

SITE SERVICING AND STORMWATER MANAGEMENT REPORT

Project Address – 2380 & 2396 Cleroux Cres., Orleans, Ontario

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

By Blanchard Letendre Engineering Ltd.
Date – May 05, 2022
Our File Reference: 20-305

Previous Submission
October 14, 2020
February 04, 2022

TABLE OF CONTENTS

Table of Contents	2
Appendix Table.....	3
1.0 Introduction.....	4
2.0 Site Plan	4
3.0 STORM WATER MANAGEMENT.....	5
3.1 Existing Site Condition	5
3.2 Proposed Storm Water Management.....	5
3.3 Proposed Storm Water Management.....	6
3.4 Proposed Stormwater Quantity Control	6
3.4.1 Roof Drainage.....	7
3.4.2 Underground Chambers	7
3.5 Proposed Stormwater Quality Control.....	8
4.0 SANITARY SEWER DESIGN	8
4.1 Existing Site Conditions	8
4.2 Existing Site Conditions	8
5.0 WATER CONNECTION DESIGN.....	8
5.1 Existing Site Conditions	9
5.2 Proposed Domestic Water Service.....	9
5.3 Proposed Fire Demand.....	9
5.4 Water Capacity Comments	10
6.0 EROSION AND SEDIMENT CONTROL	10
7.0 CONCLUSION AND LIMITATION OF REPORT	10
7.1 Stormwater Management	10
7.2 Sanitary Service	10
7.3 Water Service.....	10
8.0 Limitation.....	11

APPENDIX TABLE

Appendix A – Stormwater Design

Appendix B – Sanitary Design

Appendix C – Watermain Design

Appendix D – Stormwater Underground Chamber & Stormwater Treatment Unit

Appendix E – Boundary Conditions

Appendix F – Engineering Drawings

1.0 INTRODUCTION

Blanchard Letendre Engineering Ltd. (BLEL) was retained by Bridor Development. to complete their site servicing and stormwater management for the new proposed site located at 2380 – 2396 Cleroux Crescent in Ottawa. This report summarized proposed site servicing and stormwater management and should be read in conjunction with the engineering drawings prepare by BLEL.

This report and site servicing plan have been prepared based on the site plan proposed by P-Square Concepts and the site survey completed by Annis O’Sullivan Vollebekk. The information contained herein is based on the provided drawings and if there is any discrepancy with the survey or site plan, BLEL should be informed in order to verify the information and complete the changes if required.

2.0 SITE PLAN

The proposed site is to be located in Orleans, Ontario. As per the aerial picture in figure 1, the existing site consist of and green space area with two (2) existing houses with garage that will be demolished prior to construction. The property located at 2380 – 2396 Cleroux Cres., consist of approximately 0.839ha of undeveloped land. The land will be developed with two (2) new residential apartments building with underground parking with shared entrance and parking.



Figure 1- Existing site at 2380 - 2396 Cleroux Cres. Orleans, Ontario

3.0 STORM WATER MANAGEMENT

3.1 Existing Site Condition

The existing site currently has no stormwater management nor storm service connection. The site currently drains uncontrolled towards the surrounding roads, Cleroux Crescent and Orient Park as where the stormwater generated from the site is captured by the road site catchbasin. The south-west corner of the property drains uncontrolled towards the neighbouring backyards. An existing city catchbasin is installed in the corner with captures and conveys the stormwater towards the existing storm stub in the south easement. The existing property naturally grades south towards the existing neighbourhood backyard. There is an existing subdivision adjacent to property on the west and south portions. 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 constructing two (2) new three (3) storeys residential buildings. The site will be modified by adding two (2) new 1016 square meter building, asphalt parking and driving and amenities areas. As the runoff coefficient will increase due to addition of hard surfaces, post-development stormwater quantity and quality will be implemented.

The site stormwater management has been prepared in correlation with the existing site grading. To minimize the fill and site work required, the stormwater management has been developed to follow the existing site grading. As the property naturally drains south towards the neighbour's backyard, the proposed site work has been prepared to limit the work at the south-west corner while maintaining the stormwater outlet to City storm sewer in the easement at the south end of the property. The overland flow route has also been designed to convey the storm runoff towards Oriental Park. By limiting the work at the south-west corner, where the biggest elevation drops occurs, the use of retaining walls near the neighbour's backyard won't be as intrusive.

The stormwater generated by the new hard surfaces will be directed to a series of catchbasins which will capture and convey the water runoff to existing the 300mm diameter storm sewer stub located in the easement at the south end portion of the property between 2492 and 2490 Orient Park Dr. 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 outlet will be controlled by an inlet control device and limit the flow outletting to City storm sewer in the easement. By throttling the flow, stormwater retention will be completed with the use of underground storage which was designed to hold the 100 year storm event. Refer to Appendix 'A' for the stormwater flow and storage calculations.

3.3 Proposed Storm Water Management

The pre-development flow of the 5-year storm was calculated using a 5-year storm and a 10-minute time of concentration for the affected area. The pre-development flow of the 100-year storm was calculated using a 100-year storm and a 10-minute time of concentration for the affected area. From intensity duration curves established for the Ottawa area, the intensity was evaluated at of 104.2 mm/hr for the 5yr predevelopment flow and 178.6mm/hr for the 100-year predevelopment flow. A run-off coefficient of 0.50 was used as per the evaluated, see Appendix 'A' – Pre-Development Drainage Area table.

Using the Rational Method and considering the tributary areas of the proposed (see Appendix 'A'), the pre-development allowable release rate for the site was evaluated at **102.08 L/s**. See also the Storm Sewer Design Sheet in Appendix 'A'.

$$\begin{aligned}\text{Allowable Release Rate (Q)} &= 2.78CIA \text{ (L/s)} \\ I_5 &= 998.071 / (Tc + 6.053)^{0.814} \\ C &= 0.50 \\ I &= 104.2 \text{ mm/hr} \\ Tc &= 10 \text{ min} \\ \text{Total} &= 0.839 \text{ ha} \\ \text{Allowable Release Rate} &= 121.53 \text{ L/s}\end{aligned}$$

As the site will outlet to the existing storm sewer stub located in the easement between 2492 and 2490 Orient Park Dr., the existing 300mm diameter sewer stub previously installed only has a full flow capacity of 96.70 L/s. As the proposed site will have some underground chambers, the release rate was lowered to 50% of the allowable release rate. Therefore, the site total release rate has been designed to meet the maximum flow of **60.76 L/s** to the existing 300mm diameter storm stub on Oriental Park.

3.4 Proposed Stormwater Quantity Control

The proposed stormwater management for the site will be achieved primarily through the use of underground pipe storage and infiltration gallery. The grading of the site has been designed to direct the stormwater towards the series of catchbasins connected to the underground stormwater chambers before outleting south into the existing 300mm diameter storm city stubs that ultimately connect to the 375mm sewer on Orient Park Dr. The proposed underground stormwater chambers and catchbasins are shown on the attached drawings in Appendix 'E'.

The proposed site has been graded to outlet overland onto Oriental Park Dr. on the south-east side of the property. As the site naturally grades from the north side to the south side, the grades have been adjusted to suit this profile and minimize the grade raise of the site. All catchment areas were

designed to directed the stormwater overland to a series of catchbasins, landscaping drains and subdrains which will capture and convey the stormwater to Oriental Park Dr.

The stormwater generated from site will be discharged to the existing storm sewer stub on Orient Park Dr. and be controlled using orifices plates installed in manhole MHCB02 and the landscape catchbasin, LCB14, which will throttle the flow direct to the municipal sewer. The combined flow restrictors will release a total of **58.53 L/s** with a maximum head of 1.92m (HWL = 80.22) at MHCB02 and 0.86m (HWL = 76.65) at LCB14 during the 100 year event. As the flow will be restricted stormwater storage will be required. A total of 70.82m³ is required for the watershed 05 and 175.65m³ is for the remaining watersheds. This storage will be provided with underground stormwater chambers and infiltration gallery as the property natural slopes does not promote overland storage. The underground storage and infiltration gallery have been designed to hold and convey the stormwater water to the sewer located at in the easement on Oriental Park. Using a void area of 40% in the gravel, the infiltration gallery will provide a total of 73.8 m³ and the underground chambers will provide 176 m³ which will hold more than the required storage. Refer to the underground chambers in Appendix 'D'.

The two (2) underground parking ramp will be drained with separate catchbasin that will capture and convey the storm water generated from the ramps to the storm sewer downstream of the inlet control devices. These areas were left uncontrolled towards the city main stub.

3.4.1 Roof Drainage

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

3.4.2 Underground Chambers

The underground storage chambers have been designed to hold and convey the stormwater generated from area A1, A2, A3, A4, A6, A9 and A10. Area A6 is being captured by three landscape catchbasins and a subdrain. The underground chambers have been designed to hold the stormwater runoff under the proposed parking/ driving area. The chambers, which have been designed as per the manufacturer, were designed to also provide some filtration which is favorable for the final site TSS. A total of 176.00 m³ will be provided by the underground chambers. The chambers will be connected to the proposed manhole catchbasin which will facilitates the maintenance of the chambers. The maintenance of the chambers is to be in accordance with the manufacture. Refer to Appendix "D" for Stormwater Storage Chambers.

3.4.3 Infiltration Gallery

The infiltration gallery has been design to hold and convey the stormwater generated from the site area A5. The infiltration gallery has been designed to hold the stormwater runoff generated from the grass area that drains towards the adjacent property south. The infiltration gallery will have a total length of 82m and stretch all along the south portion of the property. The infiltration gallery volume was calculated using an area of 1.5m heigh by 1.5m wide with a void ration of 40%. A total of 73.80 m³ will be provided by the infiltration gallery. The infiltration gallery will be connected to the proposed manhole catchbasin manhole MH01.

3.5 Proposed Stormwater Quality Control

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

4.0 SANITARY SEWER DESIGN

4.1 Existing Site Conditions

The existing site is currently being service by a two separate residential service connected to the the houses on the two parcels which are connected to the existing 250mm diameter sanitary on Cleroux Crescent. The existing connection will be abandoned at the property line as the new connections will be completed at the north end portion of the property where and existing sanitary stub was previously installed in the city right away between 2492 and 2490 Orient Park Dr.

4.2 Existing Site Conditions

The two new residential apartment building, which proposes 40 units each will discharge to the city main sewer stub on Orient Park Dr. via two new 150mm diameter sanitary services connected to the 200mm diameter sewer proposed between the two new buildings. The services will be discharged into the new sewer before being conveyed north to the existing 250mm diameter sanitary stub in the city easement between 2492 and 2490 Orient Park Dr. The proposed 150mm diameter service will be installed at a minimum of 1.00% slope directly to the new private sewer. A monitoring manhole is proposed at the sanitary stub which will also be a drop structure considering the change in elevation on the property. Refer to drawing C300 – Site Servicing Plan for the existing and proposed sanitary service.

Based on the City of Ottawa Sanitary Design Guidelines, the sanitary peak loads were evaluated as follow; Block A: **1.15 L/s** and Block B: **1.12L/s** for a total of **2.27 L/s** which is below the allowable flow of 7.0L/s as per the City of Ottawa property boundaries. As per the City specific design parameters, the sanitary flow was evaluated based on the new building footprint and the total site area for each individual building. Refer to Appendix 'B' for the sanitary sewer design calculation and design parameters set by the City of Ottawa.

5.0 WATER CONNECTION DESIGN

5.1 Existing Site Conditions

The existing site is currently being service by a two separate 19mm diameter water service which services the existing two houses on the parcels and are connected to the existing 305mm diameter watermain on Cleroux Crescent. The existing connection will be removed and where two new connection will be installed to service the two new buildings. There is currently two (2) city fire hydrant, one (1) at the south façade of the property and the other at the north-west. The hydrants on south is located on the north side of Cleroux Crescent and the other is located on the north side of Orient Park Dr, both within the 90m radius from the building 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/c/d** was applied to the population of the new building. The daily and hourly peak factor of **2.5** and **2.2** respectively were applied to the water demand as stated in the City of Ottawa guideline. By using the average demand and peaking factors, the daily water demand for the new buildings were evaluated as follow:

	BLOCK A	BLOCK B	UNITS
Average Water Demand =	22050.00	22540.00	L/d
Maximum Daily =	55125.00	56350.50	L/d
Maximum Hourly =	121275.00	123970.50	L/d
Total Domestic Flow =	1.40	1.43	L/s
Total Fire Flow =	166.67	161.67	L/s

Refer to Appendix ‘C’ for the water flow calculation sheet.

The proposed buildings will be serviced with a new 100mm water service that will be connected to the existing 305mm watermain on Cleroux Crescent. The two new building will be connected to the new 100mm service via separate 50mm diameter water service. Each service will connect into the proposed mechanical room of the buildings. As per the City standard, two water service will be teed off the existing watermain on Cleroux with an isolation valve in between to allow maintenance on the city watermain without interrupting the water for the site.

5.3 Proposed Fire Demand

As the new residential buildings will not have a sprinkler system, the new services were sized to supply only the domestic flow. Based on the Ontario building code calculations, the water flow

was evaluated at **166.67L/s** for Block A and **161.67L/s** for Block B. Refer to Appendix 'C' for the fire flow calculation sheet. As there is two existing water hydrants located within the 90m radius from the building main entrances, there will be no new private hydrant installed on the property.

5.4 Water Capacity Comments

The boundary conditions and HGL for hydraulic analysis for 2396 Cleroux Crescent was obtained from the city. See attached copy in Appendix 'E'. From the boundary conditions, the minimum HGL was evaluated at 131.0 m for the water main elevation at 83.2m and a maximum pressure estimate of 67.8 psi.

6.0 EROSION AND SEDIMENT CONTROL

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

7.0 CONCLUSION AND LIMITATION OF REPORT

7.1 Stormwater Management

The stormwater management proposed for the site will maintain the site to its pre-development release rate conditions and meet the requirements from the City of Ottawa. The post development release rate will be maintained to its pre-development rate of **60.76 L/s** through flow restrictors installed in the sewers before outletting to the sewer main on Oriental Park. Stormwater quantity control will be achieved with 176m³ of underground chamber and 73.8 m³ in the infiltration gallery. The stormwater quality control will be met through the use of a stormwater treatment unit and isolator rows in the underground chambers.

7.2 Sanitary Service

The current site will be serviced with three new 200mm sanitary sewer located in the easement south of the property. The estimated sanitary flow of; Block A: **1.15 L/s** and Block B: **1.12L/s** a for the new connections will be directed to the existing sanitary sewer along the easement of Oriental Park.

7.3 Water Service

Currently the existing buildings on site are serviced with an existing 19mm diameter water service that will be replaced with a 100mm diameter water services to connected to the existing 305mm diameter main on Cleroux Crescent. The existing connections will be removed. The water demand for building was evaluated at: Block A: **1.40 L/s** and Block B: **1.43L/s** and the fire flow demand

at Block A: **166.67 L/s** and Block B: **161.67 L/s**. Sprinkler system are not proposed for the site. There is also two (2) fire located around the property within 90m from every entrance doors.

8.0 LIMITATION

This report was prepared for **Bridor Development.**, and is only applicable for the property at 2380-2396 Cleroux Crescent, Ottawa.

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

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

Sincerely Yours,



Guillaume Brunet, P. Eng.

APPENDIX “A”

Stormwater Management Design

File No.	20-305	Date:	May 5, 2022
Project:	Proposed Apartment Buildings	Designed:	Guillaume Brunet
Project Address:	2396 Cleroux Crescent, Ottawa	Checked:	Guillaume Brunet
Client:	Bridor Development	Drawing Reference:	C200 & C300

PRE-DEVELOPMENT DRAINAGE AREA (AFFECTED AREA)

Catchment Area	Runoff Coefficient			Total Area (ha)	Combined C
	C = 0.3	C = 0.80	C = 0.90		
E-01	0.671	0.000	0.168	0.839	0.42
TOTAL	0.671	0.000	0.168	0.839	0.42

POST-DEVELOPMENT DRAINAGE AREA

Catchment Area	Runoff Coefficient			Total Area (ha)	Combined C
	C = 0.30	C = 0.80	C = 0.90		
WS-01	0.074	0.000	0.011	0.085	0.38
WS-02	0.033	0.000	0.070	0.103	0.71
WS-03	0.021	0.000	0.060	0.081	0.74
WS-04	0.015	0.000	0.063	0.078	0.78
WS-05	0.200	0.000	0.020	0.220	0.35
WS-06	0.052	0.000	0.000	0.052	0.30
WS-07- Ramp	0.000	0.000	0.005	0.005	0.90
WS-08 - Ramp	0.000	0.000	0.013	0.013	0.90
WS-09 - Roof	0.000	0.000	0.102	0.102	0.90
WS-10 - Roof	0.000	0.000	0.102	0.102	0.90
TOTAL	0.395	0.000	0.444	0.839	0.62

RUNOFF COEFFICIENT (C)

Grass	0.30
Gravel	0.80
Asphalt / rooftop	0.90

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STORM WATER MANAGEMENT DESIGN SHEET
SEWER DESIGN

LOCATION		AREA (ha)			FLOW					STORM SEWER DATA								
WATERSHED / STREET	From MH	To MH	C = 0.30	C = 0.80	C = 0.90	Indiv. 2.78AC	Accum. 2.78AC	Time of Conc. (min.)	Rainfall Intensity (mm/hr)	Peak Flow Q (l/s)	Pipe Diameter (mm)	Type	Slope (%)	Length (m)	Capacity Full (L/s)	Velocity Full (m/s)	Time of Flow (min.)	Ratio (Q/Q _{FULL})
WS-06	LCB10	MHCB08	0.052	0.000	0.000	0.03	0.03	10.00	104.19	3.01	250	PVC	0.40%	20.8	37.6	0.77	0.45	0.08
	MHCB08	MHCB02	0.000	0.000	0.000	0.00	0.03	10.45	101.86	2.95	250	PVC	1.00%	16.0	59.47	1.21	0.22	0.05
	LCB13	MHCB06	0.000	0.000	0.000	0.00	0.00	10.00	104.19	0.00	250	PVC	0.40%	18.0	37.6	0.77	0.39	0.00
WS-01	LCB12	LCB07	0.000	0.000	0.000	0.00	0.00	10.00	104.19	0.00	250	PVC	0.25%	31.0	29.73	0.61	0.85	0.00
	LCB07	MHCB06	0.074	0.000	0.011	0.07	0.07	10.85	99.89	6.83	250	PVC	0.40%	15.5	37.61	0.77	0.34	0.18
	MHCB06	MHCB05	0.000	0.000	0.000	0.00	0.07	11.19	98.30	6.72	250	PVC	1.00%	19.3	59.47	1.21	0.27	0.11
WS-02 + WS-10	MHCB05	MHCB04	0.033	0.000	0.172	0.45	0.52	11.46	97.09	50.18	250	PVC	1.00%	14.7	59.5	1.21	0.20	0.84
WS-03 + WS-09	MHCB04	MHCB03	0.021	0.000	0.162	0.42	0.93	11.66	96.18	89.70	450	PVC	0.25%	21.0	142.6	0.90	0.39	0.63
WS-04	MHCB03	MHCB02	0.015	0.000	0.063	0.17	1.10	12.05	94.49	103.80	450	PVC	0.25%	21.5	142.55	0.90	0.40	0.73
	MHCB02	MHCB01	0.000	0.000	0.000	0.00	1.10	12.45	92.82	101.97	450	PVC	1.00%	7.6	285.11	1.79	0.07	0.36
WS-05	LCB14	MHCB01	0.200	0.000	0.020	0.16	1.29	12.52	92.54	119.25	250	PVC	1.00%	9.2	59.47	1.21	0.13	2.01
	MHCB01	STORMCEPTOR	0.000	0.000	0.000	0.00	1.29	12.65	92.03	118.59	300	PVC	1.00%	3.2	96.70	1.37	0.04	1.23
	STORMCEPTOR	CITY	0.000	0.000	0.000	0.00	1.29	12.68	91.87	118.39	300	PVC	1.00%	16.1	96.7	1.37	0.20	1.22

DESIGN PARAMETERS NOTES

Runoff Coefficient (C)
 Grass 0.30
 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
 $I_t = 998.071 / (T_c + 6.053)^{0.814}$
 Min. velocity = 0.76 m/s
 Manning's "n" = 0.013
 * From City of Ottawa Stub in Easement

File No. 20-305
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Client: Bridor Development

Date: May 5, 2022
Designed: Guillaume Brunet
Checked: Guillaume Brunet
Drawing Reference: C200 & C300

STORM WATER MANAGEMENT DESIGN SHEET
SEWER DESIGN

LOCATION		MANHOLE INFORMATION						
From MH	To MH	Up Invert (m)	Down Invert (m)	T/G Up Stream (m)	T/G Down Stream	Up Depth obv (m)	Down Depth obv (m)	Up Depth inv (m)
LCB10	MHCB08	78.54	78.45	81.80	80.20	3.01	1.50	3.01
MHCB08	MHCB02	78.21	78.05	80.20	80.71	1.74	2.41	1.74
LCB13	MHCB06	80.37	80.29	82.42	82.75	1.80	2.21	1.80
LCB12	LCB07	81.23	81.16	82.40	82.60	0.92	1.19	0.92
LCB07	MHCB06	80.36	80.29	82.60	82.75	1.99	2.21	1.99
MHCB06	MHCB05	80.09	79.90	82.75	82.20	2.41	2.05	2.41
MHCB05	MHCB04	79.62	79.42	82.20	81.90	2.33	2.23	2.33
MHCB04	MHCB03	78.46	78.41	81.90	81.30	2.99	2.44	3.19
MHCB03	MHCB02	78.35	78.30	81.30	80.71	2.50	1.96	2.50
MHCB02	MHCB01	76.08	76.00	80.71	78.20	4.18	1.75	4.18
LCB14	MHCB01	75.24	75.15	76.65	78.20	1.16	2.80	1.41
MHCB01	STORMCEPTOR	74.91	74.88	78.20	78.00	2.99	2.82	3.29
STORMCEPTOR	CITY	74.82	74.73	78.00	77.40	2.88	2.37	2.88

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STORM WATER MANAGEMENT DESIGN SHEET
5 YEAR STORM EVENT

PRE-DEVELOPMENT STORMWATER MANAGEMENT

Runoff	Catchment Area	Area		ΣR_s
Un-Controlled	EWS-01	0.839	ha	R= 0.42
	Total Uncontrolled =	0.839	ha	$\Sigma R = 0.42$

PRE-DEVELOPMENT ALLOWABLE RELEASE RATE

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

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

C =	0.50	up to a maximum of 0.5 as per City of Ottawa Sewer Design Guidelines
I =	104.2	mm/hr
T _c =	10	min
Total =	0.839	ha
Allowable Release Rate=	121.53	L/s

Allowable Release Rate= 96.70 L/s * As per City 300mm Diameter Stub installed at 1.00%

Allowable Release Rate= 60.76 L/s * 50% of Pre-Development Flow due to underground storage

POST-DEVELOPMENT STORMWATER MANAGEMENT

Runoff	Catchment Area	Area		ΣR_s	ΣR_{100}
Controlled	WS-01	0.085	ha	R= 0.38	0.47
	WS-02	0.103	ha	R= 0.71	0.89
	WS-03	0.081	ha	R= 0.74	0.93
	WS-04	0.078	ha	R= 0.78	0.98
	WS-05	0.220	ha	R= 0.35	0.44
	WS-06	0.052	ha	R= 0.30	0.38
	WS-09 - Roof	0.102	ha	R= 0.90	1.00
	WS-10 - Roof	0.102	ha	R= 0.90	1.00
	Total Controlled =	0.822	ha	$\Sigma R = 0.61$	0.73
	Un-controlled	WS-07 - Ramp	0.005	ha	R= 0.90
WS-08 - Ramp		0.013	ha	R= 0.90	1.00
Total Un-Controlled =		0.017	ha	$\Sigma R = 0.90$	1.00

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

* WS-09 will not be accounted for as it will remain unaffected

Time (min)	Intensity (mm/hr)	REQUIRED STORAGE (A1, A2, A3, A4, A6, A9, A10)			REQUIRED STORAGE (A5)			Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
		Controlled Runoff (L/s)	Storage Volume (m ³)	Controlled Release Rate (L/s)	Controlled Runoff (L/s)	Storage Volume (m ³)	Controlled Release Rate (L/s)		
10	104.2	127.97	64.78	20.00	28.24	0.00	39.46	1.30	60.76
15	83.6	102.63	74.37	20.00	22.65	0.00	39.46	1.05	21.05
20	70.3	86.29	79.54	20.00	19.04	0.00	39.46	0.88	20.88
25	60.9	74.80	82.19	20.00	16.51	0.00	39.46	0.76	20.76
30	53.9	66.24	83.22	20.00	14.62	0.00	39.46	0.67	20.67
35	48.5	59.59	83.14	20.00	13.15	0.00	39.46	0.61	20.61
40	44.2	54.27	82.25	20.00	11.98	0.00	39.46	0.55	20.55
45	40.6	49.90	80.73	20.00	11.01	0.00	39.46	0.51	20.51
50	37.7	46.25	78.74	20.00	10.21	0.00	39.46	0.47	20.47
60	32.9	40.46	73.66	20.00	8.93	0.00	39.46	0.41	20.41
70	29.4	36.08	67.52	20.00	7.96	0.00	39.46	0.37	20.37
80	26.6	32.62	60.60	20.00	7.20	0.00	39.46	0.33	20.33
90	24.3	29.83	53.09	20.00	6.58	0.00	39.46	0.30	20.30
500	6.3	7.71	0.00	20.00	1.70	0.00	39.46	0.08	20.08
720	4.7	5.75	0.00	20.00	1.27	0.00	39.46	0.06	20.06
1440	2.7	3.28	0.00	20.00	0.72	0.00	39.46	0.03	20.03

Storage Volume = (Controlled Runoff - Controlled RR)/1000 * (Time*60s)

STORMWATER STORAGE REQUIREMENTS

Total Storage Required =	83.22 m ³
Underground Chambers =	176.00 m ³
Total Available Storage =	175.00 m³

Total Storage Required =	0.00 m ³
Infiltration Gallery =	73.80 m ³
Total Available Storage =	73.80 m³

Inlet Control Device Parameters

Product Orifice Plate	at MHCB 02
Invert Level = 78.30	masl.
HWL = 1.92	m from inv.
HWL = 80.22	masl.
Orifice Dia. = 82	mm
Orifice Invert = 78.30	masl.
Orifice Area = 0.0053	m ²
ICD Centerline = 78.45	masl.
HWL Head = 1.91	m from centerline
C = 0.61	
Controlled Release = 20.00	L/s

Inlet Control Device Parameters

Product Orifice Plate	at LCB14
Invert Level = 75.74	masl.
HWL = 0.86	m from inv.
HWL = 76.60	masl.
Orifice Dia. = 142	mm
Orifice Invert = 75.74	masl.
Orifice Area = 0.0158	m ²
ICD Centerline = 75.89	masl.
HWL Head = 0.84	m from centerline
C = 0.61	
Controlled Release = 39.46	L/s

File No. 20-305
Project: Proposed Apartment Buildings
Project Address: 2396 Cleroux Crescent, Ottawa
Client: Bridor Development

Date: May 5, 2022
Designed: Guillaume Brunet
Checked: Guillaume Brunet
Drawing Reference: C200 & C300

**STORM WATER MANAGEMENT DESIGN SHEET
100 YEAR STORM EVENT**

PRE-DEVELOPMENT STORMWATER MANAGEMENT

Runoff	Catchment Area	Area			ΣR _s
Un-Controlled	EWS-01	0.839	ha	R=	0.42
	Total Uncontrolled =	0.839	ha	Σ R=	0.42

PRE-DEVELOPMENT ALLOWABLE RELEASE RATE

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

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

C = 0.50 up to a maximum of 0.5 as per City of Ottawa Sewer Design Guidelines
I = 104.2 mm/hr
T_c = 10 min
Total = 0.839 ha
Allowable Release Rate = 121.53 L/s

Release Rate = 96.70 L/s * As per City 300mm Diameter Stub installed at 1.00%

Allowable Release Rate = 60.76 L/s * 50% of Pre-Development Flow due to underground storage

POST-DEVELOPMENT STORMWATER MANAGEMENT

Runoff	Catchment Area	Area			ΣR _s	ΣR ₁₀₀
Controlled	WS-01	0.085	ha	R=	0.38	0.47
	WS-02	0.103	ha	R=	0.71	0.89
	WS-03	0.081	ha	R=	0.74	0.93
	WS-04	0.078	ha	R=	0.78	0.98
	WS-05	0.220	ha	R=	0.35	0.44
	WS-06	0.052	ha	R=	0.30	0.38
	WS-09 - Roof	0.102	ha	R=	0.90	1.00
	WS-10 - Roof	0.102	ha	R=	0.90	1.00
	Total Controlled =	0.822	ha	Σ R=	0.61	0.73
Un-controlled	WS-07 - Ramp	0.005	ha	R=	0.90	1.00
	WS-08 - Ramp	0.013	ha	R=	0.90	1.00
	Total Un-Controlled =	0.017	ha	Σ R=	0.90	1.00

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

Time (min)	Intensity (mm/hr)	REQUIRED STORAGE (A1, A2, A3, A4, A6, A9, A10)			REQUIRED STORAGE (A5)			Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
		Controlled Runoff (L/s)	Storage Volume (m ³)	Controlled Release Rate (L/s)	Controlled Runoff (L/s)	Storage Volume (m ³)	Controlled Release Rate (L/s)		
10	178.6	219.31	119.59	20.00	48.40	70.82	38.53	2.23	60.76
15	142.9	175.51	139.96	20.00	38.73	1.70	38.53	1.79	21.79
20	120.0	147.33	152.79	20.00	32.51	0.00	38.53	1.50	21.50
25	103.8	127.55	161.32	20.00	28.15	0.00	38.53	1.30	21.30
30	91.9	112.84	167.11	20.00	24.90	0.00	38.53	1.15	21.15
35	82.6	101.43	171.00	20.00	22.38	0.00	38.53	1.03	21.03
40	75.1	92.30	173.51	20.00	20.37	0.00	38.53	0.94	20.94
45	69.1	84.81	174.99	20.00	18.72	0.00	38.53	0.86	20.86
50	64.0	78.55	175.65	20.00	17.33	0.00	38.53	0.80	20.80
60	55.9	68.65	175.15	20.00	15.15	0.00	38.53	0.70	20.70
90	41.1	50.49	164.67	20.00	11.14	0.00	38.53	0.51	20.51
120	32.9	40.40	146.90	20.00	8.92	0.00	38.53	0.41	20.41
360	13.7	16.85	0.00	20.00	3.72	0.00	38.53	0.17	20.17
500	10.5	12.92	0.00	20.00	2.85	0.00	38.53	0.13	20.13
720	7.8	9.61	0.00	20.00	2.12	0.00	38.53	0.10	20.10

Storage Volume = (Controlled Runoff - Controlled RR)/1000 * (Time*60s)

STORMWATER STORAGE REQUIREMENTS

Total Storage Required = 175.65 m³
Underground Chambers = 176.00 m³
Total Available Storage = 175.00 m³

Total Storage Required = 70.82 m³
Infiltration Gallery = 73.80 m³
Total Available Storage = 73.80 m³

Inlet Control Device Parameters

Product Orifice Plate at MHCB 02
Invert Level = 78.30 masl.
HWL = 1.92 m from inv.
HWL = 80.22 masl.
Orifice Dia. = 82 mm
Orifice Invert = 78.30 masl.
Orifice Area = 0.0053 m²
ICD Centerline = 78.45 masl.
HWL Head = 1.91 m from centerline
C = 0.61
Controlled Release = 20.00 L/s

Inlet Control Device Parameters

Product Orifice Plate at LCB14
Invert Level = 75.74 masl.
HWL = 0.86 m from inv.
HWL = 76.60 masl.
Orifice Dia. = 142 mm
Orifice Invert = 75.74 masl.
Orifice Area = 0.0158 m²
ICD Centerline = 75.89 masl.
HWL Head = 0.84 m from centerline
C = 0.61
Controlled Release = 39.46 L/s

APPENDIX “B”

Sanitary Design

File No. 20-305
Project: Proposed Apartment Buildings
Project Address: 2396 Cleroux Crescent, Ottawa
Client: Bridor Development

Date: May 5, 2022
Designed: Guillaume Brunet
Checked: Guillaume Brunet
Drawing Reference: C200 & C300

SANITARY DESIGN SHEET
SEWER DESIGN

LOCATION			RESIDENTIAL AREA AND POPULATION						COMMERCIAL		INDUSTRIAL			INSTITUTIONAL		C+I+I	INFILTRATION			TOTAL FLOW	PIPE						MANHOLE	
STREET	FROM MH	TO MH	AREA (Ha)	POP.	CUMMULATIVE		PEAK FACT.	PEAK FLOW (l/s)	AREA (Ha)	ACCU. AREA (Ha)	AREA (Ha)	ACCU. AREA (Ha)	PEAK FACT.	AREA (Ha)	ACCU. AREA (Ha)	PEAK FLOW (l/s)	TOTAL AREA (Ha)	ACCU. AREA (Ha)	INFILT. FLOW (l/s)	TOTAL FLOW (l/s)	LENGTH (m)	DIA. (mm)	MATERAIL	SLOPE (%)	CAP. (FULL) (l/s)	VEL. (FULL) (m/s)	UP INVERT (m)	DOWN INVERT (m)
					AREA (Ha)	POP.																						
SITE	PROP. BLDG A	SAN MH02	0.450	63.0	0.45	63.0	4.0	1.02	0.000	0.000	0.00	0.00	7.0	0.0	0.0	0.00	0.45	0.45	0.13	1.15	8.4	150	PVC	2.00%	21.54	1.22	78.67	78.50
SITE	PROP. BLDG B	SAN MH02	0.389	62.3	0.39	62.3	4.0	1.01	0.000	0.000	0.00	0.00	7.0	0.0	0.0	0.00	0.39	0.39	0.11	1.12	17.4	150	PVC	2.00%	21.54	1.22	78.85	78.50
	SAN MH02	SAN MH01	0.000	0.0	0.84	125.3	4.0	2.03	0.000	0.000	0.00	0.00	7.0	0.0	0.0	0.00	0.00	0.84	0.23	2.27	65.3	200	PVC	1.20%	35.93	1.14	76.38	75.60

DESIGN PARAMETERS NOTES

Average Daily Flow = 350 L/p/day
 Commercial and Institutional Flow = 50000 L/ha/da
 Industrial Flow = 35000.00 L/ha/da
 Maximum Residential Peak Flow = 4
 Connection and Institutional Peak Factor = 1.5

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

Appartments:
 Bachelor = 1.4
 1 Bedroom = 1.4 30 28
 2 Bedroom = 2.1 10 12
 3 Bedroom = 3.1

APPENDIX “C”

Watermain Design

File No.	20-305	Date:	19/03/2021
Project:	Proposed Apartment Buildings	Designed:	Guillaume Brunet
Project Address:	2396 Cleroux Crescent, Ottawa	Checked:	Guillaume Brunet
Client:	Bridor Development	Drawing Reference:	C200 & C300

WATER CONSUMPTION CALCULATION

	BLOCK A	BLOCK B	
Total Building Floor Area =	1016	1016	m ²
Site Total Area =	0.4195	0.4195	ha
Total Population =	63.00	64.40	ea.
Average Demand Per People =	350	350	L/c/d
Average Water Demand =	22050.00	22540.00	L/d
Maximum Daily Peak Factor =	2.5	2.5	* As per City of Ottawa
Maximum Daily Residential =	55125.00	56350.00	L/d
Maximum Hourly Peak Factor =	2.2	2.2	* As per City of Ottawa
Maximum Hourly Residential =	121275.00	123970.00	L/d
Total Domestic Flow =	1.40	1.43	L/s
Total Fire Flow =	166.67	161.67	L/s

Apartments:	Person Per Unit	Building A	Building B
Bachelor =	1.4	0	0
1 Bedroom =	1.4	30	28
2 Bedroom =	2.1	10	12
3 Bedroom =	3.1	0	0
		63.00	64.40

BLOCK A	1 Bedroom	2 Bedroom	Unit Counts	WSFU	Total
Unrinal Flush Tank	1	1	40	2	80
Sinks	2	2	80	1	80
Bathub	1	1	40	4	160
Diswasher	1	1	40	1.5	60
Washing Machine	1	1	40	2	80
Total					460

BLOCK B	1 Bedroom	2 Bedroom	Unit Counts	WSFU	Total
Unrinal Flush Tank	1	1	40	2	80
Sinks	2	2	80	1	80
Bathub	1	1	40	4	160
Diswasher	1	1	40	1.5	60
Washing Machine	1	1	40	2	80
Total					460

File No.	20-305	Date:	18/02/2021
Project:	Proposed Apartment Buildings	Designed:	Guillaume Brunet
Project Address:	2396 Cleroux Crescent, Ottawa	Checked:	Guillaume Brunet
Client:	Bridor Development	Drawing Reference:	C200 & C300

BLOCK A

Term	Options	Multiplier	Choose:	Value	unit	Fire Flow		
Coefficient C related to the type of construction	Wood Frame	1.5	Non-combustible construction	0.8				
	Ordinary Construction	1.0						
	Non-combustible construction	0.8						
	Fire resistive construction <2 hrs	0.7						
	Fire resistive construction >2 hrs	0.6						
Type of housing	Single family dwelling	0	Building - no. of units per floor	14	unit			
	Townhouse - no. of units	0						
	Building - no. of units per floor	0						
	Number of floors excluding the basement					3	floor	
	Floor space per unit	1				1,016	1,016	sq.m.
Required fire flow	Fire Flow = 220 x C x Area^{0.5}				L/min	9,717		
					L/s	162		
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	8,259	
	Rapid burning	0.25				L/s	138	
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	7,433		
	Fully supervised system	-0.10	True	-0.1	L/s	124		
Exposure distance between units	North side	Over 45m	0					
	East side	20.1 to 30m	0.1					
	South side	20.1 to 30m	0.1		L/min	10,035		
	West side	10.1 to 20m	0.15	0.35	L/s	167		
Minimum required fire flow rate (rounded to nearest 100)					L/min	10,000		
Minimum required fire flow rate					L/s	167		
Required duration of fire flow					min	30		

File No.	20-305	Date:	19/03/2021
Project:	Proposed Apartment Buildings	Designed:	Guillaume Brunet
Project Address:	2396 Cleroux Crescent, Ottawa	Checked:	Guillaume Brunet
Client:	Bridor Development	Drawing Reference:	C200 & C300

BLOCK B

Term	Options	Multiplier	Choose:	Value	unit	Fire Flow		
Coefficient C related to the type of construction	Wood Frame	1.5	Non-combustible construction	0.8				
	Ordinary Construction	1.0						
	Non-combustible construction	0.8						
	Fire resistive construction <2 hrs	0.7						
	Fire resistive construction >2 hrs	0.6						
Type of housing	Single family dwelling	0	Building - no. of units per floor	14	unit			
	Townhouse - no. of units	0						
	Building - no. of units per floor	0						
	Number of floors excluding the basement						3	floor
	Floor space per unit	1					1,016	1,016
Required fire flow	Fire Flow = 220 x C x Area^{0.5}				L/min	9,717		
					L/s	162		
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	8,259
	Rapid burning	0.25					L/s	138
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	7,433		
	Fully supervised system	-0.10	True	-0.1	L/s	124		
Exposure distance between units	North side	Over 45m	0					
	East side	20.1 to 30m	0.1					
	South side	20.1 to 30m	0.1		L/min	9,663		
	West side	20.1 to 30m	0.1	0.3	L/s	161		
Minimum required fire flow rate (rounded to nearest 100)					L/min	9,700		
Minimum required fire flow rate					L/s	162		
Required duration of fire flow					min	30		

APPENDIX “D”

Underground Chambers & Stormwater Treatment Unit

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:	S230845
ADS SITE COORDINATOR:	MATTHEW BEGHIN 519-710-3687 MATTHEW.BEGHIN@ADS-PIPE.COM



2396 CLEROUX CRESCENT

OTTAWA, ON.

MC-4500 STORMTECH CHAMBER SPECIFICATIONS

- CHAMBERS SHALL BE STORMTECH MC-4500.
- CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
- CHAMBERS SHALL BE CERTIFIED TO CSA B184, "POLYMERIC SUB-SURFACE STORMWATER MANAGEMENT STRUCTURES", AND MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 60x101.
- CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
- THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE CSA S6 CL-625 TRUCK AND THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
- CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
- REQUIREMENTS FOR HANDLING AND INSTALLATION:
 - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
 - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 75 mm (3").
 - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 450 LBS/IN/IN. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 23° C / 73° F), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
- ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
 - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
 - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
 - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
- CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF MC-4500 CHAMBER SYSTEM

- STORMTECH MC-4500 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
- STORMTECH MC-4500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
- CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
 - STONESHOOTER LOCATED OFF THE CHAMBER BED.
 - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
 - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
- THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
- JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
- MAINTAIN MINIMUM - 230 mm (9") SPACING BETWEEN THE CHAMBER ROWS.
- INLET AND OUTLET MANIFOLDS MUST BE INSERTED A MINIMUM OF 300 mm (12") INTO CHAMBER END CAPS.
- EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE WELL GRADED BETWEEN ¾" AND 2" (20-50 mm).
- STONE SHALL BE BROUGHT UP EVENLY AROUND CHAMBERS SO AS NOT TO DISTORT THE CHAMBER SHAPE. STONE DEPTHS SHOULD NEVER DIFFER BY MORE THAN 300 mm (12") BETWEEN ADJACENT CHAMBER ROWS.
- STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
- THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIAL BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
- ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

- STORMTECH MC-4500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
- THE USE OF EQUIPMENT OVER MC-4500 CHAMBERS IS LIMITED:
 - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
 - NO RUBBER TIRE 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".
- 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

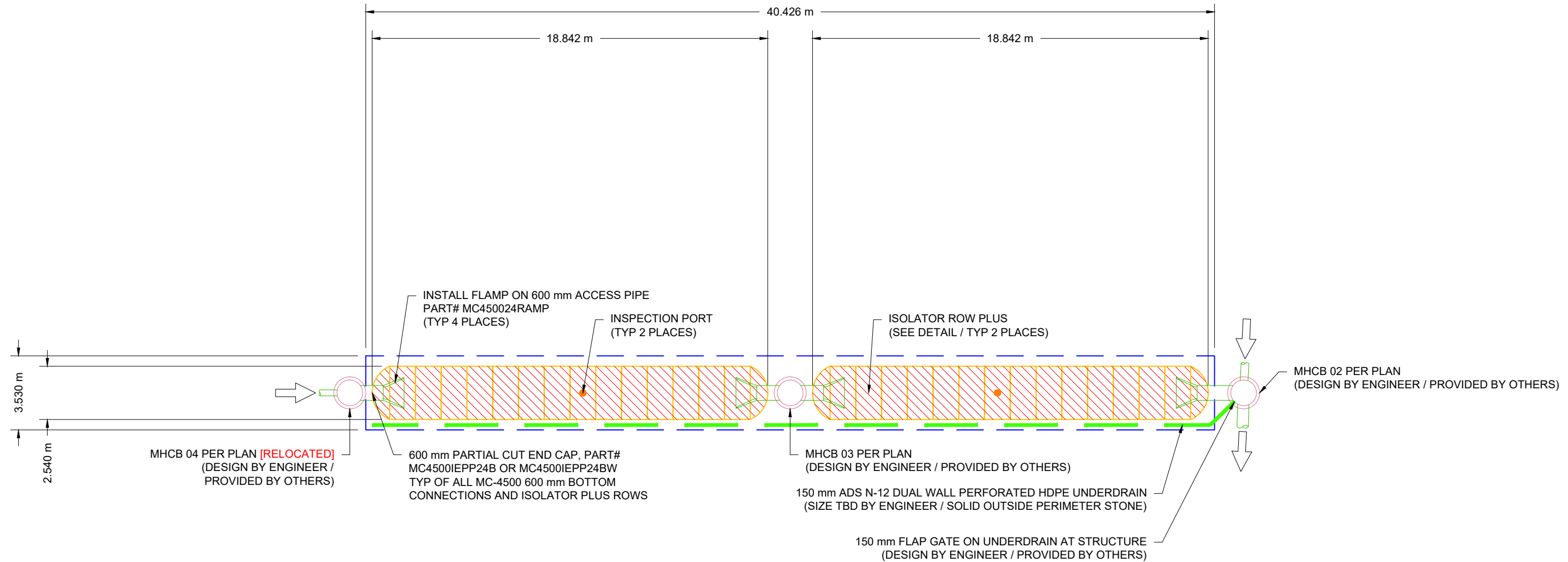
28	STORMTECH MC-4500 CHAMBERS
4	STORMTECH MC-4500 END CAPS
305	STONE ABOVE (mm)
229	STONE BELOW (mm)
40	% STONE VOID
170.9	INSTALLED SYSTEM VOLUME (m³) (PERIMETER STONE INCLUDED)
142.7	SYSTEM AREA (m²)
87.9	SYSTEM PERIMETER (m)

PROPOSED ELEVATIONS

82.051	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):
80.679	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):
80.527	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):
80.527	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):
80.527	MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT):
80.222	TOP OF STONE:
79.917	TOP OF MC-4500 CHAMBER:
78.451	600 mm ISOLATOR ROW PLUS INVERT:
78.393	BOTTOM OF MC-4500 CHAMBER:
78.164	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.



2396 CLEROUX CRESCENT

OTTAWA, ON.

DATE: 12/23/21 DRAWN: MAD
PROJECT #: S230845 CHECKED: RWD

DATE	DESCRIPTION
02/03/22	RCT NEW PLAN W/4500'S
	RCT
	DRWN CHKD

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ADS
4640 TRUJMAN BLVD
HILLIARD, OH 43026

SCALE = 1 : 200

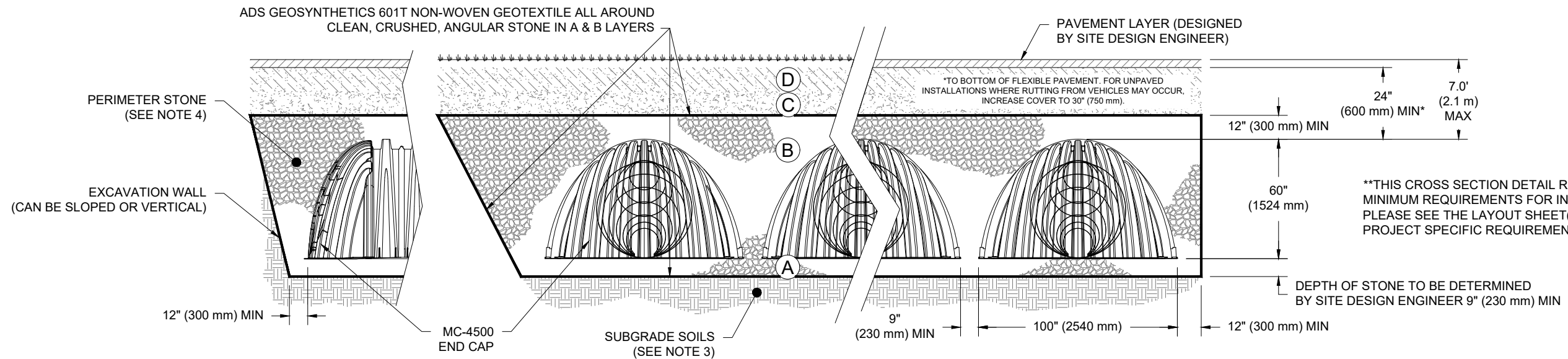
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ACCEPTABLE FILL MATERIALS: STORMTECH MC-4500 CHAMBER SYSTEMS

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	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.	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:

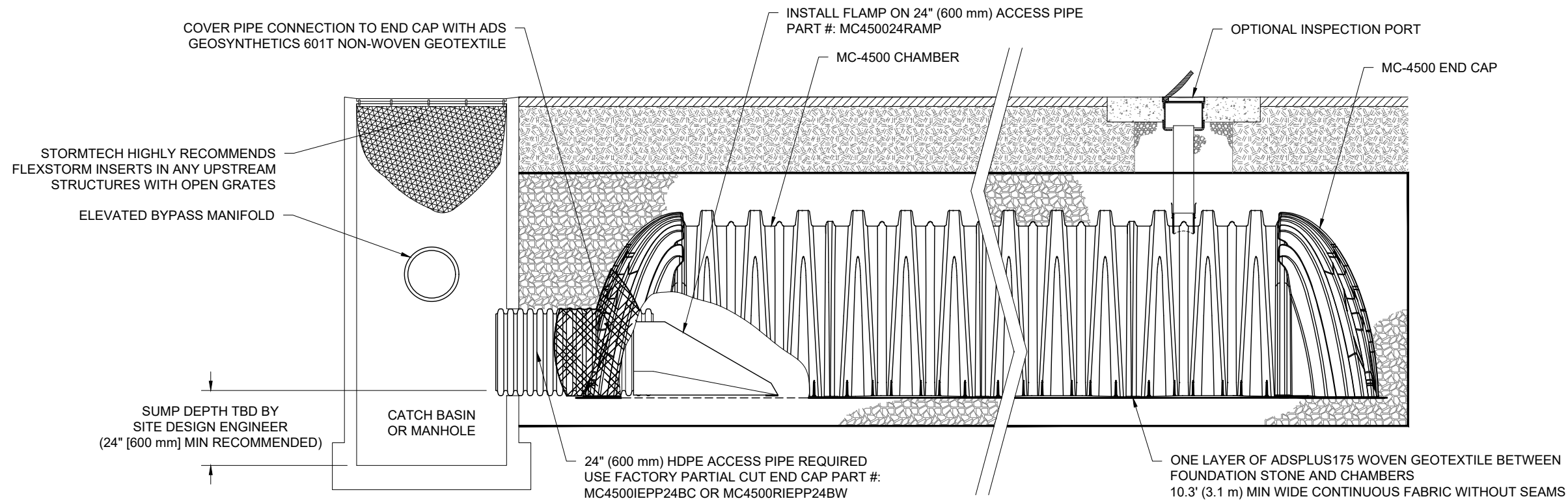
- THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
- STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9" (230 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
- WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
- ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



NOTES:

- CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 60x101
- MC-4500 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
- THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
- PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
- REQUIREMENTS FOR HANDLING AND INSTALLATION:
 - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
 - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 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.

2396 CLEROUX CRESCENT OTTAWA, ON.		DATE: 12/23/21	DRAWN: MAD
		PROJECT #: S230845	CHECKED: RWD
RCT	NEW PLAN W/4500'S	DESCRIPTION	
RCT	DRWN CHKD		
02/03/22	DATE		
StormTech® Chamber System 888-892-2694 WWW.STORMTECH.COM			
4640 TRUEMAN BLVD HILLIARD, OH 43026			
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3	SHEET	5	OF



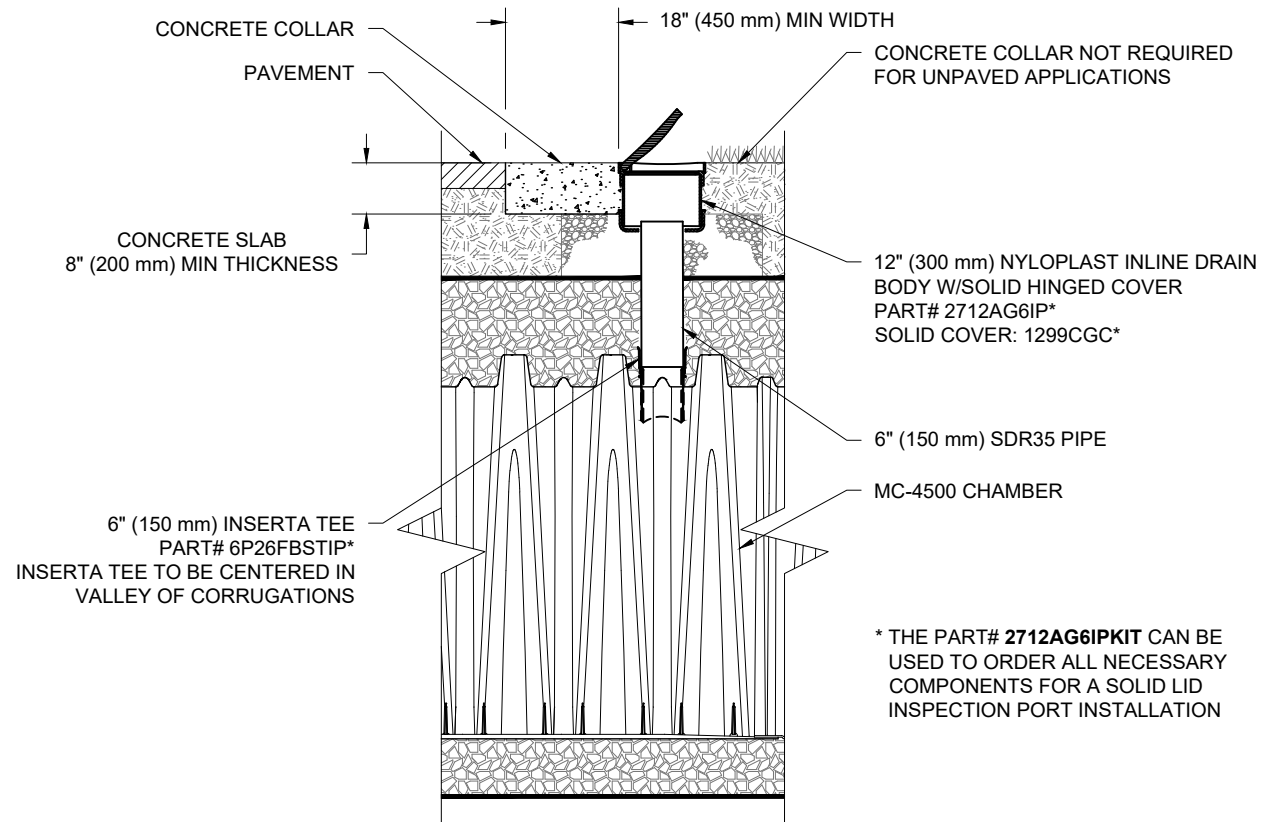
MC-4500 ISOLATOR ROW PLUS DETAIL
NTS

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-4500 6" (150 mm) INSPECTION PORT DETAIL
NTS

2396 CLEROUX CRESCENT
OTTAWA, ON.
DATE: 12/23/21 DRAWN: MAD
PROJECT #: S230845 CHECKED: RWD

DATE	DESCRIPTION
02/03/22	RCT DRWN CHKD
	RCT NEW PLAN W/4500'S

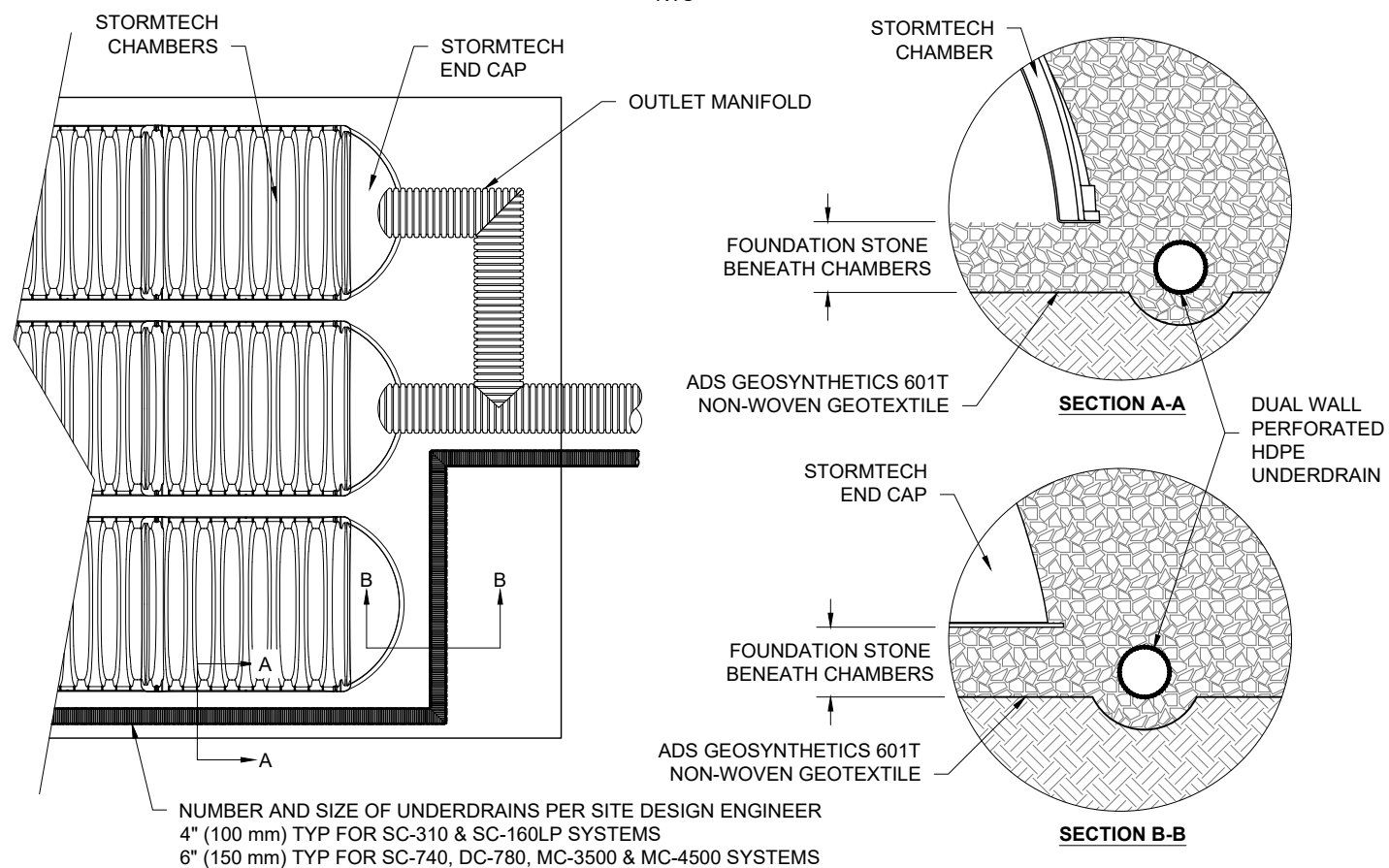
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HILLIARD, OH 43026
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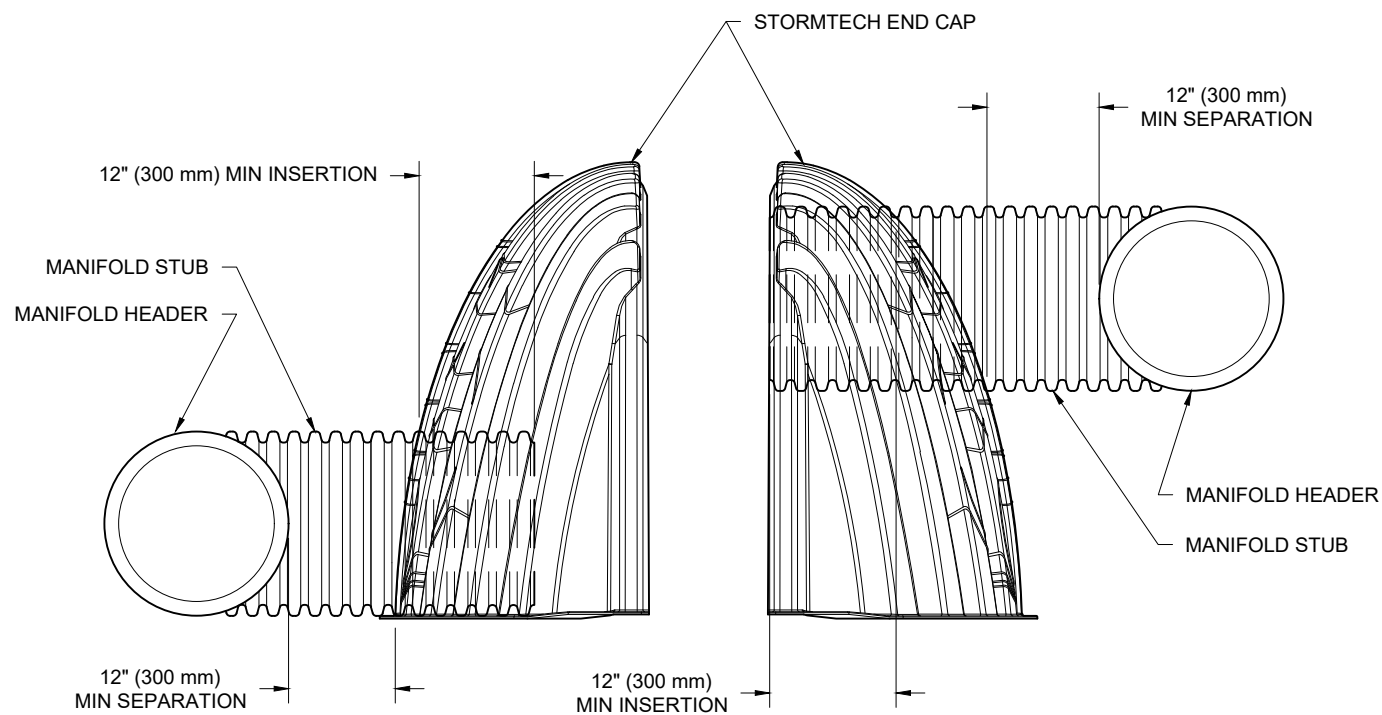
UNDERDRAIN DETAIL

NTS



MC-SERIES END CAP INSERTION DETAIL

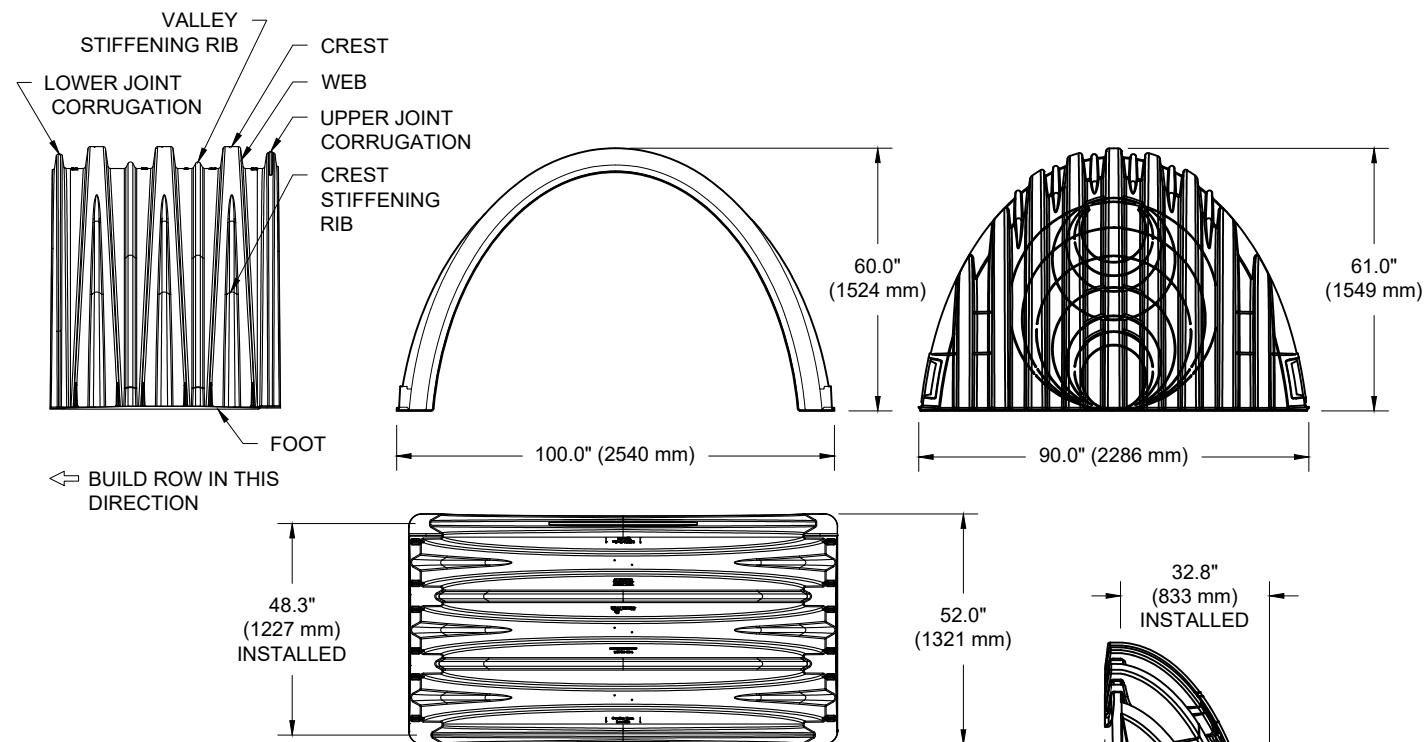
NTS



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

MC-4500 TECHNICAL SPECIFICATION

NTS



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	100.0" X 60.0" X 48.3"	(2540 mm X 1524 mm X 1227 mm)
CHAMBER STORAGE	106.5 CUBIC FEET	(3.01 m ³)
MINIMUM INSTALLED STORAGE*	162.6 CUBIC FEET	(4.60 m ³)
WEIGHT (NOMINAL)	125.0 lbs.	(56.7 kg)

NOMINAL END CAP SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	90.0" X 61.0" X 32.8"	(2286 mm X 1549 mm X 833 mm)
END CAP STORAGE	39.5 CUBIC FEET	(1.12 m ³)
MINIMUM INSTALLED STORAGE*	115.3 CUBIC FEET	(3.26 m ³)
WEIGHT (NOMINAL)	90 lbs.	(40.8 kg)

*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION AND BETWEEN CHAMBERS, 12" (305 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"

PART #	STUB	B	C
MC4500IEPP06T	6" (150 mm)	42.54" (1081 mm)	---
MC4500IEPP06B	---	---	0.86" (22 mm)
MC4500IEPP08T	8" (200 mm)	40.50" (1029 mm)	---
MC4500IEPP08B	---	---	1.01" (26 mm)
MC4500IEPP10T	10" (250 mm)	38.37" (975 mm)	---
MC4500IEPP10B	---	---	1.33" (34 mm)
MC4500IEPP12T	12" (300 mm)	35.69" (907 mm)	---
MC4500IEPP12B	---	---	1.55" (39 mm)
MC4500IEPP15T	15" (375 mm)	32.72" (831 mm)	---
MC4500IEPP15B	---	---	1.70" (43 mm)
MC4500IEPP18T	---	29.36" (746 mm)	---
MC4500IEPP18TW	18" (450 mm)	---	---
MC4500IEPP18B	---	---	1.97" (50 mm)
MC4500IEPP18BW	---	---	---
MC4500IEPP24T	---	23.05" (585 mm)	---
MC4500IEPP24TW	24" (600 mm)	---	---
MC4500IEPP24B	---	---	2.26" (57 mm)
MC4500IEPP24BW	---	---	---
MC4500IEPP30BW	30" (750 mm)	---	2.95" (75 mm)
MC4500IEPP36BW	36" (900 mm)	---	3.25" (83 mm)
MC4500IEPP42BW	42" (1050 mm)	---	3.55" (90 mm)

NOTE: ALL DIMENSIONS ARE NOMINAL

CUSTOM PREFABRICATED 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-4500 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.

2396 CLEROUX CRESCENT

StormTech[®]
Chamber System

4640 TRUEJMAN BLVD
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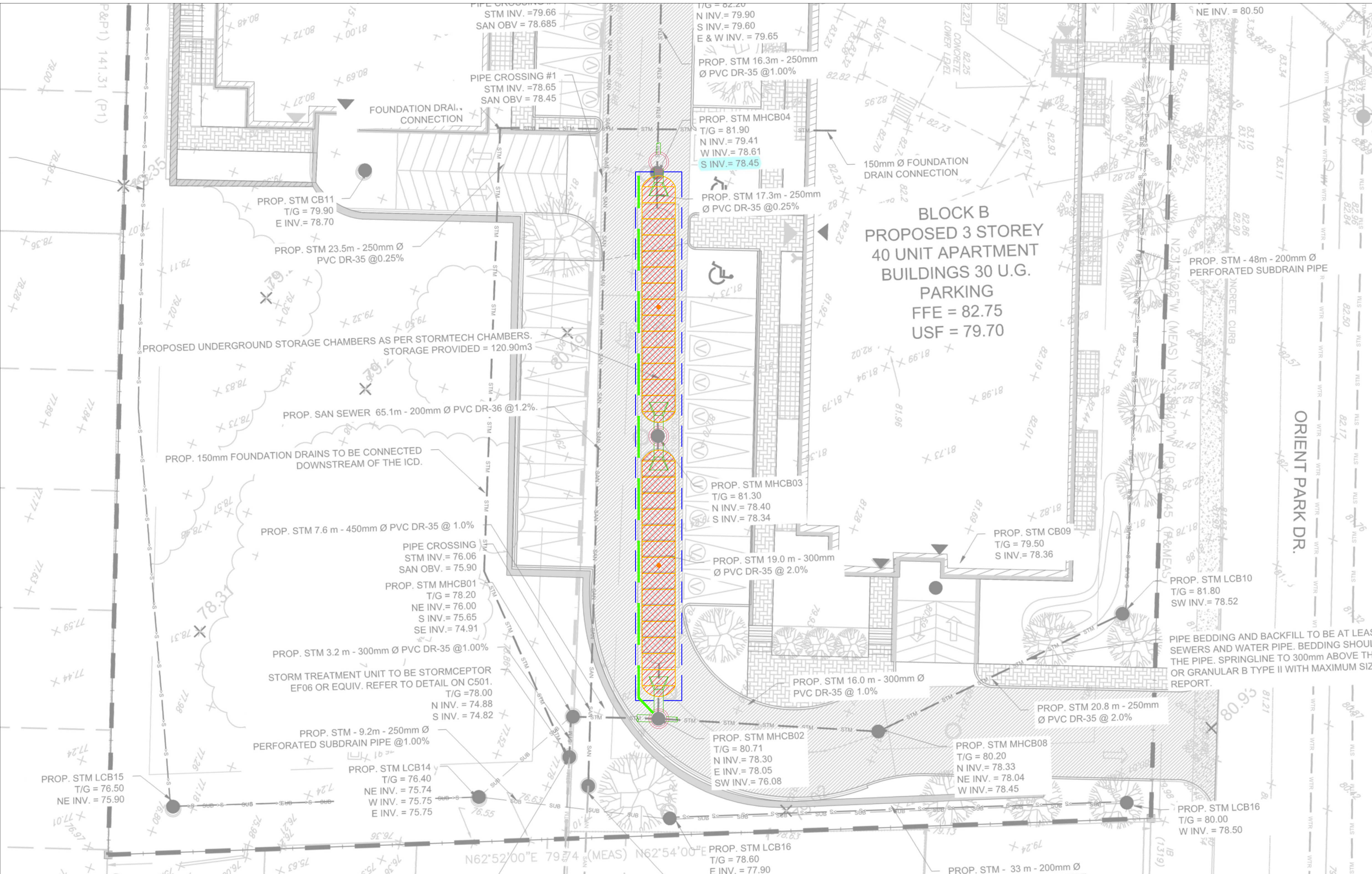
ADS

OTTAWA, ON.

DATE: 12/23/21 DRAWN: MAD
 PROJECT #: S230845 CHECKED: RWD

DESCRIPTION
 NEW PLAN W/4500'S
 RCT
 DATE 02/03/22
 RCT
 DRWN CHKD

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**BLOCK B
PROPOSED 3 STOREY
40 UNIT APARTMENT
BUILDINGS 30 U.G.
PARKING
FFE = 82.75
USF = 79.70**

ORIENT PARK DR.

P&P1) 141.31 (P1)

N62°52'00"E 79.74 (MEAS) N62°54'00"E

PROPOSED UNDERGROUND STORAGE CHAMBERS AS PER STORMTECH CHAMBERS.
STORAGE PROVIDED = 120.90m³

PROP. 150mm FOUNDATION DRAINS TO BE CONNECTED
DOWNSTREAM OF THE ICD.

PROP. STM - 9.2m - 250mm Ø
PERFORATED SUBDRAIN PIPE @1.00%

STORM TREATMENT UNIT TO BE STORMCEPTOR
EF06 OR EQUIV. REFER TO DETAIL ON C501.

PROP. STM MHCBO1
T/G = 78.20
NE INV. = 76.00
S INV. = 75.65
SE INV. = 74.91

PROP. STM 7.6 m - 450mm Ø PVC DR-35 @ 1.0%

PIPE CROSSING
STM INV. = 76.06
SAN OBV. = 75.90

PROP. STM 3.2 m - 300mm Ø PVC DR-35 @ 1.00%

PROP. STM - 9.2m - 250mm Ø
PERFORATED SUBDRAIN PIPE @1.00%

PROP. STM LCB14
T/G = 76.40
NE INV. = 75.74
W INV. = 75.75
E INV. = 75.75

PROP. STM LCB15
T/G = 76.50
NE INV. = 75.90

STM INV. = 79.66
SAN OBV = 78.685

PIPE CROSSING #1
STM INV. = 78.65
SAN OBV = 78.45

FOUNDATION DRAIN
CONNECTION

PROP. STM CB11
T/G = 79.90
E INV. = 78.70

PROP. STM 23.5m - 250mm Ø
PVC DR-35 @0.25%

T/G = 82.20
N INV. = 79.90
S INV. = 79.60
E & W INV. = 79.65

PROP. STM 16.3m - 250mm
Ø PVC DR-35 @1.00%

PROP. STM MHCBO4
T/G = 81.90
N INV. = 79.41
W INV. = 78.61
S INV. = 78.45

PROP. STM 17.3m - 250mm
Ø PVC DR-35 @0.25%

150mm Ø FOUNDATION
DRAIN CONNECTION

PROP. STM MHCBO3
T/G = 81.30
N INV. = 78.40
S INV. = 78.34

PROP. STM 19.0 m - 300mm
Ø PVC DR-35 @ 2.0%

PROP. STM CB09
T/G = 79.50
S INV. = 78.36

PROP. STM LCB10
T/G = 81.80
SW INV. = 78.52

PIPE BEDDING AND BACKFILL TO BE AT LEAST
SEWERS AND WATER PIPE. BEDDING SHOULD
BE 300mm ABOVE THE PIPE. SPRINGLINE TO 300mm ABOVE THE
PIPE OR GRANULAR B TYPE II WITH MAXIMUM SIZE
AS PER REPORT.

PROP. STM 16.0 m - 300mm Ø
PVC DR-35 @ 1.0%

PROP. STM MHCBO2
T/G = 80.71
N INV. = 78.30
E INV. = 78.05
SW INV. = 76.08

PROP. STM MHCBO8
T/G = 80.20
N INV. = 78.33
NE INV. = 78.04
W INV. = 78.45

PROP. STM 20.8 m - 250mm
Ø PVC DR-35 @ 2.0%

PROP. STM LCB16
T/G = 80.00
W INV. = 78.50

PROP. STM LCB16
T/G = 78.60
E INV. = 77.90

PROP. STM - 33 m - 200mm Ø

NE INV. = 80.50

PROP. STM - 48m - 200mm Ø
PERFORATED SUBDRAIN PIPE

PROP. STM LCB10
T/G = 81.80
SW INV. = 78.52

PROP. STM LCB16
T/G = 80.00
W INV. = 78.50



Chamber Model -
 Units -
 Number of Chambers -
 Number of End Caps -
 Voids in the stone (porosity) -
 Base of Stone Elevation -
 Amount of Stone Above Chambers -
 Amount of Stone Below Chambers -

MC-4500	
Metric	Click Here for Imperial
28	
4	
40	%
78.16	m
305	mm
229	mm

Include Perimeter Stone in Calculations

142.7 sq.meters Min. Area - 107.736 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 Cap and Stone (cubic meters)	Cumulative System (cubic meters)	Elevation (meters)
2057	0.00	0.00	0.00	0.00	1.450	1.45	170.73	80.22
2032	0.00	0.00	0.00	0.00	1.450	1.45	169.28	80.20
2007	0.00	0.00	0.00	0.00	1.450	1.45	167.83	80.17
1981	0.00	0.00	0.00	0.00	1.450	1.45	166.39	80.15
1956	0.00	0.00	0.00	0.00	1.450	1.45	164.94	80.12
1930	0.00	0.00	0.00	0.00	1.450	1.45	163.49	80.09
1905	0.00	0.00	0.00	0.00	1.450	1.45	162.04	80.07
1880	0.00	0.00	0.00	0.00	1.450	1.45	160.59	80.04
1854	0.00	0.00	0.00	0.00	1.450	1.45	159.14	80.02
1829	0.00	0.00	0.00	0.00	1.450	1.45	157.69	79.99
1803	0.00	0.00	0.00	0.00	1.450	1.45	156.24	79.97
1778	0.00	0.00	0.00	0.00	1.450	1.45	154.79	79.94
1753	0.00	0.00	0.03	0.00	1.440	1.47	153.34	79.92
1727	0.00	0.00	0.09	0.00	1.410	1.51	151.87	79.89
1702	0.00	0.00	0.13	0.01	1.390	1.53	150.37	79.87
1676	0.01	0.00	0.17	0.01	1.380	1.55	148.84	79.84
1651	0.01	0.00	0.21	0.01	1.360	1.58	147.28	79.82
1626	0.01	0.00	0.36	0.01	1.300	1.67	145.70	79.79
1600	0.02	0.00	0.53	0.01	1.230	1.77	144.03	79.76
1575	0.02	0.00	0.63	0.02	1.190	1.84	142.26	79.74
1549	0.03	0.01	0.72	0.02	1.150	1.89	140.41	79.71
1524	0.03	0.01	0.80	0.02	1.120	1.94	138.52	79.69
1499	0.03	0.01	0.86	0.03	1.090	1.98	136.58	79.66
1473	0.03	0.01	0.92	0.03	1.070	2.02	134.60	79.64
1448	0.03	0.01	0.98	0.03	1.040	2.06	132.58	79.61
1422	0.04	0.01	1.03	0.04	1.020	2.09	130.52	79.59
1397	0.04	0.01	1.08	0.04	1.000	2.12	128.43	79.56
1372	0.04	0.01	1.12	0.04	0.980	2.15	126.31	79.54
1346	0.04	0.01	1.17	0.05		2.18	124.16	79.51
1321	0.04	0.01	1.21	0.05	0.950	2.20	121.98	79.48
1295	0.04	0.01	1.25	0.05		2.23	119.78	79.46
1270	0.05	0.01	1.29	0.06	0.910	2.25	117.55	79.43
1245	0.05	0.01	1.32	0.06		2.28	115.29	79.41
1219	0.05	0.02	1.36	0.06	0.880	2.30	113.01	79.38
1194	0.05	0.02	1.39	0.06		2.32	110.72	79.36
1168	0.05	0.02	1.42	0.07	0.850	2.34	108.40	79.33
1143	0.05	0.02	1.45	0.07		2.36	106.05	79.31
1118	0.05	0.02	1.48	0.07	0.830	2.38	103.70	79.28
1092	0.05	0.02	1.51	0.07		2.40	101.32	79.26
1067	0.05	0.02	1.53	0.08	0.810	2.41	98.92	79.23
1041	0.06	0.02	1.56	0.08		2.43	96.51	79.21
1016	0.06	0.02	1.58	0.08	0.780	2.45	94.08	79.18
991	0.06	0.02	1.61	0.08		2.46	91.63	79.15
965	0.06	0.02	1.63	0.09	0.760	2.48	89.17	79.13
940	0.06	0.02	1.65	0.09		2.49	86.69	79.10
914	0.06	0.02	1.67	0.09	0.740	2.51	84.19	79.08
889	0.06	0.02	1.69	0.09		2.52	81.69	79.05
864	0.06	0.02	1.71	0.09	0.730	2.53	79.17	79.03
838	0.06	0.02	1.73	0.10		2.55	76.63	79.00
813	0.06	0.02	1.75	0.10	0.710	2.56	74.09	78.98
787	0.06	0.03	1.77	0.10		2.57	71.53	78.95
762	0.06	0.03	1.78	0.10	0.690	2.58	68.96	78.93
737	0.06	0.03	1.80	0.10		2.59	66.38	78.90
711	0.06	0.03	1.81	0.10	0.680	2.60	63.79	78.88
686	0.07	0.03	1.83	0.11		2.61	61.19	78.85
660	0.07	0.03	1.84	0.11	0.670	2.62	58.58	78.82
635	0.07	0.03	1.86	0.11		2.63	55.96	78.80
610	0.07	0.03	1.87	0.11	0.660	2.64	53.33	78.77
584	0.07	0.03	1.88	0.11		2.65	50.69	78.75
559	0.07	0.03	1.90	0.11	0.650	2.65	48.05	78.72
533	0.07	0.03	1.91	0.11		2.66	45.39	78.70
508	0.07	0.03	1.92	0.12	0.640	2.67	42.73	78.67
483	0.07	0.03	1.93	0.12		2.68	40.06	78.65
457	0.07	0.03	1.94	0.12	0.630	2.68	37.38	78.62
432	0.07	0.03	1.95	0.12		2.69	34.70	78.60
406	0.07	0.03	1.96	0.12	0.620	2.69	32.01	78.57
381	0.07	0.03	1.96	0.12		2.70	29.32	78.55
356	0.07	0.03	1.97	0.12	0.610	2.70	26.62	78.52
330	0.07	0.03	1.98	0.12		2.71	23.91	78.49
305	0.07	0.03	1.99	0.12	0.610	2.72	21.20	78.47
279	0.07	0.03	1.99	0.12		2.72	18.49	78.44
254	0.07	0.03	2.00	0.13	0.600	2.73	15.77	78.42
229	0.00	0.00	0.00	0.00		1.45	13.04	78.39
203	0.00	0.00	0.00	0.00	1.450	1.45	11.59	78.37
178	0.00	0.00	0.00	0.00		1.45	10.14	78.34
152	0.00	0.00	0.00	0.00	1.450	1.45	8.69	78.32
127	0.00	0.00	0.00	0.00		1.45	7.25	78.29
102	0.00	0.00	0.00	0.00	1.450	1.45	5.80	78.27
76	0.00	0.00	0.00	0.00		1.45	4.35	78.24
51	0.00	0.00	0.00	0.00	1.450	1.45	2.90	78.21
25	0.00	0.00	0.00	0.00		1.45	1.45	78.19

APPENDIX “E”

Boundary Conditions

Boundary Conditions 2396 Cleroux Street

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	31	0.51
Maximum Daily Demand	76	1.27
Peak Hour	167	2.79
Fire Flow Demand #1	10,000	166.67

Location



Results

Connection 1 – Cleroux St.

Demand Scenario	Head (m)	Pressure ¹ (psi)
Maximum HGL	131.0	67.8
Peak Hour	127.0	62.2
Max Day plus Fire 1	123.1	56.6

Ground Elevation = 83.2 m

Connection 2 – Orient Park Dr.

Demand Scenario	Head (m)	Pressure¹ (psi)
Maximum HGL	131.0	70.2
Peak Hour	127.0	64.6
Max Day plus Fire 1	120.1	54.8

Ground Elevation = 81.6 m

Disclaimer

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

APPENDIX “F”

Engineering Drawings

EROSION AND SEDIMENT CONTROL MEASURES:

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

1. PRIOR TO START OF CONSTRUCTION:

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

2. DURING CONSTRUCTION:

- 2.1. WORK TO BE DONE IN THE VICINITY OF MAJOR WATERWAYS TO BE CARRIED OUT FROM JULY TO SEPTEMBER ONLY.
- 2.2. MINIMIZE THE EXTENT OF DISTURBED AREAS AND THE DURATION OF EXPOSURE.
- 2.3. PROTECT DISTURBED AREAS FROM RUNOFF.
- 2.4. PROVIDE TEMPORARY COVER SUCH AS SEEDING OR MULCHING IF DISTURBED AREA WILL NOT BE REHABILITATED WITHIN 30 DAYS.
- 2.5. INSPECT SILT FENCE, FILTER CLOTHS, AND CATCH BASIN SUMPS WEEKLY AND AFTER EVERY MAJOR STORM EVENT. CLEAN AND REPAIR WHEN NECESSARY.
- 2.6. PLAN TO BE REVIEWED AND REVISED AS REQUIRED DURING CONSTRUCTION.
- 2.7. EROSION CONTROL FENCING TO BE ALSO INSTALLED AROUND THE BASE OF ALL STOCKPILES.

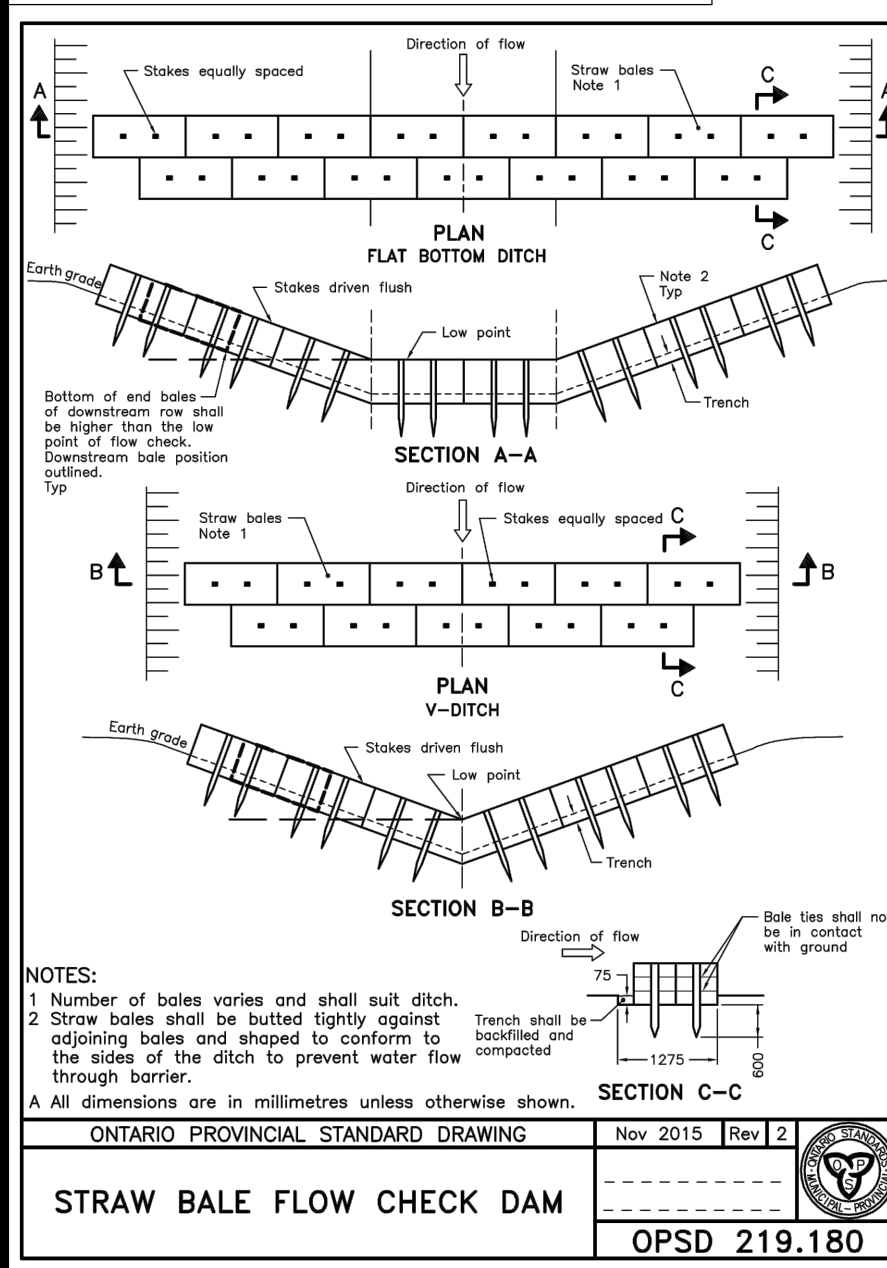
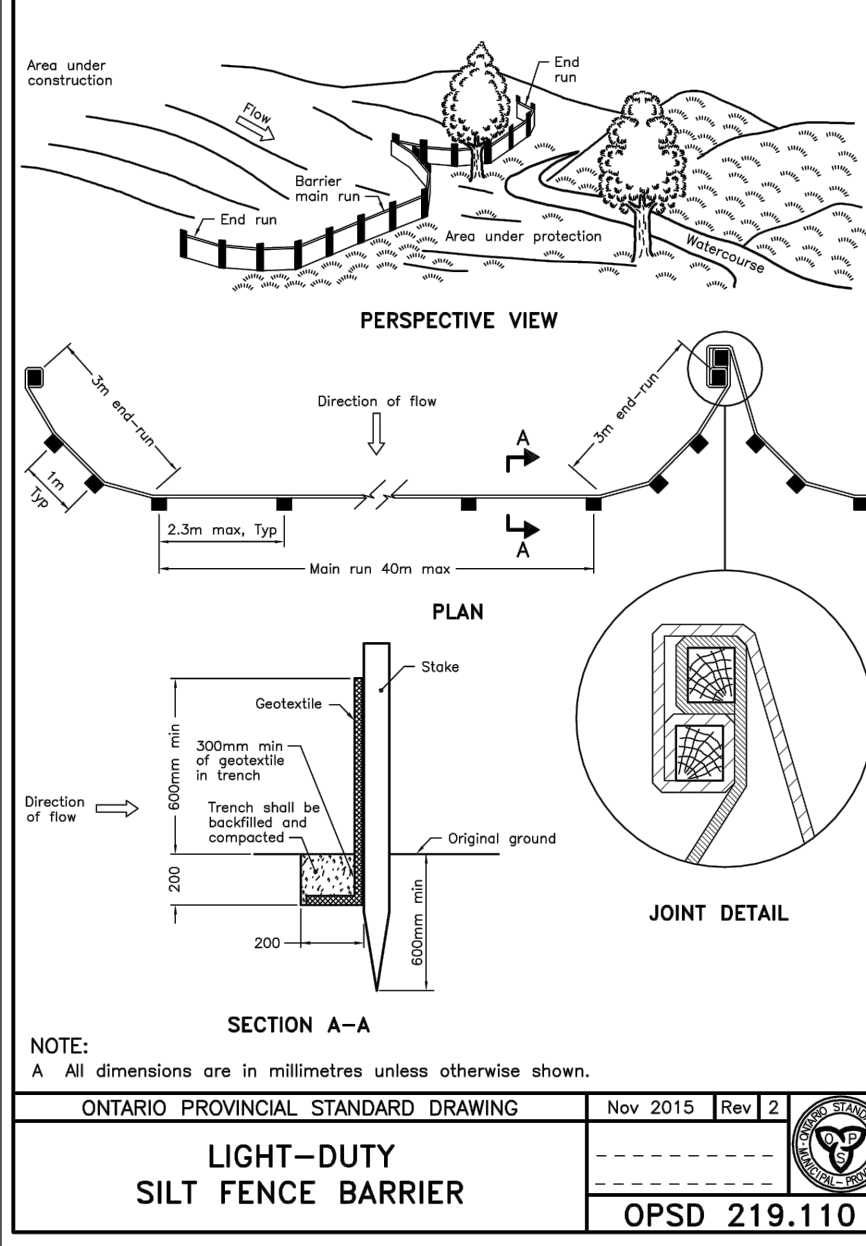
- 2.8. DO NOT LOCATE TOPSOIL PILES AND EXCAVATION MATERIAL CLOSER THAN 2.5m FROM ANY PAVED SURFACE, OR ONE WHICH IS TO BE PAVED BEFORE PILE IS REMOVED. ALL TOPSOIL PILES ARE TO BE SEEDED IF THEY ARE TO REMAIN ON SITE LONG ENOUGH FOR SEEDS TO GROW (30 DAYS).
- 2.9. CONTROL WIND-BLOWN DUST OFF SITE TO ACCEPTABLE LEVELS BY SEEDING TOPSOIL PILES AND OTHER AREAS TEMPORARILY (PROVIDE WATERING AS REQUIRED).
- 2.10. ALL EROSION CONTROL STRUCTURE TO REMAIN IN PLACE UNTIL ALL DISTURBED GROUND SURFACES HAVE BEEN STABILIZED EITHER BY PAVING OR RESTORATION OF VEGETATIVE GROUND COVER.
- 2.11. NO ALTERNATE METHODS OF EROSION PROTECTION SHALL BE PERMITTED UNLESS APPROVED BY THIS CONSULTING ENGINEER AND THE CITY DEPARTMENT OF PUBLIC WORKS. TO PREVENT UNNECESSARY SEDIMENT DISCHARGE, THE CONTRACTOR IS PERMITTED TO PLACE ADDITIONAL SEDIMENT AND EROSION CONTROL MEASURES IN A TIMELY MANNER, IF REQUIRED, THE CONTRACTOR TO ADVISE CONSULTANT ONCE INSTALLED FOR INSPECTION.
- 2.12. CONTRACTOR RESPONSIBLE FOR CITY ROADWAY AND SIDEWALK TO BE CLEANED OF ALL SEDIMENT FROM VEHICULAR TRACKING ETC. AT THE END OF EACH WORK DAY.
- 2.13. PROVIDE GRAVEL ENTRANCE WHEREVER EQUIPMENT LEAVES THE SITE TO PREVENT MUD TRACKING ONTO PAVED SURFACES. GRAVEL BED SHALL BE A MINIMUM OF 15m LONG, 4m WIDE AND 0.3m DEEP AND SHALL CONSIST OF COARSE (50mm CRUSHER-RUN LIMESTONE). MAINTAIN GRAVEL ENTRANCE IN CLEAN CONDITION.
- 2.14. DURING WET CONDITIONS, TIRES OF ALL VEHICLES/EQUIPMENT LEAVING THE SITE ARE TO BE SCRAPPED.
- 2.15. ANY MUD/MATERIAL TRACKED ONTO THE ROAD SHALL BE REMOVED IMMEDIATELY BY HAND OR RUBBER TIRE LOADER.
- 2.16. TAKE ALL NECESSARY STEPS TO PREVENT BUILDING MATERIAL, CONSTRUCTION DEBRIS OR WASTE BEING SPILLED OR TRACKED ONTO ADJUTING PROPERTIES OR PUBLIC STREETS DURING CONSTRUCTION AND PROCEED IMMEDIATELY TO CLEAN UP ANY AREAS SO AFFECTED.

3. AFTER CONSTRUCTION:

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

LEGEND:

- EXISTING PROPERTY LINE TO REMAIN
- - - PROPOSED EASEMENT
- - - PROPOSED TERRACING (3:1 MIN)
- ▽ PROPOSED DOOR ENTRANCE/EXIT
- +50.00 PROPOSED ELEVATION
- +50.00WP PROPOSED HIGH POINT ELEVATION
- +50.00SW PROPOSED SWALE ELEVATION
- +50.00EX MATCH INTO EXISTING ELEVATION
- +50.00SD PROPOSED SIDEWALK
- +50.19 EXISTING ELEVATION
- PROPOSED OVERLAND MAJOR FLOW ROUTE
- PROPOSED SILT FENCE AS PER OPSD 219.110
- PROPOSED 100mm PERFORATED SUBDRAIN
- PROPOSED STORM SEWER
- PROPOSED SANITARY SEWER
- PROPOSED WATERMAIN
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- PROPOSED CATCH BASIN/MANHOLE/CATCH-BASIN
- 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
- PROPOSED CONCRETE FEATURES/SLAB
- PROPOSED HEAVY DUTY ASPHALT
- PROPOSED LIGHT DUTY ASPHALT
- PROPOSED GRAVEL AREA
- PROPOSED RIP RAP AS PER OPSD 810.010
- PROPOSED WATER METER
- PROPOSED ACCESS GATE
- PROPOSED GROWING FIELD



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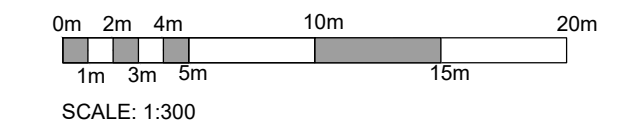
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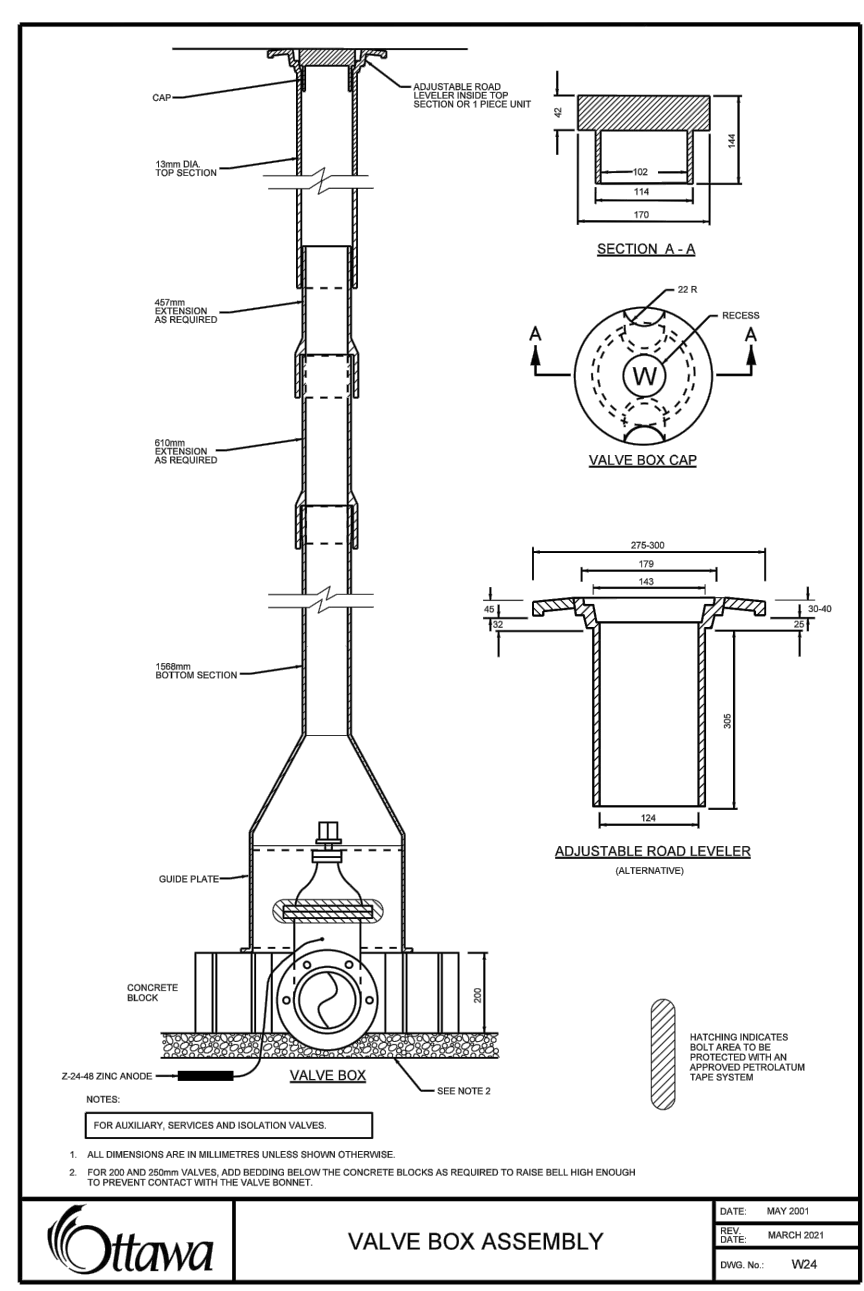
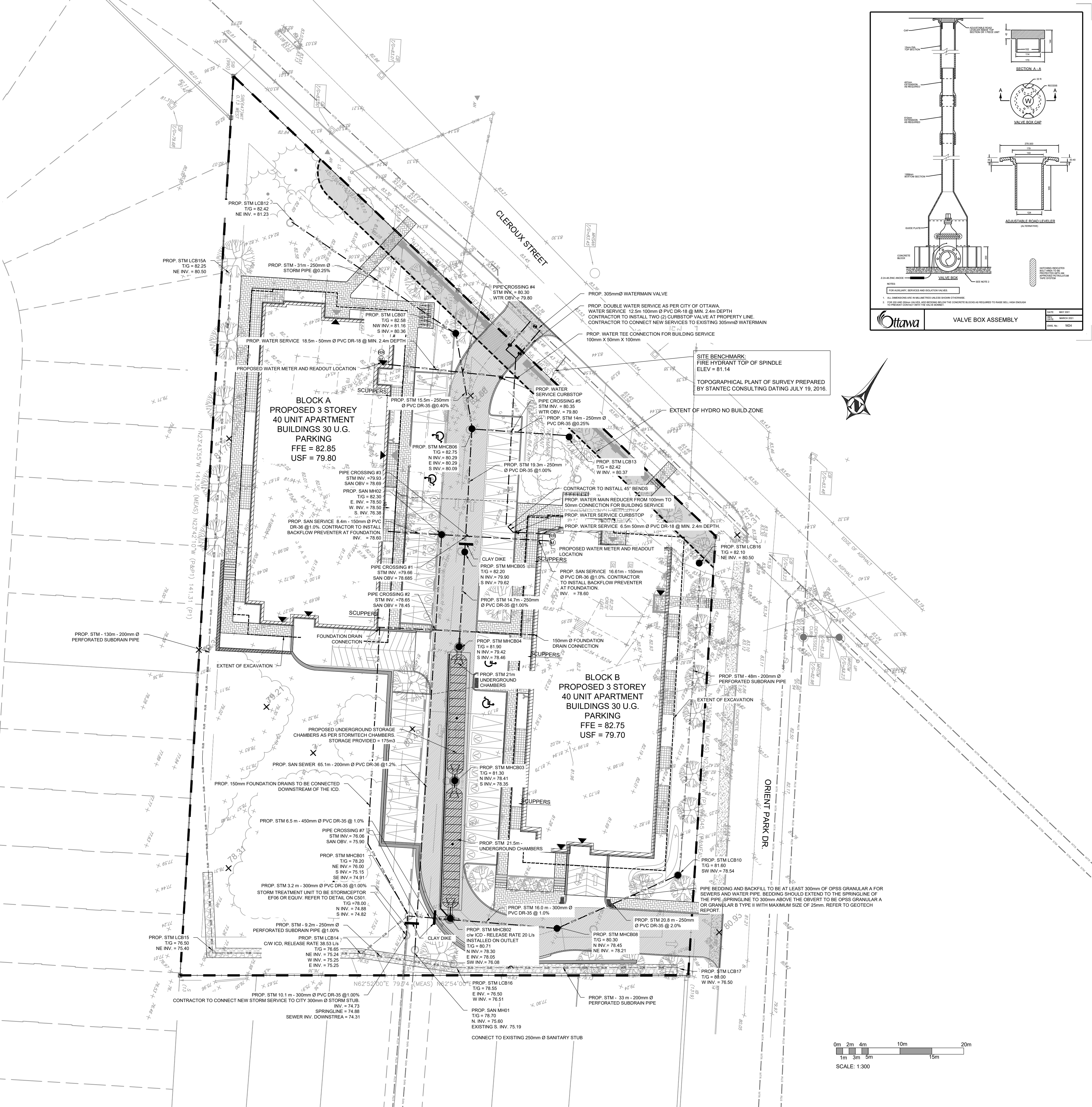
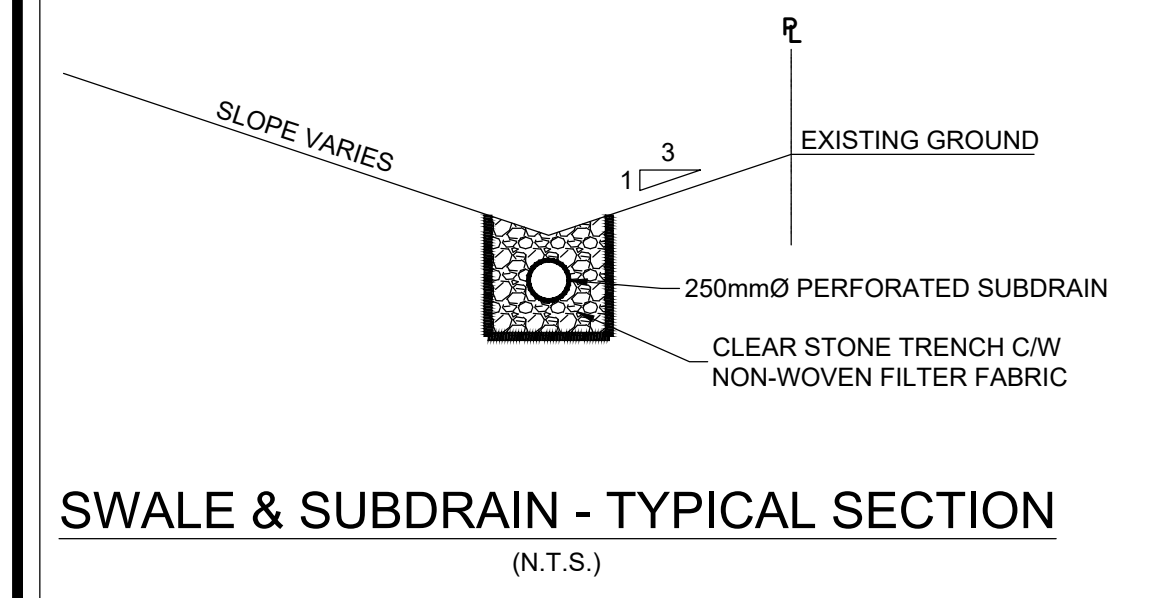
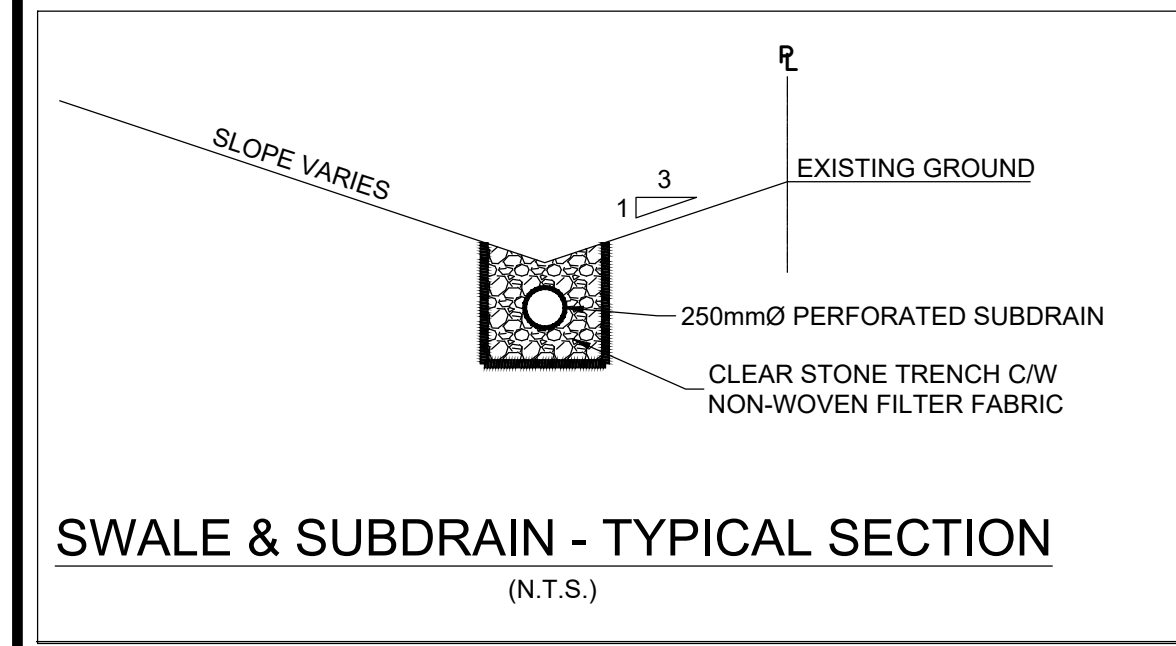
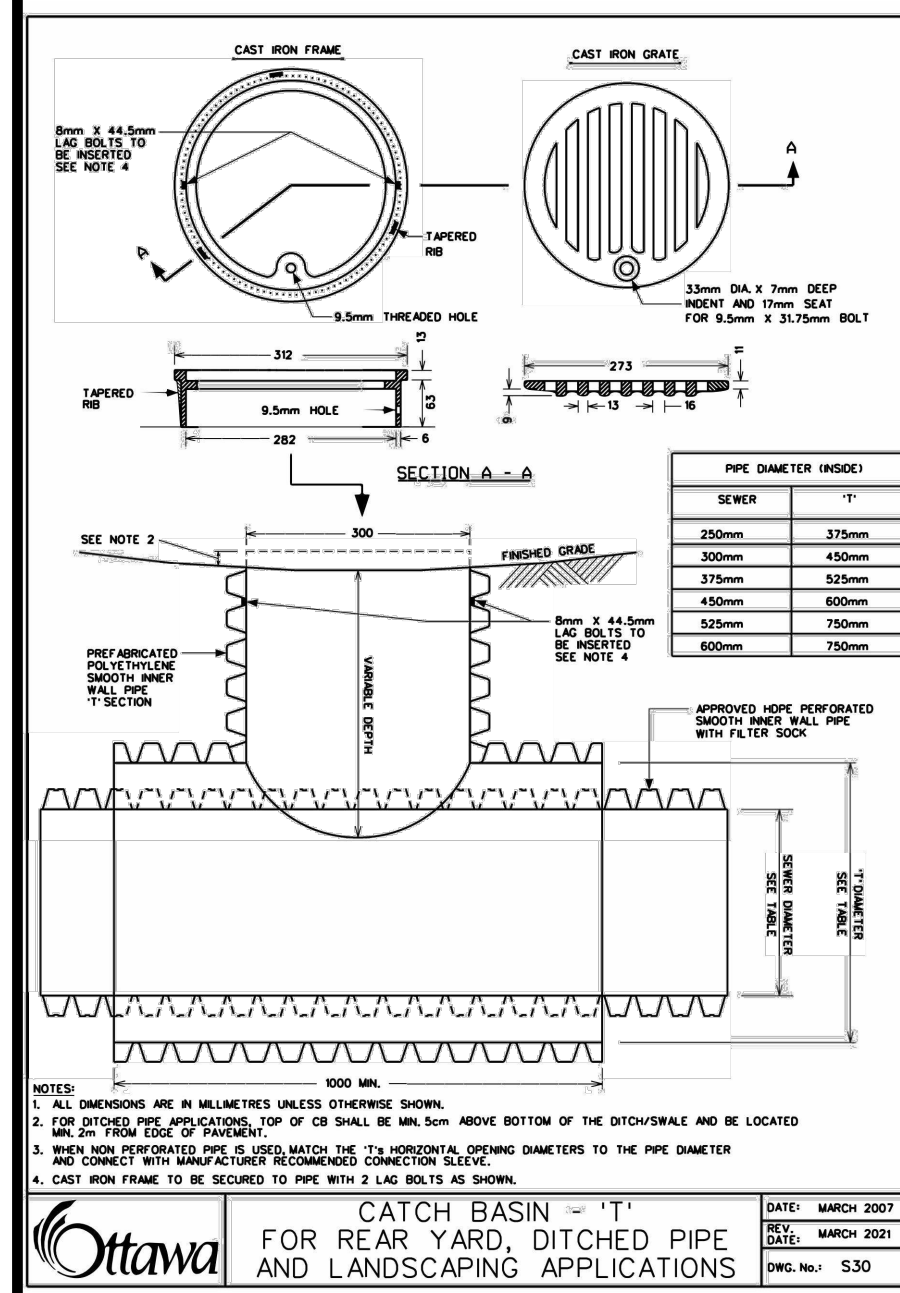
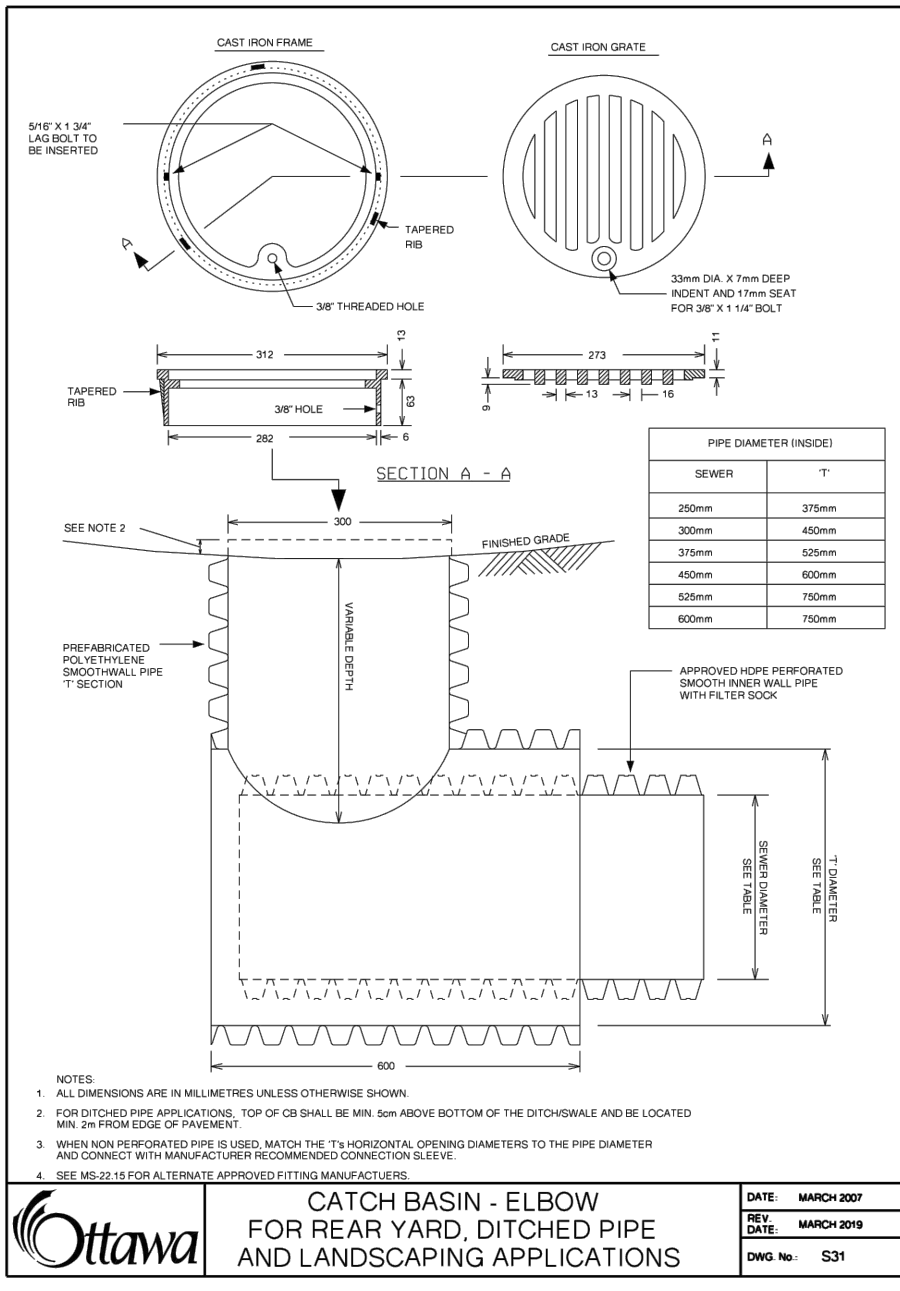
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 - PROPOSED TERRACING (3.1 MIN.)
 - PROPOSED DOOR ENTRANCE/EXIT
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 - +50.00EW PROPOSED SWALE ELEVATION
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 - PROPOSED OVERLAND MAJOR FLOW ROUTE
 - PROPOSED SILT FENCE AS PER OPSD 219.110
 - PROPOSED 100mm PERFORATED SUBDRAIN
 - PROPOSED SANITARY SEWER
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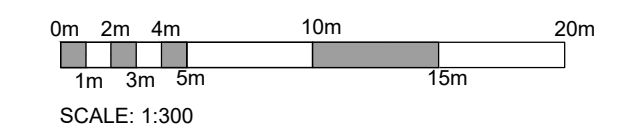
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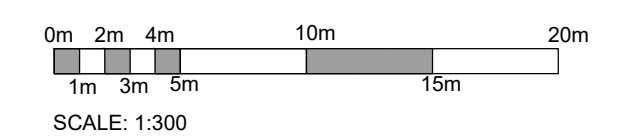
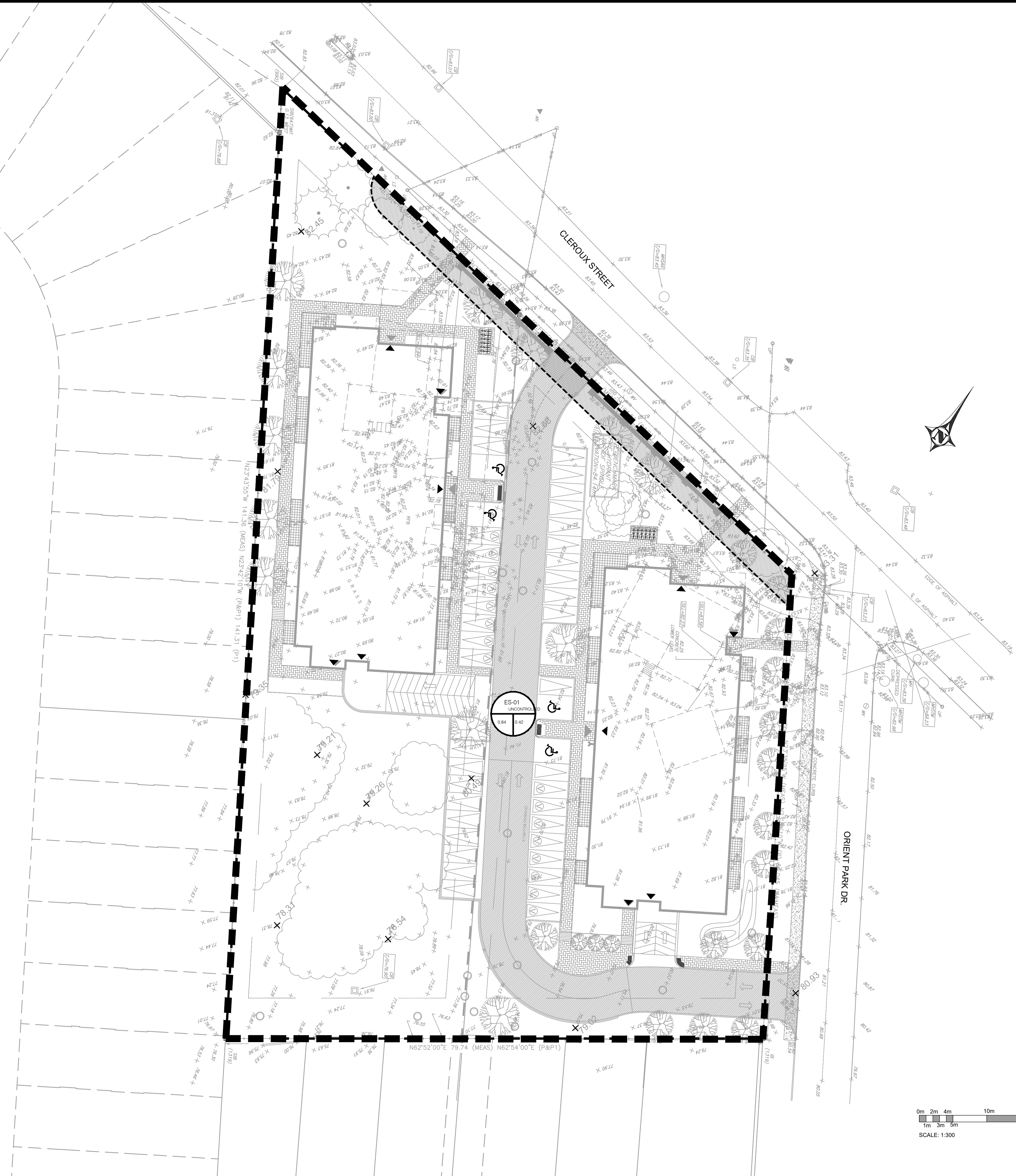
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- PROPOSED CURB STOP
- PROPOSED PIPE INSULATION
- PROPOSED 100 YEAR HIGH WATER LEVEL
- STORM WATERSHED EXTENT
- WS-XX WATERSHED NAME
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PROJECT INFORMATION	
ENGINEERED PROJECT MANAGER:	HADER NASRULLAH HADER.NASRULLAH@ADS-PIPE.COM
ADS SALES REP:	MICHAEL REED 613-862-4186 MICHAEL.REED@ADS-PIPE.COM
PROJECT NO.:	523045
ADS SITE COORDINATOR:	MATTHEW BEGIN 613-710-9867 MATTHEW.BEGIN@ADS-PIPE.COM



2396 CLEROUX CRESCENT OTTAWA, ON.

MC-4500 STORMTECH CHAMBER SPECIFICATIONS

- CHAMBERS SHALL BE STORMTECH MC-4500.
- CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
- CHAMBERS SHALL BE CERTIFIED TO CSA B14 "POLYMERIC SUB-SURFACE STORMWATER MANAGEMENT STRUCTURES" AND MEET THE REQUIREMENTS OF ASTM F2181 "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 60101.
- CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
- THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LEAD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE CSA S6 CL-625 TRUCK AND THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
- CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
- REQUIREMENTS FOR HANDLING AND INSTALLATION:
 - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LOGS.
 - 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 SHALL BE GREATER THAN OR EQUAL TO 400 LB-IN. THE ARCH IS DEFINED IN SECTION 6.2.4 OF ASTM F2181, AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 23° C / 73° F), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
- ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
 - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
 - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.46 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 LEAD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
 - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2181 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
- CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

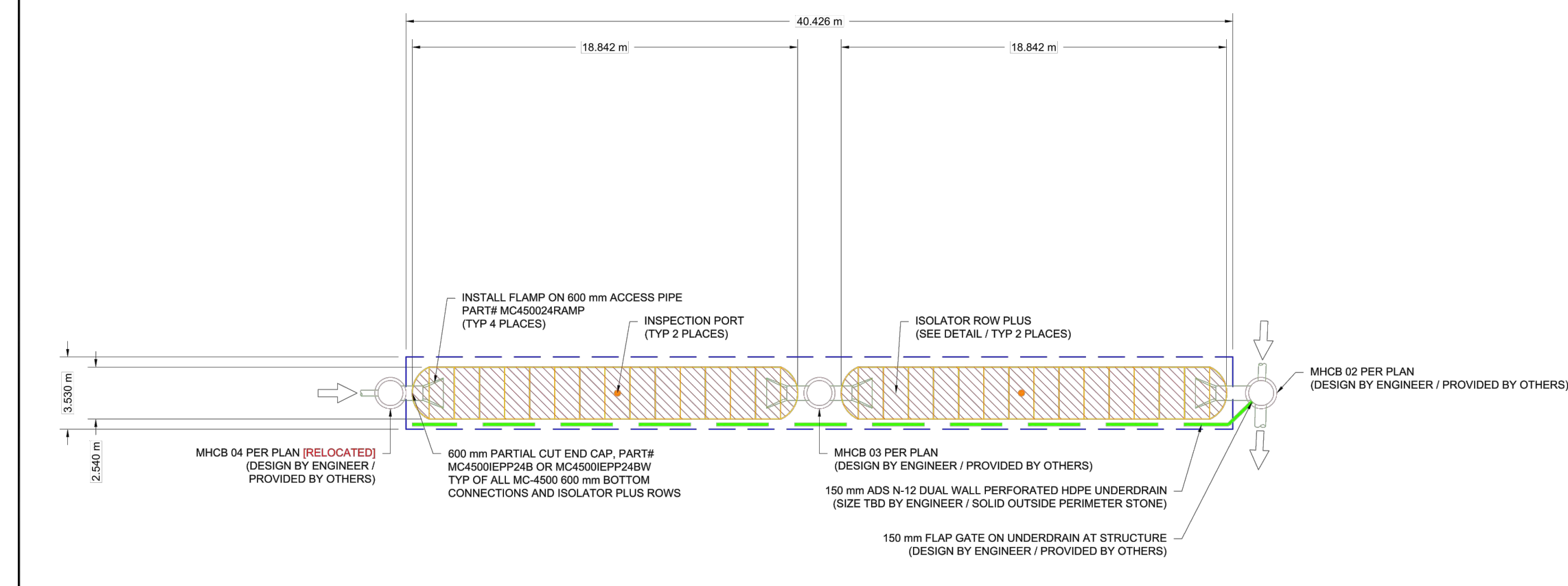
IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF MC-4500 CHAMBER SYSTEM

- STORMTECH MC-4500 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
 - STORMTECH MC-4500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3000/MC-4500 CONSTRUCTION GUIDE".
 - CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
 - STONE SHOOTER LOCATED OFF THE CHAMBER BED.
 - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
 - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
 - THE FOUNDATION STONE SHALL BE LEVELLED AND COMPACTED PRIOR TO PLACING CHAMBERS.
 - JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
 - MAINTAIN MINIMUM - 230 mm (9") SPACING BETWEEN THE CHAMBER ROWS.
 - INLET AND OUTLET MANIFOLDS MUST BE INSERTED A MINIMUM OF 300 mm (12") INTO CHAMBER END CAPS.
 - EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE WELL GRADED BETWEEN 1" AND 2" (20-50 mm).
 - STONE SHALL BE BROUGHT UP EVENLY AROUND CHAMBERS 80% AS NOT TO DISTORT THE CHAMBER SHAPE. STONE DEPTHS SHOULD NEVER EXCEED BY MORE THAN 300 mm (12") BETWEEN ADJACENT CHAMBER ROWS.
 - STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
 - THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIAL BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
 - ADS RECOMMENDS THE USE OF "FLEXSTON CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.
- NOTES FOR CONSTRUCTION EQUIPMENT**
- STORMTECH MC-4500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3000/MC-4500 CONSTRUCTION GUIDE".
 - THE USE OF EQUIPMENT OVER MC-4500 CHAMBERS IS LIMITED:
 - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
 - NO RUBBER TIED LOADERS OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH MC-3000/MC-4500 CONSTRUCTION GUIDE".
 - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH MC-3000/MC-4500 CONSTRUCTION GUIDE".
 - FULL 300 mm (9") 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	
26	STORMTECH MC-4500 CHAMBERS
4	STORMTECH MC-4500 END CAPS
206	STONE ABOVE (mm)
229	STONE BELOW (mm)
40	STONE VOID
179.8	INSTALLED SYSTEM VOLUME (m ³) (PERMETER STONE INCLUDED)
14.7	SYSTEM PERIMETER (m)
67.3	SYSTEM PERIMETER (m)

PROPOSED ELEVATIONS	
82.051	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT UNPAVED);
80.078	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC);
80.527	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC);
80.527	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT);
80.527	MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT);
80.222	TOP OF STONE;
79.917	TOP OF MC-4500 CHAMBER;
78.451	600 mm ISOLATOR ROW PLUS INVERT;
78.393	BOTTOM OF MC-4500 CHAMBER;
78.164	BOTTOM OF STONE.

- NOTES**
- MANHOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECHNICAL NOTE 632 FOR MANHOLD SIZING GUIDANCE.
 - DOE 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 MANHOLD 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 INSTALLED SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.



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OTTAWA, ON.

DATE: 12/20/21 DRAWN: MMD CHECKED: RWD

PROJECT # 523045

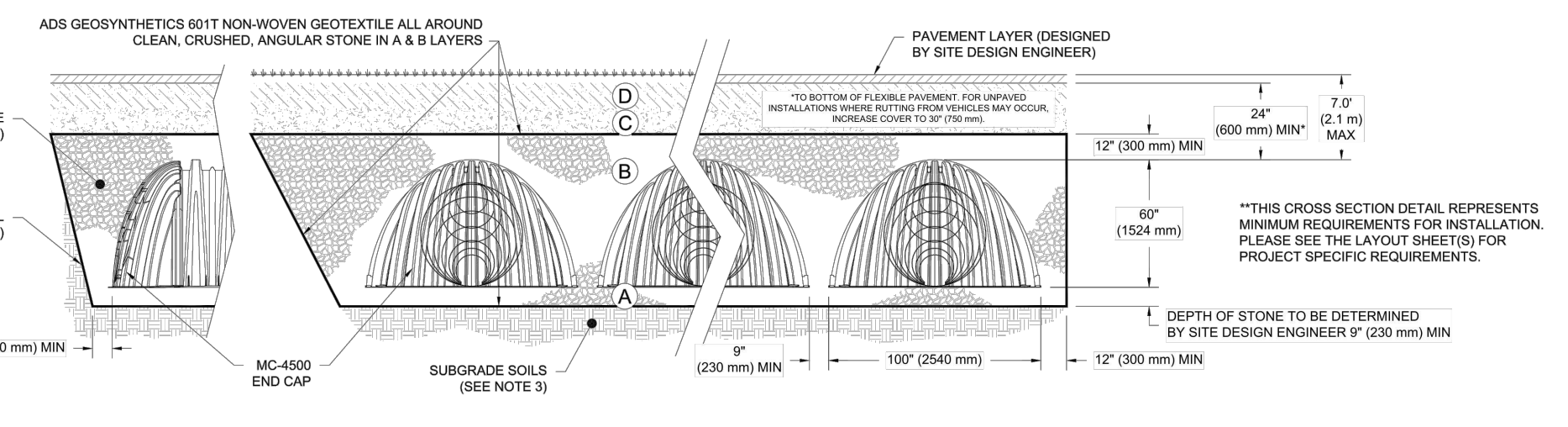
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2 SHEET OF 5

ACCEPTABLE FILL MATERIALS: STORMTECH MC-4500 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 THE FINISHED GRADE OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	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 (OR LAYER 'B') TO 24" (600 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	AASHTO M145 ¹ A-1, A-2, A-3 OR AASHTO M33 ² 3, 3S7, 4, 4F7, 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 TO 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 90% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
B	EMBEDMENT STONE: FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE (A) LAYER) TO THE 'C' LAYER ABOVE.	AASHTO M33 ² 3, 4	NO COMPACTION REQUIRED.
A	FOUNDATION STONE: FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	AASHTO M33 ² 3, 4	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE. ^{2,3}

- PLEASE NOTE:
- THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR A STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M33) STONE".
 - 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.
 - WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
 - ONCE LAYER 'C' IS PLACED, ANY SOLI-MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



- NOTES:**
- CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2181 "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 60101.
 - MC-4500 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
 - THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
 - PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
 - REQUIREMENTS FOR HANDLING AND INSTALLATION:
 - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LOGS.
 - 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 6.2.4 OF ASTM F2181 SHALL BE GREATER THAN OR EQUAL TO 400 LB-SIN. 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.

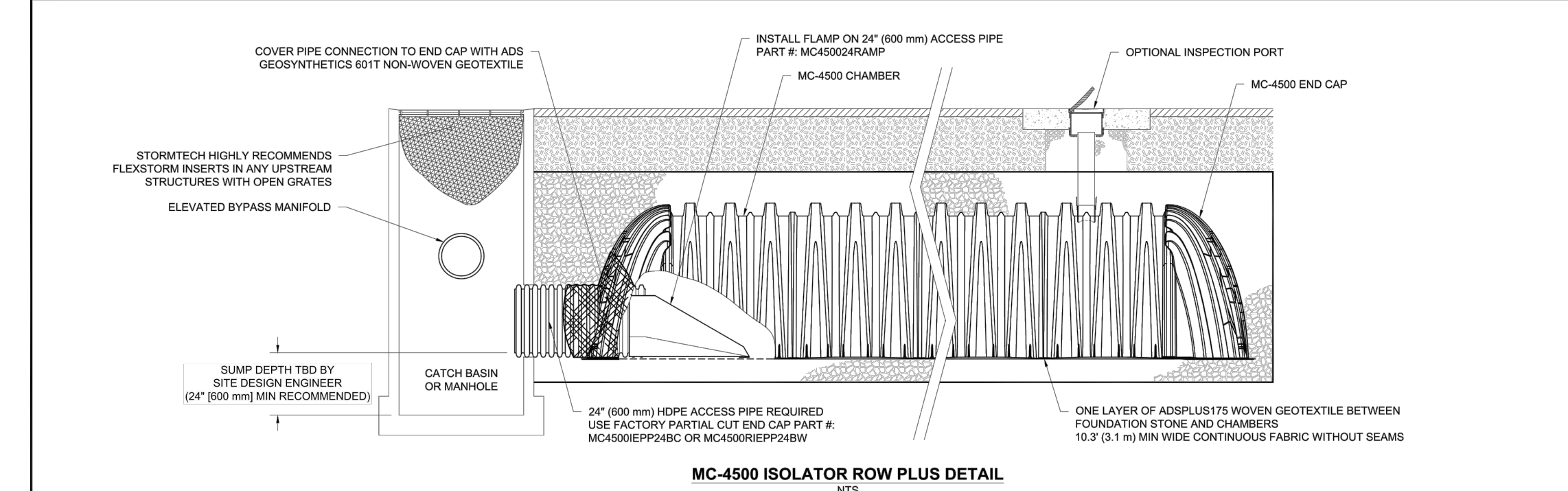
2396 CLEROUX CRESCENT
OTTAWA, ON.

DATE: 12/20/21 DRAWN: MMD CHECKED: RWD

PROJECT # 523045

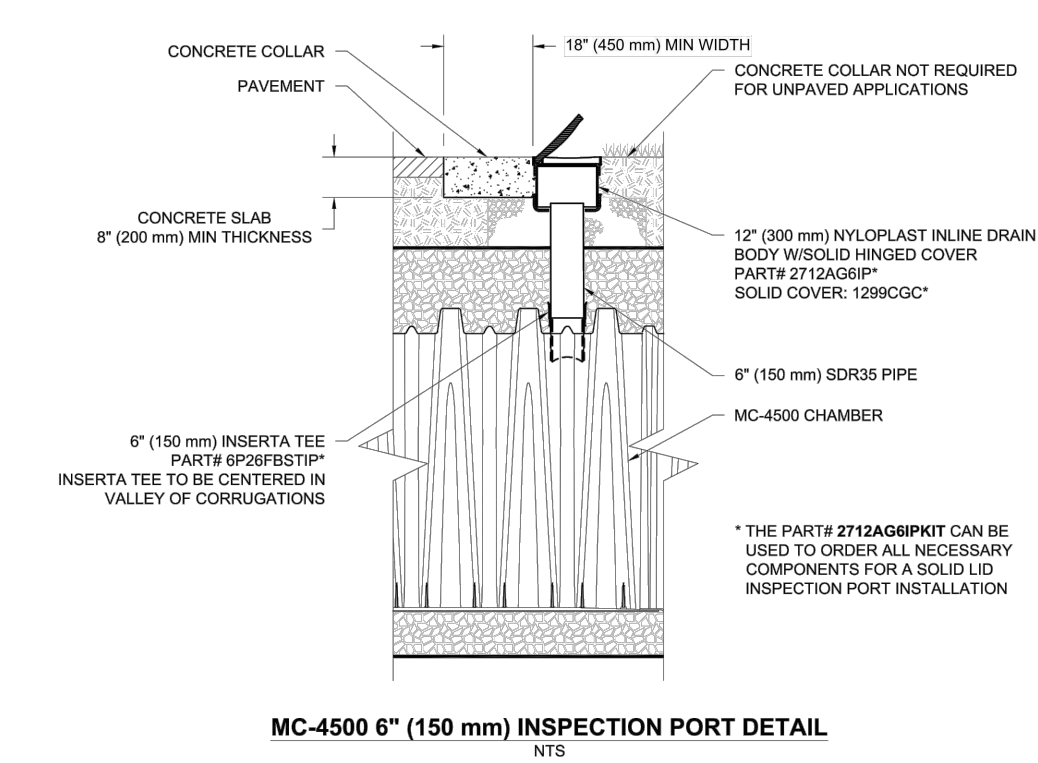
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3 SHEET OF 5



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

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



2396 CLEROUX CRESCENT
OTTAWA, ON.

DATE: 12/20/21 DRAWN: MMD CHECKED: RWD

PROJECT # 523045

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4 SHEET OF 5

ENGINEERING STAMP



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BLANCHARD LETENDRE ENGINEERING

767, Notre Dame, Local 42, Embrun, Ontario,
(613) 693-0700 K0A 1R1 blingengineering.ca

CLIENT:
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 EMBRUN, ON

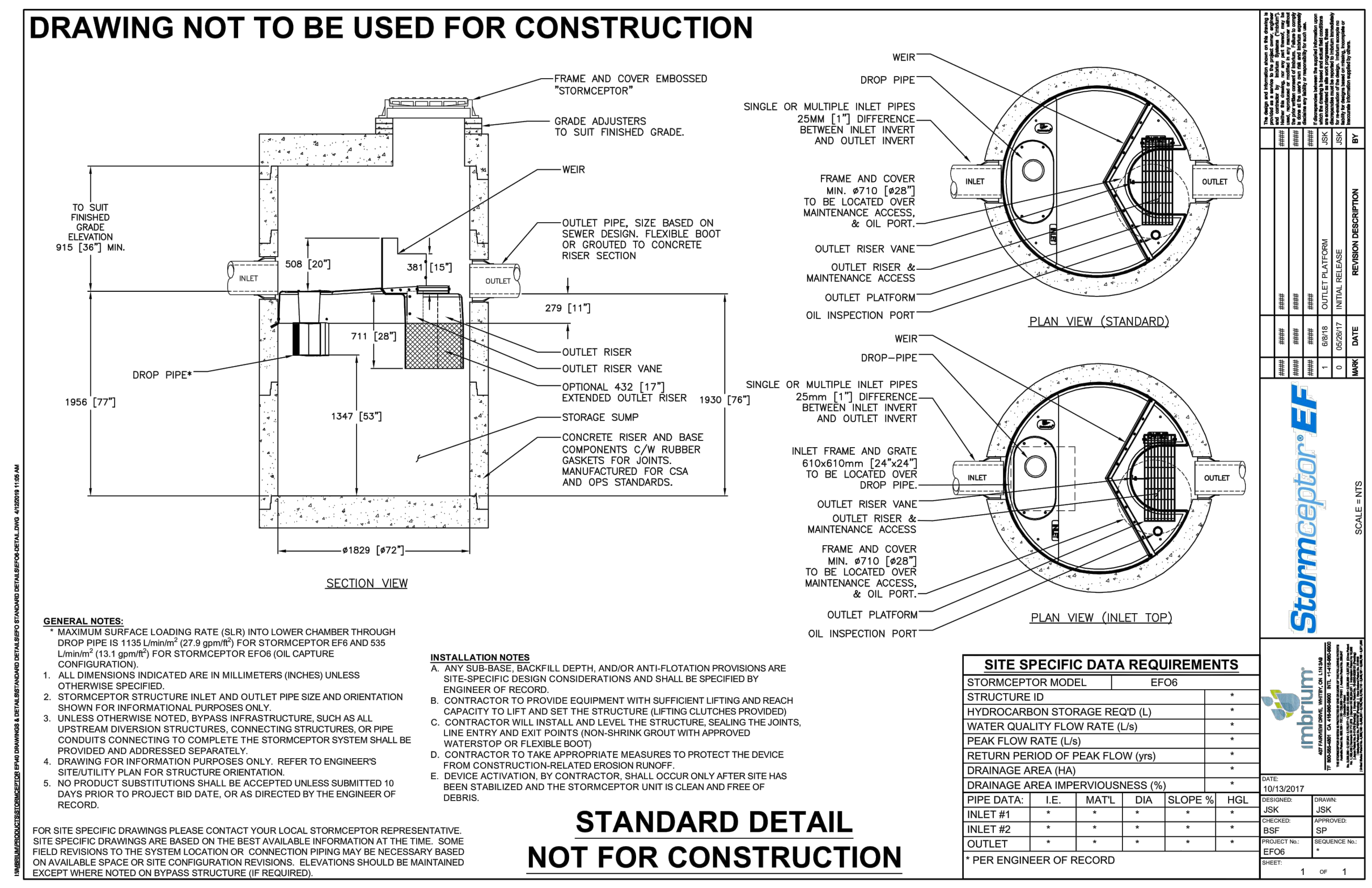
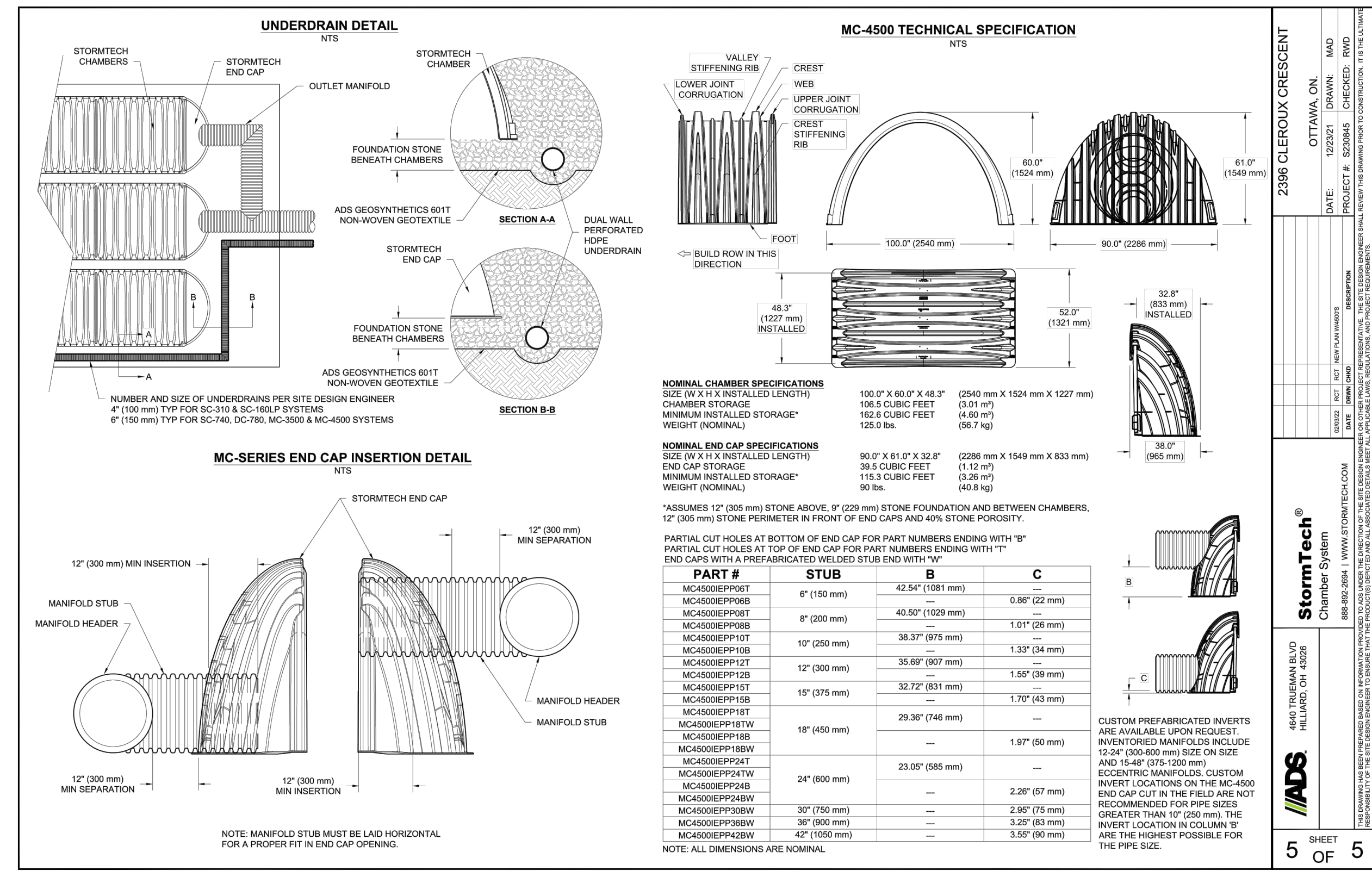
PROJECT:
NEW RESIDENTIAL DEVELOPMENT
 2380, 2396 CLEROUX CRES,
 OTTAWA, ON

DRAWING:
DETAILS - 1

PAPER FORMAT:	24x36	PAGE:	
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DATE:	07-2022	SCALE:	
PROJECT NUMBER:	20-305		

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NO. REVISION		DATE (DDMMYYYY)

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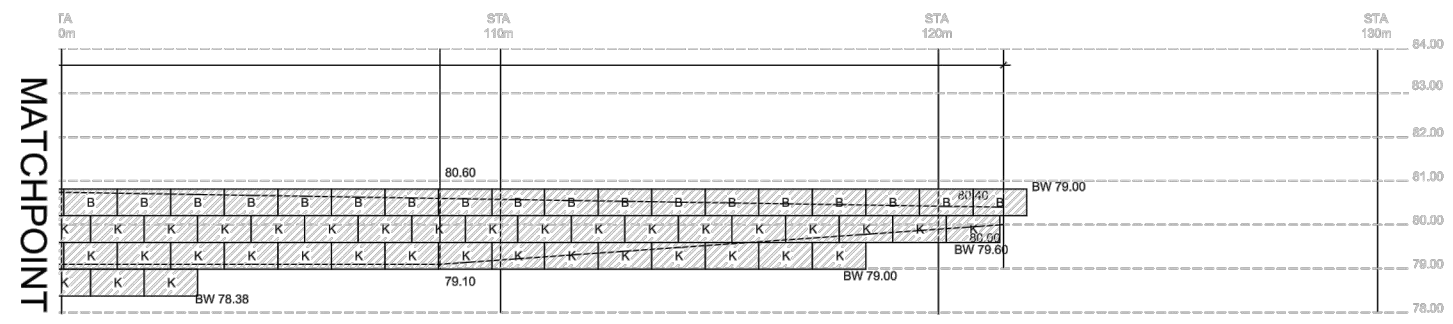
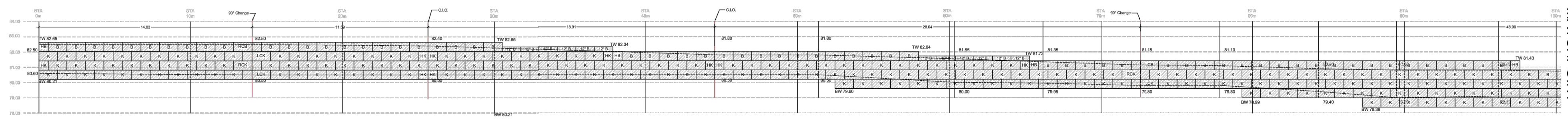
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DRAWING:
DETAILS - 1

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MATCHPOINT

MATCHPOINT

NO.	DATE	DESCRIPTION

REVISIONS ISSUED:

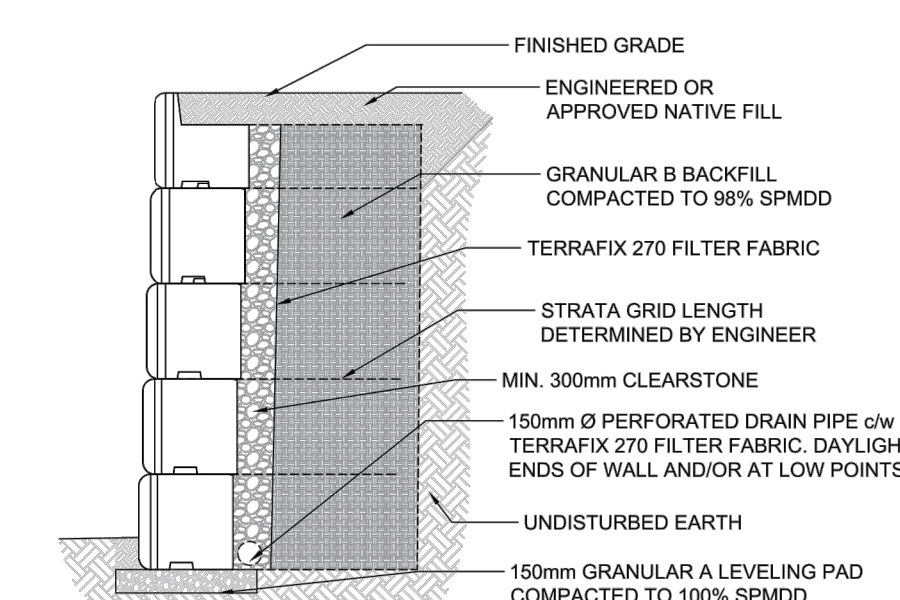
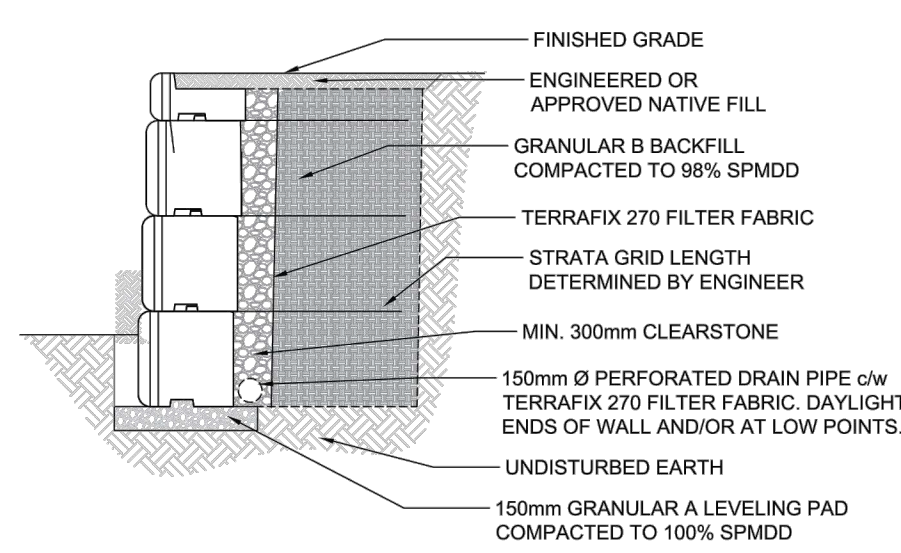
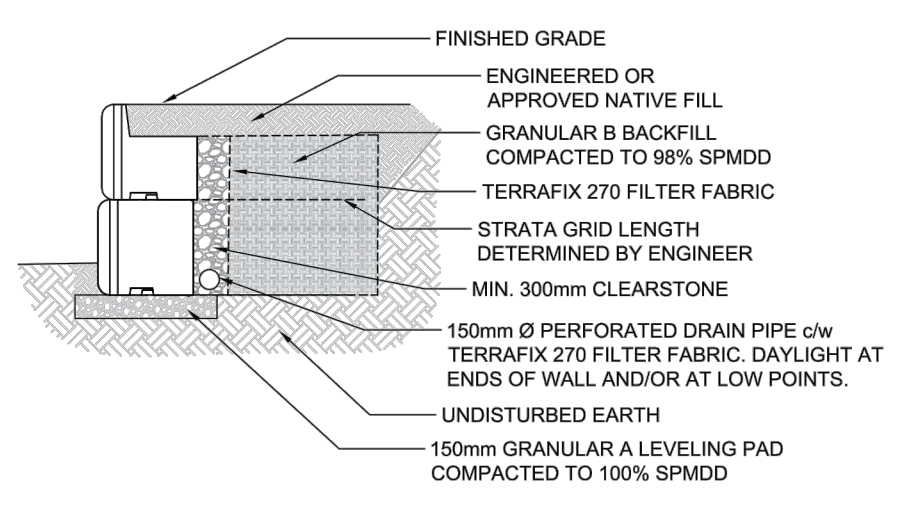
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100 MATHEWSON BLVD. S. UNIT #201,
 MISSISSAUGA, ON L4Z 1A7
 Phone: (905) 845-0532
 Fax: (905) 845-0512



4765 16TH AVE. S.W.
 KING, ON L7B 4E4
 Phone: (905) 864-8608
 Fax: (905) 864-8618

PROJECT:	OLIGO DEVELOPMENTS
LOCATION:	996-B ST. AUGUSTIN RD. EMBRUN, ON
DRAWING DESCRIPTION:	ELEVATION, CROSS SECTIONS, & LAYOUT
DATE STARTED:	2021-02-26
PROJECT NO.:	EST12897
SHEET NO.:	1



BENCH	Block Type	Count
12" BENCH	T2FB	12
FULL BENCH	B	83
HALF BENCH	HB	4
LEFT BENCH	LCB	1
RIGHT BENCH	RCB	1
12" KEYED	T2FK	0
FULL KEYED	K	254
HALF KEYED	HK	9
LEFT KEYED	LCK	3
RIGHT KEYED	RCK	2

SG350 - 5 ROLLS

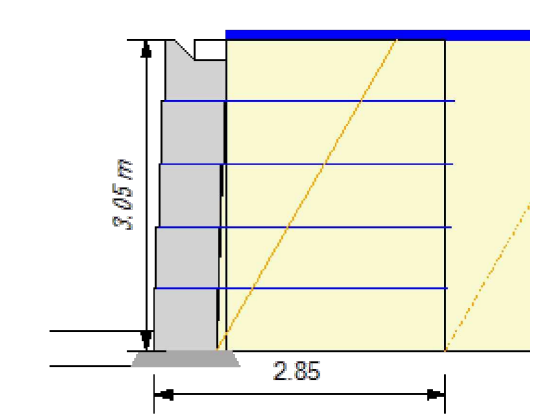
- GENERAL NOTES:**
- THE FOLLOWING NOTES SHALL GOVERN UNLESS NOTED OTHERWISE ON THE DRAWINGS.
 - THESE DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL PROJECT DRAWINGS AND CONTRACT DOCUMENTS.
 - PRIOR TO COMMENCING WORK THE CONTRACTOR WILL VERIFY ALL MEASUREMENTS AND CONDITIONS ON SITE AND REPORT TO THE ENGINEER ANY DISCREPANCIES OR UNSATISFACTORY CONDITIONS THAT MAY AFFECT THE PROPER COMPLETION OF WORK.
 - SEE FIELD CONSTRUCTION MANUAL FOR INSTALLATION DETAILS.
 - DRAWINGS ARE METRIC AND NOT TO BE SCALED.
 - OUTSIDE CURVES WILL REQUIRE BACKS OF BLOCKS TO BE TRIMMED.
 - CONTRACTORS CONSTRUCTION LOADS MUST NOT EXCEED THE ABOVE DESIGN LOADS. DESIGN LOADS MAY ONLY BE APPLIED AFTER THE WALL HAS BEEN INSTALLED AND APPROVED.

- SOIL AND BACKFILL:**
- SPECIFIED SOIL BEARING CAPACITY MUST BE VERIFIED BY A GEOTECHNICAL ENGINEER PRIOR TO COMMENCING CONSTRUCTION OF THE FOUNDATION. CONDITIONS FOUND TO BE UNSATISFACTORY IN BEARING CAPACITY MUST BE REPORTED TO THE PROJECT GEOTECHNICAL ENGINEER.
 - FOUNDATIONS MUST BEAR ON SUITABLE MATERIAL.
 - BACKFILL TO BE INSTALLED AND COMPACTED IN LIFTS NOT GREATER THAN 200mm WHERE HEAVY EQUIPMENT IS USED AND 150mm WHERE HAND OPERATED EQUIPMENT IS USED. HAND OPERATED EQUIPMENT MUST BE USED WHEN WITHIN 1m OF THE WALL.



REA Analysis

Project: Olgin Development
 Location: Ottawa
 Designer: ds
 Date: 2021-02-26
 Section: Section 1
 Design Method: CAN_CSA_S6
 Design Unit: StoneTerra



SOIL PARAMETERS

Parameter	φ	coh	γ
Reinforced Soil:	30 deg	0.00 kNpsm	18.85 kNpcm
Retained Soil:	30 deg	0.00 kNpsm	18.85 kNpcm
Foundation Soil:	30.00 deg	0.00 kNpsm	18.85 kNpcm

Leveling Pad: Crushed Stone

GEOMETRY

Design Height:	3.05 m	Live Load:	2.40 kNpsm
Wall Batter/Tilt:	2.4/ 0.00 deg	Live Load Offset:	0.00 m
Embedment:	0.20 m	Live Load Width:	6.00 m
Leveling Pad Depth:	0.15 m	Dead Load:	0.00 kNpsm
Slope Angle:	0.0 deg	Dead Load Offset:	0.0 m
Slope Length:	0.0 m	Dead Load Width:	0.00 m
Slope Toe Offset:	0.0 m	Leveling Pad Width:	0.91 m



RESULTS

CDR Sliding:	1.54 (fn)	CDR Bearing:	3.61
Eccentricity (e/L):	0.13	Bearing:	83.09; srvc 71.37
FoS Connection:	1.68		

ID	Height	Length	Geogrid	Ta (Ta/R)	% Cvr	EP (Pa)	LL (Pa)	DL (Pa)	Tmax	CDR Str	Tallow	Cn	CDR Pk	CDR POI	CDR Slg	Grid
1	2.44	2.85	SG350	32.04	100	3.30	1.25	0.00	4.54	7.05	11.31	2.49	1.74(3.30)	93.20	0.93	
2	1.83	2.85	SG350	32.04	100	5.85	0.83	0.00	6.68	4.80	15.62	2.34	2.64(5.85)	29.74	1.26	
3	1.22	2.85	SG350	32.04	100	8.77	0.83	0.00	9.59	3.34	19.93	2.08	3.33(8.77)	14.87	1.59	
4	0.61	2.85	SG350	32.04	100	11.68	0.83	0.00	12.51	2.56	21.06	1.68	2.74(11.68)	9.07(1.54)	1.91	

Column Descriptions:
 Ta: allowable geogrid strength
 Rc %: percent coverage for geosynthetics
 EP (Pa) internal active earth pressure
 LL (Pa) earth pressure due to live load surcharge
 DL (Pa) earth pressure due to dead load surcharge
 Tmax maximum earth pressure on geosynthetic layer
 FSstr factor of safety on geogrid strength (Ta/Tmax)
 Ta on allowable tension on the connection
 FS Pkon, factor of safety on the connection (Ta cn/Tmax)
 FS PO, factor of safety on pullout (Ta pullout/(Tmax - LL)
 Grid Embedment, depth of embedment beyond the theoretical failure plane.

ENGINEERING STAMP



#	ISSUED FOR SPA	DATE (DDMMYYYY)
#3	ISSUED FOR SPA	14/06/2022
#2	ISSUED FOR SPA	04/02/2022
#1	ISSUED FOR SPA	19/03/2021

BLANCHARD LETENDRE ENGINEERING
 767, Notre Dame, Local 42, Embrun, Ontario,
 (613) 693-0700 K0A 1R1 blengr.com

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

PROJECT:
NEW RESIDENTIAL DEVELOPMENT
 2380, 2396 CLEOROUX CRES,
 OTTAWA, ON

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