TATHAM ENGINEERING

Enhancing our communities

1592 Tenth Line Road, City of Ottawa

SITE SERVICING AND STORMWATER MANAGEMENT REPORT

Bridor Developments

File 522677 | June 6, 2023

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Issue	Date	Description
1	December 19, 2022	Final Report
2	December 21, 2022	Revised Final Report
3	June 6, 2023	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 1592 Tenth Line Road in Ottawa. In November 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 September 26, 2022.

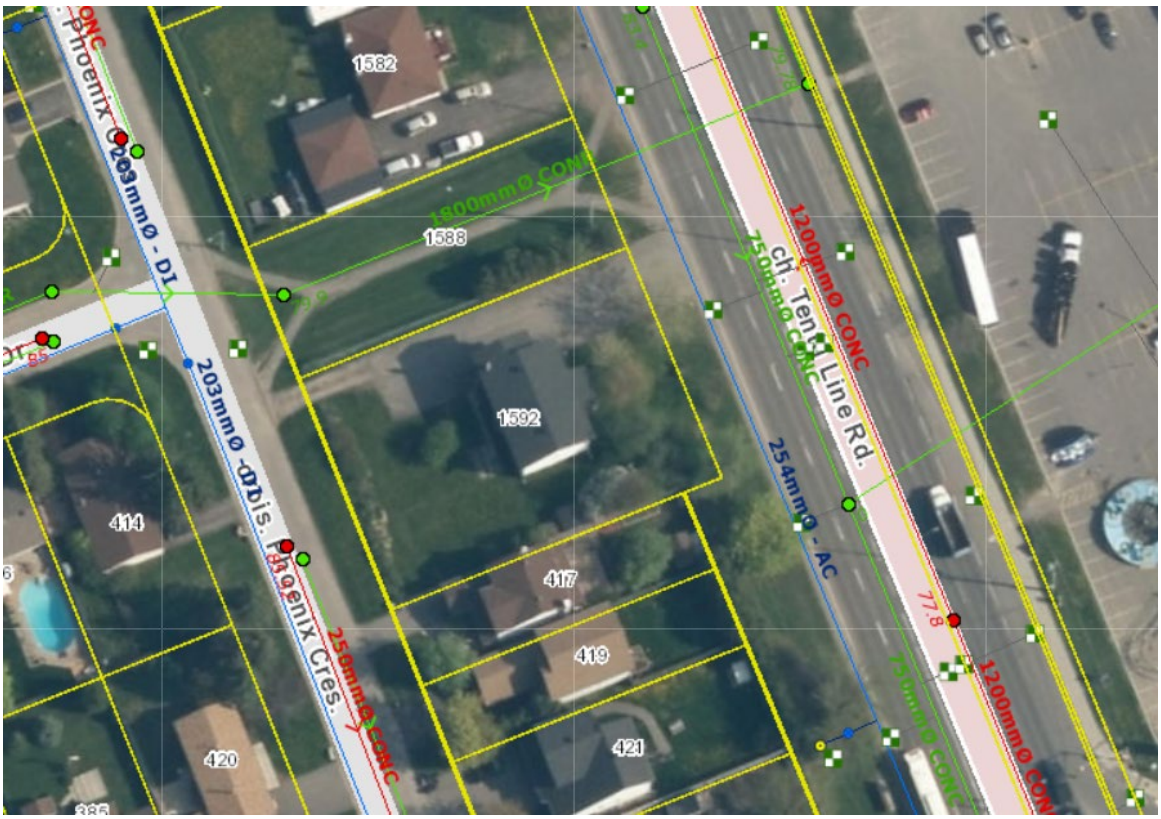
We note that the underground storage chambers that were previously proposed have been replaced with a subsurface storage tank to minimize the risk of water damage to the underground parking garage foundation and/or flooding of the underground parking garage. BL Engineering's original Site Servicing and SWM Report, dated June 14, 2022, is provided in Appendix H for reference.

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 Arpentage Dutrisac Surveying Inc.

2 Site Plan

The site is located at 1592 Tenth Line Road in Ottawa and is bounded by residential properties to the north and south, Phoenix Crescent to the west, and Tenth Line Road to the east. As per the aerial photo in Figure 1 below, the existing 0.15 ha site consists of an existing residential dwelling, green space, a paved driveway access onto Tenth Line Road and a gravel driveway access onto Phoenix Crescent. The existing dwelling is proposed to be demolished prior to construction. The land will be developed with two new residential apartment buildings and a shared underground parking garage.

Figure 1: Existing Site Location



3 Stormwater Management

3.1 EXISTING SITE CONDITION

The existing condition drainage areas within the site were delineated according to two existing surface water outlets. Runoff from the major west portion of the site (Drainage Area 101 – 0.099 ha) drains from east to west to Phoenix Crescent (Outlet 1) eventually being captured by the existing roadside catchbasins, whereas runoff from the minor east portion of the site (Drainage Area 102 – 0.050 ha) drains from west to east to Tenth Line Road (Outlet 2) eventually being captured by the existing roadside catchbasins. Refer to Drawing C400 for the pre-development drainage plan.

3.2 EXISTING CONDITION HYDROLOGIC ANALYSIS

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

The drainage area delineations were 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 Tables 1 and 2.

Table 1: Existing Condition Peak Flow Summary – Phoenix Crescent (Outlet 1)

DESIGN STORM	DRAINAGE AREA 101 0.099 ha (m^3/s)		
	3-hr CHI	6-hr CHI	24-hr SCS Type II
5-Year	0.011	0.011	0.011

Table 2: Existing Condition Peak Flow Summary – Tenth Line Road (Outlet 2)

DESIGN STORM	DRAINAGE AREA 102 0.050 ha (m^3/s)		
	3-hr CHI	6-hr CHI	24-hr SCS Type II
5-Year	0.006	0.006	0.005

3.3 PROPOSED STORMWATER MANAGEMENT

The proposed development consists of two new residential apartment buildings (Block A, 318 m^2 comprised of 15 units and Block B, 250 m^2 comprised of 12 units), and hard and softscape areas. One underground parking garage, with access to Tenth Line Road, will be shared by both apartment buildings. As the runoff coefficient for the overall site will increase in the proposed condition due to addition of hard surfaces, stormwater quantity and quality control will be implemented.

The stormwater management design has been developed to follow the existing site topography which currently drains towards both Phoenix Crescent, herein referred to as Outlet 1, and Tenth Line Road, herein referred to as Outlet 2. Each outlet is maintained in the proposed stormwater management plan. The overland flow routes have also been designed to convey emergency overland flows toward Tenth Line Road and Phoenix Crescent.

Site runoff from uncontrolled Drainage Area 206 will sheet flow to Tenth Line Road and will discharge into the existing 750 mm diameter concrete storm sewer on Tenth Line Road (Outlet 2). At Outlet 2, the proposed condition 100-year peak flow rate will match the existing condition 5-year peak flow rate.

Site runoff from controlled Drainage Areas 201 to 205, 207, and 208 will be directed to and captured by a series of on-site drainage structures and conveyed to the existing 300 mm diameter concrete storm sewer on Phoenix Crescent (Outlet 1) via a proposed internal storm sewer system. At Outlet 1, to attenuate proposed condition peak flow rates to existing condition peak flow rates, runoff will be controlled by a John Meunier Hydrovex VHV vertical vortex flow regulator (model 100VHV-1) installed in STM CBMH01, which will restrict the flow that is discharged into the municipal storm sewer on Phoenix Crescent. By restricting flow, onsite stormwater detention will be provided via underground pipe, structure, and tank storage which were designed to attenuate the proposed condition runoff from the 100-year storm event to the 5-year existing condition peak flow rate.

3.4 PROPOSED CONDITION HYDROLOGIC ANALYSIS

A VO6 model 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.

At Outlet 2, runoff from the 100-year storm was overcontrolled such that the combined controlled peak flow from Drainage Areas 201 to 205, 207, and 208 are reduced at or below the existing condition 5-year storm peak flow rate.

The drainage area delineation for the contributing lands was completed according to the proposed site grading illustrated on drawing C200, which is included in Appendix G. 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 proposed condition hydrologic model, have been included in Appendix A.

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

Table 3: Proposed Condition Peak Flow Summary – Phoenix Crescent (Outlet 1)

DESIGN STORM	DRANAIGE AREAS 201 + 202 + 203 + 204 + 205 + 207 + 208 0.136 ha CONTROLLED (m^3/s)		
	3-hr CHI	6-hr CHI	24-hr SCS TYPE II
100-Year	0.009 (0.011)	0.010 (0.011)	0.009 (0.011)

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

Table 4: Proposed Condition Peak Flow Summary – Tenth Line Road (Outlet 2)

DESIGN STORM	DRAINAGE AREA 206 0.014 ha UNCONTROLLED (m^3/s)		
	3-hr CHI	6-hr CHI	24-hr SCS TYPE II
100-Year	0.004 (0.005)	0.004 (0.005)	0.004 (0.005)

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

Tables 3 and 4 above confirm the proposed SWM plan will attenuate the proposed condition 100-year peak flows at or below the existing condition 5-year peak flows.

3.5 STORMWATER QUANTITY CONTROL

At Outlet 2 the proposed condition 100-year peak flow rate will match the existing condition 5-year peak flow rate. As such, quantity control for Outlet 2 is not required.

At Outlet 1, stormwater quantity control for the major controlled portion of the proposed development will be achieved via underground pipe, structure, and tank storage. Since the underground parking garage will occupy a major portion of the site area, a section of the proposed storm pipe will pass through the underground parking garage along the inside of the north underground parking garage foundation wall and between the residential buildings. The storm sewer within the building structure will be coordinated with the mechanical engineer at the building permit stage.

The proposed grading for the major controlled portion of the site has been designed to capture surface runoff in a series of drainage structures connected to storm sewer pipes, a storage tank, and a control structure. Runoff is proposed to discharge from the control structure into the 300mm diameter municipal storm sewer on Phoenix Crescent. The proposed grading and storm servicing designs are shown on the attached drawings in Appendix G.

Runoff generated from the major controlled portion of the site will be controlled at the outlet of control structure STM CBMH01 via a John Meunier Hydrovex VHV vertical vortex flow regulator (model 100VHV-1), which will restrict flow directed to the municipal storm sewer on Phoenix Crescent. The proposed Hydrovex flow regulator will release a total of 10.0 L/s with a maximum head of 1.68 m (HWL = 87.05) during the 100-year storm event. Approximately 48 m^3 of stormwater storage is required for the site whereas the proposed internal storm sewer system provides 52 m^3 of storage.

Runoff from the underground parking ramp (Drainage Area 207) will be captured by a trench drain located at the bottom of the ramp and drain uncontrolled to the surface, outside the northwest corner of the building structure and ultimately to STM CBMH02, via a pump located within the building structure. Details related to the underground parking garage and ramp drainage will be coordinated with the mechanical engineer and submitted with the building permit application.

Refer to Appendix E for the Hydrovex Vertical Vortex Flow Regulator Report and to Appendix A for the detailed stormwater management calculations.

3.5.1 Roof Drainage

The proposed building roofs are flat. Roof drains (one for each building) and scuppers discharge stormwater to the surface onto pervious areas, where it is captured by drainage inlets and conveyed to control structure STM CBMH01 which controls incoming flows via the Hydrovex flow regulator. The scuppers will provide emergency spill outs in the event of a blockage.

3.5.2 Underground Storage Tank

An underground storage tank (Soleno Krah 1,500 mm diameter high volume tank) has been specified to provide stormwater storage for the controlled portion of the site. A total of 33.7 m^3 will be provided by the underground tank. The tank will consist of a maintenance access on each side. The maintenance of the tank is to be in accordance with the manufacturer's guidelines.

3.6 STORMWATER QUALITY CONTROL

A water quality control requirement of 80% TSS removal is required by the City of Ottawa. To meet this requirement, a stormwater treatment unit will be installed at the downstream end of the internal storm system. Using the Stormceptor sizing software, the EFO4 was selected. The software generated report has been attached in Appendix D.

4 Sanitary Service

4.1 EXISTING SITE CONDITION

The existing site is serviced by an existing 135mm diameter service that is connected to the existing 1200 mm diameter concrete sanitary sewer on Tenth Line Road. The existing 135mm diameter service to Tenth Line Road will be abandoned.

4.2 PROPOSED SANITARY SERVICE

One new 200 mm diameter PVC sanitary service, located west of Block A, will discharge sewage flows from the proposed development into an existing sanitary maintenance hole on Phoenix Crescent, which will convey flows southward via an existing 250 mm diameter concrete sanitary sewer. The proposed 200mm diameter service will have a minimum slope of 1.0% in accordance with City guidelines. A monitoring maintenance hole (SAN MHA) is proposed for the new connection and will be installed approximately on the property line. Refer to Drawing C300 for the proposed sanitary service details.

The combined sanitary peak flow was calculated to be approximately 1.3 L/s, based on the following City of Ottawa sanitary design parameters:

- Domestic sewage flow of 350 L/c/day;
- Peak extraneous flow of 0.28 L/s/ha; and
- Peaking factor (Harmon) of 4.0.

Refer to Appendix B for the detailed sanitary flow calculations.

5 Water Supply and Fire Protection

5.1 EXISTING SITE CONDITION

The existing dwelling is serviced by a 19 mm diameter water service connected to the existing 254 mm diameter watermain on Tenth Line Road. The existing connection will be abandoned and capped at the watermain.

There are three existing municipal fire hydrants within 90 metres of the proposed buildings; one on the west side of Tenth Line Road (southeast of the site), one on the west side of Phoenix Crescent (northwest of the site), and one on Vince Drive (southwest of the site).

5.2 PROPOSED DOMESTIC WATER SERVICE

One new water connection is proposed to service the new buildings and will be connected to the existing 203 mm diameter ductile iron on Phoenix Crescent. Refer to Drawing C300 – Site Servicing Plan for the proposed water service details.

The new water service was sized based on the City of Ottawa Design Guidelines. The average water demand per person of 350 L/c/d was applied to the estimated 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 combined water demands for the new buildings are summarized in Table 1.

Table 5: Domestic Water Demands

	BLOCK A + B	UNITS
Average Water Demand	13,230	L/d
Maximum Daily	33,075	L/d
Maximum Hourly	72,765	L/d

Based on the above, the proposed development will be serviced with a 100 mm diameter PVC water service, connected to the 203 mm diameter ductile iron watermain on Phoenix Crescent, and shall be confirmed by the mechanical engineer at the building permit phase. Refer to Appendix C for the water demand and water service sizing calculations.

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. Refer to Appendix C for the fire flow calculations.

Each building is located within 90 m of a hydrant and therefore are compliant with OBC requirements. Fire flow protection will be provided by the following three hydrants, which are within 150 m (uninterrupted path) of the proposed buildings:

- One existing Class AA blue bonnet hydrant located no further than 70 m from the proposed buildings (70 m southeast of Block A and 55 m southeast of Block B) on the west side of Tenth Line Road;
- One existing Class AA blue bonnet hydrant located no further than 80 m from the proposed buildings (65 m northwest of Block A and 80 m northwest of Block B) on the west side of Phoenix Crescent; and
- One proposed Class AA blue bonnet hydrant located no further than 85 m from the proposed buildings (15 m southwest of Block A and 85 m southwest of Block B) on the south side of Vince Drive.

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 three existing hydrants near the site consist of blue bonnet hydrants, and as such are Class AA-rated hydrants. As is summarized in Table 2, the required 6,000 L/min fire flow to the proposed buildings is available from the three existing hydrants.

Table 6: Hydrants Required for Fire Flow

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	1	5,700	13,300
AA	> 75 & ≤ 150	3,800	2	7,600	

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

A hydrant flow test is recommended to verify the available fire flow, pressure, and overall fire protection.

5.4 WATER PRESSURE

Water pressure calculations for maximum daily and maximum hourly demands, Scenarios 1 and 2 respectively, were prepared for the proposed development utilizing boundary conditions provided by the City. A third scenario, for maximum daily demand plus fire flow, was deemed unnecessary as the proposed water service will be for domestic water supply only. The water pressure calculations confirm adequate water pressure is available and meets the City of Ottawa water pressure objectives outlined in Section 4.2.2 of the Ottawa Design Guidelines for Water Distribution. Scenario 1, for maximum daily demand pressure, resulted in a minimum pressure of 63.53 psi which is within the acceptable 50 to 80 psi MECP range. Scenario 2, for maximum hourly demand pressure, resulted in a minimum pressure of 57.12 psi which is within the acceptable 40 to 80 psi MECP range. Based on the above, a pressure reducing valve is not expected to be required. The pressures for the proposed development shall be confirmed by the mechanical engineer at the building permit phase. Refer to Appendix F for boundary conditions and to Appendix C for pressure calculations.

We note, the fire demand cited in Section 5.3 of the report (6,000 L/min) does not match the value used by the City to determine the water boundary conditions shown in Appendix F (8,200 L/min). The revised fire flow rate is based on the 2022 FUS, whereas the previous rate was based on the 1999 FUS. As discussed with the City, since the boundary conditions were made with a more conservative fire water demand of 8,200 L/min, revised boundary conditions are not necessary. In addition, maximum daily demand plus fire flow is not used in either of the completed scenarios.

6 Erosion and Sediment Control

During construction, sediment and erosion controls will be implemented around the site to reduce the potential for any sediment mobilizing off site. The construction and maintenance of erosion and 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 major controlled portion of the site will reduce the 100-year proposed condition peak flow from the site to the allowable 5-year pre-development peak flow rate, thereby meeting the City's requirements. The proposed condition release rate from the controlled portion of the site will be restricted by a John Meunier Hydrovex VHV vertical vortex flow regulator (model 100VHV-1) located in STM CBMH01. The combined 100-year proposed condition controlled peak flow will be reduced below the allowable 5-year pre-development peak flow rate prior to discharging into the existing 300 mm diameter concrete storm sewer on Phoenix Crescent, herein referred to as Outlet 1. Stormwater quantity control for Outlet 1 will be achieved with 52 m^3 of underground pipe, structure, and tank storage. Stormwater quality control will be met through the use of a Stormceptor EFO4 stormwater quality treatment unit. At Outlet 2, the proposed condition 100-year peak flow rate will match the existing condition 5-year peak flow rate and discharge into the 750 mm diameter concrete storm sewer on Tenth Line Road. As such, quantity control for Outlet 2 is not required.

7.2 SANITARY SERVICE

The estimated combined sanitary peak flow for the site is approximately 1.3 L/s. The proposed development will be serviced via a new 200 mm diameter PVC sanitary service connecting into an existing sanitary maintenance hole on Phoenix Crescent, which will convey flows southward via an existing 250 mm diameter concrete sanitary sewer.

7.3 WATER SERVICE

The proposed development will be serviced via a new 100 mm diameter PVC water service to be connected to the existing 203 mm diameter ductile iron watermain on Phoenix Crescent. The combined Block A and B water demands resulted in an average water demand of 13,230 L/d, a maximum daily demand of 33,075 L/d, and a peak hourly demand of 72,765 L/d. The required fire flow rate is 6,000 L/min. A sprinkler system is not proposed for the site. There are three fire hydrants surrounding the site that will provide adequate fire protection.

Appendix A: Stormwater Management Calculations

TATHAM ENGINEERING

Visual OTTHYMO Model Parameter Calculations (NasHYD)

Project Details

Project Number	522677

Prepared By

Name	HY

Data Sources

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

Pre-Development Condition

Watershed:	N/A
Catchment ID:	101
Catchment Area (ha):	0.099
Impervious %:	33%

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

Soil Symbol		**C**											
Soil Series		Clay											
Hydrologic Soils Group		C											
Soil Texture		Clay											
Runoff Coefficient Type		3											
Area (ha)		0.099											
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	0.033	98	0.95									
Gravel	3		89	0.38									
Woodland	10		73	0.35									
Pasture/Lawns	5	0.066	79	0.40									
Meadows	8		76	0.38									
Cultivated	7		82	0.55									
Waterbody	12		50	0.05									
Average CN		85.33											
Average C		0.58											
Average IA		4.00											

Time to Peak Calculations

Max. Catchment Elev. (m):	88.65
Min. Catchment Elev. (m):	87.94
Catchment Length (m):	22
Catchment Slope (%):	3.23%
Method: Bransby-Williams Formula	
Time of Concentration (mins):	1.25

Summary

Catchment CN:	85.3
Catchment C:	0.58
Catchment IA (mm):	4.00
Time of Concentration (hrs):	0.02
Catchment Time to Peak (hrs):	0.01
Catchment Time Step (mins):	0.17

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Visual OTTHYMO Model Parameter Calculations (NasHYD)

Project Details

Project Number	522677

Prepared By

Name	HY

Data Sources

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

Pre-Development Condition

Watershed:	N/A
Catchment ID:	102
Catchment Area (ha):	0.050
Impervious %:	31%

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

Soil Symbol		**C**											
Soil Series		Clay											
Hydrologic Soils Group		C											
Soil Texture		Clay											
Runoff Coefficient Type		3											
Area (ha)		0.050											
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	0.016	98	0.95									
Gravel	3		89	0.44									
Woodland	10		73	0.42									
Pasture/Lawns	5	0.035	79	0.45									
Meadows	8		76	0.44									
Cultivated	7		82	0.60									
Waterbody	12		50	0.05									
Average CN		84.89											
Average C		0.61											
Average IA		4.07											

Time to Peak Calculations

Max. Catchment Elev. (m):	88.65
Min. Catchment Elev. (m):	87.83
Catchment Length (m):	15
Catchment Slope (%):	5.47%
Method: Bransby-Williams Formula	
Time of Concentration (mins):	0.82

Summary

Catchment CN:	84.9
Catchment C:	0.61
Catchment IA (mm):	4.07
Time of Concentration (hrs):	0.01
Catchment Time to Peak (hrs):	0.01
Catchment Time Step (mins):	0.11

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Visual OTTHYMO Model Parameter Calculations (NasHYD)

Project Details

Project Number	522677

Prepared By

Name	HY

Data Sources

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

Pre-Development Condition

Watershed:	N/A
Catchment ID:	201
Catchment Area (ha):	0.034
Impervious %:	100%

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

Soil Symbol		**C**											
Soil Series		Clay											
Hydrologic Soils Group		C											
Soil Texture		Clay											
Runoff Coefficient Type		3											
Area (ha)		0.034											
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	0.034	98	0.95									
Gravel	3		89	0.44									
Woodland	10		73	0.42									
Pasture/Lawns	5		79	0.45									
Meadows	8		76	0.44									
Cultivated	7		82	0.60									
Waterbody	12		50	0.05									
Average CN		98.00											
Average C		0.95											
Average IA		2.00											

Time to Peak Calculations

Max. Catchment Elev. (m):	88.70
Min. Catchment Elev. (m):	88.40
Catchment Length (m):	5
Catchment Slope (%):	6.00%
Method: Bransby-Williams Formula	
Time of Concentration (mins):	0.28

Summary

Catchment CN:	98.0
Catchment C:	0.95
Catchment IA (mm):	2.00
Time of Concentration (hrs):	0.00
Catchment Time to Peak (hrs):	0.00
Catchment Time Step (mins):	0.04

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Visual OTTHYMO Model Parameter Calculations (NasHYD)

Project Details

Project Number	522677

Prepared By

Name	HY

Data Sources

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

Pre-Development Condition

Watershed:	N/A
Catchment ID:	202
Catchment Area (ha):	0.028
Impervious %:	100%

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

Soil Symbol		**C**											
Soil Series		Clay											
Hydrologic Soils Group		C											
Soil Texture		Clay											
Runoff Coefficient Type		3											
Area (ha)		0.028											
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	0.028	98	0.95									
Gravel	3		89	0.44									
Woodland	10		73	0.42									
Pasture/Lawns	5		79	0.45									
Meadows	8		76	0.44									
Cultivated	7		82	0.60									
Waterbody	12		50	0.05									
Average CN		98.00											
Average C		0.95											
Average IA		2.00											

Time to Peak Calculations

Max. Catchment Elev. (m):	88.70
Min. Catchment Elev. (m):	88.40
Catchment Length (m):	5
Catchment Slope (%):	6.00%
Method: Bransby-Williams Formula	
Time of Concentration (mins):	0.28

Summary

Catchment CN:	98.0
Catchment C:	0.95
Catchment IA (mm):	2.00
Time of Concentration (hrs):	0.00
Catchment Time to Peak (hrs):	0.00
Catchment Time Step (mins):	0.04

TATHAM ENGINEERING

Visual OTTHYMO Model Parameter Calculations (NasHYD)

Project Details

Project Number	522677

Prepared By

Name	HY

Data Sources

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

Pre-Development Condition

Watershed:	N/A
Catchment ID:	203
Catchment Area (ha):	0.016
Impervious %:	44%

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

Soil Symbol		**C**											
Soil Series		Clay											
Hydrologic Soils Group		C											
Soil Texture		Clay											
Runoff Coefficient Type		3											
Area (ha)		0.016											
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	0.007	98	0.95									
Gravel	3		89	0.38									
Woodland	10		73	0.35									
Pasture/Lawns	5	0.009	79	0.40									
Meadows	8		76	0.38									
Cultivated	7		82	0.55									
Waterbody	12		50	0.05									
Average CN		87.31											
Average C		0.64											
Average IA		3.69											

Time to Peak Calculations

Max. Catchment Elev. (m):	88.32
Min. Catchment Elev. (m):	88.12
Catchment Length (m):	10
Catchment Slope (%):	2.00%
Method: Bransby-Williams Formula	
Time of Concentration (mins):	0.75

Summary

Catchment CN:	87.3
Catchment C:	0.64
Catchment IA (mm):	3.69
Time of Concentration (hrs):	0.01
Catchment Time to Peak (hrs):	0.01
Catchment Time Step (mins):	0.10

TATHAM ENGINEERING

Visual OTTHYMO Model Parameter Calculations (NasHYD)

Project Details

Project Number	522677

Prepared By

Name	HY

Data Sources

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

Pre-Development Condition

Watershed:	N/A
Catchment ID:	204
Catchment Area (ha):	0.009
Impervious %:	33%

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

Soil Symbol		**C**											
Soil Series		Clay											
Hydrologic Soils Group		C											
Soil Texture		Clay											
Runoff Coefficient Type		3											
Area (ha)		0.009											
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	0.003	98	0.95									
Gravel	3		89	0.38									
Woodland	10		73	0.35									
Pasture/Lawns	5	0.006	79	0.40									
Meadows	8		76	0.38									
Cultivated	7		82	0.55									
Waterbody	12		50	0.05									
Average CN		85.33											
Average C		0.58											
Average IA		4.00											

Time to Peak Calculations

Max. Catchment Elev. (m):	88.25
Min. Catchment Elev. (m):	88.10
Catchment Length (m):	9
Catchment Slope (%):	1.67%
Method: Bransby-Williams Formula	
Time of Concentration (mins):	0.74

Summary

Catchment CN:	85.3
Catchment C:	0.58
Catchment IA (mm):	4.00
Time of Concentration (hrs):	0.01
Catchment Time to Peak (hrs):	0.01
Catchment Time Step (mins):	0.10

TATHAM ENGINEERING

Visual OTTHYMO Model Parameter Calculations (NasHYD)

Project Details

Project Number	522677

Prepared By

Name	HY

Data Sources

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

Pre-Development Condition

Watershed:	N/A
Catchment ID:	205
Catchment Area (ha):	0.023
Impervious %:	65%

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

Soil Symbol		**C**											
Soil Series		Clay											
Hydrologic Soils Group		C											
Soil Texture		Clay											
Runoff Coefficient Type		3											
Area (ha)		0.023											
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	0.015	98	0.95									
Gravel	3		89	0.38									
Woodland	10		73	0.35									
Pasture/Lawns	5	0.008	79	0.40									
Meadows	8		76	0.38									
Cultivated	7		82	0.55									
Waterbody	12		50	0.05									
Average CN		91.39											
Average C		0.76											
Average IA		3.04											

Time to Peak Calculations

Max. Catchment Elev. (m):	88.25
Min. Catchment Elev. (m):	88.03
Catchment Length (m):	13
Catchment Slope (%):	1.69%
Method: Bransby-Williams Formula	
Time of Concentration (mins):	0.97

Summary

Catchment CN:	91.4
Catchment C:	0.76
Catchment IA (mm):	3.04
Time of Concentration (hrs):	0.02
Catchment Time to Peak (hrs):	0.01
Catchment Time Step (mins):	0.13

TATHAM ENGINEERING

Visual OTTHYMO Model Parameter Calculations (NasHYD)

Project Details

Project Number	522677

Prepared By

Name	HY

Data Sources

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

Pre-Development Condition

Watershed:	N/A
Catchment ID:	206
Catchment Area (ha):	0.014
Impervious %:	43%

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

Soil Symbol		**C**											
Soil Series		Clay											
Hydrologic Soils Group		C											
Soil Texture		Clay											
Runoff Coefficient Type		3											
Area (ha)		0.014											
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	0.006	98	0.95									
Gravel	3		89	0.38									
Woodland	10		73	0.35									
Pasture/Lawns	5	0.008	79	0.40									
Meadows	8		76	0.38									
Cultivated	7		82	0.55									
Waterbody	12		50	0.05									
Average CN		87.14											
Average C		0.64											
Average IA		3.71											

Time to Peak Calculations

Max. Catchment Elev. (m):	88.32
Min. Catchment Elev. (m):	88.08
Catchment Length (m):	12
Catchment Slope (%):	2.00%
Method: Bransby-Williams Formula	
Time of Concentration (mins):	0.91

Summary

Catchment CN:	87.1
Catchment C:	0.64
Catchment IA (mm):	3.71
Time of Concentration (hrs):	0.02
Catchment Time to Peak (hrs):	0.01
Catchment Time Step (mins):	0.12

TATHAM ENGINEERING

Visual OTTHYMO Model Parameter Calculations (NasHYD)

Project Details

Project Number	522677

Prepared By

Name	HY

Data Sources

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

Pre-Development Condition

Watershed:	N/A
Catchment ID:	207
Catchment Area (ha):	0.013
Impervious %:	92%

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

Soil Symbol		**C**											
Soil Series		Clay											
Hydrologic Soils Group		C											
Soil Texture		Clay											
Runoff Coefficient Type		3											
Area (ha)		0.013											
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	0.012	98	0.95									
Gravel	3		89	0.54									
Woodland	10		73	0.52									
Pasture/Lawns	5	0.001	79	0.55									
Meadows	8		76	0.54									
Cultivated	7		82	0.70									
Waterbody	12		50	0.05									
Average CN		96.54											
Average C		0.92											
Average IA		2.23											

Time to Peak Calculations

Max. Catchment Elev. (m):	88.09
Min. Catchment Elev. (m):	85.30
Catchment Length (m):	16
Catchment Slope (%):	17.44%
Method: Bransby-Williams Formula	
Time of Concentration (mins):	0.79

Summary

Catchment CN:	96.5
Catchment C:	0.92
Catchment IA (mm):	2.23
Time of Concentration (hrs):	0.01
Catchment Time to Peak (hrs):	0.01
Catchment Time Step (mins):	0.11

TATHAM ENGINEERING

Visual OTTHYMO Model Parameter Calculations (NasHYD)

Project Details

Project Number	522677

Prepared By

Name	HY

Data Sources

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

Pre-Development Condition

Watershed:	N/A
Catchment ID:	208
Catchment Area (ha):	0.013
Impervious %:	38%

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

Soil Symbol		**C**											
Soil Series		Clay											
Hydrologic Soils Group		C											
Soil Texture		Clay											
Runoff Coefficient Type		3											
Area (ha)		0.013											
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	0.005	98	0.95									
Gravel	3		89	0.38									
Woodland	10		73	0.35									
Pasture/Lawns	5	0.008	79	0.40									
Meadows	8		76	0.38									
Cultivated	7		82	0.55									
Waterbody	12		50	0.05									
Average CN		86.31											
Average C		0.61											
Average IA		3.85											

Time to Peak Calculations

Max. Catchment Elev. (m):	88.25
Min. Catchment Elev. (m):	88.15
Catchment Length (m):	12
Catchment Slope (%):	0.83%
Method: Bransby-Williams Formula	
Time of Concentration (mins):	1.10

Summary

Catchment CN:	86.3
Catchment C:	0.61
Catchment IA (mm):	3.85
Time of Concentration (hrs):	0.02
Catchment Time to Peak (hrs):	0.01
Catchment Time Step (mins):	0.15

TATHAM ENGINEERING

Project :	1592 Tenth Line Road
File No.	522677
Date:	May-23
Designed By:	HY
Checked By:	GC
Subject:	SWM Facility Discharge Table

OUTLET CONTROL

Orifice Control: Hydrovex Vertical Vortex Flow Regulator Model 100 VHV-1

STAGE DISCHARGE TABLE & CONTROL STRUCTURE CONFIGURATION

Water Level	Flow Regulator		250 PVC	Total Discharge	Active Storage
	Head	Discharge	Capacity		
(m)	(m)	(cms)	(cms)	(cms)	(cm)
85.37	0.00	0.000	0.042	0.000	0.0
85.42	0.02	0.001	0.042	0.001	1.3
85.47	0.07	0.002	0.042	0.002	3.5
85.52	0.12	0.002	0.042	0.002	6.3
85.57	0.17	0.003	0.042	0.003	9.6
85.62	0.22	0.003	0.042	0.003	13.2
85.67	0.27	0.003	0.042	0.003	13.3
85.72	0.32	0.004	0.042	0.004	13.4
85.77	0.37	0.004	0.042	0.004	13.9
85.82	0.42	0.004	0.042	0.004	14.6
85.87	0.47	0.004	0.042	0.004	15.5
85.92	0.52	0.005	0.042	0.005	16.5
85.97	0.57	0.005	0.042	0.005	17.6
86.02	0.62	0.005	0.042	0.005	18.9
86.07	0.67	0.005	0.042	0.005	20.2
86.12	0.72	0.005	0.042	0.005	21.5
86.17	0.77	0.006	0.042	0.006	22.9
86.22	0.82	0.006	0.042	0.006	24.4
86.27	0.87	0.006	0.042	0.006	25.8
86.32	0.92	0.006	0.042	0.006	27.3
86.37	0.97	0.006	0.042	0.006	28.9
86.42	1.02	0.006	0.042	0.006	30.4
86.47	1.07	0.007	0.042	0.007	31.9
86.52	1.12	0.007	0.042	0.007	33.5
86.57	1.17	0.007	0.042	0.007	35.0
86.62	1.22	0.007	0.042	0.007	36.5
86.67	1.27	0.007	0.042	0.007	38.0
86.72	1.32	0.007	0.042	0.007	39.5
86.77	1.37	0.008	0.042	0.008	40.9
86.82	1.42	0.008	0.042	0.008	42.4
86.87	1.47	0.008	0.042	0.008	43.7
86.92	1.52	0.008	0.042	0.008	45.0
86.97	1.57	0.008	0.042	0.008	46.2
87.02	1.62	0.008	0.042	0.008	47.3
87.07	1.67	0.008	0.042	0.008	48.4
87.12	1.72	0.008	0.042	0.008	49.3
87.17	1.77	0.009	0.042	0.009	50.0
87.22	1.82	0.009	0.042	0.009	50.5
87.27	1.87	0.009	0.042	0.009	50.6
87.32	1.92	0.009	0.042	0.009	50.7
87.37	1.97	0.009	0.042	0.009	50.8
87.42	2.02	0.009	0.042	0.009	50.9
87.47	2.07	0.009	0.042	0.009	51.0
87.52	2.12	0.009	0.042	0.009	51.1
87.57	2.17	0.009	0.042	0.009	51.2
87.62	2.22	0.010	0.042	0.010	51.4
87.67	2.27	0.010	0.042	0.010	51.5
87.72	2.32	0.010	0.042	0.010	51.6
87.77	2.37	0.010	0.042	0.010	51.7
87.82	2.42	0.010	0.042	0.010	51.8
87.87	2.47	0.010	0.042	0.010	51.9
87.92	2.52	0.010	0.042	0.010	52.0
87.97	2.57	0.010	0.042	0.010	52.2

Proposed Condition (Controlled area)

Design Storm	SWM Facility Operating Characteristics		
	Storage (m^3)	Total Outlfow (m^3/s)	Water Level (m)
5yr 24hr SCS	24	0.004	86.21
5yr 3hr Chicago	24	0.006	86.21
5yr 6hr Chicago	26	0.006	86.28
100yr 24hr SCS	46	0.009	86.96
100yr 3hr Chicago	46	0.009	86.96
100yr 6hr Chicago	48	0.010	87.05

TATHAM ENGINEERING

Project :	1592 Tenth Line Road
File No.	522677
Date:	May-23
Designed By:	HY
Checked By:	GC
Subject:	SWM Facility Discharge Table

OUTLET CONTROL

Orifice Control

	Orifice	Pipe
Orifice Size (mm):	55	250
Cross-Sectional Area (sq.m):	0.002376	0.049087
Orifice Coefficient:	0.61	0.80
Invert Elevation (m):	85.37	85.37
Outlet Pipe Size (mm):	250	250

STAGE DISCHARGE TABLE & CONTROL STRUCTURE CONFIGURATION

Water Level	45 mm dia. Orifice		250 PVC	Total Discharge	Active Storage
	Head	Discharge	Capacity		
(m)	(m)	(cms)	(cms)	(cms)	(cm)
85.37	0.00	0.000	0.042	0.000	0.0
85.42	0.02	0.001	0.042	0.001	1.3
85.47	0.07	0.002	0.042	0.002	3.5
85.52	0.12	0.002	0.042	0.002	6.3
85.57	0.17	0.003	0.042	0.003	9.6
85.62	0.22	0.003	0.042	0.003	13.2
85.67	0.27	0.003	0.042	0.003	13.3
85.72	0.32	0.004	0.042	0.004	13.4
85.77	0.37	0.004	0.042	0.004	13.9
85.82	0.42	0.004	0.042	0.004	14.6
85.87	0.47	0.004	0.042	0.004	15.5
85.92	0.52	0.005	0.042	0.005	16.5
85.97	0.57	0.005	0.042	0.005	17.6
86.02	0.62	0.005	0.042	0.005	18.9
86.07	0.67	0.005	0.042	0.005	20.2
86.12	0.72	0.005	0.042	0.005	21.5
86.17	0.77	0.006	0.042	0.006	22.9
86.22	0.82	0.006	0.042	0.006	24.4
86.27	0.87	0.006	0.042	0.006	25.8
86.32	0.92	0.006	0.042	0.006	27.3
86.37	0.97	0.006	0.042	0.006	28.9
86.42	1.02	0.006	0.042	0.006	30.4
86.47	1.07	0.007	0.042	0.007	31.9
86.52	1.12	0.007	0.042	0.007	33.5
86.57	1.17	0.007	0.042	0.007	35.0
86.62	1.22	0.007	0.042	0.007	36.5
86.67	1.27	0.007	0.042	0.007	38.0
86.72	1.32	0.007	0.042	0.007	39.5
86.77	1.37	0.008	0.042	0.008	40.9
86.82	1.42	0.008	0.042	0.008	42.4
86.87	1.47	0.008	0.042	0.008	43.7
86.92	1.52	0.008	0.042	0.008	45.0
86.97	1.57	0.008	0.042	0.008	46.2
87.02	1.62	0.008	0.042	0.008	47.3
87.07	1.67	0.008	0.042	0.008	48.4
87.12	1.72	0.008	0.042	0.008	49.3
87.17	1.77	0.009	0.042	0.009	50.0
87.22	1.82	0.009	0.042	0.009	50.5
87.27	1.87	0.009	0.042	0.009	50.6
87.32	1.92	0.009	0.042	0.009	50.7
87.37	1.97	0.009	0.042	0.009	50.8
87.42	2.02	0.009	0.042	0.009	50.9
87.47	2.07	0.009	0.042	0.009	51.0
87.52	2.12	0.009	0.042	0.009	51.1
87.57	2.17	0.009	0.042	0.009	51.2
87.62	2.22	0.010	0.042	0.010	51.4
87.67	2.27	0.010	0.042	0.010	51.5
87.72	2.32	0.010	0.042	0.010	51.6
87.77	2.37	0.010	0.042	0.010	51.7
87.82	2.42	0.010	0.042	0.010	51.8
87.87	2.47	0.010	0.042	0.010	51.9
87.92	2.52	0.010	0.042	0.010	52.0
87.97	2.57	0.010	0.042	0.010	52.2

Proposed Condition (Controlled area)

Design Storm	SWM Facility Operating Characteristics		
	Storage (m^3)	Total Outlfow (m^3/s)	Water Level (m)
5yr 24hr SCS	24	0.004	86.21
5yr 3hr Chicago	24	0.006	86.21
5yr 6hr Chicago	26	0.006	86.28
100yr 24hr SCS	46	0.009	86.96
100yr 3hr Chicago	46	0.009	86.96
100yr 6hr Chicago	48	0.010	87.05

TATHAM ENGINEERING

Project :	1592 Tenth Line Road
File No.	522677
Date:	May-23
Designed By:	HY
Checked By:	GC
Subject:	SWM Stage Storage

Manhole Storage

Elevation	Depth	Area	Total Volume
(m)	(m)	(m^3)	(m^3)
85.37	0.00	2.26	0.00
85.42	0.05	2.26	0.11
85.47	0.10	2.26	0.23
85.52	0.15	2.26	0.34
85.57	0.20	2.26	0.45
85.62	0.25	2.26	0.57
85.67	0.30	2.26	0.68
85.72	0.35	2.26	0.79
85.77	0.40	2.26	0.90
85.82	0.45	2.26	1.02
85.87	0.50	2.26	1.13
85.92	0.55	2.26	1.24
85.97	0.60	2.26	1.36
86.02	0.65	2.26	1.47
86.07	0.70	2.26	1.58
86.12	0.75	2.26	1.70
86.17	0.80	2.26	1.81
86.22	0.85	2.26	1.92
86.27	0.90	2.26	2.04
86.32	0.95	2.26	2.15
86.37	1.00	2.26	2.26
86.42	1.05	2.26	2.38
86.47	1.10	2.26	2.49
86.52	1.15	2.26	2.60
86.57	1.20	2.26	2.71
86.62	1.25	2.26	2.83
86.67	1.30	2.26	2.94
86.72	1.35	2.26	3.05
86.77	1.40	2.26	3.17
86.82	1.45	2.26	3.28
86.87	1.50	2.26	3.39
86.92	1.55	2.26	3.51
86.97	1.60	2.26	3.62
87.02	1.65	2.26	3.73
87.07	1.70	2.26	3.85
87.12	1.75	2.26	3.96
87.17	1.80	2.26	4.07
87.22	1.85	2.26	4.18
87.27	1.90	2.26	4.30
87.32	1.95	2.26	4.41
87.37	2.00	2.26	4.52
87.42	2.05	2.26	4.64
87.47	2.10	2.26	4.75
87.52	2.15	2.26	4.86
87.57	2.20	2.26	4.98
87.62	2.25	2.26	5.09
87.67	2.30	2.26	5.20
87.72	2.35	2.26	5.32
87.77	2.40	2.26	5.43
87.82	2.45	2.26	5.54
87.87	2.50	2.26	5.65
87.92	2.55	2.26	5.77
87.97	2.60	2.26	5.88

STM Tank Storage

Elevation	Depth	Area	accumulated Area	Total Volume
(m)	(m)	(m^3)	(m^3)	(m^3)
85.77	0.00	0.018	0.02	0.34
85.82	0.05	0.033	0.05	0.97
85.87	0.10	0.041	0.09	1.75
85.92	0.15	0.048	0.14	2.66
85.97	0.20	0.054	0.19	3.69
86.02	0.25	0.058	0.25	4.79
86.07	0.30	0.062	0.31	5.97
86.12	0.35	0.065	0.38	7.20
86.17	0.40	0.068	0.45	8.49
86.22	0.45	0.070	0.52	9.82
86.27	0.50	0.072	0.59	11.19
86.32	0.55	0.073	0.66	12.58
86.37	0.60	0.074	0.74	13.98
86.42	0.65	0.075	0.81	15.41
86.47	0.70	0.075	0.89	16.83
86.52	0.75	0.075	0.96	18.26
86.57	0.80	0.075	1.04	19.68
86.62	0.85	0.074	1.11	21.09
86.67	0.90	0.073	1.18	22.48
86.72	0.95	0.072	1.26	23.85
86.77	1.00	0.070	1.33	25.18
86.82	1.05	0.068	1.39	26.47
86.87	1.10	0.065	1.46	27.70
86.92	1.15	0.062	1.52	28.88
86.97	1.20	0.058	1.58	29.98
87.02	1.25	0.054	1.63	31.01
87.07	1.30	0.048	1.68	31.92
87.12	1.35	0.041	1.72	32.70
87.17	1.40	0.033	1.75	33.33
87.22	1.45	0.018	1.77	33.67
87.27	1.50	0.000	1.77	33.67
87.32	1.55	0.000	1.77	33.67
87.37	1.60	0.000	1.77	33.67
87.42	1.65	0.000	1.77	33.67
87.47	1.70	0.000	1.77	33.67
87.52	1.75	0.000	1.77	33.67
87.57	1.80	0.000	1.77	33.67
87.62	1.80	0.000	1.77	33.67
87.67	1.80	0.000	1.77	33.67
87.72	1.80	0.000	1.77	33.67
87.77	1.80	0.000	1.77	33.67
87.82	1.80	0.000	1.77	33.67
87.87	1.80	0.000	1.77	33.67
87.92	1.80	0.000	1.77	33.67
87.97	1.80	0.000	1.77	33.67

STM Pipe Storage

Elevation	Depth	Area	accumulated Area	Total Volume
(m)	(m)	(m^3)	(m^3)	(m^3)
85.37	0.00	0.00	0.00	0.00
85.42	0.05	0.02	0.02	1.18
85.47	0.10	0.04	0.06	3.30
85.52	0.15	0.05	0.10	6.01
85.57	0.20	0.05	0.16	9.13
85.62	0.25	0.06	0.21	12.60
85.67	0.25	0.06	0.21	12.60
85.72	0.25	0.06	0.21	12.60
85.77	0.25	0.06	0.21	12.60
85.82	0.25	0.06	0.21	12.60
85.87	0.25	0.06	0.21	12.60
85.92	0.25	0.06	0.21	12.60
85.97	0.25	0.06	0.21	12.60
86.02	0.25	0.06	0.21	12.60
86.07	0.25	0.06	0.21	12.60
86.12	0.25	0.06	0.21	12.60
86.17	0.25	0.06	0.21	12.60
86.22	0.25	0.06	0.21	12.60
86.27	0.25	0.06	0.21	12.60
86.32	0.25	0.06	0.21	12.60
86.37	0.25	0.06	0.21	12.60
86.42	0.25	0.06	0.21	12.60
86.47	0.25	0.06	0.21	12.60
86.52	0.25	0.06	0.21	12.60
86.57	0.25	0.06	0.21	12.60
86.62	0.25	0.06	0.21	12.60
86.67	0.25	0.06	0.21	12.60
86.72	0.25	0.06	0.21	12.60
86.77	0.25	0.06	0.21	12.60
86.82	0.25	0.06	0.21	12.60
86.87	0.25	0.06	0.21	12.60
86.92	0.25	0.06	0.21	12.60
86.97	0.25	0.06	0.21	12.60
87.02	0.25	0.06	0.21	12.60
87.07	0.25	0.06	0.21	12.60
87.12	0.25	0.06	0.21	12.60
87.17	0.25	0.06	0.21	12.60
87.22	0.25	0.06	0.21	12.60
87.27	0.25	0.06	0.21	12.60
87.32	0.25	0.06	0.21	12.60
87.37	0.25	0.06	0.21	12.60
87.42	0.25	0.06	0.21	12.60
87.47	0.25	0.06	0.21	12.60
87.52	0.25	0.06	0.21	12.60
87.57	0.25	0.06	0.21	12.60
87.62	0.25	0.06	0.21	12.60
87.67	0.25	0.06	0.21	12.60
87.72	0.25	0.06	0.21	12.60
87.77	0.25	0.06	0.21	12.60
87.82	0.25	0.06	0.21	12.60
87.87	0.25	0.06	0.21	12.60
87.92	0.25	0.06	0.21	12.60
87.97	0.25	0.06	0.21	12.60

Total Storage

Total Volume
(m^3)
0.00
1.29
3.52
6.35
9.58
13.17
13.28
13.40
13.85
14.59
15.48
16.51
17.65
18.86
20.15
21.50
22.91
24.35
25.83
27.33
28.85
30.39
31.93
33.46
35.00
36.52
38.02
39.50
40.95
42.35
43.70
44.99
46.21
47.34
48.37
49.26
50.00
50.46
50.57
50.68
50.80
50.91
51.02
51.14
51.25
51.36
51.48
51.59
51.70
51.81
51.93
52.04
52.15

File No. 522677
Project: 1592 Tenth Line Road - Orleans
Project Address: 1592 Tenth Line Road, Ottawa
Client: Bridor Development

Date: December 19, 2022
Designed: HY
Checked: GC
Drawing Reference: C300

STORM WATER MANAGEMENT DESIGN SHEET

SEWER DESIGN

LOCATION			AREA (ha)			FLOW					STORM SEWER DATA							
WATERSHED / STREET	From	To	C = 0.20	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})
204	AD01	AD02	0.006	0.000	0.003	0.01	0.01	10.00	104.19	1.13	250	PVC	0.50%	14.2	42.0	0.86	0.28	**0.03**
208	AD02	AD03	0.008	0.000	0.005	0.02	0.03	10.28	102.76	2.86	250	PVC	0.50%	14.0	42.0	0.86	0.27	**0.07**
203	AD03	TANK	0.009	0.000	0.007	0.02	0.05	10.55	101.38	5.10	250	PVC	0.50%	2.5	42.0	0.86	0.05	**0.12**
202 and 206	TANK	CBMH02	0.008	0.000	0.034	0.09	0.14	10.60	101.14	14.14	250	PVC	0.50%	44.4	42.0	0.86	0.86	**0.34**
201, 205 and 207	CBMH02	CBMH01	0.008	0.000	0.015	0.04	0.18	11.46	97.06	17.65	250	PVC	0.50%	14.5	42.0	0.86	0.28	**0.42**
	CBMH01	OGS	0.000	0.000	0.000	0.00	0.00	11.74	95.81	9.00	250	PVC	0.50%	6.3	42.0	0.86	0.12	**0.21**
	OGS	Ex. STM MH	0.000	0.000	0.000	0.00	0.00	11.87	95.27	9.00	250	PVC	0.50%	9.8	42.0	0.86	0.19	**0.21**

DESIGN PARAMETERS NOTES

Runoff Coefficient (C)	
Grass	0.2
Gravel	0.80
Asphalt / rooftop	0.90

Q = 2.78 AIC, where
Q = Peak flow in Litres per second (L/s)
A = Area in hectares (ha)
I = Rainfall Intensity (mm/hr)
C = Runoff Coefficient

Ottawa Macdonald-Cartier International Airport IDF curve
$I_5 = 998.071 / (T_c + 6.053)^{0.814}$
Min. velocity = 0.76 m/s
Manning's "n" = 0.013

LOCATION		MANHOLE INFORMATION							AVAILABLE STORAGE			
From MH	To MH	U/S Invert (m)	D/S Invert (m)	T/G U/S (m)	T/G D/S	U/S Depth @ Obv. (m)	D/S Depth @ Obv. (m)	U/S Depth @ Inv. (m)	Pipe Storage 100-year (m^3)	U/S MH Dia. (m)	Water Depth 100 year (m)	MH Storage 100 year (m^3)
TANK	CBMH02	85.75	85.53	88.10	88.00	2.10	2.22	2.35	2.18	1.50	1.29	2.28
CBMH02	CBMH01	85.47	85.40	88.00	88.10	2.28	2.45	2.53	0.71	1.50	1.57	2.77
CBMH01										1.50	1.64	2.90
									2.89			**7.95**

HWL (100 Year)		87.04
TOTAL STORAGE		10.84

PRE SCS
==========
==========

```
       V    V   I    SSSSS  U   U    A    L             (v 6.1.2001)
       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

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
```

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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 6.1\VO2\voin.dat

Output filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\b7c673a3-d93a-420f-bf9f-618013aa73aa\scenario
Summary filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\b7c673a3-d93a-420f-bf9f-618013aa73aa\scenario

DATE: 04/27/2023 TIME: 09:10:01

USER:

COMMENTS: _____

```
**********************************************
** SIMULATION : Run 01                       **
**********************************************
```

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\d3b82a28-6ea5-440b-93e8-97a8ac63743e\a83aa445-7986-4
108-a295-abaadc5
    remark: Ottawa Macdonald Cartier SCS 24 2yr

*
 *  CALIB STANDHYD       0101  1  5.0    0.10    0.01 12.00  27.47 0.56   0.000
    [I%=33.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot= 49.09 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\d3b82a28-6ea5-440b-93e8-97a8ac63743e\a83aa445-7986-4
108-a295-abaadc5
    remark: Ottawa Macdonald Cartier SCS 24 2yr

*
 *  CALIB STANDHYD       0102  1  5.0    0.05    0.00 12.00  22.71 0.46   0.000
    [I%=31.0:S%= 2.00]
*
================================================================================
=======================


       V    V   I    SSSSS  U   U    A    L              (v 6.1.2001)
       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

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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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 6.1\VO2\voin.dat

  Output  filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\4761ae12-
6660-4e1c-9676-d871b8093e32\scenario
  Summary filename:
```

C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\4761ae12-6660-4e1c-9676-d871b8093e32\scenario

DATE: 04/27/2023 TIME: 09:10:01

USER:

COMMENTS: _____

```
  ********************************************
  ** SIMULATION : Run 02                     **
  ********************************************

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

      START @  0.00 hrs
      --------------------
    READ STORM                  5.0
    [ Ptot= 65.91 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\d3b82a28-6ea5-440b-93e8-97a8ac63743e\5aca6ac2-ef25-4
c6b-b023-6eea581
    remark: Ottawa Macdonald Cartier SCS 24 5yr

*
 *  CALIB STANDHYD       0101  1  5.0    0.10    0.01 12.00  40.68 0.62   0.000
    [I%=33.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot= 65.91 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\d3b82a28-6ea5-440b-93e8-97a8ac63743e\5aca6ac2-ef25-4
c6b-b023-6eea581
    remark: Ottawa Macdonald Cartier SCS 24 5yr

*
 *  CALIB STANDHYD       0102  1  5.0    0.05    0.01 12.00  37.56 0.57   0.000
    [I%=31.0:S%= 2.00]
*
================================================================================
======================


       V    V   I    SSSSS  U   U    A    L             (v 6.1.2001)
       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

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
```


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

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.1\VO2\voin.dat

Output filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\c92f24e4-8db6-46b0-88af-6f3a6a3a6952\scenario
Summary filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\c92f24e4-8db6-46b0-88af-6f3a6a3a6952\scenario

DATE: 04/27/2023 TIME: 09:10:01

USER:

COMMENTS: _____

```
**********************************************
** SIMULATION : Run 03                       **
**********************************************
```

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= 77.00 mm]								
	fname : C:\Users\hyu\AppData\Local\Temp\d3b82a28-6ea5-440b-93e8-97a8ac63743e\937e7433-4342-40da-96a5-67c3cdf								
	remark: Ottawa Macdonald Cartier SCS 24 10yr								

*

```
 *  CALIB STANDHYD       0101  1  5.0    0.10    0.01 12.00  49.90 0.65   0.000
    [I%=33.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot= 77.00 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\d3b82a28-6ea5-440b-93e8-97a8ac63743e\937e7433-4342-4
0da-96a5-67c3cdf
    remark: Ottawa Macdonald Cartier SCS 24 10yr

*
 *  CALIB STANDHYD       0102  1  5.0    0.05    0.01 12.00  49.08 0.64   0.000
    [I%=31.0:S%= 2.00]
*
================================================================================
=======================


       V    V   I    SSSSS  U   U    A    L              (v 6.1.2001)
       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

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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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 6.1\VO2\voin.dat

  Output  filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\e47b3e90-
6d5b-4b5b-a0dd-45c31ff72924\scenario
  Summary filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\e47b3e90-
6d5b-4b5b-a0dd-45c31ff72924\scenario


DATE: 04/27/2023                          TIME: 09:10:01

USER:
```

```
COMMENTS: _____________________________________________________________


  ********************************************
  ** SIMULATION : Run 04                     **
  ********************************************

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

      START @  0.00 hrs
      --------------------
    READ STORM                  5.0
    [ Ptot= 91.08 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\d3b82a28-6ea5-440b-93e8-97a8ac63743e\8677e260-0877-4
303-925b-23f8544
    remark: Ottawa Macdonald Cartier SCS 24 25yr

*
 *  CALIB STANDHYD       0101  1  5.0    0.10    0.02 12.00  61.99 0.68   0.000
    [I%=33.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot= 91.08 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\d3b82a28-6ea5-440b-93e8-97a8ac63743e\8677e260-0877-4
303-925b-23f8544
    remark: Ottawa Macdonald Cartier SCS 24 25yr

*
 *  CALIB STANDHYD       0102  1  5.0    0.05    0.01 12.00  61.11 0.67   0.000
    [I%=31.0:S%= 2.00]
*
================================================================================
=======================


       V    V   I    SSSSS  U   U    A    L              (v 6.1.2001)
       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

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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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 6.1\VO2\voin.dat

Output filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\f68a9a6e-b8dc-491f-bbd5-38b0c62db25c\scenario
Summary filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\f68a9a6e-b8dc-491f-bbd5-38b0c62db25c\scenario

DATE: 04/27/2023 TIME: 09:10:01

USER:

COMMENTS: _____

****
** SIMULATION : Run 05 **
****

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=101.52 mm]								
	fname : C:\Users\hyu\AppData\Local\Temp\d3b82a28-6ea5-440b-93e8-97a8ac63743e\55c88cf1-c07d-4de2-b4c7-fa9ea96								
	remark: Ottawa Macdonald Cartier SCS 24 50yr								
*									
*	CALIB STANDHYD	0101 1	5.0	0.10	0.02	12.00	71.16	0.70	0.000
	[I%=33.0:S%= 2.00]								
*									
	READ STORM	5.0							
	[Ptot=101.52 mm]								
	fname : C:\Users\hyu\AppData\Local\Temp\d3b82a28-6ea5-440b-93e8-97a8ac63743e\55c88cf1-c07d-4de2-b4c7-fa9ea96								

```
    remark: Ottawa Macdonald Cartier SCS 24 50yr

*
 *  CALIB STANDHYD       0102  1  5.0    0.05    0.01 12.00  70.23 0.69   0.000
    [I%=31.0:S%= 2.00]
*
================================================================================
=======================


       V    V   I    SSSSS  U   U    A    L             (v 6.1.2001)
       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

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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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 6.1\VO2\voin.dat

  Output  filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\f81c5622-
08d5-48bf-bca3-1eb71c45cbd7\scenario
  Summary filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\f81c5622-
08d5-48bf-bca3-1eb71c45cbd7\scenario


DATE: 04/27/2023                          TIME: 09:10:01

USER:


COMMENTS: _____________________________________________________________


  ********************************************
  ** SIMULATION : Run 06                     **
  ********************************************
```

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

      START @  0.00 hrs
      --------------------
    READ STORM                  5.0
    [ Ptot=111.87 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\d3b82a28-6ea5-440b-93e8-97a8ac63743e\e20e7578-d439-4
ffb-8edc-8fe2588
    remark: Ottawa Macdonald Cartier SCS 24 100yr

*
 *  CALIB STANDHYD       0101  1  5.0    0.10    0.02 12.00  80.41 0.72   0.000
    [I%=33.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot=111.87 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\d3b82a28-6ea5-440b-93e8-97a8ac63743e\e20e7578-d439-4
ffb-8edc-8fe2588
    remark: Ottawa Macdonald Cartier SCS 24 100yr

*
 *  CALIB STANDHYD       0102  1  5.0    0.05    0.01 12.00  79.44 0.71   0.000
    [I%=31.0:S%= 2.00]
*
 FINISH

================================================================================
======================
```

PRE CHI
==
======================

```
       V    V   I    SSSSS  U   U    A    L              (v 6.1.2001)
       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

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
```


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

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.1\VO2\voin.dat

Output filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\51d2b20a-c962-46f2-b46d-0bcb89b18572\scenario
Summary filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\51d2b20a-c962-46f2-b46d-0bcb89b18572\scenario

DATE: 06/06/2023 TIME: 09:03:35

USER:

COMMENTS: _____

```
**********************************************
** SIMULATION : Run 01                       **
**********************************************
```

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       0005  1  5.0    0.05    0.01  1.00  21.93 0.52   0.000
    [I%=31.0:S%= 2.00]
*
    CHIC STORM                10.0
    [ Ptot= 42.51 mm ]
*
 *  CALIB STANDHYD       0006  1  5.0    0.10    0.01  1.00  22.59 0.53   0.000
    [I%=33.0:S%= 2.00]
*
================================================================================
=======================


       V    V   I    SSSSS  U   U    A    L              (v 6.1.2001)
       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

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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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 6.1\VO2\voin.dat

  Output  filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\8106252e-
7f91-4954-a690-56795e9b7e1d\scenario
  Summary filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\8106252e-
7f91-4954-a690-56795e9b7e1d\scenario


DATE: 06/06/2023                          TIME: 09:03:35

USER:


COMMENTS: _____________________________________________________________
```

```
  ************************************************
  ** SIMULATION : Run 02                         **
  ************************************************

  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= 49.04 mm ]
*
 *  CALIB STANDHYD       0005  1  5.0    0.05    0.01  2.00  26.69 0.54   0.000
    [I%=31.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 49.04 mm ]
*
 *  CALIB STANDHYD       0006  1  5.0    0.10    0.01  2.00  27.43 0.56   0.000
    [I%=33.0:S%= 2.00]
*
 FINISH

================================================================================
======================
```

POST SCS
==========
==========

```
       V    V   I    SSSSS  U   U    A    L              (v 6.1.2001)
       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

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
```


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

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.1\VO2\voin.dat

Output filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\dead66f3-c7bd-44fa-ab3e-b90bcaf4653d\scenario
Summary filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\dead66f3-c7bd-44fa-ab3e-b90bcaf4653d\scenario

DATE: 06/06/2023 TIME: 09:04:00

USER:

COMMENTS: _____

```
**********************************************
** SIMULATION : Run 01                       **
**********************************************
```

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\9e75aafb-19cb-46c4-b0f5-106e472bb422\a83aa445-7986-4
108-a295-abaadc5
    remark: Ottawa Macdonald Cartier SCS 24 2yr

*
 *  CALIB STANDHYD       0177  1  5.0    0.01    0.00 12.00  37.09 0.76   0.000
    [I%=92.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot= 49.09 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\a83aa445-7986-4
108-a295-abaadc5
    remark: Ottawa Macdonald Cartier SCS 24 2yr

*
 *  CALIB STANDHYD       0178  1  5.0    0.02    0.00 12.00  29.83 0.61   0.000
    [I%=65.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot= 49.09 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\a83aa445-7986-4
108-a295-abaadc5
    remark: Ottawa Macdonald Cartier SCS 24 2yr

*
 *  CALIB STANDHYD       0179  1  5.0    0.01    0.00 12.00  20.31 0.41   0.000
    [I%=38.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot= 49.09 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\a83aa445-7986-4
108-a295-abaadc5
    remark: Ottawa Macdonald Cartier SCS 24 2yr

*
 *  CALIB STANDHYD       0181  1  5.0    0.01    0.00 12.00  17.91 0.36   0.000
    [I%=33.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot= 49.09 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\a83aa445-7986-4
108-a295-abaadc5
    remark: Ottawa Macdonald Cartier SCS 24 2yr
```

```
*
 *  CALIB STANDHYD       0182  1  5.0    0.03    0.00 12.00  41.93 0.85   0.000
    [I%=99.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot= 49.09 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\a83aa445-7986-4
108-a295-abaadc5
    remark: Ottawa Macdonald Cartier SCS 24 2yr

*
 *  CALIB STANDHYD       0183  1  5.0    0.02    0.00 12.00  23.73 0.48   0.000
    [I%=44.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot= 49.09 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\a83aa445-7986-4
108-a295-abaadc5
    remark: Ottawa Macdonald Cartier SCS 24 2yr

*
 *  CALIB STANDHYD       0184  1  5.0    0.03    0.01 12.00  41.93 0.85   0.000
    [I%=99.0:S%= 2.00]
*
    ADD [  0177+  0178]  0176  3  5.0    0.04    0.00 12.00  32.45  n/a   0.000
*
    ADD [  0176+  0179]  0176  1  5.0    0.05    0.01 12.00  29.23  n/a   0.000
*
    ADD [  0176+  0181]  0176  3  5.0    0.06    0.01 12.00  27.47  n/a   0.000
*
    ADD [  0176+  0182]  0176  1  5.0    0.09    0.01 12.00  32.18  n/a   0.000
*
    ADD [  0176+  0183]  0176  3  5.0    0.10    0.01 12.00  30.86  n/a   0.000
*
    ADD [  0176+  0184]  0176  1  5.0    0.14    0.02 12.00  33.62  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0175  1  5.0    0.14    0.01 12.08  33.21  n/a   0.000
*
    READ STORM                  5.0
    [ Ptot= 49.09 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\a83aa445-7986-4
108-a295-abaadc5
    remark: Ottawa Macdonald Cartier SCS 24 2yr

*
```

```
 *  CALIB STANDHYD       0180  1  5.0    0.01    0.00 12.00  23.45 0.48   0.000
    [I%=43.0:S%= 2.00]
*
================================================================================
======================


       V    V   I    SSSSS  U   U    A    L              (v 6.1.2001)
       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

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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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 6.1\VO2\voin.dat

  Output  filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\3e1f6bf3-
ccfb-4f8c-872e-40caa5f9ed93\scenario
  Summary filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\3e1f6bf3-
ccfb-4f8c-872e-40caa5f9ed93\scenario


DATE: 06/06/2023                          TIME: 09:04:01

USER:


COMMENTS: _____________________________________________________________


  ********************************************
  ** SIMULATION : Run 02                     **
  ********************************************

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

```
      START @  0.00 hrs
      --------------------
    READ STORM                  5.0
    [ Ptot= 65.91 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\5aca6ac2-ef25-4
c6b-b023-6eea581
    remark: Ottawa Macdonald Cartier SCS 24 5yr

*
 *  CALIB STANDHYD       0177  1  5.0    0.01    0.00 12.00  50.43 0.77   0.000
    [I%=92.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot= 65.91 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\5aca6ac2-ef25-4
c6b-b023-6eea581
    remark: Ottawa Macdonald Cartier SCS 24 5yr

*
 *  CALIB STANDHYD       0178  1  5.0    0.02    0.00 12.00  45.08 0.68   0.000
    [I%=65.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot= 65.91 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\5aca6ac2-ef25-4
c6b-b023-6eea581
    remark: Ottawa Macdonald Cartier SCS 24 5yr

*
 *  CALIB STANDHYD       0179  1  5.0    0.01    0.00 12.00  32.43 0.49   0.000
    [I%=38.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot= 65.91 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\5aca6ac2-ef25-4
c6b-b023-6eea581
    remark: Ottawa Macdonald Cartier SCS 24 5yr

*
 *  CALIB STANDHYD       0181  1  5.0    0.01    0.00 12.00  28.34 0.43   0.000
    [I%=33.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot= 65.91 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\5aca6ac2-ef25-4
```

```
c6b-b023-6eea581
    remark: Ottawa Macdonald Cartier SCS 24 5yr

*
 *  CALIB STANDHYD       0182  1  5.0    0.03    0.01 12.00  56.65 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\9e75aafb-19cb-46c4-b0f5-106e472bb422\5aca6ac2-ef25-4
c6b-b023-6eea581
    remark: Ottawa Macdonald Cartier SCS 24 5yr

*
 *  CALIB STANDHYD       0183  1  5.0    0.02    0.00 12.00  34.85 0.53   0.000
    [I%=44.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot= 65.91 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\5aca6ac2-ef25-4
c6b-b023-6eea581
    remark: Ottawa Macdonald Cartier SCS 24 5yr

*
 *  CALIB STANDHYD       0184  1  5.0    0.03    0.01 12.00  61.40 0.93   0.000
    [I%=99.0:S%= 2.00]
*
    ADD [  0177+  0178]  0176  3  5.0    0.04    0.01 12.00  47.01  n/a   0.000
*
    ADD [  0176+  0179]  0176  1  5.0    0.05    0.01 12.00  43.14  n/a   0.000
*
    ADD [  0176+  0181]  0176  3  5.0    0.06    0.01 12.00  40.85  n/a   0.000
*
    ADD [  0176+  0182]  0176  1  5.0    0.09    0.01 12.00  45.99  n/a   0.000
*
    ADD [  0176+  0183]  0176  3  5.0    0.10    0.02 12.00  44.24  n/a   0.000
*
    ADD [  0176+  0184]  0176  1  5.0    0.14    0.02 12.00  48.53  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0175  1  5.0    0.14    0.01 12.08  48.35  n/a   0.000
*
    READ STORM                  5.0
    [ Ptot= 65.91 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\5aca6ac2-ef25-4
c6b-b023-6eea581
    remark: Ottawa Macdonald Cartier SCS 24 5yr
```

```
*
 *  CALIB STANDHYD       0180  1  5.0    0.01    0.00 12.00  34.31 0.52   0.000
    [I%=43.0:S%= 2.00]
*
================================================================================
=======================


       V    V   I    SSSSS  U   U    A    L             (v 6.1.2001)
       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

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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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 6.1\VO2\voin.dat

  Output  filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\20983300-
3dd2-4350-9aff-ecc9603591ad\scenario
  Summary filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\20983300-
3dd2-4350-9aff-ecc9603591ad\scenario


DATE: 06/06/2023                           TIME: 09:04:01

USER:


COMMENTS: _____________________________________________________________


  ********************************************
  ** SIMULATION : Run 03                     **
  ********************************************

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

```
                                 min     ha    '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                  5.0
    [ Ptot= 77.00 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\937e7433-4342-4
0da-96a5-67c3cdf
    remark: Ottawa Macdonald Cartier SCS 24 10yr

*
 *  CALIB STANDHYD       0177  1  5.0    0.01    0.00 12.00  59.31 0.77   0.000
    [I%=92.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot= 77.00 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\937e7433-4342-4
0da-96a5-67c3cdf
    remark: Ottawa Macdonald Cartier SCS 24 10yr

*
 *  CALIB STANDHYD       0178  1  5.0    0.02    0.00 12.00  53.84 0.70   0.000
    [I%=65.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot= 77.00 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\937e7433-4342-4
0da-96a5-67c3cdf
    remark: Ottawa Macdonald Cartier SCS 24 10yr

*
 *  CALIB STANDHYD       0179  1  5.0    0.01    0.00 12.00  40.09 0.52   0.000
    [I%=38.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot= 77.00 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\937e7433-4342-4
0da-96a5-67c3cdf
    remark: Ottawa Macdonald Cartier SCS 24 10yr

*
 *  CALIB STANDHYD       0181  1  5.0    0.01    0.00 12.00  38.02 0.49   0.000
    [I%=33.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot= 77.00 mm ]
```

```
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\937e7433-4342-4
0da-96a5-67c3cdf
    remark: Ottawa Macdonald Cartier SCS 24 10yr

*
 *  CALIB STANDHYD       0182  1  5.0    0.03    0.01 12.00  71.94 0.93   0.000
    [I%=99.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot= 77.00 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\937e7433-4342-4
0da-96a5-67c3cdf
    remark: Ottawa Macdonald Cartier SCS 24 10yr

*
 *  CALIB STANDHYD       0183  1  5.0    0.02    0.00 12.00  42.67 0.55   0.000
    [I%=44.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot= 77.00 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\937e7433-4342-4
0da-96a5-67c3cdf
    remark: Ottawa Macdonald Cartier SCS 24 10yr

*
 *  CALIB STANDHYD       0184  1  5.0    0.03    0.01 12.00  71.93 0.93   0.000
    [I%=99.0:S%= 2.00]
*
    ADD [  0177+  0178]  0176  3  5.0    0.04    0.01 12.00  55.81  n/a   0.000
*
    ADD [  0176+  0179]  0176  1  5.0    0.05    0.01 12.00  51.64  n/a   0.000
*
    ADD [  0176+  0181]  0176  3  5.0    0.06    0.01 12.00  49.53  n/a   0.000
*
    ADD [  0176+  0182]  0176  1  5.0    0.09    0.02 12.00  56.82  n/a   0.000
*
    ADD [  0176+  0183]  0176  3  5.0    0.10    0.02 12.00  54.60  n/a   0.000
*
    ADD [  0176+  0184]  0176  1  5.0    0.14    0.03 12.00  58.94  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0175  1  5.0    0.14    0.01 12.08  58.54  n/a   0.000
*
    READ STORM                  5.0
    [ Ptot= 77.00 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\937e7433-4342-4
```

```
0da-96a5-67c3cdf
    remark: Ottawa Macdonald Cartier SCS 24 10yr

*
 *  CALIB STANDHYD       0180  1  5.0    0.01    0.00 12.00  42.11 0.55   0.000
    [I%=43.0:S%= 2.00]
*
================================================================================
======================


       V    V   I    SSSSS  U   U    A    L              (v 6.1.2001)
       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

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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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 6.1\VO2\voin.dat

  Output  filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\cb864a73-
4fb4-4f10-b511-fe2fc736f640\scenario
  Summary filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\cb864a73-
4fb4-4f10-b511-fe2fc736f640\scenario


DATE: 06/06/2023                          TIME: 09:04:01

USER:


COMMENTS: _____________________________________________________________


  ********************************************
  ** SIMULATION : Run 04                     **
  ********************************************
```

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

      START @  0.00 hrs
      --------------------
    READ STORM                  5.0
    [ Ptot= 91.08 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\8677e260-0877-4
303-925b-23f8544
    remark: Ottawa Macdonald Cartier SCS 24 25yr

*
 *  CALIB STANDHYD       0177  1  5.0    0.01    0.00 12.00  70.62 0.78   0.000
    [I%=92.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot= 91.08 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\8677e260-0877-4
303-925b-23f8544
    remark: Ottawa Macdonald Cartier SCS 24 25yr

*
 *  CALIB STANDHYD       0178  1  5.0    0.02    0.01 12.00  65.61 0.72   0.000
    [I%=65.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot= 91.08 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\8677e260-0877-4
303-925b-23f8544
    remark: Ottawa Macdonald Cartier SCS 24 25yr

*
 *  CALIB STANDHYD       0179  1  5.0    0.01    0.00 12.00  50.27 0.55   0.000
    [I%=38.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot= 91.08 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\8677e260-0877-4
303-925b-23f8544
    remark: Ottawa Macdonald Cartier SCS 24 25yr

*
 *  CALIB STANDHYD       0181  1  5.0    0.01    0.00 12.00  47.80 0.52   0.000
    [I%=33.0:S%= 2.00]
*
```

```
    READ STORM                  5.0
    [ Ptot= 91.08 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\8677e260-0877-4
303-925b-23f8544
    remark: Ottawa Macdonald Cartier SCS 24 25yr

*
 *  CALIB STANDHYD       0182  1  5.0    0.03    0.01 12.00  85.31 0.94   0.000
    [I%=99.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot= 91.08 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\8677e260-0877-4
303-925b-23f8544
    remark: Ottawa Macdonald Cartier SCS 24 25yr

*
 *  CALIB STANDHYD       0183  1  5.0    0.02    0.00 12.00  56.81 0.62   0.000
    [I%=44.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot= 91.08 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\8677e260-0877-4
303-925b-23f8544
    remark: Ottawa Macdonald Cartier SCS 24 25yr

*
 *  CALIB STANDHYD       0184  1  5.0    0.03    0.01 12.00  89.66 0.98   0.000
    [I%=99.0:S%= 2.00]
*
    ADD [  0177+  0178]  0176  3  5.0    0.04    0.01 12.00  67.42  n/a   0.000
*
    ADD [  0176+  0179]  0176  1  5.0    0.05    0.01 12.00  62.87  n/a   0.000
*
    ADD [  0176+  0181]  0176  3  5.0    0.06    0.01 12.00  60.53  n/a   0.000
*
    ADD [  0176+  0182]  0176  1  5.0    0.09    0.02 12.00  68.60  n/a   0.000
*
    ADD [  0176+  0183]  0176  3  5.0    0.10    0.02 12.00  66.75  n/a   0.000
*
    ADD [  0176+  0184]  0176  1  5.0    0.14    0.03 12.00  72.48  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0175  1  5.0    0.14    0.01 12.08  72.31  n/a   0.000
*
    READ STORM                  5.0
    [ Ptot= 91.08 mm ]
```

```
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\8677e260-0877-4
303-925b-23f8544
    remark: Ottawa Macdonald Cartier SCS 24 25yr

*
 *  CALIB STANDHYD       0180  1  5.0    0.01    0.00 12.00  52.43 0.58   0.000
    [I%=43.0:S%= 2.00]
*
 FINISH

================================================================================
=======================

================================================================================
=======================


       V    V   I    SSSSS  U   U    A    L             (v 6.1.2001)
       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

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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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 6.1\VO2\voin.dat

  Output  filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\3592b175-
6811-4e92-acdf-1c90c60f3294\scenario
  Summary filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\3592b175-
6811-4e92-acdf-1c90c60f3294\scenario


DATE: 06/06/2023                          TIME: 09:04:01

USER:
```

COMMENTS: _____

```
  ************************************************
  ** SIMULATION : Run 05                         **
  ************************************************

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

      START @  0.00 hrs
      --------------------
    READ STORM                  5.0
    [ Ptot=101.52 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\55c88cf1-c07d-4
de2-b4c7-fa9ea96
    remark: Ottawa Macdonald Cartier SCS 24 50yr

*
 *  CALIB STANDHYD       0177  1  5.0    0.01    0.00 12.00  84.99 0.84   0.000
    [I%=92.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot=101.52 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\55c88cf1-c07d-4
de2-b4c7-fa9ea96
    remark: Ottawa Macdonald Cartier SCS 24 50yr

*
 *  CALIB STANDHYD       0178  1  5.0    0.02    0.01 12.00  80.55 0.79   0.000
    [I%=65.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot=101.52 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\55c88cf1-c07d-4
de2-b4c7-fa9ea96
    remark: Ottawa Macdonald Cartier SCS 24 50yr

*
 *  CALIB STANDHYD       0179  1  5.0    0.01    0.00 12.00  58.13 0.57   0.000
    [I%=38.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot=101.52 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\55c88cf1-c07d-4
```

```
de2-b4c7-fa9ea96
    remark: Ottawa Macdonald Cartier SCS 24 50yr

*
 *  CALIB STANDHYD       0181  1  5.0    0.01    0.00 12.00  55.02 0.54   0.000
    [I%=33.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot=101.52 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\55c88cf1-c07d-4
de2-b4c7-fa9ea96
    remark: Ottawa Macdonald Cartier SCS 24 50yr

*
 *  CALIB STANDHYD       0182  1  5.0    0.03    0.01 12.00  95.21 0.94   0.000
    [I%=99.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot=101.52 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\55c88cf1-c07d-4
de2-b4c7-fa9ea96
    remark: Ottawa Macdonald Cartier SCS 24 50yr

*
 *  CALIB STANDHYD       0183  1  5.0    0.02    0.00 12.00  64.87 0.64   0.000
    [I%=44.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot=101.52 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\55c88cf1-c07d-4
de2-b4c7-fa9ea96
    remark: Ottawa Macdonald Cartier SCS 24 50yr

*
 *  CALIB STANDHYD       0184  1  5.0    0.03    0.01 12.00 100.08 0.99   0.000
    [I%=99.0:S%= 2.00]
*
    ADD [  0177+  0178]  0176  3  5.0    0.04    0.01 12.00  82.15  n/a   0.000
*
    ADD [  0176+  0179]  0176  1  5.0    0.05    0.01 12.00  75.78  n/a   0.000
*
    ADD [  0176+  0181]  0176  3  5.0    0.06    0.01 12.00  72.56  n/a   0.000
*
    ADD [  0176+  0182]  0176  1  5.0    0.09    0.02 12.00  79.93  n/a   0.000
*
    ADD [  0176+  0183]  0176  3  5.0    0.10    0.03 12.00  77.57  n/a   0.000
*
```

```
    ADD [  0176+  0184]  0176  1  5.0    0.14    0.04 12.00  83.20  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0175  1  5.0    0.14    0.01 12.17  83.01  n/a   0.000
*
    READ STORM                  5.0
    [ Ptot=101.52 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\55c88cf1-c07d-4
de2-b4c7-fa9ea96
    remark: Ottawa Macdonald Cartier SCS 24 50yr

*
 *  CALIB STANDHYD       0180  1  5.0    0.01    0.00 12.00  64.45 0.63   0.000
    [I%=43.0:S%= 2.00]
*
================================================================================
======================


       V    V   I    SSSSS  U   U    A    L              (v 6.1.2001)
       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

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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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 6.1\VO2\voin.dat

  Output  filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\4fd264b8-
2922-458d-bc51-3b763d71b179\scenario
  Summary filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\4fd264b8-
2922-458d-bc51-3b763d71b179\scenario


DATE: 06/06/2023                          TIME: 09:04:01
```

USER:

COMMENTS: _____

```
  ************************************************
  ** SIMULATION : Run 06                         **
  ************************************************

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

      START @  0.00 hrs
      --------------------
    READ STORM                  5.0
    [ Ptot=111.87 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\e20e7578-d439-4
ffb-8edc-8fe2588
    remark: Ottawa Macdonald Cartier SCS 24 100yr

*
 *  CALIB STANDHYD       0177  1  5.0    0.01    0.00 12.00  94.01 0.84   0.000
    [I%=92.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot=111.87 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\e20e7578-d439-4
ffb-8edc-8fe2588
    remark: Ottawa Macdonald Cartier SCS 24 100yr

*
 *  CALIB STANDHYD       0178  1  5.0    0.02    0.01 12.00  89.83 0.80   0.000
    [I%=65.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot=111.87 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\e20e7578-d439-4
ffb-8edc-8fe2588
    remark: Ottawa Macdonald Cartier SCS 24 100yr

*
 *  CALIB STANDHYD       0179  1  5.0    0.01    0.00 12.00  70.44 0.63   0.000
    [I%=38.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot=111.87 mm ]
```

```
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\e20e7578-d439-4
ffb-8edc-8fe2588
    remark: Ottawa Macdonald Cartier SCS 24 100yr

*
 *  CALIB STANDHYD       0181  1  5.0    0.01    0.00 12.00  62.74 0.56   0.000
    [I%=33.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot=111.87 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\e20e7578-d439-4
ffb-8edc-8fe2588
    remark: Ottawa Macdonald Cartier SCS 24 100yr

*
 *  CALIB STANDHYD       0182  1  5.0    0.03    0.01 12.00 110.42 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\9e75aafb-19cb-46c4-b0f5-106e472bb422\e20e7578-d439-4
ffb-8edc-8fe2588
    remark: Ottawa Macdonald Cartier SCS 24 100yr

*
 *  CALIB STANDHYD       0183  1  5.0    0.02    0.00 12.00  73.25 0.65   0.000
    [I%=44.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot=111.87 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\e20e7578-d439-4
ffb-8edc-8fe2588
    remark: Ottawa Macdonald Cartier SCS 24 100yr

*
 *  CALIB STANDHYD       0184  1  5.0    0.03    0.01 12.00 110.42 0.99   0.000
    [I%=99.0:S%= 2.00]
*
    ADD [  0177+  0178]  0176  3  5.0    0.04    0.01 12.00  91.34  n/a   0.000
*
    ADD [  0176+  0179]  0176  1  5.0    0.05    0.01 12.00  85.80  n/a   0.000
*
    ADD [  0176+  0181]  0176  3  5.0    0.06    0.02 12.00  82.22  n/a   0.000
*
    ADD [  0176+  0182]  0176  1  5.0    0.09    0.03 12.00  91.40  n/a   0.000
*
```

```
    ADD [  0176+  0183]  0176  3  5.0    0.10    0.03 12.00  88.55  n/a   0.000
*
    ADD [  0176+  0184]  0176  1  5.0    0.14    0.04 12.00  94.02  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0175  1  5.0    0.14    0.01 12.17  93.64  n/a   0.000
*
    READ STORM                  5.0
    [ Ptot=111.87 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\9e75aafb-19cb-46c4-b0f5-106e472bb422\e20e7578-d439-4
ffb-8edc-8fe2588
    remark: Ottawa Macdonald Cartier SCS 24 100yr

*
 *  CALIB STANDHYD       0180  1  5.0    0.01    0.00 12.00  72.62 0.65   0.000
    [I%=43.0:S%= 2.00]
*
```

POST CHI
==========
==========

```
       V    V   I    SSSSS  U   U    A    L             (v 6.1.2001)
       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

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
```

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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 6.1\VO2\voin.dat

Output filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\ba4b3151-3434-4d95-884c-1dfe096b7b54\scenario
Summary filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\ba4b3151-3434-4d95-884c-1dfe096b7b54\scenario

DATE: 06/06/2023 TIME: 09:04:58

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								

```
    CHIC STORM                10.0
    [ Ptot= 71.66 mm ]
*
 *  CALIB STANDHYD       0184  1  5.0    0.03    0.02  1.00  70.29 0.98   0.000
    [I%=99.0:S%= 2.00]
*
    CHIC STORM                10.0
    [ Ptot= 71.66 mm ]
*
 *  CALIB STANDHYD       0179  1  5.0    0.01    0.00  1.00  47.04 0.66   0.000
    [I%=38.0:S%= 2.00]
*
    CHIC STORM                10.0
    [ Ptot= 71.66 mm ]
*
 *  CALIB STANDHYD       0178  1  5.0    0.02    0.01  1.00  57.46 0.80   0.000
    [I%=65.0:S%= 2.00]
*
    CHIC STORM                10.0
    [ Ptot= 71.66 mm ]
*
 *  CALIB STANDHYD       0177  1  5.0    0.01    0.01  1.00  67.66 0.94   0.000
    [I%=92.0:S%= 2.00]
*
    CHIC STORM                10.0
    [ Ptot= 71.66 mm ]
*
 *  CALIB STANDHYD       0181  1  5.0    0.01    0.00  1.00  45.13 0.63   0.000
    [I%=33.0:S%= 2.00]
*
    CHIC STORM                10.0
    [ Ptot= 71.66 mm ]
*
 *  CALIB STANDHYD       0183  1  5.0    0.02    0.00  1.00  49.32 0.69   0.000
    [I%=44.0:S%= 2.00]
*
    CHIC STORM                10.0
    [ Ptot= 71.66 mm ]
*
 *  CALIB STANDHYD       0182  1  5.0    0.03    0.01  1.00  70.29 0.98   0.000
    [I%=99.0:S%= 2.00]
*
    ADD [  0177+  0178]  0176  3  5.0    0.04    0.02  1.00  61.14  n/a   0.000
*
    ADD [  0176+  0179]  0176  1  5.0    0.05    0.02  1.00  57.40  n/a   0.000
*
    ADD [  0176+  0181]  0176  3  5.0    0.06    0.02  1.00  55.50  n/a   0.000
*
    ADD [  0176+  0182]  0176  1  5.0    0.09    0.03  1.00  60.31  n/a   0.000
*
```

```
    ADD [  0176+  0183]  0176  3  5.0    0.10    0.04  1.00  58.59  n/a   0.000
*
    ADD [  0176+  0184]  0176  1  5.0    0.14    0.06  1.00  61.51  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0175  1  5.0    0.14    0.01  1.33  61.09  n/a   0.000
*
    CHIC STORM                10.0
    [ Ptot= 71.66 mm ]
*
 *  CALIB STANDHYD       0180  1  5.0    0.01    0.00  1.00  48.94 0.68   0.000
    [I%=43.0:S%= 2.00]
*
================================================================================
=======================


       V    V   I    SSSSS  U   U    A    L              (v 6.1.2001)
       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

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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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 6.1\VO2\voin.dat

  Output  filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\89d27013-
c96f-46e4-82e5-cbf43459bb00\scenario
  Summary filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\89d27013-
c96f-46e4-82e5-cbf43459bb00\scenario


DATE: 06/06/2023                          TIME: 09:04:58

USER:
```

COMMENTS: _____

```
  ************************************************
  ** SIMULATION : Ottawa 100yr 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= 82.32 mm ]
*
 *  CALIB STANDHYD       0184  1  5.0    0.03    0.02  2.00  80.92 0.98   0.000
    [I%=99.0:S%= 2.00]
*
    CHIC STORM                10.0
    [ Ptot= 82.32 mm ]
*
 *  CALIB STANDHYD       0179  1  5.0    0.01    0.00  2.00  54.21 0.66   0.000
    [I%=38.0:S%= 2.00]
*
    CHIC STORM                10.0
    [ Ptot= 82.32 mm ]
*
 *  CALIB STANDHYD       0178  1  5.0    0.02    0.01  2.00  67.27 0.82   0.000
    [I%=65.0:S%= 2.00]
*
    CHIC STORM                10.0
    [ Ptot= 82.32 mm ]
*
 *  CALIB STANDHYD       0177  1  5.0    0.01    0.01  2.00  77.23 0.94   0.000
    [I%=92.0:S%= 2.00]
*
    CHIC STORM                10.0
    [ Ptot= 82.32 mm ]
*
 *  CALIB STANDHYD       0181  1  5.0    0.01    0.00  2.00  48.66 0.59   0.000
    [I%=33.0:S%= 2.00]
*
    CHIC STORM                10.0
    [ Ptot= 82.32 mm ]
*
 *  CALIB STANDHYD       0183  1  5.0    0.02    0.00  2.00  58.72 0.71   0.000
    [I%=44.0:S%= 2.00]
*
    CHIC STORM                10.0
    [ Ptot= 82.32 mm ]
```

```
*
 *  CALIB STANDHYD       0182  1  5.0    0.03    0.01  2.00  80.92 0.98   0.000
    [I%=99.0:S%= 2.00]
*
    ADD [  0177+  0178]  0176  3  5.0    0.04    0.02  2.00  70.87  n/a   0.000
*
    ADD [  0176+  0179]  0176  1  5.0    0.05    0.02  2.00  66.45  n/a   0.000
*
    ADD [  0176+  0181]  0176  3  5.0    0.06    0.02  2.00  63.69  n/a   0.000
*
    ADD [  0176+  0182]  0176  1  5.0    0.09    0.04  2.00  69.30  n/a   0.000
*
    ADD [  0176+  0183]  0176  3  5.0    0.10    0.04  2.00  67.64  n/a   0.000
*
    ADD [  0176+  0184]  0176  1  5.0    0.14    0.06  2.00  70.96  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0175  1  5.0    0.14    0.01  2.33  70.57  n/a   0.000
*
    CHIC STORM                10.0
    [ Ptot= 82.32 mm ]
*
 *  CALIB STANDHYD       0180  1  5.0    0.01    0.00  2.00  57.10 0.69   0.000
    [I%=43.0:S%= 2.00]
*
================================================================================
======================


       V    V   I    SSSSS  U   U    A    L              (v 6.1.2001)
       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

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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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 6.1\VO2\voin.dat

  Output  filename:
```

C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\0f30a6d4-6b80-4051-9316-a065cb681355\scenario
  Summary filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\0f30a6d4-6b80-4051-9316-a065cb681355\scenario

DATE: 06/06/2023 TIME: 09:04:58

USER:

COMMENTS: _____

  ****
  ** SIMULATION : Ottawa 5yr 3 hr 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	0184	1 5.0	0.03	0.01	1.00	41.23	0.97	0.000
	[I%=99.0:S%= 2.00]								
*	CHIC STORM		10.0						
	[Ptot= 42.51 mm]								
*	CALIB STANDHYD	0179	1 5.0	0.01	0.00	1.00	22.93	0.54	0.000
	[I%=38.0:S%= 2.00]								
*	CHIC STORM		10.0						
	[Ptot= 42.51 mm]								
*	CALIB STANDHYD	0178	1 5.0	0.02	0.00	1.00	31.49	0.74	0.000
	[I%=65.0:S%= 2.00]								
*	CHIC STORM		10.0						
	[Ptot= 42.51 mm]								
*	CALIB STANDHYD	0177	1 5.0	0.01	0.00	1.00	39.26	0.92	0.000
	[I%=92.0:S%= 2.00]								
*	CHIC STORM		10.0						
	[Ptot= 42.51 mm]								

```
*
 *  CALIB STANDHYD       0181  1  5.0    0.01    0.00  1.00  19.95 0.47   0.000
    [I%=33.0:S%= 2.00]
*
    CHIC STORM                10.0
    [ Ptot= 42.51 mm ]
*
 *  CALIB STANDHYD       0183  1  5.0    0.02    0.00  1.00  25.48 0.60   0.000
    [I%=44.0:S%= 2.00]
*
    CHIC STORM                10.0
    [ Ptot= 42.51 mm ]
*
 *  CALIB STANDHYD       0182  1  5.0    0.03    0.01  1.00  41.23 0.97   0.000
    [I%=99.0:S%= 2.00]
*
    ADD [  0177+  0178]  0176  3  5.0    0.04    0.01  1.00  34.30  n/a   0.000
*
    ADD [  0176+  0179]  0176  1  5.0    0.05    0.01  1.00  31.28  n/a   0.000
*
    ADD [  0176+  0181]  0176  3  5.0    0.06    0.01  1.00  29.52  n/a   0.000
*
    ADD [  0176+  0182]  0176  1  5.0    0.09    0.02  1.00  33.34  n/a   0.000
*
    ADD [  0176+  0183]  0176  3  5.0    0.10    0.02  1.00  32.10  n/a   0.000
*
    ADD [  0176+  0184]  0176  1  5.0    0.14    0.03  1.00  34.38  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0175  1  5.0    0.14    0.01  1.25  33.96  n/a   0.000
*
    CHIC STORM                10.0
    [ Ptot= 42.51 mm ]
*
 *  CALIB STANDHYD       0180  1  5.0    0.01    0.00  1.00  24.79 0.58   0.000
    [I%=43.0:S%= 2.00]
*
================================================================================
=======================


       V    V   I    SSSSS  U   U    A    L             (v 6.1.2001)
       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

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
```

```
       OOO     T      T    H   H    Y    M   M   OOO
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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 6.1\VO2\voin.dat

  Output  filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\47c7f878-
1036-49da-9920-545bcf030f6f\scenario
  Summary filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\47c7f878-
1036-49da-9920-545bcf030f6f\scenario


DATE: 06/06/2023                          TIME: 09:04:58

USER:


COMMENTS: _____________________________________________________________


  ************************************************
  ** SIMULATION : Ottawa 5yr 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
      --------------------
    READ STORM                  5.0
    [ Ptot= 65.91 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\2ed4a497-7262-457a-833d-9bf0ba3bfd89\5aca6ac2-ef25-4
c6b-b023-6eea581
    remark: Ottawa Macdonald Cartier SCS 24 5yr

*
 *  CALIB STANDHYD       0184  1  5.0    0.03    0.01 12.00  61.40 0.93   0.000
    [I%=99.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot= 65.91 mm ]
    fname :
```

```
C:\Users\hyu\AppData\Local\Temp\2ed4a497-7262-457a-833d-9bf0ba3bfd89\5aca6ac2-ef25-4
c6b-b023-6eea581
    remark: Ottawa Macdonald Cartier SCS 24 5yr

*
 *  CALIB STANDHYD       0179  1  5.0    0.01    0.00 12.00  32.43 0.49   0.000
    [I%=38.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot= 65.91 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\2ed4a497-7262-457a-833d-9bf0ba3bfd89\5aca6ac2-ef25-4
c6b-b023-6eea581
    remark: Ottawa Macdonald Cartier SCS 24 5yr

*
 *  CALIB STANDHYD       0178  1  5.0    0.02    0.00 12.00  45.08 0.68   0.000
    [I%=65.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot= 65.91 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\2ed4a497-7262-457a-833d-9bf0ba3bfd89\5aca6ac2-ef25-4
c6b-b023-6eea581
    remark: Ottawa Macdonald Cartier SCS 24 5yr

*
 *  CALIB STANDHYD       0177  1  5.0    0.01    0.00 12.00  50.43 0.77   0.000
    [I%=92.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot= 65.91 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\2ed4a497-7262-457a-833d-9bf0ba3bfd89\5aca6ac2-ef25-4
c6b-b023-6eea581
    remark: Ottawa Macdonald Cartier SCS 24 5yr

*
 *  CALIB STANDHYD       0181  1  5.0    0.01    0.00 12.00  28.34 0.43   0.000
    [I%=33.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot= 65.91 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\2ed4a497-7262-457a-833d-9bf0ba3bfd89\5aca6ac2-ef25-4
c6b-b023-6eea581
    remark: Ottawa Macdonald Cartier SCS 24 5yr

*
 *  CALIB STANDHYD       0183  1  5.0    0.02    0.00 12.00  34.85 0.53   0.000
```

```
    [I%=44.0:S%= 2.00]
*
    READ STORM                  5.0
    [ Ptot= 65.91 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\2ed4a497-7262-457a-833d-9bf0ba3bfd89\5aca6ac2-ef25-4
c6b-b023-6eea581
    remark: Ottawa Macdonald Cartier SCS 24 5yr

*
 *  CALIB STANDHYD       0182  1  5.0    0.03    0.01 12.00  56.65 0.86   0.000
    [I%=99.0:S%= 2.00]
*
    ADD [  0177+  0178]  0176  3  5.0    0.04    0.01 12.00  47.01  n/a   0.000
*
    ADD [  0176+  0179]  0176  1  5.0    0.05    0.01 12.00  43.14  n/a   0.000
*
    ADD [  0176+  0181]  0176  3  5.0    0.06    0.01 12.00  40.85  n/a   0.000
*
    ADD [  0176+  0182]  0176  1  5.0    0.09    0.01 12.00  45.99  n/a   0.000
*
    ADD [  0176+  0183]  0176  3  5.0    0.10    0.02 12.00  44.24  n/a   0.000
*
    ADD [  0176+  0184]  0176  1  5.0    0.14    0.02 12.00  48.53  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0175  1  5.0    0.14    0.01 12.08  48.35  n/a   0.000
*
    READ STORM                  5.0
    [ Ptot= 65.91 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\2ed4a497-7262-457a-833d-9bf0ba3bfd89\5aca6ac2-ef25-4
c6b-b023-6eea581
    remark: Ottawa Macdonald Cartier SCS 24 5yr

*
 *  CALIB STANDHYD       0180  1  5.0    0.01    0.00 12.00  34.31 0.52   0.000
    [I%=43.0:S%= 2.00]
*
 FINISH

================================================================================
======================
```

Appendix B:
Sanitary Service Calculations

File No. 522677 **Date:** May 17, 2023
Project: 1592 Tenth Line Road, Ottawa **Designed:** GC
Project Address: 1592 Tenth Line Road, Ottawa **Checked:** JA
Client: Bridor Development **Drawing Reference:** 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 AREA (Ha)	CUMMULATIVE POP.	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)
SITE	BLOCK A & B	SAN MHA	0.149	37.8	0.15	37.8	4.0	0.61	0.000	0.000	0.00	0.00	7.0	0.0	0.0	0.61	0.149	0.149	0.04	1.27	2.4	200	PVC	2.1%	47.34	1.51	86.14	86.09
	SAN MHA	Ex. San MH	0.000	37.8	0.00	0.0	0.0	0.00	0.000	0.000	0.00	0.00	7.0	0.0	0.0	0.00	0.000	0.149	0.04	1.27	9.8	200	PVC	3.7%	62.86	2.00	86.03	85.67

DESIGN PARAMETERS NOTES

Average Daily Flow =	350	L/c/day
Commercial and Institutional Flow =	50000	L/ha/da
Industrial Flow =	35000	L/ha/da
Maximum Residential Peak Factor =	4	
Commercial and Intitutional Peak Factor =	1.5	

Industrial Peak Factor =	7	as per City Appendix 4-B
Extraneous Flow =	0.28	L/s/ha
Minimum Velocity =	0.76	m/s
Mannings n =	0.013	

Appartments:	Person Per Unit	Appartment	Total
Bachelor =	1.4	0	0
1 Bedroom =	1.4	27	37.8
2 Bedroom =	2.1	0	0
3 Bedroom =	3.1	0	0

Appendix C:
Water Supply and Fire Protection Calculations

File No.	522677	**Date:**	December 5, 2022
Project:	1592 Tenth Line Road, Ottawa	**Designed:**	GC
Project Address:	1592 Tenth Line Road, Ottawa	**Checked:**	JA
Client:	Bridor Development	**Drawing Reference:**	

WATER DEMAND CALCULATION

Total Population =	37.8	ea.
Average Demand Per People =	350	L/c/d
Average Water Demand =	**13230.00**	L/d
Maximum Daily Peak Factor =	2.5	* As per City of Ottawa
Maximum Daily =	**33075.00**	L/d
Maximum Hourly Peak Factor =	2.2	* As per City of Ottawa
Maximum Hourly =	**72765.00**	L/d

	Unit Counts	WSFU	Total
Unrinal Flush Tank	27	2	54
Sinks	54	1	54
Bathub	27	4	108
Diswasher	27	1.5	40.5
Washing Machine	27	2	54
Total			310.5

Appartments:	Person Per Unit	Appartment	Total
Bachelor =	1.4	0	0
1 Bedroom =	1.4	27	37.8
2 Bedroom =	2.1	0	0
3 Bedroom =	3.1	0	0
Total			37.8

TATHAM ENGINEERING

Water Service Sizing Calculations

Tatham File No. : 522677
Project : 1592 Tenth Line Road
Date : May 16, 2023
Designed by : GC
Reviewed by : JA

Required Water Service Capacity (OBC Fixture Method)

Total fixture units: 311 (as per OBC Table 7.6.3.2.A)
Conversion of fixture units to equivalent gpm (peak flow): 87.20 gpm (as per PS&D Table 13-4)

Peak hour demand = 475,326 L/d (assumes all fixtures are 'ON' at the same time)
= 5.50 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 hour demand)

Minimum pipe diameter: $d = (4Q/\pi V)^{1/2}$ (derived from Q = VA formula)
d = 0.068 m
d = 68 mm

Proposed pipe diameter: 100 mm

TATHAM ENGINEERING

Water Pressure Calculations

Tatham File No. : 522677
Project : 1592 Tenth Line Road
Date : May 16, 2023
Designed by : GC
Reviewed by : JA

Piezometric Head Equation (Derived from Bernoulli's Equation)

$$h = \frac{p}{\gamma} + z$$

Where:

h = HGL (m)
p = Pressure (Pa)
γ = Specific weight (N/m3) = 9810
z = Elevation of centreline of pipe (m) = 85.19

Water Pressure at Phoenix Crescent Connection			
HGL (m)		Pressure	
		kPa	psi
Max Day	130.2	441.55	64.04
Peak Hour	125.7	397.40	57.64
Max. Day + Fire =	115.9	301.27	43.69

Hazen Williams Equation

$$h_f = \frac{10.67 \times Q^{1.85} \times L}{C^{1.85} \times d^{4.87}}$$

Where:

h_f = Head loss over the length of pipe (m)
Q = Volumetric flow rate (m^3/s)
L = Length of pipe (m)
C = Pipe roughness coefficient
d = Pipe diameter (m)

Scenario 1: maximum daily demand

Q (L/s)	0.38	
C	150	
L (m.)	17.3	
I.D. (mm)	100	
V (m/s)	0.05	
h_f (m)	0.00	
Head Loss (psi)	0.00	
Pressure (psi)	64.04	
Service Obv. @ Street Connection (m)	85.39	
Service Obv. @ Building Connection (m)	85.75	
Pressure Adjustment (psi)	-0.51	(due to service elevation difference from street to building)
Adjusted Min. Pressure (psi)	63.53	(must not be less than 50 psi; must not be more than 80 psi)

Scenario 2: maximum hourly demand

Q (L/s)	0.84	
C	150	
L (m.)	17.3	
I.D. (mm)	100	
V (m/s)	0.11	
h_f (m)	0.00	
Head Loss (psi)	0.00	
Pressure (psi)	57.63	
Service Obv. @ Street Connection (m)	85.39	
Service Obv. @ Building Connection (m)	85.75	
Pressure Adjustment (psi)	-0.51	(due to service elevation difference from street to building)
Adjusted Min. Pressure (psi)	57.12	(must not be less than 40 psi; must not be more than 80 psi)

TATHAM ENGINEERING

FUS Fire Flow Calculations (for Bldg A/worst case scenario)

Tatham File no. :	522677
Project:	1592 Tenth Line Road
Date:	16-May-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)

2	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							
	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	3	Area of Floor(s)	318	Total Effective Area	795	sq.m.
	Unprotected Verticle Openings, Dissimillar 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 Verticle Openings, Uniform Floor Area							
	FALSE	Number of Floors		Area of Floor(s)		Total Effective Area	0	sq.m.
	Protected Verticle Openings, Dissimillar 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	5,000	L/min	
				83.3	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			4,250	L/min
			Rapid burning	0.25			70.8	L/s
5	Choose reduction for sprinklers	Sprinkler reduction	Sprinklers conforming to NFPA13 (wet or dry system)	-0.30	NO	0		
			Water supply is standard for both the system and fire department hose lines (siamese connection)	-0.10	NO	0		
			Fully supervised system (electronic monitoring system on at all times)	-0.10	NO	0		
			All buildings within 30m of the proposed structure are confirmed to have a sprinkler system	-0.25	NO	0	4,250	L/min
							70.8	L/s

Exposure Adjustment Charge

6	Exposure distance between units	North side	20.1 to 30m	Length - Height Value (Assumed worst case for exposed building facing wall)	>100	Exposure Adjustment Charge	0.04	
		East side	Over 30m		>100	Exposure Adjustment Charge	0	
		South side	3.1 to 10m		>100	Exposure Adjustment Charge	0.11	
		West side	20.1 to 30m		>100	Exposure Adjustment Charge	0.04	
	Cumulative Required Fire Flow						5,058	L/min
							84.3	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:
Stormwater Treatment Unit

Stormceptor®

FORTERRA

Stormceptor® EF Sizing Report

STORMCEPTOR®
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

06/05/2023

Province:	Ontario
City:	Ottawa
Nearest Rainfall Station:	OTTAWA CDA RCS
Climate Station Id:	6105978
Years of Rainfall Data:	20
Site Name:	
Drainage Area (ha):	0.14
% Imperviousness:	76.00

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):	3.42
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	Yes
Upstream Orifice Control Flow Rate to Stormceptor (L/s):	4.00
Peak Conveyance (maximum) Flow Rate (L/s):	
Site Sediment Transport Rate (kg/ha/yr):	

Project Name:	1592 Tenth Line Road
Project Number:	522677
Designer Name:	Guillaume Courtois
Designer Company:	Tatham Engineering
Designer Email:	gcourtois@tathameng.com
Designer Phone:	613-747-3636
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

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

Recommended Stormceptor EFO Model: EFO4

Estimated Net Annual Sediment (TSS) Load Reduction (%): 97

Water Quality Runoff Volume Capture (%): > 90

imbrium

THIRD-PARTY TESTING AND VERIFICATION

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

PERFORMANCE

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

PARTICLE SIZE DISTRIBUTION (PSD)

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

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

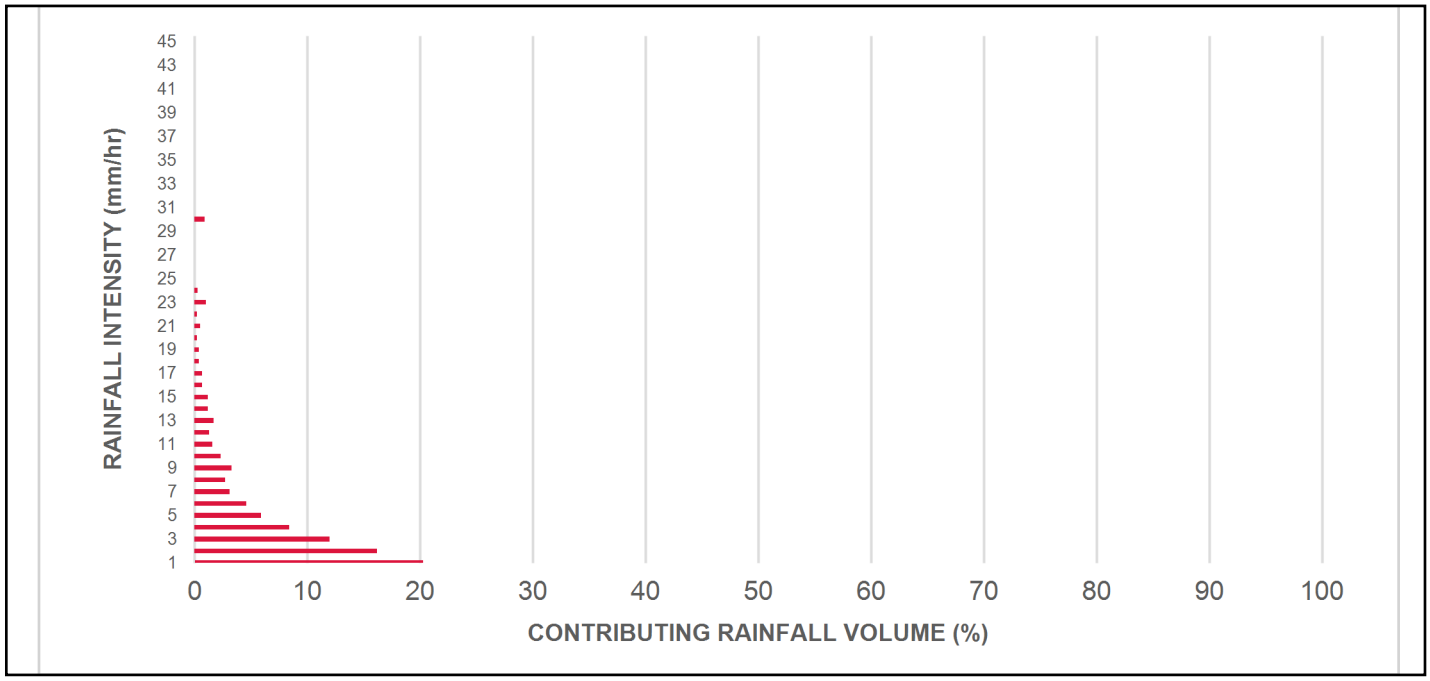
imbrium

Upstream Flow Controlled Results

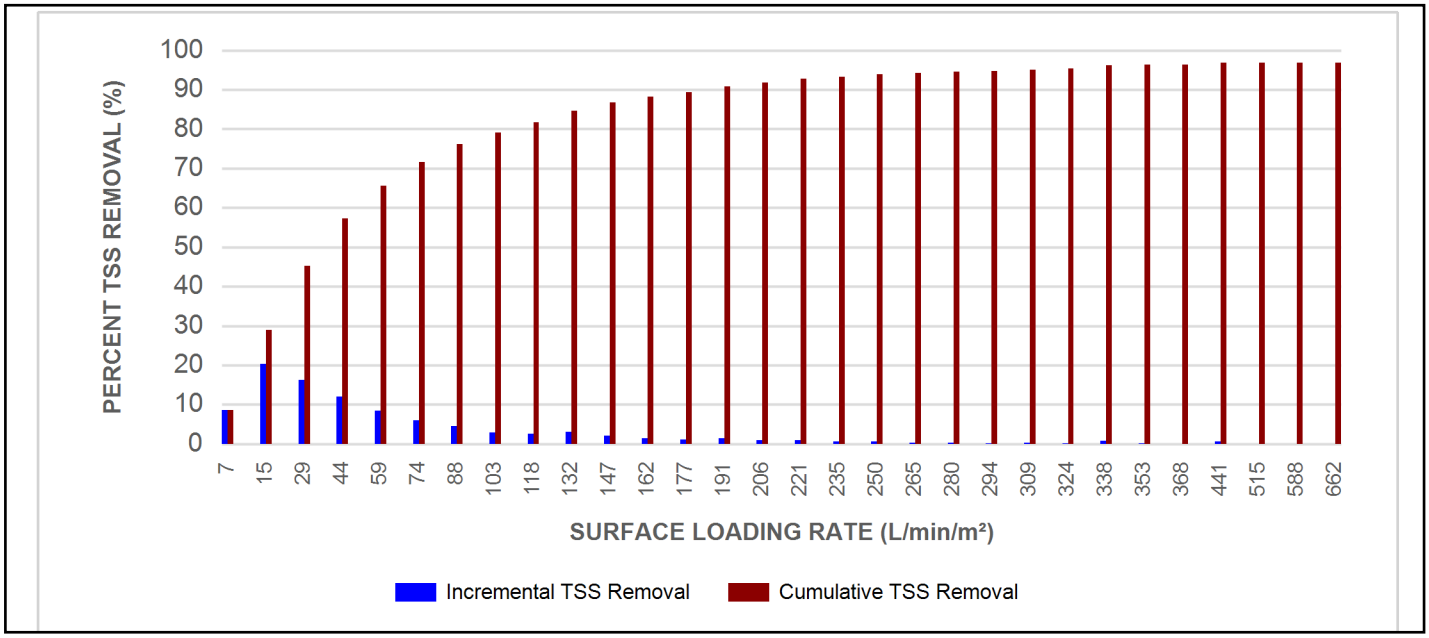
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.5	8.6	8.6	0.15	9.0	7.0	100	8.6	8.6
1	20.3	29.0	0.29	18.0	15.0	100	20.3	29.0
2	16.2	45.2	0.59	35.0	29.0	100	16.2	45.2
3	12.0	57.2	0.88	53.0	44.0	100	12.0	57.2
4	8.4	65.6	1.18	71.0	59.0	100	8.4	65.6
5	5.9	71.6	1.47	88.0	74.0	100	5.9	71.6
6	4.6	76.2	1.77	106.0	88.0	98	4.6	76.1
7	3.1	79.3	2.06	124.0	103.0	96	2.9	79.1
8	2.7	82.0	2.35	141.0	118.0	95	2.6	81.7
9	3.3	85.3	2.65	159.0	132.0	92	3.1	84.7
10	2.3	87.6	2.94	177.0	147.0	91	2.1	86.8
11	1.6	89.2	3.24	194.0	162.0	88	1.4	88.2
12	1.3	90.5	3.53	212.0	177.0	87	1.1	89.3
13	9.5	100.0	3.83	230.0	191.0	84	8.0	97.3
14	0.0	100.0	4.00	240.0	200.0	83	0.0	97.3
15	0.0	100.0	4.00	240.0	200.0	83	0.0	97.3
16	0.0	100.0	4.00	240.0	200.0	83	0.0	97.3
17	0.0	100.0	4.00	240.0	200.0	83	0.0	97.3
18	0.0	100.0	4.00	240.0	200.0	83	0.0	97.3
19	0.0	100.0	4.00	240.0	200.0	83	0.0	97.3
20	0.0	100.0	4.00	240.0	200.0	83	0.0	97.3
21	0.0	100.0	4.00	240.0	200.0	83	0.0	97.3
22	0.0	100.0	4.00	240.0	200.0	83	0.0	97.3
23	0.0	100.0	4.00	240.0	200.0	83	0.0	97.3
24	0.0	100.0	4.00	240.0	200.0	83	0.0	97.3
25	0.0	100.0	4.00	240.0	200.0	83	0.0	97.3
30	0.0	100.0	4.00	240.0	200.0	83	0.0	97.3
35	0.0	100.0	4.00	240.0	200.0	83	0.0	97.3
40	0.0	100.0	4.00	240.0	200.0	83	0.0	97.3
45	0.0	100.0	4.00	240.0	200.0	83	0.0	97.3
Estimated Net Annual Sediment (TSS) Load Reduction =								**97 %**

Climate Station ID: 6105978 *Years of Rainfall Data*: 20

RAINFALL DATA FROM OTTAWA CDA RCS RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

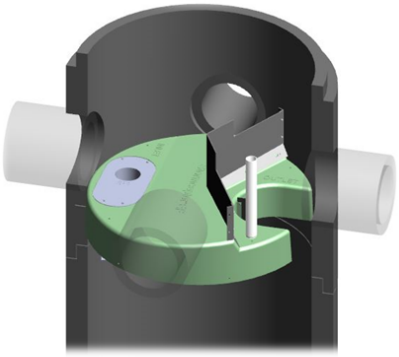
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

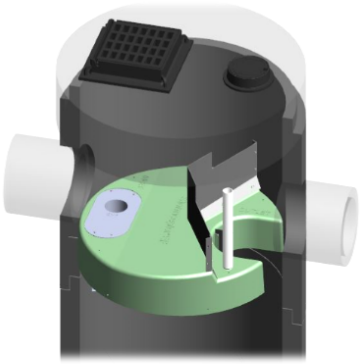
DESIGN FLEXIBILITY

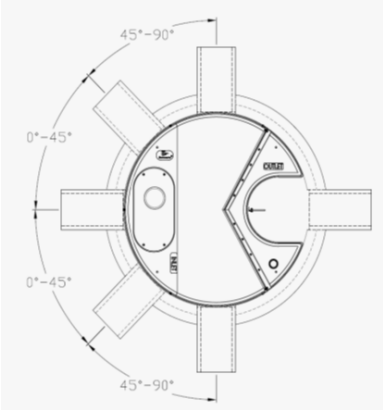
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend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

OIL CAPTURE AND RETENTION

►While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.







INLET-TO-OUTLET DROP

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

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

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

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

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

** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

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

STANDARD STORMCEPTOR EF/EFO DRAWINGS

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

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

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

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

PART 1 – GENERAL

1.1 WORK INCLUDED

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

1.2 REFERENCE STANDARDS & PROCEDURES

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

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

1.3 SUBMITTALS

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

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

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

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

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

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

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

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

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

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

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

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

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

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

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

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

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

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

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

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

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

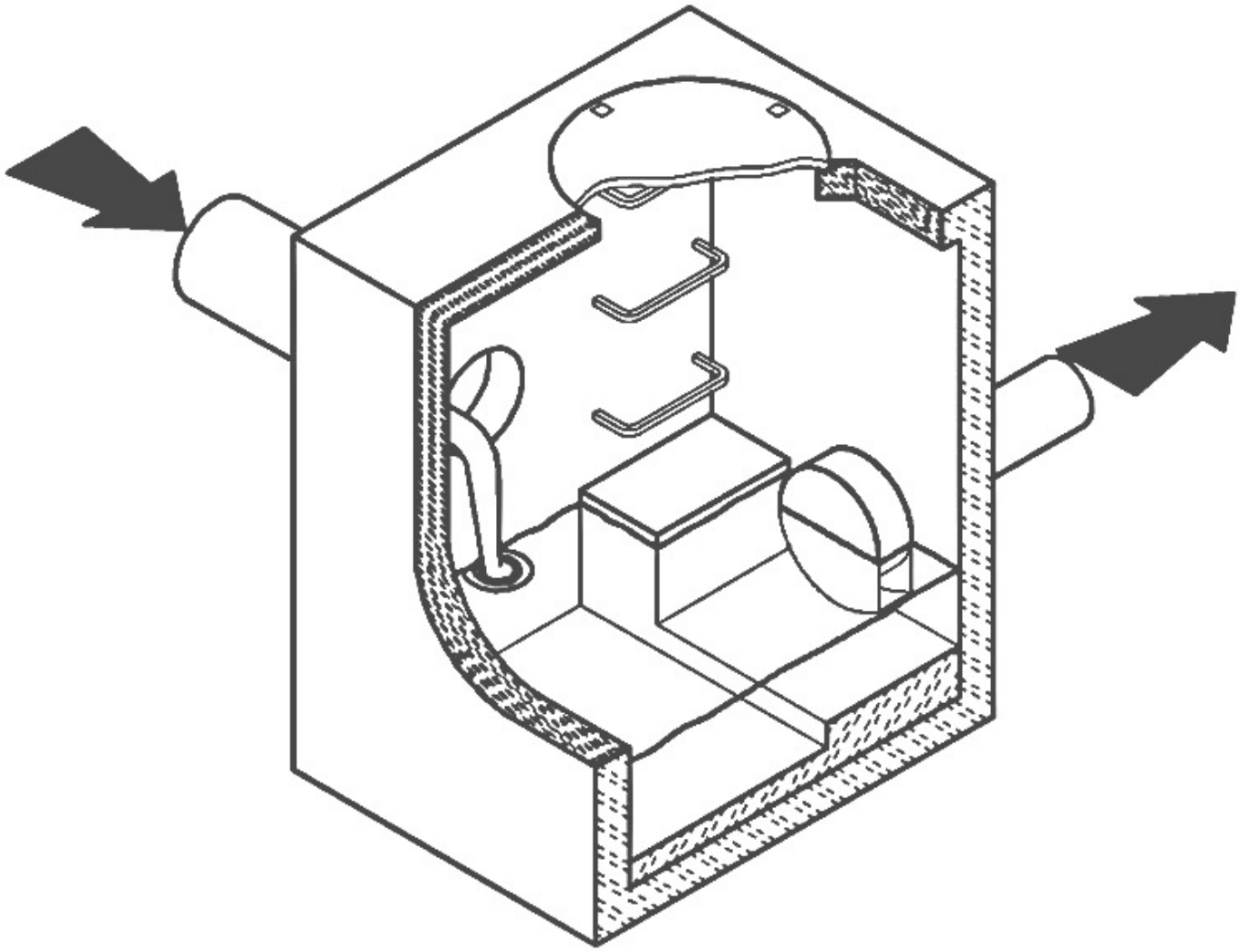
3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five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

Appendix E: Hydrovex Vertical Vortex Flow Regulator Report

CSO/STORMWATER MANAGEMENT

HYDROVEX® VHV / SVHV

Vertical Vortex Flow Regulator



JOHN MEUNIER

APPLICATIONS

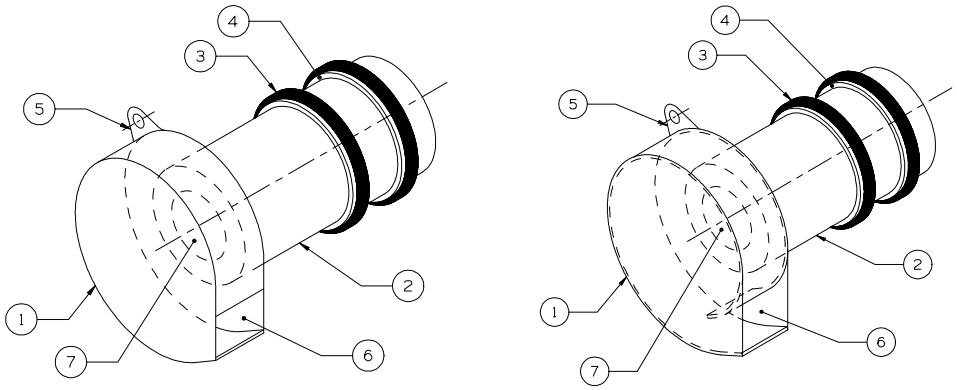
One of the major problems of urban wet weather flow management is the runoff generated after a heavy rainfall. During a storm, uncontrolled flows may overload the drainage system and cause flooding. Due to increased velocities, sewer pipe wear is increased dramatically and results in network deterioration. In a combined sewer system, the wastewater treatment plant may also experience significant increases in flows during storms, thereby losing its treatment efficiency.

A simple means of controlling excessive water runoff is by controlling excessive flows at their origin (manholes). **John Meunier Inc.** manufactures the **HYDROVEX® VHV / SVHV** line of vortex flow regulators to control stormwater flows in sewer networks, as well as manholes.

The vortex flow regulator design is based on the fluid mechanics principle of the forced vortex. This grants flow regulation without any moving parts, thus reducing maintenance. The operation of the regulator, depending on the upstream head and discharge, switches between orifice flow (gravity flow) and vortex flow. Although the concept is quite simple, over 12 years of research have been carried out in order to get a high performance.

The **HYDROVEX® VHV / SVHV** Vertical Vortex Flow Regulators **(refer to Figure 1)** are manufactured entirely of stainless steel, and consist of a hollow body (**1**) (in which flow control takes place) and an outlet orifice (**7**). Two rubber "O" rings (**3**) seal and retain the unit inside the outlet pipe. Two stainless steel retaining rings (**4**) are welded on the outlet sleeve to ensure that there is no shifting of the "O" rings during installation and use.

1. **BODY**
2. **SLEEVE**
3. **O-RING**
4. **RETAINING RINGS (SQUARE BAR)**
5. **ANCHOR PLATE**
6. **INLET**
7. **OUTLET ORIFICE**



VHV ***SVHV***

FIGURE 1: HYDROVEX® VHV-SVHV VERTICAL VORTREX FLOW REGULATORS

ADVANTAGES

- The **HYDROVEX® VHV / SVHV** line of flow regulators are manufactured entirely of stainless steel, making them durable and corrosion resistant.
- Having no moving parts, they require minimal maintenance.
- The geometry of the **HYDROVEX® VHV / SVHV** flow regulators allows a control equal to an orifice plate, having a cross section area 4 to 6 times smaller. This decreases the chance of blockage of the regulator, due to sediments and debris found in stormwater flows. **Figure 2** illustrates the comparison between a regulator model 100 SVHV-2 and an equivalent orifice plate. One can see that for the same height of water, the regulator controls a flow approximately four times smaller than an equivalent orifice plate.
- Installation of the **HYDROVEX® VHV / SVHV** flow regulators is quick and straightforward and is performed after all civil works are completed.
- Installation requires no special tools or equipment and may be carried out by any contractor.
- Installation may be carried out in existing structures.

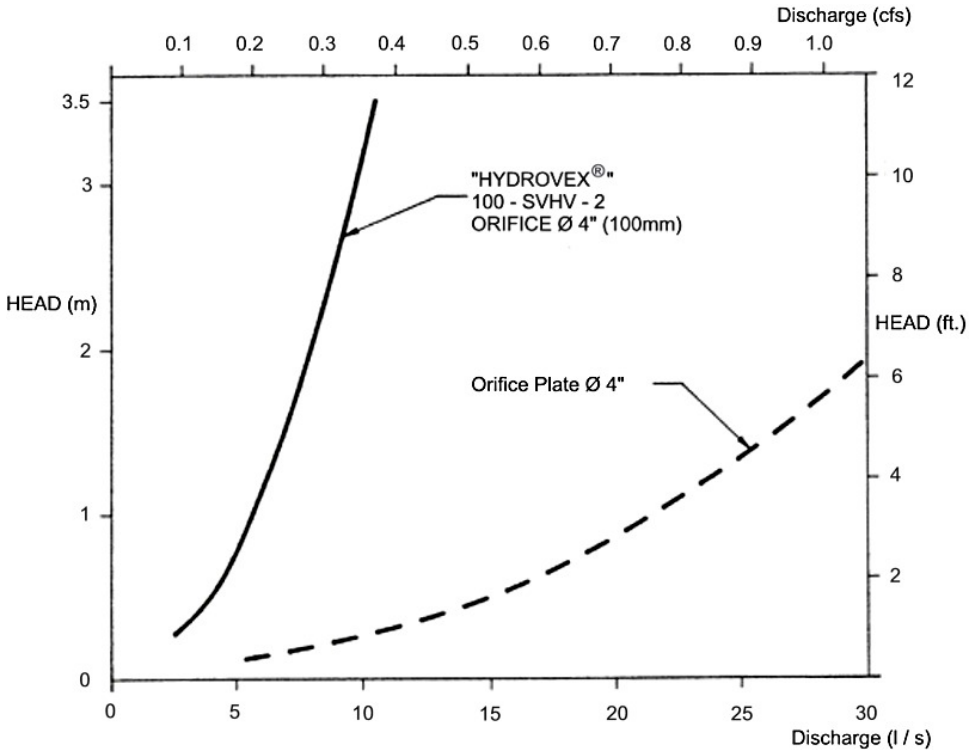


FIGURE 2: DISCHARGE CURVE SHOWING A HYDROVEX® FLOW REGULATOR VS AN ORIFICE PLATE

SELECTION

Selection of a **VHV or SVHV** regulator can be easily made using the selection charts found at the back of this brochure (see **Figure 3)**. These charts are a graphical representation of the maximum upstream water pressure (head) and the maximum discharge at the manhole outlet. The maximum design head is the difference between the maximum upstream water level and the invert of the outlet pipe. All selections should be verified by John Meunier Inc. personnel prior to fabrication.

Example:

✓ Maximum design head	2m (6.56 ft.)
✓ Maximum discharge	6 L/s (0.2 cfs)
✓ Using **Figure 3** - VHV	model required is a **75 VHV-1**

INSTALLATION REQUIREMENTS

All **HYDROVEX® VHV / SVHV** flow regulators can be installed in circular or square manholes. **Figure 4** gives the various minimum dimensions required for a given regulator. ***It is imperative to respect the minimum clearances shown to ensure easy installation and proper functioning of the regulator.***

SPECIFICATIONS

In order to specify a **HYDROVEX®** regulator, the following parameters must be defined:

- The model number (ex: 75-VHV-1)
- The diameter and type of outlet pipe (ex: 6" diam. SDR 35)
- The desired discharge (ex: 6 l/s or 0.21 CFS)
- The upstream head (ex: 2 m or 6.56 ft.) *
- The manhole diameter (ex: 36" diam.)
- The minimum clearance "H" (ex: 10 inches)
- The material type (ex: 304 s/s, 11 Ga. standard)

* ***Upstream head is defined as the difference in elevation between the maximum upstream water level and the invert of the outlet pipe where the HYDROVEX® flow regulator is to be installed.***

PLEASE NOTE THAT WHEN REQUESTING A PROPOSAL, WE SIMPLY REQUIRE THAT YOU PROVIDE US WITH THE FOLLOWING:

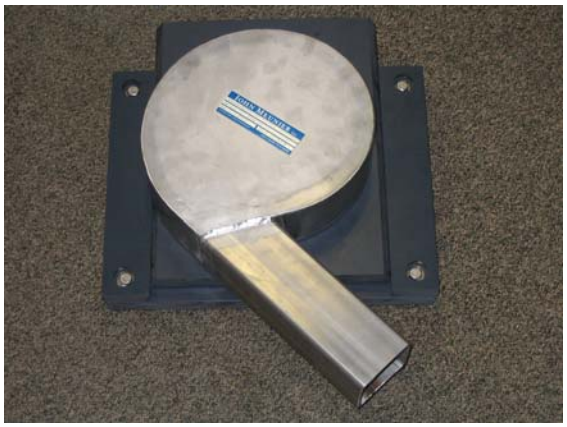
- ***project design flow rate***
- ***pressure head***
- ***chamber's outlet pipe diameter and type***

Typical VHV model in factory

OPTIONS

FV – SVHV (mounted on sliding plate)

VHV-1-O (standard model with odour control inlet)



FV – VHV-O (mounted on sliding plate with odour control inlet)

VHV with Gooseneck assembly in existing chamber without minimum release at the bottom

VHV with air vent for minimal slopes

HYDROVEX®

VHV Vertical Vortex Flow Regulator

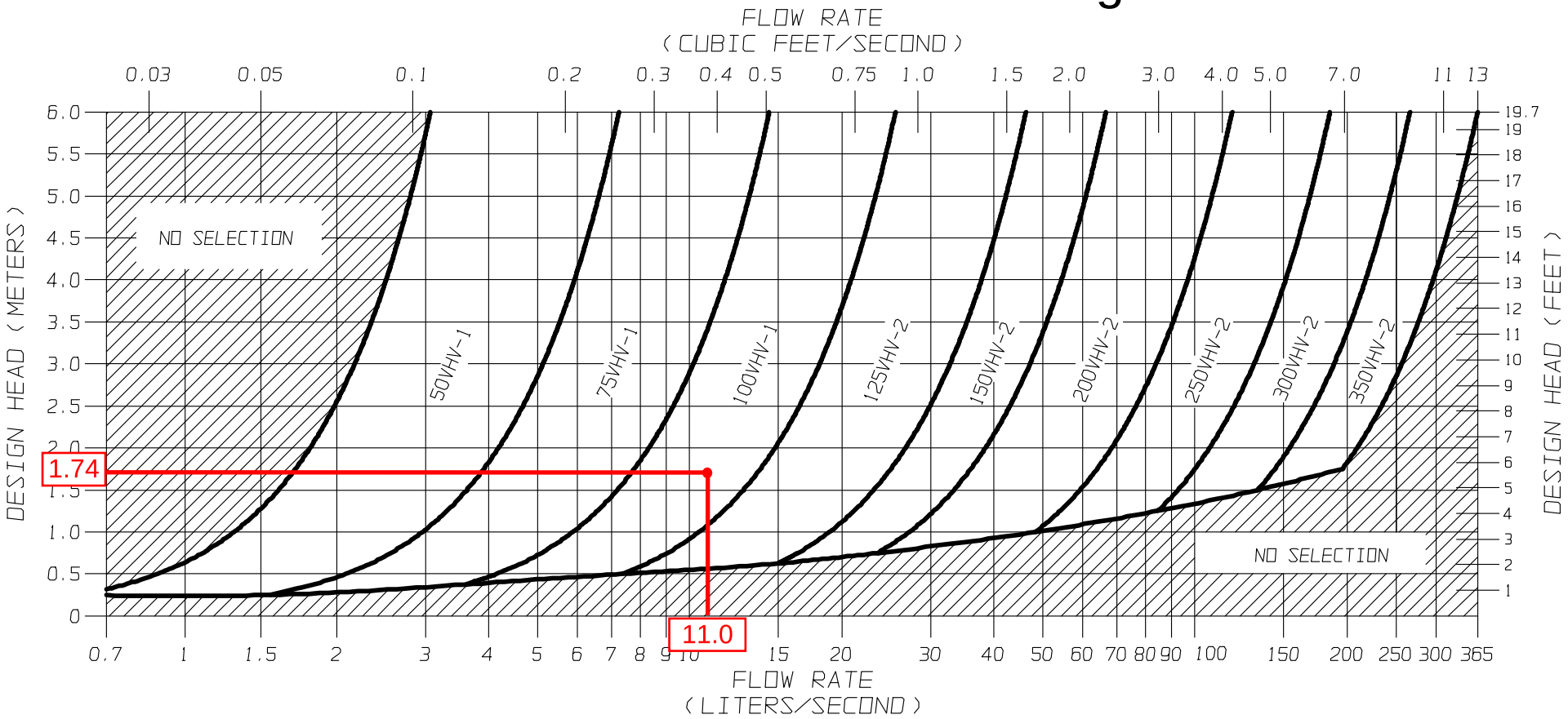


FIGURE 3 - VHV

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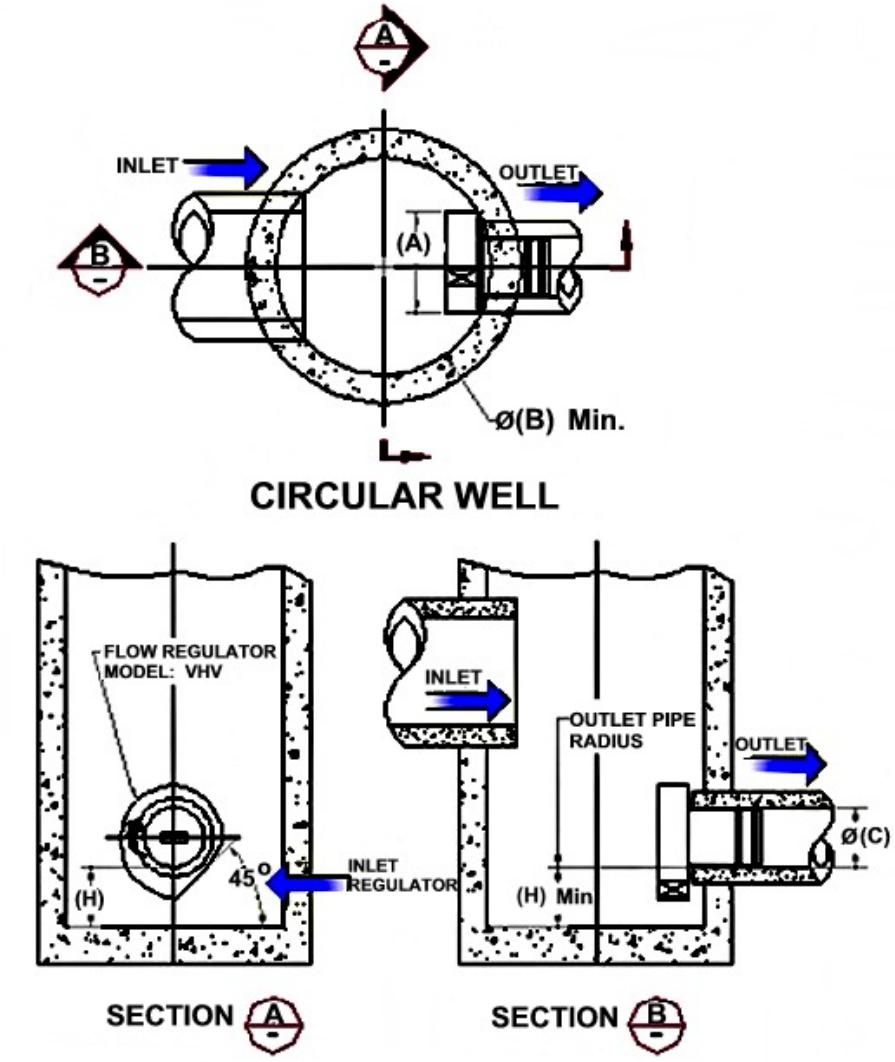
FLOW REGULATOR TYPICAL INSTALLATION IN CIRCULAR MANHOLE
FIGURE 4 (MODEL VHV)

Model Number	Regulator Diameter		Minimum Manhole Diameter		Minimum Outlet Pipe Diameter		Minimum Clearance	
	A (mm)	**A** (in.)	**B** (mm)	**B** (in.)	**C** (mm)	**C** (in.)	**H** (mm)	**H** (in.)
50VHV-1	150	6	600	24	150	6	150	6
75VHV-1	250	10	600	24	150	6	150	6
100VHV-1	325	13	900	36	150	6	200	8
125VHV-2	275	11	900	36	150	6	200	8
150VHV-2	350	14	900	36	150	6	225	9
200VHV-2	450	18	1200	48	200	8	300	12
250VHV-2	575	23	1200	48	250	10	350	14
300VHV-2	675	27	1600	64	250	10	400	16
350VHV-2	800	32	1800	72	300	12	500	20



INSTALLATION

The installation of a **HYDROVEX®** regulator may be undertaken once the manhole and piping is in place. Installation consists of simply fitting the regulator into the outlet pipe of the manhole. **John Meunier Inc.** recommends the use of a lubricant on the outlet pipe, in order to facilitate the insertion and orientation of the flow controller.

MAINTENANCE

HYDROVEX® regulators are manufactured in such a way as to be maintenance free; however, a periodic inspection (every 3-6 months) is suggested in order to ensure that neither the inlet nor the outlet has become blocked with debris. The manhole should undergo periodically, particularly after major storms, inspection and cleaning as established by the municipality

GUARANTY

The **HYDROVEX®** line of **VHV / SVHV** regulators are guaranteed against both design and manufacturing defects for a period of 5 years. Should a unit be defective, **John Meunier Inc.** is solely responsible for either modification or replacement of the unit.

John Meunier Inc.
ISO 9001 : 2008

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Revised: 2011-05-03

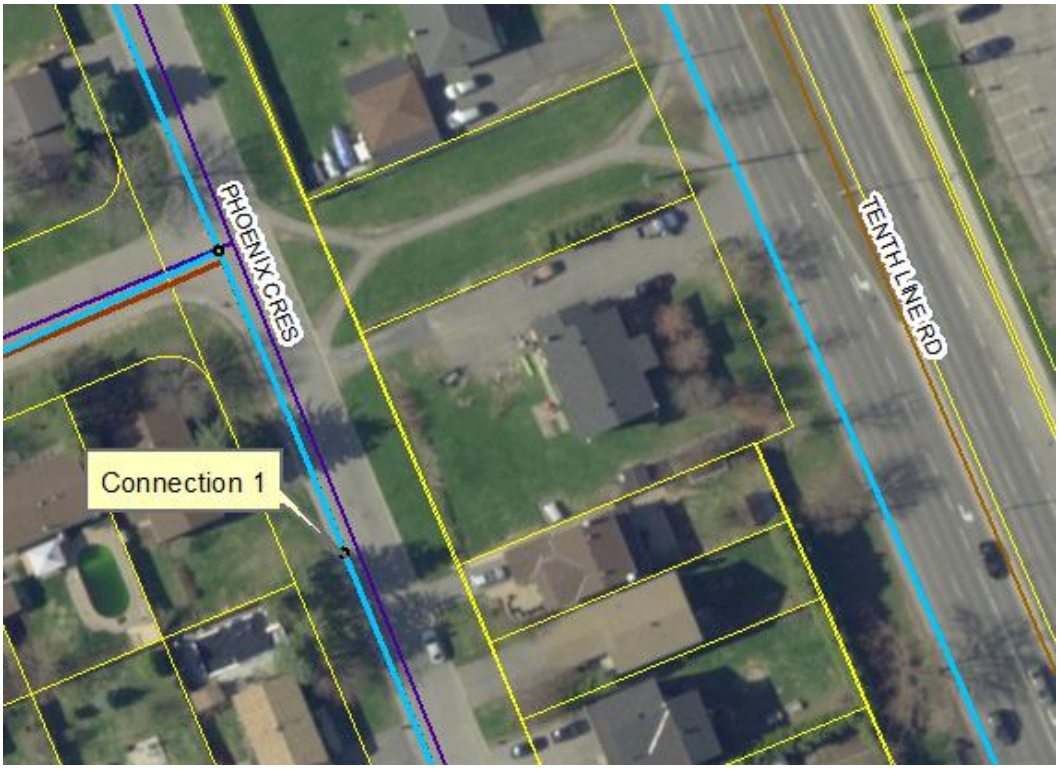
Appendix F:
Boundary Conditions

Boundary Conditions
1592 Tenth Line

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	10	0.17
Maximum Daily Demand	26	0.43
Peak Hour	56	0.94
Fire Flow Demand #1	8,200	136.67

Location



Results

Connection 1 – Phoenix Cres.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.2	60.4
Peak Hour	125.7	54.1
Max Day plus Fire 1	115.9	40.2

[1] Ground Elevation = 87.69 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 G:
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:

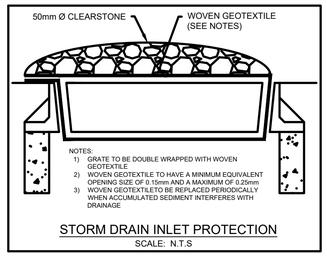
2.1. WORK TO BE DONE IN THE VICINITY OF MAJOR WATERWAYS TO BE CARRIED OUT FROM JULY TO SEPTEMBER ONLY.
2.2. MINIMIZE THE EXTENT OF DISTURBED AREAS AND THE DURATION OF EXPOSURE.
2.3. PROTECT DISTURBED AREAS FROM RUNOFF.
2.4. PROVIDE TEMPORARY COVER SUCH AS SEEDING OR MULCHING IF DISTURBED AREA WILL NOT BE REHABILIATED WITHIN 30 DAYS.
2.5. INSPECT SILT FENCE, FILTER CLOTHS, AND CATCH BASIN SUMPS WEEKLY AND AFTER EVERY MAJOR 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 SCRAPED.
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 ABUTTING PROPERTIES OR PUBLIC STREETS DURING CONSTRUCTION AND PROCEED IMMEDIATELY TO CLEAN UP ANY AREAS SO AFFECTED.

3. AFTER CONSTRUCTION:

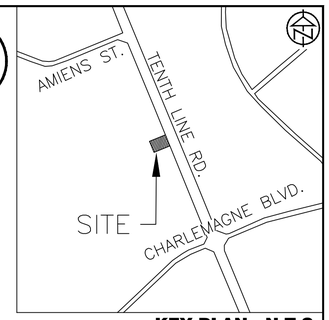
3.1. PROVIDE PERMANENT COVER CONSISTING OF TOPSOIL AND SEED TO DISTURBED AREA.
3.2. REMOVE STRAW BALE FLOW CHECK DAMS, SILT FENCES AND FILTER CLOTHS ON CATCH BASINS AND MANHOLE COVERS AFTER DISTURBED AREAS HAVE BEEN REHABILITATED AND STABILIZED.
3.3. INSPECT AND CLEAN CATCH BASIN SUMPS AND STORM SEWERS.

LEGEND:

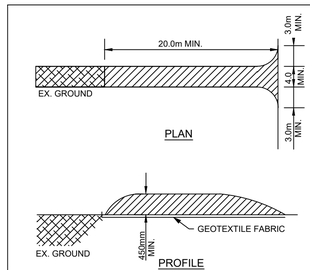
- EXISTING PROPERTY LINE TO REMAIN
- ×50.00 PROPOSED ELEVATION
- ×50.00 (SW) SWALE ELEVATION
- ×50.00 (BW) PROPOSED BOTTOM OF WALL ELEVATION
- ×50.00 (TW) PROPOSED TOP OF WALL ELEVATION
- ×50.00 (BC) PROPOSED BOTTOM OF CURB ELEVATION
- ×50.00 (TC) PROPOSED TOP OF CURB ELEVATION
- ×50.00 (ME) PROPOSED ELEVATION MATCH INTO EXISTING ELEVATION
- × 70.19 EXISTING ELEVATION
- PROPOSED 200mmØ PERFORATED SUBDRAIN
- PROPOSED STORM SEWER
- PROPOSED SANITARY SEWER
- PROPOSED WATERMAIN
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- PROPOSED CATCHBASIN-MANHOLE/MANHOLE/AREA DRAIN
- PROPOSED CURB STOP
- PROPOSED PIPE INSULATION
- PROPOSED 100 YEAR HIGH WATER LEVEL
- STORM WATERSHED EXTENT
- WS-XX (CONTROLLED) AREA / RUNOFF — WATERSHED NAME, RUNOFF COEFFICIENT, AREA IN HECTARES
- PROPOSED CONCRETE RETAINING WALL
- PROPOSED SILT FENCE AS PER OPSD 219.110
- PROPOSSED GRASS AREA. REFER TO LANDSCAPING
- 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



STORM DRAIN INLET PROTECTION
SCALE: N.T.S



KEY PLAN - N.T.S.



STONE SIZE - THE STONE PAD SHALL BE A MIN. 450mm THICK. USE 50Ømm STONE OR RECLAIMED CONCRETE EQUIVALENT FOR FIRST 10m FROM ADJACENT ROAD & 150mmØ STONE. FOR REMAINDER OF STONE PAD.

LENGTH - AS REQUIRED BUT NOT LESS THAN 20m.

WIDTH - 4m MIN. BUT NOT LESS THAN THE WIDTH AT POINTS WHERE INGRESS. AND EGRESS OCCURS.
GEOTEXTILE FABRIC (TERRAFIX 270R OR EQUAL) WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING STONE.

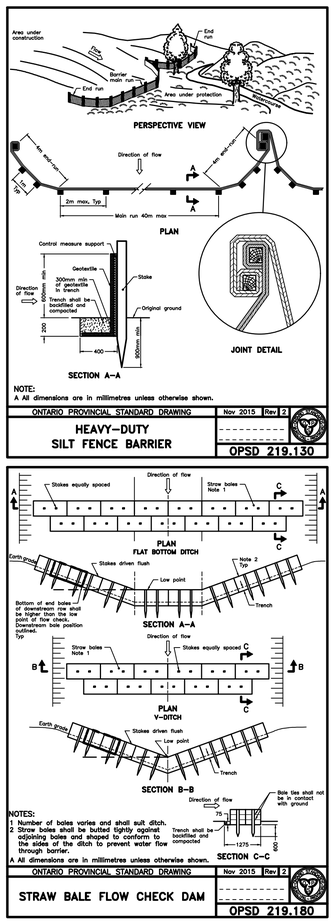
SURFACE WATER - ALL SURFACE WATER FLOWING OR DIRECTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE.

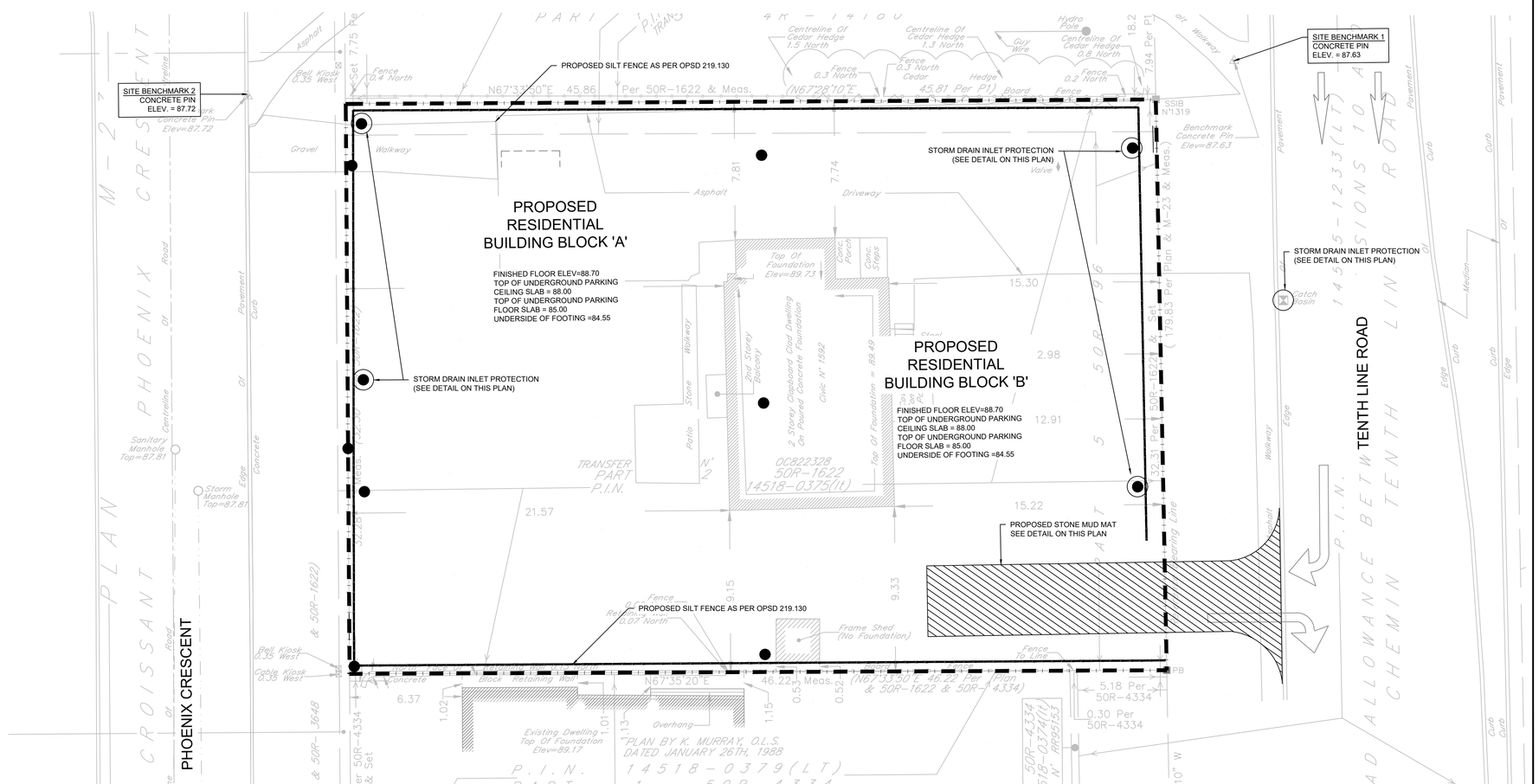
MAINTENANCE - THE CONTRACTOR SHALL MAINTAIN THE ENTRANCE IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHT-OF-WAY. THIS MAY REQUIRE PERIODIC DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHT-OF-WAY MUST BE REMOVED IMMEDIATELY BY THE CONTRACTOR. UPON OBSERVATION OF CONTINUOUS MUD TRACKING ONTO ADJACENT STREETS, THE STONE MAT IS TO BE FULLY REPLACED.

WASHING - WHEELS SHALL BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO PUBLIC RIGHT-OF-WAY. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.

INSPECTION AND REQUIRED MAINTENANCE AFTER EACH RAIN SHALL BE PROVIDED BY THE CONTRACTOR.

STONE MUD MAT DETAIL
SCALE: N.T.S





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No.	REVISION DESCRIPTION	DATE
1.	ISSUED FOR SPA	DEC. 2022
2.	AS PER ARCHITECT'S COMMENTS	DEC. 2022
3.	RE-ISSUED FOR SPA	JUN. 2023

ENGINEER STAMP

LICENSED PROFESSIONAL ENGINEER J. RASH 100123062 PROVINCE OF ONTARIO

BRIDOR DEVELOPMENTS
1592 TENTH LINE ROAD
CITY OF OTTAWA

SEDIMENT & EROSION CONTROL PLAN

TATHAM ENGINEERING

DESIGN: HY/GC	FILE: 522677	DWG: C100
DRAWN: HY	DATE: NOV 2022	
CHECK: GC	SCALE: 1:150	

D07-12-21-0084

Drawing Name: 522677-SG01.dwg, Plotted: Jun 14, 2023

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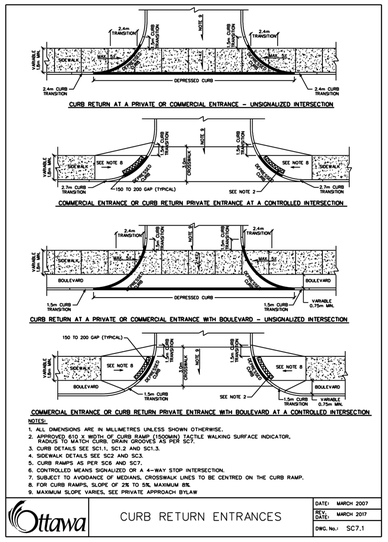
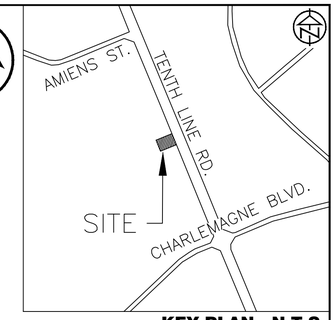


PAVEMENT STRUCTURE

COURSE	MATERIAL	THICKNESS (mm)	
		AUTOMOBILE PARKING	TRUCK ROUTE (HEAVY TRAFFIC)
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	350	450

NOTE:
IN PREPARATION FOR PAVEMENT CONSTRUCTION AT THIS SITE, ANY SURFICIAL OR NEAR SURFACE/SUBGRADE LEVEL TOPSOIL AND ANY SOFT, WET OR DELETERIOUS MATERIALS SHOULD BE REMOVED FROM THE PROPOSED PAVED AREAS. THE EXPOSED SUBGRADE SHOULD BE INSPECTED AND APPROVED BY GEOTECHNICAL ENGINEER AND ANY SOFT AREAS EVIDENT SHOULD BE SUBEXCAVATED AND REPLACED WITH SUITABLE EARTH BORROW APPROVED BY THE GEOTECHNICAL ENGINEER. FOLLOWING APPROVAL OF THE PREPARATION OF THE SUBGRADE, THE PAVEMENT GRANULARS MAY BE PLACED.



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- × 70.19 EXISTING ELEVATION
- PROPOSED RETAINING WALL(DESIGN BY OTHERS)
- PROPOSED SILT FENCE AS PER OPSD 219.110
- PROPOSED 200mmØ PERFORATED SUBDRAIN
- STM PROPOSED STORM SEWER
- SUB PROPOSED 250mmØ PERFORATED SUBDRAIN
- SAN PROPOSED SANITARY SEWER
- WTR PROPOSED WATERMAIN
- SAN EXISTING SANITARY SEWER
- WTR EXISTING WATERMAIN
- PROPOSED CATCHBASIN-MANHOLE/MANHOLE/AREA DRAIN
- PROPOSED WATER VALVE
- PROPOSED PIPE INSULATION
- PROPOSED 100 YEAR HIGH WATER LEVEL
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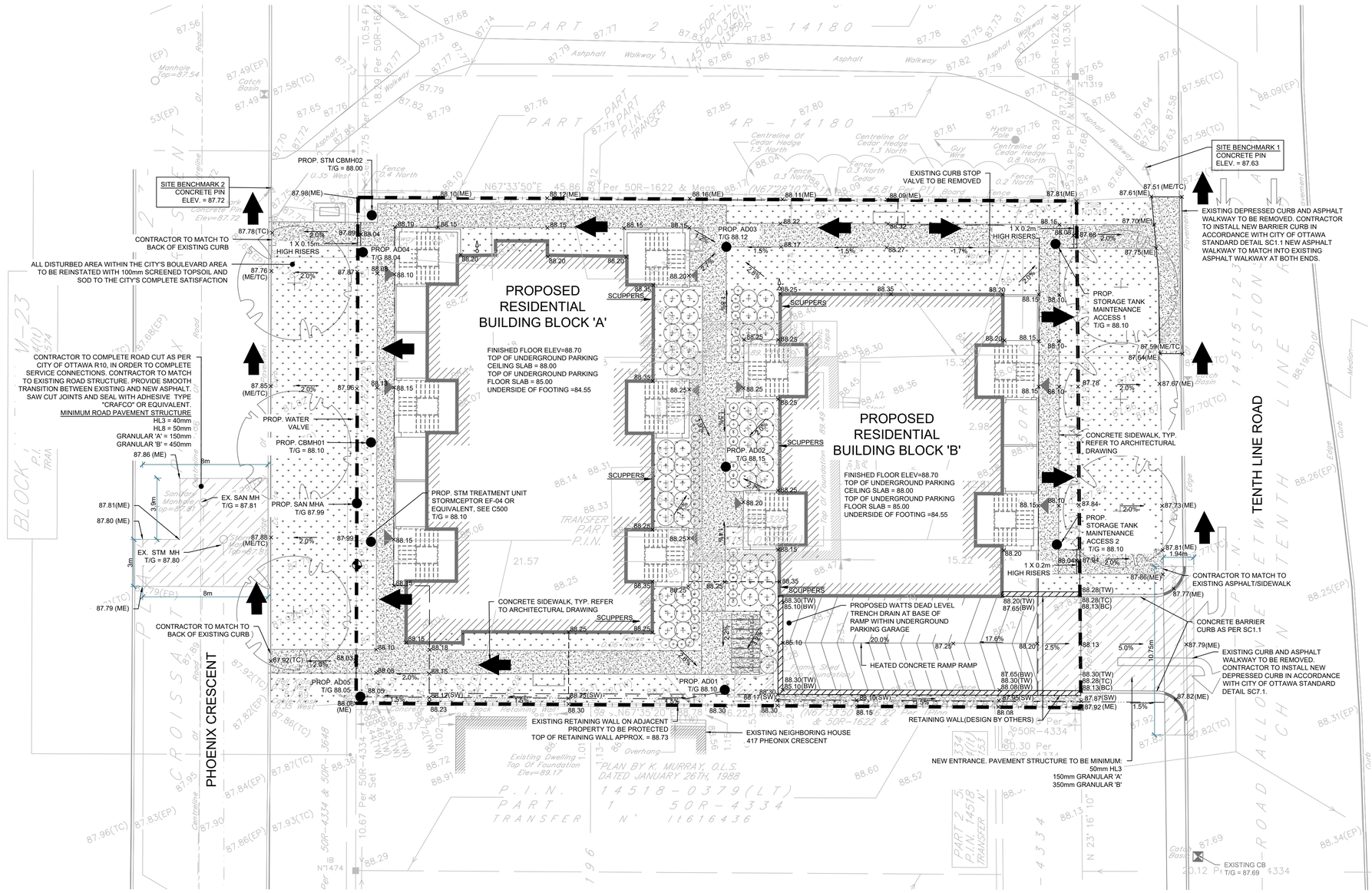
- PROPOSED LIGHT DUTY ASPHALT
- PROPOSED GRAVEL AREA
- PROPOSED RIP RAP AS PER OPSD 810.010
- M PROPOSED WATER METER
- PROPOSED MAJOR OVERLAND FLOW ROUTE
- PROPOSED ROOF DRAIN OUTLET



LEGAL AND TOPOGRAPHIC SURVEY COMPLETED BY ARPENTAGE DUTRISAC SURVEYING INC.

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BENCHMARK2: CONCRETE PIN LOCATED ON NORTH WEST CORNER OF THE SITE, ELEVATION: 87.72

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1.	ISSUED FOR SPA	DEC. 2022
2.	AS PER ARCHITECT'S COMMENTS	DEC. 2022
3.	RE-ISSUED FOR SPA	JUN. 2023

ENGINEER STAMP

LICENSED PROFESSIONAL ENGINEER
J. RASH
100123062
PROVINCE OF ONTARIO

BRIDOR DEVELOPMENTS
1592 TENTH LINE ROAD
CITY OF OTTAWA

SITE GRADING PLAN

TATHAM ENGINEERING

DESIGN: HY/GC	FILE: 522677	DWG: C200
DRAWN: HY	DATE: NOV 2022	
CHECK: GC	SCALE: 1:150	

D07-12-21-0084

18576

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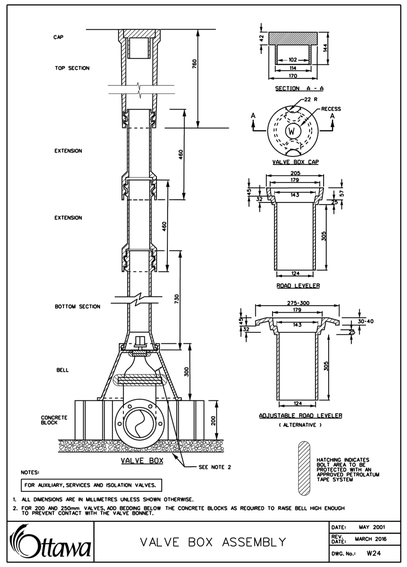

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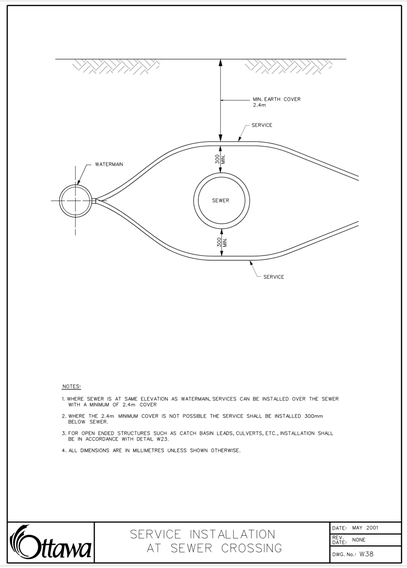
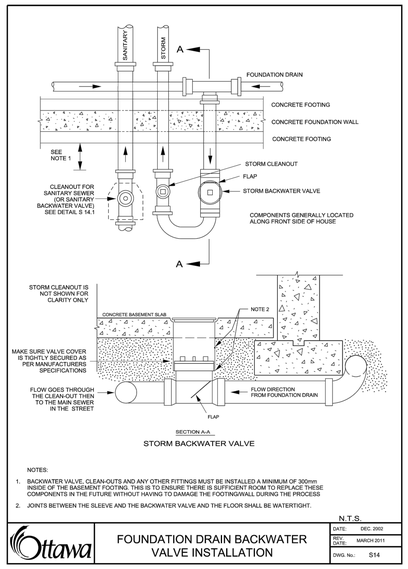
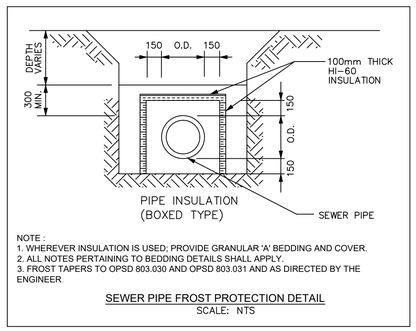


Ottawa | SERVICE INSTALLATION AT SEWER CROSSING | DATE: MAY 2001 | REV. DATE: NONE | DWG. No.: W38



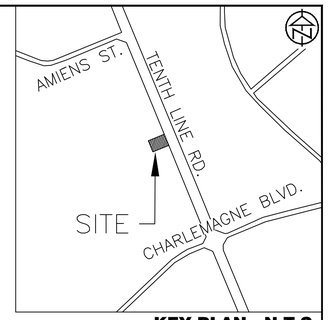
Ottawa | FOUNDATION DRAIN BACKWATER VALVE INSTALLATION | N.T.S. | DATE: DEC. 2002 | REV. DATE: MARCH 2011 | DWG. No.: S14



SEWER PIPE FROST PROTECTION DETAIL
SCALE: NTS

MANHOLE TABLE

STORM		
MH Number	**Size**	**Cover**
STM CBMH01	1200mm	S28.1
STM CBMH02	1200mm	S28.1
AD01	SEE MECHANICAL DRAWINGS	
AD02	SEE MECHANICAL DRAWINGS	
AD03	SEE MECHANICAL DRAWINGS	
SANITARY		
MH Number	**Size**	**Cover**
MHA	1200mm	S24



KEY PLAN - N.T.S.

LEGEND:

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- ×50.00 PROPOSED ELEVATION
- ×50.00 (SW) SWALE ELEVATION
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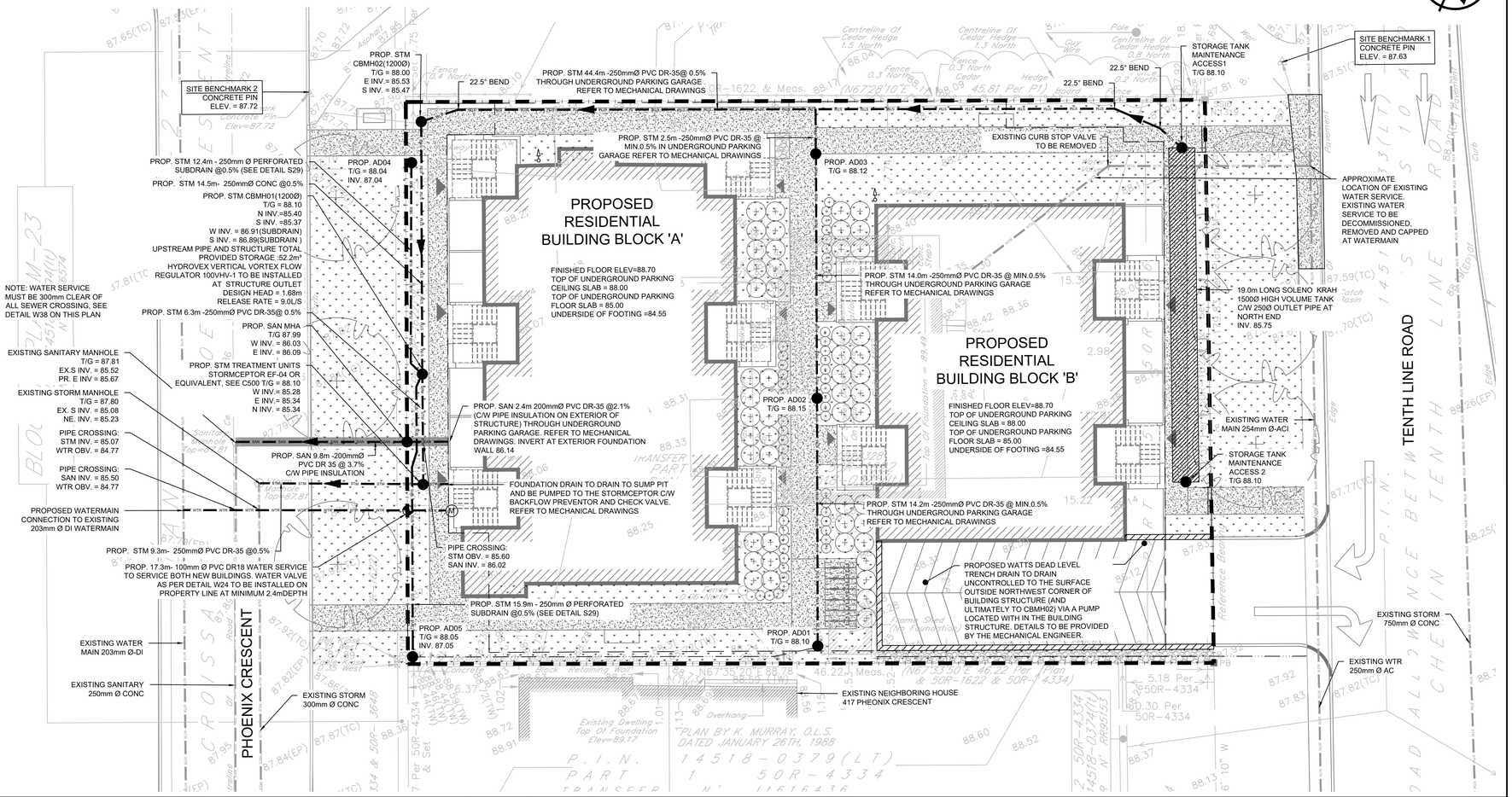
- ×70.19 EXISTING ELEVATION
- PROPOSED RETAINING WALL(DESIGN BY OTHERS)
- PROPOSED SILT FENCE AS PER OPSD 219.110
- PROPOSED 200mmØ PERFORATED SUBDRAIN
- STM PROPOSED STORM SEWER
- SUB PROPOSED 250mmØ PERFORATED SUBDRAIN
- SAN PROPOSED SANITARY SEWER
- WTR PROPOSED WATERMAIN
- SAN EXISTING SANITARY SEWER
- WTR EXISTING WATERMAIN
- PROPOSED CATCHBASIN-MANHOLE/MANHOLE/AREA DRAIN
- PROPOSED WATER VALVE
- PROPOSED PIPE INSULATION
- PROPOSED 100 YEAR HIGH WATER LEVEL
- STORM WATERSHED EXTENT
- WS-XX (OWNSHOLDER) WATERSHED NAME
- % IMPERVIOUS
- AREA IN HECTARES
- PROPOSSED GRASS AREA. REFER TO LANDSCAPING
- PROPOSED CONCRETE FEATURES/SLAB
- PROPOSED HEAVY DUTY ASPHALT
- PROPOSED LIGHT DUTY ASPHALT
- PROPOSED GRAVEL AREA
- PROPOSED RIP RAP AS PER OPSD 810.010
- M PROPOSED WATER METER
- PROPOSED MAJOR OVERLAND FLOW ROUTE
- PROPOSED ROOF DRAIN OUTLET



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ENGINEER STAMP

LICENSED PROFESSIONAL ENGINEER J.RASH 100123062 PROVINCE OF ONTARIO

BRIDOR DEVELOPMENTS
1592 TENTH LINE ROAD
CITY OF OTTAWA

SITE SERVICING PLAN

TATHAM ENGINEERING

DESIGN: HY/GC	FILE: 522677	DWG: C300
DRAWN: HY	DATE: NOV 2022	
CHECK: GC	SCALE: 1:150	

D07-12-21-0084

Drawing Name: 522677-S001.dwg Plotted: Jun 16, 2023

18576

LEGEND:

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- PROPOSED PIPE INSULATION
- PROPOSED 100 YEAR HIGH WATER LEVEL
- STORM WATERSHED EXTENT
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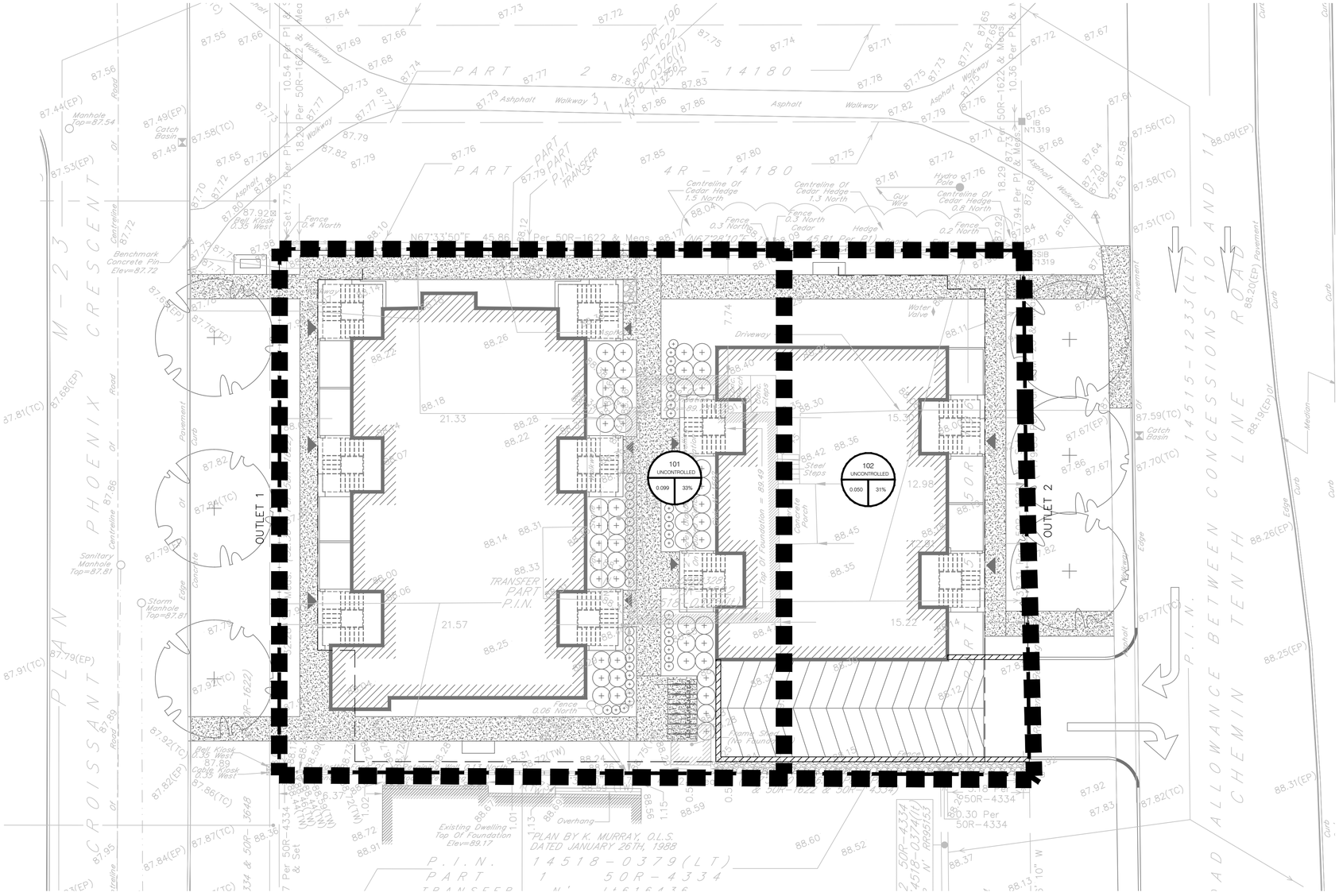

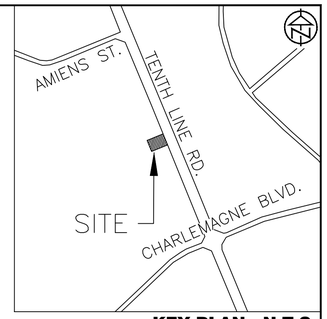

KEY PLAN - N.T.S.

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ENGINEER STAMP

LICENSED PROFESSIONAL ENGINEER — J. RASH 100123062 — PROVINCE OF ONTARIO

BRIDOR DEVELOPMENTS
1592 TENTH LINE ROAD
CITY OF OTTAWA

PRE-DEVELOPMENT DRAINAGE PLAN

TATHAM ENGINEERING

DESIGN: HY/GC	FILE: 522677	DWG: **C400**
DRAWN: HY	DATE: NOV 2022	
CHECK: GC	SCALE: 1:150	

D07-12-21-0084

18576

Drawing Name: 522677-S001.dwg, Plotted: Jun 16, 2023

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- EXISTING WATERMAIN
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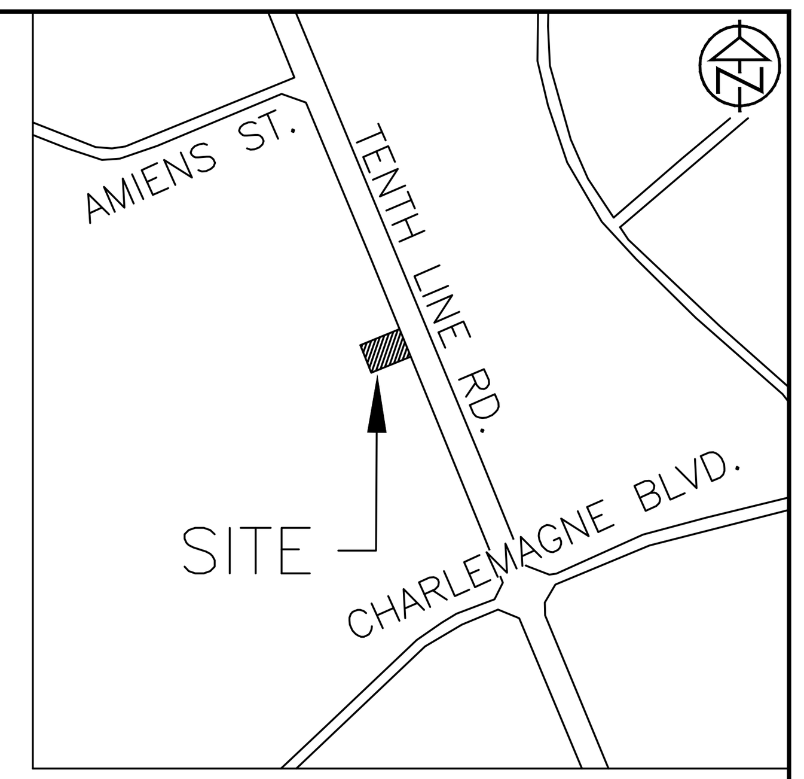
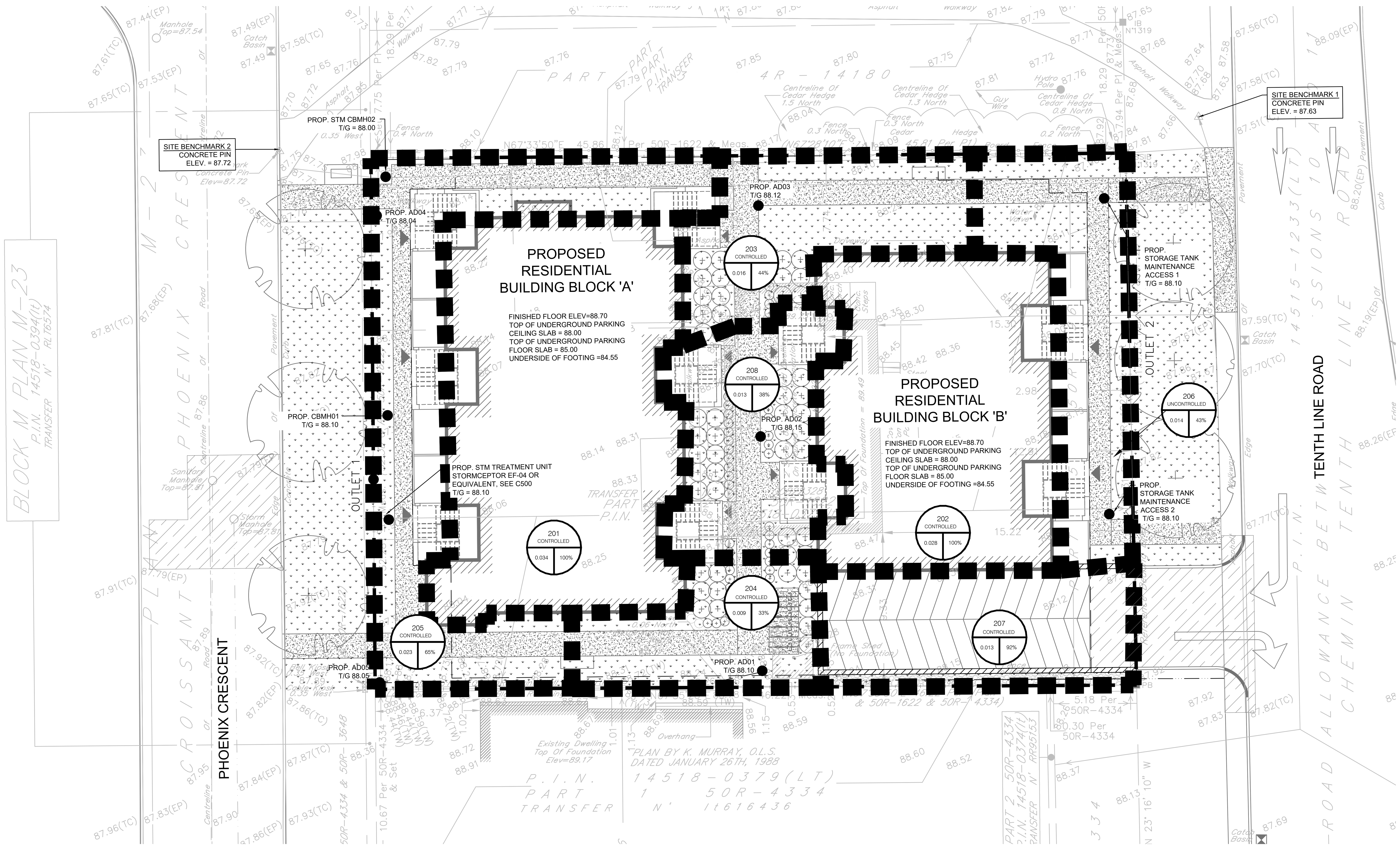


KEY PLAN - N.T.S.



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ENGINEER STAMP: LICENSED PROFESSIONAL ENGINEER J. RASH 100123062 PROVINCE OF ONTARIO

BRIDOR DEVELOPMENTS
1592 TENTH LINE ROAD
CITY OF OTTAWA

POST DEVELOPMENT DRAINAGE PLAN

TATHAM ENGINEERING

DESIGN: HY/GC	FILE: 522677	DWG:
DRAWN: HY	DATE: NOV 2022	**C401**
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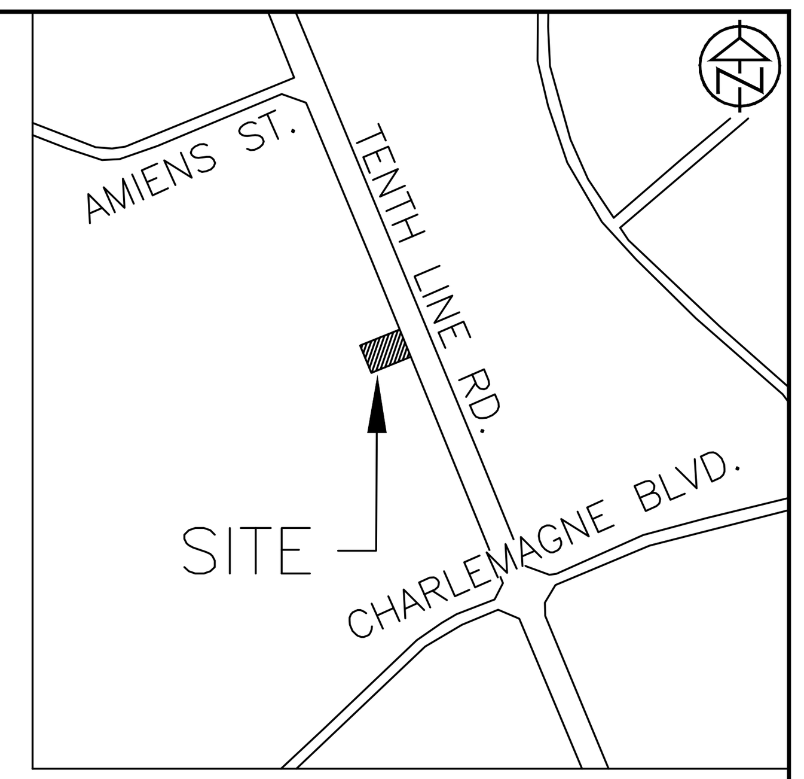

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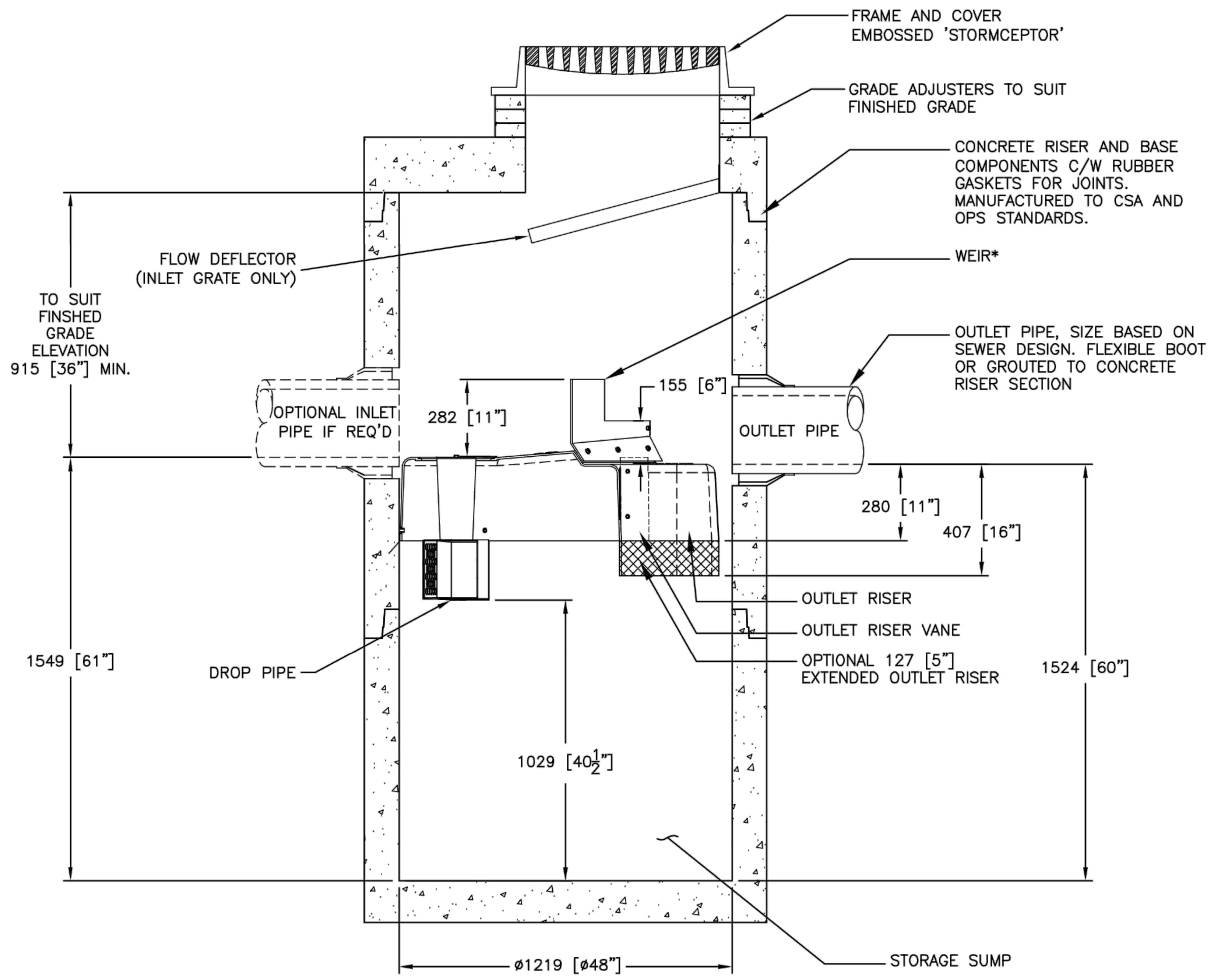
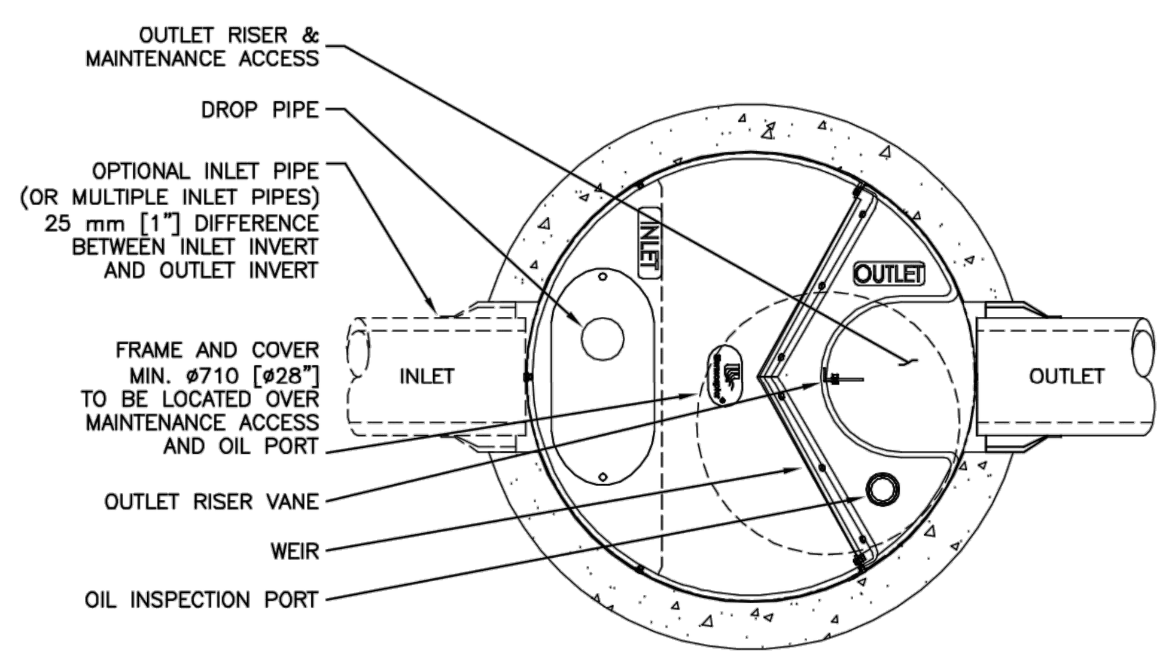
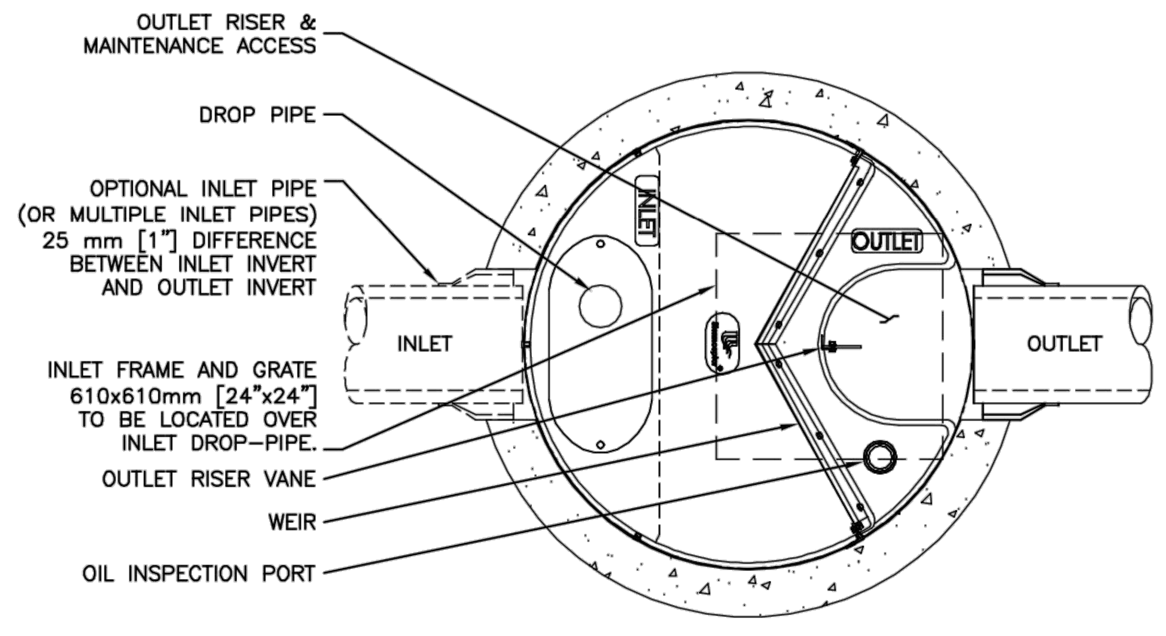


SECTION VIEW



PLAN VIEW (STANDARD)



PLAN VIEW (INLET TOP)

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

GENERAL NOTES:

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

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

INSTALLATION NOTES

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

STANDARD DETAIL
NOT FOR CONSTRUCTION

SITE SPECIFIC DATA REQUIREMENTS

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

* PER ENGINEER OF RECORD

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

Stormceptor® EF

SCALE = NTS

imbrium® 407 FAIRVIEW DRIVE, WHITBY, ON L1N 3A9 TF 800-565-4801 CA 416-960-9900 INTL +1-416-960-9900

DATE: 10/13/2017	
DESIGNED: JSK	DRAWN: JSK
CHECKED: BSF	APPROVED: SP
PROJECT No.: EFO4	SEQUENCE No.: *
SHEET: 1 OF 1	

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ENGINEER STAMP

LICENSED PROFESSIONAL ENGINEER J. R. ASH 100123062 PROVINCE OF ONTARIO

BRIDOR DEVELOPMENTS
1592 TENTH LINE ROAD
CITY OF OTTAWA

DETAILS

TATHAM ENGINEERING

DESIGN: HY/GC	FILE: 522677	DWG:
DRAWN: HY	DATE: NOV 2022	C500
CHECK: GC	SCALE: 1:150	

D07-12-21-0084

Drawing Name: 522677-S001.dwg, Plotted: Jun 14, 2023

18576

Appendix H:
BL Engineering Site Servicing and SWM Report
(June 14, 2022)

SITE SERVICING AND STORMWATER MANAGEMENT REPORT

Project Address – 1592 Tenth Line Road, Orleans On

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

By Blanchard Letendre Engineering Ltd.
Revision Date – June 14, 2022
Our File Reference: 20-261

First Submission
November 19, 2020

TABLE OF CONTENTS

APPENDIX TABLE

1.0 INTRODUCTION

Blanchard Letendre Engineering Ltd. (BLEL) was retained by Bridor Developments. to complete their site servicing and stormwater management for the new proposed site located at 1592 Tenth Line in Orleans. 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 ADSI Arpentage Dutrisac Surveying Inc. 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 at 1592 Tenth Line in Orleans, Ontario. As per the aerial picture in figure 1, the existing site (0.149ha) consist of an existing house with a paved entrance to Tenth Line and some green space area. The existing building will be demolished prior to construction. The land will be developed with a new apartment building with a new underground parking garage.

Figure 1- Existing site at 1592 Tenth Line, Orleans, Ontario

3.0 STORM WATER MANAGEMENT

3.1 Existing Site Condition

The existing site currently has and existing residential home with an access driveway off Tenth Line. The existing property has a split drainage where half the property drains towards Tenth Line and the other portion towards Phoenix Crescent. The property is bounded by residential homes and a commercial development east of Tenth Line. 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 residential apartment building which will combine a total of thirty (27) residential units with a connecting underground parking garage. The site will be modified by adding a total of 566 square meter building, asphalt area and amities. 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 and proposed underground parking garage. The property has a split drainage where a portion drains east towards Tenth Line whereas the west portion drains west towards Phoenix Crescent. The affected area stormwater management will outlet to City storm sewer on Phoenix Crescent and the overland flow route was designed to convey the storm runoff towards the city right away.

The stormwater generated by the new hard surfaces will be directed to a series of catchbasins which will capture and covey the water runoff to the existing city storm sewer on Phoenix Crescent. 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 an orifice plate installed in the downstream storm pipe in CBMH03 and limit the flow outletting to City storm sewer on Phoenix. By throttling the flow, stormwater retention will be completed with the use of underground pipe 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 5-year storm and a 10-minute time of concentration for the affected area. From the 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 0.50 was used as per the city of Ottawa design Guidelines, see Appendix 'A' – Pre-Development Drainage Area table.

Using the Rational Method and considering the tributary areas of the affected area by the proposed (see Appendix 'A'), the pre-development allowable release rate for the site was evaluated at **21.52 L/s**. See also the Storm Sewer Design Sheet in Appendix 'A'.

Allowable Release Rate (Q) =	**2.78CIA (L/s)**
I_5 =	**$998.071 / (Tc + 6.053)^{0.814}$**
C =	0.50
I =	104.2 mm/hr
Tc =	10 min
Total =	0.149 ha
Allowable Release Rate=	**21.52 L/s**

3.4 Proposed Stormwater Quantity Control

The proposed stormwater management for the site will be achieve primarily through the use of underground chambers storage. As most of the site will be covered with the underground parking area that will connect both buildings, a portion of the stormwater will be in the underground parking and the balance will be around the building foundation footprint. The grading of the site has been designed to direct the stormwater towards the series of catchbasins connected to the underground stormwater sewers before outleting west into the 300mm diameter storm city sewer on Phoenix Crescent. The proposed underground stormwater sewers and cathcbasins are shown on the attached drawings in Appendix 'E'.

The proposed site affected area has been graded to outlet overland onto Tenth Line and Phoenix Crescent. As the site has a split drainage and that the front and rear of the property are facing city right of ways, the grades have been adjusted to suit this profile to minimize the grade raise of the site. All catchment areas were designed to directed the stormwater overland to the nearest city right of way and will be captured through a series of catchbasins.

The stormwater generated from site affected area will be discharged to the existing storm sewer on Phoenix Crescent and be controlled using an orifice plate of 64mm diameter which will throttle the flow direct to the municipal sewer. The proposed 250mm diameter pipe will release a total of **15.05 L/s** with a maximum head of 1.70m (HWL = 87.40) during the 100 year event. As the flow will be restricted, 26.62m^3 of stormwater storage will be required for this area. This storage will be provided with underground stormwater chambers. The underground chamber, model MC-3500 chambers designed by ADS Pipe were designed to hold up to 37.10 m^3 with a HWL of 87.40.

The ramp to the underground parking will drain into the underground parking (WS-07) catchbasins and will therefore drain uncontrolled. This uncontrolled area will generate a total flow of **6.45L/s** under the 100 year event conditions. Therefore with the outlet restriction and the provided

stormwater storage, the post-development will meet the pre-development flow to the city main storm sewer on Phoenix Crescent.

3.4.1 Roof Drainage

The proposed roofs are flat roof with roof drains. Drain and scuppers will be installed to drain the water into the storm pipes located in the underground garage.

3.4.1 Underground Parking Garage

The proposed underground parking will be drain using a series of catchbasin that will be connected to the sanitary pipe of the building. The flow that will be generated from the underground parking will consist of the ramps area hard surface and the snow/water accumulation on the cars. This flow will be direct to the sewers using and sump pump.

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 EF04 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 an existing 135mm diameter service that is connected to the existing sanitary main on Tenth Line. The existing connection will be abandoned whereas the new connection will be completed off Phoenix Crescent that will service the new building.

4.2 Existing Site Conditions

The new apartment building, will discharge to the city via a new 150mm diameter sanitary service. The service will be located on the west side of the buildings and will discharge to the existing 250mm diameter city sewer running along Phoenix Crescent. The proposed 150mm diameter service will be installed at a minimum of 1.00% slope directly to the city sewer. A monitoring manhole is proposed for the new connections which will be installed at the property line. Refer to drawing C300 – Site Servicing Plan for the proposed sanitary service.

Based on the City of Ottawa Sanitary Design Guidelines, the sanitary peak loads were evaluated at **1.27 L/s.** As per the City specific design parameters, the sanitary flow was evaluated based on

the residential unit counts, new building footprint and the total site area. 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 19mm diameter home service which services the existing house and is connected to the existing 254mm diameter watermain on Tenth Line. The existing connection will be abandoned and capped at main, whereas the new connection will be completed off Phoenix Crescent which will service the new building. There is currently one (1) city fire hydrant on the west side of Tenth Line and two (2) fire hydrants on the west side of Phoenix that are all 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 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 **350L/p/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:

		UNITS
Average Water Demand =	**9.19**	L/min
Maximum Daily =	**22.96**	L/min
Maximum Hourly =	**50.53**	L/min
Total Domestic Flow =	**0.84**	**L/s**
Total Fire Flow =	**130.00**	**L/s**

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

5.3 Proposed Fire Demand

As the residential apartment buildings will not have a fire suppression sprinkler system, the new service was sized to supply the daily water demand. Based on the Ontario building code

calculations, the water flow was evaluated at **130.00L/s**. Refer to Appendix 'C' for the fire flow calculation sheet.

The proposed buildings will be serviced with a new 50mm water service which will connect to the existing 250mm diameter watermain on Phoenix Crescent. The new services will be installed at the west side of the new buildings and be placed in the same trench as the sanitary service.

5.4 Water Capacity Comments

The boundary conditions and HGL for hydraulic analysis for 1592 Tenth Line were obtained from the city, see attached copy in Appendix 'E'. From the boundary conditions, there is a maximum HGL of 130.2 m for the water main elevation at 87.69 m and a maximum pressure estimate of 60.4 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 of the site will be maintained to its pre-development rate of **21.52 L/s** thought an orifice plate before outletting to the sewer main on Phoenix Crescent. Stormwater quantity control will be achieved with 37.10m^3 underground pipes/structures. The stormwater quality control will be met through the use of a stormwater treatment unit.

7.2 Sanitary Service

The current site will be services with a new 150mm sanitary connection onto Phoenix Crescent. The estimated sanitary flow of **1.27 L/s** will be directed to the existing 250mm sanitary sewer along Phoenix Crescent.

7.3 Water Service

Currently the existing building on site is serviced with an existing 19mm diameter water service that will be replaced with a new 50mm diameter water service to be connected to the existing 252mm diameter main on Phoenix Crescent. The existing connection will be replaced with a new 50mm water service. The water demand for the building was evaluated at **0.94 L/s** and the fire

flow demand **130.00L/s.** Sprinkler system is not proposed for the site. There is also one (3) fire located around the property within 90m from every entrance doors.

8.0 LIMITATION

This report was prepared for **Bridor Developement.**, and is only applicable for the property at 1592 Tenth Line, 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.

Civil Engineer

APPENDIX "A"
Stormwater Management Design

BLANCHARD LETENDRE
ENGINEERING

File No. 20-363
Project: New Residential Development
Project Address: 1592 Tenth Line Road - Orleans
Client: Bridor Development

Date: June 14, 2022
Designed: Guillaume Brunet
Checked: Guillaume Brunet
Drawing Reference: C300

STORM WATER MANAGEMENT DESIGN SHEET

SEWER DESIGN

LOCATION			AREA (ha)			FLOW					STORM SEWER DATA							
WATERSHED / STREET	From MH	To MH	C = 0.20	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-02	LCB08	LCB06	0.000	0.000	0.028	0.07	0.07	10.00	104.19	7.17	250	PVC	0.25%	7.5	29.7	0.61	0.21	**0.24**
WS-06	LCB06	CB05	0.005	0.000	0.006	0.02	0.09	10.00	104.19	9.02	250	PVC	0.25%	18.0	29.7	0.61	0.50	**0.30**
WS-03	CB05	CBMH04	0.015	0.000	0.013	0.04	0.13	10.50	101.65	13.06	250	PVC	0.25%	25.0	29.7	0.61	0.69	**0.44**
WS-05	CBMH04	CBMH03	0.006	0.000	0.010	0.03	0.16	11.18	98.33	15.42	250	PVC	0.25%	11.0	29.7	0.61	0.30	**0.52**
WS-01 and WS-04	CB09	CBMH03	0.013	0.000	0.041	0.11	0.11	10.00	104.19	11.31	250	PVC	0.25%	20.0	29.7	0.61	0.55	**0.38**
	CBMH03	CBMH02	0.000	0.000	0.000	0.00	0.27	11.49	96.95	25.73	250	PVC	0.30%	2.0	32.6	0.66	0.05	**0.79**
	CBMH02	MH01	0.000	0.000	0.000	0.00	0.27	11.49	96.95	25.73	250	PVC	0.30%	8.2	32.6	0.66	0.21	**0.79**
	MH01	CITY	0.000	0.000	0.000	0.00	0.27	11.54	96.72	25.67	250	PVC	0.30%	9.2	32.6	0.66	0.23	**0.79**

DESIGN PARAMETERS NOTES

Runoff Coefficient (C)

Grass	0.2
Gravel	0.80
Asphalt / rooftop	0.90

Q = 2.78 AIC, where
Q = Peak flow in Litres per second (L/s)
A = Area in hectares (ha)
I = Rainfall Intensity (mm/hr)
C = Runoff Coefficient

Ottawa Macdonald-Cartier International Airport IDF curve
$I_5 = 998.071 / (T_c + 6.053)^{0.814}$
Min. velocity = 0.76 m/s
Manning's "n" = 0.013

BLANCHARD LETENDRE
ENGINEERING

File No. 20-363
Project: New Residential Development
Project Address: 1592 Tenth Line Road - Orleans
Client: Bridor Development

Date: June 14, 2022
Designed: Guillaume Brunet
Checked: Guillaume Brunet
Drawing Reference: C300

STORM WATER MANAGEMENT DESIGN SHEET

SEWER DESIGN

LOCATION		MANHOLE INFORMATION							AVAILABLE STORAGE						
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)	Pipe Storage 5 Year (m^3)	Pipe Storage 100 year (m^3)	Upstream CB/MH Size (m)	Water Depth 5 year (m)	Water Depth 100 year (m)	CB/MH Storage 5 year (m^3)	CB/MH Storage 100 year (m^3)
LCB08	LCB05	87.90	87.60	88.50	88.08	0.35	0.23	0.35	-	-	-	-	-	-	-
LCB06	CB05	85.67	85.63	87.90	88.15	1.98	2.27	1.98	-	-	1.20	1.88	1.98	-	-
CB05	CBMH04	85.57	85.51	88.15	88.15	2.33	2.39	2.33	1.23	1.23	1.20	1.98	2.23	2.85	3.21
CBMH04	CBMH03	85.45	85.42	88.15	88.10	2.45	2.43	2.45	0.88	0.88	0.60	2.10	2.35	0.76	0.85
CB09	CBMH03	85.50	85.45	88.25	88.10	2.50	2.40	2.50	-	-	1.20	2.05	2.30	-	-
CBMH03	CBMH02	85.39	85.38	88.10	88.10	2.46	2.47	2.46	-	-	1.20	2.16	2.41	-	-
CBMH02	MH01	85.32	85.30	88.10	88.05	2.53	2.50	2.53	-	-	2.20	2.23	2.48	-	-
MH01	CITY	85.24	85.21	88.05	87.80	2.81	2.34	2.56	-	-	3.20	2.31	2.56	-	-
									0.88	**0.88**				**0.76**	**0.85**

HWL (5 Year)		87.55
HWL (100 Year)		87.80
TOTAL STORAGE - 5 YEAR		1.64
TOTAL STORAGE - 100 YEAR		1.73

BLANCHARD LETENDRE
ENGINEERING

File No.	20-363	**Date:**	June 14, 2022
Project:	New Residential Development	**Designed:**	Guillaume Brunet
Project Address:	1592 Tenth Line Road - Orleans	**Checked:**	Guillaume Brunet
Client:	Bridor Development	**Drawing Reference:**	C300

PRE-DEVELOPMENT DRAINAGE AREA

Catchment Area	Runoff Coefficient			Total Area (ha)	Combined C
	C = 0.30	C = 0.80	C = 0.90		
E-01	0.092	0.000	0.056	0.149	0.53
TOTAL	0.092	0.000	0.056	0.149	0.53

POST-DEVELOPMENT DRAINAGE AREA

Catchment Area	Runoff Coefficient			Total Area (ha)	Combined C
	C = 0.20	C = 0.80	C = 0.90		
WS-01 - ROOF	0.000	0.000	0.034	0.034	0.90
WS-02 - ROOF	0.000	0.000	0.028	0.028	0.90
WS-03	0.015	0.000	0.013	0.028	0.53
WS-04	0.013	0.000	0.007	0.020	0.45
WS-05	0.006	0.000	0.010	0.016	0.64
WS-06	0.005	0.000	0.006	0.011	0.58
WS-07	0.001	0.000	0.012	0.013	0.85
TOTAL	0.040	0.000	0.109	0.149	0.71

RUNOFF COEFFICIENT (C)

Grass	0.20
Gravel	0.80
Asphalt / rooftop	0.90

BLANCHARD LETENDRE
ENGINEERING

File No.	20-363	**Date:**	June 14, 2022
Project:	New Residential Development	**Designed:**	Guillaume Brunet
Project Address:	1592 Tenth Line Road - Orleans	**Checked:**	Guillaume Brunet
Client:	Bridor Development	**Drawing Reference:**	C300

STORM WATER MANAGEMENT DESIGN SHEET
5 YEAR STORM EVENT

PRE-DEVELOPMENT STORMATER MANAGEMENT

Runoff	Catchment Area	Area			$\sum R_5$
Un-Controlled	EWS-01	0.149	ha	R=	0.53
	Total Uncontrolled =	**0.149**	ha	**$\sum$R=**	**0.53**

PRE-DEVELOPMENT ALLOWABLE RELEASE RATE

Q = 2.78CIA (L/s)

$$I_5 = 998.071 / (Tc + 6.053)^{0.814}$$

C =	0.50	up to a maximum of 0.5 as per City of Ottawa Sewer Design Guidelines
I =	104.2	mm/hr
Tc =	10	min
Total =	0.149	ha
Allowable Release Rate=	**21.52**	**L/s**

POST-DEVELOPMENT STORMATER MANAGEMENT

Runoff	Catchment Area	Area			$\sum R_5$	$\sum R_{100}$
Controlled	WS-01	0.034	ha	R=	0.90	1.00
	WS-02	0.028	ha	R=	0.90	1.00
	WS-03	0.028	ha	R=	0.53	0.66
	WS-04	0.020	ha	R=	0.45	0.56
	WS-05	0.016	ha	R=	0.64	0.80
	WS-06	0.011	ha	R=	0.58	0.73
	Total Contolled =	**0.136**	**ha**	**$\sum$R=**	**0.70**	**0.82**
	WS-07	0.013	ha	R=	0.85	1.00
	Total Un-Controlled =	**0.013**	**ha**	**$\sum$R=**	**0.85**	**1.00**

$$I_5 = 998.071 / (Td + 6.053)^{0.814}$$

		REQUIRED STORAGE				
Time (min)	**Intensity (mm/hr)**	**Controlled Runoff (L/s)**	**Storage Volume (m3)**	**Controlled Release Rate (L/s)**	**Uncontrolled Runoff (L/s)**	**Total Release Rate (L/s)**
10	104.2	27.65	7.55	15.07	3.19	18.25
15	83.6	22.17	6.40	15.07	2.56	17.62
20	70.3	18.64	4.29	15.07	2.15	17.22
25	60.9	16.16	1.64	15.07	1.86	16.93
30	53.9	14.31	0.00	15.07	1.65	16.72
35	48.5	12.88	0.00	15.07	1.48	16.55
40	44.2	11.73	0.00	15.07	1.35	16.42
50	37.7	9.99	0.00	15.07	1.15	16.22
60	32.9	8.74	0.00	15.07	1.01	16.08
80	26.6	7.05	0.00	15.07	0.81	15.88
90	24.3	6.45	0.00	15.07	0.74	15.81

STORMATER STORAGE REQUIREMENTS

Total Storage Required =	**7.55 m^3**	
Pipe Storage =	0.00 m^3	refer to Storm Sewer Design Sheet
CB/MH Storage =	0.00 m^3	refer to Storm Sewer Design Sheet
Underground Chambers	37.10 m^3	
Total Available Storage =	**37.10 m^3**	

BLANCHARD LETENDRE
ENGINEERING

File No.	20-363	**Date:**	June 14, 2022
Project:	New Residential Development	**Designed:**	Guillaume Brunet
Project Address:	1592 Tenth Line Road - Orleans	**Checked:**	Guillaume Brunet
Client:	Bridor Development	**Drawing Reference:**	C300

STORM WATER MANAGEMENT DESIGN SHEET
100 YEAR STORM EVENT

PRE-DEVELOPMENT STORMATER MANAGEMENT

Runoff	Catchment Area	Area			$\sum R_5$
Un-Controlled	EWS-01	0.149	ha	R=	0.53
	Total Uncontrolled =	**0.149**	ha	**∑R=**	**0.53**

PRE-DEVELOPMENT ALLOWABLE RELEASE RATE

Q = 2.78CIA (L/s)

$I_5 = 998.071 / (Tc + 6.053)^{0.814}$

C =	0.50	up to a maximum of 0.5 as per City of Ottawa Sewer Design Guidelines
I =	104.2	mm/hr
Tc =	10	min
Total =	0.149	ha
Allowable Release Rate=	**21.52**	L/s

POST-DEVELOPMENT STORMATER MANAGEMENT

Runoff	Catchment Area	Area			$\sum R_5$	$\sum R_{100}$
Controlled	WS-01	0.034	ha	R=	0.90	1.00
	WS-02	0.028	ha	R=	0.90	1.00
	WS-03	0.028	ha	R=	0.53	0.66
	WS-04	0.020	ha	R=	0.45	0.56
	WS-05	0.016	ha	R=	0.64	0.80
	WS-06	0.011	ha	R=	0.58	0.73
	Total Contolled =	**0.136**	**ha**	**∑R=**	**0.70**	**0.82**
UN-Controlled	WS-07	0.013	ha	R=	0.85	1.00
	Total Un-Controlled =	**0.013**	**ha**	**∑R=**	**0.85**	**1.00**

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

		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	178.6	55.45	24.23	15.07	6.45	21.52
15	142.9	44.37	26.37	15.07	5.16	20.23
20	120.0	37.25	26.62	15.07	4.34	19.40
25	103.8	32.25	25.77	15.07	3.75	18.82
30	91.9	28.53	24.23	15.07	3.32	18.39
35	82.6	25.64	22.21	15.07	2.98	18.05
40	75.1	23.33	19.84	15.07	2.72	17.78
50	64.0	19.86	14.37	15.07	2.31	17.38
60	55.9	17.36	8.24	15.07	2.02	17.09
70	49.8	15.46	1.65	15.07	1.80	16.87
90	41.1	12.77	0.00	15.07	1.49	16.55
100	37.9	11.77	0.00	15.07	1.37	16.44
110	35.2	10.93	0.00	15.07	1.27	16.34
120	32.9	10.21	0.00	15.07	1.19	16.26

STORMATER STORAGE REQUIREMENTS

Total Storage Required =	**26.62**	**m^3**	
Pipe Storage =	0.88	m^3	refer to Storm Sewer Design Sheet
CB/MH Storage =	0.85	m^3	refer to Storm Sewer Design Sheet
Underground Chambers	37.10	m^3	
Total Available Storage =	**38.83**	**m^3**	

Inlet Control Device Parameters

	Product	**Orifice Plate**	at MHCB 02
Invert Level =	85.70	masl.	
HWL =	1.70	m	from inv.
HWL =	87.40	masl.	
Orifice Dia. =	**64**	mm	
Orifice Invert =	85.70	masl.	
Orifice Area =	0.0032	m2	
ICD Centerline =	85.85	masl.	
HWL Head =	1.70	m	from centerline
C =	0.82		
Controlled Release =	15.07	L/s	

APPENDIX “B”
Sanitary Design

BLANCHARD LETENDRE
ENGINEERING

File No. 20-363
Project: New Residential Development
Project Address: 1592 Tenth Line Road - Orleans
Client: Bridor Development

Date: June 14, 2022
Designed: Guillaume Brunet
Checked: Guillaume Brunet
Drawing Reference: C300

SANITARY DESIGN SHEET
SEWER DESIGN

LOCATION			RESIDENTIAL AREA AND POPULATION						COMMERCIAL		INDUSTRIAL			INSTITUTIONAL			INFILTRATION			TOTAL FLOW (l/s)	PIPE						MANHOLE	
STREET	FROM MH	TO MH	AREA (Ha)	POP.	CUMMULATIVE AREA (Ha)	CUMMULATIVE POP.	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)
SITE	PROP. BLDG	PROPERTY LINE	0.149	37.8	0.15	37.8	4.0	0.61	0.000	0.000	0.00	0.00	7.0	0.0	0.0	0.61	0.149	0.149	0.04	1.27	3.4	150	PVC	1.00%	15.23	0.86	85.85	85.82
	PROPERTY LINE	CITY	0.000	37.8	0.00	0.0	0.0	0.00	0.000	0.000	0.00	0.00	7.0	0.0	0.0	0.00	0.000	0.149	0.04	1.27	10.8	150	PVC	1.00%	15.23	0.86	85.82	85.71

DESIGN PARAMETERS NOTES

Average Daily Flow =	350	L/p/day	Industrial Peak Factor =	7	as per Appendix 4-B
Commercial and Institutional Flow =	50000	L/ha/da	Extraneous Flow =	0.28	L/s/ha
Industrial Flow =	35000.00	L/ha/da	Minimum Velocity =	0.76	m/s
Maximum Resedential Peak Flow =	4		Mannings n =	0.013	
Commection and Intitutional Peak Factor =	1.5				

Appartments:	Person Per Unit	Appartment	Total
Bachelor =	1.4	0	0
1 Bedroom =	1.4	27	37.8
2 Bedroom =	2.1	0	0
3 Bedroom =	3.1	0	0

APPENDIX "C"
Watermain Design

BLANCHARD LETENDRE
ENGINEERING

File No.	20-363	**Date:**	June 14, 2022
Project:	New Residential Development	**Designed:**	Guillaume Brunet
Project Address:	1592 Tenth Line Road - Orleans	**Checked:**	Guillaume Brunet
Client:	Bridor Development	**Drawing Reference:**	

WATER CONSUMPTION CALCULATION

Total Building Floor Area =	**566**	m^2	
Site Total Area =	**0.214**	ha	
Total Population =	37.8	ea.	
Average Demand Per People =	350	L/c/d	
Average Water Demand =	**13230.00**	L/d	0.15
Maximum Daily Peak Factor =	2.5	* As per City of Ottawa	
Maximum Daily =	**33075.00**	L/d	0.38
Maximum Hourly Peak Factor =	2.2	* As per City of Ottawa	
Maximum Hourly =	**72765.00**	L/d	0.84
Total Domestic Flow =	**0.84**	**L/s**	
Total Fire Flow =	**130.00**	**L/s**	

	Unit Counts	WSFU	Total
Unrinal Flush Tank	27	2	54
Sinks	54	1	54
Bathub	27	4	108
Diswasher	27	1.5	40.5
Washing Machine	27	2	54
Total			310.5

Appartments:	Person Per Unit	Appartment	Total
Bachelor =	1.4	0	0
1 Bedroom =	1.4	27	37.8
2 Bedroom =	2.1	0	0
3 Bedroom =	3.1	0	0
Total			37.8

BLANCHARD LETENDRE
ENGINEERING

File No.	20-363	**Date:**	June 14, 2022
Project:	New Residential Development	**Designed:**	Guillaume Brunet
Project Address:	1592 Tenth Line Road - Orleans	**Checked:**	Guillaume Brunet
Client:	Bridor Development	**Drawing Reference:**	

FIRE FLOW FOR BOTH BUILDING COMBINED

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	10	unit	
	Townhouse - no. of units	0				
	Building - no. of units per floor	10				
	Number of floors excluding the basement	3		3	floor	
	Floor space per unit	varies	566	566	sq.m.	
Required fire flow	**Fire Flow = 220 x C x Area^0.5**				L/min	**7,252**
					L/s	121
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	**6,165**
	Rapid burning	0.25			L/s	103
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	**5,548**
	Fully supervised system	-0.10	True	-0.1	L/s	92
Exposure distance between units	North side	20.1 to 30m	0.1			
	East side	Over 45m	0			
	South side	3.1 to 10m	0.2		L/min	**7,767**
	West side	20.1 to 30m	0.1	0.4	L/s	129
				Minimum required fire flow rate (rounded to nearest 100)	L/min	**7,800**
				Minimum required fire flow rate	L/s	**130.00**
				Required duration of fire flow	min	**30**

BLANCHARD LETENDRE
ENGINEERING

File No.	20-363	**Date:**	June 14- 2022
Project:	New Residential Development	**Designed:**	Guillaume Brunet
Project Address:	1592 Tenth Line Road - Orleans	**Checked:**	Guillaume Brunet
Client:	Bridor Development	**Drawing Reference:**	

FIRE FLOW BUILDING A ISOLATED. Note 2hrs fire seperation wall between underground shared parking

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	10	unit	
	Townhouse - no. of units	0				
	Building - no. of units per floor	10				
	Number of floors excluding the basement	3		3	floor	
	Floor space per unit	varies	275	275	sq.m.	
Required fire flow	**Fire Flow = 220 x C x Area$^{0.5}$**				L/min	**5,055**
					L/s	84
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	**4,297**
	Rapid burning	0.25			L/s	72
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	**3,867**
	Fully supervised system	-0.10	True	-0.1	L/s	64
Exposure distance between units	North side	20.1 to 30m	0.1			
	East side	Over 45m	0			
	South side	3.1 to 10m	0.2		L/min	**5,414**
	West side	20.1 to 30m	0.1	0.4	L/s	90
				Minimum required fire flow rate (rounded to nearest 100)	L/min	**5,400**
				Minimum required fire flow rate	L/s	**90.00**
				Required duration of fire flow	min	**30**

BLANCHARD LETENDRE
ENGINEERING

File No.	20-363	**Date:**	June 14, 2022
Project:	New Residential Development	**Designed:**	Guillaume Brunet
Project Address:	1592 Tenth Line Road - Orleans	**Checked:**	Guillaume Brunet
Client:	Bridor Development	**Drawing Reference:**	

FIRE FLOW BUILDING B ISOLATED. Note 2hrs fire seperation wall between underground shared parking

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	10	unit	
	Townhouse - no. of units	0				
	Building - no. of units per floor	10				
	Number of floors excluding the basement	3		3	floor	
	Floor space per unit	varies	291	291	sq.m.	
Required fire flow	**Fire Flow = 220 x C x Area^0.5**				L/min	**5,200**
					L/s	87
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	**4,420**
	Rapid burning	0.25			L/s	74
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	**3,978**
	Fully supervised system	-0.10	True	-0.1	L/s	66
Exposure distance between units	North side	20.1 to 30m	0.1			
	East side	Over 45m	0			
	South side	3.1 to 10m	0.2		L/min	**5,569**
	West side	20.1 to 30m	0.1	0.4	L/s	93
				Minimum required fire flow rate (rounded to nearest 100)	L/min	**5,600**
				Minimum required fire flow rate	L/s	**93.33**
				Required duration of fire flow	min	**30**

APPENDIX "D"
Underground Chambers & Stormwater Treatment Unit

Project: **1592 Tenth Line Road**

Chamber Model -	MC-3500		
Units -	**Metric**	Click Here for Imperial	
Number of Chambers -	7		
Number of End Caps -	2		
Voids in the stone (porosity) -	40	%	
Base of Stone Elevation -	85.72	m	☑ Include Perimeter Stone in Calculations
Amount of Stone Above Chambers -	305	mm	
Amount of Stone Below Chambers -	229	mm	
Amount of Stone Between Chambers -	152	mm	
	43.7	sq.meters	Min. Area - 35.246 sq.meters

Height of System *(mm)*	Incremental Single Chamber *(cubic meters)*	Incremental Single End Cap *(cubic meters)*	Incremental Chambers *(cubic meters)*	Incremental End Cap *(cubic meters)*	Incremental Stone *(cubic meters)*	Incremental Chamber, End *(cubic meters)*	Cumulative System *(cubic meters)*	Elevation *(meters)*
1676	0.00	0.00	0.00	0.00	0.444	0.44	42.87	87.40
1651	0.00	0.00	0.00	0.00	0.444	0.44	42.43	87.37
1626	0.00	0.00	0.00	0.00	0.444	0.44	41.99	87.34
1600	0.00	0.00	0.00	0.00	0.444	0.44	41.54	87.32
1575	0.00	0.00	0.00	0.00	0.444	0.44	41.10	87.29
1549	0.00	0.00	0.00	0.00	0.444	0.44	40.65	87.27
1524	0.00	0.00	0.00	0.00	0.444	0.44	40.21	87.24
1499	0.00	0.00	0.00	0.00	0.444	0.44	39.77	87.22
1473	0.00	0.00	0.00	0.00	0.444	0.44	39.32	87.19
1448	0.00	0.00	0.00	0.00	0.444	0.44	38.88	87.17
1422	0.00	0.00	0.00	0.00	0.444	0.44	38.44	87.14
1397	0.00	0.00	0.00	0.00	0.444	0.44	37.99	87.12
1372	0.00	0.00	0.01	0.00	0.439	0.45	37.55	87.09
1346	0.01	0.00	0.04	0.00	0.428	0.47	37.10	87.07
1321	0.01	0.00	0.06	0.00	0.420	0.48	36.63	87.04
1295	0.01	0.00	0.08	0.00	0.411	0.49	36.15	87.01
1270	0.02	0.00	0.14	0.00	0.388	0.53	35.66	86.99
1245	0.03	0.00	0.20	0.00	0.360	0.57	35.13	86.96
1219	0.04	0.00	0.25	0.01	0.342	0.60	34.56	86.94
1194	0.04	0.00	0.28	0.01	0.328	0.62	33.96	86.91
1168	0.04	0.00	0.31	0.01	0.316	0.64	33.35	86.89
1143	0.05	0.00	0.34	0.01	0.305	0.65	32.71	86.86
1118	0.05	0.01	0.36	0.01	0.295	0.67	32.06	86.84
1092	0.05	0.01	0.38	0.01	0.286	0.68	31.39	86.81
1067	0.06	0.01	0.40	0.01	0.277	0.69	30.71	86.79
1041	0.06	0.01	0.42	0.01	0.269	0.71	30.02	86.76
1016	0.06	0.01	0.44	0.01	0.262	0.72	29.31	86.74
991	0.07	0.01	0.46	0.02	0.255	0.73	28.59	86.71
965	0.07	0.01	0.47	0.02	0.248	0.74	27.87	86.68
940	0.07	0.01	0.49	0.02	0.242	0.75	27.13	86.66
914	0.07	0.01	0.50	0.02	0.236	0.75	26.38	86.63
889	0.07	0.01	0.51	0.02	0.231	0.76	25.63	86.61
864	0.08	0.01	0.53	0.02	0.226	0.77	24.86	86.58
838	0.08	0.01	0.54	0.02	0.221	0.78	24.09	86.56
813	0.08	0.01	0.55	0.02	0.216	0.79	23.32	86.53
787	0.08	0.01	0.56	0.02	0.211	0.79	22.53	86.51
762	0.08	0.01	0.57	0.02	0.207	0.80	21.74	86.48
737	0.08	0.01	0.58	0.02	0.203	0.80	20.94	86.46
711	0.08	0.01	0.59	0.02	0.199	0.81	20.13	86.43
686	0.09	0.01	0.60	0.02	0.195	0.82	19.32	86.40
660	0.09	0.01	0.61	0.02	0.192	0.82	18.51	86.38
635	0.09	0.01	0.61	0.02	0.188	0.83	17.68	86.35
610	0.09	0.01	0.62	0.03	0.185	0.83	16.86	86.33
584	0.09	0.01	0.63	0.03	0.182	0.84	16.03	86.30
559	0.09	0.01	0.63	0.03	0.179	0.84	15.19	86.28
533	0.09	0.01	0.64	0.03	0.177	0.84	14.35	86.25
508	0.09	0.01	0.65	0.03	0.174	0.85	13.51	86.23
483	0.09	0.01	0.65	0.03	0.172	0.85	12.66	86.20
457	0.09	0.01	0.66	0.03	0.169	0.86	11.81	86.18
432	0.09	0.01	0.66	0.03	0.167	0.86	10.95	86.15
406	0.10	0.01	0.67	0.03	0.165	0.86	10.09	86.13
381	0.10	0.01	0.67	0.03	0.163	0.87	9.23	86.10
356	0.10	0.02	0.68	0.03	0.161	0.87	8.36	86.07
330	0.10	0.02	0.68	0.03	0.159	0.87	7.50	86.05
305	0.10	0.02	0.69	0.03	0.157	0.87	6.62	86.02
279	0.10	0.02	0.69	0.03	0.155	0.88	5.75	86.00
254	0.10	0.02	0.69	0.03	0.152	0.88	4.87	85.97
229	0.00	0.00	0.00	0.00	0.444	0.44	3.99	85.95
203	0.00	0.00	0.00	0.00	0.444	0.44	3.55	85.92
178	0.00	0.00	0.00	0.00	0.444	0.44	3.11	85.90
152	0.00	0.00	0.00	0.00	0.444	0.44	2.66	85.87
127	0.00	0.00	0.00	0.00	0.444	0.44	2.22	85.85
102	0.00	0.00	0.00	0.00	0.444	0.44	1.78	85.82
76	0.00	0.00	0.00	0.00	0.444	0.44	1.33	85.80
51	0.00	0.00	0.00	0.00	0.444	0.44	0.89	85.77
25	0.00	0.00	0.00	0.00	0.444	0.44	0.44	85.74

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER:	HAIDER NASRULLAH 647-850-9417 HAIDER.NASRULLAH@ADS-PIPE.COM
ADS SALES REP:	MICHAEL REID 613-882-4186 MICHAEL.REID@ADS-PIPE.COM
PROJECT NO:	S209349
ADS SITE COORDINATOR:	MATTHEW BEGHIN 519-710-3687 MATTHEW.BEGHIN@ADS-PIPE.COM

ADVANCED DRAINAGE SYSTEMS, INC.

SiteASSIST™ by Stormtech
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1592 TENTH LINE ROAD

ORLEANS, ON.

MC-3500 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH MC-3500.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBERS SHALL BE CERTIFIED TO CSA B184, "POLYMERIC SUB-SURFACE STORMWATER MANAGEMENT STRUCTURES", AND MEET THE REQUIREMENTS OF ASTM F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 45x76 DESIGNATION SS.
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 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.
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". 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.
7. 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 75 mm (3").
   - 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 500 LBS/IN/IN. 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.
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:
   - 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.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF MC-3500 CHAMBER SYSTEM

1. STORMTECH MC-3500 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH MC-3500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. 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.
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. INLET AND OUTLET MANIFOLDS MUST BE INSERTED A MINIMUM OF 300 mm (12") INTO CHAMBER END CAPS.
8. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE WELL GRADED BETWEEN ¾" AND 2" (20-50 mm)..
9. STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
10. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
11. 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 MC-3500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
2. THE USE OF EQUIPMENT OVER MC-3500 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADER, DUMP TRUCK, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH MC-3500/MC-4500 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 CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY USING 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

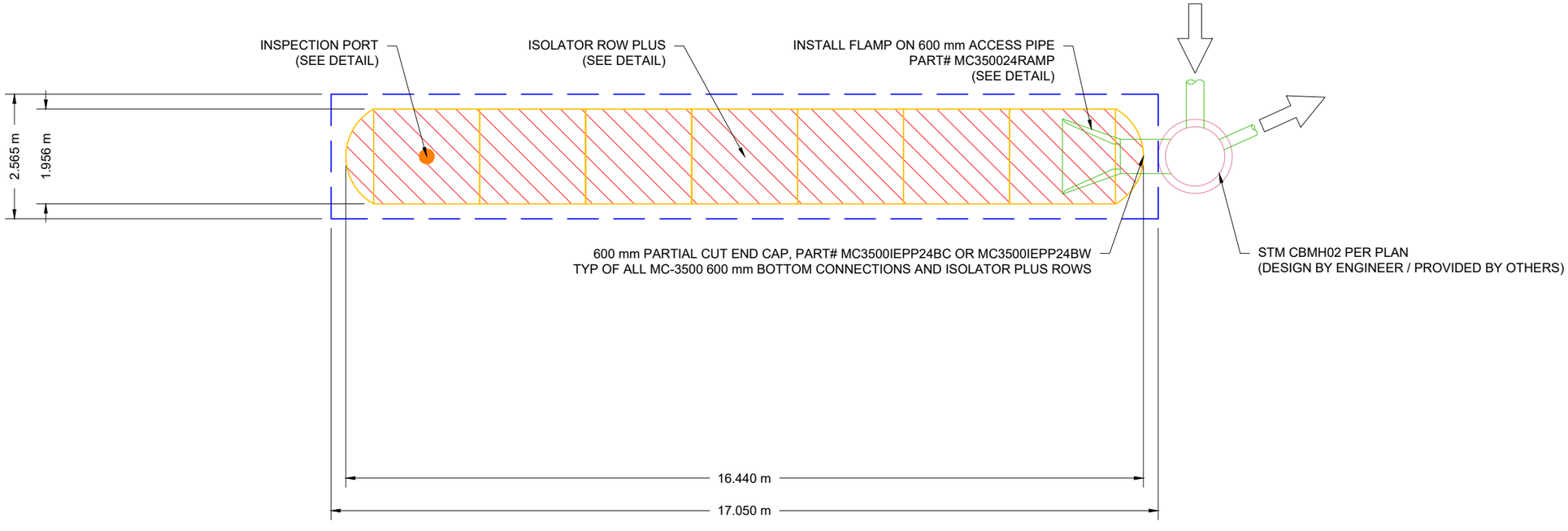
7	STORMTECH MC-3500 CHAMBERS
2	STORMTECH MC-3500 END CAPS
305	STONE ABOVE (mm)
229	STONE BELOW (mm)
40	% STONE VOID
37.1	**INSTALLED SYSTEM VOLUME (m^3) ABOVE ELEVATION 86.00 (PERIMETER STONE INCLUDED)**
43.7	SYSTEM AREA (m^2)
39.2	SYSTEM PERIMETER (m)

PROPOSED ELEVATIONS

89.529	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):
87.701	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):
87.548	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):
87.548	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):
87.548	MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT):
87.396	TOP OF STONE:
87.091	TOP OF MC-3500 CHAMBER:
86.000	600 mm ISOLATOR ROW PLUS INVERT:
85.948	BOTTOM OF MC-3500 CHAMBER:
85.719	BOTTOM OF STONE:

NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECHNICAL 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.



1592 TENTH LINE ROAD
ORLEANS, ON.

DATE: 11/04/20 | DRAWN: RCT | CHECKED: NPB | PROJECT #: S209349

DATE	DRWN	CHKD	DESCRIPTION

StormTech
Detention • Retention • Water Quality
520 CROMWELL AVENUE | ROCKY HILL | CT | 06067
860-529-8188 | 888-892-2694 | WWW.STORMTECH.COM

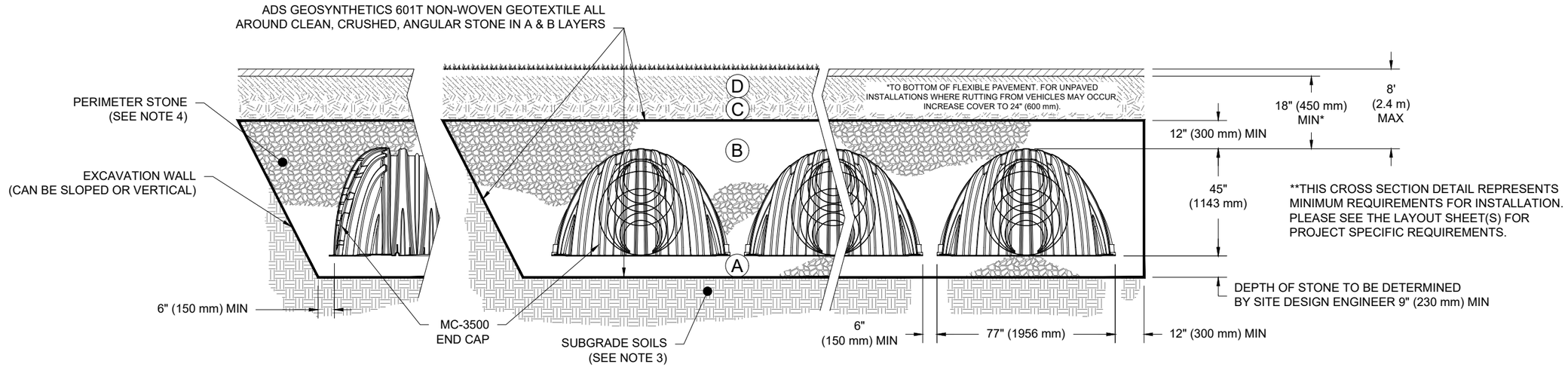
ADS
ADVANCED DRAINAGE SYSTEMS, INC.
4640 TRUEMAN BLVD
HILLIARD, OH 43026

SCALE = 1 : 100

ACCEPTABLE FILL MATERIALS: STORMTECH MC-3500 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 24" (600 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 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
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, 4	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, 4	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 9" (230 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 F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 45x76 DESIGNATION SS.
2. MC-3500 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 3".
   - 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 500 LBS/IN/IN. 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.

1592 TENTH LINE ROAD
ORLEANS, ON.

DATE: 11/04/20 | DRAWN: RCT | CHECKED: NPB | PROJECT #: S209349

DATE	DESCRIPTION	DRWN	CHKD

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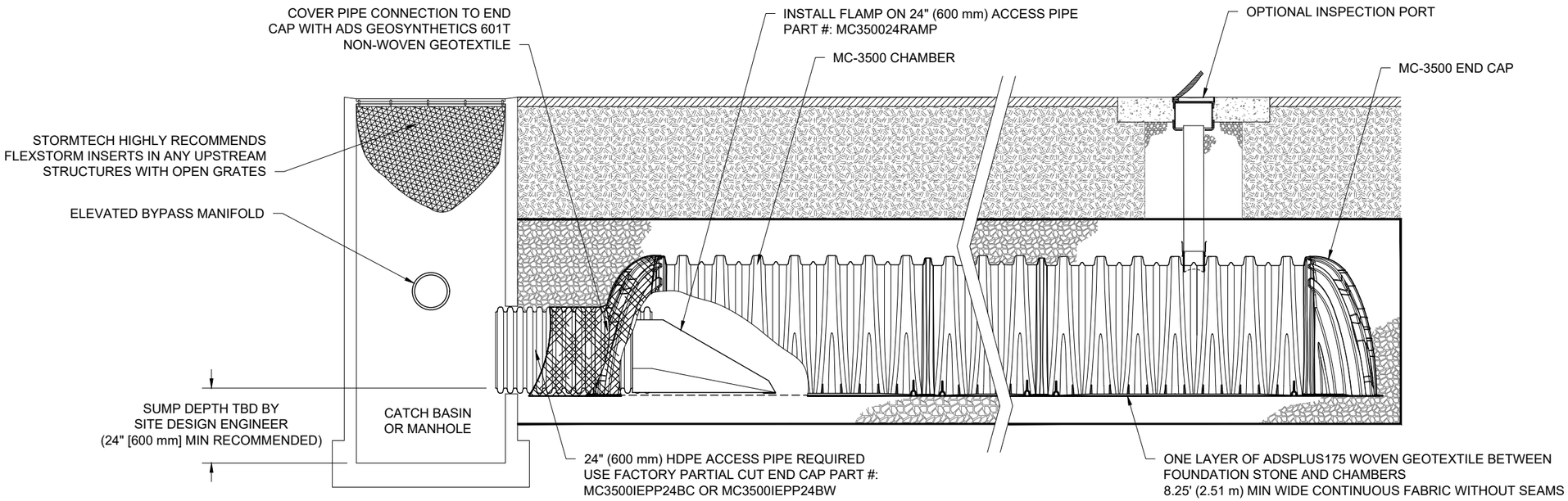
HILLIARD, OH 43026



MC-3500 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

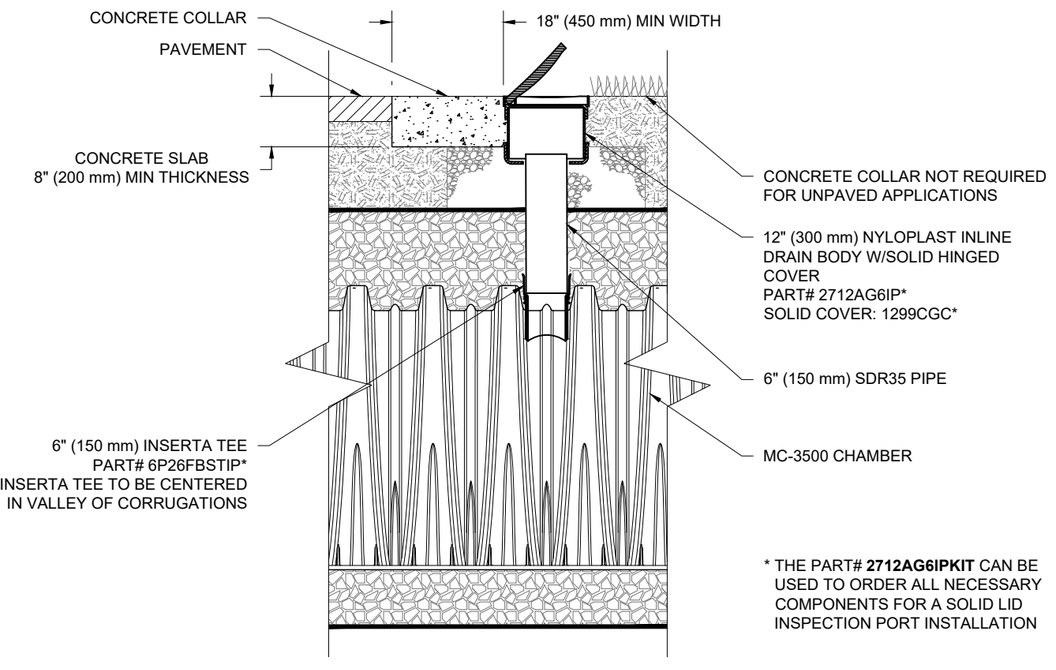
STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. 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.

2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.



MC-3500 6" (150 mm) INSPECTION PORT DETAIL
NTS

1592 TENTH LINE ROAD
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PROJECT #: S209349

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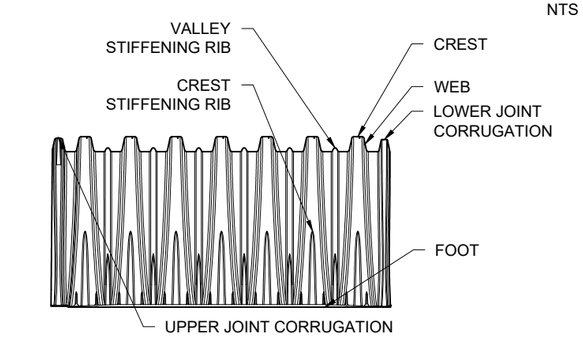
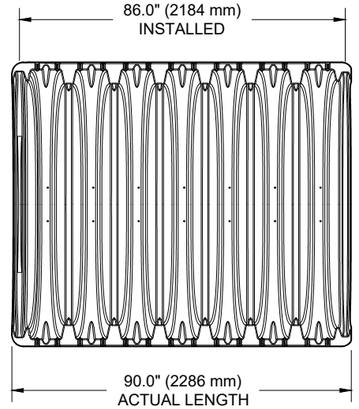
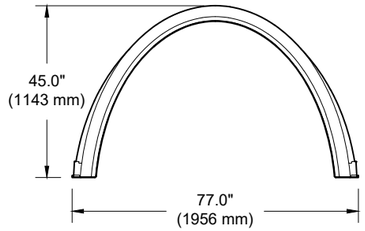
HILLIARD, OH 43026

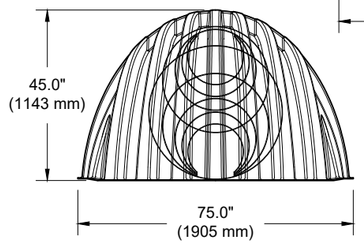
MC-3500 TECHNICAL SPECIFICATION

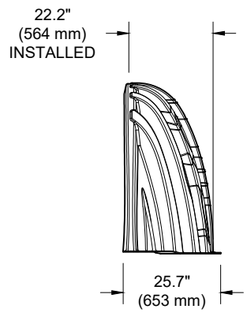
NTS











NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	77.0" X 45.0" X 86.0"	(1956 mm X 1143 mm X 2184 mm)
CHAMBER STORAGE	109.9 CUBIC FEET	(3.11 m³)
MINIMUM INSTALLED STORAGE*	175.0 CUBIC FEET	(4.96 m³)
WEIGHT	134 lbs.	(60.8 kg)

NOMINAL END CAP SPECIFICATIONS

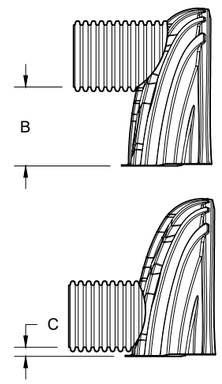
SIZE (W X H X INSTALLED LENGTH)	75.0" X 45.0" X 22.2"	(1905 mm X 1143 mm X 564 mm)
END CAP STORAGE	14.9 CUBIC FEET	(0.42 m³)
MINIMUM INSTALLED STORAGE*	45.1 CUBIC FEET	(1.28 m³)
WEIGHT	49 lbs.	(22.2 kg)

*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION, 6" (152 mm) STONE BETWEEN CHAMBERS, 6" (152 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY.

PARTIAL CUT HOLES AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PARTIAL CUT HOLES AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
END CAPS WITH A PREFABRICATED WELDED STUB END WITH "W"
END CAPS WITH A WELDED CROWN PLATE END WITH "C"

PART #	STUB	B	C
MC3500IEPP06T	6" (150 mm)	33.21" (844 mm)	---
MC3500IEPP06B		---	0.66" (17 mm)
MC3500IEPP08T	8" (200 mm)	31.16" (791 mm)	---
MC3500IEPP08B		---	0.81" (21 mm)
MC3500IEPP10T	10" (250 mm)	29.04" (738 mm)	---
MC3500IEPP10B		---	0.93" (24 mm)
MC3500IEPP12T	12" (300 mm)	26.36" (670 mm)	---
MC3500IEPP12B		---	1.35" (34 mm)
MC3500IEPP15T	15" (375 mm)	23.39" (594 mm)	---
MC3500IEPP15B		---	1.50" (38 mm)
MC3500IEPP18TC	18" (450 mm)	20.03" (509 mm)	---
MC3500IEPP18TW			
MC3500IEPP18BC		---	1.77" (45 mm)
MC3500IEPP18BW			
MC3500IEPP24TC	24" (600 mm)	14.48" (368 mm)	---
MC3500IEPP24TW			
MC3500IEPP24BC		---	2.06" (52 mm)
MC3500IEPP24BW			
MC3500IEPP30BC	30" (750 mm)	---	2.75" (70 mm)

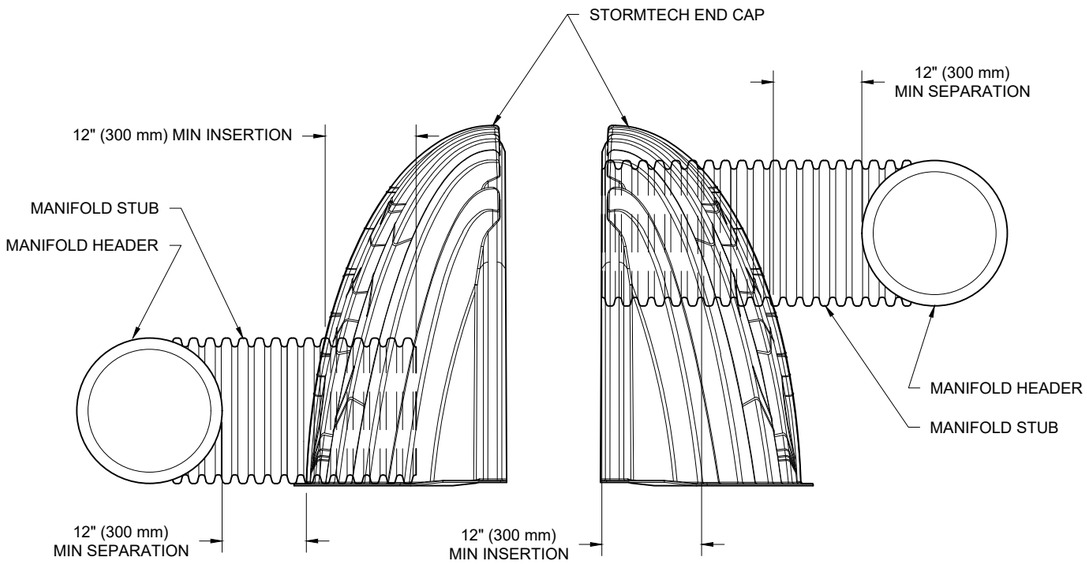
NOTE: ALL DIMENSIONS ARE NOMINAL



CUSTOM PARTIAL CUT INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS. CUSTOM INVERT LOCATIONS ON THE MC-3500 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm). THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHEST POSSIBLE FOR THE PIPE SIZE.

MC-SERIES END CAP INSERTION DETAIL

NTS



NOTE: MANIFOLD STUB MUST BE LAID HORIZONTAL FOR A PROPER FIT IN END CAP OPENING.

1592 TENTH LINE ROAD
ORLEANS, ON.

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HILLIARD, OH 43026

PROP. STM CBMH01
TREATMENT UNITS STORMCEPTOR EF-04 OR
EQUIVALENT, SEE C500
T/G = 88.08
N INV.=85.50
S INV. = 85.80

PROP. STM 4.5m - 200mm Ø PVC
DR-35 @0.38%

FOUNDATION INVERT
INV. = 85.90

PROP. STM 3.8m - 300mm Ø PVC
DR-35 @0.38%

PROP. STM CBMH02
T/G = 88.08
N INV.= 85.82
S INV. = 86.00
W INV. = 86.00

CONNECTION FROM
UNDERGROUND PARKING TO
STORM SEWER

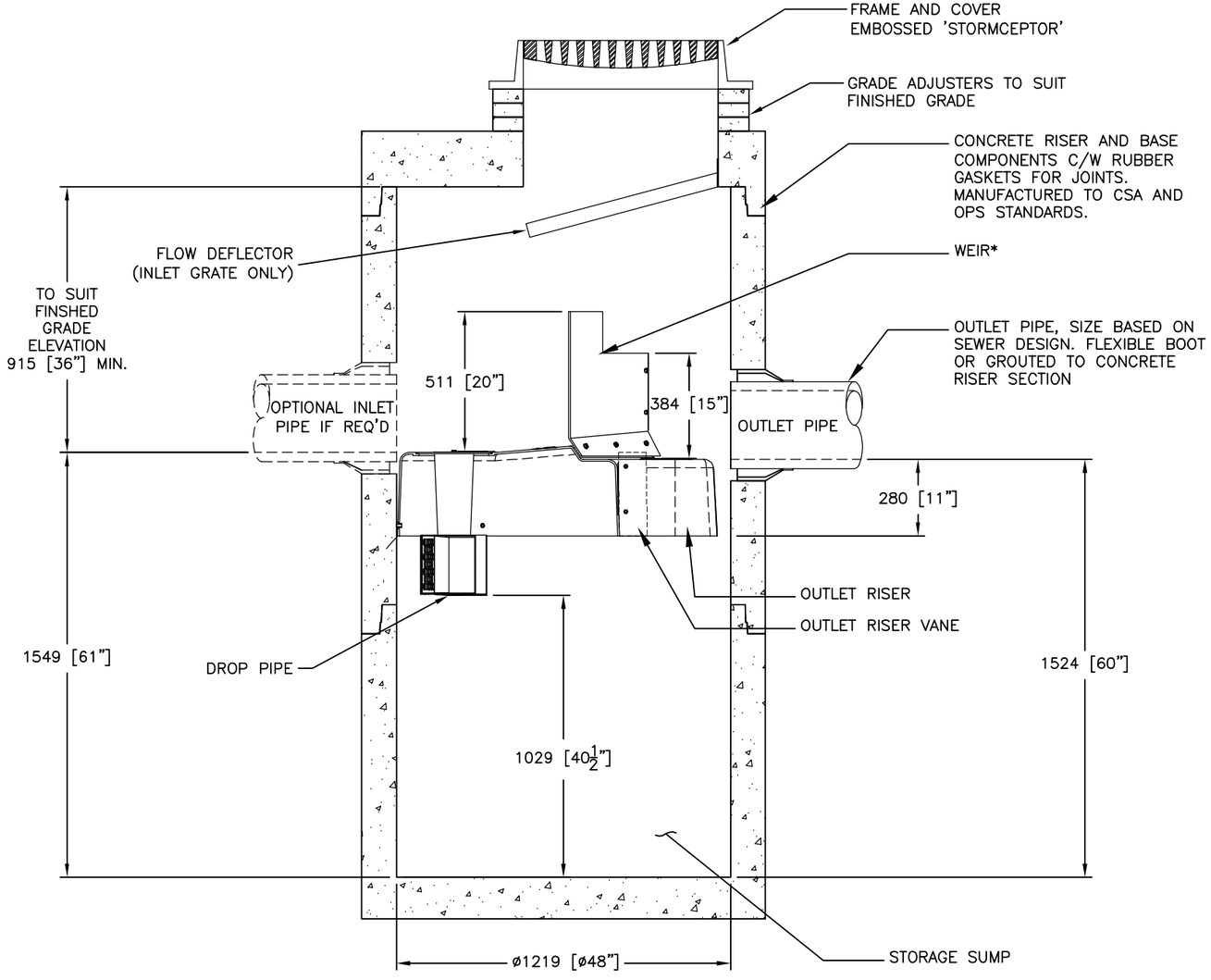
PROP.STORM STORAGE
UNDERGROUND CHAMBERS
VOLUME = 35 m³
TOTAL RELEASE RATE = 20.12 L/s

PROPOSED
RESIDENTIAL
BUILDING BLOCK 'A'
12 UNITS

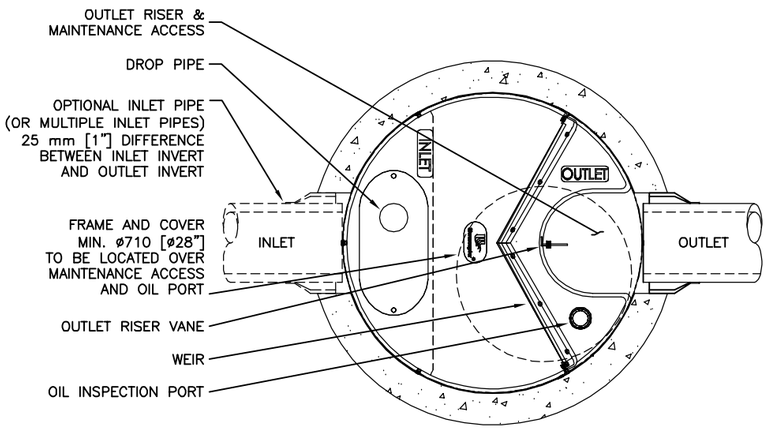
USF =

TENTH LINE ROAD

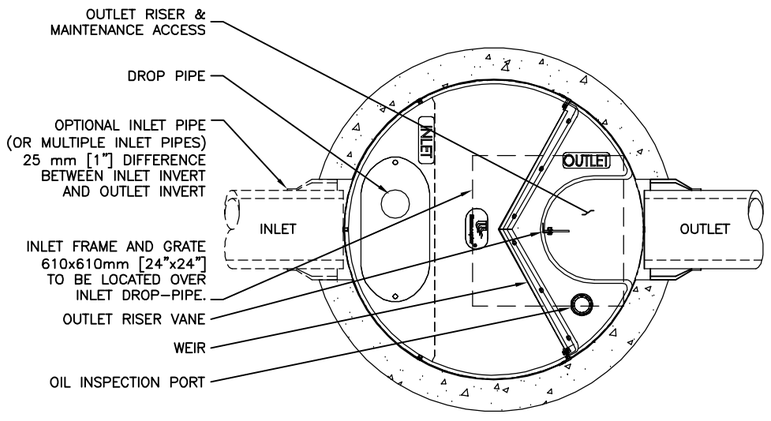
ELEV. = 87.63



SECTION VIEW



PLAN VIEW (STANDARD)



PLAN VIEW (INLET TOP)

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

GENERAL NOTES:

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

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

INSTALLATION NOTES

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

STANDARD DETAIL
NOT FOR CONSTRUCTION

SITE SPECIFIC DATA REQUIREMENTS

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

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

* PER ENGINEER OF RECORD

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

Stormceptor® EF

SCALE = NTS

imbrium®
7007 RIDGE ROAD, SUITE 350, HANOVER, MD 21076
USA 888-279-9828 CA 800-388-4601 INTL +1-416-960-9900

DATE: 5/26/2017

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

SHEET: 1 OF 1

Stormceptor®

Stormceptor® EF Sizing Report

STORMCEPTOR®
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

11/17/2020

Province:	Ontario
City:	Ottawa
Nearest Rainfall Station:	OTTAWA MACDONALD-CARTIER INT'L AP
NCDC Rainfall Station Id:	6000
Years of Rainfall Data:	37

Site Name:	1592 Tenth Line

Drainage Area (ha):	0.15
Runoff Coefficient 'c':	0.84

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

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	4.55
Oil / Fuel Spill Risk Site?	No
Upstream Flow Control?	Yes
Upstream Orifice Control Flow Rate to Stormceptor (L/s):	18.05
Peak Conveyance (maximum) Flow Rate (L/s):	
Site Sediment Transport Rate (kg/ha/yr):	

Project Name:	Tenth Line
Project Number:	20-363
Designer Name:	GUILLAUME BRUNET
Designer Company:	BL ENGINEERING
Designer Email:	guillaume@blengineering.ca
Designer Phone:	613-693-0700
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

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

Recommended Stormceptor EF Model: EF4

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

Water Quality Runoff Volume Capture (%): > 90

imbrium

THIRD-PARTY TESTING AND VERIFICATION

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

PERFORMANCE

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

PARTICLE SIZE DISTRIBUTION (PSD)

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

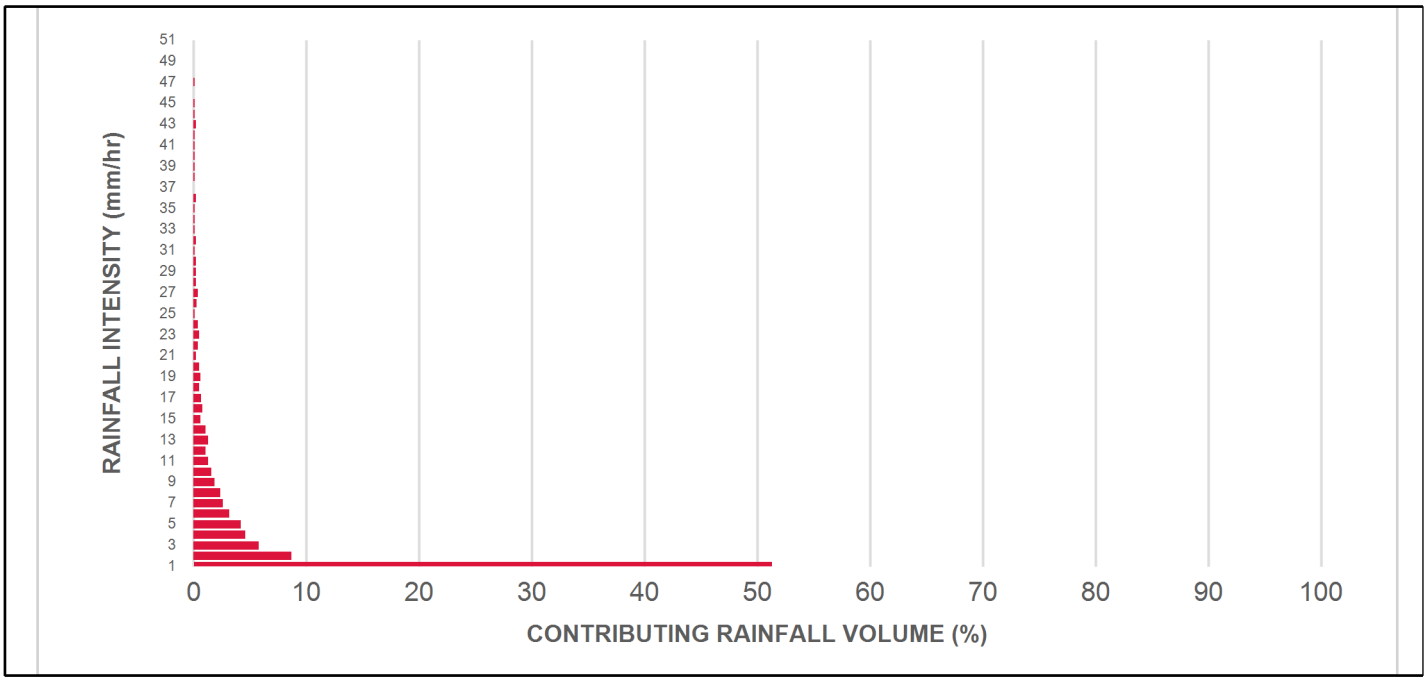
Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

Upstream Flow Controlled Results

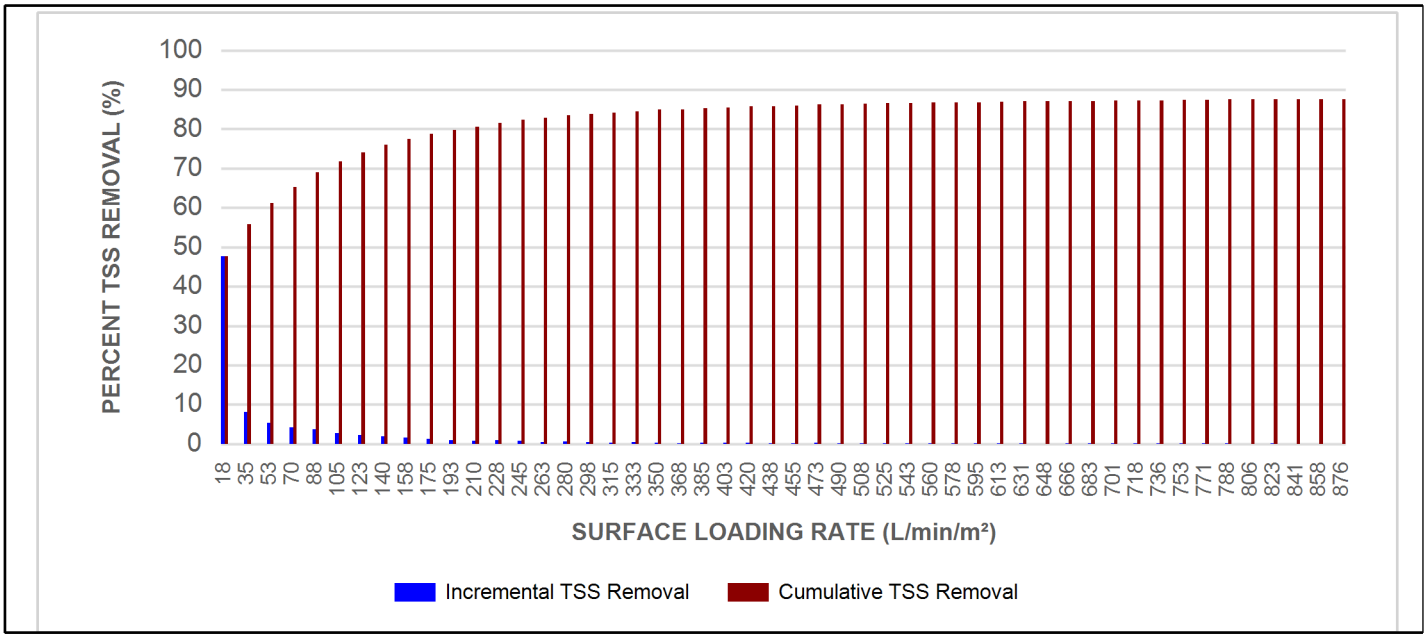
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
1	51.3	51.3	0.35	21.0	18.0	93	47.7	47.7
2	8.7	60.0	0.70	42.0	35.0	93	8.1	55.8
3	5.8	65.8	1.05	63.0	53.0	92	5.3	61.1
4	4.6	70.4	1.40	84.0	70.0	90	4.1	65.3
5	4.2	74.6	1.75	105.0	88.0	89	3.7	69.0
6	3.2	77.8	2.10	126.0	105.0	87	2.8	71.8
7	2.6	80.4	2.45	147.0	123.0	85	2.2	74.0
8	2.4	82.8	2.80	168.0	140.0	83	2.0	76.0
9	1.9	84.7	3.15	189.0	158.0	81	1.5	77.5
10	1.6	86.3	3.50	210.0	175.0	79	1.3	78.8
11	1.3	87.6	3.85	231.0	193.0	77	1.0	79.8
12	1.1	88.7	4.20	252.0	210.0	75	0.8	80.6
13	1.3	90.0	4.55	273.0	228.0	74	1.0	81.6
14	1.1	91.1	4.90	294.0	245.0	72	0.8	82.4
15	0.6	91.7	5.25	315.0	263.0	71	0.4	82.8
16	0.8	92.5	5.60	336.0	280.0	69	0.6	83.4
17	0.7	93.2	5.95	357.0	298.0	68	0.5	83.8
18	0.5	93.7	6.31	378.0	315.0	66	0.3	84.2
19	0.6	94.3	6.66	399.0	333.0	64	0.4	84.5
20	0.5	94.8	7.01	420.0	350.0	63	0.3	84.9
21	0.2	95.0	7.36	441.0	368.0	62	0.1	85.0
22	0.4	95.4	7.71	462.0	385.0	60	0.2	85.2
23	0.5	95.9	8.06	483.0	403.0	58	0.3	85.5
24	0.4	96.3	8.41	504.0	420.0	58	0.2	85.7
25	0.1	96.4	8.76	525.0	438.0	58	0.1	85.8

Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
26	0.3	96.7	9.11	546.0	455.0	58	0.2	86.0
27	0.4	97.1	9.46	567.0	473.0	57	0.2	86.2
28	0.2	97.3	9.81	588.0	490.0	57	0.1	86.3
29	0.2	97.5	10.16	609.0	508.0	57	0.1	86.4
30	0.2	97.7	10.51	631.0	525.0	57	0.1	86.5
31	0.1	97.8	10.86	652.0	543.0	57	0.1	86.6
32	0.2	98.0	11.21	673.0	560.0	56	0.1	86.7
33	0.1	98.1	11.56	694.0	578.0	56	0.1	86.8
34	0.1	98.2	11.91	715.0	595.0	56	0.1	86.8
35	0.1	98.3	12.26	736.0	613.0	56	0.1	86.9
36	0.2	98.5	12.61	757.0	631.0	56	0.1	87.0
37	1.5	100.0	12.96	778.0	648.0	56	0.8	87.8
38	0.1	100.1	13.31	799.0	666.0	56	0.1	87.9
39	0.1	100.2	13.66	820.0	683.0	56	0.1	87.9
40	0.1	100.3	14.01	841.0	701.0	56	0.1	88.0
41	0.1	100.4	14.36	862.0	718.0	55	0.1	88.0
42	0.1	100.5	14.71	883.0	736.0	55	0.1	88.1
43	0.2	100.7	15.06	904.0	753.0	55	0.1	88.2
44	0.1	100.8	15.41	925.0	771.0	55	0.1	88.3
45	0.1	100.9	15.76	946.0	788.0	55	0.1	88.3
46	-0.9	100.0	16.11	967.0	806.0	55	N/A	87.8
47	0.1	100.1	16.46	988.0	823.0	55	0.1	87.9
48	-0.1	100.0	16.81	1009.0	841.0	55	N/A	87.8
49	0.0	100.0	17.16	1030.0	858.0	55	0.0	87.8
50	0.0	100.0	17.51	1051.0	876.0	55	0.0	87.8
						Estimated Net Annual Sediment (TSS) Load Reduction =		**88 %**

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



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

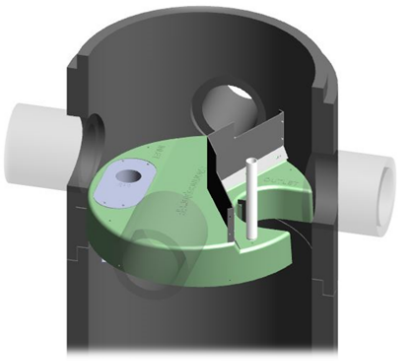
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

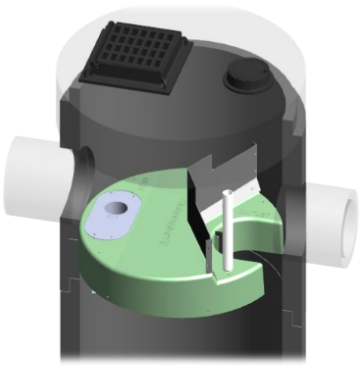
DESIGN FLEXIBILITY

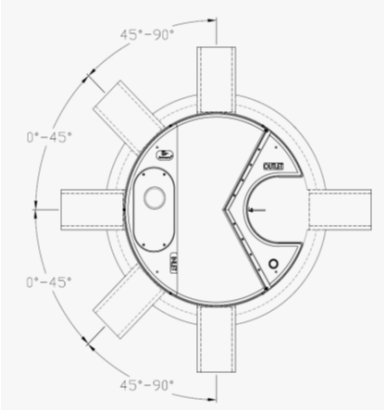
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend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

OIL CAPTURE AND RETENTION

►While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.







INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.
0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.
45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity
** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

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

STANDARD STORMCEPTOR EF/EFO DRAWINGS

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

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

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

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

PART 1 – GENERAL

1.1 WORK INCLUDED

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

1.2 REFERENCE STANDARDS & PROCEDURES

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

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

1.3 SUBMITTALS

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

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

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

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

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

2.1.1

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

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

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

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

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

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

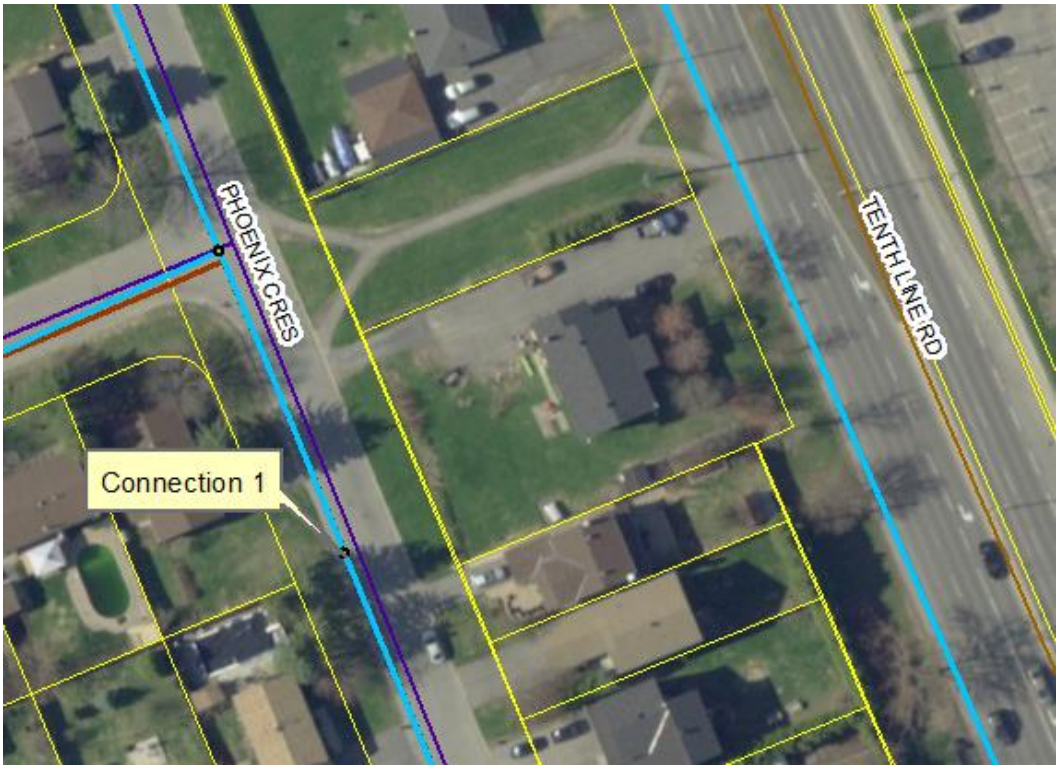
APPENDIX “E”
Boundary Conditions

Boundary Conditions
1592 Tenth Line

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	10	0.17
Maximum Daily Demand	26	0.43
Peak Hour	56	0.94
Fire Flow Demand #1	8,200	136.67

Location



Results

Connection 1 – Phoenix Cres.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.2	60.4
Peak Hour	125.7	54.1
Max Day plus Fire 1	115.9	40.2

[1] Ground Elevation = 87.69 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:

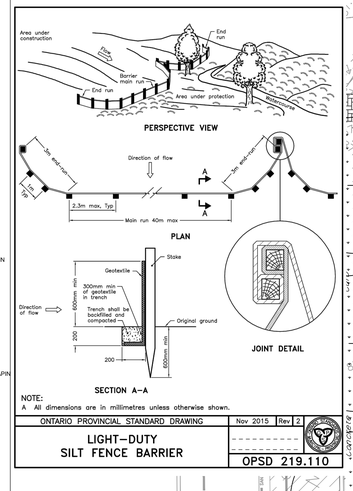
2.1. WORK TO BE DONE IN THE VICINITY OF MAJOR WATERWAYS TO BE CARRIED OUT FROM JULY TO SEPTEMBER ONLY.
2.2. MINIMIZE THE EXTENT OF DISTURBED AREAS AND THE DURATION OF EXPOSURE.
2.3. PROTECT DISTURBED AREAS FROM RUNOFF.
2.4. PROVIDE TEMPORARY COVER SUCH AS SEEDING OR MULCHING IF DISTURBED AREA WILL NOT BE REHABILIATED WITHIN 30 DAYS.
2.5. INSPECT SILT FENCE, FILTER CLOTHS, AND CATCH BASIN SUMPS WEEKLY AND AFTER EVERY MAJOR 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 SCRAPED.
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 ABUTTING 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.

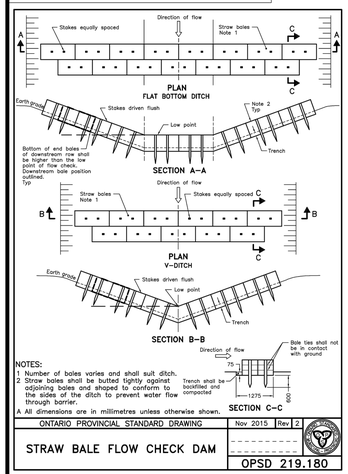
LEGEND:

- EXISTING PROPERTY LINE TO REMAIN
- PROPOSED EASEMENT
- PROPOSED TERRACING (3:1 MIN.)
- PROPOSED DOOR ENTRANCE/EXIT
- +50.00 PROPOSED ELEVATION
- +50.00 BW PROPOSED BOTTOM OF WALL ELEVATION
- +50.00 SD PROPOSED TOP OF SIDEWALK ELEVATION
- +50.00 EX MATCH INTO EXISTING ELEVATION
- - 70.19 EXISTING ELEVATION
- PROPOSED OVERLAND MAJOR FLOW ROUTE
- PROPOSED SILT FENCE AS PER OPSD 219.110
- PROPOSED 200mmØ PERFORATED SUBDRAIN
- STM PROPOSED STORM SEWER
- SAN PROPOSED SANITARY SEWER
- WTR PROPOSED WATERMAIN
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- PROPOSED CATCHBASIN-MANHOLE/CATCHBASIN
- PROPOSED CURB STOP
- PROPOSED PIPE INSULATION
- PROPOSED 100 YEAR HIGH WATER LEVEL
- STORM WATERSHED EXTENT
- WS-XX (CONTROL) — WATERSHED NAME
- AREA | RUNOFF — RUNOFF COEFFICIENT, AREA IN HECTARES
- PROPOSED GRASS AREA. REFER TO LANDSCAPING PLAN
- 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



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

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev 2
LIGHT–DUTY SILT FENCE BARRIER		OPSD 219.110



NOTES:
1 Number of bales varies and shall suit ditch.
2 Straw bales shall be butted tightly against adjoining bales and shaped to conform to the sides of the ditch to prevent water flow through barrier.

A All dimensions are in millimetres unless otherwise shown.

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

ENGINEERING STAMP

#8		
#7		
#6		
#5		
#4		
#3		
#2	ISSUED FOR CITY COMMENTS	14 / 06 / 2022
#1	ISSUED FOR SPA	19 / 11 / 2020
NO.	REVISION	DATE (DD/MM/YYYY)

BLANCHARD LETENDRE ENGINEERING
767, Notre Dame, Local 42, Embrun, Ontario, (613) 693-0700 K0A 1W1 blengineering.ca

CLIENT:
BRIDOR DEVELOPMENT
996-B ST. AUGUSTIN RD.
EMBRUN, ON

PROJECT:
NEW RESIDENTIAL DEVELOPMENT
1592 TENTH LINE RD,
ORLEANS, ON

DRAWING:
SEDIMENT & EROSION CONTROL PLAN

PAPER FORMAT:	24x36
DRAWN BY:	BF + GB
CHECKED BY:	GB
DATE:	07-2022
SCALE:	1:150
PROJECT NUMBER:	20-363

PAGE: C100

LEGEND:

- EXISTING PROPERTY LINE TO REMAIN
- PROPOSED EASEMENT
- PROPOSED TERRACING (3:1 MIN.)
- PROPOSED DOOR ENTRANCE/EXIT
- +50.00 PROPOSED ELEVATION
- +50.00 BW PROPOSED BOTTOM OF WALL ELEVATION
- +50.00 SD PROPOSED TOP OF SIDEWALK ELEVATION
- +50.00 EX MATCH INTO EXISTING ELEVATION
- ~ 75.19 EXISTING ELEVATION
- PROPOSED OVERLAND MAJOR FLOW ROUTE
- PROPOSED SILT FENCE AS PER OPSD 219.110
- PROPOSED 200mmØ PERFORATED SUBDRAIN
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- PROPOSED CURB STOP
- PROPOSED PIPE INSULATION
- PROPOSED 100 YEAR HIGH WATER LEVEL
- STORM WATERSHED EXTENT
- WS-XX (CONTROL) AREA RUNOFF — WATERSHED NAME; RUNOFF COEFFICIENT; AREA IN HECTARES
- PROPOSSED GRASS AREA. REFER TO LANDSCAPING
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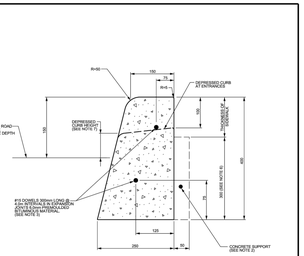
- PROPOSED LIGHT DUTY ASPHALT
- PROPOSED GRAVEL AREA
- PROPOSED RIP RAP AS PER OPSD 810.010
- (M) PROPOSED WATER METER

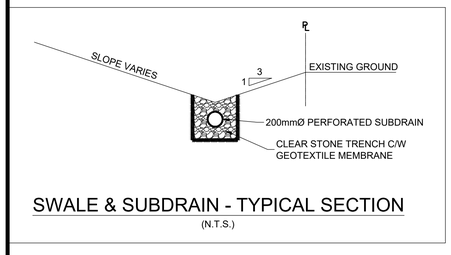


CONCRETE BARRIER CURB

NOTES:
1. THE FULL CURB DEPTH SHALL BE CARRIED THROUGH THE DEPRESSED ACCESS CROSSING.
2. A CONCRETE SUPPORT IS REQUIRED WHEN BUILT ADJACENT TO THE SIDEWALK.
3. IF EXTENSIONS OCCUR IN SLIPFORM, USE THE #15 DOWELS ARE TO BE PLACED AT THE END OF THE EXTRUSION.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SHOWN OTHERWISE.
5. DUMMY JOINTS SHALL BE 25mm DEEP, FRONT, BACK AND TOP OF SECTION AT 2m SPACING.
6. FOR DEPRESSED CURB AT ENTRANCES USE 250.
7. DEPRESSED CURB HEIGHT - FOR PEDESTRIAN CURB RAMPS 0 TO 6 mm AND FOR PRIVATE ENTRANCES 0 TO 25mm.

N.T.S.

Ottawa	CONCRETE BARRIER CURB FOR GRANULAR BASE PAVEMENT (MODIFIED OPSD-600.110)	DATE: JANUARY 2003; REV. DATE: MARCH 2014; DWG. No.: SC1.1

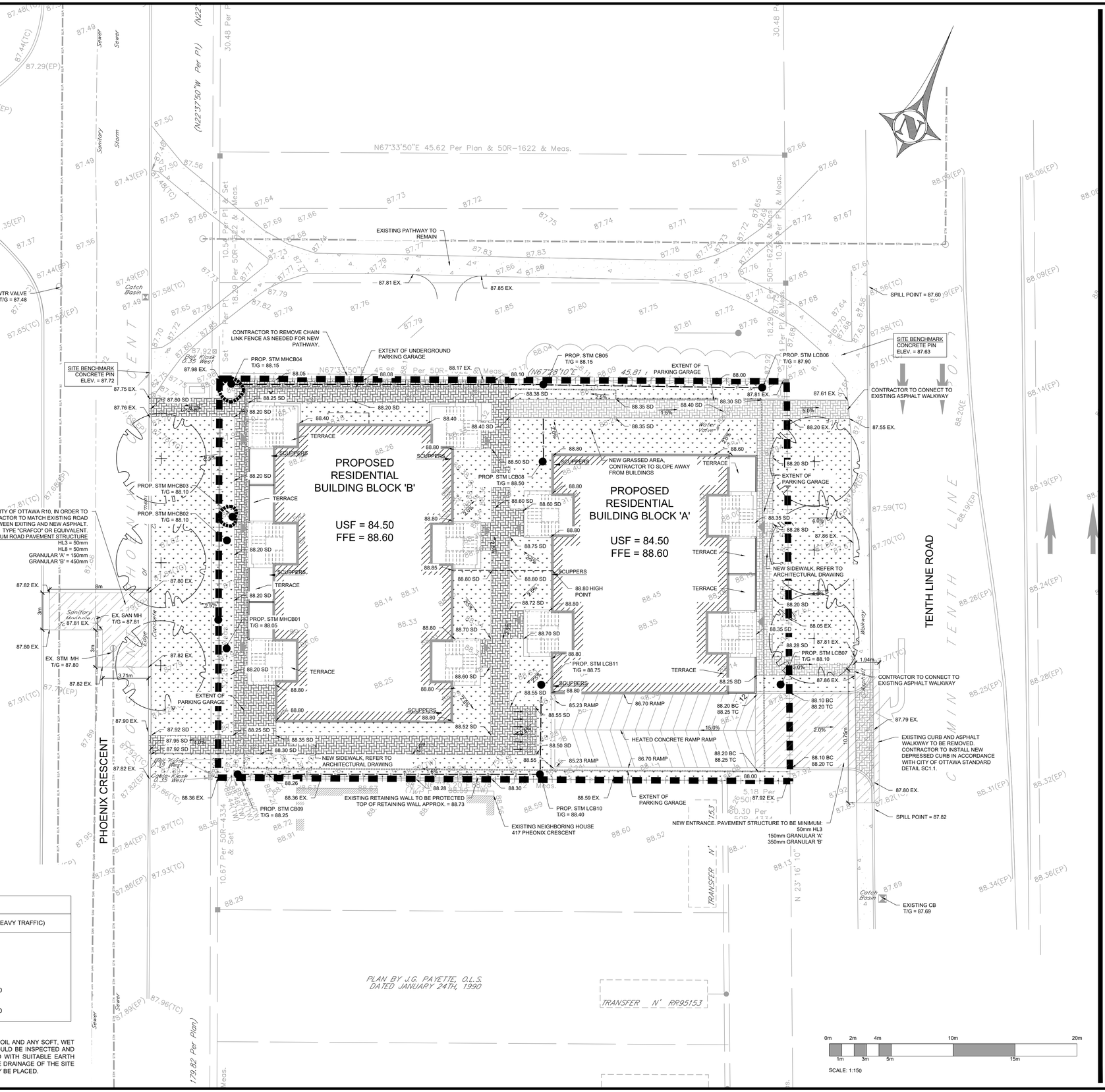


SWALE & SUBDRAIN - TYPICAL SECTION
(N.T.S.)

PAVEMENT STRUCTURE

COURSE	MATERIAL	THICKNESS (mm) AUTOMOBILE PARKING	THICKNESS (mm) TRUCK ROUTE (HEAVY TRAFFIC)
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	350	450

NOTE:
IN PREPARATION FOR PAVEMENT CONSTRUCTION AT THIS SITE, ANY SURFICIAL OR NEAR SURFACE/SUBGRADE LEVEL TOPSOIL AND ANY SOFT, WET OR DELETERIOUS MATERIALS SHOULD BE REMOVED FROM THE PROPOSED PAVED AREAS. THE EXPOSED SUBGRADE SHOULD BE INSPECTED AND APPROVED BY GEOTECHNICAL PERSONNEL AND ANY SOFT AREAS EVIDENT SHOULD BE SUBEXCAVATED AND REPLACED WITH SUITABLE EARTH BORROW APPROVED BY THE GEOTECHNICAL ENGINEER. THE SUBGRADE SHOULD BE SHAPED AND CROWNED TO PROMOTE DRAINAGE OF THE SITE DRAINAGE STRUCTURES. FOLLOWING APPROVAL OF THE PREPARATION OF THE SUBGRADE, THE PAVEMENT GRANULARS MAY BE PLACED.



ENGINEERING STAMP

LICENSED PROFESSIONAL ENGINEER — G. L. BRUNET — 100191036 — Opin 1/2020 — PROVINCE OF ONTARIO

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BLANCHARD LETENDRE ENGINEERING
767, Notre Dame, Local 42, Embrun, Ontario, (613) 693-0700 K0A 1W1 blengineering.ca

CLIENT:
BRIDOR DEVELOPMENT
996-B ST. AUGUSTIN RD.
EMBRUN, ON

PROJECT:
NEW RESIDENTIAL DEVELOPMENT
1592 TENTH LINE RD,
ORLEANS, ON

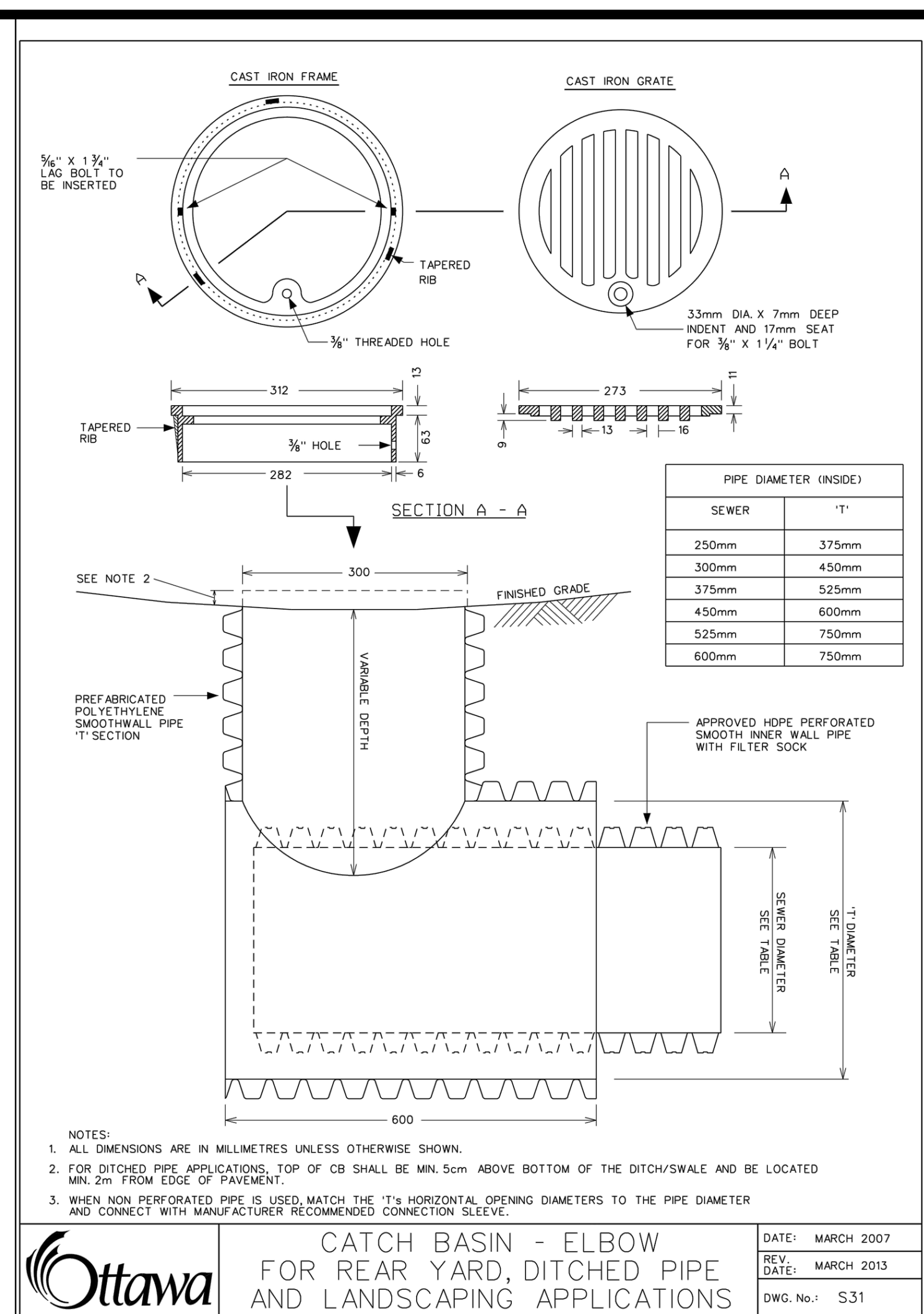
DRAWING:
SITE GRADING PLAN

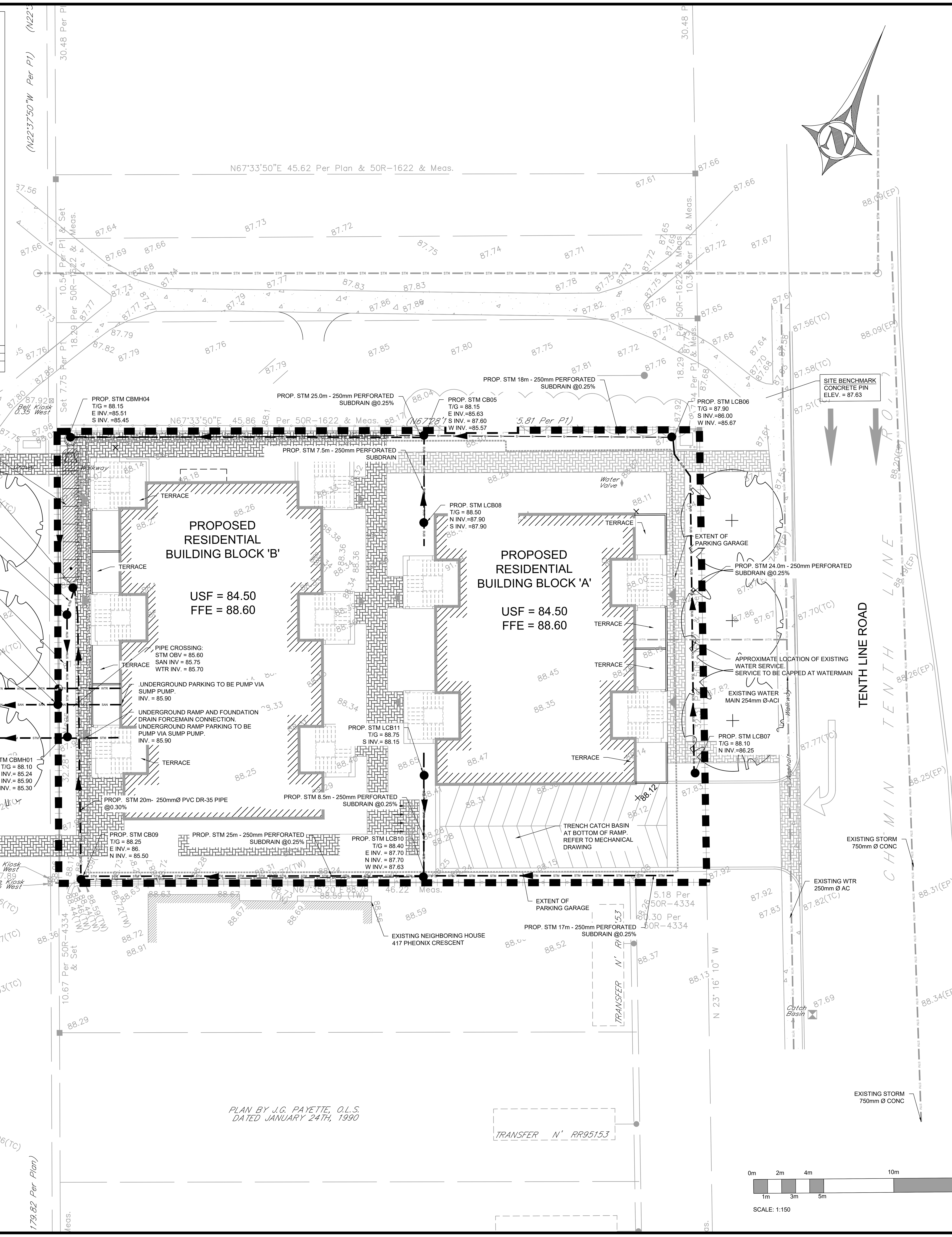
PAPER FORMAT:	24x36
DRAWN BY:	BF + GB
CHECKED BY:	GB
DATE:	07-2022
SCALE:	1:150
PROJECT NUMBER:	20-363

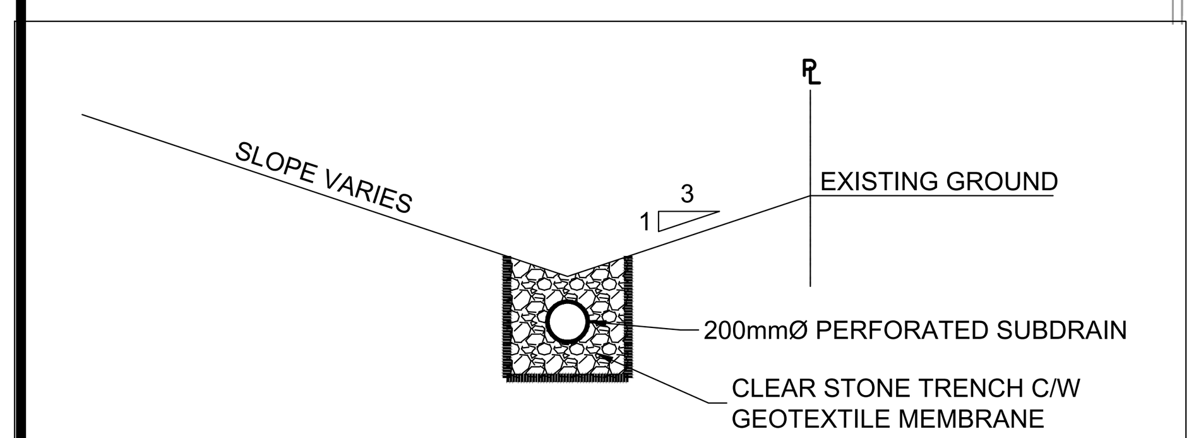
PAGE: C200

LEGEND:

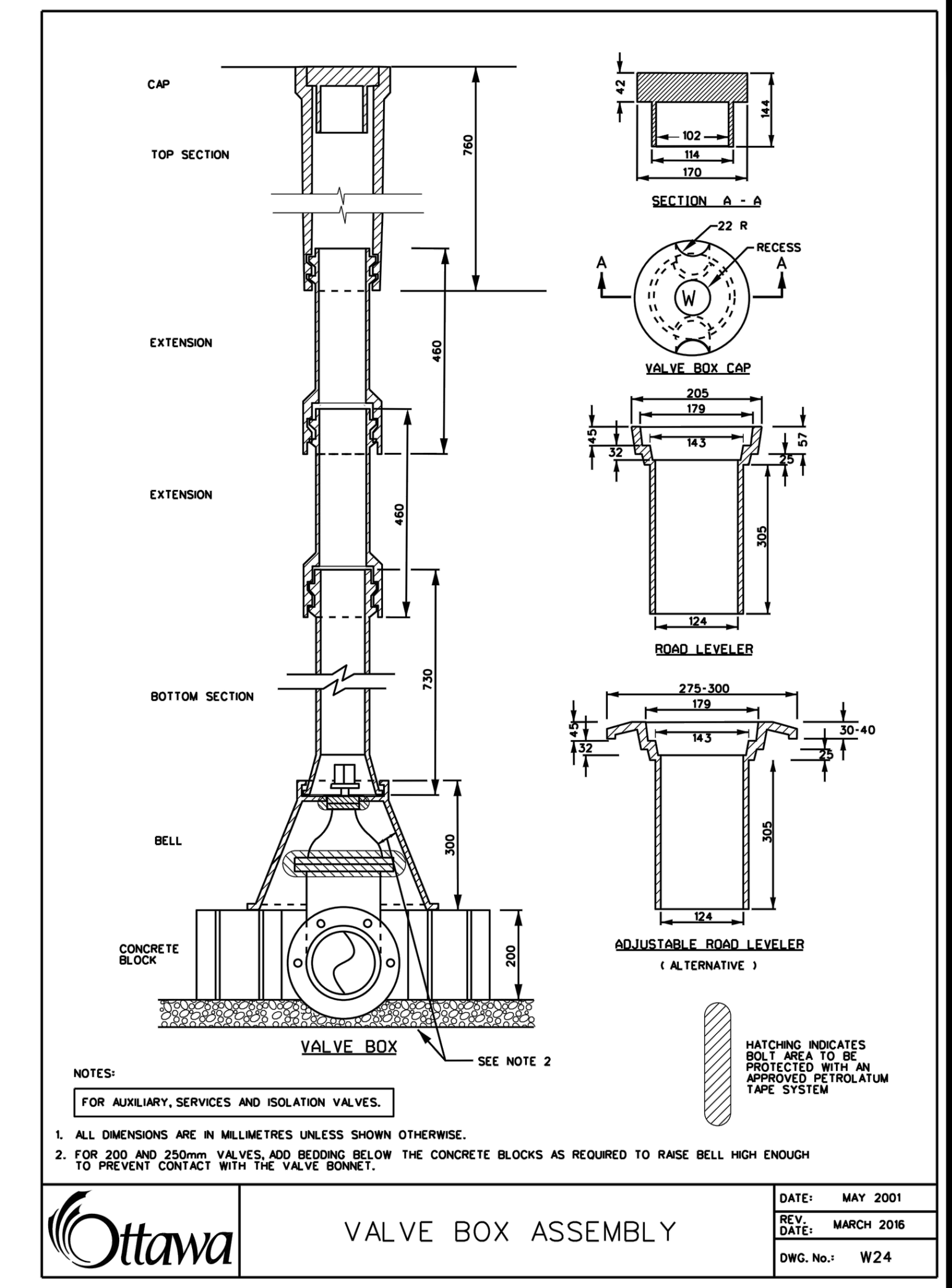
- EXISTING PROPERTY LINE TO REMAIN
- PROPOSED EASEMENT
- PROPOSED TERRACING (3:1 MIN.)
- PROPOSED DOOR ENTRANCE/EXIT
- ×50.00 PROPOSED ELEVATION
- ×50.00 BW PROPOSED BOTTOM OF WALL ELEVATION
- ×50.00 SD PROPOSED TOP OF SIDEWALK ELEVATION
- ×50.00 EX MATCH INTO EXISTING ELEVATION
- 70.19 EXISTING ELEVATION
- PROPOSED OVERLAND MAJOR FLOW ROUTE
- PROPOSED SILT FENCE AS PER OPSD 219.110
- PROPOSED 200mmØ PERFORATED SUBDRAIN
- PROPOSED STORM SEWER
- PROPOSED SANITARY SEWER
- PROPOSED WATERMAIN
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- PROPOSED CATCHBASIN-MANHOLE/CATCHBASIN
- PROPOSED CURB STOP
- PROPOSED PIPE INSULATION
- PROPOSED 100 YEAR HIGH WATER LEVEL
- STORM WATERSHED EXTENT
- WATERSHED NAME
- RUNOFF COEFFICIENT
- AREA IN HECTARES
- PROPOSED GRASS AREA. REFER TO LANDSCAPING
- 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

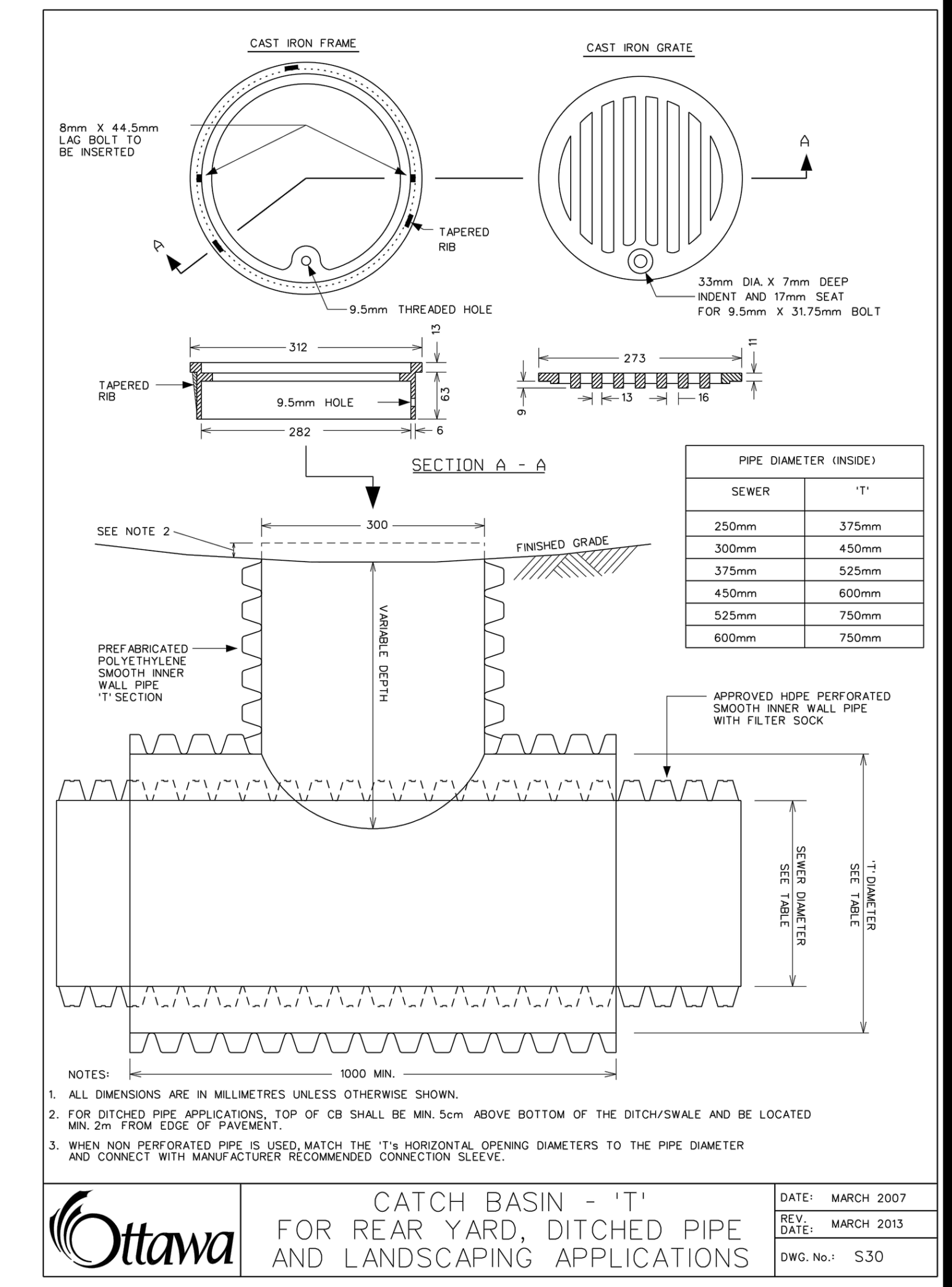






SWALE & SUBDRAIN - TYPICAL SECTION
(N.T.S.)





ENGINEERING STAMP

LICENSED PROFESSIONAL ENGINEER
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06/14/2022
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CLIENT:
BRIDOR DEVELOPMENT
996-B ST. AUGUSTIN RD.
EMBRUN, ON

PROJECT:
NEW RESIDENTIAL DEVELOPMENT
1592 TENTH LINE RD,
ORLEANS, ON

DRAWING:
SITE SERVICING PLAN

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LEGEND:

- EXISTING PROPERTY LINE TO REMAIN
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- STM — PROPOSED STORM SEWER
- SAN — PROPOSED SANITARY SEWER
- WTR — PROPOSED WATERMAIN
- SAN — EXISTING SANITARY SEWER
- WTR — EXISTING WATERMAIN
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- PROPOSED CURB STOP
- PROPOSED PIPE INSULATION
- PROPOSED 100 YEAR HIGH WATER LEVEL
- STORM WATERSHED EXTENT
- WS-XX — WATERSHED NAME
- RUNOFF COEFFICIENT
- AREA IN HECTARES
- PROPOSSED GRASS AREA. REFER TO LANDSCAPING
- PROPOSED CONCRETE FEATURES/SLAB
- PROPOSED HEAVY DUTY ASPHALT
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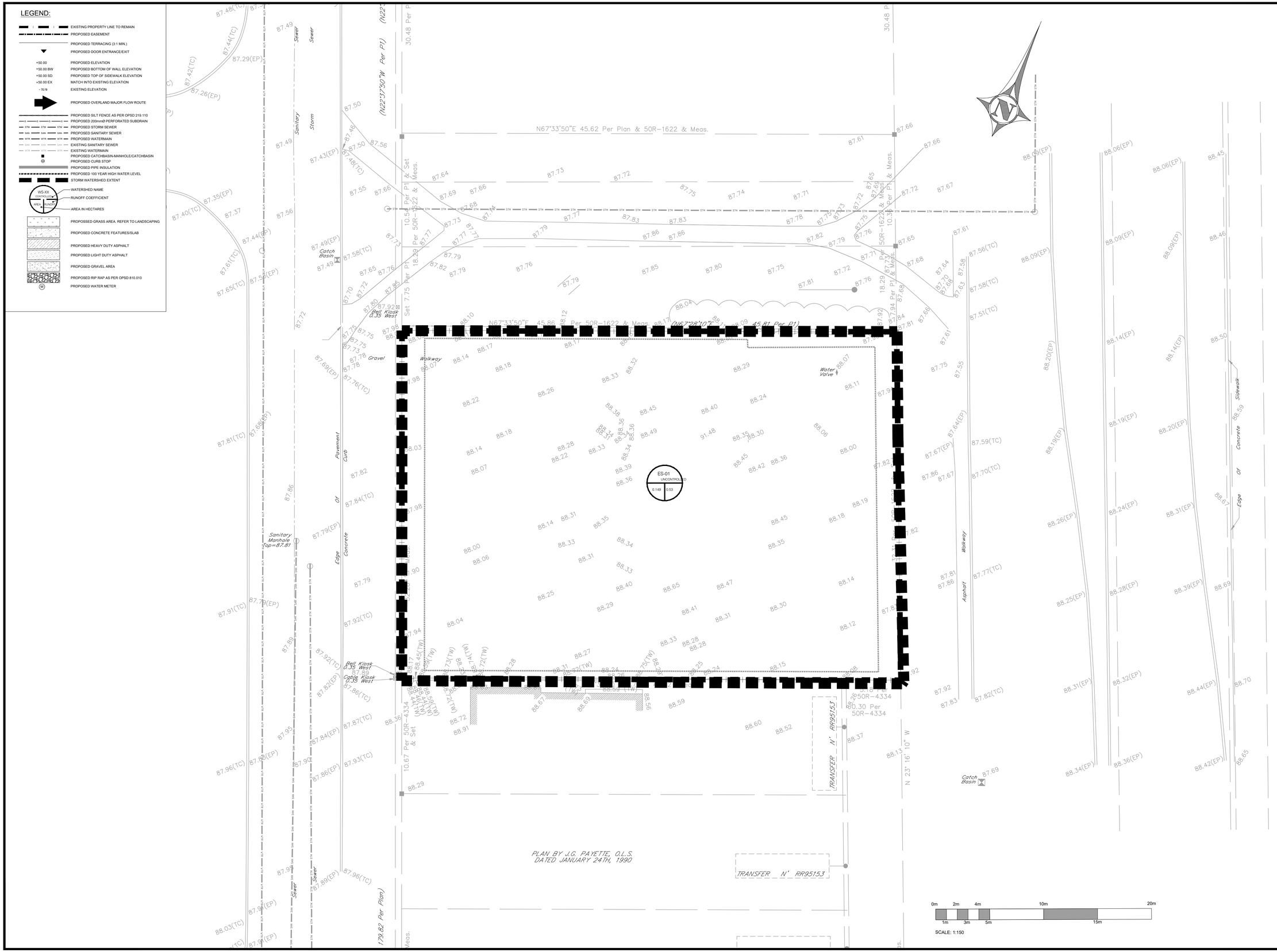

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996-B ST. AUGUSTIN RD.
EMBRUN, ON

PROJECT:
NEW RESIDENTIAL DEVELOPMENT
1592 TENTH LINE RD,
ORLEANS, ON

DRAWING:
PRE-DEVELOPMENT DRAINAGE

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- WS-XX — WATERSHED NAME; CONTROL TYPE; AREA; RUNOFF — RUNOFF COEFFICIENT; AREA IN HECTARES
- PROPOSSED GRASS AREA. REFER TO LANDSCAPING
- PROPOSED CONCRETE FEATURES/SLAB
- PROPOSED HEAVY DUTY ASPHALT
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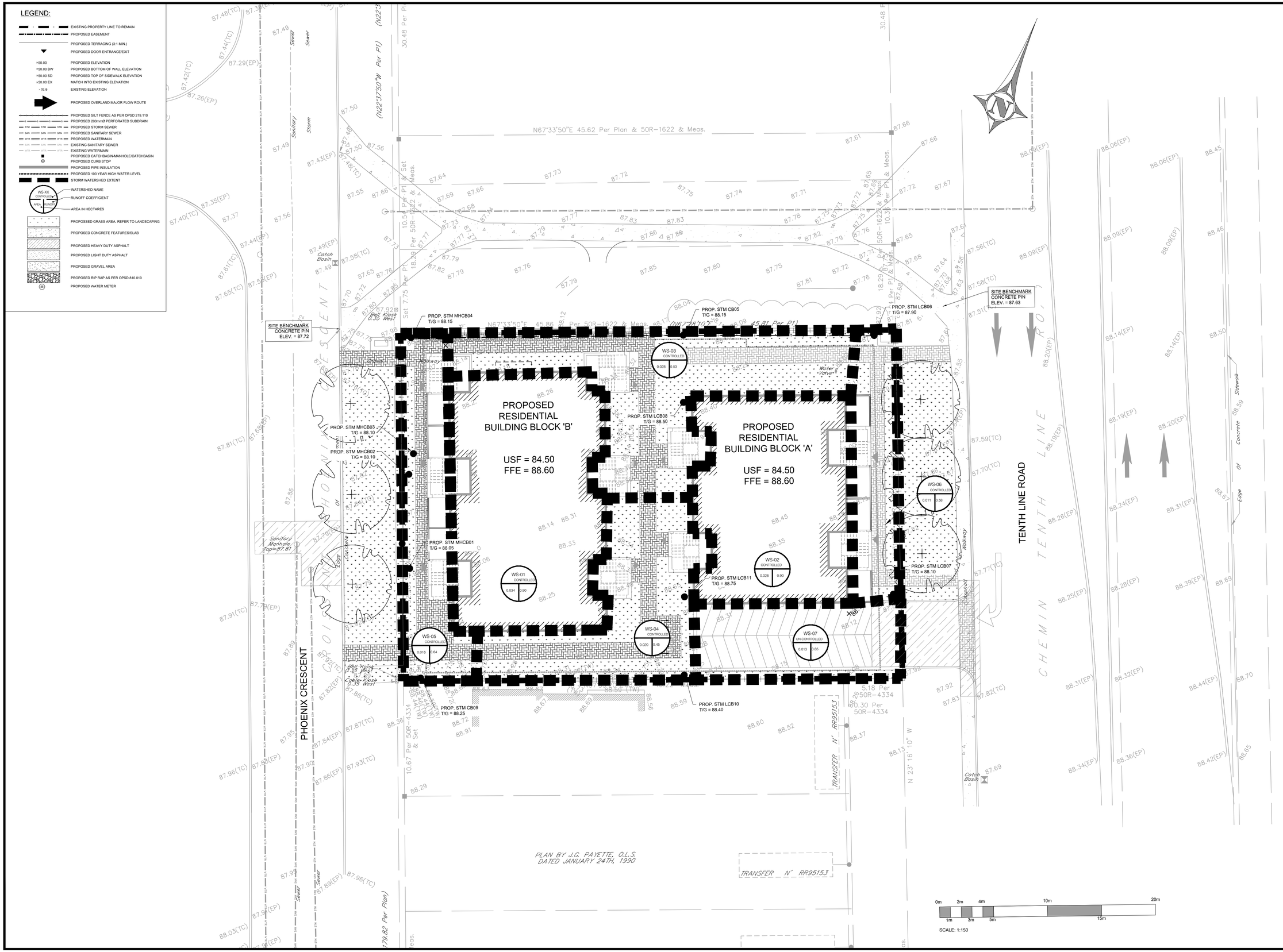

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996-B ST. AUGUSTIN RD.
EMBRUN, ON

PROJECT:
NEW RESIDENTIAL DEVELOPMENT
1592 TENTH LINE RD,
ORLEANS, ON

DRAWING:
POST DEVELOPMENT STORAGE AREA

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PROJECT INFORMATION

ENGINEERED PRODUCT MANAGER:	HAIDER NASRULLAH 647-850-9417 HAIDER.NASRULLAH@ADS-PIPE.COM
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PROJECT NO:	S209349
ADS SITE COORDINATOR:	MATTHEW BEGHIN 519-710-3687 MATTHEW.BEGHIN@ADS-PIPE.COM

ADVANCED DRAINAGE SYSTEMS, INC.

SiteASSIST StormTech — FOR STORMTECH INSTRUCTIONS, DOWNLOAD THE INSTALLATION APP

1592 TENTH LINE ROAD

ORLEANS, ON.

MC-3500 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH MC-3500.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBERS SHALL BE CERTIFIED TO CSA B184, "POLYMERIC SUB-SURFACE STORMWATER MANAGEMENT STRUCTURES", AND MEET THE REQUIREMENTS OF ASTM F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 45x76 DESIGNATION SS.
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 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.
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". 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.
7. 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 75 mm (3").
   - 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 500 LBS/IN/IN. 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.
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:
   - 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.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF MC-3500 CHAMBER SYSTEM

1. STORMTECH MC-3500 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH MC-3500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. 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.
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. INLET AND OUTLET MANIFOLDS MUST BE INSERTED A MINIMUM OF 300 mm (12") INTO CHAMBER END CAPS.
8. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE WELL GRADED BETWEEN ¾" AND 2" (20-50 mm).
9. STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
10. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
11. 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 MC-3500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
2. THE USE OF EQUIPMENT OVER MC-3500 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADER, DUMP TRUCK, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. FULL 900 mm (36") OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

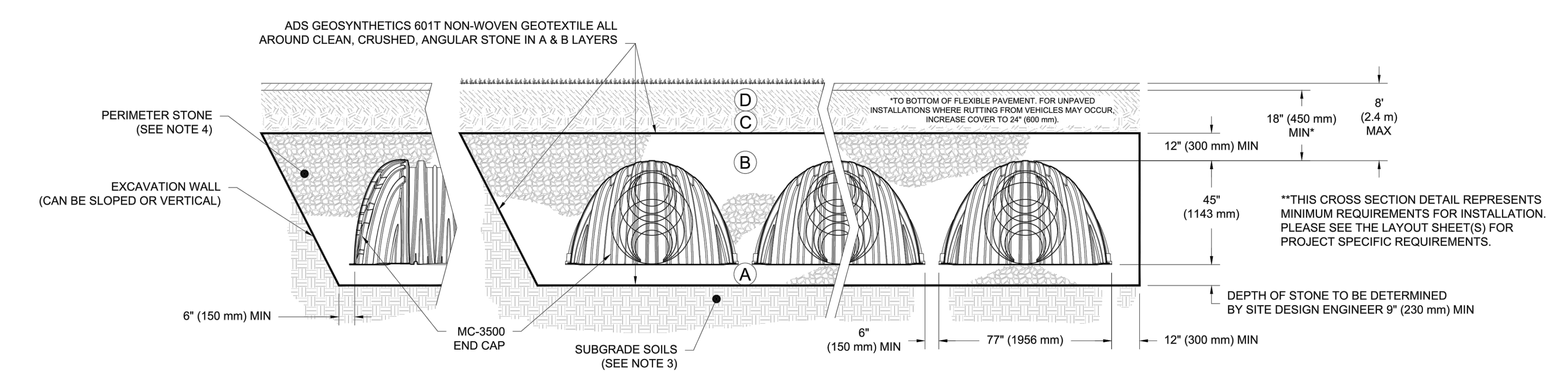
USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY USING THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

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

ACCEPTABLE FILL MATERIALS: STORMTECH MC-3500 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 24" (600 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 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
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, 4	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, 4	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 9" (230 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.


ADS GEOSYNTHETICS 601T NON-WOVEN GEOTEXTILE ALL AROUND CLEAN, CRUSHED, ANGULAR STONE IN A & B LAYERS
PERIMETER STONE (SEE NOTE 4)
EXCAVATION WALL (CAN BE SLOPED OR VERTICAL)
*TO BOTTOM OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING FROM VEHICLES MAY OCCUR, INCREASE COVER TO 24" (600 mm).
D
C
B
A
8' (2.4 m) MAX
18" (450 mm) MIN*
12" (300 mm) MIN
45" (1143 mm)
**THIS CROSS SECTION DETAIL REPRESENTS MINIMUM REQUIREMENTS FOR INSTALLATION. PLEASE SEE THE LAYOUT SHEET(S) FOR PROJECT SPECIFIC REQUIREMENTS.
DEPTH OF STONE TO BE DETERMINED BY SITE DESIGN ENGINEER 9" (230 mm) MIN
6" (150 mm) MIN
MC-3500 END CAP
SUBGRADE SOILS (SEE NOTE 3)
6" (150 mm) MIN
77" (1956 mm)
12" (300 mm) MIN

NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 45x76 DESIGNATION SS.
2. MC-3500 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 3".
   - 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 500 LBS/IN/IN. 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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SHEET 3 OF 5

PROPOSED LAYOUT

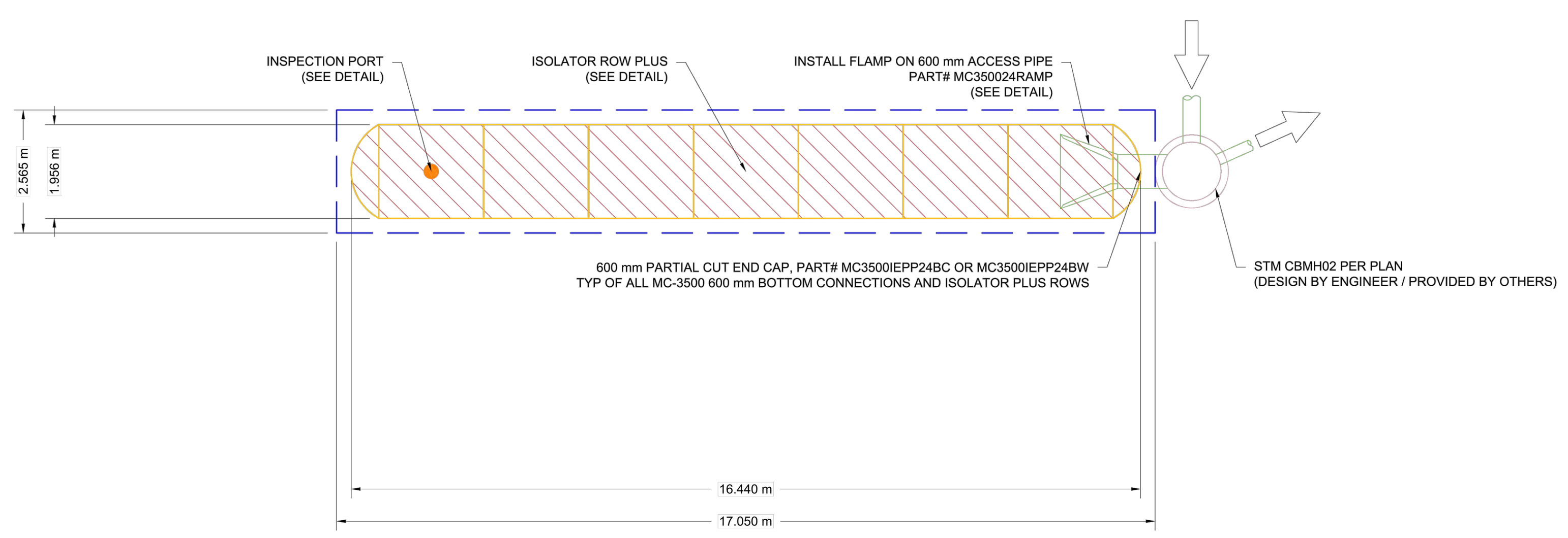
7	STORMTECH MC-3500 CHAMBERS
2	STORMTECH MC-3500 END CAPS
305	STONE ABOVE (mm)
229	STONE BELOW (mm)
40	% STONE VOID
37.1	**INSTALLED SYSTEM VOLUME (m^3) ABOVE ELEVATION 86.00 (PERIMETER STONE INCLUDED)**
43.7	SYSTEM AREA (m^2)
39.2	SYSTEM PERIMETER (m)

PROPOSED ELEVATIONS

89.529	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):
87.701	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):
87.548	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):
87.548	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):
87.548	MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT):
87.396	TOP OF STONE:
87.091	TOP OF MC-3500 CHAMBER:
86.000	600 mm ISOLATOR ROW PLUS INVERT:
85.948	BOTTOM OF MC-3500 CHAMBER:
85.719	BOTTOM OF STONE:

NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECHNICAL 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.


INSPECTION PORT (SEE DETAIL)
ISOLATOR ROW PLUS (SEE DETAIL)
INSTALL FLAMP ON 600 mm ACCESS PIPE PART# MC350024RAMP (SEE DETAIL)
600 mm PARTIAL CUT END CAP, PART# MC3500IEPP24BC OR MC3500IEPP24BW TYP OF ALL MC-3500 600 mm BOTTOM CONNECTIONS AND ISOLATOR PLUS ROWS
STM CBMH02 PER PLAN (DESIGN BY ENGINEER / PROVIDED BY OTHERS)
16.440 m
17.050 m

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SCALE = 1 : 100

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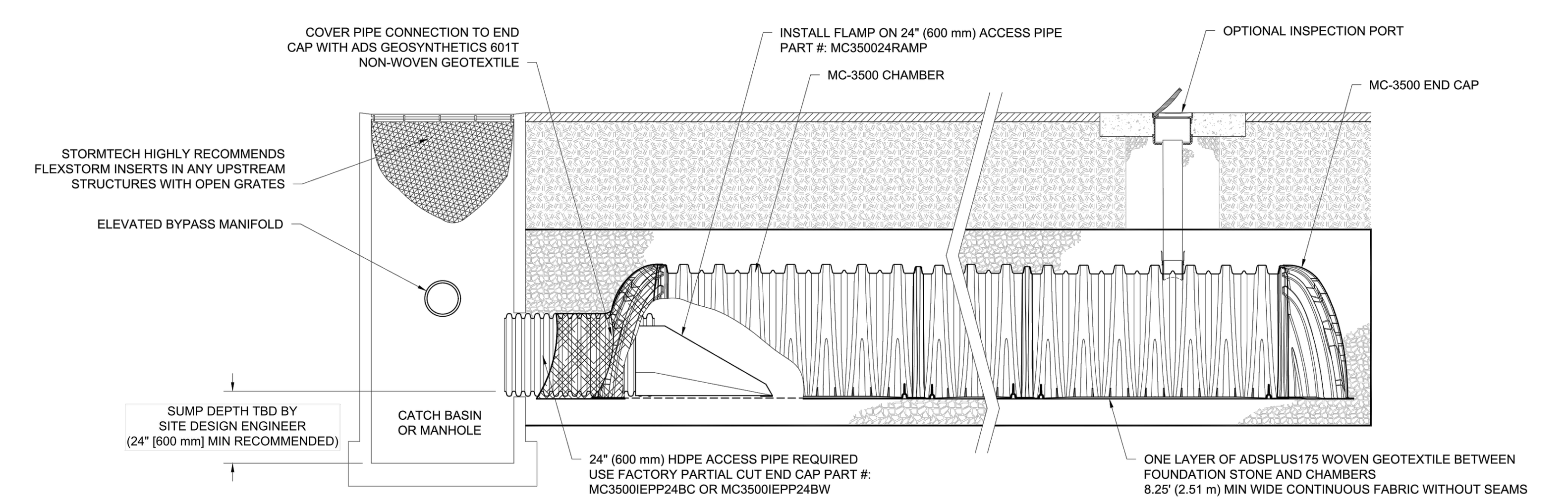

COVER PIPE CONNECTION TO END CAP WITH ADS GEOSYNTHETICS 601T NON-WOVEN GEOTEXTILE
INSTALL FLAMP ON 24" (600 mm) ACCESS PIPE PART #: MC350024RAMP
MC-3500 CHAMBER
OPTIONAL INSPECTION PORT
MC-3500 END CAP
STORMTECH HIGHLY RECOMMENDS FLEXSTORM INSERTS IN ANY UPSTREAM STRUCTURES WITH OPEN GRATES
ELEVATED BYPASS MANIFOLD
SUMP DEPTH TBD BY SITE DESIGN ENGINEER (24" [600 mm] MIN RECOMMENDED)
CATCH BASIN OR MANHOLE
24" (600 mm) HDPE ACCESS PIPE REQUIRED USE FACTORY PARTIAL CUT END CAP PART #: MC3500IEPP24BC OR MC3500IEPP24BW
ONE LAYER OF ADSPLUS175 WOVEN GEOTEXTILE BETWEEN FOUNDATION STONE AND CHAMBERS 8.25' (2.51 m) MIN WIDE CONTINUOUS FABRIC WITHOUT SEAMS

MC-3500 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.

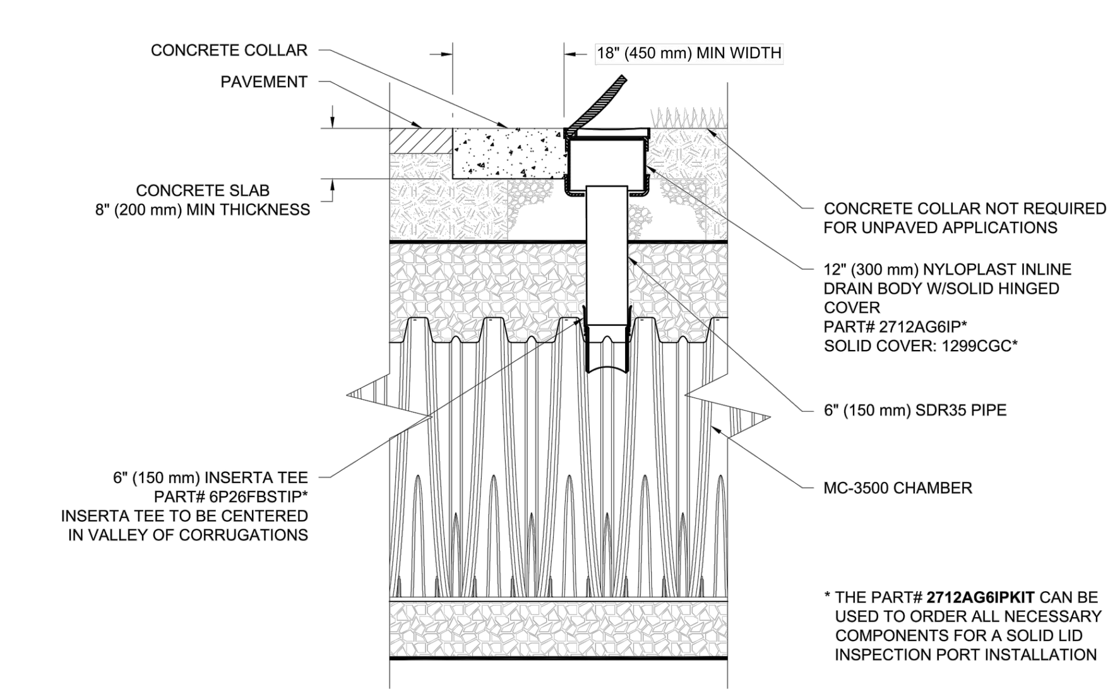
STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

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

1. 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.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.


CONCRETE COLLAR
PAVEMENT
18" (450 mm) MIN WIDTH
CONCRETE SLAB 8" (200 mm) MIN THICKNESS
CONCRETE COLLAR NOT REQUIRED FOR UNPAVED APPLICATIONS
12" (300 mm) NYLOPLAST INLINE DRAIN BODY W/SOLID HINGED COVER PART# 2712AG6IP* SOLID COVER: 1299CGC*
6" (150 mm) SDR35 PIPE
6" (150 mm) INSERTA TEE PART# 6P26FBSTIP* INSERTA TEE TO BE CENTERED IN VALLEY OF CORRUGATIONS
MC-3500 CHAMBER
* THE PART# 2712AG6IPKIT CAN BE USED TO ORDER ALL NECESSARY COMPONENTS FOR A SOLID LID INSPECTION PORT INSTALLATION

MC-3500 6" (150 mm) INSPECTION PORT DETAIL
NTS

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SHEET 4 OF 5

ENGINEERING STAMP

LICENSED PROFESSIONAL ENGINEER — G. L. BRUNET — 100191036 — 06/14/2022 — PROVINCE OF ONTARIO

NO.	REVISION	DATE (DD/MM/YYYY)
#8		
#7		
#6		
#5		
#4		
#3		
#2	ISSUED FOR CITY COMMENTS	14 / 06 / 2022
#1	ISSUED FOR SPA	19 / 11 / 2020

BLANCHARD LETENDRE ENGINEERING
767, Notre Dame, Local 42, Embrun, Ontario, K0A 1W1
(613) 693-0700 blengineering.ca

CLIENT:
BRIDOR DEVELOPMENT
996-B ST. AUGUSTIN RD.
EMBRUN, ON

PROJECT:
NEW RESIDENTIAL DEVELOPMENT
1592 TENTH LINE RD,
ORLEANS, ON

DRAWING:
DETAILS - 1

PAPER FORMAT:	24x36
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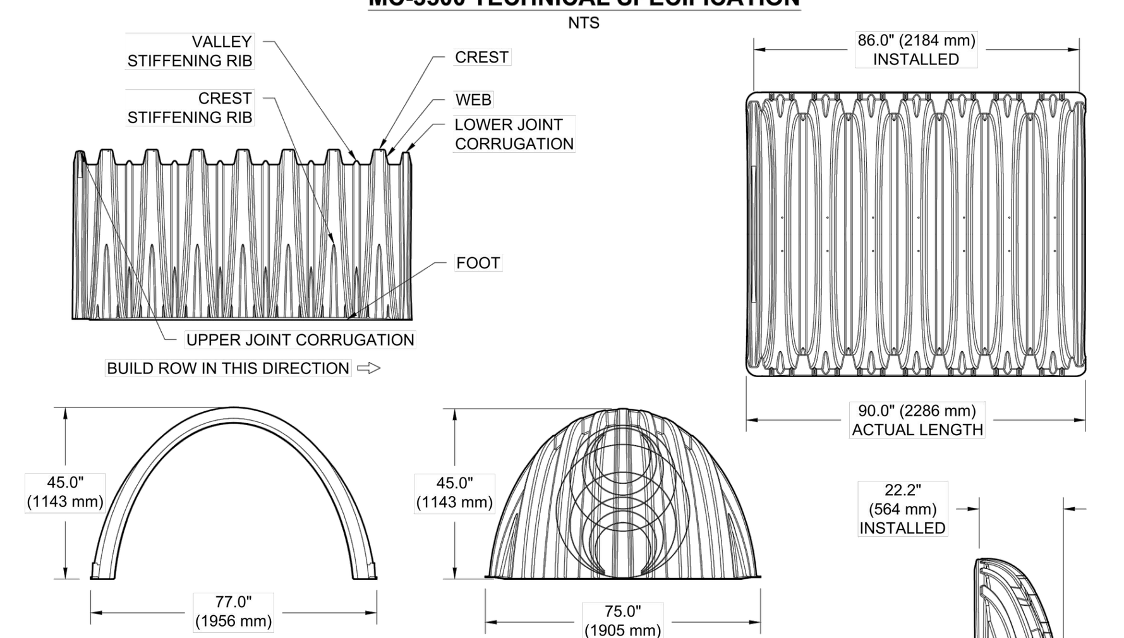
DATE:	07-2022
SCALE:	
PROJECT NUMBER:	20-363

PAGE: C500

MC-3500 TECHNICAL SPECIFICATION

NTS



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	77.0" X 45.0" X 86.0"	(1956 mm X 1143 mm X 2184 mm)
CHAMBER STORAGE	109.9 CUBIC FEET	(3.11 m³)
MINIMUM INSTALLED STORAGE*	175.0 CUBIC FEET	(4.96 m³)
WEIGHT	134 lbs.	(60.8 kg)

NOMINAL END CAP SPECIFICATIONS

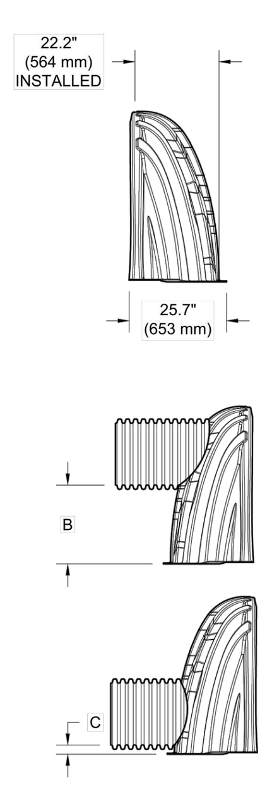
SIZE (W X H X INSTALLED LENGTH)	75.0" X 45.0" X 22.2"	(1905 mm X 1143 mm X 564 mm)
END CAP STORAGE	14.9 CUBIC FEET	(0.42 m³)
MINIMUM INSTALLED STORAGE*	45.1 CUBIC FEET	(1.28 m³)
WEIGHT	49 lbs.	(22.2 kg)

*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION, 6" (152 mm) STONE BETWEEN CHAMBERS, 6" (152 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY.

PARTIAL CUT HOLES AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PARTIAL CUT HOLES AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
END CAPS WITH A PREFABRICATED WELDED STUB END WITH "W"
END CAPS WITH A WELDED CROWN PLATE END WITH "C"

PART #	STUB	B	C
MC3500IEPP06T	6" (150 mm)	33.21" (844 mm)	---
MC3500IEPP06B		---	0.66" (17 mm)
MC3500IEPP08T	8" (200 mm)	31.16" (791 mm)	---
MC3500IEPP08B		---	0.81" (21 mm)
MC3500IEPP10T	10" (250 mm)	29.04" (738 mm)	---
MC3500IEPP10B		---	0.93" (24 mm)
MC3500IEPP12T	12" (300 mm)	26.36" (670 mm)	---
MC3500IEPP12B		---	1.35" (34 mm)
MC3500IEPP15T	15" (375 mm)	23.39" (594 mm)	---
MC3500IEPP15B		---	1.50" (38 mm)
MC3500IEPP18TC	18" (450 mm)	20.03" (509 mm)	---
MC3500IEPP18TW			
MC3500IEPP18BC		---	1.77" (45 mm)
MC3500IEPP18BW			
MC3500IEPP24TC	24" (600 mm)	14.48" (368 mm)	---
MC3500IEPP24TW			
MC3500IEPP24BC		---	2.06" (52 mm)
MC3500IEPP24BW			
MC3500IEPP30BC	30" (750 mm)	---	2.75" (70 mm)

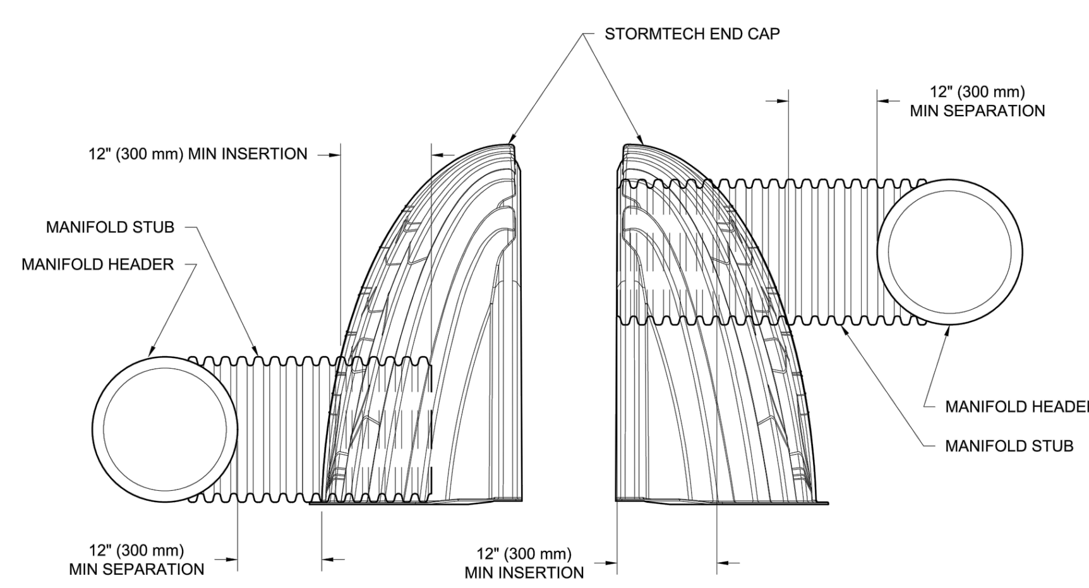
NOTE: ALL DIMENSIONS ARE NOMINAL



CUSTOM PARTIAL CUT INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS. CUSTOM INVERT LOCATIONS ON THE MC-3500 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm). THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHEST POSSIBLE FOR THE PIPE SIZE.

MC-SERIES END CAP INSERTION DETAIL

NTS



NOTE: MANIFOLD STUB MUST BE LAID HORIZONTAL FOR A PROPER FIT IN END CAP OPENING.

1592 TENTH LINE ROAD
ORLEANS, ON.
DATE: 11/04/20 DRAWN: RCT
PROJECT #: S293049 CHECKED: NPB

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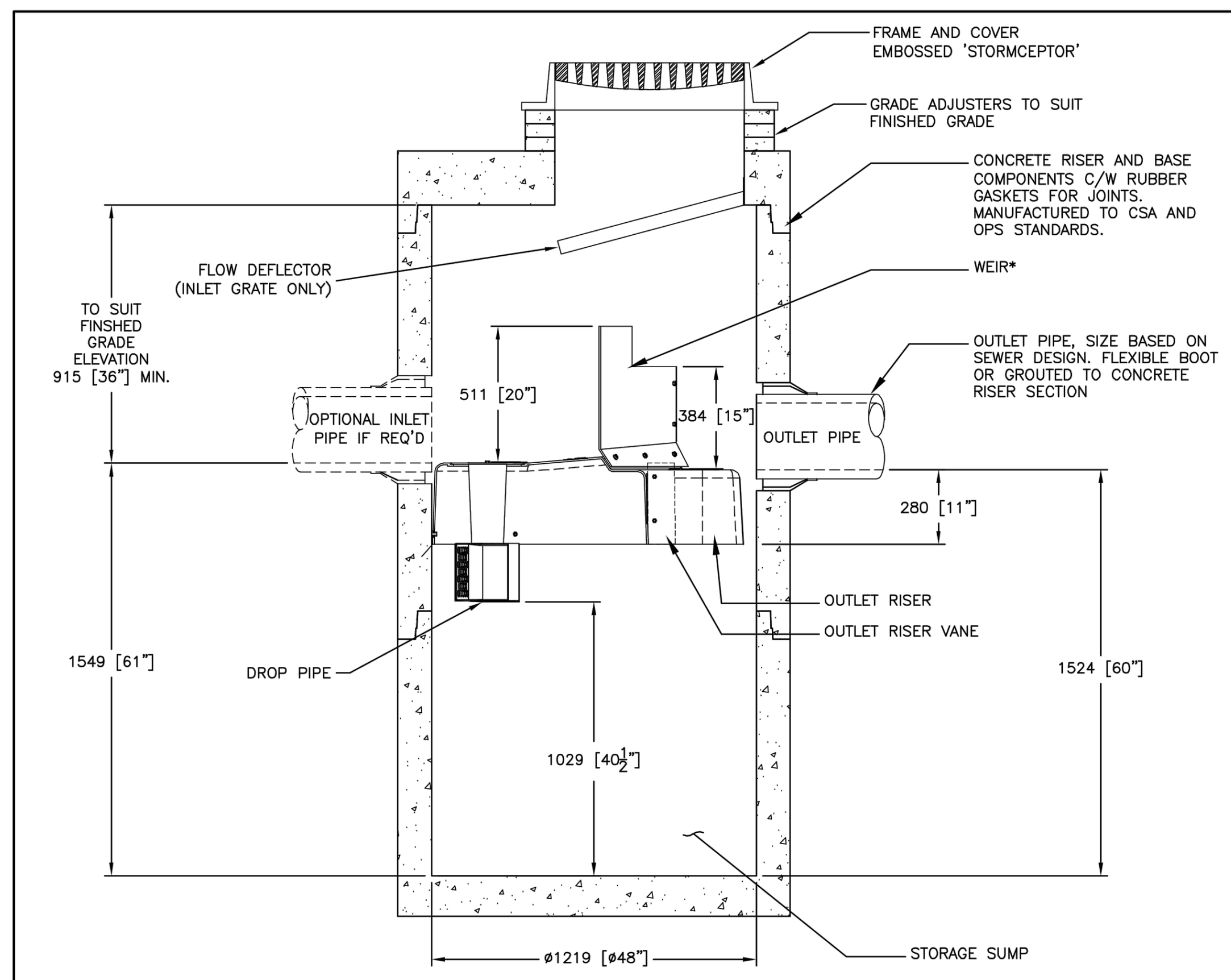
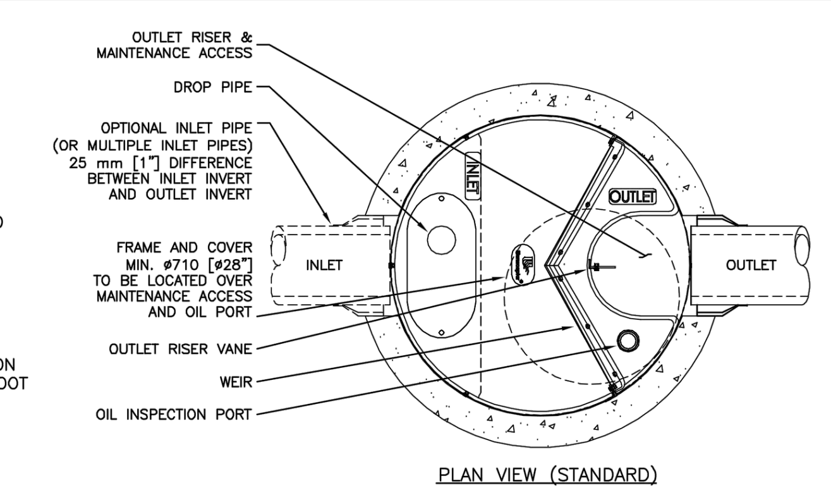
4640 TRUEMAN BLVD
HILLIARD, OH 43026

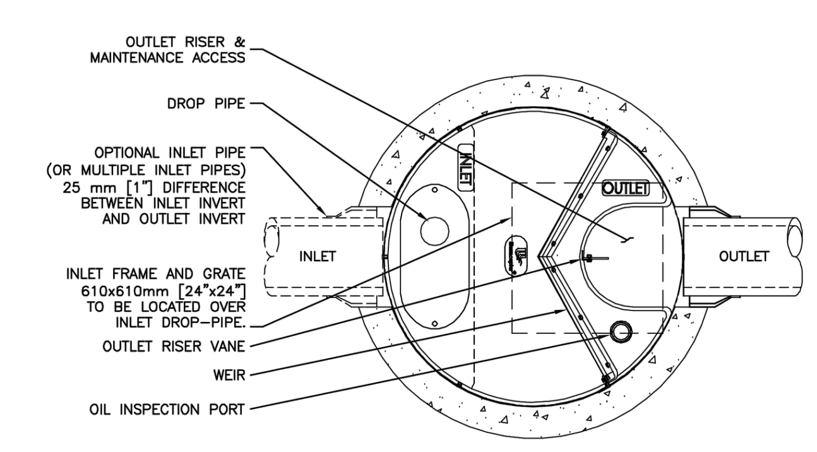
SHEET 5 OF 5



SECTION VIEW



PLAN VIEW (STANDARD)



PLAN VIEW (INLET TOP)

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

GENERAL NOTES:

* MAXIMUM SURFACE LOADING RATE (SLR) INTO LOWER CHAMBER THROUGH DROP PIPE IS 1135 L/min/m² (27.9 gpm/ft²) FOR STORMCEPTOR EF4 AND 535 L/min/m² (13.1 gpm/ft²) FOR STORMCEPTOR EFO4 (OIL CAPTURE CONFIGURATION). WEIR HEIGHT IS 150 mm (6 INCH) FOR EF04.

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

INSTALLATION NOTES

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

STANDARD DETAIL
NOT FOR CONSTRUCTION

SITE SPECIFIC DATA REQUIREMENTS

STORMCEPTOR MODEL	EF4				
STRUCTURE ID					*
WATER QUALITY FLOW RATE (L/s)					*
PEAK FLOW RATE (L/s)					*
RETURN PERIOD OF PEAK FLOW (yrs)					*
DRAINAGE AREA (HA)					*
DRAINAGE AREA IMPERVIOUSNESS (%)					*
PIPE DATA:	I.E.	MAT'L	DIA	SLOPE %	HGL
INLET #1	*	*	*	*	*
INLET #2	*	*	*	*	*
OUTLET	*	*	*	*	*

* PER ENGINEER OF RECORD

Stormceptor® EF
SCALE = NTS
imbrium® 7037 RIDGE ROAD, SUITE 350, HANOVER, MD 21076
DATE: 5/26/2017
DESIGNED: JSK DRAWN: JSK
CHECKED: BSF APPROVED: SP
PROJECT No.: EF4 SEQUENCE No.: *
SHEET: 1 OF 1

ENGINEERING STAMP

LICENSED PROFESSIONAL ENGINEER
G. L. BRUNET
100191036
06/14/2022
PROVINCE OF ONTARIO

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BLANCHARD LETENDRE ENGINEERING
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CLIENT:
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ORLEANS, ON

DRAWING:
DETAILS - 2

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