STORMWATER MANAGEMENT DESIGN BRIEF

Property located at 1195 Newmarket Street, Ottawa

N/Réf.: **14166**

RBQ : 8353-4917-04

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1.0 INTRODUCTION

The proposed warehouse and site alteration development is located at 1195 Newmarket Street, City of Ottawa, Ontario (see Figure 1). The subject 2,602 hectares development is in East Industrial of Ottawa, and bounded by Newmarket street to the south, a drainage swale to the west and a railway corridor to the north. There are Municipal sanitary and water services on Newmarket Street. The site drains to the swale that flows north.

This report provides overview of servicing and stormwater management plan required for the proposed development.

Figure 1 - Site Location and Surface Water Drainage

2.0 STORMWATER MANAGEMENT

The subject site is situated in the watershed of Cyrville Drain which joins Ottawa River East. The Rideau Valley Conservation Authority (RVCA) requires water quality and post-to-pre flow control. As the drainage swale within the property will not be altered, therefore the SWM plan focuses on the 2,494 ha development area.

The Rational Method is used to calculate the peak flows responding to design storms. The IDFparameters of design storms and calculation sheets are included in Appendix A.

2.1 PRE-DEVELOPMENT CONDITIONS

The land use of the pre-development site consists of a warehouse building, asphalt parking area, a storage shed at the north, gravel pavement area for storage and a swale at the east boundary.

The site sheet flows from north and south to the middle low area to the east swale. The swale flows northwest to the culvert under the railway track to the north.

The site weighted runoff coefficient is tabulated in Table 1. The City of Ottawa Sewer Design Guidelines (October 2012) requires the pre-development condition be determined using the lesser of a runoff coefficient of 0.5 or the actual existing site runoff coefficient. Therefore, the pre-development flow, which the post-development flow is to match, is calculated using a runoff coefficient of 0.5 (see Table 2).

Table 1: Pre-development Land Use Breakdown and Runoff Coefficient

Drainage	Surface	Area (ha)	Runoff Coefficient	Imp
To Swale	Building	0.246	0.9	100%
	Asphalt	0.271	0.9	100%
	Storage shed	0.057	0.9	100%
	Gravel	1.828	0.7	77%
	Grassed	0.09	0.25	0%
Development Area		**2.492**	**0.73**	**80%**
Swale in property		0.110		
Entire Site		2.602		

Table 2 Pre-development flow based on a runoff coefficient of 0.5

Return Period (years)	**Intensity** (mm/hr)	**Runoff Coefficient**	**Peak Flow** (L/s)
2	76.8	0.5	266.0
5	104.2	0.5	360.9
100	178.6	0.5	618.15

2.2 POST-DEVELOPMENT CONDITIONS

The proposed development consists of a warehouse building, paved parking areas and driveway and vegetative landscape areas. The swale segment within the property will remain unchanged.

Refer to Figure 3, the development is divided into three drainage catchments based on flow outlets. Table 2 shows the land use and the overall runoff coefficient of the proposed development. The post-development flow is shown in Table 3. The stormwater peak flows of post-development site are greater than the existing condition. Therefore, peak flow attenuation is required.

Table 2: Post-development Land Use and Drainage Plan

Catchment	**Outlet**	**Surface**	**Area (ha)**	**Runoff Coefficient**	**Imp**
A1	Swale	Warehouse Rooftop	1.073	0.9	100%
A2	Storm sewer and OGS	Asphalt Surface	1.224	0.9	100%
A3	Ditch	Soft Landscaped	0.195	0.32	5%
		Total	**2.492**	**0.85**	**93%**

Table 3: **Comparison of Peak Flows between Pre- and Post-Development**

Storm Return Period (Year)	**Intensity** (mm/hr)	**Catchment A1**		**Catchment A2**		**Catchment A3**		**TOTAL SITE FLOW** (L/s)
		Runoff Coefficient	Peak Flow (L/s)	Runoff Coefficient	Peak Flow (L/s)	Runoff Coefficient	Peak Flow (L/s)	
2	76.8	0.9	214.3	0.9	226.8	0.32	13.5	454.5
5	104.2	0.9	290.7	0.9	307.6	0.32	18.3	616.5
100	178.6	1.0	553.5	1.0	585.7	0.40	39.1	1178.3

*Note: *- runoff coefficient increase factor 1.25 applied to the 100-year storm*

2.3 STORMWATER MANAGEMENT (SWM) PLAN

The stormwater runoff from landscaped areas (catchment A3) will sheet flow into the existing roadside ditch. Roof top (catchment A1) stormwater discharge will be restricted prior to discharge to the west side swale. A storm sewer system will be installed to capture runoff from paved area (catchment A2) and outlet to the swale. The catchment delineation is shown in Figure 2.

2.3.1 Water Quality Control

The existing site has no water quality measure. The RVCA requires the site provides water quality treatment prior to discharge from the site. As the receiving swale contains no fish habitat and is a green infrastructure, it is considered as part of water quality treatment train for the development. The site pavement area is the main sediment load spot. Stormwater from rooftop and landscaped area is essentially uncontaminated and through ditch and swale, therefore water quality treatment is considered not necessary.

Runoff from pavement (catchment Area 2) will be captured and flow through an oil-grit separator, which is sized to provide 90% annual runoff treatment and 87% TSS removal prior to discharge to the swale. The sizing brief of OGS – Stormceptor EF06 is included in Appendix B. The OGS is to be installed at the crossing point of the sewer lines. The Owner should conduct the necessary inspection and maintenance as included in the product manual to ensure the OGS long term operational effectiveness.

2.3.2 Water Quantity Control

Roof drains will be installed at the warehouse building (Catchment A1) to restrict rooftop storm discharge rate prior to the ditch. The storm runoff from Catchments A2 and A3 will flow uncontrolled. The target is to control the site post-development flows to match the allowed release rate shown on Table 2.

Zurn® Z-150 Control-Flo roof drain is selected to control outflow to the ditch. It proposes nine (9) roof drains and nineteen 19 notches (2 notches with each eight drains and 3 notches with the other drain) be installed at deal level roof. The maximum release rate is 27.4 L/s with a water ponding depth of 58mm. The required water ponding volume on rooftop is calculated using the Modified Rational Method (see Appendix A). The details of roof drain control is tabulated in Table 4. Based on a conservative assumption that only 85% of total roof area would be used for water pooling, the available rooftop storage volume is 550m3 at a water depth of 0.058m. Therefore, the 1.115ha dead level rooftop can provide sufficient water detention storage.

Table 4: Details of roof drain

TYPE	Number of device	Total Notches	Max Flow Rate (L/s)	Storm	Water Depth (mm)	Release rate (L/s)	Volume (m3)
Zurn Z-150 Control Flo	9	19	27.4	2 year	25.4	12.0	225
				5 year	34.5	16.3	319
				100 year	58	27.4	541

The site total post-development flow is shown on Table 5. Note, the table shows a conservative result from the sum of uncontrolled peak flow and controlled peak flow. Although it shows the 100-year post-development flow is 5% larger than the allowed rate, it is not the real condition due to the effect of flow detention at rooftop. This is our professional opinion that additional flow control is not necessary.

Table 4: Post- development Flow with SWM Plan

Storm Return Period (Year)	Peak Flow Rate (L/s)				Flow Change
	Existing (target)	Post-Development			
	Site Total	Uncontrolled Area 2 & 3	Controlled Area 1	Site Total	
2	266.0	240.2	12.0	252.2	-5%
5	360.9	325.9	16.3	342.2	-5%
100	618.5	624.9	27.4	652.3	+5%

Stormwater calculation details are included in Appendix A..

3.0 OTHER PROPOSED WORK

3.1 GRADING

The objective of grading design is to direct the stormwater runoff into the storm sewers and achieve the minimum and maximum slopes in the grading of the asphalt surfaces. This will ensure the surface not only drains as per the design, but is not too steep. The grading of the site also ensures that the storm water flow will mostly drain through the onsite drainage system for storm water quality control.

3.2 DRAINAGE

The proposed storm sewer is sized to capture stormwater runoff from a 5-year storm. The drainage system requires 129.5 meters Ø300mm, 234.6 meters Ø375mm and 87.5 meters Ø450mm of solid main storm sewer, four (4) precast catch basin, two (2) precast catch basin maintenance hole, one (1) oil/grit separator (See Figure 3).

Storm Sewer Design Sheet is included in Appendix B.

3.3 EROSION AND SEDIMENT CONTROL DURING CONSTRUCTION

The proposed construction of the warehouse is located at 1195 Newmarket Street, Ottawa, ON. The site sheet flow drains into the municipal ditch at the West side of the site. An erosion and sediment control (ECA) plan during the construction has been prepared to prevent sediment migration to the existing conveyance system.

- The construction activities will be within the property boundary, and the proposed accesses to Newmarket Street will be paved 10-meter length, 9.5-meter width and 0.3-meter depth clear stone as mud-mat at construction entrance.
- Install silt fence along the outer boundary of the property to ensure that sediment will not be migrated to the adjacent properties.
- Place clear stone to cover the proposed catchbasins and maintenance holes and use woven geotextile to wrap grant.

- Clean sediment and remove debris at sediment control areas prior to completion of daily work, if there areany near the property due to the construction.
- All erosion and sediment control devices should be inspected minimum weekly and after every rainfall, maintained and cleaned as required.
- Stabilize all disturbed or grassed areas to minimize the opportunity for erosion.

All the above noted measures /devices must be installed prior to the commencement of excavation and maintained throughout the construction process, until all the landscaping is completed.

The developer and/or his contractor shall be responsible for any costs incurred during the remediation of problem areas to the satisfaction of the RVCA.

APPENDICES

APPENDIX I

- Peak Flow Rates Calculation-Rational Method

APPENDIX A-1
Project 1195 Newmarket Street, City of Ottawa

Peak Flow Rates Calculation--Rational Method

Based on Rational Method, peak flow rates are calculated:

$$Q = 2.78CIA$$

Where: Q=Peak Flow Rate in L/s
C=Runoff Coefficient
I=Rainfall Intensity in mm/hr
A=Drainge Area in ha

City of Ottawa
Intensity-Duration-Frequency (IDF), based on Ottawa Sewer Design Guidelines Section 5.4.2

$I=A/(T+B)^C$
where: I=Rainfall Intensity in mm/hr
T=Time of Concentration in hours--use inlet time of 10 min
A, B,C=Rainfall parameters

Return Period (Years)	A	B	C
2	732.951	6.199	0.810
5	998.071	6.053	0.814
100	1735.688	6.014	0.820

Peak Flow Rates under Existing Condition

A= 2.492 ha

Return Period (Years)	Intensity (mm/hr)	Runoff Coefficient	Peak Flow (L/s)
2	76.8	0.5	266.0
5	104.2	0.5	360.9
100	178.6	0.5	618.5

Peak Flow Rates under Post-development Conditions

A= 1.115 ha ROOF

Return Period (Years)	Intensity (mm/hr)	Runoff Coefficient	Peak Flow (L/s)
2	76.8	0.9	214.3
5	104.2	0.9	290.7
100	178.6	1.0	553.5

A= 1.180 ha PAVED

Return Period (Years)	Intensity (mm/hr)	Runoff Coefficient	Peak Flow (L/s)
2	76.8	0.9	226.8
5	104.2	0.9	307.6
100	178.6	1.0	585.7

A= 0.197 ha GRASS

Return Period (Years)	Intensity (mm/hr)	Runoff Coefficient	Peak Flow (L/s)
2	76.8	0.32	13.5
5	104.2	0.32	18.3
100	178.6	0.40	39.1

Note: *Runoff coefficient increase factor 1.25 is applied; the maximum is 1.0.*

APPENDIX II

- SWM Basin Stage-Storage-Discharge Curve

APPENDIX A-2

Project 1195 Newmarket Street, City of Ottawa

In accordance with City of Ottawa Sewer Design Guidelines Section 8.3.10.3

Modified Rational Method 100-year Storage Requirement

Area	1.1150	ha
Runoff Coefficient	1.00	
Allowable Discharge Rate	27.4	l/s

Time	Rainfall Intensity	Peak Flow Rate	Release Rate	Storage Rate	Storage Required
(min.)	(mm/hr)	(L/s)	(L/s)	(L/s)	(m^3)
10	178.56	553.48	27.40	526.08	315.65
20	119.95	371.81	27.40	344.41	413.29
30	91.87	284.76	27.40	257.36	463.25
40	75.15	232.93	27.40	205.53	493.27
50	63.95	198.24	27.40	170.84	512.52
60	55.89	173.26	27.40	145.86	525.08
70	49.79	154.33	27.40	126.93	533.12
80	44.99	139.46	27.40	112.06	537.88
90	41.11	127.43	27.40	100.03	540.17
100	37.90	117.49	27.40	90.09	540.53
110	35.20	109.12	27.40	81.72	539.33
120	32.89	101.96	27.40	74.56	536.86
130	30.90	95.78	27.40	68.38	533.33
140	29.15	90.36	27.40	62.96	528.88
		Maximum Storage Required:			**540.53** m3

APPENDIX III

- Modified Rational Method – 100-5-2-year Storage Requirement

APPENDIX A-3

Project **1195 Newmarket Street, City of Ottawa**

In accordance with City of Ottawa Sewer Design Guidelines Section 8.3.10.3

Modified Rational Method 5-year Storage Requirement

Area	1.1150	ha
Runoff Coefficient	0.90	
Allowable Discharge Rate	16.3	l/s

Time	Rainfall Intensity	Peak Flow Rate	Release Rate	Storage Rate	Storage Required
(min.)	(mm/hr)	(L/s)	(L/s)	(L/s)	(m^3)
10	104.19	322.97	16.30	306.67	184.00
20	70.25	217.76	16.30	201.46	241.75
30	53.93	167.16	16.30	150.86	271.55
40	44.18	136.96	16.30	120.66	289.58
50	37.65	116.71	16.30	100.41	301.24
60	32.94	102.11	16.30	85.81	308.93
70	29.37	91.04	16.30	74.74	313.93
80	26.56	82.33	16.30	66.03	316.97
90	24.29	75.29	16.30	58.99	318.53
100	22.41	69.46	16.30	53.16	318.93
110	20.82	64.54	16.30	48.24	318.41

Maximum Storage Required: **318.53** m3

APPENDIX IV

- Warehouse Development Stormceptor Sizing

APPENDIX A-4

Project **1195 Newmarket Street, City of Ottawa**

In accordance with City of Ottawa Sewer Design Guidelines Section 8.3.10.3

Modified Rational Method 2-year Storage Requirement

Area	1.1150	ha
Runoff Coefficient	0.90	
Allowable Discharge Rate	12.0	l/s

Time	Rainfall Intensity	Peak Flow Rate	Release Rate	Storage Rate	Storage Required
(min.)	(mm/hr)	(L/s)	(L/s)	(L/s)	(m^3)
10	76.81	238.07	12.00	226.07	135.64
20	52.03	161.28	12.00	149.28	179.14
30	40.04	124.12	12.00	112.12	201.82
40	32.86	101.87	12.00	89.87	215.69
50	28.04	86.92	12.00	74.92	224.76
60	24.56	76.12	12.00	64.12	230.84
70	21.91	67.92	12.00	55.92	234.88
80	19.83	61.47	12.00	49.47	237.44
90	18.14	56.24	12.00	44.24	238.88
100	16.75	51.91	12.00	39.91	239.45
110	15.57	48.26	12.00	36.26	239.31

Maximum Storage Required: **224.76** m3

STORMCEPTOR®

ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

07/16/2021

Province:	Ontario
City:	Ottawa
Nearest Rainfall Station:	OTTAWA MACDONALD-CARTIER INT'L AP
NCDC Rainfall Station Id:	6000
Years of Rainfall Data:	37
Site Name:	
Drainage Area (ha):	1.224
Runoff Coefficient 'c':	0.90
Particle Size Distribution:	OK-110
Target TSS Removal (%):	80.0
Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	39.81
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:	Warehouse Development
Project Number:	
Designer Name:	
Designer Company:	
Designer Email:	
Designer Phone:	
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	76
EFO6	87
EFO8	93
EFO10	96
EFO12	98

Recommended Stormceptor EFO Model: EFO6

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

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)

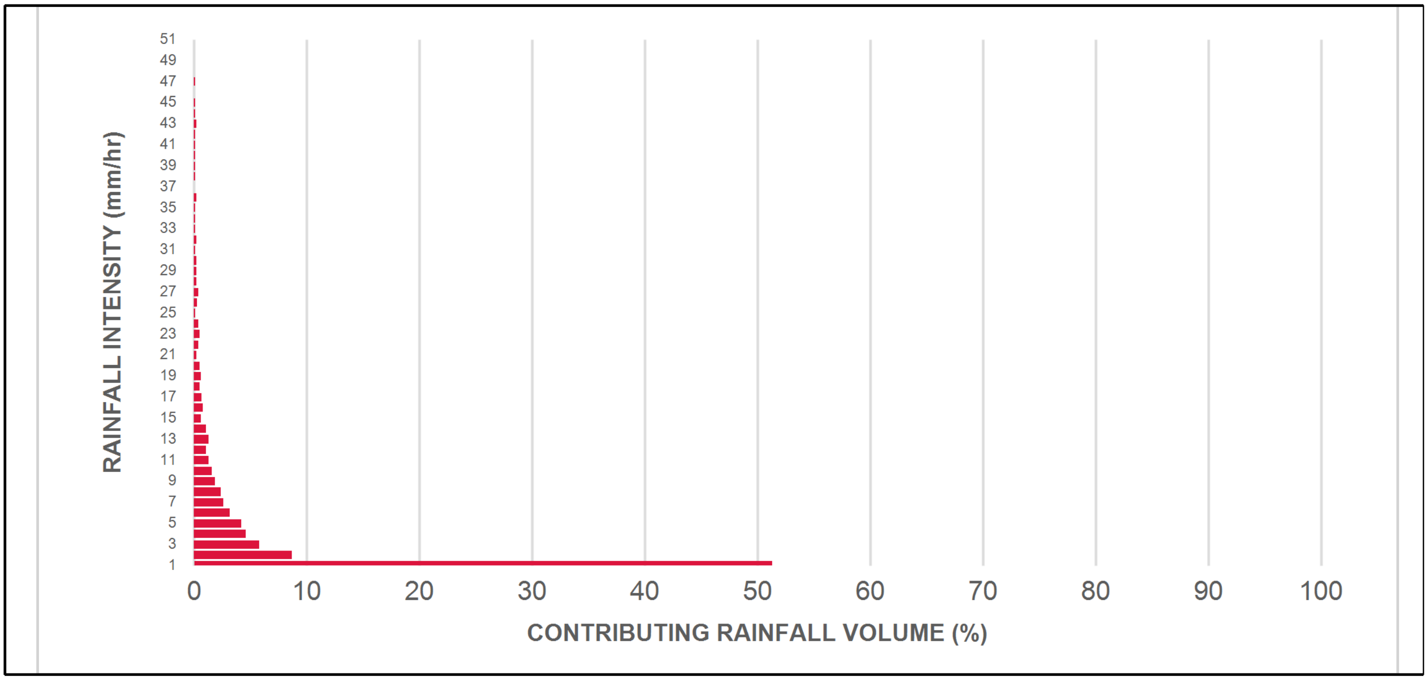
►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a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

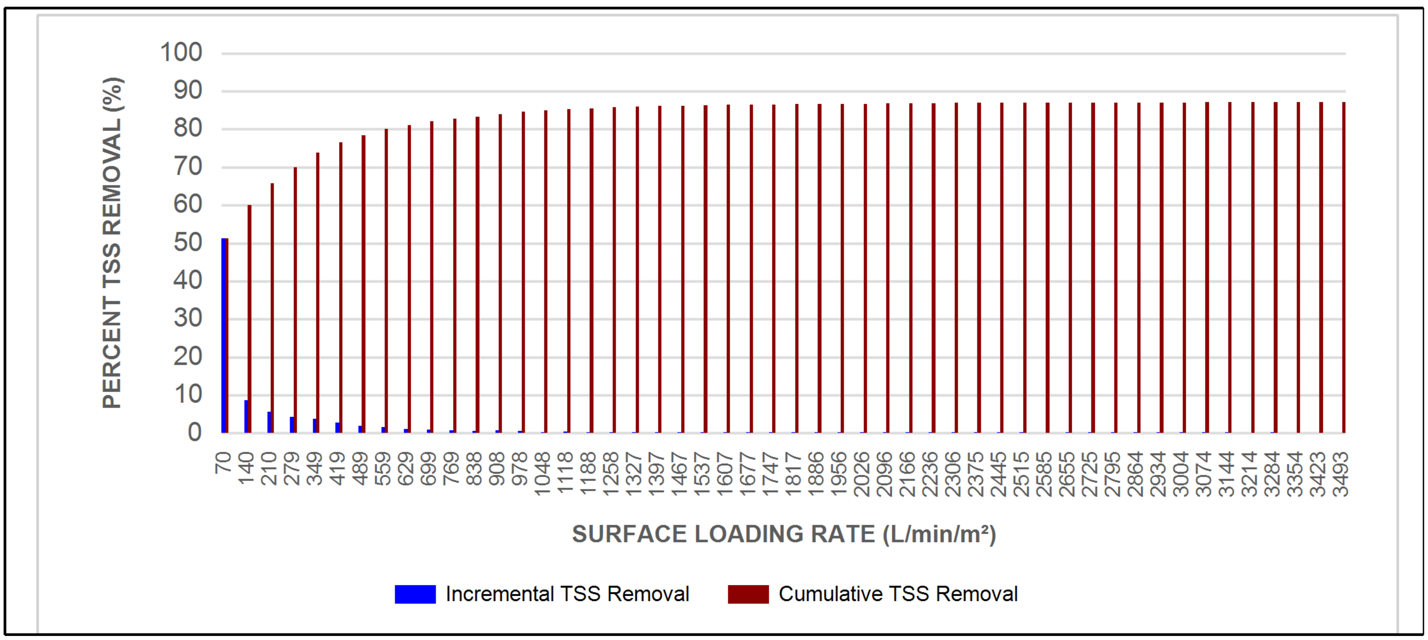
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
1	51.3	51.3	3.06	184.0	70.0	100	51.3	51.3
2	8.7	60.0	6.12	367.0	140.0	100	8.7	60.0
3	5.8	65.8	9.19	551.0	210.0	98	5.7	65.7
4	4.6	70.4	12.25	735.0	279.0	94	4.3	70.0
5	4.2	74.6	15.31	919.0	349.0	90	3.8	73.8
6	3.2	77.8	18.37	1102.0	419.0	84	2.7	76.5
7	2.6	80.4	21.44	1286.0	489.0	74	1.9	78.4
8	2.4	82.8	24.50	1470.0	559.0	66	1.6	80.0
9	1.9	84.7	27.56	1654.0	629.0	59	1.1	81.1
10	1.6	86.3	30.62	1837.0	699.0	57	0.9	82.0
11	1.3	87.6	33.69	2021.0	769.0	55	0.7	82.7
12	1.1	88.7	36.75	2205.0	838.0	54	0.6	83.3
13	1.3	90.0	39.81	2389.0	908.0	52	0.7	84.0
14	1.1	91.1	42.87	2572.0	978.0	51	0.6	84.6
15	0.6	91.7	45.94	2756.0	1048.0	48	0.3	84.9
16	0.8	92.5	49.00	2940.0	1118.0	45	0.4	85.2
17	0.7	93.2	52.06	3124.0	1188.0	41	0.3	85.5
18	0.5	93.7	55.12	3307.0	1258.0	38	0.2	85.7
19	0.6	94.3	58.19	3491.0	1327.0	35	0.2	85.9
20	0.5	94.8	61.25	3675.0	1397.0	31	0.2	86.1
21	0.2	95.0	64.31	3859.0	1467.0	30	0.1	86.1
22	0.4	95.4	67.37	4042.0	1537.0	28	0.1	86.2
23	0.5	95.9	70.44	4226.0	1607.0	27	0.1	86.4
24	0.4	96.3	73.50	4410.0	1677.0	26	0.1	86.5
25	0.1	96.4	76.56	4594.0	1747.0	25	0.0	86.5

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 (%)
26	0.3	96.7	79.62	4777.0	1817.0	24	0.1	86.6
27	0.4	97.1	82.69	4961.0	1886.0	23	0.1	86.7
28	0.2	97.3	85.75	5145.0	1956.0	22	0.0	86.7
29	0.2	97.5	88.81	5329.0	2026.0	21	0.0	86.7
30	0.2	97.7	91.87	5512.0	2096.0	21	0.0	86.8
31	0.1	97.8	94.94	5696.0	2166.0	20	0.0	86.8
32	0.2	98.0	98.00	5880.0	2236.0	19	0.0	86.8
33	0.1	98.1	101.06	6064.0	2306.0	19	0.0	86.9
34	0.1	98.2	104.12	6247.0	2375.0	18	0.0	86.9
35	0.1	98.3	107.19	6431.0	2445.0	18	0.0	86.9
36	0.2	98.5	110.25	6615.0	2515.0	17	0.0	86.9
37	0.0	98.5	113.31	6799.0	2585.0	17	0.0	86.9
38	0.1	98.6	116.37	6982.0	2655.0	17	0.0	87.0
39	0.1	98.7	119.44	7166.0	2725.0	16	0.0	87.0
40	0.1	98.8	122.50	7350.0	2795.0	16	0.0	87.0
41	0.1	98.9	125.56	7534.0	2864.0	16	0.0	87.0
42	0.1	99.0	128.62	7717.0	2934.0	15	0.0	87.0
43	0.2	99.2	131.69	7901.0	3004.0	14	0.0	87.0
44	0.1	99.3	134.75	8085.0	3074.0	14	0.0	87.1
45	0.1	99.4	137.81	8269.0	3144.0	14	0.0	87.1
46	0.0	99.4	140.87	8452.0	3214.0	14	0.0	87.1
47	0.1	99.5	143.94	8636.0	3284.0	14	0.0	87.1
48	0.0	99.5	147.00	8820.0	3354.0	13	0.0	87.1
49	0.0	99.5	150.06	9004.0	3423.0	13	0.0	87.1
50	0.0	99.5	153.12	9187.0	3493.0	13	0.0	87.1
Estimated Net Annual Sediment (TSS) Load Reduction =								**87 %**

RAINFALL DATA FROM OTTAWA MACDONALD-CARTIER INT'L AP 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

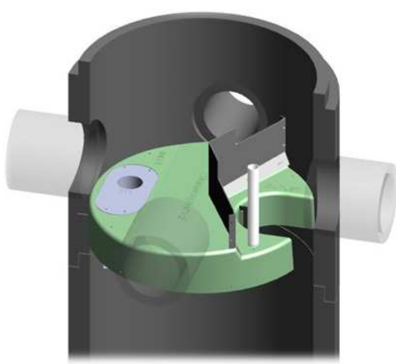
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test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

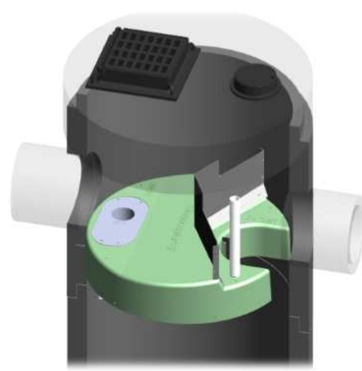
DESIGN FLEXIBILITY

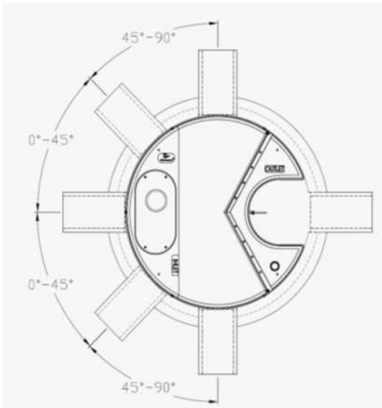
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend 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)	(ft³)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity

** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft³)

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

STANDARD STORMCEPTOR EF/EFO DRAWINGS

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

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

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

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.

APPENDIX V

- ❖ Storm Sewer Calculation Sheet (Rational Method)

Appendix C

Storm Sewer Calculation Sheet (Rational Method)

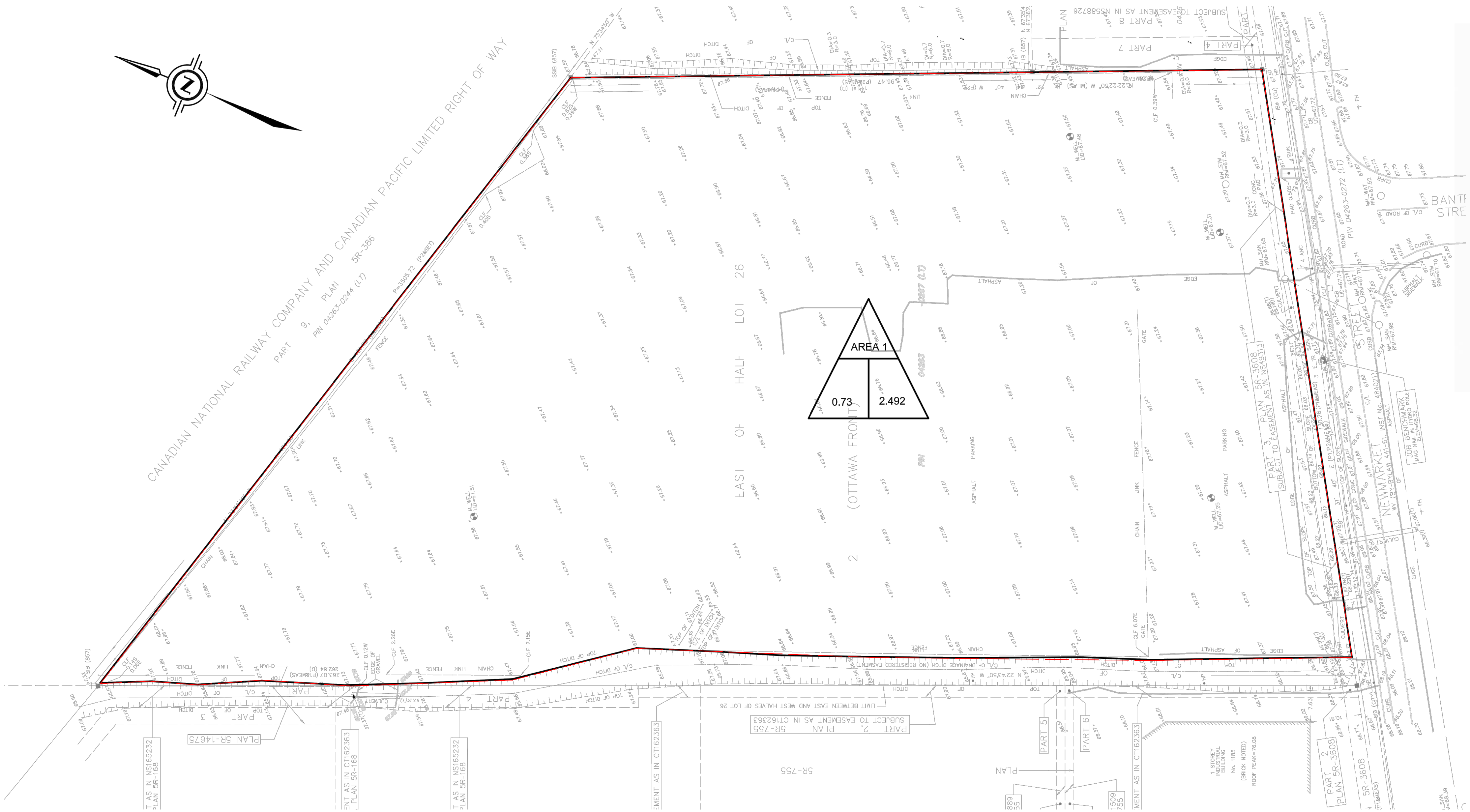
Manning's=0.013 Return Frequency = 5 years

Location			Area (ha)			Flow					Sewer Data									
Location	From Node	To Node	R=0.25	R=0.6	R=0.9	Indiv. 2.78AC	Accum. 2.78AC	Time of Conc.	Rainfall Intensity	Peak Flow Q(l/s)	Dia.(mm) (actual)	Dia.(mm) (nominal)	Type	Slope (%)	Length (m)	Capacity (l/s)	Velocity (m/s)	Time of Flow (min.)	Ratio Q/Q full
	CB1	CB2			0.038	0.095	0.095	10.00	104.19	9.91	305	300	PVC	0.5	67.5	141.66	0.97	1.16	0.070
	CB2	CBMH1			0.1153	0.288	0.384	11.16	98.42	37.75	381	375	PVC	0.3	62.4	99.13	0.87	1.20	0.381
	CBMH1	CBMH2			0.1182	0.296	0.679	12.36	93.18	63.30	381	375	PVC	0.3	59.1	99.13	0.87	1.13	0.639
	CBMH2	OGS			0.0538	0.135	0.814	13.49	88.76	72.24	381	375	PVC	0.3	51.1	99.13	0.87	0.98	0.729
	CB3	CB4			0.2369	0.593	0.593	10.00	104.19	61.76	305	300	PVC	0.3	62.0	109.73	0.75	1.38	0.563
	CB4	OGS			0.2045	0.512	1.104	11.38	97.43	107.60	457	450	PVC	0.3	62.0	161.20	0.98	1.05	0.668
	OGS	OUTLET			0.4382	1.096	3.015	14.47	85.30	257.15	533	525	PVC	0.5	51.0	313.91	1.40	0.60	0.819

*This table is extracted from the Appendix 5B of Ottawa Sewer Design Guidelines

APPENDIX VI

- ❖ Pre-development Catchment Area Plan



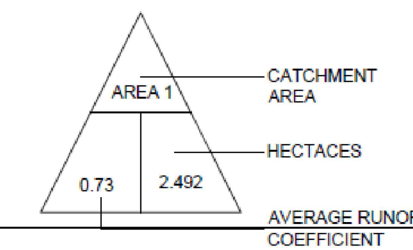
PRE-DEVELOPMENT CATCHMENT AREA PLAN

0 5 10 20 30 40 50 m

Legend

- Property limit

- Existing building



ORTAM groupe

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Project

1195 NEWMARKET STREET

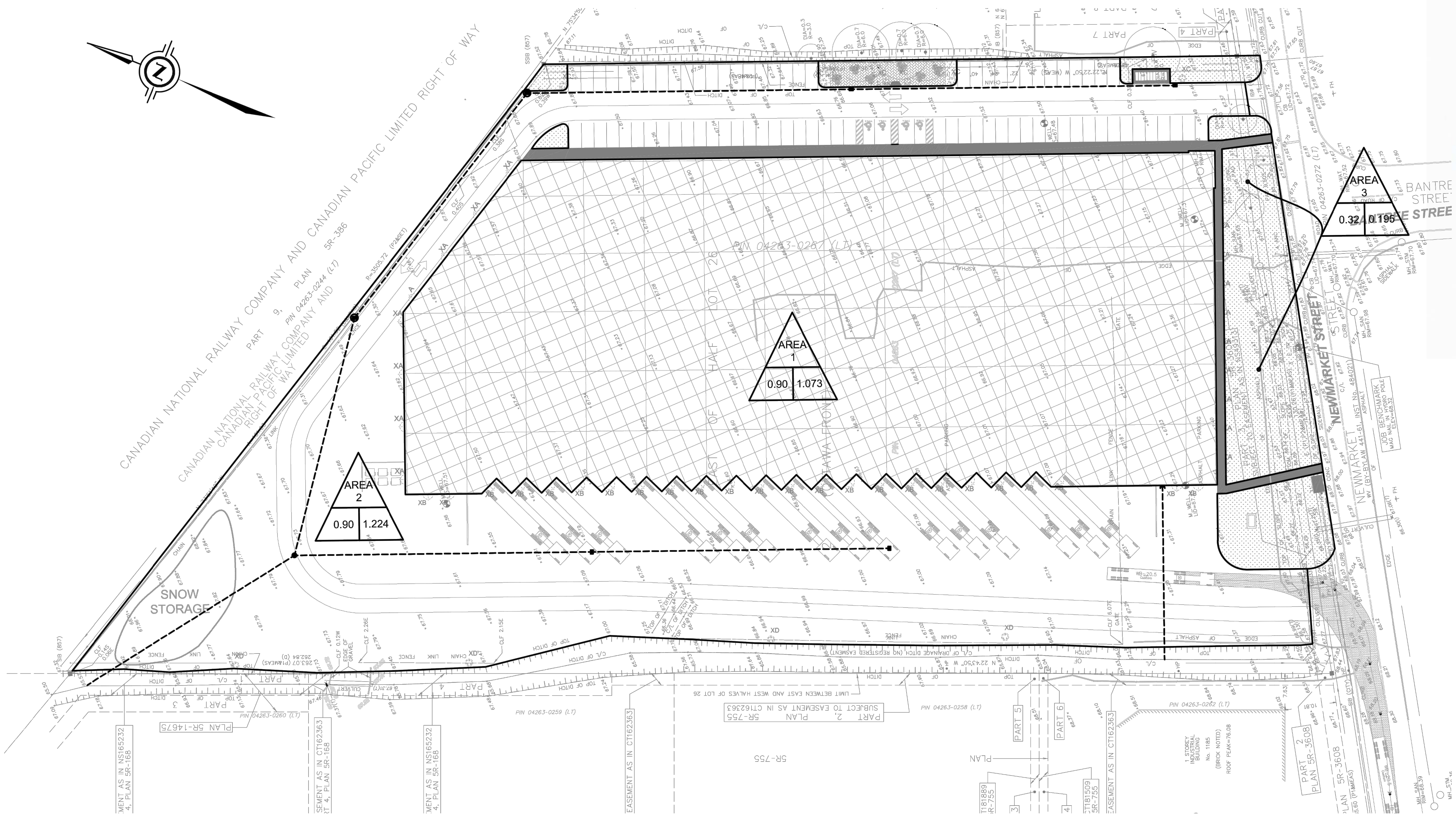
Property located at 1195 NEWMARKET STREET
OTTAWA, ONTARIO

Client

NOM CLIENT
xxx, Montreal, Quebec

Prepared :	P. Fhima Eng.	O/Ref.:	18551
Drawing :	H.Sun	File name :	D0 -12-21-0114
Verified :	P. Fhima Eng.	Date :	10-25-2021
Accepted :	P. Fhima Eng.	Scale :	1 : 1000

Drawing title	Figure
PRE-DEVELOPMENT CATCHMENT AREA PLAN	**1**



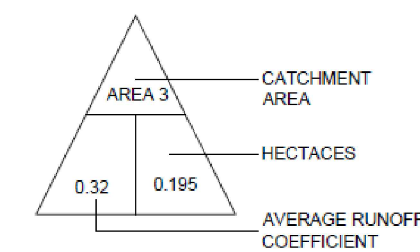
POST DEVELOPMENT CATCHMENTS AREA PLAN

0 5 10 20 30 40 50 m

Legend

- Property limit

- Existing building



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Drawing title

PRE-DEVELOPMENT CATCHMENT AREA PLAN

Figure

2