

1785 BLOOR HOLDING INC.

# STORMWATER MANAGEMENT REPORT

1785 BLOOR STREET

MAY 27, 2022







# **STORMWATER MANAGEMENT REPORT 1785 BLOOR STREET**

**1785 BLOOR HOLDING INC.**

OFFICIAL PLAN AMENDMENT / REZONING APPLICATION

PROJECT NO.: 211-10685-00  
DATE: MAY 2022

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

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# QUALITY MANAGEMENT

## ISSUE/REVISION FIRST ISSUE

|                |                                                                                   |  |  |  |  |
|----------------|-----------------------------------------------------------------------------------|--|--|--|--|
| Remarks        | Official Plan<br>Amendment and<br>Rezoning<br>Application                         |  |  |  |  |
| Date           | 2022/05/27                                                                        |  |  |  |  |
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| Signature      |                                                                                   |  |  |  |  |
| Project number | 211-10685                                                                         |  |  |  |  |

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Project Engineer



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## CLIENT

1785 BLOOR HOLDING INC.

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# 1 INTRODUCTION

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## 1.1 SCOPE

WSP has been retained by 1785 Bloor Holding Inc. to prepare a Stormwater Management (SWM) Report to support the official plan amendment and 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; 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).

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## 1.2 SITE LOCATION

The site occupies an area of approximately 1.1 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 Bridgwood Dr. The location of the proposed re-development is illustrated in Figure 1.

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## 1.3 STORMWATER MANAGEMENT PLAN OBJECTIVES

The objectives of the stormwater management plan are as follows:

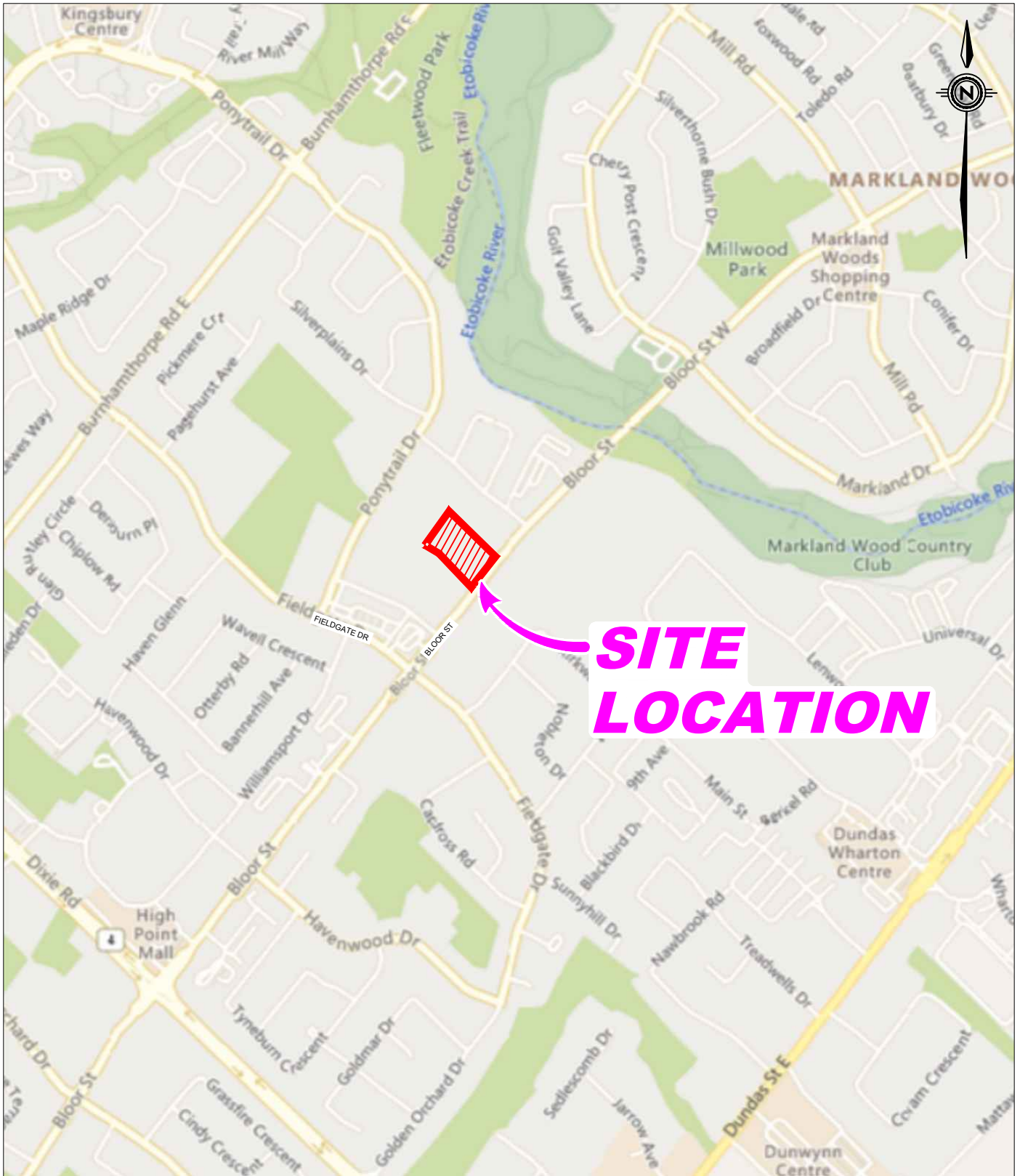
- Determine the site-specific stormwater management requirements to ensure that the development is in conformance with the City of Mississauga criteria;
  - Evaluate various stormwater management practices that meet the requirements of the City and recommend a preferred strategy; and,
  - Prepare a stormwater 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. Additionally, 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



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| Date    | May 2022 | Proj. No.  | 211-10685    |
| Scale   | NTS      | Figure No. | 1            |

## 2 PRE-DEVELOPMENT CONDITIONS

### 2.1 GENERAL

Under pre-development conditions, the 1.2 ha site is currently occupied by one 10-storey apartment building, 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 easterly 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<br>(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 with the maximum runoff coefficient of 0.5. Consequently, the 2-year pre-development discharge from the site, and therefore the allowable release rate from the subject site, is 99.9 l/s which was calculated using the 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**.

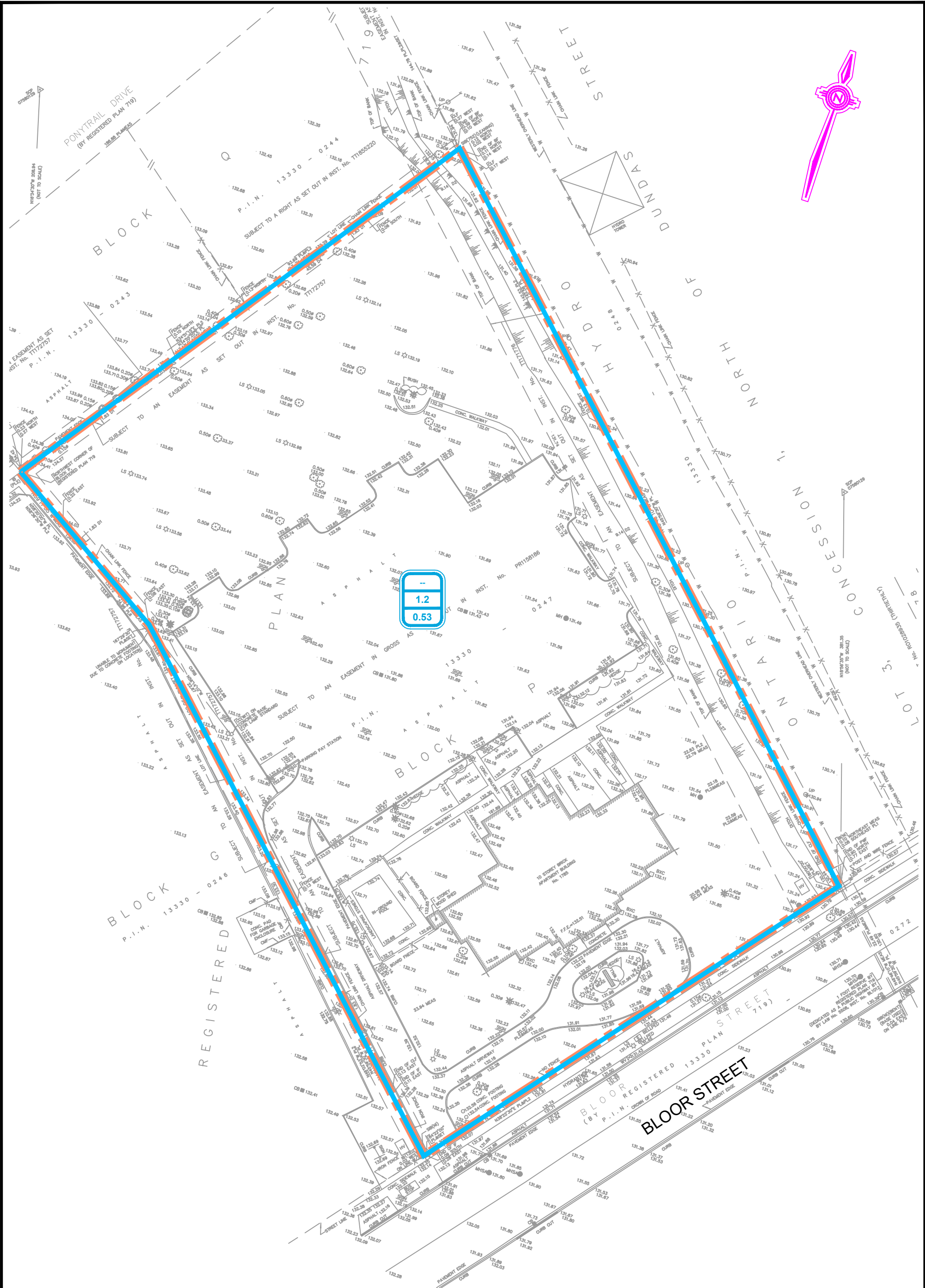
**Table 2.2      Pre-Development Peak Discharge Rates and Allowable Release Rates**

| RETURN PERIOD<br>(years) | RAINFALL INTENSITY, I<br>(mm/hour) | ALLOWABLE RELEASE RATE, Q <sub>A</sub> (L/s)* |
|--------------------------|------------------------------------|-----------------------------------------------|
| 2                        | 59.9                               | <b>99.9</b>                                   |
| 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*



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LEGEND

- PROPERTY BOUNDARY
- SUB-CATCHMENT BOUNDARY



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

CLIENT

1785 Bloor Holdings Inc.

TITLE

1785 BLOOR STREET, MISSISSAUGA, ON

PRE DEVELOPMENT PLAN



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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 building located just north of the existing 10-storey building. The building provides an estimated 238 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 <sup>2</sup> ) | 2-YEAR RUNOFF<br>COEFFICIENT, C | IMPERVIOUSNESS |
|----------------------------|------------------------------------------------|------------------------|---------------------------------|----------------|
| Captured &<br>Controlled   | Impervious Roof Area                           | 4,453.6                | 0.90                            | 100%           |
|                            | Soft/Pervious<br>Landscaping                   | 3,775.7                | 0.25                            | 0%             |
|                            | Controlled at Grade<br>Impervious / Walkway    | 1,068.0                | 0.90                            | 100%           |
|                            | Uncontrolled At-Grade<br>Impervious / Driveway | 1,414.7                | 0.25                            | 0%             |
| <b>Total (or Average):</b> |                                                | <b>10,712</b>          | <b>0.67</b>                     | <b>65%</b>     |

## 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 runoff reduction volume, and, therefore, the initial abstraction will be disregarded. Since the ground water level is high, infiltration is not feasible for this project (Hydrogeology report, Pinchin Ltd., 2022). A water reuse volume stored within the stormwater cistern is the mechanism proposed to achieve the water balance requirement.

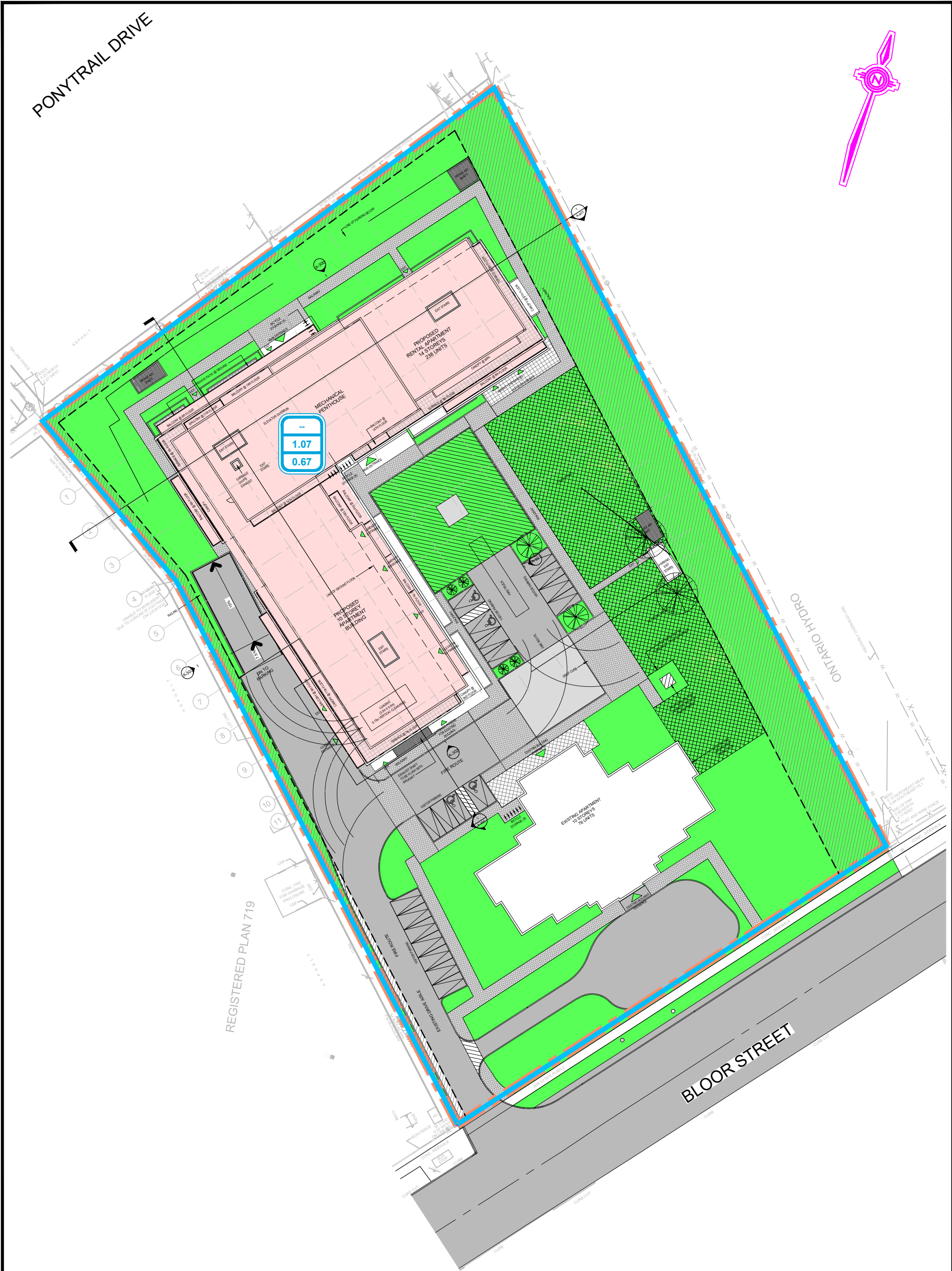
The total volume of 5 mm runoff retention from the site is 27.75 m<sup>3</sup>. Table 3.2 shows the required storage volume to meet the water balance target for the site. Calculations are provided in **Appendix A**.

**Table 3.2 Water Balance Summary**

| SURFACE TYPE                                   | AREA (m <sup>2</sup> ) | INITIAL<br>ABSTRACTION<br>(m) | VOLUME<br>ABSTRACTED<br>(m <sup>3</sup> ) | 5 MM<br>VOLUME<br>(m <sup>3</sup> ) | WATER<br>BALANCE<br>(m <sup>3</sup> ) |
|------------------------------------------------|------------------------|-------------------------------|-------------------------------------------|-------------------------------------|---------------------------------------|
| Impervious Roof Area                           | 4,453.6                | 0.001                         | 4.5                                       | 22.3                                | 17.8                                  |
| Soft/Pervious Landscaping                      | 3,775.7                | 0.005                         | 18.9                                      | 18.9                                | 0.0                                   |
| Controlled at Grade<br>Impervious / Walkway    | 1,068                  | 0.001                         | 1.1                                       | 5.3                                 | 4.3                                   |
| Uncontrolled At-Grade<br>Impervious / Driveway | 1,414.7                | 0.001                         | 1.4                                       | 7.1                                 | 5.7                                   |
| <b>Total Site Area</b>                         | <b>10,712</b>          | <b>-</b>                      | <b>25.8</b>                               | <b>53.6</b>                         | <b>27.75</b>                          |

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 enough opportunities exist to reuse the sump volume within a reasonable time frame, typically 72-hour period.

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LEGEND

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



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

|                              |                                    |                                                                                                           |              |
|------------------------------|------------------------------------|-----------------------------------------------------------------------------------------------------------|--------------|
| CLIENT                       | 1785 Bloor Holdings Inc.           |                      |              |
| TITLE                        | 1785 BLOOR STREET, MISSISSAUGA, ON | 100 Commerce Valley Dr. West, Thornhill, ON Canada L3T 0A1<br>t: 905.882.1100 f: 905.882.0055 www.wsp.com |              |
| PROPOSED<br>DEVELOPMENT PLAN |                                    | Checked                                                                                                   | V. N.        |
|                              |                                    | Drawn                                                                                                     | AutoCAD/G.W. |
|                              |                                    | Date                                                                                                      | APRIL 2022   |
|                              |                                    | Proj. No.                                                                                                 | 211-10685    |
|                              |                                    | Scale                                                                                                     | 1:600        |
|                              |                                    | Figure No.                                                                                                | 3            |

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### 3.3 WATER QUALITY CONTROL

As mentioned in Section 1.4 of this report, the Development Requirements Manual (City of Mississauga) 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 the site effectively unchanged and can be considered clean for the purposes of water quality assessment. The site wide area also includes 0.62 ha of driveway, new roof top, 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 underground chamber system (please see Section 3.5), which will detain 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 88%. 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 1.1 ha, and the site discharges to the existing storm sewer network on Bloor Street, 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 Erosion and Sediment Control Plan and should conform to the city requirements.

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### 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 shall 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 accounted as a base flow to the SWM cistern node in the HydroCAD model. Note that a groundwater treatment system will be required, designed by others, should exceed the City's water quality requirements. The hydrogeological investigation report will be submitted under separate cover.

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### 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 subject site 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. There will be two tanks in the system: the first one for water balance control (at P1 level) and the second one for quantity control (outside the proposed building). The water balance tank is assumed to be 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 underground cistern (StormTrap ST1 Double Trap) was designed to provide a storage volume of 151.2 m<sup>3</sup>, with a base area of 98.6 m<sup>2</sup> and a height of 2.18 m and will be located outside the parking structure (**Appendix D**). the chamber must be waterproofed and sealed as the site is in an area with high groundwater table. 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 0.1 m above the StormTrap chamber bottom. There will be a small re-use cistern in the P1 level of the proposed residential apartment building. It will collect the roof runoff from existing 10-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 TANK STORAGE (m <sup>3</sup> ) | PEAK WATER ELEVATION IN TANK* (m) | POST-DEVELOPMENT TANK DISCHARGE RATE (L/s) | UNCONTROLLED AREA DISCHARGE RATE (L/s) | POST-DEVELOPMENT TOTAL DISCHARGE RATE (L/s) | TARGET RELEASE RATE (L/s) |
|-----------------------|-----------------------------------------|-----------------------------------|--------------------------------------------|----------------------------------------|---------------------------------------------|---------------------------|
| 2                     | 45.1                                    | 0.7                               | 31.8                                       | 21.2                                   | 46.3                                        | <b>99.9</b>               |
| 5                     | 64.9                                    | 0.94                              | 38.3                                       | 28.5                                   | 58.2                                        |                           |
| 10                    | 83.5                                    | 1.16                              | 43.5                                       | 35.1                                   | 68.9                                        |                           |
| 25                    | 112                                     | 1.51                              | 50.4                                       | 44.3                                   | 83.2                                        |                           |
| 50                    | 129.7                                   | 1.72                              | 54.3                                       | 50                                     | 91.6                                        |                           |
| 100                   | <b>148.5</b>                            | 1.95                              | 58.1                                       | 55.3                                   | <b>99.7</b>                                 |                           |

\* 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 148.5 m<sup>3</sup>. Note that the sump volume is collected in the re-use tank in P1 level 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<sub>d</sub> = 15 minutes (for the 100-year event).

## 4 CONCLUSIONS

A stormwater management plan has been prepared to support the Official Plan Amendment and 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 27.75 m<sup>3</sup> sump volume (equivalent to the post-development 5 mm runoff volume) within the proposed 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 151.2 m<sup>3</sup> underground StormTrap chamber. 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



**Stormwater Management Calculations**

Project: 1785 Bloor St.

No.: 211-10685

**Area Takeoffs**

RJ RJ

Date: 2022-05-19

Page:

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Checked: 2022-05-19

1

**Existing**

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

**Proposed**

| Controlled and Captured | Land Use                                    | Area (m <sup>2</sup> ) | Runoff C, 2, 5, 10 | Runoff C, 25 | Runoff C, 50 | Runoff C, 100 | Imperviousness |
|-------------------------|---------------------------------------------|------------------------|--------------------|--------------|--------------|---------------|----------------|
|                         | Impervious Roof Area                        | 4,453.6                | 0.90               | 0.99         | 1.00         | 1.00          | 100%           |
|                         | Soft/Pervious Landscaping                   | 3,775.7                | 0.25               | 0.28         | 0.30         | 0.31          | 0%             |
|                         | Controlled At Grade Impervious / Walkway    | 1,068.0                | 0.90               | 0.99         | 1.00         | 1.00          | 100%           |
|                         | Uncontrolled At-Grade Impervious / Driveway | 1,414.7                | 0.90               | 0.99         | 1.00         | 1.00          | 100%           |
|                         |                                             | -                      | 0.90               | 0.99         | 1.00         | 1.00          | 100%           |
|                         | <b>Total Site Area:</b>                     | 10,712.0               | 0.67               | 0.74         | 0.75         | 0.76          | 65%            |



|          |                |          |            |            |
|----------|----------------|----------|------------|------------|
| Project: | 1785 Bloor St. | No.:     | 211-10685  | Page:<br>2 |
| By:      | RJ             | Date:    | 2022-05-19 |            |
| Checked: | VN             | Checked: | 2022-05-19 |            |

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:

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

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

| 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 Coefficient 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 <sup>3</sup> /sec) | 0.104 | 0.140 | 0.172 | 0.217 | 0.264 | 0.305 |

\* Note that adjustment factors are applied to the runoff coefficient 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:    | 2022-05-19 |
| Checked: | VN             | Checked: | 2022-05-19 |
|          |                |          | Page: 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)   | <b>99.9</b> | 134.3       | 165.4       | 190.0       | 212.1       | 234.7       |
| Q (area A) (m3/sec)   | <b>0.10</b> | <b>0.13</b> | <b>0.17</b> | <b>0.19</b> | <b>0.21</b> | <b>0.23</b> |

\* Note that adjustment factors are applied to the runoff coefficient 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**.



|          |                |          |            |
|----------|----------------|----------|------------|
| Project: | 1785 Bloor St. | No.:     | 211-10685  |
| By:      | RJ             | Date:    | 2022-05-19 |
| Checked: | VN             | Checked: | 2022-05-19 |
|          |                |          | Page:<br>5 |

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:

| Controlled<br>and<br>Captured | Land Use                                    | Area (m <sup>2</sup> ) | 2,5,10 Year<br>Runoff C | Imperviousness | CN |
|-------------------------------|---------------------------------------------|------------------------|-------------------------|----------------|----|
|                               | Impervious Roof Area                        | 4,454                  | 0.90                    | 100%           | 98 |
|                               | Soft/Pervious Landscaping                   | 3,776                  | 0.25                    | 0%             | 74 |
|                               | Controlled At Grade Impervious / Walkway    | 1,068                  | 0.90                    | 100%           | 98 |
|                               | Uncontrolled At-Grade Impervious / Driveway | 1,415                  | 0.90                    | 100%           | 98 |
| Totals                        |                                             | 10,712                 | 0.67                    | 65%            | 90 |

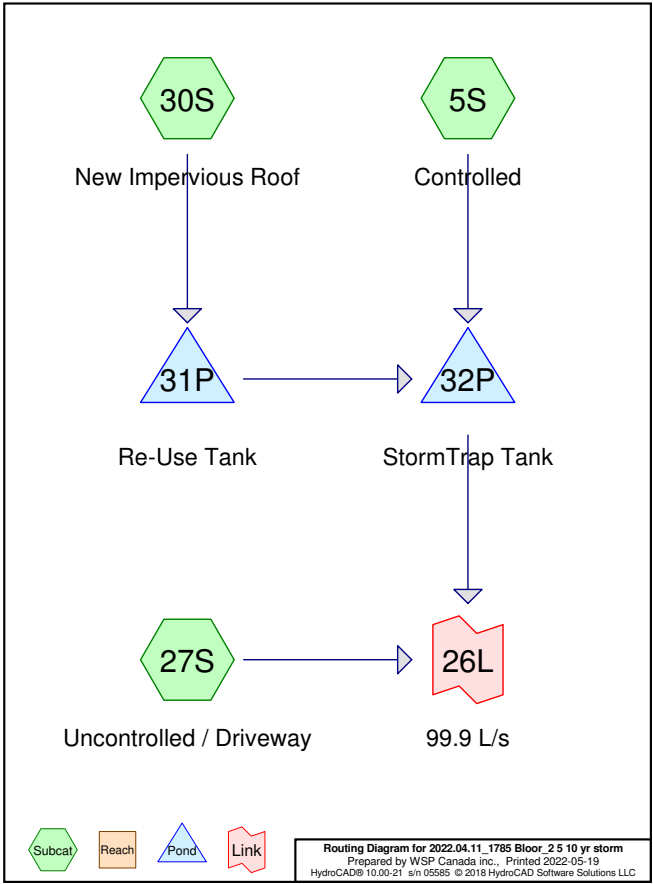
| Surface Type                                | Area<br>(m <sup>2</sup> ) | Initial Abstraction<br>(m) | Volume<br>Abstracted<br>(m <sup>3</sup> ) | 5 mm<br>Volume<br>(m <sup>3</sup> ) | Water<br>Balance<br>(m <sup>3</sup> ) |
|---------------------------------------------|---------------------------|----------------------------|-------------------------------------------|-------------------------------------|---------------------------------------|
| Impervious Roof Area                        | 4,454                     | 0.001                      | 4.5                                       | 22.3                                | 17.8                                  |
| Soft/Pervious Landscaping                   | 3,776                     | 0.005                      | 18.9                                      | 18.9                                | 0.0                                   |
| Controlled At Grade Impervious / Walkway    | 1,068                     | 0.001                      | 1.1                                       | 5.3                                 | 4.3                                   |
| Uncontrolled At-Grade Impervious / Driveway | 1,415                     | 0.001                      | 1.4                                       | 7.1                                 | 5.7                                   |
|                                             |                           | 0.000                      | 0.0                                       | 0.0                                 | 0.0                                   |
| Total Site Area:                            | 10,712                    | -                          | 25.8                                      | 53.6                                | 27.75                                 |

Therefore, volume of runoff during a 5 mm storm event: 27.75 m<sup>3</sup>

# APPENDIX

**B**

## HYDROCAD MODEL RESULTS



| Area Listing (all nodes) |      |                                    |
|--------------------------|------|------------------------------------|
| Area (hectares)          | C    | Description (subcatchment-numbers) |
| 0.1068                   | 0.90 | At Grade Impervious / Walkway (5S) |
| 0.1415                   | 0.90 | At Grade Impervious/Driveway (27S) |
| 0.0732                   | 0.90 | Impervious At-Grade (30S)          |
| 0.3722                   | 0.90 | Impervious Roof (5S)               |
| 0.3776                   | 0.25 | Soft Landscaping (5S)              |
| 1.0712                   | 0.67 | TOTAL AREA                         |

| Soil Listing (all nodes) |            |                      |
|--------------------------|------------|----------------------|
| Area (hectares)          | Soil Group | Subcatchment Numbers |
| 0.0000                   | HSG A      |                      |
| 0.0000                   | HSG B      |                      |
| 0.0000                   | HSG C      |                      |
| 0.0000                   | HSG D      |                      |
| 1.0712                   | Other      | 5S, 27S, 30S         |
| 1.0712                   |            | TOTAL AREA           |

| Ground Covers (all nodes) |                  |                  |                  |                  |                  |  | Ground Cover                  | Subcatc Number |
|---------------------------|------------------|------------------|------------------|------------------|------------------|--|-------------------------------|----------------|
| HSG-A (hectares)          | HSG-B (hectares) | HSG-C (hectares) | HSG-D (hectares) | Other (hectares) | Total (hectares) |  |                               |                |
| 0.0000                    | 0.0000           | 0.0000           | 0.0000           | 0.1068           | 0.1068           |  | At Grade Impervious / Walkway |                |
| 0.0000                    | 0.0000           | 0.0000           | 0.0000           | 0.1415           | 0.1415           |  | At Grade Impervious/Driveway  |                |
| 0.0000                    | 0.0000           | 0.0000           | 0.0000           | 0.0732           | 0.0732           |  | Impervious At-Grade           |                |
| 0.0000                    | 0.0000           | 0.0000           | 0.0000           | 0.3722           | 0.3722           |  | Impervious Roof               |                |
| 0.0000                    | 0.0000           | 0.0000           | 0.0000           | 0.3776           | 0.3776           |  | Soft Landscaping              |                |
| 0.0000                    | 0.0000           | 0.0000           | 0.0000           | 1.0712           | 1.0712           |  | 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

|                                       |                                                                                                              |
|---------------------------------------|--------------------------------------------------------------------------------------------------------------|
| Subcatchment 5S: Controlled           | Runoff Area=8,565.8 m² 0.00% Impervious Runoff Depth=9 mm<br>Tc=15.0 min C=0.61 Runoff=0.0869 m³/s 0.078 MI  |
| Subcatchment 27S: Uncontrolled /      | Runoff Area=1,414.7 m² 0.00% Impervious Runoff Depth=13 mm<br>Tc=15.0 min C=0.90 Runoff=0.0212 m³/s 0.019 MI |
| Subcatchment 30S: New Impervious Roof | Runoff Area=731.5 m² 0.00% Impervious Runoff Depth=13 mm<br>Tc=15.0 min C=0.90 Runoff=0.0110 m³/s 0.010 MI   |
| Pond 31P: Re-Use Tank                 | Peak Elev=10.329 m Storage=0.010 MI Inflow=0.0110 m³/s 0.010 MI<br>Outflow=0.0000 m³/s 0.000 MI              |
| Pond 32P: StormTrap Tank              | Peak Elev=0.698 m Storage=45.1 m³ Inflow=0.0869 m³/s 0.078 MI<br>Outflow=0.0318 m³/s 0.078 MI                |
| Link 26L: 99.9 L/s                    | Inflow=0.0463 m³/s 0.097 MI<br>Primary=0.0463 m³/s 0.097 MI                                                  |

Total Runoff Area = 1.0712 ha Runoff Volume = 0.107 MI Average Runoff Depth = 10 mm  
100.00% Pervious = 1.0712 ha 0.00% Impervious = 0.0000 ha

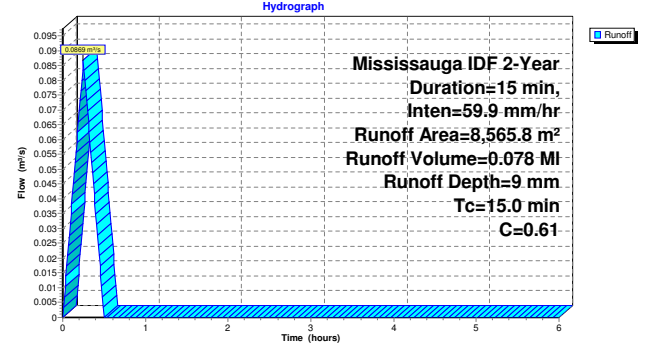
Summary for Subcatchment 5S: Controlled

Runoff = 0.0869 m³/s @ 0.25 hrs, Volume= 0.078 MI, 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 2-Year Duration=15 min, Inten=59.9 mm/hr

| Area (m²) | C    | Description                   |
|-----------|------|-------------------------------|
| 3,722.1   | 0.90 | Impervious Roof               |
| 3,775.7   | 0.25 | Soft Landscaping              |
| 1,068.0   | 0.90 | At Grade Impervious / Walkway |
| 8,565.8   | 0.61 | Weighted Average              |
| 8,565.8   |      | 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



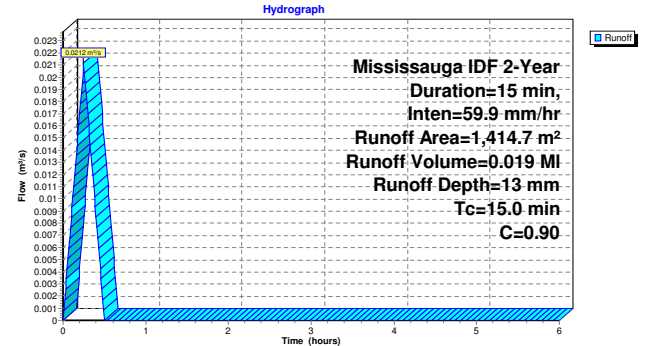
Summary for Subcatchment 27S: Uncontrolled / Driveway

Runoff = 0.0212 m³/s @ 0.25 hrs, Volume= 0.019 MI, 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 2-Year Duration=15 min, Inten=59.9 mm/hr

| Area (m²) | C    | Description                  |
|-----------|------|------------------------------|
| 1,414.7   | 0.90 | At Grade-Impervious/Driveway |
| 1,414.7   |      | 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 / Driveway



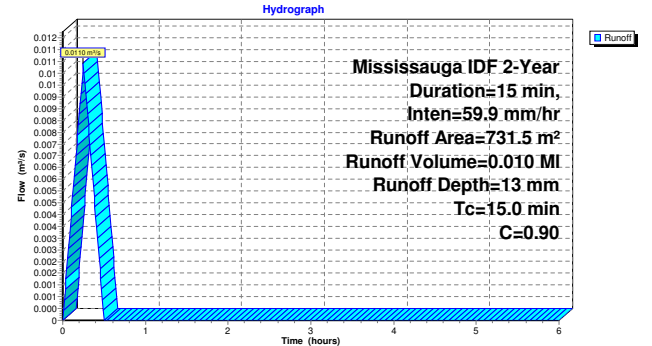
Summary for Subcatchment 30S: New Impervious Roof

Runoff = 0.0110 m³/s @ 0.25 hrs, Volume= 0.010 MI, 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 2-Year Duration=15 min, Inten=59.9 mm/hr

| Area (m²) | C    | Description           |
|-----------|------|-----------------------|
| 731.5     | 0.90 | Impervious At-Grade   |
| 731.5     |      | 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 = 0.0732 ha, 0.00% Impervious, Inflow Depth = 13 mm for 2-Year event  
Inflow = 0.0110 m³/s @ 0.25 hrs, Volume= 0.010 MI  
Outflow = 0.0000 m³/s @ 0.00 hrs, Volume= 0.000 MI, Atten= 100%, Lag= 0.0 min  
Primary = 0.0000 m³/s @ 0.00 hrs, Volume= 0.000 MI

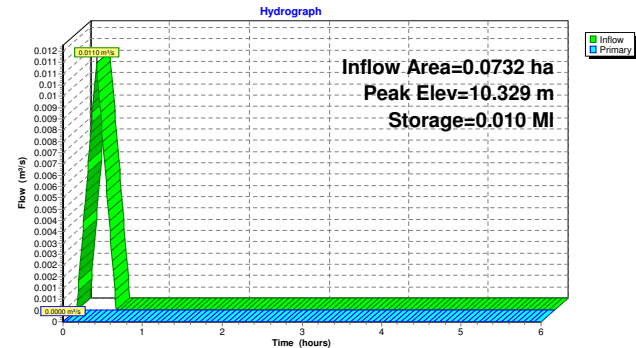
Routing by Stor-Ind method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs  
Starting Elev= 0.800 m Surf.Area= 0.0000 ha Storage= 0.000 MI  
Peak Elev= 10.329 m @ 0.50 hrs Surf.Area= 0.0030 ha Storage= 0.010 MI

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 | 0.030 MI      | 6.00 mW x 5.00 mL x 1.00 mH Prismatoid |
| Device | Routing  | Invert        | Outlet Devices                         |
| #1     | Primary  | 10.800 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: StormTrap Tank

Inflow Area = 0.9297 ha, 0.00% Impervious, Inflow Depth = 8 mm for 2-Year event  
Inflow = 0.0869 m³/s @ 0.25 hrs, Volume= 0.078 MI  
Outflow = 0.0318 m³/s @ 0.41 hrs, Volume= 0.078 MI, Atten= 63%, Lag= 9.5 min  
Primary = 0.0318 m³/s @ 0.41 hrs, Volume= 0.078 MI

Routing by Stor-Ind method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs  
Starting Elev= 0.100 m Surf.Area= 98.6 m² Storage= 0.0 m³  
Peak Elev= 0.698 m @ 0.41 hrs Surf.Area= 98.6 m² Storage= 45.1 m³ (45.1 m³ above start)

Plug-Flow detention time= 17.4 min calculated for 0.078 MI (100% of inflow)  
Center-of-Mass det. time= 17.4 min ( 32.4 - 15.0 )

| Volume | Invert  | Avail.Storage | Storage Description                                                                                                                                                                                                                                                                                          |
|--------|---------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1A    | 0.000 m | 0.0 m³        | 21.02 mW x 4.69 mL x 2.18 mH Field A<br>215.5 m³ Overall - 215.5 m³ Embedded = 0.0 m³ x 40.0% Voids                                                                                                                                                                                                          |
| #2A    | 0.000 m | 151.2 m³      | StormTrap ST1 DoubleTrap 6-0 x 10 Inside #1<br>Inside= 2,102 mmW x 1,829 mmH => 3.528 m² x 4.29 mL = 15.12 m³<br>Outside= 2,102 mmW x 2,184 mmH => 4.591 m² x 4.29 mL = 19.68 m³<br>10 Rows adjusted for 19.65 m³ perimeter wall<br>21.02 m x 4.29 m Core + 0.00 m x 0.20 m Border = 21.02 m x 4.69 m System |
|        |         |               | 151.2 m³ Total Available Storage                                                                                                                                                                                                                                                                             |

Storage Group A created with Chamber Wizard

| Device | Routing | Invert  | Outlet Devices                      |
|--------|---------|---------|-------------------------------------|
| #1     | Primary | 0.100 m | 125 mm Vert. Orifice/Grate C= 0.800 |

Primary OutFlow Max=0.0318 m³/s @ 0.41 hrs HW=0.697 m (Free Discharge)  
1=Orifice/Grate (Orifice Controls 0.0318 m³/s @ 2.59 m/s)

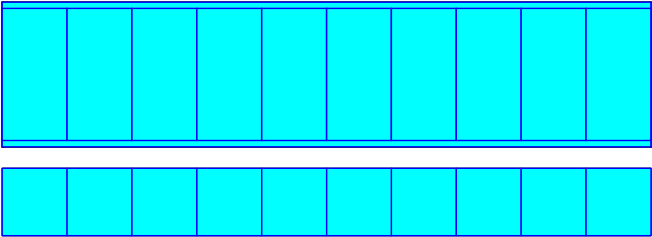
Pond 32P: StormTrap Tank - Chamber Wizard Field A

Chamber Model = StormTrap ST1 DoubleTrap 6-0 (StormTrap ST1 DoubleTrap® Type I/III/VI)  
Inside= 2,102 mmW x 1,829 mmH => 3.528 m² x 4.29 mL = 15.12 m³  
Outside= 2,102 mmW x 2,184 mmH => 4.591 m² x 4.29 mL = 19.68 m³  
10 Rows adjusted for 19.65 m³ perimeter wall

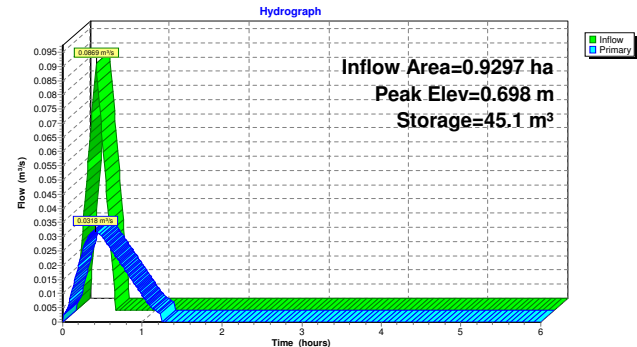
1 Chambers/Row x 4.29 m Long = 4.29 m Row Length +203 mm Border x 2 = 4.69 m Base Length  
10 Rows x 2,102 mm Wide = 21.02 m Base Width  
2,184 mm Chamber Height = 2.18 m Field Height

0.48 m² Sidewall x 1 x 2 + 0.93 m² Endwall x 10 x 2 = 19.65 m³ Perimeter Wall  
10 Chambers x 15.12 m³ - 19.65 m³ Perimeter wall = 131.56 m³ Chamber Storage  
10 Chambers x 19.68 m³ + 18.66 m³ Border = 215.45 m³ Displacement

Chamber Storage = 131.56 m³ = 0.132 MI  
Overall Storage Efficiency = 61.1%  
Overall System Size = 4.69 m x 21.02 m x 2.18 m



Pond 32P: StormTrap Tank

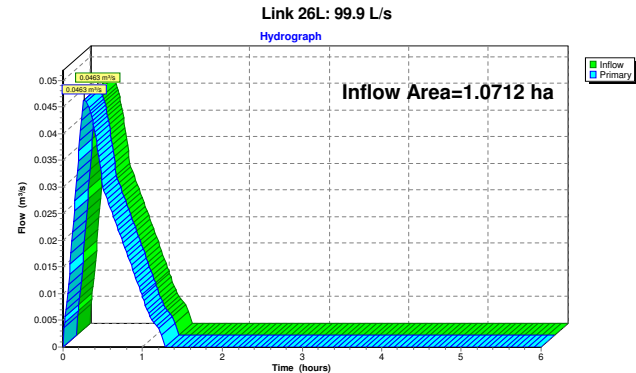




Summary for Link 26L: 99.9 L/s

Inflow Area = 1.0712 ha, 0.00% Impervious, Inflow Depth = 9 mm for 2-Year event  
Inflow = 0.0463 m³/s @ 0.27 hrs, Volume= 0.097 MI  
Primary = 0.0463 m³/s @ 0.27 hrs, Volume= 0.097 MI, Atten= 0%, Lag= 0.0 min

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



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

**Subcatchment 5S: Controlled** Runoff Area=8,565.8 m² 0.00% Impervious Runoff Depth=12 mm  
Tc=15.0 min C=0.61 Runoff=0.1169 m³/s 0.105 MI

**Subcatchment 27S: Uncontrolled /** Runoff Area=1,414.7 m² 0.00% Impervious Runoff Depth=18 mm  
Tc=15.0 min C=0.90 Runoff=0.0285 m³/s 0.026 MI

**Subcatchment 30S: New Impervious Roof** Runoff Area=731.5 m² 0.00% Impervious Runoff Depth=18 mm  
Tc=15.0 min C=0.90 Runoff=0.0147 m³/s 0.013 MI

**Pond 31P: Re-Use Tank** Peak Elev=10.442 m Storage=0.013 MI Inflow=0.0147 m³/s 0.013 MI  
Outflow=0.0000 m³/s 0.000 MI

**Pond 32P: StormTrap Tank** Peak Elev=0.937 m Storage=64.9 m³ Inflow=0.1169 m³/s 0.105 MI  
Outflow=0.0383 m³/s 0.105 MI

**Link 26L: 99.9 L/s** Inflow=0.0582 m³/s 0.131 MI  
Primary=0.0582 m³/s 0.131 MI

Total Runoff Area = 1.0712 ha Runoff Volume = 0.144 MI Average Runoff Depth = 13 mm  
100.00% Pervious = 1.0712 ha 0.00% Impervious = 0.0000 ha

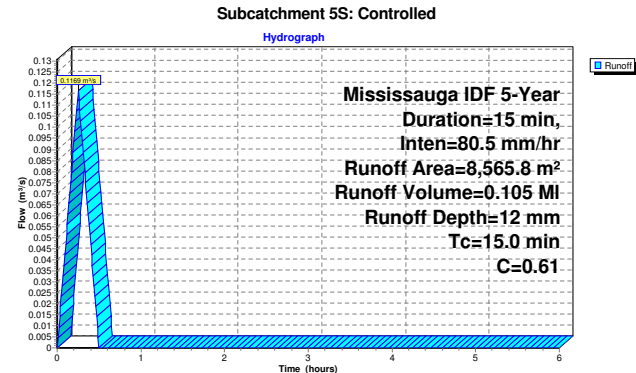
Summary for Subcatchment 5S: Controlled

Runoff = 0.1169 m³/s @ 0.25 hrs, Volume= 0.105 MI, 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 5-Year Duration=15 min, Inten=80.5 mm/hr

| Area (m²) | C    | Description                   |
|-----------|------|-------------------------------|
| 3,722.1   | 0.90 | Impervious Roof               |
| 3,775.7   | 0.25 | Soft Landscaping              |
| 1,068.0   | 0.90 | At Grade Impervious / Walkway |
| 8,565.8   | 0.61 | Weighted Average              |
| 8,565.8   |      | 100.00% Pervious Area         |

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



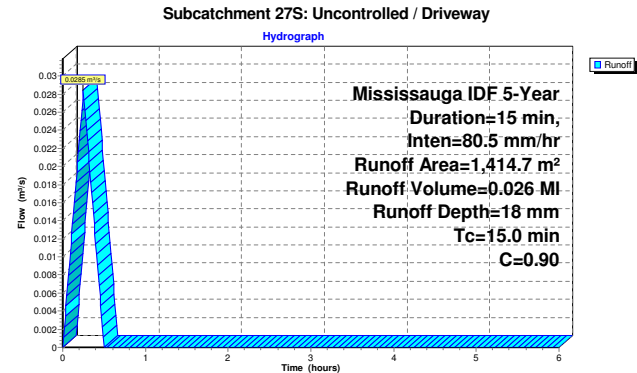
Summary for Subcatchment 27S: Uncontrolled / Driveway

Runoff = 0.0285 m³/s @ 0.25 hrs, Volume= 0.026 MI, 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=15 min, Inten=80.5 mm/hr

| Area (m²) | C    | Description                  |
|-----------|------|------------------------------|
| 1,414.7   | 0.90 | At Grade Impervious/Driveway |
| 1,414.7   |      | 100.00% Pervious Area        |

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



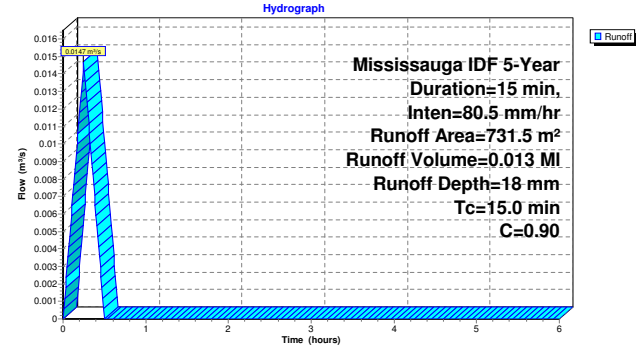
Summary for Subcatchment 30S: New Impervious Roof

Runoff = 0.0147 m³/s @ 0.25 hrs, Volume= 0.013 MI, 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=15 min, Inten=80.5 mm/hr

Table with 5 columns: Area (m²), C, Description, Tc (min), Length (meters), Slope (m/m), Velocity (m/sec), Capacity (m³/s), Description. It lists subcatchment details for Subcatchment 30S.

Direct Entry,

Subcatchment 30S: New Impervious Roof



Summary for Pond 31P: Re-Use Tank

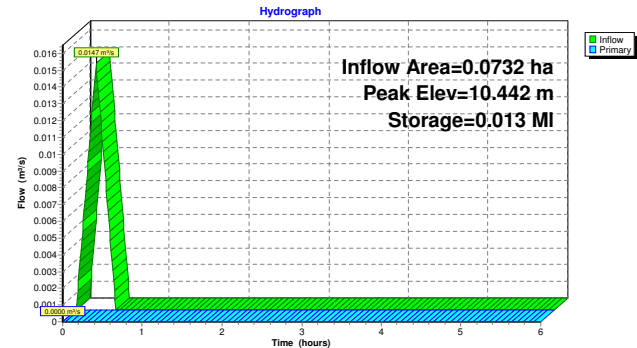
Inflow Area = 0.0732 ha, 0.00% Impervious, Inflow Depth = 18 mm for 5-Year event
Inflow = 0.0147 m³/s @ 0.25 hrs, Volume= 0.013 MI
Outflow = 0.0000 m³/s @ 0.00 hrs, Volume= 0.000 MI, Atten= 100%, Lag= 0.0 min
Primary = 0.0000 m³/s @ 0.00 hrs, Volume= 0.000 MI
Routing by Stor-Ind method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Starting Elev= 0.800 m Surf.Area= 0.0000 ha Storage= 0.000 MI
Peak Elev= 10.442 m @ 0.50 hrs Surf.Area= 0.0030 ha Storage= 0.013 MI

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

Table with 4 columns: Volume, Invert, Avail.Storage, Storage Description. It lists storage details for Pond 31P.
Below it is a table with 5 columns: Device, Routing, Invert, Outlet Devices, C. It lists device details for Pond 31P.

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: StormTrap Tank

Inflow Area = 0.9297 ha, 0.00% Impervious, Inflow Depth = 11 mm for 5-Year event
Inflow = 0.1169 m³/s @ 0.25 hrs, Volume= 0.105 MI
Outflow = 0.0383 m³/s @ 0.42 hrs, Volume= 0.105 MI, Atten= 67%, Lag= 10.1 min
Primary = 0.0383 m³/s @ 0.42 hrs, Volume= 0.105 MI

Routing by Stor-Ind method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Starting Elev= 0.100 m Surf.Area= 98.6 m² Storage= 0.0 m³
Peak Elev= 0.937 m @ 0.42 hrs Surf.Area= 98.6 m² Storage= 64.9 m³ (64.9 m³ above start)

Plug-Flow detention time= 20.5 min calculated for 0.105 MI (100% of inflow)
Center-of-Mass det. time= 20.6 min ( 35.6 - 15.0 )

Table with 4 columns: Volume, Invert, Avail.Storage, Storage Description. It lists storage details for Pond 32P, including chamber dimensions and total available storage.

Storage Group A created with Chamber Wizard

Table with 5 columns: Device, Routing, Invert, Outlet Devices, C. It lists device details for Pond 32P.

Primary OutFlow Max=0.0383 m³/s @ 0.42 hrs HW=0.937 m (Free Discharge)
1=Orifice/Grate (Orifice Controls 0.0383 m³/s @ 3.12 m/s)

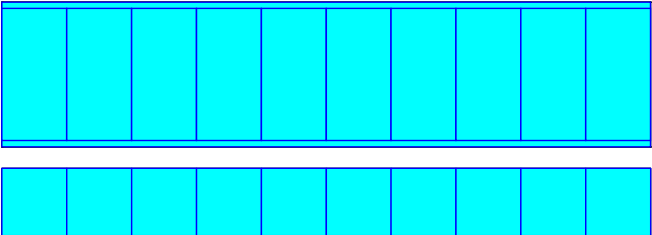
Pond 32P: StormTrap Tank - Chamber Wizard Field A

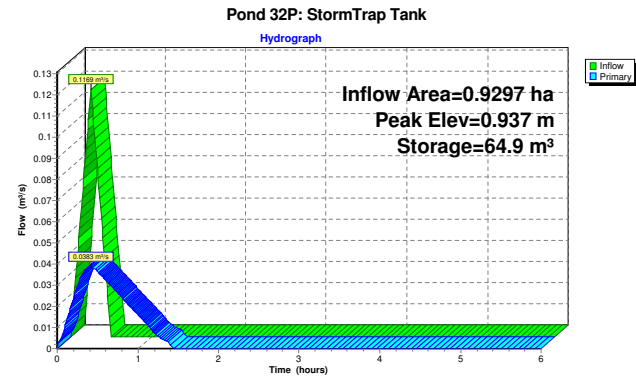
Chamber Model = StormTrap ST1 DoubleTrap 6-0 (StormTrap ST1 DoubleTrap® Type I/III/VI)
Inside= 2,102 mmW x 1,829 mmH => 3.528 m² x 4.29 mL = 15.12 m³
Outside= 2,102 mmW x 2,184 mmH => 4.591 m² x 4.29 mL = 19.68 m³
10 Rows adjusted for 19.65 m³ perimeter wall

1 Chambers/Row x 4.29 m Long = 4.29 m Row Length +203 mm Border x 2 = 4.69 m Base Length
10 Rows x 2,102 mm Wide = 21.02 m Base Width
2,184 mm Chamber Height = 2.18 m Field Height

0.48 m³ Sidewall x 1 x 2 + 0.93 m³ Endwall x 10 x 2 = 19.65 m³ Perimeter Wall
10 Chambers x 15.12 m³ - 19.65 m³ Perimeter wall = 131.56 m³ Chamber Storage
10 Chambers x 19.68 m³ + 18.66 m³ Border = 215.45 m³ Displacement

Chamber Storage = 131.56 m³ = 0.132 MI
Overall Storage Efficiency = 61.1%
Overall System Size = 4.69 m x 21.02 m x 2.18 m

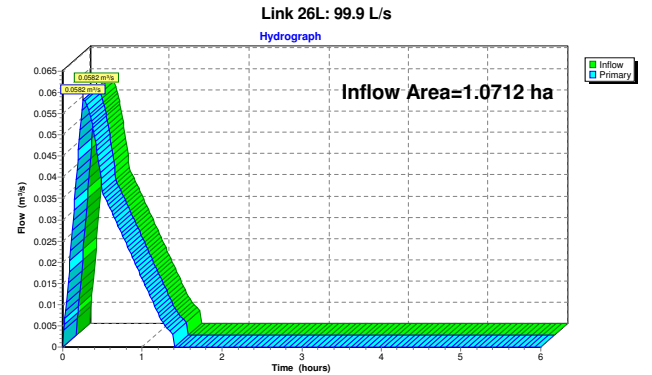




**Summary for Link 26L: 99.9 L/s**

Inflow Area = 1.0712 ha, 0.00% Impervious, Inflow Depth = 12 mm for 5-Year event  
Inflow = 0.0582 m³/s @ 0.26 hrs, Volume= 0.131 MI  
Primary = 0.0582 m³/s @ 0.26 hrs, Volume= 0.131 MI, Atten= 0%, Lag= 0.0 min

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



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

**Subcatchment 5S: Controlled** Runoff Area=8,565.8 m² 0.00% Impervious Runoff Depth=15 mm  
Tc=15.0 min C=0.61 Runoff=0.1439 m³/s 0.130 MI

**Subcatchment 27S: Uncontrolled /** Runoff Area=1,414.7 m² 0.00% Impervious Runoff Depth=22 mm  
Tc=15.0 min C=0.90 Runoff=0.0351 m³/s 0.032 MI

**Subcatchment 30S: New Impervious Roof** Runoff Area=731.5 m² 0.00% Impervious Runoff Depth=22 mm  
Tc=15.0 min C=0.90 Runoff=0.0181 m³/s 0.016 MI

**Pond 31P: Re-Use Tank** Peak Elev=10.544 m Storage=0.016 MI Inflow=0.0181 m³/s 0.016 MI  
Outflow=0.0000 m³/s 0.000 MI

**Pond 32P: StormTrap Tank** Peak Elev=1.162 m Storage=83.5 m³ Inflow=0.1439 m³/s 0.130 MI  
Outflow=0.0435 m³/s 0.130 MI

**Link 26L: 99.9 L/s** Inflow=0.0689 m³/s 0.161 MI  
Primary=0.0689 m³/s 0.161 MI

**Total Runoff Area = 1.0712 ha Runoff Volume = 0.177 MI Average Runoff Depth = 17 mm**  
**100.00% Pervious = 1.0712 ha 0.00% Impervious = 0.0000 ha**

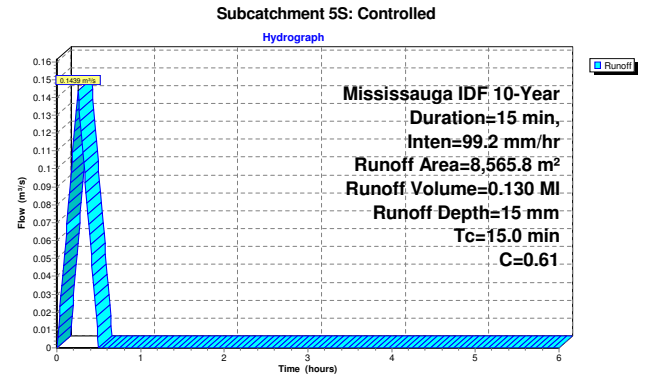
**Summary for Subcatchment 5S: Controlled**

Runoff = 0.1439 m³/s @ 0.25 hrs, Volume= 0.130 MI, Depth= 15 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=15 min, Inten=99.2 mm/hr

| Area (m²) | C    | Description                   |
|-----------|------|-------------------------------|
| 3,722.1   | 0.90 | Impervious Roof               |
| 3,775.7   | 0.25 | Soft Landscaping              |
| 1,068.0   | 0.90 | At Grade Impervious / Walkway |
| 8,565.8   | 0.61 | Weighted Average              |
| 8,565.8   |      | 100.00% Pervious Area         |

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



Summary for Subcatchment 27S: Uncontrolled / Driveway

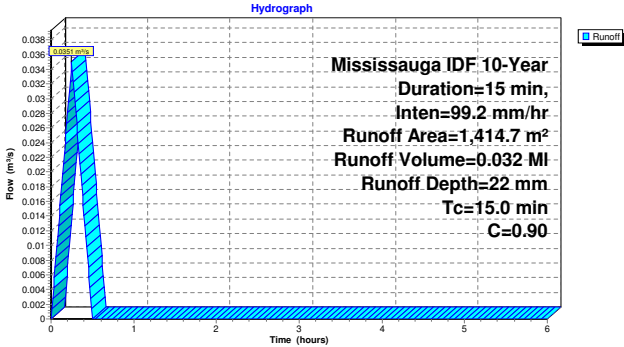
Runoff = 0.0351 m³/s @ 0.25 hrs, Volume= 0.032 MI, Depth= 22 mm

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=15 min, Inten=99.2 mm/hr

| Area (m²) | C    | Description                  |
|-----------|------|------------------------------|
| 1,414.7   | 0.90 | At Grade-Impervious/Driveway |
| 1,414.7   |      | 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 / Driveway



Summary for Subcatchment 30S: New Impervious Roof

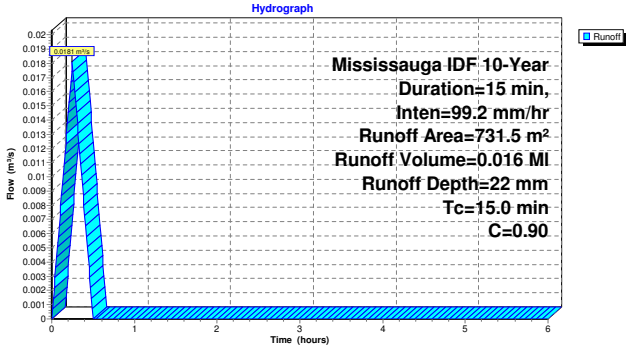
Runoff = 0.0181 m³/s @ 0.25 hrs, Volume= 0.016 MI, Depth= 22 mm

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=15 min, Inten=99.2 mm/hr

| Area (m²) | C    | Description           |
|-----------|------|-----------------------|
| 731.5     | 0.90 | Impervious At-Grade   |
| 731.5     |      | 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 = 0.0732 ha, 0.00% Impervious, Inflow Depth = 22 mm for 10-Year event  
Inflow = 0.0181 m³/s @ 0.25 hrs, Volume= 0.016 MI  
Outflow = 0.0000 m³/s @ 0.00 hrs, Volume= 0.000 MI, Atten= 100%, Lag= 0.0 min  
Primary = 0.0000 m³/s @ 0.00 hrs, Volume= 0.000 MI

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 MI  
Peak Elev= 10.544 m @ 0.50 hrs Surf.Area= 0.0030 ha Storage= 0.016 MI

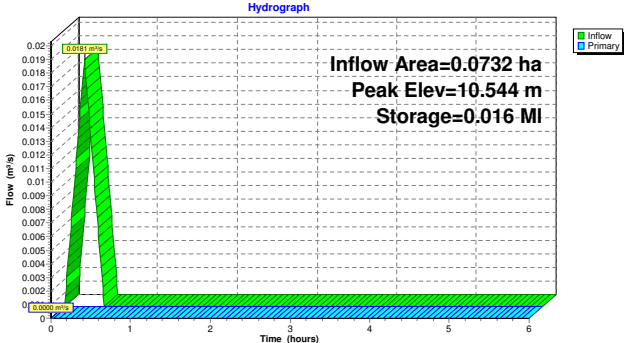
Plug-Flow detention time= (not calculated: initial storage exceeds outflow)  
Center-of-Mass det. time= (not calculated: no outflow)

| Volume | Invert   | Avail.Storage | Storage Description                    |
|--------|----------|---------------|----------------------------------------|
| #1     | 10.000 m | 0.030 MI      | 6.00 mW x 5.00 mL x 1.00 mH Prismatoid |

| Device | Routing | Invert   | Outlet Devices                      |
|--------|---------|----------|-------------------------------------|
| #1     | Primary | 10.800 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: StormTrap Tank

Inflow Area = 0.9297 ha, 0.00% Impervious, Inflow Depth = 14 mm for 10-Year event  
Inflow = 0.1439 m³/s @ 0.25 hrs, Volume= 0.130 MI  
Outflow = 0.0435 m³/s @ 0.42 hrs, Volume= 0.130 MI, Atten= 70%, Lag= 10.5 min  
Primary = 0.0435 m³/s @ 0.42 hrs, Volume= 0.130 MI

Routing by Stor-Ind method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs  
Starting Elev= 0.100 m Surf.Area= 98.6 m² Storage= 0.0 m³  
Peak Elev= 1.162 m @ 0.42 hrs Surf.Area= 98.6 m² Storage= 83.5 m³ (83.5 m³ above start)

Plug-Flow detention time= 23.1 min calculated for 0.129 MI (100% of inflow)  
Center-of-Mass det. time= 23.1 min ( 38.1 - 15.0 )

| Volume | Invert  | Avail.Storage | Storage Description                  |
|--------|---------|---------------|--------------------------------------|
| #1A    | 0.000 m | 0.0 m³        | 21.02 mW x 4.69 mL x 2.18 mH Field A |

| Device | Routing | Invert   | Outlet Devices                              |
|--------|---------|----------|---------------------------------------------|
| #2A    | 0.000 m | 151.2 m³ | StormTrap ST1 DoubleTrap 6-0 x 10 Inside #1 |

Inside= 2,102 mmW x 1,829 mmH => 3,528 m² x 4.29 mL = 15.12 m³  
Outside= 2,102 mmW x 2,184 mmH => 4,591 m² x 4.29 mL = 19.68 m³  
10 Rows adjusted for 19.65 m³ perimeter wall  
21.02 m x 4.29 m Core + 0.00 m x 0.20 m Border = 21.02 m x 4.69 m System

151.2 m³ Total Available Storage

Storage Group A created with Chamber Wizard

| Device | Routing | Invert  | Outlet Devices                      |
|--------|---------|---------|-------------------------------------|
| #1     | Primary | 0.100 m | 125 mm Vert. Orifice/Grate C= 0.800 |

Primary OutFlow Max=0.0435 m³/s @ 0.42 hrs HW=1.161 m (Free Discharge)  
1=Orifice/Grate (Orifice Controls 0.0435 m³/s @ 3.54 m/s)

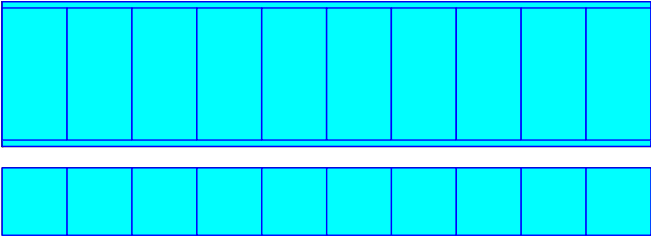
Pond 32P: StormTrap Tank - Chamber Wizard Field A

Chamber Model = StormTrap ST1 DoubleTrap 6-0 (StormTrap ST1 DoubleTrap® Type I/III/VI)  
Inside= 2,102 mmW x 1,829 mmH => 3.528 m² x 4.29 mL = 15.12 m³  
Outside= 2,102 mmW x 2,184 mmH => 4.591 m² x 4.29 mL = 19.68 m³  
10 Rows adjusted for 19.65 m³ perimeter wall

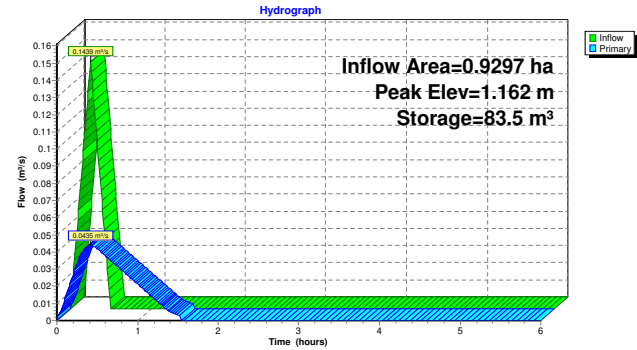
1 Chambers/Row x 4.29 m Long = 4.29 m Row Length +203 mm Border x 2 = 4.69 m Base Length  
10 Rows x 2,102 mm Wide = 21.02 m Base Width  
2,184 mm Chamber Height = 2.18 m Field Height

0.48 m³ Sidewall x 1 x 2 + 0.93 m³ Endwall x 10 x 2 = 19.65 m³ Perimeter Wall  
10 Chambers x 15.12 m³ - 19.65 m³ Perimeter wall = 131.56 m³ Chamber Storage  
10 Chambers x 19.68 m³ + 18.66 m³ Border = 215.45 m³ Displacement

Chamber Storage = 131.56 m³ = 0.132 MI  
Overall Storage Efficiency = 61.1%  
Overall System Size = 4.69 m x 21.02 m x 2.18 m



Pond 32P: StormTrap Tank

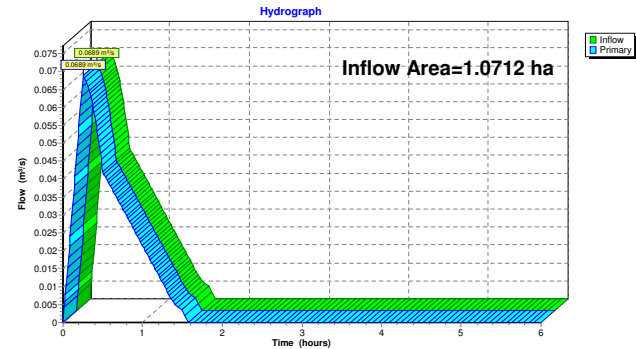


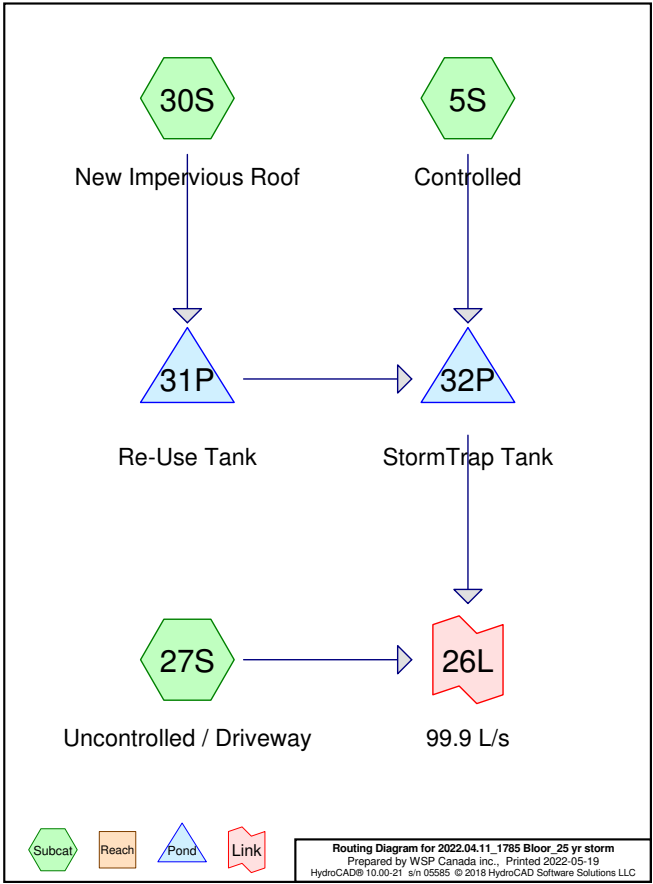
Summary for Link 26L: 99.9 L/s

Inflow Area = 1.0712 ha, 0.00% Impervious, Inflow Depth = 15 mm for 10-Year event  
Inflow = 0.0689 m³/s @ 0.25 hrs, Volume= 0.161 MI  
Primary = 0.0689 m³/s @ 0.25 hrs, Volume= 0.161 MI, 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 (all nodes) |      |                                       |
|--------------------------|------|---------------------------------------|
| Area<br>(hectares)       | C    | Description<br>(subcatchment-numbers) |
| 0.1068                   | 0.99 | At Grade Impervious / Walkway (5S)    |
| 0.1415                   | 0.99 | At Grade Impervious/Driveway (27S)    |
| 0.0732                   | 0.99 | Impervious At-Grade (30S)             |
| 0.3722                   | 0.99 | Impervious Roof (5S)                  |
| 0.3776                   | 0.28 | Soft Landscaping (5S)                 |
| 1.0712                   | 0.74 | TOTAL AREA                            |

| Soil Listing (all nodes) |               |                         |
|--------------------------|---------------|-------------------------|
| Area<br>(hectares)       | Soil<br>Group | Subcatchment<br>Numbers |
| 0.0000                   | HSG A         |                         |
| 0.0000                   | HSG B         |                         |
| 0.0000                   | HSG C         |                         |
| 0.0000                   | HSG D         |                         |
| 1.0712                   | Other         | 5S, 27S, 30S            |
| 1.0712                   |               | TOTAL AREA              |

| Ground Covers (all nodes) |                     |                     |                     |                     |                     |                                  | Ground<br>Cover | Subcatc<br>Number |
|---------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|----------------------------------|-----------------|-------------------|
| HSG-A<br>(hectares)       | HSG-B<br>(hectares) | HSG-C<br>(hectares) | HSG-D<br>(hectares) | Other<br>(hectares) | Total<br>(hectares) |                                  |                 |                   |
| 0.0000                    | 0.0000              | 0.0000              | 0.0000              | 0.1068              | 0.1068              | At Grade Impervious /<br>Walkway |                 |                   |
| 0.0000                    | 0.0000              | 0.0000              | 0.0000              | 0.1415              | 0.1415              | At<br>Grade Impervious/Driveway  |                 |                   |
| 0.0000                    | 0.0000              | 0.0000              | 0.0000              | 0.0732              | 0.0732              | Impervious At-Grade              |                 |                   |
| 0.0000                    | 0.0000              | 0.0000              | 0.0000              | 0.3722              | 0.3722              | Impervious Roof                  |                 |                   |
| 0.0000                    | 0.0000              | 0.0000              | 0.0000              | 0.3776              | 0.3776              | Soft Landscaping                 |                 |                   |
| 0.0000                    | 0.0000              | 0.0000              | 0.0000              | 1.0712              | 1.0712              | 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                                                                         |                                                                                                                |
| Subcatchment 5S: Controlled                                                                                                                      | Runoff Area=8,565.8 m² 55.92% Impervious Runoff Depth=19 mm<br>Tc=15.0 min C=0.68 Runoff=0.1843 m³/s 0.166 MI  |
| Subcatchment 27S: Uncontrolled /                                                                                                                 | Runoff Area=1,414.7 m² 100.00% Impervious Runoff Depth=28 mm<br>Tc=15.0 min C=0.99 Runoff=0.0443 m³/s 0.040 MI |
| Subcatchment 30S: New Impervious                                                                                                                 | Runoff Area=731.5 m² 100.00% Impervious Runoff Depth=28 mm<br>Tc=15.0 min C=0.99 Runoff=0.0229 m³/s 0.021 MI   |
| Pond 31P: Re-Use Tank                                                                                                                            | Peak Elev=10.687 m Storage=0.021 MI Inflow=0.0229 m³/s 0.021 MI<br>Outflow=0.0000 m³/s 0.000 MI                |
| Pond 32P: StormTrap Tank                                                                                                                         | Peak Elev=1.507 m Storage=112.0 m³ Inflow=0.1843 m³/s 0.166 MI<br>Outflow=0.0504 m³/s 0.166 MI                 |
| Link 26L: 99.9 L/s                                                                                                                               | Inflow=0.0832 m³/s 0.206 MI<br>Primary=0.0832 m³/s 0.206 MI                                                    |
| Total Runoff Area = 1.0712 ha Runoff Volume = 0.226 MI Average Runoff Depth = 21 mm<br>35.25% Pervious = 0.3776 ha 64.75% Impervious = 0.6936 ha |                                                                                                                |

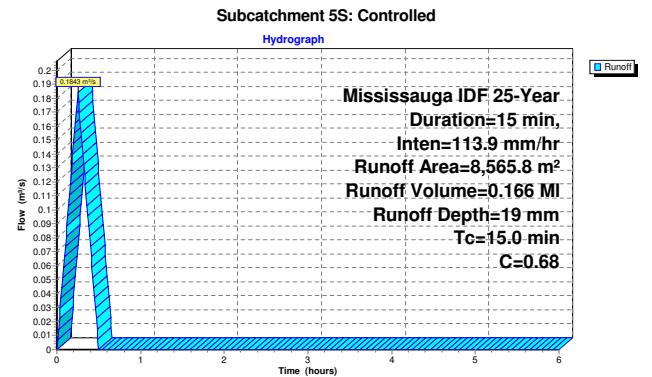
Summary for Subcatchment 5S: Controlled

Runoff = 0.1843 m³/s @ 0.25 hrs, Volume= 0.166 MI, Depth= 19 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=15 min, Inten=113.9 mm/hr

| Area (m²) | C    | Description                   |
|-----------|------|-------------------------------|
| 3,722.1   | 0.99 | Impervious Roof               |
| 3,775.7   | 0.28 | Soft Landscaping              |
| 1,068.0   | 0.99 | At Grade Impervious / Walkway |
| 8,565.8   | 0.68 | Weighted Average              |
| 3,775.7   |      | 44.08% Pervious Area          |
| 4,790.1   |      | 55.92% Impervious Area        |

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



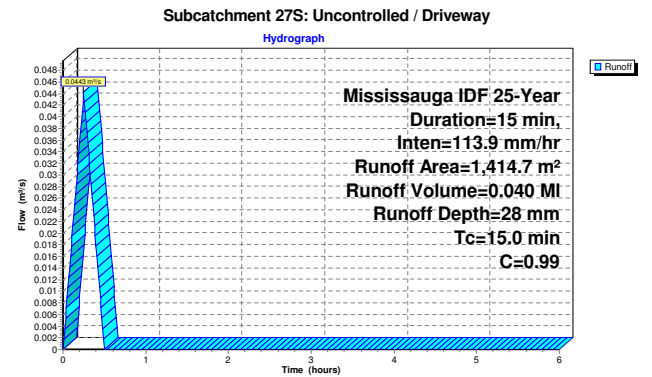
Summary for Subcatchment 27S: Uncontrolled / Driveway

Runoff = 0.0443 m³/s @ 0.25 hrs, Volume= 0.040 MI, 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=15 min, Inten=113.9 mm/hr

|           |      |                              |
|-----------|------|------------------------------|
| Area (m²) | C    | Description                  |
| 1,414.7   | 0.99 | At Grade-Impervious/Driveway |
| 1,414.7   |      | 100.00% Impervious Area      |

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



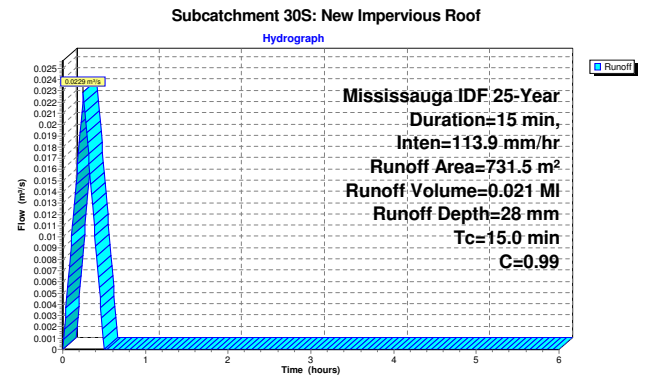
Summary for Subcatchment 30S: New Impervious Roof

Runoff = 0.0229 m³/s @ 0.25 hrs, Volume= 0.021 MI, 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=15 min, Inten=113.9 mm/hr

| Area (m²) | C       | Description         |
|-----------|---------|---------------------|
| 731.5     | 0.99    | Impervious At-Grade |
| 731.5     | 100.00% | Impervious Area     |

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





Summary for Pond 31P: Re-Use Tank

Inflow Area = 0.0732 ha, 100.00% Impervious, Inflow Depth = 28 mm for 25-Year event  
Inflow = 0.0229 m³/s @ 0.25 hrs, Volume= 0.021 MI  
Outflow = 0.0000 m³/s @ 0.00 hrs, Volume= 0.000 MI, Atten= 100%, Lag= 0.0 min  
Primary = 0.0000 m³/s @ 0.00 hrs, Volume= 0.000 MI

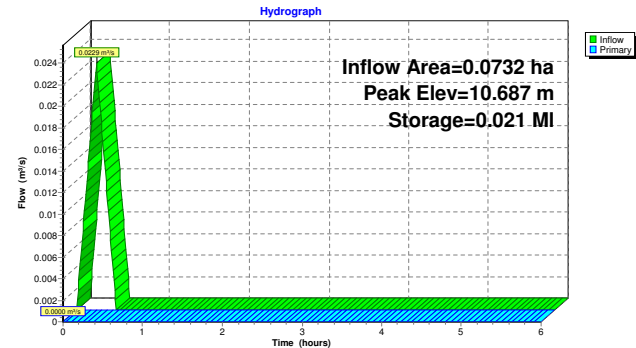
Routing by Stor-Ind method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs  
Starting Elev= 0.800 m Surf.Area= 0.0000 ha Storage= 0.000 MI  
Peak Elev= 10.687 m @ 0.50 hrs Surf.Area= 0.0030 ha Storage= 0.021 MI

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 | 0.030 MI      | 6.00 mW x 5.00 m x 1.00 mH Prismatoid |
| Device | Routing  | Invert        | Outlet Devices                        |
| #1     | Primary  | 10.800 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: StormTrap Tank

Inflow Area = 0.9297 ha, 59.39% Impervious, Inflow Depth = 18 mm for 25-Year event  
Inflow = 0.1843 m³/s @ 0.25 hrs, Volume= 0.166 MI  
Outflow = 0.0504 m³/s @ 0.43 hrs, Volume= 0.166 MI, Atten= 73%, Lag= 10.9 min  
Primary = 0.0504 m³/s @ 0.43 hrs, Volume= 0.166 MI

Routing by Stor-Ind method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs  
Starting Elev= 0.100 m Surf.Area= 98.6 m² Storage= 0.0 m³  
Peak Elev= 1.507 m @ 0.43 hrs Surf.Area= 98.6 m² Storage= 112.0 m³ (112.0 m³ above start)

Plug-Flow detention time= 26.4 min calculated for 0.166 MI (100% of inflow)  
Center-of-Mass det. time= 26.5 min ( 41.5 - 15.0 )

| Volume   | Invert  | Avail.Storage | Storage Description                                                                                                                                                                                                                                                                                          |
|----------|---------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1A      | 0.000 m | 0.0 m³        | 21.02 mW x 4.69 m x 2.18 mH Field A<br>215.5 m³ Overall - 215.5 m³ Embedded = 0.0 m³ x 40.0% Voids                                                                                                                                                                                                           |
| #2A      | 0.000 m | 151.2 m³      | StormTrap ST1 DoubleTrap 6-0 x 10 Inside #1<br>Inside= 2,102 mmW x 1,829 mmH => 3.528 m² x 4.29 mL = 15.12 m³<br>Outside= 2,102 mmW x 2,184 mmH => 4.591 m² x 4.29 mL = 19.68 m³<br>10 Rows adjusted for 19.65 m³ perimeter wall<br>21.02 m x 4.29 m Core + 0.00 m x 0.20 m Border = 21.02 m x 4.69 m System |
| 151.2 m³ |         |               | Total Available Storage                                                                                                                                                                                                                                                                                      |

Storage Group A created with Chamber Wizard

| Device | Routing | Invert  | Outlet Devices                      |
|--------|---------|---------|-------------------------------------|
| #1     | Primary | 0.100 m | 125 mm Vert. Orifice/Grate C= 0.800 |

Primary OutFlow Max=0.0504 m³/s @ 0.43 hrs HW=1.507 m (Free Discharge)  
1=Orifice/Grate (Orifice Controls 0.0504 m³/s @ 4.11 m/s)

Pond 32P: StormTrap Tank - Chamber Wizard Field A

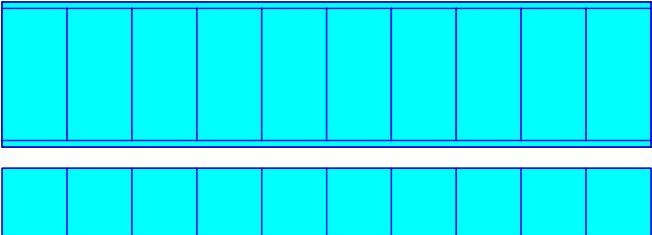
Chamber Model = StormTrap ST1 DoubleTrap 6-0 (StormTrap ST1 DoubleTrap® Type I/III/VI)

Inside= 2,102 mmW x 1,829 mmH => 3.528 m² x 4.29 mL = 15.12 m³  
Outside= 2,102 mmW x 2,184 mmH => 4.591 m² x 4.29 mL = 19.68 m³  
10 Rows adjusted for 19.65 m³ perimeter wall

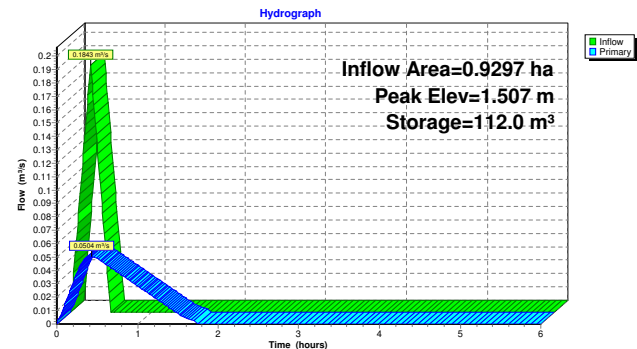
1 Chambers/Row x 4.29 m Long = 4.29 m Row Length +203 mm Border x 2 = 4.69 m Base Length  
10 Rows x 2,102 mm Wide = 21.02 m Base Width  
2,184 mm Chamber Height = 2.18 m Field Height

0.48 m² Sidewall x 1 x 2 + 0.93 m² Endwall x 10 x 2 = 19.65 m³ Perimeter Wall  
10 Chambers x 15.12 m³ - 19.65 m³ Perimeter wall = 131.56 m³ Chamber Storage  
10 Chambers x 19.68 m³ + 18.66 m³ Border = 215.45 m³ Displacement

Chamber Storage = 131.56 m³ = 0.132 MI  
Overall Storage Efficiency = 61.1%  
Overall System Size = 4.69 m x 21.02 m x 2.18 m



Pond 32P: StormTrap Tank



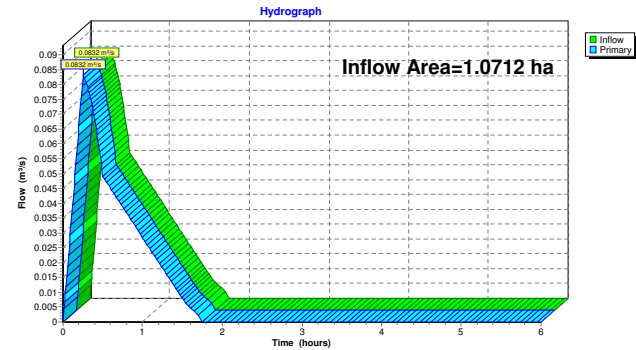


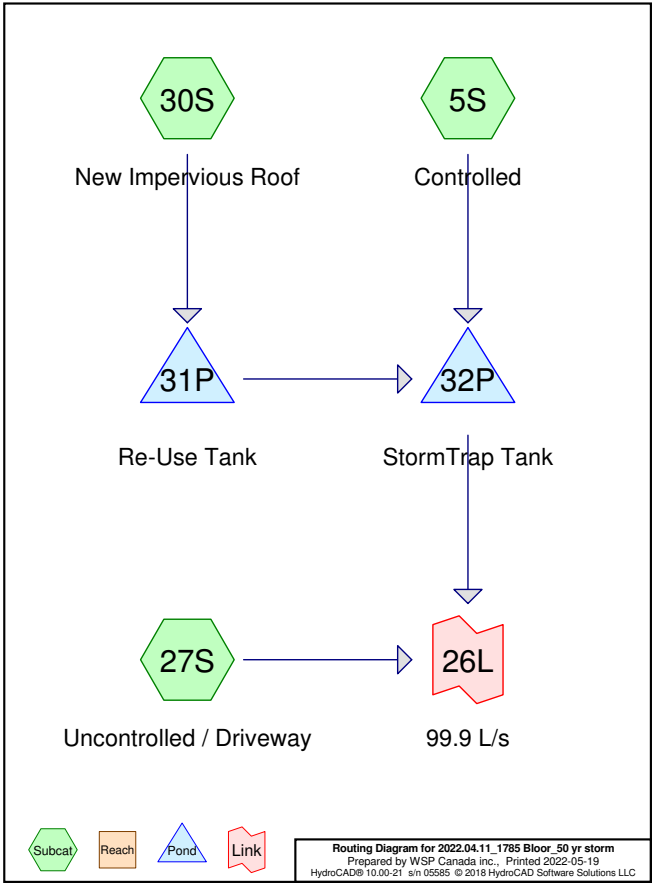
Summary for Link 26L: 99.9 L/s

Inflow Area = 1.0712 ha, 64.75% Impervious, Inflow Depth = 19 mm for 25-Year event  
Inflow = 0.0832 m³/s @ 0.25 hrs, Volume= 0.206 MI  
Primary = 0.0832 m³/s @ 0.25 hrs, Volume= 0.206 MI, 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





Soil Listing (all nodes)

| Area<br>(hectares) | Soil<br>Group | Subcatchment<br>Numbers |
|--------------------|---------------|-------------------------|
| 0.0000             | HSG A         |                         |
| 0.0000             | HSG B         |                         |
| 0.0000             | HSG C         |                         |
| 0.0000             | HSG D         |                         |
| 1.0712             | Other         | 5S, 27S, 30S            |
| 1.0712             |               | TOTAL AREA              |

Area Listing (all nodes)

| Area<br>(hectares) | C    | Description<br>(subcatchment-numbers) |
|--------------------|------|---------------------------------------|
| 0.1068             | 1.00 | At Grade Impervious / Walkway (5S)    |
| 0.1415             | 1.00 | At Grade Impervious/Driveway (27S)    |
| 0.0732             | 1.00 | Impervious At-Grade (30S)             |
| 0.3722             | 1.00 | Impervious Roof (5S)                  |
| 0.3776             | 0.30 | Soft Landscaping (5S)                 |
| 1.0712             | 0.75 | TOTAL AREA                            |

Ground Covers (all nodes)

| HSG-A<br>(hectares) | HSG-B<br>(hectares) | HSG-C<br>(hectares) | HSG-D<br>(hectares) | Other<br>(hectares) | Total<br>(hectares) | Ground<br>Cover               | Subcatc<br>Number |
|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|-------------------------------|-------------------|
| 0.0000              | 0.0000              | 0.0000              | 0.0000              | 0.1068              | 0.1068              | At Grade Impervious / Walkway |                   |
| 0.0000              | 0.0000              | 0.0000              | 0.0000              | 0.1415              | 0.1415              | At Grade Impervious/Driveway  |                   |
| 0.0000              | 0.0000              | 0.0000              | 0.0000              | 0.0732              | 0.0732              | Impervious At-Grade           |                   |
| 0.0000              | 0.0000              | 0.0000              | 0.0000              | 0.3722              | 0.3722              | Impervious Roof               |                   |
| 0.0000              | 0.0000              | 0.0000              | 0.0000              | 0.3776              | 0.3776              | Soft Landscaping              |                   |
| 0.0000              | 0.0000              | 0.0000              | 0.0000              | 1.0712              | 1.0712              | 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                                                                         |                                                                                                                |
| Subcatchment 5S: Controlled                                                                                                                      | Runoff Area=8,565.8 m² 55.92% Impervious Runoff Depth=22 mm<br>Tc=15.0 min C=0.69 Runoff=0.2087 m³/s 0.188 MI  |
| Subcatchment 27S: Uncontrolled /                                                                                                                 | Runoff Area=1,414.7 m² 100.00% Impervious Runoff Depth=32 mm<br>Tc=15.0 min C=1.00 Runoff=0.0500 m³/s 0.045 MI |
| Subcatchment 30S: New Impervious                                                                                                                 | Runoff Area=731.5 m² 100.00% Impervious Runoff Depth=32 mm<br>Tc=15.0 min C=1.00 Runoff=0.0258 m³/s 0.023 MI   |
| Pond 31P: Re-Use Tank                                                                                                                            | Peak Elev=10.775 m Storage=0.023 MI Inflow=0.0258 m³/s 0.023 MI<br>Outflow=0.0000 m³/s 0.000 MI                |
| Pond 32P: StormTrap Tank                                                                                                                         | Peak Elev=1.721 m Storage=129.7 m³ Inflow=0.2087 m³/s 0.188 MI<br>Outflow=0.0543 m³/s 0.188 MI                 |
| Link 26L: 99.9 L/s                                                                                                                               | Inflow=0.0916 m³/s 0.233 MI<br>Primary=0.0916 m³/s 0.233 MI                                                    |
| Total Runoff Area = 1.0712 ha Runoff Volume = 0.256 MI Average Runoff Depth = 24 mm<br>35.25% Pervious = 0.3776 ha 64.75% Impervious = 0.6936 ha |                                                                                                                |

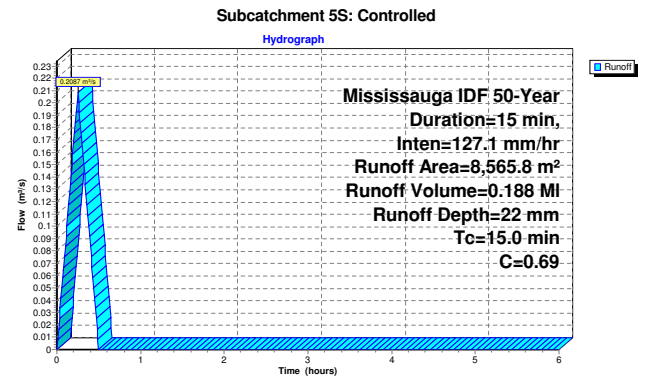
Summary for Subcatchment 5S: Controlled

Runoff = 0.2087 m³/s @ 0.25 hrs, Volume= 0.188 MI, 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 50-Year Duration=15 min, Inten=127.1 mm/hr

| Area (m²) | C    | Description                   |
|-----------|------|-------------------------------|
| 3,722.1   | 1.00 | Impervious Roof               |
| 3,775.7   | 0.30 | Soft Landscaping              |
| 1,068.0   | 1.00 | At Grade Impervious / Walkway |
| 8,565.8   | 0.69 | Weighted Average              |
| 3,775.7   |      | 44.08% Pervious Area          |
| 4,790.1   |      | 55.92% Impervious Area        |

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



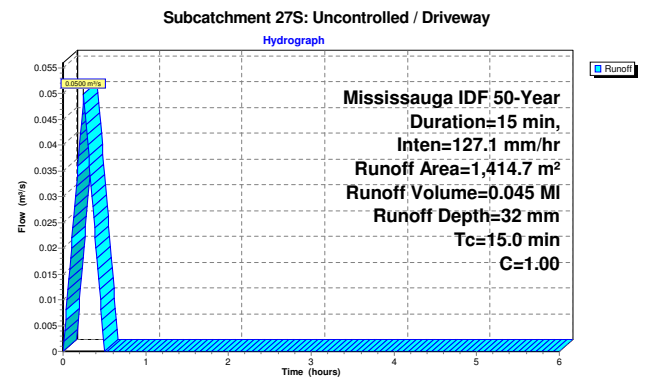
Summary for Subcatchment 27S: Uncontrolled / Driveway

Runoff = 0.0500 m³/s @ 0.25 hrs, Volume= 0.045 MI, Depth= 32 mm

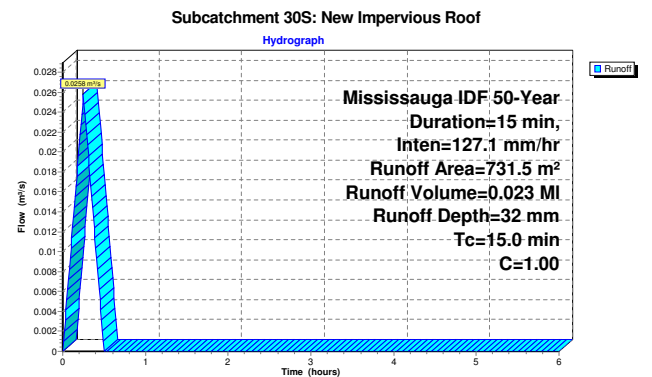
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs  
Mississauga IDF 50-Year Duration=15 min, Inten=127.1 mm/hr

| Area (m²) | C    | Description                  |
|-----------|------|------------------------------|
| 1,414.7   | 1.00 | At Grade-Impervious/Driveway |
| 1,414.7   |      | 100.00% Impervious Area      |

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



| Summary for Subcatchment 30S: New Impervious Roof                                                                                                      |                    |                         |                     |                    |                        |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-------------------------|---------------------|--------------------|------------------------|
| Runoff                                                                                                                                                 | =                  | 0.0258 m³/s @           | 0.25 hrs,           | Volume=            | 0.023 MI, Depth= 32 mm |
| Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs<br>Mississauga IDF 50-Year Duration=15 min, Inten=127.1 mm/hr |                    |                         |                     |                    |                        |
| Area (m²)                                                                                                                                              |                    | C                       | Description         |                    |                        |
| 731.5                                                                                                                                                  |                    | 1.00                    | Impervious At-Grade |                    |                        |
| 731.5                                                                                                                                                  |                    | 100.00% Impervious Area |                     |                    |                        |
| Tc<br>(min)                                                                                                                                            | Length<br>(meters) | Slope<br>(m/m)          | Velocity<br>(m/sec) | Capacity<br>(m³/s) | Description            |
| 15.0                                                                                                                                                   |                    |                         |                     |                    | Direct Entry,          |



Summary for Pond 31P: Re-Use Tank

Inflow Area = 0.0732 ha, 100.00% Impervious, Inflow Depth = 32 mm for 50-Year event  
Inflow = 0.0258 m³/s @ 0.25 hrs, Volume= 0.023 MI  
Outflow = 0.0000 m³/s @ 0.00 hrs, Volume= 0.000 MI, Atten= 100%, Lag= 0.0 min  
Primary = 0.0000 m³/s @ 0.00 hrs, Volume= 0.000 MI

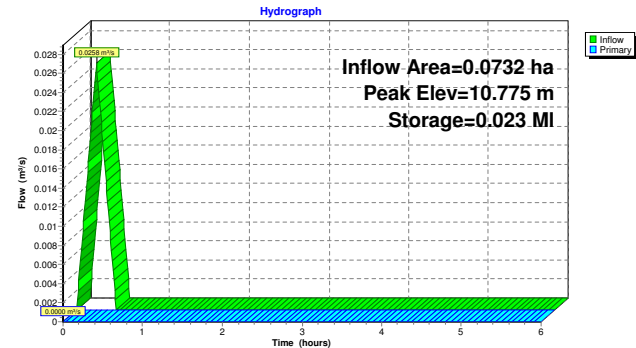
Routing by Stor-Ind method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs  
Starting Elev= 0.800 m Surf.Area= 0.0000 ha Storage= 0.000 MI  
Peak Elev= 10.775 m @ 0.50 hrs Surf.Area= 0.0030 ha Storage= 0.023 MI

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 | 0.030 MI      | 6.00 mW x 5.00 m x 1.00 mH Prismatoid |
| Device | Routing  | Invert        | Outlet Devices                        |
| #1     | Primary  | 10.800 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: StormTrap Tank

Inflow Area = 0.9297 ha, 59.39% Impervious, Inflow Depth = 20 mm for 50-Year event  
Inflow = 0.2087 m³/s @ 0.25 hrs, Volume= 0.188 MI  
Outflow = 0.0543 m³/s @ 0.43 hrs, Volume= 0.188 MI, Atten= 74%, Lag= 11.1 min  
Primary = 0.0543 m³/s @ 0.43 hrs, Volume= 0.188 MI

Routing by Stor-Ind method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs  
Starting Elev= 0.100 m Surf.Area= 98.6 m² Storage= 0.0 m³  
Peak Elev= 1.721 m @ 0.43 hrs Surf.Area= 98.6 m² Storage= 129.7 m³ (129.7 m³ above start)

Plug-Flow detention time= 28.3 min calculated for 0.188 MI (100% of inflow)  
Center-of-Mass det. time= 28.4 min ( 43.4 - 15.0 )

| Volume   | Invert  | Avail.Storage | Storage Description                                                                                                                                                                                                                                                                                          |
|----------|---------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1A      | 0.000 m | 0.0 m³        | 21.02 mW x 4.69 m x 2.18 mH Field A<br>215.5 m³ Overall - 215.5 m³ Embedded = 0.0 m³ x 40.0% Voids                                                                                                                                                                                                           |
| #2A      | 0.000 m | 151.2 m³      | StormTrap ST1 DoubleTrap 6-0 x 10 Inside #1<br>Inside= 2,102 mmW x 1,829 mmH => 3.528 m² x 4.29 mL = 15.12 m³<br>Outside= 2,102 mmW x 2,184 mmH => 4.591 m² x 4.29 mL = 19.68 m³<br>10 Rows adjusted for 19.65 m³ perimeter wall<br>21.02 m x 4.29 m Core + 0.00 m x 0.20 m Border = 21.02 m x 4.69 m System |
| 151.2 m³ |         |               | Total Available Storage                                                                                                                                                                                                                                                                                      |

Storage Group A created with Chamber Wizard

| Device | Routing | Invert  | Outlet Devices                      |
|--------|---------|---------|-------------------------------------|
| #1     | Primary | 0.100 m | 125 mm Vert. Orifice/Grate C= 0.800 |

Primary OutFlow Max=0.0543 m³/s @ 0.43 hrs HW=1.720 m (Free Discharge)  
1=Orifice/Grate (Orifice Controls 0.0543 m³/s @ 4.42 m/s)

Pond 32P: StormTrap Tank - Chamber Wizard Field A

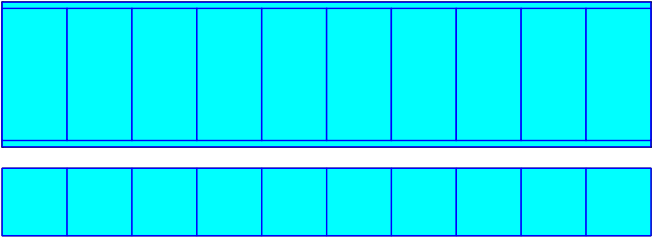
Chamber Model = StormTrap ST1 DoubleTrap 6-0 (StormTrap ST1 DoubleTrap® Type I/III/VI)

Inside= 2,102 mmW x 1,829 mmH => 3.528 m² x 4.29 mL = 15.12 m³  
Outside= 2,102 mmW x 2,184 mmH => 4.591 m² x 4.29 mL = 19.68 m³  
10 Rows adjusted for 19.65 m³ perimeter wall

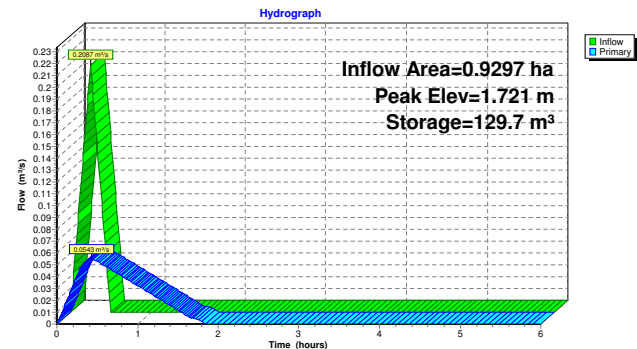
1 Chambers/Row x 4.29 m Long = 4.29 m Row Length +203 mm Border x 2 = 4.69 m Base Length  
10 Rows x 2,102 mm Wide = 21.02 m Base Width  
2,184 mm Chamber Height = 2.18 m Field Height

0.48 m² Sidewall x 1 x 2 + 0.93 m² Endwall x 10 x 2 = 19.65 m³ Perimeter Wall  
10 Chambers x 15.12 m³ - 19.65 m³ Perimeter wall = 131.56 m³ Chamber Storage  
10 Chambers x 19.68 m³ + 18.66 m³ Border = 215.45 m³ Displacement

Chamber Storage = 131.56 m³ = 0.132 MI  
Overall Storage Efficiency = 61.1%  
Overall System Size = 4.69 m x 21.02 m x 2.18 m



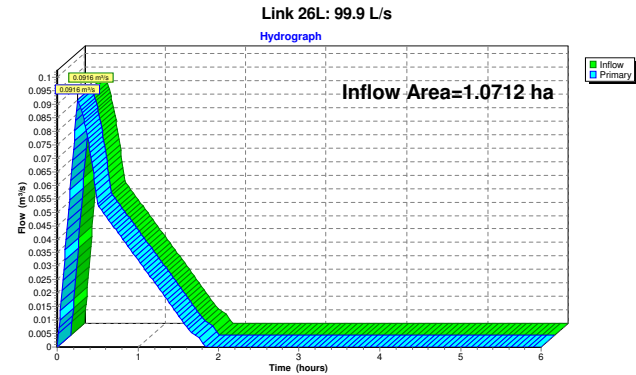
Pond 32P: StormTrap Tank

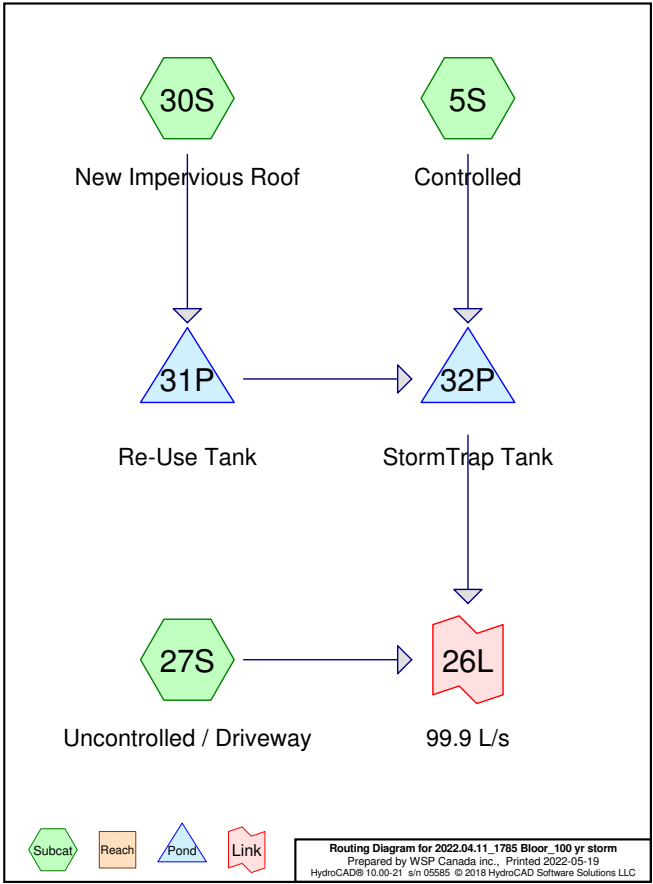


Summary for Link 26L: 99.9 L/s

Inflow Area = 1.0712 ha, 64.75% Impervious, Inflow Depth = 22 mm for 50-Year event  
Inflow = 0.0916 m³/s @ 0.25 hrs, Volume= 0.233 MI  
Primary = 0.0916 m³/s @ 0.25 hrs, Volume= 0.233 MI, Atten= 0%, Lag= 0.0 min

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





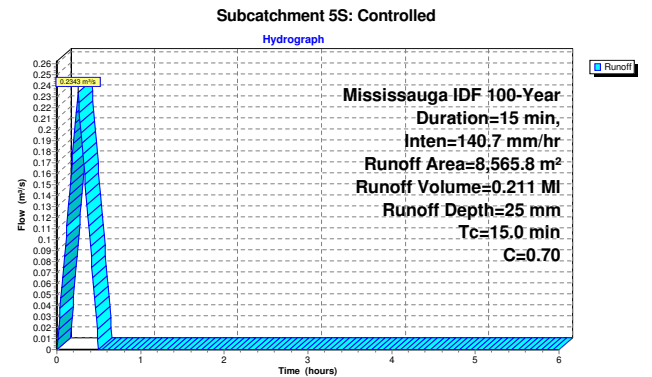
| Area Listing (all nodes) |      |                                       |
|--------------------------|------|---------------------------------------|
| Area<br>(hectares)       | C    | Description<br>(subcatchment-numbers) |
| 0.1068                   | 1.00 | At Grade Impervious / Walkway (5S)    |
| 0.1415                   | 1.00 | At Grade Impervious/Driveway (27S)    |
| 0.0732                   | 1.00 | Impervious At-Grade (30S)             |
| 0.3722                   | 1.00 | Impervious Roof (5S)                  |
| 0.3776                   | 0.31 | Soft Landscaping (5S)                 |
| 1.0712                   | 0.76 | TOTAL AREA                            |

| Soil Listing (all nodes) |               |                         |
|--------------------------|---------------|-------------------------|
| Area<br>(hectares)       | Soil<br>Group | Subcatchment<br>Numbers |
| 0.0000                   | HSG A         |                         |
| 0.0000                   | HSG B         |                         |
| 0.0000                   | HSG C         |                         |
| 0.0000                   | HSG D         |                         |
| 1.0712                   | Other         | 5S, 27S, 30S            |
| 1.0712                   |               | TOTAL AREA              |

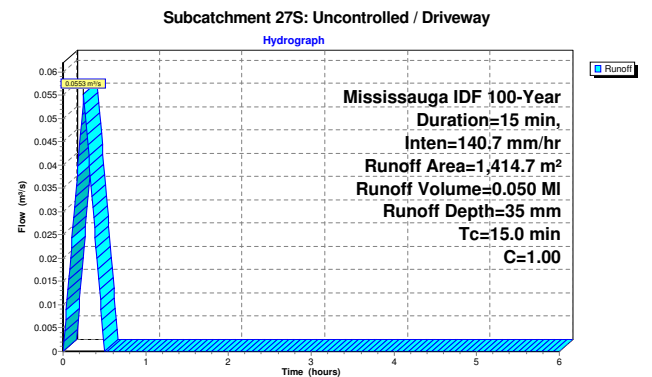
| Ground Covers (all nodes) |                     |                     |                     |                     |                     |  | Ground<br>Cover                  | Subcatc<br>Number |
|---------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|--|----------------------------------|-------------------|
| HSG-A<br>(hectares)       | HSG-B<br>(hectares) | HSG-C<br>(hectares) | HSG-D<br>(hectares) | Other<br>(hectares) | Total<br>(hectares) |  |                                  |                   |
| 0.0000                    | 0.0000              | 0.0000              | 0.0000              | 0.1068              | 0.1068              |  | At Grade Impervious /<br>Walkway |                   |
| 0.0000                    | 0.0000              | 0.0000              | 0.0000              | 0.1415              | 0.1415              |  | At<br>Grade Impervious/Driveway  |                   |
| 0.0000                    | 0.0000              | 0.0000              | 0.0000              | 0.0732              | 0.0732              |  | Impervious At-Grade              |                   |
| 0.0000                    | 0.0000              | 0.0000              | 0.0000              | 0.3722              | 0.3722              |  | Impervious Roof                  |                   |
| 0.0000                    | 0.0000              | 0.0000              | 0.0000              | 0.3776              | 0.3776              |  | Soft Landscaping                 |                   |
| 0.0000                    | 0.0000              | 0.0000              | 0.0000              | 1.0712              | 1.0712              |  | 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                                                                         |                                                                                                                |
| Subcatchment 5S: Controlled                                                                                                                      | Runoff Area=8,565.8 m² 55.92% Impervious Runoff Depth=25 mm<br>Tc=15.0 min C=0.70 Runoff=0.2343 m³/s 0.211 MI  |
| Subcatchment 27S: Uncontrolled /                                                                                                                 | Runoff Area=1,414.7 m² 100.00% Impervious Runoff Depth=35 mm<br>Tc=15.0 min C=1.00 Runoff=0.0553 m³/s 0.050 MI |
| Subcatchment 30S: New Impervious                                                                                                                 | Runoff Area=731.5 m² 100.00% Impervious Runoff Depth=35 mm<br>Tc=15.0 min C=1.00 Runoff=0.0286 m³/s 0.026 MI   |
| Pond 31P: Re-Use Tank                                                                                                                            | Peak Elev=10.842 m Storage=0.025 MI Inflow=0.0286 m³/s 0.026 MI<br>Outflow=0.0025 m³/s 0.002 MI                |
| Pond 32P: StormTrap Tank                                                                                                                         | Peak Elev=1.948 m Storage=148.5 m³ Inflow=0.2343 m³/s 0.213 MI<br>Outflow=0.0581 m³/s 0.213 MI                 |
| Link 26L: 99.9 L/s                                                                                                                               | Inflow=0.0997 m³/s 0.262 MI<br>Primary=0.0997 m³/s 0.262 MI                                                    |
| Total Runoff Area = 1.0712 ha Runoff Volume = 0.286 MI Average Runoff Depth = 27 mm<br>35.25% Pervious = 0.3776 ha 64.75% Impervious = 0.6936 ha |                                                                                                                |

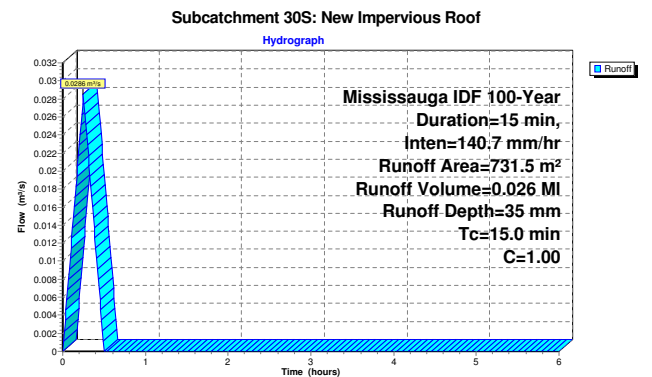
|                                                                                                                                                         |                                                                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| Summary for Subcatchment 5S: Controlled                                                                                                                 |                                                                          |
| Runoff                                                                                                                                                  | = 0.2343 m³/s @ 0.25 hrs, Volume= 0.211 MI, Depth= 25 mm                 |
| Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs<br>Mississauga IDF 100-Year Duration=15 min, Inten=140.7 mm/hr |                                                                          |
| Area (m²)                                                                                                                                               | C Description                                                            |
| 3,722.1                                                                                                                                                 | 1.00 Impervious Roof                                                     |
| 3,775.7                                                                                                                                                 | 0.31 Soft Landscaping                                                    |
| 1,068.0                                                                                                                                                 | 1.00 At Grade Impervious / Walkway                                       |
| 8,565.8                                                                                                                                                 | 0.70 Weighted Average                                                    |
| 3,775.7                                                                                                                                                 | 44.08% Pervious Area                                                     |
| 4,790.1                                                                                                                                                 | 55.92% Impervious Area                                                   |
| Tc (min)                                                                                                                                                | Length (meters) Slope (m/m) Velocity (m/sec) Capacity (m³/s) Description |
| 15.0                                                                                                                                                    | Direct Entry,                                                            |



|                                                                                                                                                         |                                                                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| Summary for Subcatchment 27S: Uncontrolled / Driveway                                                                                                   |                                                                          |
| Runoff                                                                                                                                                  | = 0.0553 m³/s @ 0.25 hrs, Volume= 0.050 MI, Depth= 35 mm                 |
| Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs<br>Mississauga IDF 100-Year Duration=15 min, Inten=140.7 mm/hr |                                                                          |
| Area (m²)                                                                                                                                               | C Description                                                            |
| 1,414.7                                                                                                                                                 | 1.00 At Grade-Impervious/Driveway                                        |
| 1,414.7                                                                                                                                                 | 100.00% Impervious Area                                                  |
| Tc (min)                                                                                                                                                | Length (meters) Slope (m/m) Velocity (m/sec) Capacity (m³/s) Description |
| 15.0                                                                                                                                                    | Direct Entry,                                                            |



|                                                                                                                                                         |                                                                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| Summary for Subcatchment 30S: New Impervious Roof                                                                                                       |                                                                          |
| Runoff                                                                                                                                                  | = 0.0286 m³/s @ 0.25 hrs, Volume= 0.026 MI, Depth= 35 mm                 |
| Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs<br>Mississauga IDF 100-Year Duration=15 min, Inten=140.7 mm/hr |                                                                          |
| Area (m²)                                                                                                                                               | C Description                                                            |
| 731.5                                                                                                                                                   | 1.00 Impervious At-Grade                                                 |
| 731.5                                                                                                                                                   | 100.00% Impervious Area                                                  |
| Tc (min)                                                                                                                                                | Length (meters) Slope (m/m) Velocity (m/sec) Capacity (m³/s) Description |
| 15.0                                                                                                                                                    | Direct Entry,                                                            |



Summary for Pond 31P: Re-Use Tank

Inflow Area = 0.0732 ha, 100.00% Impervious, Inflow Depth = 35 mm for 100-Year event  
Inflow = 0.0286 m³/s @ 0.25 hrs, Volume= 0.026 MI  
Outflow = 0.0025 m³/s @ 0.48 hrs, Volume= 0.002 MI, Atten= 91%, Lag= 13.7 min  
Primary = 0.0025 m³/s @ 0.48 hrs, Volume= 0.002 MI

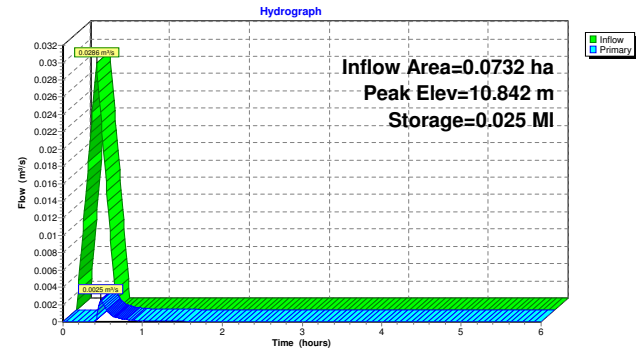
Routing by Stor-Ind method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs  
Starting Elev= 0.800 m Surf.Area= 0.0000 ha Storage= 0.000 MI  
Peak Elev= 10.842 m @ 0.48 hrs Surf.Area= 0.0030 ha Storage= 0.025 MI

Plug-Flow detention time= 39.5 min calculated for 0.002 MI (7% of inflow)  
Center-of-Mass det. time= 28.1 min ( 43.1 - 15.0 )

| Volume | Invert   | Avail.Storage | Storage Description                    |
|--------|----------|---------------|----------------------------------------|
| #1     | 10.000 m | 0.030 MI      | 6.00 mW x 5.00 mL x 1.00 mH Prismatoid |
| Device | Routing  | Invert        | Outlet Devices                         |
| #1     | Primary  | 10.800 m      | 200 mm Vert. Orifice/Grate C= 0.800    |

Primary OutFlow Max=0.0025 m³/s @ 0.48 hrs HW=10.842 m (Free Discharge)  
1=Orifice/Grate (Orifice Controls 0.0025 m³/s @ 0.52 m/s)

Pond 31P: Re-Use Tank



Summary for Pond 32P: StormTrap Tank

Inflow Area = 0.9297 ha, 59.39% Impervious, Inflow Depth = 23 mm for 100-Year event  
Inflow = 0.2343 m³/s @ 0.25 hrs, Volume= 0.213 MI  
Outflow = 0.0581 m³/s @ 0.44 hrs, Volume= 0.213 MI, Atten= 75%, Lag= 11.4 min  
Primary = 0.0581 m³/s @ 0.44 hrs, Volume= 0.213 MI

Routing by Stor-Ind method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs  
Starting Elev= 0.100 m Surf.Area= 98.6 m² Storage= 0.0 m³  
Peak Elev= 1.948 m @ 0.44 hrs Surf.Area= 98.6 m² Storage= 148.5 m³ (148.5 m³ above start)

Plug-Flow detention time= 30.3 min calculated for 0.212 MI (100% of inflow)  
Center-of-Mass det. time= 30.3 min ( 45.5 - 15.2 )

| Volume   | Invert  | Avail.Storage | Storage Description                                                                                                                                                                                                                                                                                          |
|----------|---------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1A      | 0.000 m | 0.0 m³        | 21.02 mW x 4.69 mL x 2.18 mH Field A<br>215.5 m³ Overall - 215.5 m³ Embedded = 0.0 m³ x 40.0% Voids                                                                                                                                                                                                          |
| #2A      | 0.000 m | 151.2 m³      | StormTrap ST1 DoubleTrap 6-0 x 10 Inside #1<br>Inside= 2,102 mmW x 1,829 mmH => 3.528 m² x 4.29 mL = 15.12 m³<br>Outside= 2,102 mmW x 2,184 mmH => 4.591 m² x 4.29 mL = 19.68 m³<br>10 Rows adjusted for 19.65 m³ perimeter wall<br>21.02 m x 4.29 m Core + 0.00 m x 0.20 m Border = 21.02 m x 4.69 m System |
| 151.2 m³ |         |               | Total Available Storage                                                                                                                                                                                                                                                                                      |

Storage Group A created with Chamber Wizard

| Device | Routing | Invert  | Outlet Devices                      |
|--------|---------|---------|-------------------------------------|
| #1     | Primary | 0.100 m | 125 mm Vert. Orifice/Grate C= 0.800 |

Primary OutFlow Max=0.0581 m³/s @ 0.44 hrs HW=1.948 m (Free Discharge)  
1=Orifice/Grate (Orifice Controls 0.0581 m³/s @ 4.74 m/s)

Pond 32P: StormTrap Tank - Chamber Wizard Field A

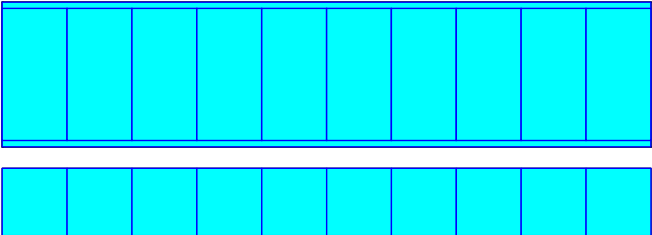
Chamber Model = StormTrap ST1 DoubleTrap 6-0 (StormTrap ST1 DoubleTrap® Type I/III/VI)

Inside= 2,102 mmW x 1,829 mmH => 3.528 m² x 4.29 mL = 15.12 m³  
Outside= 2,102 mmW x 2,184 mmH => 4.591 m² x 4.29 mL = 19.68 m³  
10 Rows adjusted for 19.65 m³ perimeter wall

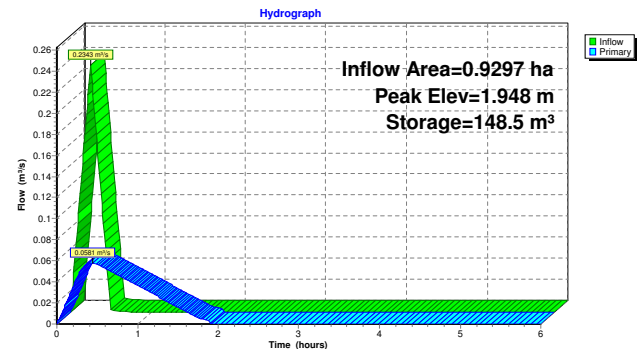
1 Chambers/Row x 4.29 m Long = 4.29 m Row Length +203 mm Border x 2 = 4.69 m Base Length  
10 Rows x 2,102 mm Wide = 21.02 m Base Width  
2,184 mm Chamber Height = 2.18 m Field Height

0.48 m² Sidewall x 1 x 2 + 0.93 m² Endwall x 10 x 2 = 19.65 m³ Perimeter Wall  
10 Chambers x 15.12 m³ - 19.65 m³ Perimeter wall = 131.56 m³ Chamber Storage  
10 Chambers x 19.68 m³ + 18.66 m³ Border = 215.45 m³ Displacement

Chamber Storage = 131.56 m³ = 0.132 MI  
Overall Storage Efficiency = 61.1%  
Overall System Size = 4.69 m x 21.02 m x 2.18 m



Pond 32P: StormTrap Tank



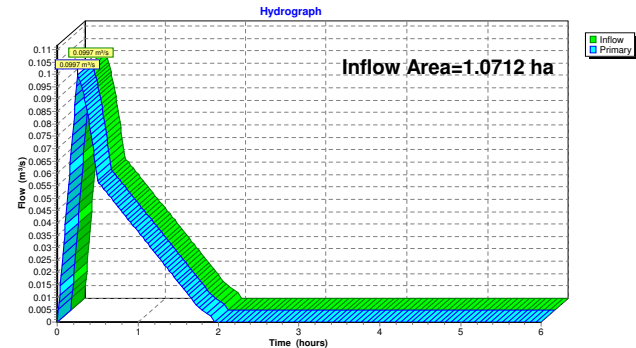


Summary for Link 26L: 99.9 L/s

Inflow Area = 1.0712 ha, 64.75% Impervious, Inflow Depth = 24 mm for 100-Year event  
Inflow = 0.0997 m³/s @ 0.25 hrs, Volume= 0.262 MI  
Primary = 0.0997 m³/s @ 0.25 hrs, Volume= 0.262 MI, 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®EF Sizing Report

## STORMCEPTOR®

### ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

05/19/2022

|                              |                 |                   |                         |
|------------------------------|-----------------|-------------------|-------------------------|
| Province:                    | Ontario         | Project Name:     | 1785 Bloor St.          |
| City:                        | Mississauga     | Project Number:   | 211-10685               |
| Nearest Rainfall Station:    | TORONTO INTL AP | Designer Name:    | Ramin Jalalirad         |
| Climate Station Id:          | 6158731         | Designer Company: | WSP                     |
| Years of Rainfall Data:      | 20              | Designer Email:   | ramin.jalalirad@wsp.com |
| Site Name:                   |                 | Designer Phone:   | 289-789-3210            |
| Drainage Area (ha):          | 0.63            | EOR Name:         |                         |
| % Imperviousness:            | 40.00           | EOR Company:      |                         |
| Runoff Coefficient 'c': 0.54 |                 | EOR Email:        |                         |
| Particle Size Distribution:  | Fine            | EOR Phone:        |                         |
| Target TSS Removal (%):      | 80.0            |                   |                         |

#### Net Annual Sediment (TSS) Load Reduction Sizing Summary

| Stormceptor Model | TSS Removal Provided (%) |
|-------------------|--------------------------|
| EFO4              | 88                       |
| EFO6              | 95                       |
| EFO8              | 98                       |
| EFO10             | 99                       |
| EFO12             | 100                      |

|                                                   |       |
|---------------------------------------------------|-------|
| Required Water Quality Runoff Volume Capture (%): | 90.00 |
| Estimated Water Quality Flow Rate (L/s):          | 10.58 |
| Oil / Fuel Spill Risk Site?                       | Yes   |
| Upstream Flow Control?                            | No    |
| Peak Conveyance (maximum) Flow Rate (L/s):        |       |
| Site Sediment Transport Rate (kg/ha/yr):          |       |

Recommended Stormceptor EFO Model: **EFO4**  
 Estimated Net Annual Sediment (TSS) Load Reduction (%): **88**  
 Water Quality Runoff Volume Capture (%): **> 90**

## Stormceptor® EF Sizing Report

### THIRD-PARTY TESTING AND VERIFICATION

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

### PERFORMANCE

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

### PARTICLE SIZE DISTRIBUTION (PSD)

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

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

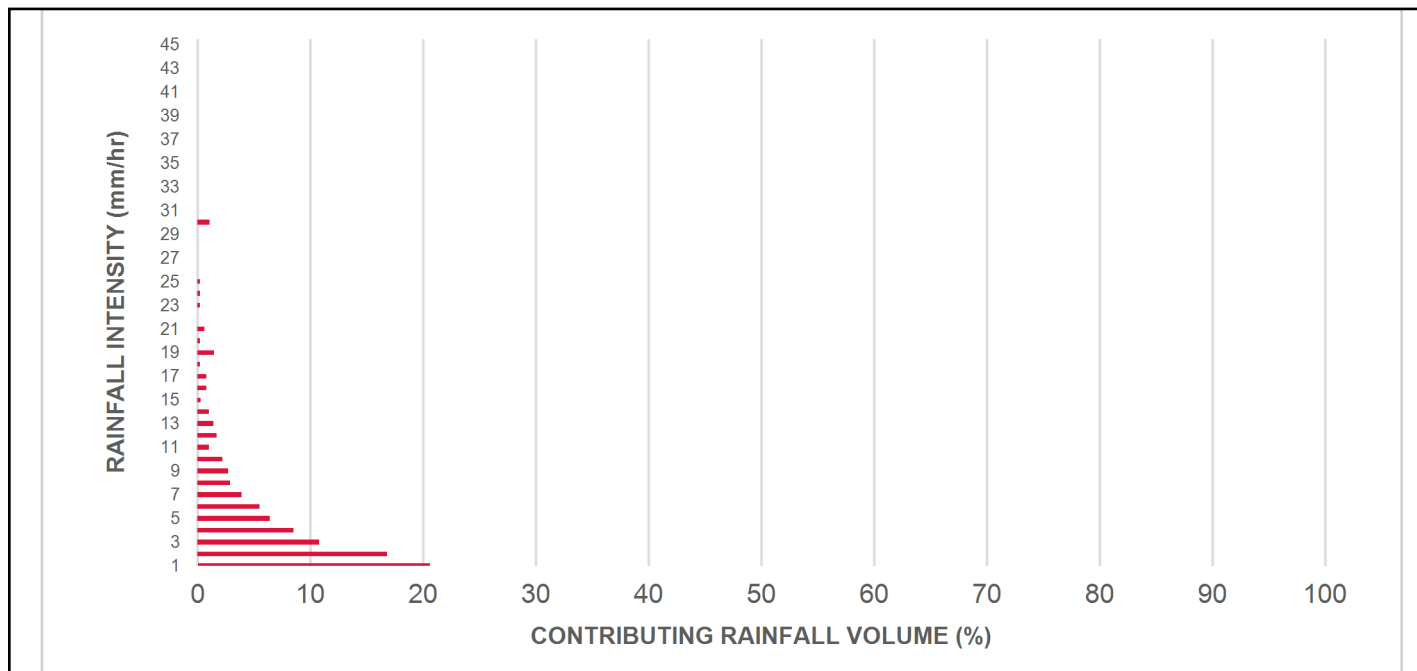
# Stormceptor®EF Sizing Report

| 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 (%) |
|------------------------------------------------------|-----------------------------|--------------------------------|-----------------|-------------------|---------------------------------|------------------------|-------------------------|------------------------|
| 0.5                                                  | 8.5                         | 8.5                            | 0.47            | 28.0              | 24.0                            | 100                    | 8.5                     | 8.5                    |
| 1                                                    | 20.6                        | 29.1                           | 0.95            | 57.0              | 47.0                            | 100                    | 20.6                    | 29.1                   |
| 2                                                    | 16.8                        | 45.9                           | 1.89            | 113.0             | 95.0                            | 97                     | 16.3                    | 45.5                   |
| 3                                                    | 10.8                        | 56.7                           | 2.84            | 170.0             | 142.0                           | 91                     | 9.8                     | 55.2                   |
| 4                                                    | 8.5                         | 65.2                           | 3.78            | 227.0             | 189.0                           | 84                     | 7.1                     | 62.4                   |
| 5                                                    | 6.4                         | 71.6                           | 4.73            | 284.0             | 236.0                           | 82                     | 5.2                     | 67.6                   |
| 6                                                    | 5.5                         | 77.0                           | 5.67            | 340.0             | 284.0                           | 79                     | 4.3                     | 71.9                   |
| 7                                                    | 3.9                         | 81.0                           | 6.62            | 397.0             | 331.0                           | 77                     | 3.0                     | 75.0                   |
| 8                                                    | 2.9                         | 83.9                           | 7.57            | 454.0             | 378.0                           | 75                     | 2.2                     | 77.2                   |
| 9                                                    | 2.7                         | 86.5                           | 8.51            | 511.0             | 426.0                           | 73                     | 2.0                     | 79.1                   |
| 10                                                   | 2.2                         | 88.7                           | 9.46            | 567.0             | 473.0                           | 71                     | 1.5                     | 80.6                   |
| 11                                                   | 1.0                         | 89.7                           | 10.40           | 624.0             | 520.0                           | 68                     | 0.7                     | 81.3                   |
| 12                                                   | 1.7                         | 91.3                           | 11.35           | 681.0             | 567.0                           | 66                     | 1.1                     | 82.4                   |
| 13                                                   | 1.4                         | 92.8                           | 12.29           | 738.0             | 615.0                           | 65                     | 0.9                     | 83.3                   |
| 14                                                   | 1.0                         | 93.7                           | 13.24           | 794.0             | 662.0                           | 64                     | 0.6                     | 83.9                   |
| 15                                                   | 0.3                         | 94.0                           | 14.19           | 851.0             | 709.0                           | 64                     | 0.2                     | 84.1                   |
| 16                                                   | 0.8                         | 94.8                           | 15.13           | 908.0             | 757.0                           | 63                     | 0.5                     | 84.6                   |
| 17                                                   | 0.8                         | 95.7                           | 16.08           | 965.0             | 804.0                           | 63                     | 0.5                     | 85.2                   |
| 18                                                   | 0.2                         | 95.8                           | 17.02           | 1021.0            | 851.0                           | 63                     | 0.1                     | 85.3                   |
| 19                                                   | 1.5                         | 97.3                           | 17.97           | 1078.0            | 898.0                           | 62                     | 0.9                     | 86.2                   |
| 20                                                   | 0.2                         | 97.5                           | 18.92           | 1135.0            | 946.0                           | 62                     | 0.1                     | 86.3                   |
| 21                                                   | 0.6                         | 98.2                           | 19.86           | 1192.0            | 993.0                           | 62                     | 0.4                     | 86.7                   |
| 22                                                   | 0.0                         | 98.2                           | 20.81           | 1248.0            | 1040.0                          | 61                     | 0.0                     | 86.7                   |
| 23                                                   | 0.2                         | 98.4                           | 21.75           | 1305.0            | 1088.0                          | 60                     | 0.1                     | 86.8                   |
| 24                                                   | 0.2                         | 98.6                           | 22.70           | 1362.0            | 1135.0                          | 59                     | 0.1                     | 87.0                   |
| 25                                                   | 0.2                         | 98.9                           | 23.64           | 1419.0            | 1182.0                          | 57                     | 0.1                     | 87.1                   |
| 30                                                   | 1.1                         | 100.0                          | 28.37           | 1702.0            | 1419.0                          | 52                     | 0.6                     | 87.7                   |
| 35                                                   | 0.0                         | 100.0                          | 33.10           | 1986.0            | 1655.0                          | 44                     | 0.0                     | 87.7                   |
| 40                                                   | 0.0                         | 100.0                          | 37.83           | 2270.0            | 1892.0                          | 39                     | 0.0                     | 87.7                   |
| 45                                                   | 0.0                         | 100.0                          | 42.56           | 2554.0            | 2128.0                          | 35                     | 0.0                     | 87.7                   |
| Estimated Net Annual Sediment (TSS) Load Reduction = |                             |                                |                 |                   |                                 |                        |                         | 88 %                   |

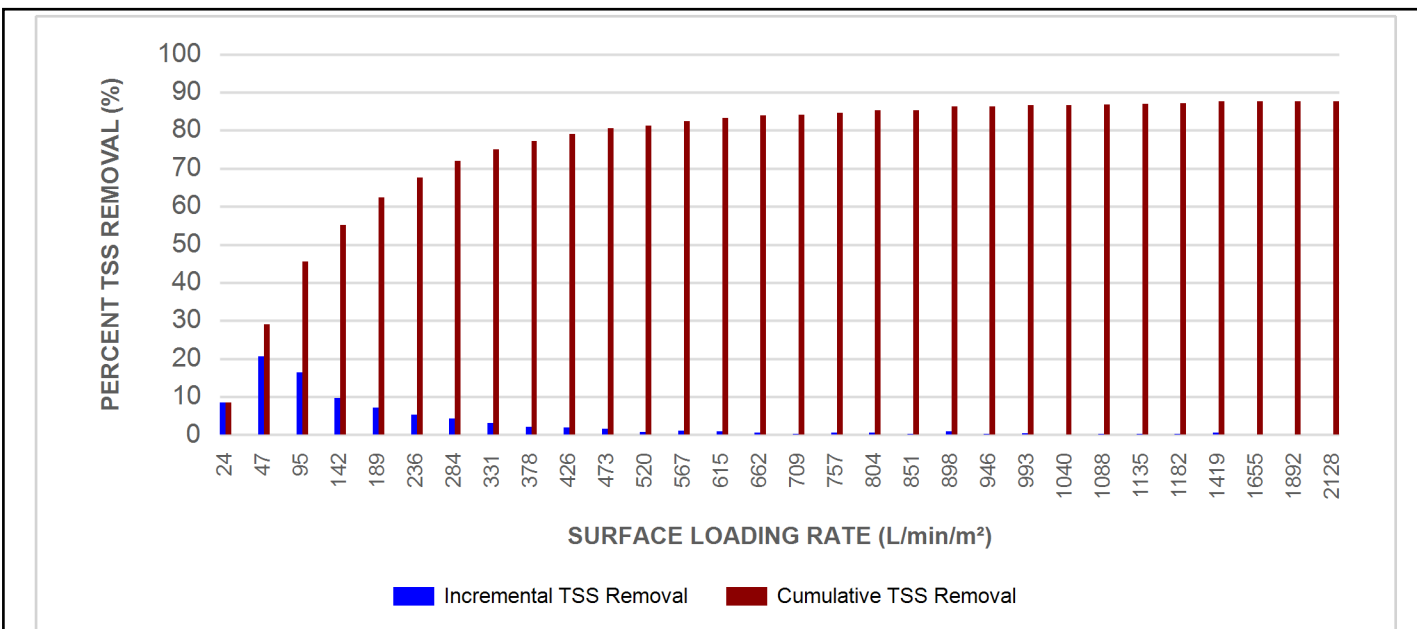
Climate Station ID: 6158731 Years of Rainfall Data: 20

# Stormceptor®EF Sizing Report

## RAINFALL DATA FROM TORONTO INTL AP RAINFALL STATION



## INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



## Stormceptor® EF Sizing Report

### Maximum Pipe Diameter / Peak Conveyance

| Stormceptor<br>EF / EFO | Model Diameter |      | Min Angle Inlet /<br>Outlet Pipes | Max Inlet Pipe<br>Diameter |      | Max Outlet Pipe<br>Diameter |      | Peak Conveyance<br>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

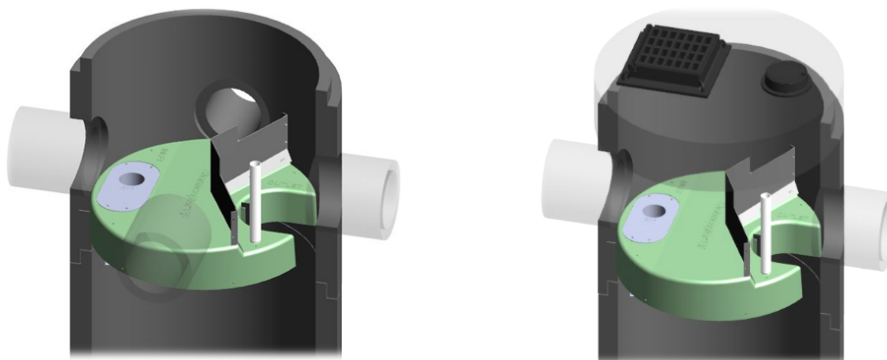
► **Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test 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

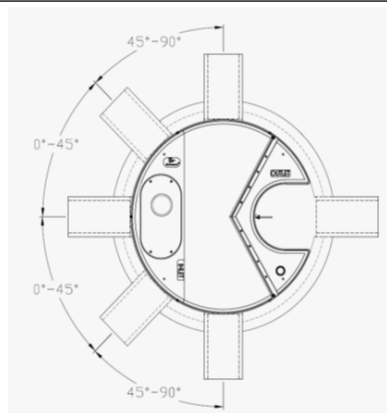
► **Stormceptor® EF and EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend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



## Stormceptor® EF Sizing Report



### 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)                       | (ft³) | (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/ft³ )

| 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>



## Stormceptor®EF Sizing Report

### 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 Separators**

##### 1.3 SUBMITTALS

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

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

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

#### PART 2 – PRODUCTS

##### 2.1 OGS POLLUTANT STORAGE

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

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

## Stormceptor®EF Sizing Report

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<sup>2</sup> to 1400 L/min/m<sup>2</sup>, 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<sup>2</sup> and 1400 L/min/m<sup>2</sup> 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<sup>2</sup> shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m<sup>2</sup>. No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m<sup>2</sup>.

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m<sup>2</sup> shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m<sup>2</sup>, and shall be calculated using a simple proportioning formula, with 1400 L/min/m<sup>2</sup> 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<sup>2</sup>.

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<sup>2</sup>.

### 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

*Stormceptor®EF Sizing Report*

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<sup>2</sup> to 2600 L/min/m<sup>2</sup>) 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

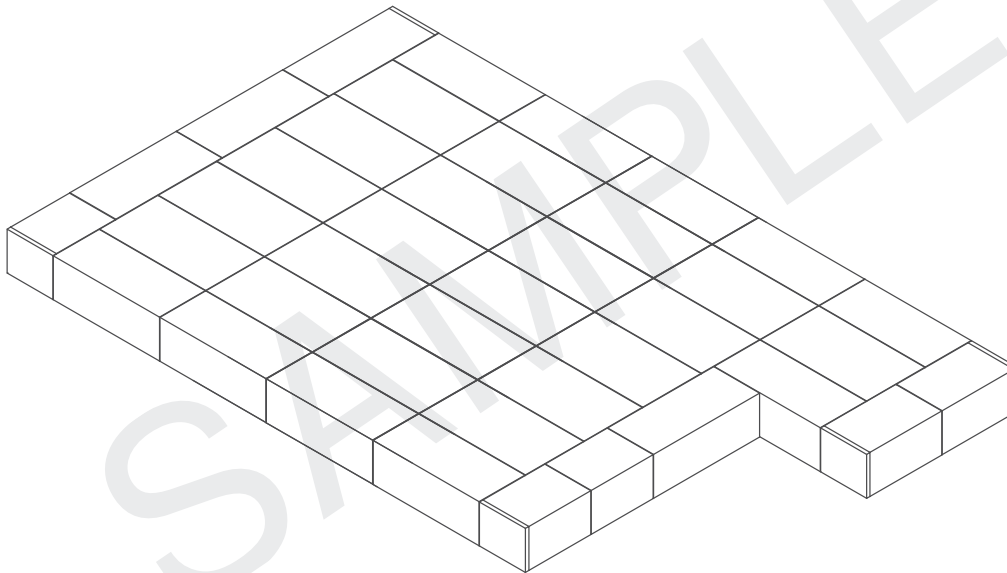
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## STORMTRAP CHAMBER SPECIFICATIONS



**StormTrap®**  
MODULAR CONCRETE  
STORMWATER MANAGEMENT

CONTACT STORMTRAP TO REQUEST A DESIGN AND  
BUDGET FOR YOUR SPECIFIC PROJECT NEEDS.



| SHEET INDEX |                                                  |
|-------------|--------------------------------------------------|
| PAGE        | DESCRIPTION                                      |
| 0.0         | COVER SHEET                                      |
| 1.0         | SINGLETRAP DESIGN CRITERIA                       |
| 2.0         | SINGLETRAP SYSTEM LAYOUT                         |
| 2.1         | SINGLETRAP FOUNDATION LAYOUT                     |
| 3.0         | SINGLETRAP INSTALLATION SPECIFICATIONS           |
| 3.1         | SINGLETRAP INSTALLATION SPECIFICATIONS           |
| 4.0         | SINGLETRAP BACKFILL SPECIFICATIONS               |
| 5.0         | RECOMMENDED PIPE / ACCESS OPENING SPECIFICATIONS |
| 6.0         | SINGLETRAP MODULE TYPES                          |
|             |                                                  |
|             |                                                  |

| STORMTRAP CONTACT INFORMATION |           |
|-------------------------------|-----------|
| STORM TRAP SUPPLIER:          | STORMTRAP |
| CONTACT NAME:                 | STORMTRAP |
| CELL PHONE:                   | STORMTRAP |
| SALES EMAIL:                  | STORMTRAP |

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COVER SHEET

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SINGLETRAP® - DETENTION  
SAMPLE DRAWING

### STORMTRAP SYSTEM INFORMATION

WATER STORAGE REQ'D: 20000 CUBIC FEET  
WATER STORAGE PROV: 21379.17 CUBIC FEET  
UNIT HEADROOM: 5' 0" SINGLETRAP  
UNIT QUANTITY: 42 TOTAL PIECES

### STORMTRAP STRUCTURAL DESIGN CRITERIA

1. STORMTRAP MODULES SHALL BE MANUFACTURED AND INSTALLED ACCORDING TO SHOP DRAWINGS APPROVED BY THE INSTALLING CONTRACTOR AND ENGINEER OF RECORD. THE SHOP DRAWINGS SHALL INDICATE SIZE AND LOCATION OF ROOF OPENINGS AND INLET/ OUTLET PIPE TYPES, SIZES, INVERT ELEVATIONS AND SIZE OF OPENINGS.
2. COVER RANGE: MIN. 1.08' MAX. 10.00'(CONSULT STORMTRAP FOR ADDITIONAL COVER OPTIONS).
3. ALL DIMENSIONS AND SOIL CONDITIONS, INCLUDING BUT NOT LIMITED TO GROUNDWATER AND SOIL BEARING CAPACITY ARE REQUIRED TO BE VERIFIED IN THE FIELD BY OTHERS PRIOR TO STORMTRAP INSTALLATION.

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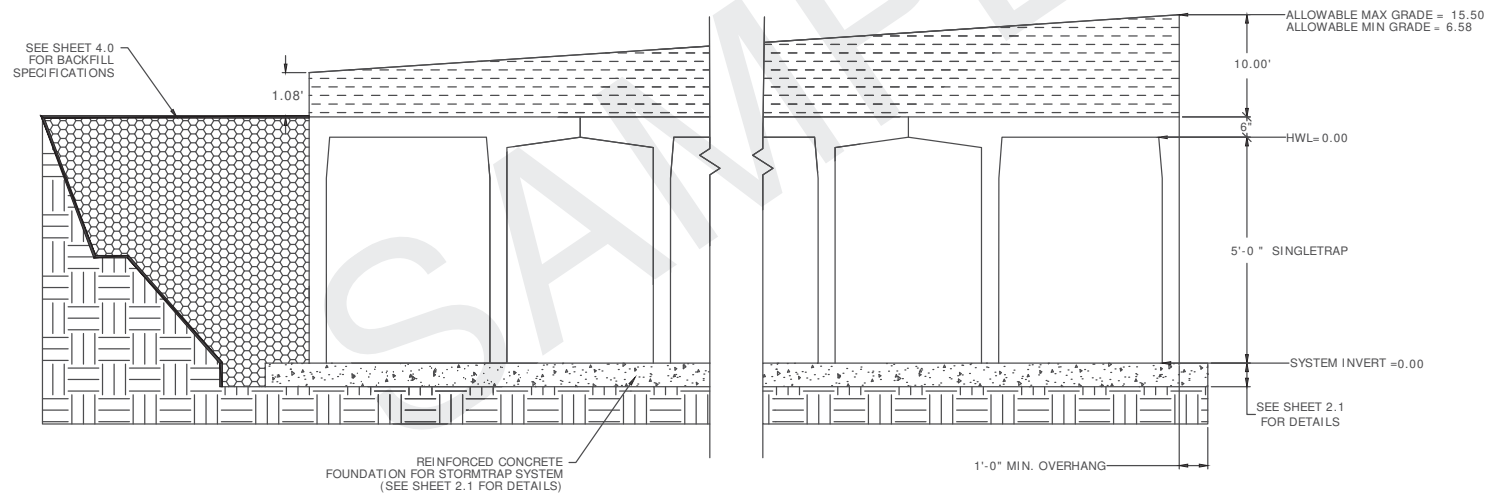
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### SHEET TITLE:

SINGLETRAP  
DESIGN  
CRITERIA

### SHEET NUMBER:

1.0

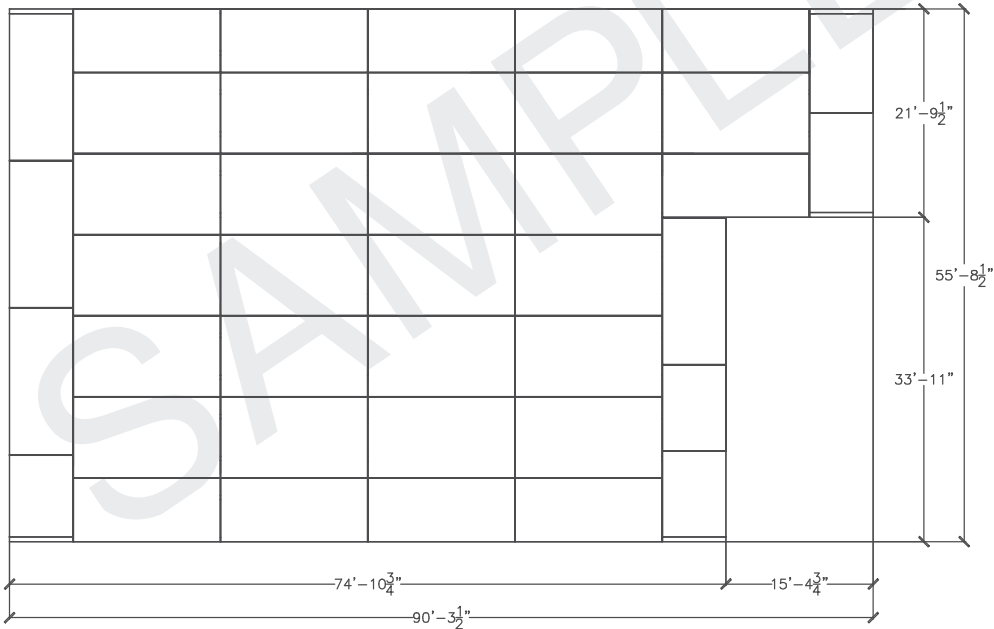


5'-0" SINGLETRAP

| BILL OF MATERIALS |           |                  |        |
|-------------------|-----------|------------------|--------|
| QTY.              | UNIT TYPE | DESCRIPTION      | WEIGHT |
| 21                | I         | 5' 0" SINGLETRAP |        |
| 0                 | II        | 5' 0" SINGLETRAP |        |
| 13                | III       | 5' 0" SINGLETRAP |        |
| 3                 | IV        | 5' 0" SINGLETRAP |        |
| 0                 | VII       | 5' 0" SINGLETRAP |        |
| 5                 | SPI V     | 5' 0" SINGLETRAP |        |
| 5                 | PANEL     | 8" THICK PANELS  |        |
| 8                 | JOINTWRAP | 150' PER ROLL    |        |
| 32                | JOINTTAPE | 14.5' PER ROLL   |        |

DESIGN CRITERIA  
ALLOWABLE MAX GRADE= 15.50  
ALLOWABLE MIN GRADE = 6.58  
INSIDE HEIGHT ELEVATION = 0.00  
SYSTEM INVERT = 0.00  
STORMTRAP VOLUME = 21379.17 C.F.

- NOTES:
- DIMENSIONING OF STORMTRAP SYSTEM SHOWN BELOW ALLOW FOR A 3/4" GAP BETWEEN EACH MODULE.
  - ALL DIMENSIONS TO BE VERIFIED IN THE FIELD BY OTHERS.
  - SEE SHEET 3.0 FOR INSTALLATION SPECIFICATIONS.
  - SP - INDICATES A MODULE WITH MODIFICATIONS.
  - P - INDICATES A MODULE WITH A PANEL ATTACHMENT.
  - CONTRACTORS RESPONSIBILITY TO ENSURE CONSISTENCY/ACCURACY TO FINAL ENGINEER OF RECORD PLAN SET.





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SHEET TITLE:

SINGLETRAP  
SYSTEM LAYOUT

SHEET NUMBER:

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ENGINEER INFORMATION:

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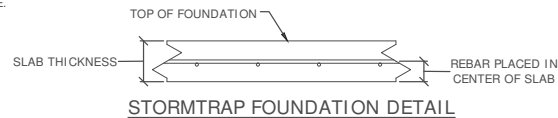
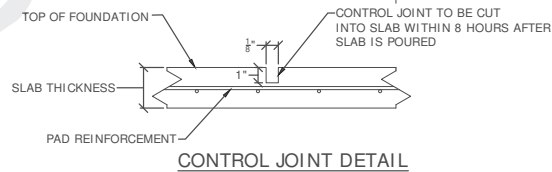
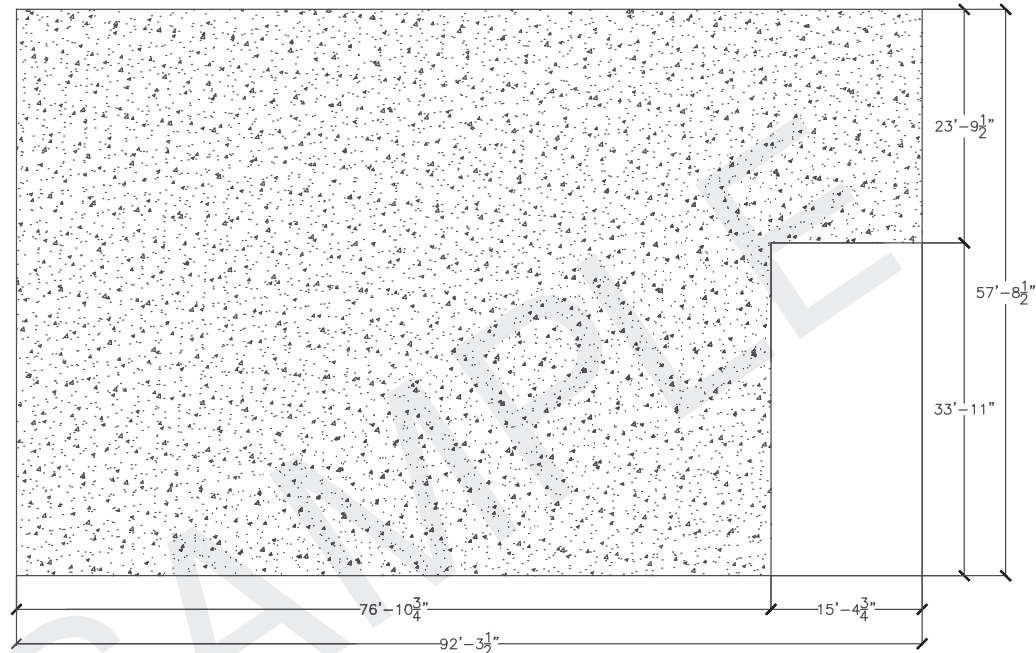
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SINGLETRAP  
FOUNDATION LAYOUT

SHEET NUMBER:

2.1



| MAXIMUM SYSTEM COVER | SLAB THICKNESS | CONCRETE STRENGTH | REINFORCEMENT (BOTH DIRECTIONS) |
|----------------------|----------------|-------------------|---------------------------------|
| 6" - 12"             | 0'-8"          | 4000 PSI          | #4 @ 18" O.C.                   |
| > 1'-0" - 2'-0"      | 0'-8"          | 4000 PSI          | #4 @ 16" O.C.                   |
| > 2'-0" - 3'-0"      | 0'-8"          | 4000 PSI          | #4 @ 12" O.C.                   |
| > 3'-0" - 4'-0"      | 0'-8"          | 4000 PSI          | #4 @ 12" O.C.                   |
| > 4'-0" - 5'-0"      | 0'-8"          | 4000 PSI          | #5 @ 18" O.C.                   |
| > 5'-0" - 6'-0"      | 0'-8"          | 4000 PSI          | #5 @ 16" O.C.                   |
| > 6'-0" - 7'-0"      | 0'-8"          | 4000 PSI          | #5 @ 16" O.C.                   |
| > 7'-0" - 8'-0"      | 0'-9"          | 4000 PSI          | #5 @ 12" O.C.                   |
| > 8'-0" - 9'-0"      | 0'-10"         | 4000 PSI          | #5 @ 12" O.C.                   |
| > 9'-0" - 10'-0"     | 0'-10"         | 4500 PSI          | #5 @ 12" O.C.                   |

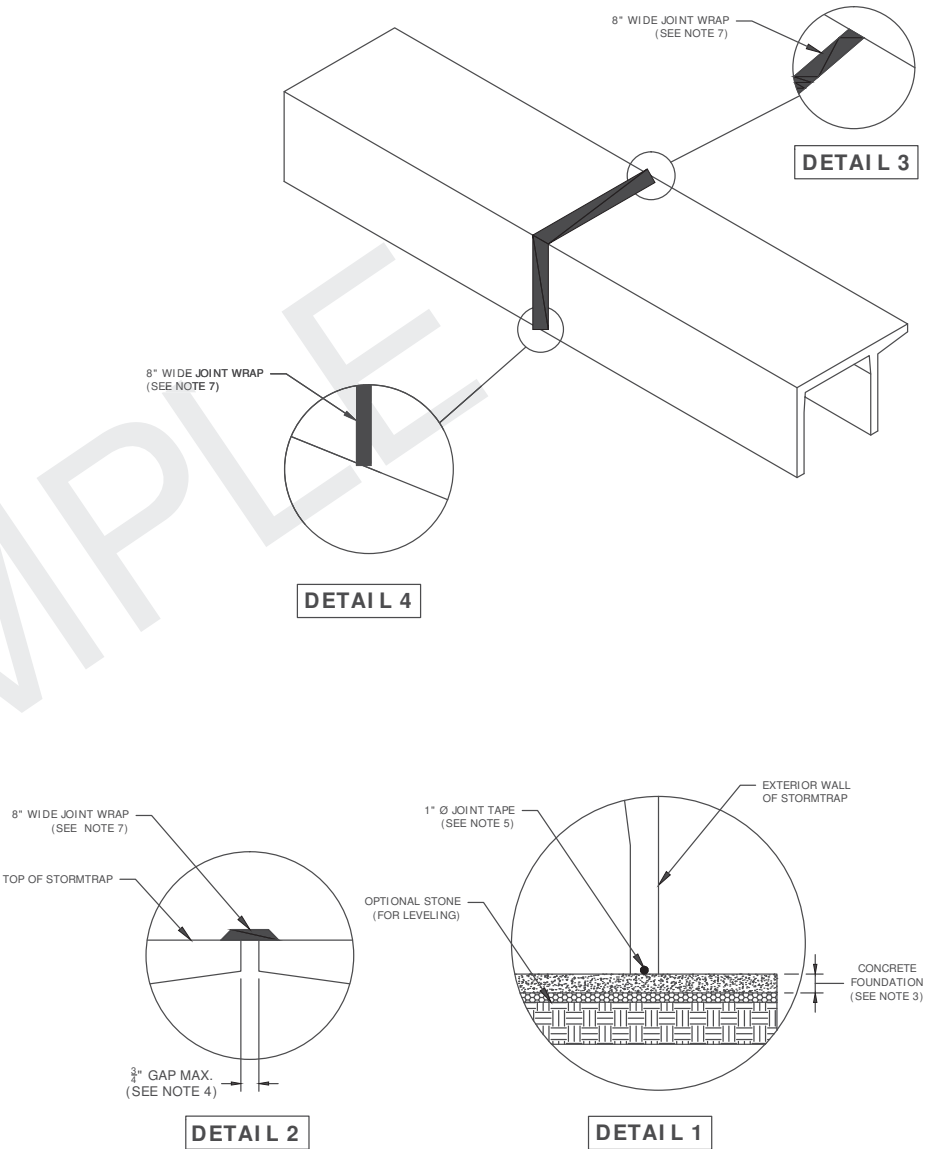
NOTES:

1. CONCRETE STRENGTH @ 28 DAYS, 5%-8% ENTRAINED AIR, 4" MAX. SLUMP.
2. NET ALLOWABLE SOIL PRESSURE AS INDICATED ON SHEET 1.0.
3. SOIL CONDITIONS TO BE VERIFIED ON SITE BY OTHERS.
4. REBAR: ASTM A-615 GRADE 60. BLACK BAR.
5. DIMENSION OF FOUNDATION MUST HAVE 1'-0" OVERHANG BEYOND EXTERNAL FACE OF MODULE.
6. DIMENSION OF STORMTRAP SYSTEM ALLOW FOR A 3/4" GAP BETWEEN EACH MODULE.
7. ALL DIMENSIONS TO BE VERIFIED IN THE FIELD BY OTHERS.
8. THE CONTROL JOINTS SHALL BE BETWEEN (IF REQUIRED BY ENGINEER OF RECORD) 16'-0" TO 24'-0" MAX APART.
9. SEE SHEET 3.0 FOR INSTALLATION SPECIFICATIONS.



STORMTRAP INSTALLATION SPECIFICATIONS

1. STORMTRAP SHALL BE INSTALLED IN ACCORDANCE WITH ASTM C891, STANDARD FOR INSTALLATION OF UNDERGROUND PRECAST CONCRETE UTILITY STRUCTURES, THE FOLLOWING ADDITIONS AND/OR EXCEPTIONS SHALL APPLY:
2. IT IS THE RESPONSIBILITY OF THE INSTALLING CONTRACTOR TO ENSURE THAT PROPER/ADEQUATE EQUIPMENT IS USED TO SET/INSTALL THE MODULES.
3. STORMTRAP MODULES SHALL BE PLACED ON A LEVEL CONCRETE FOUNDATION (SEE SHEET 2.1) WITH A 1'-0" OVERHANG ON ALL SIDES THAT SHALL BE POURED IN PLACE BY INSTALLING CONTRACTOR. A QUALIFIED GEOTECHNICAL ENGINEER WILL BE EMPLOYED, BY OWNER, TO PROVIDE ASSISTANCE IN EVALUATING THE EXISTING SOIL CONDITIONS. TO ENSURE THAT HE SOIL BEARING PRESSURE MEET OR EXCEED THE STRUCTURAL DESIGN LOADING CRITERIA AS SPECIFIED ON SHEET 1.0.
4. THE STORMTRAP MODULES SHALL BE PLACED SUCH THAT THE MAXIMUM SPACE BETWEEN ADJACENT MODULES DOES NOT EXCEED  $\frac{3}{4}$ " (SEE DETAIL 2). IF THE SPACE EXCEEDS  $\frac{3}{4}$ ", THE MODULES SHALL BE RESET WITH APPROPRIATE ADJUSTMENT MADE TO LINE AND GRADE TO BRING THE SPACE INTO SPECIFICATION.
5. THE PERIMETER HORIZONTAL JOINT BETWEEN THE STORMTRAP MODULES AND THE CONCRETE FOUNDATION SHALL BE SEALED TO THE FOUNDATION WITH PRE-FORMED MASTIC JOINT SEALER ACCORDING TO ASTM C891, 8.8 AND 8.12 (SEE DETAIL 1). THE MASTIC JOINT TAPE DOES NOT PROVIDE A WATERTIGHT SEAL. THE SOLE PURPOSE OF THE JOINT TAPE IS TO PROVIDE A SILT AND SOIL TIGHT SYSTEM.
6. STORMTRAP MODULES ARE NOT WATERTIGHT. IF A WATERTIGHT SOLUTION IS REQUIRED, CONTACT STORMTRAP FOR RECOMMENDATIONS. THE WATERTIGHT APPLICATION IS TO BE PROVIDED AND IMPLEMENTED BY THE CONTRACTOR. THE CONTRACTOR IS RESPONSIBLE TO ENSURE THAT THE SELECTED WATERTIGHT SOLUTION PERFORMS AS SPECIFIED BY THE MANUFACTURER. CONTACT STORMTRAP IF A WATERTIGHT APPLICATION IS REQUIRED.
7. ALL EXTERIOR JOINTS BETWEEN ADJACENT STORMTRAP MODULES SHALL BE SEALED WITH 8" WIDE PRE-FORMED, COLD-APPLIED, SELF-ADHERING ELASTOMERIC RESIN, BONDED TO A WOVEN, HIGHLY PUNCTURE RESISTANT POLYMER WRAP, CONFORMING TO ASTM C891 AND SHALL BE INTEGRATED WITH PRIMER SEALANT AS APPROVED BY STORMTRAP (SEE DETAILS 3 & 4). THE JOINT WRAP DOES NOT PROVIDE A WATERTIGHT SEAL. THE SOLE PURPOSE OF THE JOINT WRAP IS TO PROVIDE A SILT AND SOIL TIGHT SYSTEM. THE ADHESIVE EXTERIOR JOINT WRAP SHALL BE INSTALLED ACCORDING TO THE FOLLOWING INSTALLATION INSTRUCTIONS:
- 7.1. USE A BRUSH OR WET CLOTH TO THOROUGHLY CLEAN THE OUTSIDE SURFACE AT THE POINT WHERE JOINT WRAP IS TO BE APPLIED.
- 7.2. A RELEASE PAPER PROTECTS THE ADHESIVE SIDE OF THE JOINT WRAP. PLACE THE ADHESIVE TAPE (ADHESIVE SIDE DOWN) AROUND THE STRUCTURE, REMOVING THE RELEASE PAPER AS YOU GO. PRESS THE JOINT WRAP FIRMLY AGAINST THE STORMTRAP MODULE SURFACE WHEN APPLYING.
8. IF THE CONTRACTOR NEEDS TO CANCEL ANY SHIPMENTS, THEY MUST DO SO 48 HOURS PRIOR TO THEIR SCHEDULED ARRIVAL AT THE JOB SITE. IF CANCELED AFTER THAT TIME, PLEASE CONTACT THE PROJECT MANAGER.
9. IF THE STORMTRAP MODULE(S) IS DAMAGED IN ANY WAY PRIOR, DURING, OR AFTER INSTALL, STORMTRAP MUST BE CONTACTED IMMEDIATELY TO ASSESS THE DAMAGE AND DETERMINE WHETHER OR NOT THE MODULE(S) WILL NEED TO BE REPLACED. IF ANY MODULE ARRIVES AT THE JOBSITE DAMAGED DO NOT UNLOAD IT; CONTACT STORMTRAP IMMEDIATELY. ANY DAMAGE NOT REPORTED BEFORE THE TRUCK IS UNLOADED WILL BE THE CONTRACTOR'S RESPONSIBILITY.
10. STORMTRAP MODULES CANNOT BE ALTERED IN ANY WAY AFTER MANUFACTURING WITHOUT WRITTEN CONSENT FROM STORMTRAP.



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PROJECT INFORMATION:

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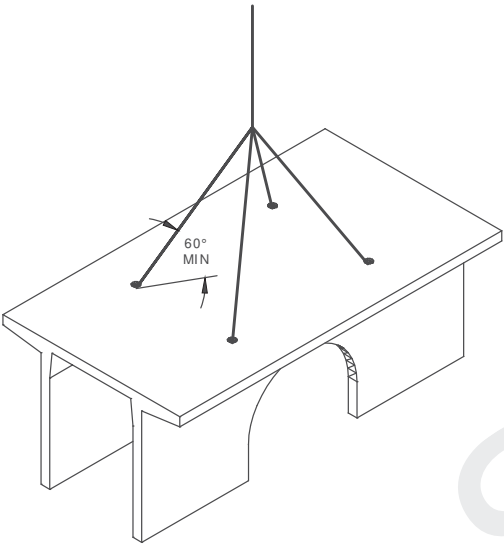
SINGLETRAP  
INSTALLATION  
SPECIFICATIONS

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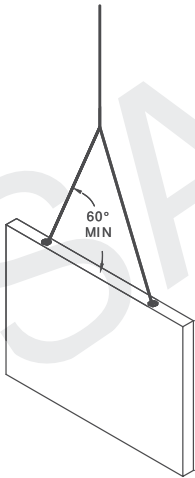
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**END PANEL ERECTION/INSTALLATION NOTES**

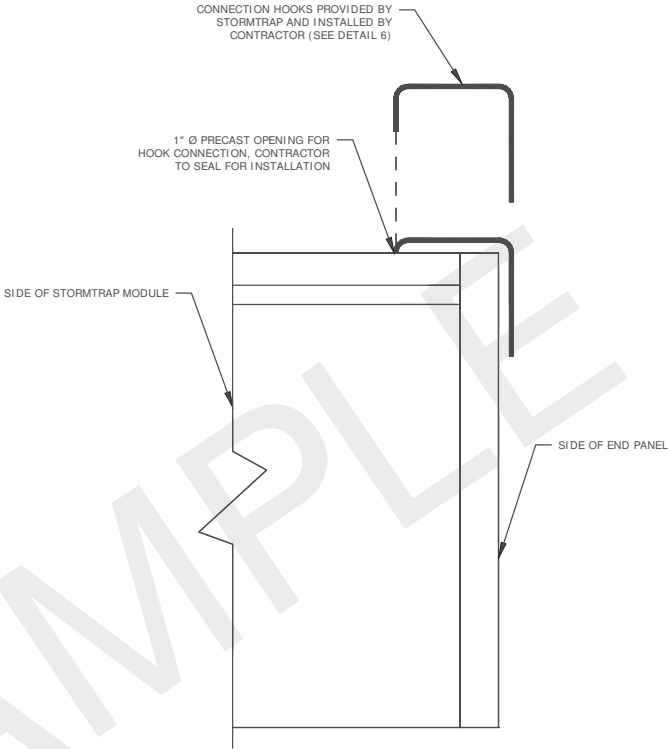
- 1. END PANELS WILL BE SUPPLIED TO CLOSE OFF OPEN ENDS OF ROWS.
- 2. PANELS SHALL BE INSTALLED IN A TILT UP FASHION DIRECTLY ADJACENT TO OPEN END OF MODULE (REFER TO SHEET 2.0 FOR END PANEL LOCATIONS).
- 3. CONNECTION HOOKS WILL BE SUPPLIED WITH END PANELS TO SECURELY CONNECT PANEL TO ADJACENT STORMTRAP MODULE (SEE PANEL CONNECTION ELEVATION VIEW).
- 4. ONCE CONNECTION HOOKS ARE ATTACHED, LIFTING CLUTCHES MAY BE REMOVED.
- 5. JOINT WRAP SHALL BE PLACED AROUND PERIMETER JOINT PANEL (SEE SHEET 3.0).



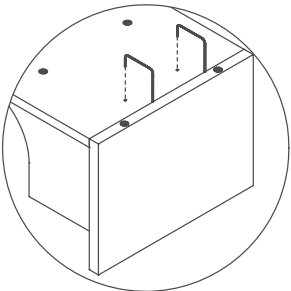
MODULE LIFTING DETAIL



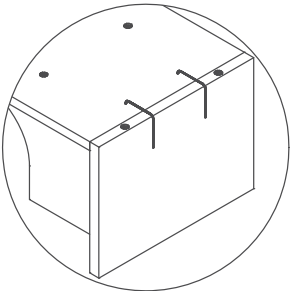
END PANEL LIFTING DETAIL



PANEL CONNECTION  
ELEVATION VIEW



**STEP 1**



**STEP 2**

DETAIL 6

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**SCALE:**

NTS

**SHEET TITLE:**

SINGLETRAP  
INSTALLATION  
SPECIFICATIONS

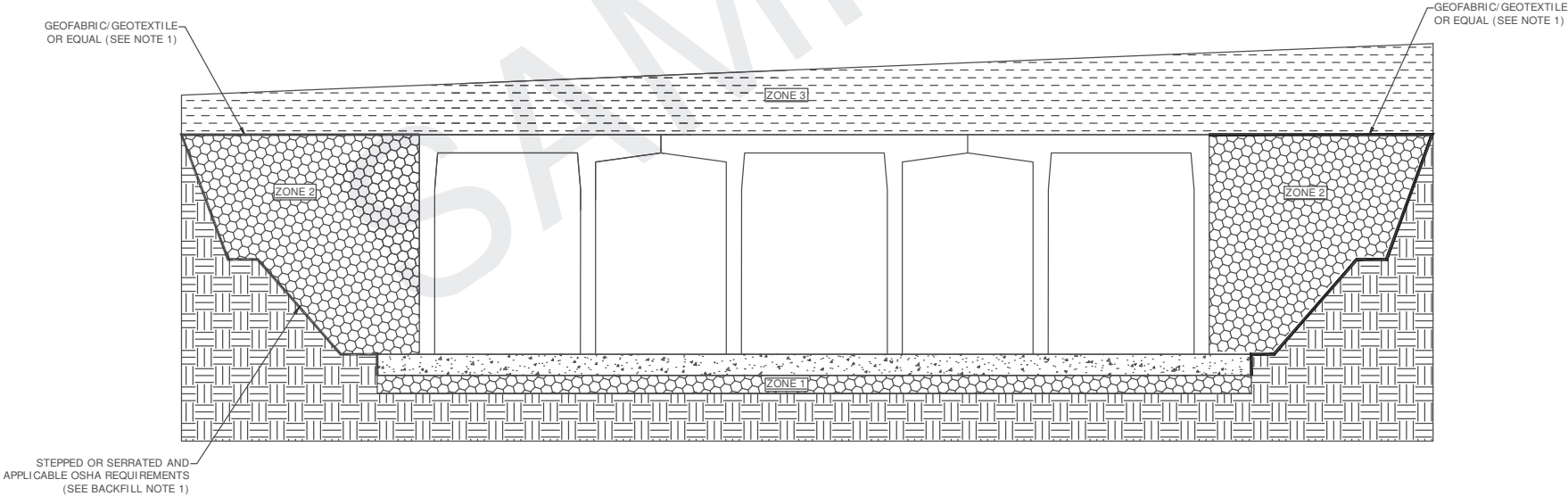
**SHEET NUMBER:**

**3.1**

| ZONE CHART        |                      |         |
|-------------------|----------------------|---------|
| ZONES             | ZONE DESCRIPTIONS    | REMARKS |
| ZONE 1 (OPTIONAL) | FOUNDATION AGGREGATE |         |
| ZONE 2            | BACKFILL             |         |
| ZONE 3            | FINAL COVER OVERTOP  |         |

STORMTRAP ZONE INSTALLATION SPECIFICATIONS/ PROCEDURES

- THE FILL PLACED AROUND THE STORMTRAP MODULES MUST DEPOSITED ON BOTH SIDES AT THE SAME TIME AND TO APPROXIMATELY THE SAME ELEVATION. AT NO TIME SHALL THE FILL BEHIND ONE SIDE WALL BE MORE THAN 2'-0" HIGHER THAN THE FILL ON THE OPPOSITE SIDE. BACKFILL SHALL EITHER BE COMPACTED AND/OR VIBRATED TO ENSURE THAT BACKFILL AGGREGATE/STONE MATERIAL IS WELL SEATED AND PROPERLY INTER LOCKED. CARE SHALL BE TAKEN TO PREVENT ANY WEDGING ACTION AGAINST THE STRUCTURE, AND ALL SLOPES WITHIN THE AREA TO BE BACKFILLED MUST BE STEPPED OR SERRATED TO PREVENT WEDGING ACTION. CARE SHALL ALSO BE TAKEN AS NOT TO DISRUPT THE JOINT WRAP FROM THE JOINT DURING THE BACKFILL PROCESS. BACKFILL MATERIAL SHALL BE CLEAN, CRUSHED, ANGULAR No. 5 (AASHTO M43) AGGREGATE. IF NATIVE EARTH IS SUSCEPTIBLE TO MIGRATION, CONFIRM WITH GEOTECHNICAL ENGINEER AND PROVIDE PROTECTION AS REQUIRED.
- DURING PLACEMENT OF MATERIAL OVERTOP THE SYSTEM, AT NO TIME SHALL MACHINERY BE USED OVERTOP THAT EXCEEDS THE DESIGN LIMITATIONS OF THE SYSTEM. WHEN PLACEMENT OF MATERIAL OVERTOP, MATERIAL SHALL BE PLACED SUCH THAT THE DIRECTION OF PLACEMENT IS PARALLEL WITH THE OVERALL LONGITUDINAL DIRECTION OF THE SYSTEM WHENEVER POSSIBLE.
- THE FILL PLACED OVERTOP THE SYSTEM SHALL BE PLACED AT A MINIMUM OF 6" LIFTS. AT NO TIME SHALL MACHINERY OR VEHICLES GREATER THAN THE DESIGN HS-20 LOADING CRITERIA TRAVEL OVERTOP THE SYSTEM WITHOUT THE MINIMUM DESIGN COVERAGE. IF TRAVEL IS NECESSARY OVERTOP THE SYSTEM PRIOR TO ACHIEVING THE MINIMUM DESIGN COVER, IT MAY BE NECESSARY TO REDUCE THE ULTIMATE LOAD/BURDEN OF THE OPERATING MACHINERY SO AS TO NOT EXCEED THE DESIGN CAPACITY OF THE SYSTEM. IN SOME CASES, IN ORDER TO ACHIEVE REQUIRED COMPACTION, HAND COMPACTION MAY BE NECESSARY IN ORDER NOT TO EXCEED THE ALLOTTED DESIGN LOADING.



BACKFILL DETAIL

PATENTS LISTED AT: [HTTP://STORMTRAP.COM/PATENT/](http://stormtrap.com/patent/)

1-877-867-6872

ENGINEER INFORMATION:

PROJECT INFORMATION:

SINGLETRAP

DETENTION

CURRENT ISSUE DATE:

ISSUED FOR:

SAMPLE PROJECT

| REV. | DATE: | ISSUED FOR: | DWN BY: |
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SCALE:

NTS

SHEET TITLE:

SINGLETRAP

BACKFILL

SPECIFICATIONS

SHEET NUMBER:

4.0



ENGINEER INFORMATION:

PROJECT INFORMATION:

SINGLETRAP

DETENTION

CURRENT ISSUE DATE:

ISSUED FOR:

SAMPLE PROJECT

| REV. | DATE: | ISSUED FOR: | DWN BY: |
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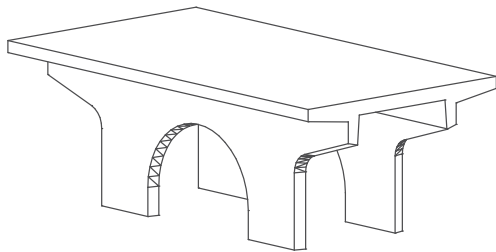
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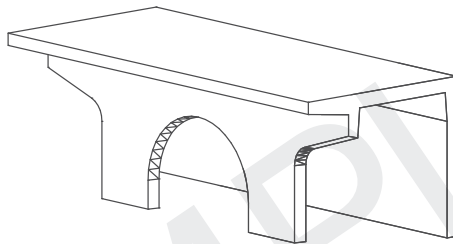
SINGLETRAP  
MODULE TYPES

SHEET NUMBER:

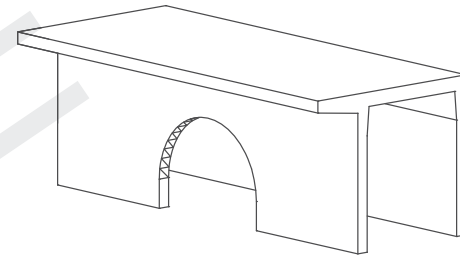
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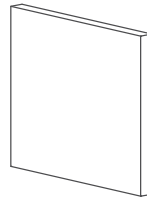
TYPE I



TYPE III



TYPE IV



TYPE IV  
END PANEL

- NOTES:
1. OPENING LOCATIONS AND SHAPES MAY VARY.
  2. SP - INDICATES A MODULE WITH MODIFICATIONS.
  3. P - INDICATES A MODULE WITH A PANEL ATTACHMENT.
  4. POCKET WINDOW OPENINGS ARE OPTIONAL.