Globe Cambridge High School

PROPOSED SCHOOL DORMITORY BUILDING
39 PINE STREET NORTH
THE MUNICIPALITY OF PORT HOPE, ON. L1A 3G5

PRELIMINARY FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT

ZBA/SPA APPLICATION

WPE PROJECT #:2021

JUN. 24, 2024

REVISION HISTORY

REVISION	DATE	REVISION DETAILS
00	2024-06-24	Issued for ZBA/SPA

DISCLAIMER

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APPENDICES

1. INTRODUCTION

1.1 Scope of the SWM Report

WPE Engineering Limited has been retained by Globe Cambridge High School to prepare a Functional Servicing and Stormwater Management Report (FSR Report) for the proposed 5-storey dormitory building located at 39 Pine Street North in the Municipality of Port Hope. This FSR report shall:

- Examine the potential water quality, quantity, and water balance impacts of the proposed dormitory building and summarize how each will be addressed per the local municipal, regional, and the provincial design criteria.
- Provide designs of SWM measures.
- Review the water supply, storm and sanitary servicing requirements of the proposed building, and propose a preliminary site servicing plan.
- Review the capacity of existing sanitary sewers, storm sewers and water supply.

1.2 Site Location

The development site, located at 39 Pine Street North, is bounded by North Street to the north, Pine Street to the west, St. John's Anglican Church and Port Hope United Church to the south, and residential area to the east. The site is currently occupied by a 2-storey school, paved parking area and driveway, and large landscaped area in the backyard. The site generally slopes eastwards per the existing topography, extensive retaining walls along the site perimeters exist due to the substantial grade differences within the site and along the site perimeters. The property is approximately 0.53 Ha in area. Refer to **Figure 1** for the location of the development site.

1.3 Stormwater Management Plan Objectives

The objectives of the stormwater management plan are as follows:

- Determine site specific stormwater management requirements to ensure that the development project is in conformance with the Ganaraska Region Conservation Authority (GRCA) Technical Engineering Guidelines for Stormwater Management Submissions.
- Prepare a stormwater management design documenting the strategy

along with the technical information necessary for sizing the proposed stormwater management practices.

FIGURE 1: SITE LOCATION

1.4 SWM Design Criteria

The proposed stormwater management strategy for the proposed development has been prepared in accordance with the municipal and GRCA guidelines.

Water Quantity Control:

- Post-development flow to be less than or equal to pre-development flow for all storms up to a 100-year event. (Water Quality Control Criteria, Section 3 of GRCA Technical Engineering Guidelines for Stormwater Management Submissions)
- Post-development drainage boundaries shall follow the pre-development pattern (Water Quality Control Criteria, Section 3 of GRCA Technical Engineering Guidelines for Stormwater Management Submissions)

Water Quality Control:

- All runoff from the site shall achieve a long-term average removal of 80% of Total Suspended Solids (TSS) on an annual loading basis to meet the water quality targets (Water Quality Control Criteria, Section 5.2 of GRCA Technical Engineering Guidelines for Stormwater Management Submissions).

2. EXISTING CONDITIONS

2.1 General

The site is currently zoned as Institutional Urban, and rezoning will be required for the proposed dormitory building,

The development site is currently occupied by an 2-storey school building with two entrances off Pine Street North. Majority of the front yard and back yard are grassed while the driveway and parking lot are paved.

Two catchbasins (EX.CB-2 & EX.CB-4), along the north-side property line, collect rainfall runoff from the site and discharges the same to existing 600mm dia. storm sewers on North Street.

No overland flow outlet to the municipal road is observed on the site. Refer to **Fig.02** (**Appendix E**) for the existing storm drainage area plan.

On the basis of the topographic survey, an impervious percent of 57.5% and a runoff coefficient of 0.62 are estimated. See **Appendix A** for calculations.

2.2 Existing Municipal Services

Through discussion with the municipality, there is no as-built records of municipal services along the surrounding roads, and Premier Locates Inc. was retained to undertake the field investigation of all existing services and utilities, including the sewer pipe inverts at manholes and catchbasins. Field locates information is provided in **Appendix E**. Discrepancies are noted between the Field Locates and available municipal records in terms of the diameters of municipal watermains on Pine Street North.

2.3 Rainfall Information

Per the GRCA Guidelines, the rainfall intensity of normal residential and industrial developments shall be determined from Yamell 5-year IDF Curve :

$$I = \frac{2464}{\mathrm{T} + 16}$$

Where; I = rainfall intensity in mm/hr,

T = time of concentration in minutes,

An initial time of concentration, T_C, of 10 minutes is established as recommended in the GRCA Guidelines.

2.4 Allowable Flow Rate

Per the GRCA Guidelines, for storms having a return period of more than 10 years, runoff coefficients shall be increased as followings, up to a maximum of 0.95.

- 25-year event - add 10%
- 50-year event - add 20%
- 100-year event - add 25%

Relevant policies from the GRCA Guidelines restrict flow rates on this site to the allowable flow rates for discharge to municipal sewers. According to the GRCA Guidelines, the allowable release rates to the municipal storm sewer system from the development site is 86.35 L/s based on the 5-year pre-development flow rate calculated with the runoff coefficient value of 0.62. The calculated peak flow rates for the development site in the pre-development condition are summarized below in **Table 1**. Detailed calculations are provided in **Appendix A**.

TABLE 1: PRE-DEVELOPMENT PEAK FLOW RATES

Return Period (Year)	Rainfall Intensity (mm/hr)	Peak Flow Rate (L/s)	Allowable Release Rate (L/s)
5	94.77	86.35	86.35
100	147.05	167.50	

3. POST-DEVELOPMENT CONDITIONS

3.1 General

The development proposes the construction of one new 5-storey student dormitory building with a total of 28 rooms and 1-level below grade. The proposed total residential GFA of 1,716 m^2. The existing 2-storey building will remain. For details of project statistics, refer to the site plan, architectural floor

plans and sections of the proposed building.

Under the post-development condition, the rainfall runoff from the entire site will be captured by catchbasins, piped to the underground stormwater storage chamber located within the new parking lot, and discharges at allowable flow rate to municipal storm sewer on North Street via an welded orifice plate. Refer to **Figure 03** - Proposed Storm Drainage Area Plan (**Appendix F**).

3.2 Groundwater Conditions

To determine existing soil and groundwater conditions, a geotechnical Investigation has been completed by Fisher Engineering. Refer to **Appendix B** for Borehole locations and groundwater level measurements.

The main findings of the geotechnical investigation include:

- The boreholes were found to be generaly dry on completion of the respective soil borings.
- Monitoring wells were installed in all boreholes for water sampling and testing.
- Measured groundwater depths vary from 3.41m to 3.93m below ground.
- A construction dewatering system, such as a wellpoint system, may be required for the construction of underground levels.

Monitoring wells location plan and measured groundwater elevations are provided in **Appendix B** - **Figure A2** Borehole Location Map and **Table 2** Groundwater Depths and Elevations.

3.3 Water Quality Control

Pursuant to the GRCA Guidelines, stormwater quality controls are to be implemented on-site to achieve a minimum of 80% long term total suspended solid (TSS) removal.

The soft landscaped areas and cool roof are not prone to sediment generation, and are not subject to petroleum hydrocarbon, and therefore are considered clean for water quality control purposes. In addition, an oil/grit separator (Stormceptor EFO4) is designed to treat the 90% rainfall runoff of the entire site. Therefore, the overall onsite stormwater quality treatment achieves 80% TSS removal. Refer to **Appendix A** for the sizing report, typical details and ETV certification of EFO oil/grit separator.

3.4 Water Balance Management

The GRCA Guidelines requires the post-development annual runoff volume to be less than the pre-development volume. One way of meeting this requirement is through the retention of all runoff from a 5 mm storm event through infiltration, irrigation, evapo-transpiration or rainwater reuse. Based on the post-development conditions, the required on-site retention volume is estimated to be 15.02m^3. Refer to **Appendix A** for details of calculations.

Bottom portion of the underground stormwater storage chamber and clear stone below the storm outlet is utilized to retain the required volume.

3.5 Water Quantity Control

As depicted on **Fig. 03** - Prop. Storm Drainage Area Plan, and to ensure the quantity control criteria in Section 1.4 is met, it is proposed that stormwater from the site be collected, piped to and detained within an underground stormwater storage chamber in the proposed parking lot, and released via an orifice plate to the 600mm Conc. storm sewer on North Street. To control discharge into storm sewer, a welded orifice plate (217Φ) is proposed at the upstream of the oil/grit separator. Refer to **Appendix A** for orifice plate sizing details, and **Dwg. C-04** for typical details of welded orifice plate.

Using the GRCA's IDF curve parameters for different design storm events, the storage requirements are estimated in **Appendix A**, The summary of stormwater management plan is summarized in **Table 2** below:

TABLE 2: STORMWATER MANAGEMENT PLAN SUMMARY

Design Storm Events	100-Year
Allowable Site Discharge (5-yr Pre-Development Flow Rate):	86.35L/s
Actual Allowable Release Rate by an orifice plate	**86.35 L/s**
Storage Required (see Appendix A) - Quantity Control:	90.72m^3
Storage Required (see Appendix A) - for Infiltration	15.02m^3
Total Storage Volume Required	**105.74m^3**
Active Storage Provided	147.62 m^3
Storage Provided - for Infiltration	23.56 m^3
Total Storage Provided	171.18 m^3

Quantity Control	217mm Welded Orifice Plate
Quality Control	Oil Grit Separator

The underground storage chamber, consisting of Layfield Aquabox HP Module and surrounding 19mm clear stones, is located in the proposed parking lot and approx. 110 m^2 in area, and provide a storage volume of approximately 171 m^3, thus satisfying the stormwater storage requirements.

The typical details of Layfield Aquabox HP and stage-storage calculations are provided in **Appendix A**. Shop drawings shall be required at the construction stage.

4. SITE SERVICING

The purpose of this site servicing study is to review the site servicing requirement of the proposed development, and adequacy of existing water, sanitary and storm services. As mentioned in Section 2.2, there is no as-built records of municipal services along the surrounding roads, and Premier Locates Inc. was retained to undertake the field investigation of all existing services and utilities, including the sewer pipe inverts at manholes and catchbasins.

4.1 Sanitary Sewage

Based on the field investigation, under the existing condition, there exists an existing 250mm dia. clay sanitary sewer at a slope of 5.42% along North Street. An 150mm dia. existing sanitary service lateral for the existing 2-storey building discharges sewage to the 250mm sanitary sewer on North Street.

The 150mm dia. existing sanitary service lateral for the existing 2-storey building will remain unchanged.

Design Parameters

The sanitary demands for the proposed site are based on the following design criteria:

Sanitary Demand Rate for New Local Sewers:

- Residential 450 L/s

Peaking Factors:

- Residential Harmon Equation $PF=1+14/(4+P/1000)^{0.5}$

Extraneous Flows:

- Infiltration Allowance 0.26 L/s/ha (all areas)

Population densities:

- 1-bedroom 1.4
- 2-bedroom 2.1
- 3-bedroom 3.1

The above parameters are based on City of Toronto - Design Criteria for Sewers and Watermain which were accepted for other developments in Port Hope

Sanitary Flows

Based on the above design criteria, sanitary flow generated from the proposed development is 1.92 L/s as estimated in **Appendix C**.

Sanitary Service Connection

a 150mm dia. PVC sanitary service connection at a slope of 2.00% is proposed to discharge the sewage to the existing 250mm dia. clay sanitary sewer @ 5.42% on North Street. A sanitary manhole (No. SAN.MH.1A) is proposed at the connection. The flow capacity of the proposed sanitary service is 21.54 L/s. Refer to **Dwg. C-02** for location of proposed sanitary lateral.

Municipal Sanitary Sewers Capacity Review

Under the proposed development condition, the sanitary discharge into 250mm dia. clay municipal sanitary sewer is 1.92L/s. In comparison with the full flow capacity of the downstream 250mm dia. clay. sanitary sewer – 144.17 L/s, the sanitary flow from the development site accounts for 1.33% of the full flow capacity. Therefore, the existing 250mm dia. clay. municipal sanitary sewer is anticipated being adequate to support the proposed development.

4.2 Storm Drainage

Based on the field investigation, under the existing condition, there exists an existing 600mm dia. concrete storm sewer at a slope of 2.50% along North Street. Two existing catchbasins (No. Ex.CB-02 & Ex.CB-04) discharges stormwater to the 600mm storm sewers on North Street.

The existing catchbasin No. Ex.CB-02 & its connection will remain unchanged.

Through implementation of on-site stormwater management plan, stormwater

discharge from the site will be controlled to pre-development 5-year flow rate (86.35L/s) at all design storm events. In comparison with the full flow capacity of the 600mm dia. Conc. storm sewer at a slope of 2.56% – 1024L/s, the stormwater flow from the development site accounts for 8.43% of the full flow capacity. Therefore, the existing 600mm dia. Conc. storm sewer is anticipated adequate to support the proposed development.

A 300mm dia. PVC storm lateral at a slope of 2.00% is proposed as shown on **Dwg. C-02 Servicing Plan** in **Appendix F**. The flow capacity of the proposed storm service is 142.67 L/s – which is capable of accommodating the 86.35 L/s allowable release rate.

4.3 Water Supply

Based on the municipal records (**Appendix E**), under the existing condition, two watermains 300 C.I and 200mm PVC (400mm & 760mm dia. Per field Locates) exists along Pine Street North. An existing municipal fire hydrant, on Pine Street North at the south side of the development site, is noticed during site review. It is worth to note that 300mm CI and 200mm PVC watermains are mentioned in the communications with the municipality. SUE QL-A investigation might be required to confirm the actual diameters of existing watermains on Pine Street North ,

An existing 50mm dia. water service feeds the existing 2-storey building, and will remain unchanged.

Design Parameters

The domestic water demands for the proposed site are based on the following municipal design criteria:

Water Demand Rate:

- Residential per capita water demand rate 270L/person/day

Peaking Factors – Peak Hour:

- Residential 3.0

Peaking Factors – Maximum Day:

- Residential 1.8

Population densities:

- 1-bedroom & Studio 1.4

- 2-bedroom 2.1
- 3-bedroom 3.1

The above parameters are based on the Design Criteria accepted by Port Hope for other development projects.

Water Demand

Based on the City's design criteria, the domestic water demand is estimated in **Appendix D** and listed as below:

- Based on the City's design criteria, the domestic water demand (maximum day) is estimated to be 0.45 L/s.
- The calculation of the required fire flow using the Fire Underwriters Survey (FUS) method is completed in **Appendix D**. A fire flow of 66.67 L/s is required to meet the FUS requirement.
- Therefore, the design water demand is 67.12L/s (or 1063.8 USGPM).

Proposed Water Services

Based on the available municipal watermains and fire hydrant, the proposed building will be separately fed by the existing 200mm water main on Pine Street North with below service connection (on **Dwg.C-02**):

- A combined 150mm PVC fire protection & domestic water service connected to existing 760mm water main with approved tapping sleeve and valve;
- A water meter and backflow preventer in chamber;
- A private hydrant.

Existing Municipal Water Supply

The proposed new building will be fed by the 200mm PVC watermain on the east side of Pine Street North. A hydrant flow test was conducted on June 20, 2024 at the existing hydrants for the water main by Classic. Test records are included in **Appendix D**.

As shown by the test readings for the 200mm water main, the available water pressure ranges from 20.0 psi with a flow of 1,232 USGPM to 42.0 psi with a flow of 1,088 USGPM during the flow tests with a static pressure of 59psi. The flow at a residual pressure at 20.0 psi (1,232 USGPM) is higher than the

design water demand of 1063.8 USGPM. It is therefore anticipated that adequate water supply and pressure are available to serve the proposed residential buildings.

Refer to **Dwg. C-2** - Site Servicing Plan for details of proposed water service connections.

5. EROSION AND SEDIMENT CONTROL DURING CONSTRUCTION

In Accordance with the Erosion and Sediment Control Guidelines for Urban Construction, temporary erosion and sediment control measures are required for any development application. Due to the small size of the subject site, it is proposed that a sediment control fence be installed along the entire perimeter of the site.

Any existing/adjacent catch basins shall be protected with a Terrafix 360R geotextile fabric (or approved equal). In addition, a mud mat shall be installed along the Pine Street North frontage to prevent any mud tracking onto the municipal roads.

6. CONCLUSIONS

6.1 Stormwater Management Plan

- Water Balance: To enhance onsite infiltration, a volume of 15.02 m^3 will be retained within the underground storage chamber within the parking lot.
- Water Quantity Control: A total active storage volume of 90.72 m^3 will be required for quantity control. The proposed underground storage chamber within the parking lot will provide a total storage volume of 171 m^3.
- To control the stormwater discharge flow rate, an welded orifice plate is proposed at the upstream of proposed oil grit separator.
- Water Quality Control: A oil/grit separator (Stormceptor EFO4) along with clean roofs and soft landscaped features are proposed to achieve 80% TSS removal;

6.2 Site Servicing

- Sanitary Service: A new 150mm dia. PVC sanitary service is proposed to service the proposed development.
- Storm Service: A new 300mm dia. PVC storm service is proposed to

service the proposed development.

- Water Services: A separate combined 150mm dia. fire protection and domestic water service off Pine Street North is proposed to service the proposed development.
- Existing 200mm dia. municipal water main has adequate flow and pressure to support the proposed development.
- Existing 250mm dia. municipal sanitary sewer has adequate flow and pressure to support the proposed development.
- Existing 600mm Conc. municipal storm sewer is adequate to support the proposed development.
- Existing site services for the 2-storey building shall remain functional.

6.3 Temporary Erosion and Sediment Control during Construction

Temporary erosion and sediment control measures should be provided before construction and maintained during construction in accordance with the GGHA CA's "Erosion & Sediment Control Guidelines for Urban Construction" and other requirements.

Prepared By:

WPE Engineering Ltd.

Michael Du, P.Eng., M.Eng.
Project Manager

Appendix A

Stormwater Peak Flow and Storage Calculations
Oil/Grit Separator Sizing Report
Layfield Aquabox HP Details

	WPE Engineering Ltd. Engineers, Planners and Project Managers	**Land Use**			
		Prepared:	A.L.	Page No.	A-01
		Checked:	Z.D.		
Project: Prop. School Dormitory Building, 39 Pine St North, Port Hope, On L1A 3G5		Proj. #	2021		
		Date:	Apr. 10, 2024		

EXISTING CONDITIONS:

Existing Land Use	Area (m^2)
Impervious Area	3024
Grassed Area	2234
Total Site Area:	**5258**

PROPOSED DEVELOPMENT:

Proposed Land Use	Area (m^2)
Building Roof	1365
Impervious Area	2391
Landscape and Permeable Pavement	1502
Total Site Area:	**5258**

	WPE Engineering Ltd. Engineers, Planners and Project Managers	**Composite "C" Calculation**			
		Prepared:	A.L.	Page No.	A-02
		Checked:	Z.D.		
Project: Prop. School Dormitory Building, 39 Pine St North, Port Hope, On L1A 3G5		Proj. #	2021		
		Date:	Apr. 10, 2024		

Pre-Development Composite Runoff Coefficient "C"

Land Use	Area (ha)	C	Composite "C"
Roof	0.3024	0.90	
Grassed Area	0.223	0.25	
Total	**0.5258**		**0.62**
Imperviousness Percent:			**57.5**

Post-Development Composite Runoff Coefficient "C"

Land Use	Area (ha)	C	Composite "C"
Roof	0.1365	0.90	
Impervious Area	0.2391	0.90	
Landscape and Permeable Paver	0.1502	0.45	
Total	**0.5258**		**0.77**
Imperviousness Percent:			**71.4**

	WPE Engineering Ltd. Engineers, Planners and Project Managers	**Pre-Development Peak Flow Rates Calculation**			
		Prepared:	A.L.	Page No.	A-03
		Checked:	Z.D.		
Project: Prop. School Dormitory Building, 39 Pine St North, Port Hope, On L1A 3G5		Proj. #	2021		
		Date:	Apr. 10, 2024		

Rational Formulae: Q = 2.78 CIA (L/s)

Entire Site Area:	0.5258	ha
Time of Concentration:	10	minutes as per WWFM Guidelines
Runoff Coefficient :	0.62	Pre-development condition

Rainfall Intensity: I_5= 2464/(T+16), I_{100}=5588/(T+28);

Return Period:	5-yr	100-yr		
Rainfall Intensity (mm/hr):	94.77	147.05		

Peak Flow Rate (L/s):

Return Period:	5-yr	100-yr	
Under existing site conditions (L/s):	86.35	167.50	

Allowable release rate from the entire development site (2 yr): 86.35 L/s

	WPE Engineering Ltd. Engineers, Planners and Project Managers	**Post-Development Peak Flow Rates Calculation(Uncontrolled)**			
		Prepared:	A.L.	Page No.	A-04
		Checked:	Z.D.		
Project: Prop. School Dormitory Building, 39 Pine St North, Port Hope, On L1A 3G5		Proj. #	2021		
		Date:	Apr. 10, 2024		

Rational Formulae: Q = 2.78 CIA (L/s)

Entire Site Area:	0.5258	ha
Time of Concentration:	10	minutes as per WWFM Guidelines
Runoff Coefficient :	0.77	Post-development

Rainfall Intensity: I_5= 2464/(T+16), I_{100}=5588/(T+28);

Return Period:	5-yr	100-yr	
Rainfall Intensity (mm/hr):	94.77	147.05	

Peak Flow Rate (L/s):

Return Period:	5-yr	100-yr	
Under post-development conditions (L/s):	106.87	165.82	

	WPE Engineering Ltd. Engineers, Planners and Project Managers	**5mm Rainfall Retention Volume (Water Balance)**			
		Prepared:	A.L.	Page No.	A-05
		Checked:	Z.D.		
Project: Prop. School Dormitory Building, 39 Pine St North, Port Hope, On L1A 3G5		Proj. #	2021		
		Date:	Apr. 10, 2024		

As per GRCA Guidelines - Retain a minimum of 50% of the total average annual rainfall volume (or equivalent 5 mm from each rainfall event) generated from all site surfaces through infiltration, evapotranspiration, water harvesting and/or reuse

Site Area: 0.5258 ha
Runoff Coefficient : 0.77 Post-development site conditions

Runoff volume from 5mm rainfall event on site:

V = 5258 m^2 x 5mm 26.29 **m^3**

Initial Abstraction 5mm for pervious area & 1mm for Impervious area
Imperviousness Area: =1mmx3756 m^2 3.76 **m^3**
Pervious Area: =5mmx1502 m^2 7.51 **m^3**

Required on-site retention volume for 5mm rainfall event: 15.02 m^3

	WPE Engineering Ltd. Engineers, Planners and Project Managers	**On-Site Storage Calculation (5-Year Storm)**			
		Prepared:	A.L.	Page No.	A-06
		Checked:	Z.D.		
Project: Prop. School Dormitory Building, 39 Pine St North, Port Hope, On L1A 3G5		Proj. #	2021		
		Date:	Apr. 10, 2024		

Total Drainage Area (ha) = 0.5258 ha
Drainage Area Composite C = 0.77
Actual allowable Release Rate (5-year) = 86.35 L/s
Return Period = 5 Year

Site storage Requirement:

Time (minutes)	Rainfall Intensity (mm/hr)	Peak Flow (L/s)	Storm Runoff Volume (m^3)	Release Rate (L/s)	Release Flow Volume (m^3)	Required Storage Volume (m^3)
10	94.77	106.79	64.07	86.35	51.81	12.26
12	88.00	99.16	71.40	86.35	62.18	9.22
14	82.13	92.55	77.74	86.35	72.54	5.20
16	77.00	86.77	83.30	86.35	82.90	0.40

Required Storage Volume = 12.26 m^3

	WPE Engineering Ltd. Engineers, Planners and Project Managers	**On-Site Storage Calculation (100 - Year Storm)**			
		Prepared:	A.L.	Page No.	A-07
		Checked:	Z.D.		
Project: Prop. School Dormitory Building, 39 Pine St North, Port Hope, On L1A 3G5		Proj. #	2021		
		Date:	Apr. 10, 2024		

Total Drainage Area (ha) = 0.5258 ha
Drainage Area Composite C = 0.95 C100
Actual allowable Release Rate (5-year) = 86.35 L/s
Return Period = 100 Year

Site storage Requirement:

Time (minutes)	Rainfall Intensity (mm/hr)	Peak Flow (L/s)	Storm Runoff Volume (m^3)	Release Rate (L/s)	Release Flow Volume (m^3)	Required Storage Volume (m^3)
10	147.05	204.06	122.43	86.35	51.81	70.62
12	139.70	193.85	139.57	86.35	62.18	77.39
14	133.05	184.62	155.08	86.35	72.54	82.54
16	127.00	176.23	169.18	86.35	82.90	86.28
18	121.48	168.57	182.05	86.35	93.26	88.79
20	116.42	161.54	193.85	86.35	103.63	90.22
22	111.76	155.08	204.71	86.35	113.99	90.72
24	107.46	149.12	214.73	86.35	124.35	90.38
26	103.48	143.59	224.01	86.35	134.71	89.30
28	99.79	138.47	232.62	86.35	145.08	87.54
30	96.34	133.69	240.65	86.35	155.44	85.21
32	93.13	129.24	248.13	86.35	165.80	82.33
34	90.13	125.07	255.14	86.35	176.16	78.98
36	87.31	121.16	261.70	86.35	186.53	75.17
38	84.67	117.49	267.87	86.35	196.89	70.98

Required Storage Volume = 90.72 m^3

	WPE Engineering Ltd. Engineers, Planners and Project Managers	**Orifice Size Calculation (Orifice Plate @ U/S OGS)**			
		Prepared:	A.L.	Page No.	A-08
		Checked:	Z.D.		
Project: Prop. School Dormitory Building, 39 Pine St North, Port Hope, On L1A 3G5		Proj. #	2021		
		Date:	Apr. 10, 2024		

Orifice Discharge Formula: $Q = CA \times \sqrt{2gh}$

Knowing Max. Q & Depth			**For Assumed Diameter**		
Max. Flow:	86.35	l/s	Diameter:	217.12	mm
Max. Depth:	0.80	m	Area:	0.037	m^2
Req'd Area:	0.037	m^2	Coeff:	0.63	Orifice Plate
Req'd Dia.:	217.12	mm	Gravitational Accel:	9.81	m/s^2
Orifice C/L Elev.:	99.577	m	Invert	99.47	m
H.W.L	100.270	m			

Depth (m)	Head (m)	Q (L/s)	Elevation (m)	Remarks
0			99.47	Orifice Invert
0.11	0.00	0.00	99.58	Center Elev. of Orifice
0.22	0.11	34.04	99.69	Top Elev. of Orifice
0.47	0.36	61.87	99.94	
0.72	0.61	80.60	100.19	
0.81	0.70	86.35	100.28	H.W.L
0.90	0.79	91.75	100.37	
0.99	0.88	96.84	100.46	
1.08	0.97	101.68	100.55	
1.17	1.06	106.30	100.64	
1.27	1.16	111.21	100.74	
1.37	1.26	115.91	100.84	
1.62	1.51	126.90	101.09	
1.87	1.76	137.01	101.34	
2.12	2.01	146.43	101.59	
2.37	2.26	155.27	101.84	
2.62	2.51	163.64	102.09	

Stormceptor®

Rinker MATERIALS™

Stormceptor® EF Sizing Report

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

04/10/2024

Province:	Ontario
City:	Port Hope
Nearest Rainfall Station:	BELLEVILLE
Climate Station Id:	6150689
Years of Rainfall Data:	29

Site Name:	39 Pine Street North

Drainage Area (ha):	0.53
% Imperviousness:	72.00

Runoff Coefficient 'c': 0.73

Project Name:	Prop. Residential Development, 39 Pine St North
Project Number:	WPE#2021
Designer Name:	Michael Du
Designer Company:	WPE Enginneering Ltd
Designer Email:	mdu@wpeengineering.com
Designer Phone:	416-578-8682
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

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

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	13.33
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	
Influent TSS Concentration (mg/L):	200
Estimated Average Annual Sediment Load (kg/yr):	456
Estimated Average Annual Sediment Volume (L/yr):	371

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	86
EFO6	94
EFO8	97
EFO10	99
EFO12	99

Recommended Stormceptor EFO Model: EFO4

Estimated Net Annual Sediment (TSS) Load Reduction (%): 86

Water Quality Runoff Volume Capture (%): > 90

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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.

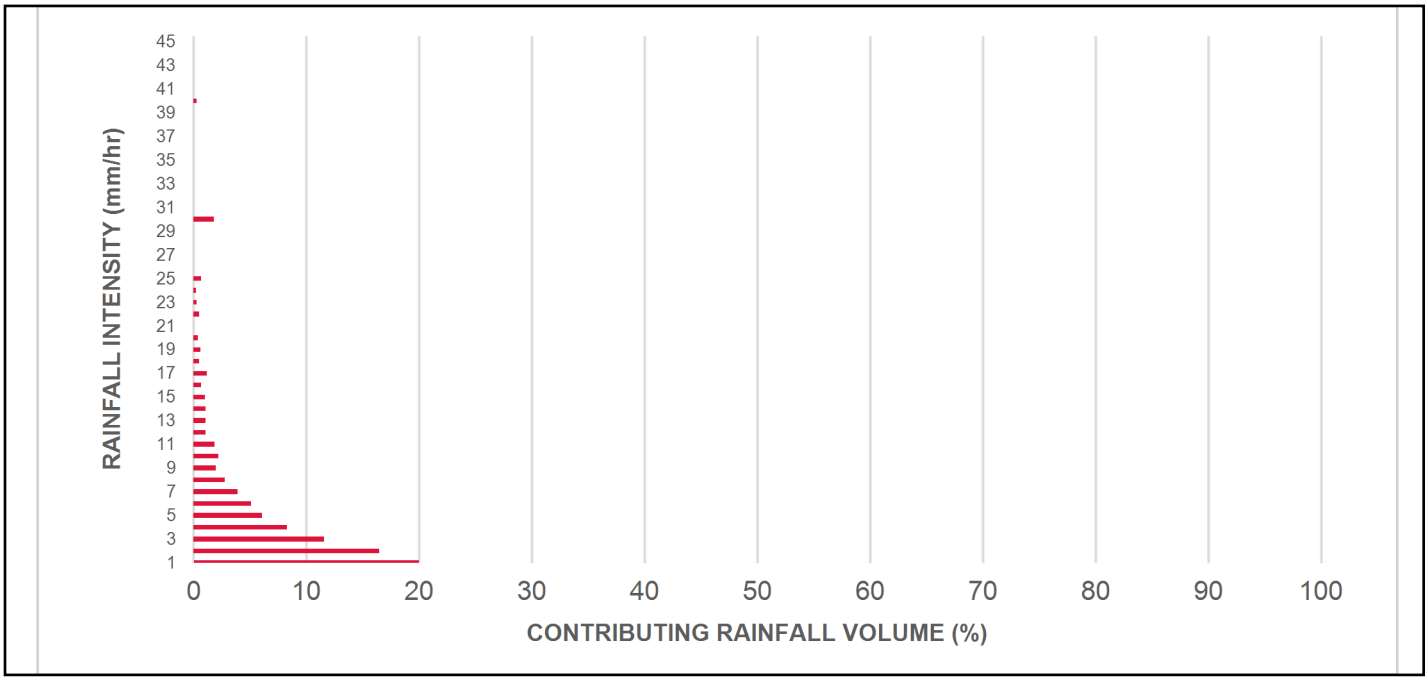
Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

Stormceptor® EF Sizing Report

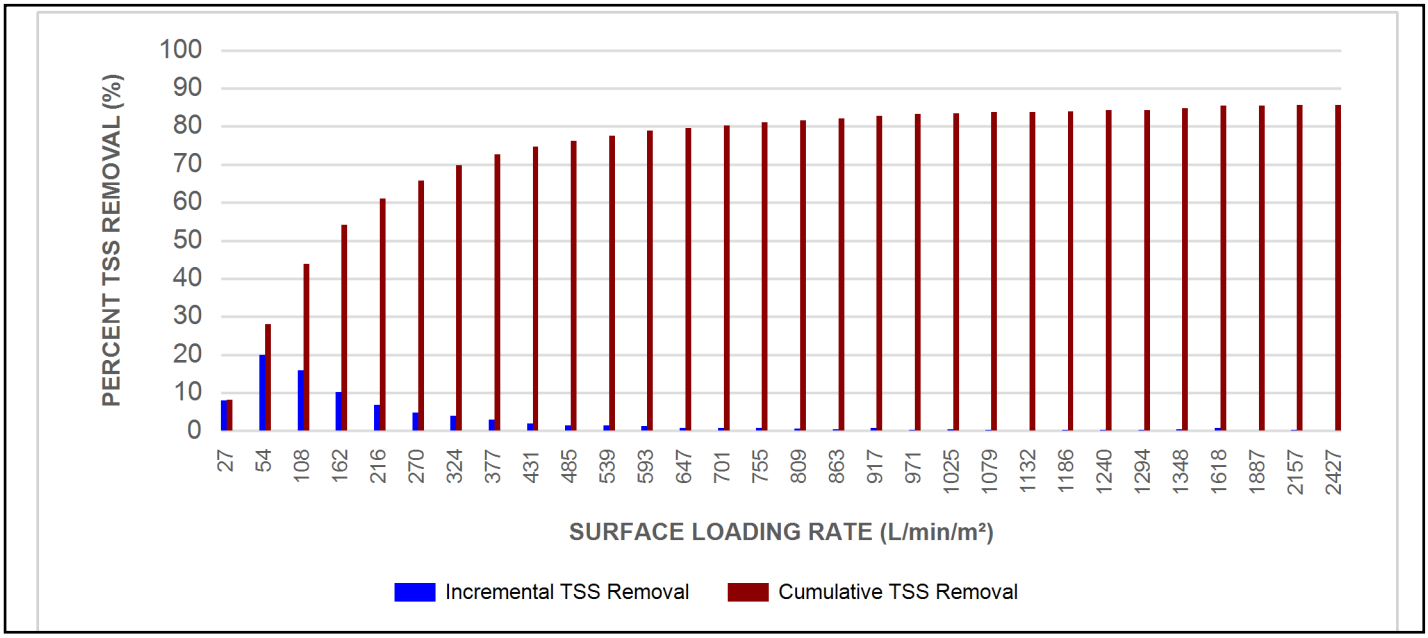
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.1	8.1	0.54	32.0	27.0	100	8.1	8.1
1.00	20.0	28.0	1.08	65.0	54.0	100	20.0	28.0
2.00	16.5	44.5	2.16	129.0	108.0	96	15.8	43.9
3.00	11.6	56.2	3.24	194.0	162.0	88	10.3	54.1
4.00	8.3	64.5	4.31	259.0	216.0	83	6.9	61.0
5.00	6.1	70.6	5.39	324.0	270.0	80	4.9	65.8
6.00	5.1	75.7	6.47	388.0	324.0	78	4.0	69.8
7.00	3.9	79.6	7.55	453.0	377.0	75	2.9	72.7
8.00	2.8	82.3	8.63	518.0	431.0	72	2.0	74.7
9.00	2.0	84.3	9.71	582.0	485.0	70	1.4	76.2
10.00	2.2	86.6	10.79	647.0	539.0	67	1.5	77.6
11.00	1.9	88.5	11.86	712.0	593.0	65	1.2	78.9
12.00	1.1	89.6	12.94	777.0	647.0	64	0.7	79.6
13.00	1.1	90.7	14.02	841.0	701.0	64	0.7	80.3
14.00	1.1	91.8	15.10	906.0	755.0	63	0.7	81.0
15.00	1.0	92.8	16.18	971.0	809.0	63	0.6	81.6
16.00	0.7	93.5	17.26	1035.0	863.0	63	0.4	82.1
17.00	1.2	94.7	18.33	1100.0	917.0	62	0.8	82.8
18.00	0.5	95.2	19.41	1165.0	971.0	62	0.3	83.2
19.00	0.6	95.8	20.49	1230.0	1025.0	61	0.3	83.5
20.00	0.4	96.2	21.57	1294.0	1079.0	60	0.3	83.8
21.00	0.0	96.2	22.65	1359.0	1132.0	59	0.0	83.8
22.00	0.5	96.7	23.73	1424.0	1186.0	57	0.3	84.0
23.00	0.3	97.0	24.81	1488.0	1240.0	56	0.2	84.2
24.00	0.2	97.2	25.88	1553.0	1294.0	55	0.1	84.3
25.00	0.7	97.9	26.96	1618.0	1348.0	54	0.4	84.7
30.00	1.8	99.7	32.36	1941.0	1618.0	45	0.8	85.5
35.00	0.0	99.7	37.75	2265.0	1887.0	39	0.0	85.5
40.00	0.3	100.0	43.14	2588.0	2157.0	34	0.1	85.6
45.00	0.0	100.0	48.53	2912.0	2427.0	30	0.0	85.6
Estimated Net Annual Sediment (TSS) Load Reduction =								**86 %**

Climate Station ID: 6150689 *Years of Rainfall Data*: 29

RAINFALL DATA FROM BELLEVILLE RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



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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

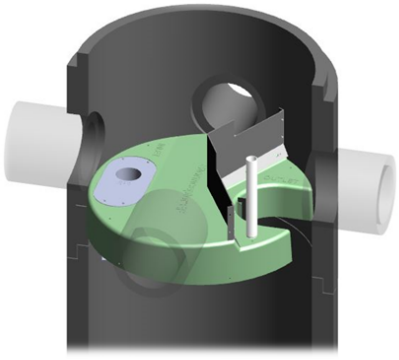
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test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

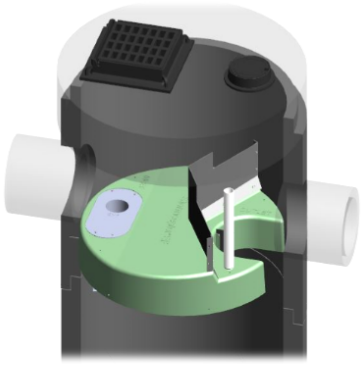
DESIGN FLEXIBILITY

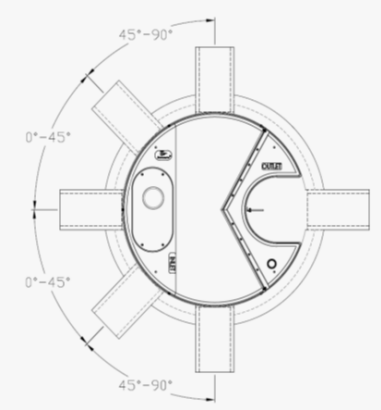
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend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

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 of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m^2 to 1400 L/min/m^2, and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m^2 and 1400 L/min/m^2 shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m^2 shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m^2. No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m^2.

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m^2 shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m^2, and shall be calculated using a simple proportioning formula, with 1400 L/min/m^2 in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m^2.

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

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

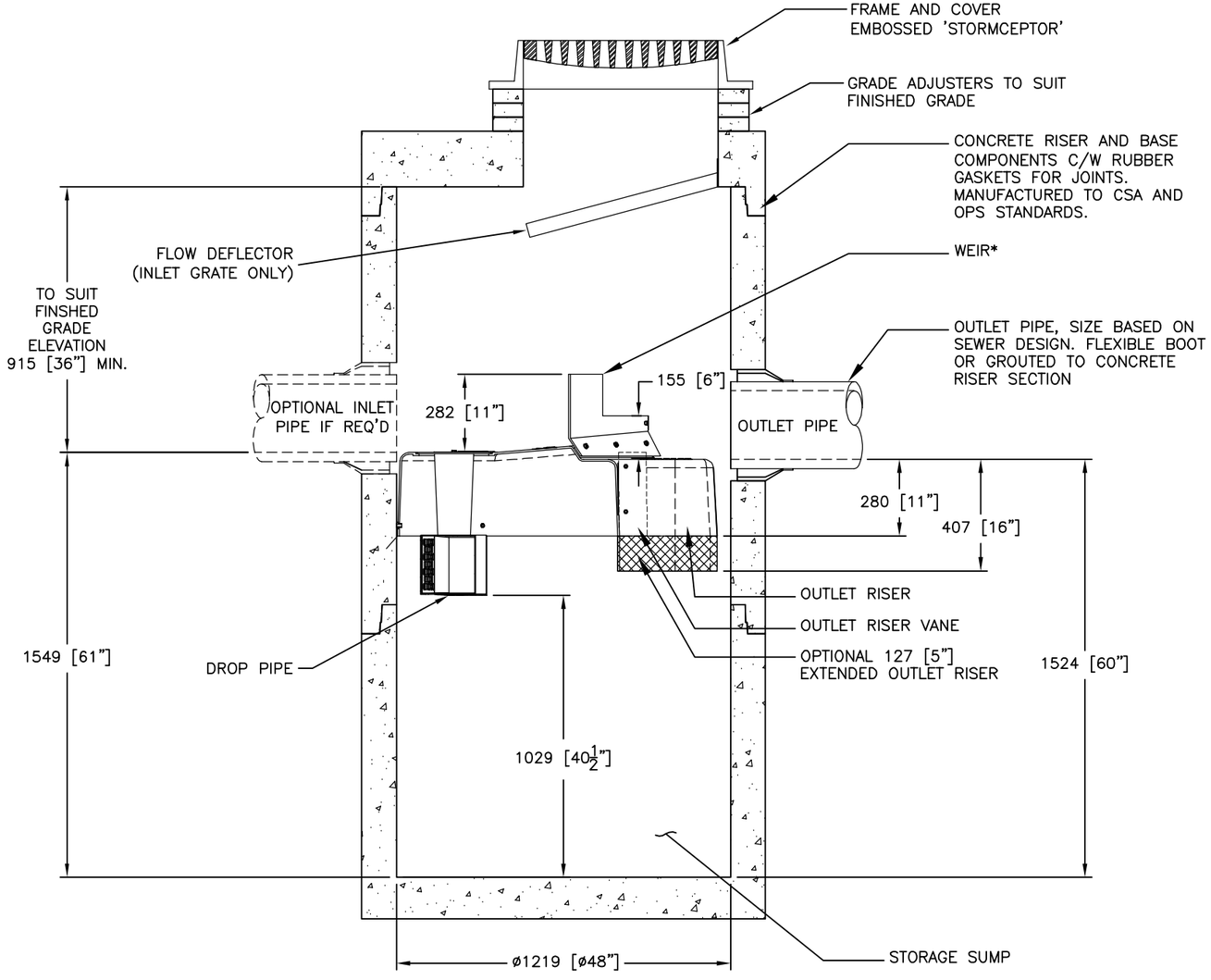
3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

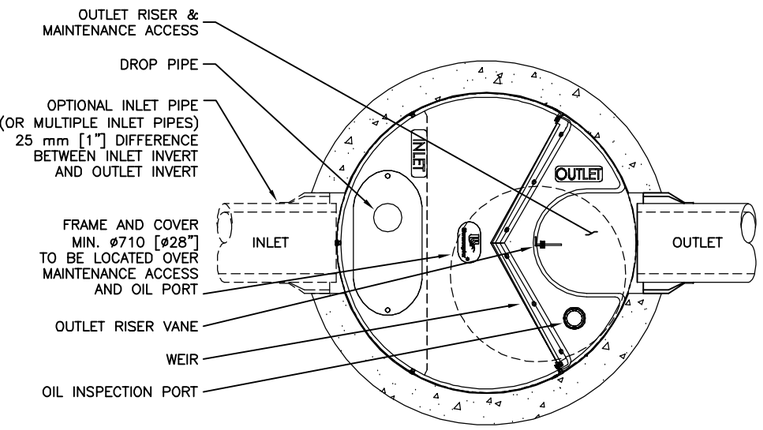
The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators,** with results reported within the Canadian ETV or ISO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

assess whether light liquids captured after a spill are effectively retained at high flow rates.

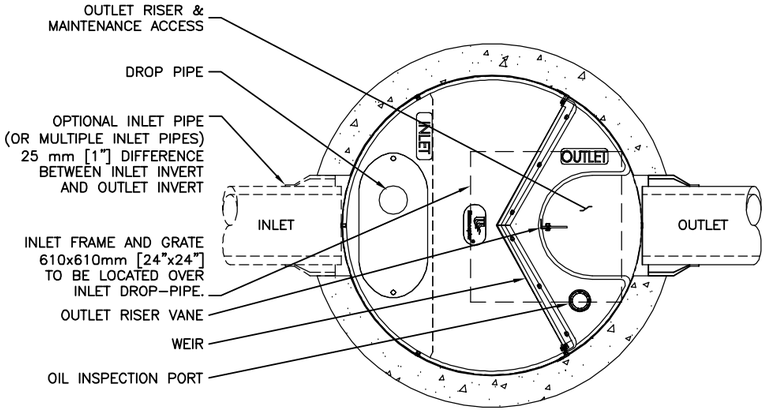
3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m^2 to 2600 L/min/m^2) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.** However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.



SECTION VIEW



PLAN VIEW (STANDARD)



PLAN VIEW (INLET TOP)

FOR SITE SPECIFIC DRAWINGS PLEASE CONTACT YOUR LOCAL STORMCEPTOR REPRESENTATIVE. SITE SPECIFIC DRAWINGS ARE BASED ON THE BEST AVAILABLE INFORMATION AT THE TIME. SOME FIELD REVISIONS TO THE SYSTEM LOCATION OR CONNECTION PIPING MAY BE NECESSARY BASED ON AVAILABLE SPACE OR SITE CONFIGURATION REVISIONS. ELEVATIONS SHOULD BE MAINTAINED EXCEPT WHERE NOTED ON BYPASS STRUCTURE (IF REQUIRED).

GENERAL NOTES:

* MAXIMUM SURFACE LOADING RATE (SLR) INTO LOWER CHAMBER THROUGH DROP PIPE IS 1135 L/min/m^2 (27.9 gpm/ft^2) FOR STORMCEPTOR EF4 AND 535 L/min/m^2 (13.1 gpm/ft^2) FOR STORMCEPTOR EFO4 (OIL CAPTURE CONFIGURATION). WEIR HEIGHT IS 150 mm (6 INCH) FOR EF04.

1. ALL DIMENSIONS INDICATED ARE IN MILLIMETERS (INCHES) UNLESS OTHERWISE SPECIFIED.
2. STORMCEPTOR STRUCTURE INLET AND OUTLET PIPE SIZE AND ORIENTATION SHOWN FOR INFORMATIONAL PURPOSES ONLY.
3. UNLESS OTHERWISE NOTED, BYPASS INFRASTRUCTURE, SUCH AS ALL UPSTREAM DIVERSION STRUCTURES, CONNECTING STRUCTURES, OR PIPE CONDUITS CONNECTING TO COMPLETE THE STORMCEPTOR SYSTEM SHALL BE PROVIDED AND ADDRESSED SEPARATELY.
4. DRAWING FOR INFORMATION PURPOSES ONLY. REFER TO ENGINEER'S SITE/UTILITY PLAN FOR STRUCTURE ORIENTATION.
5. NO PRODUCT SUBSTITUTIONS SHALL BE ACCEPTED UNLESS SUBMITTED 10 DAYS PRIOR TO PROJECT BID DATE, OR AS DIRECTED BY THE ENGINEER OF RECORD.

INSTALLATION NOTES

A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STRUCTURE (LIFTING CLUTCHES PROVIDED)
C. CONTRACTOR WILL INSTALL AND LEVEL THE STRUCTURE, SEALING THE JOINTS, LINE ENTRY AND EXIT POINTS (NON-SHRINK GROUT WITH APPROVED WATERSTOP OR FLEXIBLE BOOT)
D. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT THE DEVICE FROM CONSTRUCTION-RELATED EROSION RUNOFF.
E. DEVICE ACTIVATION, BY CONTRACTOR, SHALL OCCUR ONLY AFTER SITE HAS BEEN STABILIZED AND THE STORMCEPTOR UNIT IS CLEAN AND FREE OF DEBRIS.

STANDARD DETAIL
NOT FOR CONSTRUCTION

SITE SPECIFIC DATA REQUIREMENTS

STORMCEPTOR MODEL	EFO4
STRUCTURE ID	*
HYDROCARBON STORAGE REQ'D (L)	*
WATER QUALITY FLOW RATE (L/s)	*
PEAK FLOW RATE (L/s)	*
RETURN PERIOD OF PEAK FLOW (yrs)	*
DRAINAGE AREA (HA)	*
DRAINAGE AREA IMPERVIOUSNESS (%)	*

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

* PER ENGINEER OF RECORD

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

Stormceptor® EF

SCALE = NTS

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

DATE: 10/13/2017

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

SHEET: 1 OF 1

◆ Verification Statement ◆ Verification Statement ◆ Verification Statement ◆

VERIFICATION STATEMENT

GLOBE Performance Solutions

Verifies the performance of

Stormceptor® EF and EFO Oil-Grit Separators

Developed by Imbrium Systems, Inc.,
Whitby, Ontario, Canada

Registration: GPS-ETV_VR2020-11-15_Imbrium-SC

In accordance with

ISO 14034:2016

Environmental management —
Environmental technology verification (ETV)

John D. Wiebe, PhD
Executive Chairman
GLOBE Performance Solutions

November 15, 2020
Vancouver, BC, Canada

Verification Body
GLOBE Performance Solutions
404 – 999 Canada Place | Vancouver, B.C | Canada |V6C 3E2

Technology description and application

The Stormceptor® EF and EFO are treatment devices designed to remove oil, sediment, trash, debris, and pollutants attached to particulates from Stormwater and snowmelt runoff. The device takes the place of a conventional manhole within a storm drain system and offers design flexibility that works with various site constraints. The EFO is designed with a shorter bypass weir height, which accepts lower surface loading rate into the sump, thereby reducing re-entrainment of captured free floating light liquids.

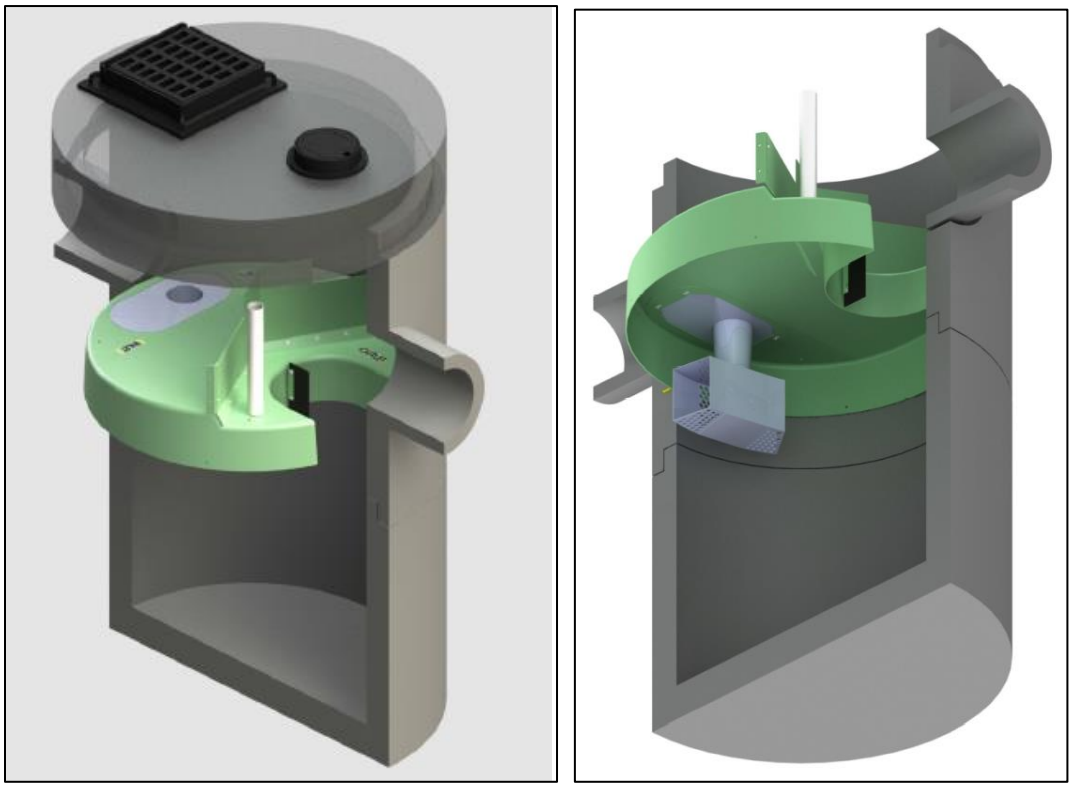


Figure 1. Graphic of typical inline Stormceptor® unit and core components.

Stormwater and snowmelt runoff enters the Stormceptor® EF/EFO's upper chamber through the inlet pipe(s) or a surface inlet grate. An insert divides the unit into lower and upper chambers and incorporates a weir to reduce influent velocity and separate influent (untreated) from effluent (treated) flows. Influent water ponds upstream of the insert's weir providing driving head for the water flowing downwards into the drop pipe where a vortex pulls the water into the lower chamber. The water diffuses at lower velocities in multiple directions through the drop pipe outlet openings. Oil and other floatables rise up and are trapped beneath the insert, while sediments undergo gravitational settling to the sump's bottom. Water from the sump can exit by flowing upward to the outlet riser onto the top side of the insert and downstream of the weir, where it discharges through the outlet pipe.

Maximum flow rate into the lower chamber is a function of weir height and drop pipe orifice diameter. The Stormceptor® EF and EFO are designed to allow a surface loading rate of 1135 L/min/m^2 (27.9 gal/min/ft^2) and 535 L/min/m^2 (13.1 gal/min/ft^2) into the lower chamber, respectively. When prescribed surface loading rates are exceeded, ponding water can overtop the weir height and bypass the lower treatment chamber, exiting directly through the outlet pipe. Hydraulic testing and scour testing demonstrate that the internal bypass effectively prevents scour at all bypass flow rates. Increasing the bypass flow rate does not increase the orifice-controlled flow rate into the lower treatment chamber where sediment is stored. This internal bypass feature allows for in-line installation, avoiding the cost of

additional bypass structures. During bypass, treatment continues in the lower chamber at the maximum flow rate. The Stormceptor® EFO's lower design surface loading rate is favorable for minimizing re-entrainment and washout of captured light liquids. Inspection of Stormceptor® EF and EFO devices is performed from grade by inserting a sediment probe through the outlet riser and an oil dipstick through the oil inspection pipe. The unit can be maintained by using a vacuum hose through the outlet riser.

Performance conditions

The data and results published in this Technology Fact Sheet were obtained from the testing program conducted on the Imbrium Systems Inc.'s Stormceptor® EF4 and EFO4 Oil-Grit Separators, in accordance with the Procedure for Laboratory Testing of Oil-Grit Separators (Version 3.0, June 2014). The Procedure was prepared by the Toronto and Region Conservation Authority (TRCA) for Environment Canada's Environmental Technology Verification (ETV) Program. A copy of the Procedure may be accessed on the Canadian ETV website at www.etvcanada.ca.

Performance claim(s)

Capture test[a]:

During the capture test, the Stormceptor® EF4 OGS device, with a false floor set to 50% of the manufacturer's recommended maximum sediment storage depth and a constant influent test sediment concentration of 200 mg/L, removes 70, 64, 54, 48, 46, 44, and 49 percent of influent sediment by mass at surface loading rates of 40, 80, 200, 400, 600, 1000, and 1400 L/min/m^2, respectively.

Stormceptor® EFO4, with a false floor set to 50% of the manufacturer's recommended maximum sediment storage depth and a constant influent test sediment concentration of 200 mg/L, removes 70, 64, 54, 48, 42, 40, and 34 percent of influent sediment by mass at surface loading rates of 40, 80, 200, 400, 600, 1000, and 1400 L/min/m^2, respectively.

Scour test[a]:

During the scour test, the Stormceptor® EF4 and Stormceptor® EFO4 OGS devices, with 10.2 cm (4 inches) of test sediment pre-loaded onto a false floor reaching 50% of the manufacturer's recommended maximum sediment storage depth, generate corrected effluent concentrations of 4.6, 0.7, 0, 0.2, and 0.4 mg/L at 5-minute duration surface loading rates of 200, 800, 1400, 2000, and 2600 L/min/m^2, respectively.

Light liquid re-entrainment test[a]:

During the light liquid re-entrainment test, the Stormceptor® EFO4 OGS device with surrogate low-density polyethylene beads preloaded within the lower chamber oil collection zone, representing a floating light liquid volume equal to a depth of 50.8 mm over the sedimentation area, retained 100, 99.5, 99.8, 99.8, and 99.9 percent of loaded beads by mass during the 5-minute duration surface loading rates of 200, 800, 1400, 2000, and 2600 L/min/m^2.

[a] The claim can be applied to other units smaller or larger than the tested unit as long as the untested units meet the scaling rule specified in the Procedure for Laboratory of Testing of Oil Grit Separators (Version 3.0, June 2014)

Performance results

The test sediment consisted of ground silica (1 – 1000 micron) with a specific gravity of 2.65, uniformly mixed to meet the particle size distribution specified in the testing procedure. The *Procedure for Laboratory Testing of Oil Grit Separators* requires that the three sample average of the test sediment particle size distribution (PSD) meet the specified PSD percent less than values within a boundary threshold of 6%. The comparison of the average test sediment PSD to the CETV specified PSD in Figure 2 indicates that the test sediment used for the capture and scour tests met this condition.

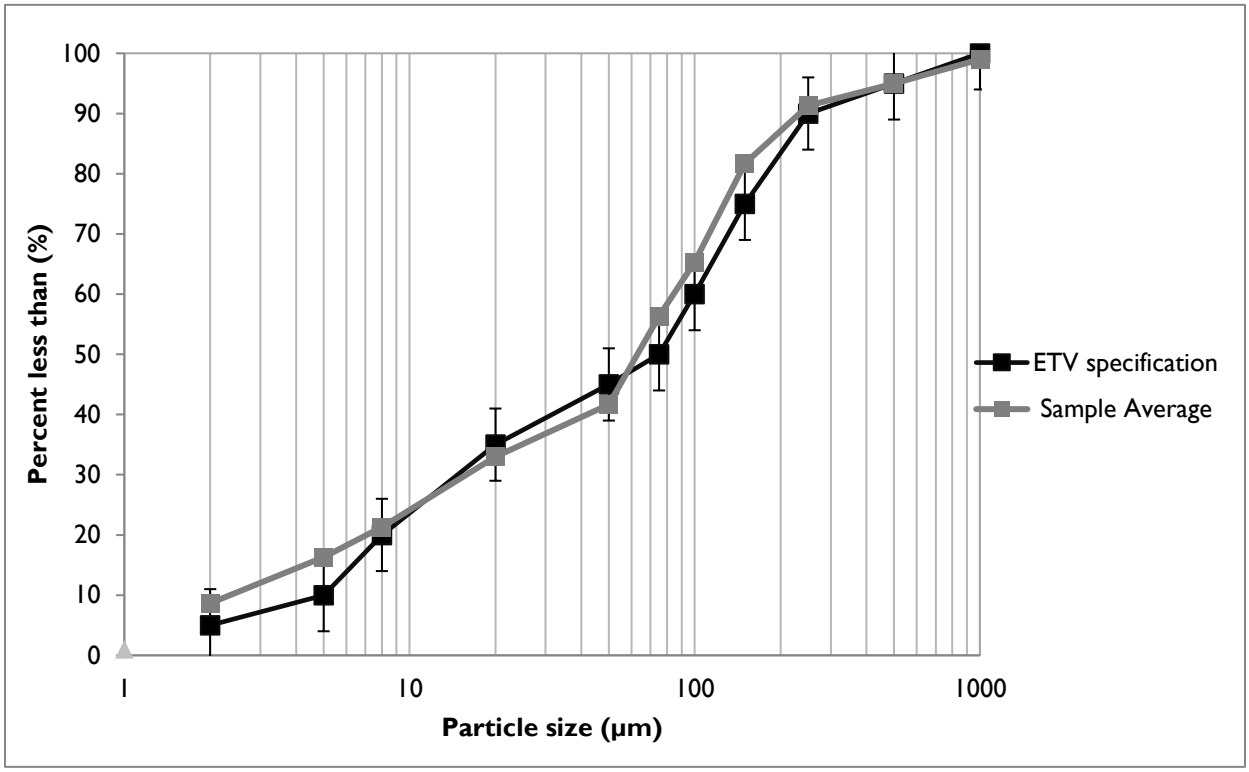


Figure 2. The three sample average particle size distribution (PSD) of the test sediment used for the capture and scour test compared to the specified PSD.

The capacity of the device to retain sediment was determined at seven surface loading rates using the modified mass balance method. This method involved measuring the mass and particle size distribution of the injected and retained sediment for each test run. Performance was evaluated with a false floor simulating the technology filled to 50% of the manufacturer's recommended maximum sediment storage depth. The test was carried out with clean water that maintained a sediment concentration below 20 mg/L. Based on these conditions, removal efficiencies for individual particle size classes and for the test sediment as a whole were determined for each of the tested surface loading rates (Table 1). Since the EF and EFO models are identical except for the weir height, which bypasses flows from the EFO model at a surface loading rate of 535 L/min/m^2 (13.1 gpm/ft^2), sediment capture tests at surface loading rates from 40 to 400 L/min/m^2 were only performed on the EF unit. Surface loading rates of 600, 1000, and 1400 L/min/m^2 were tested on both units separately. Results for the EFO model at these higher flow rates are presented in Table 2.

In some instances, the removal efficiencies were above 100% for certain particle size fractions. These discrepancies are not unique to any one test laboratory and may be attributed to errors relating to the blending of sediment, collection of representative samples for laboratory submission, and laboratory

analysis of PSD. Due to these errors, caution should be exercised in applying the removal efficiencies by particle size fraction for the purposes of sizing the tested device (see Bulletin # CETV 2016-11-0001). The results for "all particle sizes by mass balance" (see Table 1 and 2) are based on measurements of the total injected and retained sediment mass, and are therefore not subject to blending, sampling or PSD analysis errors.

Table 1. Removal efficiencies (%) of the EF4 at specified surface loading rates

Particle size fraction (µm)	**Surface loading rate (L/min/m²)**						
	40	80	200	400	600	1000	1400
>500	90	58	58	100*	86	72	100*
250 - 500	100*	100*	100	100*	100*	100*	100*
150 - 250	90	82	26	100*	100*	67	90
105 - 150	100*	100*	100*	100*	100*	100*	100
75 - 105	100*	92	74	82	77	68	76
53 - 75	Undefined [a]	56	100*	72	69	50	80
20 - 53	54	100*	54	33	36	40	31
8 - 20	67	52	25	21	17	20	20
5 – 8	33	29	11	12	9	7	19
<5	13	0	0	0	0	0	4
All particle sizes by mass balance	**70.4**	**63.8**	**53.9**	**47.5**	**46.0**	**43.7**	**49.0**

[a] An outlier in the feed sample sieve data resulted in a negative removal efficiency for this size fraction.
* Removal efficiencies were calculated to be above 100%. Calculated values ranged between 101 and 171% (average 128%). See text and Bulletin # CETV 2016-11-0001 for more information.

Table 2. Removal efficiencies (%) of the EFO4 at surface loading rates above the bypass rate of 535 L/min/m²

Particle size fraction (µm)	**Surface loading rate (L/min/m²)**		
	600	1000	1400
>500	89	83	100*
250 - 500	90	100*	92
150 - 250	90	67	100*
105 - 150	85	92	77
75 - 105	80	71	65
53 - 75	60	31	36
20 - 53	33	43	23
8 - 20	17	23	15
5 – 8	10	3	3
<5	0	0	0
All particle sizes by mass balance	**41.7**	**39.7**	**34.2**

* Removal efficiencies were calculated to be above 100%. Calculated values ranged between 103 and 111% (average 107%). See text and Bulletin # CETV 2016-11-0001 for more information.

Figure 3 compares the particle size distribution (PSD) of the three sample average of the test sediment to the PSD of the sediment retained by the EF4 at each of the tested surface loading rates. Figure 4 shows the same graph for the EFO4 unit at surface loading rates above the bypass rate of 535 L/min/m².

As expected, the capture efficiency for fine particles in both units was generally found to decrease as surface loading rates increased.

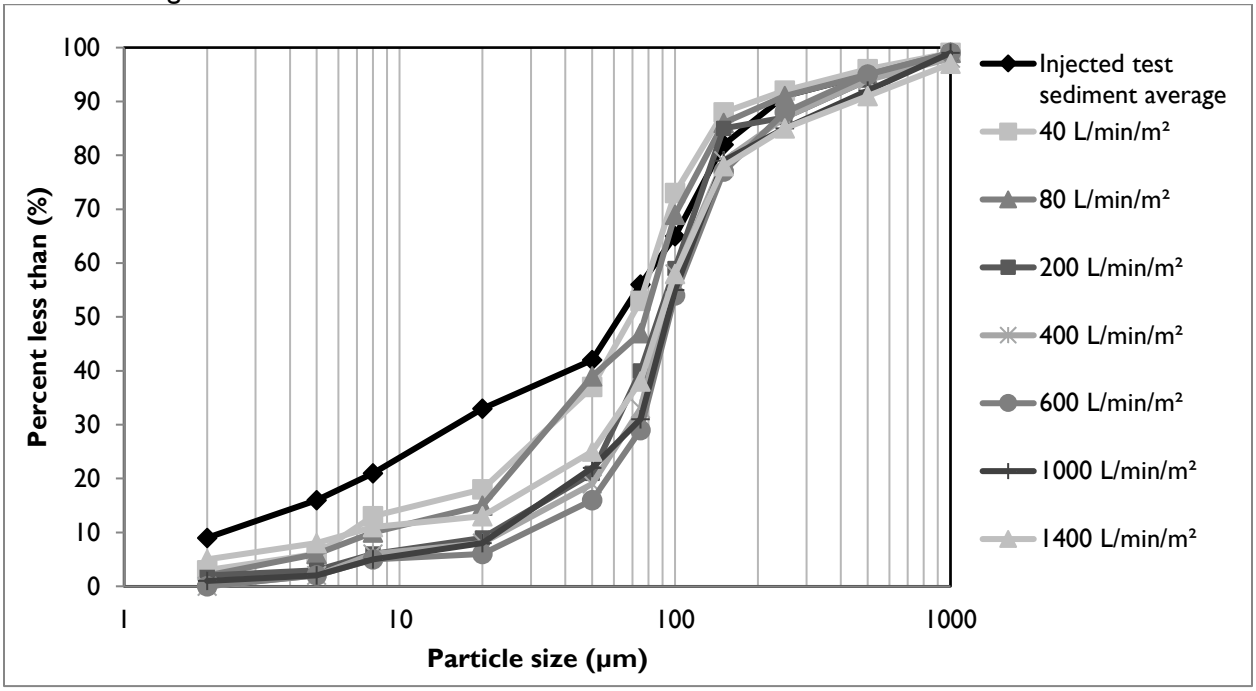


Figure 3. Particle size distribution of sediment retained in the EF4 in relation to the injected test sediment average.

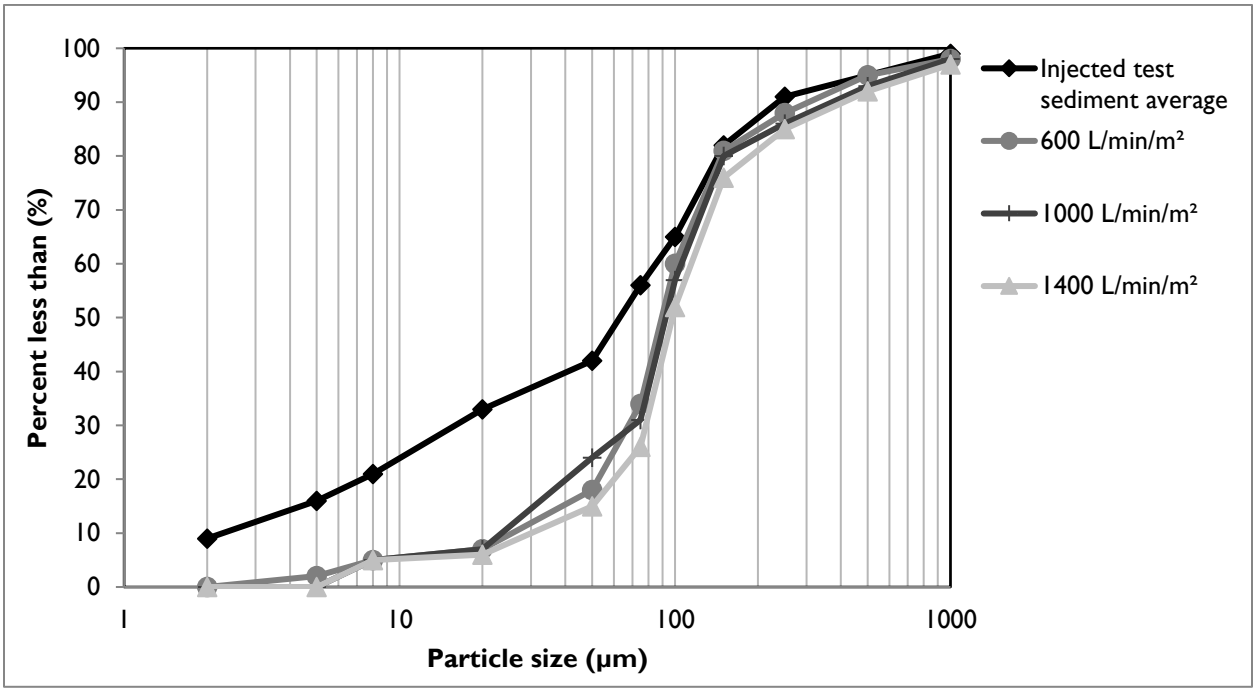


Figure 4. Particle size distribution of sediment retained in the EFO4 in relation to the injected test sediment average at surface loading rates above the bypass rate of 535 L/min/m²

Table 4 shows the results of the sediment scour and re-suspension test for the EF4 unit. The EFO4 was not tested as it was reasonably assumed that scour rates would be lower given that flow bypass occurs at a lower surface loading rate. The scour test involved preloading 10.2 cm of fresh test sediment into

the sedimentation sump of the device. The sediment was placed on a false floor to mimic a device filled to 50% of the maximum recommended sediment storage depth. Clean water was run through the device at five surface loading rates over a 30 minute period. Each flow rate was maintained for 5 minutes with a one minute transition time between flow rates. Effluent samples were collected at one minute sampling intervals and analyzed for Suspended Sediment Concentration (SSC) and PSD by recognized methods. The effluent samples were subsequently adjusted based on the background concentration of the influent water. Typically, the smallest 5% of particles captured during the 40 L/min/m^2 sediment capture test is also used to adjust the concentration, as per the method described in Bulletin # CETV 2016-09-0001. However, since the composites of effluent concentrations were below the Reporting Detection Limit of the Laser Diffraction PSD methodology, this adjustment was not made. Results showed average adjusted effluent sediment concentrations below 5 mg/L at all tested surface loading rates.

It should be noted that the EF4 starts to internally bypass water at 1135 L/min/m^2, potentially resulting in the dilution of effluent concentrations, which would not normally occur under typical field conditions because the field influent concentration would contain a much higher sediment concentration than during the lab test. Recalculation of effluent concentrations to account for dilution at surface loading rates above the bypass rate showed sediment effluent concentrations to be below 1.6 mg/L.

Table 4. Scour test adjusted effluent sediment concentration.

Run	Surface loading rate (L/min/m^2)	Run time (min)	Background sample concentration (mg/L)	Adjusted effluent suspended sediment concentration (mg/L) [a]	Average (mg/L)
1	200	1:00	<RDL	11.9	4.6
		2:00		7.0	
		3:00		4.4	
		4:00		2.2	
		5:00		1.0	
		6:00		1.2	
2	800	7:00	<RDL	1.1	0.7
		8:00		0.9	
		9:00		0.6	
		10:00		1.4	
		11:00		0.1	
		12:00		0	
3	1400	13:00	<RDL	0	0
		14:00		0.1	
		15:00		0	
		16:00		0	
		17:00		0	
		18:00		0	
4	2000	19:00	1.2	0.2	0.2
		20:00		0	
		21:00		0	
		22:00		0.7	
		23:00		0	
		24:00		0.4	

5	2600	25:00	1.6	0.3	0.4
		26:00		0.4	
		27:00		0.7	
		28:00		0.4	
		29:00		0.2	
		30:00		0.4	

[a] The adjusted effluent suspended sediment concentration represents the actual measured effluent concentration minus the background concentration. For more information see Bulletin # CETV 2016-09-0001.

The results of the light liquid re-entrainment test used to evaluate the unit's capacity to prevent re-entrainment of light liquids are reported in Table 5. The test involved preloading 58.3 L (corresponding to a 5 cm depth over the collection sump area of 1.17m^2) of surrogate low-density polyethylene beads within the oil collection skirt and running clean water through the device continuously at five surface loading rates (200, 800, 1400, 2000, and 2600 L/min/m^2). Each flow rate was maintained for 5 minutes with approximately 1 minute transition time between flow rates. The effluent flow was screened to capture all re-entrained pellets throughout the test.

Table 5. Light liquid re-entrainment test results for the EFO4.

Surface Loading Rate (L/min/m2)	Time Stamp	Amount of Beads Re-entrained			
		Mass (g)	Volume (L)[a]	% of Pre-loaded Mass Re-entrained	% of Pre-loaded Mass Retained
200	62	0	0	0.00	100
800	247	168.45	0.3	0.52	99.48
1400	432	51.88	0.09	0.16	99.83
2000	617	55.54	0.1	0.17	99.84
2600	802	19.73	0.035	0.06	99.94
Total Re-entrained		295.60	0.525	0.91	--
Total Retained		32403	57.78	--	99.09
Total Loaded		32699	58.3	--	--

[a] Determined from bead bulk density of 0.56074 g/cm^3

Variances from testing Procedure

The following minor deviations from the *Procedure for Laboratory Testing of Oil-Grit Separators* (Version 3.0, June 2014) have been noted:

1. During the capture test, the 40 L/min/m^2 and 80 L/min/m^2 surface loading rates were evaluated over 3 and 2 days respectively due to the long duration needed to feed the required minimum of 11.3 kg of test sediment into the unit at these lower flow rates. Pumps were shut down at the end of each intermediate day, and turned on again the following morning. The target flow rate was re-established within 30 seconds of switching on the pump. This procedure may have allowed sediments to be captured that otherwise may have exited the unit if the test was continuous. On the basis of practical considerations, this variance was approved by the verifier prior to testing.

2. During the scour test, the coefficient of variation (COV) for the lowest flow rate tested (200 L/min/m^2) was 0.07, which exceeded the specified limit of 0.04 target specified in the OGS Procedure. A pump capable of attaining the highest flow rate of 3036 L/min had difficulty maintaining the lowest flow of 234 L/min but still remained within +/- 10% of the target flow and is viewed as having very little impact on the observed results. Similarly, for the light liquid re-entrainment test the COV for the flow rate of the 200 L/min/m^2 run was 0.049, exceeding the limit of 0.04, but is believed to introduce negligible bias.

3. Due to pressure build up in the filters, the runs at 1000 L/min/m^2 for the Stormceptor® EF4 and 1000 and 1400 L/min/m^2 for the Stormceptor® EFO4 were slightly shorter than the target. The run times were 54, 59 and 43 minutes respectively, versus targets of 60 and 50 minutes. The final feed samples were timed to coincide with the end of the run. Since >25 lbs of sediment was fed, the shortened time did not invalidate the runs.

Verification

The verification was completed by the Verification Expert, Toronto and Region Conservation Authority, contracted by GLOBE Performance Solutions, using the International Standard ***ISO 14034:2016 Environmental management -- Environmental technology verification (ETV)***. Data and information provided by Imbrium Systems Inc. to support the performance claim included the following: Performance test report prepared by Good Harbour Laboratories, and dated September 8, 2017; the report is based on testing completed in accordance with the Procedure for Laboratory Testing of Oil-Grit Separators (Version 3.0, June 2014).

What is ISO14034:2016 Environmental management – Environmental technology verification (ETV)?

ISO 14034:2016 specifies principles, procedures and requirements for environmental technology verification (ETV), and was developed and published by the *International Organization for Standardization (ISO)*. The objective of ETV is to provide credible, reliable and independent verification of the performance of environmental technologies. An environmental technology is a technology that either results in an environmental added value or measures parameters that indicate an environmental impact. Such technologies have an increasingly important role in addressing environmental challenges and achieving sustainable development.

For more information on the Stormceptor® EF and EFO OGS please contact:

Imbrium Systems, Inc.
407 Fairview Drive
Whitby, ON
L1N 3A9, Canada
Tel: 416-960-9900
info@imbriumsystems.com

For more information on ISO 14034:2016 / ETV please contact:

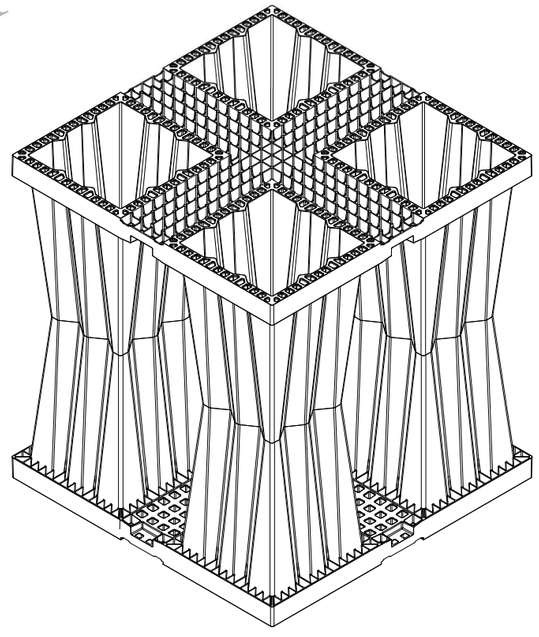
GLOBE Performance Solutions
World Trade Centre
404 – 999 Canada Place
Vancouver, BC
V6C 3E2 Canada
Tel: 604-695-5018 / Toll Free: 1-855-695-5018
etv@globeperformance.com

LAYFIELD

AQUABOX MODULE LAYOUT DRAWINGS

39 PINE STREET N.

Port Hope, ON



Pages:

REFER TO AQUABOX INSTALLATION INSTRUCTIONS

LAYFIELD
117 Basaltic Rd,
Concord, ON L4K 1G4 Canada
Ph: (905) 761-9123
www.layfieldgroup.com

Total Storage Volume		171.18 m^3
Module Storage Volume		145.15 m^3
Stone Storage Volume		26.02 m^3
System Footprint		108.13 m^2
Estimated Geotextile Fabric	NuBarrier	791 m^2
Estimated Geotextile Fabric	LP8	---- m^2
Estimated Liner		---- m^2
Estimated GeoGrid		---- m^2
Estimated Stone Volume		65.06 m^3
Excavation Required		248.70 m^3
Minimum Excavation Depth		2.3 m
Stone Type		19mm Clear Stone
Stone Void Space		40%
Number of Module Layers		2
Allowable Loading		HS-25

Surface	Paved Surface	Vegetated/ Unpaved
Minimum Top Cover	0.60 m	0.80 m
Maximum Tank Depth	3.50 m	3.40 m

39 PINE STREET N.

Port Hope, ON

REV	Record of Changes	Date	By
△	Preliminary Drawing	09APR2024	PE

Project Number: ----

Page Name: Cover Page

Drawn by: PE | Checked By: JF

Scale: NTS | Date: 09APR2024

THIS LAYOUT DRAWING WAS PREPARED TO SUPPORT THE ENGINEER OF RECORD FOR THE PROPOSED SYSTEM. IT IS THE RESPONSIBILITY OF THE ENGINEER OF RECORD TO REVIEW THE INFORMATION AND ENSURE THAT THE LAYOUT AND DESIGN IS IN FULL COMPLIANCE WITH ALL APPLICABLE LAWS AND REGULATIONS AND THAT THE AQUABOX SYSTEM HAS BEEN DESIGNED IN ACCORDANCE WITH GEOPLAST'S REQUIREMENTS. LAYFIELD DOES NOT REVIEW OR APPROVE PLANS, SIZING OR DESIGNS.

Sheet:

01 OF 07

1 S-02 NOTES

NOTES:

a. All dimensions are measured in meters unless noted otherwise.

b. Reference Aquabox standard drawings and notes for detailed information.

c. Reference current Aquabox Module installation instructions for proper installation practices.

https://www.geoplastglobal.com/en/downloads/aquabox

d. Engineer of record to confirm conformance to manufacturer's allowable proximity to other structures and slopes.

e. All inlet and pipe locations and designs by others.

f. The sub-grade and side backfill needs to be compacted to 97%, unless noted otherwise.

g. During and after installation, the AquaBox Module area should be clearly marked and roped off to prevent unauthorized construction and equipment trafficking over the modules.

h. Top of Ground water is to be maintained 610 mm (2 ft) below the module to prevent buoyancy, unless otherwise noted by engineer.

i. The quantities related to stone and geosynthetics are estimated values as the roll size, overlaps, waste, ect. may vary.

j. Materials must be stored in a manner to prevent prolonged exposure to UV light.

k. Extra care and caution must be taken when handling materials at temperatures below 0C.

l. Storm tank system is not considered complete until all backfill is installed to the minimum depth shown on Detail 5 Typical System Cross-Section. The installer MUST insure that the project site remains dry and free of water (both surface and groundwater) until the installation is complete, including the backfill as noted, to avoid damage to the tank system due to buoyancy.

Material Quantity (AQUABOX HP)

AquaBox HP	656
Sidewall Grid HP	125
Top Cap HP	672
Single Joint	614
Double Joint	339

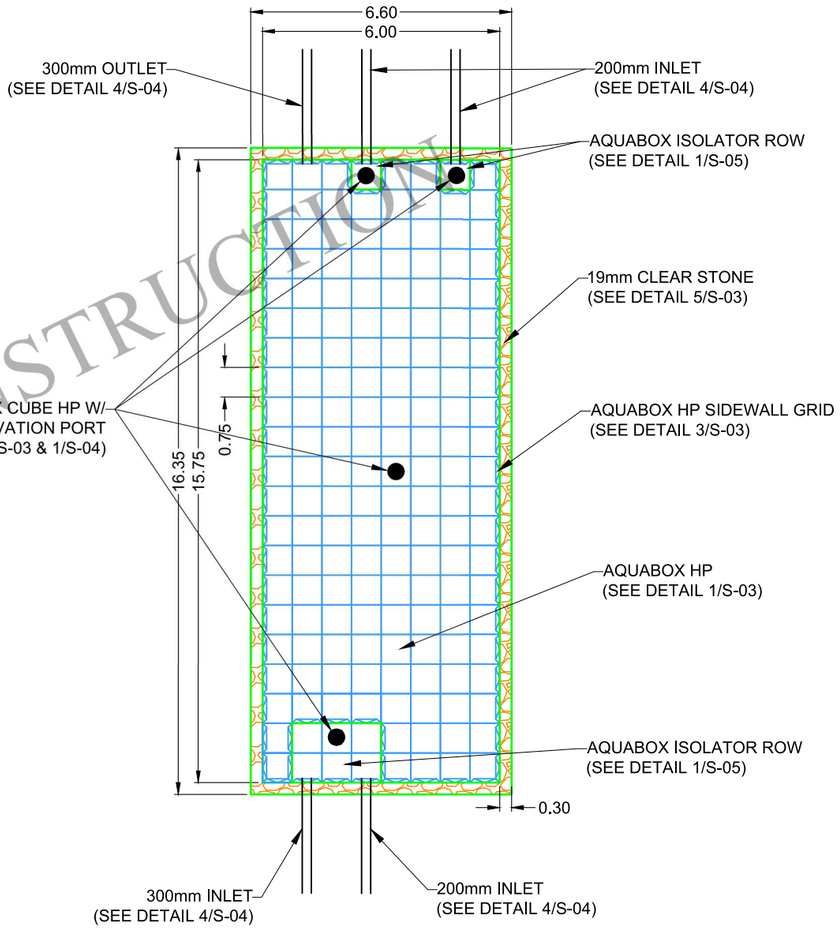
Material Quantity (AQUABOX CUBE HP)

AquaBox Cube HP	32
Sidewall Grid Cube HP	8
Circular Cap D400 HP	4
Surface Grate	4

Elevations

Leveling Stone Bottom	99.191
Bottom of Module	99.291
Module Invert	99.341
Top of Module	100.891
Top of Stone Backfill	101.191
Minimum Finished Grade *Must consider frost line, varies by region	101.491
Maximum Finished Grade	102.791

Contractor to confirm that quantities shipped to site match those listed above. Please report any discrepancy or damage to Layfield immediately.



DETENTION VOLUME ABOVE ELEVATION 99.491 = 147.62 M3

RETENTION VOLUME BELOW ELEVATION 99.491 = 23.56 M3

2 S-02 MODULE LAYOUT SCALE: NTS

LAYFIELD
117 Basaltic Rd,
Concord, ON L4K 1G4 Canada
Ph: (905) 761-9123
www.layfieldgroup.com

Total Storage Volume		171.18 m^3
Module Storage Volume		145.15 m^3
Stone Storage Volume		26.02 m^3
System Footprint		108.13 m^2
Estimated Geotextile Fabric	NuBarrier	791 m^2
Estimated Geotextile Fabric	LP8	---- m^2
Estimated Liner		---- m^2
Estimated GeoGrid		---- m^2
Estimated Stone Volume		65.06 m^3
Excavation Required		248.70 m^3
Minimum Excavation Depth		2.3 m
Stone Type		19mm Clear Stone
Stone Void Space		40%
Number of Module Layers		2
Allowable Loading		HS-25
Surface	Paved Surface	Vegetated/ Unpaved
Minimum Top Cover	0.60 m	0.80 m
Maximum Tank Depth	3.50 m	3.40 m

39 PINE STREET N.

Port Hope, ON

REV	Record of Changes	Date	By
△	Preliminary Drawing	09APR2024	PE

Project Number: ----

Page Name: Module Layout

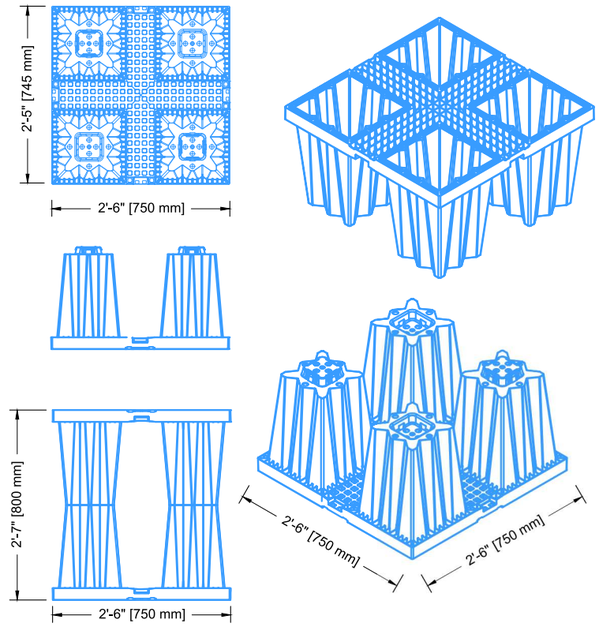
Drawn by: PE | Checked By: JF

Scale: NTS | Date: 09APR2024

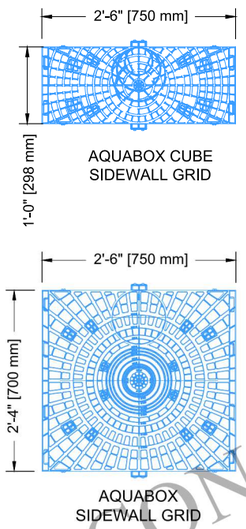
THIS LAYOUT DRAWING WAS PREPARED TO SUPPORT THE ENGINEER OF RECORD FOR THE PROPOSED SYSTEM. IT IS THE RESPONSIBILITY OF THE ENGINEER OF RECORD TO REVIEW THE INFORMATION AND ENSURE THAT THE LAYOUT AND DESIGN IS IN FULL COMPLIANCE WITH ALL APPLICABLE LAWS AND REGULATIONS AND THAT THE AQUABOX SYSTEM HAS BEEN DESIGNED IN ACCORDANCE WITH GEOPLAST'S REQUIREMENTS. LAYFIELD DOES NOT REVIEW OR APPROVE PLANS, SIZING OR DESIGNS.

Sheet:

02 OF 07

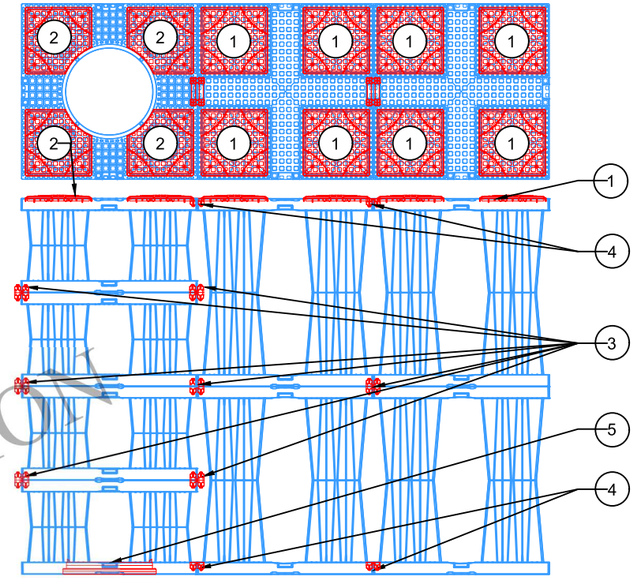


1 S-03 AQUABOX



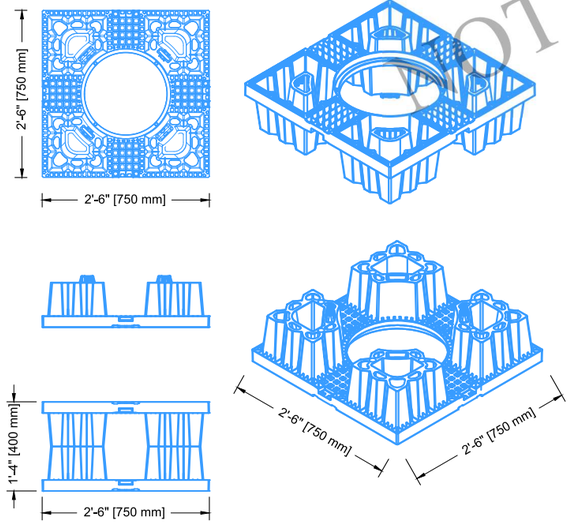
3 S-03 AQUABOX SIDEWALL GRID

1. AQUABOX CAP
2. CUT CAPS FOR AQUABOX CUBE (OBSV. PORT)
3. DOUBLE JOINT
   * For Middle Rows of Double and Triple Stacked Configurations.
4. SINGLE JOINT
   * For Top and Bottom Rows.
5. D400 CAP

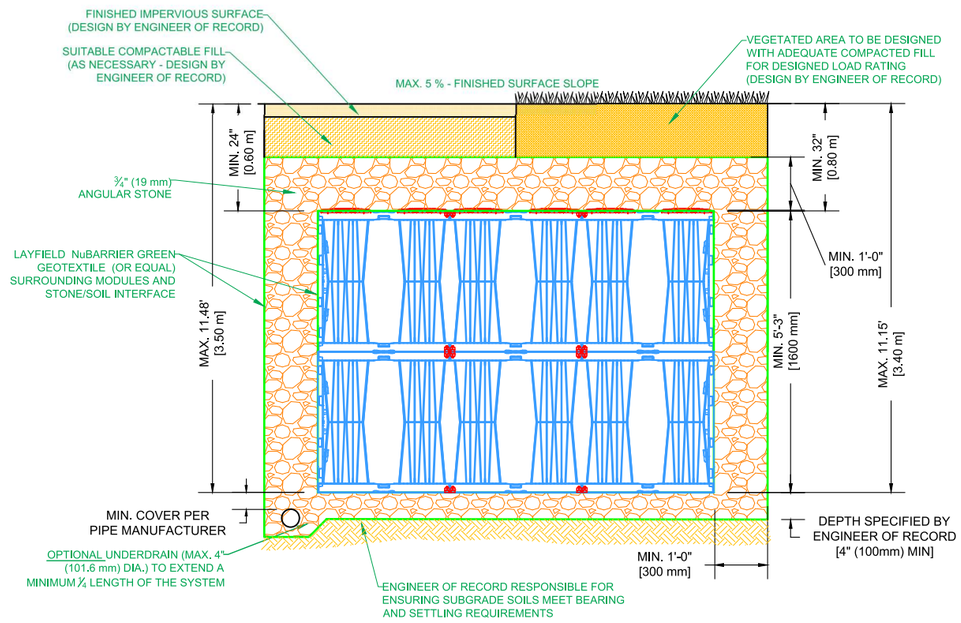


NOTE: THIS DETAIL DEPICTS ONLY THE LOCATION OF AQUABOX ACCESSORIES (CAPS/ CONNECTORS) AND DOES **NOT** REPRESENT THE PROJECT-SPECIFIC STACKING CONFIGURATION. REFER TO DETAIL 5/S-03 FOR STACKING CONFIGURATION AND CROSS-SECTIONAL DETAILS.

4 S-03 AQUABOX ACCESSORIES CAPS AND JOINTS



2 S-03 AQUABOX CUBE



5 S-03 TYPICAL SYSTEM CROSS SECTION

LAYFIELD
117 Basaltic Rd,
Concord, ON L4K 1G4 Canada
Ph: (905) 761-9123
www.layfieldgroup.com

Total Storage Volume		171.18 m^3
Module Storage Volume		145.15 m^3
Stone Storage Volume		26.02 m^3
System Footprint		108.13 m^2
Estimated Geotextile Fabric	NuBarrier	791 m^2
Estimated Geotextile Fabric	LP8	---- m^2
Estimated Liner		---- m^2
Estimated GeoGrid		---- m^2
Estimated Stone Volume		65.06 m^3
Excavation Required		248.70 m^3
Minimum Excavation Depth		2.3 m
Stone Type		19mm Clear Stone
Stone Void Space		40%
Number of Module Layers		2
Allowable Loading		HS-25
Surface	Paved Surface	Vegetated/ Unpaved
Minimum Top Cover	0.60 m	0.80 m
Maximum Tank Depth	3.50 m	3.40 m

39 PINE STREET N.

Port Hope, ON

REV	Record of Changes	Date	By
△	Preliminary Drawing	09APR2024	PE

Project Number: ----

Page Name: TYP. Construction Details

Drawn by: PE | Checked By: JF

Scale: NTS | Date: 09APR2024

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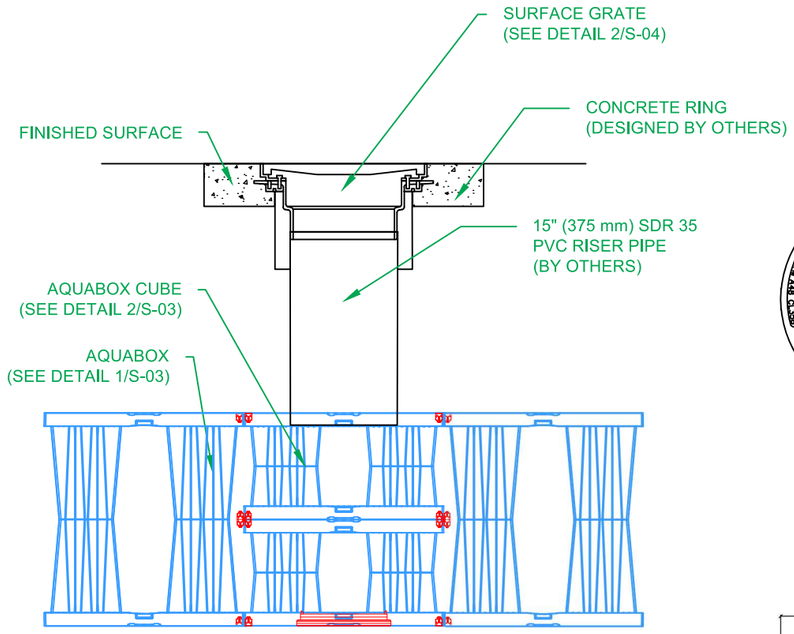
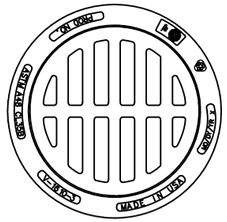
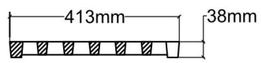
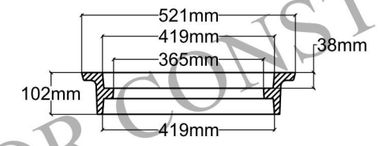
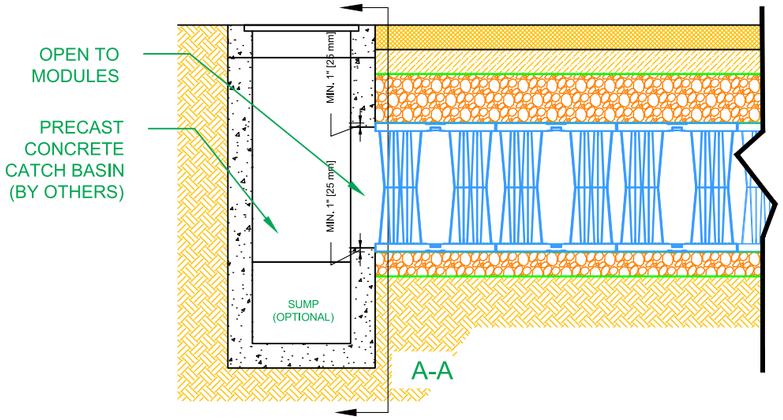
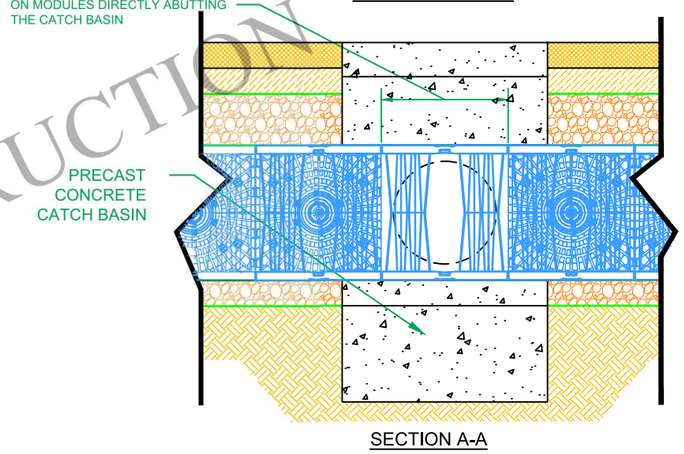








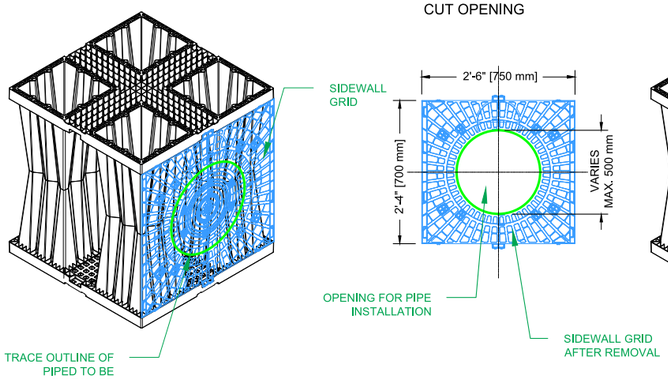




1 S-04 AQUABOX OBSERVATION PORT

2 S-04 OBSERVATION PORT SURFACE GRATE

3 S-04 AQUABOX CATCHBASIN ABUTMENT (IF APPLICABLE)



4 S-04 PIPE CONNECTION DETAIL

LAYFIELD
117 Basaltic Rd,
Concord, ON L4K 1G4 Canada
Ph: (905) 761-9123
www.layfieldgroup.com

Total Storage Volume		171.18 m^3
Module Storage Volume		145.15 m^3
Stone Storage Volume		26.02 m^3
System Footprint		108.13 m^2
Estimated Geotextile Fabric	NuBarrier	791 m^2
Estimated Geotextile Fabric	LP8	---- m^2
Estimated Liner		---- m^2
Estimated GeoGrid		---- m^2
Estimated Stone Volume		65.06 m^3
Excavation Required		248.70 m^3
Minimum Excavation Depth		2.3 m
Stone Type		19mm Clear Stone
Stone Void Space		40%
Number of Module Layers		2
Allowable Loading		HS-25
Surface	Paved Surface	Vegetated/ Unpaved
Minimum Top Cover	0.60 m	0.80 m
Maximum Tank Depth	3.50 m	3.40 m

39 PINE STREET N.

Port Hope, ON

REV	Record of Changes	Date	By
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Page Name: TYP. Pipe Penetration Details

Drawn by: PE | Checked By: JF

Scale: NTS | Date: 09APR2024

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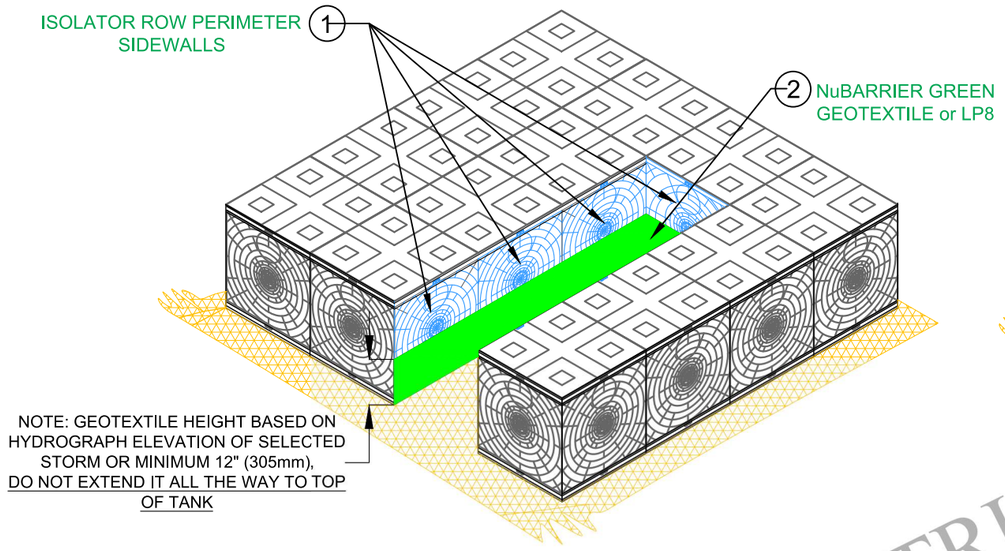
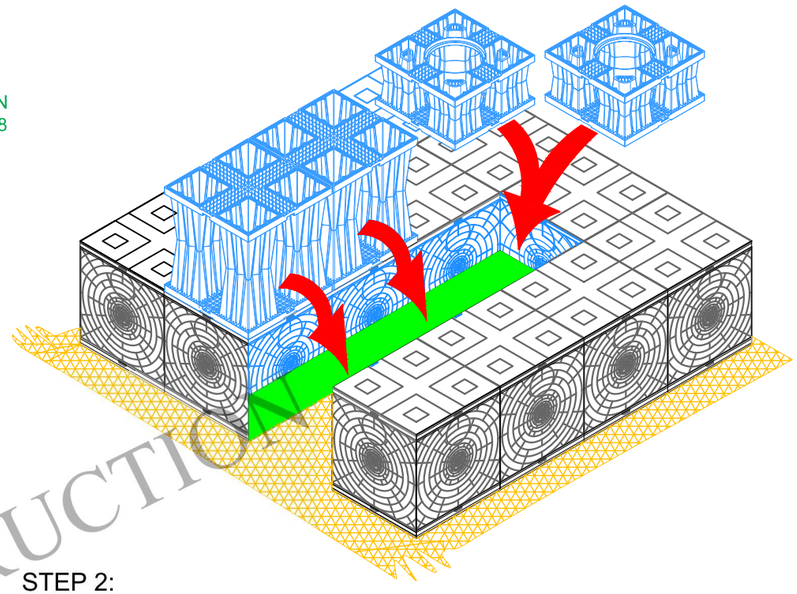
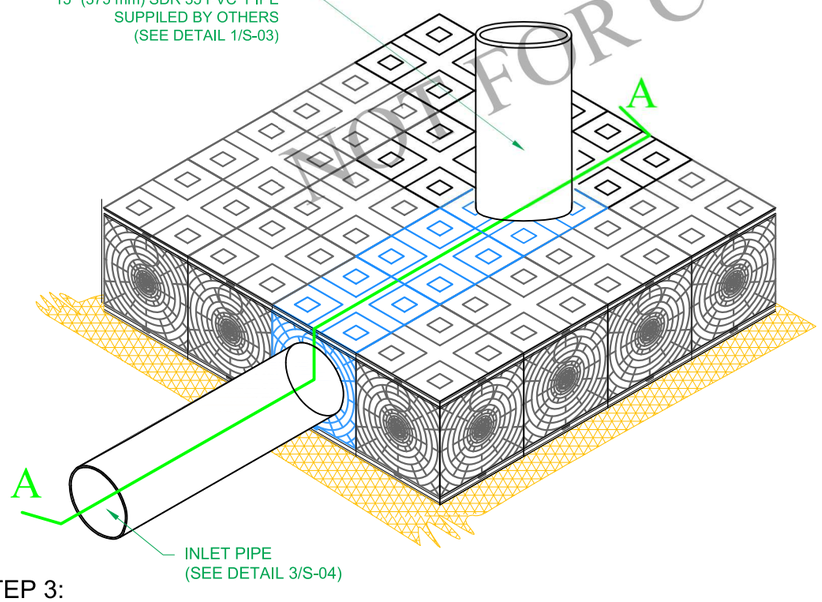


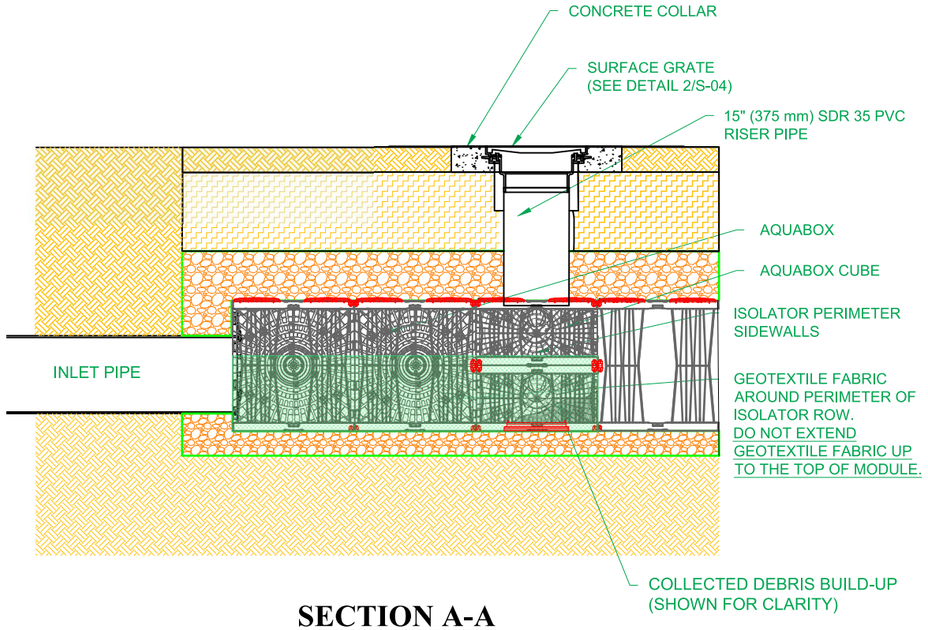
STEP 1:
INSTALL ISOLATER ROW PERIMETER SIDEWALLS AND ATTACH GEOTEXTITLE TO THEM.



STEP 2:
PLACE AQUABOX AND AQUABOX CUBE MODULES IN THE ISOLATER ROW AS PER MODULE LAYOUT 2/S-02



STEP 3:
INSTALL INLET PIPE AS PER DETAIL 4/S-04 AND CONNECTOR PIPE FOR OBSERVATION PORT AS PER DETAIL 1/S-04



SECTION A-A

1 / S-05 ISOLATOR ROW INSTALLATION DETAIL

LAYFIELD
117 Basaltic Rd,
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Ph: (905) 761-9123
www.layfieldgroup.com

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Stone Type		19mm Clear Stone
Stone Void Space		40%
Number of Module Layers		2
Allowable Loading		HS-25

Surface	Paved Surface	Vegetated/ Unpaved
Minimum Top Cover	0.60 m	0.80 m
Maximum Tank Depth	3.50 m	3.40 m

39 PINE STREET N.

Port Hope, ON

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General Conditions

- Review installation procedures and coordinate the installation with other construction activities, such as grading, excavation, utilities, construction access, erosion control, etc.
- Engineered Contract Drawings supersede all provided documentation, as the information furnished in this document is based on a typical installation.
- Coordinate the installation with the manufacturer's representative/distributor to be on-site to review start-up procedures and installation instructions.
- Components shall be unloaded, handled and stored in an area protected from traffic and in a manner to prevent damage.
- Assembled modules may be walked on, but vehicular traffic is prohibited until backfilled per the Manufacturer's requirements. Protect the installation against damage with highly visible construction tape, fencing, or other means until construction is complete.
- Ensure all construction occurs in accordance with Federal, Provincial and Local Laws, Ordinances, Regulations, and Safety Requirements.
- Extra care and caution should be taken when temperatures are at or below 0° C.

NOT FOR CONSTRUCTION

These drawings shall not be used for construction until they have been reviewed for all design aspects (structural, geotechnical, stormwater) and approved by the Engineer of Record for the Project.

It is the Buyer's responsibility to ensure that the design into which the Product will be used has been approved by the Engineer of Record (not Layfield) with a review that may include, but not be limited to, Inlet and outlet configurations including inverts and pipe connections, storage volume, system footprint, Aquabox elevations including cover soil requirements, buoyancy and groundwater conditions, and proximity to structures and slopes.

Site design/engineering elements may include but not be limited to the following:

- Review elevations and if necessary adjust grading to ensure the chamber cover requirements are met.
- Evaluating site-specific information on soil conditions and/or bearing capacity.
- Assessing the bearing resistance (allowable bearing capacity) of the subgrade soils and the depth of foundation stone with consideration for the range of expected soil moisture conditions.

1.0 Basin Excavation

1. Stake out and excavate to elevations per approved plans. Excavation Requirements:
   a. Sub-grade excavation must be a minimum of 4" (102 mm) below the designed AquaBox Module invert.
   b. The excavation should extend a minimum of 12" (305 mm) beyond the AquaBox dimensions in each length and width (an additional 24" [610 mm] in total length and total width) to allow for adequate placement of side backfill material.
   c. Remove objectionable material encountered within the excavation, including protruding material from the walls.
   d. Furnish, install, monitor, and maintain excavation support (e.g., shoring, bracing, trench boxes, etc.) as required by Federal, Provincial and Local Laws, Ordinances, Regulations, and Safety Requirements.

2.0 Sub-Grade Requirements

1. Sub-grade shall be unfrozen, level (plus or minus 1%), and free of lumps, or debris with no standing water, mud or muck. Do not use materials nor mix with materials that are frozen and/or coated with ice or frost.
2. Unstable, unsuitable, and/or compromised areas should be brought to the Engineer's attention and mitigating efforts determined prior to compacting the sub-grade.
3. Sub-grade must be compacted to 97% Standard Proctor Density or as approved by the Engineer of Record. If code requirements restrict subgrade compaction, it is the requirement of the geotechnical engineer to verify that the bearing capacity and settlement criteria for support of the system are met.

* The Engineer of Record shall confirm minimum soil bearing capacity required based on Load Rating and top cover depth. Minimum soil bearing capacity is required so that settlements are less than 1" through the entire sub-grade and do not exceed long-term 1/2" differential settlement between any two adjacent units within the system. Sub-grade must be designed to ensure soil bearing capacity is maintained throughout all soil saturation levels.

3.0 Leveling Bed Installation

1. Install geotextile fabric and/or liner material, as specified.
   a. Geotextile fabric shall be placed per the manufacturer's recommendations.
   b. Additional material to be utilized for wrapping above the system must be protected from damage until use.
2. After the geotextile is secured, place a minimum 4" (102 mm) Leveling Bed.
   a. Material should be a 3/4" (19 mm) angular stone meeting AASTHO #56, 57, 67, 68 Material specifications.
   b. Material should be raked free of voids, lumps, debris, sharp objects, and plate vibrated to a level with a maximum 1% slope.
3. Correct any unsatisfactory conditions.

4.0 AquaBox Module Assembly and Placement

1.0 AquaBox Assembly

AquaBox modules are delivered to the site as palletized components requiring simple assembly. No special equipment, tools or bonding agents are required; only a rubber mallet. The modules can be pre-assembled either inside or outside the trench. The pre-assembled modules must then be organized according to the design specifications.

ASSEMBLY INSTRUCTIONS:

1. Each AquaBox features plug and socket connections which makes assembling the modules quick and easy. Simply lay one element on the ground and join it to another by applying some pressure on the top.

GENERAL NOTES:

- Remove packaging material and check for any damage. Report any damaged components to an AquaBox Distributor or Layfield personnel.
- AquaBox components are backed by a 50 year warranty when installed per the manufacturer's recommendations.

2.0 AquaBox Placement

1. Install geotextile fabric and/or liner material, as specified.
   a. Geotextile fabric shall be placed per the manufacturer's recommendations.
   b. Additional material to be utilized for wrapping above the system must be protected from damage until use.
2. Mark the footprint of the modules for placement.
   a. Ensure module perimeter outline is square or similar prior to Module placement.
   b. Care should be taken to note any connections, ports or other irregular units to be placed.
3. Install the individual modules by hand, as detailed below.
   a. The modules should be installed as shown in the AquaBox submittal drawings. Place AquaBox Cubes at the location of observation ports.
   b. Modules are connected horizontally to adjacent modules with Single or Double Joints.
   c. Use Single Joints for Bottom and Top rows while Double Joints are used for middle rows in Double or Triple stacking configuration.
   d. For double/ triple stack configurations:
      i. Use the Single Joints for the first bottom row.
      ii. Install Double Joints on all the middle rows.
      iii. Place the upper module directly on top of the bottom module in the same direction.

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Estimated Stone Volume		65.06 m^3
Excavation Required		248.70 m^3
Minimum Excavation Depth		2.3 m
Stone Type		19mm Clear Stone
Stone Void Space		40%
Number of Module Layers		2
Allowable Loading		HS-25
Surface	Paved Surface	Vegetated/ Unpaved
Minimum Top Cover	0.60 m	0.80 m
Maximum Tank Depth	3.50 m	3.40 m

39 PINE STREET N.

Port Hope, ON

REV	Record of Changes	Date	By
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4. Install the modules to completion, taking care to avoid damage to the geotextile and/or liner material.
5. Once all the modules have been placed, Install SIDEWALLS on the perimeter and CAPS on the top.
6. Locate any ports or other penetration of the AquaBox.
    a. Install ports/penetrations in accordance with the approved submittals, contract documents, and manufacturer's recommendations.
6. Upon completion of module installation, wrap the modules in geotextile fabric and/or liner.
    a. Geotextile fabric shall be wrapped and secured per the manufacturer's recommendations.
    b. Seal any ports/penetrations per the Manufacturer's requirements

Notes:

- If damage occurs to the geotextile fabric or impermeable liner, repair the material in accordance with the geotextile/liner Manufacturer's recommendations

6.0 Side Backfill

1. Inspect all geotextiles, ensuring that no voids or damage exists; which will allow sediment into the AquaBox system.
2. Adjust the stone/soil interface geotextile along the side of the native soil to ensure the geotextile is taught to the native soil.
3. Once the geotextile is secured, begin to place the Side Backfill.
    a. Material should be a 3/4" (19 mm) angular stone meeting AASTHO #56, 57, 67, 68 Material specifications.
    b. Backfill sides "evenly" around the perimeter without exceeding single 12" (305 mm) lifts.
    c. Place material utilizing an excavator, dozer, or conveyor boom.
    d. Utilize a plate vibrator to settle the stone and provide even distribution.

Notes:

- Do not apply vehicular load to the modules during placement of side backfill. All material placement should occur with equipment located on the native soil surrounding the system.
- If damage occurs to the geotextile fabric or impermeable liner, repair the material in accordance with the geotextile/liner Manufacturer's recommendations

7.0 Top Backfill (Stone)

1. Begin to place the Top Backfill.
    a. Material should be a 3/4" (19 mm) angular stone meeting AASTHO #56, 57, 67, 68 Material specifications.
    b. Place material utilizing an excavator, dozer, or conveyor boom and use a walk-behind plate vibrator to settle the stone and provide even distribution.

DO NOT DRIVE ON THE MODULES WITHOUT REQUIRED MINIMUM COVER.

2. Upon completion of Top Backfilling, wrap the system in geotextile fabric and/or liner per the manufacturer's recommendations.
3. Install metallic tape around the perimeter of the system to mark the area for future utility detection.

Notes:

- If damage occurs to the geotextile fabric or impermeable liner, repair the material in accordance with the geotextile/liner Manufacturer's recommendations.
- Only Low Ground Pressure tracked equipment can be used during construction with at least 300 mm suitably compacted covering created over the AquaBox System. Abrupt maneuvers such as steering should be avoided at this stage.
- The passage of heavy goods vehicles with a wheel load of more than 50 kN over the basin is possible if the thickness of the covering is adequately compacted and not less than 600 mm. When dumping the backfill material, the load per wheel shall not exceed 50 kN.

8.0 Suitable Compactable Fill

Following Top Backfill placement and geotextile fabric wrapping; complete the installation as noted below.

Vegetated Area

1. Place fill onto the geotextile.
    a. Maximum 12" (305 mm) lifts, compacted with a vibratory plate or walk behind roller to a minimum of 90% Standard Proctor Density.
    b. The minimum top cover/backfill to finished grade must not be less then that shown on Detail 5 Typical System Cross Section, and the maximum depth from final grade to the bottom of the lowest module should not exceed that shown on Detail 5.
2. Finish to the surface and complete with vegetative cover.

Impervious Area

1. Place fill onto the geotextile.
    a. Maximum 12" (305 mm) lifts, compacted with a vibratory plate or walk behind roller to a minimum of 90% Standard Proctor Density.
    b. b. The minimum top cover/backfill to finished grade must not be less then that shown on Detail 5 Typical System Cross Section, and the maximum depth from final grade to the bottom of the lowest module should not exceed that shown on Detail 5.
2. Finish to the surface and complete with asphalt, concrete, etc.

Notes:

- Adequate cover for frost protection must be considered, this will vary by Region.
- A vibratory roller may only be utilized after a minimum cover has been placed or for the installation of the asphalt wearing course.
- If damage occurs to the geotextile fabric, repair the material in accordance with the geotextile Manufacturer's recommendations.
- For most recent installation guidelines visit: https://www.geoplastglobal.com/en/downloads/aquabox

9.0 Inspection and Maintenance

If the following inspections and maintenance procedures are not followed as specified below then the end-user is responsible for the performance of the modules. This maintenance procedure must be performed after termination of site operations, heavy rainfall, flooding, or any incident that will vary the flow of water drastically.

Inspection

1. Inspect all observation ports, inflow, and outflow connection and the discharge area
2. Identify and log any sediment and debris accumulation, system backup, or discharge rate changes.
3. If there is a sufficient need for a cleanout, contact a local cleaning company for assistance.
4. Inspect module for any damaged components, movement, or other irregularities and replace immediately.

Cleaning:

1. If a pre-treatment device is installed, follow manufacturer recommendations.
2. Using a vacuum pump truck, evacuate debris from the inflow and outflow points.
3. Flush the system with clean water, forcing debris from the system.
4. Repeat steps 2 and 3 until no debris is evident

Notes:

- For spray probe cleaning, the use of a 90° rotating nozzle with a 45° water jet is recommended. The nozzles used should have a pressure of 80 to 120 bar; higher pressures may damage the geotextile.

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39 PINE STREET N.

Port Hope, ON

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Stage Storage Calculator

Inputs:

Module Type=	AquaBox	
Storage Invert =	99.191	m

Input Heights to be included in stage storage:

Leveling Bed Depth =	0.1	m
Module Height =	1.6	m
Top Cover Depth =	0.3	m

System Footprints:

Module Footprint =	94.50	m^2
Stone Footprint =	108.13	m^2

Void Space %:

Module Avg. Void =	96.00%	%

* Note, this calculator works to a maximum storage height of 15' including stone leveling bed, module unit and top cover.

Increment Step	0.0508	m
Outlet Elevation	99.491	m

Height (m)	Elevation (m)	Dead Storage (m^3)	Active Storage (m^3)
0.3	99.491	23.56	147.62

Stage Storage Table					
Height (m)	Elevation (m)	Stone Stage Storage (m^3)	Module Stage Storage (m^3)	Cumulative Stage Storage (m^3)	Cumulative Total Storage (m^3)
0.0000	99.1910	0.00	0.00	0.00	0.00
0.0508	99.2418	2.20	0.00	2.20	2.20
0.1000	99.2910	2.13	0.00	2.13	4.33
0.1016	99.2926	0.01	0.15	0.15	4.48
0.1524	99.3434	0.28	4.61	4.89	9.36
0.2032	99.3942	0.28	4.61	4.89	14.25
0.2540	99.4450	0.28	4.61	4.89	19.14
0.3000	99.4910	0.25	4.17	4.42	23.56
0.3048	99.4958	0.03	0.44	0.46	24.02
0.3556	99.5466	0.28	4.61	4.89	28.91
0.4064	99.5974	0.28	4.61	4.89	33.79
0.4572	99.6482	0.28	4.61	4.89	38.68
0.5080	99.6990	0.28	4.61	4.89	43.56
0.5588	99.7498	0.28	4.61	4.89	48.45
0.6096	99.8006	0.28	4.61	4.89	53.33
0.6604	99.8514	0.28	4.61	4.89	58.22
0.7112	99.9022	0.28	4.61	4.89	63.11
0.7620	99.9530	0.28	4.61	4.89	67.99
0.8128	100.0038	0.28	4.61	4.89	72.88
0.8636	100.0546	0.28	4.61	4.89	77.76
0.9144	100.1054	0.28	4.61	4.89	82.65
0.9652	100.1562	0.28	4.61	4.89	87.53
1.0160	100.2070	0.28	4.61	4.89	92.42
1.0668	100.2578	0.28	4.61	4.89	97.30
1.1176	100.3086	0.28	4.61	4.89	102.19
1.1684	100.3594	0.28	4.61	4.89	107.08
1.2192	100.4102	0.28	4.61	4.89	111.96
1.2700	100.4610	0.28	4.61	4.89	116.85
1.3208	100.5118	0.28	4.61	4.89	121.73
1.3716	100.5626	0.28	4.61	4.89	126.62
1.4224	100.6134	0.28	4.61	4.89	131.50

1.4732	100.6642	0.28	4.61	4.89	136.39
1.5240	100.7150	0.28	4.61	4.89	141.27
1.5748	100.7658	0.28	4.61	4.89	146.16
1.6256	100.8166	0.28	4.61	4.89	151.05
1.6764	100.8674	0.28	4.61	4.89	155.93
1.7000	100.8910	0.13	2.14	2.27	158.20
1.7272	100.9182	1.18	0.00	1.18	159.38
1.7780	100.9690	2.20	0.00	2.20	161.57
1.8288	101.0198	2.20	0.00	2.20	163.77
1.8796	101.0706	2.20	0.00	2.20	165.97
1.9304	101.1214	2.20	0.00	2.20	168.17
1.9812	101.1722	2.20	0.00	2.20	170.36
2.0000	101.1910	0.81	0.00	0.81	171.18
2.0320	101.2230	0.00	0.00	0.00	0.00
		26.02	145.15	171.18	

Appendix B
Excerpts of Geotechnical Investigation

FISHER ENGINEERING

ENGINEERING

Professional Engineers Ontario

GEOTECHNICAL INVESTIGATION

EXCERPT

PROPOSED DORMITORY BUILDING,
39 PINE STREET NORTH,
PORT HOPE, ONTARIO

Prepared for:

2640573 Ontario Corp.

400 Esna Park Drive, Unit 15
Markham, ON
L3R 3K2

Tel: (905) 475-7755
Fax: (905) 475-7718
www.fishereng.com

Project No. FG 23-13246

September 29, 2023

BROWN SILT

A dense layer of brown silt was encountered below the brown sand/silty sand of BH3 extending to termination depth of 6.55m.

6. GROUNDWATER CONDITIONS

The boreholes were advanced using dry solid stem auguring and the boreholes were found to be generally dry on completion of the respective soil borings. Monitoring wells were installed in all boreholes to observe groundwater levels and for water sampling and testing.

Groundwater depths/elevations as measured on completion of boreholes and from the monitoring wells are summarized in Table 2.

Table 2: Groundwater Depths and Elevations

Monitoring Well No.	Surface Elevation (m, asl)	Depth of Well, m bgs	Elevation at well base, m asl	In open borehole on Completion		6-Sep-23		22-Sep-23	
				GW level, m bgs	GW Ele, m asl	GW level, m bgs	GW Ele, m asl	GW level, m bgs	GW Ele, m asl
BH1(MW)	102.69	3.05	99.64	dry		dry		dry	
BH2(MW)	102.97	4.59	98.38	dry		3.86	99.11	3.93	94.45
BH3(MW)	102.80	4.76	98.04	dry		3.67	99.13	3.73	94.31
BH4(MW)	102.67	6.21	96.46	dry		3.58	99.09	3.64	92.82
BH5(MW)	102.70	4.55	98.15	dry		3.41	99.29	3.48	94.67
BH6(MW)	102.48	4.76	97.72	dry		3.77	98.71	3.82	93.90

Based on the preceding information and visual examination of the soil samples, we consider that water bearing aquifer was encountered within the depths penetrated by boreholes and groundwater levels represent the local groundwater table. Groundwater may also be encountered from the wet seams/pockets/layers trapped inside the fill. This groundwater table may fluctuate with seasonal weather changes.

FISHER ENGINEERING

400 Esna Park Dr., #15
Markham, Ontario
L3R 3K2

Tel: 905 475-7755

NORTH

LEGEND

- SITE BOUNDARY
- BUILDING FOOTPRINT
- BOREHOLE WITH MONITORING WELL LOCATION
- BOREHOLE LOCATION
- METHANE PROBE LOCATION

PROJECT NAME AND ADDRESS

GEOTECHNICAL AND HYDROGEOLOGICAL INVESTIGATION

39 Pine Street North,
Port Hope, ON

FIGURE A2:

SITE PLAN WITH BOREHOLES / MONITORING WELL LOCATIONS

PROJECT NO.	SHEET NO.
FE- 23-13246/47	A2
DATE: 11 September 2023	
SCALE: AS SHOWN	

Appendix C
Sanitary Flow Estimate

WPE Engineering Ltd. Engineers, Planners and Project Managers	Sanitary Flow Rate Calculation Proposed Condition			
	Prepared:	A.L.	Page No.	C-01
	Checked:	M.D.		
Project: Prop. School Dormitory Building, 39 Pine St North, Port Hope	Proj. #	2021		
	Date:	12/Apr/24		

PROPOSED CONDITION (5-STOREY DORMITORY)

POPULATION CALCULATION

Site Area	5,258	m^2
Occupant Load (Architectual Plan)	80.0	

For Sanitary Service Connection Design

Average Daily Domestic Wastewater Flow	450	L/c/day
Total Domestic Average Flow	0.42	L/sec
Peaking Factor	4.27	
Total Domestic Peak Flow	1.78	L/sec
Infiltration Allowance (@ 0.26 L/sec/ha)	0.14	L/sec
Design Sanitary Flow	**1.92**	L/sec

Appendix D
Water Supply

WPE Engineering Ltd. Engineers, Planners and Project Managers	Fire Flow Calculation Proposed Condition			
	Prepared:	A.L.	Page No.	D-01
	Checked:	M.D.		
Project: Prop. School Dormitory Building, 39 Pine St North, Port Hope	Proj. #	2021		
	Date:	12/Apr/24		

PROPOSED CONDITION

This calculation is following the "Water Supply for Public Fire Protection" by Fire Underwriters Survey.

Formula: $F = 220C\sqrt{A}$

where F = the required fire flow in litres per minute
C = coefficient related to the type of construction.
= 0.8 for non-combustible construction
A = the total floor area in square metres (including all storeys, but excluding basements at least 50% below grade)

Step 1:

According the building stats,	Area (m^2)
1st - 5th Floor	1545
1st - 5th Floor	1545

A 2317.5 m^2

Therefore, F = 6000 **l/min** (Rounded to the nearest 1000)

Step 2: Occupancy reduction:

25% reduction is applied for non-combustible.

Therefore: F1 = 4500 l/min

Step 3: Reduction for sprinkler protection:

Using the NFPA sprinkler system, a reduction rate of 30% is used.

Therefore: F2 = 1350 l/min

Step 4: Separation charge:

Charge for the separations on each side:

Separation	Charge
10.1 to 20 m	15% West
30.1-45m	5% North
>45m	0% East
>45m	0% South

Total charge in % 20% (75% maximum)

Total charge F3 = 900 l/min

Required Fire Flow: 4000 l/min (Rounded to nearest 1000)
or 66.67 l/s
or 1057 US GPM

WPE Engineering Ltd. Engineers, Planners and Project Managers	Water Demand Calculation Proposed Condition			
	Prepared:	A.L.	Page No.	D-02
	Checked:	M.D.		
Project: Prop. School Dormitory Building, 39 Pine St North, Port Hope	Proj. #	2021		
	Date:	12/Apr/24		

PROPOSED CONDITION

Total Population **80** (Refer to Site Statistics)

Peak Domestic Water Demand Calculation:

Institutional Per Capita Demand (school)*	270	L/cap/d
Peaking Factor (Max. Day)	1.80	
Peak Domestic Water Demand	**0.45**	L/sec
Fire Flow:	66.67	L/sec
Max. Day Demand plus Fire Flow:	**67.12**	L/sec
Design Water Demand	**67.12**	L/sec
	1063.8	**US GPM**

CLASSIC FIRE + LIFE SAFETY

FLOW TEST REPORT

Form SD-003B RevDate: Nov 29, 2021

PROJECT INFORMATION			
Project Name:	39 Pine St. N Flow Test	Const. Project #:	SMC-0011302
Site Address:	39 Pine St. N. Port Hope ON	Design Project #:	2024-CFLS-297
City Contact:	Municipality of Port Hope	Phone #:	905-885-2431
CFLS Contact:	Oscar Munita	Phone #:	647-572-4576
Technical Contact:	**Andy Coghlin**	Phone #:	**519-476-0761**

SITE INFORMATION

SITE MAP

Note: If the main is a dead end, the flowing hydrant shall be closest to the dead end

ITEMS TO LABEL ON MAP	HYDRANTS USED	MAIN SIZE
☑ Static / Residual & Flow Hydrants	☑ City Hydrant(s)	City: 200mm CIP
☐ Flow Direction (if the main is dead end)	☐ Site Hydrant(s)	Site:

SITE NOTES

The flowing hydrant is the only one directly off this section of main. The next closest hydrant would be North @ Pine N and Bedford. The hydrant on the east side of the Pine @ Bedford intersection.

CLASSIC FIRE + LIFE SAFETY

FLOW TEST REPORT

Form SD-003B RevDate: Nov 29, 2021

TEST INFORMATION			
Minimum Required Flow:	NA	Min Ports:	2
CFLS Personnel Present:	Oscar Munita and Kevin Kavalagh	Test Date:	2024-06-20
City / External Company:	Municipality of Port Hope	Test Time:	10:00am

TEST EQUIPMENT	
☐ Hose Monsters with built in Pitot	Hose length used:
☐ Hand held pitot gauge	☑ Pollard diffuser elbow with built in Pitot
☐ Other:	

TEST RESULTS

Number of Ports	Outlet Size (IN)	Discharge Coefficient	Pitot Reading (PSI)				Total Flow (GPM)	Static / Residual Pressure (PSI)
0 Ports								59
1 Port	2.5	0.9	42				1,088	42
2 Ports	2.5	0.9	12	15			1,232	20
3 Ports	2.5	0.9					0	
4 Ports	2.5	0.9					0	
0 Ports	**STATIC RE-CHECK**							59

TEST NOTES

HYDRAULIC ADJUSTMENTS (FOR OFFICE USE ONLY)			
ADJUSTMENTS FOR HYDRAULIC GRADE LINE (HGL)			
Reservoir HGL (m):		Site Elevation (m):	
Theoretical Static Head (PSI):	0	PSI to subtract from test pressures:	59
OTHER HYDRAULIC ADJUSTMENTS			
Other adjustment as required by the City / AHJ:			

Appendix E
Records of Municipal Infrastructure
Field Locates by Premier Locates

RECORD DRAWINGS OF MUNICIPAL SERVICES

Matthew Belton <MBelton@porthope.ca> Mon, Oct 2, 2023 at 3:44 PM
To: Janice Wang <jwang@wpeengineering.com>
Cc: Mike Du <mdu@wpeengineering.com>

We really do have very limited answers for this but from what I can find.

South Street

Water 100mm Cast

Sani 200mm clay

Storm 375mm unknown

North Street

Water 25mm copper

Sani 250mm clay

Storm 600mm concrete

Pine Street

Water 300mm Cast and 200mm PVC

Sani 225mm Clay

Storm 300mm unknown

Brown Street

Water 200mm PVC

Sani 200mm PVC

375mm HDPE

Cavan Street

Water 150mm Cast

Sani 525mm clay and 300mm PVC

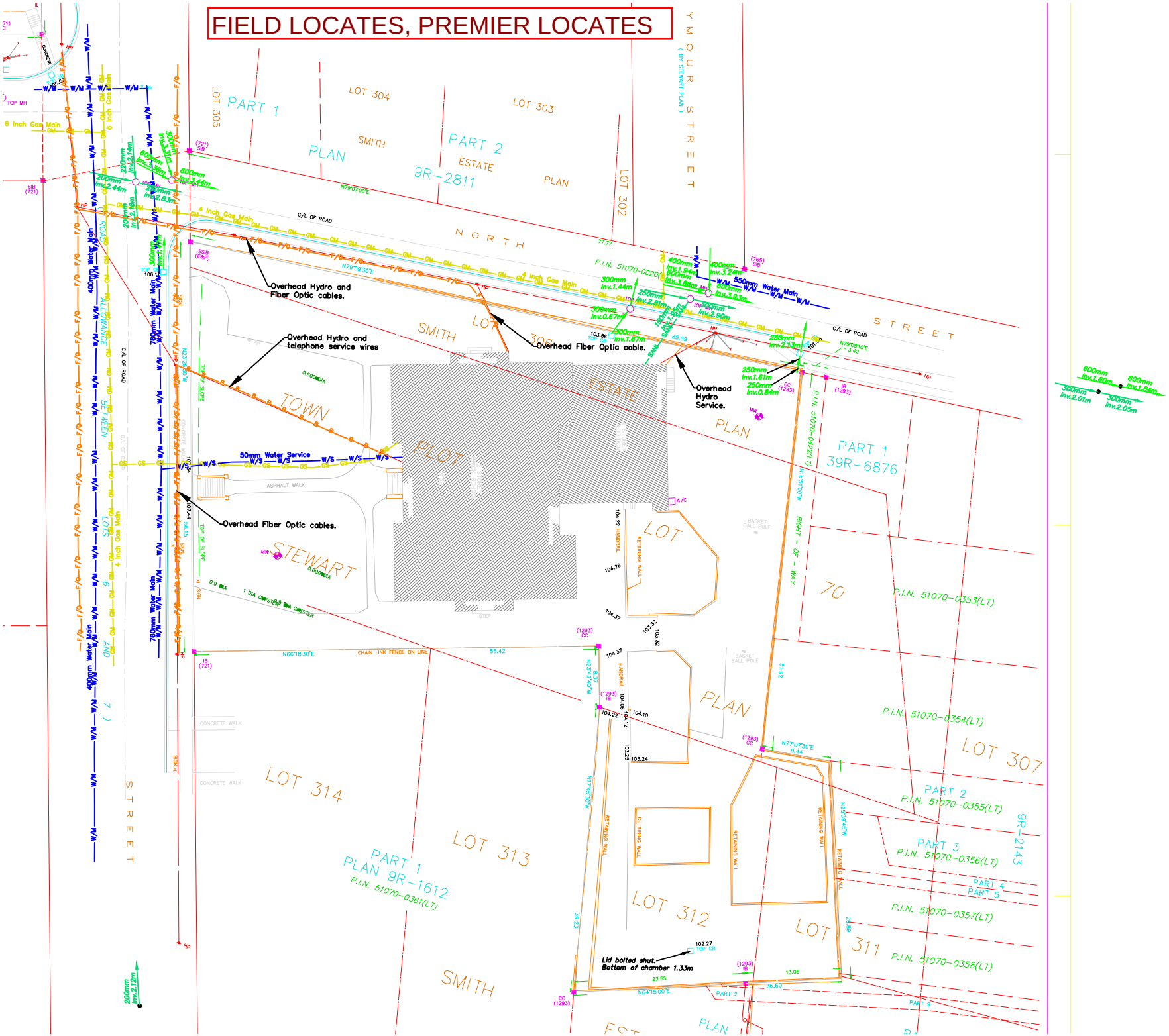
Storm 825mm Concrete

I don’t have slope values on infrastructure this old, hope this helps

---

From: Janice Wang <jwang@wpeengineering.com>
Sent: Monday, October 2, 2023 3:22 PM
To: Matthew Belton <MBelton@porthope.ca>
Cc: Mike Du <mdu@wpeengineering.com>
Subject: RECORD DRAWINGS OF MUNICIPAL SERVICES

[Quoted text hidden]


FIELD LOCATES, PREMIER LOCATES
Overhead Hydro and Fiber Optic cables.
Overhead Hydro and telephone service wires
Overhead Fiber Optic cable.
Overhead Hydro Service.
Overhead Fiber Optic cables.
50mm Water Service
Lid bolted shut. Bottom of chamber 1.33m
LOT 305
PART 1
LOT 304
LOT 303
PART 2
9R-2811
LOT 302
SMITH
PLAN
ESTATE
YMOUR STREET
(BY STEWART PLAN)
NORTH
STREET
C/L OF ROAD
4 Inch Gas Main
6 Inch Gas Main
550mm Water Main
400mm Water Main
750mm Water Main
P.I.N. 51070-0020(LT)
TOWN
PLOT
STEWART
LOT 309
LOT 308
LOT 307
LOT 314
LOT 313
LOT 312
LOT 311
PART 1 39R-6876
PART 1 PLAN 9R-1612
P.I.N. 51070-0361(LT)
P.I.N. 51070-0353(LT)
P.I.N. 51070-0354(LT)
P.I.N. 51070-0355(LT)
P.I.N. 51070-0356(LT)
P.I.N. 51070-0357(LT)
P.I.N. 51070-0358(LT)
9R-2143
CHAIN LINK FENCE ON LINE
CONCRETE WALK
ASPHALT WALK
RETAINING WALL
RIGHT - OF - WAY
BASKET BALL POLE
TOP OF SLOPE
STEP
A/C

Gmail Mike Du <mdu@wpeengineering.com>

Fwd: CAD File Deliverable for 39 Pines St. N. Port Hope

William Piraine <william.piraine@premierlocates.ca> Thu, Mar 21, 2024 at 7:31 PM
To: Henry Wang <henry@wangarchitects.ca>, Dispatch Desk - Premier Locates <locates@premierlocates.ca>
Cc: Mike Du <mdu@wpeengineering.com>, Janus Xu <janusxu@globeschool.com>

Hi Henry,

Please find the attached updated CAD file. If you have any other comments or concerns please don't hesitate to reach out.

Cheers,

PREMIER LOCATES

William Piraine
Private Locate Ops Manager • Premier Locates Inc.
Direct: 647-955-1800
william.piraine@premierlocates.ca

14845 Yonge Street, Suite 143,
Aurora, Ontario, L4G 6H8
www.premierlocates.ca
1-800-868-2196

Book a Locate

[Quoted text hidden]

2 attachments

23-19-200-00-TOPO_PLI_21Mar2024.pdf
198K

23-19-200-00-TOPO_PLI_21Mar2024.dwg
621K

Appendix F
Figures and Drawings

KEYPLAN N.T.S

THE LOCATION OF ALL UNDER- / ABOVE-GROUND UTILITIES AND SERVICES IS APPROXIMATE ONLY AND WHERE SHOWN ON THE DRAWING(S) THE ACCURACY OF THE UTILITIES AND SERVICES IS NOT GUARANTEED. THE OWNER AND / OR HIS REPRESENTATIVE SHALL DETERMINE THE LOCATION OF ALL UTILITIES AND SERVICES BEFORE COMMENCING ANY CONSTRUCTION ACTIVITIES.

DO NOT SCALE DRAWINGS.

CONTRACTOR MUST CHECK & VERIFY ALL DIMENSIONS ON SITE.

THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION.

No.	Issued	Date	By
1.	ISSUED FOR APPROVAL	2024-04-12	

WPE

222 - 7250 KEELE STREET
VAUGHAN, ON. L4K 1Z8
T: 416 578 8682
EMAIL: MDU@WPEENGINEERING.COM
WWW.WPEENGINEERING.COM

PROPOSED SCHOOL DORMITORY BUILDING

39 PINE ST N PORT HOPE, ON L1A 3G5

Project Number			
Drawn	AL	Scale	1:200
Checked	ZD	Date	2023-10-12

EXISTING STORM DRAINAGE AREA PLAN

Drawing No. FIG-02

PLAN SHOWING TOPOGRAPHIC DETAIL OF
PART OF TOWN PLOT LOT 70 AND 73
STEWART PLAN
PART OF LOTS 306 AND 314 AND
ALL OF LOTS 522, 523 AND 524
SMITH ESTATE PLAN
TOWN OF PORT HOPE
MUNICIPALITY OF PORT HOPE
COUNTY OF NORTHUMBERLAND

BENCHMARK NOTES:
ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE REFERRED TO COSINE BENCHMARK 0011910U172, BEING A BOLT IN SOUTH STONE FOUNDATION OF PORT HOPE TOWN HALL. 25cm FROM SOUTHWEST CORNER, 48cm ABOVE SIDEWALK. ELEVATION=78.253(CGVD)(1928:78)

LEGEND

- PROPERTY LINE
- PROP. SWALE
- EX. OVERHEAD WIRES
- EX. STORM PIPE
- EX. WATERMAIN
- PROP. STORM PIPE
- EX. CABLE TV PEDESTAL
- EX. HYDRO POLE
- EX. FLAG POLE
- EX. MONITORING WELL
- EX. CATCH BASIN
- EX. MANHOLE
- PROP. STORM MANHOLE
- PROP. CATCH BASIN MANHOLE
- PROP. CATCH BASIN
- EX. TREE
- PROP. TREE
- PROP. DRAINAGE ARROW
- PROP. HEAVY DUTY ASPHALT AREA
- PROP. LANDSCAPE AREA
- CATCHMENT AREA ID / CATCHMENT AREA IN HECTARE (CATH#1, AREA = 0.5258Ha)
- RUNOFF COEFFICIENT (C =0.77)

NOTES:

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EXISTING TOPOGRAPHICAL INFORMATION SUPPLIED BY ELLIOTT & PARR SURVEYORS LTD.
DATED SEPTEMBER 19, 2023.

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LICENSED PROFESSIONAL ENGINEER
Z. DU
2024-04-12
PROVINCE OF ONTARIO

WPE
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VAUGHAN, ON. L4K 1Z8
T: 416 578 8682
EMAIL: MDU@WPEENGINEERING.COM
WWW.WPEENGINEERING.COM

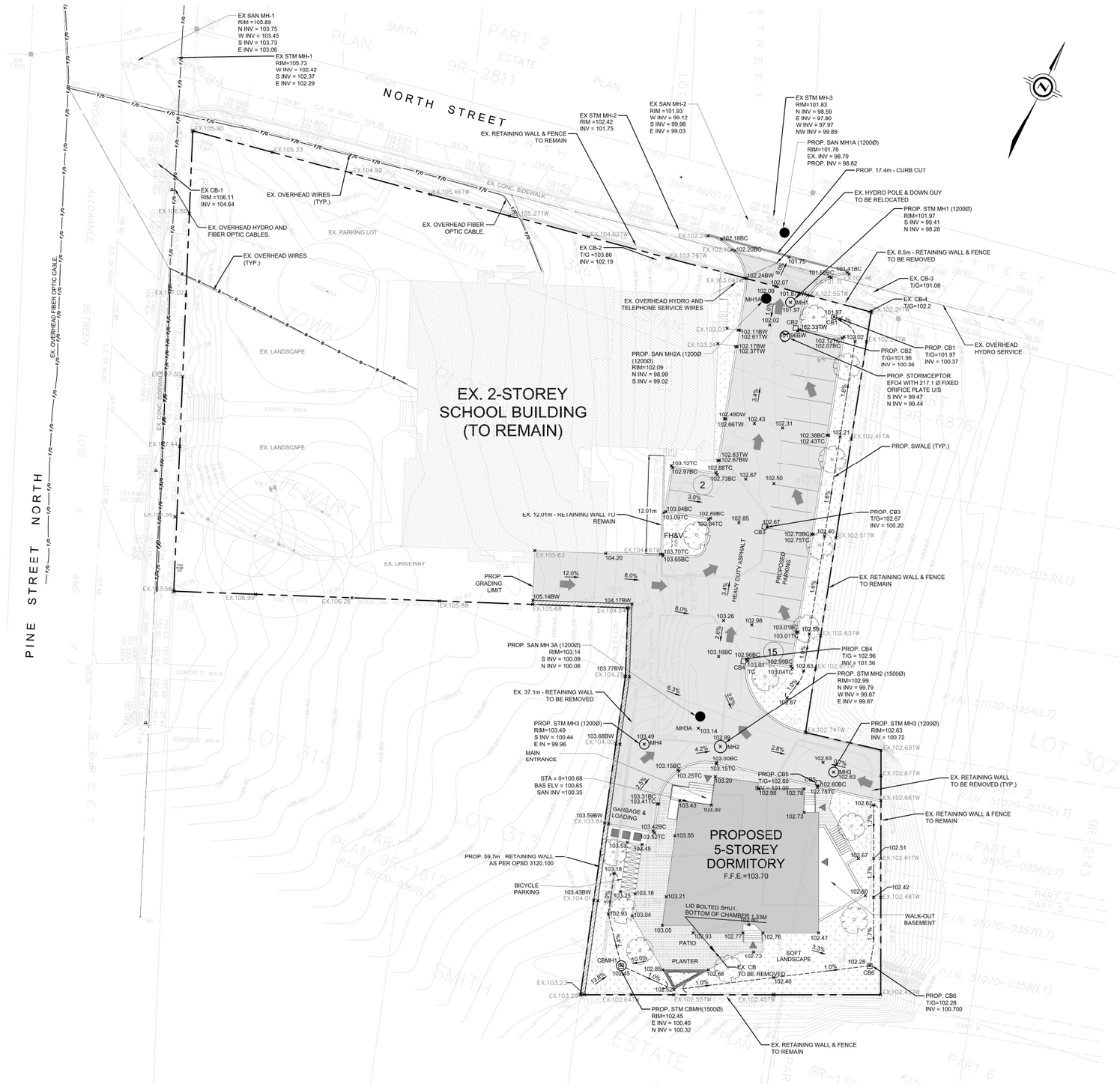
PROPOSED SCHOOL DORMITORY BUILDING

39 PINE ST N PORT HOPE, ON L1A 3G5

Project Number			2021
Drawn	AL	Scale	1:250
Checked	ZD	Date	2023-10-06

PROP. STORM DRAINAGE AREA PLAN

Drawing No. **FIG-03**



PLAN SHOWING TOPOGRAPHIC DETAIL OF
PART OF TOWN PLOT LOT 70 AND 73
STEWART PLAN
PART OF LOTS 306 AND 314 AND
ALL OF LOTS 522, 523 AND 524
SMITH ESTATE PLAN
TOWN OF PORT HOPE
MUNICIPALITY OF PORT HOPE
COUNTY OF NORTHUMBERLAND

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LEGEND

	PROPERTY LINE
	PROP. SWALE
	EX. OVERHEAD WIRES
x 226.80	PROP. ELEVATION
x 226.80TC	PROP. TOP OF CURB ELEVATION
x 226.80BC	PROP. BOTTOM OF CURB ELEVATION
x 226.80TW	PROP. TOP OF RETAINING WALL ELEVATION
x 226.80BW	PROP. BOTTOM OF RETAINING WALL ELEVATION
x EX.226.80	EX. ELEVATION
x EX.226.80TW	EX. TOP OF RETAINING WALL ELEVATION
x 101.36BC	EX. BACK OF CURB ELEVATION
x 101.36EG	EX. EDGE OF GUTTER ELEVATION
x 101.36EA	EX. EDGE OF ASPHALT ELEVATION
EB CPED	EX. CABLE TV PEDESTAL
HP	EX. HYDRO POLE
FP	EX. FLAG POLE
FH	EX. FIRE HYDRANT TO BE REMAINED
WV	EX. WATER VALVE TO BE REMAINED
MW	EX. MONITORING WELL
CB	EX. CATCH BASIN
MH	EX. MANHOLE
MH1A	PROP. SANITARY MANHOLE
MH1	PROP. STORM MANHOLE
CBMH	PROP. CATCH BASIN MANHOLE
CB	PROP. CATCH BASIN
FH&V	PROP. FIRE HYDRANT & VALVE
	PROP. WATER VALVE & BOX
	EX. TREE
	PROP. TREE
2.17%	DRAINAGE FLOW DIRECTION AND SLOPE
	OVERLAND FLOW ARROW
	PROP. HEAVY DUTY ASPHALT AREA
	PROP. LANDSCAPE AREA

NOTES:

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LICENSED PROFESSIONAL ENGINEER
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2024-04-12
PROVINCE OF ONTARIO

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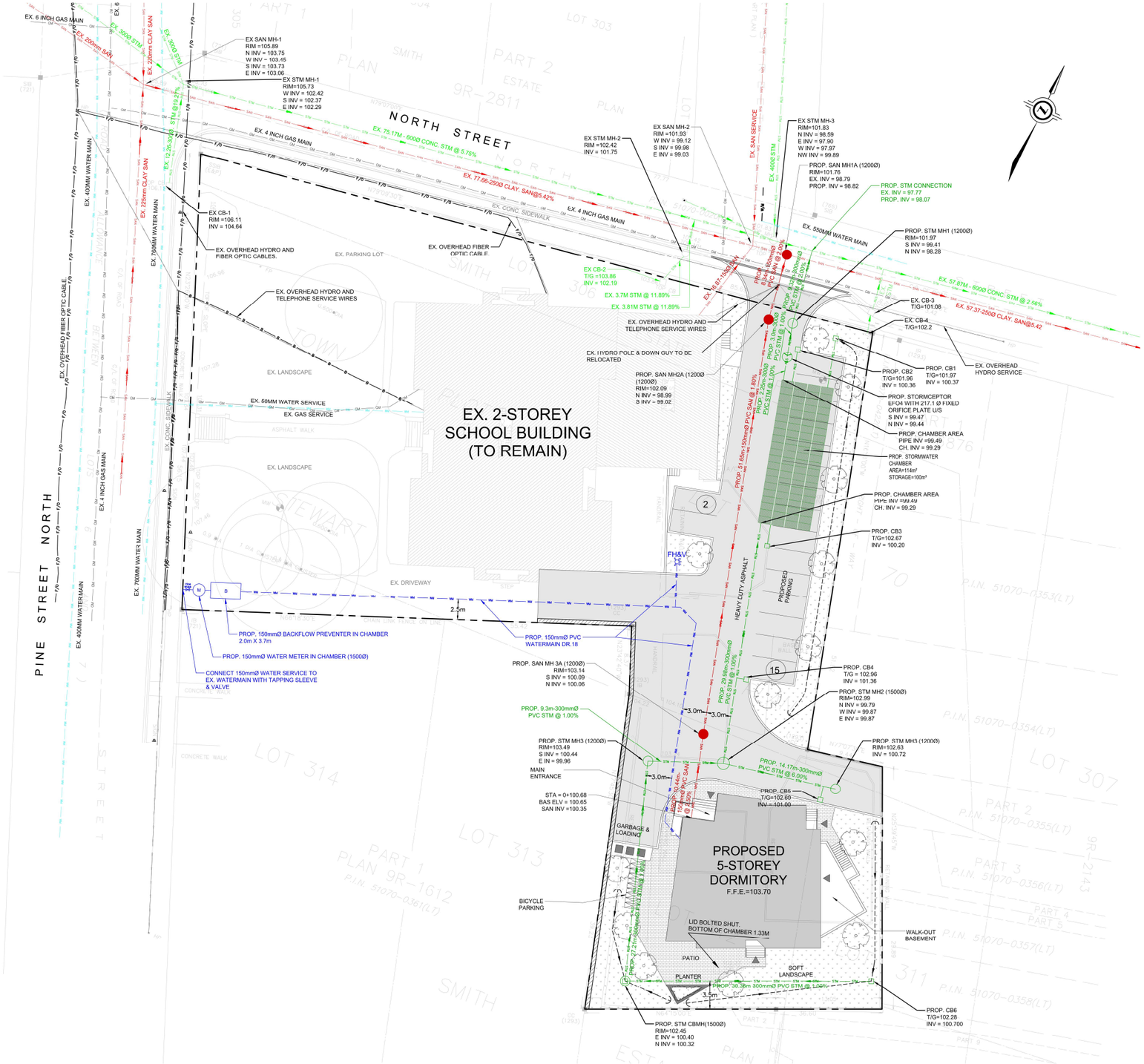
PROPOSED SCHOOL DORMITORY BUILDING

39 PINE ST N PORT HOPE, ON L1A 3G5

Project Number	2021		
Drawn	AL	Scale	1:250
Checked	ZD	Date	2023-10-04

GRADING PLAN

Drawing No. C-01



PLAN SHOWING TOPOGRAPHIC DETAIL OF PART OF TOWN PLOT LOT 70 AND 73 STEWART PLAN
PART OF LOTS 306 AND 314 AND ALL OF LOTS 522, 523 AND 524 SMITH ESTATE PLAN
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LEGEND

- PROPERTY LINE
- PROP. SWALE
- EX. OVERHEAD WIRES
- EX. SANITARY PIPE
- EX. STORM PIPE
- EX. WATERMAIN
- PROP. SANITARY PIPE
- PROP. STORM PIPE
- PROP. WATERMAIN
- EX. CABLE TV PEDESTAL
- EX. HYDRO POLE
- EX. FLAG POLE
- EX. FIRE HYDRANT TO REMAIN
- EX. WATER VALVE TO REMAIN
- EX. MONITORING WELL
- EX. CATCH BASIN
- EX. MANHOLE
- PROP. SANITARY MANHOLE
- PROP. STORM MANHOLE
- PROP. CATCH BASIN MANHOLE
- PROP. CATCH BASIN
- PROP. FIRE HYDRANT & VALVE
- PROP. WATER VALVE & BOX
- EX. TREE
- PROP. TREE
- PROP. HEAVY DUTY ASPHALT AREA
- PROP. LANDSCAPE AREA

NOTES:

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THE CONTRACTOR MUST CHECK AND VERIFY ALL DIMENSIONS ON THE JOB AND REPORT ANY DISCREPANCY TO THE ARCHITECTS/ENGINEERS BEFORE PROCEEDING WITH THE WORKS.

ALL DRAWINGS AND SPECIFICATIONS ARE INSTRUMENTS OF SERVICE AND THE PROPERTY OF THE ENGINEER WHICH MUST BE RETURNED AT THE COMPLETION OF WORK.

THIS DRAWINGS IS NOT TO BE SCALED. CONTRACTOR TO USE DIGITAL FILES FOR LAYOUT PROVIDED BY ENGINEER. THIS PLAN MUST NOT BE USED TO SITE THE PROPOSED BUILDINGS.

THE APPROVAL OF THIS PLAN DOES NOT EXEMPT THE OWNER'S CONTRACTOR FROM OBTAINING, BUT NOT LIMITED TO THE FOLLOWING PERMITS: ROAD CUT, SEWER PERMITS, RELOCATION OF SERVICES, ENCROACHMENT AGREEMENTS, APPROACH APPROVAL PERMITS, ETC..

EXISTING TOPOGRAPHICAL INFORMATION SUPPLIED BY ELLIOTT & PARR SURVEYORS LTD.
DATED SEPTEMBER 19, 2023.

KEYPLAN N.T.S

THE LOCATION OF ALL UNDER- / ABOVE-GROUND UTILITIES AND SERVICES IS APPROXIMATE ONLY AND WHERE SHOWN ON THE DRAWING(S) THE ACCURACY OF THE UTILITIES AND SERVICES IS NOT GUARANTEED. THE OWNER AND / OR HIS REPRESENTATIVE SHALL DETERMINE THE LOCATION OF ALL UTILITIES AND SERVICES BEFORE COMMENCING ANY CONSTRUCTION ACTIVITIES.

DO NOT SCALE DRAWINGS.

CONTRACTOR MUST CHECK & VERIFY ALL DIMENSIONS ON SITE.

THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION.

No.	Issued	Date	By
1	ISSUED FOR SPA	2024-04-12	

LICENSED PROFESSIONAL ENGINEER
Z. DU
2024-04-12
PROVINCE OF ONTARIO

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PROPOSED SCHOOL DORMITORY BUILDING

39 PINE ST N PORT HOPE, ON L1A 3G5

Project Number			2021
Drawn	AL	Scale	1:250
Checked	ZD	Date	2023-10-06

SERVICING PLAN

Drawing No. C-02

NOTES

UNLESS OTHERWISE NOTED ON THE DRAWINGS, THE FOLLOWING REQUIREMENTS SHALL APPLY TO THIS PROJECT.

GENERAL

1. ALL WORK WITHIN THE CITY RIGHT-OF-WAY SHALL BE CONSTRUCTED ACCORDING TO THE LATEST CITY OF TORONTO STANDARD DRAWINGS AND SPECIFICATIONS. ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS MAY, SUBJECTED TO THE APPROVAL OF THE CITY OF TORONTO, BE USED WHERE NO CITY STANDARD OR SPECIFICATION IS AVAILABLE.
2. ALL SERVICES WITHIN R.O.W TO BE REMOVED, ABANDONED AND INSTALLED BY CITY FORCES AT THE OWNER'S EXPENSE.
3. ALL WORK SHALL BE COMPLETED ACCORDING TO THE CURRENT OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS. THE GENERAL CONTRACTOR SHALL BE DEEMED TO BE THE CONSTRUCTOR AS DEFINED IN THE ACT.
4. ALL TEMPORARY TRAFFIC CONTROL AND SIGNAGE DURING CONSTRUCTION SHALL BE ACCORDING TO THE CURRENT ONTARIO TRAFFIC MANUAL BOOK 7: TEMPORARY CONDITIONS FIELD EDITION.

LOCATES AND LIABILITIES

1. ALL AREAS DISTURBED DURING CONSTRUCTION WITHIN THE CITY'S RIGHT-OF-WAY SHALL BE RESTORED TO ORIGINAL OR BETTER CONDITION AND TO THE SATISFACTION OF THE CONTRACT ADMINISTRATOR. GRASS AREAS SHALL BE TREATED WITH 100mm OF TOPSOIL AND SHALL BE SODDED ACCORDING TO TS 5.00 AND TS 5.10.
2. THE LOCATION OF ALL UNDER/ABOVE GROUND UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN AND, WHERE SHOWN ON THE DRAWING(S), THE ACCURACY OF THE LOCATION OF SUCH UTILITIES ARE NOT GUARANTEED. THE CONTRACTOR SHALL DETERMINE THE LOCATION AND DIMENSION OF ALL SUCH UTILITIES AND STRUCTURES BY CONSULTING THE APPROPRIATE AUTHORITIES OR UTILITY COMPANIES CONCERNED. THE CONTRACTORS SHALL PROVE THE LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITY FOR DAMAGE OR RESTORATION TO SAME.
3. ALL DIMENSIONS TO BE CHECKED AND VERIFIED ON THE SITE PRIOR TO ANY CONSTRUCTION. ANY DISCREPANCIES ARE TO BE REPORTED TO THE ENGINEER BEFORE PROCEEDING.
4. ANY DISCREPANCIES BETWEEN SITE CONDITIONS AND CONSTRUCTION DRAWINGS MUST BE REPORTED TO THE CITY PRIOR TO COMMENCEMENT OF CONSTRUCTION AND APPROPRIATE ACTION TAKEN TO THE SATISFACTION OF THE CONTRACT ADMINISTRATION.
5. ALL SURVEY STAKE LAYOUT POINTS SHALL BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION. ANY DISCREPANCIES BETWEEN THE DRAWINGS AND THE LAYOUT SHALL BE IMMEDIATELY REPORTED THE CITY.
6. ATTENTION IS DIRECTED TO THE POSSIBILITY OF EXISTING PRIVATE SPRINKLERS AND LIGHTING SYSTEMS WITHIN THE RIGHT-OF-WAY, WHICH ARE NOT SHOWN ON PLANS, LOCATING, WORKING AROUND AND PROTECTING THESE SYSTEMS SHALL BE COMPLETED AT NO EXTRA COST TO THE CITY.
7. ALL DIMENSION ARE EXPRESSED IN METERS AND PIPE SIZES ARE EXPRESSED IN MILLIMETERS UNLESS OTHERWISE NOTED.
8. ALL MATERIAL FOR SEWER, FORCEMAIN, WATERMAIN, HYDRANTS AND APPURTENANCES SHALL BE ACCORDING TO CITY OF TORONTO MATERIAL/MANUFACTURER SPECIFICATIONS AS REQUIRED BY CHAPTER 6, MATERIAL SPECIFICATIONS FROM DESIGN CRITERIA FOR SEWERS AND WATERMAINS MANUAL.
9. UTILITY SEPARATION SHALL BE ACCORDING TO APPENDIX 'D' OF THE CITY OF TORONTO DESIGN CRITERIA FOR SEWERS AND WATERMAINS MANUAL.
10. SERVICE CONNECTIONS AND UTILITY CUTS MADE IN ROAD PAVEMENTS SHALL BE BACKFILLED WITH UNSHRINKABLE FILL ACCORDING TO TS 4.60.
11. AT ALL LOCATIONS WHERE THE PROPOSED WATERMAIN CROSSES UNDER OR ABOVE THE EXISTING SEWERS, OR UTILITIES, GRANULAR A BEDDING MATERIAL IS TO EXTEND FROM THE LOWER PIPE TO THE TOP OF THE UPPER PIPE. GRANULAR A TO BE COMPACTED TO MINIMUM 98% OF MAXIMUM DRY DENSITY.
12. CONTRACTOR TO PROVIDE ADEQUATE SUPPORT DURING CONSTRUCTION BETWEEN THE NEW WATERMAIN AND EXISTING GAS MAINS. MAINTAIN 300mm MINIMUM VERTICAL CLEARANCES BETWEEN THE NEW WATERMAIN AND EXISTING GAS MAINS LESS THAN 300mm IN DIAMETER. MAINTAIN 600mm MINIMUM VERTICAL CLEARANCES BETWEEN THE NEW WATERMAIN AND EXISTING GAS MAINS EQUAL TO OR GREATER THAN 300mm IN DIAMETER.
13. ALL EXISTING WATERMAINS AND SEWER PIPES LARGER THAN 300mm DIAMETER SHALL BE SUPPORTED ACCORDING TO DRAWING T-1007.01-4.
14. ALL PROPOSED SERVICE CONNECTIONS WITHIN THE MUNICIPAL RIGHT-OF-WAY TO BE INSTALLED BY THE CITY AT THE OWNER'S COST.

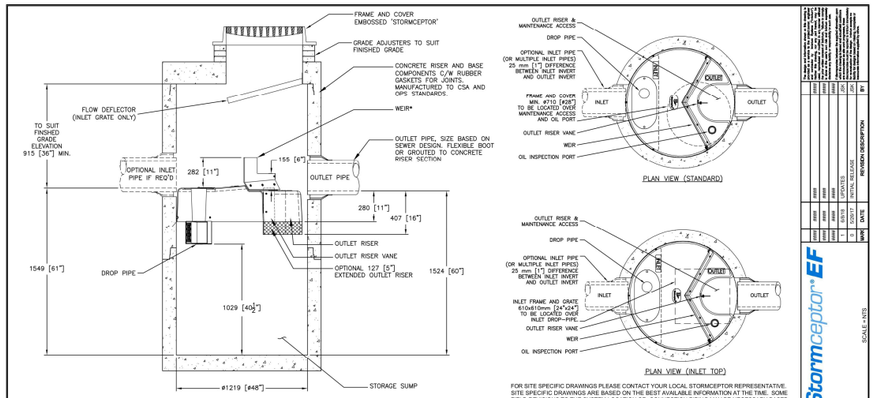
SANITARY AND STORM SEWERS

1. ALL EXISTING SEWERS ARE TO BE CONFIRMED ON SITE PRIOR TO CONSTRUCTION, INCLUDING SEWER INVERTS, MATERIAL, AND SIZE. ANY DISCREPANCIES SHALL BE REPORTED TO THE ENGINEER.
2. MAINLINE PVC PIPE SHALL BE DR 35.
3. ALL SANITARY SEWER PIPES SMALLER THAN 300mm SHALL BE PVC AND HAVE SMOOTH INTERIOR AND EXTERIOR WALL AND CONFORM TO OPSS 1841 MATERIAL SPECIFICATION. ALL OTHER SIZED SANITARY PIPES SHALL BE COMPOSED OF REINFORCED CONCRETE AND COMPLY WITH OPSS 1820 MATERIAL SPECIFICATION.
4. ALL STORM SEWER GREATER THAN 375mm SHALL BE STEEL REINFORCED CONCRETE AND SHALL CONFORM TO OPSS 1820 MATERIAL SPECIFICATION.
5. SANITARY SERVICE CONNECTIONS SHALL BE SINGLE, 150mm DIAMETER MINIMUM, PVC DR 28 INSTALLED AT 2 PERCENT AND THE COLOUR SHALL BE GREEN. FOR SINGLE RESIDENTIAL DWELLINGS.
6. STORM SERVICE CONNECTION PIPE SHALL BE PVC DR 28, CSA B182.2-06 CERTIFIED, AND ASTM D3034-04A.
7. EMBEDMENT MATERIAL FOR FLEXIBLE PIPE SHALL BE ACCORDING TO OPSD 802.010 AND USING GRANULAR A NATIVE OR GRANULAR A RCM ACCORDING TO TS 1010 AND COMPACTED TO MINIMUM 98% OF MAXIMUM DRY DENSITY.
8. BEDDING FOR RIGID PIPE SHALL BE CLASS B BEDDING MATERIAL ACCORDING TO OPSD 802.031 AND USING GRANULAR A NATIVE OR GRANULAR A RCM BEDDING MATERIAL ACCORDING TO TS 1010 AND COMPACTED TO A MINIMUM OF 98% OF MAXIMUM DRY DENSITY.
9. ULTRA-RIB PIPE IS NOT PERMITTED WITHIN THE MUNICIPAL RIGHT-OF-WAY.
10. MAINTENANCE HOLES SHALL BE ACCORDING TO T-701.010 (1200mm), T-701.011 (1500mm), T-701.012-1 (1800m) OR T-701.013 (2400mm). FRAME AND COVER SHALL BE ACCORDING TO OPSD 401.010 TYPE A CLOSED (SANITARY AND STORM)
11. MAINTENANCE HOLE CHAMBER OPENING MUST BE LOCATED ON THE UPSTREAM SIDE OF THE MAINTENANCE HOLE.
12. BENCHING DETAILS SHALL BE ACCORDING TO T-701.021 OR AS SHOWN ON THE DRAWINGS.
13. DROP STURCTURES SHALL BE ACCORDING TO T-1003.01 (EXTERNAL) AND T-1003.01-2 (INTERNAL).
14. SANITARY MAINTENANCE HOLES SHALL HAVE WATERTIGHT FRAMES AND COVERS IN PONDING AREA ACCORDING TO OPSD 401.030.
15. REINFORCED CONCRETE PIPE SHALL BE MINIMUM 65-D. HEIGHT OF FILL TO BE VERIFIED USING OPSD TABLE 807.010 AND 807.030..
16. NON-REINFORCED CONCRETE PIPE 150mm TO 250mm SHALL BE CLASS 3. HEIGHT OF FILL TO BE VERIFIED USING OPSD TABLE 807.040.
17. SINGLE CATCHBASINS SHALL BE ACCORDING TO T-705.010 COMPLETE WITH GOSS TRAP, WHERE SPECIFIED. FRAME AND COVER SHALL BE ACCORDING TO OPSD 400.070.
18. DOUBLE CATCHBASINS SHALL BE ACCORDING TO T-705.020 COMPLETED WITH GOSS TRAP, WHERE SPECIFIED.
19. CATCHBASIN LEADS TO BE 250mm PVC DR 35 FOR SINGLE CATCHBASINS AND 300mm PVC DR 35 FOR DOUBLE CATCHBASINS,
20. CONNECTION DETAIL FOR SEWER PIPE AT CATCHBASINS AND MAINTENANCE HOLES SHALL BE ACCORDING TO T708.020.
21. STORM SERVICE CONNECTION PIPE SHALL BE PVC SDR-28, CSA B182.2-06 CERTIFIED, AND ASTM D3034-04A.
22. FOR SERVICE CONNECTIONS ON EXISTING SEWERS, THE SEWER FLOW MUST BE MAINTAINED AT ALL TIMES. SEWER CONNECTIONS MUST BE CONNECTED TO THE MAIN SEWER BY MEANS OF A SADDLE, WHERE APPLICABLE. THE CONNECTION WILL TERMINATE AT THE PROPERTY LINE AND MUST BE PROPERLY PLUGGED. THE OPENING FOR THE SADDLE ON THE MAIN SEWER MUST BE MADE BY A CORE DRILL ONLY. THE DIAMETER OF THE CORE MUST NOT EXCEED THE OUTSIDE DIAMETER OF THE SADDLE BRANCH INSERT BY 25mm. WHERE CORE DRILLING IS NOT POSSIBLE, THE CONTRACTOR MUST CONNECT TO THE MAIN SEWER BY APPROPRIATE MEANS, APPROVED BY THE CITY. SEWER CONNECTIONS MUST BE LAID ON SOLID GROUND AND MUST HAVE A MINIMUM OF 75mm OF CLASS B BEDDING.

ROAD CONSTRUCTION

WATERMAIN

1. PVC WATERMAINS SHALL BE MINIMUM DR 18 CLASS 235 (AWWA) C900-07 OR MOLECULAR ORIENTED POLYVINYL CHLORIDE (PVCO) PIPES RANGING IN SIZE FROM 100mm TO 300mm IN DIAMETER PRESSURE CLASS 235 AWWA C909.09. PVC PIPES RANGING IN SIZE FROM 350mm THROUGH 600mm IN DIAMETER, SHALL BE PRESSURE RATING 235, DR 18, ACCORDING TO AWWA C905-10.
2. EMBEDMENT MATERIAL FOR FLEXIBLE PIPE SHALL BE ACCORDING TO OPSD 802.010 AND USING GRANULAR A ACCORDING TO TS 1010 AND COMPACTED TO MINIMUM 98% OF MAXIMUM DRY DENSITY.
3. MINIMUM COVER ON WATERMAINS SHALL BE 1.8m.
4. ALL HYDRANTS SHALL BE CONSTRUCTED ACCORDING TO T-1105.01.
5. HYDRANT LEADS SHALL BE MINIMU DR 18 CLASS 235 (AWWA) C900-07 OR PRESSURE CLASS 235 AWWA C909-09.
6. ALL SERVICE CONNECTIONS SHALL BE CONSTRUCTED ACCORDING TO T-1104.01, T-1104.02-1, T-1104.02-3, T-1105.02-1 AND T-1105.02-2.
7. SINGLE WATER SERVICE CONNECTIONS SHALL BE A MINIMUM OF 19mm DIA., TYPE 'K' SOFT COPPER ACCORDING TO T-1104.01. WHEN SERVICE LENGTH EXCEEDS 30m, THE DIAMETER SHALL BE 25mm DIA.
8. ALL CURB AND VALVE BOXES TO BE LOCATED AT STREET LINE.
9. MECHANICAL THRUST RESTRAINTS SHALL BE INSTALLED AT ALL FITTINGS, BENDS, TEES, CROSSES, REDUCERS AND VALVES FOR ALL WATERMAIN SIZES. MECHANICAL RESTRAINTS AT JOINTS SHALL BE INSTALLED AT EVER PIPE JOINT 6.1m OF EITHER SIDE OF THE VALVE FOR WATERMAINS 100mm DIAMETER OR LARGER.
10. ALL TEES, PLUGS, HORIZONTAL, VERTICAL BENDS, REDUCERS AND HYDRANTS TO HAVE CONCRETE THRUST BLOCKS ACCORDING TO T-1103.01 AND T-1103.020.
11. WATERMAINS MUST FOLLOW THE ONTARIO MINISTRY OF THE ENVIRONMENT PROCEDURE F-6-1 THAT GOVERN THE SEPARATION OF SEWERS AND WATERMAINS. A MINIMUM VERTICAL CLEARANCE OF 0.30m WHEN CROSSING OVER AND 0.5m WHEN CROSSING UNDER SEWERS AND ALL OTHER UTILITIES IS REQUIRES. MUST ALSO MAINTAIN 2.5m HORIZONTAL SEPARATION WITH SEWERS.
12. ALL VALVES LESS THAN 400mm WILL BE IN A VALVE AND BOX ACCORDING TO T-1101.02-2. ALL VALVES 400mm AND LARGER SHALL BE A CHAMBER.
13. SACRIFICIAL ANODES SHALL BE INSTALLED ON ALL METALLIC PIPES AND APPURTENANCES, WATER SERVICES AND FITTINGS ACCORDING TO T-1106.04, T-1106.05, T-1106.06 AND TS 7.22.
14. TRACER WIRE INSTALLATION SHALL BE ACCORDING TO TS 7.40.
15. HYDROSTATIC PRESSURE TEST AND LEAKAGE TESTING OF THE WATERMAIN SHALL BE ACCORDING TO TS 441.
16. THE NEW WATERMAIN SHALL BE ISOLATED ACCORDING TO T-1104.03-3 OR T-1104.03-4 UNTIL BACTERIOLOGICAL TESTS ARE SATISFACTORILY COMPLETED.
17. PROVISIONS FOR FLUSHING THE WATERMAIN PRIOR TO TESTING AND SO FORTH MUST BE PROVIDED WITH AT LEAST A 50mm OUTLET ON 100mm AND LARGER LINES ACCORDING TO T-1104.03-1. COPPER WATER SERVICES SHALL HAVE FLUSHING POINTS AT THE END, THE SAME SIZE AS THE LINE. ON FIRE LINES, FLUSHING OUTLET TO BE 50mm DIAMETER MINIMUM OR A HYDRANT.
18. DISINFECTION OF THE WATERMAIN SHALL BE ACCORDING TO TS 7.30 AND SHALL INCLUDE ALL NEW WATER SERVICES 100mm DIA. AND LARGER.
19. TORONTO WATER REQUIRES THAT THE NEW DISTRIBUTION SYSTEM REMAIN ISOLATED UNTIL SATISFACTORY BACTERIOLOGICAL SAMPLE RESULTS ARE RECEIVED. ECS CONTRACT ADMINISTRATOR SHALL NOTIFY TORONTO WATER WHEN SAMPLE RESULTS HAVE PASSED IN ORDER TO PROCEED WITH REMOVAL OF THE BLOW-OFF AND BACK FILLING OF THE ACCESS PIT.
20. AFTER SATISFACTORY DISINFECTION OF THE NEW WATERMAIN IS ACHIEVED, PERMANENT CONNECTIONS TO THE EXISTING WATERMAIN(S) WITH A FILTER PIECE SHALL BE MADE ACCORDING TO TS 7.70.
21. CITY IN-SERVICE WATER VALVES, CURB STOPS, FIRE HYDRANTS CAN ONLY BE OPERATED BY TORONTO WATER STAFF.
22. ALL NEW WATERMAINS SHALL BE INSULATED WHERE THE COVER IS LESS THAN 1.65m ACCORDING TO T-708.01-4.
23. BUILDING PERMIT ISSUANCE SHALL BE SUBJECT TO THE BUILDING PERMIT DRAWINGS NOT BEING IN CONTRAVENTION WITH THESE APPROVED PLANS AND DRAWINGS INCLUDING, BUT NOT LIMITED TO, THE EXTERIOR DESIGN OF THE BUILDING AND EXTERIOR BUILDING MATERIALS.



SECTION VIEW

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:

1. MAXIMUM SURFACE LOADING RATE (SLR) INTO LOWER CHAMBER THROUGH DROP PIPE IS 1135 L/min/m² (27.9 gpm/ft²) FOR STORMCEPTOR EF4 AND 535 L/min/m² (13.1 gpm/ft²) FOR STORMCEPTOR EFO4 (OIL CAPTURE CONFIGURATION). WEIR HEIGHT IS 150 mm (6 INCH) FOR EF04.
2. ALL DIMENSIONS INDICATED ARE IN MILLIMETERS (INCHES) UNLESS OTHERWISE SPECIFIED.
3. STORMCEPTOR STRUCTURE INLET AND OUTLET PIPE SIZE AND ORIENTATION SHOWN FOR INFORMATIONAL PURPOSES ONLY.
4. 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.
5. DRAWING FOR INFORMATION PURPOSES ONLY. REFER TO ENGINEER'S SITE/UTILITY PLAN FOR STRUCTURE ORIENTATION.
6. NO PRODUCT SUBSTITUTIONS SHALL BE ACCEPTED UNLESS SUBMITTED 10 DAYS PRIOR TO PROJECT BID DATE, OR AS DIRECTED BY THE ENGINEER OF RECORD.

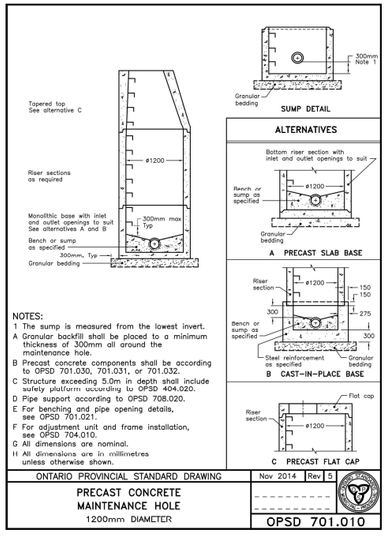
INSTALLATION NOTES

A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STRUCTURE (LIFTING CLUTCHES PROVIDED)
C. CONTRACTOR WILL INSTALL AND LEVEL THE STRUCTURE, SEALING THE JOINTS, LINE ENTRY AND EXIT POINTS (NON-SHRINK GROUT WITH APPROVED WATERSTOP OR FLEXIBLE BOOT)
D. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT THE DEVICE FROM CONSTRUCTION-RELATED EROSION RUNOFF.
E. DEVICE ACTIVATION, BY CONTRACTOR, SHALL OCCUR ONLY AFTER SITE HAS BEEN STABILIZED AND THE STORMCEPTOR UNIT IS CLEAN AND FREE OF DEBRIS.

STANDARD DETAIL
NOT FOR CONSTRUCTION

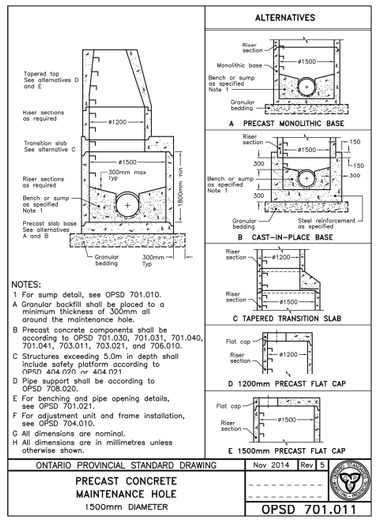
SITE SPECIFIC DATA REQUIREMENTS						
STORMCEPTOR MODEL	EFO4					
STRUCTURE ID						*
HYDROCARBON STORAGE REQ'D (L)						*
WATER QUALITY FLOW RATE (L/s)						*
PEAK FLOW RATE (L/s)						*
RETURN PERIOD OF PEAK FLOW (yrs)						*
DRAINAGE AREA (HA)						*
DRAINAGE AREA IMPERVIOUSNESS (%)						*
PIPE DATA:	I.E.	MAT'L	DIA	SLOPE %	HGL	
INLET #1	*	*	*	*	*	
INLET #2	*	*	*	*	*	
OUTLET	*	*	*	*	*	

* PER ENGINEER OF RECORD



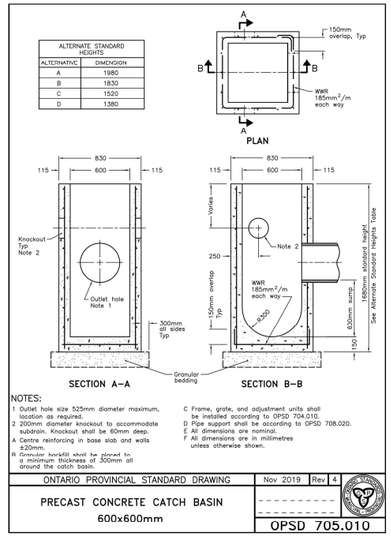
NOTES:
1 The sump is measured from the lowest invert.
A Granular backfill shall be placed to a minimum thickness of 300mm all around the maintenance hole.
B Precast concrete components shall be according to OPSD 701.030, 701.031, or 701.032.
C Structure exceeding 5.0m in depth shall include safety platform according to OPSD 404.020.
D Pipe support according to OPSD 708.020.
E For benching and pipe opening details, see OPSD 701.021.
F For adjustment unit and frame installation, see OPSD 704.010.
G All dimensions are nominal.
H All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2014	Rev 5
PRECAST CONCRETE MAINTENANCE HOLE 1200mm DIAMETER		OPSD 701.010



NOTES:
1 For sump detail, see OPSD 701.010.
A Granular backfill shall be placed to a minimum thickness of 300mm all around the maintenance hole.
B Precast concrete components shall be according to OPSD 701.030, 701.031, 701.040, 701.041, 703.011, 703.021, and 706.010.
C Structures exceeding 5.0m in depth shall include safety platform according to OPSD 404.020 or 404.021
D Pipe support shall be according to OPSD 708.020.
E For benching and pipe opening details, see OPSD 701.021.
F For adjustment unit and frame installation, see OPSD 704.010.
G All dimensions are nominal.
H All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2014	Rev 5
PRECAST CONCRETE MAINTENANCE HOLE 1500mm DIAMETER		OPSD 701.011



NOTES:
1 Outlet hole size 525mm diameter maximum, location as required.
2 200mm diameter knockout to accommodate subdrain. Knockout shall be 60mm deep.
A Centre reinforcing in base slab and walls ±20mm.
B Granular backfill shall be placed to a minimum thickness of 300mm all around the catch basin.
C Frame, grate, and adjustment units shall be installed according to OPSD 704.010.
D Pipe support shall be according to OPSD 708.020.
E All dimensions are nominal.
F All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2019	Rev 4
PRECAST CONCRETE CATCH BASIN 600x600mm		OPSD 705.010

KEYPLAN N.T.S

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DO NOT SCALE DRAWINGS.

CONTRACTOR MUST CHECK & VERIFY ALL DIMENSIONS ON SITE.

THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION.

No.	Issued	Date	By
1	ISSUED FOR SPA	2024-04-12	

LICENSED PROFESSIONAL ENGINEER
Z. DU
2024-04-12
PROVINCE OF ONTARIO

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PROPOSED SCHOOL DORMITORY BUILDING

39 PINE ST N PORT HOPE, ON L1A 3G5

Project Number			2021
Drawn	AL	Scale	NTS
Checked	ZD	Date	2023-10-06

STANDARD DRAWING & DETAILS

Drawing No. **C-03**

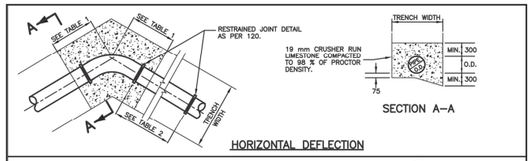
BY	REVISION DESCRIPTION	DATE
JSK	ISSUED FOR SPA	2024-04-12
JSK	ISSUED FOR SPA	2023-10-06
JSK	ISSUED FOR SPA	2023-09-15
JSK	ISSUED FOR SPA	2023-08-25
JSK	ISSUED FOR SPA	2023-08-04
JSK	ISSUED FOR SPA	2023-07-14
JSK	ISSUED FOR SPA	2023-06-23
JSK	ISSUED FOR SPA	2023-06-02
JSK	ISSUED FOR SPA	2023-05-12
JSK	ISSUED FOR SPA	2023-04-21

Stormceptor® EF

SCALE: NTS

imbrium

DATE: 10/13/2017
DESIGNED: JSK
DRAWN: JSK
CHECKED: BSP
APPROVED: SM
STORMCEPTOR SIZE/MODEL NO.: EFO4
SHEET: 1 OF 1



NOTES

1. ALL JOINTS ENCOUNTERED WITHIN THE SPECIFIED RESTRAINING LENGTH "L" SHALL BE RESTRAINED ON EACH SIDE OF THE FITTING.
2. GRANULAR THRUST BLOCKS SHALL BE FULLY EXTENDED AND COMPACTED AGAINST TRENCH WALLS.
3. IF THE BEARING CAPACITY OF TRENCH BED RESISTING DOWNWARD THRUST IS LESS THAN 100 KN/m2, CLEAR STONE FOUNDATION SHALL BE PROVIDED AS DIRECTED BY THE ENGINEER.
4. WHEN FITTINGS ARE PARTIALLY OR FULLY EXPOSED UNDER PRESSURE, ALL JOINTS MUST BE RESTRAINED.
5. ALL FITTING JOINTS SHALL BE RESTRAINED IN EARTH FILL APPLICATIONS.
6. CATHODIC PROTECTION, BONDING CABLE AND TRACER WIRE SHALL BE AS PER 121, 122.

TABLE NO. 1

DEFL. ANGLE	MINIMUM DIMENSION FOR GRANULAR THRUST BLOCKS PIPE DIAMETER (mm) 100&150	200	300	400
11.25°	400	500	600	700
22.5°	400	500	600	700
45°	450	550	650	750
90°	600	700	850	950

TABLE NO. 2

PIPE DIA. (mm)	"L" MINIMUM RESTRAINING LENGTH (m) * ON EACH SIDE OF FITTING VERTICAL DEFLECTION DOWNWARD THRUST 11.25°	22.5°	45°	UPWARD THRUST 11.25°	22.5°	45°	HORIZONTAL DEFLECTION 11.25°	22.5°	45°	90°
100&150	1.5	2.8	4.9	4.9	7.5	10.1	1.5	2.8	4.9	8.1
200	2.0	3.7	6.3	6.3	9.6	13.1	2.0	3.7	6.3	10.5
300	2.8	5.2	9.0	8.8	13.4	18.3	2.8	5.2	9.0	14.9
400	3.6	6.7	11.6	11.2	17.2	23.7	3.6	6.7	11.6	19.3

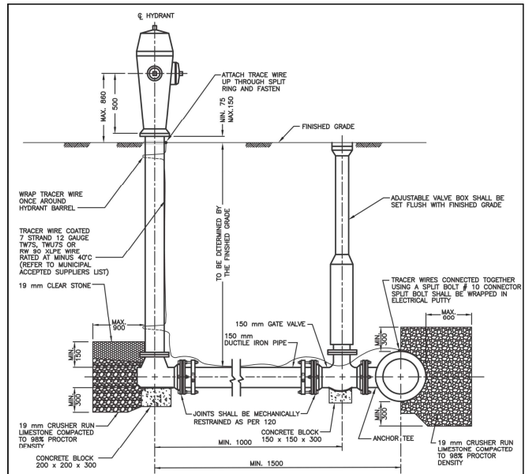
ALL DIMENSIONS IN MILLIMETRES EXCEPT WHERE NOTED

PORT HOPE

JOINT RESTRAINING LENGTH FOR PVC PIPE (IN COMBINATION WITH GRANULAR THRUST BLOCK)

DATE: OCT. 2015

119



NOTES

1. JOINTS SHALL BE MECHANICALLY RESTRAINED.
2. BEDDING AS PER 101.
3. HYDRANT EXTENSIONS SHALL BE INSTALLED AT BOTTOM OF BARREL.
4. ANCHOR TEE, VALVE & HYDRANT SHALL BE COMPLETELY BACKFILLED WITH 19 mm CRUSHER RUN LIMESTONE.
5. IF HYDRANT REQUIRES ACCESS ACROSS DITCH, INSTALLATION SHALL BE AS PER 117.
6. TRACER WIRE COATED, 7 STRAND, 12 GAUGE TWF75, TWU75 OR RW 90 XLPE WIRE RATED AT MINUS 40°C. REFER TO MUNICIPAL ACCEPTED SUPPLIERS LIST.
7. TRACER WIRE SHALL BE INSTALLED AT ALL HYDRANT LOCATIONS.
8. CATHODIC PROTECTION, BONDING CABLE AND TRACER WIRE SHALL BE AS PER 121, 122.
9. HYDRANT LEADS SHALL BE DUCTILE IRON MATERIAL ONLY

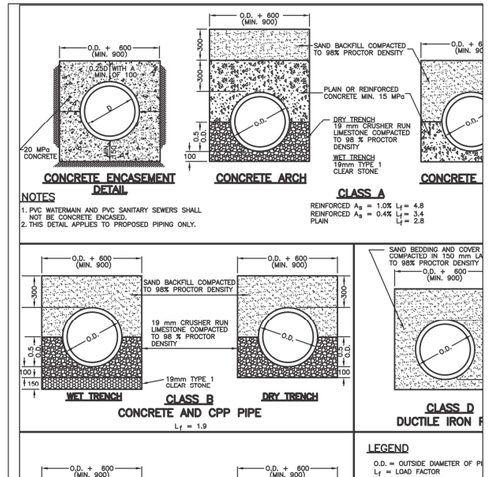
ALL DIMENSIONS IN MILLIMETRES EXCEPT WHERE NOTED.

PORT HOPE

HYDRANT ASSEMBLY WITH MECHANICALLY RESTRAINED JOINTS

DATE: FEB. 2016

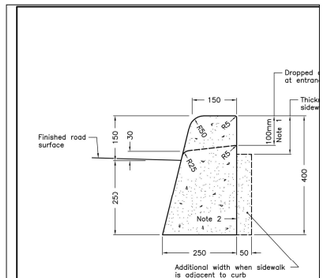
105



PORT HOPE

SANITARY, STORM AND WATER (MAIN AND SERVICE) TRENCH BEDDING AND CONCRETE ENCASEMENT DETAILS

DATE: O



NOTES:

1 When sidewalk is continuously adjacent, the dropped curb at entrances shall be reduced to 75mm.
2 For slipforming procedure a 5% batter is acceptable.
A Treatment at entrances shall be according to OPSD 351.010.
B Outlet treatment shall be according to the OPSD 610 Series.
C The transition from one curb type to another shall be a minimum length of 3.0m, except in conjunction with guide rail where it shall be according to the OPSD 900 Series.
D All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2012	Rev
CONCRETE BARRIER CURB		OPSD 60

KEYPLAN N.T.S

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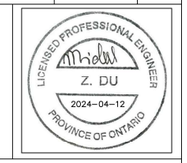
DO NOT SCALE DRAWINGS.

CONTRACTOR MUST CHECK & VERIFY ALL DIMENSIONS ON SITE.

THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION.

No.	Issued	Date	By
1	ISSUED FOR SPA	2024-04-12	



WPE

222 - 7250 KEELE STREET
VAUGHAN, ON. L4K 1Z8
T: 416 578 8662
EMAIL: MDU@WPEENGINEERING.COM
WWW.WPEENGINEERING.COM

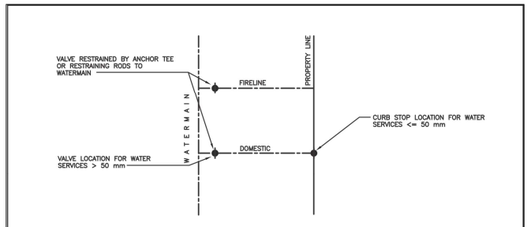
PROPOSED SCHOOL DORMITORY BUILDING

39 PINE ST N PORT HOPE, ON L1A 3G5

Project Number			2021
Drawn	AL	Scale	NTS
Checked	ZD	Date	2023-10-06

STANDARD DRAWING & DETAILS

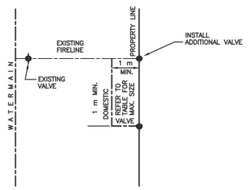
Drawing No. C-04



NOTES

1. VALVE LOCATION SHALL BE DETERMINED BY THE MUNICIPALITY OF PORT HOPE.
2. CONNECTION LAYOUT SHALL BE DETERMINED BY THE MUNICIPALITY OF PORT HOPE

SIZE OF EXISTING FIRELINE	MAX. SIZE OF DOMESTIC CONNECTION
150 mm	25 mm
200 mm	50 mm



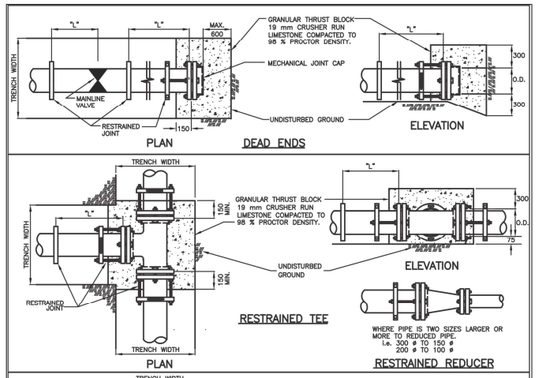
ALL DIMENSIONS IN MILLIMETRES EXCEPT WHERE NOTED.

PORT HOPE

PIPING & FITTINGS FOR COMMERCIAL, INDUSTRIAL & MULTI–RESIDENTIAL CONNECTIONS (DOMESTIC & FIRELINE)

DATE: OCT. 2015

123



NOTES

1. ALL JOINTS ENCOUNTERED WITHIN THE SPECIFIED RESTRAINING LENGTH "L" SHALL BE RESTRAINED FROM THE FIRST JOINT ON FITTING.
2. GRANULAR THRUST BLOCKS SHALL BE FULLY EXTENDED AND COMPACTED AGAINST TRENCH WALLS. IF TRENCH WALL ARE SATURATED OR DISTURBED, SPECIAL DESIGN DETAILS OF THRUST RESTRAINT SHALL BE PROVIDED BY THE ENGINEER FOR REVIEW BY THE MUNICIPALITY.
3. GRANULAR THRUST BLOCKS SHALL BE ENCLOSED WITH FILTER FABRIC IF GROUND WATER TABLE IS ABOVE THE TRENCH BED OR IF GROUND WATER IS SEEPING THROUGH TRENCH WALLS.
4. WHEN FITTINGS ARE PARTIALLY OR FULLY EXPOSED UNDER PRESSURE, ALL JOINTS MUST BE RESTRAINED.
5. ALL FITTING JOINTS SHALL BE RESTRAINED IN EARTH FILL APPLICATIONS.
6. CATHODIC PROTECTION, BONDING CABLE AND TRACER WIRE SHALL BE AS PER 121, 122.
7. ALL SIDES SHALL BE RESTRAINED FOR IN LINE TEES.

PIPE DIA.	"L" MIN. RESTRAINING LENGTH (m)
100&150	15.2
200	19.6
300	27.7
400	36.3

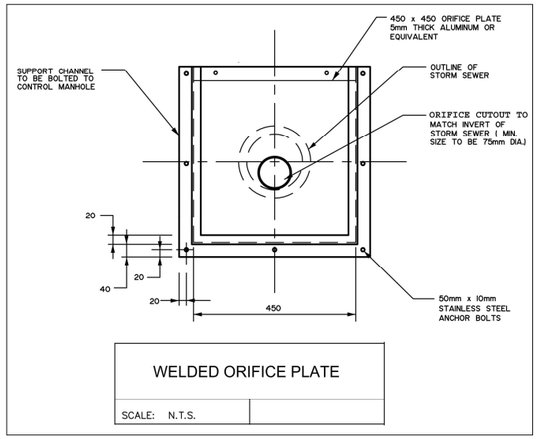
ALL DIMENSIONS IN MILLIMETRES EXCEPT WHERE NOTED.

PORT HOPE

THRUST BLOCK FOR PVC WATERMAINS FOR HYDRANT RUNOUTS, TEES AND DEAD ENDS

DATE: OCT. 2015

120



FIXED ORIFICE PLATE DETAIL

NOTES

NOTES:

a. All dimensions are measured in meters unless noted otherwise.
b. Reference Aquabox standard drawings and notes for detailed information.
c. Reference current Aquabox Module installation instructions for proper installation practices.
https://www.geoplastglobal.com/en/downloads/aquabox
d. Engineer of record to confirm conformance to manufacturer's allowable proximity to other structures and slopes.
e. All inlet and pipe locations and designs by others.
f. The sub-grade and side backfill needs to be compacted to 97%, unless noted otherwise.
g. During and after installation, the AquaBox Module area should be clearly marked and roped off to prevent unauthorized construction and equipment trafficking over the modules.
h. Top of Ground water is to be maintained 610 mm (2 ft) below the module to prevent buoyancy, unless otherwise noted by engineer.
i. The quantities related to stone and geosynthetics are estimated values as the roll size, overlaps, waste, ect. may vary.
j. Materials must be stored in a manner to prevent prolonged exposure to UV light.
k. Extra care and caution must be taken when handling materials at temperatures below 0C.
l. Storm tank system is not considered complete until all backfill is installed to the minimum depth shown on Detail 5 Typical System Cross-Section. The installer MUST insure that the project site remains dry and free of water (both surface and groundwater) until the installation is complete, including the backfill as noted, to avoid damage to the tank system due to buoyancy.

Material Quantity (AQUABOX HP)

AquaBox HP	656
Sidewall Grid HP	125
Top Cap HP	672
Single Joint	614
Double Joint	339

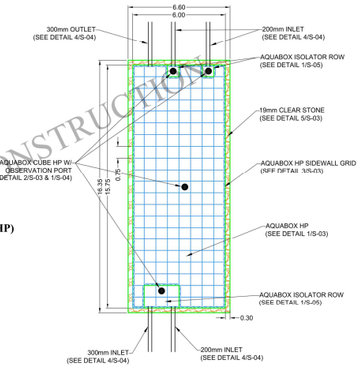
Material Quantity (AQUABOX CUBE HP)

AquaBox Cube HP	32
Sidewall Grid Cube HP	8
Circular Cap D400 HP	4
Surface Grate	4

Elevations

Leveling Stone Bottom	99.191
Bottom of Module	99.291
Module Invert	99.341
Top of Module	100.891
Top of Stone Backfill	101.191
Minimum Finished Grade *Must consider frost line, varies by region	101.491
Maximum Finished Grade	102.791

Contractor to confirm that quantities shipped to site match those listed above. Please report any discrepancy or damage to Layfield immediately.



DETENTION VOLUME ABOVE ELEVATION 99.491 = 147.62 M3
RETENTION VOLUME BELOW ELEVATION 99.491 = 23.56 M3

2/S-02 MODULE LAYOUT

SCALE: NTS

LAYFIELD
117 Basaltic Rd,
Concord, ON L4K 1G4 Canada
Ph: (905) 761-9123
www.layfieldgroup.com

Total Storage Volume		171.18 m³
Module Storage Volume		145.15 m³
Stone Storage Volume		26.02 m³
System Footprint		108.13 m²
Estimated Geotextile Fabric	NuBarrier	791 m²
Estimated Geotextile Fabric	LP8	---- m²
Estimated Liner		---- m²
Estimated GeoGrid		---- m²
Estimated Stone Volume		65.06 m³
Excavation Required		248.70 m³
Minimum Excavation Depth		2.3 m
Stone Type		19mm Cloar Stone
Stone Void Space		40%
Number of Module Layers		2
Allowable Loading		HS-25
Surface	Paved Surface	Vegetated/ Unpaved
Minimum Top Cover	0.60 m	0.80 m
Maximum Tank Depth	3.50 m	3.40 m

39 PINE STREET N.

Port Hope, ON

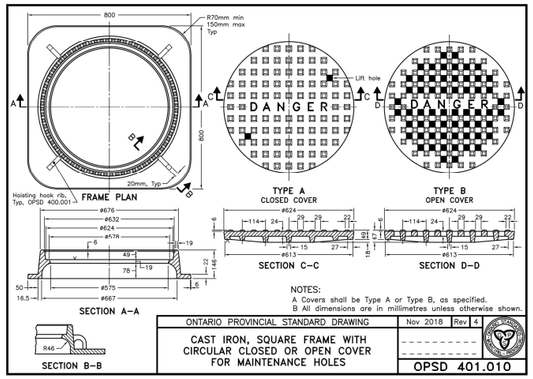
REV	Record of Changes	Date	By
1	Preliminary Drawing	09APR2024	PE

Project Number: -----
Page Name: Module Layout
Drawn by: PE | Checked By: JF
Scale: NTS | Date: 09APR2024

THIS LAYOUT DRAWING WAS PREPARED TO SUPPORT THE ENGINEER OF RECORD FOR THE PROPOSED SYSTEM. IT IS THE RESPONSIBILITY OF THE ENGINEER OF RECORD TO REVIEW THE INFORMATION AND ENSURE THAT THE LAYOUT AND DESIGN IS IN FULL COMPLIANCE WITH ALL APPLICABLE LAWS AND REGULATIONS AND THAT THE AQUABOX SYSTEM HAS BEEN DESIGNED IN ACCORDANCE WITH GEOPLASTS REQUIREMENTS. LAYFIELD DOES NOT REVIEW OR APPROVE PLANS, SIZING OR DESIGNS.

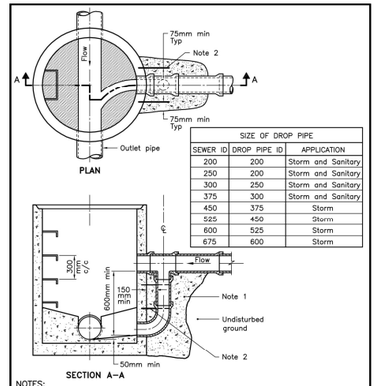
Sheet: **02 OF 07**

SCALE: NTS



ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2018	Rev 4
CAST IRON, SQUARE FRAME WITH CIRCULAR CLOSED OR OPEN COVER FOR MAINTENANCE HOLES		OPSD 401.010

SCALE: NTS

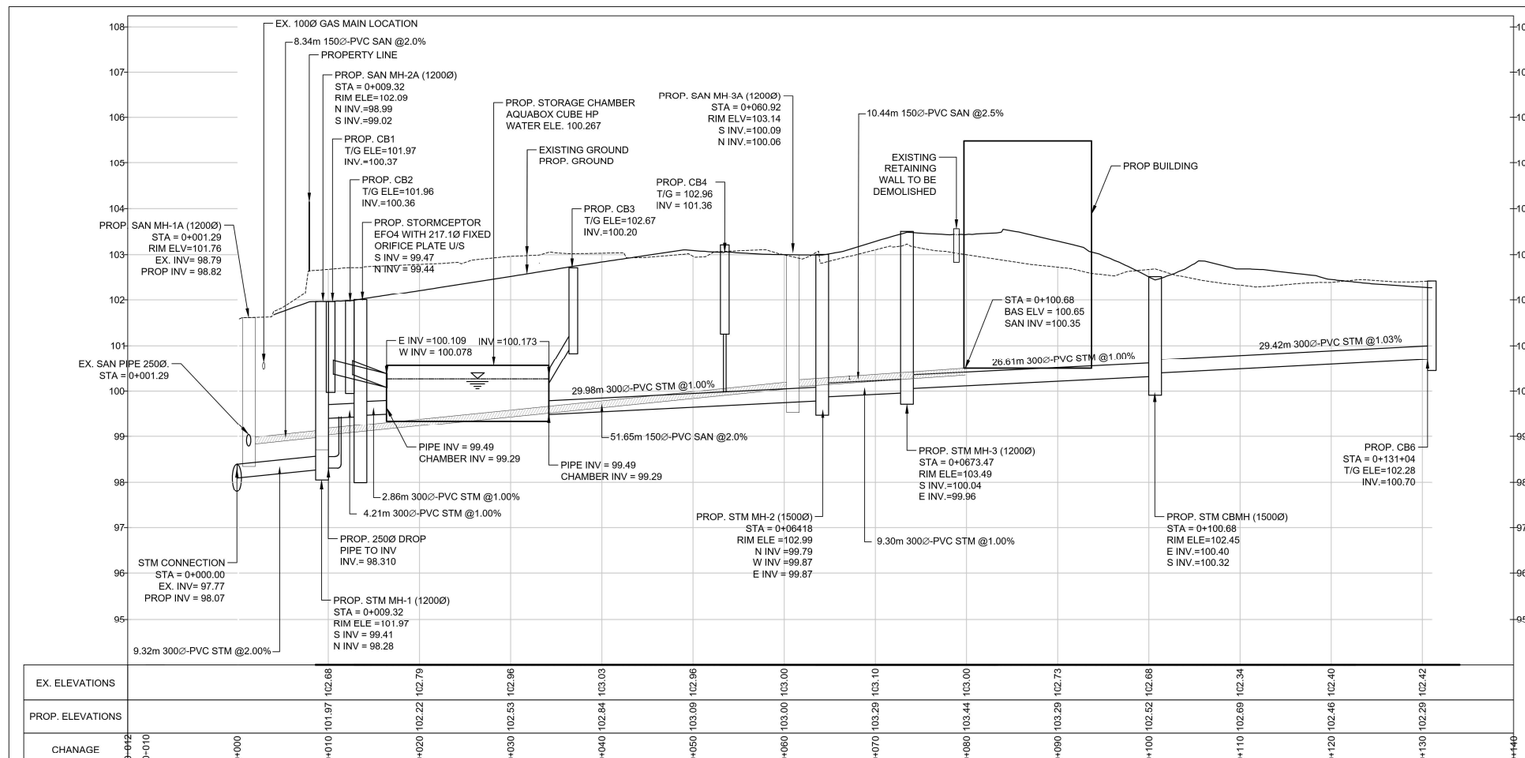


SIZE OF DROP PIPE		
SEWER ID	DROP PIPE ID	APPLICATION
200	200	Storm and Sanitary
250	200	Storm and Sanitary
300	250	Storm and Sanitary
375	300	Storm and Sanitary
450	375	Storm
525	450	Storm
600	525	Storm
675	600	Storm

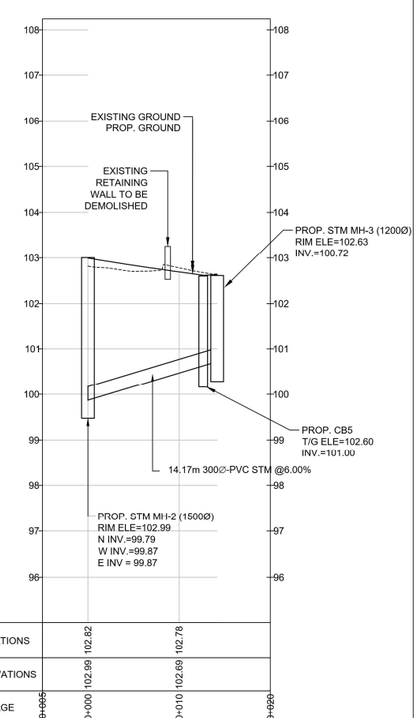
NOTES:
1 Concrete shall be placed to undisturbed ground and the outside face of the maintenance hole, but there shall be a minimum of 150mm of 15MPa concrete around the drop pipe.
2 Concrete shall be secured to the maintenance hole with 450mm long, 13mm diameter threaded rods and drilled expansion anchors down either side of the drop pipe at 300mm centres.
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2016	Rev 3
CAST–IN–PLACE MAINTENANCE HOLE DROP STRUCTURE TEE		OPSD 1003.010

SCALE: NTS



CHANAGE	0-012	0-010	0+000	0+010	0+020	0+030	0+040	0+050	0+060	0+070	0+080	0+090	0+100	0+110	0+120	0+130	0+140
EX. ELEVATIONS				102.68	102.79	102.96	103.03	102.96	103.00	103.10	103.00	102.73	102.68	102.34	102.40	102.42	
PROP. ELEVATIONS				101.97	102.22	102.53	102.84	103.09	103.00	103.29	103.44	103.29	102.52	102.69	102.46	102.29	



CHANAGE	0-005	0-000	0+010	0-020
EX. ELEVATIONS		102.82	102.78	
PROP. ELEVATIONS		102.99	102.69	

KEYPLAN N.T.S

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THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION.

No.	Issued	Date	By
1	UPDATED AS PER SITE PLAN	2024-04-12	

LICENSED PROFESSIONAL ENGINEER
Z. DU
2024-04-12
PROVINCE OF ONTARIO

WPE
222 - 7250 KEELE STREET
VAUGHAN, ON. L4K 1Z8
T: 416 578 8682
EMAIL: MDU@WPEENGINEERING.COM
WWW.WPEENGINEERING.COM

PROPOSED SCHOOL DORMITORY BUILDING

39 PINE ST N PORT HOPE, ON L1A 3G5

Project Number	2021		
Drawn	AL	Scale	1:300
Checked	ZD	Date	2023-10-06

SAN & STM PROFILE & STANDARD DETAILS

Drawing No. **C-05**