Ashbury College - Synthetic Turf Field

Site Stormwater Management Report - Revision 1

Stantec

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Ashbury College

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1 Introduction

Stantec Consulting Ltd. (Stantec) has been commissioned by Ashbury College to prepare the following Site Stormwater Management study in support of a Site Plan Control (SPC) Application for the proposed synthetic turf field to be situated at 362 Mariposa Avenue, in the City of Ottawa, as indicated in **Figure 1-1.** The property is located on the north side of Maple Lane directly north of Ashbury Place. The impacted drainage areas include portions of the property encompassed between Springfield Road to the west, Glenwood Avenue to the east, and a paved pathway to the north.

The 2.41 ha site includes existing buildings, gravel parking areas, walkways, and an existing grass sports field (football/soccer). The site development plan, as indicated on the Site Plan drawing **SP01** developed by Stantec's Landscape Architecture Team, includes converting the existing field from a grass surface to a synthetic turf field. The new synthetic turf significantly increases the site's impervious surface area and impacts the existing underground infiltration system, prompting this study. The purpose of this site stormwater management report is to develop a new stormwater management plan for the quality and quantity control requirements for the impacted portion of the site.

Figure 1-1: Overall Development Location Plan

1.1 Objectives

This stormwater management (SWM) report presents a SWM plan that is free of conflicts, provides on-site SWM in accordance with City of Ottawa Design Guidelines, the pre-consultation meeting feedback (PC2024-0226, dated July 12, 2024), the first submission comments (D07-12-26-0040 submitted March

25,2026) and uses the existing municipal infrastructure in accordance with any limitations communicated during consultation with the City of Ottawa staff. Details of the existing infrastructure located within the Springfield Road right of way (ROW) were obtained from available as-built drawings and site topographic survey by Annis, O'Sullivan, Vollebekk Ltd. (December 18, 2018).

Criteria and constraints provided by the City of Ottawa have been used as a basis for the detailed stormwater management plan for the proposed redevelopment. Specific and potential development constraints to be addressed are as follows:

Stormwater Management and Storm Servicing:

- Determine the pre-development (existing) runoff coefficient for the site.
- Define major and minor conveyance systems in conjunction with the proposed grading plan.
- Delineate and characterize stormwater drainage catchments that are impacted by the re-development.
- Determine the stormwater management quantity control storage requirements to meet the 5-year pre-development allowable release rate for the re-developed portions of the site.
- Utilize Low Impact Development (LID) designs for SWM quality and quantity control where feasible.
- Determine the quality control design requirements to meet the enhanced level of treatment requiring 80% Total Suspended Solids (TSS) removal, due to the absence of existing downstream controls.
- Design the proposed onsite private storm sewers which will be connected to the existing 525mm municipal storm sewer located in the Springfield Road ROW.

Grading, Erosion and Sediment Control, and Geotechnical Considerations:

- Prepare a grading plan in accordance with the proposed Site Plan and tie into existing grades at the property lines.
    - Identify key drainage patterns and grading features.
    - Identify the major (emergency) overland flow paths.
    - Identify static ponding areas.
- Provide an Erosion and Sediment Control (ESC) Concept Plan and Best Management Practices
- Incorporate the relevant geotechnical information, constraints, and recommendations.
- Identify utility site constraints (existing infrastructure removals/accommodations, easements, etc.)

1.2 References

Documents referenced in preparation of the design for the Ashbury College Field includes:

- *City of Ottawa Sewer Design Guidelines* (SDG 004) 4th Edition, City of Ottawa, December 2025.
- *Low Impact Development Technical Guidance Report (Draft) – City of Ottawa*, prepared by Dillon Consulting and Aquafor Beech Ltd., November 2019.
- *Low Impact Development Stormwater Management Guidance Manual – Draft for Consultation,* Ministry of the Environment, Conservation and Parks (MECP), January 2022.
- *Stormwater Management Planning and Design Manual*, Ministry of the Environment, Conservation, and Parks (MECP), March 2003.
- *Geotechnical Investigation Report – Ashbury College – 362 Mariposa Avenue, Ottawa, Ontario,* Stantec Consulting Ltd. May 2024.
- *Pre-consultation: Meeting Feedback – Proposed Site Plan Control Application – 362 Mariposa Avenue (File No.: PC2024-0226),* City of Ottawa, July 12, 2024.
- *362 Mariposa Avenue, Ottawa, ON - Stormwater Management and Site Servicing Report,* prepared by R.V. Anderson Associated Ltd., June 2013.

2 Stormwater Management and Servicing

2.1 Objectives

The objective of this stormwater management plan is to determine the measures necessary to control the quantity and quality of stormwater released from the proposed re-development to criteria established within the pre-consultation meeting feedback, and to provide sufficient detail for SPC approval and construction.

2.2 SWM Criteria and Constraints

Criteria were established by combining current design practices outlined by the City of Ottawa Design Guidelines (2025), the Low Impact Development Technical Guidance Report (Draft - 2019), and through consultation with City of Ottawa staff. The following summarizes the criteria, with the source of each criterion indicated in brackets:

2.2.1 General

- Use of the dual drainage principle (City of Ottawa).
- Wherever it is feasible and practical, LID site-level measures should be used to reduce and control the volume and rate of runoff. (City of Ottawa).
- Assess impact of 100-year event outlined in the City of Ottawa Sewer Design Guidelines on major and minor drainage system (City of Ottawa).
- Provide enhanced 80% TSS quality control onsite (City of Ottawa)

2.2.2 Storm Sewer & Inlet Controls

- Size the internal private storm sewers to convey the 2-year storm event under free-flow conditions using City of Ottawa I-D-F parameters (City of Ottawa).
- Determine the pre-development runoff coefficient for the site. Utilize the lesser of this value or 0.5 (City of Ottawa) to determine the 5-year storm event pre-development discharge rate (City of Ottawa).
- Site stormwater discharge rates for each storm event up to and including the 100-year event are to be restricted to 5-year storm event pre-development rate (City of Ottawa).
- Existing stormwater outlet options for the site re-development include:
  - the existing municipal 750mm diameter concrete storm sewer which transitions to 675mm diameter concrete storm sewer in the Maple Lane ROW, to the south of the site,
  - the existing municipal 525mm diameter PVC storm sewer in the Springfield Road ROW, to the west of the site, and
  - the existing municipal 300mm diameter PVC storm sewer located in the Glenwood Avenue ROW, to the east of the site.

As determined through the first submission comments, the storm sewer in the Maple Lane ROW does not have the capacity to receive the post-development flows from the site. The preferred outlet location is the 525mm storm sewer in the Springfield Road ROW.

2.2.3 Surface Storage & Overland Flow

- Building openings are to be a minimum of 0.15m above the 100-year water level (City of Ottawa).
- Maximum depth of flow under either static or dynamic conditions shall be less than 0.35m (City of Ottawa)
- Balance of flows exceeding the allowable release rate up to and including the 100-year storm event to be detained on-site (City of Ottawa).
- Provide adequate emergency overflow conveyance off-site for events beyond the 100-year storm (City of Ottawa)
- Where possible, major flow from the site is to be safely conveyed by surface routing towards the municipal ROWs.

2.3 Background

The existing internal stormwater management and servicing system is established in the Stormwater Management and Site Servicing Report, prepared by R.V. Anderson Associated Ltd. (June 2013). The existing system includes several components.

1. For the north portion of the site, internal storm sewers direct roof and yard drainage to an existing underground infiltration system located beneath the existing sports field. This existing system does not have an outlet (all runoff is infiltrated).

2. On the west side of the site, an existing gravel parking area drains to the west to a catch basin and are directed to the existing 375mm diameter storm sewer in the Springfield Road ROW.

3. The existing grass sports field drains from east to west, with most of the site draining to the gravel parking area and the Springfield Road ROW.

4. The existing western buildings have building storm services to Springfield Road while the eastern buildings have building storm services to Glenwood Avenue.

Some of the existing buildings have peaked roofs and rear yard areas that drain internally into the site. A portion of the existing east building expansion roof drainage is serviced internally within the site to the existing infiltration system. The internally draining areas and existing storm service will need to be accommodated in the new site stormwater system. The existing drainage conditions are shown on **Drawing C101.**

2.4 Analysis

The impacted areas of the site were identified by considering the existing drainage areas affected by the sports field resurfacing, new storm sewers, and new stormwater management system. The impacted areas were delineated utilizing the information from the R.V. Anderson 2013 report and the current topographic survey. The impacted areas delineated the existing drainage area (subcatchment EX-1 and EX-2) as shown in the existing storm drainage plan on **Drawing C101.** The existing (pre-development) runoff coefficient for the site was determined to be C=0.40. Since this value is less than 0.5, the analysis proceeded based on the 5-year pre-development runoff coefficient of 0.40.

The impacted area was subdivided into drainage areas (subcatchments) tributary to the new stormwater management system and outlet, as shown on **Drawing C130**. Runoff coefficient values were assigned to each drainage area based on the relative proportion the proposed finished surfaces and imperviousness of each surface. A summary of subareas and runoff coefficients is provided in **Appendix A.1.** The storm drainage areas were subdivided utilizing the information from the R.V. Anderson 2013 report, the current topographic survey, and the proposed site grading plan, **Drawing C120.**

The Modified Rational Method (MRM) was employed to assess the rate and volume of runoff generated during pre-development and post-development conditions. Runoff coefficient values have been increased by 25% for the post-development 100-year storm event based on the City of Ottawa SDG. MRM storm sewer design sheets have been provided in **Appendix A.1.**

2.4.1 Allowable Release Rate

The peak post-development discharge from the subject site is to be limited to that of the 5-year event discharge under pre-development conditions, to a maximum discharge coefficient C of 0.40. Due to the numerous existing stormwater outlets and short pipe runs, the pre-development time of concentration for the site was determined to be 21.6 minutes using a combination of the Airport Method and Uplands method (refer to **Appendix A.2**); hence a time of concentration of 21.6 minutes has been used for the site, as per the City of Ottawa SDG. Peak stormwater flow rates have been calculated using the rational method as follows:

Q = 2.78 CiA
Where: Q = peak flow rate, L/s
A = drainage area, ha
I = rainfall intensity, mm/hr (per Ottawa IDF curves)
C = site runoff coefficient

The 5-year pre-development rainfall event with a total site area of 2.41 ha, C-value of 0.40, and a time of concentration of 21.6 minutes was determined by the rational method to be **178.5 L/s.** Consequently, this is the target release rate for the site, under all rainfall events up to and including the 100-year event.

2.4.2 Uncontrolled Catchments

The impacted areas assessed in this study are all tributary to the proposed internal storm sewer system, storage chamber, and restricted storm sewer outlet. Consequently, there are no uncontrolled catchments considered.

2.4.3 Storage Requirements

The site requires quantity control measures and quality control measures to meet the restrictive stormwater criteria. It is proposed that a sealed subsurface storage chamber, located under the west gravel parking areas, is to provide end-of-pipe quantity control through detention storage and a restricted outflow to reduce site peak outflow to the target rate. Additional detention storage is achieved in the granular layers beneath the synthetic turf field.

2.4.3.1 Quantity Control

The modified rational method was used to evaluate the volume of onsite storage required to meet the site's restricted outflow rate. An inlet control device (ICD) is proposed at the downstream (west) invert of manhole STM 101 to restrict the outflow rate. The modified rational method calculation sheet included in **Appendix A.1** demonstrates that the peak 100-year event outflow rate can be restricted to the target release rate using a 288 mm diameter circular orifice with an invert elevation matching the outgoing pipe invert. Note that the invert elevation used in the orifice equation is raised to the elevation at the centre of the orifice opening. The 100-year water level in the storage chamber and the consequent hydraulic head results in a storage requirement of 361m^3. The chamber has been designed to accommodate a much larger volume (601.17m^3) in case of subsequent storm events with insufficient drawdown time for the storage chamber or the field subsurface.

For the detention storage in the field substructure, the following assumptions were made:

- Outflow rate to the minor system from the FIELD 1 subcatchment is limited to the fully flowing 300 mm diameter storm sewer outlet from the field sub surface drainage system.
- The vertical hydraulic conductivity of the synthetic turf and shock pad does not inhibit the percolation of the incident rainfall.
- Surface runoff outletting the FIELD 1 subcatchment was negligible due to the perimeter curb around the synthetic field.
- The minimum thickness (300mm) of granular material (Granular O) was considered for the storage area, and the porosity of the Granular O was assumed to be 0.30, as per the recommendations under *Sustainable Technologies Evaluation Program*, Dec 2023, and *OPSS.PROV 1010*.
- The shallow slope across the field surface was neglected and the storage considered was across a flat surface.

- The volume of the subdrainage pipes and the clearstone embedment/trenches was neglected in the available storage volume.

A summary of the discharge and storage requirements are provided in **Table 2.1**.

Table 2.1: 100-year Release Rate and Quantity Control Summary

Storage Mechanism	Contributing Area IDs	Tributary Area (ha)	Design Head (m)	HWL Elevation (m)	Discharge (L/s)	$V_{required}$ (m^3)	$V_{available}$ (m^3)
Subsurface Granular Voids	Field 1	1.20	0.30	69.93	96.2	364	808
Subsurface Chamber	L4A-L4D, L102A, L104A, Field 1	2.41	0.51	68.34	125.4	361	601

The end-of-pipe stormwater detention storage is to be provided by a sealed subsurface chamber which is engineered to prevent floatation given the seasonal high water levels (69.26 m measured in Spring 2026). An example product, a StormTrap SingleTrap design has been specified for this purpose. Refer to **Appendix A.3** for the SingleTrap details and as summarized in **Table 2.2.**

Table 2.2: Preliminary Design for StormTrap SingleTrap Chamber System

Invert of Chamber (m)	Inside Height of Chamber (m)	Height of Chamber (m)	Chamber Footprint Area (m^2)	Total Storage Volume (m^3)	Allowable Maximum Finished Grade (m)	Allowable Minimum Finished Grade (m)
67.56	68.86	1.295	464	601.17	69.85	69.61

As per the MRM sheet calculations in **Appendix A.1**, the proposed SingleTrap stormwater chamber and outlet restriction design provides sufficient storage to meet the site's pre-development 5-year target outflow rate. The subsequent storage volume and release rates are presented in **Table 2.3.**

Table 2.3: Target and Resultant Minor System Release Rates

Storm event	Storage Volume in Tank (m^3)	Minor System (L/s)	Total Allowable (L/s)
5-Year	199.4	100.4	178.5
100-Year	360.9	125.4	178.5

2.4.3.2 Quality Control

Quality control is required on this site due to the potential contaminants associated with the west gravel surface parking areas and the particulates associated with the proposed synthetic turf field. The proposed synthetic turf system will utilize TrueBlend infill, which does not contain crumb rubber. The infill is composed of a sand base layer topped with an engineered, fused blend of natural cork and premium elastomers. Because the components are combined into a single material rather than loose fractions, the system significantly reduces the potential for infill migration and microplastic transport when compared to conventional Styrene-Butadiene Rubber (SBR) systems, while still meeting all required performance and safety criteria.

On this site, quality control is achieved by two mechanisms:

1. By filtration through the synthetic field, shock pad, and subsurface granular materials.
2. Using an oil-grit-separator (OGS) unit located upstream of the subsurface chamber.

The overall site runoff coefficient was determined to be 0.67 in the area summary sheet included in **Appendix A.1.** The corresponding imperviousness of the site was estimated to be 0.85 (or 85%). Per the pre-consultation feedback, the City requires enhanced (80%) TSS removal for this site due to the proximity of the Ottawa River.

An oil-grit separator (OGS) has been designed to provide quality treatment for the minor system flows on this site. A stormceptor EF08 model has been sized as an example product, as specified in **Appendix A.5.** The OGS is to be located upstream of the subsurface chamber, as shown in **Drawing C110** and **C130,** which will contribute to the overall treatment train and allow for an easily accessible and maintainable structure for solids removals. A long term TSS removal of 85% is anticipated from the OGS unit.

2.4.4 LID Design Considerations

LID measures were considered for both quantity and quality control on this site. The MECP SWM Planning Design Manual (2003) and the City of Ottawa Draft Low Impact Development Technical Guidance Report (2019) provide design guidance for LIDs and physical constraints for SWMP types. For an infiltration basin/gallery, these considerations include:

- Drainage Area: <5ha
- Minimum soil percolation rate: loam (infiltration rate ≥60 mm/hr)
- Bedrock: situated ≥1.0m below the bottom of the infiltration bed
- Groundwater: situated ≥1.0m below the bottom of the infiltration bed

The Ashbury College synthetic turf field site has previously been shown to meet both the drainage area and minimum soil percolation rate criteria for an infiltration gallery. Bedrock and groundwater levels have been established in the Geotechnical Investigation Report (Stantec, 2024) and the proceeding groundwater monitoring program, which began in 2025 and continues through the 2026 season.

The south side of the proposed synthetic turf field was found to have feasible bedrock elevations for an LID facility. However, the seasonal groundwater elevation was too high to feasibly situate an LID facility. Due to the proposed storm sewer arrangement in combination with limited unused surface area for infiltration and the high seasonal groundwater level, the proposed design does not materially consider significant infiltration potential.

The sealed StormTrap chamber was substituted for stormwater quantity management and the OGS system introduced for stormwater quality management.

2.5 Stormwater Servicing

As shown in **Drawings C130 and C110** and detailed in the storm sewer design sheet in **Appendix A.5**, the proposed site will be serviced by a network of gravity storm sewers which will convey the 2-year stormwater flows from the impacted site drainage areas to the OGS unit and subsurface chamber at the west gravel parking lot area. Several new catch basins, leads, and one new catch basin manhole are proposed to collect drainage from the site's overland flow areas and convey the stormwater to the main storm sewers and stormwater management facility (SWMF).

The stormwater management design includes inlet control devices (ICD)s on some catchbasins to utilize available surface storage up to maximum ponding depths of 0.3m. An ICD is also proposed in the monitoring manhole STM 101 to restrict the outflow from the subsurface storage chamber. The ICD designs are summarized in **Table 2.4**.

Table 2.4: Preliminary ICD Design Schedule

Structure	ICD Type	Invert Elevation (m)	Size (mm)	5-Year Flow (L/s)	5-Year Head (m)	100-Year Flow (L/s)	100-Year Head (m)
STM 101	High-Flow Circular Orifice	67.52	288	100.4	0.33	125.4	0.51
L102A	High-Flow Circular Orifice	68.26	178	56.5	0.80	77.2	1.50
L104A	High-Flow Circular Orifice	68.27	178	61.2	0.94	76.4	1.47
L4D	High-Flow Circular Orifice	70.02	98	11.1	0.34	22.6	1.40

The minor storm sewer system includes a stub for the field outlet, allowing for connection/outlet of the subsurface drainage system of the proposed synthetic turf field. Design of the subsurface drainage for the field is included in the Landscape Drawing set.

The 525mm diameter storm sewer outlets from the subsurface chamber to a new (1200mm diameter) storm monitoring manhole, then connects to a new (1500mm diameter) manhole on the 525mm diameter municipal storm sewer in the Springfield Road ROW.

3 Grading and Drainage

The impacted site drainage area measures approximately 2.41ha. The topography across the site is a gradual slope draining principally from east to west, with a difference in elevation approaching 1.4m. A detailed grading plan (see **Drawing C120**) has been provided to satisfy the stormwater management requirements, adhere to the geotechnical recommendations (see **Section 4**) for the site, and provide for minimum cover requirements for storm sewers and infiltration gallery chambers, where possible. Site grading has been established to provide emergency overland flow routes required for stormwater management in accordance with City of Ottawa requirements.

The subject site maintains emergency overland flow routes for flows deriving from storm events exceeding the 100-year rainfall. The emergency overland flow routes drain toward the west, and spill through the gravel parking areas into the Springfield Road municipal ROW. Static ponding areas, volumes, depths, and spill elevations are delineated in **Drawing C130.**

Terracing and a 600mm high rock retaining wall is proposed along the north side of the field to facilitate the approximately 2.0m grade change from the sports field and pathways to the higher elevations north of the field. See the landscape plans for retaining wall details. Stairs and an accessible ramp structure are proposed at the northwest corner of the field to accommodate pedestrian connections to the existing residence building to the northwest. Proposed grading within the proposed synthetic turf field cuts into the exiting subsurface infiltration system hence, it has been identified for removal, and a new SWM facility is proposed.

4 Geotechnical Considerations

A Geotechnical Investigation Report was prepared by Stantec and dated May 2024. The report summarizes the existing soil conditions within the re-development areas and provides construction recommendations. For details which are not summarized below, please see the original report.

Subsurface soil conditions within the subject area were determined from 16 boreholes and six (6) test pits (for infiltration testing) distributed across the development for the 2024 investigation, and four (4) additional boreholes in 2025 for the installation of groundwater monitoring wells. In general, soil stratigraphy consisted of topsoil underlain by fill varying from silty sand to sandy silt, followed by glacial till consisting of silty sandy gravel to sandy silt with gravel over bedrock. Bedrock/inferred bedrock elevations range from depths of 1.0 to 5.6m below ground surface**.**

The geotechnical report recommends a grade raise restriction of 1.0m for this site. In the case that greater grade raises are contemplated, additional geotechnical input should be provided.

The report provides direction for the proposed rock retaining wall, pipe bedding and backfill requirements for underground services and recommendations for rock removal were also identified for the subject site.

The asphalt pavement structure for site access roads, parking areas, paved pathways, light traffic and occasional garbage or service trucks is outlined in the Geotechnical Investigation Report and in **Drawing C110**.

5 Utilities

As the subject site is bound to the north, east, and west by existing institutional buildings, and by a municipal right-of-way to the south, Hydro, Bell, Gas and Cable servicing for the proposed development should be readily available, if needed. Pole mounted infrastructure may exist along the southern property line and may need to be relocated during construction. It is anticipated that existing infrastructure will be sufficient to provide a means of distribution for the proposed field re-development. Exact size, location and routing of utilities will be finalized after design circulation. Utilities will be coordinated between disciplines to resolve potential conflicts. The Site Utility Plan is included on **Drawing C110.**

6 Erosion and Sediment Control During Construction

To protect downstream water quality and prevent sediment build-up in catch basins and storm sewers, erosion and sediment control (ESC) measures must be implemented by the Contractor prior to commencing construction. The Contractor will need to monitor, repair, maintain or replace the ESC measures as needed during construction. The following recommendations will be included in the contract documents and communicated to the Contractor.

1. Implement best management practices to provide appropriate protection of the existing and proposed drainage system and the receiving water course(s).
2. Limit the extent of the exposed soils at any given time.
3. Re-vegetate exposed areas as soon as possible.
4. Minimize the area to be cleared and grubbed.
5. Protect exposed slopes with geotextiles, geogrid, or synthetic mulches.
6. Install silt barriers/fencing around the perimeter of the site as indicated in **Drawing C102** to prevent the migration of sediment offsite.
7. Install trackout control mats (mud mats) at the entrance/egress to prevent migration of sediment into the public ROW.
8. Provide sediment traps and basins during dewatering works.
9. Install sediment traps (such as SiltSack® by Terrafix) between catch basins and frames.
10. Schedule the construction works at times which avoid flooding due to seasonal rains.

The Contractor will also be required to complete inspections and guarantee the proper performance of their erosion and sediment control measures at least after every rainfall. The inspections are to include:

- Verification that water is not flowing under silt barriers.
- Cleaning and changing the sediment traps placed on catch basins.

Refer to **Drawing C102** for the proposed Erosion and Sediment Control Concept Plan for the location of silt fences, sediment traps, and other erosion control measures for the onsite works.

7 Approvals

Environmental Compliance Approvals (ECAs, formerly Certificates of Approval (CofA)) under the Ontario Water Resources Act are not expected to be a requirement for this development as there are no proposed industrial site uses, and site stormwater discharges are routed from the privately owned site and SWM facility to a municipal storm sewer that is legal outlet registered under the City of Ottawa's CLI ECA. Existing downstream sewers have demonstrated adequate capacity to receive the 5-year pre-development peak release rate from the site.

For ground or surface water volumes being pumped during the construction phase, typically between 50,000 to 400,000 L/day, it is required to register on the Environmental Activity and Sector Registry (EASR). Given the variable groundwater monitoring data, it is possible that groundwater may be encountered in excavations on this site. A minimum of two to four weeks should be allotted for completion of the EASR registration and the preparation of the Water Taking and Discharge Plan by a Qualified Person as stipulated under O.Reg. 63/16. An MECP Permit to Take Water (PTTW), which is required for dewatering volumes exceeding 400,000L/day, is not anticipated for the site.

8 Conclusions

The report assessed servicing conditions within and immediately adjacent to the project site and evaluated the feasibility of a new subsurface stormwater chamber for quantity management and OGS unit for quality management of stormwater. Other SPC design requirements appeared in this report including:

- LID considerations and evaluation,
- grading and drainage,
- geotechnical considerations,
- utilities,
- erosion and sediment control during construction, and
- approvals.

We trust that the information and the proposed stormwater management and servicing strategies presented in this report are adequate to support the Site Plan Control application for this re-development. Please contact the author or engineer of record of this report if you have any questions or concerns.

Appendix A Stormwater Management

A.1 Modified Rational Method Calculations

Stormwater Management Calculations

File No: **116501019**
Project: **Ashbury College - Synthetic Turf Field**
Date: **23-Jun-26**

SWM Approach:
Post-development to Pre-development flows

Post-Development Site Conditions:

Overall Runoff Coefficient for Pre-Development Site and Sub-Catchment Areas

Runoff Coefficient Table

Catchment Type	Sub-catchment Area ID / Description		Area (ha) "A"		Runoff Coefficient "C"	"A x C"		Overall Runoff Coefficient
Controlled - Tributary	Existing Infiltration Gallery (EX-1)	Hard	0.111		0.9	0.100		
		Soft	0.069		0.2	0.014		
		Subtotal		0.18			0.113	0.63
Controlled - Tributary	EX-2	Hard	0.572		0.9	0.515		
		Soft	1.654		0.2	0.331		
		Subtotal		2.23			0.846	0.38
Total				**2.41**			**0.96**	
Overall Runoff Coefficient= C:								**0.40**

Total Tributary Surface Areas (Controlled and Uncontrolled)	**0.18 ha**
Total Tributary Area to Outlet	**0.18 ha**
Total Uncontrolled Areas (Non-Tributary)	**2.23 ha**
Total Site	**2.41 ha**

Stormwater Management Calculations

File No: **116501019**
Project: **Ashbury College - Synthetic Turf Field**
Date: **15-Sep-2026**

SWM Approach:
Post-development to Pre-development flows

Post-Development Site Conditions:

Overall Runoff Coefficient for Site and Sub-Catchment Areas

Runoff Coefficient Table

Catchment Type	Sub-catchment Area ID / Description		Area (ha) "A"	Runoff Coefficient "C"	"A x C"		Overall Runoff Coefficient
Controlled - Tributary	FIELD-1	Hard	0.992	0.9	0.893		
		Soft	0.205	0.2	0.041		
		Subtotal	1.198			0.9341982	0.780
Controlled - Tributary	L4D	Hard	0.034	0.9	0.031		
		Soft	0.038	0.2	0.008		
		Subtotal	0.073			0.0384314	0.530
Roof Uncontrolled - Tributary	L4C	Hard	0.069	0.9	0.062		
		Soft	-0.005	0.2	-0.001		
		Subtotal	0.065			0.0612836	0.950
Uncontrolled - Tributary	L4B	Hard	0.066	0.9	0.059		
		Soft	0.263	0.2	0.053		
		Subtotal	0.329			0.1119705	0.340
Uncontrolled - Tributary	L4A	Hard	0.047	0.9	0.042		
		Soft	0.075	0.2	0.015		
		Subtotal	0.121			0.0570618	0.470
Controlled - Tributary	L104A	Hard	0.209	0.9	0.188		
		Soft	0.116	0.2	0.023		
		Subtotal	0.32			0.2112026	0.650
Controlled - Tributary	L102A	Hard	0.191	0.9	0.172		
		Soft	0.113	0.2	0.023		
		Subtotal	0.305			0.1949485	0.640
Total			**2.415**			**1.609**	
Overall Runoff Coefficient= C:							**0.67**

Total Roof Areas	**0.06 ha**
Total Tributary Surface Areas (Controlled and Uncontrolled)	**2.35 ha**
Total Tributary Area to Outlet	**2.41 ha**
Total Uncontrolled Areas (Non-Tributary)	**0.000 ha**
Total Site	**2.41 ha**

Stormwater Management Calculations

Project #116501019, Ashbury College - Synthetic Turf Field
Modified Rational Method Calculations for Storage

5 yr Intensity
City of Ottawa

$I = a/(t + b)^c$

a =	998.071
b =	6.053
c =	0.814

t (min)	I (mm/hr)
5	141.18
10	104.19
15	83.56
20	70.25
25	60.90
30	53.93
35	48.52
40	44.18
45	40.63
50	37.65
55	35.12
60	32.94

5 YEAR Predevelopment Target Release from Portion of Site

Subdrainage Area: Predevelopment Tributary Area to Outlet
Area (ha): 2.41
C: 0.40

Typical Time of Concentration

tc (min)	I (5 yr) (mm/hr)	Qtarget (L/s)
21.6	66.92	**178.5**

5 YEAR Modified Rational Method for Entire Site

Subdrainage Area: FIELD1
Area (ha): 1.20
C: 0.78

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	104.19	270.60	96.2	174.4	**104.6**
20	70.25	182.45	96.2	86.2	103.5
30	53.93	140.05	96.2	43.9	78.9
40	44.18	114.75	96.2	18.6	44.5
50	37.65	97.79	96.2	1.6	4.8
60	32.94	85.56	85.6	0.0	0.0
70	29.37	76.28	76.3	0.0	0.0
80	26.56	68.98	69.0	0.0	0.0
90	24.29	63.08	63.1	0.0	0.0
100	22.41	58.19	58.2	0.0	0.0
110	20.82	54.08	54.1	0.0	0.0
120	19.47	50.56	50.6	0.0	0.0

Storage: Subsurface storage in granular layers

Depth Granular Below Turf [1] (mm): 300
Porosity of the Granular Media (Granular O): 0.30
Bed Area (m^2): 8980
Available Storage Volume (m^3): 808

Discharge [2] (L/s)	Vreq (m^3)	Vavail (m^3)	Volume Check
96.2	105	808	OK

704

Notes:
1. Refer to Drawing L601 detail 1 for Synthetic Turf with aggregate base.
2. Peak minor system discharge limited to fully-flowing subdrain outlet pipe (1% slope, 300mm diameter)

Subdrainage Area: L4D — Controlled - Tributary
Area (ha): 0.07
C: 0.53

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	104.19	11.13	11.1	0.0	0.0
20	70.25	7.51	7.5	0.0	0.0
30	53.93	5.76	5.8	0.0	0.0
40	44.18	4.72	4.7	0.0	0.0
50	37.65	4.02	4.0	0.0	0.0
60	32.94	3.52	3.5	0.0	0.0
70	29.37	3.14	3.1	0.0	0.0
80	26.56	2.84	2.8	0.0	0.0
90	24.29	2.59	2.6	0.0	0.0
100	22.41	2.39	2.4	0.0	0.0
110	20.82	2.22	2.2	0.0	0.0
120	19.47	2.08	2.1	0.0	0.0

Storage: Surface Storage Above CB

Orifice Equation: $Q = CdA(2gh)^{0.5}$ Where C = 0.572
Orifice Diameter: 98.0 mm
Invert Elevation: 70.02 m
Orifice Centre Elevation: 70.07 m
T/G Elevation: 71.40 m
Max Ponding Depth: 0.00 m
Downstream W/L: 68.84 m

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
5-year Water Level	70.41	0.34	11.1	0.00	0.80	OK
			0.00		0.80	

Project #116501019, Ashbury College - Synthetic Turf Field
Modified Rational Method Calculations for Storage

100 yr Intensity
City of Ottawa

$I = a/(t + b)^c$

a =	1735.688
b =	6.014
c =	0.820

t (min)	I (mm/hr)
5	242.70
10	178.56
15	142.89
20	119.95
25	103.85
30	91.87
35	82.58
40	75.15
45	69.05
50	63.95
55	59.62
60	55.89

100 YEAR Modified Rational Method for Entire Site

Subdrainage Area: FIELD1
Area (ha): 1.20
C: 0.98

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	579.66	96.2	483.5	290.1
20	119.95	389.40	96.2	293.2	351.8
30	91.87	298.24	96.2	202.0	**363.7**
40	75.15	243.95	96.2	147.7	354.6
50	63.95	207.62	96.2	111.4	334.3
60	55.89	181.45	96.2	85.3	306.9
70	49.79	161.63	96.2	65.4	274.8
80	44.99	146.06	96.2	49.9	239.3
90	41.11	133.46	96.2	37.3	201.2
100	37.90	123.05	96.2	26.8	161.1
110	35.20	114.28	96.2	18.1	119.3
120	32.89	106.79	96.2	10.6	76.2

Storage: Subsurface storage in granular layers

Depth Granular Below Turf [1] (mm): 300
Porosity of the Granular Media (Granular O): 0.30
Bed Area (m^2): 8980
Available Storage Volume (m^3): 808

Discharge [2] (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
96.2	364	808	OK

445

Notes:
1. Refer to Drawing L601 detail 1 for Synthetic Turf with aggregate base.
2. Minor system discharge based on fully-flowing subdrain outlet pipe (1% slope, 300mm diameter)

Subdrainage Area: L4D — Controlled - Tributary
Area (ha): 0.07
C: 0.66

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	23.85	22.6	1.2	**0.7**
20	119.95	16.02	16.0	0.0	0.0
30	91.87	12.27	12.3	0.0	0.0
40	75.15	10.04	10.0	0.0	0.0
50	63.95	8.54	8.5	0.0	0.0
60	55.89	7.46	7.5	0.0	0.0
70	49.79	6.65	6.6	0.0	0.0
80	44.99	6.01	6.0	0.0	0.0
90	41.11	5.49	5.5	0.0	0.0
100	37.90	5.06	5.1	0.0	0.0
110	35.20	4.70	4.7	0.0	0.0
120	32.89	4.39	4.4	0.0	0.0

Storage: Surface Storage Above CB

Orifice Equation: $Q = CdA(2gh)^{0.5}$ Where C = 0.572
Orifice Diameter: 98.0 mm
Invert Elevation: 70.02 m
Orifice Centre Elevation: 70.07 m
T/G Elevation: 71.40 m
Max Ponding Depth: 0.07 m
Downstream W/L: 68.96 m

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
100-year Water Level	71.47	1.40	22.6	0.74	0.80	OK
					0.06	

Stormwater Management Calculations

Project #116501019, Ashbury College - Synthetic Turf Field
Modified Rational Method Calculations for Storage

Subdrainage Area: L4C — Roof Uncontrolled - Tributary
Area (ha): 0.06
C: 0.95

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)
10	104.19	17.8	17.8
20	70.25	12.0	12.0
30	53.93	9.2	9.2
40	44.18	7.5	7.5
50	37.65	6.4	6.4
60	32.94	5.6	5.6
70	29.37	5.0	5.0
80	26.56	4.5	4.5
90	24.29	4.1	4.1
100	22.41	3.8	3.8
110	20.82	3.5	3.5
120	19.47	3.3	3.3

Subdrainage Area: L4B — Uncontrolled - Tributary
Area (ha): 0.33
C: 0.34

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)
10	104.19	32.4	32.4
20	70.25	21.9	21.9
30	53.93	16.8	16.8
40	44.18	13.8	13.8
50	37.65	11.7	11.7
60	32.94	10.3	10.3
70	29.37	9.1	9.1
80	26.56	8.3	8.3
90	24.29	7.6	7.6
100	22.41	7.0	7.0
110	20.82	6.5	6.5
120	19.47	6.1	6.1

Subdrainage Area: L4A — Uncontrolled - Tributary
Area (ha): 0.12
C: 0.47

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)
10	104.19	16.5	16.5
20	70.25	11.1	11.1
30	53.93	8.6	8.6
40	44.18	7.0	7.0
50	37.65	6.0	6.0
60	32.94	5.2	5.2
70	29.37	4.7	4.7
80	26.56	4.2	4.2
90	24.29	3.9	3.9
100	22.41	3.6	3.6
110	20.82	3.3	3.3
120	19.47	3.1	3.1

Subdrainage Area: L104A — Controlled - Tributary
Area (ha): 0.32
C: 0.65

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	104.19	61.18	61.2	0.0	0.0
20	70.25	41.25	41.2	0.0	0.0
30	53.93	31.66	31.7	0.0	0.0
40	44.18	25.94	25.9	0.0	0.0
50	37.65	22.11	22.1	0.0	0.0
60	32.94	19.34	19.3	0.0	0.0
70	29.37	17.25	17.2	0.0	0.0
80	26.56	15.60	15.6	0.0	0.0
90	24.29	14.26	14.3	0.0	0.0
100	22.41	13.16	13.2	0.0	0.0
110	20.82	12.23	12.2	0.0	0.0
120	19.47	11.43	11.4	0.0	0.0

Storage: Surface Storage Above CB

Orifice Equation: Q = CdA(2gh)^0.5 — Where C = 0.572
Orifice Diameter: 178 mm
Invert Elevation: 68.27 m
Orifice Centre Elevation: 68.36 m
T/G Elevation: 69.55 m
Max Ponding Depth: 0.00 m
Downstream W/L: 68.07 m

	Water Elev. (m)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
5-year Water Level	69.30	0.94	61.2	0.00	216.80	OK
			0.00			

Project #116501019, Ashbury College - Synthetic Turf Field
Modified Rational Method Calculations for Storage

Subdrainage Area: L4C — Roof Uncontrolled - Tributary
Area (ha): 0.06
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)
10	178.56	32.0	32.0
20	119.95	21.5	21.5
30	91.87	16.5	16.5
40	75.15	13.5	13.5
50	63.95	11.5	11.5
60	55.89	10.0	10.0
70	49.79	8.9	8.9
80	44.99	8.1	8.1
90	41.11	7.4	7.4
100	37.90	6.8	6.8
110	35.20	6.3	6.3
120	32.89	5.9	5.9

Subdrainage Area: L4B — Uncontrolled - Tributary
Area (ha): 0.33
C: 0.43

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)
10	178.56	69.5	69.5
20	119.95	46.7	46.7
30	91.87	35.7	35.7
40	75.15	29.2	29.2
50	63.95	24.9	24.9
60	55.89	21.7	21.7
70	49.79	19.4	19.4
80	44.99	17.5	17.5
90	41.11	16.0	16.0
100	37.90	14.7	14.7
110	35.20	13.7	13.7
120	32.89	12.8	12.8

Subdrainage Area: L4A — Uncontrolled - Tributary
Area (ha): 0.12
C: 0.59

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)
10	178.56	35.4	35.4
20	119.95	23.8	23.8
30	91.87	18.2	18.2
40	75.15	14.9	14.9
50	63.95	12.7	12.7
60	55.89	11.1	11.1
70	49.79	9.9	9.9
80	44.99	8.9	8.9
90	41.11	8.2	8.2
100	37.90	7.5	7.5
110	35.20	7.0	7.0
120	32.89	6.5	6.5

Subdrainage Area: L104A — Controlled - Tributary
Area (ha): 0.32
C: 0.81

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	131.05	76.4	54.6	**32.8**
20	119.95	88.04	76.4	11.6	13.9
30	91.87	67.42	67.4	0.0	0.0
40	75.15	55.15	55.2	0.0	0.0
50	63.95	46.94	46.9	0.0	0.0
60	55.89	41.02	41.0	0.0	0.0
70	49.79	36.54	36.5	0.0	0.0
80	44.99	33.02	33.0	0.0	0.0
90	41.11	30.17	30.2	0.0	0.0
100	37.90	27.82	27.8	0.0	0.0
110	35.20	25.84	25.8	0.0	0.0
120	32.89	24.14	24.1	0.0	0.0

Storage: Surface Storage Above CB

Orifice Equation: Q = CdA(2gh)^0.5 — Where C = 0.572
Orifice Diameter: 178 mm
Invert Elevation: 68.27 m
Orifice Centre Elevation: 68.36 m
T/G Elevation: 69.55 m
Max Ponding Depth: 0.30 m
Downstream W/L: 68.38 m

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
100-year Water Level	69.85	1.47	76.4	32.8	216.8	OK
					184.04	

Stormwater Management Calculations

Project #116501019, Ashbury College - Synthetic Turf Field
Modified Rational Method Calculations for Storage

Subdrainage Area: L102A — Controlled - Tributary
Area (ha): 0.30
C: 0.64

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	104.19	56.47	56.5	0.0	0.0
20	70.25	38.07	38.1	0.0	0.0
30	53.93	29.23	29.2	0.0	0.0
40	44.18	23.95	23.9	0.0	0.0
50	37.65	20.41	20.4	0.0	0.0
60	32.94	17.85	17.9	0.0	0.0
70	29.37	15.92	15.9	0.0	0.0
80	26.56	14.40	14.4	0.0	0.0
90	24.29	13.16	13.2	0.0	0.0
100	22.41	12.14	12.1	0.0	0.0
110	20.82	11.28	11.3	0.0	0.0
120	19.47	10.55	10.6	0.0	0.0

Storage: Surface Storage Above CB

Orifice Equation: Q = CdA(2gh)^0.5 — Where C = 0.572
Orifice Diameter: 178 mm
Invert Elevation: 68.26 m
Orifice Centre Elevation: 68.35 m
T/G Elevation: 69.46 m
Max Ponding Depth: 0.00 m
Downstream W/L: 67.72 m

	Water Elev. (m)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
5-year Water Level	69.15	0.80	56.5	0.00	184.04	OK
			0.00			

Subdrainage Area: STORMTRAP TANK — Controlled - Tributary

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	
10	625.16	291.69	74.0	217.7	130.6	0.00
20	421.51	228.01	88.9	139.1	166.9	0.00
30	323.57	197.38	95.2	102.2	184.0	0.00
40	265.11	179.10	98.4	80.7	193.6	0.00
50	225.92	166.85	100.4	66.5	**199.4**	0.00
60	197.66	147.37	95.8	51.6	185.7	0.00
70	176.23	131.39	90.6	40.8	171.4	0.00
80	159.37	118.82	85.8	33.1	158.7	0.00
90	145.73	108.65	81.3	27.3	147.6	0.00
100	134.44	100.23	77.3	23.0	137.8	0.00
110	124.93	93.14	73.5	19.6	129.6	0.00
120	116.81	87.08	70.1	17.0	122.3	0.00

Storage: Underground Storage in StormTrap Tank - Outflow Restriction at STM MH 101

Orifice Equation: Q = CdA(2gh)^0.5 — Where C = 0.61
Orifice Diameter: 288 mm
Invert Elevation: 67.52 m
Orifice Centre Elevation: 67.66 m
Inside Top of Chamber Elevation: 68.86 m
Tank Invert Elevation: 67.56 m
Stage of Tank: 0.43 m
Downstream W/L: 67.52 m

	Water Elev. (m)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
5-year Water Level	67.99	0.33	100.4	199.4	601.17	OK
			0.00			

SUMMARY TO OUTLET

		Vrequired	Vavailable*	
Tributary Area	2.41 ha			
Total 5yr Flow to Sewer	100.4 L/s	304	1,811 m^3	Ok
Total Area	2.41 ha			
Total 5yr Flow	100.4 L/s			
Target	178.5 L/s			

Project #116501019, Ashbury College - Synthetic Turf Field
Modified Rational Method Calculations for Storage

Subdrainage Area: L102A — Controlled - Tributary
Area (ha): 0.30
C: 0.80

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	120.96	77.2	43.7	**26.2**
20	119.95	81.26	77.2	4.0	4.8
30	91.87	62.24	62.2	0.0	0.0
40	75.15	50.91	50.9	0.0	0.0
50	63.95	43.33	43.3	0.0	0.0
60	55.89	37.87	37.9	0.0	0.0
70	49.79	33.73	33.7	0.0	0.0
80	44.99	30.48	30.5	0.0	0.0
90	41.11	27.85	27.9	0.0	0.0
100	37.90	25.68	25.7	0.0	0.0
110	35.20	23.85	23.8	0.0	0.0
120	32.89	22.28	22.3	0.0	0.0

Storage: Surface Storage Above CB

Orifice Equation: Q = CdA(2gh)^0.5 — Where C = 0.572
Orifice Diameter: 178 mm
Invert Elevation: 68.26 m
Orifice Centre Elevation: 68.35 m
T/G Elevation: 69.46 m
Max Ponding Depth: 0.39 m
Downstream W/L: 68.03 m

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
100-year Water Level	69.85	1.50	77.2	26.2	184.04	OK
					157.80	

Subdrainage Area: STORMTRAP TANK — Controlled - Tributary

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	
10	1071.35	409.41	71.7	337.8	202.7	0.00
20	719.70	357.87	107.9	249.9	299.9	0.00
30	551.21	308.57	119.7	188.9	340.0	0.00
40	450.87	269.91	123.1	146.8	352.4	0.00
50	383.72	244.04	124.6	119.4	358.2	0.00
60	335.37	225.41	125.3	100.2	360.6	0.00
70	298.74	211.30	125.4	85.9	**360.9**	0.00
80	269.95	200.20	125.2	75.0	360.2	0.00
90	246.67	191.23	124.8	66.4	358.8	0.00
100	227.42	183.82	124.3	59.5	357.0	0.00
110	211.21	177.58	123.8	53.8	355.0	0.00
120	197.37	172.24	123.2	49.0	352.9	0.00

Storage: Underground Storage in StormTrap Tank - Outflow Restriction at STM MH 101

Orifice Equation: Q = CdA(2gh)^0.5 — Where C = 0.61
Orifice Diameter: 288 mm
Invert Elevation: 67.52 m
Orifice Centre Elevation: 67.66 m
Inside Top of Chamber Elevation: 68.86 m
Tank Invert Elevation: 67.56 m
Stage of Tank: 0.777 m
Downstream W/L: 67.83 m

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
100-year Water Level	68.34	0.51	125.4	360.9	601.17	OK
			0.00			

SUMMARY TO OUTLET

		Vrequired	Vavailable*	
Tributary Area	2.41 ha			
Total 100yr Flow to Sewer	125.4 L/s	784	1,811 m^3	Ok
Total Area	2.41 ha			
Total 100yr Flow	125.4 L/s			
Target	178.5 L/s			

STORMTRAP STAGE-STORAGE-OUTFLOW CURVE

100-year HGL Conditions

Depth (m)	Stage (m Elev.)	Tank Area (m^2)	Volume (m^3)	Head (m)	Outflow (L/s)
0	67.56	464.2	0	-0.27	0.0
0.05	67.61	464.2	23	-0.22	0.0
0.1	67.66	464.2	46	-0.17	0.0
0.15	67.71	464.2	70	-0.12	0.0
0.2	67.76	464.2	93	-0.07	0.0
0.25	67.81	464.2	116	-0.02	0.0
0.3	67.86	464.2	139	0.03	30.5
0.35	67.91	464.2	162	0.08	49.8
0.4	67.96	464.2	186	0.13	63.5
0.45	68.01	464.2	209	0.18	74.7
0.5	68.06	464.2	232	0.23	84.4
0.55	68.11	464.2	255	0.28	93.1
0.6	68.16	464.2	279	0.33	101.1
0.65	68.21	464.2	302	0.38	108.5
0.7	68.26	464.2	325	0.43	115.4
0.75	68.31	464.2	348	0.48	121.9
0.8	68.36	464.2	371	0.53	128.1
0.85	68.41	464.2	395	0.58	134.1
0.9	68.46	464.2	418	0.63	139.7
0.95	68.51	464.2	441	0.68	145.1
1	68.56	464.2	464	0.73	150.4
1.05	68.61	464.2	487	0.78	155.5
1.1	68.66	464.2	511	0.83	160.4
1.15	68.71	464.2	534	0.88	165.1
1.2	68.76	464.2	557	0.93	169.7
1.25	68.81	464.2	580	0.98	174.2
1.295	68.86	464.2	601	1.03	178.2

5-year HGL Conditions

Depth (m)	Stage (m Elev.)	Tank Area (m^2)	Volume (m^3)	Head (m)	Outflow (L/s)
0	67.56	464.2	0	-0.10	0.0
0.05	67.61	464.2	23	-0.05	0.0
0.1	67.66	464.2	46	0.00	0.0
0.15	67.71	464.2	70	0.05	37.8
0.2	67.76	464.2	93	0.10	54.5
0.25	67.81	464.2	116	0.15	67.3
0.3	67.86	464.2	139	0.20	77.9
0.35	67.91	464.2	162	0.25	87.3
0.4	67.96	464.2	186	0.30	95.8
0.45	68.01	464.2	209	0.35	103.5
0.5	68.06	464.2	232	0.40	110.8
0.55	68.11	464.2	255	0.45	117.5
0.6	68.16	464.2	279	0.50	124.0
0.65	68.21	464.2	302	0.55	130.1
0.7	68.26	464.2	325	0.60	135.9
0.75	68.31	464.2	348	0.65	141.5
0.8	68.36	464.2	371	0.70	146.8
0.85	68.41	464.2	395	0.75	152.0
0.9	68.46	464.2	418	0.80	157.0
0.95	68.51	464.2	441	0.85	161.9
1	68.56	464.2	464	0.90	166.6
1.05	68.61	464.2	487	0.95	171.2
1.1	68.66	464.2	511	1.00	175.7
1.15	68.71	464.2	534	1.05	180.0
1.2	68.76	464.2	557	1.10	184.3
1.25	68.81	464.2	580	1.15	188.4
1.295	68.86	464.2	601	1.19	192.1

A.2 Pre-Development Time of Concentration

Project	Ashbury College Synthetic Turf Field	No.	116501019
PRE-DEVELOPMENT CONDITIONS Calculation of Time of Concentration			
Revision:	02	Prepared By:	AG
Revision Date	17-Sep-2026	Checked By:	DT

OVERLAND SHEET FLOW TIME

Runoff Coeffient = 0.20

Length = 111 m (longest overland flow path)
DEM Slope = 2.58% (along overland flow path)

C ≤ 0.4 **Airport Method**

$tc = [3.26 \times (1.1-C) \times L^{0.5}] / S_w^{0.33}$

L	111	m
S_w	2.58%	
C	0.37	
t_c	18.3	min

SHALLOW CONCENTRATED FLOW TIME

Uplands Method

1. Channel Segment 1 - Overland along edge of gravel parking

Length = 42 m (longest flow path)
DEM Slope 1.32% (along overland flow path)
Channel Type = Nearly bare and untilled (overland flow) or alluvial fans in Western mountain regions
k = 3
V = k * S^(1/2)
Velocity = 0.34 m/s
Channel Length = 42 m
Travel time = 2.0 min

2. Channel Segment 2 - Overland grass to CB

Length = 7 m (longest flow path)
DEM Slope 0.28% (along overland flow path)
Channel Type = Short grass pasture (overland flow)
k = 2.3
V = k * S^(1/2)
Velocity = 0.12 m/s
Channel Length = 7 m
Travel time = 1.0 min

Existing CB Lead

Mannings Flow

1. Pipe Segment: CB Lead to Main

Length = 20 m (longest flow path)
Assumed Pipe Slope = 1.00 %
Assumed Pipe Material = PVC
Assumed Pipe Size = 250 mm
Assumed Pipe Shape = circular
Qcap = 59.2 m^3/s
Manning's n = 0.013
V = k * S^(1/2)
Velocity (full) = 1.21 m/s
Pipe Length = 20 m
Travel time = 0.3 min

Actual Pipe Size = 251.5 mm
Area = 0.049 m^2
Hyd. Radius = 0.062 m

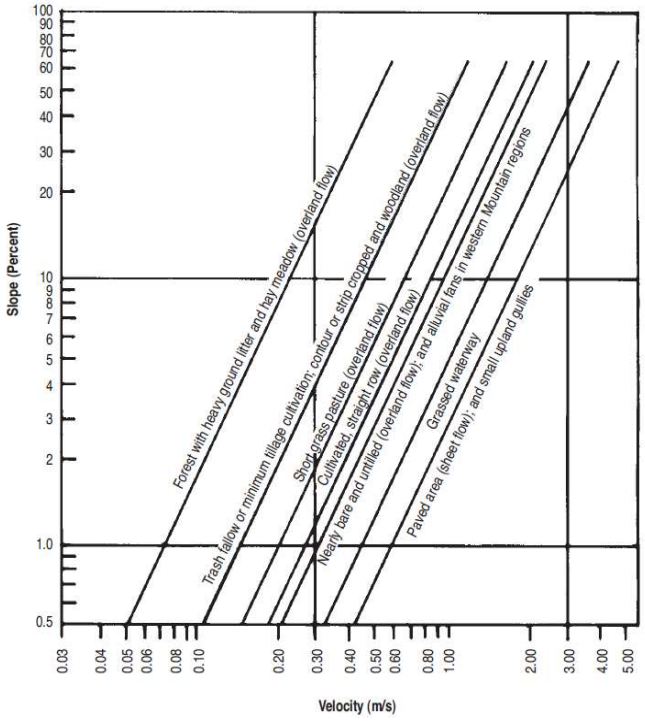
Therefore, Total T_c =	**21.6**	min
	0.4	hrs

Uplands Method Chart

118 STEEL DRAINAGE AND HIGHWAY CONSTRUCTION PRODUCTS

Table 3.9 $V/S^{0.5}$ relationship for various land covers

Land Cover	$V/S^{0.5}$ (m/s)
Forest with heavy ground litter, hay meadow (overland flow)	0.6
Trash fallow or minimum tillage cultivation, contour, strip cropped woodland (overland flow)	1.5
Short grass pasture (overland flow)	2.3
Cultivated, straight row (overland flow)	2.7
Nearly bare and untilled (overland flow) or alluvial fans in Western mountain regions	3.0
Grassed waterway	4.6
Paved areas (sheet flow); small upland gullies	6.1



A.3 StormTrap Tank Design

StormTrap®

MODULAR CONCRETE
STORMWATER MANAGEMENT

SHEET INDEX	
PAGE	DESCRIPTION
0.0	COVER SHEET
1.0	GENERAL NOTES
1.1	SINGLETRAP DESIGN CRITERIA
2.0	SINGLETRAP SYSTEM LAYOUT
2.1	SINGLETRAP FOUNDATION LAYOUT
3.0	SINGLETRAP INSTALLATION SPECIFICATION
3.1	SINGLETRAP INSTALLATION SPECIFICATION
4.0	SINGLETRAP BACKFILL SPECIFICATION
5.0	PIPE/ACCESS OPENING SPECIFICATION
6.0	SINGLETRAP MODULE TYPES

STORMTRAP CONTACT INFORMATION	
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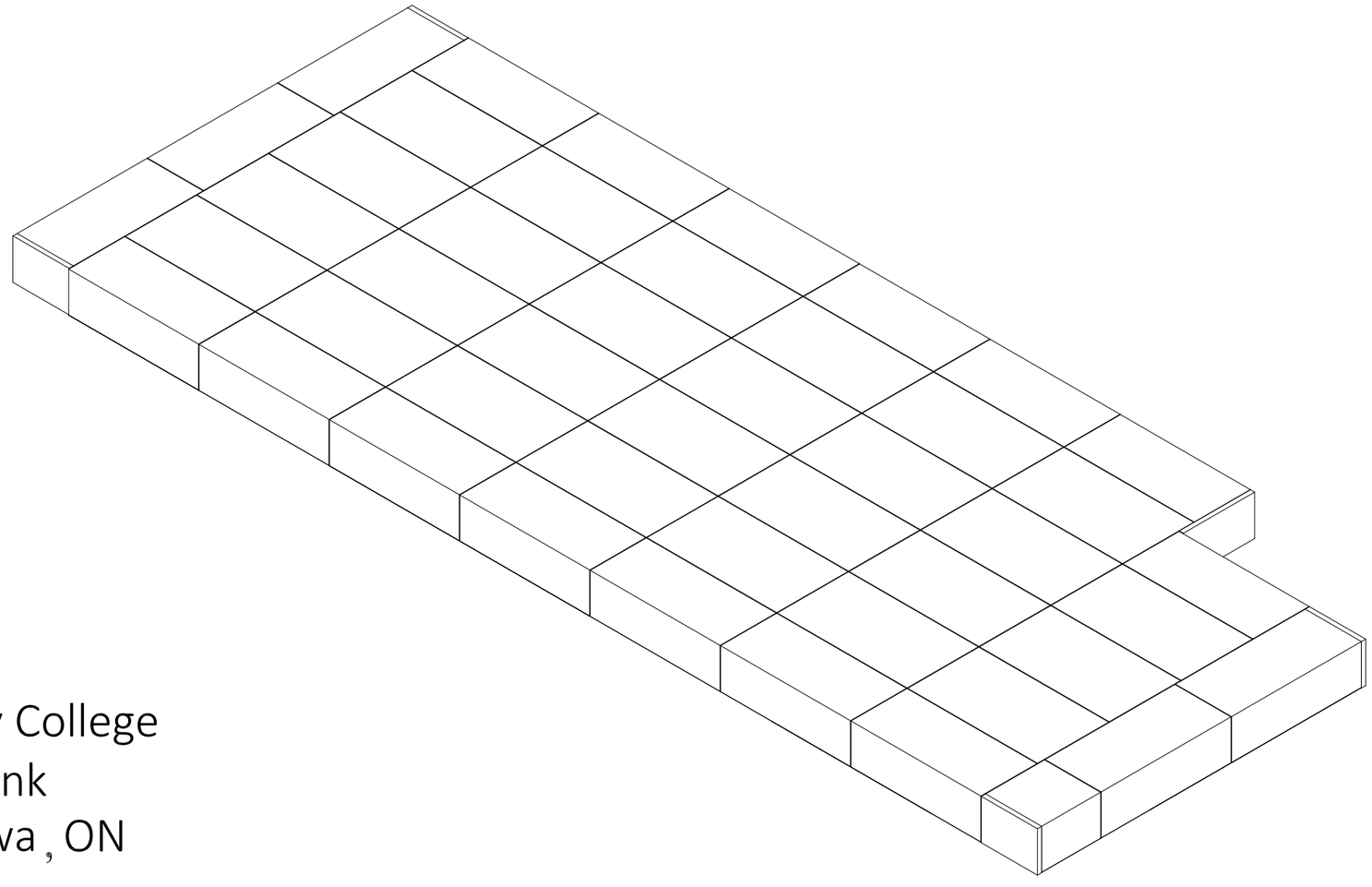
CONTACT NAME:	Jonathan Donaldson
CELL PHONE:	(416) 262-6265
SALES EMAIL:	jdonaldson@stormtrap.com



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SHEET TITLE:

COVER SHEET

SHEET NUMBER:

0.0

GENERAL NOTES:

1. STRUCTURE PROXIMITY LOADING DISCLAIMER:

STORMTRAP MODULES AND FOUNDATION ARE NOT DESIGNED TO ACCEPT ANY ADDITIONAL LOADING FROM ANY NEARBY STRUCTURES NEXT TO OR OVER THE TOP OF STORMTRAP. EXAMPLES OF NEARBY STRUCTURES MAY INCLUDE BUT ARE NOT LIMITED TO BUILDINGS, FOUNDATION ELEMENTS, RETAINING WALLS, LIGHT POLES, BOLLARDS, SIGNPOSTS, FENCES. ADDITIONALLY, STORMTRAP IS NOT RESPONSIBLE FOR INSTALLATION CONFLICTS ARISING FROM ANY OF THESE NEARBY STRUCTURES. IF ADDITIONAL LOADING CONSIDERATIONS ARE REQUIRED FOR STRUCTURAL DESIGN OF STORMTRAP, PLEASE CONTACT STORMTRAP IMMEDIATELY. FOR LIGHT POLES SHOWN OVER THE TOP OF THE SYSTEM, STORMTRAP WILL PROVIDE A 1.524m LATERAL DISTANCE CAVITY AROUND THE LIGHT POLE TO ACCOMMODATE IT. THE EOR TO TAKE RESPONSIBILITY FOR ENSURING THE LIGHT POLE IS NOT INFLICTING ANY LOADING ON THE STORMTRAP MODULES AND FOUNDATION.

2. TREE LOADING DISCLAIMER:

THE NUMBER OF TREES OR WEIGHT OF TOTAL PLANT MATERIAL PRESENT ON TOP OF A SINGLE STORMTRAP MODULE SHALL NOT EXCEED 16,000 LBS. THE REQUIREMENTS LISTED HERE APPLY AT BOTH THE TIME OF INSTALLATION AND FOR THE LIFE OF THE TREES AND PLANTS IN QUESTION. THE EOR AND LANDSCAPE ARCHITECT ARE RESPONSIBLE FOR ENSURING THAT TREE AND OTHER PLANT ROOTS DO NOT INTERFERE WITH OR COMPROMISE THE FUNCTIONAL AND STRUCTURAL INTEGRITY OF STORMTRAP'S UNDERGROUND MODULES. APPROPRIATE MEASURES SHOULD BE TAKEN TO PREVENT ROOT GROWTH INTO THE STORMTRAP SYSTEM FROM ADJACENT OR OVERHEAD TREES. FURTHERMORE, THE ROOTS OF THE TREES MUST BE CONTAINED TO PREVENT FUTURE DAMAGE TO THE STORMTRAP SYSTEM. STORMTRAP ACCEPTS NO LIABILITY FOR DAMAGES CAUSED BY TREES OR OTHER VEGETATION PLACED AROUND OR ON TOP OF THE SYSTEM.

3. PRE-TREATMENT/SEDIMENT/FILTER CHAMBER DISCLAIMER:

FOR SYSTEMS CONTAINING PRE-TREATMENT, SEDIMENTATION AND/OR FILTER CHAMBERS; IF REQUIRED TO BE SEALED TO PREVENT SAND AND/OR PRE-TREATED WATER FROM MIGRATING INTO ADJOINING MODULES, IT IS THE SOLE RESPONSIBILITY OF THE INSTALLING CONTRACTOR TO ENSURE THAT THOSE MODULES ARE SEALED.

4. OUTLET CONTROL STRUCTURE DISCLAIMER (IF SHOWN ON THESE PLANS):

IF A WATERTIGHT SOLUTION IS REQUIRED FOR AN OUTLET CONTROL STRUCTURE, ALL EXTERIOR COLD JOINTS, INCLUDING JOINT BETWEEN TOP AND BASE MODULES, BETWEEN TOP AND BASE OF ADJOINING SYMONS WALLS, AND JOINTS BETWEEN MODULE AND ADJACENT END PANELS WILL BE THE SOLE RESPONSIBILITY OF THE INSTALLING CONTRACTOR TO PROVIDE AND INSTALL THE WATERTIGHT APPLICATION PER THE EOR'S SPECIFICATION.

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GENERAL NOTES

SHEET NUMBER:

1.0

STRUCTURAL DESIGN LOADING CRITERIA

LIVE LOADING: AASHTO HS-20 HIGHWAY LOADING

ADDITIONAL SURCHARGE LOADING: PER ASTM C857 (3.83kPa)

GROUND WATER TABLE: @ 69.26m

SOIL BEARING PRESSURE: 150 kPa

SOIL DENSITY: 1922 kg/m³

EQUIVALENT UNSATURATED LATERAL ACTIVE EARTH PRESSURE: 5.5 kPa/m

EQUIVALENT SATURATED LATERAL ACTIVE EARTH PRESSURE: 12.57 kPa/m

APPLICABLE CODES: ASTM C857, ASTM C858-19, ACI-318, FOR CLEAR COVERS: CSA A23

BACKFILL TYPE: SEE SHEET 4.0 FOR BACKFILL OPTIONS

STORMTRAP SYSTEM INFORMATION

UNIT HEADROOM:	1.295m SINGLETRAP
TOTAL STORAGE PROV:	601.17 CUBIC METERS

DESIGN ASSUMPTIONS

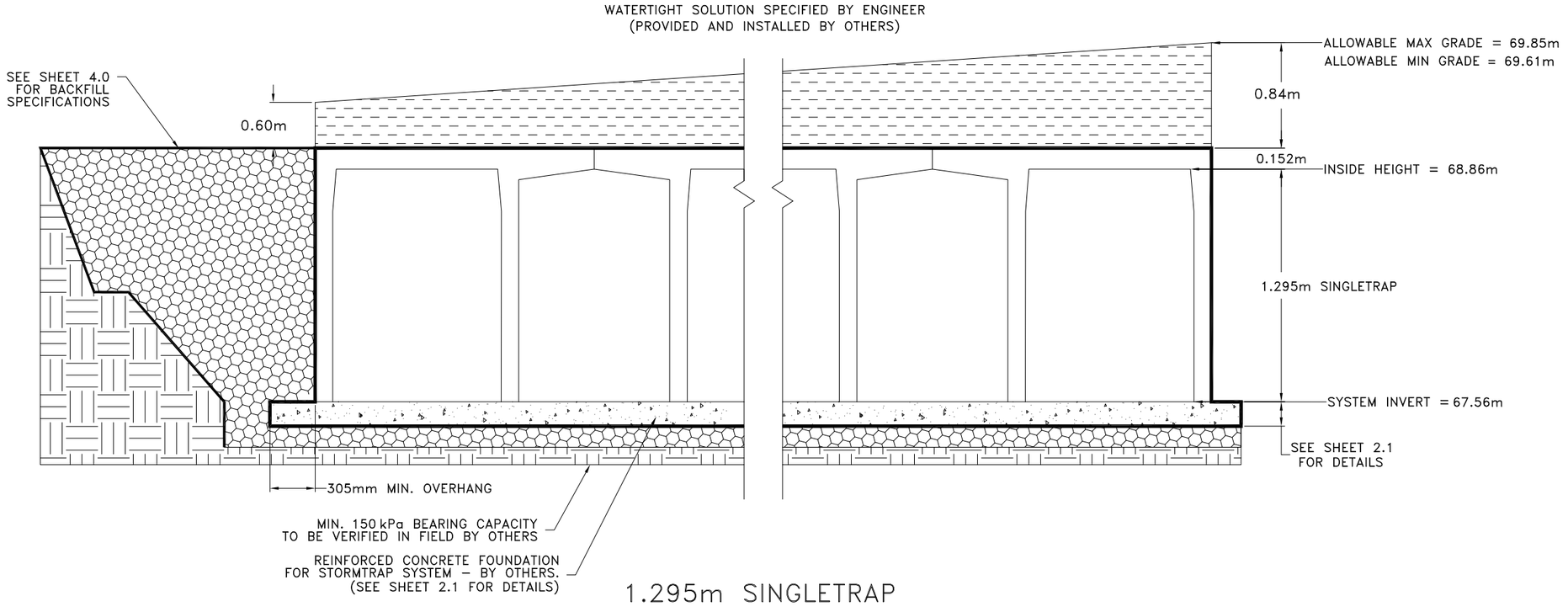
1. ASTM C858-19:
   - 1.1. THE ELASTIC METHOD OF STRUCTURAL DESIGN OR THE STRENGTH DESIGN METHOD FOR REINFORCED CONCRETE OUTLINED IN ACI 318 SHALL BE USED TO DESIGN THE CONCRETE SECTIONS. LOAD COMBINATION FACTORS LISTED BELOW.
     - 1.1.1. DEAD: 1.4
     - 1.1.2. DEAD + LIVE: 1.2 + 1.6
     - 1.1.3. SOIL PRESSURE: 1.6
     - 1.1.4. SOIL SURCHARGE: 1.6

2. ASTM C857:
   - 2.1. LIVE LOAD: PER ASTM C858/C857
     - 2.1.1. AASHTO HS-20 - (71 kN) WHEEL LOAD.
     - 2.1.2. IMPACT LOADING PER ASTM C857 SECTION 4.1.2.2, APPLIED TO ALL LIVE LOAD OPTIONS LISTED ABOVE.
       - 2.1.2.1. 0.152m TO 0.305m COVER RANGE: 30% INCREASE
       - 2.1.2.2. ABOVE 0.306m TO 0.610m COVER RANGE: 20% INCREASE
       - 2.1.2.3. ABOVE 0.611m TO 0.889m COVER RANGE: 10% INCREASE
       - 2.1.2.4. ABOVE 0.890m ONWARDS: NOT APPLIED
   - 2.2. DISTRIBUTION OF WHEEL LOADS THROUGH EARTH FILLS: WHEEL LOADS AT GROUND OR SURFACE SHALL BE DISTRIBUTED USING A WHEEL LOAD AREA REPRESENTED IN FIGURE 2 AND DETAILED IN SECTION 4.1.4 OF ASTM C 857. THE WHEEL LOAD DISTRIBUTION CONSIDERATION IS IRRESPECTIVE OF THE THICKNESS OF SOIL COVER AND IS APPLIED TO ALL SOIL COVER RANGES FROM 0.152m UP TO 3.05m.
   - 2.3. EXTERIOR WALLS SURCHARGE LOADS: EXTERIOR WALLS SURCHARGE LOADS SHALL COMPLY WITH ASTM C 857 SECTION 4.2.1 FOR SURCHARGE PRESSURES, WHICH STATES THAT SURCHARGE PRESSURE SHALL BE NO LESS THAN 0.5% OF THE WHEEL LOAD. IN ADDITION TO THIS THE SURCHARGE PRESSURE CAN BE NEGLECTED WHEN THE DEPTH OF THE SOIL EXCEEDS 2.44m.

3. OTHER STANDARDS:
   - 3.1. FLEXURE DESIGN PER ACI 318.
   - 3.2. SHEAR DESIGN PER ACI 318.
   - 3.3. CLEAR COVERS PER CSA A23.

SITE SPECIFIC DESIGN CRITERIA

1. STORMTRAP UNITS 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. 0.60m MAX. 0.84m 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.
4. FOR STRUCTURAL CALCULATIONS THE GROUND WATER TABLE IS ASSUMED TO BE @ 69.26m. IF WATER TABLE IS DIFFERENT THAN ASSUMED, CONTACT STORMTRAP.
5. SYSTEM DESIGN INTENT IS TO CONTAIN WATER AND / OR PREVENT GROUNDWATER MIGRATION INTO THE SYSTEM AND WILL NOT BE SUBJECT TO LEAKAGE TESTING. A THIRD PARTY WATER PROOFING SOLUTION IS REQUIRED FOR SEALING OF SYSTEM / MODULE JOINTS AND SEAMS. SOLUTION TO BE PROVIDED AND INSTALLED BY CONTRACTOR IN ACCORDANCE WITH THIRD PARTY WATER-PROOFING SUPPLIER'S PRODUCT SPECIFICATIONS.



1.295m SINGLETRAP

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SINGLETRAP DESIGN CRITERIA

SHEET NUMBER:

1.1

BILL OF MATERIALS

QTY.	UNIT TYPE	DESCRIPTION	WEIGHT
27	I	1.295m SINGLETRAP	6820
0	II	1.295m SINGLETRAP	–
15	III	1.295m SINGLETRAP	6560
4	IV	1.295m SINGLETRAP	6993
0	VII	1.295m SINGLETRAP	–
0	VII–1	1.295m SINGLETRAP	–
0	VII–2	1.295m SINGLETRAP	–
0	VII–3	1.295m SINGLETRAP	–
0	VII–4	1.295m SINGLETRAP	–
0	SPIII	1.295m SINGLETRAP	VARIES
1	SPIV	1.295m SINGLETRAP	VARIES
1	T2 PANEL	152mm THICK PANEL	1360
4	T4 PANEL	152mm THICK PANEL	1071
0	T7 PANEL	152mm THICK PANEL	–
23	JOINTWRAP	18.29m PER ROLL	
32	JOINTTAPE	4.42m PER ROLL	
5	GALLON(S)	PRIMER FOR JOINT WRAP	
TOTAL PIECES = 47			
TOTAL PANELS = 5			
HEAVIEST PICK WEIGHT = 6,993			

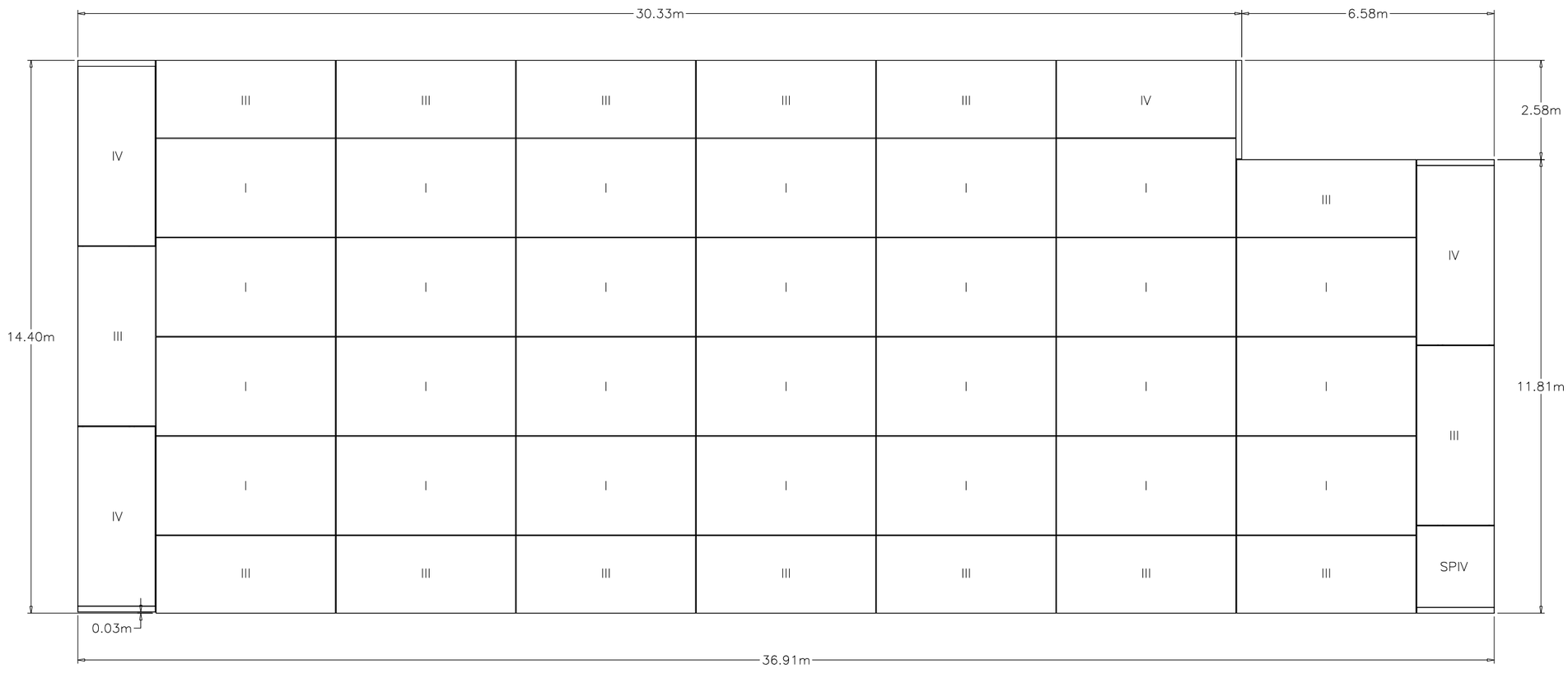
N

DESIGN CRITERIA

ALLOWABLE MAX GRADE = 69.85m
ALLOWABLE MIN GRADE = 69.61m
INSIDE HEIGHT ELEVATION = 68.86m
SYSTEM INVERT = 67.56m

NOTES:

1. DIMENSIONING OF STORMTRAP SYSTEM SHOWN BELOW ALLOW FOR A 19mm (3/4") GAP BETWEEN EACH MODULE.
2. ALL DIMENSIONS TO BE VERIFIED IN THE FIELD BY OTHERS.
3. SEE SHEET 3.0 FOR INSTALLATION SPECIFICATIONS.
4. SP – INDICATES A MODULE WITH MODIFICATIONS.
5. P – INDICATES A MODULE WITH A PANEL ATTACHMENT.
6. CONTRACTORS RESPONSIBILITY TO ENSURE CONSISTENCY/ACCURACY TO FINAL ENGINEER OF RECORD PLAN SET.
7. IN ORDER FOR STORMTRAP TO GENERATE APPROVAL DRAWINGS, CIVIL ENGINEERING DRAWINGS MUST BE PROVIDED TO STORMTRAP AND SHALL INCLUDE ALL PIPE SIZES, PIPE MATERIAL, PIPE INVERT ELEVATIONS, ACCESS OPENING SIZE AND SHAPE. IN ADDITION, FINAL GRADING PLANS SHALL ALSO INCLUDE MINIMUM AND MAXIMUM GRADES OVER THE TOP OF THE STORMTRAP SYSTEM.



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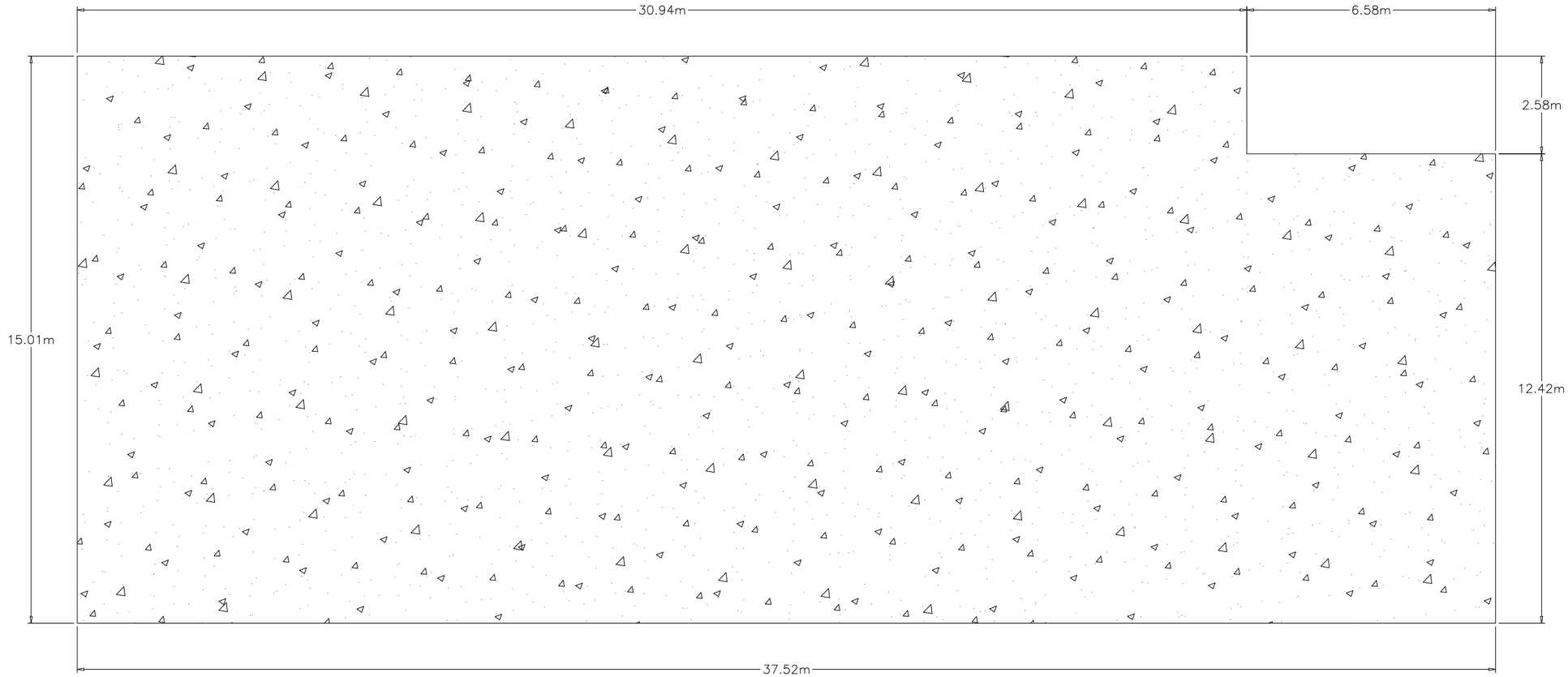
SINGLETRAP
SYSTEM LAYOUT

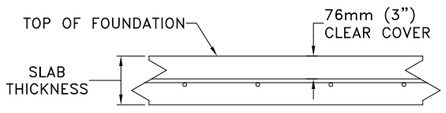
SHEET NUMBER:

2.0



CONCRETE FOUNDATION NOTES:

1. CONCRETE FOUNDATION TO BE SUPPLIED AND INSTALLED BY OTHERS.
2. CONCRETE STRENGTH @ 28 DAYS, 5%–8% ENTRAINED AIR, 76mm–127mm (3"–5") MAX SLUMP.
3. NET ALLOWABLE SOIL PRESSURE AS INDICATED ON SHEET 1.1.
4. SOIL CONDITIONS TO BE VERIFIED ON SITE BY OTHERS.
5. REBAR: ASTM A615 GRADE 60, BLACK BAR.
6. DIMENSION OF FOUNDATION MUST HAVE 305mm (1'–0") OVERHANG BEYOND EXTERNAL FACE OF MODULE.
7. DIMENSION OF STORMTRAP SYSTEM ALLOW FOR A 19mm (3/4") GAP BETWEEN EACH MODULE.
8. ALL DIMENSIONS TO BE VERIFIED IN THE FIELD BY OTHERS.
9. SEE SHEET 3.0 FOR INSTALLATION SPECIFICATIONS.



STORMTRAP FOUNDATION DETAIL

(HS–20) LOADING				
MAXIMUM SYSTEM COVER	SLAB THICKNESS	CONCRETE STRENGTH	MIN. BEARING PRESSURE	REINFORCEMENT (BOTH DIRECTIONS)
152mm – 1524mm	203mm	28 mPa	120 kPa	15M @ 406mm O.C.
1549mm – 3048mm	203mm	28 mPa	143 kPa	15M @ 305mm O.C.

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SINGLETRAP FOUNDATION LAYOUT

SHEET NUMBER:

2.1

STORMTRAP INSTALLATION SPECIFICATION

1. STORMTRAP SHALL BE INSTALLED IN ACCORDANCE WITH ASTM C891 (STANDARD PRACTICE FOR INSTALLATION OF UNDERGROUND PRECAST CONCRETE UTILITY STRUCTURES). THE FOLLOWING ADDITIONS AND/OR EXCEPTIONS ARE PROVIDED FOR EMPHASIS. THE MENTION OF THESE ITEMS DOES NOT PRECLUDE THE INSTALLING CONTRACTOR FROM FOLLOWING ASTM C891 IN ITS ENTIRETY AND IMPLEMENTING ALL APPROPRIATE MEASURES. THE INSTALLING CONTRACTOR OWNS AND IS RESPONSIBLE FOR THE STORMTRAP SYSTEM UPON REMOVAL OF THE MODULES FROM THE DELIVERY TRUCK THROUGH 'FINAL CONSTRUCTION'. FINAL CONSTRUCTION IS ACHIEVED WHEN ALL MODULES ARE SET, FULLY BACKFILLED, AND WHEN FINAL FINISHED GRADES ARE REACHED. THE CONTRACTOR IS RESPONSIBLE FOR ANY COUNTERMEASURES NECESSARY TO RESIST UPLIFT/BUOYANCY BEFORE 'FINAL CONSTRUCTION' IS ACHIEVED.

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 305mm (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 THE SOIL BEARING PRESSURE MEETS OR EXCEEDS THE STRUCTURAL DESIGN LOADING CRITERIA AS SPECIFIED ON SHEET 1.1.

4. THE STORMTRAP MODULES SHALL BE PLACED SUCH THAT THE MAXIMUM SPACE BETWEEN ADJACENT MODULES DOES NOT EXCEED 19mm ($\frac{3}{4}$") (SEE DETAIL 2). IF THE SPACE EXCEEDS 19mm ($\frac{3}{4}$"), THE MODULES SHALL BE RESET WITH APPROPRIATE ADJUSTMENT MADE TO LINE AND GRADE TO BRING THE SPACE INTO SPECIFICATION.

5. STORMTRAP MODULES ARE NOT WATERTIGHT. WATERTIGHT SOLUTION SPECIFIED BY ENGINEER (PROVIDED AND INSTALLED BY OTHERS).

6. 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.

7. ALL EXTERIOR ROOF AND EXTERIOR VERTICAL WALL JOINTS BETWEEN ADJACENT STORMTRAP MODULES SHALL BE SEALED WITH 203mm (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 2, 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:

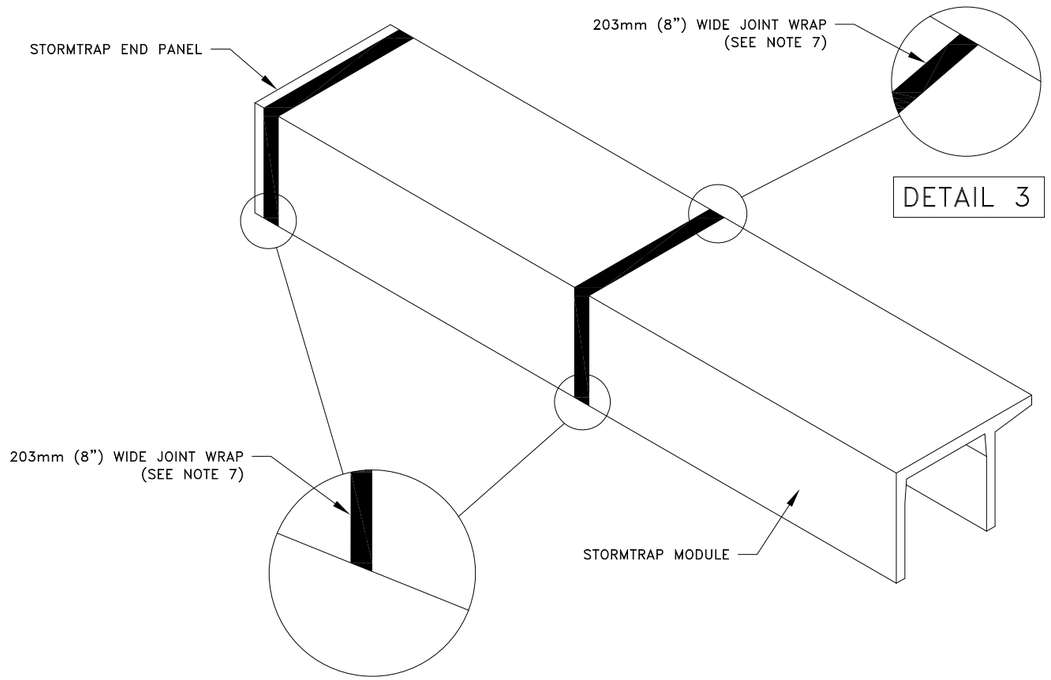
   7.1. USE A BRUSH OR WET CLOTH TO THOROUGHLY CLEAN THE OUTSIDE SURFACE AT THE POINT WHERE JOINT WRAP IS TO BE APPLIED.

   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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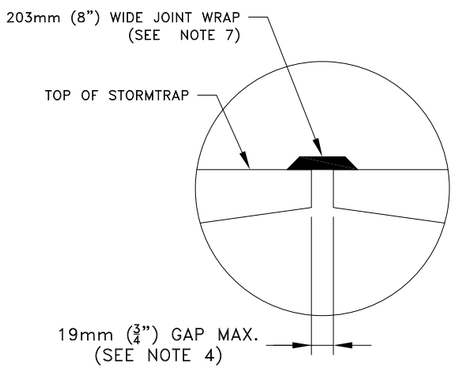
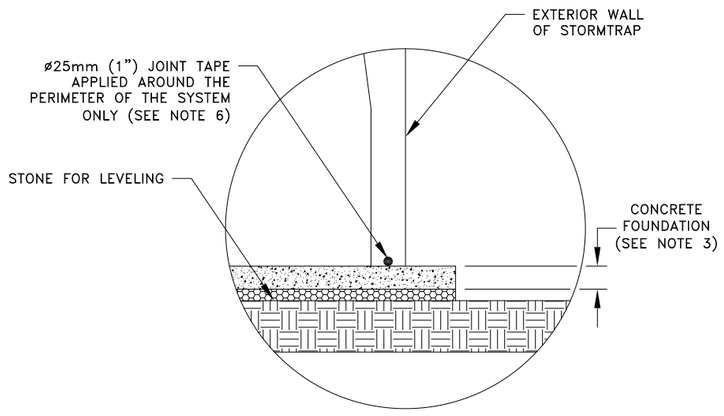


DETAIL 2



DETAIL 1

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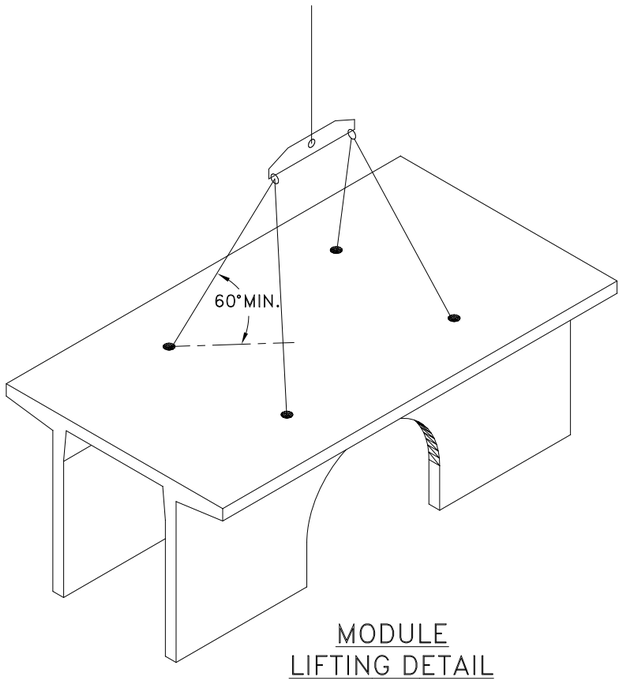
SINGLETRAP INSTALLATION SPECIFICATION

SHEET NUMBER:

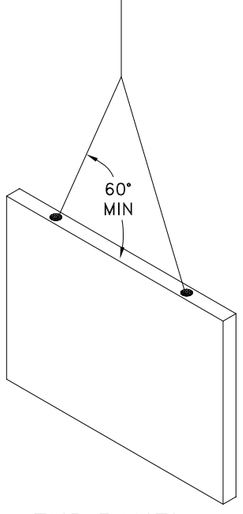
3.0

STORMTRAP MODULE LIFTING SPECIFICATION

1. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT ALL (4) CHAINS/CABLES ARE SECURED PROPERLY TO THE LIFTING ANCHORS AND IN EQUAL TENSION WHEN LIFTING THE STORMTRAP MODULE.
2. MINIMUM 2134mm (7'FT) CHAIN/CABLE LENGTH TO BE USED TO LIFT STORMTRAP MODULES (SUPPLIED BY CONTRACTOR).
3. CONTRACTOR TO ENSURE MINIMUM LIFTING ANGLE IS 60° FROM TOP SURFACE OF STORMTRAP MODULE. SEE DETAIL.
4. IT IS UNDERSTOOD AND AGREED THAT AT ALL TIMES DURING WHICH HOISTING AND RIGGING EQUIPMENT IS BEING SUPPLIED TO THE PURCHASER, OPERATOR OF SUCH EQUIPMENT SHALL BE IN CHARGE OF HIS ENTIRE EQUIPMENT AND SHALL AT ALL TIMES BE THE JUDGE OF THE SAFETY AND PROPERTY OF ANY SUGGESTION TO HIM FROM THE SELLER, ITS AGENTS OR EMPLOYEES. PURCHASER AGREES TO SAVE, INDEMNIFY AND HOLD HARMLESS SELLER FROM ALL LOSS, CLAIMS, DEMANDS OR CAUSES OF ACTION, WHICH MAY ARISE FROM THE EXISTENCE OR OPERATION OF SAID EQUIPMENT.



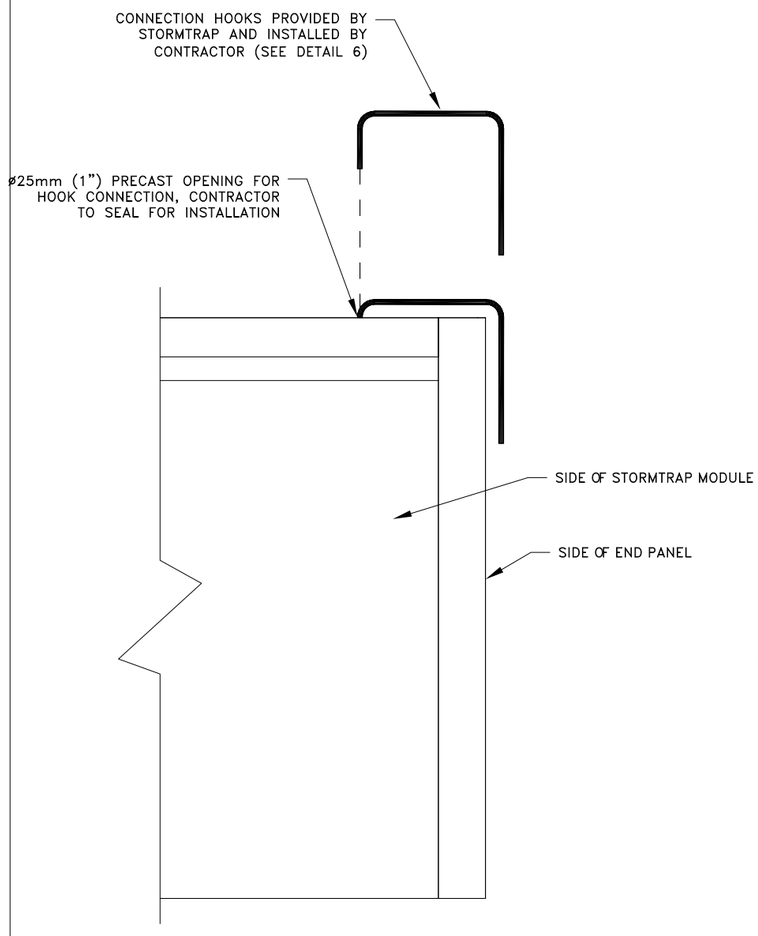
MODULE
LIFTING DETAIL



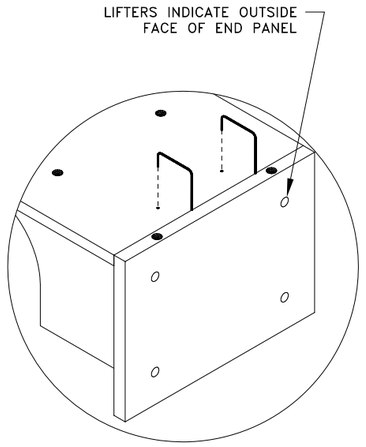
END PANEL
LIFTING DETAIL

END PANEL ERECTION/INSTALLATION SPECIFICATION

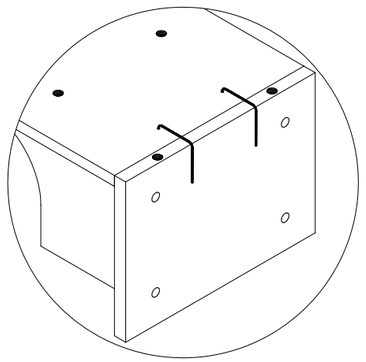
1. END PANELS WILL BE SUPPLIED TO CLOSE OFF OPEN ENDS OF ROWS.
2. PANELS SHALL BE INSTALLED IN A TILT UP FASHION DIRECTLY ADJACENT TO OPEN END OF MODULE (REFER TO SHEET 2.0 FOR END PANEL LOCATIONS). SIDE WITH LIFTERS INDICATES OUTSIDE FACE.
3. CONNECTION HOOKS WILL BE SUPPLIED WITH END PANELS TO SECURELY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



PANEL CONNECTION
ELEVATION VIEW



STEP 1



STEP 2

DETAIL 6

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SINGLETRAP
INSTALLATION
SPECIFICATION

SHEET NUMBER:

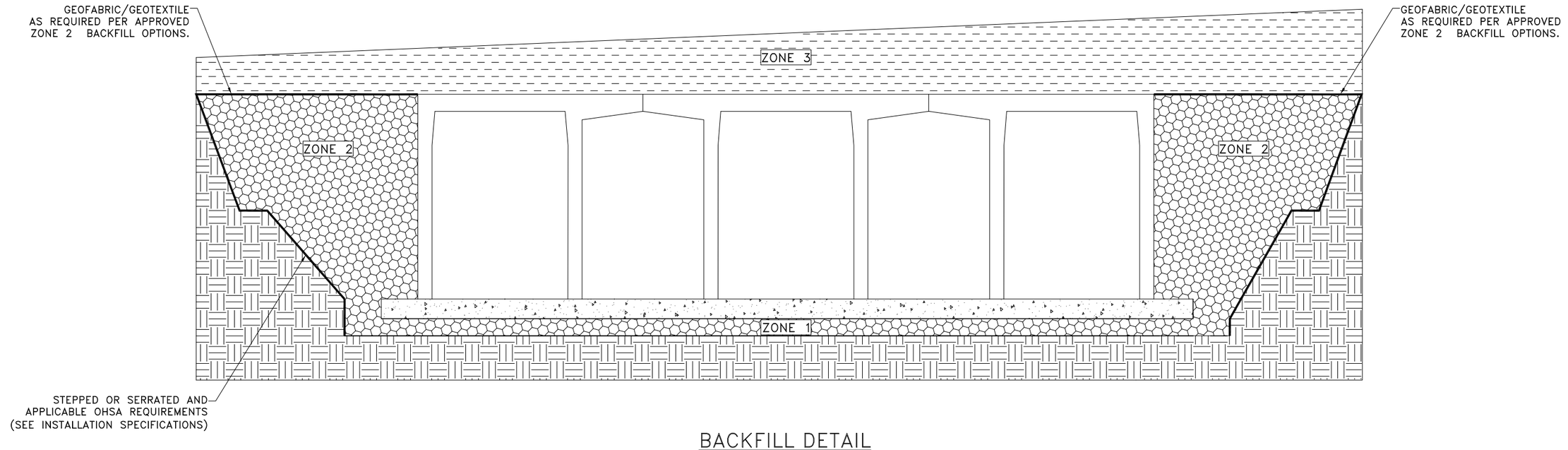
3.1

ZONE CHART

ZONES	ZONE DESCRIPTIONS	REMARKS
ZONE 1	FOUNDATION AGGREGATE	ANGULAR STONE AGGREGATE. 19mm (¾") TYPE I OR II CLEAR STONE (OPSS.MUNI 1004) GRADATION: 100% PASSING 26.5mm SIEVE, 0–10% PASSING 4.75mm SIEVE; 0–2% PASSING 75 MICROMETER SIEVE (SEE NOTE 4)
ZONE 2	BACKFILL	UNIFIED SOILS CLASSIFICATION (GW, GP, SW, SP) OR SEE BELOW FOR APPROVED BACKFILL OPTIONS
ZONE 3	FINAL COVER OVERTOP	MATERIALS NOT TO EXCEED 19 kN/m³

APPROVED ZONE 2 BACKFILL OPTIONS

OPTION	REMARKS
19mm (¾") TYPE I OR II CLEAR STONE (OPSS.MUNI 1004)	THE STONE AGGREGATE SHALL CONSIST OF CLEAN AND FREE DRAINING ANGULAR MATERIAL. THIS MATERIAL SHALL BE SEPARATED FROM THE SURROUNDING NATIVE SOIL AND OTHER FILL MATERIAL USING GEOFABRIC AS DETERMINED BY THE GEOTECHNICAL ENGINEER. GRADATION: 100% PASSING 26.5mm SIEVE, 0–10% PASSING 4.75mm SIEVE; 0–2% PASSING 75 MICROMETER SIEVE.
16mm CLEAR STONE (OPSS.MUNI 1004)	THE STONE AGGREGATE SHALL CONSIST OF CLEAN AND FREE DRAINING ANGULAR MATERIAL. THIS MATERIAL SHALL BE SEPARATED FROM THE SURROUNDING NATIVE SOIL AND OTHER FILL MATERIAL USING GEOFABRIC AS DETERMINED BY THE GEOTECHNICAL ENGINEER. GRADATION: 100% PASSING 19.0mm SIEVE, 0–10% PASSING 4.75mm SIEVE; 0–2% PASSING 75 MICROMETER SIEVE.
13.2mm CLEAR STONE (OPSS.MUNI 1004)	THE STONE AGGREGATE SHALL CONSIST OF CLEAN AND FREE DRAINING ANGULAR MATERIAL. THIS MATERIAL SHALL BE SEPARATED FROM THE SURROUNDING NATIVE SOIL AND OTHER FILL MATERIAL USING GEOFABRIC AS DETERMINED BY THE GEOTECHNICAL ENGINEER. GRADATION: 100% PASSING 16.0mm SIEVE, 0–10% PASSING 4.75mm SIEVE; 0–2% PASSING 75 MICROMETER SIEVE.
GRANULAR O (OPSS.MUNI 1010)	THE STONE AGGREGATE SHALL CONSIST OF CLEAN AND FREE DRAINING ANGULAR MATERIAL. THIS MATERIAL SHALL BE SEPARATED FROM THE SURROUNDING NATIVE SOIL AND OTHER FILL MATERIAL USING GEOFABRIC AS DETERMINED BY THE GEOTECHNICAL ENGINEER. GRADATION: 100% PASSING 37.5mm SIEVE, 95–100% PASSING 26.5mm SIEVE; 0–5% PASSING 75 MICROMETER SIEVE.



BACKFILL DETAIL

STORMTRAP ZONE INSTALLATION SPECIFICATION/PROCEDURE

1. THE FILL PLACED AROUND THE STORMTRAP MODULES MUST BE 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 610mm (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 MUST BE FREE–DRAINING MATERIAL. SEE ZONE 2 BACKFILL CHART ON THIS PAGE FOR APPROVED BACKFILL OPTIONS. IF NATIVE EARTH IS SUSCEPTIBLE TO MIGRATION, CONFIRM WITH GEOTECHNICAL ENGINEER AND PROVIDE PROTECTION AS REQUIRED (PROVIDED BY OTHERS). ALL MODULES MUST BE SET AND ALL SIDES MUST BE FULLY BACKFILLED BEFORE TRAVEL OVERTOP THE SYSTEM IS PERMITTED. SEE NOTE 2 FOR EXCEPTIONS AND LIMITATIONS.
2. THE FILL PLACED OVERTOP THE SYSTEM SHALL BE PLACED IN MINIMUM 152mm (6" LIFTS). AT NO TIME SHALL MACHINERY OR VEHICLES GREATER THAN THE DESIGN LIVE LOAD LISTED ON SHEET 1.1 TRAVEL OVERTOP THE SYSTEM. IF TRAVEL OVER THE SYSTEM OCCURS BEFORE THE MINIMUM DESIGN COVER IS ACHIEVED, 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. VEHICLES AND MACHINERY USED TO PLACE FILL MATERIAL ON TOP OF THE SYSTEM SHALL TRAVEL PARALLEL TO THE LONGITUDINAL AXIS OF THE STORMTRAP MODULES WHENEVER POSSIBLE.
3. THE VIBRATORY FUNCTION OF ANY ROLLER, COMPACTOR, VEHICLE, ETC. SHALL NOT BE USED OVERTOP THE SYSTEM WITHOUT PRIOR APPROVAL FROM STORMTRAP. IN SOME CASES, HAND COMPACTION MAY BE NECESSARY TO ENSURE THAT THE ALLOWABLE DESIGN LOADING IS NOT EXCEEDED.
4. STONE AGGREGATE FOUNDATION IN ZONE 1 IS FOR LEVELING PURPOSES.

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SINGLETRAP BACKFILL SPECIFICATION

SHEET NUMBER:

4.0

ACCESS OPENING SPECIFICATION

1. A TYPICAL ACCESS OPENING FOR THE STORMTRAP SYSTEM ARE 610mm (2'–0") IN DIAMETER. ACCESS OPENINGS LARGER THAN 1219mm (4'–0") IN DIAMETER NEED TO BE APPROVED BY STORMTRAP. ALL OPENINGS MUST RETAIN AT LEAST 610mm (2'–0") OF CLEARANCE FROM THE END OF THE STORMTRAP MODULE UNLESS NOTED OTHERWISE. ALL ACCESS OPENINGS TO BE LOCATED ON INSIDE LEG UNLESS OTHERWISE SPECIFIED. SEE SHEET 2.0 FOR SIZES AND LOCATIONS.
2. UNLESS OTHERWISE SPECIFIED, PLASTIC COATED STEPS ARE PROVIDED INSIDE ANY MODULE WHERE DEEMED NECESSARY. THE HIGHEST STEP IN THE MODULE IS TO BE PLACED A DISTANCE OF 305mm (1'–0") FROM THE INSIDE EDGE OF THE STORMTRAP MODULES. ALL ENSUING STEPS SHALL BE PLACED AT A DISTANCE BETWEEN 254mm (10") MIN AND 356mm (14") MAX BETWEEN THEM. STEPS MAY BE MOVED OR ALTERED TO AVOID OPENINGS OR OTHER IRREGULARITIES IN THE MODULE.
3. STORMTRAP LIFTING INSERTS MAY BE RELOCATED TO AVOID INTERFERENCE WITH ACCESS OPENINGS OR THE CENTER OF GRAVITY OF THE MODULE AS NEEDED.
4. STORMTRAP ACCESS OPENINGS MAY BE RELOCATED TO AVOID INTERFERENCE WITH INLET AND/OR OUTLET PIPE OPENINGS SO PLACEMENT OF STEPS IS ATTAINABLE.
5. ACCESS OPENINGS SHOULD BE LOCATED IN ORDER TO MEET THE APPROPRIATE MUNICIPAL REQUIREMENTS. STORMTRAP RECOMMENDS AT LEAST TWO ACCESS OPENINGS PER SYSTEM FOR ACCESS AND INSPECTION.
6. USE PRECAST ADJUSTING RINGS AS NEEDED TO MEET GRADE. STORMTRAP RECOMMENDS FOR COVER OVER 610mm (2'–0") TO USE PRECAST BARREL OR CONE SECTIONS. (PROVIDED BY OTHERS)

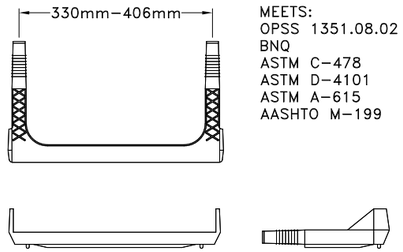
PIPE OPENING SPECIFICATION

1. MINIMUM EDGE DISTANCE FOR AN OPENING ON THE OUTSIDE WALL SHALL BE NO LESS THAN 305mm (1'–0").
2. CONNECTING PIPES MAY BE INSTALLED WITH A 305mm (1'–0") CONCRETE COLLAR AND AN AGGREGATE CRADLE (AS REQUIRED) FOR AT LEAST ONE PIPE LENGTH (SEE PIPE CONNECTION DETAIL). A STRUCTURAL GRADE CONCRETE OR HIGH STRENGTH, NON–SHRINK GROUT WITH A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 35 mPa MAY BE USED.
3. THE ANNULAR SPACE BETWEEN THE PIPE AND THE HOLE SHALL BE FILLED WITH HIGH STRENGTH NON–SHRINK GROUT.

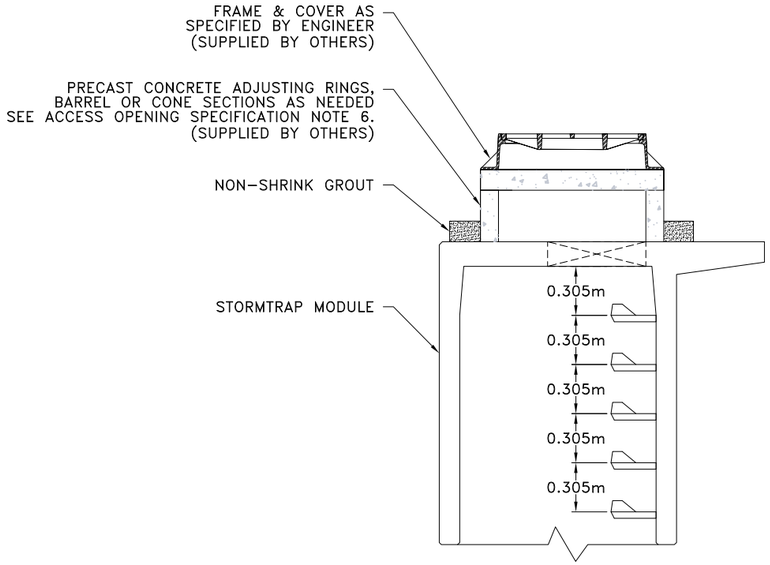
PIPE INSTALLATION INSTRUCTIONS

1. CLEAN AND LIGHTLY LUBRICATE ALL OF THE PIPE TO BE INSERTED INTO STORMTRAP.
2. IF PIPE IS CUT, CARE SHOULD BE TAKEN TO ALLOW NO SHARP EDGES. BEVEL AND LUBRICATE LEAD END OF PIPE.
3. ALIGN CENTER OF PIPE TO CORRECT ELEVATION AND INSERT INTO OPENING.

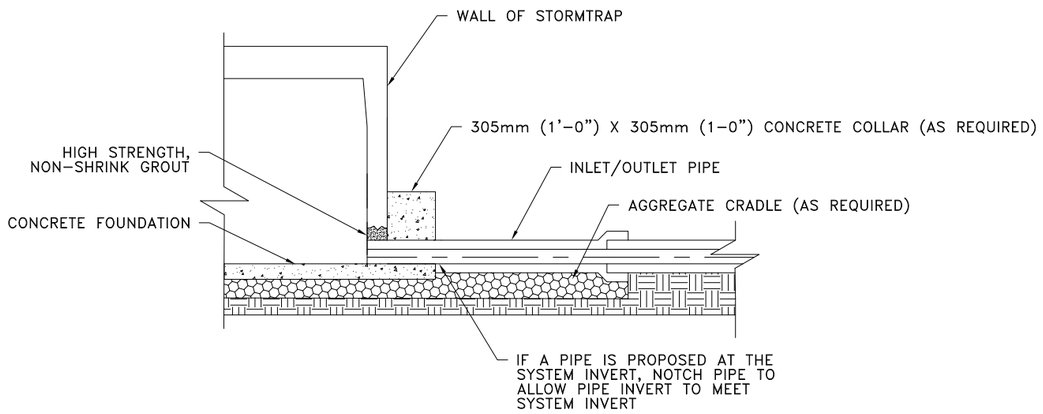
NOTE: ALL ANCILLARY PRODUCTS/SPECIFICATIONS RECOMMENDED AND SHOWN ON THIS SHEET INCLUDING BUT NOT LIMITED TO CONCRETE COLLARS, AGGREGATE CRADLES, GRADE RINGS, RISER SECTIONS, ETC., ARE RECOMMENDATIONS ONLY AND SUBJECT TO CHANGE PER THE INSTALLING CONTRACTOR AND/OR PER LOCAL MUNICIPAL CODE/REQUIREMENTS.



STEP DETAIL



RISER/STAIR DETAIL



NOTCHED PIPE CONNECTION DETAIL
WHEN PIPE INVERT IS AT
INVERT OF STORMTRAP SYSTEM

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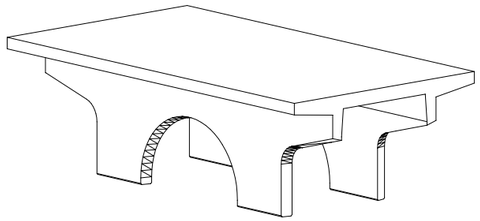
PIPE / ACCESS OPENING SPECIFICATION

SHEET NUMBER:

5.0



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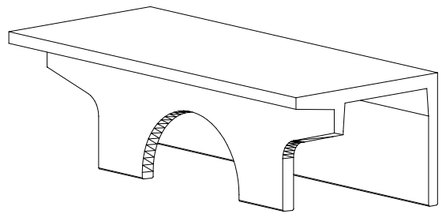

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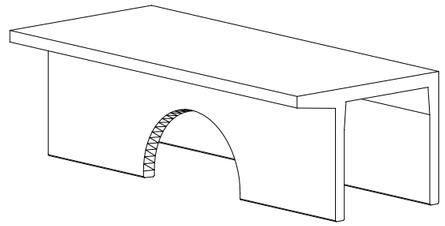
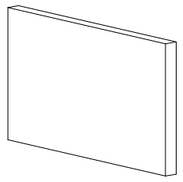
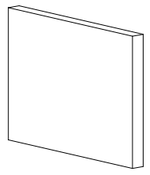


TYPE IV



TYPE II
END PANEL



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.

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SINGLETRAP
MODULE TYPES

SHEET NUMBER:

6.0

A.4 Table E.2 Groundwater Level Data – Monitoring Wells

TABLE E.2
GROUNDWATER LEVEL DATA - MONITORING WELLS

Well ID	UTM Coordinates		Date	Time	Well Depth			Screen Separation[1]	Top of Casing Elevation (m AMSL)	Ground Surface Elevation (m AMSL)	Pipe Stick-up (m)	Groundwater Level			Vertical Hydraulic Gradient[2]
	Northing	Easting			(m BTOC)	(m BGS)	(m AMSL)	(m)				(m BGS)	(m BTOC)	(m AMSL)	(+) = Upward (-) = Downward
BH25-1	5032793	447061	11-Jul-25 5-Aug-25 18-Aug-25 12-Mar-26	8:18 AM 1:15 PM 10:41 AM 10:45 AM	6.30	6.40	63.90	3.3	70.20	70.30	-0.10	3.31 3.56 3.56 2.14	3.21 3.46 3.46 2.04	66.99 66.75 66.74 68.16	-
BH25-1A	5032795	447058	11-Jul-25 5-Aug-25 18-Aug-25 12-Mar-26	8:05 AM 12:00 AM 10:08 AM 10:55 AM	3.10	3.15	67.16		70.26	70.30	-0.05	- - - 1.07	DRY DRY DRY 1.02	- - - 69.24	
BH25-2	5032798	447109	11-Jul-25 5-Aug-25 18-Aug-25 12-Mar-26	9:32 AM 1:34 PM 11:23 AM -	9.20	9.28	61.32	-	70.52	70.60	-0.08	3.77 3.96 3.95 -	3.69 3.88 3.87 -	66.83 66.65 66.65 -	

Notes:

(1) Vertical distance between the mid-point of the shallow and deep monitoring well screens.
(2) Vertical hydraulic gradient calculated based on the distance between the mid-point of the shallow and deep monitoring well screens.

m BGS = meters below ground surface
m BTOC = meters below top of casing
DRY = no groundwater or surface water was observed in the piezometer or watercourse, respectively
- = measurement not available

A.5 Stormceptor Specifications

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

09/17/2026

Province:	Ontario
City:	Ottawa
Nearest Rainfall Station:	OTTAWA CDA RCS
Climate Station Id:	6105978
Years of Rainfall Data:	20

Site Name:	OGS1

Drainage Area (ha):	2.41
Runoff Coefficient 'c':	0.67

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

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	52.12
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	320.00
Influent TSS Concentration (mg/L):	200
Estimated Average Annual Sediment Load (kg/yr):	1719
Estimated Average Annual Sediment Volume (L/yr):	1398

Project Name:	Ashbury College - Synthetic Turf Field
Project Number:	116501019
Designer Name:	Alyssa Gladish
Designer Company:	Stantec Consulting Ltd.
Designer Email:	alyssa.gladish@stantec.com
Designer Phone:	587-721-1241
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	63
EFO5	71
EFO6	77
EFO8	85
EFO10	90
EFO12	94

Recommended Stormceptor EFO Model: EFO8

Estimated Net Annual Sediment (TSS) Load Reduction (%): 85

Water Quality Runoff Volume Capture (%): > 90

imbrium

THIRD-PARTY TESTING AND VERIFICATION

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

PERFORMANCE

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

PARTICLE SIZE DISTRIBUTION (PSD)

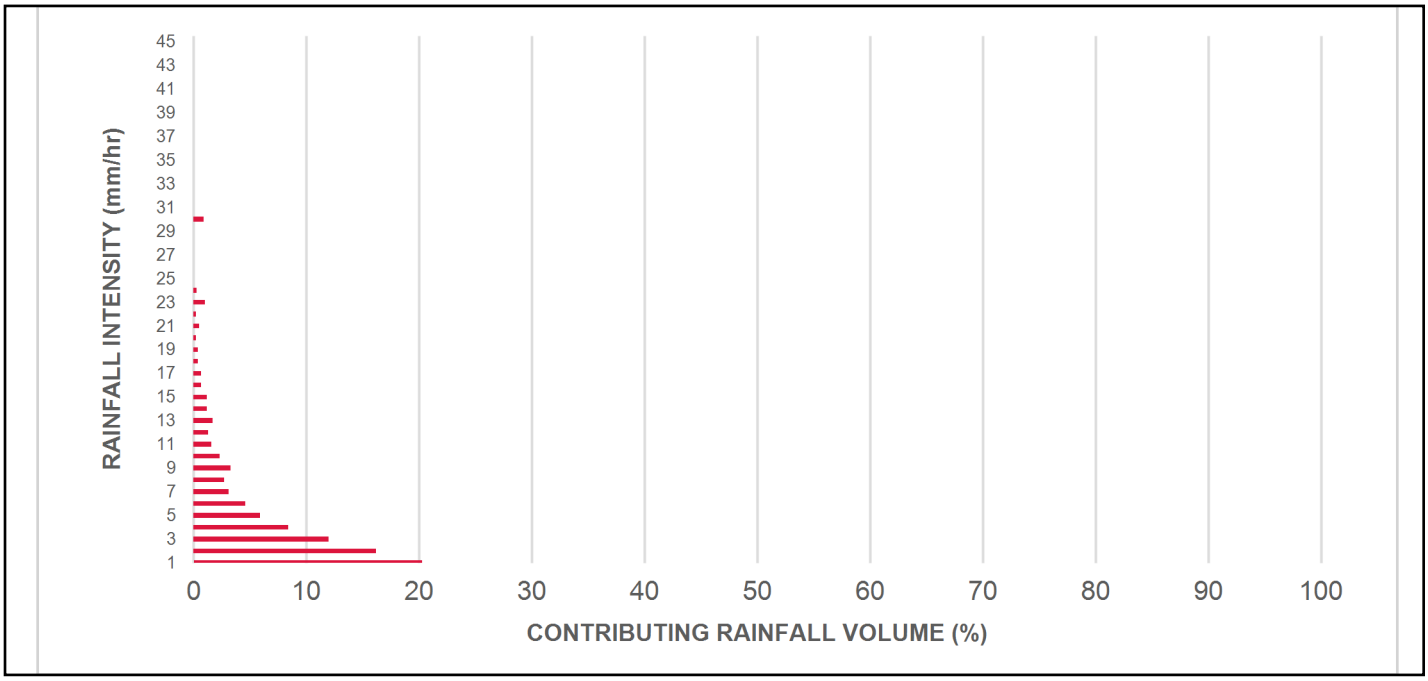
►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a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

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

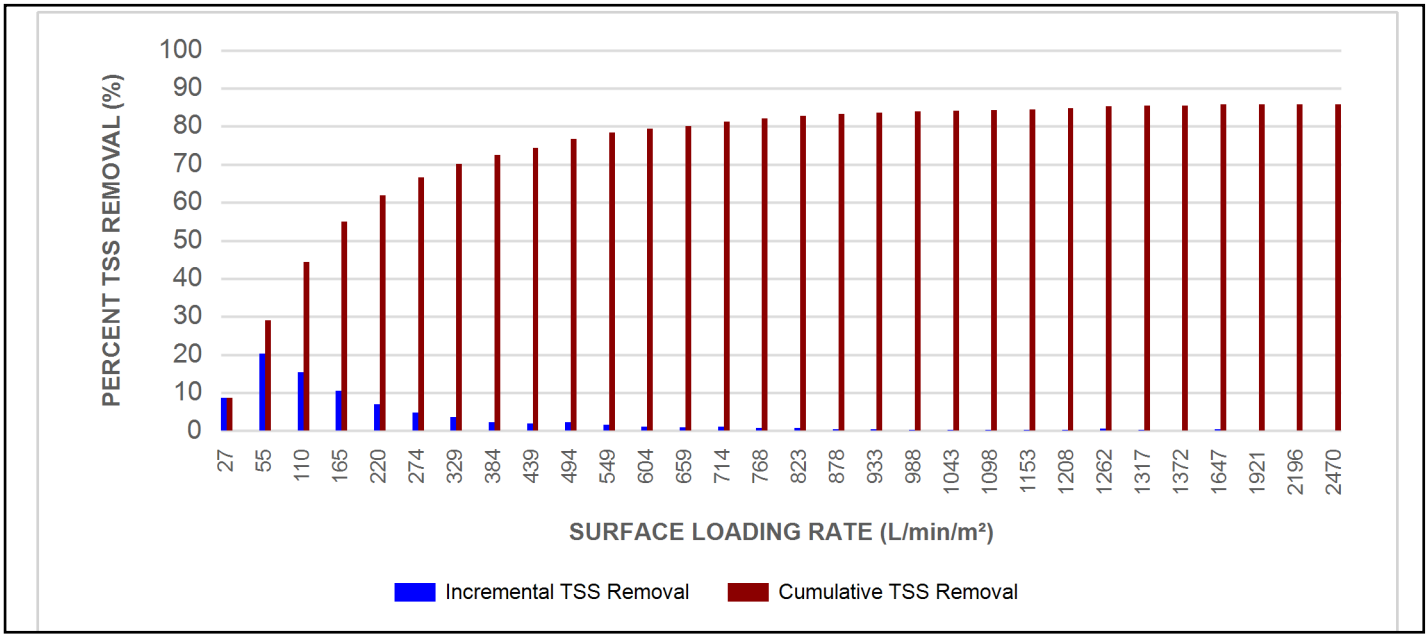
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.6	8.6	2.15	129.0	27.0	100	8.6	8.6
1.00	20.3	29.0	4.30	258.0	55.0	100	20.3	29.0
2.00	16.2	45.2	8.60	516.0	110.0	95	15.3	44.3
3.00	12.0	57.2	12.90	774.0	165.0	88	10.6	54.9
4.00	8.4	65.6	17.20	1032.0	220.0	82	6.9	61.8
5.00	5.9	71.6	21.50	1290.0	274.0	80	4.7	66.6
6.00	4.6	76.2	25.80	1548.0	329.0	77	3.6	70.1
7.00	3.1	79.3	30.10	1806.0	384.0	75	2.3	72.4
8.00	2.7	82.0	34.40	2064.0	439.0	72	2.0	74.4
9.00	3.3	85.3	38.70	2322.0	494.0	70	2.3	76.7
10.00	2.3	87.6	43.00	2580.0	549.0	67	1.5	78.3
11.00	1.6	89.2	47.30	2838.0	604.0	65	1.0	79.3
12.00	1.3	90.5	51.59	3096.0	659.0	64	0.8	80.1
13.00	1.7	92.2	55.89	3354.0	714.0	64	1.1	81.2
14.00	1.2	93.5	60.19	3612.0	768.0	63	0.8	82.0
15.00	1.2	94.6	64.49	3870.0	823.0	63	0.7	82.7
16.00	0.7	95.3	68.79	4128.0	878.0	63	0.4	83.2
17.00	0.7	96.1	73.09	4386.0	933.0	62	0.5	83.6
18.00	0.4	96.5	77.39	4644.0	988.0	62	0.2	83.9
19.00	0.4	96.9	81.69	4901.0	1043.0	61	0.2	84.1
20.00	0.2	97.1	85.99	5159.0	1098.0	59	0.1	84.3
21.00	0.5	97.5	90.29	5417.0	1153.0	58	0.3	84.5
22.00	0.2	97.8	94.59	5675.0	1208.0	57	0.1	84.7
23.00	1.0	98.8	98.89	5933.0	1262.0	56	0.6	85.2
24.00	0.3	99.1	103.19	6191.0	1317.0	54	0.1	85.4
25.00	0.0	99.1	107.49	6449.0	1372.0	53	0.0	85.4
30.00	0.9	100.0	128.99	7739.0	1647.0	45	0.4	85.8
35.00	0.0	100.0	150.48	9029.0	1921.0	38	0.0	85.8
40.00	0.0	100.0	171.98	10319.0	2196.0	33	0.0	85.8
45.00	0.0	100.0	193.48	11609.0	2470.0	30	0.0	85.8
Estimated Net Annual Sediment (TSS) Load Reduction =								**86 %**

Climate Station ID: 6105978 *Years of Rainfall Data*: 20

RAINFALL DATA FROM OTTAWA CDA RCS RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF5 / EFO5	1.5	5	90	762	30	762	30	710	25
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

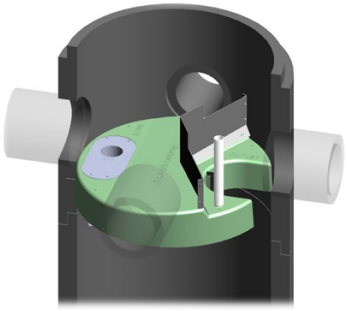
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test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

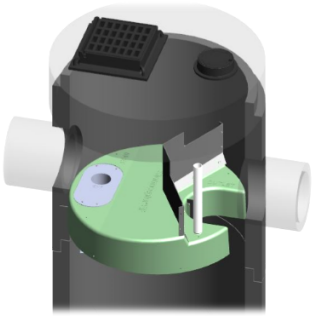
DESIGN FLEXIBILITY

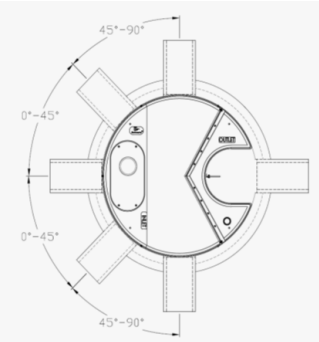
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend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

OIL CAPTURE AND RETENTION

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







INLET-TO-OUTLET DROP

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

HEAD LOSS

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

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF5 / EFO5	1.5	5	1.62	5.3	420	111	305	10	2124	75	2612	5758
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

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

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

STANDARD STORMCEPTOR EF/EFO DRAWINGS

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

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

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

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

PART 1 – GENERAL

1.1 WORK INCLUDED

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

1.2 REFERENCE STANDARDS & PROCEDURES

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

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

1.3 SUBMITTALS

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

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

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

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

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

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m^3 sediment / 265 L oil
	5 ft (1524 mm) Diameter OGS Units:	1.95 m^3 sediment / 420 L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m^3 sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m^3 sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m^3 sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m^3 sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

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

3.2 SIZING METHODOLOGY

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

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

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

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

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

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

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

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

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

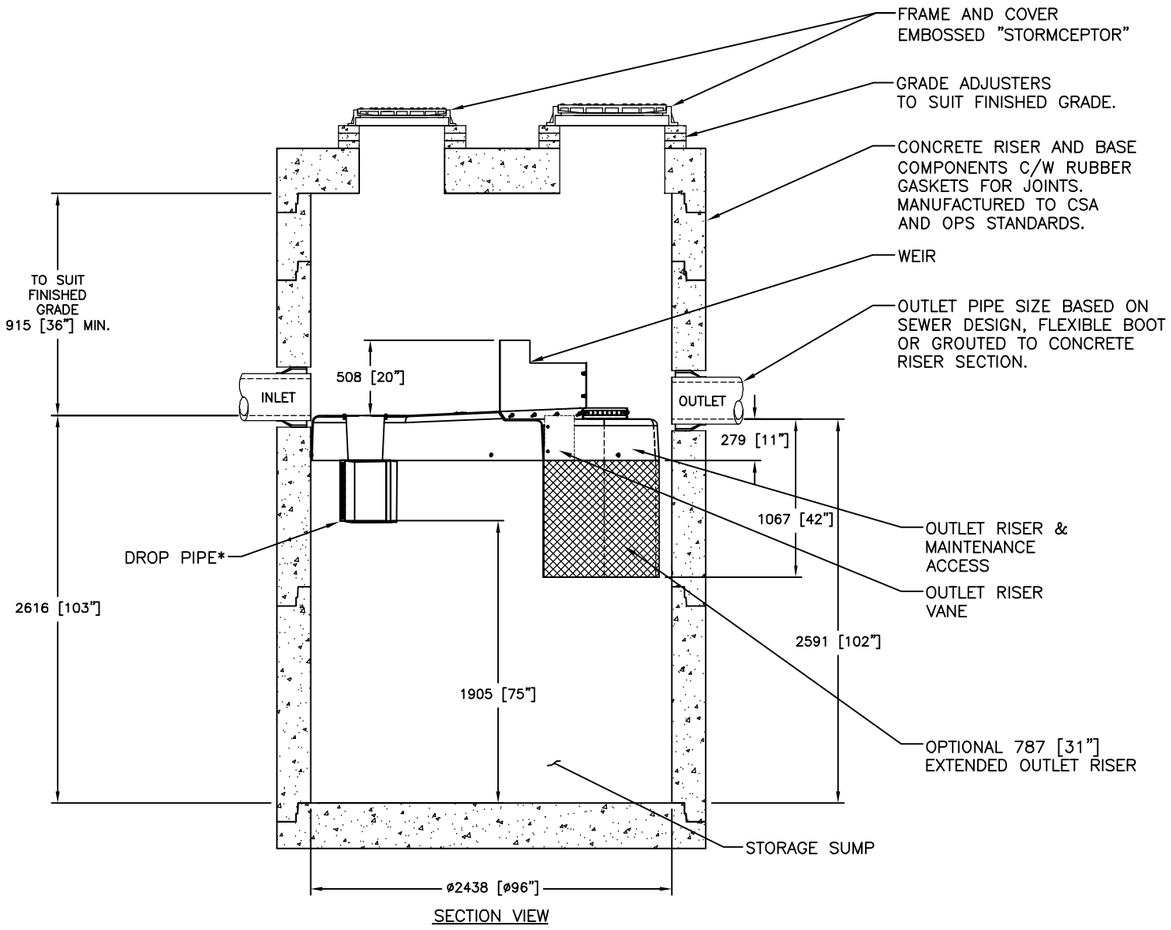
3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid

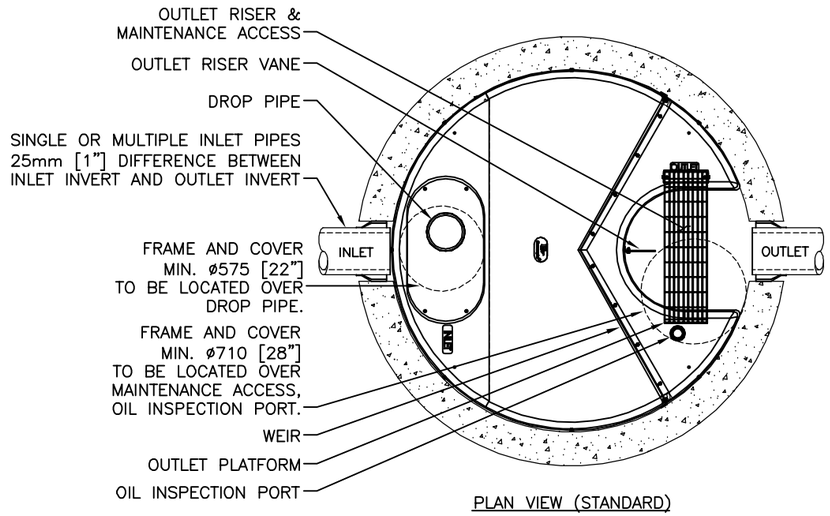
Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators,** with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to assess whether light liquids captured after a spill are effectively retained at high flow rates.

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

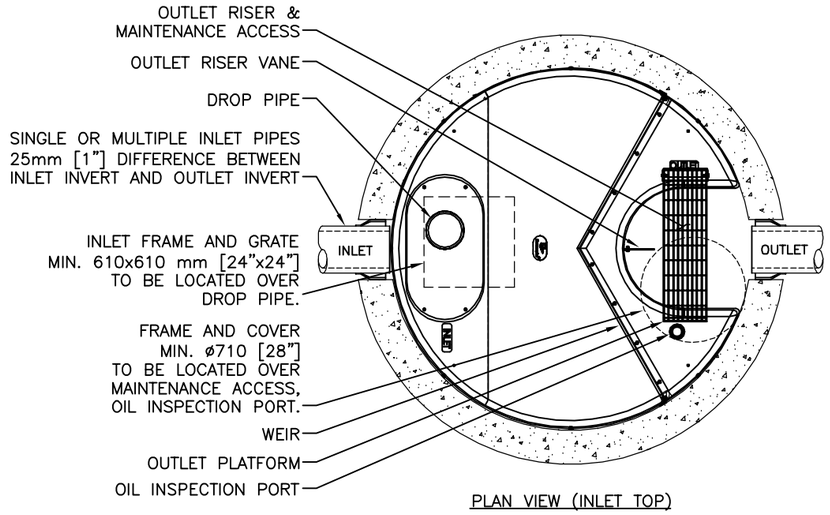
DRAWING NOT TO BE USED FOR CONSTRUCTION



SECTION VIEW



PLAN VIEW (STANDARD)



PLAN VIEW (INLET TOP)

GENERAL NOTES:

* MAXIMUM SURFACE LOADING RATE (SLR) INTO LOWER CHAMBER THROUGH DROP PIPE IS 1135 L/min/m^2 (27.9 gpm/ft^2) FOR STORMCEPTOR EF8 AND 535 L/min/m^2 (13.1 gpm/ft^2) FOR STORMCEPTOR EFO8 (OIL CAPTURE CONFIGURATION).

1. ALL DIMENSIONS INDICATED ARE IN MILLIMETERS (INCHES) UNLESS OTHERWISE SPECIFIED.
2. STORMCEPTOR STRUCTURE INLET AND OUTLET PIPE SIZE AND ORIENTATION SHOWN FOR INFORMATIONAL PURPOSES ONLY.
3. UNLESS OTHERWISE NOTED, BYPASS INFRASTRUCTURE, SUCH AS ALL UPSTREAM DIVERSION STRUCTURES, CONNECTING STRUCTURES, OR PIPE CONDUITS CONNECTING TO COMPLETE THE STORMCEPTOR SYSTEM SHALL BE PROVIDED AND ADDRESSED SEPARATELY.
4. DRAWING FOR INFORMATION PURPOSES ONLY. REFER TO ENGINEER'S SITE/UTILITY PLAN FOR STRUCTURE ORIENTATION.
5. NO PRODUCT SUBSTITUTIONS SHALL BE ACCEPTED UNLESS SUBMITTED 10 DAYS PRIOR TO PROJECT BID DATE, OR AS DIRECTED BY THE ENGINEER OF RECORD.

INSTALLATION NOTES

A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STRUCTURE (LIFTING CLUTCHES PROVIDED)
C. CONTRACTOR WILL INSTALL AND LEVEL THE STRUCTURE, SEALING THE JOINTS, LINE ENTRY AND EXIT POINTS (NON-SHRINK GROUT WITH APPROVED WATERSTOP OR FLEXIBLE BOOT)
D. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT THE DEVICE FROM CONSTRUCTION-RELATED EROSION RUNOFF.
E. DEVICE ACTIVATION, BY CONTRACTOR, SHALL OCCUR ONLY AFTER SITE HAS BEEN STABILIZED AND THE STORMCEPTOR UNIT IS CLEAN AND FREE OF DEBRIS.

FOR SITE SPECIFIC DRAWINGS PLEASE CONTACT YOUR LOCAL STORMCEPTOR REPRESENTATIVE. SITE SPECIFIC DRAWINGS ARE BASED ON THE BEST AVAILABLE INFORMATION AT THE TIME. SOME FIELD REVISIONS TO THE SYSTEM LOCATION OR CONNECTION PIPING MAY BE NECESSARY BASED ON AVAILABLE SPACE OR SITE CONFIGURATION REVISIONS. ELEVATIONS SHOULD BE MAINTAINED EXCEPT WHERE NOTED ON BYPASS STRUCTURE (IF REQUIRED).

STANDARD DETAIL
NOT FOR CONSTRUCTION

SITE SPECIFIC DATA REQUIREMENTS

STORMCEPTOR MODEL	EFO8				
STRUCTURE ID					*
HYDROCARBON STORAGE REQ'D (L)					*
WATER QUALITY FLOW RATE (L/s)					*
PEAK FLOW RATE (L/s)					*
RETURN PERIOD OF PEAK FLOW (yrs)					*
DRAINAGE AREA (HA)					*
DRAINAGE AREA IMPERVIOUSNESS (%)					*
PIPE DATA:	I.E.	MAT'L	DIA	SLOPE %	HGL
INLET #1	*	*	*	*	*
INLET #2	*	*	*	*	*
OUTLET	*	*	*	*	*

* PER ENGINEER OF RECORD

MARK	DATE	REVISION DESCRIPTION	BY
1	6/8/18	OUTLET PLATFORM	JSK
0	5/26/17	INITIAL RELEASE	JSK

Stormceptor® EF

SCALE = NTS

imbrium®
407 FAIRVIEW DRIVE, WHITBY, ON L1N 9A9
TF 800-565-6801 CA 416-665-8600 INTL +1-416-665-8600

DATE:	10/13/2017
DESIGNED: JSK	DRAWN: JSK
CHECKED: BSF	APPROVED: *
PROJECT No.: EFO8	SEQUENCE No.: *
SHEET:	1 OF 1

A.6 Storm Sewer Design Sheet

Stantec

Ashbury College Synthetic Turf

DATE: 2026-09-17
REVISION: 2
DESIGNED BY: MJS
CHECKED BY: AG

FILE NUMBER: 116501019

STORM SEWER DESIGN SHEET
(City of Ottawa)

DESIGN PARAMETERS

$I = a / (t+b)^c$ (As per City of Ottawa Guidelines, 2012)

	1:2 yr	1:5 yr	1:10 yr	1:100 yr
a =	732.951	998.071	1174.184	1735.688
b =	6.199	6.053	6.014	6.014
c =	0.810	0.814	0.816	0.820

MANNING'S n = 0.013 BEDDING CLASS = B
MINIMUM COVER: 2.00 m
TIME OF ENTRY 10 min

LOCATION			DRAINAGE AREA																						PIPE SELECTION										
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA (2-YEAR) (ha)	AREA (5-YEAR) (ha)	AREA (10-YEAR) (ha)	AREA (100-YEAR) (ha)	AREA (ROOF) (ha)	C (2-YEAR) (-)	C (5-YEAR) (-)	C (10-YEAR) (-)	C (100-YEAR) (-)	A x C (2-YEAR) (ha)	ACCUM AxC (2YR) (ha)	A x C (5-YEAR) (ha)	ACCUM. AxC (5YR) (ha)	A x C (10-YEAR) (ha)	ACCUM. AxC (10YR) (ha)	A x C (100-YEAR) (ha)	ACCUM. AxC (100YR) (ha)	T of C (min)	$I_{2\text{-YEAR}}$ (mm/h)	$I_{5\text{-YEAR}}$ (mm/h)	$I_{10\text{-YEAR}}$ (mm/h)	$I_{100\text{-YEAR}}$ (mm/h)	$Q_{CONTROL}$ (L/s)	ACCUM. $Q_{CONTROL}$ (L/s)	Q_{ACT} (CIA/360) (L/s)	LENGTH (m)	PIPE WIDTH OR DIAMETEI (mm)	PIPE HEIGHT (mm)	PIPE SHAPE (-)	MATERIAL (-)	CLASS (-)	SLOPE %	Q_{CAP} (FULL) (L/s)	% FULL (-)	VEL. (FULL) (m/s)	VEL. (ACT) (m/s)	TIME OF FLOW (min)
	TANK OUT	101	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.00	76.81	104.19	122.14	178.56	0.0	76.4	76.4	6.0	525	525	CIRCULAR	CONCRETE	-	0.50	317.2	**24.08%**	1.42	0.98	0.10
	101	100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.10	76.41	103.66	121.51	177.63	0.0	76.4	76.4	9.5	525	525	CIRCULAR	CONCRETE	-	0.50	317.2	**24.08%**	1.42	0.98	0.16
																				10.26									525	525									
L4B, L4C, L4A, L4D	CMBH 4	105	0.59	0.00	0.00	0.00	0.00	0.46	0.00	0.00	0.00	0.269	0.269	0.000	0.000	0.000	0.000	0.000	0.000	10.00	76.81	104.19	122.14	178.56	0.0	0.0	57.3	66.4	375	375	CIRCULAR	PVC	-	1.75	218.1	**26.29%**	2.07	1.45	0.76
	105	102	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.269	0.000	0.000	0.000	0.000	0.000	0.000	10.76	73.99	100.33	117.59	171.87	0.0	0.0	55.2	41.6	375	375	CIRCULAR	PVC	-	0.50	116.6	**47.39%**	1.11	0.93	0.75
																				11.51																			
	FIELD OUTLET	103	1.20	0.00	0.00	0.00	0.00	0.78	0.00	0.00	0.00	0.934	0.934	0.000	0.000	0.000	0.000	0.000	0.000	10.00	76.81	104.19	122.14	178.56	96.2	96.2	96.2	2.5	300	300	CIRCULAR	PVC	-	1.00	96.2	**100.00%**	1.37	1.43	0.03
																				10.03																			
L104A	104	103	0.32	0.00	0.00	0.00	0.00	0.65	0.00	0.00	0.00	0.211	0.211	0.000	0.000	0.000	0.000	0.000	0.000	10.00	76.81	104.19	122.14	178.56	0.0	0.0	45.1	17.1	300	300	CIRCULAR	PVC	-	0.50	68.0	**66.27%**	0.97	0.90	0.32
																				10.32																			
	103	102	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.211	0.000	0.000	0.000	0.000	0.000	0.000	10.32	75.61	102.55	120.20	175.71	0.0	96.2	140.5	22.6	525	525	CIRCULAR	CONCRETE	-	0.50	317.2	**44.29%**	1.42	1.17	0.32
																				10.64																			
L102A	102	OGS	0.30	0.00	0.00	0.00	0.00	0.64	0.00	0.00	0.00	0.195	0.675	0.000	0.000	0.000	0.000	0.000	0.000	11.51	71.45	96.83	113.47	165.83	0.0	96.2	230.1	17.1	525	525	CIRCULAR	CONCRETE	-	1.00	448.7	**51.29%**	2.01	1.73	0.16
	OGS	TANK INLET 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.675	0.000	0.000	0.000	0.000	0.000	0.000	11.68	70.92	96.10	112.61	164.56	0.0	96.2	229.1	2.2	525	525	CIRCULAR	CONCRETE	-	1.00	448.7	**51.06%**	2.01	1.73	0.02
																				11.70									525	525									

Appendix B Correspondence

B.1 Pre-Consultation: Meeting Feedback (City of Ottawa)

File No.: PC2024-0226

July 12, 2024

Gord Dol
Sports Turf International Ltd.
Via email: gdol@sportsturfintl.com

Subject: **Pre-Consultation: Meeting Feedback**
Proposed Site Plan Control Application – 362 Mariposa Avenue

Please find below information regarding next steps as well as consolidated comments from the above-noted pre-consultation meeting held on June 28, 2024.

Pre-Consultation Preliminary Assessment

1 ☐	**2** ☐	**3** ☒	**4** ☐	**5** ☐

One (1) indicates that considerable major revisions are required while five (5) suggests that the proposal appears to meet the City's key land use policies and guidelines. This assessment is purely advisory and does not consider technical aspects of the proposal or in any way guarantee application approval.

Next Steps

1. As per the provincial Bill 185, *Cutting Red Tape to Build More Homes Act*, applicants are no longer required to partake in pre-consultation, but they may choose to participate. Should your team wish to continue with the pre-consultation process, pre-consultation fees still apply. Staff encourage further pre-consultation steps to take place.

2. Alternatively, should your team wish to skip any further pre-consultation steps, and proceed directly to applying for the required applications, please be advised that upon application, the City will assess whether the submission is "complete" or "incomplete". Staff will review the submission to ensure all the material outlined on the Study Plan and Identification List (SPIL) is provided and that this material meets the City's Terms of Reference. Should it be deemed "incomplete" the submission will be put on hold.

3. In your next pre-consultation submission or application submission, please ensure that all comments detailed herein are addressed. A detailed cover letter stating how each comment has been addressed must be included with the submission materials. Please coordinate the numbering of your responses within the cover letter with the comment number(s) herein.

Supporting Information and Material Requirements

1. The attached **Study and Plan Identification List** outlines the information and material that has been identified, during this phase of pre-consultation, as either required (R) or advised (A) as part of a future complete application submission.

    a. The required plans and studies must meet the City's Terms of Reference (ToR) and/or Guidelines, as available on Ottawa.ca. These ToR and Guidelines outline the specific requirements that must be met for each plan or study to be deemed adequate.

Consultation with Technical Agencies

1. You are encouraged to consult with technical agencies early in the development process and throughout the development of your project concept. A list of technical agencies and their contact information is enclosed.

Planning

Comments:

1. Our preference is natural grass as it will better align with existing policy framework (Official Plan, Rockcliffe Park Secondary Plan and Rockcliffe Park Heritage Conservation District Plan).

2. Artificial turf has a heat generating effect. City's Official Plan has specific environmental policies with regards to heat island effect.

3. Additional features to reduce heat island effect can be considered as well, such as new tree plantings.

4. Please, consider permeability in the design of sports fields.

5. Have you explored options of integrating artificial turf with soft landscaping to reduce negative impacts associated with artificial turf?

6. There are trees proposed for removal near the running/sprint track) from Maple Lane side). Please, see Forestry and Environmental Planning comments below. Preservation of tree canopy both on private and public properties is crucial. Preservation of trees is also supported by Rockcliffe Park Secondary Plan and Rockcliffe Park Heritage Conservation District Plan. Please, design around trees.

7. The site is within the Rockcliffe Park Secondary Plan

    - Designated Special Use on Schedule A

- There is specific language about preservation of unifying landscape in the Secondary Plan and dominance of soft landscaping in the Heritage area (Section 2.4). Please, elaborate how the proposal responds to this.

  Protecting the continuity of the unifying landscape by ensuring that soft landscaping continues to dominate individual properties and the public realm…

- Please, note that if the lighting is replaces, it should respond to Secondary Plan policy 8 (Section 2.2), i.e. *Lighting in Rockcliffe Park should be configured to be sensitive to the context of the street?*

8. Zoning: Minor Institutional Zone, Subzone A (I1A)

   - No measurements for the setbacks are indicated on the site plan, and therefore, it's not possible to review compliance with Zoning By-law at this time.

   - Section 3 of the Zoning by-law speaks to non-conforming uses and non-complying buildings. The proposal is for a structure. Therefore, legal non-complying rights are not applicable in this case.

   - The subject lot has four frontages abutting City's ROW. The setbacks along Maple Lane and Glenwood Avenue should comply with Section 170, Table 170A of the Zoning By-law. Please, refer to Column IV of the Table.

   - Any setbacks that are non-compliant with Section 170, Table 170A of the Zoning By-law will need a zoning relief, whereas through Minor Variance application to the Committee of Adjustment or Zoning By-law Amendment.

Urban Design

N/A

Engineering

Comments:

9. The Stormwater Management Criteria, for the subject site, is to be based on the following:

   a. Application of the IDF information derived from the Meteorological Services of Canada rainfall data, taken from the MacDonald Cartier Airport, collected 1966 to 1997.

   b. In separated areas, the pre-development runoff shall be the lower of the existing coefficient or a maximum equivalent 'C' of 0.5, whichever is less (§ 8.3.7.3).

c. A calculated time of concentration (cannot be less than 10 minutes).

d. Flows to the storm sewer in excess of the 5-year storm release rate, up to and including the 100-year storm event, must be detained on site.

e. Storm sewer outlets should not be submerged.

f. The quantity control criteria (100-year post-development to 5-year pre-development).

g. Quality control criteria. Enhanced treatment of 80% TSS removal, due to proximity of the Ottawa River.

10. Deep Services (Storm, Sanitary and/or Water Supply)

a. Provide existing servicing information and the recommended location for the proposed connections. Services should ideally be grouped in a common trench to minimize the number of road cuts.

b. Review provision of a high-level sewer.

c. CCTV sewer inspection of city infrastructure is required to record pre and post construction conditions and ensure there is no damage to City infrastructure.

d. Sewer connections to be made above springline of the sewermain as per:

i. Std Dwg S11.1 for flexible main sewers – connections made using approved tee or wye fittings.

ii. Std Dwg S11 (For rigid main sewers) – lateral must be less that 50% the diameter of the sewermain,

iii. Std Dwg S11.2 (for rigid main sewers using bell end insert method) – for larger diameter laterals where manufactured inserts are not available; lateral must be less than 50% diameter of the sewermain,

iv. Connections to manholes permitted when the connection is to rigid main sewers where the lateral exceeds 50% the diameter of the sewermain. – Connect obvert to obvert with the outlet pipe unless pipes are a similar size.

11. Stormwater

a. Modifying the existing field to the proposed artificial turf will require storm water management of the fields as per the above mentioned criteria.

b. Underground Storage: Please note that the Modified Rational Method for storage computation in the Sewer Design Guidelines was originally

intended to be used for above ground storage (i.e. parking lot) where the change in head over the orifice varied from 1.5 m to 1.2 m (assuming a 1.2 m deep CB and a max ponding depth of 0.3 m). This change in head was small and hence the release rate fluctuated little, therefore there was no need to use an average release rate.

When underground storage is used, the release rate fluctuates from a maximum peak flow based on maximum head down to a release rate of zero. This difference is large and has a significant impact on storage requirements. We therefore require that an average release rate equal to 50% of the peak allowable rate shall be applied to estimate the required volume. Alternatively, the consultant may choose to use a submersible pump in the design to ensure a constant release rate.

In the event that there is a disagreement from the designer regarding the required storage, The City will require that the designer demonstrate their rationale utilizing dynamic modelling, that will then be reviewed by City modellers in the Water Resources Group.

Provide information on type of underground storage system including product name and model, number of chambers, chamber configuration, confirm invert of chamber system, top of chamber system, required cover over system and details, interior bottom slope (for self-cleansing), chart of storage values, length, width and height, capacity, entry ports (maintenance) etc. UG storage to provide actual 2- and 100-year event storage requirements.

In regard to all proposed UG storage, ground water levels (and in particular HGW levels) will need to be reviewed to ensure that the proposed system does not become surcharged and thereby ineffective.

Modeling can be provided to ensure capacity for both storm and sanitary sewers for the proposed development by City's Water Distribution Dept. – Modeling Group, through PM and upon request.

c. Please note that the minimum orifice dia. for a plug style ICD is 83mm and the minimum flow rate from a vortex ICD is 6 L/s in order to reduce the likelihood of plugging.

12. Grading

a. Low Impact Development (LID) measures are to be implemented and infiltration, erosion and water quality targets achieved. The site needs be designed in conformity with high-level studies and allow for available area(s) to implement suitable LID practices onsite to meet the infiltration targets. Provide detailed infiltration calculations and supporting documentation.

b. Post-development site grading shall match existing property line grades to minimize disruption to the adjacent residential properties. A topographical plan of survey shall be provided as part of the submission and a note provided on the plans.

c. Please provide an updated survey plan or Pre-Development Drainage Area Plan to define the pre-development drainage areas/patterns. Existing drainage patterns shall be maintained and discussed as part of the proposed SWM solution considering no overland flow path.

d. The consultant should demonstrate that any surface water directed towards the the street or laneway can flow unrestricted and will not adversly affect the adjacent properties.

e. The proposed sprint track is to be sloped away from the field and the drainage is to be directed towards the ROW and the laneway properly without impacting the neighboring properties.

13. Geotechnical Memo

A geotechnical memo is required to demonstrate that the soil conditions are suitable for the proposed sprint track and artificial turf field. The memo should also discuss the required pipe bedding for the artificial turf drain system, and foundation design for a proposed underground stormwater holding tank if applicable. In addition, if an underground holding tank is required the normal high ground water table level (NHGWTL) should be assessed to ensure that the holding tank under side of footing is above the NHGWTL or designed accordingly if below the NHGWTL.

14. Environmental Site Assessment

A Phase I ESA is required to be completed in accordance with Ontario Regulation 153/04 in support of this development proposal to determine the potential for site contamination. Depending on the Phase I recommendations a Phase II ESA may be required.

The Phase I ESA shall provide all the required Environmental Source Information as required by O. Reg. 153/04. ERIS records are available to public at a reasonable cost and need to be included in the ESA report to comply with O.Reg. 153/04 and the Official Plan. The City will not be in a position to approve the Phase I ESA without the inclusion of the ERIS reports.

Official Plan Section 4.8.4:

https://ottawa.ca/en/city-hall/planning-and-development/official-plan-and-master-plans/official-plan/volume-1-official-plan/section-4-review-development-applications#4-8-protection-health-and-safety

Please refer to the City of Ottawa Guide to Preparing Studies and Plans [Engineering]: Planning application submission information and materials. The guide outlines the requirement for a statement to be provided on the plan about where the property boundaries have been derived from.

Feel free to contact Amy Whelan, Project Manager, Farbod Azimi, Engineering Intern for follow-up questions.

Transportation

TIA Screening Form, Received June 13, 2024
Concept Plans, Dated May 24, 2024

General Comments:

15. Mariposa Avenue is classified as a Local Road. There are no additional protected ROW limits identified in the OP.

16. Springfield Road is classified as Collector Road adjacent to Ashbury College. There are no additional protected ROW limits identified in the OP.

17. Maple Lane is classified as a Local Road. There are no additional protected ROW limits identified in the OP.

18. Glenwood Avenue is classified as a Local Road. There are no additional protected ROW limits identified in the OP.

19. Ensure that the development proposal complies with the Right-of-Way protection requirements of the Official Plan's Schedule C16.

20. The Screening Form has indicated that no TIA Triggers have been met. This development would not generate sufficient traffic to warrant a TIA report.

21. Bicycle parking spaces are required as per Section 111 of the Ottawa Comprehensive Zoning By-law. Bicycle parking spaces should be in safe, secure places near main entrances and preferably protected from the weather.

Feel free to contact Wally Dubyk, Transportation Project Manager, for follow-up questions.

Environment

Comments:

22. There are no natural features on or adjacent to this site, accordingly there is no trigger for an environmental impact study.

23. Urban Heat Island - Please add features that reduce the urban heat island effect (see OP 10.3.3) produced by the parking lot and a building footprint. For example, this impact can be reduced by adding large canopy trees, green roofs or vegetation walls, or constructing the parking lot or building with low heat absorbing materials.

24. Bird Safe Design - Please review and incorporate bird safe design elements. Some of the risk factors include glass and related design traps such as corner glass and fly-through conditions, ventilation grates and open pipes, landscaping, light pollution. More guidance and solutions are available in the guidelines which can be found here: https://documents.ottawa.ca/sites/documents/files/birdsafedesign_guidelines_en.pdf

Feel free to contact Matthew Hayley, Environmental Planner, for follow-up questions.

Forestry

Comments:

25. A Tree Conservation Report and Landscape Plan are Site Plan Control submission requirements. The two reports can be combined into one if all required information is provided.

26. The TCR must address how the proposal will influence existing trees. All trees 10 cm in diameter or greater on private property (including property boundaries), and City trees of any size, are protected under the by-law (No. 2020-340). The development shall seek to avoid all tree conflicts where feasible. Replacement planting should be incorporated on the site if there are any unavoidable tree conflicts resulting in removal.

27. Tree protection fencing must be installed and maintained for the extent of construction. Materials and equipment cannot be stored in the critical root zone of protected trees.

28. Review section 4.10.3 of the Official Plan which speaks to protecting and incorporating trees on school sites.

29. Tree Conservation Report requirements. The following Tree Conservation Report (TCR) requirements have been adapted from the Schedule E of the Urban Tree Protection Guidelines – for more information on these requirements please contact hayley.murray@ottawa.ca

    a. A Tree Conservation Report (TCR) must be supplied for review along with the suite of other plans/reports required by the City

    b. Any tree 10 cm in diameter or greater and City-owned trees of any diameter requires a tree permit issued under the Tree Protection Bylaw

(Bylaw 2020 – 340); the permit will be based on an approved TCR and made available at or near plan approval.

c. The TCR must contain 2 separate plans/maps:

   i. Plan/Map 1 - show existing conditions with tree cover information.

   ii. Plan/Map 2 - show proposed development with tree cover information.

d. The TCR must list all trees on site, as well as off-site trees if the CRZ (critical root zone) extends into the developed area, by species, diameter, and health condition. Please note that averages can be used if there are forested areas.

e. Please identify trees by ownership – private onsite, private on adjoining site, city owned, co-owned (trees on a property line)

f. If trees are to be removed, the TCR must clearly show where they are, and document the reason they cannot be retained.

g. The removal of trees on a property line will require the permission of both property owners.

h. All retained trees must be shown, and all retained trees within the area impacted by the development process must be protected as per City guidelines available at Tree Protection Specification or by searching Ottawa.ca

i. The city encourages the retention of healthy trees; if possible, please seek opportunities for retention of trees that will contribute to the design/function of the site.

j. Removal of a City tree is not permitted unless justified. If justified, monetary compensation for the value of the tree must be paid before a tree removal permit is issued.

30. Landscape Plan (LP) requirements.

a. Landscape Plan Terms of Reference must be adhered to for all tree planting: Landscape Plan Terms of Reference. For more information on these requirements please contact hayley.murray@ottawa.ca

31. Additional Elements for Tree Planting in the Right of Way:

a. Please ensure any retained trees are shown on the LP

b. Sensitive Marine Clay - Please follow the City's 2017 Tree Planting in Sensitive Marine Clay guidelines.

c. Soil Volume - Please demonstrate as per the Landscape Plan Terms of Reference that the available soil volumes for new plantings will meet or exceed the minimum soil volumes requested.

d. The city requests that consideration be given to planting native species wherever there is a high probability of survival to maturity.

e. Efforts shall be made to provide as much future canopy cover as possible at a site level, through tree planting and tree retention. The Landscape Plan shall show/document that the proposed tree planting and retention will contribute to the City's overall canopy cover over time. Please provide a projection of the future canopy cover for the site to 40 years

f. Minimum Setbacks

    i. Maintain 1.5m from sidewalk or MUP/cycle track or water service laterals.

    ii. Maintain 2.5m from curb

    iii. Coniferous species require a minimum 4.5m setback from curb, sidewalk, or MUP/cycle track/pathway.

    iv. Maintain 7.5m between large growing trees, and 4m between small growing trees. Park or open space planting should consider 10m spacing, except where otherwise approved in naturalization / afforestation areas.

    v. Adhere to Ottawa Hydro's planting guidelines (species and setbacks) when planting around overhead primary conductors.

g. Tree specifications

    i. Minimum stock size: 50mm tree caliper for deciduous, 200cm height for coniferous.

    ii. Maximize the use of large deciduous species wherever possible to maximize future canopy coverage.

    iii. Tree planting on city property shall be in accordance with the City of Ottawa's Tree Planting Specification; and if possible, include watering and warranty as described in the specification.

    iv. No root barriers, dead-man anchor systems, or planters are permitted.

    v. No tree stakes unless necessary (and only 1 on the prevailing winds side of the tree)

h. Hard surface planting

i. If there are hard surface plantings, a planting detail must be provided.

ii. Curb style planters are highly recommended.

iii. No grates are to be used and if guards are required, City of Ottawa standard (which can be provided) shall be used.

iv. Trees are to be planted at grade.

Feel free to contact Hayley Murray, Planning Forester, for follow-up questions.

Parkland

N/A

Heritage

Comments:

32. General Heritage Conservation District Policies

- The property is designated under Part V of the Ontario Heritage Act as part of the Rockcliffe Park Heritage Conservation District (HCD). Alterations to the landscape on this property shall comply with the policies and guidelines for landscapes in the Rockcliffe Park HCD plan.

- Heritage staff support the retention of the natural grass fields and the existing trees. The dominance of soft landscaping in Rockcliffe, including trees and green spaces, are essential cultural heritage attributes of both the HCD and the property. The existing policy framework of the HCD plan requires the conservation, maintenance, and enhancement of soft landscaping.

- The applicant is strongly encouraged to consult with the Heritage Committee of the Rockcliffe Park Residents' Association. The Heritage Committee provides comments on proposals for new construction and alterations in the HCD.

33. Heritage Permit Requirements

- A heritage permit may be required. Depending on the scale of the project, approval may be delegated to staff (staff-level heritage permit). If the project does not meet the requirement for approval through delegated authority, the property owner will require the approval of City Council prior to the issuance of a heritage permit (council-level heritage permit). Council-level heritage

permit applications require the applicant to undertake consultation with the Heritage Committee of the Rockcliffe Park Residents' Association.

- An updated site plan with the requested information, a landscape plan, material specifications, and plans/elevations for the proposed new buildings are required for heritage staff to determine whether a heritage permit is necessary and the type of heritage permit that would be required.

- If a heritage permit is required, it must be obtained prior to other permits and clearances.

34. Landscape Guidelines

- The removal of mature trees is strongly discouraged. Where a tree must be removed to allow for new construction, it will be replaced with a new tree of an appropriate size and species (7.3.3).

- The tradition of using native plant material is encouraged (7.3.3).

- The selection of trees and shrubs to be planted on private property adjacent to the road should reflect the range of species historically found in gardens in the area and favour native species (7.5).

35. New Construction

- Please provide elevations and material specifications for the proposed facility building. Include existing trees and confirm whether trees will be removed in the construction of these facilities.

- Modern equipment shall be located in a manner that is discreet and not visible from the street. Screening with strategically located plant material is encouraged (7.3.3).

- The use of natural materials, such as stone, real stucco, brick and wood is an important attribute of the HCD. The use of materials such as vinyl siding, aluminum soffits, synthetic stucco, and manufactured stone will not be permitted (7.4.1).

Feel free to contact Sara Wehbi, Heritage Planner, for follow-up questions.

Conservation Authority

N/A

Community issues

N/A

Submission Requirements and Fees

1. Outlines the application type/subtype required and the associated fees
    a. Additional information regarding fees related to planning applications can be found here.
2. The attached **Study and Plan Identification List** outlines the information and material that has been identified as either required (R) or advised (A) as part of a future complete application submission.
    a. The required plans and studies must meet the City's Terms of Reference (ToR) and/or Guidelines, as available on Ottawa.ca. These ToR and Guidelines outline the specific requirements that must be met for each plan or study to be deemed adequate.
3. All of the above comments or issues should be addressed to ensure the effectiveness of the application submission review.

Should there be any questions, please do not hesitate to contact myself or the contact identified for the above areas / disciplines.

Yours Truly,
Masha Wakula

c.c. Jean Charles Renaud
Sara Wehbi
Hayley Murray
Matthew Hayley
Amy Whelan
Farbod Azimi

With every community, we redefine what's possible.

Stantec is a global leader in sustainable engineering, architecture, and environmental consulting. The diverse perspectives of our partners and interested parties drive us to think beyond what's previously been done on critical issues like climate change, digital transformation, and future-proofing our cities and infrastructure. We innovate at the intersection of community, creativity, and client relationships to advance communities everywhere, so that together we can redefine what's possible.

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