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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:

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October 3, 2024
Revised: November 14, 2025
Revised: February 19, 2026
Revised: April 23, 2026
Revised: May 28, 2026

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

NOVATECH
Engineers, Planners & Landscape Architects

May 28, 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.

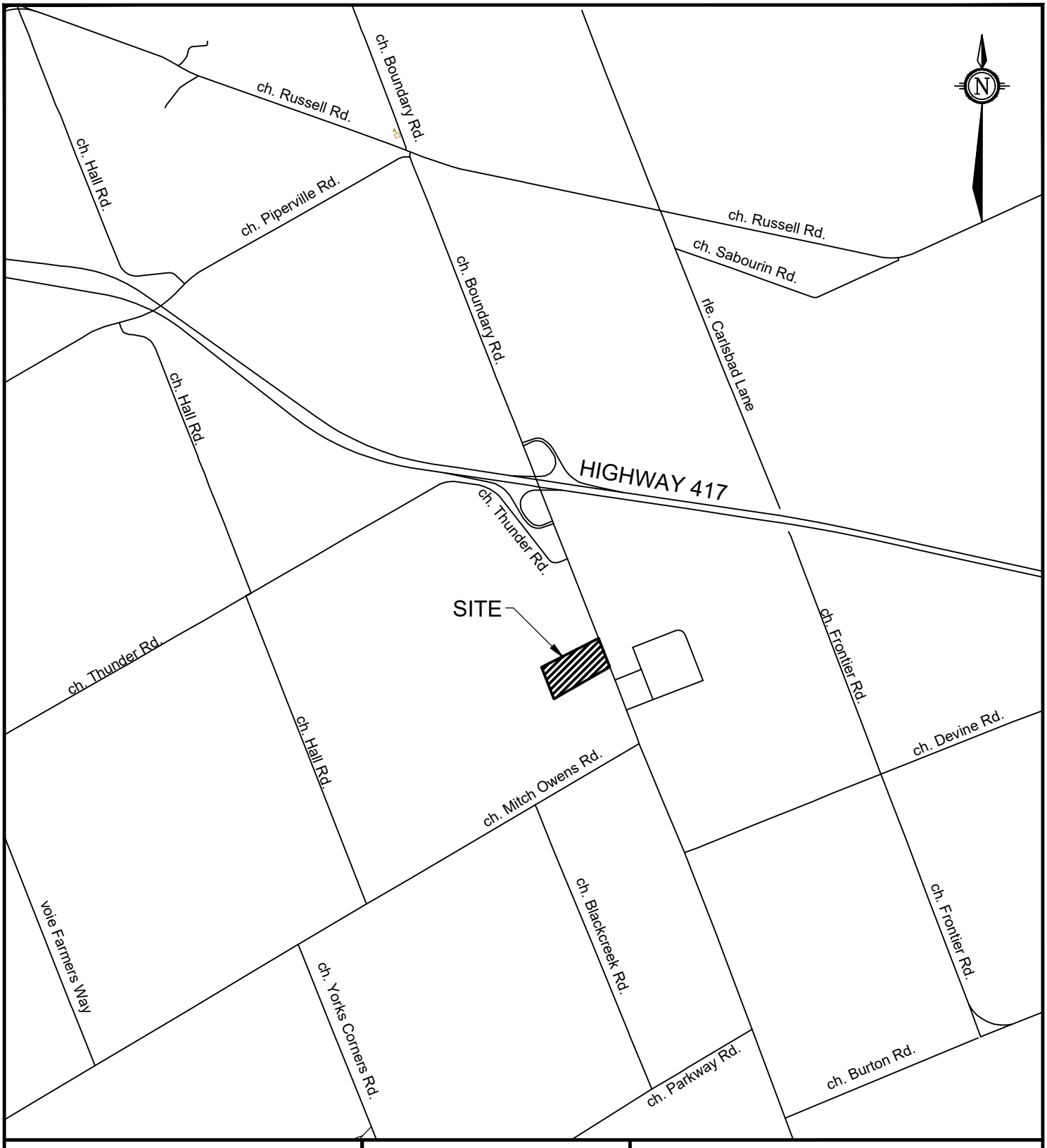
3.0 PROPOSED DEVELOPMENT

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

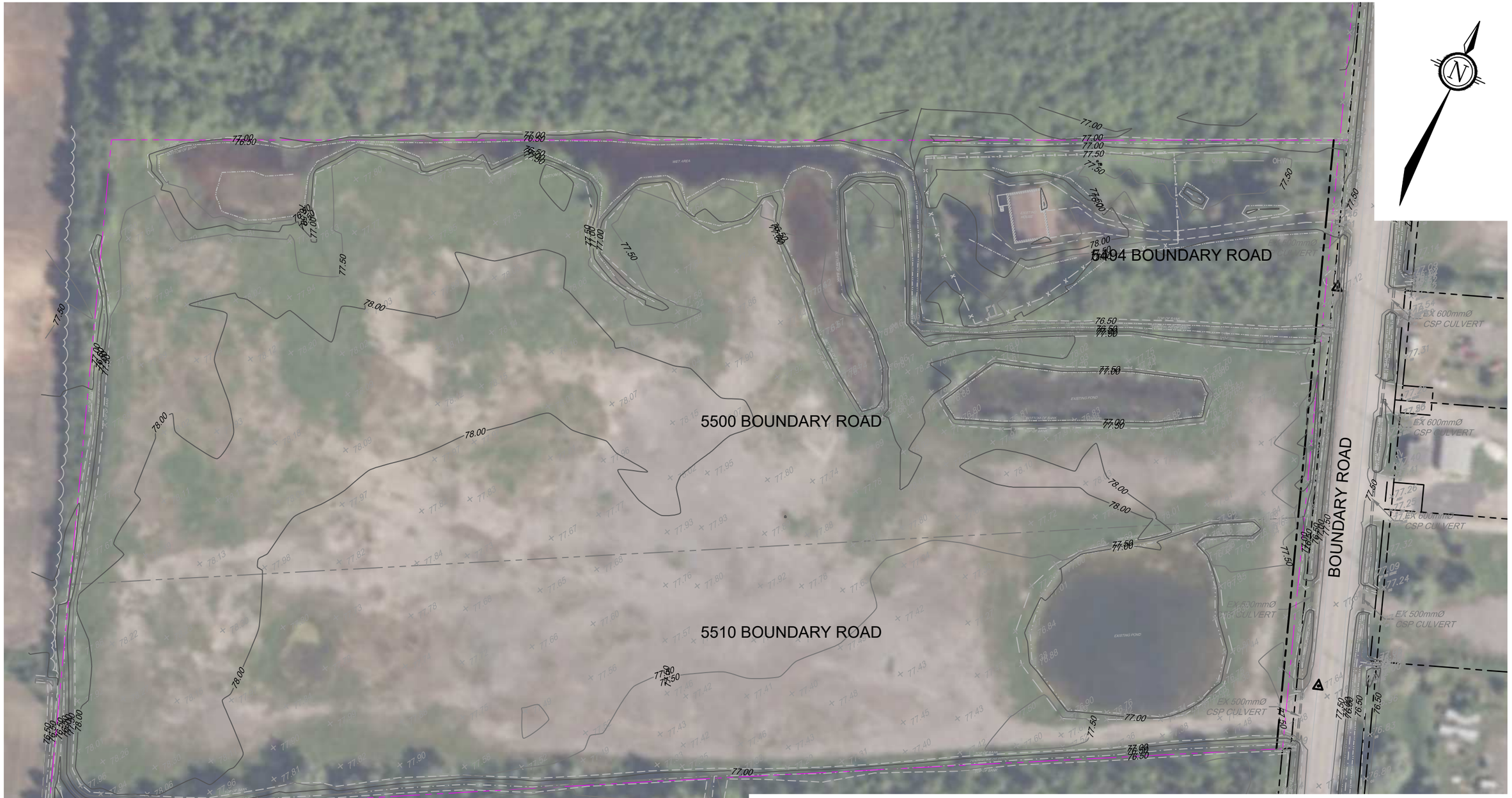
5510 BOUNDARY ROAD
CITY OF OTTAWA

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

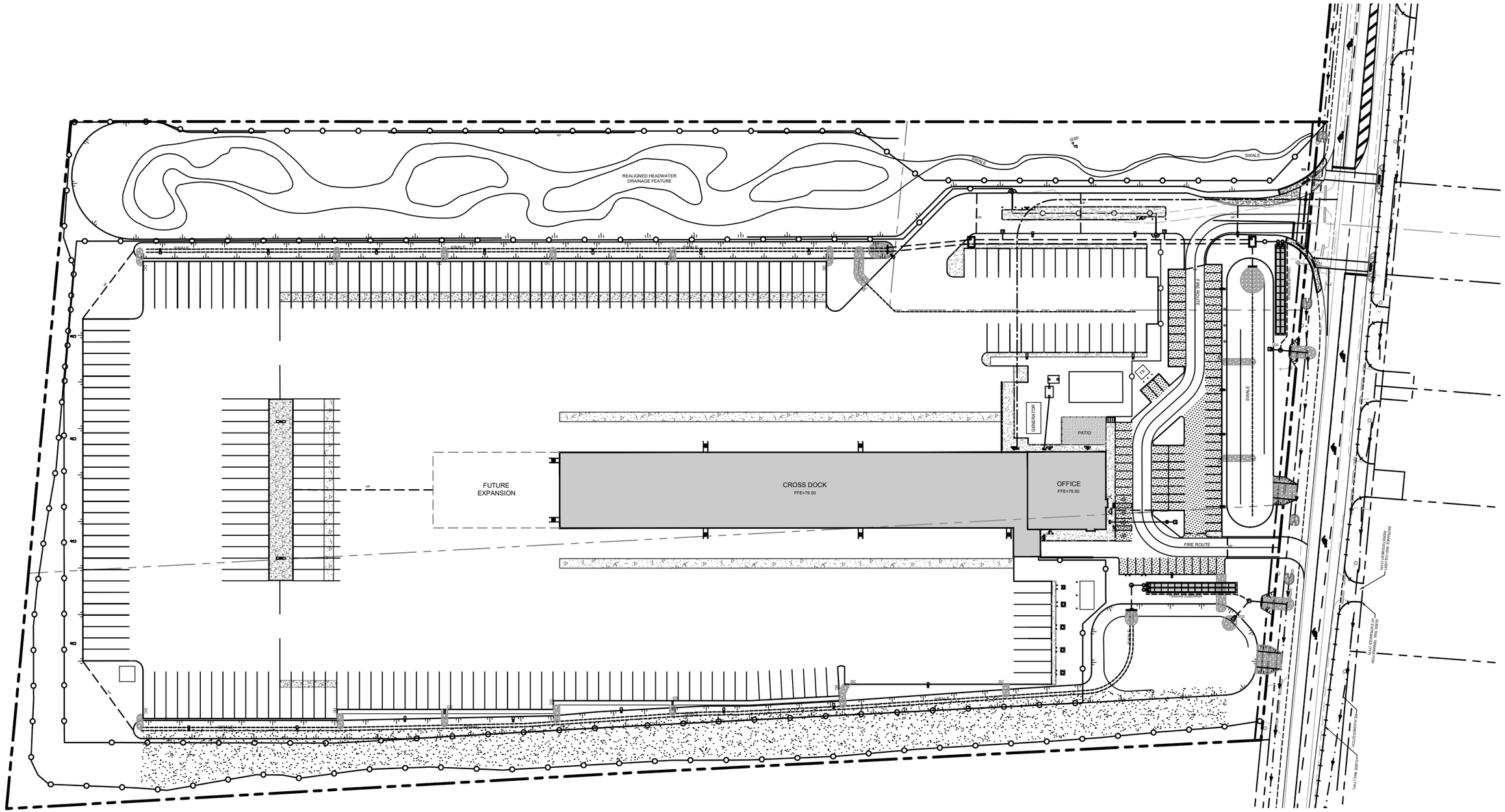
EXISTING CONDITIONS

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

DATE NOV 2025 | JOB 118168 | FIGURE 2

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REALIGNED HEADWATER
DRAINAGE FEATURE
SWALE
SWALE
SWALE
SWALE
SWALE
SWALE
FUTURE
EXPANSION
CROSS DOCK
FFE=79.50
OFFICE
FFE=79.50
GENERATOR
PATIO
FIRE ROUTE
SWALE
SWALE
SWALE
SWALE
SWALE
SWAL

  - 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 (m^3)
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	38	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**	**106**	**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	344	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	2,720	373	500	873	0.31 – 0.84

**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	148	312	76.97	77.26	0.65	1.13
C-2	600mm HDPE	0.1	194	174	400	76.90	77.23	0.85	1.40

**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:

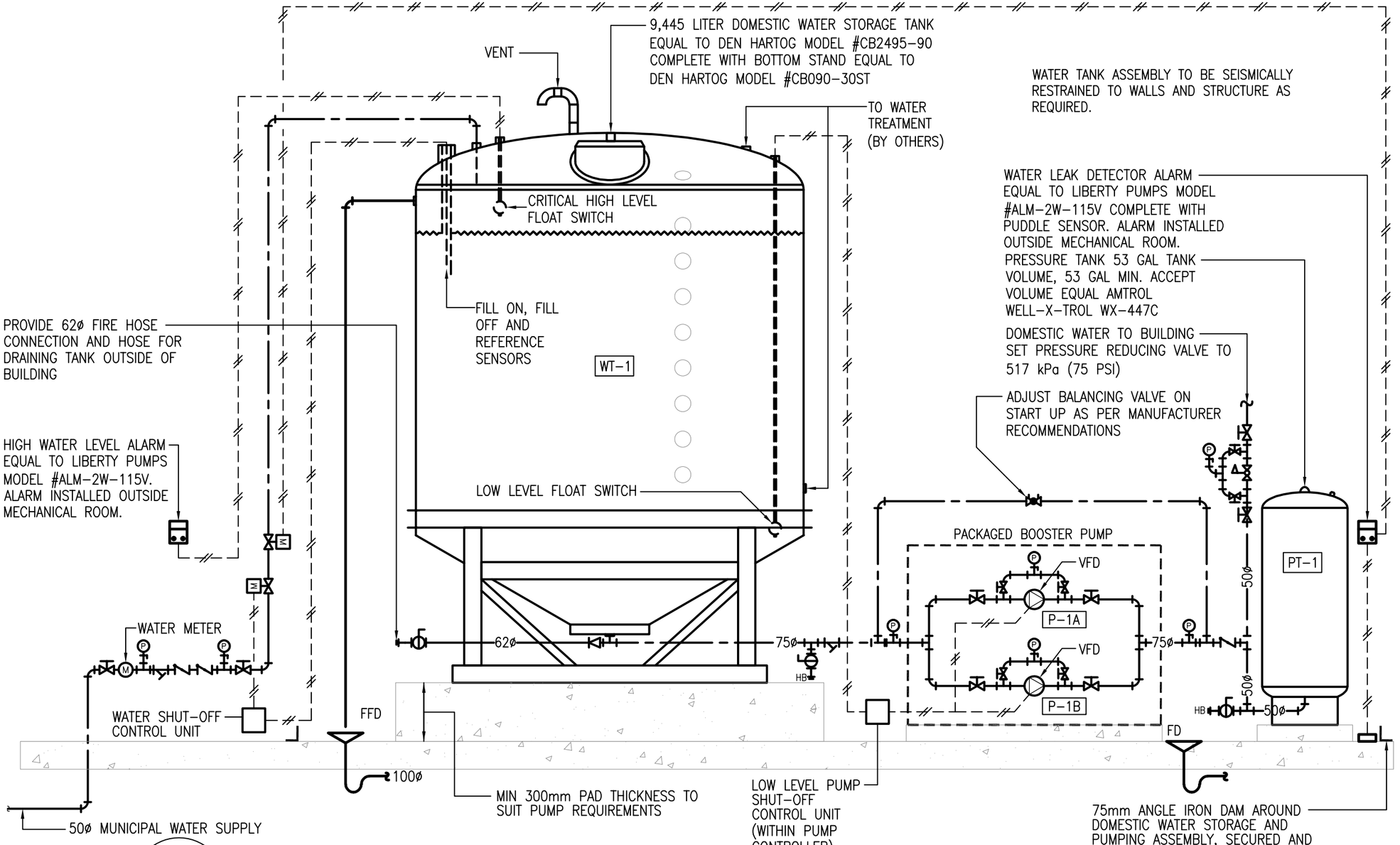
Olivia Renn, P.Eng.
Project Engineer | Water Resources

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.

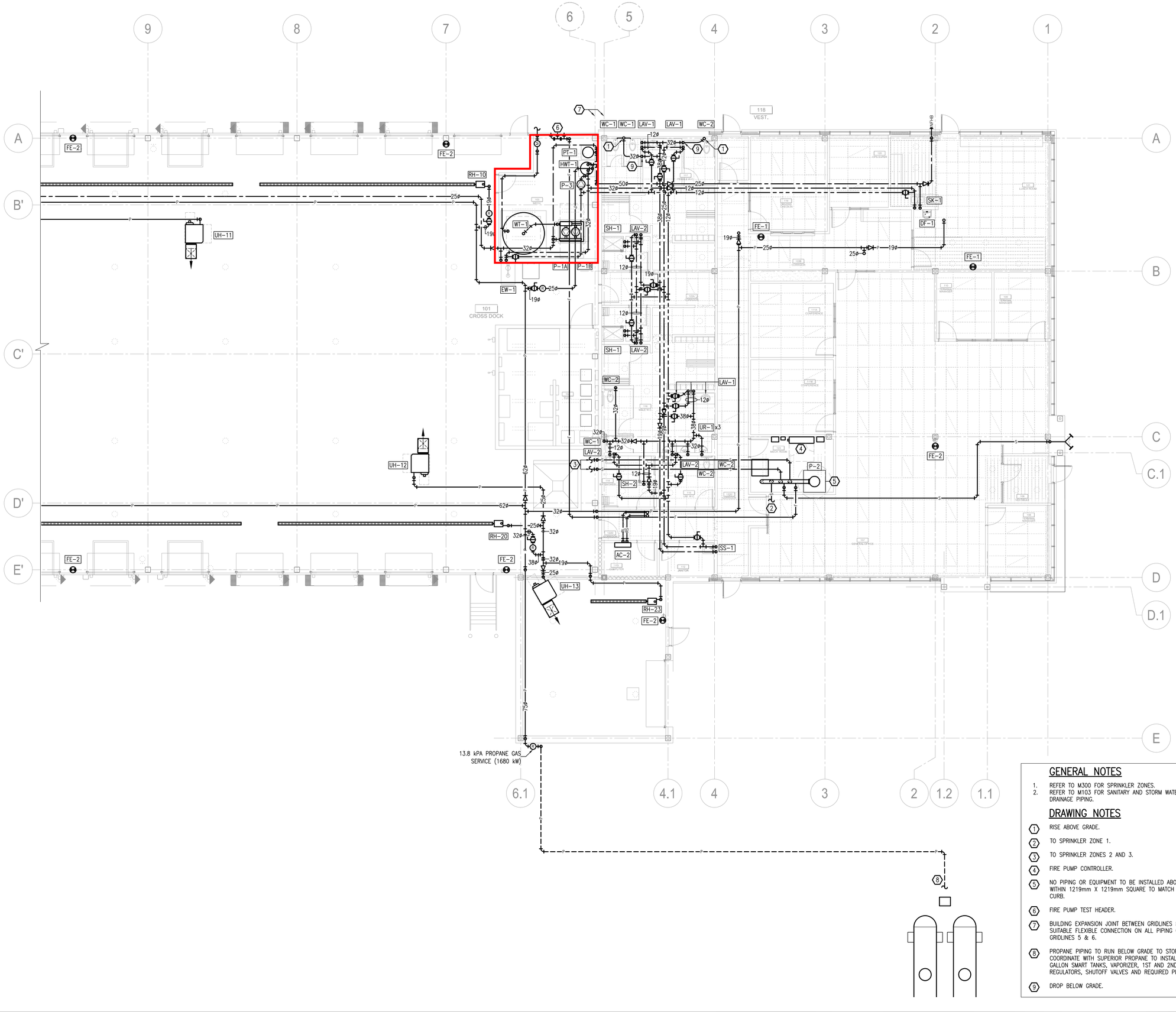
NO.	REVISION	DATE
1.	ISSUED FOR SITE PLAN APPLCATION	SEPT 18/24

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

seal

drawing title
MECHANICAL:
PLUMBING AND FIRE PROTECTION (RIGHT)

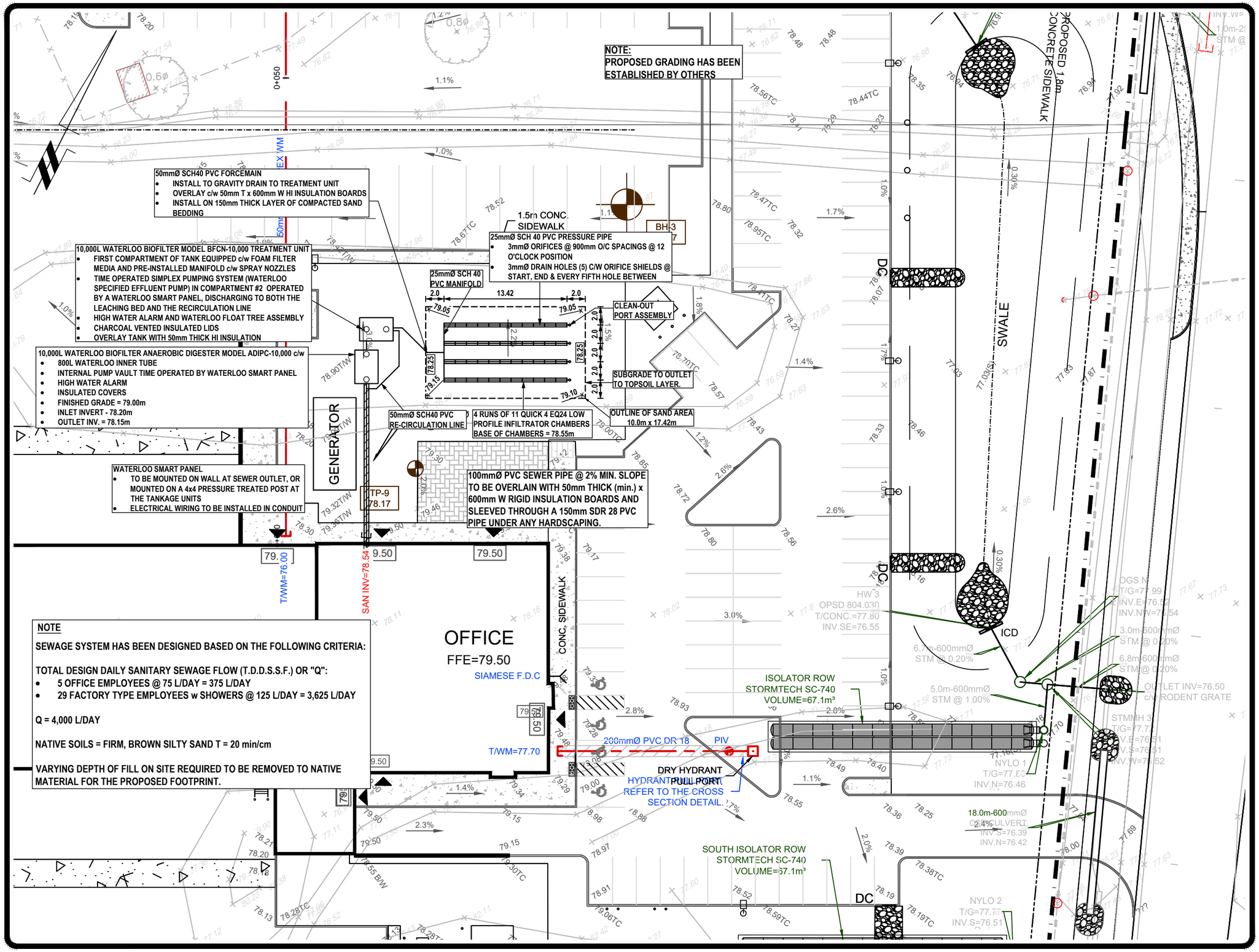
scale	drawn by
1:100	R.C
date	checked by
XX XXXX XX	S.C
project number	drawing number
24052	M102

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

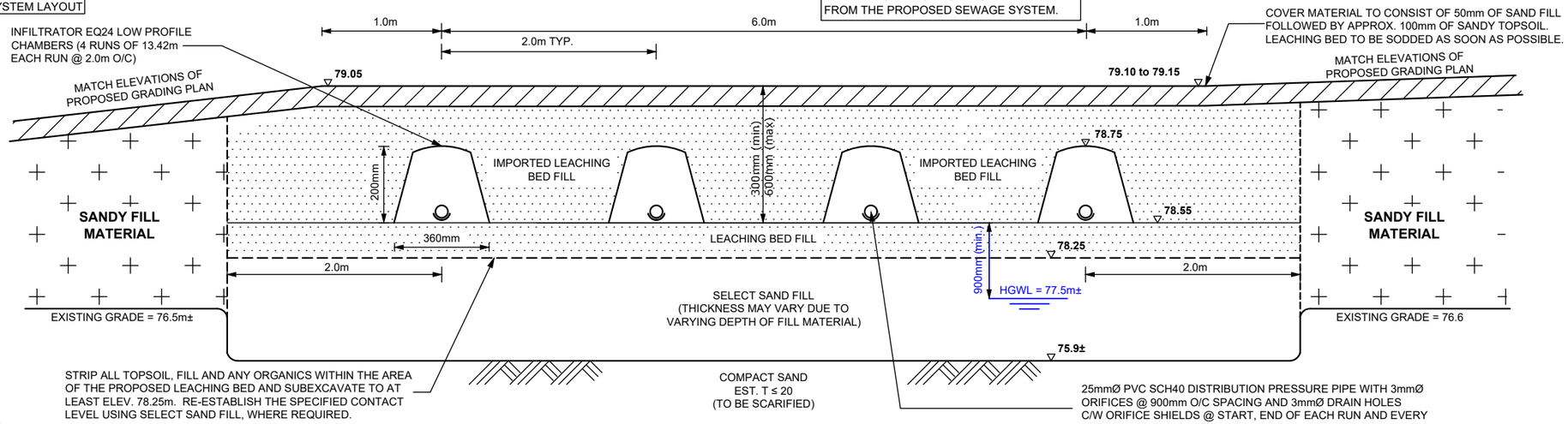
Drawing No.:

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)

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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

LEGEND

EXISTING STORM DRAINAGE AREA

PRE
6.14ha
88

DRAINAGE AREA ID
DRAINAGE AREA (ha)
SCS CURVE NUMBER

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5510 BOUNDARY ROAD

PRE-DEVELOPMENT DRAINAGE AREA PLAN

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

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LEGEND

- BOREHOLE
- TEST PIT
- PROPERTY LINE
- PROPOSED SECURITY FENCE (REFER TO LANDSCAPE)
- PROPOSED CURB
- PROPOSED DEPRESSED CURB (DC)
- 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
- SLOPE AND DIRECTION (2.0%)
- PROPOSED SITE LIGHTING (REFER TO ARCHITECTURAL DRAWINGS)
- PROPOSED ELEVATION / EXISTING ELEVATION (77.50 / 76.45)
- PROPOSED SWALE ELEVATION (79.60SD)
- PROPOSED TOP OF CURB ELEVATION (79.60TC)
- PROPOSED TOP OF WALE ELEVATION (79.60TW)
- PROPOSED BOTTOM OF WALL ELEVATION (79.60BW)
- 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

NORTH

KEY PLAN
N.T.S.

HIGHWAY 417
ch. Thomas Rd.
SITE
ch. Eagleson Rd.
ch. Huntmar Rd.
ch. Mitch Owens Rd.
ch. Donald B. Munro Dr.
ch. Binscarth Rd.
ch. Fernbank Rd.

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 0.50

0.147 A-16 0.76

0.413 A-7 0.55

0.176 BRD-2 0.69

0.065 BRD-3 0.62

0.111 DR-1 0.90

0.389 A-14 0.34

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

0.739 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

0.439 FR-1 0.90

FUTURE EXPANSION

CROSS DOCK
FFE=79.50

OFFICE
FFE=79.50

MECH

GENERATOR

PATIO

SWALE

DC

OHW

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

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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

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

NOVATECH
Engineers, Planners & Landscape Architects

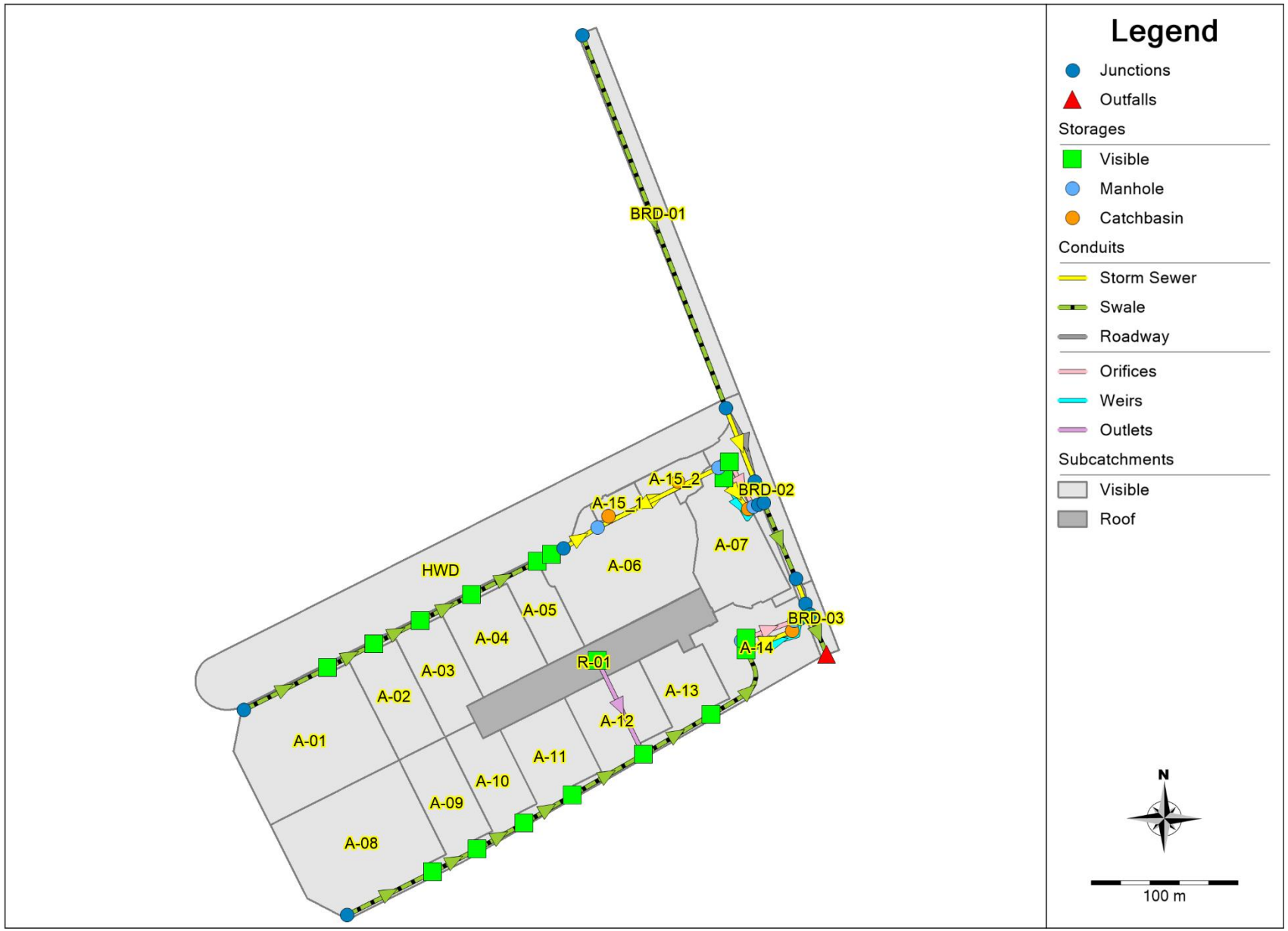
Overall Model Schematic



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

NOVATECH
Engineers, Planners & Landscape Architects

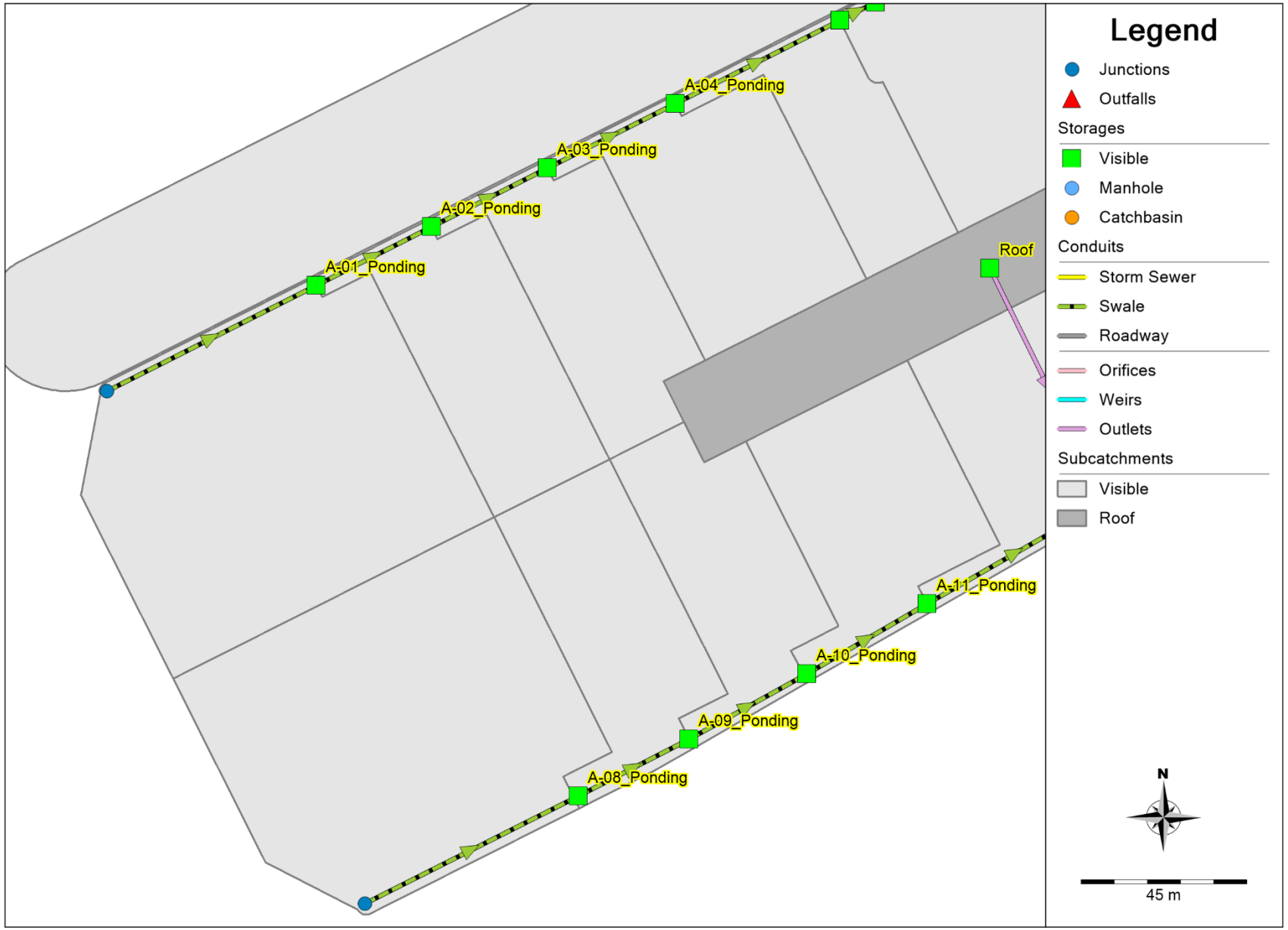
Catchment IDs



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

NOVATECH
Engineers, Planners & Landscape Architects

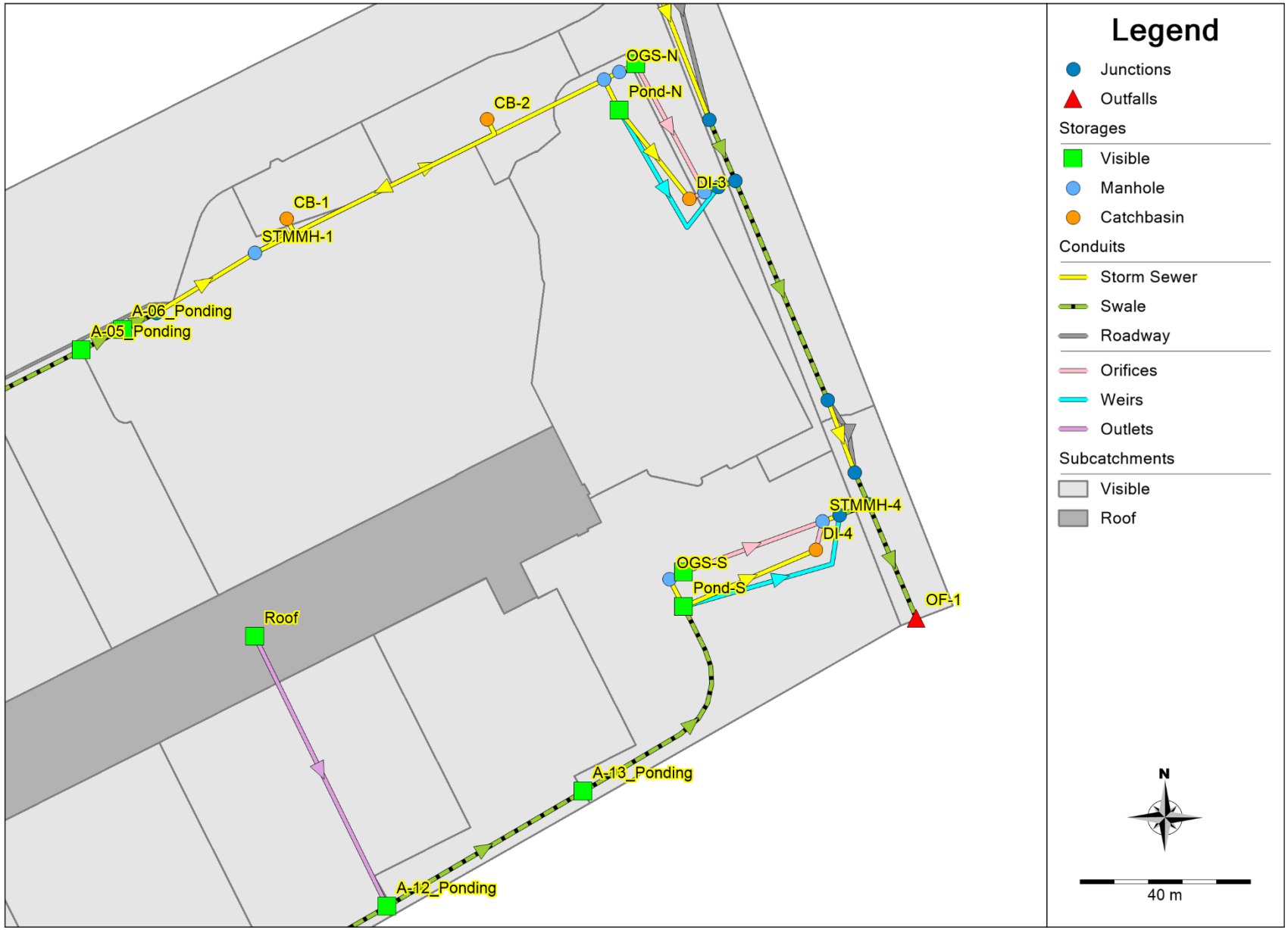
Catchbasins, Manholes, Storages & Outfalls



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

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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 20
WARNING 04: minimum elevation drop used for Conduit 27
WARNING 02: maximum depth increased for Node C-1_OUT

*************
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            76.39      2.19       0.0
C-2_OUT              JUNCTION            76.37      2.21       0.0
HW-1                 JUNCTION            77.00      1.00       0.0
HW-3                 JUNCTION            76.52      1.26       0.0
HW-5                 JUNCTION            76.48      1.25       0.0
NPONDOUT             JUNCTION            76.50      1.00       0.0
OF-2                 JUNCTION            76.42      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	76.59	1.71	0.0
DI-4	STORAGE	76.55	1.75	0.0
OGS-N	STORAGE	76.72	1.60	0.0
OGS-S	STORAGE	76.72	2.02	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	1.72	0.0
STMMH-3	STORAGE	76.54	1.20	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	0.8309	0.0300
15_(1)_(STM)	STMMH-1	STMMH-2	CONDUIT	88.3	0.2039	0.0130
16	C-1_OUT	NPONDOUT	CONDUIT	15.5	0.1941	0.0300
17	NPONDOUT	C-2_IN	CONDUIT	55.4	0.0902	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	0.1242	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	0.4742	0.0300
23	OF-2	OF-1	CONDUIT	28.9	0.1384	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	0.0017	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	0.2271	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	0.1111	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	5544.62
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	2679.61
17	TRIANGULAR	1.00	3.00	0.47	6.00	1	1826.82
18	RECT_OPEN	0.60	0.36	0.20	0.60	1	165.35
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	2143.56
2	TRAPEZOIDAL	1.00	4.00	0.55	7.00	1	3993.66
20	RECT_OPEN	0.60	0.36	0.20	0.60	1	165.35
22	TRIANGULAR	1.00	3.00	0.47	6.00	1	4188.43
23	TRIANGULAR	1.00	3.00	0.47	6.00	1	2262.88
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	1264.75
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	0.38	0.11	0.09	0.38	1	124.06
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	2898.55
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	182.34

****
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

Runoff Quantity Continuity	Volume hectare-m	Depth 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 .........         0.463         4.635
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         0.000
Continuity Error (%) .....        -0.275


************************
Highest Continuity Errors
************************
Node C-1_IN (1.81%)
Node A-13_Ponding (1.13%)


***************************
Time-Step Critical Elements
***************************
Link 18 (35.39%)
Link 10_(STM) (2.32%)
Link 20 (1.90%)
Link 40_(STM) (1.50%)
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*******************************
Highest Flow Instability Indexes
*******************************
Link 49_(STM) (44)
Link Roof_Outlet (16)
Link 47_(STM) (14)
Link 21 (11)
Link 6_(1)_(STM) (6)


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


************************
Routing Time Step Summary
************************
Minimum Time Step           :     0.27 sec
Average Time Step           :     0.81 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      :    57.94 %
    0.871 -  0.758 sec      :     1.57 %
    0.758 -  0.660 sec      :     5.79 %
    0.660 -  0.574 sec      :     7.16 %
    0.574 -  0.500 sec      :    27.54 %


***************************
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

****
Node Depth Summary
****

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	0.15	0.68	77.26	0 01:37	0.68
C-1_OUT	JUNCTION	0.22	0.77	77.24	0 01:37	0.77
C-2_IN	JUNCTION	0.26	0.84	77.23	0 01:37	0.84
C-2_OUT	JUNCTION	0.26	0.60	76.97	0 01:41	0.60
HW-1	JUNCTION	0.15	0.74	77.74	0 01:21	0.74
HW-3	JUNCTION	0.17	0.72	77.24	0 01:37	0.72
HW-5	JUNCTION	0.17	0.48	76.96	0 01:41	0.48
NPONDOUT	JUNCTION	0.19	0.74	77.24	0 01:37	0.74
OF-2	JUNCTION	0.21	0.54	76.96	0 01:41	0.54
OF-1	OUTFALL	0.21	0.54	76.92	0 01:41	0.54
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	0.04	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	0.12	0.78	77.83	0	01:10	0.78	
DI-3	STORAGE	0.23	1.00	77.59	0	01:28	1.00	
DI-4	STORAGE	0.35	0.96	77.51	0	01:52	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	01:52	0.71	
Roof	STORAGE	0.11	0.23	77.25	0	04:47	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	0.72	77.26	0	01:37	0.72	
STMMH-4	STORAGE	0.17	0.48	76.98	0	01:42	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	-7.274	
C-1_IN	JUNCTION	185.07	311.98	0	01:10	0.409	0.606	1.841	
C-1_OUT	JUNCTION	82.89	234.72	0	01:10	0.101	0.697	-0.022	
C-2_IN	JUNCTION	0.00	399.68	0	01:30	0	2.71	-0.310	
C-2_OUT	JUNCTION	29.74	399.09	0	01:36	0.0345	2.76	-0.001	
HW-1	JUNCTION	0.00	518.79	0	01:04	0	1.67	0.006	
HW-3	JUNCTION	44.92	335.83	0	01:27	0.0506	2.02	0.000	
HW-5	JUNCTION	0.00	59.91	0	01:53	0	1.88	0.002	
NPONDOUT	JUNCTION	0.00	415.93	0	01:23	0	2.71	-0.020	
OF-2	JUNCTION	0.00	447.77	0	01:41	0	4.64	0.001	
OF-1	OUTFALL	0.00	447.73	0	01:41	0	4.63	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	440.62	0	01:10	0.185	0.673	-0.018	
A-03_Ponding	STORAGE	126.76	491.30	0	01:08	0.176	0.849	-0.014	
A-04_Ponding	STORAGE	157.52	549.07	0	01:06	0.22	1.07	-0.017	
A-05_Ponding	STORAGE	95.56	451.34	0	01:05	0.133	1.2	0.074	
A-06_Ponding	STORAGE	332.09	616.69	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	813.11	0	01:10	0.219	1.99	0.011	
A-13_Ponding	STORAGE	120.88	861.58	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	-0.004	
DI-3	STORAGE	0.00	48.73	0	03:52	0	0.377	0.035	
DI-4	STORAGE	0.00	22.05	0	01:09	0	0.267	0.007	
OGS-N	STORAGE	0.00	101.17	0	01:04	0	0.865	0.015	
OGS-S	STORAGE	0.00	99.55	0	01:09	0	1.59	-0.008	
Pond-N	STORAGE	154.68	568.13	0	01:10	0.199	1.42	0.022	
Pond-S	STORAGE	76.49	907.54	0	01:10	0.127	1.88	-0.767	
Roof	STORAGE	217.73	242.33	0	01:10	0.315	0.671	0.020	
STMMH-1	STORAGE	0.00	553.07	0	01:05	0	1.76	-0.171	
STMMH-2	STORAGE	0.00	496.58	0	01:05	0	2.09	-0.075	
STMMH-3	STORAGE	0.00	75.16	0	02:52	0	1.24	-0.079	
STMMH-4	STORAGE	0.00	50.86	0	02:50	0	1.86	-0.001	
StormTech-N	STORAGE	0.00	99.85	0	01:04	0	0.865	0.070	
StormTech-S	STORAGE	0.00	96.67	0	01:09	0	1.59	-0.003	

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Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
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	307.19
A-02_Ponding	0.000	0.1	0.0	0.0	0.015	2.4	0 01:21	367.66
A-03_Ponding	0.001	0.2	0.0	0.0	0.023	5.2	0 01:21	396.66
A-04_Ponding	0.003	0.5	0.0	0.0	0.061	12.0	0 01:22	361.08
A-05_Ponding	0.001	0.6	0.0	0.0	0.031	14.2	0 01:22	326.57
A-06_Ponding	0.003	0.9	0.0	0.0	0.068	18.0	0 01:21	518.79
A-08_Ponding	0.000	0.0	0.0	0.0	0.001	0.3	0 01:10	347.05
A-09_Ponding	0.000	0.0	0.0	0.0	0.004	0.7	0 01:10	459.50
A-10_Ponding	0.000	0.0	0.0	0.0	0.005	1.5	0 01:10	556.21
A-11_Ponding	0.000	0.0	0.0	0.0	0.007	1.6	0 01:10	662.94
A-12_Ponding	0.001	0.1	0.0	0.0	0.006	1.3	0 01:52	779.14
A-13_Ponding	0.001	0.4	0.0	0.0	0.005	3.9	0 01:52	841.52
CB-1	0.000	8.5	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	13.3	0.0	0.0	0.001	58.5	0 01:28	38.11
DI-4	0.001	20.2	0.0	0.0	0.001	55.0	0 01:52	11.96
OGS-N	0.000	0.0	0.0	0.0	0.000	0.0	0 00:00	99.85
OGS-S	0.000	0.0	0.0	0.0	0.000	0.0	0 00:00	96.67
Pond-N	0.134	16.2	0.0	0.0	0.559	67.5	0 01:28	297.91
Pond-S	0.267	21.6	0.0	0.0	0.765	61.9	0 01:52	118.49
Roof	0.240	0.8	0.0	0.0	0.667	2.1	0 04:47	24.61
STMMH-1	0.001	12.6	0.0	0.0	0.004	58.3	0 01:22	496.58
STMMH-2	0.001	14.4	0.0	0.0	0.005	53.2	0 01:24	474.39
STMMH-3	0.000	13.6	0.0	0.0	0.001	60.1	0 01:37	75.19
STMMH-4	0.000	13.1	0.0	0.0	0.001	37.1	0 01:42	50.89
StormTech-N	0.020	32.7	0.0	0.0	0.063	100.0	0 01:16	37.06
StormTech-S	0.026	41.2	0.0	0.0	0.056	89.7	0 01:53	38.90

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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	90.32	83.37	447.73	4.635
System	90.32	83.37	447.73	4.635

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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	556.21	0 01:10	0.54	0.14	0.44
10_(STM)	CONDUIT	96.67	0 01:09	1.07	0.48	1.00
11	CONDUIT	662.94	0 01:10	0.59	0.17	0.47

12	CONDUIT	754.54	0	01:10	0.64	0.19	0.55
14	CONDUIT	841.52	0	01:10	0.96	0.24	0.63
15	CONDUIT	60.17	0	01:53	0.33	0.01	0.51
15_(1)_(STM)	CONDUIT	496.58	0	01:05	0.91	0.90	1.00
16	CONDUIT	222.97	0	01:10	0.31	0.08	0.73
17	CONDUIT	399.68	0	01:30	0.34	0.22	0.76
18	CONDUIT	22.05	0	01:09	0.67	0.13	0.69
18_(STM)	CONDUIT	413.81	0	01:10	1.62	0.84	1.00
19	CONDUIT	398.99	0	01:36	0.45	0.19	0.54
2	CONDUIT	307.19	0	01:10	0.41	0.08	0.43
20	CONDUIT	48.73	0	03:52	0.87	0.29	0.53
22	CONDUIT	334.90	0	01:28	0.25	0.08	0.73
23	CONDUIT	447.73	0	01:41	0.50	0.20	0.54
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	488.95	0	01:05	1.03	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	367.66	0	01:07	0.44	0.09	0.50
39_(1)_(STM)	CONDUIT	50.89	0	02:49	0.67	0.41	1.00
4	CONDUIT	396.66	0	01:06	0.43	0.10	0.57
40_(STM)	CONDUIT	101.17	0	01:04	0.76	0.28	1.00
41_(STM)	CONDUIT	99.85	0	01:04	0.80	0.34	1.00
46_(STM)	CONDUIT	99.55	0	01:09	0.97	0.49	1.00
47_(STM)	CONDUIT	75.19	0	02:51	0.73	0.53	1.00
5	CONDUIT	361.08	0	01:05	0.35	0.09	0.66
6	CONDUIT	128.31	0	01:10	0.33	0.04	0.40
6_1	CONDUIT	326.57	0	01:05	0.31	0.08	0.72
6_2	CONDUIT	518.79	0	01:04	0.49	0.17	0.73
7	CONDUIT	0.00	0	00:00	0.00	0.00	0.18
8	CONDUIT	347.05	0	01:10	0.43	0.09	0.38
9	CONDUIT	459.50	0	01:10	0.49	0.12	0.42
C-1	CONDUIT	189.12	0	01:14	0.71	0.76	1.00
C-2	CONDUIT	396.61	0	01:36	1.48	2.18	1.00
13	ORIFICE	38.90	0	02:50			1.00
21	ORIFICE	37.06	0	02:52			1.00
49_(STM)	ORIFICE	38.11	0	02:52			1.00
6_(1)_(STM)	ORIFICE	11.96	0	02:50			1.00
NorthSpillway	WEIR	268.93	0	01:28			0.26
SouthSpillway	WEIR	14.00	0	01:52			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	0.78	0.00
10_(STM)	1.00	0.01	0.00	0.00	0.56	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	0.57	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	0.38	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	0.36	0.00
17	1.00	0.02	0.00	0.00	0.72	0.00	0.00	0.26	0.07	0.00
18	1.00	0.66	0.00	0.00	0.27	0.00	0.00	0.07	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	0.19	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	0.85	0.00	0.00	0.12	0.00	0.00	0.03	0.00	0.00
22	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.35	0.00
23	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.23	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	0.72	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	0.31	0.00
4	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.80	0.00
40_(STM)	1.00	0.02	0.00	0.00	0.34	0.01	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	0.55	0.00	0.00	0.44	0.00	0.00
47_(STM)	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.36	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	0.40	0.00	0.00	0.58	0.34	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	0.83	0.00
C-1	1.00	0.01	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.64
C-2	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.21

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
10_(STM)	5.53	5.53	6.03	0.01	0.01
15_(1)_(STM)	1.22	1.22	2.84	0.01	0.01
18_(STM)	2.48	2.48	2.84	0.01	0.01
27_(STM)	0.94	0.94	1.16	0.01	0.01
28_(STM)	2.93	2.94	3.06	0.01	0.13
29_(STM)	3.82	3.83	4.03	0.16	0.19
39_(1)_(STM)	1.22	1.22	1.27	0.01	0.01
40_(STM)	3.52	3.52	3.73	0.01	0.01
41_(STM)	3.84	3.84	4.03	0.01	0.01
46_(STM)	3.60	3.60	4.52	0.01	0.01
47_(STM)	1.54	1.58	1.55	0.01	0.78
C-1	0.64	0.64	0.92	0.01	0.01
C-2	0.27	1.13	0.27	1.32	0.27

Analysis begun on: Thu May 28 13:18:29 2026
Analysis ended on: Thu May 28 13:18:32 2026

Total elapsed time: 00:00:03

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	3.00
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 100-year Post-Development Flow= 873 L/s

Note: The total 100-year post-development flow was generated from the PCSWMM model for the 100-year 3-hour Chicago storm event. There is adequate capacity 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.

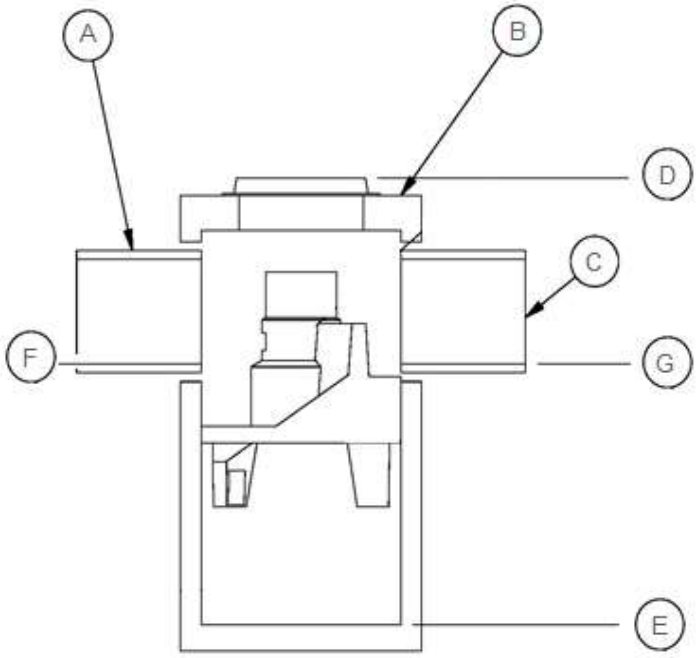
Individual OGS Results		
Model	**TSS Removal**	**Volume Treated**
FD-4HC	32.0%	>90%
FD-5HC	34.0%	>90%
FD-6HC	36.0%	>90%
FD-8HC	39.0%	>90%
FD-10HC	41.0%	>90%

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.

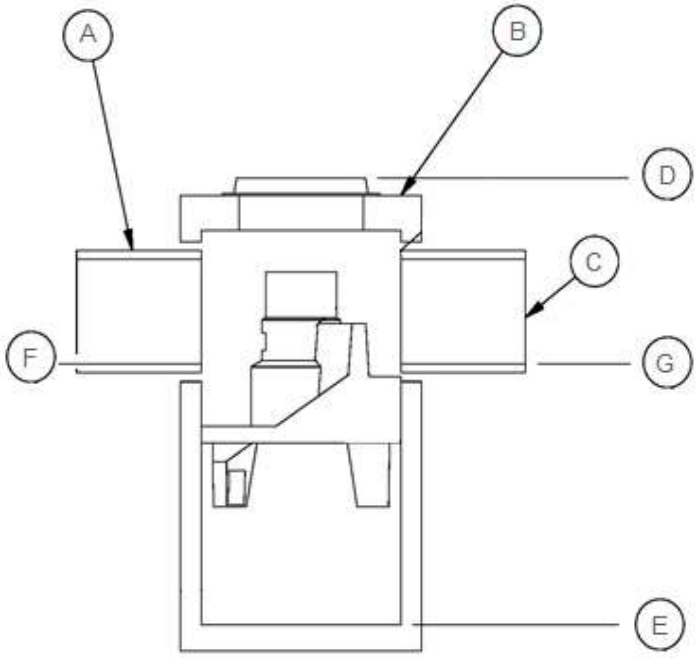
Individual OGS Results		
Model	**TSS Removal**	**Volume Treated**
FD-4HC	32.0%	>90%
FD-5HC	34.0%	>90%
FD-6HC	36.0%	>90%
FD-8HC	39.0%	>90%
FD-10HC	42.0%	>90%

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.

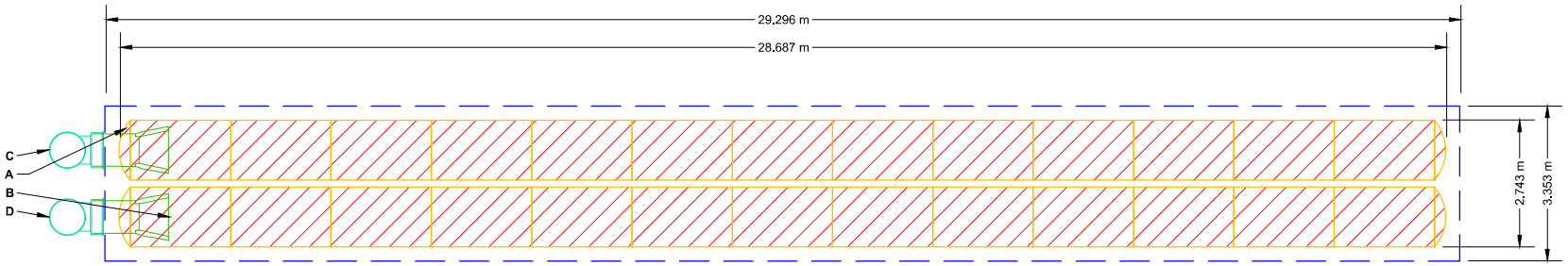
CONTACT STORMTECH AT 1-800-821-6710 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

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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

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StormTech®
Chamber System

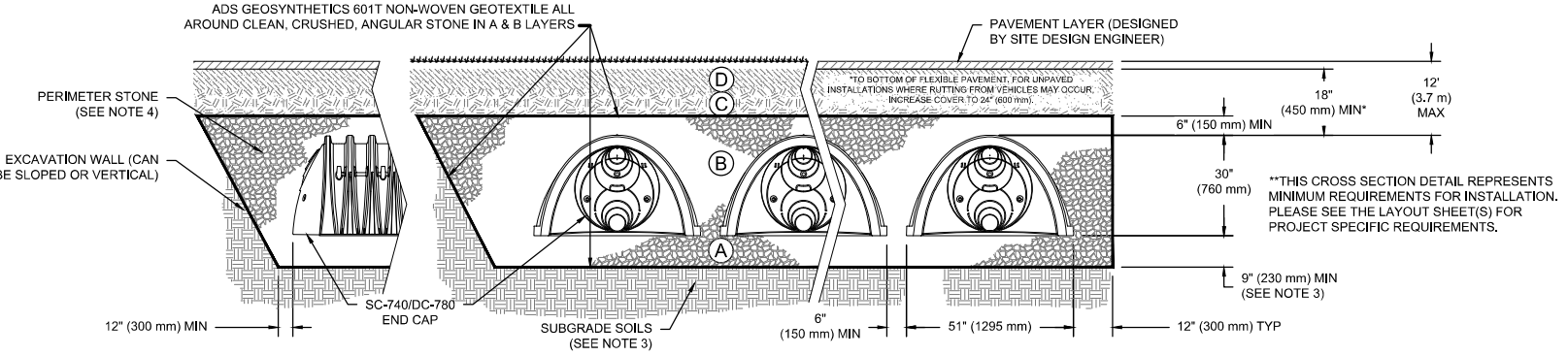
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

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.

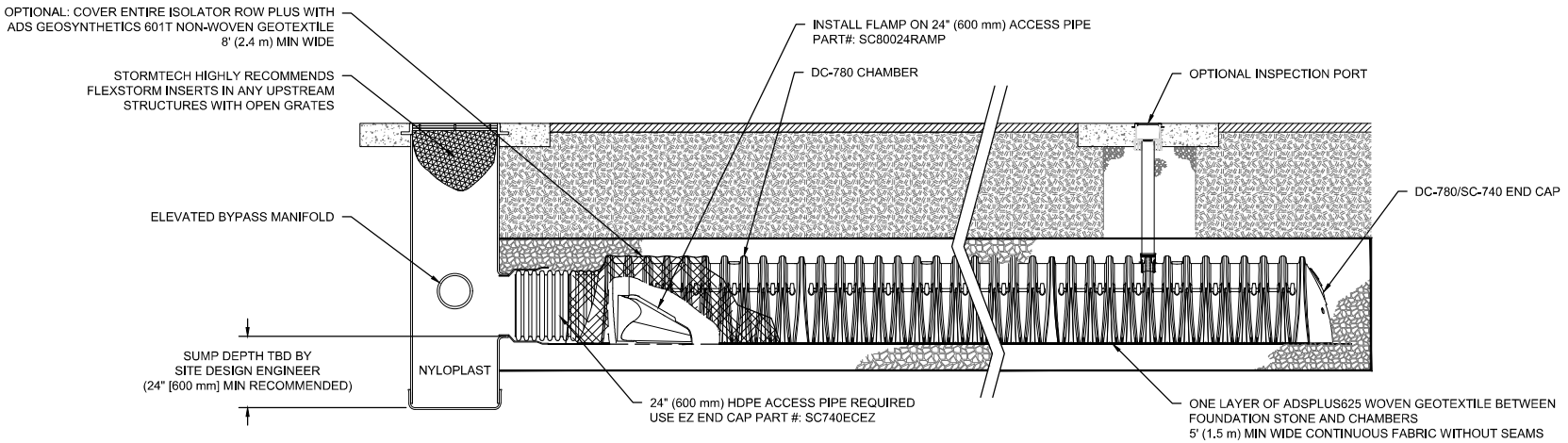
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StormTech® Chamber System

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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.

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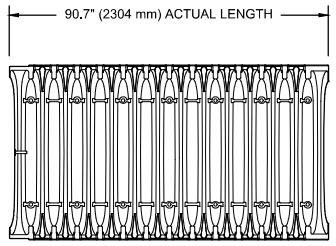
StormTech® Chamber System

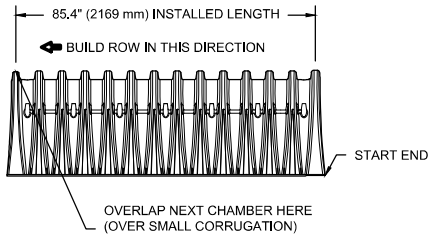
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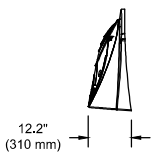
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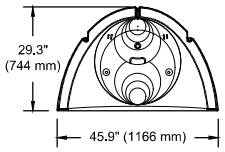
DC-780 TECHNICAL SPECIFICATION

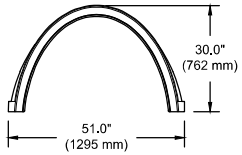
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NOMINAL CHAMBER SPECIFICATIONS

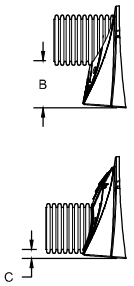
SIZE (W X H X INSTALLED LENGTH)	51.0" X 30.0" X 85.4"	(1295 mm X 762 mm X 2169 mm)
CHAMBER STORAGE	46.2 CUBIC FEET	(1.30 m³)
MINIMUM INSTALLED STORAGE*	78.4 CUBIC FEET	(2.20 m³)
WEIGHT	75.0 lbs.	(33.6 kg)

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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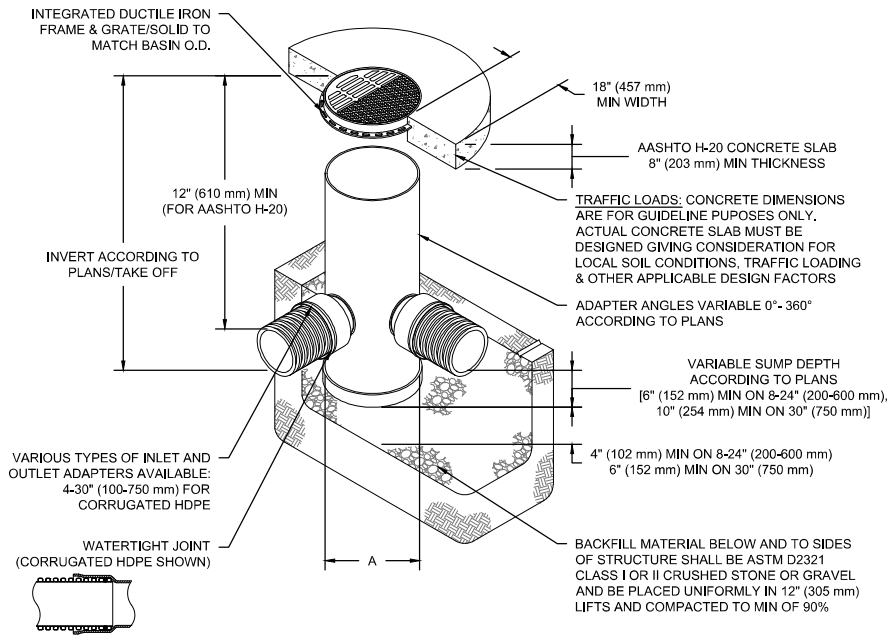
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NYLOPLAST DRAIN BASIN

NTS



NOTES

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

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

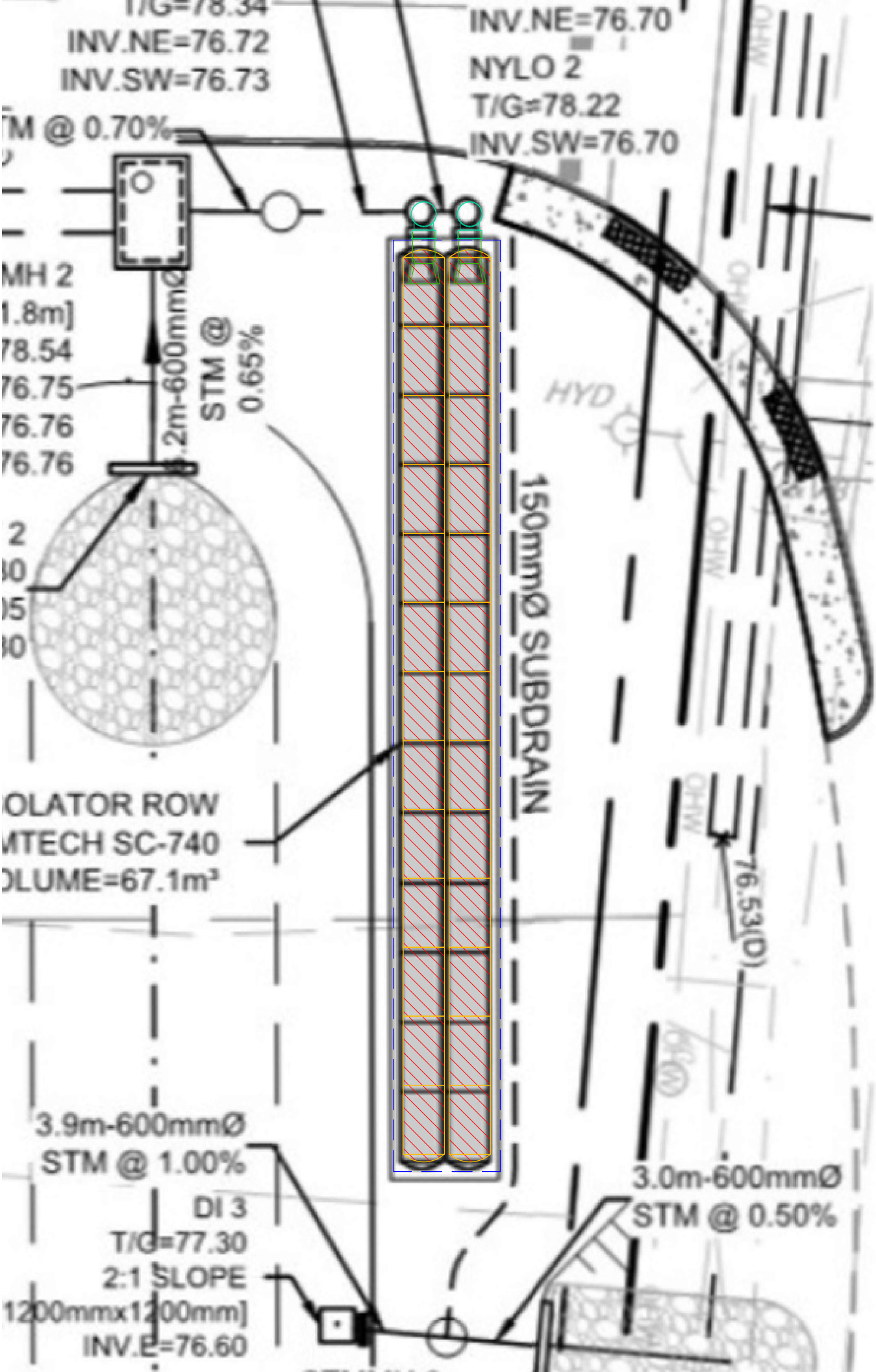
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T/G=78.34
INV.NE=76.72
INV.SW=76.73
M @ 0.70%
MH 2
1.8m]
78.54
76.75
76.76
76.76
2m-600mmØ
STM @
0.65%
2
0
5
0
OLATOR ROW
MTECH SC-740
OLUME=67.1m³
INV.NE=76.70
NYLO 2
T/G=78.22
INV.SW=76.70
HYD
150mmØ SUBDRAIN
76.53(D)
3.9m-600mmØ
STM @ 1.00%
DI 3
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.

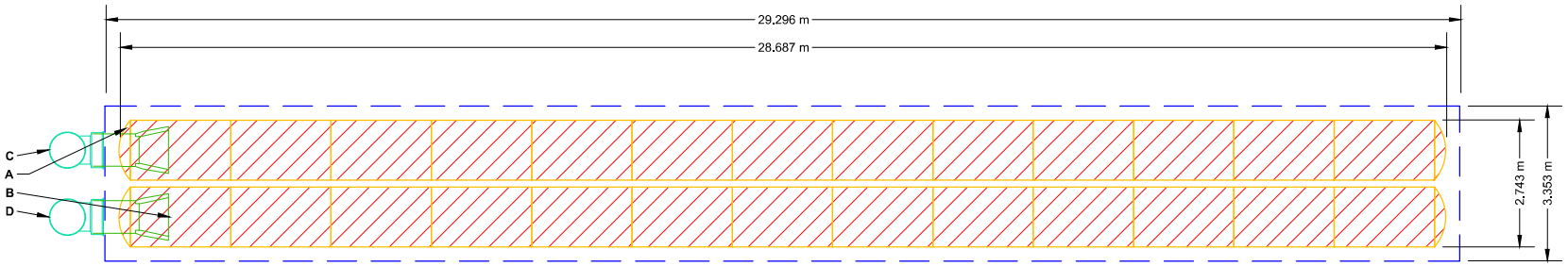
CONTACT STORMTECH AT 1-800-821-6710 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

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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.

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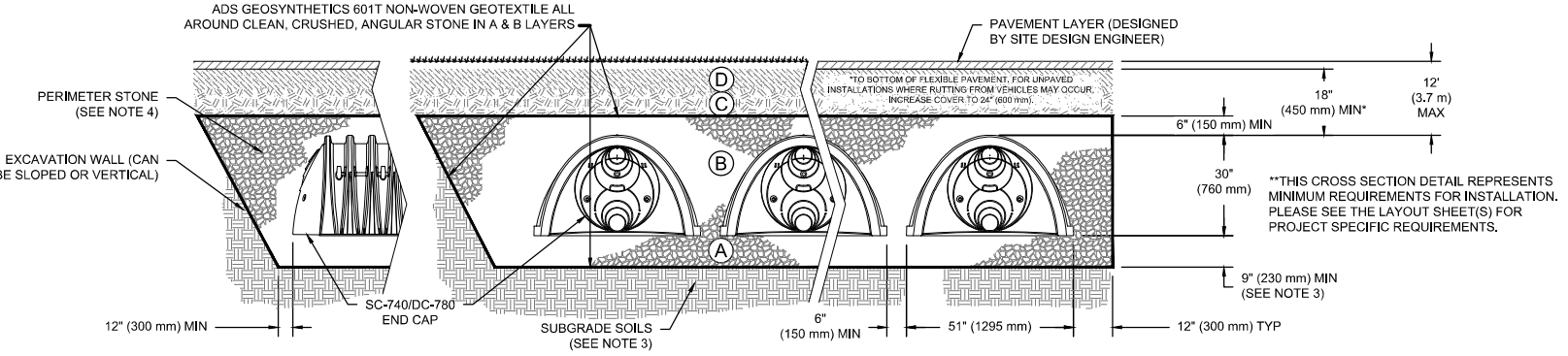
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SHEET
2 OF 6

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.

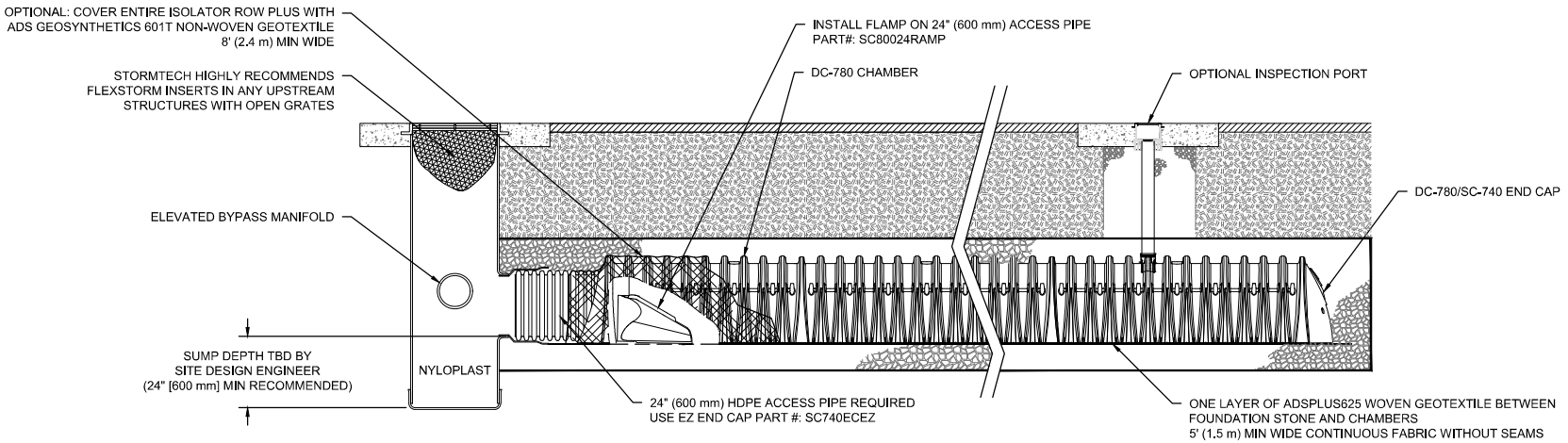
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DC-780 ISOLATOR ROW PLUS DETAIL
NTS

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.

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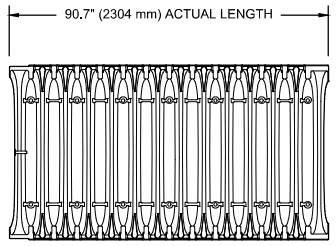
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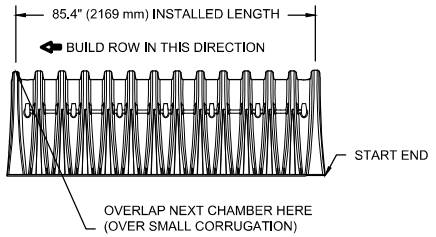
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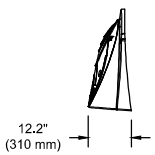
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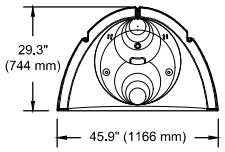
DC-780 TECHNICAL SPECIFICATION

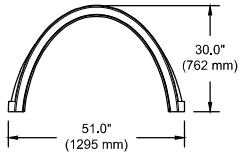
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NOMINAL CHAMBER SPECIFICATIONS

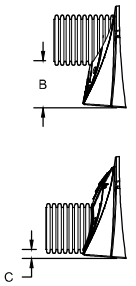
SIZE (W X H X INSTALLED LENGTH)	51.0" X 30.0" X 85.4"	(1295 mm X 762 mm X 2169 mm)
CHAMBER STORAGE	46.2 CUBIC FEET	(1.30 m³)
MINIMUM INSTALLED STORAGE*	78.4 CUBIC FEET	(2.20 m³)
WEIGHT	75.0 lbs.	(33.6 kg)

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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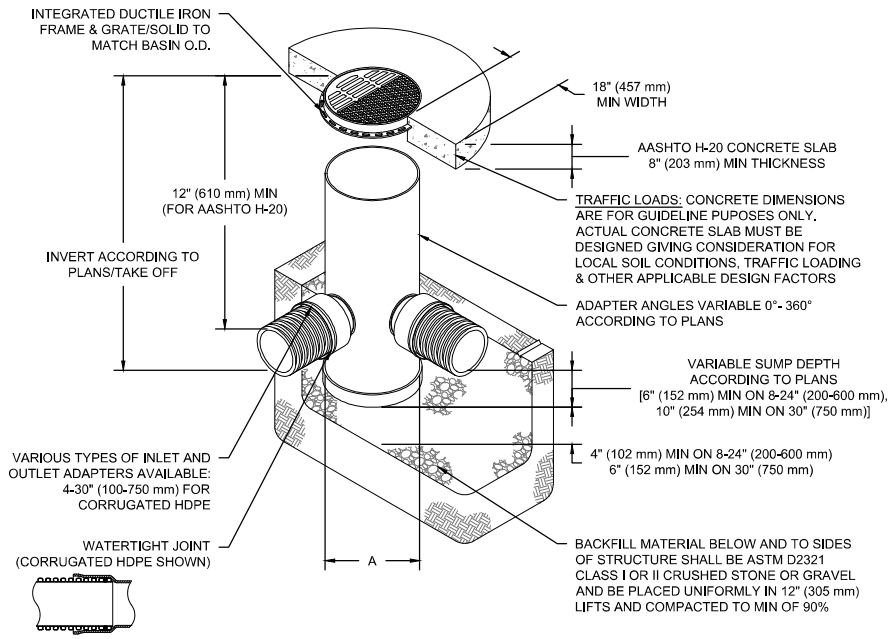
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NYLOPLAST DRAIN BASIN

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

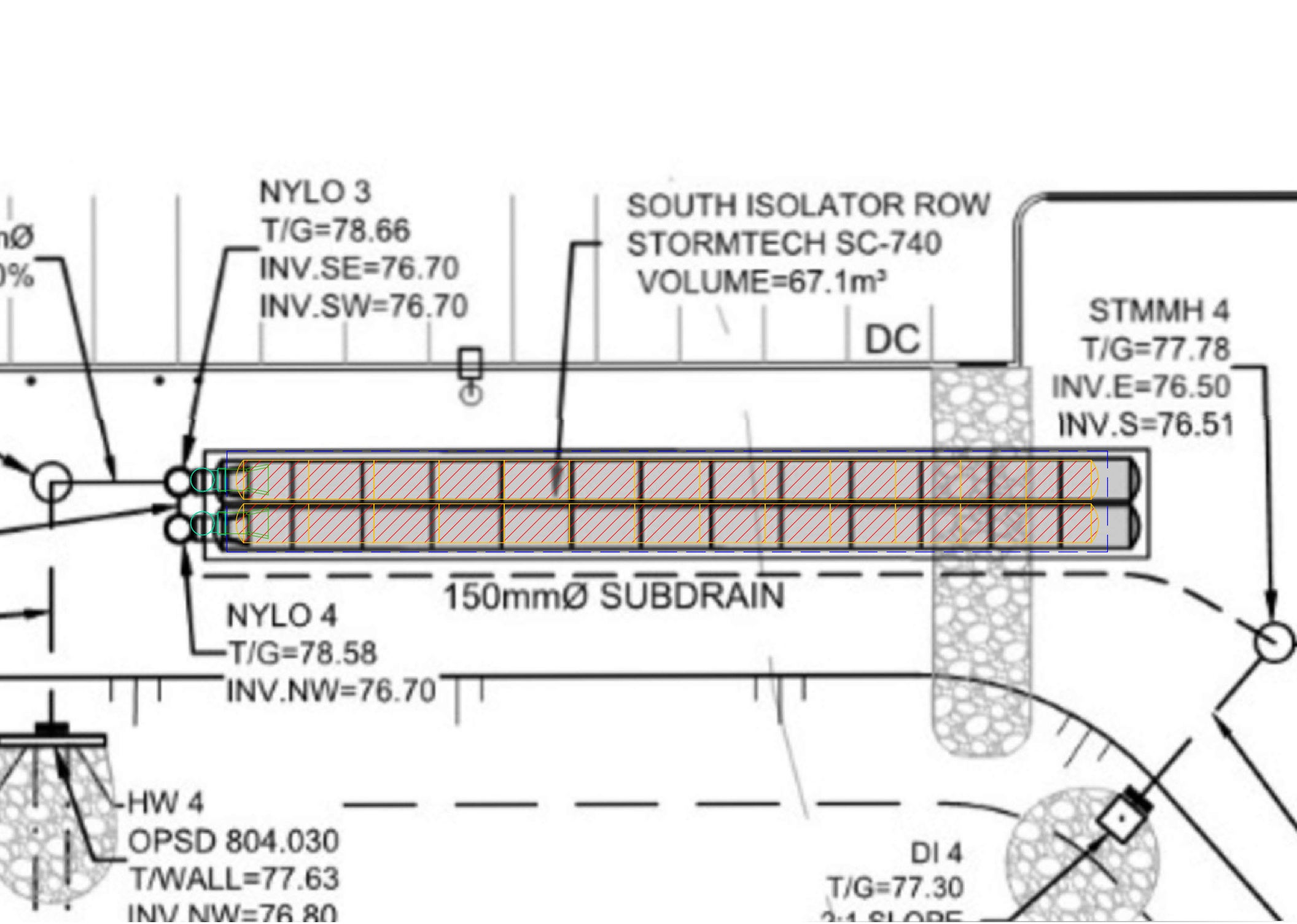
5510 BOUNDARY ROAD - SOUTH
OTTAWA, ON, CANADA
DATE: 10/07/2025
DRAWN: HN
PROJECT #:
CHECKED: N/A

DATE	DWN	CHK

Nyloplast®

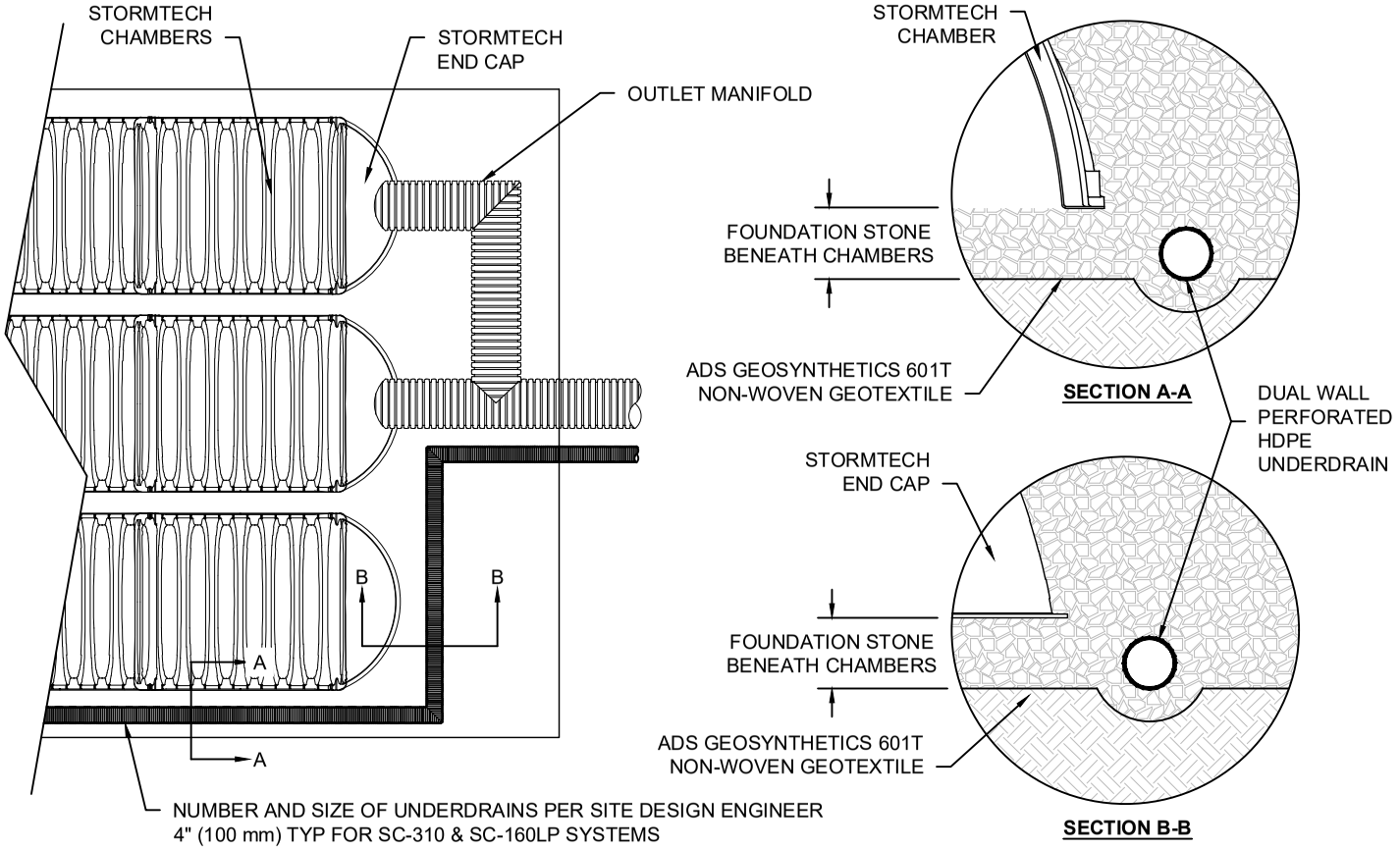
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS/STORMTECH UNDER THE DIRECTION OF THE PROJECT'S ENGINEER OF RECORD TO ASSIST OR OTHER PROJECT REPRESENTATIVE. THIS DRAWING IS NOT INTENDED FOR USE IN BIDDING OR CONSTRUCTION WITHOUT THE EOR'S PRIOR APPROVAL. EOR SHALL REVIEW THIS DRAWING PRIOR TO BIDDING AND/OR CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE EOR TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.


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
DI 4
T/G=77.30

UNDERDRAIN DETAIL

NTS



CHAMBER SYSTEM UNDERDRAIN
STORMTECH

DATE: 08/04/25 | DRAWN: SMW

DRAWING #: 720-010 | CHECKED: JLM

THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS/STORMTECH UNDER THE DIRECTION OF THE PROJECT'S ENGINEER OF RECORD ("EOR") OR OTHER PROJECT REPRESENTATIVE. THIS DRAWING IS NOT INTENDED FOR USE IN BIDDING OR CONSTRUCTION WITHOUT THE EOR'S PRIOR APPROVAL. EOR SHALL REVIEW THIS DRAWING PRIOR TO BIDDING AND/OR CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE EOR TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

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

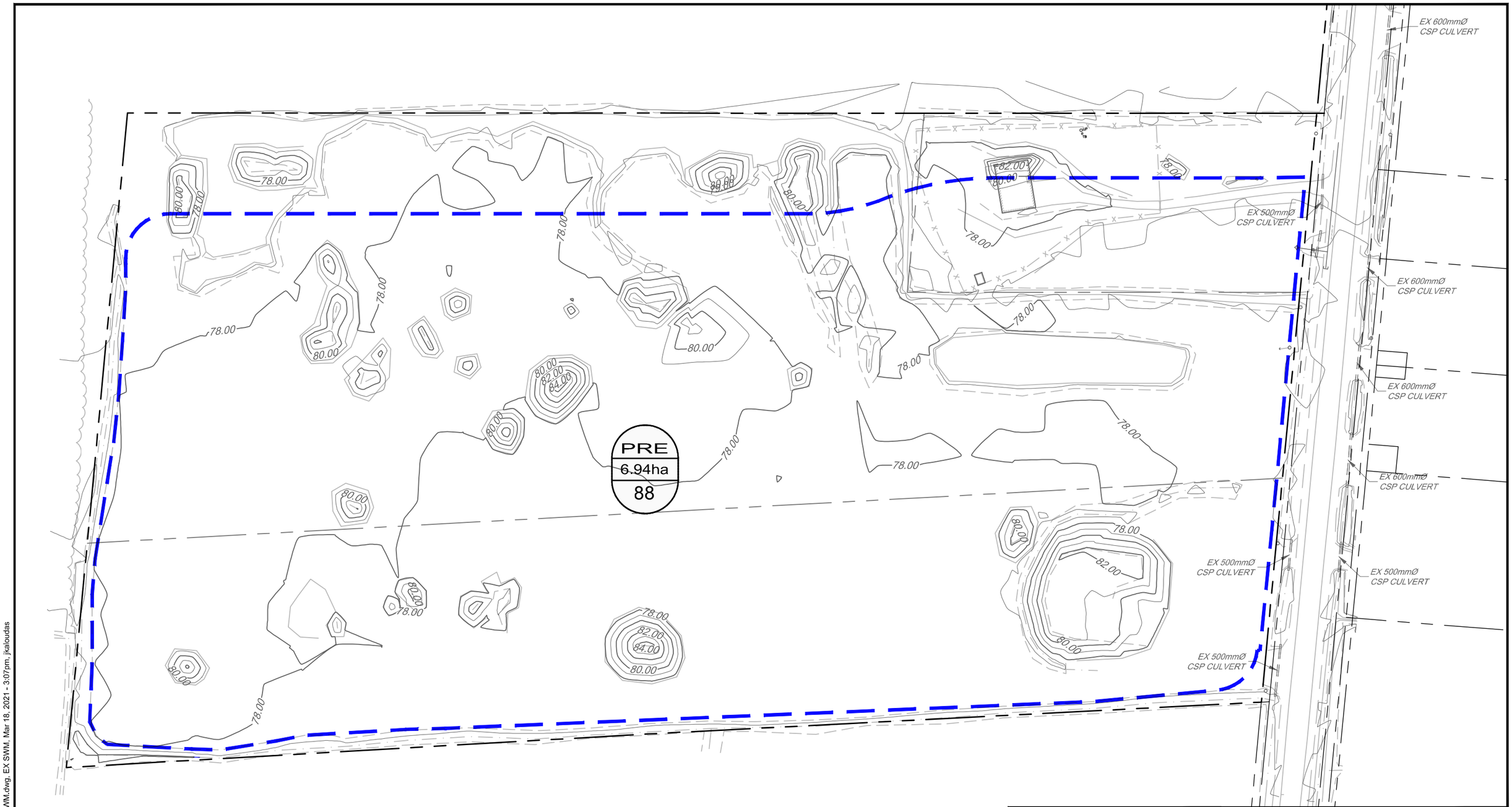
Area ID	Drainage Area (ha)	Peak Flow (m^3/s)					
		3-hour Chicago Storm			*12-hour SCS Type II Storm*		
		2-yr	5-yr	100-yr	2-yr	5-yr	100-yr
Area 'A'							
PRE	6.94	0.129	0.221	0.519	0.168	0.270	0.574

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

M:\2018\118168\CAD\Design\Figures\118168-EXSWM.dwg, EX SWM, Mar 18, 2021 - 3:07pm, jkaloudas

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

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

       V    V   I    SSSSS  U   U    A    L             (v 5.1.2000)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

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


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4e8b-a3a4-fca80fbc9b41\scena


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

USER:


COMMENTS: _____________________________________________________________
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```
  ********************************************
  ** SIMULATION : Run 01                     **
  ********************************************


--------------------
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| 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 |

--------------------------------------------------------------------------------

--------------------
| 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.

--------------------------------------------------------------------------------
```

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


--------------------
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| 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 |

--------------------------------------------------------------------------------

--------------------
| 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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```

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


--------------------
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| Ptotal= 71.67 mm |    Comments: C3-100
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN 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		

```
--------------------
| 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	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.
```

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


--------------------
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|                  |              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

```
--------------------
| 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 **
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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

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     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)

GENERAL NOTES:

1. COORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
2. DETERMINE THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION. PROTECT AND ASSUME RESPONSIBILITY FOR ALL EXISTING UTILITIES WHETHER OR NOT SHOWN ON THIS DRAWING.
3. OBTAIN ALL NECESSARY PERMITS AND APPROVALS FROM THE CITY OF OTTAWA BEFORE COMMENCING CONSTRUCTION.
4. BEFORE COMMENCING CONSTRUCTION OBTAIN AND PROVIDE PROOF OF COMPREHENSIVE, ALL RISK AND OPERATIONAL LIABILITY INSURANCE FOR $5,000,000.00. INSURANCE POLICY TO NAME OWNERS, ENGINEERS AND ARCHITECTS AS CO-INSURED.
5. RESTORE ALL DISTURBED AREAS ON-SITE AND OFF-SITE, INCLUDING TRENCHES AND SURFACES ON PUBLIC ROAD ALLOWANCES TO EXISTING CONDITIONS OR BETTER TO THE SATISFACTION OF MUNICIPAL AUTHORITIES.
6. REMOVE FROM SITE ALL EXCESS EXCAVATED MATERIAL, ORGANIC MATERIAL AND DEBRIS UNLESS OTHERWISE INSTRUCTED BY ENGINEER. EXCAVATE AND REMOVE FROM SITE ANY CONTAMINATED MATERIAL. ALL CONTAMINATED MATERIAL SHALL BE DISPOSED OF AT A LICENSED LANDFILL FACILITY.
7. ALL ELEVATIONS ARE GEODETIC AND UTILIZE METRIC UNITS.
8. REFER TO GEOTECHNICAL INVESTIGATION REPORT PG4592-1-5510 DATED SEPTEMBER 10, 2018) PREPARED BY PATERSON GROUP INC. FOR SUBSURFACE CONDITIONS, CONSTRUCTION RECOMMENDATIONS AND GEOTECHNICAL INSPECTION REQUIREMENTS. THE GEOTECHNICAL CONSULTANT IS TO REVIEW ON-SITE CONDITIONS AFTER EXCAVATION PRIOR TO PLACEMENT OF THE GRANULAR MATERIAL.
9. REFER TO ARCHITECT'S AND LANDSCAPE ARCHITECT'S DRAWINGS FOR BUILDING AND HARD SURFACE AREAS AND DIMENSIONS.
10. REFER TO THE STORMWATER MANAGEMENT REPORT No. R-2024-095, DATED NOVEMBER 14, 2025 PREPARED BY NOVATECH.
11. SAW CUT AND KEYGRIND ASPHALT AT ALL ROAD CUTS AND ASPHALT TIE IN POINTS AS PER CITY OF OTTAWA STANDARDS (R10 AND R25).
12. CONTRACTOR TO PROVIDE THE CONSULTANT WITH A GENERAL PLAN OF SERVICES INDICATING ALL SERVICING AS-BUILT INFORMATION. AS-BUILT INFORMATION MUST INCLUDE: PIPE MATERIAL, SIZES, LENGTHS, SLOPES, INVERT AND T/G ELEVATIONS, STRUCTURE LOCATIONS, VALVE AND HYDRANT LOCATION, T/WM ELEVATIONS AND ANY ALIGNMENT CHANGES, ETC AND A GRADING PLAN INDICATING ALL AS-BUILT SURFACE ELEVATIONS AND SLOPES.

GRADING NOTES:

1. ALL TOPSOIL, ORGANIC OR DELETERIOUS MATERIAL MUST BE ENTIRELY REMOVED FROM BENEATH THE PROPOSED BUILDING AND PAVED AREAS.
2. EXPOSED SUBGRADES IN PROPOSED PAVED AREAS SHOULD BE PROOF ROLLED WITH A LARGE STEEL DRUM ROLLER AND ANY SOFT AREAS EVIDENT FROM THE PROOF ROLLING SHOULD BE SUBEXCAVATED AND REPLACED WITH SUITABLE MATERIAL THAT IS FROST COMPATIBLE WITH THE EXISTING SOILS.
3. THE PAVEMENT GRANULAR BASE AND SUBBASE SHOULD BE PLACED IN MAXIMUM 300mm THICK LIFTS AND COMPACTED TO A MINIMUM OF 98% OF THE MATERIAL'S STANDARD PROCTOR MAXIMUM DRY DENSITY VALUE.
4. ALL CURBS AND SIDEWALKS TO BE BUILT AS PER CITY OF OTTAWA DETAIL DRAWINGS SC1.4 AND SC4.
5. GRADE AND/OR FILL BEHIND PROPOSED CURB AND BETWEEN BUILDINGS AND CURBS, WHERE REQUIRED TO PROVIDE POSITIVE DRAINAGE.
6. MINIMUM OF 2% GRADE FOR ALL GRASS AREAS UNLESS OTHERWISE NOTED.
7. MAXIMUM TERRACING GRADE TO BE 3:1 UNLESS OTHERWISE NOTED.
8. ALL GRADES BY CURBS ARE EDGE OF PAVEMENT GRADES UNLESS OTHERWISE INDICATED.
9. REFER TO LANDSCAPE PLAN FOR PLANTING AND OTHER LANDSCAPE FEATURE DETAILS.
10. CONTRACTOR TO PROVIDE THE CONSULTANT WITH A GRADING PLAN INDICATING THE AS-BUILT ELEVATION OF EVERY DESIGN GRADE SHOWN ON THIS PLAN.

WATERMAIN NOTES:

1. SUPPLY AND CONSTRUCT ALL WATERMAIN AND APPURTENANCES IN ACCORDANCE WITH THE MOST CURRENT CITY OF OTTAWA STANDARDS AND SPECIFICATIONS.
2. SPECIFICATIONS:

ITEM	SPEC. No.	REFERENCE
WATERMAIN TRENCHING	W17	CITY OF OTTAWA
THERMAL INSULATION IN SHALLOW TRENCHES	W22	CITY OF OTTAWA
THERMAL INSULATION BY OPEN STRUCTURES	W23	CITY OF OTTAWA
WATERMAIN	PEX SDR 9	

3. SUPPLY AND CONSTRUCT ALL WATERMAINS AND APPURTENANCES IN ACCORDANCE WITH THE CITY OF OTTAWA STANDARD AND SPECIFICATIONS. EXCAVATION, INSTALLATION, BACKFILL AND RESTORATION OF ALL WATERMAINS BY THE CONTRACTOR. CONNECTIONS AND SHUT-OFFS AT THE MAIN AND CHLORINATION OF THE WATER SYSTEM SHALL BE PERFORMED BY CITY OFFICIALS.
4. WATERMAIN SHALL BE MINIMUM 2.4m DEPTH BELOW GRADE UNLESS OTHERWISE INDICATED.
5. PROVIDE MINIMUM 0.5m CLEARANCE BETWEEN OUTSIDE OF PIPES AT ALL CROSSINGS.
6. WATER SERVICE IS TO BE CONSTRUCTED TO WITHIN 1.0m OF FOUNDATION WALL AND CAPPED, UNLESS OTHERWISE INDICATED.

SEWER NOTES:

1. SUPPLY AND CONSTRUCT ALL SEWERS AND APPURTENANCES IN ACCORDANCE WITH THE MOST CURRENT CITY OF OTTAWA STANDARDS AND SPECIFICATIONS.
2. SPECIFICATIONS:

ITEM	SPEC. No.	REFERENCE
CATCHBASIN (600X600mm)	705.010	OPSD
SANITARY/STORM/CATCHBASIN MANHOLE (1200Ø)	701.010	OPSD
STORM MANHOLE (1500Ø)	701.011	OPSD
STORM/SANITARY MH FRAME	S25	CITY OF OTTAWA
STORM COVER (OPEN)	S28.1	CITY OF OTTAWA
STORM SEWER < 450mmØ	PVC DR 35 (UNLESS SPECIFIED OTHERWISE)	
STORM SEWER >= 450mmØ	CONC 65D (UNLESS SPECIFIED OTHERWISE)	
SANITARY SEWER	PVC DR 35	
CATCHBASIN LEAD	PVC DR 35	
PIPE INSULATION	S35	

3. SERVICES ARE TO BE CONSTRUCTED TO 1.0m FROM THE FACE OF BUILDING AT A MINIMUM SLOPE OF 1.0%.
4. ALL STORM AND SANITARY LATERALS SHALL BE EQUIPPED WITH BACKFLOW PREVENTION DEVICES AS PER THE CITY OF OTTAWA STANDARD DETAILS S14 AND S14.1 OR S14.2.
5. PIPE BEDDING, COVER AND BACKFILL ARE TO BE COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY. THE USE OF CLEAR CRUSHED STONE AS A BEDDING LAYER SHALL NOT BE PERMITTED.
6. FLEXIBLE CONNECTIONS ARE REQUIRED FOR CONNECTING PIPES TO MANHOLES (FOR EXAMPLE KOR-N-SEAL, PSX POSITIVE SEAL AND DURASEAL). THE CONCRETE CRADLE FOR THE PIPE CAN BE ELIMINATED.
7. ALL STORM MANHOLES MANHOLES WITH PIPE SIZES LESS THAN 900mm ARE TO HAVE 300mm SUMPS UNLESS OTHERWISE INDICATED. ALL STORM MANHOLES WITH PIPE SIZES 900mm AND LARGER ARE TO BE BENCHED.
8. CONTRACTOR TO TELEVISE (CCTV) ALL PROPOSED SEWERS 200mm OR GREATER IN DIAMETER PRIOR TO BASE COURSE ASPHALT TO ENSURE THAT THEY ARE CLEAN AND OPERATIONAL UPON COMPLETION OF CONTRACT. THE CONTRACTOR IS RESPONSIBLE TO FLUSH AND CLEAN ALL SEWERS & APPURTENANCES AND RE CCTV PRIOR TO ACCEPTANCE. OBTAIN APPROVAL FROM THE CITY'S SEWER OPERATIONS. PROVIDE THE CCTV INSPECTION AND REPORT TO THE ENGINEER FOR REVIEW AND APPROVAL.
9. CONTRACTOR TO PROVIDE THE CONSULTANT WITH A GENERAL PLAN OF SERVICES INDICATING ALL APPLICABLE SERVICING AS-BUILT INFORMATION SHOWN ON THIS PLAN. AS-BUILT INFORMATION MUST INCLUDE: PIPE MATERIAL, SIZES, LENGTHS, SLOPES, INVERT AND T/G ELEVATIONS, STRUCTURE LOCATIONS AND ANY ALIGNMENT CHANGES, ETC.
10. THE OWNER SHALL REQUIRE THAT THE SITE SERVICING CONTRACTOR PERFORM FIELD TESTS FOR QUALITY CONTROL OF ALL SANITARY SEWERS. LEAKAGE TESTING SHALL BE COMPLETED IN ACCORDANCE WITH OPSS 410.07.16, 410.07.16.04 AND 407.07.24. DYE TESTING IS TO BE COMPLETED ON ALL SANITARY SERVICES TO CONFIRM PROPER CONNECTION TO THE SANITARY SEWER MAIN. THE FIELD TESTS SHALL BE PERFORMED IN THE PRESENCE OF A CERTIFIED PROFESSIONAL ENGINEER WHO SHALL SUBMIT A CERTIFIED COPY OF THE TEST RESULTS.
11. INSULATE ALL STORM SEWERS THAT HAVE LESS THAN 1.5m COVER PER INSULATION DETAIL FOR SHALLOW SEWERS, PROVIDE 150mm CLEARANCE BETWEEN PIPE AND INSULATION.
12. ALL CATCHBASINS IN THE PARKING AREA ARE TO BE PROVIDED WITH MINIMUM 3 METER LONG PERFORATED SUBDRAINS EXTENDING IN FOUR ORTHOGONAL DIRECTIONS AT THE SUBGRADE LEVEL. SUBDRAIN IS TO BE PROVIDED AT THE TRANSITIONS BETWEEN DIFFERENT PAVEMENT COMPOSITIONS. THE SUBGRADE SURFACE SHOULD BE SHAPED TOWARDS THE CATCHBASINS TO PROMOTE DRAINAGE OF THE GRANULAR BASE.
13. PERIMETER SUBDRAINS SHALL BE PROVIDED LONGITUDINALLY AROUND THE PARKING AREA ALONG CURBS PER GEOTECHNICAL RECOMMENDATION.

EROSION AND SEDIMENT CONTROL NOTES :

1. THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES DURING CONSTRUCTION ACTIVITIES TO PROTECT THE STORM DRAINAGE SYSTEM AND THE DOWNSTREAM RECEIVING WATERCOURSE(S). THIS INCLUDES LIMITING THE AMOUNT OF EXPOSED SOIL, USING FILTER BAGS UNDER THE GRATES OF CATCHBASINS AND MANHOLES AND INSTALLING SILT FENCES AND OTHER EFFECTIVE SEDIMENT TRAPS.
2. ALL EROSION AND SEDIMENT CONTROLS ARE TO BE INSTALLED TO THE SATISFACTION OF THE ENGINEER AND THE CITY OF OTTAWA. THEY ARE TO BE APPROPRIATE TO THE SITE CONDITIONS. PRIOR TO UNDERTAKING ANY SITE ALTERATIONS (FILLING, GRADING, REMOVAL OF VEGETATION, ETC.) AND DURING ALL PHASES OF SITE PREPARATION AND CONSTRUCTION. THESE PRACTICES ARE TO BE IMPLEMENTED IN ACCORDANCE WITH THE CURRENT BEST MANAGEMENT PRACTICES FOR EROSION AND SEDIMENT CONTROL AND SHOULD INCLUDE AS A MINIMUM THOSE MEASURES INDICATED ON THE PLAN.
3. TO PREVENT SURFACE EROSION FROM ENTERING ANY DITCH OR STORM SEWER SYSTEM DURING CONSTRUCTION, FILTER BAGS WILL BE PLACED UNDER GRATES OF CATCHBASINS AND STRUCTURES. A LIGHT DUTY SILT FENCE BARRIER WILL ALSO BE INSTALLED AROUND THE CONSTRUCTION AREA. THESE CONTROL MEASURES ARE TO REMAIN IN PLACE UNTIL VEGETATION HAS BEEN ESTABLISHED AND CONSTRUCTION IS COMPLETE.
4. THE SEDIMENT CONTROL MEASURES SHALL ONLY BE REMOVED WHEN, IN THE OPINION OF THE ENGINEER, THE MEASURES ARE NO LONGER REQUIRED. NO CONTROL MEASURES MAY BE PERMANENTLY REMOVED WITHOUT PRIOR AUTHORIZATION FROM THE ENGINEER.
5. THE CONTRACTOR SHALL IMMEDIATELY REPORT TO THE ENGINEER ANY ACCIDENTAL DISCHARGES OF SEDIMENT MATERIAL INTO ANY DITCH OR STORM SEWER SYSTEM. APPROPRIATE RESPONSE MEASURES, INCLUDING ANY REPAIRS TO EXISTING CONTROL MEASURES OR THE IMPLEMENTATION OF ADDITIONAL CONTROL MEASURES, SHALL BE CARRIED OUT BY THE CONTRACTOR WITHOUT DELAY.
6. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.
7. ROADWAYS ARE TO BE SWEPT AS REQUIRED OR AS DIRECTED BY THE ENGINEER AND/OR MUNICIPALITY.
8. THE CONTRACTOR SHALL ENSURE PROPER DUST CONTROL IS PROVIDED WITH THE APPLICATION OF WATER (AND IF REQUIRED, CALCIUM CHLORIDE) DURING DRY PERIODS.
9. THE PROPOSED PERIMETER SWALE IS TO BE TREATED WITH TOPSOIL, HYDROSEED AND MULCH AS SOON AS IS PRACTICAL AFTER CONSTRUCTION OF THE SWALE.
10. THE EROSION SEDIMENT CONTROL PLAN IS TO BE CONSIDERED A "LIVING DOCUMENT" WHICH MAY BE MODIFIED IN THE EVENT THAT THE CONTROL MEASURES ARE INSUFFICIENT.
11. PROVIDE REGULAR MAINTENANCE TO THE EROSION AND SEDIMENT CONTROL MEASURES DURING CONSTRUCTION. CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING THAT THE EROSION AND SEDIMENT CONTROL MEASURES ARE MAINTAINED AND WILL MONITOR THE WATER CLARITY DOWNSTREAM OF THE WORK SITE THROUGHOUT THE DAY AND DURING RAIN EVENTS. WATER QUALITY IS TO MEET THE CANADIAN WATER QUALITY GUIDELINES FOR THE PROTECTION OF AQUATIC LIFE. MONITORING FOR VISIBLE PLUMES OUTSIDE OF THE WORK AREA IS TO BE UNDERTAKEN.
12. SUSPEND ACTIVITIES THAT CAUSE MUDDY ENVIRONMENTS DURING PERIODS OF HEAVY RAINS.
13. ANY STOCKPILES OF SOIL OR FILL MATERIAL WILL BE STORED AS FAR AS POSSIBLE FROM THE FISH HABITAT OR CHANNELS LEADING TO FISH HABITAT (MINIMUM 30 M).
14. THE EROSION CONTROL MEASURES WILL NOT BE REMOVED UNTIL THE BANKS ARE STABILIZED (I.E., <20% EXPOSED SOIL).
15. WHERE BANKS/RIPARIAN AREA (AREA WITHIN 30 M OF CHANNEL) HAVE BEEN STABILIZED BY SEEDING AND/OR PLANTING, MONITOR THE REVEGETATION TO ENSURE THAT THE VEGETATION BECOMES FULLY ESTABLISHED (AT LEAST 80% COVER REQUIRED).
16. WHERE POSSIBLE, LIMIT CLEARING OF VEGETATION TO TRIMMING AND LEAVE THE STUMP AND LOWER 60 CM OF THE TREE TRUNK IN PLACE (FOR SHORELINE STABILIZATION).
17. ONCE WORK IS COMPLETED, STABILIZE USING NATIVE VEGETATION. WHERE POSSIBLE, THIS SHOULD INCLUDE NATIVE TREES AND SHRUBS AS PER THE LANDSCAPING PLAN (TO BE DEVELOPED AT DETAILED DESIGN).

PAVEMENT STRUCTURES:

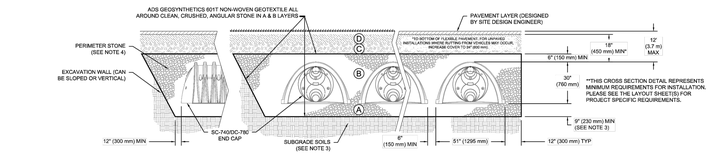
LIGHT DUTY (CAR PARKING AREAS ONLY)
50mm HL3 OR SUPERPAVE 12.5
150mm GRAN "A"
300mm GRAN "B" TYPE II
SUBGRADE - Either fill, in situ soil, or OPSS Granular B Type I or II material placed over in situ soil or fill

HEAVY DUTY (ACCESS LANES AND HEAVY TRUCK PARKING)
40mm HL3 OR SUPERPAVE 12.5
50mm HL8 OR SUPERPAVE 19.0
150mm GRAN "A"
450mm GRAN "B" TYPE II
SUBGRADE - Either fill, in situ soil, or OPSS Granular B Type I or II material placed over in situ soil or fill

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, PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION 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 (SF 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[3]	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[3]	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. THE USE OF RECYCLED CONCRETE AGGREGATES 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 ENGINEERING GUIDANCE.
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".



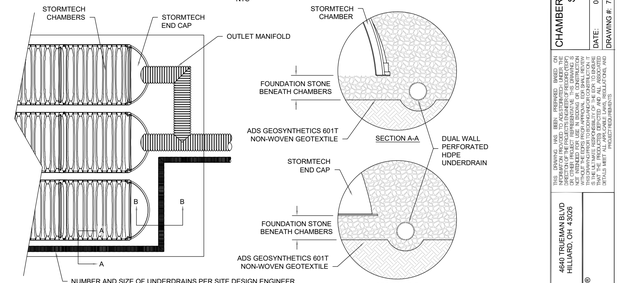
NOTES:
1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. DC-780 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER 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.

THE INFORMATION CONTAINED ON THIS DRAWING IS THE SOLE PROPERTY OF STORMTECH LLC AND CANNOT BE REPRODUCED, DISTRIBUTED, OR USED IN ANY MANNER WITHOUT THE EXPRESS WRITTEN CONSENT OF STORMTECH LLC. ANY USE OF THIS DRAWING WITHOUT SUCH CONSENT IS STRICTLY PROHIBITED AND MAY RESULT IN LEGAL ACTION. THE RECIPIENT AGREES TO INDEMNIFY AND HOLD HARMLESS STORMTECH LLC FOR ANY DAMAGES RESULTING FROM THE RECIPIENT'S USE OF THIS DRAWING. THE RECIPIENT ALSO AGREES TO DESTROY ALL COPIES OF THIS DRAWING UPON THE COMPLETION OF THE PROJECT FOR WHICH IT WAS INTENDED.

5510 BOUNDARY ROAD - OTTAWA, ON, CANADA
DATE: 10/07/2025
DRAWN: PK
CHECKED: JLS
STORMTECH CHAMBER SYSTEM
SHEET 3 OF 6

UNDERDRAIN DETAIL

NTS



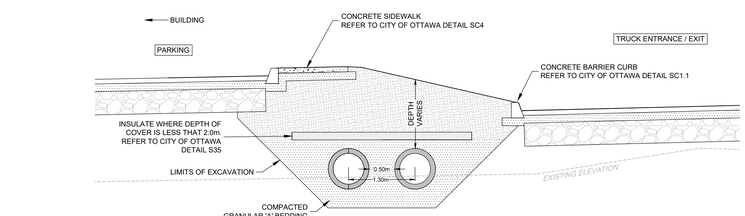
NUMBER AND SIZE OF UNDERDRAINS PER SITE DESIGN ENGINEER
4" (100 mm) TYP FOR SC-310 & SC-160LP SYSTEMS
6" (150 mm) TYP FOR SC-800, DC-780, MC-3500, MC-4500 & MC-7200 SYSTEMS

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

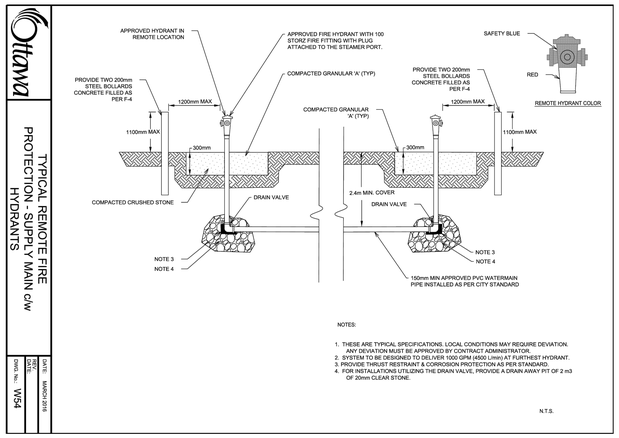
CHAMBER SYSTEM UNDERDRAIN
STORMTECH
DATE: 08/04/25
DRAWN: SMV
DRAWING #: 730-010
CHECKED: JLM

THIS DRAWING AND SPECIFICATION, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF SERVICE, IS AND SHALL REMAIN THE PROPERTY OF ADVANCED DRAINAGE SYSTEMS, INC. UNAUTHORIZED USE OF THESE PLANS AND DESIGNS IS PROHIBITED AND SUBJECT TO CORRECTIVE ACTION UNDER APPLICABLE LAW. ADS RETAINS ALL COMMON LAW, STATUTORY AND OTHER RIGHTS, INCLUDING COPYRIGHT, IN THE DESIGNS, INFORMATION AND DATA CONTAINED IN THIS DRAWING, AND THE RIGHTS OF PATENTABLE SUBJECT MATTER. NO PART OF THIS DRAWING MAY BE REPRODUCED, DISTRIBUTED, OR USED IN ANY MANNER WITHOUT THE PRIOR WRITTEN CONSENT OF ADS. BY USING THIS DRAWING, THE RECIPIENT AGREES TO INDEMNIFY AND HOLD HARMLESS ADS FOR ANY DAMAGES RESULTING FROM THE RECIPIENT'S USE OF THIS DRAWING. THE RECIPIENT ALSO AGREES TO DESTROY ALL COPIES OF THIS DRAWING UPON THE COMPLETION OF THE PROJECT FOR WHICH IT WAS INTENDED.

1



TYPICAL TWIN 600mm STORM SEWER TRENCH CROSS SECTION DETAIL
SCALE: 1:50



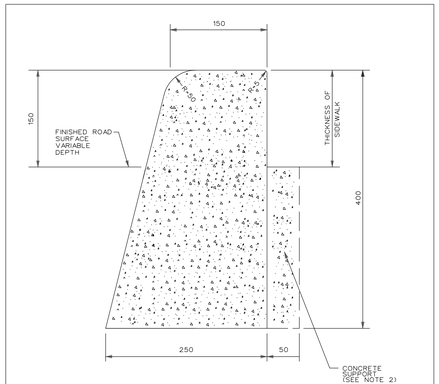
Ottawa

TYPICAL REMOTE FIRE PROTECTION - SUPPLY MAIN c/w HYDRANTS

No.	Date	By
V5d	2026-03-04	MJH

NOTES:
1. THESE ARE TYPICAL SPECIFICATIONS. LOCAL CONDITIONS MAY REQUIRE DEVIATION. ANY DEVIATION MUST BE APPROVED BY CONTRACT ADMINISTRATOR.
2. SYSTEM TO BE DESIGNED TO DELIVER 1000 GPM (4500 L/min) AT FURTHEST HYDRANT.
3. PROVIDE THRUST RESTRAINT & CORROSION PROTECTION AS PER STANDARD.
4. FOR INSTALLATIONS UTILIZING THE DRAIN VALVE, PROVIDE A DRAIN AWAY PIT OF 2 m3 OF 20mm CLEAR STONE.

N.T.S.

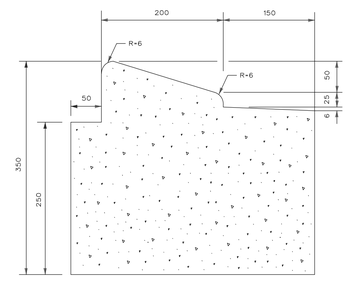


CONCRETE BARRIER CURB

NOTES:
1. THE FULL CURB DEPTH SHALL BE CARRIED THROUGH THE DEPRESSED ACCESS CROSSING.
2. A CONCRETE SUPPORT IS REQUIRED WHEN BUILT ADJACENT TO THE SIDEWALK
3. IF AN EXTRUSION CURBING MACHINE IS USED, THE EXPANSION BITUMINOUS MATERIAL AND THE ⌀15 DOWELS ARE TO BE PLACED AT THE END OF THE EXTRUSION
4. EXPANSION AND CONTRACTION JOINTS AS PER SC5
5. DEPRESSED CURB HEIGHT - FOR PEDESTRIAN CURB RAMPS 0 TO 6 mm AND FOR PRIVATE ENTRANCES 0 TO 13mm

(DIMENSIONS mm)
NTS

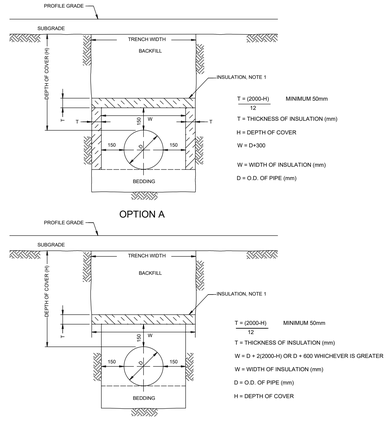
Ottawa | CONCRETE BARRIER CURB FOR GRANULAR BASE PAVEMENT (MODIFIED OPSD 600.110)
DATE: JAN 2003 | REV. DATE: JANUARY 2026 | DWG. No.: SC1.1



NOTES:
1. IF AN EXTRUSION CURBING MACHINE IS USED, THE EXPANSION BITUMINOUS MATERIAL AND THE ⌀15 DOWELS ARE TO BE PLACED AT THE END OF THE EXTRUSION.
2. JOINT CONSTRUCTION AS PER SC5 DETAIL

(DIMENSIONS mm)
NTS

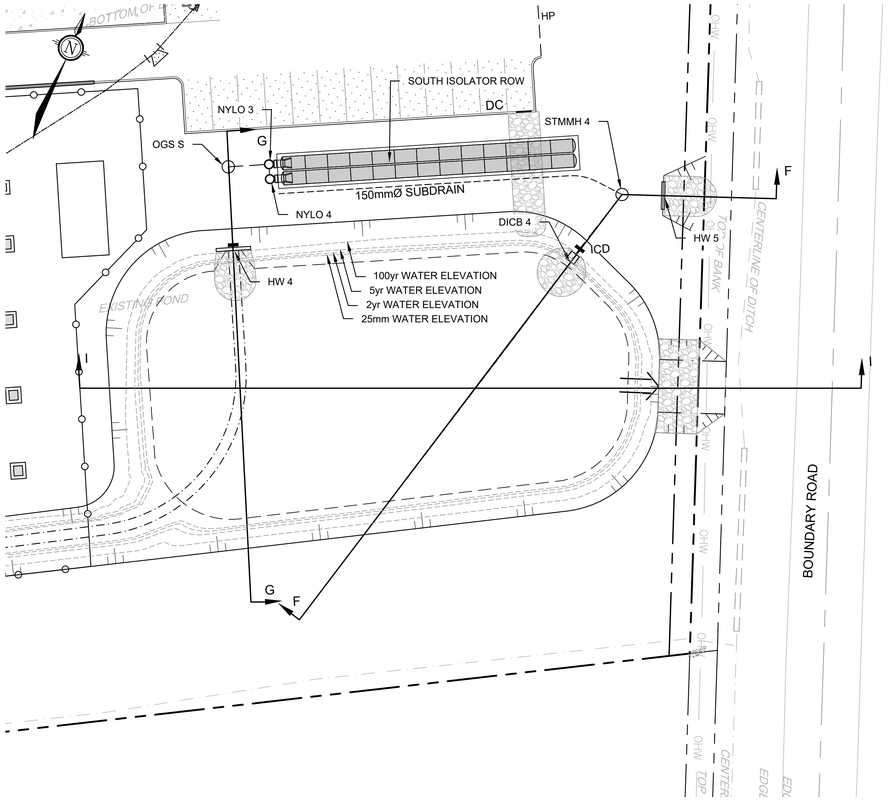
Ottawa | CONCRETE MOUNTABLE CURB FOR ROUNDABOUT TRUCK APRON
DATE: JAN 2003 | REV. DATE: JAN 2026 | DWG. No.: SC1.5



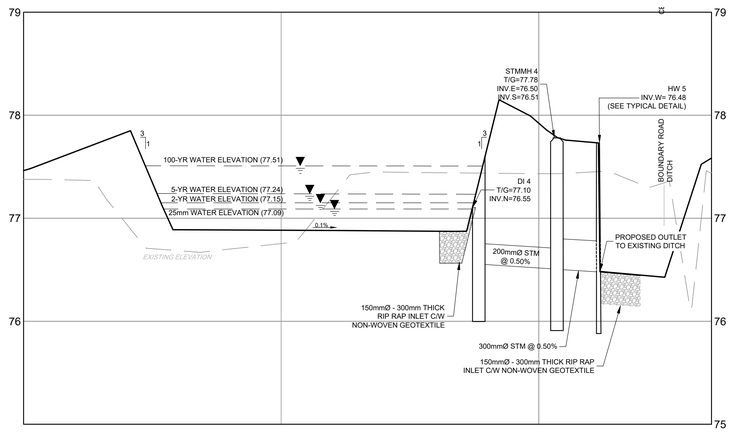
TYPICAL PIPE INSULATION DETAIL

NOTES:
1. THE INSULATION MATERIAL SHALL BE EXTRUDED POLYSTYRENE ACCORDING TO MW-19.15 WITH A MINIMUM COMPRESSIVE STRENGTH OF 275 kPa
2. MINIMUM INSULATION THICKNESS SHALL BE 50mm
3. JOINTS SHALL BE STAGGERED FOR MULTIPLE INSULATION SHEETS
4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED

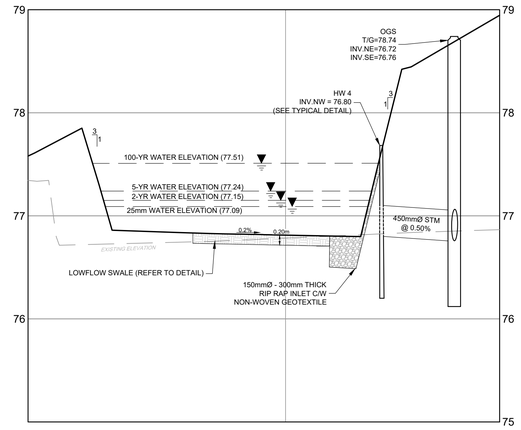
Ottawa | TITLE: INSULATION FOR SHALLOW SEWERS
DATE: MAY 2001 | REV: JULY 2024 |



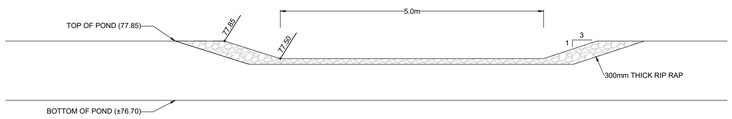
SOUTH POND PLAN VIEW
1:250



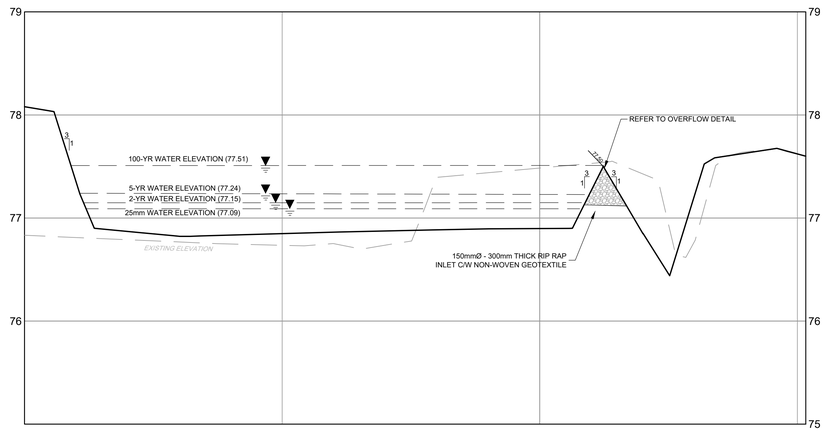
POND CROSS SECTION DETAIL F-F
SCALE: 1:250 HORIZONTAL
1:25 VERTICAL



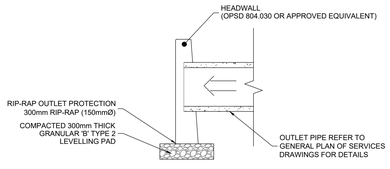
POND CROSS SECTION DETAIL G-G
SCALE: 1:250 HORIZONTAL
1:25 VERTICAL



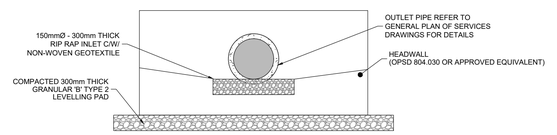
TYPICAL POND EMERGENCY OVERFLOW WIER
SCALE: N.T.S.



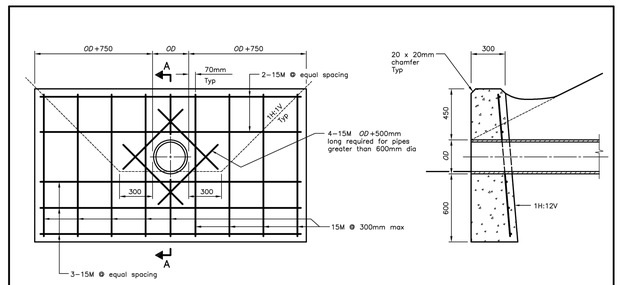
POND CROSS SECTION DETAIL I-I
SCALE: 1:250 HORIZONTAL
1:25 VERTICAL



TYPICAL POND OUTLET HEADWALL DETAIL - PROFILE
SCALE: N.T.S.



TYPICAL POND OUTLET HEADWALL DETAIL - ELEVATION
SCALE: N.T.S.



LEGEND:
OD – Outside diameter of pipe

NOTES:
A This OPSD to be read in conjunction with OPSD 3940.150.
B If a steel grate is required, refer to OPSD 804.05.
C Class of concrete: 30MPa.
D Cover to reinforcing bars 70mm ± 20mm.
E All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2017	Rev	2
CONCRETE HEADWALL FOR PIPE LESS THAN 900mm DIAMETER			
	OPSD 804.030		

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.

No.	REVISION	DATE	BY
4.	REVISED PER SNCA COMMENTS	MAY 28/2026	MJH
3.	REVISED PER SNCA COMMENTS	APR 24/2026	MJH
2.	REVISED PER CITY COMMENTS	FEB 20/2026	MJH
1.	REVISED PER CITY AND SNCA COMMENTS	NOV 14/2025	MJH

SCALE: AS SHOWN

DESIGN MJH
CHECKED JLS
DRAWN MJH
CHECKED JLS
APPROVED MJH

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER
M. J. HREHORIAK
100211256
MAY 28/ 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
5510 BOUNDARY ROAD

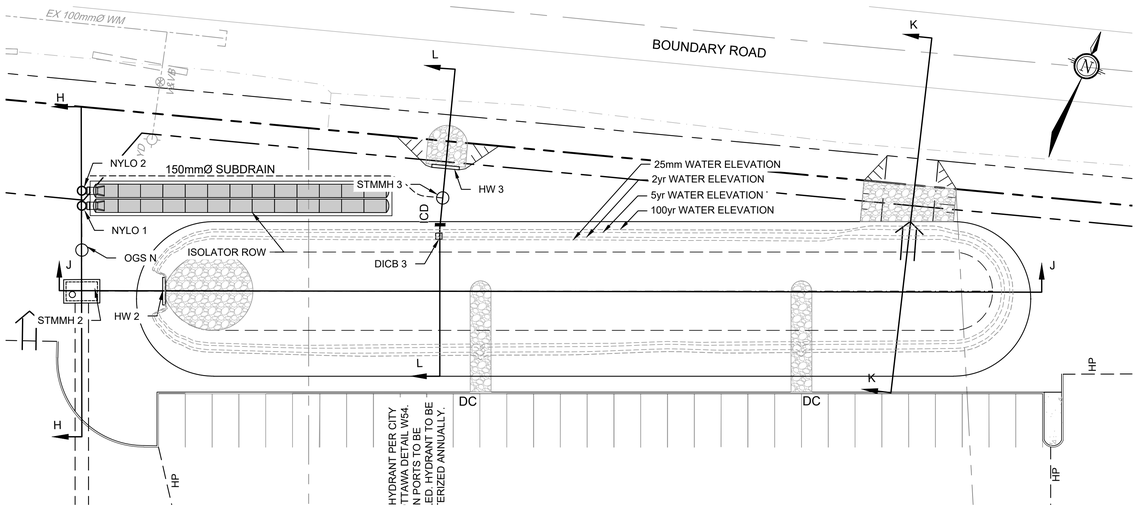
DRAWING NAME
NOTES AND DETAILS

PROJECT No. 118168
REV REV # 4
DRAWING No. 118168-PND1

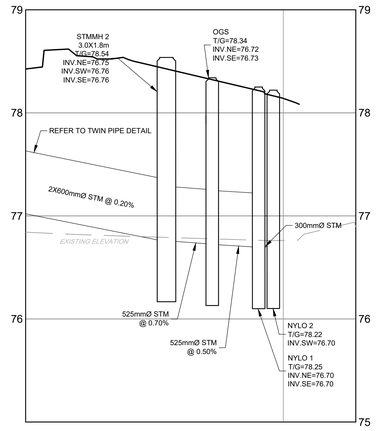
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PLAN # 19296

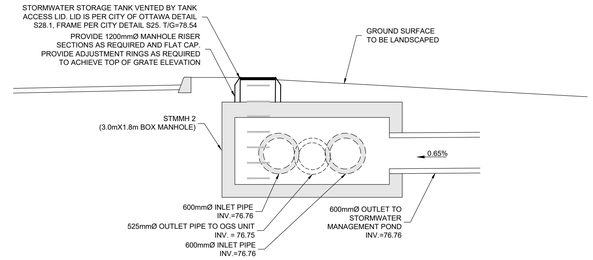
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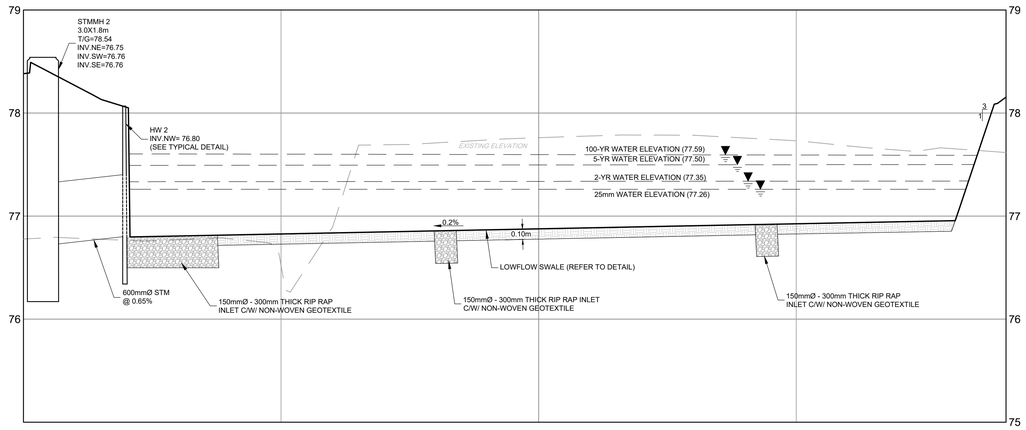
NORTH POND PLAN VIEW
1:250



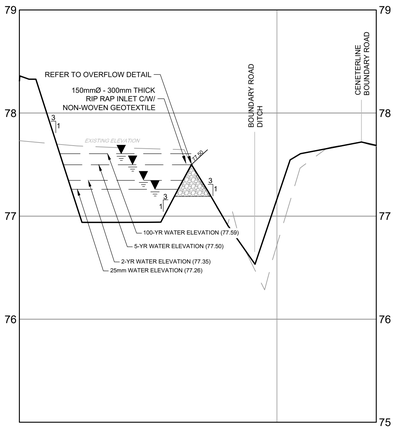
POND CROSS SECTION DETAIL H-H
SCALE: 1:250 HORIZONTAL
1:25 VERTICAL



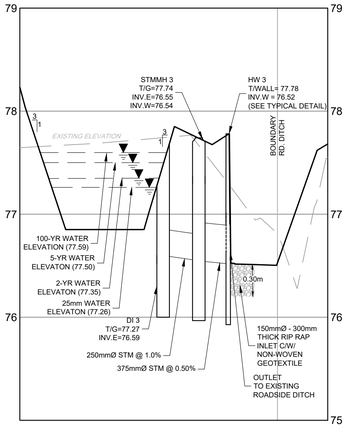
STORM MANHOLE 2 DETAIL
N.T.S



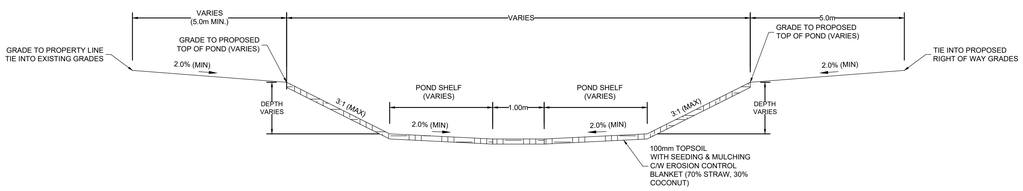
POND CROSS SECTION DETAIL J-J
SCALE: 1:250 HORIZONTAL
1:25 VERTICAL



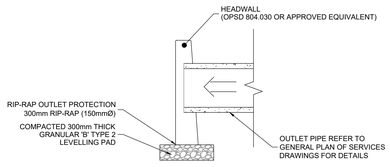
POND CROSS SECTION DETAIL K-K
SCALE: 1:250 HORIZONTAL
1:25 VERTICAL



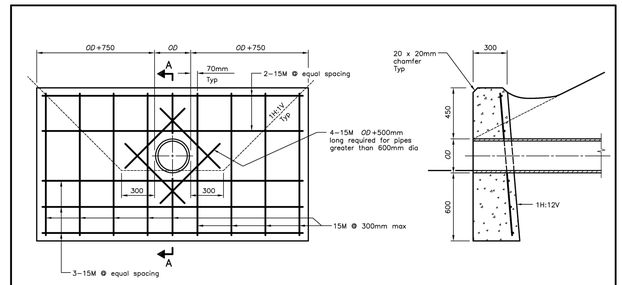
POND CROSS SECTION DETAIL L-L
SCALE: 1:250 HORIZONTAL
1:25 VERTICAL



DRY POND LOW FLOW SWALE
SCALE: N.T.S.



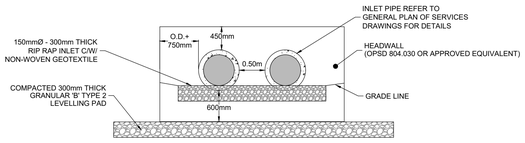
TYPICAL POND OUTLET HEADWALL DETAIL - PROFILE
SCALE: N.T.S.



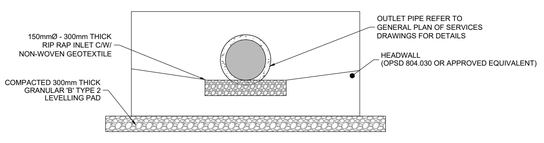
LEGEND:
OD – Outside diameter of pipe

NOTES:
A This OPSD to be read in conjunction with OPSD 3940.150.
B If a steel grate is required, refer to OPSD 804.05.
C Class of concrete: 30MPa.
D Cover to reinforcing bars 70mm ± 20mm.
E All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2017	Rev 2
CONCRETE HEADWALL FOR PIPE LESS THAN 900mm DIAMETER		
	OPSD 804.030	



TWIN 600mmØ PIPE HEADWALL INLET DETAIL
SCALE: N.T.S.



TYPICAL POND OUTLET HEADWALL DETAIL - ELEVATION
SCALE: N.T.S.

NOTE:
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3.	REVISED PER SNCA COMMENTS	APR 24/2026	MJH
2.	REVISED PER CITY COMMENTS	FEB 20/2026	MJH
1.	REVISED PER CITY AND SNCA COMMENTS	NOV 14/2025	MJH

SCALE: AS SHOWN

DESIGN MJH
CHECKED JLS
DRAWN MJH
CHECKED JLS
APPROVED MJH

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER
M. J. HREHORIAK
100211256
MAY 28/2026
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
5510 BOUNDARY ROAD

DRAWING NAME
NOTES AND DETAILS

PROJECT No. 118168
REV REV # 4
DRAWING No. 118168-PND2

PLAN # 19296

M:\2019\118168\CAD\ESIGN\118168-PND.DWG 5/28/2026 3:57 PM HKARGUS

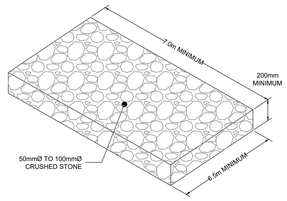
D07-12-24-0117

EROSION AND SEDIMENT CONTROL NOTES :

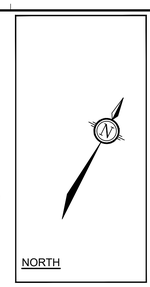
1. THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES DURING CONSTRUCTION ACTIVITIES TO PROTECT THE STORM DRAINAGE SYSTEM AND THE DOWNSTREAM RECEIVING WATERCOURSE(S). THIS INCLUDES LIMITING THE AMOUNT OF EXPOSED SOIL, USING FILTER BAGS UNDER THE GRATES OF CATCHBASINS AND MANHOLES AND INSTALLING SILT FENCES AND OTHER EFFECTIVE SEDIMENT TRAPS.
2. ALL EROSION AND SEDIMENT CONTROLS ARE TO BE INSTALLED TO THE SATISFACTION OF THE ENGINEER AND THE CITY OF OTTAWA. THEY ARE TO BE APPROPRIATE TO THE SITE CONDITIONS, PRIOR TO UNDERTAKING ANY SITE ALTERATIONS (FILLING, GRADING, REMOVAL OF VEGETATION, ETC.) AND DURING ALL PHASES OF SITE PREPARATION AND CONSTRUCTION. THESE PRACTICES ARE TO BE IMPLEMENTED IN ACCORDANCE WITH THE CURRENT BEST MANAGEMENT PRACTICES FOR EROSION AND SEDIMENT CONTROL AND SHOULD INCLUDE AS A MINIMUM THOSE MEASURES INDICATED ON THE PLAN.
3. TO PREVENT SURFACE EROSION FROM ENTERING ANY DITCH OR STORM SEWER SYSTEM DURING CONSTRUCTION, FILTER BAGS WILL BE PLACED UNDER GRATES OF CATCHBASINS AND STRUCTURES. A LIGHT DUTY SILT FENCE BARRIER WILL ALSO BE INSTALLED AROUND THE CONSTRUCTION AREA. THESE CONTROL MEASURES ARE TO REMAIN IN PLACE UNTIL VEGETATION HAS BEEN ESTABLISHED AND CONSTRUCTION IS COMPLETE.
4. THE SEDIMENT CONTROL MEASURES SHALL ONLY BE REMOVED WHEN, IN THE OPINION OF THE ENGINEER, THE MEASURES ARE NO LONGER REQUIRED. NO CONTROL MEASURES MAY BE PERMANENTLY REMOVED WITHOUT PRIOR AUTHORIZATION FROM THE ENGINEER.
5. THE CONTRACTOR SHALL IMMEDIATELY REPORT TO THE ENGINEER ANY ACCIDENTAL DISCHARGES OF SEDIMENT MATERIAL INTO ANY DITCH OR STORM SEWER SYSTEM. APPROPRIATE RESPONSE MEASURES, INCLUDING ANY REPAIRS TO EXISTING CONTROL MEASURES OR THE IMPLEMENTATION OF ADDITIONAL CONTROL MEASURES, SHALL BE CARRIED OUT BY THE CONTRACTOR WITHOUT DELAY.
6. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.
7. ROADWAYS ARE TO BE SWEPT AS REQUIRED OR AS DIRECTED BY THE ENGINEER AND/OR MUNICIPALITY.
8. THE CONTRACTOR SHALL ENSURE PROPER DUST CONTROL IS PROVIDED WITH THE APPLICATION OF WATER (AND IF REQUIRED, CALCIUM CHLORIDE) DURING DRY PERIODS.
9. THE PROPOSED PERIMETER SWALE IS TO BE TREATED WITH TOPSOIL, HYDROSEED AND MULCH AS SOON AS IS PRACTICAL AFTER CONSTRUCTION OF THE SWALE.
10. THE EROSION SEDIMENT CONTROL PLAN IS TO BE CONSIDERED A "LIVING DOCUMENT" WHICH MAY BE MODIFIED IN THE EVENT THAT THE CONTROL MEASURES ARE INSUFFICIENT.
11. PROVIDE REGULAR MAINTENANCE TO THE EROSION AND SEDIMENT CONTROL MEASURES DURING CONSTRUCTION. CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING THAT THE EROSION AND SEDIMENT CONTROL MEASURES ARE MAINTAINED AND WILL MONITOR THE WATER CLARITY DOWNSTREAM OF THE WORK SITE THROUGHOUT THE DAY AND DURING RAIN EVENTS. WATER QUALITY IS TO MEET THE CANADIAN WATER QUALITY GUIDELINES FOR THE PROTECTION OF AQUATIC LIFE. MONITORING FOR VISIBLE PLUMES OUTSIDE OF THE WORK AREA IS TO BE UNDERTAKEN.
12. SUSPEND ACTIVITIES THAT CAUSE MUDDY ENVIRONMENTS DURING PERIODS OF HEAVY RAINS.
13. ANY STOCKPILES OF SOIL OR FILL MATERIAL WILL BE STORED AS FAR AS POSSIBLE FROM THE FISH HABITAT OR CHANNELS LEADING TO FISH HABITAT (MINIMUM 30 M).
14. THE EROSION CONTROL MEASURES WILL NOT BE REMOVED UNTIL THE BANKS ARE STABILIZED (I.E., <20% EXPOSED SOIL).
15. WHERE BANKS/RIPARIAN AREA (AREA WITHIN 30 M OF CHANNEL) HAVE BEEN STABILIZED BY SEEDING AND/OR PLANTING, MONITOR THE REVEGETATION TO ENSURE THAT THE VEGETATION BECOMES FULLY ESTABLISHED (AT LEAST 80% COVER REQUIRED).
16. WHERE POSSIBLE, LIMIT CLEARING OF VEGETATION TO TRIMMING AND LEAVE THE STUMP AND LOWER 60 CM OF THE TREE TRUNK IN PLACE (FOR SHORELINE STABILIZATION).
17. ONCE WORK IS COMPLETED, STABILIZE USING NATIVE VEGETATION. WHERE POSSIBLE, THIS SHOULD INCLUDE NATIVE TREES AND SHRUBS AS PER THE LANDSCAPING PLAN (TO BE DEVELOPED AT DETAILED DESIGN).

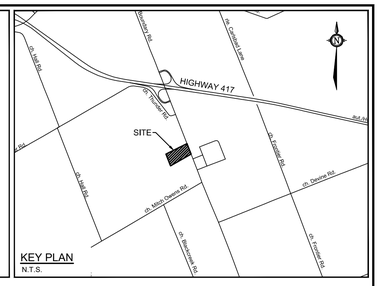
ESC CONTROL MEASURES

				During Construction			After Construction	
	ESC Measure	Symbol	OPSD No.	Installation Responsibility	Inspection Responsibility	Inspection Frequency	Inspection/Maintenance Responsibility	Removal Responsibility
Temporary Measures	Silt Fence		219.110	Developer's Contractor	Developer's Contractor	Weekly (as a minimum)	Developer	Developer's Contractor
	Mud Mat	M M	See Detail	Developer's Contractor	Developer's Contractor	Weekly (as a minimum)	N/A	Developer's Contractor
	Straw Bale Check Dam		219.180	Developer's Contractor	Developer's Contractor	Weekly (as a minimum)	N/A	N/A
	Sediment Basin (for flows being pumped out of excavations)	Location as Required by Contractor	- - -	Developer's Contractor	Developer's Contractor	After Every Rainstorm	N/A	Developer's Contractor
Permanent Measures	Vegetated Swales	N/A	N/A	Developer's Contractor	Developer's Contractor	Weekly (as a minimum)	Developer	N/A



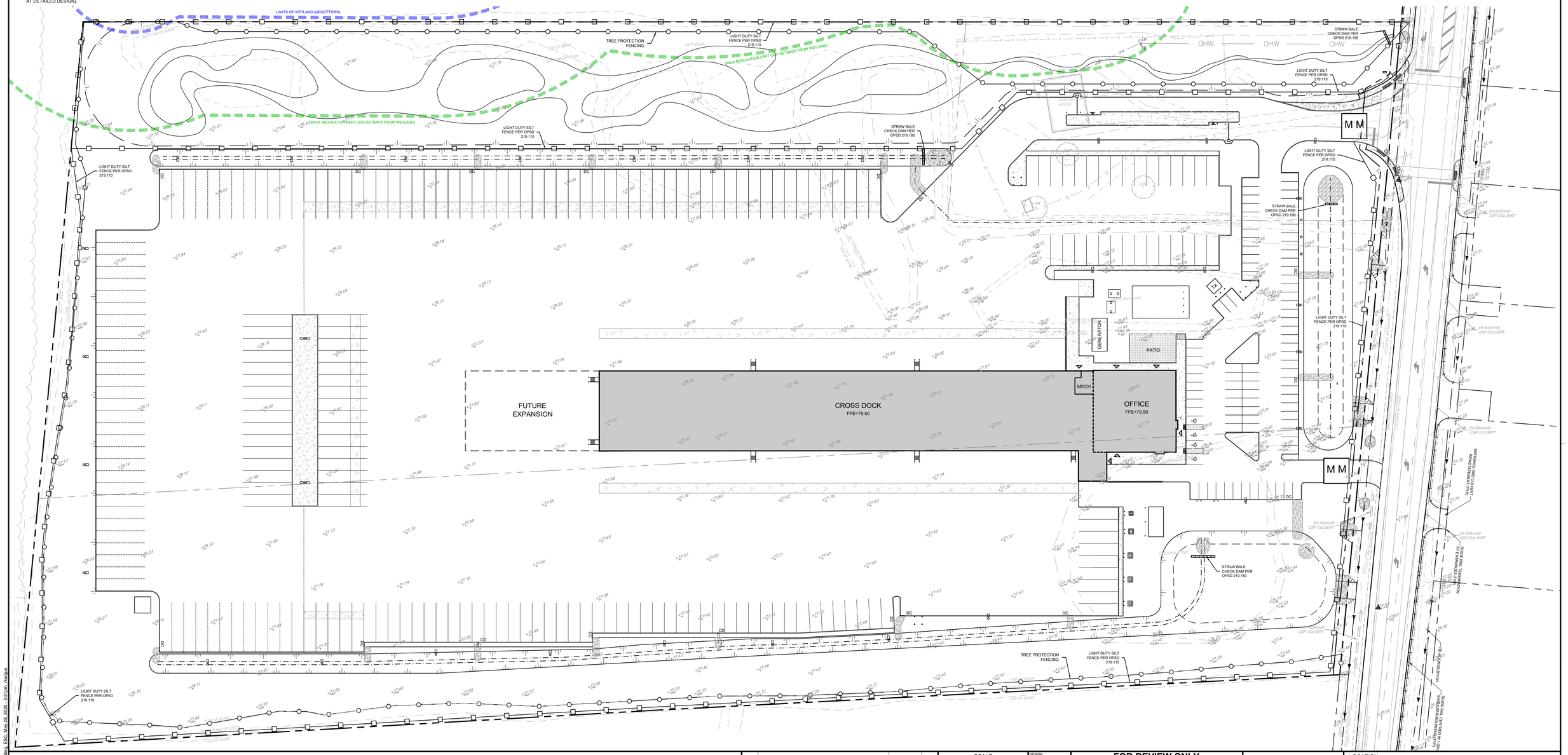
MUD MAT DETAIL
NOT TO SCALE





LEGEND

- PROPERTY LINE
- PROPOSED SWALE
- TERRACING 3:1 SLOPE MAX (UNLESS OTHERWISE INDICATED)
- PROPOSED MUD MAT
- LIGHT DUTY SILT FENCE (OPSD 219.110)
- PROPOSED STORM MANHOLE
- PROPOSED BUILDING ENTRANCE
- STRAWBALE CHECK DAM (OPSD 219.180)
- RIP-RAP



NOTE:
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3.	REVISED PER BUILDING PERMIT COMMENTS	APR 22/2025	MJH
2.	ISSUED FOR BUILDING PERMIT	OCT 24/2024	MJH
1.	ISSUED FOR SPA	OCT 3/2024	MJH

SCALE
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1:500
0 5 10 15 20

DESIGN MJH
CHECKED JLS
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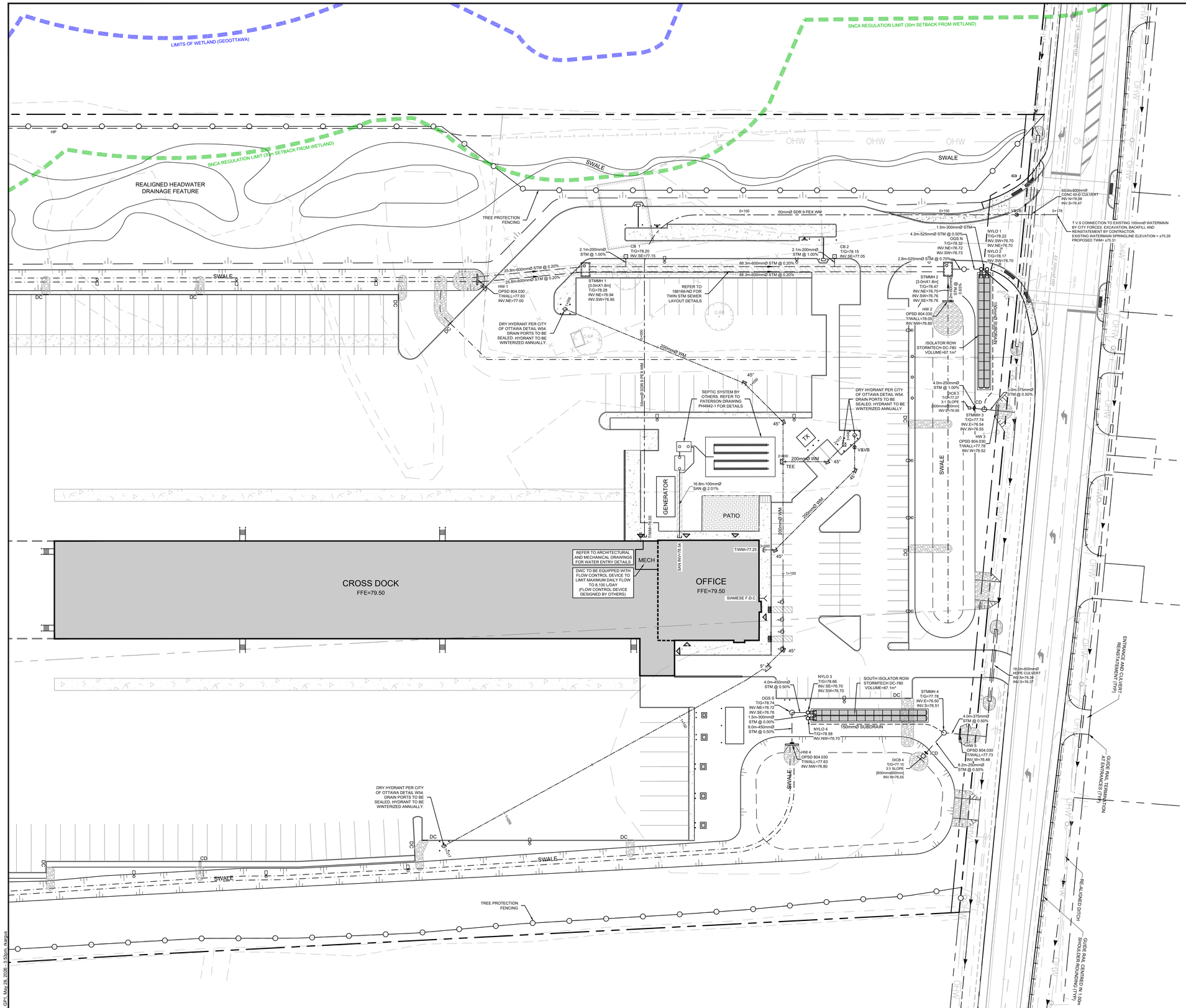
LOCATION
CITY OF OTTAWA
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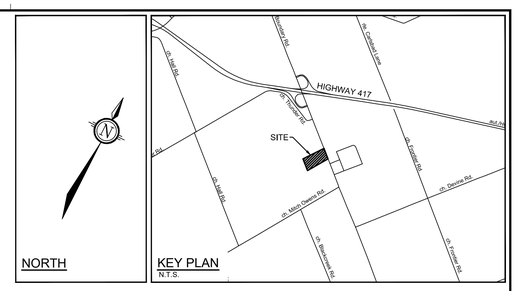
DRAWING NAME
EROSION AND SEDIMENT CONTROL PLAN

PROJECT No. 118168
REV REV # 7
DRAWING No. 118168-ESC
PLAN # 19296

D07-12-24-0117

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LEGEND

- BOREHOLE
- TEST PIT
- PROPERTY LINE
- PROPOSED SECURITY FENCE (REFER TO LANDSCAPE)
- PROPOSED CURB
- DC — PROPOSED DEPRESSED CURB
- CD — PROPOSED CURB DRAIN (REFER TO DETAIL ON GRADING PLANS 118168-GR1&2)
- TACTILE WALKING SURFACE INDICATOR (TWSI) PER CITY DETAIL SC7.3
- SWALE AND DIRECTION OF FLOW
- PROPOSED PIPE INSULATION (REFER TO CITY OF OTTAWA DETAIL S35 ON 118168-ND)
- PROPOSED BUILDING ENTRANCE
- DIRECTION OF MAJOR OVERLAND FLOW
- PROPOSED RIP RAP c/w NON WOVEN GEOTEXTILE
- PROPOSED WATERMAIN
- PROPOSED STORM SEWER AND MANHOLE
- PROPOSED CATCHBASIN MANHOLE
- ICD — PROPOSED INLET CONTROL DEVICE
- TERRACING 2.5:1 SLOPE MAX (UNLESS OTHERWISE INDICATED)
- BOTTOM OF SLOPE
- PROPOSED SITE LIGHTING (REFER TO ARCHITECTURAL DRAWINGS)
- PROPOSED DRY HYDRANT PER CITY OF OTTAWA DETAIL W54

R-1 to R-13 ROOF DRAIN TABLE - PROPOSED BUILDING ROOF

ROOF DRAIN MODEL No.	ROOF DRAIN OPENING SETTING	1:5 YEAR RELEASE RATE	APPROX. 100 YR PONDING DEPTH	1:100 YEAR RELEASE RATE
RD - 100 - A - ADJ	FULLY OPEN	16.38 L/S	0.15	24.61 L/S

* REFER TO THE "SERVICING AND STORMWATER MANAGEMENT REPORT" R-2024-095 PREPARED BY NOVATECH FOR DRAINAGE AREA IDs AND SWM DETAILS.

**ALL 13 CONTROLLED FLOW ROOF DRAINS FOR THE PROPOSED BUILDING TO BE WATTS ADJUSTABLE ACCUTROL ROOF DRAINS

INLET CONTROL DEVICE @ DICB 3

DESIGN EVENT	ICD TYPE AND SIZE	DIAMETER OF OUTLET PIPE (mm)	DESIGN FLOW (L/s)	DESIGN HEAD (m)
1:5 YEAR	PLATE 152mm	250	38.0	0.91
1:100 YEAR	PLATE 152mm	250	38.0	1.00

INLET CONTROL DEVICE @ DICB 4

DESIGN EVENT	ICD TYPE AND SIZE	DIAMETER OF OUTLET PIPE (mm)	DESIGN FLOW (L/s)	DESIGN HEAD (m)
1:5 YEAR	PLATE 83mm	250	10.0	0.69
1:100 YEAR	PLATE 83mm	250	12.0	0.96

PROPOSED 50mmØ WATERMAIN TABLE

STATION	SURFACE ELEVATION	T/WM ELEVATION	COMMENTS
0+000.0	79.48	76.00	CAP 1.0m FROM BUILDING FACE
0+025.0	78.13	75.73	-
0+048.5	78.09	75.69	CROSS OVER 200mmØ WM (0.5m CLEARANCE PER W25)
0+050.0	78.09	76.69	CROSS BELOW 450mmØ STM
0+075.0	78.62	76.22	-
0+100.0	78.77	76.37	-
0+125.0	78.36	75.96	-
0+150.0	78.56	75.74	-
0+172.7	77.84	75.44	STANDPOST
0+175.0	77.78	75.38	-
0+178.0	77.80	±75.31	CONNECT TO EXISTING 100mmØ WM

PROPOSED 200mmØ REMOTE HYDRANT WATERMAIN TABLE

STATION	SURFACE ELEVATION	T/WM ELEVATION	COMMENTS
1+000.0	78.16	75.76	DRY HYDRANT
1+022.5	78.09	75.00	CROSS UNDER 50mmØ WM (0.5m CLEARANCE PER W25)
1+025.0	78.08	75.00	-
1+048.5	78.42	76.00	45° BEND
1+050.0	78.46	76.00	-
1+062.2	78.42	76.00	45° BEND
1+072.1	78.86	76.20	200mm X 200mm TEE
1+092.2	79.00	76.60	CROSS UNDER 200mmØ WM (0.45m CLEARANCE)
1+100.0	79.09	76.60	-
1+119.0	78.99	76.60	45° BEND
1+125.0	79.04	76.60	5° BEND
1+150.0	78.38	75.98	-
1+175.0	77.91	75.51	-
1+200.0	77.66	75.24	-
1+217.0	77.64	75.24	DRY HYDRANT

PROPOSED 200mmØ REMOTE HYDRANT WATERMAIN TABLE

STATION	SURFACE ELEVATION	T/WM ELEVATION	COMMENTS
2+000.0	78.86	76.21	TEE CONNECT TO 200mmØ
2+011.0	78.55	76.15	45° BEND
2+017.0	78.56	76.15	DRY HYDRANT

PROPOSED 200mmØ REMOTE HYDRANT WATERMAIN TABLE

STATION	SURFACE ELEVATION	T/WM ELEVATION	COMMENTS
3+000.0	79.32	77.25	CAP 1.0m FROM BUILDING FACE
3+003.0	79.09	77.25	45° BEND
3+005.8	79.00	77.25	CROSS OVER 200mmØ WM (0.45m CLEARANCE)
3+025.0	78.57	76.17	-
3+031.2	78.45	76.05	45° BEND
3+037.0	78.38	75.98	VALVE & VALVE BOX
3+040.0	78.50	76.10	DRY HYDRANT

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11.	REVISED PER SNCA COMMENTS	APR 24/2026	MJH
10.	REVIED PER OFS COMMENTS	APRIL 9/2026	MJH
9.	REVISED PER CITY COMMENTS	FEB 20/2026	MJH
8.	REVISED PER CITY AND SNCA COMMENTS	NOV 14/025	MJH
7.	REVISED PER BUILDING PERMIT COMMENTS	APR 22/2025	MJH
6.	ISSUED FOR BUILDING PERMIT	OCT 24/2024	MJH
5.	ISSUED FOR 90% SUBMISSION	OCT 4/2024	MJH
4.	ISSUED FOR SPA	OCT 3/2024	MJH
3.	ISSUED FOR 60% SUBMISSION	AUG 16/2024	MJH
2.	ISSUED FOR 30% SUBMISSION	JUNE 27/2024	MJH
1.	COORDINATION	MAR 7/2024	MJH

SCALE
1:400
1:400
0 4 8 12 16

DESIGN MJH
CHECKED JLS
DRAWN MJH
CHECKED JLS
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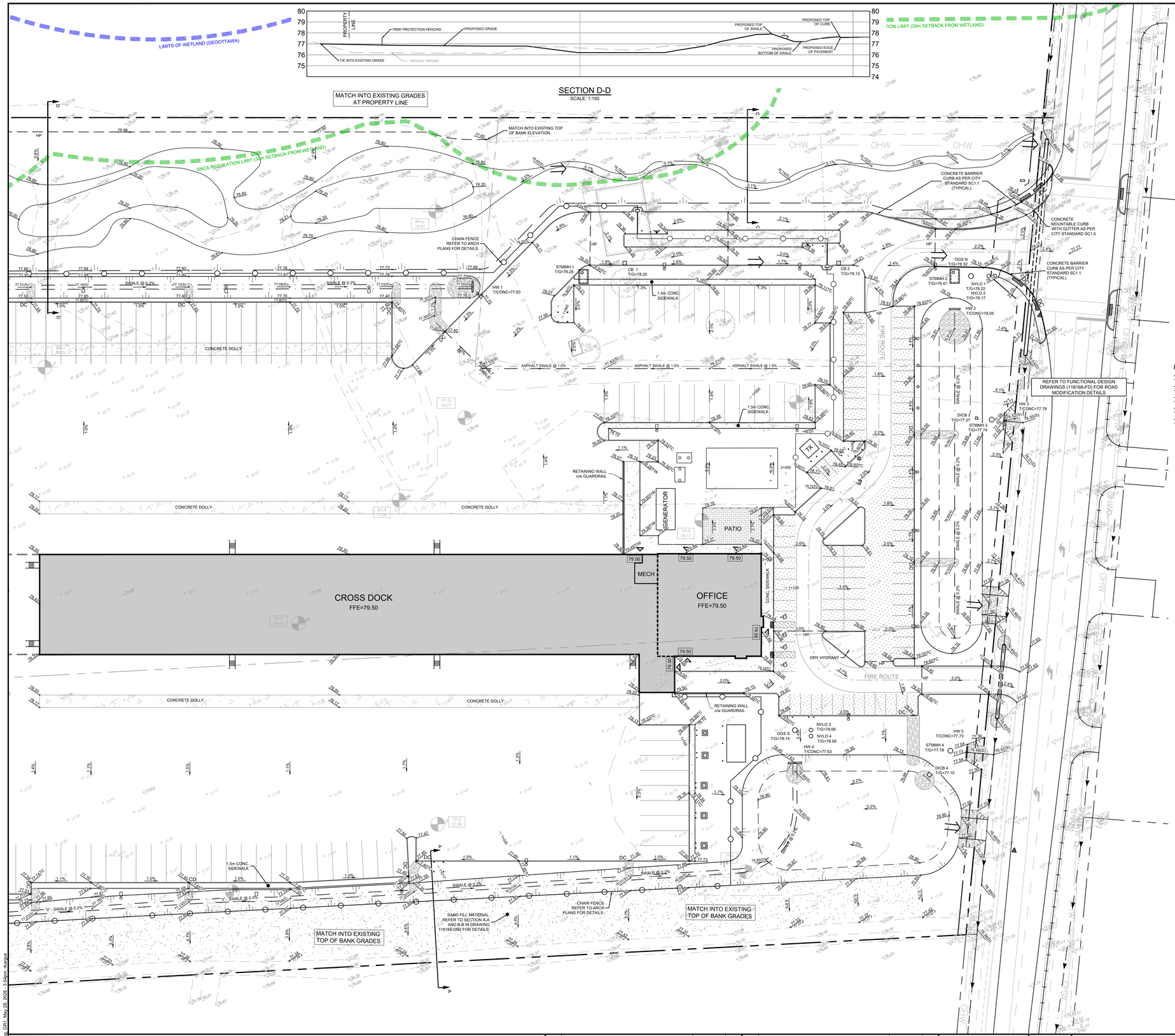
LOCATION
CITY OF OTTAWA
5110 BOUNDARY ROAD

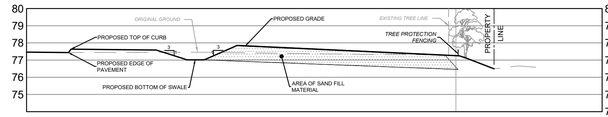
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GENERAL PLAN OF SERVICES

PROJECT No. 118168
REV # 12
DRAWING No. 118168-GP

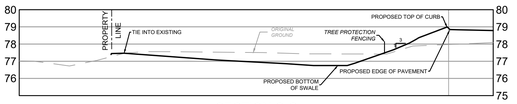
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PLAN # 19296

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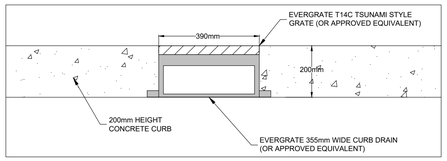




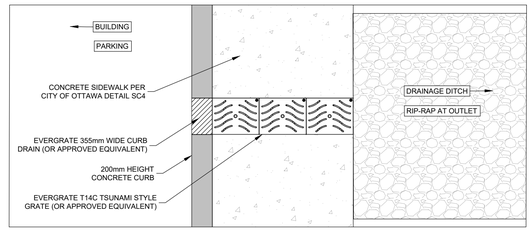
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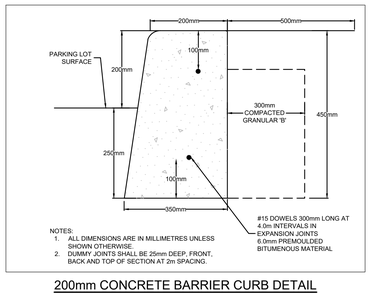
SECTION C-C
SCALE: 1:150



CURB DRAIN DETAIL - FRONT VIEW
SCALE: N.T.S.



CURB DRAIN DETAIL - TOP VIEW
SCALE: N.T.S.



200mm CONCRETE BARRIER CURB DETAIL
SCALE: N.T.S.

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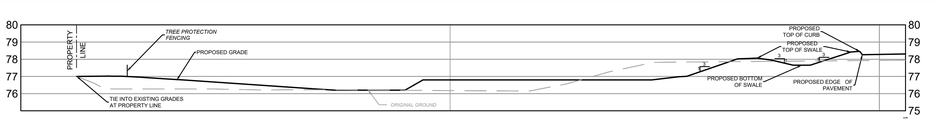
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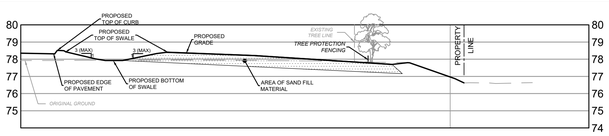
DRAWING NAME
GRADING PLAN

PROJECT No. 118168
REV # 12
DRAWING No. 118168-GR1

007-12-24-0117
PLAN # 19296

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SECTION E-E
SCALE: 1:150

SECTION B-B
SCALE: 1:50

MATCH INTO EXISTING GRADES AT PROPERTY LINE

MATCH INTO EXISTING GRADES AT PROPERTY LINE

LIMITS OF WETLAND (GEOOTTAWA)

SNCA REGULATION LIMIT (30m SETBACK FROM WETLAND)

SNCA REGULATION LIMIT (30m SETBACK FROM WETLAND)

HEADWATER DRAINAGE FEATURE

CHAIN FENCE REFER TO ARCH PLANS FOR DETAILS.

CONCRETE DOLLY

CONCRETE DOLLY

CONCRETE ISLAND

CONCRETE DOLLY

CONCRETE DOLLY

CONCRETE DOLLY

FUTURE EXPANSION

CROSS DOCK
FFE=79.50

SEE 118168-GR1

TIE INTO EXISTING GRADES ALONG EXISTING TOP OF BANK

TIE INTO EXISTING GRADES ALONG EXISTING TOP OF BANK

CHAIN FENCE REFER TO ARCH PLANS FOR DETAILS.

SAND FILL MATERIAL REFER TO SECTION A-A' AND B-B IN DRAWING 118168-GR2 FOR DETAILS.

CHAIN FENCE REFER TO ARCH PLANS FOR DETAILS.

MATCH INTO EXISTING TOP OF BANK GRADES

MATCH INTO EXISTING TOP OF BANK GRADES

1.5m CONC. SIDEWALK

1.5m CONC. SIDEWALK

SWALE @ 1.5%

SWALE @ 1.5%

SWALE @ 0.2%

SWALE @ 0.2%

'V' - SWALE @ 0.2%

'V' - SWALE @ 0.2%

'V' - SWALE @ 0.2%

'V' - SWALE @ 0.3%

BH-1 77.66

BH-2 78.67

BH-3 77.66

TP-1 78.27

TP-2 77.93

TP-3 77.91

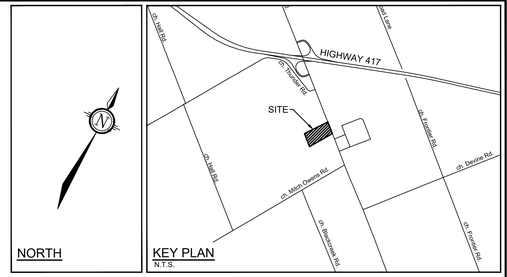
TP-4 77.66

TP-5 78.05

TP-6 78.45

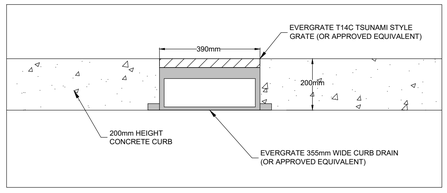
TP-7 78.00

TP-8 78.05

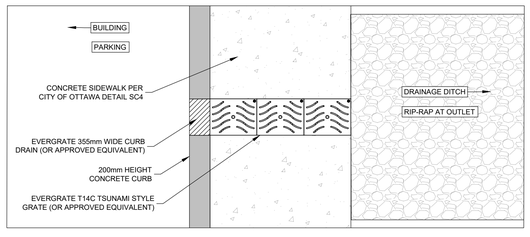


LEGEND

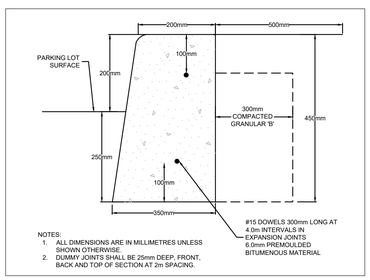
- BOREHOLE
- TEST PIT
- PROPERTY LINE
- PROPOSED SECURITY FENCE (REFER TO LANDSCAPE)
- PROPOSED CURB
- DC — PROPOSED DEPRESSED CURB
- CD — PROPOSED CURB DRAIN (REFER TO DETAIL)
- TACTILE WALKING SURFACE INDICATOR (TWSI) PER CITY DETAIL SC7.3
- SWALE AND DIRECTION OF FLOW
- TERRACING 2.5:1 SLOPE MAX (UNLESS OTHERWISE INDICATED)
- BOTOM OF SLOPE
- 2.0% — SLOPE AND DIRECTION
- PROPOSED SITE LIGHTING (REFER TO ARCHITECTURAL DRAWINGS)
- PROPOSED SAND FILL MATERIAL
- 77.50 / 76.40 — PROPOSED ELEVATION EXISTING ELEVATION
- 78.00(S) — PROPOSED SWALE ELEVATION
- 78.00(C) — PROPOSED TOP OF CURB ELEVATION
- 78.00(W) — PROPOSED TOP OF WALL ELEVATION
- 78.00(BW) — 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
- CB — PROPOSED INLET CONTROL DEVICE
- 100-YEAR PONDING LIMITS



CURB DRAIN DETAIL - FRONT VIEW
SCALE: N.T.S.



CURB DRAIN DETAIL - TOP VIEW
SCALE: N.T.S.



NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SHOWN OTHERWISE.
2. DUMMY JOINTS SHALL BE 25mm DEEP, FRONT, BACK AND TOP OF SECTION AT 2m SPACING.

200mm CONCRETE BARRIER CURB DETAIL
SCALE: N.T.S.

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.

No.	REVISION	DATE	BY
12.	REVISED PER SNCA COMMENTS	MAY 28/2026	MJH
11.	REVISED PER SNCA COMMENTS	APR 24/2026	MJH
10.	REVISED PER CITY COMMENTS	FEB 20/2026	MJH
9.	REVISED PER CITY AND SNCA COMMENTS	NOV 14/2025	MJH
8.	REVISED PER BUILDING PERMIT COMMENTS	APR 22/2025	MJH
7.	RE-ISSUED FOR BUILDING PERMIT	FEB 26/2025	MJH
6.	ISSUED FOR BUILDING PERMIT	OCT 24/2024	MJH
5.	ISSUED FOR 90% SUBMISSION	OCT 4/2024	MJH
4.	ISSUED FOR SPA	OCT 3/2024	MJH
3.	ISSUED FOR 60% SUBMISSION	AUG 16/2024	MJH
2.	ISSUED FOR 30% SUBMISSION	JUNE 27/2024	MJH
1.	COORDINATION	MAR 7/2024	MJH

SCALE: 1:400 (1:400 0 4 8 12 16)

DESIGN MJH
CHECKED JLS
DRAWN MJH
CHECKED JLS
APPROVED MJH

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER M. J. HREHORIAK 100211256 MAY 28/2026 PROVINCE OF ONTARIO

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Website www.novatech-eng.com

LOCATION
CITY OF OTTAWA
5110 BOUNDARY ROAD

DRAWING NAME
GRADING PLAN

PROJECT No. 118168
REV REV # 12
DRAWING No. 118168-GR2

PLAN # 19296

D07-12-24-0117

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