Stormwater Management Report

GAS STATION

1480 DERRY ROAD EAST

MISSISSAUGA ROAD, ONTARIO

February 21, 2020

Project No. n 1690

Prepared By:

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1.0 Introduction

n Architecture was retained by Mr. Vicky Aulakh (Prabh Aulakh Ltd.) to be the civil engineering consultants responsible for the preparation of plans for site grading, site servicing and erosion and sediment control plans and obtaining approval from the City of Mississauga for a proposed gas station facility consisting of three canopied fuel pumps, a C-store and offices, with associated parking areas and driveways.

2.0 Site Location

The site is located at the south-west corner of the intersection of Derry Road East and Dixie Road. The site (shown on Figure 1: Key Plan) is on the west side of Dixie Road and the South side of Derry Road East. This polygonal shaped property is legally described as Part 1 plan of part of lot 10, concession 3 east of Hurantario Street. The municipal (mailing) address is 1480 Derry Road East, Mississauga. The site fronts Derry Road East and flanks Dixie Road and for the purposes of describing its orientation, Derry Road East is the north-west axis at the entrance to the site, while Dixie Road is the north-east axis.

3.0 Development Proposal

The proponent for this site proposes to redevelop the property by building a three-pump canopied fuelling area, a two storey building which consist of C-store and offices. The total area of the property is about 0.176 ha.

Potential stormwater management (SWM) strategies to mitigate any potential impacts per City of Mississauga design guidelines are presented in the report. New site servicing requirements for sanitary and water supply will also be discussed in the following sections.

FIGURE 1: KEY PLAN

4.0 Existing Conditions

FIGURE 2 – SITE EXISTING CONDITION

4.1 Site Characteristics / Topography

The subject site is parking lot of limousines and coach buses with mostly gravel pavement and some landscaped area.

Topographically, the site is mostly level, with elevations ranging between 176.70m +/- and 176.22m +/-.

4.2 Vegetation

The majority of the site is mostly gravel paved, with some grassy areas and some trees.

4.3 Drainage

Currently there is no internal stormwater system within the property and the general overland flow is in the south direction, towards the adjacent green area.

4.4 Existing Services

There is 450 mm dia. storm sewer, 300 mm dia. sanitary sewer available on Derry Rd East and 750 mm dia. watermain available on Dixie Road have a 50 mm diameter plug provided by the city for the site.

5.0 Stormwater Management Criteria

The proposed development shall follow the respective criteria/guidelines of the *"Development Requirement Manual, Effective September 2016"*, City of Mississauga. The criteria for proposed developments summarized as follows:

- **Water Quantity Control** – Post development storm discharge is to be controlled to pre-development levels of for year through 100 years;
- **Water Balance Control** - Retain first 5mm from each rainfall through on-site infiltration, filtration, evapo-transpiration and/or rainwater reuse;
- **Water Quality Control** - long-term average removal of 80% of total suspended solids (TSS) on an annual loading basis from all runoff leaving the site;
- **Pre-development Runoff Co-efficient** – Maximum pre-development run-off co-efficient can be used is 0.55 for a site that is already developed.
- **Roof Drain Discharge Rate:** Roof drains should be selected to give a maximum discharge of 42 laps/ha of roof area.

6.0 Water Quantity Control Plan

The City of Mississauga design storm parameters were used for storm flow calculations and the derived Intensity-Duration-Frequency (IDF) equations are given below:

I_{100} (mm/hr) = 1450 / (TC +4.9) ^0.78
I_{50} (mm/hr) = 1300 / (TC +4.7) ^0.78
I_{25} (mm/hr) = 1160 / (TC +4.6) ^0.78
I_{10} (mm/hr) = 1010 / (TC +4.6) ^0.78
I_{5} (mm/hr) = 820 / (TC +4.6) ^0.78
I_{2} (mm/hr) = 610 / (TC +4.6) ^0.78

Where:

I = intensity of rainfall, mm/h
T_C= initial time of concentration (entry time).

As per the City of Mississauga design criteria, the initial time of concentration = 15 minutes

Based on the small size of the site, only 0.176 ha, the "Modified Rational Method" is used to compute the discharge from the drainage area as:

Q = 0.0028 CIA

Where:
Q = Flow in cubic meters per second
A = Area in hectares, ha
C = Runoff coefficient
I = Intensity in mm/hr

For 25, 50 and 100-year storm, adjustment factor of 1.1, 1.2 and 1.25 were used respectively.

7.0 Runoff Quantity Control for the Site

7.1 Quantity Control

Objective of Quantity Control is to achieve a target of post development discharge be controlled to the pre-development levels for the 2 year through 100 year event and a regional storm event with storage up to and including the 100 year storm event.

This site considered as "not developed" previously, therefore calculated composite runoff co-efficient 0.47 is used to calculated of pre-development runoff is shown in Appendix (Calculation Sheet: 1, Appendix B).

Following development, due to the increase in the impermeable surface area, the runoff coefficient increased to 0.79 as shown in Calculation Sheet 2 in the Appendix B. Post-development land-use is presented in Drawing DR-102, Appendix A

Pre and post-development runoff coefficient and flows from 2-year to 100-year rainfall event are summarized in Table 1.

Table 1: Runoff Coefficient and Flows Summary

Land-use	Run-off Co-efficient	2-yrs	5-yrs	10-yrs	25-yrs	50-yrs	100-yrs
Pre-development (L/sec)	0.47	13.97	18.78	23.14	26.57	29.66	32.82
Post-development (L/sec)	0.79	23.32	31.35	38.61	48.78	59.40	68.47

7.2 Orifice Control:

Discharge form storm events from 2 year up to 100 years proposed to be restricted by installing an orifice pipe of 100mm at inlet of MH1. Orifice sizing calculated is presented in Appendix C as Table 1. Comparison controlled flow through orifice and allowable flow limit presented in Table 2.

Table 2: Controlled Flow through Orifice

Return Period (Years)	2	5	10	25	50	100
Pre-Development Allowable Flow (L/sec)	13.97	18.78	23.14	26.57	29.66	32.82
Post-Development Peak Flow (L/sec)	23.32	31.35	38.61	48.78	59.40	68.47
Orifice Controlled Flow (L/sec)	13.85	15.18	14.72	14.95	15.04	15.18
Detention Storage Required (m^3)	8.99	14.84	20.13	19.31	21.16	25.18

7.3 On-site Detention Storage:

Require detention storage caused by flow restriction calculated for 2, 5, 10, 25, 50 and 100 years rainfall events and presented in Appendix C. Maximum depth of 0.15m will create total storage on paved surface of 26.70 m^3 (Refer: Drawing C1, Ponding Storage Table) and additional storage available in pipes, catch basin and manholes will be 3.86m^3. (Table 3, Appendix C)

Table 3: Detention Storage Summary

Return Period (Years)	2	5	10	25	50	100
Detention Storage Required (m^3)	8.99	14.84	20.13	19.31	21.16	25.18
Storage Used in Pipe (m^3)	1.74	1.74	1.74	1.74	1.74	1.74
Storage Used in MH (m^3)	2.36	2.36	2.36	2.36	2.36	2.36
Storage Used in Ponding (m^3)	4.89	10.74	16.03	15.21	17.06	21.08
Total Available Storage	**30.78**	**30.78**	**30.78**	**30.78**	**30.78**	**30.78**

7.2 Minor Storm Sewer System:

Designing the storm sewers to makes sure the capacity to transportation of the runoff of only a 10-year storm event to the municipal drain. The post-development drainage areas for the site are shown on Drawing DR-102 in the Appendix A.

Detailed breakdown of the land use and the runoff coefficients during post-development conditions are given in Drawing DR-102. The calculations for the sizing of the pipes for channelling the surface water flow from a 10-year storm event system are presented in Design Sheet (Appendix C).

7.3 Major Drainage System:

The overland flow will not impact the proposed developed site since the grading of the site ensures storm flows greater than 100 years will be able to flow overland through the site without any impact to Derry Road East.

8.0 Water Quality Control Plan

8.1 Oil and Grit Separator

To substantially improve the water quality of the water leaving the site, it is proposed that an oil/grit separating device be installed for water quality treatment. The suggested unit for the area of the site and the level of treatment desired will be in accordance with the attached "Stormceptor EF Sizing Report" . Owner's manual and details also attached in Appendix F.

For the tributary area of 0.176 ha for this site and for Enhanced Level (80%) TSS Removal, an Enhanced Model Stormceptor (FE4) has been recommended, which provides a 91 % TSS Removal, higher than Enhanced Level 1 (80%).

9.0 Erosion and Sediment Control:

During the construction period, total sediment loadings are much greater than for pre-development and post-development conditions. Also, with site regarding, water borne sediment quantities will increase. As a consequence, sediment control will be required during the construction phase.

Sediment control could be effectively implemented by the following procedures that are recommended to minimize the transportation of sediments out of the property, especially during construction:

1. Filter bags shall be attached to hoses where pumping is carried out from excavations and the filter bags shall be maintained on a regular basis;
2. During the construction period, a mud mat shall be provided at the entrance into and the exit from the area under construction, to minimize sediment transportation from the site to the municipal roads;
3. Limit extent of exposed excavation;
4. Installation of a silt fence to prevent sediment from entering the existing conveyance system;
5. Provide sediment traps to existing catch basins;
6. Scheduling construction during times when there is no danger of flooding.

10.0 Water Balance

According to City's SWM Guidelines retain storm water on-site, to the extent practicable, to achieve the same level of annual volume of overland runoff allowable from the development site under pre-development conditions. Site volume requirements for water balance are calculated at 5mm rainfall depth for catchment areas. Initial abstraction for the site calculated and presented in Table 4 below:

Table 4: Initial Abstraction

Catchment	Area (m^2)	IA (mm)	Retention(m^3)
Rooftop	192.57	1	0.19
Asphalt/Concrete Surface	1,268.68	1	1.27
Landscaped Surface	301.45	5	1.51
Total			**2.97**

According to City's guideline, required quantity for water balance was calculated as follows:

Post Development Water Balance Quantity = Site Area x 5mm
= 1762.7 x (5/1000)
= 8.81 m^3

Stormtech storage tank (DC-780) recommended as shown in Drawing C2. Bed size of the chamber is 12m^2 (5.55 m x 2.09m) with a capacity of 6.0 m^3. Drawdown calculations for the chamber are presented in section 10.1. Water Balance calculations are summarized below in Table 5:

Table 5: Water Balance Quantity

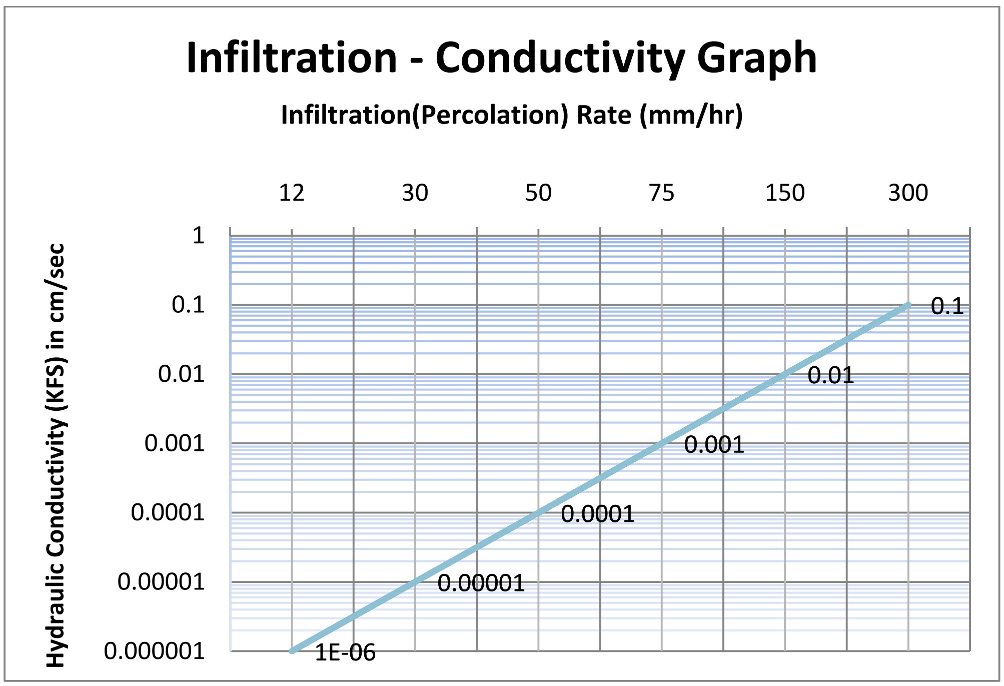
Required Water Balance Quantity (m^3)	8.81
Water Balance Available:	
1) Initial Abstraction (m^3)	2.97
2) Storm chamber (MC3500) (m^3)	6.0
Total Water Balance Quantity Available (m^3)	8.97

Detail design and information presented in Appendix F.

10.1 Permeability and Drawdown Calculation for Storm Chamber:

The site soils were evaluated for potential application of infiltration based areas. As per Quaternary Geology – Toronto and Surrounding area – southern Ontario (Map 2204) – soil of the area is classified as Lake Iroquois, shallow-water deposit-"**sand, silty-sand**".

Hydraulic conductivity of sand-sand/silty-sand ranges from 2 x 10^{-5} to 2 x 10^{-3} cm/sec. The infiltration rate of the sand/silty-sand estimated as 30-50 mm/hr. A median value of 40 mm/hr. is considered in the drawdown calculations.



Source: Table C2 Approximate relationship between hydraulic conductivity, percolation time and infiltration rate.

The required water balance volume to be infiltrated trough storm chamber is 6.0 m^3. The Ministry of Environment's Stormwater Management and Planning Manual, March 2003 method of infiltration will be implemented. The infiltration of this remainder volume of runoff will be through a pervious bottom of an underground device.

This Manual sizes the bottom area of the infiltration device by applying the following equation:

$$A = \frac{1000V}{Pn\Delta t}$$

Where
A = Bottom area of the infiltration trench (m^2)
V = Runoff volume to be infiltrated (m^3)
P = Percolation rate of surrounding native soil (mm / hr.)
n = Porosity of the storage media (0.40 for storm chambers)
Δt = Retention time (48 hours)

The above equation assumes that all of the infiltration occurs through the bottom of the device.

The retention time in the underground device is calculated on the conservative side, namely 48 hours.

Substituting the known values in the above equation:

A = (1000 x 6.0m^3) / (40 mm per hour x 0.40 x 48 hours)
= **7.81 m^2**

It is proposed to provide an open bottom storm chamber with an available bottom surface area of **12.0 m^2**. The draw down time for the provided storm chamber will be **13.16 hrs**.

11.0 Summary

- To control post-development runoff to pre-development runoff up to 100-year rainfall event, quantity controls are required which are provided through orifice control.
- To ensure water quality a Stormceptor (EF4) is recommended for the site.
- Water balance will be achieved through green area, surface evaporation and infiltration tank.
- Overland flow route through the site ensures that major overland flows are safely carried through the site.
- Erosion control such as installation of temporary silt fence, mud matt & rock check dams are recommended to minimize off-site sediment transport.

We trust you will find this submission complete and in order. Should you have any questions, please contact the undersigned.

Respectfully submitted.

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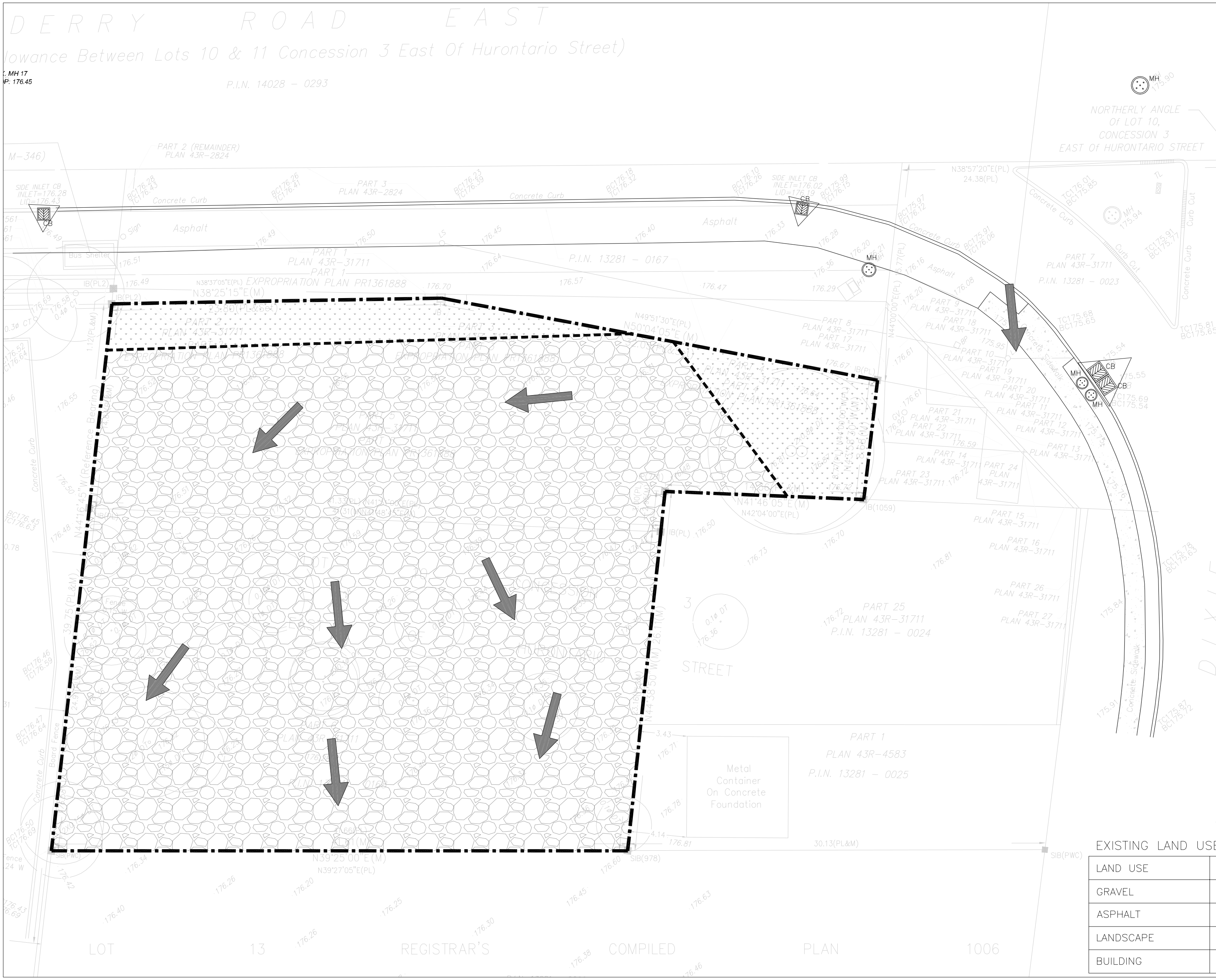
Appendix A
Figures



LEGEND

DRAINAGE AREA IDENTIFICATION (EX. A)	
AREA IN HA. (0.278)	
RUNOFF COEFFICIENT (0.500)	
SITE BOUNDARY	— · —
EX. DRAINAGE BOUNDARY	— —
EXIST. DIRECTION FLOW	→

EXISTING LAND USE TABLE

LAND USE	HATCH	AREA (SQ.M.)	CO-EFFICIENT
GRAVEL		1570.130	0.5
ASPHALT		–	–
LANDSCAPE		192.57	0.25
BUILDING		–	–

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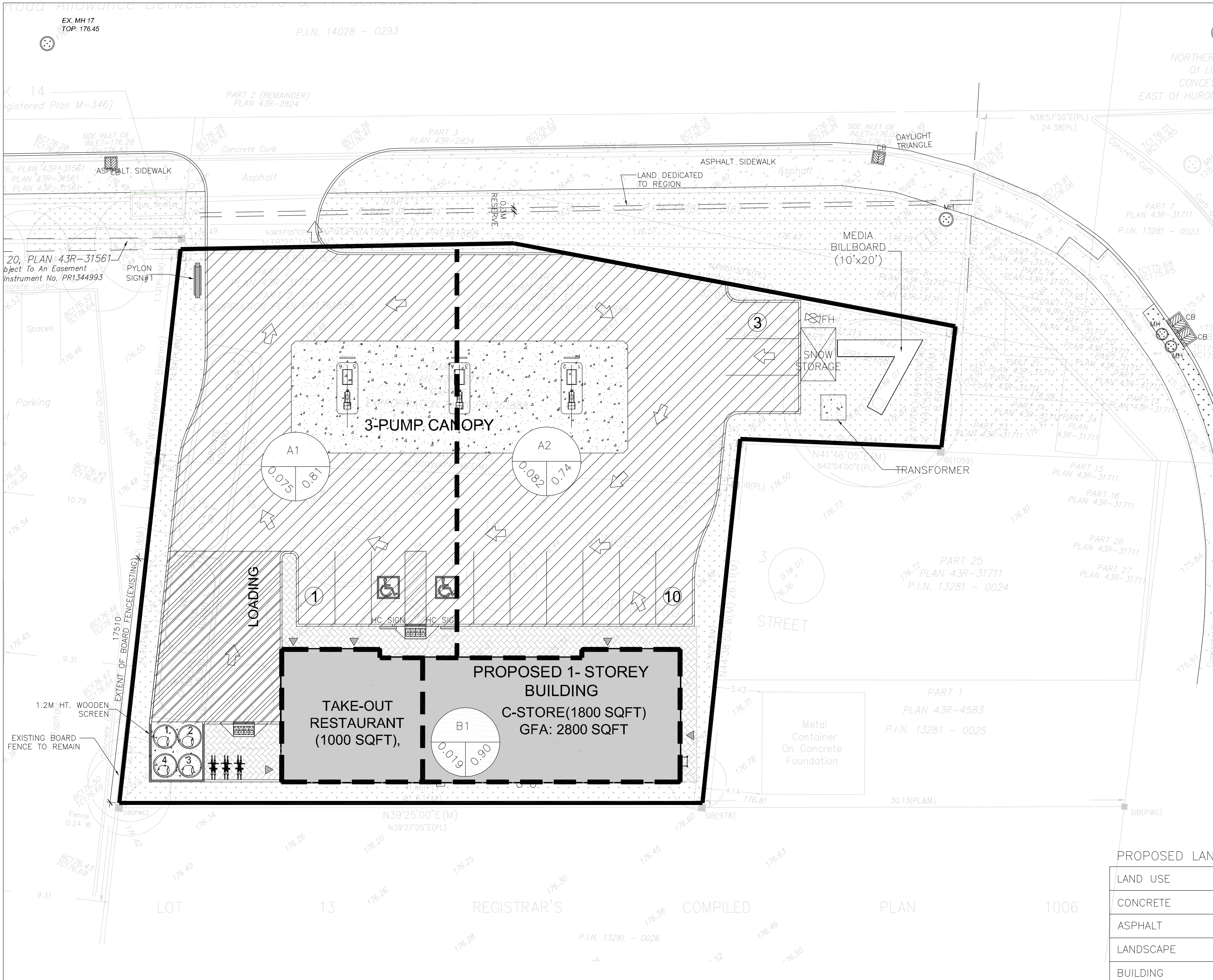
PROJECT:
PROPOSED GAS STATION 1480 DERRY ROAD EAST, MISSISSAUGA, ON.

DRAWING TITLE:
PRE-DEVELOPMENT LAND USE & DRAINAGE PATTERN

DRAWN BY: AZ
DATE: 2019-05-15
CHECKED BY: AZ
SCALE: 1:400
PROJECT NO.: **16-90**
DRAWING NO.: **DR-101**

N
(NORTH GEODETIC)
PROJECT NORTH



LEGEND

DRAINAGE AREA IDENTIFICATION

AREA IN HA.

RUNOFF COEFFICIENT

SITE BOUNDARY

DRAINAGE BOUNDARY

MAJOR OVERLAND FLOW

PROPOSED LAND USE TABLE

LAND USE	AREA (SQ.M.)	HATCH	RUN OFF CO-EFFICIENT
CONCRETE	292.58		0.90
ASPHALT	936.1		0.90
LANDSCAPE	273.86		0.25
BUILDING	260.16		0.90

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PROJECT:

PROPOSED GAS STATION 1480 DERRY ROAD EAST, MISSISSAUGA, ON.

DRAWING TITLE:

POST-DEVELOPMENT SITE DRAINAGE PLAN

DRAWN BY: AZ | DATE: 2019-05-15
CHECKED BY: AZ | SCALE: 1:400
PROJECT NO.: **16-90** | DRAWING NO.: **DR-102**

N (NORTH GEODETIC) PROJECT NORTH

Appendix B

Flow Analysis

Calculation Sheet 1

n Architecture Inc

Project:	Gas Station
Address:	1480 Derry Road East
Town/Township/City	City of Mississauga
Project No.	n1690
Proposed Development Area (m^2)	1762.7
Date:	2/10/2020

PRE-DEVELOPMENT RUNOFF COFFICENT

AREA TYPE	AREA (M^2)	RUNOFF COEFFICIENT "C"	AREA x C
ASPHALT/CONC.		0.90	0.00
BUILDING ROOF		0.90	0.00
LANDSCAPED AREA	192.670	0.25	48.17
GRAVEL	1570.130	0.50	785.07
		ΣAREA X C	833.23
		WEIGHTED AVERAGE "C"	**0.47**
		AREA "A" (Hectares)	0.1763

Rainfall intensity:

$$i = \frac{A}{(t + B)^C}$$

Where:
I = Rainfall Intensity (mm/hr)
A = coefficient
B = coefficient

t =Time of concentration(min) 15.00

Design Flow:

$$Q = 0.0028\ CIA$$

Where:

Q= Flow (m^3/second)

C = Runoff coefficient

A = Draingae Area (hectares)

I= Average rainfall intensity (milimeters/hour)

Return Period (Years)	2 -Years	5-Years	10 -Years	25 -Years	50 -Years	100-Years
A	610.00	820.00	1010.00	1160.00	1300.00	1450.00
B	4.60	4.60	4.60	4.60	4.70	4.90
C	0.78	0.78	0.78	0.78	0.78	0.78
t (mins)	15.00	15.00	15.00	15.00	15.00	15.00
i (mm/hr)	59.89	80.51	99.17	113.89	127.13	140.69
C	0.47	0.47	0.47	0.47	0.47	0.47
Q (m^3/sec)	0.01	0.02	0.02	0.03	0.03	0.03
Q (l/sec)	13.97	18.78	23.14	26.57	29.66	32.82

Calculation Sheet 2

n Architecture Inc

Project:	**Gas Station**
Address:	**1480 Derry Road East**
Town/Township/City	**City of Mississauga**
Project No.	**n1690**
Proposed Development Area (m^2)	**1762.7**
Date:	**2/10/2020**

POST DEVELOPMENT RUNOFF COFFICENT

AREA TYPE	AREA (M^2)	RUNOFF COEFFICIENT "C"	AREA x C
ASPHALT/CONC.	1228.680	0.90	1105.81
LANDSCAPED AREA	273.860	0.25	68.47
BUILDING	260.160	0.90	234.14
		ΣAREA X C	1408.42
		WEIGHTED AVERAGE "C"	**0.79**
		AREA "A" (Hectares)	0.1763

Rainfall intensity:

$$i = \frac{A}{(t+B)^C}$$

Where:

I = Rainfall Intensity (mm/hr)

A = coefficient

B = coefficient

t =Time of concentration(min) 15.00

Design Flow:

$$Q = 0.0028\ CIA$$

Where:

Q= Flow (m^3/second)

C = Runoff coefficient

A = Draingae Area (hectares)

I= Average rainfall intensity (milimeters/hour)

Return Period (Years)	2 -Years	5-Years	10 -Years	25 -Years	50 -Years	100-Years
A	610.00	820.00	1010.00	1160.00	1300.00	1450.00
B	4.600	4.600	4.600	4.600	4.700	4.900
C	0.780	0.780	0.780	0.780	0.780	0.780
t (mins)	15.00	15.00	15.00	15.00	15.00	15.00
I (mm/hr)	59.89	80.51	99.17	113.89	127.13	140.69
C	0.79	0.79	0.79	0.79	0.79	0.79
C_a	1.00	1.00	1.00	1.10	1.20	1.25
Q (m^3/sec)	0.02	0.03	0.04	0.05	0.06	0.07
Q (l/sec)	23.35	31.39	38.67	48.85	59.48	68.57

Note: Adjustment factor of 1.1,1.2,1.25 are used for 25,50, 100 yrs storm respectively

Appendix C

Orifice Sizing
Detention Analysis

n Architecture Inc

Table 1

Orifice Sizing Calculations

Project:	**Gas Station**
Address:	**1480 Derry Road East**
Town/Township/City	**City of Mississauga**
Project No.	**n1690**
Proposed Development Area (m^2)	**1762.7**
Date:	**2/10/2020**

Orifice Location	MH1	
Orifice Type	Eccentric Reducer Pipe	
Invert Elevation	174.740	m
Min. Ground Elevation	176.400	m
Orifice Center Elevation	174.790	
Diameter of Orifce Pipe	100	mm
Area of Orifice (A)	0.00785	m^2
Coefficient of Discharge (C_d)	0.6	
Gravitational Constant	9.81	

Orifice Flow Equation:

$$Q = C_d A_o \sqrt{(2gH)}$$

Where:

Q = Flow (m3/sec)

A_o = Orifice area (m2)

g = Gravitational Constant

H = Center line head (m)

C_d = coefficient of discharge, dimensionless, typically between 0.6 and 0.85, depending on the orifice geometry

	2 years	5 years	10 years	25 years	50 years	100 years
Ponding Depth (m)	-1.200	-1.100	-1.000	-0.400	-0.050	0.050
Water Elevation	175.20	175.30	175.40	176.00	176.35	176.45
Upstearm Head (m)	0.410	0.510	0.610	1.210	1.560	1.660
Total Discharge (L/sec)	**13.36**	**14.90**	**16.29**	**22.95**	**26.06**	**26.88**
Discharge Velocity (m/sec)	1.70	1.90	2.08	2.92	3.32	3.42
Allowable Peak Flow (l/sec)	**13.97**	**18.78**	**23.14**	**26.57**	**29.66**	**32.82**
Detention Storage Required (m^3)	**8.99**	**14.84**	**20.13**	**19.31**	**21.16**	**25.18**
Storage Used in Pipe (m^3)	1.74	1.74	1.74	1.74	1.74	1.74
Storage Used in MH (m^3)	2.36	2.36	2.36	2.36	2.36	2.36
Storage Used in Ponding (m^3)	4.89	10.74	16.03	15.21	17.06	21.08
Total Available Storage	**30.78**	**30.78**	**30.78**	**30.78**	**30.78**	**30.78**

On-Site Storage Calculator

City of Mississauga

Project: **Gas Station**

Project No.: **n1690**

Date: **10-Feb-20**

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Table 2A - 2 Years Storage

Equation of IDF:

R = 0.79

A = 0.18 ha

$Q_{release}$ = 0.013 m^3/s

13.36 L/s

$$i = \frac{a}{(t_c + b)^c}$$

I = Rainfall Intensity (mm/hr)

T = Time of Concentration (hr)

A= 610

B= 4.6

C= 0.78

Storage Required (m^3) 8.99

t_c (min)	i2 (mm/hr)	Q2 (m^3/s)	Q_{stored} (m^3/s)	Peak Volume (m^3)	
15	59.89	0.023	0.010	8.994	***
16	57.61	0.022	0.009	8.741	
17	55.52	0.022	0.008	8.455	
18	53.60	0.021	0.008	8.142	
19	51.82	0.020	0.007	7.803	
20	50.16	0.020	0.006	7.441	
21	48.63	0.019	0.006	7.059	
22	47.20	0.018	0.005	6.658	
23	45.86	0.018	0.005	6.240	
24	44.60	0.017	0.004	5.807	
25	43.42	0.017	0.004	5.359	
26	42.31	0.016	0.003	4.897	
27	41.26	0.016	0.003	4.424	
28	40.27	0.016	0.002	3.939	
29	39.34	0.015	0.002	3.443	
30	38.45	0.015	0.002	2.937	
31	37.60	0.015	0.001	2.422	
32	36.80	0.014	0.001	1.899	
33	36.03	0.014	0.001	1.367	
34	35.30	0.014	0.000	0.828	
35	34.60	0.013	0.000	0.281	

On-Site Storage Calculator

City of Mississauga

Project: **Gas Station**
Project No.: **n1690**
Date: **10-Feb-20**

n Architecture Inc

Table 2B - 5 Years Storage

Equation of IDF:

R = 0.79
A = 0.18 ha
$Q_{release}$ = 0.015 m^3/s
14.90 L/s

$$i = \frac{a}{(t_c + b)^c}$$

I = Rainfall Intensity (mm/hr)
T = Time of Concentration (hr)
A= 820
B= 4.6
C= 0.78
Storage Required (m^3) 14.84

t_c (min)	i5 (mm/hr)	Q5 (m^3/s)	Q_{stored} (m^3/s)	Peak Volume (m^3)	
15	80.51	0.031	0.016	14.844	***
16	77.45	0.030	0.015	14.686	
17	74.63	0.029	0.014	14.486	
18	72.05	0.028	0.013	14.248	
19	69.65	0.027	0.012	13.976	
20	67.43	0.026	0.011	13.673	
21	65.37	0.025	0.011	13.343	
22	63.45	0.025	0.010	12.988	
23	61.65	0.024	0.009	12.610	
24	59.96	0.023	0.008	12.210	
25	58.37	0.023	0.008	11.791	
26	56.88	0.022	0.007	11.355	
27	55.47	0.022	0.007	10.901	
28	54.14	0.021	0.006	10.433	
29	52.88	0.021	0.006	9.950	
30	51.68	0.020	0.005	9.454	
31	50.55	0.020	0.005	8.945	
32	49.47	0.019	0.004	8.425	
33	48.44	0.019	0.004	7.894	
34	47.45	0.019	0.004	7.352	
35	46.52	0.018	0.003	6.801	
36	45.62	0.018	0.003	6.240	

On-Site Storage Calculator

City of Mississauga

Project: **Gas Station**

Project No.: **n1690**

Date: **10-Feb-20**

n Architecture Inc

Table 2C - 10 Years Storage

Equation of IDF:

$R =$ 0.79

$A =$ 0.18 ha

$Q_{release} =$ 0.016 m^3/s

16.29 L/s

$$i = \frac{a}{(t_c + b)^c}$$

I = Rainfall Intensity (mm/hr)

T = Time of Concentration (hr)

A= 1010

B= 4.6

C= 0.78

Storage Required (m^3) 20.13

t_c (min)	i10 (mm/hr)	Q10 (m^3/s)	Q_{stored} (m^3/s)	Peak Volume (m^3)	
15	99.17	0.039	0.022	20.134	***
16	95.39	0.037	0.021	20.063	
17	91.93	0.036	0.020	19.940	
18	88.74	0.035	0.018	19.771	
19	85.79	0.033	0.017	19.559	
20	83.06	0.032	0.016	19.310	
21	80.52	0.031	0.015	19.027	
22	78.15	0.030	0.014	18.712	
23	75.93	0.030	0.013	18.370	
24	73.85	0.029	0.013	18.001	
25	71.90	0.028	0.012	17.609	
26	70.06	0.027	0.011	17.194	
27	68.32	0.027	0.010	16.760	
28	66.68	0.026	0.010	16.306	
29	65.13	0.025	0.009	15.834	
30	63.66	0.025	0.009	15.347	
31	62.26	0.024	0.008	14.844	
32	60.93	0.024	0.007	14.326	
33	59.66	0.023	0.007	13.795	
34	58.45	0.023	0.006	13.252	
35	57.30	0.022	0.006	12.696	
36	56.19	0.022	0.006	12.129	

On-Site Storage Calculator

City of Mississauga

Project: **Gas Station**

Project No.: **n1690**

Date: **10-Feb-20**

n Architecture Inc

Table 2D - 25 Years Storage

Equation of IDF:

R = 0.79

A = 0.18 ha

$Q_{release}$ = 0.023 m^3/s

22.95 L/s

$$i = \frac{a}{(t_c + b)^c}$$

I = Rainfall Intensity (mm/hr)

T = Time of Concentration (hr)

A= 1160

B= 4.6

C= 0.78

Storage Required (m^3) 19.31

t_c (min)	i25 (mm/hr)	Q25 (m^3/s)	Q_{stored} (m^3/s)	Peak Volume (m^3)	
15	113.89	0.044	0.021	19.313	***
16	109.56	0.043	0.020	18.978	
17	105.58	0.041	0.018	18.582	
18	101.92	0.040	0.017	18.133	
19	98.53	0.038	0.015	17.636	
20	95.40	0.037	0.014	17.096	
21	92.48	0.036	0.013	16.517	
22	89.75	0.035	0.012	15.902	
23	87.21	0.034	0.011	15.254	
24	84.82	0.033	0.010	14.577	
25	82.58	0.032	0.009	13.872	
26	80.46	0.031	0.008	13.142	
27	78.47	0.031	0.008	12.388	
28	76.59	0.030	0.007	11.613	
29	74.80	0.029	0.006	10.818	
30	73.11	0.029	0.006	10.003	
31	71.50	0.028	0.005	9.171	
32	69.97	0.027	0.004	8.323	
33	68.52	0.027	0.004	7.459	
34	67.13	0.026	0.003	6.581	
35	65.80	0.026	0.003	5.689	
36	64.54	0.025	0.002	4.783	

On-Site Storage Calculator

City of Mississauga

Project: **Gas Station**
Project No.: **n1690**
Date: **10-Feb-20**

n Architecture Inc

Table 2E - 50 Years Storage

Equation of IDF:

R = 0.79
A = 0.18 ha
$Q_{release}$ = 0.026 m^3/s
26.06 L/s

$$i = \frac{a}{(t_c + b)^c}$$

I = Rainfall Intensity (mm/hr)
T = Time of Concentration (hr)
A= 1300
B= 4.7
C= 0.78
Storage Required (m^3) 21.16

t_c (min)	i50 (mm/hr)	Q50 (m^3/s)	Q_{stored} (m^3/s)	Peak Volume (m^3)	
15	127.13	0.050	0.024	21.162	***
16	122.32	0.048	0.022	20.770	
17	117.90	0.046	0.020	20.310	
18	113.83	0.044	0.018	19.790	
19	110.06	0.043	0.017	19.217	
20	106.57	0.042	0.015	18.595	
21	103.32	0.040	0.014	17.928	
22	100.29	0.039	0.013	17.222	
23	97.46	0.038	0.012	16.479	
24	94.80	0.037	0.011	15.703	
25	92.30	0.036	0.010	14.896	
26	89.94	0.035	0.009	14.060	
27	87.72	0.034	0.008	13.198	
28	85.62	0.033	0.007	12.311	
29	83.64	0.033	0.007	11.402	
30	81.75	0.032	0.006	10.471	
31	79.96	0.031	0.005	9.521	
32	78.25	0.031	0.004	8.552	
33	76.63	0.030	0.004	7.566	

On-Site Storage Calculator

City of Mississauga

Project: **Gas Station**

Project No.: **n1690**

Date: **10-Feb-20**

n Architecture Inc

Table 2F - 100 Years Storage

Equation of IDF:

$$i = \frac{a}{(t_c + b)^c}$$

R = 0.79

A = 0.18 ha

$Q_{release}$ = 0.027 m^3/s

26.88 L/s

I = Rainfall Intensity (mm/hr)

T = Time of Concentration (hr)

A= 1450

B= 4.9

C= 0.78

Storage Required (m^3) 25.18

t_c (min)	i_{100} (mm/hr)	Q_{100} (m^3/s)	Q_{stored} (m^3/s)	Peak Volume (m^3)	
15	140.69	0.055	0.028	25.179	***
16	135.41	0.053	0.026	24.882	
17	130.56	0.051	0.024	24.509	
18	126.09	0.049	0.022	24.069	
19	121.96	0.048	0.021	23.568	
20	118.12	0.046	0.019	23.013	
21	114.55	0.045	0.018	22.408	
22	111.21	0.043	0.016	21.759	
23	108.09	0.042	0.015	21.068	
24	105.16	0.041	0.014	20.340	
25	102.41	0.040	0.013	19.577	
26	99.82	0.039	0.012	18.782	
27	97.37	0.038	0.011	17.957	
28	95.05	0.037	0.010	17.105	
29	92.86	0.036	0.009	16.227	
30	90.77	0.035	0.009	15.325	
31	88.80	0.035	0.008	14.402	
32	86.91	0.034	0.007	13.457	
33	85.12	0.033	0.006	12.492	
34	83.41	0.033	0.006	11.509	
35	81.77	0.032	0.005	10.509	
36	80.21	0.031	0.004	9.492	
37	78.71	0.031	0.004	8.460	
38	77.28	0.030	0.003	7.413	
39	75.90	0.030	0.003	6.352	
40	74.58	0.029	0.002	5.278	
41	73.31	0.029	0.002	4.192	
42	72.09	0.028	0.001	3.093	

On-Site Avaiable Storage Calculator

City of Mississauga

Table 3- Avilable Storage

n Architecture Inc

Project:	**Gas Station**
Address:	**1480 Derry Road East**
Project No.:	**n 1690**
Date:	**10-Feb-20**

MH/CATCH BASIN

HWL **176.45**

Description	Length (m)	Width (m)	Elevation	Height (m)	Volume (m^3)
CB1	0.6	0.6	174.99	1.46	0.53
CBMH1	1.2	1.2	174.83	1.62	1.83
TOTAL					2.36

PIPES

FROM MH	TO MH	Length (m)		DIA (mm)	Volume (m^3)
CB1	CBMH1	27		300	0.48
STM Plug	CBMH1	11.5		300	0.84
CBMH1	MH1	18.5		300	0.33
STM Plug	Pipe	5.0		150	0.09
TOTAL					1.74

PONDING

Ponding Location	Top Evevation	Ponding Depth (m)	Ponding Area (m^2)	Ponding Volume (m^3)
CB1	176.3	0.15	339.4	17.0
CBMH1	176.3	0.15	194.2	9.7
TOTAL				26.7

TOTAL VOLUME: (m^3) **30.78**

Appendix D

Storm Drainage Design Sheet

DEVELOPMENT	1480 Derry Road East	**SHEET NO.** 1 **OF** 1	**DATE** 10-Feb-20
CONSULTANT	**n Architecture Inc**	**DESIGNED BY**	RM
MAJOR DRAINAGE AREA		**CHECKED BY**	AZ

MISSISSAUGA Transportation and Works
STORM DRAINAGE DESIGN CHART
FOR CIRCULAR DRAINS FLOWING FULL

CALCULATION Sheet : 1

[City of Mississauga IDF]
IDF Parameter : **Storm Event 10 Yr**

Sizing Calculations for the Proposed Internal Storm Sewer System

i = RAINFALL INTENSITY

$i = A / (tc + B)^{C}$

A =	1010
B =	4.6
C =	0.78

LOCATION OF SITE	Catchment ID (For ID see Drawing C4)	FROM UPSTREAM	TO DOWNSTREAM	ADJACENT CONTRIBUTARY AREA	RUNOFF COEFFICIENT	AREA TIMES RUNOFF COEFFICIENT	ACCUMULATIVE AREA DRAINED BY SECTION	ACCUMULATIVE AREA TIMES RUNOFF COFFICIENT FOR	FLOW TIME TO SECTION FROM EXTREME UPSTREAM	INITIAL TIME OF CONCENTRATION AT EXTREME UPSTREAM	TIME OF CONCENTRATION UPSTREAM END OF SECTION	INTENSITY OF RAINFAL	QUANTITY OF FLOW TO BE ACCOMMODATED IN SECTION	TYPE OF PIPE	MANNINGS ROUGHNESS COEFICIENT	SLOPE	DIAMETER	LENGTH OF SECTION	VELOCITY OF FLOW WITH PIPE FLOWING FULL	CAPACITY OF PIPE FLOWING FULL	PIPE INVERT AT UPSTREAM M.H.	PIPE INVERT AT DOWNSTREAM M.H.	TIME OF FLOW IN SECTION
		MH#	MH#	A_A	C_A	$A_A \times C_A$	ΣA_A	$\Sigma A_A \times C_A$	tc_f	tc_i	$tc = tc_f + tc_i$	i	Q = 0.0028CIA		n	s	D	L	V	Q			$t = \frac{L}{V \times 60}$
				ha			ha		min	min	min	mm / hr	m^3/sec			%	mm	m	m/sec	m^3/sec	m	m	min
1480 Derry Road East	A1	CB1	CBMH1	0.075	0.81	0.061	0.075	0.061	15.00	15.00	15.00	99.17	0.017	PVC	0.013	0.50	300	27.0	0.97	0.068	175.24	175.105	0.47
	Building Roof	STM Plug	MH2	0.019	0.90	0.017	0.019	0.017	15.00	15.00	15.00	99.17	0.005	PVC	0.013	1.00	300	5.5	1.37	0.097	175.26	175.2	0.07
	Pipe Conveyance	MH2	TANK	-	-	-	-	0.017	15.07	15.00	15.13	98.64	0.005	PVC	0.013	1.00	300	5.5	1.37	0.097	175.26	175.2	0.07
	Pipe Conveyance	TANK	CB MH1	-	-	-	-	0.017	15.13	15.00	15.21	98.34	0.005	PVC	0.013	0.50	300	4.5	0.97	0.068	174.97	174.96	0.08
	Gas Canopy	CAONPY-Plug	Pipe	0.019	0.90	0.017	0.019	0.017	15.00	15.00	15.00	99.17	0.005	PVC	0.013	1.00	150	5.0	0.86	0.015	174.86	174.81	0.10
	A2	CB MH1	MH1	0.082	0.74	0.061	0.113	0.095	15.47	15.00	15.56	97.00	0.026	PVC	0.013	0.50	300	18.5	0.97	0.068	174.94	172.6	0.32
	Pipe Conveyance	MH1	EX.STM	-	-	-	-	0.095	15.47	15.00	15.56	97.00	0.026	PVC	0.013	2.00	300	18.0	1.93	0.137	174.69	174.33	0.16

STANDARD NO. 2112.030

Appendix E

Infiltration chamber

User Inputs

Chamber Model	DC-780
Outlet Control Structure	Yes (Outlet)
Project Name	Dixie Road Gas
Engineer	Abu Sayed Ziauddin
Project Location	Mississauga ON
Project Date	10/02/2019
Measurement Type	Metric
Required Storage Volume	6 cubic meters
Stone Porosity	40%
Stone Foundation Depth	229 mm.
Stone Above Chambers	152 mm.
Average Cover Over Chambers	460 mm.
Design Constraint	Width
Design Constraint Dimension	15 meters

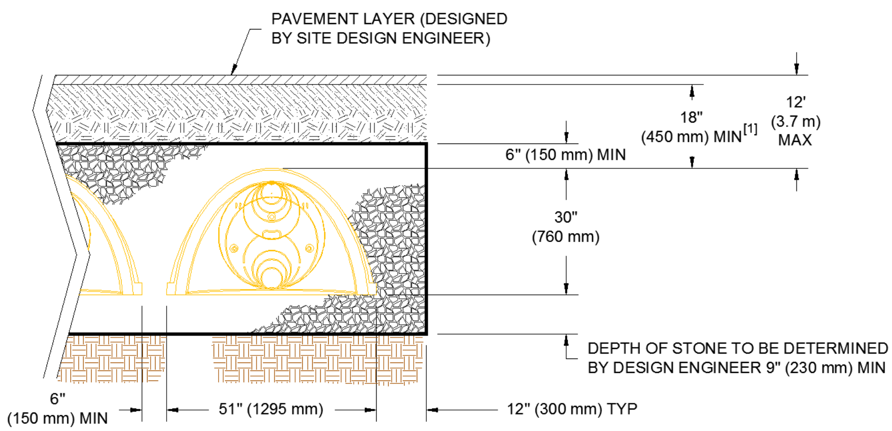
Results

System Volume and Bed Size

Installed Storage Volume	6 cubic meters
Storage Volume Per Chamber	2.21 cubic meters
Number Of Chambers Required	1 each
Number Of End Caps Required	2 each
Rows/Chambers	1 row(s) of 1 chamber(s)
Maximum Length	5.55 meters
Maximum Width	2.09 meters
Approx. Bed Size Required	12 square meters

System Components

Amount Of Stone Required	12 cubic meters
Volume Of Excavation (Not Including Fill)	13 cubic meters
Non-woven Filter Fabric Required	35 square meters
Length Of Isolator Row	2.66 meters
Woven Isolator Row Fabric	7 square meters



*TO BOTTOM OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING FROM VEHICLES MAY OCCUR, INCREASE COVER TO 24" (600 mm).

StormTech®
Detention • Retention • Water Quality
An ADS company

Isolator® Row O&M Manual

*THE MOST **ADVANCED** NAME IN WATER MANAGEMENT SOLUTIONS™*

THE ISOLATOR® ROW

INTRODUCTION

An important component of any Stormwater Pollution Prevention Plan is inspection and maintenance. The StormTech Isolator Row is a technique to inexpensively enhance Total Suspended Solids (TSS) and Total Phosphorus (TP) removal with easy access for inspection and maintenance.

THE ISOLATOR ROW

The Isolator Row is a row of StormTech chambers, either SC-160, SC-310, SC-310-3, SC-740, DC-780, MC-3500 or MC-4500 models, that is surrounded with filter fabric and connected to a closely located manhole for easy access. The fabric-wrapped chambers provide for settling and filtration of sediment as storm water rises in the Isolator Row and ultimately passes through the filter fabric. The open bottom chambers and perforated sidewalls (SC-310, SC- 310-3 and SC-740 models) allow storm water to flow both vertically and horizontally out of the chambers. Sediments are captured in the Isolator Row protecting the storage areas of the adjacent stone and chambers from sediment accumulation.

A woven geotextile fabric is placed between the stone and the Isolator Row chambers. The woven geotextile provides a media for stormwater filtration, a durable surface for maintenance, prevents scour of the underlying stone and remains intact during high pressure jetting. A non-woven fabric is placed over the chambers to provide a filter media for flows passing through the perforations in the sidewall of the chamber. The non-woven fabric is not required over the SC-160, DC-780, MC-3500 or MC-4500 models as these chambers do not have perforated side walls.

The Isolator Row is typically designed to capture the "first flush" and offers the versatility to be sized on a volume basis or flow rate basis. An upstream manhole provides access to the Isolator Row and typically includes a high flow weir. When flow rates or volumes exceed the Isolator Row weir capacity the water will flow over the weir and discharge through a manifold to the other chambers.

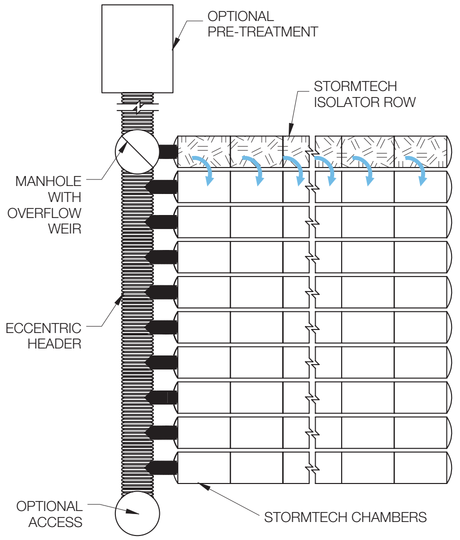
Another acceptable design uses one open grate inlet structure. Using a "high/low" design (low invert elevation on the Isolator Row and a higher invert elevation on the manifold) an open grate structure can provide the advantages of the Isolator Row by creating a differential between the Isolator Row and manifold thus allowing for settlement in the Isolator Row.

The Isolator Row may be part of a treatment train system. The design of the treatment train and selection of pretreatment devices by the design engineer is often driven by regulatory requirements. Whether pretreatment is used or not, the Isolator Row is recommended by StormTech as an effective means to minimize maintenance requirements and maintenance costs.

Note: See the StormTech Design Manual for detailed information on designing inlets for a StormTech system, including the Isolator Row.

Looking down the Isolator Row from the manhole opening, woven geotextile is shown between the chamber and stone base.

StormTech Isolator Row with Overflow Spillway (not to scale)



ISOLATOR ROW INSPECTION/MAINTENANCE

INSPECTION

The frequency of inspection and maintenance varies by location. A routine inspection schedule needs to be established for each individual location based upon site specific variables. The type of land use (i.e. industrial, commercial, residential), anticipated pollutant load, percent imperviousness, climate, etc. all play a critical role in determining the actual frequency of inspection and maintenance practices.

At a minimum, StormTech recommends annual inspections. Initially, the Isolator Row should be inspected every 6 months for the first year of operation. For subsequent years, the inspection should be adjusted based upon previous observation of sediment deposition.

The Isolator Row incorporates a combination of standard manhole(s) and strategically located inspection ports (as needed). The inspection ports allow for easy access to the system from the surface, eliminating the need to perform a confined space entry for inspection purposes.

If upon visual inspection it is found that sediment has accumulated, a stadia rod should be inserted to determine the depth of sediment. When the average depth of sediment exceeds 3 inches throughout the length of the Isolator Row, clean-out should be performed.

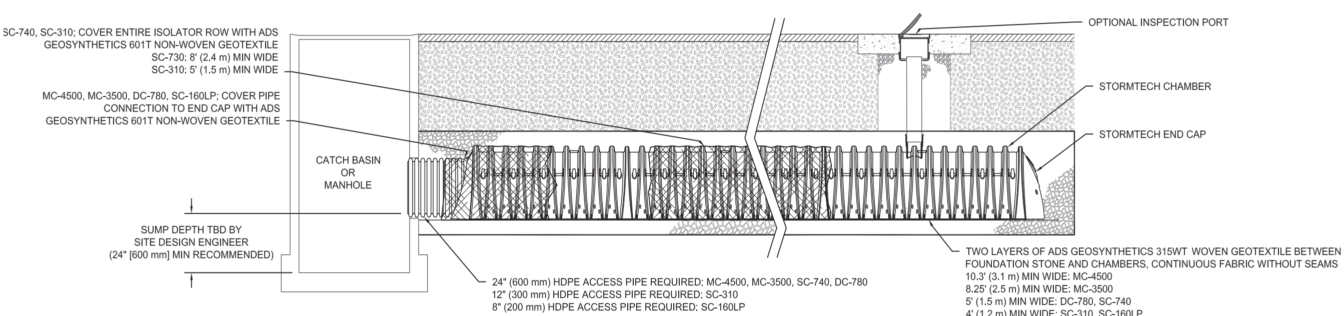
MAINTENANCE

The Isolator Row was designed to reduce the cost of periodic maintenance. By "isolating" sediments to just one row, costs are dramatically reduced by eliminating the need to clean out each row of the entire storage bed. If inspection indicates the potential need for maintenance, access is provided via a manhole(s) located on the end(s) of the row for cleanout. If entry into the manhole is required, please follow local and OSHA rules for a confined space entries.

Maintenance is accomplished with the JetVac process. The JetVac process utilizes a high pressure water nozzle to propel itself down the Isolator Row while scouring and suspending sediments. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/JetVac combination vehicles. Selection of an appropriate JetVac nozzle will improve maintenance efficiency. Fixed nozzles designed for culverts or large diameter pipe cleaning are preferable. Rear facing jets with an effective spread of at least 45" are best. Most JetVac reels have 400 feet of hose allowing maintenance of an Isolator Row up to 50 chambers long. **The JetVac process shall only be performed on StormTech Isolator Rows that have AASHTO class 1 woven geotextile (as specified by StormTech) over their angular base stone.**

StormTech Isolator Row (not to scale)

Note: Non-woven fabric is only required over the inlet pipe connection into the end cap for SC-160LP, DC-780, MC-3500 and MC-4500 chamber models and is not required over the entire Isolator Row.



ISOLATOR ROW STEP BY STEP MAINTENANCE PROCEDURES

STEP 1

Inspect Isolator Row for sediment.

A) Inspection ports (if present)
  i. Remove lid from floor box frame
  ii. Remove cap from inspection riser
  iii. Using a flashlight and stadia rod,measure depth of sediment and record results on maintenance log.
  iv. If sediment is at or above 3 inch depth, proceed to Step 2. If not, proceed to Step 3.

B) All Isolator Rows
  i. Remove cover from manhole at upstream end of Isolator Row
  ii. Using a flashlight, inspect down Isolator Row through outlet pipe
    1. Mirrors on poles or cameras may be used to avoid a confined space entry
    2. Follow OSHA regulations for confined space entry if entering manhole
  iii. If sediment is at or above the lower row of sidewall holes (approximately 3 inches), proceed to Step 2. If not, proceed to Step 3.

STEP 2

Clean out Isolator Row using the JetVac process.

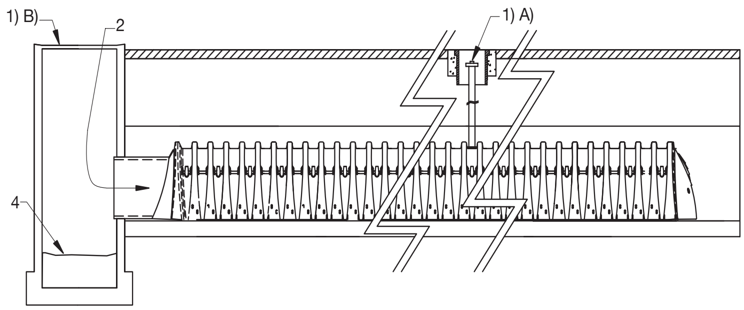
A) A fixed floor cleaning nozzle with rear facing nozzle spread of 45 inches or more is preferable
B) Apply multiple passes of JetVac until backflush water is clean
C) Vacuum manhole sump as required

STEP 3

Replace all caps, lids and covers, record observations and actions.

STEP 4

Inspect & clean catch basins and manholes upstream of the StormTech system.



SAMPLE MAINTENANCE LOG

Date	Stadia Rod Readings: Fixed point to chamber bottom (1)	Stadia Rod Readings: Fixed point to top of sediment (2)	Sediment Depth (1)–(2)	Observations/Actions	Inspector
3/15/11	6.3 ft	none		New installation. Fixed point is CI frame at grade	DJM
9/24/11		6.2	0.1 ft	Some grit felt	SM
6/20/13		5.8	0.5 ft	Mucky feel, debris visible in manhole and in Isolator Row, maintenance due	NV
7/7/13	6.3 ft		0	System jetted and vacuumed	DJM

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An ADS company

Advanced Drainage Systems, Inc.
4640 Trueman Blvd., Hilliard, OH 43026
1-800-821-6710 www.ads-pipe.com

Appendix F

Oil and Grit Separator

Stormceptor® EF Sizing Report

ESTIMATED NET ANNNUAL SEDIMENT (TSS) LOAD REDUCTION STORMCEPTOR®

Province:	Ontario
City:	Mississauga
Nearest Rainfall Station:	TORONTO CENTRAL
NCDC Rainfall Station Id:	0100
Years of Rainfall Data:	18
Site Name:	Gas Station
Drainage Area (ha):	0.176
Runoff Coefficient 'c':	0.79
Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0

Project Name:	Gas Station
Project Number:	n1690
Designer Name:	Abu Ziauddin
Designer Company:	n Architecture Inc.
Designer Email/Phone:	az@narchitecture.com
EOR Name:	
EOR Company:	
EOR Email/Phone:	

Require Hydrocarbon Spill Capture?	No
Upstream Flow Control?	No
Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	2.18
Peak Conveyance (maximum) Flow Rate (L/s):	26.88
Site Sediment Transport Rate (kg/ha/yr):	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EF4	91
EF6	92
EF8	93
EF10	93
EF12	93

Recommended Stormceptor EF Model:	**EF4**
Estimated Net Annual Sediment (TSS) Load Reduction (%):	**91**
Water Quality Runoff Volume Capture (%):	**> 90**

THIRD-PARTY TESTING AND VERIFICATION

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

PERFORMANCE

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

PARTICLE SIZE DISTRIBUTION (PSD)

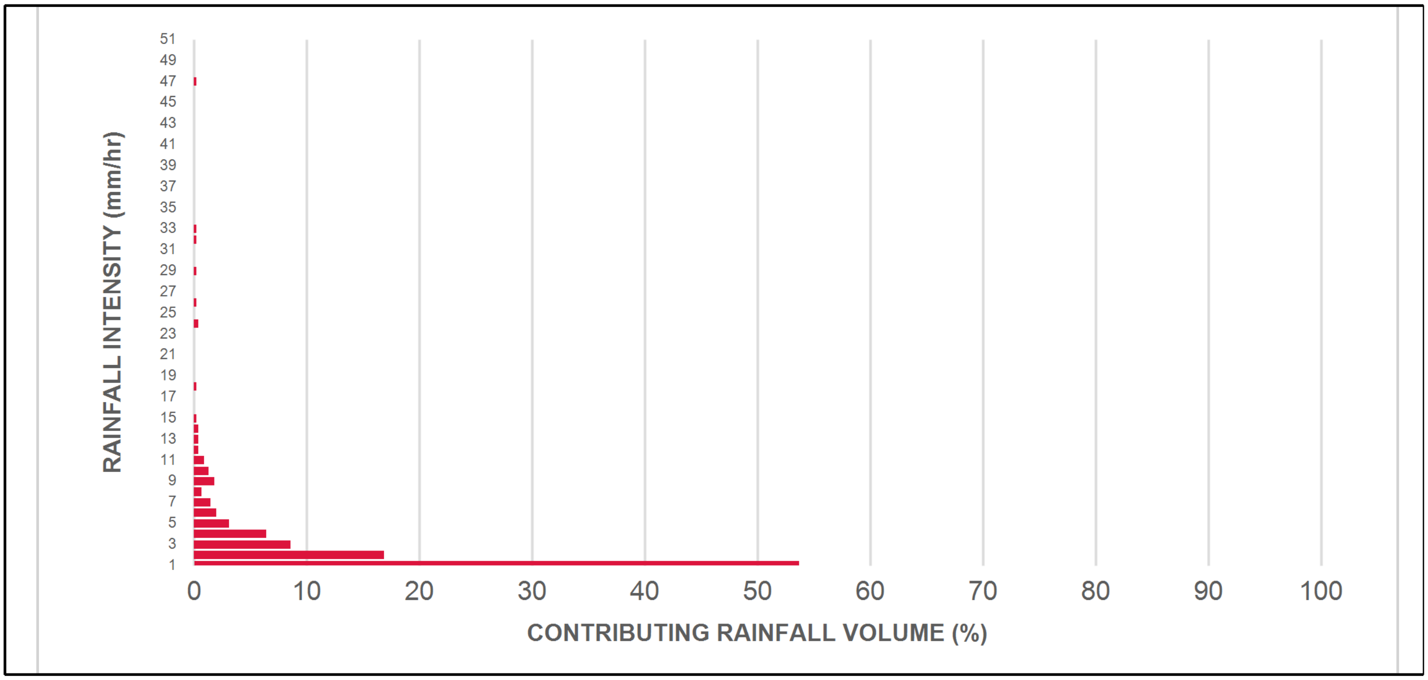
►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a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

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

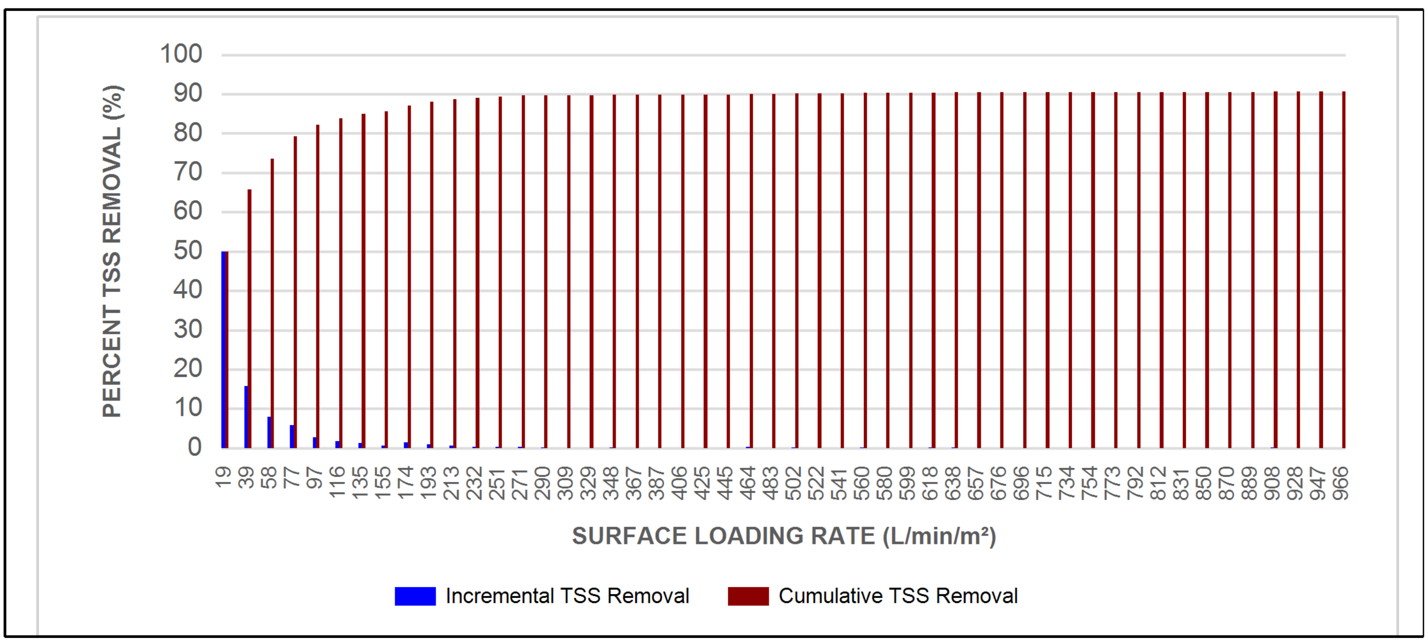
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
1	53.7	53.7	0.39	23.0	19.0	93	49.9	49.9
2	16.9	70.6	0.77	46.0	39.0	93	15.7	65.7
3	8.6	79.2	1.16	70.0	58.0	92	7.9	73.6
4	6.4	85.6	1.55	93.0	77.0	90	5.8	79.3
5	3.1	88.7	1.93	116.0	97.0	88	2.7	82.1
6	2.0	90.7	2.32	139.0	116.0	86	1.7	83.8
7	1.5	92.2	2.71	162.0	135.0	84	1.3	85.0
8	0.7	92.9	3.09	186.0	155.0	81	0.6	85.6
9	1.8	94.7	3.48	209.0	174.0	79	1.4	87.0
10	1.3	96.0	3.87	232.0	193.0	77	1.0	88.0
11	0.9	96.9	4.25	255.0	213.0	75	0.7	88.7
12	0.4	97.3	4.64	278.0	232.0	73	0.3	89.0
13	0.4	97.7	5.02	301.0	251.0	72	0.3	89.3
14	0.4	98.1	5.41	325.0	271.0	70	0.3	89.6
15	0.2	98.3	5.80	348.0	290.0	68	0.1	89.7
16	0.0	98.3	6.18	371.0	309.0	66	0.0	89.7
17	0.0	98.3	6.57	394.0	329.0	65	0.0	89.7
18	0.2	98.5	6.96	417.0	348.0	63	0.1	89.8
19	0.0	98.5	7.34	441.0	367.0	62	0.0	89.8
20	0.0	98.5	7.73	464.0	387.0	60	0.0	89.8
21	0.0	98.5	8.12	487.0	406.0	58	0.0	89.8
22	0.0	98.5	8.50	510.0	425.0	58	0.0	89.8
23	0.0	98.5	8.89	533.0	445.0	58	0.0	89.8
24	0.4	98.9	9.28	557.0	464.0	57	0.2	90.0
25	0.0	98.9	9.66	580.0	483.0	57	0.0	90.0

Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
26	0.2	99.1	10.05	603.0	502.0	57	0.1	90.2
27	0.0	99.1	10.44	626.0	522.0	57	0.0	90.2
28	0.0	99.1	10.82	649.0	541.0	57	0.0	90.2
29	0.2	99.3	11.21	673.0	560.0	56	0.1	90.3
30	0.0	99.3	11.60	696.0	580.0	56	0.0	90.3
31	0.0	99.3	11.98	719.0	599.0	56	0.0	90.3
32	0.2	99.5	12.37	742.0	618.0	56	0.1	90.4
33	0.2	99.7	12.76	765.0	638.0	56	0.1	90.5
34	0.0	99.7	13.14	789.0	657.0	56	0.0	90.5
35	0.0	99.7	13.53	812.0	676.0	56	0.0	90.5
36	0.0	99.7	13.92	835.0	696.0	56	0.0	90.5
37	0.0	99.7	14.30	858.0	715.0	55	0.0	90.5
38	0.0	99.7	14.69	881.0	734.0	55	0.0	90.5
39	0.0	99.7	15.07	904.0	754.0	55	0.0	90.5
40	0.0	99.7	15.46	928.0	773.0	55	0.0	90.5
41	0.0	99.7	15.85	951.0	792.0	55	0.0	90.5
42	0.0	99.7	16.23	974.0	812.0	55	0.0	90.5
43	0.0	99.7	16.62	997.0	831.0	55	0.0	90.5
44	0.0	99.7	17.01	1020.0	850.0	55	0.0	90.5
45	0.0	99.7	17.39	1044.0	870.0	55	0.0	90.5
46	0.0	99.7	17.78	1067.0	889.0	55	0.0	90.5
47	0.2	99.9	18.17	1090.0	908.0	55	0.1	90.6
48	0.0	99.9	18.55	1113.0	928.0	54	0.0	90.6
49	0.0	99.9	18.94	1136.0	947.0	54	0.0	90.6
50	0.0	99.9	19.33	1160.0	966.0	54	0.0	90.6
Estimated Net Annual Sediment (TSS) Load Reduction =								91 %

RAINFALL DATA FROM TORONTO CENTRAL RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

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

SCOUR PREVENTION AND ONLINE CONFIGURATION

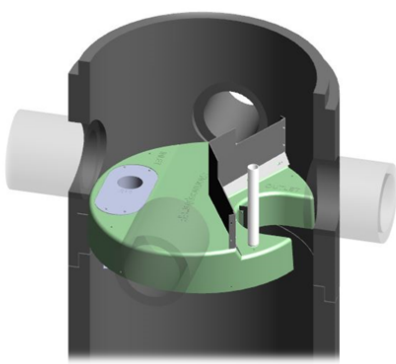
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test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

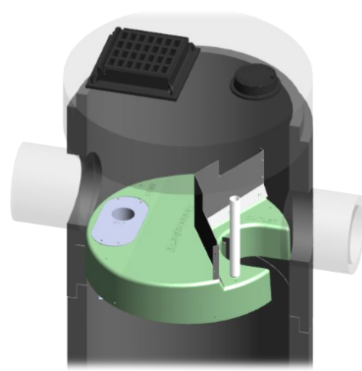
DESIGN FLEXIBILITY

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

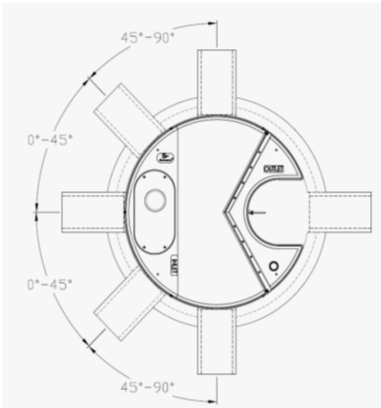
OIL CAPTURE AND RETENTION

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





Stormceptor® EF Sizing Report



INLET-TO-OUTLET DROP

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

HEAD LOSS

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

Pollutant Capacity

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

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

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

STANDARD STORMCEPTOR EF/EFO DRAWINGS

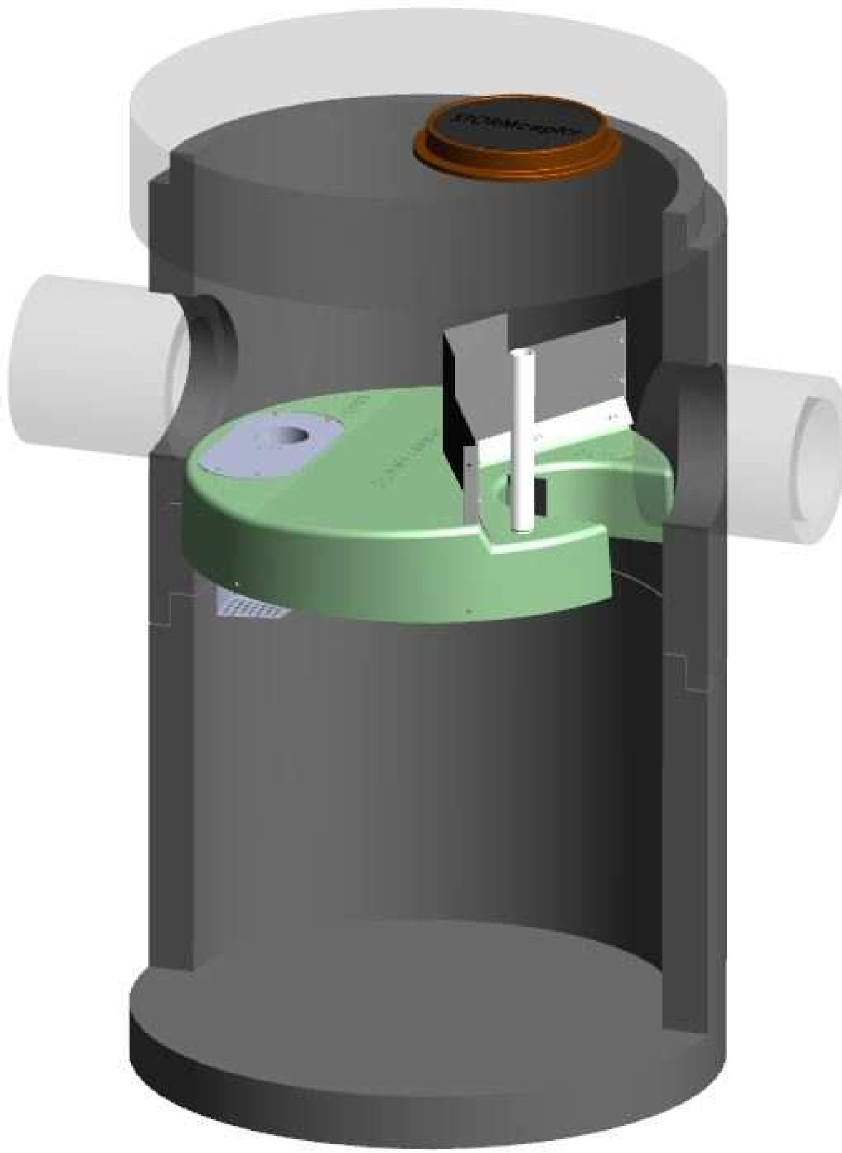
For standard details, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

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

Stormceptor® EF

Owner's Manual



Stormceptor is protected by one or more of the following patents:

Canadian Patent No. 2,137,942
Canadian Patent No. 2,180,305
Canadian Patent No. 2,327,768
Canadian Patent No. 2,694,159
Canadian Patent No. 2,697,287
U.S. Patent No. 6,068,765
U.S. Patent No. 6,371,690
U.S. Patent No. 7,582,216
U.S. Patent No. 7,666,303
Australia Patent No. 693.164
Australia Patent No. 729,096
Australia Patent No. 2008,279,378
Australia Patent No. 2008,288,900
Japanese Patent No. 5,997,750
Japanese Patent No. 5,555,160
Korean Patent No. 0519212
Korean Patent No. 1451593
New Zealand Patent No. 583,008
New Zealand Patent No. 583,583
South African Patent No. 2010/00682
South African Patent No. 2010/01796
Patent pending

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1 - Stormceptor EF Overview

2 - Stormceptor EF Operation, Components

3 - Stormceptor EF Model Details

4 - Stormceptor EF Identification

5 - Stormceptor EF Inspection & Maintenance

6 – Stormceptor Contacts

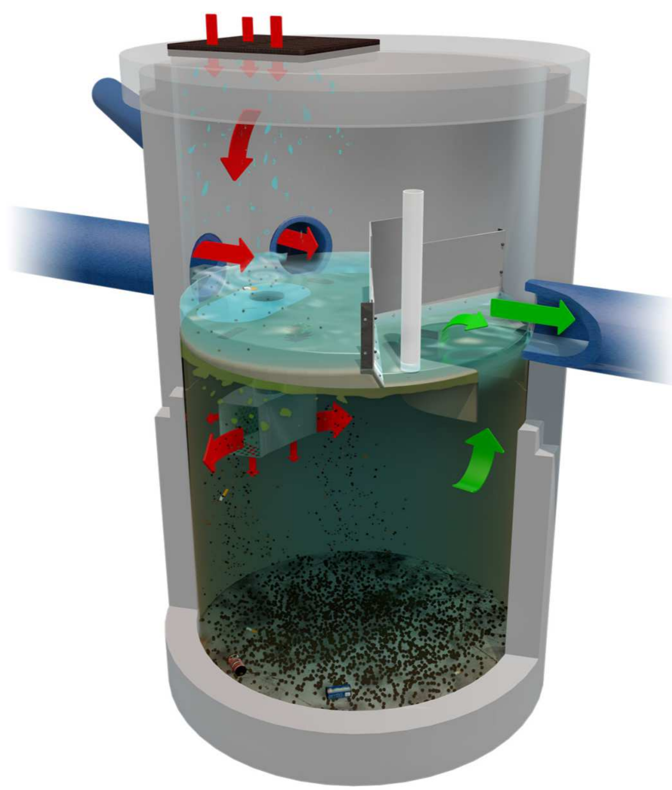
OVERVIEW

Stormceptor® EF is a continuation and evolution of the most globally recognized oil grit separator (OGS) stormwater treatment technology - ***Stormceptor®***. Also known as a hydrodynamic separator, the enhanced flow Stormceptor EF is a high performing oil grit separator that effectively removes a wide variety of pollutants from stormwater and snowmelt runoff at flow rates higher than the original Stormceptor. Stormceptor EF captures and retains sediment (TSS), free oils, gross pollutants and other pollutants that attach to particles, such as nutrients and metals. Stormceptor EF's patent-pending treatment and scour prevention platform ensures sediment is retained during all rainfall events.

Stormceptor EF offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe, multiple inlet pipes, and/or from the surface through an inlet grate. Stormceptor EF can also serve as a junction structure, accommodate a 90-degree inlet to outlet bend angle, and be modified to ensure performance in submerged conditions. With its scour prevention and internal bypass, Stormceptor EF can be installed online, eliminating the need for costly additional bypass structures.

OPERATION

- Stormwater enters the Stormceptor upper chamber through the inlet pipe(s) or a surface inlet grate. A specially designed insert reduces the influent velocity by creating a pond upstream of the insert's weir. Sediment particles immediately begin to settle. Swirling flow sweeps water, sediment, and floatables across the sloped surface of the insert to the inlet opening of the drop pipe, where a strong vortex draws water, sediment, oil, and debris down the drop pipe cone.
- Influent exits the cone into the drop pipe duct. The duct has two large rectangular outlet openings as well as perforations in the backside and floor of the duct. Influent is diffused through these various opening in multiple directions and at low velocity into the lower chamber.
- Free oils and other floatables rise up within the channel surrounding the central riser pipe and are trapped beneath the insert, while sediment settles to the sump. Pollutants are retained for later removal during maintenance cleaning.
- Treated effluent enters the outlet riser, moves upward, and discharges to the top side of the insert downstream of the weir, where it flows out the outlet pipe.
- During intense storm events with very high influent flow rates, the pond height on the upstream side of the weir may exceed the height of the weir, and the excess flow passes over the top of the weir to the downstream side of the insert, and exits through the outlet pipe. This internal bypass feature allows for in-line installation, avoiding the cost of additional bypass structures. During bypass, the pond separates sediment from all incoming flows, while full treatment in the lower chamber continues at the maximum flow rate.
- Stormceptor EF's patent-pending enhanced flow and scour prevention technology ensures pollutants are captured and retained, allowing excess flows to bypass during infrequent, high intensity storms.



COMPONENTS

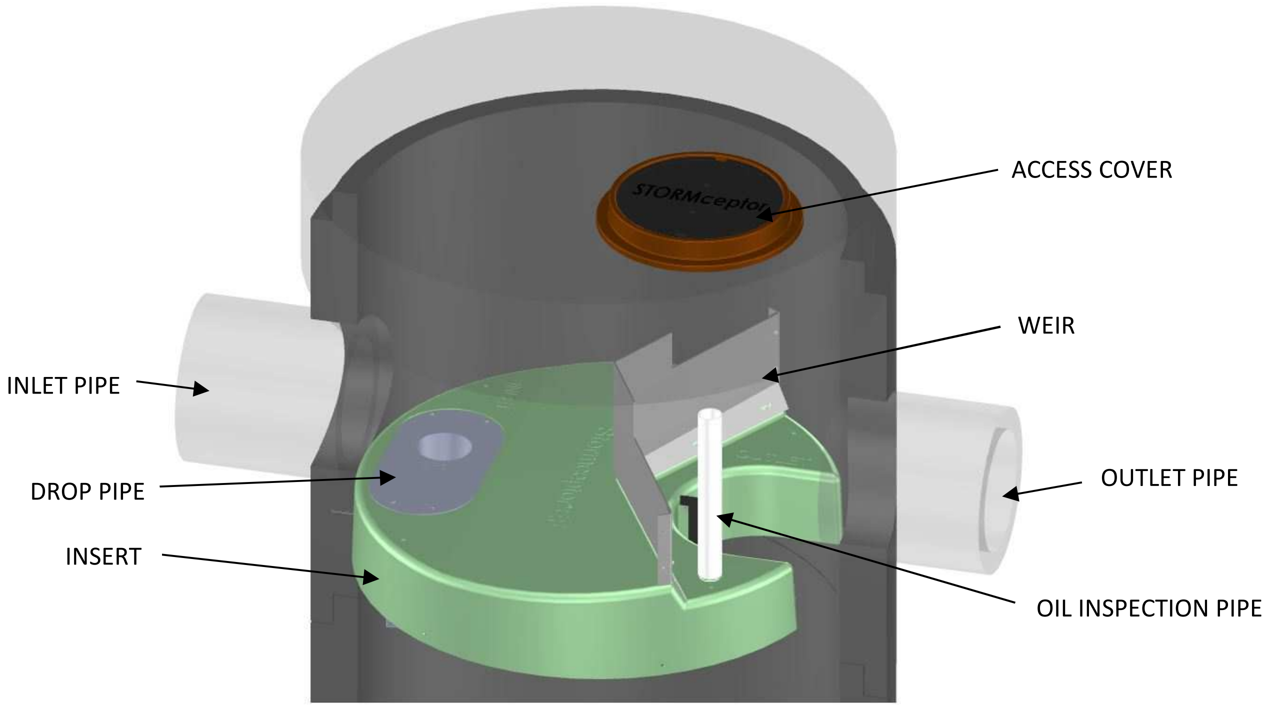


Figure 1

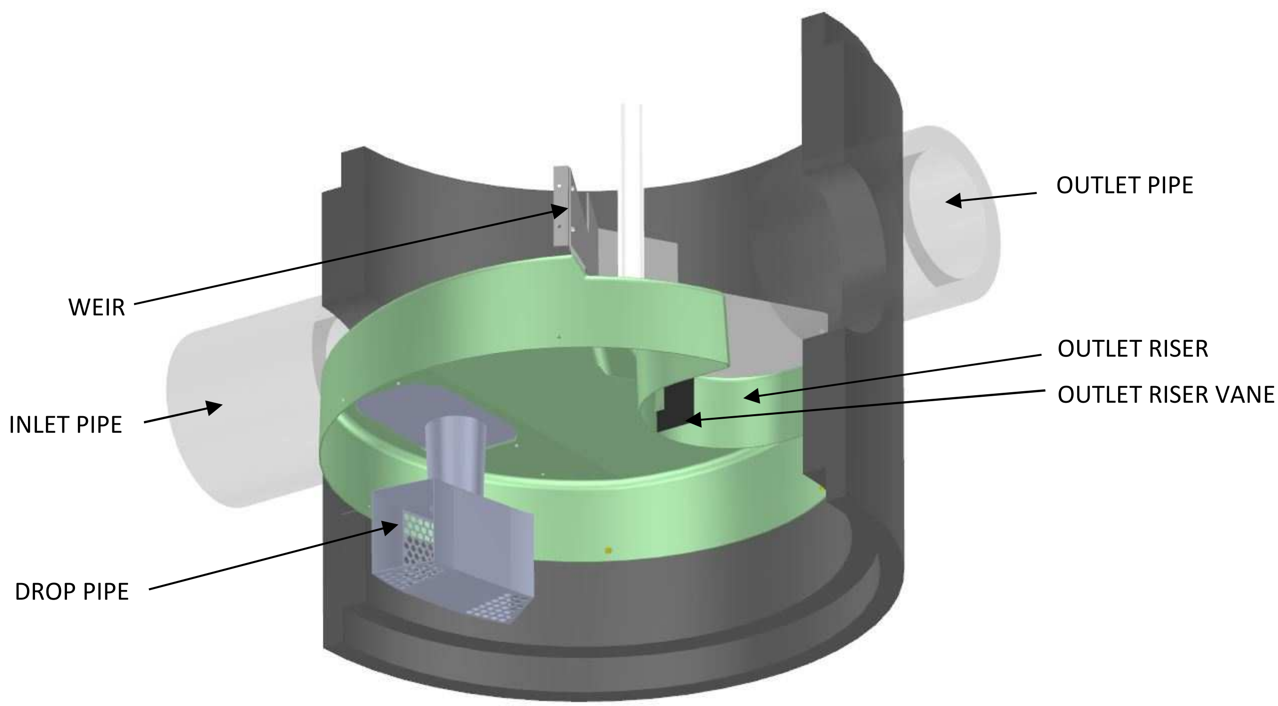


Figure 2

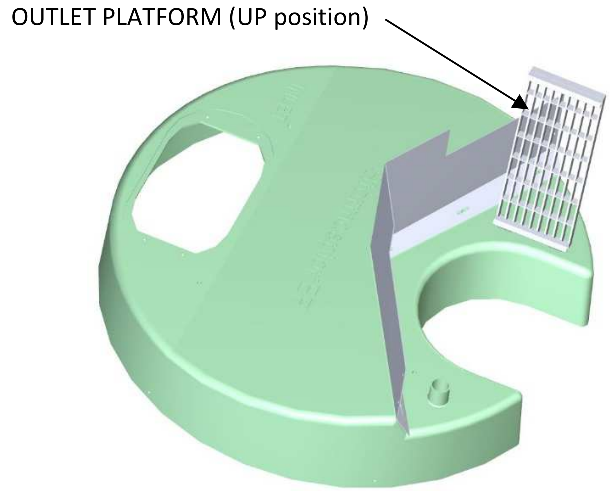


Figure 3A

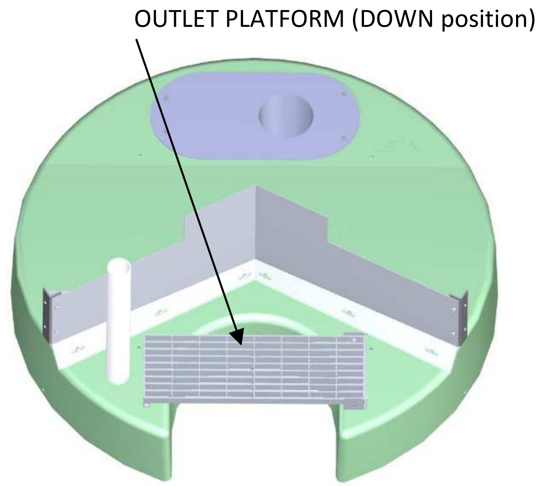


Figure 3B

- **Insert** – separates vessel into upper and lower chambers, and provides double-wall containment of hydrocarbons
- **Weir** – creates stormwater ponding and driving head on top side of insert
- **Drop pipe** – conveys stormwater and pollutants into the lower chamber
- **Outlet riser** – conveys treated stormwater from the lower chamber to the outlet pipe, and provides primary inspection and maintenance access into the lower chamber
- **Outlet riser vane** – prevents formation of a vortex in the outlet riser during high flow rate conditions
- **Outlet platform (optional)** – safety platform in the event of manned entry into the unit
- **Oil inspection pipe** – primary access for measuring oil depth

PRODUCT DETAILS

METRIC DIMENSIONS AND CAPACITIES

Table 1

Stormceptor Model	Inside Diameter (m)	Minimum Surface to Outlet Invert Depth (mm)	Depth Below Outlet Pipe Invert (mm)	Wet Volume (L)	Sediment Capacity [1] (m^3)	Hydrocarbon Storage Capacity [2] (L)	Maximum Flow Rate into Lower Chamber [3] (L/s)	Peak Conveyance Flow Rate [4] (L/s)
EF4 / EFO4	1.22	915	1524	1780	1.19	265	22.1 / 10.4	425
EF6 / EFO6	1.83	915	1930	5070	3.47	610	49.6 / 23.4	990
EF8 / EFO8	2.44	1219	2591	12090	8.78	1070	88.3 / 41.6	1700
EF10 / EFO10	3.05	1219	3251	23700	17.79	1670	138 / 65	2830
EF12 / EFO12	3.66	1524	3886	40800	31.22	2475	198.7 / 93.7	2830

[1] Sediment Capacity is measured from the floor to the bottom of the drop pipe cone. Sediment Capacity can be increased to accommodate specific site designs and pollutant loads. Contact your local representative for assistance.
[2] Hydrocarbon Storage Capacity is measured from the bottom of the outlet riser to the underside of the insert. Hydrocarbon Storage Capacity can be increased to accommodate specific site designs and pollutant loads. Contact your local representative for assistance.
[3] EF Maximum Flow Rate into Lower Chamber is based on a maximum surface loading rate (SLR) into the lower chamber of 1135 L/min/m^2.
EFO Maximum Flow Rate into Lower Chamber is based on a maximum surface loading rate (SLR) into the lower chamber of 535 L/min/m^2.
[4] Peak Conveyance Flow Rate is limited by a maximum velocity of 1.5 m/s.

U.S. DIMENSIONS AND CAPACITIES

Table 2

Stormceptor Model	Inside Diameter (ft)	Minimum Surface to Outlet Invert Depth (in)	Depth Below Outlet Pipe Invert (in)	Wet Volume (gal)	Sediment Capacity [1] (ft^3)	Hydrocarbon Storage Capacity [2] (gal)	Maximum Flow Rate into Lower Chamber [3] (cfs)	Peak Conveyance Flow Rate [4] (cfs)
EF4 / EFO4	4	36	60	471	42	70	0.78 / 0.37	15
EF6 / EFO6	6	36	76	1339	123	160	1.75 / 0.83	35
EF8 / EFO8	8	48	102	3194	310	280	3.12 / 1.47	60
EF10 / EFO10	10	48	128	6261	628	440	4.87 / 2.30	100
EF12 / EFO12	12	60	153	10779	1103	655	7.02 / 3.31	100

[1] Sediment Capacity is measured from the floor to the bottom of the drop pipe cone. Sediment Capacity can be increased to accommodate specific site designs and pollutant loads. Contact your local representative for assistance.
[2] Hydrocarbon Storage Capacity is measured from the bottom of the outlet riser to the underside of the insert. Hydrocarbon Storage Capacity can be increased to accommodate specific site designs and pollutant loads. Contact your local representative for assistance.
[3] EF Maximum Flow Rate into Lower Chamber is based on a maximum surface loading rate (SLR) into the lower chamber of 27.9 gpm/ft^2.
EFO Maximum Flow Rate into Lower Chamber is based on a maximum surface loading rate (SLR) into the lower chamber of 13.1 gpm/ft^2.
[4] Peak Conveyance Flow Rate is limited by a maximum velocity of 5 fps.

IDENTIFICATION

Each Stormceptor EF/EFO unit is easily identifiable by the trade name ***Stormceptor®*** embossed on the access cover at grade as shown in **Figure 3**. The tradename ***Stormceptor®*** is also embossed on the top of the insert upstream of the weir as shown in **Figure 3**.

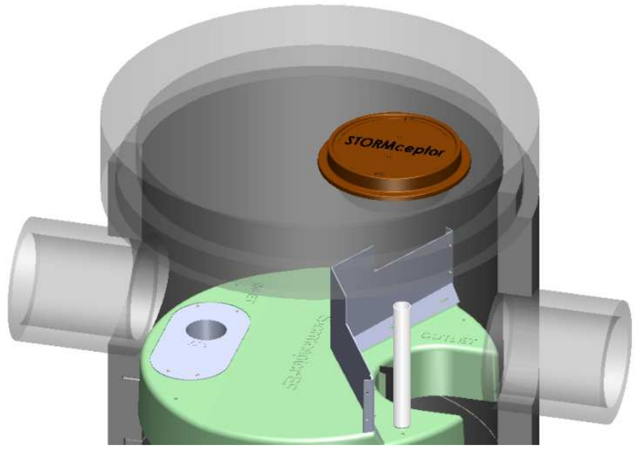


Figure 4

The specific Stormceptor EF/EFO model number is identified on the top of the aluminum Drop Pipe as shown in **Figure 4**. The unit serial number is identified on the top of the insert upstream of the weir as shown in **Figure 4**.

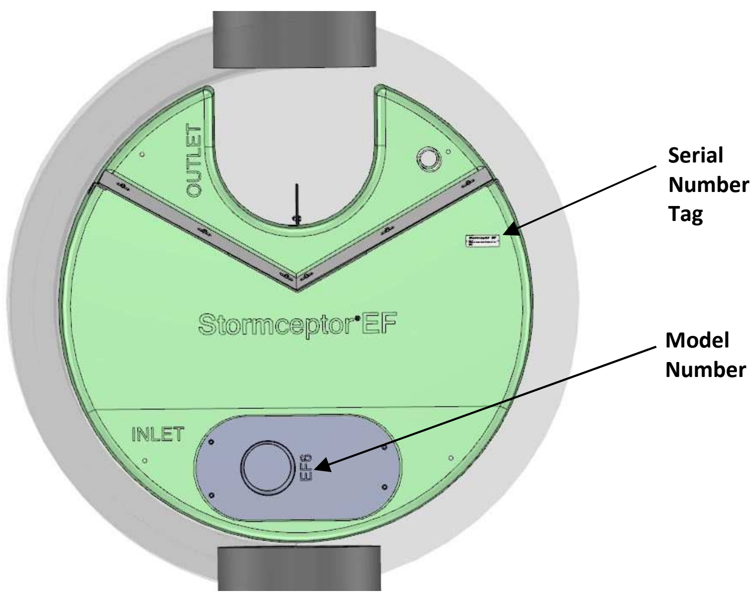


Figure 5

INSPECTION AND MAINTENANCE

It is very important to perform regular inspection and maintenance. Regular inspection and maintenance ensures maximum operation efficiency, keeps maintenance costs low, and provides continued of natural waterways.

Quick Reference

- Typical inspection and maintenance is performed from grade
- Remove manhole **cover(s)** or **inlet grate** to access insert and lower chamber
  NOTE: EF4/EFO4 requires the removal of a **flow deflector** beneath inlet grate
- Use Sludge Judge® or similar sediment probe to check sediment depth through the **outlet riser**
- Oil dipstick can be inserted through the **oil inspection pipe**
- Visually inspect the **insert** for debris, remove debris if present
- Visually inspect the **drop pipe** opening for blockage, remove blockage if present
- Visually inspect **insert** and **weir** for damage, schedule repair if needed
- Insert vacuum hose and jetting wand through the outlet riser and extract sediment and floatables
- Replace flow deflector (EF4/EFO4), inlet grate, and cover(s)
- **NOTE:** If the unit has an **outlet platform**, the outlet platform is typically in the UP position (see Figure 3A) for normal treatment conditions, and for inspection and maintenance. If manned entry into the unit is required, the outlet platform must first be placed in the DOWN position (see Figure 3B). After manned entry is completed, return the outlet platform to the UP position for treatment.

When is inspection needed?

- Post-construction inspection is required prior to putting the Stormceptor into service.
- Routine inspections are recommended during the first year of operation to accurately assess pollutant accumulation.
- Inspection frequency in subsequent years is based on the maintenance plan developed in the first year.
- Inspections should also be performed immediately after oil, fuel, or other chemical spills.

What equipment is typically required for inspection?

- Manhole access cover lifting tool
- Oil dipstick / Sediment probe with ball valve (typically ¾-inch to 1-inch diameter)
- Flashlight
- Camera
- Data log / Inspection Report
- Safety cones and caution tape
- Hard hat, safety shoes, safety glasses, and chemical-resistant gloves

When is maintenance cleaning needed?

- If the post-construction inspection indicates presence of construction sediment of a depth greater than a few inches, maintenance is recommended at that time.
- For optimum performance and normal operation the unit should be cleaned out once the sediment depth reaches the recommended maintenance sediment depth, see **Table 3**.
- Maintain immediately after an oil, fuel, or other chemical spill.

Table 3

Recommended Sediment Depths for Maintenance Service*	
MODEL	Sediment Depth (in/mm)
EF4 / EFO4	8 / 203
EF6 / EFO6	12 /305
EF8 / EFO8	24 / 610
EF10 / EFO10	24 / 610
EF12 / EFO12	24 / 610

* Based on a minimum distance of 40 inches (1,016 mm) from bottom of outlet riser to top of sediment bed

The frequency of inspection and maintenance may need to be adjusted based on site conditions to ensure the unit is operating and performing as intended. Maintenance costs will vary based on the size of the unit, site conditions, local requirements, disposal costs, and transportation distance.

What equipment is typically required for maintenance?

- Vacuum truck equipped with water hose and jet nozzle
- Small pump and tubing for oil removal
- Manhole access cover lifting tool
- Oil dipstick / Sediment probe with ball valve (typically ¾-inch to 1-inch diameter)
- Flashlight
- Camera
- Data log / Inspection Report
- Safety cones
- Hard hats, safety shoes, safety glasses, chemical-resistant gloves, and hearing protection for service providers
- Gas analyzer, respiratory gear, and safety harness for specially trained personnel if confined space entry is required (adhere to all OSHA / CCOSH standards)

What conditions can compromise Stormceptor performance?

- Presence of construction sediment and debris in the unit prior to activation
- Excessive sediment depth beyond the recommended maintenance depth
- Oil spill in excess of the oil storage capacity
- Clogging or restriction of the drop pipe inlet opening with debris
- Downstream blockage that results in a backwater condition

Maintenance Procedures

- Maintenance should be conducted during dry weather conditions when no flow is entering the unit.
- Stormceptor is maintained from grade through a standard surface manhole access cover or inlet grate.
- In the case of submerged or tailwater conditions, extra measures are likely required, such as plugging the inlet and outlet pipes prior to conducting maintenance.
- Inspection and maintenance of upstream catch basins and other stormwater conveyance structures is also recommended to extend the time between future maintenance cycles.

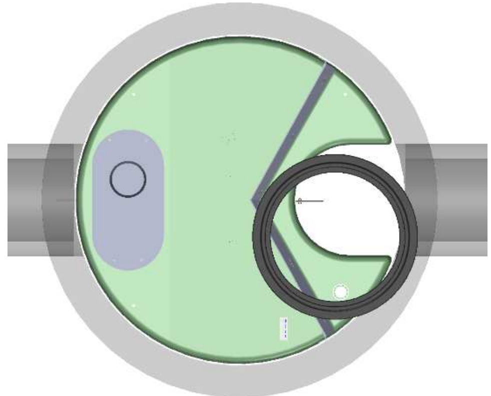


Figure 6

- Sediment depth inspections are performed through the **Outlet Riser** and oil presence can be determined through the **Oil Inspection Pipe**.
- Oil presence and sediment depth are determined by inserting a Sludge Judge® or measuring stick to quantify the pollutant depths.

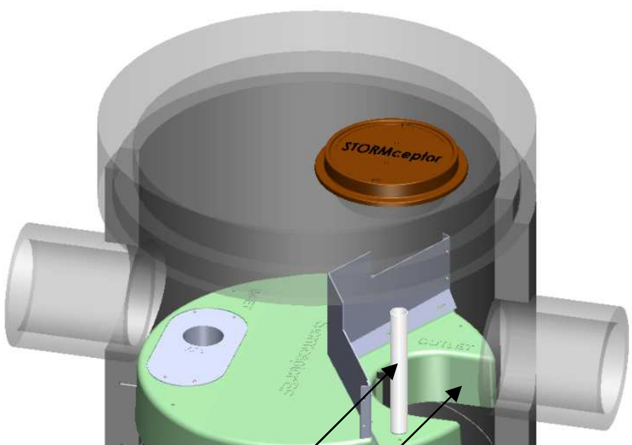


Figure 7

Figure 8

- Visually inspect the insert, weir, and drop pipe inlet opening to ensure there is no damage or blockage.
- **NOTE:** If the unit has an **outlet platform**, the outlet platform is typically in the UP position (see Figure 3A) for normal treatment conditions, and for inspection and maintenance. If manned entry into the unit is required, the outlet platform must first be placed in the DOWN position (see Figure 3B). After manned entry is completed, return the outlet platform to the UP position for treatment.

- When maintenance is required, a standard vacuum truck is used to remove the pollutants from the lower chamber of the unit through the **Outlet Riser**.

Figure 9

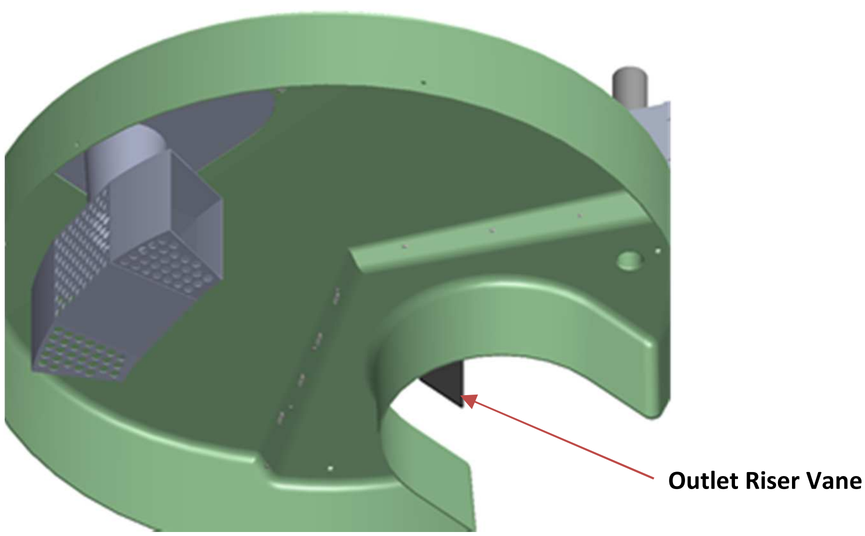


Figure 10

NOTE: The Outlet Riser Vane is durable and flexible and designed to allow maintenance activities with minimal, if any, interference.

Removable Flow Deflector

- Top grated inlets for the Stormceptor EF4/EFO4 model requires a removable flow deflector staged underneath a 24-inch x 24-inch (600 mm x 600 mm) square inlet grate to direct flow towards the inlet side of the insert, and avoid flow and pollutants from entering the outlet side of the insert from grade. The EF6/EFO6 and larger models do not require the flow deflector.

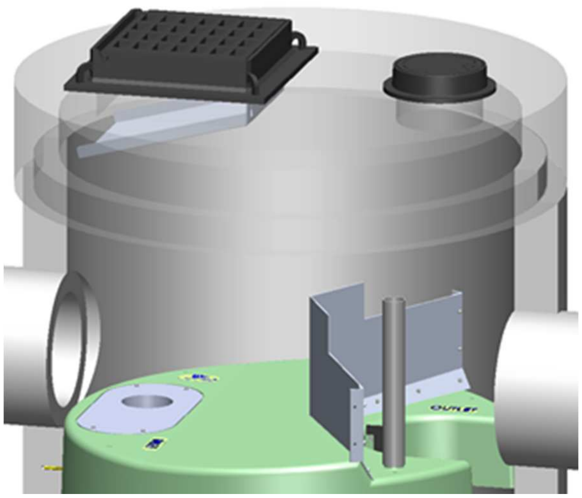
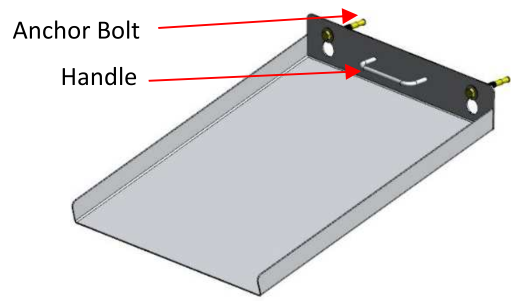


Figure 11

How to Remove:

1. Loosen anchor bolts
2. Pull up and out using the handle



Removable Flow Deflector

Hydrocarbon Spills

Stormceptor is often installed on high pollutant load hotspot sites with vehicular traffic where hydrocarbon spill potential exists. Should a spill occur, or presence of oil be identified within a Stormceptor EF/EFO, it should be cleaned immediately by a licensed liquid waste hauler.

Disposal

Maintenance providers are to follow all federal, state/ provincial, and local requirements for disposal of material.

Oil Sheens

When oil is present in stormwater runoff, a sheen may be noticeable at the Stormceptor outlet. An oil rainbow or sheen can be noticeable at very low oil concentrations (< 10 mg/L). Despite the appearance of a sheen, Stormceptor EF/EFO may still be functioning as intended.

Oil Level Alarm

To mitigate spill liability with 24/7 detection, an electronic monitoring system can be employed to trigger a visual and audible alarm when a pre-set level of oil is captured within the lower chamber or when an oil spill occurs. The oil level alarm is available as an optional feature to include with Stormceptor EF/EFO as shown in **Figure 11**. For additional details about the Oil Level Alarm please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-systems.

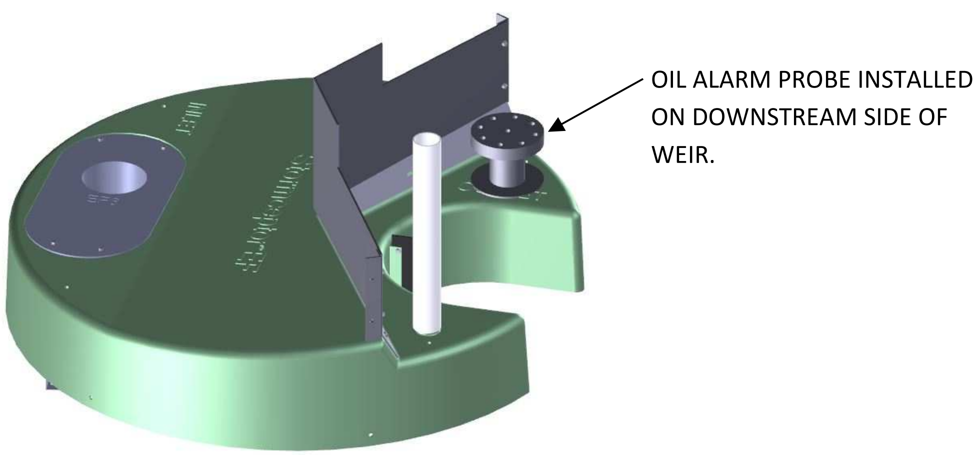


Figure 12

Replacement Parts

Stormceptor has no moving parts to wear out. Therefore inspection and maintenance activities are generally focused on pollutant removal. Since there are no moving parts during operation in a Stormceptor, broken, damaged, or worn parts are not typically encountered. However, if replacement parts are necessary, they may be purchased by contacting your local Stormceptor representative.

Stormceptor Inspection and Maintenance Log

Stormceptor Model No: ________________________

Serial Number: ________________________

Installation Date: ________________________

Location Description of Unit: ________________________

Recommended Sediment Maintenance Depth: ________________________

DATE	SEDIMENT DEPTH (inch or mm)	OIL DEPTH (inch or mm)	SERVICE REQUIRED (Yes / No)	MAINTENANCE PERFORMED	MAINTENANCE PROVIDER	COMMENTS

Other Comments:

Contact Information

Questions regarding Stormceptor EF/EFO can be addressed by contacting your local Stormceptor representative or by visiting our website at **www.stormceptor.com**.

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