AME-TECH Developments Limited
Urban Engineering & Project Management Services

STORMWATER MANAGEMENT DESIGN BRIEF
Lot 30 and Part of Lot 31, Registered Plan 230
6460 Main Street, Residential Development
TOWN OF WHITCHURCH STOUFFVILLE
Revised JULY 2026

1.0 INTRODUCTION

The subject property is located on the north side of Main Street west of Baker Street, described as Lot 30 and Part of Lot 31, Registered Plan 230 in the Town Whitchurch. Stouffville, Municipal address 6460 Main Street as depicted in Figure 1.

The existing topography of the land is gently sloping in a southerly direction towards Main Street as identified in Figure 2. Storm drainage from the site is presently conveyed to Main Street via sheet flow drainage. An existing 600mm diameter storm sewer on Main Street and 300mm diameter service connection are available to service the subject lands.

The minor storm system shall be sized in order to accomodate the 5 year storm per Town specifications. The 100 year post-development flows shall be captured on-site and controlled to the 2 year pre-development level if possible in order to maintain the present water balance site characteristics. Best management practices shall be implimented including sedimentation control, infiltration, evapotranspiration, enhanced landscaping, and other low impact developmet (LIDs) storm drainage practices for water management.

2.0 POST-DEVELOPMENT STORM DRAINAGE AREAS

Total Site Area =	2468.1 sq.m.	
Hard Surface Area =	1520.1 sq.m.	C=0.90
Landscaped Area =	948.0 sq.m.	C=0.30

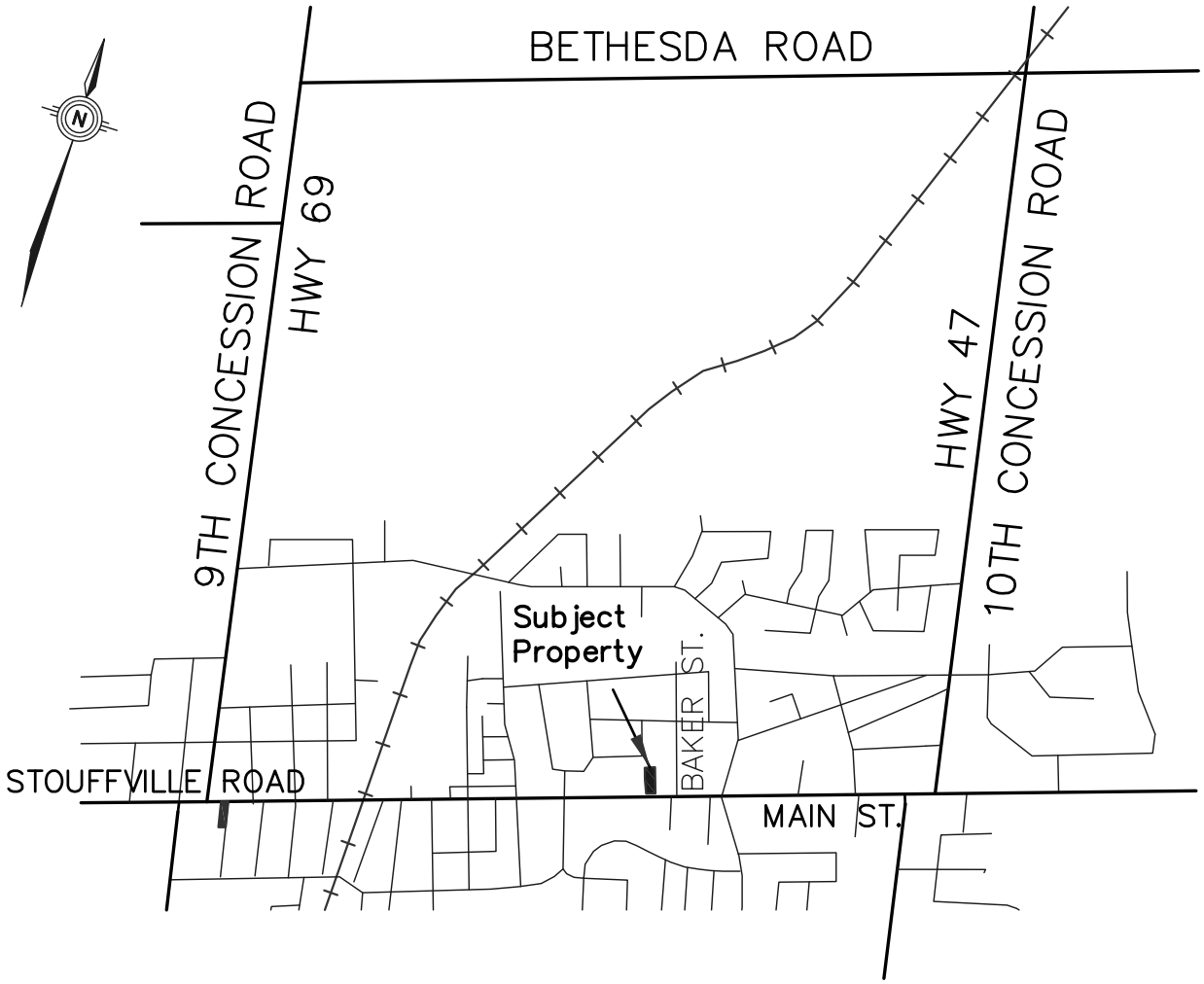
Composite Run-off Coefficient 0.670
(refer to Figure 3. for further details)

346 Newkirk Road, Unit 9, Richmond Hill, Ontario L4C 0A9 Tel: (905) 884-4336 Email: ame-tech@on.aibn.com

2426009 ONTARIO LTD.

PROPOSED RESIDENTIAL DEVELOPMENT

6460 MAIN STREET, TOWN OF WHITCHURCH–STOUFFVILLE



KEY PLAN
N.T.S.

FIGURE 1 – LOCATION PLAN

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PROPOSED RESIDENTIAL DEVELOPMENT

6460 MAIN STREET, TOWN OF WHITCHURCH–STOUFFVILLE

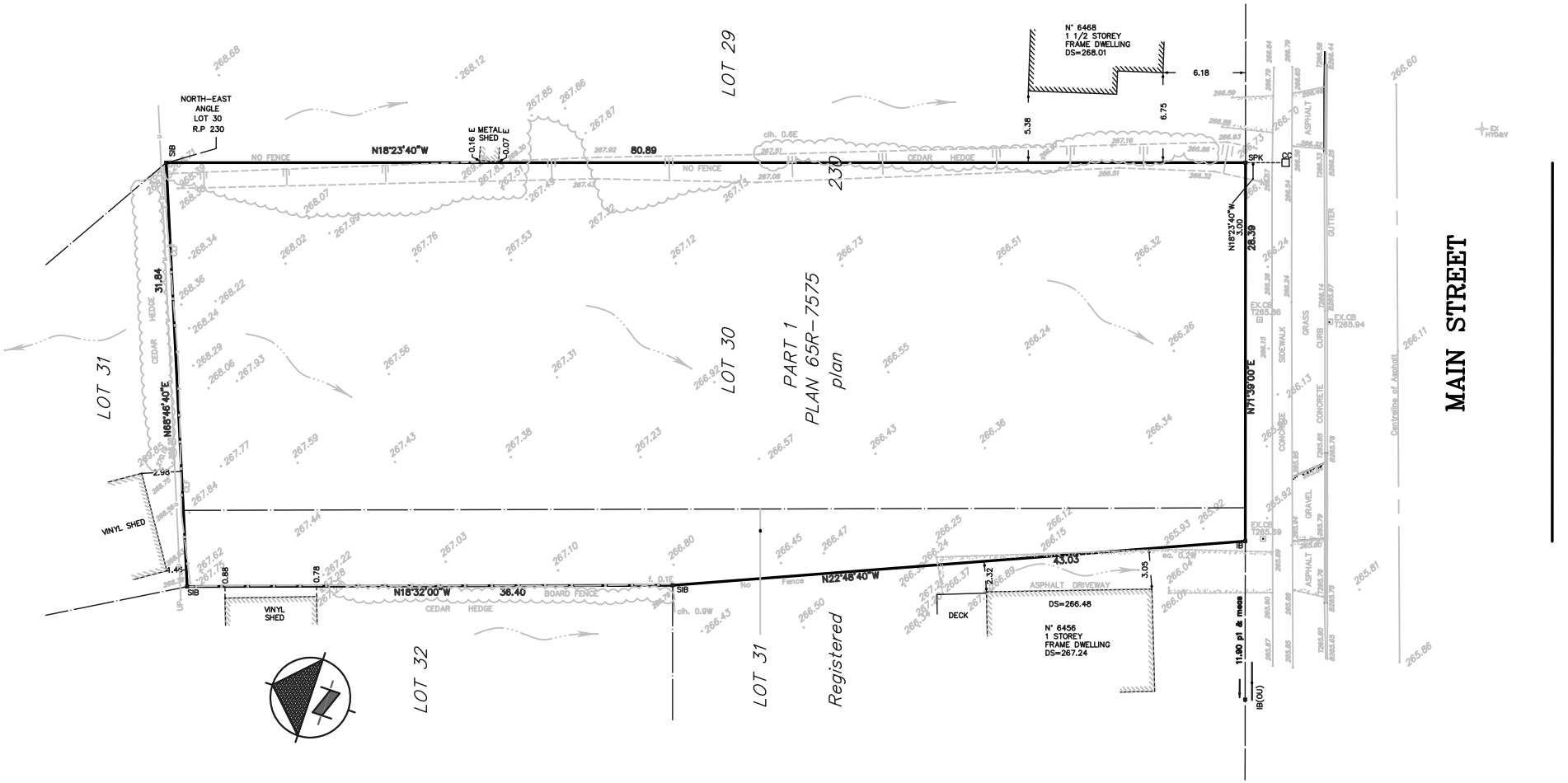


FIGURE 2 – EXISTING TOPOGRAPHY

3.0 DESIGN CRITERIA

Proposed 5-year Minor System

The proposed internal minor storm sewer system shall be designed to accomodate the 5-year storm in accordance with the Town's standards using the following formula:

I5 = 1015.93 x (T+5.255)^-0.82

Q5= 2.78xRIA l/s
R - Runoff coeficient
I - Intensity mm/hr, Tc (10min.)
A - Drainage Area (ha)

R =	0.75 (Towns)
I =	107.00 mm/hr
A =	0.2468 ha
Q5post =	55.06 l/s
Q5pre =	22.02 l/s R=0.30

Note: The existing 300mm dia. service lateral @ 0.5% has a capacity of 71 L/s which is satisfactory.
Flow capacity of the internal 450mm dia storm @ 0.25% = 149 l/s

Proposed Major System

On-site detention shall be provided in order to control the 100 year post-development flows to the 2 year pre-development level (R=0.30).

The 2-year pre-development flow is calculated as follows:

Q2pre = 2.78xRIA l/s
R - Runoff coeficient
I - Intensity mm/hr, Tc (10min.)
A - Drainage Area (ha)
= 2.78 x 0.30 x 77.67 x .2468
16.0 l/s

I2 =	696.679 x (T+4.957)^-0.81
R =	0.30
I =	77.67
A =	0.2468 ha

4.0 UNCONTROLLED RUNOFF

A small landscaped portion of the site on the south side of Block B shall discharge to the Main Street without stormwater controls as follows:

Landscaped Area = 0.00453 ha

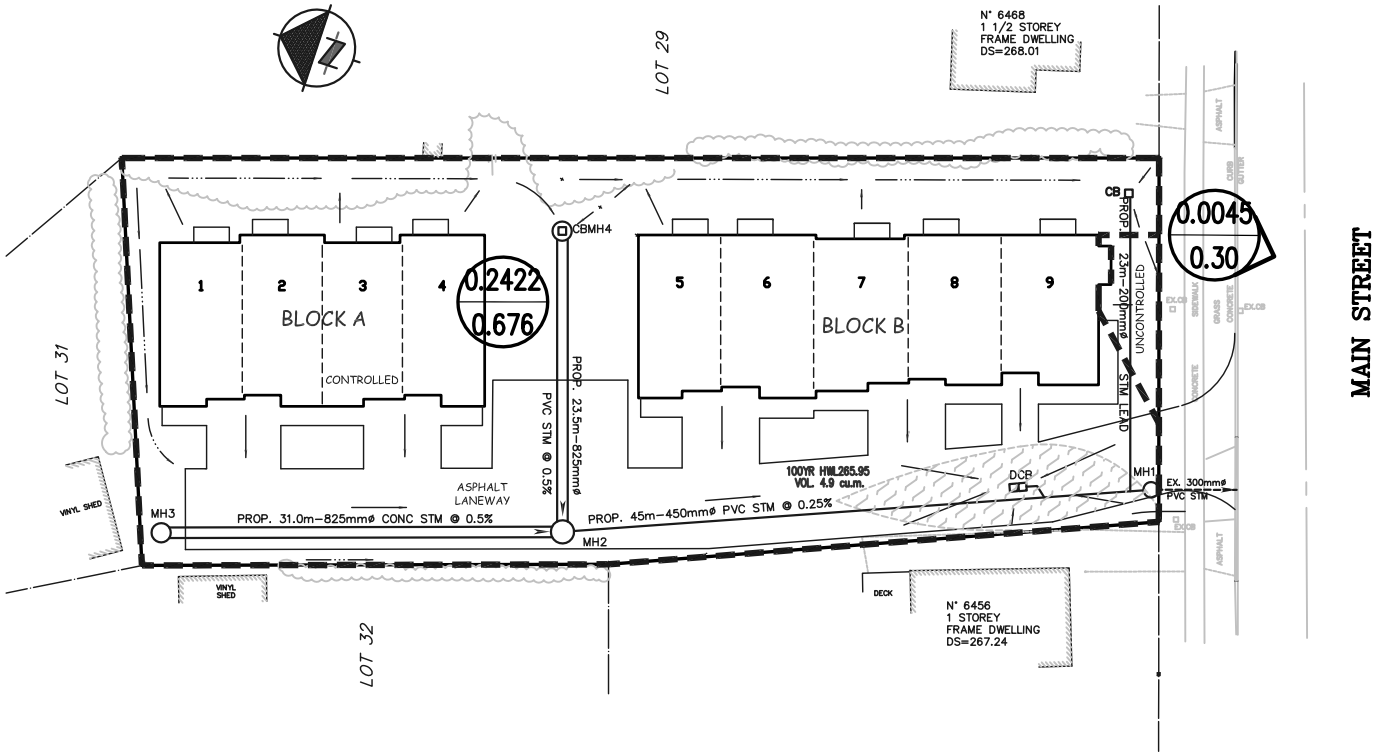
R=	0.30
Tc(min.) =	10.0
I2 =	77.67

Q2u = 2.78 x 0.30 x 186.74 x 0.00453
= 0.3 l/s
(refer to previous Figure 3)

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PROPOSED RESIDENTIAL DEVELOPMENT

6460 MAIN STREET, TOWN OF WHITCHURCH–STOUFFVILLE



POST–DEVELOPMENT STORM DRAINAGE	
TOTAL SITE AREA	2468.1 SQ.M.
LANDSCAPED AREAS	948 SQ.M.
HARD SURFACE AREA	1520.1 SQ.M.
COMPOSITE RUN–OFF COEFFICIENT	Rc=0.669
CONTROLLED AREAS	
LANDSCAPED	902.7 SQ.M.
HARD	1520.1 SQ.M.
COMPOSITE RUN–OFF COEFFICIENT	Rc=0.676
UNCONTROLLED	
LANDSCAPED	45.3 SQ.M.
RUN–OFF COEFFICIENT	R=0.30

FIGURE 3 – POST–DEVELOPMENT DRAINAGE

5.0 DETENTION VOLUME CALCULATIONS

RUNOFF / STORAGE COMPUTATIONS (100 Year Storm Event)

The allowable flow adjusted for uncontrolled areas is :

Qall = 16 - 0.3 l/s
= 15.7 l/s

Note: Actual discharge (Q=29.0 l/s) is based on the minimum orifice size of 100mm.
(REFER TO SECTION 6.0)

Total Controlled areas: 0.24228

100 Year Storm Storage Requirements
I for Tc 10 min. 186.74

Landscaped = 0.0903
Hard Surface 0.15201
Post Rc x 1.25 0.85
All- Dist(cms) 0.02900

Max. Stor. (m3)= 50.05

TIME (min.)	INTENSITY (mm/hr)	Q PEAK (m3/s)	RUN-VOL (m3)	DIS-VOL (m3)	STO-VOL (m3)
1	374.33	0.213	12.78	1.740	11.04
5	256.32	0.146	43.76	8.700	35.06
10	186.74	0.106	63.76	17.400	46.36
15	148.23	0.084	75.92	26.100	49.82
16	142.48	0.081	77.84	27.840	50.00
17	137.19	0.078	79.63	29.580	**50.05**
18	132.30	0.075	81.31	31.320	49.99
20	123.58	0.070	84.39	34.800	49.59
25	106.36	0.061	90.79	43.500	47.29
30	93.61	0.053	95.88	52.200	43.68

AVAILABLE DETENTION VOLUME CALCULATIONS

Required Storage Volume : **50.05** cu.m.

Available Storage Volume :
Pipe : 23 m - 200mm dia. STM 0.7 cu.m.
Pipe : 45 m - 450mm dia. STM 7.2 cu.m.
Pipe : 23.5 m - 825mm dia. STM 12.6 cu.m.
Pipe : 31 m - 825mm dia. STM 16.6 cu.m.

Ponding Areas 4.9 cu.m.
Catchbasins & Concrete Structures 8.5 cu.m.

Provided Storage Volume : **Total** **50.4** cu.m.

6.0 INLET CAPACITY / OUTLET CONTROLS

The inlet capacity at the sag can be verified using the attached MTO Design Chart 4.19. Based on a ponding depth of 150mm the capacity of the double catchbasin is 0.17 cu.m/s.

Post Dev. flow to the DCB: Q100 = 2.78 x 0.69 x 186.74 x 0.1965
= 106.4 l/s

Assuming 50% blockage at DCB or reduced capacity of 85 l/s, sufficient capacity within acceptable tolerances (<2%) has been provided to accomodate the anticipated 100 year flow.

Limit discharge to Qa = 15.7 l/s

Q = CA(2gh)^.5		C =	0.82
A = Q/(C(2gh)^.5)		Q =	0.0157 cms
D = (4A/PI)^.5		g =	9.8 m/s^2
		h(max) =	1.035 m
	A =	0.0042 m^2	
	D =	0.074 m	
	Use a	75 mm orifice pipe (use 100mm min.)	

Based on the recommended minimum orifice size to minimize nuisance blockages, and a maximum head of 1.035m, the actual release rate is :

Discharge with 100mm orifice = **29.0** l/s

Q = CA(2gh)^.5		C =	0.82
A = Q/(C(2gh)^.5)		Q =	0.0290 cms
D = (4A/PI)^.5		g =	9.8 m/s^2
		h(max) =	1.035 m
	A =	0.0079 m^2	
	D =	**0.100 m**	

7.0 WATER BALANCE MANAGEMENT

The primary objective of Water Balance Management is to capture and manage rainfall on the development site itself where possible to preserve the pre-development hydrology or "Water Balance". The pre-development hydrology / water balance typically consists of three components: runoff, infiltration and evapotranspiration.

Water balance targets / criteria on a development site can be achieved through the implimentation of a combination of the following:

1. Infiltration
2. Evapotransportation
3. Landscaping
4. Rainwater re-use and/or other Low Impact Development (LID) practices.

Targets and Design criteria:

Within the Toronto area, storms with 24-hour volumes of 5mm or less contribute 50% of the total average annual rainfall volume. Therefore, the first flush or 5mm shall be retained on-site through infiltration, evapotranspiration and/or rainwater re-use. The techniques used in order to facilitate a water balance for the subject development are identified and summarized below:

1. Use of absorbent landscaping materials.
2. Extended swale lengths, reduced swale gradients with french drains (where possible).
3. Porous / Eco Pavers on driveways.

Water Balance Measures Summary:

Target - Retain runoff from a 5mm, 24hr rainfall event

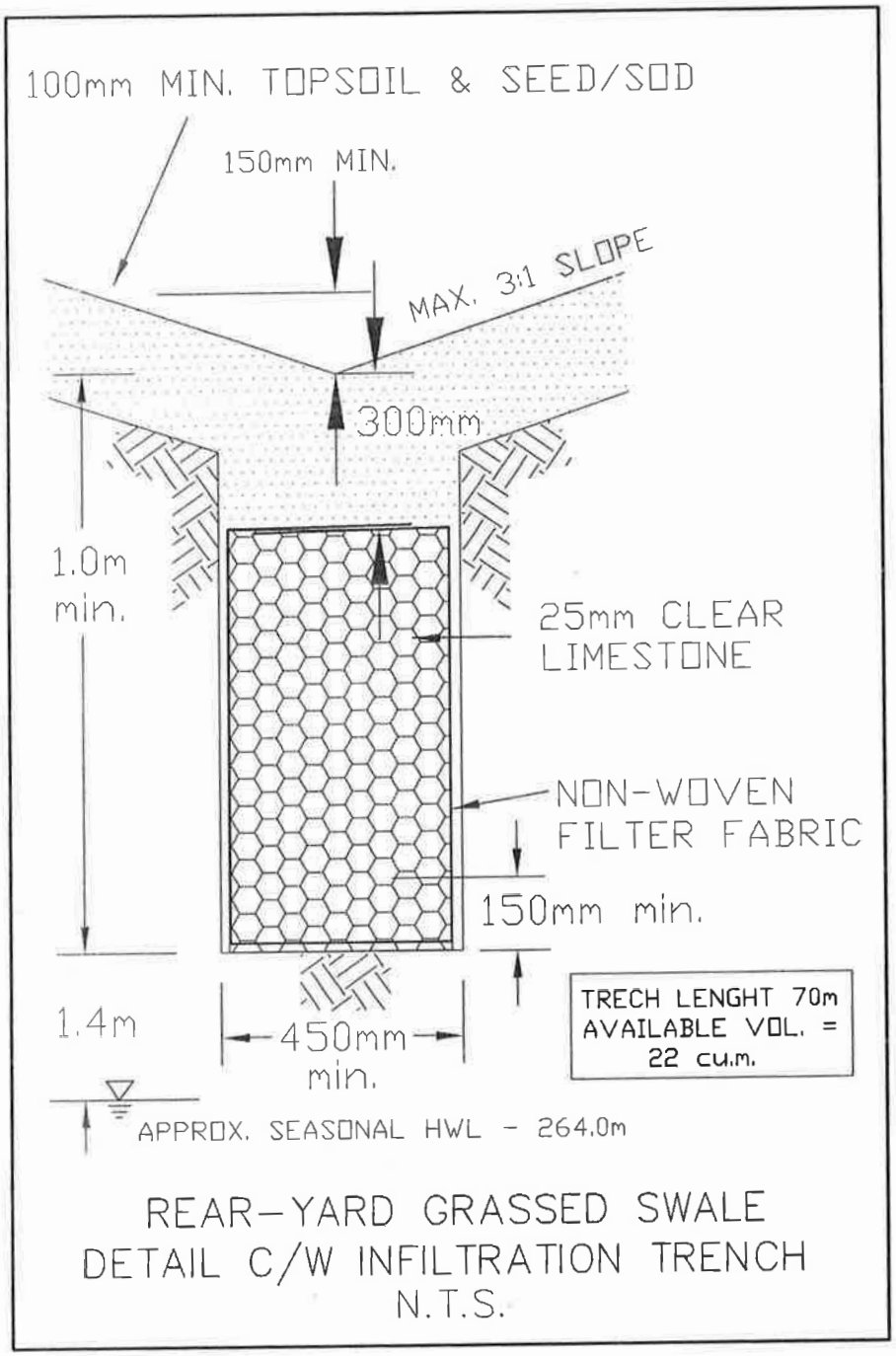
Site Area	% of Total Area	Abstraction for Area	Abstraction for Total Area
Absorbent Landscaping	38.4% (948 m2)	5 mm	1.92 mm
Porous / Eco Pavers on Driveways	6.2% (152.3 m2)	5 mm	0.31 mm
Roof-top to Infiltr. Galleries	12.6% (311.4 m2)	5 mm	0.63 mm
Bal. of Roof-tops & Hard Surfaces	42.8% (1056.4 m2)	0.6 mm	2.14 mm
Total	100.0%		**5.00 mm Total**

The infiltration trench has been sized to capture approximately 50% of the roof-top. A detail of the trench has been rpovided on the Servicing Plan with calculation and has also been provided herewith in Figure 4. for reference and summarized as follows:

- *Required Volume: 21.8 cu.m.*
- *Provided Volume: 0.7m x 0.45m x 70m = 22 cu.m.*

* Although the roof-top and asphalt surfaces are impermeable some minor evaporation / infiltration will occur during and after a rainfall event (0.6mm).

Smaller developments present a challenge with respect to achieving Water Balance targets however, we believe the proposed LID measures and assumptions have achieved / exceeded the required target level and are in general conformity with Water Balance Management best management practices.



$$\text{REQ'D. VOLUME(V)} = \frac{\text{REAR ROOF AREAS (sq.m.)} \times 0.025\text{m}}{0.4\ \text{(Void Ratio)}}$$

$$V = \frac{350\ \text{(sq.m.)} \times 0.025}{0.4}$$

$$V = 21.8\ \text{cu.m.}$$

FIGURE 4 – INFILTRATION TRENCH

8.0 STORMWATER QUALITY CONTROL

Water quality controls can be enhanced by installing an Oil and Grit (OG) separator. The Stormceptor EFO technology is effective for sediment capture and scour prevention. The proposed EFO4 Unit has the capacity to provide Level 1 (Enhanced) water quality control for the subject area by removing the annual TSS as noted in the Sizing Report.

The EFO4 Sizing Report and Standard Detail has been provided herewith in Appendix A The EFO Standard Specifications including Inspection & Maintenance guidelines is also provided in Appendix B.

Based on the specified treated drainage area, the EFO4 sizing report estimates that a net TSS load reduction of 94% can be acheived.

The TRCA rate the Stormceptor OGS products as being only 50 to 60 % effective in TSS removal and as such a pro-rated water quality assesment (worst case) for the subject site can be summarized as follows:

Target: Level 1 (Enhanced) - 80% TSS Removal for the site.

Total Site Area:	2468 sq.m.
Treated areas: Pavement / Driveways / Walkways	846 sq.m.

Water Quality Summary:	**(sq.m.)**	**% TSS Removal**
Roof plus Landscape Areas -	1762	100
Treated Pavement Areas -	706	50
Un-treated Pavement Areas -	0	0
Pro-rated TSS removal:		**85.7**
Plus: Catchbasin with sumps:		10
Total Estimated TSS Removal		**95.7**

Notes:
1. Suspended solid transfer from roof-tops and absorbant landscaped areas are negligible
2. Properly maintained catchbasins equipped with sumps and / or goss traps will enhance the overall water quality and TSS removal within the site.

The Stormceptor unit will require maintenance every 2-5 years, consistent with standard Stormceptor sizing guidelines and recommended sediment maintenance depth for the specified model size.

The Water Quality Level 1 Enhanced target has been achieved for the subject property by utilizing the Stormcetor EFO4 which provides an estimated TSS removal > 80% .

9.0 EROSION AND SEDIMENTATION COTROL

Prior to and during the construction phase of the project the erosion and sedimentation control strategy as outlined on Dwg. ESC1 shall be implimented.

In order to prevent erosion and the transport of sediments off-site and / or from migrating into the storm sewer system, the following temporary measures should be considered and implimented as required:

- install 'heavy duty' sediment fencing around the perimeter of the construction area
- install sediment controls at catchbasins and catchbasin maintenance chambers
- install rock-check dams and provide mud-mat tracking area at entrance / exit to the site
- immediate seeding and mulching of any disturbed and permanent landscaped areas

Sincerely,

AME-TECH Developments Limited



C. Di Rezze, P. Eng.
Consulting Engineer

APPENDIX A

Stormcetor Sizing Table and Standard Detail

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

04/23/2026

Province:	Ontario
City:	Stouffville
Nearest Rainfall Station:	TORONTO CITY
Climate Station Id:	6158355
Years of Rainfall Data:	20

Site Name:	

Drainage Area (ha):	0.25
% Imperviousness:	63.00

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):	5.48
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	
Influent TSS Concentration (mg/L):	200
Estimated Average Annual Sediment Load (kg/yr):	190
Estimated Average Annual Sediment Volume (L/yr):	155

Project Name:	6460 Main St
Project Number:	
Designer Name:	Eric Carmona-Epp
Designer Company:	Imbrium Systems
Designer Email:	eric.carmona-epp@imbriumsystems.com
Designer Phone:	406-677-9967
EOR Name:	Carlo Di Rezze
EOR Company:	
EOR Email:	ame-tech@outlook.com
EOR Phone:	905-884-4336

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	94
EFO5	97
EFO6	98
EFO8	99
EFO10	100
EFO12	100

Recommended Stormceptor EFO Model: EFO4

Estimated Net Annual Sediment (TSS) Load Reduction (%): 94

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)

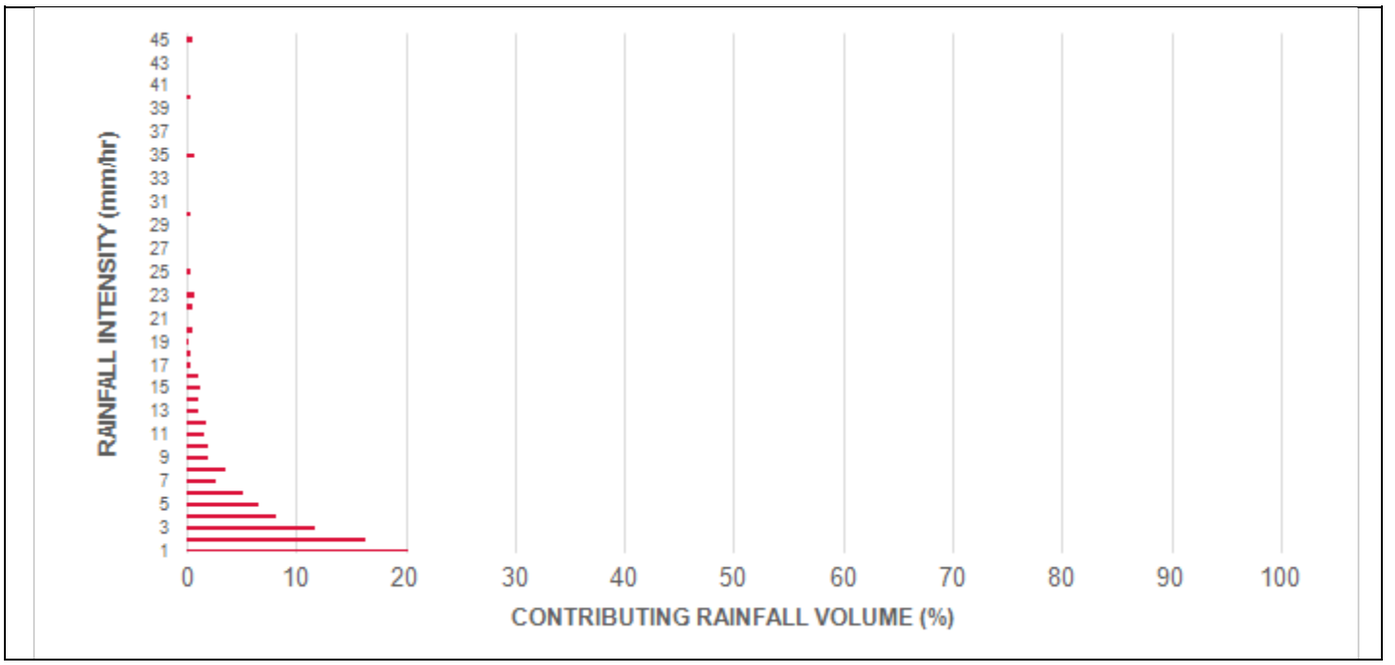
►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a 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

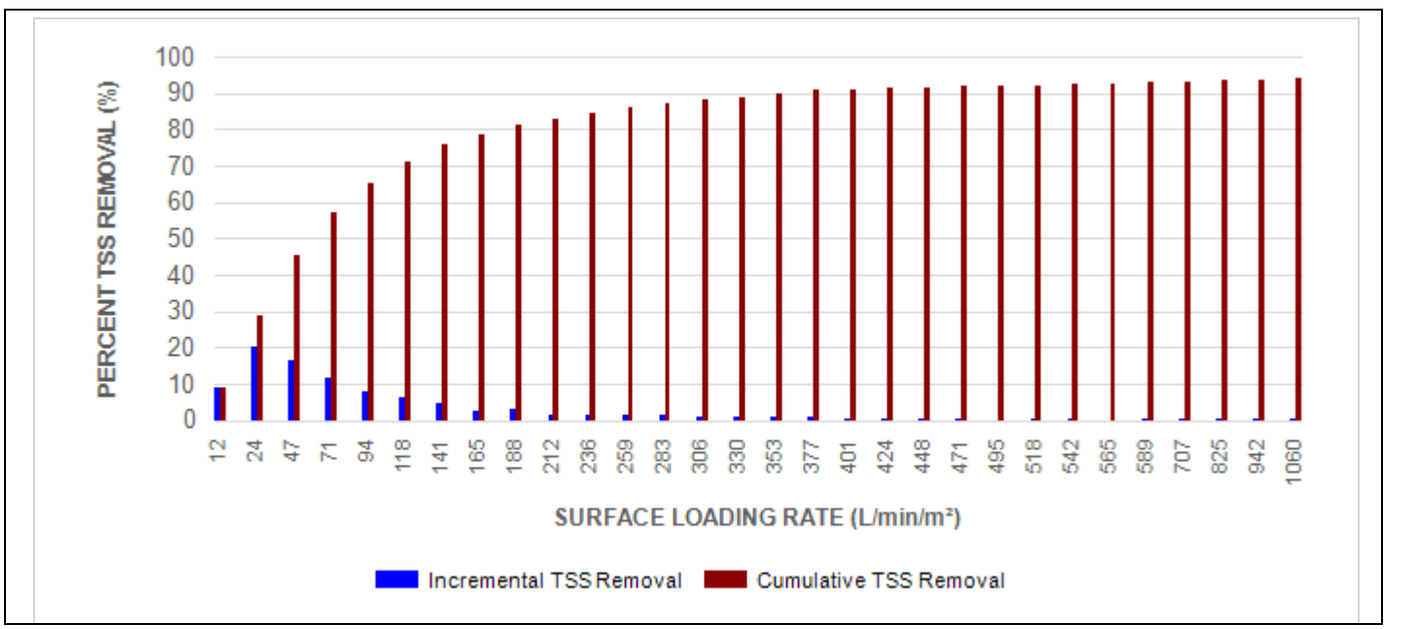
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.7	8.7	0.24	14.0	12.0	100	8.7	8.7
1.00	20.2	28.9	0.47	28.0	24.0	100	20.2	28.9
2.00	16.4	45.3	0.94	57.0	47.0	100	16.4	45.3
3.00	11.8	57.1	1.41	85.0	71.0	100	11.8	57.1
4.00	8.1	65.2	1.88	113.0	94.0	97	7.9	65.0
5.00	6.6	71.9	2.36	141.0	118.0	95	6.3	71.3
6.00	5.2	77.1	2.83	170.0	141.0	91	4.8	76.0
7.00	2.7	79.8	3.30	198.0	165.0	88	2.3	78.4
8.00	3.6	83.4	3.77	226.0	188.0	86	3.1	81.5
9.00	2.0	85.4	4.24	254.0	212.0	83	1.7	83.1
10.00	1.9	87.3	4.71	283.0	236.0	82	1.6	84.7
11.00	1.6	88.9	5.18	311.0	259.0	80	1.3	86.0
12.00	1.8	90.7	5.65	339.0	283.0	79	1.4	87.4
13.00	1.0	91.6	6.13	368.0	306.0	78	0.8	88.1
14.00	1.0	92.7	6.60	396.0	330.0	77	0.8	88.9
15.00	1.3	93.9	7.07	424.0	353.0	76	1.0	89.9
16.00	1.0	95.0	7.54	452.0	377.0	75	0.8	90.7
17.00	0.4	95.3	8.01	481.0	401.0	74	0.3	90.9
18.00	0.4	95.7	8.48	509.0	424.0	73	0.3	91.2
19.00	0.2	95.9	8.95	537.0	448.0	72	0.1	91.4
20.00	0.6	96.5	9.42	565.0	471.0	71	0.4	91.8
21.00	0.0	96.5	9.90	594.0	495.0	70	0.0	91.8
22.00	0.5	97.0	10.37	622.0	518.0	69	0.3	92.1
23.00	0.7	97.7	10.84	650.0	542.0	67	0.5	92.6
24.00	0.0	97.7	11.31	679.0	565.0	66	0.0	92.6
25.00	0.3	98.0	11.78	707.0	589.0	65	0.2	92.8
30.00	0.3	98.3	14.14	848.0	707.0	64	0.2	93.0
35.00	0.8	99.1	16.49	990.0	825.0	63	0.5	93.5
40.00	0.4	99.5	18.85	1131.0	942.0	62	0.2	93.7
45.00	0.5	100.0	21.20	1272.0	1060.0	60	0.3	94.0
Estimated Net Annual Sediment (TSS) Load Reduction =								**94 %**

Climate Station ID: 6158355 *Years of Rainfall Data*: 20

RAINFALL DATA FROM TORONTO CITY 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

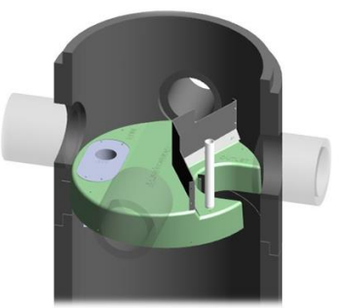
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test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

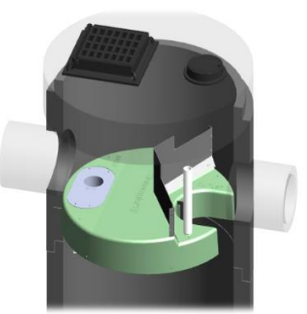
DESIGN FLEXIBILITY

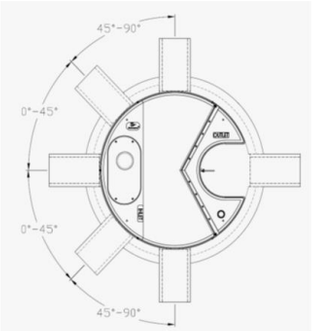
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend 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)	(ft³)	(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/ft³)

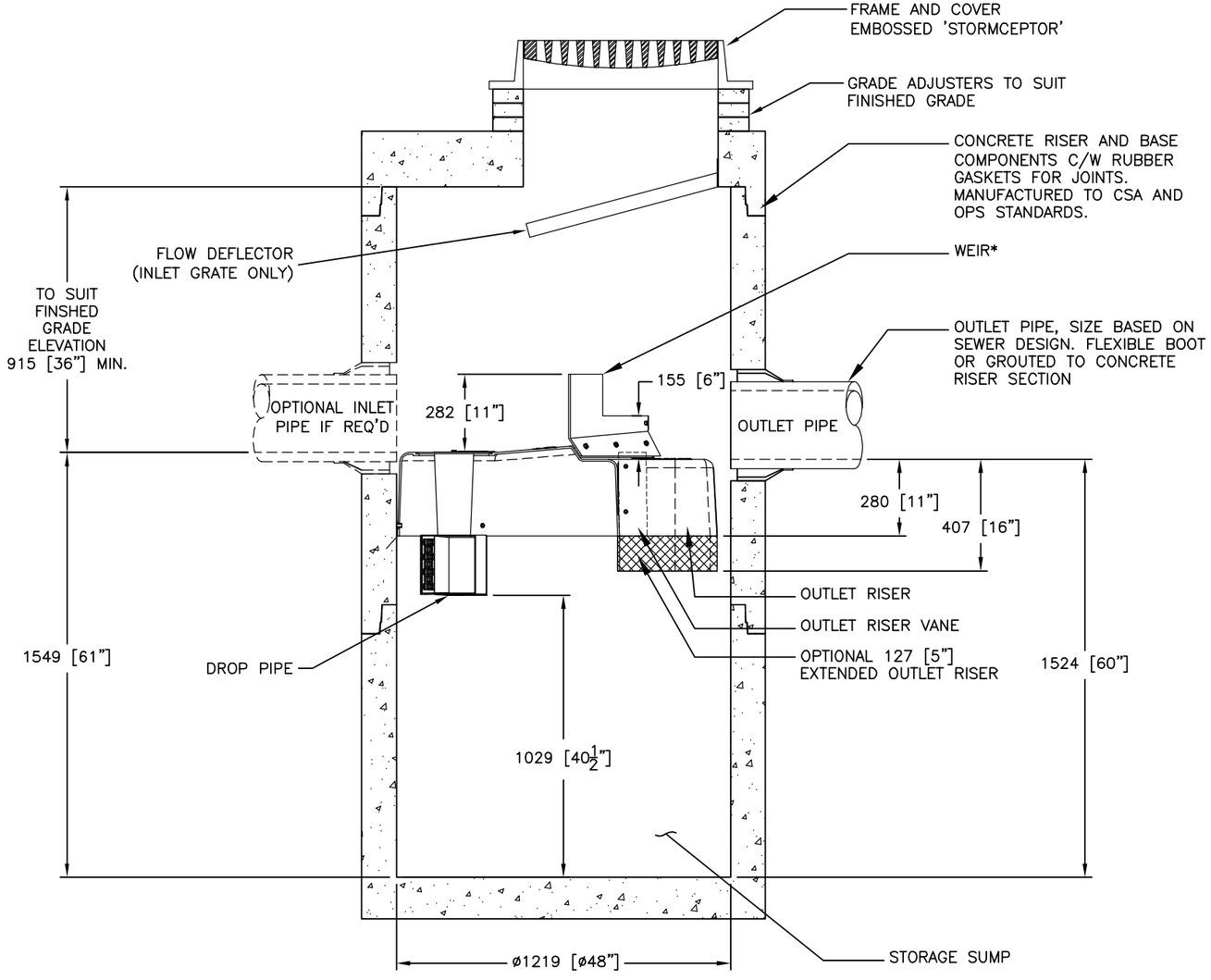
Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot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

STANDARD STORMCEPTOR EF/EFO DRAWINGS

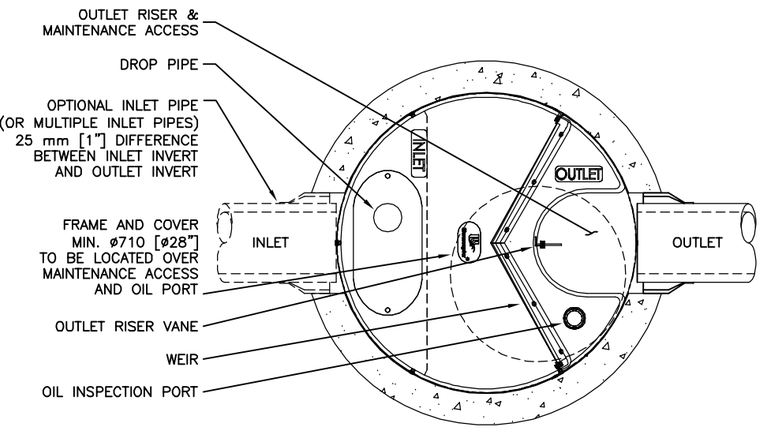
For standard details, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

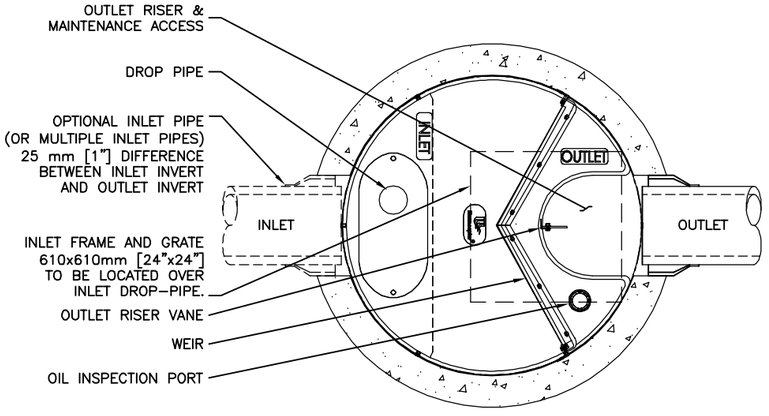
For specifications, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef



SECTION VIEW



PLAN VIEW (STANDARD)



PLAN VIEW (INLET TOP)

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).

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 EF4 AND 535 L/min/m^2 (13.1 gpm/ft^2) FOR STORMCEPTOR EFO4 (OIL CAPTURE CONFIGURATION). WEIR HEIGHT IS 150 mm (6 INCH) FOR EF04.

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.

STANDARD DETAIL
NOT FOR CONSTRUCTION

SITE SPECIFIC DATA REQUIREMENTS

STORMCEPTOR MODEL	EFO4
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

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

Stormceptor® EF

SCALE = NTS

imbrium®
407 FAIRVIEW DRIVE, WHITBY, ON, L1N 9A9
TF 800-565-4501 CA 416-800-9000 INTL +1-416-800-9000

DATE: 10/13/2017

DESIGNED:	DRAWN:
JSK	JSK
CHECKED:	APPROVED:
BSF	SP
PROJECT No.:	SEQUENCE No.:
EFO4	*

SHEET: 1 OF 1

APPENDIX B
Stormcetor Standard Specifications

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

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, designing, maintaining, and constructing 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). Work includes supply and installation of concrete bases, precast sections, and the appropriate precast section with OGS internal components correctly installed within the system, watertight sealed to the precast concrete prior to arrival to the project site.

1.2 REFERENCE STANDARDS

1.2.1 For Canadian projects only, the following reference standards apply:

CAN/CSA-A257.4-14: Joints for Circular Concrete Sewer and Culvert Pipe, Manhole Sections, and Fittings Using Rubber Gaskets
CAN/CSA-A257.4-14: Precast Reinforced Circular Concrete Manhole Sections, Catch Basins, and Fittings
CAN/CSA-S6-00: Canadian Highway Bridge Design Code

1.2.2 For ALL projects, the following reference standards apply:

ASTM D-4097: Contact Molded Glass Fiber Reinforced Chemical Resistant Tanks
ASTM C 478: Specification for Precast Reinforced Concrete Manhole Sections
ASTM C 443: Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
ASTM C 891: Standard Practice for Installation of Underground Precast Concrete Utility Structures
ASTM D2563: Standard Practice for Classification of Visual Defects in Reinforced Plastics

1.3 SHOP DRAWINGS

1.3.1 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 the precast concrete components and OGS internal components prior to shipment, including the sequence for installation.

1.3.2 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 based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record. Any and all changes to project cost estimates, bonding amounts, plan check fees for revision of approved documents, or design impacts due to regulatory requirements as a result of a product substitution shall be coordinated by the Contractor with the Engineer of Record.

1.4 HANDLING AND STORAGE

Prevent damage to materials during storage and handling.

1.4.1 OGS internal components supplied by the Manufacturer for attachment to the precast concrete vessel shall be pre-fabricated, bolted to the precast and watertight sealed to the precast vessel surface prior to site delivery to ensure Manufacturer's internal assembly process and quality control processes are fully adhered to, and to prevent materials damage on site.

1.4.2 Follow all instructions including the sequence for installation in the shop drawings during installation.

PART 2 – PRODUCTS

2.1 GENERAL

2.1.1 The OGS vessel shall be cylindrical and constructed from precast concrete riser and slab components.

2.1.2 The precast concrete OGS internal components shall include a fiberglass insert bolted and watertight sealed inside the precast concrete vessel, prior to site delivery. Primary internal components that are to be anchored and watertight sealed to the precast concrete vessel shall be done so only by the Manufacturer prior to arrival at the job site to ensure product quality.

2.1.3 The OGS shall be allowed to be specified and have the ability to function as a 240-degree bend structure in the stormwater drainage system, or as a junction structure.

2.1.4 The OGS to be specified shall have the capability to accept influent flow from an inlet grate and an inlet pipe.

2.2 PRECAST CONCRETE SECTIONS

All precast concrete components shall be designed and manufactured to meet highway loading conditions per State/Provincial or local requirements.

2.3 GASKETS

Only profile neoprene or nitrile rubber gaskets that are oil resistant shall be accepted. For Canadian projects only, gaskets shall be in accordance to CSA A257.4-14. Mastic sealants, butyl tape/rope or Conseal CS-101 alone are not acceptable gasket materials.

2.4 JOINTS

The concrete joints shall be watertight and meet the design criteria according to ASTM C-990. For projects where joints require gaskets, the concrete joints shall be watertight and oil resistant and meet the design criteria according to ASTM C-443. Mastic sealants or butyl tape/rope alone are not an acceptable alternative.

2.5 FRAMES AND COVERS

Frames and covers shall be manufactured in accordance with State/Provincial or local requirements for inspection and maintenance access purposes. A minimum of one cover, at least 22-inch (560 mm) in diameter, shall be clearly embossed with the OGS manufacturer's product name to properly identify this asset's purpose is for stormwater quality treatment.

2.6 PRECAST CONCRETE

All precast concrete components shall conform to the appropriate CSA or ASTM specifications.

2.7 FIBERGLASS

The fiberglass portion of the OGS device shall be constructed in accordance with ASTM D2563, and in accordance with the PS15-69 manufacturing standard, and shall only be installed, bolted and watertight sealed to the precast concrete by the Manufacturer prior to arrival at the project site to ensure product quality.

2.8 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a fiberglass insert for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The total sediment storage capacity shall be a minimum 40 ft^3 (1.1 m^3). The total petroleum hydrocarbon storage capacity shall be a minimum 50 gallons (189 liters). The access opening to the sump of the OGS device for periodic inspection and maintenance purposes shall be a minimum 16 inches (406 mm) in diameter.

2.9 LADDERS

Ladder rungs shall be provided upon request or to comply with State/Provincial or local requirements.

2.10 INSPECTION

All precast concrete sections shall be level and inspected to ensure dimensions, appearance, integrity of internal components, and quality of the product meets State/Provincial or local specifications and associated standards.

2.11 WEIR

Weir shall be constructed of 5052 aluminum alloy and shall be installed, bolted and watertight sealed by the Manufacturer prior to shipment to the project site to ensure product quality.

2.12 DROP PIPE

Drop pipe shall be constructed of 5052 aluminum alloy and shall be watertight sealed to the insert with silicone adhesive. Based on assessment of the dimensions of the precast riser section containing the fiberglass insert and the dimensions of the drop pipe, the drop pipe may be installed by the Manufacturer prior to shipment to the project site, or may be installed at the project site by the Contractor, at the Manufacturer's discretion.

2.13 OUTLET RISER VANE

Outlet riser vane shall be constructed of ¼-inch 60 durometer EPDM rubber and shall be installed by the Manufacturer prior to shipment to the site.

2.14 SAFETY GRATE

Safety grate shall be constructed of 6061-T6 aluminum alloy and shall be installed by the Manufacturer prior to shipment to the site.

2.15 FASTENERS

All fasteners for component attachment shall be constructed of stainless steel. These include bolts, washers, and nuts used for attachment of the fiberglass insert, weir, drop pipe, outlet riser vane, and safety grate.

2.16 OIL INSPECTION PIPE

Oil inspection pipe shall be constructed of 3-inch diameter Schedule 40 PVC and shall be watertight sealed to the oil inspection port with Sikaflex 1a adhesive. Oil inspection pipe shall be installed by the Manufacturer prior to shipment to the site.

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 HYDROLOGY AND RUNOFF VOLUME

The OGS device shall be engineered, designed and sized to treat a minimum of 90 percent of the average annual runoff volume, unless otherwise stated by the Engineer of Record, using historical rainfall data. Rainfall data sets should be comprised of a minimum 15-years of rainfall data or a longer continuous period if available for a given location, but in all cases a minimum 5-year period of rainfall data.

3.3 ANNUAL (TSS) SEDIMIMENT LOAD AND STORAGE CAPACITY

The OGS device shall be capable of removing and have sufficient storage capacity for the calculated annual total suspended solids (TSS) mass load and volume without scouring previously captured pollutants prior to maintenance being required. The annual (TSS) sediment load and volume transported from the drainage area should be calculated and compared to the OGS device's available storage capacity by the specifying Engineer to ensure adequate capacity between maintenance cycles. Sediment loadings shall be determined by land use and defined as a minimum of 450 kg (992 lb) of sediment (TSS) per impervious hectare of drainage area per year, or greater based on land use, as noted in Table 1 below.

Annual sediment volume calculations shall be performed using the projected average annual treated runoff volume, a typical sediment bulk density of 1602 kg/m^3 (100 lbs/ft^3) and an assumed Event Mean Concentration (EMC) of 125 mg/L TSS in the runoff, or as otherwise determined by the Engineer of Record.

Example calculation for a 1.3-hectares parking lot site:

- 1.28 meters of rainfall depth, per year
- 1.3 hectares of 100% impervious drainage area
- EMC of 125 mg/L TSS in runoff
- Treatment of 90% of the average annual runoff volume
- Target average annual TSS removal rate of 60% by OGS

Annual Runoff Volume:

- 1.28 m rain depth x 1.3 ha x 10,000 m^2/ha= 16,640 m^3 of runoff volume
- 16,640 m^3 x 1000 L/m^3 = 16,640,000 L of runoff volume
- 16,640,000 L x 0.90 = 14,976,000 L to be treated by OGS unit

Annual Sediment Mass and Sediment Volume Load Calculation:

- 14,976,000 L x 125 mg/L x kg/1,000,000 mg = 1,872 kg annual sediment mass
- 1,872 kg x m^3/1602 kg = 1.17 m^3 annual sediment volume
- 1.17 m^3 x 60% TSS removal rate by OGS = 0.70 m^3 minimum expected annual storage requirement in OGS

As a guideline, the U.S. EPA has determined typical annual sediment loads per drainage area for various sites by land use (see Table 1). Certain States, Provinces and local jurisdictions have also established such guidelines.

Table 1 – Annual Mass Sediment Loading by Land Use						
	Commercial	**Parking**	**Residential**	**Highways**	**Industrial**	**Shopping**

		Lot	High	Med.	Low			Center
(lbs/acre/yr)	1,000	400	420	250	10	880	500	440
(kg/hectare/yr)	1,124	450	472	281	11	989	562	494

Source: U.S. EPA Stormwater Best Management Practice Design Guide Volume 1, Appendix D, Table D-1, Burton and Pitt 2002

3.4 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 Table 2, Section 3.5, and based on third-party performance testing conducted in accordance with the Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit Separators**. 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:

3.4.1 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.

3.4.2 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.

3.4.3 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.

3.4.4 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 3.3.

3.4.5 The Peclet Number is not an approved method or model for calculating TSS removal, sizing, or scaling OGS devices.

3.4.6 If an alternate OGS device is proposed, supporting documentation shall be submitted that demonstrates:

- Canadian ETV or ISO 14034 ETV Verification Statement which verifies third-party performance testing conducted in accordance with the **Procedure for Laboratory Testing of Oil-Grit Separators**
- Equal or better sediment (TSS) removal of the PSD specified in Table 2 at equivalent surface loading rates, as compared to the OGS device specified herein.
- Equal or greater sediment storage capacity, as compared to the OGS device specified herein.
- Supporting documentation shall be signed and sealed by a local registered Professional Engineer. All costs associated with preparing and certifying this documentation shall be born solely by the Contractor.

3.5 PARTICLE SIZE DISTRIBUTION (PSD) FOR SIZING

The OGS device shall be sized to achieve the Engineer-specified average annual percent sediment (TSS) removal based solely on the test sediment used in the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.** This test sediment is comprised of inorganic ground silica with a specific gravity of 2.65, uniformly mixed, and containing a broad range of particle sizes as specified in Table 2. No alternative PSDs or deviations from Table 2 shall be accepted.

Table 2
Canadian ETV Program Procedure for Laboratory Testing of Oil-Grit Separators
Particle Size Distribution (PSD) of Test Sediment

Particle Diameter (Microns)	% by Mass of All Particles	Specific Gravity
1000	5%	2.65
500	5%	2.65
250	15%	2.65
150	15%	2.65
100	10%	2.65
75	5%	2.65
50	10%	2.65
20	15%	2.65
8	10%	2.65
5	5%	2.65
2	5%	2.65

3.6 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**. This scour testing is conducted with the device pre-loaded with test sediment comprised of the particle size distribution (PSD) illustrated in Table 2.

3.6.1 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.

Data generated from laboratory scour testing performed with an OGS device pre-loaded with a coarser PSD than in Table 2 (i.e. the coarser PSD has no particles in the 1-micron to 50-micron size range, or the D_{50} of the test sediment exceeds 75 microns) shall not be acceptable for the determination of the device's suitability for on-line installation.

3.7 DESIGN ACCOUNTING FOR BYPASS

3.7.1 The OGS device shall be specified to achieve the TSS removal performance and water quality objectives without washout of previously captured pollutants. The OGS device shall also have sufficient hydraulic conveyance capacity to convey the peak storm event, in accordance with hydraulic conditions per the Engineer of Record. To ensure this is achieved, there are two design options with associated requirements:

3.7.1.1 The OGS device shall be placed **off-line** with an upstream diversion structure (typically in an upstream manhole) that only allows the water quality volume to be diverted to the OGS device, and excessive flows diverted downstream around the OGS device to prevent high flow washout of pollutants previously captured. This design typically incorporates a triangular layout including an upstream bypass manhole with an appropriately engineered weir wall, the OGS device, and a downstream junction manhole, which is connected to both the OGS device and bypass structure. In this case with an external bypass required, the OGS device manufacturer must provide calculations and designs for all structures, piping and any other required material applicable to the proper functioning of the system, stamped by a Professional Engineer.

3.7.1.2 Alternatively, OGS devices in compliance with Section 3.6 shall be acceptable for an **on-line** design configuration, thereby eliminating the requirement for an upstream bypass manhole and downstream junction manhole.

3.7.2 The OGS device shall also have sufficient hydraulic conveyance capacity to convey the peak storm event, in accordance with hydraulic conditions per the Engineer of Record. If an alternate OGS device is proposed, supporting documentation shall be submitted that demonstrates equal or better hydraulic conveyance capacity as compared to the OGS device specified herein. This documentation shall be signed and sealed by a local registered Professional Engineer. All costs associated with preparing and certifying this documentation shall be born solely by the Contractor.

3.8 PETROLEUM HYDROCARBONS AND FLOATABLES STORAGE CAPACITY

Petroleum hydrocarbons and floatables storage capacity in the OGS device shall be a minimum 50 gallons (189 Liters), or more as specified.

3.8.1 The OGS device shall have gasketed precast concrete joints that are watertight, and oil resistant and meet the design criteria according to ASTM C-443 to provide safe oil and other hydrocarbon materials storage and ground water protection. Mastic sealants or butyl tape/rope alone are not an acceptable alternative.

3.9 SURFACE LOADING RATE SCALING OF DIFFERENT MODEL SIZES

The reference device for scaling shall be an OGS device that has been third-party tested in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators**. Other model sizes of the tested device shall only be scaled such that the claimed TSS removal efficiency of the scaled device shall be no greater than the TSS removal efficiency of the tested device at identical **surface loading rates** (flow rate divided by settling surface area). The depth of other model sizes of the tested device shall be scaled in accordance with the depth scaling provisions within Section 6.0 of the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators**.

3.9.1 The Peclet Number and volumetric scaling are not approved methods for scaling OGS devices.

PART 4 – INSPECTION & MAINTENANCE

The OGS manufacturer shall provide an Owner's Manual upon request.
Maintenance shall be performed by a professional service provider who has experience in cleaning OGS devices and has been trained and certified in applicable health and safety practices, including confined space entry procedures.

4.1 A Quality Assurance Plan that provides inspection for a minimum of 5 years shall be included with the OGS stormwater quality device, and written into the Environmental Compliance Approval (ECA) or the appropriate State/Provincial or local approval document.

4.2 OGS device inspection shall include determination of sediment depth and presence of petroleum hydrocarbons and floatables below the insert. Inspection shall be easily conducted from finished grade through a Frame and Cover of at least 22 inch (560 mm) in diameter.

4.3 Inspection and pollutant removal from below the OGS's insert shall be conducted as a periodic maintenance practice using a standard maintenance truck and vacuum apparatus, and shall be easily conducted from finished grade through a Frame and Cover of at least 22-inches (560 mm) in diameter.

4.4 Diameter of the maintenance access opening to the lower chamber and sump shall be scaled consistently across all model sizes, and shall be 1/3 the inside diameter of the OGS structure, or larger.

4.5 No confined space entry shall be required for routine inspection and maintenance cleaning activities.

4.6 For OGS model sizes of diameter 72 inches (1828 mm) and greater, the access opening to the OGS device's lower chamber and sump shall be large enough to allow a maintenance worker to enter the lower chamber to facilitate non-routine maintenance cleaning activities and repairs, as needed.

4.7 The orifice-containing component (i.e. drop pipe, duct, chute, etc.) of the OGS device used to control flow rate into the lower chamber shall be removable from the insert to facilitate cleaning, repair, or replacement of the orifice-containing component, as needed.

PART 5 – EXECUTION

5.1 PRECAST CONCRETE INSTALLATION

The installation of the precast concrete OGS stormwater quality treatment device shall conform to ASTM C 891, ASTM C 478, ASTM C 443, CAN/CSA-A257.4-14, CAN/CSA-A257.4-14, CAN/CSA-S6-00 and all highway, State/Provincial, or local specifications for the construction of manholes. Selected sections of a general specification that are applicable are summarized below. The Contractor shall furnish all labor, equipment and materials necessary to offload, assemble as needed the OGS internal components as specified in the Shop Drawings.

5.2 EXCAVATION

5.2.1 Excavation for the installation of the OGS stormwater quality treatment device shall conform to highway, State/Provincial or local specifications. Topsoil that is removed during the excavation for the OGS stormwater quality treatment device shall be stockpiled in designated areas and not be mixed with subsoil or other materials. Topsoil stockpiles and the general site preparation for the installation of the OGS stormwater quality device shall conform to highway, State/Provincial or local specifications.

5.2.2 The OGS device shall not be installed on frozen ground. Excavation shall extend a minimum of 12 inch (300 mm) from the precast concrete surfaces plus an allowance for shoring and bracing where required. If the bottom of the excavation provides an unsuitable foundation additional excavation may be required.

5.2.3 In areas with a high water table, continuous dewatering shall be provided to ensure that the excavation is stable and free of water.

5.3 BACKFILLING

Backfill material shall conform to highway, State/Provincial or local specifications. Backfill material shall be placed in uniform layers not exceeding 12 inches (300 mm) in depth and compacted to highway, State/Provincial or local specifications.

5.4 OGS WATER QUALITY DEVICE CONSTRUCTION SEQUENCE

5.4.1 The precast concrete OGS stormwater quality treatment device is installed and leveled in sections in the following sequence:

- aggregate base

- base slab, or base
- riser section(s) (if required)
- riser section w/ pre-installed fiberglass insert
- upper riser section(s)
- internal OGS device components
- connect inlet and outlet pipes
- riser section, top slab and/or transition (if required)
- frame and access cover

5.4.2 The precast concrete base shall be placed level at the specified grade. The entire base shall be in contact with the underlying compacted granular material. Subsequent sections, complete with oil resistant, watertight joint seals, shall be installed in accordance with the precast concrete manufacturer's recommendations.

5.4.3 Adjustment of the OGS stormwater quality treatment device can be performed by lifting the upper sections free of the excavated area, re-leveling the base, and re-installing the sections. Damaged sections and gaskets shall be repaired or replaced as necessary. Once the OGS stormwater quality treatment device has been constructed, any lift holes must be plugged with mortar.

5.5 DROP PIPE AND OIL INSPECTION PIPE

Once the upper precast concrete riser has been attached to the lower precast concrete riser section, the OGS device Drop Pipe and Oil Inspection Pipe must be attached, and watertight sealed to the fiberglass insert using Sikaflex 1a. Installation instructions and required materials shall be provided by the OGS manufacturer.

5.6 INLET AND OUTLET PIPES

Inlet and outlet pipes shall be securely set using grout or approved pipe seals (flexible boot connections, where applicable) so that the structure is watertight. Non-secure inlets and outlets will result in improper performance.

5.7 FRAME AND COVER OR FRAME AND GRATE INSTALLATION

Precast concrete adjustment units shall be installed to set the frame and cover/grate at the required elevation. The adjustment units shall be laid in a full bed of mortar with successive units being joined using sealant recommended by the manufacturer. Frames for the cover/grate should be set in a full bed of mortar at the elevation specified.

5.7.1 A minimum of one cover, at least 22-inch (560 mm) in diameter, shall be clearly embossed with the OGS device brand or product name to properly identify this asset's purpose is for stormwater quality treatment.