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PROFESSIONAL ENGINEERS & PROJECT MANAGERS

STORMWATER MANAGEMENT REPORT

PROPOSED STACKED TOWNHOUSE DEVELOPMENT

13656 EMIL KOLB PARKWAY
CALEDON, ONTARIO

AUG 23, 2021

SPA 2021-0077

SOSCIA PROJECT # 20-007

10376 Yonge Street - Suite 307 - Richmond Hill - Ontario - L4C 3B8 - T:905-237-5410 - F:905-237-5413 - E:ssoscia@sosciaeng.ca

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APPENDIX

10376 Yonge Street - Suite 307 - Richmond Hill - Ontario - L4C 3B8 - T:905-237-5410 - F:905-237-5413 - E:ssoscia@sosciaeng.ca

1.0 DESIGN CRITERIA

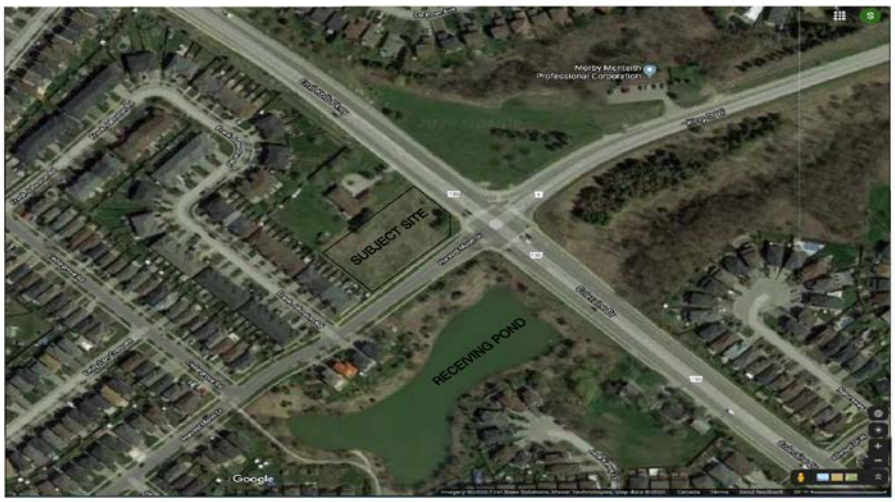
In accordance with the Town of Caledon storm water management policies, the storm water management plan of this site is premised on controlling the 100 yr post-development flows to an allowable release rate of 180 litres/ha/sec. This will be achieved by a flow restrictor device provided at the outlet of Control Manhole (MH1).

Water quality will be achieved by the removal of 80% total suspended solids. The Town policies also require on-site retention of at least 5mm of each rainfall through rainwater reuse, on-site infiltration and Evapo-transpiration. A water balance analysis is carried out to minimize storm water leaving the site.

2.0 SITE DESCRIPTION

The subject property is located at the North-West corner of Harvest Moon Drive and Coleraine Drive. The subject lands are located upon Part of the East Half of Lot 9, Concession 5, Town of Caledon in the Regional Municipality of Peel. The property is currently vacant with approximately 0.4538 ha in area, bound by residential properties to the west and north.

The proposed development includes the construction of 45 condominium stacked townhouse units, with asphalt parking, concrete walkways, interlocking stones and landscaped areas. Currently, the property drains by sheet flow from the north west to the south east. The drainage ultimately ends up in a double catch basin in the north west corner of Harvest Moon Drive and Coleraine Drive. This will serve as the point of connection for the storm service from the site. This double catchbasin outlets via a 300mm storm sewer which discharges to a municipal stormwater pond south of Harvest Moon Drive.



3.0 ALLOWABLE RELEASE RATE

The Town of Caledon's criteria requires that the release rate from the site be controlled to 180 l/ha/sec for all storms up to the 100yr- event.

Total Pre-development Site Area = 4538 m^2

Allowable Release Rate, $Q_{allowable}$ = 180 x 0.4538

= **81.684 l/s**

4.0 100 YEAR POST DEVELOPMENT SITE CONDITIONS

The post development drainage areas will be as given below:

	AREA	
Asphalt	1031.44	m²
Rooftop	1905.59	m²
Interlocking stones/Walkway	781.88	m²
Landscaping & Sod	818.98	m²
Total Drainage Area	**4538**	**m²**

(Please see Dwg# D2, Appendix A, for Post-development Drainage Area Plan)

4.1 100 YEAR UNCONTROLLED FLOW

A small portion of roof area of buildings 2 & 3, landscaped areas and concrete sidewalk bordering the east and south property line will discharge as uncontrolled flow onto Coleraine Drive and Harvest Moon drive. The controlled allowable release rate for the remaining areas should be adjusted to compensate this uncontrolled flow.

	AREA		CO-EFFICIENT
Impervious (Concrete sidewalk)	257.08	m²	0.90
Building Roof	607.79	m²	0.90
Landscape	395.17	m²	0.25
Total Uncontrolled Drainage Area	**1260**	**m²**	

Now: I_{100} = 4688/(T + 17)^(0.9624)
T = 10min
I = 196.54 mm/hr

$$C = \frac{(257.08 \times 0.9) + (607.79 \times 0.9) + (395.17 \times 0.25)}{1260}$$
$$= \mathbf{0.70}$$

Post Development-Uncontrolled Run -off Co-Efficient = **0.70**

Therefore Q uncontrolled = 2.778 CIA
= 2.778 x 0.70 x 196.54 x 0.1260
= 47.89 l/s

The 100 yr Uncontrolled post-development release rate is 47.89 l/s.

4.2 100 YEAR CONTROLLED FLOW (Remaining area)

DRAINAGE AREA	AREA	CO-EFFICIENT
Conventional Roof	1297.80 m²	0.90
Impervious areas(Concrete/Asphalt)	1556.24 m²	0.90
Landscape	423.81 m²	0.25
Total Drainage Area	**3278 m²**	

$$C = \frac{(1297.80 \times 0.9) + (1556.240 \times 0.9) + (423.81 \times 0.25)}{3278}$$

C = 0.82

Allowable Post-Development Flow for Remaining Controlled Area = 33.79 l/s
(Predevelopment flow ;81.68 l/s - Uncontrolled flow; 47.89 l/s)

5.0 ORIFICE CONTROL CALCULATION

In order to ensure that the peak flow from the remaining areas do not exceed the allowable release rate of 33.79 l/s, it is proposed to install a 100mm Orifice Control Plate, at the outlet pipe of the proposed control manhole (CTL.MH). This device will restrict all outflows up to the 100-Year post-development flow. Based on our proposed grading the 100 year high water line becomes 257.90. The orifice control invert becomes 255.50.

"ORIFICE CALCULATIONS"

$$Q = C \times A (2 g h)^{1/2}$$

Where: Q = Flow Discharge (l/s)
C = Orifice Co-Efficient (0.60) for orifice plate
A = Area of Orifice (m^2)
g = Gravitational Constant (m/s^2)
h = Difference in Elevation (100 yr. HWL. – Orifice Elev.)

H.W.L = 257.90
Orifice Invert = 255.50
h = 2.40 m
Diameter = 100 mm.
A = 0.0079 m^2
C = 0.60
$Q = 0.60 \times 0.0079 (2 \times 9.81 \times 2.40)^{1/2}$

Q = 32.32 l/s
100 Year Controlled Rate = 32.32l/s < 33.79 l/s
100 Year Uncontrolled Rate = 47.89 l/s
100 Year Total Outflow Rate = 80.21 l/s
< Allowable Discharge Outflow Rate = 81.68 L/s

6.0 100 YEAR DETENTION VOLUME CALCULATION

In accordance with the Town of Caledon's storm water drainage policies, excess runoff will be controlled on-site. An orifice restrictor is proposed within the storm control manhole in order to attenuate the 1 in 100 year flows from this development area. Attenuation of the 1 in 100 year flow will require on-site storage to be provided.

Table 1 (see appendix A) details the input parameters for determining the required on-site storage(modified rational method).

Based on our analysis, controlling the 100 year storm event to the controlled release rate of **32.32 l/s** equates to a post development site storage requirement of **43.66 m³**. Roof storage is not considered in this design proposal.
The excess Run-off will be stored on-site with the use of Surface Ponding and Underground Storm sewer system.

The Surface Ponding Calculations are as shown below:

Catchment	Area	Depth of Ponding	Volume
	m2	m	m3
CB# 1	94.85	0.15	4.74
CBMH #3	133.03	0.13	5.76
CBMH #4	177.91	0.14	8.29
Total Surface Ponding			18.79

A CULTEC recharger 280HD (or equivalent) will be provided between CBMH#3 and CBMH#4 to satisfy the remaining storage requirement. In addition to the Cultec system, run-off will be stored in the underground storm sewer system (*See Table 2, Appendix A for calculations).* The underground storm sewer system is designed to 5 year storm intensity. *(Please see Table 3, Appendix A for Storm sewer Design sheet and DWG# D3 for Post Development Tributary plan).*

Storage volume provided by Surface Ponding = **18.79 m³**
Storage volume provided by Cultec Chambers = **10.03 m³** (Appendix B)
Storage volume provided by underground sewers = **22.93 m³** (Table 2)

Total Available Site Storage = **51.75 m³**

Total 100 Year Required Site Storage = **43.66 m³** (Table 1)

7.0 WATER BALANCE ANALYSIS

The Toronto and Region Conservation Authority (TRCA) requires the development to retain a minimum 5mm of runoff on site through infiltration, evapo-transpiration, or rainwater re-uses.

Based on the calculation presented below, the initial abstraction amounts over the site is equal to 1.72 mm. An additional 3.32 mm would be required to retain the 5mm runoff, which translates to a volume of 14.88 m^3.

We are proposing to recharge storm water through a CULTEC infiltration system located between CBMH3 and CBMH4. The proposed Cultec system provides a total system storage of 25.45 m^3 of which:

Quantity control Storage = 10.03 m^3
Water Balance Storage = 15.42 m^3
(*Please refer to Appendix B, Cultec Recharger Details)*

The total volume captured on site for water balance
= 7.81 (initial abstraction)+ 15.42 (Cultec system)
= **23.23 m^3**
which exceeds the required target volume of **22.69 m^3** (4538m^2 X0.005m).

	Area (m2)	% of Site Area	Initial Abstraction (mm)	Overall Site Capture (mm)
Conventional Roof	1906	41.99	1	0.42
Gravel	0	0.00	1.5	0.00
Pervious areas - landscape	819	18.05	5.0	0.90
Impervious areas	1813	39.96	1	0.40
Sub Total	4537.9	100.00		1.72

A=Required average annual Precipitation depth to be retained	5
B= Total capture over entire site through the surface	1.72
D=A-B	3.32
Total required volume for water balance	14.88
Total Volume captured onsite by initial abstraction	7.81

8.0 WATER QUALITY

In accordance with the Town of Caledon's storm water drainage policies, an enhanced level of protection is required for all infiltrated storm water. This means that a minimum of 80% TSS must be removed before discharging storm runoff.

The water quality for 3278 m^2 of subject site is provided by installing an Oil/Grit separator device downstream of the orifice control device. A stormceptor model EF4 has been proposed *(See Appendix C)* that allows for 88% TSS removal and captures more than 90% of total runoff volume.

9.0 BEST MANAGEMENT PRACTICES

The proposed siltation control measures for the site will be designed in accordance with the Town of Caledon's design criteria. The course of action with respect to implementation of the required controls would be as follows:

1) Siltation Control Fence as per Town of Caledon Standard Drawing No.325.01 is to be installed around the site perimeter prior to site grading and shall be maintained throughout the construction period.
2) A mud mat to service the construction entrance onto Harvest Moon Drive shall also be installed and maintained throughout the construction phase.
3) Sediment Traps for proposed CB's on site. Their openings will be wrapped with geo textile filter fabric or silt sacks and covered with 20mm crusher run limestone. The filter fabric will be removed when the structures are raised to final grade prior to the placement of the asphalt pavement.

10.0 CONCLUSION

Allowable Release Rate = 81.68 l/s (Section 3.0)
100-Year Post-Development Controlled Rate = 32.32 l/s (Section 5.0)
100-Year Post-Development Uncontrolled Rate = 47.89 l/s (Section 4.1)
Required Site storage = 43.66 m^3 (Section 6.0)
Provided Site Storage = 51.75 m^3 (Section 6.0)
Required Water Recharge Storage = 14.88 m^3 (Section 7.0)
Provided Water Recharge Storage = 15.42m^3 (Section 7.0)
Water quality control achieved 88% TSS Removal (Section 8.0)
No Rooftop controls or storage required

PREPARED BY:

Yours truly,

Sandro Soscia, P. Eng.
SOSCIA Professional Engineers Inc.

SOSCIA
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“APPENDIX”

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APPENDIX A

STORM WATER MANAGEMENT CALCULATIONS

10376 Yonge Street - Suite 307 - Richmond Hill - Ontario - L4C 3B8 - T:905-237-5410 - F:905-237-5413 - E:ssoscia@sosciaeng.ca

JOB NAME: COLERAINE DR AND HARVEST MOON DR , CALEDON ONTARIO **TABLE 1**
FILE: (20-007) TABLE 1 - 100 YR POST DEVELOPMENT FLOW ANALYSIS
DATE: FEB 16, 2021

ROOFTOPS	0.1298	ha	Qall roof	0.0000	m³/s	43.66	m³	IS THE SITE STORAGE REQ'D	
PAVEMENT AREA	0.1556	ha	Qact ORF	0.0323	m³/s	0.00	m³	IS THE ROOF STORAGE REQ'D	
GRAVEL AREA	0.0000	ha							
LANDSCAPED AREA	0.0424	ha	head=	2.40	m	COMMENTS	==>>		
ORIFICE DIA.	0.100	m							
T/O/W/L	257.900	m	Qroof act	1.0000	m³/s				
ORIFICE INV	255.500	m							

	SITE STORAGE REQUIRED					ROOF STORAGE			
TIME min.	INTENSITY mm/hr	Q in m³/s	Q out m³/s	INCRAMENTS m³	VOLUME m³	Q in m³/s	Q out m³/s	INCRAMENTS m³	VOLUME m³
5	1.92	0.0014	0.0014	0.0	0.0	0.0006	0.0006	0.0	0.0
10	2.04	0.0015	0.0015	0.0	0.0	0.0007	0.0007	0.0	0.0
15	2.16	0.0016	0.0016	0.0	0.0	0.0007	0.0007	0.0	0.0
20	2.28	0.0017	0.0017	0.0	0.0	0.0007	0.0007	0.0	0.0
25	2.40	0.0018	0.0018	0.0	0.0	0.0008	0.0008	0.0	0.0
30	2.64	0.0020	0.0020	0.0	0.0	0.0009	0.0009	0.0	0.0
35	2.88	0.0021	0.0021	0.0	0.0	0.0009	0.0009	0.0	0.0
40	3.12	0.0023	0.0023	0.0	0.0	0.0010	0.0010	0.0	0.0
45	3.48	0.0026	0.0026	0.0	0.0	0.0011	0.0011	0.0	0.0
50	3.96	0.0029	0.0029	0.0	0.0	0.0013	0.0013	0.0	0.0
55	4.68	0.0035	0.0035	0.0	0.0	0.0015	0.0015	0.0	0.0
60	5.64	0.0042	0.0042	0.0	0.0	0.0018	0.0018	0.0	0.0
65	8.10	0.0060	0.0060	0.0	0.0	0.0026	0.0026	0.0	0.0
70	11.24	0.0084	0.0084	0.0	0.0	0.0036	0.0036	0.0	0.0
75	22.54	0.0167	0.0167	0.0	0.0	0.0073	0.0073	0.0	0.0
80	239.35	0.1778	0.0323	43.7	43.7	0.0777	0.0777	0.0	0.0
85	28.65	0.0213	0.0323	-3.3	40.3	0.0093	0.0093	0.0	0.0
90	16.10	0.0120	0.0323	-6.1	34.2	0.0052	0.0052	0.0	0.0
95	11.40	0.0085	0.0323	-7.2	27.1	0.0037	0.0037	0.0	0.0
100	9.12	0.0068	0.0323	-7.7	19.4	0.0030	0.0030	0.0	0.0
105	7.68	0.0057	0.0323	-8.0	11.4	0.0025	0.0025	0.0	0.0
110	6.72	0.0050	0.0323	-8.2	3.2	0.0022	0.0022	0.0	0.0
115	5.88	0.0044	0.0323	-8.4	0.0	0.0019	0.0019	0.0	0.0
120	5.28	0.0039	0.0039	0.0	0.0	0.0017	0.0017	0.0	0.0
125	4.92	0.0037	0.0037	0.0	0.0	0.0016	0.0016	0.0	0.0
130	4.44	0.0033	0.0033	0.0	0.0	0.0014	0.0014	0.0	0.0
135	4.20	0.0031	0.0031	0.0	0.0	0.0014	0.0014	0.0	0.0
140	3.84	0.0029	0.0029	0.0	0.0	0.0012	0.0012	0.0	0.0
145	3.60	0.0027	0.0027	0.0	0.0	0.0012	0.0012	0.0	0.0
150	3.48	0.0026	0.0026	0.0	0.0	0.0011	0.0011	0.0	0.0
155	3.24	0.0024	0.0024	0.0	0.0	0.0011	0.0011	0.0	0.0
160	3.12	0.0023	0.0023	0.0	0.0	0.0010	0.0010	0.0	0.0
165	3.00	0.0022	0.0022	0.0	0.0	0.0010	0.0010	0.0	0.0
170	2.76	0.0021	0.0021	0.0	0.0	0.0009	0.0009	0.0	0.0
175	2.64	0.0020	0.0020	0.0	0.0	0.0009	0.0009	0.0	0.0
180	2.64	0.0020	0.0020	0.0	0.0	0.0009	0.0009	0.0	0.0
185	2.52	0.0019	0.0019	0.0	0.0	0.0008	0.0008	0.0	0.0

TOTAL AREA 0.3278 ha
COMPOSITE 0.816 100 YEAR POST-DEVLOPMENT FLOW = 32.32 l/s

UNDERGROUND STORMWATER STORAGE

TABLE 2

PROJECT CONSULTANT: SOSCIA ENGINEERING
PROJECT DESCRIPTION: COLERAINE-HARVEST MOON
PROJECT LOCATION: CALEDON, ON
SOSCIA FILE #:20-007
REVISION DATE: FEB 12,2021

TOTAL: 22.93 m³

FROM MH.	TO MH.	PIPE DIA. (mm)	PIPE AREA (m²)	PIPE LENGTH (m)	PIPE VOL (m³)	REMARKS
CB1	CBMH1	250	0.049	12.0	0.59	100% FULL
CBMH1	MH1	250	0.049	20.0	0.98	100% FULL
MH1	CBMH2	250	0.049	37.0	1.82	100% FULL
CBMH2	CBMH3	300	0.071	15.0	1.06	100% FULL
CBMH3	CULTEC	300	0.071	6.0	0.42	100% FULL
CULTEC	CBMH4	300	0.071	5.0	0.35	100% FULL
CBMH4	CTL. MH	300	0.071	5.0	0.35	100% FULL
CTL.MH	EF4	300	0.071	18	1.27	100% FULL
EF4	EX.DICB	300	0.071	16	1.13	100% FULL

MH.	SIZE	AREA (m²)	INV	TOP	HWL	VOL (m³)
CB1	600x600	0.36	256.35	257.75	257.90	0.50
CBMH1	1200ϕ	1.13	256.20	257.89	257.90	1.91
MH1	1200ϕ	1.13	255.97	258.00	257.90	2.18
CBMH2	1200ϕ	1.13	255.55	257.81	257.90	2.55
CBMH3	1200ϕ	1.13	255.37	257.77	257.90	2.71
CBMH4	1200ϕ	1.13	255.60	257.76	257.90	2.44
CTL.MH	1200ϕ	1.13	255.48	257.82	257.90	2.65

STRUCT: 14.95

PIPE: 7.98

TOTAL: 22.93

5 Y E A R - STORM SEWER DESIGN SHEET

TABLE 3

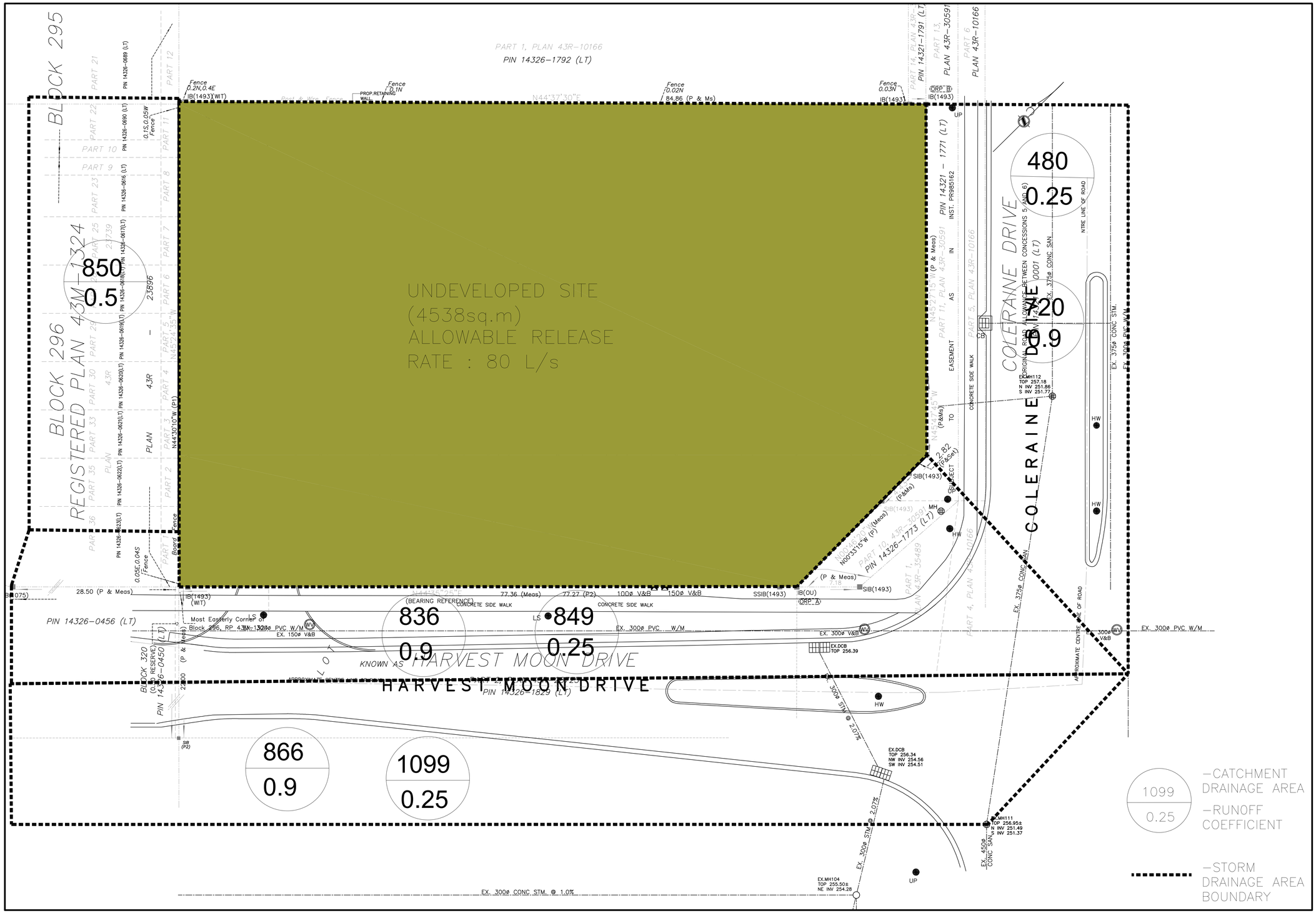
PROJECT CONSULTANT: SOSCIA ENGINEERING
PROJECT DESCRIPTION: COLERAINE-HARVEST MOON
PROJECT LOCATION: CALEDON, ON
SOSCIA FILE #: **20-007**

Revision Date: APR 08,2021

Design Parameters:
N = 2.778 given Area (ha) & Rainfall Intensity (mm/hr)
5 YR Intensity =1593/(tc+11)^0.878 tc=10
Manning's Coeff = 0.013

	FROM MH.	TO MH.	SECTION AREA (ha)	RUNOFF FACTOR "R"	SECTION A*R "AR"	ACCUM A*R "AR"	RAINFALL I (mm/hr)	Q = RAIN (L/s)	PIPE LENGTH (m)	SLOPE (%)	PIPE DIAM. (mm)	FULL CAP'TY (L/s)	FULL VEL'TY (m/s)	TIME OF FLOW (min)	TIME OF CONCENT'N (min)	PERCENT FULL (%)
	CB1	CBMH1	0.095	0.90	0.086	0.086	109.68	26.19	12.0	1.00	250	59.48	1.21	0.17	10.00	44.0%
	CBMH1	MH1	0.031	0.90	0.028	0.114	109.68	34.62	20.0	1.00	250	59.48	1.21	0.28	10.00	58.2%
	MH1	CBMH2	0.000	0.90	0.000	0.114	109.68	34.62	37.0	1.00	250	59.48	1.21	0.51	10.00	58.2%
	CBMH2	CBMH3	0.050	0.90	0.045	0.159	109.68	48.36	15.0	1.00	300	96.72	1.37	0.18	10.00	50.0%
	CBMH3	CULTEC	0.042	0.90	0.038	0.196	109.68	59.87	6.0	1.00	300	96.72	1.37	0.07	10.00	61.9%
	CULTEC	CBMH4	0.000	0.90	0.000	0.196	109.68	59.87	5.0	1.00	300	96.72	1.37	0.06	10.00	61.9%
	CBMH4	CMH	0.104	0.90	0.094	0.290	109.68	88.50	5.0	1.60	300	122.34	1.73	0.05	10.00	72.3%
	Ctl. MH	STC	0.000	0.90	0.000	0.290	109.68	88.50	18.0	1.50	300	118.45	1.68	0.18	10.00	74.7%
	STC	EX.DCBMH	0.000	0.90	0.000	0.290	109.68	88.50	16.0	1.50	300	118.45	1.68	0.16	10.00	74.7%
	TOTAL AREA =		0.323													

MANNINGS COEFF 0.013



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PRE DEVELOPMENT DRAINAGE PLAN

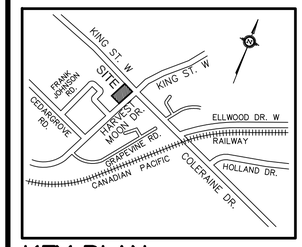
SCALE: 1:200

THE GENERAL CONTRACTOR SHALL REPORT AND VERIFY ALL DIMENSIONS AND REPORT ERRORS AND OMISSIONS TO THE ARCHITECT.

DRAWINGS MUST NOT BE SCALED.

THIS DRAWING SHALL NOT BE USED FOR CONSRUCTION PURPOSES UNLESS COUNTERSIGNED BY:

No.	Date:	Revision:	D'wn.	Ch'd.
1.	08/23/2021	ISSUED FOR SPA	N.R.	S.S.



KEY PLAN

SCALE: N.T.S.

LEGAL DESCRIPTION:

PART 2-SUBJECT TO EASEMENT IN GROSS AS IN INST. No. PR1070814 AND SUBJECT TO EASEMENT FOR ENTRY AS IN INST. No. PR1191573
PART 3-SUBJECT TO EASEMENT FOR ENTRY AS IN INST. No. PR1191573

PLAN OF SURVEY OF
PART OF LOT 9, CONCESSION 5
(GEOGRAPHIC TOWNSHIP OF ALBION)
TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL

APPLICANT:
HUMPHRIES PLANNING GROUP INC.
190 PIPPIN ROAD, SUITE A
VAUGHAN, ON L4K 4X9
TEL: 905-264-7678 EXT. 244
EMAIL: rhumphries@humphriesplanning.com

OWNER:
HARVESTONE CENTRE INC.
3 BROWNING COURT,
BOLTON, ON L7E 5S6
TEL: 905-857-3266
EMAIL: vince@boltonrailings.com

ARCHITECTS / ENGINEERS:
SOSCIA PROFESSIONAL ENGINEERS INC
10376 YONGE STREET, SUITE 307
RICHMOND HILL, ON L4C 3B8
TEL: 905 237 5410
FAX: 905 237 5413
CEL: 416 704 3868
E-MAIL: hma@sosciaeng.ca

LICENSED PROFESSIONAL ENGINEER — SOSCIA — JAN 28, 2020 — PROVINCE OF ONTARIO

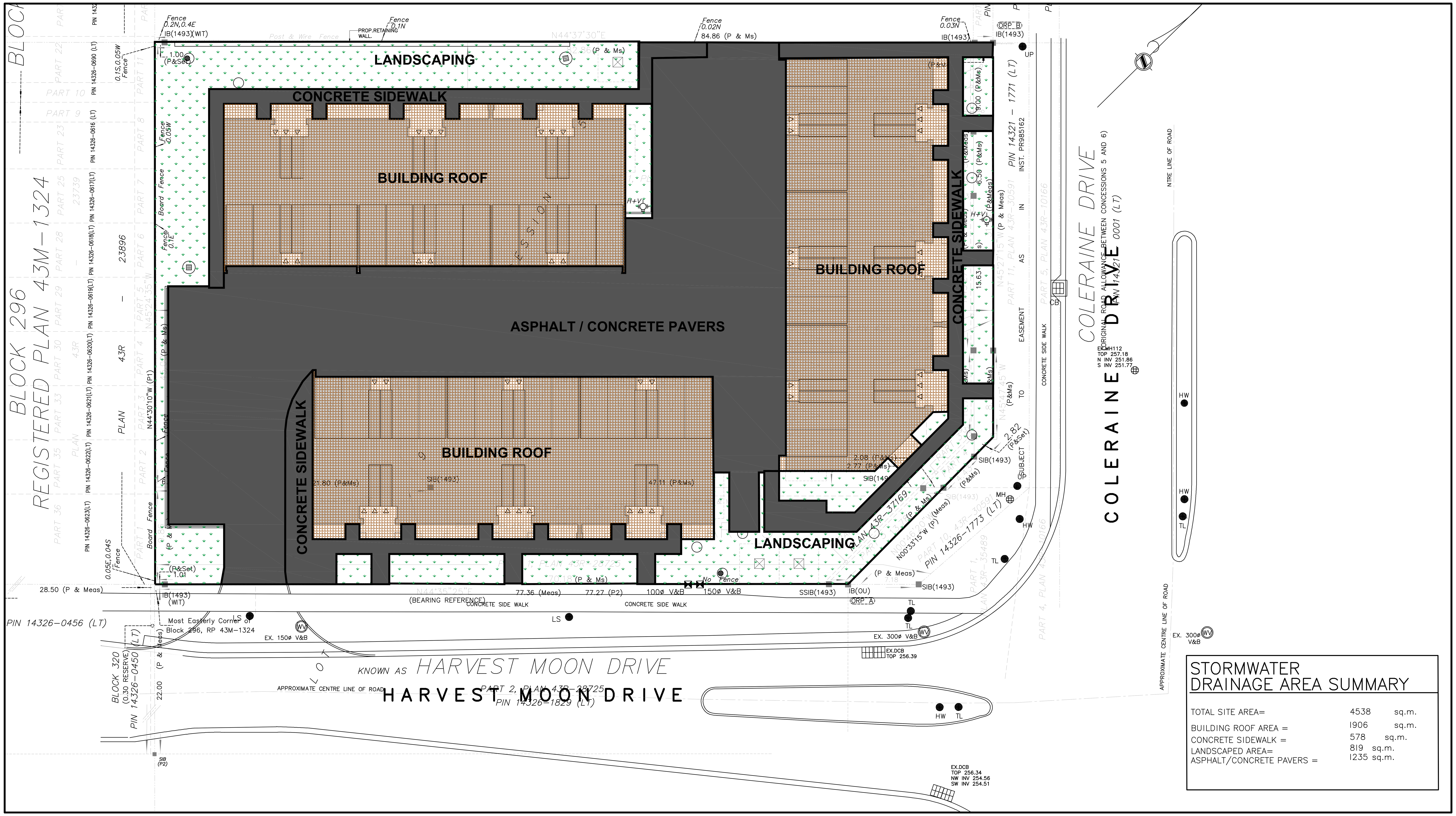
SOSCIA
PROFESSIONAL ENGINEERS INC.
10376 YONGE STREET,SUITE 307
RICHMOND HILL, ON, L4C 3B8
www.sosciaeng.co
T 905. 237. 5410
F 905. 237. 5413

Project:
PROPOSED:
STACKED TOWNHOUSE DEVELOPMENT
13656 EMIL KOLB PARKWAY
CALEDON, ONTARIO.
SPA 2021-0077

Sheet title:		Job. no.
PRE DEVELOPMENT DRAINAGE PLAN		20-007
Scale: AS NOTED	Date: FEB 2021	D'wg. no. DI
Drawn: N.R.	Checked: S.S.	

SITE PLAN LEGEND:

202.00	MAINTAIN EXISTING GRADE	TC	TOP OF CURB
202.00	NEW SPOT ELEVATION	BC	BOTTOM OF CURB
200.00	EXISTING SPOT ELEVATION	H.PT	HIGH POINT
(xxx.xx)	EXISTING BOUNDARY ELEVATION		LIGHT STANDARD
1.8%	SURFACE DRAINAGE		STORM WATER STORAGE
	CONC. CURB		SILTATION CONTROL FENCE
	CONC. TOE WALL		OVERLAND FLOW ROUTE
	PROPERTY LINE	MC	METER CHAMBER
H+V	HYDRANT & VALVE	CVC	CHECK VALVE CHAMBER
CB	CATCH BASIN	PVC	PROTECTUS III VALVE CHAMBER
MH	STORM MAINTENANCE HOLE		
CBMH	CATCH BASIN/MAINTENANCE HOLE		
SAN	SANITARY MANHOLE		



STORMWATER DRAINAGE AREA SUMMARY		
TOTAL SITE AREA=	4538	sq.m.
BUILDING ROOF AREA =	1906	sq.m.
CONCRETE SIDEWALK =	578	sq.m.
LANDSCAPED AREA=	819	sq.m.
ASPHALT/CONCRETE PAVERS =	1235	sq.m.

POST DEVELOPMENT DRAINAGE AREA PLAN

1 / D2

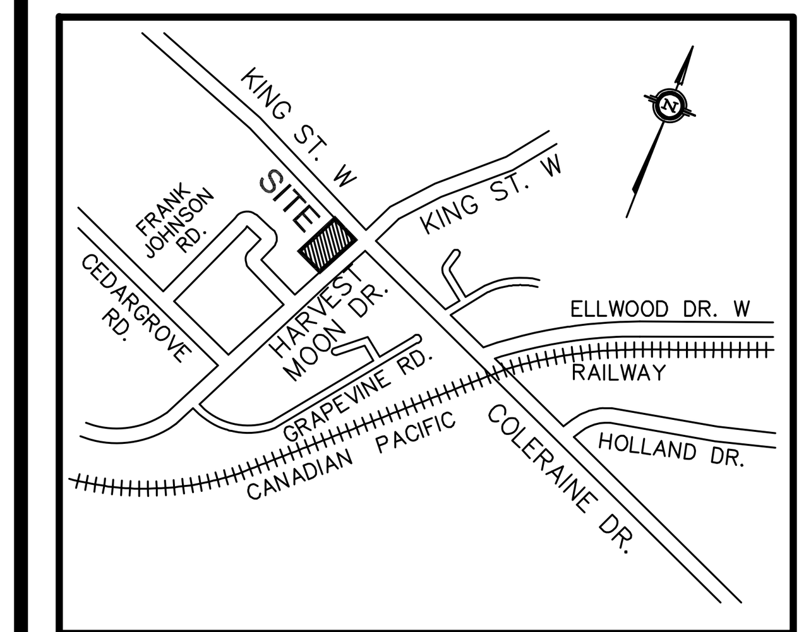
SCALE: 1:200

THE GENERAL CONTRACTOR SHALL REPORT AND VERIFY ALL DIMENSIONS AND REPORT ERRORS AND OMISSIONS TO THE ARCHITECT.

DRAWINGS MUST NOT BE SCALED.

THIS DRAWING SHALL NOT BE USED FOR CONSRUCTION PURPOSES UNLESS COUNTERSIGNED BY: ________________

No.	Date:	Revision:	D'wn.	Ch'd.
1.	08/23/2021	ISSUED FOR SPA	N.R.	S.S.



KEY PLAN

SCALE: N.T.S.

LEGAL DESCRIPTION:

PART 2–SUBJECT TO EASEMENT IN GROSS AS IN INST. No. PR1070814 AND SUBJECT TO EASEMENT FOR ENTRY AS IN INST. No. PR1191573
PART 3–SUBJECT TO EASEMENT FOR ENTRY AS IN INST. No. PR1191573

PLAN OF SURVEY OF
PART OF LOT 9, CONCESSION 5
(GEOGRAPHIC TOWNSHIP OF ALBION)
TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL

APPLICANT:
HUMPHRIES PLANNING GROUP INC.
190 PIPPIN ROAD, SUITE A
VAUGHAN, ON L4K 4X9
TEL: 905-264-7678 EXT. 244
EMAIL: rhumphries@humphriesplanning.com

OWNER:
HARVESTONE CENTRE INC.
3 BROWNING COURT,
BOLTON, ON L7E 5S6
TEL: 905-857-3266
EMAIL: vince@boltonrailings.com

ARCHITECTS / ENGINEERS:
SOSCIA PROFESSIONAL ENGINEERS INC
10376 YONGE STREET, SUITE 307
RICHMOND HILL, ON L4C 3B8
TEL: 905 237 5410
FAX: 905 237 5413
CEL: 416 704 3868
E-MAIL: hma@sosciaeng.ca

LICENSED PROFESSIONAL ENGINEER
S. SOSCIA
JAN28/2020
PROVINCE OF ONTARIO

SOSCIA
PROFESSIONAL ENGINEERS INC.
10376 YONGE STREET, SUITE 307
RICHMOND HILL, ON. L4C 3B8
www.sosciaeng.ca
T 905. 237. 5410
F 905. 237. 5413

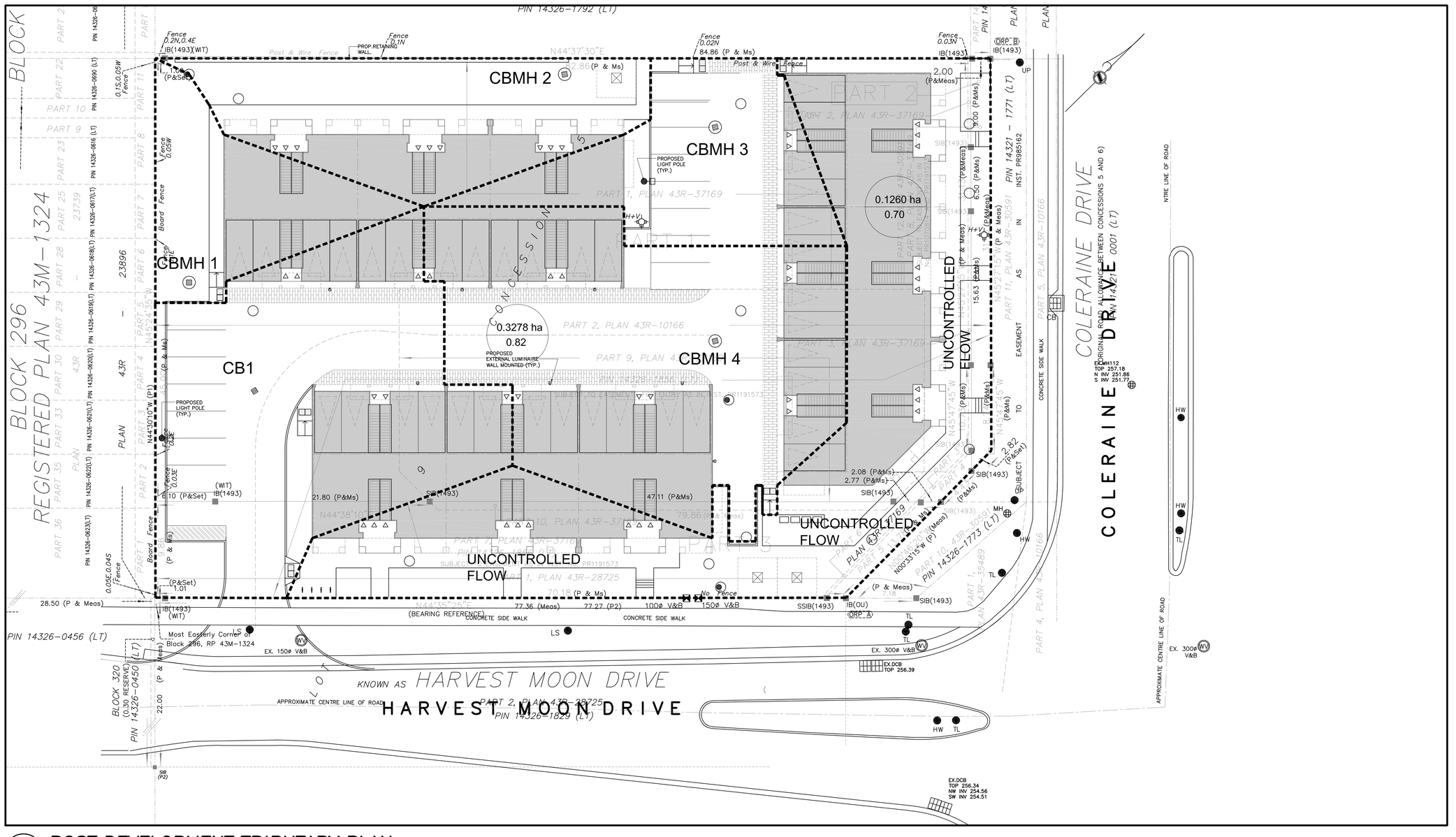
Project:
PROPOSED:
STACKED TOWNHOUSE DEVELOPMENT
13656 EMIL KOLB PARKWAY
CALEDON, ONTARIO.
SPA 2021-0077

Sheet title:	Job. no.
POST DEVELOPMENT DRAINAGE AREA PLAN	20-007

Scale:	Date:	D'wg. no.
AS NOTED	FEB 2021	D2
Drawn: N.R.	Checked: S.S.	

SITE PLAN LEGEND:

- 202.00 — MAINTAIN EXISTING GRADE
- 202.00 — NEW SPOT ELEVATION
- 200.00 — EXISTING SPOT ELEVATION
- (xxx.xx) — EXISTING BOUNDARY ELEVATION
- 1.8% — SURFACE DRAINAGE
- CONC. CURB
- CONC. TOE WALL
- PROPERTY LINE
- H+V — HYDRANT & VALVE
- CB — CATCH BASIN
- MH — STORM MAINTENANCE HOLE
- CBMH — CATCH BASIN/MAINTENANCE HOLE
- SAN — SANITARY MANHOLE
- TC — TOP OF CURB
- BC — BOTTOM OF CURB
- H.PT — HIGH POINT
- LIGHT STANDARD
- STORM WATER STORAGE
- SILTATION CONTROL FENCE
- OVERLAND FLOW ROUTE
- MC — METER CHAMBER
- CVC — CHECK VALVE CHAMBER
- PVC — PROTECTUS III VALVE CHAMBER



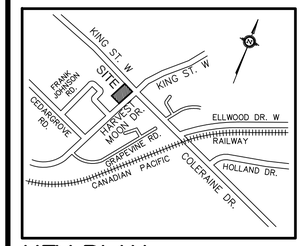
1 / D3 POST DEVELOPMENT TRIBUTARY PLAN
SCALE: 1:200

THE GENERAL CONTRACTOR SHALL REPORT AND VERIFY ALL DIMENSIONS AND REPORT ERRORS AND OMISSIONS TO THE ARCHITECT.

DRAWINGS MUST NOT BE SCALED.

THIS DRAWING SHALL NOT BE USED FOR CONSTRUCTION PURPOSES UNLESS COUNTERSIGNED BY: _____

No.	Date:	Revision:	D'wn.	Ch'd.
1.	08/23/2021	ISSUED FOR SPA	N.R.	S.S.



KEY PLAN
SCALE: N.T.S.

LEGAL DESCRIPTION:
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PLAN OF SURVEY OF
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10376 YONGE STREET, SUITE 307
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TEL: 905 237 5410
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E-MAIL: hma@sosciaeng.ca

LICENSED PROFESSIONAL ENGINEER — SOSCIA — JAN 28, 2020 — PROVINCE OF ONTARIO

SOSCIA
PROFESSIONAL ENGINEERS INC.
10376 YONGE STREET,SUITE 307
RICHMOND HILL, ON, L4C 3B8
www.sosciaeng.ca
T 905. 237. 5410
F 905. 237. 5413

Project:
PROPOSED:
STACKED TOWNHOUSE DEVELOPMENT
13656 EMIL KOLB PARKWAY
CALEDON, ONTARIO.
SPA 2021-0077

Sheet title:		Job. no.
POST DEVELOPMENT TRIBUTARY PLAN		20-007
Scale: AS NOTED	Date: FEB 2021	D'wg. no. D3
Drawn: N.R.	Checked: S.S.	

SOSCIA
ENGINEERING LTD.

PROFESSIONAL ENGINEERS & PROJECT MANAGERS

APPENDIX B

CULTEC 280HD RECHARGER DETAILS

10376 Yonge Street - Suite 307 - Richmond Hill - Ontario - L4C 3B8 - T:905-237-5410 - F:905-237-5413 - E:ssoscia@sosciaeng.ca

CULTEC Stormwater Design Calculator

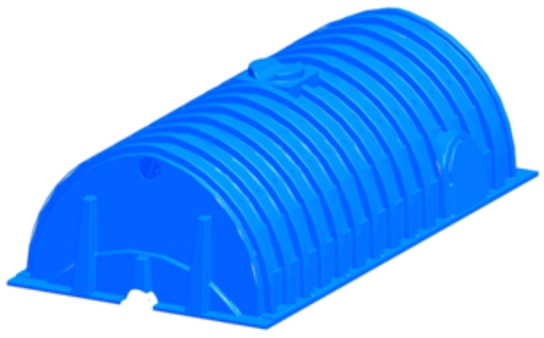
Date:	February 16, 2021

Project Number:	20-007

Project Information:

Stacked Townhouse Development
Coleraine-Harvest Moon
Caledon
ONTARIO
CANADA

RECHARGER 280HD



Calculations Performed By:

Sreelakshmi
Soscia Professional Engineers
10376 Yonge St
Richmond Hill ON

CA

schangaradil@sosciaeng.ca

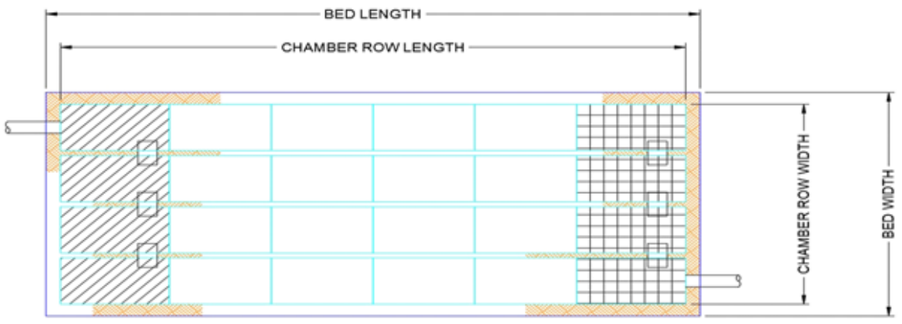
Recharger 280HD Chamber Specifications		
Height	**673**	mm
Width	**1194**	mm
Length	**2.44**	meters
Installed Length	**2.13**	meters
Bare Chamber Volume	**1.20**	cu. meters
Installed Chamber Volume	**1.83**	cu. meters

Breakdown of Storage Provided by Recharger 280HD Stormwater System		
Within Chambers	**14.98**	cu. meters
Within Feed Connectors	**0.04**	cu. meters
Within Stone	**10.42**	cu. meters
Total Storage Provided	**25.4**	**cu. meters**
Total Storage Required	23.00	cu. meters

Materials List

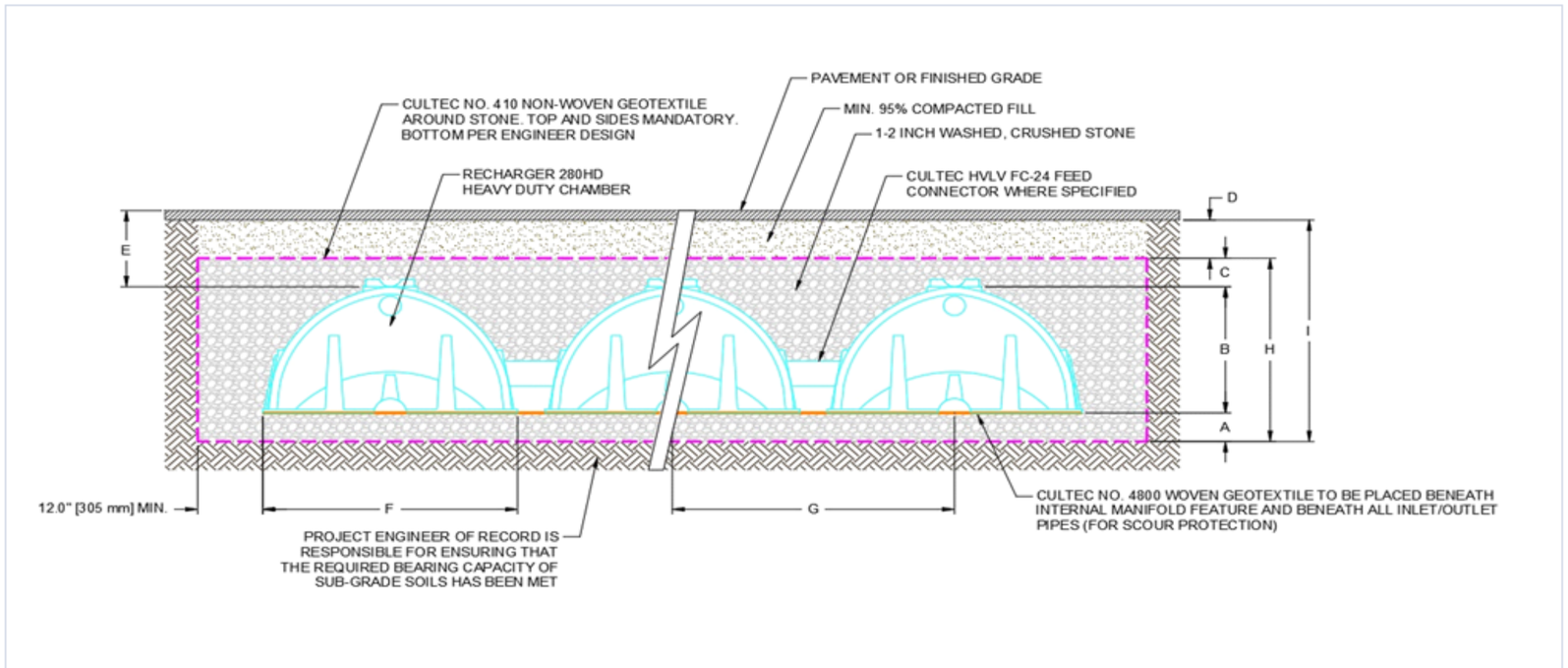
Recharger 280HD			
Total Number of Chambers Required	**12**	**pieces**	
Separator Row Chambers	**4**	pieces	Separator Row Qty Included in Total
Starter Chambers	**3**	pieces	
Intermediate Chambers	**6**	pieces	
End Chambers	**3**	pieces	
HVLV FC-24 Feed Connectors	**4**	pieces	*Based on 2 Internal Manifolds*
CULTEC No. 410 Non-Woven Geotextile	**139**	sq. meters	
CULTEC No. 4800 Woven Geotextile	**18**	meters	
Stone	**26**	cu. meters	

Bed Detail



Bed detail for reference only. Not project specific. Not to scale.

Bed Layout Information		
Number of Rows Wide	**3**	pieces
Number of Chambers Long	**4**	pieces
Chamber Row Width	**3.84**	meters
Chamber Row Length	**8.84**	meters
Bed Width	**4.45**	meters
Bed Length	**9.45**	meters
Bed Area Required	**42.00**	sq. meters
Length of Separator Row	**8.84**	meters



Conceptual graphic only. Not job specific.

Cross Section Table Reference			
A	Depth of Stone Base	**152**	mm
B	Chamber Height	**673**	mm
C	Depth of Stone Above Units	**152**	mm
D	Depth of 95% Compacted Fill	**254**	mm
E	Max. Depth Allowed Above the Chamber	**3.66**	meters
F	Chamber Width	**1194**	mm
G	Center to Center Spacing	**1.32**	meters
H	Effective Depth	**0.98**	meters
I	Bed Depth	**1.23**	meters

CULTEC Stage-Storage Calculations

Date:	February 16, 2021

Project Information:
Stacked Townhouse Development
Coleraine-Harvest Moon
Caledon
ONTARIO
CANADA

Project Number:
20-007

Chamber Model -	**Recharger 280HD**	
Number of Rows-	3	units
Total Number of Chambers -	12	units
HVLV FC-24 Feed Connectors-	4	units
Stone Void -	40	%
Stone Base -	152	mm
Stone Above Units -	152	mm
Area -	42.00	m2
Base of Stone Elevation -	0.00	

Recharger 280HD Incremental Storage Volumes

Height of System		Chamber Volume		HVLV Feed Connector Volume		Stone Volume		Cumulative Storage Volume		Total Cumulative Storage Volume		Elevation		
in	mm	ft^3	m^3	ft3	m3	ft^3	m^3	ft^3	m^3	ft^3	m^3	ft	m	
38.5	978	0.0	0.0	0.0	0.0	15.1	0.4	15.069	0.4	898.88	25.45	3.21	0.98	Top of Stone Elevation
37.5	953	0.0	0.0	0.0	0.0	15.1	0.4	15.069	0.4	883.81	25.03	3.13	0.95	
36.5	927	0.0	0.0	0.0	0.0	15.1	0.4	15.069	0.4	868.74	24.60	3.04	0.93	
35.5	902	0.0	0.0	0.0	0.0	15.1	0.4	15.069	0.4	853.67	24.17	2.96	0.90	
34.5	876	0.0	0.0	0.0	0.0	15.1	0.4	15.069	0.4	838.60	23.75	2.88	0.88	
33.5	851	0.0	0.0	0.0	0.0	15.1	0.4	15.069	0.4	823.53	23.32	2.79	0.85	
32.5	826	0.0	0.0	0.0	0.0	7.5	0.2	7.540	0.2	808.46	22.89	2.71	0.83	Top of Chamber Elevation
32.0	813	1.6	0.0	0.0	0.0	14.4	0.4	16.009	0.5	800.92	22.68	2.67	0.81	
31.0	787	4.1	0.1	0.0	0.0	13.4	0.4	17.523	0.5	784.91	22.23	2.58	0.79	
30.0	762	8.7	0.2	0.0	0.0	11.6	0.3	20.289	0.6	767.39	21.73	2.50	0.76	
29.0	737	11.7	0.3	0.0	0.0	10.4	0.3	22.064	0.6	747.10	21.16	2.42	0.74	
28.0	711	13.8	0.4	0.0	0.0	9.5	0.3	23.369	0.7	725.04	20.53	2.33	0.71	
27.0	686	15.6	0.4	0.0	0.0	8.8	0.3	24.413	0.7	701.67	19.87	2.25	0.69	
26.0	660	17.0	0.5	0.0	0.0	8.3	0.2	25.248	0.7	677.25	19.18	2.17	0.66	
25.0	635	18.2	0.5	0.0	0.0	7.8	0.2	25.979	0.7	652.01	18.46	2.08	0.64	
24.0	610	19.2	0.5	0.0	0.0	7.4	0.2	26.606	0.8	626.03	17.73	2.00	0.61	
23.0	584	20.2	0.6	0.0	0.0	7.0	0.2	27.180	0.8	599.42	16.97	1.92	0.58	
22.0	559	21.0	0.6	0.0	0.0	6.7	0.2	27.650	0.8	572.24	16.20	1.83	0.56	
21.0	533	21.7	0.6	0.0	0.0	6.4	0.2	28.067	0.8	544.59	15.42	1.75	0.53	
20.0	508	22.9	0.6	0.0	0.0	5.9	0.2	28.798	0.8	516.52	14.63	1.67	0.51	
19.0	483	23.2	0.7	0.0	0.0	5.8	0.2	29.007	0.8	487.73	13.81	1.58	0.48	
18.0	457	23.6	0.7	0.2	0.0	5.6	0.2	29.400	0.8	458.72	12.99	1.50	0.46	
17.0	432	23.9	0.7	0.2	0.0	5.5	0.2	29.576	0.8	429.32	12.16	1.42	0.43	
16.0	406	24.3	0.7	0.1	0.0	5.4	0.2	29.778	0.8	399.74	11.32	1.33	0.41	
15.0	381	25.0	0.7	0.1	0.0	5.1	0.1	30.194	0.9	369.97	10.48	1.25	0.38	
14.0	356	25.4	0.7	0.1	0.0	4.9	0.1	30.451	0.9	339.77	9.62	1.17	0.36	
13.0	330	25.6	0.7	0.1	0.0	4.8	0.1	30.549	0.9	309.32	8.76	1.08	0.33	
12.0	305	26.5	0.8	0.1	0.0	4.5	0.1	31.115	0.9	278.77	7.89	1.00	0.30	
11.0	279	26.6	0.8	0.1	0.0	4.4	0.1	31.162	0.9	247.66	7.01	0.92	0.28	
10.0	254	26.8	0.8	0.1	0.0	4.4	0.1	31.251	0.9	216.49	6.13	0.83	0.25	
9.0	229	27.0	0.8	0.1	0.0	4.3	0.1	31.329	0.9	185.24	5.25	0.75	0.23	
8.0	203	27.1	0.8	0.0	0.0	4.2	0.1	31.389	0.9	153.91	4.36	0.67	0.20	
7.0	178	28.4	0.8	0.0	0.0	3.7	0.1	32.108	0.9	122.53	3.47	0.58	0.18	
6.0	152	0.0	0.0	0.0	0.0	15.1	0.4	15.069	0.4	90.42	2.56	0.50	0.15	Bottom of Chamber Elevation
5.0	127	0.0	0.0	0.0	0.0	15.1	0.4	15.069	0.4	75.35	2.13	0.42	0.13	
4.0	102	0.0	0.0	0.0	0.0	15.1	0.4	15.069	0.4	60.28	1.71	0.33	0.10	
3.0	76	0.0	0.0	0.0	0.0	15.1	0.4	15.069	0.4	45.21	1.28	0.25	0.08	
2.0	51	0.0	0.0	0.0	0.0	15.1	0.4	15.069	0.4	30.14	0.85	0.17	0.05	
1.0	25	0.0	0.0	0.0	0.0	15.1	0.4	15.069	0.4	15.07	0.43	0.08	0.03	
0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.000	0.0	0.00	0.00	0.00	0.00	Bottom of Stone Elevation
-1.0														
-2.0														
-3.0														
-4.0														
-5.0														
-6.0														
-7.0														
-8.0														
-9.0														
-10.0														
-11.0														
-12.0														
-13.0														

Cultec Storage:
Quantity Control storage : 10.03 cu.m
Water Balance Storage : 15.42 cu.m
Total System Storage : 25.45 cu.m
Outlet pipe to be set 530mm above bottom of stone elevation to control Water Balance storage

CULTEC Recharger® 280HD Stormwater Chamber

The Recharger® 280HD is a 26.5" (673 mm) tall, mid-size chamber and is typically used for installations with depth restrictions or when a larger infiltrative area is required. The Recharger® 280HD has the side portal internal manifold feature. HVLV® FC-24 Feed Connectors are inserted into the side portals to create the internal manifold.

Size (L x W x H)	8' x 47" x 26.5"
	2.44 m x 1194 mm x 673 mm
Installed Length	7'
	2.13 m
Length Adjustment per Run	1'
	0.30 m
Chamber Storage	6.08 ft^3/ft
	0.56 m^3/m
	42.55 ft^3/unit
	1.21 m^3/unit
Min. Installed Storage	9.21 ft^3/ft
	0.86 m^3/m
	64.46 ft^3/unit
	1.83 m^3/unit
Min. Area Required	30.33 ft^2
	2.82 m^2
Chamber Weight	64.0 lbs
	29.03 kg
Shipping	35 chambers/skid
	2,345 lbs/skid
	12 skids/48' flatbed
Min. Center-to-Center Spacing	4.33'
	1.32 m
Max. Allowable Cover	12'
	3.66 m
Max. Inlet Opening in End Wall	21" HDPE, PVC
	525 mm HDPE, PVC
Max. Allowable O.D. in Side Portal	10" HDPE, 12" PVC
	250 mm HDPE, 300 mm PVC
Compatible Feed Connector	HVLV FC-24 Feed Connector

Calculations are based on installed chamber length.
All above values are nominal.
Min. installed storage includes 6" (152 mm) stone base, 6" (152 mm) stone above crown of chamber and typical stone surround at 52"(1321 mm) center-to-center spacing.

	Stone Foundation Depth		
	6"	12"	18"
	152 mm	305 mm	457 mm
Chamber and Stone Storage Per Chamber	64.46 ft^3	70.53 ft^3	76.59 ft^3
	1.83 m^3	2.00 m^3	2.17 m^3
Min. Effective Depth	3.21'	3.71'	4.21'
	0.98 m	1.13 m	1.28 m
Stone Required Per Chamber	2.03 yd^3	2.59 yd^3	3.15 yd^3
	1.55 m^3	1.98 m^3	2.41 m^3

Calculations are based on installed chamber length.
Includes 6" (305 mm) stone above crown of chamber and typical stone surround at 52"(1321 mm) center-to-center spacing and stone foundation as listed in table.
Stone void calculated at 40%.

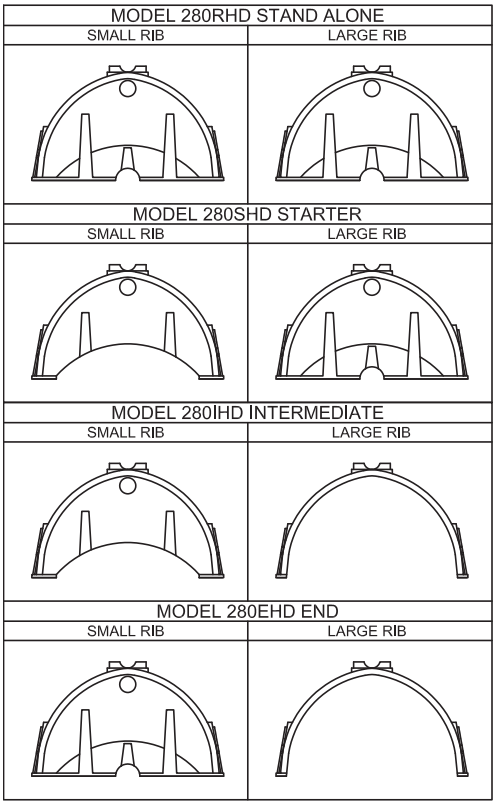
Recharger® 280HD Bare Chamber Storage Volumes

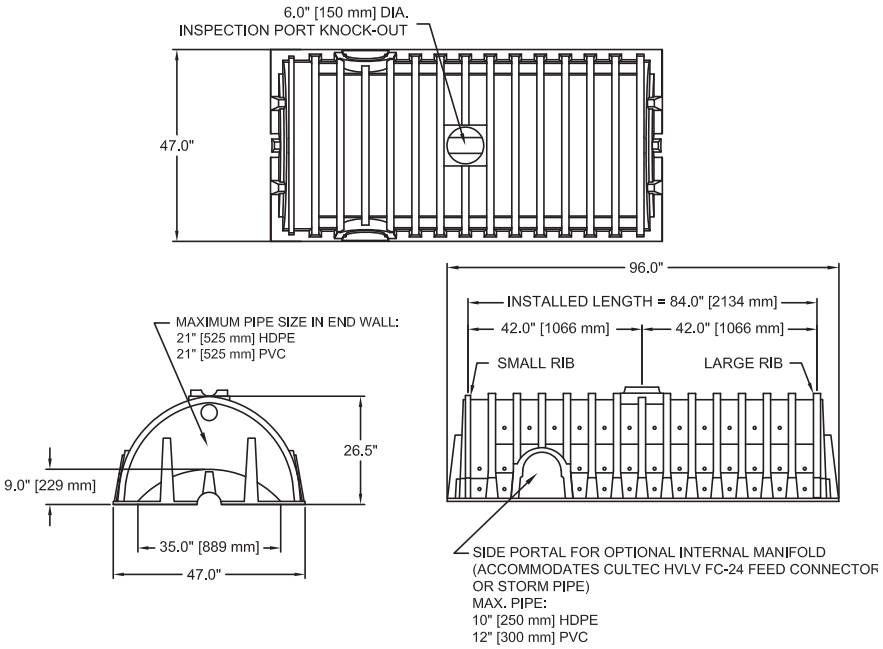
Elevation		Incremental Storage Volume				Cumulative Storage	
in.	mm	ft^3/ft	m^3/m	ft^3	m^3	ft^3	m^3
26.5	686	0.000	0.000	0.000	0.000	42.553	1.205
26	660	0.018	0.002	0.126	0.004	42.553	1.205
25	635	0.047	0.004	0.329	0.009	42.427	1.202
24	609	0.100	0.009	0.700	0.020	42.098	1.192
23	584	0.134	0.012	0.938	0.027	41.398	1.172
22	559	0.159	0.015	1.113	0.032	40.460	1.146
21	533	0.179	0.017	1.253	0.035	39.347	1.114
20	508	0.195	0.018	1.365	0.039	38.094	1.079
19	483	0.209	0.019	1.463	0.041	36.729	1.040
18	457	0.221	0.021	1.547	0.044	35.266	0.999
17	432	0.232	0.022	1.624	0.046	33.719	0.955
16	406	0.241	0.022	1.687	0.048	32.095	0.909
15	381	0.249	0.023	1.743	0.049	30.408	0.861
14	356	0.263	0.024	1.841	0.052	28.665	0.812
13	330	0.267	0.025	1.869	0.053	26.824	0.760
12	305	0.271	0.025	1.897	0.054	24.955	0.707
11	279	0.275	0.026	1.925	0.055	23.058	0.653
10	254	0.279	0.026	1.953	0.055	21.133	0.598
9	229	0.287	0.027	2.009	0.057	19.180	0.543
8	203	0.292	0.027	2.044	0.058	17.171	0.486
7	178	0.294	0.027	2.058	0.058	15.127	0.428
6	152	0.305	0.028	2.135	0.060	13.069	0.370
5	127	0.306	0.028	2.142	0.061	10.934	0.310
4	102	0.308	0.029	2.156	0.061	8.792	0.249
3	76	0.310	0.029	2.170	0.061	6.636	0.188
2	51	0.312	0.029	2.184	0.062	4.466	0.126
1	25	0.326	0.030	2.282	0.065	2.282	0.065
Total		**6.079**	**0.565**	**42.553**	**1.205**	**42.553**	**1.205**

Calculations are based on installed chamber length.

Visit www.cultec.com/downloads.html for Product Downloads and CAD details.

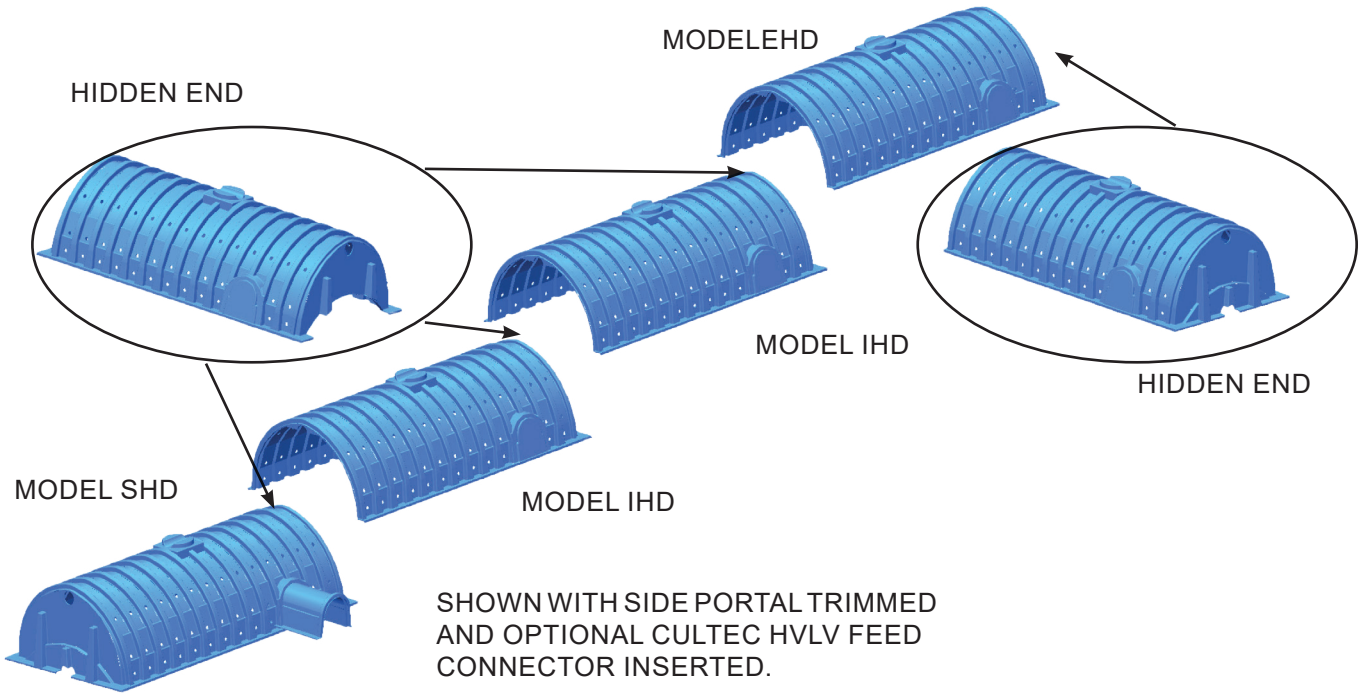
Three View Drawing



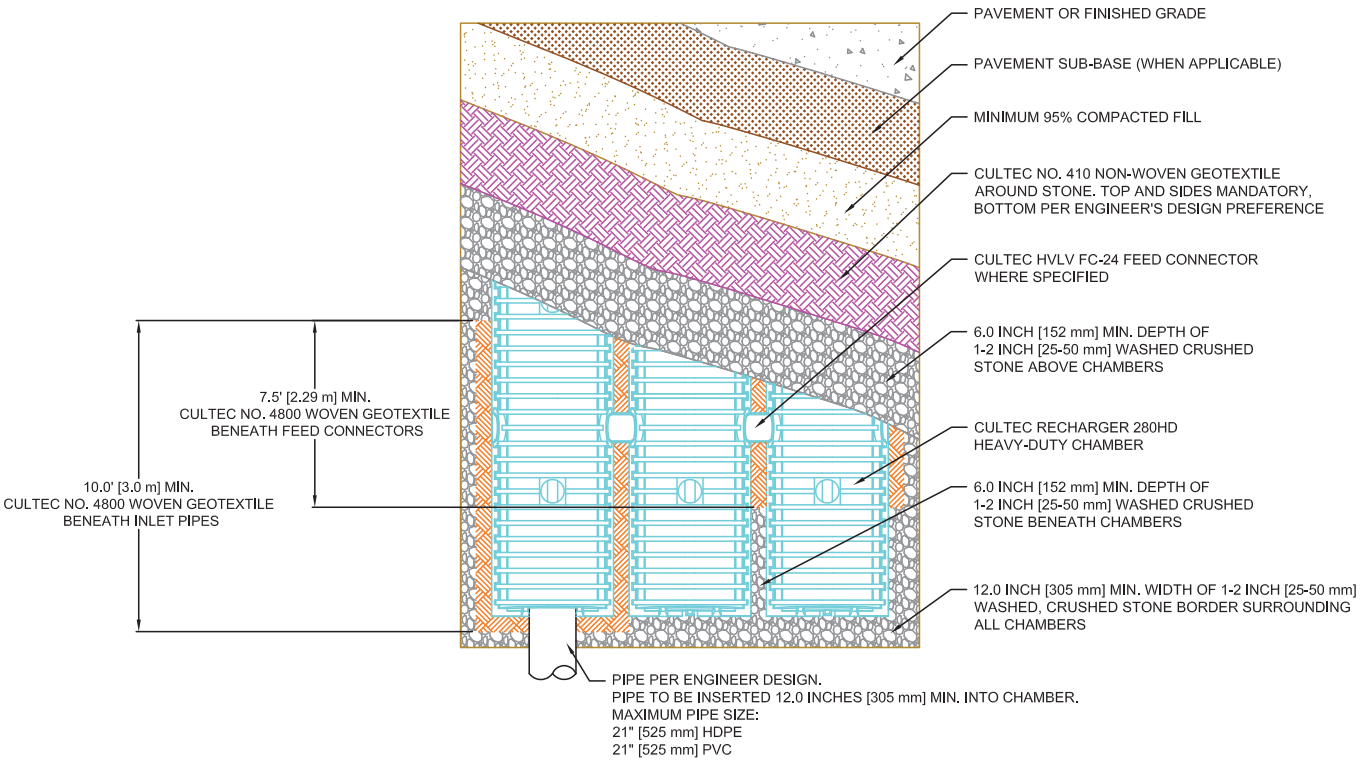


CULTEC RECHARGER 280HD CHAMBER STORAGE = 6.079 CF/FT [0.565 m³/m]
INSTALLED LENGTH ADJUSTMENT = 1.0' [0.3048 m]

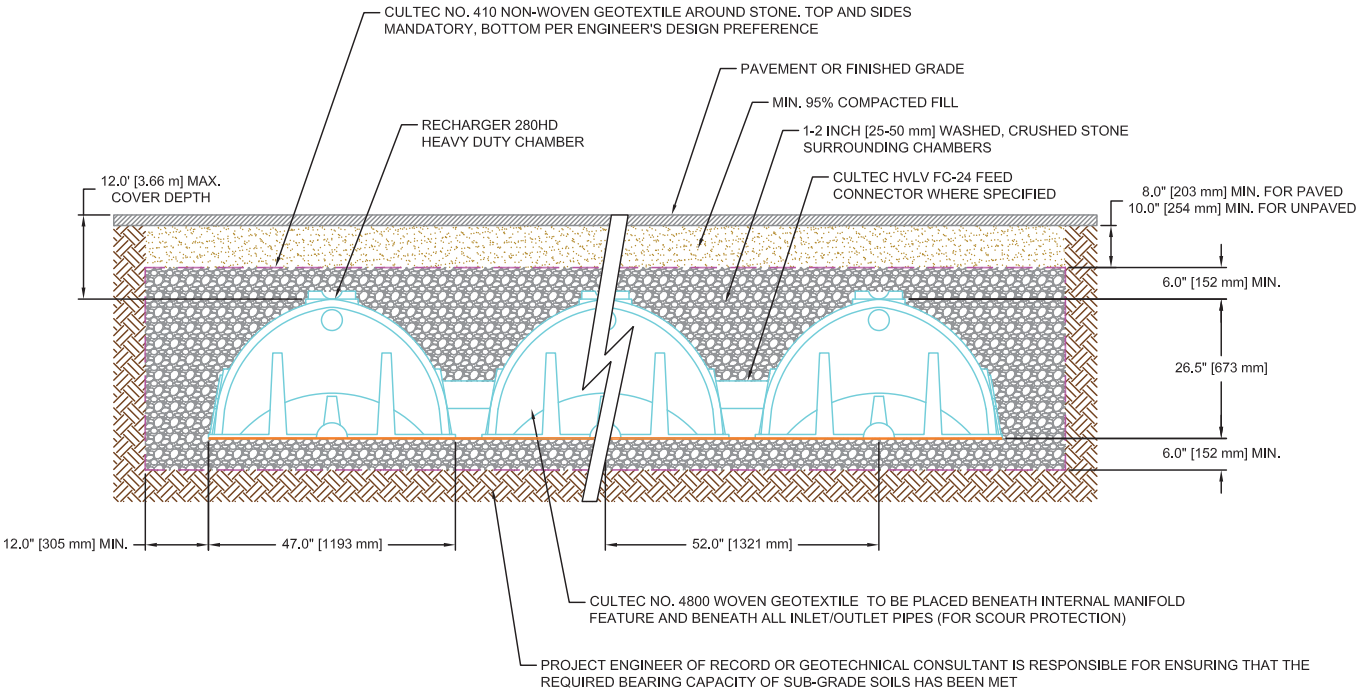
Typical Interlock Installation



Plan View Drawing



Typical Cross Section for Traffic Application



CULTEC Recharger® 280HD Specifications

GENERAL

CULTEC Recharger® 280HD chambers are designed for underground stormwater management. The chambers may be used for retention, recharging, detention or controlling the flow of on-site stormwater runoff.

CHAMBER PARAMETERS

1. The chambers shall be manufactured in the U.S.A. by CULTEC, Inc. of Brookfield, CT (cultec.com, 203-775-4416).
2. The chamber shall be vacuum thermoformed of polyethylene with a black interior and blue exterior.
3. The chamber shall be arched in shape.
4. The chamber shall be open-bottomed.
5. The chamber shall be joined using an interlocking overlapping rib method. Connections must be fully shouldered overlapping ribs, having no separate couplings or separate end walls.
6. The nominal chamber dimensions of the CULTEC Recharger® 280HD shall be 26.5 inches (673 mm) tall, 47 inches (1194 mm) wide and 8 feet (2.44 m) long. The installed length of a joined Recharger® 280HD shall be 7 feet (2.13 m).
7. Maximum inlet opening on the chamber end wall is 21 inches (525 mm) HDPE, PVC.
8. The chamber shall have two side portals to accept CULTEC HVLV® FC-24 Feed Connectors to create an internal manifold. Maximum allowable O.D. in the side portal is 10 inches (250 mm) HDPE, 12 inches (300 mm) PVC.
9. The nominal chamber dimensions of the CULTEC HVLV® FC-24 Feed Connector shall be 12 inches (305 mm) tall, 16 inches (406 mm) wide and 24.2 inches (614 mm) long.
10. The nominal storage volume of the Recharger® 280HD chamber shall be 6.079 ft^3 / ft (0.565 m^3 / m) - without stone. The nominal storage volume of a single Recharger 280RHD Stand Alone unit shall be 48.63 ft^3 (1.38 m^3) - without stone. The nominal storage volume of a joined Recharger® 280IHD Intermediate unit shall be 42.553 ft^3 (1.205 m^3) - without stone. The nominal storage volume of the length adjustment amount per run shall be 6.08 ft^3 (0.56 m^3) - without stone.
11. The nominal storage volume of the HVLV® FC-24 Feed Connector shall be 0.913 ft^3 / ft (0.085 m^3 / m) - without stone.
12. The Recharger® 280HD chamber shall have seventy-two discharge holes bored into the sidewalls of the unit's core to promote lateral conveyance of water.
13. The Recharger® 280HD chamber shall have 15 corrugations.
14. The end wall of the chamber, when present, shall be an integral part of the continuously formed unit. Separate end plates cannot be used with this unit.
15. The Recharger® 280RHD Stand Alone unit must be formed as a whole chamber having two fully formed integral end walls and having no separate end plates or separate end walls.
16. The Recharger® 280SHD Starter unit must be formed as a whole chamber having one fully formed integral end wall and one partially formed integral end wall with a lower transfer opening of 9 inches (229 mm) high x 35 inches (889 mm) wide.
17. The Recharger® 280IHD Intermediate unit must be formed as a whole chamber having one fully open end wall and one partially formed integral end wall with a lower transfer opening of 9 inches (229 mm) high x 35 inches (889 mm) wide.
18. The Recharger® 280EHD End unit must be formed as a whole chamber having one fully formed integral end wall and one fully open end wall and having no separate end plates or end walls.
19. The HVLV® FC-24 Feed Connector must be formed as a whole chamber having two open end walls and having no separate end plates or separate end walls. The unit shall fit into the side portals of the Recharger® 280HD and act as cross feed connections.
20. Chambers must have horizontal stiffening flex reduction steps between the ribs.
21. The chamber shall have a raised integral cap at the top of the arch in the center of each unit to be used as an optional inspection port or clean-out.
22. The units may be trimmed to custom lengths by cutting back to any corrugation on the large rib end.
23. The chamber shall be manufactured in an ISO 9001:2015 certified facility.
24. The chamber shall be designed and manufactured to meet the material and structural requirements of IAPMO PS 63-2019, including resistance to AASHTO H-10 and H-20 highway live loads, when installed in accordance with CULTEC's installation instructions.
25. Maximum allowable cover over the top of the chamber shall be 12' (3.66 m).
26. The chamber shall be designed to withstand traffic loads when installed according to CULTEC's recommended installation instructions.

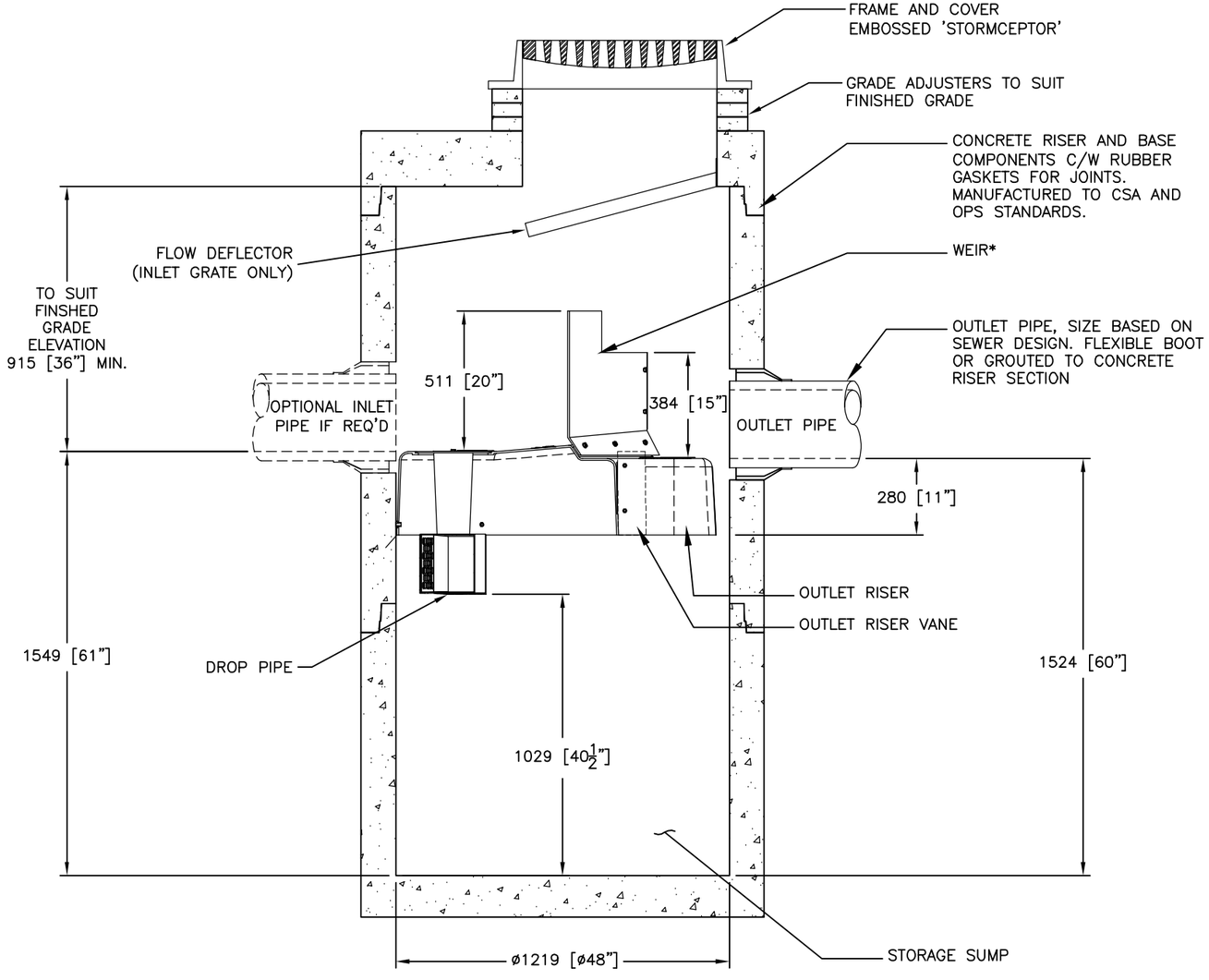
SOSCIA
ENGINEERING LTD.

PROFESSIONAL ENGINEERS & PROJECT MANAGERS

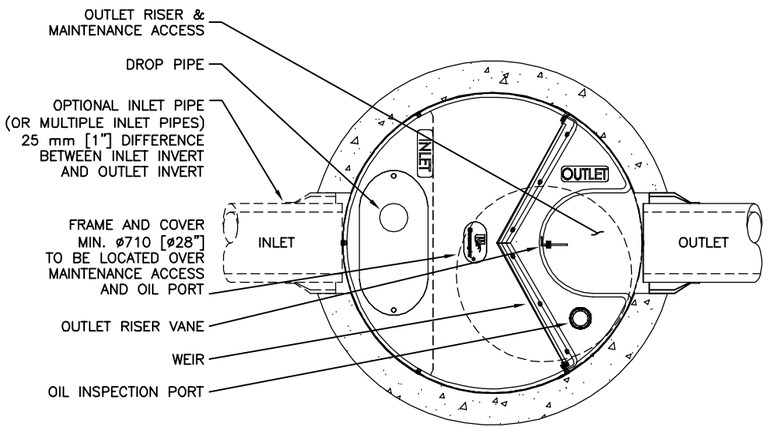
APPENDIX C

STORMCEPTOR EF4 DETAILS

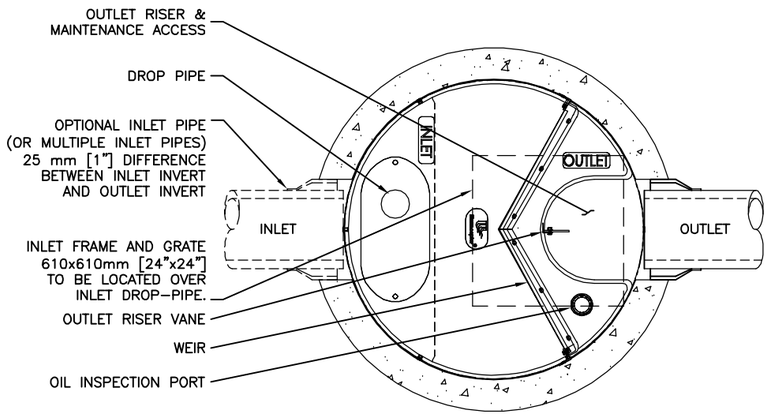
10376 Yonge Street - Suite 307 - Richmond Hill - Ontario - L4C 3B8 - T:905-237-5410 - F:905-237-5413 - E:ssoscia@sosciaeng.ca



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	EF4
STRUCTURE ID	*
WATER QUALITY FLOW RATE (L/s)	*
PEAK FLOW RATE (L/s)	*
RETURN PERIOD OF PEAK FLOW (yrs)	*
DRAINAGE AREA (HA)	*
DRAINAGE AREA IMPERVIOUSNESS (%)	*

PIPE DATA:	I.E.	MAT'L	DIA	SLOPE %	HGL
INLET #1	*	*	*	*	*
INLET #2	*	*	*	*	*
OUTLET	*	*	*	*	*

* PER ENGINEER OF RECORD

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

Stormceptor® EF

SCALE = NTS

imbrium®
7007 RIDGE ROAD, SUITE 350, HANOVER, MD 21076
USA: 888-279-9828 CA: 800-386-4801 INTL: +1-416-960-9900

DATE: 5/26/2017

DESIGNED:	DRAWN:
JSK	JSK
CHECKED:	APPROVED:
BSF	SP
PROJECT No.:	SEQUENCE No.:
EF4	*

SHEET: 1 OF 1

Stormceptor®

Stormceptor® EF Sizing Report

STORMCEPTOR®
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

01/20/2021

Province:	Ontario
City:	Caledon
Nearest Rainfall Station:	TORONTO CENTRAL
NCDC Rainfall Station Id:	0100
Years of Rainfall Data:	18

Site Name:	

Drainage Area (ha):	0.33
% Imperviousness:	80.00

Runoff Coefficient 'c': 0.78

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

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	4.04
Oil / Fuel Spill Risk Site?	No
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	
Site Sediment Transport Rate (kg/ha/yr):	

Project Name:	Coleraine-Harvest Moon
Project Number:	20-007
Designer Name:	Sreelakshmi Changaradil
Designer Company:	Soscia Professional Engineers
Designer Email:	srilaka.menon@gmail.com
Designer Phone:	437-388-6131
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EF4	88
EF6	91
EF8	92
EF10	93
EF12	93

Recommended Stormceptor EF Model: EF4

Estimated Net Annual Sediment (TSS) Load Reduction (%): 88

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)

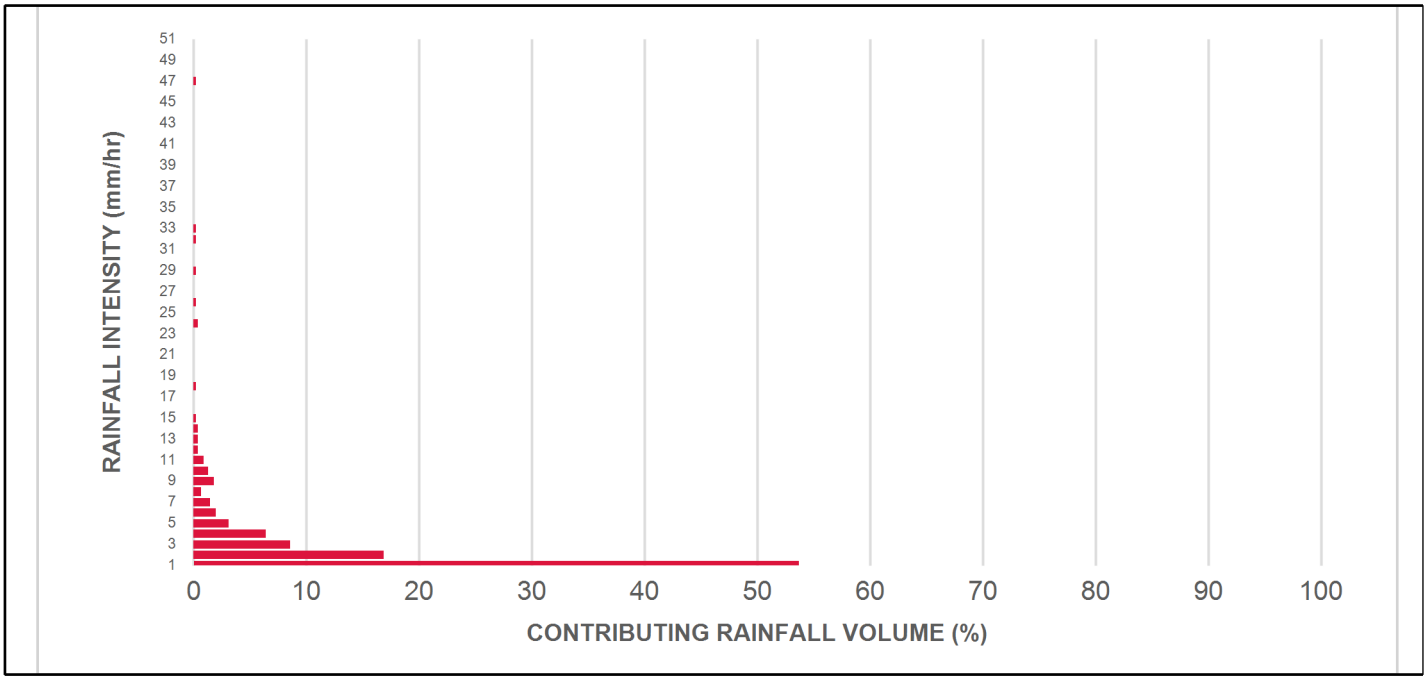
►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a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

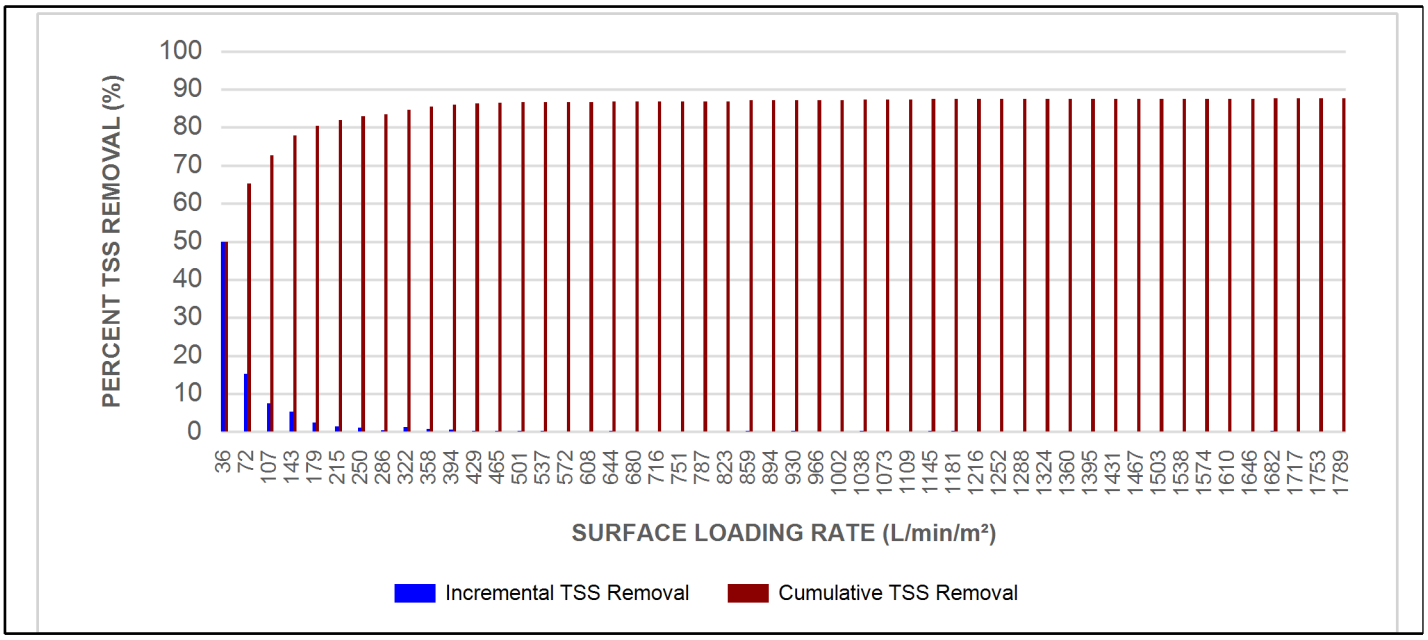
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
1	53.7	53.7	0.72	43.0	36.0	93	49.9	49.9
2	16.9	70.6	1.43	86.0	72.0	90	15.2	65.2
3	8.6	79.2	2.15	129.0	107.0	87	7.5	72.6
4	6.4	85.6	2.86	172.0	143.0	83	5.3	77.9
5	3.1	88.7	3.58	215.0	179.0	79	2.5	80.4
6	2.0	90.7	4.29	258.0	215.0	75	1.5	81.9
7	1.5	92.2	5.01	301.0	250.0	72	1.1	82.9
8	0.7	92.9	5.72	343.0	286.0	69	0.5	83.4
9	1.8	94.7	6.44	386.0	322.0	65	1.2	84.6
10	1.3	96.0	7.16	429.0	358.0	63	0.8	85.4
11	0.9	96.9	7.87	472.0	394.0	59	0.5	85.9
12	0.4	97.3	8.59	515.0	429.0	58	0.2	86.2
13	0.4	97.7	9.30	558.0	465.0	57	0.2	86.4
14	0.4	98.1	10.02	601.0	501.0	57	0.2	86.6
15	0.2	98.3	10.73	644.0	537.0	57	0.1	86.7
16	0.0	98.3	11.45	687.0	572.0	56	0.0	86.7
17	0.0	98.3	12.16	730.0	608.0	56	0.0	86.7
18	0.2	98.5	12.88	773.0	644.0	56	0.1	86.8
19	0.0	98.5	13.60	816.0	680.0	56	0.0	86.8
20	0.0	98.5	14.31	859.0	716.0	55	0.0	86.8
21	0.0	98.5	15.03	902.0	751.0	55	0.0	86.8
22	0.0	98.5	15.74	945.0	787.0	55	0.0	86.8
23	0.0	98.5	16.46	987.0	823.0	55	0.0	86.8
24	0.4	98.9	17.17	1030.0	859.0	55	0.2	87.1
25	0.0	98.9	17.89	1073.0	894.0	55	0.0	87.1

Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
26	0.2	99.1	18.60	1116.0	930.0	54	0.1	87.2
27	0.0	99.1	19.32	1159.0	966.0	54	0.0	87.2
28	0.0	99.1	20.04	1202.0	1002.0	54	0.0	87.2
29	0.2	99.3	20.75	1245.0	1038.0	54	0.1	87.3
30	0.0	99.3	21.47	1288.0	1073.0	55	0.0	87.3
31	0.0	99.3	22.18	1331.0	1109.0	55	0.0	87.3
32	0.2	99.5	22.90	1374.0	1145.0	56	0.1	87.4
33	0.2	99.7	23.61	1417.0	1181.0	56	0.1	87.5
34	0.0	99.7	24.33	1460.0	1216.0	57	0.0	87.5
35	0.0	99.7	25.05	1503.0	1252.0	57	0.0	87.5
36	0.0	99.7	25.76	1546.0	1288.0	58	0.0	87.5
37	0.0	99.7	26.48	1589.0	1324.0	58	0.0	87.5
38	0.0	99.7	27.19	1632.0	1360.0	59	0.0	87.5
39	0.0	99.7	27.91	1674.0	1395.0	59	0.0	87.5
40	0.0	99.7	28.62	1717.0	1431.0	58	0.0	87.5
41	0.0	99.7	29.34	1760.0	1467.0	57	0.0	87.5
42	0.0	99.7	30.05	1803.0	1503.0	55	0.0	87.5
43	0.0	99.7	30.77	1846.0	1538.0	54	0.0	87.5
44	0.0	99.7	31.49	1889.0	1574.0	53	0.0	87.5
45	0.0	99.7	32.20	1932.0	1610.0	51	0.0	87.5
46	0.0	99.7	32.92	1975.0	1646.0	50	0.0	87.5
47	0.2	99.9	33.63	2018.0	1682.0	49	0.1	87.6
48	0.0	99.9	34.35	2061.0	1717.0	48	0.0	87.6
49	0.0	99.9	35.06	2104.0	1753.0	47	0.0	87.6
50	0.0	99.9	35.78	2147.0	1789.0	46	0.0	87.6
Estimated Net Annual Sediment (TSS) Load Reduction =								**88 %**

RAINFALL DATA FROM TORONTO CENTRAL RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		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

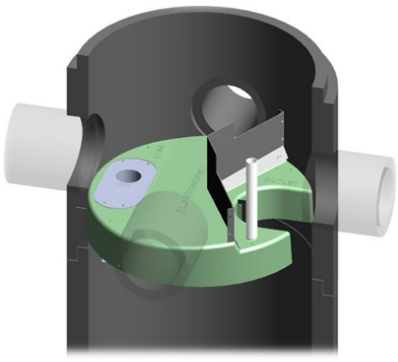
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test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

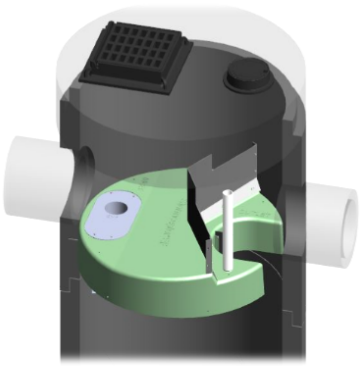
DESIGN FLEXIBILITY

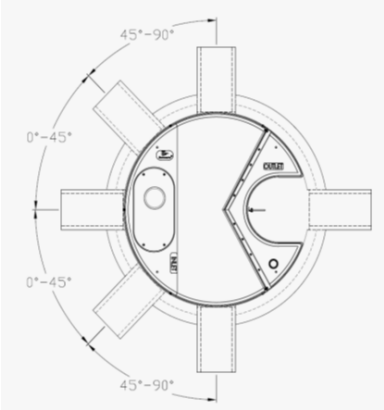
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend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