Self-Storage Development

Stormwater Management Report

Project Location:
Road 120
St. Marys, Ontario

Prepared For:
C&C Stonetown Management

Prepared by:
GRIT Engineering Inc.
169 Huron Street, Ontario

December 20, 2021
Revision 1

GRIT File No: GE021-21

PASSION, DETERMINATION, RESOLVE

GRIT ENGINEERING INC

Contents

Appendices

1.0 Introduction

GRIT Engineering Inc. (GRIT) was retained by C&C Stonetown Management to design the private stormwater management system for the proposed self-storage development to satisfy the site plan approval requirements set forth by the Town of St. Marys.

The proposed development is located on the south side of Highway 9 and west of Road 120 in St. Marys, Ontario and is approximately 2.04 hectares in size. The site is bounded by existing Highway Commercial (zone C3-7) to the west, existing agricultural (zone A) to the east, existing agricultural (zone A-16) to the south and existing Highway Commercial (zone C3) to the north. Figure 1 provides a 2018 aerial image, illustrating the site location and surrounding characteristics.

The Stormwater Management (SWM) report will provide the necessary background and proposed design information to address the site plan approval requirements for the subject site. Furthermore, this SWM report is to be read in conjunction with the included GRIT engineering design drawings, which provides details the proposed design and construction details.

IMAGE SOURCE: MICROSOFT BING MAPS

GRIT ENGINEERING INC

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STRATFORD, ON
N5A 5S9
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Legend

Project:

ROAD 120
SELF STORAGE UNITS

Figure Title:

SITE LOCATION
ST. MARYS, ON.

Figure No:

FIGURE 1

2.0 Design Requirements for Approval

The Town of St. Marys as part of the Site Plan Approval for the development requires the proposed development to meet the following stormwater management design requirements:

Stormwater Quantity Control Requirement

In accordance with Section 6.2.4 of the May 2017 Town of St. Marys Engineering Design Guidelines and Supplemental Specifications for Municipal Services, the post development peak flow rates are to be controlled to the corresponding predevelopment (allowable) peak flow rates for the 2 year through to the 250 year storm events.

Stormwater Quality Control Requirement

In accordance with Section 6. required "Enhanced" Level of treatment as defined in the Ministry of the Environment, Conservation and Parks (MECP) Stormwater Management Planning and Design Manual. It is recommended that the proposed site be designed to promote natural removal of sediment for post 2.1 of the Town of St. Marys Engineering Design Guidelines and Supplemental Specifications for Municipal Services, the post development flows are to be designed to meet the development flows.

3.0 Stormwater Management Design

3.1 Design Approach

Calculation Method

In accordance with Section 5.3 of the Town of St. Marys Engineering Design Guidelines and Supplemental Specifications for Municipal Services, rational method calculations are required. Therefore, GRIT will use the rational method calculations to review the predevelopment (allowable) and post development peak flow rates. When using the rational method calculations, The Town of St. Marys requires the use of time of concentration from Section 5.3.2, and runoff coefficient parameters from Section 5.3.3. When using the rational method calculations, GRIT recommends the runoff coefficients be increased 10% for the 25 year storm, 20% for the 50 year storm, and 25% for the 100 year storm events.

Site Review Methodology

To complete a stormwater management design for the development that achieves the previously noted requirements set forth by the Town of St. Marys, GRIT will complete the following:

- Review of the existing drainage and overland flow route patterns and site characteristics.
- Calculate the predevelopment (allowable) runoff coefficients and peak flow rates for the 2, 5, 10, 25, 50, 100 and 250 year storm events.
- Calculate the post development runoff coefficients and peak flow rates for the 2, 5, 10, 25, 50, 100 and 250 year storm events.
- Determine the onsite quantity control structures based on proposed site characteristics and accurately calculate the size requirements.
- Determine the required onsite stormwater storage volume and surface ponding elevations.
- Review and evaluate stormwater quality control techniques and structures.

3.2 Predevelopment Condition

In a predevelopment condition the site is comprised of a residential building, shed and garage/barn, gravel parking areas, and vegetated areas. The Site generally slopes to the northwest corner of the property.

Stormwater minor and major flows are directed overland towards the northwest of the site. Those flows then continue northwesterly where it is intercepted at the northwest

grocery store. External flows to the south of the site flow overland on the cultivated field towards an existing drainage draw southwest of the site.

Figure 2 illustrates the predevelopment catchment areas, the site characteristics analysis, existing drainage and overland flow pattern.

3.3 Post Development Condition

In the ultimate post development condition, the site is comprised of six self-storage buildings and outside gravel storage area, two residential buildings, gravel parking areas, and vegetated areas. Figure 3 illustrates the proposed ultimate site and the site characteristics analysis chart.

Controlled stormwater minor flows are directed through on site swales and a private storm sewer. Flows are intercepted at a rear grassed swale to the west of the site where stormwater major flows will be overcontrolled and ultimately discharged at the northwest portion of the site.

Uncontrolled flows for minor and major flows will maintain the existing drainage patterned and outlet towards the northern site boundary.

3.4 Quantity Control Summary

To meet the stormwater management quantity control criteria as noted in Section 2 of this report, a 200mm diameter PVC storm pipe will be installed in the storm ditch inlet catchbasin with a 190mm orifice installed (ST-DICB 10) at elevation 325.04m. Sufficient stormwater retention volumes will be provided for the major storm events, while being controlled by the proposed outlet. A 1.3m wide turfstone weir will be installed at an elevation of 325.75m to allow for flows over the 10 year to outlet while maintaining predevelopment flows. Discharge from the weir will be directed over a rip rap spillway toward the northwest corner of the site.

To accommodate the reduced minor and major stormwater flows, the underground storm infrastructure and proposed grading (surface storage) will be used to provide the stormwater retention volumes required. Refer to Appendix A for stage storage discharge and proposed design calculations.

Figure 4 illustrates the location of the proposed stormwater controls, proposed ponding elevations and a design summary chart.

3.5 Quality Control Summary

To meet the recommended stormwater management quality control criteria, as noted in Section 2 of this report, low lot level grassed retention area and a 1200mm diameter First

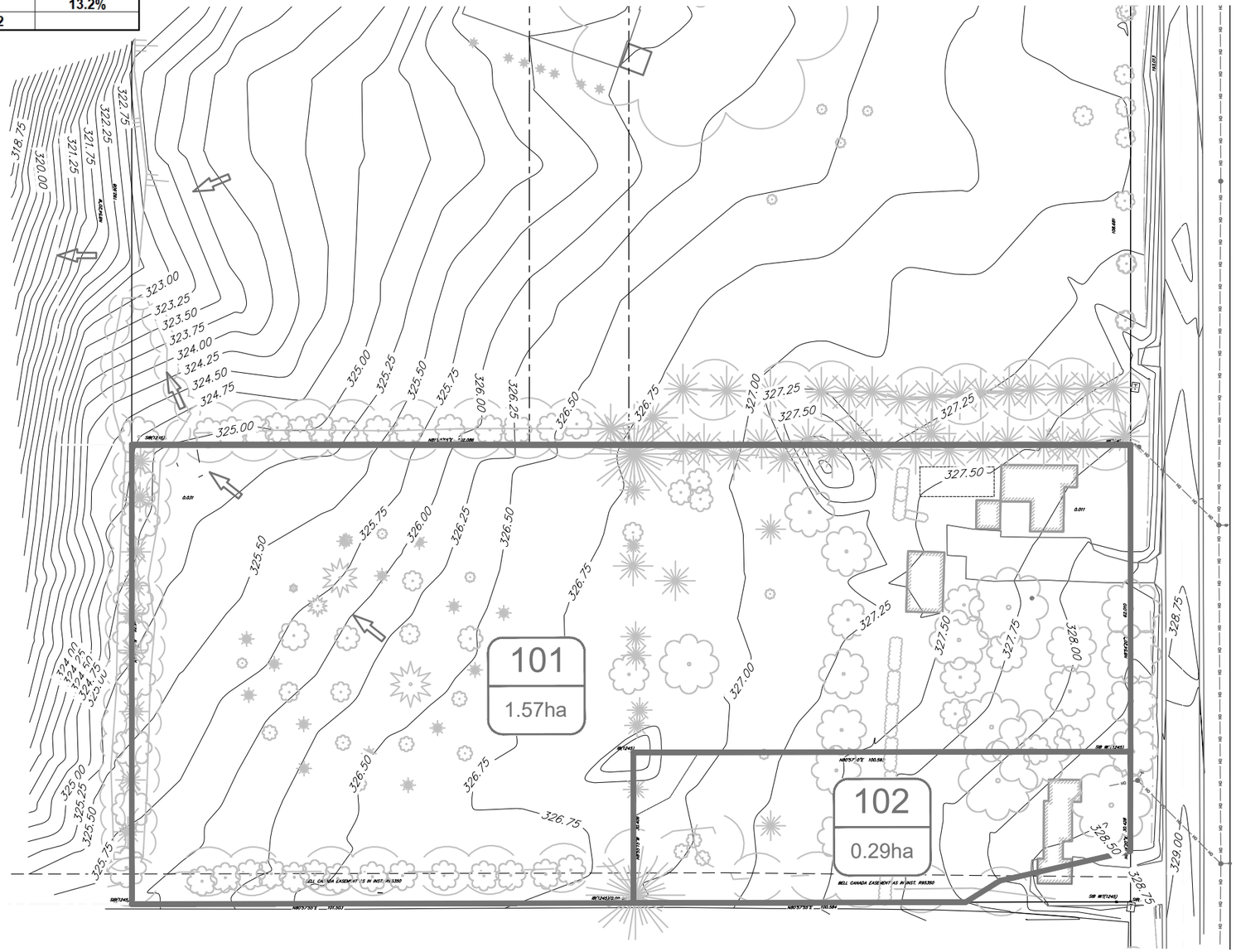
Defense, model FD-4HC oil grit separator or approved equivalent is proposed for the development. The FD-4HC (ST-OGS 11) is proposed to be installed inline and downstream form the proposed orifice and provides 84.0% removal of total suspended solids (TSS).

Refer to Appendix B for oil grit separator sizing summary, typical details and Operations and Maintenance information.

3.6 Erosion & Sedimentation Control

Erosion and sediment controls are proposed for the site design as illustrated on GRIT Engineering Drawing C300 and further detailed on C500. The proposed measures include sediment control fencing and sediment silt sacs to be installed prior to the start of any construction and maintained with regular maintenance by the contractor until the development is complete with final surface and vegetation stabilized with mature growth.

CATCHMENT AREA CHARACTERISTICS						
CATCHMENT	AREA (m^2)	BUILDING (m^2)	LANDSCAPED (m^2)	ASP/CONC. (m^2)	GRAVEL (m^2)	PERCENT IMPERVIOUS (m^2)
101	15,668.61	265.12	15,104.47		299.02	**13.0%**
102	2,850.93	102.70	2,748.23			**13.2%**
Total	**18,519.54**	**367.82**	**17,852.70**	**0.00**	**299.02**	



SCALE 1:1000

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Legend

CATCHMENT 101

CATCHMENT PARAMETER — 101 / 0.123

EX. OVERLAND FLOW ROUTE

Project:
ROAD 120
SELF STORAGE UNITS

Figure Title:
PREDEVELOPMENT
CATCHMENTS

Figure No:
FIGURE 2

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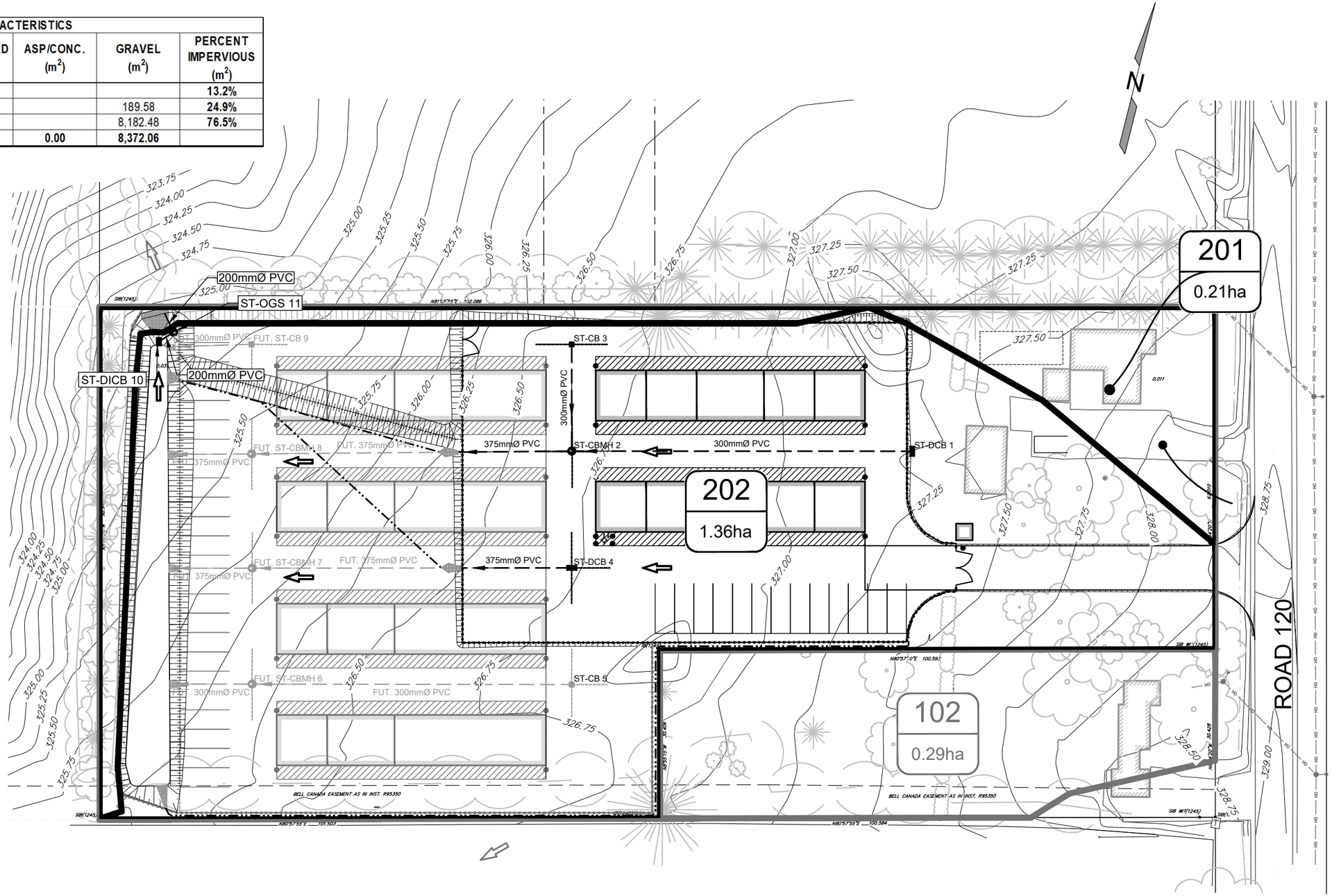
CATCHMENT AREA CHARACTERISTICS						
CATCHMENT	AREA (m^2)	BUILDING (m^2)	LANDSCAPED (m^2)	ASP/CONC. (m^2)	GRAVEL (m^2)	PERCENT IMPERVIOUS (m^2)
102	2,850.93	102.70	2,748.23			**13.2%**
201	2,071.14	175.06	1,706.50		189.58	**24.9%**
202	13,597.47	2,774.40	2,640.59		8,182.48	**76.5%**
Total	**18,519.54**	**3,052.16**	**7,095.32**	**0.00**	**8,372.06**	



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Legend

CATCHMENT BOUNDARY

CATCHMENT PARAMETER — 201 / 0.123

EX. OVERLAND FLOW ROUTE

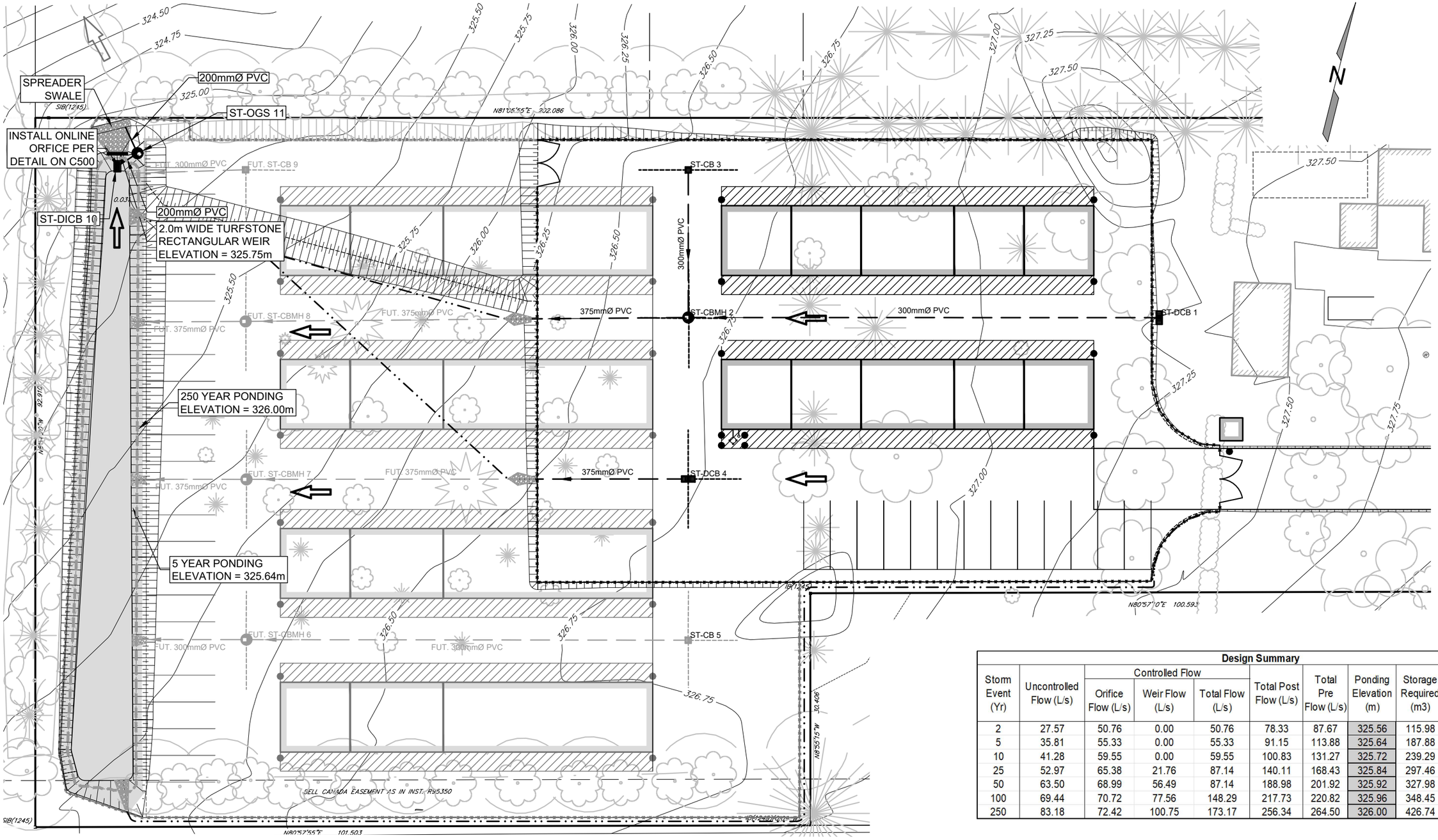
PROPOSED SWALE — 0.2%

PROPOSED STORM SEWER

Project:
ROAD 120
SELF STORAGE UNITS

Figure Title:
POST DEVELOPMENT CATCHMENTS

Figure No:
FIGURE 3



Design Summary

Storm Event (Yr)	Uncontrolled Flow (L/s)	Controlled Flow			Total Post Flow (L/s)	Total Pre Flow (L/s)	Ponding Elevation (m)	Storage Required (m3)	Ponding Volume (m3)	Ponding Depth (m)
		Orifice Flow (L/s)	Weir Flow (L/s)	Total Flow (L/s)						
2	27.57	50.76	0.00	50.76	78.33	87.67	325.56	115.98	145.36	0.52
5	35.81	55.33	0.00	55.33	91.15	113.88	325.64	187.88	192.09	0.60
10	41.28	59.55	0.00	59.55	100.83	131.27	325.72	239.29	241.48	0.68
25	52.97	65.38	21.76	87.14	140.11	168.43	325.84	297.46	320.58	0.80
50	63.50	68.99	56.49	87.14	188.98	201.92	325.92	327.98	376.68	0.88
100	69.44	70.72	77.56	148.29	217.73	220.82	325.96	348.45	405.75	0.92
250	83.18	72.42	100.75	173.17	256.34	264.50	326.00	426.74	435.51	0.96

SCALE 1:500

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Legend

- PROPOSED STORM SEWER (ST-MH1)
- PROPOSED STORM STRUCTURE
- PROPOSED SWALE (0.2%)
- PROPOSED 5 YEAR PONDING ELEVATION
- PROPOSED 250 YEAR PONDING ELEVATION
- EX. STORM SEWER (EX. MH)
- EX. SANITARY SEWER
- EX. WATERMAIN (EX. VALVE, EX. FH)

Project:
ROAD 120
SELF STORAGE UNITS

Figure Title:
STORMWATER MANAGEMENT SKETCH

Figure No:
FIGURE 4

4.0 Design Summary

4.1 The predevelopment and post development characteristics of the site were analyzed and an increase in imperviousness was calculated in the post development condition and therefore quantity control will be required.

4.2 The proposed 190mm diameter orifice stormwater control in ditch inlet catchbasin ST-DICB 10 will restrict the post development peak flows to less than the allowable peak flow for the 2 year through to the 250 year storm event utilizing the available stormwater retention.

4.3 A 1.3m wide Turfstone weir will be installed at an elevation of 325.75m to discharge additional predevelopment flows over the 10 year design storm.

4.4 The post development minor and major stormwater flows will outlet to the northwest of the site over a rip rap spillway.

4.5 The proposed low lot level dry retention area and sumps should provide adequate natural sedimentation to occur in addition to a proposed oil grit separator model FD-4HC by ADS Canada or approved equivalent to provide the required MECP *'Enhanced'* quality control requirements.

5.0 Design Recommendations

The proposed design recommends the following be installed and constructed in accordance with the GRIT Engineering drawings located in Appendix B:

5.1 Install a 190mm diameter orifice in ditch inlet catchbasin ST-DICB 10, at an elevation of 325.04m, as shown on drawing C300 and further detailed on C500;

5.2 Construct a 1.3m wide Turfstone weir at an elevation of 325.75m to discharge additional pre-development flows over the 10 year design storm;

5.3 Construct an oil grit separator (ST-OGS 11) downstream of ST-DICB 10 to provide *"Enhanced"* level of treatment for the site;

5.4 Construct the proposed site grading to provide the required stormwater retention volume as shown on drawing C300; and

5.5 Install the proposed erosion and sediment control measures as shown on drawing C300 and further detailed on C500.

Yours respectfully,

GRIT Engineering Inc.

Dan Santos, C.Tech
Designer

Montana Wilson, EMBA, M.Eng, P.Eng, PMP
Founder & CEO

Appendix A

Stormwater Quantity Control Calculations

File No. GE021-21

GRIT ENGINEERING INC

STORMWATER MANAGEMENT
CALCULATION FORMULA'S

Project No.: GE021-21
Project Name: Road 120 Self Storage
Project Location: St. Mary
Designer: Dan Santos, C.Tech
Engineer: Montana Wilson, EMBA, M.Eng, P.Eng, PMP
Date: 15-Dec-21

Rainfall Intensity Formula

$I = A/(B+t)^C$

A =*IDF Parameter*
B =*IDF Parameter*
C =*IDF Parameter*
t =Time (Min.)

Modified Rational Method Formula

$Q = kCIA$

k =*2.78*
C =*Runoff coefficient*
I =*Rainfall intensity (mm/hr)*
A =*Contribution area (ha)*

Online Orifice

$Q = Ca\sqrt{2gh}$

C =Discharge Coefficient
a =Cross sectional area of orifice (m2)
g =Constant of Gravitational Pull (9.81 m/s2)
h =Total Head (m)

Weir **Rectangular**

Q =cLH 3/2
c =Discharge Coefficient
L =Length of Weir (m)
H =Maximum head (m)

Rainfall Parameters: **Stratford**

Rainfall Event	A	B	C
2 Year	601.090	4.922	0.767
5 Year	875.105	7.641	0.762
10 Year	1062.156	9.025	0.760
25 Year	1319.273	10.500	0.762
50 Year	1560.739	12.129	0.767
100 Year	1821.990	13.507	0.773
250 Year	2095.179	13.509	0.773

STORMWATER MANAGEMENT CALCULATIONS

PREDEVELOPMENT CONDITION

Project No.: GE021-21
Project Name: Road 120 Self Storage
Project Location: St. Mary
Designer: Dan Santos, C.Tech
Engineer: Montana Wilson, EMBA, M.Eng, P.Eng, PMP
Date: 15-Dec-21

Catchment Number: Catchment 101 - Outlets to NW corner of site

Catchment Characteristics:

Surface Material	Area (m2) **(A)**	Percent Impervious	Coefficient **(C)**
Building	265.12	100%	0.90
Asphalt / Concrete	-	100%	0.90
Gravel	299.02	90%	0.90
Grass	15,104.48	10%	0.20
Total / Average	15,668.62	13.0%	0.23

Rainfall Event (Year)	A	B	C	t (min)	Intensity (mm/hr)	C' Multiplier	C	Q (L/s)
2	601.090	4.922	0.767	10	75.616	1.00	0.23	74.18
5	875.105	7.641	0.762	10	98.22	1.00	0.23	96.35
10	1062.156	9.025	0.760	10	113.21	1.00	0.23	111.06
25	1319.273	10.500	0.762	10	132.06	1.10	0.25	142.50
50	1560.739	12.129	0.767	10	145.13	1.20	0.27	170.83
100	1821.990	13.507	0.773	10	158.71	1.20	0.27	186.83
250	2095.179	13.509	0.773	10	182.50	1.25	0.28	223.78

Catchment Number: Catchment 102 - Outlets to NW corner of site

Catchment Characteristics:

Surface Material	Area (m2) **(A)**	Percent Impervious	Coefficient **(C)**
Building	102.70	100%	0.90
Asphalt / Concrete	-	100%	0.90
Gravel	-	90%	0.90
Grass	2,748.23	10%	0.20
Total / Average	2,850.93	13.2%	0.23

Rainfall Event (Year)	A	B	C	t (min)	Intensity (mm/hr)	C' Multiplier	C	Q (L/s)
2	601.090	4.922	0.767	10	75.616	1.00	0.23	13.50
5	875.105	7.641	0.762	10	98.22	1.00	0.23	17.53
10	1062.156	9.025	0.760	10	113.21	1.00	0.23	20.21
25	1319.273	10.500	0.762	10	132.06	1.10	0.25	25.93
50	1560.739	12.129	0.767	10	145.13	1.20	0.27	31.09
100	1821.990	13.507	0.773	10	158.71	1.20	0.27	34.00
250	2095.179	13.509	0.773	10	182.50	1.25	0.28	40.72

STORMWATER MANAGEMENT CALCULATIONS

PROPOSED DEVELOPMENT - CHARACTERISTICS

Project No.: GE021-21
Project Name: Road 120 Self Storage
Project Location: St. Mary
Designer: Dan Santos, C.Tech
Engineer: Montana Wilson, EMBA, M.Eng, P.Eng, PMP
Date: 15-Dec-21

Uncontrolled Catchment: Catchment 102 & 201 - Outlets to NW corner of site

Catchment Characteristics:

Surface Material	Area (m2) **(A)**	Percent Impervious	Coefficient **(C)**
Building	277.76	100%	0.90
Asphalt / Concrete	-	100%	0.90
Gravel	189.58	90%	0.90
Grass	4,454.73	20%	0.20
Total / Average	4,922.07	27.2%	0.27

Rainfall Event (Year)	A	B	C	t (min)	Intensity (mm/hr)	C' Multiplier	C	Q (L/s)
2	601.090	4.922	0.767	10	75.616	1.00	0.27	27.57
5	875.105	7.641	0.762	10	98.22	1.00	0.27	35.81
10	1062.156	9.025	0.760	10	113.21	1.00	0.27	41.28
25	1319.273	10.500	0.762	10	132.06	1.10	0.29	52.97
50	1560.739	12.129	0.767	10	145.13	1.20	0.32	63.50
100	1821.990	13.507	0.773	10	158.71	1.20	0.32	69.44
250	2095.179	13.509	0.773	10	182.50	1.25	0.33	83.18

Controlled Catchment: Catchment 202 - Outlets to NW corner of site

Catchment Characteristics:

Surface Material	Area (m2) **(A)**	Percent Impervious	Coefficient **(C)**
Building	2,774.40	100%	0.90
Asphalt / Concrete	-	100%	0.90
Gravel	8,182.48	90%	0.90
Grass	2,640.59	20%	0.20
Total / Average	13,597.47	78.4%	0.76

Rainfall Event (Year)	A	B	C	t (min)	Intensity (mm/hr)	C' Multiplier	C	Q (L/s)
2	601.090	4.922	0.767	10	75.616	1.00	0.76	218.40
5	875.105	7.641	0.762	10	98.22	1.00	0.76	283.69
10	1062.156	9.025	0.760	10	113.21	1.00	0.76	326.99
25	1319.273	10.500	0.762	10	132.06	1.10	0.84	419.57
50	1560.739	12.129	0.767	10	145.13	1.20	0.92	502.99
100	1821.990	13.507	0.773	10	158.71	1.20	0.92	550.08
250	2095.179	13.509	0.773	10	182.50	1.25	0.96	658.87

STORMWATER MANAGEMENT CALCULATIONS

PROPOSED DEVELOPMENT - DESIGN INFORMATION

Project No.: GE021-21
Project Name: Road 120 Self Storage
Project Location: St. Mary
Designer: Dan Santos, C.Tech
Engineer: Montana Wilson, EMBA, M.Eng, P.Eng, PMP
Date: 15-Dec-21

Stage Storage Discharge Pond Characteristics

Top of Grate Elevation=	325.04	m
Max Ponding Elevation=	326.00	m
Elevation Increment=	0.04	m
No of Stages=	25	
Volume in Structures=	3.5	m^3

Stage Storage Discharge

Stage	Elevation (m)	Surface Volume (m^3)	Total Volume (m^3)
1	325.04	0.00	3.50
2	325.08	0.20	3.70
3	325.12	1.33	4.83
4	325.16	3.74	7.24
5	325.20	7.74	11.24
6	325.24	13.56	17.06
7	325.28	21.42	24.92
8	325.32	31.48	34.98
9	325.36	43.96	47.46
10	325.40	59.07	62.57
11	325.44	77.03	80.53
12	325.48	97.74	101.24
13	325.52	119.47	122.97
14	325.56	141.86	145.36
15	325.60	164.90	168.40
16	325.64	188.59	192.09
17	325.68	212.95	216.45
18	325.72	237.98	241.48
19	325.76	263.67	267.17
20	325.80	290.04	293.54
21	325.84	317.08	320.58
22	325.88	344.79	348.29
23	325.92	373.18	376.68
24	325.96	402.25	405.75
25	326.00	432.01	435.51
26			
27			
28			
29			
30			

Design Summary

Storm Event (Yr)	Uncontrolled Flow (L/s)	Controlled Flow			Total Post Flow (L/s)	Total Pre Flow (L/s)	Ponding Elevation (m)	Storage Required (m3)	Ponding Volume (m3)	Ponding Depth (m)
		Orifice Flow (L/s)	Weir Flow (L/s)	Total Flow (L/s)						
2	27.57	50.76	0.00	50.76	78.33	87.67	325.56	115.98	145.36	0.52
5	35.81	55.33	0.00	55.33	91.15	113.88	325.64	187.88	192.09	0.60
10	41.28	59.55	0.00	59.55	100.83	131.27	325.72	239.29	241.48	0.68
25	52.97	65.38	21.76	87.14	140.11	168.43	325.84	297.46	320.58	0.80
50	63.50	68.99	56.49	87.14	188.98	201.92	325.92	327.98	376.68	0.88
100	69.44	70.72	77.56	148.29	217.73	220.82	325.96	348.45	405.75	0.92
250	83.18	72.42	100.75	173.17	256.34	264.50	326.00	426.74	435.51	0.96

Online Orifice $=Ca\sqrt{2gh}$

Orifice Diameter	190.00	mm
Invert Elevation	325.04	m
Orifice Area	0.0284	m2
Weir Coefficient	0.62	

Weir $=cLH^{3/2}$

Elevation	325.75
c	0.62
L	1.30
H	Varies

GRIT ENGINEERING INC

STORMWATER MANAGEMENT CALCULATIONS

PROPOSED DEVELOPMENT - 2 YEAR SWM

Predevelopment Flow Rate	87.67 L/s
Proposed Flow Rate	78.33 L/s

Project No.: GE021-21
Project Name: Road 120 Self Storage
Project Location: St. Mary
Designer: Dan Santos, C.Tech
Engineer: Montana Wilson, EMBA, M.Eng, P.Eng, PMP
Date: 15-Dec-21

Orifice Details	
Size	190.00 mm
Elevation	325.04 m
Area	0.0284 m^2
Coefficient	0.62
Head	0.52 m
Flow	50.76 L/s

Catchment Characteristics		
	Uncontrolled Catchment	**Controlled Catchment**
Area (Ha) (A)	0.49	1.36
Coefficient (C)	0.27	0.76

IDF Parameters		
A	B	C
601.090	4.922	0.767

Weir Details	
Elevation	325.75 m
Coefficient	0.62
Length	1.3 m
Head	0.00 m
Flow	0 L/s

Total Controlled Flow= 50.76 L/s

Storage Required=	115.98 m^3
Storage Available=	145.36 m^3
Ponding Elevation=	325.56 m

Design Chart

Time (min)	Intensity (I) (mm/hr) *(A/(B+t) C)*	Uncontrolled Flow (L/s) *(=2.78CIA)*	Controlled Flow (L/s) *(=2.78CIA)*	Storage Volume Required	Total Site Flow (L/s)
10	75.62	27.57	218.40	100.58	78.33
15	60.58	22.09	174.98	111.79	72.85
20	51.02	18.60	147.36	115.92	69.36
25	44.35	16.17	128.08	115.98	66.93
30	39.39	14.36	113.77	113.41	65.12
35	35.55	12.96	102.67	109.01	63.72
40	32.47	11.84	93.79	103.26	62.60
45	29.95	10.92	86.49	96.48	61.68
50	27.83	10.15	80.39	88.88	60.91
55	26.03	9.49	75.19	80.62	60.25
60	24.48	8.93	70.71	71.81	59.69
65	23.13	8.43	66.80	62.54	59.19
70	21.93	8.00	63.35	52.87	58.76
75	20.87	7.61	60.29	42.87	58.37
80	19.92	7.26	57.55	32.57	58.03
85	19.07	6.95	55.08	22.00	57.71
90	18.29	6.67	52.84	11.20	57.43

GRIT ENGINEERING INC

STORMWATER MANAGEMENT CALCULATIONS

PROPOSED DEVELOPMENT - 5 YEAR SWM

Predevelopment Flow Rate	113.88 L/s
Proposed Flow Rate	91.15 L/s

Project No.: GE021-21
Project Name: Road 120 Self Storage
Project Location: St. Mary
Designer: Dan Santos, C.Tech
Engineer: Montana Wilson, EMBA, M.Eng, P.Eng, PMP
Date: 15-Dec-21

Orifice Details	
Size	190.00 mm
Elevation	325.04 m
Area	0.0284 m^2
Coefficient	0.62
Head	0.60 m
Flow	55.33 L/s

Catchment Characteristics		
	Uncontrolled Catchment	**Controlled Catchment**
Area (Ha) (A)	0.49	1.36
Coefficient (C)	0.27	0.76

IDF Parameters		
A	B	C
875.105	7.641	0.762

Weir Details	
Elevation	325.75 m
Coefficient	0.62
Length	1.3 m
Head	0.00 m
Flow	0 L/s

Total Controlled Flow= 55.33 L/s

Storage Required=	187.88 m^3
Storage Available=	192.09 m^3
Ponding Elevation=	325.64 m

Design Chart					
Time (min)	Intensity (I) (mm/hr) *(A/(B+t) C)*	Uncontrolled Flow (L/s) *(=2.78CIA)*	Controlled Flow (L/s) *(=2.78CIA)*	Storage Volume Required	Total Site Flow (L/s)
10	98.22	35.81	283.69	137.01	91.15
15	81.21	29.61	234.56	161.31	84.94
20	69.76	25.43	201.48	175.37	80.77
25	61.46	22.41	177.50	183.25	77.74
30	55.13	20.10	159.23	187.02	75.43
35	50.13	18.28	144.80	187.88	73.61
40	46.07	16.80	133.07	186.56	72.13
45	42.70	15.57	123.32	183.57	70.90
50	39.85	14.53	115.08	179.25	69.86
55	37.40	13.64	108.02	173.85	68.97
60	35.27	12.86	101.88	167.55	68.19
65	33.41	12.18	96.49	160.50	67.51
70	31.75	11.58	91.72	152.81	66.91
75	30.28	11.04	87.46	144.55	66.37
80	28.95	10.56	83.63	135.81	65.89
85	27.76	10.12	80.17	126.65	65.45
90	26.67	9.72	77.02	117.10	65.06

GRIT ENGINEERING INC

STORMWATER MANAGEMENT CALCULATIONS

PROPOSED DEVELOPMENT - 10 YEAR SWM

Predevelopment Flow Rate	131.27 L/s
Proposed Flow Rate	100.83 L/s

Project No.: GE021-21
Project Name: Road 120 Self Storage
Project Location: St. Mary
Designer: Dan Santos, C.Tech
Engineer: Montana Wilson, EMBA, M.Eng, P.Eng, PMP
Date: 15-Dec-21

Orifice Details	
Size	190.00 mm
Elevation	325.04 m
Area	0.0284 m^2
Coefficient	0.62
Head	0.68 m
Flow	59.55 L/s

Catchment Characteristics		
	Uncontrolled Catchment	**Controlled Catchment**
Area (Ha) (A)	0.49	1.36
Coefficient (C)	0.27	0.76

IDF Parameters		
A	B	C
1062.156	9.025	0.760

Weir Details	
Elevation	325.75 m
Coefficient	0.62
Length	1.3 m
Head	0.00 m
Flow	0 L/s

Total Controlled Flow= 59.55 L/s

Storage Required=	239.29 m^3
Storage Available=	241.48 m^3
Ponding Elevation=	325.72 m

Design Chart

Time (min)	Intensity (I) (mm/hr) *(A/(B+t) C)*	Uncontrolled Flow (L/s) *(=2.78CIA)*	Controlled Flow (L/s) *(=2.78CIA)*	Storage Volume Required	Total Site Flow (L/s)
10	113.21	41.28	326.99	160.46	100.83
15	94.82	34.57	273.85	192.87	94.13
20	82.13	29.94	237.20	213.17	89.50
25	72.78	26.54	210.21	225.98	86.09
30	65.58	23.91	189.41	233.74	83.47
35	59.84	21.82	172.83	237.87	81.37
40	55.14	20.10	159.26	239.29	79.66
45	51.22	18.67	147.93	238.61	78.23
50	47.89	17.46	138.30	236.25	77.01
55	45.02	16.41	130.02	232.52	75.97
60	42.52	15.50	122.79	227.66	75.06
65	40.31	14.70	116.44	221.84	74.25
70	38.36	13.99	110.79	215.21	73.54
75	36.61	13.35	105.75	207.87	72.90
80	35.04	12.78	101.20	199.91	72.33
85	33.61	12.26	97.09	191.41	71.81
90	32.32	11.78	93.34	182.42	71.34

GRIT ENGINEERING INC

STORMWATER MANAGEMENT CALCULATIONS

PROPOSED DEVELOPMENT - 25 YEAR SWM

Predevelopment Flow Rate	168.43 L/s
Proposed Flow Rate	140.11 L/s

Project No.: GE021-21
Project Name: Road 120 Self Storage
Project Location: St. Mary
Designer: Dan Santos, C.Tech
Engineer: Montana Wilson, EMBA, M.Eng, P.Eng, PMP
Date: 15-Dec-21

Orifice Details	
Size	190.00 mm
Elevation	325.04 m
Area	0.0284 m^2
Coefficient	0.62
Head	0.80 m
Flow	65.38 L/s

Catchment Characteristics		
	Uncontrolled Catchment	**Controlled Catchment**
Area (Ha) (A)	0.49	1.36
Coefficient (C)	0.29	0.84

IDF Parameters		
A	B	C
1319.273	10.500	0.762

Weir Details	
Elevation	325.75 m
Coefficient	0.62
Length	1.3 m
Head	0.09 m
Flow	21.762 L/s

Total Controlled Flow= 87.14 L/s

Storage Required=	297.46 m^3
Storage Available=	320.58 m^3
Ponding Elevation=	325.84 m

Design Chart					
Time (min)	Intensity (I) (mm/hr) *(A/(B+t) C)*	Uncontrolled Flow (L/s) *(=2.78CIA)*	Controlled Flow (L/s) *(=2.78CIA)*	Storage Volume Required	Total Site Flow (L/s)
10	132.06	52.97	419.57	199.46	140.11
15	111.83	44.85	355.28	241.33	131.99
20	97.57	39.13	309.97	267.40	126.27
25	86.91	34.86	276.11	283.46	122.00
30	78.61	31.53	249.73	292.67	118.67
35	71.93	28.85	228.54	296.93	115.99
40	66.44	26.65	211.08	297.46	113.79
45	61.83	24.80	196.43	295.08	111.94
50	57.89	23.22	183.93	290.38	110.36
55	54.50	21.86	173.13	283.78	109.00
60	51.52	20.67	163.70	275.60	107.81
65	48.90	19.61	155.37	266.09	106.75
70	46.57	18.68	147.96	255.44	105.82
75	44.48	17.84	141.32	243.81	104.98
80	42.60	17.08	135.33	231.31	104.22
85	40.89	16.40	129.90	218.06	103.54
90	39.33	15.77	124.94	204.13	102.91

GRIT ENGINEERING INC

STORMWATER MANAGEMENT CALCULATIONS

PROPOSED DEVELOPMENT - 50 YEAR SWM

Predevelopment Flow Rate	201.92 L/s
Proposed Flow Rate	188.98 L/s

Project No.: GE021-21
Project Name: Road 120 Self Storage
Project Location: St. Mary
Designer: Dan Santos, C.Tech
Engineer: Montana Wilson, EMBA, M.Eng, P.Eng, PMP
Date: 15-Dec-21

Orifice Details	
Size	190.00 mm
Elevation	325.04 m
Area	0.0284 m^2
Coefficient	0.62
Head	0.88 m
Flow	68.99 L/s

Catchment Characteristics		
	Uncontrolled Catchment	**Controlled Catchment**
Area (Ha) (A)	0.49	1.36
Coefficient (C)	0.32	0.92

IDF Parameters		
A	B	C
1560.739	12.129	0.767

Weir Details	
Elevation	325.75 m
Coefficient	0.62
Length	1.3 m
Head	0.17 m
Flow	56.4948 L/s

Total Controlled Flow= 125.48 L/s

Storage Required=	327.98 m^3
Storage Available=	376.68 m^3
Ponding Elevation=	325.92 m

Design Chart					
Time (min)	Intensity (I) (mm/hr) *(A/(B+t) C)*	Uncontrolled Flow (L/s) *(=2.78CIA)*	Controlled Flow (L/s) *(=2.78CIA)*	Storage Volume Required	Total Site Flow (L/s)
10	145.13	63.50	502.99	226.50	188.98
15	124.13	54.31	430.23	274.27	179.79
20	109.03	47.70	377.88	302.88	173.19
25	97.58	42.69	338.20	319.08	168.18
30	88.57	38.75	306.97	326.67	164.23
35	81.27	35.56	281.66	327.98	161.04
40	75.22	32.91	260.70	324.52	158.39
45	70.12	30.68	243.02	317.34	156.16
50	65.75	28.77	227.87	307.16	154.25
55	61.96	27.11	214.74	294.53	152.59
60	58.64	25.65	203.22	279.86	151.14
65	55.70	24.37	193.04	263.47	149.85
70	53.08	23.22	183.96	245.61	148.71
75	50.73	22.19	175.81	226.46	147.68
80	48.60	21.26	168.44	206.21	146.75
85	46.67	20.42	161.75	184.97	145.90
90	44.91	19.65	155.64	162.86	145.13

GRIT ENGINEERING INC

STORMWATER MANAGEMENT CALCULATIONS

PROPOSED DEVELOPMENT - 100 YEAR SWM

Predevelopment Flow Rate	220.82 L/s
Proposed Flow Rate	217.73 L/s

Project No.: GE021-21
Project Name: Road 120 Self Storage
Project Location: St. Mary
Designer: Dan Santos, C.Tech
Engineer: Montana Wilson, EMBA, M.Eng, P.Eng, PMP
Date: 15-Dec-21

Orifice Details	
Size	190.00 mm
Elevation	325.04 m
Area	0.0284 m^2
Coefficient	0.62
Head	0.92 m
Flow	70.72 L/s

Catchment Characteristics		
	Uncontrolled Catchment	**Controlled Catchment**
Area (Ha) (A)	0.49	1.36
Coefficient (C)	0.32	0.92

Weir Details	
Elevation	325.75 m
Coefficient	0.62
Length	1.3 m
Head	0.21 m
Flow	77.5647 L/s

IDF Parameters		
A	B	C
1821.990	13.507	0.773

Total Controlled Flow= 148.29 L/s

Storage Required=	348.45 m^3
Storage Available=	405.75 m^3
Ponding Elevation=	325.96 m

Design Chart					
Time (min)	Intensity (I) (mm/hr) *(A/(B+t) C)*	Uncontrolled Flow (L/s) *(=2.78CIA)*	Controlled Flow (L/s) *(=2.78CIA)*	Storage Volume Required	Total Site Flow (L/s)
10	158.71	69.44	550.08	241.07	217.73
15	136.73	59.82	473.89	293.05	208.11
20	120.67	52.80	418.24	323.95	201.09
25	108.37	47.42	375.61	340.98	195.71
30	98.61	43.15	341.78	348.29	191.44
35	90.66	39.67	314.22	348.45	187.96
40	84.04	36.77	291.27	343.16	185.06
45	78.43	34.32	271.84	333.58	182.61
50	73.61	32.21	255.14	320.55	180.50
55	69.43	30.38	240.62	304.70	178.66
60	65.75	28.77	227.87	286.49	177.05
65	62.49	27.34	216.57	266.29	175.63
70	59.57	26.07	206.47	244.38	174.35
75	56.96	24.92	197.40	221.00	173.21
80	54.59	23.88	189.19	196.32	172.17
85	52.43	22.94	181.72	170.51	171.23
90	50.46	22.08	174.90	143.70	170.37

GRIT ENGINEERING INC

STORMWATER MANAGEMENT CALCULATIONS

PROPOSED DEVELOPMENT - 250 YEAR SWM

Predevelopment Flow Rate	264.50 L/s
Proposed Flow Rate	256.34 L/s

Project No.: GE021-21
Project Name: Road 120 Self Storage
Project Location: St. Mary
Designer: Dan Santos, C.Tech
Engineer: Montana Wilson, EMBA, M.Eng, P.Eng, PMP
Date: 15-Dec-21

Orifice Details	
Size	190.00 mm
Elevation	325.04 m
Area	0.0284 m^2
Coefficient	0.62
Head	0.96 m
Flow	72.42 L/s

Catchment Characteristics		
	Uncontrolled Catchment	**Controlled Catchment**
Area (Ha) (A)	0.49	1.36
Coefficient (C)	0.33	0.96

IDF Parameters		
A	B	C
2095.179	13.509	0.773

Weir Details	
Elevation	325.75 m
Coefficient	0.62
Length	1.3 m
Head	0.25 m
Flow	100.75 L/s

Total Controlled Flow= 173.17 L/s

Storage Required=	426.74 m^3
Storage Available=	435.51 m^3
Ponding Elevation=	326.00 m

Design Chart					
Time (min)	Intensity (I) (mm/hr) *(A/(B+t) C)*	Uncontrolled Flow (L/s) *(=2.78CIA)*	Controlled Flow (L/s) *(=2.78CIA)*	Storage Volume Required	Total Site Flow (L/s)
10	182.50	83.18	658.87	291.42	256.34
15	157.22	71.66	567.63	355.01	244.83
20	138.76	63.24	500.97	393.36	236.41
25	124.62	56.80	449.91	415.11	229.96
30	113.40	51.68	409.39	425.21	224.85
35	104.25	47.51	376.38	426.74	220.68
40	96.64	44.04	348.89	421.73	217.21
45	90.19	41.11	325.61	411.60	214.27
50	84.65	38.58	305.61	397.33	211.75
55	79.83	36.39	288.22	379.68	209.55
60	75.60	34.46	272.95	359.21	207.63
65	71.85	32.75	259.41	336.35	205.92
70	68.50	31.22	247.32	311.45	204.39
75	65.49	29.85	236.45	284.77	203.02
80	62.77	28.61	226.62	256.56	201.78
85	60.29	27.48	217.67	226.98	200.65
90	58.03	26.45	209.50	196.19	199.62

Appendix B

Oil Grit Sizing Summary

ADS OGS Sizing Summary

Project Name: 60 Road 120

Consulting Engineer: GRIT Engineering

Location: St. Mary's, ON

Sizing Completed By: C. Neath **Email:** cody.neath@ads-pipe.com

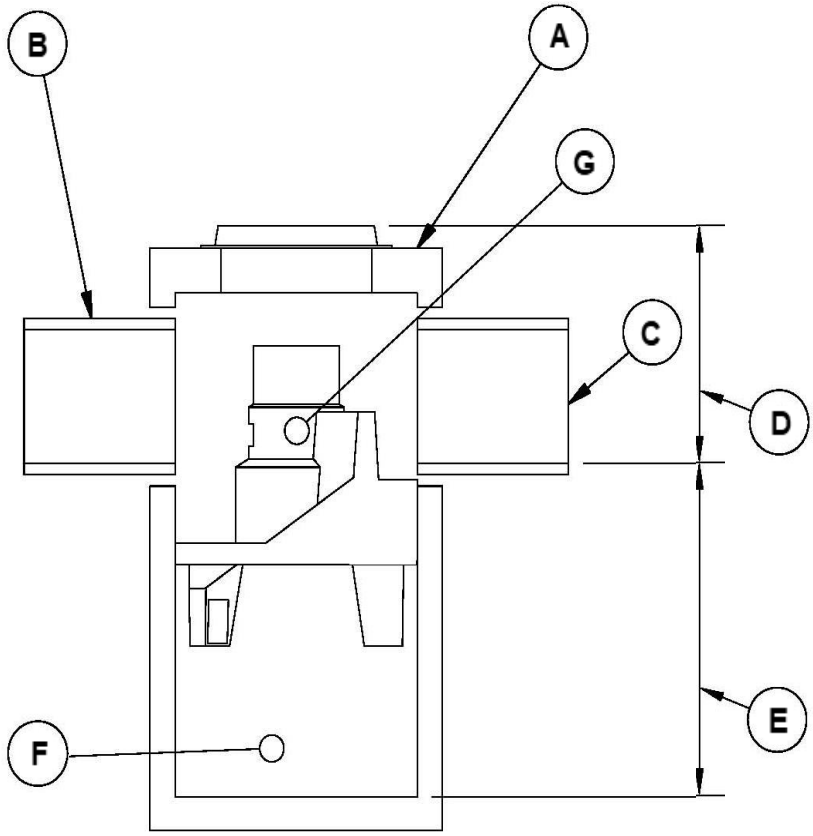
Treatment Requirements		
Treatment Goal:	Enhanced (MOE)	
Selected Parameters:	80% TSS	90% Volume
Selected Unit:	**FD-4HC**	

Site Details	
Site Area:	1.28 ha
% Impervious:	82%
Rational C:	0.79
Rainfall Station:	Stratford, ONT
Particle Size Distribution:	Fine
Peak Flowrate:	90 L/s

Summary of Results		
Model	**TSS Removal**	**Volume Treated**
FD-4HC	84.0%	99.1%
FD-5HC	88.0%	99.6%
FD-6HC	90.0%	99.9%
FD-8HC	94.0%	99.9%

FD-4HC Specification	
Unit Diameter (A):	1,200 mm
Inlet Pipe Diameter (B):	300 mm
Outlet Pipe Diameter (C):	300 mm
Height, T/G to Outlet Invert (D):	1460 mm
Height, Outlet Invert to Sump (E):	1515 mm
Sediment Storage Capacity (F):	0.78 m^3
Oil Storage Capacity (G):	723 L
Recommended Sediment Depth for Maintenance:	440 mm
Max. Pipe Diameter:	600 mm
Peak Flow Capacity:	510 L/s

Site Elevations:	
Rim Elevation:	326.51
Inlet Pipe Elevation:	325.05
Outlet Pipe Elevation:	325.05



Notes:

Removal efficiencies are based on NJDEP Test Protocols and independently verified.

All units supplied by ADS have numerous local, provincial, and international certifications (copies of which can be provided upon request). The design engineer is responsible for ensuring compliance with applicable regulations.

Project Name:	60 Road 120
Consulting Engineer:	GRIT Engineering
Location:	St. Mary's, ON

Net Annual Removal Efficiency Summary: FD-4HC

Rainfall Intensity[1]	Fraction of Rainfall[1]	FD-4HC Removal Efficiency[2]	Weighted Net-Annual Removal Efficiency
mm/hr	%	%	%
0.50	0.3%	100.0%	0.3%
1.00	15.5%	94.4%	14.7%
1.50	14.3%	90.9%	13.0%
2.00	13.6%	88.5%	12.0%
2.50	4.0%	86.7%	3.5%
3.00	2.3%	85.3%	2.0%
3.50	8.4%	84.1%	7.1%
4.00	4.6%	83.0%	3.9%
4.50	1.7%	82.1%	1.4%
5.00	4.8%	81.3%	3.9%
6.00	3.8%	79.9%	3.0%
7.00	4.2%	78.8%	3.3%
8.00	3.0%	77.8%	2.3%
9.00	2.2%	77.0%	1.7%
10.00	2.3%	76.2%	1.8%
20.00	9.3%	71.5%	6.7%
30.00	2.8%	68.8%	2.0%
40.00	1.2%	67.0%	0.8%
50.00	0.6%	65.6%	0.4%
100.00	0.8%	61.5%	0.5%
150.00	0.1%	59.3%	0.1%
200.00	0.0%	57.7%	0.0%
		Total Net Annual Removal Efficiency:	84.0%
		Total Runoff Volume Treated:	99.1%

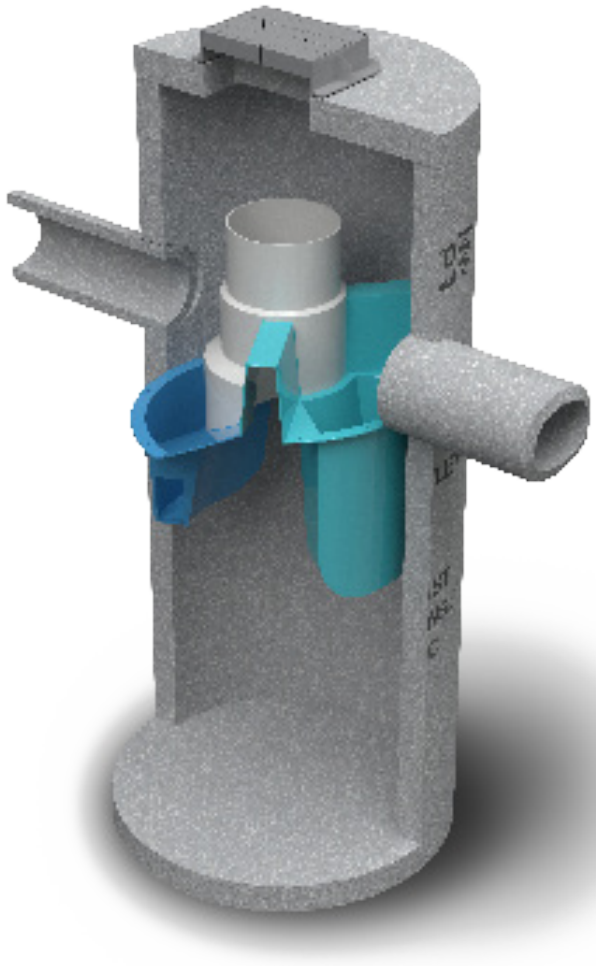
Notes:

(1) Rainfall Data: 1965:2007, HLY03, Stratford, ON, 6148105.

(2) Based on third party verified data and appoximating the removal of a PSD similar to the STC Fine distribution

(3) Rainfall adjusted to 5 min peak intensity based on hourly average.

Hydro International



Operation and Maintenance Manual

First Defense® High Capacity and First Defense®Optimum

Vortex Separator for Stormwater Treatment

Table of Contents

Hydro International (Stormwater), 94 Hutchins Drive, Portland ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com

I. First Defense® by Hydro International

Introduction

The First Defense® is an enhanced vortex separator that combines an effective and economical stormwater treatment chamber with an integral peak flow bypass. It efficiently removes total suspended solids (TSS), trash and hydrocarbons from stormwater runoff without washing out previously captured pollutants. The First Defense® is available in several model configurations to accommodate a wide range of pipe sizes, peak flows and depth constraints.

The two product models described in this guide are the First Defense® High Capacity and the First Defense® Optimum; they are inspected and maintained identically.

Operation

The First Defense® operates on simple fluid hydraulics. It is self-activating, has no moving parts, no external power requirement and is fabricated with durable non-corrosive components. No manual procedures are required to operate the unit and maintenance is limited to monitoring accumulations of stored pollutants and periodic clean-outs. The First Defense® has been designed to allow for easy and safe access for inspection, monitoring and clean-out procedures. Neither entry into the unit nor removal of the internal components is necessary for maintenance, thus safety concerns related to confined-space-entry are avoided.

Pollutant Capture and Retention

The internal components of the First Defense® have been designed to optimize pollutant capture. Sediment is captured and retained in the base of the unit, while oil and floatables are stored on the water surface in the inner volume (Fig.1).

The pollutant storage volumes are isolated from the built-in bypass chamber to prevent washout during high-flow storm events. The sump of the First Defense® retains a standing water level between storm events. This ensures a quiescent flow regime at the onset of a storm, preventing resuspension and washout of pollutants captured during previous events.

Accessories such as oil absorbent pads are available for enhanced oil removal and storage. Due to the separation of the oil and floatable storage volume from the outlet, the potential for washout of stored pollutants between clean-outs is minimized.

Applications

- Stormwater treatment at the point of entry into the drainage line
- Sites constrained by space, topography or drainage profiles with limited slope and depth of cover
- Retrofit installations where stormwater treatment is placed on or tied into an existing storm drain line
- Pretreatment for filters, infiltration and storage

Advantages

- Inlet options include surface grate or multiple inlet pipes
- Integral high capacity bypass conveys large peak flows without the need for “offline” arrangements using separate junction manholes
- Long flow path through the device ensures a long residence time within the treatment chamber, enhancing pollutant settling
- Delivered to site pre-assembled and ready for installation

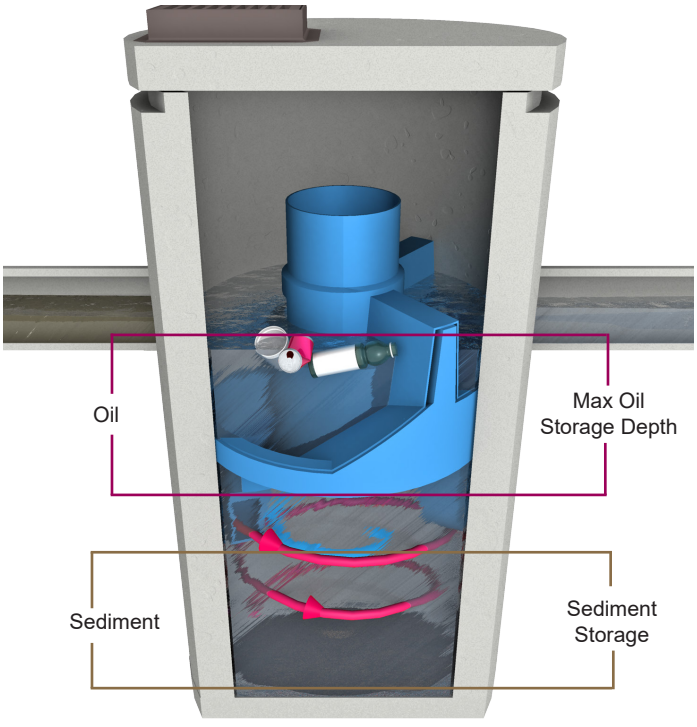


Fig.1 Pollutant storage volumes in the First Defense®.

II. Model Sizes & Configurations

The First Defense® inlet and internal bypass arrangements are available in several model sizes and configurations. The components have modified geometries allowing greater design flexibility to accommodate various site constraints.

All First Defense® models include the internal components that are designed to remove and retain total suspended solids (TSS), gross solids, floatable trash and hydrocarbons (Fig.2). First Defense® model sizes (diameter) are shown in Table 1.

III. Maintenance

First Defense® Components

1. **Built-In Bypass**
2. **Inlet Pipe**
3. **Inlet Chute**
4. **Floatables Draw-off Port**
5. **Outlet Pipe**
6. **Floatables Storage**
7. **Sediment Storage**
8. **Inlet Grate or Cover**

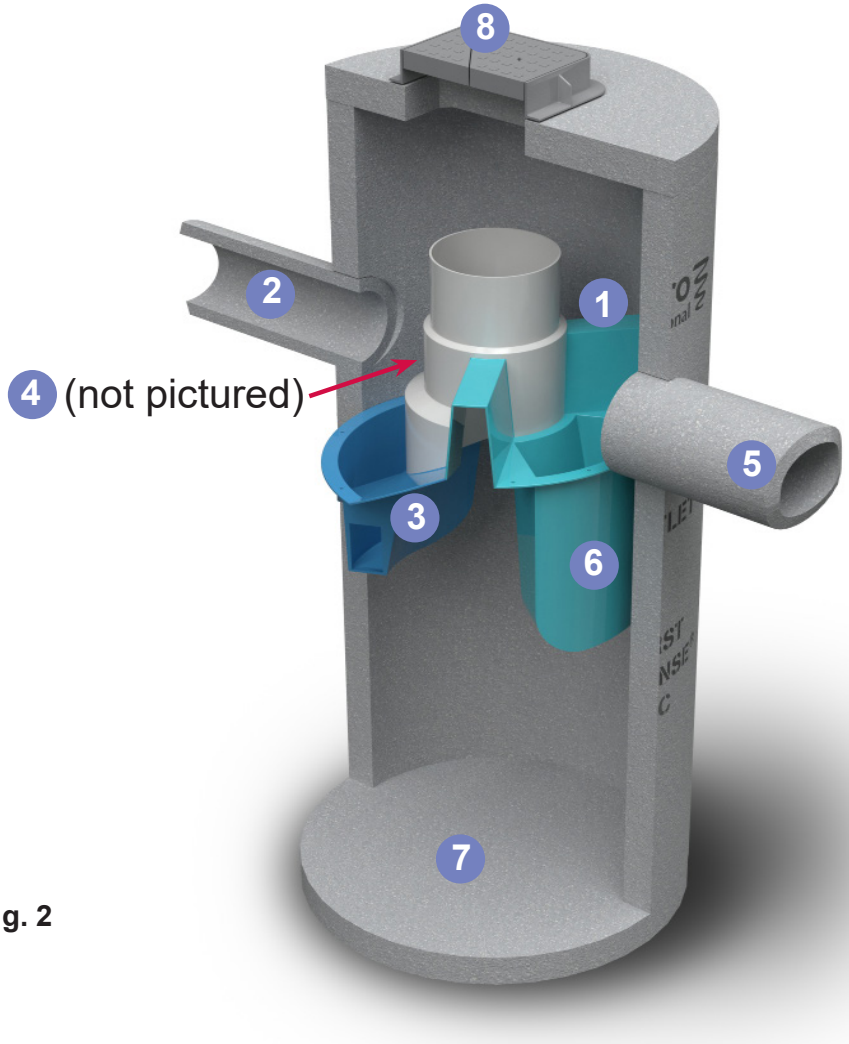


Fig. 2

Table 1

First Defense® Model Sizes
(ft / m) diameter
3 / 0.9
4 / 1.2
5 / 1.5
6 / 1.8
7 / 2.1
8 / 2.4
10 / 3.0

Overview

The First Defense® protects the environment by removing a wide range of pollutants from stormwater runoff. Periodic removal of these captured pollutants is essential to the continuous, long-term functioning of the First Defense®. The First Defense® will capture and retain sediment and oil until the sediment and oil storage volumes are full to capacity. When sediment and oil storage capacities are reached, the First Defense® will no longer be able to store removed sediment and oil.

The First Defense® allows for easy and safe inspection, monitoring and clean-out procedures. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables. Access ports are located in the top of the manhole.

Maintenance events may include Inspection, Oil & Floatables Removal, and Sediment Removal. Maintenance events do not require entry into the First Defense®, nor do they require the internal components of the First Defense® to be removed. In the case of inspection and floatables removal, a vactor truck is not required. However, a vactor truck is required if the maintenance event is to include oil removal and/or sediment removal.

Maintenance Equipment Considerations

The internal components of the First Defense® have a centrally located circular shaft through which the sediment storage sump can be accessed with a sump vac hose. The open diameter of this access shaft is 15 inches in diameter (Fig.3). Therefore, the nozzle fitting of any vactor hose used for maintenance should be less than 15 inches in diameter.

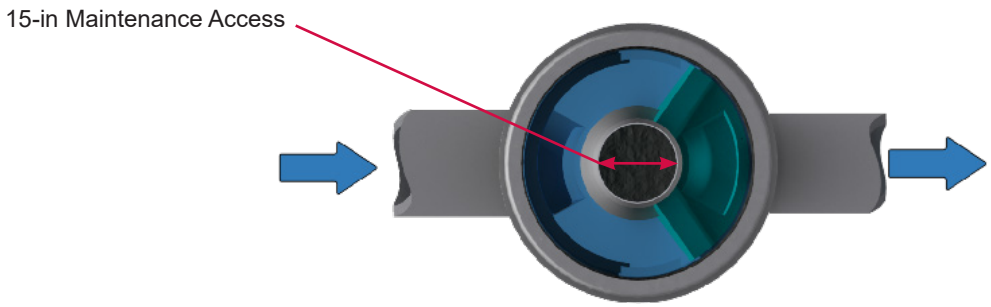


Fig.3 The central opening to the sump of the First Defense®is 15 inches in diameter.

Determining Your Maintenance Schedule

The frequency of clean out is determined in the field after installation. During the first year of operation, the unit should be inspected every six months to determine the rate of sediment and floatables accumulation. A simple probe such as a Sludge-Judge® can be used to determine the level of accumulated solids stored in the sump. This information can be recorded in the maintenance log (see page 9) to establish a routine maintenance schedule.

The vactor procedure, including both sediment and oil / flotables removal, for First Defense® typically takes less than 30 minutes and removes a combined water/oil volume of about 765 gallons.

Inspection Procedures

1. Set up any necessary safety equipment around the access port or grate of the First Defense® as stipulated by local ordinances. Safety equipment should notify passing pedestrian and road traffic that work is being done.

2. Remove the grate or lid to the manhole.

3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities. Fig.4 shows the standing water level that should be observed.

4. Without entering the vessel, use the pole with the skimmer net to remove floatables and loose debris from the components and water surface.

5. Using a sediment probe such as a Sludge Judge®, measure the depth of sediment that has collected in the sump of the vessel.

6. On the Maintenance Log (see page 9), record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components or blockages.

7. Securely replace the grate or lid.

8. Take down safety equipment.

9. Notify Hydro International of any irregularities noted during inspection.

Floatables and Sediment Clean Out

Floatables clean out is typically done in conjunction with sediment removal. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables (Fig.4).

Floatables and loose debris can also be netted with a skimmer and pole. The access port located at the top of the manhole provides unobstructed access for a vactor hose to be lowered to the base of the sump.

Scheduling

- Floatables and sump clean out are typically conducted once a year during any season.

- Floatables and sump clean out should occur as soon as possible following a spill in the contributing drainage area.

Fig.4 Floatables are removed with a vactor hose

Recommended Equipment

- Safety Equipment (traffic cones, etc)
- Crow bar or other tool to remove grate or lid
- Pole with skimmer or net (if only floatables are being removed)
- Sediment probe (such as a Sludge Judge®)
- Vactor truck (flexible hose recommended)
- First Defense® Maintenance Log

Floatables and Sediment Clean Out Procedures

1. Set up any necessary safety equipment around the access port or grate of the First Defense® as stipulated by local ordinances. Safety equipment should notify passing pedestrian and road traffic that work is being done.

2. Remove the grate or lid to the manhole.

3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities.

4. Remove oil and floatables stored on the surface of the water with the vactor hose or with the skimmer or net

5. Using a sediment probe such as a Sludge Judge®, measure the depth of sediment that has collected in the sump of the vessel and record it in the Maintenance Log (page 9).

6. Once all floatables have been removed, drop the vactor hose to the base of the sump. Vactor out the sediment and gross debris off the sump floor

7. Retract the vactor hose from the vessel.

8. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components, blockages, or irregularly high or low water levels.

9. Securely replace the grate or lid.

Maintenance at a Glance

Inspection	- Regularly during first year of installation - Every 6 months after the first year of installation
Oil and Floatables Removal	- Once per year, with sediment removal - Following a spill in the drainage area
Sediment Removal	- Once per year or as needed - Following a spill in the drainage area
NOTE: For most clean outs the entire volume of liquid does not need to be removed from the manhole. Only remove the first few inches of oils and floatables from the water surface to reduce the total volume of liquid removed during a clean out.	

First Defense® Installation Log

HYDRO INTERNATIONAL REFERENCE NUMBER:	
SITE NAME:	
SITE LOCATION:	
OWNER:	CONTRACTOR:
CONTACT NAME:	CONTACT NAME:
COMPANY NAME:	COMPANY NAME:
ADDRESS:	ADDRESS:
TELEPHONE:	TELEPHONE:
FAX:	FAX:

INSTALLATION DATE: / /

MODEL SIZE (CIRCLE ONE): [3-FT] [4-FT] [5-FT] [6-FT] [7-FT] [8-FT] [10-FT]

INLET (CIRCLE ALL THAT APPLY): GRATED INLET (CATCH BASIN) INLET PIPE (FLOW THROUGH)

Hydro International (Stormwater), 94 Hutchins Drive, Portland ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com

First Defense® Inspection and Maintenance Log

Date	Initials	Depth of Floatables and Oils	Sediment Depth Measured	Volume of Sediment Removed	Site Activity and Comments

Hydro International (Stormwater), 94 Hutchins Drive, Portland ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com

Appendix C

Design Drawings

PROPOSED FEATURES

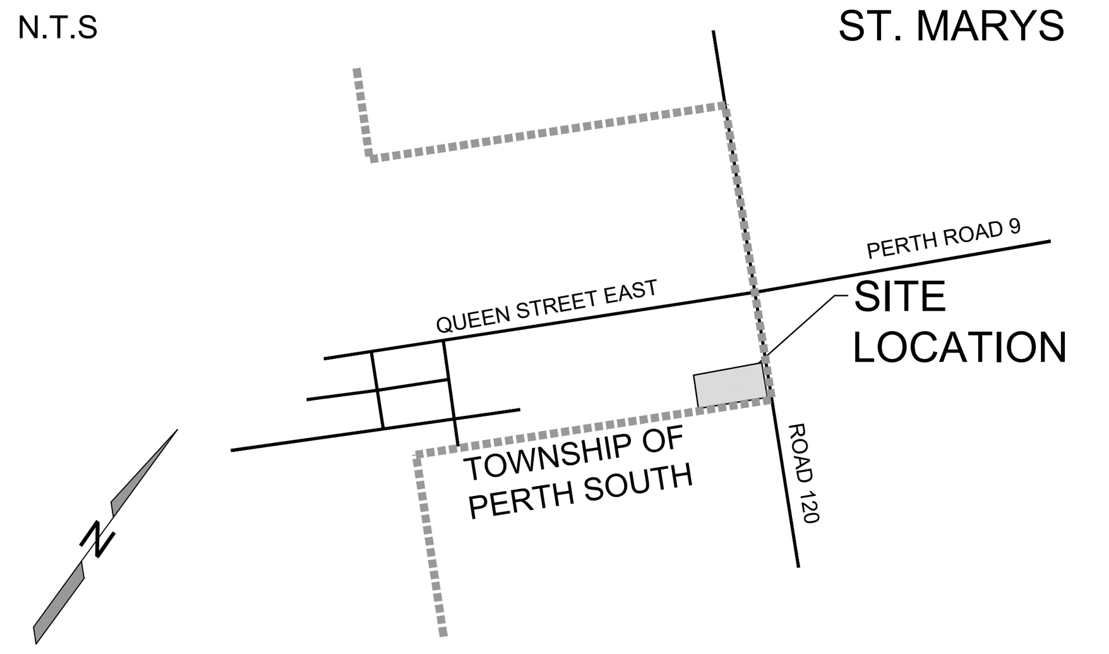
PROPOSED BUILDING
PROPOSED OVERHEAD DOOR
PROPOSED ELEVATION — 360.00
FUTURE ELEVATION — 360.00
PROPOSED DRAINAGE — 0.2%
FUTURE DRAINAGE — 0.2%
PROPOSED SWALE — 0.2%
PROPOSED STORM SEWER — ST-MH1
PROPOSED STORM STRUCTURE
FUTURE STORM SEWER — ST-MH1
FUTURE STORM STRUCTURE
PROPOSED WATERMAIN — XXXmmØ PVC WTM — FH
PROPOSED EMBANKMENT — TOP OF EMBANKMENT / BOTTOM OF EMBANKMENT
FUTURE RETAINING WALL
PROPOSED RIP RAP
PROPOSED BOLLARD — BOL.
FUTURE BOLLARD — BOL.
PROPOSED LIGHT DUTY SILT FENCE
PROPOSED HEAVY DUTY SILT FENCE
PROPOSED SILT SACK
PROPOSED CONSTRUCTION ACCESS
PROPOSED OVERLAND FLOW ROUTE
PROPOSED PIPE INSULATION
PROPOSED FENCE
FUTURE FENCE

EXISTING FEATURES

SITE BOUNDARY
PROPERTY LINE (OTHERS)
EASEMENT
EX. BUILDING
EX. CONTOURS
EX. OVERLAND FLOW ROUTE
EX. HYDRO (OVERHEAD)
EX. HYDRO POLE — EX. HP
EX. VEGETATION

N
SPREADER SWALE LINED WITH 150mm Ø RIP RAP TO BE LAYED 0.3m THICK OVER GEOTEXTILE 14.00m²
OUTLET C/W RODENT GRATE INV = 324.74m
ST-OGS 11 ADS FD-4HC OR APPROVED EQUIVALENT T/G:326.00 SW INV:324.84 NW INV:324.78
PROPOSED RETAINING WALL TO BE DESIGNED BY OTHERS IN ACCORDANCE WITH THE OBC.
INSTALL HEAVY DUTY SILT FENCE PER OPSD 219.130 (TYP.)
INSTALL 6.0m WIDE DOUBLE SWING CHAIN LINK GATE PER OPSD 972.102 (TYP.) C/W INSTALLATION OF OUTWARD FACING BARBED WIRE COMPONENT PER OPSD 972.101 (TYP.)
INSTALL LIGHT DUTY SILT FENCE PER OPSD 219.110 (TYP.)
INSTALL 1.8m HIGH CHAIN LINK FENCE PER OPSD 972.130 (TYP.) WITH TOP RAIL. INSTALLATION OF OUTWARD FACING BARBED WIRE COMPONENT PER OPSD 972.101 (TYP.)
INSTALL 1.3m X 0.5m TURFSTONE WEIR AT ELEVATION 325.75m SEE DETAIL ON C500
INSTALL ONLINE ORIFICE PER DETAIL ON C500
CONTRACTOR NOTE: ALL STORM SEWER PIPING TO BE INSULATED WITH RIGID INSULATION PER DETAIL ON C500
PROPOSED STORAGE BUILDING (AREA = 445.76m²)
FUTURE PROPOSED STORAGE BUILDING (AREA = 445.76m²)
CONSTRUCT CONCRETE FIRE WATER STORAGE CISTERN UNDER PROPOSED BUILDING. MINIMUM STORAGE OF 38,610L WITH A SUPPLY OF 1,800 L/min
DRY HYDRANT AND RECHARGE STATION. SEE DETAIL ON C500. INSTALL NO PARKING ON DRIVEWAY FIRE ROUTE SIGN IN ACCORDANCE WITH TOWN OF ST. MARYS STANDARDS
INSTALL BOLLARD PER DETAIL ON C500 OR APPROVED EQUIV. (TYP.)
MATCH INTO EXISITING GRADE AS SHOWN MAX 3:1 (TYP.)
CONTRACTOR TO TAPER GRADE EX. WELL OUTWARD TO PROVIDE POSITIVE DRAINAGE
6.0m X 9.0m CONSTRUCTION ACCESS MUD MAT
CONSTRUCT ASPHALT PER DETAIL ON C500 (TYP.)
CONSTRUCT GRAVEL PER DETAIL ON C500 (TYP.)
EXTENT OF ASPHALT
INSTALL 6.0m WIDE DOUBLE SWING MECHANICAL GATE DESIGNED BY OTHERS
CAUTION: EXISTING BELL EASEMENT, LOCATE EXISTING UTILITIES BY HAND DIG OR VACC TRUCK PRIOR TO CONSTRUCTION.
150mm Ø RIP RAP TO BE LAYED 0.3m THICK OVER GEOTEXTILE 5.00m²
SWALE SUBDRAIN OUTLET COMPLETE WITH RODENT GRATE PER OPSD 206.050
SWALE C/W SUBDRAIN PER DETAIL ON C500
BELL CANADA EASEMENT AS IN INST. R95350
1 STOREY HOUSE
APPROXIMATE LOCATION SEPTIC
SHED
BARN/GARAGE
EX. WELL
GRAVEL DRIVE
ROAD 120
ROAD CENTERLINE
ASPHALT
GRAVEL
GRASS

KEY PLAN
N.T.S



CONTRACTOR NOTES:

CONTRACTORS MUST CHECK AND VERIFY ALL DIMENSIONS AND REPORT ANY ERRORS TO THE ENGINEER PRIOR TO COMMENCEMENT OF WORK.

ALL DRAWINGS SHALL REMAIN THE PROPERTY OF THE ENGINEER AND SHALL NOT BE REUSED WITHOUT THE ENGINEER'S WRITTEN PERMISSION.

DRAWING SHOULD NOT BE SCALED FOR DIMENSIONS PURPOSES.

BENCHMARK

ELEVATIONS ARE RELATED TO TOP SPINDLE OF FIRE HYDRANT ON THE NORTH SIDE OF QUEEN STREET AT THE CORNER OF QUEEN AND 120 ROAD.

ELEVATION: 235.88m

No.	ISSUED DESCRIPTION	DATE
1	ISSUED FOR CLIENT REVIEW	2021-11-12
2	ISSUED FOR SITE PLAN APPROVAL	2021-11-16
3	REVISED PER MUNICIPAL COMMENTS	2021-12-20
4		
5		

GRIT ENGINEERING INC

LICENSED PROFESSIONAL ENGINEER — 2021-12-20 — M. E. WILSON — 100136472 — PROVINCE OF ONTARIO

ROAD 120 SELF STORAGE UNITS

PROJECT INFORMATION: 60 ROAD 120, ST. MARYS, ONTARIO

C & C MANAGEMENT

CLIENT INFORMATION:

DRAWING NAME:

SITE SERVICING, GRADING, AND EROSION & SEDIMENT CONTROL PLAN

PROJECT No: GE021-21

SCALE: 1:300

DRAWING No: C300

GENERAL NOTES AND CONSTRUCTION SPECIFICATIONS

1. GENERAL NOTES

1.1. THESE PLANS ARE NOT FOR CONSTRUCTION UNTIL SIGNED AND SEALED BY ENGINEER AND APPROVED BY THE TOWN OF ST. MARYS.

1.2. ALL CONSTRUCTION WORK TO BE COMPLETED IN ACCORDANCE WITH ALL APPLICABLE (MOST RECENT) STANDARDS.

1.3. THE PLANS PREPARED BY GRIT ENGINEERING INC. ARE NOT TO BE USED FOR CONSTRUCTION UNTIL SIGNED BY THE ENGINEER AND ACCEPTED BY THE APPROVING AGENCY. THESE PLANS ARE NOT TO BE REPRODUCED IN WHOLE OR IN PART WITHOUT THE PERMISSION OF GRIT ENGINEERING INC.

1.4. CHANGES TO DRAWINGS ARE NOT PERMITTED UNTIL REVIEWED AND APPROVED BY THE ENGINEER AND ACCEPTED BY THE APPROVING AUTHORITY.

1.5. CONTRACTOR TO VERIFY THAT THE DRAWINGS BEING USED FOR THE CONSTRUCTION ARE THE MOST RECENT VERSION.

1.6. UTILITY LOCATES AND ALL APPLICABLE PERMITS ARE TO BE OBTAINED PRIOR TO THE START OF CONSTRUCTION AND INSPECTION BEING COMPLETED.

1.7. THE CONTRACTOR IS TO VERIFY THE EXISTING CONDITION OF THE SITE. THE VERIFICATION INCLUDES AND NOT LIMITED TO THE SERVICE LOCATION, SERVICE ELEVATIONS, UTILITY CONFLICTS AND BENCHMARK ELEVATIONS. ANY DISCREPANCIES ARE TO BE REPORTED TO THE ENGINEER IMMEDIATELY AND PRIOR TO THE CONTINUATION OF CONSTRUCTION.

1.8. LEGAL INFORMATION AND EXISTING TOPOGRAPHIC INFORMATION TAKEN FROM PLAN PREPARED BY NA GEOMATICS, RECEIVED NOVEMBER 9, 2021.

1.9. THE CONTRACTOR IS TO OBTAIN CONSENT FROM THE NEIGHBOR IN THE FORM OF WRITTEN CORRESPONDENCE GRANTING PERMISSION TO ENTERING THE PROPERTY TO COMPLETE ANY CONSTRUCTION ACTIVITY. THE WRITTEN CONSENT IS TO BE PROVIDED TO THE APPROVING AUTHORITY PRIOR TO THE CONTINUATION OF WORK FOR APPROVAL, THE CONTRACTOR WILL ASSUME LIABILITY FOR ALL WORKS IF FAILURE TO COMPLY.

1.10. THIS DRAWING IS TO BE READ COMBINATION WITH THE FOLLOWING:
1.10.1. STORMWATER MANAGEMENT REPORT, DECEMBER 20TH, 2021.

1.11. DURING THE CONSTRUCTION, THE CONTRACTOR ASSUMES ALL LIABILITY FOR DAMAGE TO ALL EXISTING FEATURES AND STRUCTURES. THE CONTRACTOR WILL BE RESPONSIBLE FOR ALL RESTORATION AND RESTORED TO EXISTING CONDITION OR BETTER.

1.12. THESE PLANS ARE TO BE USED FOR SERVICING AND GRADING ONLY; ANY OTHER INFORMATION SHOWN IS FOR ILLUSTRATION PURPOSES ONLY. THESE PLANS MUST NOT BE USED TO SITE THE PROPOSED BUILDING.

1.13. THE CONTRACTOR SHALL ASSUME ALL LIABILITY FOR ANY DAMAGE TO EXISTING WORKS. THE CONTRACTOR IS RESPONSIBLE FOR RESTORATION OF ALL DAMAGED AND/OR DISTURBED PROPERTY WITHIN THE MUNICIPAL RIGHT-OF-WAY TO THE APPROVING AGENCY STANDARDS

1.14. ALL UNDERGROUND SERVICES ARE TO BE CONSTRUCTED IN FULL COMPLIANCE WITH THE ONTARIO PROVINCIAL BUILDING CODE (PART 7, PLUMBING), THE ONTARIO PROVINCIAL STANDARD SPECIFICATIONS (OPSS) AND THE REQUIREMENTS OF THE TOWN OF ST.MARYS; WHICH CODES AND REGULATIONS SHALL SUPERSEDE ALL OTHERS.

1.15. SITE SERVICING CONTRACTOR TO TERMINATE ALL SERVICES 1 METRE FROM FOUNDATION WALL.

1.16. FILTER FABRIC TO BE TERRAFIX 270R OR APPROVED EQUAL.

1.17. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD INCLUDING THE SUPPLY, INSTALLATION AND REMOVAL OF ALL NECESSARY SIGNALS, DELINEATORS, MARKERS, AND BARRIERS. ALL SIGNS, ETC. SHALL CONFORM TO THE STANDARDS OF THE TOWN OF ST.MARYS AND THE MTO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES.

1.18. THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

1.19. FOLLOWING COMPLETION OF PROPOSED WORKS AND PRIOR TO OCCUPANCY INSPECTION, ALL STORM SEWERS ARE TO BE FLUSHED, AND ALL CATCHBASIN AND CATCHBASIN MANHOLE SUMPS ARE TO BE CLEANED OF DEBRIS AND SILT.

2. INSPECTION AND CERTIFICATION

2.1. GRIT ENGINEERING INC. REQUIRES A MINIMUM OF 24 HOURS NOTICE PRIOR TO THE REQUIRED INSPECTION BE REQUESTED. INSPECTIONS ARE REQUIRED TO VERIFY, PIPE INSTALLATION (MATERIALS, SIZE, LOCATION AND ELEVATION), STRUCTURE PLACEMENT, SURFACE MATERIAL AND FINISHED GRADING.

2.1.1. CONSTRUCTION WORKS WITHIN THE PUBLIC RIGHT-OF-WAY REQUIRE FULL TIME INSPECTION.

2.1.2. CONSTRUCTION WORKS WITHIN PRIVATE LANDS ARE REQUIRED ON A PART TIME AND AS NEEDED BASIS.

2.2. FAILURE TO COMPLY WITH GRIT ENGINEERING INC. INSPECTION REQUIREMENTS, WILL RESULT IN ADDITIONAL CONSTRUCTION INSPECTION AND VERIFICATION AT THE EXPENSE OF THE CONTRACTOR.

3. STORM SEWERS AND SERVICING

3.1. PIPE BEDDING FOR RIGID PIPE TO BE CLASS ``B'' AS PER OPSD 802.030, 802.031, OR 802.032. PIPE BEDDING FOR FLEXIBLE PIPE TO BE AS PER OPSD 802.010. BEDDING MATERIAL AND COVER MATERIAL TO BE GRANULAR ``A''. TRENCH BACKFILL TO BE NATIVE MATERIAL REPLACED IN 300mm LIFTS AND COMPACTED TO 95% STANDARD PROCTOR MAXIMUM DRY DENSITY.

3.2. STORM SEWERS 200mmØ TO 450mmØ SHALL BE POLYVINYL CHLORIDE (PVC) PIPE DR35 ASTM-D3034 OR RIBBED PVC SEWER PIPE CSA B182.4-M90 ASTM-F794 WITH INTEGRAL BELL AND SPIGOT UTILIZING FLEXIBLE ELASTOMERIC SEALS. RIBBED PVC NOT TO BE USED WITHIN-RIGHT-OF-WAY.

3.3. MAINTENANCE HOLES AND MAINTENANCE HOLE CATCHBASINS TO BE 1200mmØ PRECAST WITH ALUMINIUM STEPS AT 300mm CENTRES AS PER OPSD 701.010 UNLESS OTHERWISE SPECIFIED.

3.4. MAINTENANCE HOLES TO BE BENCHED PER OPSD 701.021.

3.5. CATHBASIN STRUCTURES 600mmX600mm PER OPSD 705.010

3.6. DITCHINLET CATCHBASIN STRUCTURES 600mmX1200mm PER OPSD 705.040 (TYPE B)

3.7. DOUBLE CATCHBASIN STRUCTURES 600mmX1450mm PER OPSD 705.020

3.8. OIL GRIT SEPARATOR TO BE ADS MODEL FD-4HC OR APPROVED EQUIVALENT.
RAINFALL DATA: STRATFORD
CATCHMENT AREA: ±1.36 Ha
CATCHMENT IMPERVIOUS PERCENTAGE: 80.0%
QUALITY LEVEL: ENHANCED
FLOW RATE: ± 90 L/s

3.9. CATCHBASIN MAINTENANCE HOLES, CATCHBASINS AND DITCH INLET CATCHBASINS TO HAVE A MINIMUM 600mm DEEP SUMP.

3.10. MAINTENANCE HOLE AND CATCHBASIN, FRAMES, GRATES, CASTINGS AND LIDS TO BE QUALITY GREY IRON ASTM A48 CLASS 30B.

3.11. STORM MAINTENANCE HOLE LIDS TO BE PER OPSD 401.010 - TYPE 'B' CATCHBASIN AND CATCHBASIN MAINTENANCE HOLE GRATES TO BE PER OPSD 400.100.

3.12. STORM SEWERS AND SERVICES TO HAVE MINIMUM 1.2m COVER TO TOP OF PIPE. WHERE COVER TO TOP OF PIPE IS DEFICIENT, CONTRACTOR SHALL INSTALL SHALLOW BURIED SEWER PIPE PER DETAIL THIS SHEET OR OTHER ENGINEER-APPROVED EQUIVALENT.

4. FIRE WATER SUPPLY SERVICE

4.1. DRY HYDRANTS TO BE INSTALLED IN ACCORDANCE TO NFPA 1142.

4.2. FIRE MAIN IS TO BE 200mmØ GALVANIZED STEEL SCHEDULE 80 OR APPROVED EQUIVALENT.

4.3. FIRE MAIN PIPE BEDDING TO BE CLASS 'B' AS PER OPSD 802.030. PIPE BEDDING AND COVER MATERIAL TO BE GRANULAR 'A' OR APPROVED EQUIVALENT. TRENCH BACKFILL TO BE APPROVED NATIVE MATERIAL AND PLACED IN 300mm THICK LIFTS COMPACTED TO A MINIMUM OF 95% STANDARD PROCTOR MAXIMUM DRY DENSITY.

5. EROSION AND SEDIMENT CONTROL

5.1. PRIOR TO THE START OF ANY CONSTRUCTION THE CONTRACTOR IS TO INSTALL THE EROSION AND SEDIMENT CONTROLS IN ACCORDANCE TO THE APPROVED PLAN.

5.2. NO ALTERNATE EROSION AND SEDIMENT CONTROLS ARE PERMITTED WITHOUT APPROVAL FROM THE ENGINEER AND APPROVING AUTHORITY.

5.3. ADDITIONAL EROSION AND SEDIMENT CONTROLS MAY BE REQUIRED AS THE CONSTRUCTION PROGRESSES. THE CONTRACTOR TO INSTALL ADDITIONAL MEASURES AS REQUIRED BY THE ENGINEER AND APPROVING AUTHORITY.

5.4. THE CONTRACTOR IS TO PERFORM REGULAR MAINTENANCE, REPAIRS AND REPLACEMENT ON ALL CONTROLS TO ENSURE PROPER FUNCTIONING UNTIL PROJECT IS COMPLETE.

5.5. EROSION CONTROL FENCING TO BE INSTALLED AROUND BASE OF ALL STOCKPILES. ALL STOCKPILES TO BE KEPT 2.5m MINIMUM FROM PROPERTY LINE.

5.6. EROSION PROTECTION TO BE PROVIDED AROUND ALL STORM AND SANITARY MHs AND CBs.

5.7. ADDITIONAL EROSION CONTROL MEASURES MAY BE REQUIRED AS SITE DEVELOPMENT PROGRESSES. CONTRACTOR TO PROVIDE ALL ADDITIONAL EROSION CONTROL STRUCTURES.

5.8. CONTRACTOR TO CLEAN ROADWAY AND SIDEWALKS OF SEDIMENTS RESULTING FROM CONSTRUCTION TRAFFIC FROM THE SITE EACH DAY.

5.9. THE CONTRACTOR IS TO REMOVE ALL EROSION AND SEDIMENT CONTROLS UNTIL DEVELOPMENT IS COMPLETE AND VEGETATION PROPOSED FINISHED HARD SURFACE MATERIALS ARE INSTALLED AND VEGETATION IS STABILIZED WITH MATURE GROWTH.

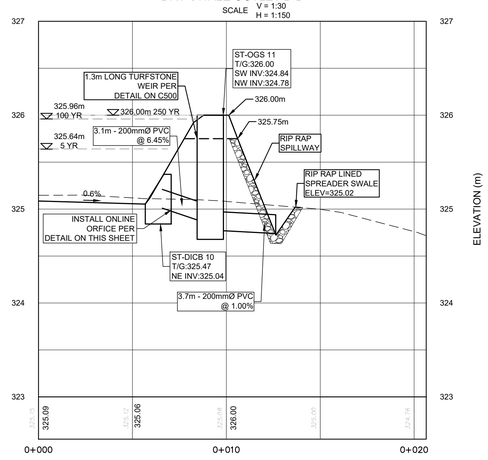
6. MAINTENANCE RECOMMENDATIONS

6.1. EROSION CONTROL STRUCTURES TO BE MONITORED REGULARLY AND ANY DAMAGE REPAIRED IMMEDIATELY. SEDIMENTS TO BE REMOVED WHEN ACCUMULATIONS REACH A MAXIMUM OF 1/3 THE HEIGHT OF THE FENCE.

6.2. OWNER'S REPRESENTATIVE TO MONITOR EROSION CONTROL STRUCTURES TO ENSURE FENCING IS INSTALLED AND MAINTENANCE IS PERFORMED TO MUNICIPALITY REQUIREMENTS.

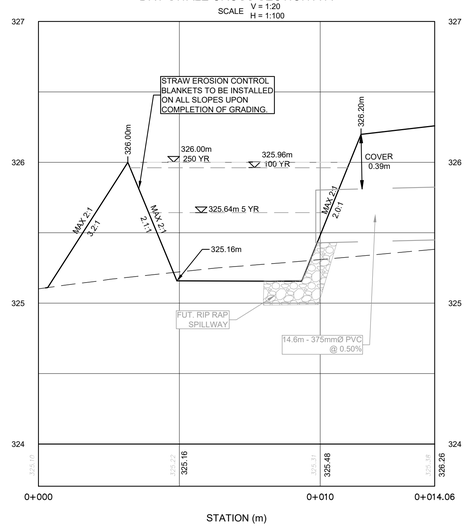
DRY SWALE OUTLET B-B

SCALE V = 1:30
H = 1:150



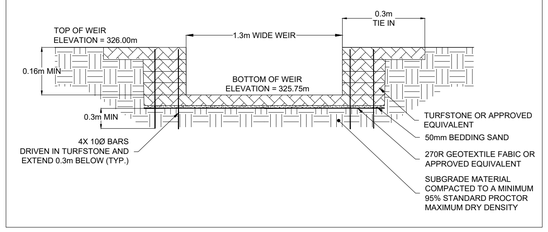
DRY SWALE CROSS SECTION A-A

SCALE V = 1:20
H = 1:100



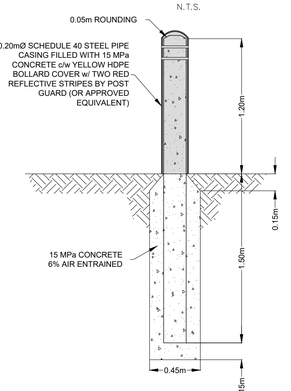
OVERFLOW WEIR DETAIL

N.T.S.



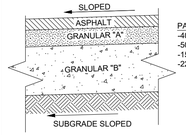
BOLLARD DETAIL

N.T.S.



PAVEMENT STRUCTURE

N.T.S.

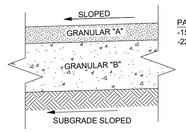


PAVEMENT RESTORATION:
-40mm HL3 TOP COAT
-50mm HL4 BASE COAT
-150mm GRANULAR 'A'
-225mm GRANULAR 'B'

NOTE: ROAD STRUCTURE PER TOWN OF ST.MARYS. ROAD STRUCTURE TO BE VERIFIED ONSITE BY A QUALIFIED GEOTECHNICAL ENGINEER AT TIME OF CONSTRUCTION.

GRAVEL STRUCTURE

N.T.S.

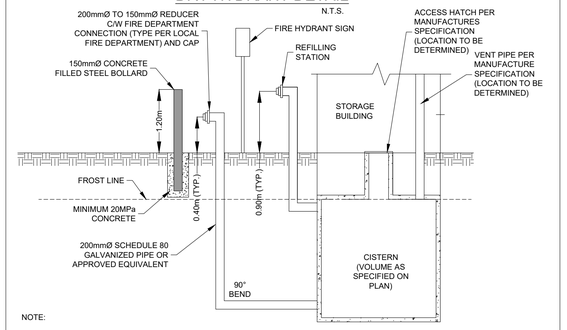


PAVEMENT RESTORATION:
-150mm GRANULAR 'A'
-225mm GRANULAR 'B'

NOTE: ROAD STRUCTURE PER TOWN OF ST. MARYS. ROAD STRUCTURE. TO BE VERIFIED ONSITE BY A QUALIFIED GEOTECHNICAL ENGINEER AT TIME OF CONSTRUCTION.

DRY HYDRANT DETAIL

N.T.S.

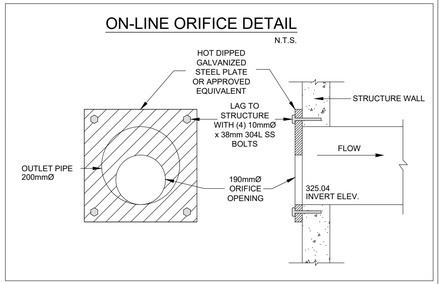


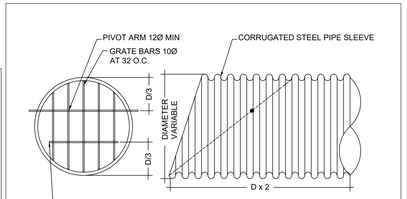
NOTE:

1. ONSITE VERIFICATION REQUIRED TO DETERMINE ADDITIONAL INSTALLATION MEASURES FOR TANK FLOATING
2. PROVIDE FROST PROTECTION TO DRY HYDRANT IF PERMANENT WATER LEVEL IS ABOVE FROST LINE

ON-LINE ORIFICE DETAIL

N.T.S.





1. FOR 300mmØ PIPES AND OVER, ADDITIONAL 12mmØ HORIZONTAL GRATE BAR TO BE PLACED IN THIS LOCATION.
2. FOR PIPES LESS THAN 300mmØ, NO HORIZONTAL GRATE BARS REQUIRED.
3. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.
4. ALL MATERIALS TO BE DOUBLE HOT DIPPED GALVANIZED.

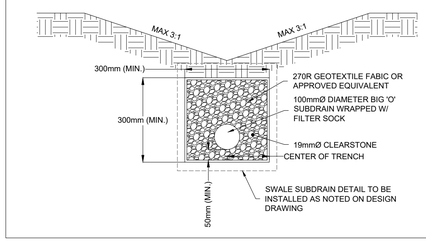
RODENT GRATE DETAIL C/W CSP SLEEVE

N.T.S.

TYPICAL SWALE

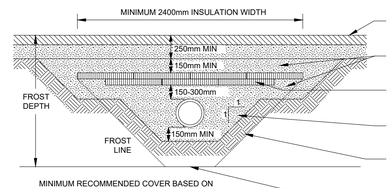
N.T.S.

NOTE: SWALE TO BE CONSTRUCTED TO ACHIEVE POSITIVE DRAINAGE



SEWER PIPE INSULATION DETAIL

N.T.S.



NOTE: FOR STORM SEWERS HAVING LESS THAN 1500mm COVER AND MINIMUM 680mm COVER

PAVEMENT STRUCTURE (ASPHALT AND/OR GRANULAR), OR SELECT NATIVE MATERIAL AND TOPSOIL, AS SPECIFIED ON DRAWINGS

GRANULAR 'A' BEDDING & BACK FILL BELOW AND ABOVE PIPE AND INSULATION BOARD, COMPACTED TO MINIMUM 95% SPMDD

RIGID EPS-INSULATION BOARD PER SPECIFICATION NOTES (MINIMUM R20-THICKNESS, TYPICALLY 100-130mm. MINIMUM 2 LAYERS INSULATION BOERD OVERLAPPED MINIMUM 300mm AT ALL JOINTS)

NOTE: TRENCH SIDE-SLOPES IN AREAS OF PIPE INSULATION TO BE MAXIMUM 1:1 SLOPE, NO VERTICAL SECTIONS ALLOWED UNLESS INDICATED IN DETAIL

NATIVE SOILS - WHERE NATIVE SOIL IS SOFT AND/OR OF ORGANIC CONTENT, REMOVE TO DEPTH OF SUITABLE SOILS AND REPLACE WITH GRANULAR-B2 MATERIAL COMPACTED TO 95% SPMDD, OR CONSTRUCT IN ACCORDANCE WITH WRITTEN DIRECTION FROM GEOTECHNICAL CONSULTANT

FROST DEPTH - PROTECT SOIL ZONE UNDER PIPE FROM FREEZING REFER TO OPSD 3400.011 FOR SPECIFIC LOCAL FROST DEPTH

	SURFACE LIVE LOADING CONDITIONS	
PIPE DIA.	H-25	HEAVY CONSTRUCTION (75T AXLE LOAD)*
300mm-1200mm	305mm	305mm
1500mm	610mm	610mm

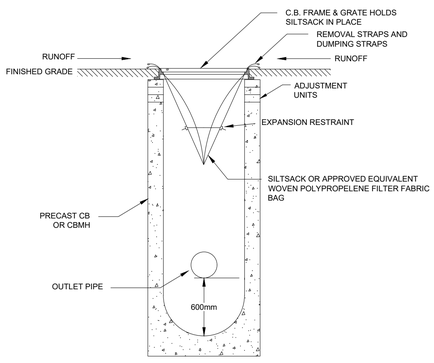
FOR VEHICLE LOADING APPLICATIONS LESS THAN 1.22m OF COVER, CLASS I OR CLASS II BACKFILL REQUIRED FOR PIPE EMBEDMENT

*VEHICLES IN EXCESS OF 75T MAY REQUIRE ADDITIONAL COVER

**REFER TO ADS DRAWING NUMBER STD-101A FOR ADDITIONAL INFORMATION

TEMPORARY SILTSACK SILTATION CONTROL IN CB

N.T.S.

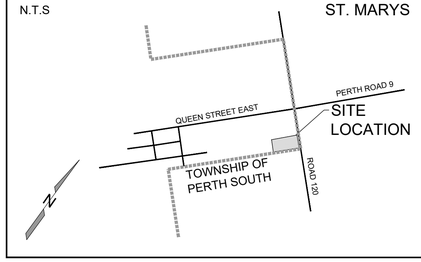


MAINTENANCE SCHEDULE

-INSPECT AFTER EVERY MAJOR RAIN EVENT.
-INSPECT EVERY 3 WEEKS MINIMUM.
-SILTSACK SHOULD NEVER BE OVER HALF FULL.
-FULL BAG CAN BE REMOVED, DUMPED, CLEANED AND REUSED (TO REMOVE INSERT 25mm REBAR INTO REMOVAL FLAP POCKETS) (TO DUMP INSERT 25mm REBAR INTO BOTH DUMPING STRAPS)

KEY PLAN
N.T.S

TOWN OF ST. MARYS



CONTRACTOR NOTES:

CONTRACTORS MUST CHECK AND VERIFY ALL DIMENSIONS AND REPORT ANY ERRORS TO THE ENGINEER PRIOR TO COMMENCEMENT OF WORK.

ALL DRAWINGS SHALL REMAIN THE PROPERTY OF THE ENGINEER AND SHALL NOT BE REUSED WITHOUT THE ENGINEER'S WRITTEN PERMISSION.

DRAWING SHOULD NOT BE SCALED FOR DIMENSIONS PURPOSES.

BENCHMARK

ELEVATIONS ARE RELATED TO TOP SPINDLE OF FIRE HYDRANT ON THE NORTH SIDE OF QUEEN STREET AT THE CORNER OF QUEEN AND 120 ROAD.

ELEVATION: 235.88m

No.	ISSUED DESCRIPTION	DATE
1	ISSUED FOR CLIENT REVIEW	2021-11-12
2	ISSUED FOR SITE PLAN APPROVAL	2021-11-16
3	REVISED PER MUNICIPAL COMMENTS	2021-12-20
4		
5		

GRIT ENGINEERING INC

LICENSED PROFESSIONAL ENGINEER
2021-12-20
M. E. WILSON
100136472
PROVINCE OF ONTARIO

ROAD 120
SELF STORAGE UNITS

PROJECT INFORMATION: 60 ROAD 120, ST, MARYS, ONTARIO

C & C MANAGEMENT

CLIENT INFORMATION:

DRAWING NAME:

NOTES AND DETAILS

PROJECT No: GE021-21

SCALE: AS SHOWN

DRAWING No: C500

SHEET SET No: 4 OF 4