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FUNCTIONAL SERVICING REPORT AND STORMWATER MANAGEMENT REPORT

**120 MAPLEVIEW DRIVE WEST
CITY FILE No. DA.28-108-2021**

CITY OF BARRIE

UEL FILE No: 21013.330

DATE: January 18, 2022



PART A

**FUNCTIONAL SERVICING REPORT
120 MAPLEVIEW DRIVE WEST**

**CITY OF BARRIE
FILE No: 21013.330**

1.0 INTRODUCTION

The proposed development site area is = 3.95 Ha approx.

The proposed development site is located in the northerly quadrant of 120 Mapleview Drive West in the City of Barrie.

An industrial building (Matsu Manufacturing Barrie Inc.) currently exists within the southerly quadrant of 120 Mapleview Drive West in the City of Barrie.

The 120 Mapleview Drive West property is currently zoned Industrial .

This development site is bound by Veteran's Drive to the west, existing industrial buildings to the north, existing Matsu Manufacturing building to the south located within the same 120 Mapleview Drive West property, and a recently approved manufacturing facility on 90 Mapleview Drive West to the southeast, under the same ownership as this development site.

The engineering design drawings contained herein are based on architectural plans prepared by Nestico Architect.

The site will be developed with a single industrial warehouse building.

The site currently shares the Matsu Building most northerly access to Veterans Drive.

Two driveway entrances are proposed for this development site.

A 6.7 m wide access, for vehicular traffic only, is proposed at the north limit of the development site.

A modified 12.0 m wide access at the south limit of this development site is proposed to be shared with the existing Matsu Manufacturing building to the south located within the same 120 Mapleview Drive West property, for both truck and vehicular traffic.

2.0 EXISTING SITE AND GROUNDWATER CONDITIONS

Currently, the site is vacant and undeveloped.

A Geotechnical Investigation was previously completed in 2019 by Cambium Inc. for the neighbouring 90 Mapleview Drive West property, currently under the same ownership, . Ten test pits were excavated throughout the subject property, with depths ranging from 1.5 m to 2.4 m, in order to determine the composition of the site soils. Based on the results of the investigation, the on-site soils primarily consist of sand with silt trace gravel and silty sand with some gravel. The site soils are classified as hydrologic soil Group A/B, using Design Chart 1.08 of the Ministry of Transportation Ontario (MTO) Drainage Management Manual and provide moderate drainage.

Crozier Consulting Engineers was retained to conduct a Hydrogeological Investigation of the subsurface soil conditions for the neighbouring 90 Mapleview Drive West property . On April 9th, 2020 an investigation of the five (5) existing monitoring wells on site found the groundwater levels ranged between 5.1 m to 8.2 m below ground surface ranging in elevation between 302.04 m and 300.67 m. The groundwater level readings were considered representative of the seasonally high groundwater levels found in this area.



3.0 STORMWATER QUANTITY CONTROL

Based on the existing topographic survey produced by Rudy Mak Surveying Ltd., the existing site drains primarily in a west to east direction to the easterly property limit and to an existing drainage ditch located in a municipal easement. The municipal easement extends, in a northerly direction, from the south limit of this development site to Caplan Ave. The existing municipal drainage ditch conveys all of the existing drainage flows from this site to an existing headwall located on the south side of Caplan Ave under pre-development conditions. The predevelopment condition of this site consists of approx 0.7 ha of asphalt surface (incl dome structure) and approx 3.2 ha of grass surface.

Therefore, discharging to the existing municipal drainage ditch is an acceptable outlet strategy provided that the post-development flows are controlled to the pre-development release rates .

NOTE: Storm Drainage from this site drains to Caplan Ave based on a runoff coefficient of 0.75 per City of Barrie Caplan Avenue Urbanization - Storm Drainage Area Plan STM 1 File No 2007-010-002

On-site detention of excess runoff for the site will be required in order not to exceed the allowable quantity of runoff from the site. The intent of the proposed stormwater management is to satisfy the storage requirements produced by the occurrence of a 5 year return frequency design storm and 100 year return frequency design storm.

In the event of a blockage in the storm sewer network, runoff will be conveyed through the internal site towards the site outlet.

4.0 STORMWATER QUALITY CONTROL

Stormwater quality criteria for the site requires "Enhanced" protection levels to achieve 80% Total Suspended Solids (TSS) Removal, in accordance with the Ministry of the Environment, Conservation and Parks SWM Planning & Design Manual (March 2003).

A Treatment Train Approach is proposed to address City and LSRCA Water quality requirement for 80% Total Suspended Solids removal.

Roof Drainage Flows will be directed to Infiltration Basin which includes an Isolator row to address LSRCA 25mm water balance requirements

Landscape Drainage Flows will be permitted to continue to drain to the site outlet.

A Hydro International Up-Flo Filter (or approved equivalent) will be installed within the site in order to provide quality treatment of stormwater effluent prior to outletting to the existing municipal drainage ditch. Sizing calculations for this Filter Unit are provided in Appendix .

5.0 WATER BALANCE

LSRCA guidelines indicate that new development sites which create more than 0.5 hectares of new impervious area, shall capture and retain the 25 mm runoff volume from the total impervious area of the site. However, as per the City of Barrie's Infiltration Low Impact Development Screening Process, the subject site is located within an area where directing paved areas to LIDs is not permissible. Therefore, the 25 mm runoff volume from the Total impervious area of the site is not achievable since runoff from the paved areas of the site cannot be directed to infiltration LIDs and therefore will accept the proposed LIDs being sized only to provide for on-site infiltration of 25mm of receiving runoff from the Building roof .

As described later in Part B-SWM Report, the proposed LIDs have been sized to provide for on-site infiltration of 25 mm of receiving rooftop runoff from the Building roof.

This total infiltration volume is equivalent to a depth of runoff over the total impervious area =

13.0 mm

6.0 STORM SERVICE CONNECTION

No storm sewer currently exists within the Veteran's Drive to service this development site.

A storm outlet headwall to an existing municipal drainage ditch is proposed to service this property .

Internal storm sewers and service connection to the building are proposed to outlet to the outlet headwall.



7.0 WATER SERVICE CONNECTION

A review of the Veteran's Drive Improvements drawings (Drawing No. 2004-13-PP10 and 2004-13-PP9) received from the City of Barrie identify a 400 mm diameter watermain fronting the site. A proposed 300 mm diameter PVC watermain, split at property line into a 250 mm diameter PVC Fire Service and a 100 mm diameter PVC Domestic Water Service is proposed to service this development site. Although fire hydrants are existing within the westerly boulevard of Veteran's Drive Improvements, internal hydrant within this development site will be required. The approximate location of the existing watermain and hydrants is identified on the Site Servicing Plan.

Service connections to the building will be provided through an internal 250 mm fire line and an internal 100 mm domestic line from these stub watermain.

A 150mm watermain will be provided from the building to service the internal site hydrant.

A Backflow Preventer control is proposed to be located within the mechanical room of the proposed building for the incoming fire water line and out going hydrant water line.

A Meter & Backflow Preventer control is proposed to be located within the mechanical room of the proposed building for the incoming domestic line.

8.0 SANITARY SERVICE CONNECTION

A review of the Veteran's Drive Improvements drawings (Drawing No. 2004-13-PP10 and 2004-13-PP9) received from the City of Barrie identify a 250 mm diameter pvc sanitary sewer existing within the Veteran's Drive roadway flowing from north to south. A 200 mm diameter PVC sanitary lateral is proposed to service this development site. The approximate location of the existing sanitary sewer is identified on the Site Servicing Plan.

A Service Connection Manhole is proposed at the Maplevue Drive property limit to service this development.

A Sanitary service connection to the building is proposed to be provided from this sanitary manhole.

9.0 PHOSPHORUS CONTROL

As outlined in the LSRCA Phosphorus Offsetting Policy, all new developments or redevelopments must control or offset 100% of the phosphorus leaving the site. Any phosphorus loading that cannot be controlled on-site must be offset at a ratio of 2.5:1 (ie. 2.5 kg of phosphorus per year would be removed for every 1 kg required to be offset).

The Hutchinson Environmental Sciences Ltd. Report titled "Phosphorus Coefficient for Sod Farm/Golf Course identified a Phosphorus Budget Tool in Support of Sustainable Development for the Lake Simcoe Watershed" (March 30, 2012) provides phosphorus export coefficients for land uses in the Lovers Creek watershed. A best efforts approach was conducted to achieve 100% phosphorus removal. The table below summarizes the pre- and post-development phosphorus loading conditions for the subject property.

TABLE - PHOSPHORUS LOADING CONDITIONS			
Pre-Development Phosphorus Loading (kg/yr)	Post-Development Phosphorus Loading without Mitigation (kg/yr)	Post-Development Phosphorus Loading with Mitigation (kg/yr)	Post-to-Pre Development Phosphorus Loading INCREASE (+) / REDUCTION (-) (kg/yr)
0.67	7.18	0.59	-0.09

The pre-development conditions are classified as a Low Intensity Development Sod Farm/Golf Course with a phosphorus loading rate of 0.17 kg/ha/yr. In the post-development conditions the industrial development is classified under the High Intensity Commercial / Industrial Development land use with a phosphorus loading rate of 1.82 kg/ha/yr.

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PART B **STORMWATER MANAGEMENT REPORT**
120 MAPLEVIEW DRIVE WEST

CITY OF BARRIE
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1.0 INTRODUCTION

The objective of this report is to provide recommended grading and drainage proposals, which when utilized will control runoff from the site.

On-site detention of excess runoff for the site will be required in order not to exceed the allowable quantity of runoff from the site. The intent of the proposed stormwater management is to satisfy the storage requirements produced by the occurrence of a 5 year return frequency design storm and 100 year return frequency design storm. The maximum volume of runoff to be stored on site was determined using the Modified Rational Method as outlined in the American Public Works Association titled, "Practices in Detention of Urban Stormwater Runoff". The rainfall intensities were obtained from City of Barrie curves.

2.0 ALLOWABLE SITE RUNOFF

Based on the existing topographic survey produced by Rudy Mak Surveying Ltd., the existing site drains primarily in a west to east direction to the easterly property limit and to an existing drainage ditch located in a municipal easement. The municipal easement extends, in a northerly direction, from the south limit of this development site to Caplan Ave. The existing municipal drainage ditch conveys all of the existing drainage flows from this site to an existing headwall located on the south side of Caplan Ave under pre-development conditions. The predevelopment condition of this site consists of approx 0.7 ha of asphalt surface (incl dome structure) and approx 3.2 ha of grass surface.

A review of City of Barrie Caplan Avenue Urbanization - Storm Drainage Area Plan STM 1 File No 2007-010-002 reveals that the predevelopment drainage flows from this site have been previously approved to outlet, via the municipal existing ditch, to Caplan Ave based on a runoff coefficient of 0.75

Based on the above, the predevelopment drainage flows approved to outlet to the existing drainage ditch located in a municipal easement to Caplan Ave, area are as follows :

100 yr	Pre-development flow =	1481.2 l/sec
5 yr	Pre-development flow =	895.5 l/sec

This development block has been designed to meet maximum allowable release rates noted above for the 5yr and 100yr storm events.

This development will encompass three stormwater management systems.

System "A" includes the drainage area from the proposed landscape area to the north of the building, System "B" includes the drainage from the Building Roof and pavement areas and System "C" includes the drainage area from the proposed landscape area to the east of the building.

System "A" will connect to proposed control manhole CBMH 100 and includes no orifice control.

System "B" will connect to proposed control manhole CBMH 300 and includes a 450 mm orifice control plate.

System "C" will connect to proposed control manhole CBMH 100 and includes no orifice control.

Systems "A" + "B" + "C" will combine at CBMH 100 and outlet to the existing drainage course located at the north east limit of this development site

Total 100 yr Storm Allowable Release rate for System " A + B + C " , for all storm events, is:	1481.2 L/s
Total 5 yr Storm Allowable Release rate for System " A + B + C " , for all storm events, is:	895.5 L/s



3.0 POST-DEVELOPMENT SITE CONDITION

The Site has been designed on the basis of 3 drainage systems.

	unit	Total	System A	System B	System C
Total Site Area	(m ²)	39461	1560	36640	1261
Pavement Area	(m ²)	17244	0	17244	0
Landscaped Area	(m ²)	3577	1560	756	1261
Building Area	(m ²)	18640	0	18640	0
Uncontrolled Pavement Area	(m ²)	0	0	0	0
Uncontrolled Landscape Area	(m ²)	0	0	0	0

4.0 EVALUATION OF SITE RUNOFF - SYSTEM A

4.1 Roof Top Storage

ROOF STORAGE NOT APPLICABLE

4.2 Parking Lot Storage and Release Rate

Note: 100 year runoff coefficients:

$$\begin{aligned} \text{pavements - } C_{100} &= C_5 \times 0.5 + 0.5 = 0.9 \times 0.5 + 0.5 = 0.95 \\ \text{landscaped - } C_{100} &= 0.25 \times 0.5 + 0.5 = 0.625 \end{aligned}$$

4.2.1 The composite runoff coefficients for the site, excluding building, are calculated as follows:

$$\begin{aligned} C_c &= \frac{0 \times 0.95}{0} + \frac{1560 \times 0.625}{1560} \\ C_c &= 0.63 \end{aligned}$$



4.2.2 Release rate calculations are based on orifice flow formula:

$$Q = C \times A \times (2gH)^{1/2}$$

where,

Q = discharge in m³/s

C = shape coefficient, 0.62 for orificeplate, dimensionless

A = area of orifice in m²

g = acceleration due to gravity in m/s²

H = head from centre of orifice to ponding level in m

Pipe / Orifice Plate at Existing Storm Manhole - System A

max. ponding level	(m)	0
invert of orifice	(m)	0
head	(m)	0.0
diameter of orifice	(mm)	No Orifice
Q, orifice discharge	(l/s)	

Refer to Summary in Appendix

4.2.3 Using the Modified Rational Method, the maximum storage volume required on the parking lot was calculated. As shown in Appendix Table 2 and dwg SP-1, Urban Ecosystems Project No.: 0 the required pond volume was calculated to be 0 m³

Available site storage:

a) Surface Storage		=	0.0	m ³
b) Underground Storage				
0	m - 300	dia. stm =	0.0	m ³
0	m - 375	dia. stm =	0.0	m ³
65	m - 450	dia. stm =	10.3	m ³
148	m - 525	dia. stm =	32.0	m ³
0	m - 600	dia. stm =	0.0	m ³
0	m - 675	dia. stm =	0.0	m ³
3	1200 mm dia mh(@ 1.5 m avg depth) =		5.1	m ³
1	1500 mm dia mh(@ 1.5 m avg depth) =		2.7	m ³
0	1800 mm dia mh(@ 1.5 m avg depth) =		0.0	m ³
0	2400 mm dia mh(@ 1.5 m avg depth) =		0.0	m ³
Total Underground Storage=			50.1	m ³
Total site storage (a + b) =			50.1	m ³

Required Storage	m ³	0
Available Storage	m ³	50

Therefore, there is sufficient storage in the parking lot to self contain the drainage and control the 100 year runoff to the allowable rate within the site.



5.0 EVALUATION OF SITE RUNOFF - SYSTEM B

5.1 Roof Top Storage

Proposed roofs to be equipped with control flow drains.

Model ID: Zurn Control Flo Z-105-5

Weir Rating 6 USGPM per inch head (0.15 L/s/cm head)

Quantity: One weir per hopper. Based on manufacturers table, one hopper drains a maximum roof area of 465m² with a maximum head of 10.16 cm

For this building 50 hoppers

Total roof outflow is calculated as:

$$Q_{\text{roof}} = 50 \times 0.15 \text{ L/s/cm hd.} \times 10 \text{ cm head} = 75 \text{ L/s}$$

From Appendix - Table 1 maximum storage volumes:

required =	863.0	m ³
available =	1262.5	m ³

As shown, the available storage volume for the roof can easily contain the respective required maximum roof storage volumes.

Note: Peak rate of runoff, eg: $Q = \text{Rain (L/s)}$

$$= 0.95 \times 0' \times \text{mm/hr} \times 2.778$$

5.2 Parking Lot Storage and Release Rate

Note: 100 year runoff coefficients:

pavements - $C_{100} = C_5 \times 0.5 + 0.5 = 0.9 \times 0.5 + 0.5 = 0.95$

landscaped - $C_{100} = 0.25 \times 0.5 + 0.5 = 0.625$

6.2.1 The composite runoff coefficients for the site, excluding building, are calculated as follows:

$$C_c = \frac{17244 \times 0.95}{17244} + \frac{756 \times 0.625}{756}$$

$$C_c = 0.94$$



5.2.2 Release rate calculations are based on orifice flow formula:

$$Q = C \times A \times (2gH)^{1/2}$$

where,

Q = discharge in m³/s

C = shape coefficient, 0.62 for orificeplate, dimensionless

A = area of orifice in m²

g = acceleration due to gravity in m/s²

H = head from centre of orifice to ponding level in m

Orifice Plate at Existing Storm Manhole - System B

max. ponding level	(m)	308.2
invert of orifice	(m)	306.2
head	(m)	1.775
diameter of orifice	(mm)	450
Q, pipe discharge	(l/s)	

Refer to Summary in Appendix

5.2.3 Using the Modified Rational Method, the maximum storage volume required on the parking lot was calculated. As shown in Appendix

Table 2 and dwg SP-1, Urban Ecosystems Project No.:

the required pond volume was calculated to be 83.8 m³

1) AVAILABLE TOTAL SURFACE SITE STORAGE = 345.6 m³

2) AVAILABLE PIPE / MANHOLE STORAGE :

0	m -	300	dia. stm =	0.0	m ³
0	m -	375	dia. stm =	0.0	m ³
0	m -	450	dia. stm =	0.0	m ³
0	m -	525	dia. stm =	0.0	m ³
340.5	m -	600	dia. stm =	96.3	m ³
0	m -	750	dia. stm =	0.0	m ³
4		1200 mm dia mh(@	1.5 m avg depth) =	6.8	m ³
1		1500 mm dia mh(@	1.5 m avg depth) =	2.7	m ³
2		1800 mm dia mh(@	1.5 m avg depth) =	7.6	m ³
1		2400 mm dia mh(@	1.5 m avg depth) =	6.8	m ³
2) AVAILABLE TOTAL PIPE / MANHOLE STORAGE :					120.1 m³

TOTAL QUANTITY STORAGE 1) + 2) = 465.8 cu.m.

100 YEAR STORM EVENT

Required Storage	m ³	84
Available Storage	m ³	466

5 YEAR STORM EVENT

Required Storage	m ³	2
Available Storage	m ³	272

Therefore, there is sufficient storage in the parking lot to self contain the drainage and control the 100 year runoff to the allowable rate within the site.



6.0 EVALUATION OF SITE RUNOFF - SYSTEM C

6.1 Roof Top Storage

ROOF STORAGE NOT APPLICABLE

6.2 Parking Lot Storage and Release Rate

Note: 100 year runoff coefficients:

$$\begin{aligned} \text{pavements} - C_{100} &= C_5 \times 0.5 + 0.5 = 0.9 \times 0.5 + 0.5 = 0.95 \\ \text{landscaped} - C_{100} &= 0.25 \times 0.5 + 0.5 = 0.625 \end{aligned}$$

4.2.1 The composite runoff coefficients for the site, excluding building, are calculated as follows:

$$\begin{aligned} C_c &= \frac{0 \times 0.95}{0} + \frac{0 \times 0.625}{0} \\ C_c &= 0.00 \end{aligned}$$



6.2.2 Release rate calculations are based on orifice flow formula:

$$Q = C \times A \times (2gH)^{1/2}$$

where,

Q = discharge in m³/s

C = shape coefficient, 0.62 for orificeplate, dimensionless

A = area of orifice in m²

g = acceleration due to gravity in m/s²

H = head from centre of orifice to ponding level in m

Orifice Plate at Existing Storm Manhole - System C

max. ponding level	(m)	No Orifice
invert of orifice	(m)	0
head	(m)	0.0
diameter of orifice	(mm)	0
Q, Pipe discharge	(l/s)	

Refer to Summary in Appendix

6.2.3 Using the Modified Rational Method, the maximum storage volume required on the parking lot was calculated. As shown in Appendix Table 2 and dwg SP-1, Urban Ecosystems Project No.: the required pond volume was calculated to be 0 m³

Available site storage:

a) Surface Storage		=	0.0	m ³
b) Underground Storage				
0	m - 300	dia. stm =	0.0	m ³
0	m - 375	dia. stm =	0.0	m ³
0	m - 450	dia. stm =	0.0	m ³
103	m - 525	dia. stm =	22.3	m ³
0	m - 600	dia. stm =	0.0	m ³
0	m - 675	dia. stm =	0.0	m ³
1	1200 mm dia mh(@	1.5 m avg depth) =	1.7	m ³
0	1500 mm dia mh(@	1.5 m avg depth) =	0.0	m ³
0	1800 mm dia mh(@	1.5 m avg depth) =	0.0	m ³
1	2400 mm dia mh(@	1.5 m avg depth) =	6.8	m ³
Total Underground Storage=			30.8	m ³
Total site storage (a + b) =			30.8	m ³

Required Storage	m ³	0
Available Storage	m ³	31

Therefore, there is sufficient storage in the parking lot to self contain the drainage and control the 100 year runoff to the allowable rate within the site.



7.0 WATER BALANCE - RETENTION OF 25mm of WATER FROM ROOF AREA

Although LSRCA requires that the 25mm storm event be retained on site, City of Barrie acknowledges that the 25 mm runoff volume from the total impervious area of the site is not achievable since runoff from the paved areas of the site cannot be directed to infiltration LIDs and therefore will accept the proposed LIDs being sized only to provide for on-site infiltration of 25mm of receiving runoff from the Building roof.

$$\begin{aligned} \text{Required Infiltration Volume} &= 250.0 \text{ cu.m/Ha} = 25 \text{ mm} \\ \text{Roof Area} &= 1.864 \text{ Ha} \end{aligned}$$

Required Onsite Infiltration Volume =	1.864 Ha	x	250 cu.m/Ha	=	466.0 cu.m.
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Part A) Retention Volume within Initial Abstraction (IA)

SURFACE	AREA	Abstracti	Volume
pervious	3577 sm	25 mm	89.4
impervious	35884 sm	1 mm	
total	39461 sm		89.4 cu.m.

Part A) Subtotal 89.4 cu.m.

Part B) Retention Volume within Proposed Infiltration Gallery

Based on MOE Guidelines, the soil percolation rate is 40 mins/cm or 15 mm/hour

Based on the soil percolation rate of 50 mins/cm or 12 mm/hour and based on achieving 48 hour to 72 hour draw down time

$$\text{Minimum Required Gallery Height is approx.} = 0.9 \text{ metres}$$

Therefore, Proposed Infiltration Trench is as follows:

$$\text{Number of StormTech SC-740 Chambers} = 7 \text{ rows} \times 32 \text{ per row} = 224 \text{ chambers}$$

$$\text{StormTech SC-740 Chamber Row Volume} = 224 \times 1.3 \text{ cu.m} = 291.2 \text{ cu.m.}$$

$$\text{StormTech SC-740 Chambers End Caps Volume} = 6 \times 0.05 \text{ cu.m} = 0.3 \text{ cu.m.}$$

$$\text{Chamber Height} = 0.76 \text{ m}$$

$$\text{Chamber Length} = 2.17 \text{ m}$$

$$\text{STONE Below Depth} = 0.152 \text{ m}$$

$$\text{STONE Above Depth} = 0.152 \text{ m}$$

$$\text{GALLERY AREA (L x W)} = 72.6 \text{ m} \times 10.0 \text{ m} = 723.2 \text{ sm}$$

$$\text{GROSS VOLUME (GALLERY)} = 723.2 \text{ sm} \times 1.1 \text{ m} = 795.5 \text{ cu.m.}$$

$$\text{REQUIRED VOLUME (GALLERY)} = 723.2 \text{ sm} \times 0.9 \text{ m} = 650.8 \text{ cu.m.}$$

$$\text{STONE VOLUME (GALLERY)} = 650.8 \text{ cu.m.} - 291.5 \text{ cu.m.} = 359.3 \text{ cu.m.}$$

$$\text{Provided Infiltration Trench Volume} = 359.3 \text{ cu.m.} \times 40\% = 143.7 \text{ cu.m.}$$

Part B) Subtotal 435.2 cu.m.

Required Onsite Infiltration Volume =	=	466.0 cu.m.
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Note: Total Infiltration Volume Equivalent to a depth of runoff over total impervious area of site = 13.0 mm

Provided Onsite Infiltration Volume =	PART A) + Part B) =	524.7 cu.m.
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8.0 WATER QUALITY

A Treatment Train Approach is proposed to address City and LSRCA Water quality requirement for 80% Total Suspended Solids removal.

Roof Drainage Flows will be directed to Infiltration Basin which includes an Isolator row to address LSRCA 25mm water balance requirements

Landscape Drainage Flows will be permitted to continue to drain to the site outlet.

A Hydro International Up-Flo Filter (or approved equivalent) will be installed within the site in order to provide quality treatment of stormwater effluent prior to outletting to the existing municipal drainage ditch. Sizing calculations for this Filter Unit are provided in Appendix .

9.0 SUMMARY

The following table summarizes the results presented in this report.

100 YR STORM EVENT

SYSTEM		A	B	C	TOTAL
orifice size	mm	No Orifice	450	No Orifice	
total site release rate	L/s	48.8	581.9	115.6	746.3
allowable site release rate	L/s				1481.2
maximum ponding elevation	m	306.6	308.2	306.6	
catchbasin elevation	m	N/A	308.0	N/A	
ponding depth	m	N/A	0.0	N/A	
required ponding storage	m ³	NIL	84	NIL	
available ponding storage	m ³	50	466	31	

5 YR STORM EVENT

SYSTEM		A	B	C	TOTAL
orifice size	mm	No Orifice	450	No Orifice	
total site release rate	L/s	11.8	548.1	85.7	645.7
allowable site release rate	L/s				895.5
maximum ponding elevation	m	306.6	308	306.6	
catchbasin elevation	m	N/A	308	N/A	
ponding depth	m	N/A	0.0	N/A	
required ponding storage	m ³	NIL	2	NIL	
available ponding storage	m ³	50	272	31	

Respectfully submitted,

Urban Ecosystems Limited

Rosario Sacco, P. Eng.

DATED January 18, 2022





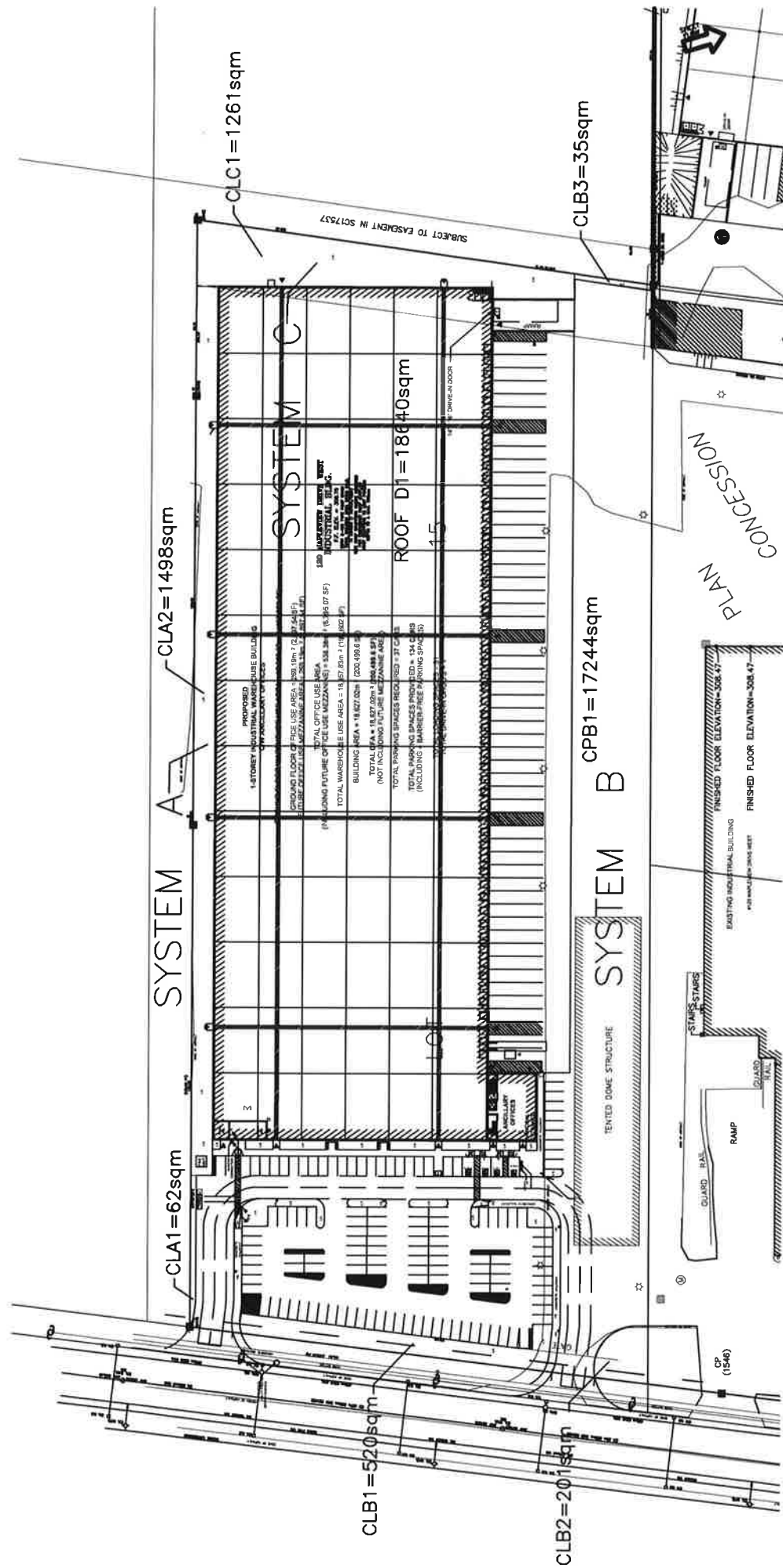
A P P E N D I C E S

A P P E N D I X	No 1 - DRAINAGE AREA PLANS
A P P E N D I X	No 2 - SWM CALCULATIONS
A P P E N D I X	No 3 - PHOSPHORUS CALCULATIONS
A P P E N D I X	No 4 - QUALITY FILTER UNIT
A P P E N D I X	No 5 - INFILTRATION UNIT

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A P P E N D I X N o 1 - DRAINAGE AREA PLANS



KEY PLAN
NOT TO SCALE



STORM LEGEND

- WATERSHED BOUNDARY
- CATCHMENT BOUNDARY
- MAJOR SYSTEM FLOW
- MINOR SYSTEM FLOW
- AREA (sq ft)
- PERCENT
- EXISTING STORM DRAIN
- PROPOSED STORM DRAIN
- EXISTING STORM MANHOLE
- PROPOSED STORM MANHOLE
- PROPOSED STORM VALVE
- PROPOSED STORM BACK

NO.	DESCRIPTION	DATE

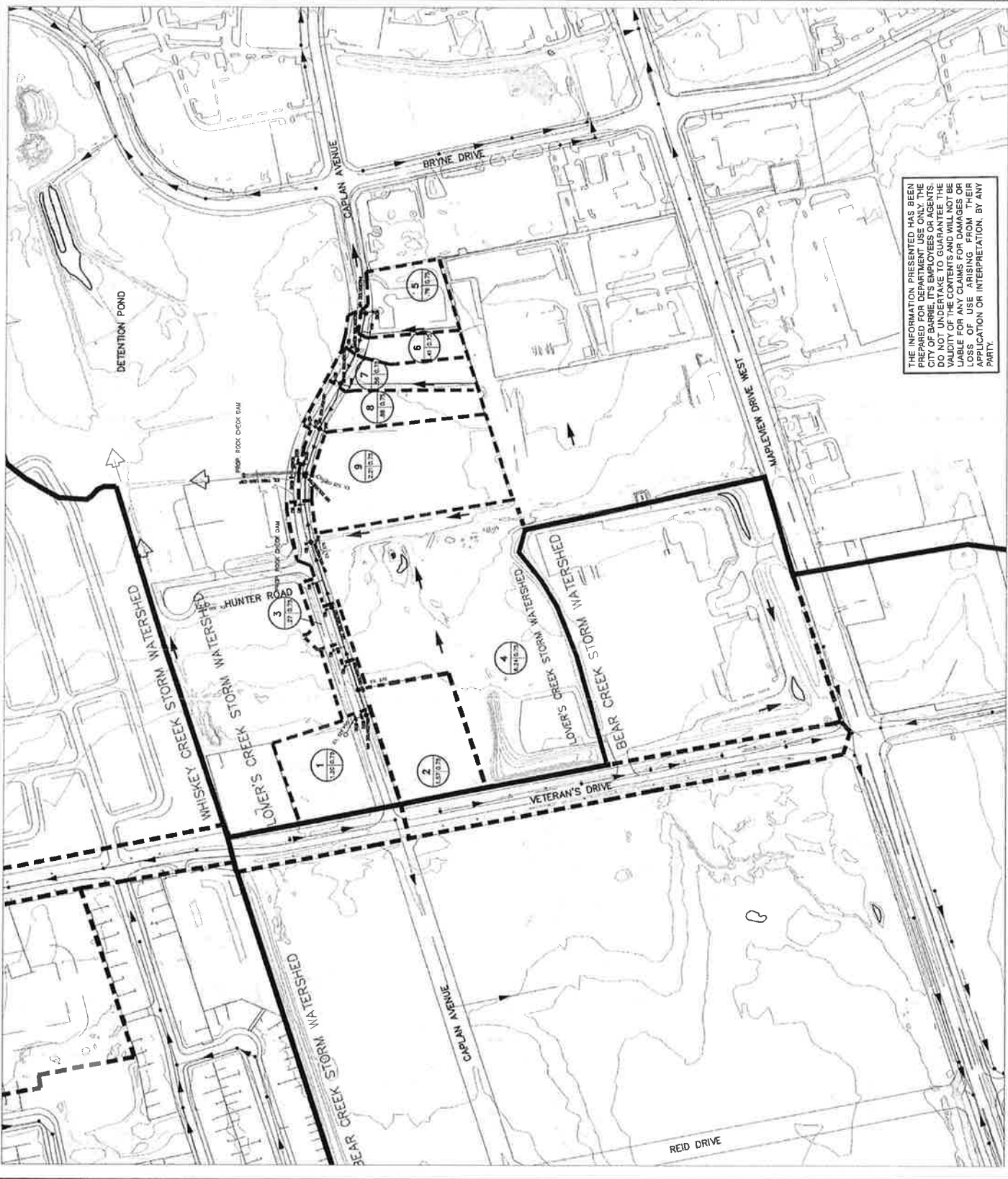


CITY OF BARRIE
ENGINEERING DEPARTMENT

CAPLAN AVENUE
URBANIZATION

STORM DRAINAGE PLAN

DATE: 2007-01-10
DRAWN: J. J. J.
CHECKED: J. J. J.
REVIEWED: J. J. J.
PROJECT NO: 2004-008
SHEET NO: 10



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2007-010-002

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A P P E N D I X N o 2 - S W M C A L C U L A T I O N S

PROJECT: 120 MAPLEVIEW DRIVE WEST

MUNICIPALITY: CITY OF BARRIE
FILE NO.: 21013.330
Date: January 18, 2022
City File No DA.28-108-2021
LOCATION:

URBAN ECOSYSTEMS LIMITED
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SITE STORM WATER MANAGEMENT

SUMMARY

	<u>TOTAL</u>	<u>SYSTEM A</u>	<u>SYSTEM B</u>	<u>SYSTEM C</u>
Site area (sq.m) :	39461	1560	36640	1261
Controlled Pavement area (sq.m) :	17244		17244	
Controlled Landscaped area (sq.m) :	3577	1560	756	1261
Roof area (sq.m) :	18640		18640	
Uncontrolled Pavement area (sq.m) :	0		0	
Uncontrolled Landscape area (sq.m) :	0		0	

100 YEAR STORM EVENT

	<u>SYSTEM A</u>	<u>SYSTEM B</u>	<u>SYSTEM C</u>	<u>TOTAL</u>
CONTROLLED Orifice release rate (l/sec) :	48.8	581.9	115.6	746.3
UNCONTROLLED Site release rate (l/sec) :		0.0	0.0	0.0
TOTAL Site release rate (l/sec) :	48.8	581.9	115.6	746.3
ALLOWABLE Site release rate (l/sec) :				1481.2

5 YEAR STORM EVENT

	<u>SYSTEM A</u>	<u>SYSTEM B</u>	<u>SYSTEM C</u>	<u>TOTAL</u>
CONTROLLED Orifice release rate (l/sec) :	11.8	548.1	85.7	645.7
UNCONTROLLED Site release rate (l/sec) :	0.0	0.0	0.0	0.0
TOTAL Site release rate (l/sec) :	11.8	548.1	85.7	645.7
ALLOWABLE Site release rate (l/sec) :				895.5

PROJECT: 120 MAPLEVIEW DRIVE WEST
MUNICIPALITY: CITY OF BARRIE
JOB NO.: 21013.330
DATE: January 18, 2022
LOCATION:

SYSTEM A 100 yr
SITE STORM WATER MANAGEMENT

SITE PLAN CHARACTERISTICS - SYSTEM A

Site area (sq.m) : 1560
Controlled Pavement area (sq.m) : 0
Controlled Landscaped area (sq.m) : 1560
Proposed Roof area (sq.m) : 0
Uncontrolled Pavement area (sq.m.) : 0
Uncontrolled Landscaped area (sq.m.) : 0

Pavement coefficient : 0.95
Landscape coefficient : 0.625
Roof area coefficient : 0.95

Orifice diameter (mm) : No Orifice
Area of orifice (sq.m) : 0.00000
Orifice coefficient : 0.62
Max. ponding elev. :
Catchbasin elev. :
Ponding depth. :
Orifice invert :
Orifice center line elev. :
Head (m) :
Orifice release rate (l/sec) :

Composite runoff coefficient : 0.63

NO ORIFICE
PIPE release rate (l/sec) : 48.8

100 yr Rainfall intensity (mm/hr) : $1426.408 \cdot ((T+5.273)^{-0.759})$
25 yr Rainfall intensity (mm/hr) : $1146.275 \cdot ((T+4.922)^{-0.757})$
5 yr Rainfall intensity (mm/hr) : $853.608 \cdot ((T+4.699)^{-0.766})$
2 yr Rainfall intensity (mm/hr) : $678.085 \cdot ((T+4.699)^{-0.781})$

TABLE 2 - System Storage

Time (min.)	Intensity I (mm/hr)	Peak rate of runoff Q (l/sec)	Runoff volume (cu.m)	Orifice Outflow volume (cu.m)	Required storage volume (cu.m.)
10	180.15	48.80			

Required site storage (cu.m) : 0
Available site storage (cu.m) : 50
SEE DRAWING SP-1

SYSTEM A
SITE SUMMARY

Pipe / Orifice release rate (l/sec) : 48.8
Uncontrolled release rate (l/sec) :
Total site release rate (l/sec) : 48.8

SITE PLAN CHARACTERISTICS - SYSTEM B

Site area (sq.m) : 36640
Controlled Pavement area (sq.m) : 17244
Controlled Landscaped area (sq.m) : 756
Proposed Roof area (sq.m) : 18640
Uncontrolled Pavement area (sq.m.) : 0
Uncontrolled Landscaped area (sq.m.) : 0

Roof DRAINAGE CHARACTERISTICS

Pavement coefficient : 0.95
Landscape coefficient : 0.625
Roof area coefficient : 0.95
Total roof area (sq. m) : 18640
Total number of roof hoppers : 50
Total number of weirs : 50
Max. sloped roof depth (mm) : 50.8
Max. sloped roof storage (cu.m) : 315.64
Max. parapit roof storage (cu.m) : 946.91
Rainfall intensity (mm/hr) : 1426.408*((T+5.273)^-0.759)
100 yr

Weir rating (l/sec) : 0.15
Weir area rating (sq. m.) : 465
Maximum head (cm) : 10.16
Peak roof outflow rate (l/sec) : 76.2

TABLE 1 - ROOF DRAINAGE SYSTEM

1st ITERATION				2nd ITERATION				3rd ITERATION						
Time (min.)	Rainfall Intensity I (mm/hr)	Peak rate of runoff Q (l/sec)	Peak Runoff volume (cu.m.)	Peak roof outflow volume (cu.m)	Required storage volume (cu.m)	Volume in sloped roof areas (cu.m)	Volume contained by roof parapit (cu.m)	Total head on roof hoppers (cm)	Roof outflow rate (l/sec)	Roof outflow volume (cu.m)	Required storage volume (cu.m)	Total head on roof hoppers (cm)	Roof outflow volume (cu.m)	Required storage volume (cu.m)
5	243.43	1197.48	359.24	22.86	336.38	315.64	20.75	5.19	38.93	11.68	347.56	5.25	11.82	347.43
10	180.15	886.23	531.74	45.72	486.02	315.64	170.38	5.99	44.96	26.97	504.77	6.09	27.43	504.31
15	145.31	714.82	643.34	68.58	574.76	315.64	259.12	6.47	48.53	43.67	599.66	6.60	44.58	598.76
20	122.92	604.68	725.62	91.44	634.18	315.64	318.54	6.79	50.92	61.10	664.52	6.95	62.57	663.06
25	107.18	527.26	790.89	114.30	676.59	315.64	360.95	7.02	52.62	78.93	711.95	7.21	81.07	709.82
30	95.44	469.50	845.10	137.16	707.94	315.64	392.30	7.18	53.88	96.99	748.11	7.40	99.90	745.20
35	86.31	424.56	891.58	160.02	731.56	315.64	415.92	7.31	54.83	115.15	776.42	7.55	118.94	772.63
40	78.97	388.48	932.34	182.88	749.46	315.64	433.82	7.41	55.56	133.33	799.01	7.67	138.12	794.22
45	72.93	358.78	968.72	205.74	762.98	315.64	447.34	7.48	56.10	151.47	817.25	7.77	157.36	811.35
50	67.87	333.87	1001.61	228.60	773.01	315.64	457.37	7.53	56.50	169.51	832.10	7.85	176.64	824.97
55	63.55	312.63	1031.68	251.46	780.22	315.64	464.59	7.57	56.79	187.42	844.27	7.92	195.92	835.76
60	59.82	294.28	1059.41	274.32	785.09	315.64	469.46	7.60	56.99	205.16	854.25	7.97	215.18	844.23
65	56.56	278.25	1085.17	297.18	787.99	315.64	472.35	7.61	57.11	222.71	862.46	8.01	234.40	850.77
70	53.69	264.10	1109.24	320.04	789.20	315.64	473.56	7.62	57.15	240.05	869.19	8.05	253.57	855.67
75	51.13	251.52	1131.85	342.90	788.95	315.64	473.32	7.62	57.14	257.15	874.70	8.08	272.68	859.18
80	48.84	240.25	1153.19	365.76	787.43	315.64	471.79	7.61	57.08	274.00	879.19	8.10	291.72	861.47
85	46.77	230.08	1173.40	388.62	784.78	315.64	469.15	7.60	56.98	290.58	882.82	8.12	310.70	862.70
90	44.90	220.86	1192.62	411.48	781.14	315.64	465.50	7.58	56.83	306.88	885.74	8.14	329.61	863.01
95	43.19	212.45	1210.94	434.34	776.60	315.64	460.96	7.55	56.65	322.89	888.05	8.15	348.45	862.49
100	41.62	204.74	1228.45	457.20	771.25	315.64	455.61	7.52	56.43	338.59	889.86	8.16	367.23	861.23
105	40.18	197.66	1245.24	480.06	765.18	315.64	449.54	7.49	56.19	353.98	891.25	8.17	385.94	859.30
110	38.85	191.11	1261.36	502.92	758.44	315.64	442.80	7.46	55.92	369.05	892.31	8.17	404.60	856.76
115	37.62	185.05	1276.87	525.78	751.09	315.64	435.45	7.42	55.62	383.78	893.09	8.18	423.21	853.66
120	36.47	179.42	1291.83	548.64	743.19	315.64	427.55	7.37	55.30	398.18	893.65	8.18	441.77	850.06
125	35.41	174.17	1306.27	571.50	734.77	315.64	419.13	7.33	54.96	412.23	894.04	8.18	460.29	845.97
130	34.41	169.26	1320.23	594.36	725.87	315.64	410.24	7.28	54.61	425.93	894.30	8.18	478.79	841.44

Roof= RAIN
= 4.919 x I (l / sec)

Peak roof outflow rate =
no. of hoppers x weir rating x max. head
= 76.2 l/sec

Peak roof outflow volume =
= 76.2 x time x 60/1000 cu. m.

Roof outflow rate =
head x weir rating x no. of weirs
= head x 7.50 l/sec

Required max. roof storage (cu. m.) : 863.0
Available roof storage (cu. m.) : 1262.5

SYSTEM B 100 yr
SITE STORM WATER MANAGEMENT

SITE PLAN CHARACTERISTICS - SYSTEM B

SITE CHARACTERISTICS

Controlled Pavement area (sq.m) : 17244
Controlled Landscaped area (sq.m) : 756
Total area - excl. Bldg (sq.m) : 18000
Composite runoff coefficient : 0.94

OUTLET CHARACTERISTICS

Orifice diameter (mm) : 450
Area of orifice (sq.m) : 0.15904
Orifice coefficient : 0.62
Max. ponding elev. : 308.20
Catchbasin elev. : 308.00
Ponding depth. : 0.20
Orifice invert : 306.2
Orifice center line elev. : 306.425
Head (m) : 1.77
Orifice release rate (l/sec) : 581.9

Required site storage (cu. m) : 84
Available site storage (cu. m) : 466
SEE DRAWING SP-1

INCLUDES ROOF RELEASE RATE = 76.2 (l/sec)

TABLE 3 - Uncontrolled Runoff

Time (min.)	Intensity I (mm/hr)	Peak rate of runoff Q (l/sec)
10	180.15	0.0
15	145.31	0.0
20	122.92	0.0

Peak runoff (l/sec) : 0.0

UNCONTROLLED
SITE CHARACTERISTICS

Uncontrolled Pavement area (sq.m.) : 0
Uncontrolled Landscaped area (sq.m.) : 0
Total area (sq.m) : 0
Composite runoff coefficient : 0.000

SYSTEM B
SITE SUMMARY

Pipe release rate (l/sec) : 581.9
Uncontrolled release rate (l/sec) : 0.0
Total site release rate (l/sec) : 581.9

TABLE 2 - System Storage

Time (min.)	Intensity I (mm/hr)	Peak rate of runoff Q (l/sec)	Runoff volume (cu.m)	Orifice Outflow volume (cu.m)	Required storage volume (cu.m.)
20	122.92	651.73	782.08	698.29	83.8
22	116.02	619.41	817.62	768.12	49.5
24	109.95	591.00	851.04	837.95	13.1

PROJECT: 120 MAPLEVIEW DRIVE WEST
MUNICIPALITY: CITY OF BARRIE
JOB NO.: 21013.330
DATE: January 18, 2022
LOCATION:

SYSTEM C 100 yr
SITE STORM WATER MANAGEMENT

SITE PLAN CHARACTERISTICS - SYSTEM C

Site area (sq.m) : 1261
Controlled Pavement area (sq.m) : 0
Controlled Landscaped area (sq.m) : 1261
Proposed Roof area (sq.m) : 0
Uncontrolled Pavement area (sq.m.) : 0
Uncontrolled Landscaped area (sq.m.) : 0

Pavement coefficient : 0.95
Landscape coefficient : 0.625
Roof area coefficient : 0.95

Rainfall intensity (mm/hr) : 1426.408*((T+5.273)^-0.759) 100 yr

Orifice diameter (mm) : No Orifice
Area of orifice (sq.m) : 0.00000
Orifice coefficient : 0.62
Max. ponding elev. :
Catchbasin elev. :
Ponding depth. :
Orifice invert :
Orifice center line elev. :
Head (m) :
Orifice release rate (l/sec) :

Composite runoff coefficient : 0.63

NO ORIFICE

PIPE release rate (l/sec) : 115.6

TABLE 2 - System Storage

Time (min.)	Intensity I (mm/hr)	Peak rate of runoff Q (l/sec)	Runoff volume (cu.m)	Orifice Outflow volume (cu.m)	Required storage volume (cu.m.)
10	180.15	115.64			

Required site storage (cu. m) : 0
Available site storage (cu. m) : 31
SEE DRAWING SP-1

SYSTEM C
SITE SUMMARY

Pipe / Orifice release rate (l/sec) : 115.6
Uncontrolled release rate (l/sec) :
Total site release rate (l/sec) : 115.6

SYSTEM A + B + C
SITE SUMMARY

Total site release rate (l/sec) : 746.3
Total Allowable site release rate (l/sec) : 1481.2

SITE PLAN CHARACTERISTICS - SYSTEM A

Site area (sq.m) : 1560
Controlled Pavement area (sq.m) : 0
Controlled Landscaped area (sq.m) : 1560
Proposed Roof area (sq.m) : 0
Uncontrolled Pavement area (sq.m.) : 0
Uncontrolled Landscaped area (sq.m.) : 0

Pavement coefficient : 0.9
Landscape coefficient : 0.25
Roof area coefficient : 0.9

Orifice diameter (mm) : No Orifice
Area of orifice (sq.m) : 0.00000
Orifice coefficient : 0.62
Max. ponding elev. :
Catchbasin elev. :
Ponding depth. :
Orifice invert :
Orifice center line elev. :
Head (m) :
Orifice release rate (l/sec) :

NO ORIFICE
PIPE release rate (l/sec) : 11.8

Composite runoff coefficient : 0.25

TABLE 2 - System Storage

Time (min.)	Intensity I (mm/hr)	Peak rate of runoff Q (l/sec)	Runoff volume (cu.m)	Orifice Outflow volume (cu.m)	Required storage volume (cu.m.)
10	108.92	11.80			

Required site storage (cu. m) : 0
Available site storage (cu. m) : 50
SEE DRAWING SP-1

SYSTEM A
SITE SUMMARY

Pipe / Orifice release rate (l/sec) : 11.8
Uncontrolled release rate (l/sec) :
Total site release rate (l/sec) : 11.8

SYSTEM B 5 yr
SITE STORM WATER MANAGEMENT

SITE PLAN CHARACTERISTICS - SYSTEM B

Site area (sq.m) : 36840
Controlled Pavement area (sq.m) : 17244
Controlled Landscaped area (sq.m) : 756
Proposed Roof area (sq.m) : 18640
Uncontrolled Pavement area (sq.m.) : 0
Uncontrolled Landscaped area (sq.m.) : 0

Pavement coefficient : 0.9
Landscape coefficient : 0.25
Roof area coefficient : 0.9

ROOF DRAINAGE CHARACTERISTICS

Total roof area (sq. m) : 18640
Total number of roof hoppers : 50
Total number of weirs : 50
Max. sloped roof depth (mm) : 50.8
Max. sloped roof storage (cu.m) : 315.64
Max. parapit roof storage (cu.m) : 946.91
100 yr
Rainfall intensity (mm/hr) : 1426.408*(T+5.273)^{-0.759}

Weir rating (l/sec) : 0.15
Weir area rating (sq. m.) : 465
Maximum head (cm) : 10.16
Peak roof outflow rate (l/sec) : 76.2

TABLE 1 - ROOF DRAINAGE SYSTEM

1st ITERATION					2nd ITERATION					3rd ITERATION				
Time (min.)	Rainfall Intensity I (mm/hr)	Peak rate of runoff Q (l/sec)	Peak Runoff volume (cu.m.)	Peak roof outflow volume (cu.m)	Required storage volume (cu.m)	Volume in sloped roof areas (cu.m)	Volume contained by roof parapit (cu.m)	Total head on roof hoppers (cm)	Roof outflow rate (l/sec)	Roof outflow volume (cu.m)	Required storage volume (cu.m)	Total head on roof hoppers (cm)	Roof outflow volume (cu.m)	Required storage volume (cu.m)
5	149.77	697.99	209.40	22.86	186.54	186.54	-129.10	2.31	17.32	5.20	204.20	2.69	6.05	203.35
10	108.92	507.62	304.57	45.72	258.85	258.85	-56.79	3.86	28.96	17.38	287.19	4.47	20.11	284.46
15	87.04	405.63	365.07	68.58	296.49	296.49	-19.15	4.67	35.02	31.52	333.55	5.18	34.94	330.13
20	73.19	341.10	409.32	91.44	317.88	315.64	2.25	5.09	38.19	45.83	363.50	5.34	48.03	361.29
25	63.55	296.18	444.27	114.30	329.97	315.64	14.34	5.16	38.68	58.02	386.26	5.46	61.41	382.86
30	56.41	262.90	473.23	137.16	336.07	315.64	20.43	5.19	38.92	70.06	403.17	5.55	74.92	398.31
35	50.89	237.15	498.00	160.02	337.98	315.64	22.35	5.20	39.00	81.90	416.11	5.62	88.50	409.51
40	46.47	216.55	519.71	182.88	336.83	315.64	21.19	5.19	38.95	93.49	426.22	5.67	102.12	417.59
45	42.84	199.65	539.06	205.74	333.32	315.64	17.69	5.17	38.81	104.79	434.27	5.72	115.76	423.31
50	39.81	185.52	556.56	228.60	327.96	315.64	12.32	5.15	38.60	115.79	440.77	5.75	129.40	427.15
55	37.23	173.50	572.54	251.46	321.08	315.64	5.44	5.11	38.32	126.45	446.08	5.78	143.05	429.48
60	35.00	163.13	587.26	274.32	312.94	312.94	-2.69	5.02	37.67	135.60	451.66	5.81	156.86	430.40
65	33.06	154.09	600.94	297.18	303.76	303.76	-11.88	4.83	36.19	141.14	459.81	5.85	171.21	429.73
70	31.35	146.12	613.72	320.04	293.68	293.68	-21.96	4.61	34.57	145.18	468.54	5.90	185.86	427.86
75	29.84	139.05	625.72	342.90	282.82	282.82	-32.82	4.38	32.82	147.68	478.04	5.95	200.85	424.86
80	28.48	132.72	637.04	365.76	271.28	271.28	-44.36	4.13	30.96	148.61	488.43	6.01	216.25	420.79
85	27.25	127.01	647.76	388.62	259.14	259.14	-56.50	3.87	29.01	147.94	499.82	6.07	232.11	415.65
90	26.14	121.84	657.95	411.48	246.47	246.47	-69.17	3.60	26.97	145.63	512.32	6.14	248.47	409.47
95	25.13	117.13	667.66	434.34	233.32	233.32	-82.32	3.31	24.85	141.66	526.01	6.21	265.42	402.25
100	24.21	112.82	676.95	457.20	219.75	219.75	-95.89	3.02	22.67	136.00	540.94	6.29	282.99	393.95
105	23.36	108.86	685.84	480.06	205.78	205.78	-109.85	2.72	20.42	128.64	557.20	6.38	301.26	384.58
110	22.58	105.21	694.39	502.92	191.47	191.47	-124.17	2.42	18.12	119.56	574.82	6.47	320.29	374.10
115	21.85	101.83	702.60	525.78	176.82	176.82	-138.81	2.10	15.76	108.74	593.87	6.57	340.13	362.47
120	21.18	98.68	710.53	548.64	161.89	161.89	-153.75	1.78	13.35	96.15	614.37	6.68	360.86	349.66
125	20.55	95.76	718.18	571.50	146.68	146.68	-168.96	1.45	10.91	81.80	636.38	6.80	382.54	335.64
130	19.96	93.02	725.57	594.36	131.21	131.21	-184.43	1.12	8.42	65.66	659.91	6.93	405.23	320.34

Q_{roof} = RAIN = 4.660 x l (l / sec)

Peak roof outflow rate =
no. of hoppers x weir rating x max. head
= 76.2 l/sec
Peak roof outflow volume =
= 76.2 x time x 60/1000 cu. m.

Required max. roof storage (cu. m.) : 430.4
Available roof storage (cu. m.) : 1262.5

Roof outflow rate =
head x weir rating x no. of weirs
= head x 7.50 l/sec

SYSTEM B **5 yr**
SITE STORM WATER MANAGEMENT

SITE PLAN CHARACTERISTICS - SYSTEM B

SITE CHARACTERISTICS

Controlled Pavement area (sq.m) : 17244
Controlled Landscaped area (sq.m) : 756
Total area - excl. Bldg (sq.m) : 18000
Composite runoff coefficient : 0.87

OUTLET CHARACTERISTICS

Orifice diameter (mm) : 450
Area of orifice (sq.m) : 0.15904
Orifice coefficient : 0.62
Max. ponding elev. : 308.00
Catchbasin elev. : 308.00
Ponding depth. : 0.00
Orifice invert : 306.20
Orifice center line elev. : 306.425
Head (m) : 1.57
Orifice release rate (l/sec) : 548.1

TABLE 2 - System Storage

Time (min.)	Intensity I (mm/hr)	Peak rate of runoff Q (l/sec)	Runoff volume (cu.m)	Orifice Outflow volume (cu.m)	Required storage volume (cu.m.)
10	108.92	551.52	330.91	328.89	2.0

Required site storage (cu. m) : 2
Available site storage (cu. m) : 272
SEE DRAWING SP-1

INCLUDES ROOF RELEASE RATE = 76.2 (l/sec)

TABLE 3 - Uncontrolled Runoff

Time (min.)	Intensity I (mm/hr)	Peak rate of runoff Q (l/sec)
10	108.92	0.0

Peak runoff (L/sec) : 0.0

**UNCONTROLLED
SITE CHARACTERISTICS**

Uncontrolled Pavement area (sq.m.) : 0
Uncontrolled Landscaped area (sq.m.) : 0
Total area (sq.m) : 0
Composite runoff coefficient : 0.000

SYSTEM B
SITE SUMMARY

Pipe release rate (l/sec) : 548.1
Uncontrolled release rate (l/sec) : 0.0
Total site release rate (l/sec) : **548.1**

PROJECT: 120 MAPLEVIEW DRIVE WEST
MUNICIPALITY: CITY OF BARRIE
JOB NO.: 21013.330
DATE: January 18, 2022
LOCATION:

SYSTEM C 5 yr
SITE STORM WATER MANAGEMENT

SITE PLAN CHARACTERISTICS - SYSTEM C

Site area (sq.m) : 1261
Controlled Pavement area (sq.m) : 0
Controlled Landscaped area (sq.m) : 1261
Proposed Roof area (sq.m) : 0
Uncontrolled Pavement area (sq.m.) : 0
Uncontrolled Landscaped area (sq.m.) : 0

Pavement coefficient : 0.9
Landscape coefficient : 0.25
Roof area coefficient : 0.9

Rainfall intensity (mm/hr) : 1426.408*((T+5.273)^-0.759) 100 yr

Orifice diameter (mm) : No Orifice
Area of orifice (sq.m) : 0.00000
Orifice coefficient : 0.62
Max. ponding elev. :
Catchbasin elev. :
Ponding depth. :
Orifice invert :
Orifice center line elev. :
Head (m) :
Orifice release rate (l/sec) :

NO ORIFICE
PIPE release rate (l/sec) : 85.7

Composite runoff coefficient : 0.25

TABLE 2 - System Storage

Time (min.)	Intensity I (mm/hr)	Peak rate of runoff Q (l/sec)	Runoff volume (cu.m)	Orifice Outflow volume (cu.m)	Required storage volume (cu.m.)
10	108.92	85.74			

Required site storage (cu. m) : 0
Available site storage (cu. m) : 31
SEE DRAWING SP-1

SYSTEM C
SITE SUMMARY

Pipe / Orifice release rate (l/sec) : 85.7
Uncontrolled release rate (l/sec) :
Total site release rate (l/sec) : 85.7

SYSTEM A + B + C
SITE SUMMARY

Total site release rate (l/sec) : 645.7
Total Allowable site release rate (l/sec) : 895.5

PROJECT: 120 MAPLEVIEW DRIVE WEST
MUNICIPALITY: CITY OF BARRIE
JOB NO.: 21013.330
DATE: January 18, 2022
LOCATION:

PRE - DEVELOPMENT
SITE STORM WATER MANAGEMENT

SITE PLAN CHARACTERISTICS - PRE - DEVELOPMENT

Site area (sq.m) : 39461
Existing Pavement area (sq.m) : 7215
Existing Landscaped area (sq.m) : 32246

Storm Runoff Coefficient : 0.75
Landscape coefficient : 0.75

100 yr Rainfall intensity (mm/hr) : $1426.408 * (T + 5.273)^{-0.759}$
25 yr Rainfall intensity (mm/hr) : $1146.275 * (T + 4.922)^{-0.757}$
5 yr Rainfall intensity (mm/hr) : $853.608 * (T + 4.699)^{-0.766}$
2 yr Rainfall intensity (mm/hr) : $678.085 * (T + 4.699)^{-0.781}$

NOTE: Storm Drainage from this site drains to Caplan Ave Based on a runoff coefficient of 0.75 per City of Barrie Caplan Avenue Urbanization - Storm Drainage Area Plan STM 1 File No 2007-010-002

PRE - DEVELOPMENT 100 yr

Time (min.)	Intensity I (mm/hr)	Peak rate of runoff Q (l/sec)
10	180.15	1481.2

Peak runoff (l/sec) : 1481.2

**UNCONTROLLED
SITE CHARACTERISTICS**

Existing Pavement area (sq.m) : 7215
Existing Pavement area (sq.m) : 32246
Total area (sq.m) : 39461
Composite runoff coefficient : 0.750

100 yr Rainfall intensity (mm/hr) : $1426.408 * (T + 5.273)^{-0.759}$

TOTAL ALLOWABLE

SITE RELEASE RATE (l/sec) : 1481.2

PRE - DEVELOPMENT 5 yr

Time (min.)	Intensity I (mm/hr)	Peak rate of runoff Q (l/sec)
10	108.92	895.5

Peak runoff (l/sec) : 895.5

**UNCONTROLLED
SITE CHARACTERISTICS**

Existing Pavement area (sq.m) : 7215
Existing Pavement area (sq.m) : 32246
Total area (sq.m) : 39461
Composite runoff coefficient : 0.750

5 yr Rainfall intensity (mm/hr) : $853.608 * (T + 4.699)^{-0.766}$

TOTAL ALLOWABLE

SITE RELEASE RATE (l/sec) : 895.5

URBAN ECOSYSTEMS LIMITED
7050 WESTON ROAD, SUITE 705
WOODBRIIDGE, ONTARIO L4L 8G7
uel@urbanecosystems.com
T: (905)856-0629
F: (905)856-0898



A P P E N D I X N o 3 - P H O S P H O R U S C A L C U L A T I O N S

PROJECT: 120 MAPLEVIEW DRIVE WEST
MUNICIPALITY: CITY OF BARRIE
JOB NO.: 21013.330
DATE: January 18, 2022

URBAN ECOSYSTEMS
LIMITED

PHOSPHORUS LOADING

SITE PLAN CHARACTERISTICS -
Site area (sq.m) : 39461
Controlled Pavement area (sq.m) : 17244
Controlled Landscaped area (sq.m) : 3577
Proposed Roof area (sq.m) : 18640
Uncontrolled Pavement area (sq.m) : 0
Uncontrolled Landscaped area (sq.m) : 0

PART A) Pre- Development Phosphorus Loading Review

Pre- Development Condition

CATCHMENT	LAND USE	AREA (ha)	Phosphorus Coefficient (kg / ha / yr)	Phosphorus Loading (kg / yr)	TOTAL Phosphorus Load (kg / yr)
	Low Intensity Development	3.9461	0.17	0.67	0.67

PART B) Post- Development Phosphorus Loading Review

Post- Development Condition

CATCHMENT	LAND USE	AREA (ha)	Phosphorus Coefficient (kg / ha / yr)	Phosphorus Loading (kg / yr)	TOTAL Phosphorus Load (kg / yr)
	Commercial / Industrial	3.9461	1.82	7.18	7.18

Note: Phosphorus Loading Coefficients for Low Density Development Lands Uses obtained from Phosphorus Budget tool In Support of Sustainable Development For Lake

PROJECT: 120 MAPLEVIEW DRIVE WEST
MUNICIPALITY: CITY OF BARRIE
JOB NO.: 21013.330
DATE: January 18, 2022

URBAN ECOSYSTEMS
LIMITED

PHOSPHORUS LOADING

PART C) Post- Development Phosphorus Loading with Mitigation Review

Post- Development Condition

CATCHMENT	LAND USE	AREA (ha)	Phosphorus Coefficient (kg / ha / yr)	Percentage of Area Treated with BMP
Roof	Commercial / Industrial	1.864	1.82	100%
N & E Landscape Area	Commercial / Industrial	0.3577	1.82	100%
Remaining Site	Commercial / Industrial	1.7244	1.82	100%
TOTAL		3.9461		

Treatment for Roof Flows

Mitigation Applied	Reduction Factor	Phosphorus Load Reduction (kg/yr)
Infiltrate 25mm Depth of Water	1.00	3.39

Treatment for N & E Landscape Area Flows

Mitigation Applied	Reduction Factor	Phosphorus Load Reduction (kg/yr)
Infiltrate 25mm Depth of Water	1.00	0.65

Treatment for Remaining Site Flows

1st Mitigation Applied	Reduction Factor	Phosphorus Load Reduction (kg/yr)
Hydro International Upflo Filter	0.72	2.26

Treatment for Remaining Site Flows

2nd Mitigation Applied	Reduction Factor	Phosphorus Load Reduction (kg/yr)
Water Quality Swale	0.45	0.29

SUMMARY	
MITIGATION	Total Load Reduction (kg/yr)
Infiltration from Roof	3.39
Infiltration from N & E Landscape Area	0.65
Hydro International Upflo Filter	2.26
Water Quality Swale	0.29
TOTAL	6.60

TOTAL PHOSPHORUS POST-DEVELOPMENT LOAD WITHOUT BMPs = 7.18 kg/yr
TOTAL PHOSPHORUS POST-DEVELOPMENT LOAD REDUCTION WITH BMPs = 6.60 kg/yr
TOTAL PHOSPHORUS POST-DEVELOPMENT LOAD WITH BMPs = 0.59 kg/yr

TOTAL PHOSPHORUS POST-DEVELOPMENT LOAD WITHOUT BMPs = 0.67 kg/yr

% OF TOTAL PHOSPHORUS POST-DEVELOPMENT LOAD REDUCTION = 92%

% OF TOTAL PHOSPHORUS POST-DEVELOPMENT LOAD REMAINING = 8%

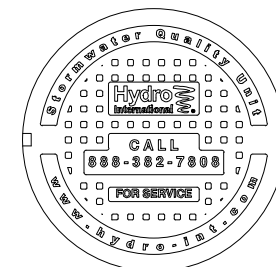
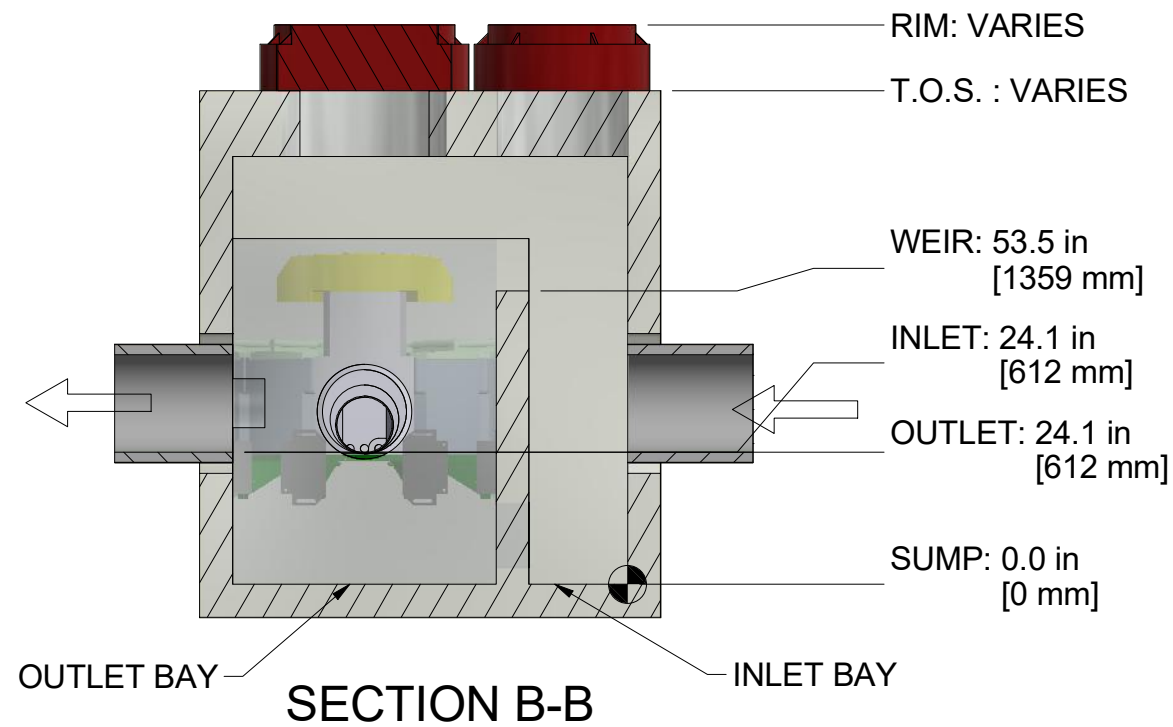
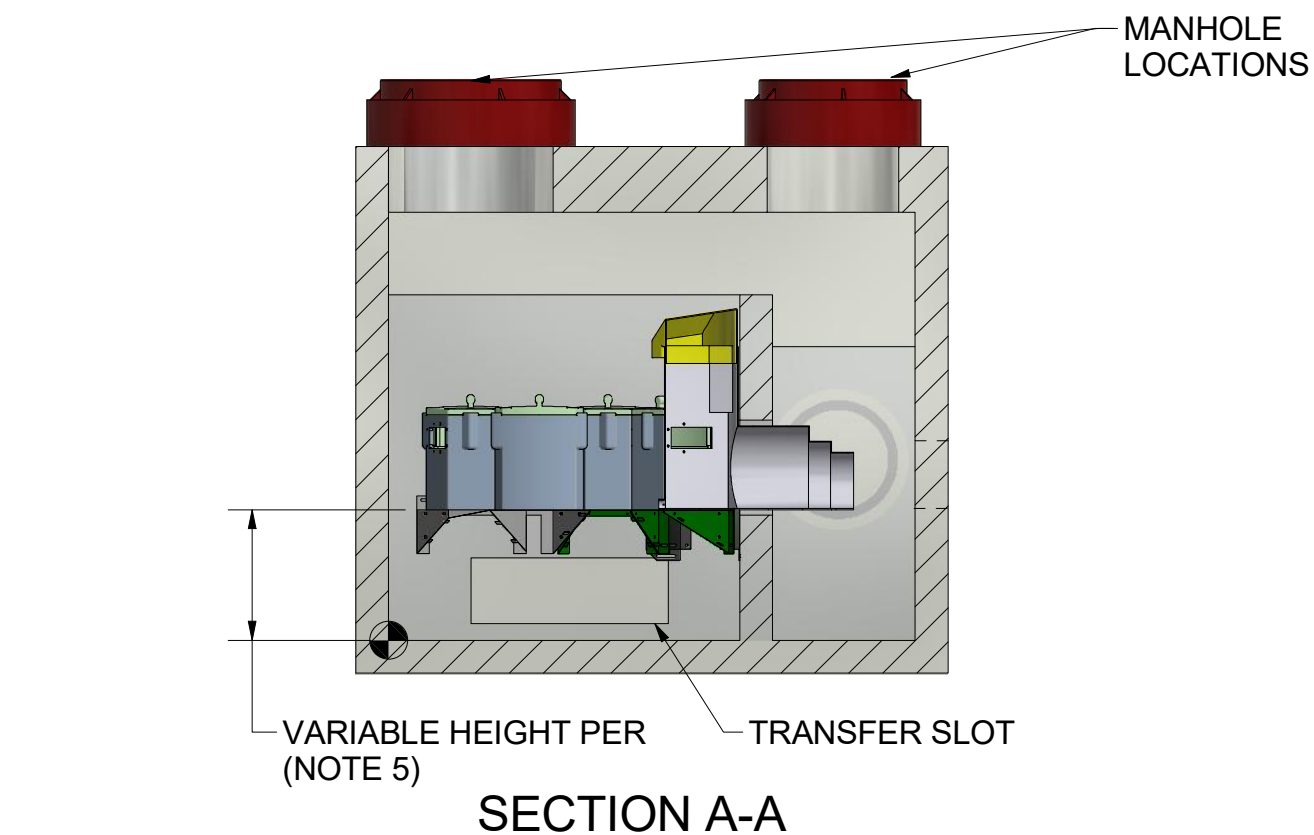
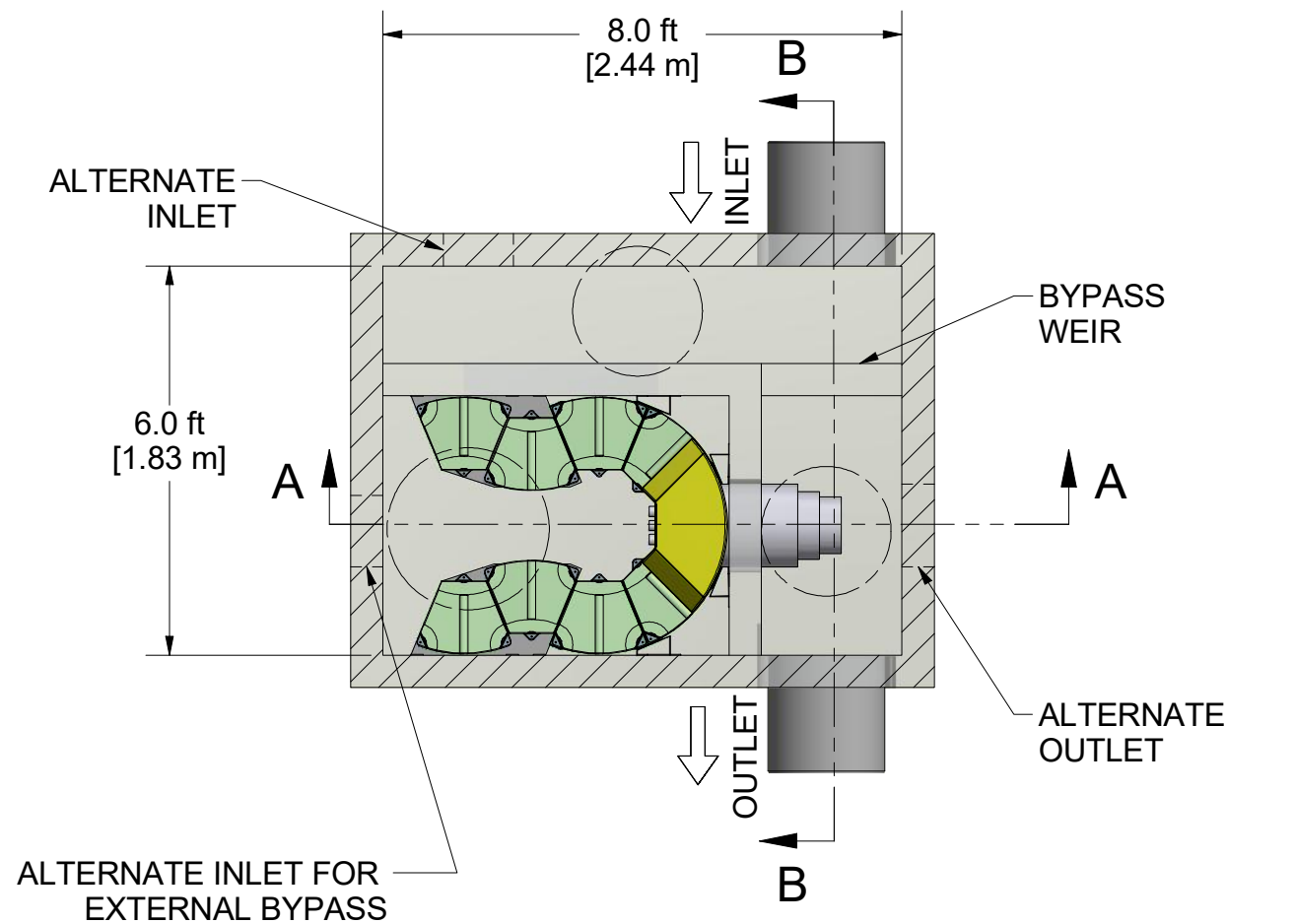
TOTAL PHOSPHORUS POST-DEVELOPMENT SITE INCREASE (+) / REDUCTION (-) = -0.09 kg/yr REDUCTION

Note: Phosphorus Loading Coefficients for Low Density Development Lands Uses obtained from Phosphorus Budget tool In Support of Sustainable Development For Lake Simcoe Watershed Report prepared by Hutchinson Environmental Services Ltd dated March 30, 2012

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A P P E N D I X N o 4 - Q U A L I T Y F I L T E R U N I T



CAPACITIES:

- Minimum performance: 80% removal. Washington DOE/NJCAT verified at the peak treatment flow.
- Peak treatment flow:
 - .033 CFS (0.9 LPS) (15 GPM) per module (Ribbons)
 - .022 CFS (0.6 LPS) (10 GPM) per module (Long Ribbons)
 - .056 CFS (1.6 LPS) (25 GPM) per module (CPZ)
- Maximum number of ribbon modules per outlet module: 36
- Maximum number of CPZ modules per outlet module: 18 (contract Hydro if more are required)

ADDITIONAL DESIGN INFORMATION:

- Normal operating W.S.E. is 26-30" (660-762mm) above the outlet invert
- Media Types Available: Ribbons, CPZ

ANY WARRANTY GIVEN BY HYDRO INTERNATIONAL WILL APPLY ONLY TO THOSE ITEMS SUPPLIED BY IT. ACCORDINGLY HYDRO INTERNATIONAL CANNOT ACCEPT ANY RESPONSIBILITY FOR ANY STRUCTURE, PLANT, OR EQUIPMENT, (OR THE PERFORMANCE THERE OF) DESIGNED, BUILT, MANUFACTURED, OR SUPPLIED BY ANY THIRD PARTY. HYDRO INTERNATIONAL HAVE A POLICY OF CONTINUOUS DEVELOPMENT AND RESERVE THE RIGHT TO AMEND THE SPECIFICATION. HYDRO INTERNATIONAL CANNOT ACCEPT LIABILITY FOR PERFORMANCE OF ITS EQUIPMENT, (OR ANY PART THEREOF), IF THE EQUIPMENT IS SUBJECT TO CONDITIONS OUTSIDE ANY DESIGN SPECIFICATION. HYDRO INTERNATIONAL OWNS THE COPYRIGHT OF THIS DRAWING, WHICH IS SUPPLIED IN CONFIDENCE. IT MUST NOT BE USED FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT IS SUPPLIED AND MUST NOT BE REPRODUCED, IN WHOLE OR IN PART, WITHOUT PRIOR PERMISSION IN WRITING FROM HYDRO INTERNATIONAL.

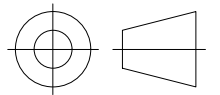
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DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES.

TOLERANCES ARE:
FRACTIONS ± 1/16
DECIMALS:
X.X ± .06
X.XX ± .03
X.XXX ± .015
ANGLES: ± .5°

PROJECTION



COMMENTS:

- STRUCTURE WALL AND SLAB THICKNESSES ARE NOT TO SCALE
- CONTACT HYDRO INTERNATIONAL FOR A BOTTOM OF STRUCTURE ELEVATION PRIOR TO SETTING THE STRUCTURE
- NOT FOR CONSTRUCTION CONTACT HYDRO FOR SITE SPECIFIC DRAWING
- NOT ALL SIZES AVAILABLE IN ALL AREAS
- SUMP DEPTH AVAILABLE IN 24" (610mm) CPZ, RIBBONS AND 36" (914mm) LONG RIBBONS DEPTH

REVISION HISTORY

REV	BY	DESCRIPTION	DATE
-	ER	FIRST RELEASE	3/8/2019

DATE: 3/8/2019 SCALE: 1:35

DRAWN BY: ER CHECKED BY: APPROVED BY:

Title
UP-FLO FILTER
6ft (1829mm) X 8ft (2438mm)

8 MODULES MAX

Hydro International

94 Hutchins Drive
Portland, ME 04102
Tel: +1 (207) 756-6200
Fax: +1 (207) 756-6212
hydro-int.com

WEIGHT: N/A MATERIAL:

NEXT ASSEMBLY: 6x8-1

DRAWING NO.: 6x8-UFF-1

SHEET SIZE: B SHEET: 1 OF 1 Rev: -

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A P P E N D I X N o 5 - INFILTRATION UNIT

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER:	CODY NEATH 519-465-9958 CODY.NEATH@ADS-PIPE.COM
ADS SALES REP:	RYAN MARTIN 705-207-3059 RYAN.MARTIN@ADS-PIPE.COM
PROJECT NO:	S260345
ADS SITE COORDINATOR:	MATTHEW BEGHIN 519-710-3687 MATTHEW.BEGHIN@ADS-PIPE.COM



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INSTRUCTIONS,
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INSTALLATION APP



120 AND 90 MAPLEVIEW DR. WEST BARRIE, ON.

SC-740 STORMTECH CHAMBER SPECIFICATIONS

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

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

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

NOTES FOR CONSTRUCTION EQUIPMENT

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

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

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

PROPOSED LAYOUT - EAST SYSTEM

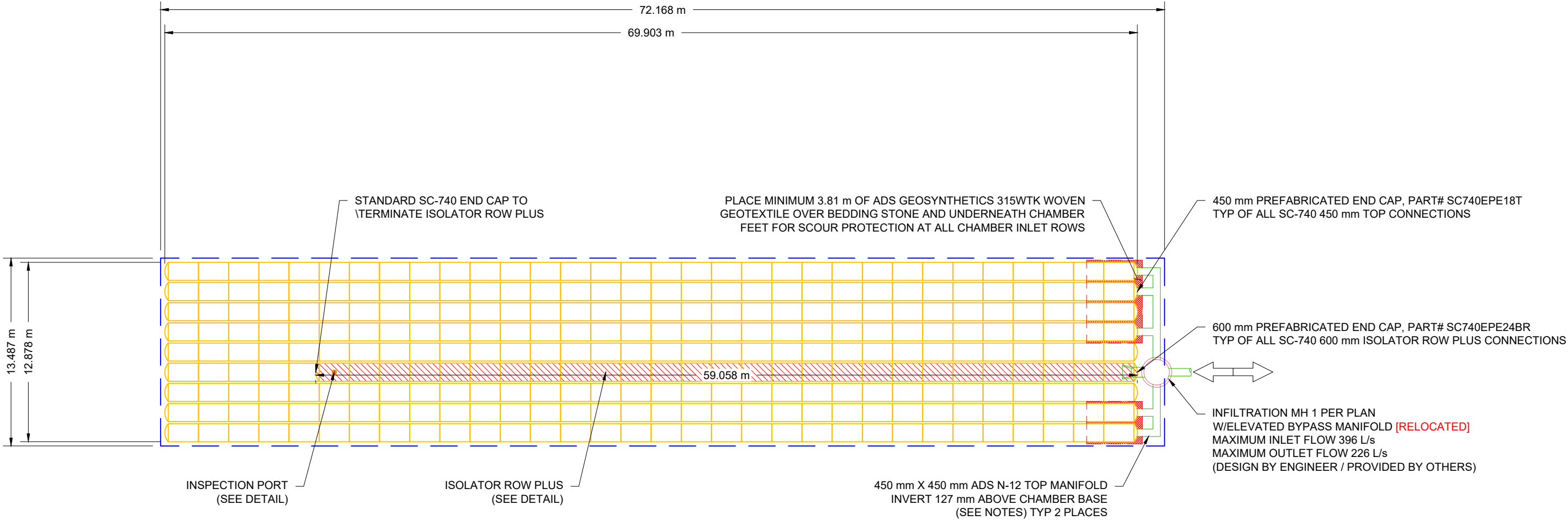
288	STORMTECH SC-740 CHAMBERS
19	STORMTECH SC-740 END CAPS
152	STONE ABOVE (mm)
152	STONE BELOW (mm)
40	% STONE VOID
639.8	INSTALLED SYSTEM VOLUME (m³) (PERIMETER STONE INCLUDED)
973.3	SYSTEM AREA (m²)
171.3	SYSTEM PERIMETER (m)

PROPOSED ELEVATIONS - EAST SYSTEM

308.097	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):
306.269	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):
306.116	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):
306.116	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):
306.116	MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT):
305.811	TOP OF STONE:
305.659	TOP OF SC-740 CHAMBER:
305.025	450 mm TOP MANIFOLD INVERT:
304.900	600 mm ISOLATOR ROW PLUS INVERT:
304.897	BOTTOM OF SC-740 CHAMBER:
304.745	BOTTOM OF STONE:

NOTES

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



90 MAPLEVIEW DR. WEST

BARRIE, ON

DATE: 09/28/21 DRAWN: RCT

PROJECT #: S200345 CHECKED: RCT

DESCRIPTION

DATE

DRWN

CHKD

StormTech®
Chamber System

888-992-2694 | WWW.STORMTECH.COM

ADS
4640 TRUEMAN BLVD
HILLIARD, OH 43026

SCALE = 1 : 300

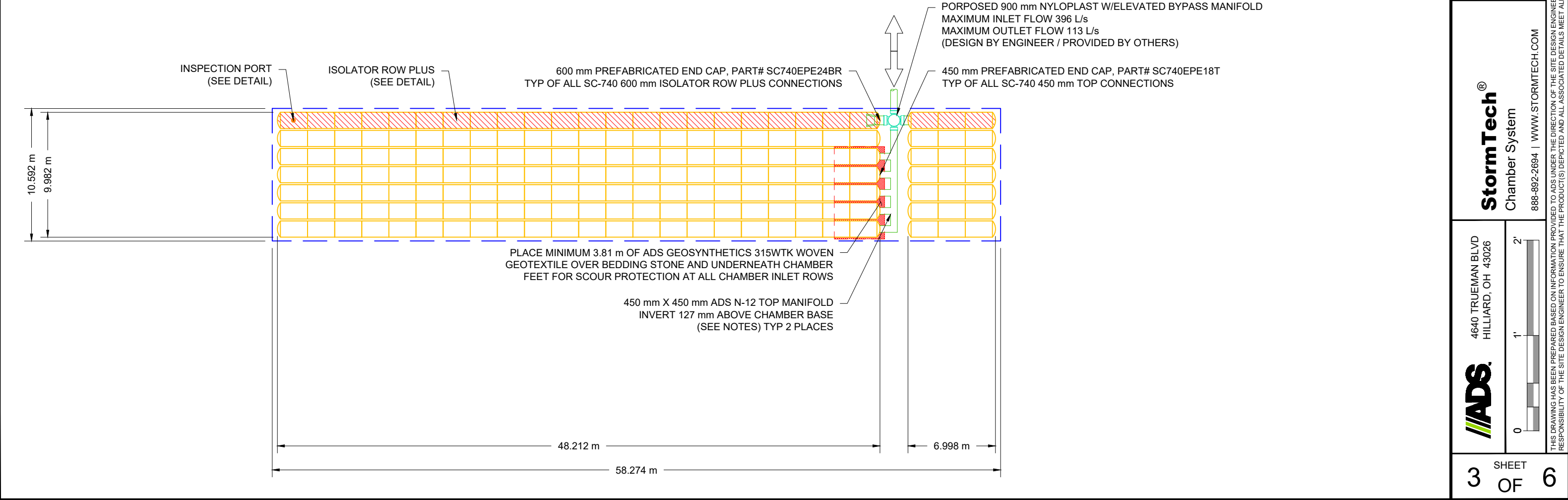
2 SHEET
OF 6

THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

PROPOSED LAYOUT - WEST SYSTEM	
175	STORMTECH SC-740 CHAMBERS
28	STORMTECH SC-740 END CAPS
152	STONE ABOVE (mm)
152	STONE BELOW (mm)
40	% STONE VOID
400.0	INSTALLED SYSTEM VOLUME (m³) (PERIMETER STONE INCLUDED)
617.2	SYSTEM AREA (m²)
137.7	SYSTEM PERIMETER (m)
PROPOSED ELEVATIONS - WEST SYSTEM	
308.797	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):
306.969	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):
306.816	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):
306.816	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):
306.816	MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT):
306.511	TOP OF STONE:
306.359	TOP OF SC-740 CHAMBER:
305.725	450 mm TOP MANIFOLD INVERT:
305.600	600 mm ISOLATOR ROW PLUS INVERT:
305.597	BOTTOM OF SC-740 CHAMBER:
305.445	BOTTOM OF STONE:

NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECHNICAL NOTE 6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.

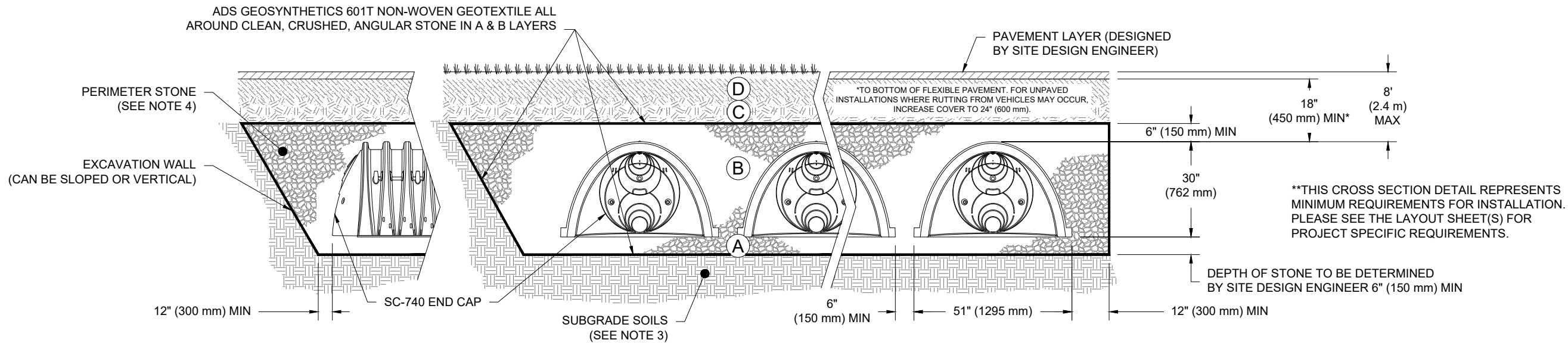


ACCEPTABLE FILL MATERIALS: STORMTECH SC-740 CHAMBER SYSTEMS

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

PLEASE NOTE:

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



NOTES:

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

90 MAPLEVIEW DR. WEST

BARRIE, ON.

DATE:	09/28/21	DRAWN:	RCT
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DESCRIPTION

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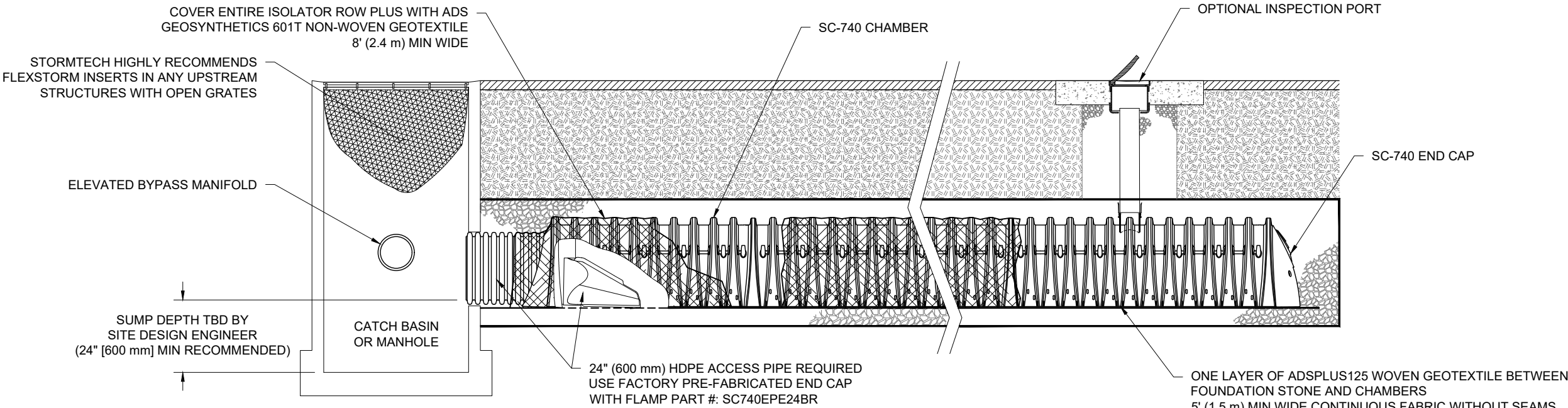
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StormTech®
Chamber System

888-892-2694 | WWW.STORMTECH.COM

4640 TRUEMAN BLVD
HILLIARD, OH 43026

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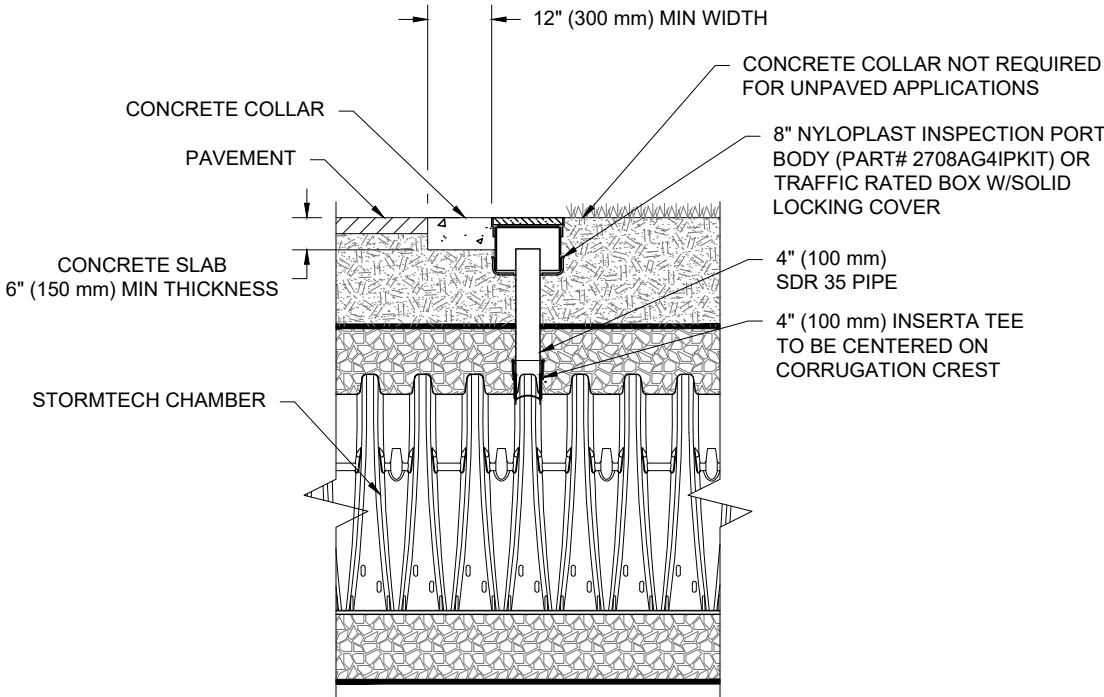
SC-740 ISOLATOR ROW PLUS DETAIL
NTS

INSPECTION & MAINTENANCE

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

NOTES

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.



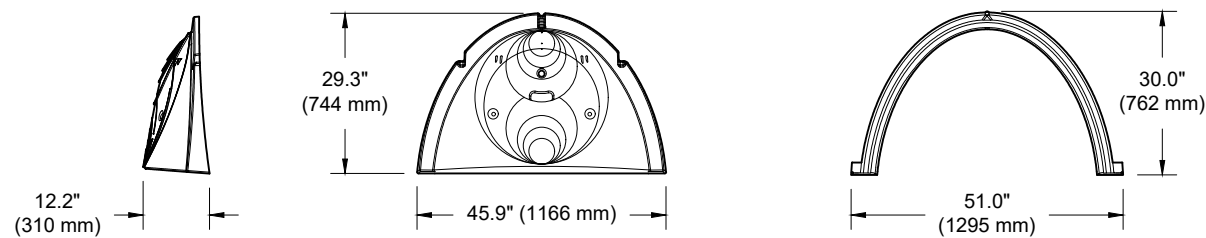
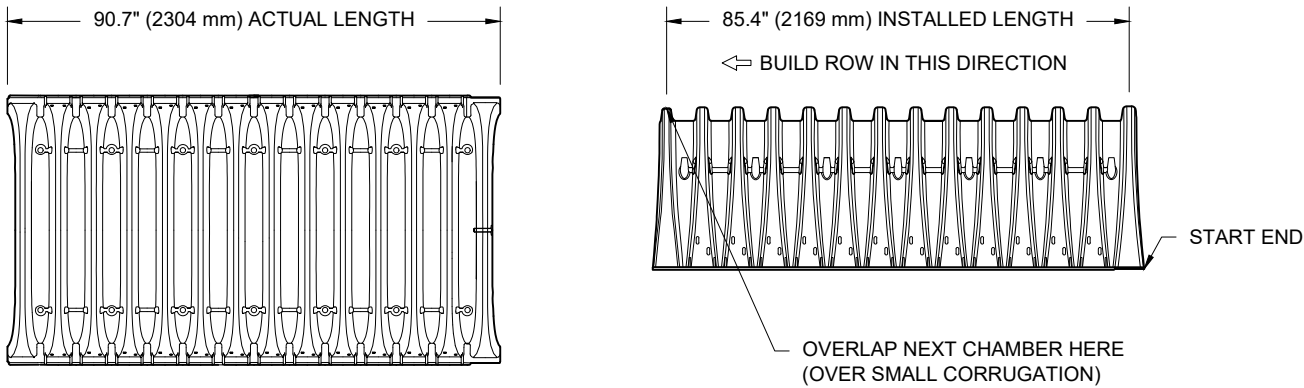
NOTE:
INSPECTION PORTS MAY BE CONNECTED THROUGH ANY CHAMBER CORRUGATION CREST.

4" PVC INSPECTION PORT DETAIL
(SC SERIES CHAMBER)
NTS

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DATE:	09/28/21	DRAWN:	RCT
PROJECT #:	S260345	CHECKED:	RCT
DESCRIPTION		DRWN	CHKD
DATE			
ADS 4640 TRUEMAN BLVD HILLIARD, OH 43026 StormTech® Chamber System 888-892-2694 WWW.STORMTECH.COM			
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SC-740 TECHNICAL SPECIFICATION

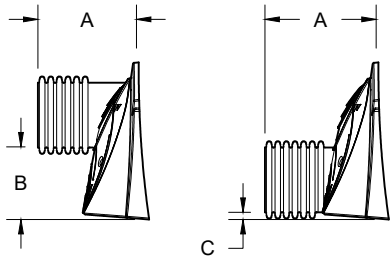
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NOMINAL CHAMBER SPECIFICATIONS

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

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



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

PART #	STUB	A	B	C
SC740EPE06T / SC740EPE06TPC	6" (150 mm)	10.9" (277 mm)	18.5" (470 mm)	---
SC740EPE06B / SC740EPE06BPC			---	0.5" (13 mm)
SC740EPE08T / SC740EPE08TPC	8" (200 mm)	12.2" (310 mm)	16.5" (419 mm)	---
SC740EPE08B / SC740EPE08BPC			---	0.6" (15 mm)
SC740EPE10T / SC740EPE10TPC	10" (250 mm)	13.4" (340 mm)	14.5" (368 mm)	---
SC740EPE10B / SC740EPE10BPC			---	0.7" (18 mm)
SC740EPE12T / SC740EPE12TPC	12" (300 mm)	14.7" (373 mm)	12.5" (318 mm)	---
SC740EPE12B / SC740EPE12BPC			---	1.2" (30 mm)
SC740EPE15T / SC740EPE15TPC	15" (375 mm)	18.4" (467 mm)	9.0" (229 mm)	---
SC740EPE15B / SC740EPE15BPC			---	1.3" (33 mm)
SC740EPE18T / SC740EPE18TPC	18" (450 mm)	19.7" (500 mm)	5.0" (127 mm)	---
SC740EPE18B / SC740EPE18BPC			---	1.6" (41 mm)
SC740EPE24B*	24" (600 mm)	18.5" (470 mm)	---	0.1" (3 mm)
SC740EPE24BR*	24" (600 mm)	18.5" (470 mm)	---	0.1" (3 mm)

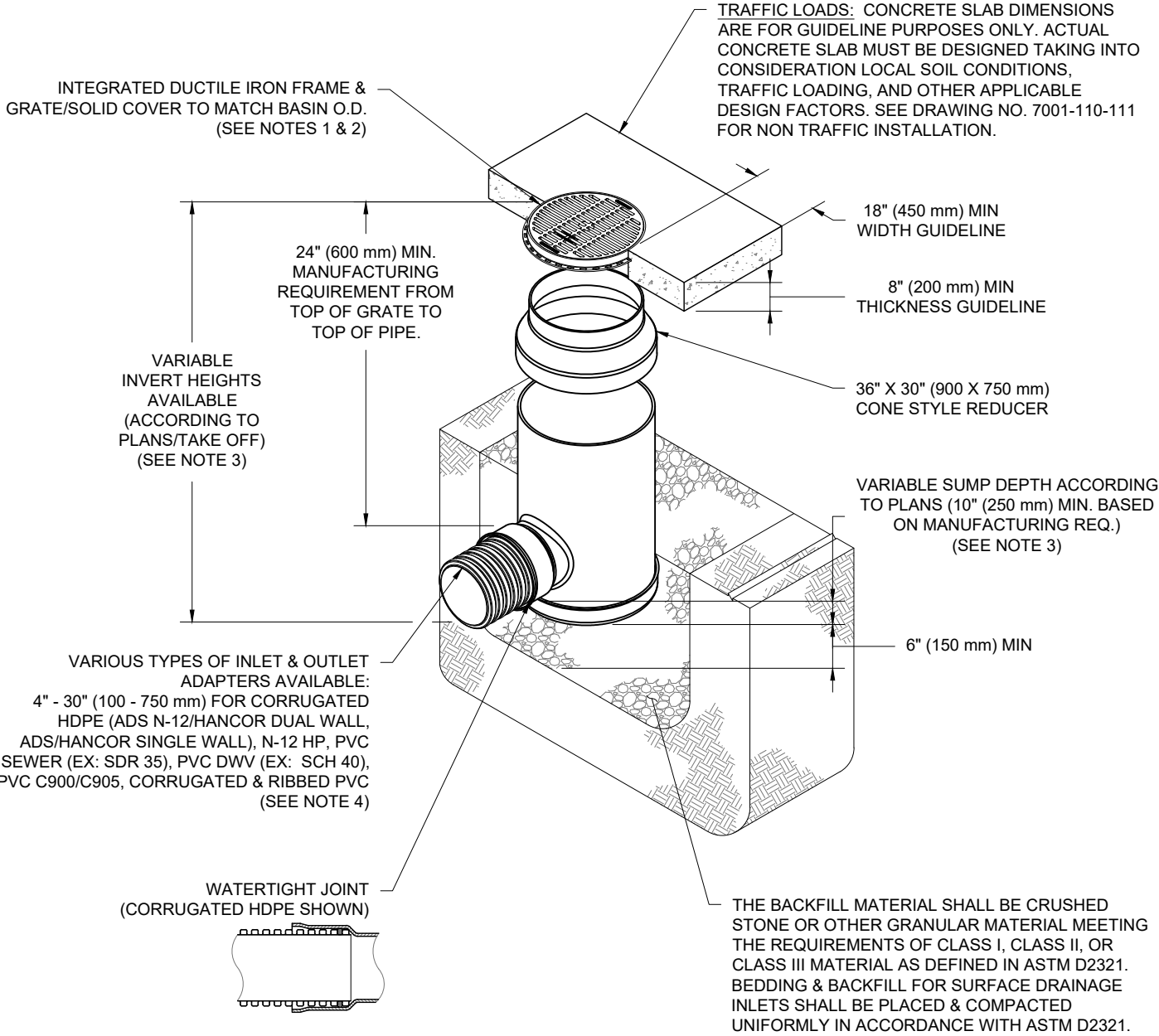
ALL STUBS, EXCEPT FOR THE SC740EPE24B/SC740EPE24BR ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

* FOR THE SC740EPE24B/SC740EPE24BR THE 24" (600 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 1.75" (44 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

NOTE: ALL DIMENSIONS ARE NOMINAL

36" (900 mm) NYLOPLAST DRAIN BASIN

NTS



NOTES

- GRATES/SOLID COVER SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05.
- FRAMES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05.
- DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS. RISERS ARE NEEDED FOR BASINS OVER 84" (2.13 m) DUE TO SHIPPING RESTRICTIONS. SEE DRAWING NO. 7001-110-065.
- DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS N-12/HANCOR DUAL WALL), N-12 HP, & PVC SEWER.
- ADAPTERS CAN BE MOUNTED ON ANY ANGLE 0° TO 360°. TO DETERMINE MINIMUM ANGLE BETWEEN ADAPTERS SEE DRAWING NO. 7001-110-012.

GRATE OPTION	LOAD RATING	PART #	DWG #
PEDESTRIAN	MEETS H-20	3099CGP	7001-110-220
STANDARD	MEETS H-20	3099CGS	7001-110-221
SOLID COVER	MEETS H-20	3099CGC	7001-110-222
DOME	N/A	3099CGD	7001-110-223

90 MAPLEVIEW DR. WEST

BARRIE, ON.

DATE: 09/28/21

DRAWN: RCT

PROJECT #: S200345

CHECKED: RCT

DESCRIPTION

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ADS

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