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3817-3843 Innes Road

SITE SERVICING AND STORMWATER MANAGEMENT REPORT

Bridor Developments

Document Control

File:

522676

Date:

February
11, 2025

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Issue	Date	Description
2	April 13, 2022	Revised Final Report
3	July 17, 2023	Revised Final Report
4	August 28, 2024	Revised Final Report
5	November 22, 2024	Revised Final Report
6	December 20, 2024	Revised Final Report
7	January 17, 2025	Revised Final Report
8	February 11, 2025	Revised Final Report

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1 Introduction

Blanchard Letendre Engineering Ltd. (BL Engineering) was originally retained by Bridor Developments (Bridor) to complete site servicing and stormwater management designs for the proposed site development located at 3817 – 3843 Innes Road in Ottawa. In September 2022, Tatham Engineering Limited (Tatham) was retained by Bridor to replace BL Engineering as the Engineer of Record for the project moving forward. The revisions made to this report, and the enclosed detailed engineering design drawings, have been completed to address the City's engineering comments dated June 21, 2022. We note that a hydrologic model, Visual Otthymo Version 6.0 (V06), has also been prepared to replace the rational method calculations previously submitted by BL Engineering, to further refine the SWM quantity control storage volume required. BL Engineering's original Site Servicing and SWM Report, dated May 3, 2022, is provided in Appendix G.

This report and detailed engineering drawings have been prepared based on the Site Plan prepared by P-Square Concepts and the site survey completed by Annis O'Sullivan Vollebakk.



2 Site Plan

As per the aerial picture in Figure 1, the existing 0.7 ha site consists of green space area with four (4) existing buildings that will be demolished prior to construction. The land will be developed with two (2) new residential apartment buildings.

Figure 1: Existing Site at 3817-3843 Innes Road, Orleans, Ontario



3 Stormwater Management

3.1 EXISTING SITE CONDITIONS

The site currently drains uncontrolled towards Innes Road where runoff is captured by the existing roadside catch basins. The existing property naturally grades towards Innes Road away from the residential development on the north and west portion of the property. There is an existing gas station at the east side of the property that is developed at a lower elevation than the existing property. Refer to Drawing C400 for the pre-development drainage area.

3.2 EXISTING CONDITION HYDROLOGIC ANALYSIS

A Visual OTTHYMO hydrologic model (V06) scenario was developed to quantify the existing condition peak flows from the site.

The catchment delineation was determined based on the topographic survey. Existing condition land uses were established based on our review of online aerial photography.

A summary of all hydrologic parameters established for the existing condition hydrologic model has been included in Appendix A.

The peak flow for the 5-year storm event was calculated for the 3-hour Chicago, 6-hour Chicago and 24-hour SCS Type II design storms using IDF data derived from Meteorological Services of Canada (MSC) rainfall data taken from the MacDonald-Cartier Airport. Detailed calculations and Visual OTTHYMO modeling output are included in Appendix A with the results summarized below in Table 1.

Table 1: Existing Condition Peak Flow Summary

DESIGN STORM	CATCHMENT AREA EWS-01 0.7 ha (m ³ /s)		
	3-hr CHI	6-hr CHI	24-hr SCS Type II
5-Year	0.050	0.051	0.054

3.3 PROPOSED STORMWATER MANAGEMENT

The development of the site will consist of adding two (2) new residential apartment buildings. The site will be modified by adding a total of 2592 square meters of building (Block A = 1296m²; Block B = 1296m²), asphalt parking and driving aisles, and amenity areas. As the runoff coefficient



will increase in the proposed condition due to addition of hard surfaces, post-development stormwater quantity and quality control will be implemented.

The stormwater management design has been developed to follow the existing site topography. As the property naturally drains towards Innes Road, the proposed stormwater management plan will also outlet to the City storm sewer at Innes Road. The overland flow route has also been designed to convey emergency overland flow towards Innes Road.

The stormwater generated by the new hard surfaces will be directed to a series of drainage structures which will capture and convey runoff to the existing municipal system. The catchment areas have been delineated according to the proposed grading plan. In order to respect the 5-year pre-development allowable release rate, the outlets will be controlled by two orifice plate controls which will limit the flow discharging to the City storm sewer at Innes Road. By restricting flow, onsite stormwater detention will be provided via surface ponding and underground storage which were designed to attenuate the post-development runoff from the 100-year storm event to the 5-year pre-development peak flow rate.

3.4 PROPOSED CONDITION HYDROLOGIC ANALYSIS

A VO6 model scenario was developed to quantify the proposed condition peak flow from the site. The peak flow for the 100-year storm event was calculated for the 3-hour Chicago, 6-hour Chicago, and 24-hour SCS Type II design storms using the previously described IDF data.

Runoff from the 100-year storm was overcontrolled such that the combined controlled peak flow from Catchments WS-01 to WS-07 and the uncontrolled peak flows from Catchment WS-08 are reduced at or below the existing condition 5-year storm peak flow rate.

The catchment delineation for the contributing lands was completed according to the proposed site grading illustrated on drawing C200, which is included in Appendix F. The proposed surface cover and the existing soil type were used to establish the percent imperviousness, curve numbers, and other hydrologic parameters used in the hydrologic model. Summaries of all hydrologic parameters and stage-storage-discharge tables, established for the post-development hydrologic model, have been included in Appendix A.

Peak runoff rates are shown in the table below and the results of the modelling are included in Appendix A.



Table 2: Proposed Condition Peak Flow Summary

DESIGN STORM	CATCHMENT AREA WS-01 + WS-02 + WS-03 + WS-04 + WS-05 + WS-06 + WS-07 0.68 ha CONTROLLED (m ³ /s)			CATCHMENT AREA WS-08 0.02 ha UNCONTROLLED (m ³ /s)			TOTAL 0.7 ha (m ³ /s)		
	3-hr CHI	6-hr CHI	24-hr SCS TYPE II	3-hr CHI	6-hr CHI	24-hr SCS TYPE II	3-hr CHI	6-hr CHI	24-hr SCS TYPE II
100-Year	0.041	0.042	0.042	0.003	0.003	0.004	0.043 (0.050)	0.044 (0.051)	0.045 (0.054)

Note: (0.100) refers to existing condition 5-year peak flow rate.

Table 2 above confirms the proposed SWM plan will attenuate the proposed condition 100-year peak flow at or below the existing condition 5-year peak flow.

3.5 PROPOSED STORMWATER QUANTITY CONTROL

The proposed stormwater management for the site will be achieved through the use of underground storage chambers (Stormtech SC-740) and pipes, as well as surface ponding. The grading of the site has been designed to direct runoff from the controlled catchments into the onsite storm network, consisting of a series of drainage structures, pipes, underground stormwater chambers, and control structures, prior to discharging into the 1350mm diameter municipal storm sewer at Innes Road. The proposed storm network and underground stormwater chambers are shown on the attached drawings in Appendix F.

The stormwater generated from the site will be controlled via two orifice plates located at the outlets of STM MH01 and CBMH06, which will restrict flow directed to the municipal sewer. The proposed orifice plate within STM MH01 will release a total of 22 L/s with a maximum head of 3.13 m (HWL = 91.67) during the 100-year storm event while the proposed orifice plate within CBMH06 will release a total of 21 L/s with a maximum head of 1.80 m (HWL = 90.02) during the 100-year storm event. As the flow will be restricted, 196.00 m³ of stormwater storage will be required for the site. Upstream of STM MH01 (Control Structure #1), the parking and drive aisle areas will provide 112.2 m³ of surface storage, while the Stormtech SC-740 underground chambers will provide 83.4 m³ of underground storage. Upstream of CBMH06 (Control Structure #2), the 375mm diameter perforated storage pipes (complete with stone trench) along with the manhole structures will provide 29.0 m³ of underground storage. The combined storage volume of 224.6 m³ is sufficient to meet the minimum storage requirement for the site. Refer to the underground chambers drawings in Appendix D.



All internal storm sewers will be sized based on the 5-year design storm and similarly underground storage chambers have been designed to provide enough storage volume for the 5-year storm.

Runoff from the two (2) underground parking ramps (catchments WS-04 and WS-05) will be captured by a trench drain directing the runoff to the surface along the side of the building (west side of Building A and east side of Building B) via a pump located within the building. Details related to the underground parking ramp drainage will be coordinated with the mechanical designer and submitted with the building permit application.

Uncontrolled runoff within the south portion of the site (catchment WS-08) will sheet flow towards Innes Road.

3.5.1 Roof Drainage

The proposed roofs are pitched. The majority of the runoff from the roofs will discharge to the surface via downspouts and be conveyed overland to drainage structures surrounding each building. All runoff from the roofs will be controlled by the orifice plates in STM MH01 and CBMH06.

3.5.2 Underground Chambers

Underground storage chambers (Stormtech SC-740) have been specified to provide a portion of the required stormwater storage for the controlled portion of the site. The chambers have been designed with an impermeable liner to reduce potential groundwater impacts and the potential for a hydraulic connection between the chambers and the building foundation drains. An isolator row has been included with the storage chamber design to provide additional water quality treatment via filtration. A total of 83.4 m³ will be provided by the underground chambers. The chambers will be connected to a proposed catchbasin-manhole on either side to provide sufficient access to the chambers for maintenance. The maintenance of the chambers is to be in accordance with the manufacturer's guidelines. Refer to Appendix D for the Stormtech SC-740 drawings.

3.6 PROPOSED STORMWATER QUALITY CONTROL

A water quality control requirement of 80% TSS removal is required by the City of Ottawa. In order to meet this requirement, a stormwater treatment unit will be constructed at the downstream end of the system. Using the Stormceptor sizing software, the EF04 was selected. The software generated report has been attached in Appendix D.



4 Sanitary Sewer Design

4.1 EXISTING SITE CONDITIONS

Per Tatham's discussion with Bridor Developments, it is understood that the existing sanitary services, to the existing 250mm diameter PVC sanitary sewer at Innes Road, have already been abandoned, grouted and capped at property line back in 2020 during the demolition works at the site. In the proposed condition, one new connection will service the new development.

4.2 PROPOSED SANITARY SERVICE

The new residential apartment buildings, which include 58 units in Block A and 58 units in Block B will discharge to the City sewer via a new 200mm diameter PVC sanitary service. The service will be located south of building Block A and will discharge to the existing 250mm diameter city sewer at Innes Road. The proposed 200mm diameter service will have a minimum slope of 1.00% to the City sewer for adequate self flushing. A monitoring maintenance hole (SAN MH-A) is proposed upstream of the new connection. Refer to drawing C300 – Site Servicing Plan for the proposed sanitary service.

Based on the City of Ottawa Sanitary Design Guidelines, the sanitary peak flows were evaluated as follow; Block A: 1.64 L/s and Block B: 1.64 L/s. As per the City specific design parameters, the sanitary flow was evaluated based on the new building footprint and the total site area for each individual building. The proposed sanitary service was sized to convey the total combined peak flow of 3.28 L/s from both buildings. Refer to Appendix B for the sanitary sewer design calculation and design parameters set by the City of Ottawa.



5 Water Supply and Fire Protection

5.1 EXISTING SITE CONDITIONS

Per Tatham's discussion with Bridor Developments, it is understood that the existing water services, from the existing 406mm diameter PVC watermain at Innes Road, have already been abandoned and blanked back in 2020 during the demolition works at the site. In the proposed condition, one new connection will service the new development. There are currently two (2) city fire hydrants at the front of the property. The hydrants are located on the south side of Innes Road, both within a 90m radius the main entrance of both buildings.

5.2 DOMESTIC WATER DEMANDS

The new residential apartment building water services were sized based on the City of Ottawa Design Guidelines. As per City guidelines, the average water demand per person of 280L/c/d was applied to the population of each building. The daily and hourly peaking factors of 2.5 and 2.2 respectively were applied as stated in the City of Ottawa guidelines. The water demands for the new buildings are summarized in Table 3.

Table 3: Domestic Water Demands

	BLOCK A	BLOCK B	BLOCK A+B	UNITS
Average Water Demand	26,656	26,656	53,312	L/d
Maximum Daily	66,640	66,640	133,280	L/d
Maximum Hourly	146,608	146,608	293,216	L/d

Based on the above, the proposed development will be serviced with a 200 mm diameter PVC water service, connected to the 406 mm diameter PVC watermain at Innes Road. The proposed service is oversized to meet the combined Block A and B peak hour demand and is in accordance with the OBC, requiring a minimum service diameter of 150 mm for buildings with sprinklers. The service will have its own shut-off valve at the property line.

Refer to Appendix C for the water demand calculation sheet.

5.3 FIRE PROTECTION

The required fire flow rate was calculated in accordance with the 2020 Fire Underwriters Survey (FUS). This method is based on the type of building construction and the floor area of the



building to be protected while accounting for reductions and surcharges related to combustibility of contents and the presence of a sprinkler system as well as building exposure of surrounding structures. The required fire flow rate is 6,000 L/min.

Each building is located within 90 m of a hydrant, in compliance with OBC requirements. Fire flow protection will be provided by the following three (3) hydrants, which are within 75 m (uninterrupted path) of the buildings:

- One existing Class AA blue bonnet hydrant located no further than 89 m from the proposed buildings (89 m southeast of Block A and 45 m southeast of Block B) on the south side of Innes Road;
- One existing Class AA blue bonnet hydrant located no further than 46 m from the proposed buildings (39 m south of Block A and 46 m southwest of Block B) on the south side of Innes Road; and
- One proposed Class AA blue bonnet hydrant located on-site, no further than 28 m from the proposed buildings (15 m from Block B and 28 m from Block A).

All fire hydrant bonnets are color coded to indicate the available flow at a residual pressure of 150 kPa (20 psi), in accordance with the NFPA 291 Fire Flow Testing and Marking of Hydrants Code. The two (2) existing hydrants near the site consist of blue bonnet hydrants, and as such are Class AA-rated hydrants. Due to the proximity of the proposed hydrant to the existing hydrants, it will also be a Class AA-rated hydrant. As is summarized in Table 3, the required 6,000 L/min fire flow to the proposed buildings is available from the two (2) existing hydrants, while the proposed hydrant will further contribute to the available fire flow and will be located within 45 m of both of the Block A and B siamese connections in accordance with OBC requirements.

HYDRANT CLASS	DISTANCE TO BUILDING (m) ¹	CONTRIBUTION TO REQUIRED FIRE FLOW (L/min)	NUMBER OF USABLE NEARBY HYDRANTS	MAXIMUM FLOW TO BE CONSIDERED (L/min)	CUMULATIVE MAXIMUM FLOW TO BE CONSIDERED (L/min)
AA	≤ 75	5,700	2	11,400	15,200
AA	> 75 & ≤ 150	3,800	1	3,800	

Notes: 1. Distance of contributing hydrant from the structure, measured in accordance with NFPA 1.

A hydrant flow test is recommended to confirm the hydrant classes, thereby confirming adequate flow and pressure is available for fire protection.



5.4 WATER CAPACITY COMMENTS

The boundary conditions and HGL for hydraulic analysis for 3817-3843 Innes Road was obtained from the City and is attached in Appendix E. From the boundary conditions, the minimum HGL was evaluated at 130.3 m for the water main elevation at 91.6 m and a maximum pressure estimate of 55.1 psi.



6 Erosion and Sediment Control

During construction, sediment and erosion controls will be implemented around the property to reduce the potential for any sediment leaching off site. The construction and maintenance of the sediment controls must comply with the Ontario Provision Standard Specification OPSS 577. Refer to drawing C100 – Erosion and Sediment Control for additional details.



7 Summary

7.1 STORMWATER MANAGEMENT

The stormwater management design for the site will reduce the 100-year post-development peak flow from the site to the 5-year pre-development peak flow rate, thereby meeting the City's requirements. The post-development release rate from the controlled portion of the site will be restricted by two orifice plates located in STM MH01 and CBMH06. The combined 100-year post-development controlled and uncontrolled peak flow will be reduced below the 5-year pre-development peak flow rate prior to discharging into the city sewer at Innes Road. Stormwater quantity control will be achieved with 224.6 m³ of surface and underground storage. The stormwater quality control will be met through the use of a stormwater treatment unit and supplemented by the isolator row in the underground chambers system.

7.2 SANITARY SERVICE

The estimated combined sanitary flow for the site is 3.28 L/s. The proposed development will be serviced via a new 200mm diameter PVC sanitary service connecting to the existing 250 mm diameter PVC sanitary sewer at Innes Road.

7.3 WATER SERVICE

The proposed development will be serviced via a new 200mm diameter PVC water service to be connected to the existing 406mm diameter PVC watermain at Innes Road. The water demands for each of the buildings resulted in an average water demand of 26,656 L/d, a maximum daily demand of 66,640 L/d, and a peak hourly demand of 146,608 L/d. The required fire flow rate is 6,000 L/min. There will also be a new private fire hydrant installed in front of Block B.



Appendix A: Stormwater Management Design

Visual OTTHYMO Model Parameter Calculations (NasHYD)

Project Details

Project Number	522676
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Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)
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Prepared By

Name	HY
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Pre-Development Condition

Watershed:	N/A
Catchment ID:	EWS-01
Catchment Area (ha):	0.70
Impervious %:	23%

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol		FI											
Soil Series		Farmington											
Hydrologic Soils Group		B											
Soil Texture		Loam or Silt Loam											
Runoff Coefficient Type		2											
Area (ha)		0.70											
Percentage of Catchment		100%											
Land Cover Category	IA	A (ha)	CN	C	A (ha)	CN	C	A (ha)	CN	C	A (ha)	CN	C
Impervious	2	0.16	100	0.95									
Gravel	3		89	0.27									
Woodland	10		60	0.25									
Pasture/Lawns	5	0.54	69	0.28									
Meadows	8		65	0.27									
Cultivated	7		74	0.35									
Waterbody	12		50	0.05									
Average CN		76.09											
Average C		0.43											
Average IA		4.31											

Time to Peak Calculations

Max. Catchment Elev. (m):	94.20
Min. Catchment Elev. (m):	91.05
Catchment Length (m):	101
Catchment Slope (%):	3.12%
Method:	Bransby-Williams Formula
Time of Concentration (mins):	4.75

Summary

Catchment CN:	76.1
Catchment C:	0.43
Catchment IA (mm):	4.31
Time of Concentration (hrs):	0.08
Catchment Time to Peak (hrs):	0.05
Catchment Time Step (mins):	0.63

Visual OTTHYMO Model Parameter Calculations (NasHYD)

Project Details

Project Number	522676
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Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)
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Prepared By

Name	HY
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Pre-Development Condition

Watershed:	N/A
Catchment ID:	WS-01
Catchment Area (ha):	0.24
Impervious %:	63%

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol		FI											
Soil Series		Farmington											
Hydrologic Soils Group		B											
Soil Texture		Loam or Silt Loam											
Runoff Coefficient Type		2											
Area (ha)		0.24											
Percentage of Catchment		100%											
Land Cover Category	IA	A (ha)	CN	C	A (ha)	CN	C	A (ha)	CN	C	A (ha)	CN	C
Impervious	2	0.15	100	0.95									
Gravel	3		89	0.27									
Woodland	10		60	0.25									
Pasture/Lawns	5	0.09	69	0.28									
Meadows	8		65	0.27									
Cultivated	7		74	0.35									
Waterbody	12		50	0.05									
Average CN		88.38											
Average C		0.70											
Average IA		3.13											

Time to Peak Calculations

Max. Catchment Elev. (m):	92.35
Min. Catchment Elev. (m):	91.80
Catchment Length (m):	16
Catchment Slope (%):	3.44%
Method:	Bransby-Williams Formula
Time of Concentration (mins):	0.82

Summary

Catchment CN:	88.4
Catchment C:	0.70
Catchment IA (mm):	3.13
Time of Concentration (hrs):	0.01
Catchment Time to Peak (hrs):	0.01
Catchment Time Step (mins):	0.11

Visual OTTHYMO Model Parameter Calculations (NasHYD)

Project Details

Project Number	522676
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Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)
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Prepared By

Name	HY
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Pre-Development Condition

Watershed:	N/A
Catchment ID:	WS-02
Catchment Area (ha):	0.06
Impervious %:	100%

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol		FI											
Soil Series		Farmington											
Hydrologic Soils Group		B											
Soil Texture		Loam or Silt Loam											
Runoff Coefficient Type		2											
Area (ha)		0.06											
Percentage of Catchment		100%											
Land Cover Category	IA	A (ha)	CN	C	A (ha)	CN	C	A (ha)	CN	C	A (ha)	CN	C
Impervious	2	0.06	100	0.95									
Gravel	3		89	0.27									
Woodland	10		60	0.25									
Pasture/Lawns	5		69	0.28									
Meadows	8		65	0.27									
Cultivated	7		74	0.35									
Waterbody	12		50	0.05									
Average CN		100.00											
Average C		0.95											
Average IA		2.00											

Time to Peak Calculations

Max. Catchment Elev. (m):	92.65
Min. Catchment Elev. (m):	92.60
Catchment Length (m):	20
Catchment Slope (%):	0.25%
Method:	Bransby-Williams Formula
Time of Concentration (mins):	1.99

Summary

Catchment CN:	100.0
Catchment C:	0.95
Catchment IA (mm):	2.00
Time of Concentration (hrs):	0.03
Catchment Time to Peak (hrs):	0.02
Catchment Time Step (mins):	0.27

Visual OTTHYMO Model Parameter Calculations (NasHYD)

Project Details

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Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)
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Prepared By

Name	HY
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Pre-Development Condition

Watershed:	N/A
Catchment ID:	WS-03
Catchment Area (ha):	0.13
Impervious %:	100%

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol		FI											
Soil Series		Farmington											
Hydrologic Soils Group		B											
Soil Texture		Loam or Silt Loam											
Runoff Coefficient Type		2											
Area (ha)		0.13											
Percentage of Catchment		100%											
Land Cover Category	IA	A (ha)	CN	C	A (ha)	CN	C	A (ha)	CN	C	A (ha)	CN	C
Impervious	2	0.13	100	0.95									
Gravel	3		89	0.27									
Woodland	10		60	0.25									
Pasture/Lawns	5		69	0.28									
Meadows	8		65	0.27									
Cultivated	7		74	0.35									
Waterbody	12		50	0.05									
Average CN		100.00											
Average C		0.95											
Average IA		2.00											

Time to Peak Calculations

Max. Catchment Elev. (m):	92.65
Min. Catchment Elev. (m):	92.60
Catchment Length (m):	20
Catchment Slope (%):	0.25%
Method:	Bransby-Williams Formula
Time of Concentration (mins):	1.84

Summary

Catchment CN:	100.0
Catchment C:	0.95
Catchment IA (mm):	2.00
Time of Concentration (hrs):	0.03
Catchment Time to Peak (hrs):	0.02
Catchment Time Step (mins):	0.25

Visual OTTHYMO Model Parameter Calculations (NasHYD)

Project Details

Project Number	522676
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Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)
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Prepared By

Name	HY
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Pre-Development Condition

Watershed:	N/A
Catchment ID:	WS-04
Catchment Area (ha):	0.02
Impervious %:	100%

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol		FI											
Soil Series		Farmington											
Hydrologic Soils Group		B											
Soil Texture		Loam or Silt Loam											
Runoff Coefficient Type		2											
Area (ha)		0.02											
Percentage of Catchment		100%											
Land Cover Category	IA	A (ha)	CN	C	A (ha)	CN	C	A (ha)	CN	C	A (ha)	CN	C
Impervious	2	0.02	100	0.95									
Gravel	3		89	0.33									
Woodland	10		60	0.30									
Pasture/Lawns	5		69	0.35									
Meadows	8		65	0.33									
Cultivated	7		74	0.45									
Waterbody	12		50	0.05									
Average CN		100.00											
Average C		0.95											
Average IA		2.00											

Time to Peak Calculations

Max. Catchment Elev. (m):	92.40
Min. Catchment Elev. (m):	90.10
Catchment Length (m):	26
Catchment Slope (%):	8.85%
Method:	Bransby-Williams Formula
Time of Concentration (mins):	1.40

Summary

Catchment CN:	100.0
Catchment C:	0.95
Catchment IA (mm):	2.00
Time of Concentration (hrs):	0.02
Catchment Time to Peak (hrs):	0.02
Catchment Time Step (mins):	0.19

Visual OTTHYMO Model Parameter Calculations (NasHYD)

Project Details

Project Number	522676
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Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)
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Prepared By

Name	HY
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Pre-Development Condition

Watershed:	N/A
Catchment ID:	WS-05
Catchment Area (ha):	0.02
Impervious %:	100%

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol		FI											
Soil Series		Farmington											
Hydrologic Soils Group		B											
Soil Texture		Loam or Silt Loam											
Runoff Coefficient Type		2											
Area (ha)		0.02											
Percentage of Catchment		100%											
Land Cover Category	IA	A (ha)	CN	C	A (ha)	CN	C	A (ha)	CN	C	A (ha)	CN	C
Impervious	2	0.02	100	0.95									
Gravel	3		89	0.33									
Woodland	10		60	0.30									
Pasture/Lawns	5		69	0.35									
Meadows	8		65	0.33									
Cultivated	7		74	0.45									
Waterbody	12		50	0.05									
Average CN		100.00											
Average C		0.95											
Average IA		2.00											

Time to Peak Calculations

Max. Catchment Elev. (m):	92.40
Min. Catchment Elev. (m):	90.10
Catchment Length (m):	26
Catchment Slope (%):	8.85%
Method:	Bransby-Williams Formula
Time of Concentration (mins):	1.40

Summary

Catchment CN:	100.0
Catchment C:	0.95
Catchment IA (mm):	2.00
Time of Concentration (hrs):	0.02
Catchment Time to Peak (hrs):	0.02
Catchment Time Step (mins):	0.19

Visual OTTHYMO Model Parameter Calculations (NasHYD)

Project Details

Project Number	522676
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Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)
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Prepared By

Name	HY
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Pre-Development Condition

Watershed:	N/A
Catchment ID:	WS-06
Catchment Area (ha):	0.14
Impervious %:	50%

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol		FI											
Soil Series		Farmington											
Hydrologic Soils Group		B											
Soil Texture		Loam or Silt Loam											
Runoff Coefficient Type		2											
Area (ha)		0.14											
Percentage of Catchment		100%											
Land Cover Category	IA	A (ha)	CN	C	A (ha)	CN	C	A (ha)	CN	C	A (ha)	CN	C
Impervious	2	0.07	100	0.95									
Gravel	3		89	0.27									
Woodland	10		60	0.25									
Pasture/Lawns	5	0.07	69	0.28									
Meadows	8		65	0.27									
Cultivated	7		74	0.35									
Waterbody	12		50	0.05									
Average CN		84.50											
Average C		0.62											
Average IA		3.50											

Time to Peak Calculations

Max. Catchment Elev. (m):	92.40
Min. Catchment Elev. (m):	91.80
Catchment Length (m):	16
Catchment Slope (%):	3.75%
Method:	Bransby-Williams Formula
Time of Concentration (mins):	0.85

Summary

Catchment CN:	84.5
Catchment C:	0.62
Catchment IA (mm):	3.50
Time of Concentration (hrs):	0.01
Catchment Time to Peak (hrs):	0.01
Catchment Time Step (mins):	0.11

Visual OTTHYMO Model Parameter Calculations (NasHYD)

Project Details

Project Number	522676
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Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)
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Prepared By

Name	HY
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Pre-Development Condition

Watershed:	N/A
Catchment ID:	WS-07
Catchment Area (ha):	0.07
Impervious %:	

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol		FI											
Soil Series		Farmington											
Hydrologic Soils Group		B											
Soil Texture		Loam or Silt Loam											
Runoff Coefficient Type		2											
Area (ha)		0.07											
Percentage of Catchment		100%											
Land Cover Category	IA	A (ha)	CN	C	A (ha)	CN	C	A (ha)	CN	C	A (ha)	CN	C
Impervious	2		100	0.95									
Gravel	3		89	0.27									
Woodland	10		60	0.25									
Pasture/Lawns	5	0.07	69	0.28									
Meadows	8		65	0.27									
Cultivated	7		74	0.35									
Waterbody	12		50	0.05									
Average CN		69.00											
Average C		0.28											
Average IA		5.00											

Time to Peak Calculations

Max. Catchment Elev. (m):	92.45
Min. Catchment Elev. (m):	92.20
Catchment Length (m):	16
Catchment Slope (%):	1.56%
Method: Airport Method	
Time of Concentration (mins):	9.23

Summary

Catchment CN:	69.0
Catchment C:	0.28
Catchment IA (mm):	5.00
Time of Concentration (hrs):	0.15
Catchment Time to Peak (hrs):	0.10
Catchment Time Step (mins):	1.23

Visual OTTHYMO Model Parameter Calculations (NasHYD)

Project Details

Project Number	522676
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Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Prepared By

Name	HY
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Pre-Development Condition

Watershed:	N/A
Catchment ID:	WS-06
Catchment Area (ha):	0.02
Impervious %:	20%

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol		FI											
Soil Series		Farmington											
Hydrologic Soils Group		B											
Soil Texture		Loam or Silt Loam											
Runoff Coefficient Type		2											
Area (ha)		0.02											
Percentage of Catchment		100%											
Land Cover Category	IA	A (ha)	CN	C	A (ha)	CN	C	A (ha)	CN	C	A (ha)	CN	C
Impervious	2	0.004	100	0.95									
Gravel	3		89	0.27									
Woodland	10		60	0.25									
Pasture/Lawns	5	0.016	69	0.28									
Meadows	8		65	0.27									
Cultivated	7		74	0.35									
Waterbody	12		50	0.05									
Average CN		75.20											
Average C		0.41											
Average IA		4.40											

Time to Peak Calculations

Max. Catchment Elev. (m):	92.40
Min. Catchment Elev. (m):	91.80
Catchment Length (m):	16
Catchment Slope (%):	3.75%
Method:	Bransby-Williams Formula
Time of Concentration (mins):	1.04

Summary

Catchment CN:	75.2
Catchment C:	0.41
Catchment IA (mm):	4.40
Time of Concentration (hrs):	0.02
Catchment Time to Peak (hrs):	0.01
Catchment Time Step (mins):	0.14

	Project :	3817-3843 INNES ROAD
	File No.	522676
	Date:	Oct-22
	Designed By:	HY
	Checked By:	GC
	Subject:	Stage-Storage-Discharge Table1

OUTLET CONTROL

Orifice Control

	Orifice #1
Orifice Size (mm):	75
Cross-Sectional Area (sq.m):	0.004418
Orifice Coefficient:	0.63
Invert Elevation (m):	88.56
Outlet Pipe Size (mm):	375

STAGE DISCHARGE TABLE & CONTROL STRUCTURE CONFIGURATION

Water Level	75 mm dia. Orifice		Total Discharge	Active Storage
	Head	Discharge		
(m)	(m)	(cms)	(cms)	(cm)
90.10	1.50	0.015	0.015	0.0
90.15	1.55	0.015	0.015	6.7
90.20	1.60	0.016	0.016	13.3
90.25	1.65	0.016	0.016	20.0
90.30	1.70	0.016	0.016	26.2
90.35	1.75	0.016	0.016	32.5
90.40	1.80	0.017	0.017	38.7
90.45	1.85	0.017	0.017	44.7
90.50	1.90	0.017	0.017	50.6
90.55	1.95	0.017	0.017	56.4
90.60	2.00	0.017	0.017	61.8
90.65	2.05	0.018	0.018	67.0
90.70	2.10	0.018	0.018	71.9
90.75	2.15	0.018	0.018	76.4
90.80	2.20	0.018	0.018	80.2
90.85	2.25	0.018	0.018	83.4
90.90	2.30	0.019	0.019	83.4
90.95	2.35	0.019	0.019	83.4
91.00	2.40	0.019	0.019	83.4
91.05	2.45	0.019	0.019	83.4
91.10	2.50	0.019	0.019	83.4
91.15	2.55	0.020	0.020	83.4
91.20	2.60	0.020	0.020	83.4
91.25	2.65	0.020	0.020	83.4
91.30	2.70	0.020	0.020	83.4
91.35	2.75	0.020	0.020	83.4
91.40	2.80	0.021	0.021	83.4
91.45	2.85	0.021	0.021	83.9
91.50	2.90	0.021	0.021	87.6
91.55	2.95	0.021	0.021	97.4
91.60	3.00	0.021	0.021	116.7
91.65	3.05	0.022	0.022	148.4
91.70	3.10	0.022	0.022	195.6

Proposed Condition (Controlled Area)

Design Storm	Underground Storage Chamber Operating Characteristics		
	Storage (m ³)	Total Outflow (m ³ /s)	Water Level (m)
100yr 24hr SCS	160	0.022	91.66
100yr 3hr Chicago	167	0.022	91.67
100yr 6hr Chicago	170	0.022	91.67
5yr 24hr SCS	74	0.018	90.72
5yr 3hr Chicago	78	0.018	90.77
5yr 6hr Chicago	80	0.018	90.80
2yr 24hr SCS	49	0.017	90.49
2yr 3hr Chicago	52	0.017	90.51
2yr 6hr Chicago	52	0.017	90.51

Proposed Condition (Controlled + Uncontrolled)

Design Storm	Total Outflow (m ³ /s)
100yr 24hr SCS	0.045
100yr 3hr Chicago	0.043
100yr 6hr Chicago	0.044
Existing Condition	
Design Storm	Total Outflow (m ³ /s)
5yr 24hr SCS	0.054
5yr 3hr Chicago	0.050
5yr 6hr Chicago	0.051



Project :	3817-3843 INNES ROAD
File No.	522676
Date:	Oct-22
Designed By:	HY
Checked By:	GC
Subject:	Storm Stage Storage 1

Underground Chamber Storage

Elevation	Depth	Quantity Volume	Total # Chambers	Total Volume
(m)	(m)	(m ³)	(ea)	(m ³)
90.10	0.00	0.00	48	0.0
90.15	0.05	0.14	48	6.7
90.20	0.10	0.28	48	13.3
90.25	0.15	0.42	48	20.0
90.30	0.20	0.55	48	26.2
90.35	0.25	0.68	48	32.5
90.40	0.30	0.81	48	38.7
90.45	0.35	0.93	48	44.7
90.50	0.40	1.06	48	50.6
90.55	0.45	1.17	48	56.4
90.60	0.50	1.29	48	61.8
90.65	0.55	1.40	48	67.0
90.70	0.60	1.50	48	71.9
90.75	0.65	1.59	48	76.4
90.80	0.70	1.67	48	80.2
90.85	0.75	1.74	48	83.4

Parking Lot Surface Storage

Elevation	Depth	Increasing Area	Accum Area	Volume	Total Volume
(m)	(m)	(m ²)	(m ²)	(m ³)	(m ³)
91.40	0.00	0.00	0.00	0.00	0.0
91.45	0.05	31.17	31.17	0.52	0.5
91.50	0.10	93.50	124.67	3.64	4.2
91.55	0.15	155.83	280.50	9.87	14.0
91.60	0.20	218.17	498.67	19.22	33.2
91.65	0.25	280.50	779.17	31.69	64.9
91.70	0.30	342.83	1122.00	47.27	112.2

	Project :	3817-3843 INNES ROAD
	File No.	522676
	Date:	Oct-22
	Designed By:	HY
	Checked By:	GC
	Subject:	Stage-Storage-Discharge Table 2

OUTLET CONTROL

Orifice Control

	Orifice #2
Orifice Size (mm):	95
Cross-Sectional Area (sq.m):	0.007088
Orifice Coefficient:	0.63
Invert Elevation (m):	88.80
Outlet Pipe Size (mm):	375

STAGE DISCHARGE TABLE & CONTROL STRUCTURE CONFIGURATION

Water Level	95 mm dia. Orifice		Total Discharge	Active Storage
	Head	Discharge		
(m)	(m)	(cms)	(cms)	(cm)
88.80	0.00	0.000	0.000	0.0
88.85	0.00	0.001	0.001	1.2
88.90	0.05	0.005	0.005	2.4
88.95	0.10	0.006	0.006	3.6
89.00	0.15	0.008	0.008	4.8
89.05	0.20	0.009	0.009	6.0
89.10	0.25	0.010	0.010	7.3
89.15	0.30	0.011	0.011	8.5
89.20	0.35	0.012	0.012	9.7
89.25	0.40	0.013	0.013	10.9
89.30	0.45	0.013	0.013	12.1
89.35	0.50	0.014	0.014	13.3
89.40	0.55	0.015	0.015	14.5
89.45	0.60	0.015	0.015	15.7
89.50	0.65	0.016	0.016	16.9
89.55	0.70	0.017	0.017	18.1
89.60	0.75	0.017	0.017	19.3
89.65	0.80	0.018	0.018	20.6
89.70	0.85	0.018	0.018	21.8
89.75	0.90	0.019	0.019	23.0
89.80	0.95	0.019	0.019	24.2
89.85	1.00	0.020	0.020	25.4
89.90	1.05	0.020	0.020	26.6
89.95	1.10	0.021	0.021	26.8
90.00	1.15	0.021	0.021	26.9
90.05	1.20	0.022	0.022	27.1
90.10	1.25	0.022	0.022	27.3
90.15	1.30	0.023	0.023	27.4
90.20	1.35	0.023	0.023	27.6
90.25	1.40	0.023	0.023	27.8
90.30	1.45	0.024	0.024	28.0
90.35	1.50	0.024	0.024	28.1
90.40	1.55	0.025	0.025	28.3
90.45	1.60	0.025	0.025	28.5
90.50	1.65	0.025	0.025	28.6
90.55	1.70	0.026	0.026	28.8
90.60	1.75	0.026	0.026	29.0

Proposed Condition (Controlled Area)

Design Storm	Underground Storage Chamber Operating Characteristics		
	Storage (m ³)	Total Outflow (m ³ /s)	Water Level (m)
100yr 24hr SCS	27	0.021	90.02
100yr 3hr Chicago	24	0.019	89.79
100yr 6hr Chicago	26	0.020	89.88

	Project :	3817-3843 INNES ROAD
	File No.	522676
	Date:	Oct-22
	Designed By:	HY
	Checked By:	GC
	Subject:	Storm Stage Storage 2

Storm Structure storage	6.1	(m ³)
Storm pipe Storage	10.2	(m ³)
Stone Trench Storage	12.7	(m ³)
Total storage	29.0	(m ³)

Infiltration Stage Storage

Elevation	Depth	Quantity Volume
(m)	(m)	(m ³)
88.80	0.00	0.00
88.85	0.05	1.04
88.90	0.10	1.04
88.95	0.15	1.04
89.00	0.20	1.04
89.05	0.25	1.04
89.10	0.30	1.04
89.15	0.35	1.04
89.20	0.40	1.04
89.25	0.45	1.04
89.30	0.50	1.04
89.35	0.55	1.04
89.40	0.60	1.04
89.45	0.65	1.04
89.50	0.70	1.04
89.55	0.75	1.04
89.60	0.80	1.04
89.65	0.85	1.04
89.70	0.90	1.04
89.75	0.95	1.04
89.80	1.00	1.04
89.85	1.05	1.04
89.90	1.10	1.04

Structure Stage Storage

Elevation	Depth	Quantity Volume	Total Volume
(m)	(m)	(m ³)	(m ³)
88.80	0.00	0.00	0.0
88.85	0.05	0.17	1.2
88.90	0.10	0.17	2.4
88.95	0.15	0.17	3.6
89.00	0.20	0.17	4.8
89.05	0.25	0.17	6.0
89.10	0.30	0.17	7.3
89.15	0.35	0.17	8.5
89.20	0.40	0.17	9.7
89.25	0.45	0.17	10.9
89.30	0.50	0.17	12.1
89.35	0.55	0.17	13.3
89.40	0.60	0.17	14.5
89.45	0.65	0.17	15.7
89.50	0.70	0.17	16.9
89.55	0.75	0.17	18.1
89.60	0.80	0.17	19.3
89.65	0.85	0.17	20.6
89.70	0.90	0.17	21.8
89.75	0.95	0.17	23.0
89.80	1.00	0.17	24.2
89.85	1.05	0.17	25.4
89.90	1.10	0.17	26.6
89.95	0.00	0.17	26.8
90.00	1.20	0.17	26.9
90.05	1.25	0.17	27.1
90.10	1.30	0.17	27.3
90.15	1.35	0.17	27.4
90.20	1.40	0.17	27.6
90.25	1.45	0.17	27.8
90.30	1.50	0.17	28.0
90.35	1.55	0.17	28.1
90.40	1.60	0.17	28.3
90.45	1.65	0.17	28.5
90.50	1.70	0.17	28.6
90.55	1.75	0.17	28.8
90.60	1.80	0.17	29.0

LOCATION			AREA (ha)			FLOW					STORM SEWER DATA							
WATERSHED / STREET	From MH	To MH	C = 0.30	C = 0.80	C = 0.95	Indiv. 2.78AC	Accum. 2.78AC	Time of Conc. (min.)	Rainfall Intensity (mm/hr)	Peak Flow Q (l/s)	Pipe Diameter (mm)	Type	Slope (%)	Length (m)	Capacity Full (L/s)	Velocity Full (m/s)	Time of Flow (min.)	Ratio (Q/Q _{FULL})
WS-06	CBMH08	LCB11	0.070	0.000	0.070	0.22	0.22	10.00	104.19	23.32	375	PVC	0.50%	25.7	123.98	1.12	0.38	0.19
	LCB11	CBMH07	0.000	0.000	0.000	0.00	0.22	10.38	102.22	22.88	375	PVC	0.50%	25.1	123.98	1.12	0.37	0.18
	CBMH07	LCB10	0.000	0.000	0.000	0.00	0.22	10.75	100.37	22.46	375	PVC	0.50%	15.9	123.98	1.12	0.24	0.18
	LCB10	LCB09	0.000	0.000	0.000	0.00	0.22	10.99	99.24	22.21	375	PVC	0.50%	13.8	123.98	1.12	0.20	0.18
	LCB09	CBMH06	0.000	0.000	0.000	0.00	0.22	11.20	98.28	21.99	375	PVC	0.50%	12.3	123.98	1.12	0.18	0.18
WS-04	CBMH06	TREATMENT	0.000	0.000	0.020	0.05	0.28	10.99	99.24	13.00	300	PVC	0.70%	40.2	80.91	1.14	0.59	0.16
WS-07	LCB15	LCB14	0.070	0.000	0.000	0.04	0.04	10.00	104.19	4.06	250	PVC	0.50%	19.9	42.05	0.86	0.39	0.10
	LCB14	LCB13	0.000	0.000	0.000	0.00	0.04	10.39	102.19	3.98	250	PVC	0.50%	16.5	42.05	0.86	0.32	0.09
	LCB13	LCB12	0.000	0.000	0.000	0.00	0.04	10.71	100.60	3.92	250	PVC	0.50%	13.0	42.05	0.86	0.25	0.09
	LCB12	STM MH1	0.000	0.000	0.000	0.00	0.04	10.96	99.38	3.87	250	PVC	0.50%	23.6	42.0	0.86	0.46	0.09
WS-01 WS-02 WS-03	CBMH05	CBMH04	0.090	0.000	0.340	0.95	0.95	10.00	104.19	98.77	375	PVC	1.00%	0.0	175.3	1.59	0.00	0.56
	CBMH04	CBMH03	0.000	0.000	0.000	0.00	0.95	10.00	104.19	98.77	375	PVC	1.00%	19.8	175.3	1.59	0.21	0.56
	CBMH03	STM MH02	0.000	0.000	0.000	0.00	0.95	10.21	103.11	97.74	375	PVC	1.00%	10.4	175.3	1.59	0.11	0.56
WS-5	STM MH02	STM MH01	0.000	0.000	0.020	0.05	1.00	10.32	102.55	102.63	375	PVC	0.90%	28.5	166.3	1.51	0.32	0.62
	STM MH01	TREATMENT	0.000	0.000	0.000	0.00	1.04	11.42	97.25	18.00	375	PVC	4.40%	2.5	367.78	3.33	0.01	0.05
	TREATMENT	CITY	0.000	0.000	0.000	0.00	1.32	11.43	97.19	51.00	375	PVC	2.80%	11.6	293.4	2.66	0.07	0.17

DESIGN PARAMETERS NOTES

Runoff Coefficient (C)		Q = 2.78 AIC, where	
Grass	0.30	Q = Peak flow in Litres per second (L/s)	Ottawa Macdonald-Cartier International Airport IDF curve
Gravel	0.80	A = Area in hectares (ha)	$I_5 = 998.071 / (T_c + 6.053)^{0.814}$
Asphalt / rooftop	0.90	I = Rainfall Intensity (mm/hr)	Min. velocity = 0.76 m/s
		C = Runoff Coefficient	Manning's "n" = 0.013

STORM WATER MANAGEMENT DESIGN SHEET

SEWER DESIGN

LOCATION		MANHOLE INFORMATION						
From MH	To MH	Up Invert (m)	Down Invert (m)	T/G Up Stream (m)	T/G Down Stream	Up Depth obv (m)	Down Depth obv (m)	Up Depth inv (m)
CBMH 08	LCB11	89.45	89.32	90.90	90.77	1.08	1.08	1.45
LCB11	CBMH 07	89.32	89.19	90.77	90.65	1.08	1.09	1.45
CBMH 07	LCB10	89.16	89.08	90.65	91.30	1.12	1.85	1.49
LCB10	LCB9	89.08	89.01	91.30	91.48	1.85	2.10	2.22
LCB9	CBMH 06	89.01	88.95	91.48	91.58	2.10	2.26	2.47
LCB15	LCB14	91.30	91.20	91.80	91.70	0.25	0.25	0.50
LCB14	LCB13	91.17	91.08	91.70	91.62	0.28	0.29	0.53
LCB13	LCB12	91.05	90.98	91.62	91.55	0.32	0.32	0.57
LCB12	CBMH01	90.92	90.80	91.55	92.00	0.38	0.95	0.63
CBMH05	CBMH04	90.10	90.10	91.40	91.40	0.93	0.93	1.30
CBMH04	CBMH03	89.78	89.58	91.40	91.62	1.25	1.67	1.62
CBMH03	CBMH02	89.55	89.45	91.62	91.80	1.70	1.97	2.07
CBMH02	CBMH01	89.42	89.16	91.80	92.00	2.01	2.47	2.38
CBMH06	TREATMENT	88.80	88.45	91.58	92.03	2.48	3.28	2.78
CBMH01	TREATMENT	88.50	89.45	92.00	92.03	3.13	2.21	3.50
TREATMENT	CITY	88.39	88.13	92.03	91.77	3.27	3.27	3.64

	Project: 3817-3843 INNES ROAD	Date: Feb-25
	File No.: 522676	Designed: HY
	Subject: East Swale Conveyance Calcs	Checked: GC

East Grass Swale Capacity Calculation

100-year Storm Peak Flow: 0.034 m³/s

<u>Channel Depth</u>	<u>Channel Type</u>	<u>Manning's N</u>	<u>Base Width</u>	<u>Side Slopes</u>	<u>Min. Slope</u>	<u>Catchment 202 Area (ha)</u>	<u>Area Contributing (ha)¹</u>
0.15 m	Grass Ditch	0.035	0.00 m	3H : 1V	0.50%	0.14	0.08

Storm Conditions		Swale Flow Conditions					
Return Period	Peak Flow (m ³ /s) ²	Flow Depth	Area (m ²)	WP	R	Q (m ³ /s)	V (m/s)
100-year storm	0.022	0.146	0.06	0.92	0.07	0.022	0.34
Comments:							
		The 0.15 m deep grassed swale has sufficient capacity to convey the 100-year storm at a depth of approximatey 0.146m.					

	Project: 3817-3843 INNES ROAD	Date: Feb-25
	File No.: 522676	Designed: HY
	Subject: West Swale Conveyance Calcs	Checked: GC

West Grass Swale Capacity Calculation

100-year Storm Peak Flow: 0.010 m³/s

<u>Channel Depth</u>	<u>Channel Type</u>	<u>Manning's N</u>	<u>Base Width</u>	<u>Side Slopes</u>	<u>Min. Slope</u>	<u>Catchment 202 Area (ha)</u>	<u>Area Contributing (ha)¹</u>
0.15 m	Grass Ditch	0.035	0.00 m	3H : 1V	0.50%	0.07	0.07

Storm Conditions		Swale Flow Conditions					
Return Period	Peak Flow (m ³ /s) ²	Flow Depth	Area (m ²)	WP	R	Q (m ³ /s)	V (m/s)
100-year storm	0.010	0.110	0.04	0.70	0.05	0.010	0.28
Comments:							
		The 0.15 m deep grassed swale has sufficient capacity to convey the 100-year storm at a depth of approximatey 0.11 m.					

PRE SCS

=====

V V I SSSSS U U A L (v 6.2.2015)
V V I SS U U A A L
V V I SS U U AAAAA L
V V I SS U U A A L
VV I SSSSS UUUUU A A LLLLL

000 TTTTT TTTTT H H Y Y M M 000 TM
O O T T H H Y Y MM MM O O
O O T T H H Y M M O O
000 T T H H Y M M 000

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***** S U M M A R Y O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\V02\voin.dat

Output filename:

C:\Users\hyu\AppData\Local\Civica\XH5\2c2d2be-418b-4c4d-a4c4-d228733f752c\b7c673a3-d93a-420f-bf9f-618013aa73aa\scenario

Summary filename:

C:\Users\hyu\AppData\Local\Civica\XH5\2c2d2be-418b-4c4d-a4c4-d228733f752c\b7c673a3-d93a-420f-bf9f-618013aa73aa\scenario

DATE: 11/20/2024

TIME: 01:53:59

USER:

COMMENTS: _____

** SIMULATION : SCS 24hr 5yr **

W/E COMMAND	HYD ID	DT min	AREA ha	' Qpeak ' cms	Tpeak hrs	R.V. mm	R.C.	Qbase cms
-------------	--------	-----------	------------	------------------	--------------	------------	------	--------------

START @ 0.00 hrs

READ STORM 5.0

[Ptot= 65.91 mm]

fname :

C:\Users\hyu\AppData\Local\Temp\35aae8f8-50fd-4741-979a-c240f989366c\5aca6ac2-ef25-4c6b-b023-6eea581

remark: Ottawa Macdonald Cartier SCS 24 5yr

*

* CALIB STANDHYD 0001 1 5.0 0.70 0.05 12.00 31.24 0.47 0.000
[I%=23.0:S%= 2.00]

*

FINISH

=====
=====

PRE CHI

=====

V V I SSSSS U U A L (v 6.2.2015)
V V I SS U U A A L
V V I SS U U AAAAA L
V V I SS U U A A L
VV I SSSSS UUUUU A A LLLLL

000 TTTTT TTTTT H H Y Y M M 000 TM
O O T T H H Y Y MM MM O O
O O T T H H Y M M O O
000 T T H H Y M M 000

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***** S U M M A R Y O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\V02\voin.dat

Output filename:

C:\Users\hyu\AppData\Local\Civica\XH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\51d2b20a-c962-46f2-b46d-0bcb89b18572\scenario

Summary filename:

C:\Users\hyu\AppData\Local\Civica\XH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\51d2b20a-c962-46f2-b46d-0bcb89b18572\scenario

DATE: 11/20/2024

TIME: 01:54:04

USER:

COMMENTS: _____

** SIMULATION : Ottawa 5yr 3hr Chicago **

W/E COMMAND	HYD ID	DT min	AREA ha	' Qpeak ' cms	Tpeak hrs	R.V. mm	R.C.	Qbase cms
-------------	--------	-----------	------------	------------------	--------------	------------	------	--------------

START @ 0.00 hrs

CHIC STORM 10.0

[Ptot= 42.51 mm]

*

* CALIB STANDHYD 0002 1 5.0 0.70 0.05 1.00 16.68 0.39 0.000

[I%=23.0:S%= 2.00]

*

=====

V V I SSSSS U U A L (v 6.2.2015)
V V I SS U U A A L
V V I SS U U AAAAA L
V V I SS U U A A L
VV I SSSSS UUUUU A A LLLLL

000 TTTTT TTTTT H H Y Y M M 000 TM
0 0 T T H H Y Y MM MM 0 0
0 0 T T H H Y M M 0 0
000 T T H H Y M M 000

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***** S U M M A R Y O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\V02\voin.dat

Output filename:

C:\Users\hyu\AppData\Local\Civica\XH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\8106252e-7f91-4954-a690-56795e9b7e1d\scenario

Summary filename:

C:\Users\hyu\AppData\Local\Civica\XH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\8106252e-7f91-4954-a690-56795e9b7e1d\scenario

DATE: 11/20/2024

TIME: 01:54:04

USER:

COMMENTS: _____

** SIMULATION : Ottawa 5yr 6hr Chicago **

W/E COMMAND	HYD ID	DT min	AREA ha	Qpeak ' cms	Tpeak hrs	R.V. mm	R.C.	Qbase cms
-------------	--------	-----------	------------	-------------------	--------------	------------	------	--------------

START @ 0.00 hrs

CHIC STORM 10.0
[Ptot= 49.04 mm]

*

* CALIB STANDHYD	0002	1	5.0	0.70	0.05	2.00	20.47	0.42	0.000
------------------	------	---	-----	------	------	------	-------	------	-------

[I%=23.0:S%= 2.00]

*

FINISH

=====

=====

POST SCS

=====

V V I SSSSS U U A L (v 6.2.2015)
V V I SS U U A A L
V V I SS U U AAAAA L
V V I SS U U A A L
VV I SSSSS UUUUU A A LLLLL

000 TTTTT TTTTT H H Y Y M M 000 TM
O O T T H H Y Y MM MM O O
O O T T H H Y M M O O
000 T T H H Y M M 000

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***** S U M M A R Y O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\V02\voin.dat

Output filename:

C:\Users\hyu\AppData\Local\Civica\XH5\2c2d2be-418b-4c4d-a4c4-d228733f752c\dead66f3-c7bd-44fa-ab3e-b90bcaf4653d\scenario

Summary filename:

C:\Users\hyu\AppData\Local\Civica\XH5\2c2d2be-418b-4c4d-a4c4-d228733f752c\dead66f3-c7bd-44fa-ab3e-b90bcaf4653d\scenario

DATE: 11/20/2024

TIME: 01:54:08

USER:

COMMENTS: _____

** SIMULATION : SCS 24hr 100yr **

W/E COMMAND	HYD ID	DT min	AREA ha	' Qpeak ' cms	Tpeak hrs	R.V. mm	R.C.	Qbase cms
-------------	--------	-----------	------------	------------------	--------------	------------	------	--------------

START @ 0.00 hrs

READ STORM 5.0

[Ptot=111.87 mm]

fname :

C:\Users\hyu\AppData\Local\Temp\3d3fe779-22bb-4a0b-97f7-aa9931ec727b\20e7578-d439-4ffb-8edc-8fe2588

remark: Ottawa Macdonald Cartier SCS 24 100yr

*

* CALIB STANDHYD 0211 1 5.0 0.06 0.02 12.00 110.28 0.99 0.000
[I%=99.0:S%= 2.00]

*

READ STORM 5.0

[Ptot=111.87 mm]

fname :

C:\Users\hyu\AppData\Local\Temp\3d3fe779-22bb-4a0b-97f7-aa9931ec727b\20e7578-d439-4ffb-8edc-8fe2588

remark: Ottawa Macdonald Cartier SCS 24 100yr

*

* CALIB STANDHYD 0215 1 5.0 0.02 0.01 12.00 104.94 0.94 0.000
[I%=99.0:S%= 2.00]

*

READ STORM 5.0

[Ptot=111.87 mm]

fname :

C:\Users\hyu\AppData\Local\Temp\3d3fe779-22bb-4a0b-97f7-aa9931ec727b\20e7578-d439-4ffb-8edc-8fe2588

remark: Ottawa Macdonald Cartier SCS 24 100yr

*

* CALIB STANDHYD 0216 1 5.0 0.24 0.06 12.00 88.95 0.80 0.000
[I%=63.0:S%= 2.00]

*

READ STORM 5.0

[Ptot=111.87 mm]

fname :

C:\Users\hyu\AppData\Local\Temp\3d3fe779-22bb-4a0b-97f7-aa9931ec727b\20e7578-d439-4ffb-8edc-8fe2588

remark: Ottawa Macdonald Cartier SCS 24 100yr

*

* CALIB NASHYD 0218 1 5.0 0.07 0.01 12.00 51.49 0.46 0.000
[CN=69.0]
[N = 3.0:Tp 0.17]

*

READ STORM 5.0

[Ptot=111.87 mm]

fname :

C:\Users\hyu\AppData\Local\Temp\3d3fe779-22bb-4a0b-97f7-aa9931ec727b\20e7578-d439-4ffb-8edc-8fe2588

remark: Ottawa Macdonald Cartier SCS 24 100yr

*
* CALIB STANDHYD 0220 1 5.0 0.13 0.04 12.00 110.28 0.99 0.000
[I%=99.0:S%= 2.00]

*
ADD [0211+ 0215] 0209 3 5.0 0.08 0.03 12.00 108.94 n/a 0.000

*
ADD [0209+ 0216] 0209 1 5.0 0.32 0.09 12.00 93.95 n/a 0.000

*
ADD [0209+ 0218] 0209 3 5.0 0.39 0.10 12.00 86.33 n/a 0.000

*
ADD [0209+ 0220] 0209 1 5.0 0.52 0.15 12.00 92.32 n/a 0.000

*
** Reservoir
OUTFLOW: 0208 1 5.0 0.52 0.02 12.50 92.29 n/a 0.000

*
READ STORM 5.0
[Ptot=111.87 mm]
fname :

C:\Users\hyu\AppData\Local\Temp\3d3fe779-22bb-4a0b-97f7-aa9931ec727b\e20e7578-d439-4ffb-8edc-8fe2588

remark: Ottawa Macdonald Cartier SCS 24 100yr

*
* CALIB STANDHYD 0212 1 5.0 0.02 0.01 12.00 104.94 0.94 0.000
[I%=99.0:S%= 2.00]

*
READ STORM 5.0
[Ptot=111.87 mm]
fname :

C:\Users\hyu\AppData\Local\Temp\3d3fe779-22bb-4a0b-97f7-aa9931ec727b\e20e7578-d439-4ffb-8edc-8fe2588

remark: Ottawa Macdonald Cartier SCS 24 100yr

*
* CALIB STANDHYD 0217 1 5.0 0.14 0.03 12.00 81.23 0.73 0.000
[I%=50.0:S%= 2.00]

*
ADD [0212+ 0217] 0214 3 5.0 0.16 0.04 12.00 84.19 n/a 0.000

*
** Reservoir
OUTFLOW: 0210 1 5.0 0.16 0.02 12.08 84.13 n/a 0.000

*
READ STORM 5.0
[Ptot=111.87 mm]
fname :

C:\Users\hyu\AppData\Local\Temp\3d3fe779-22bb-4a0b-97f7-aa9931ec727b\e20e7578-d439-4ffb-8edc-8fe2588

remark: Ottawa Macdonald Cartier SCS 24 100yr

```

*
* CALIB STANDHYD      0219  1  5.0    0.02    0.00 12.00  53.20 0.48    0.000
  [I%=20.0:S%= 2.00]
*
  ADD [  0208+  0210]  0213  3  5.0    0.68    0.04 12.08  90.37 n/a    0.000
*
  ADD [  0213+  0219]  0213  1  5.0    0.70    0.04 12.08  89.31 n/a    0.000
*

```

```

=====
=====

```

```

V   V   I   SSSSS  U   U   A   L           (v 6.2.2015)
V   V   I   SS    U   U   A A  L
V   V   I   SS    U   U  AAAAA L
V   V   I   SS    U   U   A   A  L
  VV    I   SSSSS  UUUUU  A   A  LLLLL

```

```

  000    TTTTT  TTTTT  H   H   Y   Y   M   M   000    TM
O   O    T      T      H   H   Y Y   MM MM  O   O
O   O    T      T      H   H   Y   M   M  O   O
  000    T      T      H   H   Y   M   M   000

```

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***** S U M M A R Y O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYM0 6.2\V02\voin.dat

Output filename:

C:\Users\hyu\AppData\Local\Civica\XH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\7a1ba2c2-14ca-403a-a7eb-89944acfee17\scenario

Summary filename:

C:\Users\hyu\AppData\Local\Civica\XH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\7a1ba2c2-14ca-403a-a7eb-89944acfee17\scenario

DATE: 11/20/2024

TIME: 01:54:09

USER:

COMMENTS: _____

** SIMULATION : SCS 24hr 2yr **

W/E COMMAND	HYD ID	DT min	AREA ha	' Qpeak ' cms	Tpeak hrs	R.V. mm	R.C.	Qbase cms
-------------	--------	-----------	------------	------------------	--------------	------------	------	--------------

START @ 0.00 hrs

 READ STORM 5.0

[Ptot= 49.09 mm]

fname :

C:\Users\hyu\AppData\Local\Temp\3d3fe779-22bb-4a0b-97f7-aa9931ec727b\a83aa445-7986-4108-a295-abaadc5

remark: Ottawa Macdonald Cartier SCS 24 2yr

*

* CALIB STANDHYD	0211	1	5.0	0.06	0.01	12.00	45.39	0.92	0.000
[I%=99.0:S%= 2.00]									

*

READ STORM 5.0

[Ptot= 49.09 mm]

fname :

C:\Users\hyu\AppData\Local\Temp\3d3fe779-22bb-4a0b-97f7-aa9931ec727b\a83aa445-7986-4108-a295-abaadc5

remark: Ottawa Macdonald Cartier SCS 24 2yr

*

* CALIB STANDHYD	0215	1	5.0	0.02	0.00	12.00	38.96	0.79	0.000
[I%=99.0:S%= 2.00]									

*

READ STORM 5.0

[Ptot= 49.09 mm]

fname :

C:\Users\hyu\AppData\Local\Temp\3d3fe779-22bb-4a0b-97f7-aa9931ec727b\a83aa445-7986-4108-a295-abaadc5

remark: Ottawa Macdonald Cartier SCS 24 2yr

*

* CALIB STANDHYD	0216	1	5.0	0.24	0.02	12.00	34.80	0.71	0.000
[I%=63.0:S%= 2.00]									

*

READ STORM 5.0

[Ptot= 49.09 mm]

fname :

C:\Users\hyu\AppData\Local\Temp\3d3fe779-22bb-4a0b-97f7-aa9931ec727b\a83aa445-7986-4108-a295-abaadc5

remark: Ottawa Macdonald Cartier SCS 24 2yr

*

* CALIB NASHYD	0218	1	5.0	0.07	0.00	12.00	12.24	0.25	0.000
----------------	------	---	-----	------	------	-------	-------	------	-------

[CN=69.0]
[N = 3.0:Tp 0.17]

*

READ STORM 5.0
[Ptot= 49.09 mm]
fname :

C:\Users\hyu\AppData\Local\Temp\3d3fe779-22bb-4a0b-97f7-aa9931ec727b\a83aa445-7986-4108-a295-abaadc5

remark: Ottawa Macdonald Cartier SCS 24 2yr

*

* CALIB STANDHYD 0220 1 5.0 0.13 0.02 12.00 47.73 0.97 0.000
[I%=99.0:S%= 2.00]

*

ADD [0211+ 0215] 0209 3 5.0 0.08 0.01 12.00 43.78 n/a 0.000

*

ADD [0209+ 0216] 0209 1 5.0 0.32 0.04 12.00 37.05 n/a 0.000

*

ADD [0209+ 0218] 0209 3 5.0 0.39 0.04 12.00 32.60 n/a 0.000

*

ADD [0209+ 0220] 0209 1 5.0 0.52 0.06 12.00 36.38 n/a 0.000

*

** Reservoir
OUTFLOW: 0208 1 5.0 0.52 0.02 12.08 36.36 n/a 0.000

*

READ STORM 5.0
[Ptot= 49.09 mm]
fname :

C:\Users\hyu\AppData\Local\Temp\3d3fe779-22bb-4a0b-97f7-aa9931ec727b\a83aa445-7986-4108-a295-abaadc5

remark: Ottawa Macdonald Cartier SCS 24 2yr

*

* CALIB STANDHYD 0212 1 5.0 0.02 0.00 12.00 38.96 0.79 0.000
[I%=99.0:S%= 2.00]

*

READ STORM 5.0
[Ptot= 49.09 mm]
fname :

C:\Users\hyu\AppData\Local\Temp\3d3fe779-22bb-4a0b-97f7-aa9931ec727b\a83aa445-7986-4108-a295-abaadc5

remark: Ottawa Macdonald Cartier SCS 24 2yr

*

* CALIB STANDHYD 0217 1 5.0 0.14 0.01 12.00 30.14 0.61 0.000
[I%=50.0:S%= 2.00]

*

ADD [0212+ 0217] 0214 3 5.0 0.16 0.01 12.00 31.24 n/a 0.000

*

** Reservoir

```

OUTFLOW:          0210  1  5.0    0.16    0.01 12.00  31.19  n/a    0.000
*
READ STORM          5.0
[ Ptot= 49.09 mm ]
fname :
C:\Users\hyu\AppData\Local\Temp\3d3fe779-22bb-4a0b-97f7-aa9931ec727b\a83aa445-7986-4
108-a295-abaadc5
remark: Ottawa Macdonald Cartier SCS 24 2yr
*
* CALIB STANDHYD      0219  1  5.0    0.02    0.00 12.00  14.09  0.29    0.000
  [I%=20.0:S%= 2.00]
*
ADD [ 0208+ 0210]  0213  3  5.0    0.68    0.03 12.08  35.14  n/a    0.000
*
ADD [ 0213+ 0219]  0213  1  5.0    0.70    0.03 12.00  34.54  n/a    0.000
*
FINISH

```

```

=====
=====

=====
=====

```

```

V   V   I   SSSSS  U   U   A   L           (v 6.2.2015)
V   V   I   SS    U   U   A A  L
V   V   I   SS    U   U  AAAAA L
V   V   I   SS    U   U   A   A  L
VV     I   SSSSS  UUUUU  A   A  LLLLL

```

```

000  TTTT  TTTT  H   H  Y   Y  M   M  000  TM
O   O   T     T   H   H   Y Y  MM MM  O   O
O   O   T     T   H   H   Y   M   M  O   O
000    T     T   H   H   Y   M   M  000

```

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***** S U M M A R Y O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\V02\voin.dat

Output filename:
 C:\Users\hyu\AppData\Local\Civica\XH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\c957f93b-
 a5df-4bb5-bf20-110906f17fd2\scenario
 Summary filename:

C:\Users\hyu\AppData\Local\Civica\XH5\2c2d2be-418b-4c4d-a4c4-d228733f752c\c957f93b-a5df-4bb5-bf20-110906f17fd2\scenario

DATE: 11/20/2024

TIME: 01:54:09

USER:

COMMENTS: _____

** SIMULATION : SCS 24hr 5yr **

W/E COMMAND	HYD ID	DT min	AREA ha	' Qpeak ' cms	Tpeak hrs	R.V. mm	R.C.	Qbase cms
-------------	--------	-----------	------------	---------------------	--------------	------------	------	--------------

START @ 0.00 hrs

READ STORM 5.0

[Ptot= 65.91 mm]

fname :

C:\Users\hyu\AppData\Local\Temp\3d3fe779-22bb-4a0b-97f7-aa9931ec727b\5aca6ac2-ef25-4c6b-b023-6eea581

remark: Ottawa Macdonald Cartier SCS 24 5yr

*
* CALIB STANDHYD 0211 1 5.0 0.06 0.01 12.00 64.47 0.98 0.000
[I%=99.0:S%= 2.00]

*
READ STORM 5.0
[Ptot= 65.91 mm]
fname :

C:\Users\hyu\AppData\Local\Temp\3d3fe779-22bb-4a0b-97f7-aa9931ec727b\5aca6ac2-ef25-4c6b-b023-6eea581

remark: Ottawa Macdonald Cartier SCS 24 5yr

*
* CALIB STANDHYD 0215 1 5.0 0.02 0.00 12.00 56.59 0.86 0.000
[I%=99.0:S%= 2.00]

*
READ STORM 5.0
[Ptot= 65.91 mm]
fname :

C:\Users\hyu\AppData\Local\Temp\3d3fe779-22bb-4a0b-97f7-aa9931ec727b\5aca6ac2-ef25-4c6b-b023-6eea581

remark: Ottawa Macdonald Cartier SCS 24 5yr

```

*
* CALIB STANDHYD      0216  1  5.0    0.24    0.03 12.00  48.70 0.74    0.000
  [I%=63.0:S%= 2.00]
*
  READ STORM              5.0
  [ Ptot= 65.91 mm ]
  fname :
C:\Users\hyu\AppData\Local\Temp\3d3fe779-22bb-4a0b-97f7-aa9931ec727b\5aca6ac2-ef25-4
c6b-b023-6eea581
  remark: Ottawa Macdonald Cartier SCS 24 5yr

```

```

*
* CALIB NASHYD        0218  1  5.0    0.07    0.00 12.00  21.11 0.32    0.000
  [CN=69.0          ]
  [ N = 3.0:Tp 0.17]
*
  READ STORM              5.0
  [ Ptot= 65.91 mm ]
  fname :
C:\Users\hyu\AppData\Local\Temp\3d3fe779-22bb-4a0b-97f7-aa9931ec727b\5aca6ac2-ef25-4
c6b-b023-6eea581
  remark: Ottawa Macdonald Cartier SCS 24 5yr

```

```

*
* CALIB STANDHYD      0220  1  5.0    0.13    0.03 12.00  64.47 0.98    0.000
  [I%=99.0:S%= 2.00]
*
  ADD [ 0211+ 0215] 0209  3  5.0    0.08    0.02 12.00  62.50 n/a    0.000
*
  ADD [ 0209+ 0216] 0209  1  5.0    0.32    0.05 12.00  52.15 n/a    0.000
*
  ADD [ 0209+ 0218] 0209  3  5.0    0.39    0.05 12.00  46.58 n/a    0.000
*
  ADD [ 0209+ 0220] 0209  1  5.0    0.52    0.08 12.00  51.05 n/a    0.000
*
** Reservoir
  OUTFLOW:              0208  1  5.0    0.52    0.02 12.17  51.02 n/a    0.000

```

```

*
  READ STORM              5.0
  [ Ptot= 65.91 mm ]
  fname :
C:\Users\hyu\AppData\Local\Temp\3d3fe779-22bb-4a0b-97f7-aa9931ec727b\5aca6ac2-ef25-4
c6b-b023-6eea581
  remark: Ottawa Macdonald Cartier SCS 24 5yr

```

```

*
* CALIB STANDHYD      0212  1  5.0    0.02    0.00 12.00  56.59 0.86    0.000
  [I%=99.0:S%= 2.00]
*
  READ STORM              5.0

```

[Ptot= 65.91 mm]

fname :

C:\Users\hyu\AppData\Local\Temp\3d3fe779-22bb-4a0b-97f7-aa9931ec727b\5aca6ac2-ef25-4c6b-b023-6eea581

remark: Ottawa Macdonald Cartier SCS 24 5yr

*

* CALIB STANDHYD 0217 1 5.0 0.14 0.02 12.00 42.99 0.65 0.000
[I%=50.0:S%= 2.00]

*

ADD [0212+ 0217] 0214 3 5.0 0.16 0.02 12.00 44.69 n/a 0.000

*

** Reservoir

OUTFLOW: 0210 1 5.0 0.16 0.01 12.08 44.62 n/a 0.000

*

READ STORM 5.0

[Ptot= 65.91 mm]

fname :

C:\Users\hyu\AppData\Local\Temp\3d3fe779-22bb-4a0b-97f7-aa9931ec727b\5aca6ac2-ef25-4c6b-b023-6eea581

remark: Ottawa Macdonald Cartier SCS 24 5yr

*

* CALIB STANDHYD 0219 1 5.0 0.02 0.00 12.00 22.37 0.34 0.000
[I%=20.0:S%= 2.00]

*

ADD [0208+ 0210] 0213 3 5.0 0.68 0.03 12.08 49.52 n/a 0.000

*

ADD [0213+ 0219] 0213 1 5.0 0.70 0.03 12.00 48.74 n/a 0.000

*

POST CHI

=====

V V I SSSSS U U A L (v 6.2.2015)
V V I SS U U A A L
V V I SS U U AAAAA L
V V I SS U U A A L
VV I SSSSS UUUUU A A LLLLL

000 TTTTT TTTTT H H Y Y M M 000 TM
O O T T H H Y Y MM MM O O
O O T T H H Y M M O O
000 T T H H Y M M 000

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***** S U M M A R Y O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\V02\voin.dat

Output filename:

C:\Users\hyu\AppData\Local\Civica\XH5\2c2d2be-418b-4c4d-a4c4-d228733f752c\ba4b3151-3434-4d95-884c-1dfe096b7b54\scenario

Summary filename:

C:\Users\hyu\AppData\Local\Civica\XH5\2c2d2be-418b-4c4d-a4c4-d228733f752c\ba4b3151-3434-4d95-884c-1dfe096b7b54\scenario

DATE: 11/20/2024

TIME: 01:54:17

USER:

COMMENTS: _____

** SIMULATION : Ottawa 100yr 3hr Chicago **

W/E COMMAND	HYD ID	DT min	AREA ha	' Qpeak ' cms	Tpeak hrs	R.V. mm	R.C.	Qbase cms
-------------	--------	-----------	------------	------------------	--------------	------------	------	--------------

START @ 0.00 hrs

[illegible]

```

*
* CALIB STANDHYD      0212  1  5.0    0.02    0.01  1.00  70.20 0.98  0.000
  [I%=99.0:S%= 2.00]
*
* ADD [ 0212+ 0217] 0214  3  5.0    0.16    0.05  1.00  50.40 n/a  0.000
*
** Reservoir
OUTFLOW:      0210  1  5.0    0.16    0.02  1.17  50.33 n/a  0.000
*
CHIC STORM      10.0
[ Ptot= 71.66 mm ]
*
* CALIB STANDHYD      0219  1  5.0    0.02    0.00  1.00  33.55 0.47  0.000
  [I%=20.0:S%= 2.00]
*
* ADD [ 0208+ 0210] 0213  3  5.0    0.68    0.04  1.17  54.94 n/a  0.000
*
* ADD [ 0213+ 0219] 0213  1  5.0    0.70    0.04  1.08  54.33 n/a  0.000
*

```

```

=====
=====

```

```

V   V   I   SSSSS U   U   A   L           (v 6.2.2015)
V   V   I   SS    U   U   A A  L
V   V   I   SS    U   U   AAAAA L
V   V   I   SS    U   U   A   A  L
  WV    I   SSSSS UUUUU A   A  LLLLL

```

```

    000   TTTTT   TTTTT   H   H   Y   Y   M   M   000   TM
    0   0   T       T   H   H   Y   Y   MM  MM  0   0
    0   0   T       T   H   H   Y       M   M  0   0
    000   T       T   H   H   Y       M   M  000

```

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***** S U M M A R Y O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\V02\voin.dat

Output filename:

C:\Users\hyu\AppData\Local\Civica\XH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\89d27013-c96f-46e4-82e5-cbf43459bb00\scenario

Summary filename:

C:\Users\hyu\AppData\Local\Civica\XH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\89d27013-c96f-46e4-82e5-cbf43459bb00\scenario

DATE: 11/20/2024

TIME: 01:54:17

USER:

COMMENTS: _____

** SIMULATION : Ottawa 100yr 6hr Chicago **

W/E	COMMAND	HYD	ID	DT min	AREA ha	Qpeak ' cms	Tpeak hrs	R.V. mm	R.C.	Qbase cms
	START @ 0.00 hrs									

	CHIC STORM			10.0						
	[Ptot= 82.32 mm]									
*										
*	CALIB STANDHYD	0211	1	5.0	0.06	0.03	2.00	80.82	0.98	0.000
	[I%=99.0:S%= 2.00]									
*										
	CHIC STORM			10.0						
	[Ptot= 82.32 mm]									
*										
*	CALIB STANDHYD	0215	1	5.0	0.02	0.01	2.00	80.82	0.98	0.000
	[I%=99.0:S%= 2.00]									
*										
	CHIC STORM			10.0						
	[Ptot= 82.32 mm]									
*										
*	CALIB STANDHYD	0220	1	5.0	0.13	0.06	2.00	80.82	0.98	0.000
	[I%=99.0:S%= 2.00]									
*										
	CHIC STORM			10.0						
	[Ptot= 82.32 mm]									
*										
*	CALIB NASHYD	0218	1	5.0	0.07	0.01	2.08	31.11	0.38	0.000
	[CN=69.0]									
	[N = 3.0:Tp 0.17]									
*										
	CHIC STORM			10.0						
	[Ptot= 82.32 mm]									
*										
*	CALIB STANDHYD	0216	1	5.0	0.24	0.08	2.00	62.77	0.76	0.000
	[I%=63.0:S%= 2.00]									
*										
	ADD [0211+ 0215]	0209	3	5.0	0.08	0.04	2.00	80.82	n/a	0.000

```

*
*   ADD [ 0209+ 0216] 0209 1 5.0 0.32 0.12 2.00 67.28 n/a 0.000
*
*   ADD [ 0209+ 0218] 0209 3 5.0 0.39 0.13 2.00 60.79 n/a 0.000
*
*   ADD [ 0209+ 0220] 0209 1 5.0 0.52 0.19 2.00 65.80 n/a 0.000
*
** Reservoir
OUTFLOW:          0208 1 5.0 0.52 0.02 2.58 65.76 n/a 0.000
*
CHIC STORM
[ Ptot= 82.32 mm ]
*
*   CALIB STANDHYD 0217 1 5.0 0.14 0.04 2.00 56.22 0.68 0.000
*   [I%=50.0:S%= 2.00]
*
CHIC STORM
[ Ptot= 82.32 mm ]
*
*   CALIB STANDHYD 0212 1 5.0 0.02 0.01 2.00 80.82 0.98 0.000
*   [I%=99.0:S%= 2.00]
*
*   ADD [ 0212+ 0217] 0214 3 5.0 0.16 0.05 2.00 59.30 n/a 0.000
*
** Reservoir
OUTFLOW:          0210 1 5.0 0.16 0.02 2.17 59.23 n/a 0.000
*
CHIC STORM
[ Ptot= 82.32 mm ]
*
*   CALIB STANDHYD 0219 1 5.0 0.02 0.00 2.00 41.02 0.50 0.000
*   [I%=20.0:S%= 2.00]
*
*   ADD [ 0208+ 0210] 0213 3 5.0 0.68 0.04 2.17 64.23 n/a 0.000
*
*   ADD [ 0213+ 0219] 0213 1 5.0 0.70 0.04 2.08 63.56 n/a 0.000
*

```

```

=====
=====

```

```

V   V   I   SSSSS U   U   A   L           (v 6.2.2015)
V   V   I   SS    U   U   A A  L
V   V   I   SS    U   U  AAAAA L
V   V   I   SS    U   U   A   A  L
VV      I   SSSSS UUUUU A   A  LLLLL

```

```

000  TTTTT  TTTTT  H   H   Y   Y   M   M   000  TM
O   O   T    T    H   H   Y   Y   MM  MM  O   O
O   O   T    T    H   H   Y    M   M   O   O

```


*	CALIB STANDHYD [I%=99.0:S%= 2.00]	0220	1	5.0	0.13	0.03	1.00	30.60	0.96	0.000
*	CHIC STORM [Ptot= 31.86 mm]			10.0						
*	CALIB NASHYD [CN=69.0 [N = 3.0:Tp 0.17]	0218	1	5.0	0.07	0.00	1.17	5.09	0.16	0.000
*	CHIC STORM [Ptot= 31.86 mm]			10.0						
*	CALIB STANDHYD [I%=63.0:S%= 2.00]	0216	1	5.0	0.24	0.03	1.00	21.28	0.67	0.000
*	ADD [0211+ 0215]	0209	3	5.0	0.08	0.02	1.00	30.60	n/a	0.000
*	ADD [0209+ 0216]	0209	1	5.0	0.32	0.05	1.00	23.61	n/a	0.000
*	ADD [0209+ 0218]	0209	3	5.0	0.39	0.05	1.00	20.29	n/a	0.000
*	ADD [0209+ 0220]	0209	1	5.0	0.52	0.08	1.00	22.86	n/a	0.000
**	Reservoir OUTFLOW:	0208	1	5.0	0.52	0.02	1.25	22.83	n/a	0.000
*	CHIC STORM [Ptot= 31.86 mm]			10.0						
*	CALIB STANDHYD [I%=50.0:S%= 2.00]	0217	1	5.0	0.14	0.02	1.00	17.90	0.56	0.000
*	CHIC STORM [Ptot= 31.86 mm]			10.0						
*	CALIB STANDHYD [I%=99.0:S%= 2.00]	0212	1	5.0	0.02	0.00	1.00	30.60	0.96	0.000
*	ADD [0212+ 0217]	0214	3	5.0	0.16	0.02	1.00	19.49	n/a	0.000
**	Reservoir OUTFLOW:	0210	1	5.0	0.16	0.01	1.08	19.43	n/a	0.000
*	CHIC STORM [Ptot= 31.86 mm]			10.0						
*	CALIB STANDHYD [I%=20.0:S%= 2.00]	0219	1	5.0	0.02	0.00	1.00	9.00	0.28	0.000

```

*
  ADD [ 0208+ 0210] 0213 3 5.0 0.68 0.03 1.08 22.03 n/a 0.000
*
  ADD [ 0213+ 0219] 0213 1 5.0 0.70 0.03 1.08 21.66 n/a 0.000
*
=====
=====

```

```

V  V  I  SSSSS  U  U  A  L  (v 6.2.2015)
V  V  I  SS    U  U  A  A  L
V  V  I  SS    U  U  AAAAA  L
V  V  I  SS    U  U  A  A  L
W  I  SSSSS  UUUUU  A  A  LLLLL

```

```

000  TTTT  TTTT  H  H  Y  Y  M  M  000  TM
O  O  T  T  H  H  Y  Y  MM  MM  O  O
O  O  T  T  H  H  Y  M  M  O  O
000  T  T  H  H  Y  M  M  000

```

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***** S U M M A R Y O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\V02\voin.dat

Output filename:

C:\Users\hyu\AppData\Local\Civica\XH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\b8b60c78-bc3f-48f2-898f-38aea7123f8e\scenario

Summary filename:

C:\Users\hyu\AppData\Local\Civica\XH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\b8b60c78-bc3f-48f2-898f-38aea7123f8e\scenario

DATE: 11/20/2024

TIME: 01:54:18

USER:

COMMENTS: _____

```

*****
** SIMULATION : Ottawa 2yr 6hr Chicago **
*****

```

W/E COMMAND	HYD ID	DT	AREA	' Qpeak	Tpeak	R.V.	R.C.	Qbase
-------------	--------	----	------	---------	-------	------	------	-------

			min	ha	'	cms	hrs	mm		cms
	START @ 0.00 hrs									

	CHIC STORM		10.0							
	[Ptot= 36.86 mm]									
*										
*	CALIB STANDHYD	0211	1	5.0	0.06	0.01	2.00	35.57	0.96	0.000
	[I%=99.0:S%= 2.00]									
*										
	CHIC STORM		10.0							
	[Ptot= 36.86 mm]									
*										
*	CALIB STANDHYD	0215	1	5.0	0.02	0.00	2.00	33.37	0.91	0.000
	[I%=99.0:S%= 2.00]									
*										
	CHIC STORM		10.0							
	[Ptot= 36.86 mm]									
*										
*	CALIB STANDHYD	0220	1	5.0	0.13	0.03	2.00	35.57	0.96	0.000
	[I%=99.0:S%= 2.00]									
*										
	CHIC STORM		10.0							
	[Ptot= 36.86 mm]									
*										
*	CALIB NASHYD	0218	1	5.0	0.07	0.00	2.17	6.92	0.19	0.000
	[CN=69.0]									
	[N = 3.0:Tp 0.17]									
*										
	CHIC STORM		10.0							
	[Ptot= 36.86 mm]									
*										
*	CALIB STANDHYD	0216	1	5.0	0.24	0.03	2.00	25.11	0.68	0.000
	[I%=63.0:S%= 2.00]									
*										
*	ADD [0211+ 0215]	0209	3	5.0	0.08	0.02	2.00	35.02	n/a	0.000
*										
*	ADD [0209+ 0216]	0209	1	5.0	0.32	0.05	2.00	27.59	n/a	0.000
*										
*	ADD [0209+ 0218]	0209	3	5.0	0.39	0.05	2.00	23.88	n/a	0.000
*										
*	ADD [0209+ 0220]	0209	1	5.0	0.52	0.08	2.00	26.80	n/a	0.000
*										
**	Reservoir									
	OUTFLOW:	0208	1	5.0	0.52	0.02	2.25	26.77	n/a	0.000
*										
	CHIC STORM		10.0							
	[Ptot= 36.86 mm]									
*										
*	CALIB STANDHYD	0217	1	5.0	0.14	0.02	2.00	21.30	0.58	0.000

```

    [I%=50.0:S%= 2.00]
*
    CHIC STORM                10.0
    [ Ptot= 36.86 mm ]
*
*   CALIB STANDHYD           0212  1  5.0    0.02    0.00  2.00  33.37 0.91   0.000
    [I%=99.0:S%= 2.00]
*
    ADD [ 0212+ 0217] 0214  3  5.0    0.16    0.02  2.00  22.81 n/a   0.000
*
** Reservoir
    OUTFLOW:                0210  1  5.0    0.16    0.01  2.08  22.73 n/a   0.000
*
    CHIC STORM                10.0
    [ Ptot= 36.86 mm ]
*
*   CALIB STANDHYD           0219  1  5.0    0.02    0.00  2.00   9.93 0.27   0.000
    [I%=20.0:S%= 2.00]
*
    ADD [ 0208+ 0210] 0213  3  5.0    0.68    0.03  2.08  25.82 n/a   0.000
*
    ADD [ 0213+ 0219] 0213  1  5.0    0.70    0.03  2.08  25.37 n/a   0.000
*
    FINISH

```

```

=====
=====

=====
=====

```

```

V   V   I   SSSSS  U   U   A   L               (v 6.2.2015)
V   V   I   SS    U   U   A A  L
V   V   I   SS    U   U   AAAAA L
V   V   I   SS    U   U   A   A  L
VV    I   SSSSS  UUUUU  A   A  LLLLL

```

```

    000  TTTTT  TTTTT  H   H  Y   Y  M   M  000  TM
    0   0   T    T    H   H   Y Y  MM MM  0   0
    0   0   T    T    H   H   Y   M   M  0   0
    000   T    T    H   H   Y   M   M  000

```

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***** S U M M A R Y O U T P U T *****

[N = 3.0:Tp 0.17]

*

CHIC STORM 10.0
[Ptot= 42.51 mm]

*

* CALIB STANDHYD 0216 1 5.0 0.24 0.04 1.00 29.55 0.70 0.000
[I%=63.0:S%= 2.00]

*

ADD [0211+ 0215] 0209 3 5.0 0.08 0.02 1.00 41.19 n/a 0.000

*

ADD [0209+ 0216] 0209 1 5.0 0.32 0.07 1.00 32.46 n/a 0.000

*

ADD [0209+ 0218] 0209 3 5.0 0.39 0.07 1.00 28.29 n/a 0.000

*

ADD [0209+ 0220] 0209 1 5.0 0.52 0.11 1.00 31.52 n/a 0.000

*

** Reservoir
OUTFLOW: 0208 1 5.0 0.52 0.02 1.33 31.48 n/a 0.000

*

CHIC STORM 10.0
[Ptot= 42.51 mm]

*

* CALIB STANDHYD 0217 1 5.0 0.14 0.02 1.00 25.33 0.60 0.000
[I%=50.0:S%= 2.00]

*

CHIC STORM 10.0
[Ptot= 42.51 mm]

*

* CALIB STANDHYD 0212 1 5.0 0.02 0.01 1.00 41.19 0.97 0.000
[I%=99.0:S%= 2.00]

*

ADD [0212+ 0217] 0214 3 5.0 0.16 0.03 1.00 27.32 n/a 0.000

*

** Reservoir
OUTFLOW: 0210 1 5.0 0.16 0.01 1.08 27.24 n/a 0.000

*

CHIC STORM 10.0
[Ptot= 42.51 mm]

*

* CALIB STANDHYD 0219 1 5.0 0.02 0.00 1.00 15.31 0.36 0.000
[I%=20.0:S%= 2.00]

*

ADD [0208+ 0210] 0213 3 5.0 0.68 0.03 1.08 30.49 n/a 0.000

*

ADD [0213+ 0219] 0213 1 5.0 0.70 0.03 1.08 30.05 n/a 0.000

*

=====
=====

```

V   V   I   SSSSS U   U   A   L           (v 6.2.2015)
V   V   I   SS    U   U   A A   L
V   V   I   SS    U   U   AAAAA L
V   V   I   SS    U   U   A   A   L
VV    I   SSSSS UUUUU A   A   LLLLL

```

```

000   TTTTT TTTTT H   H   Y   Y   M   M   000   TM
O   O   T       T   H   H   Y   Y   MM  MM   O   O
O   O   T       T   H   H   Y       M   M   O   O
000       T       T   H   H   Y       M   M   000

```

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***** S U M M A R Y O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\V02\voin.dat

Output filename:

C:\Users\hyu\AppData\Local\Civica\XH5\2c2d2be-418b-4c4d-a4c4-d228733f752c\da3c740a-58f3-448e-bf72-403525343db2\scenario

Summary filename:

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DATE: 11/20/2024

TIME: 01:54:18

USER:

COMMENTS: _____

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*****
** SIMULATION : Ottawa 5yr 6 hr Chicago **
*****

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W/E COMMAND	HYD ID	DT min	AREA ha	' Qpeak ' cms	Tpeak hrs	R.V. mm	R.C.	Qbase cms
-------------	--------	-----------	------------	------------------	--------------	------------	------	--------------

START @ 0.00 hrs

CHIC STORM 10.0
 [Ptot= 49.04 mm]

*

* CALIB STANDHYD	0211	1	5.0	0.06	0.02	2.00	47.68	0.97	0.000
[I%=99.0:S%= 2.00]									

*	CHIC STORM			10.0						
	[Ptot= 49.04 mm]									
*										
*	CALIB STANDHYD	0215	1	5.0	0.02	0.01	2.00	46.84	0.96	0.000
	[I%=99.0:S%= 2.00]									
*										
	CHIC STORM			10.0						
	[Ptot= 49.04 mm]									
*										
*	CALIB STANDHYD	0220	1	5.0	0.13	0.04	2.00	47.68	0.97	0.000
	[I%=99.0:S%= 2.00]									
*										
	CHIC STORM			10.0						
	[Ptot= 49.04 mm]									
*										
*	CALIB NASHYD	0218	1	5.0	0.07	0.00	2.17	12.21	0.25	0.000
	[CN=69.0]									
	[N = 3.0:Tp 0.17]									
*										
	CHIC STORM			10.0						
	[Ptot= 49.04 mm]									
*										
*	CALIB STANDHYD	0216	1	5.0	0.24	0.04	2.00	34.77	0.71	0.000
	[I%=63.0:S%= 2.00]									
*										
	ADD [0211+ 0215]	0209	3	5.0	0.08	0.02	2.00	47.47	n/a	0.000
*										
	ADD [0209+ 0216]	0209	1	5.0	0.32	0.07	2.00	37.94	n/a	0.000
*										
	ADD [0209+ 0218]	0209	3	5.0	0.39	0.07	2.00	33.32	n/a	0.000
*										
	ADD [0209+ 0220]	0209	1	5.0	0.52	0.11	2.00	36.91	n/a	0.000
*										
**	Reservoir									
	OUTFLOW:	0208	1	5.0	0.52	0.02	2.33	36.88	n/a	0.000
*										
	CHIC STORM			10.0						
	[Ptot= 49.04 mm]									
*										
*	CALIB STANDHYD	0217	1	5.0	0.14	0.02	2.00	30.09	0.61	0.000
	[I%=50.0:S%= 2.00]									
*										
	CHIC STORM			10.0						
	[Ptot= 49.04 mm]									
*										
*	CALIB STANDHYD	0212	1	5.0	0.02	0.01	2.00	46.84	0.96	0.000
	[I%=99.0:S%= 2.00]									
*										
	ADD [0212+ 0217]	0214	3	5.0	0.16	0.03	2.00	32.18	n/a	0.000

```

*
** Reservoir
OUTFLOW:          0210  1  5.0    0.16    0.01  2.08  32.12  n/a    0.000
*
CHIC STORM
[ Ptot= 49.04 mm ]
*
* CALIB STANDHYD    0219  1  5.0    0.02    0.00  2.00  16.67  0.34    0.000
  [ I%=20.0:S%= 2.00]
*
ADD [  0208+  0210] 0213  3  5.0    0.68    0.03  2.08  35.76  n/a    0.000
*
ADD [  0213+  0219] 0213  1  5.0    0.70    0.03  2.08  35.21  n/a    0.000
*

```

Appendix B: Sanitary Design

Appendix C: Watermain Design

File No.	522676	Date: July 17, 2023
Project:	Proposed Apartment Buildings	Designed: GC
Project Address:	3817-3843 - Innes Road	Checked: JA
Client:	Bridor Developments	Drawing Reference: C300

WATER CONSUMPTION CALCULATION

	BLOCK A	BLOCK B	BLOCK A + B	
Total Population =	95.20	95.20	190.40	ea.
Average Demand Per People =	280	280	280	L/c/d
Average Water Demand =	26656.00	26656.00	53312.00	L/d
	0.31	0.31	0.62	L/s
Maximum Daily Peak Factor =	2.5	2.5		* As per City of Ottawa
Maximum Daily Residential =	66640.00	66640.00	133280.00	L/d
	0.77	0.77	1.54	L/s
Maximum Hourly Peak Factor =	2.2	2.2		* As per City of Ottawa
Maximum Hourly Residential =	146608.00	146608.00	293216.00	L/d
	1.70	1.70	3.39	L/s

WATER SERVICE SIZING

Q = VA	Where:	V = Design velocity of 1.5m/s x 3600 = 5400m/h (as per OBC guidelines)
		A = area of pipe = $(\pi/4) \times D^2$
		Q = water supply flow rate to be accounted for in m ³ /h (peak flow)
Minimum pipe diameter for individual blocks:		d = $(4Q/\pi V)^{1/2}$ (derived from Q = VA formula)
		d = 0.038 m
		d = 38 mm
Minimum pipe diameter for combined blocks:		d = $(4Q/\pi V)^{1/2}$ (derived from Q = VA formula)
		d = 0.054 m
		d = 54 mm
Proposed pipe diameter:		200 mm (Min 150mm dia. pipe required as building is sprinklered, per OBC guidelines. To be conservative, upsized to allow for additional flow.)

Appartments:	Person Per Unit	Building A	Building B
Bachelor =	1.4	8	8
1 Bedroom =	1.4	30	30
2 Bedroom =	2.1	20	20
3 Bedroom =	3.1	0	0
		95.20	95.20

BLOCK A	Bachelor	1 Bedroom	2 Bedroom	Unit Counts	WSFU	Total
Unrinal Flush Tank	1	1	2	78	2	156
Sinks	2	2	2	116	1	116
Bathub	1	1	2	78	4	312
Diswasher	1	1	1	58	1.5	87
Washing Machine	1	1	1	58	2	116
Total						787

BLOCK B	Bachelor	1 Bedroom	2 Bedroom	Unit Counts	WSFU	Total
Unrinal Flush Tank	1	1	2	78	2	156
Sinks	2	2	2	116	1	116
Bathub	1	1	2	78	4	312
Diswasher	1	1	1	58	1.5	87
Washing Machine	1	1	1	58	2	116
Total						787

			FUS Fire Flow Calculations (Same for Blocks A & B)								
			Tatham File no.: 522656								
			Project: 3817-3843 Innes Road								
			Date: 17-Jul-23								
			Designed by: GC								
			Checked by: JA								
$RFF = 220C\sqrt{A}$ Where: RFF = the Required Fire Flow in litres per minutes (LPM) C = the Construction Coefficient is related to the type of construction of the building A = the Total Effective Floor Area (effective building area) in square metres of the building											
Determine the Construction Coefficient (C)											
1	Choose frame used for building	Coefficient C related to the type of construction	Type V Wood Frame Construction	1.5	Type II Noncombustible Construction	0.8					
			Type IV-A Mass Timber Construction	0.8							
			Type IV-B Mass Timber Construction	0.9							
			Type IV-C Mass Timber Construction	1.0							
			Type IV-D Mass Timber Construction	1.5							
			Type III Ordinary Construction	1.0							
			Type II Noncombustible Construction	0.8							
			Type I Fire Resistive Construction	0.6							
Determine Total Effective Floor Area (A)											
Option 1											
	The Construction coefficient is greater or equal to 1	FALSE	100% of all floor area (Excluding basements at least 50% below grade)			Total Effective Area	0	sq.m.			
Option 2											
2		The Construction coefficient is less than 1	TRUE	Are vertical openings in the building protected? (Per NBC Division B, Section 3.5. Vertical Transportation)		NO	Are the floor areas uniform throughout the building	YES			
				Unprotected Vertical Openings, Uniform Floor Area							
				TRUE	Number of Floors	4	Area of Floor(s)	1,296	Total Effective Area	3,888	sq.m.
				Unprotected Vertical Openings, Dissimilar Floor Area							
				FALSE	Area of 2 largest adjoining floors		Area of floors above 2 largest adjoining floors (up to a maximum of 8 floors)		Total Effective Area	0	sq.m.
				Protected Vertical Openings, Uniform Floor Area							
				FALSE	Number of Floors		Area of Floor(s)		Total Effective Area	0	sq.m.
				Protected Vertical Openings, Dissimilar Floor Area							
	FALSE	Area of the largest floor		Area of floor directly above largest floor			Total Effective Area	0	sq.m.		
				Area of floor directly below largest floor							
Determine the Required Fire Flow											
3	Obtain Required Fire Flow	$RFF = 220C\sqrt{A}$				Required Fire Flow	11,000	L/min			
							183.3	L/s			
Reduction or Surcharge Due to Factors Affecting Burning											
4	Choose combustibility of contents	Occupancy hazard reduction or surcharge	Non-combustible	-0.25	Limited combustible	-0.15					
			Limited combustible	-0.15							
			Combustible	0							
			Free burning	0.15			9,350	L/min			
			Rapid burning	0.25			155.8	L/s			
5	Choose reduction for sprinklers	Sprinkler reduction	Sprinklers conforming to NFPA13 (wet or dry system)	-0.30	YES	-0.3					
			Water supply is standard for both the system and fire department hose lines (siamese connection)	-0.10	YES	-0.1					
			Fully supervised system (electronic monitoring system on at all times)	-0.10	YES	-0.1					
			All buildings within 30m of the proposed structure are confirmed to have a sprinkler system	-0.25	NO	0	4,675	L/min			
							77.9	L/s			
Exposure Adjustment Charge											
6	Exposure distance between units	North side	Over 30m	Length - Height Value Assumed worst case exposed building facing wall	>100	Exposure Adjustment Charge	0				
		East side	10.1 to 20m		>100	Exposure Adjustment Charge	0.08				
		South side	Over 30m		>100	Exposure Adjustment Charge	0.00				
		West side	10.1 to 20m		>100	Exposure Adjustment Charge	0.08				
		Cumulative Required Fire Flow						5,423	L/min		
								90.4	L/s		
Total Required Fire Flow											
7	Obtain fire flow, duration	Minimum required fire flow rate (rounded to nearest 1000)					6,000	L/min			
		Minimum required fire flow rate					100.0	L/s			
		Required duration of fire flow					2	Hrs			

Appendix D: Underground Chambers & Stormwater Treatment Unit

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER	
ADS SALES REP	
PROJECT NO.	



3817 INNES ROAD
OTTAWA, CANADA

SC-740 STORMTECH CHAMBER SPECIFICATIONS

- CHAMBERS SHALL BE STORMTECH SC-740.
- CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
- CHAMBERS SHALL BE CERTIFIED TO CSA B184, "POLYMERIC SUB-SURFACE STORMWATER MANAGEMENT STRUCTURES", AND MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
- CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
- THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE CSA S6 CL-625 TRUCK AND THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
- CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
- REQUIREMENTS FOR HANDLING AND INSTALLATION:
 - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
 - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 50 mm (2").
 - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 550 LBS/FT/%. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 23° C / 73° F), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
- ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
 - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
 - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
 - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
- CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF THE SC-740 SYSTEM

- STORMTECH SC-740 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
- STORMTECH SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
- CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
 - STONESHOOTER LOCATED OFF THE CHAMBER BED.
 - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
 - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
- THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
- JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
- MAINTAIN MINIMUM - 150 mm (6") SPACING BETWEEN THE CHAMBER ROWS.
- EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE 20-50 mm (3/4-2").
- THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
- ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

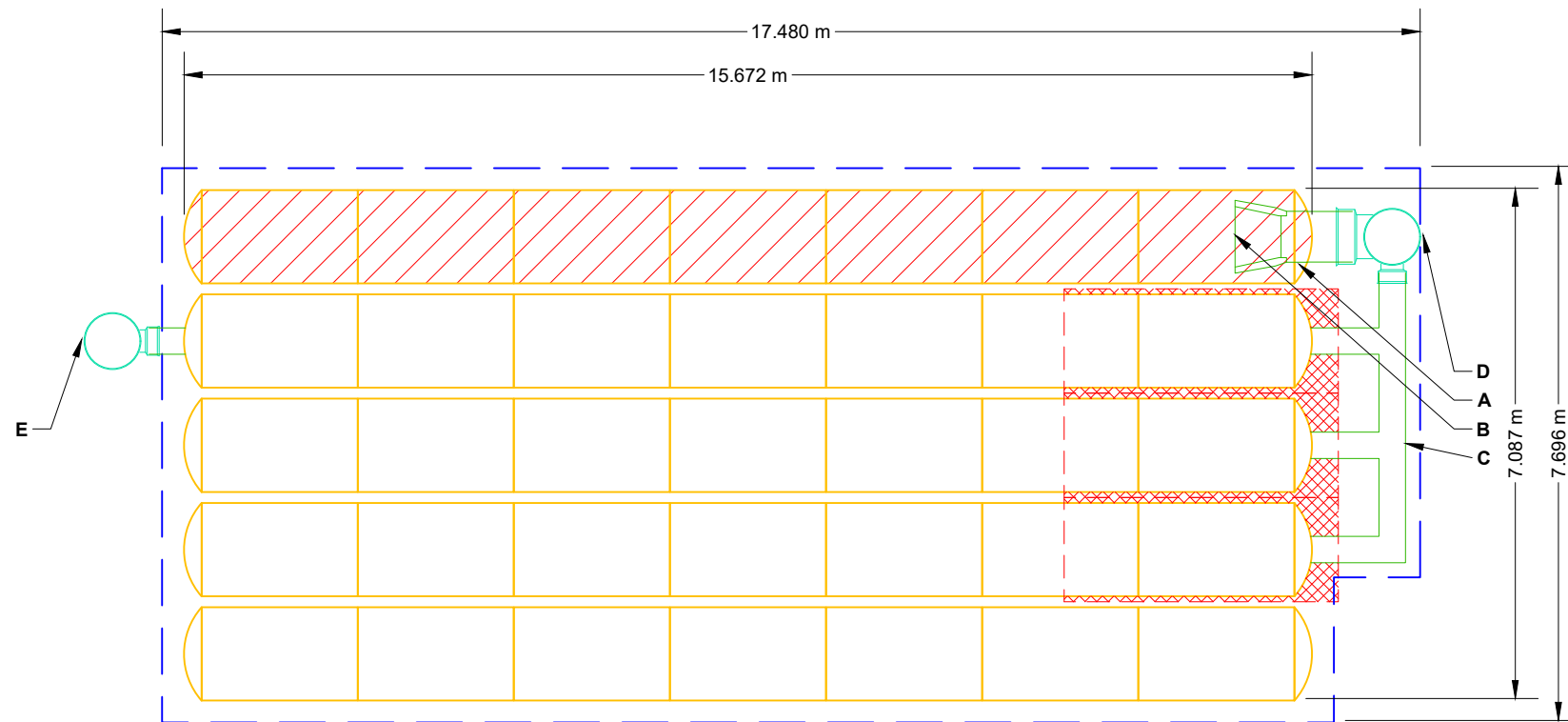
NOTES FOR CONSTRUCTION EQUIPMENT

- STORMTECH SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
- THE USE OF CONSTRUCTION EQUIPMENT OVER SC-740 CHAMBERS IS LIMITED:
 - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
 - NO RUBBER TIRED LOADERS, DUMP TRUCKS, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
 - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
- FULL 900 mm (36") OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO THE CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

PROPOSED LAYOUT		CONCEPTUAL ELEVATIONS		*INVERT ABOVE BASE OF CHAMBER				
				PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
35	STORMTECH SC-740 CHAMBERS	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	3.353					
10	STORMTECH SC-740 END CAPS	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	1.524					
152	STONE ABOVE (mm)	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	1.372	PREFABRICATED EZ END CAP	A	600 mm BOTTOM PREFABRICATED EZ END CAP, PART#: SC740ECEZ / TYP OF ALL 600 mm	3 mm	
152	STONE BELOW (mm)	MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	1.372	FLAMP	B	INSTALL FLAMP ON 600 mm ACCESS PIPE / PART#: SC74024RAMP		
40	STONE VOID	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	1.372	MANIFOLD	C	300 mm x 300 mm TOP MANIFOLD, ADS N-12	318 mm	
83.4	INSTALLED SYSTEM VOLUME (m ³) (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)	TOP OF STONE:	1.067	NYLOPLAST (INLET W/ ISO PLUS ROW)	D	750 mm DIAMETER (610 mm SUMP MIN)		161 L/s IN
		TOP OF SC-740 CHAMBER:	0.914					
		300 mm x 300 mm TOP MANIFOLD INVERT:	0.470	NYLOPLAST (OUTLET)	E	750 mm DIAMETER (DESIGN BY ENGINEER)		57 L/s OUT
		300 mm BOTTOM CONNECTION INVERT:	0.183					
132.1	SYSTEM AREA (m ²)	600 mm ISOLATOR ROW PLUS INVERT:	0.155					
50.4	SYSTEM PERIMETER (m)	BOTTOM OF SC-740 CHAMBER:	0.152					
		BOTTOM OF STONE:	0.000					

ISOLATOR ROW PLUS
(SEE DETAIL)

PLACE MINIMUM 3.810 m OF ADSPPLUS125 WOVEN GEOTEXTILE OVER
BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR
PROTECTION AT ALL CHAMBER INLET ROWS

BED LIMITS

NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH NOTE #6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
 - THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
 - THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.
 - **NOT FOR CONSTRUCTION:** THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.

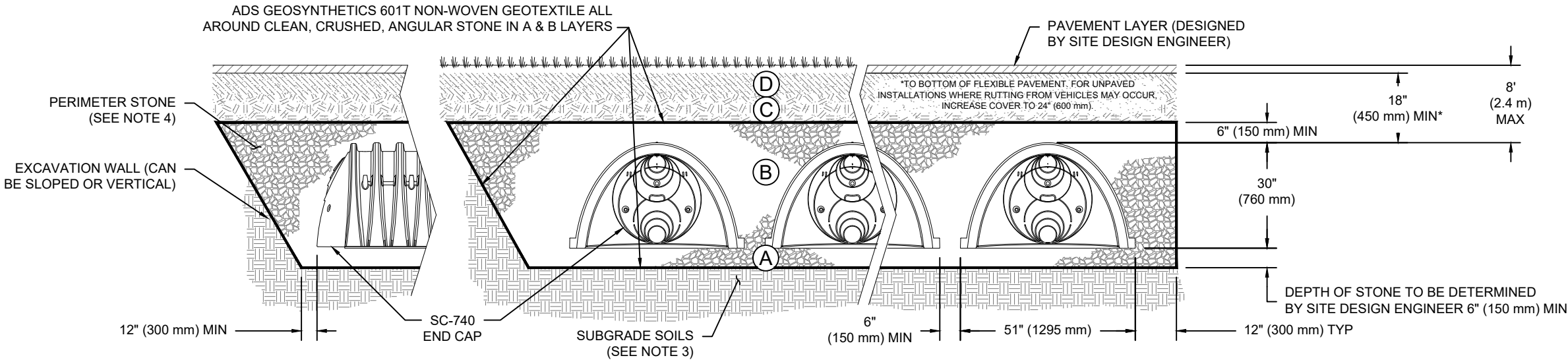
	4640 TRUEMAN BLVD HILLIARD, OH 43026 1-800-733-7473	StormTech® Chamber System					3817 INNES ROAD OTTAWA, CANADA	
							DATE:	DRAWN: HY
							PROJECT #:	CHECKED: N/A
SCALE = 1 : 100			888-892-2694 WWW.STORMTECH.COM					
THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.								
SHEET								
2 OF 6								

ACCEPTABLE FILL MATERIALS: STORMTECH SC-740 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	FINAL FILL: FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	INITIAL FILL: FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145 ¹ A-1, A-2-4, A-3 OR AASHTO M43 ¹ 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	EMBEDMENT STONE: FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43 ¹ 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	FOUNDATION STONE: FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43 ¹ 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE. ^{2,3}

PLEASE NOTE:

1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-740 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR 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.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
 - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
 - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
 - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 550 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

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DESCRIPTION

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DATE

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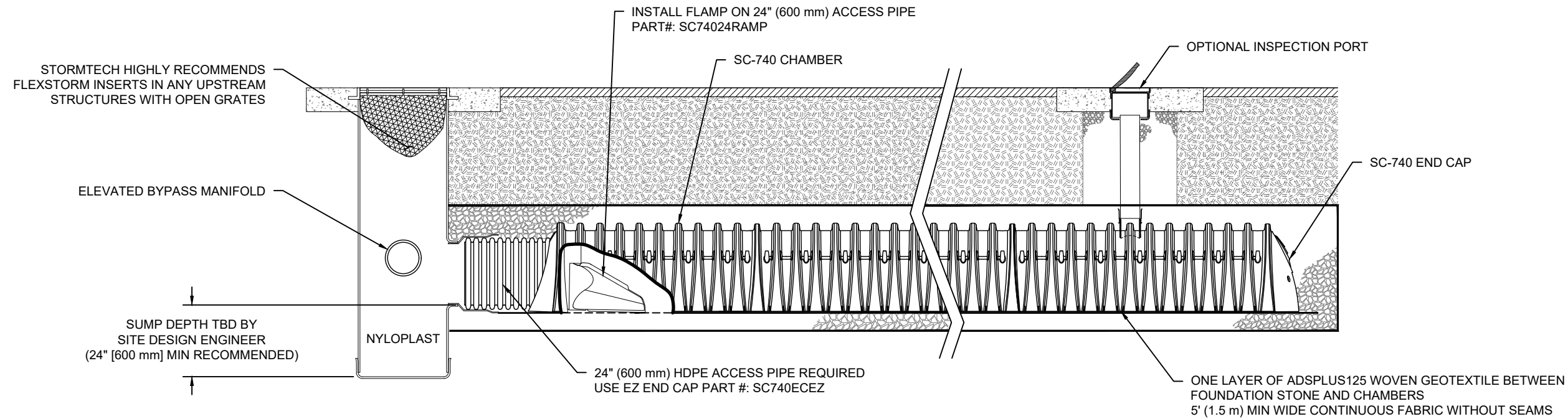
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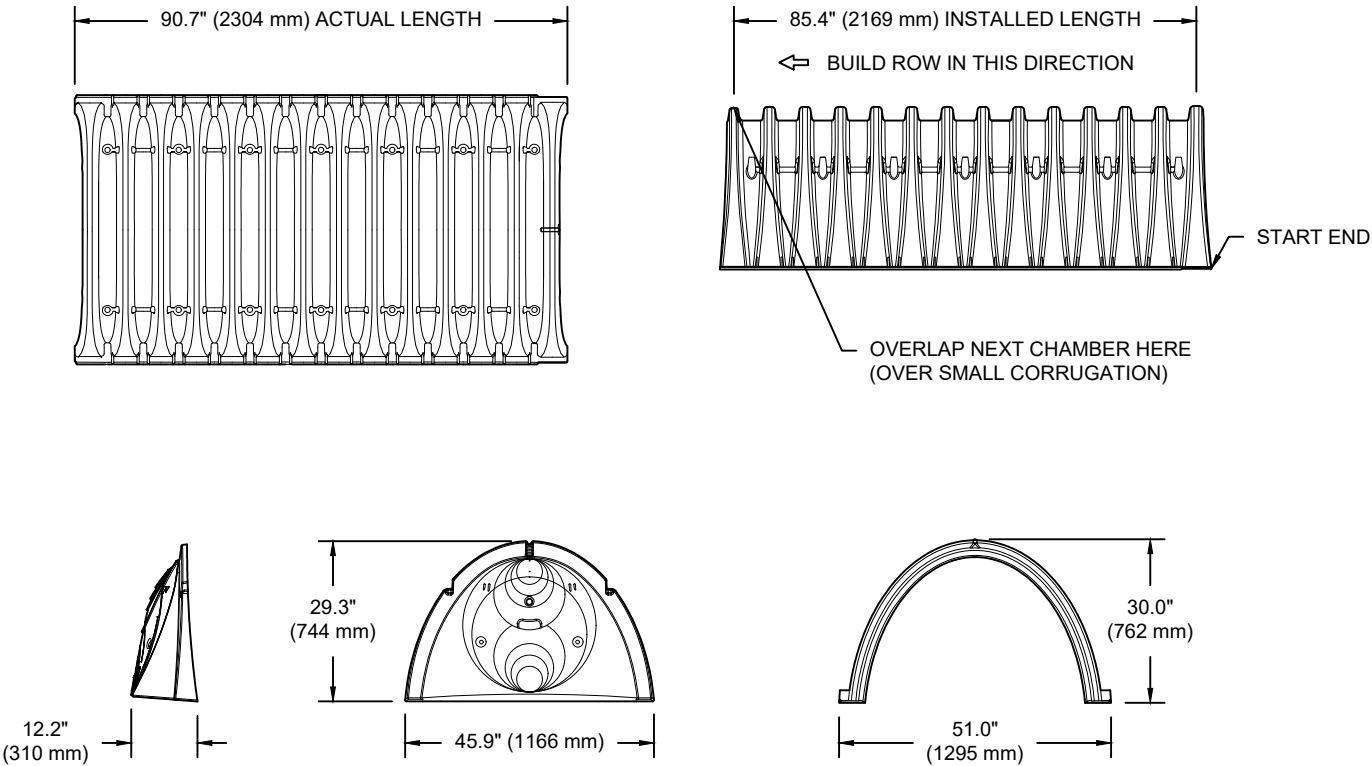
SHEET
3 OF 6

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SC-740 TECHNICAL SPECIFICATION

NTS



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	51.0" X 30.0" X 85.4"	(1295 mm X 762 mm X 2169 mm)
CHAMBER STORAGE	45.9 CUBIC FEET	(1.30 m³)
MINIMUM INSTALLED STORAGE*	74.9 CUBIC FEET	(2.12 m³)
WEIGHT	75.0 lbs.	(33.6 kg)

*ASSUMES 6" (152 mm) STONE ABOVE, BELOW, AND BETWEEN CHAMBERS

PRE-FAB STUB AT BOTTOM OF END CAP WITH FLAMP END WITH "BR"
PRE-FAB STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PRE-FAB STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
PRE-CORED END CAPS END WITH "PC"

PART #	STUB	A	B	C
SC740EPE06T / SC740EPE06TPC	6" (150 mm)	10.9" (277 mm)	18.5" (470 mm)	---
SC740EPE06B / SC740EPE06BPC			---	0.5" (13 mm)
SC740EPE08T / SC740EPE08TPC	8" (200 mm)	12.2" (310 mm)	16.5" (419 mm)	---
SC740EPE08B / SC740EPE08BPC			---	0.6" (15 mm)
SC740EPE10T / SC740EPE10TPC	10" (250 mm)	13.4" (340 mm)	14.5" (368 mm)	---
SC740EPE10B / SC740EPE10BPC			---	0.7" (18 mm)
SC740EPE12T / SC740EPE12TPC	12" (300 mm)	14.7" (373 mm)	12.5" (318 mm)	---
SC740EPE12B / SC740EPE12BPC			---	1.2" (30 mm)
SC740EPE15T / SC740EPE15TPC	15" (375 mm)	18.4" (467 mm)	9.0" (229 mm)	---
SC740EPE15B / SC740EPE15BPC			---	1.3" (33 mm)
SC740EPE18T / SC740EPE18TPC	18" (450 mm)	19.7" (500 mm)	5.0" (127 mm)	---
SC740EPE18B / SC740EPE18BPC			---	1.6" (41 mm)
SC740ECEZ*	24" (600 mm)	18.5" (470 mm)	---	0.1" (3 mm)

ALL STUBS, EXCEPT FOR THE SC740ECEZ ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

* FOR THE SC740ECEZ THE 24" (600 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 1.75" (44 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

NOTE: ALL DIMENSIONS ARE NOMINAL

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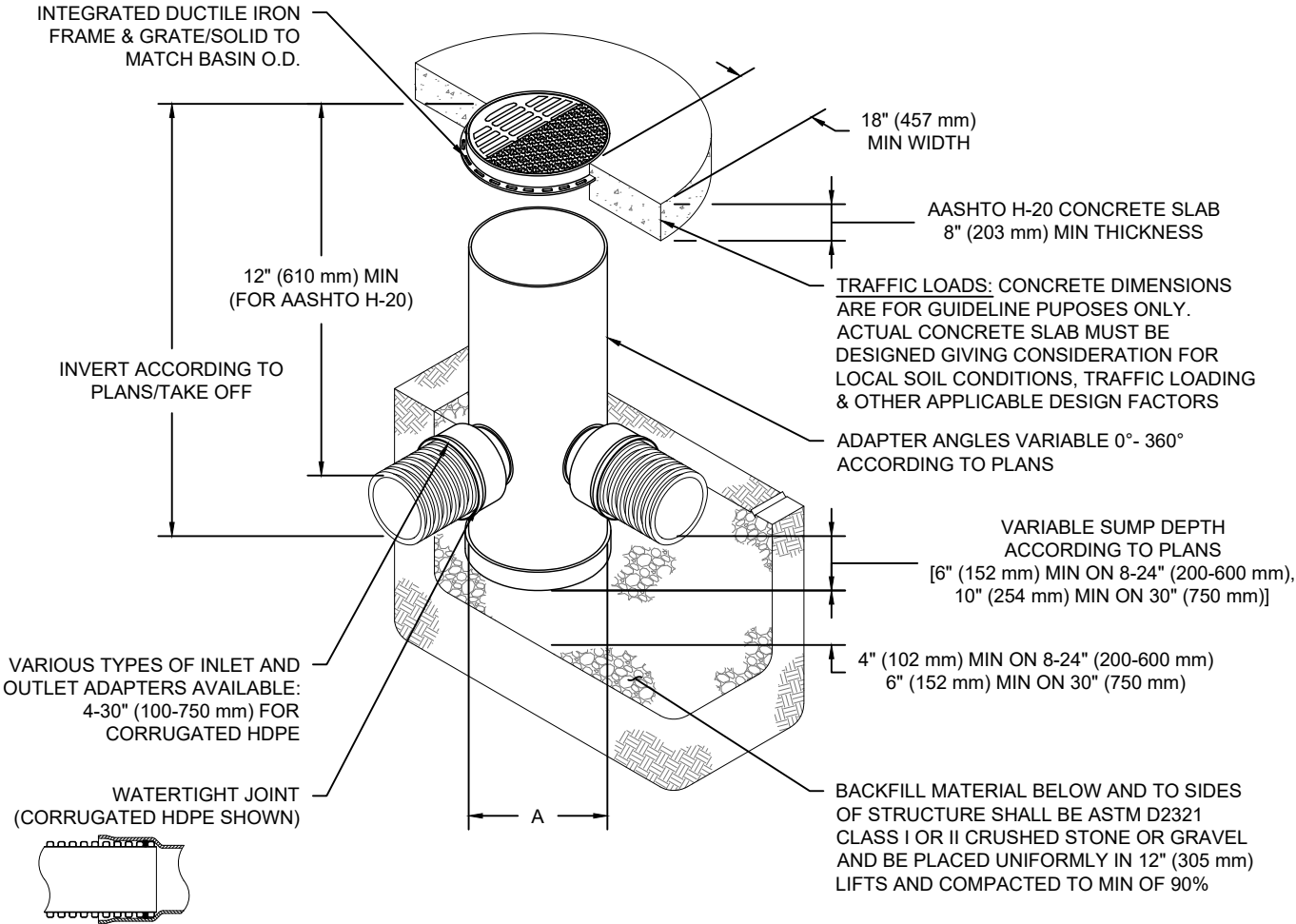
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SHEET
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NYLOPLAST DRAIN BASIN

NTS



NOTES

- 8-30" (200-750 mm) GRATES/SOLID COVERS SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
- 12-30" (300-750 mm) FRAMES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
- DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS
- DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS & HANCOR DUAL WALL) & SDR 35 PVC
- FOR COMPLETE DESIGN AND PRODUCT INFORMATION: **WWW.NYLOPLAST-US.COM**
- TO ORDER CALL: **800-821-6710**

A	PART #	GRATE/SOLID COVER OPTIONS		
8" (200 mm)	2808AG	PEDESTRIAN LIGHT DUTY	STANDARD LIGHT DUTY	SOLID LIGHT DUTY
10" (250 mm)	2810AG	PEDESTRIAN LIGHT DUTY	STANDARD LIGHT DUTY	SOLID LIGHT DUTY
12" (300 mm)	2812AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
15" (375 mm)	2815AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
18" (450 mm)	2818AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
24" (600 mm)	2824AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
30" (750 mm)	2830AG	PEDESTRIAN AASHTO H-20	STANDARD AASHTO H-20	SOLID AASHTO H-20

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SHEET
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Stormceptor® EF Sizing Report

STORMCEPTOR®

ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

10/26/2022

Province:	Ontario	Project Name:	Innes Rd
City:	Ottawa	Project Number:	522676
Nearest Rainfall Station:	OTTAWA CDA RCS	Designer Name:	Guillaume Courtois
Climate Station Id:	6105978	Designer Company:	Tatham Engineering
Years of Rainfall Data:	20	Designer Email:	gcourtois@tathameng.com
		Designer Phone:	613-747-3636
Site Name:	Innes	EOR Name:	
		EOR Company:	
Drainage Area (ha):	0.54	EOR Email:	
% Imperviousness:	75.40	EOR Phone:	

Runoff Coefficient 'c': 0.75

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

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	13.11
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	Yes
Upstream Orifice Control Flow Rate to Stormceptor (L/s):	25.00
Peak Conveyance (maximum) Flow Rate (L/s):	
Site Sediment Transport Rate (kg/ha/yr):	

**Net Annual Sediment
(TSS) Load Reduction
Sizing Summary**

Stormceptor Model	TSS Removal Provided (%)
EFO4	86
EFO6	94
EFO8	97
EFO10	99
EFO12	100

Recommended Stormceptor EFO Model: **EFO4**

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

Water Quality Runoff Volume Capture (%): **> 90**

Stormceptor® EF Sizing Report

THIRD-PARTY TESTING AND VERIFICATION

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

PERFORMANCE

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

PARTICLE SIZE DISTRIBUTION (PSD)

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

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

Stormceptor®EF Sizing Report

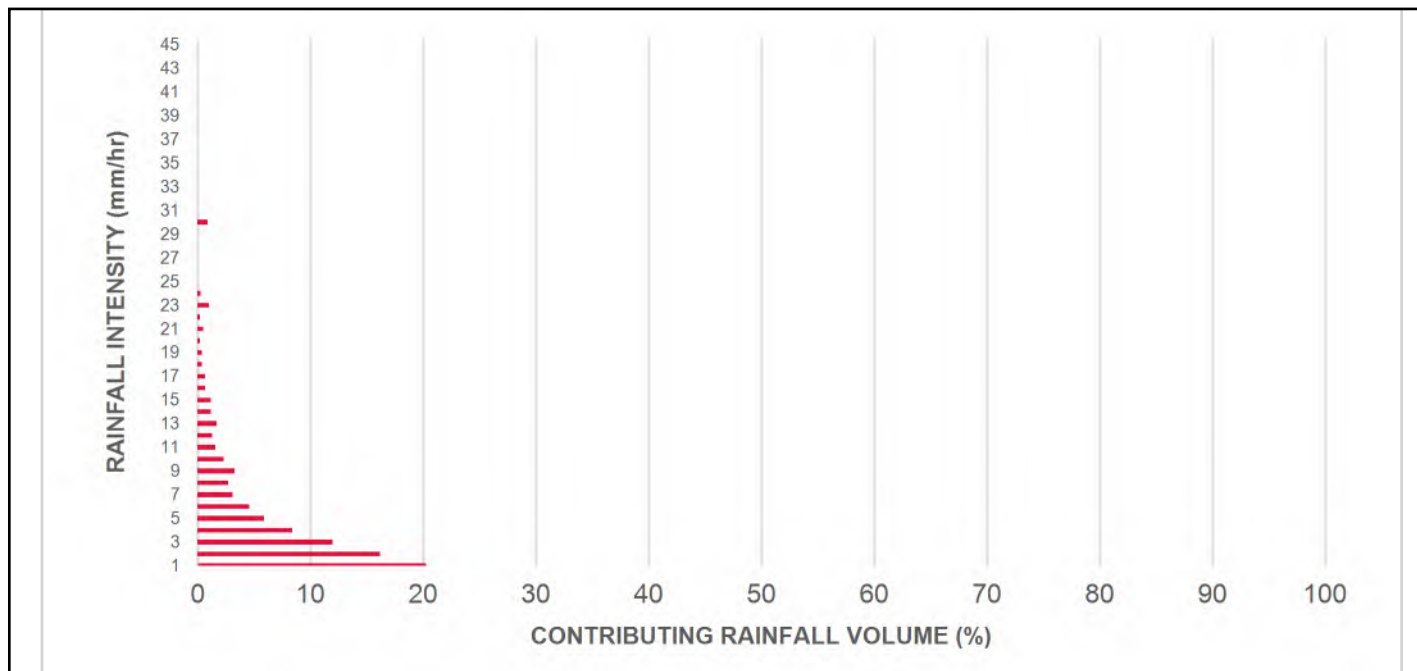
Upstream Flow Controlled Results

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 (%)
0.5	8.6	8.6	0.56	34.0	28.0	100	8.6	8.6
1	20.3	29.0	1.13	68.0	56.0	100	20.3	29.0
2	16.2	45.2	2.26	136.0	113.0	95	15.3	44.3
3	12.0	57.2	3.39	203.0	169.0	87	10.4	54.7
4	8.4	65.6	4.52	271.0	226.0	82	6.9	61.7
5	5.9	71.6	5.65	339.0	282.0	79	4.7	66.4
6	4.6	76.2	6.78	407.0	339.0	77	3.6	70.0
7	3.1	79.3	7.91	474.0	395.0	74	2.3	72.2
8	2.7	82.0	9.04	542.0	452.0	72	2.0	74.2
9	3.3	85.3	10.17	610.0	508.0	69	2.3	76.5
10	2.3	87.6	11.30	678.0	565.0	66	1.5	78.0
11	1.6	89.2	12.42	745.0	621.0	64	1.0	79.0
12	1.3	90.5	13.55	813.0	678.0	64	0.8	79.9
13	1.7	92.2	14.68	881.0	734.0	64	1.1	81.0
14	1.2	93.5	15.81	949.0	791.0	63	0.8	81.8
15	1.2	94.6	16.94	1017.0	847.0	63	0.7	82.5
16	0.7	95.3	18.07	1084.0	904.0	62	0.4	82.9
17	0.7	96.1	19.20	1152.0	960.0	62	0.5	83.4
18	0.4	96.5	20.33	1220.0	1017.0	61	0.2	83.6
19	0.4	96.9	21.46	1288.0	1073.0	60	0.2	83.9
20	0.2	97.1	22.59	1355.0	1130.0	59	0.1	84.0
21	0.5	97.5	23.72	1423.0	1186.0	57	0.3	84.3
22	2.5	100.0	24.85	1491.0	1242.0	56	1.4	85.6
23	0.0	100.0	25.00	1500.0	1250.0	56	0.0	85.6
24	0.0	100.0	25.00	1500.0	1250.0	56	0.0	85.6
25	0.0	100.0	25.00	1500.0	1250.0	56	0.0	85.6
30	0.0	100.0	25.00	1500.0	1250.0	56	0.0	85.6
35	0.0	100.0	25.00	1500.0	1250.0	56	0.0	85.6
40	0.0	100.0	25.00	1500.0	1250.0	56	0.0	85.6
45	0.0	100.0	25.00	1500.0	1250.0	56	0.0	85.6
Estimated Net Annual Sediment (TSS) Load Reduction =								86 %

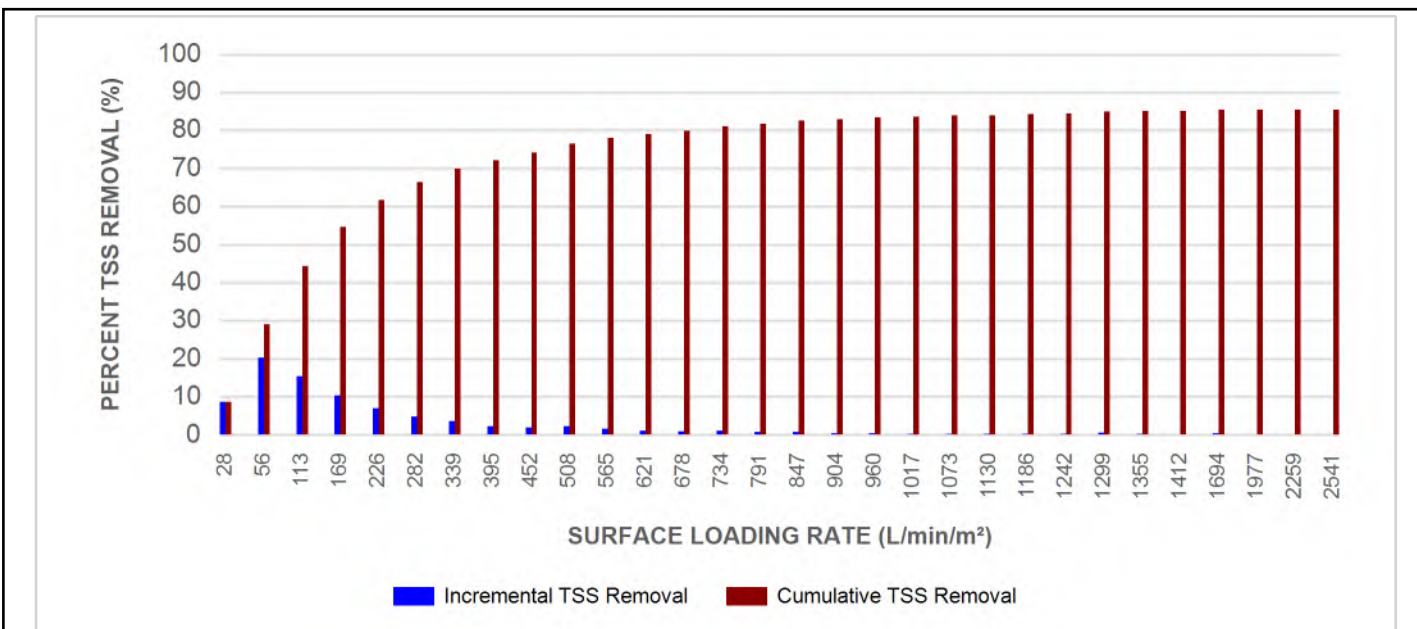
Climate Station ID: 6105978 Years of Rainfall Data: 20

Stormceptor®EF Sizing Report

RAINFALL DATA FROM OTTAWA CDA RCS RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Stormceptor® EF Sizing Report

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

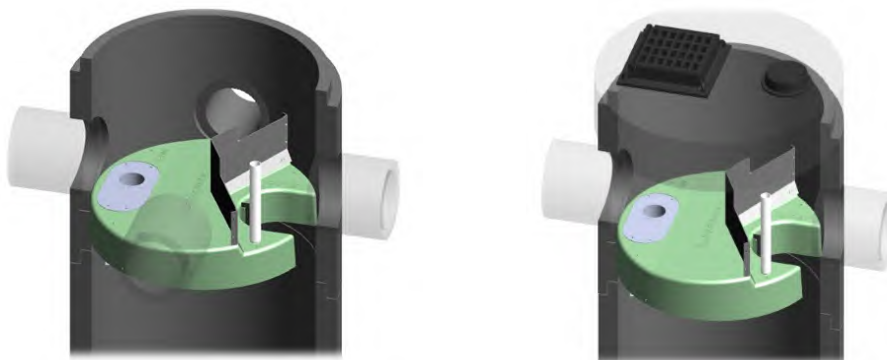
► **Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test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

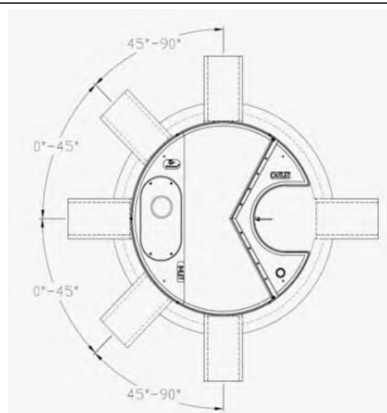
► **Stormceptor® EF and EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend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



Stormceptor® EF Sizing Report



INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.

0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.

45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

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

For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft³)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

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

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

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

STANDARD STORMCEPTOR EF/EFO DRAWINGS

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

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

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

Stormceptor® EF Sizing Report

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

PART 1 – GENERAL

1.1 WORK INCLUDED

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

1.2 REFERENCE STANDARDS & PROCEDURES

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

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

1.3 SUBMITTALS

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

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

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

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

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

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

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

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

Stormceptor® EF Sizing Report

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/m² to 1400 L/min/m², 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/m² and 1400 L/min/m² 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/m² shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m². No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m².

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m² shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m², and shall be calculated using a simple proportioning formula, with 1400 L/min/m² 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/m².

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/m².

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

Stormceptor®EF Sizing Report

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

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

Appendix E: Boundary Conditions

Boundary Conditions 3817-3843 Innes Road

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	769	12.82
Maximum Daily Demand	1,154	19.23
Peak Hour	1,385	23.08
Fire Flow Demand #1	5,600	93.33

Location



Results

Connection 1 – Innes Rd.

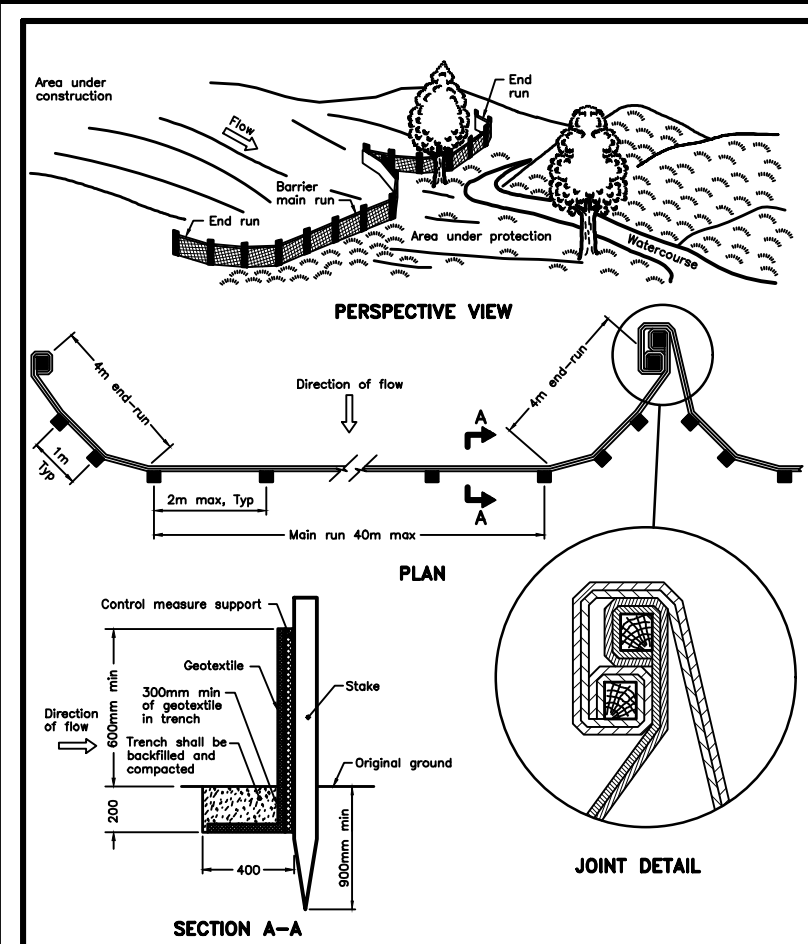
Demand Scenario	Head (m)	Pressure ¹ (psi)
Maximum HGL	130.3	55.1
Peak Hour	127.1	50.5
Max Day plus Fire 1	129.3	53.7

¹ Ground Elevation = 91.6 m

Disclaimer

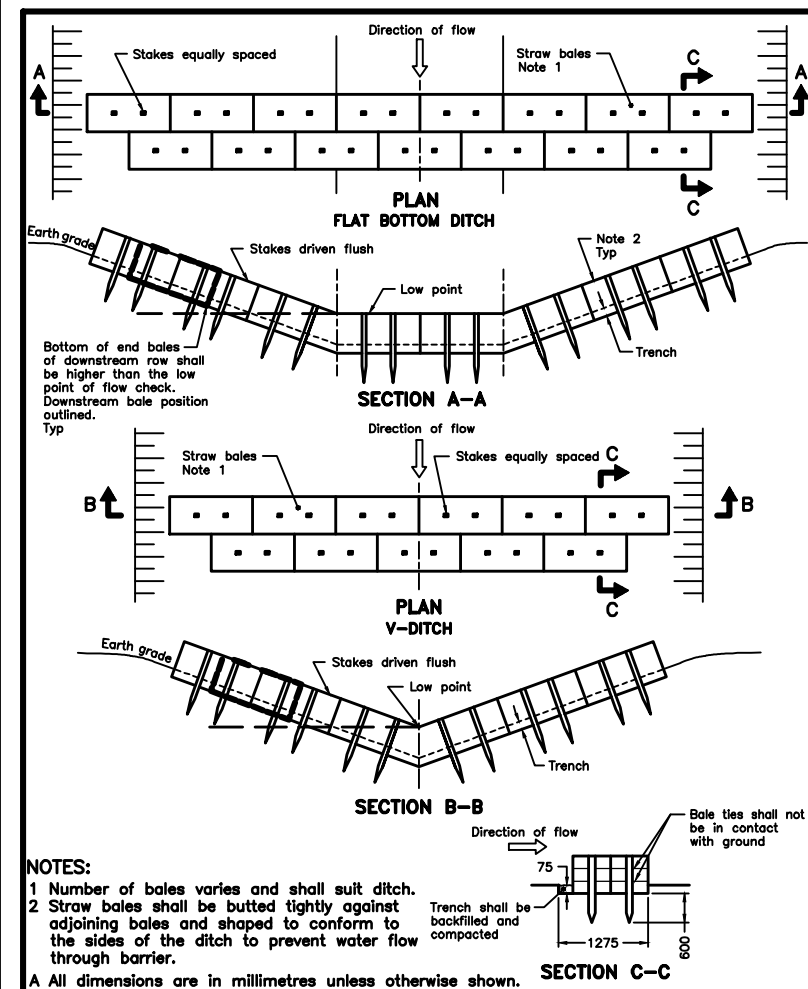
The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.

Appendix F: Engineering Drawings



NOTE:
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING
HEAVY-DUTY
SILT FENCE BARRIER
Nov 2015 Rev 2
OPSD 219.130



NOTE:
1 Number of bales varies and shall suit ditch.
2 Straw bales shall be spaced to conform to the side of the ditch to prevent water flow through barrier.

ONTARIO PROVINCIAL STANDARD DRAWING
STRAW BALE FLOW CHECK DAM
Nov 2015 Rev 2
OPSD 219.180

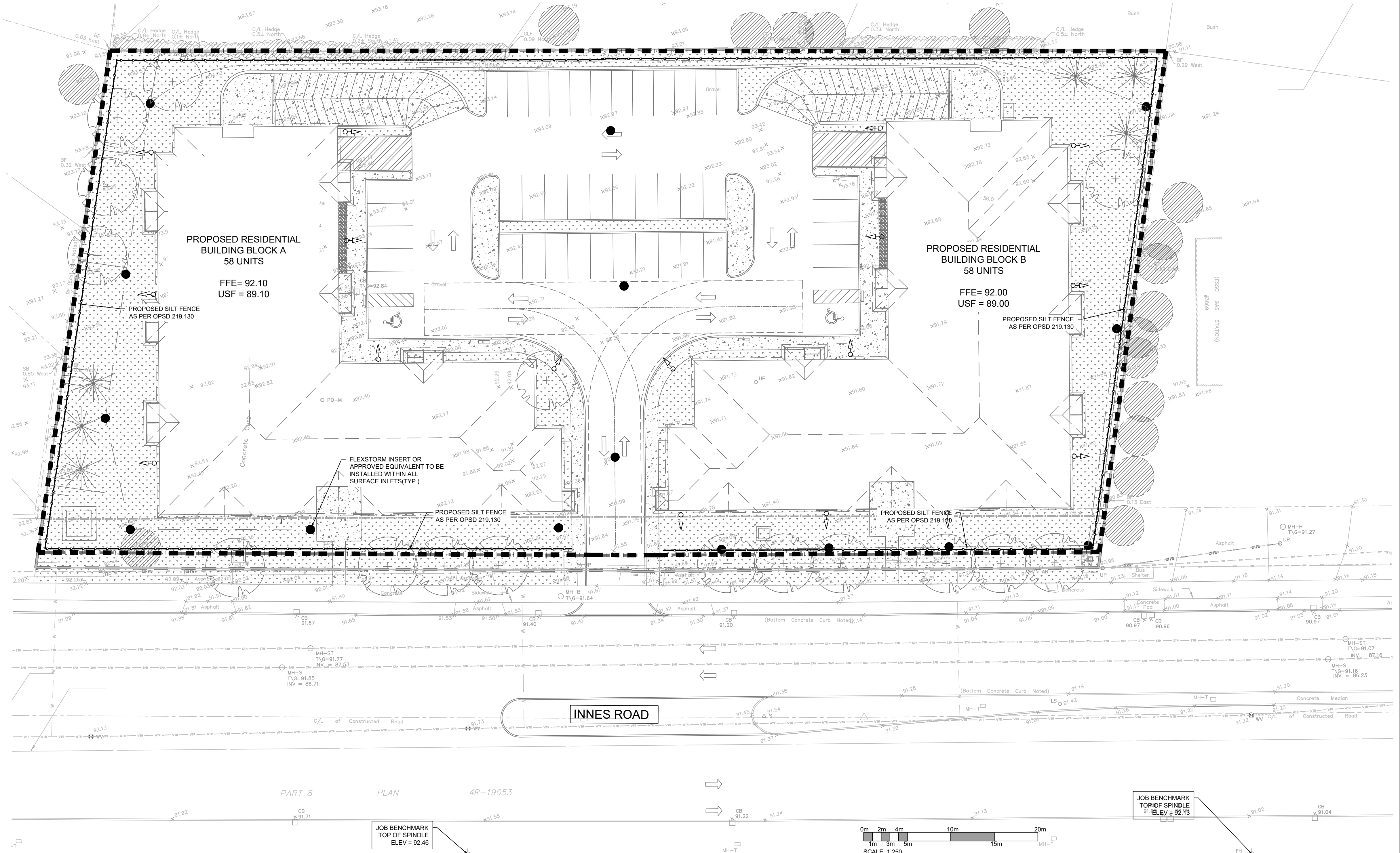
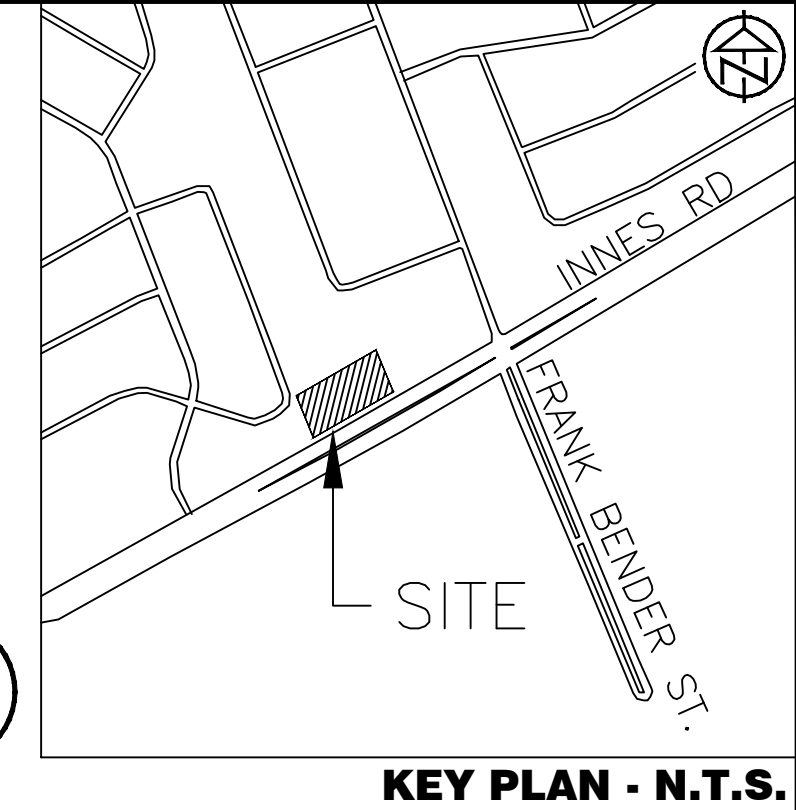
LEGEND:	
	EXISTING PROPERTY LINE TO REMAIN
	PROPOSED ENTRANCE
	PROPOSED ELEVATION
	PROPOSED TOP OF CURB ELEVATION
	PROPOSED BOTTOM OF CURB ELEVATION
	EXISTING ELEVATION
	PROPOSED OVERLAND MAJOR FLOW ROUTE
	PROPOSED SILT FENCE AS PER OPSD 219.130
	PROPOSED 250mm PERFORATED SUBDRAIN
	PROPOSED STORM SEWER
	PROPOSED SANITARY SEWER
	PROPOSED WATERMAIN
	EXISTING STORM SEWER
	EXISTING SANITARY SEWER
	EXISTING WATERMAIN
	PROPOSED DRAINAGE STRUCTURE
	PROPOSED CURB STOP
	PROPOSED PIPE INSULATION AS PER W22
	PROPOSED 100 YEAR HIGH WATER LEVEL STORM WATERSHED EXTENT
	WATERSHED NAME
	CNR OR % IMPERVIOUS
	AREA IN HECTARES
	PROPOSED GRASS AREA
	PROPOSED CONCRETE FEATURES/SLAB
	PROPOSED HEAVY DUTY ASPHALT
	PROPOSED LIGHT DUTY ASPHALT
	PROPOSED WATER METER
	PROPOSED SIAMESE CONNECTION
	PROPOSED DRAIN OUTLET

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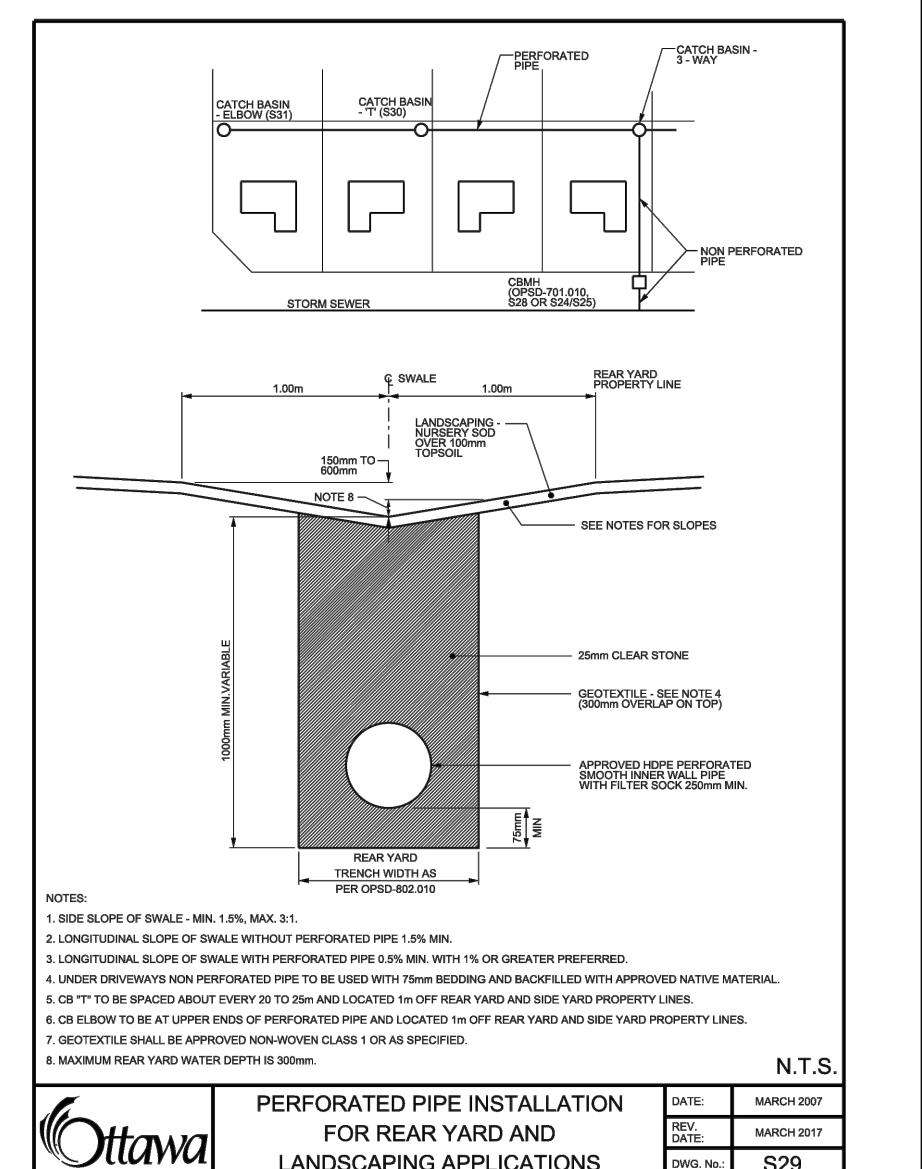
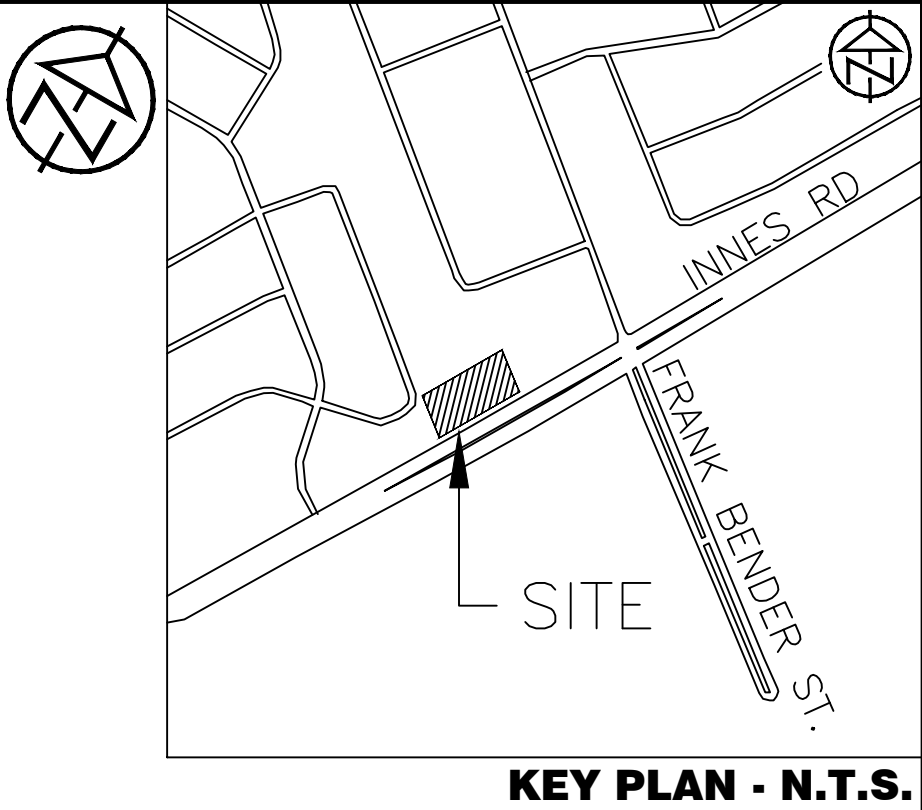
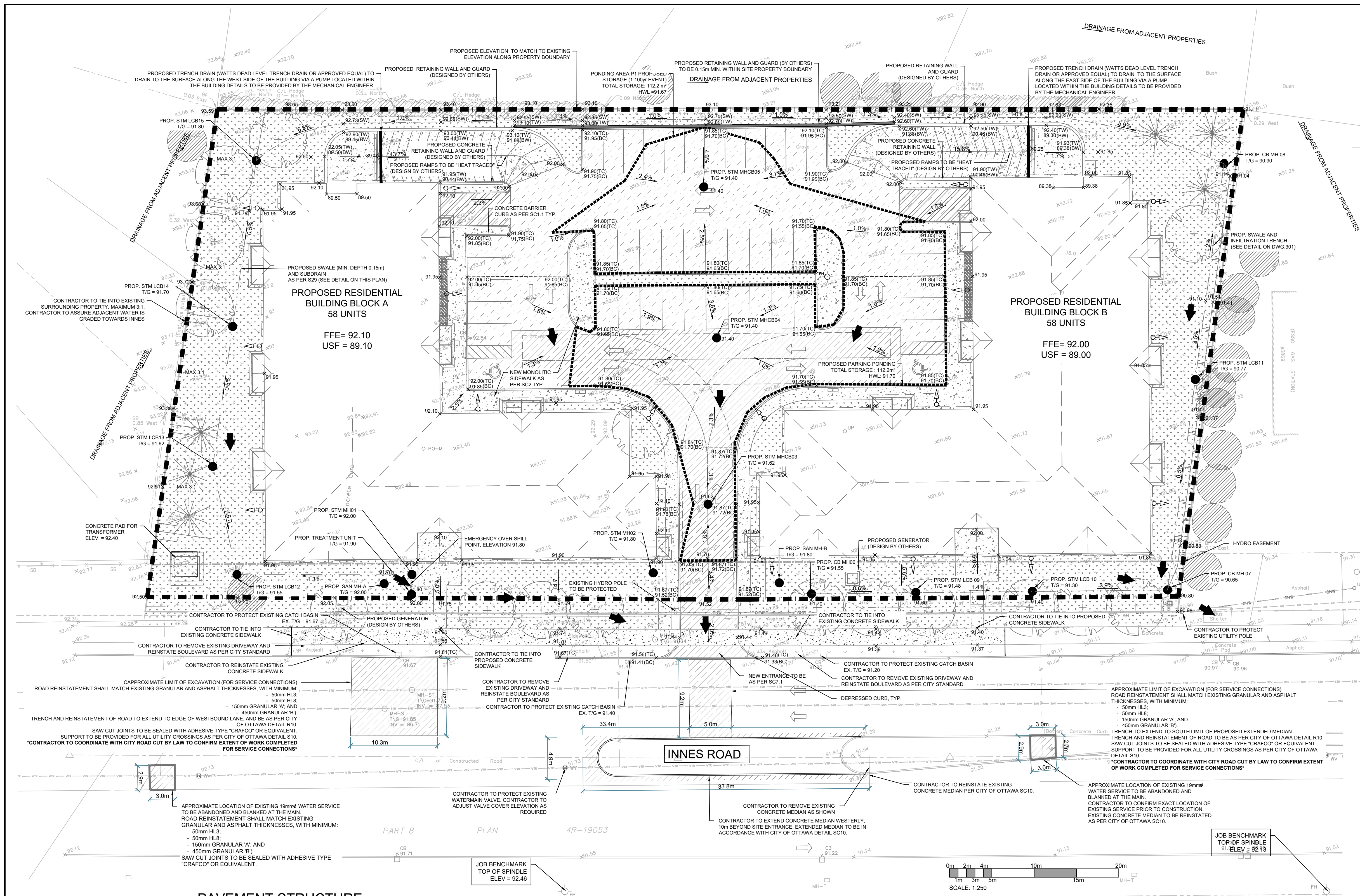
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- EROSION AND SEDIMENT CONTROL MEASURES:**
- ** CONTRACTOR IS RESPONSIBLE FOR ALL INSTALLATION, MONITORING, REPAIR AND REMOVAL OF ALL EROSION AND SEDIMENT CONTROL FEATURES **
- PRIOR TO START OF CONSTRUCTION:**
 - PRIOR TO THE REMOVAL OF ANY VEGETATIVE COVER, MOVING OF ANY SOIL, AND CONSTRUCTION:
 - INSTALL SILT FENCE IMMEDIATELY DOWNSTREAM FROM AREAS TO BE DISTURBED (SEE PLAN FOR LOCATION).
 - INSTALL GEOSOCK INSERTS WITH AN OVERFLOW IN ALL THE DOWNSTREAM CATCH BASINS AND MANHOLES.
 - INSTALL SILTSTACK FILTERS IN ALL CONCRETE CATCH BASIN STRUCTURES.
 - INSPECT MEASURES IMMEDIATELY AFTER INSTALLATION.
 - DURING CONSTRUCTION:**
 - WORK TO BE DONE IN THE VICINITY OF MAJOR WATERWAYS TO BE CARRIED OUT FROM JULY TO SEPTEMBER ONLY.
 - MINIMIZE THE EXTENT OF DISTURBED AREAS AND THE DURATION OF EXPOSURE.
 - PROTECT DISTURBED AREAS FROM RUNOFF.
 - PROVIDE TEMPORARY COVER SUCH AS SEEDING OR MULCHING IF DISTURBED AREA WILL NOT BE REHABILITATED WITHIN 30 DAYS.
 - INSPECT SILT FENCE, FILTER CLOTHS, AND CATCH BASIN SUMPS WEEKLY AND AFTER EVERY MAJOR STORM EVENT. CLEAN AND REPAIR WHEN NECESSARY.
 - PLAN TO BE REVIEWED AND REVISED AS REQUIRED DURING CONSTRUCTION.
 - EROSION CONTROL FENCING TO BE ALSO INSTALLED AROUND THE BASE OF ALL STOCKPILES.
 - DO NOT LOCATE TOPSOIL PILES AND EXCAVATION MATERIAL CLOSER THAN 2.5m FROM ANY PAVED SURFACE, OR ONE WHICH IS TO BE PAVED BEFORE PILE IS REMOVED. ALL TOPSOIL PILES ARE TO BE SEEDING IF THEY ARE TO REMAIN ON SITE LONG ENOUGH FOR SEEDS TO GROW (30 DAYS).
 - CONTROL WIND-BLOWN DUST OFF SITE TO ACCEPTABLE LEVELS BY SEEDING TOPSOIL PILES AND OTHER AREAS TEMPORARILY (PROVIDE WATERING AS REQUIRED).
 - ALL EROSION CONTROL STRUCTURE TO REMAIN IN PLACE UNTIL ALL DISTURBED GROUND SURFACES HAVE BEEN STABILIZED EITHER BY PAVING OR RESTORATION OF VEGETATIVE GROUND COVER.
 - NO ALTERNATE METHODS OF EROSION PROTECTION SHALL BE PERMITTED UNLESS APPROVED BY THIS CONSULTING ENGINEER AND THE CITY DEPARTMENT OF PUBLIC WORKS. TO PREVENT UNNECESSARY SEDIMENT DISCHARGE, THE CONTRACTOR IS PERMITTED TO PLACE ADDITIONAL SEDIMENT AND
 - EROSION CONTROL MEASURES IN A TIMELY MANNER, IF REQUIRED. THE CONTRACTOR TO ADVISE CONSULTANT ONCE INSTALLED FOR INSPECTION. CONTRACTOR RESPONSIBLE FOR CITY ROADWAY AND SIDEWALK TO BE CLEANED OF ALL SEDIMENT FROM VEHICULAR TRACKING ETC. AT THE END OF EACH WORK DAY.
 - PROVIDE GRAVEL ENTRANCE WHEREVER EQUIPMENT LEAVES THE SITE TO PREVENT MUD TRACKING ONTO PAVED SURFACES. GRAVEL BED SHALL BE A MINIMUM OF 15m LONG, 4m WIDE AND 0.3m DEEP AND SHALL CONSIST OF COARSE (50mm CRUSHER-RUN LESTONE). MAINTAIN GRAVEL ENTRANCE IN CLEAN CONDITION.
 - DURING WET CONDITIONS, TIRES OF ALL VEHICLES/EQUIPMENT LEAVING THE SITE ARE TO BE SCRAPPED.
 - ANY MUD/MATERIAL TRACKED ONTO THE ROAD SHALL BE REMOVED IMMEDIATELY BY HAND OR RUBBER TIRE LOADER.
 - TAKE ALL NECESSARY STEPS TO PREVENT BUILDING MATERIAL, CONSTRUCTION DEBRIS OR WASTE BEING SPILLED OR TRACKED ONTO ADJUTING PROPERTIES OR PUBLIC STREETS DURING CONSTRUCTION AND PROCEED IMMEDIATELY TO CLEAN UP ANY AREAS SO AFFECTED.
 - AFTER CONSTRUCTION:**
 - PROVIDE PERMANENT COVER CONSISTING OF TOPSOIL AND SEED TO DISTURBED AREA.
 - REMOVE STRAW BALE FLOW CHECK DAMS, SILT FENCES AND FILTER CLOTHS ON CATCH BASINS AND MANHOLE COVERS AFTER DISTURBED AREAS HAVE BEEN REHABILITATED AND STABILIZED.
 - INSPECT AND CLEAN CATCH BASIN SUMPS AND STORM SEWERS.



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CHECK: GC	SCALE: 1:250																																
SEDIMENT & EROSION CONTROL PLAN																																	



PAVEMENT STRUCTURE

COURSE	MATERIAL	THICKNESS (mm)	
		LIGHT DUTY	HEAVY DUTY
SURFACE	HL.3 A/C (PG 58-28)	50	40
BINDER	HL.8 A/C (PG 58-28)	-	50
BASECOURSE	GRANULAR "A"	150	150
SUBBASE	GRANULAR "B" TYPE II	300	400

PONDING TABLE		
100 year storm HWL = 91.70		
PONDING AREA	VOLUME (m3)	DEPTH (mm)
P1	107.8	300

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8.	RE-ISSUED FOR SPA	FEB. 2025

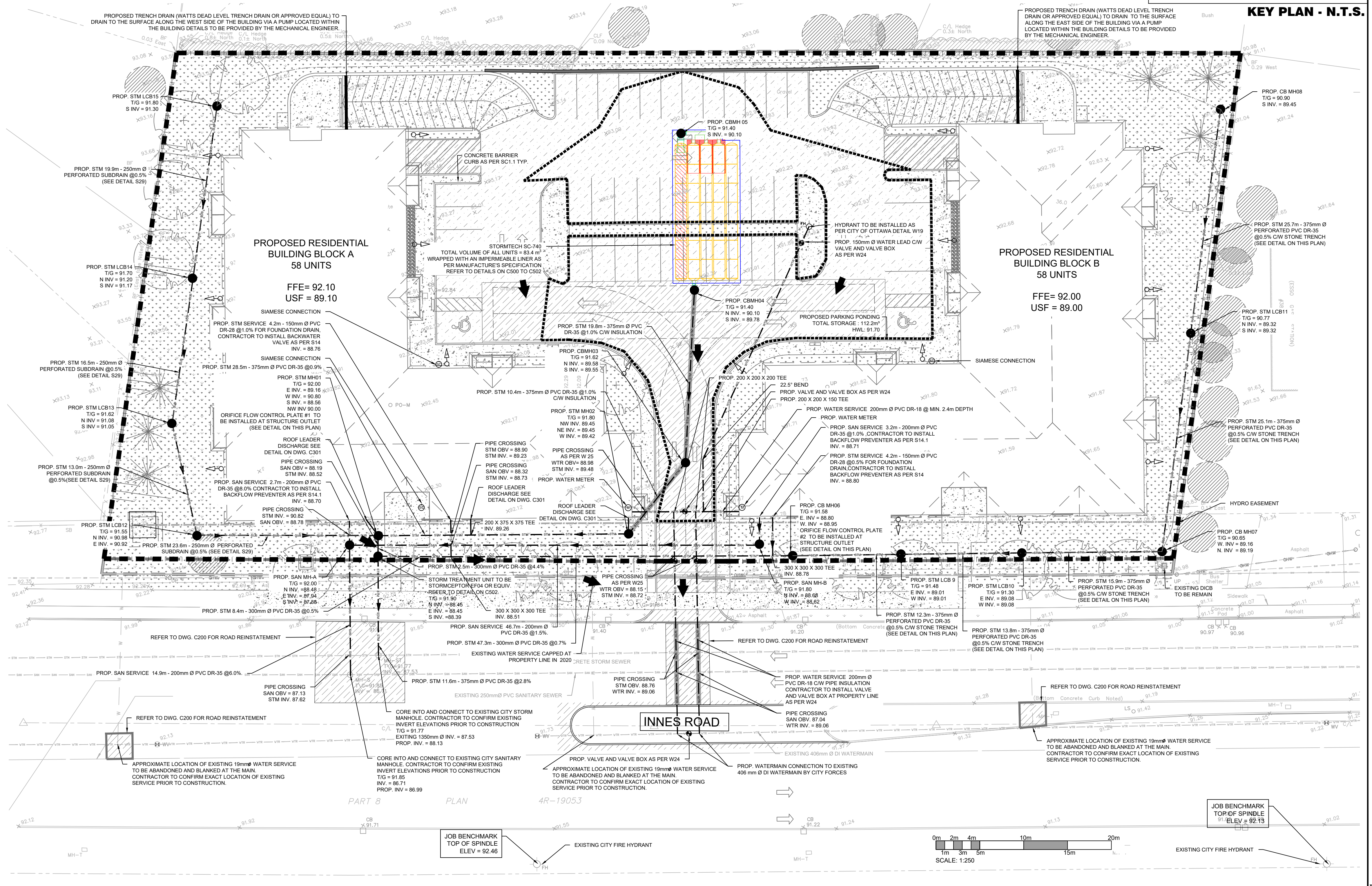
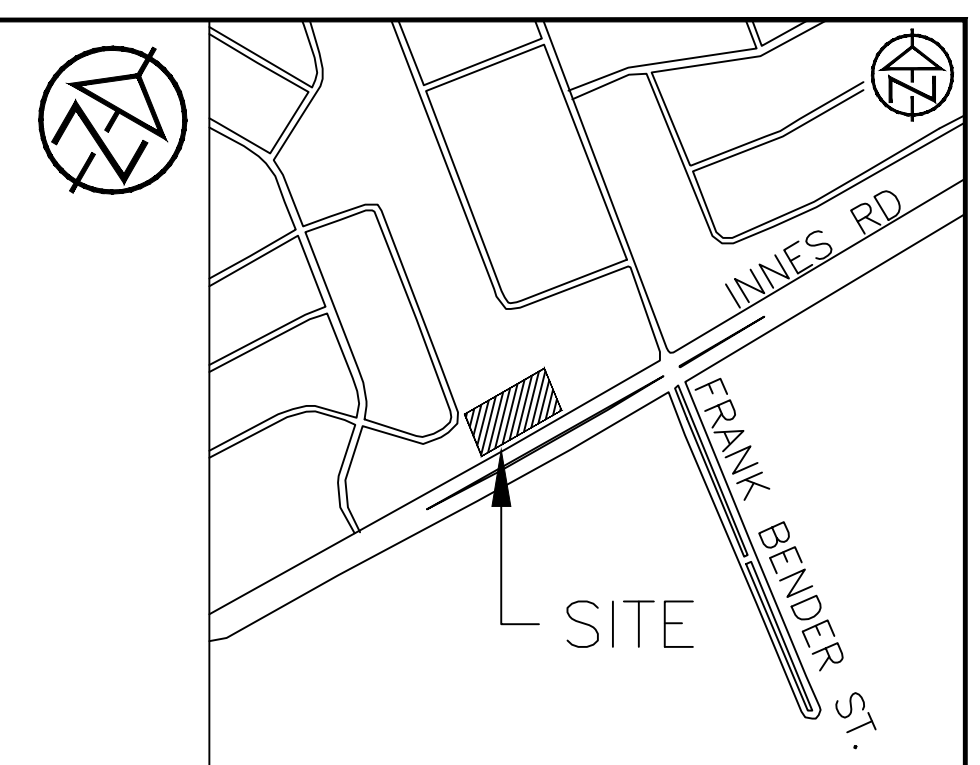
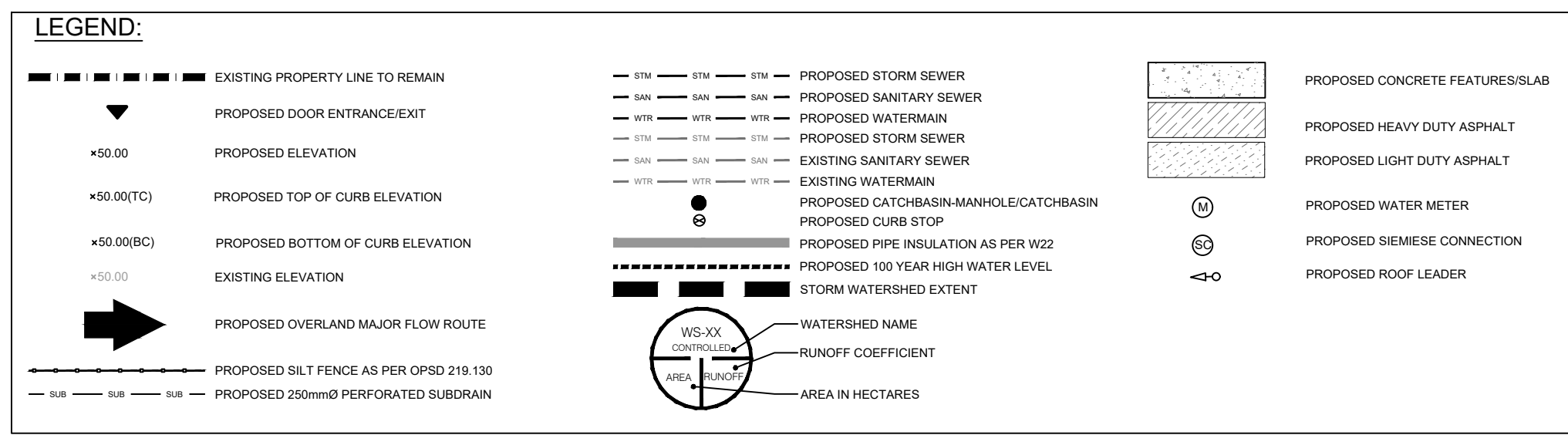
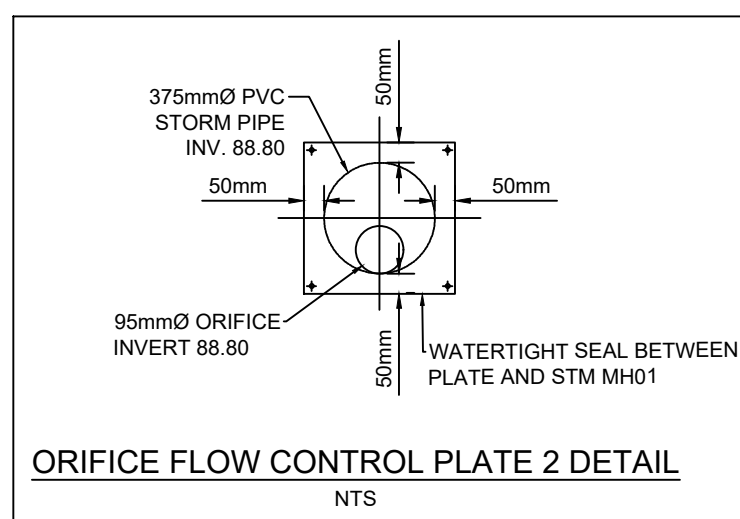
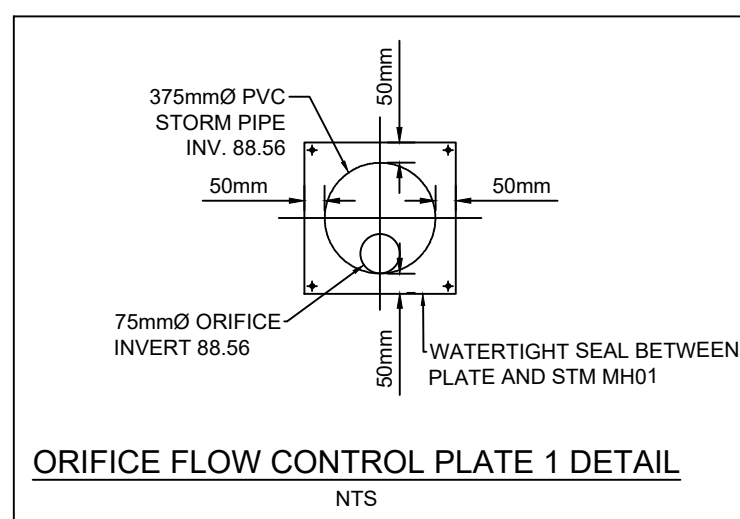
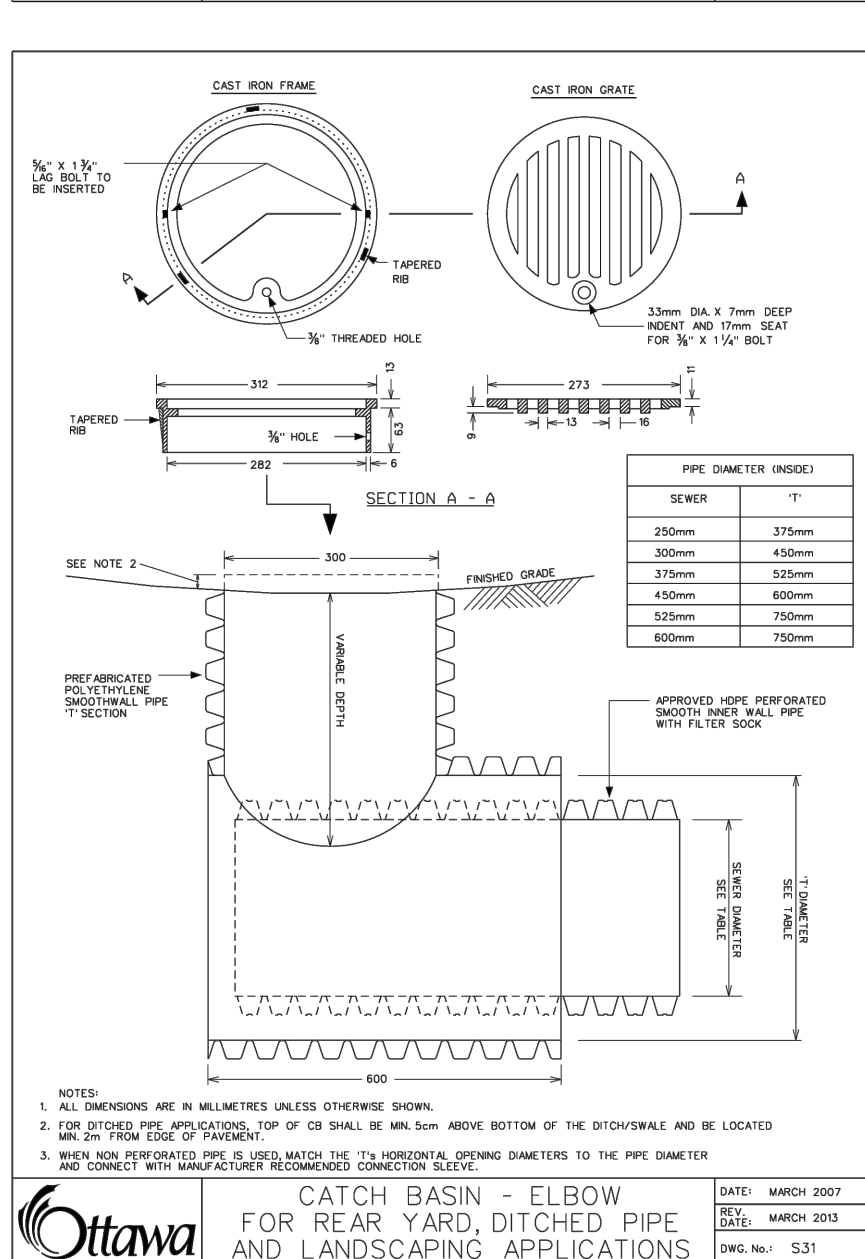
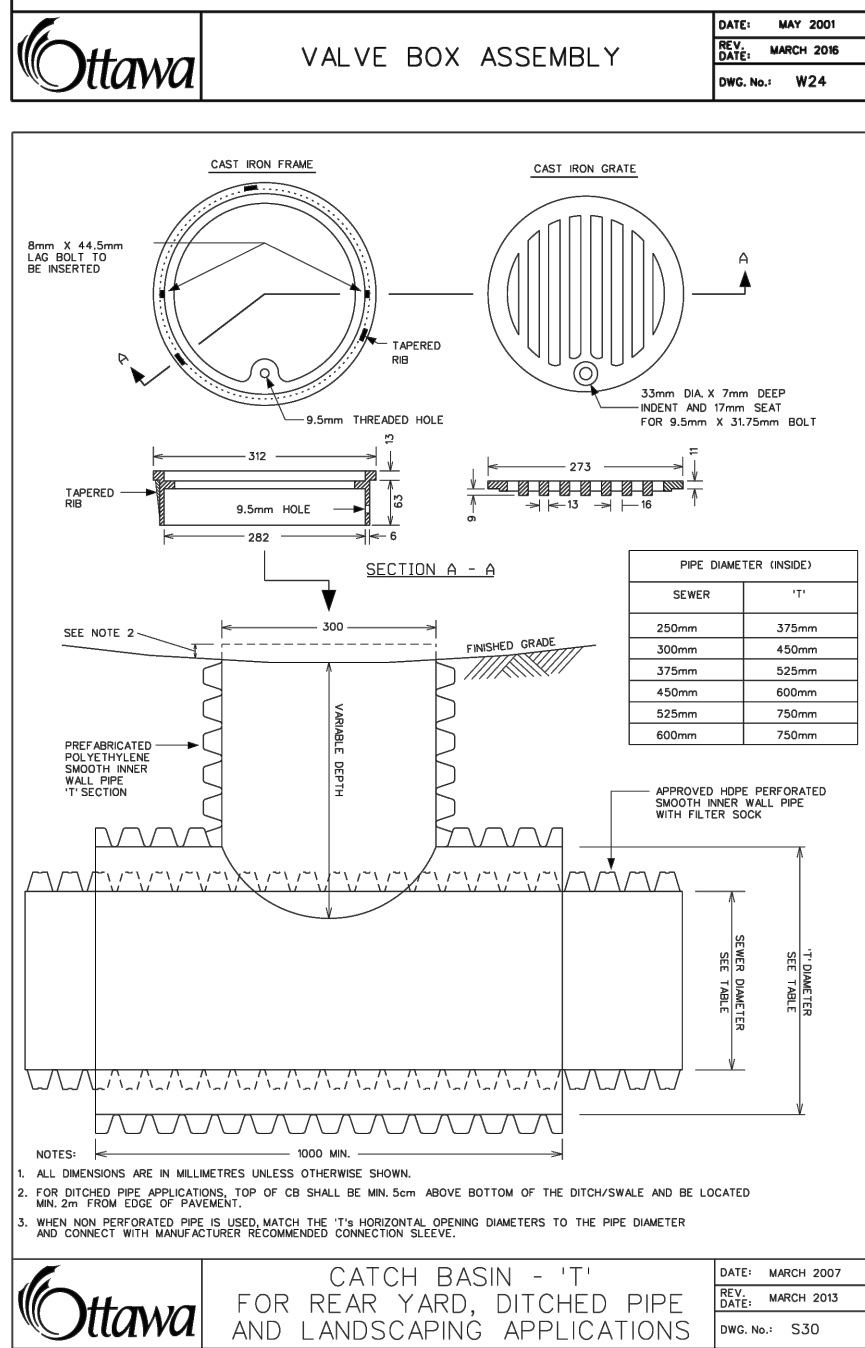
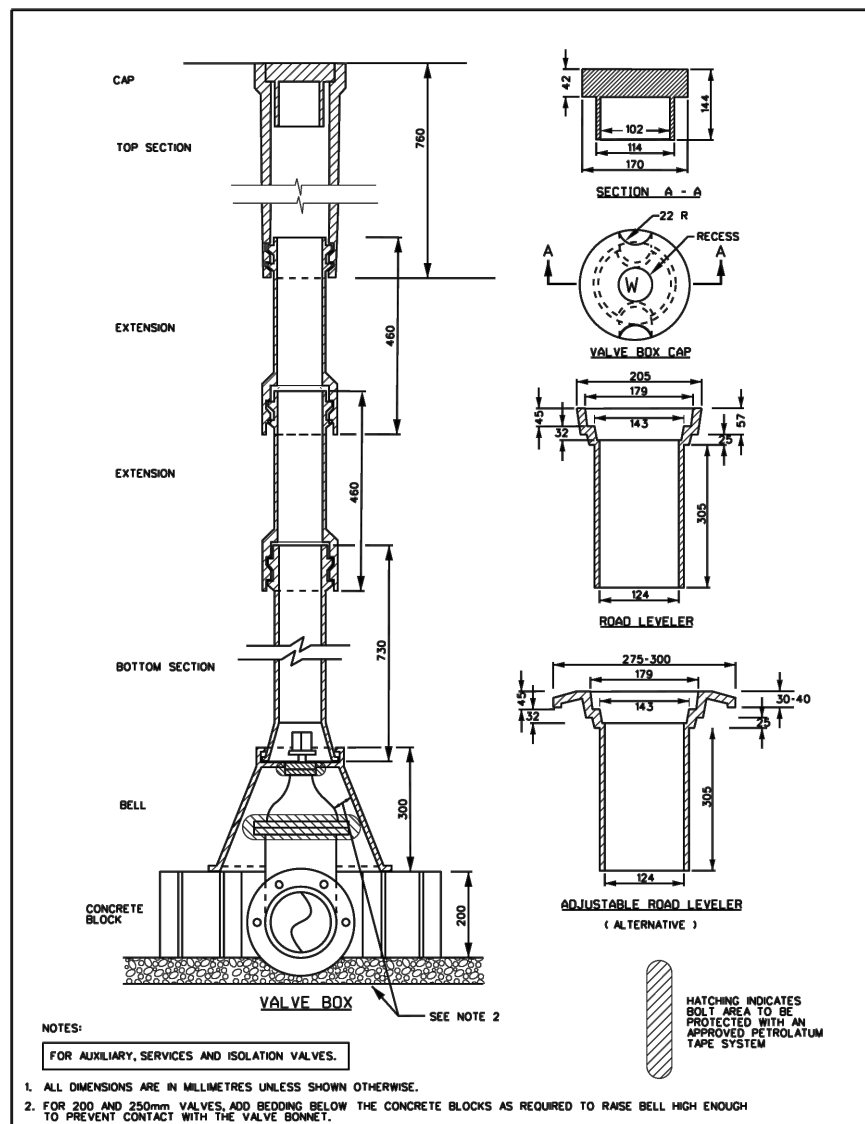
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BRIDOR DEVELOPMENTS
3817-3843 INNES ROAD
CITY OF OTTAWA

SITE GRADING PLAN

TATHAM ENGINEERING

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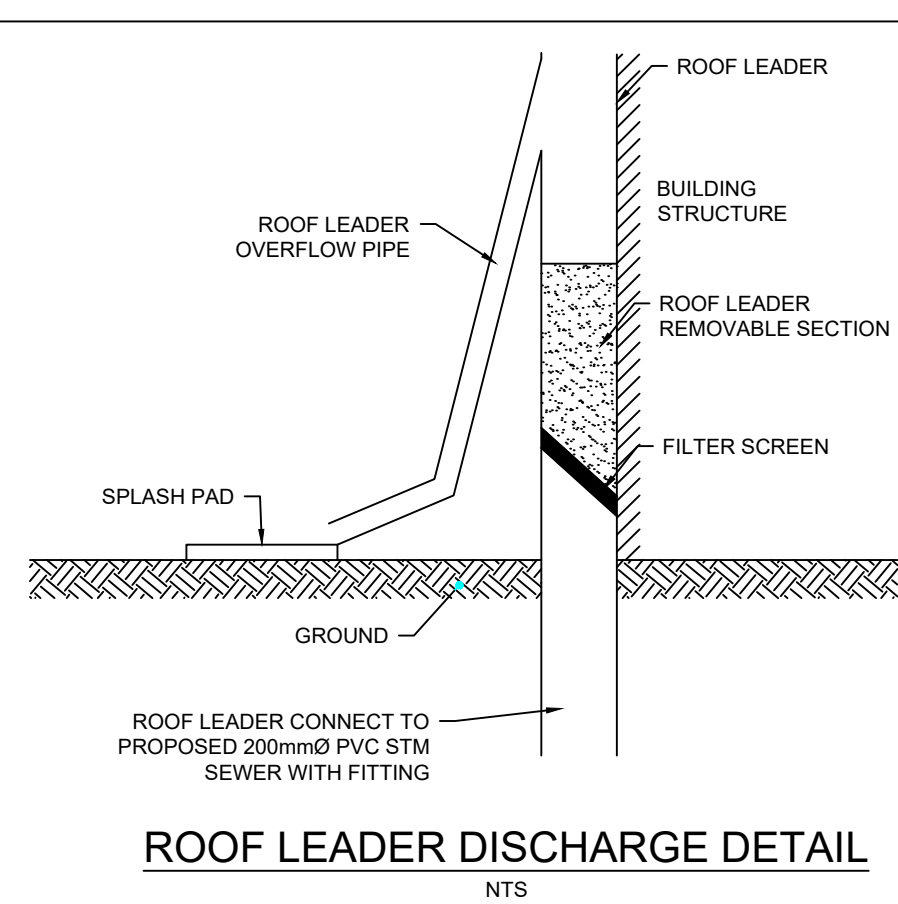
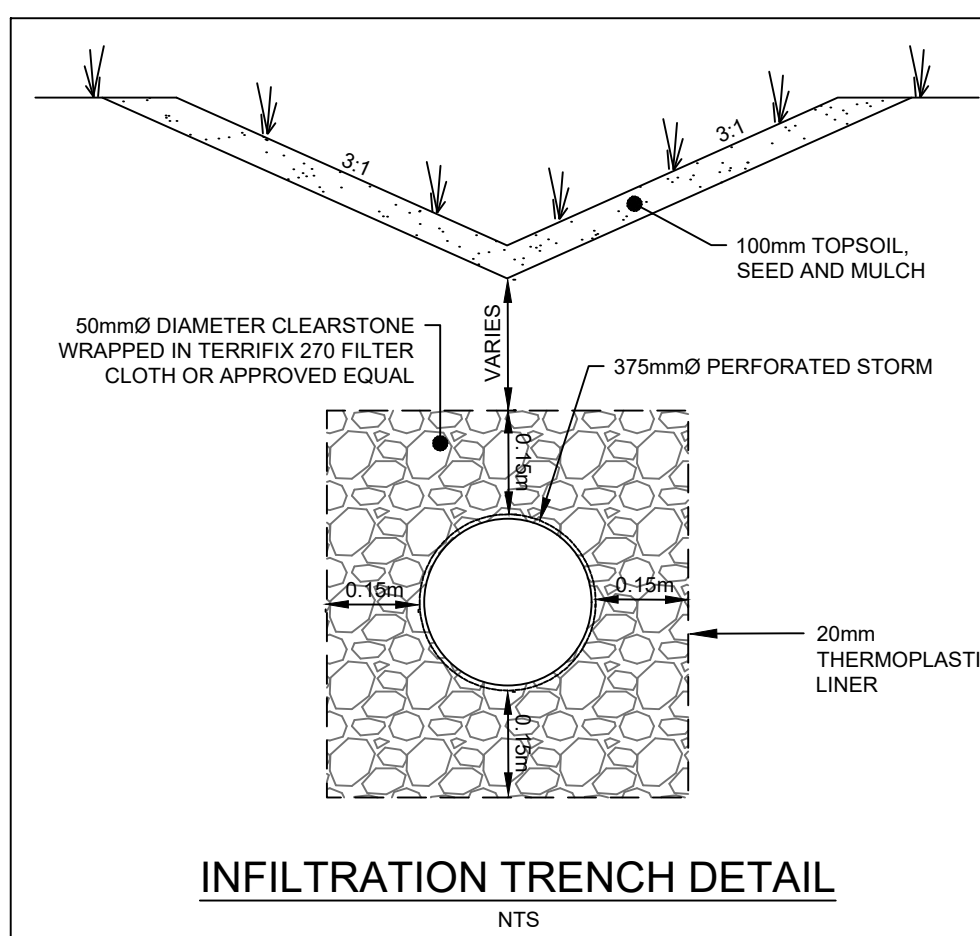


BRIDOR DEVELOPMENTS
3817-3843 INNES ROAD
CITY OF OTTAWA

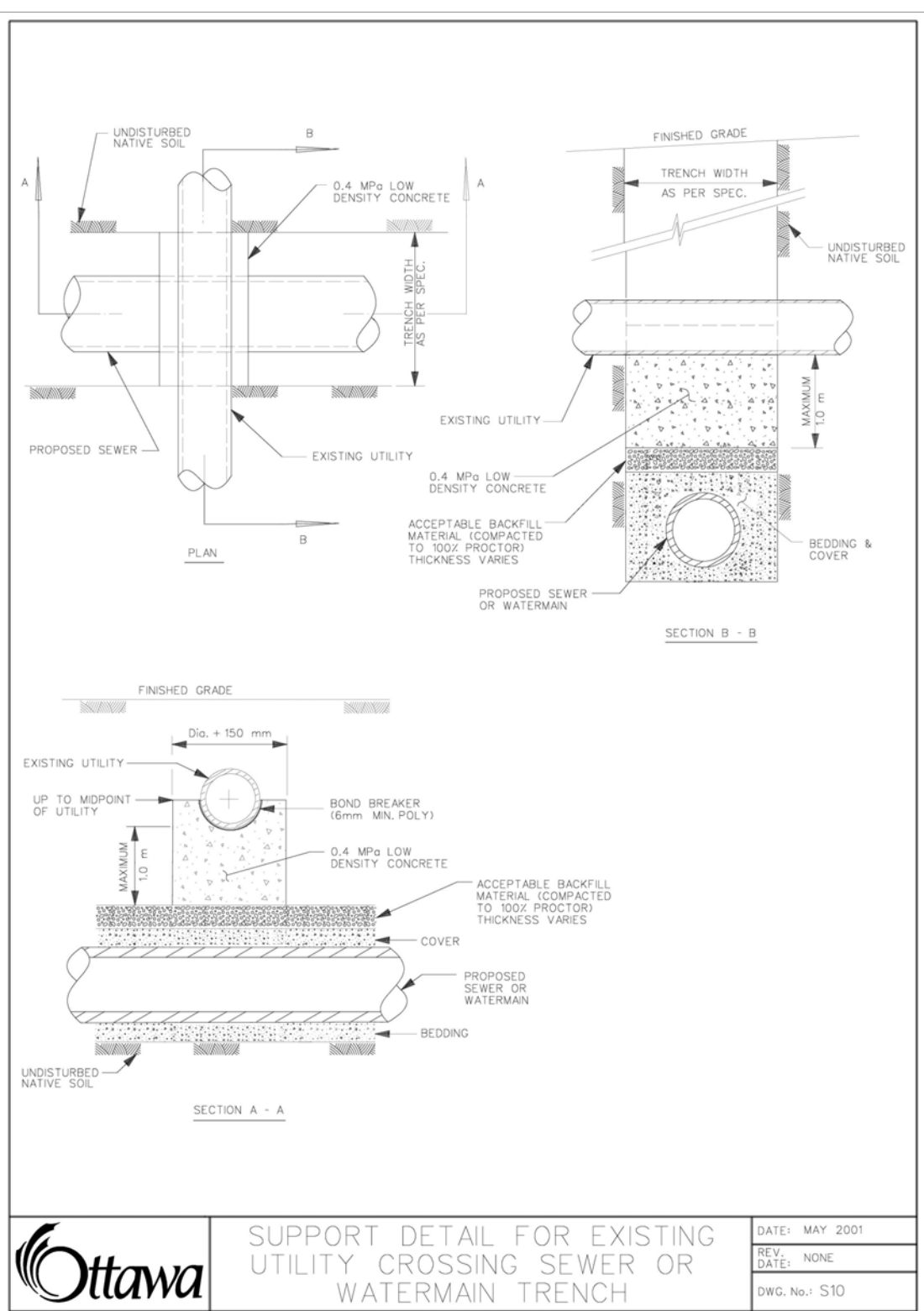
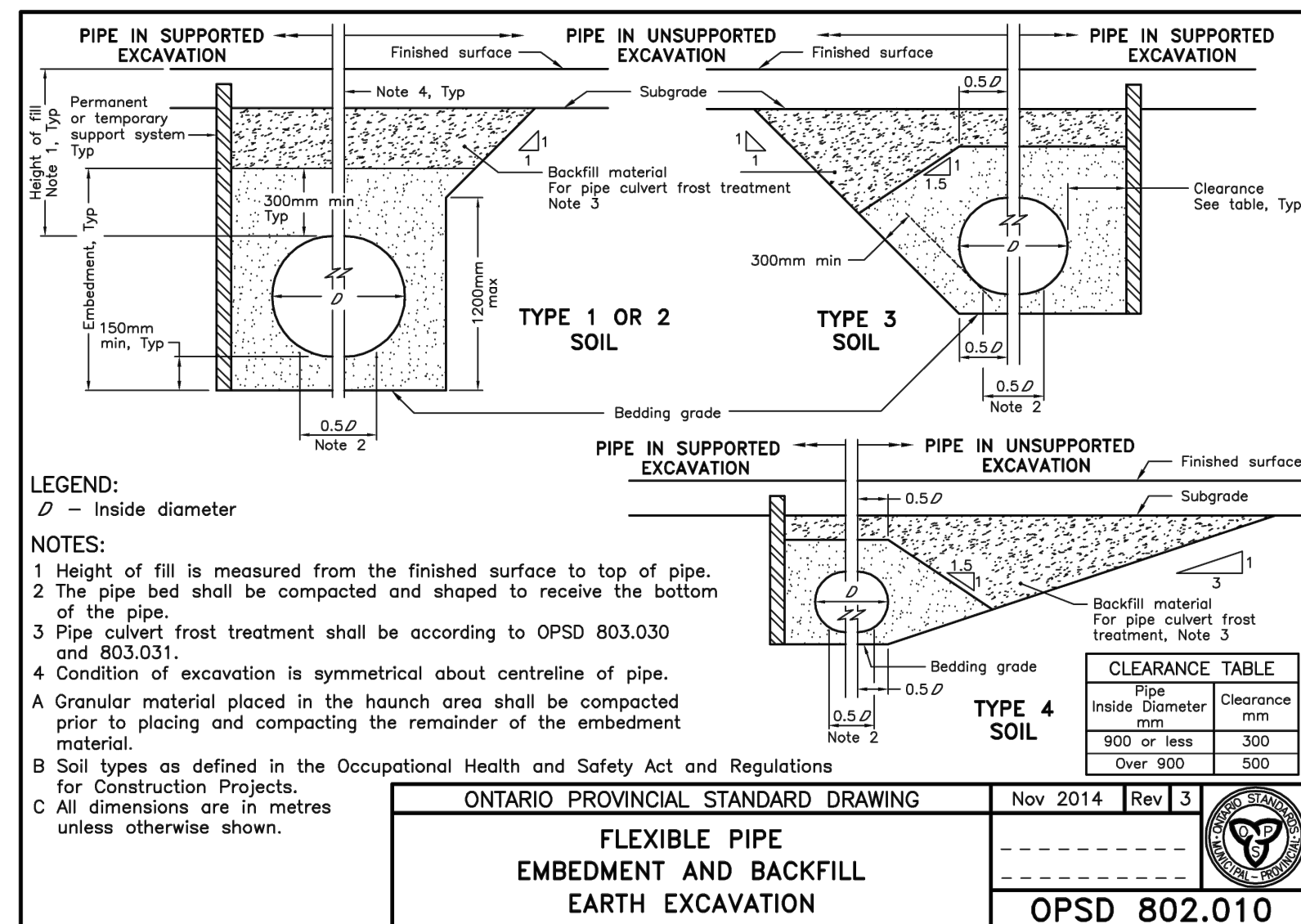
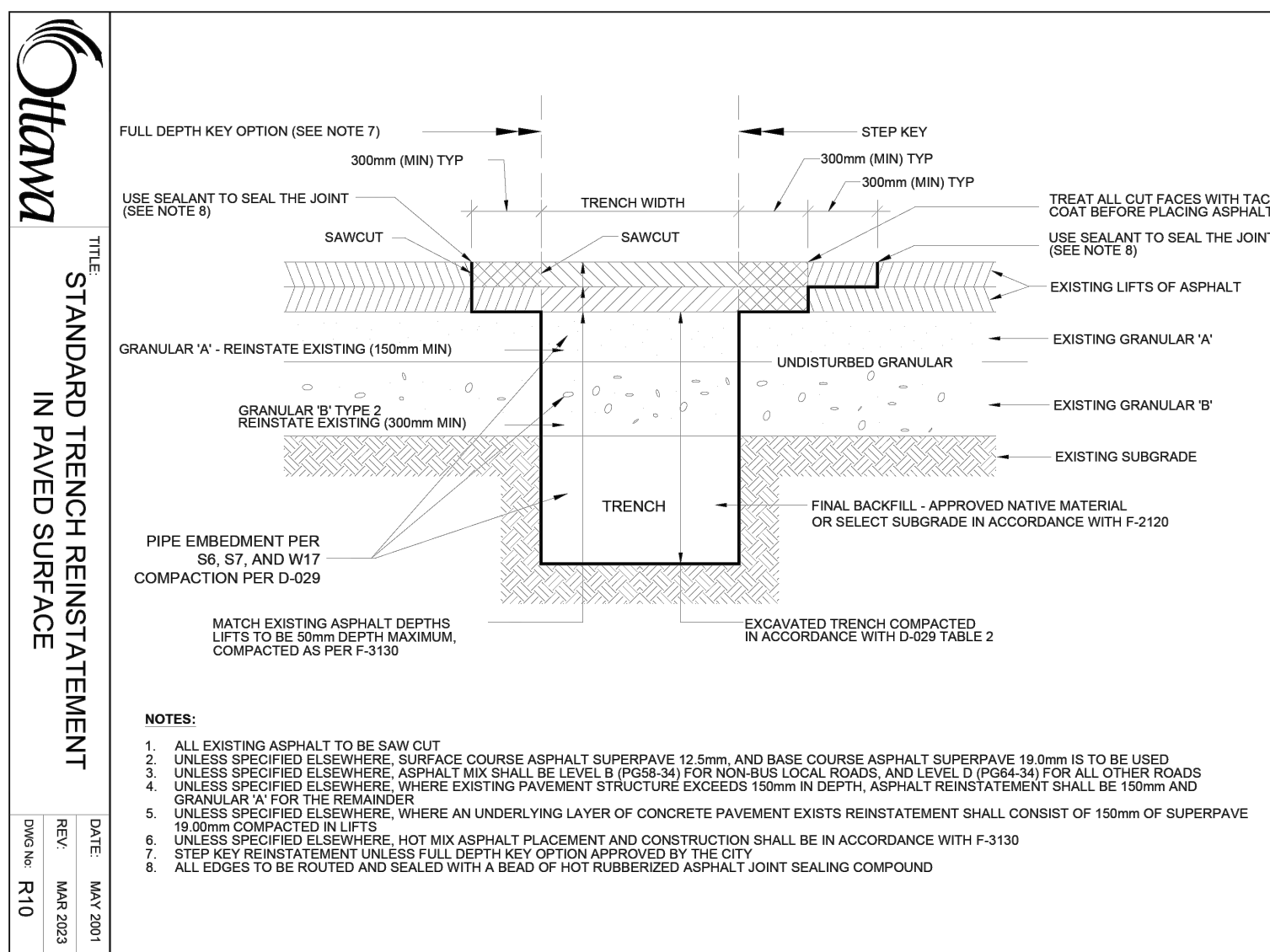
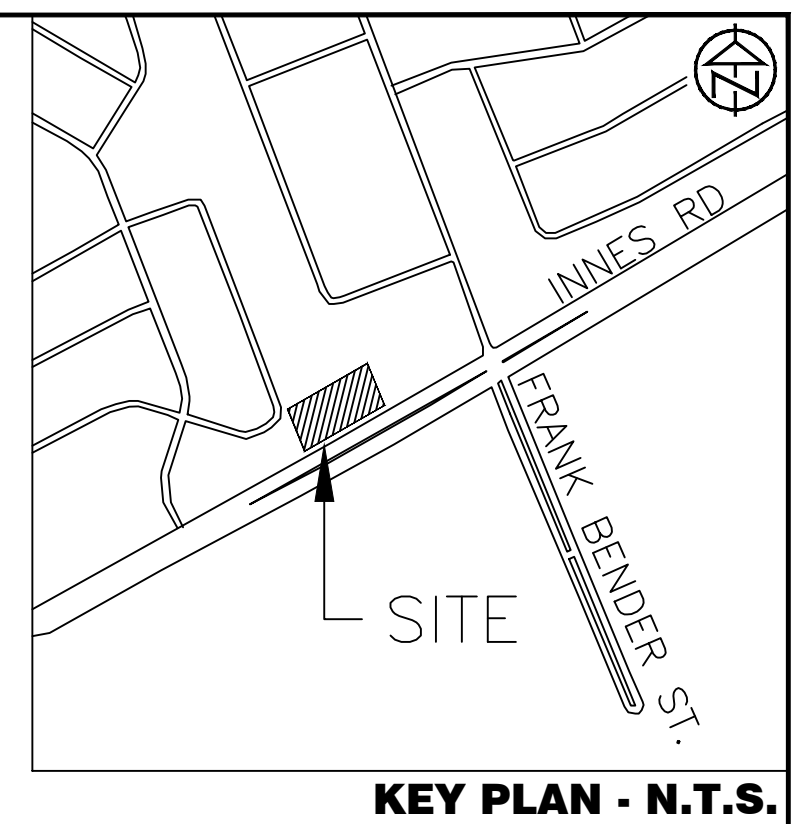
SITE SERVICING PLAN

TATHAM ENGINEERING

DESIGN: HY/GC	FILE: 522676	DWG:
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MANHOLE TABLE		
STORM		
MH Number	Size	Cover
STM MH01	1200mm	S24.1
STM MH02	1200mm	S24.1
CBMH03	1200mm	S28.1
CBMH04	1200mm	S28.1
CBMH05	1200mm	S28.1
CBMH06	1200mm	S28.1
CBMH07	1200mm	S28.1
CBMH08	1200mm	S28.1
LCB08 TO LCB14	S30 AND S31	
SANITARY		
MH Number	Size	Cover
MHA	1200mm	S24
MHB	1200mm	S24



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SIDE OF INNES ROAD, SOUTH OF SITE.
TOP OF SPINDLE ELEV=92.46

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SIDE OF INNES ROAD, SOUTHEAST OF SITE(90.0m
EAST FROM BENCHMARK 1)
TOP OF SPINDLE ELEV=92.13

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BRIDOR DEVELOPMENTS
3817-3843 INNES ROAD
CITY OF OTTAWA

SITE SERVICING PLAN



DESIGN: HY/GC

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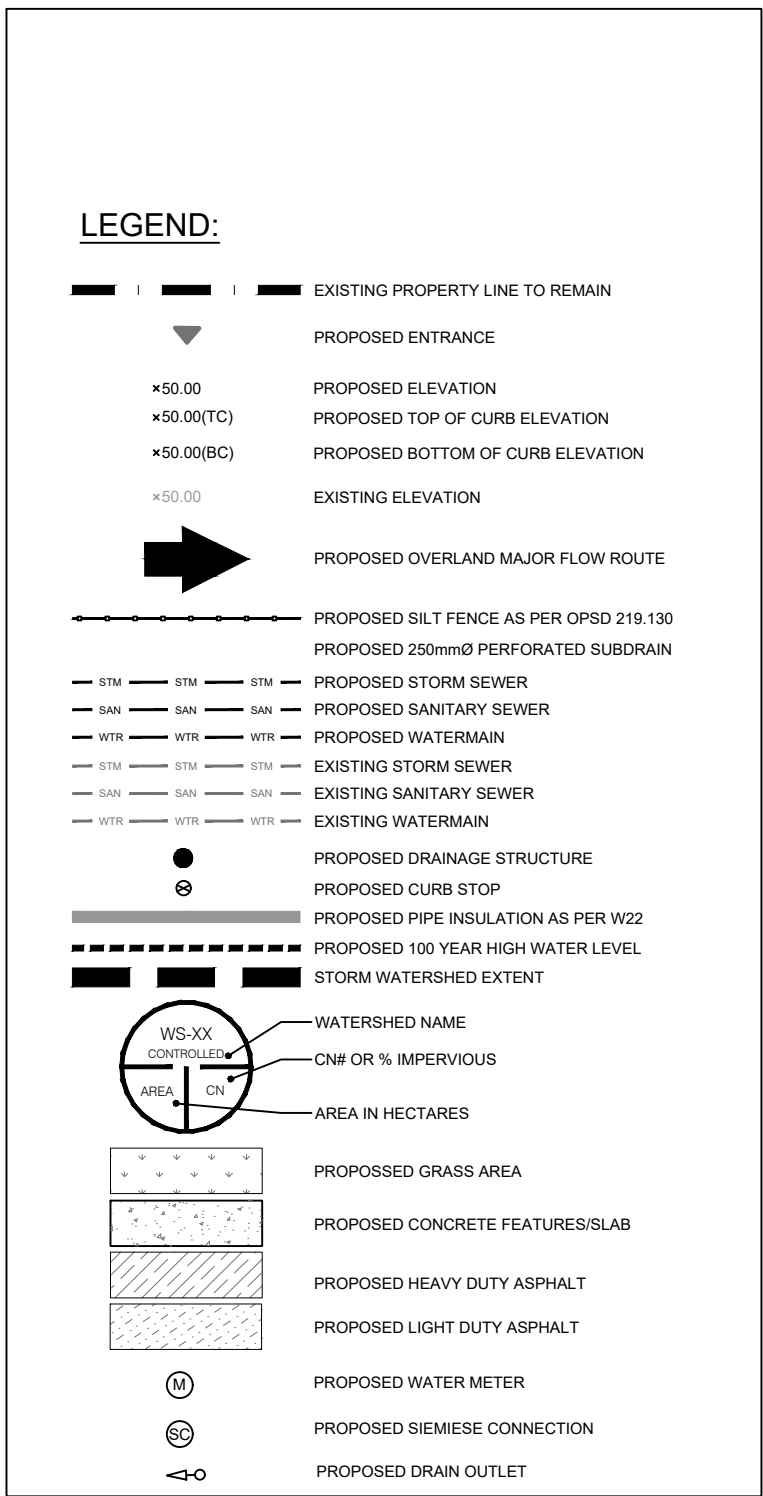
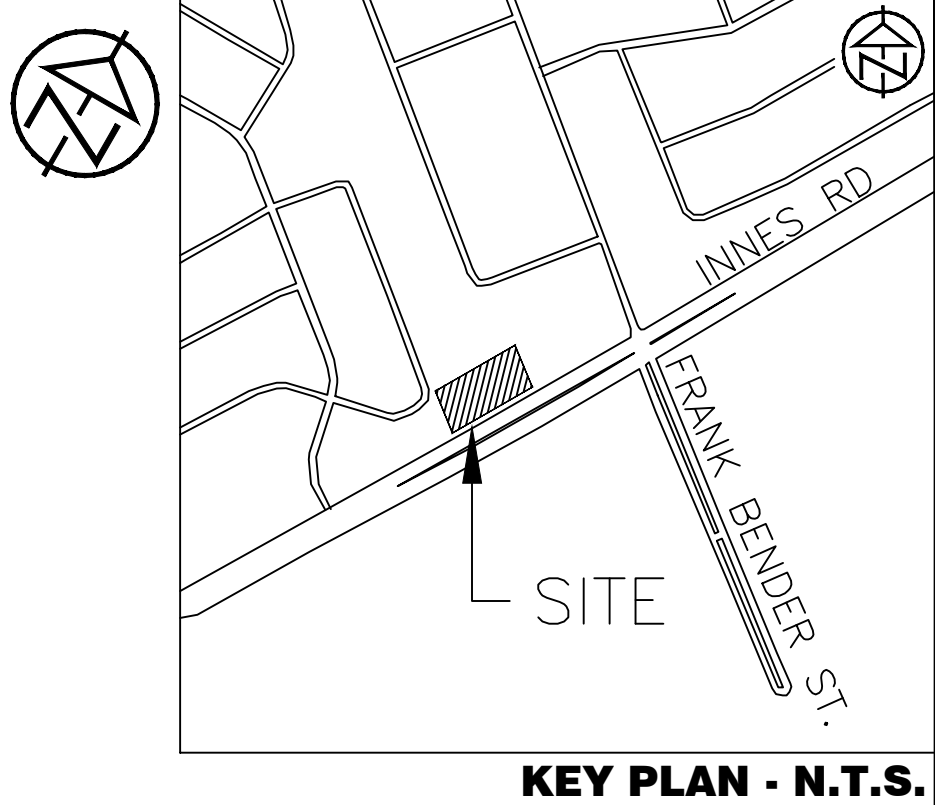
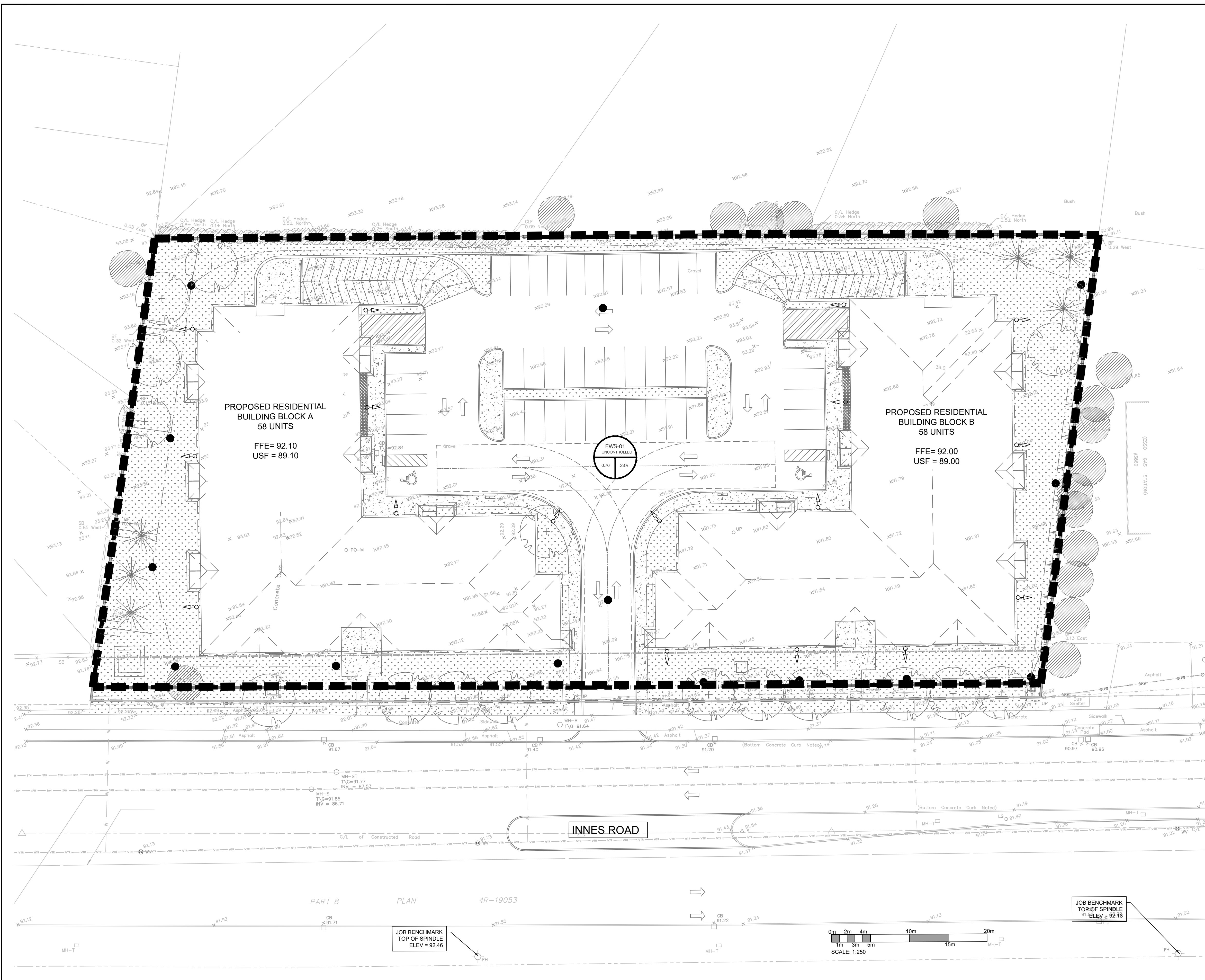
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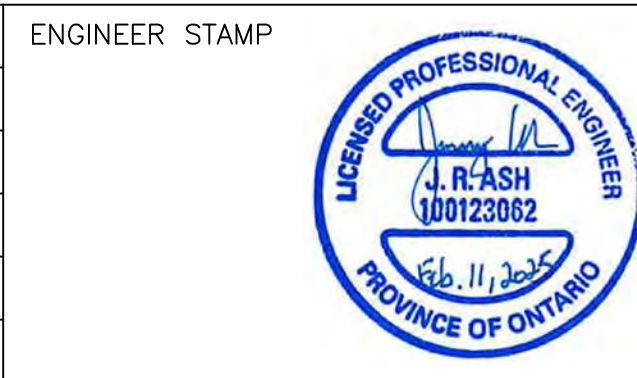
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TOP OF SPINDLE ELEV=92.13

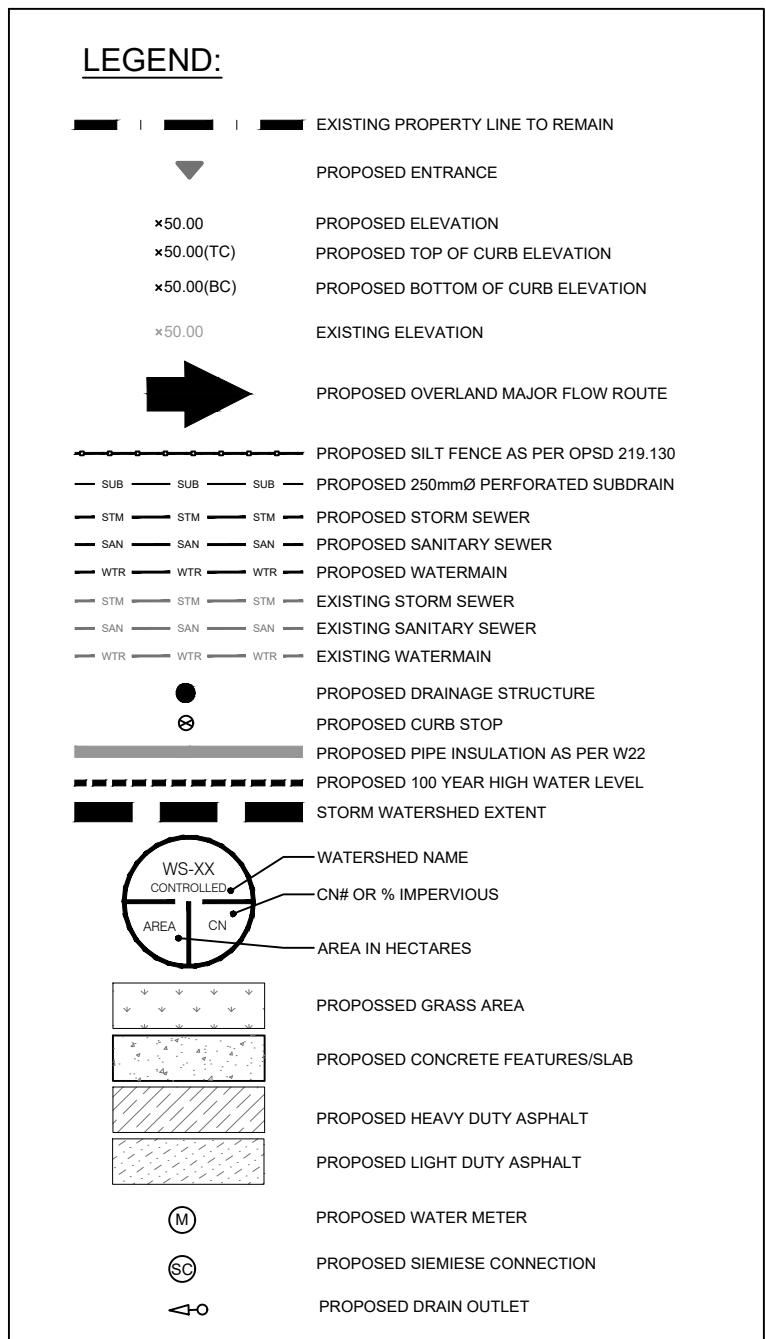
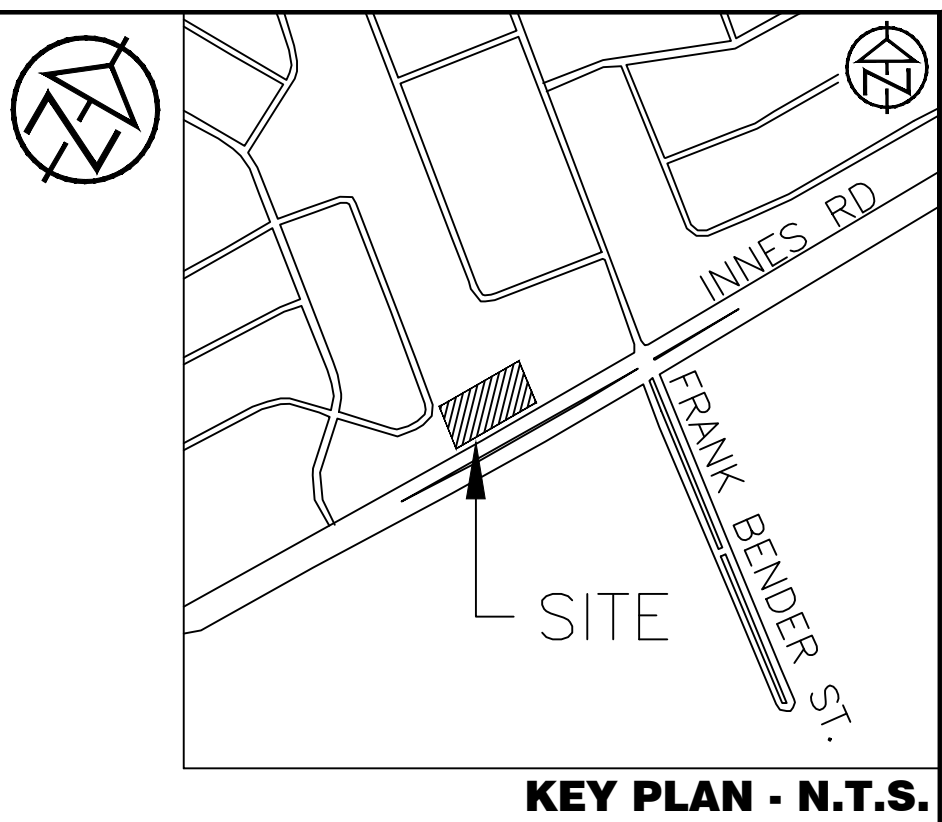
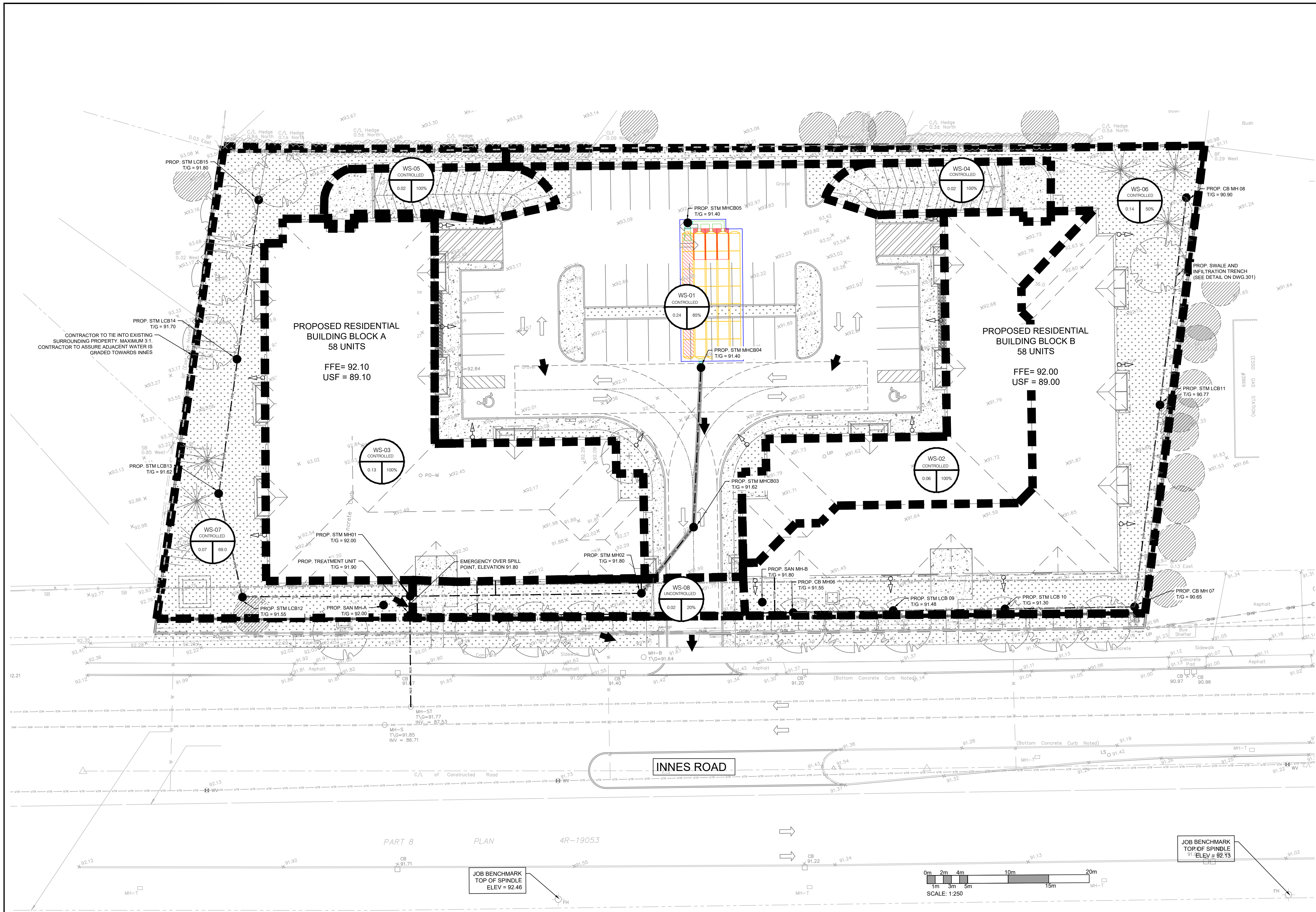
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8.	RE-ISSUED FOR SPA	FEB. 2025



BRIDOR DEVELOPMENTS
3817-3843 INNES ROAD
CITY OF OTTAWA

PRE DEVELOPMENT
DRAINAGE PLAN

DESIGN: HY/GC	FILE: 522676	DWG: C400
DRAWN: HY	DATE: OCT 2022	
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BENCHMARK1: FIRE HYDRANT LOCATED ON SOUTH SIDE OF INNES ROAD, SOUTH OF SITE. TOP OF SPINDLE ELEV=92.46

BENCHMARK2: FIRE HYDRANT LOCATED ON SOUTH SIDE OF INNES ROAD, SOUTHEAST OF SITE(90.0m EAST FROM BENCHMARK 1) TOP OF SPINDLE ELEV=92.13

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8.	RE-ISSUED FOR SPA	FEB. 2025

ENGINEER STAMP

J. R. ASH
100123062
Feb 11, 2025
PROVINCE OF ONTARIO

BRIDOR DEVELOPMENTS
3817-3843 INNES ROAD
CITY OF OTTAWA

POST DEVELOPMENT
DRAINAGE PLAN

TATHAM
ENGINEERING

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DRAWN: HY	DATE: OCT 2022	C401
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A map showing the location of the site. The site is a shaded rectangular area located at the intersection of Innes Rd and Frank Bender St. An arrow points from the label 'SITE' to the shaded area. A north arrow is located in the top right corner of the map.

SC-740 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH SC-740.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBERS SHALL BE CERTIFIED TO CSA B184, "POLYMER SUB-SURFACE STORMWATER MANAGEMENT STRUCTURES", AND MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE FOLLOWING FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE CSA S6 6-24S TRUCK AND THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" AND COORDINATIONS WITH THE FOLLOWING: (1) MINIMUM ASHED DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) ASHED DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
 - a. TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STIFFENING LUGS
 - b. TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 50 mm (2").
 - c. TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 500 LB/IN²/FT AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 23° C / 73° F), CHAMBERS SHALL BE PRODUCED FROM SELECTIVE GRS WITH 10% COLLOIDS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
 - a. THE STRUCTURAL EVALUATION SHALL BE SEaled BY A REGISTERED PROFESSIONAL ENGINEER.
 - b. THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.5 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
 - c. THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF THE SC-740 SYSTEM

1. STORMTECH SC-740 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
 2. STORMTECH SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310SC-740DC-780 CONSTRUCTION GUIDE".
 3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS.
STORMTECH RECOMMENDS 3 BACKFILL METHODS:
- STONES/HOOTER LOCATED OFF THE CHAMBER BED.
- BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
- BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
 4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
 5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
 6. MAINTAIN MINIMUM - 150 mm (6") SPACING BETWEEN THE CHAMBER ROWS.
 7. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE 20-50 mm (3/4-2").
 8. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
 9. ADS RECOMMENDS THE USE OF "FLEKSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.
- ### NOTES FOR CONSTRUCTION EQUIPMENT
1. STORMTECH SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310SC-740DC-780 CONSTRUCTION GUIDE".
 2. THE USE OF CONSTRUCTION EQUIPMENT OVER SC-740 CHAMBERS IS LIMITED:
 - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
 - NO RUBBER TIRED LOADERS, DUMP TRUCKS, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH SC-310SC-740DC-780 CONSTRUCTION GUIDE".
 - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH SC-310SC-740DC-780 CONSTRUCTION GUIDE".
 3. FULL 900 mm (36") OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.
- USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO THE CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.**
- CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

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SIDE OF INNES ROAD, SOUTH OF SITE.
TOP OF SPINDLE ELEV=92.46

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SIDE OF INNES ROAD, SOUTHEAST OF SITE(90.0m
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SIDE OF INNES ROAD, SOUTHEAST OF SITE(90.0m
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BRIDOR DEVELOPMENTS
3817-3843 INNES ROAD
CITY OF OTTAWA

DETAILS - 1

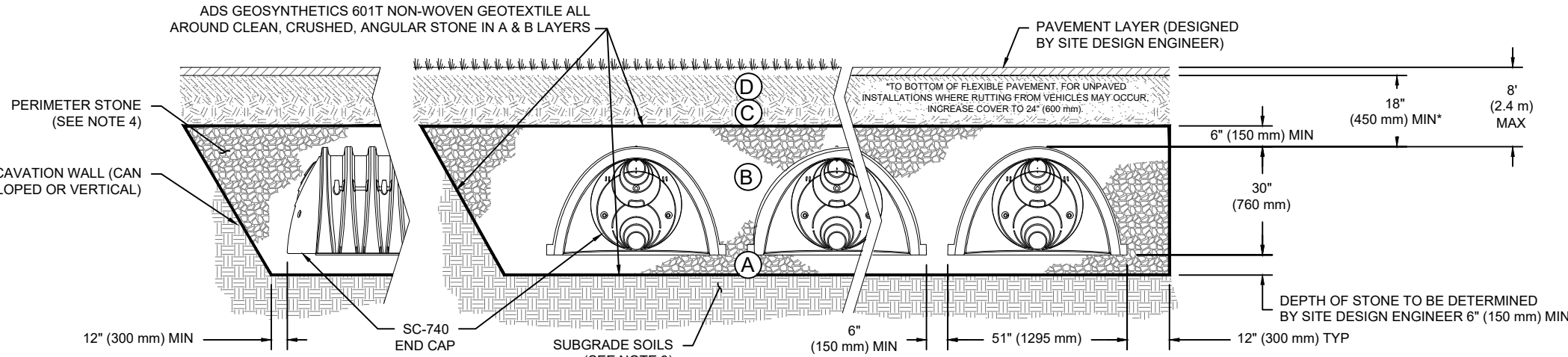


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CHECK: GC	SCALE: 1:250	

ACCEPTABLE FILL MATERIALS: STORMTECH SC-740 CHAMBER SYSTEMS

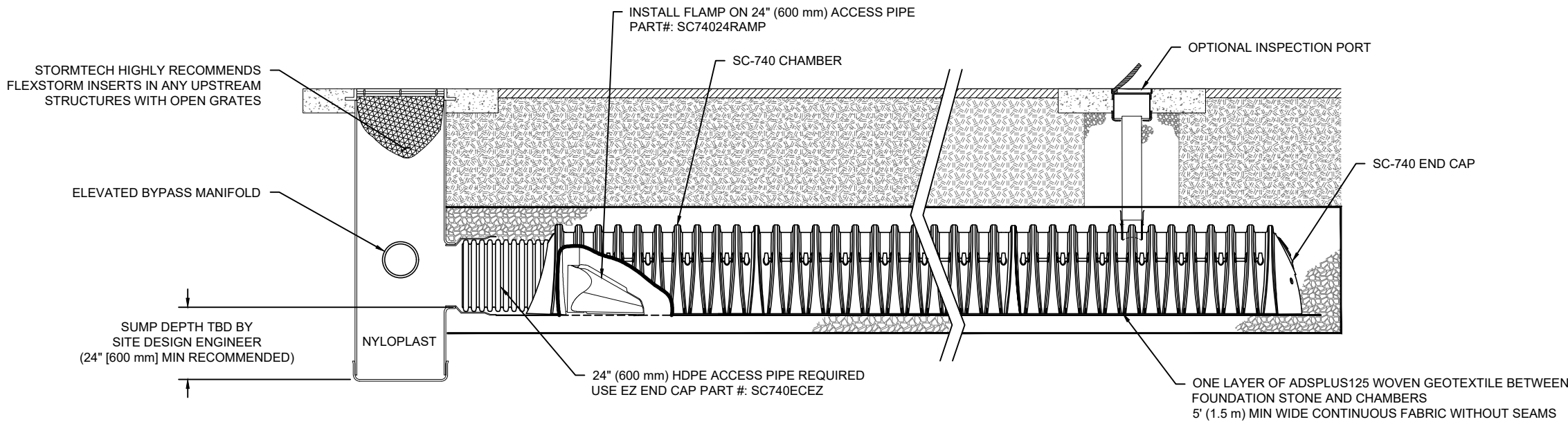
MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	FINAL FILL: FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	INITIAL FILL: FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M14S ¹ A-1, A-2-4, A-3 OR AASHTO M43 ¹ 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	EMBEDMENT STONE: FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43 ¹ 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	FOUNDATION STONE: FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43 ¹ 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE 2.3

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR ALL LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) MAX LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



NOTES:

- CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
- SC-740 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
- THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR 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.
- PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
- REQUIREMENTS FOR HANDLING AND INSTALLATION:
 - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
 - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
 - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 550 LBS/FT³%; THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.



SC-740 ISOLATOR ROW PLUS DETAIL
NTS

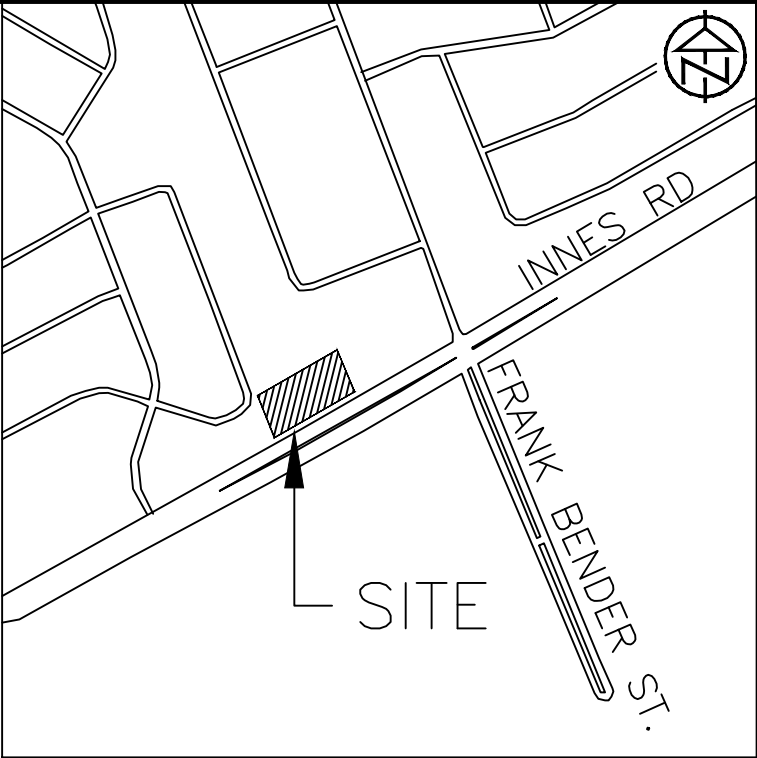
INSPECTION & MAINTENANCE

- STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- INSPECTION PORTS (IF PRESENT)
 - REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
 - REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
 - USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
 - LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
 - IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
 - ALL ISOLATOR PLUS ROWS
 - REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
 - USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
 - MIRRORS OR POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
 - FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
 - IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45° (1.1 m) OR MORE IS PREFERRED
 - APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
 - VACUUM STRUCTURE SUMP AS REQUIRED
- STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.
- STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

- INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
- CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

3817 INNES ROAD		OTTAWA, CANADA	
DATE:	DRAWN: HY	CHECKED: N/A	
PROJECT #:	DESCRIPTION:	DATE DRW CHK:	
StormTech® Chamber System		888-892-2694 WWW.STORMTECH.COM	
4640 TRUEMAN BLVD OTTAWA, ONTARIO K1J 1B1 1-800-733-7473	ADS		
SHEET 3 OF 6			



KEY PLAN - N.T.S.

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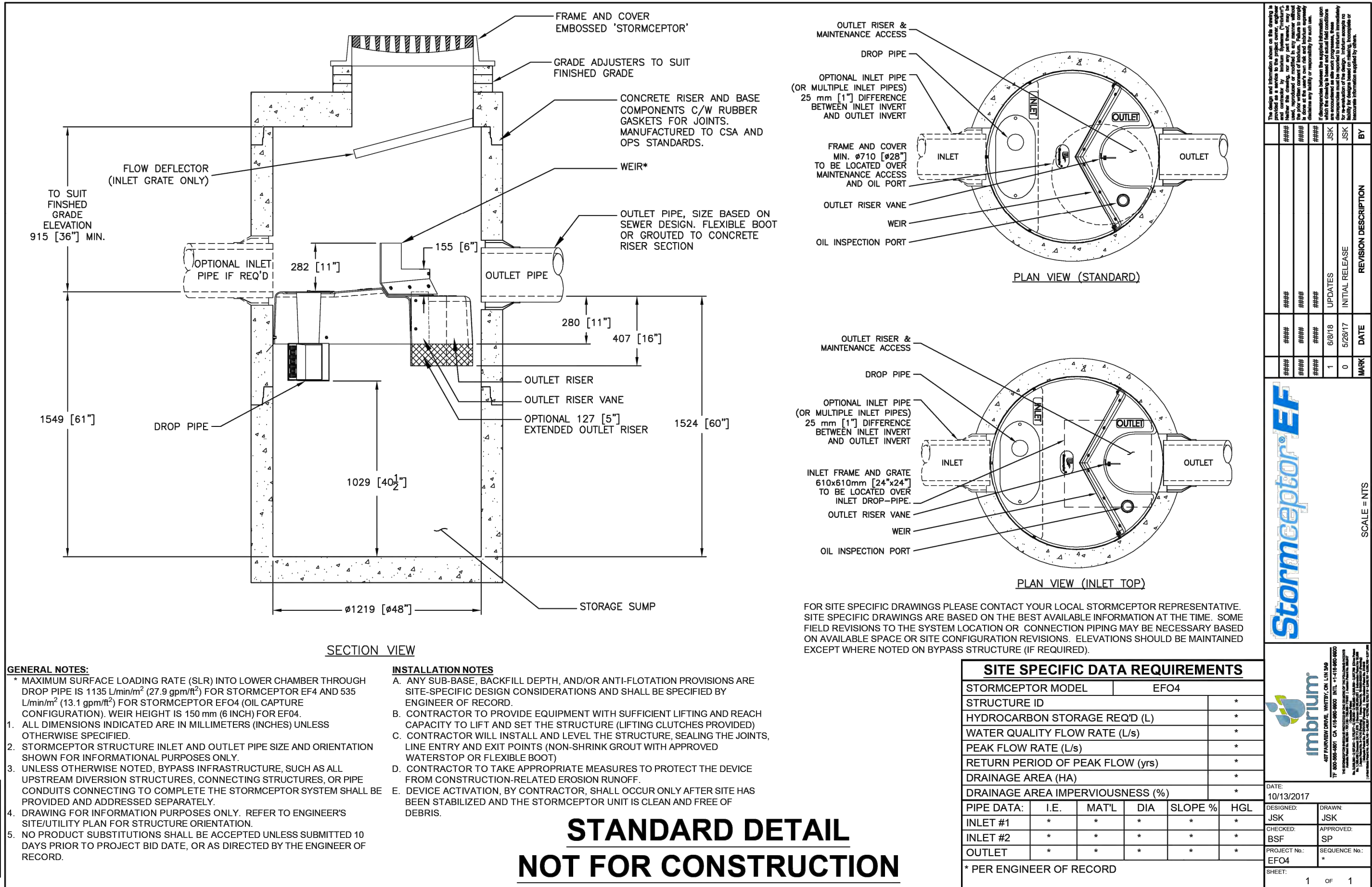
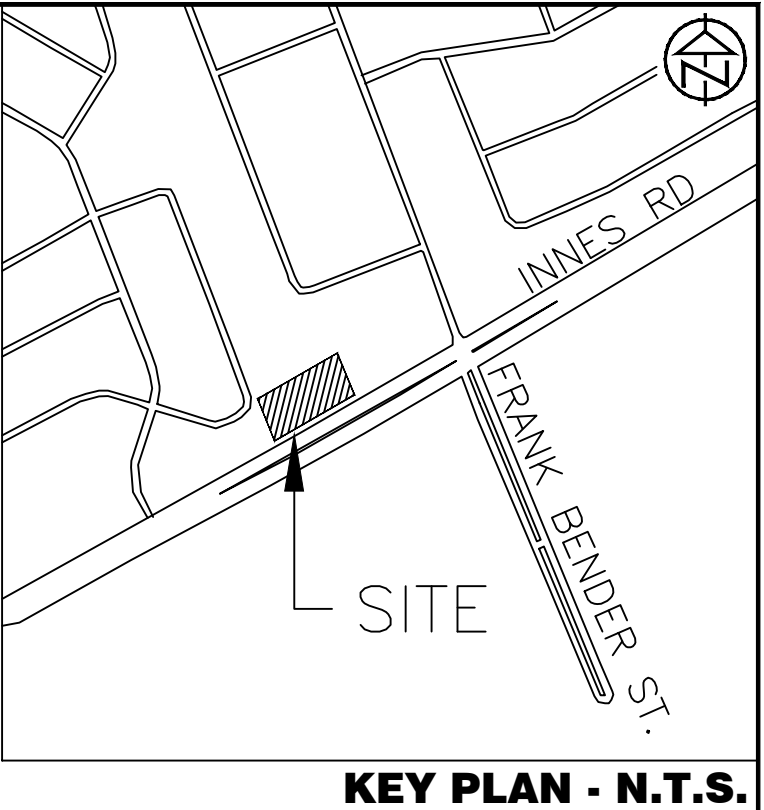
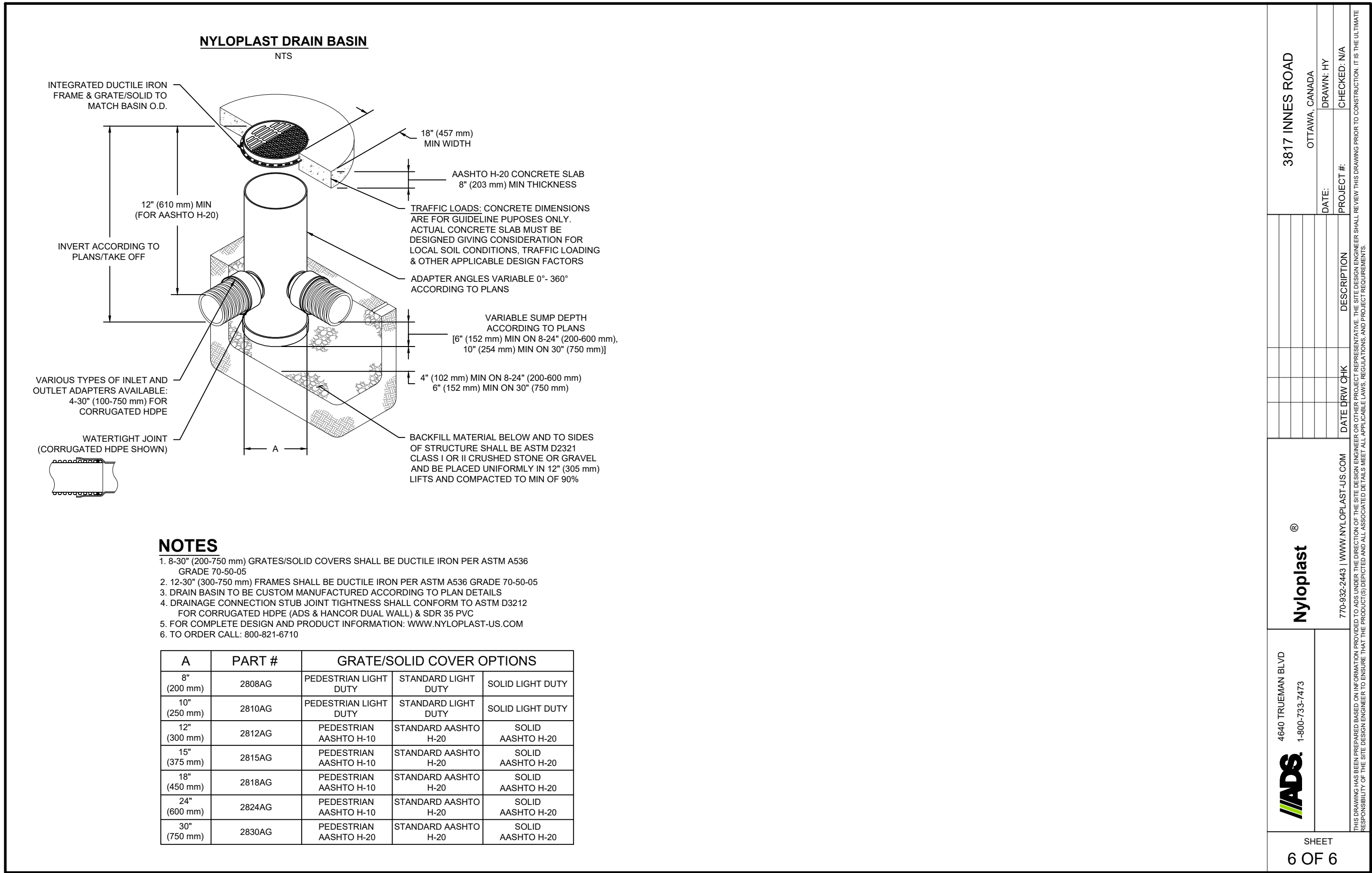
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8.	RE--ISSUED FOR SPA	FEB. 2025	

BRIDOR DEVELOPMENTS
3817-3843 INNES ROAD
CITY OF OTTAWA

DETAILS - 2

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BRIDOR DEVELOPMENTS
3817-3843 INNES ROAD
CITY OF OTTAWA

DETAILS - 3

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DESIGN: HY/GC
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CHECK: GC

FILE: 522676
DATE: OCT 2022
SCALE: 1:250

DWG:
C502

**Appendix G:
BL Engineering's Site Servicing
and SWM Report
(May 3, 2022)**

SITE SERVICING AND STORMWATER MANAGEMENT REPORT

Project Address – 3817 – 3843 Innes Road, Ottawa

Owner/Client: Bridor Development
Address: 996-B St-Augustin Rd, Embrun ON
City file Number:

By Blanchard Letendre Engineering Ltd.
Date – May 3, 2022
Our File Reference: 20-184

Submission
April 5, 2021

Previous Submission
December 17, 2020

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APPENDIX TABLE

Appendix A – Stormwater Design

Appendix B – Sanitary Design

Appendix C – Watermain Design

Appendix D – Stormwater Underground Chamber & Stormwater Treatment Unit

Appendix E – Boundary Conditions

Appendix F – Engineering Drawings

1.0 INTRODUCTION

Blanchard Letendre Engineering Ltd. (BLEL) was retained by Bridor Development. to complete their site servicing and stormwater management for the new proposed site located at 3817 – 3843 Innes Road in Ottawa. This report summarized proposed site servicing and stormwater management and should be read in conjunction with the engineering drawings prepare by BLEL. This report and site servicing plan have been prepared based on the site plan proposed by P-Square Concepts and the site survey completed by Annis O’Sullivan Vollebekk. The information contained herein is based on the provided drawings and if there is any discrepancy with the survey or site plan, BLEL should be informed in order to verify the information and complete the changes if required.

2.0 SITE PLAN

The proposed site is to be located in Orleans, Ontario. As per the aerial picture in figure 1, the existing site consist of and green space area with four (4) existing building that will be demolished prior to construction. The property located at 3817- 3843 Innes Road, consist of approximately 0.661ha of undeveloped land. The land will be developed with two (2) new residential apartments building and be severed into two separate properties with one (1) shared entrance.



Figure 1- Existing site at 3817 – 3843 Innes Road, Orleans, Ontario

3.0 STORM WATER MANAGEMENT

3.1 Existing Site Condition

The existing site currently has no stormwater management nor storm service connection. The site currently drains uncontrolled towards Innes road where the stormwater generated from the site is captured by the road site catchbasin. The existing property naturally grades towards Innes road away from the residential development on the north and west portion of the property. There is an existing gas station at the east side of the property that is developed at a lower elevation than the existing property. Refer to BL Engineering drawing C400 for the pre-development drainage area and existing grading showing the current drainage of the site.

3.2 Proposed Storm Water Management

The development of the site will consist of adding two (2) new residential apartment buildings. The site will be modified by adding a total of 2436 square meter of building (Block A = 1218m²; Block B = 1218m²) asphalt parking and driving and amenities areas. As the runoff coefficient will increase due to addition of hard surfaces, post-development stormwater quantity and quality will be implemented.

The site stormwater management has been prepared in correlation with the existing site grading. To minimize the fill and site work required, the stormwater management has been developed to follow the existing site grading. As the property naturally drains towards Innes Road, the proposed stormwater management will outlet to City storm sewer on Innes Road. The overland flow route has also been designed to convey the storm runoff towards Innes road.

The stormwater generated by the new hard surfaces will be directed to a series of catchbasins which will capture and convey the water runoff to existing the surrounding ditches. The catchment areas have been delineated as per the proposed grading plan. Refer to Appendix 'A', for the catchment area and runoff coefficient. In order to respect the 5 year pre-development allowable release rate, the outlets will be controlled by inlet control device which will limit the flow outletting to City storm sewer on Innes road. By throttling the flow, stormwater retention will be completed with the use of overland ponding and underground storage which was designed to hold the 100 year storm event. Refer to Appendix 'A' for the stormwater flow and storage calculations.

3.3 Proposed Storm Water Management

The pre-development flow of the 5-year storm was calculated using a 5-year storm and a 10-minute time of concentration for the affected area. The pre-development flow of the 100-year storm was calculated using a 100-year storm and a 10-minute time of concentration for the affected area. From intensity duration curves established for the Ottawa area, the intensity was evaluated at of 104.2 mm/hr for the 5yr predevelopment flow and 178.6mm/hr for the 100-year predevelopment

flow. A run-off coefficient of 0.45 was used as per the evaluated, see Appendix 'A' – Pre-Development Drainage Area table.

Using the Rational Method and considering the tributary areas of the proposed (see Appendix 'A'), the pre-development allowable release rate for the site was evaluated at **86.16 L/s**. See also the Storm Sewer Design Sheet in Appendix 'A'.

$$\begin{aligned}\text{Allowable Release Rate (Q)} &= 2.78CIA \text{ (L/s)} \\ I_s &= 998.071 / (T_c + 6.053)^{0.814} \\ C &= 0.45 \\ I &= 104.2 \text{ mm/hr} \\ T_c &= 10 \text{ min} \\ \text{Total} &= 0.661 \text{ ha} \\ \text{Allowable Release Rate} &= 86.16 \text{ L/s}\end{aligned}$$

3.4 Proposed Stormwater Quantity Control

The proposed stormwater management for the site will be achieved primarily through the use of underground pipe storage and overland surface ponding. The grading of the site has been designed to direct the stormwater towards the series of catchbasins connected to the underground stormwater chambers before outleting south into the 1350mm diameter storm city sewer. The proposed underground stormwater chambers and catchbasins are shown on the attached drawings in Appendix 'E'.

The proposed site has been graded to outlet overland onto Innes Road on the south side of the property. As the site naturally grades from the north side to the south side, the grades have been adjusted to suit this profile, to minimize the grade raise of the site. All catchment areas were designed to direct the stormwater overland to the south-east corner and to will be conveyed captured through a series of parking catchbasins and landscaping drains with subdrains.

The stormwater generated from site will be discharged to the existing storm sewer on Innes road and be controlled using an undersized pipe which will throttle the flow direct to the municipal sewer. The proposed inlet control device will release a total of **20.05 L/s** with a maximum head of 2.93m (HWL = 92.10) during the 100 year event. As the flow will be restricted, 223.81m³ of stormwater storage will be required for this area. This storage will be provided with underground stormwater chambers and surface ponding. The underground storage has been designed to hold and convey the stormwater water to the sewer on Innes road. The underground chambers will provide 160.0 m³ whereas the remaining will be stored on the parking and driving areas. An additional 65.82m³ of storage was designed overland which combined with the underground chambers (163.3 m³ + 68.82m³ = 229.12 m³) can hold more than the minimum required storage. Refer to the underground chambers in Appendix 'D'.

The two (2) underground parking ramp will be drained with separate catchbasin that will capture and to the underground garage drainage. These areas have been designated uncontrolled.

3.4.1 Roof Drainage

The proposed roofs are flat roof with roof drains. Drain and scuppers will be installed to drain the water onto the pavement area.

3.4.2 Underground Chambers

The underground storage chambers have been designed to hold and convey the stormwater generated from the site. The underground chambers have been designed to hold most of the stormwater under the proposed parking/ driving area. The chambers, which have been designed as isolator rows, were designed to also provide some filtration which is favorable for the final site TSS. A total of 163.30 m³ will be provided by the underground chambers. The chambers will be connected to the proposed manhole catchbasin which will facilitates the maintenance of the chambers. The maintenance of the chambers is to be in accordance with the manufacture. Refer to Appendix “D” for Stormwater Storage Chambers.

3.5 Proposed Stormwater Quality Control

A water quality control requirement of 80% TSS removal was set by the City of Ottawa. In order to meet the requirements, a storm treatment unit will be installed and the downstream end of the system. Using the Stormceptor sizing software, the EF06 was selected. The software generated report has been attached (See Appendix "D").

4.0 SANITARY SEWER DESIGN

4.1 Existing Site Conditions

The existing site is currently being service by a three separate service which services the existing three parcels and are connected to the existing 250mm diameter sanitary on Innes Road. The existing connection will be removed and reinstated with three new connection that will service the new buildings.

4.2 Existing Site Conditions

The new residential apartment building, which proposes 55 units for Block A and 55 units for Block B will discharge to the city via one new 200mm diameter sanitary services. The service will be located on the south face of the buildings Block A and will discharge to the existing 250mm diameter city sewer running along Innes road. The proposed 200mm diameter service will be installed at a minimum of 1.00% slope directly to the city sewer. A monitoring manhole (SAN-MH-A) is proposed for the new connection to city. Refer to drawing C300 – Site Servicing Plan for the existing and proposed sanitary service.

Based on the City of Ottawa Sanitary Design Guidelines, the sanitary peak loads were evaluated as follow; Block A: **1.57 L/s** and Block B: **1.57L/s**. As per the City specific design parameters, the sanitary flow was evaluated based on the new building footprint and the total site area for each individual building. Refer to Appendix 'B' for the sanitary sewer design calculation and design parameters set by the City of Ottawa.

5.0 WATER CONNECTION DESIGN

5.1 Existing Site Conditions

The existing site is currently being service by a three separate 19mm diameter water service which services the existing three parcels and are connected to the existing 403mm diameter watermain on Innes Road. The existing connection will be removed and reinstated with a new connection that will service the new buildings. There is currently two (2) city fire hydrant at the front of the property. The two (2) hydrants are located on the south side of Innes Road both within the 90m radius from the building main entrance. Refer to drawing C300 – Site Servicing Plan for the existing and proposed water services and city existing infrastructure.

5.2 Proposed Domestic Water Service

The two new residential apartment buildings water services were sized based on the City of Ottawa Design Guidelines and the AWWA Standards. Based on the number of fixtures proposed and on the average water demand for residential developments the daily water consumption was evaluated for the proposed building. As per the city guidelines, the average water demand per person of is **350L/c/d** was applied to the population of the new building. The daily and hourly peak factor of **2.5** and **2.2** respectively were applied to the water demand as stated in the City of Ottawa guideline. By using the average demand and peaking factors, the daily water demand for the new buildings were evaluated as follow:

	BLOCK A	BLOCK B	UNITS
Average Water Demand =	31850.00	31850.00	L/d
Maximum Daily =	79625.00	79625.00	L/d
Maximum Hourly =	175175.00	175175.00	L/d
Total Domestic Flow =	2.03	2.03	L/s
Total Fire Flow =	203.33	203.33	L/s

Refer to Appendix 'C' for the water flow calculation sheet.

5.3 Proposed Fire Demand

The new property will be serviced by a new fire hydrant located in front of Block B. Since the fire hydrants are located on the south side of Innes Road, the 45 meters of unobstructed path of travel is not possible hence the new fire hydrant will be installed. The fire hydrant will be installed in the city right of way and have a separate connection to the city 405mm diameter watermain.

The new residential buildings Block A and Block B will not have a sprinkler system as it is not required in the building code. Hence the new services were sized to supply only the domestic water. Therefore the buildings Block A and Block B will be serviced with two (2) new 75mm water service which will connect to the existing 405mm diameter watermain on Innes Road. The new service will be installed at the south elevation of the new buildings and be placed in the same trench as the other services.

5.4 Water Capacity Comments

The boundary conditions and HGL for hydraulic analysis for 3817 Innes was obtained from the city. See attached copy in Appendix 'E'. From the boundary conditions, the minimum HGL was evaluated at 130.3 m for the water main elevation at 91.6m and a maximum pressure estimate of 55.1 psi.

6.0 EROSION AND SEDIMENT CONTROL

During the construction, sediment and erosion protect will be implemented around the property to prevent any sediments from leaching off site. The construction and maintenance of the sediment controls must comply with the Ontario Provision Standard Specification OPSS 577. Refer to drawing C100 – Erosion and Sediment Control for the perimeter fence proposed.

7.0 CONCLUSION AND LIMITATION OF REPORT

7.1 Stormwater Management

The stormwater management proposed for the site will maintain the site to its pre-development release rate conditions and meet the requirements from the City of Ottawa. The post development release rate will be maintained to its pre-development rate of **86.16 L/s** through an **orifice plate of 103mm**, the outlet to the sewer main on Innes Road. Stormwater quantity control will be achieved with 160.00m³ underground chamber and 65.82 m³ overland. The stormwater quality control will be met through the use of a stormwater treatment unit and isolator rows in the underground chambers.

7.2 Sanitary Service

The current site will be serviced with three new 200mm sanitary connection onto Innes Road. The estimated sanitary flow of; Block A: **1.57 L/s** and Block B: **1.57L/s**, for the new connections will be directed to the existing sanitary sewer along Innes Road.

7.3 Water Service

Currently the existing buildings on site are serviced with an existing 19mm diameter water service that will be replaced with a new 10mm diameter water service to be connected to the existing 406mm diameter main on Innes Road. The existing connections will all be replaced with new water services. The water demand for the building was evaluated at: Block A: **2.03 L/s** and Block B: **2.03L/s** and the fire flow demand at Block A: **203.33 L/s** and Block B: **203.33 L/s**. There will also be a new fire hydrant installed on the property at the front of Block B in the city right of way.

8.0 LIMITATION

This report was prepared for **Bridor Developement.**, and is only applicable for the property at 3817 – 3843 Innes Road, Ottawa.

Any changes to the existing site may require a review by Blanchard Letendre engineering Ltd. to ensure all information is consistent with the proposed design.

Should you have any questions, please do not hesitate to contact the undersigned.

Sincerely Yours,



Guillaume Brunet, P. Eng.

APPENDIX “A”

Stormwater Management Design

File No.	20-184	Date:	May 3, 2022
Project:	Proposed Apartment Buildings	Designed:	Guillaume Brunet
Project Address:	3817-3843 - Innes Road	Checked:	Guillaume Brunet
Client:	Bridor Development	Drawing Reference:	C200 & C300

STORM WATER MANAGEMENT DESIGN SHEET

SEWER DESIGN

LOCATION			AREA (ha)			FLOW					STORM SEWER DATA							
WATERSHED / STREET	From MH	To MH	C = 0.30	C = 0.80	C = 0.90	Indiv. 2.78AC	Accum. 2.78AC	Time of Conc. (min.)	Rainfall Intensity (mm/hr)	Peak Flow Q (l/s)	Pipe Diameter (mm)	Type	Slope (%)	Length (m)	Capacity Full (L/s)	Velocity Full (m/s)	Time of Flow (min.)	Ratio (Q/Q _{FULL})
WS-06	LCB10	LCB09	0.045	0.000	0.014	0.06	0.06	10.00	104.19	6.13	200	PVC	0.25%	25.0	16.40	0.52	0.80	0.37
	LCB09	LCB08	0.000	0.000	0.000	0.00	0.06	10.80	100.16	5.89	200	PVC	0.25%	26.2	16.40	0.52	0.84	0.36
	LCB08	LCB07	0.000	0.000	0.000	0.00	0.06	11.63	96.28	5.66	200	PVC	0.25%	25.5	16.40	0.52	0.81	0.35
	LCB07	LCB06	0.000	0.000	0.000	0.00	0.06	12.45	92.82	5.46	200	PVC	0.25%	17.0	16.40	0.52	0.54	0.33
	LCB06	CBMH03	0.000	0.000	0.000	0.00	0.06	12.99	90.66	5.33	250	PVC	0.25%	13.1	29.73	0.61	0.36	0.18
WS-07	LCB15	LCB14	0.045	0.000	0.014	0.06	0.06	10.00	104.19	6.13	200	PVC	0.25%	19.2	16.40	0.52	0.61	0.37
	LCB14	LCB13	0.000	0.000	0.000	0.00	0.06	10.61	101.06	5.94	200	PVC	0.25%	16.5	16.40	0.52	0.53	0.36
	LCB13	LCB12	0.000	0.000	0.000	0.00	0.06	11.14	98.53	5.79	200	PVC	0.25%	11.5	16.40	0.52	0.37	0.35
	LCB12	LCB11	0.000	0.000	0.000	0.00	0.06	11.51	96.85	5.69	200	PVC	0.25%	40.0	16.4	0.52	1.28	0.35
	LCB11	CBMH03	0.000	0.000	0.000	0.00	0.06	12.78	91.47	5.38	250	PVC	0.25%	16.0	29.7	0.61	0.44	0.18
WS-01	CBMH05	CBMH04	0.086	0.000	0.168	0.47	0.47	10.00	104.19	48.86	375	PVC	0.40%	15.7	110.9	1.00	0.26	0.44
WS-02+ WS-03	CBMH04	CBMH03A	0.000	0.000	0.243	0.61	1.08	10.26	102.84	110.85	375	PVC	0.40%	19.2	110.9	1.00	0.32	1.00
	CBMH03A	CBMH03	0.000	0.000	0.145	0.36	1.44	10.58	101.23	145.82	375	PVC	0.40%	2.6	110.9	1.00	0.04	1.31
	CBMH03	TREATMENT	0.000	0.000	0.000	0.00	1.20	13.35	89.29	106.74	300	PVC	0.40%	28.5	61.16	0.87	0.55	1.75
	TREATMENT	CBMH01	0.000	0.000	0.000	0.00	1.20	13.90	87.28	104.35	300	PVC	0.40%	4.5	61.16	0.87	0.09	1.71
	CBMH01	CITY	0.000	0.000	0.000	0.00	1.20	13.99	86.98	103.98	300	PVC	1.00%	13.2	96.7	1.37	0.16	1.08

DESIGN PARAMETERS NOTES

Runoff Coefficient (C)		Q = 2.78 AIC, where	
Grass	0.30	Q = Peak flow in Litres per second (L/s)	Ottawa Macdonald-Cartier International Airport IDF curve
Gravel	0.80	A = Area in hectares (ha)	I _s = 998.071 / (T _c + 6.053) ^{0.814}
Asphalt / rooftop	0.90	I = Rainfall Intensity (mm/hr)	Min. velocity = 0.76 m/s
		C = Runoff Coefficient	Manning's "n" = 0.013

File No.	20-184	Date: May 3, 2022
Project:	Proposed Apartment Buildings	Designed: Guillaume Brunet
Project Address:	3817-3843 - Innes Road	Checked: Guillaume Brunet
Client:	Bridor Development	Drawing Reference: C200 & C300

STORM WATER MANAGEMENT DESIGN SHEET

SEWER DESIGN

LOCATION		MANHOLE INFORMATION						
From MH	To MH	Up Invert (m)	Down Invert (m)	T/G Up Stream (m)	T/G Down Stream	Up Depth obv (m)	Down Depth obv (m)	Up Depth inv (m)
LCB10	LCB09	90.38	90.32	91.80	91.70	1.22	1.18	1.22
LCB09	LCB08	90.26	90.19	91.70	91.30	1.24	0.91	1.24
LCB08	LCB07	90.13	90.07	91.30	91.75	0.97	1.48	0.97
LCB07	LCB06	90.01	89.97	91.75	91.95	1.54	1.73	1.54
LCB06	CBMH03	89.77	89.73	91.95	91.80	1.93	1.87	1.98
LCB15	LCB14	90.62	90.57	92.20	92.10	1.38	1.33	1.38
LCB14	LCB13	90.51	90.47	92.10	92.10	1.39	1.43	1.39
LCB13	LCB12	90.41	90.38	92.10	92.00	1.49	1.42	1.49
LCB12	LCB11	90.32	90.22	92.00	92.20	1.48	1.73	1.48
LCB11	CBMH03	89.72	89.68	92.20	91.80	2.23	1.74	2.28
CBMH05	CBMH04	89.61	89.55	91.80	91.80	1.81	1.87	1.81
CBMH04	CBMH03A	89.49	89.41	91.80	91.80	1.93	2.09	1.93
CBMH03A	CBMH03	89.35	89.34	91.80	91.80	2.07	2.16	2.07
CBMH03	TREATMENT	89.28	89.17	91.80	92.25	2.22	2.78	2.14
TREATMENT	CBMH01	89.11	89.09	92.25	92.30	2.84	2.91	2.84
CBMH01	CITY	89.03	88.90	92.30	91.77	2.97	2.57	2.97

BLANCHARD LETENDRE
 ENGINEERING

File No.	20-184	Date:	May 3, 2022
Project:	Proposed Apartment Buildings	Designed:	Guillaume Brunet
Project Address:	3817-3843 - Innes Road	Checked:	Guillaume Brunet
Client:	Bridor Development	Drawing Reference:	C200 & C300

PRE-DEVELOPMENT DRAINAGE AREA (AFFECTED AREA)

Catchment Area	Runoff Coefficient			Total Area (ha)	Combined C
	C = 0.3	C = 0.80	C = 0.90		
E-01	0.501	0.000	0.160	0.661	0.45
TOTAL	0.501	0.000	0.160	0.661	0.45

POST-DEVELOPMENT DRAINAGE AREA

Catchment Area	Runoff Coefficient			Total Area (ha)	Combined C
	C = 0.30	C = 0.80	C = 0.90		
WS-01	0.086	0.000	0.168	0.254	0.70
WS-02 - Roof	0.000	0.000	0.122	0.122	0.90
WS-03 - Roof	0.000	0.000	0.122	0.122	0.90
WS-04 - Ramp	0.000	0.000	0.023	0.023	0.90
WS-05 - Ramp	0.000	0.000	0.023	0.023	0.90
WS-06	0.045	0.000	0.014	0.059	0.44
WS-07	0.045	0.000	0.014	0.059	0.44
TOTAL	0.176	0.000	0.485	0.661	0.74

RUNOFF COEFFICIENT (C)

Grass	0.30
Gravel	0.80
Asphalt / rooftop	0.90

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STORM WATER MANAGEMENT DESIGN SHEET
5 YEAR STORM EVENT

PRE-DEVELOPMENT STORMWATER MANAGEMENT

Runoff	Catchment Area	Area			ΣR _s
Un-Controlled	EWS-01	0.661	ha	R=	0.45
	Total Uncontrolled =	0.661	ha	ΣR=	0.45

PRE-DEVELOPMENT ALLOWABLE RELEASE RATE

$$Q = 2.78CIA \text{ (L/s)}$$

$$I_s = 998.071 / (T_c + 6.053)^{0.814}$$

C =	0.45	up to a maximum of 0.5 as per City of Ottawa Sewer Design Guidelines
I =	104.2	mm/hr
T _c =	10	min
Total =	0.661	ha
Allowable Release Rate=	86.16	L/s
Allowable Release Rate=	43.08	L/s

50% of flow as per City of Ottawa

POST-DEVELOPMENT STORMWATER MANAGEMENT

Runoff	Catchment Area	Area			ΣR _s	ΣR ₁₀₀
Controlled	WS-01	0.254	ha	R=	0.70	0.87
	WS-02 - Roof	0.122	ha	R=	0.90	1.00
	WS-03 - Roof	0.122	ha	R=	0.90	1.00
	WS-06	0.059	ha	R=	0.44	0.55
	WS-07	0.059	ha	R=	0.44	0.55
	Total Controlled =	0.615	ha	ΣR=	0.73	0.86
Un-controlled	WS-04 - Ramp	0.023	ha	R=	0.90	1.00
	WS-05 - Ramp	0.023	ha	R=	0.90	1.00
	Total Un-Controlled =	0.046	ha	ΣR=	0.90	1.00

$$I_s = 998.071 / (T_c + 6.053)^{0.814}$$

REQUIRED STORAGE						
Time (min)	Intensity (mm/hr)	Controlled Runoff (L/s)	Storage Volume (m ³)	Controlled Release Rate (L/s)	Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
10	104.2	129.66	65.77	20.05	6.05	26.09
15	83.6	103.98	75.54	20.05	4.85	24.90
20	70.3	87.42	80.85	20.05	4.08	24.12
25	60.9	75.78	83.60	20.05	3.53	23.58
30	53.9	67.11	84.71	20.05	3.13	23.18
35	48.5	60.38	84.69	20.05	2.82	22.86
40	44.2	54.98	83.85	20.05	2.56	22.61
45	40.6	50.56	82.38	20.05	2.36	22.40
50	37.7	46.86	80.43	20.05	2.19	22.23
60	32.9	41.00	75.42	20.05	1.91	21.96
70	29.4	36.55	69.32	20.05	1.70	21.75
80	26.6	33.05	62.44	20.05	1.54	21.59
90	24.3	30.22	54.96	20.05	1.41	21.46
500	6.3	7.81	0.00	20.05	0.36	20.41
720	4.7	5.83	0.00	20.05	0.27	20.32
1440	2.7	3.32	0.00	20.05	0.16	20.20

$$\text{Storage Volume} = (\text{Controlled Runoff} - \text{Controlled RR})/1000 * (\text{Time} * 60s)$$

STORMWATER STORAGE REQUIREMENTS

Total Storage Required =	84.71 m ³
Surface Ponding =	65.52 m ³
Underground Chambers =	163.30 m ³
Total Available Storage =	228.82 m ³

File No.	20-184	Date:	May 3, 2022
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STORM WATER MANAGEMENT DESIGN SHEET
100 YEAR STORM EVENT

PRE-DEVELOPMENT STORMWATER MANAGEMENT

Runoff	Catchment Area	Area			ΣR_s
Un-Controlled	EWS-01	0.661	ha	R=	0.45
	Total Uncontrolled =	0.661	ha	$\Sigma R=$	0.45

PRE-DEVELOPMENT ALLOWABLE RELEASE RATE

$$Q = 2.78CIA \text{ (L/s)}$$

$$I_s = 998.071 / (T_c + 6.053)^{0.814}$$

C =	0.45	up to a maximum of 0.5 as per City of Ottawa Sewer Design Guidelines
I =	104.2	mm/hr
T _c =	10	min
Total =	0.661	ha
Allowable Release Rate=	86.16	L/s
Allowable Release Rate=	43.08	L/s

50% of flow as per City of Ottawa

POST-DEVELOPMENT STORMWATER MANAGEMENT

Runoff	Catchment Area	Area			ΣR_s	ΣR_{100}
	WS-01	0.254	ha	R=	0.70	0.87
	WS-02 - Roof	0.122	ha	R=	0.90	1.00
	WS-03 - Roof	0.122	ha	R=	0.90	1.00
	WS-06	0.059	ha	R=	0.44	0.55
	WS-07	0.059	ha	R=	0.44	0.55
	Total Contolled =	0.615	ha	$\Sigma R=$	0.73	0.86
Un-controlled	WS-04 - Ramp	0.023	ha	R=	0.90	1.00
	WS-05 - Ramp	0.023	ha	R=	0.90	1.00
	Total Un-Controlled =	0.046	ha	$\Sigma R=$	0.90	1.00

$$I_{100} = 1735.688 / (T_c + 6.014)^{0.820}$$

Time (min)	Intensity (mm/hr)	REQUIRED STORAGE			Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
		Controlled Runoff (L/s)	Storage Volume (m ³)	Controlled Release Rate (L/s)		
10	178.6	262.65	145.56	20.05	23.03	43.08
15	142.9	210.19	171.13	20.05	18.43	38.48
20	120.0	176.44	187.67	20.05	7.74	27.78
25	103.8	152.75	199.06	20.05	6.70	26.74
30	91.9	135.13	207.15	20.05	5.93	25.97
35	82.6	121.47	212.98	20.05	5.33	25.37
40	75.1	110.53	217.17	20.05	4.85	24.89
45	69.1	101.57	220.11	20.05	4.45	24.50
50	64.0	94.07	222.08	20.05	4.12	24.17
60	55.9	82.22	223.81	20.05	3.60	23.65
90	41.1	60.47	218.29	20.05	2.65	22.70
120	32.9	48.39	204.05	20.05	2.12	22.17
360	13.7	20.18	2.96	20.05	0.88	20.93
500	10.5	15.48	0.00	20.05	0.68	20.73
720	7.8	11.51	0.00	20.05	0.50	20.55

$$\text{Storage Volume} = (\text{Controlled Runoff} - \text{Controlled RR})/1000 * (\text{Time} * 60s)$$

STORMWATER STORAGE REQUIREMENTS

Total Storage Required =	223.81 m³
Surface Ponding =	65.52 m ³
Underground Chambers =	163.30 m ³
Total Available Storage =	228.82 m³

Inlet Control Device Parameters

Product	Orifice Plate	at CB01
HWL =	92.00	m (highest HWL)
Grate Level =	92.00	m from inv.
Invert Level =	89.30	m
Outlet Pipe Dia. =	300	mm
Max. Flow =	20.05	L/s
ICD Centerline =	89.45	
HWL Head =	2.55	m (from centerlin from centerline)
C=	0.86	
Orifice Area =	0.008	m2
Orifice Diameter =	103	mm (min. 75mm)

APPENDIX “B”

Sanitary Design

File No.

20-184

Project:

Proposed Apartment Buildings

Project Address:

3817-3843 - Innes Road

Client:

Bridor Development

Date:

May 3, 2022

Designed:

Guillaume Brunet

Checked:

Guillaume Brunet

Drawing Reference:

C200 & C300

SANITARY DESIGN SHEET

SEWER DESIGN

LOCATION			RESIDENTIAL AREA AND POPULATION						COMMERCIAL		INDUSTRIAL			INSTITUTIONAL		C+I+I	INFILTRATION			TOTAL FLOW (l/s)	PIPE						MANHOLE	
STREET	FROM MH	TO MH	AREA (Ha)	POP.	CUMMULATIVE		PEAK FACT.	PEAK FLOW (l/s)	AREA (Ha)	ACCU. AREA (Ha)	AREA (Ha)	ACCU. AREA (Ha)	PEAK FACT.	AREA (Ha)	ACCU. AREA (Ha)	PEAK FLOW (l/s)	TOTAL AREA (Ha)	ACCU. AREA (Ha)	INFILT. FLOW (l/s)		LENGTH (m)	DIA. (mm)	MATERAIL	SLOPE (%)	CAP. (FULL) (l/s)	VEL. (FULL) (m/s)	UP INVERT (m)	DOWN INVERT (m)
					AREA (Ha)	POP.																						
SITE	PROP. BLDG B	TRUNK	0.331	91.0	0.33	91.0	4.0	1.47	0.000	0.000	0.00	0.00	7.0	0.0	0.0	0.00	0.33	0.33	0.09	1.57	25.3	200	PVC	1.00%	32.80	1.04	86.90	86.65
SITE	PROP. BLDG A	TRUNK	0.331	91.0	0.66	182.0	4.0	2.95	0.000	0.000	0.00	0.00	7.0	0.0	0.0	0.00	0.33	0.66	0.19	3.13	25.3	200	PVC	1.00%	32.80	1.04	87.18	86.93

DESIGN PARAMETERS NOTES

Average Daily Flow =	350 L/p/day	Industrial Peak Factor =	7 as per Appendix 4-B	Appartments:	Person Per Unit	Building B	Building A
Commercial and Institutional Flow =	50000 L/ha/da	Extraneous Flow =	0.28 L/s/ha	Bachelor =	1.4	0	0
Industrial Flow =	35000.00 L/ha/da	Minimum Velocity =	0.76 m/s	1 Bedroom =	1.4	35	35
Maximum Resedential Peak Flow =	4	Mannings n =	0.013	2 Bedroom =	2.1	20	20
Commection and Intitutional Peak Factor =	1.5			3 Bedroom =	3.1	0	0

APPENDIX “C”

Watermain Design

File No.	20-184	Date:	May 3, 2022
Project:	Proposed Apartment Buildings	Designed:	Guillaume Brunet
Project Address:	3817-3843 - Innes Road	Checked:	Guillaume Brunet
Client:	Bridor Development	Drawing Reference:	C200 & C300

WATER CONSUMPTION CALCULATION

	BLOCK A	BLOCK B	
Total Building Floor Area =	892.05	557.05	m ²
Site Total Area =	0.24	0.24	ha
Total Population =	91.00	91.00	ea.
Average Demand Per People =	350	350	L/c/d
Average Water Demand =	31850.00	31850.00	L/d
Maximum Daily Peak Factor =	2.5	2.5	* As per City of Ottawa
Maximum Daily Residential =	79625.00	79625.00	L/d
Maximum Hourly Peak Factor =	2.2	2.2	* As per City of Ottawa
Maximum Hourly Residential =	175175.00	175175.00	L/d
Total Domestic Flow =	2.03	2.03	L/s
Total Fire Flow =	203.33	203.33	L/s

Appartments:	Person Per Unit	Building A	Building B
Bachelor =	1.4	0	0
1 Bedroom =	1.4	35	35
2 Bedroom =	2.1	20	20
3 Bedroom =	3.1	0	0
		91.00	91.00

BLOCK A	1 Bedroom	2 Bedroom	Unit Counts	WSFU	Total
Unrinal Flush Tank	1	2	75	2	150
Sinks	2	2	110	1	110
Bathub	1	2	75	4	300
Diswasher	1	1	55	1.5	82.5
Washing Machine	1	1	55	2	110
Total					752.5

BLOCK B	1 Bedroom	2 Bedroom	Unit Counts	WSFU	Total
Unrinal Flush Tank	1	2	75	2	150
Sinks	2	2	110	1	110
Bathub	1	2	75	4	300
Diswasher	1	1	55	1.5	82.5
Washing Machine	1	1	55	2	110
Total					752.5

BLANCHARD LETENDRE
 ENGINEERING

File No.	20-184	Date:	May 3, 2021
Project:	Proposed Apartment Buildings	Designed:	Guillaume Brunet
Project Address:	3817-3843 - Innes Road	Checked:	Guillaume Brunet
Client:	Bridor Development	Drawing Reference:	C200 & C300

BLOCK B

Term	Options	Multiplier	Choose:	Value	unit	Fire Flow
Coefficient C related to the type of construction	Wood Frame	1.5	Non-combustible construction	0.8		
	Ordinary Construction	1.0				
	Non-combustible construction	0.8				
	Fire resistive construction <2 hrs	0.7				
	Fire resistive construction >2 hrs	0.6				
Type of housing	Single family dwelling	0	Building - no. of units per floor	15	unit	
	Townhouse - no. of units	0				
	Building - no. of units per floor	2				
	Number of floors excluding the basement			4	floor	
	Floor space per unit	1	1,218	1,218	sq.m.	
Required fire flow	Fire Flow = $220 \times C \times \text{Area}^{0.5}$				L/min	12,285
					L/s	205
Occupancy hazard reduction or surcharge	Non-combustible	-0.25	Limited combustible	-0.15		
	Limited combustible	-0.15				
	Combustible	0				
	Free burning	0.15			L/min	10,442
	Rapid burning	0.25			L/s	174
Sprinkler reduction	Sprinklers (NFPA13)	-0.30	False	0		
	Water supply is standard for both the system and fire department hose lines	-0.10	False	0	L/min	9,398
	Fully supervised system	-0.10	True	-0.1	L/s	157
Exposure distance between units	North side	Over 45m	0			
	East side	10.1 to 20m	0.15			
	South side	Over 45m	0		L/min	12,217
	West side	10.1 to 20m	0.15	0.3	L/s	204
Minimum required fire flow rate (rounded to nearest 100)					L/min	12,200
Minimum required fire flow rate					L/s	203
Required duration of fire flow					min	30

BLANCHARD LETENDRE
 ENGINEERING

File No.	20-184	Date:	May 3, 2022
Project:	Proposed Apartment Buildings	Designed:	Guillaume Brunet
Project Address:	3817-3843 - Innes Road	Checked:	Guillaume Brunet
Client:	Bridor Development	Drawing Reference:	C200 & C300

BLOCK A

Term	Options	Multiplier	Choose:	Value	unit	Fire Flow
Coefficient C related to the type of construction	Wood Frame	1.5	Non-combustible construction	0.8		
	Ordinary Construction	1.0				
	Non-combustible construction	0.8				
	Fire resistive construction <2 hrs	0.7				
	Fire resistive construction >2 hrs	0.6				
Type of housing	Single family dwelling	0	Building - no. of units per floor	15	unit	
	Townhouse - no. of units	0				
	Building - no. of units per floor	2				
	Number of floors excluding the basement			4	floor	
	Floor space per unit	1	1,218	1,218	sq.m.	
Required fire flow	Fire Flow = $220 \times C \times \text{Area}^{0.5}$				L/min	12,285
					L/s	205
Occupancy hazard reduction or surcharge	Non-combustible	-0.25	Limited combustible	-0.15		
	Limited combustible	-0.15				
	Combustible	0				
	Free burning	0.15			L/min	10,442
	Rapid burning	0.25			L/s	174
Sprinkler reduction	Sprinklers (NFPA13)	-0.30	False	0		
	Water supply is standard for both the system and fire department hose lines	-0.10	False	0	L/min	9,398
	Fully supervised system	-0.10	True	-0.1	L/s	157
Exposure distance between units	North side	Over 45m	0			
	East side	10.1 to 20m	0.15			
	South side	Over 45m	0		L/min	12,217
	West side	10.1 to 20m	0.15	0.3	L/s	204
Minimum required fire flow rate (rounded to nearest 100)					L/min	12,200
Minimum required fire flow rate					L/s	203
Required duration of fire flow					min	30

APPENDIX “D”

Underground Chambers & Stormwater Treatment Unit

Stormceptor® EF Sizing Report

STORMCEPTOR®

ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

09/25/2020

Province:	Ontario	Project Name:	Innes Road
City:	Ottawa	Project Number:	20-184
Nearest Rainfall Station:	OTTAWA MACDONALD-CARTIER INT'L AP	Designer Name:	GUILLAUME BRUNET
NCDC Rainfall Station Id:	6000	Designer Company:	BL ENGINEERING
Years of Rainfall Data:	37	Designer Email:	guillaume@blengineering.ca
		Designer Phone:	613-693-0700
Site Name:	Innes Road	EOR Name:	GUILLAUME BRUNET
		EOR Company:	BL ENGINEERING
Drainage Area (ha):	0.72	EOR Email:	guillaume@blengineering.ca
Runoff Coefficient 'c':	0.80	EOR Phone:	613-693-0700

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

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	20.82
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	93.85
Site Sediment Transport Rate (kg/ha/yr):	480.00
Estimated Average Annual Sediment Load (kg/yr):	276.48

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	74
EFO6	83
EFO8	87
EFO10	89
EFO12	90

Recommended Stormceptor EFO Model: **EFO6**
 Estimated Net Annual Sediment (TSS) Load Reduction (%): **83**
 Water Quality Runoff Volume Capture (%): **> 90**

Stormceptor® EF Sizing Report

THIRD-PARTY TESTING AND VERIFICATION

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

PERFORMANCE

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

PARTICLE SIZE DISTRIBUTION (PSD)

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

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

Stormceptor® EF Sizing Report

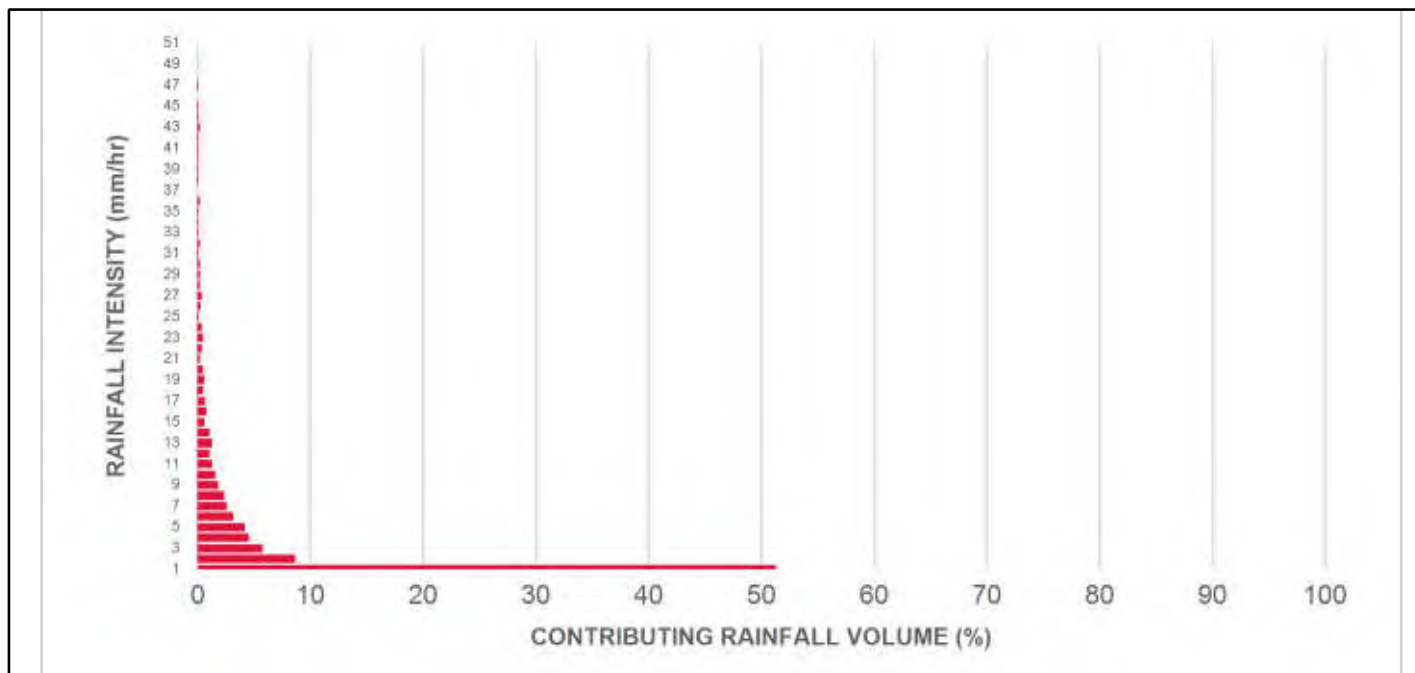
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
1	51.3	51.3	1.60	96.0	37.0	93	47.7	47.7
2	8.7	60.0	3.20	192.0	73.0	90	7.8	55.5
3	5.8	65.8	4.80	288.0	110.0	86	5.0	60.5
4	4.6	70.4	6.41	384.0	146.0	83	3.8	64.3
5	4.2	74.6	8.01	480.0	183.0	78	3.3	67.6
6	3.2	77.8	9.61	576.0	219.0	74	2.4	70.0
7	2.6	80.4	11.21	673.0	256.0	72	1.9	71.8
8	2.4	82.8	12.81	769.0	292.0	68	1.6	73.5
9	1.9	84.7	14.41	865.0	329.0	65	1.2	74.7
10	1.6	86.3	16.01	961.0	365.0	62	1.0	75.7
11	1.3	87.6	17.61	1057.0	402.0	58	0.8	76.4
12	1.1	88.7	19.22	1153.0	438.0	57	0.6	77.1
13	1.3	90.0	20.82	1249.0	475.0	56	0.7	77.8
14	1.1	91.1	22.42	1345.0	511.0	55	0.6	78.4
15	0.6	91.7	24.02	1441.0	548.0	54	0.3	78.7
16	0.8	92.5	25.62	1537.0	584.0	53	0.4	79.1
17	0.7	93.2	27.22	1633.0	621.0	52	0.4	79.5
18	0.5	93.7	28.82	1729.0	658.0	52	0.3	79.8
19	0.6	94.3	30.42	1825.0	694.0	52	0.3	80.1
20	0.5	94.8	32.03	1922.0	731.0	51	0.3	80.3
21	0.2	95.0	33.63	2018.0	767.0	51	0.1	80.4
22	0.4	95.4	35.23	2114.0	804.0	51	0.2	80.6
23	0.5	95.9	36.83	2210.0	840.0	51	0.3	80.9
24	0.4	96.3	38.43	2306.0	877.0	51	0.2	81.1
25	0.1	96.4	40.03	2402.0	913.0	50	0.1	81.1

Stormceptor[®] EF Sizing Report

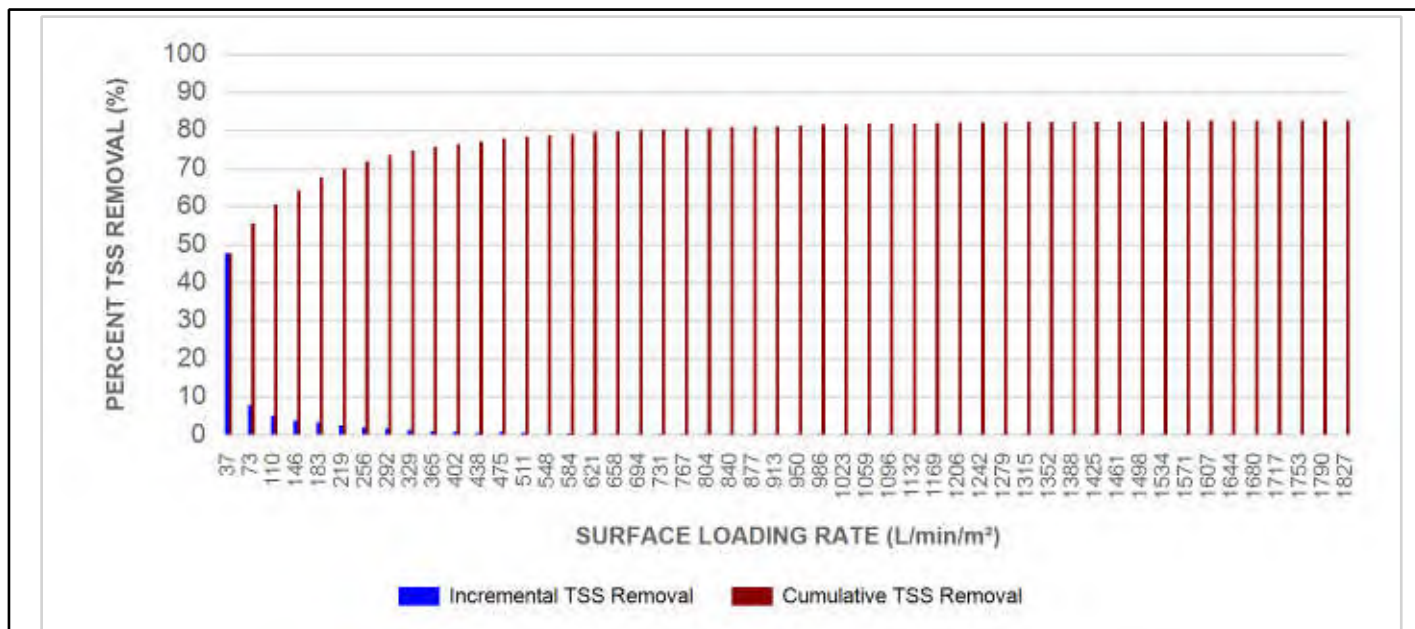
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m ²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
26	0.3	96.7	41.63	2498.0	950.0	50	0.2	81.3
27	0.4	97.1	43.23	2594.0	986.0	50	0.2	81.5
28	0.2	97.3	44.84	2690.0	1023.0	50	0.1	81.6
29	0.2	97.5	46.44	2786.0	1059.0	49	0.1	81.7
30	0.2	97.7	48.04	2882.0	1096.0	49	0.1	81.8
31	0.1	97.8	49.64	2978.0	1132.0	49	0.0	81.8
32	0.2	98.0	51.24	3074.0	1169.0	48	0.1	81.9
33	0.1	98.1	52.84	3171.0	1206.0	48	0.0	82.0
34	0.1	98.2	54.44	3267.0	1242.0	48	0.0	82.0
35	0.1	98.3	56.04	3363.0	1279.0	47	0.0	82.1
36	0.2	98.5	57.65	3459.0	1315.0	47	0.1	82.2
37	0.0	98.5	59.25	3555.0	1352.0	47	0.0	82.2
38	0.1	98.6	60.85	3651.0	1388.0	46	0.0	82.2
39	0.1	98.7	62.45	3747.0	1425.0	45	0.0	82.3
40	0.1	98.8	64.05	3843.0	1461.0	44	0.0	82.3
41	0.1	98.9	65.65	3939.0	1498.0	43	0.0	82.3
42	0.1	99.0	67.25	4035.0	1534.0	42	0.0	82.4
43	0.2	99.2	68.86	4131.0	1571.0	41	0.1	82.5
44	0.1	99.3	70.46	4227.0	1607.0	40	0.0	82.5
45	0.1	99.4	72.06	4323.0	1644.0	39	0.0	82.5
46	0.0	99.4	73.66	4420.0	1680.0	38	0.0	82.5
47	0.1	99.5	75.26	4516.0	1717.0	38	0.0	82.6
48	0.0	99.5	76.86	4612.0	1753.0	37	0.0	82.6
49	0.0	99.5	78.46	4708.0	1790.0	36	0.0	82.6
50	0.0	99.5	80.06	4804.0	1827.0	35	0.0	82.6
Estimated Net Annual Sediment (TSS) Load Reduction =								83 %

Stormceptor® EF Sizing Report

RAINFALL DATA FROM OTTAWA MACDONALD-CARTIER INT'L AP RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Stormceptor® EF Sizing Report

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

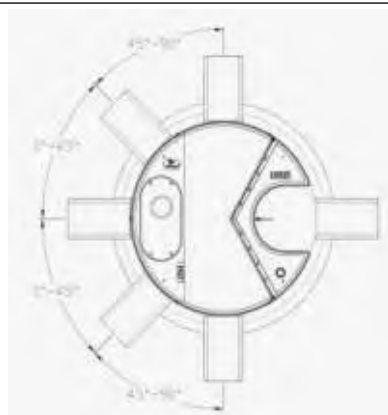
► **Stormceptor® EF and EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend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



Stormceptor® EF Sizing Report



INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.

0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.

45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

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

For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft³)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

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

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

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

STANDARD STORMCEPTOR EF/EFO DRAWINGS

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

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

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

Stormceptor® EF Sizing Report

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

PART 1 – GENERAL

1.1 WORK INCLUDED

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

1.2 REFERENCE STANDARDS & PROCEDURES

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

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

1.3 SUBMITTALS

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

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

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

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

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

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

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

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

Stormceptor® EF Sizing Report

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

3.2 SIZING METHODOLOGY

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

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

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

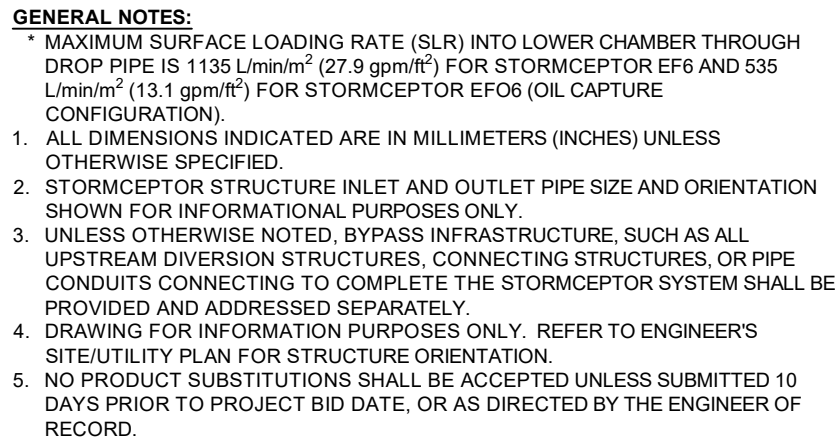
3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m².

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

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

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

\\NIMBRIUM\PRODUCTS\STORMCEPTOR EF40 DRAWINGS & DETAILS\STANDARD DETAILS\EFO8-DETAIL.DWG 4/12/2019 11:05 AM



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).

- 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.



<u>SITE SPECIFIC DATA REQUIREMENTS</u>					
STORMCEPTOR MODEL			EFO6		
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					

Stormceptor® EF



imbrrium®
407 FAIRVIEW DRIVE, WHITBY, ON L1N 3J3
TEL 800-565-4801 CA 416-960-9600 INTL +1-416-960-9600

DATE: 10/13/2017	
DESIGNED: JSK	DRAWN: JSK
CHECKED: BSF	APPROVED: SP
PROJECT No.: EFO6	SEQUENCE: *
SHEET: 1 OF 1	

SCALE = NTS

APPENDIX “E”

Boundary Conditions

Boundary Conditions 3817-3843 Innes Road

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	769	12.82
Maximum Daily Demand	1,154	19.23
Peak Hour	1,385	23.08
Fire Flow Demand #1	5,600	93.33

Location



Results

Connection 1 – Innes Rd.

Demand Scenario	Head (m)	Pressure ¹ (psi)
Maximum HGL	130.3	55.1
Peak Hour	127.1	50.5
Max Day plus Fire 1	129.3	53.7

¹ Ground Elevation = 91.6 m

Disclaimer

The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.

APPENDIX “F”

Engineering Drawings

EROSION AND SEDIMENT CONTROL MEASURES:

** CONTRACTOR IS RESPONSIBLE FOR ALL INSTALLATION, MONITORING, REPAIR AND REMOVAL OF ALL EROSION AND SEDIMENT CONTROL FEATURES **

1. PRIOR TO START OF CONSTRUCTION:

- 1.1. PRIOR TO THE REMOVAL OF ANY VEGETATIVE COVER, MOVING OF ANY SOIL, AND CONSTRUCTION:
 - 1.1.1. INSTALL SILT FENCE IMMEDIATELY DOWNSTREAM FROM AREAS TO BE DISTURBED (SEE PLAN FOR LOCATION).
 - 1.1.2. INSTALL GEOSOCK INSERTS WITH AN OVERFLOW IN ALL THE DOWNSTREAM CATCH BASINS AND MANHOLES.
 - 1.1.3. INSTALL SILTSACK FILTERS IN ALL CONCRETE CATCH BASIN STRUCTURES.
 - 1.1.4. INSPECT MEASURES IMMEDIATELY AFTER INSTALLATION.

2. DURING CONSTRUCTION:

- 2.1. WORK TO BE DONE IN THE VICINITY OF MAJOR WATERWAYS TO BE CARRIED OUT FROM JULY TO SEPTEMBER ONLY.
- 2.2. MINIMIZE THE EXTENT OF DISTURBED AREAS AND THE DURATION OF EXPOSURE.
- 2.3. PROTECT DISTURBED AREAS FROM RUNOFF.
- 2.4. PROVIDE TEMPORARY COVER SUCH AS SEEDING OR MULCHING IF DISTURBED AREA WILL NOT BE REHABILITATED WITHIN 30 DAYS.
- 2.5. INSPECT SILT FENCE, FILTER CLOTHS, AND CATCH BASIN SUMPS WEEKLY AND AFTER EVERY MAJOR OR STORM EVENT. CLEAN AND REPAIR WHEN NECESSARY.
- 2.6. PLAN TO BE REVIEWED AND REVISED AS REQUIRED DURING CONSTRUCTION.
- 2.7. EROSION CONTROL FENCING TO BE ALSO INSTALLED AROUND THE BASE OF ALL STOCKPILES.
- 2.8. DO NOT LOCATE TOPSOIL PILES AND EXCAVATION MATERIAL CLOSER THAN 2.5m FROM ANY PAVED SURFACE, OR ONE WHICH IS TO BE PAVED BEFORE PILE IS REMOVED. ALL TOPSOIL PILES ARE TO BE SEEDED IF THEY ARE TO REMAIN ON SITE LONG ENOUGH FOR SEEDS TO GROW (30 DAYS).

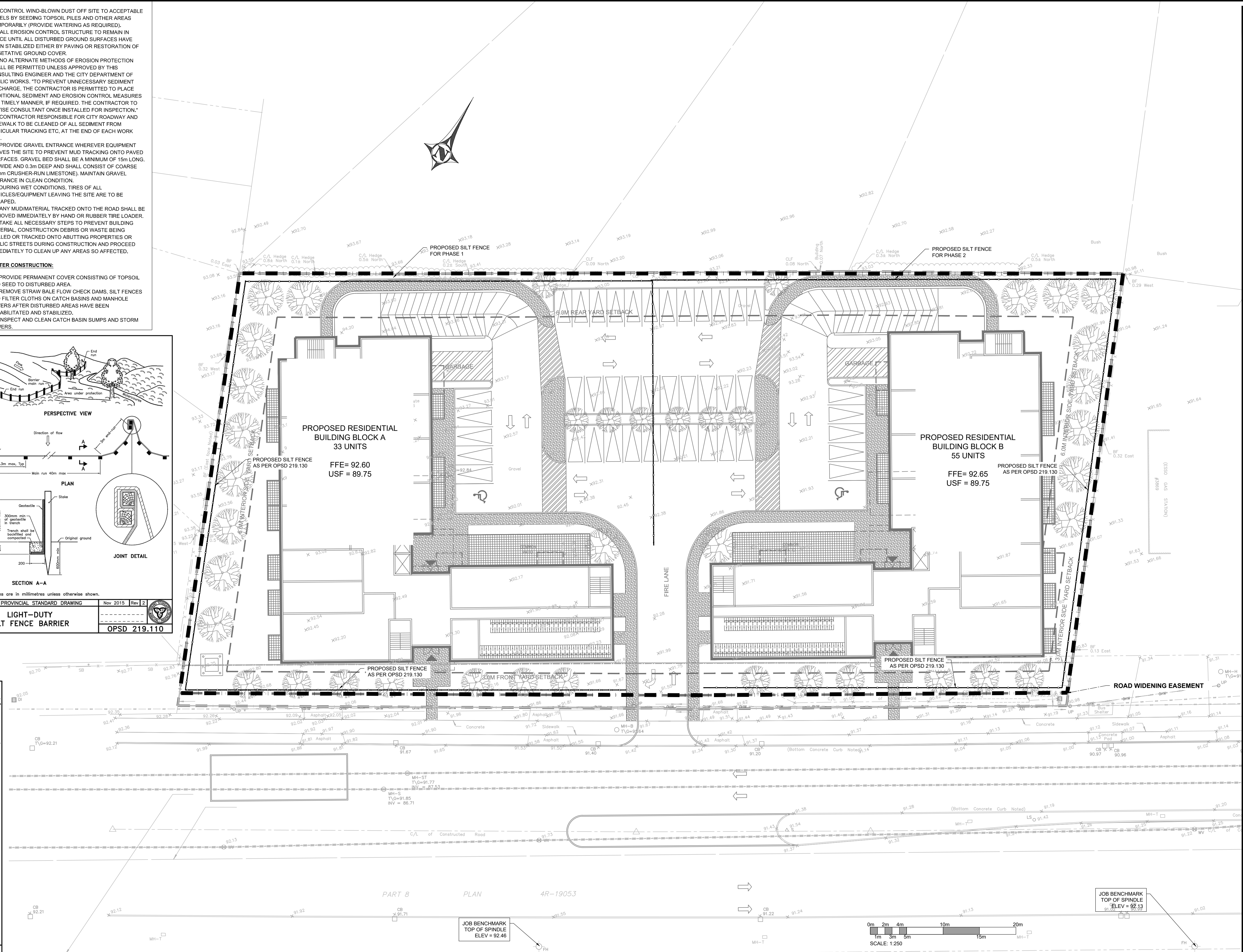
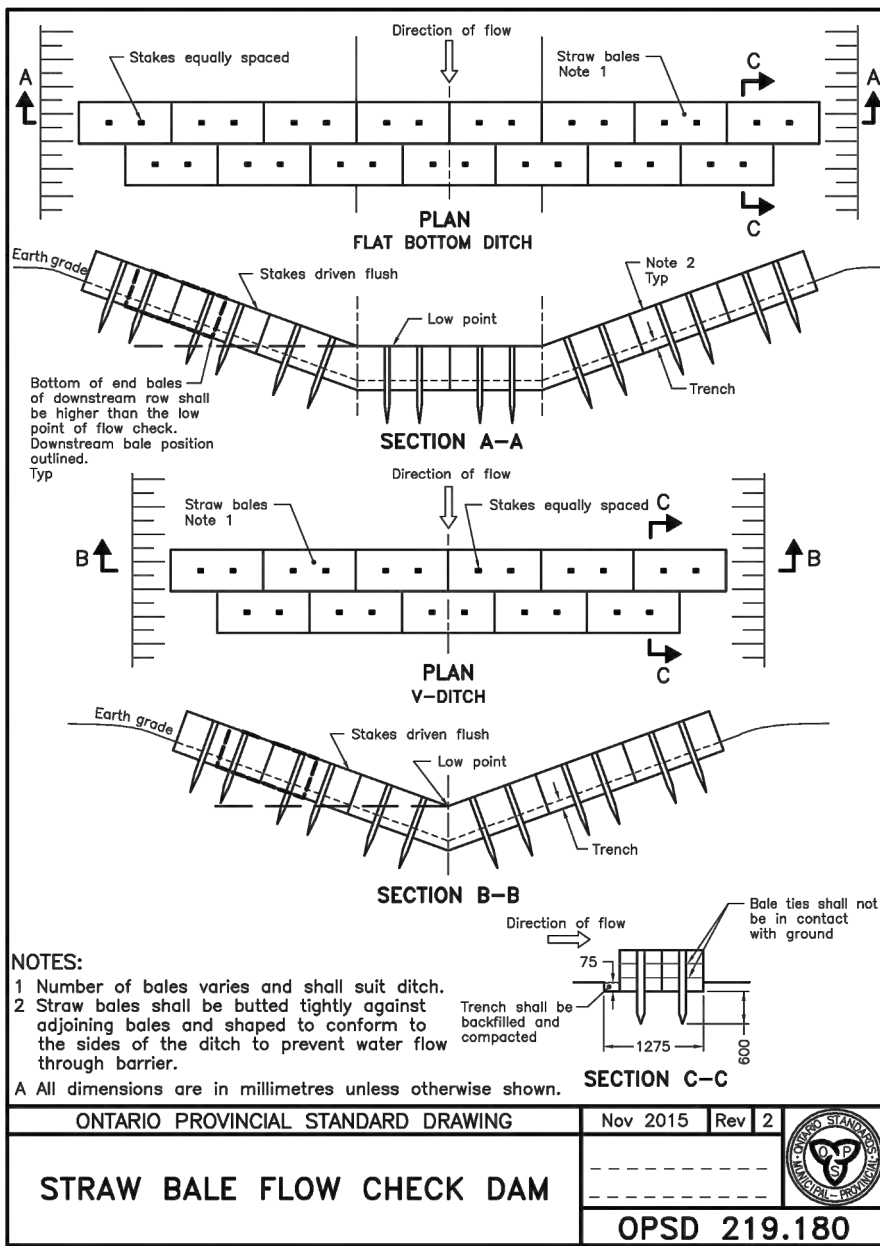
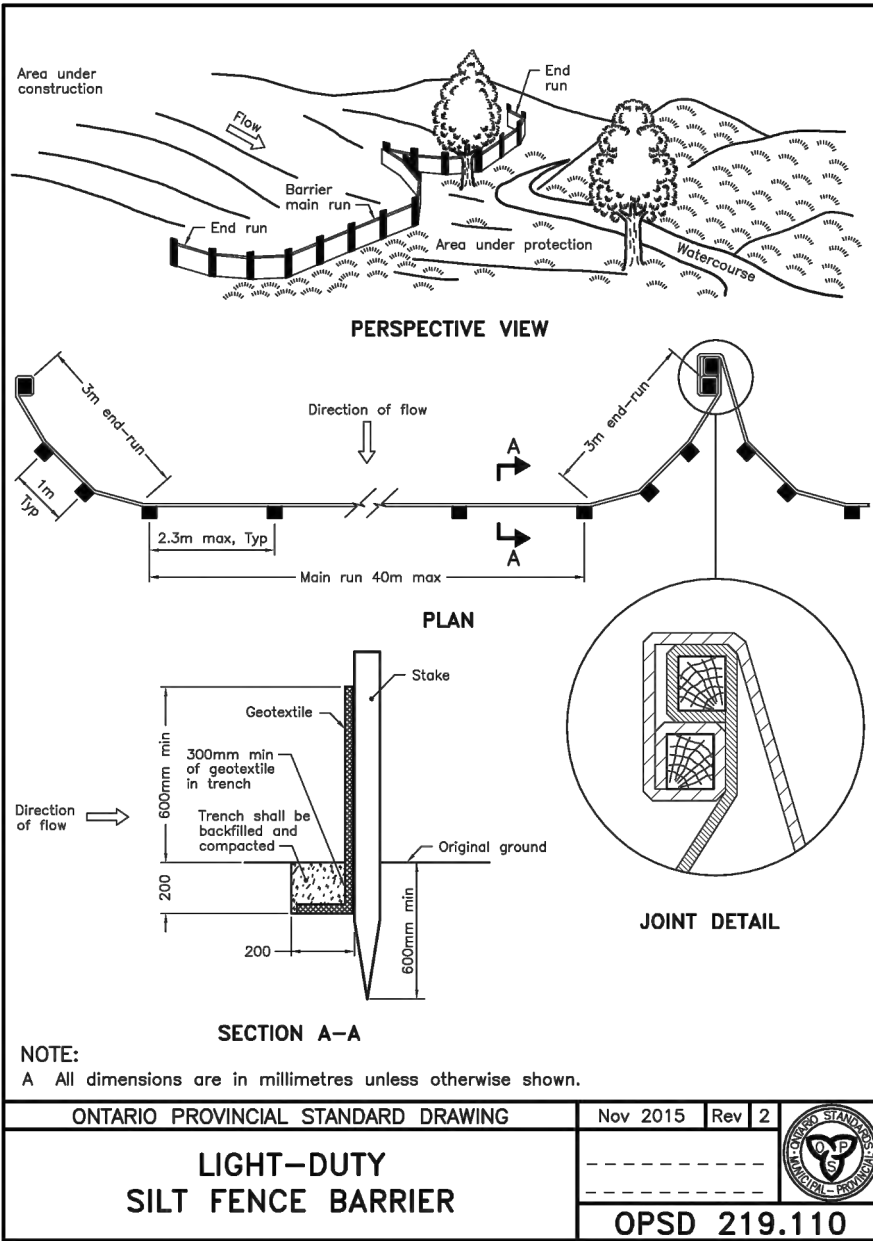
- 2.9. CONTROL WIND-BLOWN DUST OFF SITE TO ACCEPTABLE LEVELS BY SEEDING TOPSOIL PILES AND OTHER AREAS TEMPORARILY (PROVIDE WATERING AS REQUIRED).
- 2.10. ALL EROSION CONTROL STRUCTURE TO REMAIN IN PLACE UNTIL ALL DISTURBED GROUND SURFACES HAVE BEEN STABILIZED EITHER BY PAVING OR RESTORATION OF VEGETATIVE GROUND COVER.
- 2.11. NO ALTERNATE METHODS OF EROSION PROTECTION SHALL BE PERMITTED UNLESS APPROVED BY THIS CONSULTING ENGINEER AND THE CITY DEPARTMENT OF PUBLIC WORKS. TO PREVENT UNNECESSARY SEDIMENT DISCHARGE, THE CONTRACTOR IS PERMITTED TO PLACE ADDITIONAL SEDIMENT AND EROSION CONTROL MEASURES IN A TIMELY MANNER, IF REQUIRED. THE CONTRACTOR TO ADVISE CONSULTANT ONCE INSTALLED FOR INSPECTION.
- 2.12. CONTRACTOR RESPONSIBLE FOR CITY ROADWAY AND SIDEWALK TO BE CLEANED OF ALL SEDIMENT FROM VEHICULAR TRACKING ETC, AT THE END OF EACH WORK DAY.
- 2.13. PROVIDE GRAVEL ENTRANCE WHEREVER EQUIPMENT LEAVES THE SITE TO PREVENT MUD TRACKING ONTO PAVED SURFACES. GRAVEL BED SHALL BE A MINIMUM OF 15m LONG, 4m WIDE AND 0.3m DEEP AND SHALL CONSIST OF COARSE (50mm CRUSHER-RUN LIMESTONE). MAINTAIN GRAVEL ENTRANCE IN CLEAN CONDITION.
- 2.14. DURING WET CONDITIONS, TIRES OF ALL VEHICLES/EQUIPMENT LEAVING THE SITE ARE TO BE SCRAPPED.
- 2.15. ANY MUD/MATERIAL TRACKED ONTO THE ROAD SHALL BE REMOVED IMMEDIATELY BY HAND OR RUBBER TIRE LOADER.
- 2.16. TAKE ALL NECESSARY STEPS TO PREVENT BUILDING MATERIAL, CONSTRUCTION DEBRIS OR WASTE BEING SPILLED OR TRACKED ONTO ADJUTING PROPERTIES OR PUBLIC STREETS DURING CONSTRUCTION AND PROCEED IMMEDIATELY TO CLEAN UP ANY AREAS SO AFFECTED.

3. AFTER CONSTRUCTION:

- 3.1. PROVIDE PERMANENT COVER CONSISTING OF TOPSOIL AND SEED TO DISTURBED AREA.
- 3.2. REMOVE STRAW BALE FLOW CHECK DAMS, SILT FENCES AND FILTER CLOTHS ON CATCH BASINS AND MANHOLE COVERS AFTER DISTURBED AREAS HAVE BEEN REHABILITATED AND STABILIZED.
- 3.3. INSPECT AND CLEAN CATCH BASIN SUMPS AND STORM SEWERS.

LEGEND:

- EXISTING PROPERTY LINE TO REMAIN
- PROPOSED DOOR ENTRANCE/EXIT
- PROPOSED ELEVATION
- PROPOSED HIGH POINT ELEVATION
- PROPOSED SIDEWALK ELEVATION
- PROPOSED SWALE ELEVATION
- MATCH INTO EXISTING ELEVATION
- EXISTING ELEVATION
- PROPOSED OVERLAND MAJOR FLOW ROUTE
- PROPOSED SILT FENCE AS PER OPSD 218.110
- PROPOSED 250mm PERFORATED SUBCRAN
- PROPOSED SWALE
- PROPOSED STORM SEWER
- PROPOSED SANITARY SEWER
- PROPOSED WATERMAIN
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- PROPOSED CATCH BASIN/MANHOLE/CATCH BASIN
- PROPOSED CURB STOP
- PROPOSED 100 YEAR HIGH WATER LEVEL
- STORM WATERSHED EXTENT
- WATERSHED NAME
- RUNOFF COEFFICIENT
- AREA IN HECTARES
- PROPOSED GRASS AREA
- PROPOSED CONCRETE FEATURES/SLAB
- PROPOSED HEAVY DUTY ASPHALT
- PROPOSED LIGHT DUTY ASPHALT
- PROPOSED GRAVEL AREA
- PROPOSED RIP RAP AS PER OPSD 810.010
- PROPOSED WATER METER
- PROPOSED SIEMSE CONNECTION
- PROPOSED GROWING FIELD



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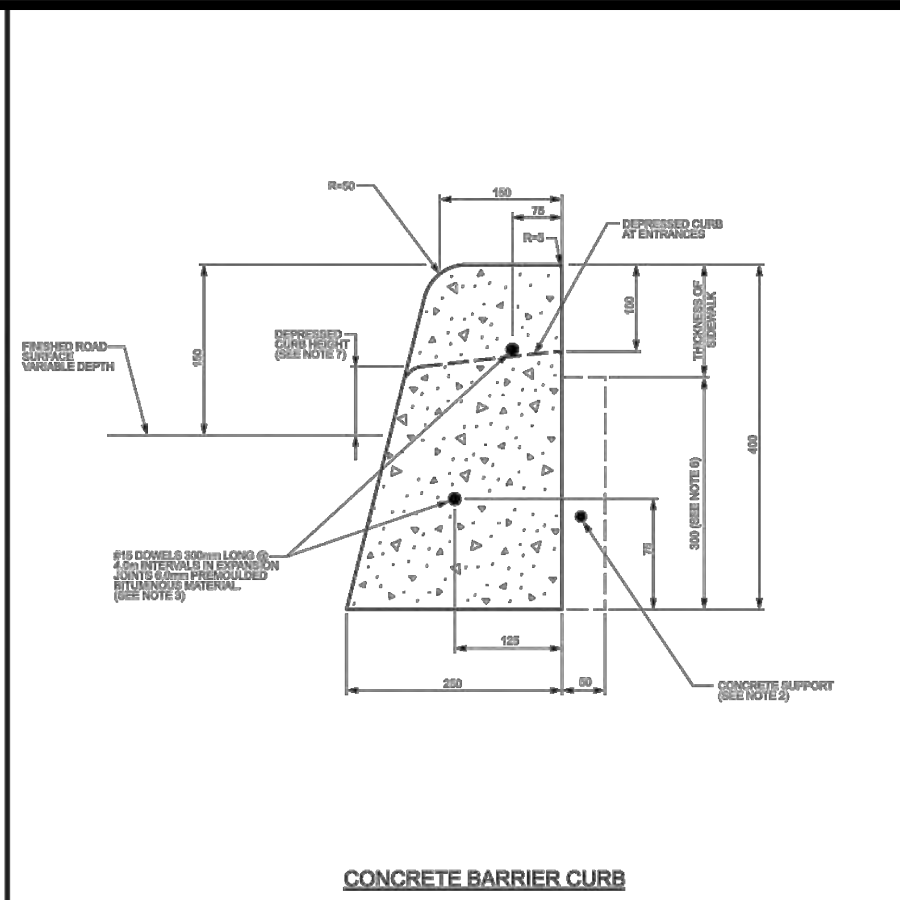
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SEDIMENT & EROSION CONTROL PLAN

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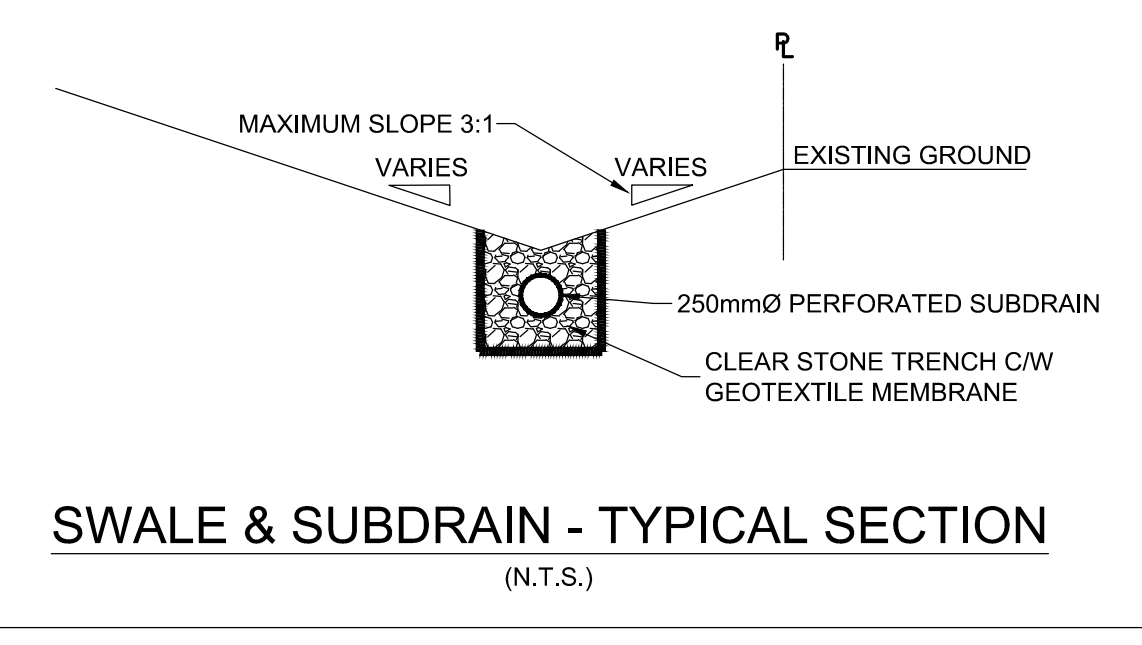
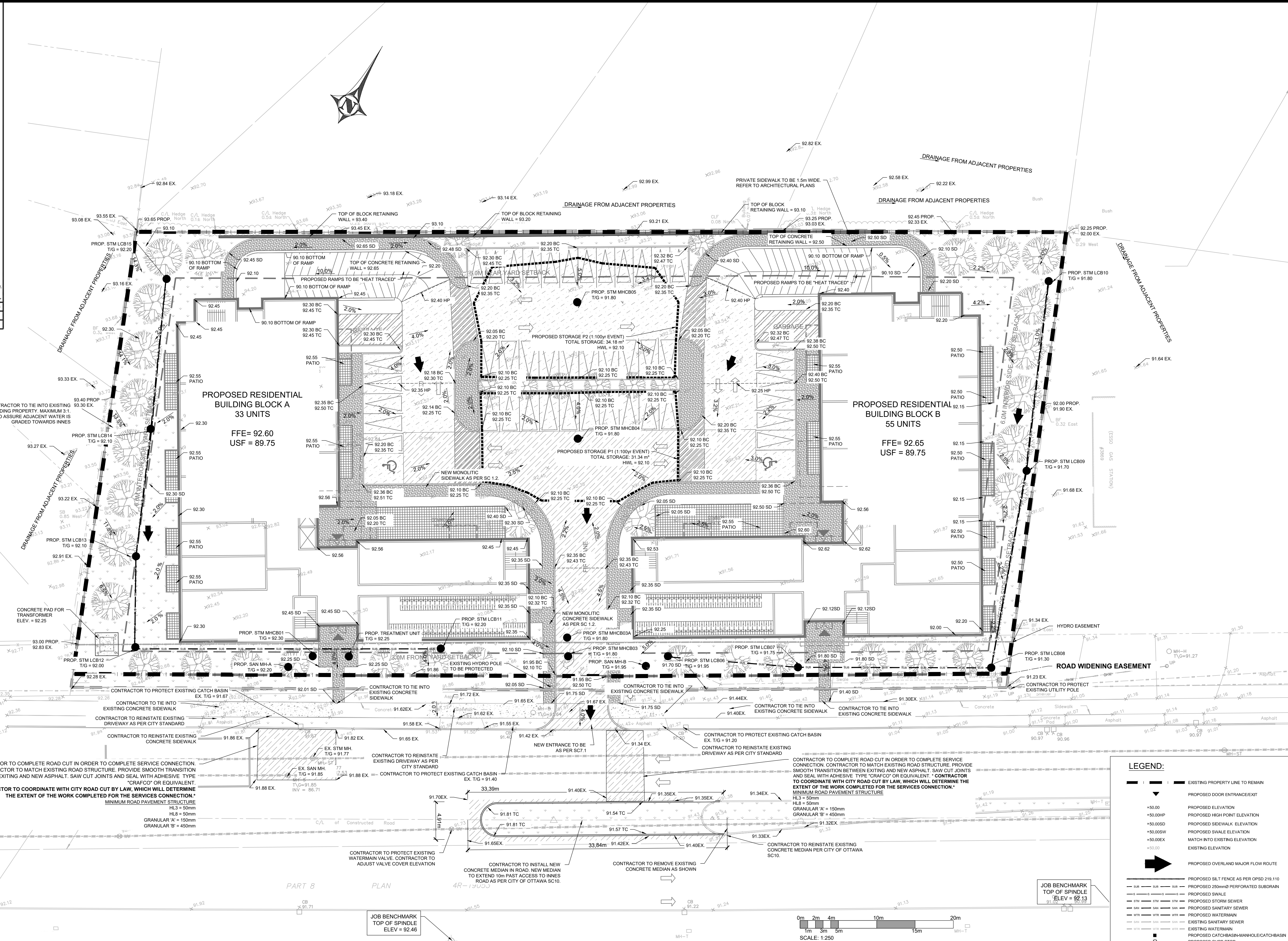


CONCRETE BARRIER CURB
FOR GRANULAR BASE PAVEMENT
(MODIFIED OPSD-600.110)

NOTES:
1. THE FULL CURB DEPTH SHALL BE CARRIED THROUGH THE DEPRESSION ACCESS CROSSING.
2. A CONCRETE SUPPORT IS REQUIRED WHEN BUILT ADJACENT TO THE SIDEWALK.
3. IF ANY EXISTING CURBING IMPACTS THE #4'S DOUBLE ARE TO BE PLACED AT THE END OF THE EXISTING CURB.
4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS SHOWN OTHERWISE.
5. DRAINAGE GROUVE SHALL BE 25mm DEEP, 100mm WIDE AND TOP OF SECTION AT 4m SPACING OR MATCH ADJACENT WHERE SIDEWALK IS ADJACENT.
6. FOR DEPRESSION CURB AT ENTRANCES USE 600.
7. DEPRESSION CURB HEIGHT - FOR PEDESTRIAN CURB RAMP 6 TO 8 mm AND FOR PRIVATE ENTRANCES 6 TO 10 mm.

N.T.S.

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DRAWN BY: JACOB GIBSON
CHECKED BY: JACOB GIBSON
SCALE: SC1.1



PONDING TABLE		
100 year storm HWL = 92.10		
PONDING AREA	VOLUME (m3)	DEPTH (mm)
P1	31.34	300
P2	34.18	300

		THICKNESS (mm)	
COURSE	MATERIAL	LIGHT DUTY	HEAVY DUTY
SURFACE	HL.3 A/C (PG 58-28)	50	40
BINDER	HL.8 A/C (PG 58-28)	--	50
BASECOURSE	GRANULAR "A"	150	150
SUBBASE	GRANULAR "B" TYPE II	300	400

LEGEND:

- EXISTING PROPERTY LINE TO REMAIN
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- PROPOSED ELEVATION
- PROPOSED HIGH POINT ELEVATION
- PROPOSED SIDEWALK ELEVATION
- PROPOSED SWALE ELEVATION
- MATCH INTO EXISTING ELEVATION
- EXISTING ELEVATION
- PROPOSED OVERLAND MAJOR FLOW ROUTE
- PROPOSED SILT FENCE AS PER OPSD 219.110
- PROPOSED 250mmØ PERFORATED SUBDRAIN
- PROPOSED SWALE
- PROPOSED STORM SEWER
- PROPOSED SANITARY SEWER
- PROPOSED WATERMAIN
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- PROPOSED GATOR-BAR/RAINFALL/CATCH BASIN
- PROPOSED CURB STOP
- PROPOSED PIPE INSULATION AS PER W22
- PROPOSED 100 YEAR HIGH WATER LEVEL
- STORM WATERSHED EXTENT
- WATERSHED NAME
- RUNOFF COEFFICIENT
- AREA IN HECTARES
- PROPOSED GRASS AREA
- PROPOSED CONCRETE FEATURES/SLAB
- PROPOSED HEAVY DUTY ASPHALT
- PROPOSED LIGHT DUTY ASPHALT
- PROPOSED GRAVEL AREA
- PROPOSED RPP RAP AS PER OPSD 810.010
- PROPOSED WATER METER
- PROPOSED SEMI-SE CONNECTION
- PROPOSED GROWING FIELD

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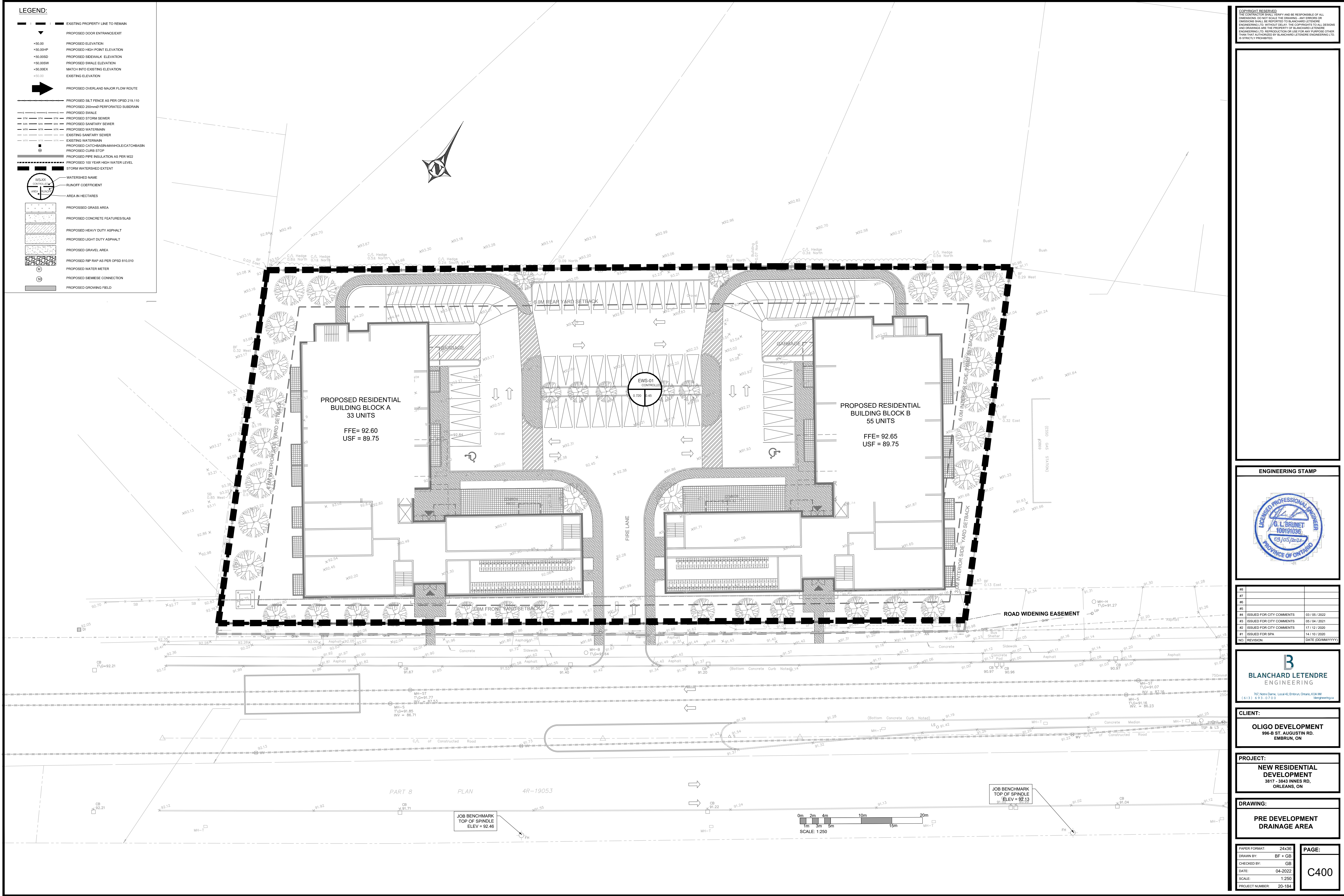
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- LEGEND:**
- EXISTING PROPERTY LINE TO REMAIN
 - PROPOSED DOOR ENTRANCE/EXIT
 - +50.00 PROPOSED ELEVATION
 - +50.00+P PROPOSED HIGH POINT ELEVATION
 - +50.00SD PROPOSED SIDEWALK ELEVATION
 - +50.00SW PROPOSED SWALE ELEVATION
 - +50.00EX MATCH INTO EXISTING ELEVATION
 - +50.00 EXISTING ELEVATION
 - PROPOSED OVERLAND MAJOR FLOW ROUTE
 - PROPOSED SILT FENCE AS PER OPSD 219.110
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EMBRURY, ON

PROJECT:

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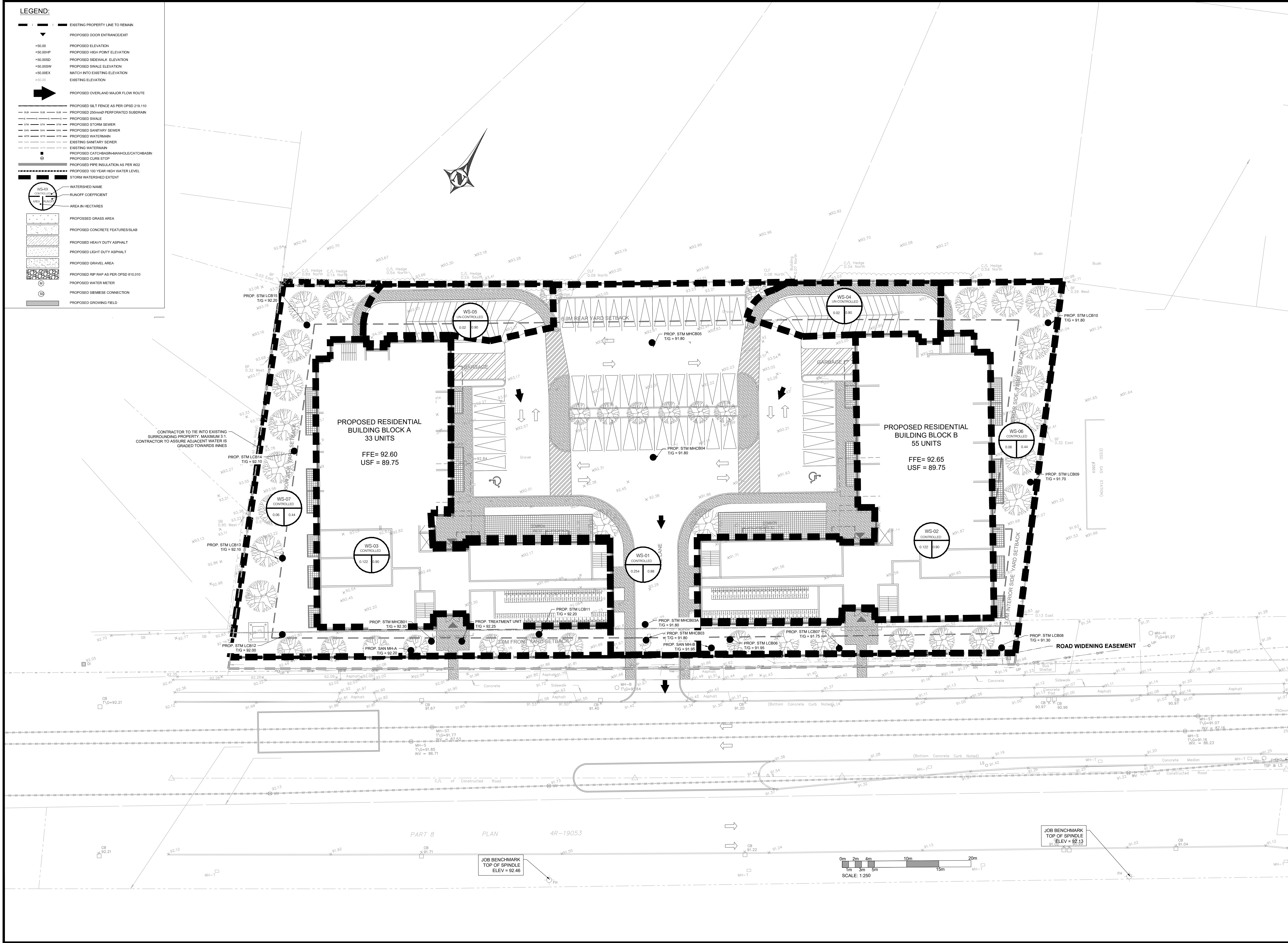
PRE DEVELOPMENT DRAINAGE AREA

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- EXISTING PROPERTY LINE TO REMAIN
- PROPOSED DOOR ENTRANCE/EXIT
- +50.00 PROPOSED ELEVATION
- +50.00+P PROPOSED HIGH POINT ELEVATION
- +50.00SD PROPOSED SIDEWALK ELEVATION
- +50.00SW PROPOSED SWALE ELEVATION
- +50.00EX MATCH INTO EXISTING ELEVATION
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100191036
03/05/2012
PROVINCE OF ONTARIO

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EMBRUN, ON

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DRAWING NUMBER: 18235

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Advanced Drainage Systems, Inc.



SC-740 STORMTECH CHAMBER SPECIFICATIONS

- ### IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF THE SC-740 SYSTEM

1. STORMTECH SC-740 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-700 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS.
STORMTECH RECOMMENDS 3 BACKFILL METHODS:
 - STONES/HOTTER LOCATED OFF THE CHAMBER BED.
 - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
 - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM - 150 mm (6") SPACING BETWEEN THE CHAMBER ROWS.
7. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE 20-80 mm (3/4-2").
8. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
9. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE 'STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE'.
2. THE USE OF CONSTRUCTION EQUIPMENT OVER SC-740 CHAMBERS IS LIMITED:
 - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
 - NO RUBBER TIERED LOADERS, DUMP TRUCKS, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE 'STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE'.
 - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE 'STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE'.
3. FULL 900 mm (36") OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO THE CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

Technical drawing of the longitudinal section of the 'L' shaped tunnel. The drawing shows a horizontal section with a total length of 44.536 m and a section length of 41.702 m. The vertical section has a height of 7.087 m. The drawing includes labels A through H and various dimensions and annotations.

ISOLATOR ROW PLUS
(SEE DETAIL/TYP 2 PLACES)

PLACE MINIMUM 3.810 m OF ADSPLUS125 WOVEN GEOTEXTILE OVER
BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR
PROTECTION AT ALL CHAMBER INLET ROWS

— BED LIMITS

NOTES

- MANHOLE SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH NOTE #32 FOR MANHOLE SIZING GUIDANCE.
 THE LOCATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONDITIONS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANHOLE SIZES IN THE FIELD.
 THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
 THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.
NOT FOR CONSTRUCTION: THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.

NOT FOR CONSTRUCTION: THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE

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DETAILS - 1

PAPER FORMAT:	24x36
DRAWN BY:	BF + GB
CHECKED BY:	GB
DATE:	04-2022
SCALE:	
PROJECT NUMBER:	20-184

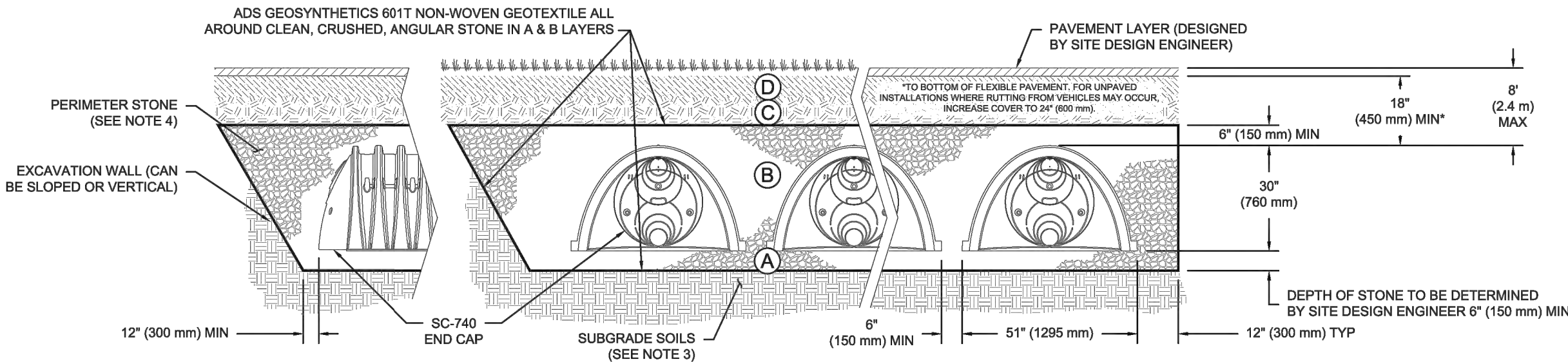
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ACCEPTABLE FILL MATERIALS: STORMTECH SC-740 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	FINAL FILL: FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	INITIAL FILL: FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145 ¹ A-1, A-2-4, A-3 OR AASHTO M43 ¹ 3, 357, 4, 467, 5, 56, 57, 6, 97, 68, 7, 78, 8, 86, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	EMBEDMENT STONE: FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43 ¹ 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	FOUNDATION STONE: FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43 ¹ 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE. ^{2,3}

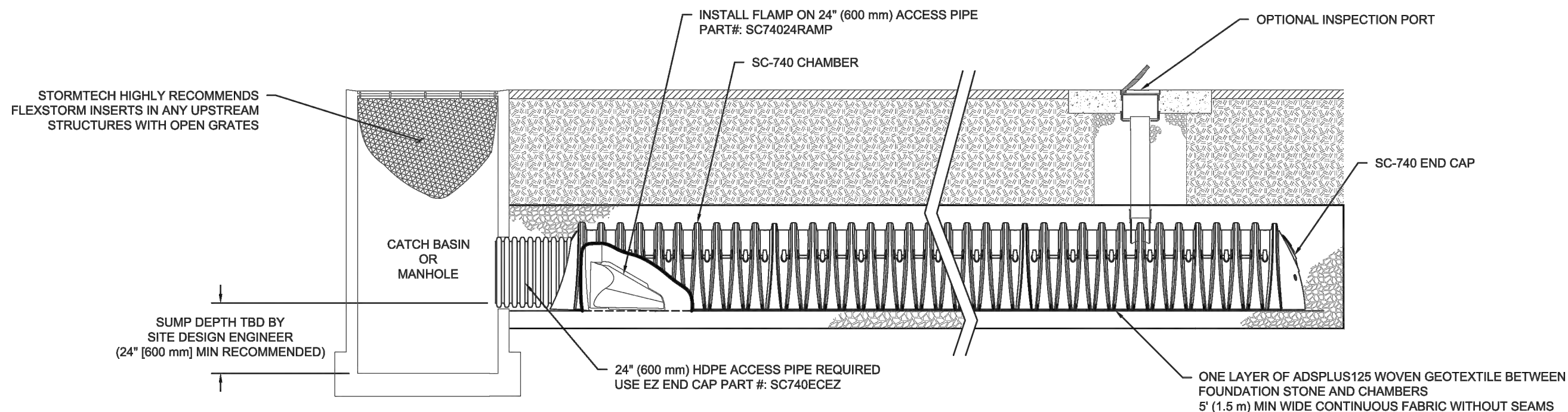
PLEASE NOTE:

- THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
- STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
- WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
- ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



NOTES:

- CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
- SC-740 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
- THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR 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.
- PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
- REQUIREMENTS FOR HANDLING AND INSTALLATION:
 - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
 - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
 - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 550 LBS/FT³%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

SC-740 ISOLATOR ROW PLUS DETAIL
NTS

INSPECTION & MAINTENANCE

- STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
- A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
- A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
- A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
- A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
- A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
- B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
- B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
- i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
- ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
- B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45° (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED
- STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.
- STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

- INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
- CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

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