1299 RICHMOND ROAD – SERVICING AND STORMWATER MANAGEMENT REPORT

September 4, 2024

Prepared for:
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1.0 Introduction

Stantec Consulting Ltd. has been commissioned by 11034936 Canada Inc. to prepare the following Servicing and Stormwater Management Report in support of a Major Zoning By-law Amendment and Site Plan Control application for the proposed development located at 1299 Richmond Road in the City of Ottawa.

The site is 0.41 ha in area and is situated along the north side of Richmond Road, the south and west sides of Starflower Lane, and the east side of Assaly Road. The site is currently zoned AM10 and consists of an existing commercial strip mall and surface parking lot. The site is bounded by Richmond Road to the south, Starflower Lane to the east and north, and Assaly Road to the west, as shown in **Figure 1-1** below.

Figure 1-1: Key Plan of Site

The proposed development will comprise of a single mixed-use building with a 5-storey podium and two residential high-rise towers. The proposed unit type breakdown is shown in **Table 1.1** below, while the site plan defining the proposed development by Quadrangle Architects Ltd. is included in **Appendix A.1**.

Table 1.1: Unit Type Breakdown

Unit Type	Total
Bachelor	4
One-bedroom	296
One-bedroom with Den	28
Two-bedroom	38
Two-bedroom with Den	202
Three-bedroom	20
Total	**588**
Commercial Space (m^2)	**734**

1.1 Objective

This site servicing and stormwater management (SWM) report presents a servicing scheme that is free of conflicts, provides on-site servicing in accordance with City of Ottawa Design Guidelines, and uses the existing municipal infrastructure in accordance with any limitations communicated during consultation with the City of Ottawa staff. Details of the existing infrastructure located within the Richmond Road, Assaly Road, and Starflower Lane right of ways (ROW) were obtained from available as-built drawings and site topographic survey.

Criteria and constraints provided by the City of Ottawa have been used as a basis for the servicing design of the proposed development. Specific and potential development constraints to be addressed are as follows:

- **Potable Water Servicing**
  - Estimated water demands to characterize the proposed feed(s) for the proposed development which will be serviced from the existing 305 mm diameter watermain within the Richmond Road ROW.
  - Watermain servicing for the development is to be able to provide average day and maximum day (including peak hour) demands (i.e., non-emergency conditions) at pressures within the acceptable range of 345 to 552 kPa (50 to 80 psi)
  - Under fire flow (emergency) conditions, the water distribution system is to maintain a minimum pressure greater than 140 kPa (20 psi)
- **Wastewater (Sanitary) Servicing**
  - Define and size the sanitary service lateral which will be connected to the existing 300 mm diameter sanitary sewer within the Richmond Road ROW.
- **Storm Sewer Servicing**
  - Define major and minor conveyance systems in conjunction with the proposed grading plan.

  - Determine the stormwater management storage requirements to meet the allowable release rate for the site.
  - Define and size the proposed storm service lateral that will be connected to the existing 450 mm diameter municipal storm sewer within the Richmond Road ROW.
- Prepare a grading plan in accordance with the proposed site plan and existing grades.

The accompanying drawings illustrate the proposed internal servicing scheme for the site.

2.0 Background

Documents referenced in preparing of this stormwater and servicing report for the 1299 Richmond Road development include:

- *City of Ottawa Sewer Design Guidelines* (SDG), City of Ottawa, October 2012, including all subsequent technical bulletins
- *City of Ottawa Design Guidelines – Water Distribution*, City of Ottawa, July 2010, including all subsequent technical bulletins
- *Design Guidelines for Drinking Water Systems*, Ministry of the Environment, Conservation, and Parks (MECP), 2008
- *Fire Protection Water Supply Guideline* for Part 3 in the Ontario Building Code, Office of the Fire Marshal (OFM), October 2020
- *Water Supply for Public Fire Protection*, Fire Underwriters Survey (FUS), 2020
- *Geotechnical Investigation, Proposed Multi-Storey Building – 1299 Richmond Road, Ottawa, Ontario,* Patterson Group, April 25, 2023
- *Stormwater Management Guidelines for the Pinecrest Creek/Westboro Area Final Report,* Prepared for Planning and Infrastructure, City of Ottawa by J.F. Sabourin and Associates Inc., May 2019.

3.0 Water Servicing

3.1 Background

The proposed building is in Pressure Zone 1W of the City of Ottawa's Water Distribution System. The existing watermains along the boundaries of the site consists of a 305 mm diameter cast iron watermain within Richmond Road and a 152 mm diameter cast iron watermain within Assaly Road. There are existing fire hydrants on Richmond Road and Assaly Road. The existing strip mall on site is presently serviced by a building service lateral connection to the 305 mm diameter watermain on Richmond Road, which would be removed by City Staff and blanked at the watermain as shown in the Existing Conditions and Removals Plan (see **Drawing EX-1**).

3.2 Water Demands

3.2.1 POTABLE (DOMESTIC) WATER DEMANDS

The City of Ottawa Water Distribution Guidelines (July 2010) and ISTB 2021-03 Technical Bulletin were used to determine water demands based on projected population densities for residential areas and peaking factors. The population was estimated using an occupancy of 1.4 persons per unit for bachelor and one-bedroom apartments, 2.1 persons per unit for one-bedroom apartments with den and two-bedroom apartments, and 3.1 persons per unit for two-bedroom apartments with den and three-bedroom apartments. Based on the unit type breakdown summarized in **Table 1.1**, the proposed development is projected to have a population of around 1249 persons.

A daily rate of 280 L/cap/day has been used to estimate average daily (AVDY) potable water demand for the residential units, and 28,000 L/gross ha/day for the commercial spaces. Maximum day (MXDY) demands were determined by multiplying the AVDY demands by a factor of 2.5 for residential areas and 1.5 for commercial areas. Peak hourly (PKHR) demands were determined by multiplying the MXDY by a factor of 2.2 for residential areas and 1.8 for commercial areas. The estimated demands for each commercial and residential plot are summarized in **Table 3.1** below and detailed in **Appendix B.1**.

Table 3.1: Estimated Water Demands

	Comm. Area (m^2)	Total Apartment Units	Population	AVDY (L/s)	MXDY (L/s)	PKHR (L/s)
Building	734.0	588	1249	4.1	10.2	22.3

3.2.2 FIRE FLOW DEMANDS

Based on the site plan, the fire flow requirement was calculated in accordance with Fire Underwriters Survey (FUS) methodology. Through correspondence with the architect (see **Appendix A.2**), the building

will be constructed out of cast-in-place concrete with non-combustible cladding, sprinklered, and the vertical separations between the floors will be equipped with all the necessary fire separations required by code.

As such, they were estimated based on a building of non-combustible construction type with two-hour fire rated structural members, and full protections of all vertical openings (one hour fire rating), and the final sprinkler design to conform to the NFPA 13 standard. The gross floor area of the largest floor + 25 % of the gross floor area of two additional floors were used in the FUS calculation for the two high-rises, as per Page 22 of the *Fire Underwriters Survey's Water Supply for Public Fire Protection* (2020).

Therefore, the building's required fire flow was determined to be 100.0 L/s (6,000 L/min). Detailed fire flow calculations per the FUS methodology are provided in **Appendix B.2**.

3.3 Level of Servicing

3.3.1 BOUNDARY CONDITIONS

The estimated domestic potable water demands, and fire flow demands, were used to define the level of servicing required for the proposed development from the municipal watermain and hydrants within the Richmond Road ROW. **Table 3.2** outlines the boundary conditions provided by the City of Ottawa on May 18, 2023 (See **Appendix B.3** for correspondence).

Table 3.2: Boundary Conditions

Connection	Richmond Road
Min. HGL (m)	108.3
Max. HGL (m)	115.9
MXDY + FF (100.0 L/s) (m)	109.4

3.3.2 ALLOWABLE DOMESTIC PRESSURES

The desired normal operating pressure range in occupied areas as per the City of Ottawa 2010 Water Distribution Design Guidelines is 345 kPa to 552 kPa (50 psi to 80 psi) under a condition of maximum daily flow and no less than 276 kPa (40 psi) under a condition of maximum hourly demand. Furthermore, the maximum pressure at any point in the water distribution should not exceed 689 kPa (100 psi) as per the Ontario Building/Plumbing Code; pressure reducing measures are required to service areas where pressures greater than 552 kPa (80 psi) are anticipated in occupied areas.

The proposed finished floor elevation at the ground floor of 70.2 m will serve as the ground floor elevation for the calculation of residual pressures at ground level. As per the boundary conditions, the on-site pressures are expected to range from 374.0 kPa to 448.5 kPa (54.2 psi to 65.0 psi) under normal operating conditions, which are within the normal operating pressure range defined by the City of Ottawa design guidelines as within 276 kPa to 552 kPa (40 psi to 80 psi). It is anticipated that booster pumps will be required to service the upper floors of the townhouses and towers.

3.3.3 ALLOWABLE FIRE FLOW PRESSURES

The boundary conditions provided by the City of Ottawa indicate that the 305 mm diameter watermain within Richmond Road is expected to maintain a residual pressure of 39.25 m equivalent to 384.8 kPa (55.8 psi) under the worst-case fire flow conditions. This demonstrates that the watermains and nearby hydrants can provide the required fire flows while maintaining a residual pressure of 20 psi.

3.3.4 FIRE HYDRANT COVERAGE

The building will be sprinklered and a Siamese (fire department) connection is to be provided to the left of the main entrance. There are two fire hydrants in the proximity of the proposed development site, as shown in **Figure 3-1**. The distance of each hydrant from the proposed building is less than 115 m.

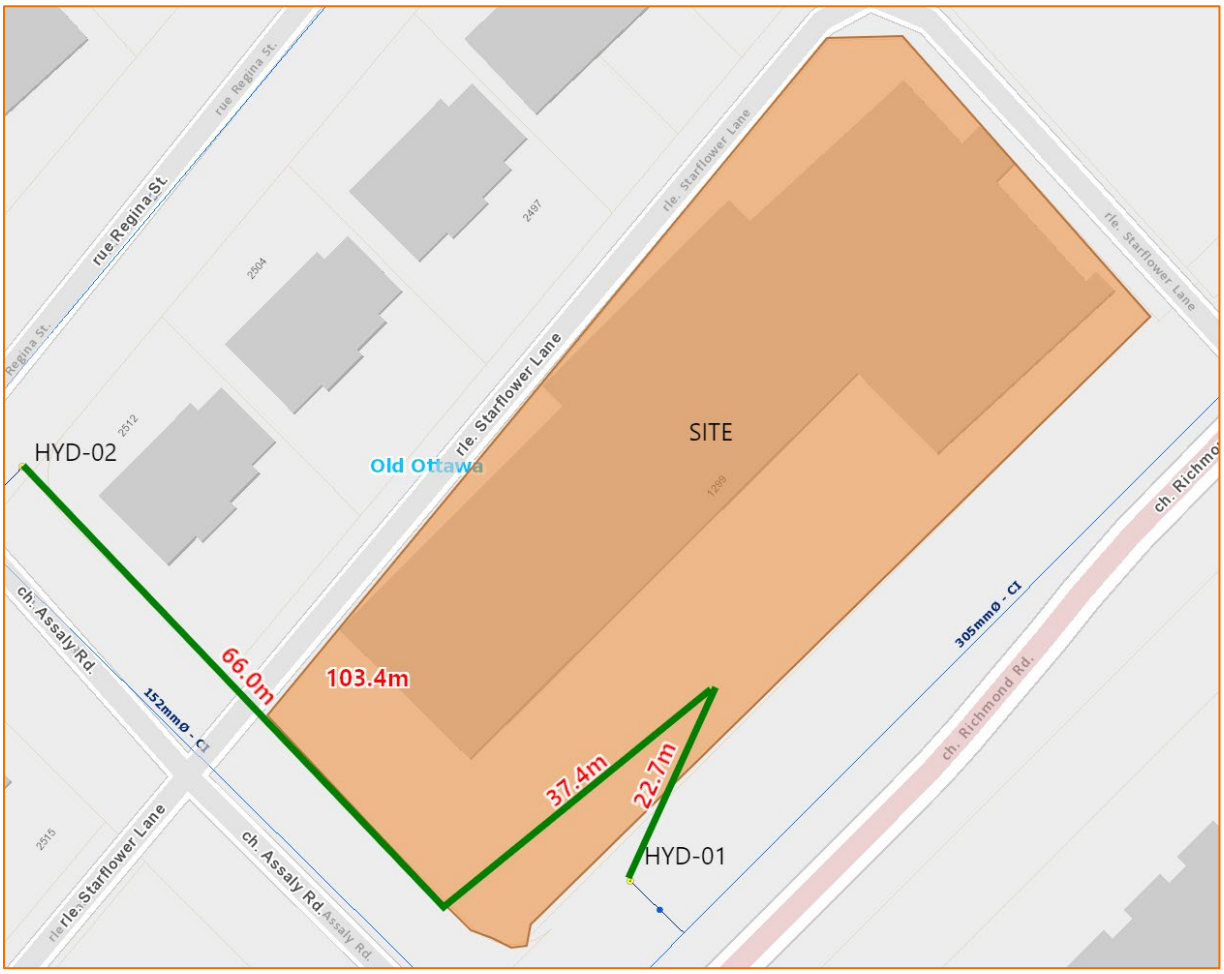

Figure 3-1: Fire Hydrant Coverage Sketch

According to the NFPA 1 Table 18.5.4.3 and as referenced in Technical Bulletin ISTB-2018-02 by the City of Ottawa, a hydrant situated less than 76 m away from a building can supply a maximum capacity of 5,678

L/min while a hydrant situated 76 m to 152 m away from a building can supply a fire flow of 3,785 L/min. Hence, the required fire flow for this site (6,000 L/min) can be achieved with the two hydrants. See **Appendix B.4** for fire hydrant coverage table calculations and NFPA 1 Table 18.5.4.3.

As per Section 3.2.5.16 of the Ontario Building Code, the distance between the fire department connection and hydrant must be unobstructed and cannot be more than 45 m. As such, the site will be primarily served by HYD-02, which can provide the adequate fire flows from an unobstructed distance less than 45 m to the fire department connection and meet the OBC requirements.

3.4 Proposed Water Servicing

The development will be serviced by two 200 mm building service connections to the 305 mm diameter watermain on Richmond Road. The sizing of the service connections is to be confirmed by the mechanical consultant. The proposed water servicing is shown on **Drawing SSP-1**. Based on the City of Ottawa Water Design Guidelines, the 305 mm diameter watermain on Richmond Road can provide adequate fire and domestic flows for the subject site.

Thermal insulation is required on the water service laterals in the connection to the watermain on Richmond Road, as there is less than 2.4 m cover provided per W22. Booster pumps are required for the towers. The mechanical consultant or plumbing contractor will ultimately be responsible to confirm building pressures are adequate to meet building code requirements.

4.0 Wastewater Servicing

The site will be serviced from the existing 300 mm diameter concrete sanitary sewer on Richmond Road. The existing strip mall on site is presently serviced by a sanitary service lateral connected to the existing 300 mm diameter sanitary sewer. The lateral and manholes will be decommissioned, capped, and abandoned at the property line per City Standard S11.4, as shown in Existing Conditions and Removals Plan (see **Drawing EX-1**).

4.1 Design Criteria

As outlined in the City of Ottawa Sewer Design Guidelines and the MECP Design Guidelines for Sewage Works, the following criteria were used to calculate the estimated wastewater flow rates and to determine the size and location of the sanitary service lateral:

- Minimum velocity = 0.6 m/s (0.8 m/s for upstream sections)
- Maximum velocity = 3.0 m/s
- Manning roughness coefficient for all smooth wall pipes = 0.013
- Minimum size of sanitary sewer service = 135 mm
- Minimum grade of sanitary sewer service = 1.0 % (2.0 % preferred)
- Average wastewater generation = 280 L/person/day (per City Design Guidelines)
- Peak Factor = based on Harmon Equation; maximum of 4.0 (residential)
- Harmon correction factor = 0.8
- Infiltration allowance = 0.33 L/s/ha (per City Design Guidelines)
- Minimum cover for sewer service connections – 2.0 m
- Population density for bachelor and one-bedroom apartments – 1.4 persons/apartment
- Population density for one-bedroom with den and two-bedroom apartments – 2.1 persons/apartment
- Population density for two-bedroom with den and three-bedroom apartments – 3.1 persons/apartment
- Average commercial wastewater generation – 28,000 L/ha/day of building space

4.2 Wastewater Generation and Servicing Design

A sanitary sewer design sheet was prepared and is included in **Appendix C.1.** The estimated wastewater peak flows to be generated are based on the current site plan and unit mix as summarized in **Table 1.1** and are summarized in **Table 4.1** below.

Table 4.1: Estimated Total Wastewater Peak Flow

Residential Units				Commercial Areas			Infiltration Flow (L/s)	Total Peak Flow (L/s)
Building	Population	Peak Factor	Peak Flow (L/s)	Area (ha)	Peak Factor	Peak Flow (L/s)		
A	646	3.33	7.0	0.02	1.5	0.01	0.07	7.1
B	603	3.34	6.5	0.05	1.5	0.02	0.07	6.6
Total Estimated Wastewater Peak Flow (L/s):								**13.7**

1. Design residential flow based on 280 L/p/day and design commercial flow based on 28,000 L/ha/day.
2. Peak factor for residential units calculated using Harmon's formula and taken as 1.50 for commercial areas.
3. Residential population estimated based on 1.4 persons/unit for bachelor and one-bedroom apartments, 2.1 persons/unit for one-bedroom units with dens and two-bedroom units, and 3.1 persons/unit for two-bedroom units with dens and three-bedroom units.
4. Infiltration design flow equals 0.33 L/s/ha.

Design of internal plumbing and associated mechanical systems for the buildings on site is to be completed by the buildings' mechanical engineer. A backflow preventer will be required for the proposed building in accordance with the City of Ottawa Sewer Design Guidelines. This requirement will be coordinated with the building's mechanical engineer.

The anticipated peak wastewater flows for the proposed development were provided to the City of Ottawa staff to conduct a capacity analysis of the sanitary sewer system in the vicinity of the site and downstream system. The City has confirmed that they have no concerns with the proposed peak flow, as shown in the correspondence in **Appendix C.2**.

4.3 Proposed Sanitary Servicing

Two 300 mm diameter sanitary building services, one for each tower and complete with full port backwater valve as per City standard S14.1, are recommended to service the proposed development. The sanitary laterals are each to be equipped with a sanitary monitor manhole, anchored as per S.P. No. F-4070, before connecting to the sewer main with a riser pipe as per City standard S11.1. The proposed sanitary servicing is shown on **Drawing SSP-1** and **Drawing SA-1**.

Existing connections are to be abandoned and full port backwater valves installed on the proposed sanitary service within the site to prevent any surcharge from the downstream sewer main from impacting the proposed property. A sump pump will be required for sewage discharge from the mechanical room. Sizing of the service lateral, sump pit, and sump pump are to be confirmed by the mechanical consultant.

5.0 Stormwater Management and Servicing

5.1 Objectives

The goal of this stormwater servicing and stormwater management (SWM) plan is to determine the measures necessary to control the quantity and quality of stormwater released from the proposed development to meet the criteria established during the consultation process with City of Ottawa staff, and to provide sufficient details required for approval.

5.2 Stormwater Management (SWM) Criteria

The Stormwater Management (SWM) criteria were established by combining current design practices outlined by the City of Ottawa Sewer Design Guidelines (SDG) (October 2012), review of project pre-consultation notes with the City of Ottawa, and through consultation with City of Ottawa staff and SWM Guidelines for the Pinecrest Creek/Westboro Area (PWSG). The following summarizes the criteria, with the source of each criterion indicated in brackets:

General

- Use of the dual drainage principle (City of Ottawa SDG)
- Wherever feasible and practical, site-level measures should be used to reduce and control the volume and rate of runoff (City of Ottawa SDG)
- Assess impact of 100-year event outlined in the City of Ottawa Sewer Design Guidelines on the major and minor drainage systems (City of Ottawa SDG)

Storm Sewer & Inlet Controls

- Discharge for each storm event to be restricted to a 2-year storm event pre-development rate with a maximum pre-development C coefficient of 0.5 (PWSG, **Appendix E**, and City of Ottawa pre-consultation)
- Peak flows generated from events greater than the 2-year and including the 100-year storm must be detained on site (PWSG, **Appendix E**, and City of Ottawa pre-consultation)
- The preferred stormwater system outlet for this site is the 450 mm diameter storm sewer within the Richmond Road ROW. (City of Ottawa pre-consultation)
- The foundation drainage system is to be independently connected to sewer main unless being pumped with appropriate back up power, sufficient sized pump, and backflow prevention. (City of Ottawa pre-consultation)
- T_c should be not less than 10 minutes since IDF curves become unrealistic at less than 10 min (PWSG, **Appendix E**, and City of Ottawa SDG).

Surface Storage & Overland Flow

- Building openings to be a minimum of 0.30 m above the 100-year water level (City of Ottawa SDG)

- Maximum depth of flow under either static or dynamic conditions shall be less than 0.30 m (City of Ottawa SDG)
- Provide adequate emergency overflow conveyance off-site with a minimum vertical clearance of 15 cm between the spill elevation and the ground elevation at the building envelope in the proximity of the flow route or ponding area (City of Ottawa SDG)

Quality Control

- Site must provide quality control measures that meet 80 % TSS Removal (PWSG, **Appendix E**)

5.3 Existing Conditions

The existing site (0.41 ha) is dominated by roofs and asphalt pavement with only around 131.9 m^2 in soft area, as such the overall site pre-development runoff coefficient was established to be C=0.88, in which the hard surface areas use a coefficient of 0.90 while soft surface areas have a coefficient of 0.20. This exceeds the maximum permissible pre-development runoff coefficient of C=0.5 identified in the City of Ottawa pre-consultation for this site. Therefore, the pre-development runoff coefficient of 0.5 was used for the site analysis.

The pre-development release rates for the site have been determined using the rational method and the drainage characteristics identified above. A time of concentration for the pre-development area (10 minutes) was assigned based on the relatively small area, and its proximity to the stormwater outfall. The peak pre-development flow rates shown in **Table 5.1** have been calculated using the rational method as follows:

$$Q = 2.78\,(C)(I)(A)$$

Where:
$Q = peak\ flow\ rate, L/s$
$C = site\ runoff\ coefficient$
$I = rainfall\ intensity, mm/hr\ (per\ City\ of\ Ottawa\ IDF\ curves)$
$A = drainage\ area, ha$

Table 5.1: Peak Pre-Development Flow Rates

Design Storm	Pre-Development Flow Rate (L/s) for C=0.5, A=0.41 ha, t_c = 10 min
2-year	**44.2**
100-year	**102.8**

5.4 Stormwater Management Design

The site will be serviced by the 450 mm diameter storm sewers in Richmond Road. The site has been subdivided into catchment areas to effectively collect, store, and convey runoff at flowrates not exceeding

the target release rate established by consultation with the City of Ottawa (refer to **Drawing SD-1** for drainage areas).

A stormwater cistern located in the underground parking area is proposed to attenuate peak flows from the rooftop areas from the towers and the common areas. Area drains will convey stormwater runoff from the surface to the stormwater cistern via the internal plumbing of the buildings. The stormwater cistern will be pumped at controlled rates to monitor manholes which outlets to the 450 mm diameter storm sewer on Richmond Road via a 300 mm diameter lateral. The stormwater cistern's location will be coordinated by building's architect in conjunction with mechanical and structural engineers.

Footing drainage will be independent of the internal stormwater cistern quantity control system while sharing the same outlet. The mechanical design for the weeping tile system will include dedicated storm pits and duplex pumps to pump the weeping tile drainage to the storm main downstream of the cistern.

The proposed site plan, drainage areas and proposed storm sewer infrastructure are shown on **Drawing SD-1** and **SSP-1**.

5.4.1 ALLOWABLE RELEASE RATE

Based on consultation with City of Ottawa staff, the peak post-development discharge from the subject site must be limited to the discharge resulting from the 2-year storm event due to capacity restrictions of the downstream municipal stormwater infrastructure. As per **Section 5.3**, the maximum pre-development runoff coefficient of C=0.5 was utilized for the site. C coefficient values have been increased by 25 % for the post-development 100-year storm event based on the MTO Drainage Manual recommendations.

The pre-development 2-year release rate for the site, as determined in **Table 5.1**, was calculated using the rational method to be 44.2 L/s. Consequently, the target release rate for the site under all events up to and including the 100-year event will be 44.2 L/s, as shown in **Table 5.2** below.

Table 5.2: Target Release Rate

Design Storm	**Target Flow Rate (L/s)**
All Events	44.2

5.4.2 QUANTITY CONTROL: STORAGE REQUIREMENTS

The Modified Rational Method (MRM) was used to assess the flow rate and volume of runoff generated under post-development conditions. The site was subdivided into sub-catchments tributary to separate quantity control measures and subject to different inlet controls. **Drawing SD-1** shows the delineated sub-catchment areas. The MRM spreadsheet is included in **Appendix D.1** and the Storm Sewer Design Sheet is included in **Appendix D.2**.

The following assumptions were made in the creation of the storm drainage plan and accompanying MRM spreadsheet:

- Excess run-off that cannot be captured as surface storage due to grading constraints is to sheet flow uncontrolled to the adjacent roadways (areas UNC-1, UNC-2, UNC-3, and UNC-4).
- No rooftop storage is proposed, the roof drains discharge uncontrolled into the cistern.
- Stormwater cistern equipped with mechanical pump to attenuate peak flows from the cistern will be used to manage stormwater flows from the site.

5.4.2.1 Uncontrolled Areas

Uncontrolled areas represent drainage areas that cannot be graded to enter the storm sewer system and are not captured by the proposed storm cistern. As such, they will sheet drain off the site to the adjacent roadways (see **Drawing SD-1**).

Table 5.3: Peak Uncontrolled 2- and 100-Year run-off

Area ID	2-Year (L/s)	100-Year (L/s)
UNC-1	4.8	12.4
UNC-2	1.4	3.7
UNC-3	3.4	8.9
UNC-4	4.5	11.6
Total	**14.1**	**36.6**

Given the imperviousness of the full site, the total uncontrolled drainage generated in the 100-year event, at around 36.6 L/s, leaves minimal room for controlled discharge from the on-site storage to meet the 44.2 L/s target release rate. As the development will see a reduction of controlled discharge from the site to the Richmond and Assaly Roads ROWs, the City has confirmed that the post-development drainage to the two roads from areas UNC-1 and UNC-2 can be disregarded from the target release rate, as shown in correspondence attached in **Appendix D.3**, while **Table 5.4** below compares the pre- and post-development uncontrolled discharges to Richmond and Assaly Roads.

Table 5.4: Uncontrolled Discharge to Richmond and Assaly Roads comparison

	Area (ha)	2-year Discharge (L/s)	100-Year Discharge (L/s)
Pre-Development	0.16	30.3	70.4
Post-Development	0.03	6.2	16.1
Difference (Post minus Pre)	**-0.13 (-81.2 %)**	**-24.1 (-79.5 %)**	**-54.3 (-77.1 %)**

5.4.2.2 Stormwater Cistern

As part of the stormwater management design of the site development, a stormwater cistern located in the underground parking area and equipped with mechanical pumps is proposed to attenuate peak flows from

drainage areas CIST 1-1 to CIST 1-5. The final location of the cistern within the proposed building is to be coordinated by the architect with mechanical and structural engineers.

The cistern is to be designed to provide a minimum active storage volume of 120 m^3 with a maximum controlled release rate of 23.7 L/s. The stormwater cistern is to discharge at the specified controlled release rate using a pump.

Table 5.5 summarizes the respective flow rates and volume of retained stormwater in the 2-year and 100-year storm events.

Table 5.5: Proposed Cistern 2 and 100-Year Storage Requirement

Storm Return Period	Area IDs	Drainage Area (ha)	$Q_{release}$ (L/s)	$V_{required}$ (m^3)	$V_{available}$ (m^3)
2-year	CIST 1-1 to CIST 1-5	0.34	23.7	25.0	120.00
100-year				113.8	

5.4.2.3 Results

The proposed stormwater management plan provides adequate attenuation to meet the target release rate for the 2 and 100-year storm events as shown in **Table 5.6** below.

Table 5.6: Estimated Post-Development Discharge

Area Type	2-Year (L/s)	100-Year (L/s)	Target (L/s)
Uncontrolled to Richmond and Assaly	6.2	16.1	44.2
Uncontrolled to Starflower	7.9	20.5	
Controlled Areas	23.7		
Total Flow to Sewer	**44.2**		

5.4.3 QUALITY CONTROL

As per the Pinecrest Creek/Westboro Stormwater Design Guidelines, the site will be required to provide Enhanced level of quality control (80 % TSS Removal). Correspondence with the RVCA regarding the quality control requirements for the site can be found in **Appendix D.4**, however, further correspondence in addition to the pre-consultation notes provided will be required to determine if any further quality control measures should be implemented.

To meet the quality control requirement, storm runoff from the surface areas of the development will be captured into the site storm sewer system and directed to the proposed oil/grit separator unit. It should be noted that the SWM design criteria for the Pinecrest Creek/Westboro Study Area states the requirement to infiltrate the first 10 mm of rainfall, which will not be feasible based on the proposed buildings and underground parking layout. Best management practices are to be employed and the quality control

provided by the OGS unit is a substantial improvement from existing conditions. Quality control design criteria excerpts have been provided in **Appendix D.4**.

The Stormceptor sizing software has been used to size the required unit to provide up to 90% TSS removal as shown in the Stormceptor sizing design sheet and standard detail included in **Appendix D.5.**

A Stormceptor EF 04 or an approved equivalent designed to provide up to > 80% TSS removal has been proposed to collect and treat storm runoff from the site before discharging into the existing 450 mm diameter storm sewer in Richmond Road as shown on **Drawing SSP-1.**

5.5 Proposed Stormwater Servicing

A single 300 mm diameter stormwater building service, complete with full port backwater valve as per City standard S14.1, is proposed for the storm service discharge, as per **Drawing SSP-1** and **Drawing SD-1**. A stormwater sump and pump are required for the proposed foundation drain, and the roof drains are to be connected to the cistern.

The combined foundation drain, roof drain, and subdrain flows will outlet to the cistern, which then pumps the discharge at a controlled rate and to the existing 450 mm diameter storm sewer within the Richmond Road ROW. The lateral is to connect to the main as per City standard S11.1 via monitoring manholes. The proposed stormwater servicing is shown on **Drawing SSP-1** and **SD-1**.

6.0 Site Grading

The proposed re-development site measures approximately 0.41 ha in area and consists of an existing commercial strip mall and asphalt parking area, with very small patches of grassland. The topography across the site generally slopes from the middle, close to the east, towards the Assaly Road ROW at the west and the Starflower Lane ROW at the east.

A detailed grading plan (see **Drawing GP-1**) has been provided to satisfy the stormwater management requirements, as detailed in **Section 5.0**, adhere to any grade raise restrictions for the site, and provide for minimum cover requirements for storm and sanitary sewers where possible. Site grading has been established to provide emergency overland flow routes required for stormwater management.

The proposed grading plan provides an adequate overland flow route and maintains the existing drainage conditions for the perimeter locations adjacent to the public right of way. No retaining walls are required for the proposed development. As identified on the grading plan, various depressed curbs and associated sidewalks will be removed and replaced with full height barrier curbs and sidewalks in accordance with Ottawa standards.

7.0 Utilities

Overhead (OH) hydro-wires run east-west on the north side of Starflower Lane and the east side of Assaly Road, terminating at a utility pole located at the northwest corner of the site. An existing underground hydro duct bank runs east-west within Richmond Road along the south property line of the site. The existing utility poles and duct banks within the public right of way are to be protected during construction.

As the site is surrounded by existing residential and commercial development, Hydro Ottawa, Bell, Rogers, and Enbridge servicing is readily available through existing infrastructure to service this site. The exact size, location, and routing of utilities will be finalized after design circulation. Existing overhead wires and utility plants may need to be temporarily moved/reconfigured to allow sufficient clearance for the movement of heavy machinery required for construction. The relocation of existing utilities will be coordinated with the individual utility providers upon design circulation.

8.0 Approvals

The proposed development lies on a private site under singular ownership; therefore, the site will not require an Environmental Compliance Approval (ECA) from the Ministry of the Environment, Conservation and Parks (MECP) under O.Reg. 525/98.

For ground or surface water volumes being pumped during the construction phase, typically between 50,000 to 400,000 L/day, it is required to register on the Environmental Activity and Sector Registry (EASR). It is possible that groundwater may be encountered during the foundation excavation on this site. A minimum of two to four weeks should be allotted for completion of the EASR registration and the preparation of the Water Taking and Discharge Plan by a Qualified Person as stipulated under O.Reg. 63/16. An MECP Permit to Take Water (PTTW), which is required for dewatering volumes exceeding 400,000L/day, is not anticipated for the site.

9.0 Erosion and Sediment Control During Construction

To protect downstream water quality and prevent sediment build-up in catch basins and storm sewers, erosion and sediment control measures must be implemented during construction. The following recommendations will be included in the contract documents and communicated to the Contractor.

1. Implement best management practices to provide appropriate protection of the existing and proposed drainage system and the receiving water course(s).
2. Limit the extent of the exposed soils at any given time.
3. Re-vegetate exposed areas as soon as possible.
4. Minimize the area to be cleared and grubbed.
5. Protect exposed slopes with geotextiles, geogrid, or synthetic mulches.
6. Install silt barriers/fencing around the perimeter of the site as indicated in **Drawing ECDS-1** to prevent the migration of sediment offsite.
7. Install trackout control mats (mud mats) at the entrance/egress to prevent migration of sediment into the public ROW.
8. Provide sediment traps and basins during dewatering works.
9. Install sediment traps (such as SiltSack® by Terrafix) between catch basins and frames.
10. Schedule the construction works at times which avoid flooding due to seasonal rains.

The Contractor will also be required to complete inspections and guarantee the proper performance of their erosion and sediment control measures at least after every rainfall. The inspections are to include:

- Verification that water is not flowing under silt barriers.
- Cleaning and changing the sediment traps placed on catch basins.

Refer to **Drawing ECDS-1** for the proposed location of silt fences, sediment traps, and other erosion control measures.

10.0 Geotechnical Investigation

A geotechnical investigation report was prepared by Paterson Group on April 25, 2023 to provide an assessment of the subsurface conditions found at the site. Five (5) boreholes were advanced on site, in which two were advanced to a maximum depth of 13.2 metres below the existing ground surface (BGS), and the remainder to a maximum depth of 16.5 metres BGS in the investigation carried out from March 13 to March 15, 2023. The information obtained from the field investigation will guide the detailed design of the site and identify development constraints.

The subsurface profile encountered are characterized primarily by a layer of topsoil, concrete or asphaltic concrete underlain by brown sandy silt and crushed stone with silty sand fill, some clay, traces of gravel and organics. Brown silty clay and some sand and gravel were also observed underlying the crushed stone.

The bedrock generally consists of excellent grey quartz sandstone of the Ottawa formation at depths ranging from 12 m to 14 m. Groundwater levels are expected to be 4.5 metres to 6.0 metres below the existing ground surface, though as groundwater levels are subject to seasonal fluctuations, they could vary at the time of construction.

Based on Paterson's recommendations, the site is suitable for the proposed development. It is expected that the building be founded on the bedrock. Alternatively, a near vertical, zero entry trench be excavated to the surface of the bedrock will be filled with lean concrete for the footings to avoid excavating the entire building footprint to the bedrock level. A total of five foundation options are presented.

The recommended rigid pavement structure is further presented in **Table 10.1** below.

Table 10.1: Recommended Pavement Structure

Material	Light Vehicle Parking	Access Lanes, Local Roadways and Heavy Vehicle Parking
Wear Course – Superpave 12.5-FC2 Asphaltic Concrete	40 mm	
Binder Course –Superpave 19.0 Asphaltic Concrete	50 mm	
BASE – OPSS Granular A Crushed Stone	150 mm	
SUBBASE – OPSS Granular B Type II	300 mm	400 mm

Refer to the full geotechnical report part of the submission package for further details.

11.0 Conclusions

11.1 Water Servicing

Based on the supplied boundary conditions for existing watermains and calculated domestic and fire flow demands for the subject site, the adjacent watermain on Richmond Road has sufficient capacity to sustain both the required domestic and emergency fire flow demands for the development. The proposed development will be serviced by two 150 mm diameter water service laterals to connect to the 305 mm diameter watermain on Richmond Road. Booster pumps will be required to provide adequate pressure to the towers' upper stories. Sizing of the water service and requirements for booster pump(s) are to be confirmed by the mechanical consultant.

11.2 Sanitary Servicing

The proposed sanitary sewer service will consist of two 300 mm diameter sanitary service laterals, one for each two and each equipped with a sanitary sump pit, a monitor manhole, and sump pump directing wastewater to the existing 250 mm diameter sanitary sewer on Richmond Road. Existing connections are to be abandoned and full port backwater valves installed on the proposed sanitary services within the site to prevent any surcharge from the downstream sewer main from impacting the proposed property. Sump pumps will be required for sewage discharge from the mechanical room. Sizing of the service laterals, sump pits, and sump pumps are to be confirmed by the mechanical consultant.

11.3 Stormwater Servicing and Management

A cistern in the underground parking has been proposed to limit the stormwater discharge rate for all rainfall events up to and including the 100-year event to a peak 2-year predevelopment release rate. The remaining site area drains uncontrolled to the adjacent surrounding ROWs as per existing conditions.

A 300 mm diameter storm service lateral is proposed for the building's foundation drain and internal storm sewer system, which is to be mechanically pumped and include a full port backwater valve. The roof drains and ramp drain are to be connected through internal plumbing to the cistern, which will pump discharge at a controlled rate through the service lateral and the backwater valve to the 450 mm diameter municipal storm sewer in the Richmond Road ROW. Sizing of the service lateral, cistern, and foundation drain pump are to be confirmed by the mechanical consultant. A Stormceptor EF 04 or an approved equivalent designed to provide up to > 80% TSS removal has been proposed to collect and treat storm runoff from the site before discharging into the existing 450 mm diameter storm sewer in Richmond Road.

11.4 Grading

Site grading has been designed to provide an adequate emergency overland flow route and respect the existing grades at the property lines. The northeast, east, west, and south sides will continue to drain as per existing conditions.

11.5 Erosion and Sediment Control During Construction

Erosion and sediment control measures and best management practices outlined in this report and included in the drawing set, will be implemented during construction to reduce the impact on adjacent properties, the public ROW, and existing facilities.

11.6 Geotechnical Investigation

Based on the geotechnical investigation, the site is considered suitable for the proposed building. It is expected that the building be founded on the bedrock. Alternatively, a near vertical, zero entry trench be excavated to the surface of the bedrock will be filled with lean concrete for the footings to avoid excavating the entire building footprint to the bedrock level. The report did not identify any grade-rise restrictions for the site.

11.7 Utilities

The site is situated within an established neighbourhood, hence existing utility infrastructure is readily available to service the proposed development. Overhead lines within the Starflower Lane and Assaly Road ROWs will need to be protected and accommodated during construction. Utility infrastructure exists within overhead lines running parallel to the north and west sides of the property, and underground hydro duct bank within the Richmond Road ROW. It is anticipated that existing infrastructure will be sufficient to provide a means of distribution for the proposed site. Exact size, location and routing of utilities will be finalized after design circulation.

11.8 Approvals

This site will not be subjected to the Ministry of the Environment, Conservation and Parks (MECP) Environmental Compliance Approval (ECA) process under O.Reg. 525/98. For the expected dewatering needs of 50,000 to 400,000 L/day, the proponent will need to register on the MECP's Environmental Activity and Sector Registry (EASR). A Permit to Take Water, for dewatering needs in excess of 400,000 L/day, is not anticipated for this site.

APPENDICES

Appendix A Background Documents

A.1 Site Plan

1 A102.S SITE PLAN

Date	No.	Description

REVISION RECORD

2023-06-01	Zoning By-Law Amendment & Site Plan Approval

ISSUE RECORD

BDP. Quadrangle

Quadrangle Architects Limited
The Well, 8 Spadina Avenue, Suite 2100, Toronto, ON M5V 0S8
t 416 598 1240 www.bdpquadrangle.com

1299 Richmond Road, Ottawa

for
Brigil

PROJECT	SCALE	DRAWN	REVIEWED
22026	1:100	BS,GZ	RL

Site Plan

A102.S

2024-08-02 5:24:22 PM

C:\Users\BS45384\Documents\BDPQ_SITE_22026_1299 Richmond Road_R2022_bsakhareEEMCW.rvt

A.2 Construction Type Confirmation

Mott, Peter

From: Kilborn, Kris
Sent: Tuesday, May 30, 2023 12:45 PM
To: Mott, Peter
Subject: FW: 1299 Richmond Road Building Construction and Fire Protection Confirmation

See below for the Building construction questions
Kris

From: Bhagyashri Sakhare <BSakhare@bdpquadrangle.com>
Sent: Tuesday, May 2, 2023 5:45 PM
To: Wu, Michael <Michael.Wu@stantec.com>
Cc: Kilborn, Kris <kris.kilborn@stantec.com>; Sharp, Mike <Mike.Sharp@stantec.com>; Ford, Matthew <Matthew.Ford@stantec.com>; Ryan Lupien <rlupien@bdpquadrangle.com>
Subject: RE: 1299 Richmond Road Building Construction and Fire Protection Confirmation

Hi Michael,
Here are the answers to your questions.

1. It's a non- combustible construction with non-combustible cladding and we will be using cast in place concrete structure.
2. Yes, we will be following the two codes. Air shafts will be enclosed in two-hour fire rated assembly and fire dampers will be installed at the air vents as specified my mechanical consultants. And the building will be required to be sprinklered.
3. We would like to locate it near main entrance lobby on Richmond road side. Can you confirm the fire hydrant location?

Let me know if you need anything else.

Thanks

From: Wu, Michael <Michael.Wu@stantec.com>
Sent: Tuesday, May 2, 2023 9:16 AM
To: Bhagyashri Sakhare <BSakhare@bdpquadrangle.com>
Cc: Kilborn, Kris <kris.kilborn@stantec.com>; Sharp, Mike <Mike.Sharp@stantec.com>; Ford, Matthew <Matthew.Ford@stantec.com>
Subject: 1299 Richmond Road Building Construction and Fire Protection Confirmation

> You don't often get email from michael.wu@stantec.com. Learn why this is important

Good morning, Bhagyashri:

I was wondering if you could provide us the following information for the proposed building at 1299 Richmond Road? We would need them for requesting the hydraulic boundary conditions from the City.

1. Construction type.
2. Confirmation that the vertical openings (between floors) are going to be **protected** per the fire code requirements outlined in the Ontario and National Building Codes and whether the building will be sprinklered.
3. Locations of the fire department connections.

Thanks,

Michael Wu, EIT
Civil Engineering Intern, Community Development

Work: (613) 738-6033
Mobile: (613) 858-0548
michael.wu@stantec.com

Stantec
300 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

Appendix B Water Demands

B.1 Domestic Water Demands

1299 Richmond Road, Ottawa, ON - Domestic Water Demand Estimates

Site Plan provided by Quadrangle Architects Ltd. (2024-08-06)

Project No. 160401697 Designed by: MW

Date: 2024-08-06 Checked by:

Revision: 01 City File No. D07-12-23-0083

Population densities per Table 4.1 City of Ottawa Water Design Guidelines:		
1 Bedroom	1.4	ppu
2 Bedroom	2.1	ppu
3 Bedroom	3.1	ppu

Demand conversion factors per Table 4.2 of the City of Ottawa Water Design Guidelines and Technical Bulletin ISTB-2021-03:		
Residential	280	L/cap/day
Commercial	28000	L/gross ha/day

Building ID	Commercial (m^2)	No. of Units	Population	Avg Day Demand		Max Day Demand [1 2]		Peak Hour Demand [1 2]	
				(L/min)	(L/s)	(L/min)	(L/s)	(L/min)	(L/s)
Bachelor		4	6	1.2	0.02	2.9	0.05	6.4	0.11
1 Bedroom		296	415	80.7	1.34	201.7	3.36	443.8	7.40
1 Bedroom + Den[3]		28	59	11.5	0.19	28.7	0.48	63.1	1.05
2 Bedroom		38	80	15.6	0.26	38.9	0.65	85.6	1.43
2 Bedroom + Den[3]		202	627	121.9	2.03	304.8	5.08	670.5	11.18
3 Bedroom		20	62	12.1	0.20	30.1	0.50	66.3	1.11
Commercial	734			1.4	0.02	2.1	0.04	3.9	0.06
Residential Subtotal		588	1249	242.9	4.0	607.2	10.1	1335.7	22.3
Total Site :	**734**	**588**	**1249**	**244.3**	**4.1**	**609.3**	**10.2**	**1339.6**	**22.3**

1 The City of Ottawa water demand criteria used to estimate peak demand rates for residential areas are as follows:
maximum day demand rate = 2.5 x average day demand rate
peak hour demand rate = 2.2 x maximum day demand rate (as per Technical Bulletin ISD-2010-02)

2 Water demand criteria used to estimate peak demand rates for long-term care units based on commercial areas and are as follows:
maximum daily demand rate = 1.5 x average day demand rate
peak hour demand rate = 1.8 x maximum day demand rate (as per Technical Bulletin ISD-2010-02)

3 Assumption that "1 bedroom with den" has density of 2.1 ppu, "2-bedroom with den" has density of 3.1 ppu

B.2 Fire Flow Demands (FUS 2020)

Stantec

FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

Stantec Project #: 160401697
Project Name: 1299 Richmond Road
Date: 2024-08-07
Fire Flow Calculation #: 1
Description: 5-Storey Podium with 28-Storey and 30-Storey High-Rise Towers
Podium Footprint: 2745.0 m^2. Tower Footprint: 1500 m^2.

Notes: Building footprint areas per Quadrangle Site Plan provided August 6, 2024

Step	Task	Notes										Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Type II - Noncombustible Construction / Type IV-A - Mass Timber Construction										0.8	-
2	Determine Effective Floor Area	Sum of Largest Floor + 25% of Two Additional Floors					Vertical Openings Protected?					YES	-
		2745	2700	2700								4095	-
3	Determine Required Fire Flow	($F = 220 \times C \times A^{1/2}$). Round to nearest 1000 L/min										-	11000
4	Determine Occupancy Charge	Limited Combustible										-15%	9350
5	Determine Sprinkler Reduction	Conforms to NFPA 13										-30%	-4675
		Standard Water Supply										-10%	
		Fully Supervised										-10%	
		% Coverage of Sprinkler System										100%	
6	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	Firewall / Sprinklered ?				-	-
		North	20.1 to 30	81.79	3	> 100	Type V	NO				10%	935
		East	> 30	0	0	0-20	Type V	NO				0%	
		South	> 30	0	0	0-20	Type V	NO				0%	
		West	> 30	0	0	0-20	Type V	NO				0%	
7	Determine Final Required Fire Flow	Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min											6000
		Total Required Fire Flow in L/s											100.0
		Required Duration of Fire Flow (hrs)											2.00
		Required Volume of Fire Flow (m^3)											720

B.3 Hydraulic Boundary Conditions (City of Ottawa)

Wu, Michael

From: Rathnasooriya, Shika <Thakshika.Rathnasooriya@ottawa.ca>
Sent: Thursday, 18 May, 2023 12:56
To: Wu, Michael
Cc: Kilborn, Kris; Ford, Matthew
Subject: RE: 1299 Richmond Road Follow-up
Attachments: 1299 Richmond Road May 2023.pdf

Hi Michael,

Well I received a response much quicker than I expected!

Please find BC below:

******The following information may be passed on to the consultant, but do NOT forward this e-mail directly.******

The following are boundary conditions, HGL, for hydraulic analysis at 1299 Richmond Road, (zone 1W) assumed to be a dual connection to the 305 mm watermain on Richmond Road (see attached PDF for location).

Min HGL: 108.3 m

Max HGL: 115.9 m

Max Day + FF (100 L/s): 109.4 m

Regards,
Shika

From: Rathnasooriya, Shika
Sent: May 18, 2023 12:47 PM
To: Wu, Michael <Michael.Wu@stantec.com>
Cc: Kilborn, Kris <kris.kilborn@stantec.com>; Ford, Matthew <Matthew.Ford@stantec.com>
Subject: RE: 1299 Richmond Road Follow-up

Hi Michael,

The typical turn around time for boundary conditions is 3 weeks and given that they were submitted on May 4th you should receive them by May 25th. I'll send a message over to our water resources team requesting a statues update.

If you do not receive an answer before then, please go ahead with the first submission and mention in the report that boundary conditions and sanitary sewer capacity constraints will be included in the second submission.

Regards,
Shika Rathnasooriya, P.Eng
Project Manager
Planning, Real Estate and Economic Development Department - West Branch
City of Ottawa
110 Laurier Avenue West Ottawa, ON
613.580.2424 ext. 23433

From: Wu, Michael <Michael.Wu@stantec.com>
Sent: May 18, 2023 12:10 PM
To: Rathnasooriya, Shika <Thakshika.Rathnasooriya@ottawa.ca>
Cc: Kilborn, Kris <kris.kilborn@stantec.com>; Ford, Matthew <Matthew.Ford@stantec.com>
Subject: 1299 Richmond Road Follow-up

Good afternoon, Shika:

Just wanted to do a quick follow up on the status of the hydraulic boundary conditions and confirmation of sanitary sewer capacity request for 1299 Richmond Road.

We are looking to have the site servicing and stormwater management report submitted by next Friday (May 26th), as such, in the event the boundary conditions and sanitary sewer capacity confirmation cannot be received prior to that day, I was wondering if it will be possible for us to make the first submission without the boundary conditions and then have them added in as part of the comments following the first submission. There are a few sites in which we were allowed to make the first submission without the boundary conditions.

On a side note, if you received the boundary conditions and sanitary sewer capacity confirmation before next Friday, please be sure to forward them to Matt Ford, who I have cc'd in this email, as I will be away on vacation for the next two weeks.

Thanks,

Michael Wu, EIT
Civil Engineering Intern, Community Development

Work: (613) 738-6033
Mobile: (613) 858-0548
michael.wu@stantec.com

Stantec
300 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

Vacation Alert: I will be away on vacation from May 19th to June 2nd

'

B.4 Fire Hydrant Coverage Calculations

Stantec	Project:	**1299 Richmond Road**	160401697
	TABLE 1: FIRE HYDRANT COVERAGE TABLE		
	Revision:	1	Prepared By: MW
	Revision Date:	2024-08-28	Checked By:

Description	Hydrants[1]			Total Available Fire Flow (L/min)	Total Required Fire Flow[2] (L/min)
	HYD-01	**HYD-02**	**HYD-03**		
1299 Richmond Road					
Distance from fire department connection (m)	22.7	103.4		-	-
Maximum fire flow capacity[3] (L/min)	5,678	3,785		**9,463**	6,000

NFPA 1 Table 18.5.4.3	
Distance to Building (m)	Maximum Capacity (L/min)
≤ 76	**5,678**
> 76 and ≤ 152	**3,785**
> 152 and ≤ 305	**2,839**

Notes:

1. Hydrant locations as per GeoOttawa accessed May 18, 2023. Refer to fire hydrant coverage sketch (Figure 3-1).
2. See FUS Calculations in Appendix B.2 for fire flow requirements.
3. See NFPA 1 Table 18.5.4.3 in Appendix I of the City of Ottawa Technical Bulletin ISTB-2018-02 for maxiumim fire flow capacity of hydrants by distance to building.

Appendix C Sanitary

C.1 Sanitary Calculation Sheet

Stantec

SUBDIVISION:
1299 Richmond Road

DATE: 2024-07-26
REVISION: 1
DESIGNED BY: MW
CHECKED BY: PM

SANITARY SEWER DESIGN SHEET
(City of Ottawa)

FILE NUMBER: 160401697

DESIGN PARAMETERS

MAX PEAK FACTOR (RES.)=	4.0	AVG. DAILY FLOW / PERSON	280 l/p/day	MINIMUM VELOCITY	0.60 m/s
MIN PEAK FACTOR (RES.)=	2.0	COMMERCIAL	28,000 l/ha/day	MAXIMUM VELOCITY	3.00 m/s
PEAKING FACTOR (INDUSTRIAL):	2.4	INDUSTRIAL (HEAVY)	55,000 l/ha/day	MANNINGS n	0.013
PEAKING FACTOR (ICI >20%):	1.5	INDUSTRIAL (LIGHT)	35,000 l/ha/day	BEDDING CLASS	B
PERSONS / 1 BEDROOM	1.4	INSTITUTIONAL	28,000 l/ha/day	MINIMUM COVER	2.50 m
PERSONS / 2 BEDROOM	2.1	INFILTRATION	0.33 l/s/Ha	HARMON CORRECTION FACTOR	0.8
PERSONS / 3 BEDROOM	3.1				

LOCATION			RESIDENTIAL AREA AND POPULATION									COMMERCIAL		INDUSTRIAL (L)		INDUSTRIAL (H)		INSTITUTIONAL		GREEN / UNUSED		C+I+I	INFILTRATION			TOTAL	PIPE						
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA	UNITS 1 BEDROOM	2 BEDROOM	3 BEDROOM	POP.	CUMULATIVE AREA	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	PEAK FLOW	TOTAL AREA	ACCU. AREA	INFILT. FLOW	**FLOW**	LENGTH	DIA	MATERIAL	CLASS	SLOPE	CAP. (FULL)	CAP. V PEAK FLOW	VEL. (FULL)
			(ha)					(ha)			(l/s)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(l/s)	(ha)	(ha)	(l/s)	(l/s)	(m)	(mm)			(%)	(l/s)	(%)	(m/s)
R2A	B SAN 1	SAN 2	0.14	156	33	115	646	0.14	646	3.33	7.0	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.14	0.14	0.05	7.0	1.4	300	PVC	SDR 35	1.00	96.0	**7.32%**	1.36
G2A	SAN 2	SAN 1	0.00	0	0	0	0	0.14	646	3.33	7.0	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.07	0.01	0.07	0.21	0.07	7.1	19.5	300	PVC	SDR 35	1.00	96.0	**7.35%**	1.36
R4A	B SAN 2	SAN 4	0.15	144	33	107	603	0.15	603	3.34	6.5	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.15	0.15	0.05	6.6	1.4	300	PVC	SDR 35	1.00	96.0	**6.88%**	1.36
G4A	SAN 4	SAN 3	0.00	0	0	0	0	0.15	603	3.34	6.5	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.06	0.02	0.06	0.21	0.07	6.6	19.7	300	PVC	SDR 35	1.00	96.0	**6.90%**	1.36
							1249				**13.5**											**0.04**			**0.14**	**13.7**							

C.2 Correspondence with City on Sanitary Sewer Capacity

Mott, Peter

From: Kilborn, Kris
Sent: Tuesday, May 30, 2023 11:57 AM
To: Mott, Peter
Subject: FW: 1299 Richmond Road Sanitary Sewer Capacity Confirmation and SWM Quality Control Measures

---

From: Rathnasooriya, Shika <Thakshika.Rathnasooriya@ottawa.ca>
Sent: Tuesday, May 23, 2023 11:56 AM
To: Kilborn, Kris <kris.kilborn@stantec.com>; Ford, Matthew <Matthew.Ford@stantec.com>
Cc: Wu, Michael <Michael.Wu@stantec.com>
Subject: FW: 1299 Richmond Road Sanitary Sewer Capacity Confirmation and SWM Quality Control Measures

Hi Kris,

Please see below.

Thanks,
Shika

From: Tousignant, Eric <Eric.Tousignant@ottawa.ca>
Sent: May 23, 2023 11:43 AM
To: Rathnasooriya, Shika <Thakshika.Rathnasooriya@ottawa.ca>
Subject: RE: 1299 Richmond Road Sanitary Sewer Capacity Confirmation and SWM Quality Control Measures

Hi Shika

No concerns with that flow. The pipe is also steep there and it's the end of the run, so there is quite a bit of spare capacity.

Eric

Eric Tousignant, P.Eng.
Senior Water Resources Engineer/ Ingénieur principal en resources hydriques
Infrastructure and Water Services / *services d'infrastructure et d'eau*
City of Ottawa
613-580-2424 ext 25129

From: Rathnasooriya, Shika <Thakshika.Rathnasooriya@ottawa.ca>
Sent: May 16, 2023 8:50 AM
To: Tousignant, Eric <Eric.Tousignant@ottawa.ca>
Subject: FW: 1299 Richmond Road Sanitary Sewer Capacity Confirmation and SWM Quality Control Measures

Hi Eric,

Can you please confirm if the capacity of the 300mm diameter sanitary sewer within Richmond Road can accommodate an additional 15.4L/s?

Thank you,
Shika

From: Wu, Michael <Michael.Wu@stantec.com>
Sent: May 15, 2023 4:50 PM
To: Rathnasooriya, Shika <Thakshika.Rathnasooriya@ottawa.ca>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>; Kilborn, Kris <kris.kilborn@stantec.com>
Subject: 1299 Richmond Road Sanitary Sewer Capacity Confirmation and SWM Quality Control Measures

Good afternoon, Shika:

In addition to the hydraulic boundary conditions, as part of the servicing for the proposed development on 1299 Richmond Road, we would like to confirm if there is sufficient capacity downstream of the 300 mm diameter sanitary sewer in Richmond Road to receive an additional peak flow of 15.4 L/s from the proposed development.

Please find our sanitary design sheet and location map attached for your information. Furthermore, it is my understanding that the City now provides the SWM quality control criteria. Given that the site drains directly to the Ottawa River as indicated in the 2020 Pinecrest Creek/Westboro SWM Design Criteria report, are there any additional quality control measures applicable to the site, besides the 80 % TSS Removal?

On a side note, I will be away on vacation for two weeks starting this Friday afternoon. If you have any questions or have received the boundary conditions, please don't hesitate to reach out to let Kris and Matt, who I have cc'd in this email.

Thanks,

Michael Wu, EIT
Civil Engineering Intern, Community Development

Work: (613) 738-6033
Mobile: (613) 858-0548
michael.wu@stantec.com

Stantec
300 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

Vacation Alert: I will be away on vacation from May 19th to June 2nd

'

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Appendix D Stormwater Servicing

D.1 Modified Rational Method Sheet

Stormwater Management Calculations

File No: **160401697**
Project: **1299 Richmond Road**
Date: **14-Aug-24**

SWM Approach:
Post-development to Pre-development flows

Post-Development Site Conditions:

Overall Runoff Coefficient for Site and Sub-Catchment Areas

Runoff Coefficient Table

Catchment Type	Sub-catchment Area ID / Description		Area (ha) "A"		Runoff Coefficient "C"	"A x C"		Overall Runoff Coefficient
Tributary to Cistern	CIST 1-5	Hard	0.023		0.9	0.021		
		Soft	0.000		0.2	0.000		
		Subtotal		0.023			0.021	0.900
Tributary to Cistern	CIST 1-4	Hard	0.004		0.9	0.004		
		Soft	0.000		0.2	0.000		
		Subtotal		0.004			0.004	0.900
Tributary to Cistern	CIST 1-3	Hard	0.014		0.9	0.013		
		Soft	0.000		0.2	0.000		
		Subtotal		0.014			0.013	0.900
Tributary to Cistern	CIST 1-2	Hard	0.013		0.9	0.012		
		Soft	0.000		0.2	0.000		
		Subtotal		0.013			0.012	0.900
Tributary to Cistern	CIST 1-1	Hard	0.286		0.9	0.257		
		Soft	0.000		0.2	0.000		
		Subtotal		0.286			0.257	0.900
Uncontrolled - Towards Starflower	UNC-4	Hard	0.023		0.9	0.021		
		Soft	0.000		0.2	0.000		
		Subtotal		0.023			0.021	0.900
Uncontrolled - Towards Starflower	UNC-3	Hard	0.018		0.9	0.016		
		Soft	0.000		0.2	0.000		
		Subtotal		0.018			0.016	0.900
Uncontrolled - Towards Assaly	UNC-2	Hard	0.008		0.9	0.007		
		Soft	0.000		0.2	0.000		
		Subtotal		0.008			0.007	0.900
Uncontrolled - Towards Richmond	UNC-1	Hard	0.025		0.9	0.022		
		Soft	0.000		0.2	0.000		
		Subtotal		0.025			0.022	0.900
Total				**0.414**			**0.373**	
Overall Runoff Coefficient= C:								**0.90**

Total Roof Areas	**0.000 ha**
Total Tributary Surface Areas (Controlled and Uncontrolled)	**0.340 ha**
Total Tributary Area to Outlet	**0.340 ha**
Total Uncontrolled Areas (Non-Tributary)	**0.074 ha**
Total Site	**0.414 ha**

Stormwater Management Calculations

Project #160401697, 1299 Richmond Road
Modified Rational Method Calculations for Storage

2 yr Intensity
City of Ottawa

$I = a/(t + b)^c$

a =	732.951
b =	6.199
c =	0.81

t (min)	I (mm/hr)
10	76.81
20	52.03
30	40.04
40	32.86
50	28.04
60	24.56
70	21.91
80	19.83
90	18.14
100	16.75
110	15.57
120	14.56

2 YEAR Predevelopment Target Release for Entire Site

Subdrainage Area: Predevelopment Tributary Area to Outlet
Area (ha): 0.4142
C: 0.50

Typical Time of Concentration

tc (min)	I (2 yr) (mm/hr)	Qtarget (L/s)
10	76.81	**44.22**

2 YEAR Modified Rational Method for Portion of Site

Subdrainage Area: CISTERN — Cistern
Area (ha): 0.34
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	65.42	23.72	41.70	**25.02**
20	52.03	44.32	23.72	20.60	24.72
30	40.04	34.11	23.72	10.39	18.69
40	32.86	27.99	23.72	4.27	10.25
50	28.04	23.88	23.72	0.16	0.49
60	24.56	20.92	23.72	0.00	0.00
70	21.91	18.66	23.72	0.00	0.00
80	19.83	16.89	23.72	0.00	0.00
90	18.14	15.45	23.72	0.00	0.00
100	16.75	14.26	23.72	0.00	0.00
110	15.57	13.26	23.72	0.00	0.00
120	14.56	12.40	23.72	0.00	0.00

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
2-year Water Level	0.00	0.00	23.72	25.02	120.00	OK

Subdrainage Area: CIST 1-5 — Tributary to Cistern
Area (ha): 0.02
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	4.38	4.38		
20	52.03	2.97	2.97		
30	40.04	2.28	2.28		
40	32.86	1.87	1.87		
50	28.04	1.60	1.60		
60	24.56	1.40	1.40		
70	21.91	1.25	1.25		
80	19.83	1.13	1.13		
90	18.14	1.03	1.03		
100	16.75	0.95	0.95		
110	15.57	0.89	0.89		
120	14.56	0.83	0.83		

Subdrainage Area: CIST 1-4 — Tributary to Cistern
Area (ha): 0.00
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	0.84	0.84		
20	52.03	0.57	0.57		
30	40.04	0.44	0.44		
40	32.86	0.36	0.36		
50	28.04	0.31	0.31		
60	24.56	0.27	0.27		
70	21.91	0.24	0.24		
80	19.83	0.22	0.22		
90	18.14	0.20	0.20		
100	16.75	0.18	0.18		
110	15.57	0.17	0.17		
120	14.56	0.16	0.16		

Subdrainage Area: CIST 1-3 — Tributary to Cistern
Area (ha): 0.01
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	2.73	2.73		
20	52.03	1.85	1.85		
30	40.04	1.42	1.42		
40	32.86	1.17	1.17		
50	28.04	1.00	1.00		
60	24.56	0.87	0.87		
70	21.91	0.78	0.78		
80	19.83	0.70	0.70		
90	18.14	0.64	0.64		
100	16.75	0.59	0.59		
110	15.57	0.55	0.55		
120	14.56	0.52	0.52		

Subdrainage Area: CIST 1-2 — Tributary to Cistern
Area (ha): 0.01
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	2.55	2.55		
20	52.03	1.73	1.73		
30	40.04	1.33	1.33		
40	32.86	1.09	1.09		
50	28.04	0.93	0.93		
60	24.56	0.82	0.82		
70	21.91	0.73	0.73		
80	19.83	0.66	0.66		
90	18.14	0.60	0.60		
100	16.75	0.56	0.56		
110	15.57	0.52	0.52		
120	14.56	0.48	0.48		

Subdrainage Area: CIST 1-1 — Tributary to Cistern
Area (ha): 0.29
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	54.92	54.92		
20	52.03	37.21	37.21		
30	40.04	28.64	28.64		
40	32.86	23.50	23.50		
50	28.04	20.05	20.05		
60	24.56	17.56	17.56		
70	21.91	15.67	15.67		
80	19.83	14.18	14.18		
90	18.14	12.97	12.97		

Project #160401697, 1299 Richmond Road
Modified Rational Method Calculations for Storage

100 yr Intensity
City of Ottawa

$I = a/(t + b)^c$

a =	1735.688
b =	6.014
c =	0.820

t (min)	I (mm/hr)
10	178.56
20	119.95
30	91.87
40	75.15
50	63.95
60	55.89
70	49.79
80	44.99
90	41.11
100	37.90
110	35.20
120	32.89

100 YEAR Predevelopment Target Release for Entire Site

Subdrainage Area: Predevelopment Tributary Area to Outlet
Area (ha): 0.4142
C: 0.50

Estimated Time of Concentration after Development

tc (min)	I (100 yr) (mm/hr)	Q100yr (L/s)
10	178.56	**102.80**

100 YEAR Modified Rational Method for Portion of Site

Subdrainage Area: CISTERN — Cistern
Area (ha): 0.34
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	168.98	23.72	145.26	87.16
20	119.95	113.52	23.72	89.80	107.76
30	91.87	86.94	23.72	63.22	**113.80**
40	75.15	71.11	23.72	47.39	113.75
50	63.95	60.52	23.72	36.80	110.41
60	55.89	52.90	23.72	29.18	105.04
70	49.79	47.12	23.72	23.40	98.28
80	44.99	42.58	23.72	18.86	90.52
90	41.11	38.91	23.72	15.19	82.00
100	37.90	35.87	23.72	12.15	72.90
110	35.20	33.31	23.72	9.59	63.32
120	32.89	31.13	23.72	7.41	53.36

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
100-year Water Level	0.00	0.00	23.72	113.80	120.00	OK
					6.20	

Subdrainage Area: CIST 1-5 — Tributary to Cistern
Area (ha): 0.02
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	11.31	11.31		
20	119.95	7.60	7.60		
30	91.87	5.82	5.82		
40	75.15	4.76	4.76		
50	63.95	4.05	4.05		
60	55.89	3.54	3.54		
70	49.79	3.15	3.15		
80	44.99	2.85	2.85		
90	41.11	2.60	2.60		
100	37.90	2.40	2.40		
110	35.20	2.23	2.23		
120	32.89	2.08	2.08		

Subdrainage Area: CIST 1-4 — Tributary to Cistern
Area (ha): 0.00
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	2.16	2.16		
20	119.95	1.45	1.45		
30	91.87	1.11	1.11		
40	75.15	0.91	0.91		
50	63.95	0.77	0.77		
60	55.89	0.68	0.68		
70	49.79	0.60	0.60		
80	44.99	0.54	0.54		
90	41.11	0.50	0.50		
100	37.90	0.46	0.46		
110	35.20	0.43	0.43		
120	32.89	0.40	0.40		

Subdrainage Area: CIST 1-3 — Tributary to Cistern
Area (ha): 0.01
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	7.04	7.04		
20	119.95	4.73	4.73		
30	91.87	3.62	3.62		
40	75.15	2.96	2.96		
50	63.95	2.52	2.52		
60	55.89	2.20	2.20		
70	49.79	1.96	1.96		
80	44.99	1.77	1.77		
90	41.11	1.62	1.62		
100	37.90	1.50	1.50		
110	35.20	1.39	1.39		
120	32.89	1.30	1.30		

Subdrainage Area: CIST 1-2 — Tributary to Cistern
Area (ha): 0.01
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	6.59	6.59		
20	119.95	4.42	4.42		
30	91.87	3.39	3.39		
40	75.15	2.77	2.77		
50	63.95	2.36	2.36		
60	55.89	2.06	2.06		
70	49.79	1.84	1.84		
80	44.99	1.66	1.66		
90	41.11	1.52	1.52		
100	37.90	1.40	1.40		
110	35.20	1.30	1.30		
120	32.89	1.21	1.21		

Subdrainage Area: CIST 1-1 — Tributary to Cistern
Area (ha): 0.29
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	141.88	141.88		
20	119.95	95.31	95.31		
30	91.87	73.00	73.00		
40	75.15	59.71	59.71		
50	63.95	50.82	50.82		
60	55.89	44.41	44.41		
70	49.79	39.56	39.56		
80	44.99	35.75	35.75		
90	41.11	32.67	32.67		

Stormwater Management Calculations

Project #160401697, 1299 Richmond Road
Modified Rational Method Calculations for Storage

100	16.75	11.98	11.98
110	15.57	11.13	11.13
120	14.56	10.41	10.41

Subdrainage Area: UNC-4 — Uncontrolled - Towards Starflower
Area (ha): 0.02
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	4.50	4.50		
20	52.03	3.05	3.05		
30	40.04	2.34	2.34		
40	32.86	1.92	1.92		
50	28.04	1.64	1.64		
60	24.56	1.44	1.44		
70	21.91	1.28	1.28		
80	19.83	1.16	1.16		
90	18.14	1.06	1.06		
100	16.75	0.98	0.98		
110	15.57	0.91	0.91		
120	14.56	0.85	0.85		

Subdrainage Area: UNC-3 — Uncontrolled - Towards Starflower
Area (ha): 0.02
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	3.44	3.44		
20	52.03	2.33	2.33		
30	40.04	1.79	1.79		
40	32.86	1.47	1.47		
50	28.04	1.26	1.26		
60	24.56	1.10	1.10		
70	21.91	0.98	0.98		
80	19.83	0.89	0.89		
90	18.14	0.81	0.81		
100	16.75	0.75	0.75		
110	15.57	0.70	0.70		
120	14.56	0.65	0.65		

Subdrainage Area: UNC-2 — Uncontrolled - Towards Assaly
Area (ha): 0.01
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	1.44	1.44		
20	52.03	0.98	0.98		
30	40.04	0.75	0.75		
40	32.86	0.62	0.62		
50	28.04	0.53	0.53		
60	24.56	0.46	0.46		
70	21.91	0.41	0.41		
80	19.83	0.37	0.37		
90	18.14	0.34	0.34		
100	16.75	0.31	0.31		
110	15.57	0.29	0.29		
120	14.56	0.27	0.27		

Subdrainage Area: UNC-1 — Uncontrolled - Towards Richmond
Area (ha): 0.02
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	4.80	4.80		
20	52.03	3.25	3.25		
30	40.04	2.50	2.50		
40	32.86	2.05	2.05		
50	28.04	1.75	1.75		
60	24.56	1.54	1.54		
70	21.91	1.37	1.37		
80	19.83	1.24	1.24		
90	18.14	1.13	1.13		
100	16.75	1.05	1.05		
110	15.57	0.97	0.97		
120	14.56	0.91	0.91		

SUMMARY TO OUTLET

			Vrequired	Vavailable*		
Tributary Area	0.340	ha				
Total 2yr Flow to Sewer	24	L/s	25	120	m^3	Ok
Non-Tributary Area	0.074	ha				
Total 2yr Flow Uncontrolled to Starflower	8	L/s				
Total 2yr Flow Uncontrolled to Richmond and Assaly	6	L/s				
Total Area	0.414	ha				
Total 2yr Flow	32	L/s				
Target	44	L/s				

Project #160401697, 1299 Richmond Road
Modified Rational Method Calculations for Storage

100	37.90	30.12	30.12
110	35.20	27.97	27.97
120	32.89	26.14	26.14

Subdrainage Area: UNC-4 — Uncontrolled - Towards Starflower
Area (ha): 0.02
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	11.62	11.62		
20	119.95	7.80	7.80		
30	91.87	5.98	5.98		
40	75.15	4.89	4.89		
50	63.95	4.16	4.16		
60	55.89	3.64	3.64		
70	49.79	3.24	3.24		
80	44.99	2.93	2.93		
90	41.11	2.67	2.67		
100	37.90	2.47	2.47		
110	35.20	2.29	2.29		
120	32.89	2.14	2.14		

Subdrainage Area: UNC-3 — Uncontrolled - Towards Starflower
Area (ha): 0.02
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	8.88	8.88		
20	119.95	5.97	5.97		
30	91.87	4.57	4.57		
40	75.15	3.74	3.74		
50	63.95	3.18	3.18		
60	55.89	2.78	2.78		
70	49.79	2.48	2.48		
80	44.99	2.24	2.24		
90	41.11	2.05	2.05		
100	37.90	1.89	1.89		
110	35.20	1.75	1.75		
120	32.89	1.64	1.64		

Subdrainage Area: UNC-2 — Uncontrolled - Towards Assaly
Area (ha): 0.01
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	3.72	3.72		
20	119.95	2.50	2.50		
30	91.87	1.92	1.92		
40	75.15	1.57	1.57		
50	63.95	1.33	1.33		
60	55.89	1.17	1.17		
70	49.79	1.04	1.04		
80	44.99	0.94	0.94		
90	41.11	0.86	0.86		
100	37.90	0.79	0.79		
110	35.20	0.73	0.73		
120	32.89	0.69	0.69		

Subdrainage Area: UNC-1 — Uncontrolled - Towards Richmond
Area (ha): 0.02
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	12.40	12.40		
20	119.95	8.33	8.33		
30	91.87	6.38	6.38		
40	75.15	5.22	5.22		
50	63.95	4.44	4.44		
60	55.89	3.88	3.88		
70	49.79	3.46	3.46		
80	44.99	3.13	3.13		
90	41.11	2.86	2.86		
100	37.90	2.63	2.63		
110	35.20	2.45	2.45		
120	32.89	2.29	2.29		

SUMMARY TO OUTLET

			Vrequired	Vavailable*		
Tributary Area	0.340	ha				
Total 100yr Flow to Sewer	24	L/s	114	120	m^3	Ok
Non-Tributary Area	0.074	ha				
Total 100yr Flow Uncontrolled to Starflower	21	L/s				
Total 100yr Flow Uncontrolled to Richmond and Assaly	16	L/s				
Total Area	0.414	ha				
Total 100yr Flow	44	L/s				
Target	44	L/s				

D.2 Storm Sewer Design Sheet

Stantec

1299 Richmond Road

DATE: 2024-08-28
REVISION: 1
DESIGNED BY: MW
CHECKED BY: PM

FILE NUMBER: **160401697**

STORM SEWER DESIGN SHEET
(City of Ottawa)

DESIGN PARAMETERS

$I = a / (t+b)^c$ (As per City of Ottawa Guidelines, 2012)

	1:2 yr	1:5 yr	1:10 yr	1:100 yr
a =	732.951	998.071	1174.184	1735.688
b =	6.199	6.053	6.014	6.014
c =	0.810	0.814	0.816	0.820

MANNING'S n = 0.013 BEDDING CLASS = B
MINIMUM COVER: 2.00 m
TIME OF ENTRY 10 min

LOCATION			DRAINAGE AREA																						PIPE SELECTION									
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA (2-YEAR) (ha)	AREA (5-YEAR) (ha)	AREA (10-YEAR) (ha)	AREA (100-YEAR) (ha)	AREA (ROOF) (ha)	C (2-YEAR) (-)	C (5-YEAR) (-)	C (10-YEAR) (-)	C (100-YEAR) (-)	A x C (2-YEAR) (ha)	ACCUM AxC (2YR) (ha)	A x C (5-YEAR) (ha)	ACCUM. AxC (5YR) (ha)	A x C (10-YEAR) (ha)	ACCUM. AxC (10YR) (ha)	A x C (100-YEAR) (ha)	ACCUM. AxC (100YR) (ha)	T of C (min)	$I_{2\text{-YEAR}}$ (mm/h)	$I_{5\text{-YEAR}}$ (mm/h)	$I_{10\text{-YEAR}}$ (mm/h)	$I_{100\text{-YEAR}}$ (mm/h)	$Q_{CONTROL}$ (L/s)	ACCUM. $Q_{CONTROL}$ (L/s)	Q_{ACT} (CIA/360) (L/s)	LENGTH (m)	PIPE WIDTH OR DIAMETE (mm)	PIPE HEIGHT (mm)	PIPE SHAPE (-)	MATERIAL (-)	CLASS (-)	SLOPE %	Q_{CAP} (FULL) (L/s)	% FULL (-)	VEL. (FULL) (m/s)	TIME OF FLOW (min)
CISTERN	Building	100	0.00	0.00	0.00	0.00	0.33	0.00	0.00	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.00	76.81	104.19	122.14	178.56	24.1	24.1	24.1	7.3	300	300	CIRCULAR	PVC	-	1.00	96.2	**25.06%**	1.37	0.13
																				10.13																

D.3 SWM Quantity Control Criteria Correspondence

Wu, Michael

From: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Sent: August 28, 2024 13:00
To: Wu, Michael
Cc: Roy, Jean-Miguel; Thiffault, Dustin; Sharp, Mike; Kilborn, Kris
Subject: RE: D07-12-23-0083 - 1299 Richmond Road SWM

Hi Michael,

This is to confirm we can disregard the post-development uncontrolled discharge towards Assaly and Richmond Roads.

Thank you.

Best Regards,

Mohammed Fawzi, P.Eng.
Senior Project Manager (A), Infrastructure Approvals
Development Review – West Branch
Planning, Development and Building Services Department (PDBS)| Direction générale des services de la planification, de l'aménagement et du bâtiment (DGSPAB)
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West | 110 Avenue Laurier Ouest
Ottawa, ON K1P 1J1
613.580.2424 ext./poste 20120, Mohammed.Fawzi@ottawa.ca

From: Fawzi, Mohammed
Sent: Wednesday, August 28, 2024 8:34 AM
To: Wu, Michael <Michael.Wu@stantec.com>
Cc: Roy, Jean-Miguel <Jean-Miguel.Roy@ottawa.ca>; Thiffault, Dustin <dustin.thiffault@stantec.com>; Sharp, Mike <Mike.Sharp@stantec.com>; Kilborn, Kris <kris.kilborn@stantec.com>
Subject: RE: D07-12-23-0083 - 1299 Richmond Road SWM

Good Morning Michael,

Our sincere apologies for the late reply. The West team has been quite busy lately.

I've reached out to our Water Resources Group to determine if this would be permissible, given the site's reduction in storm water – I don't imagine this would be an issue. Hopefully we can expect a response by end of week, if not early next week. I'll do my best to expedite this request.

That being said, can you please confirm if there was any existing stormwater management on site with the roof or the catch basins? Additionally, can you please also provide a pre-development storm drainage plan that includes major overland flow routes. Major overland flow routes also need to be shown on the post-development storm drainage plan.

Lastly, I had a quick look at the servicing plan and was surprised to see two manholes close to each other for both the sanitary and storm service. Can we not shift the monitoring manholes on to private property and install them as part of the parking garage similar to the detail I presented for the application on Catherine Street?

Let me know what you think. Perhaps a team's call would help.

Thanks Michael.

Best Regards,

Mohammed Fawzi, P.Eng.
Senior Project Manager (A), Infrastructure Approvals
Development Review – West Branch
Planning, Development and Building Services Department (PDBS)| Direction générale des services de la planification, de l'aménagement et du bâtiment (DGSPAB)
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West | 110 Avenue Laurier Ouest
Ottawa, ON K1P 1J1
613.580.2424 ext./poste 20120, Mohammed.Fawzi@ottawa.ca

From: Roy, Jean-Miguel <Jean-Miguel.Roy@ottawa.ca>
Sent: Monday, August 26, 2024 3:25 PM
To: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Subject: FW: D07-12-23-0083 - 1299 Richmond Road SWM

Hey Mo,

Here is the inquiry from Stantec for 1299 Richmond. Let me know if you need anything else.

Thanks,
JM

From: Wu, Michael <Michael.Wu@stantec.com>
Sent: August 16, 2024 9:49 AM
To: Roy, Jean-Miguel <Jean-Miguel.Roy@ottawa.ca>
Cc: Kilborn, Kris <kris.kilborn@stantec.com>; Thiffault, Dustin <dustin.thiffault@stantec.com>; Sharp, Mike <Mike.Sharp@stantec.com>
Subject: D07-12-23-0083 - 1299 Richmond Road SWM

Good morning, Jean-Miguel:

Hope this email finds you well.

We are working on the stormwater analysis for the proposed site at 1299 Richmond Road for second submission of the site servicing and stormwater management report, and based on the

pre-consultation, post-development discharge for all storm events including the 100-year is to be restricted to the 2-year pre-development, which has been calculated to be around 44 L/s.

However, given the imperviousness of the site both pre and post-development and with the four sides at the property lines continuing to drain uncontrolled per existing conditions, it meant the site will release a total uncontrolled flow of around 43 L/s to the adjacent ROWs during the 100-year storm event post-development, which includes around 11 L/s towards Assaly Road to the west and around 12 L/s towards Richmond Road to the south.

Given the reduction in paved parking area at the south and west, we will be looking at a reduction of uncontrolled discharge towards the Assaly and Richmond Roads systems post-development (from around 70 L/s pre-development to around 23 L/s post-development).

Attached are the stormwater calculations for your reference. Please let us know if we can disregard the post-development uncontrolled discharge towards Assaly and Richmond Roads from the target release rate.

Thanks,

Michael Wu EIT
Civil Engineering Intern, Community Development

Direct: 1 (613) 738-6033
Michael.Wu@stantec.com

Stantec
300-1331 Clyde Avenue
Ottawa ON K2C 3G4

'

'

D.4 SWM Quality Control Criteria Correspondence

Mott, Peter

From: Eric Lalande <eric.lalande@rvca.ca>
Sent: Tuesday, May 30, 2023 2:34 PM
To: Mott, Peter
Cc: Kilborn, Kris
Subject: RE: 1299 Richmond Road - Water Quality Control

Hi Peter,

While the RVCA likely would not have had any requirements, water quality control is now being handled by the City of Ottawa's infrastructure, I would direct you to them for review and comments.

Cheers,

Eric Lalande, MCIP, RPP
Planner, RVCA
613-692-3571 x1137

From: Mott, Peter <Peter.Mott@stantec.com>
Sent: Tuesday, May 30, 2023 2:07 PM
To: Eric Lalande <eric.lalande@rvca.ca>
Cc: Kilborn, Kris <kris.kilborn@stantec.com>
Subject: 1299 Richmond Road - Water Quality Control

Hi Eric,

We've been retained to help provide a design for a development containing a single mixed-use building with a 5-storey podium and two residential high-rise towers at 1299 Richmond Road in Ottawa. The site is shown in the attached SSP drawing.

We are looking to confirm if quality control measures are required on-site. Please review the site servicing plan attached and confirm if quality treatment is required for the site. If you need any other information, feel free to reach out.

Best regards,

Peter Mott EIT
Engineering Intern, Community Development

Mobile: +1 (613) 897-0445
Teams: +1 (613) 724-4370
Peter.Mott@stantec.com
Stantec
300 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

Stormwater Management Design Criteria

for the Pinecrest Creek/Westboro Area

City of Ottawa

Final – May 2020

Table 1: SWM Design Criteria for the Pinecrest Creek / Westboro Study Area

	Development Type	Runoff Volume Reduction	Water Quality	Water Quantity	
			TSS Removal	Flood Control	Erosion Control
All Locations					
Residential Development *not* subject to Plan of Subdivision or Site Plan Control approval(s)					
1	all soil infiltration rates	Direction/re-direction of downspouts/roof drainage to discharge to pervious surfaces, where possible, to reduce runoff, while meeting all other City of Ottawa lot grading requirements. Amended topsoil, or a depth of topsoil up to 300 mm, provides runoff volume reduction benefits and is encouraged (but not mandatory) as a best practice over all soft landscaped surfaces.	Not applicable	Not applicable	Not applicable
Draining to the Ottawa River					
Development subject to Plan of Subdivision or Site Plan Control approval(s) - discharging directly to the Ottawa River					
2	all soil infiltration rates	A minimum on-site retention of the 10 mm design storm; refer to LID references(i) for guidance on prudent approach to planning infiltration-based LID best management practices. Assumptions re: non-viability of infiltration measures must be substantiated. A green roof, rain harvesting measures and/or a combination of detention/retention measures(ii) could be implemented to provide further runoff volume reduction.	On-site removal of 80% of TSS; some of which ma be achieved by on-site retention of first 10 mm of rainfall.	As per City of Ottawa Sewer Design Guideline	Not applicable
Draining to Pinecrest Creek					
Development subject to Plan of Subdivision or Site Plan Control approval(s) - discharging upstream of the Ottawa River Parkway pipe (ORPP) inlet					
3	all soil infiltration rates	A minimum on-site retention of the 10 mm design storm; refer to LID references(i) for guidance on prudent approach to planning infiltration-based LID best management practices. Assumptions re: non-viability of infiltration measures must be substantiated. A green roof, rain harvesting measures and/or a combination of detention/retention measures(ii) could be implemented to provide further runoff volume reduction.	On-site removal of 80% of TSS; some of which may be achieved by on-site retention of first 10 mm of rainfall and detention of the 25 mm design storm(iii).	The more stringent of the following criteria will govern: i) 1:100 year discharge from site not to exceed 33.5 L/s/ha) or; ii) Requirements of City of Ottawa Sewer Design Guideline.	Control (detain) the runoff from the 25 mm design storm(iii) such that the peak outflow from the site does not exceed 5.8 L/s/ha.
Development subject to Plan of Subdivision or Site Plan Control approval(s) - discharging directly to the Ottawa River Parkway pi					
4	all soil infiltration rates	A minimum on-site retention of the 10 mm design storm; refer to LID references(i) for guidance on prudent approach to planning infiltration-based LID best management practices. Assumptions re: non-viability of infiltration measures must be substantiated. A green roof, rain harvesting measures and/or a combination of detention/retention measures(ii) could be implemented to provide further runoff volume reduction.	On-site removal of 80% of TSS; some of which may be achieved by on-site retention of first 10 mm of rainfall.	The more stringent of the following criteria will govern: i) 1:100 year discharge from site not to exceed 33.5 L/s/ha) or; ii) Requirements of City of Ottawa Sewer Design	Not applicable

Notes:

(i) Re: Infiltration measures: Beyond the targets specified in this table, the planning, design and use of these systems shall be in accordance with the guidance in the Stormwater Management Planning and Design Manual (MOE, 2003); the Low Impact Development Stormwater Management Planning and Design Guide (CVC and TRCA, 2010); the Low Impact Development Stormwater Management Planning and Design Wiki at: wiki.sustainabletechnologies.ca; and Draft No.2 Low Impact Development (LID) Stormwater Management Guidance Manual (MOECC, November 2017) or the final version of this Manual, when available. As noted in the MOECC LID SWM Guidance Manual, a prudent approach to planning infiltration-based LID best management practices on any site involves delineating catchment areas that contain high risk site activities and isolating them by applying non-infiltration-based practices to these areas.

(ii) Retention is to hold or retain stormwater on a more permanent basis such as for infiltration to the surrounding soils. Detention is the temporary storage or detaining of stormwater for eventual release to the downstream system.

(iii) 25 mm 4-hour Chicago design storm

D.5 Stormceptor Sizing Report and Detail

Stormceptor®

FORTERRA

Stormceptor® EF Sizing Report

STORMCEPTOR®
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

06/01/2023

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

Site Name:	1299 RR Cistern

Drainage Area (ha):	0.32
Runoff Coefficient 'c':	0.90

Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	9.30
Oil / Fuel Spill Risk Site?	No
Upstream Flow Control?	Yes
Upstream Orifice Control Flow Rate to Stormceptor (L/s):	12.50
Peak Conveyance (maximum) Flow Rate (L/s):	
Site Sediment Transport Rate (kg/ha/yr):	

Project Name:	1299 Richmond Road - Brigil Towers
Project Number:	160401697
Designer Name:	Peter Mott
Designer Company:	Stantec Consulting Ltd.
Designer Email:	peter.mott05@gmail.com
Designer Phone:	613-897-0445
EOR Name:	Peter Moroz
EOR Company:	Stantec Consulting Ltd.
EOR Email:	peter.moroz@stantec.com
EOR Phone:	613-294-2851

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EF4	90
EF6	96
EF8	99
EF10	100
EF12	100

Recommended Stormceptor EF Model: EF4

Estimated Net Annual Sediment (TSS) Load Reduction (%): 90

Water Quality Runoff Volume Capture (%): > 90

imbrium

THIRD-PARTY TESTING AND VERIFICATION

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

PERFORMANCE

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

PARTICLE SIZE DISTRIBUTION (PSD)

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

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

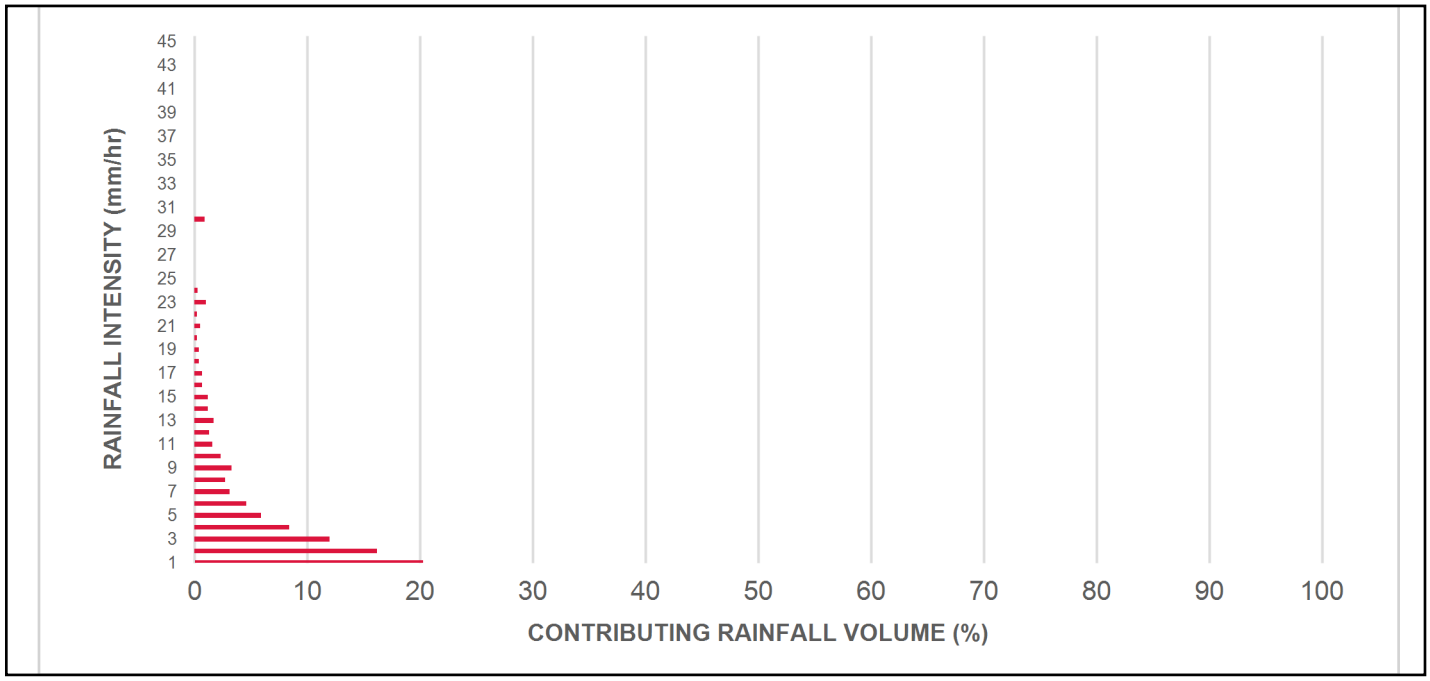
imbrium

Upstream Flow Controlled Results

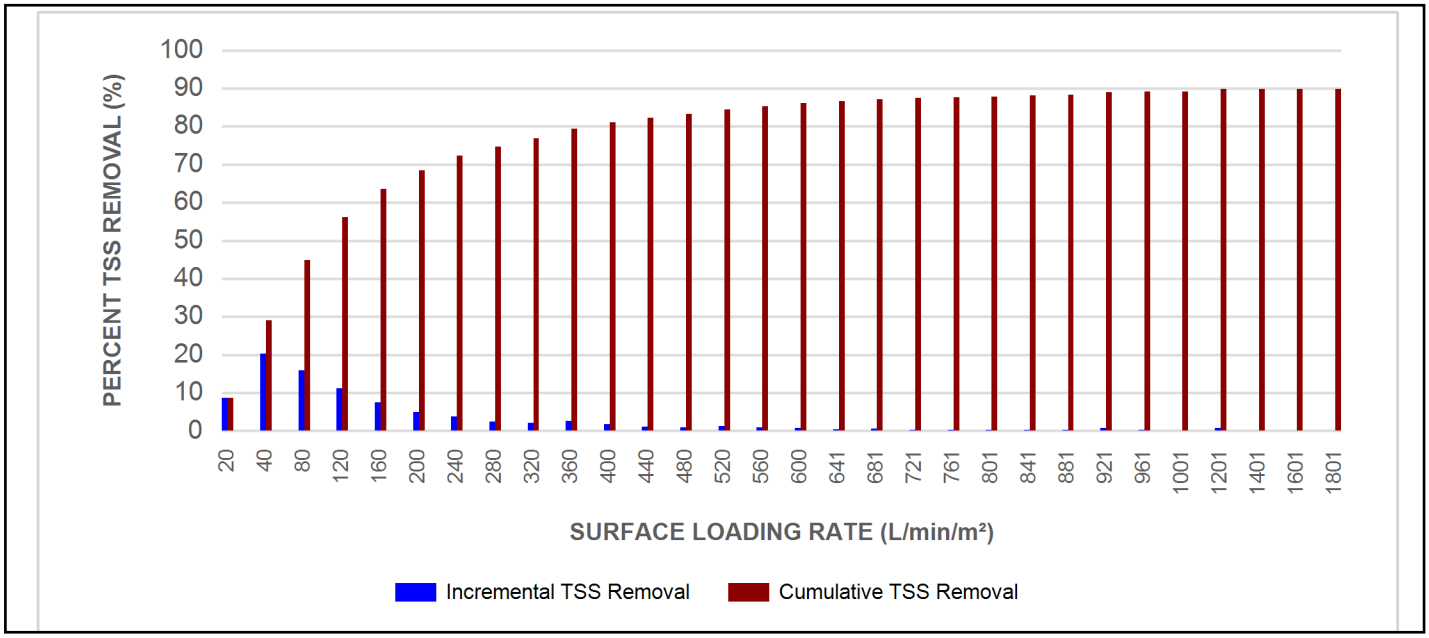
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.5	8.6	8.6	0.40	24.0	20.0	100	8.6	8.6
1	20.3	29.0	0.80	48.0	40.0	100	20.3	29.0
2	16.2	45.2	1.60	96.0	80.0	98	16.0	44.9
3	12.0	57.2	2.40	144.0	120.0	93	11.2	56.1
4	8.4	65.6	3.20	192.0	160.0	88	7.4	63.6
5	5.9	71.6	4.00	240.0	200.0	83	4.9	68.5
6	4.6	76.2	4.80	288.0	240.0	81	3.8	72.3
7	3.1	79.3	5.60	336.0	280.0	79	2.4	74.7
8	2.7	82.0	6.41	384.0	320.0	78	2.1	76.8
9	3.3	85.3	7.21	432.0	360.0	76	2.5	79.4
10	2.3	87.6	8.01	480.0	400.0	74	1.7	81.1
11	1.6	89.2	8.81	528.0	440.0	73	1.1	82.2
12	1.3	90.5	9.61	576.0	480.0	73	1.0	83.2
13	1.7	92.2	10.41	624.0	520.0	72	1.2	84.4
14	1.2	93.5	11.21	673.0	560.0	71	0.9	85.3
15	6.5	100.0	12.00	720.0	600.0	71	4.6	89.9
16	0.0	100.0	12.00	720.0	600.0	71	0.0	89.9
17	0.0	100.0	12.00	720.0	600.0	71	0.0	89.9
18	0.0	100.0	12.00	720.0	600.0	71	0.0	89.9
19	0.0	100.0	12.00	720.0	600.0	71	0.0	89.9
20	0.0	100.0	12.00	720.0	600.0	71	0.0	89.9
21	0.0	100.0	12.00	720.0	600.0	71	0.0	89.9
22	0.0	100.0	12.00	720.0	600.0	71	0.0	89.9
23	0.0	100.0	12.00	720.0	600.0	71	0.0	89.9
24	0.0	100.0	12.00	720.0	600.0	71	0.0	89.9
25	0.0	100.0	12.00	720.0	600.0	71	0.0	89.9
30	0.0	100.0	12.00	720.0	600.0	71	0.0	89.9
35	0.0	100.0	12.00	720.0	600.0	71	0.0	89.9
40	0.0	100.0	12.00	720.0	600.0	71	0.0	89.9
45	0.0	100.0	12.00	720.0	600.0	71	0.0	89.9
Estimated Net Annual Sediment (TSS) Load Reduction =								**90 %**

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

RAINFALL DATA FROM OTTAWA CDA RCS RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

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

SCOUR PREVENTION AND ONLINE CONFIGURATION

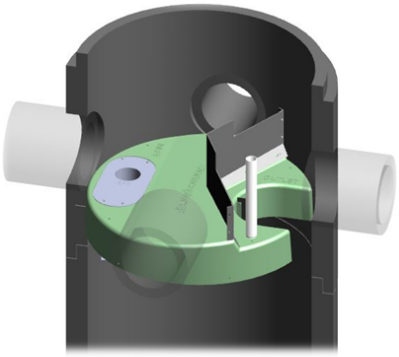
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test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

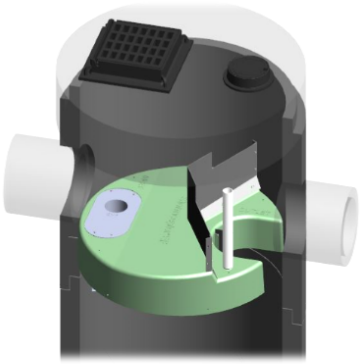
DESIGN FLEXIBILITY

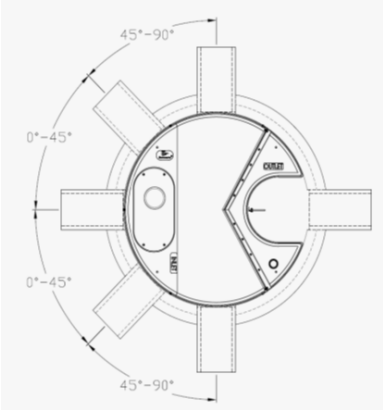
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend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

OIL CAPTURE AND RETENTION

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







INLET-TO-OUTLET DROP

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

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

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

HEAD LOSS

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

Pollutant Capacity

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

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

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

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

STANDARD STORMCEPTOR EF/EFO DRAWINGS

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

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

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

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

PART 1 – GENERAL

1.1 WORK INCLUDED

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

1.2 REFERENCE STANDARDS & PROCEDURES

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

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

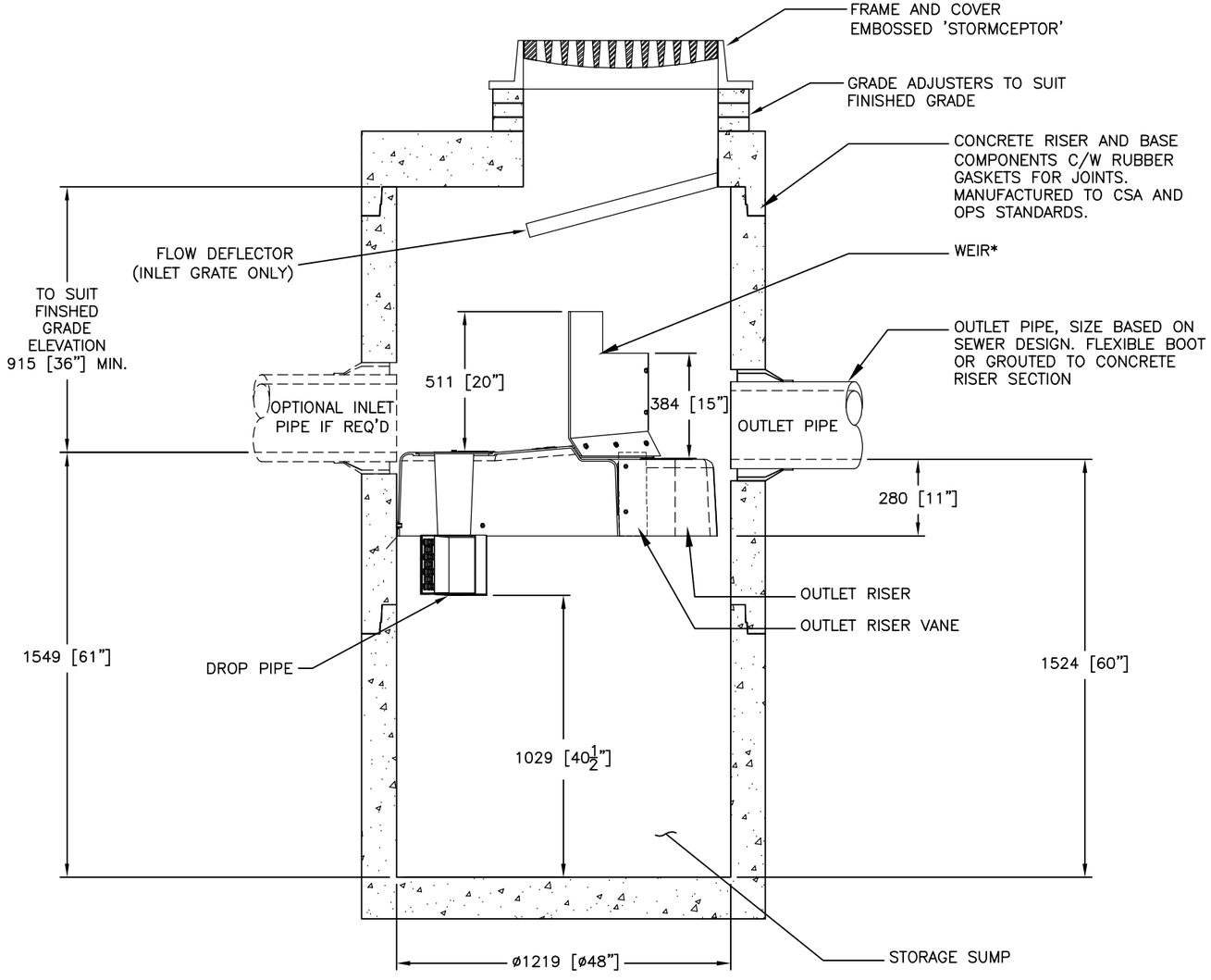
3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m^2 shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m^2, and shall be calculated using a simple proportioning formula, with 1400 L/min/m^2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

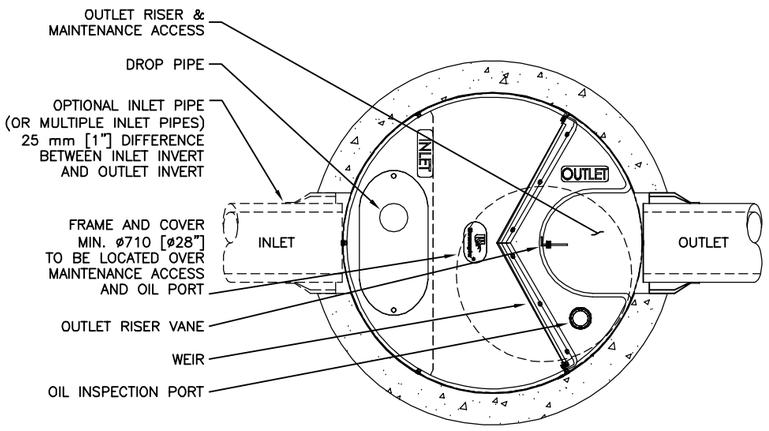
3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

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.**

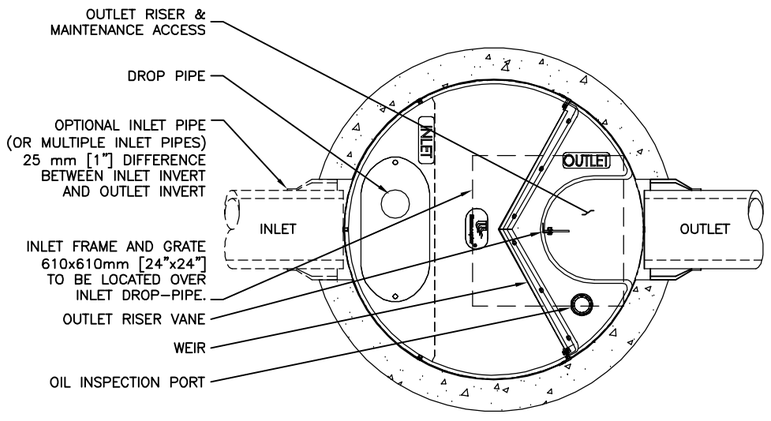
3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.



SECTION VIEW



PLAN VIEW (STANDARD)



PLAN VIEW (INLET TOP)

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

GENERAL NOTES:

* MAXIMUM SURFACE LOADING RATE (SLR) INTO LOWER CHAMBER THROUGH DROP PIPE IS 1135 L/min/m^2 (27.9 gpm/ft^2) FOR STORMCEPTOR EF4 AND 535 L/min/m^2 (13.1 gpm/ft^2) FOR STORMCEPTOR EFO4 (OIL CAPTURE CONFIGURATION). WEIR HEIGHT IS 150 mm (6 INCH) FOR EF04.

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

INSTALLATION NOTES

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

STANDARD DETAIL
NOT FOR CONSTRUCTION

SITE SPECIFIC DATA REQUIREMENTS

STORMCEPTOR MODEL	EF4
STRUCTURE ID	*
WATER QUALITY FLOW RATE (L/s)	*
PEAK FLOW RATE (L/s)	*
RETURN PERIOD OF PEAK FLOW (yrs)	*
DRAINAGE AREA (HA)	*
DRAINAGE AREA IMPERVIOUSNESS (%)	*

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

* PER ENGINEER OF RECORD

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

Stormceptor® EF

SCALE = NTS

imbrium®
7007 RIDGE ROAD, SUITE 350, HANOVER, MD 21076
USA 888-279-9828 CA 800-388-4601 INTL +1-416-960-9900

DATE: 5/26/2017

DESIGNED:	DRAWN:
JSK	JSK
CHECKED:	APPROVED:
BSF	SP
PROJECT No.:	SEQUENCE No.:
EF4	*

SHEET: 1 OF 1

Appendix E Background Report Excerpts

PATERSON GROUP

Geotechnical Investigation

Proposed Multi-Storey Building

1299 Richmond Road
Ottawa, Ontario

Prepared for Brigil Construction

Report PG6598 – 1 dated April 25, 2023

5.0 Discussion

5.1 Geotechnical Assessment

Foundation Design Considerations

From a geotechnical perspective, the subject site is suitable for the proposed multi-storey buildings. It is expected that the proposed building will be founded on the quartz sandstone bedrock to a dense glacial till comprised of grey silty sand, some gravel, cobbles and boulders.

Alternately, to avoid excavating the entire building footprint to the bedrock level, footings could be placed over lean concrete infilled trenches. Near vertical, zero entry trench extending at least 300 mm beyond the footing face should be excavated to a clean bedrock surface approved by the geotechnical consultant. The trenches should be infilled by a minimum of 15 MPa lean concrete to the underside of the footing.

The above and other considerations are discussed in the following paragraphs.

5.2 Site Grading and Preparation

Stripping Depth

Topsoil and deleterious fill, such as those containing significant organic materials, should be stripped from under any buildings and other settlement sensitive structures. The existing fill material, where free of organic materials, should be reviewed by the geotechnical consultant at the time of construction to determine if the existing fill can be left in place below paved areas and below the slab granular fill layers.

Fill Placement

Fill placed for grading beneath the building area should consist, unless otherwise specified, of clean imported granular fill, such as Ontario Provincial Standard Specifications (OPSS) Granular A or Granular B Type II. The fill material should be tested and approved prior to delivery to the site. The fill should be placed in maximum 300 mm thick lifts and compacted to 98% of the material's standard Proctor maximum dry density (SPMDD).

Site-excavated soil can be placed as general landscaping fill where settlement is a minor concern of the ground surface. These materials should be spread in thin lifts and at least compacted by the tracks of the spreading equipment to minimize voids. If these materials are to be placed to increase the subgrade level for areas to be paved, the fill should be compacted in maximum 300 mm thick lifts and to a minimum density of 95% of the respective SPMDD.

a_c = $(1.45-a_{max}/g)a_{max}$
γ = unit weight of fill of the applicable retained soil (kN/m^3)
H = height of the wall (m)
g = gravity, 9.81 m/s^2

The peak ground acceleration, (a_{max}), for the Ottawa area is 0.32g according to OBC 2012. Note that the vertical seismic coefficient is assumed to be zero.

The earth force component (P_o) under seismic conditions can be calculated using $P_o = 0.5\ K_o\ \gamma\ H^2$, where $K_o = 0.5$ for the soil conditions noted above.

The total earth force (P_{AE}) is considered to act at a height, h (m), from the base of the wall, where:

$$h = \{P_o \cdot (H/3) + \Delta P_{AE} \cdot (0.6 \cdot H)\}/P_{AE}$$

The earth forces calculated are unfactored. For the ULS case, the earth loads should be factored as live loads, as per OBC 2012.

5.7 Pavement Structure

For design purposes, it is recommended that the rigid pavement structure for the underground parking level consist of Category C2, 32 MPa concrete at 28 days with air entrainment of 5 to 8%. The recommended rigid pavement structure is further presented in Table 5 on the next page. The flexible pavement structure presented in Table 6 and Table 7 should be used for driveways and car only parking areas and at grade access lanes and heavy loading parking areas.

Table 5 - Recommended Rigid Pavement Structure - Lower Parking Level

Thickness (mm)	Material Description
150	**Exposure Class C2 - 32 MPa Concrete** (5 to 8% Air Entrainment)
300	**BASE** – OPSS Granular A Crushed Stone
SUBGRADE – Hard to firm silty clay, or OPSS Granular A or OPSS Granular B Type II granular fill material placed over in situ soil.	

To control cracking due to shrinking of the concrete floor slab, it is recommended that strategically located saw cuts be used to create control joints within the concrete floor slab of the underground parking level. The control joints are generally recommended to be located at the center of the column lines and spaced at approximately 24 to 36 times the slab thickness (for example; a 0.15 m thick slab should have control joints spaced between 3.6 and 5.4 m).

The joints should be cut between 25 and 30% of the thickness of the concrete floor slab and completed as early as 4 hours after the concrete has been poured during warm temperatures and up to 12 hours during cooler temperatures.

Table 6 – Recommended Pavement Structure – Light Vehicle Parking	
Thickness (mm)	**Material Description**
40	**Wear Course –** Superpave 12.5-FC2 Asphaltic Concrete
50	**Binder Course –** Superpave 19.0 Asphaltic Concrete
150	**BASE –** OPSS Granular A Crushed Stone
300	**SUBBASE –** OPSS Granular B Type II Crushed Stone
SUBGRADE - Either fill, in situ silty clay or sand/crushed stone material placed over in situ soil	

Table 7 – Recommended Pavement Structure –Local Roadways, Access Lanes and Heavy Vehicle Parking	
Thickness (mm)	**Material Description**
40	**Wear Course –** Superpave 12.5-FC2 Asphaltic Concrete
50	**Upper Binder Course –** Superpave 19.0 Asphaltic Concrete
150	**BASE –** OPSS Granular A Crushed Stone
400	**SUBBASE –** OPSS Granular B Type II Crushed Stone
SUBGRADE - Either fill, in situ silty clay or sand/crushed stone material placed over in situ soil	

If soft spots develop in the subgrade during compaction or due to construction traffic, the affected areas should be excavated and replaced with OPSS Granular B Type I or Type II material.

The pavement granular base and subbase should be placed in maximum 300 mm thick lifts and compacted to a minimum of 98% of the material's SPMDD using suitable compaction equipment.

Pavement Structure Drainage

Satisfactory performance of the pavement structure is largely dependent on keeping the contact zone between the subgrade material and the base stone in a dry condition. Failure to provide adequate drainage under conditions of heavy wheel loading can result in the fine subgrade soil being pumped into the voids in the stone subbase, thereby reducing its load carrying capacity.

Where silty clay is encountered at subgrade level, consideration should be given to installing subdrains during the pavement construction. These drains should be constructed according to City of Ottawa specifications. The drains should be connected to a positive outlet. The subgrade surface should be crowned to promote water flow to the drainage lines. The subdrains will help drain the pavement structure, especially in early Spring when the subgrade is saturated and weaker and, therefore, more susceptible to permanent deformation.

7.0 Recommendations

For the foundation design data provided herein to be applicable that a material testing and observation services program is required to be completed. The following aspects be performed by the geotechnical consultant:

- ❑ Review of the site master grading plan, once available.
- ❑ Review of the excavation and shoring plan (can be prepared by Paterson)
- ❑ Observation of all bearing surfaces prior to the placement of concrete.
- ❑ Sampling and testing of the concrete and fill materials.
- ❑ Observation of the placement of the foundation insulation, if applicable.
- ❑ Observe and review the installation of the drainage and waterproofing system.
- ❑ Periodic observation of the condition of unsupported excavation side slopes in excess of 3 m in height, if applicable.
- ❑ Observation of all subgrades prior to backfilling and follow-up field density tests to determine the level of compaction achieved.
- ❑ Field density tests to determine the level of compaction achieved.
- ❑ Sampling and testing of the bituminous concrete including mix design reviews.

A report confirming the construction has been conducted in general accordance with the recommendations could be issued, upon request, following the completion of a satisfactory materials testing and observation program by the geotechnical consultant.

8.0 Statement of Limitations

The recommendations made in this report are in accordance with our present understanding of the project. We request that we be permitted to review the grading plan once available and our recommendations when the drawings and specifications are complete.

A geotechnical investigation of this nature is a limited sampling of a site. The recommendations are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around the test locations. The extent of the limited area depends on the soil, bedrock and groundwater conditions, as well the history of the site reflecting natural, construction, and other activities. Should any conditions at the site be encountered which differ from those at the test locations, we request notification immediately in order to permit reassessment of our recommendations.

The recommendations provided in this report are intended for the use of design professionals associated with this project. Contractors bidding on or undertaking the work should examine the factual information contained in this report and the site conditions, satisfy themselves as to the adequacy of the information provided for construction purposes, supplement the factual information if required, and develop their own interpretation of the factual information based on both their and their subcontractors construction methods, equipment capabilities and schedules.

The present report applies only to the project described in this document. Use of this report for purposes other than those described herein or by person(s) other than Brigil Construction or their agent(s) is not authorized without review by Paterson Group for the applicability of our recommendations to the altered use of the report.

Paterson Group Inc.

April 25, 2023

Pratheep Thirumoolan, M.Eng. Joey R. Villeneuve, M.A.Sc., P.Eng, ing.

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