3210 Albion Road South, Ottawa, ON

Site Servicing and Stormwater Management Report

Date: June 03, 2026

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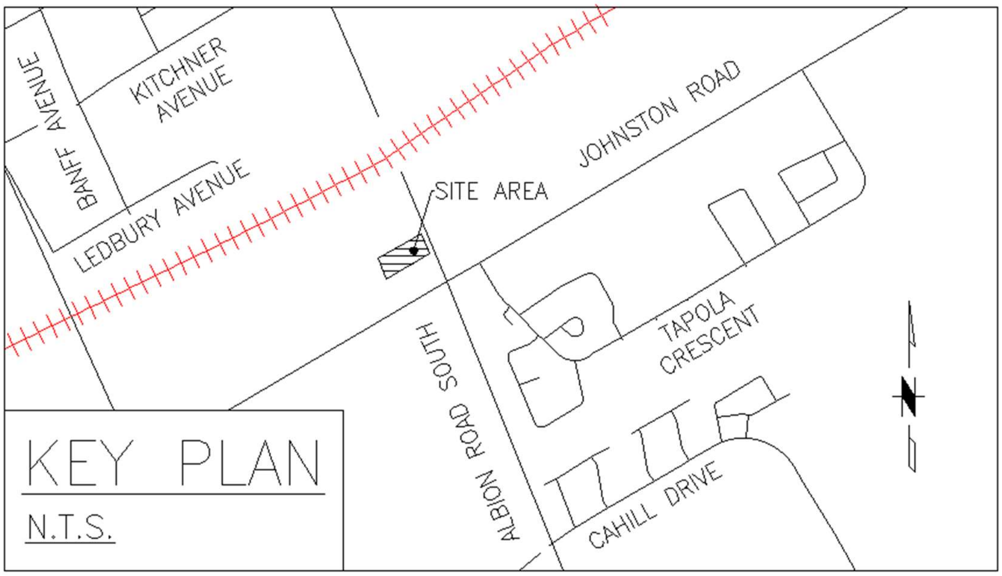
1 Introduction

Engineering for Industry (EFI) has been retained by Roof Maintenance Solutions Inc. (RMS) to complete a site servicing and stormwater management report for the property located at 3210 Albion Road South, Ottawa, ON. The site consists of one parcel with an area of 0.49 ha. The client is planning to add two light industrial warehouse units in a new building in addition to the existing building which will be used as office space. The site is bounded to the northeast by Albion Road South. The other sides are adjacent to commercial establishments. The overall key plan of the site is presented in **Figure 1** below.

Figure 1 – Key Plan



This report has been prepared regarding the functional servicing and water and storm water management (SWM) requirements set forth by the City of Ottawa; proposing a design which meets the requirements for the site. It is to be read in conjunction with the accompanying engineering drawings (drawings **C100** and **C103** to **C108**) which are attached as **Appendix D**. The report and accompanying engineering drawings is to be submitted to the City of Ottawa in support of the site plan application for the above project.

2 Site Servicing

The objective of the site servicing design is to provide proper sanitary sewages servicing, a suitable domestic water supply and to ensure that appropriate fire protection is provided for the proposed development. The servicing criteria, the expected sewage flows, and the water demands are to conform to the requirements of the city of Ottawa's standards & design guidelines for sewers and water distribution systems.

2.1 Sanitary Servicing

Per City of Ottawa's GIS (Geo-Ottawa) a 450mm sanitary main exists along the Albion Road South as shown in **Figure 2** below. The subject development will be serviced by a new 200mm service lateral which will be connected to the existing sanitary main.

Figure 2 – Site on City of Ottawa's GIS

Anticipated sanitary flows is calculated based on City of Ottawa's "Sewer Design Guidelines". The guideline requires that the sewers be designed for the sum of peak design flow and infiltration allowance. The average flow for light industrial usage is assumed to be 35,000 L/ha/day. This results in the following average daily flow for the proposed development:

$$Average\ Daily\ Flow\ = 35{,}000\ L/ha/day\ \times 0.49\ ha\ = 17{,}150\ L/day\ = 0.198\ L/s$$

The peaking factor applicable for sewage flows from industrial areas shall be based on the Appendix 4-B of the MOE sanitary sewer guidelines, which provides a peaking factor of 7.4 for proposed light industrial development and the following peak flow:

$$Peak\ Flow = 0.198\ L/s\ \times 7.4\ \approx 1.47\ L/s$$

Considering an infiltration allowance of 0.28 L/s/ha, the infiltration flow will be:

$$Inflitration\ Flow = 0.28\ L/s/ha\ \times 0.49\ ha\ \approx 0.137\ L/s$$

Hence, the sanitary sewer design flow will be:

$$Design\ Flow = 1.47\ L/s\ + 0.137\ L/s\ \approx 1.61\ L/s$$

The proposed sanitary service lateral is a 200 mm PVC pipe with a minimum slope of 1.5%. Two manholes (**SAN#100** and **SAN#101**) will be installed inside the property and near the property line for future maintenance and monitoring purposes. More details about the proposed sanitary lateral and manholes can be found in drawing **C103** (Site Servicing Plan).

The Sanitary Sewer Desing Sheet in **Appendix A** establishes the adequacy of the proposed service lateral. The following table summarizes the results of the calculation. It can bee seen that the velocities are between the minimum and maximum velocities of 0.6 m/s and 3.0 m/s.

Table 1: Sanitary Sewer Flows

From	To	Pipe Dia. (mm)	Pipe Slope (%)	Peak Flow (L/s)	Full Flow Capacity (L/s)	Full Flow Velocity (m/s)	Peak Flow Velocity (m/s)
Building	SAN#100	200	1.59	1.48	41.4	1.32	0.62
SAN#100	SAN#101	200	1.52	1.60	40.4	1.29	0.63
SAN#101	Main	200	2.07	1.61	47.2	1.50	0.70

2.2 Water Servicing

The site is planned to be serviced by a new ⌀ 150 mm water service off the existing ⌀ 152 mm watermain on Albion Road South. The water demand for the site includes the water required for fire protection and domestic water usage.

Water demands for the site are anticipated to meet the flows noted in the Ministry of Environment's Design Guidelines for Drinking Water Systems and the "Ottawa Water Distribution Design Guidelines". The requirements, calculations and analysis are presented in the following subsections.

2.2.1 Calculation of Average Daily, Maximum Day and Maximum Hour Demands

Based on "Ottawa Water Distribution Design Guidelines", the average day demand for the proposed light industrial development is taken to be 35,000 L/ha/day. The subject site has an area of about 0.49 ha. Thus, the average daily demand would be:

$$Average\ Day\ Demand\ = 35{,}000\ L/ha/day \times 0.49\ ha\ = 17{,}150\ L/day \approx 11.91\ L/min$$

The above guideline specifies that Table 3-3 of the MOE's "Design Guidelines for Drinking-Water Systems" (2008) to be used for maximum day and maximum hour peaking factors for sites with populations less than 500. The MOE Guidelines recommends that for determining the equivalent population for a commercial/industrial area, "the area occupied by the commercial/industrial complex be considered at an equivalent population density to the surrounding residential lands". Ottawa's guidelines set this density as 60 persons per gross hectare. This yields the following number for the population for the proposed development:

$$Population\ = 0.49\ ha\ \times 60\ person/ha = 29.4\ person$$

Alternatively, an estimation of the population can be made by using the occupancy load (OBC Table 3.1.17.1) for the proposed industrial development and office space. The total floor area of the light industrial building is 1,115 m^2 and office area is 101 m^2, thus:

$$\begin{aligned} Occupancy\ Load\ &= (1{,}115\ sqm\ \div\ 46\ sqm/person) + (101\ sqm\ \div\ 9.3\ sqm/person) \\ &= 35\ \ person \end{aligned}$$

Based on the above estimations, a population of 30 is used to determine a conservative value for the peaking factors from Table 3-3 of "Design Guidelines for Drinking-Water Systems". This yields the following values for maximum day and peak hour demands:

$$Maximum\ Day\ Demand\ = 17{,}150\ L/day\ \times 9.5\ = 162{,}925\ L/day\ \approx 114\ L/min$$

$$Peak\ Hour\ Demand\ = 11.91\ L/min\ \times 14.3 \approx 171\ L/min$$

The following table summarizes the average daily, maximum day and maximum hour demands:

Table 2: Average Daily, Maximum Day and Maximum Hour Demands

Description	Demand Flow	
	L/day	L/min
Average Day Demand	17,150	11.9
Maximum Day Demand	162,925	114
Peak Hour Demand	-	171

2.2.2 Calculation of Fire Protection Water Supply Requirement

Per “Ottawa Water Distribution Design Guidelines - 2026” (WDG003), the requirements for fire protection in private property in urban areas are covered by Section A-3.2.5.7 of OBC when the required flow is less than 9,000 L/min.

Per OBC 2024 A-3.2.5.7.3(a) and Office of the Fire Marshall’s “Fire Protection Water Supply Guideline for Part 3 in the Ontario Building Code”, the required fire protection water supply is calculated by the following formula:

$$Q = K\ \times\ V\ \times\ S_{Tot}$$

Where $\boldsymbol{Q}$ is the minimum supply of water (in liters), $\boldsymbol{K}$ is water supply coefficient (per OBC 2024 A-3.2.5.7 Table 1), $\boldsymbol{V}$ is total building volume (in cubic meters), and $\mathbf{S_{Tot}}$ is the total of spatial coefficient values from property line exposures on all sides (per OBC 2024 A-3.2.5.7 Figure 1). Then, having $\boldsymbol{Q}$, the minimum water supply flow rate can be obtained immediately from OBC 2024 A-3.2.5.7 Table 2

The proposed development consists of new building and existing building. The area (101 m^2) and total volume of existing building is significantly smaller that the area (1,115 m^2) and volume of the new building. Consequently, the fire protection for the new building is more critical in determining the required flow. At the time of this report, the construction information about the building material is not yet finalized. However, based on site plan, the building is constructed per OBC 3.2.2.78 and based on the latest design, the construction is prefabricated steel frame with the metallic wall and roof panels. Considering that the major occupancy of the building is light industrial, the value of $\boldsymbol{K}$=*17* is used for calculating fire protection water supply. By substitution of the appropriate values, the minimum required supply of water for the proposed development is calculated in **Appendix F** and is summarized in **Table 3** below:

Table 3: Building Fire Protection Flow Requirements

S_{Tot}	Q	Minimum Water Supply Flow Rate
1.422	174,512 liters	5,400 L/min

2.2.3 Water Boundary Conditions

Based on the computer model simulation by the City of Ottawa's Infrastructure and Water Services, the water supply boundary conditions at the location of the proposed connection for the site are shown in **Table 4**. Approximate elevation at the centreline of the Albion Road South at this location is 82.68 and the HGL at the simulated flow of 100.3 L/s is 102.2 mH_2O. Consequently, the residual pressure at the 5514 L/min (fire flow + maximum day demand) is calculated to be 224 kPa.

Table 4: Water Servicing Boundary Conditions

Minimum HGL (mH2O)	Maximum HGL (mH2O)	Simulated Flow (L/s)	Simulated Flow HGL (mH2O)
125.0	131.5	100.3	102.2

For the email communication from the City and the location for the simulation, please see **Appendix B**.

2.2.4 Water Supply Flow Calculations Summary

Appendix I "Guideline on Coordination of Hydrant Placement" to the WDG003 establishes that the aggregate fire flow capacity of all contributing fire hydrants within 150 m of a building shall not be less than the required fire flow. The proposed development will be serviced by an existing municipal Class AA hydrant (located near 3208 Albion Road South) and a proposed new Class AA on-site private hydrant. Please refer to drawing C103 (Site Servicing Plan) for location of the existing Hydrant and proposed new on-site hydrant. The following table presents the maximum allowable contribution from each hydrant as per Table 1 of Appendix I of the guideline:

Table 5: Contributing Hydrants

Hydrant	Class	Distance Range	Max. Allowable Contribution
Proposed New On-Site	AA	≤ 75 m	5,700 L/min
Existing Municipal (Near 3208 Albion Rd S)	AA	≤ 150 m	3,800 L/min
Total of Contributing Hydrants			9,500 L/min

As it can be seen in the above table, the maximum allowable flow from the two contributing hydrants is 9,500 L/min which is more than the required fire flow (RFF) of 5,400 L/min. The boundary condition provided by the City of Ottawa's Infrastructure and Water Services is presented in section 2.2.3 and indicates that the RFF (5400 L/min) can be supplied at the required 140 kPa minimum residual pressure at main (at the ground level). Consequently, the proposed 150 mm water service, proposed on-site fire hydrant and existing fire hydrant can provide adequate water supply for fire fighting.

3 Stormwater Management

Based on Pre-Consultation Meeting's Feedback dated May 5, 2025, the following criteria, as established by the "Sawmill Creek Subwatershed Study Update" (May 2003), were considered to design the stormwater management system:

- **Quantity Control**: The post-development flows are to be controlled to the 2-year pre-development flowrate.
- **Quality Control**: The MOE Enhanced Protection Level (Level 1) quality control is to be achieved on site. (8"0% TSS removal and 90% run-off capture)
- **Run-off Detention**: Flows in excess of the 2-year storm release rate, up to and including the 100-year storm event, must be detained on site.

- **Groundwater Recharge**: Limiting the directly connected impervious area to 60% of total impervious area
- **IDF Curves**: Intensity-Duration-Frequency (IDF) curves for design storm events for quantity and quality control are given by following equation:

$$i = \frac{a}{(t_d + b)^c}$$

where i is rainfall intensity (mm/hr.) and t_d is the rainfall duration (minutes). The regression constants a, b and c for the City of Ottawa, as well as the duration and depth of the design storms, are given in **Table 6** as per City of Ottawa's "Ottawa Sewer Design Guidelines" (October 2012). The regression constants are derived from the Meteorological Services of Canada rainfall data, taken from the MacDonald Cartier Airport, collected 1966 to 1997.

Table 6: Applicable IDF Curve Parameters

Rainfall Event	Parameters		
	a	b	c
2-year	732.951	6.199	0.810
5-year	998.071	6.053	0.814
10-year	1,174.184	6.014	0.816
100-year	1,735.688	6.014	0.820

3.1 Pre-Development Condition and allowable flow rate

The subject parcel currently does not have any connection to the city's storm sewer and water generated from the storm drains to Albion Road right-of-way/adjacent lands. Based on the pre-consultation comments, all post-development flows are to be controlled to the 2-year pre-development flow rate which here is considered as allowable flow rate.

City of Ottawa's "Ottawa Sewer Design Guidelines" allows the rational method to be used for calculating the flow rates in drainage areas less than 40 ha. The site has an area of approximately 0.49 ha. Consequently, the rational method will be used for stormwater management calculations.

A geotechnical investigation dated 2025-10-01 was undertaken by Cambium. A complete copy of the report is included in Appendix C for the City's records. Per geotechnical report, in the predevelopment condition, the property is mainly covered by "a gravel lot, used as parking and storage." The remainder of the site is covered by a residential building, asphalt driveway and grass areas. The following table presents areas and run-off coefficients for different parts of the site based on "Ottawa Sewer Design Guidelines" recommendations:

Table 7: Pre-Development "C" Values

Area Description	Run-off Coefficient (C)	Area (ha)
Gravel	0.5	0.390
Grass/Lawn	0.1	0.072
Impervious (Roof & Asphalt)	0.9	0.028
Site	0.46	0.490

From above table, the overall pre-development run-off coefficient for the site is $C = 0.46$. Based on the pre-consultation comments by the City dated May 5, 2025, a maximum of 0.5 is allowed for the pre-development run-off coefficient. Hence, a value $C = 0.46$ will be used in the following calculations.

The 2-year pre-development flow rate will be used as the allowable discharge for the post-development conditions as per the pre-consultation comments.

The minimum time of concentration recommended by the City of Ottawa's guidelines and pre-consultation comments is 10 minutes. As the run-off coefficient for the post-development condition is greater than 0.40, the Bransby Williams formula may be used. The following equation is used to evaluate the time of concentration:

$$t_c = \max(\frac{0.057 \times L}{S^{0.2} \times A^{0.1}}, 10\text{ min}) = \max(\frac{0.057 \times 45}{3^{0.2} \times 0.49^{0.1}}, 10\text{ min}) = 10\text{ min}$$

The design rainfall intensity is calculated based on the applicable IDF curves as follows:

$$i_{2yr} = \frac{a}{(t_d + b)^c} = \frac{732.951}{(10 + 6.199)^{0.810}} \approx 76.81\ mm/hr$$

The peak discharge (release rate) for the various storm events is calculated by using the rational method and is shown in **Table 8** below.

Table 8: Pre-Development Release Rates

Strom Return Period	Area (ha)	Run-off Coeff. (C)	t_c (min)	Rainfall Intensity (mm/hr)	Release Rate (L/s)
2 Year	0.49	0.46	10	76.81	48.1
5 Year	0.49	0.46	10	104.19	65.3
10 Year	0.49	0.46	10	122.14	76.5
100 Year	0.49	0.58	10	178.56	141.1

Please note that the run-off coefficient for the 100-year storm is increased by 25% in accordance with the MTO and City of Ottawa guidelines. Generally, for each return period, the post-development peak run-offs should be kept below the pre-development level. However, the pre-consultation comments recommend that 2-year pre-development release rate should be used as the allowable release rate for the storms up to 100-year return period. Hence, 48.1 L/s will be used as the allowable release rate for all storms.

3.2 Post-Development Condition

The proposed development consists of the existing building as well as two light industrial units in a new building. In the post development condition, the rest of the site is covered with asphalt parking spaces, asphalt driveway and landscaping area. The storm water management system has been designed to achieve the quantity and quality control and groundwater recharge targets as set in **Section 3**. The following subsection describes the SWM system and measures implemented to achieve the above targets. The proposed system consists of two catch basins, seven catch basin manholes, an underground infiltration chamber, an underground detention tank with orifice plate at outlet, OGS and pipes. Details of the proposed SWM system can be found in drawing **C103** “Site Servicing Plan”.

3.2.1 Quantity Control

For the purpose of quantity control, the site in the post-development condition is divided to 13 subcatchments (A-0 to A-12) as shown in drawing **C107** “Post-Development Condition Drainage Plan). Subcatchments A-0 to A-10 are controlled and a minor system is designed to collect the run-off generated in these subcatchments and either infiltrate to the ground or release it to the existing 200 mm City storm sewer in the Albion Road South. Site grading has been designed such that there is positive draining towards the catch basins installed in controlled subcatchments. Details of site grading can be found in drawing **C104**. Subcatchments A-11 and A-12 are uncontrolled. **Table 9** summarizes the area and run-off coefficient for each subcatchments in the post-development condition. Using this table and averaging the run-off coefficient over the entire area of site, yields a value of C = 0.65 for post-development condition with 68.1% impervious area.

Table 9: Summery of Post-Development Subcatchments' Parameters

	A-0	A-1	A-2	A-3	A-4	A-5	A-6	A-7	A-8	A-9	A-10	A-11	A-12
Area (ha)	0.010	0.013	0.037	0.026	0.026	0.016	0.111	0.033	0.028	0.015	0.087	0.047	0.040
Imp. Area (ha)	0.010	0.013	0.032	0.024	0.018	0.014	0.111	0.033	0.028	0.015	0.019	0.016	0
C	0.90	0.90	0.79	0.84	0.65	0.80	0.90	0.90	0.90	0.90	0.27	0.38	0.10

Per City of Ottawa guidelines, the minor system sewer shall be designed for a 5-year storm event. Detailed calculation for sewer sizing and slope of the sewers is presented in the Storm Sewer Design Sheet (**Appendix C)**. As it can be seen from the table, all sewers have enough capacity for 5-year peak flows, and their full velocities are between minimum velocity (0.8 m/s) and maximum velocity (6.0 m/s) recommended by MECP and Ottawa's Guidelines.

To maintain the run-off release rate below the allowable value, a combination of an underground infiltration chamber, underground detention tank and an orifice plate is used. As it is explained in **section 3.2.3**, to achieve groundwater recharge targets set in The Sawmill Creek Subwatershed study, the volume of underground infiltration chamber has been determined to collect all rainfall from the subcatchment A-6 (building roof) during a 100-year storm. Modified rational method is used for evaluation of additional detention volume required to maintain the released run-off from all other subcatchments (with total area of 0.378 ha) below the allowable rate (48.1 L/s) during a 100-year storm event. The run-off coefficient for the 100-year storm is increased by 25% in accordance with the MTO and City of Ottawa guidelines. Please refer to **Appendix C** for a table of detailed calculations for the required detention volume. It can be seen from the table, that the critical storm is a storm with duration of 15 minutes and the required storage volume for this storm is estimated to be 66.1 m^3. In the proposed SWM system, this volume is mainly provided by installing an EZstorm$^+$ underground detention tank (V = 62.3 m^3) in the front yard. The total storage volume provided by the various components of the minor system is shown in **Table 10**.

Table 10: Storage Volume

Component	Storage Volume (m^3)	HGL Elevation (m)
Pipes	2.6	81.33
Storm Structures	1.8	81.33
Detention Tank	61.9	81.33
Total	**66.3**	**81.33**

Please note that in **Table 10**, the storage volume of the storm structures (manholes and catch basins) and pipes and detention Tank are calculated at the HGL = 81.33. As it can be seen, at this elevation, the storage provided by the minor system (66.3 m^3) exceeds the required storge (66.1 m^3). The elevation on top of all structures is above this elevation. Consequently, there will be no ponding over the storm structures when the underground detention tank reaches its maximum HGL during 100-year storm.

To restrict the released rate below the allowable value, an orifice plate is placed in the outlet of the underground detention tank. The allowable release rate for post-development condition is 48.1 L/s. The uncontrolled subcatchments A-11 and A-12 (with a total area of 0.087 ha) release the run-off at the following rate:

$$\begin{aligned} Uncontrolled\ Release &= 2.78 \times C \times I \times A \\ &= 2.78 \times 0.38 \times 142.89 \times 0.047 + 2.78 \times 0.10 \times 142.89 \times 0.040 \\ &\approx 8.68\ L/s \end{aligned}$$

Hence, the release rate from the orifice shall be:

$$Orifice\ Release\ Rate = Allowable - Uncontrolled = \ 48.1 - 8.68 = 39.42\ L/s$$

An orifice plate with invert elevation of 80.95 and diameter of 175mm is used to ensure that release rate does not exceeds the above value when the storage elevation reaches it highest value for 100-year storm. Details of orifice calculations can be found in **Appendix C**. For more details of quantity control and the underground detention tank, please refer to drawing **C103** “site servicing plan” and **Appendix J**.

3.2.2 Quality Control

To achieve the MOE Enhanced Protection Level (Level 1) quality control required by the City of Ottawa, an OGS device will be utilized. For this level of protection, it is necessary to provide at least 80% TSS removal and 90% run-off capture in order to meet the required suspended solids removal.

The proposed OGS device is a Stormceptor model EFO4 which satisfies the required criteria. The calculations by the software provided by the OGS manufacturer in **Appendix H** shows that a Stormceptor model EFO4 can achieve the Enhanced Protection Level targets by providing 87% TSS removal and run-off capture of greater than 90%. The unit also meets the "ISO 14034 Environmental Management – Environmental Technology Verification (ETV)" requirements. Please see **Appendix I** for the verification statement. In addition to OGS, all the storm manholes will have a minimum 600 mm sump for an extra quality control.

The Stormceptor will require periodical inspection/maintenance to ensure it is operating properly. The required periodical inspection/maintenance of the unit should be performed by a qualified contractor hired by the owner per manufacturer's instructions and applicable regulations.

3.2.3 Groundwater Recharge

"Sawmill Creek Subwatershed Study – Final Report" dated May 2003 sets groundwater recharge targets for the Subwatershed. Per findings of the report, it has been concluded that annual surface recharge can be maintained if directly connected impervious areas in industrial/commercial developments is limited to 60% of the total impervious areas. This effectively requires disconnecting runoff from 40% of hard surfaces. For the proposed development, to achieve this limit, the impervious area from subcatchments A0 (roof of existing building), A6 (roof of new building) and A10 (the yard between two buildings) are disconnected. The total impervious area in new development is 0.333 ha. Thus:

$$Reqyuired\ Disconnected\ Imperviοius\ Area = 0.40 \times 0.333 \approx 0.133\ ha$$

$$Impervious\ Disconnected\ Area\ from\ subcatchments\ A0, A6\ and\ A10 \\ = 0.010 + 0.111 + 0.019 = 0.140\ \ ha$$

From above calculations, it is concluded the ground water recharge target is achieved by disconnecting impervious areas from subcatchments A0, A6 and A10. In the proposed SWM system, the design of site grading is such that the runoff from A0 and impervious areas of A10 are directed to the pervious area of A10 for infiltration. Subcatchments A10 has about 0.068 ha of pervious area which can infiltrates the runoff from 0.029 ha impervious area of A10 and A0 (roof of existing building). For infiltration of the runoff from subcatchment A6 (roof of the new building), an infiltration (retention) chamber has been considered which also serves quality and quantity purposes. The retention volume of the chamber is calculated such that it can accommodate all runoff generated from roof during the 100-year critical storm. This volume is calculated as:

$$Reqyuired\ Retention\ Volume = 2.78 \times 0.9 \times 142.89 \times 0.111 \times 15 \times 60 = 35{,}715\ L \approx 35.72\ m^3$$

In the proposed SWM system the required $35.72\ m^3$ retention volume is provided by construction of an underground infiltration chamber using EZstorm+ underground modular tank. For emergency cases, an 200mm overflow pipe is provided on top of the tank which direct the excessive flow to the city sewer system through a manhole. As explained in **section 3.2.1**, the infiltration chamber also serves for quantity control purpose. For details of the underground retention tank, please refer to drawing **C103 "Servicing Plan"** and **Appendix J**.

4 Erosion and Sediment Control

In order to minimize the amount of erosion and transport of construction sediments off the site during grading and construction, sediment control fencing will be installed. The sediment control fence (light duty silt fence) should be installed around the site and at the base of all stockpiles prior to construction. Please refer to the engineering drawing **C105 "Sediment and Erosion Control Plan"** for more details.

Additionally, all catch-basins should be protected from entry of sediments by installing silt sack or double layer geotextile fabric during the construction.

Any sediment that is tracked onto the roadway during the course of construction should be cleaned by the contractor. To help minimize the amount of mud being tracked onto the roadway, a mud mat should be installed at the construction entrance.

5 Conclusions and Recommendations

In conclusion, the proposed development will be provided with a complete site servicing and stormwater management system integrated with the site grading and improvement of the existing site surface elevations with the following results:

1. Upon completion of construction, the proposed development conforms to the site servicing and stormwater design criteria specified by the City of Ottawa and "Sawmill Creek Subwatershed Study – Final Report"
2. The proposed stormwater management design provides adequate attenuation of all storm events up to the 1:100-year storm events to flows below the allowable level.
3. Groundwater recharge target is achieved by installing an underground infiltration chamber.
4. The downstream facility is designed to provide MOE Enhanced Protection Level (Level 1) quality control required by the City of Ottawa.
5. Prior to construction, a sediment control perimeter fence will be installed, and all catch basins will be protected by appropriate geotextile filters. Silt fence at the base of all stockpiles and construction entrance mud mats will provide additional erosion control.

We have included stormwater management design calculations for this development. The existing and proposed conditions presented indicate the post-development conditions will be improved and the proposed development can safely be carried out.

The following are recommended:

1. All grading, servicing and erosion and sediment control are to be carried out according to the approved engineering drawings and specifications.
2. All engineering works are to be inspected during the construction.
3. It is required that after commissioning/occupancy, all water, sanitary and storm pipes and structures should be adequately maintained and inspected by their respective owners as per applicable municipal, regional and provincial regulations and standards.

Sincerely,
EFI ENGINEERING

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Appendix A

Sanitary Design Sheet

3210 Albion Road South, Ottawa, ON

PROJECT #: 25-7834
DATE: 2026-06-03
DESIGNED BY:
CHECKED BY:

SANITARY SEWER DESIGN SHEET

Total Site Area (ha) 0.49
n = 0.013
Min. Full Velocity = 0.6 m/s
Max. Full Velocity = 3 m/s
Residential Peak Fac. = Harmon Equation
Commercial Peak Fac. = 1.5
Institutional Peak Fac. = 1.5
Light Indust. Peak Fac. = 7.4 Per appendix 4-B
Heavy Indust. Peak Fac. = N/A Per appendix 4-B

Average Daily Flow
Residential: 350 L/c/d
Commercial: 0.5787 l/s/ha
Institutional: 0.5787 l/s/ha
Lifgt Industrial:: 0.4051 l/s/ha
Heavy Industrial:: 0.6366 l/s/ha
Infiltration: 0.28 l/s/ha

EFI ENGINEERING

Street	From	To	RESIDENTIAL AREA AND POPULATION							Commercial		Institutional		Industrial		C+I+I	Infiltration			Total	Pipe						Remarks
			Area (ha)	Pop. Density Zone	Pop. (p/unit)	Cumulative Area (ha)	Cumulative Pop.	Peak Fact.	Peak Flow (m^3/s)	Area (ha)	Cum. Area (ha)	Area (ha)	Cum. Area (ha)	Area (ha)	Cum. Area (ha)	Peak Flow (L/s)	Area (ha)	Cum. Area (ha)	Infilt. Flow (L/s)	Flow (L/s)	Length (m)	Dia. (mm)	Slope (%)	Cap. (Full) (L/s)	Vel. (Full) (m/s)	Vel. (Act.) (m/s)	
Driveway	Building	SAN100												0.49	0.49	1.47	0.051	0.051	0.014	1.48	11.3	200	1.59	41.4	1.32	0.6213	OK
Driveway	SAN100	SAN101												0	0.49	1.47	0.401	0.453	0.127	1.60	88.3	200	1.52	40.4	1.29	0.6250	OK
Driveway	SAN101	City MH												0	0.49	1.47	0.037	0.490	0.137	1.61	8.2	200	2.07	47.2	1.50	0.6978	OK

Appendix B

Water Servicing Boundary Conditions

From: Cassidy, Tyler <tyler.cassidy@ottawa.ca>
Sent: Monday, August 18, 2025 10:36:30 AM
To: Torben Ruddock <truddock@efiengineering.com>
Subject: RE: Water Boundary Condition Request: 3210 Albion Rd Proposed Light Industrial (City File: PC2025-0114)

Hi Torben,

Please find below the revised boundary conditions for the site at 3210 Albion Road S.

The following are boundary conditions, HGL, for hydraulic analysis at 3210 Albion Road (zone 2W2C) assumed to be connected to the 152 mm watermain on Albion Road (see attached PDF for location).

Minimum HGL: 125.0 m

Maximum HGL: 131.5 m

Max Day + Fire Flow (100 L/s): 102.2 m

These are for current conditions and are based on computer model simulation.

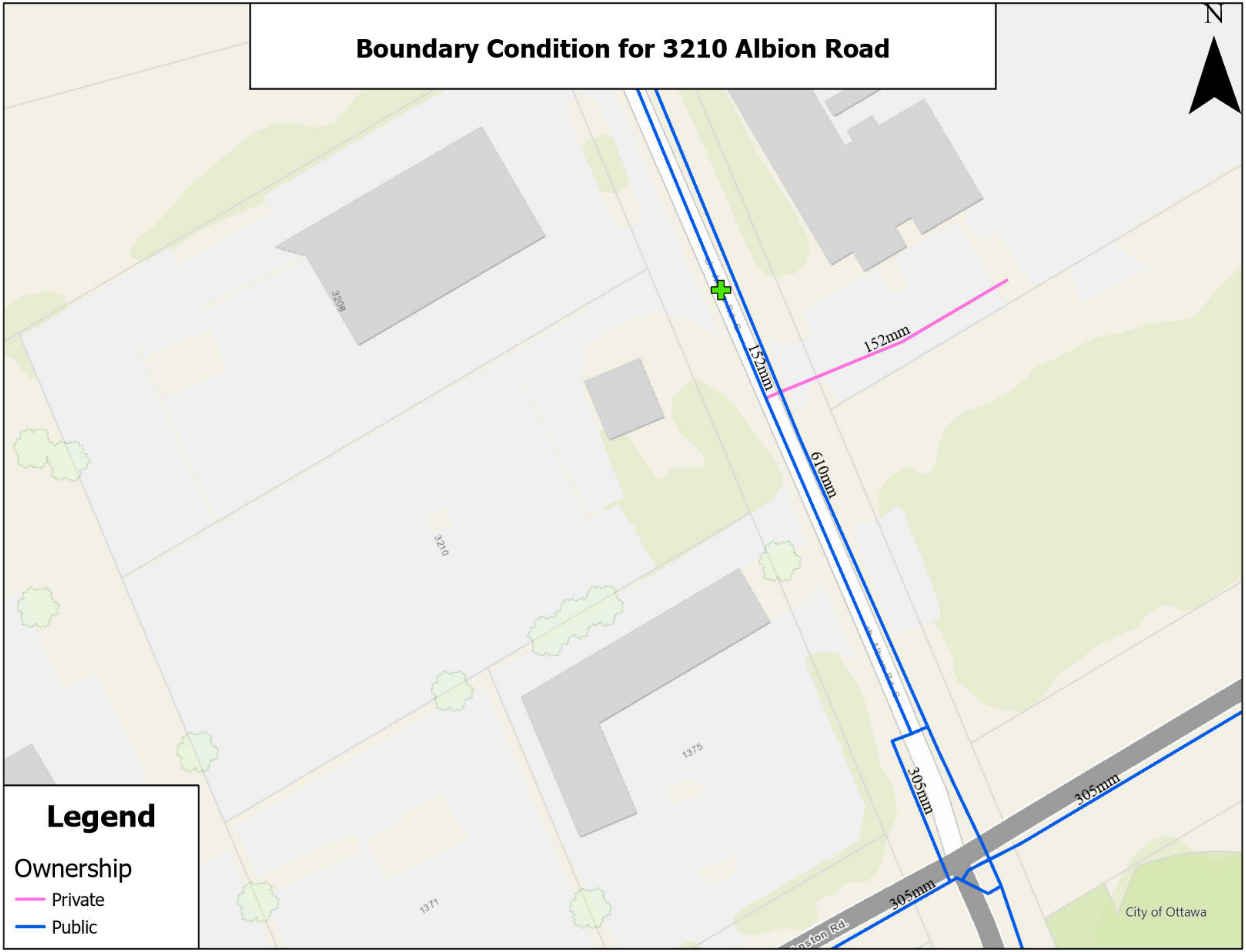
Disclaimer:

The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.

"The IWSD has recently updated their water modelling software. Any significant difference between previously received BC results and newly received BC results could be attributed to this update."

Tyler Cassidy, P.Eng
Infrastructure Project Manager,
Planning, Development and Building Services department (PDBS)/ Direction générale des services de la planification, de l'aménagement et du bâtiment (DGSPAB) - South Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 12977, Tyler.Cassidy@ottawa.ca

Boundary Condition for 3210 Albion Road



Appendix C

Storm Sewer Design Sheet

3210 Albion Road South, Ottawa, Ontario

Project Number:	25-7834
Date:	2026-06-03
Design By:	
Checked By:	

STORM SEWER DESIGN SHEET

Design Parameters

5 YEAR STORM		**OTHER PARAMETERS**	
Q=kAIR, k=0.00278		Manning's "n"	0.013
I = a/(tc+b)^c		Min. Full Velocity	0.8 m/s
		Max. Full Velocity	6 m/s
a=	998.071	Concentration Time	10
b=	6.053		
c=	0.814		

EFI
ENGINEERING

LOCATION				STORMWATER FLOW								DESIGN				
STREET	AREA NUMBER	FROM MH	TO MH	AREA (A)	RUNOFF COEFF. (C)	A x C	CUMUL. A x C	CONCENTRATION TIME		RAIN INTENCITY (I)	FLOW (Q)	PIPE SIZE	LENGTH	SLOPE	CAPACITY	FULL FLOW VELOCITY
				ha		ha	ha	min	min	mm/hr	L/sec	mm	m	%	L/sec	m/s
West Driveway	A-1	CB#11	CBMH#104	0.013	0.90	0.0117	0.0117	10.0	0.87	104.19	3.4	300	23.9	0.38	59.6	0.84
South Driveway	A-7	CBMH#104	CBMH#105	0.033	0.90	0.0297	0.0414	10.9	0.84	99.80	11.5	300	32.4	0.37	58.8	0.83
South Driveway	A-8	CBMH#105	CBMH#106	0.028	0.90	0.0252	0.0666	11.7	0.54	95.96	17.8	300	23.8	0.38	59.6	0.84
South Driveway	A-9	CBMH#106	Storage Tank	0.015	0.90	0.0135	0.0801	12.2	0.38	93.65	20.9	300	17.9	0.39	60.4	0.85
North Driveway	A-2	CB#12	CBMH#100	0.037	0.79	0.0292	0.0292	10.0	0.57	104.19	8.5	300	19.9	0.35	57.2	0.81
North Driveway	A-3	CBMH#100	CBMH#101	0.026	0.84	0.0218	0.0511	10.6	0.36	101.27	14.4	300	15.2	0.39	60.4	0.85
North Driveway	A-4	CBMH#101	CBMH#102	0.026	0.65	0.0169	0.0680	10.9	0.50	99.51	18.8	300	22.1	0.36	58.0	0.82
North Driveway	A-5	CBMH#102	CBMH#103	0.016	0.80	0.0128	0.0808	11.4	0.38	97.17	21.8	300	17.0	0.35	57.2	0.81
North Driveway	A-10	CBMH#103	Storage Tank	0.087	0.27	0.0235	0.1043	11.8	0.02	95.51	27.7	300	1.3	0.77	84.9	1.20

Storm Storage Calculation

	Post-Dev.	**Allowable**
Area (ha)	0.38	
Period	100 Y	2 Y
C	0.72	0.46
a	1,735.69	732.95
b	6.014	6.199
c	0.82	0.81
t_c (min)	-	10.00
i	-	76.81

Rainfall Duration	**Rainfall Intensity**	**Post-Dev. Q**	**Allowable Q**	**Storage Volume**
min	**mm/hr**	**m3/s**	**m3/s**	**m3**
5	242.70	0.21	0.0481	47.48781
10	178.56	0.15	0.0481	62.24251
15	142.89	0.12	0.0481	66.0641
20	119.95	0.10	0.0481	64.66909
25	103.85	0.09	0.0481	60.29251
30	91.87	0.08	0.0481	54.01252
35	82.58	0.07	0.0481	46.42288
40	75.15	0.06	0.0481	37.88196
45	69.05	0.06	0.0481	28.62122
50	63.95	0.05	0.0481	18.79811

Orifice Flow Calculation

The proposed orifice has an invert elevation of 80.95 and a diameter of 175 mm. At the HGL elevation of 81.33 (top of the 100-year storm storage), H_e would be 0.38 m. Using an orifice coefficient of 0.6, the maximum flow trough the orifice can be calculated using the orifice flow equation for a circular orifice:

$$Q = C_d \frac{\pi D^2}{4}\sqrt{2gH_e} = 0.6\frac{\pi \times 0.175^2}{4}\sqrt{2 \times 9.81 \times 0.38} \approx$$
$$0.03941\, m^2 s \; = 39.41\, L/s$$

Appendix D
Engineering Drawings

Appendix E
References

- Ottawa Water Distribution Guidelines, City of Ottawa (2026)
- Ottawa Sewer Design Guidelines, City of Ottawa (October 2012)
- Sawmill Creek Subwatershed Study Update, City of Ottawa (May 2003)
- Ontario 2024 Building Code
- Water Supply for Public Water Protection: A Guide to Recommended Practice in Canada, Fire Underwriters Survey (2020)

Appendix F

Fire Flow Calculation

Fire Flow Calculation (OBC)

Calculation of Spatial Coefficient (S_{tot})

Side	New Building	
	Distance (m)	S
North	Over 10	0
West	6.05	0.395
South	9.73	0.027
West	Over 10	0
	S_{tot}	***1.422***

Total building volume is calculated from architectural and initial structural drawings as:

$$V = 1{,}115 \times 6.09 + 1{,}115 \times 0.389 \approx 7{,}219\ m^3$$

Considering ***K****=17* for the proposed construction, the required fire protection water supply is calculated by the following formula:

$$Q = K\ \times\ V\ \times\ S_{tot} = 1.422\ \times 17\ \times 7{,}219 = 174{,}512\ L$$

Having $\boldsymbol{Q}$ = 174,512 L, the minimum required water supply flow rate is obtained from **OBC A-3.2.5.7** to be:

$$q = 5400\ L/min$$

Appendix G

Geotechnical Report

Geotechnical Investigation Report – 3210 Albion Road South, Ottawa

October 1, 2025

Prepared for:
EFI Engineering

Cambium Reference: 22599-001

CAMBIUM INC.

866.217.7900

cambium-inc.com

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1.0 Introduction

Cambium Inc. (Cambium) was retained by EFI Engineering (Client) to complete a geotechnical investigation in support of the proposed development located at 3210 Albion Road South, Ottawa, Ontario (Site), as shown on the Site Location Map on the attached Figure 1. The terms of reference for the geotechnical consulting services were included in Cambium's Proposal No. 22599-P, dated January 31, 2025.

The purpose of the field work and testing was to obtain information on the general subsurface soil and groundwater conditions at the site by means of a limited number of boreholes and laboratory tests. This report provides engineering comments, recommendations, and parameters for the geotechnical design aspects of the project, including selected construction considerations which could influence design decisions, based on the findings of the subsurface investigation program and subsequent analysis. A limited chemical testing program was also completed to assess the potential for corrosion of buried steel elements and sulphate attack against buried concrete elements at the Site.

This report provides the results of the geotechnical investigation and testing program and should be read in conjunction with the *"Standard Limitations"* in Section 7.0 which forms an integral part of this document. The reader's attention is specifically drawn to this information, as it is essential for the proper use and interpretation of this report. The data, interpretations and recommendations contained in this report pertain to the specific project as described in the report and are not applicable to any other project or site location. If the project is modified in concept, location or elevation, or if the project is not initiated within eighteen months of the date of the report, Cambium should be given an opportunity to confirm that the recommendations in this report are still valid.

1.1 Standards and Guidelines

Applicable standards, guidelines and other normative documents utilized in preparing geotechnical engineering recommendations for this report are provided below.

[1] Canadian Foundation Engineering Manual – 5th Edition; Canadian Geotechnical Society; 2023.

[2] Ontario Building Code: 2024 Building Code Compendium – Volume 1, May 29, 2024 – Amalgamating O. Reg. 203/24 with Errata, Supersedes O. Reg. 163/24

2.0 Site Description

The Site is located at 3210 Albion Road South in Ottawa, Ontario as shown on the attached Figure 1.

The Site is currently occupied by a building near the frontage of the property along Albion Road South. The building is a single-detached home with a basement level, and was recently renovated to act as office space for the Client. Most of the property is a gravel lot, used as parking and storage. The ground surface at the Site is relatively flat, with elevations ranging from approximately 82 to 83 mASL. A ditch line is located parallel to Albion Road between the road and the Site.

Based on correspondence with the Client, it is understood that the proposed construction consists of a warehouse type building with associated paved parking areas and access lanes. It is assumed that the building will be slab on grade (no basement). It is also assumed that the proposed building will be municipally serviced. At this time, it is understood that the existing building will remain.

Publicly available geological data map the site within a clay plains physiographic region. The site soils are therefore expected to consist of fine-textured glaciomarine deposits or older alluvial deposits, primarily comprised of silt and clay. The local bedrock is mapped as shale, limestone, dolostone and siltstone of the Billings Formation.

3.0 Methodology

3.1 Borehole Investigation

Cambium completed a borehole investigation at the Site on May 1, 2025, to assess subsurface conditions. Four boreholes, designated BH101-25 to BH104-25, were advanced to a maximum sampled depth of 5.9 meters below ground surface (mbgs). In BH102-25 sampling was carried out to 5.2 mbgs, followed by Dynamic Cone Penetration Testing (DCPT) to a depth of 9.3 mbgs. Table 1 below summarizes notable borehole information.

Table 1 Borehole Program Summary

Borehole	Location	Surface Elevation (mASL)	Borehole Sampling Termination Depth / Elevation (mbgs / mASL)	DCPT (mbgs / mASL)
BH101-25	Proposed Building	82.59	5.2 / 77.39	--
BH102-25	Proposed Building	81.96	5.2 / 76.76	9.3 / 72.66
BH103-25	Proposed Building	82.60	5.9 / 76.70	--
BH104-25	Property Entrance	82.82	5.2 / 77.62	--

The approximate borehole locations are shown on the Borehole Location Plan, Figure 2, attached. The results of the subsurface investigation are presented on the Borehole Logs provided in Appendix A.

Drilling and sampling were completed using a truck-mounted drill rig operating under the supervision of a Cambium technician. The boreholes were advanced to the sampling depths by means of continuous flight hollow stem augers using conventional 38 mm inside diameter split spoon sampling equipment driven by an automatic hammer in accordance with the SPT procedures outlined in ASTM D1586, “Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils”. SPT N values were recorded for the sampled intervals as the number of blows required to drive a split spoon sampler 305 mm into the soil, using a 63.5 kg drop hammer falling 750 mm, as per ASTM D1586 procedures.

The SPT N values are used in this report to assess consistency of cohesive soils and relative density of non-cohesive soils. Soil samples were collected at regular depth intervals, typically approximately 0.75 m intervals up to a depth of 3.0 mbgs and at 1.5 m intervals thereafter.

Dynamic Cone Penetration Testing (DCPT) was completed below 5.9 mbgs in BH102-25 to further evaluate soil consistency / relative density below the sampled borehole depths. In the DCPT, a 51 mm diameter, 60 degree Apex cone point, attached to the tip of A-size drilling rods, is driven into the ground using the same driving energy as in the SPT method. By recording the number of blows to drive the cone/rod assembly into the soil every 305 mm, a qualitative record of relative density / consistency is obtained. Although the interpretation of the test results may be difficult because no soil samples are obtained through this method, and the penetration resistances are not necessarily equivalent to N values or undrained shear strengths, useful information is gained by the continuity of the results and by the elimination of unbalanced hydrostatic effects which may affect SPT N values.

Shear vane testing was carried out in cohesive soil deposits to assess their consistency, in accordance with ASTM D2573-01, “Standard Test Method for Field Vane Shear Test”.

Groundwater conditions were noted in the open boreholes during and upon completion of drilling. All boreholes were backfilled and sealed in accordance with Ontario Regulation (O.Reg.) 903, as amended.

The field work for this investigation was overseen by members of Cambium’s technical staff, who located the boreholes in the field, arranged for the clearance of underground utilities, supervised the borehole drilling, sampling and in situ testing operations, logged the boreholes and examined and took custody of the recovered soil samples. The samples were identified in the field, placed in appropriate containers, labelled, and transported to our geotechnical laboratory for further visual examination and laboratory testing.

The borehole locations were surveyed by Monument-Urso Surveying Ltd., in conjunction with the site topographic survey. Borehole locations are shown on Figure 2, and the coordinates and ground surface elevations at the borehole locations are provided on the borehole logs in Appendix A.

3.2 Laboratory Testing

Following the field investigation program, a laboratory test program was completed for selected soil samples to characterize the site soils. The testing included the following:

- Natural moisture content on all samples (LS 701)
- Sieve and hydrometer analysis on three samples (LS 702)
- Atterberg Limits determination on one sample (LS 703/704)

In addition, one sample was submitted for chemical analysis to determine the corrosion potential of buried steel elements and potential of sulphate attack against buried concrete elements in contact with the site soils.

The laboratory results are summarized in the subsequent report sections. Physical laboratory analysis results and the chemical testing certificates of analysis are attached in Appendix B and Appendix C, respectively.

4.0 Subsurface Conditions

The detailed soil profiles encountered during the field investigation are indicated on the attached borehole logs in Appendix A. It should be noted that the conditions indicated on the borehole logs are for specific locations only and can vary between and beyond the borehole locations. The soil boundaries indicated on the borehole logs are inferred from non-continuous sampling and observations during drilling. These boundaries are intended to reflect approximate transition zones and should not be interpreted as exact planes of geological change. In addition, the descriptions provided on the borehole logs are inferred from a variety of factors, including visual observations of the soil samples retrieved, laboratory testing, measurements prior to and after drilling, and the drilling process itself (such as drilling speed and shaking/grinding of the augers). It should also be noted that soil samples were collected using a 38 mm inside diameter split spoon; as such, particles having nominal diameter greater than 38 mm may not be represented in the collected samples.

Based on the results of the borehole investigation, subsurface conditions at the Site generally consist of granular fill at ground surface, overlying a non-cohesive fill or reworked native material layer of clayey silt in all the boreholes. An organic peat layer was observed below the fill in BH101-25, BH102-25 and BH104-25. The following sections provide a generalized summary of the conditions encountered at the borehole locations; reference should be made to the borehole logs in Appendix A for the conditions encountered at specific borehole locations.

4.1 Granular Fill

Granular fill material was encountered at ground surface at all borehole locations. The material consisted predominantly of sand and gravel with varying amounts of silt and trace clay, and extended to depths ranging from 0.2 to 0.6 mbgs.

SPT N values obtained during sampling of this material ranged from 26 to over 50 blows per 305 mm of penetration, indicating a compact to very dense relative density.

The natural moisture content of the granular fill material ranged from 4.7 to 11.0 percent based on laboratory testing.

4.2 Reworked Native Fill

A layer of fill inferred to be reworked native soil was encountered below the granular fill layer at all borehole locations. The material was non-cohesive, generally consisting of clayey silt with varying amounts of sand and gravel and extended to depths ranging from 1.1 to 1.5 mbgs.

SPT N values obtained during sampling of this material ranged from 7 to 30 blows per 305 mm of penetration, indicating a loose to dense relative density.

The natural moisture content of the fill material ranged from 6.9 to 22.8 percent based on laboratory testing.

4.3 Organic Peat

An organic peat layer was observed in BH101-25, BH102-25, and BH103-25 below the fill materials. The soil is described as fibrous peat, and was dark brown in colour and moist at the time of sampling. Where encountered, the layer thickness is approximately 0.2 to 0.3 m thick, extending to depths ranging from 1.4 to 1.7 mbgs.

The SPT N values obtained traversing this material layer range from 3 to 7 blows per 305 mm of penetration, which indicates a very loose to loose relative density.

The natural moisture content of this material ranged from 34.4 to 187.3 percent based on laboratory testing. It should be noted that full characterization of organic material contents was not included in the current scope of work; however, based on the moisture contents obtained, it is inferred that loss of solid organic materials occurred during the oven-drying process.

4.4 Silty Sand

A thin layer of silty sand was encountered below the peat layer in borehole BH104-25, extending to approximately 1.8 mbgs. This material contained some gravel, was wet at the time of sampling and was grey in colour.

One SPT N value was obtained traversing this material of 3 blows per 305 mm of penetration, indicating very loose relative density.

The natural moisture content of this material was 16.2 percent based on laboratory testing.

4.5 Silty Clay

A cohesive soil deposit consisting of silty clay was encountered below the peat, fill material and silty sand layers in boreholes BH102-25 and BH104-25 and extended to depths ranging from 2.3 to 3.5 mbgs. The material contained sand, varying from trace to sandy. This material was generally about its plastic limit (w~PL) at the time of sampling and brown to grey in colour.

SPT N values obtained in this material ranged from 2 to 3 blows per 305 mm of penetration. In BH104-25, in-situ shear vane tests yielded shear strengths ranging from 37 to 43 kPa, indicating a firm consistency. A vane test was attempted in BH102-25, but did not shear.

The natural moisture content of this material ranged from 37.0 to 60.4 percent based on laboratory testing.

Particle size distribution analysis was completed on one selected sample of this material and the results are summarized in Table 2.

Table 2 Particle Size Distribution Results – Silty Clay

Sample	Depth (mbgs)	Soil	% Gravel	% Sand	% Silt	% Clay
BH102-25 SS3B	1.7 – 2.1	Silty Sandy Clay	0	20	27	53

The percolation rate (T-time) was estimated for the above sample based on the grain size analysis results. The percolation rate for the sample was T > 50 min/cm.

4.6 Glacial Till – Silty Sand

A glacial till deposit was encountered in all four boreholes below the peat, silty clay and fill materials. The glacial till extended to the sampling termination depths at the borehole locations, ranging from 5.2 to 5.9 mbgs. This material generally consisted of non-cohesive silty sand, containing clay and gravel. The glacial till was moist to wet at the time of sampling and mostly grey in colour.

SPT N values obtained in the glacial till ranged from 4 to 41 blows per 305 mm of penetration, indicating loose to dense relative density.

The natural moisture content of the glacial till ranged from 7.7 to 16.6 percent based on laboratory testing.

Particle size distribution analysis was completed on two selected sample of this material and the results are summarized in Table 3.

Table 3 Particle Size Distribution Results – Glacial Till

Sample	Depth (mbgs)	Soil	% Gravel	% Sand	% Silt	% Clay
BH101-25 SS3	1.5 – 2.1	Silty Clayey Gravelly Sand	12	40	34	14
BH103-25 SS3	1.5 – 2.1	Silty Clayey Sand, some Gravel	10	44	33	13

The percolation rate (T-time) was estimated for the above samples based on the grain size analysis results. The percolation rate ranged from T = 30 to T = 35 min/cm.

Atterberg Limits testing was completed on one selected sample of this material. The analysis results are summarized in Table 4 with full results provided in Appendix B.

Table 4 Atterberg Limits Test Results – Glacial Till – Fines Component

Sample	Depth (mbgs)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Moisture (%)	Classification
BH103-25 SS4	2.3-2.9	17.7	11.1	6.7	10.0	CL-ML (Silty Clay – Clayey Silt)

4.7 Bedrock

Bedrock was not encountered in any of the boreholes advanced by Cambium at the Site. Practical refusal to DCPT was encountered in borehole BH102-25 at a depth of 9.3 mbgs. Refusal may have occurred on the bedrock surface, or on cobbles and boulders in the glacial till deposit.

4.8 Groundwater

Groundwater level observations and measurements were carried out at the time of drilling. Borehole side wall instability (caving) depth, groundwater depth and standing water depth were recorded in the open boreholes, if observed. The groundwater observations are summarized in Table 5.

Table 5 Summary of Groundwater Observations

Borehole	Ground Surface Elevation (mASL)	Groundwater in Borehole upon Completion (mbgs / mASL)	Standing Water in Borehole upon Completion (mbgs / mASL)	Caving Depth (mbgs / mASL)
BH101-25	82.59	2.3 / 80.29	2.4 / 80.19	3.5 / 79.09
BH102-25	81.96	2.3 / 79.66	2.4 / 79.56	3.5 / 78.46
BH103-25	82.60	--	--	4.6 / 78.00
BH104-25	82.82	1.5 / 81.32	3.1 / 79.72	3.5 / 79.32

During the field investigation, Cambium performed a visual search for monitoring wells installed by others from the Phase Two Environmental Site Assessment completed by Paterson Group in 2021. One monitoring well was discovered (BH 2-21). The flush mount well cap was found at approximately 0.4 mbgs, and there are signs that the ground surface at the Site had been elevated with fill material; this indicates that the other monitoring wells could be buried.

On May 1, 2025, the groundwater level in BH 2-21 was measured at approximately 0.61 mbgs. Based on the topographic plan completed by Monument-Urso Surveying, the interpolated ground surface elevation of BH 2-21 is approximately 82.7 mASL. Based on this information, the groundwater level in BH 2-21 has an elevation of approximately 82.1 mASL.

Furthermore, based on the Phase Two Environmental Site Assessment from June 11, 2021, the groundwater elevation on April 12, 2021 was approximately 81.8 mASL at the Site, or 0.9 mbgs.

4.9

4.9 Chemical Analysis

One soil sample was submitted for chemical corrosivity analysis to determine corrosion potential of buried steel elements and sulphate attack potential against buried concrete elements. The sample was analyzed for pH, resistivity, chloride, sulphate, sulphide concentration and redox potential. The results are summarized in Table 6, and the Certificates of Analysis provided in Appendix C.

Table 6 Summary of Chemical Testing Results

Sample	Depth (mbgs)	pH	Resistivity (Ω·cm)	Chloride (µg/g)	Sulphate (µg/g)	Sulphide (%)	Redox Potential (mV)
BH104-25	1.8 – 2.1	7.84	1870	147	87	0.03	196

The test results were compared to the ANSI/AWWA corrosivity rating system. Based on the comparison, corrosion potential is considered high. Therefore, corrosion protection measures should be considered for buried steel elements at the Site.

The sulphate and sulphide concentrations indicate that sulphate attack potential against buried concrete elements is low, and Type 10 Portland cement (normal cement) may be used at the Site.

It should be noted that there may be other overriding factors in the assessment of corrosion potential, such as the nature of effluent conveyed, the application of de-icing salts on any access roads and subsequent leaching into the subsoils and stray currents.

5.0 Geotechnical Design Considerations

This section of the report provides engineering information on, and recommendations for, the geotechnical design aspects of the project based on our interpretation of the borehole information, the laboratory test data, and our understanding of the project requirements. The information in this portion of the report is provided for planning and for the guidance of the design team. Where comments are made on construction, they are provided only to highlight aspects of construction which could affect the design of the project. Contractors bidding on or undertaking any work at the Site should examine the factual results of the investigation, satisfy themselves as to the adequacy of the information for construction and make their own independent interpretation of the factual data as it affects their proposed construction techniques, schedule, equipment capabilities, costs, sequencing, and the like. Cambium will not assume any responsibility for construction-related decisions made by contractors based on this report. It is possible that subsurface conditions beyond the borehole locations may vary from those observed. If significant variations are found before or during construction, Cambium should be contacted to reassess findings and recommendations as needed.

It is understood that the proposed site development will include a single storey slab-on-grade building, municipally serviced, with associated at-grade parking areas and access lanes.

5.1 Site Preparation

Prior to any construction work, any existing unsuitable materials within the building footprint should be removed. This includes soil that is soft, loose, disturbed, frozen or contains excessive amounts of organic or deleterious materials. Vegetation should be stripped from within the building footprint and below any areas to be paved. Excavations should therefore be expected to extend approximately 1.8 to 2.3 mbgs to ensure all organic-rich and soft or unsuitable soils are removed from below building foundation elements.

Given the compactness of the existing fill encountered at ground surface, it may be possible for the existing fill to remain in place below the slab-on-grade. However, the existing fill must be evaluated by Cambium if this approach is considered to ensure the existing material performance is not impacted by the underlying peat layer. Further discussion is provided in Section 5.7

Any boulders larger than 300 mm diameter in the largest dimension should be removed from below foundation elements. Any resulting voids in the subgrade should be backfilled with properly placed and compacted engineered fill, per the recommendations provided in Section 5.8.

5.2 Frost Penetration

Based on OPSD 3090.101, the maximum frost penetration depth below ground surface at the site is estimated to be 1.8 mbgs. Any footings and utilities for both heated and unheated structures should therefore be founded at or below 1.8 mbgs or be provided with a thermal protection equivalent of soil and insulation.

5.3 Excavations

All excavations must be carried out in accordance with the latest edition of the Occupational Health and Safety Act (OHSA) and O.Reg. 213/91, as amended.

Soils at the site can generally be considered Type 3 soils above the groundwater table, and Type 4 soils below the groundwater table. Unsupported excavations in Type 3 soils must be sloped no steeper than 1 horizontal to 1 vertical (1H:1V), and 3H:1V in Type 4 soils. Where excavation side slopes consist of more than one soil type, the soil shall be classified as the most stringent type of the soil types present. It should be noted that the soil type classifications indicated above are provisional, and subject to change based on field observations of actual conditions at the time of exposure.

Excavation side slopes should be protected from exposure to precipitation and associated ground surface runoff and should be regularly inspected for signs of instability. If localized instability is noted during excavation or if wet conditions are encountered, the side slopes should be flattened as required to maintain safe working conditions, or the excavation sidewalls must be fully supported (shored).

Material stockpiles should be kept at least at the same distance as the excavation depth from the top edge of the excavation to prevent slope instability.

5.4 Dewatering

Groundwater level observations made at the Site during the investigation period are summarized in Section 4.8. The groundwater level during construction could therefore be within 1 m of the existing ground surface. However, it should be noted that water levels can fluctuate seasonally and could be significantly higher in response to precipitation and/or snowmelt.

The native sandy soils at the site should generally be expected to have moderate permeability, and therefore groundwater inflows through these soils could be relatively high. Inflows should be controllable using filtered sumps and pumps; sump pumps should be sized according to the size of the excavations, and additional pumps used as needed to keep the bases of excavations in the dry. The lower permeability fine-grained soils could cause water to perch within the upper fill and peat layers. Therefore, construction should be planned to avoid wetter seasons (e.g. spring) where water levels and inflows are typically at the highest volumes. Excavations should be graded to allow for any groundwater seepage or precipitation to collect at the sump location(s).

It should be noted that water takings in excess of 50,000 L/day (including both groundwater and precipitation runoff/stormwater) are regulated by the Ministry of the Environment, Conservation and Parks (MECP). Certain takings of groundwater and stormwater for construction site dewatering purposes with a combined total of less than 400,000 L/day qualify for self-registration on the MECP’s Environmental Activity and Sector Registry (EASR). Registry on the EASR replaces the need to obtain a Permit to Take Water (PTTW) and a Section 53 approval. A Category 3 PTTW is required when proposed water takings exceed 400,000 L/day. An EASR will likely be required and should be completed in advance of construction to avoid delays.

5.5 Foundation Design

Based on the anticipated building design, conventional shallow footings placed on undisturbed native soils are expected to be appropriate for the proposed building.

Any footings should be set at a depth greater than the frost penetration depth for the site (1.8 mbgs).

Footings placed directly on an undisturbed compact silty sand bearing surface should be sized using a net reaction at serviceability limit state (SLS) of **75 kPa**, and a factored geotechnical resistance at ultimate limit states (ULS) of **120 kPa**, incorporating a geotechnical resistance factor of 0.5. Footings should be expected to be constructed between 1.8 and 2.3 mbgs, or approximately 80.8 to 79.7 mASL, before the appropriate bearing surface is encountered.

Footings designed using these bearing capacity values assume maximum allowable total and differential settlements of 25 mm and 20 mm, respectively.

In areas where unsuitable, softened or otherwise deleterious materials are encountered at the underside of footing elevation, the unsuitable material must be removed and replaced with engineered fill. Engineered fill should be placed and compacted in accordance with the recommendations provided in Section 5.8.

For areas where footings are stepped, the lowest footings should be constructed first to avoid undermining footings at shallower elevations.

5.6 Seismic Site Classification

The site class for seismic site response can be taken as **Class D**. The soils at the Site are not considered susceptible to seismic liquefaction. Reference should be made to Section 4.1.8.4 – Site Properties of the most recent revision of the OBC [2] for seismic design requirements and discussion.

5.7 Slabs-On-Grade

Inorganic native soils at the Site are considered competent to support floor slab loads. To create a stable working surface and to distribute loadings, all slabs-on-grade should be constructed on a minimum of 200 mm of OPSS 1010 Granular A compacted to 98 percent of standard Proctor maximum dry density (SPMDD).

For areas below the proposed slab-on-grade, outside of the excavation areas for building footings or utilities, consideration could be given to assessing the existing fill material to remain in place. The feasibility of this approach would be contingent on an assessment to determine whether the organic soil layer impacts the performance of the overlying existing fill. Any existing material remaining in place must be reviewed and approved by Cambium prior to placement of additional fill for grading below the slab. Cambium should be consulted during design and construction to coordinate on-site testing of the existing fill to evaluate its performance and determine appropriate next steps.

5.8 Backfill and Compaction

All existing organic and non-organic fill, native materials containing organics, and any loose or otherwise unsuitable soils shall be removed down to a competent base prior to placement of any backfill material. Backfill areas must be approved by a qualified geotechnical engineer prior to placement of any new fill, to ensure the suitability of subgrade conditions.

Foundation wall and any buried utility backfill material should consist of free-draining imported granular material. Imported material for engineered fill should consist of clean, non-organic soils, free of chemical contamination or deleterious material. The moisture content of the engineered fill will need to be close enough to optimum at the time of placement to allow for adequate compaction.

Excavated materials with a high silt content, as encountered throughout the boreholes advanced by Cambium at the Site, will not be suitable for re-use as backfill for foundation walls or retaining walls. As such, it is recommended that allowances be made to import appropriate fill material to the Site for backfill applications. Geotechnical testing of the material proposed for import to the Site will be required to confirm suitability and compaction parameters for various backfill applications (e.g., Proctor testing to confirm optimum moisture content, grain size analysis to confirm material composition). Typically, backfill should be placed in maximum 300 mm thick loose lifts and compacted to a minimum of 98% of the material's SPMDD. Backfill adjacent to the structural elements (e.g., foundation walls) should be compacted to 95% of SPMDD, taking care not to damage the adjacent structures. The backfill material in the upper 300 mm below pavement subgrade elevation should be compacted to 100% of SPMDD in all areas.

5.8.1 Engineered Fill

The following is recommended for the construction of engineered fill:

I. Remove any and all existing vegetation, surficial topsoil / organics, organic fills or fills and any loose/disturbed soils to a competent subgrade for a suitable envelope.

II. The area of the engineered fill should extend horizontally 1 m beyond the outside edge of the foundations then extend downward at an imaginary 1H:1V slope to the competent approved native soil. The exposed edges of the engineered fill should be sloped at a maximum of 3H:1V to avoid weakening of the engineered fill edges due to slope movement. If fill is required adjacent to sloped banks (i.e., slope steeper than 3H:1V), the fill shall be placed in stepped planes to avoid a plane weakness.

III. The subgrade or base of the engineered fill area must be approved by Cambium prior to placement of any new fill, to ensure suitability of the subgrade condition.

IV. Place approved OPSS 1010.MUNI SSM or Granular 'B' Type I material at a moisture content at or near optimum moisture in suitable maximum 200 mm thick lifts, compacted to 100% of SPMDD. If tested and approved native soils from the site are not used as engineered fill, imported material for engineered fill should consist of clean, non-organic soils, free of chemical contamination or deleterious material. Any frost penetration into the fill material must be removed prior to placement of subsequent lifts of fill and reviewed by Cambium.

V. The engineered fill should be placed at least 600 mm above the elevation of the proposed underside of footing.

VI. Due to the potential negative effects of differential settlement between engineered fill and the native soils, footings should only be placed on either native soils or engineered fill and not a combination. Reinforcing steel bars should be included and placed within the footings and the top of the foundation walls. All tie reinforcing steel bars should be included and placed within the top of the foundation walls. All tie reinforcing steel bars should have at least 600 mm of overlap. The actual steel reinforcement design should be confirmed / designed by the project structural engineer.

VII. Full time testing and inspection of the engineered fill will be required for it to be used as a founding material, as outlined in Section 4.2.2.2 of the Ontario Building Code [2].

The final surface of the engineered fill should be protected as necessary from construction traffic, ponded water and freezing, and should be sloped to provide positive drainage for surface water during and following the construction period. During periods of freezing weather, additional soil cover should be placed above final subgrade to provide frost protection.

If engineered fill is placed over dissimilar material such as silty or clayey soils, it may be necessary to separate the engineered fill from the finer-grained soils and prevent long-term fine particle migration into the engineered fill. A non-woven geotextile, such as Terrafix 360R or an approved equivalent, should be used for this purpose. The exposed subgrades below engineered fill should be verified onsite by geotechnical personnel prior to backfilling to ensure subgrade suitability and that appropriate treatments are applied as needed.

Additional recommendations for backfilling of buried utilities are provided in Section 5.10.

5.9 Lateral Earth Pressure

Lateral earth pressure coefficients (K) and soil mechanical parameters for the encountered stratigraphy are shown in Table 7 below and may be used for the preliminary design of temporary and permanent structures at the Site, if required.

Table 7 Lateral Earth Pressure Coefficients

Soil	Bulk Unit Weight γ (kN/m^3)	Internal Friction Angle φ (°)	Earth Pressure Coefficients (Rankine)		
			Active K_a (-)	Passive K_p (-)	At-rest K_0 (-)
Non-Cohesive Soils *Loose*	18.0	28	0.36	2.77	0.53
Cohesive Soils *Firm*	16.5	28	0.34	2.94	0.53
Non-Cohesive Soils *Compact*	19.0	30	0.33	3.00	0.50
Granular A, Granular B Type I/II *(Placed and compacted according to recommendations provided in this report)*	21	32	0.31	3.21	0.47

The coefficients provided in Table 7 assume that the surface of the granular backfill is horizontal against any proposed retaining wall, and the wall is vertical and smooth. It is noted that use of the active earth pressure coefficient for design purposes assumes that any proposed retaining structures will be free to deform/experience sufficient displacement throughout their lifespan.

5.10 Buried Utilities

Cambium should be retained to review the site servicing plan to confirm the following recommendations.

5.10.1 Frost Protection for Underground Services

It is recommended to place water services at a minimum depth of 300 mm below the frost penetration depth, with the top of the pipe located at 2.1 mbgs or lower as dictated by municipal service requirements. If a minimum of 2.1 m of soil cover cannot be provided, then the pipe should be insulated using a suitable rigid polystyrene insulation (DOW Styrofoam HI40, or equivalent) or a pre-insulated pipe should be installed. The thickness of insulation will depend on the depth of available soil cover; Cambium can provide additional recommendations if required.

5.10.2 Subgrade Preparation

Excavation and dewatering recommendations are provided in Sections 5.3 and 5.4. The subgrades are generally expected to consist of silty sand and silty clay. To limit migration of fine particles into pipe bedding, non-woven geotextile such as Terrafix 270R or an approved equivalent should be used as a separator between subgrade and pipe bedding materials. The geotextile should be placed immediately following excavation, followed as soon as possible by pipe bedding.

Care should be taken to limit construction traffic directly on the subgrade.

5.10.3 Pipe Bedding and Cover Materials

Bedding and cover material for any services should conform to Ontario Provincial Standard Drawings (OPSD) 802.010 and 802.013 (flexible pipes) and OPSD 802.031 to 802.033 (rigid pipes). The pipe bedding should consist of 200 mm of OPSS.MUNI 1010 Granular A wrapped by a geotextile (Terrafix 270R or an approved equivalent). The bedding and cover material shall be placed in maximum 200 mm thick lifts and should be compacted to at least 95 percent SPMDD. The cover material shall extend a minimum of 300 mm above the top of the pipe and be compacted to a minimum of 95 percent of SPMDD, taking care not to damage the utility pipes during compaction. It should be noted that excessive vibrations from compaction equipment could soften the subgrade, so low vibration methods should be used wherever possible. The use of clear stone as pipe bedding and cover material should not be permitted.

5.10.4 Pipe Backfill

Above the pipe cover material, the pipe can be backfilled by using imported granular fill material such as OPSS.MUNI 1010 Granular B Type I. An alternative select subgrade material (SSM) may be used as well, provided that the material is approved by Cambium prior to use. The re-using of excavated organic free native soils is likely not feasible due to the high moisture content and material composition. In any case, backfill should be free of organic, frozen or otherwise deleterious materials, and should match as closely as reasonably possible the composition of the materials in the trench walls to limit differential movement. The soils should be placed in maximum 300 mm thick lifts compacted to 95 percent of SPMDD.

5.11 Pavement Design

The performance of pavement is dependent upon provision of a properly prepared and well-drained subgrade. All topsoil and organic materials should be removed down to native material and backfilled with approved engineered fill or native material, compacted to minimum 95 percent SPMDD. The subgrade should be proof rolled and inspected by a geotechnical engineer. Any areas where rutting or appreciable deflection is noted should be subexcavated and replaced with suitable fill. Fill placed below the pavement structure should be compacted to at least 98 percent of SPMDD.

The recommended minimum pavement structure design has been developed for two traffic loading scenarios; light duty and heavy duty. The heavy-duty design is appropriate for areas where truck/bus/emergency vehicle traffic is anticipated, such as access and emergency lanes, while the light duty design is appropriate for areas where no heavy vehicles are anticipated, such as parking areas. The recommended minimum pavement structure is provided in Table 8.

Table 8 Recommended Minimum Pavement Structure

Pavement Layer	Light Duty	Heavy Duty
Surface Course Asphalt	50 mm HL3 or HL4	40 mm HL3 or HL4
Binder Course Asphalt	--	50 mm HL8
Granular Base	150 mm OPSS 1010 Granular A	150 mm OPSS 1010 Granular A
Granular Subbase	300 mm OPSS 1010 Granular B	400 mm OPSS 1010 Granular B

Material and thickness substitutions must be approved by the Design Engineer.

The thickness of the subbase layer could be increased at the discretion of the Engineer, to accommodate site conditions at the time of construction, including soft or weak subgrade soil replacement.

In areas where additional subgrade support is required and/or sub-excavation is not feasible, either due to high groundwater or soft soils, consideration should be given to placing a non-woven geotextile and geogrid subgrade reinforcement prior to placing the pavement structure. The non-woven geotextile should consist of Terrafix 270R, followed by a geogrid consisting of Terrafix TBX11, or approved equivalents. The geosynthetics should be provided with minimum 300 mm overlap between adjacent sheets and installed according to the manufacturer’s instructions.

To maintain a relatively dry subgrade condition and prevent subgrade softening, subdrains are recommended to be installed. These should consist of 150 mm diameter perforated, corrugated plastic pipe, surrounded by 150 mm of 19 mm clear crushed stone with pipe inverts placed 300 mm below the top of subgrade. The subdrains should connect to a positive outlet such as a catch basin or storm sewer.

Transitions between differing pavement structures should be provided with minimum slopes of 10H:1V to limit differential movement due to frost heave.

Compaction of the subgrade should be verified by the Engineer prior to placing the granular fill. Pavement granular materials should be placed in 150 mm maximum loose lifts and compacted to at least 100 percent of SPMDD. The granular materials specified should conform to OPSS standards, as confirmed by appropriate materials testing.

The final asphalt surface should be sloped at a minimum of 2 percent to shed runoff. Abutting pavements should be sawcut to provide clean vertical joints with new pavement areas.

5.12 Design Review and Inspections

Testing and inspections should be carried out during construction operations to examine and approve subgrade conditions, fill material, compaction of pipe bedding, trench backfill, granular base courses, and asphalt concrete.

Cambium should be contacted to review and approve design drawings, prior to tendering or commencing construction, to ensure that all pertinent geotechnical-related factors have been addressed. It is important that onsite geotechnical supervision be provided at the site for excavation procedures, fill placement, and compaction testing.

6.0 Closing

Please note that this work program and report are governed by the attached Qualifications and Limitations. If you have questions or comments regarding this document, please do not hesitate to contact the undersigned at (705) 742-7900.

Respectfully submitted,

Cambium Inc.

Signed by:
Nathan Christie
61E8638C183444F...

Nathan Christie, P.Eng.
Senior Project Manager – Geotechnical

DS

LICENSED PROFESSIONAL ENGINEER
N. F. S. CHRISTIE
100200855
Nathan Christie
PROVINCE OF ONTARIO

2025-10-01

NC/rg

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7.0 Standard Limitations

Limited Warranty

In performing work on behalf of a client, Cambium relies on its client to provide instructions on the scope of its retainer and, on that basis, Cambium determines the precise nature of the work to be performed. Cambium undertakes all work in accordance with applicable accepted industry practices and standards. Unless required under local laws, other than as expressly stated herein, no other warranties or conditions, either expressed or implied, are made regarding the services, work or reports provided.

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A site assessment is created using data and information collected during the investigation of a site and based on conditions encountered at the time and particular locations at which fieldwork is conducted. The information, sample results and data collected represent the conditions only at the specific times at which and at those specific locations from which the information, samples and data were obtained and the information, sample results and data may vary at other locations and times. To the extent that Cambium’s work or report considers any locations or times other than those from which information, sample results and data was specifically received, the work or report is based on a reasonable extrapolation from such information, sample results and data but the actual conditions encountered may vary from those extrapolations.

Only conditions at the site and locations chosen for study by the client are evaluated; no adjacent or other properties are evaluated unless specifically requested by the client. Any physical or other aspects of the site chosen for study by the client, or any other matter not specifically addressed in a report prepared by Cambium, are beyond the scope of the work performed by Cambium and such matters have not been investigated or addressed.

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Personal Liability

The client expressly agrees that Cambium employees shall have no personal liability to the client with respect to a claim, whether in contract, tort and/or other cause of action in law. Furthermore, the client agrees that it will bring no proceedings nor take any action in any court of law against Cambium employees in their personal capacity.

Appended Figures

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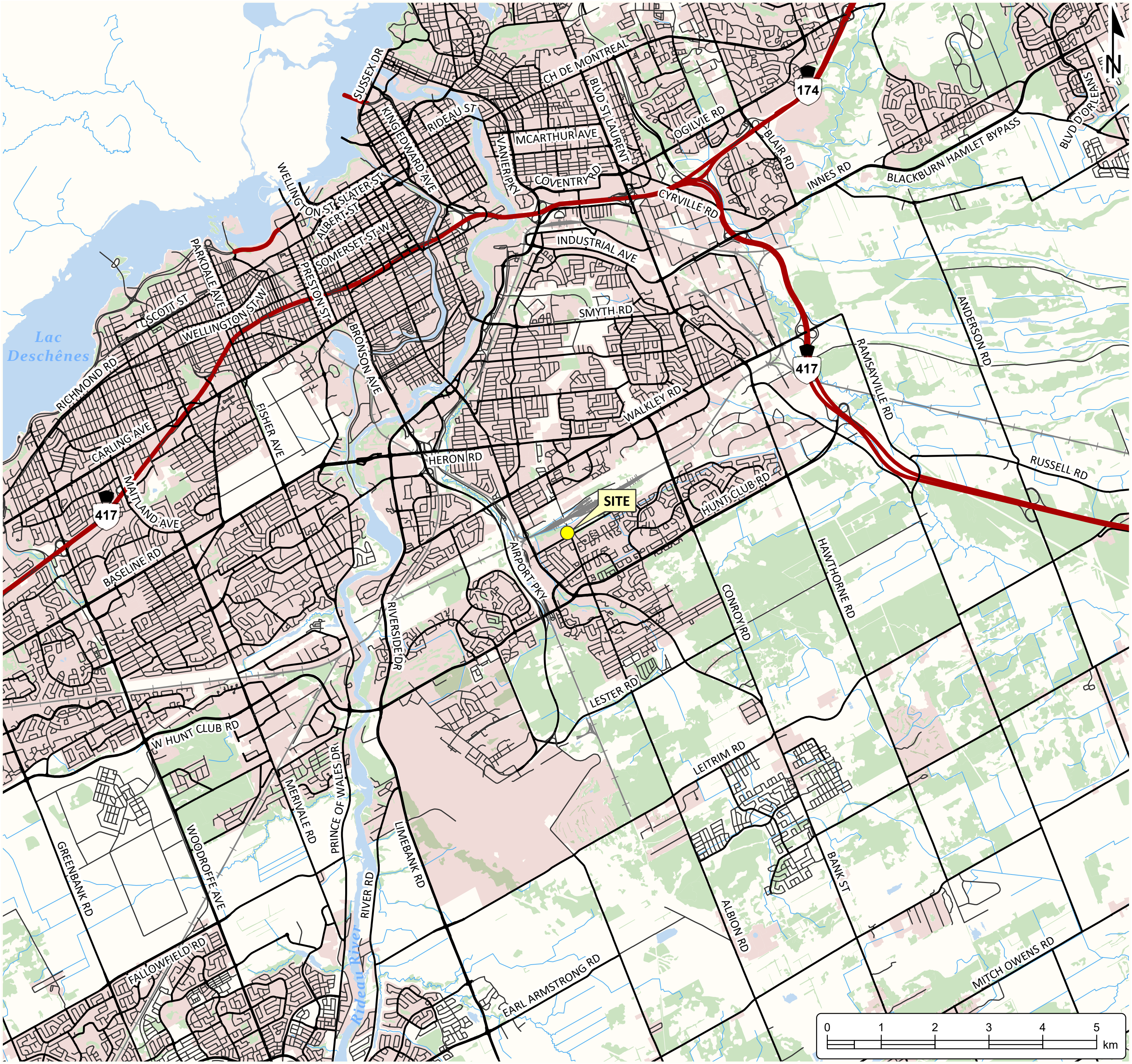

GEOTECHNICAL INVESTIGATION

EFI ENGINEERING
3210 Albion Road South
Ottawa, Ontario

LEGEND

▬	Highway
—	Major Road
—	Minor Road
┼	Railway
—	Watercourse
🟦	Water Area
🟩	Wooded Area
🟥	Built Up Area

Notes:
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SITE LOCATION PLAN

Project No.: 22599-001	Date: May 2025
Scale: 1:100,000	Projection: NAD 1983 UTM Zone 18N

Created by: LD	Checked by: NC	Figure: 1

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GEOTECHNICAL INVESTIGATION

EFI ENGINEERING
3210 Albion Road South
Ottawa, Ontario

LEGEND

⊕ Borehole
□ Site (approximate)

Notes:
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BOREHOLE LOCATION PLAN

Project No.: 22599-001
Date: May 2025
Scale: 1:1,000
Projection: NAD 1983 UTM Zone 18N
Created by: LD
Checked by: NC
Figure: 2

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Appendix A

Borehole Logs

CAMBIUM

Client: EFI Engineering
Contractor: Downing Drilling
Project No.: 22599-001
Location: 3210 Albion Rd S, Ottawa

Project Name: 3210 Albion Rd S
Method: Truck Mounted Hollow Stem Auger
Elevation: 82.59 mASL
UTM: 18T **N:** 5023606.25 **E:** 449096.53

Log of Borehole: BH101-25
Page: 1 of 1
Date Completed: May 1, 2025

SUBSURFACE PROFILE

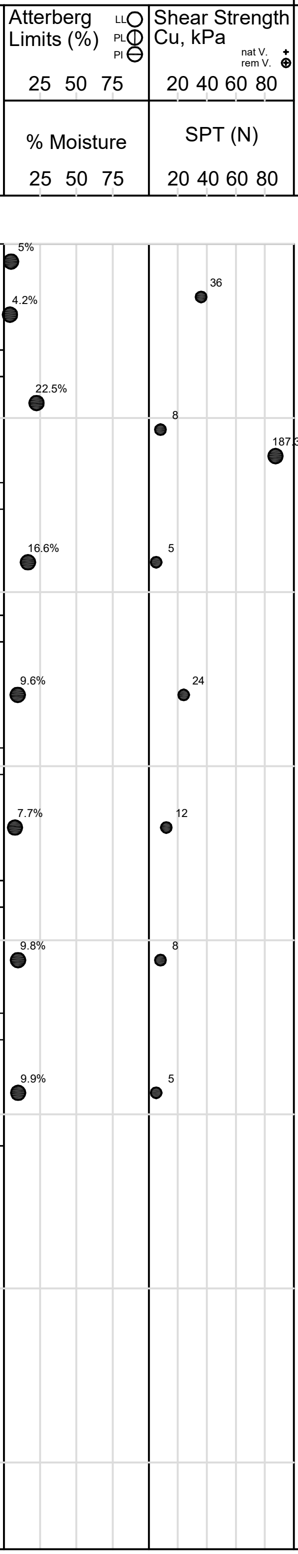
Elevation (m)	Depth
82.6	0
82.1	0.5
81.6	1
81.1	1.5
80.6	2
80.1	2.5
79.6	3
79.1	3.5
78.6	4
78.1	4.5
77.6	5
77.1	5.5
76.6	6
76.1	6.5
75.6	7
75.1	

Description	Elevation Depth
(GW) GRAVEL and SAND: some silt; brown; moist, compact [FILL]	82.39 0.20
(SM) SILTY SAND and GRAVEL: trace clay; dark brown; moist, compact [FILL]	81.98 0.61
(ML) sandy CLAYEY SILT: black; moist, loose [FILL]	81.52 1.07
(PT) PEAT: fibrous; black; wet, loose	81.22 1.37
(SM) gravelly SILTY SAND: with clay; brown to grey; wet to moist, loose to compact [TILL]	77.41 5.18

Borehole terminated @ 5.2 mbgs due to target depth achieved.

SAMPLE

Number	Type	% Recovery	SPT (N)	% Moisture	SPT (N)
1A	SS	71	36	5%	36
1B	SS			4.2%	
2A	SS	79	8	22.5%	8
2B	SS			187.3%	
3	SS	71	5	16.6%	5
4	SS	79	24	9.6%	24
5	SS	100	12	7.7%	12
6	SS	79	8	9.8%	8
7	SS	67	5	9.9%	5



Well Installation

Log Notes

Borehole terminated at 5.2 mbgs due to target depth achieved. Borehole caved to 3.5 mbgs upon completion. First groundwater encountered at 2.3 mbgs. Standing water encountered at 2.4 mbgs upon completion.

GRAINSIZE DISTRIBUTION	SAMPLE	GRAVEL	SAND	SILT	CLAY
	03	12	40	34	14

Logged By: RR **Input By:** MA

CAMBIUM

Client: EFI Engineering
Contractor: Downing Drilling
Project No.: 22599-001
Location: 3210 Albion Rd S, Ottawa

Project Name: 3210 Albion Rd S
Method: Truck Mounted Hollow Stem Auger
Elevation: 81.96 mASL
UTM: 18T **N:** 5023634.97 **E:** 449105.90

Log of Borehole: BH102-25
Page: 1 of 2
Date Completed: May 1, 2025

SUBSURFACE PROFILE

Elevation (m) Depth	Description	Elevation / Depth
82 / 0	**(SW) gravelly SAND:** some silt; brown; moist, very dense [FILL]	81.78 / 0.18
	(SW) gravelly SAND and CLAYEY SILT: dark brown; moist, very dense to dense [FILL]	80.44 / 1.52
	(PT) PEAT: fibrous; dark brown; wet, loose	80.23 / 1.73
	(CL) sandy SILTY CLAY: grey; w~PL, soft	79.67 / 2.29
	(SM) gravelly SILTY SAND: with clay; dark grey; wet to moist, loose to compact [TILL]	76.78 / 5.18

SAMPLE

Number	Type	% Recovery	SPT (N)	% Moisture	SPT (N)
1A	SS	63	57	4.7%	
1B	SS			10.2%	57
2	SS	13	30	6.9%	30
3A	SS	92	3	170.5%	
3B	SS			37%	3
4	SS	63	8	12.1%	8
5	SS	71	10	10.6%	10
6	SS	58	4	9.9%	4
7	SS	42	9	9.5%	9
8	DCPT		7		7
9	DCPT		16		16
10	DCPT		14		14
11	DCPT		21		21
12	DCPT		18		18
13	DCPT		26		26
14	DCPT		25		25

Atterberg Limits (%) LL ○ PL ⊖ PI ⊖ — 25 50 75
Shear Strength Cu, kPa nat V. + rem V. ⊕ — 20 40 60 80
% Moisture — 25 50 75
SPT (N) — 20 40 60 80

Well Installation

Log Notes

Shear Vane refusal at 2.1 mbgs; could not penetrate underlying soil layer.

GRAINSIZE DISTRIBUTION

SAMPLE	GRAVEL	SAND	SILT	CLAY
3B		20	27	53

Logged By: RR **Input By:** MA

Client: EFI Engineering
Contractor: Downing Drilling
Project No.: 22599-001
Location: 3210 Albion Rd S, Ottawa

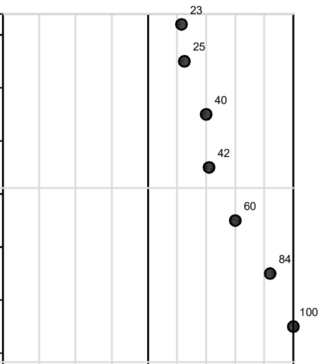
Project Name: 3210 Albion Rd S
Method: Truck Mounted Hollow Stem Auger
Elevation: 81.96 mASL
UTM: 18T **N:** 5023634.97 **E:** 449105.90

Log of Borehole: BH102-25
Page: 2 of 2
Date Completed: May 1, 2025

SUBSURFACE PROFILE | **SAMPLE**

Elevation (m)	Depth	Number	Type	% Recovery	SPT (N)
74.5	7.5	15	DCPT		23
		16	DCPT		25
74	8	17	DCPT		40
		18	DCPT		42
73.5	8.5	19	DCPT		60
73	9	20	DCPT		84
		21	DCPT		100 /8"
72.5	9.5				
72	10				
71.5	10.5				
71	11				
70.5	11.5				
70	12				
69.5	12.5				
69	13				
68.5	13.5				
68	14				
67.5	14.5				
67					

Atterberg Limits (%) LL PL PI 25 50 75 | % Moisture 25 50 75 | Shear Strength Cu, kPa nat V. rem V. 20 40 60 80 | SPT (N) 20 40 60 80 | Well Installation | Log Notes



Log Notes: Borehole sampling terminated at 5.2 mbgs due to target depth achieved. DCPT refusal at 9.3 mbgs. Borehole caved to 3.5 mbgs upon completion. First groundwater encountered at 2.3 mbgs. Standing water encountered at 2.4 mbgs upon completion.

GRAINSIZE DISTRIBUTION	SAMPLE	GRAVEL	SAND	SILT	CLAY
	3B		20	27	53

Logged By: RR **Input By:** MA

Peterborough, Barrie, Whitby, Kingston, Ottawa

Docusign Envelope ID: 19C0F9E9-1779-4445-928F-AA3A2DD6327C

CAMBIUM

Client: EFI Engineering
Contractor: Downing Drilling
Project No.: 22599-001
Location: 3210 Albion Rd S, Ottawa

Project Name: 3210 Albion Rd S
Method: Truck Mounted Hollow Stem Auger
Elevation: 82.60 mASL
UTM: 18T **N:** 5023622.95 **E:** 449128.71

Log of Borehole: BH103-25
Page: 1 of 1
Date Completed: May 1, 2025

SUBSURFACE PROFILE

Elevation (m)	Depth
82.6	0
82.1	0.5
81.6	1
81.1	1.5
80.6	2
80.1	2.5
79.6	3
79.1	3.5
78.6	4
78.1	4.5
77.6	5
77.1	5.5
76.6	6
76.1	6.5
75.6	7
75.1	

Description	Elevation Depth
(SW) gravelly SAND and SILT: dark brown; moist, compact [FILL]	81.99 0.61
(ML) sandy CLAYEY SILT: trace gravel; black to dark brown, organics present; moist, compact [FILL]	81.08 1.52
(SM) gravelly SILTY SAND: with clay; brown to dark grey; moist, loose to compact [TILL] - occasional cobbles, dense	76.66 5.94
Borehole terminated @ 5.9 mbgs due to target depth achieved.	

SAMPLE

Number	Type	% Recovery	SPT (N)	Atterberg Limits (%) LL ○ PL ○ PI ○	% Moisture	Shear Strength Cu, kPa nat V. ✚ rem V. ⊕ / SPT (N)
1	SS	88	26		11%	26
2	SS	79	12		20.5%	12
3	SS	100	24		9.6%	24
4	SS	83	10	6.7 17.7 11.1	10%	10
5	SS	50	8		8.7%	8
6	SS	75	6		9.4%	6
7	SS	25	11		8.5%	11
8	SS	50	41		10.6%	41

Well Installation

Log Notes

Borehole terminated at 5.9 mbgs due to target depth achieved. Borehole caved to 4.6 mbgs upon completion. No ground water or standing water encountered.

GRAINSIZE DISTRIBUTION

SAMPLE	GRAVEL	SAND	SILT	CLAY
03	10	44	33	13

Logged By: RR **Input By:** MA

Peterborough, Barrie, Whitby, Kingston, Ottawa

Docusign Envelope ID: 19C0F9E9-1779-4445-928F-AA3A2DD6327C

Client: EFI Engineering
Contractor: Downing Drilling
Project No.: 22599-001
Location: 3210 Albion Rd S, Ottawa

Project Name: 3210 Albion Rd S
Method: Truck Mounted Hollow Stem Auger
Elevation: 82.82 mASL
UTM: 18T **N:** 5023655.83 **E:** 449132.92

Log of Borehole: BH104-25
Page: 1 of 1
Date Completed: May 1, 2025

SUBSURFACE PROFILE

Elevation (m)	Depth	Description	Elevation / Depth
82.8	0	**(SW) gravelly SAND:** some silt, occasional cobble; brown to dark brown; moist, very dense [FILL]	82.21 0.61
		(ML) sandy CLAYEY SILT: contains organics; dark grey; moist, loose [FILL]	81.60 1.22
		(PT) PEAT: fibrous; black; wet, loose	81.30 1.52
		(SM) SILTY SAND: some gravel; grey; wet, very loose	80.99 1.83
		(CL) sandy SILTY CLAY: grey, w~PL, firm	79.31 3.51
		(SM) gravelly SILTY SAND: with clay; grey; moist, loose to compact [TILL]	77.64 5.18
		Borehole terminated @ 5.2 mbgs due to target depth achieved.	

Elevation / Depth scale: 82.8 – 0; 82.3 – 0.5; 81.8 – 1; 81.3 – 1.5; 80.8 – 2; 80.3 – 2.5; 79.8 – 3; 79.3 – 3.5; 78.8 – 4; 78.3 – 4.5; 77.8 – 5; 77.3 – 5.5; 76.8 – 6; 76.3 – 6.5; 75.8 – 7; 75.3

SAMPLE

Number	Type	% Recovery	SPT (N)	% Moisture	SPT (N)	Shear Strength Cu, kPa nat V. +	rem V. ⊕
1	SS	79	51	6.7%	51		
2A	SS	83	7	22.8%	7		
2B	SS			34.4%			
3A	SS	83	3	16.2%	3		
3B	SS			43.8%			
4	FV					43	6
5	FV					37	7
6A	SS	100	2	60.4%	2		
6B	SS			8.6%			
7	SS	58	4	11.1%	4		
8	SS	50	14	10.1%	14		

Atterberg Limits (%) LL ○ PL ⦶ PI ⊖ 25 50 75

Well Installation

Log Notes

Environmental sample collected: BH104-25_1.8-2.1, tested for corrosivity, sulfides and redox potential

Borehole terminated at 5.2 mbgs due to target depth achieved. Borehole caved to 3.5 mbgs upon completion. First groundwater encountered at 1.5 mbgs. Standing water encountered at 3.0 mbgs upon completion.

GRAINSIZE DISTRIBUTION: SAMPLE | GRAVEL | SAND | SILT | CLAY

Logged By: RR **Input By:** MA

Appendix B

Soil Laboratory Testing Results

Grain Size Distribution Chart

Project Number: *22599-001* **Client:** *EFI Engineering*

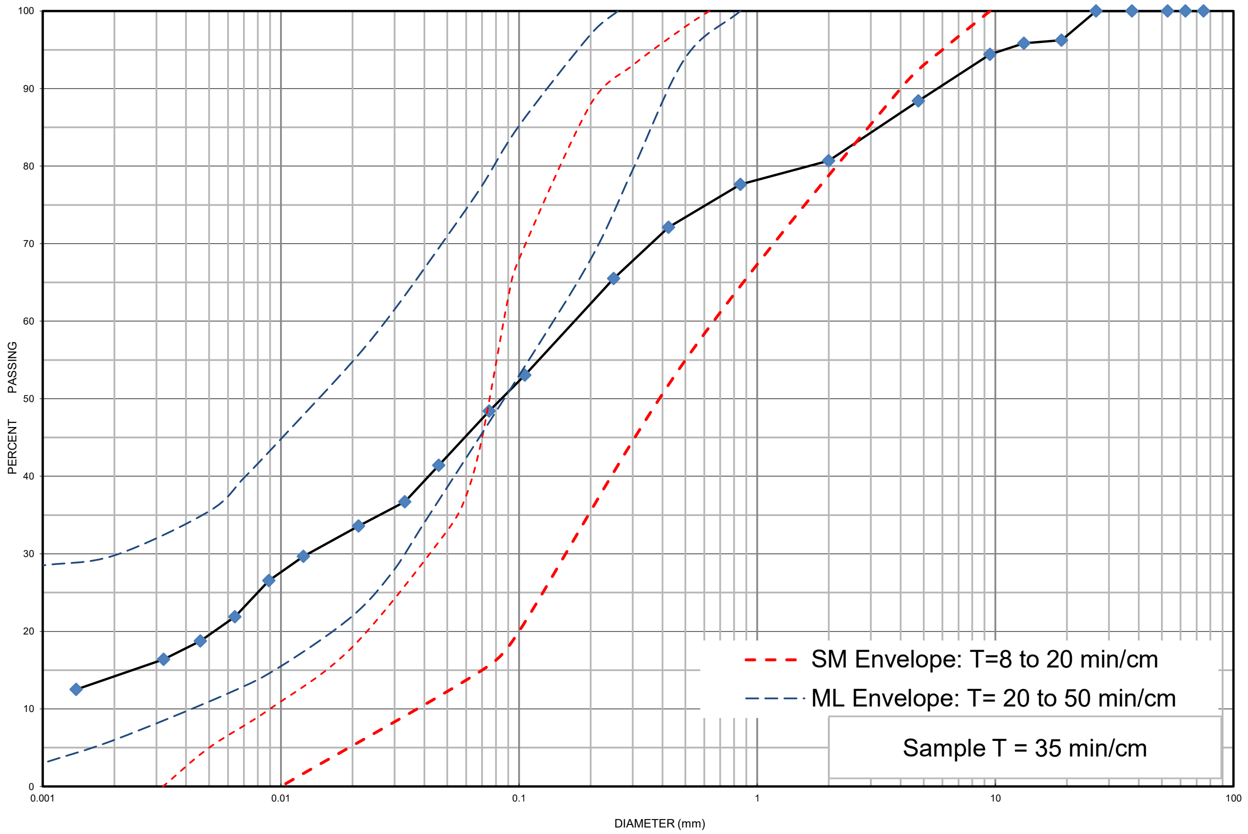
Project Name: *3210 Albion Rd S*

Sample Date: *May 1, 2025* **Sampled By:** *Rory Ryan - Cambium Inc.*

Location: *BH 101-25 SS 3* **Depth:** *1.5 m to 2.1 m* **Lab Sample No:** *S-25-0723*

UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM

CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 101-25	SS 3	1.5 m to 2.1 m	12	40	34	14	16.6

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Silty Clayey Gravelly Sand	SM	0.165	0.014	-	-	-

Additional information availabe upon request

Issued By: (Senior Project Manager) *Date Issued:* *May 28, 2025*

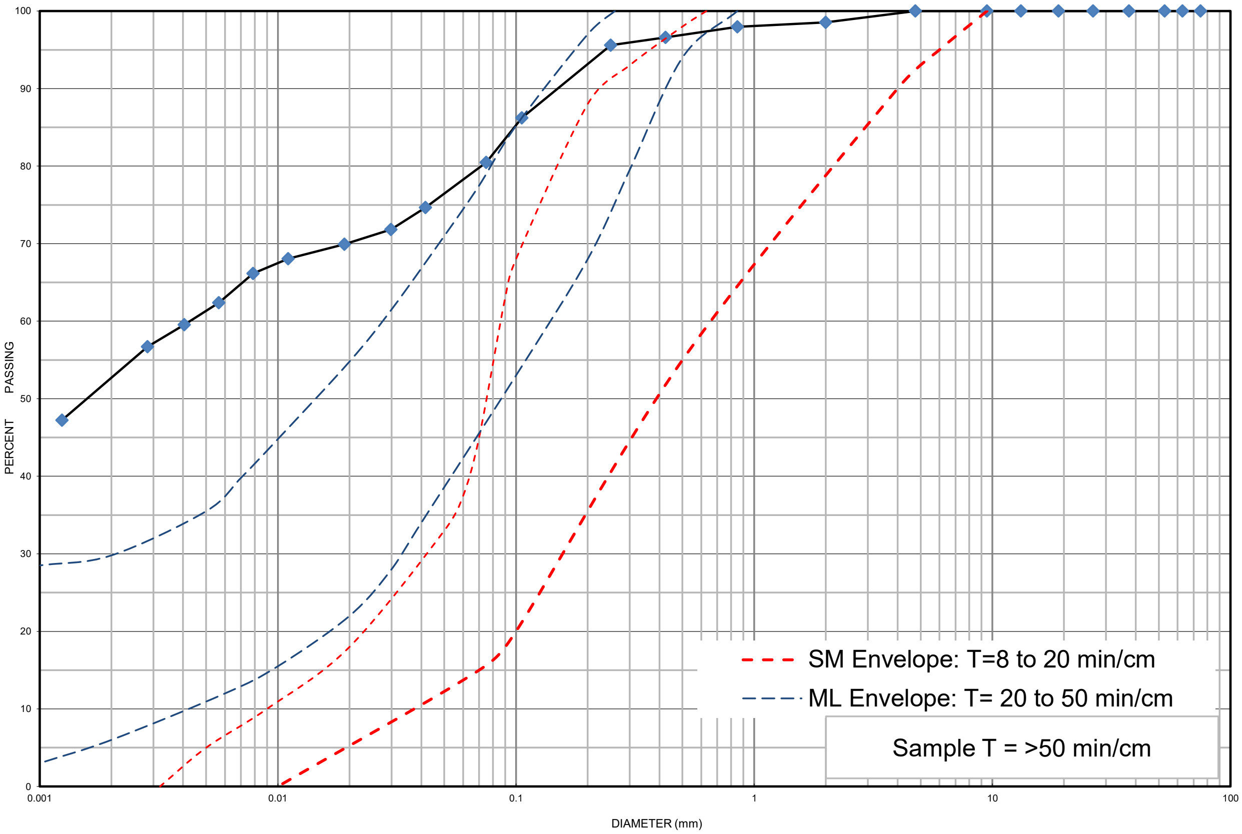
Cambium Inc. (Laboratory)
866.217.7900 | cambium-inc.com
194 Sophia St. | Peterborough | ON | K9H 1E5

Form: L6V.2 - Grad.Hydo

Grain Size Distribution Chart

Project Number: *22599-001* **Client:** *EFI Engineering*
Project Name: *3210 Albion Rd S*
Sample Date: *May 1, 2025* **Sampled By:** *Rory Ryan - Cambium Inc.*
Location: *BH 102-25 SS 3B* **Depth:** *1.7 m to 2.1 m* **Lab Sample No:** *S-25-0724*

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 102-25	SS 3B	1.7 m to 2.1 m	0	20	27	53	37.0

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Silty Sandy Clay	CL	0.0043	-	-	-	-

Additional information availabe upon request

Issued By: (Senior Project Manager) *Date Issued:* *May 28, 2025*

CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

Grain Size Distribution Chart

Project Number: *22599-001* **Client:** *EFI Engineering*

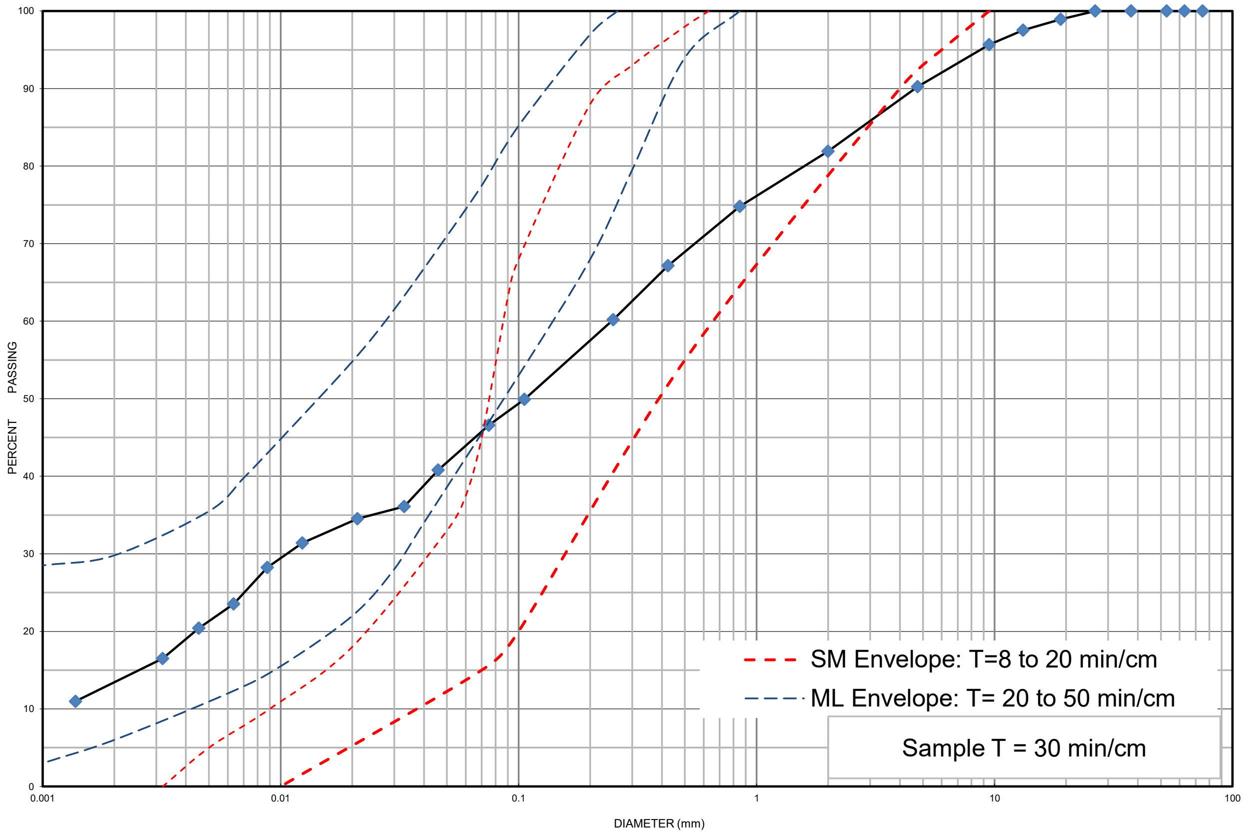
Project Name: *3210 Albion Rd S*

Sample Date: *May 1, 2025* **Sampled By:** *Rory Ryan - Cambium Inc.*

Location: *BH 103-25 SS 3* **Depth:** *1.5 m to 2.1 m* **Lab Sample No:** *S-25-0725*

UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM

CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 103-25	SS 3	1.5 m to 2.1 m	10	44	33	13	9.6

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Silty Clayey Sand some Gravel	SM	0.255	0.012	-	-	-

Additional information availabe upon request

Issued By: (Senior Project Manager) *Date Issued:* *May 28, 2025*

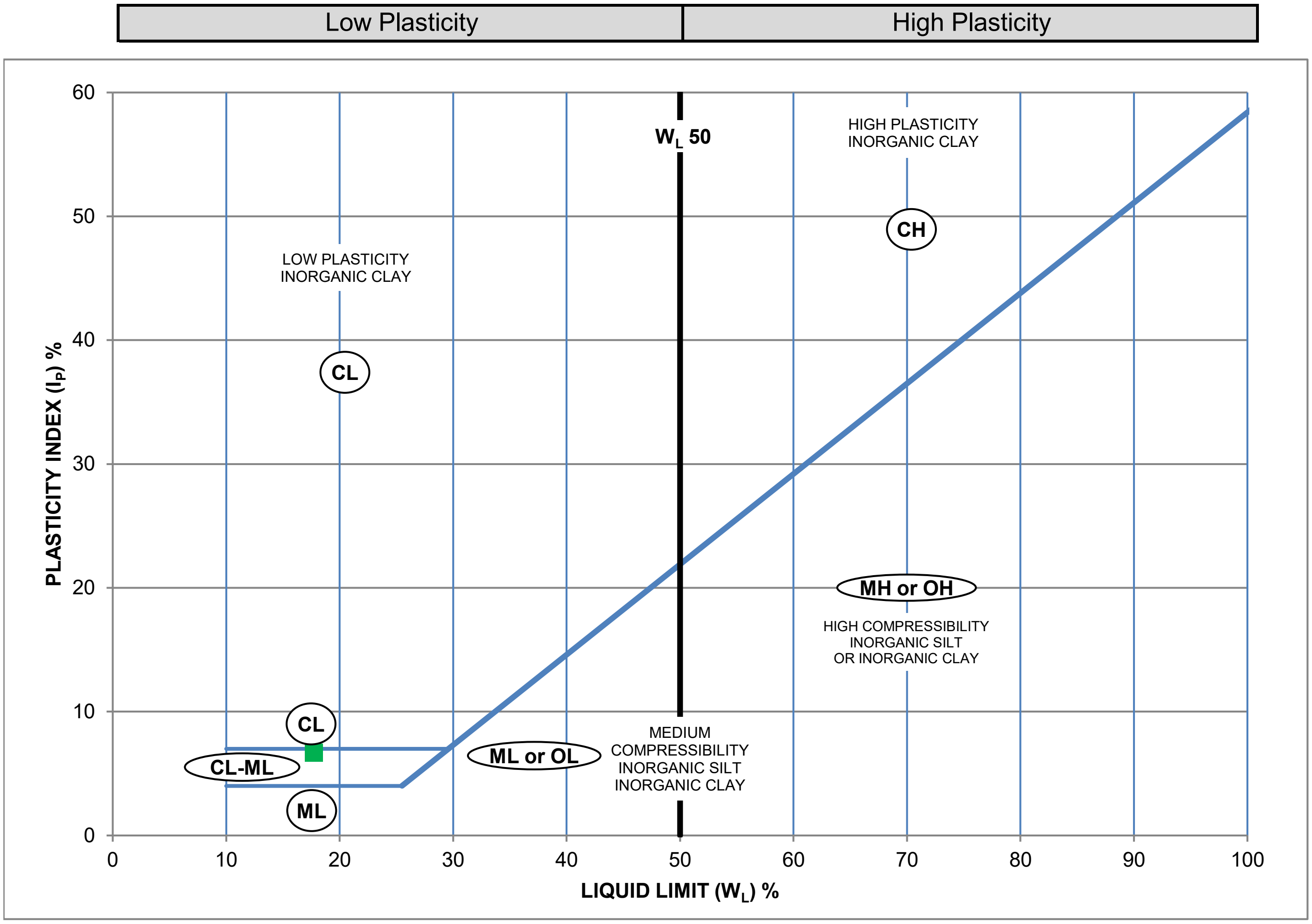
CAMBIUM

CERTIFIED BY CCIL
Canadian Council of Independent Laboratories
For specific tests as listed on www.ccil.com

Plasticity Chart

Project Number: *22599-001* **Client:** *EFI Engineering*
Project Name: *3210 Albion Rd S*
Sampled By: *Rory Ryan - Cambium Inc.* **Sample Date:** *May 1, 2025*

Hole No.: *BH 103-25 SS 4* **Depth:** *2.3 m to 2.9 m* **Lab Sample No:** *S-25-0726*



Symbol	Borehole	Sample	Depth	Description
🟩	BH 103-25	SS 4	2.3 m to 2.9 m	CL-ML

Liquid Limit (%)	Plastic Limit	Plasticity Index (%)
17.7	***11.1***	***6.7***

Additional information available upon request

Issued By: *Date Issued:* *May 13, 2025*

(Senior Project Manager)

Appendix C

Laboratory Certificate of Analysis

PARACEL LABORATORIES LTD. | TRUSTED. RESPONSIVE. RELIABLE.

300 - 2319 St. Laurent Blvd
Ottawa, ON, K1G 4J8
1-800-749-1947
www.paracellabs.com

Certificate of Analysis

Cambium Inc. (Ottawa)
102-343 Preston Street
Ottawa, ON K7K 7G3
Attn: Nathan Christie

Report Date: 7-May-2025
Order Date: 1-May-2025

Client PO:
Project: 22599-001
Custody: 75259

Order #: 2518438

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
2518438-01	BH104-25_1.8-2.1

Approved By: Mark Foto

Mark Foto, M.Sc.
Laboratory Director

Order #: 2518438

Certificate of Analysis

Report Date: 07-May-2025

Client: **Cambium Inc. (Ottawa)**

Order Date: 1-May-2025

Client PO:

Project Description: 22599-001

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Anions	EPA 300.1 - IC, water extraction	6-May-25	6-May-25
pH, soil	EPA 150.1 - pH probe @ 25 °C, CaCl buffered ext.	2-May-25	2-May-25
Resistivity	EPA 120.1 - probe, water extraction	5-May-25	5-May-25
Solids, %	CWS Tier 1 - Gravimetric	5-May-25	6-May-25

Certificate of Analysis

Report Date: 07-May-2025

Client: **Cambium Inc. (Ottawa)**

Order Date: 1-May-2025

Client PO:

Project Description: 22599-001

	Client ID:	BH104-25_1.8-2.1	-	-	-		
	Sample Date:	01-May-25 10:00	-	-	-	-	-
	Sample ID:	2518438-01	-	-	-		
	Matrix:	Soil	-	-	-		
	MDL/Units						
Physical Characteristics							
% Solids	0.1 % by Wt.	64.9	-	-	-	-	-
General Inorganics							
pH	0.05 pH Units	7.84	-	-	-	-	-
Resistivity	0.1 Ohm.m	18.7	-	-	-	-	-
Anions							
Chloride	10 ug/g	147	-	-	-	-	-
Sulphate	10 ug/g	87	-	-	-	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions								
Chloride	ND	10	ug/g					
Sulphate	ND	10	ug/g					
General Inorganics								
Resistivity	ND	0.1	Ohm.m					

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	33.4	10	ug/g	27.1			20.6	35	
Sulphate	56.7	10	ug/g	47.8			17.1	35	
General Inorganics									
pH	7.87	0.05	pH Units	7.90			0.4	2.3	
Resistivity	59.6	0.1	Ohm.m	60.2			1.1	20	
Physical Characteristics									
% Solids	87.6	0.1	% by Wt.	87.6			0.0	25	

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	140	10	ug/g	27.1	113	82-118			
Sulphate	153	10	ug/g	47.8	106	80-120			

Qualifier Notes:

Sample Data Revisions:

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

NC: Not Calculated

Soil results are reported on a dry weight basis unlesss otherwise noted.

Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

PARACEL
LABORATORIES LTD

Paracel ID: 2518438

Paracel Order Number (Lab Use Only): 2518438

Chain Of Custody

(Lab Use Only)

№ 75259

Client Name: Nathan Christie Cambium Inc

Contact Name: Nathan Christie

Address: 343 Preston st, Ottawa, ON
11th Floor

Telephone: 613-808-4182

Project Ref: 22599-001

Quote #:

PO #:

E-mail: nathan.christie
James.sullivan @ cambium-inc.com

Page 1 of 1

Turnaround Time

☐ 1 day ☐ 3 day
☐ 2 day ☒ Regular

Date Required:

☐ REG 153/04 ☐ REG 406/19

☐ Table 1 ☐ Res/Park ☐ Med/Fine
☐ Table 2 ☐ Ind/Comm ☐ Coarse
☐ Table 3 ☐ Agri/Other
☐ Table ___

For RSC: ☐ Yes ☐ No

Other Regulation

☐ REG 558 ☐ PWQO
☐ CCME ☐ MISA
☐ SU - Sani ☐ SU - Storm

Mun:

☐ Other:

Matrix Type: **S** (Soil/Sed.) **GW** (Ground Water) **SW** (Surface Water) **SS** (Storm/Sanitary Sewer) **P** (Paint) **A** (Air) **O** (Other)

Required Analysis

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken		Corrosivity	Sulphides	Redox Potential									
					Date	Time												
1	BH104-25_1.8-2.1	S		3	May 1, 2025	10:00	X	X	X									
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

Comments:

Method of Delivery: WALK-IN

Relinquished By (Sign): R. Ryan

Relinquished By (Print): Rory Ryan

Date/Time: May 1, 2025 2:26

Received at Depot:

Date/Time:

Temperature: °C

Received at Lab: LTJ

Date/Time: 01/05/25; 14:34

Temperature: 17.9 °C

Verified By: LTJ

Date/Time: 01/05/25; 16:41

pH Verified: ☐ By:

Chain of Custody (Blank) xlsx

Revision 5.0

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1-800-749-1947
www.paracellabs.com

Subcontracted Analysis

Cambium Inc. (Ottawa)
102-343 Preston Street
Ottawa, ON K7K 7G3
Attn: Nathan Christie

Paracel Report No. **2518438**
Client Project(s): **22599-001**
Client PO:
Reference: **SO Cambium - ENV**
CoC Number: **75259**

Order Date: 01-May-25
Report Date: 7-May-25

Sample(s) from this project were subcontracted for the listed parameters. A copy of the subcontractor's report is attached

Paracel ID	Client ID	Analysis
2518438-01	BH104-25_1.8-2.1	Redox potential, soil Sulphide, solid

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

09-May-2025

Paracel Laboratories
Attn : Dale Robertson

300-2319 St.Laurent Blvd.
Ottawa, ON
K1G 4K6, Canada

Phone: 613-731-9577
Fax:613-731-9064

Date Rec. : 07 May 2025
LR Report: **CA13407-MAY25**
Reference: Project#: 2518438

Copy: #1

CERTIFICATE OF ANALYSIS

Final Report

Sample ID	Sample Date & Time	Sulphide (Na2CO3) %
1: Analysis Start Date		09-May-25
2: Analysis Start Time		10:16
3: Analysis Completed Date		09-May-25
4: Analysis Completed Time		11:37
5: RL		0.01
6: BH104-25_1.8-2.1	01-May-25 10:00	0.03

RL - SGS Reporting Limit

Kimberley Didsbury
Project Specialist,
Environment, Health & Safety

OnLine LIMS

0004107019

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

LR Report : **CA13407-MAY25**

Quality Control Report

Inorganic Analysis													
Parameter	Reporting Limit	Unit	Method Blank	Duplicate				LCS / Spike Blank			Matrix Spike / Reference Material		
				Result 1	Result 2	RPD	Acceptance Criteria	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
							%		Low	High		Low	High
Carbon/Sulphur - QCBatchID: ECS0034-MAY25													
Sulphide (Na2CO3)	0.01	%	< 0.01										

TESTMARK Laboratories Ltd.
Committed to Quality and Service

CERTIFICATE OF ANALYSIS

Client:	Dale Robertson	Work Order Number:	575478
Company:	Paracel Laboratories Ltd. - Ottawa	PO #:	
Address:	300-2319 St. Laurent Blvd. Ottawa, ON, K1G 4J8	Regulation:	Information not provided
		Project #:	2518438
Phone/Fax:	(613) 731-9577 / (613) 731-9064	DWS #:	
Email:	drobertson@paracellabs.com	Sampled By:	
Date Order Received:	5/7/2025	Analysis Started:	5/12/2025
Arrival Temperature:	20.3 C	Analysis Completed:	5/12/2025

WORK ORDER SUMMARY

ANALYSES WERE PERFORMED ON THE FOLLOWING SAMPLES. THE RESULTS RELATE ONLY TO THE ITEMS TESTED.

Sample Description	Lab ID	Matrix	Type	Comments	Date Collected	Time Collected
BH104-25_1.8-2.1	2137214	Soil	None		5/1/2025	10:00 AM

METHODS AND INSTRUMENTATION

THE FOLLOWING METHODS WERE USED FOR YOUR SAMPLE(S):

Method	Lab	Description	Reference
RedOx - Soil (T06)	Mississauga	Determination of RedOx Potential of Soil	Modified from APHA-2580B

REPORT COMMENTS

Non-Testmark container received 05/07/25 JM
Sample for Redox Potential received past hold time, proceed with analysis as per client note 05/07/25 JM

This report has been approved by:

Aline de Chevigny
Production Coordinator CET

CERTIFICATE OF ANALYSIS

Paracel Laboratories Ltd. - Ottawa

Work Order Number: 575478

WORK ORDER RESULTS

Sample Description	BH104 - 25 _ 1.8 - 2.1
Sample Date	5/1/2025 10:00 AM
Lab ID	2137214

General Chemistry	Result	MDL	Units
RedOx (vs. S.H.E.)	196 [195]	N/A	mV

LEGEND

Dates: Dates are formatted as mm/dd/year throughout this report.

MDL: Method detection limit or minimum reporting limit.

[ ]: Results for laboratory replicates are shown in square brackets immediately below the associated sample result for ease of comparison.

Organic Soil Analysis: Data reported for organic analysis in soils samples are corrected for moisture content.

Quality Control: All associated Quality Control data is available on request.

Field Data: Reports containing Field Parameters represent data that has been collected and provided by the client. Testmark is not responsible for the validity of this data which may be used in subsequent calculations.

Sample Condition Deviations: A noted sample condition deviation may affect the validity of the result. Results apply to the sample(s) as received.

Reproduction of Report: Report shall not be reproduced, except in full, without the approval of Testmark Laboratories Ltd.

ICPMS Dustfall Insoluble: The ICPMS Dustfall Insoluble Portion method analyzes only the particulate matter from the Dustfall Sampler which is retained on the analysis filter during the Dustfall method.

Regulation Comparisons: Disclaimer: Please note that regulation criteria are provided for comparative purposes, however the onus on ensuring the validity of this comparison rests with the client.

Date of Issue: 05/12/2025 10:44

PARACEL
LABORATORIES LTD

Paracel ID: 2518438

Paracel Order Number
(Lab Use Only)
2518438

Chain Of Custody
(Lab Use Only)
№ 75259

Client Name: Nathan Christie Cambium Inc

Contact Name: Nathan Christie

Address: 343 Preston st, Ottawa, ON
11th Floor

Telephone: 613-808-4182

Project Ref: 22599-001

Quote #:

PO #:

E-mail: nathan.christie
James.sullivan @ cambium-inc.com

Page 1 of 1

Turnaround Time

☐ 1 day ☐ 3 day
☐ 2 day ☒ Regular

Date Required:

☐ REG 153/04 ☐ REG 406/19
☐ Table 1 ☐ Res/Park ☐ Med/Fine
☐ Table 2 ☐ Ind/Comm ☐ Coarse
☐ Table 3 ☐ Agri/Other
☐ Table ____
For RSC: ☐ Yes ☐ No

Other Regulation
☐ REG 558 ☐ PWQO
☐ CCME ☐ MISA
☐ SU - Sani ☐ SU - Storm
Mun:
☐ Other:

Matrix Type: **S** (Soil/Sed.) **GW** (Ground Water) **SW** (Surface Water) **SS** (Storm/Sanitary Sewer) **P** (Paint) **A** (Air) **O** (Other)

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	Corrosivity	Sulphides	Redox Potential									
1	BH104-25_1.8-2.1	S		3	May 1, 2025	10:00	X	X	X									
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

Comments:

Method of Delivery: WALK-IN

Relinquished By (Sign): R. Ryan

Relinquished By (Print): Rory Ryan

Date/Time: May 1, 2025 2:26

Received at Depot:

Date/Time:

Temperature: °C

Received at Lab: LTJ

Date/Time: 01/05/25; 14:34

Temperature: 17.9 °C

Verified By: LTJ

Date/Time: 01/05/25; 16:41

pH Verified: ☐ By:

Appendix H

OGS Sizing Report

Stormceptor® EF Sizing Report

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

05/31/2026

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

Site Name:	

Drainage Area (ha):	0.49
% Imperviousness:	68.10

Runoff Coefficient 'c': 0.70

Project Name:	3210 Albion Road
Project Number:	25-7834
Designer Name:	Ali Keyhani
Designer Company:	EFI Engineering
Designer Email:	ali.keyhani42@gmail.com
Designer Phone:	226-600-9742
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0
Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	11.21
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	
Influent TSS Concentration (mg/L):	200
Estimated Average Annual Sediment Load (kg/yr):	395
Estimated Average Annual Sediment Volume (L/yr):	321

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	87
EFO5	92
EFO6	95
EFO8	98
EFO10	99
EFO12	100

Recommended Stormceptor EFO Model:	**EFO4**
Estimated Net Annual Sediment (TSS) Load Reduction (%):	**87**
Water Quality Runoff Volume Capture (%):	**> 90**

THIRD-PARTY TESTING AND VERIFICATION

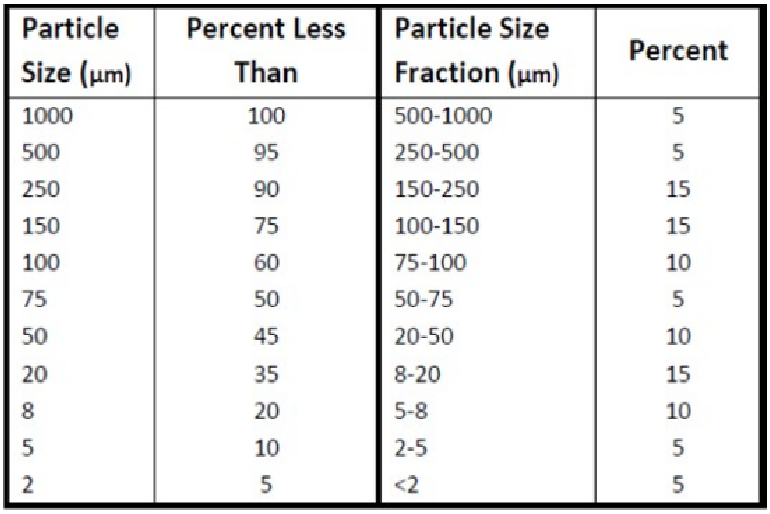
►**Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian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

PERFORMANCE

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

PARTICLE SIZE DISTRIBUTION (PSD)

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

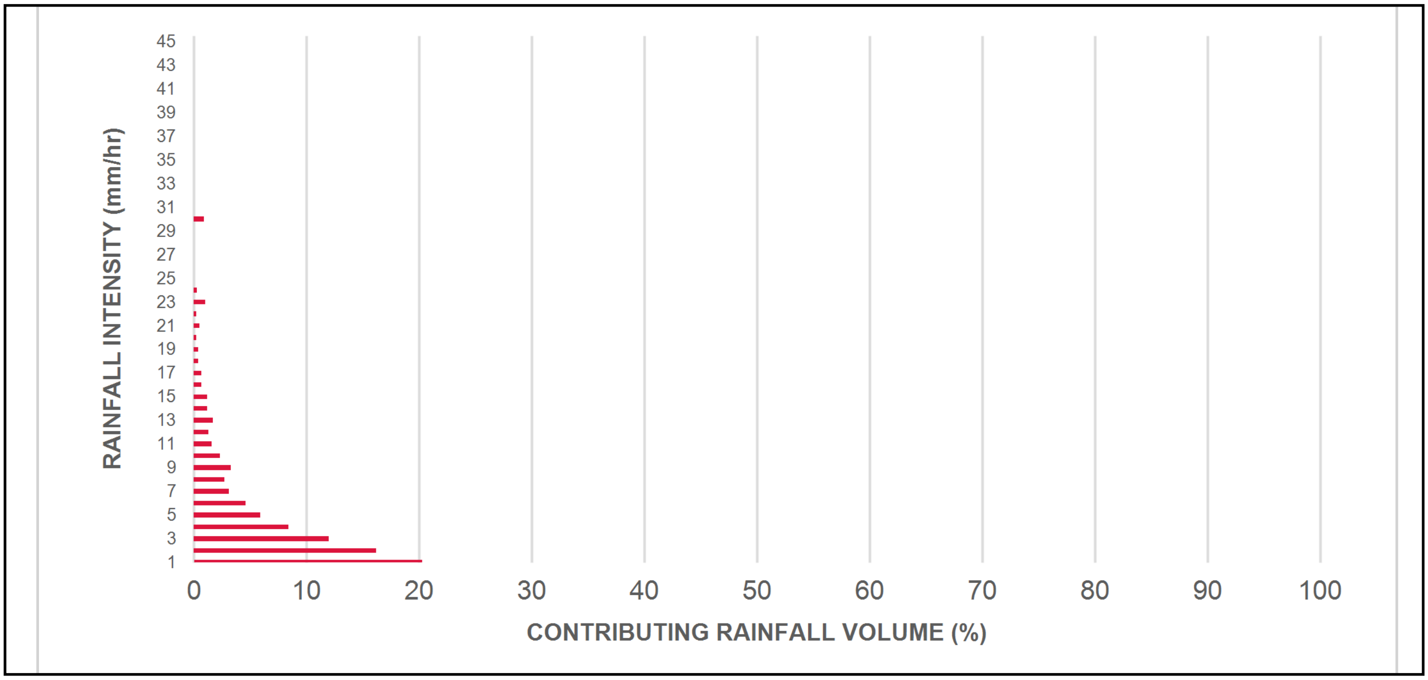


Particle Size (μm)	Percent Less Than	Particle Size Fraction (μm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

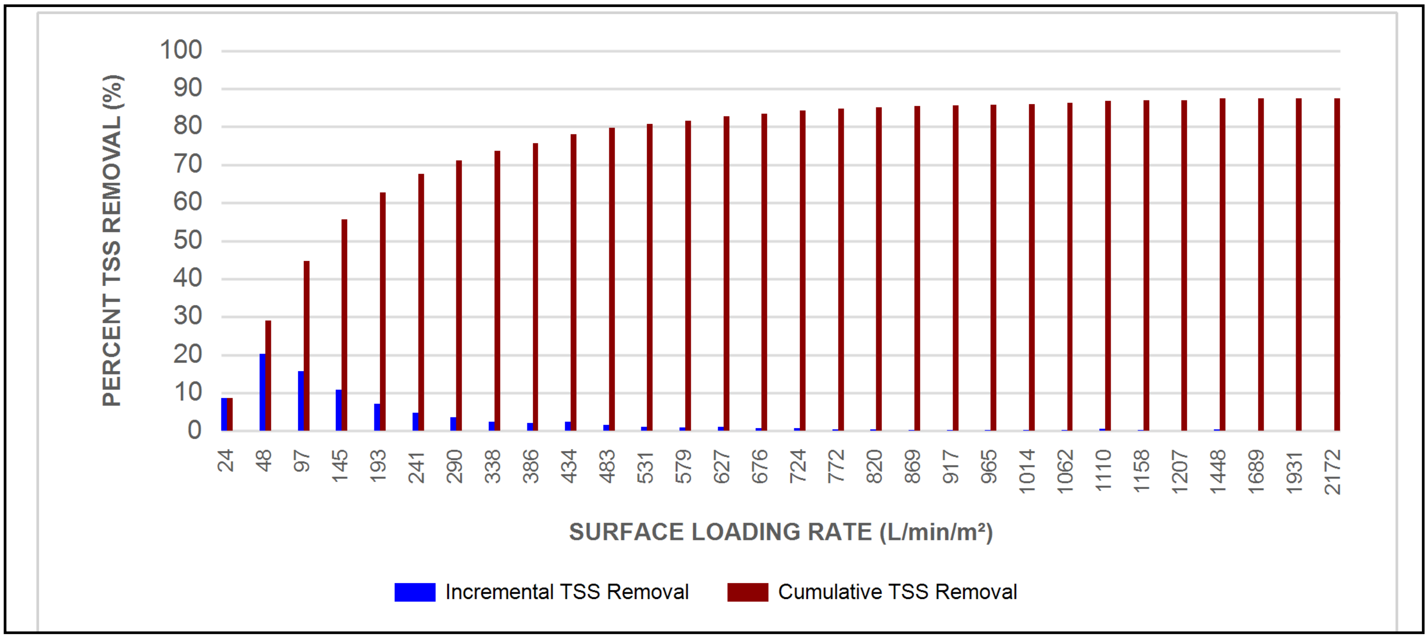
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.6	8.6	0.48	29.0	24.0	100	8.6	8.6
1.00	20.3	29.0	0.97	58.0	48.0	100	20.3	29.0
2.00	16.2	45.2	1.93	116.0	97.0	97	15.8	44.7
3.00	12.0	57.2	2.90	174.0	145.0	91	10.9	55.6
4.00	8.4	65.6	3.86	232.0	193.0	84	7.1	62.7
5.00	5.9	71.6	4.83	290.0	241.0	81	4.8	67.6
6.00	4.6	76.2	5.79	347.0	290.0	79	3.7	71.2
7.00	3.1	79.3	6.76	405.0	338.0	77	2.4	73.6
8.00	2.7	82.0	7.72	463.0	386.0	75	2.0	75.6
9.00	3.3	85.3	8.69	521.0	434.0	72	2.4	78.0
10.00	2.3	87.6	9.65	579.0	483.0	70	1.6	79.7
11.00	1.6	89.2	10.62	637.0	531.0	68	1.1	80.7
12.00	1.3	90.5	11.58	695.0	579.0	66	0.9	81.6
13.00	1.7	92.2	12.55	753.0	627.0	64	1.1	82.7
14.00	1.2	93.5	13.51	811.0	676.0	64	0.8	83.5
15.00	1.2	94.6	14.48	869.0	724.0	64	0.7	84.2
16.00	0.7	95.3	15.44	927.0	772.0	63	0.4	84.7
17.00	0.7	96.1	16.41	985.0	820.0	63	0.5	85.1
18.00	0.4	96.5	17.37	1042.0	869.0	63	0.2	85.4
19.00	0.4	96.9	18.34	1100.0	917.0	62	0.3	85.6
20.00	0.2	97.1	19.31	1158.0	965.0	62	0.1	85.8
21.00	0.5	97.5	20.27	1216.0	1014.0	61	0.3	86.0
22.00	0.2	97.8	21.24	1274.0	1062.0	60	0.1	86.2
23.00	1.0	98.8	22.20	1332.0	1110.0	59	0.6	86.8
24.00	0.3	99.1	23.17	1390.0	1158.0	58	0.2	86.9
25.00	0.0	99.1	24.13	1448.0	1207.0	57	0.0	86.9
30.00	0.9	100.0	28.96	1737.0	1448.0	51	0.5	87.4
35.00	0.0	100.0	33.78	2027.0	1689.0	43	0.0	87.4
40.00	0.0	100.0	38.61	2317.0	1931.0	38	0.0	87.4
45.00	0.0	100.0	43.44	2606.0	2172.0	34	0.0	87.4
Estimated Net Annual Sediment (TSS) Load Reduction =								**87 %**

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

SCOUR PREVENTION AND ONLINE CONFIGURATION

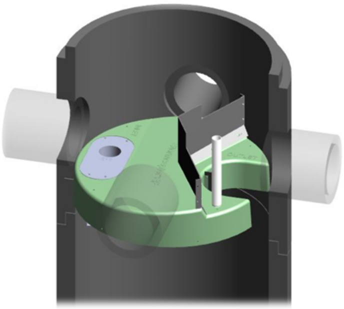
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test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

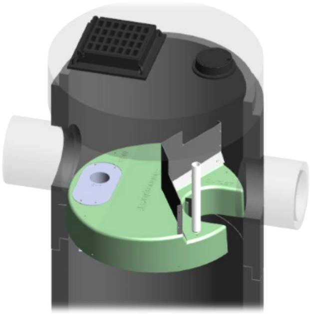
DESIGN FLEXIBILITY

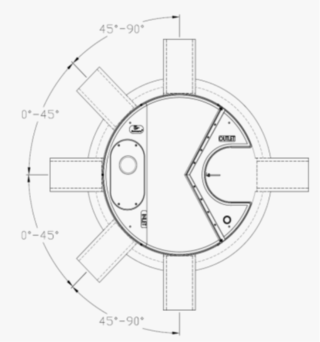
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend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

OIL CAPTURE AND RETENTION

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







INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.

0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.

45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

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

Pollutant Capacity

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

*Increased sump depth may be added to increase sediment storage capacity

** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

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

STANDARD STORMCEPTOR EF/EFO DRAWINGS

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

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

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

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

PART 1 – GENERAL

1.1 WORK INCLUDED

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

1.2 REFERENCE STANDARDS & PROCEDURES

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

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

1.3 SUBMITTALS

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

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

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

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

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

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

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

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

3.2 SIZING METHODOLOGY

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

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

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

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

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

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

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

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

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

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid

Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators,** with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to assess whether light liquids captured after a spill are effectively retained at high flow rates.

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

Appendix I

ETV Verification Statement for the OGS

◆ Verification Statement ◆ Verification Statement ◆ Verification Statement ◆

VERIFICATION STATEMENT

GLOBE Performance Solutions

Verifies the performance of

Stormceptor® EF4 and EFO4 Oil-Grit Separators

Developed by Imbrium Systems, Inc.,
Whitby, Ontario, Canada

In accordance with

ISO 14034:2016

Environmental management —
Environmental technology verification (ETV)

John D. Wiebe, PhD
Executive Chairman
GLOBE Performance Solutions

November 10, 2017
Vancouver, BC, Canada

GLOBE
PERFORMANCE
SOLUTIONS

Verification Body
GLOBE Performance Solutions
404 – 999 Canada Place | Vancouver, B.C | Canada |V6C 3E2

Technology description and application

The Stormceptor® EF4 and EFO4 are treatment devices designed to remove oil, sediment, trash, debris, and pollutants attached to particulates from Stormwater and snowmelt runoff. The device takes the place of a conventional manhole within a storm drain system and offers design flexibility that works with various site constraints. The EFO4 is designed with a shorter bypass weir height, which accepts lower surface loading rate into the sump, thereby reducing re-entrainment of captured free floating light liquids.

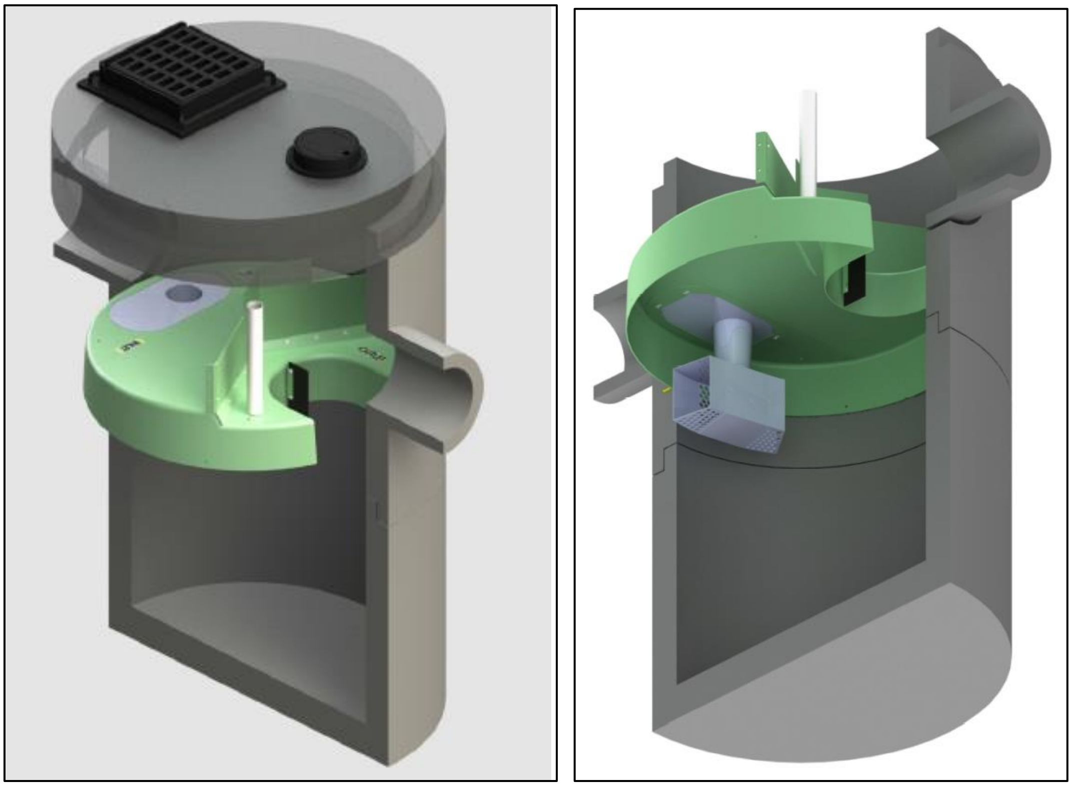


Figure 1. Graphic of typical inline Stormceptor® unit and core components.

Stormwater and snowmelt runoff enters the Stormceptor® EF/EFO's upper chamber through the inlet pipe(s) or a surface inlet grate. An insert divides the unit into lower and upper chambers and incorporates a weir to reduce influent velocity and separate influent (untreated) from effluent (treated) flows. Influent water ponds upstream of the insert's weir providing driving head for the water flowing downwards into the drop pipe where a vortex pulls the water into the lower chamber. The water diffuses at lower velocities in multiple directions through the drop pipe outlet openings. Oil and other floatables rise up and are trapped beneath the insert, while sediments undergo gravitational settling to the sump's bottom. Water from the sump can exit by flowing upward to the outlet riser onto the top side of the insert and downstream of the weir, where it discharges through the outlet pipe.

Maximum flow rate into the lower chamber is a function of weir height and drop pipe orifice diameter. The Stormceptor® EF and EFO are designed to allow a surface loading rate of 1135 L/min/m^2 (27.9 gal/min/ft^2) and 535 L/min/m^2 (13.1 gal/min/ft^2) into the lower chamber, respectively. When prescribed surface loading rates are exceeded, ponding water can overtop the weir height and bypass the lower treatment chamber, exiting directly through the outlet pipe. Hydraulic testing and scour testing demonstrate that the internal bypass effectively prevents scour at all bypass flow rates. Increasing the bypass flow rate does not increase the orifice-controlled flow rate into the lower treatment chamber where sediment is stored. This internal bypass feature allows for in-line installation, avoiding the cost of additional bypass structures. During bypass, treatment continues in the lower chamber at the maximum flow rate. The Stormceptor® EFO's lower design surface loading rate is favorable for minimizing re-entrainment and washout of captured light liquids. Inspection of Stormceptor® EF and EFO devices is performed from grade by inserting a sediment probe through the outlet riser and an oil dipstick through the oil inspection pipe. The unit can be maintained by using a vacuum hose through the outlet riser.

Performance conditions

The data and results published in this Technology Fact Sheet were obtained from the testing program conducted on the Imbrium Systems Inc.'s Stormceptor® OGS device, in accordance with the Procedure for Laboratory Testing of Oil-Grit Separators (Version 3.0, June 2014). The Procedure was prepared by the Toronto and Region Conservation Authority (TRCA) for Environment Canada's Environmental Technology Verification (ETV) Program. A copy of the Procedure may be accessed on the Canadian ETV website at www.etvcanada.ca.

Performance claim(s)

Capture test[a]:

During the capture test, the Stormceptor® EF OGS device, with a false floor set to 50% of the manufacturer's recommended maximum sediment storage depth and a constant influent test sediment concentration of 200 mg/L, removes 70, 64, 54, 48, 46, 44, and 49 percent of influent sediment by mass at surface loading rates of 40, 80, 200, 400, 600, 1000, and 1400 L/min/m^2, respectively.

Stormceptor® EFO, with a false floor set to 50% of the manufacturer's recommended maximum sediment storage depth and a constant influent test sediment concentration of 200 mg/L, removes 70, 64, 54, 48, 42, 40, and 34 percent of influent sediment by mass at surface loading rates of 40, 80, 200, 400, 600, 1000, and 1400 L/min/m^2, respectively.

Scour test[a]:

During the scour test, the Stormceptor® EF and Stormceptor® EFO OGS devices, with 10.2 cm (4 inches) of test sediment pre-loaded onto a false floor reaching 50% of the manufacturer's recommended maximum sediment storage depth, generate corrected effluent concentrations of 4.6, 0.7, 0, 0.2, and 0.4 mg/L at 5-minute duration surface loading rates of 200, 800, 1400, 2000, and 2600 L/min/m^2, respectively.

Light liquid re-entrainment test[a]:

During the light liquid re-entrainment test, the Stormceptor® EFO OGS device with surrogate low-density polyethylene beads preloaded within the lower chamber oil collection zone, representing a floating light liquid volume equal to a depth of 50.8 mm over the sedimentation area, retained 100, 99.5, 99.8, 99.8, and 99.9 percent of loaded beads by mass during the 5-minute duration surface loading rates of 200, 800, 1400, 2000, and 2600 L/min/m^2.

---

[a] The claim can be applied to other units smaller or larger than the tested unit as long as the untested units meet the scaling rule specified in the Procedure for Laboratory of Testing of Oil Grit Separators (Version 3.0, June 2014)

Performance results

The test sediment consisted of ground silica (1 – 1000 micron) with a specific gravity of 2.65, uniformly mixed to meet the particle size distribution specified in the testing procedure. The *Procedure for Laboratory Testing of Oil Grit Separators* requires that the three sample average of the test sediment particle size distribution (PSD) meet the specified PSD percent less than values within a boundary threshold of 6%. The comparison of the average test sediment PSD to the CETV specified PSD in Figure 2 indicates that the test sediment used for the capture and scour tests met this condition.

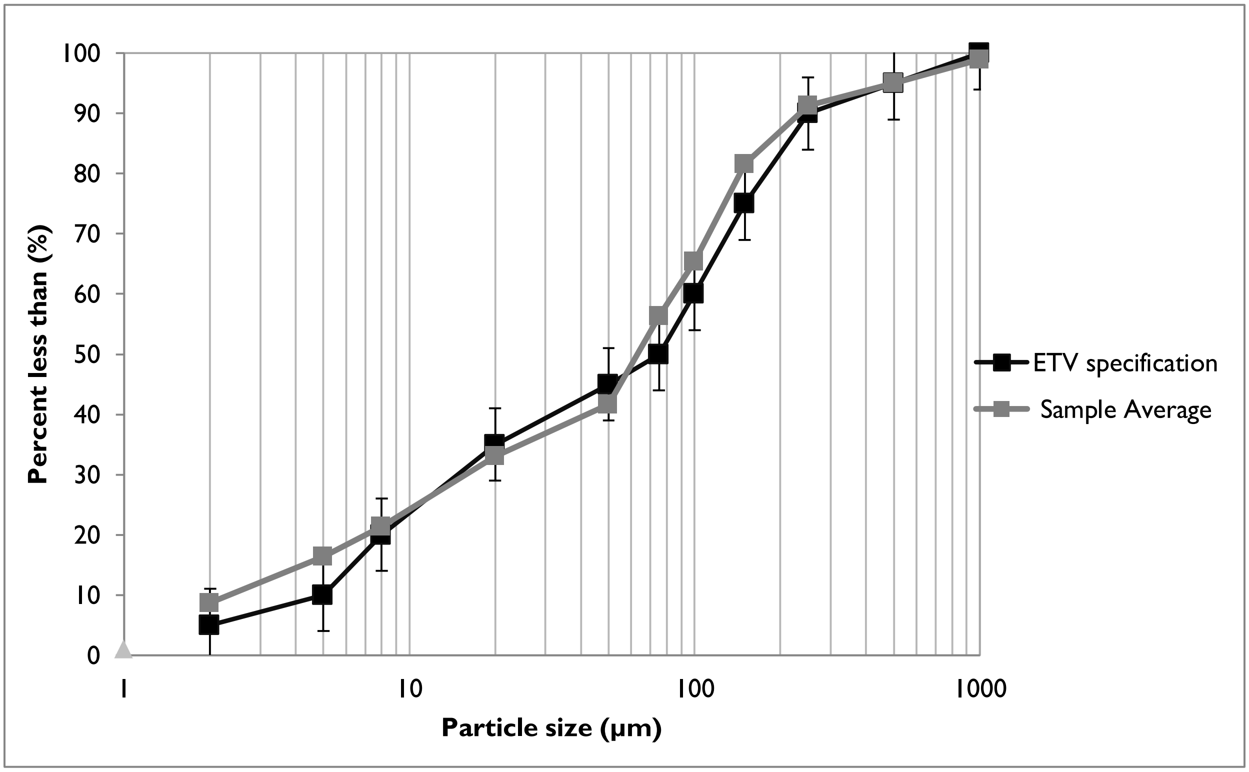


Figure 2. The three sample average particle size distribution (PSD) of the test sediment used for the capture and scour test compared to the specified PSD.

The capacity of the device to retain sediment was determined at seven surface loading rates using the modified mass balance method. This method involved measuring the mass and particle size distribution of the injected and retained sediment for each test run. Performance was evaluated with a false floor simulating the technology filled to 50% of the manufacturer's recommended maximum sediment storage depth. The test was carried out with clean water that maintained a sediment concentration below 20 mg/L. Based on these conditions, removal efficiencies for individual particle size classes and for the test sediment as a whole were determined for each of the tested surface loading rates (Table 1). Since the EF and EFO models are identical except for the weir height, which bypasses flows from the EFO model at a surface loading rate of 535 L/min/m^2 (13.1 gpm/ft^2), sediment capture tests at surface loading rates from 40 to 400 L/min/m^2 were only performed on the EF unit. Surface loading rates of 600, 1000, and 1400 L/min/m^2 were tested on both units separately. Results for the EFO model at these higher flow rates are presented in Table 2.

In some instances, the removal efficiencies were above 100% for certain particle size fractions. These discrepancies are not unique to any one test laboratory and may be attributed to errors relating to the blending of sediment, collection of representative samples for laboratory submission, and laboratory analysis of PSD. Due to these errors, caution should be exercised in applying the removal efficiencies by particle size fraction for the purposes of sizing the tested device (see Bulletin # CETV 2016-11-0001). The results for "all particle sizes by mass balance" (see Table 1 and 2) are based on measurements of the total injected and retained sediment mass, and are therefore not subject to blending, sampling or PSD analysis errors.

Table 1. Removal efficiencies (%) of the EF4 at specified surface loading rates

Particle size fraction (µm)	**Surface loading rate (L/min/m^2)**						
	40	80	200	400	600	1000	1400
>500	90	58	58	100*	86	72	100*
250 - 500	100*	100*	100	100*	100*	100*	100*
150 - 250	90	82	26	100*	100*	67	90
105 - 150	100*	100*	100*	100*	100*	100*	100
75 - 105	100*	92	74	82	77	68	76
53 - 75	Undefined[a]	56	100*	72	69	50	80
20 - 53	54	100*	54	33	36	40	31
8 - 20	67	52	25	21	17	20	20
5 – 8	33	29	11	12	9	7	19
<5	13	0	0	0	0	0	4
All particle sizes by mass balance	**70.4**	**63.8**	**53.9**	**47.5**	**46.0**	**43.7**	**49.0**

---

[a] An outlier in the feed sample sieve data resulted in a negative removal efficiency for this size fraction.

* Removal efficiencies were calculated to be above 100%. Calculated values ranged between 101 and 171% (average 128%). See text and Bulletin # CETV 2016-11-0001 for more information.

Table 2. Removal efficiencies (%) of the EFO4 at surface loading rates above the bypass rate of 535 L/min/m^2

Particle size fraction (µm)	**Surface loading rate (L/min/m^2)**		
	600	1000	1400
>500	89	83	100*
250 - 500	90	100*	92
150 - 250	90	67	100*
105 - 150	85	92	77
75 - 105	80	71	65
53 - 75	60	31	36
20 - 53	33	43	23
8 - 20	17	23	15
5 – 8	10	3	3
<5	0	0	0
All particle sizes by mass balance	**41.7**	**39.7**	**34.2**

* Removal efficiencies were calculated to be above 100%. Calculated values ranged between 103 and 111% (average 107%). See text and Bulletin # CETV 2016-11-0001 for more information.

Figure 3 compares the particle size distribution (PSD) of the three sample average of the test sediment to the PSD of the sediment retained by the EF4 at each of the tested surface loading rates. Figure 4 shows the same graph for the EFO4 unit at surface loading rates above the bypass rate of 535 L/min/m^2.

As expected, the capture efficiency for fine particles in both units was generally found to decrease as surface loading rates increased.

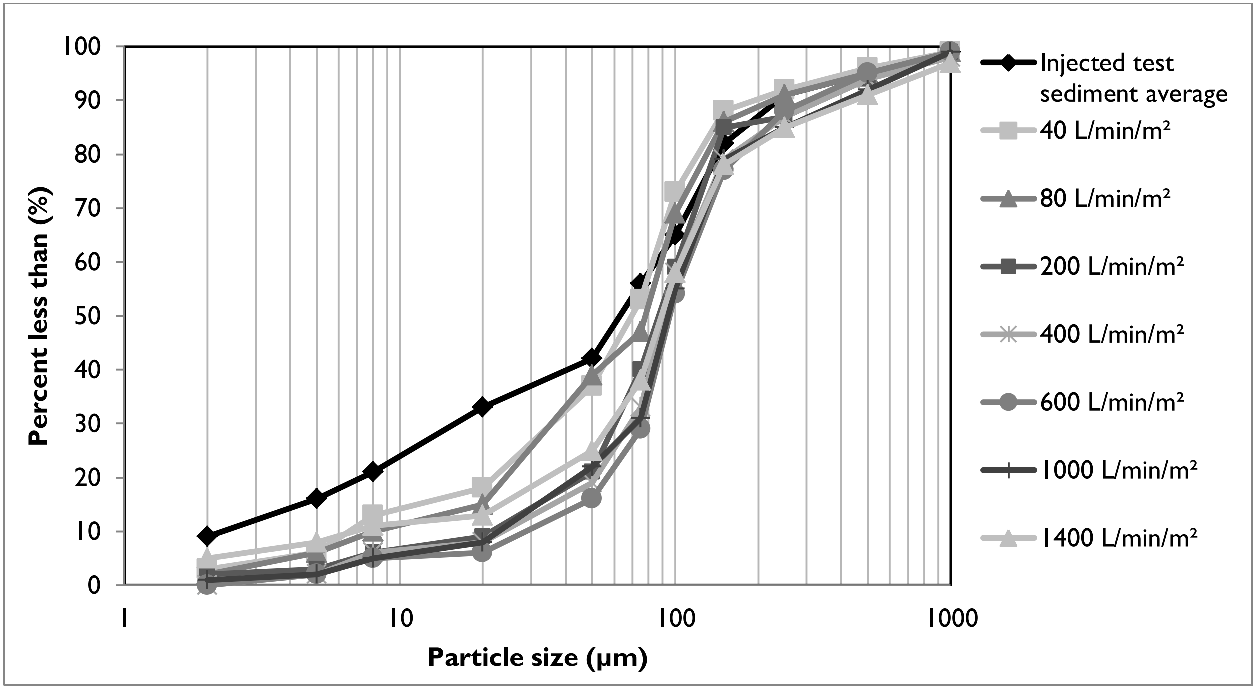


Figure 3. Particle size distribution of sediment retained in the EF4 in relation to the injected test sediment average.

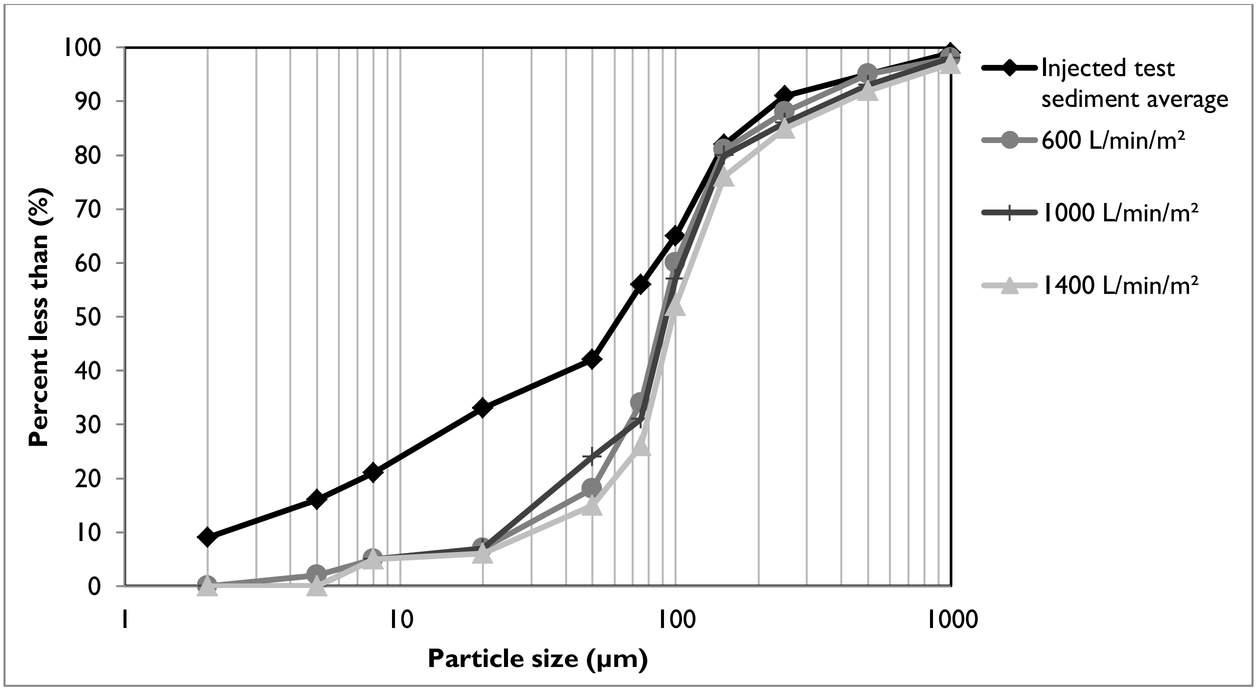


Figure 4. Particle size distribution of sediment retained in the EFO4 in relation to the injected test sediment average at surface loading rates above the bypass rate of 535 L/min/m2

Table 4 shows the results of the sediment scour and re-suspension test for the EF4 unit. The EFO4 was not tested as it was reasonably assumed that scour rates would be lower given that flow bypass occurs at a lower surface loading rate. The scour test involved preloading 10.2 cm of fresh test sediment into the sedimentation sump of the device. The sediment was placed on a false floor to mimic a device filled to 50% of the maximum recommended sediment storage depth. Clean water was run through the device at five surface loading rates over a 30 minute period. Each flow rate was maintained for 5 minutes with a one minute transition time between flow rates. Effluent samples were collected at one minute sampling intervals and analyzed for Suspended Sediment Concentration (SSC) and PSD by recognized methods. The effluent samples were subsequently adjusted based on the background concentration of the influent water. Typically, the smallest 5% of particles captured during the 40 L/min/m² sediment capture test is also used to adjust the concentration, as per the method described in Bulletin # CETV 2016-09-0001. However, since the composites of effluent concentrations were below the Reporting Detection Limit of the Laser Diffraction PSD methodology, this adjustment was not made. Results showed average adjusted effluent sediment concentrations below 5 mg/L at all tested surface loading rates.

It should be noted that the EF4 starts to internally bypass water at 1135 L/min/m², potentially resulting in the dilution of effluent concentrations, which would not normally occur under typical field conditions because the field influent concentration would contain a much higher sediment concentration than during the lab test. Recalculation of effluent concentrations to account for dilution at surface loading rates above the bypass rate showed sediment effluent concentrations to be below 1.6 mg/L.

Table 4. Scour test adjusted effluent sediment concentration.

Run	Surface loading rate (L/min/m²)	Run time (min)	Background sample concentration (mg/L)	Adjusted effluent suspended sediment concentration (mg/L) [a]	Average (mg/L)
1	200	1:00	<RDL	11.9	4.6
		2:00		7.0	
		3:00		4.4	
		4:00		2.2	
		5:00		1.0	
		6:00		1.2	
2	800	7:00	<RDL	1.1	0.7
		8:00		0.9	
		9:00		0.6	
		10:00		1.4	
		11:00		0.1	
		12:00		0	
3	1400	13:00	<RDL	0	0
		14:00		0.1	
		15:00		0	
		16:00		0	
		17:00		0	
		18:00		0	
4	2000	19:00	1.2	0.2	0.2
		20:00		0	
		21:00		0	
		22:00		0.7	
		23:00		0	

		24:00		0.4	
5	2600	25:00	1.6	0.3	0.4
		26:00		0.4	
		27:00		0.7	
		28:00		0.4	
		29:00		0.2	
		30:00		0.4	

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[a] The adjusted effluent suspended sediment concentration represents the actual measured effluent concentration minus the background concentration. For more information see Bulletin # CETV 2016-09-0001.

The results of the light liquid re-entrainment test used to evaluate the unit's capacity to prevent re-entrainment of light liquids are reported in Table 5. The test involved preloading 58.3 L (corresponding to a 5 cm depth over the collection sump area of 1.17m^2) of surrogate low-density polyethylene beads within the oil collection skirt and running clean water through the device continuously at five surface loading rates (200, 800, 1400, 2000, and 2600 L/min/m^2). Each flow rate was maintained for 5 minutes with approximately 1 minute transition time between flow rates. The effluent flow was screened to capture all re-entrained pellets throughout the test.

Table 5. Light liquid re-entrainment test results for the EFO4.

Surface Loading Rate (L/min/m2)	Time Stamp	Amount of Beads Re-entrained			
		Mass (g)	Volume (L)[a]	% of Pre-loaded Mass Re-entrained	% of Pre-loaded Mass Retained
200	62	0	0	0.00	100
800	247	168.45	0.3	0.52	99.48
1400	432	51.88	0.09	0.16	99.83
2000	617	55.54	0.1	0.17	99.84
2600	802	19.73	0.035	0.06	99.94
Total Re-entrained		295.60	0.525	0.91	--
Total Retained		32403	57.78	--	99.09
Total Loaded		32699	58.3	--	--

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[a] Determined from bead bulk density of 0.56074 g/cm^3

Variances from testing Procedure

The following minor deviations from the *Procedure for Laboratory Testing of Oil-Grit Separators* (Version 3.0, June 2014) have been noted:

1. During the capture test, the 40 L/min/m^2 and 80 L/min/m^2 surface loading rates were evaluated over 3 and 2 days respectively due to the long duration needed to feed the required minimum of 11.3 kg of test sediment into the unit at these lower flow rates. Pumps were shut down at the end of each intermediate day, and turned on again the following morning. The target flow rate was re-established within 30 seconds of switching on the pump. This procedure may have allowed sediments to be captured that otherwise may have exited the unit if the test was

continuous. On the basis of practical considerations, this variance was approved by the verifier prior to testing.

2. During the scour test, the coefficient of variation (COV) for the lowest flow rate tested (200 L/min/m^2) was 0.07, which exceeded the specified limit of 0.04 target specified in the OGS Procedure. A pump capable of attaining the highest flow rate of 3036 L/min had difficulty maintaining the lowest flow of 234 L/min but still remained within +/- 10% of the target flow and is viewed as having very little impact on the observed results. Similarly, for the light liquid re-entrainment test the COV for the flow rate of the 200 L/min/m^2 run was 0.049, exceeding the limit of 0.04, but is believed to introduce negligible bias.

3. Due to pressure build up in the filters, the runs at 1000 L/min/m^2 for the Stormceptor® EF4 and 1000 and 1400 L/min/m^2 for the Stormceptor® EFO4 were slightly shorter than the target. The run times were 54, 59 and 43 minutes respectively, versus targets of 60 and 50 minutes. The final feed samples were timed to coincide with the end of the run. Since >25 lbs of sediment was fed, the shortened time did not invalidate the runs.

Verification

The verification was completed by the Verification Expert, Toronto and Region Conservation Authority, contracted by GLOBE Performance Solutions, using the International Standard ***ISO 14034:2016 Environmental management -- Environmental technology verification (ETV)***. Data and information provided by Imbrium Systems Inc. to support the performance claim included the following: Performance test report prepared by Good Harbour Laboratories, and dated September 8, 2017; the report is based on testing completed in accordance with the Procedure for Laboratory Testing of Oil-Grit Separators (Version 3.0, June 2014).

What is ISO14034:2016 Environmental management – Environmental technology verification (ETV)?

ISO 14034:2016 specifies principles, procedures and requirements for environmental technology verification (ETV), and was developed and published by the *International Organization for Standardization (ISO)*. The objective of ETV is to provide credible, reliable and independent verification of the performance of environmental technologies. An environmental technology is a technology that either results in an environmental added value or measures parameters that indicate an environmental impact. Such technologies have an increasingly important role in addressing environmental challenges and achieving sustainable development.

For more information on the Stormceptor® EF4 and EFO4 please contact:

Imbrium Systems, Inc.
407 Fairview Drive
Whitby, ON
L1N 3A9, Canada
Tel: 416-960-9900
info@imbriumsystems.com

For more information on ISO 14034:2016 / ETV please contact:

GLOBE Performance Solutions
World Trade Centre
404 – 999 Canada Place
Vancouver, BC
V6C 3E2 Canada
Tel: 604-695-5018 / Toll Free: 1-855-695-5018
etv@globeperformance.com

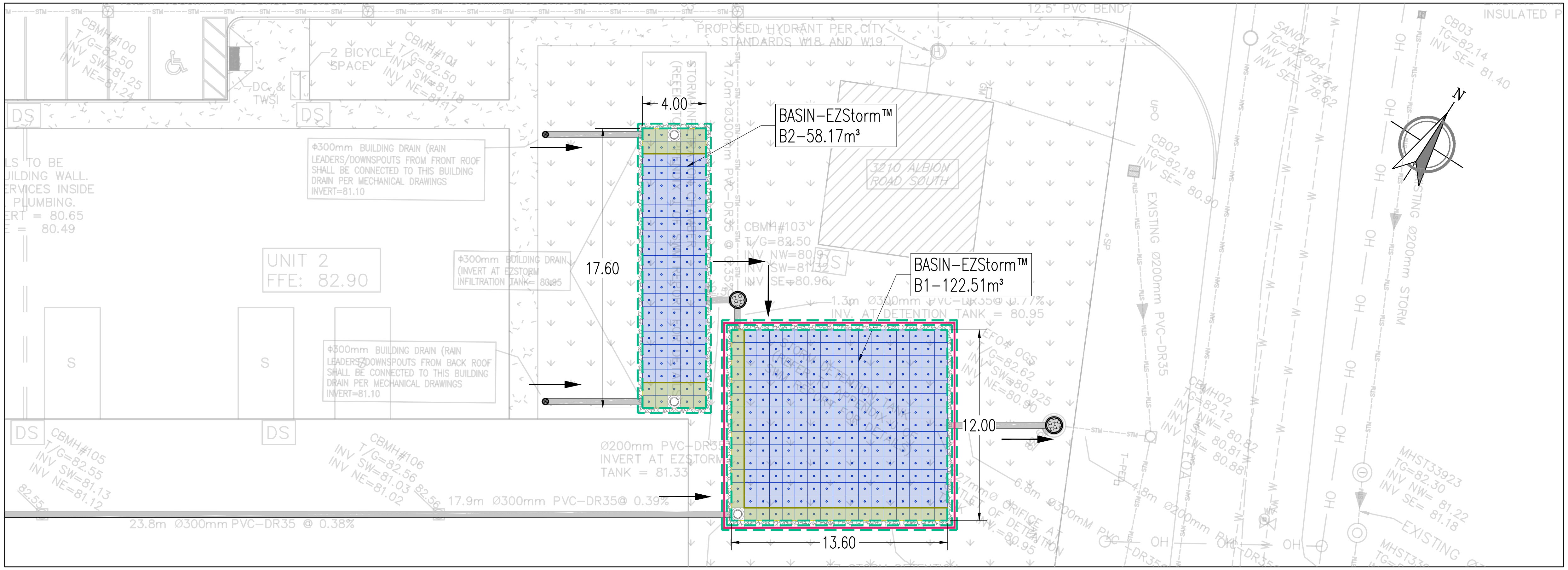
Limitation of verification

GLOBE Performance Solutions and the Verification Expert provide the verification services solely on the basis of the information supplied by the applicant or vendor and assume no liability thereafter. The responsibility for the information supplied remains solely with the applicant or vendor and the liability for the purchase, installation, and operation (whether consequential or otherwise) is not transferred to any other party as a result of the verification.

Appendix J

Underground Infiltration Chamber and Detention Tank

3210 ALBION ROAD SOUTH, OTTAWA, ON



1
01

IMPLANTATION

SCALE 1:300

CONTACTS			
SITE CONTACT	PARTH PUSHKARNA	647 278-7339	ppushkarna@brunet.cc
SALES REPRESENTATIVE	PARTH PUSHKARNA	647 278-7339	ppushkarna@brunet.cc
TECNICAL SUPPORT	NEXTSTORM	450 322-6260	info@nextstorm.ca

NOTE :

- These drawings may contain components, including but not limited to manholes, catch basins, storm pipes, fittings, manifolds, castings or other necessary appurtenances that may not be supplied by Nextstorm.
- It is the responsibility of the contractor to confirm all the material required is provided before installation.
- This drawing was prepared to support the project engineer of record for the proposed system. It is the ultimate responsibility of the project engineer of record to ensure that the EZSTORM™ System's design is in full compliance with all applicable laws and regulations. It is the contractor of record's responsibility to ensure that the Nextstorm products are designed in accordance with Nextstorm's minimum requirements. Nextstorm does not approve plans, sizings or systems designs.
- All measurements are in meters unless otherwise indicated.

N°.	REVISION	DATE	BY
C	ISSUED FOR APPROVAL	03/06/2026	S.M.
B	ISSUED FOR APPROVAL	02/06/2026	S.M.
A	ISSUED FOR APPROVAL	01/06/2026	S.M.

ISSUED FOR APPROVAL
NOT FOR PRODUCTION

COVER

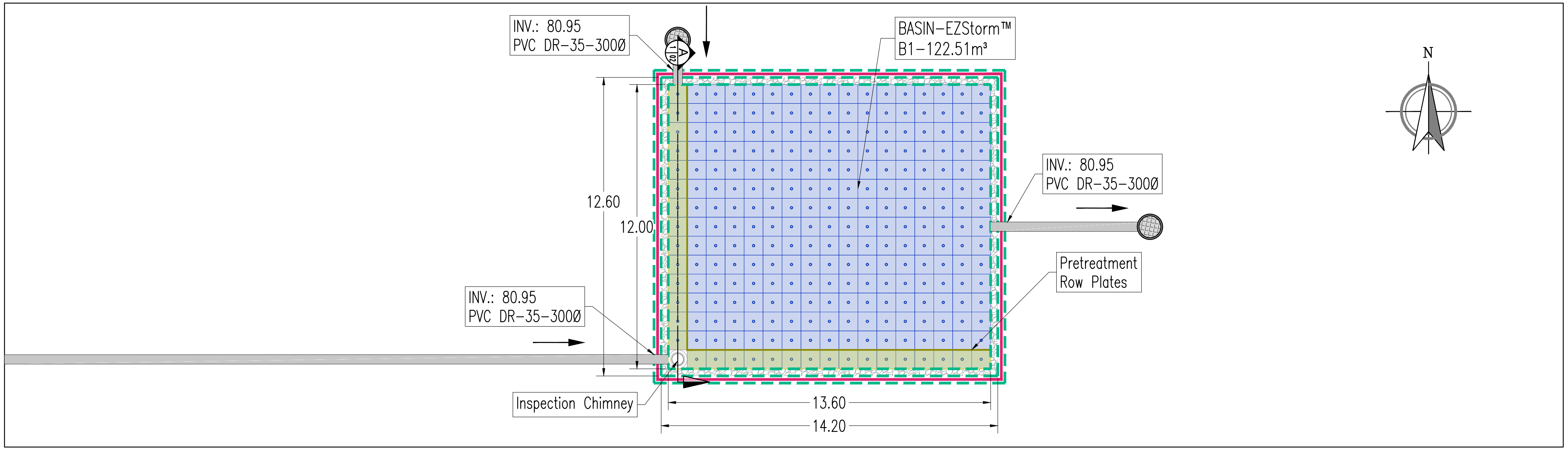
BASIN-EZSTORM™

PROJECT NAME:
3210 ALBION ROAD SOUTH,
OTTAWA, ON

PROJECT N°: 260529-05	DATE: 01/06/2026
DRAWN BY: S.M.	CHECKED BY: S.K.
SCALE: SCALE	SHEET N°: 1/9

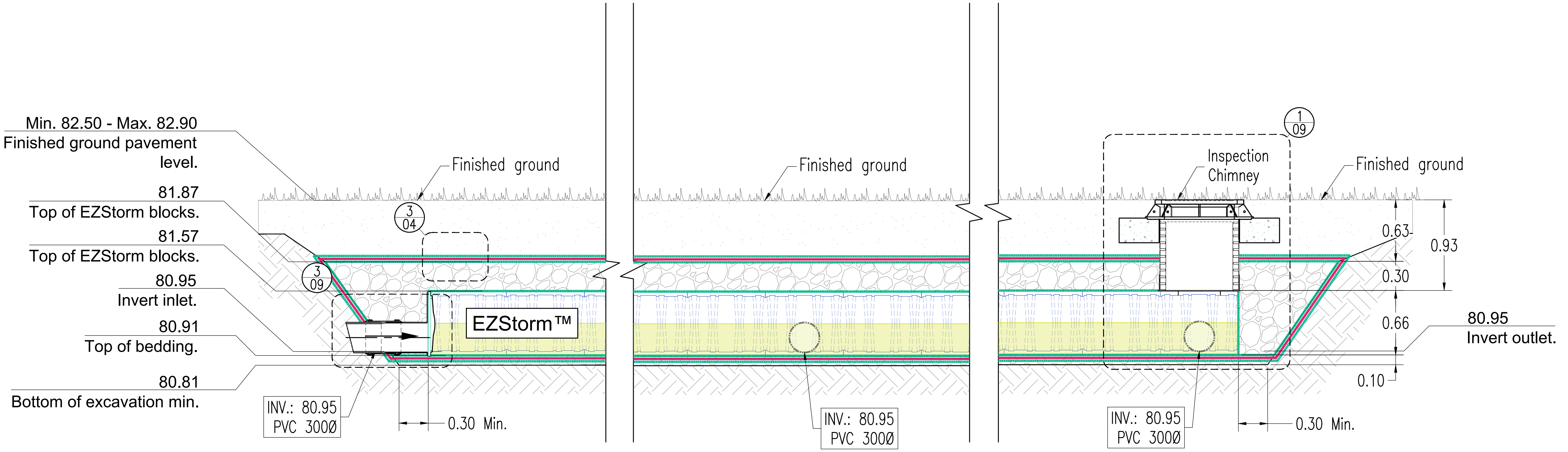
NEXT

1625, Blvd. Monseigneur-Langlois
Salaberry-de-Valleyfield
J6S 1C2, Québec



1 02 1 LAYER PLAN VIEW
SCALE 1:200

EZSTORM™ SYSTEM	
Total volume storage capacity	122.51m³
EZSTORM™ Storage Volume	97.14m³
clear Stone Storage Volume	25.37m³
System Area	178.92m²
Number of blocks length	17
Number of blocks width	15
System's height	0.66m



2 02 SECTION A-A
SCALE 1:50

LEGEND

○ Inspection Chimney
▨ Catch basin
☐ Connection–access concrete manhole
● Manhole
A. Geotextile EZ-226.
B. Geomembrane EZ-LLDPE-30
Drain HDPE 150Ø (By others)
Clear Stone with maximum grain size of 20mm at 40% void ratio
MG-20 or MG-112 compacted sand at 90%PM
Ⓐ Ⓑ Thickness of this layer may vary according to project requirements
Ⓒ Paving bed

N°.	REVISION	DATE	BY
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B	ISSUED FOR APPROVAL	02/06/2026	S.M.
A	ISSUED FOR APPROVAL	01/06/2026	S.M.

ISSUED FOR APPROVAL
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BASIN'S PLAN AND SECTION VIEW

BASIN-EZSTORM™ - B1 - 122.51M³

PROJECT NAME:
3210 ALBION ROAD SOUTH,
OTTAWA, ON

PROJECT N°: 260529-05
DATE: 01/06/2026
DRAWN BY: S.M.
CHECKED BY: S.K.
SCALE: SCALE
SHEET N°: 2/9

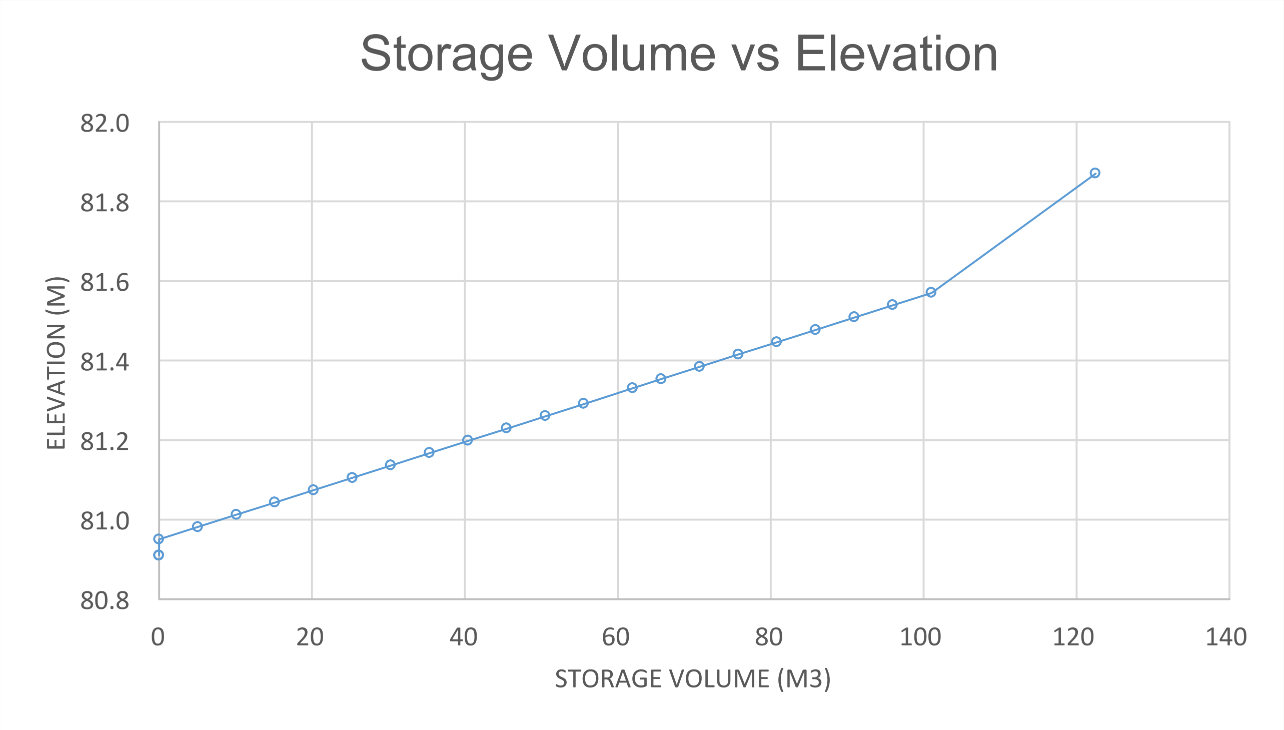
NEXT
1625, Blvd. Monseigneur-Langlois
Salaberry-de-Valleyfield
J6S 1C2, Québec

SYSTEM CHARACTERISTICS			
Model	EZSTORM™ system B1		
	Number of blocks (unit)	Dimensions / blocks (m)	Dimensions EZStorm (m)
Height	1.0	0.66	0.66
Length	17	0.80	13.60
Width	15	0.80	12.00

EZSTORM area (m2)	163.2
EZSTORM + Clear stone area (m2)	178.9
Total storage volume (m3)	122.5
Invert (m)	80.95
Min finished ground level (m)	82.50

EZSTORM volume (m3)	97.1	Clear stone volume (m3)	25.4
Void in EZSTORM (%)	96%	Void in Clear stone (%)	40%

System height (m)	Storage volume (m3)	Elevation (m)	Notes
0.96	122.51	81.870	Top clear stone
0.66	101.04	81.570	Top EZSTORM
0.63	95.98	81.539	
0.60	90.93	81.508	
0.57	85.88	81.477	
0.54	80.83	81.446	
0.51	75.78	81.415	
0.47	70.72	81.384	
0.44	65.67	81.353	
0.42	61.92	81.330	
0.38	55.57	81.291	
0.35	50.52	81.260	
0.32	45.47	81.229	
0.29	40.41	81.198	
0.26	35.36	81.167	
0.23	30.31	81.136	
0.20	25.26	81.105	
0.16	20.21	81.074	
0.13	15.16	81.043	
0.10	10.10	81.012	
0.07	5.05	80.981	
0.04	0.00	80.950	Invert
0.00	0.00	80.910	Bottom EZSTORM



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B	ISSUED FOR APPROVAL	02/06/2026	S.M.
A	ISSUED FOR APPROVAL	01/06/2026	S.M.
N°.	REVISION	DATE	BY

ISSUED FOR APPROVAL
NOT FOR PRODUCTION

VOLUME CALCULATION

BASIN-EZSTORM™ - B1 - 122.51M³

PROJECT NAME:
3210 ALBION ROAD SOUTH,
OTTAWA, ON

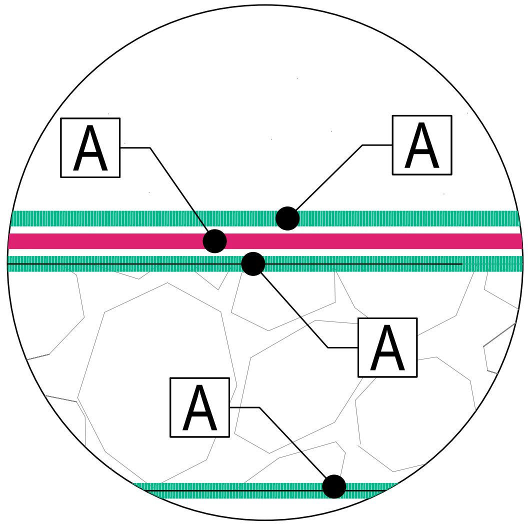
PROJECT N°: 260529-05	DATE: 01/06/2026
DRAWN BY: S.M.	CHECKED BY: S.K.
SCALE: SCALE	SHEET N°: 3/9

NEXT
1625, Blvd. Monseigneur-Langlois
Salaberry-de-Valleyfield
J6S 1C2, Québec

Traffic–free

Acceptable backfill materials for this project

	Layer location	Description	Density requirements
	Backfill located above layer B	Topsoil backfill with a 32mm grain size	No compaction necessary
Ⓐ	Top embankment: Embankment located directly above the EZStorm chambers and below layer A	3/4" Clear stone at a 40% void ratio	No compaction needed.
Ⓑ	Lateral backfill: located between the side faces of the EZStorm chambers and the limits of the excavated volume.	3/4" Clear stone at a 40% void ratio	No compaction needed.
Ⓒ	Laying bed: located under the EZStorm system, between the foundation floor and the base of the system	Subgrade granular material 100 mm Min. 3/4 (20mm) granular material, clean stone or sand to 90% M.P	Use a plate compactor or roller to obtain a flat surface

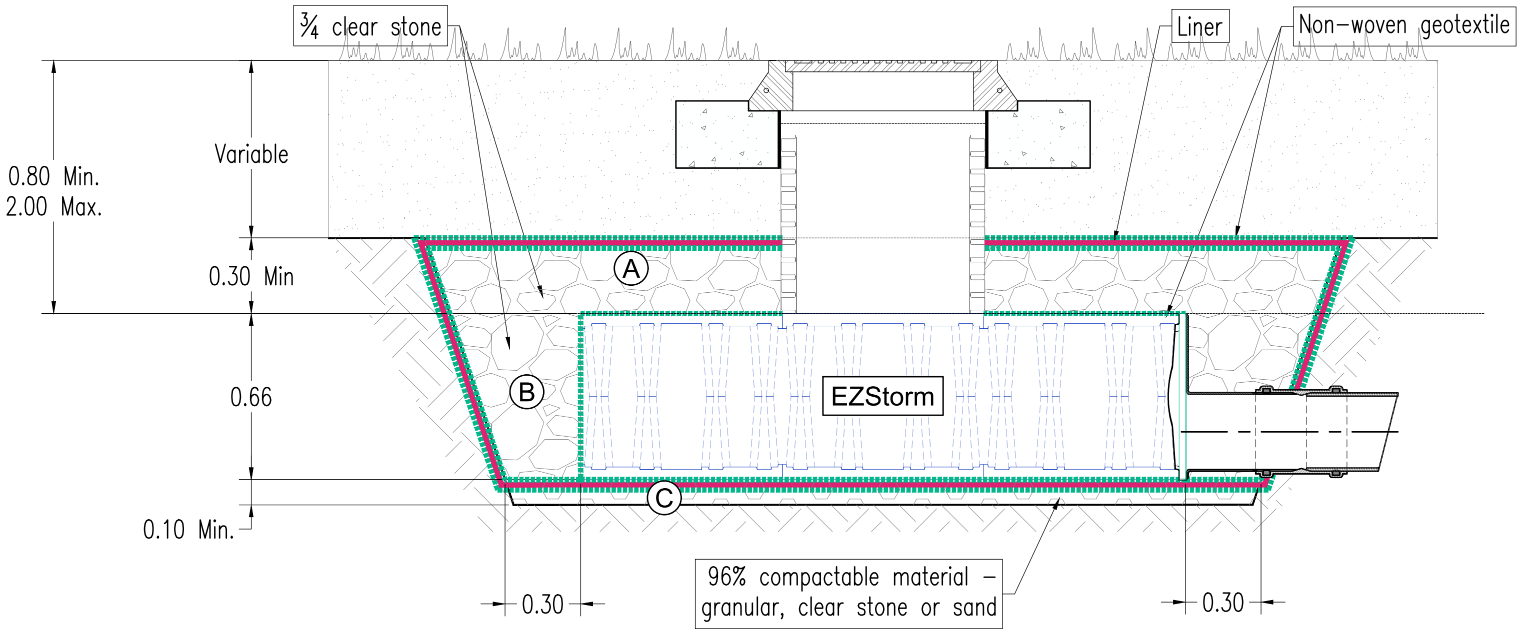


3 / 04 DETAIL

SCALE NOT AT SCALE

LEGEND

◎	Inspection Chimney
⊘	Catch basin
▢	Connection–access concrete manhole
⊞	Manhole
– – A.	Geotextile EZ–226.
— B.	Geomembrane EZ–LLDPE–30
–·–	Drain HDPE 150Ø (By others)
▨	Clear Stone with maximum grain size of 20mm at 40% void ratio
▨	MG–20 or MG–112 compacted sand at 90%PM
Ⓐ Ⓑ	Thickness of this layer may vary according to project requirements
Ⓒ	Paving bed



1 / 04 TYPICAL SECTION

SCALE 1:30

N°.	REVISION	DATE	BY
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B	ISSUED FOR APPROVAL	02/06/2026	S.M.
A	ISSUED FOR APPROVAL	01/06/2026	S.M.

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NOT FOR PRODUCTION

STANDARD BACKFILL REQUIREMENTS

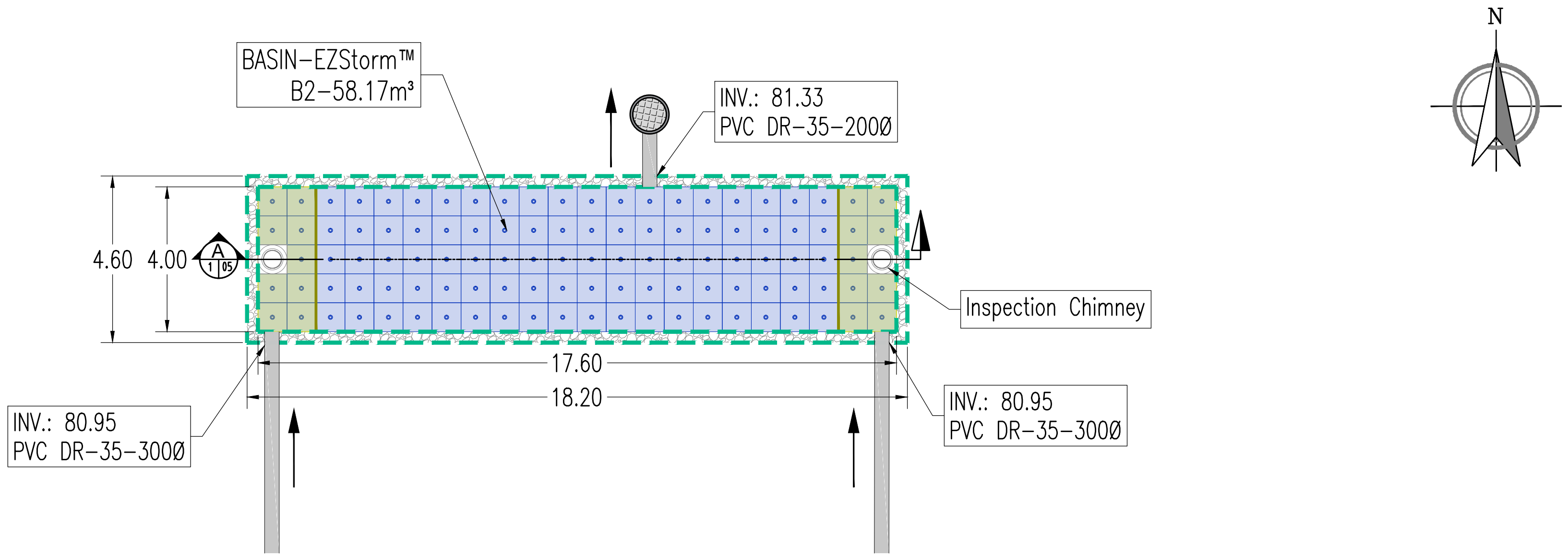
BASIN-EZSTORM™ - B1 - 122.51M³

PROJECT NAME:
3210 ALBION ROAD SOUTH,
OTTAWA, ON

PROJECT N°: 260529-05	DATE: 01/06/2026
DRAWN BY: S.M.	CHECKED BY: S.K.
SCALE: SCALE	SHEET N°: 4/9

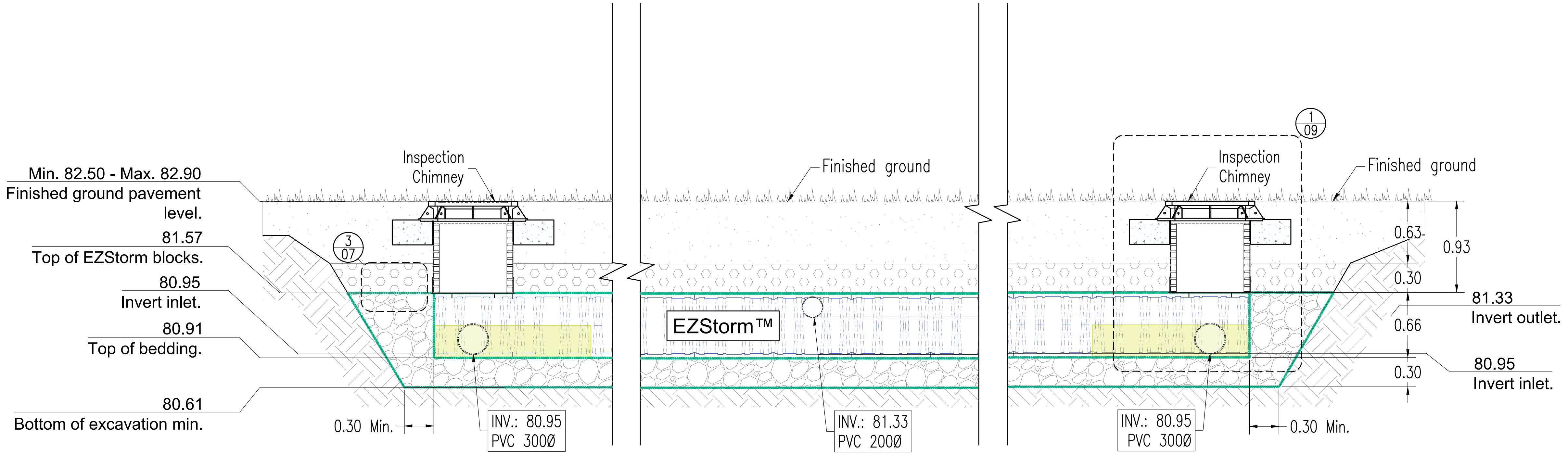
NEXT

1625, Blvd. Monseigneur-Langlois
Salaberry-de-Valleyfield
J6S 1C2, Québec



1
05
1 LAYER PLAN VIEW
SCALE 1:200

EZSTORM™ SYSTEM	
Total volume storage capacity	58.17m³
EZSTORM™ Storage Volume	44.61m³
clear Stone Storage Volume	13.56m³
System Area	83.72m²
Number of blocks length	22
Number of blocks width	5
System's height	0.66m



2
05
SECTION A-A
SCALE 1:50

LEGEND

◎	Inspection Chimney
▨	Catch basin
□	Connection–access concrete manhole
▦	Manhole
– – A.	Geotextile EZ–226.
— B.	Geomembrane EZ–LLDPE–30
–·–	Drain HDPE 150Ø (By others)
▨	Clear Stone with maximum grain size of 20mm at 40% void ratio
▨	MG–20 or MG–112 compacted sand at 90%PM
Ⓐ Ⓑ	Thickness of this layer may vary according to project requirements
Ⓒ	Paving bed

N°.	REVISION	DATE	BY
C	ISSUED FOR APPROVAL	03/06/2026	S.M.
B	ISSUED FOR APPROVAL	02/06/2026	S.M.
A	ISSUED FOR APPROVAL	01/06/2026	S.M.

ISSUED FOR APPROVAL
NOT FOR PRODUCTION

BASIN'S PLAN AND SECTION VIEW

BASIN-EZSTORM™ - B2 - 58.17M³

PROJECT NAME:
3210 ALBION ROAD SOUTH,
OTTAWA, ON

PROJECT N°: 260529-05	DATE: 01/06/2026
DRAWN BY: S.M.	CHECKED BY: S.K.
SCALE: SCALE	SHEET N°: 5/9

NEXT

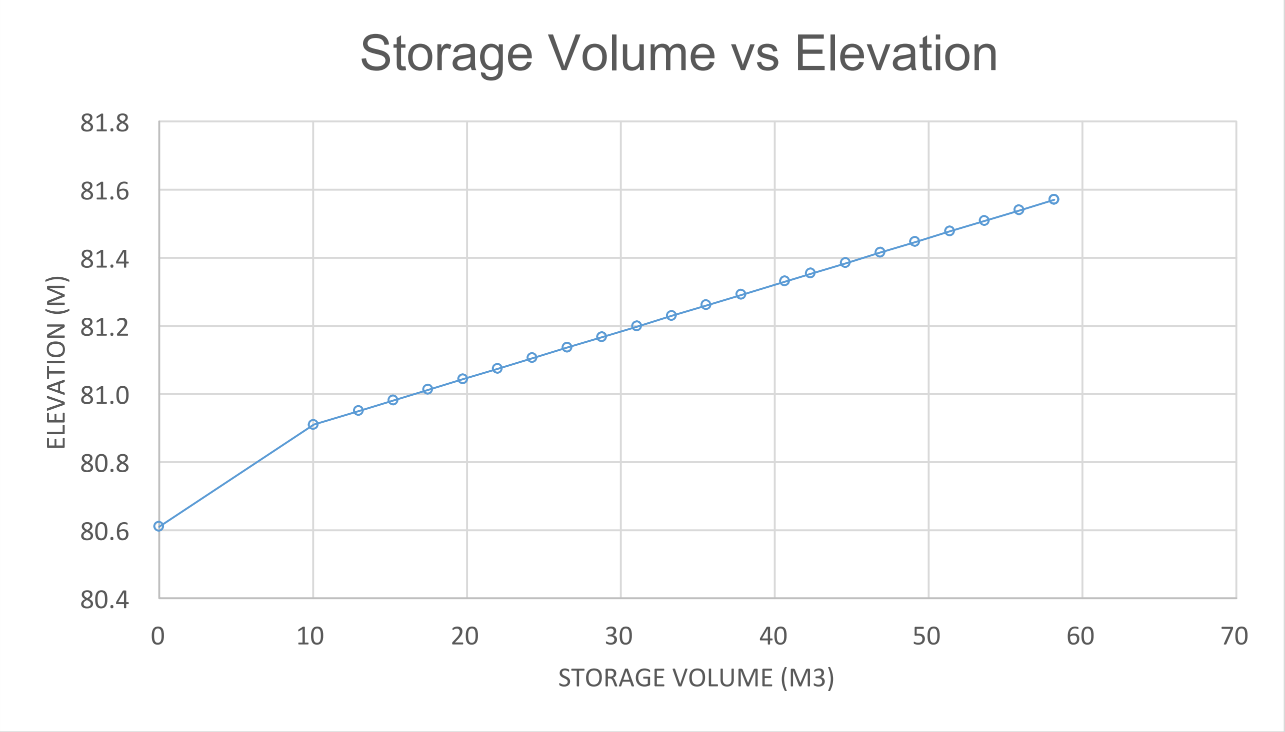
1625, Blvd. Monseigneur-Langlois
Salaberry-de-Valleyfield
J6S 1C2, Québec

SYSTEM CHARACTERISTICS			
Model	EZSTORM™ system B2		
	Number of blocks (unit)	Dimensions / blocks (m)	Dimensions EZStorm (m)
Height	1.0	0.66	0.66
Length	22	0.80	17.60
Width	5	0.80	4.00

EZSTORM area (m2)	70.4
EZSTORM + Clear stone area (m2)	83.7
Total storage volume (m3)	58.2
Invert (m)	80.95
Min finished ground level (m)	82.50

EZSTORM volume (m3)	44.6	Clear stone volume (m3)	13.6
Void in EZSTORM (%)	96%	Void in Clear stone (%)	40%

System height (m)	Storage volume (m3)	Elevation (m)	Notes
0.96	58.17	81.570	Top EZSTORM
0.93	55.91	81.539	
0.90	53.65	81.508	
0.87	51.39	81.477	
0.84	49.13	81.446	
0.81	46.87	81.415	
0.77	44.61	81.384	
0.74	42.35	81.353	
0.72	40.67	81.330	Overflow
0.68	37.83	81.291	
0.65	35.57	81.260	
0.62	33.31	81.229	
0.59	31.05	81.198	
0.56	28.78	81.167	
0.53	26.52	81.136	
0.50	24.26	81.105	
0.46	22.00	81.074	
0.43	19.74	81.043	
0.40	17.48	81.012	
0.37	15.22	80.981	
0.34	12.96	80.950	Invert
0.30	10.05	80.910	Bottom EZSTORM
0.00	0.00	80.610	Bottom clear stone



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VOLUME CALCULATION

BASIN-EZSTORM™ - B2 - 58.17M³

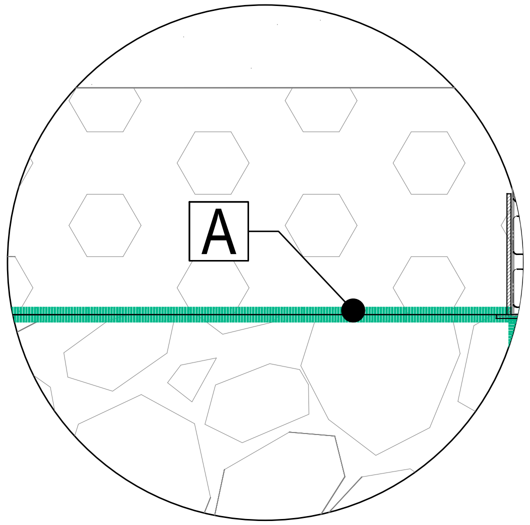
PROJECT NAME:
3210 ALBION ROAD SOUTH,
OTTAWA, ON

PROJECT N°: 260529-05	DATE: 01/06/2026
DRAWN BY: S.M.	CHECKED BY: S.K.
SCALE: SCALE	SHEET N°: 6/9

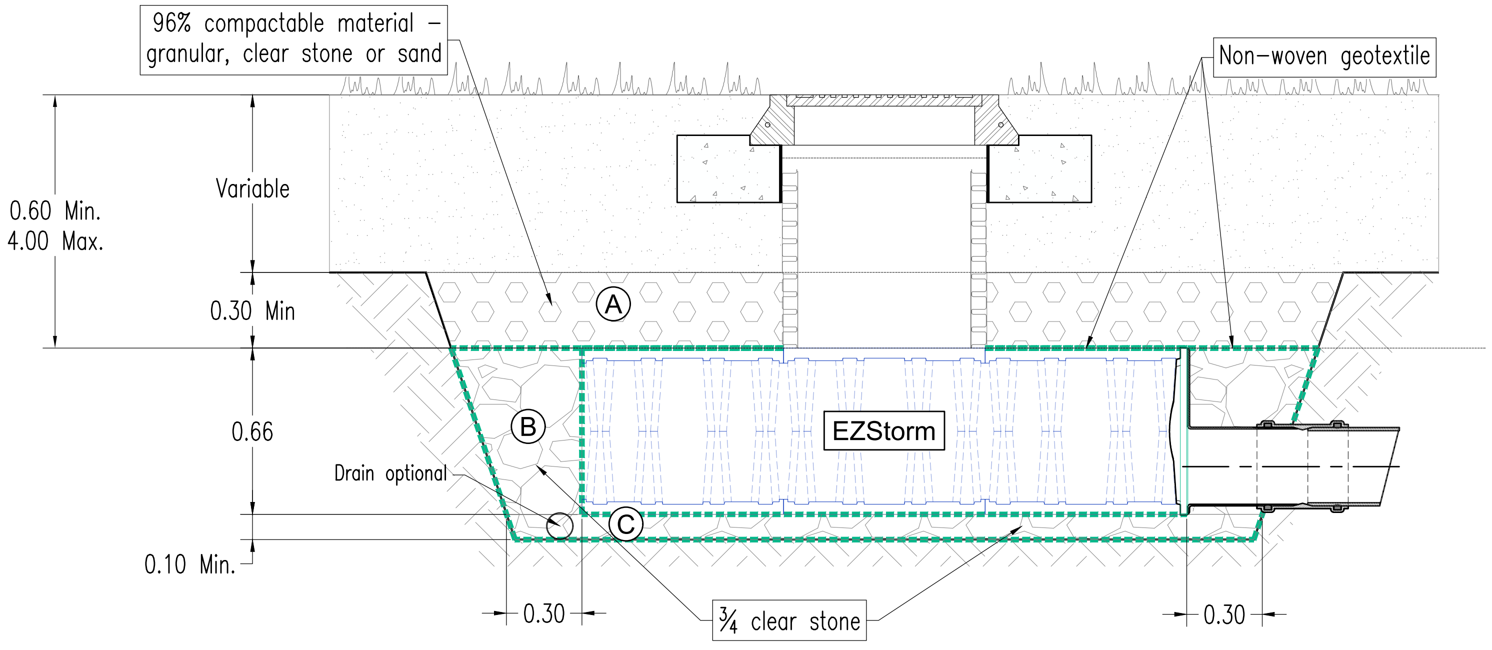
NEXT

1625, Blvd. Monseigneur-Langlois
Salaberry-de-Valleyfield
J6S 1C2, Québec

Traffic−free			
Acceptable backfill materials for this project			
	Layer location	Description	Density requirements
	Backfill located above layer B	Topsoil backfill with a 32mm grain size	No compaction necessary
Ⓐ	Top embankment: Embankment located directly above the EZStorm chambers and below layer A	Backfill with a 20 mm Max. granular material compacted at a rate > 95 % S.P.D. (3/4 (20mm) granular material, clean stone or sand)	The first layer of backfill should be applied using a loader or tracked mini−excavator. When using mini−excavators weighing up to 15 tonnes (chain, 4 wheels, twin tires), a 300 mm layer of backfill should be spread over the retention basin (beware of rutting). Avoid steering maneuvers at this stage of construction.
Ⓑ	Lateral backfill: located between the side faces of the EZStorm chambers and the limits of the excavated volume.	3/4" Clear stone at a 40% void ratio	No compaction needed.
Ⓒ	Laying bed: located under the EZStorm system, between the foundation floor and the base of the system	3/4" Clear stone at a 40% void ratio	No compaction needed.



3
04
DETAIL
SCALE NOT AT SCALE



1
04
TYPICAL SECTION
SCALE 1:30

LEGEND

◎	Inspection Chimney
⊘	Catch basin
▣	Connection−access concrete manhole
⊕	Manhole
– – A.	Geotextile EZ−226.
— B.	Geomembrane EZ−LLDPE−30
−·−	Drain HDPE 150Ø (By others)
▨	Clear Stone with maximum grain size of 20mm at 40% void ratio
▨	MG−20 or MG−112 compacted sand at 90%PM
Ⓐ Ⓑ	Thickness of this layer may vary according to project requirements
Ⓒ	Paving bed

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STANDARD BACKFILL REQUIREMENTS

BASIN-EZSTORM™ - B2 - 58.17M³

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SHEET N°: 7/9

NEXT
1625, Blvd. Monseigneur-Langlois
Salaberry-de-Valleyfield
J6S 1C2, Québec

List of materials

CODE DE L'ARTICLE	DESCRIPTION	B1	B2	Total
EZ-SHD	EZStorm - half block 2 units/block (units)	540	220	760
FL-EZSHD	EZSTORM Sidewall grid (units)	66	54	120
FL-EZSHD 1/2	EZSTORM Sidewall grid for half block (units)	0	0	0
PR-EZSHD	EZSTORM Cover plate	0	0	0
CONNECTEUR EZS-1	EZSTORM Single layer-connector (units)	600	300	900
CONNECTEUR EZS-2	EZSTORM Multi layer-connector (units)	0	0	0
R-P	EZSTORM Pre-treatment row (0.8m / unit)	31	10	41
EZSTORM adapters				
FC-200mm-PVC	EZSTORM Adapter 200 mm PVC (units)	0	1	1
FC-250mm-PVC	EZSTORM Adapter 250 mm PVC (units)	0	0	0
FC-300mm-PVC	EZSTORM Adapter 300 mm PVC (units)	3	2	5
FC-375mm-PVC	EZSTORM Adapter 375 mm PVC (units)	0	0	0
FC-450mm-PVC	EZSTORM Adapter 450 mm PVC (units)	0	0	0
FC-450mm-TBA	EZSTORM Adapter 450 mm PCP (units)	0	0	0
FC-525mm-PVC	EZSTORM Adapter 525 mm PVC (units)	0	0	0
FC-600mm-PEHD	EZSTORM Adapter 600 mm HDPE (units)	0	0	0
Inspection Chimney				
EZSTORM-ACCES	EZSTORM half-elements with opening (units)	0	0	0
PP-EZSTORM	EZSTORM half-elements with positioning plate (units)	1	2	3
PP-EZSTORM 1/2	EZSTORM Cover plate with positioning plate (units)	0	0	0
REHAUSSE-PEHD-600	EZSTORM Extension Pipe - Chimney (units) - Ø 600mm - 1.5 m /unit	1	2	3
Dalle-répartition	EZSTORM Support concrete ring (units)	1	2	3
OPSD401.01ST	Cast iron frame and cover (unit)	1	2	3
OPSD400.02	Catch basin Frame and grates (unités)	0	0	0
Rectangulare concrete inspection manhole 1200mm x 1200mm				
R1212	EZSTORM rectangular inspection concrete manhole	0	0	0
EZ-226	EZSTORM Protection geotextile (226g/m2) - Rolls of 6 m x 100 m	1	1	2
EZ-450	EZSTORM Protection geotextile (450g/m2) -Rolls of 6 m x 50 m	4	0	4
EZ-LLDPE30	LLDPE 30 mils liner - Rolls of 4m x 50m	3	0	3
Clear Stone (by others)				
	Quantity of 20 mm (3/4 in) clear stone required (m3) (by others)	67	34	101

LEGEND

- **ACCESSORIES not included in all projects**
- **Drawings for guidance only. For more details please refer to the DETAILS project plans**

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LIST OF MATERIALS

BASIN-EZSTORM™

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OTTAWA, ON

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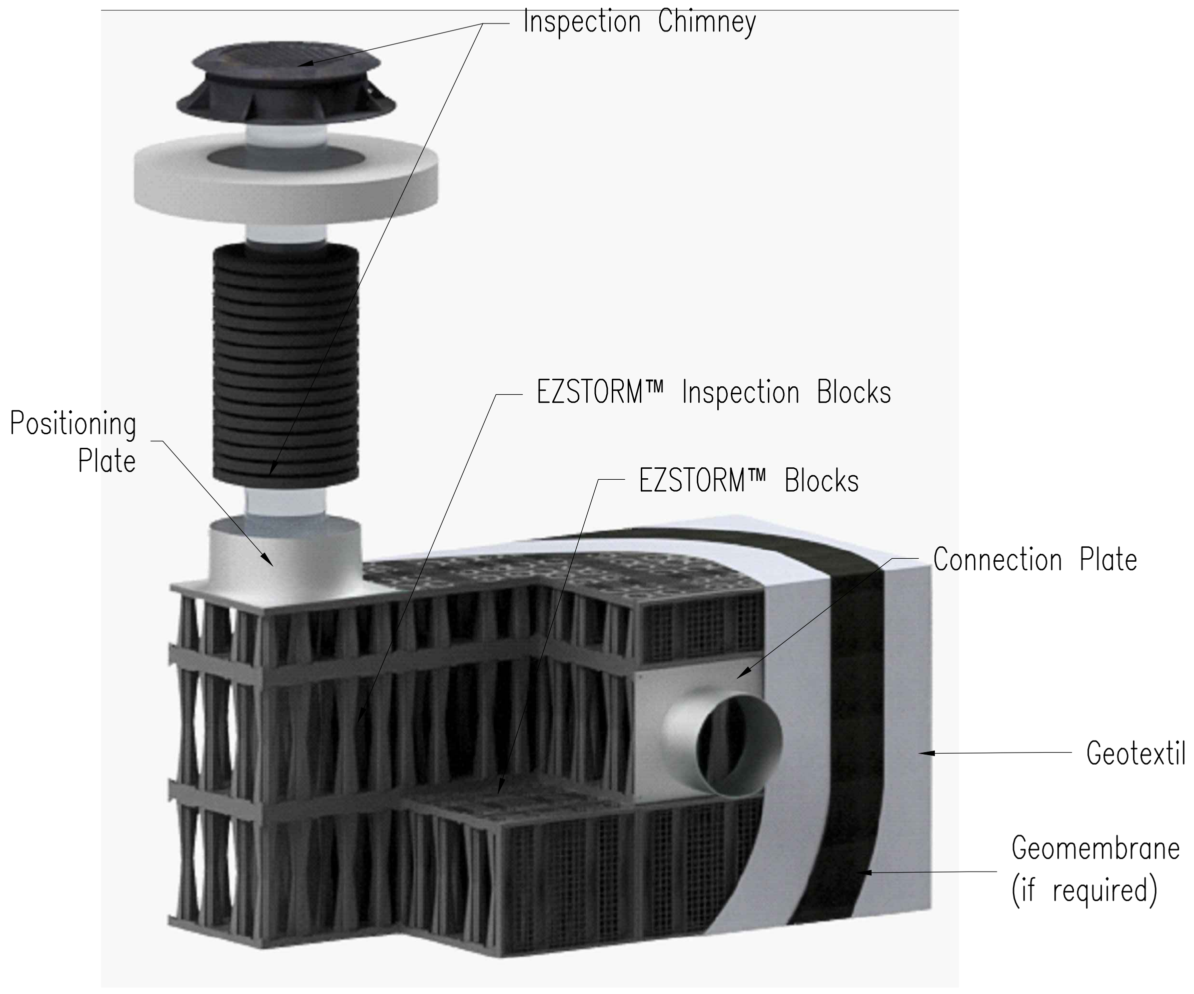
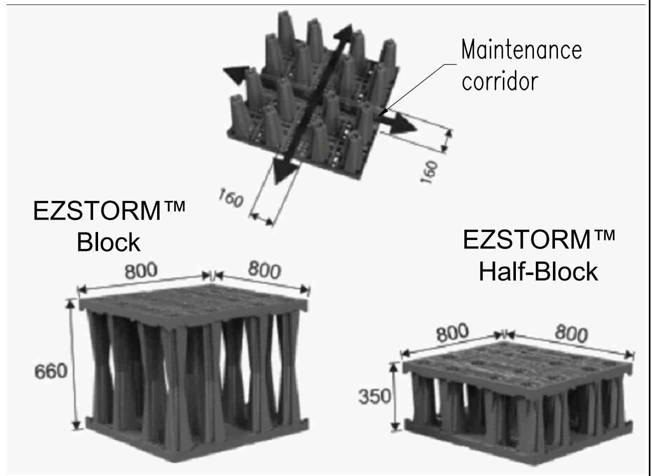
SCALE: SCALE
SHEET N°: 8/9

NEXT

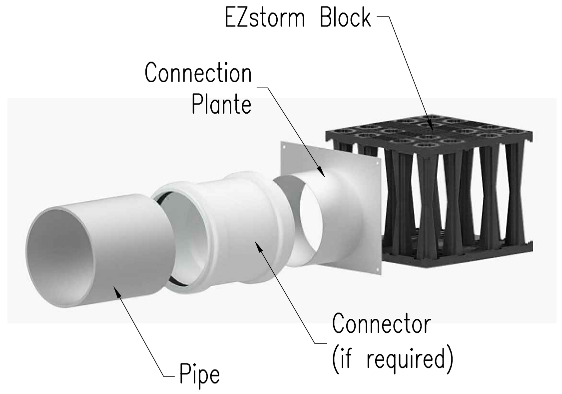
1625, Blvd. Monseigneur-Langlois
Salaberry-de-Valleyfield
J6S 1C2, Québec



1. EZSTORM™ Components and Accessories
(According on each project)



2. EZSTORM™ Block Standard Dimensions



3.Connection Accessories Configuration

LEGEND

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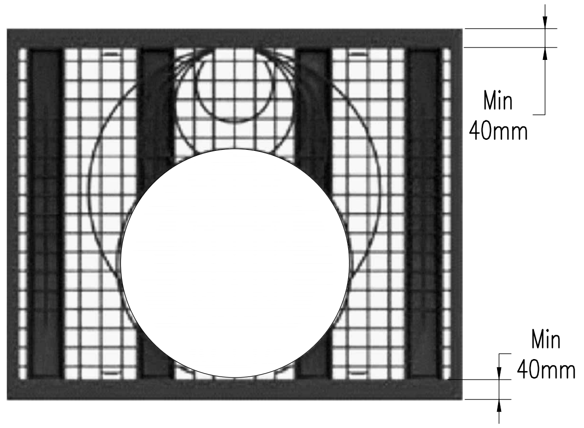
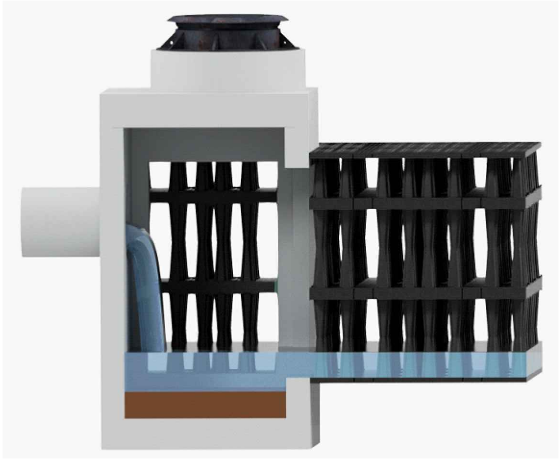
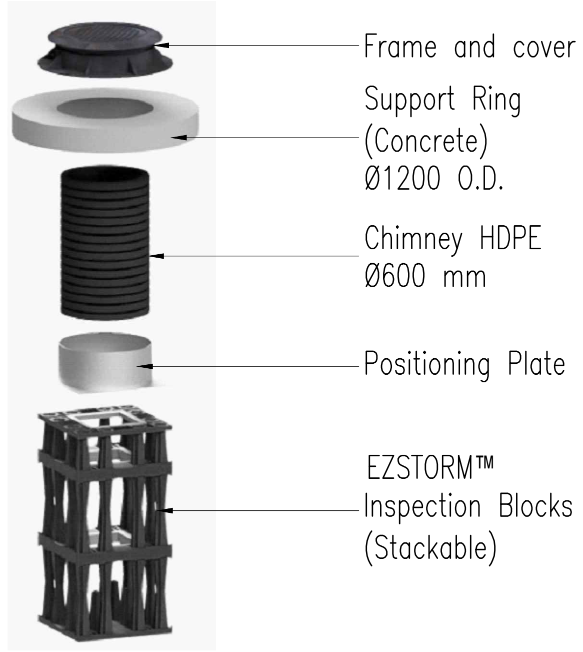


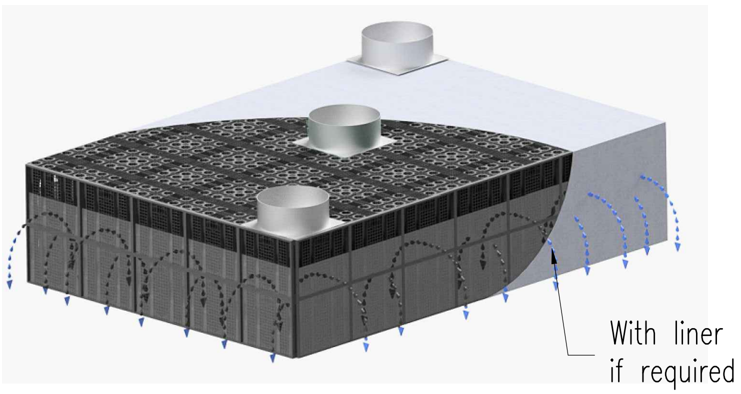
5. sidewall Grid with Connection Opening



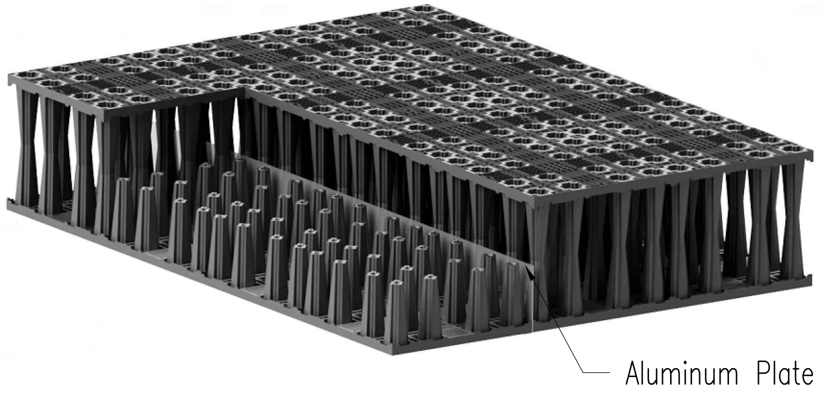
6. Concrete Manhole for Access and Connection (if required)



4. EZSTORM™ Block and Inspection Chimney



7. Infiltration Basin Typical 3D Section View



8. Pretreatment Row (if required)

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ACCESSORIES

BASIN-EZSTORM™

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