20 Ferndale Drive North
Proposed Development
Functional Service and
Stormwater Management Report

4/4/2021

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1.0 Introduction

The existing site is located in 20 Ferndale Drive North, in the City of Barrie. The existing site is an empty lot. The adjacent site of 18 Ferndale Drive North currently consists of a detached house with paved areas. Ferndale Drive North connects to Tiffin Street to the south.

The project site is shown in **Figure 1**.

Figure 1: Project Site – 18 and 20 Ferndale Drive North

The existing site will be developed as an Automotive Repair Establishment. The developed area is approximately 0.175 ha. The developed site will consist of a proposed 1-storey building with a footprint of 220 m^2, paved areas, and limited landscaped areas. The adjacent property of 18 Ferndale Drive North will also undergo development and the access road to the proposed site will be located in this property.

The report outlines the functional servicing and stormwater management (SWM) plan for the proposed development.

2.0 Sanitary Service

The proposed development is considered as a commercial development. Based on the City of Barrie guidelines, the average Commercial water consumption or usage is 28 m^3/ha/day, resulting in an average flow of 0.113 L/s. The average flow includes a peaking factor of 2.0.

Based on the City of Barrie guidelines, extraneous flow of 0.1 L/s/ha is used.

The final sanitary design flow for the site is 0.13 L/s.

Proposed sanitary sewer of 150 mm with 0.5% slope can be used to service the site. The proposed sanitary line to tie to the existing 250 mm PVC DR26 sanitary sewer along Ferndale Drive North.

Design calculations shown in **Appendix A**.

3.0 Water Service

The average water demand for a commercial site is 28 m^3/ha/day. The average water demand is 0.056 L/s. Based on the City of Barrie standards, the peak factors are:

- Maximum daily factor = 2.75
- Peak Hourly factor = 4.13

The minimum required fire flow for Commercial area is 283 L/s.

The final design water demand is (Maximum Daily + Fire Flow) or (Maximum Hourly), whichever is more.

Maximum Daily + Fire Flow = 0.056 x 2.75 + 283 = 283.16 L/s

Maximum Hourly = 0.056 x 4.13 = 0.234 L/s

The design water demand for the site is 283.16 L/s.

The site will be connected to the existing water main (WM) tie in at the property line, which ultimately connects to 400 mm PVC DR18 WM along Ferndale Drive North.

Design calculations shown in **Appendix B**.

4.0 Storm Service

4.1 Existing Condition

The existing site at 18 and 20 Ferndale Drive North consists of an empty lot (grassed) and a lot with a detached house. According to the Stormwater Drainage Plan (Sheet STM 2, City of Barrie 2014), the assigned runoff coefficient for the existing site is 0.54. Using the Barrie intensity-duration-frequency (IDF) curve parameters, the 5-year release rate for the site is 29 L/s.

4.2 SWM Criteria

According to the City of Barrie design standards (City of Barrie 2017), the applicable SWM criteria for the site include:

- Quantity Control: Control post-development flows to pre-development levels. 100-year post-development flows shall be controlled to existing 5-year level.
- Quality Control: Provide Enhanced level of control.
- Water Balance and Erosion Control: At minimum retain 5 mm rainfall on-site.

4.3 Proposed Condition

4.3.1 Quantity Control

In the proposed condition, the site will consist of a 1-storey automotive repair facility, parking areas, driveways and limited landscaped areas. The area-weighted runoff coefficient of the site is approximately 0.74. The proposed peak flows are higher than the existing condition. The proposed runoff coefficient is increased by 25% to 0.92, per City of Barrie design standards for the 100-year event.

Based on the Modified Rational Method, the required storage volume to control the 100-year proposed flow to the existing 5-year level is approximately 33 m^3. The storage volume will be provided by an underground storage tank and controlled by a 111 mm orifice plate, located in the control manhole (MH).

4.3.2 Quality Control

In the proposed condition, quality control for the site is provided by an EFO4 OGS.

4.3.3 Water Balance and Erosion Control

In the proposed condition, to retain 5 mm runoff on-site, around 9 m^3 storage is required. Initial abstraction of the site retains 3 m^3 of runoff. The remaining 6 m^3 of storage will be provided by an infiltration gallery located underneath the underground storage tank.

Design calculations shown in **Appendix C**.

5.0 Conclusion

The proposed site can be serviced by a new water main, sanitary sewer, and storm sewer system.

Appendix A

Sanitary Sewer Design

Sanitary Sewer Design

Commercial	28	m3/ha/day				
Peak Factor	2					
Design Flow	0.000113	m3/s				
	0.113426	L/s				
Extraneous	0.1	L/s/ha				
	0.0175	L/s				
SAN design flow	0.130926	L/s				
SAN sewer size (commercial)	250	mm	0.5% slope	Qcap	0.042	m3/s
					42	L/s

Appendix B

Water Main Design

Water Demand Analysis

Max daily + FF

Max Hourly

Avg	Commercial	28	m3/ha/day
		4.9	m3/day
		5.6713E-05	m3/s
		0.05671296	L/s
Peaking Factor	Table 3-1 and 3-3		
Maxm daily factor	2.75		
Peak hourly factor	4.13		
FF demand		283	L/s
Max daily + FF		0.28315596	m3/s
Max Hourly		0.00023422	m3/s

Max daily + FF	283.156 L/s
Max Hourly	0.234225 L/s

150mm dia WM @ 0.5% slope

Table 3-1: Peaking Factors

Population	Minimum rate factor (minimum hour)	Maximum day factor	Peak rate factor (peak hour)
500 - 1000	0.40	2.75	4.13
1001 - 2000	0.45	2.50	3.75
2001 - 3000	0.45	2.25	3.38
3001 - 10000	0.50	2.00	3.00
10001 - 25000	0.60	1.90	2.85
25001 - 50000	0.65	1.80	2.70
50001 - 75000	0.65	1.75	2.62
75001 -150000	0.70	1.65	2.48
greater than 150000	0.80	1.50	2.25

Fire Flow Requirements

Description	Minimum Required Fire Flow (L/s)[1]
Large Residential Lots [2]	70
Residential	100
Townhouse	155
Apartment	200
High Rise Residential / Downtown / Mixed Use	- [3]
Institutional	200
Commercial	283
Industrial	333

Appendix C

Stormwater Management Calculations

Drainage Assessment

Minor system 5yr

Tc 10 min

A m2 1750
A ha 0.175

Existing Condition

C 0.54 (city drainage area plan)

A ha	Runoff C	A	B	C	I5 mm/h	Q m3/s	Q L/s
0.175	0.54	853.608	4.699	0.766	108.9221	0.028592	28.59205

Proposed Condition

Area ha				Total
Asph	Build	Grass	Gravel	C
0.9	0.9	0.25	0.5	0.738533
0.109311	0.022217	0.043472	0	0.175

Table 3.1: Barrie WPCC IDF Curve Parameters - Adjusted to Account for Climate Change

Parameter	Return Period					
	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
A	678.085	853.608	975.865	1146.275	1236.152	1426.408
B	4.699	4.699	4.699	4.922	4.699	5.273
C	0.781	0.766	0.760	0.757	0.751	0.759

Existing

Tr yr	A	B	C	I mm/h	Q m3/s
2	678.085	4.699	0.781	83.106	0.021815
5	853.608	4.699	0.766	108.9221	0.028592
10	975.865	4.699	0.76	126.5468	0.033219
25	1146.275	4.922	0.757	148.15	0.038889
50	1236.152	4.699	0.751	164.2248	0.043109
100	1426.408	5.273	0.759	180.1545	0.047291

Proposed

Tr yr	A	B	C	I mm/h	Q m3/s	% inc
2	678.085	4.699	0.781	83.106	0.029836	36.76536
5	853.608	4.699	0.766	108.9221	0.039104	36.76536
10	975.865	4.699	0.76	126.5468	0.045431	36.76536
25	1146.275	4.922	0.757	148.15	0.053187	36.76536
50	1236.152	4.699	0.751	164.2248	0.058958	36.76536
100	1426.408	5.273	0.759	180.1545	0.064677	36.76536

Modified Rational Method

Proposed 100yr Event

Area A=	0.175	ha		
Runoff Coefficient C =	0.923			
AC=	0.162		IDF Values for 100-yr Storm	
Starting Time =	10	min	A=	1426.41
Time Increment =	1	min	B=	5.273
Release Rate =	29	l/s	C=	0.759
Max.Storage =	33	m^3		

Time (min)	Rainfall Intensity (mm/hr)	Storm Runoff (l/s)	Runoff Volume (m^3)	Released Volume (m^3)	Storage Volume (m^3)
10	180	81	49	17	31
11	172	77	51	19	32
12	164	74	53	21	32
13	157	71	55	22	33
14	151	68	57	24	33
15	145	65	59	26	33
16	140	63	60	27	33
17	135	61	62	29	33
18	131	59	63	31	33
19	127	57	65	33	32
20	123	55	66	34	32
21	119	54	68	36	32
22	116	52	69	38	31
23	113	51	70	39	31
24	110	49	71	41	30
25	107	48	72	43	29
26	105	47	73	45	29
27	102	46	74	46	28
28	100	45	75	48	27
29	98	44	76	50	26
30	95	43	77	51	26
31	93	42	78	53	25
32	92	41	79	55	24
33	90	40	80	57	23

Orifice Size Calculation

Invert =	233.71	m
Size =	111	mm
C =	0.62	
Obvert =	233.821	m

100 Year Water Level Elevation = 234.95 m

Area =	0.010	m^2
Head =	1.18	m
Design Flow =	**0.029**	m^3/s

Table 3.1: Barrie WPCC IDF Curve Parameters - Adjusted to Account for Climate Change

Parameter	Return Period					
	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
A	678.085	853.608	975.865	1146.275	1236.152	1426.408
B	4.699	4.699	4.699	4.922	4.699	5.273
C	0.781	0.766	0.760	0.757	0.751	0.759

User Inputs

Chamber Model:	SC-740
Outlet Control Structure:	Yes
Project Name:	Ferndale
Engineer:	N/A
Project Location:	Barrie
Measurement Type:	Metric
Required Storage Volume:	33.00 cubic meters.
Stone Porosity:	40%
Stone Foundation Depth:	152 mm.
Stone Above Chambers:	152 mm.
Average Cover Over Chambers:	457 mm.
Design Constraint Dimensions:	(5.00 m. x 16.00 m.)

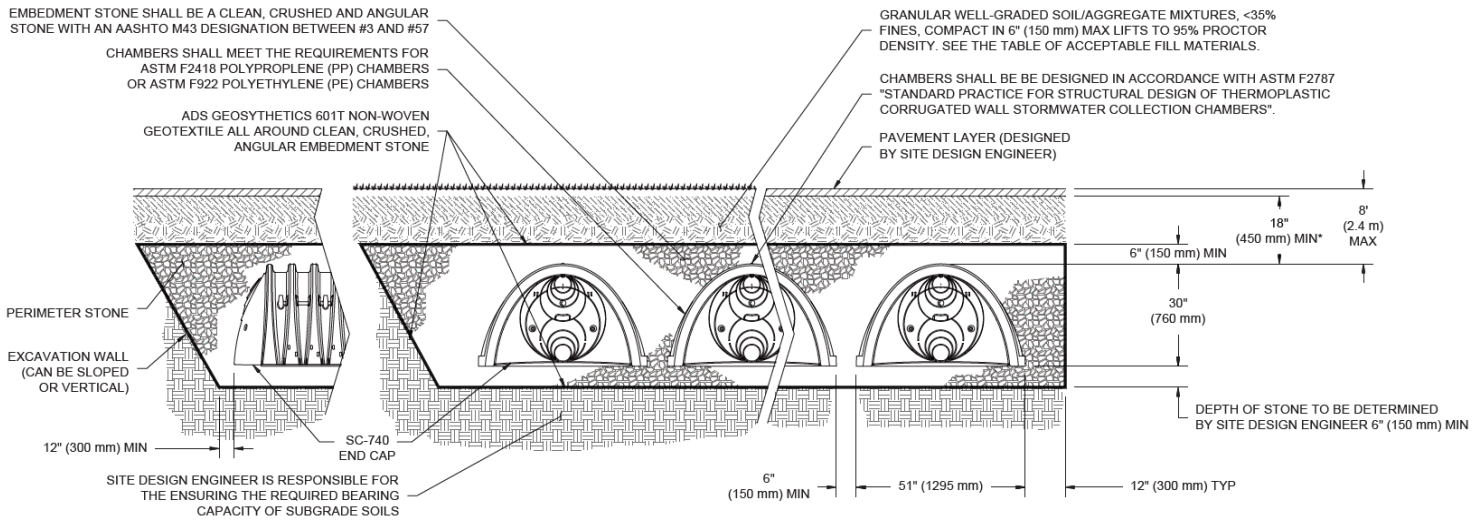
Results

System Volume and Bed Size

Installed Storage Volume:	37.35 cubic meters.
Storage Volume Per Chamber:	1.30 cubic meters.
Number Of Chambers Required:	14
Number Of End Caps Required:	6
Chamber Rows:	3
Maximum Length:	13.14 m.
Maximum Width:	4.98 m.
Approx. Bed Size Required:	61.95 square meters.

System Components

Amount Of Stone Required:	47.89 cubic meters
Volume Of Excavation (Not Including Fill):	66.09 cubic meters



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

Stormceptor®

Stormceptor® EF Sizing Report

STORMCEPTOR®
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

04/04/2021

Province:	Ontario
City:	Barrie
Nearest Rainfall Station:	BARRIE WPCC
NCDC Rainfall Station Id:	0557
Years of Rainfall Data:	36

Site Name:	20 Ferndale North Drive

Drainage Area (ha):	0.17
% Imperviousness:	76.00

Runoff Coefficient 'c': 0.75

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

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	4.45
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	
Site Sediment Transport Rate (kg/ha/yr):	

Project Name:	1234
Project Number:	44952
Designer Name:	xxx
Designer Company:	xxx
Designer Email:	xxx@gmail.com
Designer Phone:	647-xxxxxxx
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	87
EFO6	91
EFO8	92
EFO10	92
EFO12	92

Recommended Stormceptor EFO Model: EFO4

Estimated Net Annual Sediment (TSS) Load Reduction (%): 87

Water Quality Runoff Volume Capture (%): > 90

imbrium

THIRD-PARTY TESTING AND VERIFICATION

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

PERFORMANCE

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

PARTICLE SIZE DISTRIBUTION (PSD)

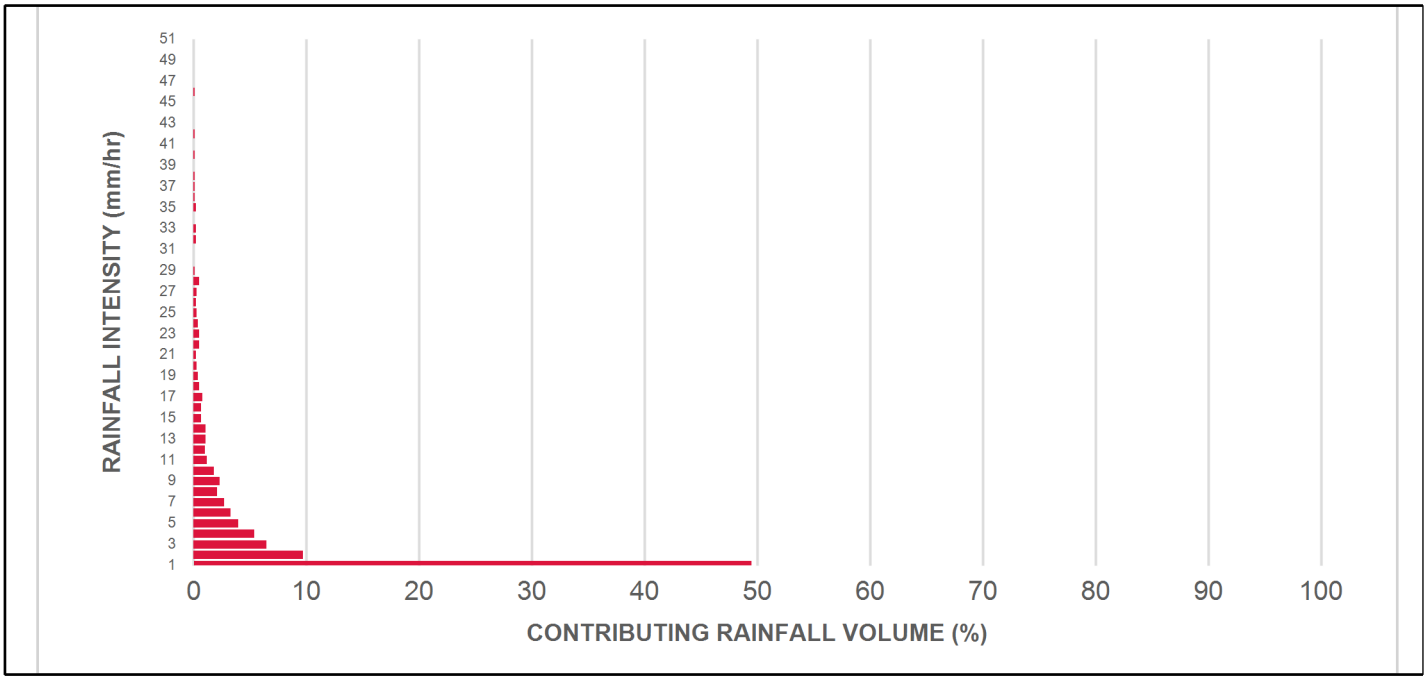
►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a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

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

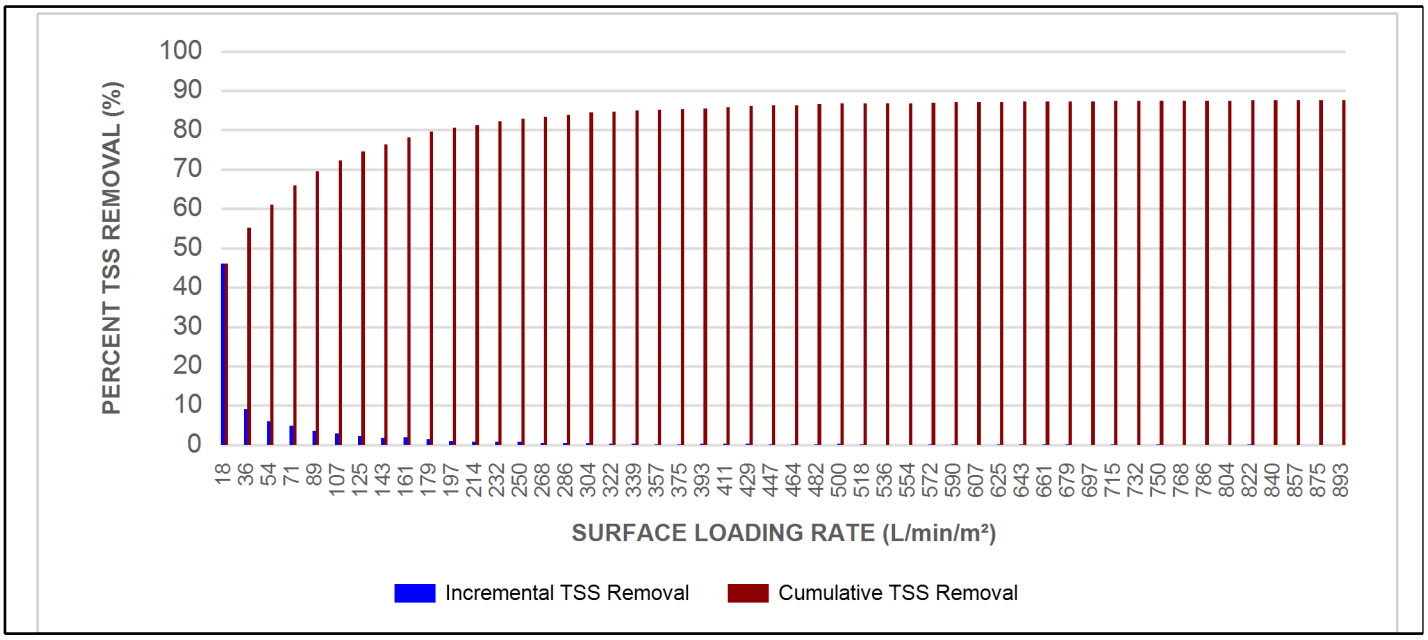
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
1	49.5	49.5	0.36	21.0	18.0	93	46.0	46.0
2	9.7	59.2	0.71	43.0	36.0	93	9.0	55.1
3	6.5	65.7	1.07	64.0	54.0	92	6.0	61.0
4	5.4	71.1	1.43	86.0	71.0	90	4.9	65.9
5	4.0	75.1	1.79	107.0	89.0	88	3.5	69.4
6	3.3	78.4	2.14	129.0	107.0	87	2.9	72.3
7	2.7	81.1	2.50	150.0	125.0	85	2.3	74.6
8	2.1	83.2	2.86	171.0	143.0	83	1.7	76.3
9	2.3	85.5	3.22	193.0	161.0	80	1.8	78.1
10	1.8	87.3	3.57	214.0	179.0	79	1.4	79.6
11	1.2	88.5	3.93	236.0	197.0	77	0.9	80.5
12	1.0	89.5	4.29	257.0	214.0	75	0.8	81.2
13	1.1	90.6	4.64	279.0	232.0	73	0.8	82.1
14	1.1	91.7	5.00	300.0	250.0	72	0.8	82.8
15	0.7	92.4	5.36	322.0	268.0	71	0.5	83.3
16	0.7	93.1	5.72	343.0	286.0	69	0.5	83.8
17	0.8	93.9	6.07	364.0	304.0	67	0.5	84.4
18	0.5	94.4	6.43	386.0	322.0	65	0.3	84.7
19	0.4	94.8	6.79	407.0	339.0	63	0.3	84.9
20	0.3	95.1	7.15	429.0	357.0	63	0.2	85.1
21	0.2	95.3	7.50	450.0	375.0	61	0.1	85.2
22	0.5	95.8	7.86	472.0	393.0	59	0.3	85.5
23	0.5	96.3	8.22	493.0	411.0	58	0.3	85.8
24	0.4	96.7	8.57	514.0	429.0	57	0.2	86.1
25	0.3	97.0	8.93	536.0	447.0	57	0.2	86.2

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	97.2	9.29	557.0	464.0	56	0.1	86.3
27	0.3	97.5	9.65	579.0	482.0	56	0.2	86.5
28	0.5	98.0	10.00	600.0	500.0	55	0.3	86.8
29	0.1	98.1	10.36	622.0	518.0	55	0.1	86.8
30	0.0	98.1	10.72	643.0	536.0	54	0.0	86.8
31	0.0	98.1	11.08	665.0	554.0	54	0.0	86.8
32	0.2	98.3	11.43	686.0	572.0	53	0.1	86.9
33	0.2	98.5	11.79	707.0	590.0	52	0.1	87.0
34	0.0	98.5	12.15	729.0	607.0	52	0.0	87.0
35	0.2	98.7	12.50	750.0	625.0	52	0.1	87.1
36	0.1	98.8	12.86	772.0	643.0	52	0.1	87.2
37	0.1	98.9	13.22	793.0	661.0	52	0.1	87.2
38	0.1	99.0	13.58	815.0	679.0	52	0.1	87.3
39	0.0	99.0	13.93	836.0	697.0	52	0.0	87.3
40	0.1	99.1	14.29	857.0	715.0	51	0.1	87.4
41	0.0	99.1	14.65	879.0	732.0	51	0.0	87.4
42	0.1	99.2	15.01	900.0	750.0	51	0.1	87.4
43	0.0	99.2	15.36	922.0	768.0	51	0.0	87.4
44	0.0	99.2	15.72	943.0	786.0	51	0.0	87.4
45	0.0	99.2	16.08	965.0	804.0	51	0.0	87.4
46	0.1	99.3	16.44	986.0	822.0	51	0.1	87.5
47	0.0	99.3	16.79	1008.0	840.0	51	0.0	87.5
48	0.0	99.3	17.15	1029.0	857.0	51	0.0	87.5
49	0.0	99.3	17.51	1050.0	875.0	51	0.0	87.5
50	0.0	99.3	17.86	1072.0	893.0	51	0.0	87.5
						Estimated Net Annual Sediment (TSS) Load Reduction =		**87 %**

RAINFALL DATA FROM BARRIE WPCC RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

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

SCOUR PREVENTION AND ONLINE CONFIGURATION

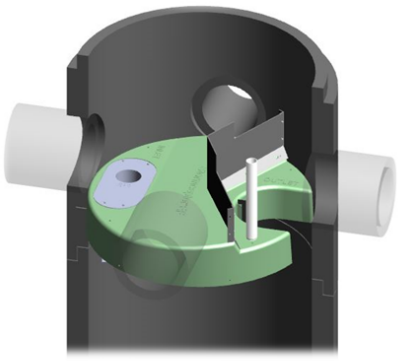
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test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

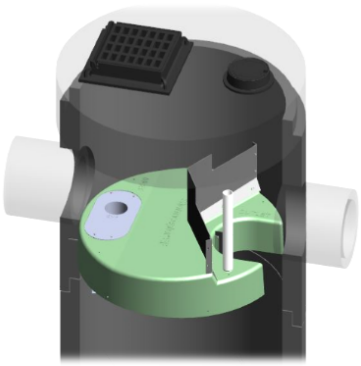
DESIGN FLEXIBILITY

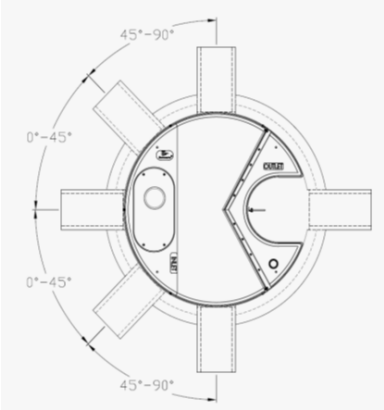
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend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

OIL CAPTURE AND RETENTION

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







INLET-TO-OUTLET DROP

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

HEAD LOSS

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

Pollutant Capacity

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

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

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

STANDARD STORMCEPTOR EF/EFO DRAWINGS

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

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

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

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

PART 1 – GENERAL

1.1 WORK INCLUDED

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

1.2 REFERENCE STANDARDS & PROCEDURES

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

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

1.3 SUBMITTALS

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

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

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

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

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

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

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

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

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

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing shall be determined using historical rainfall data and a sediment removal performance curve derived from the actual third-party verified laboratory testing data. The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

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

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

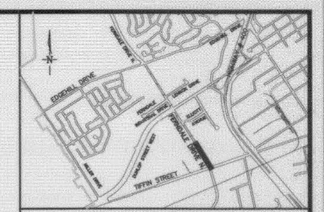
3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

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

3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m2 to 2600 L/min/m2) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.

THE INFORMATION PRESENTED HAS BEEN PREPARED FOR DEPARTMENT USE ONLY. THE CITY OF BARRIE, IT'S EMPLOYEES OR AGENTS, DO NOT UNDERTAKE TO GUARANTEE THE VALIDITY OF THE CONTENTS AND WILL NOT BE LIABLE FOR ANY CLAIMS FOR DAMAGES OR LOSS OF USE ARISING FROM THEIR APPLICATION OR INTERPRETATION, BY ANY PARTY.

FERNDALE DRIVE NORTH



TIFFIN STREET

DYMENT'S CREEK WATERSHED

HOTCHKISS CREEK WATERSHED

HIGH POINT 0+120

HIGH POINT 0+240

HIGH POINT 0+330

0.99 | ST3 | 0.54

0.84 | ST1 | 0.70

0.46 | ST4 | 0.61

0.90 | ST2 | 0.62

PROP. 50.4m–675mmø CONC. STM. @ 0.4%

PROP. 84.9m–675mmø CONC. STM. @ 0.4%

PROP. 45.3m–600mmø CONC. STM. @ 0.4%

PROP. 54.0m–450mmø CONC. STM. @ 0.4%

PROP. STORMWATER TREATMENT UNIT DDHT01667

PROP. DICB. DDHT01668

PROP. DCB. DDHT01669

PROP. CB. DDHT01689

PROP. STM.MH. DDHT01672

PROP. DCB. DDHT01670

PROP. DICB. DDHT01671

PROP. CB. DDHT01673

PROP. DICB. DDHT01674

PROP. DICB. DDHT01688

PROP. DCB. DDHT01675

PROP. STM.MH. DDHT01678

PROP. DCB. DDHT01676

PROP. DCB. DDHT01677

PROP. CB. DDHT01687

PROP. STM.MH. DDHT01680

PROP. CB. DDHT01679

PROP. DICB. DDHT01681

PROP. DICB. DDHT01690

PROP. CB. DDHT01682

PROP. DCB. DDHT01683

PROP. STM.MH. DDHT01684

PROP. DCB. DDHT01685

PROP. DICB. DDHT01686

#306 TIFFIN ST. HYDRO ONE

HYDRO ONE

#368 VACANT

#24 PLUMBTECH

#28 FERNDALE GARDENS

#38 INDUSTRIAL BUILDING

#42

#5 NORTH STAR MOTORS

#9 HAWG WORKS

#15 MIDHURST CLASSIC AUTO PARTS

#29 ALL SEASONS STORAGE

#33

#18

#21

#25

EX. STM. MH. DDHT00713

EX. STM. MH. DDHT00221

EX. STM. MH. DDHT00275

EX. DCB.

LIMIT OF CONSTRUCTION

SEE DRAWING STM3

LEGEND

- WATERSHED BOUNDARY
- CATCHMENT BOUNDARY
- HIGH–POINT / LOW POINT
- OVERLAND FLOW DIRECTION
- 0.23 / ST1 / 0.67 — CATCHMENT NUMBER; TOTAL AREA (ha); RUNOFF COEFFICIENT

GENERAL NOTES

REFER TO CURRENT CITY OF BARRIE STANDARDS FOR APPLICABLE GENERAL NOTES.

BENCH MARKS

DISTANCE NOTE
DISTANCES SHOWN HEREON ARE GROUND DISTANCES AND CAN BE CONVERTED TO GRID DISTANCES BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF: 0.9996884

BEARING NOTE
BEARINGS HEREON ARE GRID BEARINGS AND ARE REFERRED TO NAD 83 UTM ZONE 17 COORDINATES.

BENCH MARK 03120080038 (HORIZONTAL & VERTICAL)
ELEVATION: 234.946m – BRASS TABLET LOCATED ON THE SOUTHEAST CORNER OF FERNDALE DRIVE NORTH AND TIFFIN STREET. EASTING: 602444.371 NORTHING: 4913680.353. A PROTECTIVE WATER VALVE COVER HAS BEEN PLACED OVER MONUMENT CAP.

BENCH MARK 03120040048 (HORIZONTAL)
P.I.B. WITH BRASS CAP LOCATED ON THE NORTH SIDE OF TIFFIN STREET AT PATTERSON ROAD BETWEEN THE CURB LINE AND THE SIDEWALK AT THE END OF A HYDRO ANCHOR. EASTING: 602854.015 NORTHING: 4913637.896. A PROTECTIVE WATER VALVE COVER HAS BEEN PLACED OVER MONUMENT CAP.

BENCH MARK 03120080037 (HORIZONTAL & VERTICAL)
ELEVATION: 236.127m – BRASS TABLET LOCATED APPROXIMATELY 23m NORTH OF CENTRELINE OF DUNLOP STREET 0.5km WEST OF FERNDALE DRIVE. EASTING: 601554.803 NORTHING: 4914054.762. A PROTECTIVE WATER VALVE COVER HAS BEEN PLACED OVER MONUMENT CAP.

NO.	REVISIONS	DATE	APPROVED
1.	60% SUBMISSION	NOV/14	T.F.H.
2.	90% SUBMISSION	NOV/15	T.F.H.
3.	LSRCA SUBMISSION	NOV/15	T.F.H.
4.	100% SUBMISSION	FEB/16	T.F.H.
5.	ISSUED FOR TENDER	FEB/16	T.F.H.

LICENSED PROFESSIONAL ENGINEER T.M. Kaffanakos 100078028 Feb. 11/2016 PROVINCE OF ONTARIO

CITY OF BARRIE ACCEPTED DATE Feb 22, 2016 DIRECTOR OF ENGINEERING

FERNDALE DRIVE NORTH RECONSTRUCTION TIFFIN ST. TO DUNLOP ST.

STORMWATER DRAINAGE PLAN

The City of BARRIE
ENGINEERING DEPARTMENT

SCALE HOR. 1:500	VERT. N/A	CONTRACT NO.	2016-030T
DESIGN T.F.H.	DRAWN J.D.C.	SHEET NO.	STM2
REVIEWED S.L.F.	DATE 2014.01.23		

Plotted by: KMCDOWELL on February 19, 2016 at 8:56am
File: V:\2\30\engineering\submissions\2015-02-18 for Tender\CAD\2130681-STM.dwg Layout: STM2

2016-030-003