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5494-5510 Boundary Road
Day and Ross

Servicing and Stormwater Management Report

SERVICING AND STORMWATER MANAGEMENT REPORT

5494-5510 BOUNDARY ROAD
DAY AND ROSS
OTTAWA, ONTARIO.

Prepared By:

NOVATECH
Suite 200, 240 Michael Cowpland Drive
Kanata, Ontario
K2M 1P6

October 3, 2024
Revised: November 14, 2025
Revised: February 19, 2026
Revised: April 23, 2026

Novatech File: 118168
Ref No. R-2024-09

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Engineers, Planners & Landscape Architects

April 23, 2026

City of Ottawa
Planning Infrastructure and Economic Development Department
110 Laurier Avenue West, 4th Floor
Ottawa, ON
K1P 1J1

Attention: Kevin Hall, C.E.T.

Dear Mr. Hall

Reference: 5494-5510 Boundary Road
Ottawa, ON
Servicing and Stormwater Management Report
Our File No. : 118168

Please find enclosed the 'Servicing and Stormwater Management Report' for the above noted development. This report has been revised as per SNCA comments and is hereby resubmitted for review in support of the Site Plan Application for the proposed development.

Should you have any questions or require additional information, please contact the undersigned.

Yours truly,

NOVATECH

Matt Hrehoriak, P.Eng.
Project Manager | Land Development Engineering

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1.0 INTRODUCTION

Novatech has been retained to prepare a Servicing and Stormwater Management Report for the proposed development located at 5494-5510 Boundary Road within the City of Ottawa. This report will support a Site Plan Application for the subject development. **Figure 1** Key Plan shows the site location.

2.0 EXISTING CONDITIONS

The subject site is approximately 8.5 hectares in size and is currently undeveloped. The site is generally covered with areas of tall grass and bare soil, bordered by wooded areas. There are two existing gravel entrances to the site from Boundary Rd. The topography of the site is relatively flat with general drainage to perimeter watercourse. There is ponding water along the north property line which is a result of extensive grade changes on the site over the past approximately 20 years. It is our understanding that the site was previously used as a pit where the native sand material was removed and replaced with miscellaneous fill material. The grade changes on site have trapped water on site from outletting to the roadside ditch on Boundary Road. **Figure 2** shows the existing site conditions.

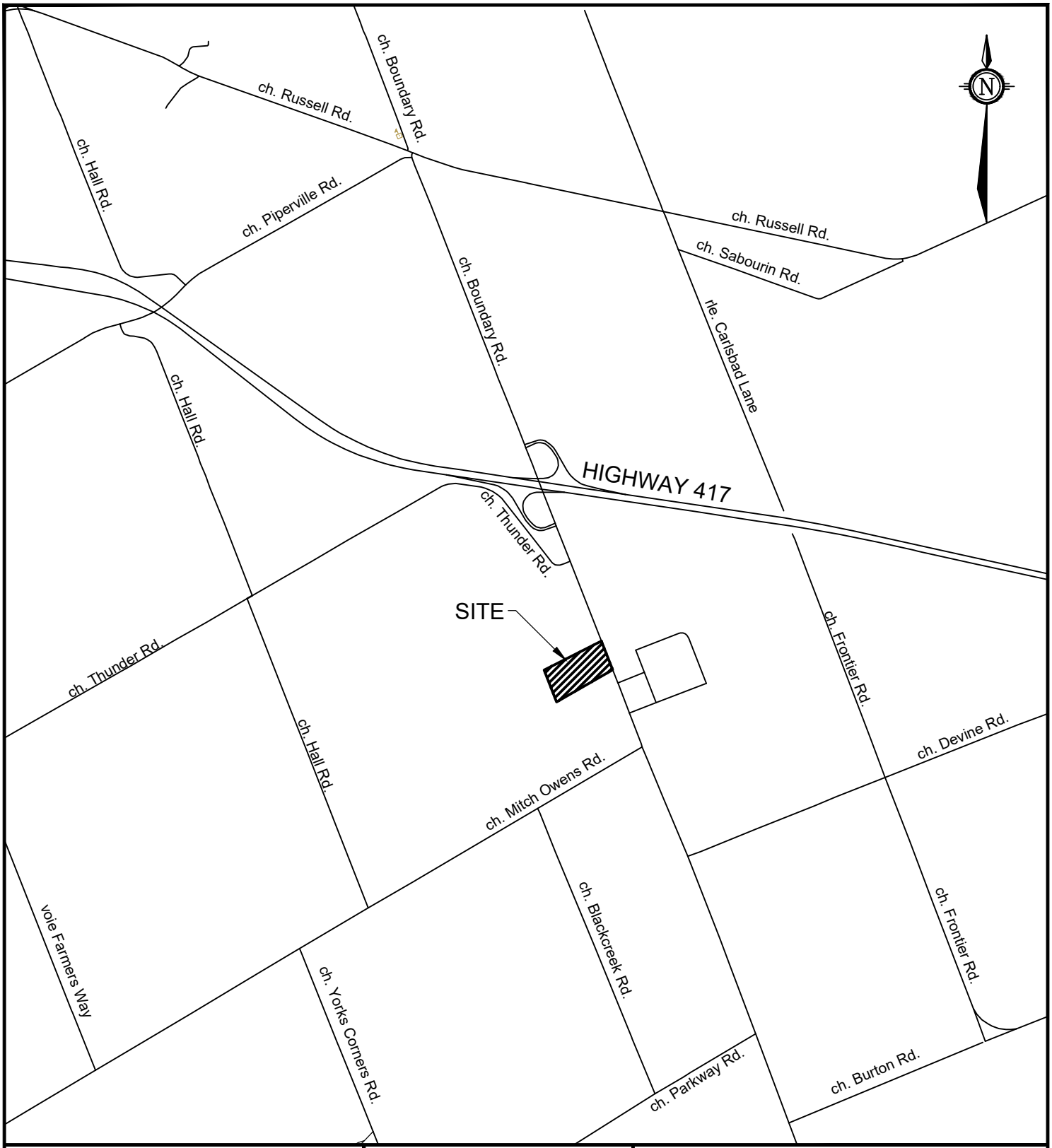
3.0 PROPOSED DEVELOPMENT

It is proposed to develop the site with a cross-dock facility with 3,758m² of industrial floor space and 642m² of office floor space. The cross-dock facility will consist of 72 loading bays and will include associated secured truck and trailer parking. The office component will include associated car parking lots fronting the development. It is proposed to access the development from two paved entrances from Boundary Road. **Figure 3** shows the proposed development site plan.

4.0 SITE CONSTRAINTS

A geotechnical investigation was completed for the subject development and a report provided entitled 'Geotechnical Investigation Proposed Warehouse Complex – 5510 Boundary Road Ottawa, Ontario' prepared by Paterson Group dated September 10, 2018. The following is a summary of the findings of this report:

- From available geological mapping the bedrock is shale and at depth of 25-35m below ground surface.
- Groundwater levels are expected to be 2-3m below existing ground surface.
- A category 3 permit to take water (PTTW) may be required during construction if more than 400,000 L/day of surface and/ or ground water is to be pumped during the construction phase. A time allowance of 4-5 months is required to obtain a permit from the Ministry of Environment Conservation and Parks MECP.
- For typical ground and/ or surface water pumping (50,000-400,000 L/day) during construction a MECP permit to take water (PTTW) and registry with the Environmental Activity and Sector Registry (EASR) is required. A time allowance of 2-4 weeks should be allocated to complete the EASR registry and PTTW discharge plan.
- Due to the presence of a silty clay deposit, the site will be subject to a permissible grade raise restriction. It is anticipated that due to time constraints a surcharge program is not realistic and lightweight fill and granular material will be required on site to manage long-term settlement.



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KEY PLAN
5510 BOUNDARY ROAD
CITY OF OTTAWA

5510 BOUNDARY ROAD

DATE	JOB	FIGURE
NOV 2025	118168	1

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SHT8X11.DWG - 216mmx279mm

LEGEND

— — —	PROPERTY LINE
— — —	EXISTING TOP OF BANK
— · — · —	EXISTING DITCH
═ ═ ═	EXISTING CULVERT
77.00	CONTOUR LINES

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5510 BOUNDARY ROAD

EXISTING CONDITIONS

SCALE	DATE	JOB	FIGURE
1 : 1250	NOV 2025	118168	2

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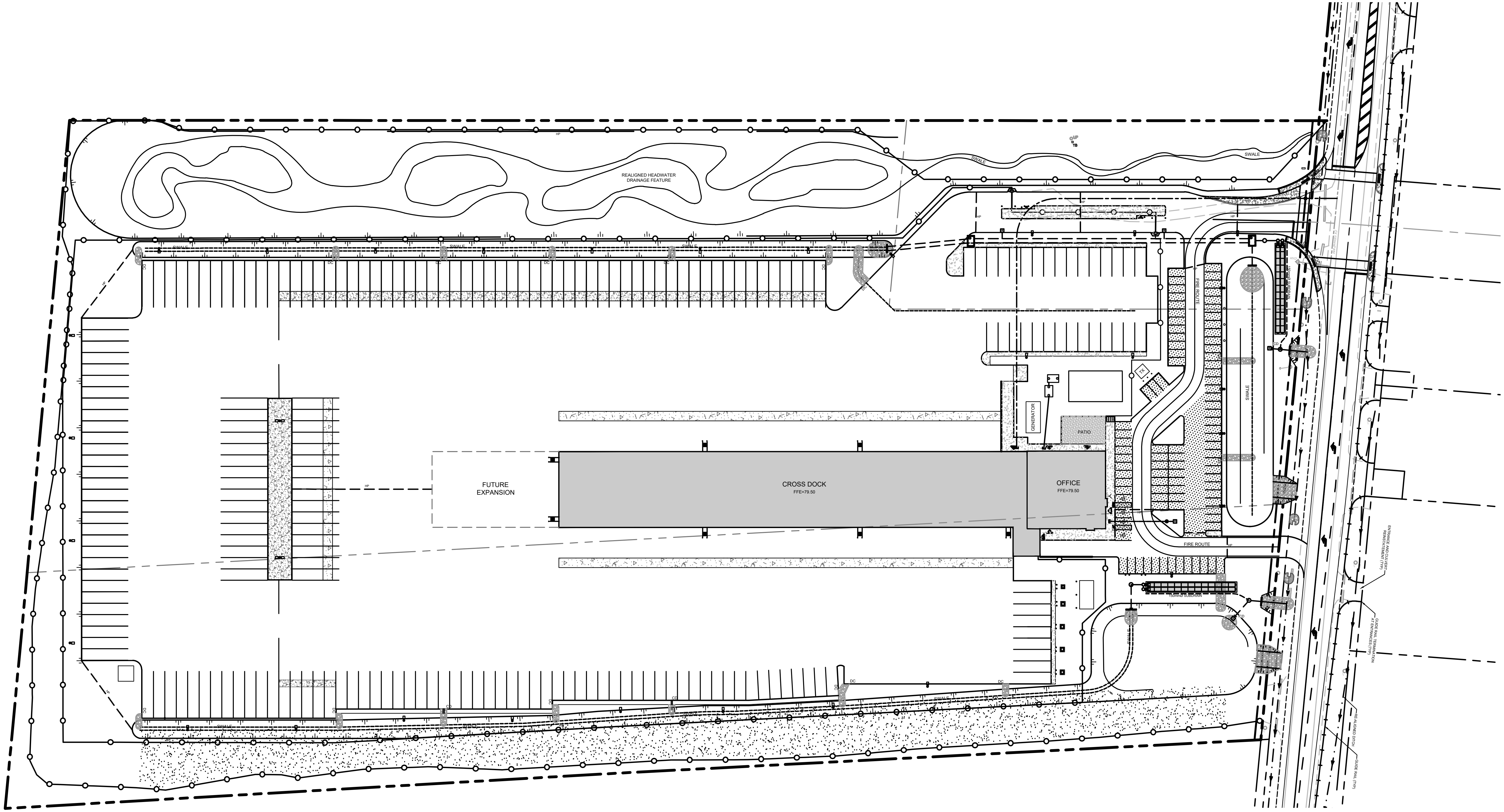

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5510 BOUNDARY ROAD

PROPOSED SITE PLAN

SCALE 1 : 1250 (0 10 20 30 40 50)

DATE	JOB	FIGURE
NOV 2025	118168	3

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SHT11X17.DWG - 279mmX432mm

  - A permissible grade raise of 1.0-1.2m is recommended for slab-on-grade using 400mm EPS geofoam blocks to compensate for sustained slab on grade loading.
  - A permissible grade raise of 1.4m is recommended for parking and loading areas away from the building foundations.
- It is recommended to limit plantings around structures and provide clay dikes on service trenches to reduce long term ground water lowering.
- Catchbasins are to be equipped with subdrains extending in four orthogonal directions and longitudinally when placed along curbs. Subdrains are to be placed 300mm below the subgrade level. Subgrade is to be shaped to promote water flow to the subdrains.

A subsequent memo was prepared by Paterson Group entitled 'Settlement Surcharge Monitoring Program Proposed Commercial development – 5510 Boundary Road, Ottawa, Ontario' dated August 12, 2024. The settlement surcharge memo outlines the requirements for surcharging the site to reduce and/or remove the requirements for lightweight fill on site. The following is a summary of the settlement surcharge program requirements:

- Surcharge pile to be constructed to a geodetic elevation of 81.50m and extend 2.4m horizontally beyond the limits of the building foundation.
- The surcharge pile will be constructed from imported granular material, placed in maximum 300mm thick loose lifts and compacted with the tracks of the leveling equipment.
- 4 settlement plates will be installed at the underside of footing elevation, 1 temporary benchmark settlement plate will be installed 1.8m below existing ground level a minimum of 30m away from the surcharge pile.
- Settlement monitoring surveys will be conducted monthly using a high accuracy, digital level.
- It is anticipated that a total of 18 months will be required to complete the settlement monitoring program.

An environmental impact study was completed for the subject development and a report provided entitled 'Environmental Impact Statement and Tree Conservation Report (EIS/TCR) – 5494-5510 Boundary Road Ottawa, Ontario' prepared by Holly Bickerton, BASc, MES. dated February 15, 2021, updated November 9, 2021. The subject site is designated as a Rural Natural Feature Area in the Official Plan. The EIS/TCR was required to determine that no negative impacts will occur to any natural heritage features on or within 120m of the property. The following is a summary of the findings of this report:

- There are no provincially significant or local wetlands on the subject site however, local wetlands exist to the north and south. Mitigating setbacks of 45m will be employed adjacent to wetlands.
- There are no species at risk observed within 120m of the site. Two regulated species the Bank Swallow and Barn Swallow were observed on site.
- The permanent headwater drainage features around the perimeter of the site are considered significant wildlife habitat as snapping turtle were observed on site.
- Fish habitats were observed on site and will be maintained in the proposed development. A proposed 15m setback will be maintained from limits of the fish habitat to the proposed development.
- Significant woodlands are present to the north and south of the site which are to be protected by restored naturalized setbacks.

- Any tree clearing on site is to occur outside the bird breeding season (April 15 – August 15) unless authorized by a qualified biologist.
- By implementing the mitigation measures identified in the EIS/TCR, the proposed development will have no negative impacts on the ecological features and functions of the applicable natural heritage features.

An Environmental Impact Statement Fisheries Component was prepared by Bowfin Environmental Consulting Inc. dated April 2021, updated November 2021. Several potential fish habitats were identified on site, generally confined to the perimeter and were likely a result of the fill brought to site by the previous owner. These features are part of the Upper Bear Brook sub watershed which is tributary to the South Nation River. The Fisheries Impact Statement outlines the potential impacts to fish and fish habitat and the required mitigation measures. The following is a summary of the findings of this report:

- Eight different features were identified on site plus the roadside ditch. Of these features only feature 5 along the north property line and the roadside ditch will be directly impacted by the proposed development.
- The roadside ditch will need to be piped and filled in for a portion of the ditch fronting the site. The culvert will need to be designed and installed to promote fish passage.
- Feature 5 will need to be realigned out of the development area, the total area of the fish habitat will be maintained in the proposed development.
- A minimum 15m buffer will be provided from the proposed development to the existing and realigned features.
- To maintain water quantity and quality reaching all features on site an infiltration berm will be constructed in the proposed conveyance ditches to promote filtration of water to the existing features.
- All in water works are required to be completed outside fish spawning periods (work between July 1 and March 14).

A subsequent report titled Environmental Impact Statement Update was prepared by CIMA+ dated October 3, 2024. The report was prepared for the recent updates to the Site Plan application and to update the mitigation measures to current guidelines. The following is a summary of the findings of this report:

- Consultation with DFO is required prior to any disturbance to the fish habitat.
- A complete flora Species at Risk inventory must be completed no earlier than 2 years prior to construction.
- Butternut and Black Ash inventories must be completed at the appropriate time of year.
- As a condition of Site Plan Approval, review and update the list of avoidance and mitigation measures, as needed, at the time of construction.

The City of Ottawa has recently adopted Zoning By Law 2024-238, which has rezoned the developable area of the Site to RG-Rural Geneal Industrial which permits the proposed cross-dock facility. The rezoning also captures and designates the realigned headwater feature along the northern property limits and the setback to the wetland on the neighboring property to south as Open Space O1R Zone. The proposed development respects the required setbacks as per the Zoning Amendment.

5.0 WATER SERVICING

There is an existing 100mm dia. municipal watermain in Boundary Road which terminates in front of the proposed site. This existing watermain infrastructure is part of the Carlsbad Springs Trickle Feed Water System which was recently extended to service the Amazon distribution facility to the north of the site. This municipal water system would provide potable water for domestic use only.

The domestic water supply to the facility from the Carlsbad water system will be 3 Equivalent connections: 2,700L/Day x 3 = 8,100/ Litres/day [5.63l/min continuous flow]. The water meter and flow control valve will be designed to accommodate this continuous flow rate while not exceeding it.

It is proposed to service the development by connecting to the existing 100mm dia. watermain in Boundary Road and extending a 50mm dia. private watermain into the site. The 50mm water service will supply the internal water system which consists of a domestic water storage tank, booster pump and pressure tank to maintain the internal operating pressures while not exceeding the equivalent connection flow rate. The domestic water will be re-chlorinated on site prior to being distributed though the internal plumbing system to mitigate any potential stagnation in the Carlsbad water system or the onsite water storage tank. Refer to the Water Entry Room figure in **Appendix A** for details on the internal water system configuration.

Design Criteria from Section 4 of the City of Ottawa Water Distribution Guidelines and Section 8 of the Ontario Building Code were used to calculate the theoretical water demands for the proposed development. The average water demand for the proposed development is calculated as follows:

Average Day Water Demand

The water demand is calculated for a total of 34 employees at the facility, which includes office and cross-dock workers.

29 cross-dock employees
Average demand per employee = 125 Litres/day (includes shower allotment)

5 office employees
Average demand per employee = 75 Litres/day

(29 x 125) + (5 x 75) = 4,000 Litres/day

There will also be miscellaneous external hose bib use throughout the day. Assuming a combined hose bib allowance of 1.5 hrs./day at a rate of 20 Litres/min, the average day flows are calculated as follows:

1.5 hrs/day. x 20Litres/minute = 1,800 Litres/day

It should be noted that hose bibs supplied directly from the Carlsbad municipal water system are not to be used for irrigation, truck washing or firefighting.

Average Day Summary

Employee use + hose bibs
4,000 Litres/day + 1,800 Litres/day
= 5,800 Litres / day

Fire Suppression

As previously indicated, the Carlsbad system will not provide fire suppression for the development. Fire suppression will be provided by a 400m³ underground storage tank located under the office component of the building. The required fire flows for the development were calculated based FM Global criteria to be 97.8L/s (1550GPM). The flow rate accounts for a 1300GPM sprinkler requirement and a 250GPM hose allowance. As per the FM Global criteria the required fire flow will need to be provided for a minimum duration of 60 minutes which equates to a required water storage volume of 352m³ (93,000 gallons). The fire flow requirements for the development were also calculated using the FUS and NFPA methods, a comparison of the flow and storage requirements is provided below in **Table 5.1**.

Table 5.1: Fire Protection Requirement Comparison

Fire Protection Method	Fire Flow (LPS)	Duration (min)	Storage Volume (m³)
FM Global	97.8	60	352
Fire Underwriter Survey - FUS	133.0	120	960
National Fire Protection Association - NFPA	90.4	90	488

In the event of a fire, the fire department will draw water from the storage tank to pressurize the internal fire suppression system. A Siamese connection will be located near the main entrance of the office and a dry hydrant will be located along the fire route in the landscaped island fronting the building. The dry hydrant will be provided as per City of Ottawa Standard detail W54. Refer to the General Plan of Services (118168-GP) for additional details.

Based on the preceding it can be concluded that the municipal water supply along with the internal water system as designed, will provide adequate system pressures and flow for the domestic demand and the water storage tank will provide an adequate volume of water to meet the fire suppression requirements of the development.

6.0 SANITARY SERVICING

There is currently no existing municipal sanitary sewer fronting the development in Boundary Road as the development is not located within the City of Ottawa sanitary service area. A private onsite septic system is proposed to service the development as the daily flow rates are less than 10,000 L/day. The septic system was designed by Paterson Group for a total peak flow of 4,000L/day. Paterson has designed a Waterloo Biofilter system for the site, design drawings and details of the system are provided in **Appendix B** for reference.

7.0 STORM SERVICING & STORMWATER MANAGEMENT

There is no municipal storm sewer fronting the development. As previously indicated, the site currently sheet drains to a perimeter watercourse which outlets to the existing Boundary Road ditch. The storm drainage system has been designed to ensure there will be no negative impacts to the provincially significant wetland (PSW) northwest of the development, the realigned headwater feature along the northern property limits and the wetland to the south.

It is proposed to service the development with a perimeter swale system that will collect and convey surface runoff to two dry ponds which will attenuate peak flows from the site to pre-development levels prior to discharging to the Boundary Road ditch. Storm runoff from the site will not be conveyed to the PSW, the realigned headwater feature or the wetland to the south. The proposed storm drainage system has been sized to ensure no surface ponding on the paved surfaces during storms up to and including the 2-year event, and that all storm runoff is directed to the roadside ditch and not the realigned headwater feature or wetlands adjacent to the site during all storms up to and including the 100-year event. Refer to the General Plan of Services (118168-GP) for details on the storm servicing design.

7.1 Existing Drainage Conditions

As previously stated, the site in its current condition is relatively flat with general drainage to perimeter swales at the property limits. There is currently no municipal storm sewer fronting the development on Boundary Road. Boundary Road is a rural cross-section which includes roadside ditches on both sides of the road. Most of the site currently drains to the existing roadside ditch on Boundary Road. Refer to **Figure 4** in **Appendix C** for the Pre-Development Drainage Area Plan.

7.2 Stormwater Management Criteria

The stormwater management criteria and objectives for the site are as follows, per the City of Ottawa's requirements. For storm runoff directed to the Boundary Road ditch:

- Control post-development peak flows to pre-development levels for all storms up to and including the 100-year event.
- Provide a dual drainage system (i.e. minor and major system flows).
- Ensure that no surface ponding will occur on the paved surfaces during the 2-year storm event.
- Provide on-site water quality control equivalent to an 'Enhanced' Level of Protection (i.e., minimum 80% long-term TSS removal).
- Provide guidelines to ensure that site preparation and construction is in accordance with the current Best Management Practices for Erosion and Sediment Control.

7.3 Proposed Stormwater Management System

To effectively manage the post-development storm runoff from the site, the following measures are being proposed:

- Controlled flow roof drains will be provided to attenuate storm runoff from the roof area and to effectively utilize the roof storage. Roof leaders will discharge controlled flows to the surface on the south side of the building.
- Swales were designed around the north and south boundaries of the site to ensure efficient conveyance of stormwater and to provide sufficient storage capacity. It should be

noted that the perimeter swales have been designed below the MOE minimum slope criteria due to the shallow storm outlet (Boundary Road ditch) and the very flat topography of the site. As outlined in Section 4.0 of the report the site has a strict grade raise restriction that limits the potential to raise the site to achieve the MOE minimum preferred slope of 0.5%. Any standing water in the swales will be mitigated through infiltration in the native sand layer below the swales. More frequent maintenance will be required to ensure sediment buildup is cleaned out regularly to ensure proper conveyance due to the lower flow velocities.

- Depressed curb spillways have been provided along the curb in the parking lot and truck court to convey sheet drainage from the pavement surface to the perimeter swales. Each subcatchment in the PCSWMM model outlets to a storage node that represents the surface storage in parking lot locally at each depressed curb. The stage-storage curves representing the parking lot surface storage were generated by surface contours from the Civil 3D surface model.
- Two dry ponds were strategically located at the downstream end of the north and south swale systems to effectively control peak flows to pre-development levels during all storms up to and including the 100-year event. The stage-storage curves for each pond were generated by surface contours from the Civil 3D surface model.
- An open-ended storm sewer system is proposed to convey stormwater from the north swale under the main driveway entrance to the north dry pond.
- Each pond was designed with a low flow outlet pipe directing the first flush flows to an Oil Grit Separator (OGS) unit and StormTech Isolator Row PLUS (IR+) chamber system to provide treatment.
- A major overland flow route will be provided for storms greater than the 100-year event and is shown on the Grading Plan (118168-GR).

It should be noted that the outlet elevation in the roadside ditch doesn't allow for adequate cover on the storm pipes to meet frost protection requirements. The storm sewers will require insulation over the pipe to provide frost protection for the pipe bedding.

7.4 Stormwater Management Modeling

7.4.1 Pre-Development

A technical memorandum was prepared by Novatech titled *Proposed Warehouse Complex, 5510 Boundary Road, Supplemental SWM Modeling Information*, dated October 5, 2020. This memo provides detailed hydrologic modeling of the existing site conditions and the pre-development release rates for the proposed site. The memo is provided in **Appendix D** for reference. The allowable release rates in the 2020 memo were based on an assumed development area of 6.94 ha; however, the development area has been since reduced to 6.14 ha due to increased development setbacks. The allowable release rate for the development has been revised to account for the development area reduction. A summary of the pre-development peak flows is provided in **Table 7.1**.

Table 7.1: Summary of Adjusted Pre-Development Peak Flows

Area ID	Drainage Area (ha)	Peak Flow (L/s)		
		2-year	5-year	100-year
PRE	6.14	118	188	445

7.4.2 Post-Development

The City of Ottawa Sewer Design Guidelines (October 2012) requires hydrologic / hydraulic modeling for all dual drainage systems. The performance of the proposed storm drainage system was evaluated using the PCSWMM model for this site. The results of the analysis were used to:

- Determine the total post-development runoff from the proposed site.
- Determine the required storage volumes for the proposed ponds.

A PCSWMM model has been prepared as part of this design submission. Model schematics and output files are provided in **Appendix C** for reference.

7.4.2.1 Design Storms

The hydrologic / hydraulic analysis was completed using the following synthetic design storms and historical storms. The IDF parameters used to generate the design storms were taken from the City of Ottawa Sewer Design Guidelines (October 2012).

Chicago Storms:

2-year 3-hour storm
5-year 3-hour storm
100-year 3-hour storm
100-year+20% 3-hour storm

SCS Type II Storms:

2-year 12-hour storm
5-year 12-hour storm
100-year 12-hour storm

Historical Storms:

July 1, 1979 storm
August 4, 1988 storm
August 8, 1996 storm

The 3-hour Chicago distribution generates the highest peak flows for both the minor and major systems and was determined to be the critical storm distribution for the design of the storm drainage system.

The proposed drainage system was also stress tested using a 3-hour Chicago design storm that has a 20% higher intensity and total volume compared to the 100-year event. The stress test and historical storm events were used to analyze how the drainage system functions under extreme conditions and ensure that there would be no severe flooding.

7.4.2.2 Modeling Parameters

The hydrologic parameters for each subcatchment were developed based on the proposed land use and grading. Subcatchments were modeled using the standard SWMM5 runoff module with Horton's Equation for infiltration. A table of the subcatchment parameters is provided in **Appendix C**.

Infiltration

Infiltration losses for all subcatchments were modeled using Horton's infiltration equation, which defines the infiltration capacity of soil over the duration of a precipitation event using a decay function that ranges from an initial maximum infiltration rate to a minimum rate as the storm progresses. The default values for the City of Ottawa were used for all catchments.

Horton's Equation:
$f(t) = f_c + (f_o - f_c)e^{-k(t)}$

Initial infiltration rate: f_o = 76.2 mm/hr
Final infiltration rate: f_c = 13.2 mm/hr
Decay Coefficient: k = 4.14/hr

Depression Storage

The default values for depression storage in the City of Ottawa were used for all catchments. Rooftops were assumed to provide no depression storage (zero-impervious parameter).

- Depression Storage (pervious areas): 4.67 mm
- Depression Storage (impervious areas): 1.57 mm

Equivalent Width

'Equivalent Width' refers to the width of the subcatchment flow path. This parameter is calculated as described in Section 5.4.5.6 of the *City of Ottawa Sewer Design Guidelines* (October 2012).

Impervious Values

Runoff coefficients for each subcatchment were determined based on the proposed site plan. Percent impervious values were calculated using the following equation:

$$\%imp = (C - 0.20) / 0.70$$

7.4.2.3 Model Results

Peak Flows

A summary of the post-development peak flows from the site is provided in **Table 7.2**. The peak flows are based on the 3-hour Chicago storm distribution as the pre-development peak flows were established using this distribution. As shown in the table, post-development peak flows will be controlled to pre-development levels.

Table 7.2: Summary of Post-Development Peak Flows

Location	Contributing Area (ha)	Peak Flow (L/s)		
		2-year	5-year	100-year
North System				
150mm StormTech Subdrain	3.04	34	37	37
DICB 3 – 152mm Orifice		34	39	38
Weir/Spillway*		0	0	269
South System				
150mm StormTech Subdrain	2.99	30	31	39
DICB 4 – 83mm Orifice		9	10	12
Weir/Spillway*		0	0	14
Direct Runoff				
DR-01	0.11	10	19	45
Total**	**6.14**	**105**	**117**	**380**
Allowable	**6.14**	**118**	**188**	**445**

**Provided by a depression in the pond berm.*
***Calculated by adding the hydrographs at junctions 'HW-3' and 'HW-5' (accounts for timing of peak flows).*

The flows entering the StormTech chambers will filter through the ADS Plus fabric at the base of the chambers and into the underlying stone layer. A 150mm subdrain will be installed within the underlying stone layer and will connect to the downstream manhole and outlet pipe discharging to the Boundary Road ditch. The outlet from the chambers has been modeled as a 150mm diameter orifice representing the subdrain.

Dry Ponds

The water levels and storage volumes in the dry ponds are summarized in **Table 7.3**. The results presented are based on the 3-hour Chicago storm distribution.

Table 7.3: Summary of Pond Water Levels & Storage Requirements

Pond	Water Level (m)			Storage Volume (m^3)		
	2-year	5-year	100-year	2-year	5-year	100-year
North	77.35	77.50	77.59	342	471	559
South	77.15	77.24	77.51	313	418	765

The approximate drawdown times of the ponds based on the PCSWMM model results are summarized in **Table 7.4**. As the StormTech chambers are hydraulically connected to the dry ponds, the PCSWMM model results indicate that the drawdown times of the StormTech chambers are the same as the dry ponds to which they are connected.

Table 7.4: Dry Pond Drawdown Times

Pond	Drawdown Time (hr)		
	2-year	5-year	100-year
North	6	7	8
South	8	10	15

Stress Test

The stress test and historical storm events listed in **Section 7.4.2.1** were simulated in the PCSWMM model. It was determined that the stress test generated higher peak flows and runoff volumes than the historical storms. Based on the results of the PCSWMM model, during the stress test event, surface ponding will occur on the paved surfaces but will be localized to the depressed curb areas. The results also indicate that while the stress test flows will be contained in the south swale, there may be some overflow from the downstream end of the north swale to the realigned headwater feature to the north for a short period of time. The dry ponds have also been designed with sufficient freeboard to contain the water levels during the stress test event.

7.5 Stormwater Quality Control

Quality control of storm runoff from the site will be provided through the installation of two ADS StormTech IR+ chamber systems as well as two Hydro International First Defense High-Capacity OGS units for pretreatment. Each of the dry ponds near the outlet of the site will have low flow pipes directing runoff from the 25mm storm event to the OGS units and StormTech IR+ chambers, ensuring that all runoff from the first flush will be routed through the treatment train.

As the first flush flows through the ADS Plus fabric at the base of the chambers and into the underlying stone, sediment will be trapped on the fabric and the treated flows will outlet via 150mm subdrains within the underlying stone layer. The subdrains will connect to the downstream storm manholes (STMMH3 and STMMH4) and outlet pipes discharging to the Boundary Road ditch. The upstream ponds will have DICBs set at the approximate 25mm event water levels so that flows exceeding the 25mm event will spill into the DICBs connected to the outlet pipes discharging to the Boundary Road ditch, bypassing the StormTech IR+ chambers.

The OGS units in combination with the StormTech IR+ chamber systems will provide a net annual removal efficiency of approximately 86% while treating greater than 90% of the total runoff based on the ETV particle size distribution. Refer to **Appendix C** for detailed sizing of the OGS units and StormTech IR+ chambers. A summary of the water quality treatment unit sizing is provided in **Table 7.5**.

Table 7.5: Water Quality Treatment Unit Sizing Parameters

Location	Drainage Area (Ha)	Runoff Coefficient 'C'	OGS Model	No. of DC-780 Chambers	Total TSS Removal
North Outlet	3.04	0.81	FD-4HC	26	86.0%
South Outlet	2.99	0.79	FD-4HC	26	86.2%
TOTAL	**6.03**	**0.80**	**-**	**52**	**86.1%**

In addition to the OGS units and StormTech IR+ chamber systems, a sand berm will be constructed on the back slope of the south perimeter ditch system to promote infiltration and recharge to the existing watercourse. The sand berm will provide additional filtration treatment through infiltration of the sand layer.

7.6 Boundary Road Ditch and Culvert Capacity

As indicated in **Section 7.4.2.3**, the post-development flows from the site to the Boundary Road ditch have been reduced from pre-development conditions. However, a capacity analysis was completed using Manning's equation to verify the ditch fronting the development is adequately sized to convey the receiving runoff from the development and upstream drainage areas. The ditch was also included in the PCSWMM model to confirm its conveyance capacity. A summary of the roadside ditch capacity, design flows, and flow depths is provided in **Table 7.6**.

The boundary road ditch has a v-bottom shape, 3:1 side slopes, a 0.2% longitudinal slope, and is approximately 1.0m deep. A Manning's roughness coefficient of 0.03 was applied. As shown in the table, the Boundary Road ditch has sufficient capacity to convey runoff from the proposed development and upstream drainage areas.

Table 7.6: Boundary Road Ditch

Location	Full Flow Capacity * (L/s)	100-yr Peak Flow** (L/s)			100-yr Flow Depth*** (m)
		Controlled	Uncontrolled	Total	
Boundary Road	2,721	372	500	872	0.31 – 0.83

**Calculated using Manning's equation.*
***Controlled flow from dry ponds. Uncontrolled flow from site and external drainage areas.*
****Based on the PCSWMM model results.*

The driveway culverts (Culverts C-1 and C-2) were analyzed in the PCSWMM model. A summary of the full flow capacities, design flows, and headwater elevations are provided in **Table 7.7**.

Table 7.7: Driveway Culvert Design

Culvert ID	Culvert Size / Type	Slope (%)	Full Flow Capacity* (L/s)	Design Flow** (L/s)		Max. HW Elev.** (m)		HW/D Ratio	
				5-yr	100-yr	5-yr	100-yr	5-yr	100-yr
C-1	600mm CONC	0.2	275	147	312	76.98	77.26	0.67	1.13
C-2	600mm HDPE	0.2	275	174	403	76.90	77.23	0.83	1.38

**Calculated using Manning's equation.*
**Based on the PCSWMM model results ('Max. Total Inflow' and 'Max. HGL' at upstream nodes 'C-1_IN' and 'C-2_IN').*

As shown in the table, the driveway culverts are adequately sized to convey the 'Minor System Design Flow' (5-year) from the proposed development and upstream drainage areas as per the MTO Highway Drainage Design Standards (January 2008). The model results also indicate that

while the 100-year design flows exceed the full flow capacities of the culverts, the water levels in the roadside ditch would not overtop the roadways.

8.0 EROSION AND SEDIMENT CONTROL

Temporary erosion and sediment control measures will be implemented on-site during construction in accordance with the Best Management Practices for Erosion and Sediment Control. This includes the following temporary measures:

- Filter socks (catchbasin inserts) will be placed in existing and proposed catchbasins and catchbasin manholes and will remain in place until vegetation has been established and construction is completed.
- Silt fencing will be placed along the surrounding construction limits.
- Mud mats will be installed at the site entrances.
- Strawbale or rock check dams will be installed in swales and ditches.
- The contractor will be required to perform regular street sweeping and cleaning as required, to suppress dust and to provide safe and clean roadways adjacent to the construction site.

Erosion and sediment control measures should be inspected daily and after every rain event to determine maintenance, repair or replacement requirements. Sediments or granulars that enter site sewers shall be removed immediately by the contractor. These measures will be implemented prior to the commencement of construction and maintained in good order until vegetation has been established. Refer to the Erosion and Sediment Control Plan (Drawing 118168-ESC) for additional information.

9.0 CONCLUSIONS AND RECOMMENDATIONS

- The existing 100mm diameter dead end watermain fronting the development can service the proposed development for domestic use. A water storage tank and private fire suppression system will be installed to provide adequate volumes and flow to meet the fire demands for the proposed development.
- The site will be serviced by a private septic system. The detailed septic design has been completed by Paterson to treat a daily sewage volume of 4,000 L/day.
- The existing Boundary Road ditch can service the proposed development. Storage of stormwater will be provided on the building roof and within the perimeter swale / dry pond systems. Peak flows will be controlled to pre-development levels through the implementation of flow control roof drains and the pond outlet control structures.
- Stormwater quality control for the site will be provided through the implementation of Oil Grit Separator units combined with StormTech Isolator Row PLUS chambers to achieve 80% TSS removal using the ETV particle size distribution.
- The overland flow route to the Boundary Road ditch will be maintained.
- Erosion and sediment control measures will be implemented prior to and during construction.

10.0 CLOSURE

The preceding report is respectfully submitted for review and approval. Please contact the undersigned should you have questions or require additional information.

NOVATECH

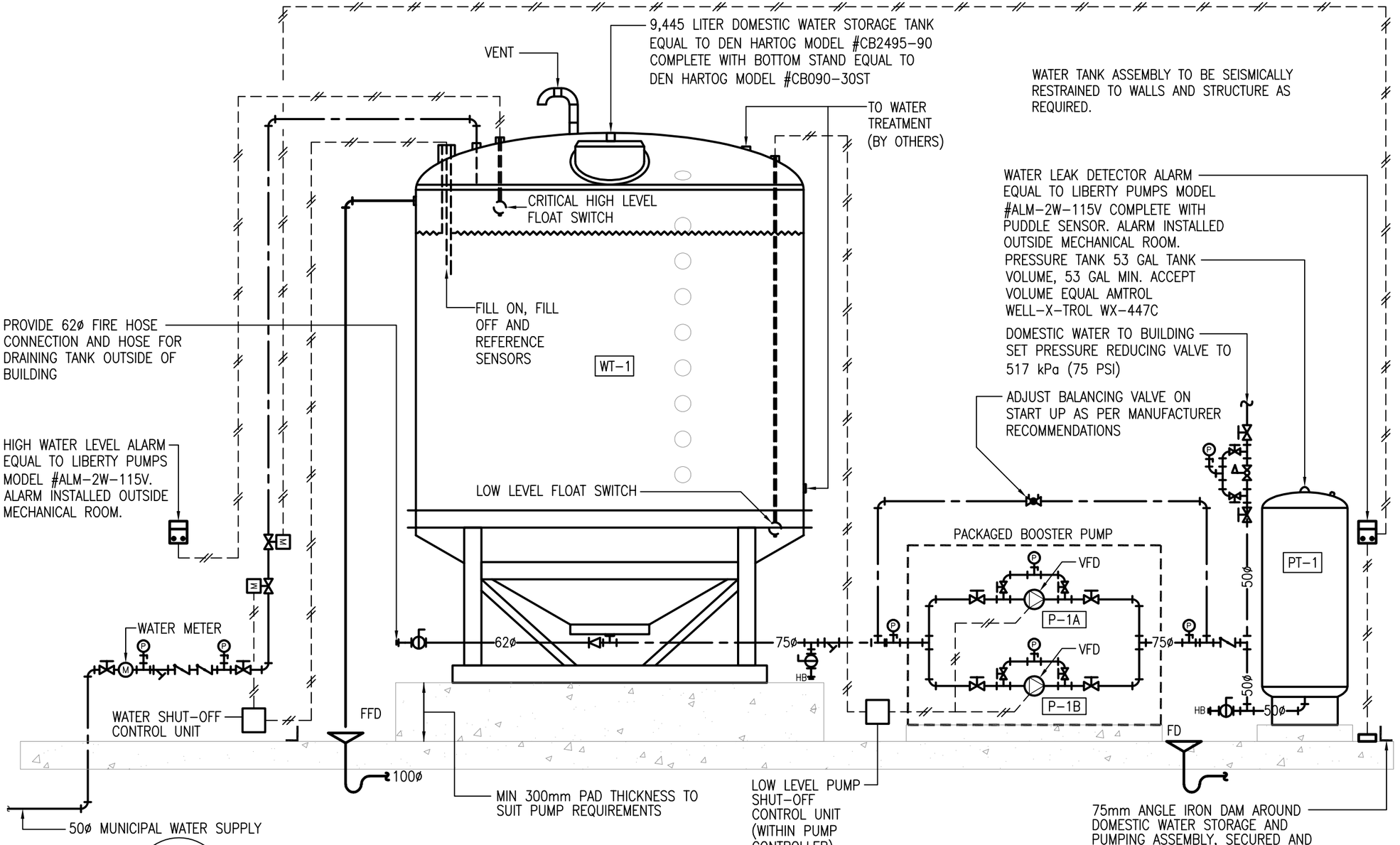
Prepared by:

Olivia Renn, P.Eng.
Project Engineer | Water Resources

Prepared / Reviewed by:

Matt Hrehoriak, P.Eng.
Project Manager | Land Development Engineering

APPENDIX A
Water Servicing Information



1 / M003 **WATER ENTRY ROOM DETAIL**

N.T.S.

NO.	REVISION	DATE
1.	ISSUED FOR SITE PLAN APPLCATION	SEPT 18/24

McKEE ENGINEERING

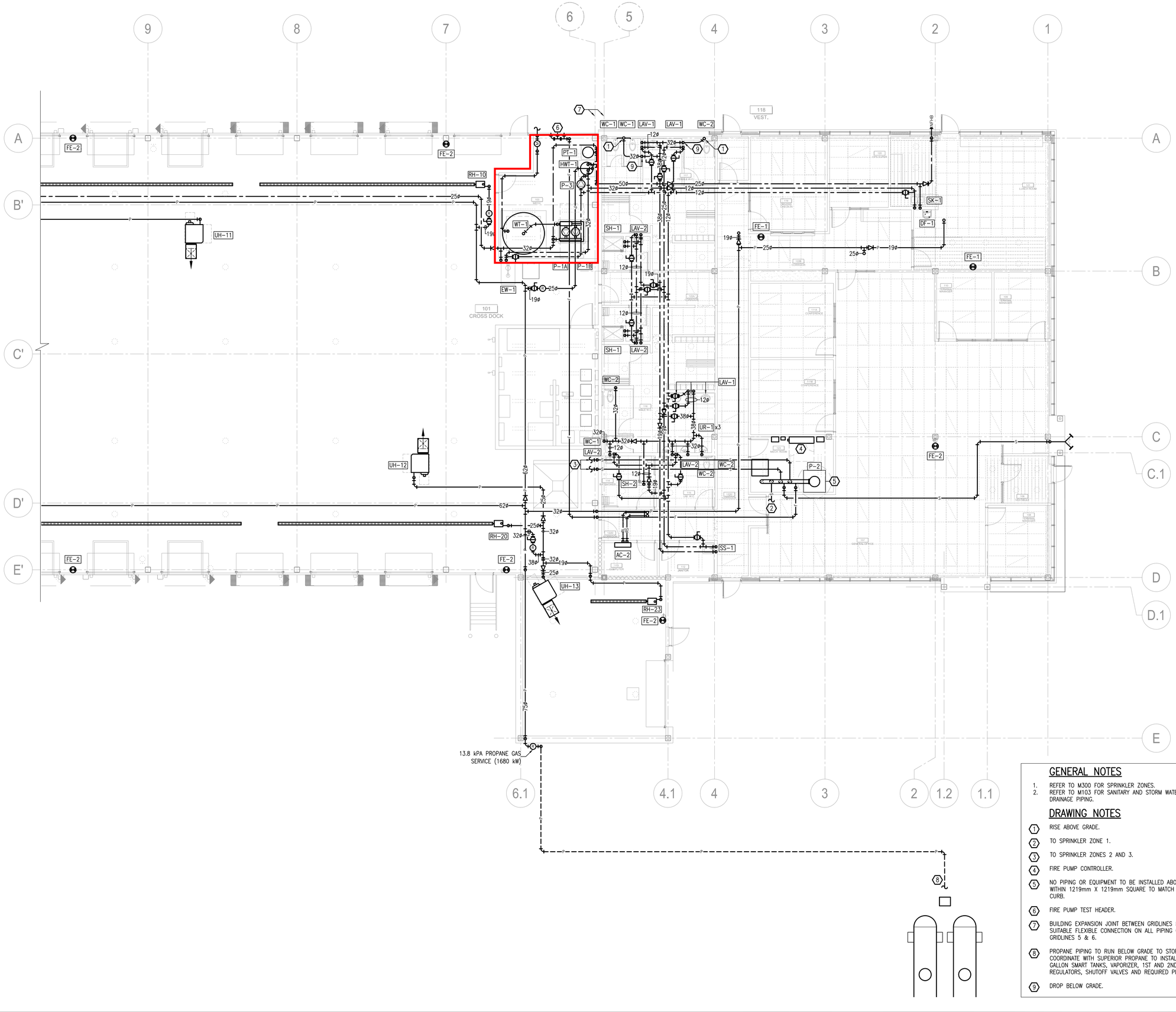
PROJECT: DAY & ROSS
5494-5510 BOUNDARY ROAD GLOUCESTER, ON

DRAWING NAME: WATER ENTRY ROOM DETAIL

SCALE: N.T.S

DRAWING No. Part of M003

JOB No. 24052



GENERAL NOTES

1. REFER TO M300 FOR SPRINKLER ZONES.
2. REFER TO M103 FOR SANITARY AND STORM WATER DRAINAGE PIPING.

DRAWING NOTES

1. RISE ABOVE GRADE.
2. TO SPRINKLER ZONE 1.
3. TO SPRINKLER ZONES 2 AND 3.
4. FIRE PUMP CONTROLLER.
5. NO PIPING OR EQUIPMENT TO BE INSTALLED ABOVE FIRE PUMP WITHIN 1219mm X 1219mm SQUARE TO MATCH ROOF ACCESS CURB.
6. FIRE PUMP TEST HEADER.
7. BUILDING EXPANSION JOINT BETWEEN GRIDLINES 5 & 6. PROVIDE SUITABLE FLEXIBLE CONNECTION ON ALL PIPING CROSSING GRIDLINES 5 & 6.
8. PROPANE PIPING TO RUN BELOW GRADE TO STORAGE TANKS. COORDINATE WITH SUPERIOR PROPANE TO INSTALL TWO 2000 GALLON SMART TANKS, VAPORIZER, 1ST AND 2ND STAGE REGULATORS, SHUTOFF VALVES AND REQUIRED PIPING.
9. DROP BELOW GRADE.

DAY & ROSS

no.	revision	date
2.	ISSUE FOR 60% SUBMISSION	AUG 15, 2024
1.	ISSUE FOR 30% SUBMISSION	JUNE 27, 2024

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DAY & ROSS
5494-5510 BOUNDARY ROAD
GLOUCESTER, ON

Project North
True North
N
W
E
S

seal

drawing title
MECHANICAL:
PLUMBING AND FIRE PROTECTION (RIGHT)

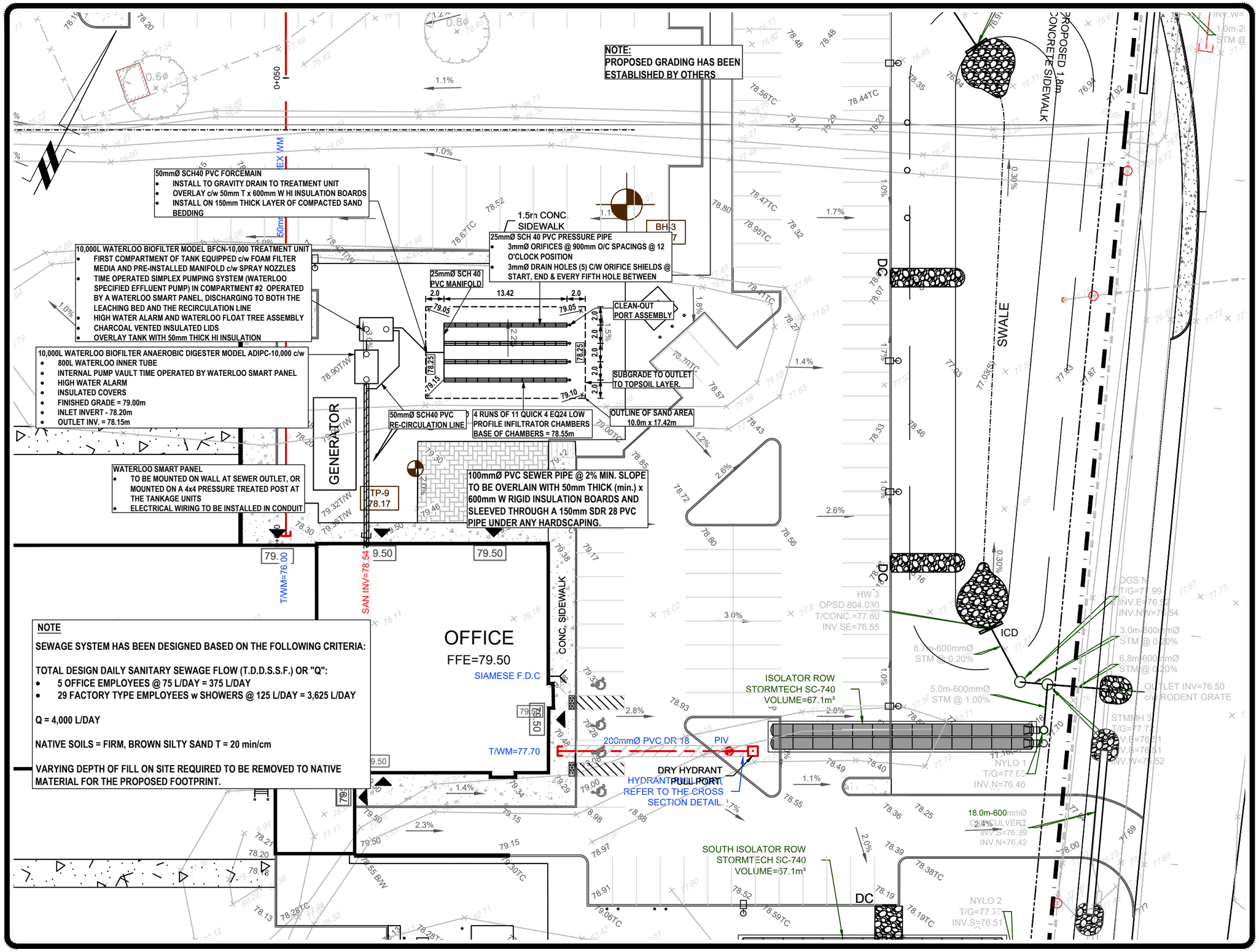
scale 1:100	drawn by R.C
date XX XXXX XX	checked by S.C
project number 24052	drawing number M102

CONTRACTOR TO VERIFY ALL DIMENSIONS AND NOTIFY THE ARCHITECT OF ANY DISCREPANCIES BEFORE WORK COMMENCES.

revision

DO NOT SCALE DRAWINGS

APPENDIX B
Sanitary Servicing Information



LEGEND:

- Test Pit / Borehole Location
- x 100.99 — Existing Ground Surface Elev. (m)
- **x 102.30** — Proposed Ground Surface Elev. (m)
- T/C — Top of Foundation Wall
- Proposed Structure

All units are in meters unless otherwise specified.

Professional Engineers Ontario 03/02/26

Licensed Engineering Technologist

Name: H. G. VAN DE GLIND
Number: 100647862
Limitations: Inspecting, designing, and assessing residential and commercial sewage systems, grading designs and soil analysis, and overseeing installation and compliance.

Association of Professional Engineers of Ontario

BENCHMARK INFORMATION:

Refer to Grading Plan No. 118168-GR, by Novatech Engineers, PLanners & Landscape Architects

REFERENCE:

Base Plan and Topographic Information obtained from Grading Plan No. 118168-GR, by Novatech Engineers, PLanners & Landscape Architects

DD/MM/YY	DESCRIPTION	REV.
03/02/26	Revised Pumping Layout	4
03/12/24	Revised per the Updated Site Plans	3
19/09/24	Revised System Location	2
22/08/24	Revised Dispersal Bed	1

Consultant:

PATERSON GROUP
9 AURIGA DRIVE
OTTAWA, ON
K2E 7S9
TEL: (613) 226-7381

Client:

DAY AND ROSS TRANSPORTATION

Project:

PROPOSED CROSS DOCK BUILDING

5510 BOUNDARY ROAD
OTTAWA (CARLSBAD SPRINGS), ONTARIO

Drawing:

SEWAGE SYSTEM LAYOUT PLAN

Scale:	Drawn by:
1:400	HV
Date: 02/2026	Checked by: MK

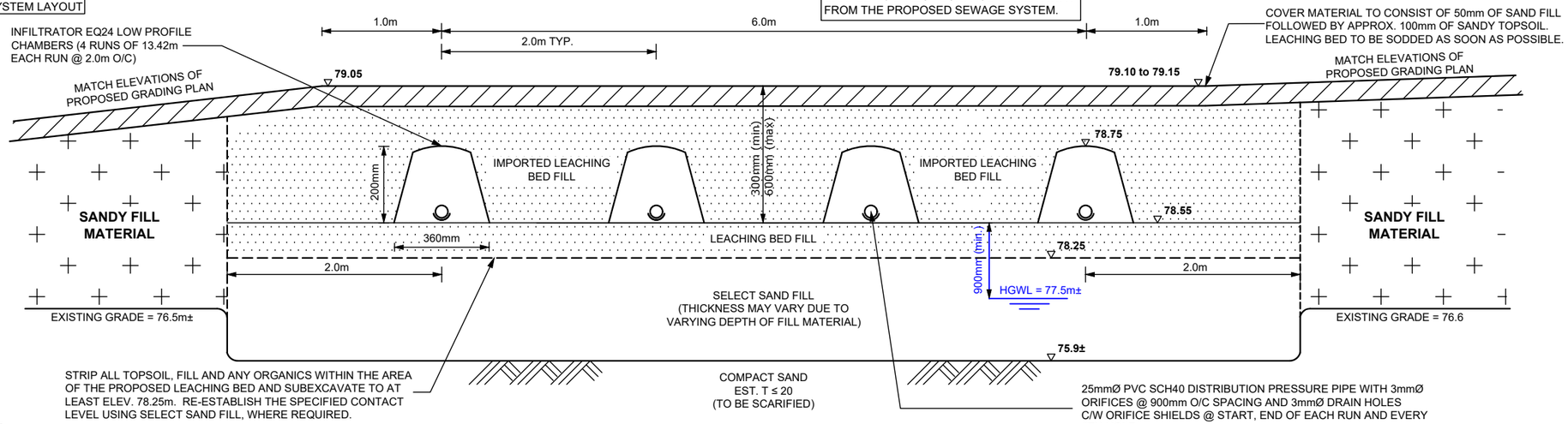
Drawing No.:

PH4942-1(rev.4)

p:\autocad drawings\hydrogeology\ph49xx\ph4942 - day and ross transportation - 5510 boundary road\ph4942-1(rev.4).dwg

REFER TO PATERSON GROUP DRAWING No. PH4942-1(rev.4) FOR SEWAGE SYSTEM LAYOUT

FINAL GRADING SHALL BE SUITABLY SHAPED TO DIRECT SURFACE WATER AWAY FROM THE PROPOSED SEWAGE SYSTEM.



PROFILE

N.T.S.

NOTES:

1) ESTIMATE OF DAILY SEWAGE FLOW (Q)

TOTAL DESIGN DAILY SANITARY SEWAGE FLOW (T.D.D.S.S.F) HAS BEEN DESIGNED IN ACCORDANCE WITH ONTARIO BUILDING CODE (OBC) TABLE 8.2.1.3.B. AND HAS BEEN REVIEWED / PRE-APPROVED BY THE OTTAWA SEPTIC SYSTEM OFFICE. (OSSO)

- OFFICE EMPLOYEES @ 75 L/DAY = 5 x 75 L/DAY = 375 L/DAY
- FACTORY TYPE EMPLOYEES w SHOWERS @ 125 L/DAY = 29 x 125 L/DAY = 3,625 L/DAY

TOTAL SEWAGE FLOW = 4,000 L/DAY

2) SOIL CONDITIONS

SOILS INFORMATION GATHERED BY PATERSON GROUP INC. ON AUGUST, 2018 (REFER TO PGI REPORT No. PG4592-1)

BH 3, ELEV. 77.67m		TP 9 ELEV. 78.17m	
0-0.05	TOPSOIL	0-3.50	FILL:BROWN, SILTY SAND, SOME CLAY GRAVEL, COBBLES, BOULDERS AND CONSTRUCTION DEBRIS
0.05-1.83	FILL: BROWNSILTY CLAY, SOME SAND		
1.83-2.44	COMPACT BROWN SAND		
2.44-9.75	SOFT GREY SILTY CLAY		
- G.W.L.@ 1.29m (76.4m±)		- G.W.L. @ 0.65m (77.52m±)	

3) ANAEROBIC DIGESTER

- REFER TO WATERLOO DESIGN AND INSTALLATION GUIDE WITH REGARDS TO MINIMUM TANKAGE SIZING, AND ADDITIONAL INSTALLATION REQUIREMENTS.
- TANK SHALL BE CONNECTED TO THE PROPOSED BUILDING BY A 100mm PVC SEWER PIPE.
- SEWER PIPE SHALL BE INSTALLED AT 2.0% MINIMUM SLOPE AND SHALL BE OVERLAIN WITH 50mm T x 600 mm WIDE RIGID INSULATION BOARDS.
- SEWER PIPE SHALL BE SLEEVED THROUGH A 150 mmØ SDR 28 PVC PIPE UNDER ANY HARDSCAPING (CONCRETE, ASPHALT, ETC.)
- SEWER PIPE SHALL BE BEDDED ON A 150mm THICK LAYER OF GRANULAR 'A' WHICH SHALL BE COMPACTED TO 95% SPMDD.
- IT IS RECOMMENDED THAT A NEW SINGLE-COMPARTMENT 10,000L CONCRETE ANAEROBIC DIGESTER WATERLOO MODEL ADIPC-10,000 BE INSTALLED.
- TANK SHALL BE BEDDED ON A LAYER OF OPSS GRANULAR 'A' OF AT LEAST 150mm IN THICKNESS AND SHALL BE COMPACTED TO AT LEAST 95% SPMDD.
- TANK SHALL BE EQUIPPED WITH WATERTIGHT CONNECTIONS (I.E. STAINLESS LINK SEALS OR APPROVED EQUIVALENT).
- INLET PIPE OF DIGESTER SHALL BE EQUIPPED WITH A 800L (min.) WATERLOO INNER TUBE.
- THE DIGESTER TANK SHALL BE COVERED WITH 50mm (2") DOW HI-40 INSULATION BOARDS AND SHALL BE PROVIDED WITH 510 mm OF SOIL COVER PER THE DESIGN MANUAL.
- A POLY RISER AND INSULATED COVER ASSEMBLY, WHICH EXTENDS TO THE GROUND SURFACE, SHALL BE INSTALLED OVER THE EACH OF THE TANK OPENINGS.
- INTERNAL PUMP VAULT WITH, TIME CONTROLLED EFFLUENT PUMP (WATERLOO SPECIFIED EFFLUENT PUMP) OPERATED BY A WATERLOO SMART PANEL.
- ALL ELECTRICAL WORKS SHALL BE CARRIED OUT BY A QUALIFIED ELECTRICAL CONTRACTOR.
- ACCESS LIDS SHALL INCLUDE SAFETY DEVICES AS PER CSA B66-21.

4) TREATMENT UNIT

- THE TREATMENT UNIT SHALL BE INSTALLED IN SERIES AND DOWNSTREAM FROM THE ANAEROBIC DIGESTER TANK.
- THE TREATMENT UNIT SHALL CONSIST OF A BULK FILLED CONCRETE WATERLOO BIOFILTER MODEL BFCN-10,000 WASTEWATER TREATMENT.
- TANK SHALL BE BEDDED ON A LAYER OF OPSS GRANULAR 'A' OF AT LEAST 150mm IN THICKNESS AND SHALL BE COMPACTED TO AT LEAST 95% SPMDD.
- A 50mmØ SCH 40 PVC FORCEMAIN SHALL BE USED TO CARRY THE EFFLUENT FROM THE PUMP TANK IN THE ANAEROBIC DIGESTER TO THE BULK FILLED BIOFILTER IN THE FIRST COMPARTMENT OF THE TREATMENT UNIT.
- THE FIRST COMPARTMENT OF THE BIOFILTER TANK SHALL BE BULK FILLED WITH THE BIOFILTER FOAM FILTER MEDIA.
- THE SECOND COMPARTMENT OF THE TREATMENT UNIT SHALL BE EQUIPPED WITH A TIME OPERATED SIMPLEX EFFLUENT PUMPS SPECIFIED BY WATERLOO. THE FINAL TREATED EFFLUENT COLLECTS ON THE FLOOR OF THE SECOND COMPARTMENT AND THE EFFLUENT PUMP, DOSES THE LEACHING BED AS WELL AS THE RECIRCULATION LINE.
- MINIMUM RESIDUAL PRESSURE HEAD AT THE FURTHEST POINT FROM THE PUMP SHALL BE 600mm TO BE VERIFIED IN THE FIELD.
- THE DOSING TIME OPERATED PUMPING SYSTEM SHALL OPERATE HOURLY.
- THE RECOMMENDED PUMP TIME DOSING CYCLE IS 167L + CHARGE (28L) (TOTAL OF 195 L), THE PUMP DISCHARGE DURATION SHALL BE VERIFIED BY WATERLOO.
- THE TREATMENT UNIT SHALL BE PROVIDED WITH A MINIMUM OF 510 mm SOIL COVER AND OVERLAIN WITH 50mm THICK HI INSULATION BOARDS.
- A POLYLOK RISER AND CHARCOAL VENTED INSULATED COVER ASSEMBLY, WHICH EXTENDS TO THE GROUND SURFACE, SHALL BE INSTALLED OVER EACH OF THE TANK OPENINGS.
- ALL ELECTRICAL WORKS SHALL BE CARRIED OUT BE A QUALIFIED ELECTRICAL CONTRACTOR.
- ACCESS LIDS SHALL INCLUDE SAFETY DEVICES AS PER CSA B66-21.

5) FORCEMAIN

- A 50mmØ SCH40 PVC FORCEMAIN (RECIRCULATION LINE) SHALL BE USED TO CARRY THE EFFLUENT FROM THE TREATMENT UNIT TO THE ANAEROBIC DIGESTER AS PER MANUFACTURER SPECIFICATIONS.
- A 50mmØ SCH40 PVC FORCEMAIN SHALL BE USED TO CARRY THE EFFLUENT FROM THE TREATMENT UNIT TO THE DISPOSAL FIELD.
- THE FORCEMAIN SHALL BE INSTALLED TO GRAVITY DRAIN TO TREATMENT UNIT AND OVERLAY WITH 50mm T x 600mm W WITH INSULATION BOARDS.
- FORCEMAIN SHALL BE INSTALLED ON A 150mm THICK LAYER OF COMPACTED SAND BEDDING.

6) DISPOSAL FIELD

- THE DISPOSAL FIELD SHALL CONSIST OF SHALLOW BURIED TRENCHES (SBT) USING QUICK 4 EQ24 LOW PROFILE INFILTRATOR CHAMBERS.
- SBT LENGTH REQUIRED = Q/50 = 4000/75 = 53.3 LINEAR METERS/1.22 = 43.7 CHAMBERS.
- USE 4 RUNS OF 11 CHAMBERS, 44 CHAMBERS TOTAL (13.42m LENGTH EACH RUN) FOR A TOTAL LENGTH OF 53.7 LINEAR METRES.
- REMOVE ALL EXISTING TOPSOIL, FILL AND ANY ORGANIC MATERIAL AND SUBEXCAVATE TO AT LEAST ELEVATION 78.25m, ACTUAL FILL REMOVAL WILL BE TO APPROXIMATELY 75.9m±, WHICHEVER IS GREATER. ESTABLISH THE SPECIFIED CONTACT LEVEL WITH SELECT SAND FILL, WHERE REQUIRED.
- SCARIFY THE BASE AND SIDES OF EXCAVATED AREA USING A HAND RAKE. DO NOT WALK ON THE SCARIFIED SURFACES.
- ESTABLISH THE SPECIFIED CONTACT LEVEL, ELEV. 78.55m, WITH LEACHING BED FILL OVER THE APPROVED SUBGRADE SURFACE.
- LEACHING BED SAND FILL SHALL BE UNIFORM SAND WITH GRADING LIMITS SIMILAR TO 100% PASSING 13.2mm SIEVE, LESS THAN 5% PASSING 0.075mm SIEVE AND HAVING A PERCOLATION RATE OF 6 TO 8 min/cm.
- PREPARE THE 25mmØ PVC SCH 40 PRESSURE PIPE BY DRILLING 3mmØ HOLES @ 900mm SPACINGS ALONG THE TOP OF THE PIPE (I.E. 12 O'CLOCK POSITION). THE FIRST HOLE SHALL BE LOCATED 450mm FROM THE MANIFOLD.
- DRILL A 3mmØ (1/8"Ø) DRAIN HOLE NEAR THE START, END OF EACH RUN AND EVERY 5TH HOLE. THE DRAIN HOLES SHOULD BE LOCATED AT THE 6 O'CLOCK POSITION. AN ORIFICE SHIELD SHALL BE INSTALLED OVER EACH DRAIN HOLE.
- THE PRESSURE PIPE SHALL BE INSTALLED ONTO THE PREPARED SAND LAYER @ DESIGN ELEVATION AND IN THE CONFIGURATION AS SPECIFIED ON THE PLAN VIEW. PIPES SHALL REST ON ORIFICE SHIELDS.
- THE PRESSURE SYSTEM MUST BE TESTED AND SQUIRT HEIGHTS VERIFIED PRIOR TO INSTALLING THE CHAMBERS.
- RUN THE PRESSURE PIPE THROUGH THE END PLATE OF THE CHAMBER.
- PLACE THE FIRST CHAMBER OVER THE PIPE AND ENSURE THE HOLES IN THE PRESSURE PIPE ARE FACING UP (I.E. 12 O'CLOCK POSITION).
- INSERT THE END PLATE TO THE FIRST CHAMBER.
- CONNECT EACH SUBSEQUENT CHAMBER TO THE END OF THE PROCEEDING CHAMBER. ENSURE THAT THE CHAMBERS ARE PROPERLY INTERLOCKED AS PER MANUFACTURER'S REQUIREMENTS.
- ATTACH AN END PLATE TO THE END OF EACH CHAMBER RUN.
- TO ALLOW FOR SERVICING, IT IS RECOMMENDED THAT THE END OF EACH PRESSURE PIPE BE SLEEVED THROUGH THE END PLATE AND BE FITTED WITH A 25mmØ PVC LONG RADIUS 90° SWEEP C/W 1-25mmØ PVC FPT x SLIP FIT ADAPTER AND 1-MPT PVC END CAP, COVER CLEAN-OUT ASSEMBLY WITH 150mmØ IRRIGATION VALVE COVER (OR APPROVED EQUAL).
- BACKFILL THE CHAMBERS IN LIFTS, USING SELECT SAND FILL. BACKFILL MUST CONSIST OF SELECT SAND FILL FOLLOWED BY 100mm OF SANDY TOPSOIL IT IS RECOMMENDED THAT THE LEACHING BED AREA BE SODDED AS SOON AS POSSIBLE.
- START BACKFILLING AT THE JOINTS, COMPACT THE BACKFILL ALONG THE SIDE OF THE CHAMBERS BY WALKING ALONG THE EDGES OF THE TRENCHES.
- THE GROUND SURFACE OVER THE LEACHING BED SHOULD BE CROWNED TO SHED SURFACE WATER AND SODDED IMMEDIATELY.

7) MINIMUM CLEARANCE DISTANCE FROM LEACHING BED

- 7.1m FROM ANY PROPERTY LINE
- 9.1m FROM ANY STRUCTURE
- 19.1m FROM ANY EXISTING DRILLED WELL

8) MINIMUM CLEARANCE DISTANCE FROM TANK(S)

- 1.5m FROM ANY STRUCTURE
- 15.0m FROM ANY DRILLED OR DUG WELL
- 3.0m FROM ANY PROPERTY LINE

9) GENERAL

- **SNOW STORAGE SHALL NOT BE LOCATED OVER PROPOSED SEWAGE SYSTEM.**
- **THE SEWAGE SYSTEM HAS NOT BEEN DESIGNED TO SUPPORT TRAFFIC LOADING.**
- **THE BACKFILLING OF THE SEWAGE SYSTEM SHOULD MINIMIZE THE RISK OF OVER COMPACTION WITH THE USE RUBBER TRACKED EQUIPMENT AND BY AVOIDING THE CREATION OF ANY CONSTRUCTION ROUTES OR PATHWAYS OVER THE SYSTEM.**
- **ANY NEW IRRIGATION / SPRINKLER SYSTEM SHOULD NOT BE USED IN PROXIMITY OF THE PROPOSED SEWAGE SYSTEM.**
- **ENSURE WALKWAYS AND/OR SHRUBBERY ARE NOT PLACED WITHIN PROXIMITY OF THE TANKAGE.**
- **THE BACKWASH WATERS FROM ANY WATER TREATMENT UNIT, SUCH AS WATER SOFTENER, SHOULD NOT DISCHARGE INTO THE SEWAGE SYSTEM.**
- **THE SEWAGE SYSTEM HAS NOT BEEN DESIGNED FOR THE USE OF A GARBAGE DISPOSAL.**
- **SEWAGE SYSTEM INSTALLER SHALL BE QUALIFIED AND REGISTERED UNDER PART 8 OF THE ONTARIO BUILDING CODE AND SHALL BE AN AUTHORIZED WATERLOO TREATMENT SYSTEM INSTALLER.**
- **ALL WORK SHALL BE CARRIED OUT IN ACCORDANCE WITH THE LATEST BY-LAWS, CODES AND REGULATIONS.**
- **CONTRACTOR SHALL REVIEW DRAWINGS IN DETAIL AND SHALL INFORM THE CONSULTANT OF ANY ERRORS AND/OR OMISSIONS ON DESIGN DRAWINGS IMMEDIATELY.**
- **CONTRACTOR SHALL BE RESPONSIBLE TO LOCATE AND PROTECT ALL EXISTING UNDERGROUND SERVICES.**
- **CONTRACTOR SHALL VISIT THE SITE AND REVIEW ALL DOCUMENTATION TO BECOME FAMILIAR WITH THE SITE AND SUBSURFACE SOIL CONDITIONS TO DETERMINE SUITABLE METHODS OF CONSTRUCTION.**
- **THE MANUFACTURER PROVIDES A LIMITED WARRANTY OF THE SYSTEM COMPONENTS. THE OWNER OF THE SYSTEM MUST SIGN A MAINTENANCE AGREEMENT WITH THE MANUFACTURER'S REPRESENTATIVE. THE SYSTEM OWNER IS RESPONSIBLE FOR THE ANNUAL FEES ASSOCIATED WITH THE MAINTENANCE.**
- **THE FIRM OF PATERSON GROUP INC. HAS PROVIDED DESIGN SERVICES ONLY FOR THE SUBJECT SEWAGE SYSTEM. THE DESIGN HAS BEEN CARRIED OUT IN ACCORDANCE WITH THE MANUFACTURER'S GUIDELINES AND OUR INTERPRETATION OF PART 8 OF THE ONTARIO BUILDING CODE.**
- **THE PROPERTY LINE / SEPARATION DISTANCES SHOULD BE CONFIRMED PRIOR TO CONSTRUCTION.**
- **CONSTRUCTION INSPECTIONS DURING THE INSTALLATION OF THE SEWAGE SYSTEM MAY BE REQUIRED BY THE REGULATING AUTHORITY AND ARE STRONGLY RECOMMENDED BY THIS FIRM. IF THIS FIRM IS TO COMPLETE ANY CONSTRUCTION INSPECTION(S), ADDITIONAL FEES MAY BE APPLIED. CONFIRMATION OF PAYMENT WILL BE REQUIRED PRIOR TO THE INSPECTION.**
- **THE TEST HOLE INFORMATION PROVIDED, IS INTENDED TO BE USED FOR DESIGN PURPOSES ONLY, AND SHOULD NOT BE RELIED UPON FOR CONSTRUCTION PURPOSES. IF DISCREPANCIES ARE FOUND DURING THE CONSTRUCTION PROCESS, IT IS THE CLIENT'S RESPONSIBILITY TO CONTACT THIS FIRM TO MAKE ANY NECESSARY COMMENTS OR REVISIONS. ADDITIONAL REVISIONS ARE NOT CONSIDERED PART OF THE DESIGN WORKS AND WILL BE CONSIDERED AS AN ADDITIONAL COST.**

Professional Engineers Ontario 03/02/26

Licensed Engineering Technologist

Name: H. G. VAN DE GLIND
Number: 100647862
Limitations: Inspecting, designing, and assessing residential and commercial sewage systems, grading designs and soil analysis, and overseeing installation and compliance.

Association of Professional Engineers of Ontario

DD/MM/YY	DESCRIPTION	REV.
03/02/26	Revised Pumping Layout	4
03/12/24	Revised per the Updated Site Plans	3
19/09/24	Revised System Location	2
22/08/24	Revised Dispersal Bed	1
14/08/24	Issued for Preliminary Review	0

Consultant:

PATERSON GROUP
9 AURIGA DRIVE OTTAWA, ON K2E 7Z9
TEL: (613) 226-7381

Client:

DAY AND ROSS TRANSPORTATION

Project:

PROPOSED CROSS DOCK BUILDING

5510 BOUNDARY ROAD OTTAWA (CARLSBAD SPRINGS), ONTARIO

Drawing:

SEWAGE SYSTEM DETAIL & NOTES

Scale:	Drawn by:
N.T.S.	KB
Date: 02/2026	Checked by: HV

Drawing No.:

PH4942-2(rev.4)

p:\autocad drawings\hydrogeology\ph49xx\ph4942 - day and ross transportation - 5510 boundary road\ph4942-2(rev.4).dwg

APPENDIX C
Stormwater Management Calculations

PRE
6.14ha
88

EX 600mmØ CSP CULVERT
EX 500mmØ CSP CULVERT
EX 600mmØ CSP CULVERT
EX 600mmØ CSP CULVERT
EX 500mmØ CSP CULVERT
EX 500mmØ CSP CULVERT
EX 500mmØ CSP CULVERT

77.00 77.25 77.50 77.75 78.00 78.25

LEGEND

EXISTING STORM DRAINAGE AREA

PRE
6.14ha
88

DRAINAGE AREA ID
DRAINAGE AREA (ha)
SCS CURVE NUMBER

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

5510 BOUNDARY ROAD

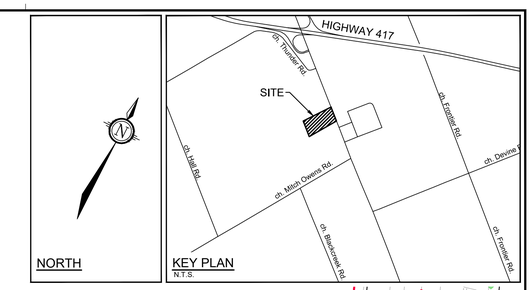
PRE-DEVELOPMENT DRAINAGE AREA PLAN

SCALE 1 : 1250 (0 10 20 30 40 50)
DATE NOV 2025
JOB 118168
FIGURE 4

LEGEND

- BOREHOLE
- TEST PIT
- PROPERTY LINE
- PROPOSED SECURITY FENCE (REFER TO LANDSCAPE)
- PROPOSED CURB
- DC — PROPOSED DEPRESSED CURB
- TACTILE WALKING SURFACE INDICATOR (TWSI) PER CITY DETAIL SC7.3
- SWALE c/w SUBDRAIN AND DIRECTION OF FLOW
- TERRACING 2.5:1 SLOPE MAX (UNLESS OTHERWISE INDICATED)
- BOTOM OF SLOPE
- 2.0% — SLOPE AND DIRECTION
- PROPOSED SITE LIGHTING (REFER TO ARCHITECTURAL DRAWINGS)

- 77.50 / 76.45 — PROPOSED ELEVATION / EXISTING ELEVATION
- 79.65(S) — PROPOSED SWALE ELEVATION
- 79.80(C) — PROPOSED TOP OF CURB ELEVATION
- 79.80(W) — PROPOSED TOP OF WALE ELEVATION
- 79.65(W) — PROPOSED BOTTOM OF WALL ELEVATION
- PROPOSED BUILDING ENTRANCE
- DIRECTION OF MAJOR OVERLAND FLOW
- PROPOSED RIP RAP c/w NON WOVEN GEOTEXTILE
- PROPOSED STORM SEWER AND MANHOLE
- PROPOSED CATCHBASIN MANHOLE
- PROPOSED INLET CONTROL DEVICE
- 100-YEAR PONDING LIMITS



LIMITS OF WETLAND (GEOOTTAWA)

SNCA REGULATION LIMIT (30m SETBACK FROM WETLAND)

REALIGNED HEADWATER DRAINAGE FEATURE

1.346 HWD 0.45

0.344 BRD-1 0.82

0.111 DR-1 0.20

0.147 A-16 0.76

SWALE

OHW

0.739 A-1 0.84

0.278 A-2 0.85

0.263 A-3 0.85

0.323 A-4 0.87

0.198 A-5 0.87

0.690 A-6 0.87

0.413 A-7 0.55

0.176 BRD-2 0.69

0.065 BRD-3 0.62

GENERATOR

PATIO

MECH

FUTURE EXPANSION

0.439 FR-1 0.90

CROSS DOCK
FFE=79.50

OFFICE
FFE=79.50

0.111 DR-1 0.90

RAMP 5.0% MAX

0.739 A-8 0.88

0.279 A-9 0.83

0.255 A-10 0.84

0.303 A-11 0.81

0.332 A-12 0.83

0.249 A-13 0.83

0.389 A-14 0.34

DC

CB

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

NOT FOR CONSTRUCTION

No.	REVISION	DATE	BY
3.	REVISED PER SNCA COMMENTS	APR 16/2026	MJH
2.	REVISED PER CITY AND SNCA COMMENTS	NOV 13/2025	MJH
1.	ISSUED FOR SPA	OCT 3/2024	MJH

SCALE 1:500

1:500
0 5 10 15 20

DESIGN MJH
CHECKED JLS
DRAWN MJH
CHECKED JLS
APPROVED MJH

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER
M.J. HREHORIAK
100211256
APR 29/2026
PROVINCE OF ONTARIO

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

LOCATION
CITY OF OTTAWA
5110 BOUNDARY ROAD

DRAWING NAME
STORMWATER MANAGEMENT PLAN

PROJECT No. 118168
REV REV # 2
DRAWING No. 118168-SWM

PLAN # 19296

D07-12-24-0117

5494-5510 Boundary Road – Day & Ross (118168)
Post-Development PCSWMM Model Schematic

NOVATECH
Engineers, Planners & Landscape Architects

Overall Model Schematic

5494-5510 Boundary Road – Day & Ross (118168)
Post-Development PCSWMM Model Schematic

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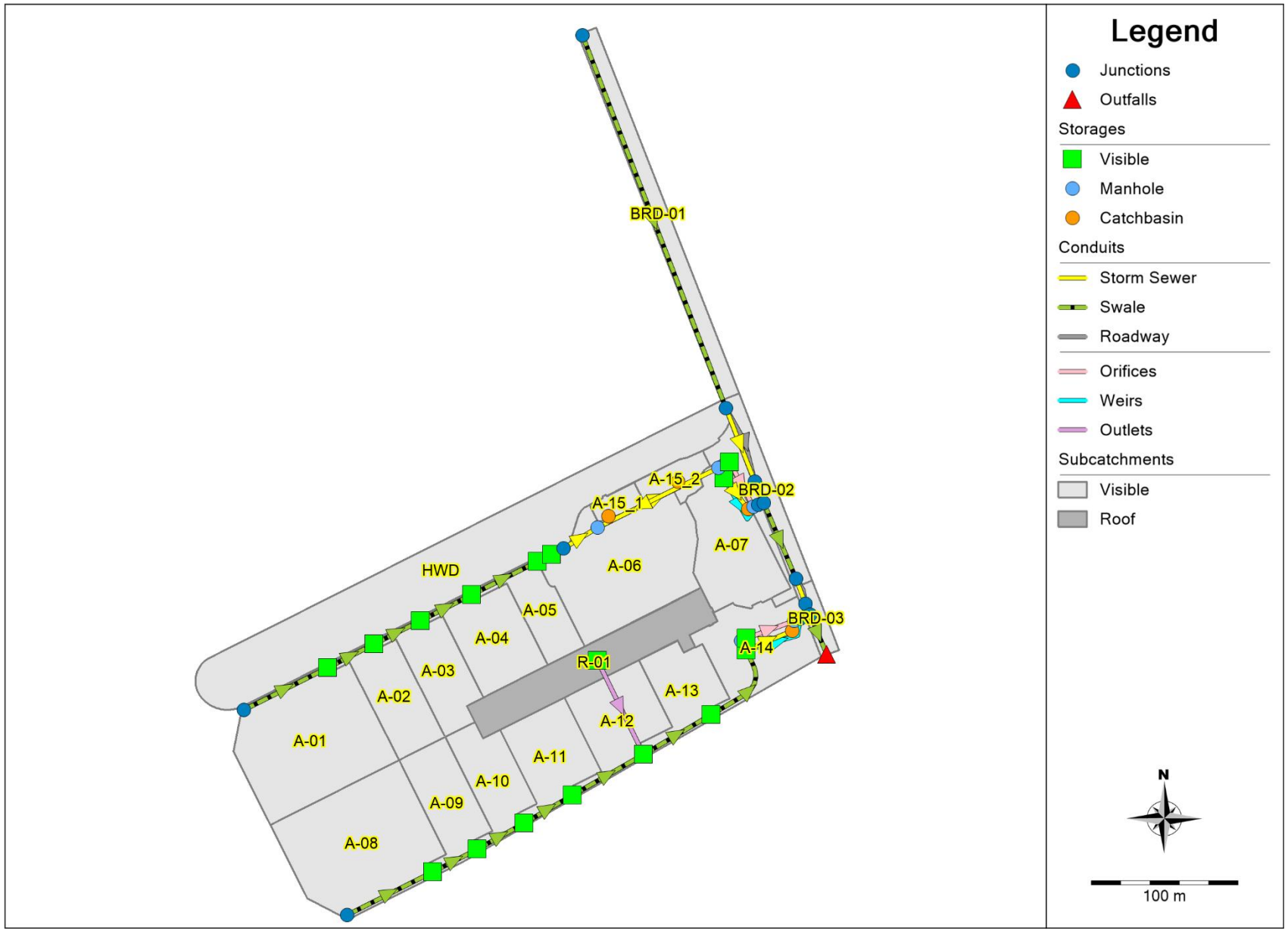
Engineers, Planners & Landscape Architects

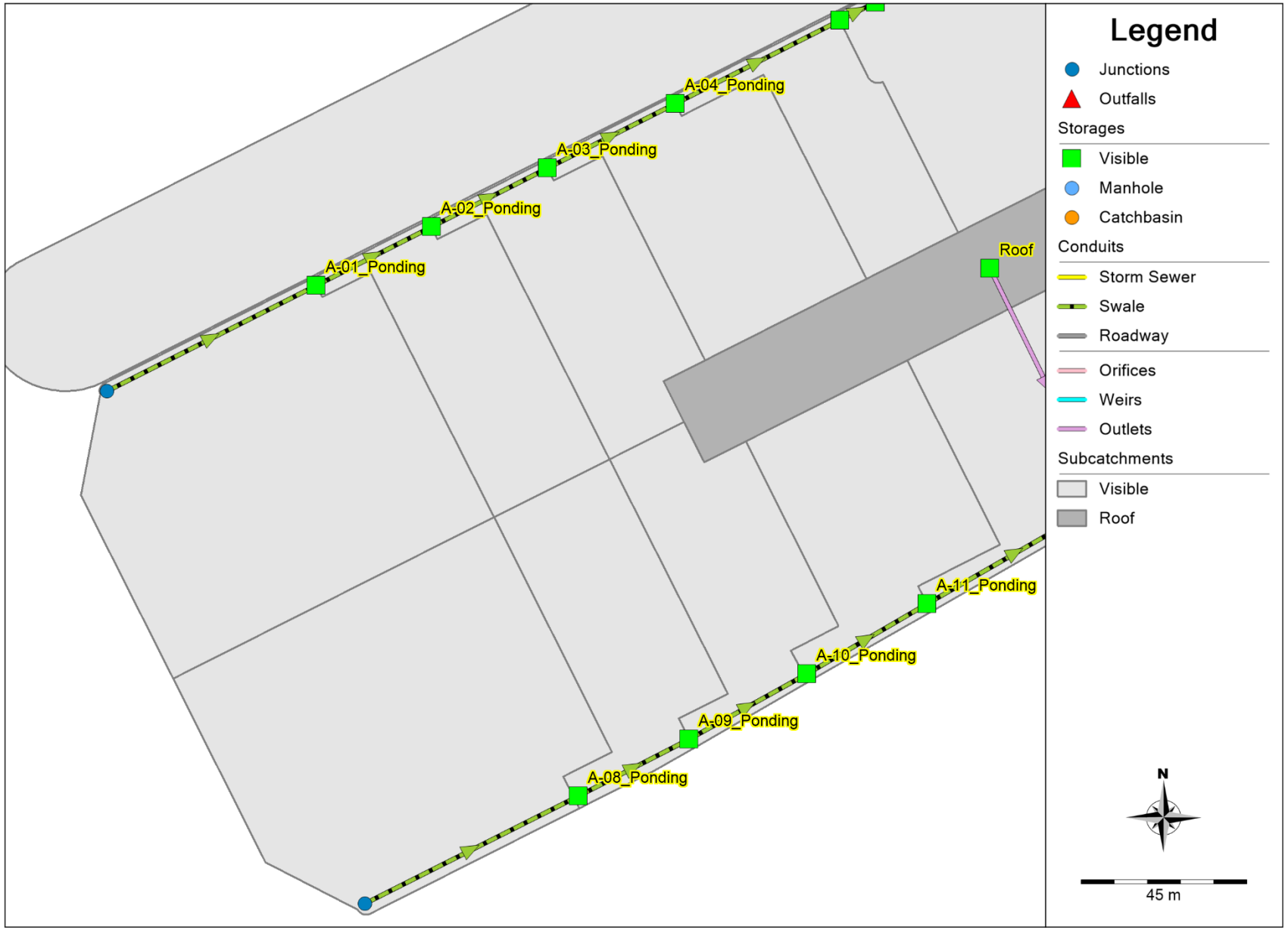
Catchment IDs



5494-5510 Boundary Road – Day & Ross (118168)
Post-Development PCSWMM Model Schematic

NOVATECH
Engineers, Planners & Landscape Architects

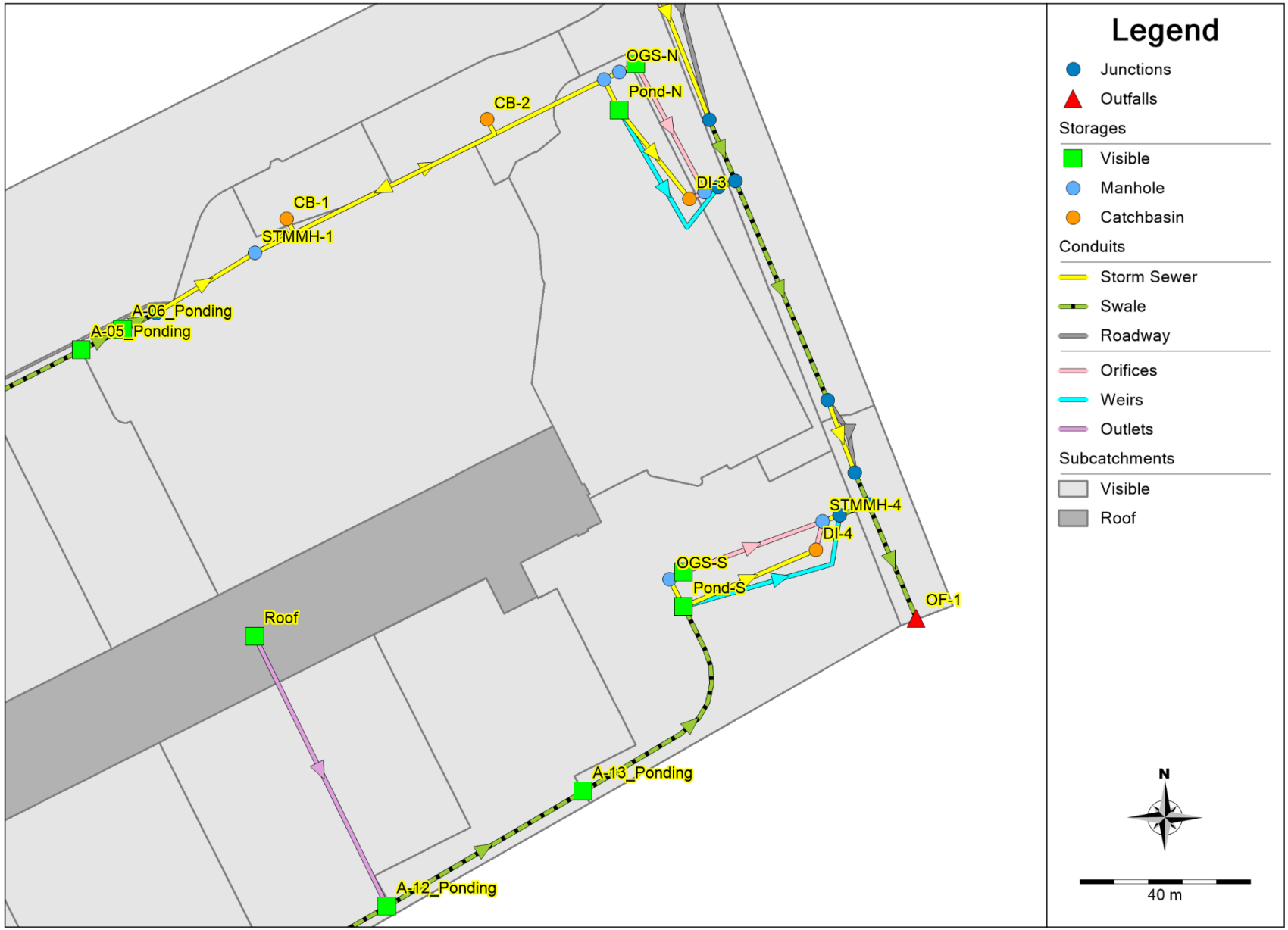
Catchbasins, Manholes, Storages & Outfalls



5494-5510 Boundary Road – Day & Ross (118168)
Post-Development PCSWMM Model Schematic

NOVATECH
Engineers, Planners & Landscape Architects

Catchbasins, Manholes, Storages & Outfalls (Cont'd)



5494-5510 Boundary Road – Day & Ross (118168)
Post-Development PCSWMM Model Schematic

NOVATECH
Engineers, Planners & Landscape Architects

Boundary Road Culverts

Name	Area (ha)	Width (m)	Flow Length (m)	Slope (%)	Imperv. (%)	Zero Imperv. (%)	Runoff Coeff.
A-01	0.735	67	110	2.0	91	0	0.84
A-02	0.276	37	75	1.0	93	0	0.85
A-03	0.262	35	75	1.0	93	0	0.85
A-04	0.321	53	61	1.0	96	0	0.87
A-05	0.195	30	65	1.0	96	0	0.87
A-06	0.689	55	125	1.5	96	0	0.87
A-07	0.413	103	40	2.0	50	0	0.55
A-08	0.739	68	109	2.0	97	0	0.88
A-09	0.279	39	72	1.0	90	0	0.83
A-10	0.255	36	71	1.5	91	0	0.84
A-11	0.303	48	63	1.5	87	0	0.81
A-12	0.332	66	50	1.5	90	0	0.83
A-13	0.249	50	50	1.5	90	0	0.83
A-14	0.389	54	72	2.0	20	0	0.34
A-15	0.147	113	13	2.0	80	0	0.76
DR-01	0.111	48	23	3.0	43	0	0.50
R-01	0.439	183	24	1.0	100	100	0.90

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.4)
------------------------------------------------------------

WARNING 04: minimum elevation drop used for Conduit 18
WARNING 04: minimum elevation drop used for Conduit 19
WARNING 04: minimum elevation drop used for Conduit 20
WARNING 02: maximum depth increased for Node C-1_OUT
WARNING 02: maximum depth increased for Node C-2_IN

*************
Element Count
*************
Number of rain gages ...... 1
Number of subcatchments ... 22
Number of nodes ........... 40
Number of links ........... 45
Number of pollutants ...... 0
Number of land uses ....... 0


****************
Raingage Summary
****************
                                                 Data       Recording
Name                 Data Source                 Type       Interval
------------------------------------------------------------------------
Raingage1            04-C3hr-100yr               INTENSITY   10 min.


********************
Subcatchment Summary
********************
Name                         Area     Width   %Imperv    %Slope Rain Gage            Outlet
-----------------------------------------------------------------------------------------------------
A-01                         0.73     67.00     91.00    2.0000 Raingage1            A-01_Ponding
A-02                         0.28     37.00     93.00    1.0000 Raingage1            A-02_Ponding
A-03                         0.26     35.00     93.00    1.0000 Raingage1            A-03_Ponding
A-04                         0.32     53.00     96.00    1.0000 Raingage1            A-04_Ponding
A-05                         0.20     30.00     96.00    1.0000 Raingage1            A-05_Ponding
```

```
A-06                         0.69     55.00     96.00    1.5000 Raingage1            A-06_Ponding
A-07                         0.41    103.00     50.00    2.0000 Raingage1            Pond-N
A-08                         0.74     68.00     97.00    2.0000 Raingage1            A-08_Ponding
A-09                         0.28     39.00     90.00    1.0000 Raingage1            A-09_Ponding
A-10                         0.26     36.00     91.00    1.5000 Raingage1            A-10_Ponding
A-11                         0.30     48.00     87.00    1.5000 Raingage1            A-11_Ponding
A-12                         0.33     66.00     90.00    1.5000 Raingage1            A-12_Ponding
A-13                         0.25     50.00     90.00    1.5000 Raingage1            A-13_Ponding
A-14                         0.39     54.00     20.00    2.0000 Raingage1            Pond-S
A-15_1                       0.05     39.00     80.00    2.0000 Raingage1            CB-1
A-15_2                       0.10     74.00     80.00    2.0000 Raingage1            CB-2
BRD-01                       0.34    265.00     60.00    2.0000 Raingage1            3
BRD-02                       0.18    135.00     70.00    2.0000 Raingage1            C-1_OUT
BRD-03                       0.07     50.00     60.00    2.0000 Raingage1            C-2_OUT
DR-01                        0.11     48.00     43.00    3.0000 Raingage1            HW-3
HWD                          1.35     34.00     37.00    0.1000 Raingage1            C-1_IN
R-01                         0.44    183.00    100.00    1.0000 Raingage1            Roof


************
Node Summary
************
                                      Invert      Max.    Ponded    External
Name                 Type              Elev.     Depth      Area    Inflow
------------------------------------------------------------------------------
1                    JUNCTION          77.80      1.00       0.0
2                    JUNCTION          78.29      1.00       0.0
3                    JUNCTION          77.25      1.00       0.0
C-1_IN               JUNCTION          76.58      2.08       0.0
C-1_OUT              JUNCTION          76.47      2.18       0.0
C-2_IN               JUNCTION          76.40      2.02       0.0
C-2_OUT              JUNCTION          76.37      2.18       0.0
HW-1                 JUNCTION          77.00      1.00       0.0
HW-3                 JUNCTION          76.53      1.00       0.0
HW-5                 JUNCTION          76.48      1.00       0.0
NPONDOUT             JUNCTION          76.52      1.00       0.0
OF-2                 JUNCTION          76.43      1.00       0.0
OF-1                 OUTFALL           76.38      1.00       0.0
A-01_Ponding         STORAGE           77.35      1.00       0.0
```

A-02_Ponding	STORAGE	77.28	1.00	0.0
A-03_Ponding	STORAGE	77.21	1.00	0.0
A-04_Ponding	STORAGE	77.13	1.00	0.0
A-05_Ponding	STORAGE	77.03	1.00	0.0
A-06_Ponding	STORAGE	77.01	1.00	0.0
A-08_Ponding	STORAGE	77.35	1.00	0.0
A-09_Ponding	STORAGE	77.28	1.00	0.0
A-10_Ponding	STORAGE	77.21	1.00	0.0
A-11_Ponding	STORAGE	77.13	1.00	0.0
A-12_Ponding	STORAGE	77.02	1.00	0.0
A-13_Ponding	STORAGE	76.91	1.00	0.0
CB-1	STORAGE	77.15	1.05	0.0
CB-2	STORAGE	77.05	1.10	0.0
DI-3	STORAGE	76.60	1.70	0.0
DI-4	STORAGE	76.55	1.75	0.0
OGS-N	STORAGE	76.72	1.62	0.0
OGS-S	STORAGE	76.72	2.25	0.0
Pond-N	STORAGE	76.80	1.05	0.0
Pond-S	STORAGE	76.80	1.05	0.0
Roof	STORAGE	77.02	1.23	0.0
STMMH-1	STORAGE	76.94	1.34	0.0
STMMH-2	STORAGE	76.75	1.79	0.0
STMMH-3	STORAGE	76.55	1.19	0.0
STMMH-4	STORAGE	76.50	1.28	0.0
StormTech-N	STORAGE	76.55	1.35	0.0
StormTech-S	STORAGE	76.55	1.35	0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
1	1	A-01_Ponding	CONDUIT	63.0	0.7142	0.0300
10	A-10_Ponding	A-11_Ponding	CONDUIT	37.5	0.2136	0.0300
10_(STM)	OGS-S	StormTech-S	CONDUIT	4.0	0.5062	0.0130
11	A-11_Ponding	A-12_Ponding	CONDUIT	55.0	0.2002	0.0300
12	A-12_Ponding	A-13_Ponding	CONDUIT	52.9	0.2078	0.0300
14	A-13_Ponding	Pond-S	CONDUIT	40.0	0.1500	0.0300
15	HW-5	OF-2	CONDUIT	7.2	0.6924	0.0300
15_(1)_(STM)	STMMH-1	STMMH-2	CONDUIT	88.3	0.2039	0.0130
16	C-1_OUT	NPONDOUT	CONDUIT	15.5	0.0647	0.0300
17	NPONDOUT	C-2_IN	CONDUIT	55.4	0.1082	0.0300
18	Pond-S	DI-4	CONDUIT	1.0	0.0305	0.0130
18_(STM)	Pond-N	STMMH-2	CONDUIT	6.2	0.6421	0.0130
19	C-2_OUT	OF-2	CONDUIT	8.1	0.0038	0.0300
2	A-01_Ponding	A-02_Ponding	CONDUIT	34.8	0.2010	0.0300
20	Pond-N	DI-3	CONDUIT	1.0	0.0305	0.0130
22	HW-3	NPONDOUT	CONDUIT	4.2	0.2371	0.0300
23	OF-2	OF-1	CONDUIT	28.9	0.1730	0.0300
26	C-1_IN	C-1_OUT	CONDUIT	53.0	0.0189	0.0130
27	C-2_IN	C-2_OUT	CONDUIT	18.0	-0.7222	0.0130
27_(STM)	HW-1	STMMH-1	CONDUIT	25.8	0.1938	0.0130
28_(STM)	CB-1	STMMH-1	CONDUIT	2.1	0.9616	0.0130
29_(STM)	CB-2	STMMH-1	CONDUIT	2.1	0.9662	0.0130
3	A-02_Ponding	A-03_Ponding	CONDUIT	35.0	0.2002	0.0300
39_(1)_(STM)	STMMH-4	HW-5	CONDUIT	4.0	0.5006	0.0130
4	A-03_Ponding	A-04_Ponding	CONDUIT	38.5	0.2075	0.0300
40_(STM)	STMMH-2	OGS-N	CONDUIT	2.8	0.7042	0.0130
41_(STM)	OGS-N	StormTech-N	CONDUIT	4.3	0.4651	0.0130
46_(STM)	Pond-S	OGS-S	CONDUIT	8.0	0.5006	0.0130
47_(STM)	STMMH-3	HW-3	CONDUIT	3.0	0.6645	0.0130
5	A-04_Ponding	A-05_Ponding	CONDUIT	49.6	0.2014	0.0300
6	3	C-1_IN	CONDUIT	268.6	0.2308	0.0300
6_1	A-05_Ponding	A-06_Ponding	CONDUIT	10.7	0.1873	0.0300
6_2	A-06_Ponding	HW-1	CONDUIT	8.8	0.1133	0.0300
7	2	A-08_Ponding	CONDUIT	64.2	1.4633	0.0300
8	A-08_Ponding	A-09_Ponding	CONDUIT	33.6	0.2082	0.0300
9	A-09_Ponding	A-10_Ponding	CONDUIT	36.2	0.1936	0.0300
C-1	C-1_IN	C-1_OUT	CONDUIT	53.0	0.2075	0.0130
C-2	C-2_IN	C-2_OUT	CONDUIT	18.0	0.1667	0.0130
13	StormTech-S	STMMH-4	ORIFICE			
21	StormTech-N	STMMH-3	ORIFICE			
49_(STM)	DI-3	STMMH-3	ORIFICE			
6_(1)_(STM)	DI-4	STMMH-4	ORIFICE			
NorthSpillway	Pond-N	HW-3	WEIR			
SouthSpillway	Pond-S	HW-5	WEIR			
Roof_Outlet	Roof	A-12_Ponding	OUTLET			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
1	TRAPEZOIDAL	1.00	4.00	0.55	7.00	1	7528.90
10	TRAPEZOIDAL	1.00	4.00	0.55	7.00	1	4117.31
10_(STM)	CIRCULAR	0.45	0.16	0.11	0.45	1	202.86
11	TRAPEZOIDAL	1.00	4.00	0.55	7.00	1	3985.79
12	TRAPEZOIDAL	1.00	4.00	0.55	7.00	1	4060.90
14	TRAPEZOIDAL	1.00	4.00	0.55	7.00	1	3450.35
15	TRIANGULAR	1.00	3.00	0.47	6.00	1	5061.49
15_(1)_(STM)	CIRCULAR	0.60	0.28	0.15	0.60	2	277.24
16	TRIANGULAR	1.00	3.00	0.47	6.00	1	1547.07
17	TRIANGULAR	1.00	3.00	0.47	6.00	1	2001.18
18	RECT_OPEN	1.00	1.20	0.37	1.20	1	838.09
18_(STM)	CIRCULAR	0.60	0.28	0.15	0.60	1	492.03
19	TRIANGULAR	1.00	3.00	0.47	6.00	1	374.23
2	TRAPEZOIDAL	1.00	4.00	0.55	7.00	1	3993.66
20	RECT_OPEN	1.00	1.20	0.37	1.20	1	838.09
22	TRIANGULAR	1.00	3.00	0.47	6.00	1	2961.65
23	TRIANGULAR	1.00	3.00	0.47	6.00	1	2529.97
26	RECT_OPEN	1.00	5.00	0.71	5.00	1	4221.79
27	RECT_OPEN	1.00	5.00	0.71	5.00	1	26120.12
27_(STM)	CIRCULAR	0.60	0.28	0.15	0.60	2	270.32
28_(STM)	CIRCULAR	0.20	0.03	0.05	0.20	1	32.16
29_(STM)	CIRCULAR	0.20	0.03	0.05	0.20	1	32.24
3	TRAPEZOIDAL	1.00	4.00	0.55	7.00	1	3986.12
39_(1)_(STM)	CIRCULAR	0.30	0.07	0.07	0.30	1	68.43
4	TRAPEZOIDAL	1.00	4.00	0.55	7.00	1	4058.52
40_(STM)	CIRCULAR	0.53	0.22	0.13	0.53	1	360.93
41_(STM)	CIRCULAR	0.53	0.22	0.13	0.53	1	293.32
46_(STM)	CIRCULAR	0.45	0.16	0.11	0.45	1	201.74
47_(STM)	CIRCULAR	0.38	0.11	0.09	0.38	1	142.93
5	TRAPEZOIDAL	1.00	4.00	0.55	7.00	1	3998.46
6	TRIANGULAR	1.00	3.00	0.47	6.00	1	2922.21
6_1	TRAPEZOIDAL	1.00	4.00	0.55	7.00	1	3855.38
6_2	TRAPEZOIDAL	1.00	4.00	0.55	7.00	1	2999.23
7	TRAPEZOIDAL	1.00	4.00	0.55	7.00	1	10776.51
8	TRAPEZOIDAL	1.00	4.00	0.55	7.00	1	4065.25
9	TRAPEZOIDAL	1.00	4.00	0.55	7.00	1	3919.48
C-1	FILLED_CIRCULAR	0.54	0.27	0.14	0.60	1	249.21
C-2	FILLED_CIRCULAR	0.54	0.27	0.14	0.60	1	223.32

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... YES
  Water Quality ..... NO
Infiltration Method ..... HORTON
Flow Routing Method ..... DYNWAVE
Surcharge Method ..... EXTRAN
Starting Date 09/22/2021 00:00:00
Ending Date 09/23/2021 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:01:00
Dry Time Step 00:01:00
Routing Time Step ..... 1.00 sec
Variable Time Step ..... YES
Maximum Trials 8
Number of Threads 4
Head Tolerance ..... 0.001500 m

********** Volume Depth
Runoff Quantity Continuity hectare-m mm

**************************	---------	-------
Total Precipitation	0.578	71.667
Evaporation Loss	0.000	0.000
Infiltration Loss	0.107	13.322
Surface Runoff	0.462	57.324
Final Storage	0.009	1.070
Continuity Error (%)	-0.068	

**************************	Volume	Volume
Flow Routing Continuity	hectare-m	10^6 ltr
**************************	---------	---------
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.462	4.622
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.464	4.636
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.001
Continuity Error (%)	-0.300	

```
************************
Highest Continuity Errors
************************
Node C-1_IN (2.09%)
Node A-13_Ponding (1.13%)
```

```
**************************
Time-Step Critical Elements
**************************
Link 18 (34.43%)
Link 10_(STM) (3.41%)
Link 40_(STM) (1.72%)
```

```
*******************************
Highest Flow Instability Indexes
*******************************
Link 49_(STM) (43)
Link 21 (19)
Link Roof_Outlet (16)
Link 47_(STM) (14)
Link 6_(1)_(STM) (6)
```

```
*********************************
Most Frequent Nonconverging Nodes
*********************************
Convergence obtained at all time steps.
```

```
************************
Routing Time Step Summary
************************
Minimum Time Step           :     0.50 sec
Average Time Step           :     0.82 sec
Maximum Time Step           :     1.00 sec
% of Time in Steady State   :     0.00
Average Iterations per Step :     2.00
% of Steps Not Converging   :     0.00
Time Step Frequencies       :
    1.000 -  0.871 sec      :    60.67 %
    0.871 -  0.758 sec      :     2.01 %
    0.758 -  0.660 sec      :     5.01 %
    0.660 -  0.574 sec      :     5.17 %
    0.574 -  0.500 sec      :    27.13 %
```

```
**************************
Subcatchment Runoff Summary
**************************
```

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
A-01	71.67	0.00	0.00	4.02	63.83	2.44	66.26	0.49	351.86	0.925
A-02	71.67	0.00	0.00	3.11	65.23	1.91	67.14	0.19	133.55	0.937
A-03	71.67	0.00	0.00	3.11	65.23	1.91	67.14	0.18	126.76	0.937
A-04	71.67	0.00	0.00	1.76	67.34	1.11	68.45	0.22	157.52	0.955
A-05	71.67	0.00	0.00	1.76	67.34	1.11	68.44	0.13	95.56	0.955
A-06	71.67	0.00	0.00	1.77	67.33	1.10	68.42	0.47	332.09	0.955
A-07	71.67	0.00	0.00	22.79	35.10	13.06	48.16	0.20	154.68	0.672
A-08	71.67	0.00	0.00	1.32	68.03	0.83	68.87	0.51	361.33	0.961
A-09	71.67	0.00	0.00	4.47	63.13	2.70	65.83	0.18	133.34	0.919
A-10	71.67	0.00	0.00	4.00	63.83	2.46	66.29	0.17	123.34	0.925
A-11	71.67	0.00	0.00	5.80	61.03	3.52	64.56	0.20	144.32	0.901
A-12	71.67	0.00	0.00	4.43	63.14	2.75	65.89	0.22	161.14	0.919
A-13	71.67	0.00	0.00	4.43	63.14	2.75	65.89	0.16	120.88	0.919
A-14	71.67	0.00	0.00	38.68	14.04	18.66	32.71	0.13	76.49	0.456
A-15_1	71.67	0.00	0.00	8.79	56.17	5.57	61.74	0.03	24.54	0.861
A-15_2	71.67	0.00	0.00	8.79	56.17	5.57	61.74	0.06	46.19	0.861
BRD-01	71.67	0.00	0.00	17.68	42.13	11.02	53.15	0.18	157.39	0.742
BRD-02	71.67	0.00	0.00	13.22	49.15	8.30	57.46	0.10	82.89	0.802
BRD-03	71.67	0.00	0.00	17.68	42.13	11.02	53.15	0.03	29.74	0.742
DR-01	71.67	0.00	0.00	25.50	30.19	15.38	45.57	0.05	44.92	0.636
HWD	71.67	0.00	0.00	40.84	26.10	4.31	30.41	0.41	185.07	0.424
R-01	71.67	0.00	0.00	0.00	71.74	0.00	71.74	0.31	217.73	1.001

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Node Depth Summary
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Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
1	JUNCTION	0.00	0.00	77.80	0 00:00	0.00
2	JUNCTION	0.00	0.00	78.29	0 00:00	0.00
3	JUNCTION	0.03	0.31	77.56	0 01:10	0.31
C-1_IN	JUNCTION	0.16	0.68	77.26	0 01:37	0.68
C-1_OUT	JUNCTION	0.23	0.77	77.24	0 01:36	0.77
C-2_IN	JUNCTION	0.26	0.83	77.23	0 01:36	0.83
C-2_OUT	JUNCTION	0.26	0.59	76.96	0 01:40	0.59
HW-1	JUNCTION	0.15	0.74	77.74	0 01:21	0.74
HW-3	JUNCTION	0.17	0.71	77.24	0 01:36	0.71
HW-5	JUNCTION	0.17	0.47	76.95	0 01:41	0.47
NPONDOUT	JUNCTION	0.18	0.72	77.24	0 01:36	0.72
OF-2	JUNCTION	0.20	0.52	76.95	0 01:41	0.52
OF-1	OUTFALL	0.20	0.52	76.90	0 01:41	0.52
A-01_Ponding	STORAGE	0.04	0.39	77.74	0 01:20	0.39
A-02_Ponding	STORAGE	0.06	0.46	77.74	0 01:21	0.46
A-03_Ponding	STORAGE	0.07	0.53	77.74	0 01:21	0.53
A-04_Ponding	STORAGE	0.10	0.61	77.74	0 01:22	0.61

A-05_Ponding	STORAGE	0.13	0.71	77.74	0	01:22	0.71	
A-06_Ponding	STORAGE	0.14	0.73	77.74	0	01:21	0.73	
A-08_Ponding	STORAGE	0.03	0.37	77.72	0	01:10	0.37	
A-09_Ponding	STORAGE	0.05	0.40	77.68	0	01:10	0.40	
A-10_Ponding	STORAGE	0.06	0.43	77.64	0	01:10	0.43	
A-11_Ponding	STORAGE	0.09	0.46	77.59	0	01:10	0.46	
A-12_Ponding	STORAGE	0.15	0.49	77.51	0	01:52	0.49	
A-13_Ponding	STORAGE	0.21	0.60	77.51	0	01:52	0.60	
CB-1	STORAGE	0.09	0.57	77.72	0	01:20	0.57	
CB-2	STORAGE	0.13	0.78	77.83	0	01:10	0.78	
DI-3	STORAGE	0.23	0.99	77.59	0	01:28	0.99	
DI-4	STORAGE	0.36	0.96	77.51	0	01:53	0.96	
OGS-N	STORAGE	0.26	0.94	77.66	0	01:24	0.94	
OGS-S	STORAGE	0.33	0.79	77.51	0	01:53	0.79	
Pond-N	STORAGE	0.22	0.79	77.59	0	01:28	0.79	
Pond-S	STORAGE	0.28	0.71	77.51	0	01:53	0.71	
Roof	STORAGE	0.11	0.23	77.25	0	04:49	0.23	
STMMH-1	STORAGE	0.17	0.78	77.72	0	01:22	0.78	
STMMH-2	STORAGE	0.25	0.91	77.66	0	01:24	0.91	
STMMH-3	STORAGE	0.16	0.71	77.26	0	01:36	0.71	
STMMH-4	STORAGE	0.18	0.48	76.98	0	01:41	0.48	
StormTech-N	STORAGE	0.35	1.11	77.66	0	01:24	1.11	
StormTech-S	STORAGE	0.44	0.96	77.51	0	01:53	0.96	

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Node Inflow Summary
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Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent	
1	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
2	JUNCTION	0.00	0.00	0	00:00	0	0	0.000	ltr
3	JUNCTION	157.39	157.39	0	01:10	0.183	0.183	-8.189	
C-1_IN	JUNCTION	185.07	311.51	0	01:10	0.409	0.608	2.134	
C-1_OUT	JUNCTION	82.89	231.88	0	01:10	0.101	0.697	-0.015	
C-2_IN	JUNCTION	0.00	403.12	0	01:30	0	2.72	-0.261	
C-2_OUT	JUNCTION	29.74	402.40	0	01:36	0.0345	2.76	0.003	
HW-1	JUNCTION	0.00	518.11	0	01:04	0	1.67	0.006	
HW-3	JUNCTION	44.92	335.96	0	01:28	0.0506	2.02	0.000	
HW-5	JUNCTION	0.00	59.75	0	01:53	0	1.88	0.002	
NPONDOUT	JUNCTION	0.00	417.39	0	01:23	0	2.72	-0.023	
OF-2	JUNCTION	0.00	450.23	0	01:40	0	4.64	0.001	
OF-1	OUTFALL	0.00	450.19	0	01:41	0	4.64	0.000	
A-01_Ponding	STORAGE	351.86	351.86	0	01:10	0.487	0.487	-0.109	
A-02_Ponding	STORAGE	133.55	440.60	0	01:10	0.185	0.673	-0.018	
A-03_Ponding	STORAGE	126.76	491.13	0	01:08	0.176	0.849	-0.014	
A-04_Ponding	STORAGE	157.52	548.84	0	01:06	0.22	1.07	-0.017	
A-05_Ponding	STORAGE	95.56	450.92	0	01:05	0.133	1.2	0.074	
A-06_Ponding	STORAGE	332.09	616.06	0	01:05	0.471	1.67	-0.005	
A-08_Ponding	STORAGE	361.33	361.33	0	01:10	0.509	0.509	-0.073	
A-09_Ponding	STORAGE	133.34	480.12	0	01:10	0.184	0.693	-0.023	
A-10_Ponding	STORAGE	123.34	580.68	0	01:10	0.169	0.862	-0.016	
A-11_Ponding	STORAGE	144.32	695.47	0	01:10	0.196	1.06	-0.106	
A-12_Ponding	STORAGE	161.14	813.10	0	01:10	0.219	2	0.010	
A-13_Ponding	STORAGE	120.88	861.59	0	01:10	0.164	1.82	1.147	
CB-1	STORAGE	24.54	24.54	0	01:10	0.0315	0.0315	-0.004	
CB-2	STORAGE	46.19	46.19	0	01:10	0.0593	0.0593	-0.003	
DI-3	STORAGE	0.00	78.39	0	03:22	0	0.387	-0.414	
DI-4	STORAGE	0.00	26.57	0	01:09	0	0.274	-0.146	
OGS-N	STORAGE	0.00	100.91	0	01:04	0	0.856	0.015	
OGS-S	STORAGE	0.00	100.30	0	01:09	0	1.58	-0.008	
Pond-N	STORAGE	154.68	568.37	0	01:10	0.199	1.42	0.003	
Pond-S	STORAGE	76.49	907.59	0	01:10	0.127	1.88	-0.769	
Roof	STORAGE	217.73	242.33	0	01:10	0.315	0.673	0.022	
STMMH-1	STORAGE	0.00	552.35	0	01:05	0	1.76	-0.169	
STMMH-2	STORAGE	0.00	495.92	0	01:05	0	2.08	-0.075	
STMMH-3	STORAGE	0.00	74.87	0	02:51	0	1.25	-0.047	
STMMH-4	STORAGE	0.00	50.36	0	02:50	0	1.86	-0.001	
StormTech-N	STORAGE	0.00	99.58	0	01:04	0	0.857	0.046	
StormTech-S	STORAGE	0.00	97.40	0	01:09	0	1.58	-0.004	

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Node Surcharge Summary
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No nodes were surcharged.

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Node Flooding Summary
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No nodes were flooded.

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Storage Volume Summary
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Storage Unit	Average Volume 1000 m³	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m³	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
A-01_Ponding	0.000	0.0	0.0	0.0	0.002	0.6	0 01:20	307.17
A-02_Ponding	0.000	0.1	0.0	0.0	0.015	2.4	0 01:21	367.52
A-03_Ponding	0.001	0.2	0.0	0.0	0.023	5.2	0 01:21	396.45
A-04_Ponding	0.003	0.5	0.0	0.0	0.061	12.0	0 01:22	360.68
A-05_Ponding	0.001	0.6	0.0	0.0	0.031	14.2	0 01:22	326.02
A-06_Ponding	0.003	0.9	0.0	0.0	0.068	18.0	0 01:21	518.11
A-08_Ponding	0.000	0.0	0.0	0.0	0.001	0.3	0 01:10	347.06
A-09_Ponding	0.000	0.0	0.0	0.0	0.004	0.7	0 01:10	459.53
A-10_Ponding	0.000	0.0	0.0	0.0	0.005	1.5	0 01:10	556.24
A-11_Ponding	0.000	0.0	0.0	0.0	0.007	1.6	0 01:10	662.99
A-12_Ponding	0.001	0.1	0.0	0.0	0.006	1.3	0 01:52	779.20
A-13_Ponding	0.001	0.4	0.0	0.0	0.005	3.9	0 01:52	841.61
CB-1	0.000	8.6	0.0	0.0	0.000	54.6	0 01:20	24.07
CB-2	0.000	11.4	0.0	0.0	0.000	71.2	0 01:10	45.71
DI-3	0.000	13.4	0.0	0.0	0.001	58.2	0 01:28	43.92
DI-4	0.001	20.6	0.0	0.0	0.001	55.0	0 01:53	11.84
OGS-N	0.000	0.0	0.0	0.0	0.000	0.0	0 00:00	99.58
OGS-S	0.000	0.0	0.0	0.0	0.000	0.0	0 00:00	97.40
Pond-N	0.133	16.1	0.0	0.0	0.559	67.5	0 01:28	297.96
Pond-S	0.268	21.7	0.0	0.0	0.765	61.9	0 01:53	126.80
Roof	0.238	0.7	0.0	0.0	0.668	2.1	0 04:49	24.61
STMMH-1	0.001	12.5	0.0	0.0	0.004	58.3	0 01:22	495.92
STMMH-2	0.001	13.7	0.0	0.0	0.005	51.1	0 01:24	473.84
STMMH-3	0.000	13.4	0.0	0.0	0.001	59.4	0 01:36	74.90
STMMH-4	0.000	13.8	0.0	0.0	0.001	37.6	0 01:41	50.38
StormTech-N	0.020	32.6	0.0	0.0	0.063	100.0	0 01:16	36.91
StormTech-S	0.026	41.3	0.0	0.0	0.056	89.8	0 01:53	38.51

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Outfall Loading Summary
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Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
OF-1	93.69	80.35	450.19	4.636
System	93.69	80.35	450.19	4.636

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Link Flow Summary
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Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
1	CONDUIT	0.00	0 00:00	0.00	0.00	0.20
10	CONDUIT	556.24	0 01:10	0.54	0.14	0.44
10_(STM)	CONDUIT	97.40	0 01:09	1.08	0.48	1.00
11	CONDUIT	662.99	0 01:10	0.59	0.17	0.47

12	CONDUIT	754.60	0	01:10	0.64	0.19	0.55
14	CONDUIT	841.61	0	01:10	0.96	0.24	0.63
15	CONDUIT	60.01	0	01:53	0.33	0.01	0.50
15_(1)_(STM)	CONDUIT	495.92	0	01:05	0.90	0.89	1.00
16	CONDUIT	219.38	0	01:10	0.31	0.14	0.71
17	CONDUIT	403.12	0	01:30	0.37	0.20	0.74
18	CONDUIT	26.57	0	01:09	0.56	0.03	0.41
18_(STM)	CONDUIT	414.14	0	01:10	1.62	0.84	1.00
19	CONDUIT	402.33	0	01:36	0.48	1.08	0.53
2	CONDUIT	307.17	0	01:10	0.41	0.08	0.43
20	CONDUIT	78.39	0	03:22	0.66	0.09	0.32
22	CONDUIT	335.10	0	01:28	0.27	0.11	0.71
23	CONDUIT	450.19	0	01:41	0.55	0.18	0.52
26	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
27	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
27_(STM)	CONDUIT	488.25	0	01:05	1.02	0.90	1.00
28_(STM)	CONDUIT	24.07	0	01:10	0.80	0.75	1.00
29_(STM)	CONDUIT	45.71	0	01:10	1.46	1.42	1.00
3	CONDUIT	367.52	0	01:07	0.44	0.09	0.50
39_(1)_(STM)	CONDUIT	50.38	0	02:50	0.73	0.74	1.00
4	CONDUIT	396.45	0	01:06	0.43	0.10	0.57
40_(STM)	CONDUIT	100.91	0	01:04	0.76	0.28	1.00
41_(STM)	CONDUIT	99.58	0	01:04	0.79	0.34	1.00
46_(STM)	CONDUIT	100.30	0	01:09	0.97	0.50	1.00
47_(STM)	CONDUIT	74.90	0	02:51	0.74	0.52	1.00
5	CONDUIT	360.68	0	01:05	0.35	0.09	0.66
6	CONDUIT	127.90	0	01:10	0.32	0.04	0.40
6_1	CONDUIT	326.02	0	01:05	0.31	0.08	0.72
6_2	CONDUIT	518.11	0	01:04	0.49	0.17	0.73
7	CONDUIT	0.00	0	00:00	0.00	0.00	0.18
8	CONDUIT	347.06	0	01:10	0.43	0.09	0.38
9	CONDUIT	459.53	0	01:10	0.49	0.12	0.42
C-1	CONDUIT	188.86	0	01:15	0.71	0.76	1.00
C-2	CONDUIT	399.91	0	01:36	1.49	1.79	1.00
13	ORIFICE	38.51	0	02:50			1.00
21	ORIFICE	36.91	0	02:51			1.00
49_(STM)	ORIFICE	37.96	0	02:51			1.00
6_(1)_(STM)	ORIFICE	11.84	0	02:50			1.00
NorthSpillway	WEIR	268.94	0	01:28			0.26
SouthSpillway	WEIR	14.14	0	01:53			0.04
Roof_Outlet	DUMMY	24.61	0	00:55			

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Flow Classification Summary
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	Adjusted	Fraction of Time in Flow Class								
	/Actual		Up	Down	Sub	Sup	Up	Down	Norm	Inlet
Conduit	Length	Dry	Dry	Dry	Crit	Crit	Crit	Crit	Ltd	Ctrl
1	1.00	0.02	0.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.77	0.00
10_(STM)	1.00	0.01	0.00	0.00	0.57	0.00	0.00	0.42	0.00	0.00
11	1.00	0.01	0.01	0.00	0.98	0.00	0.00	0.00	0.68	0.00
12	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.56	0.00
14	1.00	0.01	0.00	0.00	0.60	0.00	0.00	0.39	0.06	0.00
15	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.36	0.00
15_(1)_(STM)	1.00	0.02	0.00	0.00	0.38	0.00	0.00	0.61	0.08	0.00
16	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.07	0.00
17	1.00	0.02	0.00	0.00	0.71	0.00	0.00	0.27	0.08	0.00
18	1.00	0.66	0.00	0.00	0.29	0.00	0.00	0.05	0.00	0.00
18_(STM)	1.00	0.02	0.00	0.00	0.33	0.00	0.00	0.65	0.00	0.00
19	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
2	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.85	0.00
20	1.00	0.86	0.00	0.00	0.12	0.00	0.00	0.02	0.00	0.00
22	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
23	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.24	0.00
26	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27_(STM)	1.00	0.02	0.00	0.00	0.31	0.00	0.00	0.68	0.02	0.00
28_(STM)	1.00	0.02	0.00	0.00	0.21	0.00	0.00	0.77	0.01	0.00
29_(STM)	1.00	0.02	0.00	0.00	0.26	0.00	0.00	0.73	0.01	0.00
3	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.83	0.00
39_(1)_(STM)	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.30	0.00
4	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.81	0.00
40_(STM)	1.00	0.02	0.00	0.00	0.34	0.00	0.00	0.64	0.00	0.00

41_(STM)	1.00	0.02	0.00	0.00	0.33	0.00	0.00	0.65	0.00	0.00
46_(STM)	1.00	0.01	0.00	0.00	0.56	0.00	0.00	0.43	0.00	0.00
47_(STM)	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.33	0.00
5	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.77	0.00
6	1.00	0.01	0.00	0.00	0.98	0.00	0.00	0.00	0.97	0.00
6_1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.72	0.00
6_2	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.70	0.00
7	1.00	0.02	0.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.85	0.00
9	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.82	0.00
C-1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.63
C-2	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.24

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
10_(STM)	5.62	5.62	6.15	0.01	0.01
15_(1)_(STM)	1.22	1.22	2.85	0.01	0.01
18_(STM)	2.49	2.49	2.85	0.01	0.01
19	0.01	0.01	0.01	0.45	0.01
27_(STM)	0.94	0.94	1.15	0.01	0.01
28_(STM)	2.95	2.95	3.06	0.01	0.13
29_(STM)	3.77	3.79	3.98	0.16	0.19
39_(1)_(STM)	1.82	2.34	1.83	0.01	1.71
40_(STM)	3.47	3.47	3.68	0.01	0.01
41_(STM)	3.79	3.79	3.98	0.01	0.01
46_(STM)	3.62	3.62	4.57	0.01	0.01
47_(STM)	1.50	1.53	1.51	0.01	0.76
C-1	0.63	0.63	0.91	0.01	0.01
C-2	0.01	1.09	0.01	1.16	0.01

Analysis begun on: Tue Apr 21 15:55:20 2026

Analysis ended on: Tue Apr 21 15:55:23 2026
Total elapsed time: 00:00:03

PROJECT #: 118168
PROJECT NAME: 5510 BOUNDARY ROAD
LOCATION: OTTAWA

NOVATECH
Engineers, Planners & Landscape Architects

DATE PREPARED: APRIL 23, 2026

Table 1: Mannings Ditch Flow Capacity - V-bottom ditch

Ditch Criteria	Units	Value
Depth	m	1.0
Side slope (L)	1 to X	3.0
Side slope (R)	1 to X	3.0
Top Width (L)	m	3.0
Top Width (R)	m	3.0
Area	m^2	3.000
Perimeter	m	6.32
R=A/P (wetted perimeter)	m	0.47
n (mannings roughness coeficient)		0.03
Slope	m/m	0.002
Q_{max}	m^3/s	2.720
V_{max}	m/s	0.907

Mannings Equation

$R = A/P$

$Q = (1/n) \times (S)^{0.5} \times A \times R^{2/3}$

$V = Q/A$

Boundary Road Ditch Flow Capacity = 2720 L/s
Total Post-Development 100yr Flow= 872 L/s

Note: The total 100yr post-development flows were generated from PCSWMM model for the 3 hour 100yr Chicago storm distribution. Therefore there is adequate capcity in the Boundary Road ditch for the proposed development flows.

ADS Treatment Train Sizing

Project Name:	5510 Boundary Road North OGS		
Consulting Engineer:	Novatech Engineering		
Location:	Ottawa, Ontario		
Sizing Completed By:	Haider Nasrullah	**Email:**	haider.nasrullah@adspipe.com

Summary of Results	
Isolator Row PLUS TSS Removal:	80.0%
FD-4HC TSS Removal:	32.0%
Combined TSS Removal:	**86.0%**
Total Volume Treated:	**>90%**

Site Details	
Site Area (ha):	3.05
Rational C:	0.81
Particle Size Distribution:	ETV
Rainfall Station:	Ottawa, ONT

Notes: OGS results based on ETV PSD and results from ETV testing protocols.

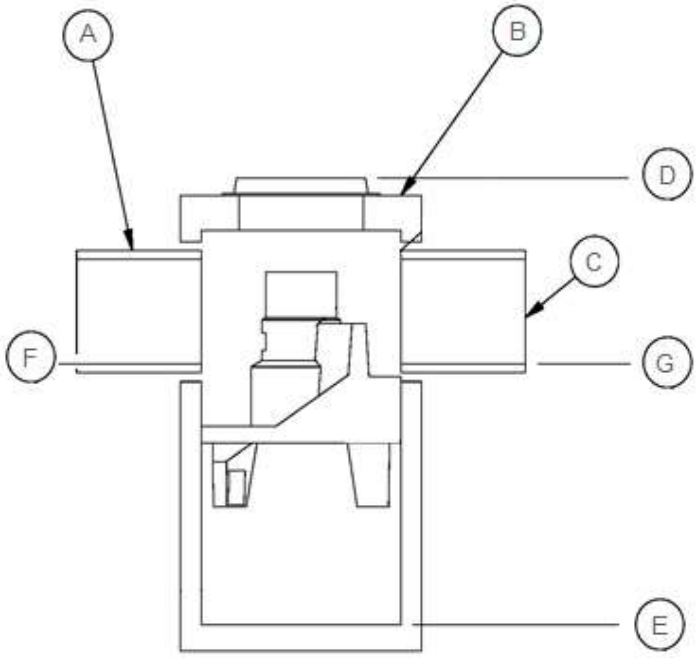
Individual OGS Results		
Model	**TSS Removal**	**Volume Treated**
FD-4HC	32.0%	>90%
FD-5HC	34.0%	>90%
FD-6HC	36.0%	>90%
FD-8HC	39.0%	>90%
FD-10HC	41.0%	>90%

Stormtech Details	
Chamber Model:	DC-780
No. Chambers in Isolator Row PLUS:	26
Volume Treated by Isolator Row PLUS:	>90%

Notes: Refer to Stormtech drawings for full IR+ configuration.

Isolator Row PLUS must include Flared End Ramp (FLAMP) for proper performance.

Overall System Capacities	
Total Sediment Storage Capacity:	5.88 m³
Oil Storage Capacity:	723 L
Max. OGS Pipe Diameter:	600 mm
Peak OGS Flow Capacity:	510 L/s
Peak Stormtech Inlet Flow Capacity:	---
Peak IR PLUS Water Quality Flow:	186.7 L/s



OGS Specifications	
Inlet Pipe Diameter (A):	525 mm
Unit Diameter (B):	1,200 mm
Outlet Pipe Diameter (C):	525 mm
Rim Elevation (D):	78.34 m
Bottom of Sump Elevation (E):	75.22 m
Inlet Pipe Elevation (F):	76.73 m
Outlet Pipe Elevation (G):	76.72 m

Notes:

Isolator Row PLUS removal efficiency based on verified ETV test report. For dimensions and configuration of Isolator Row PLUS, please see Stormtech drawing package.

Project Name:	5510 Boundary Road North OGS
Consulting Engineer:	Novatech Engineering
Location:	Ottawa, Ontario

Net Annual Removal Efficiency Summary

Rainfall Intensity	Fraction of Rainfall	Removal Efficiency		Combined Removal Efficiency	Combined Weighted Removal Efficiency
		FD-4HC	IR PLUS[(2)]		
mm/hr	%	%	%	%	%
0.50	0.1%	54.0%	81.2%	91.3%	0.1%
1.00	14.1%	49.0%	81.2%	90.4%	12.8%
1.50	14.2%	46.0%	81.2%	89.9%	12.8%
2.00	14.1%	44.0%	81.2%	89.5%	12.6%
2.50	4.2%	42.4%	81.2%	89.2%	3.7%
3.00	1.5%	41.1%	81.2%	88.9%	1.3%
3.50	8.5%	39.9%	81.2%	88.7%	7.6%
4.00	5.4%	39.0%	81.2%	88.5%	4.8%
4.50	1.2%	38.1%	81.2%	88.4%	1.0%
5.00	5.5%	37.4%	81.2%	88.2%	4.9%
6.00	4.3%	36.1%	81.2%	88.0%	3.8%
7.00	4.5%	0.0%	81.2%	81.2%	3.7%
8.00	3.1%	0.0%	81.2%	81.2%	2.5%
9.00	2.3%	0.0%	81.2%	81.2%	1.9%
10.00	2.6%	0.0%	81.2%	81.2%	2.1%
20.00	9.2%	0.0%	81.2%	81.2%	7.5%
30.00	2.6%	0.0%	73.6%	73.6%	1.9%
40.00	1.2%	0.0%	55.2%	55.2%	0.6%
50.00	0.5%	0.0%	44.2%	44.2%	0.2%
100.00	0.7%	0.0%	22.1%	22.1%	0.2%
150.00	0.1%	0.0%	14.7%	14.7%	0.0%
200.00	0.0%	0.0%	11.0%	11.0%	0.0%
		Total Net Annual Removal Efficiency			**86.0%**
		Total Runoff Volume Treated			**>90%**

Notes:

(1) Rainfall Data: 1960:2007, HLY03, Ottawa, ONT, 6105976 & 6105978.

(2) IR PLUS removal based on ETV PSD and ETV protocols.

(3) Rainfall adjusted to 5 min peak intensity based on hourly average.

(4) Combined removal efficiencies calculated based on NCDENR Stormwater BMP Manual, Section 3.9.4, where Total Removal Efficiency = 1st BMP Efficiency + 2nd BMP Efficiency - (1st BMP Efficiency x 2nd BMP Efficiency)

ADS Treatment Train Sizing

Project Name:	5510 Boundary Road South OGS		
Consulting Engineer:	Novatech Engineering		
Location:	Ottawa, Ontario		
Sizing Completed By:	Haider Nasrullah	**Email:**	haider.nasrullah@adspipe.com

Summary of Results	
Isolator Row PLUS TSS Removal:	80.2%
FD-4HC TSS Removal:	32.0%
Combined TSS Removal:	**86.2%**
Total Volume Treated:	**>90%**

Site Details	
Site Area (ha):	2.99
Rational C:	0.79
Particle Size Distribution:	ETV
Rainfall Station:	Ottawa, ONT

Notes: OGS results based on ETV PSD and results from ETV testing protocols.

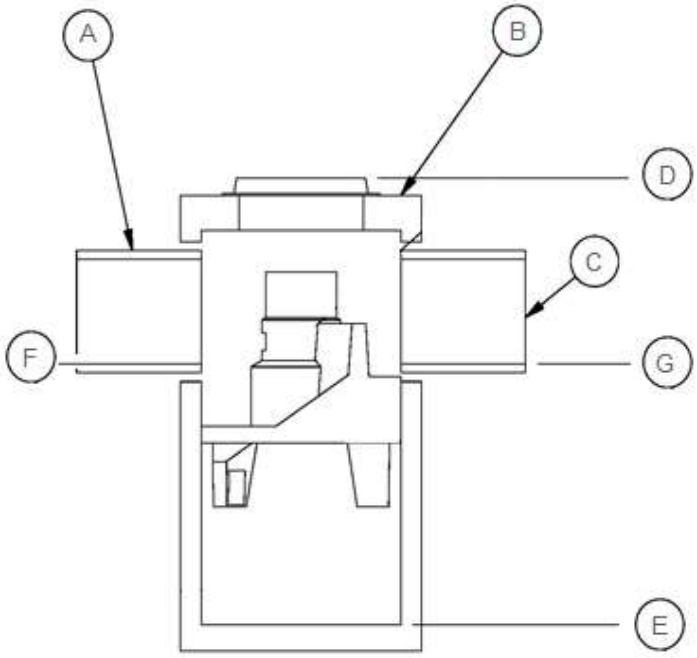
Individual OGS Results		
Model	**TSS Removal**	**Volume Treated**
FD-4HC	32.0%	>90%
FD-5HC	34.0%	>90%
FD-6HC	36.0%	>90%
FD-8HC	39.0%	>90%
FD-10HC	42.0%	>90%

Stormtech Details	
Chamber Model:	DC-780
No. Chambers in Isolator Row PLUS:	26
Volume Treated by Isolator Row PLUS:	>90%

Notes: Refer to Stormtech drawings for full IR+ configuration.

Isolator Row PLUS must include Flared End Ramp (FLAMP) for proper performance.

Overall System Capacities	
Total Sediment Storage Capacity:	5.88 m³
Oil Storage Capacity:	723 L
Max. OGS Pipe Diameter:	600 mm
Peak OGS Flow Capacity:	510 L/s
Peak Stormtech Inlet Flow Capacity:	---
Peak IR PLUS Water Quality Flow:	186.7 L/s



OGS Specifications	
Inlet Pipe Diameter (A):	300 mm
Unit Diameter (B):	1,200 mm
Outlet Pipe Diameter (C):	300 mm
Rim Elevation (D):	78.74 m
Bottom of Sump Elevation (E):	75.22 m
Inlet Pipe Elevation (F):	76.76 m
Outlet Pipe Elevation (G):	76.72 m

Notes:

Isolator Row PLUS removal efficiency based on verified ETV test report. For dimensions and configuration of Isolator Row PLUS, please see Stormtech drawing package.

Project Name:	5510 Boundary Road South OGS
Consulting Engineer:	Novatech Engineering
Location:	Ottawa, Ontario

Net Annual Removal Efficiency Summary

Rainfall Intensity	Fraction of Rainfall	Removal Efficiency		Combined Removal Efficiency	Combined Weighted Removal Efficiency
		FD-4HC	IR PLUS[2]		
mm/hr	%	%	%	%	%
0.50	0.1%	54.3%	81.2%	91.4%	0.1%
1.00	14.1%	49.3%	81.2%	90.5%	12.8%
1.50	14.2%	46.4%	81.2%	89.9%	12.8%
2.00	14.1%	44.3%	81.2%	89.5%	12.6%
2.50	4.2%	42.7%	81.2%	89.2%	3.7%
3.00	1.5%	41.4%	81.2%	89.0%	1.3%
3.50	8.5%	40.3%	81.2%	88.8%	7.6%
4.00	5.4%	39.3%	81.2%	88.6%	4.8%
4.50	1.2%	38.5%	81.2%	88.4%	1.0%
5.00	5.5%	37.7%	81.2%	88.3%	4.9%
6.00	4.3%	36.4%	81.2%	88.0%	3.8%
7.00	4.5%	0.0%	81.2%	81.2%	3.7%
8.00	3.1%	0.0%	81.2%	81.2%	2.5%
9.00	2.3%	0.0%	81.2%	81.2%	1.9%
10.00	2.6%	0.0%	81.2%	81.2%	2.1%
20.00	9.2%	0.0%	81.2%	81.2%	7.5%
30.00	2.6%	0.0%	77.0%	77.0%	2.0%
40.00	1.2%	0.0%	57.8%	57.8%	0.7%
50.00	0.5%	0.0%	46.2%	46.2%	0.2%
100.00	0.7%	0.0%	23.1%	23.1%	0.2%
150.00	0.1%	0.0%	15.4%	15.4%	0.0%
200.00	0.0%	0.0%	11.6%	11.6%	0.0%
		Total Net Annual Removal Efficiency			**86.2%**
		Total Runoff Volume Treated			**>90%**

Notes:

(1) Rainfall Data: 1960:2007, HLY03, Ottawa, ONT, 6105976 & 6105978.

(2) IR PLUS removal based on ETV PSD and ETV protocols.

(3) Rainfall adjusted to 5 min peak intensity based on hourly average.

(4) Combined removal efficiencies calculated based on NCDENR Stormwater BMP Manual, Section 3.9.4, where Total Removal Efficiency = 1st BMP Efficiency + 2nd BMP Efficiency - (1st BMP Efficiency x 2nd BMP Efficiency)

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER	
ADS SALES REP	
PROJECT NO.	

Advanced Drainage Systems, Inc.

SiteAssist™
FOR STORMTECH INSTALLATION INSTRUCTIONS VISIT OUR APP

5510 BOUNDARY ROAD - NORTH

OTTAWA, ON, CANADA

DC-780 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH DC-780.
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".
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 F2418 SHALL BE GREATER THAN OR EQUAL TO 500 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.
10. 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.
11. ADS DOES NOT DESIGN OR PROVIDE MEMBRANE LINER SYSTEMS. 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.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF THE DC-780 CHAMBER SYSTEM

1. STORMTECH DC-780 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH DC-780 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 OR RECYCLED CONCRETE; AASHTO M43 #3, 357, 4, 467, 5, 56, OR 57.
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 DC-780 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
2. THE USE OF CONSTRUCTION EQUIPMENT OVER DC-780 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.

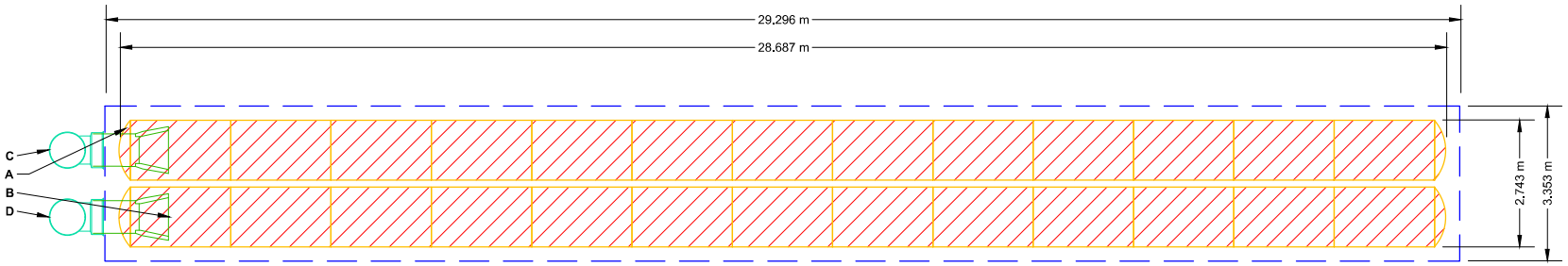
USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO THE CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-800-821-6710 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

PROPOSED LAYOUT		PROPOSED ELEVATIONS	
26	STORMTECH DC-780 CHAMBERS	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	81.117
4	STORMTECH DC-780 END CAPS	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	78.069
152	STONE ABOVE (mm)	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	77.917
152	STONE BELOW (mm)	MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	77.917
40	STONE VOID	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	77.917
62.5	INSTALLED SYSTEM VOLUME (m³) (PERIMETER STONE INCLUDED) (BASE STONE INCLUDED)	TOP OF STONE:	77.612
		TOP OF DC-780 CHAMBER:	77.460
		600 mm ISOLATOR ROW PLUS INVERT:	76.700
98.2	SYSTEM AREA (m²)	600 mm ISOLATOR ROW PLUS INVERT:	76.700
65.3	SYSTEM PERIMETER (m)	BOTTOM OF DC-780 CHAMBER:	76.698
		BOTTOM OF STONE:	76.546

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
PREFABRICATED EZ END CAP	A	600 mm BOTTOM PREFABRICATED EZ END CAP, PART#: SC740ECEZ / TYP OF ALL 600 mm BOTTOM CONNECTIONS AND ISOLATOR PLUS ROWS	3 mm	
FLAMP	B	INSTALL FLAMP ON 600 mm ACCESS PIPE / PART#: SC80024RAMP (TYP 2 PLACES)		
NYLOPLAST (INLET W/ ISO PLUS ROW)	C	750 mm DIAMETER (610 mm SUMP MIN)		
NYLOPLAST (INLET W/ ISO PLUS ROW)	D	750 mm DIAMETER (610 mm SUMP MIN)		



ISOLATOR ROW PLUS (SEE DETAIL)

NO WOVEN GEOTEXTILE

BED LIMITS

NOTES

- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- **NOT FOR CONSTRUCTION**: THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.

5510 BOUNDARY ROAD - NORTH
OTTAWA, ON, CANADA
DATE: 10/07/2025
DRAWN: HN
PROJECT #:
CHECKED: N/A

DATE	DWN	CHK

StormTech®
Chamber System

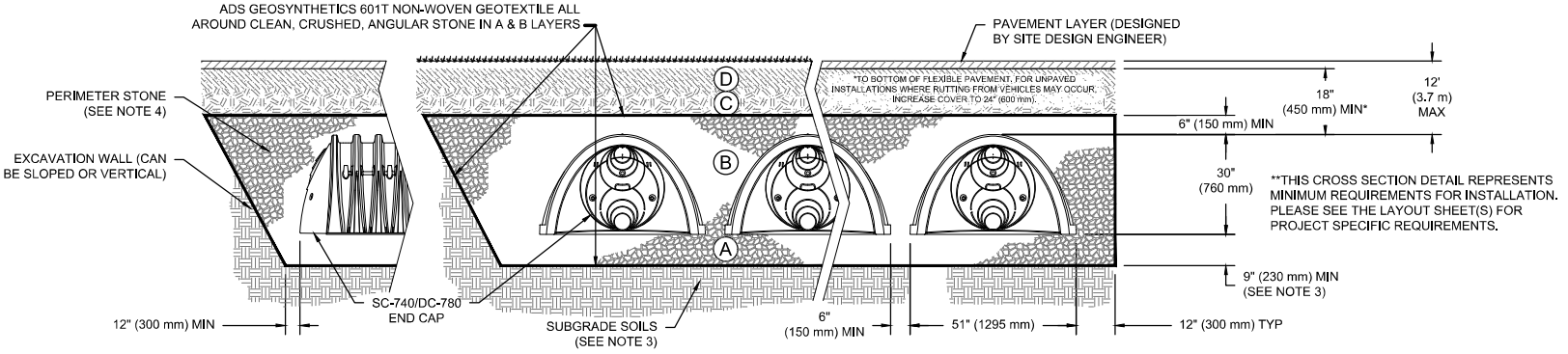
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

SCALE = 1 : 100

ACCEPTABLE FILL MATERIALS: STORMTECH DC-780 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 OR RECYCLED CONCRETE[5]	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 OR RECYCLED CONCRETE[5]	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 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.
5. WHERE RECYCLED CONCRETE AGGREGATE IS USED IN LAYERS 'A' OR 'B' THE MATERIAL SHOULD ALSO MEET THE ACCEPTABILITY CRITERIA OUTLINED IN TECHNICAL NOTE 6.20 "RECYCLED CONCRETE STRUCTURAL BACKFILL".



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. DC-780 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. REFERENCE STORMTECH DESIGN MANUAL FOR BEARING CAPACITY GUIDANCE.
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 500 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.

5510 BOUNDARY ROAD - NORTH
OTTAWA, ON, CANADA
DATE: 10/07/2025 | DRAWN: HN | CHECKED: N/A
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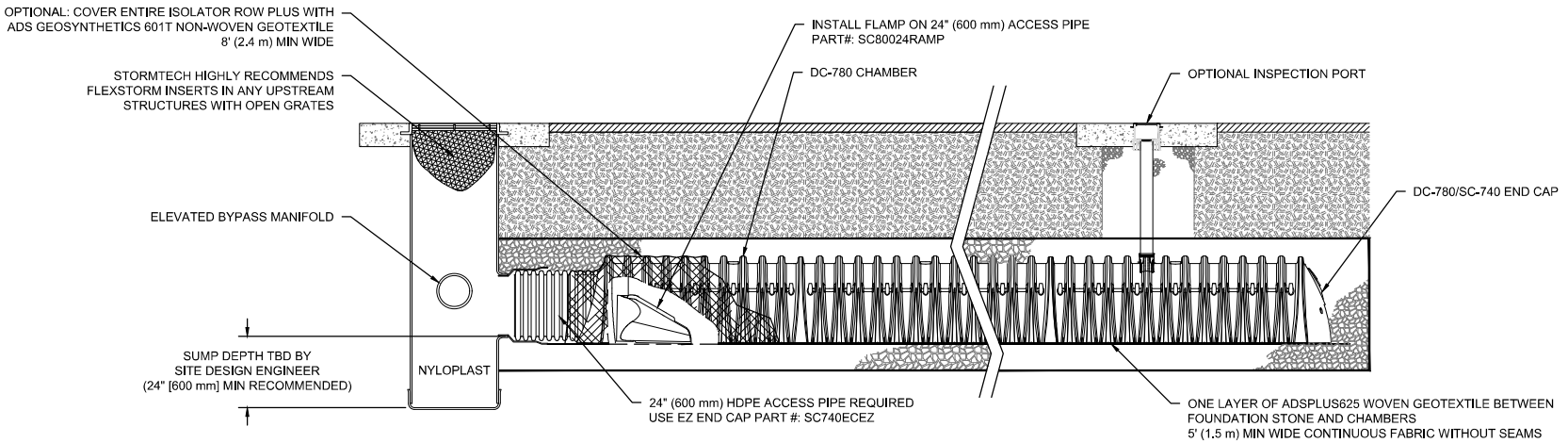
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

StormTech® Chamber System



DC-780 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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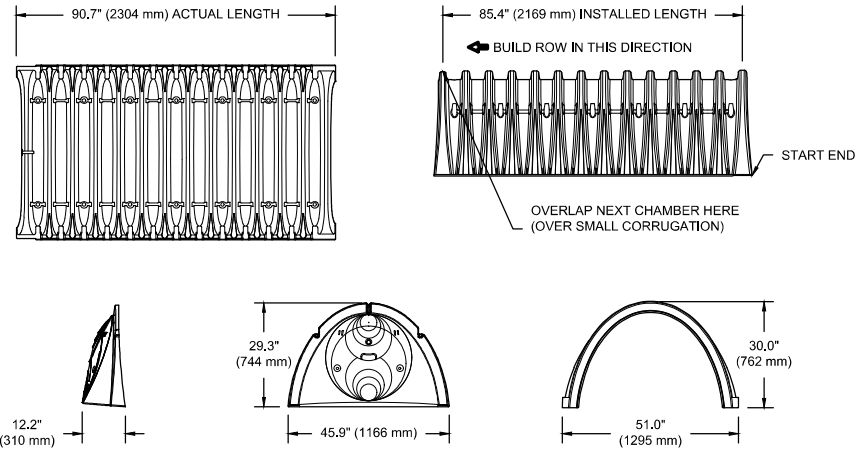
DC-780 TECHNICAL SPECIFICATION

NTS



NOMINAL CHAMBER SPECIFICATIONS

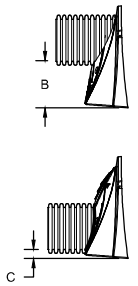
SIZE (W X H X INSTALLED LENGTH)	51.0" X 30.0" X 85.4"	(1295 mm X 762 mm X 2169 mm)
CHAMBER STORAGE	46.2 CUBIC FEET	(1.30 m³)
MINIMUM INSTALLED STORAGE*	78.4 CUBIC FEET	(2.20 m³)
WEIGHT	75.0 lbs.	(33.6 kg)

NOMINAL END CAP SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	45.9" X 29.3" X 9.6"	(1166 mm X 744 mm X 244 mm)
END CAP STORAGE	2.6 CUBIC FEET	(0.07 m³)
MINIMUM INSTALLED STORAGE**	14.4 CUBIC FEET	(0.40 m³)
WEIGHT	11.7 lbs.	(5.3 kg)

* ASSUMES 6" (152 mm) STONE ABOVE, 9" (229 mm) BELOW, AND 6" (152 mm) BETWEEN CHAMBERS
**ASSUMES 6" (152 mm) STONE ABOVE, 9" (229 mm) BELOW END CAPS, 6" (152 mm) BETWEEN ROWS, 12" (305 mm) BEYOND END CAPS

PART #	STUB	B	C
SC740EPE06TPC	6" (150 mm)	18.5" (470 mm)	---
SC740EPE06BPC		---	0.5" (13 mm)
SC740EPE08TPC	8" (200 mm)	16.5" (419 mm)	---
SC740EPE08BPC		---	0.6" (15 mm)
SC740EPE10TPC	10" (250 mm)	14.5" (368 mm)	---
SC740EPE10BPC		---	0.7" (18 mm)
SC740EPE12TPC	12" (300 mm)	12.5" (318 mm)	---
SC740EPE12BPC		---	1.2" (30 mm)
SC740EPE15TPC	15" (375 mm)	9.0" (229 mm)	---
SC740EPE15BPC		---	1.3" (33 mm)
SC740EPE18TPC	18" (450 mm)	5.0" (127 mm)	---
SC740EPE18BPC		---	1.6" (41 mm)
SC740ECEZ*	24" (600 mm)	---	0.1" (3 mm)



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

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

NOTE: ALL DIMENSIONS ARE NOMINAL; PRE-CORED END CAPS END WITH "PC"

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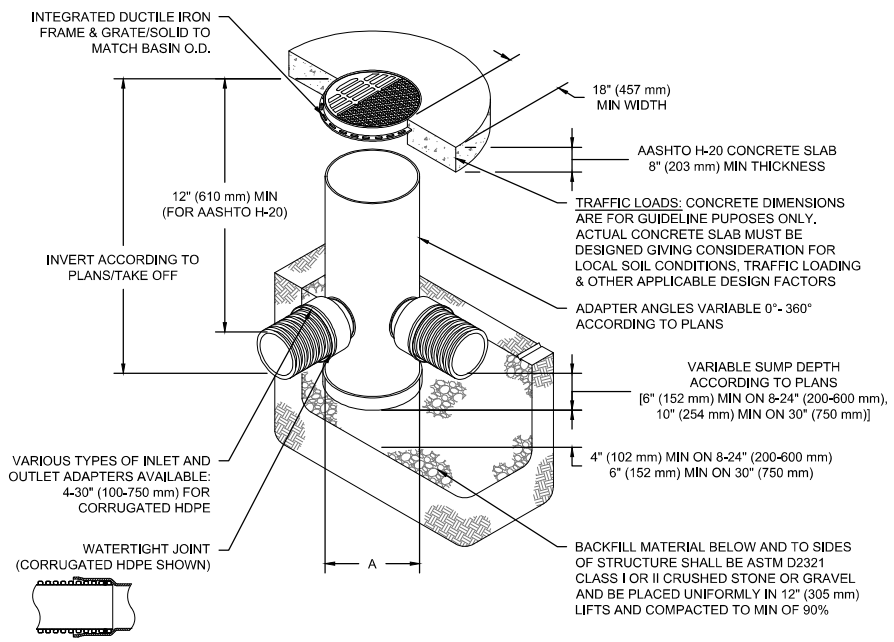
StormTech®
Chamber System

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

5510 BOUNDARY ROAD - NORTH
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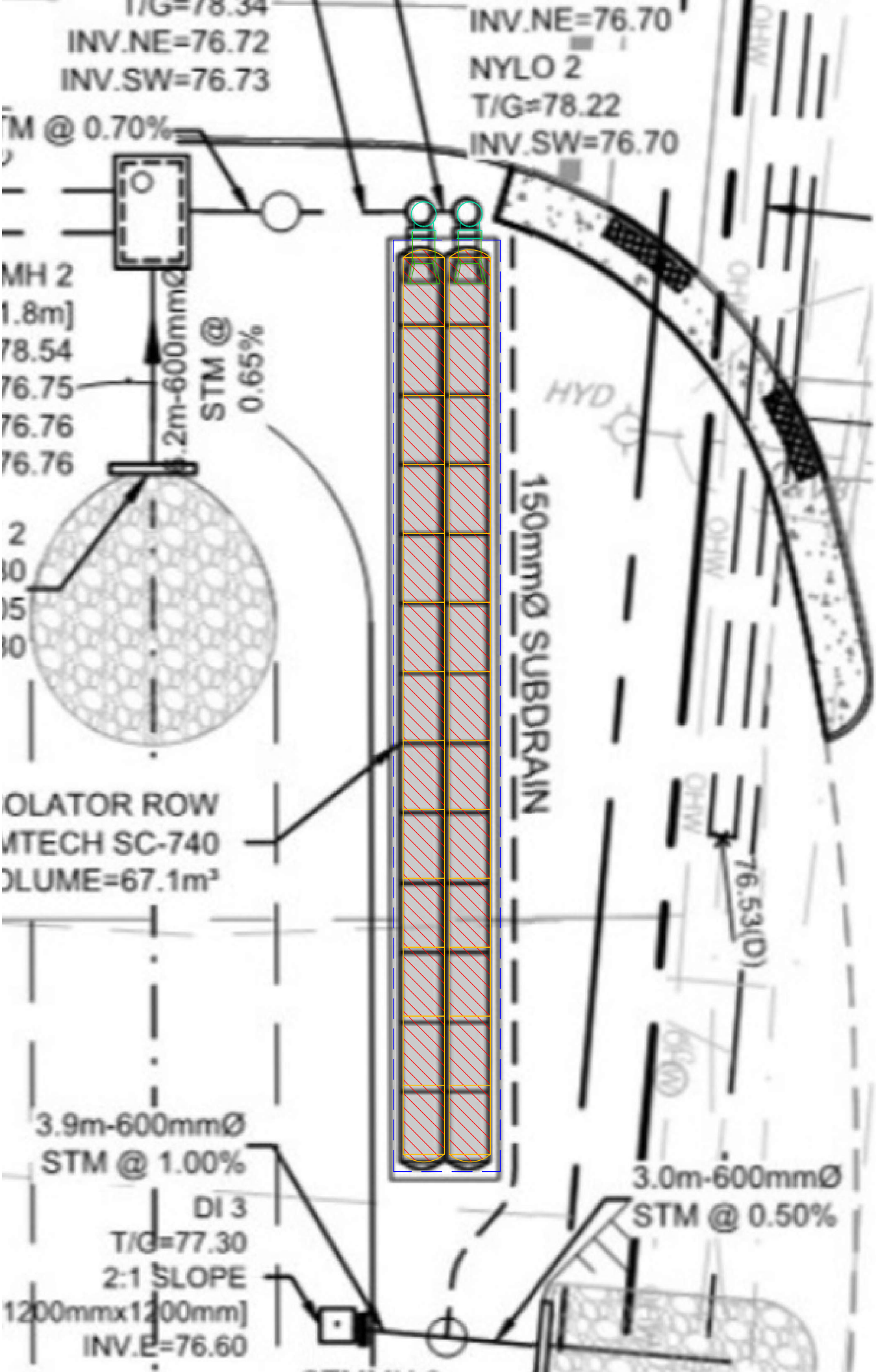
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INV.NE=76.72
INV.SW=76.73
M @ 0.70%
MH 2
1.8m]
78.54
76.75
76.76
76.76
2m-600mmØ
STM @
0.65%
2
0
5
0
OLATOR ROW
MTECH SC-740
OLUME=67.1m³
INV.NE=76.70
NYLO 2
T/G=78.22
INV.SW=76.70
HYD
150mmØ SUBDRAIN
76.53(D)
3.9m-600mmØ
STM @ 1.00%
DI 3
T/G=77.30
2:1 SLOPE
1200mmx1200mm]
INV.E=76.60
3.0m-600mmØ
STM @ 0.50%

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER	
ADS SALES REP	
PROJECT NO.	

Advanced Drainage Systems, Inc.

SiteAssist™
FOR STORMTECH INSTALLATION INSTRUCTIONS VISIT OUR APP

5510 BOUNDARY ROAD - SOUTH

OTTAWA, ON, CANADA

DC-780 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH DC-780.
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".
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 F2418 SHALL BE GREATER THAN OR EQUAL TO 500 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.
10. 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.
11. ADS DOES NOT DESIGN OR PROVIDE MEMBRANE LINER SYSTEMS. 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.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF THE DC-780 CHAMBER SYSTEM

1. STORMTECH DC-780 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH DC-780 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 OR RECYCLED CONCRETE; AASHTO M43 #3, 357, 4, 467, 5, 56, OR 57.
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 DC-780 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
2. THE USE OF CONSTRUCTION EQUIPMENT OVER DC-780 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.

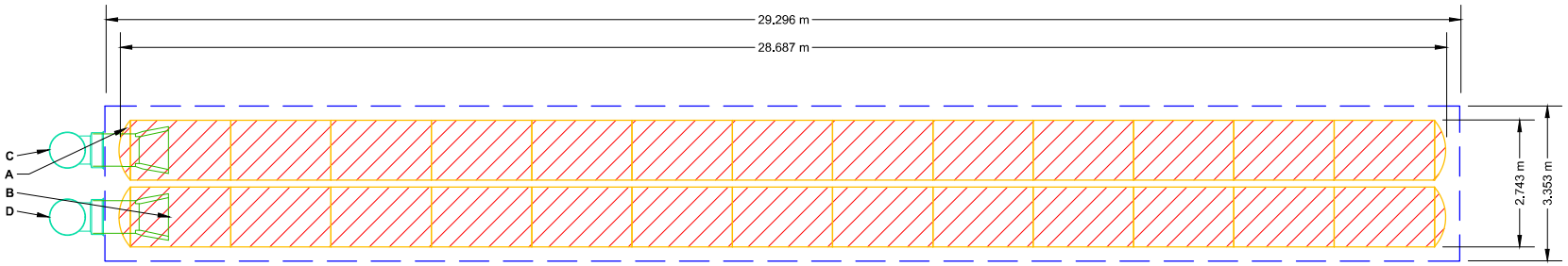
USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO THE CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-800-821-6710 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

PROPOSED LAYOUT		PROPOSED ELEVATIONS	
26	STORMTECH DC-780 CHAMBERS	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	81.117
4	STORMTECH DC-780 END CAPS	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	78.069
152	STONE ABOVE (mm) 152	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	77.917
152	STONE BELOW (mm)	MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	77.917
40	STONE VOID	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	77.917
62.5	INSTALLED SYSTEM VOLUME (m³) (PERIMETER STONE INCLUDED) (BASE STONE INCLUDED)	TOP OF STONE:	77.612
		TOP OF DC-780 CHAMBER:	77.460
		600 mm ISOLATOR ROW PLUS INVERT:	76.700
98.2	SYSTEM AREA (m²)	600 mm ISOLATOR ROW PLUS INVERT:	76.700
65.3	SYSTEM PERIMETER (m)	BOTTOM OF DC-780 CHAMBER:	76.698
		BOTTOM OF STONE:	76.546

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
PREFABRICATED EZ END CAP	A	600 mm BOTTOM PREFABRICATED EZ END CAP, PART#: SC740ECEZ / TYP OF ALL 600 mm BOTTOM CONNECTIONS AND ISOLATOR PLUS ROWS	3 mm	
FLAMP	B	INSTALL FLAMP ON 600 mm ACCESS PIPE / PART#: SC80024RAMP (TYP 2 PLACES)		
NYLOPLAST (INLET W/ ISO PLUS ROW)	C	750 mm DIAMETER (610 mm SUMP MIN)		
NYLOPLAST (INLET W/ ISO PLUS ROW)	D	750 mm DIAMETER (610 mm SUMP MIN)		



ISOLATOR ROW PLUS (SEE DETAIL)

NO WOVEN GEOTEXTILE

BED LIMITS

NOTES

- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- **NOT FOR CONSTRUCTION**: THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.

5510 BOUNDARY ROAD - SOUTH
OTTAWA, ON, CANADA
DATE: 10/07/2025
DRAWN: HN
PROJECT #:
CHECKED: N/A

DATE	DWN	CHK

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

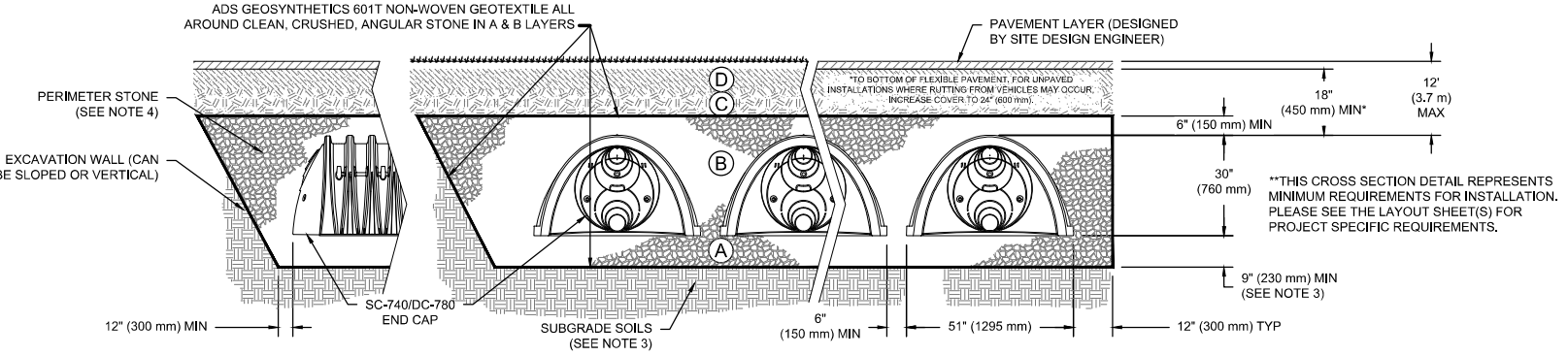
StormTech® Chamber System

SCALE = 1 : 100

ACCEPTABLE FILL MATERIALS: STORMTECH DC-780 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 OR RECYCLED CONCRETE[5]	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 OR RECYCLED CONCRETE[5]	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 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.
5. WHERE RECYCLED CONCRETE AGGREGATE IS USED IN LAYERS 'A' OR 'B' THE MATERIAL SHOULD ALSO MEET THE ACCEPTABILITY CRITERIA OUTLINED IN TECHNICAL NOTE 6.20 "RECYCLED CONCRETE STRUCTURAL BACKFILL".



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. DC-780 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. REFERENCE STORMTECH DESIGN MANUAL FOR BEARING CAPACITY GUIDANCE.
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 500 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.

5510 BOUNDARY ROAD - SOUTH
OTTAWA, ON, CANADA
DATE: 10/07/2025 | DRAWN: HN | CHECKED: N/A
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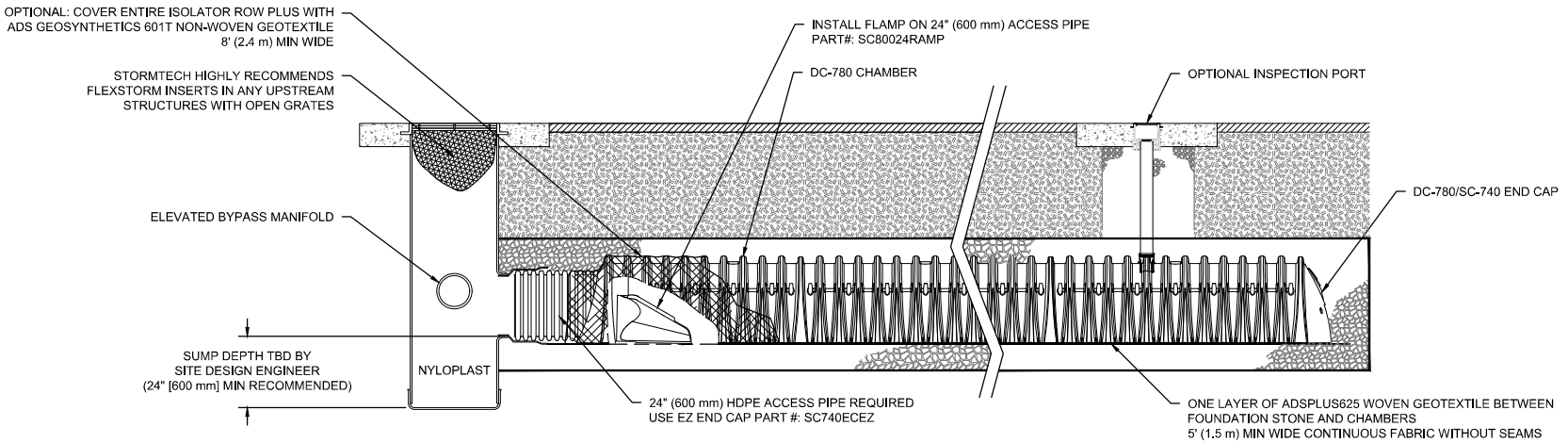

DC-780 ISOLATOR ROW PLUS DETAIL
NTS

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.

5510 BOUNDARY ROAD - SOUTH
OTTAWA, ON, CANADA
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StormTech® Chamber System

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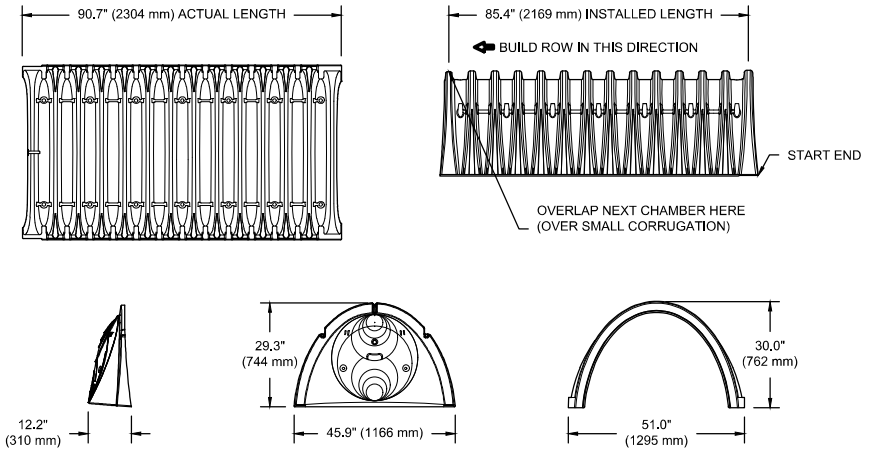
DC-780 TECHNICAL SPECIFICATION

NTS



NOMINAL CHAMBER SPECIFICATIONS

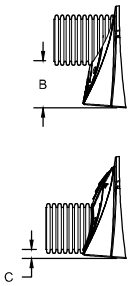
SIZE (W X H X INSTALLED LENGTH)	51.0" X 30.0" X 85.4"	(1295 mm X 762 mm X 2169 mm)
CHAMBER STORAGE	46.2 CUBIC FEET	(1.30 m³)
MINIMUM INSTALLED STORAGE*	78.4 CUBIC FEET	(2.20 m³)
WEIGHT	75.0 lbs.	(33.6 kg)

NOMINAL END CAP SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	45.9" X 29.3" X 9.6"	(1166 mm X 744 mm X 244 mm)
END CAP STORAGE	2.6 CUBIC FEET	(0.07 m³)
MINIMUM INSTALLED STORAGE**	14.4 CUBIC FEET	(0.40 m³)
WEIGHT	11.7 lbs.	(5.3 kg)

* ASSUMES 6" (152 mm) STONE ABOVE, 9" (229 mm) BELOW, AND 6" (152 mm) BETWEEN CHAMBERS
**ASSUMES 6" (152 mm) STONE ABOVE, 9" (229 mm) BELOW END CAPS, 6" (152 mm) BETWEEN ROWS, 12" (305 mm) BEYOND END CAPS

PART #	STUB	B	C
SC740EPE06TPC	6" (150 mm)	18.5" (470 mm)	---
SC740EPE06BPC		---	0.5" (13 mm)
SC740EPE08TPC	8" (200 mm)	16.5" (419 mm)	---
SC740EPE08BPC		---	0.6" (15 mm)
SC740EPE10TPC	10" (250 mm)	14.5" (368 mm)	---
SC740EPE10BPC		---	0.7" (18 mm)
SC740EPE12TPC	12" (300 mm)	12.5" (318 mm)	---
SC740EPE12BPC		---	1.2" (30 mm)
SC740EPE15TPC	15" (375 mm)	9.0" (229 mm)	---
SC740EPE15BPC		---	1.3" (33 mm)
SC740EPE18TPC	18" (450 mm)	5.0" (127 mm)	---
SC740EPE18BPC		---	1.6" (41 mm)
SC740ECEZ*	24" (600 mm)	---	0.1" (3 mm)



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

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

NOTE: ALL DIMENSIONS ARE NOMINAL; PRE-CORED END CAPS END WITH "PC"

5510 BOUNDARY ROAD - SOUTH
OTTAWA, ON, CANADA
DATE: 10/07/2025 | DRAWN: HN | CHECKED: N/A
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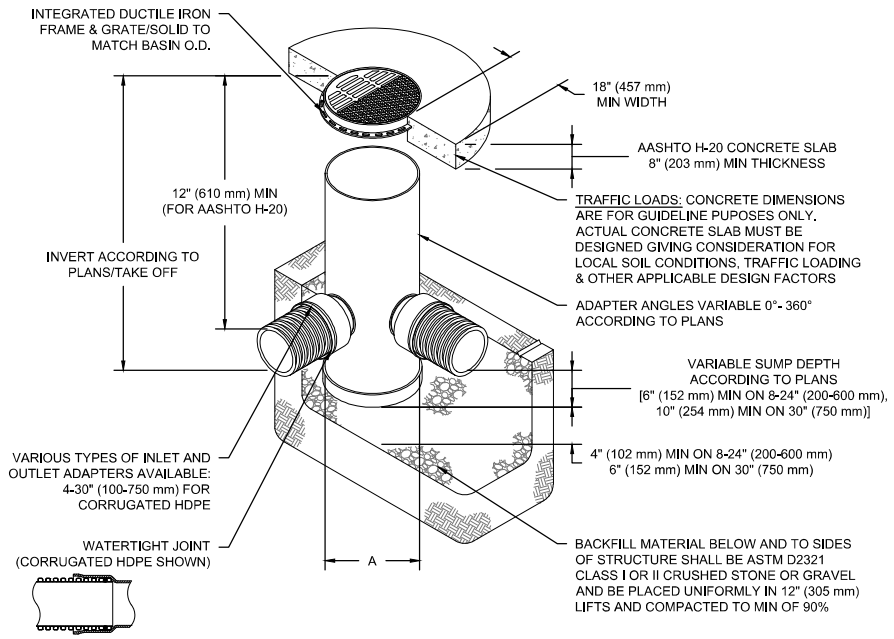
NYLOPLAST DRAIN BASIN

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

5510 BOUNDARY ROAD - SOUTH
OTTAWA, ON, CANADA
DATE: 10/07/2025
DRAWN: HN
PROJECT #:
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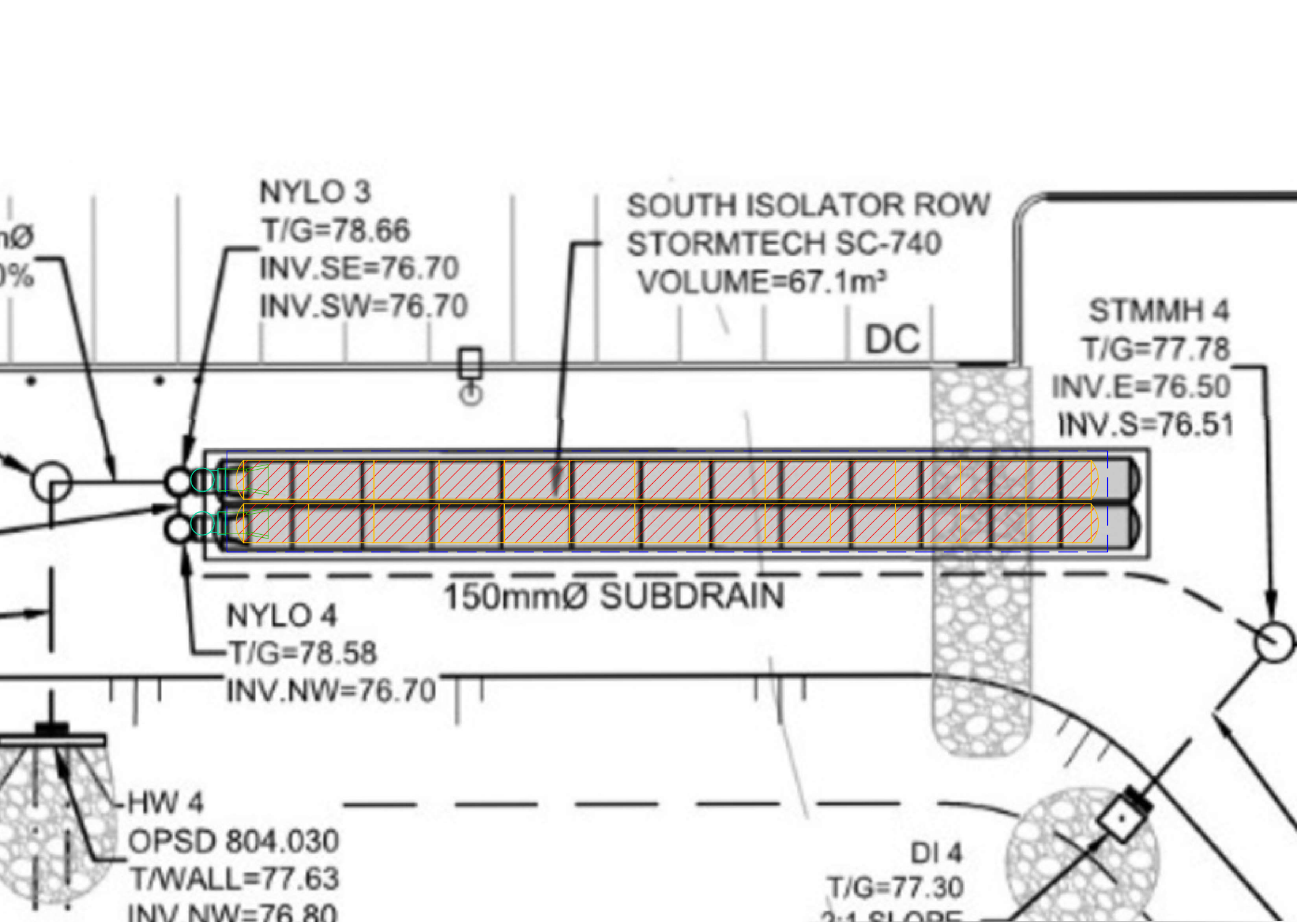
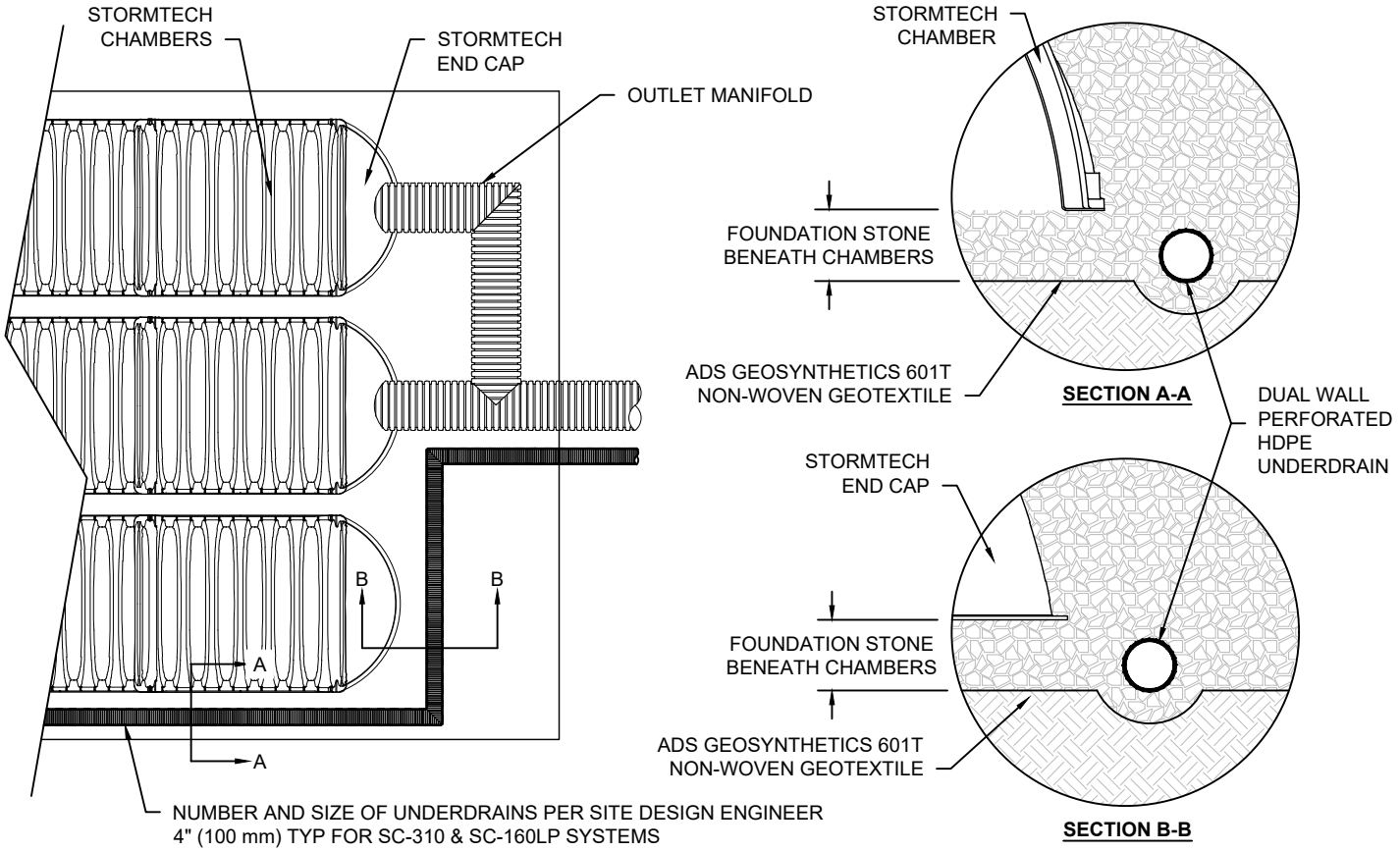

NYLO 3
T/G=78.66
INV.SE=76.70
INV.SW=76.70
SOUTH ISOLATOR ROW
STORMTECH SC-740
VOLUME=67.1m³
DC
STMMH 4
T/G=77.78
INV.E=76.50
INV.S=76.51
150mmØ SUBDRAIN
NYLO 4
T/G=78.58
INV.NW=76.70
HW 4
OPSD 804.030
T/WALL=77.63
INV.NW=76.80
DI 4
T/G=77.30

UNDERDRAIN DETAIL

NTS



NUMBER AND SIZE OF UNDERDRAINS PER SITE DESIGN ENGINEER
4" (100 mm) TYP FOR SC-310 & SC-160LP SYSTEMS
6" (150 mm) TYP FOR SC-800, DC-780, MC-3500, MC-4500 & MC-7200 SYSTEMS

CHAMBER SYSTEM UNDERDRAIN
STORMTECH

DATE: 08/04/25 | DRAWN: SMW
DRAWING #: 720-010 | CHECKED: JLM

4640 TRUEMAN BLVD
HILLIARD, OH 43026

StormTech®
Chamber System

APPENDIX D
Referenced Reports

NOVATECH
Engineers, Planners & Landscape Architects

M E M O R A N D U M

DATE: **OCTOBER 5, 2020**

TO: **MATT HREHORIAK**

FROM: **CONRAD STANG**

RE: **PROPOSED WAREHOUSE COMPLEX**
5510 BOUNDARY ROAD (OTTAWA, ON)
SUPPLEMENTAL SWM MODELLING INFORMATION

PROJECT NO: 118168

This memorandum provides the supplemental stormwater management (SWM) modelling information for the proposed warehouse complex at 5510 Boundary Road (Ottawa, Ontario) in support of the detailed design report, prepared by Novatech.

The Visual Otthymo hydrologic model was used to estimate pre-development peak flows (quantity control targets) for the site. The pre-development drainage area is based on the proposed development area. Refer to the Pre-Development Storm Drainage Area Plan provided in the detailed design report.

Design Storms

The design storms are based on the IDF parameters presented in the City of Ottawa Sewer Design Guidelines (October 2012). Storm distributions include the 3-hour Chicago and 12-hour SCS Type II storm distributions. Design storms were created for the 2, 5, and 100-year return periods (i.e. storm events).

Model Parameters

Pre-development conditions were established using data collected through the latest aerial photography (current site conditions), latest topographic mapping and geotechnical investigations.

The pre-development catchments were modelled using the CALIB NASHYD routine with the following parameters:

- The “standard” CN values were estimated based on area weighting the CN values for each associated land cover and soil types (extracted from reference TR-55 CN values).
- The surficial soil type is primarily fill material consisting of silty clay with sand, gravel and cobbles overlying thin layer of very loose to compact silty sand (estimated hydrologic soil group (HSG) ‘C’). The geotechnical investigation was performed by Paterson Group; report dated September 10, 2018 (Report No. PG4592-1).
- The Ia values were estimated based on CN values using 0.10*S.

Suite 200, 240 Michael Cowpland Drive, Ottawa ON K2M 1P6 Tel: 613.254.9643 Fax: 613.254.5867 www.novatech-eng.com

- The number of linear reservoirs (N) was estimated to be N = 3.0, which is typical for catchments within Ontario.
- Time-to-peak (T_p) values were calculated using Airport Method, with a minimum 10-minute time-of-concentration (T_c). $T_p = 0.67 * T_c$.

A summary of the pre-development model parameters, model schematic and detailed model output for the 2-year, 5-year, and 100-year storm events are attached.

Peak Flows

The estimated pre-development peak flows are presented in Table 1 below.

Table 1: Summary of Pre-development Peak Flows

Area ID	Drainage Area (ha)	Peak Flow (m^3/s)					
		3-hour Chicago Storm			*12-hour SCS Type II Storm*		
		2-yr	5-yr	100-yr	2-yr	5-yr	100-yr
Area 'A'							
PRE	6.94	0.129	0.221	0.519	0.168	0.270	0.574

As the 3-hour Chicago storm distribution results in lower peak flows, the post-development quantity control requirements and release rates will need to adhere to these peak flows.

ATTACHMENTS:

- Visual Otthymo Model Parameters
- Visual Otthymo Detailed Model Output (3-hour Chicago & 12-hour SCS storm distributions)

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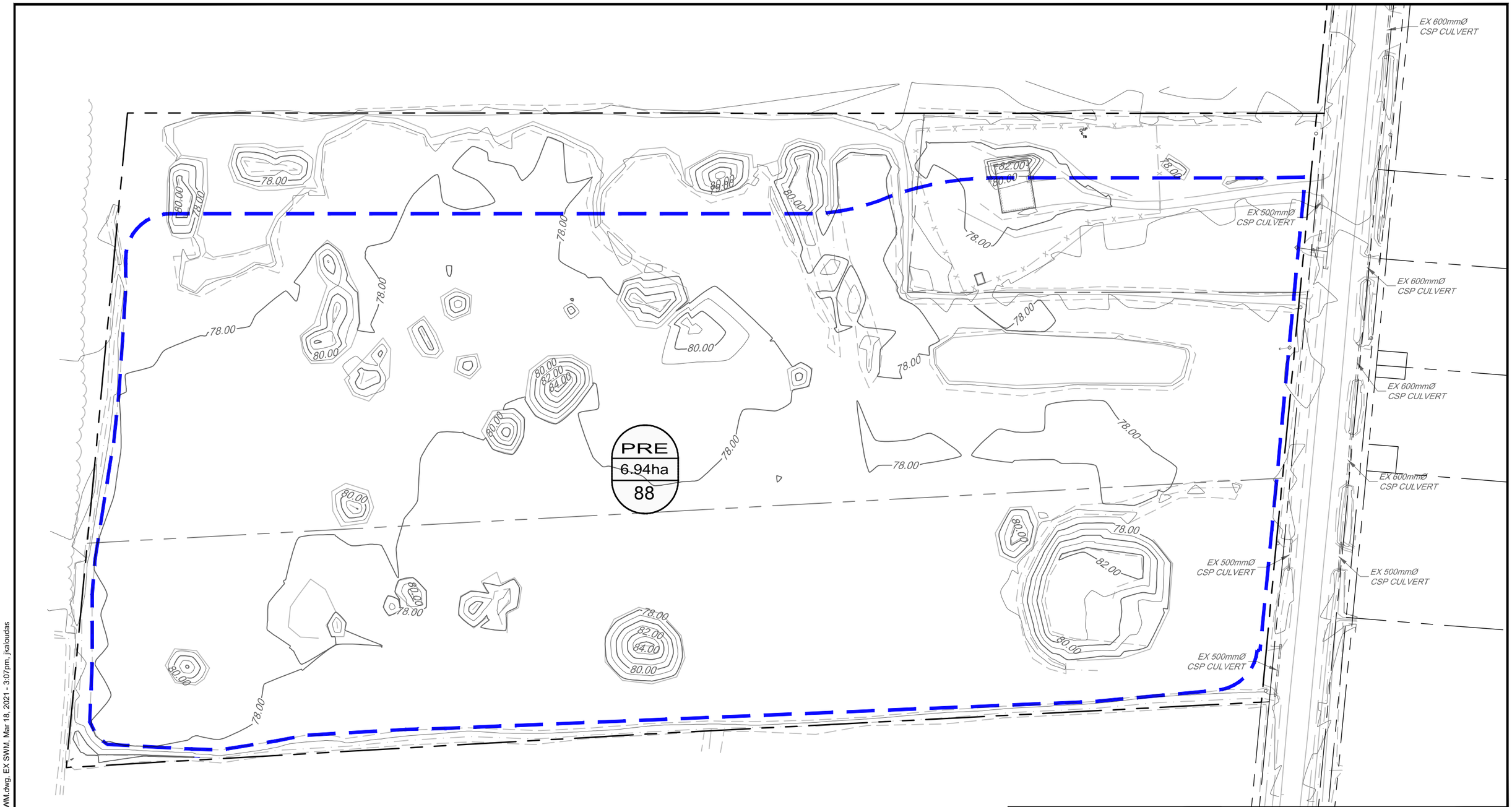

LEGEND

EXISTING STORM DRAINAGE AREA

PRE
6.94ha
88

DRAINAGE AREA ID
DRAINAGE AREA (ha)
SCS CURVE NUMBER

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

5510 BOUNDARY ROAD

PRE-DEVELOPMENT DRAINAGE AREA PLAN

SCALE 1 : 1250 (0 10 20 30 40 50)

DATE MAR 2021 | JOB 118168 | FIGURE 5

SHT11X17.DWG - 279mmX432mm

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Proposed Warehouse Complex - 5510 Boundary Road (Ottawa, ON)
Visual Otthymo Model Parameters (118168)

NOVATECH
Engineers, Planners & Landscape Architects

NASHYD's (Pre-Development)				
Land Cover	**Hydrologic Soil Group (HSG)**	**Area (ha)**	**SCS Curve Number (CN)**	**Initial Abstraction (Ia)* (mm)**
Open Water	HSG 'C'	0.29	50	25.4
Meadow	HSG 'C'	0.50	71	10.4
Fallow Field (Bare Soil)	HSG 'C'	6.15	91	2.5
TOTAL (PRE)	**-**	**6.94**	**88**	**5.0**

**Initial Abstraction based on 0.10*S. S = 25400 / CN - 254*

Time-to-Peak (Tp) Calculations (Airport Method) (NASHYD's)				
Runoff Coefficient (C)	**Average Slope (%)**	**Flow Path Length (m)**	**Time-of-Concentration (Tc) (min)**	**Time-to-Peak (Tp)* (hours)**
0.20	0.25	150	57	0.63

**Tp = 0.67*Tc*

Visual Otthymo Model Schematic

Storm Distributions:

Run 01: 2-year, 3-hour Chicago Storm
Run 02: 5-year, 3-hour Chicago Storm
Run 03: 100-year, 3-hour Chicago Storm

Run 04: 2-year, 12-hour SCS Storm
Run 05: 5-year, 12-hour SCS Storm
Run 06: 100-year, 12-hour SCS Storm

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

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        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

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       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


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DATE: 10/05/2020                          TIME: 12:46:55

USER:


COMMENTS: _____________________________________________________________
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  ** SIMULATION : Run 01                      **
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--------------------
|    READ STORM    |    Filename: C:\Users\cstang\AppD
|                  |              ata\Local\Temp\
|                  |              3423a1c4-1884-4f21-baad-4d458bc37917\d23ad515
| Ptotal= 31.86 mm |    Comments: C3-2
--------------------
                TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
                 hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
                0.17     2.81 |  1.00    76.81 |  1.83     5.09 |  2.67     2.68
                0.33     3.50 |  1.17    24.08 |  2.00     4.29 |  2.83     2.46
                0.50     4.69 |  1.33    12.36 |  2.17     3.72 |  3.00     2.28
                0.67     7.30 |  1.50     8.32 |  2.33     3.29 |
                0.83    18.21 |  1.67     6.30 |  2.50     2.95 |

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| CALIB            |
| NASHYD   (  0001)|   Area     (ha)=   6.94   Curve Number    (CN)= 88.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.63

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
                 hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
               0.083     2.81 | 0.833    18.21 | 1.583     6.30 |  2.33     3.29
               0.167     2.81 | 0.917    76.81 | 1.667     6.30 |  2.42     2.95
               0.250     3.50 | 1.000    76.81 | 1.750     5.09 |  2.50     2.95
               0.333     3.50 | 1.083    24.08 | 1.833     5.09 |  2.58     2.68
               0.417     4.69 | 1.167    24.08 | 1.917     4.29 |  2.67     2.68
               0.500     4.69 | 1.250    12.36 | 2.000     4.29 |  2.75     2.46
               0.583     7.30 | 1.333    12.36 | 2.083     3.72 |  2.83     2.46
               0.667     7.30 | 1.417     8.32 | 2.167     3.72 |  2.92     2.28
               0.750    18.21 | 1.500     8.32 | 2.250     3.29 |  3.00     2.28

     Unit Hyd Qpeak  (cms)=   0.421

     PEAK FLOW       (cms)=   0.129 (i)
     TIME TO PEAK    (hrs)=   1.750
     RUNOFF VOLUME    (mm)=  11.729
     TOTAL RAINFALL   (mm)=  31.857
     RUNOFF COEFFICIENT   =   0.368

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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  **********************************************
  ** SIMULATION : Run 02                      **
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|    READ STORM    |    Filename: C:\Users\cstang\AppD
|                  |              ata\Local\Temp\
|                  |              3423a1c4-1884-4f21-baad-4d458bc37917\b96d6d94
| Ptotal= 42.51 mm |    Comments: C3-5
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    3.68 |  1.00  104.19 |  1.83    6.69 |  2.67    3.51
                0.33    4.58 |  1.17   32.04 |  2.00    5.63 |  2.83    3.22
                0.50    6.15 |  1.33   16.34 |  2.17    4.87 |  3.00    2.98
                0.67    9.61 |  1.50   10.96 |  2.33    4.30 |
                0.83   24.17 |  1.67    8.29 |  2.50    3.86 |

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--------------------
| CALIB            |
| NASHYD   (  0001)|   Area     (ha)=   6.94   Curve Number    (CN)= 88.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.63

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    3.68 | 0.833   24.17 | 1.583    8.29 |  2.33    4.30
               0.167    3.68 | 0.917  104.19 | 1.667    8.29 |  2.42    3.86
               0.250    4.58 | 1.000  104.19 | 1.750    6.69 |  2.50    3.86
               0.333    4.58 | 1.083   32.04 | 1.833    6.69 |  2.58    3.51
               0.417    6.15 | 1.167   32.04 | 1.917    5.63 |  2.67    3.51
               0.500    6.15 | 1.250   16.34 | 2.000    5.63 |  2.75    3.22
               0.583    9.61 | 1.333   16.34 | 2.083    4.87 |  2.83    3.22
               0.667    9.61 | 1.417   10.96 | 2.167    4.87 |  2.92    2.98
               0.750   24.17 | 1.500   10.96 | 2.250    4.30 |  3.00    2.98

     Unit Hyd Qpeak  (cms)=   0.421

     PEAK FLOW       (cms)=   0.221 (i)
     TIME TO PEAK    (hrs)=   1.750
     RUNOFF VOLUME    (mm)=  19.503
     TOTAL RAINFALL   (mm)=  42.512
     RUNOFF COEFFICIENT   =   0.459

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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  **********************************************
  ** SIMULATION : Run 03                      **
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|    READ STORM    |    Filename: C:\Users\cstang\AppD
|                  |              ata\Local\Temp\
|                  |              3423a1c4-1884-4f21-baad-4d458bc37917\e1438c1c
| Ptotal= 71.67 mm |    Comments: C3-100
--------------------
                TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
                 hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
                0.17     6.05 |  1.00   178.56 |  1.83    11.06 |  2.67     5.76
                0.33     7.54 |  1.17    54.05 |  2.00     9.29 |  2.83     5.28
                0.50    10.16 |  1.33    27.32 |  2.17     8.02 |  3.00     4.88
                0.67    15.97 |  1.50    18.24 |  2.33     7.08 |
                0.83    40.65 |  1.67    13.74 |  2.50     6.35 |

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--------------------
| CALIB            |
| NASHYD   (  0001)|   Area     (ha)=   6.94   Curve Number    (CN)= 88.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.63

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
                 hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
               0.083     6.05 | 0.833    40.65 | 1.583    13.74 |  2.33     7.08
               0.167     6.05 | 0.917   178.56 | 1.667    13.74 |  2.42     6.35
               0.250     7.54 | 1.000   178.56 | 1.750    11.06 |  2.50     6.35
               0.333     7.54 | 1.083    54.05 | 1.833    11.06 |  2.58     5.76
               0.417    10.16 | 1.167    54.05 | 1.917     9.29 |  2.67     5.76
               0.500    10.16 | 1.250    27.32 | 2.000     9.29 |  2.75     5.28
               0.583    15.97 | 1.333    27.32 | 2.083     8.02 |  2.83     5.28
               0.667    15.97 | 1.417    18.24 | 2.167     8.02 |  2.92     4.88
               0.750    40.65 | 1.500    18.24 | 2.250     7.08 |  3.00     4.88

     Unit Hyd Qpeak  (cms)=   0.421

     PEAK FLOW       (cms)=   0.519 (i)
     TIME TO PEAK    (hrs)=   1.667
     RUNOFF VOLUME    (mm)=  43.872
     TOTAL RAINFALL   (mm)=  71.667
     RUNOFF COEFFICIENT   =   0.612

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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  **********************************************
  ** SIMULATION : Run 04                      **
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|    READ STORM    |    Filename: C:\Users\cstang\AppD
|                  |              ata\Local\Temp\
|                  |              3423a1c4-1884-4f21-baad-4d458bc37917\fceeafce
| Ptotal= 42.34 mm |    Comments: S12-2
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.50	1.27	3.50	1.69	6.50	9.23	9.50	1.27
1.00	0.59	4.00	1.69	7.00	4.06	10.00	1.02
1.50	1.10	4.50	2.29	7.50	2.71	10.50	1.44
2.00	1.10	5.00	2.88	8.00	2.37	11.00	0.93
2.50	1.44	5.50	4.57	8.50	1.86	11.50	0.85
3.00	1.27	6.00	36.24	9.00	1.95	12.00	0.85

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--------------------
| CALIB            |
| NASHYD   (  0001)|   Area     (ha)=   6.94   Curve Number    (CN)= 88.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.63

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.27	3.083	1.69	6.083	9.23	9.08	1.27
0.167	1.27	3.167	1.69	6.167	9.23	9.17	1.27
0.250	1.27	3.250	1.69	6.250	9.23	9.25	1.27
0.333	1.27	3.333	1.69	6.333	9.23	9.33	1.27
0.417	1.27	3.417	1.69	6.417	9.23	9.42	1.27
0.500	1.27	3.500	1.69	6.500	9.23	9.50	1.27
0.583	0.59	3.583	1.69	6.583	4.06	9.58	1.02
0.667	0.59	3.667	1.69	6.667	4.06	9.67	1.02
0.750	0.59	3.750	1.69	6.750	4.06	9.75	1.02
0.833	0.59	3.833	1.69	6.833	4.06	9.83	1.02
0.917	0.59	3.917	1.69	6.917	4.06	9.92	1.02
1.000	0.59	4.000	1.69	7.000	4.06	10.00	1.02
1.083	1.10	4.083	2.29	7.083	2.71	10.08	1.44
1.167	1.10	4.167	2.29	7.167	2.71	10.17	1.44
1.250	1.10	4.250	2.29	7.250	2.71	10.25	1.44
1.333	1.10	4.333	2.29	7.333	2.71	10.33	1.44
1.417	1.10	4.417	2.29	7.417	2.71	10.42	1.44
1.500	1.10	4.500	2.29	7.500	2.71	10.50	1.44
1.583	1.10	4.583	2.88	7.583	2.37	10.58	0.93
1.667	1.10	4.667	2.88	7.667	2.37	10.67	0.93
1.750	1.10	4.750	2.88	7.750	2.37	10.75	0.93
1.833	1.10	4.833	2.88	7.833	2.37	10.83	0.93
1.917	1.10	4.917	2.88	7.917	2.37	10.92	0.93
2.000	1.10	5.000	2.88	8.000	2.37	11.00	0.93
2.083	1.44	5.083	4.57	8.083	1.86	11.08	0.85
2.167	1.44	5.167	4.57	8.167	1.86	11.17	0.85
2.250	1.44	5.250	4.57	8.250	1.86	11.25	0.85
2.333	1.44	5.333	4.57	8.333	1.86	11.33	0.85
2.417	1.44	5.417	4.57	8.417	1.86	11.42	0.85
2.500	1.44	5.500	4.57	8.500	1.86	11.50	0.85
2.583	1.27	5.583	36.24	8.583	1.95	11.58	0.85
2.667	1.27	5.667	36.24	8.667	1.95	11.67	0.85

2.750	1.27	5.750	36.24	8.750	1.95	11.75	0.85
2.833	1.27	5.833	36.24	8.833	1.95	11.83	0.85
2.917	1.27	5.917	36.24	8.917	1.95	11.92	0.85
3.000	1.27	6.000	36.24	9.000	1.95	12.00	0.85

Unit Hyd Qpeak (cms)= 0.421

PEAK FLOW (cms)= 0.168 (i)
TIME TO PEAK (hrs)= 6.583
RUNOFF VOLUME (mm)= 19.367
TOTAL RAINFALL (mm)= 42.335
RUNOFF COEFFICIENT = 0.457

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

READ STORM | Filename: C:\Users\cstang\AppData\Local\Temp\3423a1c4-1884-4f21-baad-4d458bc37917\8f07cf7d
Ptotal= 56.19 mm | Comments: S12-5

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.50	1.69	3.50	2.25	6.50	12.25	9.50	1.69
1.00	0.79	4.00	2.25	7.00	5.39	10.00	1.35
1.50	1.46	4.50	3.03	7.50	3.60	10.50	1.91
2.00	1.46	5.00	3.82	8.00	3.15	11.00	1.24
2.50	1.91	5.50	6.07	8.50	2.47	11.50	1.12
3.00	1.69	6.00	48.08	9.00	2.58	12.00	1.12

CALIB
NASHYD (0001) | Area (ha)= 6.94 Curve Number (CN)= 88.0
ID= 1 DT= 5.0 min | Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.63

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.69	3.083	2.25	6.083	12.25	9.08	1.69
0.167	1.69	3.167	2.25	6.167	12.25	9.17	1.69
0.250	1.69	3.250	2.25	6.250	12.25	9.25	1.69
0.333	1.69	3.333	2.25	6.333	12.25	9.33	1.69
0.417	1.69	3.417	2.25	6.417	12.25	9.42	1.69
0.500	1.69	3.500	2.25	6.500	12.25	9.50	1.69
0.583	0.79	3.583	2.25	6.583	5.39	9.58	1.35
0.667	0.79	3.667	2.25	6.667	5.39	9.67	1.35
0.750	0.79	3.750	2.25	6.750	5.39	9.75	1.35
0.833	0.79	3.833	2.25	6.833	5.39	9.83	1.35
0.917	0.79	3.917	2.25	6.917	5.39	9.92	1.35
1.000	0.79	4.000	2.25	7.000	5.39	10.00	1.35
1.083	1.46	4.083	3.03	7.083	3.60	10.08	1.91
1.167	1.46	4.167	3.03	7.167	3.60	10.17	1.91
1.250	1.46	4.250	3.03	7.250	3.60	10.25	1.91
1.333	1.46	4.333	3.03	7.333	3.60	10.33	1.91
1.417	1.46	4.417	3.03	7.417	3.60	10.42	1.91

1.500	1.46	4.500	3.03	7.500	3.60	10.50	1.91
1.583	1.46	4.583	3.82	7.583	3.15	10.58	1.24
1.667	1.46	4.667	3.82	7.667	3.15	10.67	1.24
1.750	1.46	4.750	3.82	7.750	3.15	10.75	1.24
1.833	1.46	4.833	3.82	7.833	3.15	10.83	1.24
1.917	1.46	4.917	3.82	7.917	3.15	10.92	1.24
2.000	1.46	5.000	3.82	8.000	3.15	11.00	1.24
2.083	1.91	5.083	6.07	8.083	2.47	11.08	1.12
2.167	1.91	5.167	6.07	8.167	2.47	11.17	1.12
2.250	1.91	5.250	6.07	8.250	2.47	11.25	1.12
2.333	1.91	5.333	6.07	8.333	2.47	11.33	1.12
2.417	1.91	5.417	6.07	8.417	2.47	11.42	1.12
2.500	1.91	5.500	6.07	8.500	2.47	11.50	1.12
2.583	1.69	5.583	48.08	8.583	2.58	11.58	1.12
2.667	1.69	5.667	48.08	8.667	2.58	11.67	1.12
2.750	1.69	5.750	48.08	8.750	2.58	11.75	1.12
2.833	1.69	5.833	48.08	8.833	2.58	11.83	1.12
2.917	1.69	5.917	48.08	8.917	2.58	11.92	1.12
3.000	1.69	6.000	48.08	9.000	2.58	12.00	1.12

Unit Hyd Qpeak (cms)= 0.421

PEAK FLOW (cms)= 0.270 (i)
TIME TO PEAK (hrs)= 6.583
RUNOFF VOLUME (mm)= 30.527
TOTAL RAINFALL (mm)= 56.185
RUNOFF COEFFICIENT = 0.543

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

READ STORM | Filename: C:\Users\cstang\AppData\Local\Temp\3423a1c4-1884-4f21-baad-4d458bc37917\4c999c78
Ptotal= 93.91 mm | Comments: S12-100

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.50	2.82	3.50	3.76	6.50	20.47	9.50	2.82
1.00	1.31	4.00	3.76	7.00	9.02	10.00	2.25
1.50	2.44	4.50	5.07	7.50	6.01	10.50	3.19
2.00	2.44	5.00	6.39	8.00	5.26	11.00	2.07
2.50	3.19	5.50	10.14	8.50	4.13	11.50	1.88
3.00	2.82	6.00	80.38	9.00	4.32	12.00	1.88

CALIB
NASHYD (0001) | Area (ha)= 6.94 Curve Number (CN)= 88.0
ID= 1 DT= 5.0 min | Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.63

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.82	3.083	3.76	6.083	20.47	9.08	2.82
0.167	2.82	3.167	3.76	6.167	20.47	9.17	2.82

0.250	2.82	3.250	3.76	6.250	20.47	9.25	2.82
0.333	2.82	3.333	3.76	6.333	20.47	9.33	2.82
0.417	2.82	3.417	3.76	6.417	20.47	9.42	2.82
0.500	2.82	3.500	3.76	6.500	20.47	9.50	2.82
0.583	1.31	3.583	3.76	6.583	9.02	9.58	2.25
0.667	1.31	3.667	3.76	6.667	9.02	9.67	2.25
0.750	1.31	3.750	3.76	6.750	9.02	9.75	2.25
0.833	1.31	3.833	3.76	6.833	9.02	9.83	2.25
0.917	1.31	3.917	3.76	6.917	9.02	9.92	2.25
1.000	1.31	4.000	3.76	7.000	9.02	10.00	2.25
1.083	2.44	4.083	5.07	7.083	6.01	10.08	3.19
1.167	2.44	4.167	5.07	7.167	6.01	10.17	3.19
1.250	2.44	4.250	5.07	7.250	6.01	10.25	3.19
1.333	2.44	4.333	5.07	7.333	6.01	10.33	3.19
1.417	2.44	4.417	5.07	7.417	6.01	10.42	3.19
1.500	2.44	4.500	5.07	7.500	6.01	10.50	3.19
1.583	2.44	4.583	6.39	7.583	5.26	10.58	2.07
1.667	2.44	4.667	6.39	7.667	5.26	10.67	2.07
1.750	2.44	4.750	6.39	7.750	5.26	10.75	2.07
1.833	2.44	4.833	6.39	7.833	5.26	10.83	2.07
1.917	2.44	4.917	6.39	7.917	5.26	10.92	2.07
2.000	2.44	5.000	6.39	8.000	5.26	11.00	2.07
2.083	3.19	5.083	10.14	8.083	4.13	11.08	1.88
2.167	3.19	5.167	10.14	8.167	4.13	11.17	1.88
2.250	3.19	5.250	10.14	8.250	4.13	11.25	1.88
2.333	3.19	5.333	10.14	8.333	4.13	11.33	1.88
2.417	3.19	5.417	10.14	8.417	4.13	11.42	1.88
2.500	3.19	5.500	10.14	8.500	4.13	11.50	1.88
2.583	2.82	5.583	80.38	8.583	4.32	11.58	1.88
2.667	2.82	5.667	80.38	8.667	4.32	11.67	1.88
2.750	2.82	5.750	80.38	8.750	4.32	11.75	1.88
2.833	2.82	5.833	80.38	8.833	4.32	11.83	1.88
2.917	2.82	5.917	80.38	8.917	4.32	11.92	1.88
3.000	2.82	6.000	80.38	9.000	4.32	12.00	1.88

```
     Unit Hyd Qpeak  (cms)=   0.421

     PEAK FLOW       (cms)=   0.574 (i)
     TIME TO PEAK    (hrs)=   6.500
     RUNOFF VOLUME    (mm)=  63.982
     TOTAL RAINFALL   (mm)=  93.910
     RUNOFF COEFFICIENT   =   0.681

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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 FINISH
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APPENDIX E
Drawings

Notes and Details Plan (118168-ND,PND1,PND2)
Erosion and Sediment Control Plan (118168-ESC)
General Plan of Services (118168-GP)
Grading Plan (118168-GR1, GR2)