link 26L: 99.9 L/s Inflow=0.0543 m³/s 0.321 Ml
Primary=0.0543 m³/s 0.321 Ml

Total Runoff Area = 1.1866 ha Runoff Volume = 0.357 Ml Average Runoff Depth = 30 mm
43.86% Pervious = 0.5204 ha 56.14% Impervious = 0.6662 ha

Summary for Subcatchment 5S: Controlled

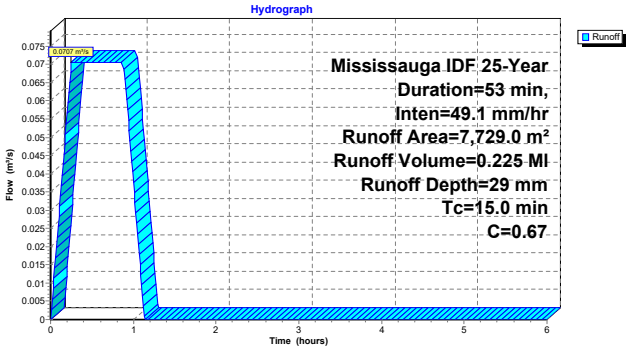
Runoff = 0.0707 m³/s @ 0.25 hrs, Volume= 0.225 Ml, Depth= 29 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Mississauga IDF 25-Year Duration=53 min, Inten=49.1 mm/hr

Area (m²)	C	Description
731.4	1.00	Impervious Roof
3,644.8	0.30	Soft Landscaping
3,352.8	1.00	At Grade Impervious / Walkway
7,729.0	0.67	Weighted Average
3,644.8		47.16% Pervious Area
4,084.2		52.84% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
15.0					Direct Entry,

Subcatchment 5S: Controlled



Summary for Subcatchment 27S: Uncontrolled

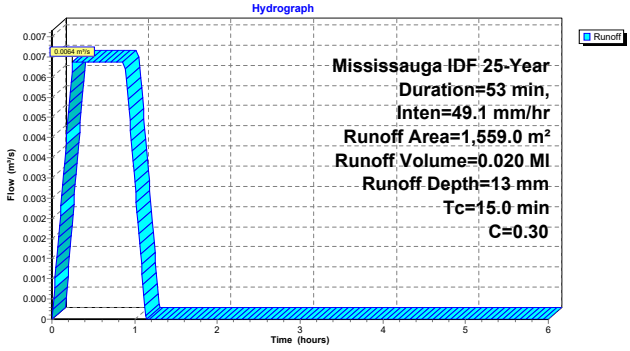
Runoff = 0.0064 m³/s @ 0.25 hrs, Volume= 0.020 Ml, Depth= 13 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Mississauga IDF 25-Year Duration=53 min, Inten=49.1 mm/hr

Area (m²)	C	Description
1,559.0	0.30	At Grade-Impervious/Driveway
1,559.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
15.0					Direct Entry,

Subcatchment 27S: Uncontrolled



Summary for Subcatchment 30S: New Impervious Roof

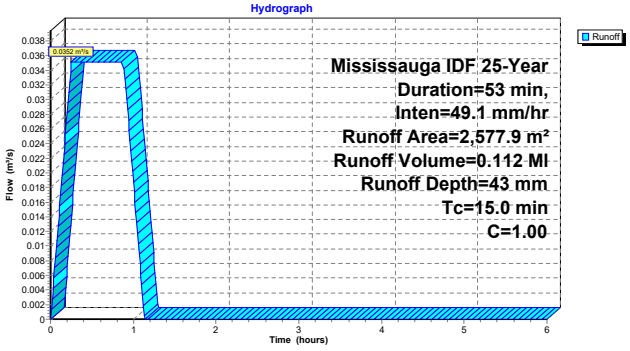
Runoff = 0.0352 m³/s @ 0.25 hrs, Volume= 0.112 Ml, Depth= 43 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Mississauga IDF 25-Year Duration=53 min, Inten=49.1 mm/hr

Area (m²)	C	Description
2,577.9	1.00	Impervious At-Grade
2,577.9		100.00% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
15.0					Direct Entry,

Subcatchment 30S: New Impervious Roof



Summary for Pond 31P: Re-Use Tank

Inflow Area = 0.2578 ha,100.00% Impervious, Inflow Depth = 43 mm for 25-Year event
Inflow = 0.0352 m³/s @ 0.25 hrs, Volume= 0.112 Ml
Outflow = 0.0342 m³/s @ 0.89 hrs, Volume= 0.050 Ml, Atten= 3%, Lag= 38.4 min
Primary = 0.0342 m³/s @ 0.89 hrs, Volume= 0.050 Ml

Routing by Stor-Ind method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Starting Elev= 0.800 m Surf.Area= 0.0000 ha Storage= 0.000 Ml
Peak Elev= 11.344 m @ 0.89 hrs Surf.Area= 0.0054 ha Storage= 0.072 Ml

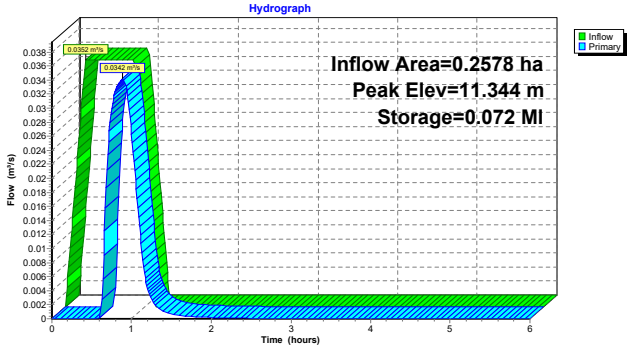
Plug-Flow detention time= 36.8 min calculated for 0.050 Ml (45% of inflow)
Center-of-Mass det. time= 21.8 min (55.8 - 34.0)

Volume	Invert	Avail.Storage	Storage Description
#1	10.000 m	0.080 Ml	**53.50 mW x 1.00 mL x 1.50 mH Prismatoid**

Device	Routing	Invert	Outlet Devices
#1	Primary	11.150 m	**200 mm Vert. Orifice/Grate** C= 0.800

Primary OutFlow Max=0.0344 m³/s @ 0.89 hrs HW=11.344 m (Free Discharge)
1=Orifice/Grate (Orifice Controls 0.0344 m³/s @ 1.10 m/s)

Pond 31P: Re-Use Tank



Summary for Pond 32P: Box Culvert

Inflow Area = 1.0307 ha, 64.64% Impervious, Inflow Depth > 28 mm for 25-Year event
Inflow = 0.1058 m³/s @ 0.88 hrs, Volume= 0.292 Ml, Incl. 0.0008 m³/s Base Flow
Outflow = 0.0505 m³/s @ 1.03 hrs, Volume= 0.301 Ml, Atten= 52%, Lag= 9.5 min
Primary = 0.0505 m³/s @ 1.03 hrs, Volume= 0.301 Ml

Routing by Stor-Ind method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Starting Elev= 0.100 m Surf.Area= 110.0 m² Storage= 11.0 m³
Peak Elev= 1.413 m @ 1.03 hrs Surf.Area= 110.0 m² Storage= 155.4 m³ (144.4 m³ above start)

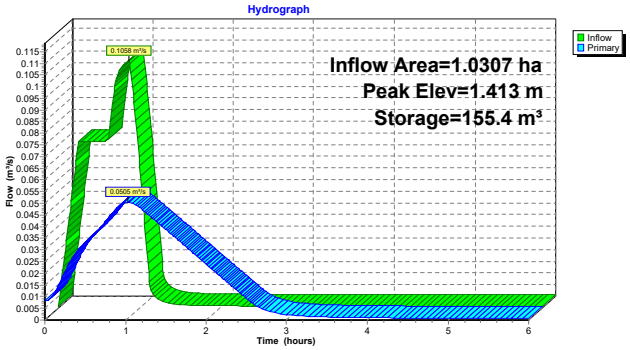
Plug-Flow detention time= 39.9 min calculated for 0.290 Ml (99% of inflow)
Center-of-Mass det. time= 34.5 min (80.9 - 46.4)

Volume	Invert	Avail.Storage	Storage Description
#1	0.000 m	236.5 m³	**2,750 mm W x 2,150 mm H Box Pipe Storage** L= 40.00 m

Device	Routing	Invert	Outlet Devices
#1	Primary	0.000 m	**125 mm Vert. Orifice/Grate** C= 0.800

Primary OutFlow Max=0.0505 m³/s @ 1.03 hrs HW=1.413 m (Free Discharge)
1=Orifice/Grate (Orifice Controls 0.0505 m³/s @ 4.12 m/s)

Pond 32P: Box Culvert

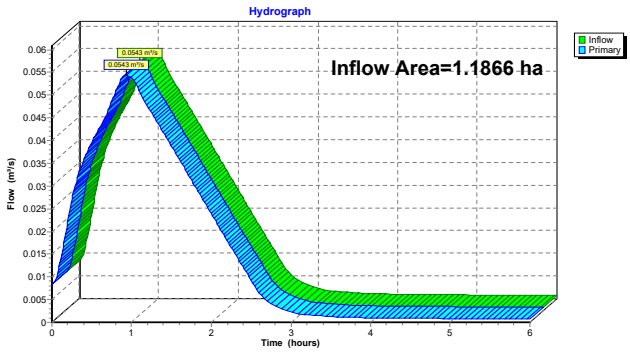


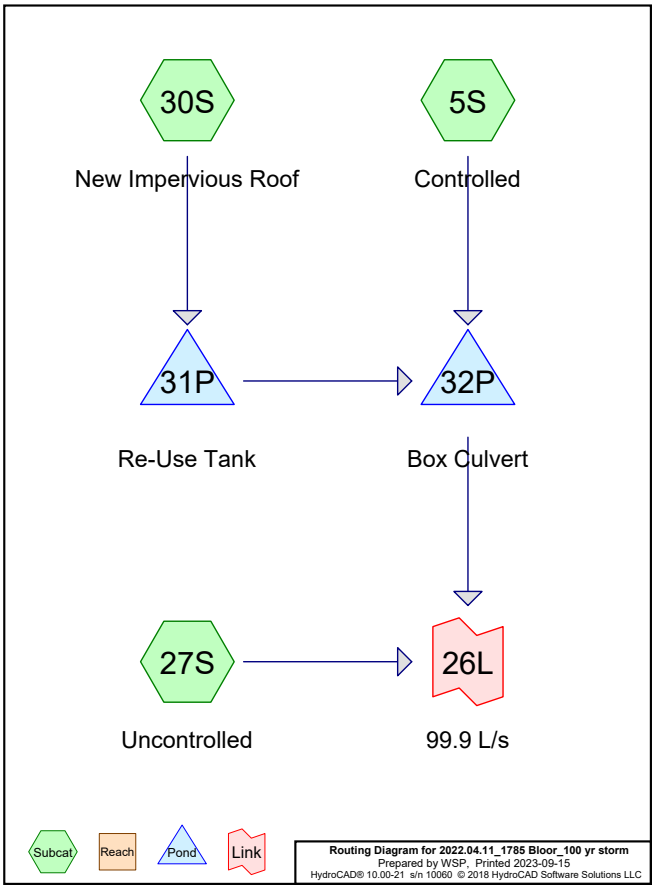
Summary for Link 26L: 99.9 L/s

Inflow Area = 1.1866 ha, 56.14% Impervious, Inflow Depth > 27 mm for 25-Year event
Inflow = 0.0543 m³/s @ 0.93 hrs, Volume= 0.321 Ml
Primary = 0.0543 m³/s @ 0.93 hrs, Volume= 0.321 Ml, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs

Link 26L: 99.9 L/s





Area Listing (selected nodes)

Area (sq-meters)	C	Description (subcatchment-numbers)
3,352.8	1.00	At Grade Impervious (5S)
1,559.0	0.31	At Grade-Pervious (27S)
2,577.9	1.00	Impervious At-Grade (30S)
731.4	1.00	Impervious Roof (5S)
3,644.8	0.31	Soft Landscaping (5S)
11,865.9	**0.70**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (sq-meters)	Soil Group	Subcatchment Numbers
0.0	HSG A	
0.0	HSG B	
0.0	HSG C	
0.0	HSG D	
11,865.9	Other	5S, 27S, 30S
11,865.9		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (sq-meters)	HSG-B (sq-meters)	HSG-C (sq-meters)	HSG-D (sq-meters)	Other (sq-meters)	Total (sq-meters)	Ground Cover	Sub Nur
0.0	0.0	0.0	0.0	3,352.8	3,352.8	At Grade Impervious	
0.0	0.0	0.0	0.0	1,559.0	1,559.0	At Grade-Pervious	
0.0	0.0	0.0	0.0	2,577.9	2,577.9	Impervious At-Grade	
0.0	0.0	0.0	0.0	731.4	731.4	Impervious Roof	
0.0	0.0	0.0	0.0	3,644.8	3,644.8	Soft Landscaping	
0.0	**0.0**	**0.0**	**0.0**	**11,865.9**	**11,865.9**	**TOTAL AREA**	

Time span=0.00-6.00 hrs, dt=0.01 hrs, 601 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment5S: Controlled Runoff Area=7,729.0 m² 52.84% Impervious Runoff Depth=37 mm
Tc=15.0 min C=0.67 Runoff=0.0857 m³/s 282.7 m³

Subcatchment27S: Uncontrolled Runoff Area=1,559.0 m² 0.00% Impervious Runoff Depth=17 mm
Tc=15.0 min C=0.31 Runoff=0.0080 m³/s 26.4 m³

Subcatchment30S: New Impervious Runoff Area=2,577.9 m² 100.00% Impervious Runoff Depth=55 mm
Tc=15.0 min C=1.00 Runoff=0.0427 m³/s 140.8 m³

Pond 31P: Re-Use Tank Peak Elev=11.393 m Storage=74.5 m³ Inflow=0.0427 m³/s 140.8 m³
Outflow=0.0421 m³/s 79.2 m³

Pond 32P: Box Culvert Peak Elev=1.911 m Storage=210.2 m³ Inflow=0.1279 m³/s 364.1 m³
Outflow=0.0591 m³/s 363.2 m³

Link 26L: 99.9 L/s Inflow=0.0641 m³/s 389.6 m³
Primary=0.0641 m³/s 389.6 m³

Total Runoff Area = 11,865.9 m² Runoff Volume = 449.9 m³ Average Runoff Depth = 38 mm
43.86% Pervious = 5,203.8 m² 56.14% Impervious = 6,662.1 m²

Summary for Subcatchment 5S: Controlled

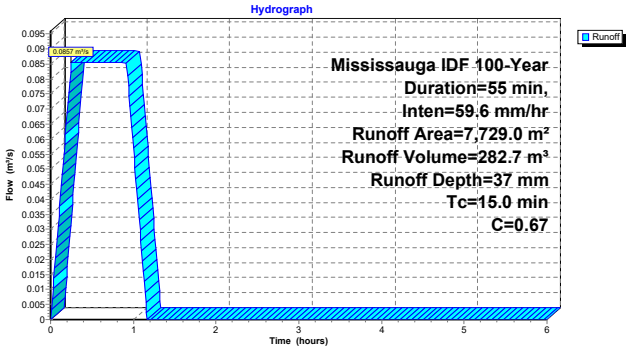
Runoff = 0.0857 m³/s @ 0.25 hrs, Volume= 282.7 m³, Depth= 37 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Mississauga IDF 100-Year Duration=55 min, Inten=59.6 mm/hr

Area (m²)	C	Description
731.4	1.00	Impervious Roof
3,644.8	0.31	Soft Landscaping
3,352.8	1.00	At Grade Impervious
7,729.0	0.67	Weighted Average
3,644.8		47.16% Pervious Area
4,084.2		52.84% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
15.0					Direct Entry,

Subcatchment 5S: Controlled



Summary for Subcatchment 27S: Uncontrolled

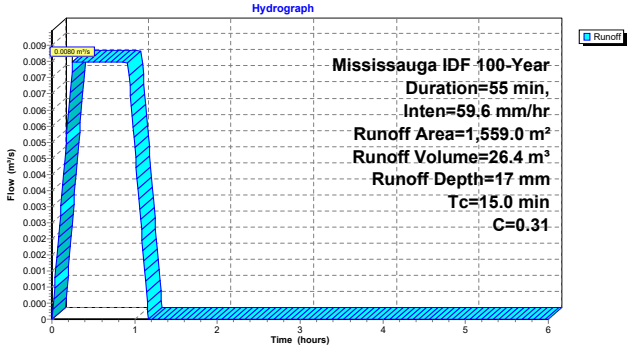
Runoff = 0.0080 m³/s @ 0.25 hrs, Volume= 26.4 m³, Depth= 17 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Mississauga IDF 100-Year Duration=55 min, Inten=59.6 mm/hr

Area (m²)	C	Description
1,559.0	0.31	At Grade-Pervious
1,559.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
15.0					Direct Entry,

Subcatchment 27S: Uncontrolled



Summary for Subcatchment 30S: New Impervious Roof

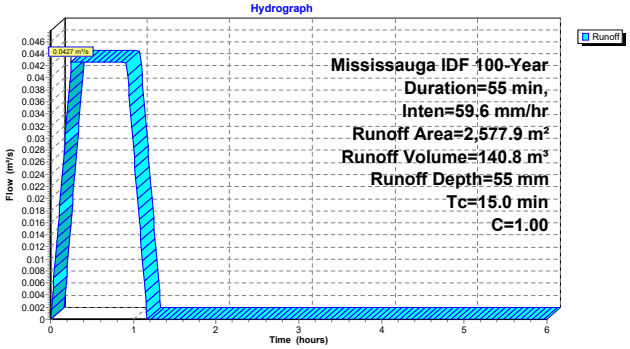
Runoff = 0.0427 m³/s @ 0.25 hrs, Volume= 140.8 m³, Depth= 55 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Mississauga IDF 100-Year Duration=55 min, Inten=59.6 mm/hr

Area (m²)	C	Description
2,577.9	1.00	Impervious At-Grade
2,577.9		100.00% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
15.0					Direct Entry,

Subcatchment 30S: New Impervious Roof



Summary for Pond 31P: Re-Use Tank

Inflow Area = 2,577.9 m², 100.00% Impervious, Inflow Depth = 55 mm for 100-Year event
Inflow = 0.0427 m³/s @ 0.25 hrs, Volume= 140.8 m³
Outflow = 0.0421 m³/s @ 0.92 hrs, Volume= 79.2 m³, Atten= 1%, Lag= 40.0 min
Primary = 0.0421 m³/s @ 0.92 hrs, Volume= 79.2 m³

Routing by Stor-Ind method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Starting Elev= 0.800 m Surf.Area= 0.0 m² Storage= 0.0 m³
Peak Elev= 11.393 m @ 0.92 hrs Surf.Area= 53.5 m² Storage= 74.5 m³

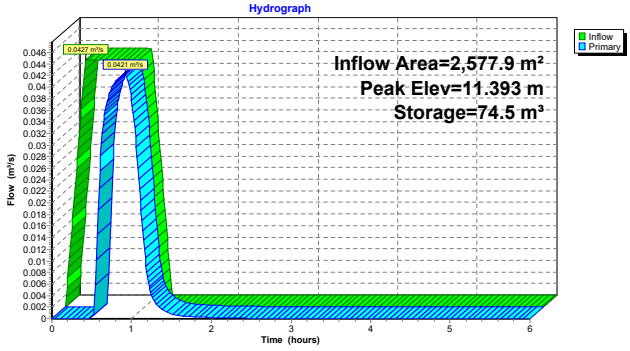
Plug-Flow detention time= 30.5 min calculated for 79.0 m³ (56% of inflow)
Center-of-Mass det. time= 18.5 min (53.5 - 35.0)

Volume	Invert	Avail.Storage	Storage Description
#1	10.000 m	80.3 m³	**53.50 mW x 1.00 mL x 1.50 mH Prismatoid**

Device	Routing	Invert	Outlet Devices
#1	Primary	11.150 m	**200 mm Vert. Orifice/Grate** C= 0.800

Primary OutFlow Max=0.0421 m³/s @ 0.92 hrs HW=11.393 m (Free Discharge)
1=Orifice/Grate (Orifice Controls 0.0421 m³/s @ 1.34 m/s)

Pond 31P: Re-Use Tank



Summary for Pond 32P: Box Culvert

Inflow Area = 10,306.9 m², 64.64% Impervious, Inflow Depth > 35 mm for 100-Year event
Inflow = 0.1279 m³/s @ 0.91 hrs, Volume= 364.1 m³, Incl. 0.0001 m³/s Base Flow
Outflow = 0.0591 m³/s @ 1.07 hrs, Volume= 363.2 m³, Atten= 54%, Lag= 9.8 min
Primary = 0.0591 m³/s @ 1.07 hrs, Volume= 363.2 m³

Routing by Stor-Ind method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Peak Elev= 1.911 m @ 1.07 hrs Surf.Area= 110.0 m² Storage= 210.2 m³

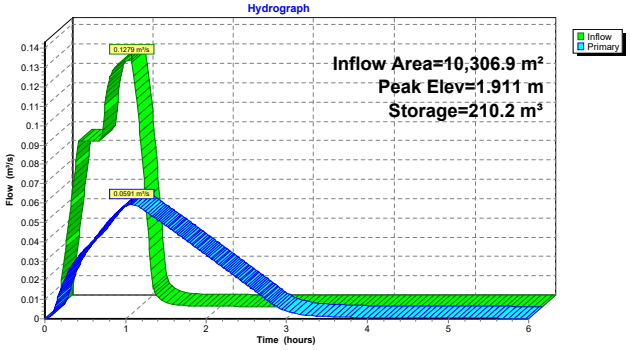
Plug-Flow detention time= 44.3 min calculated for 363.2 m³ (100% of inflow)
Center-of-Mass det. time= 43.7 min (83.6 - 39.9)

Volume	Invert	Avail.Storage	Storage Description
#1	0.000 m	236.5 m³	**2,750 mm W x 2,150 mm H Box Pipe Storage** L= 40.00 m

Device	Routing	Invert	Outlet Devices
#1	Primary	0.000 m	**125 mm Vert. Orifice/Grate** C= 0.800

Primary OutFlow Max=0.0591 m³/s @ 1.07 hrs HW=1.911 m (Free Discharge)
1=Orifice/Grate (Orifice Controls 0.0591 m³/s @ 4.82 m/s)

Pond 32P: Box Culvert

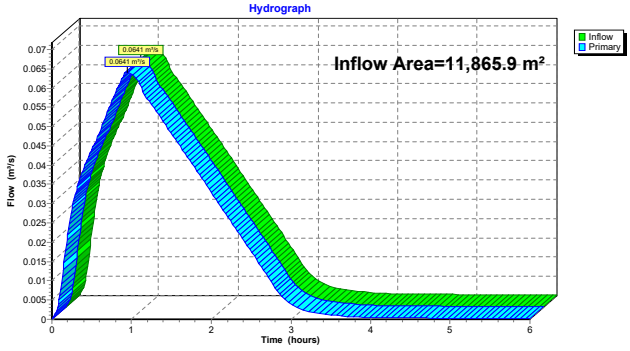


Summary for Link 26L: 99.9 L/s

Inflow Area = 11,865.9 m², 56.14% Impervious, Inflow Depth > 33 mm for 100-Year event
Inflow = 0.0641 m³/s @ 0.95 hrs, Volume= 389.6 m³
Primary = 0.0641 m³/s @ 0.95 hrs, Volume= 389.6 m³, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs

Link 26L: 99.9 L/s



APPENDIX

C WATER QUALITY UNIT SPECIFICATIONS

Stormceptor®

Rinker MATERIALS™

Stormceptor® EF Sizing Report

Imbrium® Systems
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

09/13/2023

Province:	Ontario
City:	Mississauga
Nearest Rainfall Station:	TORONTO INTL AP
Climate Station Id:	6158731
Years of Rainfall Data:	20

Site Name:	

Drainage Area (ha):	0.70
Runoff Coefficient 'c':	0.56

Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	12.19
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	
Influent TSS Concentration (mg/L):	
Estimated Average Annual Sediment Volume (L/yr):	260

Project Name:	1785 Bloor St
Project Number:	211-10685
Designer Name:	Stefanie Kurtz
Designer Company:	WSP Canada Group Limited
Designer Email:	stefanie.kurtz@wsp.com
Designer Phone:	289-982-9258
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	86
EFO6	94
EFO8	97
EFO10	99
EFO12	100

Recommended Stormceptor EFO Model: EFO4

Estimated Net Annual Sediment (TSS) Load Reduction (%): 86

Water Quality Runoff Volume Capture (%): > 90

imbrium

THIRD-PARTY TESTING AND VERIFICATION

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

PERFORMANCE

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

PARTICLE SIZE DISTRIBUTION (PSD)

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

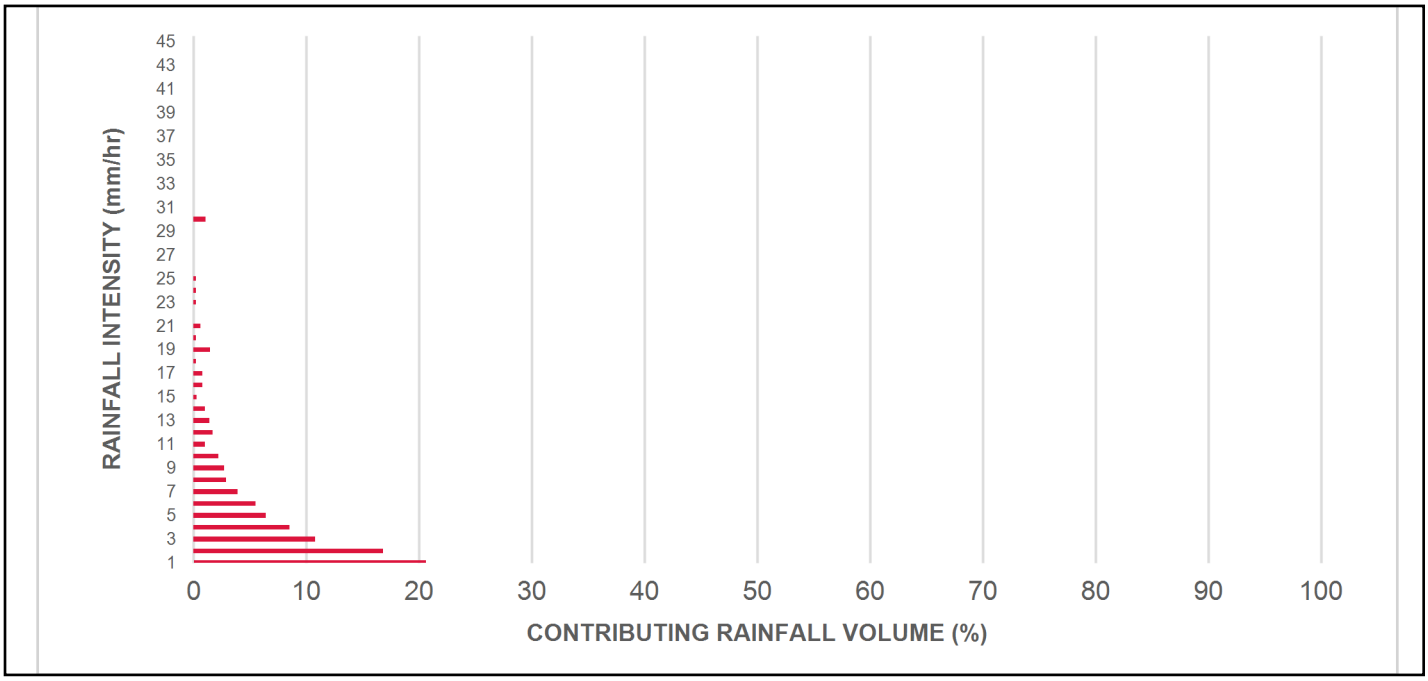
Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

Stormceptor® EF Sizing Report

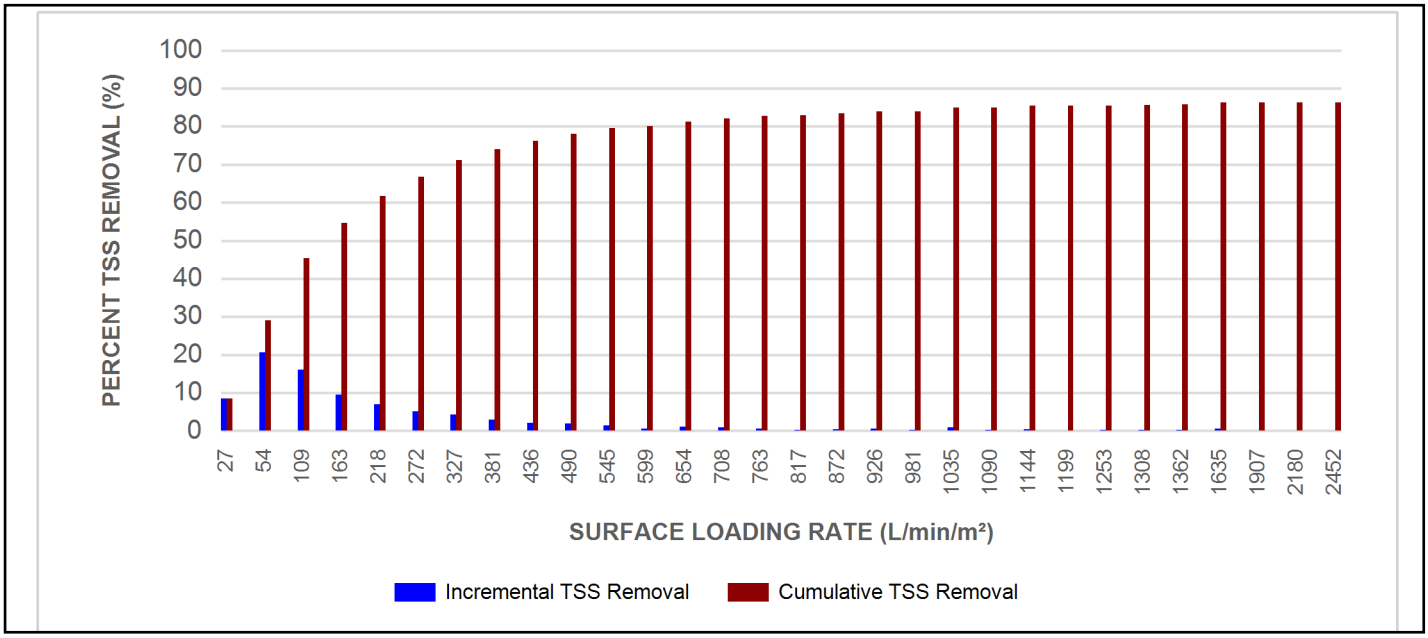
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.5	8.5	0.54	33.0	27.0	100	8.5	8.5
1.00	20.6	29.1	1.09	65.0	54.0	100	20.6	29.1
2.00	16.8	45.9	2.18	131.0	109.0	96	16.1	45.3
3.00	10.8	56.7	3.27	196.0	163.0	88	9.5	54.7
4.00	8.5	65.2	4.36	262.0	218.0	83	7.0	61.7
5.00	6.4	71.6	5.45	327.0	272.0	80	5.1	66.8
6.00	5.5	77.0	6.54	392.0	327.0	78	4.2	71.1
7.00	3.9	81.0	7.63	458.0	381.0	75	3.0	74.0
8.00	2.9	83.9	8.72	523.0	436.0	72	2.1	76.1
9.00	2.7	86.5	9.81	588.0	490.0	70	1.9	78.0
10.00	2.2	88.7	10.90	654.0	545.0	67	1.5	79.5
11.00	1.0	89.7	11.99	719.0	599.0	65	0.6	80.1
12.00	1.7	91.3	13.08	785.0	654.0	64	1.1	81.2
13.00	1.4	92.8	14.17	850.0	708.0	64	0.9	82.1
14.00	1.0	93.7	15.26	915.0	763.0	63	0.6	82.7
15.00	0.3	94.0	16.35	981.0	817.0	63	0.2	82.9
16.00	0.8	94.8	17.44	1046.0	872.0	63	0.5	83.4
17.00	0.8	95.7	18.53	1112.0	926.0	62	0.5	83.9
18.00	0.2	95.8	19.62	1177.0	981.0	62	0.1	84.0
19.00	1.5	97.3	20.71	1242.0	1035.0	61	0.9	84.9
20.00	0.2	97.5	21.80	1308.0	1090.0	59	0.1	85.0
21.00	0.6	98.2	22.88	1373.0	1144.0	58	0.4	85.4
22.00	0.0	98.2	23.97	1438.0	1199.0	57	0.0	85.4
23.00	0.2	98.4	25.06	1504.0	1253.0	56	0.1	85.5
24.00	0.2	98.6	26.15	1569.0	1308.0	55	0.1	85.6
25.00	0.2	98.9	27.24	1635.0	1362.0	53	0.1	85.8
30.00	1.1	100.0	32.69	1962.0	1635.0	45	0.5	86.3
35.00	0.0	100.0	38.14	2288.0	1907.0	39	0.0	86.3
40.00	0.0	100.0	43.59	2615.0	2180.0	34	0.0	86.3
45.00	0.0	100.0	49.04	2942.0	2452.0	30	0.0	86.3
Estimated Net Annual Sediment (TSS) Load Reduction =								**86 %**

Climate Station ID: 6158731 *Years of Rainfall Data*: 20

RAINFALL DATA FROM TORONTO INTL AP RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

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

SCOUR PREVENTION AND ONLINE CONFIGURATION

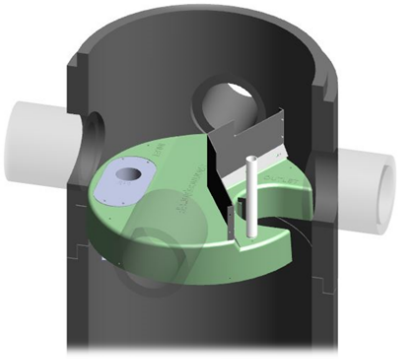
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test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

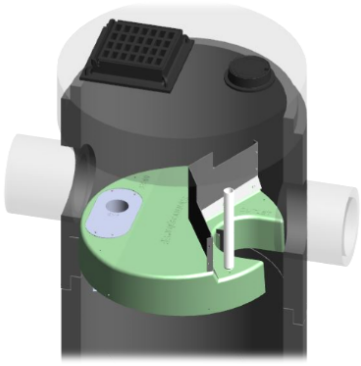
DESIGN FLEXIBILITY

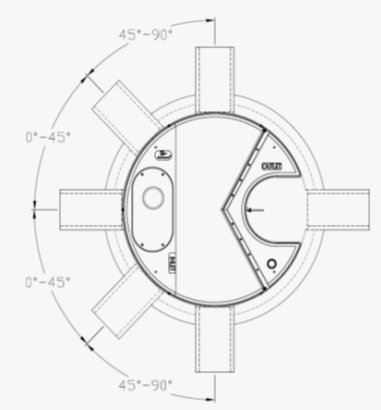
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend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

OIL CAPTURE AND RETENTION

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







INLET-TO-OUTLET DROP

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

HEAD LOSS

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

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

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

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

STANDARD STORMCEPTOR EF/EFO DRAWINGS

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

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

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

STANDARD PERFORMANCE SPECIFICATION FOR "OIL GRIT SEPARATOR" (OGS) STORMWATER QUALITY TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

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

1.2 REFERENCE STANDARDS & PROCEDURES

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

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

1.3 SUBMITTALS

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

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

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

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

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

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m^3 sediment / 265 L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m^3 sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m^3 sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m^3 sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m^3 sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall

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

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m^2 to 1400 L/min/m^2, and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m^2 and 1400 L/min/m^2 shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m^2 shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m^2. No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m^2.

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m^2 shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m^2, and shall be calculated using a simple proportioning formula, with 1400 L/min/m^2 in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m^2.

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

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

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators,** with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to

assess whether light liquids captured after a spill are effectively retained at high flow rates.

3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m^2 to 2600 L/min/m^2) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.** However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.

APPENDIX

D DECAST BOX CULVERT SPECIFICATION

ENGINEERED PRECAST

MANUFACTURED
100%
INDOORS WITH CONTROLLED CONDITIONS

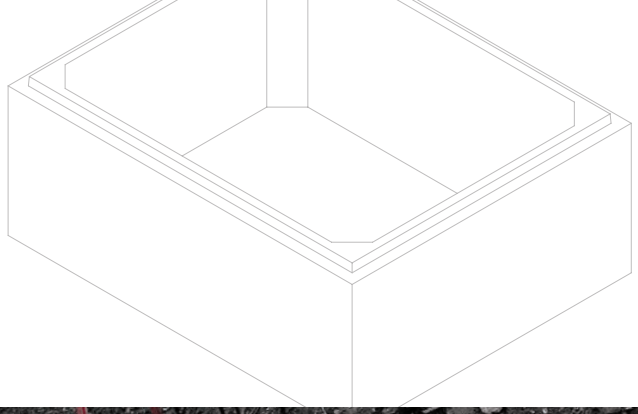
FAST AND EASY INSTALLATION

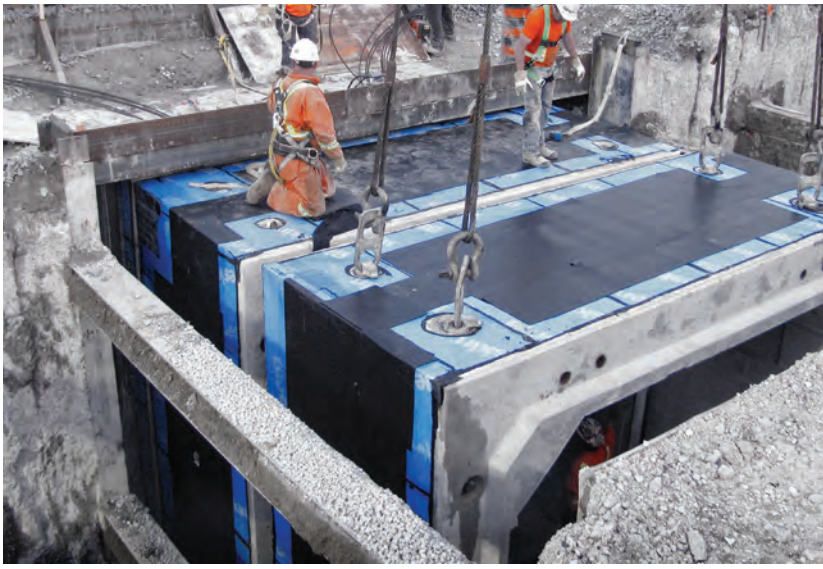
ASSURED QUALITY

REDUCED RISK

DECAST

BOX CULVERTS





APPLICATIONS

- Conveyance of storm water from urban developments
- Designed for gravity flow of fluids
- Can be used as small bridges and for stream crossing where natural stream bed does not have to be maintained

STANDARD(S) REFERENCES

- Plant Prequalification Program
- OPSS 1821
- CSA S6 – CHDBC
- OPSS 422
- ASTM C1433
- CSA A23.4

ADDITIONAL INFORMATION

Contact us at sales@decastltd.com for:

- Box culvert sizes, not listed on next page
- 3-sided box culverts
- Special loading conditions (increased depth of cover, railway loading, other special loading conditions)
- Post tensioned box culverts

DIMENSIONS

OPSS Design: standard length of sections is 2.44m
DECAST Design: standard length of sections is 2.5m

OPSS DESIGN		
SPAN X RISE (mm)	WALL THICKNESS (mm)	APPROX. MASS (kg/m)
1800 x 900	200	3,380
1800 x 1200	200	3,690
2400 x 1200	200	4,560
2400 x1500	200	4,870
2400 x 1800	200	5,170
3000 x 150	250	6,860
3000 x 1800	250	7,250
3000 x 2100	250	7,630
3000 x 2400	250	8,020

DECAST DESIGN		
SPAN X RISE (mm)	WALL THICKNESS (mm)	APPROX. MASS (kg/m)
3600 x 2400	300	10,130
3600 x 3000	300	11,010
3600 x 3600	300	11,900
3600 x 4200	300	12,780
4200 x 2400	300	11,010
4200 x 3000	300	11,900
4200 x 3600	300[10]	12,780
4200 x 4200	300	13,660
4800 x 2400	350	14,140
4800 x 3000	350	15,160
4800 x 3600	350	16,190
4800 x 4200	350	17,220
5400 x 2400	350	15,160
5400 x 3000	350	16,190
5400 x 3600	350	17,220
5400 x 4200	350	18,250

FEATURES AVAILABLE ON REQUEST

- Bends
- Reducers & Increasers
- Radius Sections
- Beveled Ends
- Scribed Holes
- Flush Ends
- Maintenance Hole Tees
- Plugs and Caps
- Dowels and Inserts - 15 M

ENGINEERED PRECAST SOLUTIONS

Our **engineering** team can work with you to design the exact precast concrete products you need to achieve your **project objectives.**

With DECAST you get higher quality, long asset life and **leading engineered precast solutions.**

DECAST

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