TATHAM ENGINEERING

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1981 Century Road West

SITE SERVICING & STORMWATER MANAGEMENT REPORT

Brunstad Christian Church Ottawa

File 523654 | January 15, 2025

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Issue	Date	Description
1	January 15, 2025	Final Report

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

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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 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 subject land is identified as having floodplain on 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 1.83 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, 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 on the rear portion of the lot. 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 loose, 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. Refusal was encountered at an approximate depth of 10.8 mbgs in borehole BH 4-23.

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 immediately north of the proposed building addition, to service the existing church and proposed addition. A septic system decommissioning permit from the Ottawa Septic System Office (OSSO) is required prior to decommissioning the existing septic system.

A Sewage System Sizing Memorandum, dated August 15, 2024, 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 42,274 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 23,000 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 Plan and Details and Notes Plan, dated November 22, 2024, 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.

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 demands and to demonstrate compliance with the current water quality requirements.

In the case where the domestic water supply and/or the water quality are insufficient, recommendations will be provided by the hydrogeological consultant.

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 a new 40,000 L fire water holding tank will provide sufficient fire protection for the remainder of the site.

Fire flow demands were calculated in accordance with the City of Ottawa Technical Bulletin IWSTB-2024-05. This method combines aspects of the Ontario Building Code (OBC), Fire Underwriters Survey (FUS), National Fire Protection Association (NFPA) 1142, and NFPA 13 (applicable to sprinklered buildings). The fire flow demand for the site (excluding the demand for sprinklers) is 2,700 L/min and requires a fire water holding tank having a minimum storage volume of 38,000 L. The new tank 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 2,700 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.

We note NFPA 13 calculations, applicable solely to the building's sprinklered system, have been completed under separate cover by the mechanical engineer.

The existing and proposed fire water holding tanks are shown on the Site Grading and Servicing Plan (Drawing SG-1).

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 (Second Edition, Document No. SDG002, October 2012), including technical bulletins:
  - ISDTB-2014-01;
  - PIEDTB-2016-01;
  - ISTB-2018-01;
  - ISTB-2018-04; and
  - ISTB-2019-02.

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 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 1.83 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 - 1.69 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 1.69 ha (m^3/s)		
	3-hr CHI	6-hr CHI	24-hr SCS Type II
2-Year	0.043	0.050	0.072

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 – 1.70 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 dry SWM facility via the proposed storm sewer and controlled by an orifice plate flow restrictor located in CBMH1. 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 (1.69 ha).
- The dry 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 3.0 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). Therefore, an oil-grit separator (OGS) unit is proposed immediately upstream of the site outlet and will provide 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.
- Runoff from both drainage areas (201 and 202) discharges to the Mud Creek municipal drain, and ultimately into the Rideau River, unchanged from the 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 Rideau Valley Conservation Authority (RVCA) prior to construction.

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 145 mm diameter orifice, installed in CBMH1, 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.

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 Plan (Drawing SG-1), 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 Tables 2.

Table 2: Proposed Condition Peak Flow Summary – Outlet 1

DESIGN STORM	DRAINAGE AREA 201 1.70 ha CONTROLLED (m^3/s)		
	3-hr CHI	6-hr CHI	24-hr SCS Type II
100-Year	0.039 (0.043)	0.040 (0.050)	0.040 (0.072)

Note: (0.100) 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 727 m^3, whereas 759 m^3 of storage volume is provided in the dry SWM facility is provided up to the emergency overflow elevation of 92.20 m as is shown on the Site Grading and Servicing Plan (Drawing SG-1) 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.

Water quality control for the development will be provided via a proposed Stormceptor Model EFO6 oil-grit-separator.

4.6.1 Oil-Grit-Separator

All runoff from Drainage Area 201 will be treated by a Stormceptor Model EFO6 OGS prior to discharging to the existing watercourse which is located along the east and north property limits (Outlet 1). The OGS has been sized to treat a minimum of 90% of annual runoff and provide 80% TSS removal based on a fine particle size distribution. The specified Stormceptor Model EFO6 will provide 83% TSS removal from the contributing drainage area, thus exceeding the MECP's requirement for enhanced level water quality control. The Stormceptor EFO Sizing Report is included in Appendix E.

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 dry 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 dry 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 Ottawa Septic System Office (OSSO) 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.

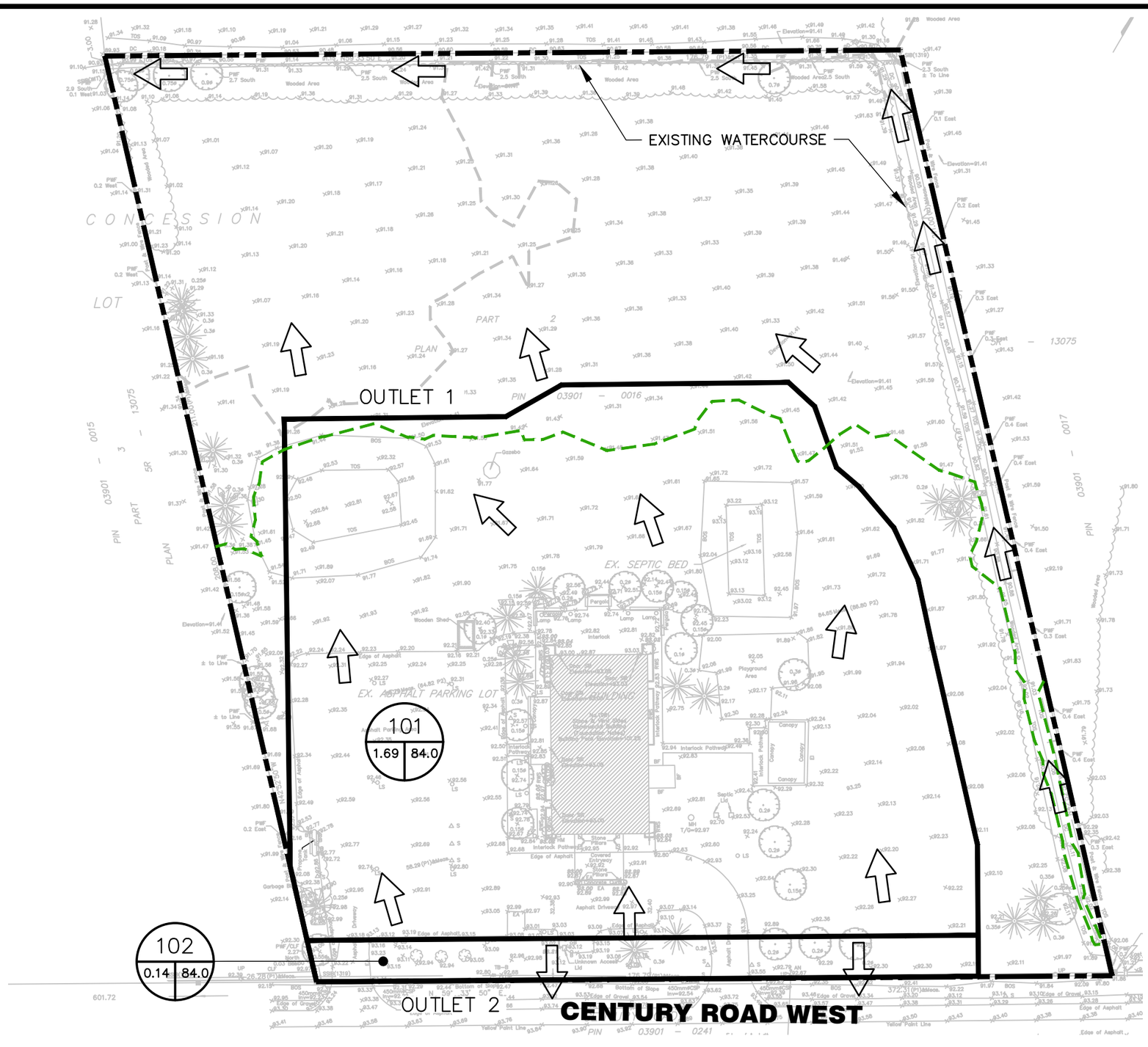
The existing 50,499 L fire water holding tank will be utilized solely to supply the building sprinkler system, and a new 40,000 L fire water holding tank will provide sufficient fire protection for the remainder of the site.

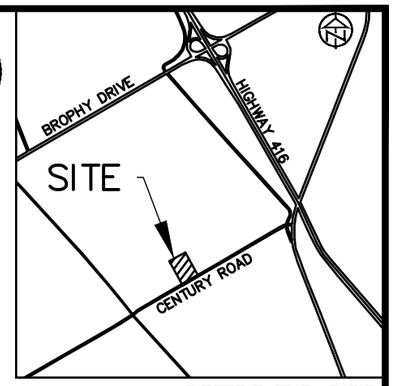
Runoff from the major portion of the site will be directed to a dry SWM facility and controlled by an orifice plate flow restrictor. The 100-year proposed condition peak flow rate from this area will be controlled to the 2-year pre-development peak flow rate. Water quality control for runoff discharging from the dry SWM facility is proposed by means of a Stormceptor Model EFO6 OGS, 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, unchanged from existing conditions.

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





KEY PLAN

LEGEND

- SUBJECT PROPERTY BOUNDARY
- DRAINAGE AREA BOUNDARY
- 100–YEAR FLOOD ELEVATION 91.27
- 350–YEAR FLOOD ELEVATION 91.49
- EXISTING CONDITION DRAINAGE DIRECTION
- 101 / 1.69 / 84.0 — DRAINAGE AREA ID, CURVE NUMBER CN, AREA (ha.)

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

TATHAM ENGINEERING

1981 CENTURY RD. WEST
CITY OF OTTAWA
EXISTING CONDITION DRAINAGE PLAN

DWG. No. **DP-1**

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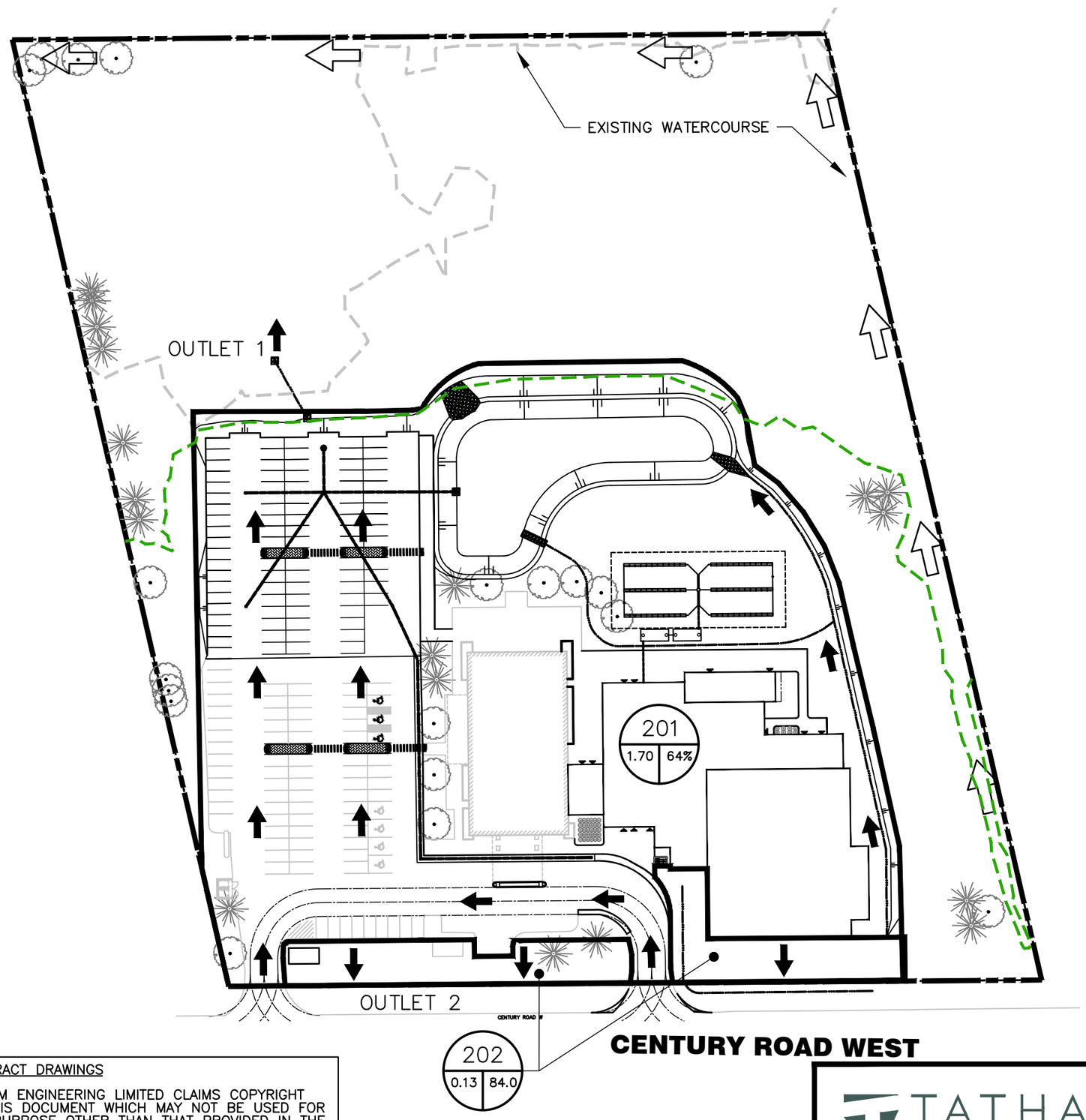
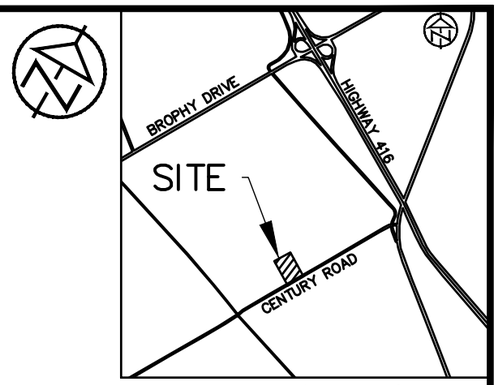


CENTURY ROAD WEST



KEY PLAN

LEGEND

- SUBJECT PROPERTY BOUNDARY
- DRAINAGE AREA BOUNDARY
- 100–YEAR FLOOD ELEVATION 91.27
- 350–YEAR FLOOD ELEVATION 91.49
- PROPOSED CONDITION DRAINAGE DIRECTION
- 201 / 1.70 / 64% — DRAINAGE AREA ID; CURVE NUMBER CN/ % IMPERVIOUS; AREA (ha.)

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

TATHAM ENGINEERING

1981 CENTURY RD. WEST
CITY OF OTTAWA
PROPOSED CONDITION DRAINAGE PLAN

DWG. No. **DP-2**

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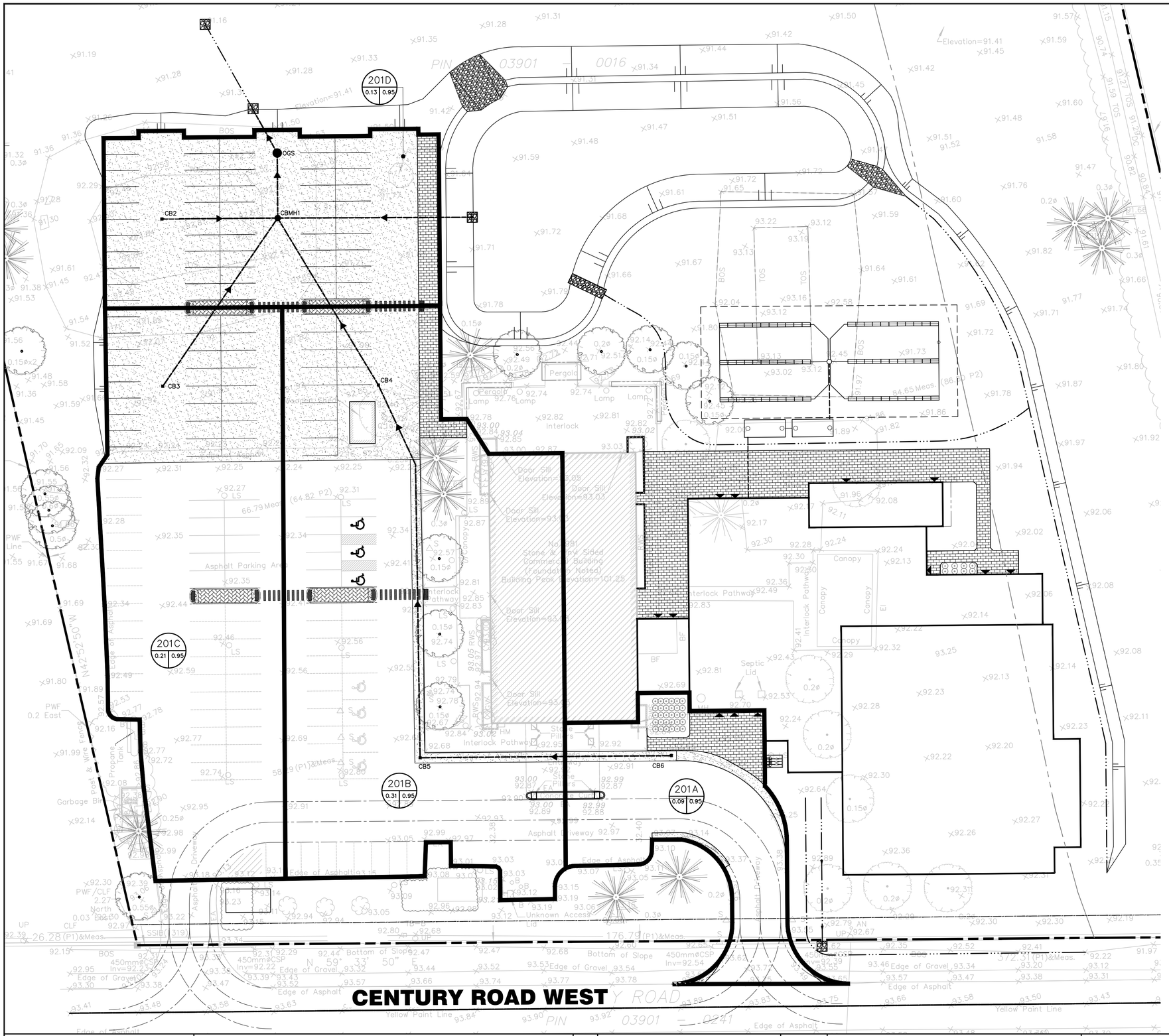
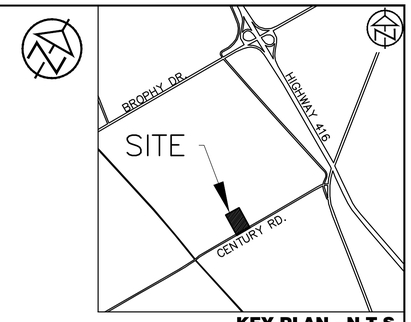




KEY PLAN - N.T.S.

LEGEND

- PROPERTY BOUNDARY
- BOTTOM OF DITCH AND FLOW DIRECTION
- STORM DRAINAGE BOUNDARY
- HEAVY DUTY ASPHALT
- CONCRETE WALKWAY
- 201A — AREA ID
- 1.70 0.95 — RUNOFF COEFFICIENT / DRAINAGE AREA

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
1.	ISSUED FOR APPROVAL	JAN 2025

ENGINEER STAMP

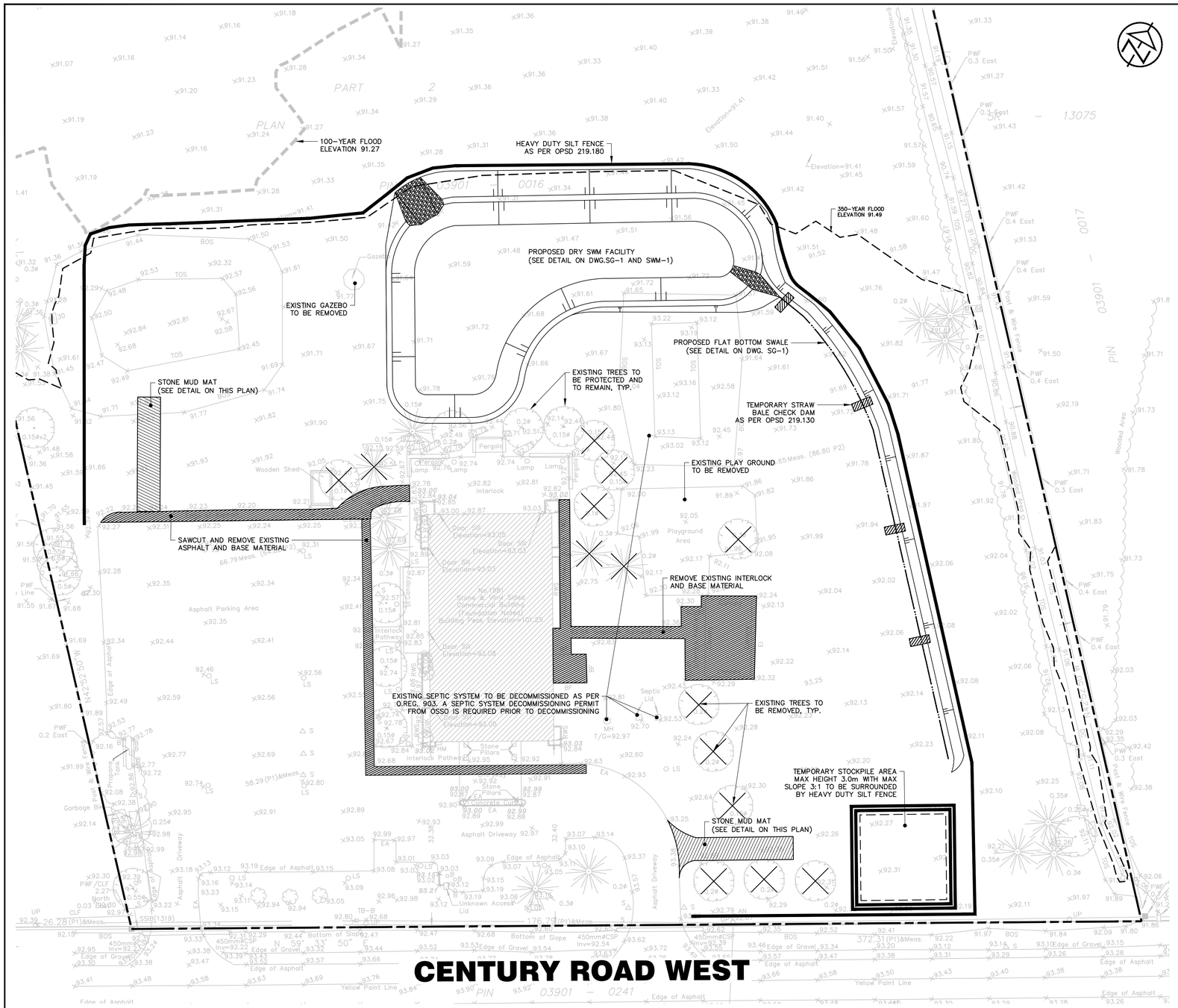
1981 CENTURY RD. WEST
CITY OF OTTAWA
BRUNSTAD CHRISTIAN CHURCH OTTAWA

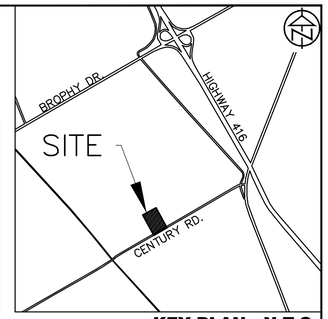
STORM DRAINAGE PLAN

TATHAM ENGINEERING

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

Drawing Name: 523654-STM01.dwg, Plotted: Jan 15, 2025

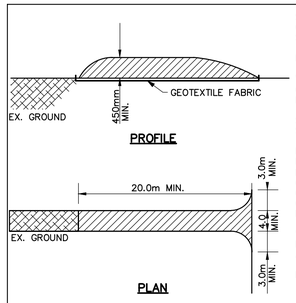




KEY PLAN - N.T.S.

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.



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.

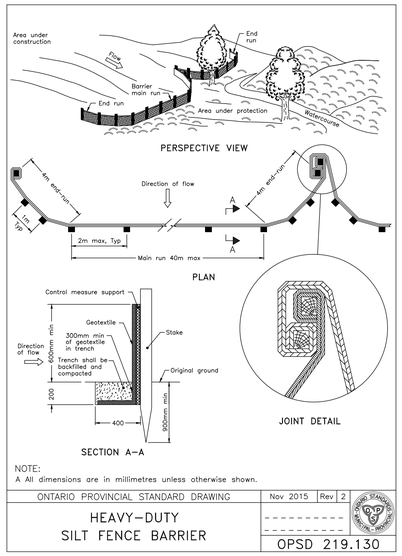
SURFACE WATER – ALL SURFACE WATER FLOWING OR DIRECTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE.

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.

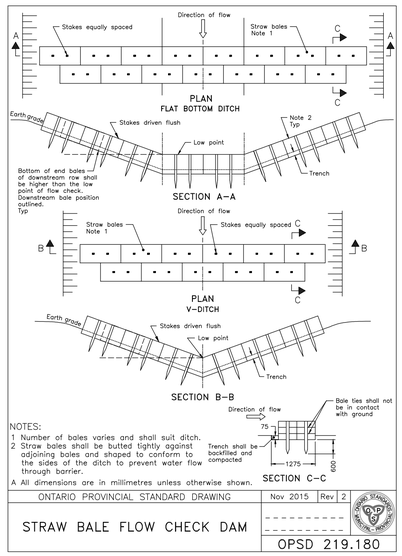
INSPECTION AND REQUIRED MAINTENANCE AFTER EACH RAIN SHALL BE PROVIDED BY THE CONTRACTOR.

STONE MUD MAT DETAIL
SCALE: N.T.S



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

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

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
1.	ISSUED FOR APPROVAL	JAN 2025

ENGINEER STAMP

LICENSED PROFESSIONAL ENGINEER
J.R.ASH
100123082
Jan.15,2025
PROVINCE OF ONTARIO

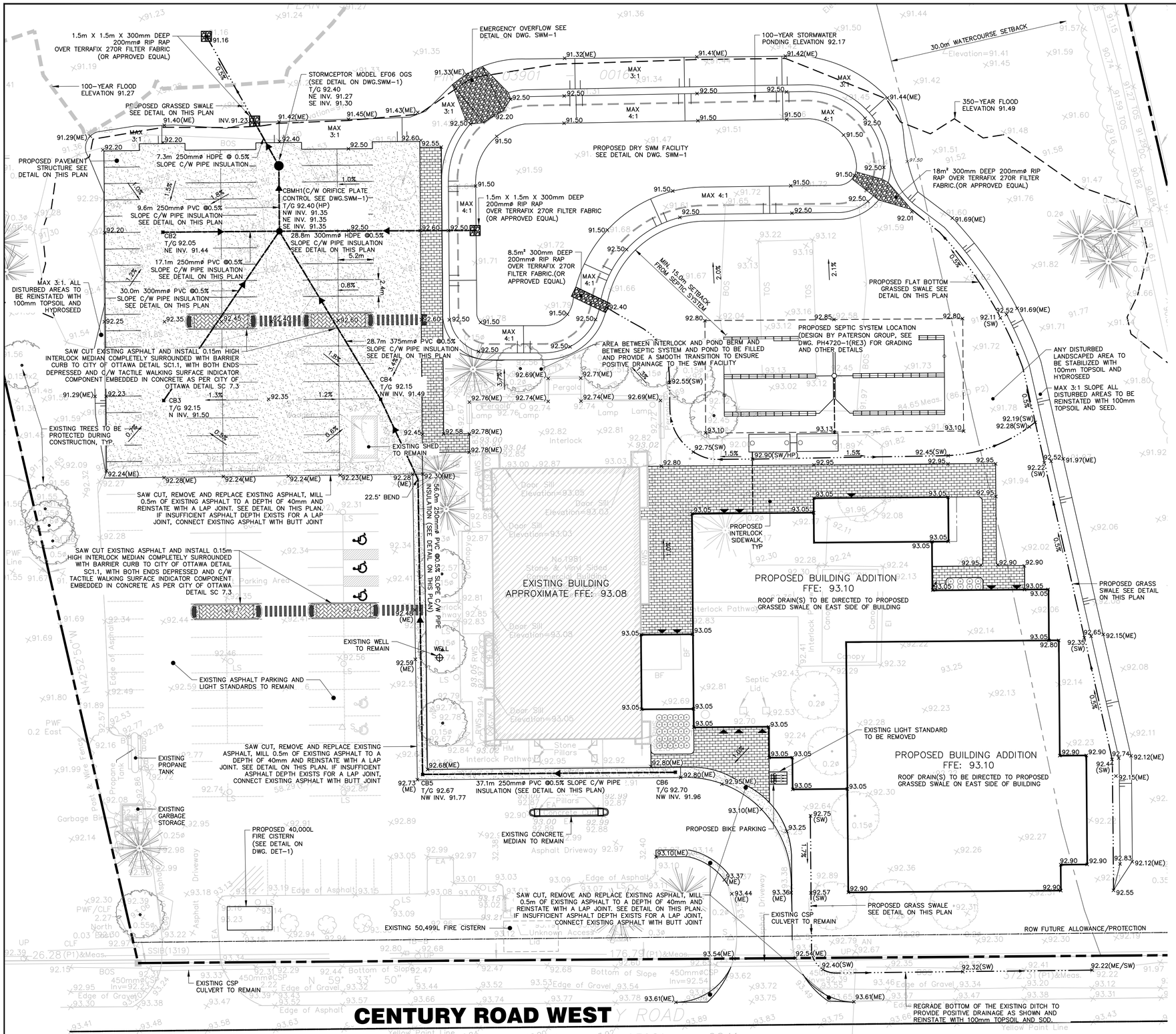
1981 CENTURY RD. WEST
CITY OF OTTAWA
BRUNSTAD CHRISTIAN CHURCH OTTAWA

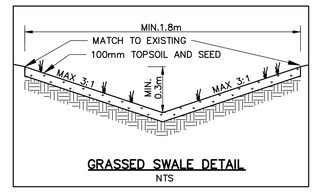
REMOVALS, SILTATION AND EROSION CONTROL PLAN

TATHAM ENGINEERING

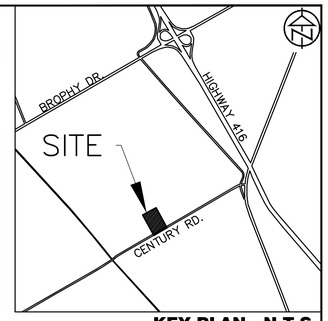
DESIGN: HY	FILE: 523654	DWG: SC-1
DRAWN: HY	DATE: SEPT 2024	
CHECK: GC	SCALE: 1:400	

Drawing Name: 523654-SC01.dwg, Plotted: Jan 15, 2025

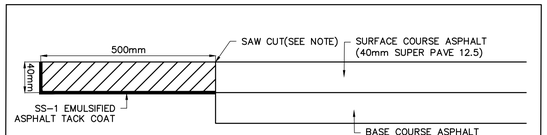




GRASSED SWALE DETAIL
NTS

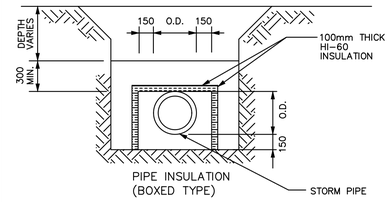


KEY PLAN - N.T.S.



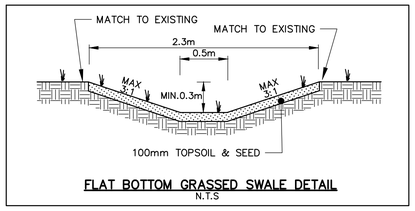
LAP JOINT DETAIL

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.

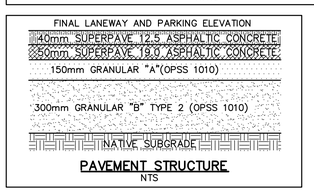


NOTE :
1. WHEREVER INSULATION IS USED; PROVIDE GRANULAR 'A' BEDDING AND COVER.
2. ALL NOTES PERTAINING TO BEDDING DETAILS SHALL APPLY.
3. FROST TAPERS TO OPSD 803.030 AND OPSD 803.031 AND AS DIRECTED BY THE ENGINEER.

STORM PIPE FROST PROTECTION DETAIL
SCALE: NTS



FLAT BOTTOM GRASSED SWALE DETAIL
N.T.S



PAVEMENT STRUCTURE
NTS

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

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.

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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
1.	ISSUED FOR APPROVAL	JAN 2025

ENGINEER STAMP

LICENSED PROFESSIONAL ENGINEER J.R. ASH 100123082 Jan. 15, 2025 PROVINCE OF ONTARIO

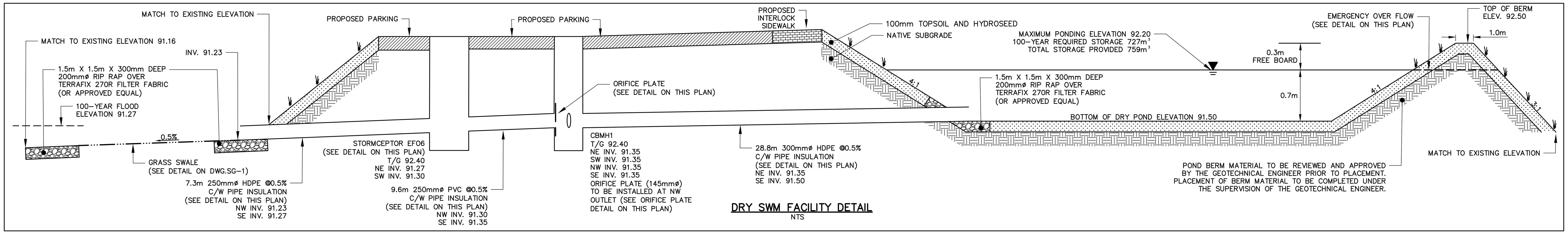
1981 CENTURY RD. WEST
CITY OF OTTAWA
BRUNSTAD CHRISTIAN CHURCH OTTAWA

SITE GRADING AND SERVICING PLAN

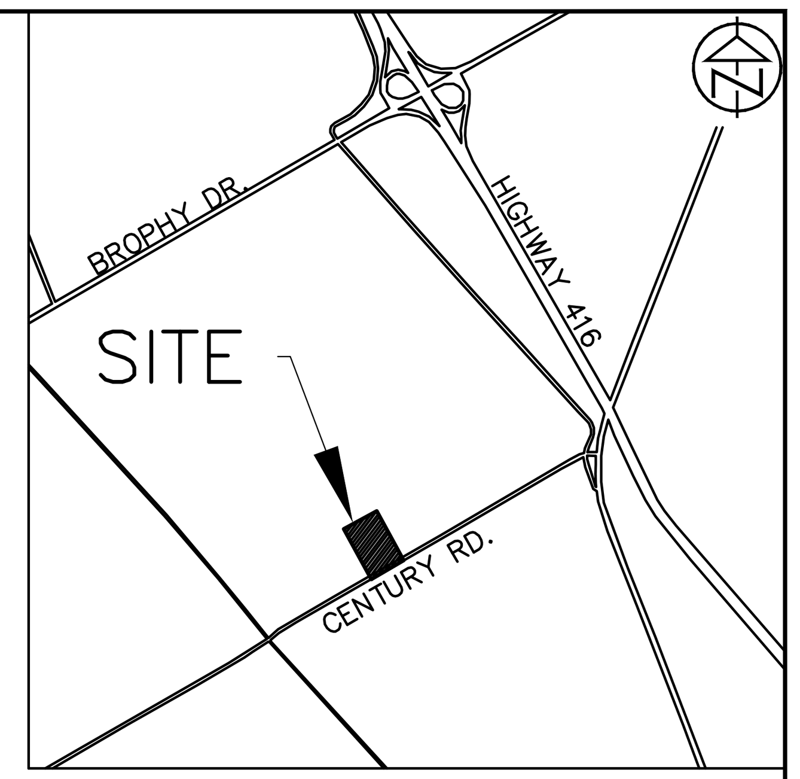
TATHAM ENGINEERING

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

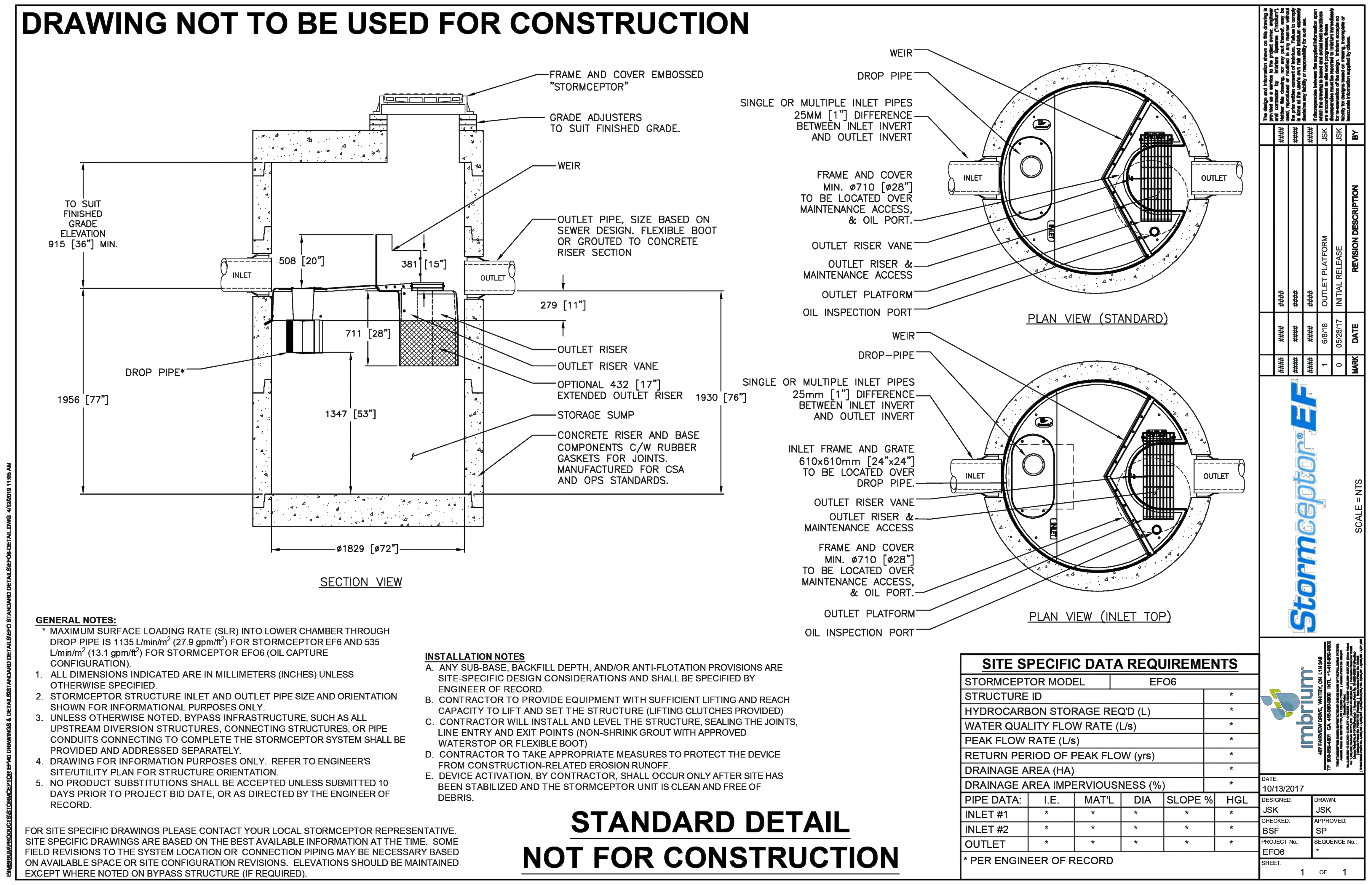
Drawing Name: 523654-SG01.dwg, Plotted: Jan 15, 2025

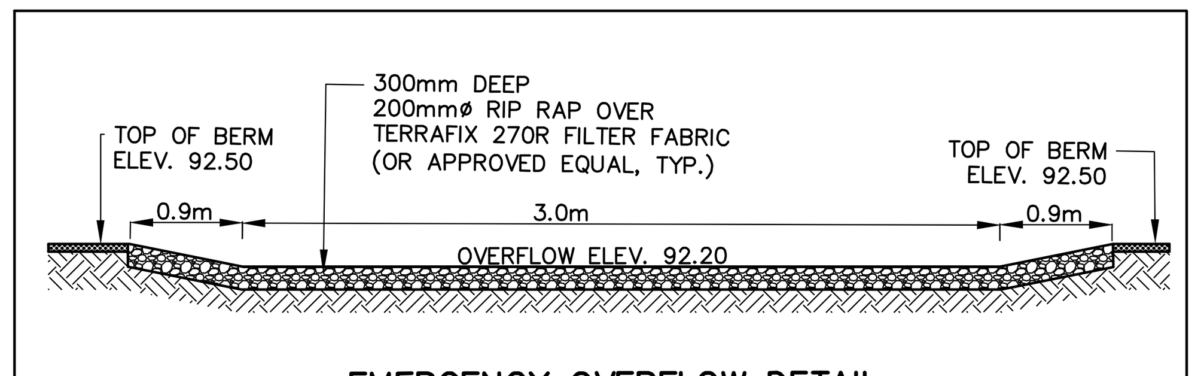


DRY SWM FACILITY DETAIL
NTS

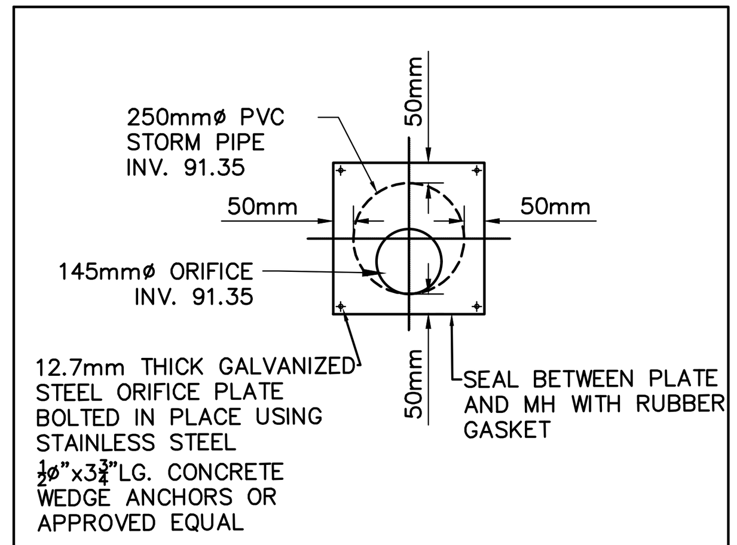


KEY PLAN - N.T.S.





EMERGENCY OVERFLOW DETAIL
SCALE: NTS



ORIFICE PLATE DETAIL
NTS

DISCLAIMER AND COPYRIGHT

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.

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

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No.	REVISION DESCRIPTION	DATE
1.	ISSUED FOR APPROVAL	JAN 2025

ENGINEER STAMP

LICENSED PROFESSIONAL ENGINEER J.R. ASH 100123082 Jan. 15, 2025 PROVINCE OF ONTARIO

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

STORMWATER MANAGEMENT PLAN

TATHAM ENGINEERING

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

Drawing Name: 523654-SWM01.dwg, Plotted: Jan 15, 2025

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 1500mm 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 1200mmø 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.

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.

4. 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.

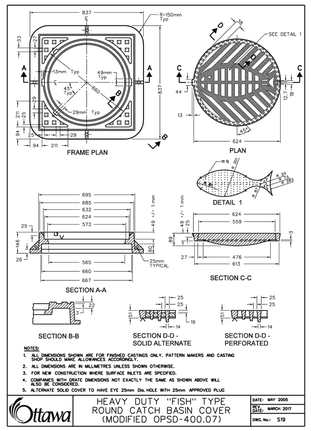
D. DEWATERING PUMPS SHALL DISCHARGE TO A GEOTEXTILE FILTER BAG LOCATED ON A GENTLY SLOPING GRASSED SURFACE TO THE APPROVED OUTLET.

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.

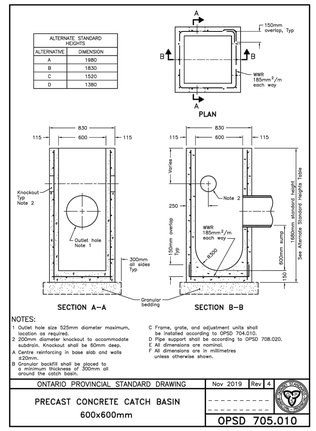
F. TO MINIMIZE THE VOLUME OF WATER TO BE REMOVED FROM EXCAVATIONS, THE WORK AREA SHALL BE GRADED TO DIRECT SURFACE RUNOFF AROUND AND AWAY FROM OPEN EXCAVATIONS.

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.

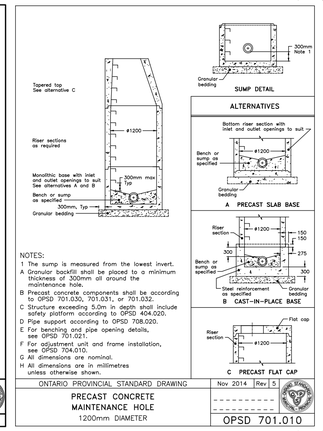
H. DEWATERING OPERATIONS ARE TO BE SUSPENDED DURING SEVERE STORM EVENTS.



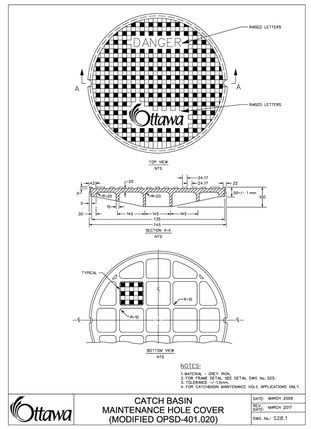
Ottawa	HEAVY DUTY "FISH" TYPE ROUND CATCH BASIN COVER (MODIFIED OPSD-400.07)	DATE: MAY 2020 / REV.: MARCH 2017 / DWG No.: S19



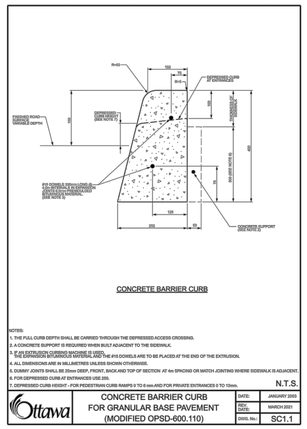
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2019	Rev 4
PRECAST CONCRETE CATCH BASIN 600x600mm		OPSD 705.010



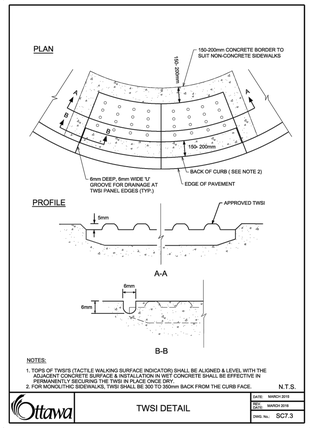
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2014	Rev 5
PRECAST CONCRETE MAINTENANCE HOLE 1200mm DIAMETER		OPSD 701.010



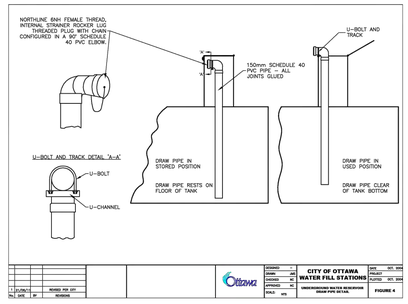
Ottawa	CATCH BASIN MAINTENANCE HOLE COVER (MODIFIED OPSD-401.020)	DATE: MARCH 2009 / REV.: MARCH 2017 / DWG No.: S28.1



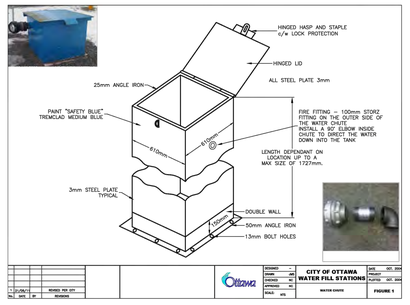
Ottawa	CONCRETE BARRIER CURB FOR GRANULAR BASE PAVEMENT (MODIFIED OPSD-600.110)	N.T.S. / DATE: JANUARY 2005 / REV.: MARCH 2021 / DWG No.: SC1.1



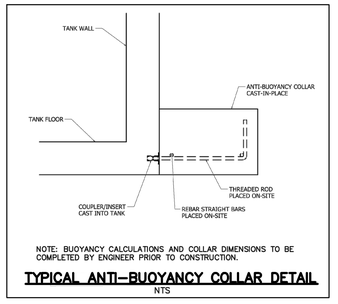
Ottawa	TWSI DETAIL	N.T.S. / DATE: MARCH 2015 / REV.: MARCH 2016 / DWG No.: SC7.3



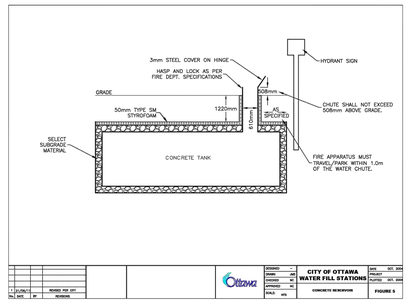
Ottawa	CITY OF OTTAWA WATER FILL STATIONS — UNDERGROUND WATER DISTRIBUTION DRAW PIPE DETAIL	FIGURE 4



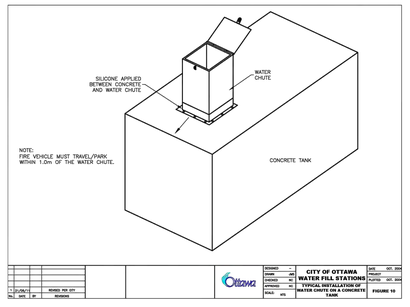
Ottawa	CITY OF OTTAWA WATER FILL STATIONS — WATER CHUTE	FIGURE 5



TYPICAL ANTI-BUOYANCY COLLAR DETAIL
NTS



Ottawa	CITY OF OTTAWA WATER FILL STATIONS — CONCRETE RESERVOIR	FIGURE 8



Ottawa	CITY OF OTTAWA WATER FILL STATIONS — TYPICAL METHOD OF LOCATION OF WATER CHUTE ON CONCRETE TANK	FIGURE 10

No.	REVISION DESCRIPTION	DATE
1.	ISSUED FOR APPROVAL	JAN 2025

ENGINEER STAMP

LICENSED PROFESSIONAL ENGINEER — J.R. ASH — 100123092 — PROVINCE OF ONTARIO

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

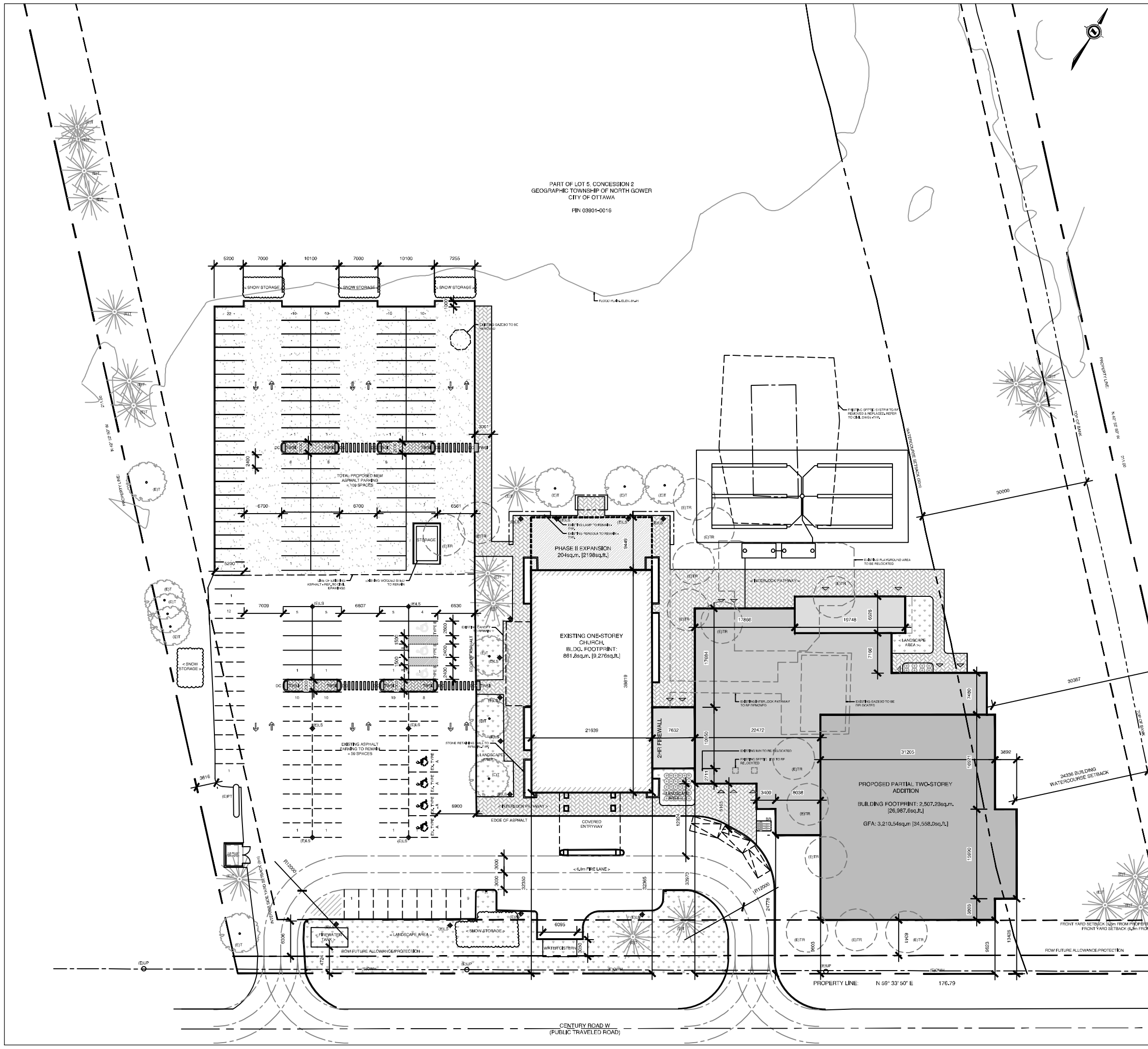
TATHAM ENGINEERING

NOTES AND DETAILS

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

Drawing Name: 523654-DET01.dwg, Plotted: Jan 15, 2025

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

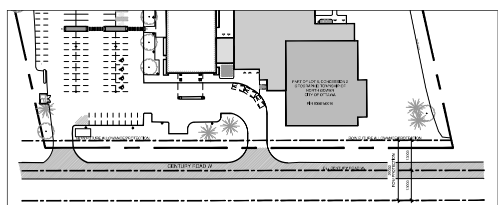


01 / A1.0 CONCEPT SITE PLAN
SCALE: 1:400

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

LEGEND

NEW OVERHEAD DOOR (O/H)	NEW SIGN, REFER TO SIGN LEGEND (S#)	TWO WAY TRAFFIC	MINIMUM SETBACKS (ZONING)
NEW DOOR / ENTRANCE	FIRE ROUTE SIGN (S1)	DEPRESSED CURB (DC)	NEW CONSTRUCTION
BICYCLE PARKING SPACE (1.8Mx0.6M)	STREET LIGHT (SL)	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

CITY OF OTTAWA ZONING BY-LAW

ZONING MECHANISM (RI5)	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 6.3m 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 CHURCH** • PLACE OF WORSHIP: 861.8 m² • 10 SPACES PER 100m² GFA = 861.8/100 = 8.618 x 10 = 87 SPACES **PROPOSED ADDITION** • COMMUNITY CENTER (ANCILLARY AREA): 1387.5 m² • 4 SPACES PER 100m² GFA = 1387.5/100 = 13.875 x 4 = 56 SPACES • PLACE OF WORSHIP: 587.7 m² • 10 SPACES PER 100m² GFA = 587.7/100 = 5.877 x 10 = 59 SPACES • TOTAL: 115 SPACES NEW BUILD + EXISTING : 87 + 115 = 202 SPACES REQUIRED	168 SPACES PROVIDED
PROVIDED PARKING	REGULAR SPACES (EXISTING)	55
	REGULAR SPACES (NEW)	45
	ACCESSIBLE SPACE (TYPE A)	4 (EXISTING)
	ACCESSIBLE SPACE (TYPE B)	3
	COMPACT SPACES (50% OF PARKING SPACES: BY-LAW 2021-218, PART 4 - SECTION 106)	61
	TOTAL	168
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% (81 SPACES PERMITTED) = 61 SPACES

AREA SCHEDULE

ROOM NAME	ROOM AREA	LOCATION
PRIMARY USE (WORSHIP)		
EXISTING ONE-STOREY CHURCH	861.8 SQ.M	GROUND FLOOR
NURSERY ROOM	134.7 SQ.M	GROUND FLOOR
NURSERY W/C	4.9 SQ.M	GROUND FLOOR
FEEDING ROOM	21.2 SQ.M	GROUND FLOOR
STROLLER STORAGE	5.9 SQ.M	GROUND FLOOR
SUNDAY SCHOOL ROOM 01	59.4 SQ.M	SECOND FLOOR
YOUTH LOUNGE	197.8 SQ.M	SECOND FLOOR
MEZZANINE	27.9 SQ.M	SECOND FLOOR
SENIORS LOUNGE	70.8 SQ.M	SECOND FLOOR
SUNDAY SCHOOL ROOM 02	47.8 SQ.M	SECOND FLOOR
OFFICE	11.2 SQ.M	SECOND FLOOR
OFFICE	11.2 SQ.M	SECOND FLOOR
SECONDARY USE (ANCILLARY)		
MULTI PURPOSE SPACE	1102.4 SQ.M	GROUND FLOOR
FEAST HALL/CAFE	245.6 SQ.M	GROUND FLOOR
COFFEE BAR	10.6 SQ.M	GROUND FLOOR
MEETING ROOM	28.9 SQ.M	SECOND FLOOR
SERVICE SPACE		
COAT CHECK	16.3 SQ.M	GROUND FLOOR
RECEPTION	7.7 SQ.M	GROUND FLOOR
MALE CHANGE ROOM	85.9 SQ.M	GROUND FLOOR
FEMALE CHANGE ROOM	86.8 SQ.M	GROUND FLOOR
UNIVERSAL W/C	9.3 SQ.M	GROUND FLOOR
STORAGE/JAN. CL.	15.0 SQ.M	GROUND FLOOR
COMMERCIAL KITCHEN	134.5 SQ.M	GROUND FLOOR
STAFF W/C	4.8 SQ.M	GROUND FLOOR
STAFF W/C	3.6 SQ.M	GROUND FLOOR
STORAGE/MECH	44.5 SQ.M	GROUND FLOOR
STORAGE	56.5 SQ.M	GROUND FLOOR
JAN. CL.	6.3 SQ.M	SECOND FLOOR
W/C	3.8 SQ.M	SECOND FLOOR
B.F W/C	6.5 SQ.M	SECOND FLOOR
CIRCULATION		
BUILDING LINK	55.5 SQ.M	GROUND FLOOR
LOBBY	117.6 SQ.M	GROUND FLOOR
VESTIBULE	15.4 SQ.M	GROUND FLOOR
EXIT CORRIDOR	3.8 SQ.M	GROUND FLOOR
STAIR A	22.7 SQ.M	GROUND FLOOR
CORRIDOR 01	48.3 SQ.M	GROUND FLOOR
STAIR B	24.2 SQ.M	GROUND FLOOR
CORRIDOR 02	62.4 SQ.M	GROUND FLOOR
CORRIDOR 03	120.2 SQ.M	SECOND FLOOR
STAIR A	22.7 SQ.M	SECOND FLOOR
STAIR B	20.5 SQ.M	SECOND FLOOR
AREA TOTALS		
PRIMARY USE (WORSHIP):	**1449.5 SQ.M** [587.7 SQ.M NEW BUILD ONLY]	
SECONDARY USE (ANCILLARY):	**1387.5 SQ.M**	
SERVICE SPACE:	**481.5 SQ.M**	
CIRCULATION:	**513.3 SQ.M**	

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

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 K23 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: ONTARIO ASSOCIATION OF ARCHITECTS
NORTH ARROW:

No.	DATE	REVISION
20	2024.12.18	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:
SITE PLAN

DRAWN BY: D.T. B.L.	CHECKED BY: S.J.L.
PLOT DATE: 2024.12.18	PROJECT DATE: 2023.03.15
JOB NUMBER: SL-1090-23	SCALE: 1:400

SHEET NUMBER:
A1.0

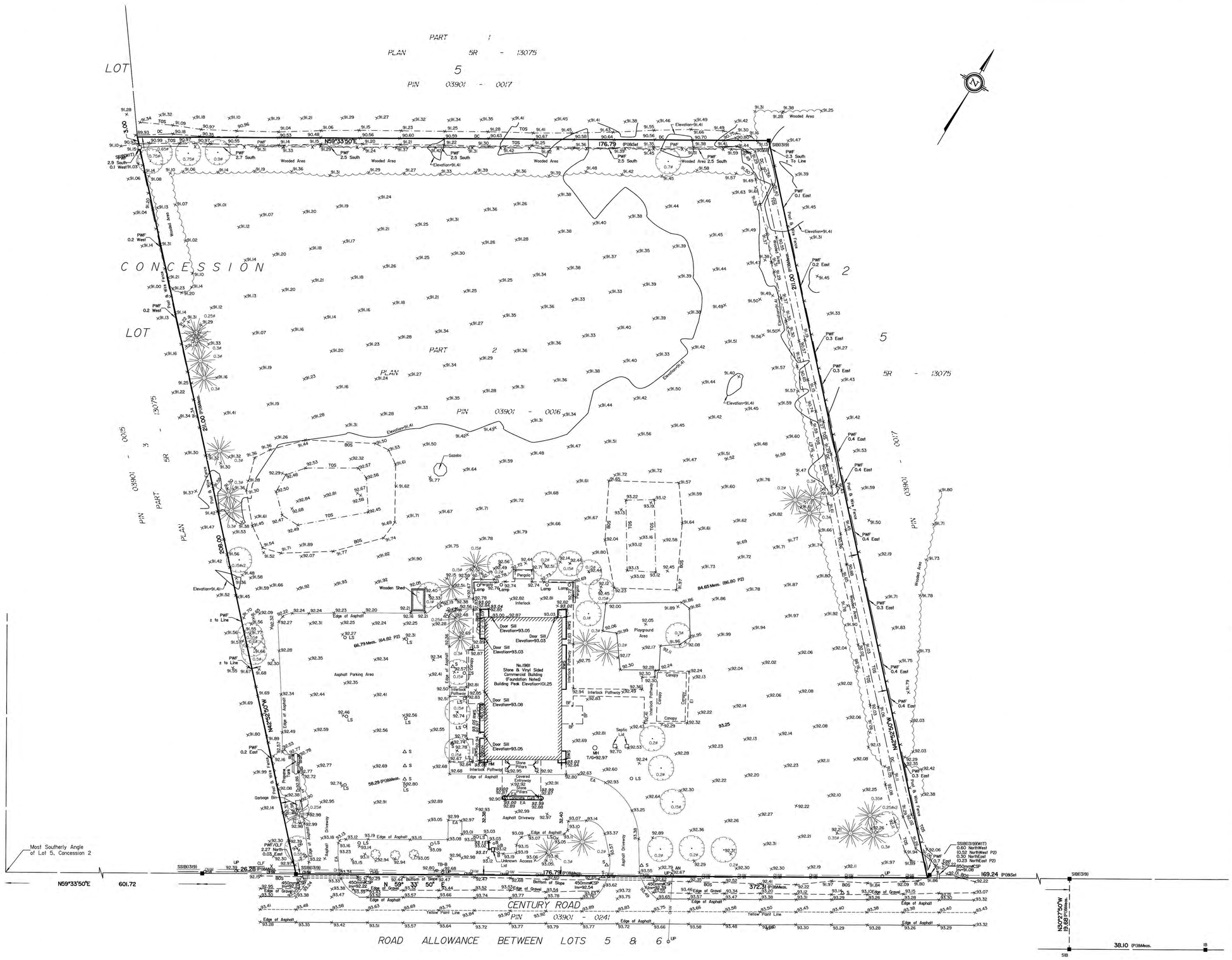
PLAN #
APPLICATION #

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.

PATERSON GROUP

memorandum

re: **Sewage System Sizing Exercise**
1981 Century Road - Ottawa
to: **Peter Twilley -** ptwilley@arrowservice.ca
date: August 15, 2024
file: PH4720-MEMO.01.REV.01

Preliminary
2024-11-11 3:04:17 PM

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:

Phase 1

- 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)
- Nursery: 1 use per week during Sunday service
- 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
- Multi purpose 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: one time 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:
  - 700 people: once every couple of years
  - 400 people: 1 time per month max for 9 months of the year
  - 150 people: one a week

Sewage System Flow Calculation

Phase 1

- ❑ 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)
  - *350 people x 36L x 1 day = 12,600 L/week +100 people x 36L x 2 days = 7,200 L/week*
- ❑ Nursery: 1 use per week during Sunday service
  - *30 people x 30L x 1 day = 900 L/week*
- ❑ Kitchen: 350 people once a month, 500 – 600 people once every few years
  - *600 people x 36L x 0.2 days = 4,320 L/week. 350 people once a month is accounted in conjunction with church service*
- ❑ Feast hall / Lobby: few times a year for a few hours at a time
  - *For design purposes assume once per week – 80 people x 36 L x 1 day = 2,880 L/week*
- ❑ Multi purpose space: used in conjunction with church
  - *Accounted for in church services*
- ❑ Youth Lounge (Mezzanine): used once a week with Saturday night service
  - *25 people x 125L x 1 day = 1,440 L/week*
- ❑ Seniors area: once every 2 weeks for 2 hours
  - *40 people x 36L x 0.5 days = 720 L/week*
- ❑ Workshop: one time a week in conjunction with church service
  - *Accounted for in church services*
- ❑ Offices (2) and a small meeting room: once a week
  - *(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
  - *80 people x 30L x 1 day = 2,400 L/week*
- ❑ Sanctuary/Main Meeting Hall Extension:
  - 700 people: once every couple of years
    - *700 people x 8 L x 0.2 days = 1,120 L/week*
  - 400 people: 1 time per month max for 9 months of the year
    - *400 people x 36L x 0.2 days = 2,880 L/week*
  - 150 people: one 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 a week are: 12,600 L/week + 7,200 L/week + 900 L/week + 4,320 L/week + 2,880 L/week + 1,440 L/week + 720 L/week + 414 L/week + 2,400 L/week + 1,120 L/week + 2,880 L/week + 5,400 L/week = **42,274 L/week**

Proposed Sewage systems flows using a Balancing Tank

In order to have a total daily design sewage flow volume (TDDSF) of less than 10,000 L/day, then a balancing tank would need to 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: 42,274 L/week / 7 days per week = 6,040 L/day

For a cumulative flow of **6,040 L/day**.

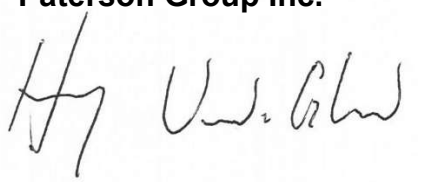
Conclusion

Provided that a balancing tank is used as part of the sewage system design and that the provided usage is not increased from the information provided, the Site Application for the addition and renovation of the existing Church Building at 1981 Century Road can proceed using a TDDSF of less than 10,000 L/day. A ECA application will not be required for flow volumes of greater than 10,000 L/day.

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:
Fire Flow Demand Calculations

TATHAM ENGINEERING

Fire Flow Demand Calculations

Tatham File no. :	523654
Project:	1981 Century Road, Ottawa
Date:	9-Jan-25
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

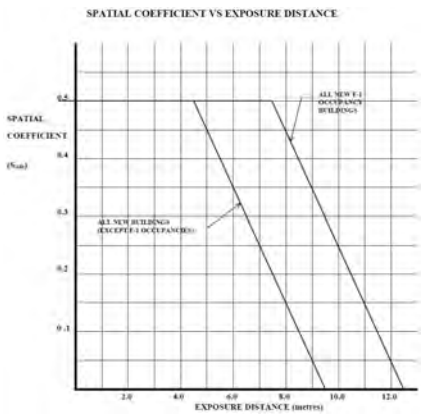
TYPE OF CONSTRUCTION	Classification by Group or Division in Accordance with Table 3.1.2.1 of the Ontario Building Code: A-2, B-1, B-2, B-3, C, D	A-4, F-3	A-1, A-3	E, F-2	F-1
Building is of noncombustible construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2. of the OBC, including loadbearing walls, columns and arches.	10	12	14	17	23
Building is of noncombustible construction or of heavy timber construction conforming to Article 3.1.4.6. 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 as part of fire-resistance rating where permitted in Subsection 3.1.2. of the OBC.	18	22	25	34	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	25	28	32	39	55
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	861.8	m^2	Determine the Height of the Building	3	m	Total Volume	2585.4	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		$Q = KVS_{Tot}$	59464.2	L
	V	2585.4	m^3			
	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 ISWTB-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.

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):	1.69
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)		1.69											
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	1.69	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):	91.40
Catchment Length (m):	133
Catchment Slope (%):	1.32%
Method: Airport Method	
Time of Concentration (mins):	24.04

Summary

Catchment CN:	84.0
Catchment C:	0.40
Catchment IA (mm):	5.00
Time of Concentration (hrs):	0.40
Catchment Time to Peak (hrs):	0.27
Catchment Time Step (mins):	3.21

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):	1.70
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)		1.70											
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	1.09	100	0.95									
Gravel	3		89	0.38									
Woodland	10		73	0.35									
Pasture/Lawns	5	0.61	79	0.40									
Meadows	8		76	0.38									
Cultivated	7		82	0.55									
Waterbody	12		50	0.05									
Average CN		92.46											
Average C		0.75											
Average IA		3.08											

Time to Peak Calculations

Max. Catchment Elev. (m):	93.15
Min. Catchment Elev. (m):	91.40
Catchment Length (m):	133
Catchment Slope (%):	1.32%
Method: Bransby-Williams Formula	
Time of Concentration (mins):	6.81

Summary

Catchment CN:	92.5
Catchment C:	0.75
Catchment IA (mm):	3.08
Time of Concentration (hrs):	0.11
Catchment Time to Peak (hrs):	0.08
Catchment Time Step (mins):	0.91

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):	145	Weir Length (m)	3
Cross-Sectional Area (sq.m):	0.016513	Sill elevation (m)	92.20
Orifice Coefficient:	0.63	Weir Coefficient	1.7
Invert Elevation (m):	91.35	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	145 mm dia. Orifice		Emergency Overflow		Total Discharge	Active Storage
	Head	Discharge	Head	Discharge		
(m)	(m)	(cms)	(m)	(cms)	(cms)	(cm)
91.50	0.08	0.013	0.000	0.000	0.013	0.0
91.55	0.13	0.016	0.000	0.000	0.016	44.3
91.60	0.18	0.019	0.000	0.000	0.019	90.0
91.65	0.23	0.022	0.000	0.000	0.022	137.1
91.70	0.28	0.024	0.000	0.000	0.024	185.8
91.75	0.33	0.026	0.000	0.000	0.026	236.0
91.80	0.38	0.028	0.000	0.000	0.028	287.7
91.85	0.43	0.030	0.000	0.000	0.030	341.0
91.90	0.48	0.032	0.000	0.000	0.032	395.8
91.95	0.53	0.033	0.000	0.000	0.033	452.3
92.00	0.58	0.035	0.000	0.000	0.035	510.4
92.05	0.63	0.036	0.000	0.000	0.036	570.1
92.10	0.68	0.038	0.000	0.000	0.038	631.6
92.15	0.73	0.039	0.000	0.000	0.039	694.7
92.20	0.78	0.041	0.000	0.000	0.041	759.5
92.25	0.83	0.042	0.050	0.062	0.104	911.9
92.30	0.88	0.043	0.100	0.188	0.231	980.2
92.35	0.93	0.044	0.150	0.370	0.415	1050.4

TATHAM ENGINEERING

Project :	1981 Century Road
File No.	523654
Date:	Oct-24
Designed By:	HY
Checked By:	JA
Subject:	SWM Facility 1

Dry Pond Storage

Elevation	Depth	Increasing Area	Accum Area	Volume	Storage Volume[1]
(m)	(m)	(m^2)	(m^2)	(m^3)	(m^3)
91.50	0.00	0.00	871.00	0.00	0.00
91.55	0.05	28.65	899.65	44.26	44.26
91.60	0.10	29.11	928.76	45.71	89.97
91.65	0.15	29.57	958.33	47.18	137.15
91.70	0.20	30.04	988.37	48.67	185.81
91.75	0.25	30.50	1018.87	50.18	235.99
91.80	0.30	30.96	1049.83	51.72	287.71
91.85	0.35	31.43	1081.26	53.28	340.98
91.90	0.40	31.89	1113.15	54.86	395.84
91.95	0.45	32.35	1145.51	56.46	452.31
92.00	0.50	32.82	1178.33	58.09	510.40
92.05	0.55	33.28	1211.61	59.75	570.15
92.10	0.60	33.75	1245.35	61.42	631.57
92.15	0.65	34.21	1279.56	63.12	694.69
92.20	0.70	34.67	1314.23	64.84	759.53
92.25	0.75	35.14	1349.37	66.59	826.12
92.30	0.80	35.60	1384.97	68.36	894.48
92.35	0.85	36.06	1421.03	70.15	964.62
92.40	0.90	36.53	1457.56	71.96	1036.59
92.45	0.95	36.99	1494.55	73.80	1110.39
92.50	1.00	37.45	1532.00	75.66	1186.05

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
0.627

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%	1.700	0.510

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	0.254	0.300	0.42	2.40	0.18	0.266	0.63
Comments:							

Pre SCS
==
======================

```
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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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DATE: 01/15/2025 TIME: 11:22:49

USER:

COMMENTS: _____

****
** 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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108-a295-abaadc5
    remark: Ottawa Macdonald Cartier SCS 24 2yr

*
 ** CALIB NASHYD         0005  1  5.0    1.69    0.07 12.17  21.01 0.43   0.000
    [CN=84.0         ]
    [ N = 3.0:Tp 0.27]
*
    READ STORM                  5.0
    [ Ptot= 49.09 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\0ae462b3-c5e8-4289-9215-dff6382d6c76\a83aa445-7986-4
108-a295-abaadc5
    remark: Ottawa Macdonald Cartier SCS 24 2yr

*
 ** CALIB NASHYD         0006  1  5.0    0.14    0.01 12.00  20.95 0.43   0.000
    [CN=84.0         ]
    [ N = 3.0:Tp 0.17]
*
================================================================================
======================


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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  *****


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DATE: 01/15/2025 TIME: 11:22:49

USER:

COMMENTS: _____

  ****
  ** SIMULATION : Ottawa Macdonald Cartier SCS **
  ****

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\0ae462b3-c5e8-4289-9215-dff6382d6c76\e20e7578-d439-4ffb-8edc-8fe2588
    remark: Ottawa Macdonald Cartier SCS 24 100yr

*
 ** CALIB NASHYD 0005 1 5.0 1.69 0.26 12.08 73.52 0.66 0.000
    [CN=84.0]
    [N = 3.0:Tp 0.27]
*
    READ STORM 5.0
    [Ptot=111.87 mm]
    fname :
C:\Users\hyu\AppData\Local\Temp\0ae462b3-c5e8-4289-9215-dff6382d6c76\e20e7578-d439-4ffb-8edc-8fe2588
    remark: Ottawa Macdonald Cartier SCS 24 100yr

*
 ** CALIB NASHYD 0006 1 5.0 0.14 0.03 12.00 73.30 0.66 0.000
    [CN=84.0]
    [N = 3.0:Tp 0.17]
*
 FINISH

==

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Pre CHI
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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\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: 01/15/2025 TIME: 11:27:01

USER:

COMMENTS: _____

****
** 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								

```
    CHIC STORM                10.0
    [ Ptot= 31.86 mm ]
*
 ** CALIB NASHYD         0003  1  5.0    1.69    0.04  1.33   9.58 0.30   0.000
    [CN=84.0         ]
    [ N = 3.0:Tp 0.27]
*
    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

  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: 01/15/2025                          TIME: 11:27:01

USER:
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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    1.69    0.05  2.25  12.64 0.34   0.000
    [CN=84.0         ]
    [ N = 3.0:Tp 0.27]
*
    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]
*
================================================================================
=======================
```

```
       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\5080961c-
0df7-498c-a72b-3b4f7f250bad\scenario
  Summary filename:
C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\5080961c-
0df7-498c-a72b-3b4f7f250bad\scenario


DATE: 01/15/2025                          TIME: 11:27:01

USER:


COMMENTS: _____________________________________________________________


  ************************************************
  ** SIMULATION : Ottawa 100yr 3hr Chicago      **
  ************************************************

  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= 71.66 mm ]
*
 ** CALIB NASHYD         0003  1  5.0    1.69    0.20  1.25  38.61 0.54   0.000
    [CN=84.0         ]
    [ N = 3.0:Tp 0.27]
*
    CHIC STORM                 10.0
    [ Ptot= 71.66 mm ]
*
 ** CALIB NASHYD         0004  1  5.0    0.14    0.02  1.08  38.49 0.54   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
```


***** 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\6080229b-3f43-4041-8595-fee7c730212c\scenario
Summary filename: C:\Users\hyu\AppData\Local\Civica\VH5\e2c2d2be-418b-4c4d-a4c4-d228733f752c\6080229b-3f43-4041-8595-fee7c730212c\scenario

DATE: 01/15/2025 TIME: 11:27:01

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COMMENTS: _____

****
** SIMULATION : Ottawa 100yr 6hr Chicago **
****

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	0003	1 5.0	1.69	0.22	2.25	47.53	0.58	0.000
	[CN=84.0]								
	[N = 3.0:Tp 0.27]								
*									
	CHIC STORM		10.0						
	[Ptot= 82.32 mm]								
*									
**	CALIB NASHYD	0004	1 5.0	0.14	0.02	2.08	47.39	0.58	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:
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: 01/15/2025 TIME: 11:27:21

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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\a51249a6-0a17-4051-a687-920f551f6fcb\e20e7578-d439-4
ffb-8edc-8fe2588
    remark: Ottawa Macdonald Cartier SCS 24 100yr

*
 ** CALIB NASHYD         0022  1  5.0    0.13    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\a51249a6-0a17-4051-a687-920f551f6fcb\e20e7578-d439-4
ffb-8edc-8fe2588
    remark: Ottawa Macdonald Cartier SCS 24 100yr

*
 *  CALIB STANDHYD       0021  1  5.0    1.70    0.48 12.00  94.53 0.85   0.000
    [I%=64.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:             0023  1  5.0    1.70    0.04 12.75  94.50  n/a   0.000
*
 FINISH

================================================================================
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================================================================================
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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:
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: 01/15/2025 TIME: 11:27:21

USER:

COMMENTS: _____

```
  ********************************************
  ** SIMULATION : Ottawa Macdonald Cartier SCS  **
  ********************************************

  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= 49.09 mm ]
    fname :
C:\Users\hyu\AppData\Local\Temp\a51249a6-0a17-4051-a687-920f551f6fcb\a83aa445-7986-4108-a295-abaadc5
    remark: Ottawa Macdonald Cartier SCS 24 2yr

*
 ** CALIB NASHYD         0022  1  5.0    0.13    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\a51249a6-0a17-4051-a687-920f551f6fcb\a83aa445-7986-4108-a295-abaadc5
    remark: Ottawa Macdonald Cartier SCS 24 2yr

*
```

```
 *  CALIB STANDHYD       0021  1  5.0    1.70    0.18 12.00  37.05 0.75   0.000
    [I%=64.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:             0023  1  5.0    1.70    0.03 12.58  37.01  n/a   0.000
*
```

Post CHI
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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: 01/15/2025 TIME: 11:27:59

USER:

COMMENTS: _____

```
**********************************************
** 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								

```
    CHIC STORM                 10.0
    [ Ptot= 31.86 mm ]
*
 ** CALIB NASHYD         0015  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       0017  1  5.0    1.70    0.23  1.00  22.50 0.71   0.000
    [I%=64.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:             0016  1  5.0    1.70    0.03  1.67  22.46  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: 01/15/2025                          TIME: 11:27:59
```

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= 36.86 mm ]
*
 ** CALIB NASHYD         0015  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       0017  1  5.0    1.70    0.23  2.00  26.62 0.72   0.000
    [I%=64.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:              0016  1  5.0    1.70    0.03  2.75  26.58  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: 01/15/2025 TIME: 11:27:59

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	0015	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	0017	1 5.0	1.70	0.62	1.00	57.15	0.80	0.000
	[I%=64.0:S%= 2.00]								
*									
**	Reservoir								
	OUTFLOW:	0016	1 5.0	1.70	0.04	2.00	57.11	n/a	0.000
*									
FINISH									

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


DATE: 01/15/2025                          TIME: 11:27:59

USER:


COMMENTS: _____________________________________________________________


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

  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= 82.32 mm ]
*
 ** CALIB NASHYD         0015  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       0017  1  5.0    1.70    0.63  2.00  66.90 0.81   0.000
    [I%=64.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:              0016  1  5.0    1.70    0.04  3.00  66.86  n/a   0.000
*
```

Stormceptor®

Rinker MATERIALS™

Stormceptor® EF Sizing Report

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

10/08/2024

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

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:	

Site Name:	201
Drainage Area (ha):	1.70
% Imperviousness:	64.00

Runoff Coefficient 'c': 0.68

Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0
Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	37.53
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	Yes
Upstream Orifice Control Flow Rate to Stormceptor (L/s):	40.00
Peak Conveyance (maximum) Flow Rate (L/s):	
Influent TSS Concentration (mg/L):	100
Estimated Average Annual Sediment Load (kg/yr):	614
Estimated Average Annual Sediment Volume (L/yr):	500

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	70
EFO6	83
EFO8	90
EFO10	94
EFO12	97

Recommended Stormceptor EFO Model: EFO6

Estimated Net Annual Sediment (TSS) Load Reduction (%): 83

Water Quality Runoff Volume Capture (%): > 90

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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

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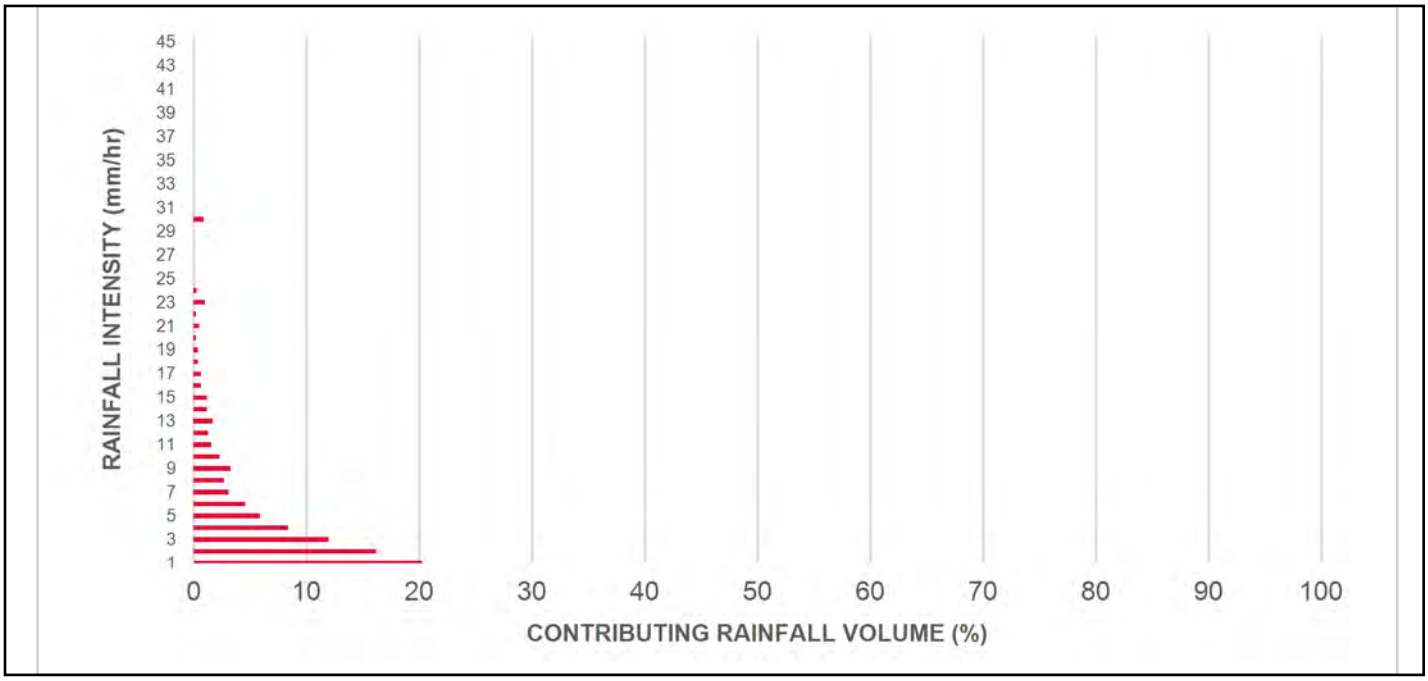
Upstream Flow Controlled Results

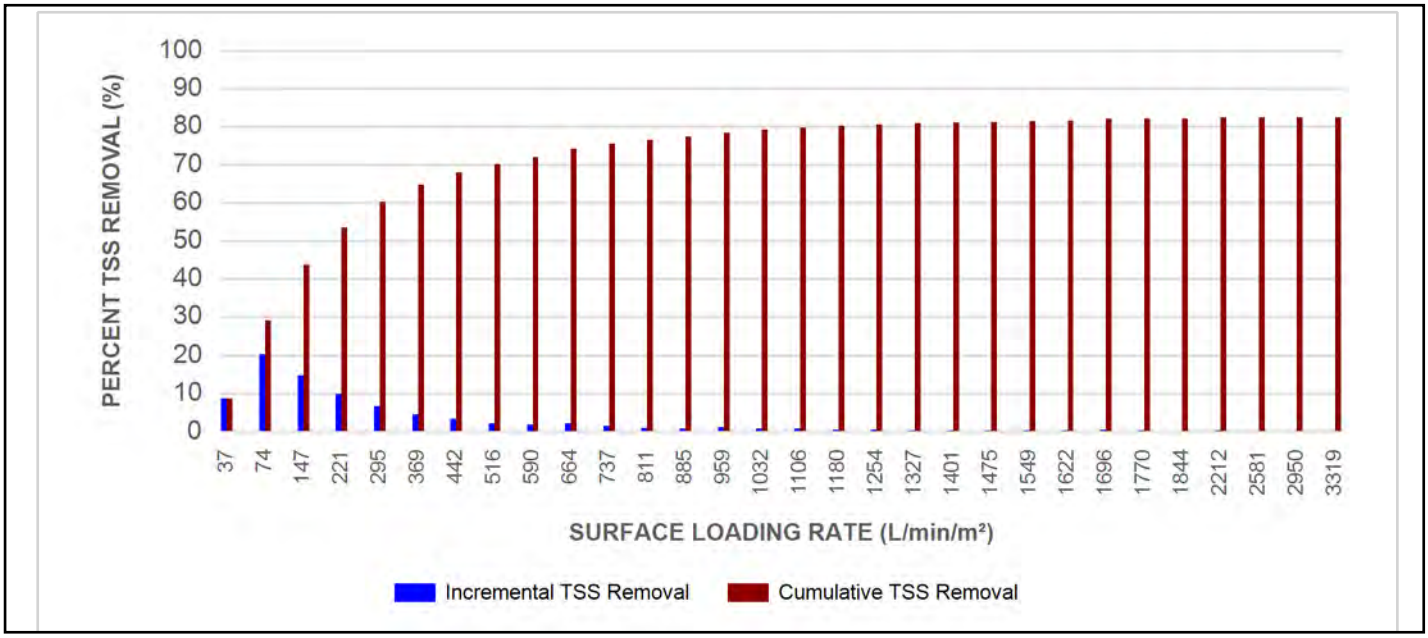
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.6	8.6	1.62	97.0	37.0	100	8.6	8.6
1.00	20.3	29.0	3.23	194.0	74.0	100	20.3	29.0
2.00	16.2	45.2	6.47	388.0	147.0	91	14.7	43.7
3.00	12.0	57.2	9.70	582.0	221.0	82	9.9	53.5
4.00	8.4	65.6	12.93	776.0	295.0	79	6.7	60.2
5.00	5.9	71.6	16.16	970.0	369.0	76	4.5	64.7
6.00	4.6	76.2	19.40	1164.0	442.0	72	3.3	68.0
7.00	3.1	79.3	22.63	1358.0	516.0	69	2.1	70.1
8.00	2.7	82.0	25.86	1552.0	590.0	65	1.8	71.9
9.00	3.3	85.3	29.09	1746.0	664.0	64	2.1	74.1
10.00	2.3	87.6	32.33	1940.0	737.0	64	1.5	75.5
11.00	1.6	89.2	35.56	2134.0	811.0	63	1.0	76.5
12.00	10.8	100.0	38.79	2327.0	885.0	62	6.7	83.3
13.00	0.0	100.0	40.00	2400.0	913.0	62	0.0	83.3
14.00	0.0	100.0	40.00	2400.0	913.0	62	0.0	83.3
15.00	0.0	100.0	40.00	2400.0	913.0	62	0.0	83.3
16.00	0.0	100.0	40.00	2400.0	913.0	62	0.0	83.3
17.00	0.0	100.0	40.00	2400.0	913.0	62	0.0	83.3
18.00	0.0	100.0	40.00	2400.0	913.0	62	0.0	83.3
19.00	0.0	100.0	40.00	2400.0	913.0	62	0.0	83.3
20.00	0.0	100.0	40.00	2400.0	913.0	62	0.0	83.3
21.00	0.0	100.0	40.00	2400.0	913.0	62	0.0	83.3
22.00	0.0	100.0	40.00	2400.0	913.0	62	0.0	83.3
23.00	0.0	100.0	40.00	2400.0	913.0	62	0.0	83.3
24.00	0.0	100.0	40.00	2400.0	913.0	62	0.0	83.3
25.00	0.0	100.0	40.00	2400.0	913.0	62	0.0	83.3
30.00	0.0	100.0	40.00	2400.0	913.0	62	0.0	83.3
35.00	0.0	100.0	40.00	2400.0	913.0	62	0.0	83.3
40.00	0.0	100.0	40.00	2400.0	913.0	62	0.0	83.3
45.00	0.0	100.0	40.00	2400.0	913.0	62	0.0	83.3
Estimated Net Annual Sediment (TSS) Load Reduction =								**83 %**

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
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

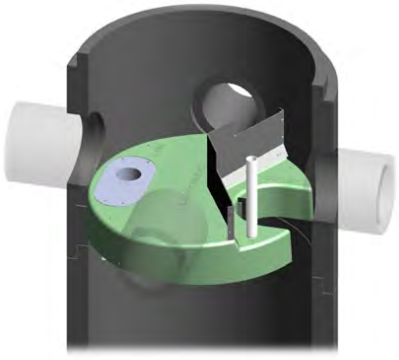
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test 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.

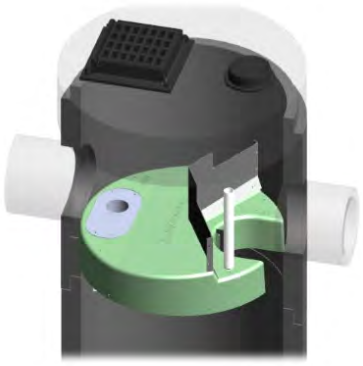
DESIGN FLEXIBILITY

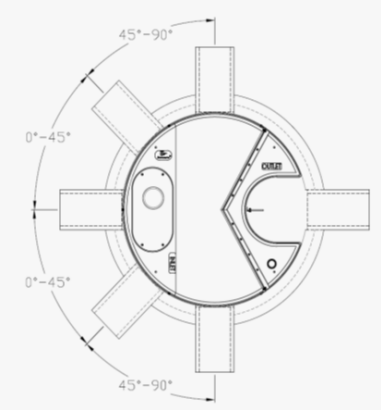
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend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

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STANDARD PERFORMANCE SPECIFICATION FOR "OIL GRIT SEPARATOR" (OGS) STORMWATER QUALITY TREATMENT 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** S**eparators**

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
	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.