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1981 Century Road West

SITE SERVICING & STORMWATER MANAGEMENT REPORT

Brunstad Christian Church Ottawa

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Issue	Date	Description
1	January 15, 2025	Final Report
2	July 3, 2025	Revised Final Report
3	August 20, 2025	Revised Final Report
4	July 31, 2026	Revised Final Report

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1 Introduction

Tatham Engineering Limited (Tatham) has been retained by the Brunstad Christian Church Ottawa (BCCO) to prepare a Site Servicing & Stormwater Management (SWM) Report in support of Site Plan Approval (SPA) for the proposed site redevelopment works at 1981 Century Road in the City of Ottawa. Specifically, this report has been prepared to confirm the servicing and SWM designs for the site.

The site is approximately 3.6 ha and currently consists of a one storey church, wooden shed, gazebo, canopy/pavilion area, playground area, asphalt parking area, and green space. There are two entrances to the site from Century Road along the south property limit. The site is identified as having floodplain within the rear portion of the lot. The site is currently zoned Rural Institutional, Subzone 5 (RI5) and is bounded by adjacent agricultural properties (AG1 to the North and East, and AG2 (undeveloped) to the West), and Century Road to the South. A key plan illustrating the site location is provided on the drawings enclosed at the back of this report.

The area proposed for re-development, herein referred to as the site, is approximately 1.95 ha. The final SWM plan has been developed for the site area only. The balance of the property will remain undisturbed. The proposed re-development consists of removing a portion of the existing Church's interlock and a few trees, decommissioning the existing private septic system, relocating the existing canopy/pavilion, and constructing a 2,507 m^2 partial two-storey addition and associated paved parking area. In the proposed condition, the two existing site entrances along the south property limit on Century Road will continue to provide access to the site. All work is being proposed outside of the 100-year floodplain. It is noted that all flood control storage in the pond is provided above the 350-year flood elevation (91.49). The Proposed Site Plan (A1.0) prepared by Lawrence Architect Inc., illustrating the proposed site layout, is included in Appendix A.

The servicing and SWM designs included herein are based on the topographic survey completed by Annis, O'Sullivan, Vollebekk Ltd. dated May 11, 2023, included in Appendix B.

2 Geotechnical Investigation

A geotechnical investigation to assess subsurface conditions was completed at the site by Paterson Group Inc. (Paterson) on July 17, 2023, and is documented in their report dated September 5, 2023. The report has been submitted under separate cover.

Four (4) boreholes (BH 1-23 to BH 4-23) were advanced throughout the site to a maximum depth of 6.7 metres below ground surface (mbgs).

A 300 mm thick layer of topsoil was encountered at all borehole locations. The topsoil layer was underlain by deposits of clayey silt to silty clay, silty sand, and glacial till. A 400 mm thick layer of fill was encountered underlying the topsoil at borehole BH 1-23. A very stiff to firm, brown to grey clayey silt to silty clay deposit was encountered underlying the topsoil layer (or fill layer at BH 1-23), extending to depths of 1.8 to 4.0 mbgs. A 700 mm thick, very loose to grey silty sand layer, was encountered underlying the clayey silt to silty clay. A glacial till deposit was encountered underlying the silty sand, consisting of a loose to compact, grey silty sand to sandy silt with varying amounts of gravel, cobbles, and boulders.

During the July 17, 2023 investigation, three (3) boreholes were fitted with flexible standpipe piezometers and one (1) borehole was equipped with a monitoring well to facilitate monitoring of groundwater levels following the completion of the sampling program. Groundwater levels were measured in the monitoring wells on July 24, 2023, and ranged from 1.10 to 1.99 mbgs.

Further to the above, Paterson conducted a subsequent groundwater monitoring program, where the monitoring well installed at BH 3-23 was equipped with a Van Essen Instrument MiniDiver Water Level Logger on February 22, 2024, to accurately monitor fluctuations in the groundwater levels. The Mini-Diver was programmed to continuously measure and record groundwater levels throughout the subject site at a rate of 1 reading every 24 hours for a period of 6 months. The groundwater levels from the subsequent groundwater monitoring program, recorded between February 22, 2024 and August 26, 2024, ranged from 0.03 to 0.97 mbgs. The results are documented in Paterson's memorandum dated August 23, 2024. The memorandum has been submitted under separate cover.

3 Site Servicing

3.1 SEWAGE COLLECTION AND DISPOSAL

In the existing condition, sewage flow is conveyed to a private septic system located immediately east of the existing church.

In the proposed condition, the existing septic system is to be decommissioned, removed, and replaced with a new septic system located north of the proposed building addition, to service the existing church and proposed addition. A septic system decommissioning permit from the Rideau Valley Conservation Authority (RVCA) is required prior to decommissioning the existing septic system.

A Sewage System Sizing Memorandum dated February 18, 2025, was prepared by Paterson to estimate the sewage design flow for the existing church and proposed addition. The estimated sewage design flow was found to be 23,054 L/week. To ensure a total daily design sewage flow (TDDSF) of less than 10,000 L/day and eliminate the requirement for an Environmental Compliance Approval (ECA), a balancing tank is required. The balancing tank will distribute the daily sewage evenly over a one (1) week period, allowing for a TDDSF of less than 10,000 L. The memorandum is included in Appendix C.

The proposed septic system design was completed by Paterson and consists of one 24,300 L pretreatment tank, an 18,500 L balancing tank, a 38 mm diameter schedule 40 PVC forcemain, a 6-outlet distribution box, and 66 Eljen GSF A42 modules with a 100 mm diameter perforated distribution pipe on top of the modules. The Sewage System Layout Plan and Details and Notes Plan, dated January 2026, are included in Appendix C.

3.2 DOMESTIC WATER SUPPLY

In the existing condition, domestic water supply is provided via a private well located immediately west of the existing church.

In the proposed condition, the existing well will be maintained and will provide water supply for the existing church and proposed addition. The water service on-site will be a regulated drinking water system, under O.Reg.319, and will follow any requirements set by the Ottawa Public Health Office. Any requirements related to the regulated system must be fulfilled prior to the use of the system.

Water demand calculations for the proposed conditions have been completed using the Type of Establishment Method from Section 8 of the 2024 Ontario Building Code (OBC).

The combined daily water demand for the overall development in the proposed condition was determined to be 0.94 L/s, and does not include allowances for fire fighting, irrigation, etc.

It is understood a Hydrogeological and Terrain Analysis Report is being prepared by others to demonstrate that the existing well can provide water supply in excess of the demand and to demonstrate compliance with the current water quality requirements. A pumping test of the existing water supply well is recommended to confirm a reliable well yield of at least 0.94 L/s and ensure the existing well supply will be sufficient to service the overall development. In the case where the domestic water supply and/or the water quality are insufficient, recommendations will be provided by the hydrogeological consultant.

The water demand calculations are included in Appendix D.

3.3 FIRE PROTECTION

In the existing condition, water supply for fire protection is provided via a private on-site 50,499 L fire water holding tank located south of the existing church, immediately within the south property limit.

In the proposed condition, the existing fire water holding tank will be utilized solely to supply the building's sprinkler system, and new fire water holding tanks with a combined storage capacity of 151,000 L will provide sufficient fire protection for the remainder of the site.

Fire flow demands were calculated in accordance with the 2025 City of Ottawa Water Distribution Design Guidelines. This method combines aspects of the OBC, Fire Underwriters Survey (FUS), and National Fire Protection Association (NFPA) 13 (applicable to sprinklered buildings). The fire flow demand for the site (excluding the demand for sprinklers) is 5,000 L/min and requires fire water holding tanks having a minimum combined storage volume of 150,000 L. The new tanks will be located on the east side of the site's west entrance along the south property limit and will be capable of providing the fire water supply flow rate of 5,000 L/min for a minimum duration of 30 minutes. On this basis, adequate fire flow protection will be provided. The fire flow demand calculations are included in Appendix D.

NFPA 13 calculations, applicable solely to the building's sprinklered system, have been complete by GWAL and are included within Appendix D.

The existing and proposed fire water holding tanks, and proposed fire pump location are shown on the Site Grading and Servicing Plans (Drawings SG-1 & SG-2).

4 Stormwater Management

The primary objective of the SWM plan is to demonstrate that post-development conditions will not adversely impact the hydrologic cycle and surface water runoff characteristics of the area. This will be accomplished by evaluating the effects of the proposed development on local drainage conditions. Where necessary, solutions will be provided to mitigate any adverse impacts. The following sections of the report will present the following:

- Existing runoff conditions including constraints and opportunities for improvement;
- Criteria to be applied in the SWM design;
- An overall SWM plan that complies with appropriate technical SWM guidelines; and
- Erosion and sediment control strategies.

The SWM plan was prepared recognizing municipal, provincial, and conservation authority guidelines on water resources and the environment, including the following publications:

- Design Criteria for Sanitary Sewers, Storm Sewers and Forcemains for Alterations Authorized under Environmental Compliance Approval (The Ministry of the Environment, Conservation and Parks, 2022);
- O. Reg. 174/06: Rideau Valley Conservation Authority: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses (2022);
- Erosion and Sediment Control Guide for Urban Construction (Toronto and Region Conservation Authority, 2019); and
- The City of Ottawa Sewer Design Guidelines (Fourth Edition, Document No. SDG 004, December 2025).

4.1 SWM DESIGN CRITERIA

Criteria to be met regarding drainage and stormwater management on the site are summarized as follows:

- The site will be developed in accordance with applicable municipal, provincial, and conservation authority, guidelines and standards;
- Attenuation of proposed condition peak flow rates from all storm events up to and including the 100-year storm to the allowable 2-year existing condition peak flow rate at each outlet;
- MECP "Enhanced" level water quality control, including 80% TSS removal, is required to ensure the development will have no negative impacts on the downstream receivers;
- Safe conveyance of runoff from all storms up to and including the 100-year storm;
- The SWM pond outlet is to consider the 100-year floodplain elevation of 91.27 as the hydraulic downstream boundary condition;
- The proposed storm sewers are to be sized for conveyance of the 5-year design storm; and
- Erosion and sediment control measures are to be implemented during construction and are to remain in place until construction is completed and the site is stabilized thereby minimizing the potential for erosion and sediment transport off-site.

4.2 EXISTING SITE DRAINAGE CONDITIONS

The existing topography, ground cover, and drainage patterns were obtained through a review of available plans, base mapping, and site investigation. A detailed topographic survey of the site was completed by Annis, O'Sullivan, Vollebekk Ltd. on May 11, 2023 to confirm existing features and elevations.

The area proposed for re-development, herein referred to as the site, is approximately 1.95 ha. A well-defined ridge extending across the site from west to east bisects the site into two drainage areas with two distinct outlets.

Runoff from the major portion of the site (Drainage Area 101 – 1.81 ha) drains overland, generally from south to north, to a watercourse which is located along the east and north property limits (Outlet 1).

Runoff from the south portion of the site (Drainage Area 102 - 0.14 ha) drains overland, generally from north to south, into the Century Road north roadside ditch (Outlet 2). There is no proposed development within Drainage Area 102. On this basis, Drainage Area 102 has been excluded from the hydrologic modelling analysis included herein.

Eventually, runoff from both drainage areas discharges into the Mud Creek municipal drain, and ultimately into the Rideau River.

The Ontario Soil Survey Complex characterizes the native soils onsite as Brandon clay, having a corresponding hydrologic soil group D.

The Existing Condition Drainage Plan (DP-1), illustrating the existing condition drainage characteristics of the site, is attached at the back of this report.

4.3 EXISTING CONDITION HYDROGEOLOGIC ANALYSIS

A Visual OTTHYMO hydrologic model (VO6) scenario was developed to quantify the existing condition peak flows from Drainage Area 101.

The drainage area delineations were determined based on the available topographic information in combination with the areas proposed for development.

A summary of all hydrologic parameters established for the existing condition hydrologic model has been included in Appendix E.

Even though the site is currently developed, the City required that the existing condition land use reflect the site condition prior to the current development, which is conservative as it relates to the flood storage that is required to control post development peak flows at or below existing condition peak flow rates.

The peak flow rates for the 2-year storm event were calculated for the 3-hour Chicago, 6-hour Chicago and 24-hour SCS Type II design storms using IDF data derived from Meteorological Services of Canada (MSC) rainfall data taken from the MacDonald-Cartier Airport. Detailed calculations and Visual OTTHYMO modeling output are included in Appendix E with the results summarized below in Tables 1.

Table 1: Existing Condition Peak Flow Summary – Outlet 1

DESIGN STORM	DRAINAGE AREA 101 1.81 ha (m^3/s)		
	3-hr CHI	6-hr CHI	24-hr SCS Type II
2-Year	0.044	0.050	0.073

4.4 PROPOSED SWM PLAN

The proposed SWM plan has been prepared recognizing the SWM requirements for the site and has been developed to follow the existing topography of the land as much as possible to maintain

the existing condition drainage patterns, while safely conveying stormwater runoff to the existing outlets.

- Runoff from the very south portion of the site (Drainage Area 202 – 0.13 ha), consisting of clean and unimpaired runoff from vegetated areas, will sheet flow uncontrolled to the Century Road north roadside ditch (Outlet 2), unchanged from the existing condition. The proposed development within Drainage Area 202 (which is slightly smaller than Drainage Area 102) will not result in any increase in impervious area or peak flows. On this basis, Drainage Area 202 has been excluded from the modelling analysis included herein.
- Runoff from the major portion of the site (Drainage Area 201 – 1.82 ha) will be controlled and treated onsite and will discharge to the existing watercourse which is located along the east and north property limits (Outlet 1).
- Runoff from Drainage Area 201 will be directed to a proposed wet SWM facility via the proposed storm sewer and controlled by an orifice plate flow restrictor located in STMMH7. The 100-year proposed condition peak flow rate from this area will be controlled to the 2-year pre-development peak flow from Drainage Area 101 (1.81 ha).
- The wet SWM facility has been sized to provide the requisite quantity control for the site. It consists of 0.3 m of freeboard above the 100-year storm peak flow level, and a 5.0 m wide emergency spillway, which has sufficient capacity to safely direct the uncontrolled 100-year peak flow from the facility to Outlet 1.
- Infiltration of stormwater runoff is not practical due to high groundwater levels (0.03 mbgs at BH 3-23 according to Paterson Groundwater Monitoring Program memorandum).
- Due to spatial constraints, a wet pond forebay was not included. Therefore, an oil-grit separator (OGS) unit is proposed immediately upstream of the wet pond and will provide pretreatment to attain MECP “Enhanced” level water quality treatment including 80% TSS removal from on-site runoff prior to discharging from the site.
- All internal storm sewers have been sized based on the 5-year design storm. A storm sewer design sheet and a corresponding Storm Drainage Plan (Dwg. STM-1) are attached in Appendix E.
- Storms sewers downstream of CBMH1 have been sized to convey the 100-year design storm. A storm sewer design sheet, corresponding Storm Drainage Plan (Dwg. STM-1), and conveyance under head calculation are attached in Appendix E.
- Runoff from both drainage areas (201 and 202) discharges to the Mud Creek municipal drain, and ultimately into the Rideau River. The drainage patterns remain unchanged from existing conditions, and the peak flows have been reduced from existing condition.

Portions of the property are within the 100-year and 350-year floodplains. Development is prohibited within the 100-year flood plain as per Zoning By-law Section 58. We note that all work is being proposed outside of the 100-year floodplain. Any work within 15 metres of the 100-year floodplain will require a permit from the RVCA prior to construction.

Runoff from the site drains from south to north into the existing watercourse at the east and northern limits of the site. As the outlet from the SWM discharges to the natural environment (and not a municipal storm drainage outlet), approval by the MECP is required. Based on a review of the MECP EASR process, which is now in effect, the site meets the requirements of the EASR process. The mapping available on the City's GeoOttawa website confirms that the site does not pose a significant drinking water threat.

The Proposed Condition Drainage Plan (DP-2), illustrating the proposed condition drainage characteristics of the site, is attached at the back of this report.

4.5 QUANTITY CONTROL

An orifice plate flow restrictor, consisting of a 168 mm diameter orifice, installed in STMMH7, is proposed to control peak flows from Drainage Area 201, to ensure the 100-year post development peak flow is less than or equal to the existing 2-year peak flow rate from Drainage Area 101. It is noted that the invert elevation of the orifice control has been set at the 100-year floodplain elevation in the receiving watercourse of 91.27 to reduce the potential for backwater effects on the pond outlet from the receiving watercourse.

A VO6 model scenario was developed to quantify the proposed condition peak flow from Drainage Area 201.

The drainage area delineation for the contributing lands was completed according to the proposed site grading illustrated on the Site Grading and Servicing Plans (Drawings SG-1 & SG-2), which is included at the back of this report.

Summaries of all hydrologic parameters and stage-storage-discharge tables, established for the proposed condition hydrologic model, have been included in Appendix E.

The peak flow for the 100-year storm event was calculated for the 3-hour Chicago, 6-hour Chicago, and 24-hour SCS Type II design storms using IDF data derived from Meteorological Services of Canada (MSC) rainfall data taken from the MacDonald-Cartier Airport. Detailed calculations and Visual OTTHYMO modeling output are included in Appendix E with the results summarized below in Table 2.

Table 2: Proposed Condition Peak Flow Summary – Outlet 1

DESIGN STORM	DRAINAGE AREA 201 1.82 ha CONTROLLED (m^3/s)		
	3-hr CHI	6-hr CHI	24-hr SCS Type II
100-Year	0.044 (0.044)	0.045 (0.050)	0.046 (0.073)

Note: (0.044) refers to existing condition 2-year peak flow rate.

Table 2 confirms the proposed SWM plan will attenuate the proposed condition 100-year peak flow rate at or below the existing condition 2-year peak flow rate. The maximum storage required during the 100-year storm was determined to be 798 m^3, whereas 805 m^3 of storage volume is provided in the wet SWM facility above the permanent pool up to the emergency overflow elevation of 91.90 m as is shown on the Site Grading and Servicing Plan (Drawing SG-2) and the Stormwater Management Plan (Drawing SWM-1).

4.6 QUALITY CONTROL

The proposed water quality treatment objective under the proposed condition is to provide MECP enhanced level treatment including 80% TSS removal from on-site runoff, including treatment for the existing developed portion of the site, which is currently not treated.

Water quality control for the development will be provided via a wet pond.

In lieu of a forebay, pre-treatment upstream of the wet pond will be provided via an EFO4 OGS. Additionally, at-source and conveyance type controls such as, roof leaders discharging to splash pads directed to pervious areas, and enhanced grassed swales are specified within the overall SWM design; however, they are not being relied on or included in the quality control calculations.

Pre-treatment upstream of the proposed OGS for runoff from the parking area is not feasible and therefore diligent maintenance of the OGS unit is needed for it to function as designed.

4.6.1 Oil-Grit-Separator

0.73 ha from Drainage Area 201, consisting of the majority of the parking area, will be treated by a Stormceptor Model EFO4 OGS prior to entering the wet pond and ultimately discharging to the existing watercourse which is located along the east and north property limits (Outlet 1). The OGS has been sized using the CA ETV particle size distribution to treat a minimum of 90% of annual runoff and provide 50% TSS removal. The specified Stormceptor Model EFO4 will provide 51% TSS removal from the contributing drainage area.

The Stormceptor EFO Sizing Report is included in Appendix E.

4.6.2 Wet Pond

All runoff from Drainage Area 201 will be treated by a the SWM pond. The catchment has a weighted imperviousness of approximately 64%. The corresponding MECP storage volume applicable to wet ponds is 208.0 m^3/ha, where 168.0 m^3/ha is required for the permanent pool and 40 m^3/ha is required for minimum 24 hr extended detention. The permanent pool storage requirement is 305.8 m^3, whereas 643.5 m^3 is provided.

Supporting calculations are provided in Appendix E.

The MECP recommends a minimum drainage area of 5 ha in order to sustain the permanent pool within a wet pond, unless there is another source of water. The local high groundwater on site provides a suitable alternative source to maintaining the permanent pool.

4.7 SWM OPERATION AND MAINTENANCE PROGRAM

Monitoring and maintenance provide a variety of important functions. Specifically, they ensure that the systems implemented are operating correctly and effectively, while maintaining and protecting water resources. A proactive, routine inspection and maintenance program will also:

- Identify maintenance issues before they significantly affect the function of the individual stormwater components;
- Ensure the SWM plan continues to perform as designed; and
- Demonstrate to stakeholders that the SWM plan is achieving its intended design objective.

Monitoring the effectiveness of the proposed SWM facility and Stormceptor encourages the protection and restoration of surface water and groundwater resources. Early warnings provide time for problems to be identified and rectified at the source. Monitoring also helps develop strategies to improve existing conditions and protect downstream water uses. To ensure the operation and maintenance plan is operating effectively, regular inspection and maintenance of each element of the plan is recommended.

The objectives of the Operation and Maintenance Program are to:

- Evaluate and maintain the condition of the SWM plan components in relation to their intended design purpose;
- Provide a tool for maintaining and implementing remediation works to restore SWM plan components performance; and
- Establish a future maintenance schedule based on the SWM plan's past performance.

The operation and maintenance program is to be provided year-round, albeit the majority of inspection, monitoring, and maintenance activities are anticipated to be provided when the

ground conditions are clear of snow and ice. During the winter, and most importantly prior to the spring melt, the pipe inlets and outlets, including the pond inlet/outlet and the storm pipe outlet from the ponding area, should be checked for blockages and cleared.

The following sub-sections are potential areas of concern and should be monitored on an ongoing basis.

4.7.1 Erosion

Erosion prone areas such as areas of loose topsoil should be identified and remediated against further degradation.

The inlets, outlets and connecting storm sewer are crucial to the function of the SWM plan components. They should be inspected monthly and after major storm events for obstructions or damage. Each inlet and outlet should be inspected for erosion, and corrective action should be carried out as necessary.

The condition of the SWM facility's overflow weirs should be inspected monthly for erosion, and corrective action should be carried out as required.

Embankments should be inspected for erosion, rodent holes, etc. on a regular basis and repaired to their original state as required.

Maintenance access roads should be inspected for surface defects caused by erosion and should be maintained and repaired as required.

4.7.2 Water Quality

Water quality concerns from surface spills should be reported and documented in a prompt manner to allow for a suitable cleanup and to prevent groundwater contamination.

4.7.3 Sediment Removal

To ensure long-term effectiveness of the SWM plan, the sediment which accumulates in the SWM plan components should be monitored and periodically removed. The highest sediment load can be expected during the construction phase. Less sediment loading is expected after the development phase is complete.

For the first six months following construction, inspection should occur after each storm event greater than 10 mm or at least twice. Following this period, inspections should occur in the spring of each year and after rainfall events greater than 15 mm. The visual checks will provide an early warning of potential problems and reduce potential threats to the environment.

Prior to any handling, removal, and disposal of sediment from the SWM plan components, the accumulated sediment is to be tested according to the criteria contained in the April 15, 2011 Ministry of Environment Conservation and Parks "Soil, Ground, Water and Sediment Standard for use Under Part XV-1 of the Environmental Protection Act" and disposed of accordingly at an approved offsite location.

Within the SWM facility, sediment is expected to accumulate near the inlet and outlet pipe. The stone placed around the perforated HDPE risers will prevent debris blockages at the outlet and further promote settling of fine particles around the outlet structures. Visual inspections inside the storm outlet manhole (STMMH7) and removal of any sediment or debris within the sump is recommended to further prevent blockages.

The Stormceptor model EFO4 has been specified upstream of the SWM facility. This unit will reduce sediment loading within the SWM facility. Sediment monitoring and removal is performed using vacuum trucks. No entry into the unit is required for maintenance (in most cases). The Operation and Maintenance Guide, provided in Appendix E, provides the sediment depths indicating required sediment removal and should be followed to ensure the long-term function of the unit.

4.7.4 Vegetation

A large portion of the SWM facility consist of grassed surface. Allowing the growth of grass tends to improve the performance of each. In general, the grass trimming is more associated with the aesthetics compared to the performance. Grass and other vegetation should be inspected on an annual basis, and the following actions for inspection are recommended:

- Remove and replace dying or unhealthy vegetation;
- Weeds, poisonous or invasive vegetation should be removed without the use of pesticides;
- Tree growth interfering with the intended operation or maintenance access should be trimmed or if necessary, removed;
- Grass cutting should be limited as much as possible while recognizing the aesthetic concerns of clients and nearby residents. Grass clippings must be removed to reduce potential for organic loading;
- Herbicides and insecticides should not be used to control weeds. Fertilizer should also be limited to minimize nutrient loadings; and
- If gullies are observed along the surface, localized regrading and revegetating may be required.

4.7.5 Trash and Debris

During inspections, the area should be checked for any trash and/or debris which should be disposed of immediately.

Debris can include but is not limited to leaves, branches, sediment, litter, and other forms of debris. These obstructions can cause nuisance ponding and/or redirection of flows away from the intended outlet.

4.7.6 Weed Control

Weed control for any invasive species such as Dog Strangling Vines, European Buckhorn, Norway Maple, Garlic Mustard, etc., is recommended on a bi-annual basis. Herbicides and insecticides should be avoided due to the potential water quality concerns associated with downstream uses.

5 Erosion and Sediment Control

Erosion and sediment control will be implemented for all construction activities within the development site, including vegetation clearing, topsoil stripping, drive aisle and parking area construction, and stockpiling of materials. The principles considered and to be utilised to minimize erosion and sedimentation at the site and resultant negative environmental impacts consist of the following:

- Minimize disturbance activities where possible;
- Expose the smallest possible land area to erosion for the shortest possible time;
- Institute specified erosion control measures immediately;
- Implement sediment control measures before the outset of construction activities;
- Carry out regular inspections of erosion/sediment control measures and repair or maintain as necessary; and
- Seed or sod exposed soils as soon as possible after construction and keep chemical applications to suppress dust and control pests and vegetation to a minimum.

The proposed grading and building construction for the subject site will be carried out in such a manner that a minimum amount of erosion occurs and such that sedimentation facilities control any erosion that does occur. Specific erosion, sediment, and pollution control measures included within the proposed design, that are to be utilized on-site, consist of the following:

- Installing heavy-duty silt fence downstream of the overall construction work area (i.e., along the limits of construction) to prevent sediment from discharging offsite;
- Constructing the wet SWM facility (to be used as a temporary settling basin) and swale, complete with temporary straw bale check dams, immediately following the installation of the silt fence to filter out and capture sediment from runoff prior to discharging from the site;
- Placing and maintaining stone mud mats at the construction work area access points;
- Confining refuelling/servicing of equipment to areas well away from the existing watercourses, and the minor/major drainage system elements;
- Cleaning out/removing all sediment from the wet SWM facility at the end of construction; and
- Bi-weekly inspections of control measures to be instituted through a monitoring and mitigation plan and repairs made, as necessary.

The proposed erosion and sediment controls are shown on the Removals, Siltation and Erosion Control Plan (Drawing SC-1).

6 Summary

The proposed site development has been designed recognizing the pertinent Municipal Agency and Provincial guidelines along with site specific constraints and criteria.

The existing septic system will be decommissioned, removed, and replaced with a new septic system capable of servicing the existing church and the proposed addition. A septic system decommissioning permit from the RVCA is required prior to decommissioning the existing septic system.

It is the intent that the existing private on-site well be maintained to provide water supply to meet the demands of the existing church and the proposed addition. If the domestic water supply and/or the water quality are insufficient, recommendations will be provided by the hydrogeological consultant.

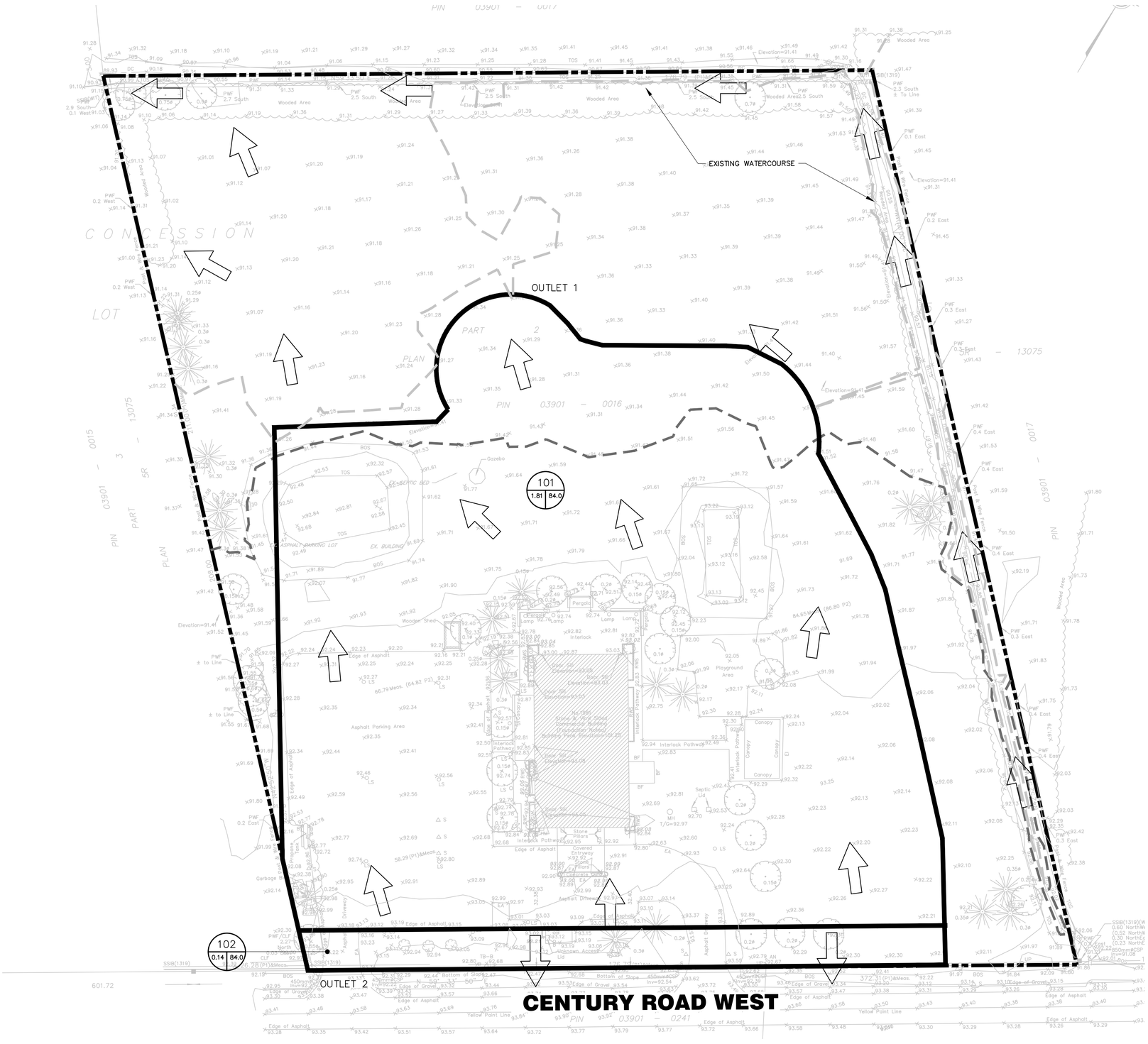
The existing 50,499 L fire water holding tank will be utilized solely to supply the building sprinkler system, and new fire water holding tanks with a combined storage capacity of 151,000 L will provide sufficient fire protection for the remainder of the site.

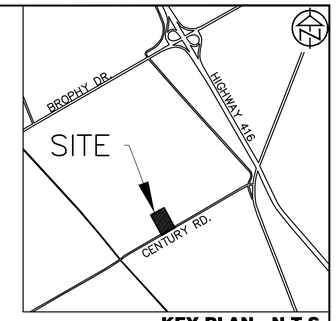
Runoff from the major portion of the site will be directed to a SWM facility and controlled by an orifice plate flow restrictor. The 100-year proposed condition peak flow rate from this area will be controlled to the 2-year pre-development peak flow rate. Water quality control is proposed by means of a Stormceptor Model EFO4 OGS in line with a SWM facility, which achieves MECP enhanced level water quality control.

Runoff from the balance of the site, consisting of clean and unimpaired runoff from vegetated areas, will sheet flow uncontrolled to the Century Road north roadside ditch, unchanged from the existing condition.

All proposed condition runoff will eventually discharge to the Mud Creek municipal drain and ultimately into the Rideau River. The drainage patterns remain unchanged, and the peak flows have been reduced from existing conditions.

We trust this report is sufficient to support the proposed site plan application.





KEY PLAN - N.T.S.

LEGEND

- SUBJECT PROPERTY BOUNDARY
- DRAINAGE AREA BOUNDARY
- 100-YEAR FLOOD ELEVATION 91.27
- 350-YEAR FLOOD ELEVATION 91.49
- EXISTING CONDITION DRAINAGE DIRECTION
- 101 / 1.81 | 84.0 — DRAINAGE AREA ID / CURVE NUMBER CN / AREA (ha.)

LEGAL AND TOPOGRAPHIC SURVEY COMPLETED BY ANNIS, O'SULLIVAN VOLLEBEKK LTD. ONTARIO LAND SURVEYOR, ON MAY 11, 2023.

ELEVATION SHOWN ARE GEODETIC AND ARE REFERRED TO CGVD28 GEODETIC DATUM.

TBM1: TOP OF PROPERTY IRON BAR LOCATED ON SOUTHEAST OF THE PROPERTY, ELEVATION 91.86.

No.	REVISION DESCRIPTION	DATE
2.	RE-ISSUED FOR SITE PLAN APPROVAL	JUL 2025
3.	RE-ISSUED FOR SITE PLAN APPROVAL	AUG 2025
4.	RE-ISSUED FOR SITE PLAN APPROVAL	APR 2026
5.	ISSUED FOR BUILDING PERMIT	JULY 2026
6.	RE-ISSUED FOR SITE PLAN APPROVAL	JULY 2026

ENGINEER STAMP

LICENSED PROFESSIONAL ENGINEER
J.R. ASH
100123062
July 31, 2026
PROVINCE OF ONTARIO

1981 CENTURY RD. WEST
CITY OF OTTAWA
BRUNSTAD CHRISTIAN CHURCH OTTAWA

EXISTING CONDITION DRAINAGE PLAN

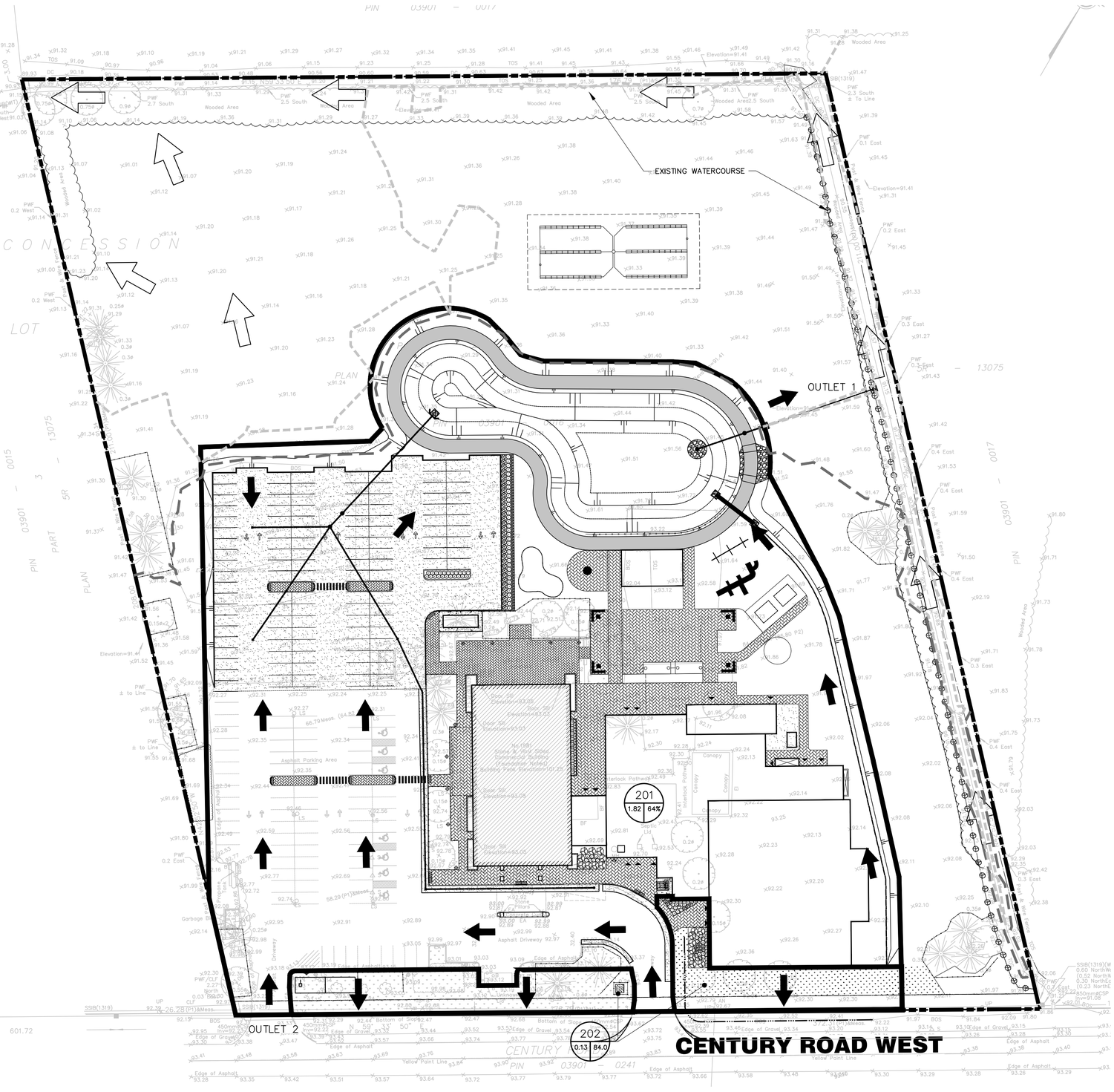
TATHAM ENGINEERING

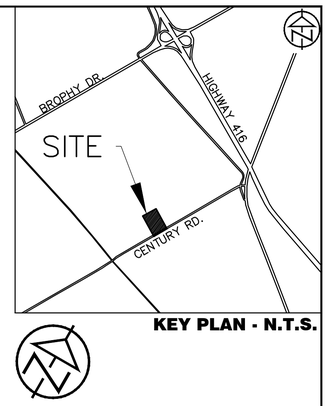
DESIGN: HY	FILE: 523654	DWG: DP-1
DRAWN: HY	DATE: SEPT 2024	
CHECK: GC	SCALE: 1:500	

D07-12-25-0033

APPLICATION#

Drawing Name: 523654-DP01.dwg, Plotted: Jul 31, 2026





KEY PLAN - N.T.S.

LEGEND

- SUBJECT PROPERTY BOUNDARY
- DRAINAGE AREA BOUNDARY
- 100-YEAR FLOOD ELEVATION 91.27
- 350-YEAR FLOOD ELEVATION 91.49
- PROPOSED CONDITION DRAINAGE DIRECTION
- 201 / 1.82 / 64% — DRAINAGE AREA ID; CURVE NUMBER CN/ % IMPERVIOUS; AREA (ha.)

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LEGAL AND TOPOGRAPHIC SURVEY COMPLETED BY ANNIS, O'SULLIVAN VOLLEBEKK LTD. ONTARIO LAND SURVEYOR, ON MAY 11, 2023.

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6.	RE-ISSUED FOR SITE PLAN APPROVAL	JULY 2026

ENGINEER STAMP

LICENSED PROFESSIONAL ENGINEER
J.R. ASH
100123062
PROVINCE OF ONTARIO

1981 CENTURY RD. WEST
CITY OF OTTAWA
BRUNSTAD CHRISTIAN CHURCH OTTAWA

PROPOSED CONDITION DRAINAGE PLAN

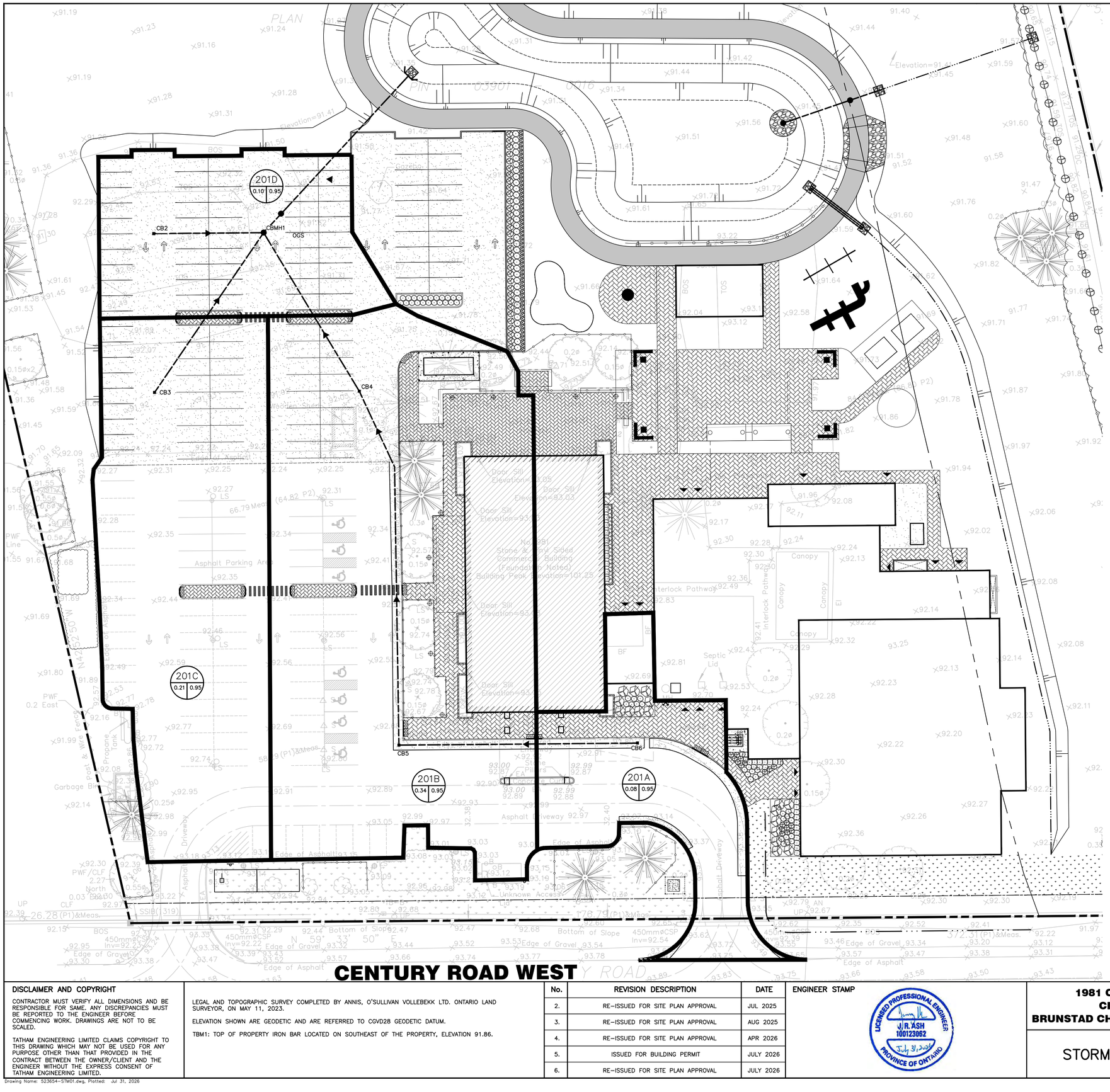
TATHAM ENGINEERING

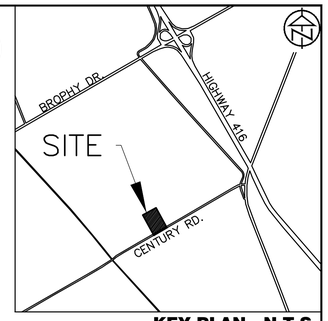
DESIGN: HY	FILE: 523654	DWG: DP-2
DRAWN: HY	DATE: SEPT 2024	
CHECK: GC	SCALE: 1:500	

D07-12-25-0033

APPLICATION#

Drawing Name: 523654-DP02.dwg, Plotted: Jul 31, 2026





KEY PLAN - N.T.S.

LEGEND

- PROPERTY BOUNDARY
- BOTTOM OF DITCH AND FLOW DIRECTION
- STORM DRAINAGE BOUNDARY
- HEAVY DUTY ASPHALT
- CONCRETE WALKWAY
- 201A / 0.08 / 0.95 — AREA ID / RUNOFF COEFFICIENT / DRAINAGE AREA

LEGAL AND TOPOGRAPHIC SURVEY COMPLETED BY ANNIS, O'SULLIVAN VOLLEBEKK LTD. ONTARIO LAND SURVEYOR, ON MAY 11, 2023.

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ENGINEER STAMP

LICENSED PROFESSIONAL ENGINEER — J.R. ASH — 100123062 — PROVINCE OF ONTARIO

1981 CENTURY RD. WEST
CITY OF OTTAWA
BRUNSTAD CHRISTIAN CHURCH OTTAWA

TATHAM ENGINEERING

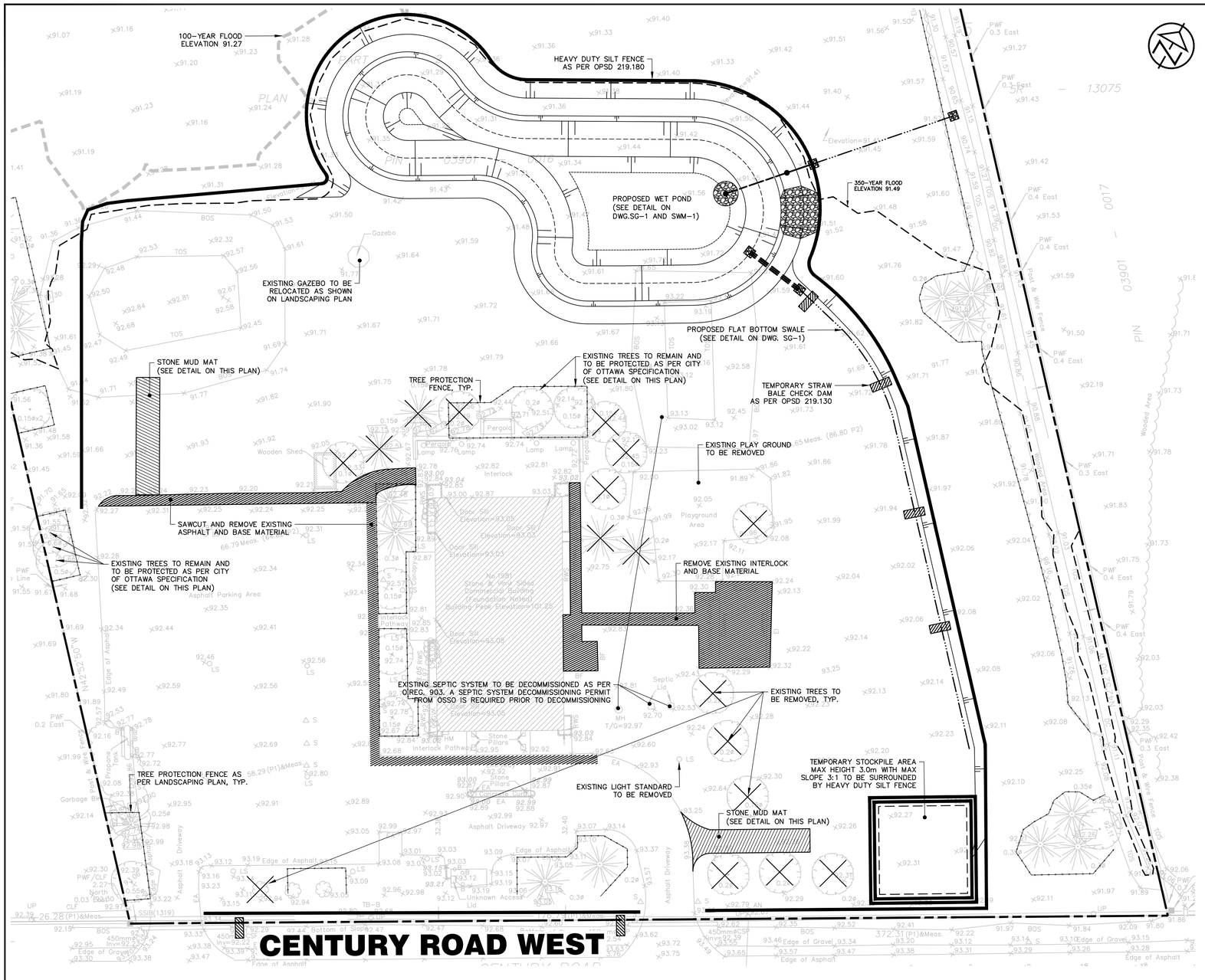
STORM DRAINAGE PLAN

DESIGN: HY	FILE: 523654	DWG: STM-1
DRAWN: HY	DATE: SEPT 2024	
CHECK: GC	SCALE: 1:300	

D07-12-25-0033

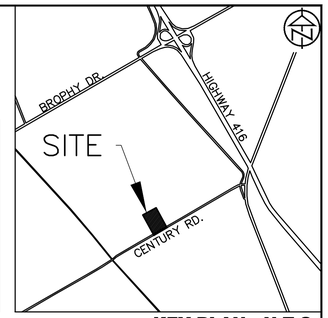
APPLICATION#

Drawing Name: 523654-STM01.dwg, Plotted: Jul 31, 2026

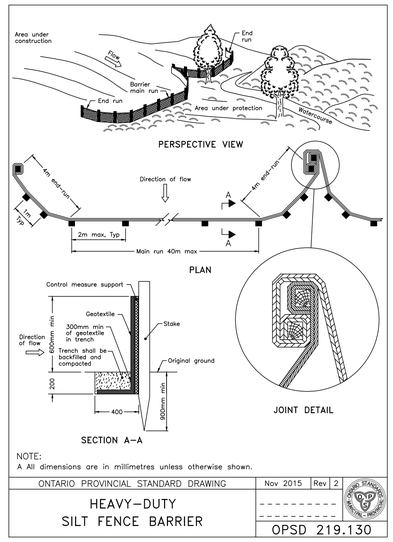


GENERAL NOTES

1. CONTRACTOR TO INSTALL AND MAINTAIN SILT FENCE AND STRAW BALE CHECK DAMS AT LOCATIONS SHOWN OR AS DIRECTED BY THE ENGINEER.
2. IF CONSTRUCTION IS INTERRUPTED AND/OR INACTIVITY EXCEEDS 30 DAYS, THEN STOCKPILED, STRIPPED OR EXPOSED AREAS MUST BE STABILIZED BY HYDROSEEDING AND ANY OTHER APPROPRIATE GEOTEXTILE MATERIAL, IF REQUIRED.
3. REMOVAL OF ALL SILT FENCES AND STRAW BALE CHECK DAMS AT THE END OF CONSTRUCTION TO BE APPROVED BY THE ENGINEER AFTER THE SITE HAS STABILIZED.
4. SILT FENCE TO OPSD 219.130 AND STRAW BALE CHECK DAM TO OPSD 219.180.
5. CLEARING OF VEGETATION AND TREE COVER IS TO OCCUR OUTSIDE OF BIRD BREEDING SEASON AS RECOMMENDED BY THE CITY OF OTTAWA'S PROTOCOL FOR WILDLIFE PROTECTION DURING CONSTRUCTION (APRIL 15 – AUGUST 15).
6. ALL SIDE SLOPES 3:1 OR GREATER ARE TO BE STABILIZED IMMEDIATELY WITH HYDROSEED (USING A NATIVE SEED MIX) UNLESS OTHERWISE NOTED. USE OF AN EROSION CONTROL BLANKET SUCH AS TERRAFIX S-100 (OR APPROVED EQUAL) IS RECOMMENDED IF CONSTRUCTION OCCURS OUTSIDE OF THE GROWING SEASON.

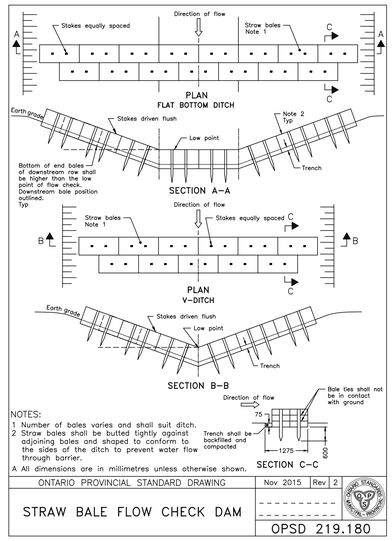


KEY PLAN - N.T.S.



NOTE:
A All dimensions are in millimetres unless otherwise shown.

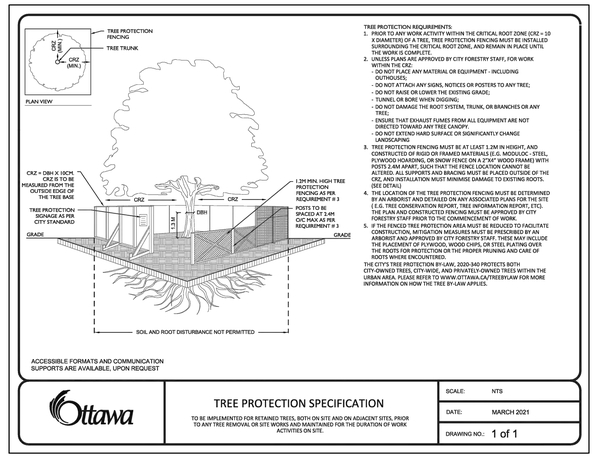
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev 2
HEAVY-DUTY SILT FENCE BARRIER		OPSD 219.130



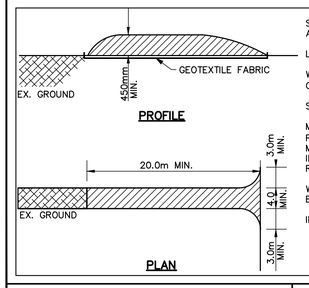
NOTES:
1 Number of bales varies and shall suit ditch.
2 Straw bales shall be butted tightly against adjoining bales and shaped to conform to the sides of the ditch to prevent water flow through barrier.

A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev 2
STRAW BALE FLOW CHECK DAM		OPSD 219.180



Ottawa	TREE PROTECTION SPECIFICATION TO BE IMPLEMENTED FOR RETAINED TREES, BOTH ON SITE AND ON ADJACENT SITES, PRIOR TO ANY TREE REMOVAL OR SITE WORKS AND MAINTAINED FOR THE DURATION OF WORK ACTIVITIES ON SITE.	SCALE: NTS DATE: MARCH 2021 DRAWING NO.: 1 of 1



STONE SIZE – THE STONE PAD SHALL BE A MIN. 450mm THICK. USE 50#mm STONE OR RECLAIMED CONCRETE EQUIVALENT FOR FIRST 10m FROM ADJACENT ROAD & 150mm# STONE. FOR REMAINDER OF STONE PAD.

LENGTH – AS REQUIRED BUT NOT LESS THAN 20m.

WIDTH – 4m MIN. BUT NOT LESS THAN THE WIDTH AT POINTS WHERE INGRESS. AND EGRESS OCCURS. GEOTEXTILE FABRIC (TERRAFIX 270R OR EQUAL) WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING STONE.

SURFACE WATER – ALL SURFACE WATER FLOWING OR DIRECTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE.

MAINTENANCE – THE CONTRACTOR SHALL MAINTAIN THE ENTRANCE IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHT-OF-WAY. THIS MAY REQUIRE PERIODIC DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHT-OF-WAY MUST BE REMOVED IMMEDIATELY BY THE CONTRACTOR. UPON OBSERVATION OF CONTINUOUS MUD TRACKING ONTO ADJACENT STREETS, THE STONE MAT IS TO BE FULLY REPLACED.

WASHING – WHEELS SHALL BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO PUBLIC RIGHT-OF-WAY. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.

INSPECTION AND REQUIRED MAINTENANCE AFTER EACH RAIN SHALL BE PROVIDED BY THE CONTRACTOR.

STONE MUD MAT DETAIL
SCALE: N.T.S

SCHEDULE OF CONSTRUCTION WORKS

1. IMPLEMENTATION OF EROSION CONTROL MEASURES AS SPECIFIED ON THIS PLAN
2. REMOVALS AS SPECIFIED ON THIS PLAN
3. TOPSOIL STRIPPING AND STOCKPILING
4. EXCAVATION OF THE DRY SWM FACILITY TO BE USED AS A TEMPORARY SETTLING BASIN DURING CONSTRUCTION. EXCAVATION OF SWALE TO INTERCEPT RUNOFF FROM THE CONSTRUCTION ZONE AND DIRECT IT TO THE SWM POND.
5. EARTH EXCAVATION AND ROUGH GRADING THROUGH OUT THE SITE

LEGEND

- PROPERTY BOUNDARY
- BOTTOM OF SWALE AND FLOW DIRECTION
- 262.25 EXISTING ELEVATION
- TEMPORARY STRAW BALE CHECK DAM AS PER OPSD 219.180
- HEAVY DUTY SILT FENCE AS PER OPSD 219.130

LEGAL AND TOPOGRAPHIC SURVEY COMPLETED BY ANNIS, O'SULLIVAN VOLLEBEKK LTD. ONTARIO LAND SURVEYOR, ON MAY 11, 2023.

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ENGINEER STAMP

LICENSED PROFESSIONAL ENGINEER J.R. ASH 100123062 PROVINCE OF ONTARIO

1981 CENTURY RD. WEST
CITY OF OTTAWA
BRUNSTAD CHRISTIAN CHURCH OTTAWA

REMOVALS, SILTATION AND EROSION CONTROL PLAN

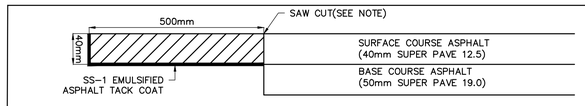
TATHAM ENGINEERING

DESIGN: HY	FILE: 523654	DWG: SC-1
DRAWN: HY	DATE: SEPT 2024	
CHECK: GC	SCALE: 1:400	

D07-12-25-0033

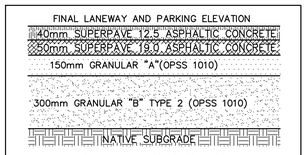
APPLICATION#

Drawing Name: 523654-SC01.dwg, Plotted: Jul 31, 2026

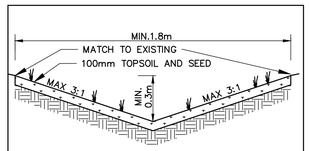


LAP JOINT DETAIL

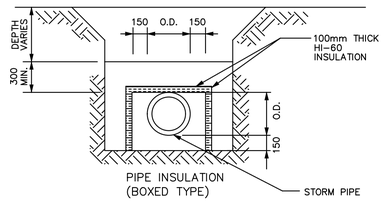
NOTES:
1. TRANSITION TREATMENT (LAP JOINT) REQUIRED AT ALL LOCATIONS WHERE MATCHING TO AN EXISTING ASPHALT SURFACE. THE EXISTING PAVEMENT EDGES SHALL BE"SAW CUT" TO FORM A STRAIGHT, CLEAN VERTICAL FACE.
2. APPLY UNIFORM COATING OF SS-1 EMULSIFIED TACK COAT TO EXISTING ASPHALT AT THE TRANSITION TREATMENT AREA.



PAVEMENT STRUCTURE
NTS

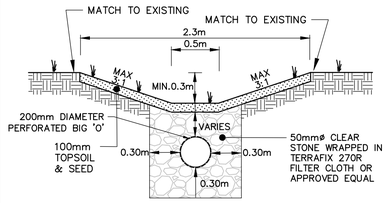


GRASSED SWALE DETAIL
NTS



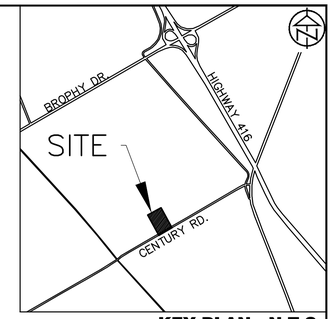
NOTE :
1. WHEREVER INSULATION IS USED; PROVIDE GRANULAR 'A' BEDDING AND COVER.
2. ALL NOTES PERTAINING TO BEDDING DETAILS SHALL APPLY.
3. FROST TAPERS TO OPSD 803.030 AND OPSD 803.031 AND AS DIRECTED BY THE ENGINEER.

STORM PIPE FROST PROTECTION DETAIL
SCALE: NTS

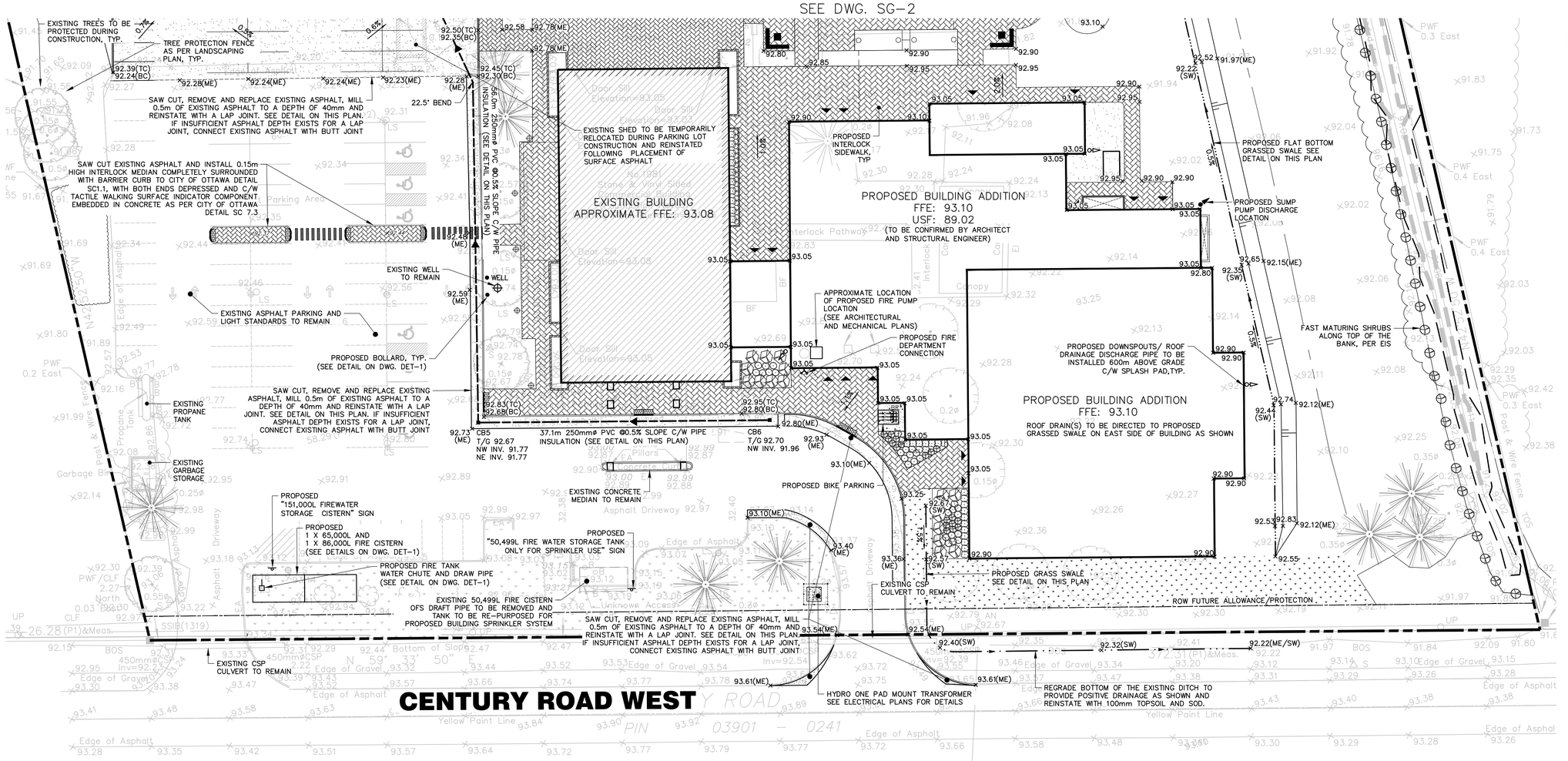


NOTE: GRASSED SWALE TO BE EQUIPPED WITH 150mmø SUBDRAIN IN A CLEAR STONE TRENCH IF SLOPE < 1.5%

ENHANCED FLAT BOTTOM GRASSED SWALE DETAIL
N.T.S



KEY PLAN - N.T.S.



LEGEND

- PROPERTY BOUNDARY
- BOTTOM OF DITCH AND FLOW DIRECTION
- × 262.25 EXISTING ELEVATION
- × 262.25(ME) PROPOSED ELEVATION MATCH EXISTING
- × 262.25(SW) BOTTOM OF SWALE ELEVATION
- PROPOSED ASPHALT
- PROPOSED INTERLOCK WALKWAY

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ENGINEER STAMP

LICENSED PROFESSIONAL ENGINEER
J.R. ASH
100123062
PROVINCE OF ONTARIO

1981 CENTURY RD. WEST
CITY OF OTTAWA
BRUNSTAD CHRISTIAN CHURCH OTTAWA

TATHAM ENGINEERING

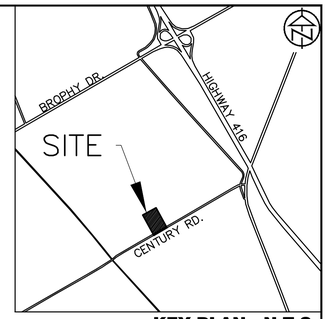
SITE GRADING AND SERVICING PLAN

DESIGN: HY	FILE: 523654	DWG: SG-1
DRAWN: HY	DATE: SEPT 2024	
CHECK: GC	SCALE: 1:300	

D07-12-25-0033

APPLICATION#

Drawing Name: 523654-SG01.dwg, Plotted: Jul 31, 2026



KEY PLAN - N.T.S.

PROPOSED SEPTIC SYSTEM LOCATION (DESIGN BY PATERSON GROUP, SEE DWG. PH4720-1 AND PH4720-02 (RE5) FOR GRADING AND OTHER DETAILS

350-YEAR FLOOD ELEVATION 91.49

1.5m X 1.5m X 300mm DEEP 200mmø RIP RAP OVER TERRAFIX 270R FILTER FABRIC (OR APPROVED EQUAL)

CONCRETE HEADWALL AS PER OPSD 804.030 GRATING AS PER 804.050

30.9m 525mmø PVC @ 0.5% SLOPE C/W PIPE INSULATION

STORMCEPTOR MODEL EF04 OGS (SEE DETAIL ON DWG.SWM-1) T/G 92.42 N INV. 91.30 SW INV. 91.33

CBMH1 T/G 92.38 NE INV. 91.35 SE INV. 91.35 S INV. 91.35 SW INV. 91.35

100 YEAR PONDING ELEVATION 91.90

3.0m WIDE WET POND MAINTENANCE ACCESS, SEE DETAIL ON DWG. SWM-1

11.0m 250mmø PVC @14.1% REVERSED SLOPE C/W PIPE

4.5m 250mmø PVC @1.0% REVERSED SLOPE C/W PIPE INSULATION SEE DETAIL ON DWG.SG-1

STMMH7 (C/W ORIFICE PLATE CONTROL AT NORTHEAST OUTLET SEE DETAIL ON DWG.SWM-1) T/G 92.25 NE INV. 91.30 SW INV. 91.27

FAST MATURING SHRUBS ALONG TOP OF THE BANK, PER EIS

100-YEAR FLOOD ELEVATION 91.27

15.0m WATERCOURSE SETBACK

1.5m X 1.5m X 300mm DEEP 200mmø RIP RAP OVER TERRAFIX 270R FILTER FABRIC (OR APPROVED EQUAL)

GRASSED SWALE SEE DETAIL ON DWG.SG-1

INV. 91.20

PERMANENT POOL ELEVATION 91.30

BOTTOM OF POND ELEVATION 89.80

PROPOSED WET POND (SEE DETAIL ON DWG. SWM-1)

HICKEN BOTTOM SEE DETAIL ON DWG. SWM-1

EMERGENCY OVERFLOW C/W 51m³ 300mm DEEP 200mmø RIP RAP OVER TERRAFIX 270R FILTER FABRIC (OR APPROVED EQUAL), SEE DETAIL ON DWG. SWM-1

12.0m 300mmø HDPE TWIN CULVERT W INV. 91.60 E INV. 91.72

1.5m X 1.5m X 300mm DEEP 200mmø RIP RAP OVER TERRAFIX 270R FILTER FABRIC (OR APPROVED EQUAL), BOTH ENDS

TREE PROTECTION FENCE AS PER LANDSCAPING PLAN, TYP.

100-YEAR FLOOD ELEVATION 91.27

2.0m WIDE DEPRESSED CURB

4.0m 525mmø PVC @ 0.5% SLOPE C/W PIPE INSULATION SEE DETAIL ON DWG.SG-1

PROPOSED PAVEMENT STRUCTURE SEE DETAIL ON THIS PLAN

CB2 T/G 92.05 NE INV. 91.44

17.1m 250mmø PVC @0.5% SLOPE C/W PIPE INSULATION SEE DETAIL ON DWG.SG-1

30.0m 300mmø PVC @0.5% SLOPE C/W PIPE INSULATION SEE DETAIL ON DWG.SG-1

MAX 3:1, ALL DISTURBED AREAS TO BE REINSTATED WITH 100mm TOPSOIL AND HYDROSEED

28.7m 375mmø PVC @0.5% SLOPE C/W PIPE INSULATION SEE DETAIL ON DWG.SG-1

0.15m HIGH INTERLOCK MEDIAN COMPLETELY SURROUNDED WITH BARRIER CURB TO CITY OF OTTAWA DETAIL SC1.1, WITH BOTH ENDS DEPRESSED AND C/W TACTILE WALKING SURFACE INDICATOR COMPONENT EMBEDDED IN CONCRETE AS PER CITY OF OTTAWA DETAIL SC 7.3

CB3 T/G 92.15 N INV. 91.50

CB4 T/G 92.15 NW INV. 91.49

EXISTING TREES TO BE PROTECTED DURING CONSTRUCTION, TYP.

TREE PROTECTION FENCE AS PER LANDSCAPING PLAN, TYP.

CONCRETE BARRIER CURB TO CITY OF OTTAWA DETAIL SC1.1 SEE DETAIL ON DWG DET-1

PROPOSED SAFETY FENCE, REFER TO LANDSCAPE PLAN FOR DETAILS

PROPOSED GENERATOR (SEE ELECTRICAL PLANS FOR DETAILS)

RELOCATED EXISTING PAVILLION

PROPOSED PLAYGROUND

ANY DISTURBED LANDSCAPED AREA TO BE STABILIZED WITH 100mm TOPSOIL AND HYDROSEED

MAX 3:1 SLOPE ALL DISTURBED AREAS TO BE REINSTATED WITH 100mm TOPSOIL AND SEED.

SEE DWG. SG-1

LEGEND

- PROPERTY BOUNDARY
- BOTTOM OF DITCH AND FLOW DIRECTION
- × 262.25 EXISTING ELEVATION
- × 262.25(ME) PROPOSED ELEVATION MATCH EXISTING
- × 262.25(SW) BOTTOM OF SWALE ELEVATION
- PROPOSED ASPHALT
- PROPOSED INTERLOCK WALKWAY

DISCLAIMER AND COPYRIGHT

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LEGAL AND TOPOGRAPHIC SURVEY COMPLETED BY ANNIS, O'SULLIVAN VOLLEBEKK LTD. ONTARIO LAND SURVEYOR, ON MAY 11, 2023.

ELEVATION SHOWN ARE GEODETIC AND ARE REFERRED TO CGVD28 GEODETIC DATUM.

TBM1: TOP OF PROPERTY IRON BAR LOCATED ON SOUTHEAST OF THE PROPERTY, ELEVATION 91.86.

No.	REVISION DESCRIPTION	DATE
2.	RE-ISSUED FOR SITE PLAN APPROVAL	JUL 2025
3.	RE-ISSUED FOR SITE PLAN APPROVAL	AUG 2025
4.	RE-ISSUED FOR SITE PLAN APPROVAL	APR 2026
5.	ISSUED FOR BUILDING PERMIT	JULY 2026
6.	RE-ISSUED FOR SITE PLAN APPROVAL	JULY 2026

ENGINEER STAMP

LICENSED PROFESSIONAL ENGINEER J.R. ASH 100123062 PROVINCE OF ONTARIO

1981 CENTURY RD. WEST
CITY OF OTTAWA
BRUNSTAD CHRISTIAN CHURCH OTTAWA

TATHAM ENGINEERING

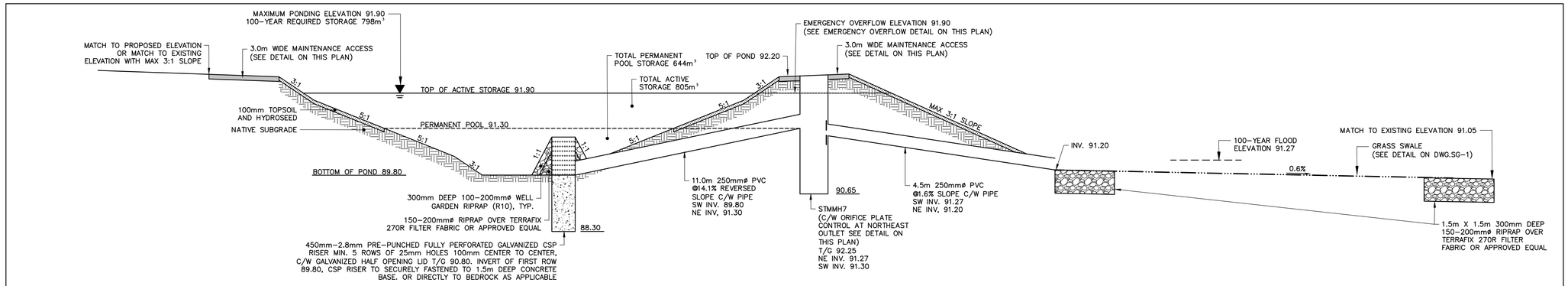
SITE GRADING AND SERVICING PLAN

DESIGN: HY	FILE: 523654	DWG: SG-2
DRAWN: HY	DATE: SEPT 2024	
CHECK: GC	SCALE: 1:300	

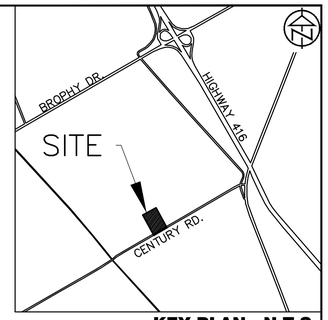
D07-12-25-0033

APPLICATION#

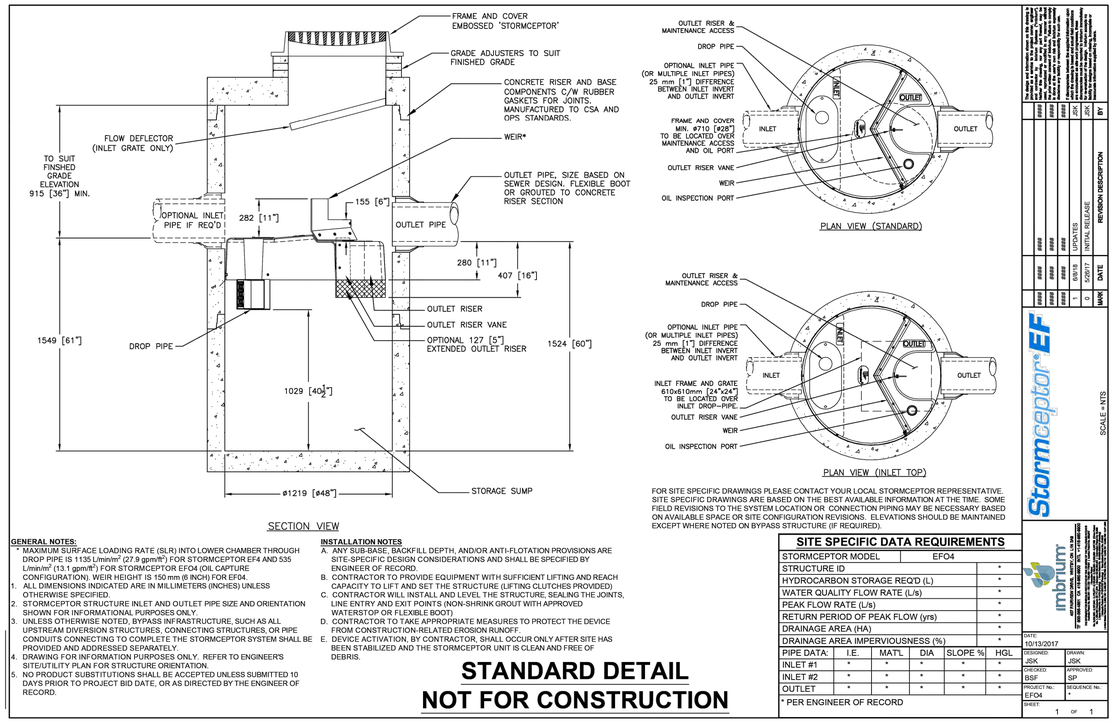
Drawing Name: 523654-SG01.dwg, Plotted: Jul 31, 2026



WET POND DETAIL
SCALE: NTS



KEY PLAN - N.T.S.



MARK	DATE	REVISION DESCRIPTION	BY
####	####	####	####
####	####	####	####
####	####	####	####
1	6/8/18	UPDATES	JSK
0	5/26/17	INITIAL RELEASE	JSK

FOR SITE SPECIFIC DRAWINGS PLEASE CONTACT YOUR LOCAL STORMCEPTOR REPRESENTATIVE. SITE SPECIFIC DRAWINGS ARE BASED ON THE BEST AVAILABLE INFORMATION AT THE TIME. SOME FIELD REVISIONS TO THE SYSTEM LOCATION OR CONNECTION PIPING MAY BE NECESSARY BASED ON AVAILABLE SPACE OR SITE CONFIGURATION REVISIONS. ELEVATIONS SHOULD BE MAINTAINED EXCEPT WHERE NOTED ON BYPASS STRUCTURE (IF REQUIRED).

SITE SPECIFIC DATA REQUIREMENTS

STORMCEPTOR MODEL	EFO4
STRUCTURE ID	*
HYDROCARBON STORAGE REQ'D (L)	*
WATER QUALITY FLOW RATE (L/s)	*
PEAK FLOW RATE (L/s)	*
RETURN PERIOD OF PEAK FLOW (yrs)	*
DRAINAGE AREA (HA)	*
DRAINAGE AREA IMPERVIOUSNESS (%)	*

PIPE DATA:	I.E.	MAT'L	DIA	SLOPE %	HGL
INLET #1	*	*	*	*	*
INLET #2	*	*	*	*	*
OUTLET	*	*	*	*	*

* PER ENGINEER OF RECORD

GENERAL NOTES:

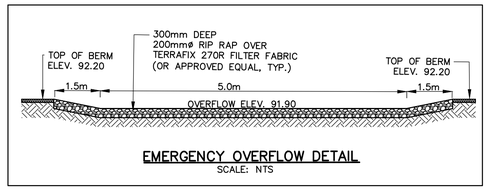
* MAXIMUM SURFACE LOADING RATE (SLR) INTO LOWER CHAMBER THROUGH DROP PIPE IS 1135 L/min/m² (27.9 gpm/ft²) FOR STORMCEPTOR EF4 AND 535 L/min/m² (13.1 gpm/ft²) FOR STORMCEPTOR EFO4 (OIL CAPTURE CONFIGURATION). WEIR HEIGHT IS 150 mm (6 INCH) FOR EF04.

1. ALL DIMENSIONS INDICATED ARE IN MILLIMETERS (INCHES) UNLESS OTHERWISE SPECIFIED.
2. STORMCEPTOR STRUCTURE INLET AND OUTLET PIPE SIZE AND ORIENTATION SHOWN FOR INFORMATIONAL PURPOSES ONLY.
3. UNLESS OTHERWISE NOTED, BYPASS INFRASTRUCTURE, SUCH AS ALL UPSTREAM DIVERSION STRUCTURES, CONNECTING STRUCTURES, OR PIPE CONDUITS CONNECTING TO COMPLETE THE STORMCEPTOR SYSTEM SHALL BE PROVIDED AND ADDRESSED SEPARATELY.
4. DRAWING FOR INFORMATION PURPOSES ONLY. REFER TO ENGINEER'S SITE/UTILITY PLAN FOR STRUCTURE ORIENTATION.
5. NO PRODUCT SUBSTITUTIONS SHALL BE ACCEPTED UNLESS SUBMITTED 10 DAYS PRIOR TO PROJECT BID DATE, OR AS DIRECTED BY THE ENGINEER OF RECORD.

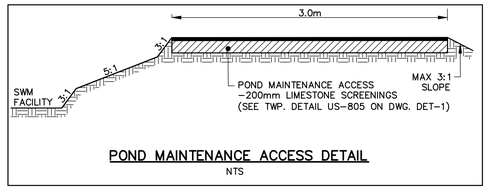
INSTALLATION NOTES

A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STRUCTURE (LIFTING CLUTCHES PROVIDED)
C. CONTRACTOR WILL INSTALL AND LEVEL THE STRUCTURE, SEALING THE JOINTS, LINE ENTRY AND EXIT POINTS (NON-SHRINK GROUT WITH APPROVED WATERSTOP OR FLEXIBLE BOOT).
D. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT THE DEVICE FROM CONSTRUCTION-RELATED EROSION RUNOFF.
E. DEVICE ACTIVATION, BY CONTRACTOR, SHALL OCCUR ONLY AFTER SITE HAS BEEN STABILIZED AND THE STORMCEPTOR UNIT IS CLEAN AND FREE OF DEBRIS.

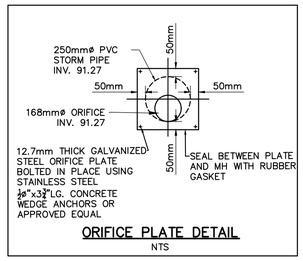
STANDARD DETAIL
NOT FOR CONSTRUCTION



EMERGENCY OVERFLOW DETAIL
SCALE: NTS



POND MAINTENANCE ACCESS DETAIL
NTS



ORIFICE PLATE DETAIL
NTS

DISCLAIMER AND COPYRIGHT

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LEGAL AND TOPOGRAPHIC SURVEY COMPLETED BY ANNIS, O'SULLIVAN VOLLEBEKK LTD. ONTARIO LAND SURVEYOR, ON MAY 11, 2023.

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ENGINEER STAMP

LICENSED PROFESSIONAL ENGINEER
J.R. ASH
100123062
PROVINCE OF ONTARIO

1981 CENTURY RD. WEST
CITY OF OTTAWA
BRUNSTAD CHRISTIAN CHURCH OTTAWA

TATHAM ENGINEERING

STORMWATER MANAGEMENT PLAN

DESIGN: HY	FILE: 523654	DWG: **SWM-1**
DRAWN: HY	DATE: SEPT 2024	
CHECK: GC	SCALE: AS SHOWN	

D07-12-25-0033

APPLICATION#

Drawing Name: 523654-SWM01.dwg, Plotted: Jul 31, 2026

1. STANDARDS AND DRAWINGS

A. THE NOTES ON THIS SHEET APPLY TO ALL WORKS UNDER THIS CONTRACT UNLESS OTHERWISE NOTED ON DRAWINGS AND/OR SPECIFIC DETAIL DRAWINGS.

B. THE STANDARDS OF THE CITY OF OTTAWA, ONTARIO PROVINCIAL STANDARDS AND SPECIFICATIONS (OPSS), THE ONTARIO PROVINCIAL STANDARDS DRAWINGS (OPSD) AND ELECTRICAL SAFETY AUTHORITY (ESA) CONSTITUTE PART OF THE PLANS OF THIS CONTRACT.

C. ORDER OF PRECEDENCE OF STANDARDS IS FIRSTLY CITY OF OTTAWA.

D. ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH OCCUPATIONAL HEALTH AND SAFETY ACT.

E. THE STANDARD DRAWINGS INCLUDED WITH THESE PLANS ARE PROVIDED FOR CONVENIENCE ONLY AND ARE NOT TO BE CONSTRUED TO BE A COMPLETE SET FOR THE PURPOSE OF THE CONTRACT. IT IS THE CONTRACTOR'S RESPONSIBILITY TO OBTAIN ALL RELEVANT STANDARD DRAWINGS AND SPECIFICATIONS AS REQUIRED FOR THIS CONTRACT.

2. MEASUREMENTS

A. ALL DIMENSIONS ARE IN METRES, EXCEPT PIPE AND STRUCTURE DIAMETERS, WHICH ARE IN MILLIMETRES.

B. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION. ANY DISCREPANCIES SHALL BE REPORTED IMMEDIATELY TO THE ENGINEER.

3. GENERAL

A. PIPES TO BE CONSTRUCTED WITH BEDDING, COVER AND BACKFILL OR EMBEDMENT AND BACKFILL CONFORMING TO OPSD 802.010, 802.013, 802.014, 802.030, 802.031, 802.032, 802.033 AND 802.034 AS APPLICABLE BASED ON PIPE MATERIAL AND SOIL CONDITIONS, BEDDING, COVER, AND EMBEDMENT MATERIALSHALL BE GRANULAR 'A'. EMBEDMENT, BEDDING, COVER AND BACKFILL MATERIAL TO BE COMPACTED TO A DRY DENSITY OF AT LEAST 100% OF THE MATERIALS SPMDD. IN WET AREAS EMBEDMENT MATERIAL TO BE 9.5 MM CLEAR LIMESTONE WRAPPED IN AN APPROVED GEOTEXTILE (TERRAFIX 270R OR APPROVED EQUIVALENT).

B. ALL DISTURBED AREAS ARE TO BE REINSTATED TO THEIR ORIGINAL CONDITION OR BETTER, AS DETERMINED BY THE CITY ENGINEERING DEPARTMENT. ALL DISTURBED AREAS WITHIN THE CITY RIGHT-OF-WAY TO BE SODDED.

C. EXISTING SERVICES AND UTILITIES SHOWN ON THESE CONTRACT DRAWINGS ARE APPROXIMATE ONLY. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING ALL UTILITIES DURING CONSTRUCTION.

D. EXISTING BELL DUCT BANKS, HYDRO BANKS AND GAS MAINS IN PAVEMENT OR BOULEVARD (AS LOCATED BY UTILITY PROVIDER) TO BE EXPOSED AT CONTRACTORS COST PRIOR TO INSTALLATION OF SANITARY OR STORM SEWER, CULVERTS, WATERMAIN OR SERVICES WHICH CROSS DUCT BANK OR GAS MAINS. ALL UTILITY DUCT BANKS ARE TO BE PROPERLY SUPPORTED WHEN SEWERS OR SERVICES ARE INSTALLED UNDERNEATH. SPACE BETWEEN DUCT BANK AND SEWER OR SERVICE TO BE BACKFILLED WITH UNSHRINKABLE FILL.

E. THE CONTRACTOR IS RESPONSIBLE TO PROVIDE TEMPORARY SUPPORT OF EXISTING CULVERTS, SEWER AND WATERMAIN AT ALL CROSSINGS.

F. THE CONTRACTOR SHALL OBTAIN ROAD OCCUPANCY AND ACCESS PERMITS FOR ALL WORK IN THE MUNICIPAL ROW. THE PERMIT(S) OBTAINED SHALL BE TAKEN OUT IN THE NAME OF THE CONTRACTOR.

G. THE CONTRACTOR SHALL PROTECT SURVEY MONUMENTS AND BENCHMARKS ENCOUNTERED DURING THE WORK. ALL SURVEY MONUMENTS AND BENCHMARK DISTURBED DURING CONSTRUCTION SHALL BE REPLACED BY AN ONTARIO LAND SURVEYOR, AT THE CONTRACTOR'S EXPENSE.

H. CONTRACTOR TO SUBMIT SHOP DRAWINGS FOR ALL MATERIALS TO CONTRACT ADMINISTRATOR FOR REVIEW PRIOR TO ORDERING.

I. THE CONTRACTOR IS REQUIRED TO CONFIRM EXISTING GRADES AND PIPE INVERTS AT CONNECTIONS AND REPORT ANY DISCREPANCIES TO THE CONTRACT ADMINISTRATOR BEFORE COMMENCING WORK.

J. THE CONTRACTOR SHALL SUPPLY ALL NECESSARY WATER AND/OR CALCIUM CHLORIDE AS REQUIRED FOR COMPACTION AND/OR DUST CONTROL.

K. TREES/SHRUBS THAT MUST BE REMOVED SHALL BE IDENTIFIED AND PERMISSION FOR REMOVAL SHALL BE OBTAINED FROM THE CONTRACT ADMINISTRATOR.

L. CONTRACTOR IS TO NOTIFY THE CITY OF ALL CONSTRUCTION ACTIVITIES A MINIMUM OF 72 HOURS PRIOR TO COMMENCEMENT OF CONSTRUCTION.

M. TRAFFIC CONTROL AND SIGNAGE DURING CONSTRUCTION SHALL CONFORM TO THE MOST CURRENT ONTARIO CONSTRUCTION REGULATIONS INCLUDING REGULATION No. 213 UNDER OHSA AND REFERENCE TO MTO TEMPORARY CONDITIONS MANUAL BOOK No. 7.

N. ALL EARTH GRADING TO OPSS 206.

O. EXCESS STOCKPILED OR UNSUITABLE MATERIALS TO BE DISPOSED OF BY THE CONTRACTOR AT AN APPROVED OFFSITE LOCATION IN ACCORDANCE WITH O.REG.406/19.

P. FOR THE DURATION OF THE CONTRACT. MATERIAL THAT BECOMES CONTAMINATED DUE TO CONTRACTOR'S ACTIVITY SHALL BE REMOVED AND REPLACED AT THE CONTRACTOR'S EXPENSE.

4. ENTRANCE, DRIVE AISLES AND PARKING AREAS

A. ALL TOPSOIL MUST BE STRIPPED FROM LANEWAY AND PARKING AREAS PRIOR TO CONSTRUCTION.

B. CONTRACTOR TO REMOVE ALL TOPSOIL AND ORGANIC MATERIAL LOCATED BELOW EXISTING FILL MATERIAL WITHIN THE LANEWAY AND PARKING AREAS. BACKFILL TO BE APPROVED ENGINEERED FILL OR NATIVE MATERIAL COMPACTED TO 95% SPMDD. THE SUBGRADE SHOULD BE COMPACTED. PROOF ROLLED AND INSPECTED BY A GEOTECHNICAL ENGINEER.

C. GRANULAR 'B' SUBBASE TO BE PLACED IN 150mm MAXIMUM LOOSE LIFT AND COMPACTED TO 98% OF MATERIAL'S SPMDD.

D. GRANULAR 'A' BASES TO BE PLACED IN 150mm MAXIMUM LOOSE LIFT AND COMPACTED TO 100% OF MATERIAL'S SPMDD.

E. ALL ASPHALT MATERIAL AND PLACEMENT TO BE IN ACCORDANCE WITH OPSS 310.

F. PAVEMENT AND GRANULAR STRUCTURES SHALL BE AS PER PAVEMENT STRUCTURE TABLE ON DRAWING SG-1 AND GEOTECHNICAL RECOMMENDATIONS.

G. FROST TREATMENT FOR ALL STORM SEWERS IN ACCORDANCE WITH OPSD 803.030.

H. BOULDER TREATMENT TO OPSD 204.010.

I. TRANSITION TREATMENT FOR EARTH/ROCK CUT/FILL OPERATIONS TO OPSD 205.010, 205.020, 205.040, 205.050 ACCORDINGLY.

5. STORM SEWER

A. PIPE MATERIAL TO BE PVC SDR 35 CERTIFIED TO C.S.A. STANDARDS B182.2 AND B182.4 OR CONCRETE REINFORCED PIPE, CONFORMING TO CSA STANDARD A257.1 WITH A STRENGTH AS INDICATED ON THE DRAWINGS OR APPROVED EQUIVALENTS. WHERE SPECIFIED, HDPE STORM SEWER TO BE CORRUGATED DOUBLE WALL PIPE CONFORMING TO CSA B1 82.8 AND WITH MIN. 320 KPA PIPE STIFFNESS.

B. ALL PIPE HANDLING AND INSTALLATION MUST BE IN STRICT COMPLIANCE WITH MANUFACTURERS INSTALLATION GUIDES AND THE UNIBELL GUIDELINES.

C. MAXIMUM DEFLECTION FROM COMBINED LINE AND DEAD LOADING SHALL NOT EXCEED ANY C.S.A., O.P.S. OR MANUFACTURERS RECOMMENDED SPECIFICATIONS.

D. SINGLE CATCHBASINS TO BE 600 mm SQUARE PRECAST CONCRETE TO OPSD 705.010. FRAME AND GRATE TO CITY OF OTTAWA DETAIL S19. 900mm SUMP. CATCHBASIN MAINTENANCE HOLE TO BE 1200mm# PRECAST CONCRETE TO OPSD 701.010 FRAME AND GRATE TO CITY OF OTTAWA DETAIL S28.1 500mm SUMP.

E. STORM SEWER WITH LESS THAN 2.0M COVER TO PIPE CROWN REQUIRES INSULATION AS PER DETAIL ON DWG SG-1 OR APPROVED EQUIVALENT.

F. TESTING OF STORM SEWERS SHALL INCLUDE:

-CCTV VIDEO INSPECTION
-FLUSHING AND CLEANING

G. PIPE SUPPORT AT ALL STRUCTURES TO OPSD 708.020.

H. IF SEPARATION BETWEEN STORM SEWER AND OTHER STRUCTURES, PIPE OR UTILITIES IS LESS THAN 0.3m, INSTALL 50mm HI-60 INSULATION AS DIRECTED BY THE ENGINEER.

I. ALL RIP RAP SHALL CONFORM WITH OPSD 810.010.

J. WHERE THE SERVICE TRENCH IS BELOW THE GROUNDWATER TABLE, CLAY SEALS SHALL BE PLACED NO MORE THAN 60.0m APART. CLAY SEALS SHALL BE 1.5m LONG IN THE TRENCH DIRECTION AND SHALL EXTEND FROM TRENCH WALL TO TRENCH WALL. CLAY SEALS TO BE PLACED IN MAXIMUM 225mm LOOSE LIFTS AND COMPACTED TO 95% OF THE MATERIALS SPMDD. CLAY SEAL TO BE IN ACCORDANCE WITH CITY DETAIL S8.

6. UTILITIES

A. LOCATION OF EXISTING UTILITIES ARE APPROXIMATE ONLY, ACTUAL LOCATION TO BE CONFIRMED BY CONTRACTOR.

B. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING LOCATES AND INFORMATION IN REGARD TO EXACT LOCATION OF BURIED UTILITIES AND INFRASTRUCTURE. THIS SHALL INCLUDE HYDRO VACUUM EXCAVATION IF NECESSARY. THE CONTRACTOR MUST EXERCISE NECESSARY CARE IN CONSTRUCTION OPERATIONS INCLUDING IF NECESSARY HAND DIGGING TO SAFEGUARD UTILITIES AND ALL OTHER BURIED INFRASTRUCTURE FROM DAMAGE. THE CONTRACTOR IS LIABLE FOR ALL DAMAGE TO UTILITIES AND ALL BURIED INFRASTRUCTURE OCCURRING WITHIN OR OUTSIDE THE CONTRACT LIMITS CAUSED BY HIS OPERATIONS.

C. ANY AREA OF POSSIBLE CONFLICTS WITH EXISTING UTILITIES SHALL BE EXCAVATED BY HAND PRIOR TO CONSTRUCTION.

D. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE TO GIVE 72 HOURS WRITTEN NOTICE TO UTILITY CORPORATIONS PRIOR TO CROSSING UTILITIES FOR THE PURPOSE OF INSPECTION BY THE CONCERNED CORPORATION. THIS INSPECTION WILL BE FOR THE DURATION OF CONSTRUCTION WITH THE CONTRACTOR RESPONSIBLE FOR ALL COSTS ARISING FROM SUCH INSPECTION.

7. CONSTRUCTION DEWATERING

A. THE CONTRACTOR IS RESPONSIBLE FOR ALL DEWATERING THAT MAY BE REQUIRED TO PRODUCE A DRY AND STABLE TRENCH FOR CONSTRUCTION OF THE WORKS. WORK TO BE IN ACCORDANCE WITH ONTARIO REGULATION 63/16, OPSS 518.

B. DURING NORMAL OPERATIONS, THE MAXIMUM VOLUME OF WATER TO BE DISCHARGED FROM THE DE-WATERING OPERATION ON A DAILY BASIS WITHOUT A MECP PERMIT TO TAKE WATER IS 400,000 L/DAY. FOR DE-WATERING BETWEEN 50,000L/DAY AND 400,000L/DAY THE CONTRACTOR IS REQUIRED TO REGISTER THE ACTIVITY ON THE EASR IN ACCORDANCE WITH O.REG. 63/16.

C. ALL WATER DISCHARGED FROM THE DEWATERING OPERATION SHALL BE DISCHARGED TO AN APPROVED OUTLET AS DETERMINED BY THE CONTRACT ADMINISTRATOR.

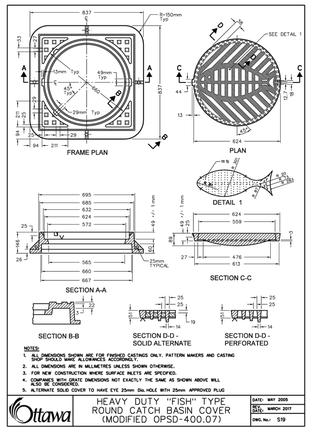
D. DEWATERING PUMPS SHALL DISCHARGE TO A GEOTEXTILE FILTER BAG LOCATED ON A GENTLY SLOPING GRASSED SURFACE TO THE APPROVED OUTLET.

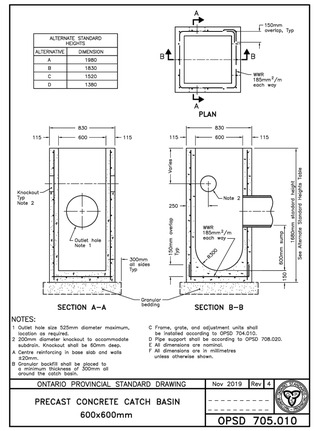
E. WHERE REQUIRED, SUPPLEMENTARY SEDIMENT AND EROSION CONTROL WORKS, SUCH AS SILT FENCE AND STRAW BALE CHECK DAMS, SHALL BE INSTALLED DOWN GRADIENT OF THE FILTER BAGS TO ENSURE DISCHARGE WATER IS FREE OF SEDIMENT AND TO PREVENT EROSION.

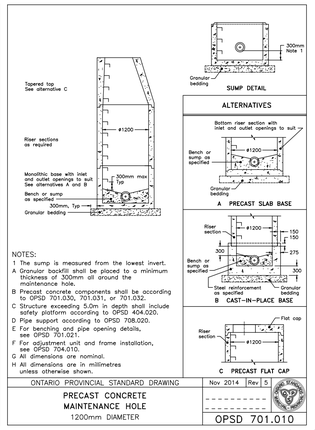
F. TO MINIMIZE THE VOLUME OF WATER TO BE REMOVED FROM EXCAVATIONS, THE WORK AREA SHALL BE GRADED TO DIRECT SURFACE RUNOFF AROUND AND AWAY FROM OPEN EXCAVATIONS.

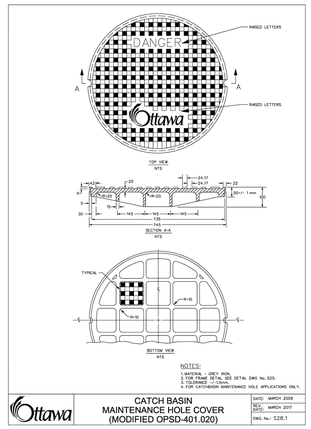
G. THE CONTRACTOR SHALL MEASURE AND RECORD, ON A DAILY BASIS, THE TOTAL VOLUME OF WATER DISCHARGED (L/DAY) AND THE AVERAGE DISCHARGE RATE (L/S). THE CONTRACTOR SHALL SUBMIT COPIES OF THE DEWATERING DISCHARGE FLOW RECORDS TO THE CONTRACT ADMINISTRATOR ON A WEEKLY BASIS OR UPON REQUEST. THE METHOD OF MEASURING THE VOLUME OF WATER DISCHARGED SHALL BE APPROVED BY THE CONTRACT ADMINISTRATOR PRIOR TO COMMENCING DEWATERING OPERATIONS.

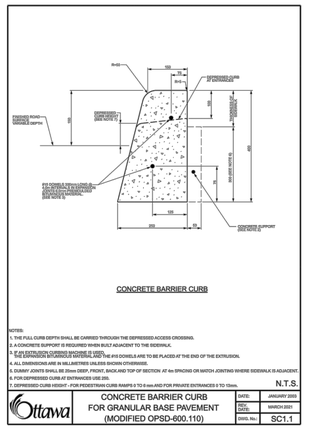
H. DEWATERING OPERATIONS ARE TO BE SUSPENDED DURING SEVERE STORM EVENTS.

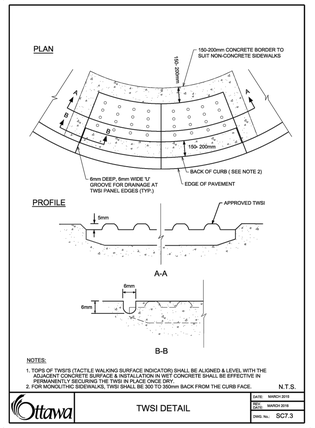


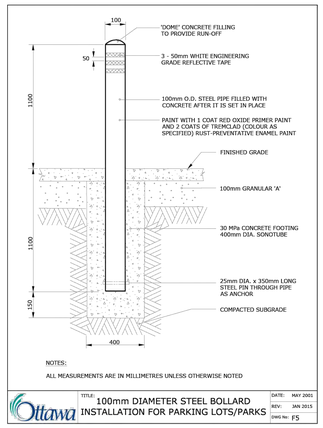


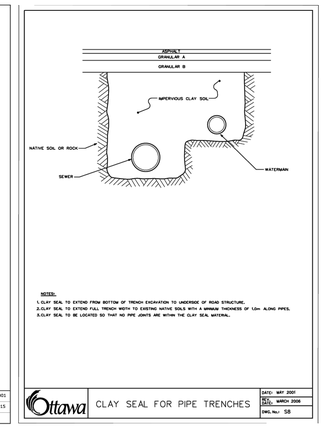


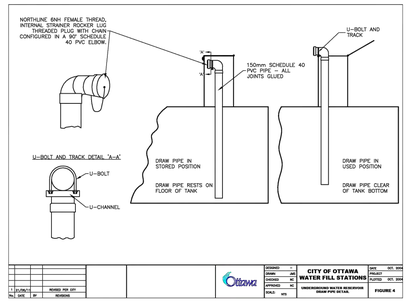


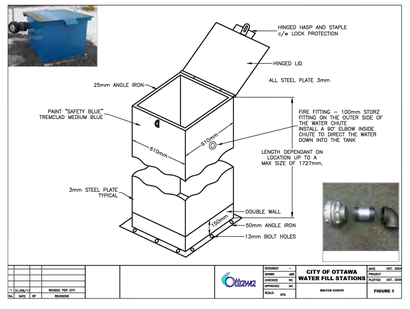


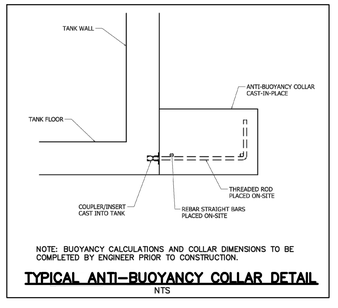


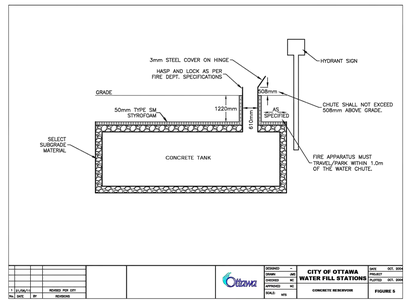


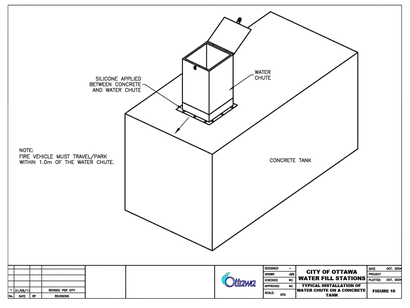












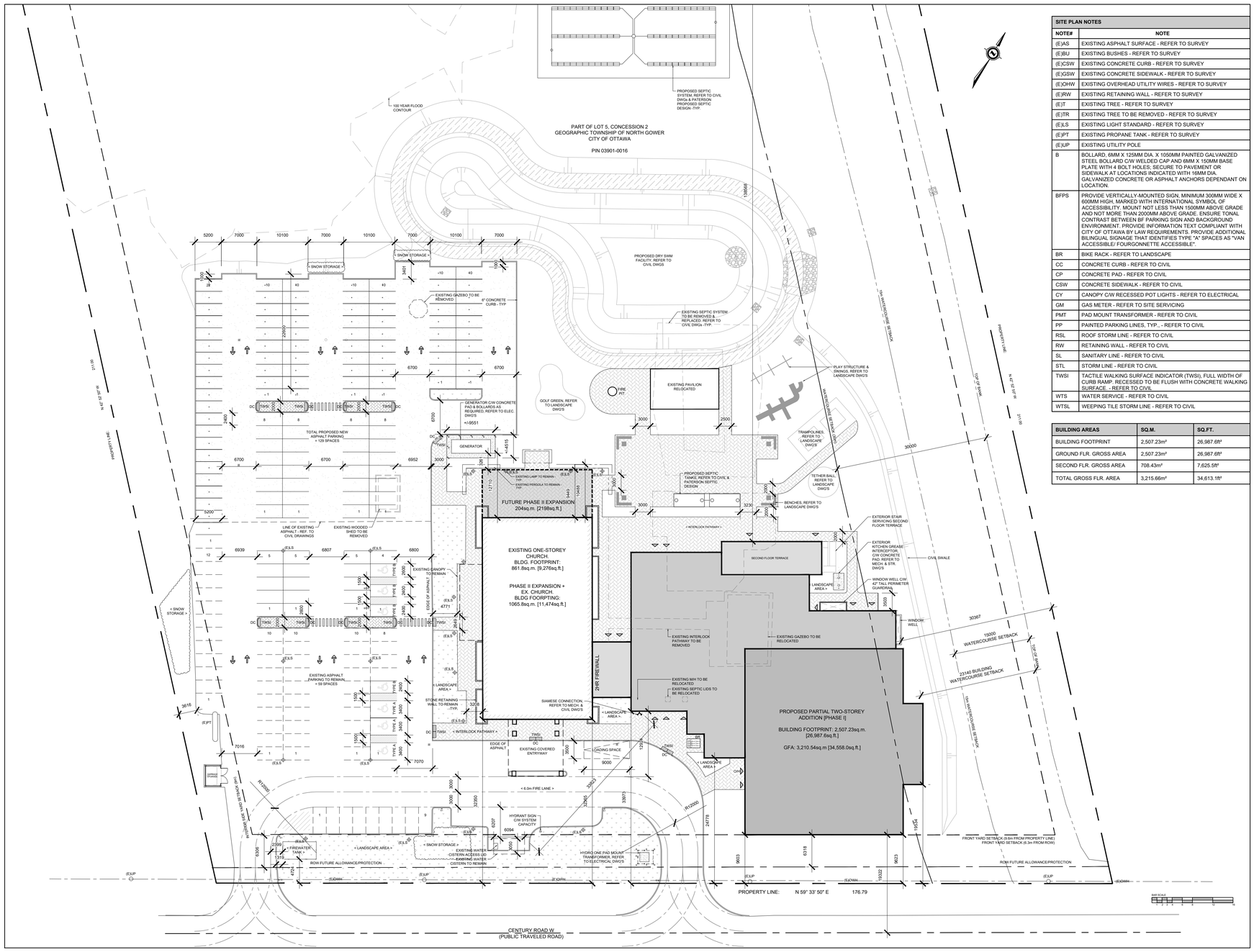
DISCLAIMER AND COPYRIGHT	No.	REVISION DESCRIPTION	DATE	ENGINEER STAMP	1981 CENTURY RD. WEST CITY OF OTTAWA BRUNSTAD CHRISTIAN CHURCH OTTAWA	TATHAM ENGINEERING
CONTRACTOR MUST VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME. ANY DISCREPANCIES MUST BE REPORTED TO THE ENGINEER BEFORE COMMENCING WORK. DRAWINGS ARE NOT TO BE SCALED. TATHAM ENGINEERING LIMITED CLAIMS COPYRIGHT TO THIS DRAWING WHICH MAY NOT BE USED FOR ANY PURPOSE OTHER THAN THAT PROVIDED IN THE CONTRACT BETWEEN THE OWNER/CLIENT AND THE ENGINEER WITHOUT THE EXPRESS CONSENT OF TATHAM ENGINEERING LIMITED.	2.	RE-ISSUED FOR SITE PLAN APPROVAL	JUL 2025	LICENSED PROFESSIONAL ENGINEER J.R. ASH 100123062 July 31, 2026 PROVINCE OF ONTARIO	NOTES AND DETAILS	DESIGN: HY / FILE: 523654 / DWG: DET-1 DRAWN: HY / DATE: SEPT 2024 CHECK: GC / SCALE:
	3.	RE-ISSUED FOR SITE PLAN APPROVAL	AUG 2025			
	4.	RE-ISSUED FOR SITE PLAN APPROVAL	APR 2026			
	5.	ISSUED FOR BUILDING PERMIT	JULY 2026			
	6.	RE-ISSUED FOR SITE PLAN APPROVAL	JULY 2026			

Drawing Name: 523654-DET01.dwg, Plotted: Jul 31, 2026

D07-12-25-0033

APPLICATION#

Appendix A:
Proposed Site Plan prepared by Lawrence Architect Inc.



SITE PLAN NOTES	
NOTE#	NOTE
(E)AS	EXISTING ASPHALT SURFACE - REFER TO SURVEY
(E)BU	EXISTING BUSHES - REFER TO SURVEY
(E)CSW	EXISTING CONCRETE CURB - REFER TO SURVEY
(E)GSW	EXISTING CONCRETE SIDEWALK - REFER TO SURVEY
(E)OHW	EXISTING OVERHEAD UTILITY WIRES - REFER TO SURVEY
(E)RW	EXISTING RETAINING WALL - REFER TO SURVEY
(E)T	EXISTING TREE - REFER TO SURVEY
(E)TR	EXISTING TREE TO BE REMOVED - REFER TO SURVEY
(E)LS	EXISTING LIGHT STANDARD - REFER TO SURVEY
(E)PT	EXISTING PROPANE TANK - REFER TO SURVEY
(E)UP	EXISTING UTILITY POLE
B	BOLLARD, 6MM X 125MM DIA. X 1050MM PAINTED GALVANIZED STEEL BOLLARD C/W WELDED CAP AND 6MM X 150MM BASE PLATE WITH 4 BOLT HOLES; SECURE TO PAVEMENT OR SIDEWALK AT LOCATIONS INDICATED WITH 16MM DIA. GALVANIZED CONCRETE OR ASPHALT ANCHORS DEPENDANT ON LOCATION.
BFPS	PROVIDE VERTICALLY-MOUNTED SIGN, MINIMUM 300MM WIDE X 600MM HIGH, MARKED WITH INTERNATIONAL SYMBOL OF ACCESSIBILITY. MOUNT NOT LESS THAN 1500MM ABOVE GRADE AND NOT MORE THAN 2000MM ABOVE GRADE. ENSURE TONAL CONTRAST BETWEEN BF PARKING SIGN AND BACKGROUND ENVIRONMENT. PROVIDE INFORMATION TEXT COMPLIANT WITH CITY OF OTTAWA BY LAW REQUIREMENTS. PROVIDE ADDITIONAL BILINGUAL SIGNAGE THAT IDENTIFIES TYPE "A" SPACES AS "VAN ACCESSIBLE/ FOURGONNETTE ACCESSIBLE".
BR	BIKE RACK - REFER TO LANDSCAPE
CC	CONCRETE CURB - REFER TO CIVIL
CP	CONCRETE PAD - REFER TO CIVIL
CSW	CONCRETE SIDEWALK - REFER TO CIVIL
CY	CANOPY C/W RECESSED POT LIGHTS - REFER TO ELECTRICAL
GM	GAS METER - REFER TO SITE SERVICING
PMT	PAD MOUNT TRANSFORMER - REFER TO CIVIL
PP	PAINTED PARKING LINES, TYP.. - REFER TO CIVIL
RSL	ROOF STORM LINE - REFER TO CIVIL
RW	RETAINING WALL - REFER TO CIVIL
SL	SANITARY LINE - REFER TO CIVIL
STL	STORM LINE - REFER TO CIVIL
TWSI	TACTILE WALKING SURFACE INDICATOR (TWSI), FULL WIDTH OF CURB RAMP. RECESSED TO BE FLUSH WITH CONCRETE WALKING SURFACE. - REFER TO CIVIL
WTS	WATER SERVICE - REFER TO CIVIL
WTSL	WEEPING TILE STORM LINE - REFER TO CIVIL

BUILDING AREAS	SQ.M.	SQ.FT.
BUILDING FOOTPRINT	2,507.23m²	26,987.6ft²
GROUND FLR. GROSS AREA	2,507.23m²	26,987.6ft²
SECOND FLR. GROSS AREA	708.43m²	7,625.5ft²
TOTAL GROSS FLR. AREA	3,215.66m²	34,613.1ft²

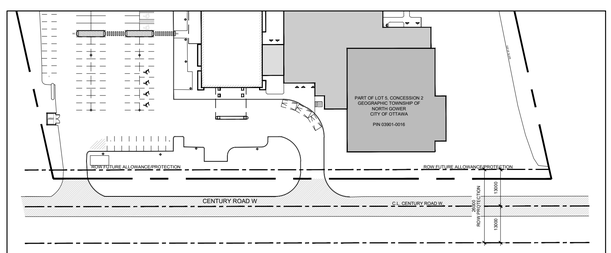
CITY OF OTTAWA ZONING BY-LAW

ZONING MECHANISM (RIS)	REQUIRED	PROVIDED
MINIMUM LOT WIDTH	75m	176.79m
MINIMUM LOT AREA	10,000m²	36,422.13m²
MAXIMUM BUILDING HEIGHT	12m	7.5m
MINIMUM FRONT YARD SETBACK	9.0m	9.6m FROM PROPERTY LINE 5.3m FROM ROW
MINIMUM REAR YARD SETBACK	10m	130m
MINIMUM INTERIOR YARD SETBACK	9.0m	30.4m/80m
MAXIMUM LOT COVERAGE	30%	6.9%
MINIMUM LANDSCAPED AREA	20%	70.5%
PROVIDED TOTAL LANDSCAPE AREA		25,670m²
WATERCOURSE SETBACK	30m	24.34m
PARKING PROVISIONS		
MINIMUM REQUIRED VEHICLE PARKING SPACES (AREA D ON SCHEDULE 1A) (COMMUNITY CENTRE / PLACE OF WORSHIP)	**EXISTING BUILDING** • CHURCH (PLACE OF WORSHIP): 861.8 m² • 10 SPACES PER 100m² GFA = 861.8/100 = 8.618 x 10 = 87 SPACES **PROPOSED ADDITION** • FLEX SPACE (COMMUNITY CENTER / PLACE OF ASSEMBLY): 1387.5 m² • 10 SPACES PER 100m² GFA = 1387.5/100 = 13.875 x 10 = 139 SPACES • CHURCH (PLACE OF WORSHIP): 587.7 m² • 10 SPACES PER 100m² GFA = 587.7/100 = 5.877 x 10 = 59 SPACES • TOTAL: 198 SPACES **PHASE II EXPANSION** • CHURCH (PLACE OF WORSHIP): 204 m² • 10 SPACES PER 100m² GFA = 204/100 = 2.04 x 10 = 20 SPACES **TOTAL** : 87 + 198 + 20 = 305 SPACES REQ.	188 SPACES PROVIDED
PROVIDED PARKING	REGULAR SPACES (EXISTING)	55
	REGULAR SPACES (NEW)	49
	ACCESSIBLE SPACE (TYPE A)	3
	ACCESSIBLE SPACE (TYPE B)	4
	COMPACT SPACES (50% OF PARKING SPACES: BY-LAW 2021-218, PART 4 - SECTION 106)	81
	TOTAL	172
BICYCLE PARKING REQUIRED	1 PER 1500 m² OF GFA = 3 SPACES	3
MINIMUM DRIVEWAY WIDTH	PARKING LOT: 6.0m	6.0m
MINIMUM AISLE WIDTH	PARKING LOT: 6.0m	6.0m
MINIMUM PARKING SPACE DIMENSIONS	LENGTH: 5.2m WIDTH: 2.6m	LENGTH: 5.2m WIDTH: 2.6m
	UP TO 50% OF REQUIRED PARKING SPACES MAY BE 4.6m x 2.4m	50% (94 SPACES PERMITTED) = 81 SPACES

01 / A1.0 PROPOSED SITE PLAN
SCALE: 1:400

LEGEND

O/H	NEW OVERHEAD DOOR	S#	NEW SIGN, REFER TO SIGN LEGEND	TWO WAY TRAFFIC	MINIMUM SETBACKS (ZONING)
	NEW DOOR / ENTRANCE	S1	FIRE ROUTE SIGN	DEPRESSED CURB (DC)	NEW CONSTRUCTION
	BICYCLE PARKING SPACE (1.8Mx0.6M)	SL	STREET LIGHT	TACTILE WALKING SURFACE INDICATORS (TWSIs)	EXISTING BUILDINGS
	NO PARKING LINES		DESIGNATED ACCESSIBLE PARKING SPACE AS PER AODA STANDARDS	PROPERTY LINE	SOFT LANDSCAPING
#	PARKING STALL COUNT PER ROW	V	VISITOR PARKING	PROPOSED FENCE	CONCRETE SIDEWALK
				* COMPACT PARKING SPACES	BUILDING MOUNTED LIGHTS REFER TO ELECTRICAL DWGs



KEY PLAN — 26.0m REQUIRED ROW PROTECTION

CLIENT NAME:

BCCO BRUNSTAD CHRISTIAN CHURCH

NOTES:

1) ALL WORK TO BE IN COMPLIANCE WITH LOCAL BUILDING CODES, REGULATIONS AND BY-LAWS.

2) ADDITIONAL DRAWINGS MAY BE ISSUED FOR CLARIFICATION TO ASSIST PROPER EXECUTION OF WORK. SUCH DRAWINGS WILL HAVE THE SAME MEANING AND INTENT AS IF THEY WERE INCLUDED WITH PLANS IN CONTRACT DOCUMENTS.

3) DO NOT SCALE DRAWINGS.

4) ALL SUB-CONTRACTORS TO TAKE THEIR OWN ON-SITE MEASUREMENTS AND BE RESPONSIBLE FOR THEIR ACCURACY.

5) NOTIFY SHAWN J. LAWRENCE ARCHITECT FOR ANY ERRORS AND/OR OMISSIONS PRIOR TO START OF WORK.

CONSULTANTS:

ARCHITECTURAL DRAWINGS

S.J. LAWRENCE ARCHITECT INC.
205-18 DEAKIN STREET, NEPEAN, ON K2E 8B7
613.739.7770

STRUCTURAL DRAWINGS

CLELAND JARDINE (BPA)
580 TERRY FOX DR, KANATA, ON K2L 4B9
613.591.1533

MECHANICAL & ELECTRICAL DRAWINGS

GOODKEY, WEEDMARK & ASSOCIATES LTD. (GWAL)
1688 WOODWARD DR. OTTAWA, ON K2C 3R8
613.727.5111

CIVIL DRAWINGS

TATHAM ENGINEERING
100-5335 CANOTEK RD, GLOUCESTER, ON K1J 9L4
613.747.3636

SEPTIC DRAWINGS

PATERSON GROUP
9 AURIGA DRIVE, OTTAWA,ON K2J 7T9
613.226.7381

LANDSCAPE DRAWINGS

VS LANDSCAPE GROUP
4886 BANK ST. OTTAWA, ON K1X 1G7
613.774.5296

URBAN PLANNER

Q9 PLANNING + DESIGN
43 ECCLES ST UNIT C, OTTAWA, ON K1R 6S3
613.850.8345

SEAL:

NORTH ARROW:

No.	DATE	REVISION
34	2026.05.11	ISSUED FOR COORDINATION
33	2026.04.10	ISSUED FOR COORDINATION
32	2026.01.28	ISSUED FOR COORDINATION
31	2025.12.09	ISSUED FOR COORDINATION
30	2025.11.11	ISSUED FOR COORDINATION
29	2025.10.27	ISSUED FOR COORDINATION
28	2025.09.30	ISSUED FOR REVIEW
27	2025.08.21	ISSUED FOR SPC RESPONSE 01
26	2025.08.06	ISSUED FOR COORDINATION
25	2025.07.02	ISSUED FOR COORDINATION
24	2025.05.08	ISSUED FOR COORDINATION
22	2025.03.12	ISSUED FOR SPC
19	2024.12.05	ISSUED FOR COORDINATION
18	2024.08.29	ISSUED FOR COORDINATION

S.J.LAWRENCE ARCHITECT INCORPORATED
18 DEAKIN STREET
SUITE 205
OTTAWA, ONTARIO
K2E 8B7
T: (613) 739.7770
F: (613) 739.7703
sjl@sjlarchitect.com

PROJECT:
BCCO CHURCH ADDITION
1981 CENTURY RD W, NORTH GOWER, ON

SHEET TITLE:
PROPOSED SITE PLAN

DRAWN BY: D.T. | CHECKED BY: B.L.
PLOT DATE: 2026.05.11 | PROJECT DATE: 2023.03.15
JOB NUMBER: SL-1090-23 | SCALE: 1:400
SHEET NUMBER: A1.0

D01-12-25-0033

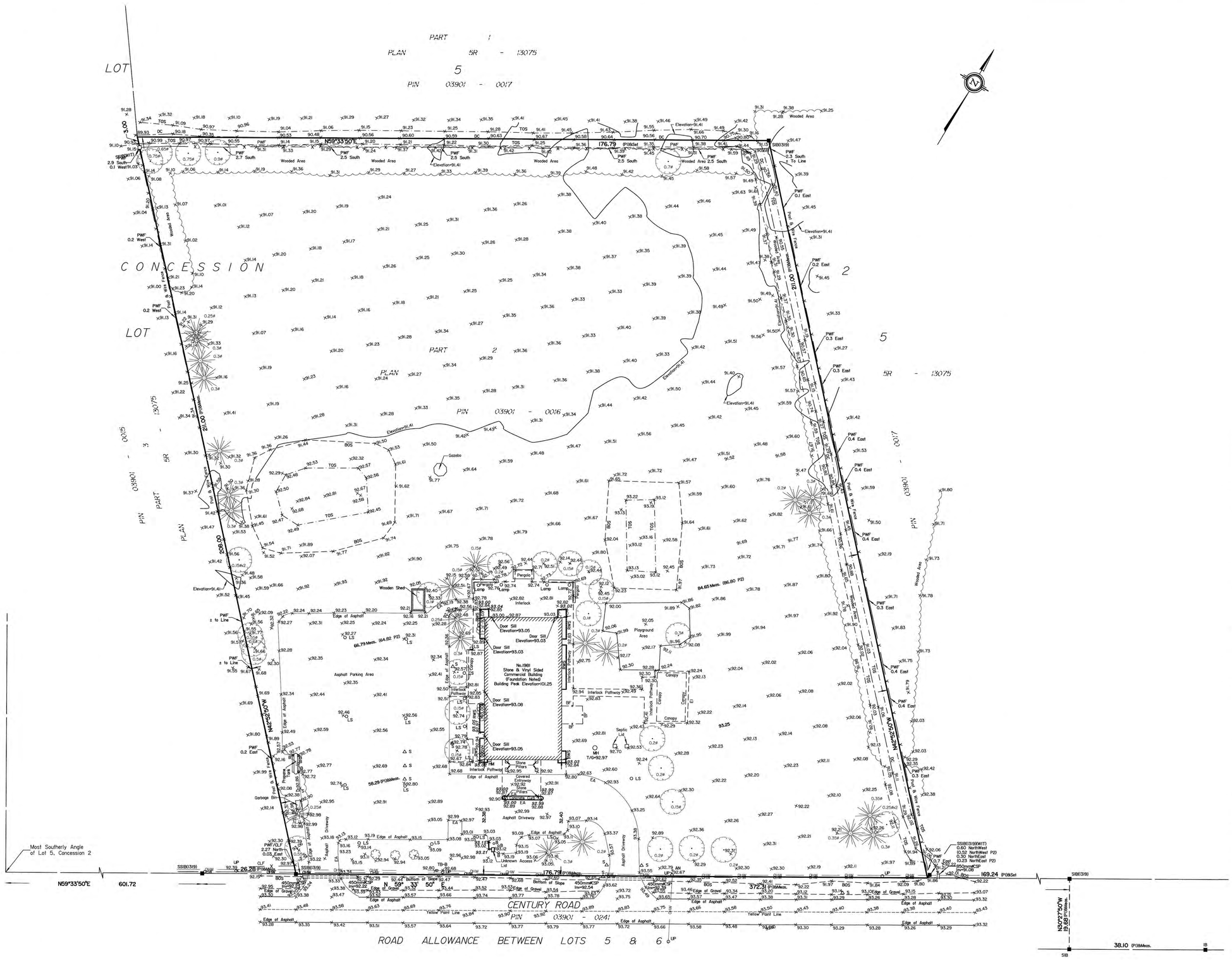
APPLICATION #

Appendix B:
Topographic Survey prepared by Annis, O'Sullivan, Vollebekk Ltd.

TOPOGRAPHIC PLAN OF SURVEY OF

PART OF LOT 5
CONCESSION 2
GEOGRAPHIC TOWNSHIP OF NORTH GOWER
CITY OF OTTAWA

Surveyed by Annis, O'Sullivan, Vollebekk Ltd.



Scale 1 : 500

20 15 10 5 0 10 20 Metres

Metric

DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

Surveyor's Certificate

I CERTIFY THAT :

1. This survey and plan are correct and in accordance with the Surveys Act and the Surveyors Act and the regulations made under them.
2. The survey was completed on the 10th day of May, 2023.

May 11, 2023
Date

T. Hartwick
Ontario Land Surveyor

ASSOCIATION OF ONTARIO LAND SURVEYORS
PLAN SUBMISSION FORM
V-45086

THIS PLAN IS NOT VALID UNLESS IT IS AN EMBOSSED ORIGINAL COPY ISSUED BY THE SURVEYOR In accordance with Regulation 1026, Section 29 (3).

Notes & Legend

Denotes		
—□—	=	Survey Monument Planted
—■—	=	Survey Monument Found
SIB	=	Standard Iron Bar
SSIB	=	Short Standard Iron Bar
IB	=	Iron Bar
(WIT)	=	Witness
Meas.	=	Measured
(AOG)	=	Annis, O'Sullivan, Vollebekk Ltd.
(P1)	=	Plan 5R-13075
(P2)	=	(1697) Plan Dated November 4, 1994
	=	Deciduous Tree
	=	Coniferous Tree
OHW	=	Overhead Wires
CSP	=	Corrugated Steel Pipe
GV	=	Gas Valve
HM	=	Hydro Meter
TB-B	=	Bell Terminal Box
B	=	Bollard
S	=	Sign
CLF	=	Chain Link Fence
BF	=	Board Fence
PWF	=	Post and Wire Fence
TOS	=	Top of Slope
BOS	=	Bottom of Slope
DC	=	Ditch Centreline
EA	=	Edge of Asphalt
EC	=	Edge of Concrete
RWS	=	Stone Retaining Wall
UP	=	Utility Pole
AN	=	Anchor
LS	=	Light Standard
ø	=	Diameter
+ 65.00	=	Location of Elevations
+ 65.00	=	Top of Concrete Curb Elevation and Retaining Wall Elevation
	=	Property Line
	=	Shrub
EI	=	Edge of Interlock
MH	=	Maintenance Hole (Unidentified)

Bearings are grid, derived from Can-Net 2016 Real Time Network GPS observations and are referenced to Specified Control Points 01919791338 and 01919871649, MTM Zone 9 (76°30' West Longitude) NAD-83 (original).

For bearing comparisons, a rotation of 0°31'00" counter-clockwise was applied to bearings on plan (P1).

ELEVATION NOTES

1. Elevations shown are geodetic and are referred to the CGVD28 geodetic datum.
2. It is the responsibility of the user of this information to verify that the job benchmark has not been altered or disturbed and that it's relative elevation and description agrees with the information shown on this drawing.

UTILITY NOTES

1. This drawing cannot be accepted as acknowledging all of the utilities and it will be the responsibility of the user to contact the respective utility authorities for confirmation.
2. Only visible surface utilities were located.
3. A field location of underground plant by the pertinent utility authority is mandatory before any work involving breaking ground, probing, excavating etc

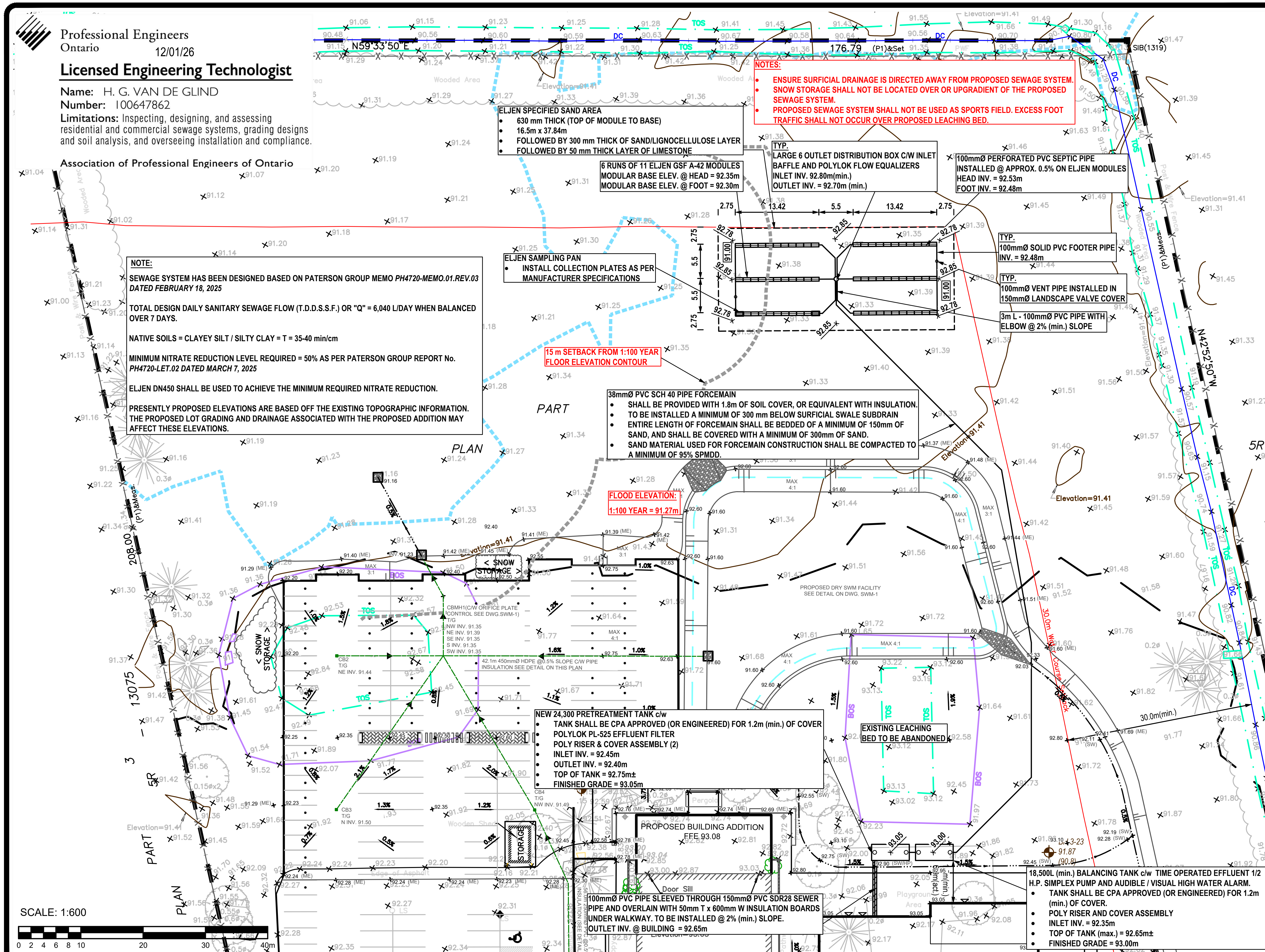
Topographic data was collected under Winter Conditions. Snow cover and ice preclude determining location and elevation of some topographical data that is otherwise visible.

Ontario Land Surveyors
ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
14 Concourse Gate, Suite 500
Nepean, Ont. K2E 7S6
Phone: (613) 727-0850 / Fax: (613) 727-1073
Email: Nepean@aovltd.com

Job No. 23827-23 BCOD PHJ5 CZ T DZ

F1

Appendix C:
Sewage System Documents prepared by Paterson Group Inc.



LEGEND:

⌖	Test Hole Location
x 100.99	Existing Ground Surface Elev. (m)
x 102.30	Proposed Ground Surface Elev. (m)
91.50	Proposed Subgrade Elev. (m)
(99.99)	Ground Water Elev. (m) - 17/07/23
T/C	Top of Foundation Wall
	Existing Structure
	Proposed Structure
	Existing Coniferous Tree
	Existing Deciduous Tree

All units are in meters unless otherwise specified.

REFERENCE:

Base Plan Information obtained from Proposed Site Plan A1.0, dated August 29, 2024, by Lawrence Architect Inc. and from Site Grading Plan No. SG-1, dated September 2024 by Tatham Engineering

DD/MM/YY	DESCRIPTION	REV.
12/01/26	Sewage System Location Revised	5
03/02/25	Issued with PH4720-MEMO.02	4
22/11/24	Proposed Grading Information Added	3
14/11/24	30m Setback Revised to Top of Bank	2
15/10/24	Proposed Grading Information Added	1
13/09/24	Issued for Preliminary Review	0

Consultant:

PATERSON GROUP
9 AURIGA DRIVE
OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

Client:

BRUNSTAD CHRISTIAN CHURCH

Project:

PROPOSED ADDITION TO EXISTING CHURCH

1981 CENTURY ROAD OTTAWA (CARP), ONTARIO

Drawing:

SEWAGE SYSTEM LAYOUT PLAN

Scale: 1:600	Drawn by: HV
Date: 01/2026	Checked by: MK

Drawing No.:

PH4720-1(rev.5)

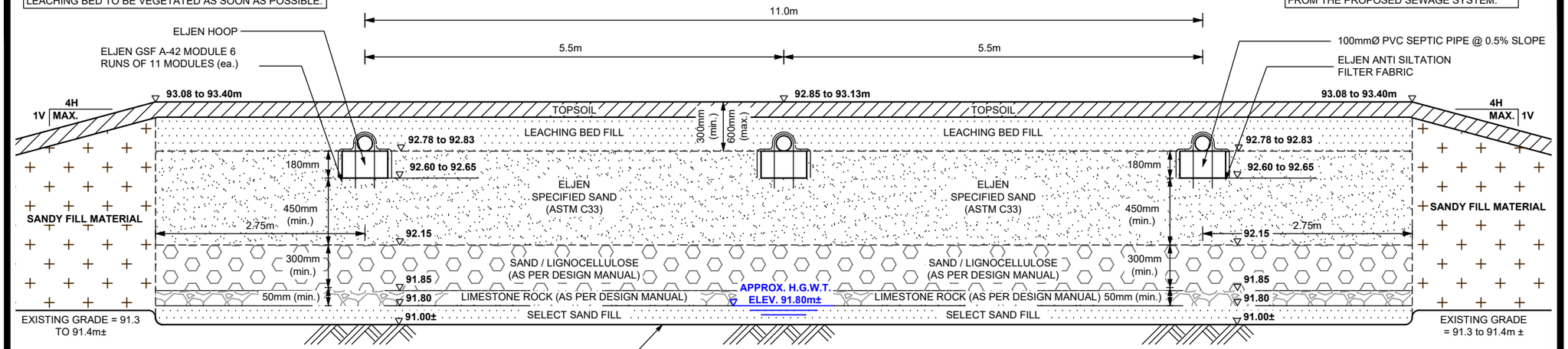
p:\autocad drawings\hydrogeology\ph47xx\ph4720\ph4720 - brunstad christian church - 1981 century road, ottawa\ph4720-1(rev.5).dwg

COVER MATERIAL TO CONSIST OF LEACHING BED FILL FOLLOWED BY APPROX. 100mm OF SANDY TOPSOIL. LEACHING BED TO BE VEGETATED AS SOON AS POSSIBLE.

SEWAGE SYSTEM LAYOUT AS PER PATERSON GROUP DRAWING No. PH4720-1(rev.5)

SEWAGE SYSTEM DESIGN, SPECIFICATION, DETAILS AND NOTES HAVE BEEN COMPLETED IN ACCORDANCE WITH ELJEN DENITRIFICATION SUPPLEMENTAL DESIGN AND INSTALLATION MANUAL.

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



STRIP ALL TOPSOIL AND ANY FILL MATERIAL WITHIN THE AREA OF THE PROPOSED LEACHING BED AND SUBEXCAVATE TO AT LEAST ELEV. 91.00m±. RE-ESTABLISH THE SPECIFIED CONTACT LEVEL USING SELECT SAND FILL, WHERE REQUIRED.

PROFILE

N.T.S.

NOTES:

) ESTIMATE OF DAILY SEWAGE FLOW (Q)

THE PROPOSED SEWAGE SYSTEM HAS BEEN DESIGNED TO SUPPORT A PLACE OF WORSHIP, CONSISTING OF AN EXISTING CHURCH WITH PROPOSED ADDITIONS. THE DAILY DESIGN SEWAGE FLOW RATE IS CALCULATED IN ACCORDANCE WITH O.B.C. TABLE 8.2.1.3.B. AND HAS BEEN CALCULATED AS PER PATERSON GROUP MEMO No. *PH4720-MEMO.01.REV.03 DATED FEBRUARY 18, 2025.*

PEAK DAILY FLOW = 8,100 L/DAY
BALANCED DESIGN SEWAGE FLOW = 6,040 L/DAY

2) SOIL CONDITIONS

SOILS INFORMATION GATHERED BY PATERSON GROUP INC. ON JULY 17, 2023. REFER TO PATERSON GROUP REPORT PG6727-1 FOR FULL SOILS BREAKDOWN.

BH 3-23, ELEV.91.87m		BH 4-23, ELEV. 92.03m	
0-0.30	TOPSOIL	0-0.30	TOPSOIL
0.30-2.29	BR. CLAYEY SILT, TR. SAND	0.30-2.59	BR. SILTY CLAY, TRACE TO SOME SAND
2.29-4.88	GR. CLAYEY SILT, TR. SAND	2.59-3.96	GREY CLAYEY SILT, TRACE SAND
4.88-6.71	GLACIAL TILL: SISA TO SASO	3.96-4.72	GREY SILTY SAND, TRACE CLAY
		4.72-6.1	GLACIAL TILL: SISA TO SASI
-	G.W.L. @ 1.10m DEPTH (90.8m)	-	G.W.L. @ 1.25m DEPTH (90.8m)

3) PRETREATMENT TANK

- TANK SHALL BE CONNECTED TO BUILDING BY A 100mm Ø PVC PIPE SLEEVED THROUGH A 150mmØ PVC SDR 28 PIPE AND OVERLAIN WITH 50mm T x 600mm W RIGID INSULATION BOARDS (UNDER WALKWAY) AND SHALL BE INSTALLED AT 2.0% (min.) SLOPE TO THE PRETREATMENT TANK.
- MINIMUM WORKING CAPACITY OF PRETREATMENT TANK = (3 x peak Q) = 3 x 8,100 L/DAY = 24,300 L (min.).
- *IN CONSIDERATION THAT THE DAILY FLOW IS A BALANCED DAILY FLOW RATE,* IT IS RECOMMENDED THAT A NEW 24,300L (min.), TWO-COMPARTMENT SEPTIC TANK BE INSTALLED.
- AN OBC APPROVED EFFLUENT FILTER (I.E. POLYLOK PL-525 EFFLUENT FILTER, OR EQUIVALENT) SHALL BE INSTALLED ON THE OUTLET PIPE IN THE PRETREATMENT TANK.
- THE ACCESS LIDS TO THE TANK OPENINGS SHALL BE EXTENDED TO THE GROUND SURFACE. INSTALL RISERS AND COVERS TO SUIT.
- ACCESS LIDS SHALL INCLUDE SAFETY DEVICES AS PER CSA B66-21.
- **IF THE SEWER OUTLET AT THE BUILDING IS AT A LOWER ELEVATION THAN ANTICIPATED, THE TANK COVER WILL REQUIRE REVIEW.**
- **TANK SHALL BE REVIEWED FOR BUOYANCY BY A QUALIFIED ENGINEER PRIOR TO INSTALLATION.**

4) BALANCING TANK

- INSTALL A 18,500L (min.) BALANCING TANK IN SERIES AND DOWNSTREAM FROM THE NEW PRETREATMENT TANK.
- A TIME OPERATED SIMPLEX 1/2 H.P. PUMPING SYSTEM AND A HIGH WATER ALARM SHALL BE INSTALLED IN THE BALANCING TANK.
- THE TIME OPERATIONAL PUMPING SYSTEM SHALL OPERATE EVERY 1/2 HOUR (I.E. 126 L/DOSE + VOLUME TO CHARGE THE SYSTEM).
- A 3mmØ DRAIN HOLE SHALL BE INSTALLED IN THE UNDERSIDE OF THE FORCEMAIN IN THE BALANCING TANK NEAR THE WALL CONNECTION.
- RISERS WITH A COVER SHALL BE INSTALLED OVER THE BALANCING TANK TO PROVIDE ACCESS FROM THE GROUND SURFACE.
- DISCHARGE PIPING FOR PUMP SHALL BE CONFIGURED SUCH THAT THE PUMP IS EASILY SERVICED FROM THE GROUND SURFACE.
- ACCESS LIDS SHALL INCLUDE SAFETY DEVICES AS PER CSA B66-21.

5) DISTRIBUTION BOX / FORCEMAIN

- A 38mmØ (NOMINAL) PVC SCH 40 FORCEMAIN SHALL BE USED TO CARRY THE EFFLUENT FROM THE BALANCING TANK TO THE 3m L x 100mm Ø PVC SEWER PIPE.
- 100mm SEWER PIPE SHALL DRAIN BY GRAVITY TO A LARGE 6 OUTLET DISTRIBUTION BOX.
- THE FORCE MAIN SHALL BE PROVIDED WITH 1.8m OF SOIL COVER OR EQUIVALENT RIGID INSULATION.
- THE DISTRIBUTION BOX SHALL BE EQUIPPED WITH AN INLET BAFFLE AND OUTLET PIPES (6).
- EACH PIPING RUN SHALL BE FED BY A 6 OUTLET DISTRIBUTION BOX.
- THE DISTRIBUTION BOX SHALL BE CONNECTED TO THE DISTRIBUTION PIPING RUNS USING 100mmØ SOLID PVC SEWER PIPE @ 2% (min.) SLOPE.

6) LEACHING BED SIZING CRITERIA

- NO. OF MODULES REQUIRED = Q/95 = 6,040/95 = 64 MODULES
- USE 6 RUNS OF 11 (66) ELJEN GSF A-42 MODULES EACH
- SAND AREA REQUIRED = QT/400 = 6,040(40)/400 = 604.0m²
- SAND AREA PROVIDED = 16.5m x 37.84m = 624.4m² (min.)

7) LEACHING BED CONSTRUCTION GUIDELINES

- REMOVE ALL EXISTING TOPSOIL AND ANY FILL MATERIAL WITHIN THE LIMITS OF THE SAND AREA AND SUBEXCAVATE TO AT LEAST ELEVATION 91.00m±, WHICHEVER IS GREATER. RE-ESTABLISH THE SPECIFIED CONTACT LEVEL USING SELECT SAND FILL, WHERE REQUIRED.
- THE SUBGRADE SURFACE SHALL BE SCARIFIED, UNDER **DRY** CONDITIONS.
- PLACE A 50mm MIN. THICK LAYER OF LIMESTONE ROCK OVER THE SUITABLY PREPARED SUBGRADE.
- LIMESTONE ROCK SHALL NOT BE SMALLER THAN 25mm IN DIAMETER AND UP TO 50mm IN DIAMETER. THE ROCK SHALL CONTAIN GREATER THAN 15% LIMESTONE AS PER ELJEN DENITRIFICATION SUPPLEMENTAL DESIGN AND INSTALLATION MANUAL.
- PLACE A 300mm THICK LAYER OF SAND / LIGNOCELLULOSE OVER THE LIMESTONE ROCK LAYER.
- SAND / LIGNOCELLULOSE SHALL CONSIST OF WOOD CHIPS OR SAW DUST FROM HARD WOOD TREES THAT HAVE NOT BEEN FURTHER PROCESSED BY CHEMICALS. THE 300mm SAND AND LIGNOCELLULOSE LAYER SHALL BE A MINIMUM OF 50/50 EQUAL MIXTURE OF ASTM C33 SAND AND WOOD CHIPS FROM HARD WOOD TREES. THE MIXTURE MUST NOT EXCEED 60/40 IN FAVOR OF THE MORE WOOD TO SAND.
- PLACE A 450mm MIN. THICK LAYER OF ELJEN SPECIFIED SAND FILL OVER THE SAND/LIGNOCELLULOSE FILL.
- THE ELJEN SPECIFIED SAND FILL SHALL CONSIST OF WASHED SAND MEETING THE REQUIREMENTS OF ASTM C33 "STANDARD SPECIFICATION FOR CONCRETE AGGREGATES" WITH LESS THAN THAN 5% PASSING 0.075mm SIEVE. ELJEN SPECIFIED SAND FILL SHALL BE PRE-APPROVED BY THE CONSULTANT.
- THE MODULES SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
- THE MODULES SHALL BE INSTALLED @ A 0.5% SLOPE, END TO END AND WITH THE WHITE DEMARCATION LINE FACING UP.
- THE MODULAR BASE LEVEL (ELEV. 92.65 AT THE HEAD AND 92.60m AT THE FOOT) SHALL BE ESTABLISHED WITH ELJEN SPECIFIED SAND FILL, HAVING A MINIMUM THICKNESS OF 150mm.
- THE ELJEN MODULES SHALL BE FED BY GRAVITY BY A 100mmØ PVC SEWER PIPE @ 2% (min.) SLOPE FROM THE DISTRIBUTION BOX TO BE OVERLAIN WITH 50mm T x 600mm W RIGID INSULATION BOARDS
- THE DISTRIBUTION PIPE SHALL CONSIST OF A 100mmØ PERFORATED PVC PIPE CENTRED OVER THE MODULES. THE PIPE SHALL BE SECURED TO THE TOP OF THE MODULES USING AN ELJEN HOOP (MINIMUM 1 HOOP PER MODULE).
- THE INVERT LEVEL OF THE DISTRIBUTION PIPE SHALL BE SET ON THE MODULES AT A 0.5% AT ELEVATION 92.83m AT THE HEAD AND 92.78m AT THE FOOT. THE END OF THE PIPE RUNS SHALL BE CONNECTED TO A 100mmØ SOLID PVC FOOTER PIPE
- INSTALL ELJEN SYSTEM SAMPLING DEVICE AS PER MANUFACTURER'S RECOMMENDATIONS.
- THE ELJEN ANTI-SILTATION FILTER FABRIC SHALL BE SPREAD LENGTHWISE OVER THE PERFORATED SEPTIC PIPE AND DOWN THE SIDES OF THE MODULES. ENSURE ENDS OF MODULES ARE ALSO COVERED WITH FABRIC.
- THE MODULES SHALL BE BACKFILLED, WITH ELJEN SPECIFIED SAND FILL TO AT LEAST THE TOP OF THE ELJEN MODULES, FOLLOWED BY 200mm (min.) TO 500mm (max.) OF LEACHING BED FILL, FOLLOWED BY 100mm OF SANDY TOPSOIL, WITHIN THE LIMITS OF THE SAND AREA. THE BED AREA SHOULD BE VEGETATED AS SOON AS POSSIBLE.
- THE SIDES OF THE BED SHOULD BE SLOPED AT 3H:1V OR SHALLOWER.
- VENT SYSTEM SHALL BE INSTALLED ON THE FOOTER PIPE. CONNECT A 100mmØ PVC VENT PIPE TO FOOTER PIPE, EXTENDING TO GROUND SURFACE. VENT PIPE TO BE INSTALLED IN 150mmØ LANDSCAPE VALVE COVER.

8) MINIMUM CLEARANCE DISTANCE FROM DISTRIBUTION PIPE

- 5.2m FROM ANY PROPERTY LINE
- 7.2m FROM ANY STRUCTURE: 5.0m FROM ANY BASEMENTLESS STRUCTURE
- 17.2m FROM ANY DRILLED WELL

9) 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

10) GENERAL

- WHEN THE INVERT OF A SEWER OUTLET PIPE AT THE PROPOSED BUILDING HAS BEEN CONFIRMED, THE TANKAGE SHALL BE PROPERLY REVIEWED BY A QUALIFIED ENGINEER FOR BUOYANCY AT THE TIME OF CONSTRUCTION.
- 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 EJLEN 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.
- INSPECTIONS BY THE CONSULTANT DURING THE INSTALLATION OF THE SYSTEM IS A REQUIREMENT OF SOME REGULATING AUTHORITIES AND IS STRONGLY RECOMMENDED BY THIS FIRM.
- 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 12/01/26

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.
12/01/26	Sewage System Location Revised	5
23/02/25	Issued with PH4720-MEMO.02	4
22/11/24	Proposed Grading Information Added	3
14/11/24	30m Setback Revised to Top of Bank	2
12/10/24	Proposed Grading Information Added	1
13/09/24	Issued for Preliminary Review	0

Consultant:

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

Client:

BRUNSTAD CHRISTIAN CHURCH

Project:

PROPOSED ADDITION TO EXISTING CHURCH

**1981 CENTURY ROAD
OTTAWA (CARP), ONTARIO**

Drawing:

SEWAGE SYSTEM DETAILS AND NOTES

Scale:	Drawn by:
N.T.S.	HV
Date:	**Checked by:**
01/2026	MK

Drawing No.:

PH4720-2(rev.5)

p:\autocad drawings\hydrogeology\ph47xx\ph4720 - brunstad christian church - 1981 century road, ottawa\ph4720-2(rev.5).dwg

PATERSON GROUP

memorandum

re: **Sewage System Sizing Exercise**
1981 Century Road - Ottawa
to: **Peter Twilley -** ptwilley@arrowservice.ca
date: February 18, 2025
file: PH4720-MEMO.01.REV.03

Paterson Group (Paterson) prepared the following Memorandum (memo) to summarize the findings of a Sewage System Sizing Exercise in support of a Site Plan application at 1981 Century Road.

Background

A Site Application has been proposed for the addition and renovation of the existing Church Building at 1981 Century Road. This Sewage System Sizing Exercise is based on the attached Brunstad Christian Church Ottawa Architectural Design Program Drawings as well as discussion with the client.

Proposed Development

The following is Paterson's summary of the proposed development taken from the attached Brunstad Christian Church Ottawa Architectural Design Program Drawings as well as discussion with the client:

- Church with space for 350 people: 1 service on Sunday (max 350 people), 1 service on Wednesday (100 people), and 1 service on Friday (100 people)
  - **Kitchen facilities are not intended for usage during typical weekly church services**
- Nursery: 1 use per week *during Sunday service only*
- Kitchen: 350 people once a month, 500 – 600 people *once every few years*
- Feast hall / Lobby: *few times a year for a few hours at a time*
- Multipurpose space: *used in conjunction with church*
- Youth Lounge (Mezzanine): *used once a week with Saturday night service*
- Seniors' area: once every 2 weeks for 2 hours
- Workshop: once a week *in conjunction with church service*
- Office with 2 desks and small meeting table: *once a week*
- Meeting & Seminar Rooms: *once a week in conjunction with church service*
- Gymnasium: *once per week on Friday evening*
- Sanctuary/Main Meeting Hall:
  - 150 people: *once a week*

Sewage System Flow Calculation

- Church with space for 350 people: 1 service on Sunday (max 350 people), 1 service on Wednesday (100 people), and 1 service on Friday (100 people)
  - **Kitchen facilities are not intended for usage during typical weekly church services**
  - *8.2.1.3.B. Item 2 a) 350 people x 8 L x 1 day = 2,800 L/week + 100 people x 8 L x 2 days = 1,600L/week*

- Nursery: 1 use per week during Sunday service
  - *Similar to 8.2.1.3.B. Item 18 c) 30 people x 30L x 1 day = 900 L/week*

- Kitchen: 350 people **once a month,** 500 – 600 people **once every few years**
  - *8.2.1.3.B. Item 12 i) 600 meals x 12L = 7,200 L/week*
  - **Flow is conservative as this occurs less than once per month.**

- Feast hall / Lobby: **few times a year** for a few hours at a time
  - *8.2.1.3.B. Item 2 b) For design purposes assume once per week – 80 people x 36 L x 1 day = 2,880 L/week:*
  - **Flow is conservative as this occurs less than once per week.**

- Multipurpose space: used in conjunction with church
  - *Accounted for in church services*

- Youth Lounge (Mezzanine used with coffee bar): used once a week with Saturday night service
  - *8.2.1.3.B. Item 2 b) 25 people x 36L x 1 day = 900 L/week*
  - **Flow is conservative as this is in conjunction with other church services.**

- Seniors' area: once every 2 weeks for 2 hours
  - *8.2.1.3.B. Item 2 b) 40 people x 36L days = 1,440 L/week*
  - **Flow is conservative as this occurs less than once per week.**

- Workshop: once a week in conjunction with church service
  - *Accounted for in church services*

- Offices and a small meeting room: once a week
  - *8.2.1.3.B. Item 15 b) (51.3msq / 9.3) x 75L x 1 day = 414 L/week*

- Meeting & Seminar Rooms: once a week in conjunction with church service
  - *Accounted for in church services*

- ❑ Gymnasium: once per week on Friday evening
  - *Similar to 8.2.1.3.B. Item 18 b) 80 people x 30L x 1 day = 2,400 L/week*

- ❑ Sanctuary/Main Meeting Hall Extension:
  - *8.2.1.3.B. Item 2 b)* 150 people once a week
    - *150 people x 36 L x 1 day = 5,400 L/week*

The total sewage system design flows for the proposed addition development calculated cumulatively over peak a week are: 414 L/week + 5,400 L/week + 800 L/week + 1,440 L/week + 800 L/week + 2,400 L/week + 7,200 L/week + 900 L/week + 2,800 L/week + 900 L/week = **23,054 L/week.**

Proposed Sewage systems flow using a Balancing Tank

In order to have a total daily design sewage flow volume (TDDSF) of less than 10,000 L/day, a balancing tank will be used. A balancing tank will distribute the daily sewage flow volumes over a week, allowing for a lower TDDSF. Should the sewage system design flow volume be over 10,000 L/day, then an Environmental Compliance Approval (ECA) application would be required. The sizing of the balancing tank will need to be calculated as part of a new sewage system design.

- ❑ Balanced Flows: 23,054 L/week / 7 days per week = **3,294 L/day**

In consideration that there may be events / uses anticipated outside of the above prescribed value that cannot be accurately calculated, a conservative value of 2,746 L/day has been added to the daily flow to account for these peak events for a cumulative balanced daily flow of **6,040 L/day**.

Peak Daily Use for Tankage Sizing

It is expected that the peak daily flow would be during a Sunday church service. During Sundays the peak flow would be on a day which a meal service is provided as follows: Kitchen @ 7,200 L + Nursery Use @ 900 L = 8,100 L. Considering that the Pretreatment tank shall be a minimum of 3 x (peak)Q = 24,300 L. The minimum balancing tank volume shall be a 1 x the (peak)Q = 8,100 L.

Weekly Usage Examples

The frequency of many events at the church is irregular. Examples of the anticipated flow volumes on a weekly basis are provided below for clarity. The maximum TDDSSF is 6,040 L/day. For large events that exceed 6,040 L/day, the excess volume that does not get dosed remains in the effluent tank. If the volume produced is less than the maximum daily dosing volume then the full volume is dosed and none remains in the effluent tank.

Table 1:

Week	Week 1 (Typical Week)						
Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Use	Office Use (414 L/ day)		1 Church Service: 100 people (800 L/day)		1 Church Service: 100 people (800 L/day)		1 Church Service: 350 people (2,800 L/day)
	Sanctuary Meeting Hall: 150 people (5,400 L/day)				Gymnasium Use: 80 people (2,400 L/day)	Service using Youth Lounge/ Mezzanine: 25 people (900 L/day)	Nursery used during service: 30 people (900 L/day)
Maximum Daily TDDSSF (L/day)	5,814	0	800	0	3,200	900	3,700
Proposed Daily Dosing Volume (L/day)	5,814	0	800	0	3,200	900	3,700
Volume Remaining in Effluent Tank (L)	0	0	0	0	0	0	0

Table 1: Example of TDDSSF during a typical week

Table 2:

Week	Week 2 (Bi-weekly Example)						
Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Use	Office Use (414 L/ day)		1 Church Service: 100 people (800 L/day)		1 Church Service: 100 people (800 L/day)		1 Church Service: 350 people (2,800 L/day)
	Sanctuary Meeting Hall: 150 people (5,400 L/day)		Seniors Area (2 hrs usage): 40 people (1,440 L/day)		Gymnasium Use: 80 people (2,400 L/day)	Service using Youth Lounge/ Mezzanine: 25 people (900 L/day)	Nursery used during service: 30 people (900 L/day)
Maximum Daily TDDSSF (L/day)	5,814	0	2,240	0	3,200	900	3,700
Proposed Daily Dosing Volume (L/day)	5,814	0	2,240	0	3,200	900	3,700
Volume Remaining in Effluent Tank (L)	0	0	0	0	0	0	0

Table 2: Example of TDDSSF on a bi-weekly basis

Table 3:

Week	Week 3 (Monthly to Quarterly Example)						
Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Use	Office Use (414 L/ day)		1 Church Service: 100 people (800 L/day)		1 Church Service: 100 people (800 L/day)		1 Church Service with Full Kitchen Use: 350 people (4,200 L/day)
	Sanctuary Meeting Hall: 150 people (5,400 L/day)		Feast Hall/ Lobby: 80 people (2,880 L/day)		Gymnasium Use: 80 people (2,400 L/day)	Service using Youth Lounge/ Mezzanine: 25 people (900 L/day)	Nursery used during service: 30 people (900 L/day)
Maximum Daily TDDSSF (L/day)	5,814	0	3,680	0	3,200	900	5,100
Proposed Daily Dosing Volume (L/day)	5,814	0	3,680	0	3,200	900	5,100
Volume Remaining in Effluent Tank (L)	0	0	0	0	0	0	0

Table 3: Example of TDDSSF on a monthly to quarterly basis

Table 4:

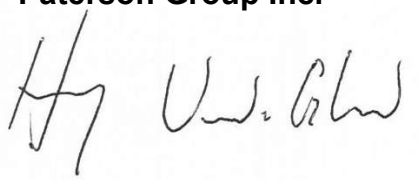
Week	Week 4 (Semi-annually to Annually Example)						
Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Use	Office Use (414 L/ day)		1 Church Service: 100 people (800 L/day)		1 Church Service: 100 people (800 L/day)	Full Kitchen Use: 500-600 people (7,200 L/day)	1 Church Service: 350 people (2,800 L/day)
	Sanctuary Meeting Hall: 150 people (5,400 L/day)		Seniors Area (2 hrs usage): 40 people (1,440 L/day)		Gymnasium Use: 80 people (2,400 L/day)	Service using Youth Lounge/ Mezzanine: 25 people (900 L/day)	Nursery used during service: 30 people (900 L/day)
Maximum Daily TDDSSF (L/day)	5,814	0	2,240	0	3,200	8,100	3,700
Proposed Daily Dosing Volume (L/day)	5,814	0	2,240	0	3,200	8,100	5,760
Volume Remaining in Effluent Tank (L)	0	0	0	0	0	2,060	0

Table 4: Example of TDDSSF on a semiannual to annual basis

We trust that this information satisfies your immediate requirements.

Best Regards,

Paterson Group Inc.



Hendrik Van De Glind
C.E.T.

Attachments:

- ❑ Brunstad Christian Church Ottawa Architectural Design Program Drawings

Appendix D: Domestic and Fire Flow Demand Calculations

TATHAM ENGINEERING

Water Demand Calculations

Tatham File No. : 523654
Project : 1981 Century road
Date : April 29, 2026
Designed by : DVF
Reviewed by : GC

Water Demands (OBC Type of Establishment Method)

Establishment	Max Day Population	Total Area (m^2)	Loading Rate (L/d)	Total Daily Demand (L/d)	Frequency
Gymnasium	80	-	30	2,400	once per week (Friday)
Youth Lounge	25	-	36	900	once per week (Saturday)
Church	350	-	36	12,600	once per week (Sunday)
Nursery	30	-	30	900	once per week (Sunday)
Offices	-	51.3	8.1	414	once per week (may alternate)
Seniors Area	40	-	36	1,440	once every two weeks (may alternate)
Feast Hall/Lobby	80	-	36	2,880	a few times per year
Kitchen	600	-	36	21,600	once every few years
Sanctuary/Main Meeting Hall	150	-	36	5,400	once every few years

Total Daily Demands During Worst Case Scenarios:

Fridays	7,134	L/d	(Gymnasium + Offices + Seniors Area + Feast Hall/Lobby)
Saturdays	5,634	L/d	(Youth Lounge + Offices + Seniors Area + Feast Hall/Lobby)
Sundays	18,234	L/d	(Church + Nursery + Offices + Seniors Area + Feast Hall/Lobby)
Largest Event	**27,000**	**L/d**	**(Kitchen+Main Meeting Hall) *Worst Case Scenario**

Instantaneous Flow Rate	**0.94**	**L/s**	**(Wort Case Scenario Total Daily Demand Over 8hr Period)**

TATHAM ENGINEERING

FUS Fire Flow Calculations (Proposed Building/East Addition)

Tatham File no. :	523654
Project:	1981 Century Road, Ottawa
Date:	29-Apr-26
Designed by:	DVF

$$RFF = 220C\sqrt{A}$$

Where:

RFF = the Required Fire Flow in litres per minutes (LPM)
C = the Construction Coefficient is related to the type of construction of the building
A = the Total Effective Floor Area (effective building area) in square metres of the building

Determine the Construction Coefficient (C)

1	Choose frame used for building	Coefficient C related to the type of construction	Type V Wood Frame Construction	1.5	Type II Noncombustible Construction	0.8		
			Type IV-A Mass Timber Construction	0.8				
			Type IV-B Mass Timber Construction	0.9				
			Type IV-C Mass Timber Construction	1.0				
			Type IV-D Mass Timber Construction	1.5				
			Type III Ordinary Construction	1.0				
			Type II Noncombustible Construction	0.8				
			Type I Fire Resistive Construction	0.6				

Determine Total Effective Floor Area (A)

2	The Construction coefficient is less than 1	TRUE	Are vertical openings in the building protected? (Per NBC Division B, Section 3.5. Vertical Transportation)		NO	Are the floor areas uniform throughout the building	NO	
	TRUE	Area of 2 largest adjoining floors	3210.54	Area of floors above 2 largest adjoining floors (up to a maximum of 8 floors)	0	Total Effective Area	3210.54	sq.m.

Determine the Required Fire Flow

3	Obtain Required Fire Flow	$RFF = 220C\sqrt{A}$	Required Fire Flow		10,000	L/min
					166.7	L/s

Reduction or Surcharge Due to Factors Affecting Burning

4	Choose combustibility of contents	Occupancy hazard reduction or surcharge	Non-combustible	-0.25	Limited combustible	-0.15		
			Limited combustible	-0.15				
			Combustible	0				
			Free burning	0.15			8,500	L/min
			Rapid burning	0.25			141.7	L/s
5	Choose reduction for sprinklers	Sprinkler reduction	Sprinklers conforming to NFPA13 (wet or dry system)	-0.30	YES	-0.3		
			Water supply is standard for both the system and fire department hose lines (siamese connection)	-0.10	YES	-0.1		
			Fully supervised system (electronic monitoring system on at all times)	-0.10	YES	-0.1		
			All buildings within 30m of the proposed structure are confirmed to have a sprinkler system	-0.25	NO	0	4,250	L/min
							70.8	L/s

Exposure Adjustment Charge

6	Exposure distance between units	North side	Over 30m	Length - Height Value Assumed worst case exposed building facing wall	>100	Exposure Adjustment Charge	0	
		East side	Over 30m		>100	Exposure Adjustment Charge	0	
		South side	Over 30m		>100	Exposure Adjustment Charge	0.00	
		West side	Over 30m		>100	Exposure Adjustment Charge	0.00	
	Cumulative Required Fire Flow						4,250	L/min
							70.8	L/s

Total Required Fire Flow

7	Obtain fire flow, duration	Minimum required fire flow rate (rounded to nearest 1000)	**5,000**	L/min
		Minimum required fire flow rate	**83.3**	L/s
		Required duration for Storage Calculation per City of Ottawa	**0.5**	Hrs
		Required Storage Volume	**150000**	L

TATHAM ENGINEERING

Fire Flow Demand Calculations (Existing Building incl. North Addition)

Tatham File no. :	523654
Project:	2026-04-29
Date:	DVF
Designed by:	DVF

$$Q = KVS_{Tot}$$

Where:

Q = minimum supply of water in litres
K = water supply coefficient from Table 1 of the Building Code
V = total building volume in cubic metres

S_{Tot} = total spacial coefficient values from property line exposures on all sides to a maximum of 2
(Note: if property line runs parallel to road; mesure from building to CL of road)

Determining water supply coefficient (K)

Table 3.1.2.1.
Major Occupancy Classification
Forming Part of Sentence 3.1.2.1.(1)

Column 1 Group	Column 2 Division	Column 3 Description of *Major Occupancies*
A	1	*Assembly occupancies* intended for the production and viewing of the performing arts
A	2	*Assembly occupancies* not elsewhere classified in Group A
A	3	*Assembly occupancies* of the arena type
A	4	*Assembly occupancies* in which occupants are gathered in the open air
B	1	Detention occupancies
B	2	Care and treatment occupancies
B	3	Care occupancies
C	—	Residential occupancies
D	—	Business and personal services occupancies
E	—	Mercantile occupancies
F	1	High hazard industrial occupancies
F	2	Medium hazard industrial occupancies
F	3	Low hazard industrial occupancies

TABLE 1
WATER SUPPLY COEFFICIENT – K

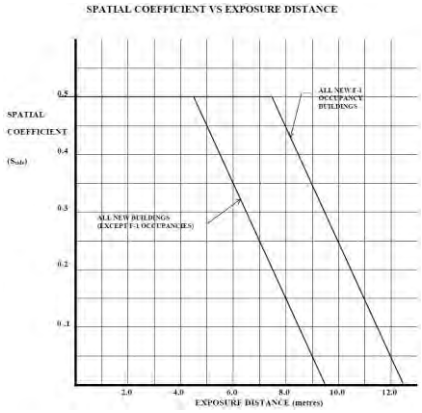
TYPE OF CONSTRUCTION	Classification by Group or Division in Accordance with Table 3.1.2.1 of the Ontario Building Code A-2 B-1 B-2 B-3 C D	A-4 F-3	A-1 A-3	E F-2	F-1
Building is of noncombustible construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2. of the OBC, including loadbearing walls, columns and arches	10	12	14	17	23
Building is of noncombustible construction is of heavy timber construction conforming to Article 3.1.4.9. of the OBC. Floor assemblies are fire separations but with no fire-resistance rating. Roof assemblies, mezzanines, loadbearing walls, columns and arches do not have a fire-resistance rating	16	19	22	27	37
Building is of combustible construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2. of the OBC, including loadbearing walls, columns and arches. Noncombustible construction may be used in lieu of fire-resistance rating where permitted in Subsection 3.2.2. of the OBC	19	22	25	31	41
Building is of combustible construction. Floor assemblies are fire separations but with no fire-resistance rating. Roof assemblies, mezzanines, loadbearing walls, columns and arches do not have a fire-resistance rating	23	28	32	39	53
Column 1	2	3	4	5	6

1	Determine the Type of Construction	Building is of combustible construction. Floor assemblies are fire separations but with no fireresistance rating. Roof assemblies, mezzanines, loadbearing walls, columns and arches do not have a fire-resistance rating.		Determine the Classification or Division on the building.	A-2	Coefficient K	23	

Determine the Total Building Volume in Cubic Metres (V)

2	Determine the Gross Floor Area	1065.8	m^2	Determine the Height of the Building	3	m	Total Volume	3197.4	m^3

Determine the Total Spacial coefficient Values from Property Line Exposure on All Sides S_{tot}



3	Determine the Distance on each side	North Side	134	m	$S_{side\ 1}$	0	S_{tot}	1	
		East Side	30	m	$S_{side\ 2}$	0			
		South Side	20	m	$S_{side\ 3}$	0			
		West Side	59	m	$S_{side\ 4}$	0			

Determine the Minimum Water Supply (Q)

4	K	23		$Q = KVS_{Tot}$	
	V	3197.4	m^3		73540.2 L
	S_{tot}	1			

Determine the Minimum Water Supply Flow Rates

5

TABLE 2
MINIMUM WATER SUPPLY FLOW RATES

Building Code, Part 3 Buildings	Required Minimum Water Supply Flow Rate (L/min.)
One-storey building with building area not exceeding 600m² (excluding F-1 occupancies)	1800
All other buildings	2700 (If **Q** ≤ 108,000L)[1] 3600 (If **Q** > 108,000L **and** ≤ 135,000L)[1] 4500 (If **Q** > 135,000L **and** ≤ 162,000L)[1] 5400 (If **Q** > 162,000L **and** ≤ 190,000L)[1] 6300 (If **Q** > 190,000L **and** ≤ 270,000L)[1] 9000 (If **Q** > 270,000L)[1]

Is the Site Building One Storey?	FALSE	Minimum Water Supply Duration	30	Minimum OBC Flow Rate	2700	L/min
				Required Storage	38000	L

Note: Per City of Ottawa Technical Bulletin IWSTB-2024-05, a reduction in storage volume (Q) of 57000L will be applied for OBC flow rates ≤ 4500 L/min, to a minimum permissible storage volume of 38000L.

GWAL
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April 15, 2026

Lawrence Architects Inc.
18 Deakin Street, Suite 205
Nepean, Ontario
K2E 8B7

ATTENTION: BRANDON LAWRENCE, B.AS, M.ARCH, OAA, MRAIC, DIRECTOR

SUBJECT: NFPA 13 FIRE PROTECTION DEMAND CALCULATION
1981 CENTURY RD. - NORTH GOWER, ON
BRUNSTAD CHRISTIAN CHURCH OTTAWA (BCCO) ADDITION
GWAL PROJECT NO. 2024-654

We have completed the fire protection demand calculation for the new Brunstad Christian Church addition, located at 1981 Century Rd., North Gower, ON in accordance with the National Fire Protection Association (NFPA) 13, Standard for the Installation of Sprinkler Systems, 2019 Edition.

It is our findings that the new addition will require 14,850 US gallons (56,123 litres) of available water supply. This is based on the requirements of what is anticipated to be the most demanding zone, and the outside hose allowance. For the Ordinary Hazard Group 1 commercial kitchen, a minimum area density flow of 225 gallons per minute for a duration of 60 minutes is required. The building does not require a standpipe system or fire hose cabinets, and therefore inside hose allowances are not required. The outside hose allowance is 250 gpm. Refer to the enclosed for detailed calculation. In order to validate these findings, the building must be equipped with a full fire alarm system with 24/7 monitoring by a ULC certified company.

Yours very truly,

GOODKEY, WEEDMARK & ASSOCIATES LTD.

Ryan Leonard, P.Eng. | Director, Mechanical Engineer

RL/nh

Enclosure: Fire Protection Demand Calculation – One (1) page

April 2, 2026

1981 Century Rd. - North Gower, ON - Brunstad Christian Church Ottawa (BCCO) Addition

Sprinkler System (NFPA 13) Fire Protection Demand Calculation

1. Light Hazard Occupancy – Portions with Ordinary Hazard Group 1 include commercial kitchen.
2. Standpipe not required as per OBC 3.2.9.1, hence no inside/outside hose allowance accounted for in calculation. Fire department use hoses to be accounted for in other water supplies on site.
3. Wet Pipe System
4. Dedicated wet chemical automative fire suppression system for Commercial Kitchen Range Hood
5. No Specialized Storage
6. Non-Combustible Construction
7. Sprinkler system will be electrically supervised by a fire alarm system monitored by ULC listed agency (NFPA 13 Reference 11.2.3.1.3)
8. Sprinkler System to be designed using hydraulic calculation methods.
9. Major occupancy – Light Hazard Demand Calculation – Reference Figure 11.2.3.1.1

   Sprinkler System Demand = (1500 sq.ft x 0.10 gpm/sq.ft) x 10% demand overage allowance

   = **165 GPM**

   Proposed Window Sprinkler System – Maximum projected area = 125 sq.ft – 5 sprinkler heads at 15 gpm

   = 5 x 15 GPM = **75 GPM**

   Light Hazard Duration – 30 minutes as per Table 11.2.3.1.2

   Water Supply Calculation

   Sprinkler + Window Sprinkler x 30 = (165 + 75) x 30 = **7,200 USG.**

10. Minor occupancy – Ordinary Hazard (G1) Demand Calculation – Reference Figure 11.2.3.1.1

    Sprinkler System Demand = (1500 sq.ft x 0.15 gpm/sq.ft) x 10% demand overage allowance

    = **247.5 GPM**

    Proposed Window Sprinkler System – None

    Ordinary Hazard (G1) Duration – 60 minutes as per Table 11.2.3.1.2

    Water Supply Calculation

    Sprinkler + Window Sprinkler x 30 = (247.5 + 0) x 60 = **14,850 USG.**

11. Recommend use of 250 GPM rated vertical turbine Fire Pump mounted indoors over a vertical wet well connected to exterior storage tank, with water supply capable of supporting sprinkler operation of most demanding zone, thus requiring 14,850 USG (56,213 Litres) of available water supply.

12. Proposed to use existing 50,489 L capacity tank, and tap into bottom portion of tank (approximately 14 feet below grade) with new 12" pipe routed to new vertical wet well, which is 5 feet in diameter and 21 feet deep, providing an additional storage capacity of 8000 Litres, for total water supply of roughly 58,000 litres.

Appendix E: SWM Calculations and Supporting Documents

TATHAM ENGINEERING

Visual OTTHYMO Model Parameter Calculations (NasHYD)

Project Details

Project Number	523654

Prepared By

Name	HY

Data Sources

Detailed Soil Survey Reports for Ontario, MTO
Drainage Management Manual (1997)

Pre-Development Condition

Watershed:	RVCA
Catchment ID:	101
Catchment Area (ha):	1.81
Impervious %:	

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol		**Bra**											
Soil Series		Brandon											
Hydrologic Soils Group		D											
Soil Texture		Clay											
Runoff Coefficient Type		3											
Area (ha)		1.81											
Percentage of Catchment		100%											
Land Cover Category	**IA**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**
Impervious	2		100	0.95									
Gravel	3		89	0.38									
Woodland	10		79	0.35									
Pasture/Lawns	5	1.81	84	0.40									
Meadows	8		81	0.38									
Cultivated	7		86	0.55									
Waterbody	12		50	0.05									
Average CN		84.00											
Average C		0.40											
Average IA		5.00											

Time to Peak Calculations

Max. Catchment Elev. (m):	93.15
Min. Catchment Elev. (m):	91.27
Catchment Length (m):	159
Catchment Slope (%):	1.18%
Method: Airport Method	
Time of Concentration (mins):	27.23

Summary

Catchment CN:	84.0
Catchment C:	0.40
Catchment IA (mm):	5.00
Time of Concentration (hrs):	0.45
Catchment Time to Peak (hrs):	0.30
Catchment Time Step (mins):	3.63

TATHAM ENGINEERING

Visual OTTHYMO Model Parameter Calculations (NasHYD)

Project Details

Project Number	523654

Prepared By

Name	HY

Data Sources

Detailed Soil Survey Reports for Ontario, MTO
Drainage Management Manual (1997)

Pre-Development Condition

Watershed:	RVCA
Catchment ID:	102
Catchment Area (ha):	0.14
Impervious %:	

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol		**Bra**											
Soil Series		Brandon											
Hydrologic Soils Group		D											
Soil Texture		Clay											
Runoff Coefficient Type		3											
Area (ha)		0.14											
Percentage of Catchment		100%											
Land Cover Category	**IA**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**
Impervious	2		100	0.95									
Gravel	3		89	0.44									
Woodland	10		79	0.42									
Pasture/Lawns	5	0.14	84	0.45									
Meadows	8		81	0.44									
Cultivated	7		86	0.60									
Waterbody	12		50	0.05									
Average CN		84.00											
Average C		0.45											
Average IA		5.00											

Time to Peak Calculations

Max. Catchment Elev. (m):	93.15
Min. Catchment Elev. (m):	92.68
Catchment Length (m):	9
Catchment Slope (%):	5.22%
Method: Bransby-Williams Formula	
Time of Concentration (mins):	0.45

Summary

Catchment CN:	84.0
Catchment C:	0.45
Catchment IA (mm):	5.00
Time of Concentration (hrs):	0.01
Catchment Time to Peak (hrs):	0.00
Catchment Time Step (mins):	0.06

TATHAM ENGINEERING

Visual OTTHYMO Model Parameter Calculations (NasHYD)

Project Details

Project Number	523654

Prepared By

Name	HY

Data Sources

Detailed Soil Survey Reports for Ontario, MTO
Drainage Management Manual (1997)

Post Development Condition

Watershed:	RVCA
Catchment ID:	201
Catchment Area (ha):	1.82
Impervious %:	64%

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol		**NGC**											
Soil Series		NGC											
Hydrologic Soils Group		C											
Soil Texture		Clay Loam											
Runoff Coefficient Type		3											
Area (ha)		1.82											
Percentage of Catchment		100%											
Land Cover Category	**IA**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**
Impervious	2	1.17	100	0.95									
Gravel	3		89	0.38									
Woodland	10		73	0.35									
Pasture/Lawns	5	0.54	79	0.40									
Meadows	8		76	0.38									
Cultivated	7		82	0.55									
Waterbody	12	0.11	50	0.05									
Average CN		90.75											
Average C		0.73											
Average IA		3.49											

Time to Peak Calculations

Max. Catchment Elev. (m):	93.15
Min. Catchment Elev. (m):	91.27
Catchment Length (m):	159
Catchment Slope (%):	1.18%
Method: Bransby-Williams Formula	
Time of Concentration (mins):	8.25

Summary

Catchment CN:	90.7
Catchment C:	0.73
Catchment IA (mm):	3.49
Time of Concentration (hrs):	0.14
Catchment Time to Peak (hrs):	0.09
Catchment Time Step (mins):	1.10

TATHAM ENGINEERING

Visual OTTHYMO Model Parameter Calculations (NasHYD)

Project Details

Project Number	523654

Prepared By

Name	HY

Data Sources

Detailed Soil Survey Reports for Ontario, MTO
Drainage Management Manual (1997)

Post Development Condition

Watershed:	RVCA
Catchment ID:	202
Catchment Area (ha):	0.13
Impervious %:	

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol		**Bra**											
Soil Series		Brandon											
Hydrologic Soils Group		D											
Soil Texture		Clay											
Runoff Coefficient Type		3											
Area (ha)		0.13											
Percentage of Catchment		100%											
Land Cover Category	**IA**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**
Impervious	2		100	0.95									
Gravel	3		89	0.44									
Woodland	10		79	0.42									
Pasture/Lawns	5	0.13	84	0.45									
Meadows	8		81	0.44									
Cultivated	7		86	0.60									
Waterbody	12		50	0.05									
Average CN		84.00											
Average C		0.45											
Average IA		5.00											

Time to Peak Calculations

Max. Catchment Elev. (m):	93.15
Min. Catchment Elev. (m):	92.68
Catchment Length (m):	9
Catchment Slope (%):	5.22%
Method: Bransby-Williams Formula	
Time of Concentration (mins):	0.45

Summary

Catchment CN:	84.0
Catchment C:	0.45
Catchment IA (mm):	5.00
Time of Concentration (hrs):	0.01
Catchment Time to Peak (hrs):	0.01
Catchment Time Step (mins):	0.06

TATHAM ENGINEERING

Project :	1981 Century Road
File No.	523654
Date:	Oct-24
Designed By:	HY
Checked By:	JA
Subject:	SWMF Discharge Table

OUTLET CONTROL

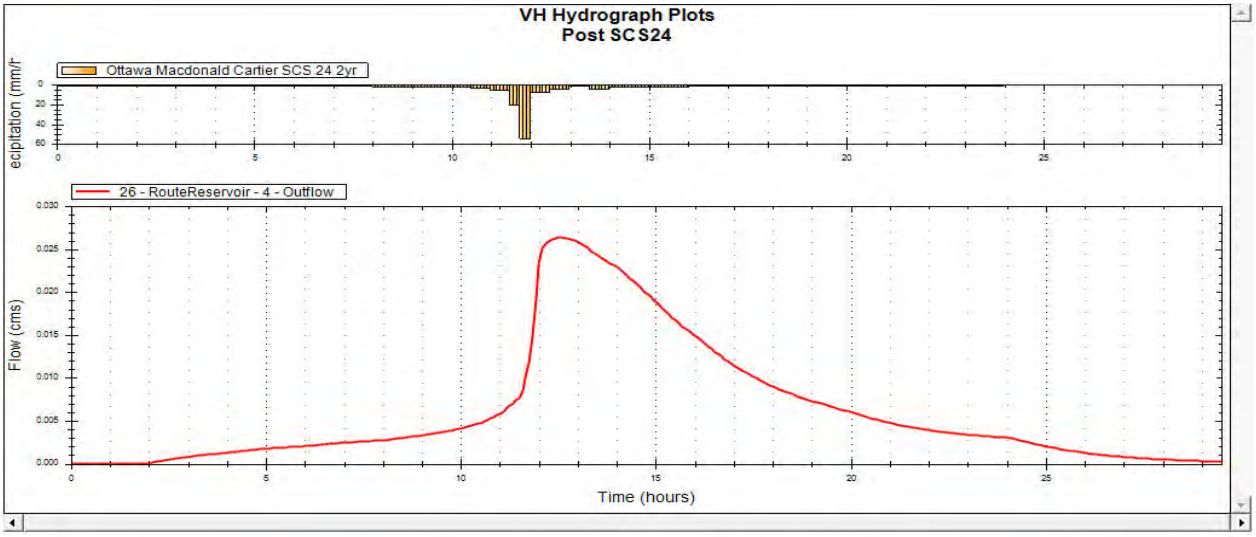
Orifice		Emergency Overflow	
Orifice Size (mm):	168	Weir Length (m)	5
Cross-Sectional Area (sq.m):	0.022167	Sill elevation (m)	91.90
Orifice Coefficient:	0.63	Weir Coefficient	1.7
Invert Elevation (m):	91.27	Weir Side Slopes (H:V)	5H : 1V
Outlet Pipe Size (mm):	250	Downstream Weir Length (m)	3

STAGE DISCHARGE TABLE & CONTROL STRUCTURE CONFIGURATION

Water Level	168 mm dia. Orifice		Emergency Overflow		Total Discharge	Active Storage
	Head	Discharge	Head	Discharge		
(m)	(m)	(cms)	(m)	(cms)	(cms)	(cm)
91.30	0.00	0.000	0.000	0.000	0.000	0.0
91.35	0.00	0.000	0.000	0.000	0.000	54.2
91.40	0.05	0.013	0.000	0.000	0.013	110.5
91.45	0.10	0.019	0.000	0.000	0.019	169.1
91.50	0.15	0.024	0.000	0.000	0.024	230.0
91.55	0.20	0.027	0.000	0.000	0.027	293.2
91.60	0.25	0.031	0.000	0.000	0.031	358.8
91.65	0.30	0.034	0.000	0.000	0.034	426.8
91.70	0.35	0.036	0.000	0.000	0.036	497.3
91.75	0.40	0.039	0.000	0.000	0.039	570.3
91.80	0.45	0.041	0.000	0.000	0.041	645.8
91.85	0.50	0.044	0.000	0.000	0.044	724.0
91.90	0.55	0.046	0.000	0.000	0.046	804.7
91.95	0.60	0.048	0.050	0.100	0.148	888.1
92.00	0.65	0.050	0.100	0.296	0.345	973.2
92.05	0.70	0.052	0.150	0.568	0.619	1059.2
92.10	0.75	0.053	0.200	0.912	0.966	1146.1
92.15	0.80	0.055	0.250	1.328	1.383	1233.9
92.20	0.85	0.057	0.300	1.816	1.873	1323.5

Proposed Condition (Controlled area)				
Design Storm	SWM Facility Operating Characteristics			
	Required Storage (m^3)	Provided Storage (m^3)	Total Outlfow (m^3/s)	Water Level (m)
2yr 24hr SCS	280	280	0.026	91.54
2yr 3hr Chicago	252	252	0.025	91.52
2yr 6hr Chicago	267	267	0.026	91.53
100yr 24hr SCS	798	798	0.046	91.90
100yr 3hr Chicago	719	719	0.044	91.85
100yr 6hr Chicago	759	759	0.045	91.87

TATHAM ENGINEERING	Project:	1981 Century Road	Date:	2025/06/06
	File No.:	523654	Designed By:	HY
	Subject:	SWM Facility Detention	Checked By:	JA



Statistics

Glyph Name	FlowType	Min [cms]	Max [cms]	Average [cms]
RouteReservoir - 4	Outflow	0	0.026	0.006

For 100-year storm, proposed SWM pond detention time is 30 hours as calculated by VISUAL OTTHYMO software.

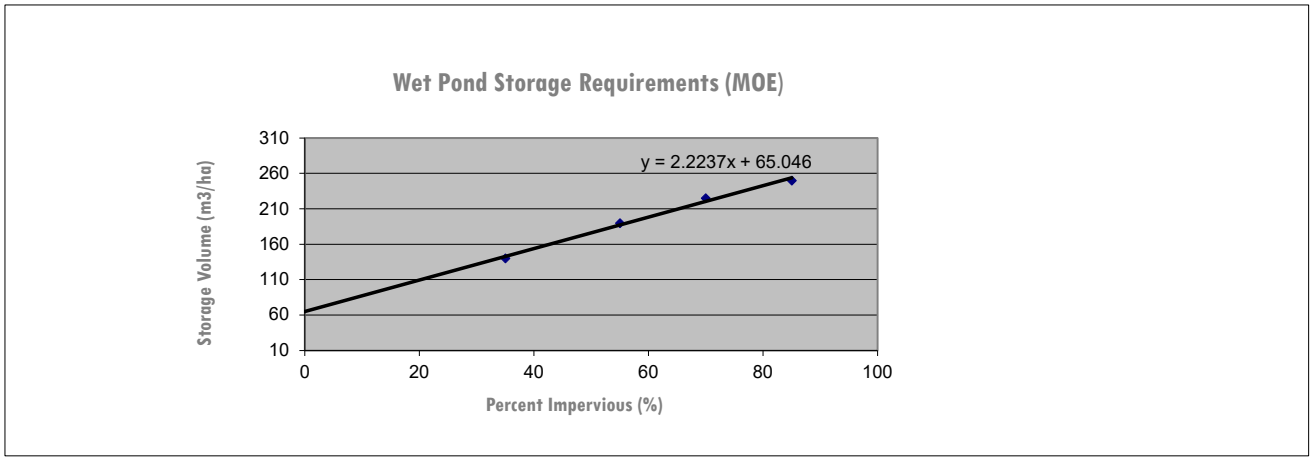
TATHAM ENGINEERING

Project:	1981 Century Road
File No.:	523654
Date:	Dec-2025
Designed By:	HY
Checked By:	JA
Subject:	Wet SWM Pond Stage-Volume Table

Wet SWM Pond STAGE- VOLUME TABLE

	Elevation	Depth	Relative Depth	Increasing Area	Accum. Area	Volume	Accum. Dead Volume	Accum. Active Volume	Accum. Total	
	(m)	(m)	(m)	(m^2)	(m^2)	(m^3)	(m^3)	(m^3)	(m^3)	
3:1 slope	89.80	0.00	0.00	0.00	316.00	0.0	0.0	0.0	0.0	Permanent Pool
	89.85	0.05	0.05	13.70	329.70	16.1	16.1	0.0	16.1	
	89.90	0.10	0.10	13.99	343.68	16.8	33.0	0.0	33.0	
	89.95	0.15	0.15	14.28	357.96	17.5	50.5	0.0	50.5	
	90.00	0.20	0.20	14.57	372.53	18.3	68.8	0.0	68.8	
	90.05	0.25	0.25	14.86	387.39	19.0	87.8	0.0	87.8	
	90.10	0.30	0.30	15.15	402.54	19.7	107.5	0.0	107.5	
	90.15	0.35	0.35	15.44	417.98	20.5	128.0	0.0	128.0	
	90.20	0.40	0.40	15.73	433.71	21.3	149.3	0.0	149.3	
	90.25	0.45	0.45	16.02	449.73	22.1	171.4	0.0	171.4	
	90.30	0.50	0.50	16.31	466.04	22.9	194.3	0.0	194.3	
	90.35	0.55	0.55	16.60	482.65	23.7	218.0	0.0	218.0	
	90.40	0.60	0.60	16.89	499.54	24.6	242.6	0.0	242.6	
	90.45	0.65	0.65	17.18	516.72	25.4	268.0	0.0	268.0	
	90.50	0.70	0.70	17.47	534.20	26.3	294.2	0.0	294.2	
	90.55	0.75	0.75	17.76	551.96	27.2	321.4	0.0	321.4	
	90.60	0.80	0.80	18.06	570.02	28.0	349.4	0.0	349.4	
	90.65	0.85	0.85	18.35	588.36	29.0	378.4	0.0	378.4	
	90.70	0.90	0.90	18.64	607.00	29.9	408.3	0.0	408.3	
5:1 slope	90.75	0.95	0.05	33.05	640.05	31.2	180.5	0.0	439.5	
	90.80	1.00	0.10	33.93	673.98	32.8	213.3	0.0	472.3	
	90.85	1.05	0.15	34.80	708.78	34.6	247.9	0.0	506.9	
	90.90	1.10	0.20	35.68	744.46	36.3	284.2	0.0	543.2	
	90.95	1.15	0.25	36.55	781.01	38.1	322.4	0.0	581.3	
	91.00	1.20	0.30	37.43	818.44	40.0	362.4	0.0	621.3	
	91.05	1.25	0.35	38.31	856.75	41.9	404.2	0.0	663.2	
	91.10	1.30	0.40	39.18	895.93	43.8	448.0	0.0	707.0	
	91.15	1.35	0.45	40.06	935.99	45.8	493.8	0.0	752.8	
	91.20	1.40	0.50	40.93	976.92	47.8	541.7	0.0	800.6	
	91.25	1.45	0.55	41.81	1018.74	49.9	591.5	0.0	850.5	
	91.30	1.50	0.60	42.69	1061.42	52.0	643.5	0.0	902.5	
	91.35	1.55	0.65	43.56	1104.99	54.2	697.7	54.2	956.7	Active Storage
	91.40	1.60	0.70	44.44	1149.42	56.4	754.1	110.5	1013.0	
	91.45	1.65	0.75	45.32	1194.74	58.6	812.7	169.1	1071.6	
	91.50	1.70	0.80	46.19	1240.93	60.9	873.5	230.0	1132.5	
	91.55	1.75	0.85	47.07	1288.00	63.2	936.8	293.2	1195.7	
	91.60	1.80	0.90	47.94	1335.94	65.6	1002.4	358.8	1261.3	
	91.65	1.85	0.95	48.82	1384.76	68.0	1070.4	426.8	1329.3	
	91.70	1.90	1.00	49.70	1434.46	70.5	1140.8	497.3	1399.8	
	91.75	1.95	1.05	50.57	1485.03	73.0	1213.8	570.3	1472.8	
	91.80	2.00	1.10	51.45	1536.48	75.5	1289.4	645.8	1548.3	
	91.85	2.05	1.15	52.32	1588.80	78.1	1367.5	724.0	1626.5	
	91.90	2.10	1.20	53.20	1642.00	80.8	1448.3	804.7	1707.2	
3:1 slope	91.95	2.15	0.15	51.86	1693.86	83.4	1531.7	888.1	1790.6	Freeboard
	92.00	2.20	0.20	17.47	1711.32	85.1	1616.8	973.2	1875.7	
	92.05	2.25	0.25	17.56	1728.88	86.0	1702.8	1059.2	1961.8	
	92.10	2.30	0.30	17.64	1746.52	86.9	1789.7	1146.1	2048.6	
	92.15	2.35	0.35	17.73	1764.26	87.8	1877.4	1233.9	2136.4	
	92.20	2.40	0.50	53.74	1818.00	89.6	1967.0	1323.5	2226.0	

TATHAM ENGINEERING	Project:	1981 Century Road	Date:	February 20, 2026
	File No.:	523654	Designed By:	HY
	Subject:	Wet SWM Facility Water Quality Calculations	Checked By:	JA



MOE Water Quality Storage Volumes

Table 3.2 Values

% imp	storage (m^3/ha)
35	140
55	190
70	225
85	250

Catchment Post 203 - Water Quality Storage Calculation

Catchment imperviousness:	64%	
Contributing area:	1.82	ha
Required MECP Storage Volume:	208.0	m^3/ha
Required Water Quality Storage Volume (PP):	305.8	m^3
Provided Water Quality Storage Volume (PP):	643.5	m^3
Extended Detention Volume (40m^3/ha):	72.8	m^3
25mm Storm Runoff Volume	29.9	m^3

TATHAM ENGINEERING	Project:	1981 Century Road	Date:	Oct-24
	File No.:	523654	Designed:	HY
	Subject:	Swale Capacity Calcs.	Checked	JA

East Swale Capacity Calculation

Swale Characteristics

Design Storms
100-Year Storm
0.651

Channel Depth	Channel Type	Manning's N	Base Width	Side Slopes	Min. Slope	Total Area	Area Contributing
0.30 m	Grass Ditch	0.035	0.50 m	3H : 1V	0.50%	1.740	0.340

Storm Conditions		Swale Flow Conditions					
Return Period	**Peak Flow (m^3/s)**	**Flow Depth**	**Area (m^2)**	**WP**	**R**	**Q (m^3/s)**	**V (m/s)**
100-year storm	**0.191**	**0.258**	**0.33**	**2.13**	**0.15**	**0.191**	**0.58**
Comments:							

TATHAM ENGINEERING	Project:	1981 Century Road	Date:	Oct-24
	File No.:	523654	Designed:	HY
	Subject:	Swale Capacity Calcs.	Checked	JA

Wet Pond Oulet Swale Capacity Calculation

Swale Characteristics

Design Storms
100-Year Storm
0.046

Channel Depth	Channel Type	Manning's N	Base Width	Side Slopes	Min. Slope	Total Area	Area Contributing
0.30 m	Grass Ditch	0.035	0.00 m	3H : 1V	0.60%	1.820	1.820

Storm Conditions		Swale Flow Conditions					
Return Period	**Peak Flow (m^3/s)**	**Flow Depth**	**Area (m^2)**	**WP**	**R**	**Q (m^3/s)**	**V (m/s)**
100-year storm	**0.046**	**0.194**	**0.11**	**1.23**	**0.09**	**0.051**	**0.45**
Comments:							

TATHAM ENGINEERING

Storm Sewer Design Sheet

Version Number: 1 **Version Date:** Aug/20/2025

Project Information

1981 Century Road	523654

Drawing Reference

Storm Drainage Plan	STM-1

Prepared By

HY	October 03/24

Reviewed By

JA	October 03/24

Municipality

City of Ottawa

Runoff Coefficient Adjustment

Year	A	B
10	1.00	0.00
25	1.00	0.00
50	1.20	0.00
100	1.25	0.00

Manning's Coefficient

Pipe	Value
CSP	0.025
Concrete	0.013
PVC	0.013

Time of Concentration

10 mins

IDF Curve Coefficients

Year	A	B	C
2	732.95	0.81	6.20
5	998.07	0.81	6.05
10	1174.18	0.82	6.01
25	1402.88	0.82	6.02
50	1569.58	0.82	6.01
100	1735.69	0.82	6.01

Engineer Stamp

Notes	Area ID / Label	Upstream Maintenance Hole	Downstream Maintenance Hole	Area (ha)	5 Year Runoff Coefficient (C)	Design Storm (Year)	Adjusted Runoff Coefficient (C)	Area × Runoff Coefficient	Cumulative Area (ha)	Cumulative Area × Adjusted Runoff Coefficient	Time of Concentration (min)	Rainfall Intensity (mm/hr)	Peak Flow (m^3/s)	Manning's Roughness Coefficient	Sewer Length (m)	Sewer Slope (%)	Actual Sewer Diameter (mm)	Full Flow Velocity (m/s)	Full Flow Capacity (m^3/s)	Actual Velocity (m/s)	Travel Time (min)	Calculated Sewer Diameter (mm)	Percentage of Full Flow Capacity (%)	Total Time of Travel (min)
	201A	CB6	CB5	0.08	0.95	5	0.95	0.08	0.08	0.08	10.00	104.19	0.022	0.013	37.1	0.5%	250	0.86	0.042	0.81	0.77	196	52.3%	10.77
		CB5	CB4	0.00	0.95	5					10.77		0.022	0.013	56.0	0.5%	250	0.86	0.042	0.81	1.16	196	52.3%	11.92
	201B	CB4	CBMH1	0.34	0.95	5	0.95	0.32	0.42	0.40	11.92	95.04	0.105	0.013	28.7	0.5%	375	1.12	0.124	1.12	0.43	353	85.0%	12.35
	201C	CB3	CBMH1	0.21	0.95	5	0.95	0.20	0.21	0.20	10.00	104.19	0.058	0.013	30.0	0.5%	300	0.97	0.068	0.97	0.52	281	84.4%	10.52
	201D	CB2	CBMH1	0.10	0.95	5	0.95	0.10	0.10	0.10	10.00	104.19	0.027	0.013	17.1	0.5%	250	0.86	0.042	0.86	0.33	213	65.4%	10.33
		CBMH1	OGS	0.00	0.95	5	0.95	0.00	0.73	0.69	12.35	93.24	0.180	0.013	4.0	0.5%	450	1.27	0.202	1.27	0.05	431	89.1%	12.40
		OGS	POND	0.00	0.95	5					12.40		0.180	0.013	31.8	0.5%	450	1.27	0.202	1.27	0.42	431	89.1%	12.82

TATHAM ENGINEERING

Storm Sewer Design Sheet - 100 Year Storm
(For Confirming Hydraulics from Parking Lot to Pond During 100-Year Storm)

Version Number: 1 **Version Date:** July 30, 2026

Project Information

1981 Century Road	523654

Drawing Reference

Storm Drainage Plan	STM-1

Prepared By

DVF	April 29-26

Reviewed By

JA	April 29-26

Municipality

City of Ottawa

Runoff Coefficient Adjustment

Year	A	B
10	1.00	0.00
25	1.00	0.00
50	1.20	0.00
100	1.25	0.00

Manning's Coefficient

Pipe	Value
CSP	0.025
Concrete	0.013
PVC	0.013

Time of Concentration

10 mins

IDF Curve Coefficients

Year	A	B	C
2	732.95	0.81	6.20
5	998.07	0.81	6.05
10	1174.18	0.82	6.01
25	1402.88	0.82	6.02
50	1569.58	0.82	6.01
100	1735.69	0.82	6.01

Engineer Stamp

Notes	Area ID / Label	Upstream Maintenance Hole	Downstream Maintenance Hole	Area (ha)	5 Year Runoff Coefficient (C)	Design Storm (Year)	Adjusted Runoff Coefficient (C)	Area x Runoff Coefficient	Cumulative Area (ha)	Cumulative Area x Adjusted Runoff Coefficient	Time of Concentration (min)	Rainfall Intensity (mm/hr)	Peak Flow (m^3/s)	Manning's Roughness Coefficient	Sewer Length (m)	Sewer Slope (%)	Actual Sewer Diameter (mm)	Full Flow Velocity (m/s)	Full Flow Capacity (m^3/s)	Actual Velocity (m/s)	Travel Time (min)	Calculated Sewer Diameter (mm)	Percentage of Full Flow Capacity (%)	Total Time of Travel (min)
	201A	CB6	CB5	0.08	0.95	100	1.00	0.08	0.08	0.08	10.00	178.56	0.040	0.013	37.1	0.5%	250	0.86	0.042	0.86	0.72	245	94.4%	10.72
		CB5	CB4	0.00	0.95	100					10.72		0.040	0.013	56.0	0.5%	250	0.86	0.042	0.86	1.09	245	94.4%	11.81
	201B	CB4	CBMH1	0.34	0.95	100	1.00	0.34	0.42	0.42	11.81	163.54	0.191	0.013	28.7	0.5%	375	1.12	0.124	1.12	0.43	441	153.9%	12.24
	201C	CB3	CBMH1	0.21	0.95	100	1.00	0.21	0.21	0.21	10.00	178.56	0.104	0.013	30.0	0.5%	300	0.97	0.068	0.97	0.52	351	152.3%	10.52
	201D	CB2	CBMH1	0.10	0.95	100	1.00	0.10	0.10	0.10	10.00	178.56	0.050	0.013	17.1	0.5%	250	0.86	0.042	0.86	0.33	266	118.0%	10.33
		CBMH1	OGS	0.00	0.95	100	1.00	0.00	0.73	0.73	12.24	160.40	0.325	0.013	4.0	0.5%	525	1.40	0.304	1.40	0.05	538	107.0%	12.28
		OGS	POND	0.00	0.95	100					12.28	160.06	**0.325**	0.013	30.9	0.5%	525	1.40	0.304	1.40	0.37	538	107.0%	12.65

TATHAM ENGINEERING

Project :	1981 Century Road
File No.	523654
Date:	Jul-26
Designed By:	DVF
Checked By:	JA
Subject:	100 Year Pipe Conveyance under Head

Pipe Peak Flow under Head

Orifice	
Pipe Size (mm):	525
Cross-Sectional Area (sq.m):	0.216475
Orifice Coefficient:	0.63
100-yr Ponding Elevation (m):	91.90

Water Level	525mm Pipe		
	Head	Discharge	
(m)	(m)	(cms)	
91.90	0.00	0.000	
91.95	0.05	0.135	
92.00	0.10	0.191	
92.05	0.15	0.234	Top of Grate, CB2
92.10	0.20	0.270	
92.15	0.25	0.302	Top of Grate, CB3
92.20	0.30	0.331	Parking Lot Spill-Out Elevation

As calculated on the Storm Sewer Design Sheet - 100 Year Storm, peak flow directed to the outlet pipe is 0.325 m^3/s, which can be conveyed into the SWM pond via a 525 mm diameter pipe.

Pre SCS
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```
       V    V   I    SSSSS  U   U    A    L             (v 6.2.2015)
       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
```


***** S U M M A R Y O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

Output filename:
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DATE: 07/31/2026 TIME: 09:10:19

USER:

COMMENTS: _____

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**********************************************
** SIMULATION : 1                            **
**********************************************
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W/E	COMMAND	HYD ID	DT min	AREA ha	Qpeak cms	Tpeak hrs	R.V. mm	R.C.	Qbase cms
	START @ 0.00 hrs								

```
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    [ Ptot= 49.09 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\5be5f670-8795-4933-b8b7-3bb412cc9bff\a83aa445-7986-4
108-a295-abaadc5
    remark: Ottawa Macdonald Cartier SCS 24 2yr

*
 ** CALIB NASHYD         0004  1  5.0    0.14    0.01 12.00  20.95 0.43   0.000
    [CN=84.0         ]
    [ N = 3.0:Tp 0.17]
*
    READ STORM                  5.0
    [ Ptot= 49.09 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\5be5f670-8795-4933-b8b7-3bb412cc9bff\a83aa445-7986-4
108-a295-abaadc5
    remark: Ottawa Macdonald Cartier SCS 24 2yr

*
 ** CALIB NASHYD         0003  1  5.0    1.81    0.07 12.17  21.02 0.43   0.000
    [CN=84.0         ]
    [ N = 3.0:Tp 0.30]
*
================================================================================
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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       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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                 *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

  Output  filename:
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c627-420d-8b62-75c7a7bb36de\scenario
  Summary filename:
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DATE: 07/31/2026 TIME: 09:10:19

USER:

COMMENTS: _____

  ****
  ** SIMULATION : 2 **
  ****

W/E	COMMAND	HYD ID	DT min	AREA ha	Qpeak cms	Tpeak hrs	R.V. mm	R.C.	Qbase cms
	START @ 0.00 hrs								
	READ STORM		5.0						
	[Ptot=111.87 mm]								
	fname : C:\Users\hyu\AppData\Local\Temp\5be5f670-8795-4933-b8b7-3bb412cc9bff\e20e7578-d439-4ffb-8edc-8fe2588								
	remark: Ottawa Macdonald Cartier SCS 24 100yr								
*									
**	CALIB NASHYD	0004	1 5.0	0.14	0.03	12.00	73.30	0.66	0.000
	[CN=84.0]								
	[N = 3.0:Tp 0.17]								
*									
	READ STORM		5.0						
	[Ptot=111.87 mm]								
	fname : C:\Users\hyu\AppData\Local\Temp\5be5f670-8795-4933-b8b7-3bb412cc9bff\e20e7578-d439-4ffb-8edc-8fe2588								
	remark: Ottawa Macdonald Cartier SCS 24 100yr								
*									
**	CALIB NASHYD	0003	1 5.0	1.81	0.26	12.17	73.54	0.66	0.000
	[CN=84.0]								
	[N = 3.0:Tp 0.30]								
*									
	FINISH								

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Pre Chicago
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```
       V    V   I    SSSSS  U   U    A    L             (v 6.2.2015)
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        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        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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***** S U M M A R Y O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

Output filename:
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DATE: 07/31/2026 TIME: 01:22:11

USER:

COMMENTS: _____

****
** SIMULATION : 1 **
****

W/E	COMMAND	HYD ID	DT	AREA	Qpeak	Tpeak	R.V.	R.C.	Qbase
			min	ha	cms	hrs	mm		cms

START @ 0.00 hrs

```
    CHIC STORM                10.0
    [ Ptot= 31.86 mm ]
*
 ** CALIB NASHYD         0003  1  5.0    1.81    0.04  1.33   9.58 0.30   0.000
    [CN=84.0         ]
    [ N = 3.0:Tp 0.30]
*
    CHIC STORM                10.0
    [ Ptot= 31.86 mm ]
*
 ** CALIB NASHYD         0004  1  5.0    0.14    0.00  1.17   9.55 0.30   0.000
    [CN=84.0         ]
    [ N = 3.0:Tp 0.17]
*
================================================================================
========================


       V    V   I    SSSSS  U   U    A    L             (v 6.2.2015)
       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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                 *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

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  Summary filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\534287f8-
242b-455a-9958-3ef80031fd7f\scenario


DATE: 07/31/2026                          TIME: 01:22:11

USER:
```

COMMENTS: _____

```
  ***********************************************
  ** SIMULATION : 2                             **
  ***********************************************

  W/E COMMAND             HYD ID   DT     AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min      ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    CHIC STORM                 10.0
    [ Ptot= 36.86 mm ]
*
 ** CALIB NASHYD         0003  1  5.0    1.81    0.05  2.33  12.64 0.34   0.000
    [CN=84.0         ]
    [ N = 3.0:Tp 0.30]
*
    CHIC STORM                 10.0
    [ Ptot= 36.86 mm ]
*
 ** CALIB NASHYD         0004  1  5.0    0.14    0.01  2.17  12.60 0.34   0.000
    [CN=84.0         ]
    [ N = 3.0:Tp 0.17]
*
 FINISH

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

Post SCS
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```
       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       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
```


***** S U M M A R Y O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

Output filename:
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Summary filename:
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DATE: 07/31/2026 TIME: 01:22:54

USER:

COMMENTS: _____

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**********************************************
** SIMULATION : 1                            **
**********************************************
```

W/E	COMMAND	HYD ID	DT min	AREA ha	Qpeak cms	Tpeak hrs	R.V. mm	R.C.	Qbase cms

START @ 0.00 hrs

```
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    [ Ptot=  0.00 mm ]
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108-a295-abaadc5
    remark: Ottawa Macdonald Cartier SCS 24 2yr

*
******* ERROR: RAINFALL INCREMENT = 0, COMMAND ABORTED.
 ** CALIB NASHYD         0025  1  5.0    0.13    0.00  0.00   0.00  NaN   0.000
    [CN=84.0         ]
    [ N = 3.0:Tp 0.17]
*
    READ STORM                  5.0
    [ Ptot=  0.00 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\a3df23e0-668b-409b-b169-09a23e6c3db3\a83aa445-7986-4
108-a295-abaadc5
    remark: Ottawa Macdonald Cartier SCS 24 2yr

*
******* ERROR: RAINFALL INCREMENT = 0, COMMAND ABORTED.
 ** CALIB STANDHYD       0024  1  5.0    1.82    0.00  0.00   0.00  NaN   0.000
    [I%=64.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:             0026  1  5.0    1.82    0.00  0.00   0.00  n/a   0.000
*
================================================================================
=======================


       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       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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                  *****  S U M M A R Y   O U T P U T  *****
```

```
  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

  Output  filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\e7a7ce61-
35c3-493d-b880-631f56b7bff7\scenario
  Summary filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\e7a7ce61-
35c3-493d-b880-631f56b7bff7\scenario


DATE: 07/31/2026                          TIME: 01:22:54

USER:


COMMENTS: _____________________________________________________________


  ********************************************
  ** SIMULATION : 2                          **
  ********************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                  5.0
    [ Ptot=  0.00 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\a3df23e0-668b-409b-b169-09a23e6c3db3\e20e7578-d439-4
ffb-8edc-8fe2588
    remark: Ottawa Macdonald Cartier SCS 24 100yr

*
******* ERROR: RAINFALL INCREMENT = 0, COMMAND ABORTED.
 ** CALIB NASHYD         0025  1  5.0    0.13    0.00  0.00   0.00  NaN   0.000
    [CN=84.0         ]
    [ N = 3.0:Tp 0.17]
*
    READ STORM                  5.0
    [ Ptot=  0.00 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\a3df23e0-668b-409b-b169-09a23e6c3db3\e20e7578-d439-4
ffb-8edc-8fe2588
    remark: Ottawa Macdonald Cartier SCS 24 100yr

*
******* ERROR: RAINFALL INCREMENT = 0, COMMAND ABORTED.
 ** CALIB STANDHYD       0024  1  5.0    1.82    0.00  0.00   0.00  NaN   0.000
```

```
    [I%=64.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:             0026  1  5.0    1.82    0.00  0.00   0.00  n/a   0.000
*
 FINISH
```

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==========

Post Chicago
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```
       V    V   I    SSSSS  U   U    A    L             (v 6.2.2015)
       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
```


***** S U M M A R Y O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

Output filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\94514945-66e0-46aa-99d8-33d13997a96b\scenario
Summary filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\94514945-66e0-46aa-99d8-33d13997a96b\scenario

DATE: 07/31/2026 TIME: 01:23:19

USER:

COMMENTS: _____

****
** SIMULATION : 1 **
****

W/E	COMMAND	HYD ID	DT	AREA	Qpeak	Tpeak	R.V.	R.C.	Qbase
			min	ha	cms	hrs	mm		cms

START @ 0.00 hrs

```
    CHIC STORM                10.0
    [ Ptot= 31.86 mm ]
*
 ** CALIB NASHYD         0042  1  5.0    0.13    0.00  1.17   9.55 0.30   0.000
    [CN=84.0         ]
    [ N = 3.0:Tp 0.17]
*
    CHIC STORM                10.0
    [ Ptot= 31.86 mm ]
*
 *  CALIB STANDHYD       0043  1  5.0    1.82    0.24  1.00  21.79 0.68   0.000
    [I%=64.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:              0044  1  5.0    1.82    0.03  1.75  21.69  n/a   0.000
*
================================================================================
======================


       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       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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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

  Output  filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\802e2e82-
a7f3-4573-bc19-493105733e18\scenario
  Summary filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\802e2e82-
a7f3-4573-bc19-493105733e18\scenario


DATE: 07/31/2026                          TIME: 01:23:19
```

USER:

COMMENTS: _____

```
  ***********************************************
  ** SIMULATION : 2                             **
  ***********************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    CHIC STORM                10.0
    [ Ptot= 36.86 mm ]
*
 ** CALIB NASHYD         0042  1  5.0    0.13    0.00  2.17  12.60 0.34   0.000
    [CN=84.0         ]
    [ N = 3.0:Tp 0.17]
*
    CHIC STORM                10.0
    [ Ptot= 36.86 mm ]
*
 *  CALIB STANDHYD       0043  1  5.0    1.82    0.24  2.00  25.75 0.70   0.000
    [I%=64.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:              0044  1  5.0    1.82    0.03  2.75  25.65  n/a   0.000
*
================================================================================
======================


       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       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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```

***** S U M M A R Y O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

Output filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\ee31136a-3779-4040-9bcf-769891f328a9\scenario
Summary filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\ee31136a-3779-4040-9bcf-769891f328a9\scenario

DATE: 07/31/2026 TIME: 01:23:19

USER:

COMMENTS: _____

****
** SIMULATION : 3 **
****

W/E	COMMAND	HYD ID	DT min	AREA ha	Qpeak cms	Tpeak hrs	R.V. mm	R.C.	Qbase cms
	START @ 0.00 hrs								
	CHIC STORM		10.0						
	[Ptot= 71.66 mm]								
*									
**	CALIB NASHYD	0042	1 5.0	0.13	0.02	1.08	38.49	0.54	0.000
	[CN=84.0]								
	[N = 3.0:Tp 0.17]								
*									
	CHIC STORM		10.0						
	[Ptot= 71.66 mm]								
*									
*	CALIB STANDHYD	0043	1 5.0	1.82	0.64	1.00	55.17	0.77	0.000
	[I%=64.0:S%= 2.00]								
*									
**	Reservoir								
	OUTFLOW:	0044	1 5.0	1.82	0.04	1.92	55.07	n/a	0.000
*									

==========

```
       V    V   I    SSSSS  U   U    A    L             (v 6.2.2015)
       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
```


***** S U M M A R Y O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

Output filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\30c49944-173c-4d7b-ba19-aef5c83a1a7d\scenario
Summary filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\30c49944-173c-4d7b-ba19-aef5c83a1a7d\scenario

DATE: 07/31/2026 TIME: 01:23:19

USER:

COMMENTS: _____

****
** SIMULATION : 4 **
****

W/E	COMMAND	HYD ID	DT min	AREA ha	' Qpeak ' cms	Tpeak hrs	R.V. mm	R.C.	Qbase cms
	START @ 0.00 hrs								
	CHIC STORM		10.0						
	[Ptot= 82.32 mm]								
*									
**	CALIB NASHYD	0042	1 5.0	0.13	0.02	2.08	47.39	0.58	0.000
	[CN=84.0]								

```
    [ N = 3.0:Tp 0.17]
*
    CHIC STORM                 10.0
    [ Ptot= 82.32 mm ]
*
 *  CALIB STANDHYD       0043  1  5.0    1.82    0.65  2.00  64.63 0.79   0.000
    [I%=64.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:             0044  1  5.0    1.82    0.04  2.92  64.53  n/a   0.000
*
================================================================================
=======================


       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       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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                  *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

  Output  filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\004b6a58-
d280-424d-ae39-3cfb5b94b17c\scenario
  Summary filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\004b6a58-
d280-424d-ae39-3cfb5b94b17c\scenario


DATE: 07/31/2026                          TIME: 01:23:20

USER:


COMMENTS: _____________________________________________________________
```

```
  ********************************************
  ** SIMULATION : 5                          **
  ********************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                  5.0
    [ Ptot=  0.00 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\02de8489-afe6-4113-aeb8-81d9014a0b9a\952f00c1-71d9-4
d70-99b2-8666e8f
    remark: 25mm

*
******* ERROR: RAINFALL INCREMENT = 0, COMMAND ABORTED.
 ** CALIB NASHYD         0042  1  5.0    0.13    0.00  0.00   0.00  NaN   0.000
    [CN=84.0         ]
    [ N = 3.0:Tp 0.17]
*
    READ STORM                  5.0
    [ Ptot=  0.00 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\02de8489-afe6-4113-aeb8-81d9014a0b9a\952f00c1-71d9-4
d70-99b2-8666e8f
    remark: 25mm

*
******* ERROR: RAINFALL INCREMENT = 0, COMMAND ABORTED.
 ** CALIB STANDHYD       0043  1  5.0    1.82    0.00  0.00   0.00  NaN   0.000
    [I%=64.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:             0044  1  5.0    1.82    0.00  0.00   0.00  n/a   0.000
*
 FINISH

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

Pre SCS
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```
       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       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
```


***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

Output filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\7ac295bd-e705-454d-a39e-5431bd7e237e\scenario
Summary filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\7ac295bd-e705-454d-a39e-5431bd7e237e\scenario

DATE: 07/31/2026 TIME: 01:29:58

USER:

COMMENTS: _____

****
** SIMULATION : 1 **
****

| READ STORM | Filename: C:\Users\hyu\AppData\

```
|                   |              Local\Temp\
|                   |              102a2c08-32c6-44b5-85b8-a21d47a45078\a83aa445
| Ptotal=  0.00 mm |    Comments: Ottawa Macdonald Cartier SCS 24 2yr
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr

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

--------------------
| CALIB            |
| NASHYD   (  0004)|   Area    (ha)=   0.14   Curve Number   (CN)= 84.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17


--------------------
| CALIB            |
| NASHYD   (  0003)|   Area    (ha)=   1.81   Curve Number   (CN)= 84.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.30


================================================================================
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       V    V   I    SSSSS  U   U    A    L             (v 6.2.2015)
       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 *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

  Output  filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\9460e25e-
c627-420d-8b62-75c7a7bb36de\scenario
  Summary filename:
```

C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\9460e25e-c627-420d-8b62-75c7a7bb36de\scenario

DATE: 07/31/2026 TIME: 01:29:58

USER:

COMMENTS: _____

```
  ***********************************************
  ** SIMULATION : 2                             **
  ***********************************************
```

READ STORM	Filename: C:\Users\hyu\AppData\Local\Temp\102a2c08-32c6-44b5-85b8-a21d47a45078\e20e7578
Ptotal= 0.00 mm	Comments: Ottawa Macdonald Cartier SCS 24 100yr

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

---

CALIB NASHYD (0004) ID= 1 DT= 5.0 min	Area (ha)= 0.14	Curve Number (CN)= 84.0	
	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 0.17		

CALIB NASHYD (0003) ID= 1 DT= 5.0 min	Area (ha)= 1.81	Curve Number (CN)= 84.0	
	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 0.30		

FINISH

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Pre Chicago
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```
       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       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
```


***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

Output filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\1797188a-1803-4bbe-9794-067484109463\scenario
Summary filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\1797188a-1803-4bbe-9794-067484109463\scenario

DATE: 07/31/2026 TIME: 01:30:21

USER:

COMMENTS: _____

****
** SIMULATION : 1 **
****

| CHICAGO STORM | IDF curve parameters: A= 732.951
| Ptotal= 31.86 mm | B= 6.199

```
--------------------                              C=   0.810
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  3.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	2.81	0.83	76.81	1.67	5.09	2.50	2.68
0.17	3.50	1.00	24.08	1.83	4.29	2.67	2.46
0.33	4.69	1.17	12.36	2.00	3.72	2.83	2.28
0.50	7.30	1.33	8.32	2.17	3.29		
0.67	18.21	1.50	6.30	2.33	2.95		

```
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0003)|   Area    (ha)=   1.81   Curve Number   (CN)= 84.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.30

         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	2.81	0.833	18.21	1.583	6.30	2.33	3.29
0.167	2.81	0.917	76.80	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)=   0.230

     PEAK FLOW       (cms)=   0.044 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=   9.584
     TOTAL RAINFALL   (mm)=  31.860
     RUNOFF COEFFICIENT   =   0.301

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

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

```
--------------------
| CALIB            |
| NASHYD   (  0004)|   Area    (ha)=   0.14   Curve Number   (CN)= 84.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

         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	2.81	0.833	18.21	1.583	6.30	2.33	3.29
0.167	2.81	0.917	76.80	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)=   0.031

     PEAK FLOW       (cms)=   0.005 (i)
     TIME TO PEAK    (hrs)=   1.167
     RUNOFF VOLUME    (mm)=   9.552
     TOTAL RAINFALL   (mm)=  31.860
     RUNOFF COEFFICIENT   =   0.300

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

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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       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
Developed and Distributed by Smart City Water Inc
```

***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

Output filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\534287f8-242b-455a-9958-3ef80031fd7f\scenario
Summary filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\534287f8-242b-455a-9958-3ef80031fd7f\scenario

DATE: 07/31/2026 TIME: 01:30:21

USER:

COMMENTS: _____

****
** SIMULATION : 2 **
****

| CHICAGO STORM |
| Ptotal= 36.86 mm |

IDF curve parameters: A= 732.951
B= 6.199
C= 0.810
used in: INTENSITY = A / (t + B)^C

Duration of storm = 6.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	1.37	1.50	7.30	3.00	3.72	4.50	1.77
0.17	1.49	1.67	18.21	3.17	3.29	4.67	1.68
0.33	1.63	1.83	76.81	3.33	2.95	4.83	1.60
0.50	1.82	2.00	24.08	3.50	2.68	5.00	1.52
0.67	2.05	2.17	12.36	3.67	2.46	5.17	1.46
0.83	2.37	2.33	8.32	3.83	2.28	5.33	1.40
1.00	2.81	2.50	6.30	4.00	2.12	5.50	1.34
1.17	3.50	2.67	5.09	4.17	1.99	5.67	1.29
1.33	4.69	2.83	4.29	4.33	1.87	5.83	1.24

```
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0003)|   Area    (ha)=   1.81   Curve Number   (CN)= 84.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.30

         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    1.37 | 1.583    7.30 | 3.083    3.72 |  4.58    1.77
              0.167    1.37 | 1.667    7.30 | 3.167    3.72 |  4.67    1.77
              0.250    1.49 | 1.750   18.21 | 3.250    3.29 |  4.75    1.68
              0.333    1.49 | 1.833   18.21 | 3.333    3.29 |  4.83    1.68
              0.417    1.63 | 1.917   76.81 | 3.417    2.95 |  4.92    1.60
              0.500    1.63 | 2.000   76.80 | 3.500    2.95 |  5.00    1.60
              0.583    1.82 | 2.083   24.08 | 3.583    2.68 |  5.08    1.52
              0.667    1.82 | 2.167   24.08 | 3.667    2.68 |  5.17    1.52
              0.750    2.05 | 2.250   12.36 | 3.750    2.46 |  5.25    1.46
              0.833    2.05 | 2.333   12.36 | 3.833    2.46 |  5.33    1.46
              0.917    2.37 | 2.417    8.32 | 3.917    2.28 |  5.42    1.40
              1.000    2.37 | 2.500    8.32 | 4.000    2.28 |  5.50    1.40
              1.083    2.81 | 2.583    6.30 | 4.083    2.12 |  5.58    1.34
              1.167    2.81 | 2.667    6.30 | 4.167    2.12 |  5.67    1.34
              1.250    3.50 | 2.750    5.09 | 4.250    1.99 |  5.75    1.29
              1.333    3.50 | 2.833    5.09 | 4.333    1.99 |  5.83    1.29
              1.417    4.69 | 2.917    4.29 | 4.417    1.87 |  5.92    1.24
              1.500    4.69 | 3.000    4.29 | 4.500    1.87 |  6.00    1.24

     Unit Hyd Qpeak  (cms)=   0.230

     PEAK FLOW       (cms)=   0.050 (i)
     TIME TO PEAK    (hrs)=   2.333
     RUNOFF VOLUME    (mm)=  12.645
     TOTAL RAINFALL   (mm)=  36.860
     RUNOFF COEFFICIENT   =   0.343

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0004)|   Area    (ha)=   0.14   Curve Number   (CN)= 84.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17
```

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	1.37	1.583	7.30	3.083	3.72	4.58	1.77
0.167	1.37	1.667	7.30	3.167	3.72	4.67	1.77
0.250	1.49	1.750	18.21	3.250	3.29	4.75	1.68
0.333	1.49	1.833	18.21	3.333	3.29	4.83	1.68
0.417	1.63	1.917	76.81	3.417	2.95	4.92	1.60
0.500	1.63	2.000	76.80	3.500	2.95	5.00	1.60
0.583	1.82	2.083	24.08	3.583	2.68	5.08	1.52
0.667	1.82	2.167	24.08	3.667	2.68	5.17	1.52
0.750	2.05	2.250	12.36	3.750	2.46	5.25	1.46
0.833	2.05	2.333	12.36	3.833	2.46	5.33	1.46
0.917	2.37	2.417	8.32	3.917	2.28	5.42	1.40
1.000	2.37	2.500	8.32	4.000	2.28	5.50	1.40
1.083	2.81	2.583	6.30	4.083	2.12	5.58	1.34
1.167	2.81	2.667	6.30	4.167	2.12	5.67	1.34
1.250	3.50	2.750	5.09	4.250	1.99	5.75	1.29
1.333	3.50	2.833	5.09	4.333	1.99	5.83	1.29
1.417	4.69	2.917	4.29	4.417	1.87	5.92	1.24
1.500	4.69	3.000	4.29	4.500	1.87	6.00	1.24

Unit Hyd Qpeak (cms)=   0.031

PEAK FLOW   (cms)=   0.005 (i)
TIME TO PEAK   (hrs)=   2.167
RUNOFF VOLUME   (mm)= 12.602
TOTAL RAINFALL   (mm)= 36.860
RUNOFF COEFFICIENT   =   0.342

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

FINISH

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Post SCS
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```
       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       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
```


***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

Output filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\c9fa69aa-7cbe-4bba-942c-2c766e95ce75\scenario
Summary filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\c9fa69aa-7cbe-4bba-942c-2c766e95ce75\scenario

DATE: 07/31/2026 TIME: 01:30:36

USER:

COMMENTS: _____

```
  ********************************************
  ** SIMULATION : 1                         **
  ********************************************
```

```
--------------------
|    READ STORM    |    Filename: C:\Users\hyu\AppData\
```

```
|                   |              Local\Temp\
|                   |              f50b6a04-6903-46c8-8019-2228c7d4ef35\a83aa445
| Ptotal=  0.00 mm |    Comments: Ottawa Macdonald Cartier SCS 24 2yr
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr

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

--------------------
| CALIB            |
| NASHYD   (  0025)|   Area    (ha)=   0.13   Curve Number   (CN)= 84.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17


--------------------
| CALIB            |
| STANDHYD (  0024)|   Area    (ha)=   1.82
|ID= 1 DT= 5.0 min |   Total Imp(%)=  64.00   Dir. Conn.(%)=  64.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.16         0.66
     Dep. Storage     (mm)=       1.00         6.30
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     110.15        40.00
     Mannings n           =      0.013        0.250

******* ERROR: RAINFALL INCREMENT = 0, COMMAND ABORTED.

-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0026)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
     **** WARNING : FIRST OUTFLOW IS NOT ZERO.
                       0.0070     0.0054   |   0.0360      0.0497
                       0.0130     0.0111   |   0.0390      0.0570
                       0.0190     0.0169   |   0.0410      0.0646
                       0.0240     0.0230   |   0.0440      0.0724
                       0.0270     0.0293   |   0.0460      0.0805
                       0.0310     0.0359   |   0.1480      0.0888
                       0.0340     0.0427   |   0.0000      0.0000

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0024)     1.820     0.000      0.00       0.00
   OUTFLOW: ID= 1 (  0026)     1.820     0.000      0.00       0.00
```

```
                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=   NaN
                  TIME SHIFT OF PEAK FLOW         (min)=  0.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0000
                  MAXIMUM  STORAGE   USED       (cu.m.)=  0.000000

     **** WARNING : HYDROGRAPH PEAK WAS NOT REDUCED.
                    CHECK OUTFLOW/STORAGE TABLE  OR REDUCE DT.
-------------------------------------------------------------------------------
===============================================================================
=======================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       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 *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

  Output  filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\e7a7ce61-
35c3-493d-b880-631f56b7bff7\scenario
  Summary filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\e7a7ce61-
35c3-493d-b880-631f56b7bff7\scenario


DATE: 07/31/2026                          TIME: 01:30:36

USER:



COMMENTS: _____________________________________________________________


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```

```
  ********************************************
  ** SIMULATION : 2                          **
  ********************************************


--------------------
|    READ STORM    |    Filename: C:\Users\hyu\AppData\
|                  |              Local\Temp\
|                  |              f50b6a04-6903-46c8-8019-2228c7d4ef35\e20e7578
| Ptotal=  0.00 mm |    Comments: Ottawa Macdonald Cartier SCS 24 100yr
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr

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


--------------------
| CALIB            |
| NASHYD   (  0025)|   Area    (ha)=   0.13   Curve Number   (CN)= 84.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17


--------------------
| CALIB            |
| STANDHYD (  0024)|   Area    (ha)=   1.82
|ID= 1 DT= 5.0 min |   Total Imp(%)=  64.00   Dir. Conn.(%)=  64.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.16         0.66
     Dep. Storage     (mm)=       1.00         6.30
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     110.15        40.00
     Mannings n           =      0.013        0.250

******* ERROR: RAINFALL INCREMENT = 0, COMMAND ABORTED.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0026)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
     **** WARNING : FIRST OUTFLOW IS NOT ZERO.
                       0.0070     0.0054   |   0.0360      0.0497
                       0.0130     0.0111   |   0.0390      0.0570
                       0.0190     0.0169   |   0.0410      0.0646
                       0.0240     0.0230   |   0.0440      0.0724
                       0.0270     0.0293   |   0.0460      0.0805
                       0.0310     0.0359   |   0.1480      0.0888
```

```
                        0.0340     0.0427   |   0.0000      0.0000

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0024)      1.820      0.000      0.00       0.00
   OUTFLOW: ID= 1 (  0026)      1.820      0.000      0.00       0.00

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=   NaN
                  TIME SHIFT OF PEAK FLOW         (min)=  0.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0000
                  MAXIMUM  STORAGE   USED       (cu.m.)=  0.000000

     **** WARNING : HYDROGRAPH PEAK WAS NOT REDUCED.
                    CHECK OUTFLOW/STORAGE TABLE  OR REDUCE DT.
-------------------------------------------------------------------------------

 FINISH
===============================================================================
=======================
```

Post Chicago
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```
       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       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
```


***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

Output filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\94514945-66e0-46aa-99d8-33d13997a96b\scenario
Summary filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\94514945-66e0-46aa-99d8-33d13997a96b\scenario

DATE: 07/31/2026 TIME: 01:31:01

USER:

COMMENTS: _____

****
** SIMULATION : 1 **
****

```
--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 732.951
| Ptotal= 31.86 mm |                          B=   6.199
```

```
--------------------                              C=   0.810
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  3.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    2.81 |  0.83   76.81 |  1.67    5.09 |  2.50    2.68
                0.17    3.50 |  1.00   24.08 |  1.83    4.29 |  2.67    2.46
                0.33    4.69 |  1.17   12.36 |  2.00    3.72 |  2.83    2.28
                0.50    7.30 |  1.33    8.32 |  2.17    3.29 |
                0.67   18.21 |  1.50    6.30 |  2.33    2.95 |


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0042)|   Area    (ha)=   0.13   Curve Number   (CN)= 84.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

         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   76.80 | 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)=   0.029

     PEAK FLOW       (cms)=   0.004 (i)
     TIME TO PEAK    (hrs)=   1.167
     RUNOFF VOLUME    (mm)=   9.552
     TOTAL RAINFALL   (mm)=  31.860
     RUNOFF COEFFICIENT   =   0.300

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

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

```
--------------------
| CALIB            |
| STANDHYD (  0043)|   Area    (ha)=   1.82
|ID= 1 DT= 5.0 min |   Total Imp(%)=  64.00   Dir. Conn.(%)=  64.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.16         0.66
     Dep. Storage     (mm)=       1.00         6.30
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     110.15        40.00
     Mannings n             =      0.013        0.250

         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   76.80 | 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

     Max.Eff.Inten.(mm/hr)=      76.81         7.81
               over (min)        5.00        25.00
     Storage Coeff.  (min)=      3.01 (ii)   22.58 (ii)
     Unit Hyd. Tpeak (min)=      5.00        25.00
     Unit Hyd. peak  (cms)=      0.28         0.05
                                                        *TOTALS*
     PEAK FLOW       (cms)=      0.24         0.01          0.243 (iii)
     TIME TO PEAK    (hrs)=      1.00         1.42           1.00
     RUNOFF VOLUME    (mm)=     30.86         5.69          21.79
     TOTAL RAINFALL   (mm)=     31.86        31.86          31.86
     RUNOFF COEFFICIENT   =      0.97         0.18           0.68

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  74.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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```
| RESERVOIR(  0044)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
     **** WARNING : FIRST OUTFLOW IS NOT ZERO.
                          0.0070     0.0054   |   0.0360      0.0497
                          0.0130     0.0111   |   0.0390      0.0570
                          0.0190     0.0169   |   0.0410      0.0646
                          0.0240     0.0230   |   0.0440      0.0724
                          0.0270     0.0293   |   0.0460      0.0805
                          0.0310     0.0359   |   0.1480      0.0888
                          0.0340     0.0427   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0043)      1.820      0.243      1.00      21.79
   OUTFLOW: ID= 1 (  0044)      1.820      0.025      1.75      21.69

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 10.30
                  TIME SHIFT OF PEAK FLOW         (min)= 45.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0252

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       V    V   I    SSSSS  U   U    A    L             (v 6.2.2015)
       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 *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

  Output  filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\802e2e82-
a7f3-4573-bc19-493105733e18\scenario
  Summary filename:
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DATE: 07/31/2026 TIME: 01:31:01

USER:

COMMENTS: _____

****
** SIMULATION : 2 **
****

CHICAGO STORM
Ptotal= 36.86 mm

IDF curve parameters: A= 732.951
B= 6.199
C= 0.810
used in: INTENSITY = A / (t + B)^C

Duration of storm = 6.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	1.37	1.50	7.30	3.00	3.72	4.50	1.77
0.17	1.49	1.67	18.21	3.17	3.29	4.67	1.68
0.33	1.63	1.83	76.81	3.33	2.95	4.83	1.60
0.50	1.82	2.00	24.08	3.50	2.68	5.00	1.52
0.67	2.05	2.17	12.36	3.67	2.46	5.17	1.46
0.83	2.37	2.33	8.32	3.83	2.28	5.33	1.40
1.00	2.81	2.50	6.30	4.00	2.12	5.50	1.34
1.17	3.50	2.67	5.09	4.17	1.99	5.67	1.29
1.33	4.69	2.83	4.29	4.33	1.87	5.83	1.24

CALIB NASHYD (0042) ID= 1 DT= 5.0 min	Area (ha)= 0.13 Ia (mm)= 5.00 U.H. Tp(hrs)= 0.17	Curve Number (CN)= 84.0 # of Linear Res.(N)= 3.00

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	1.37	1.583	7.30	3.083	3.72	4.58	1.77
0.167	1.37	1.667	7.30	3.167	3.72	4.67	1.77
0.250	1.49	1.750	18.21	3.250	3.29	4.75	1.68
0.333	1.49	1.833	18.21	3.333	3.29	4.83	1.68
0.417	1.63	1.917	76.81	3.417	2.95	4.92	1.60
0.500	1.63	2.000	76.80	3.500	2.95	5.00	1.60
0.583	1.82	2.083	24.08	3.583	2.68	5.08	1.52
0.667	1.82	2.167	24.08	3.667	2.68	5.17	1.52
0.750	2.05	2.250	12.36	3.750	2.46	5.25	1.46
0.833	2.05	2.333	12.36	3.833	2.46	5.33	1.46
0.917	2.37	2.417	8.32	3.917	2.28	5.42	1.40
1.000	2.37	2.500	8.32	4.000	2.28	5.50	1.40
1.083	2.81	2.583	6.30	4.083	2.12	5.58	1.34
1.167	2.81	2.667	6.30	4.167	2.12	5.67	1.34
1.250	3.50	2.750	5.09	4.250	1.99	5.75	1.29
1.333	3.50	2.833	5.09	4.333	1.99	5.83	1.29
1.417	4.69	2.917	4.29	4.417	1.87	5.92	1.24
1.500	4.69	3.000	4.29	4.500	1.87	6.00	1.24

Unit Hyd Qpeak (cms)= 0.029

PEAK FLOW (cms)= 0.005 (i)
TIME TO PEAK (hrs)= 2.167
RUNOFF VOLUME (mm)= 12.602
TOTAL RAINFALL (mm)= 36.860
RUNOFF COEFFICIENT = 0.342

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

CALIB STANDHYD (0043) ID= 1 DT= 5.0 min	Area (ha)= 1.82 Total Imp(%)= 64.00 Dir. Conn.(%)= 64.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.16	0.66
Dep. Storage	(mm)=	1.00	6.30
Average Slope	(%)=	1.00	2.00
Length	(m)=	110.15	40.00
Mannings n	=	0.013	0.250

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	1.37	1.583	7.30	3.083	3.72	4.58	1.77
0.167	1.37	1.667	7.30	3.167	3.72	4.67	1.77
0.250	1.49	1.750	18.21	3.250	3.29	4.75	1.68
0.333	1.49	1.833	18.21	3.333	3.29	4.83	1.68
0.417	1.63	1.917	76.81	3.417	2.95	4.92	1.60
0.500	1.63	2.000	76.80	3.500	2.95	5.00	1.60
0.583	1.82	2.083	24.08	3.583	2.68	5.08	1.52
0.667	1.82	2.167	24.08	3.667	2.68	5.17	1.52
0.750	2.05	2.250	12.36	3.750	2.46	5.25	1.46
0.833	2.05	2.333	12.36	3.833	2.46	5.33	1.46
0.917	2.37	2.417	8.32	3.917	2.28	5.42	1.40
1.000	2.37	2.500	8.32	4.000	2.28	5.50	1.40
1.083	2.81	2.583	6.30	4.083	2.12	5.58	1.34
1.167	2.81	2.667	6.30	4.167	2.12	5.67	1.34
1.250	3.50	2.750	5.09	4.250	1.99	5.75	1.29
1.333	3.50	2.833	5.09	4.333	1.99	5.83	1.29
1.417	4.69	2.917	4.29	4.417	1.87	5.92	1.24
1.500	4.69	3.000	4.29	4.500	1.87	6.00	1.24

			TOTALS
Max.Eff.Inten.(mm/hr)=	76.81	9.34	
over (min)	5.00	25.00	
Storage Coeff. (min)=	3.01 (ii)	21.23 (ii)	
Unit Hyd. Tpeak (min)=	5.00	25.00	
Unit Hyd. peak (cms)=	0.28	0.05	
PEAK FLOW (cms)=	0.24	0.01	0.243 (iii)
TIME TO PEAK (hrs)=	2.00	2.42	2.00
RUNOFF VOLUME (mm)=	35.86	7.80	25.75
TOTAL RAINFALL (mm)=	36.86	36.86	36.86
RUNOFF COEFFICIENT =	0.97	0.21	0.70

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 74.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0044) IN= 2---> OUT= 1 / DT= 5.0 min	OVERFLOW IS OFF		OUTFLOW	STORAGE
	OUTFLOW (cms)	STORAGE (ha.m.)	(cms)	(ha.m.)
**** WARNING : FIRST OUTFLOW IS NOT ZERO.				
	0.0070	0.0054	0.0360	0.0497

```
                          0.0130     0.0111   |   0.0390      0.0570
                          0.0190     0.0169   |   0.0410      0.0646
                          0.0240     0.0230   |   0.0440      0.0724
                          0.0270     0.0293   |   0.0460      0.0805
                          0.0310     0.0359   |   0.1480      0.0888
                          0.0340     0.0427   |   0.0000      0.0000

                                    AREA     QPEAK     TPEAK       R.V.
                                    (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0043)      1.820      0.243      2.00      25.75
   OUTFLOW: ID= 1 (  0044)      1.820      0.026      2.75      25.65

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 10.57
                  TIME SHIFT OF PEAK FLOW         (min)= 45.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0267

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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       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 *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

  Output  filename:
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3779-4040-9bcf-769891f328a9\scenario
  Summary filename:
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3779-4040-9bcf-769891f328a9\scenario


DATE: 07/31/2026                          TIME: 01:31:01
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USER:

COMMENTS: ____

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  ***********************************************
  ** SIMULATION : 3                            **
  ***********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1735.688
| Ptotal= 71.66 mm |                          B=   6.014
--------------------                          C=   0.820
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  3.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	6.05	0.83	178.56	1.67	11.06	2.50	5.76
0.17	7.54	1.00	54.05	1.83	9.29	2.67	5.28
0.33	10.16	1.17	27.32	2.00	8.02	2.83	4.88
0.50	15.97	1.33	18.24	2.17	7.08		
0.67	40.65	1.50	13.74	2.33	6.35		

```
-----------------------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0042)|   Area    (ha)=   0.13   Curve Number   (CN)= 84.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

         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)= 0.029

PEAK FLOW (cms)= 0.020 (i)
TIME TO PEAK (hrs)= 1.083
RUNOFF VOLUME (mm)= 38.488
TOTAL RAINFALL (mm)= 71.665
RUNOFF COEFFICIENT = 0.537

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

CALIB
STANDHYD (0043)
ID= 1 DT= 5.0 min

Area (ha)= 1.82
Total Imp(%)= 64.00 Dir. Conn.(%)= 64.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.16	0.66
Dep. Storage	(mm)=	1.00	6.30
Average Slope	(%)=	1.00	2.00
Length	(m)=	110.15	40.00
Mannings n	=	0.013	0.250

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

Max.Eff.Inten.(mm/hr)=		178.56	61.49
	over (min)	5.00	10.00
Storage Coeff. (min)=		2.15 (ii)	6.59 (ii)
Unit Hyd. Tpeak (min)=		5.00	10.00
Unit Hyd. peak (cms)=		0.31	0.14

TOTALS

```
     PEAK FLOW       (cms)=       0.57         0.09          0.640 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.08           1.00
     RUNOFF VOLUME    (mm)=      70.66        27.63          55.17
     TOTAL RAINFALL   (mm)=      71.66        71.66          71.66
     RUNOFF COEFFICIENT   =       0.99         0.39           0.77

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  74.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0044)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
     **** WARNING : FIRST OUTFLOW IS NOT ZERO.
                           0.0070     0.0054   |   0.0360      0.0497
                           0.0130     0.0111   |   0.0390      0.0570
                           0.0190     0.0169   |   0.0410      0.0646
                           0.0240     0.0230   |   0.0440      0.0724
                           0.0270     0.0293   |   0.0460      0.0805
                           0.0310     0.0359   |   0.1480      0.0888
                           0.0340     0.0427   |   0.0000      0.0000

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0043)      1.820      0.640      1.00       55.17
   OUTFLOW: ID= 1 (  0044)      1.820      0.044      1.92       55.07

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  6.85
                  TIME SHIFT OF PEAK FLOW         (min)= 55.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0719

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       V    V   I    SSSSS  U   U    A    L             (v 6.2.2015)
       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
```


***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

Output filename:
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Summary filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\30c49944-173c-4d7b-ba19-aef5c83a1a7d\scenario

DATE: 07/31/2026 TIME: 01:31:01

USER:

COMMENTS: _____

****
** SIMULATION : 4 **
****

| CHICAGO STORM |
| Ptotal= 82.32 mm |

IDF curve parameters: A=1735.688
B= 6.014
C= 0.820
used in: INTENSITY = A / (t + B)^C

Duration of storm = 6.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	2.90	1.50	15.97	3.00	8.02	4.50	3.77
0.17	3.16	1.67	40.65	3.17	7.08	4.67	3.57
0.33	3.48	1.83	178.56	3.33	6.35	4.83	3.40

0.50	3.88	2.00	54.05	3.50	5.76	5.00	3.24
0.67	4.39	2.17	27.32	3.67	5.28	5.17	3.10
0.83	5.07	2.33	18.24	3.83	4.88	5.33	2.97
1.00	6.05	2.50	13.74	4.00	4.54	5.50	2.85
1.17	7.54	2.67	11.06	4.17	4.25	5.67	2.74
1.33	10.16	2.83	9.29	4.33	3.99	5.83	2.64

CALIB			
NASHYD (0042)	Area (ha)= 0.13	Curve Number (CN)= 84.0	
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 0.17		

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	2.90	1.583	15.97	3.083	8.02	4.58	3.77
0.167	2.90	1.667	15.97	3.167	8.02	4.67	3.77
0.250	3.16	1.750	40.65	3.250	7.08	4.75	3.57
0.333	3.16	1.833	40.66	3.333	7.08	4.83	3.57
0.417	3.48	1.917	178.56	3.417	6.35	4.92	3.40
0.500	3.48	2.000	178.56	3.500	6.35	5.00	3.40
0.583	3.88	2.083	54.05	3.583	5.76	5.08	3.24
0.667	3.88	2.167	54.05	3.667	5.76	5.17	3.24
0.750	4.39	2.250	27.32	3.750	5.28	5.25	3.10
0.833	4.39	2.333	27.32	3.833	5.28	5.33	3.10
0.917	5.07	2.417	18.24	3.917	4.88	5.42	2.97
1.000	5.07	2.500	18.24	4.000	4.88	5.50	2.97
1.083	6.05	2.583	13.74	4.083	4.54	5.58	2.85
1.167	6.05	2.667	13.74	4.167	4.54	5.67	2.85
1.250	7.54	2.750	11.06	4.250	4.25	5.75	2.74
1.333	7.54	2.833	11.06	4.333	4.25	5.83	2.74
1.417	10.16	2.917	9.29	4.417	3.99	5.92	2.64
1.500	10.16	3.000	9.29	4.500	3.99	6.00	2.64

Unit Hyd Qpeak (cms)= 0.029

PEAK FLOW (cms)= 0.022 (i)
TIME TO PEAK (hrs)= 2.083
RUNOFF VOLUME (mm)= 47.386
TOTAL RAINFALL (mm)= 82.319
RUNOFF COEFFICIENT = 0.576

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

```
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0043)|   Area    (ha)=   1.82
|ID= 1 DT= 5.0 min |   Total Imp(%)=  64.00   Dir. Conn.(%)=  64.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.16         0.66
     Dep. Storage     (mm)=       1.00         6.30
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     110.15        40.00
     Mannings n             =      0.013        0.250

         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     2.90 | 1.583    15.97 | 3.083     8.02 |  4.58     3.77
              0.167     2.90 | 1.667    15.97 | 3.167     8.02 |  4.67     3.77
              0.250     3.16 | 1.750    40.65 | 3.250     7.08 |  4.75     3.57
              0.333     3.16 | 1.833    40.66 | 3.333     7.08 |  4.83     3.57
              0.417     3.48 | 1.917   178.56 | 3.417     6.35 |  4.92     3.40
              0.500     3.48 | 2.000   178.56 | 3.500     6.35 |  5.00     3.40
              0.583     3.88 | 2.083    54.05 | 3.583     5.76 |  5.08     3.24
              0.667     3.88 | 2.167    54.05 | 3.667     5.76 |  5.17     3.24
              0.750     4.39 | 2.250    27.32 | 3.750     5.28 |  5.25     3.10
              0.833     4.39 | 2.333    27.32 | 3.833     5.28 |  5.33     3.10
              0.917     5.07 | 2.417    18.24 | 3.917     4.88 |  5.42     2.97
              1.000     5.07 | 2.500    18.24 | 4.000     4.88 |  5.50     2.97
              1.083     6.05 | 2.583    13.74 | 4.083     4.54 |  5.58     2.85
              1.167     6.05 | 2.667    13.74 | 4.167     4.54 |  5.67     2.85
              1.250     7.54 | 2.750    11.06 | 4.250     4.25 |  5.75     2.74
              1.333     7.54 | 2.833    11.06 | 4.333     4.25 |  5.83     2.74
              1.417    10.16 | 2.917     9.29 | 4.417     3.99 |  5.92     2.64
              1.500    10.16 | 3.000     9.29 | 4.500     3.99 |  6.00     2.64

     Max.Eff.Inten.(mm/hr)=     178.56        69.26
               over (min)         5.00        10.00
     Storage Coeff.  (min)=       2.15 (ii)    6.59 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.31         0.14
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.57         0.10          0.651 (iii)
     TIME TO PEAK    (hrs)=       2.00         2.08           2.00
     RUNOFF VOLUME    (mm)=      81.32        34.97          64.63
     TOTAL RAINFALL   (mm)=      82.32        82.32          82.32
     RUNOFF COEFFICIENT   =       0.99         0.42           0.79
```

```
***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  74.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0044)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
     **** WARNING : FIRST OUTFLOW IS NOT ZERO.
                       0.0070     0.0054   |   0.0360      0.0497
                       0.0130     0.0111   |   0.0390      0.0570
                       0.0190     0.0169   |   0.0410      0.0646
                       0.0240     0.0230   |   0.0440      0.0724
                       0.0270     0.0293   |   0.0460      0.0805
                       0.0310     0.0359   |   0.1480      0.0888
                       0.0340     0.0427   |   0.0000      0.0000

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0043)    1.820      0.651      2.00      64.63
   OUTFLOW: ID= 1 (  0044)    1.820      0.045      2.92      64.53

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  6.89
                  TIME SHIFT OF PEAK FLOW         (min)= 55.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0759

--------------------------------------------------------------------------------
================================================================================
=======================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       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 *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

Output filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\004b6a58-d280-424d-ae39-3cfb5b94b17c\scenario
Summary filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\004b6a58-d280-424d-ae39-3cfb5b94b17c\scenario

DATE: 07/31/2026 TIME: 01:31:02

USER:

COMMENTS: _____

****
** SIMULATION : 5 **
****

READ STORM	Filename: C:\Users\hyu\AppData\Local\Temp\13c5ad37-cccf-4fdf-a10e-b3b4e827cfec\952f00c1
Ptotal= 0.00 mm	Comments: 25mm

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

---

CALIB NASHYD (0042) ID= 1 DT= 5.0 min	Area (ha)= 0.13	Curve Number (CN)= 84.0
	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.17	

CALIB

```
| STANDHYD (  0043)|   Area    (ha)=   1.82
|ID= 1 DT= 5.0 min |   Total Imp(%)=  64.00   Dir. Conn.(%)=  64.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.16         0.66
     Dep. Storage     (mm)=       1.00         6.30
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     110.15        40.00
     Mannings n             =      0.013        0.250

******* ERROR: RAINFALL INCREMENT = 0, COMMAND ABORTED.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0044)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
     **** WARNING : FIRST OUTFLOW IS NOT ZERO.
                          0.0070     0.0054   |   0.0360      0.0497
                          0.0130     0.0111   |   0.0390      0.0570
                          0.0190     0.0169   |   0.0410      0.0646
                          0.0240     0.0230   |   0.0440      0.0724
                          0.0270     0.0293   |   0.0460      0.0805
                          0.0310     0.0359   |   0.1480      0.0888
                          0.0340     0.0427   |   0.0000      0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0043)      1.820      0.000      0.00       0.00
   OUTFLOW: ID= 1 (  0044)      1.820      0.000      0.00       0.00

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=   NaN
                  TIME SHIFT OF PEAK FLOW         (min)=  0.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0000
                  MAXIMUM  STORAGE   USED       (cu.m.)=  0.000000

     **** WARNING : HYDROGRAPH PEAK WAS NOT REDUCED.
                    CHECK OUTFLOW/STORAGE TABLE  OR REDUCE DT.
--------------------------------------------------------------------------------

 FINISH
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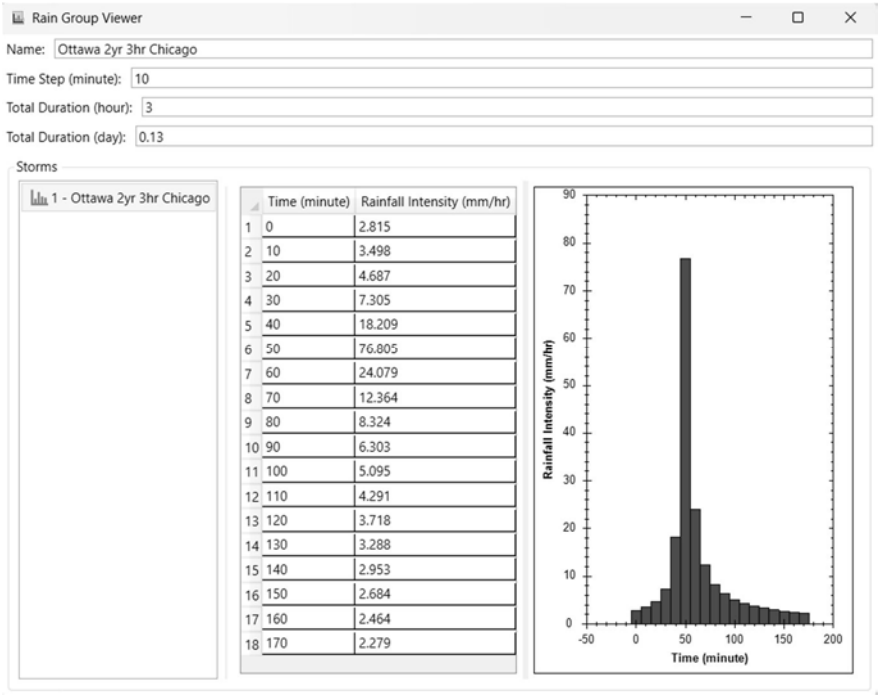
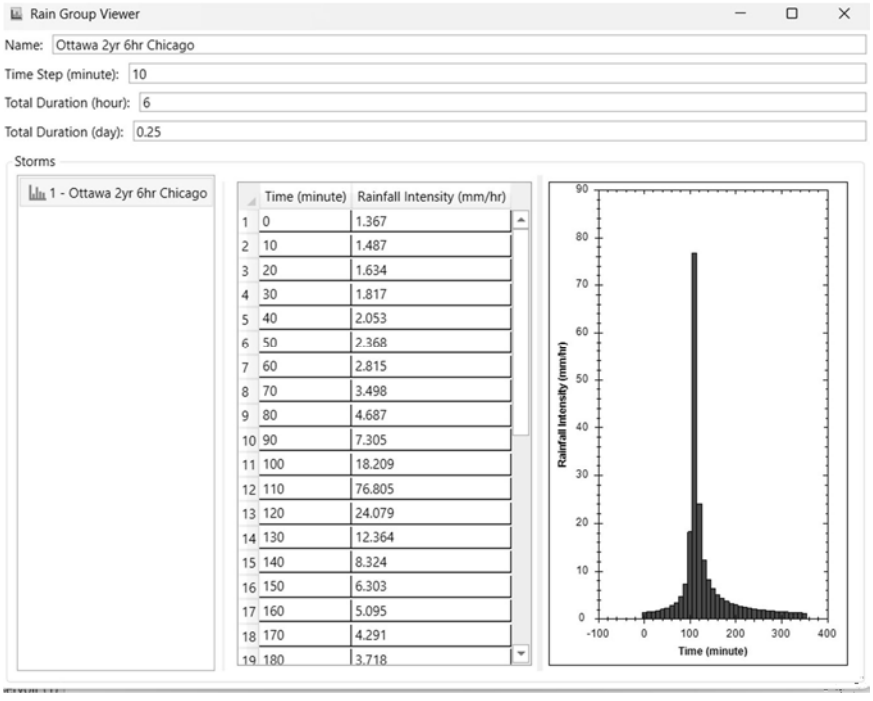
2-year 3-hr CHI Hyetograph



	Time (minute)	Rainfall Intensity (mm/hr)
1	0	2.815
2	10	3.498
3	20	4.687
4	30	7.305
5	40	18.209
6	50	76.805
7	60	24.079
8	70	12.364
9	80	8.324
10	90	6.303
11	100	5.095
12	110	4.291
13	120	3.718
14	130	3.288
15	140	2.953
16	150	2.684
17	160	2.464
18	170	2.279

2-year 6-hr CHI Hyetograph



	Time (minute)	Rainfall Intensity (mm/hr)
1	0	1.367
2	10	1.487
3	20	1.634
4	30	1.817
5	40	2.053
6	50	2.368
7	60	2.815
8	70	3.498
9	80	4.687
10	90	7.305
11	100	18.209
12	110	76.805
13	120	24.079
14	130	12.364
15	140	8.324
16	150	6.303
17	160	5.095
18	170	4.291
19	180	3.718

2-year 24-hr SCS Type II Hyetograph

Rain Group Viewer

Name: Ottawa Macdonald Cartier SCS 24 2yr

Time Step (minute): 5

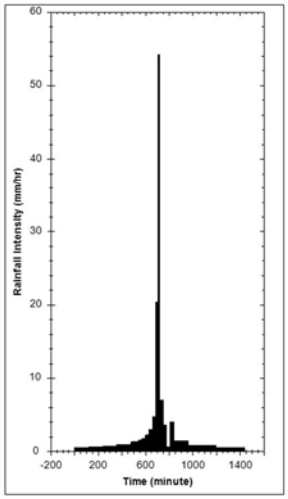
Total Duration (hour): 24

Total Duration (day): 1.00

Storms

1 - Ottawa Macdonald Cartier SCS 24 2yr

	Time (minute)	Rainfall Intensity (mm/hr)
1	0	0.54
2	5	0.54
3	10	0.54
4	15	0.54
5	20	0.54
6	25	0.54
7	30	0.54
8	35	0.54
9	40	0.54
10	45	0.54
11	50	0.54
12	55	0.54
13	60	0.54
14	65	0.54
15	70	0.54
16	75	0.54
17	80	0.54
18	85	0.54
19	90	0.54
20	95	0.54
21	100	0.54
22	105	0.54
23	110	0.54



Imbrium® Systems
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

03/02/2026

Province:	Ontario
City:	Ottawa
Nearest Rainfall Station:	OTTAWA CDA RCS
Climate Station Id:	6105978
Years of Rainfall Data:	20

Site Name:	201

Drainage Area (ha):	0.73
Runoff Coefficient 'c':	0.95

Particle Size Distribution:	CA ETV
Target TSS Removal (%):	50.0

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	22.38
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	180.00
Influent TSS Concentration (mg/L):	100
Estimated Average Annual Sediment Load (kg/yr):	253
Estimated Average Annual Sediment Volume (L/yr):	206

Project Name:	1981 Century Road
Project Number:	523654
Designer Name:	David Fendler
Designer Company:	Tatham
Designer Email:	dfendler@tathameng.com
Designer Phone:	613-747-3636
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	51
EFO5	56
EFO6	59
EFO8	63
EFO10	66

Recommended Stormceptor EFO Model: EFO4

Estimated Net Annual Sediment (TSS) Load Reduction (%): 51

Water Quality Runoff Volume Capture (%): > 90

THIRD-PARTY TESTING AND VERIFICATION

►**Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

►**Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterwavs.

PARTICLE SIZE DISTRIBUTION (PSD)

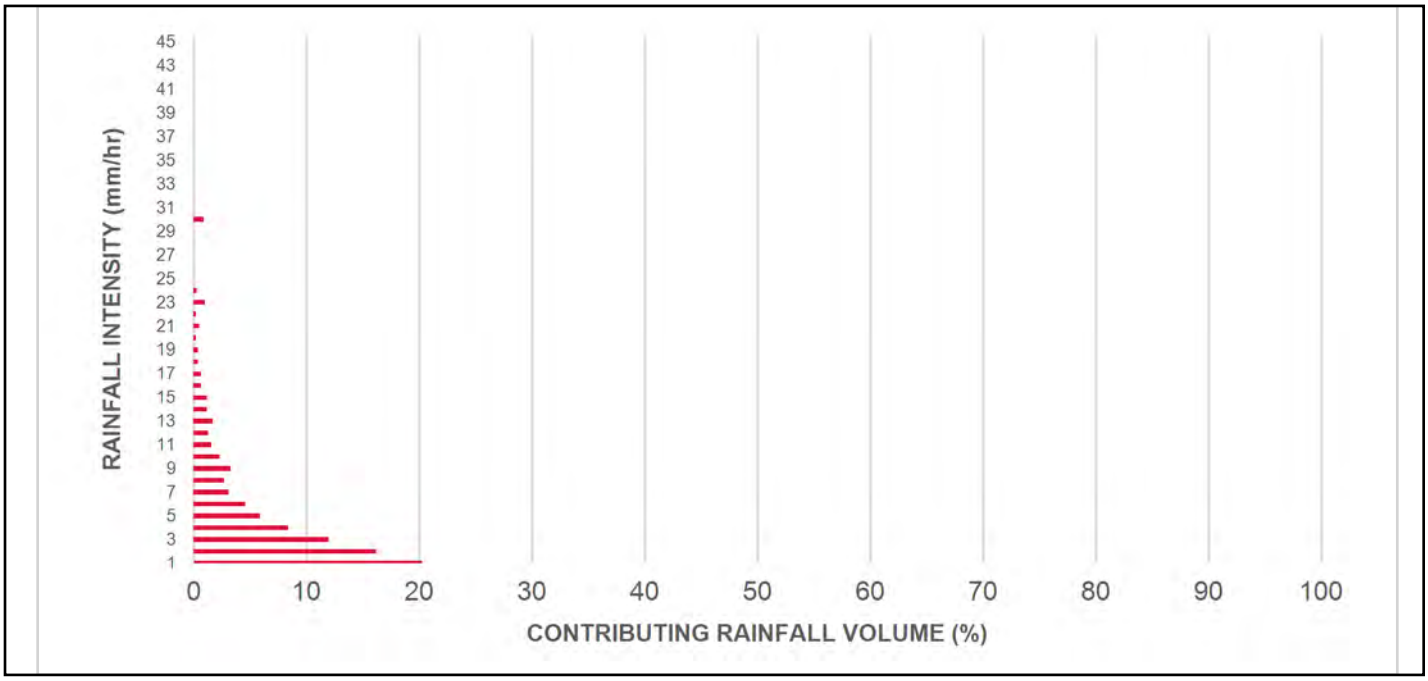
►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

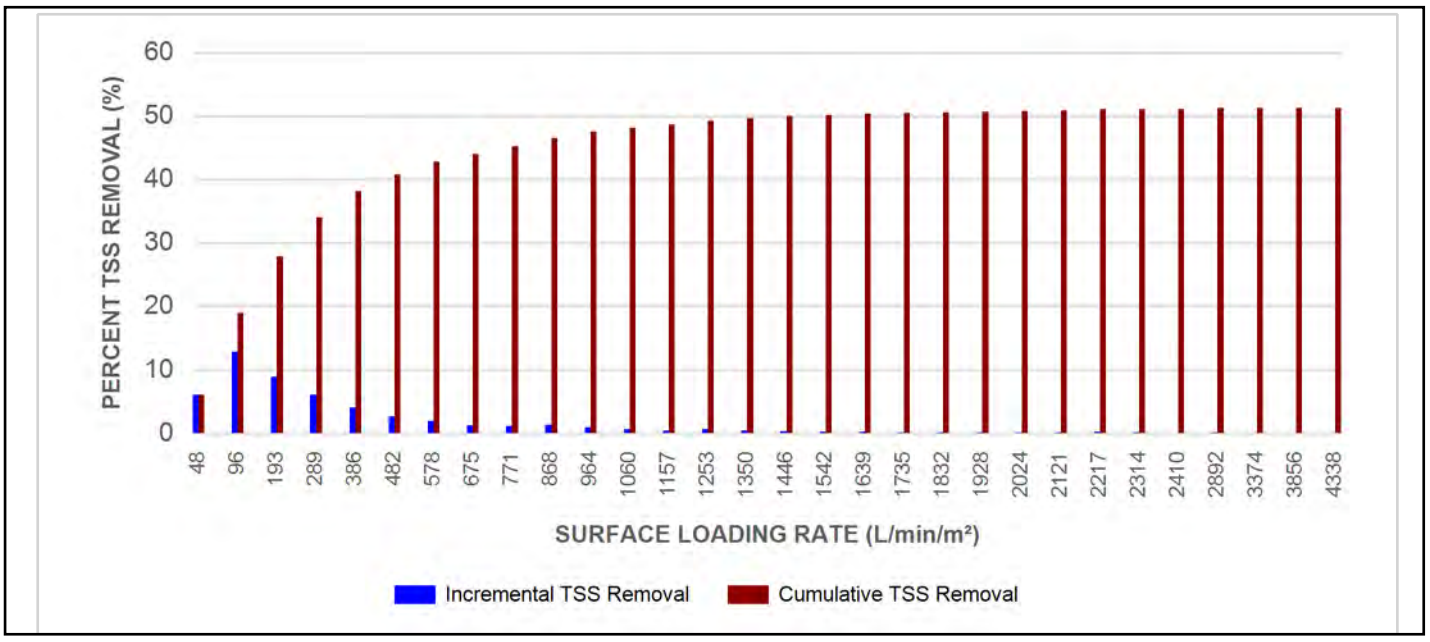
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.6	8.6	0.96	58.0	48.0	70	6.1	6.1
1.00	20.3	29.0	1.93	116.0	96.0	63	12.8	18.9
2.00	16.2	45.2	3.86	231.0	193.0	55	8.9	27.8
3.00	12.0	57.2	5.78	347.0	289.0	51	6.2	34.0
4.00	8.4	65.6	7.71	463.0	386.0	49	4.1	38.1
5.00	5.9	71.6	9.64	578.0	482.0	46	2.7	40.8
6.00	4.6	76.2	11.57	694.0	578.0	43	2.0	42.8
7.00	3.1	79.3	13.50	810.0	675.0	42	1.3	44.0
8.00	2.7	82.0	15.42	925.0	771.0	41	1.1	45.2
9.00	3.3	85.3	17.35	1041.0	868.0	41	1.4	46.5
10.00	2.3	87.6	19.28	1157.0	964.0	40	0.9	47.5
11.00	1.6	89.2	21.21	1272.0	1060.0	39	0.6	48.1
12.00	1.3	90.5	23.14	1388.0	1157.0	38	0.5	48.6
13.00	1.7	92.2	25.06	1504.0	1253.0	36	0.6	49.2
14.00	1.2	93.5	26.99	1619.0	1350.0	35	0.4	49.6
15.00	1.2	94.6	28.92	1735.0	1446.0	33	0.4	50.0
16.00	0.7	95.3	30.85	1851.0	1542.0	31	0.2	50.2
17.00	0.7	96.1	32.77	1966.0	1639.0	29	0.2	50.4
18.00	0.4	96.5	34.70	2082.0	1735.0	28	0.1	50.5
19.00	0.4	96.9	36.63	2198.0	1832.0	26	0.1	50.6
20.00	0.2	97.1	38.56	2314.0	1928.0	25	0.1	50.7
21.00	0.5	97.5	40.49	2429.0	2024.0	24	0.1	50.8
22.00	0.2	97.8	42.41	2545.0	2121.0	22	0.1	50.9
23.00	1.0	98.8	44.34	2661.0	2217.0	22	0.2	51.1
24.00	0.3	99.1	46.27	2776.0	2314.0	21	0.1	51.1
25.00	0.0	99.1	48.20	2892.0	2410.0	20	0.0	51.1
30.00	0.9	100.0	57.84	3470.0	2892.0	17	0.2	51.3
35.00	0.0	100.0	67.48	4049.0	3374.0	14	0.0	51.3
40.00	0.0	100.0	77.12	4627.0	3856.0	13	0.0	51.3
45.00	0.0	100.0	86.76	5205.0	4338.0	11	0.0	51.3
Estimated Net Annual Sediment (TSS) Load Reduction =								**51 %**

Climate Station ID: 6105978 *Years of Rainfall Data*: 20

RAINFALL DATA FROM OTTAWA CDA RCS RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL
FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF5 / EFO5	1.5	5	90	762	30	762	30	710	25
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

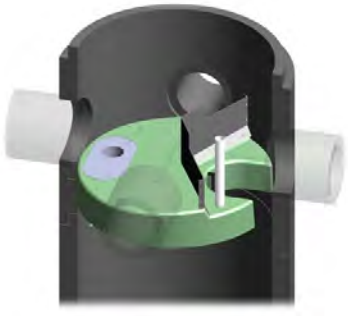
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

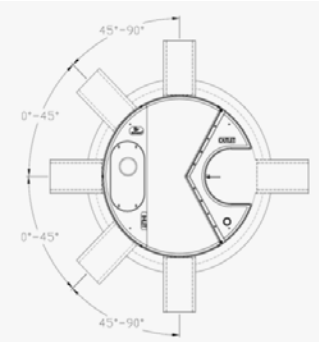
DESIGN FLEXIBILITY

►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

►While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.





INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.
0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.
45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF5 / EFO5	1.5	5	1.62	5.3	420	111	305	10	2124	75	2612	5758
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity
** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

For specifications, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

Table of TSS Removal vs Surface Loading Rate Based on Third-Party Test Results
Stormceptor® EFO

SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL
1	70	660	42	1320	35	1980	24
30	70	690	42	1350	35	2010	24
60	67	720	41	1380	34	2040	23
90	63	750	41	1410	34	2070	23
120	61	780	41	1440	33	2100	23
150	58	810	41	1470	32	2130	22
180	56	840	41	1500	32	2160	22
210	54	870	41	1530	31	2190	22
240	53	900	41	1560	31	2220	21
270	52	930	40	1590	30	2250	21
300	51	960	40	1620	29	2280	21
330	50	990	40	1650	29	2310	21
360	49	1020	40	1680	28	2340	20
390	48	1050	39	1710	28	2370	20
420	47	1080	39	1740	27	2400	20
450	47	1110	38	1770	27	2430	20
480	46	1140	38	1800	26	2460	19
510	45	1170	37	1830	26	2490	19
540	44	1200	37	1860	26	2520	19
570	43	1230	37	1890	25	2550	19
600	42	1260	36	1920	25	2580	18
630	42	1290	36	1950	24	2600	26

STANDARD PERFORMANCE SPECIFICATION FOR "OIL GRIT SEPARATOR" (OGS) STORMWATER QUALITY TREAMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit Separators**

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The minimum sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m^3 sediment / 265 L oil
	5 ft (1524 mm) Diameter OGS Units:	1.95 m^3 sediment / 420 L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m^3 sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m^3 sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m^3 sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m^3 sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m^2 to 1400 L/min/m^2, and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m^2 and 1400 L/min/m^2 shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m^2 shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m^2. No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m^2.

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m^2 shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m^2, and shall be calculated using a simple proportioning formula, with 1400 L/min/m^2 in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m^2.

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

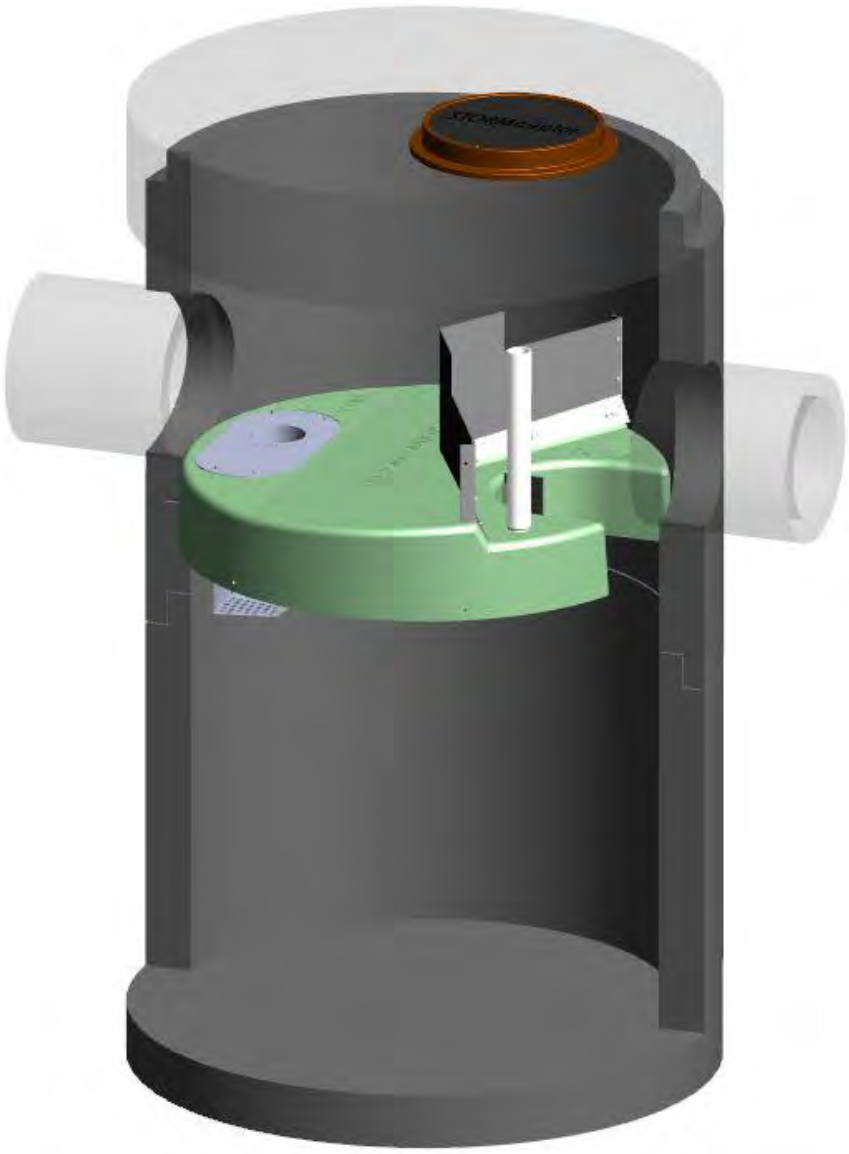
The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators,** with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-

entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to assess whether light liquids captured after a spill are effectively retained at high flow rates.

3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m^2 to 2600 L/min/m^2) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.** However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.

Stormceptor® EF

Owner's Manual



Stormceptor is protected by one or more of the following patents:

Canadian Patent No. 2,137,942
Canadian Patent No. 2,180,305
Canadian Patent No. 2,327,768
Canadian Patent No. 2,694,159
Canadian Patent No. 2,697,287
U.S. Patent No. 6,068,765
U.S. Patent No. 6,371,690
U.S. Patent No. 7,582,216
U.S. Patent No. 7,666,303
Australia Patent No. 693.164
Australia Patent No. 729,096
Australia Patent No. 2008,279,378
Australia Patent No. 2008,288,900
Japanese Patent No. 5,997,750
Japanese Patent No. 5,555,160
Korean Patent No. 0519212
Korean Patent No. 1451593
New Zealand Patent No. 583,008
New Zealand Patent No. 583,583
South African Patent No. 2010/00682
South African Patent No. 2010/01796
Patent pending

Table of Contents:

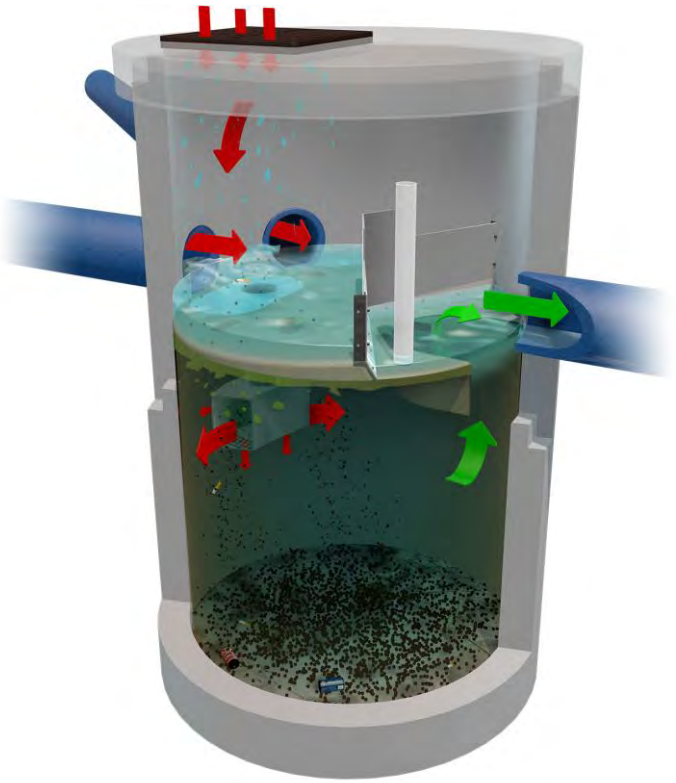
OVERVIEW

Stormceptor® EF is a continuation and evolution of the most globally recognized oil grit separator (OGS) stormwater treatment technology - ***Stormceptor®***. Also known as a hydrodynamic separator, the enhanced flow Stormceptor EF is a high performing oil grit separator that effectively removes a wide variety of pollutants from stormwater and snowmelt runoff at flow rates higher than the original Stormceptor. Stormceptor EF captures and retains sediment (TSS), free oils, gross pollutants and other pollutants that attach to particles, such as nutrients and metals. Stormceptor EF's patent-pending treatment and scour prevention platform ensures sediment is retained during all rainfall events.

Stormceptor EF offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe, multiple inlet pipes, and/or from the surface through an inlet grate. Stormceptor EF can also serve as a junction structure, accommodate a 90-degree inlet to outlet bend angle, and be modified to ensure performance in submerged conditions. With its scour prevention and internal bypass, Stormceptor EF can be installed online, eliminating the need for costly additional bypass structures.

OPERATION

- Stormwater enters the Stormceptor upper chamber through the inlet pipe(s) or a surface inlet grate. A specially designed insert reduces the influent velocity by creating a pond upstream of the insert's weir. Sediment particles immediately begin to settle. Swirling flow sweeps water, sediment, and floatables across the sloped surface of the insert to the inlet opening of the drop pipe, where a strong vortex draws water, sediment, oil, and debris down the drop pipe cone.
- Influent exits the cone into the drop pipe duct. The duct has two large rectangular outlet openings as well as perforations in the backside and floor of the duct. Influent is diffused through these various opening in multiple directions and at low velocity into the lower chamber.
- Free oils and other floatables rise up within the channel surrounding the central riser pipe and are trapped beneath the insert, while sediment settles to the sump. Pollutants are retained for later removal during maintenance cleaning.
- Treated effluent enters the outlet riser, moves upward, and discharges to the top side of the insert downstream of the weir, where it flows out the outlet pipe.
- During intense storm events with very high influent flow rates, the pond height on the upstream side of the weir may exceed the height of the weir, and the excess flow passes over the top of the weir to the downstream side of the insert, and exits through the outlet pipe. This internal bypass feature allows for in-line installation, avoiding the cost of additional bypass structures. During bypass, the pond separates sediment from all incoming flows, while full treatment in the lower chamber continues at the maximum flow rate.
- Stormceptor EF's patent-pending enhanced flow and scour prevention technology ensures pollutants are captured and retained, allowing excess flows to bypass during infrequent, high intensity storms.



COMPONENTS

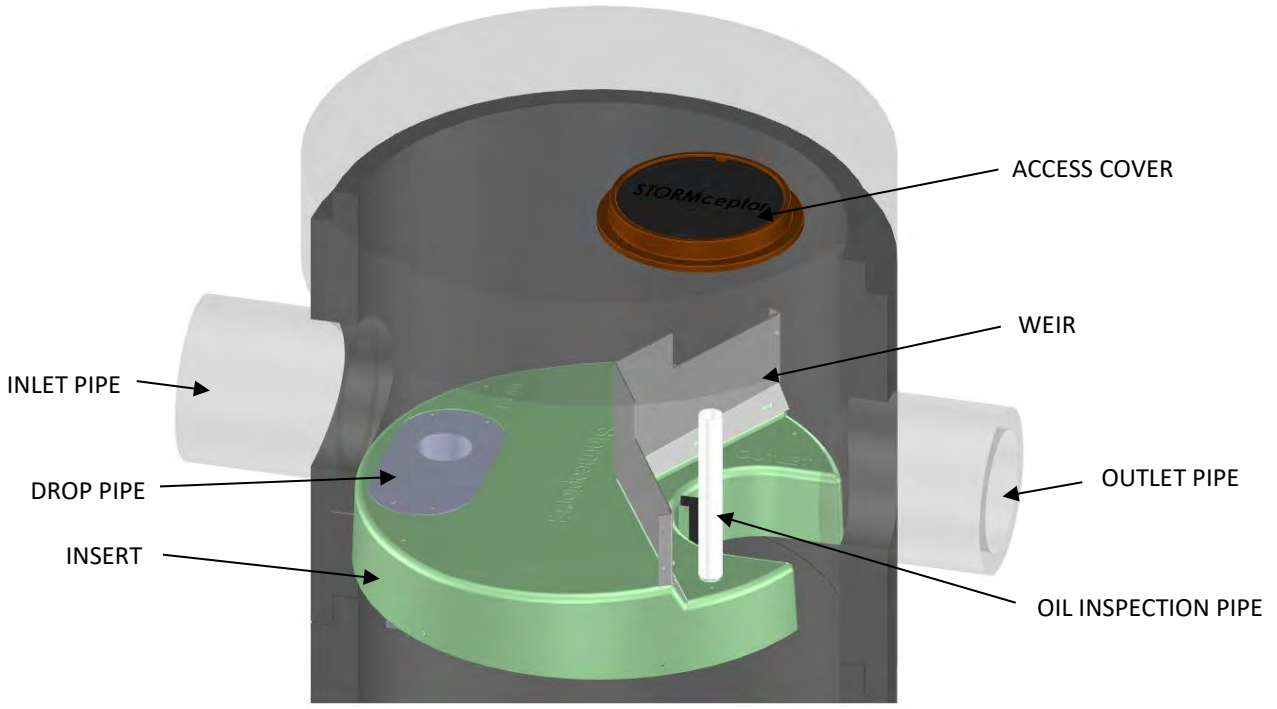


Figure 1

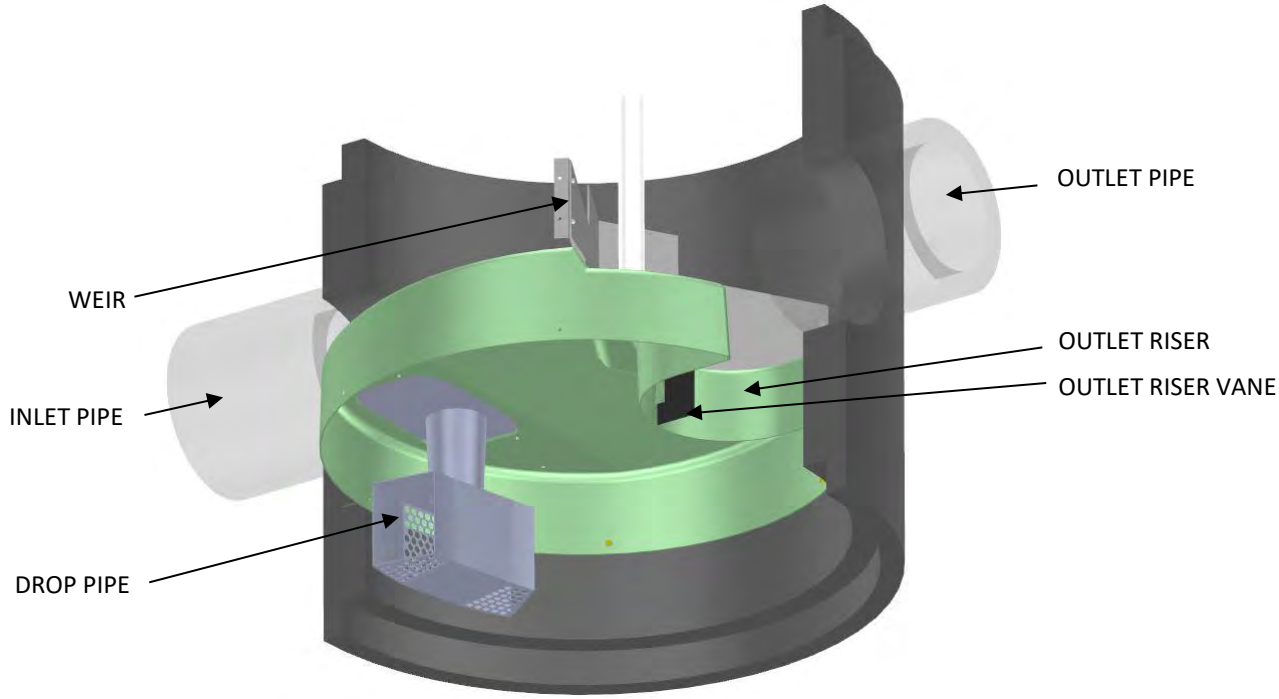


Figure 2

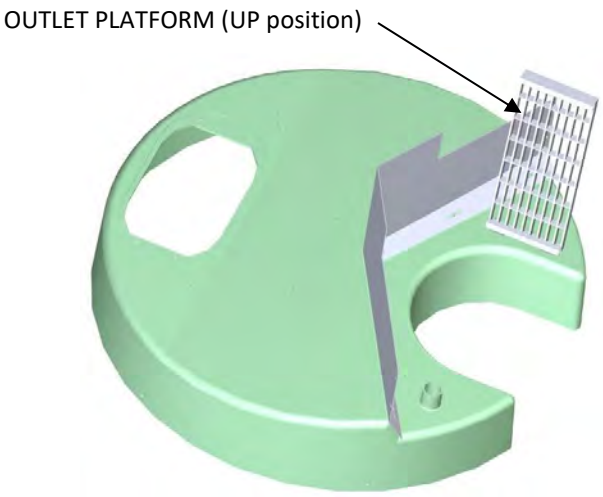


Figure 3A

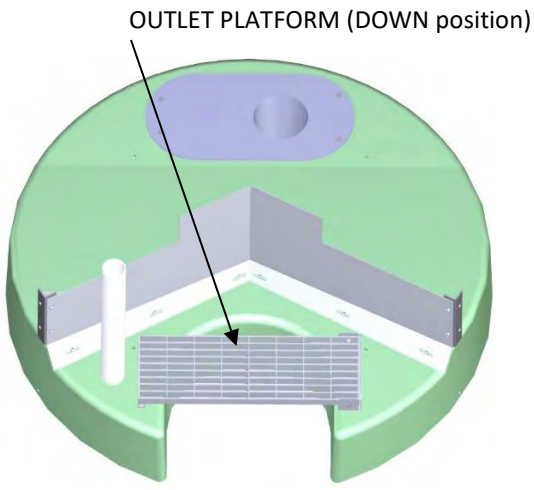


Figure 3B

- **Insert** – separates vessel into upper and lower chambers, and provides double-wall containment of hydrocarbons
- **Weir** – creates stormwater ponding and driving head on top side of insert
- **Drop pipe** – conveys stormwater and pollutants into the lower chamber
- **Outlet riser** – conveys treated stormwater from the lower chamber to the outlet pipe, and provides primary inspection and maintenance access into the lower chamber
- **Outlet riser vane** – prevents formation of a vortex in the outlet riser during high flow rate conditions
- **Outlet platform (optional)** – safety platform in the event of manned entry into the unit
- **Oil inspection pipe** – primary access for measuring oil depth

PRODUCT DETAILS

METRIC DIMENSIONS AND CAPACITIES

Table 1

Stormceptor Model	Inside Diameter (m)	Minimum Surface to Outlet Invert Depth (mm)	Depth Below Outlet Pipe Invert (mm)	Wet Volume (L)	Sediment Capacity [1] (m^3)	Hydrocarbon Storage Capacity [2] (L)	Maximum Flow Rate into Lower Chamber [3] (L/s)	Peak Conveyance Flow Rate [4] (L/s)
EF4 / EFO4	1.22	1219/914	1524	1780	1.19	265	22.1 / 10.4	425
EF5/EFO5	1.52	1219	1626	3150	1.95	420	34.6 / 16.2	708
EF6 / EFO6	1.83	1219	1930	5070	3.47	610	49.6 / 23.4	990
EF8 / EFO8	2.44	1219	2591	12090	8.78	1070	88.3 / 41.6	1700
EF10 / EFO10	3.05	1219	3251	23700	17.79	1670	138 / 65	2830
EF12 / EFO12	3.66	1219	3886	40800	31.22	2475	198.7 / 93.7	2830

[1] Sediment Capacity is measured from the floor to the bottom of the drop pipe duct. Sediment Capacity can be increased to accommodate specific site designs and pollutant loads. Contact your local representative for assistance.
[2] Hydrocarbon Storage Capacity is measured from the bottom of the outlet riser to the underside of the insert. Hydrocarbon Storage Capacity can be increased to accommodate specific site designs and pollutant loads. Contact your local representative for assistance.
[3] EF Maximum Flow Rate into Lower Chamber is based on a maximum surface loading rate (SLR) into the lower chamber of 1135 L/min/m^2.
EFO Maximum Flow Rate into Lower Chamber is based on a maximum surface loading rate (SLR) into the lower chamber of 535 L/min/m^2.
[4] Peak Conveyance Flow Rate is limited by a maximum velocity of 1.5 m/s.

U.S. DIMENSIONS AND CAPACITIES

Table 2

Stormceptor Model	Inside Diameter (ft)	Minimum Surface to Outlet Invert Depth (in)	Depth Below Outlet Pipe Invert (in)	Wet Volume (gal)	Sediment Capacity [1] (ft^3)	Hydrocarbon Storage Capacity [2] (gal)	Maximum Flow Rate into Lower Chamber [3] (cfs)	Peak Conveyance Flow Rate [4] (cfs)
EF4 / EFO4	4	48 / 36	60	471	42	70	0.78 / 0.37	15
EF5 / EFO5	5	48	64	833	75	111	1.22 / 0.57	25
EF6 / EFO6	6	48	76	1339	123	160	1.75 / 0.83	35
EF8 / EFO8	8	48	102	3194	310	280	3.12 / 1.47	60
EF10 / EFO10	10	48	128	6261	628	440	4.87 / 2.30	100
EF12 / EFO12	12	48	153	10779	1103	655	7.02 / 3.31	100

[1] Sediment Capacity is measured from the floor to the bottom of the drop pipe duct. Sediment Capacity can be increased to accommodate specific site designs and pollutant loads. Contact your local representative for assistance.
[2] Hydrocarbon Storage Capacity is measured from the bottom of the outlet riser to the underside of the insert. Hydrocarbon Storage Capacity can be increased to accommodate specific site designs and pollutant loads. Contact your local representative for assistance.
[3] EF Maximum Flow Rate into Lower Chamber is based on a maximum surface loading rate (SLR) into the lower chamber of 27.9 gpm/ft^2.
EFO Maximum Flow Rate into Lower Chamber is based on a maximum surface loading rate (SLR) into the lower chamber of 13.1 gpm/ft^2.
[4] Peak Conveyance Flow Rate is limited by a maximum velocity of 5 fps.

IDENTIFICATION

Each Stormceptor EF/EFO unit is easily identifiable by the trade name ***Stormceptor***® embossed on the access cover at grade as shown in **Figure 3**. The tradename ***Stormceptor***® is also embossed on the top of the insert upstream of the weir as shown in **Figure 3**.

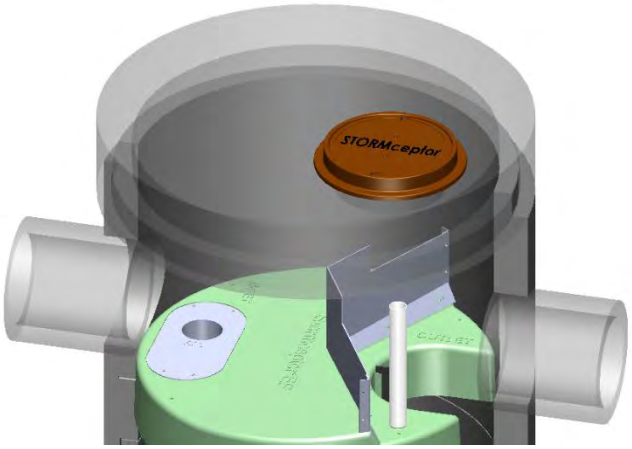


Figure 4

The specific Stormceptor EF/EFO model number is identified on the top of the aluminum Drop Pipe as shown in **Figure 4**. The unit serial number is identified on the top of the insert upstream of the weir as shown in **Figure 4**.

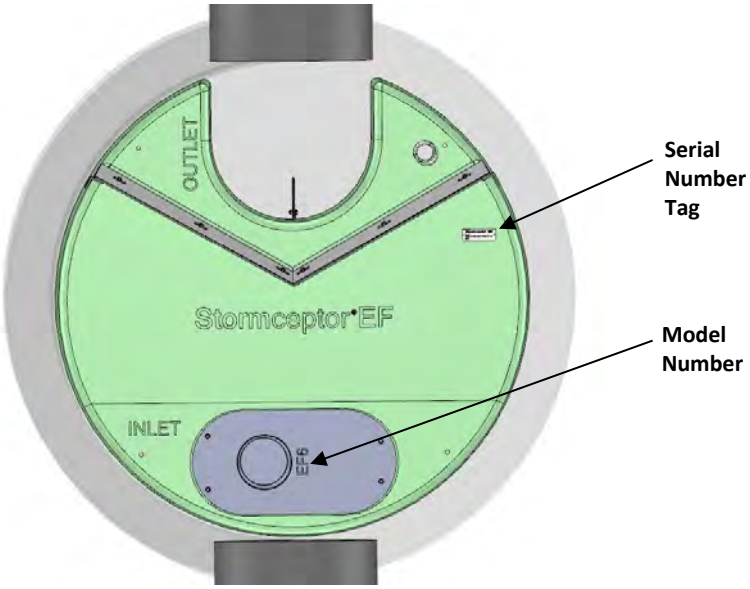


Figure 5

INSPECTION AND MAINTENANCE

It is very important to perform regular inspection and maintenance. Regular inspection and maintenance ensures maximum operation efficiency, keeps maintenance costs low, and provides continued of natural waterways.

Quick Reference

- Typical inspection and maintenance is performed from grade
- Remove manhole **cover(s)** or **inlet grate** to access insert and lower chamber
  NOTE: EF4/EFO4 & EF5/EFO5 require the removal of a **flow deflector** beneath inlet grate
- Use Sludge Judge® or similar sediment probe to check sediment depth through the **outlet riser**
- Oil dipstick can be inserted through the **oil inspection pipe**
- Visually inspect the **insert** for debris, remove debris if present
- Visually inspect the **drop pipe** opening for blockage, remove blockage if present
- Visually inspect **insert** and **weir** for damage, schedule repair if needed
- Insert vacuum hose and jetting wand through the outlet riser and extract sediment and floatables
- Replace flow deflector (EF4/EFO4 & EF5/EFO5), inlet grate, and cover(s)
- **NOTE:** If the unit has an **outlet platform**, the outlet platform is typically in the UP position (see Figure 3A) for normal treatment conditions, and for inspection and maintenance. If manned entry into the unit is required, the outlet platform must first be placed in the DOWN position (see Figure 3B). After manned entry is completed, return the outlet platform to the UP position for treatment.

When is inspection needed?

- Post-construction inspection is required prior to putting the Stormceptor into service.
- Routine inspections are recommended during the first year of operation to accurately assess pollutant accumulation.
- Inspection frequency in subsequent years is based on the maintenance plan developed in the first year.
- Inspections should also be performed immediately after oil, fuel, or other chemical spills.

What equipment is typically required for inspection?

- Manhole access cover lifting tool
- Oil dipstick / Sediment probe with ball valve (typically ¾-inch to 1-inch diameter)
- Flashlight
- Camera
- Data log / Inspection Report
- Safety cones and caution tape
- Hard hat, safety shoes, safety glasses, and chemical-resistant gloves

When is maintenance cleaning needed?

- If the post-construction inspection indicates presence of construction sediment of a depth greater than a few inches, maintenance is recommended at that time.
- For optimum performance and normal operation the unit should be cleaned out once the sediment depth reaches the recommended maintenance sediment depth, see **Table 3**.
- Maintain immediately after an oil, fuel, or other chemical spill.

Table 3

Recommended Sediment Depths for Maintenance Service*	
MODEL	Sediment Depth (in/mm)
EF4 / EFO4	8 / 203
EF5 / EFO5	12 /305
EF6 / EFO6	12 /305
EF8 / EFO8	24 / 610
EF10 / EFO10	24 / 610
EF12 / EFO12	24 / 610

* Based on a minimum distance of 41 inches (1,041 mm) from bottom of outlet riser to top of sediment bed

The frequency of inspection and maintenance may need to be adjusted based on site conditions to ensure the unit is operating and performing as intended. Maintenance costs will vary based on the size of the unit, site conditions, local requirements, disposal costs, and transportation distance.

What equipment is typically required for maintenance?

- Vacuum truck equipped with water hose and jet nozzle
- Small pump and tubing for oil removal
- Manhole access cover lifting tool
- Oil dipstick / Sediment probe with ball valve (typically ¾-inch to 1-inch diameter)
- Flashlight
- Camera
- Data log / Inspection Report
- Safety cones
- Hard hats, safety shoes, safety glasses, chemical-resistant gloves, and hearing protection for service providers
- Gas analyzer, respiratory gear, and safety harness for specially trained personnel if confined space entry is required (adhere to all OSHA / CCOSH standards)

What conditions can compromise Stormceptor performance?

- Presence of construction sediment and debris in the unit prior to activation
- Excessive sediment depth beyond the recommended maintenance depth
- Oil spill in excess of the oil storage capacity
- Clogging or restriction of the drop pipe inlet opening with debris
- Downstream blockage that results in a backwater condition

Maintenance Procedures

- Maintenance should be conducted during dry weather conditions when no flow is entering the unit.
- Stormceptor is maintained from grade through a standard surface manhole access cover or inlet grate.
- In the case of submerged or tailwater conditions, extra measures are likely required, such as plugging the inlet and outlet pipes prior to conducting maintenance.
- Inspection and maintenance of upstream catch basins and other stormwater conveyance structures is also recommended to extend the time between future maintenance cycles.

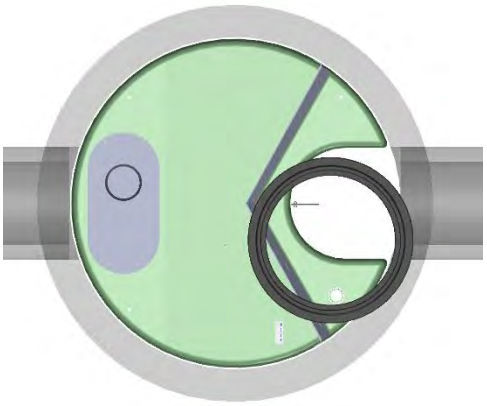


Figure 6

- Sediment depth inspections are performed through the **Outlet Riser** and oil presence can be determined through the **Oil Inspection Pipe**.
- Oil presence and sediment depth are determined by inserting a Sludge Judge® or measuring stick to quantify the pollutant depths.

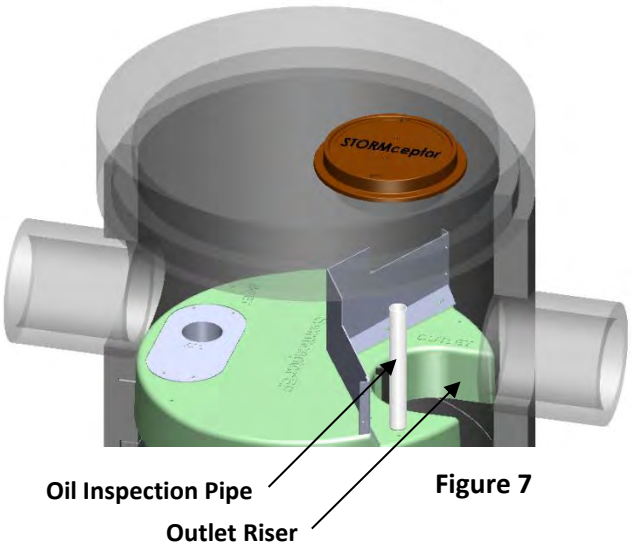


Figure 7

Figure 8

- Visually inspect the insert, weir, and drop pipe inlet opening to ensure there is no damage or blockage.
- **NOTE:** If the unit has an **outlet platform**, the outlet platform is typically in the UP position (see Figure 3A) for normal treatment conditions, and for inspection and maintenance. If manned entry into the unit is required, the outlet platform must first be placed in the DOWN position (see Figure 3B). After manned entry is completed, return the outlet platform to the UP position for treatment.

- When maintenance is required, a standard vacuum truck is used to remove the pollutants from the lower chamber of the unit through the **Outlet Riser**.

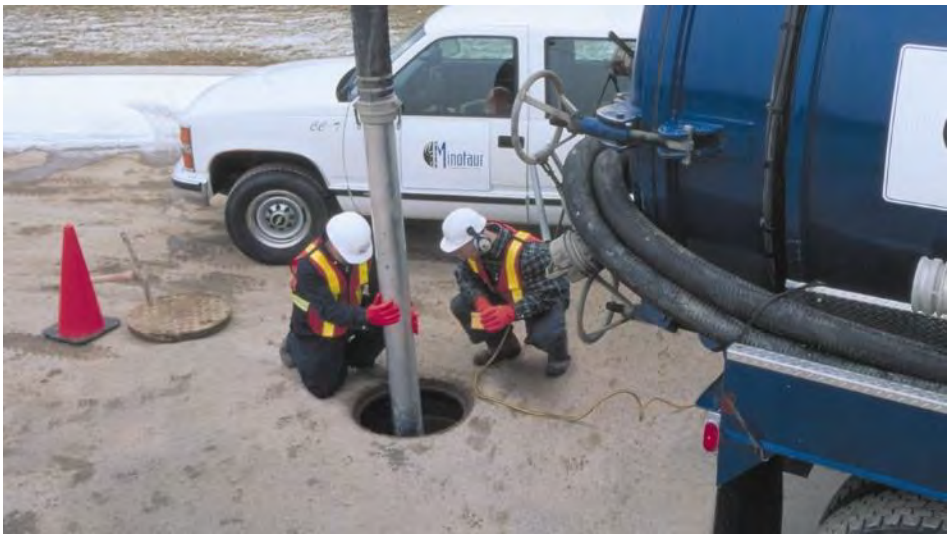


Figure 9

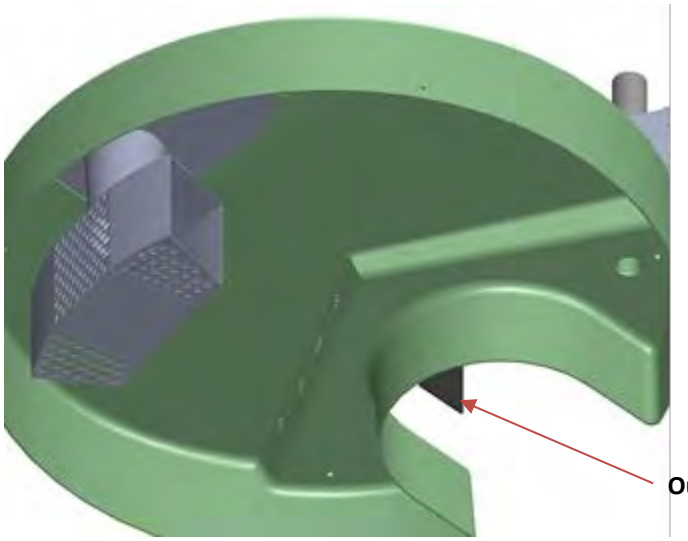


Figure 10

NOTE: The Outlet Riser Vane is durable and flexible and designed to allow maintenance activities with minimal, if any, interference.

Removable Flow Deflector

- Top grated inlets for the Stormceptor EF4/EFO4 & EF5/EFO5 models require a removable flow deflector staged underneath a 24-inch x 24-inch (600 mm x 600 mm) square inlet grate to direct flow towards the inlet side of the insert, and avoid flow and pollutants from entering the outlet side of the insert from grade. The EF6/EFO6 and larger models do not require the flow deflector.

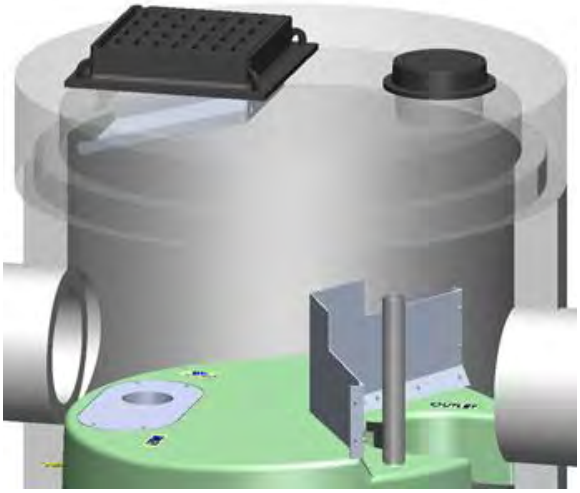
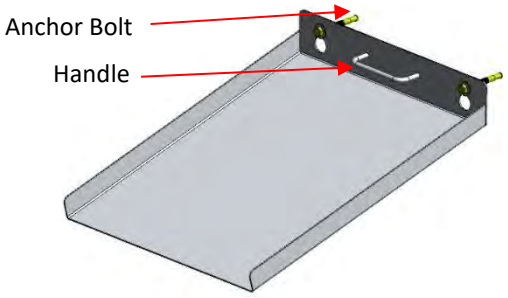


Figure 11

How to Remove:

1. Loosen anchor bolts
2. Pull up and out using the handle



Removable Flow Deflector

Hydrocarbon Spills

Stormceptor is often installed on high pollutant load hotspot sites with vehicular traffic where hydrocarbon spill potential exists. Should a spill occur, or presence of oil be identified within a Stormceptor EF/EFO, it should be cleaned immediately by a licensed liquid waste hauler.

Disposal

Maintenance providers are to follow all federal, state/ provincial, and local requirements for disposal of material.

Oil Sheens

When oil is present in stormwater runoff, a sheen may be noticeable at the Stormceptor outlet. An oil rainbow or sheen can be noticeable at very low oil concentrations (< 10 mg/L). Despite the appearance of a sheen, Stormceptor EF/EFO may still be functioning as intended.

Oil Level Alarm

To mitigate spill liability with 24/7 detection, an electronic monitoring system can be employed to trigger a visual and audible alarm when a pre-set level of oil is captured within the lower chamber or when an oil spill occurs. The oil level alarm is available as an optional feature to include with Stormceptor EF/EFO as shown in **Figure 11**. For additional details about the Oil Level Alarm please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-systems.

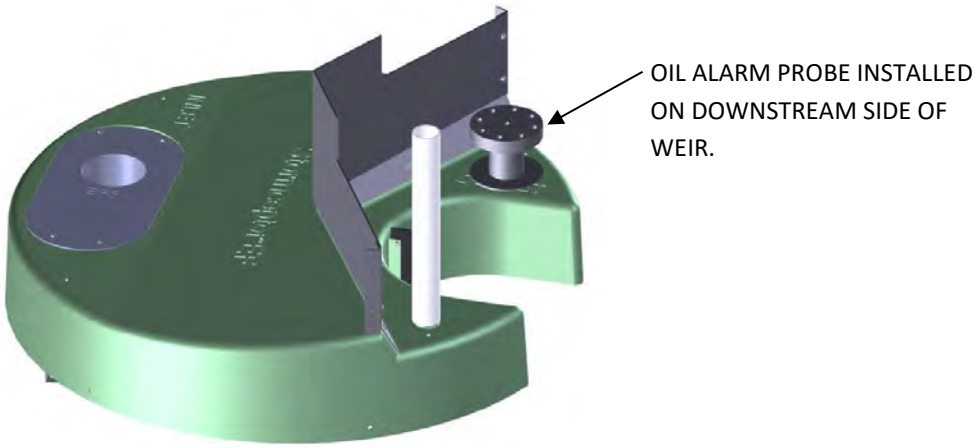


Figure 12

Replacement Parts

Stormceptor has no moving parts to wear out. Therefore inspection and maintenance activities are generally focused on pollutant removal. Since there are no moving parts during operation in a Stormceptor, broken, damaged, or worn parts are not typically encountered. However, if replacement parts are necessary, they may be purchased by contacting your local Stormceptor representative.

Stormceptor Inspection and Maintenance Log

Stormceptor Model No: _____

Serial Number: _____

Installation Date: _____

Location Description of Unit: _____

Recommended Sediment Maintenance Depth: _____

DATE	SEDIMENT DEPTH (inch or mm)	OIL DEPTH (inch or mm)	SERVICE REQUIRED (Yes / No)	MAINTENANCE PERFORMED	MAINTENANCE PROVIDER	COMMENTS

Other Comments:

Contact Information

Questions regarding Stormceptor EF/EFO can be addressed by contacting your local Imbrium representative or by visiting our website at www.imbriumsystems.com**.**

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