STORMWATER MANAGEMENT AND FUNCTIONAL SERVICING REPORT IN SUPPORT OF SITE PLAN APPLICATION

LARKIN+ LUPi RESIDENTIAL DEVELOPMENT

181 TORONTO STREET SOUTH
UXBRIDGE ONTARIO

counterpoint ENGINEERING

Prepared For:
LARKIN+ LUPi

Counterpoint Engineering Inc.
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File Number: 21026

2nd Submission: November 24th, 2023
1st Submission: May 16th, 2021

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1.0 PROJECT INTRODUCTION

This Stormwater Management and Functional Servicing Report has been prepared on behalf of Larkin+ and Lupi in support of Site Plan Application for the proposed 0.30ha Subject Site (Site). The residential development is comprised of two townhouse blocks with a total of 10 units. The subject site is located at 181 Toronto Street South, in the Town of Uxbridge.

2.0 BACKGROUND MATERIALS

This report is based on a review of the following drawings and reports located in **Appendix A**:

- *Toronto Street Plan and Profiles from 53 m E. of Elgin Park Dr. to 303 m E. of Elgin Park Dr. - Drawing U-06-R-315, prepared by Chishol, Fleming and Associates Consulting Engineers, dated May 17, 2007* **[Plan and Profile of Toronto Street South]**
- *Storm Drainage Area Plan – Drawing STDP -1, prepared by LGI Consulting Engineers Inc.* **[LGI Stormwater Drainage Area Plan]**
- *Topographic Mapping, prepared by Barcih Grenkie, dated March 2021 and updated May 2021* **[Topographic Mapping]**
- *Geotechnical Investigation 181 Toronto Street South Uxbridge, Ontario, prepared by Toronto Inspection, dated May 2021* **[Geotechnical Report]**
- *Hydrogeotechnical Investigation 181 Toronto Street South Uxbridge, Ontario, prepared by Toronto Inspection, dated August 2023 [***Hydrogeotechnical Report]**
- *Township of Uxbridge Design Criteria and Standard Detail Drawings - 2016*

3.0 EXISTING CONDITIONS AND EXISTING DRAINAGE

The Site is currently a vacant open field that fronts onto Toronto Street South's ROW. Based on the Topographic Mapping, there is an existing ditch that is not well defined that drains north along the ROW toward a low point at the northwest corner of the site. There is an existing

culvert at that low point that drains west towards an existing catchbasin EX. CB32 located on the east side of Toronto Street.

The existing site drainage splits three ways, southeast through an existing DICB (catchment 101), north through and existing ditch inlet and culvert to Toronto Street (catchment 102), and southeast through a, existing ditch inlet and culvert (Catchment 103). Catchments 101 and 103 are assumed to drain to the same storm sewer line indicated on the LGI Stormwater Drainage Plan and are indicated on **SWM-1 Pre-Development drainage plan**.

As seen on the LGI Stormwater Drainage Plan (STDP-1) included in **Appendix A**, the topographic information and drainage areas on SWM-1 generally confirm with STDP-1. In pre-development conditions the existing stormwater flows all outlet to the same downstream creek. As seen in LGI Stormwater Drainage Plan (STDP-1), the two outlets are located approximately 65m from one another.

4.0 DESIGN CRITERIA

The site will be designed based on the following criteria:

- Quantity Control – Control post development flows to 5-year pre-development levels.
- Water Balance – Provide Post to Pre Water Balance
- Volume Control – Provide 25 mm retention for all impervious site area, alternative #1 for 12.5mm on-site retention, and alternative #2 for minimum 5mm on-site retention.
- Quality Control – Provide 80% TSS Removal
- Phosphorus Removal – As per Lake Simcoe Conservation Authority (LSRCA) provide a net 0 load increase in phosphorus to Lake Simcoe as per the Lake Simcoe Phosphorus Offsetting Policy

5.0 QUANTITY CONTROL

Quantity control, water balance and volume control will be achieved through on-site detention storage and infiltration. Refer to SWM-2 for post development drainage areas.

Quantity Control

The pre-development drainage areas 101, 102, and 103 combined to provide 22.5 l/s of allowable release flow for the site. The proposed stormwater design controls the 100-year storm event to meet this 5-year pre-development flow.

Two separate underground chambers are located within the site. The first chamber system is composed of a Stormtech SC-310 units and are designed to retain and infiltrate the 25mm storm event from the clean roof runoff. These units are located at the east side of the site under the parking area. All roof flows in excess of the 25mm event will bypass the SC-310 chambers via an overflow outlet on the rainwater leader to splash pads and will flow overland to the proposed catchbasins.

The second chamber system is composed of Stormtech MC-3500 units and are designed for detention of flows up to and including the 100-year storm. The storage chamber for Area 201 is located within the driveway entrance of the site and will control the remainder of the site to a release rate of 5.4 L/s. This tank includes 119 m3 of storage. Storms more than the 100-year will flow overland through the site to Toronto Street. Calculations for stormwater quantity control are provided in **Appendix B**.

The other method of quantity control is pipe storage. The 450mm PVC storm pipes within the site will produce 7m3 of storage for the site. A summary of the predevelopment flow is compared to the post development conditions in **Table 1** below.

Table 1 – 100-Year Peak Flow Summary

Drainage Outlet	Pre-development			Post-development		
	Area ID	Area (ha)	Flow Rate (l/s)	Area ID	Area (ha)	Flow Rate (l/s)
Existing South East Outlet	101	0.06	4.5	303	0.02	3.5
North West Culvert (Toronto St.)	102	0.13	9.8	301 201	0.04 0.23	11.5 5.4
North East Outlet	103	0.11	8.2	302	0.01	2.1
Totals		0.3	22.5		0.3	22.5

Table 2 – 100-Year Storage Summary

Area I.D	Storage Provided (m3)	Storage Required (m3)
Toronto Street Storm Sewer Outlet (Allowable Release Rate - 5 year = 5.4 L/s)		
201 (Site) Underground Chamber Storage	**119**	**124**
201 (site) Underground Pipe Storage	**7**	
Total Storage	**126**	

Quantity control calculations are provided in **Appendix B**. A post development drainage plan is shown as **SWM-2**.

To confirm conveyance of the 100-year storm to the storage chamber an inlet capacity analysis was completed. Refer to **Appendix B** for calculations. The results found that there is capacity with the catchbasins including a 50% blockage factor to capture the 100-year storm. A storm design sheet was also produced and found that the storm pipes are adequately sized for conveying the 100-year storm event to the Stormtech Chamber.

6.0 WATER BALANCE AND VOLUME CONTROL

Water Balance

The water balance results are shown below in **Appendix B**. As seen in the summary table, the infiltration has been increased from predevelopment conditions via site grading and implementation of roof infiltration. Total infiltration for the site has an increase of 89.9%.

Volume Control

The volume control targets for the site include: 25mm volume control target, alternative #1 for 12.5mm on-site retention, and alternative #2 for minimum 5mm on-site retention. Various LIDs have been reviewed but due to site constraints, they have been deemed unfeasible for this development. The constraints with the site include high groundwater limiting the locations where infiltration is feasible and property, spatial and infrastructure restrictions.

For this site (0.20 ha of impermeable area), a total of 18.75 m^3 of infiltration is proposed. This equals 25mm for the site roof area or 9.4 mm of infiltration for the entire site. This volume control does meet alternative #2 with a minimum of 5mm of onsite retention.

Based on the Toronto Inspection laboratory results, the recommended infiltration rate is 30.0 mm/hr after applying a safety factor of 2.5. This report also outlines the water table elevations within the site. At the location of the SC-310 Stormtech chambers (roof infiltration) (as per 21BH-4) the groundwater has a high elevation of 276.05 m. This provides 1.0 m clearance to the bottom of the system.

7.0 QUALITY CONTROL

The proposed development shall target an enhanced level of quality control (80% TSS removal) for this site. Quality control will be provided by a treatment train approach utilizing the proposed Isolator Row Plus within the Stormtech chamber systems, the proposed CB shields, and the proposed infiltration volume.

The Isolator Row Plus has been Verified to achieve the 80% TSS removal when acting alone and is also ETV certified. Specification for the Isolator Row Plus and the ETV certification have been provided in **Appendix B**. A calculation has also been provided for the proposed CB shields. The CB shields were found to provide 72% TSS removal. Therefore, the proposed Isolator Row Plus in combination with the CB shields will provide adequate treatment to achieve the 80% TSS removal quality control criteria.

8.0 PHOSPHORUS REMOVAL

A phosphorus calculation has been prepared to determine the pre and post development phosphorus loading from the site. The existing and post development phosphorus loading is summarized in **Table** below. As seen below the site will be required to provide a phosphorus offset for the post development condition. The cost to be paid is **$10,083.34.**

The pre and post-development have been evaluated based on the Hutchinson report "Phosphorus Budget Tool in support of Sustainable Development for the lake Simcoe Watershed", dated March 30, 2012. The pre-development conditions for the site have been considered as low intensity development due to the cleared areas with low density of trees, and proximity to adjacent residential development. In proposed conditions the site is characterized as high intensity development.

Table 3 Phosphorus Loading Summary

Phosphorus Loading Summary		
Existing Conditions	0.039	kg/year
Proposed Conditions with no BMP	0.396	kg/year
Proposed Conditions with BMP	0.098	kg/year
Post Development % Phosphorus Removal	**75%**	

Phosphorus calculations are provided in **Appendix B**.

9.0 PROPOSED GRADING

Grading for the site will be implemented to follow the Township of Uxbridge minimum criteria for Lot Grading. Overland flow routes will be provided such that stormwater will be safely conveyed offsite and maintain existing conditions. Refer to drawing C-1, Grading Plan for details included in **Appendix E**.

10.0 WATER SERVICING

The site will be serviced by making a connection to the existing 300mm PVC watermain within Toronto Street South. The proposed watermain is 150mm PVC watermain. As per the Region of Durham standards, a water meter room will be installed within the site prior to distribution to individual units and for fire protection. Currently Toronto Street South has existing hydrants spaced 150m along the front of this site. This provides adequate spatial coverage for fire protection and therefore no additional hydrants are proposed on this site.

Water demand calculations were completed per Region of Durham standards and a max day plus fire flow for the site is 5,037 L/min. Water demand calculations can be found in **Appendix C**. As per Region comments received December 8th, 2022, the estimate watermain pressure is at the site 78 psi. A hydrant flow test will be scheduled for spring 2024 to confirm available fire flow rates to the site.

11.0 SANITARY SERVICING

Sanitary servicing for the site will be completed by making a connection from each lot to the 375mm VC sanitary sewer located within the Toronto Street ROW as per Region of Durham standards S-100.020. The proposed connections will be made with 150mm PVC pipe. The total sanitary flow rate for the 10 units was calculated per Region of Durham standards. The flow rate for the proposed site is 0.56 L/s. Calculations can be found in **Appendix D**.

12.0 EROSION AND SEDIMENT CONTROL MEASURES

The Erosion and Sediment Control Measures Provided generally follow the Erosion and Sediment Control Guidelines for Urban Construction (December 2006), Prepared by the Greater Golden Horseshoe Area Conservation Authorities. As illustrated in Drawing EC-01 the sediment control measures are summarized below:

1. Silt Fences are to be installed along the limit of the property prior to construction activities such as topsoil stripping and topsoil stockpiling.
2. Catch Basin and Area Drain Inlet Protection Filter are to be installed on all catch basins and area drains.
3. Mud Mat is to be installed at the construction entrance prior to the commencement of earthworks in order to reduce mud tracking onto municipal roads.

Construction Sequencing

The following are the construction sequencing with respect to sediment control:

1. Installation of all silt fences along the limit of property, and sediment traps.
2. Installation of mud mat for construction access.
3. Topsoil stripping, stockpiling and excavate the site for the construction of the buildings.
4. Installation of site servicing and underground utilities.
5. Installation of CB and Area Drain sediment traps.
6. Construction of the buildings.
7. Restore or re-vegetate all disturbed area with temporary measures or with final landscaping and paving; and,
8. Remove sediment control measures when all disturbed areas are stabilized.

Inspection and Maintenance

Inspection, maintenance, and record keeping for all sediment control measures are to be conducted on a regular basis to ensure they operate effectively.

The minimum inspection frequency during all construction stages is to be as follows:

- On a weekly basis.

- After every rainfall event.
- After significant snowmelt events; and,
- Daily during extended rain or snowmelt periods.

During inactive construction periods, when the site is left alone for 30 days or longer, a monthly inspection should be conducted.

All damaged sediment control measures should be repaired and/or replaced within 48 hours of the inspection.

Record Keeping Procedure

Maintenance record keeping of all the Erosion and Sediment Control requirements will be conducted by Counterpoint Engineering's field representative, or his/her designee. The minimum inspection frequency during all construction stages is to be as follows:

- On a weekly basis.
- After every rainfall event.
- After significant snowmelt events; and,
- Daily during extended rain or snowmelt periods.

During inactive construction periods, when the Site is left alone for 30 days or longer, a monthly inspection should be conducted. All damaged erosion and sediment control measures should be repaired and / or replaced within 48 hours of the inspection.

13.0 CONCLUSIONS

Based on the assessment provided above, the residential development will meet the stormwater management criteria via the following methods:

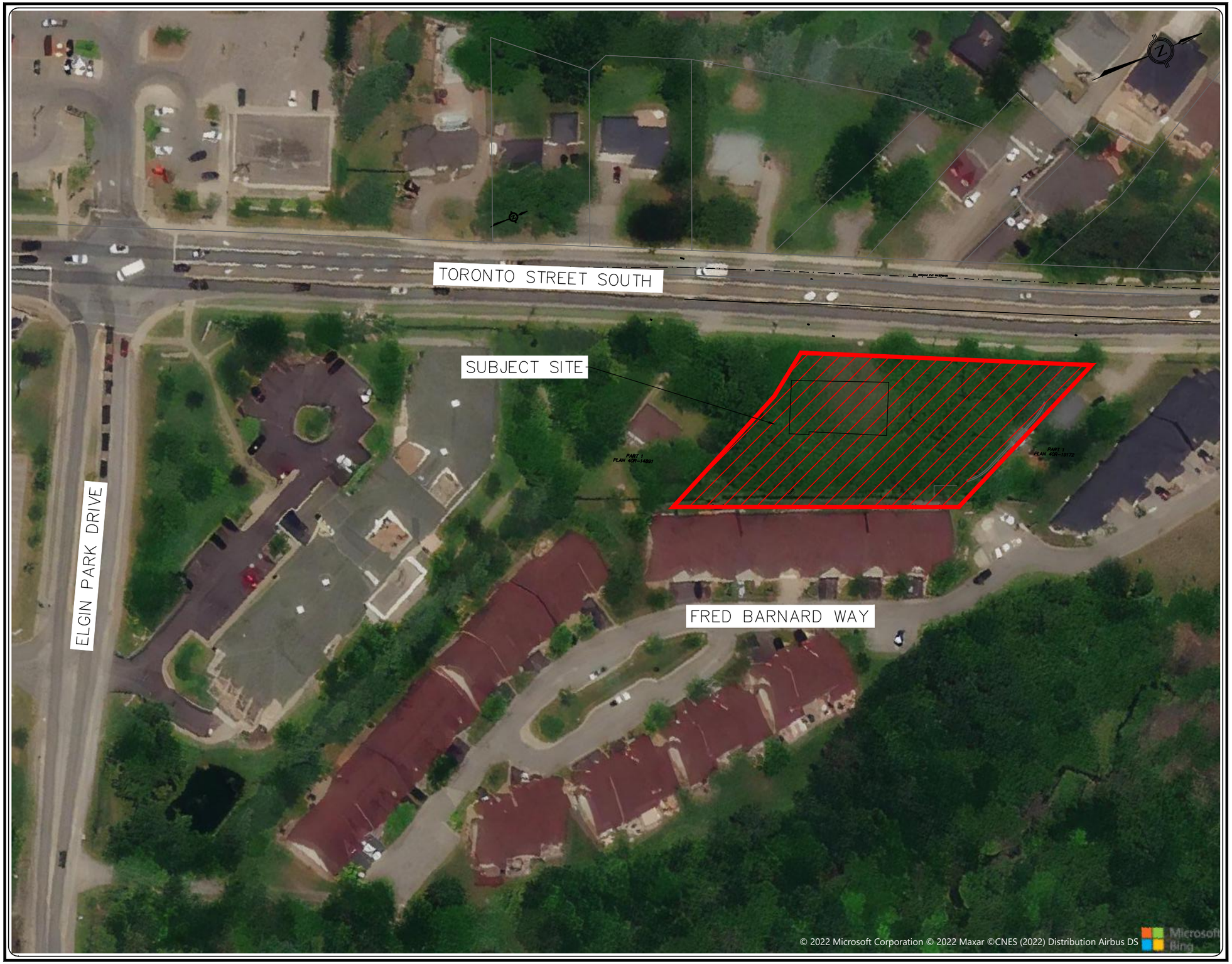
- Quantity Control, Water Balance and Volume Control will be met with infiltration and stormwater storage.
- Quality Control will be met via inherently clean surfaces, Isolator Row Plus, CB Sheilds and stormwater infiltration.
- Phosphorus Removal will be met using the CB Sheilds, Isolator Row Plus and infiltration areas on site.

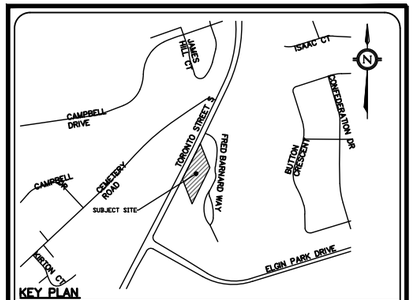
We trust the information provided in this report meets with your requirements. Should there be any questions or comments, please feel free to contact the undersigned.

Sincerely,
Counterpoint Engineering

Jude Yoganathan, P.Eng

Scott Corley, E.I.T.





LEGEND

counterpoint ENGINEERING
COUNTERPOINT ENGINEERING INC.
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181 TORONTO STREET SOUTH MANSOUR
ARABI/MAN HOLDINGS LTD
UXBRIDGE, ONTARIO

SITE LOCATION PLAN

DESIGNED BY: SC	DATE: NOV 2023
CHECKED BY: PT	PROJECT No. 21026
DRAWING BY: SC	
CHECKED BY: PT	FIGURE No. F-1
SCALE: 1:1000	

TORONTO STREET SOUTH
(THE KINGS HIGHWAY No. 47, AS SHOWN ON DEPOSITED PLAN HIGHWAY No. 30)
PIN 26838-0009 (LT)

EX. 300mmø PVC WATERMAIN

EAST HALF OF CONCESSION 1 GRAPHIC TOWNSHIP OF UXBRIDGE

102
A=0.13
C=0.25

101
A=0.06
C=0.25

103
A=0.11
C=0.25

EX. DITCH INLET AND CULVERT

EX. CB

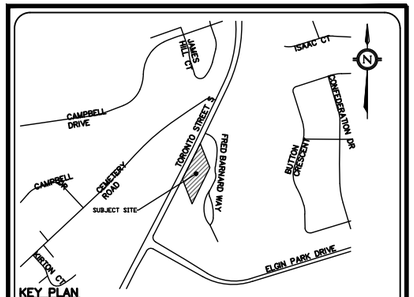
PART 1
PLAN 40R-14891
PIN 26838-0067 (LT)

PART 1
PLAN 40R-19172
PIN 26838-0055 (LT)

CONDO BLOCK 27218

FRED BARNARD WAY

KEY PLAN



LEGEND

PRE-DEVELOPMENT DRAINAGE AREA

103 — AREA ID
A=3.30 — AREA (Ha)
C=0.25 — RUNOFF COEFFICIENT

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181 TORONTO STREET SOUTH MANSOUR
ARABI/MAN HOLDINGS LTD
UXBRIDGE, ONTARIO

PRE-DEVELOPMENT STORM DRAINAGE PLAN

DESIGNED BY: SC	DATE: NOV 2023
CHECKED BY: PT	PROJECT No. 21026
DRAWING BY: SC	
CHECKED BY: PT	FIGURE No. SWM-1
SCALE: 1:500	

TORONTO STREET SOUTH
(THE KING'S HIGHWAY No. 47, AS SHOWN ON DEPOSITED PLAN HIGHWAY No. 30)
PIN 26838-0009 (LT)

EX. 300mm ø PVC WATERMAIN

301
A=0.04
C=0.41

203
A=3.30
C=0.25

303
A=0.02
C=0.25

201
A=0.23
C=0.79

302
A=0.01
C=0.25

BUILDING 2

BUILDING 1

EAST HALF
CONCESSION
GRAPHIC
TOWNSHIP OF
UXBRIDGE

PART 1
PLAN 40R-14891
PIN 26838-0067 (LT)

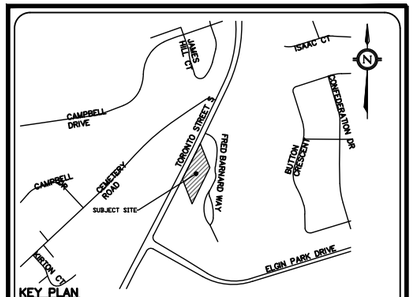
PART 1
PLAN 40R-19172
PIN 26838-0065 (LT)

PIN 26838-0066 (LT)

CONDO BLOCK 27218

FRED BARNARD WAY

KEY PLAN



LEGEND

POST-DEVELOPMENT DRAINAGE AREA

203 — AREA ID
A=3.30 — AREA (Ha)
C=0.25 — RUNOFF COEFFICIENT

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181 TORONTO STREET SOUTH MANSOUR
ARABI/MAN HOLDINGS LTD
UXBRIDGE, ONTARIO

POST-DEVELOPMENT STORM DRAINAGE PLAN

DESIGNED BY: SC	DATE: NOV 2023
CHECKED BY: PT	PROJECT No. 21026
DRAWING BY: SC	
CHECKED BY: PT	FIGURE No. SWM-2
SCALE: 1:500	

Appendix A
Background Information

NOTES:

TEMPORARY BENCHMARKS

NOTE: ELEVATIONS HAVE NOT BEEN CONFIRMED AS GEODETIC.

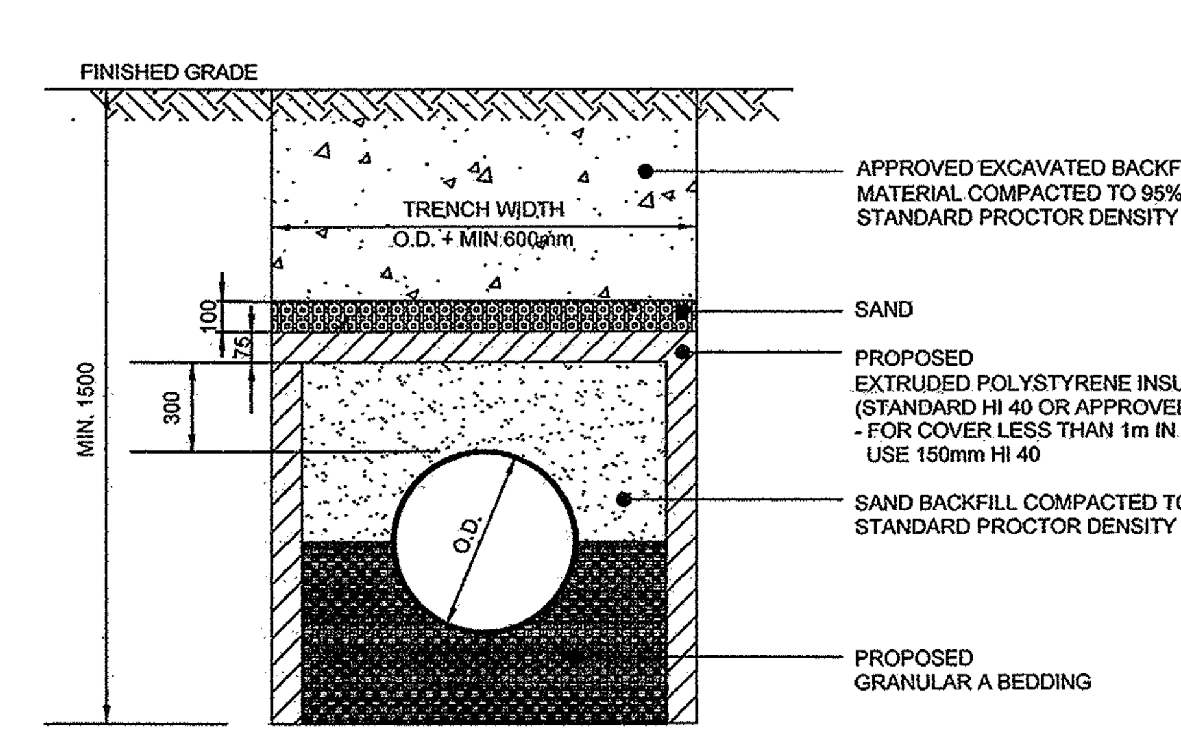
MH #15-7 ELEV 276.77 (Top)
SANITARY MANHOLE LOCATED 6.1± metres NORTH OF THE SOUTHWEST CORNER OF PART 1 40R-10738, AS SHOWN ON SITE PLAN SSN.

MH #15-6 ELEV 276.06 (Top)
SANITARY MANHOLE LOCATED 103.6± metres NORTH OF THE SOUTHWEST CORNER AND 85.9± metres SOUTH OF THE NORTHWEST CORNER PART 1 40R-10738, AS SHOWN ON SITE PLAN SSN.

BEARING REFERENCE
BEARINGS ARE ASTRONOMIC AND ARE REFERRED TO THE EASTERLY LIMIT OF THE KING'S HIGHWAY N° 47 AS SHOWN ON DEPOSITED PLAN N° 30 HIGHWAYS HAVING A BEARING OF N27°01'00"E.

LEGEND:

273.50	PROPOSED ELEVATION
H.P.	PROPOSED HIGH POINT
TC / BC	PROPOSED TOP / BOTTOM OF CURB
	PROPOSED SWALE
	PROPOSED AREA DRAIN
RDB1	PROPOSED REAR DRAIN BASIN
MH1	PROPOSED STORM MANHOLE
CBMH1	PROPOSED CATCH BASIN MANHOLE
CB1	PROPOSED CATCH BASIN
DCB1	PROPOSED DOUBLE CATCH BASIN
	PROPOSED PERVIOUS STORM SEWER
	PROPOSED STORM SEWER
	PROPOSED 150mm Ø STORM LATERAL
	PROPOSED SEWER FLOW DIRECTION
	PROPOSED SUB-SURFACE INFILTRATION TRENCH
G-1B	PROPOSED SUB-SURFACE INFILTRATION TRENCH NUMBER
	PROPOSED SANITARY SEWER
	PROPOSED 100mm Ø SANITARY LATERAL
MHS1	PROPOSED SANITARY MANHOLE
	PROPOSED WATER MAIN
	PROPOSED 19mm Ø WATER MAIN LATERAL
V&B	PROPOSED VALVE AND BOX
HYD	PROPOSED HYDRANT
CS	PROPOSED CURB STOP
CO	PROPOSED CLEAN-OUT
BH-3	PHASE 1 BOREHOLE LOCATIONS - JUNE, 2000
BH1	PHASE 2 BOREHOLE LOCATIONS - SEPTEMBER, 2004

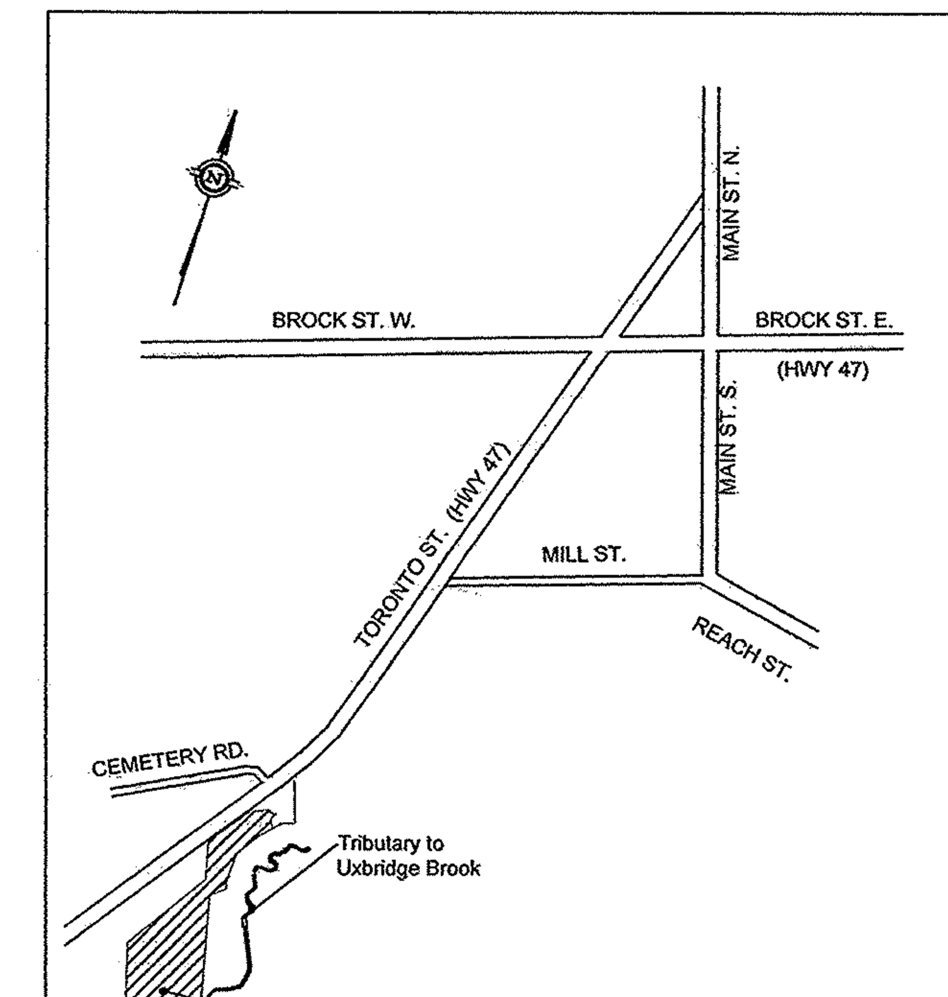


TYPICAL INSULATION DETAIL

N.T.S.

STORM SEWER DETAILS

STRUCTURE NAME	OPSD NUMBER STRUCTURE	COVER
MANHOLE (1200)	701.010	401.020
CATCHBASIN MANHOLE	701.010	401.020
CATCHBASIN	705.010	400.000
TWIN CATCHBASIN	705.020	400.000
DRAIN BASINS	BY ARMTEC, SEE DWG. 'D-5'	
DRAINS	BY ARMTEC, SEE DWG. 'D-5'	
CLEAN-OUT	BY ARMTEC, SEE DWG. 'D-5'	



KEY PLAN
SCALE 1:10000

ACCEPTED TO BE IN GENERAL CONFORMANCE WITH THE TOWNSHIP OF UXBRIDGE STANDARDS. THIS ACCEPTANCE IS NOT TO BE CONSTRUED AS VERIFICATION OF ENGINEERING CONTENT.
TOTTEN SIMS HUBICKI ASSOCIATES (1997) LIMITED
DATE: Feb 15, 2007

APPROVED
DEPARTMENT OF WORKS
REGION OF DURHAM
DATE:

NOTES:

1. THE TWO WELLS EXISTING ON THE SITE SHALL BE DECOMMISSIONED AS PER MOE GUIDELINES.

DRAINAGE AREA NUMBER
7 0.47 — RUNOFF COEFFICIENT
0.1014ha — DRAINAGE AREA

DRAINAGE AREA BOUNDARY

REVISIONS

No.	REVISIONS	DATE	BY	APPROVED
1	AS PER COMMENTS TO 2nd SUBMISSION	0320/06	J.L.	
2	REVISIONS TO STORM SYSTEM/MINOR REVISONS FROM ARCHITECT	05/06	T.L.G.	
3	AS PER TOWN COMMENTS TO 4th SUB.	31/07/06	J.L	
4	AS PER TOWN COMMENTS TO 5th SUB.	28/09/06	J.L	
5	ASPER INFORMATION PROVIDED BY CLIENT	11/01/07	SEL	
6	DRAINAGE AREA ADJUSTED AS PER SITE VISIT AND TOWN COMMENTS	23/01/07	J.L.	
7	AS PER TOWN COMMENTS	08/02/07	J.L.	

CORPORATION OF THE
TOWNSHIP OF UXBRIDGE

PROJECT TITLE

ORPHEUS INVESTMENT CO. LTD.
PROPOSED TOWNHOUSE DEVELOPMENT

DRAWING TITLE

STORM DRAINAGE AREA PLAN

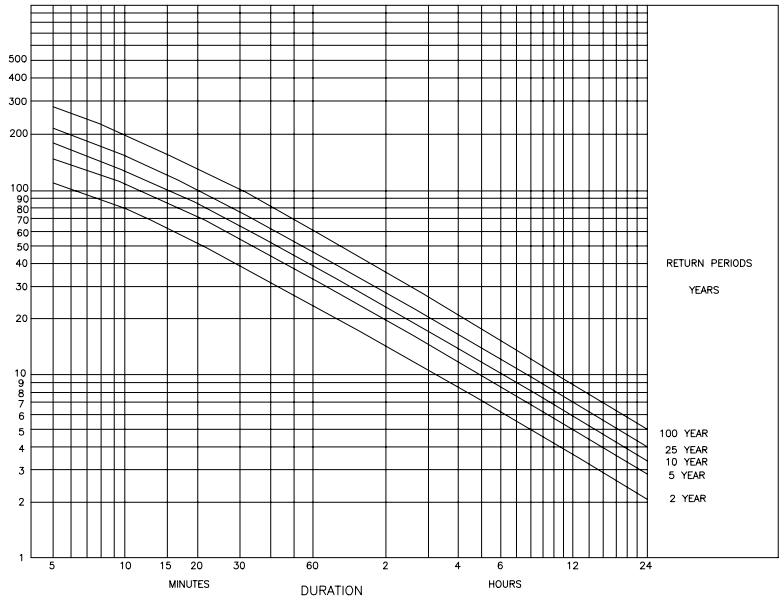
RECEIVED ORP
FEB 09 2007

LGI Consulting Engineers Inc.
588 Edward Avenue Unit 49 Richmond Hill ON L4C 9Y6
T: 905-884-0911 F: 905-884-0790 eng@lgiengineers.com

REGISTERED PROFESSIONAL ENGINEER
K.W. LATHEM
8/2/07
PROVINCE OF ONTARIO

SCALE: 1 : 500		PROJECT No. 0423
DRAWN:	J.L.	DRAWING No. STDP - 1
DESIGN:	K.W.L.	
CHECKED:	K.W.L.	SHEET No. 5
DATE: FEBRUARY, 2006		

\\Lathem-eng\Acad\2004\0423-Uxbridge\WorkingDrawings\Feb-2007\0423STDP-(FEB07).dwg, 2/8/2007 4:00:46 PM

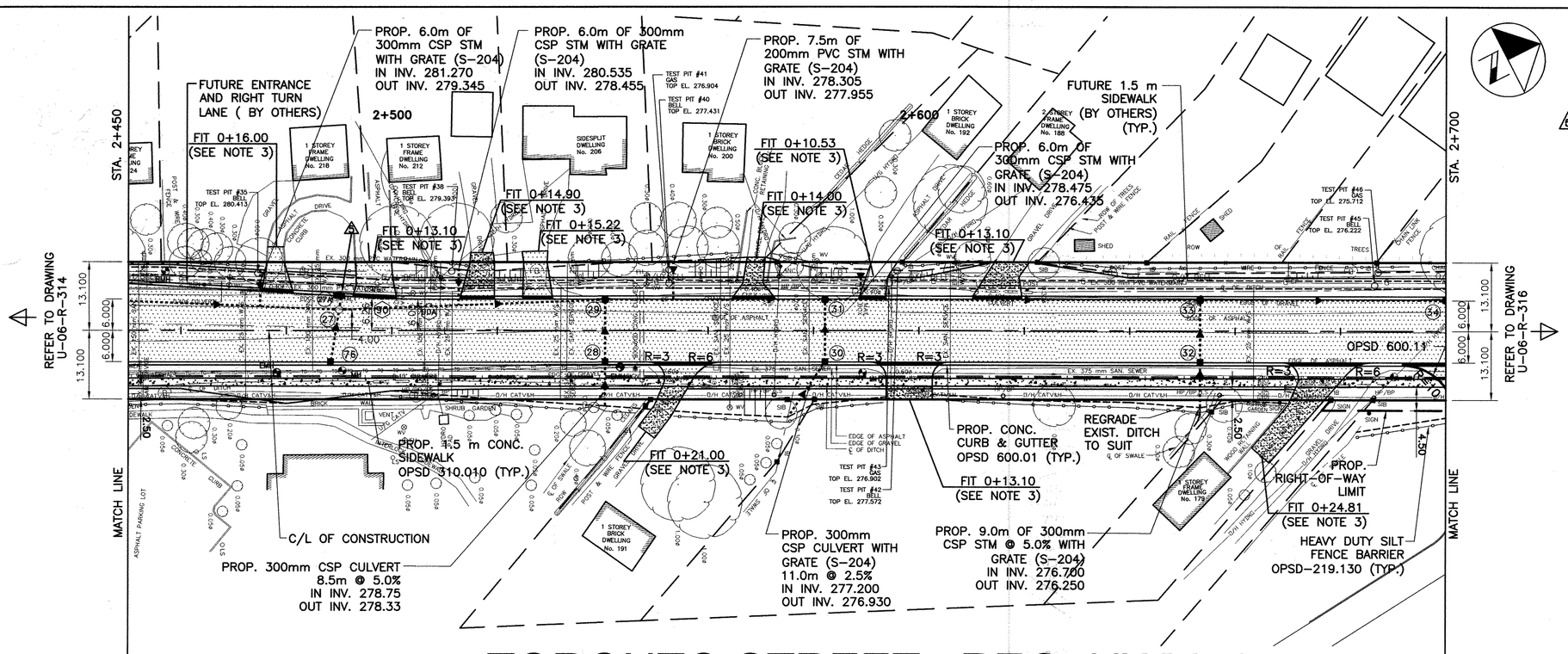


1. EQUATION FOR TYPICAL INTENSITY–DURATION–FREQUENCY CURVES: T–TIME(MINUTES)
   I – INTENSITY (mm/hr)

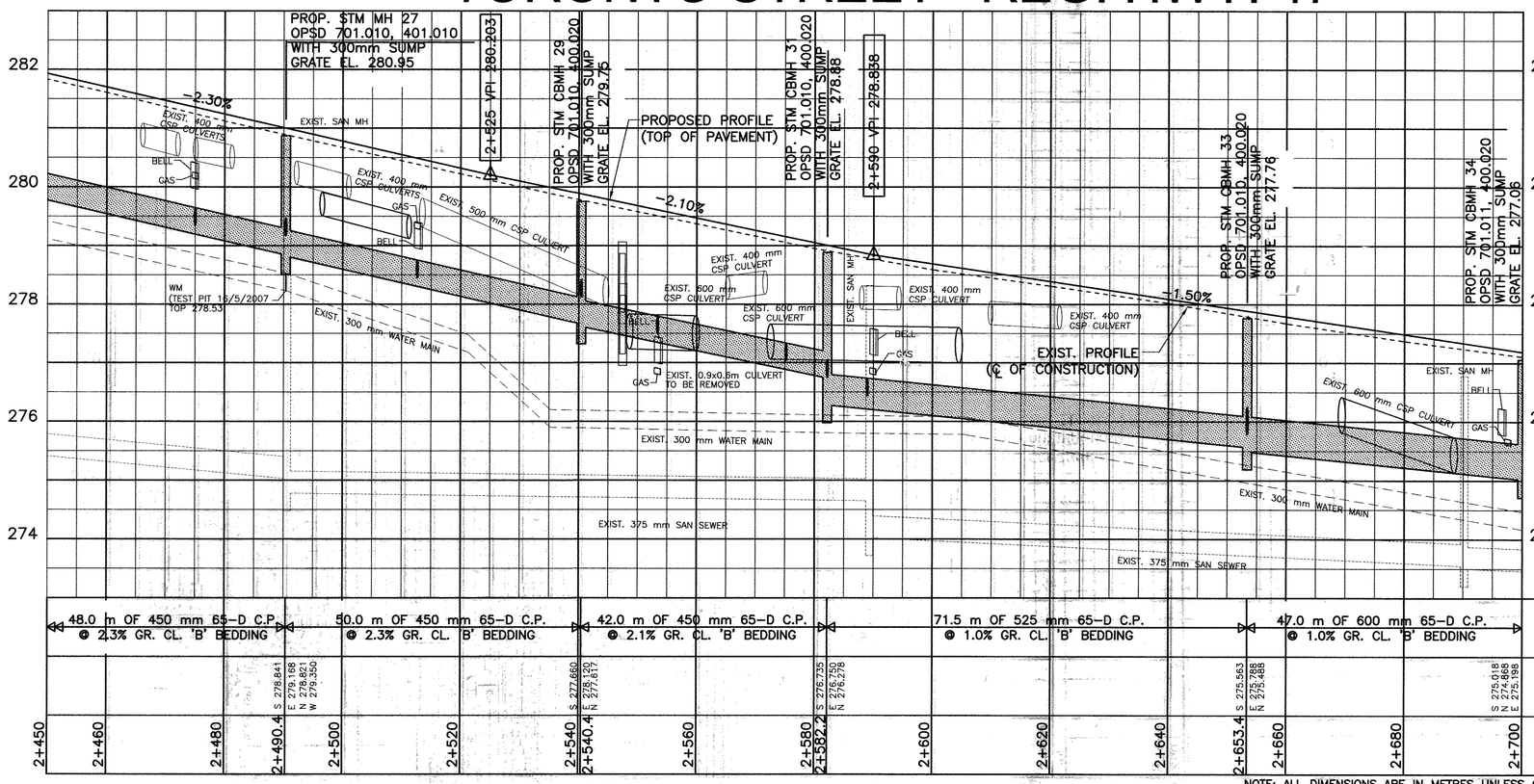
$$I_2 \quad \frac{645}{(T+5)^{0.786}} \qquad I_5 \quad \frac{904}{(T+5)^{0.788}} \qquad I_{10} \quad \frac{1065}{(T+5)^{0.788}} \qquad I_{25} \quad \frac{1234}{(T+4)^{0.787}} \qquad I_{100} \quad \frac{1799}{(T+5)^{0.810}}$$

2. THE ABOVE EQUATION ARE ONLY VALID FOR T=10 MINUTES TO 1440 MINUTES

APPROVED	TOWNSHIP OF UXBRIDGE	DATE OF ISSUE MARCH 1989
REVISION	RAINFALL INTENSITY DURATION CURVES	DRAWING No. US–600
DATE OF REVISION		



TORONTO STREET REG. HWY. 47



48.0 m OF 450 mm 65-D C.P. @ 2.3% GR. CL. 'B' BEDDING	50.0 m OF 450 mm 65-D C.P. @ 2.3% GR. CL. 'B' BEDDING	42.0 m OF 450 mm 65-D C.P. @ 2.1% GR. CL. 'B' BEDDING	71.5 m OF 525 mm 65-D C.P. @ 1.0% GR. CL. 'B' BEDDING	47.0 m OF 600 mm 65-D C.P. @ 1.0% GR. CL. 'B' BEDDING	LENGTHS, SIZES AND GRADES
	S 278.841 E 279.168 N 278.821 W 279.350	S 277.660 E 278.829 N 277.617	S 276.735 E 276.750 N 276.278	S 275.563 E 275.788 N 275.488	S 275.018 E 274.868 N 275.198	STORM SEWER INVERT ELEV.
2+450 2+460	2+480 2+490.4	2+500 2+520	2+540 2+540.4	2+560 2+580 2+582.2	2+600 2+620 2+640	2+653.4 2+660 2+680 2+700	℄ OF CONSTRUCTION CHAINAGE

NOTE: ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.

CATCH BASIN DATA								C.B. CONNECTION DATA	
OPSD	INV. NO.	CHAINAGE	GRATE EP. ELEV.	INVERT ELEV. IN	INVERT ELEV. OUT	LEN. (m)	DIA. (mm)	CLASS OF PIPE	GRADE %
705.010,400.020	76			–			300	65-D	2.0
701.010,400.020	28						300	65-D	1.0
701.010,400.020	30						300	65-D	1.0
701.010,400.020	32						300	65-D	1.0
5 705.020,400.020	27A			–	279.37	2.0	300	65-D	1.0

NO.	CHAINAGE	EP DATA EP ELEV.	RADIUS (m)	LENGTH (m)	GRADE (%)	OFFSET
89A	2+444.93	281.86	–	51.359	–	9.25m WEST
90	2+496.20	280.74	150	8.740	–	6.26m WEST
90A	2+504.94	280.55	–	238.256	–	6.00m WEST
91	2+743.19	276.57				6.00m WEST

NOTES:

1. FOR GENERAL NOTES REFER TO DWG. GEN-1 & GEN-2.
2. FOR DRIVEWAY PROFILE DETAILS, REFER TO DWG. S2 & S3.

NO.	DATE	NAME	REVISIONS
5	17/5/07	MW	MH 27 REVISED, DCB 27A ADDED
2	02/10/06	MW	ISSUED FOR CONSTRUCTION
1	21/07/06	MW	ISSUED FOR TENDER

UTILITIES VERIFIED

CABLE T.V.	2005 01 17	HYDRO	2005 02 03
BELL CANADA	2005 03 01	CONSUMER GAS	2005 02 14

CONTRACTOR TO BE RESPONSIBLE FOR LOCATION OF ALL EXISTING U/G & OVERHEAD UTILITIES. VARIOUS UTILITIES REQUIRE ADVANCE NOTICE PRIOR TO DIGGING, FOR STAKE OUT. THE REGION ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE LOCATION OF EXISTING UTILITIES AS INDICATED ON THIS DRAWING.

SURVEY DATA DATE 2004 12 24

SCALE
HORIZONTAL 10m 0 10m
VERTICAL 1m 0 1m

DRAWN:	K. HO	DATE: 2006 07 21
DESIGN:	J. KIELAR	DATE: 2006 07 21
CHECKED:	P. LAPALME	DATE: 2006 07 21
APPROVED:	M. WILSON	DATE: 2006 07 21

Chisholm, Fleming and Associates consulting engineers

THE REGIONAL MUNICIPALITY OF DURHAM
WORKS DEPARTMENT
WHITBY ONTARIO

TORONTO STREET
FROM 53 m E. OF ELGIN PARK DR. TO 303 m E. OF ELGIN PARK DR.

CONCESSION	REG. RD. NO.	AREA MUNICIPALITY
6	47	TOWNSHIP OF UXBRIDGE

DRAWING NUMBER	CONTRACT NUMBER	SHEET NUMBER
U-06-R-315	D2006-034	23 OF 42

BM No. 0011931U517S EL. 272.439 m
UXBRIDGE UNITED CHURCH, TABLET IN SOUTH SIDEWALL 17.2m FROM SOUTHEAST CORNER, 1.57m BELOW BRICKWORK, MIDWAY BETWEEN TWO LARGE BASEMENT WINDOWS.

UXB-1328

Appendix B

Stormwater Management

SWM DESIGN CALCULATIONS
5-Year Flow Rate Calculations - Pre Development Area 101

Project Name: 181 Toronto Street
Municipality: Uxbridge
Project No.: 21026
Date: 24-Nov-23

Prepared by: S.C
Last Revised: 24-Nov-23

Rainfall Data

Location:	**Uxbridge**	a	**904**
Event	**5-year**	b	**5**
		c	**0.788**

Site Data

Area (ha)	**0.06**
Runoff Coefficient	**0.25**
AC	0.02
Tc (min)	**10**
Rainfall Intensity (mm/hr)	**107**
Rational Flow Rate (l/s)	**4.5**

The Rational Equation:

$$Q = \frac{(C)(i)(A)}{360}$$

where,

Q = the design flow (m^3/s)
C = the site specific runoff coefficient
A = the drainage area (ha)
i = rainfall intensity (mm/hr)

Counterpoint Engineering Inc.
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TEL: (905) 326-1404 FAX: (905) 326-1405
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SWM DESIGN CALCULATIONS
5-Year Flow Rate Calculations - Pre Development Area 102

Project Name: 181 Toronto Street
Municipality: Uxbridge
Project No.: 21026
Date: 24-Nov-23

Prepared by: S.C
Last Revised: 24-Nov-23

Rainfall Data

Location:	**Uxbridge**	a	**904**
Event	**5-year**	b	**5**
		c	**0.788**

Site Data

Area (ha)	**0.13**
Runoff Coefficient	**0.25**
AC	0.03
Tc (min)	**10**
Rainfall Intensity (mm/hr)	**107**
Rational Flow Rate (l/s)	**9.8**

The Rational Equation:

$$Q = \frac{(C)(i)(A)}{360}$$

where,

Q = the design flow (m^3/s)
C = the site specific runoff coefficient
A = the drainage area (ha)
i = rainfall intensity (mm/hr)

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SWM DESIGN CALCULATIONS
5-Year Flow Rate Calculations - Pre Development Area 103

Project Name: 181 Toronto Street
Municipality: Uxbridge
Project No.: 21026
Date: 24-Nov-23

Prepared by: S.C
Last Revised: 24-Nov-23

Rainfall Data

Location:	**Uxbridge**	a	**904**
Event	**5-year**	b	**5**
		c	**0.788**

Site Data

Area (ha)	**0.11**
Runoff Coefficient	**0.25**
AC	0.03
Tc (min)	**10**
Rainfall Intensity (mm/hr)	**107**
Rational Flow Rate (l/s)	**8.2**

The Rational Equation:

$$Q = \frac{(C)(i)(A)}{360}$$

where,

Q = the design flow (m^3/s)
C = the site specific runoff coefficient
A = the drainage area (ha)
i = rainfall intensity (mm/hr)

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SWM DESIGN CALCULATIONS
100-Year Flow Rate Calculations - Post Development Uncontrolled Area 301

Project Name: 181 Toronto Street
Municipality: Uxbridge
Project No.: 21026
Date: 24-Nov-23

Prepared by: S.C
Last Revised: 24-Nov-23

Rainfall Data

Location:	**Uxbridge**	a	**1799**
Event	**100-year**	b	**5**
		c	**0.81**

Site Data

Area (ha)	**0.04**
Runoff Coefficient	**0.52**
AC	0.02
Tc (min)	**10**
Rainfall Intensity (mm/hr)	**201**
Rational Flow Rate (l/s)	**11.5**

The Rational Equation:

$$Q = \frac{(C)(i)(A)}{360}$$

where,

Q = the design flow (m^3/s)
C = the site specific runoff coefficient
A = the drainage area (ha)
i = rainfall intensity (mm/hr)

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SWM DESIGN CALCULATIONS
100-Year Flow Rate Calculations - Post Development Uncontrolled Area 302

Project Name: 181 Toronto Street
Municipality: Uxbridge
Project No.: 21026
Date: 24-Nov-23

Prepared by: S.C
Last Revised: 24-Nov-23

Rainfall Data

Location:	**Uxbridge**	a	**1799**
Event	**100-year**	b	**5**
		c	**0.81**

Site Data

Area (ha)	**0.01**
Runoff Coefficient	**0.31**
AC	0.00
Tc (min)	**10**
Rainfall Intensity (mm/hr)	**201**
Rational Flow Rate (l/s)	**2.1**

The Rational Equation:

$$Q = \frac{(C)(i)(A)}{360}$$

where,

Q = the design flow (m^3/s)
C = the site specific runoff coefficient
A = the drainage area (ha)
i = rainfall intensity (mm/hr)

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SWM DESIGN CALCULATIONS
100-Year Flow Rate Calculations - Post Development Uncontrolled Area 303

Project Name: 181 Toronto Street
Municipality: Uxbridge
Project No.: 21026
Date: 24-Nov-23

Prepared by: S.C
Last Revised: 24-Nov-23

Rainfall Data

Location:	**Uxbridge**	a	**1799**
Event	**100-year**	b	**5**
		c	**0.81**

Site Data

Area (ha)	**0.02**
Runoff Coefficient	**0.31**
AC	0.01
Tc (min)	**10**
Rainfall Intensity (mm/hr)	**201**
Rational Flow Rate (l/s)	**3.5**

The Rational Equation:

$$Q = \frac{(C)(i)(A)}{360}$$

where,

Q = the design flow (m^3/s)
C = the site specific runoff coefficient
A = the drainage area (ha)
i = rainfall intensity (mm/hr)

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SWM DESIGN CALCULATIONS
Required Storage Calculations - Area 201

Project Name: 181 Toronto Street
Municipality: Uxbridge
Project No.: 21026
Date: 24-Nov-23

Prepared by: S.C
Last Revised: 24-Nov-23

Rainfall Data

Location:	Uxbridge	a	1799
Event	100-year	b	5
		c	0.81

Site Data

Area (ha)	0.23
Runoff Coefficient	0.98
AC	0.22
Tc (min)	10
Time Increment (min)	5
Release Rate (l/s)	5.4
Storage Required (m^3)	**123**

The Rational Equation:

$$Q = \frac{(C)(i)(A)}{360}$$

where,

Q = the design flow (m^3/s)
C = the site specific runoff coefficient
A = the drainage area (ha)
i = rainfall intensity (mm/hr)

Time	Rainfall Intensity	Storm Runoff	Runoff Volume	Released Volume	Storage Volume	
(min)	(mm/hr)	(m^3/s)	(m^3)	(m^3)	(m^3)	
10	201	0.13	75	3	72	
15	159	0.10	89	5	84	
20	133	0.08	99	6	93	
25	114	0.07	107	8	99	
30	101	0.06	113	10	104	
35	91	0.06	119	11	107	
40	82	0.05	123	13	110	
45	76	0.05	127	15	113	
50	70	0.04	131	16	115	
55	65	0.04	134	18	117	
60	61	0.04	137	19	118	
65	58	0.04	140	21	119	
70	54	0.03	143	23	120	
75	52	0.03	145	24	121	
80	49	0.03	147	26	121	
85	47	0.03	149	27	122	
90	45	0.03	151	29	122	
95	43	0.03	153	31	123	
100	41	0.03	155	32	123	
105	40	0.02	157	34	123	
110	39	0.02	159	36	123	********
115	37	0.02	160	37	123	
120	36	0.02	162	39	123	

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SWM DESIGN CALCULATIONS
Composite Runoff Area 201

Project Name: 181 Toronto Street
Municipality: Uxbridge
Project No.: 21026
Date: 24-Nov-23

Prepared by: S.C
Last Revised: 24-Nov-23

Rainfall Data

			5-Year	100-year
Location:	**Uxbridge**	a	904	1799
		b	5	5
		c	0.788	0.81

PRE-DEV
AREA ID

Composite RC Value		Area [ha]	C	RC * Area
IMP		0.19	0.90	0.171
PERV		0.04	0.25	0.010
	Total	0.23		0.181
		Divided by Total Area =		0.79

		x1.1	x1.2	x1.25
Storm Event	**5-year**	**25-year**	**50-year**	**100-year**
Runnoff Coeffiecient	0.79	0.87	0.94	0.98

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SWM DESIGN CALCULATIONS
Composite Runoff Area Uncotrolled (301,302,303)

Project Name: 181 Toronto Street
Municipality: Uxbridge
Project No.: 21026
Date: 24-Nov-23

Prepared by: S.C
Last Revised: 24-Nov-23

Rainfall Data

			5-Year	100-year
Location:	**Uxbridge**	a	904	1799
		b	5	5
		c	0.788	0.81

PRE-DEV
AREA ID

Composite RC Value		Area [ha]	C	RC * Area
IMP		0.01	0.90	0.009
PERV		0.03	0.25	0.008
	Total	0.04		0.017
		Divided by Total Area =		0.41

		x1.1	x1.2	x1.25
Storm Event	**5-year**	**25-year**	**50-year**	**100-year**
Runnoff Coeffiecient	0.41	0.45	0.50	0.52

		x1.1	x1.2	x1.25
Storm Event	**5-year**	**25-year**	**50-year**	**100-year**
Runnoff Coeffiecient	0.25	0.28	0.30	0.31

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PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER	
ADS SALES REP	
PROJECT NO.	

Advanced Drainage Systems, Inc.

SiteAssist™
FOR STORMTECH
INSTALLATION INSTRUCTIONS
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TO 2
UXBRIDGE, ON, CANADA

SC-310 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH SC-310.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE OR POLYETHYLENE COPOLYMERS.
3. CHAMBERS SHALL BE CERTIFIED TO CSA B184, "POLYMERIC SUB-SURFACE STORMWATER MANAGEMENT STRUCTURES", AND MEET THE REQUIREMENTS OF ASTM F2922 (POLETHYLENE) OR ASTM F2418 (POLYPROPYLENE), "STANDARD SPECIFICATION FOR CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE CSA S6 CL-625 TRUCK AND THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 50 mm (2").
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2922 SHALL BE GREATER THAN OR EQUAL TO 400 LBS/FT/%. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 23° C / 73° F), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
   - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
   - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
   - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2922 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF THE SC-310 SYSTEM

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

NOTES FOR CONSTRUCTION EQUIPMENT

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

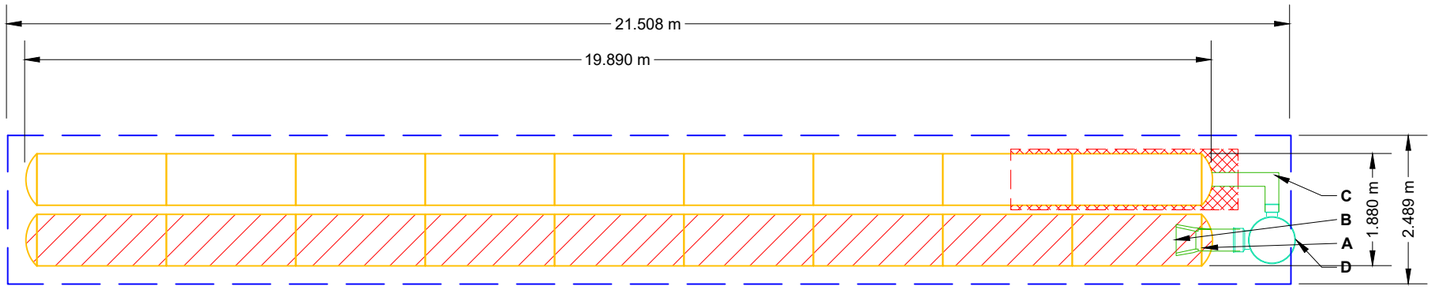
USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO THE CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

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

PROPOSED LAYOUT		CONCEPTUAL ELEVATIONS:	
18	STORMTECH SC-310 CHAMBERS	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	2.997
4	STORMTECH SC-310 END CAPS	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	1.168
152	STONE ABOVE (mm)	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	1.016
152	STONE BELOW (mm)	MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	1.016
40	STONE VOID	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	1.016
19.7	INSTALLED SYSTEM VOLUME (m^3) (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)	TOP OF STONE:	0.711
		TOP OF SC-310 CHAMBER:	0.559
		200 mm x 200 mm TOP MANIFOLD INVERT:	0.241
		300 mm ISOLATOR ROW PLUS INVERT:	0.175
53.5	SYSTEM AREA (m^2)	BOTTOM OF SC-310 CHAMBER:	0.152
48.0	SYSTEM PERIMETER (m)	BOTTOM OF STONE:	0.000

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
PREFABRICATED EZ END CAP	A	300 mm BOTTOM PREFABRICATED EZ END CAP, PART#: SC310ECEZ / TYP OF ALL 300 mm BOTTOM CONNECTIONS AND ISOLATOR PLUS ROWS	23 mm	
FLAMP	B	INSTALL FLAMP ON 300 mm ACCESS PIPE / PART#: SC31012RAMP		
MANIFOLD	C	200 mm x 200 mm TOP MANIFOLD, MOLDED FITTINGS	89 mm	
NYLOPLAST (INLET W/ ISO PLUS ROW)	D	750 mm DIAMETER (610 mm SUMP MIN)		25 L/s IN



ISOLATOR ROW PLUS
(SEE DETAIL)

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

BED LIMITS

NOTES

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

TO 2
UXBRIDGE, ON, CANADA
DATE:
DRAWN: SC
PROJECT #:
CHECKED: N/A

DESCRIPTION	DATE	DRW	CHK

4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

SCALE = 1 : 100

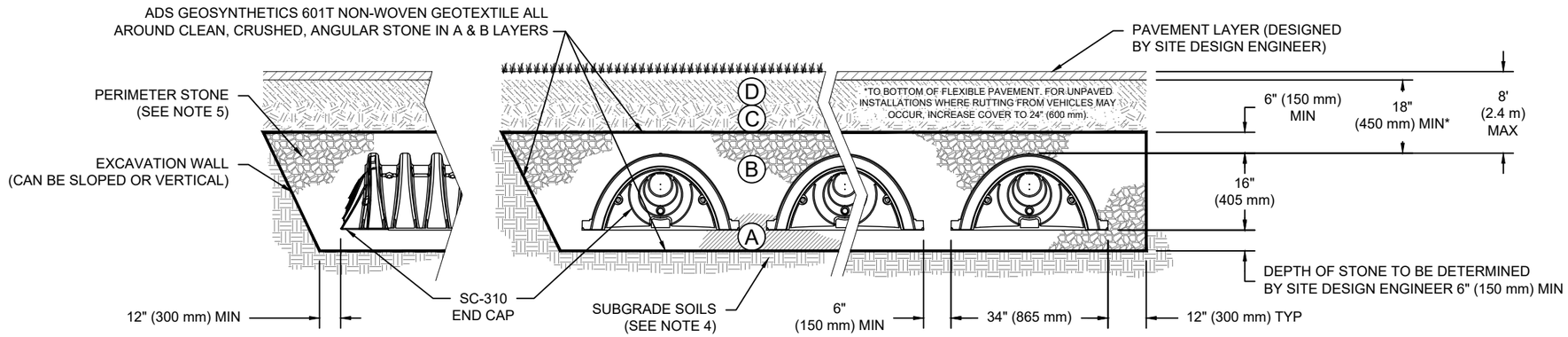
StormTech® Chamber System

888-892-2694 | WWW.STORMTECH.COM

ACCEPTABLE FILL MATERIALS: STORMTECH SC-310 CHAMBER SYSTEMS

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

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



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2922 (POLETHYLENE) OR ASTM F2418 (POLYPROPYLENE), "STANDARD SPECIFICATION FOR CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-310 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 400 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

TO 2
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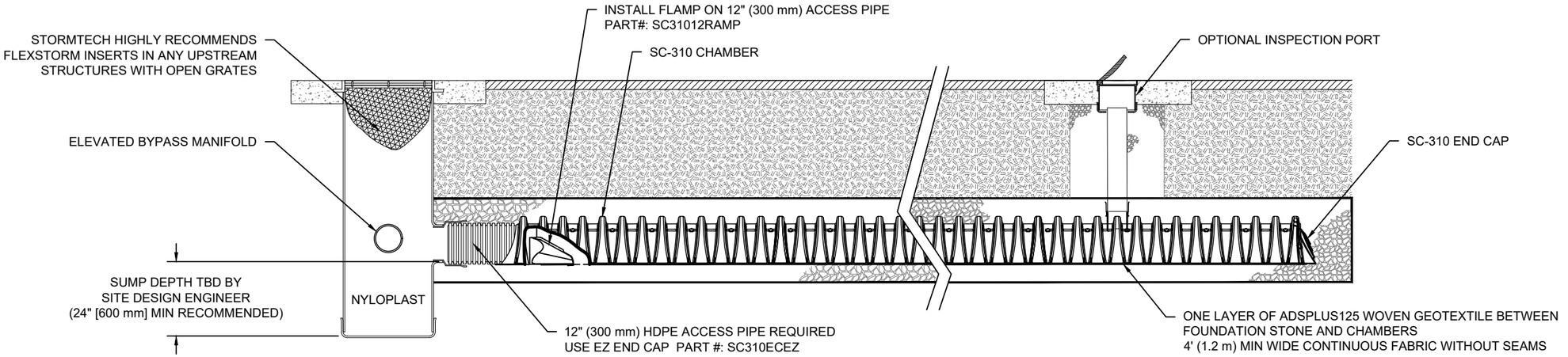

SC-310 ISOLATOR ROW PLUS DETAIL
NTS

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.

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SC-310 TECHNICAL SPECIFICATION

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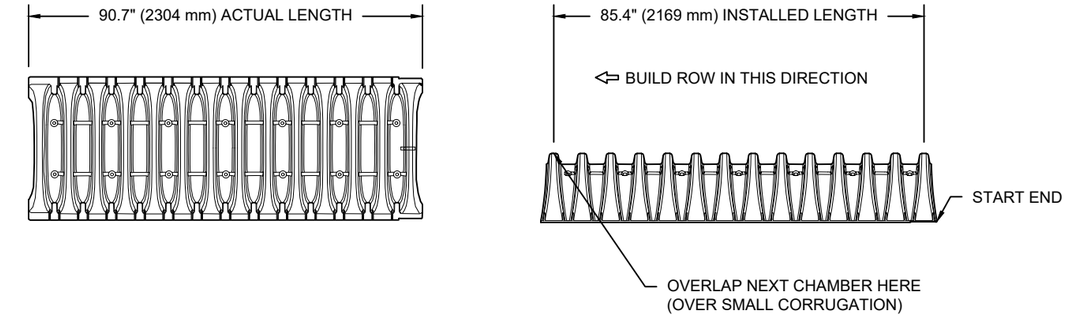
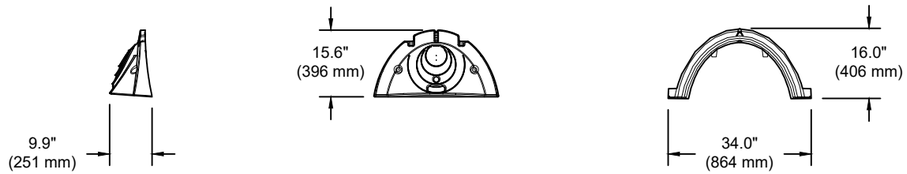
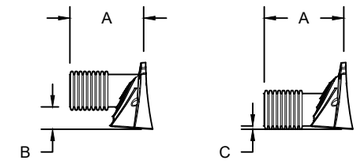




NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	34.0" X 16.0" X 85.4"	(864 mm X 406 mm X 2169 mm)
CHAMBER STORAGE	14.7 CUBIC FEET	(0.42 m³)
MINIMUM INSTALLED STORAGE*	31.0 CUBIC FEET	(0.88 m³)
WEIGHT	35.0 lbs.	(16.8 kg)

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



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

PART #	STUB	A	B	C
SC310EPE06T / SC310EPE06TPC	6" (150 mm)	9.6" (244 mm)	5.8" (147 mm)	---
SC310EPE06B / SC310EPE06BPC			---	0.5" (13 mm)
SC310EPE08T / SC310EPE08TPC	8" (200 mm)	11.9" (302 mm)	3.5" (89 mm)	---
SC310EPE08B / SC310EPE08BPC			---	0.6" (15 mm)
SC310EPE10T / SC310EPE10TPC	10" (250 mm)	12.7" (323 mm)	1.4" (36 mm)	---
SC310EPE10B / SC310EPE10BPC			---	0.7" (18 mm)
SC310ECEZ*	12" (300 mm)	13.5" (343 mm)	---	0.9" (23 mm)

ALL STUBS, EXCEPT FOR THE SC310ECEZ ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

* FOR THE SC310ECEZ THE 12" (300 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 0.25" (6 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

NOTE: ALL DIMENSIONS ARE NOMINAL

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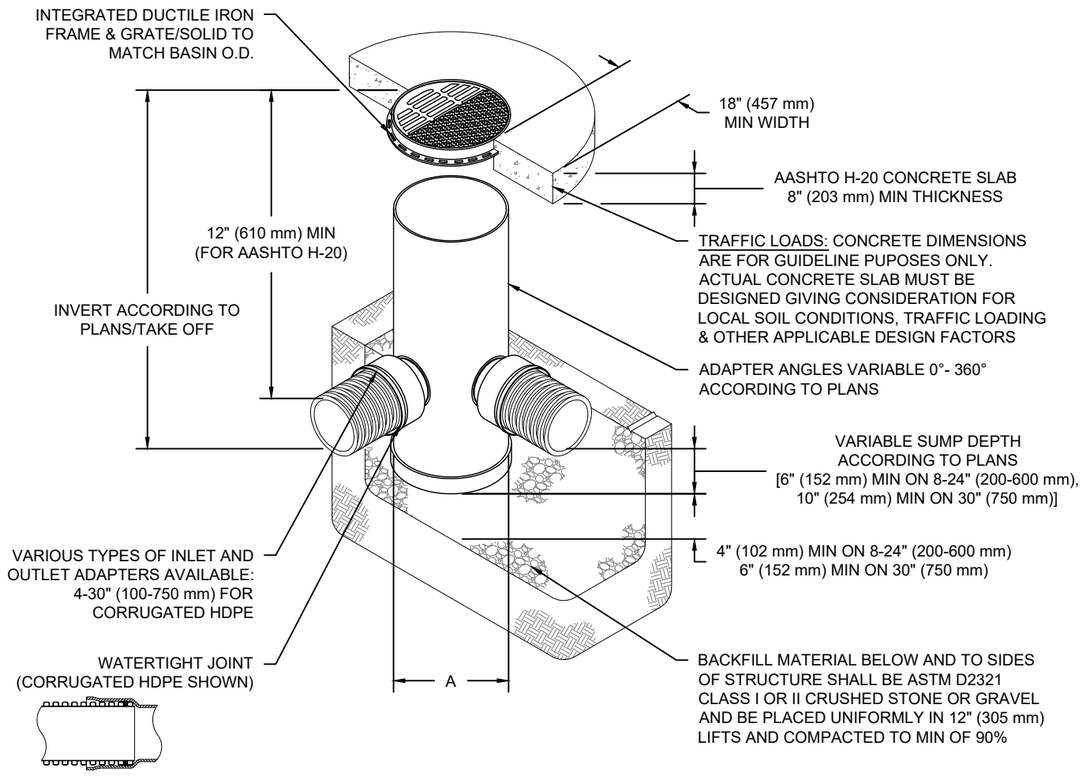
NYLOPLAST DRAIN BASIN

NTS



NOTES

1. 8-30" (200-750 mm) GRATES/SOLID COVERS SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
2. 12-30" (300-750 mm) FRAMES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
3. DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS
4. DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS & HANCOR DUAL WALL) & SDR 35 PVC
5. FOR COMPLETE DESIGN AND PRODUCT INFORMATION: **WWW.NYLOPLAST-US.COM**
6. TO ORDER CALL: **800-821-6710**

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

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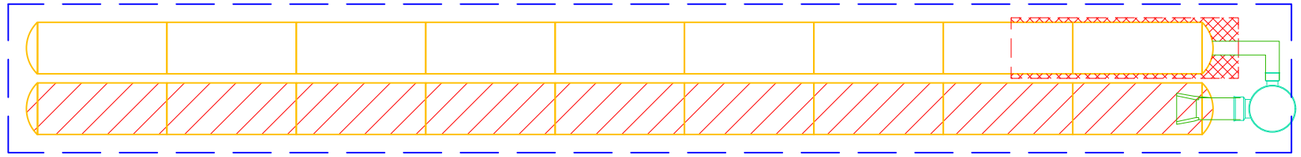


Project: **SC-310 Roof Infiltration**

Chamber Model -	SC-310	
Units -	**Metric**	
	-	
Number of chambers -	18	
Voids in the stone (porosity) -	40	%
Base of Stone Elevation -	277.05	m
Amount of Stone Above Chambers -	152	mm
Amount of Stone Below Chambers -	152	mm

53.53816389 sq.meters Min. Area - 39.68 sq.meters

StormTech SC-310 Cumulative Storage Volumes

Height of System *(mm)*	Incremental Single Chamber *(cubic meters)*	Incremental Total Chamber *(cubic meters)*	Incremental Stone *(cubic meters)*	Incremental Ch & St *(cubic meters)*	Cumulative Chamber *(cubic meters)*	Elevation *(meters)*
711	0.00	0.00	0.54	0.54	19.752	277.76
686	0.00	0.00	0.54	0.54	19.208	277.74
660	0.00	0.00	0.54	0.54	18.664	277.71
635	0.00	0.00	0.54	0.54	18.120	277.69
610	0.00	0.00	0.54	0.54	17.576	277.66
584	0.00	0.00	0.54	0.54	17.031	277.63
559	0.00	0.03	0.53	0.56	16.487	277.61
533	0.00	0.08	0.51	0.59	15.925	277.58
508	0.01	0.14	0.49	0.63	15.334	277.56
483	0.02	0.28	0.43	0.71	14.708	277.53
457	0.02	0.36	0.40	0.76	13.998	277.51
432	0.02	0.42	0.38	0.80	13.238	277.48
406	0.03	0.47	0.36	0.83	12.442	277.46
381	0.03	0.52	0.34	0.85	11.614	277.43
356	0.03	0.56	0.32	0.88	10.760	277.41
330	0.03	0.59	0.31	0.90	9.881	277.38
305	0.03	0.62	0.30	0.92	8.983	277.35
279	0.04	0.65	0.28	0.93	8.067	277.33
254	0.04	0.68	0.27	0.95	7.133	277.30
229	0.04	0.70	0.27	0.96	6.184	277.28
203	0.04	0.72	0.26	0.97	5.222	277.25
178	0.04	0.73	0.25	0.98	4.248	277.23
152	0.00	0.00	0.54	0.54	3.265	277.20
127	0.00	0.00	0.54	0.54	2.720	277.18
102	0.00	0.00	0.54	0.54	2.176	277.15
76	0.00	0.00	0.54	0.54	1.632	277.13
51	0.00	0.00	0.54	0.54	1.088	277.10
25	0.00	0.00	0.54	0.54	0.544	277.08

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER	
ADS SALES REP	
PROJECT NO.	

Advanced Drainage Systems, Inc.

SiteAssist™
FOR STORMTECH
INSTALLATION INSTRUCTIONS
VISIT OUR APP

TORONTO ST. 2023

UXBRIDGE, ON, CANADA

MC-3500 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH MC-3500.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBERS SHALL BE CERTIFIED TO CSA B184, "POLYMERIC SUB-SURFACE STORMWATER MANAGEMENT STRUCTURES", AND MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 45x76 DESIGNATION SS.
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE CSA S6 CL-625 TRUCK AND THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 75 mm (3").
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 450 LBS/FT/%. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 23° C / 73° F), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
   - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
   - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
   - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

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

1. STORMTECH MC-3500 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH MC-3500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
   - STONESHOOTER LOCATED OFF THE CHAMBER BED.
   - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
   - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM - 150 mm (6") SPACING BETWEEN THE CHAMBER ROWS.
7. INLET AND OUTLET MANIFOLDS MUST BE INSERTED A MINIMUM OF 300 mm (12") INTO CHAMBER END CAPS.
8. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE WELL GRADED BETWEEN ¾" AND 2" (20-50 mm)..
9. STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
10. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
11. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH MC-3500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
2. THE USE OF EQUIPMENT OVER MC-3500 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADER, DUMP TRUCK, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. FULL 900 mm (36") OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

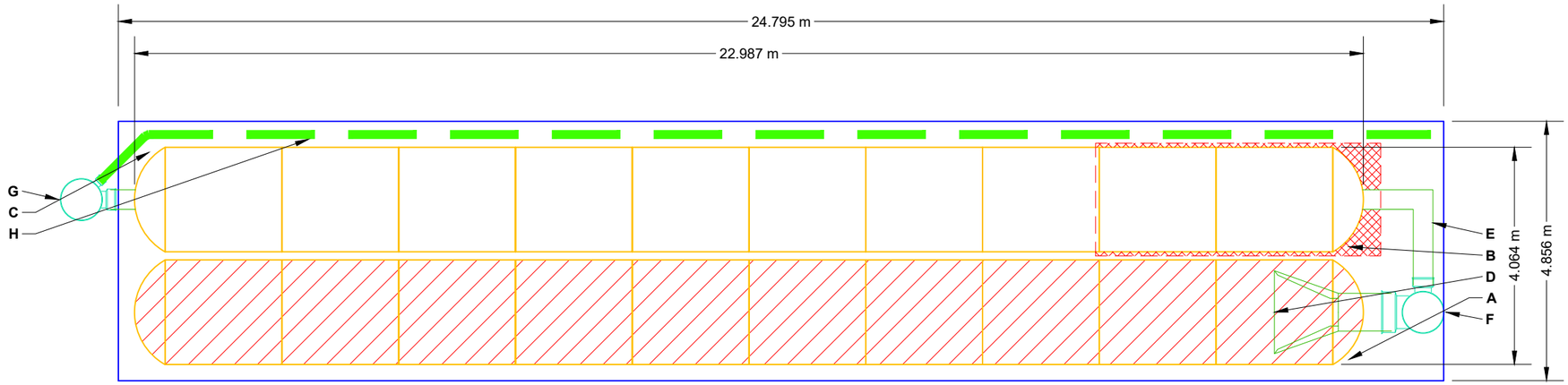
USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY USING THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

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

PROPOSED LAYOUT		PROPOSED ELEVATIONS:	
20	STORMTECH MC-3500 CHAMBERS	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	279.810
4	STORMTECH MC-3500 END CAPS	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	277.981
305	STONE ABOVE (mm)	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	277.829
229	STONE BELOW (mm)	MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	277.829
40	STONE VOID	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	277.829
119.1	INSTALLED SYSTEM VOLUME (m^3) (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)	TOP OF STONE:	277.676
		TOP OF MC-3500 CHAMBER:	277.372
		300 mm x 300 mm TOP MANIFOLD INVERT:	276.898
		600 mm ISOLATOR ROW PLUS INVERT:	276.281
120.4	SYSTEM AREA (m^2)	300 mm BOTTOM CONNECTION INVERT:	276.263
59.3	SYSTEM PERIMETER (m)	BOTTOM OF MC-3500 CHAMBER:	276.229
264	THERMOPLASTIC LINER (m^2) (20% OVERAGE)	UNDERDRAIN INVERT:	276.000
		BOTTOM OF STONE:	276.000

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
PREFABRICATED END CAP	A	600 mm BOTTOM CORED END CAP, PART#: MC3500IEPP24BC / TYP OF ALL 600 mm BOTTOM CONNECTIONS AND ISOLATOR PLUS ROWS	52 mm	
PREFABRICATED END CAP	B	300 mm TOP CORED END CAP, PART#: MC3500IEPP12T / TYP OF ALL 300 mm TOP CONNECTIONS	670 mm	
PREFABRICATED END CAP	C	300 mm BOTTOM CORED END CAP, PART#: MC3500IEPP12B / TYP OF ALL 300 mm BOTTOM CONNECTIONS	34 mm	
FLAMP	D	INSTALL FLAMP ON 600 mm ACCESS PIPE / PART#: MCFLAMP		
MANIFOLD	E	300 mm x 300 mm TOP MANIFOLD, ADS N-12	670 mm	
NYLOPLAST (INLET W/ ISO PLUS ROW)	F	750 mm DIAMETER (610 mm SUMP MIN)		70 L/s IN
NYLOPLAST (OUTLET)	G	750 mm DIAMETER (DESIGN BY ENGINEER)		57 L/s OUT
UNDERDRAIN	H	150 mm ADS N-12 DUAL WALL PERFORATED HDPE UNDERDRAIN		



ISOLATOR ROW PLUS (SEE DETAIL)

PLACE MINIMUM 5.334 m OF ADSPLUS175 WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS

THERMOPLASTIC LINER (SEE TECH NOTE #6.50 PROVIDED BY OTHERS / DESIGN BY OTHERS)

NOTES

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

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DRAWN: SC
CHECKED: N/A
DATE:
PROJECT #:

DATE	DRW	CHK	DESCRIPTION

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Chamber System
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4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

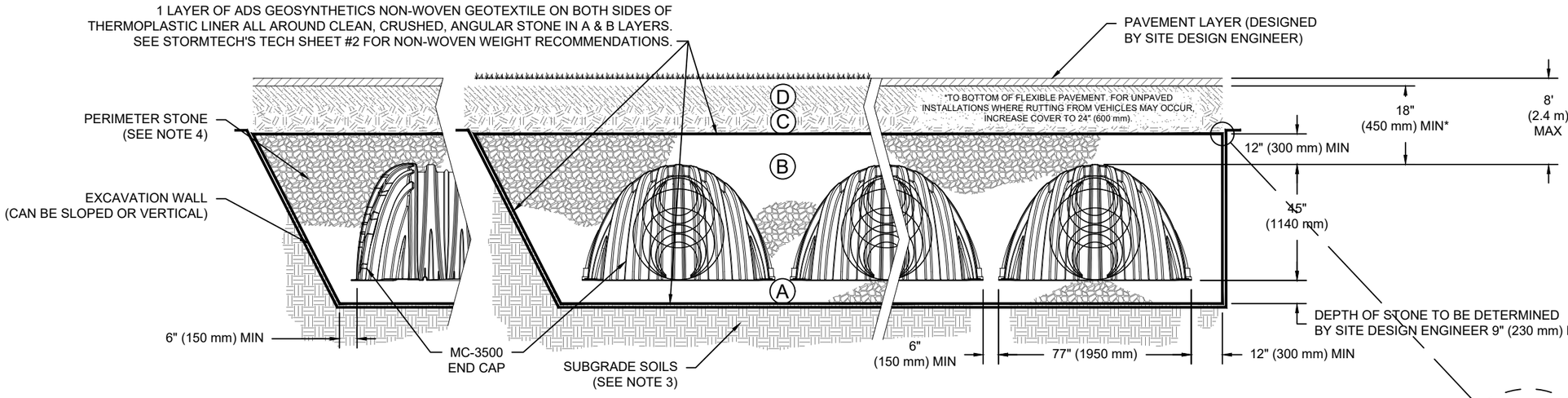
SCALE = 1 : 100

SHEET
2 OF 6

ACCEPTABLE FILL MATERIALS: STORMTECH MC-3500 CHAMBER SYSTEMS

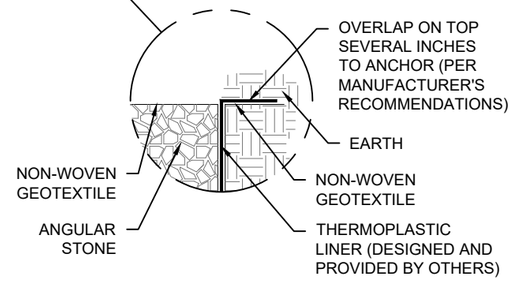
MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 24" (600 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

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



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 45x76 DESIGNATION SS.
2. MC-3500 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 450 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.



THERMOPLASTIC LINER DETAIL

TORONTO ST. 2023
UXBRIDGE, ON, CANADA
DATE:
DRAWN: SC
PROJECT #:
CHECKED: N/A

DATE	DRW	CHK	DESCRIPTION

StormTech® Chamber System
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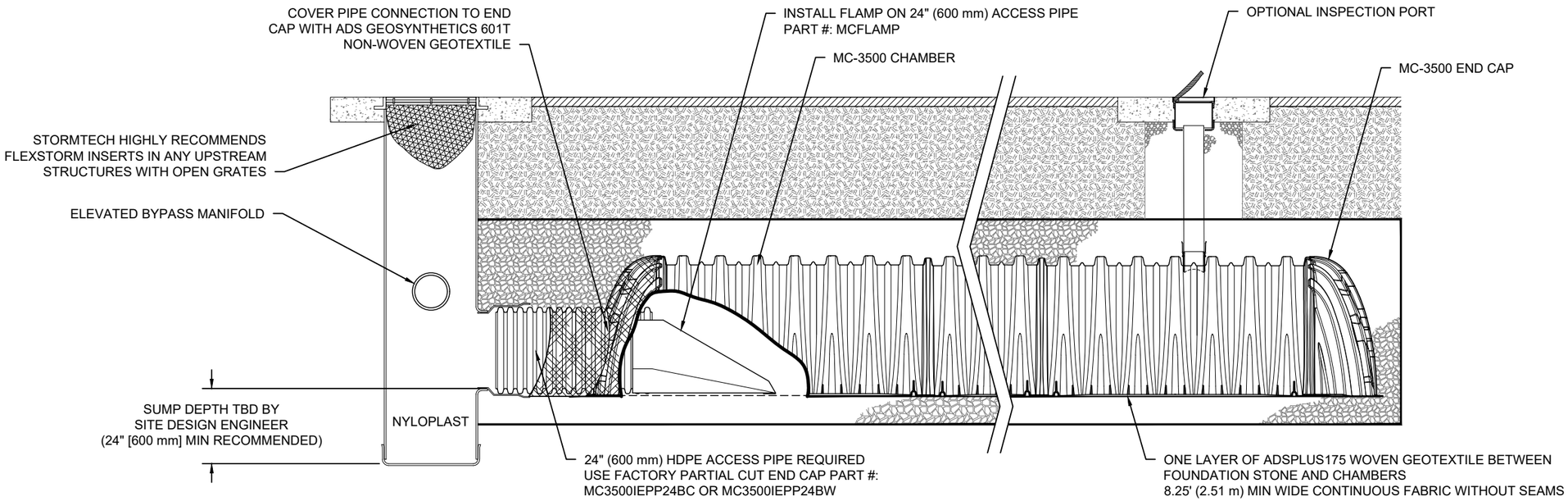
ADS



MC-3500 ISOLATOR ROW PLUS DETAIL
NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

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

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

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

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.

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

TORONTO ST. 2023
UXBRIDGE, ON, CANADA
DATE: DRAWN: SC
PROJECT #: CHECKED: N/A

DATE	DRW	CHK	DESCRIPTION

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UNDERDRAIN DETAIL

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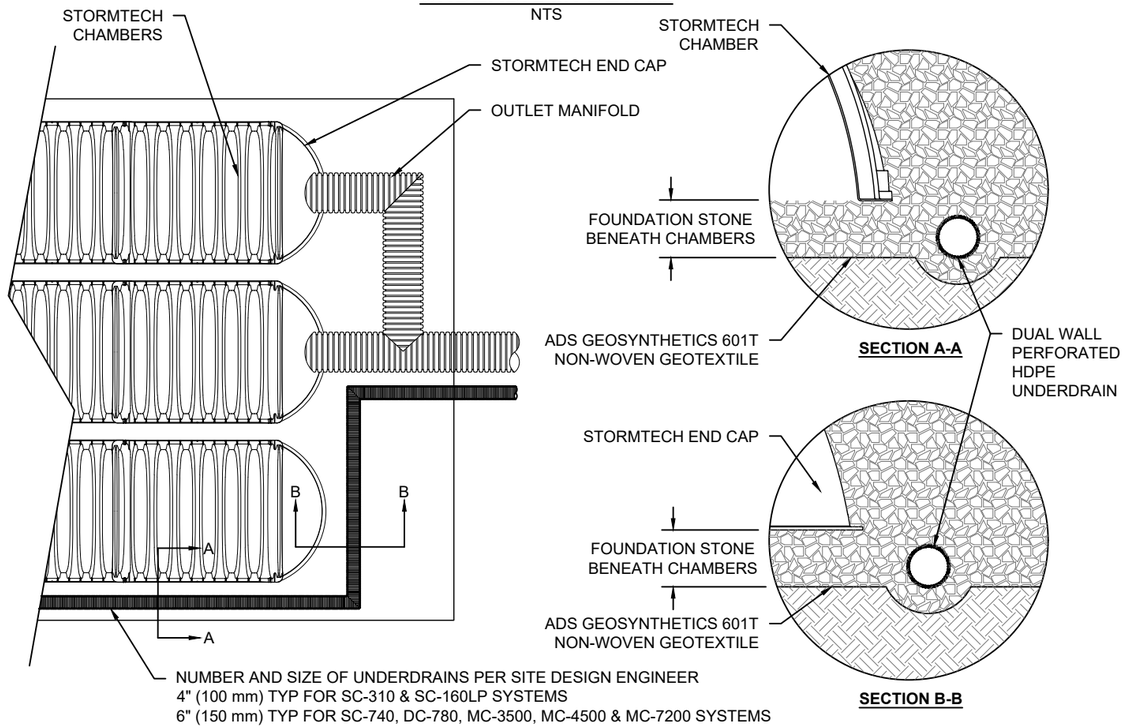
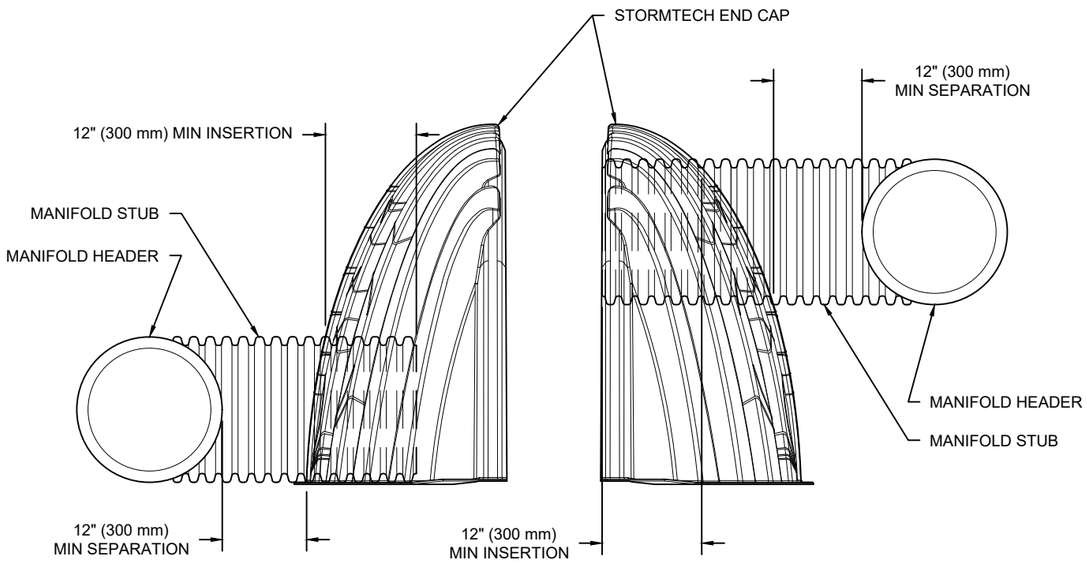


MC-SERIES END CAP INSERTION DETAIL

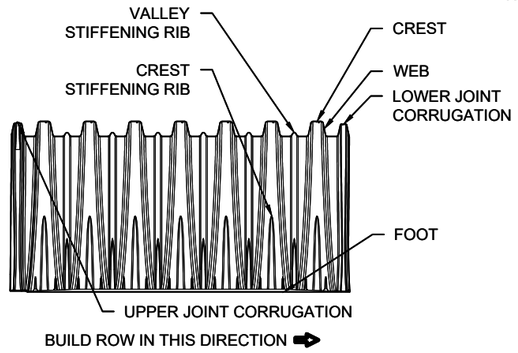
NTS

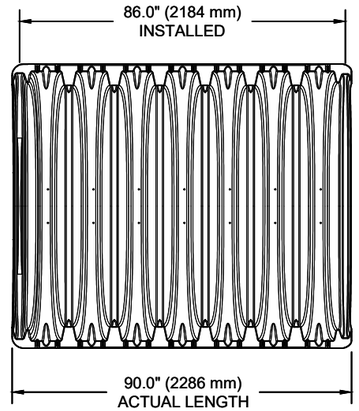


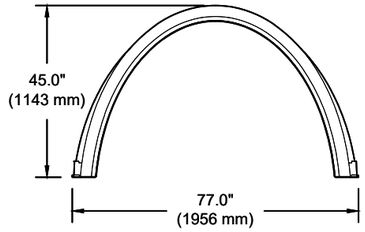
NOTE: MANIFOLD STUB MUST BE LAID HORIZONTAL FOR A PROPER FIT IN END CAP OPENING.

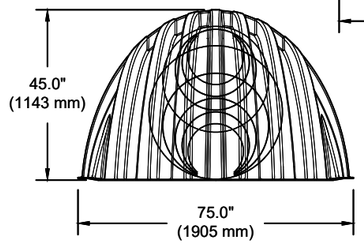
MC-3500 TECHNICAL SPECIFICATION

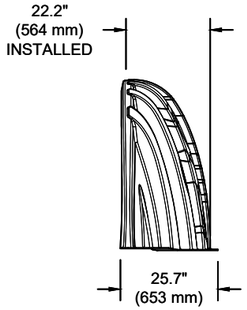
NTS











NOMINAL CHAMBER SPECIFICATIONS

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

NOMINAL END CAP SPECIFICATIONS

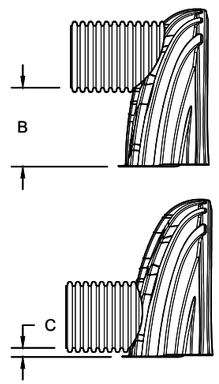
SIZE (W X H X INSTALLED LENGTH)	75.0" X 45.0" X 22.2"	(1905 mm X 1143 mm X 564 mm)
END CAP STORAGE	14.9 CUBIC FEET	(0.42 m³)
MINIMUM INSTALLED STORAGE*	45.1 CUBIC FEET	(1.28 m³)
WEIGHT	49 lbs.	(22.2 kg)

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

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

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

NOTE: ALL DIMENSIONS ARE NOMINAL



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

TORONTO ST. 2023
UXBRIDGE, ON, CANADA
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DRAWN: SC
PROJECT #:
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DESCRIPTION	CHK	DRW	DATE

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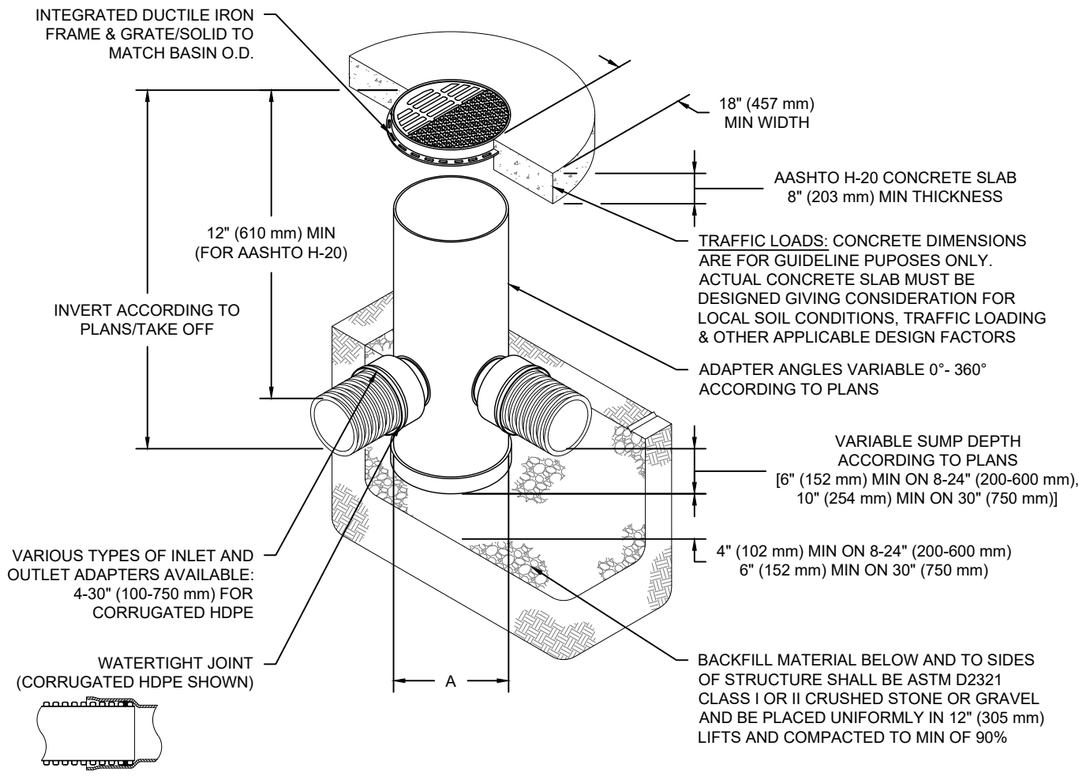
NYLOPLAST DRAIN BASIN

NTS



NOTES

1. 8-30" (200-750 mm) GRATES/SOLID COVERS SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
2. 12-30" (300-750 mm) FRAMES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
3. DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS
4. DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS & HANCOR DUAL WALL) & SDR 35 PVC
5. FOR COMPLETE DESIGN AND PRODUCT INFORMATION: **WWW.NYLOPLAST-US.COM**
6. TO ORDER CALL: **800-821-6710**

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

TORONTO ST. 2023

UXBRIDGE, ON, CANADA

DATE: | DRAWN: SC

PROJECT #: | CHECKED: N/A

DATE	DRW	CHK	DESCRIPTION

Nyloplast®

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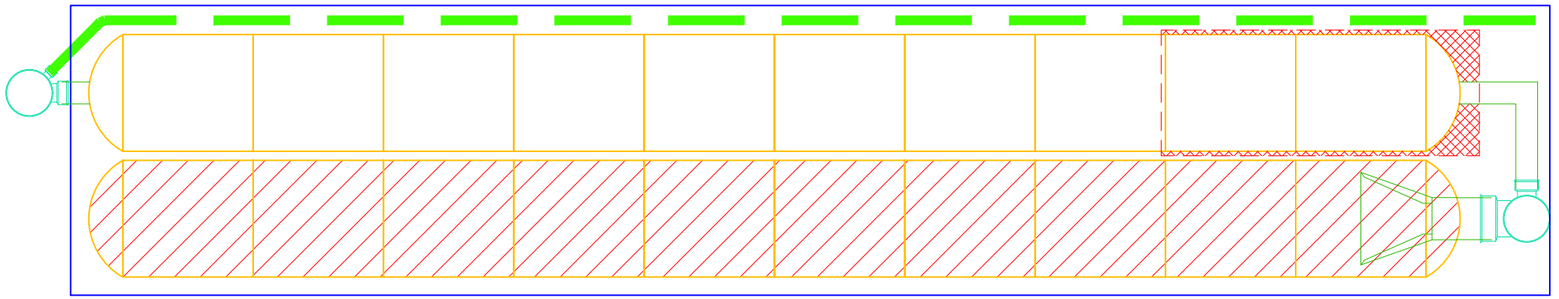


Project: **Toronto St. 2023**

Chamber Model -	MC-3500	
Units -	**Metric**	
Number of Chambers -	20	
Number of End Caps -	4	
Voids in the stone (porosity) -	40	%
Base of Stone Elevation -	275.78	m
Amount of Stone Above Chambers -	305	mm
Amount of Stone Below Chambers -	229	mm

120.4153463 sq.meters Min. Area - 98.11 sq.meters

StormTech MC-3500 Cumulative Storage Volumes

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 Ch, EC and Stone (cubic meters)	Cumulative System (cubic meters)	Elevation (meters)
1676	0.00	0.00	0.00	0.00	1.223	1.22	119.08	277.46
1651	0.00	0.00	0.00	0.00	1.223	1.22	117.86	277.43
1626	0.00	0.00	0.00	0.00	1.223	1.22	116.64	277.41
1600	0.00	0.00	0.00	0.00	1.223	1.22	115.41	277.38
1575	0.00	0.00	0.00	0.00	1.223	1.22	114.19	277.35
1549	0.00	0.00	0.00	0.00	1.223	1.22	112.97	277.33
1524	0.00	0.00	0.00	0.00	1.223	1.22	111.75	277.30
1499	0.00	0.00	0.00	0.00	1.223	1.22	110.52	277.28
1473	0.00	0.00	0.00	0.00	1.223	1.22	109.30	277.25
1448	0.00	0.00	0.00	0.00	1.223	1.22	108.08	277.23
1422	0.00	0.00	0.00	0.00	1.223	1.22	106.85	277.20
1397	0.00	0.00	0.00	0.00	1.223	1.22	105.63	277.18
1372	0.00	0.00	0.03	0.00	1.210	1.24	104.41	277.15
1346	0.01	0.00	0.11	0.00	1.178	1.29	103.17	277.13
1321	0.01	0.00	0.17	0.00	1.155	1.33	101.88	277.10
1295	0.01	0.00	0.23	0.01	1.129	1.36	100.55	277.08
1270	0.02	0.00	0.39	0.01	1.064	1.46	99.19	277.05
1245	0.03	0.00	0.58	0.01	0.986	1.58	97.73	277.02
1219	0.04	0.00	0.71	0.01	0.935	1.65	96.15	277.00
1194	0.04	0.00	0.81	0.01	0.895	1.71	94.49	276.97
1168	0.04	0.00	0.89	0.02	0.860	1.77	92.78	276.95
1143	0.05	0.00	0.97	0.02	0.829	1.81	91.01	276.92
1118	0.05	0.01	1.04	0.02	0.800	1.86	89.20	276.90
1092	0.05	0.01	1.10	0.02	0.775	1.89	87.34	276.87
1067	0.06	0.01	1.16	0.02	0.751	1.93	85.45	276.85
1041	0.06	0.01	1.21	0.03	0.729	1.96	83.51	276.82
1016	0.06	0.01	1.26	0.03	0.708	2.00	81.55	276.80
991	0.07	0.01	1.31	0.03	0.688	2.02	79.55	276.77
965	0.07	0.01	1.35	0.03	0.670	2.05	77.53	276.75
940	0.07	0.01	1.39	0.03	0.652	2.08	75.48	276.72
914	0.07	0.01	1.43	0.03	0.636	2.10	73.40	276.69
889	0.07	0.01	1.47	0.04	0.621	2.13	71.30	276.67
864	0.08	0.01	1.50	0.04	0.606	2.15	69.17	276.64
838	0.08	0.01	1.54	0.04	0.592	2.17	67.02	276.62
813	0.08	0.01	1.57	0.04	0.579	2.19	64.85	276.59
787	0.08	0.01	1.60	0.04	0.566	2.21	62.66	276.57
762	0.08	0.01	1.63	0.04	0.554	2.23	60.46	276.54
737	0.08	0.01	1.66	0.04	0.542	2.24	58.23	276.52
711	0.08	0.01	1.68	0.05	0.532	2.26	55.99	276.49
686	0.09	0.01	1.71	0.05	0.521	2.27	53.73	276.47
660	0.09	0.01	1.73	0.05	0.512	2.29	51.45	276.44
635	0.09	0.01	1.75	0.05	0.502	2.30	49.16	276.42
610	0.09	0.01	1.77	0.05	0.493	2.32	46.86	276.39
584	0.09	0.01	1.79	0.05	0.485	2.33	44.54	276.36
559	0.09	0.01	1.81	0.05	0.477	2.34	42.21	276.34
533	0.09	0.01	1.83	0.05	0.469	2.35	39.87	276.31
508	0.09	0.01	1.85	0.06	0.462	2.36	37.52	276.29
483	0.09	0.01	1.86	0.06	0.455	2.37	35.15	276.26
457	0.09	0.01	1.88	0.06	0.448	2.38	32.78	276.24
432	0.09	0.01	1.89	0.06	0.442	2.39	30.39	276.21
406	0.10	0.01	1.91	0.06	0.436	2.40	28.00	276.19
381	0.10	0.01	1.92	0.06	0.430	2.41	25.60	276.16
356	0.10	0.02	1.93	0.06	0.425	2.42	23.18	276.14
330	0.10	0.02	1.95	0.06	0.420	2.43	20.76	276.11
305	0.10	0.02	1.96	0.06	0.415	2.44	18.34	276.08
279	0.10	0.02	1.97	0.06	0.410	2.44	15.90	276.06
254	0.10	0.02	1.99	0.07	0.402	2.45	13.46	276.03
229	0.00	0.00	0.00	0.00	1.223	1.22	11.01	276.01
203	0.00	0.00	0.00	0.00	1.223	1.22	9.78	275.98
178	0.00	0.00	0.00	0.00	1.223	1.22	8.56	275.96
152	0.00	0.00	0.00	0.00	1.223	1.22	7.34	275.93
127	0.00	0.00	0.00	0.00	1.223	1.22	6.11	275.91
102	0.00	0.00	0.00	0.00	1.223	1.22	4.89	275.88
76	0.00	0.00	0.00	0.00	1.223	1.22	3.67	275.86
51	0.00	0.00	0.00	0.00	1.223	1.22	2.45	275.83
25	0.00	0.00	0.00	0.00	1.223	1.22	1.22	275.81

Project Name: Penn Avenue
Municipality: Newmarket
Project No.: 19080
Date: 24-Nov-23

Prepared by: S.C
Checked by: Z.S

INTERNAL LOW POINT 100-Yr-2

Flow to be Captured, Qcapture=	0.130	(m3/s)
# of Inlets	4	CBs at low point

Assumption: Flow is split between the number of openings

H=	0.100	(m)	Maximum allowable ponding at low point (measured at gutterline)
Qcapture=	0.130	(m^3/s)	total major system flow to be captured
Q per inlet=	0.033	(m^3/s)	flow to be captured by each inlet (assumes equal split between each)
Required Inlet Area (no grate loss, no blockage) =	**0.037**	**(m^2)**	area required based on orifice equation:

CATCHBASIN DIMENSIONS:

Structure References: Birdcage Grate OPSD 400.120

Inlet Length=	600	(mm)
Inlet Width=	600	(mm)
Inlet Area=	0.360	(m^2)
% of Inlet Area Lost Due to Grate	30.00	%
Inlet Area (Including Loss Due to Grate)=	0.252	(m^2)
% of Inlet Area Lost Due to Blockage	50	%
Inlet Area (Including Loss Due to Blockage)=	0.126	(m^2)
Total Available Inlet Area (Including Losses Due to Grate & Blockage)	**0.126**	**(m^2)**

MMCDA 2005 Design Guideline Manual — **STORM DRAINAGE** — Section 4.0, Page 12 of 20

$$Q = kCA\sqrt{2gh}$$

Where: Q = inlet capacity (m^3/s)
k = clogging factor (0.6)
C = orifice coefficient (0.8)
A = open area (0.068 m^2 for Dobney B-23 grate)
g = gravitational acceleration (9.81 m/s^2)
h = depth of ponding (m)

SUMMARY:

Inlet Area Required=	**0.037**	**(m^2)**
Inlet Area Provided=	**0.126**	**(m^2)**

The inlet area provided is greater than the inlet area required to accept major system flows into the structure without exceeding the maximum ponding criteria.

Counterpoint Engineering Inc.

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Project: 181 Toronto Street
Project No: 21026
Location: Uxbridge
Date: 11-24-23

Rainfall Data: a, b, c Values

	100 - year
a	1799
b	5
c	0.81

Manning's Roughness Coefficient (All pipes)= 0.013
Design Return Frequency (years)= 100

1	2	4	7	8	9	10	11		12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Location	From Node	To Node	Diam. (nominal)	Length Pipe	Slope Pipe	Area	C	CA = Cx1.25	A x CA	Accum AxC	Rainfall Intensity	Time of Conc. (Tc)	Area Flow Q	Other Flows	Total Flow	Diameter Actual	Pipe Area	Hydraulic Radius	Pipe Mat.	Pipe Capacity	Velocity	Time of Flow	Ratio Q/Q full	Cap. Check
			(mm)	(m)	(%)	(ha)			(ha)	(ha)	mm/hr	(min)	(l/s)	(l/s)	(l/s)	(m)	(sq.m)	(m)		(l/s)	(m/s)	(min)		
Prop	CBMH02	MH01	450	12.0	0.51%	0.23	0.98	1.23	0.282	0.282	200.6	10.00	157.0	0.0	157.0	0.448	0.16	0.112	PVC	201.2	1.28	0.16	0.78	OK

Definitions:

Q = 2.78 AIR, where

Q = Peak Flow in Litres per second (L/s)

Tc= Time of concentration

A = Areas in hectares (ha)

I = Rainfall Intensity (mm/h)

$I = a / (Td + b)^c$ (see above for regression contants)

C = Runoff Coefficient

Tc= Time of concentration

A = Areas in hectares (ha)

Verification Statement

StormTech Isolator® Row PLUS
Registration number: (V-2020-10-01)
Date of issue: (2020-October-27)

Technology type	Stormwater Filtration Device
Application	Stormwater filtration technology to remove sediments, nutrients, heavy metals, and organic contaminants from stormwater runoff
Company	StormTech, LLC.
Address	520 Cromwell Avenue, Rocky Hill, CT 06067 USA **Phone** +1-888-892-2694
Website	www.stormtech.com
E-mail	info@stormtech.com

Verified Performance Claims

The StormTech Isolator® Row PLUS technology was tested at the Mid-Atlantic Storm Water Research Center (MASWRC), under the supervision of Boggs Environmental Consultants, Inc. The performance test results for two overlapping StormTech Isolator® Row PLUS chambers (commercial unit model SC-740) were verified by Good Harbour Laboratories Inc. (GHL), following the requirements of ISO 14034:2016 and the VerifiGlobal Performance Verification Protocol. Based on the laboratory testing conducted, the verified performance claims are as follows:

Total Suspended Solids (TSS) Removal Efficiency - The StormTech Isolator® Row PLUS achieved 82% ± 1% removal efficiency of suspended sediment concentration (SCC) at a 95% confidence level.

Average Loading Rate - Based on the reported flow rate data and the effective sedimentation and filtration treatment area of the test unit, the average loading rate of the test unit was 4.15 ± 0.03 GPM/ft^2 at a 95% confidence level.

Maximum Treatment Flow Rate (MTFR) - Although the MTFR varies among the StormTech Isolator® Row PLUS model sizes and the number of chambers, the design surface loading rate remains the same (4.13 gpm/ ft^2 of treatment surface area). The test unit consisted of two overlapping StormTech SC-740 chambers with a nominal MTFR of 225 GPM (0.501 CFS) and an effective filtration treatment area (EFTA) of approximately 54.5 ft^2.

Detention Time and Volume - The StormTech Isolator Row PLUS detention time and wet volume varies with model size. The unit tested had a wet volume of approximately 65.1 ft^3 and a detention time of 2.2 minutes.

Maximum Sediment Storage Depth and Volume - The sediment storage volume and depth vary according to the StormTech Isolator® Row PLUS model sizes and system configuration. For the two overlapping StormTech SC-740 chambers tested, the maximum sediment storage volume is 2.3 ft^3 at a sediment depth of 0.5 inches.

Effective Sedimentation/Filtration Treatment Areas - The Effective Sedimentation Area (ESA) and the Effective Filtration Treatment Area (EFTA) increase as the size of the system increases. For the two overlapping StormTech SC-740 chambers tested, the ESA and the ratio of ESA/EFTA were 54.5 ft^2 and 1.0, respectively.

Sediment Mass Load Capacity - The sediment mass load capacity varies according to the StormTech Isolator® Row PLUS model sizes and system configuration. For the two overlapping StormTech SC-740 chambers tested, the mass loading capture was 158.4 lbs ± 0.8 lbs (2.91 ±0.01 lbs/ ft^2) following a total sediment loading of 195.2 lbs.

Technology Application

The StormTech "Isolator® Row PLUS" is a stormwater treatment technology designed for use under parking lots, roadways and heavy earth loads while providing a superior and durable structural system. The technology comprises a row of chambers covered in a non-woven geotextile fabric with a single layer of proprietary woven fabric at the bottom that serves as a filter strip, providing surface area for infiltration and runoff reduction with enhanced suspended solids and pollutant removal. The following features make the Isolator® Row PLUS effective as a water quality solution:

- Enhanced infiltration Surface Area
- Runoff Volume Reduction
- Peak Flow Reduction
- Sediment/Pollutant Removal
- Internal Water Storage (IWS)
- Water Temperature Cooling (Thermal Buffer).

Technology Description

The Isolator® Row PLUS (shown in Figures 1 and 2) is the first row of StormTech chambers that is surrounded with filter fabric and connected to a closely located manhole for easy access. The Isolator® Row PLUS provides for settling and filtration of sediment as stormwater rises in the chamber and ultimately passes through the filter fabric. The open-bottom chambers allow stormwater to flow out of the chambers, while sediment is captured in the Isolator® Row PLUS.

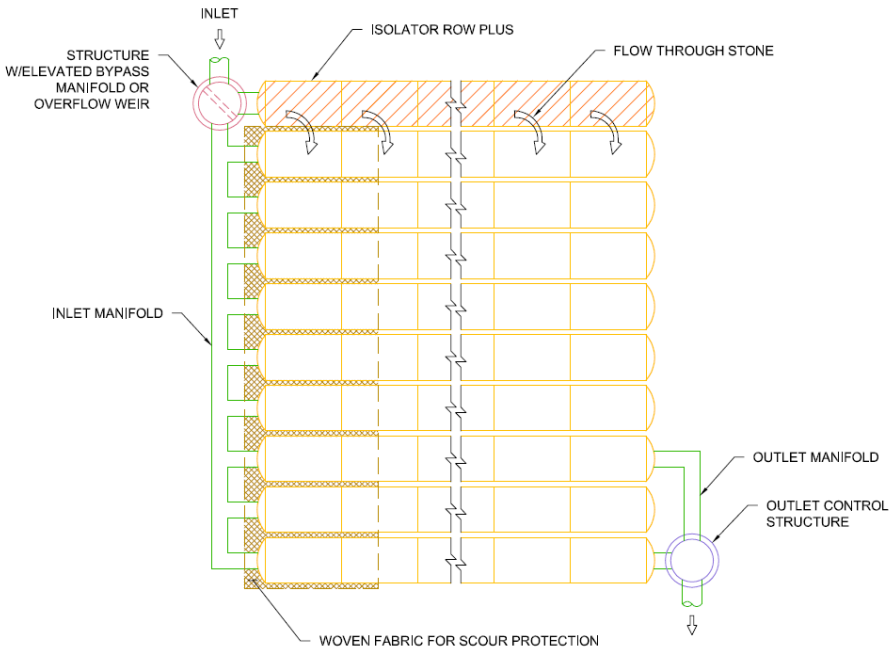


Figure 1: Schematic of the StormTech Isolator® Row PLUS System

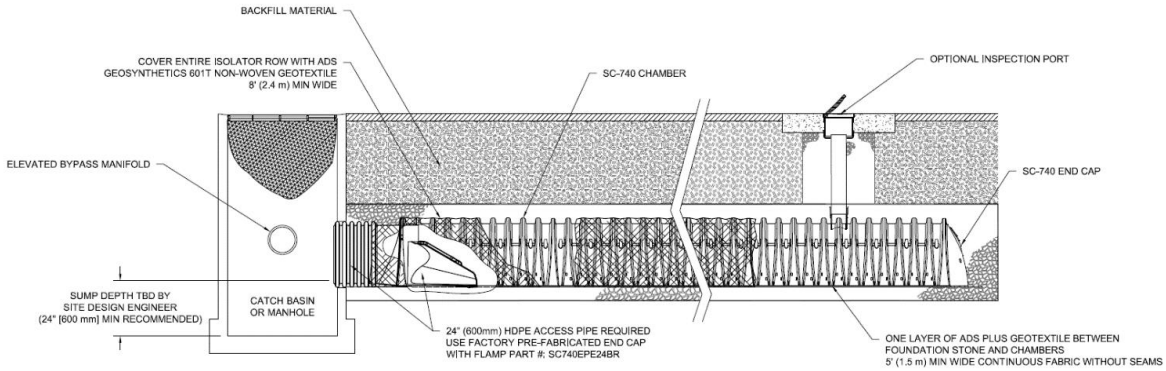


Figure 2: Isolator® Row PLUS Detail

A single layer of proprietary Advanced Drainage Systems (ADS) PLUS fabric is placed between the angular base stone and the Isolator Row PLUS chamber. The geotextile provides the means for stormwater filtration and provides a durable surface for maintenance operations. A 6 oz. non-woven fabric is placed over the chambers.

The Isolator® Row PLUS is designed to capture the “first flush” and offers the versatility to be sized on a volume basis or a flow-rate basis. An upstream manhole not only provides access to the Isolator® Row PLUS but includes a high low/concept such that stormwater flow rates or volumes that exceed the capacity of the Isolator® Row PLUS bypass through a manifold to the other chambers. This is achieved with either a high-flow weir or an elevated manifold. This creates a differential between the Isolator® Row PLUS and the manifold, thus allowing for settlement time in the Isolator® Row PLUS. After Stormwater flows through the Isolator® Row PLUS and into the rest of the StormTech chamber system it is either infiltrated into the soils below or passed at a controlled rate through an outlet manifold and outlet control structure.

StormTech developed and owns the Isolator® Row PLUS technology and has filed a number of patent applications relating to the Isolator® Row PLUS system.[1]

Description of Test Procedure for the StormTech Isolator® Row PLUS

In January 2020, two overlapping StormTech SC-740 Isolator® Row PLUS commercial size chambers were installed at the Mid-Atlantic Storm Water Research Center (MASWRC, a subsidiary of BaySaver), in Mount Airy, Maryland, to evaluate the performance of the Isolator® Row PLUS system for Total Suspended Solid (TSS) removal (Figure 3) All testing and data collection procedures were supervised by Boggs Environmental Consultants, Inc. (BEC), who was hired by ADS for third party oversight, and were in accordance with the *New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Filtration Manufactured Treatment Device (January 2013)*.

Prior to the start of testing, a Quality Assurance Project Plan (QAPP), revision dated January 09, 2020, was submitted and approved by the New Jersey Corporation for Advanced Technology (NJCAT), c/o Center for Environmental Systems, Stevens Institute of Technology, Castle Point on Hudson, Hoboken, NJ 07030.

[1] (U.S. Provisional Application No. 62/753,050, filed October 30, 2018; U.S. Non-Provisional Application No. 16/670,628, filed October 31, 2019; International Application No. PCT/US2019/059283, filed October 31, 2019; U.S. Application No. 16/938,482, filed July 24, 2020; U.S. Application No. 16/938,657, filed July 24, 2020; PCT International Application No. PCT/US2020/043543, filed July 24, 2020; PCT International Application No. PCT/US2020/043557, filed July 24, 2020.

Figure 3: StormTech "Isolator® Row PLUS" Test Set-up at MASWRC

Verification Results

The verification process for the StormTech Isolator® Row PLUS technology was conducted by GHL in accordance with the VerifiGlobal Verification Plan for the StormTech "Isolator® Row PLUS" Technology – 2020-09-09. The technology performance claims verified by GHL are summarized at the front of this Verification Statement and in Table 6 on Page 8 under the heading "Verification Summary".

Particle size distribution analysis was performed by ECS Mid-Atlantic, LLC of Frederick, MD in accordance with ASTM D422-63(2007). ECS is accredited by the American Association of State Highways and Transportation Officials (AASHTO).

ASTM D422-63(2007) is a sieve and hydrometer method where the larger particles, > 75 microns, are measured using a standard sieve stack while the smaller particles are measured based on their settling time using a hydrometer.

The PSD meets the requirements of NJDEP, which is generally accepted as representative of the type of particle sizes an OGS would be designed to treat. Actual PSD is site and rainfall event specific, so it was necessary to choose a standard PSD to make testing and comparison manageable.

Table 1 shows the NJDEP PSD specification. Table 2 and Figure 4 show the incoming material PSD as determined by ECS Mid-Atlantic and confirmed by the verifier.

Table 1: NJDEP PSD Specification

Particle Size (µm)	NJDEP Minimum Specification
1000	98
500	93
250	88
150	73
100	58
75	48
50	43
20	33
8	18
5	8
2	3
d_{50}	< 75 µm

Table 2 – Particle Size Distribution (PSD) of Test Sediment

Mesh (mm)	US Sieve Size	Sample ID		
		PSD A	PSD B	PSD C
		Percent Finer		
9.525	0.375	100.0	100.0	100.0
4.750	#4	100.0	100.0	100.0
4.000	#5	100.0	100.0	100.0
2.360	#8	100.0	100.0	100.0
2.000	#10	100.0	100.0	100.0
1.180	#16	100.0	100.0	100.0
1.000	#18	100.0	100.0	100.0
0.500	#35	100.0	100.0	100.0
0.425	#40	93.3	93.0	93.6
0.250	#60	90.3	89.8	90.2
0.150	#100	79.3	78.1	78.1
0.125	#120	73.6	71.7	71.7
0.106	#140	68.4	65.2	64.8
0.090	#170	60.2	58.3	57.5
0.075	#200	52.0	50.9	50.3
0.053	#270	48.0	48.3	47.8
0.045	Hydrometer	46.6	46.7	46.7
0.032		42.8	42.9	41.0
0.021		37.1	37.2	35.3
0.0125		25.7	25.7	25.8
0.0090		20.1	20.1	19.2
0.0064		16.3	16.4	14.5
0.0032		8.8	8.7	7.8
0.0014		3.8	3.7	3.8

The suspended sediment concentration analysis was completed by Fredericktowne Labs Inc., Meyersville, MD. Fredericktown Labs is accredited by the Maryland Department of Environment as Maryland Certified Water Quality Laboratory. The analysis procedure was ASTM D3977-97, Suspended Sediment Concentration. The sampling procedure and submission of samples to the test lab were overseen by the independent observer, Boggs Environmental Consultants, Inc.

All test data and calculations were detailed in the report “NJCAT TECHNOLOGY VERIFICATION Isolator® Row PLUS StormTech, LLC”, July 2020, which was submitted to and verified by the New Jersey Corporation for Advanced Technology (NJCAT).

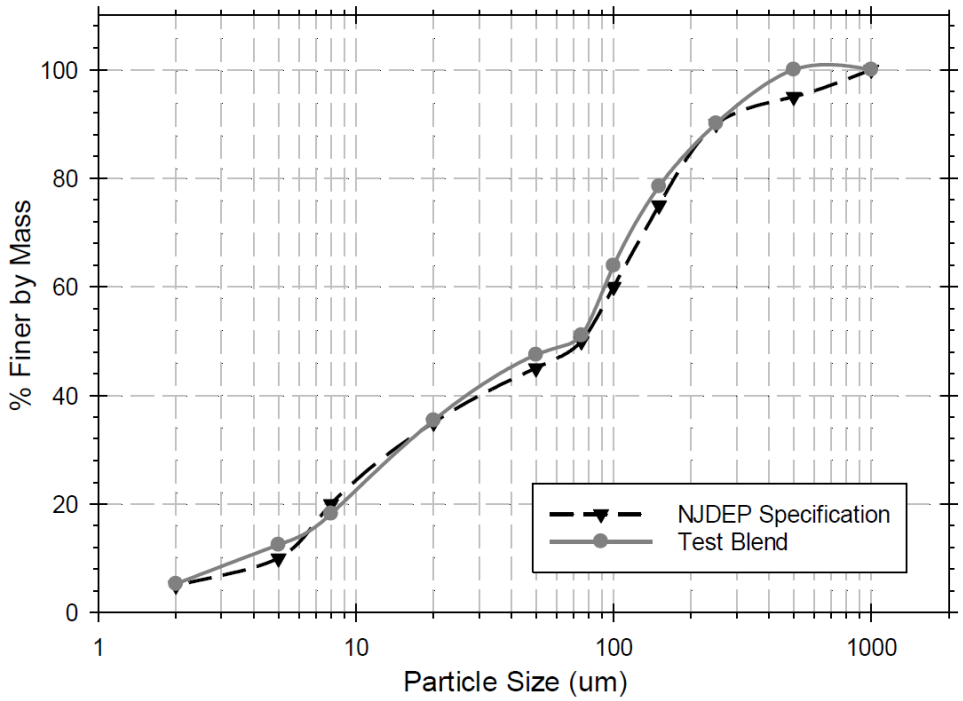


Figure 4– Particle Size Distribution (PSD)

The data in Table 3 (Flow Rate and Temperature) and Table 4 (Removal Efficiency) form the basis for the verified technology performance claim, specifically, flow rate, sediment captured and removal efficiency.

Table 3: Flow Rate and Temperature Summary

Run	Max Flow (gpm)	Min Flow (gpm)	Average Flow (gpm)	Flow COV	Flow Compliance (COV< 0.1)	Maximum Temperature (Fahrenheit)	NJDEP Temperature Compliance (< 80 F)
1	232.8	223.9	226.3	0.0078	Y	48.2	Y
2	228.9	218.6	220.8	0.0104	Y	51.5	Y
3	229.4	220.0	227.2	0.0094	Y	44.7	Y
4	230.2	218.7	223.2	0.0138	Y	40.5	Y
5	228.7	216.9	222.2	0.0103	Y	44.7	Y
6	227.6	217.0	224.2	0.0115	Y	46.7	Y
7	229.7	221.9	226.4	0.0092	Y	44.6	Y
8	230.3	222.2	226.8	0.0089	Y	43.5	Y
9	233.2	218.4	225.6	0.0136	Y	45.5	Y
10	232.2	219.7	228.4	0.0126	Y	44.7	Y
11	226.9	219.2	224.1	0.0088	Y	52.4	Y
12	232.2	222.1	226.9	0.0107	Y	48.5	Y
13	234.7	221.2	226.1	0.0109	Y	48.5	Y
14	231.9	223.4	228.7	0.0103	Y	45.6	Y
15	236.8	224.1	231.4	0.0131	Y	52.2	Y
16	232.5	221.3	229.0	0.0137	Y	47.8	Y

Table 4: Removal Efficiency Results

Run	Average Influent TSS (mg/L)	Influent Water Volume (gal)	Adjusted Average Effluent TSS (mg/L)	Effluent Water Volume (gal)	Adjusted Average Drain Down TSS (mg/L)	Drain Down Water Volume (gal)	Single Run Removal Efficiency (%)	Mass of Captured Sediment (g)	Cumulative Removal Efficiency (%)
1	203	7166	46	6881	34	285	77.8	4282	77.8
2	199	6993	32	6639	27	354	84.0	4415	80.8
3	207	7197	37	6793	27	403	82.6	4654	81.4
4	217	7068	33	6635	29	433	84.9	4923	82.3
5	215	7037	39	6593	29	444	82.2	4705	82.3
6	207	7097	40	6643	31	454	81.2	4504	82.1
7	198	7169	37	6693	30	476	81.6	4386	82.0
8	201	7184	37	6716	32	468	81.6	4473	82.0
9	205	7147	38	6675	30	472	81.8	4539	82.0
10	203	7235	38	6759	31	476	81.4	4523	81.9
11	208	7096	38	6624	30	472	81.8	4567	81.9
12	209	7185	41	6709	30	476	80.7	4584	81.8
13	198	7162	41	6680	32	482	79.7	4277	81.6
14	200	7242	43	6757	34	485	78.8	4318	81.4
15	196	7329	41	6842	32	487	79.5	4320	81.3
16	202	7254	44	6769	31	485	78.9	4384	81.2
Avg.	**204.2**	**7160**	**39**	**6713**	**31**	**447**	**81.2**	**4491**	**N/A**
Cumulative Mass Removed (g)							**71854**		
Cumulative Mass Removed (lb)							**158.4**		
Total Mass Loaded (lb)							**195.2**		
Cumulative Removal Efficiency (%)							**81.2**		

Quality Assurance

Performance verification of the StormTech Isolator® Row PLUS technology was performed in accordance with the requirements of ISO 14034:2016 and the VerifiGlobal Performance Verification Protocol. This included reviewing all data sheets and calculated values, as well as overall management of the test system, quality control and data integrity.

Additional information on quality control measures taken can be found in section 5 of the QAPP for StormTech Isolator Row New Jersey Department of Environmental Protection Testing, Rev. 1/9/2020.

Specific QA/QC measures reviewed by the verifier are summarized in Table 5 below.

Table 5. Validation of QA/QC Procedures

QC Parameter	Acceptance Criteria
Independence of observer	Confirmed in letter from Boggs Environmental Consultants, Inc. to NJCAT
Consistency of procedure	Daily logs confirm proper procedure
Existence of QAPP	Confirmed. “QAPP For StormTech Isolator Row New Jersey Department of Environmental Protection Testing”, Rev. 1/9/2020*)*
Use of appropriate sample analysis method – ASTM D3799	Confirmed by method reference on lab reports from Fredericktowne Labs Inc.
Test method appropriate for the technology	Used industry stakeholder approved protocol: *New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids*

	Removal by a Filtration Manufactured Treatment Device (January 2013)
Test parameters stayed within required limits	Confirmed in report "NJCAT TECHNOLOGY VERIFICATION Isolator® Row PLUS StormTech, LLC", July 2020
Third party verified data	All testing was observed and reviewed by Boggs Environmental Consultants, Inc.

Variance

Performance claims regarding structural load limitations were not verified as they are outside the scope of the performance testing that was conducted in accordance with the 'Quality Assurance Project Plan (QAPP) for StormTech Isolator Row, New Jersey Department of Environmental Protection Testing', revision dated January 09, 2020.

Verification Summary

The StormTech "Isolator® Row PLUS" is a stormwater treatment technology designed for use under parking lots, roadways and heavy earth loads while providing a superior and durable structural system. The technology comprises a row of chambers wrapped in woven geotextile fabric with two layers at the bottom that serve as a filter strip, providing surface area for infiltration and runoff reduction with enhanced suspended solids and pollutant removal.

The StormTech Isolator® Row PLUS technology was tested at the Mid-Atlantic Storm Water Research Center (MASWRC), under the supervision of Boggs Environmental Consultants, Inc. The performance test results for two overlapping StormTech Isolator® Row PLUS chambers (commercial unit model SC-740) were verified by Good Harbour Laboratories Inc. (GHL), following the requirements of ISO 14034:2016 and the VerifiGlobal Performance Verification Protocol. Table 6 summarizes the verification results in relation to the technology performance parameters that were identified in the Verification Plan to determine the efficacy of the StormTech Isolator® Row PLUS technology.

Table 6 - Summary of Verification Results Against Performance Parameters

Parameters	Verified Claims	Accuracy
Total Suspended Solids (TSS) Removal Efficiency	Based on the laboratory testing conducted, the StormTech Isolator® Row PLUS achieved an average 82% removal efficiency of SSC	± 1% (95% confidence level)
Average Loading Rate	Based on the laboratory testing parameters, the StormTech Isolator® Row PLUS maintained a loading rate of 4.15 GPM/sf	±0.03 GPM/sf (95% confidence level)
Maximum Treatment Flow Rate (MTFR)	Although the MTFR varies among the StormTech Isolator® Row PLUS model sizes and the number of chambers, the design surface loading rate remains the same (4.13 GPM/ft^2 of treatment surface area). The test unit consisted of two overlapping StormTech SC-740 chambers with a nominal MTFR of 225 GPM (0.501 CFS) and an effective filtration treatment area (EFTA) of approximately 54.5 ft^2.	± 1.4 GPM (95% confidence level)
Detention Time and Volume	Detention time and wet volume varies with model size. The unit tested had a wet volume of approximately 65.1 ft^3 (based on	N/A

	physical measurement) and a detention time of 2.2 minutes.	
Maximum Sediment Storage Depth and Volume	The sediment storage volume and depth vary according to the StormTech Isolator® Row PLUS model sizes and system configuration. For the two overlapping StormTech SC-740 chambers tested, the maximum sediment storage volume is 2.3 ft^3 at a sediment depth of 0.5 inches.	N/A
Effective Sedimentation/ Filtration Treatment Area	The effective sedimentation and filtration treatment area increases as the size of the chamber increases. Under the tested conditions using 2 overlapping chambers, the treatment area was 54.5 ft^2	The sedimentation /filtration area was determined from the actual physical dimensions of the test unit*
Sediment Mass Load Capacity	The sediment mass load capacity varies according to the StormTech Isolator® Row PLUS model sizes and system configuration. For the two overlapping StormTech SC-740 chambers tested, the mass loading capture was 158.4 lbs (2.91 lbs/ ft^2) following a total sediment loading of 195.2 lbs	± 0.8 lbs (±0.01 lbs/ft^2) (95% confidence level)

*Note: These numbers are determined based on physical measurement or a dimensional drawing, which is standard practice. Highly accurate measurements are not practical.

In conclusion, the StormTech Isolator® Row PLUS is a viable technology that can be used to remove contaminants from stormwater runoff via filtration. This technology has proven effective at removing suspended sediment from stormwater through in-lab testing using an industry recognized laboratory protocol.

By extension of sediment removal, this technology should also remove particle bound nutrients, heavy metals, and a wide variety of organic contaminants. Performance is a function of pollutant properties, hydraulic retention time, filter media, pre-treatment, and flow rate, such that proper design of the system is critical to achieving the desired results.

What is ISO 14034?

The purpose of environmental technology verification is to provide a credible and impartial account of the performance of environmental technologies. Environmental technology verification is based on a number of principles to ensure that verifications are performed and reported accurately, clearly, unambiguously and objectively. The International Organization for Standardization (ISO) standard for environmental technology verification (ETV) is ISO 14034, which was published in November 2016.

Benefits of ETV

ETV contributes to protection and conservation of the environment by promoting and facilitating market uptake of innovative environmental technologies, especially those that perform better than relevant alternatives. ETV is particularly applicable to those environmental technologies whose innovative features or performance cannot be fully assessed using existing standards. Through the provision of objective evidence, ETV provides an independent and impartial confirmation of the performance of an environmental technology based on reliable test data. ETV aims to strengthen the credibility of new, innovative technologies by supporting informed decision-making among interested parties.

For more information on the StormTech "Isolator® Row PLUS" technology, contact:	For more information on VerifiGlobal, contact:
StormTech, LLC. 520 Cromwell Avenue, Rocky Hill, CT 06067 USA t: +1-888-892-2694 e: info@stormtech.com w: www.stormtech.com	VerifiGlobal c/o ETA-Danmark A/S Göteborg Plads 1, DK-2150 Nordhaven t +45 7224 5900 e: info@verifiglobal.com w: www. verifiglobal.com
Signed for StormTech: *Original signed by:* *Greg Spires* Greg Spires, P.E. General Manager	Signed for VerifiGlobal: *Original signed by:* *Thomas Bruun* Thomas Bruun, Managing Director *Original signed by:* *John Neate* John Neate, Managing Director

Technical Specification

Control Point	Head (m)	Flow (l/s)
Primary Design	1.000	5.400
Flush-Flo™	0.099	1.962
Kick-Flo®	0.108	1.955
Mean Flow		3.668

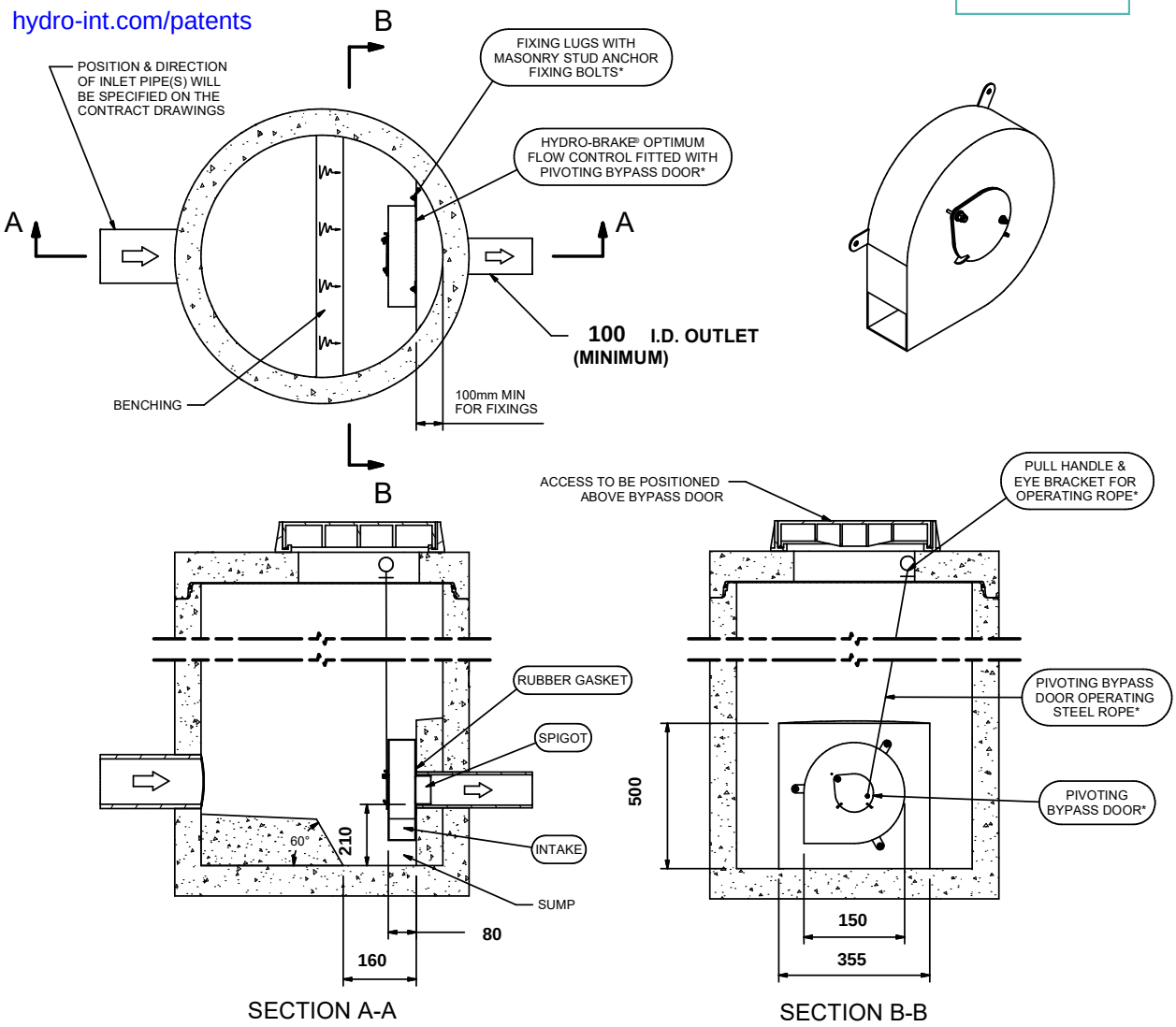
Hydro-Brake® Optimum Flow Control including:

- **3 mm** grade 304L stainless steel
- Integral stainless steel pivoting by-pass door allowing clear line of sight through to outlet, c/w stainless steel operating rope
- Beed blasted finish to maximise corrosion resistance
- Stainless steel fixings
- Rubber gasket to seal outlet
- Indicative Weight: 0 kg

BBA APPROVAL INSPECTION TESTING CERTIFICATION CERTIFICATE 08/4596

wrc approved PT/503/0422 Valid: 01/04/2022 - 31/03/2027

hydro-int.com/patents



SECTION A-A

SECTION B-B

IMPORTANT: ⬭ LIMIT OF HYDRO INTERNATIONAL SUPPLY
THE DEVICE WILL BE HANDED TO SUIT SITE CONDITIONS
FOR SITE SPECIFIC DETAILS AND MINIMUM CHAMBER SIZE REFER TO HYDRO INTERNATIONAL
ALL CIVIL AND INSTALLATION WORK BY OTHERS
* WHERE SUPPLIED
HYDRO-BRAKE® FLOW CONTROL & HYDRO-BRAKE® OPTIMUM FLOW CONTROL ARE REGISTERED TRADEMARKS FOR FLOW CONTROLS DESIGNED AND MANUFACTURED EXCLUSIVELY BY HYDRO INTERNATIONAL

THIS DESIGN LAYOUT IS FOR ILLUSTRATIVE PURPOSES ONLY. NOT TO SCALE.

DESIGN ADVICE

The head/flow characteristics of this SCU-0072-5400-1000-5400 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.
The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

Hydro International
A CRH COMPANY

DATE	11/24/2023 1:58 PM
SITE	Toronto Street
DESIGNER	**scott corley**
REF	**21026**

SCU-0072-5400-1000-5400

Hydro-Brake® Optimum

 Hydro International Ltd, 94 Hutchins Drive, Portland, Maine, 04102-1930. Tel; +1 (207) 756 6200 Fax; +1 (207) 756 6212 Web; www.hydro-int.com Email; enquiries@hydro-int.com

scorley@counterpointeng.com

Technical Specification

Control Point	Head (m)	Flow (l/s)
Primary Design	1.000	5.400
Flush-Flo	0.099	1.962
Kick-Flo®	0.108	1.955
Mean Flow		3.668

BBA APPROVAL INSPECTION TESTING CERTIFICATION
CERTIFICATE No 08/4596

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PT/503/0422
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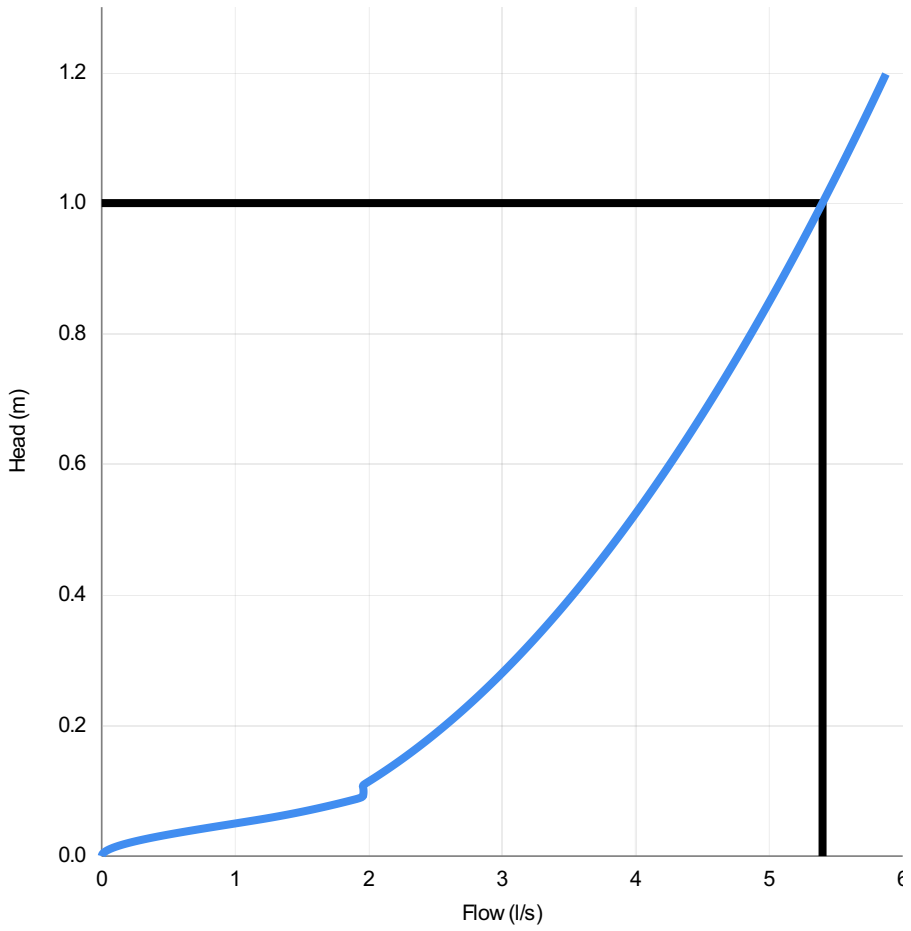


Head (m)	Flow (l/s)
0.000	0.000
0.034	0.539
0.069	1.523
0.103	1.960
0.138	2.176
0.172	2.406
0.207	2.613
0.241	2.802
0.276	2.977
0.310	3.142
0.345	3.297
0.379	3.444
0.414	3.585
0.448	3.720
0.483	3.849
0.517	3.973
0.552	4.094
0.586	4.210
0.621	4.323
0.655	4.433
0.690	4.540
0.724	4.644
0.759	4.746
0.793	4.845
0.828	4.942
0.862	5.037
0.897	5.130
0.931	5.221
0.966	5.311
1.000	5.399

DESIGN ADVICE

The head/flow characteristics of this SCU-0072-5400-1000-5400 Hydro-Brake Optimum® Flow Control are unique. Dynamic hydraulic modeling evaluates the full head/flow characteristic curve.

! **The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.**

Hydro International
A CRH COMPANY

DATE	11/24/2023 1:58 PM
Site	Toronto Street
DESIGNER	scott corley
Ref	21026

SCU-0072-5400-1000-5400

Hydro-Brake Optimum®

Summary of Inputs for Water Balance Calculation

Precipitation (mm/yr)	**831**	Based on Uxbridge Brook Subwatershed Data	
Evapotranspiration (mm/yr)	**560**	Based on Uxbridge Brook Subwatershed Data	
Topography Infiltration Factor	**0.20**	Pre-development site (Grass)	
Soil Infiltration Factor	**0.40**	Pre-development site (Grass)	
Land Cover Infiltration Factor	**0.10**	Pre-development site (Grass)	
MOE Infiltration Factor	**0.70**	Pre-development site (Grass)	
Topography Infiltration Factor	**0.20**	Post- Development	
Soil Infiltration Factor	**0.30**	Post- Development	*Adjusted for compaction
Land Cover Infiltration Factor	**0.10**	Post- Development	
MOE Infiltration Factor	**0.60**	Post- Development	

TABLE 5-2 Summary of Key Hydrologic Processes by Soil Class (1990-2009)

Soil Class	Total Area (km^2)	Percent of Study Area (%)	Precipitation (mm/yr)	Evapotranspiration (mm/yr)	Groundwater Recharge (mm/yr)	Groundwater Discharge (mm/yr)
Gravel	168	21	899	546	370	5
Sand	238	30	889	561	351	249
Silt/Till	241	30	899	523	181	26
Clay	151	19	892	576	30	241
Study Area	797	100	895	549	243	129

Table extracted from chapter 5 of "City of Barrie Tier Three Recharge Estimations Using Mike SHE, Technical Memorandum" Prepared for Lake Simcoe Conservation Authority, by AquaResource, June 2012.

Table 2: Infiltration Factors

Description of Area/Development Site	Value of Infiltration Factor
TOPOGRAPHY	
■ Flat land, average slope not exceeding 0.6 m per km	0.30
■ Rolling land, average slope of 2.8 m to 3.8 m per km	0.20
■ Hilly land, average slope of 28 m to 47 m per km	0.10
SOIL	
■ Tight impervious clay	0.10
■ Medium combinations of clay and loam	0.20
■ Open sandy loam	0.4
COVER	
■ Cultivated lands	0.1
■ Woodland	0.2

Table extracted from chapter 4 of "MOEE Hydrogeological technical Information requirements for Land Development Applications" MOE, April 1995.

SWM DESIGN CALCULATIONS
Water Balance/ Water Budget Assessment

Project Name: 181 Toronto Street South
Municipality: Township of Uxbridge
Project No.: 21026
Date: 16-Nov-23

Last Revised: 16-Nov-23

Catchment Designation	Site				
	Pre-Development	Post-Development	Change (Pre- to Post-)	Post- Development with Mitigation	Change (Pre- to Post- with Mitigation)
Inputs (Volumes)					
Precipitation (m^3/yr)	2,493	2,493	0.0%	2,493	0.0%
Run-on (m^3/yr)	0	0	0.0%	0	0.0%
Other Inputs (m^3/yr)	0	0	0.0%	0	0.0%
Total Inputs (m^3/yr)	**2,493**	**2,493**	**0.0%**	**2,493**	**0.0%**
Outputs (Volumes)					
Precipitation Surplus (m^3/yr)	813	1,684	107.1%	1,684	107.1%
Evapotranspiration (m^3/yr)	1,680	809	-51.8%	809	-51.8%
Infiltration (m^3/yr)	569	163	-71.4%	163	-71.4%
Infiltration Measures (m^3/yr)	0	0	0.0%	918	N/A
Total Infiltration (m^3/yr)	569	163	-71.4%	1,081	89.9%
Runoff Pervious Areas (m^3/yr)	244	108	-55.6%	108	-55.6%
Runoff Impervious Areas (m^3/yr)	0	1,413	N/A	494	N/A
Total Runoff (m^3/yr)	244	1,521	523.7%	603	147.2%
Total Outputs (m^3/yr)	**2,493**	**2,493**	**0.0%**	**2,493**	**0.0%**

SWM DESIGN CALCULATIONS
Water Budget - Pre-Development

Project Name: 181 Toronto Street South
Municipality: Township of Uxbridge
Project No.: 21026
Date: 16-Nov-23

Last Revised: 16-Nov-23

Catchment Designation	Site Area		
	Pervious	Impervious	Total
Area (m^2)	3,000	0	**3,000**
Pervious Area (m^2)	3,000	0	**3,000**
Impervious Area (m^2)	0	0	**0**
Inputs (per Unit Area)			
Precipitation (mm/yr)	831	831	**831**
Run-on (mm/yr)	0	0	**0**
Other Inputs (mm/yr)	0	0	**0**
Outputs (per Unit Area)			
Precipitation Surplus (mm/yr)	271	706	**271**
Evapotranspiration (mm/yr)	560	125	**560**
Infiltration (mm/yr)	190	0	**190**
Infiltration Measures (mm/yr)	0	0	**0**
Total Infiltration (mm/yr)	190	0	**190**
Runoff Pervious Areas (mm/yr)	81	0	**81**
Runoff Impervious Areas (mm/yr)	0	706	**0**
Total Runoff (mm/yr)	81	706	**81**
Total Outputs (mm/yr)	**831**	**831**	**831**
Difference (Inputs-Outputs)	**0**	0	**0**
Inputs (Volumes)			
Precipitation (m^3/yr)	2,493	0	**2,493**
Run-on (m^3/yr)	0	0	**0**
Other Inputs (m^3/yr)	0	0	**0**
Total Inputs (m3/yr)	**2,493**	**0**	**2,493**
Outputs (Volumes)			
Precipitation Surplus (m^3/yr)	813	0	**813**
Net Surplus (m^3/yr)	813	0	**813**
Evapotranspiration (m^3/yr)	1,680	0	**1,680**
Infiltration (m^3/yr)	569	0	**569**
Infiltration Measures (m^3/yr)	0	0	**0**
Total Infiltration (m^3/yr)	569	0	**569**
Runoff Pervious Areas (m^3/yr)	244	0	**244**
Runoff Impervious Areas (m^3/yr)	0	0	**0**
Total Runoff (m^3/yr)	244	0	**244**
Total Outputs (m^3/yr)	**2,493**	**0**	**2,493**
Difference (Inputs-Outputs)			**0**

SWM DESIGN CALCULATIONS
Water Budget - Post-Development (No Mitigation)

Project Name: 181 Toronto Street South
Municipality: Township of Uxbridge
Project No.: 21026
Date: 16-Nov-23

Last Revised: 16-Nov-23

Catchment Designation	Site Area		
	Pervious	Impervious	Total
Area (m^2)	1,000	2,000	**3,000**
Pervious Area (m^2)	1,000	0	**1,000**
Impervious Area (m^2)	0	2,000	**2,000**
Infiltration Factors			
MOE Infiltration Factor	0.60		
Run-off from Impervious Surfaces			
Inputs (per Unit Area)			
Precipitation (mm/yr)	831	831	**831**
Run-on (mm/yr)	0	0	**0**
Other Inputs (mm/yr)	0	0	**0**
Outputs (per Unit Area)			
Precipitation Surplus (mm/yr)	271	706	**561**
Evapotranspiration (mm/yr)	560	125	**270**
Infiltration (mm/yr)	163	0	**54**
Infiltration Measures (mm/yr)	0	0	**0**
Total Infiltration (mm/yr)	163	0	**54**
Runoff Pervious Areas (mm/yr)	108	0	**36**
Runoff Impervious Areas (mm/yr)	0	706	**471**
Total Runoff (mm/yr)	108	706	**507**
Total Outputs (mm/yr)	**831**	**831**	**831**
Difference (Inputs-Outputs)	**0**	0	**0**
Inputs (Volumes)			
Precipitation (m^3/yr)	831	1,662	**2,493**
Run-on (m^3/yr)	0	0	**0**
Other Inputs (m^3/yr)	0	0	**0**
Total Inputs (m3/yr)	**831**	**1,662**	**2,493**
Outputs (Volumes)			
Precipitation Surplus (m^3/yr)	271	1,413	**1,684**
Net Surplus (m^3/yr)	271	1,413	**1,684**
Evapotranspiration (m^3/yr)	560	249	**809**
Infiltration (m^3/yr)	163	0	**163**
Infiltration Measures (m^3/yr)	0	0	**0**
Total Infiltration (m^3/yr)	163	0	**163**
Runoff Pervious Areas (m^3/yr)	108	0	**108**
Runoff Impervious Areas (m^3/yr)	0	1,413	**1,413**
Total Runoff (m^3/yr)	108	1,413	**1,521**
Total Outputs (m^3/yr)	**831**	**1,662**	**2,493**
Difference (Inputs-Outputs)			**0**

Note:
- Evaporation from impervious area assumed to be 15% of precipitation

SWM DESIGN CALCULATIONS
Water Budget - Post-Development (With Mitigation)

Project Name: 181 Toronto Street South
Municipality: Township of Uxbridge
Project No.: 21026
Date: 16-Nov-23

Last Revised: 16-Nov-23

Catchment Designation	Pervious	Impervious	Total Area 201	Total
Area (m^2)	1,000	2,000	**3,000**	**3,000**
Pervious Area (m^2)	1,000	0	**1,000**	**1,000**
Impervious Area (m^2)	0	2,000	**2,000**	**2,000**
Infiltration Factors				
MOE Infiltration Factor	0.60			
Run-off from Impervious Surfaces				
Inputs (per Unit Area)				
Precipitation (mm/yr)	831	831	831	**831**
Run-on (mm/yr)	0	0	0	**0**
Other Inputs (mm/yr)	0	0	0	**0**
Outputs (per Unit Area)				
Precipitation Surplus (mm/yr)	271	706	561	**561**
Evapotranspiration (mm/yr)	560	125	270	**270**
Infiltration (mm/yr)	163	0	54	**54**
Infiltration Measures (mm/yr)	0	459	306	**306**
Total Infiltration (mm/yr)	163	459	360	**360**
Runoff Pervious Areas (mm/yr)	108	0	36	**36**
Runoff Impervious Areas (mm/yr)	0	247	165	**165**
Total Runoff (mm/yr)	108	247	201	**201**
Total Outputs (mm/yr)	**831**	**831**	831	**831**
Difference (Inputs-Outputs)	**0**	0	0	**0**
Inputs (Volumes)				
Precipitation (m^3/yr)	831	1,662	2,493	**2,493**
Run-on (m^3/yr)	0	0	0	**0**
Other Inputs (m^3/yr)	0	0	0	**0**
Total Inputs (m3/yr)	**831**	**1,662**	**2,493**	2,493
Outputs (Volumes)				
Precipitation Surplus (m^3/yr)	271	1,413	1,684	**1,684**
Net Surplus (m^3/yr)	271	1,413	1,684	**1,684**
Evapotranspiration (m^3/yr)	560	249	809	**809**
Infiltration (m^3/yr)	163	0	163	**163**
Infiltration Measures (m^3/yr)	0	918	918	**918**
Total Infiltration (m^3/yr)	163	918	1,081	**1,081**
Runoff Pervious Areas (m^3/yr)	108	0	108	**108**
Runoff Impervious Areas (m^3/yr)	0	494	494	**494**
Total Runoff (m^3/yr)	108	494	603	**603**
Total Outputs (m^3/yr)	**831**	**1,662**	2,493	**2,493**
Difference (Inputs-Outputs)			**0**	**0**

Note:
- Evaporation from impervious area assumed to be 15% of precipitation

Counterpoint Engineering

181 Toronto Street South
Project Number: 21026

Drawdown Time Calculation - Roof Drain Infiltration

Infiltration			
Dimensions:	Area=	53.8	m^2
	Volume=	18.75	m^3
	Average Height=	**0.35**	**m**

Infiltration Gallery	**18.75**	**m^3**

Drawdown Time:

Infiltration rate (with safety factor applied): 30.0 mm/hr = 0.030 m/hr

(Based on hydrogeological report results, infiltration rate ranges from 75mm/hr - 94mm/hr)
Infiltration rate used = 75mm/hr / 2.5 safety factor = 30.0mm/hr

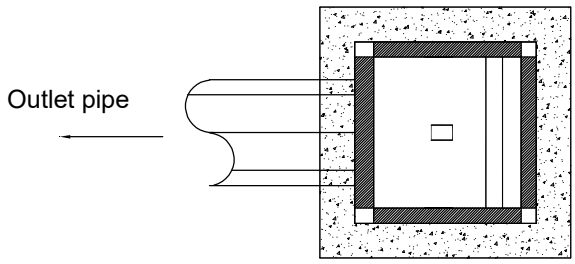
Drawdown Time = Depth/Infiltration Rate

Drawdown Time = 0.50m/0.030m/hr = **11.6** **hrs**

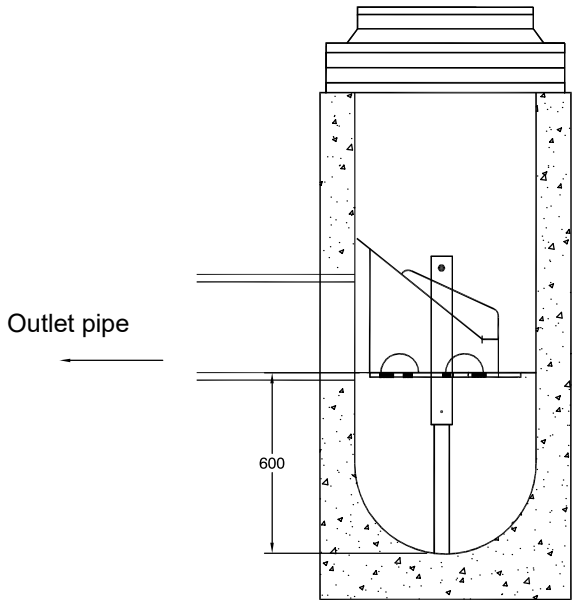
Drawdown time is less than 48 hours, therefore, MECP drawdown time is achieved.

Notes

1. CB Shield can be installed at any time. In a non frozen condition.
2. The **frame and cover MUST BE well aligned** with the catchbasin for proper installation.
3. The catchbasin sump must be clean before installation
4. The grate should be at the same level as the standing water in the sump.



Top view



Profile view

CB Shield (600mm Sump)

Average Annual Sediment Removal Rates (%) using a CB Shield (based on MOECC Sediment - 20 to 2000 micron Particle Size Distribution)						
Area to CB (ha)	**Imperviousness[1] (%)**					
	20%	35%	50%	65%	80%	100%
0.02	73%	73%	73%	73%	73%	73%
0.05	73%	73%	73%	72%	72%	72%
0.10	72%	72%	72%	71%	70%	69%
0.20	71%	70%	69%	67%	66%	64%
0.30	70%	68%	66%	64%	62%	60%
0.40	70%	66%	63%	61%	59%	57%
0.50	68%	64%	61%	59%	57%	54%
0.60	66%	63%	60%	57%	54%	51%

Notes:

1. Runoff Coefficient 'C' is approximately equal to 0.05 + 0.9*Impervious Fraction.
2. Above chart is based on long term continuous hydrologic analysis of Toronto, Ontario (Bloor St) rainfall data.
3. Assumes 0.6 m sump in CB and that maintenance is performed (i.e. CB cleaning) when required by sediment/pollutant build-up or otherwise.
4. See accompanying chart for suggested maintenance scheduling - AND - get CB Shield Inc. to monitor it for you in field.
5. Sediment/Pollutant removal rates based on third party certified laboratory testing using MOECC sediment (PSD available on request).
6. See additional discussion regarding scour protection from CB Shield during more infrequent runoff events.

Drainage Area 201 Imperviousness = 80**%**
Total Area 201 treated by CB Shields = 0.23 ha
# of CB Shields on site = 6

Approximate Area to each CB shield = ~ **0.04ha**
From sizing chart above, Annual TSS removal rate = **~72%**

Phosphorus Removal Calculations

181 Toronto Street South
21026
Oct-23

Existing Phosphorus Loading Calculation

Land Use		Area	P Coef (kg/ha/yr)	P Load (kg/yr)	BMP	Efficiency (%)	BMP P (kg/yr)	Notes
Low Intensity Development		0.30	0.13	0.039	None	0	0.039	
	Total	0.30					0.039	

Proposed Phosphorus Loading Calculation with BMP

Land Use		Area	P Coef (kg/ha/yr)	P Load (kg/yr)	BMP	Efficiency (%)	BMP P (kg/yr)	Notes	
Low Intensity Development		0.025	0.13	0.003	Sodded Area	0%	0.003	Uncontrolled Landscaped Area	
High Intensity Development		0.20	1.32	0.264	CB Shield/Stormtech Chamber Isolator ROW	79%	0.055	Area to CB Sheild and Stormtech Chambers	CB Shield - 0.021 Kg/yr/CB Shield Removal
High Intensity Development		0.075	1.32	0.099	Stormtech Chamber Isolator ROW/Infiltration	60%	0.040	Roof Area to Stormtech Chamber	Stormtech Chamber - 60% Removal
	Total	0.30					**0.098**		

Proposed Phosphorus Loading Calculation without BMP

Land Use		Area	P Coef (kg/ha/yr)	P Load (kg/yr)	BMP	Efficiency (%)	BMP P (kg/yr)	Notes
High Intensity Development		0.30	1.32	0.396	None	0%	0.396	
	Total	0.30					**0.396**	Total Phosphorus Load without BMP
							0.298	Total Phosphorus Removed with BMP
							75%	Phosphorus removal

Phosphorus Loading Summary		
Existing Conditions	0.039	kg/year
Proposed Conditions with no BMP	0.396	kg/year
Proposed Conditions with BMP	0.098	kg/year
Post Development % Phosphorus Removal	**75%**	

	LSPOP Compensation Calculation Form		
Application Details			
Site Name (Developer):	Larkin+LUPi		
Site Location:	181 Toronto Street South		
File/APID #			
Anticipated Construction Start:			
Subwatershed:	Pefferlaw-Uxbridge Brook		
Phosphorous Balance			
Kg/year	0.098		
Compensation Costs			
Offsetting Value	**2.5**		
Compensation Cost (P load *2.5*$35,770)	$8,768.12		
Administration Fee (15%)	$1,315.22		
Total	$10,083.34		

Table 2. Land-Use Specific Phosphorus Export Coefficients (kg/ha/yr) for Lake Simcoe Subwatersheds

Subwatershed	Phosphorus Export (kg/ha/yr)											
				High Intensity Development								
	Cropland	Hay-Pasture	Sod Farm/Golf Course	Commercial /Industrial	Residential	Low Intensity Development	Quarry	Unpaved Road	Forest	Transition	Wetland	Open Water
Monitored Subwatersheds												
Beaver River	0.22	0.04	0.01	1.82	1.32	0.19	0.06	0.83	0.02	0.04	0.02	0.26
Black River	0.23	0.08	0.02	1.82	1.32	0.17	0.15	0.83	0.05	0.06	0.04	0.26
East Holland River	0.36	0.12	0.24	1.82	1.32	0.13	0.08	0.83	0.10	0.16	0.10	0.26
Hawkestone Creek	0.19	0.10	0.06	1.82	1.32	0.09	0.10	0.83	0.03	0.04	0.03	0.26
Lovers Creek	0.16	0.07	0.17	1.82	1.32	0.07	0.06	0.83	0.06	0.06	0.05	0.26
Pefferlaw/Uxbridge Brook	0.11	0.06	0.02	1.82	1.32	0.13	0.04	0.83	0.03	0.04	0.04	0.26
Whites Creek	0.23	0.10	0.42	1.82	1.32	0.15	0.08	0.83	0.10	0.11	0.09	0.26
Unmonitored Subwatersheds												
Barrie Creeks	0.19	0.07	0.12	1.82	1.32	0.13	0.08	0.83	0.05	0.06	0.05	0.26
GeorginaCreeks	0.36	0.12	0.24	1.82	1.32	0.13	0.08	0.83	0.10	0.16	0.10	0.26
Hewitts Creek	0.19	0.07	0.12	1.82	1.32	0.13	0.08	0.83	0.05	0.06	0.05	0.26
Innisfil Creeks	0.19	0.07	0.12	1.82	1.32	0.13	0.08	0.83	0.05	0.06	0.05	0.26
Maskinonge River	0.19	0.07	0.12	1.82	1.32	0.13	0.08	0.83	0.05	0.06	0.05	0.26
Oro Creeks North	0.36	0.12	0.24	1.82	1.32	0.13	0.08	0.83	0.10	0.16	0.10	0.26
Oro Creeks South	0.19	0.07	0.12	1.82	1.32	0.13	0.08	0.83	0.05	0.06	0.05	0.26
Ramara Creeks	0.19	0.07	0.12	1.82	1.32	0.13	0.08	0.83	0.05	0.06	0.05	0.26
Talbot/Upper Talbot River	0.19	0.07	0.12	1.82	1.32	0.13	0.08	0.83	0.05	0.06	0.05	0.26
West Holland River	0.36	0.12	0.24	1.82	1.32	0.13	0.08	0.83	0.10	0.16	0.10	0.26

Module 2 – Estimates post-development phosphorus loads that are representative of the proposed changes in land use for the study site using the same data sources used in Module 1, but accounting for the change in land use that will occur with development.

Module 3 – Estimates efficiencies attributed to classes of BMPs that can be used to reduce stormwater phosphorus loads in the post-development scenario. These efficiencies are based on data that is sourced from relevant, regional studies. The Tool provides standardized phosphorus reduction efficiencies (with rationale) for specific BMPs, but also allows the user to enter their own efficiencies provided that the rationale is also documented and is acceptable to the MOE. The Tool also allows the user to use custom BMPs or to enter the net efficiency achieved using a Treatment Train approach, which would also require documentation in a rationale that is acceptable to the MOE. The BMP selection criteria and efficiencies are shown below as reproduced from Figure 5 and Table 3 of the report, as follows:

Table 3. Phosphorus Removal Efficiencies for Major Classes of BMPs Using the Decision Tree (Figure 5).

BMP Class	Reference IDs[1]	Reported Phosphorus Removal Efficiency (%)		Relevant to Ontario?	Range <40%?	Are Non-Ontario values acceptable?	Possible design criteria?	Median % Removal Efficiency
		Min	Max					
Post-development BMPs								
Bioretention Systems	8-10, 12,13, 34-38, 40	-1552	80	no	no	no	No	none
Constructed Wetlands	104, 106, 109	72	87	yes	yes			77
Dry Detention Ponds	104, 109	0	20	no	yes	yes		10
Dry Swales	24, 26-32	-216	94	no	no	no	possible	none
Enhanced Grass/Water Quality Swales	21, 104	34	55	no	yes	no	No	none
Flow Balancing Systems	106	77		no	?	yes	Min data	77
Green Roofs	2	-248		no	no	no	No	none
Hydrodynamic Devices	109	-8		no	?	yes		none
Perforated Pipe Infiltration/Exfiltration Systems	7, 4	81	93	yes	yes			87
Sand or Media Filters	104, 109	30	59	no	yes	yes		45
Soakaways - Infiltration Trenches	6, 104	50	70	no	yes	yes		60
Sorbtive Media Interceptors	111	78	80	no	yes	yes		79
Underground Storage	106	25		no	?	yes	Min data	25
Vegetated Filter Strips/Stream Buffers	6, 42, 104	60	70	no	yes	yes	Yes	65
Wet Detention Ponds	104-106, 109	42	85	yes	yes			63

Notes: [1]References associated with IDs are provided in Appendix 7.

Module 4 – Examines the potential for erosion and sediment loss during the construction phase on the basis of the Universal Soil Loss Equation and provides guidance to the user on appropriate BMPs that can be implemented during this phase to minimize sediment loss and resultant phosphorus export. The module calculates loads for the entire construction phase, but pro-rates this one-time load to annual loads to account for the eight-year hydraulic residence time in Lake Simcoe. The quantification of expected soil and phosphorus loss from a construction site is an uncertain process, even under ideal conditions. Determining expected loss reductions from the use of various on-site BMPs adds to the uncertainty. Even with

Appendix C
Water Demand Calculation

Counterpoint Engineering Inc.

RESIDENTIAL WATER DEMAND CALCULATIONS

Project: **181 Toronto Street South**
Project No: **21026**
Client: **LARKIN+ LUPi**
Location: **Uxbridge, Ontario**

Average Daily Demand:	364	L/(cap*d)	
Maximum Day Peaking Factor:	4.9		(See Note 1)
Peak Hour Peaking Factor:	7.4		(See Note 2)
Population Density (Singles)	3.5	ppu	(See Note 3)
Population Density (Towns)	3	ppu	(See Note 3)

Modelled Area	Number of Units	Population	Average Day Demand (L/min)	Maximum Day Demand (L/min)	Maximum Hour Demand (L/min)	Maximum Day Plus Fire Flow Demand (L/min)
Singles	0	0	0	0	0	0
Street & Condominium Towns	10	30	8	37	56	5037
Total	**10**	**30**	**8**	**37**	**56**	**5037**
Total (gpm)			**2.0**	**9.8**	**14.8**	**1330.7**

Notes:

1. For population less than 500 per 2008 MOE Watermain Design Guidelines, Table 3-3.
2. For population less than 500 per 2008 MOE Watermain Design Guidelines, Table 3-3.
3. Persons per unit for singles and townhouses per section 2.0 Region of Durham Design Specifications for Sanitary Sewers.

Counterpoint Engineering Inc.

REQUIRED FIRE FLOW WORKSHEET - Lot 1
Fire Underwriters Survey

Project : **181 Toronto Street South**
Project No: **21026**
Client: **LARKIN+ LUPi**
Location: **Uxbridge, Ontario**

Guide for Determination of Required Flow Copyright I.S.O

$$F = 220C\sqrt{A}$$ where

F = the required fire flow in litres per minute.
C = coefficient related to the type of construction.
= 1.5 for wood frame construction (structure essentially all combustible).
= 1.0 for ordinary construction (brick or other masonry walls, combustible floor and interior).
= 0.8 for non-combustible construction (unprotected metal structural components, masonry or metal walls).
= 0.6 for fire-resistive construction (fully protected frame, floors, roof).
A = The total floor area in square metres (including all storeys, but excluding basements at least 50 percent below grade) in the building being considered.

Type of Construction		Class Factor
WF	Wood Frame	1.5
OC	Ordinary Construction	1.0
NC	Non-Combustible	0.8
FC	Fire-Resistive	0.6

Area Notes for Fire Resistive Buildings (from FUS manual, 1999):

If Vertical Openings are inadequately protected (less than 1-hour fire rating): Area is the total of the two largest adjoining floors (above ground level) plus 50% of the area of each of the next 8 adjoining floors above that.

If Vertical Openings are adequately protected (at least 1-hour fire rating): Area is the total of the largest floor (above ground level) plus 25% of the area of each of the next 2 immediately adjoining floors above that.

Contents		% Reduction
NC	Non-Combustible	25
LC	Limited Combustible	15
C	Combustible	0
FB	Free Burning	15
RB	Rapid Burning	25

1) Fire Flow

Type of Construction:	OC
C=	1
A*=	360 m^2
F=	**4,174 L/min**

Note: Exterior walls are proposed brick and/or stone with wood frame. Assumes windows are adequately protected. Assume two-storeys.

2) Occupancy Reduction/Surcharge

Contents Factor:		C			
Reduction/Surcharge of		0%	=	0	L/min
F=	4174L/min	0	L/min =	4,174	**L/min**

3) System Type Reduction

NFPA 13 Sprinkler:		NO	0%		
Standard Water Supply:		NO	0%		
Fully Supervised:		NO	0%		
Total			0%		
Reduction of		0%	L/min =	0	L/min
F=	4174L/min -	0	L/min =	4,174	**L/min**

4) Separation Charge

Building Face	Dist(m)	Charge	
North	46	0%	
East	2.5	25%	
South	46	0%	*Fire wall assumed between units
West	46	0%	
Total		25%	**of** 4,174 **L/min = 1,044 L/min**

(max exposure charge can be 75%)

Separation	Charge	Separation	Charge
0 to 3m	25%	20.1 to 30 m	10%
3.1 to 10m	20%	30.1 to 45m	5%
10.1 to 20m	15%		

F= 4174L/min + 1044L/min = 5,218 **L/min** (2,000L/min<F<45,000L/min)

F=	5,000	**L/min**
F=	83	**L/s**
F=	1,321	**gpm**

(round to the nearest 1,000L/min)
Note: Minimum recommended fire flow for conitguous buildings is **8,000 L/min**

Appendix D
Sanitary Demand Calculation

Counterpoint Engineering Inc.

REGIONAL MUNICIPALITY OF DURHAM
SANITARY SEWER DESIGN SHEET (METRIC)

PROJECT: **181 Toronto Street South**
PROJECT No.: **21026**
MUNICIPALITY: **Uxbridge**

DESIGNED BY: S. Corley
CHECKED BY: P. Turner
MANNINGS "n": 0.013
DATE: October 24, 2023

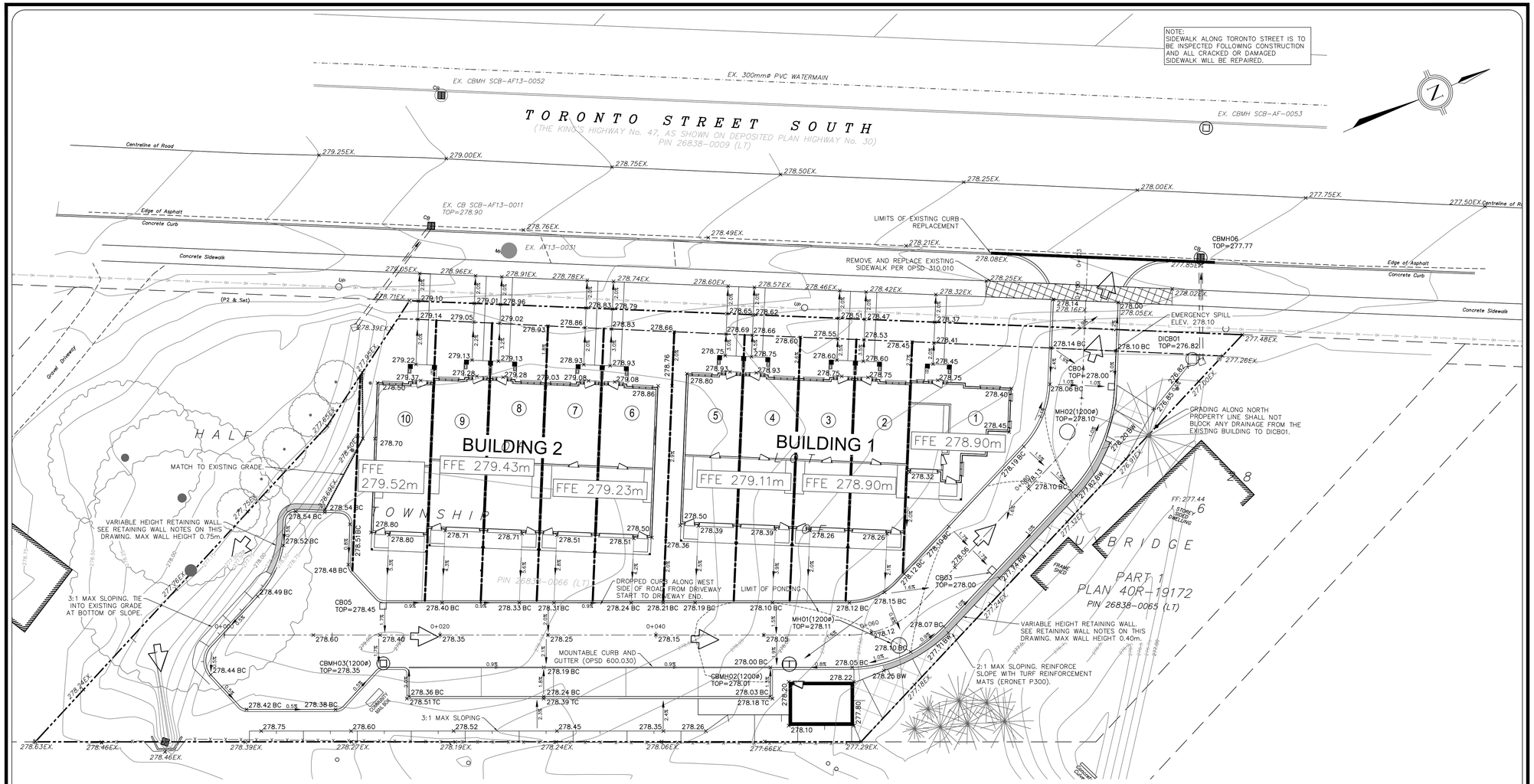
	RESIDENTIAL				COMMERCIAL			INDUSTRIAL	INSTITUTIONAL	FLOW IN LITRES PER SECOND						PROPOSED SEWER				PRESENT CONDITION
MAINTENANCE No.	GROSS AREA (ha)	POP. DENSITY UNITS	POP.	PEAK FLOW FACTOR	LOT AREA (ha)	FLOOR SPACE INDEX (See Note 7)	FLOOR AREA (ha)	LOT AREA (ha)	LOT AREA (ha)	RESIDENTIAL FLOW INFIL. * 0.26 l/s	RESIDENTIAL FLOW SEWAGE 0.0042 l/s	COMM. 2.08 l/s	INDUS. 2.08 l/s	INSTIT. 1.30 l/s	TOTAL FLOW l/s	PIPE SIZE (Nom) (mm)	SLOPE %	CAPACITY Q (Act Pipe) l/s	VELOCITY V (Act Pipe) m/s	SURCHARGED %
Toronto Street South	0.30	10	30																	
	0.30		**30**	**3.80**						**0.08**	**0.48**				**0.56**					

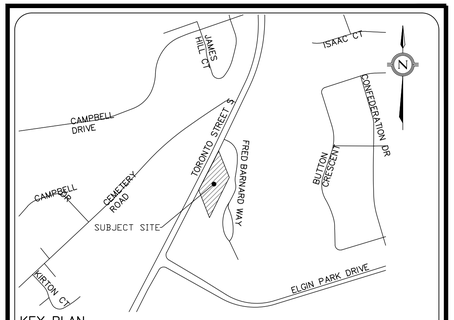
NOTES:

INFILTRATION 0.26L/s - 22.5 m3/ha/day
0.52 L/s - 45.0 m3/ha/day
INDUSTRIAL 1.04L/s - 90.0 m3/ha/day
FLOW RATES 2.08L/s - 180 m3/ha/day

Appendix E
Engineering Drawings

NOTE:
SIDEWALK ALONG TORONTO STREET IS TO BE INSPECTED FOLLOWING CONSTRUCTION AND ALL CRACKED OR DAMAGED SIDEWALK WILL BE REPAIRED.





KEY PLAN

LEGEND

- EXISTING HYDRANT
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- PROPOSED STORM SEWER AND MH
- PROPOSED SANITARY SEWER AND MH
- H&V — PROPOSED HYDRANT AND VALVE
- V&B — PROPOSED VALVE AND BOX
- XXX.XXEX. — EXISTING ELEVATION
- XXX.XX — EXISTING CONTOUR
- XXXX.XX — PROPOSED ELEVATION
- OVERLAND FLOW ROUTE
- PROPOSED WATERMAIN
- PROPERTY LINE
- PROPOSED SWALE

CONSTRUCTION NOTES

GENERAL NOTES

1. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING DURING THE PERIOD OF THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES WITH ALL OTHER CONTRACTORS AND PREVENT CONSTRUCTION CONFLICTS.
2. THE INFORMATION SHOWN FOR EXISTING UTILITIES WAS PROVIDED BY OTHERS. THE INFORMATION IS SHOWN FOR GENERAL INFORMATION ONLY AND THE ACCURACY OR COMPLETENESS OF THE PROVIDED INFORMATION HAS NOT BEEN CONFIRMED BY COUNTERPOINT ENGINEERING INC. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING ALL UTILITIES DURING CONSTRUCTION. ALL EXISTING UTILITIES MUST BE LOCATED AND VERIFIED BY THE CONTRACTOR PRIOR TO COMMENCEMENT OF WORK. ANY VARIANCE IS TO BE IMMEDIATELY REPORTED TO THE ENGINEER. LOST TIME DUE TO FAILURE OF THE CONTRACTOR TO CONFIRM UTILITY LOCATIONS AND NOTIFY THE ENGINEER OF POSSIBLE CONFLICTS PRIOR TO CONSTRUCTION WILL BE AT THE CONTRACTOR'S EXPENSE.
3. THIS PLAN SHOULD BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANTS PLANS. ANY DISCREPANCIES SHALL BE CLARIFIED PRIOR TO CONSTRUCTION. INFORMATION RELATED TO DIMENSIONS FOR PRIVATE ROADS, PARKING, CURBING, BUILDING LOCATION AND SETBACKS SHALL BE TAKEN FROM THE SITE PLAN PREPARED BY THE SITE ARCHITECT.
4. INSPECTIONS: ALL WORK IN THE MUNICIPAL RIGHT OF WAY AND EASEMENTS IS TO BE INSPECTED BY THE TOWNSHIP PRIOR TO BACKFILLING. ALL WORK RELATING TO WATERMAINS AND SEWERS TO BE INSPECTED BY THE CITY AS PER THE SITE PLAN AGREEMENT.
5. ALL DISTURBED GRASSED AREAS TO BE RESTORED WITH MINIMUM 150mm TOPSOIL AND No. 1 NURSERY SOD.
6. A MINIMUM HORIZONTAL CLEARANCE OF 1.0m SHALL BE MAINTAINED BETWEEN ALL ABOVE GROUND SERVICES AND UTILITIES.
7. THE CONTRACTOR SHALL NOTIFY THE TOWNSHIP A MINIMUM OF 48 HOURS PRIOR TO COMMENCEMENT OF CONSTRUCTION, UNLESS OTHERWISE NOTED HEREON OR PURSUANT TO CONDITIONS OF PERMIT APPROVALS. WHERE APPLICABLE, THE CONTRACTOR SHALL OBTAIN CITY ROAD OCCUPANCY PERMIT A MINIMUM OF 48 HOURS PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.
8. ALL DIMENSIONS AND ELEVATIONS TO BE VERIFIED PRIOR TO CONSTRUCTION AND ANY DISCREPANCIES FOUND PRIOR TO OR DURING CONSTRUCTION SHALL BE CLARIFIED WITH THE ENGINEER.
9. ALL TRENCHING SHALL BE IN ACCORDANCE WITH THE OCCUPATIONAL HEALTH AND SAFETY ACT. TRENCH SIDES SHALL BE FLATTENED IN ACCORDANCE WITH DIRECTIONS FROM THE GEOTECHNICAL ENGINEER. CONSTRUCTION OF SHORING, BRACING AND PROTECTION SCHEMES SHALL CONFORM TO OPSS 538 & 539.
10. ALL TRAFFIC CONTROL AND SIGNAGE SHALL BE IN ACCORDANCE WITH MTO'S "ONTARIO TRAFFIC MANUAL".

GRADING NOTES

1. ALL DISTURBED GRASSED AREAS OUTSIDE OF PROPERTY LIMITS SHALL BE RESTORED TO ORIGINAL CONDITION OR BETTER, WITH SOD ON MINUMUM 100mm TOPSOIL. ALL TREE AND SHRUB RELOCATION SUBJECT TO APPROVAL BY THE LANDSCAPE ARCHITECT.
2. ALL UNSUITABLE SOIL OR SURPLUS MATERIAL OBTAINED FROM EXCAVATIONS TO BE DISPOSED OF OFF-SITE TO AN APPROVED DISPOSAL FACILITY THAT MEETS ALL ENVIRONMENTAL REGULATIONS AND GUIDELINES.
3. EXCEPT WHERE INDICATED, ALL DIFFERENCES IN GRADE BETWEEN THIS SITE AND ADJOINING LANDS ARE TO BE TAKEN UP ON OWNER'S LAND WITH A MAXIMUM SLOPE OF ONE (1) VERTICAL AND THREE (3) HORIZONTAL, SODDED AND/OR PAVED.
4. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING VEGETATION AND TREE PRESERVATION HOARDING IN AN APPROVED AND FUNCTIONING CONDITION AS REQUIRED.

CONFORMANCE REQUIREMENTS

1. THE FOLLOWING ITEMS ARE TO BE PROVIDED TO COUNTERPOINT NO LESS THAN 10 WORKING DAYS PRIOR TO THE REQUEST FOR A LETTER OF GENERAL CONFORMANCE/FINAL CERTIFICATION. THE DOCUMENTS MUST INDICATE THAT THE SITE HAS BEEN CONSTRUCTED IN GENERAL CONFORMANCE WITH THE APPROVED DESIGN;
   - AS-CONSTRUCTED TOPOGRAPHIC/UNDERGROUND SURVEY COMPLETED BY A REGISTERED LAND SURVEYOR AS PER THE SPECIFICATIONS OUTLINED WITHIN THE CONTRACT DOCUMENT;
   - GEOTECHNICAL ENGINEER CERTIFICATION LETTER, WHICH INCLUDES SUB-GRADE COMPACTION RESULTS, BEDDING AND BACKFILL COMPACTION AND MATERIAL ACCEPTANCE, GRANULAR, ASPHALT, SITE CONCRETE MATERIAL ACCEPTANCE AND COMPACTION RESULTS;
   - CCTV INSPECTION OF FLUSHED STORM AND SANITARY PIPES AND STRUCTURES;
   - AIR/MANDREL TEST RESULTS FOR SANITARY SEWER (IF REQUIRED);
   - WATERMAIN PRESSURE, CHLORINATION AND BACTERIAL TEST RESULTS AND MUNICIPAL APPROVAL IF AVAILABLE.
2. SHOULD THE SUBMITTED MATERIALS INDICATE NON-CONFORMANCE OR DEFICIENCIES, THEY MUST BE ADDRESSED TO COUNTERPOINT'S SATISFACTION WITH AN UPDATED SUBMITTAL PRIOR TO ISSUANCE OF A LETTER OF GENERAL CONFORMANCE/FINAL CERTIFICATION.
3. COUNTERPOINT MUST ALSO COMPLETE ALL NECESSARY SITE INSPECTIONS AS OUTLINED IN THE APPROVED SERVICE PROGRAM, WITH ALL DEFICIENCIES ADDRESSED TO COUNTERPOINT'S SATISFACTION.

CONFORMANCE REQUIREMENTS

1. UNLESS OTHERWISE NOTED, RETAINING WALL ELEVATIONS INDICATED ARE THE FINISHED GRADE AT THE TOP OR BOTTOM OF THE WALL. TOP AND BOTTOM OF WALL ELEVATIONS MAY DIFFER FROM FINISHED GRADE DEPENDING ON THE WALL DESIGN.
2. FACE OF RETAINING WALL AT PROPRTY LINES SHALL BE SETBACK A MINIMUM OF 300mm FROM THE PROPERTY LINE UNLESS OTHERWISE NOTED.
3. RETAINING WALLS SHOWN HAVE BEEN DESIGNED FOR GRADING ONLY. WALL DETAILED DESIGN SHALL BE COMPLETED BY THE OWNER'S STRUCTURAL ENGINEER OR CONTRACTOR, AND SHALL BE DESIGNED IN CONFORMANCE WITH APPLICABLE O.B.C. REQUIREMENTS AND GENERAL SITE GRADING.
4. RETAINING WALL DETAILED DESIGN (BY OTHERS) SHALL INCLUDE CONSIDERATION FOR THE FOLLOWING AS DEEMED NECESSARY BY THE DESIGNER:
   - GEOTEXTILE PLACED BEHIND THE WALL
   - GRANULAR BACKFILL MATERIAL AND COMPACTION
   - WALL SUBDRAINAGE AND OUTLET LOCATIONS
   - SOIL BEARING CAPACITY OF THE SUBGRADE
   - WALL TIEBACKS
   - O.B.C. GUARD AT TOP OF WALL
5. PRIOR TO CONSTRUCTION, RETAINING WALL SHOP DRAWINGS SHALL BE SUBMITTED TO COUNTERPOINT ENGINEERING FOR REVIEW TO CONFIRM CONFORMANCE TO THE REQUIREMENTS ABOVE.
6. THE PARTY RESPONSIBLE FOR DETAILED DESIGN OF THE RETAINING WALL SHALL ALSO BE RESPONSIBLE FOR FINAL CERTIFICATION OF THE WALL.

RETAINING WALLS:

1. UNLESS OTHERWISE NOTED, RETAINING WALL ELEVATIONS INDICATED ARE THE FINISHED GRADE AT THE TOP OR BOTTOM OF THE WALL. TOP AND BOTTOM OF WALL ELEVATIONS MAY DIFFER FROM FINISHED GRADE DEPENDING ON THE WALL DESIGN.
2. FACE OF RETAINING WALL AT PROPRTY LINES SHALL BE SETBACK A MINIMUM OF 300mm FROM THE PROPERTY LINE UNLESS OTHERWISE NOTED.
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   - GEOTEXTILE PLACED BEHIND THE WALL
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   - WALL SUBDRAINAGE AND OUTLET LOCATIONS
   - SOIL BEARING CAPACITY OF THE SUBGRADE
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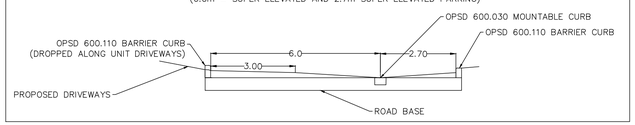
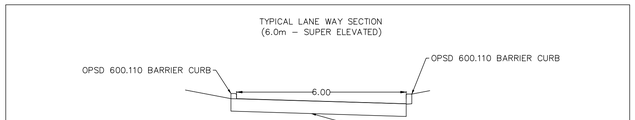
6. THE PARTY RESPONSIBLE FOR DETAILED DESIGN OF THE RETAINING WALL SHALL ALSO BE RESPONSIBLE FOR FINAL CERTIFICATION OF THE WALL.

TYPICAL ROAD SECTION
(6.0m – SUPER ELEVATED AND 2.7m SUPER ELEVATED PARKING)



TYPICAL LANE WAY SECTION
(6.0m – SUPER ELEVATED)



LEGAL & TOPOGRAPHY

PROVIDED BY: BARICH GRENKIE
297 HWY No. 8 (UNIT 101)
STONEY CREEK, ON, L8G 1E5
PHONE:(905) 662-6767

BENCHMARK AND ELEVATION

ELEVATIONS SHOWN ARE REFERRED TO THE CANADIAN GEODETIC VERTICAL DATUM (CGVD-1928: 1978) AND ARE DERIVED FROM THE TOWNSHIP OF UXBRIDGE BENCHMARK No. 0011931U5175, HAVING AN ELEVATION OF 272.439 METERS.
BEARINGS ARE UTM GRID, DERIVED FROM OBSERVED REFERENCE BY REAL TIME NETWORK (RTN) OBSERVATIONS, UTM ZONE 17 (81°00' WEST LONGITUDE) NAD83 (CSRS) (2010.0). ORP 1 – NORTHING (4884511.823), EASTING (649875.665).

No.	REVISIONS/ISSUED	DATE	BY	CITY
2.	ISSUED FOR 2ND SUBMISSION	2023/11/24	J.Y	
1.	ISSUED FOR 1ST SUBMISSION	2022/05/16	P.T	

counterpoint ENGINEERING
COUNTERPOINT ENGINEERING INC.
8395 Jane St., Suite 100, Vaughan, ON L4K 5Y2 Phone 905.326.1404 Fax 905.326.1405

LICENSED PROFESSIONAL ENGINEER
J. S. YOGANATHAN
10010545
NOV 24/23
PROVINCE OF ONTARIO
ENGINEER'S STAMP

APPLICANT:
MANSOUR ARAB/MAN HOLDINGS LTD
174 DINNICK CRESCENT
TORONTO, ONTARIO
M4N 1M3

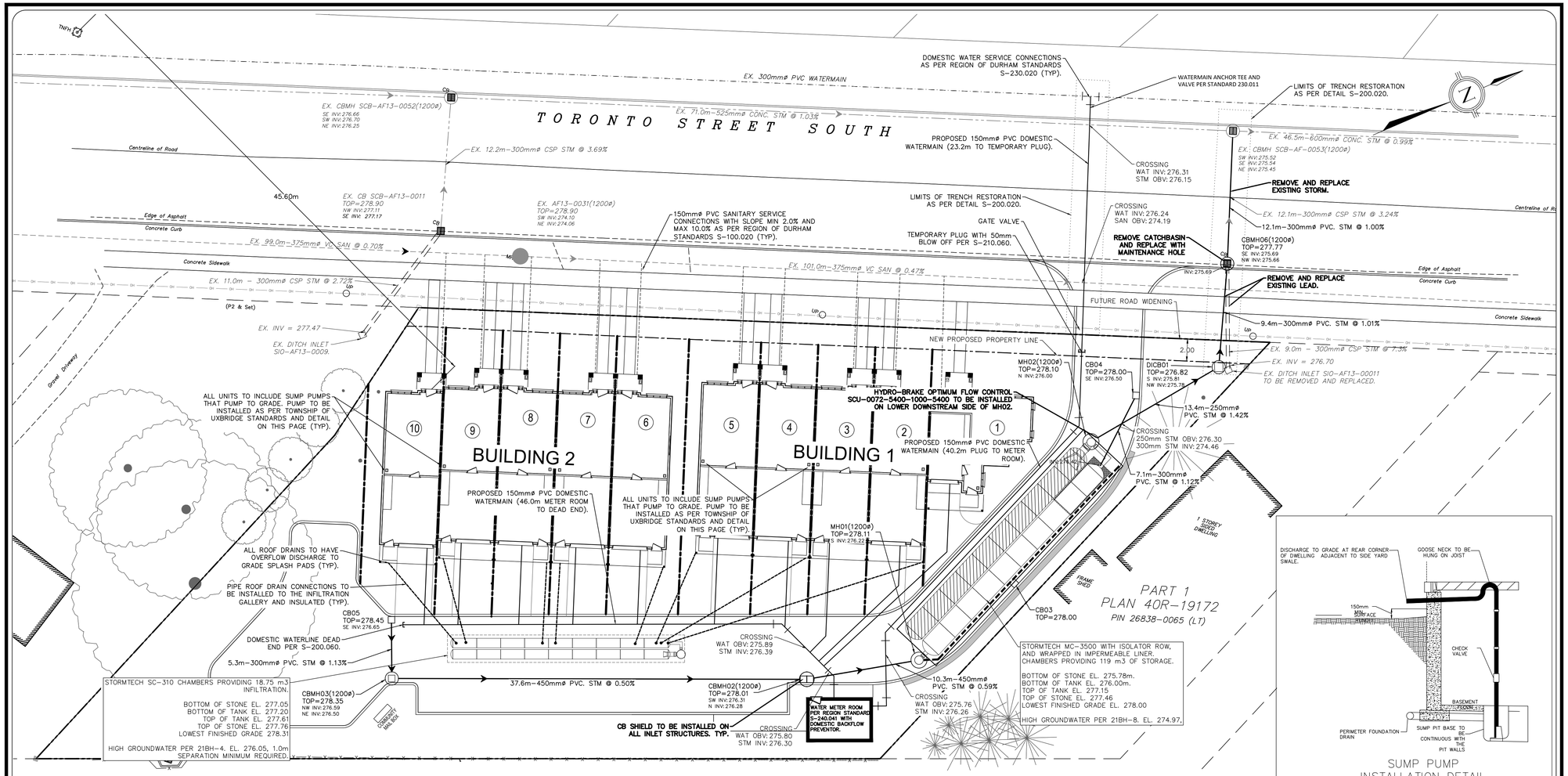
SITE LOCATION:
181 TORONTO STREET SOUTH
UXBRIDGE, ONTARIO

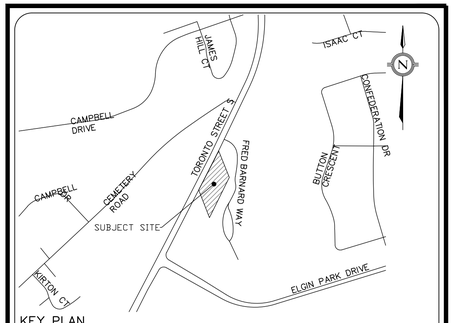
SITE PLAN FILE No.:

GRADING PLAN

DESIGNED BY:	CHECKED BY:	DATE: APRIL 2021
DRAWING BY:	CHECKED BY:	PROJECT NO. 21026
SWM BY:	CHECKED BY:	
SCALE: 1: 200m (0m 4m 8m 12m)		DRAWING NO. C-1

REGION FILE No.:





KEY PLAN

LEGEND

- EXISTING HYDRANT
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- PROPOSED STORM SEWER AND MH
- PROPOSED SANITARY SEWER AND MH
- H&V — PROPOSED HYDRANT AND VALVE
- V&B — PROPOSED VALVE AND BOX
- PROPOSED WATERMAIN
- PROPERTY LINE

CONSTRUCTION NOTES

GENERAL NOTES

1. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING DURING THE PERIOD OF THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES WITH ALL OTHER CONTRACTORS AND PREVENT CONSTRUCTION CONFLICTS.
2. THE INFORMATION SHOWN FOR EXISTING UTILITIES WAS PROVIDED BY OTHERS. THE INFORMATION IS SHOWN FOR GENERAL INFORMATION ONLY AND THE ACCURACY OR COMPLETENESS OF THE PROVIDED INFORMATION HAS NOT BEEN CONFIRMED BY COUNTERPOINT ENGINEERING INC. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING ALL UTILITIES DURING CONSTRUCTION. ALL EXISTING UTILITIES MUST BE LOCATED AND VERIFIED BY THE CONTRACTOR PRIOR TO COMMENCEMENT OF WORK. ANY VARIANCE IS TO BE IMMEDIATELY REPORTED TO THE ENGINEER. LOST TIME DUE TO FAILURE OF THE CONTRACTOR TO CONFIRM UTILITY LOCATIONS AND NOTIFY THE ENGINEER OF POSSIBLE CONFLICTS PRIOR TO CONSTRUCTION WILL BE AT THE CONTRACTOR'S EXPENSE.
3. THIS PLAN SHOULD BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANTS PLANS. ANY DISCREPANCIES SHALL BE CLARIFIED PRIOR TO CONSTRUCTION. INFORMATION RELATED TO DIMENSIONS FOR PRIVATE ROADS, PARKING, CURBING, BUILDING LOCATION AND SETBACKS SHALL BE TAKEN FROM THE SITE PLAN PREPARED BY THE SITE ARCHITECT.
4. INSPECTIONS: ALL WORK IN THE MUNICIPAL RIGHT OF WAY AND EASEMENTS IS TO BE INSPECTED BY THE TOWNSHIP PRIOR TO BACKFILLING. ALL WORK RELATING TO WATERMAINS AND SEWERS TO BE INSPECTED BY THE CITY AS PER THE SITE PLAN AGREEMENT.
5. ALL DISTURBED GRASSED AREAS TO BE RESTORED WITH MINIMUM 150mm TOPSOIL AND No. 1 NURSERY SOD.
6. A MINIMUM HORIZONTAL CLEARANCE OF 1.0m SHALL BE MAINTAINED BETWEEN ALL ABOVE GROUND SERVICES AND UTILITIES.
7. THE CONTRACTOR SHALL NOTIFY THE TOWNSHIP A MINIMUM OF 48 HOURS PRIOR TO COMMENCEMENT OF CONSTRUCTION, UNLESS OTHERWISE NOTED HEREON OR PURSUANT TO CONDITIONS OF PERMIT APPROVALS. WHERE APPLICABLE, THE CONTRACTOR SHALL OBTAIN CITY ROAD OCCUPANCY PERMIT A MINIMUM OF 48 HOURS PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.
8. ALL DIMENSIONS AND ELEVATIONS TO BE VERIFIED PRIOR TO CONSTRUCTION AND ANY DISCREPANCIES FOUND PRIOR TO OR DURING CONSTRUCTION SHALL BE CLARIFIED WITH THE ENGINEER.
9. ALL TRENCHING SHALL BE IN ACCORDANCE WITH THE OCCUPATIONAL HEALTH AND SAFETY ACT. TRENCH SIDES SHALL BE FLATTENED IN ACCORDANCE WITH DIRECTIONS FROM THE GEOTECHNICAL ENGINEER. CONSTRUCTION OF SHORING, BRACING AND PROTECTION SCHEMES SHALL CONFORM TO OPSS 538 & 539.
10. ALL TRAFFIC CONTROL AND SIGNAGE SHALL BE IN ACCORDANCE WITH MTO'S "ONTARIO TRAFFIC MANUAL".

STORM AND SANITARY SEWER

1. FOR CONSTRUCTION DETAILS NOT SHOWN ON PLANS, REFERENCE SHALL BE MADE TO REGION OF DURHAM STANDARDS AND SPECIFICATIONS, AND ONTARIO PROVINCIAL STANDARDS DRAWINGS AND SPECIFICATIONS.
2. ALL STORM MANHOLES SHALL BE AS PER OPSD 701.010 TO 701.014 (SIZE AS SHOWN) WITH FRAME AND COVER AS PER OPSD 401.010. ALL CATCHBASIN MANHOLES TO HAVE FRAME AND GRATE AS PER OPSD 400.020 UNLESS OTHERWISE SPECIFIED. SAFETY PLATFORMS TO BE INSTALLED IN ALL MANHOLES WHERE DEPTHS EXCEED 5.0m. THE MAXIMUM SPACING BETWEEN SAFETY GRATING SHALL NOT EXCEED 4.5m.
3. ALL STORM SEWERS UP TO 450mm DIA., INCLUDING CATCHBASIN LEADS, SHALL BE PVC SDR-35 SEWER PIPE AND SHALL BE IN COMPLIANCE WITH OPSS 1841, CSA B182.2, CSA B182.3. SEALING GASKETS MUST MEET THE REQUIREMENTS OF ASTM D3034 OR ASTM F1760, CSA B182.2 OR CSA B182.7. IN ADDITION, THE PIPE JOINTS MUST BE ABLE TO WITHSTAND A MINIMUM HYDROSTATIC PRESSURE OF 345 kPa WITHOUT LEAKAGE. INJECTION-MOLDED GASKETED PVC FITTING SHALL MEET THE REQUIREMENTS OF ASTM D3034 AND ASTM F1336 AND SHALL BE CERTIFIED TO CSA B182.1 OR CSA B182.2. FABRICATED FITTINGS MUST CONFORM TO ASTM F1336 AND CSA B182.2.
4. ALL STORM SEWERS 525mm OR LARGER SHALL BE REINFORCED CONCRETE COMPLYING WITH WITH C.S.A. SPECIFICATION A257.2. STANDARD MINIMUM CLASS OF CONCRETE SEWER SHALL BE AS PER OPSD 807.010 AND 807.030. RIGID PIPE REQUIRES CONCRETE ENCASEMENT FOR THE FIRST PIPE LENGTH CONNECTING TO ANY APPURTENANCES. WHERE CONCRETE PIPE SMALLER THAN 525mm IS SPECIFIED CLASS SHALL BE 100-D.
5. PVC STORM SEWER BEDDING SHALL BE CLASS "P" BEDDING AS PER REGIONAL MUNICIPALITY OF DURHAM STANDARD S-200.010. CONCRETE STORM SEWER BEDDING SHALL BE OPSS GRANULAR 'A' AS PER OPSD 802.030 CLASS 'B'. ALL BEDDING AND COVER MATERIAL ARE TO BE COMPACTED TO MINIMUM 95% SPMDD WITH A MINIMUM 300mm SAND COVER OVER THE PIPE. WITHIN 0.5m OF SUBGRADE ELEVATION, BACKFILL TO BE COMPACTED TO 98% SPMDD.
6. SINGLE AND DOUBLE CATCH BASINS TO BE PRECAST AS PER OPSD 705.010 AND OPSD 705.020, WITH FRAME AND GRATE AS PER OPSD 400.020.
7. CATCHBASIN LEADS TO HAVE MIN. COVER OF 1.5m BELOW FINISHED GRADE UNLESS OTHERWISE SPECIFIED.
8. ALL SANITARY MANHOLES SHALL BE 1200mmø AS PER OPSD 701.010 AND WATERTIGHT FRAME AND COVER AS PER OPSD 401.050.
9. ALL SANITARY SEWERS SHALL BE PVC SDR 28 SEWER PIPE FOR 150mm DIA, & PVC SDR 35 SEWER PIPE FOR 200mm DIA, AND SHALL BE IN COMPLIANCE WITH ASTM D3034 OR ASTM F1760 AND THIRD PARTY CERTIFIED TO CSA B182.2 OR CSA B182.7. SEALING GASKETS MUST MEET THE REQUIREMENTS OF ASTM D3034 OR ASTM F1760, CSA B182.2 OR CSA B182.7. IN ADDITION, THE PIPE JOINTS MUST BE ABLE TO WITHSTAND A MINIMUM HYDROSTATIC PRESSURE OF 345 kPa WITHOUT LEAKAGE. INJECTION-MOLDED GASKETED PVC FITTING SHALL MEET THE REQUIREMENTS OF ASTM D3034 AND ASTM F1336 AND SHALL BE CERTIFIED TO CSA B182.1 OR CSA B182.2. FABRICATED FITTINGS MUST CONFORM TO ASTM F1336 AND CSA B182.2.
10. BEDDING FOR SANITARY SEWERS SHALL BE 19mm CRUSHER RUN LIMESTONE COMPACTED TO 98% PROCTOR DENSITY FROM 100mm BELOW INVERT TO OBVERT, WITH 300mm SAND COVER ABOVE COMPACTED TO 98% PROCTOR DENSITY AS PER REGION STANDARD S-200.010 (CLASS 'P'). WITHIN 0.5m OF SUBGRADE ELEVATION, BACKFILL TO BE COMPACTED TO 100% SPMDD.
11. ALL MANHOLE AND CATCHBASIN EXCAVATIONS TO BE BACKFILLED WITH OPSS 1010 GRANULAR "B"-TYPE 2 COMPACTED TO 98% SPMDD. WITHIN 0.5m OF SUBGRADE ELEVATION, BACKFILL TO BE COMPACTED TO 100% SPMDD.
12. MANHOLES SHALL BE BENCHED ACCORDING TO OPSD 701.021. STORM MANHOLES SHALL BE BENCHED TO SPRING LINE UNLESS OTHERWISE SPECIFIED. CATCHBASIN TYPE MANHOLES TO BE PROVIDED WITH A MIN. 0.30m SUMP. SANITARY MANHOLES SHALL BE BENCHED TO OBVERT.
13. "MODULOC" OR APPROVED PRE-CAST MANHOLE AND CATCH BASIN ADJUSTERS TO BE USED TO SET STRUCTURES TO FINAL GRADE. PARGE ADJUSTING UNITS ON THE OUTSIDE ONLY.
14. SERVICES TO BUILDINGS TO BE TERMINATED 1.5m FROM THE STREELINE UNLESS OTHERWISE NOTED.
15. DROP STRUCTURES AS PER DURHAM REGION STANDARD DETAIL S-100.08, TYPE 'B'.
16. VERTICAL AND HORIZONTAL LASER ALIGNMENT CONTROL TO BE UTILIZED ON ALL SEWER INSTALLATIONS.
17. THE CONTRACTOR IS TO FLUSH AND PROVIDE CCTV CAMERA INSPECTIONS OF ALL SANITARY AND STORM SEWERS, INCLUDING PICTORIAL REPORT AND TWO (2) CD's, TO COUNTERPOINT ENGINEERING, PRIOR TO PLACEMENT OF ASPHALT AT PRELIMINARY ACCEPTANCE, AND AT FINAL ACCEPTANCE.
18. SANITARY SERVICE CONNECTIONS TO BE 100mmø GREEN PVC, INSTALLED TO THE REGION OF DURHAM STANDARD DRAWING S-230.010.

WATER SERVICING NOTES

1. WATERMAINS AND APPURTENANCES SHALL BE AS PER REGION OF DURHAM STANDARDS AND SPECIFICATIONS.
2. WATERMAINS SHALL BE POLYVINYL CHLORIDE (PVC) CLASS 150, OR 18 CONFORMING TO AWWA C-900,
3. ALL PIPE FITTINGS SHALL BE CAST IRON, CEMENT LINED MECHANICAL JOINT, SHORT BODY CONFIRMING TO AWWA C110 IRON FITTINGS OR AWWA C135 FOR DUCTILE IRON FITTINGS. FITTINGS SHALL BE SUPPLIED WITH MECHANICAL JOINT TYPE ENDS AWWA C111.
4. WATERMAIN BEDDING SHALL BE 19mm CRUSHER RUN LIMESTONE COMPACTED TO 98% PROCTOR DENSITY FROM 100mm BELOW INVERT TO OBVERT, WITH 300mm SAND COVER ABOVE COMPACTED TO 98% PROCTOR DENSITY AS PER REGION STANDARD S-200.010 (CLASS 'P'). WITHIN 0.5m OF SUBGRADE ELEVATION, BACKFILL TO BE COMPACTED TO 100% SPMDD.
5. ALL BENDS, TEES, JOINTS, ETC., ARE TO BE RESTRAINED WITH THRUST BLOCKS AS PER OPSD 1103.010 & OPSD 1103.020.
6. TRACER WIRE SHALL BE INSTALLED ON ALL PVC WATERMAIN AS PER REGION STANDARD DRAWING S-201.030. TRACER WIRE SHALL BE No. 12 GAUGE (CANADIAN WIRE STRANDED T.W.V., 75C 600V OR APPROVED EQUIVALENT).
7. ANODES FOR METAL FITTING TO BE 5.4 Kg. ZINC AS PER REGION SPECIFICATIONS. CATHODIC PROTECTION FOR WATERMAINS TO BE PER REGION STANDARD DRAWING S-201.030. CATHODIC PROTECTION SHALL BE PROVIDED ON ALL BURIED METAL PIPES AND FITTINGS.
8. WATERMAINS AND/OR WATER SERVICES ARE TO HAVE A MINIMUM COVER OF 1.8m FROM PROPOSED GRADES WITH A MINIMUM HORIZONTAL SPACING OF 2.5m HORIZ FROM STORM AND SANITARY SEWERS AND 2.0m HORIZ FROM GAS MAINS AND OTHER WIRE CONDUITS. IN PRE-GRADE OR EXISTING UNDEVELOPED AREAS COVER SHALL BE FROM PRE-GRADE EXISTING ELEVATIONS.
9. WATERMAIN SEPERATION AS PER MOE REQUIREMENTS CONTAINED IN MOE DOCUMENT PROCEDURE F-6-1, PROCEDURES TO COVERN THE SEPERATION OF SEWERS AND WATERMAINS. UNDER NORMAL CONDITIONS, WATERMAINS SHOULD BE LAID WITH AT LEAST 2.5 METERS HORIZONTAL SEPERATION FROM ANY SEWER OR SEWER MANHOLE; THE DISTANCE SHALL BE MEASURED FROM THE NEAREST EDGES. UNDER NORMAL CONDITIONS, WATERMAINS SHALL CROSS ABOVE SEWERS WITH SUFFICIENT VERTICAL SEPERATION TO ALLOW FOR PROPER BEDDING AND STRUCTURAL SUPPORT OF THE WATERMAIN AND SEWER MAIN. WHEN IT IS NOT POSSIBLE FOR THE WATERMAIN TO CROSS ABOVE THE SEWER, THE WATERMAIN PASSING UNDER A SEWER SHALL BE PROTECTED BY PROVIDING:
   - A VERTICAL SEPERATION OF AT LEAST 0.5 METRES BETWEEN THE INVERT OF THE SEWER AND THE CROWN OF THE WATERMAIN.
   - ADEQUATE STRUCTURAL SUPPORT FOR THE SEWERS TO PREVENT EXCESSIVE DEFLECTION OF JOINTS AND SETTLING.
   - THAT THE LENGTH OF WATER PIPE SHALL BE CENTRED AT THE POINT OF CROSSING SO THAT THE JOINTS WILL BE EQUIDISTANT AND AS FAR AS POSSIBLE FROM THE SEWER.
10. ALL PROPOSED WATER PIPING MUST BE ISOLATED FROM EXISTING SYSTEMS IN ORDER TO ALLOW INDEPENDENT PRESSURE TESTING AND CHLORINATING IN ACCORDANCE WITH THE REGION OF DURHAM REQUIREMENTS.
11. ALL WATERMAINS AND FIREMAINS SHALL BE BACTERIOLOGICALLY TESTED IN ACCORDANCE WITH ALL LOCAL MUNICIPAL AND PROVINCIAL REQUIREMENTS. DISPOSAL OF CHLORINATED WATER TO BE IN ACCORDANCE WITH MUNICIPAL REQUIREMENTS.
12. WATER SERVICE CONNECTIONS TO BE 19mmø TYPE "K" COPPER, INCLUDING CURB STOPS AND VALVE BOXES LOCATED AT THE PROPERTY LINE PER REGION STANDARD S-230.020.

CONFORMANCE REQUIREMENTS

1. THE FOLLOWING ITEMS ARE TO BE PROVIDED TO COUNTERPOINT NO LESS THAN 10 WORKING DAYS PRIOR TO THE REQUEST FOR A LETTER OF GENERAL CONFORMANCE/FINAL CERTIFICATION. THE DOCUMENTS MUST INDICATE THAT THE SITE HAS BEEN CONSTRUCTED IN GENERAL CONFORMANCE WITH THE APPROVED DESIGN;
   - AS-CONSTRUCTED TOPOGRAPHIC/UNDERGROUND SURVEY COMPLETED BY A REGISTERED LAND SURVEYOR AS PER THE SPECIFICATIONS OUTLINED WITHIN THE CONTRACT DOCUMENT;
   - GEOTECHNICAL ENGINEER CERTIFICATION LETTER, WHICH INCLUDES SUB-GRADE COMPACTION RESULTS, BEDDING AND BACKFILL COMPACTION AND MATERIAL ACCEPTANCE, GRANULAR, ASPHALT, SITE CONCRETE MATERIAL ACCEPTANCE AND COMPACTION RESULTS;
   - CCTV INSPECTION OF FLUSHED STORM AND SANITARY PIPES AND STRUCTURES;
   - AIR/MANDREL TEST RESULTS FOR SANITARY SEWER (IF REQUIRED);
   - WATERMAIN PRESSURE, CHLORINATION AND BACTERIAL TEST RESULTS AND MUNICIPAL APPROVAL IF AVAILABLE.
2. SHOULD THE SUBMITTED MATERIALS INDICATE NON-CONFORMANCE OR DEFICIENCIES, THEY MUST BE ADDRESSED TO COUNTERPOINT'S SATISFACTION WITH AN UPDATED SUBMITTAL PRIOR TO ISSUANCE OF A LETTER OF GENERAL CONFORMANCE/FINAL CERTIFICATION.
3. COUNTERPOINT MUST ALSO COMPLETE ALL NECESSARY SITE INSPECTIONS AS OUTLINED IN THE APPROVED SERVICE PROGRAM, WITH ALL DEFICIENCIES ADDRESSED TO COUNTERPOINT'S SATISFACTION.

LEGAL & TOPOGRAPHY

PROVIDED BY: BARICH GRENKIE
297 HWY No. 8 (UNIT 101)
STONEY CREEK, ON, L8G 1E5
PHONE:(905) 662-6767

BENCHMARK AND ELEVATION

ELEVATIONS SHOWN ARE REFERRED TO THE CANADIAN GEODETIC VERTICAL DATUM (CGVD-1928: 1978) AND ARE DERIVED FROM THE TOWNSHIP OF UXBRIDGE BENCHMARK No. 0011931U517S, HAVING AN ELEVATION OF 272.439 METERS.

BEARINGS ARE UTM GRID, DERIVED FROM OBSERVED REFERENCE BY REAL TIME NETWORK (RTN) OBSERVATIONS. UTM ZONE 17 (81°00' WEST LONGITUDE) NAD83 (CSRS) (2010.0). ORP 1 — NORTHING (4884511.823), EASTING (649875.665).

No.	REVISIONS/ISSUED	DATE	BY	CITY
2.	ISSUED FOR 2ND SUBMISSION	2023/11/24	J.Y	
1.	ISSUED FOR 1ST SUBMISSION	2022/05/16	P.T	

counterpoint ENGINEERING
COUNTERPOINT ENGINEERING INC.
8305 Jane St., Suite 100, Vaughan, ON L4K 5Y2 Phone 905.326.1404 Fax 905.326.1405

LICENSED PROFESSIONAL ENGINEER J. S. YOGANATHAN 100100545 NOV 24 '23 PROVINCE OF ONTARIO

ENGINEER'S STAMP

APPLICANT:
MANSOUR ARAB/MAN HOLDINGS LTD
174 DINNICK CRESCENT
TORONTO, ONTARIO
M4N 1M3

SITE LOCATION:
181 TORONTO STREET SOUTH
UXBRIDGE, ONTARIO

SITE PLAN FILE No.:

SERVICING PLAN

DESIGNED BY:	CHECKED BY:	DATE: APRIL 2021
DRAWING BY:	CHECKED BY:	PROJECT NO. 21026
SWM BY:	CHECKED BY:	
SCALE: 1:200m (0m, 4m, 8m, 12m)		DRAWING NO. C-2

REGION FILE No.:

EROSION AND SEDIMENT CONTROL

1. SILT CONTROL FENCE SHALL BE INSTALLED AROUND THE PERIMETER OFFSET 0.60M INSIDE THE PROPERTY OF THE SITE AND MAINTAINED UNTIL THE COMPLETION OF THE LANDSCAPING.

2. DURING GRADING OPERATIONS, ALL STORM RUNOFF SHALL BE CONTROLLED WITH TEMPORARY SWALES TO PREVENT SURFACE RUNOFF FROM LEAVING THE SITE UNTREATED.

3. MUD MAT FOR CONSTRUCTION ACCESS IS TO BE INSTALLED AT ALL SITE ENTRANCES PRIOR TO THE STRIPPING OF TOPSOIL AND IS TO BE MAINTAINED UNTIL ROADS/DRIVEWAYS HAVE BEEN CONSTRUCTED TO BASE COURSE ASPHALT. MUD MAT TO BE A MINIMUM 30M LONG AND 8M WIDE AND SHALL CONSIST OF 100MM CLEAR STONE AND 450MM DEEP.

4. VEHICLE REFUELLING AND SOIL STOCKPILING SHALL BE UNDERTAKEN AWAY FROM ANY VALLEY/WATERCOURSE OR EXISTING CATCHBASINS.

5. ADDITIONAL EROSION AND SEDIMENT CONTROL MATERIALS (i.e. SILT FENCE, STRAW BALES, CLEAR STONE, ETC.) ARE TO BE KEPT ON SITE FOR EMERGENCIES AND REPAIRS.

6. EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE CONTINUOUSLY EVALUATED AND REPLACED/MAINTAINED AS REQUIRED TO ENSURE THEIR EFFECTIVENESS.

7. ALL CATCHBASINS ARE TO BE PROTECTED WITH SEDIMENT TRAPS AS PER DETAIL ON ESC2 IMMEDIATELY AFTER INSTALLATION AND ARE TO BE MAINTAINED UNTIL ALL CONSTRUCTION IS COMPLETE.

8. ALL TOPSOIL STOCKPILES INTENDED TO REMAIN IN PLACE FOR MORE THAN 30 DAYS ARE TO BE SEEDED TO PREVENT WIND EROSION.

9. THE CONTRACTOR MUST UNDERTAKE MEASURES TO CONTROL DUST DURING CONSTRUCTION, AND DURING SOIL REMENDIATION/EXCAVATION ACTIVITIES, AND SHOULD INCLUDE THE FOLLOWING AS APPLICABLE:

A. THE WEEKLY, OR MORE FREQUENTLY IF REQUIRED, WETTING OF ALL SOFT AND HARD SURFACES AND ANY EXCAVATION FACE ON THE SITE, WITH THE ADDITION OF CALCIUM CHLORIDE OR OTHER RECOGNIZED MATERIALS AS A DUST SUPPRESANT, IF REQUIRED;

B. THE WEEKLY CLEANING OF THE ROAD PAVEMENT AND SIDEWALKS FOR THE ENTIRE FRONTAGE(S) OF THE PROPERTY TO A DISTANCE OF TWENTY-FIVE METRES FROM THE PROPERTY LINES.

11. SINCE THE LOCATION AND TYPE OF EROSION AND SEDIMENT CONTROL MEASURES WILL BE MODIFIED AS THE CONSTRUCTION OF THE SITE PROCEEDS, EROSION AND SEDIMENT CONTROL, BEST MANAGEMENT PRACTICES ARE DYNAMIC AND ADJUSTMENTS TO THE LOCATION AND TYPE OF ESC MEASURES WILL BE REQUIRED TO REDUCE THE AMOUNT OF SEDIMENT LEAVING THE SITE AND ONTO ADJACENT AREAS.

12. BEFORE PROCEEDING WITH ANY AREA GRADING THE FOLLOWING MUST BE CONSTRUCTED:

A. MUD MAT WHERE INDICATED,
B. TEMPORARY SWALES,
C. SILT FENCE WHERE INDICATED,
D. TREE PRESERVATION, INSPECTION IS REQUIRED
E. TEMPORARY POND, IF REQUIRED.
F. SILT TRAPS.

13. ACCUMULATED SILT TO BE REMOVED OFF SITE PRIOR TO REMOVAL OF ESC MEASURES.

14. THE SILT FENCE MUST BE INSPECTED BI-WEEKLY AND IMMEDIATELY AFTER RAINFALL EVENTS FOR RIPS OR TEARS, BROKEN STAKES, BLOW OUTS (STRUCTURAL FAILURE) AND ACCUMULATION OF SEDIMENT. THE SILT FENCE MUST BE FIXED AND/OR REPLACED IMMEDIATELY WHEN DAMAGED. SEDIMENT MUST BE REMOVED FROM SILT FENCE WHEN ACCUMULATION REACHES 50% OF THE HEIGHT OF THE FENCE.

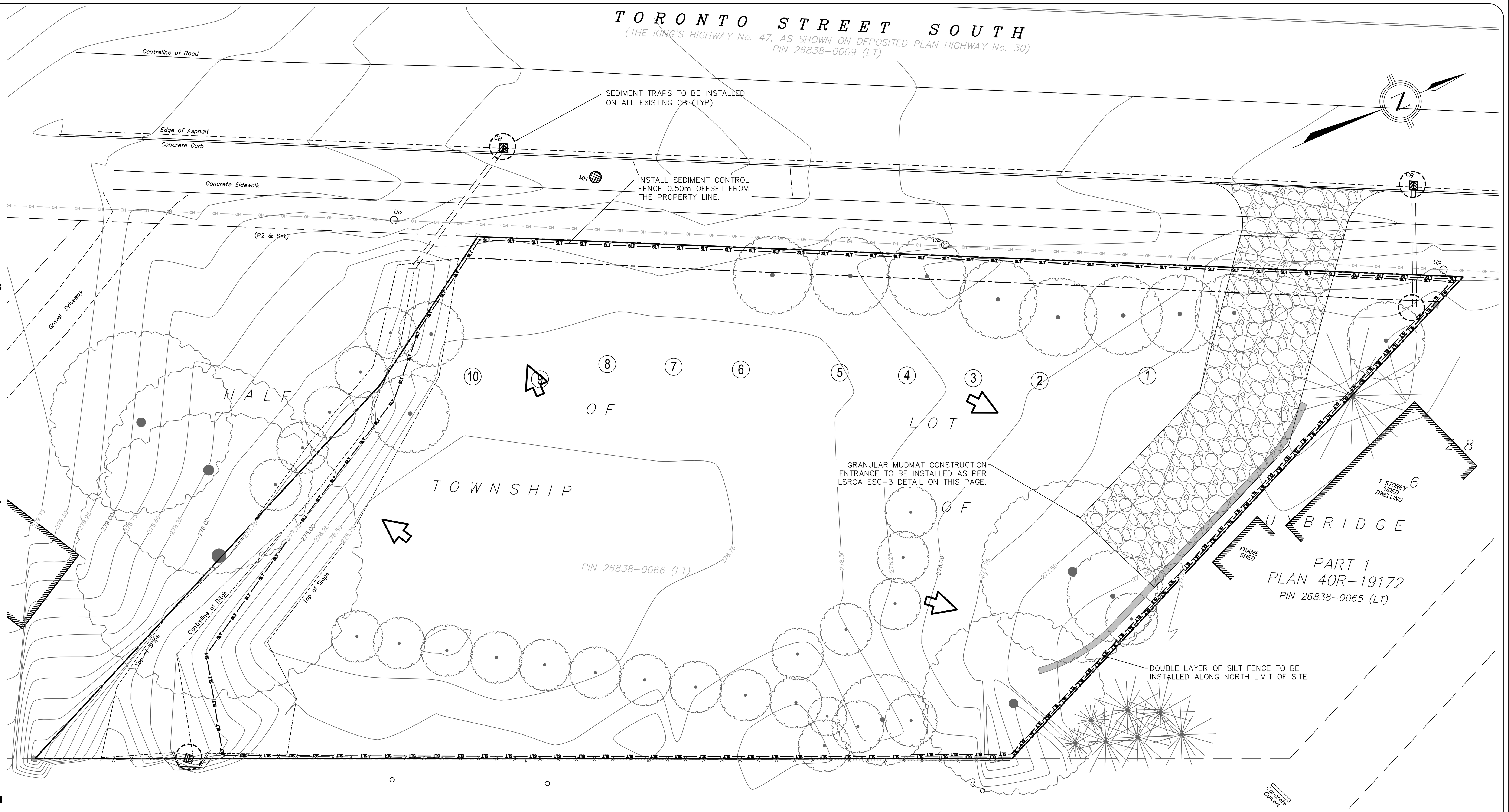
15. THE OWNER WILL SEED, MULCH AND MAINTAIN THE ENTIRE SITE IF A BUILDING PERMIT IS NOT ISSUED WITHIN 365 DAYS OF THE SEDIMENT AND EROSION CONTROL PERMIT BEING USED.

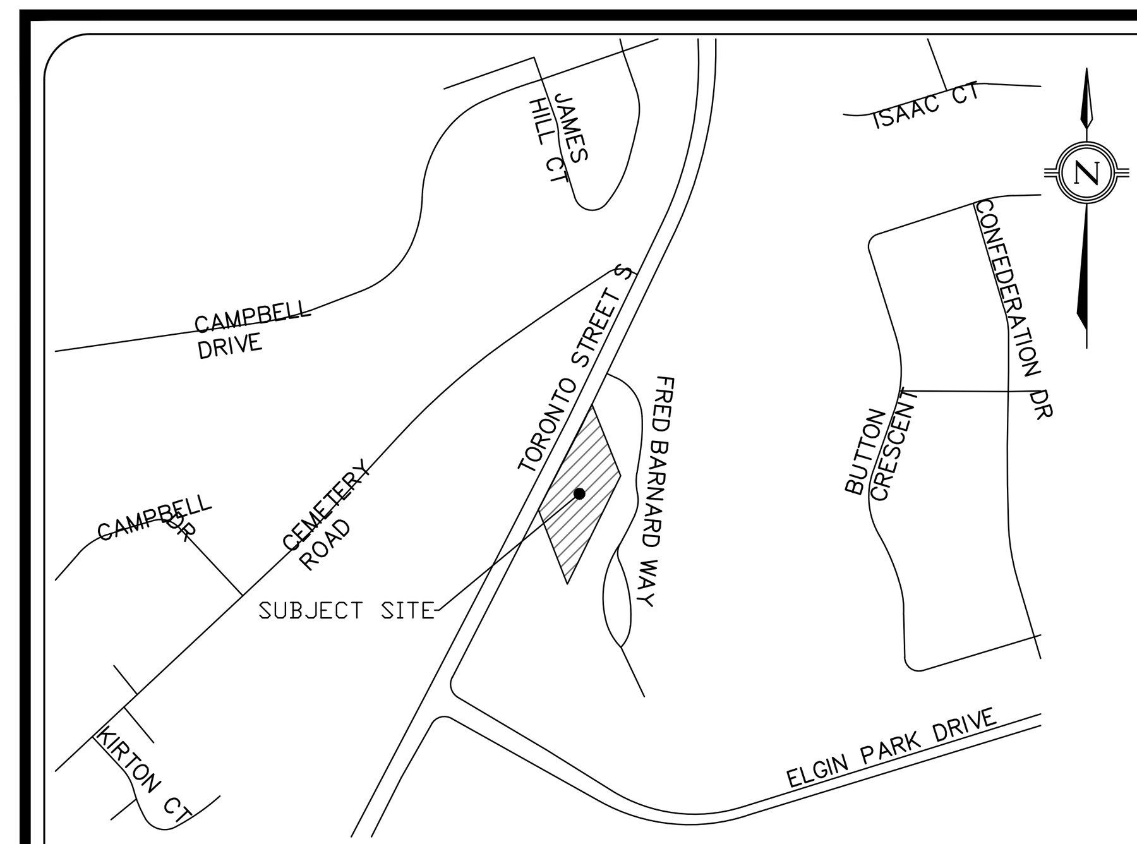
16. UPON COMPLETION OF LANDSCAPING ALL SEDIMENT AND EROSION CONTROL MEASURES SHALL BE REMOVED.

17. NO CONSTRUCTION ACTIVITY OR MACHINERY SHALL BE BEYOND THE SILT FENCE.

18. ALL TOPSOIL STOCKPILES SHALL BE SURROUNDED WITH A SEDIMENT CONTROL FENCE.

19. ANY AREAS THAT ARE INACTIVE FOR MORE THAN 30 DAYS SHALL BE SEEDED AND/OR STABILIZED.

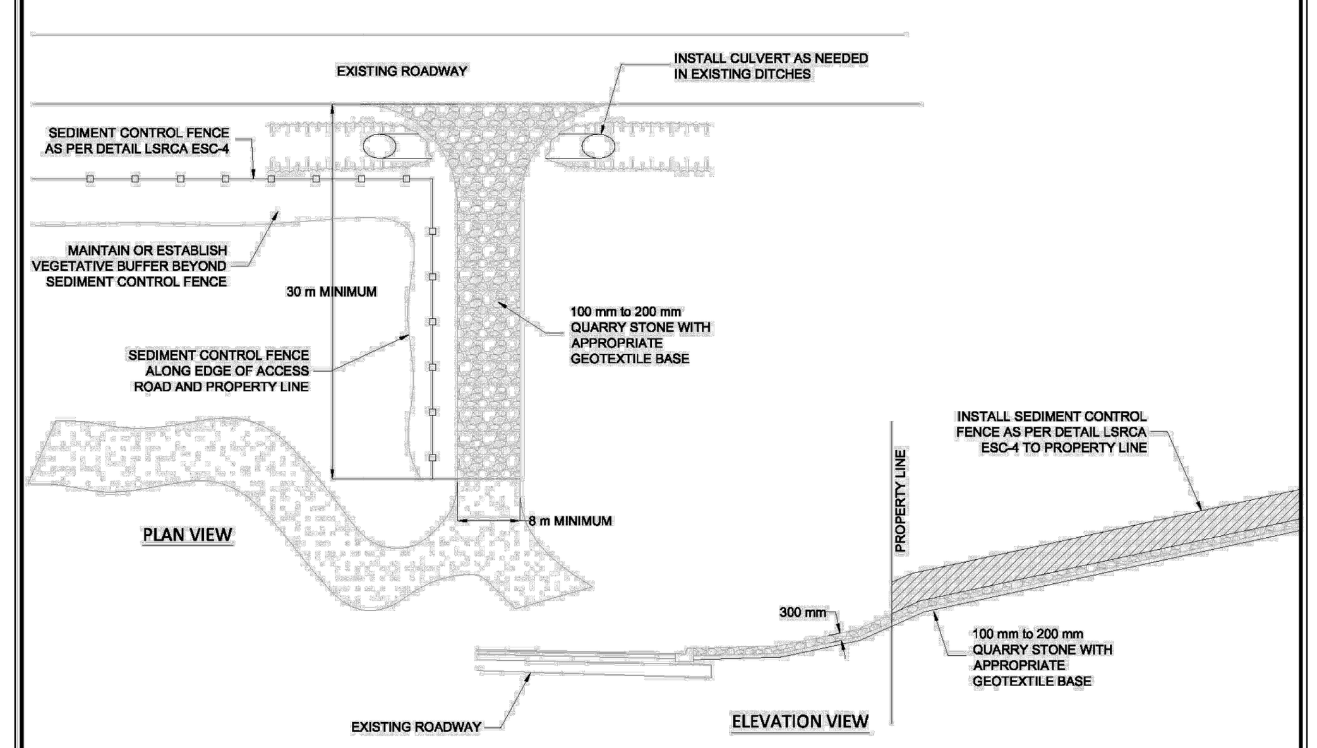




KEY PLAN

LEGEND

- CATCHBASIN
- SILT FENCE
- SEDIMENT TRAP
- GRANULAR MUDMAT
- PROPOSED SWALE
- SEDIMENT TRAP PER OPSD 219.220
- ROCK CHECK DAM AS PER OPSD 219.210
- OVERLAND FLOW ROUTE



NO.	REVISION	DATE
1	SWM GUIDELINES UPDATE	06.2016

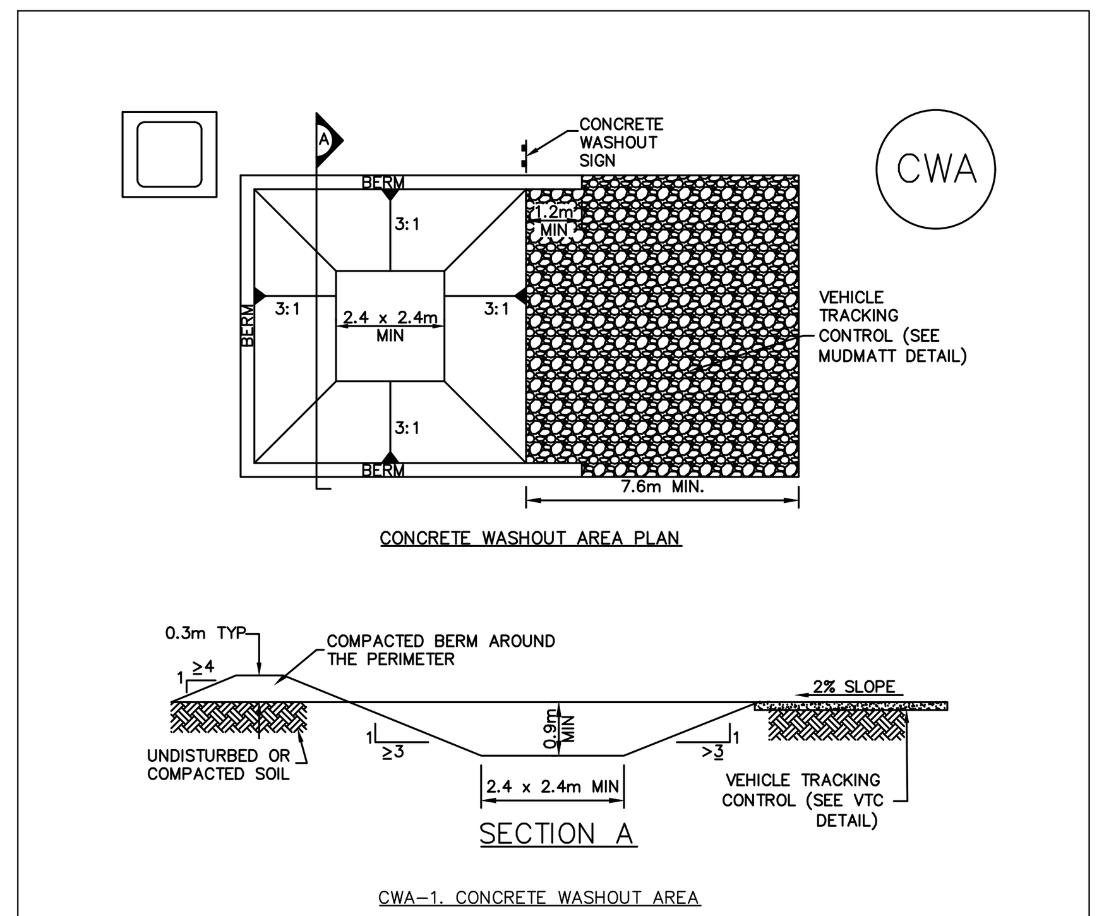
CONSTRUCTION ACCESS MAT — DATE: 06.2016 — SCALE: NTS — LSRCA ESC-3

EROSION AND SEDIMENT CONTROL NOTES:

1. ALL SEDIMENT CONTROL MEASURES SUCH AS SEDIMENT CONTROL FENCE, TEMPORARY PONDS, CONSTRUCTION ACCESS MATS, SEDIMENT TRAPS, SWALES AND CHECK DAMS MUST BE INSTALLED PRIOR TO THE COMMENCEMENT OF SITE WORKS.
2. SEDIMENT CONTROLS SHOULD BE INSPECTED ON A REGULAR BASIS AND AFTER EVERY SIGNIFICANT RAINFALL EVENT. REPAIRS TO ESC MEASURES MUST BE COMPLETED IN A TIMELY MANNER TO PREVENT SEDIMENT MIGRATION.
3. ADDITIONAL MATERIALS SUCH AS CLEAR STONE, FILTER FABRIC, PUMPS, HOSES AND SILTSOXX TO BE KEPT ONSITE AT ALL TIMES FOR CONDUCTING REPAIRS TO SEDIMENT CONTROL MEASURES.
4. ALL DISTURBED AREAS LEFT INACTIVE FOR MORE THAN THIRTY DAYS ARE TO BE STABILIZED.
5. THE STABILIZATION SEED MIXTURE IS TO BE AS SPECIFIED ON THE EROSION AND SEDIMENT CONTROL PLAN.
6. THE STABILIZATION SEED MIXTURE IS TO BE APPLIED AT A MINIMUM RATE OF 25 kg/ha.
7. ENGINEERED CHANGES TO THE ESC MEASURES MAY BE NEEDED AS SITE CONDITIONS CHANGE THROUGHOUT THE CONSTRUCTION PROCESS. THESE UPDATES MUST REFLECT BEST MANAGEMENT PRACTICES TO CONTROL SEDIMENT AND EROSION ONSITE AND SHOULD BE COMPLETED BASED ON DIRECTION FROM THE SITE ENGINEER. ADDITIONAL MEASURES MAY BE REQUIRED AS DIRECTED BY AN ENGINEER THROUGHOUT THE CONSTRUCTION PROCESS.
8. THE CONSTRUCTION ENTRANCE MAT IS TO BE INSTALLED AS THE FIRST STEP IN THE SITE ALTERATION PROCESS.
9. SEDIMENT CONTROL FENCE IS TO BE INSTALLED DOWNSLOPE OF ALL DISTURBED AREAS. A DOUBLE ROW OF SEDIMENT CONTROL FENCE IS TO BE INSTALLED SURROUNDING ALL NATURAL HERITAGE FEATURES AND AS DIRECTED BY THE SITE ENGINEER. SEDIMENT CONTROL FENCE IS TO BE AS PER LSRCA STANDARD ESC-4 or ESC-5 AS A MINIMUM. LIGHT DUTY SEDIMENT CONTROL FENCE IS NOT ACCEPTABLE.
10. CUT-OFF SWALES OR DITCHES ARE TO BE INSTALLED AS SHOWN ON THE ESC PLANS AND AS NECESSARY BASED ON CHANGING SITE CONDITIONS TO DIRECT OVERLAND FLOW TO THE APPROPRIATE SEDIMENT TRAP OR TEMPORARY SEDIMENT POND.
11. CHECK DAMS ARE TO BE INSTALLED IN ALL SWALES AND DITCHES IN ACCORDANCE WITH DRAWING LSRCA ESC-2, AS A MINIMUM
12. TEMPORARY SEDIMENT TRAP(S) ARE TO BE CONSTRUCTED AT THE BEGINNING OF SITE GRADING AND IF THE SITE DRAINAGE CHANGES DURING CONSTRUCTION. IT MAY BE NECESSARY FOR TEMPORARY SWALES TO BE CONSTRUCTED TO DIRECT SITE FLOWS TO THE TEMPORARY SEDIMENT TRAP(S) DURING ROUGH GRADING AND AS CONSTRUCTION PROGRESSES.
13. TEMPORARY SEDIMENT POND(S) ARE TO BE CONSTRUCTED AT THE BEGINNING OF SITE GRADING AND IF THE SITE DRAINAGE CHANGES DURING CONSTRUCTION. IT MAY BE NECESSARY FOR TEMPORARY SWALES TO BE CONSTRUCTED TO DIRECT SITE FLOWS TO THE TEMPORARY SEDIMENT POND(S) DURING ROUGH GRADING AND AS CONSTRUCTION PROGRESSES.
14. FILTREXX SILTSOXX OR APPROVED EQUIVALENT TO BE INSTALLED DOWNSTREAM FROM SEDIMENT TRAP AND TEMPORARY SEDIMENT POND OUTLETS TO A MINIMUM HEIGHT OF 300mm.
15. IF STOCKPILES ARE USED ON-SITE FOR THE STORAGE OF EXCESS MATERIAL, THEY ARE TO BE IN ACCORDANCE WITH DETAIL DRAWING LSRCA ESC-6 OR BETTER.
16. ANY DEWATERING OCCURRING ONSITE MUST BE IN ACCORDANCE WITH AN APPROVED DEWATERING PLAN. ADDITIONAL DEWATERING REQUIREMENTS MAY BE DEEMED NECESSARY AND SHALL BE IMPLEMENTED AS DIRECTED BY THE ENGINEER, CONTRACT ADMINISTRATOR OR LOCAL MUNICIPALITY.
17. THE SITE TRAILER IS TO BE LOCATED ONLY AT THE DESIGNATED LOCATION SHOWN ON THE PLANS.
18. EQUIPMENT AND HYDROCARBON STORAGE IS TO OCCUR ONLY WITHIN THE DESIGNATED AREA SHOWN ON THE PLANS.
19. REFUELING IS TO TAKE PLACE ONLY WITHIN THE DESIGNATED AREA SHOWN ON THE PLANS AND SHALL BE A MINIMUM OF THIRTY METRES FROM ANY WATERCOURSE OR ENVIRONMENTALLY SENSITIVE AREA.
20. AN APPROVED SPILLS MANAGEMENT PLAN IS TO BE KEPT ONSITE.
21. SPILL CLEANUP EQUIPMENT SUCH AS ABSORPTIVE MEDIA IS TO BE MAINTAINED ONSITE FOR IMMEDIATE USE IN THE EVENT OF A SPILL.
22. SPILLS ARE TO BE REPORTED IMMEDIATELY TO THE MOECC SPILLS ACTION CENTRE AT 1-800-268-6060.
23. THE CONTRACTOR WILL BE RESPONSIBLE FOR CLEAN-UP AND RESTORATION, INCLUDING ALL COSTS, DUE TO THE RELEASE OF SEDIMENT FROM THE SITE.
24. LOW IMPACT DEVELOPMENT (LID) MEASURES ARE NOT TO BE USED AS SEDIMENT CONTROL DEVICES.
25. ADDITIONAL SEDIMENT CONTROL DEVICES MAY BE DEEMED NECESSARY AND AS SITE CONDITIONS CHANGE AND SHALL BE INSTALLED AS DIRECTED BY THE SITE ENGINEER, CONTRACT ADMINISTRATOR OR LOCAL MUNICIPALITY.

NO.	REVISION	DATE
1	SWM GUIDELINES UPDATE	06.2016

EROSION AND SEDIMENT CONTROL PLAN NOTES — DATE: 06.2016 — SCALE: NTS — LSRCA ESC-1



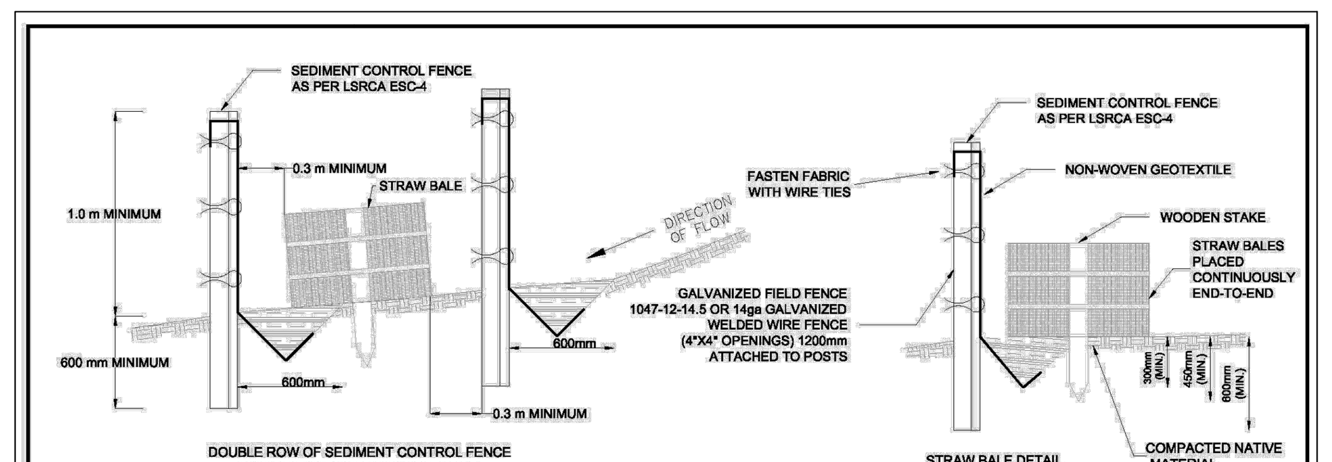
CWA–1. CONCRETE WASHOUT AREA

NOTES:

1. SEE PLAN VIEW FOR CWA INSTALLATION LOCATION.
2. CONTAINMENT MUST BE STRUCTURALLY SOUND AND LEAK FREE AND CONTAIN ALL LIQUID WASTES.
3. THE CWA SHALL BE INSTALLED PRIOR TO CONCRETE PLACEMENT ON SITE.
4. CONTAINMENT DEVICES MUST BE OF SUFFICIENT QUANTITY OR VOLUME TO COMPLETELY CONTAIN THE LIQUID WASTES GENERATED.
5. WASHOUT MUST BE CLEANED OR NEW FACILITIES CONSTRUCTED AND READY TO USE ONCE WASHOUT IS 75% FULL.
6. FACILITY MUST HOLD SUFFICIENT VOLUME TO CONTAIN WASTE WITH A MINIMUM FREEBOARD OF 300mm.
7. CWA SHALL INCLUDE A FLAT SUBSURFACE PIT THAT IS AT LEAST 2.4m BY 2.4m SLOPES LEADING OUT OF THE SUBSURFACE PIT SHALL BE 3:1 OR FLATTER. THE PIT SHALL BE AT LEAST 0.9m DEEP.
8. WASHOUT AREA(S) SHALL BE INSTALLED IN A LOCATION EASILY ACCESSIBLE BY CONCRETE TRUCKS.
9. BERM SURROUNDING SIDES AND BACK OF THE CWA SHALL HAVE MINIMUM HEIGHT OF 0.3m.
10. ONE OR MORE AREAS MAY BE INSTALLED ON THE CONSTRUCTION SITE AND MAY BE RELOCATED AS CONSTRUCTION PROGRESSES.
11. VEHICLE TRACKING PAD SHALL BE SLOPED 2% TOWARDS THE CWA.
12. AT LEAST WEEKLY REMOVE ACCUMULATION OF SAND AND AGGREGATE AND DISPOSE OF PROPERLY.
13. SIGNS SHALL BE PLACED AT THE CONSTRUCTION ENTRANCE, AT THE CWA, AND ELSEWHERE AS NECESSARY TO CLEARLY INDICATE THE LOCATION OF THE CWA TO OPERATORS OF CONCRETE TRUCKS AND PUMP RIGS.
14. USE EXCAVATED MATERIAL FOR PERIMETER BERM CONSTRUCTION.

CONCRETE WASHOUT AREA

SCALE: N.T.S.

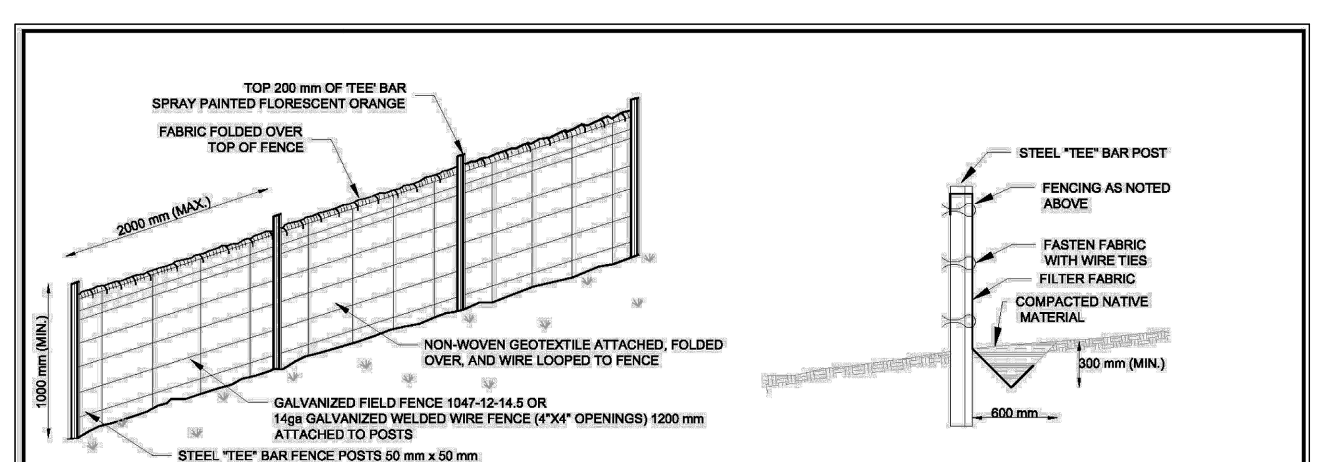


NOTES:

1. SEDIMENT CONTROL FENCE SHOULD BE ALIGNED WITH CONTOURS FOR SHEET OVERLAND FLOW.
2. SEDIMENT CONTROL FENCE IS TO BE LOCATED IN AREAS OF LOW SEDIMENT YIELD ON SLOPES THAT CONFORM TO MTO DRAINAGE MANUAL VOLUME 2 CHART F4-3C TOPOGRAPHIC FACTOR LS BASED ON SLOPE LENGTH AND GRADIENT.
3. SEDIMENT CONTROL FENCE SHALL BE INSTALLED WITH FILTER MEDIA FABRIC TIED INTO THE SOIL A MINIMUM OF 300 mm BY EITHER STATIC SLICING OR TRENCH METHODS WITH COMPACTION OF TRENCH MATERIAL MEETING 95% STANDARD PROCTOR MAXIMUM DRY DENSITY.
4. STEEL 'T' BAR POSTS ARE TO BE SPACED A MAXIMUM DISTANCE OF 2000 mm ON CENTER.
5. STRAW BALES TO BE PLACED END-TO-END CONTINUOUSLY BETWEEN SEDIMENT CONTROL FENCES.
6. FROZEN GROUND CONDITIONS REQUIRE FILTER FABRIC TO BE BACKFILLED IN TRENCH WITH CLEAR STONE.
7. GEOTEXTILE FABRIC TO BE COMPRISED OF NON-WOVEN U.V. STABILIZED MATERIAL FABRIC TO BE FOLDED OVER TOP OF FENCE A MINIMUM OF 300 mm AND WIRE FASTENED.
8. CONSTRUCTION OPERATIONS SHALL BE CARRIED OUT IN SUCH A MANNER THAT EROSION AND WATER POLLUTION IS MINIMIZED.
9. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SHOWN.

NO.	REVISION	DATE
1	SWM GUIDELINES UPDATE	06.2016

DOUBLE ROW SEDIMENT CONTROL FENCE — DATE: 06.2016 — SCALE: NTS — LSRCA ESC-5

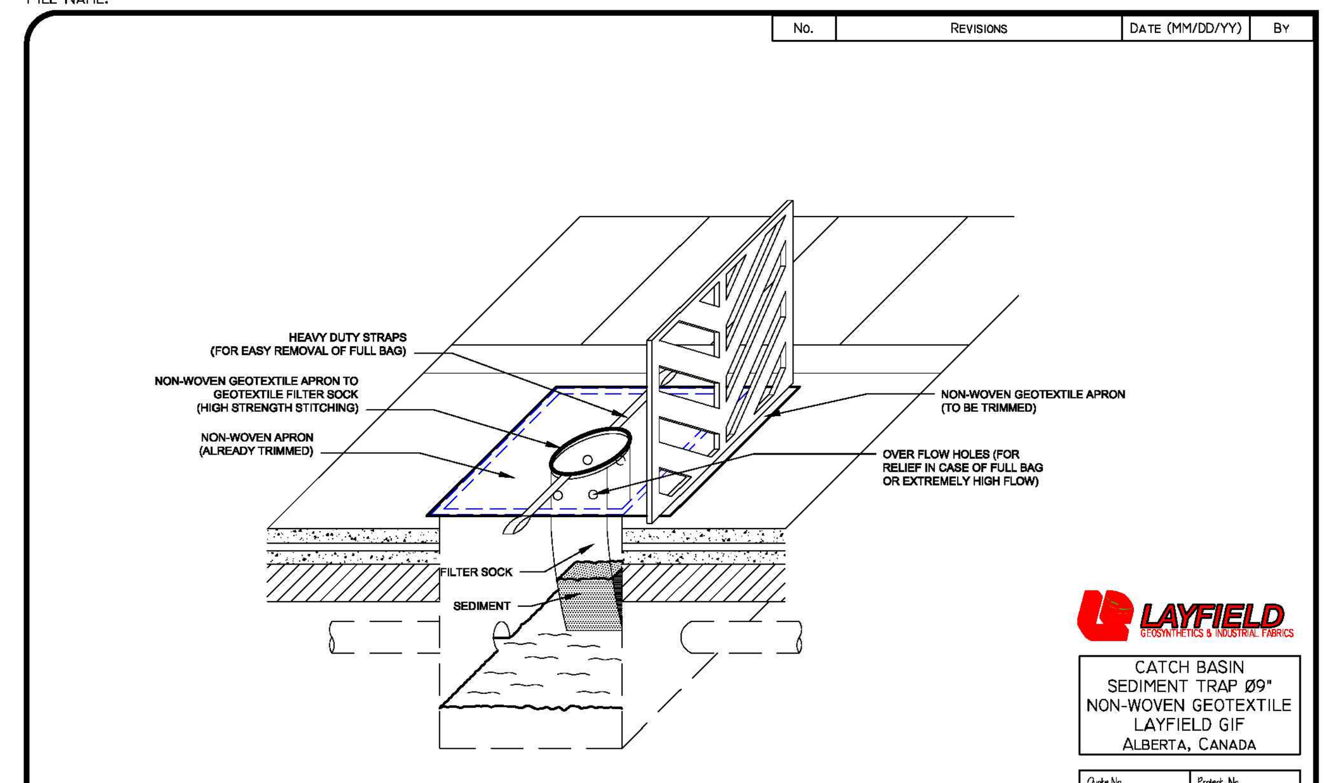


NOTES:

1. SEDIMENT CONTROL FENCE SHOULD BE ALIGNED WITH CONTOURS FOR SHEET OVERLAND FLOW.
2. SEDIMENT CONTROL FENCE IS TO BE LOCATED IN AREAS OF LOW SEDIMENT YIELD ON SLOPES THAT CONFORM TO MTO DRAINAGE MANUAL VOLUME 2 CHART F4-3C TOPOGRAPHIC FACTOR LS BASED ON SLOPE LENGTH AND GRADIENT.
3. SEDIMENT CONTROL FENCE SHALL BE INSTALLED WITH FILTER MEDIA FABRIC TIED INTO THE SOIL A MINIMUM OF 300 mm BY EITHER STATIC SLICING OR TRENCH METHODS WITH COMPACTION OF TRENCH MATERIAL MEETING 95% STANDARD PROCTOR DENSITY.
4. STEEL 'T' BAR POSTS ARE TO BE SPACED A MAXIMUM DISTANCE OF 2000 mm ON CENTER.
5. FROZEN GROUND CONDITIONS REQUIRE FILTER FABRIC TO BE BACKFILLED IN TRENCH WITH CLEAR STONE.
6. GEOTEXTILE FABRIC TO BE COMPRISED OF NON-WOVEN U.V. STABILIZED MATERIAL FABRIC TO BE FOLDED OVER TOP OF FENCE A MINIMUM OF 300 mm AND WIRE FASTENED.
7. CONSTRUCTION OPERATIONS SHALL BE CARRIED OUT IN SUCH A MANNER THAT EROSION AND WATER POLLUTION IS MINIMIZED.
8. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SHOWN.

NO.	REVISION	DATE
1	SWM GUIDELINES UPDATE	06.2016

SEDIMENT CONTROL FENCE — DATE: 06.2016 — SCALE: NTS — LSRCA ESC-4



CATCH BASIN SEDIMENT TRAP Ø9" NON-WOVEN GEOTEXTILE LAYFIELD GIF ALBERTA, CANADA

ITEM	PART NAME	DESCRIPTION
1	CATCH BASIN SEDIMENT TRAP	APRON 36"X39" FILTER SOCK Ø9"X38" LONG

ANSI A Size Page (Horizontal)

LEGAL & TOPOGRAPHY

PROVIDED BY: BARICH GRENKIE
297 HWY No. 8 (UNIT 101)
STONEY CREEK, ON, L8G 1E5
PHONE: (905) 662–6767

BENCHMARK AND ELEVATION

ELEVATIONS SHOWN ARE REFERRED TO THE CANADIAN GEODETIC VERTICAL DATUM (CGVD–1928: 1978) AND ARE DERIVED FROM THE TOWNSHIP OF UXBRIDGE BENCHMARK No. 0011931U517S, HAVING AN ELEVATION OF 272.439 METERS.

BEARINGS ARE UTM GRID, DERIVED FROM OBSERVED REFERENCE BY REAL TIME NETWORK (RTN) OBSERVATIONS. UTM ZONE 17 (81°00' WEST LONGITUDE) NAD83 (CSRS) (2010.0). ORP 1 – NORTHING (4884511.823), EASTING (649875.665).

No.	REVISIONS/ISSUED	DATE	BY	CITY
2.	ISSUED FOR 2ND SUBMISSION	2023/11/24	J.Y	
1.	ISSUED FOR 1ST SUBMISSION	2022/05/16	P.T	

counterpoint ENGINEERING
COUNTERPOINT ENGINEERING INC.
8395 Jane St., Suite 100, Vaughan, ON L4K 5Y2 Phone 905.326.1404 Fax 905.326.1405

LICENSED PROFESSIONAL ENGINEER J. S. YOGANATHAN 100100545 NOV 24/23 PROVINCE OF ONTARIO

ENGINEER'S STAMP

APPLICANT:
MANSOUR ARAB/MAN HOLDINGS LTD
174 DINNICK CRESCENT
TORONTO, ONTARIO
M4N 1M3

SITE LOCATION:
181 TORONTO STREET SOUTH
UXBRIDGE, ONTARIO

SITE PLAN FILE No.:

EROSION AND SEDIMENT CONTROL PLAN

DESIGNED BY:	CHECKED BY:	DATE: APRIL 2021
DRAWING BY:	CHECKED BY:	PROJECT NO. 21026
SWM BY:	CHECKED BY:	
SCALE: 1:200m (0m 4m 8m 12m)		DRAWING NO. C-2

REGION FILE No.: