2760-2770 Sheffield Warehouse Access Road

Site Servicing and Stormwater Management Report

Prepared for:
Richcraft Homes Ltd.

Prepared by:
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Stantec Consulting Ltd.

Revision Schedule

Revision	Description	Author	Date	Quality Check	Date	Independent Review	Date
0	Draft Submission	Michael W.	2025-03-21	Dustin T.	2025-04-17	Sheridan G.	2025-03-21

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1 Introduction

Stantec Consulting Ltd. has been commissioned by Richcraft Hones Ltd. to prepare the following Servicing and Stormwater Management Report in support of the proposed redevelopment works located at 2760-2770 Sheffield Road in the City of Ottawa.

The 8.4 ha site is located between Lancaster Road to the west and Sheffield Road to the east. The site is currently zoned IL and IH and consists of several warehouses and an office building with surface parking and private driveways. The portion of the development's intended for the redevelopment works measures approximately 0.67 ha in area and is sandwiched between two existing warehouses. It is bound by the existing warehouses on site and Sheffield Road to the east, existing industrial development to the north and south, and Lancaster Road to the west, as shown in **Figure 1** below.

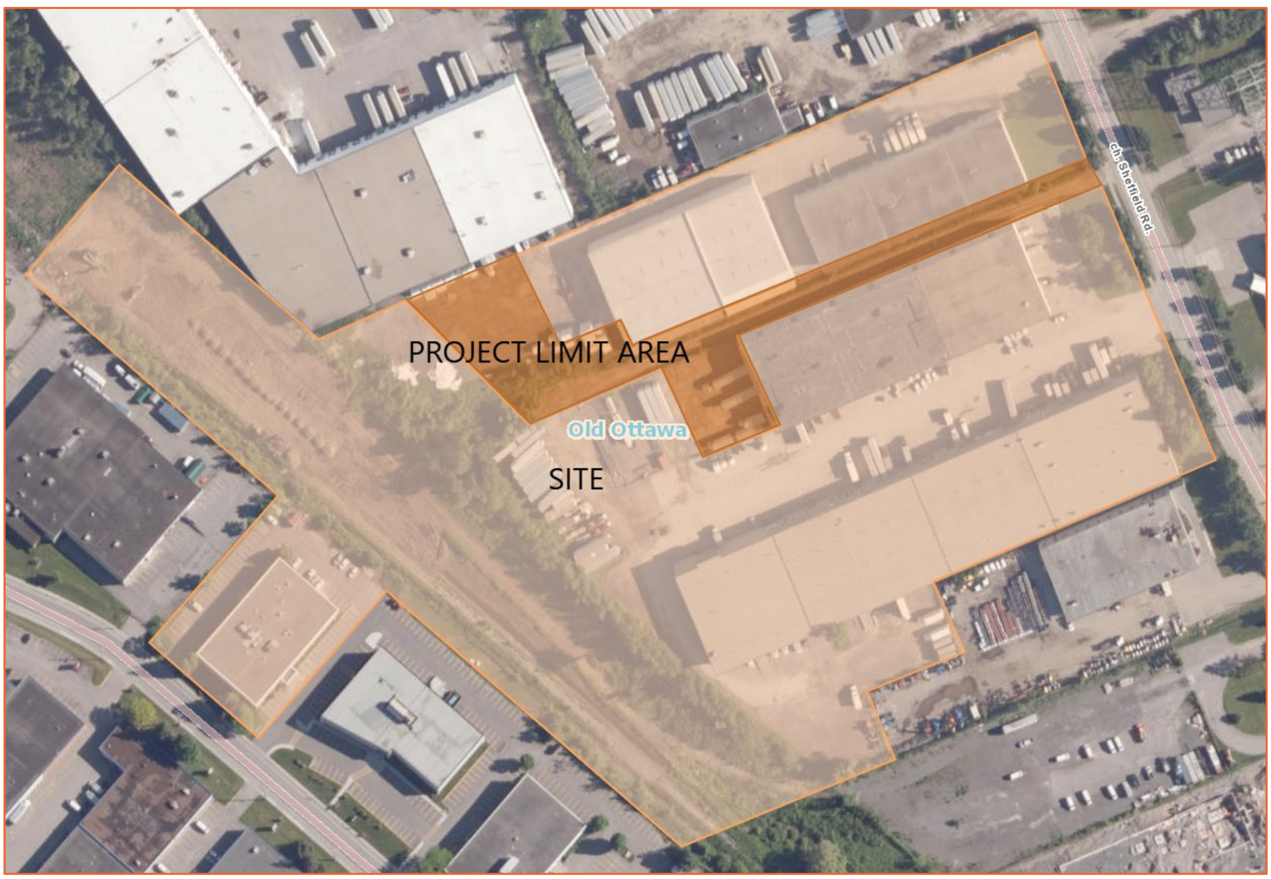

Figure 1: Key Plan

The proposed works consists of new parking spaces and a new access driveway connecting the proposed industrial building to Sheffield Road, along with a new stormwater sewer system that conveys drainage from existing warehouses and surrounding area within the site to the existing 300 mm diameter storm sewer in Sheffield Road.

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 Guidelines, and uses existing municipal infrastructure in accordance with any limitations communicated.

Criteria and constraints identified in the pre-consultation with City of Ottawa staff and the site servicing and stormwater management report for the proposed industrial building on site have been used as a basis for the detailed servicing design of the proposed stormwater works. Specific and potential development constraints to be addressed are as follows:

- 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 sewers that will collect discharge from the existing warehouses and surrounding area to the existing 300 mm diameter storm sewers in Sheffield Road.
- Prepare a grading plan in accordance with the proposed site plan and existing grades.

The accompanying drawings illustrate the proposed stormwater servicing for the proposed access road and accompanying works on site.

2 Background

Documents referenced in preparing this stormwater and servicing report for 2760-2770 Sheffield Road include:

- *City of Ottawa Sewer Design Guidelines* (SDG), City of Ottawa, October 2012, including all subsequent technical bulletins
- *2760-2770 Sheffield Road – Site Servicing and Stormwater Management Report*, Stantec Consulting, November 2024
- *Geotechnical Investigation – Proposed Industrial Building 2760-2770 Sheffield Road,* Paterson Group, January 2023

3 Stormwater Management and Servicing

3.1 Objectives

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

3.2 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 SWM criteria established in the Stantec SWM Report for the proposed industrial building (2024), and through consultation with City of Ottawa staff. 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)
- The post-development discharge under both the 2-year and 100-year storm events from the site are to be restricted to the 2-year pre-development discharge rate for areas intended for redevelopment. Other on-site areas that are not subject to redevelopment are to continue to discharge to their respective outlets at pre-development rates.

3.3 Existing Conditions

The area of the proposed access driveway is partly tributary to an existing ditch inlet catch basin (DICB), which ultimately outlets to the existing 300 mm diameter storm sewers in Sheffield Road. Existing areas subject to redevelopment are delineated into several subcatchment areas, as shown in the Storm Drainage Plan (see **Drawing SD-1**). Existing subcatchments have been delineated based on relative locations of the proposed access road to compare directly to the post-development scenario, of which catchments UNC-E and EX S100B are identified for redevelopment. The existing DICB also receives runoff from existing building rooftops (catchments EX 2750-1 and EX 2760) that are to remain as per existing conditions. These areas are summarized below:

Table 3-1: Drainage Areas with Pre-Development Runoff Coefficient C

Subcatchments	A (ha)	C
UNC-E	0.42	0.67
EX S100B	0.21	0.73
EX 2750-1	0.28	0.90
EX 2760	0.49	0.90
Total Area	**1.40**	

The pre-development release rates for the site have been determined using the rational method and the drainage areas identified above. A time of concentration for pre-development areas (10 minutes) was assigned based on their proximity to the existing drainage outlet. Allowable release rates for the site have been set in consideration of control to the 2-year pre-development discharge for areas UNC-E and EX S100B subject to redevelopment, and no flow control (i.e. release to the 100-year pre-development rate) for existing buildings to remain (EX2750-1 and EX2760). The peak allowable discharge rates shown in **Table 3-2** have been calculated using the rational method:

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

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 3-2: Peak Allowable Discharge Rate

Design Storm	Pre-Development Rate (L/s)
2-year	**240.6**
100-year	**474.7**

3.4 Stormwater Management Design

The Modified Rational Method was employed to assess the rate and volume of runoff anticipated during post-development rainfall events. The site assumes seven subcatchment areas as defined by the proposed grades. A summary of subdrainage areas and runoff coefficients is provided in **Table 3-3** below. Further details can be found in **Appendix A.1,** while **Drawing SD-2** illustrates the drainage areas.

Table 3-3: Drainage Areas with Post-Development Runoff Coefficient C

Subcatchments	A (ha)	C
C101A	0.060	0.90
C101B	0.065	0.90
C102A	0.068	0.90
C102B	0.065	0.90
C102C	0.150	0.80
C102D	0.063	0.90
C103A	0.179	0.90
EX 2750-1	0.279	0.90
EX 2760	0.489	0.90
UNC-E	0.033	0.82
Total Area	**1.45**	**0.89**

3.4.1 Quantity Control

The site requires quantity control measures to meet the pre-development stormwater release rates. It is proposed that a combination of surface storage and pipe storage to reduce the site peak outflow rate to the target release rate. A spreadsheet using the Modified Rational Method (MRM) was used to assess the post-development runoff, as shown in **Appendix A.1**.

3.4.1.1 Inlet Control

Storage in the access roadways will be achieved using surface ponding and pipe storage within the sewer pipes through the downstream monitoring manhole. Discharge from the site to the Sheffield Road sewer is restricted by the existing 300mm DICB sewer lead, acting as an orifice to restrict minor system peak flows as outlined below in **Table 3-4** (see **Appendix A.1** for detailed calculations).

Table 3-4: Minor System Release Rates (100yr)

Manhole ID	Tributary Area IDs	Orifice size	Head (m)	Flow (L/s)	Outlets to
MH 100	C10X, EX 2750-1, EX2760, UNC-E	300 mm	1.84	259.1	Ex. DICB

Table 3-5 below summarizes the required and available storage under post-development conditions. Note that the proposed catch basins, 200-300mm storm sewer, and manholes on site provides a total storage volume of 29.0 m^3. As such, no surface ponding is expected in the 2-year storm event.

Table 3-5: Summary of Storage under Post-Development Conditions

Manhole ID	Tributary Area IDs	2-Year Required Storage (m^3)	100-Year Required Storage (m^3)	Provided Storage (m^3)
MH 100	C10X, EX 2750-1, EX2760, UNC-E	28.8	166.3	166.3

3.4.1.2 Major System

Given the imperviousness of the site post-development and limited storage provided, major system spillage from the site towards the Sheffield Road ROW is anticipated at the 100-year storm event. Through the Modified Rational Method, the peak spillover from the site during the 100-year storm event is estimated as 183.1 L/s. Under this condition, excess stormwater is not collected by the onsite storm sewer system and existing downstream DICB and is instead spilled onto the Sheffield Road ROW per existing conditions.

Given the controlled minor system discharge of 259.1 L/s under the 100-year storm event, the total discharge from the site sums to 442.2 L/s, which is well within the target discharge rate of 474.7 L/s.

3.4.1.3 Results

The proposed stormwater management plan meets the requirements noted in sections above and attempts to match existing drainage patterns. **Table 3-6** provides a summary of the peak design discharge rates calculated from the MRM analysis, shown in **Appendix A.1**.

Table 3-6: Summary of 2-Year and 100-Year Event Release Rates

	2-year Peak Discharge (L/s)	100-Year Peak Discharge (L/s)
Minor System (to DICB)	226.8	259.1
Major System (to Sheffield Rd. ROW)	0.0	183.1
Total (L/s)	**226.8**	**442.2**
Target (L/s)	**240.6**	**474.7**

3.4.2 Quality Control

Correspondence with City of Ottawa staff confirmed that on-site quality control with a minimum of 80 % TSS long term removal is to be established for the site.

A Stormceptor oil/grit separator has been specified for this purpose and is arranged to treat flows captured by the proposed storm sewer segments within tributary areas to the existing DICB. Using a fine particle size distribution and the Stormceptor Sizing Tool, a Stormceptor model EFO6 has been selected for the monitoring manhole proposed for the site and will achieve approximately 81% TSS removal, exceeding the minimum required TSS removal level of 80%. The detailed Stormceptor sizing reports are included in **Appendix A.4**.

While a Stormceptor EFO6 has been specified for the monitoring manhole, the objective is to demonstrate the ability to meet the water quality requirement. Other treatment systems with equivalent TSS removal capabilities based on parameters specified within the sizing reports may also be used provided a sufficient monitoring manhole to meet City of Ottawa requirements is also included.

3.5 Proposed Stormwater Servicing

The proposed stormwater servicing comprises of several catch basins contributing to a 300 mm diameter storm sewer and a monitoring manhole, providing quantity storage on site with controlled discharge to the downstream existing ditch inlet catch basin before discharge into the existing 600 mm diameter storm sewers in Sheffield Road.

Details of the pipe sizing and structures can be found in **Appendix A.3**, while **Drawing SD-2** showcases the sewer layout**.** It is of note that the existing DICB and sewer lead to the Sheffield Road sewer is substantially undersized to suit discharge from both pre-development and post-development scenarios in meeting typical City of Ottawa sewer design criteria for free-flowing sewers under the 2-year storm event. It is anticipated that the sewer system proposed will operate as a component of a stormwater management facility with a restricted release rate to suit the required development criteria outlined in pre-consultation with City of Ottawa staff.

4 Site Grading

A detailed site servicing and grading plan (see **Drawing GP-1**) has been prepared to satisfy the stormwater management requirements described in **Section** 3 and to allow for positive drainage away from the face of existing buildings.

The topographic survey plan indicates that the existing terrain within the project limit area is relatively flat, and slopes towards an existing ditch inlet catch basin, which conveys drainage from the site to the storm sewers in Sheffield Road.

The site servicing and grading plan satisfies the grading and drainage objectives for the proposed development site. The proposed grading respects the existing grades at the property lines and provides adequate overland flow routes. The site grading has been designed to maintain the existing drainage patterns for areas not intended for redevelopment to remain.

5 Approvals

The proposed access road lies on a private site under singular ownership and drains to an approved separated sewer outlet. However, as the proposed sewers are intended to service industrial land or land uses, the site is subject to the Ministry of the Environment, Conservation and Parks (MECP) Environmental Compliance Application (ECA) process. Consultation will be initiated with City of Ottawa and MECP staff to determine if the ECA will be obtained through direct submission to MECP or through the City of Ottawa Transfer of Review process.

6 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.

7 Geotechnical Investigation

A geotechnical investigation report was prepared by Paterson Group on January 23, 2023, to provide an assessment of the subsurface conditions for the site. The subsurface profile generally consists of approximately 0.2 m to 1.8 m thickness of fill, comprising of silty sand with varying amounts of gravel, cobbles, and organics. From available geological mapping, the bedrock consists of shale with a drift thickness of about 10 m to 15 m.

Based on Paterson's recommendations, the site is suitable for the proposed development. Due to presence of a silty clay deposit, the site is subject to a permissible grade raise restriction of 2 m.

The recommended rigid pavement structure is further presented in **Table 7-1** below.

Table 7-1: Recommended Pavement Structure

Material	Car Only Parking Areas (mm)	Access Lanes/Local Roadways, Loading Areas, and Heavy Truck Parking Areas (mm)
Wear Course – Superpave 12.5 Asphaltic Concrete	50	40
Binder Course – Superpave 19.0 Asphaltic Concrete	-	50
BASE – OPSS Granular A Crushed Stone	150	150
SUBBASE – OPSS Granular B Type II	300	450

Refer to the geotechnical report excerpts attached in **Appendix B** and the full report part of the submission package for further details.

8 Conclusions

8.1 Stormwater Servicing and Management

Surface storage at catch basins and within the storm sewer system has been proposed to limit the stormwater discharge for all storm events, up to and including the 100-year event, to the 2-year peak pre-development release rate for areas slated for redevelopment. The adjacent existing roof areas continue to drain as per existing conditions to sewers within Sheffield Road. An oil/grit separator is provided to meet the 80% TSS removal water quality requirement for redeveloped site areas.

8.2 Grading

The site comprises of the proposed assess driveway and a proposed storm sewer. The site grading and drainage patterns will be maintained as much as possible and will not be negatively impacted by the proposed access driveway.

8.3 Approvals

An Environmental Compliance Approval (ECA) from the Ministry of the Environment, Conservation and Parks (MECP) will be required for the proposed storm sewers, as they are intended to service industrial land or land uses.

8.4 Geotechnical Investigation

Based on the geotechnical investigation, the site is considered suitable for the proposed development. Due to presence of a silty clay deposit, the site is subject to a permissible grade raise restriction of 2 m.

Appendices

Appendix A Stormwater Servicing and Management

A.1 Modified Rational Method (MRM) Calculations

Stormwater Management Calculations

File No: **160401916**
Project: **2760-2770 Sheffield Access Road**
Date: **17-Apr-25**

SWM Approach:
Post-development to Pre-development flows

Post-Development Site Conditions:

Overall Runoff Coefficient for Site and Sub-Catchment Areas

Runoff Coefficient Table								
Sub-catchment Area Catchment Type	**ID / Description**		**Area (ha) "A"**		**Runoff Coefficient "C"**	**"A x C"**		**Overall Runoff Coefficient**
Controlled - Tributary	UNC-E	Hard	0.029		0.9	0.026		
		Soft	0.004		0.2	0.001		
		Subtotal		0.033			0.027	0.820
Controlled - Tributary	C101A	Hard	0.060		0.9	0.054		
		Soft	0.000		0.2	0.000		
		Subtotal		0.060			0.054	0.900
Uncontrolled - Tributary	EX 2750-1	Hard	0.279		0.9	0.251		
		Soft	0.000		0.2	0.000		
		Subtotal		0.279			0.251	0.900
Uncontrolled - Tributary	EX 2760	Hard	0.489		0.9	0.440		
		Soft	0.000		0.2	0.000		
		Subtotal		0.489			0.440	0.900
Controlled - Tributary	C101B	Hard	0.065		0.9	0.058		
		Soft	0.000		0.2	0.000		
		Subtotal		0.065			0.058	0.900
Controlled - Tributary	C102A	Hard	0.068		0.9	0.061		
		Soft	0.000		0.2	0.000		
		Subtotal		0.068			0.061	0.900
Controlled - Tributary	C102B	Hard	0.065		0.9	0.058		
		Soft	0.000		0.2	0.000		
		Subtotal		0.065			0.058	0.900
Controlled - Tributary	C102C	Hard	0.129		0.9	0.116		
		Soft	0.021		0.2	0.004		
		Subtotal		0.150			0.120	0.800
Controlled - Tributary	C102D	Hard	0.063		0.9	0.057		
		Soft	0.000		0.2	0.000		
		Subtotal		0.063			0.057	0.900
Controlled - Tributary	C103A	Hard	0.179		0.9	0.161		
		Soft	0.000		0.2	0.000		
		Subtotal		0.179			0.161	0.900
Total				**1.449**			**1.287**	
Overall Runoff Coefficient= C:								**0.89**

Total Roof Areas	**0.000 ha**
Total Tributary Surface Areas (Controlled and Uncontrolled)	**1.449 ha**
Total Tributary Area to Outlet	**1.449 ha**
Total Uncontrolled Areas (Non-Tributary)	**0.000 ha**
Total Site	**1.449 ha**

Stormwater Management Calculations

Project #160401916, 2760-2770 Sheffield Access 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

Predevelopment Target Release from Portion of Site

Subdrainage Area:	UNC-E, EX S100B (2-yr)	EX 2750-1, EX 2760 (2-yr)
Area (ha):	0.63	0.77
C:	0.69	0.90

Typical Time of Concentration

tc (min)	I (2 yr) (mm/hr)		Qtarget (L/s)
10	76.81		**240.6**

2 YEAR Modified Rational Method for Entire Site

Subdrainage Area: DICB — Total Tributary to DICB
Area (ha): 1.45
C: 0.89

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.8	274.7	226.8	47.9	**28.8**
20	52.0	186.1	186.1	0.0	0.0
30	40.0	143.2	143.2	0.0	0.0
40	32.9	117.6	117.6	0.0	0.0
50	28.0	100.3	100.3	0.0	0.0
60	24.6	87.8	87.8	0.0	0.0
70	21.9	78.4	78.4	0.0	0.0
80	19.8	70.9	70.9	0.0	0.0
90	18.1	64.9	64.9	0.0	0.0
100	16.7	59.9	59.9	0.0	0.0
110	15.6	55.7	55.7	0.0	0.0
120	14.6	52.1	52.1	0.0	0.0

Storage: Surface Storage, CBs, MHs, and Pipes

Orifice Equation:	= CdA(2gh)^0.5		Where C =	0.61
Orifice Diameter:	300.00	mm		
Invert Elevation	64.75	m	Storage Volume (m³)	
T/G Elevation	66.74	m	CB	3.5
Max Water Elev	66.31	m	MH	4.7
			Pipe	20.9

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
2-year Water Level	66.31	1.41	226.8	28.8	29.0	OK

Subdrainage Area: UNC-E — Controlled - Tributary
Area (ha): 0.03
C: 0.82

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.8	5.8	5.8		
20	52.0	3.9	3.9		
30	40.0	3.0	3.0		
40	32.9	2.5	2.5		
50	28.0	2.1	2.1		
60	24.6	1.8	1.8		
70	21.9	1.6	1.6		
80	19.8	1.5	1.5		
90	18.1	1.4	1.4		
100	16.7	1.3	1.3		
110	15.6	1.2	1.2		
120	14.6	1.1	1.1		

Subdrainage Area: C101A — Controlled - Tributary
Area (ha): 0.06
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.8	11.5	11.5		
20	52.0	7.8	7.8		
30	40.0	6.0	6.0		
40	32.9	4.9	4.9		
50	28.0	4.2	4.2		
60	24.6	3.7	3.7		
70	21.9	3.3	3.3		
80	19.8	3.0	3.0		
90	18.1	2.7	2.7		
100	16.7	2.5	2.5		
110	15.6	2.3	2.3		
120	14.6	2.2	2.2		

Subdrainage Area: EX 2750-1 — Uncontrolled - Tributary
Area (ha): 0.28
C: 0.90

Project #160401916, 2760-2770 Sheffield Access 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

Predevelopment Target Release from Portion of Site

Subdrainage Area:	UNC-E, EX S100B (2-yr)	EX 2750-1, EX 2760 (100-yr)
Area (ha):	0.63	0.77
C:	0.69	1.00

Typical Time of Concentration

tc (min)	I (2 yr) (mm/hr)	I (100 yr) (mm/hr)	Qtarget (L/s)
10	76.81	178.6	**474.7**

100 YEAR Modified Rational Method for Entire Site

Subdrainage Area: DICB — Total Tributary to DICB
Area (ha): 1.45
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Qspilled (L/s)
10	178.6	719.4	259.1	277.2	**166.3**	183.1
20	120.0	483.3	259.1	138.6	**166.3**	85.6
30	91.9	370.1	259.1	92.4	**166.3**	18.7
40	75.1	302.8	259.1	43.7	104.9	0.0
50	64.0	257.7	257.7	0.0	0.0	0.0
60	55.9	225.2	225.2	0.0	0.0	0.0
70	49.8	200.6	200.6	0.0	0.0	0.0
80	45.0	181.3	181.3	0.0	0.0	0.0
90	41.1	165.6	165.6	0.0	0.0	0.0
100	37.9	152.7	152.7	0.0	0.0	0.0
110	35.2	141.8	141.8	0.0	0.0	0.0
120	32.9	132.5	132.5	0.0	0.0	0.0

Storage: Surface Storage, CBs, MHs, and Pipes

Orifice Equation:	Q = CdA(2gh)^0.5	Where C =	0.61	
Orifice Diameter:	300.00 mm			
Invert Elevation	64.75 m	Surface	137.3	m3
T/G Elevation	66.74 m	CB	3.5	m3
Max Water Elev	66.74 m	MH	4.7	m3
		Pipe	20.9	m3

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
100-year Water Level	66.74	1.84	259.1	166.3	166.3	OK

Subdrainage Area: UNC-E — Controlled - Tributary
Area (ha): 0.03
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.6	16.4	16.4		
20	120.0	11.0	11.0		
30	91.9	8.4	8.4		
40	75.1	6.9	6.9		
50	64.0	5.9	5.9		
60	55.9	5.1	5.1		
70	49.8	4.6	4.6		
80	45.0	4.1	4.1		
90	41.1	3.8	3.8		
100	37.9	3.5	3.5		
110	35.2	3.2	3.2		
120	32.9	3.0	3.0		

Subdrainage Area: C101A — Controlled - Tributary
Area (ha): 0.06
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.6	29.6	29.6		
20	120.0	19.9	19.9		
30	91.9	15.2	15.2		
40	75.1	12.4	12.4		
50	64.0	10.6	10.6		
60	55.9	9.3	9.3		
70	49.8	8.2	8.2		
80	45.0	7.5	7.5		
90	41.1	6.8	6.8		
100	37.9	6.3	6.3		
110	35.2	5.8	5.8		
120	32.9	5.4	5.4		

Subdrainage Area: EX 2750-1 — Uncontrolled - Tributary
Area (ha): 0.28
C: 1.00

Stormwater Management Calculations

Project #160401916, 2760-2770 Sheffield Access Road
Modified Rational Method Calculations for Storage

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.8	53.6	53.6		
20	52.0	36.3	36.3		
30	40.0	28.0	28.0		
40	32.9	22.9	22.9		
50	28.0	19.6	19.6		
60	24.6	17.1	17.1		
70	21.9	15.3	15.3		
80	19.8	13.8	13.8		
90	18.1	12.7	12.7		
100	16.7	11.7	11.7		
110	15.6	10.9	10.9		
120	14.6	10.2	10.2		

Subdrainage Area: EX 2760 — Uncontrolled - Tributary
Area (ha): 0.49
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.8	93.9	93.9		
20	52.0	63.6	63.6		
30	40.0	48.9	48.9		
40	32.9	40.2	40.2		
50	28.0	34.3	34.3		
60	24.6	30.0	30.0		
70	21.9	26.8	26.8		
80	19.8	24.2	24.2		
90	18.1	22.2	22.2		
100	16.7	20.5	20.5		
110	15.6	19.0	19.0		
120	14.6	17.8	17.8		

Subdrainage Area: C101B — Controlled - Tributary
Area (ha): 0.06
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.8	12.5	12.5		
20	52.0	8.4	8.4		
30	40.0	6.5	6.5		
40	32.9	5.3	5.3		
50	28.0	4.5	4.5		
60	24.6	4.0	4.0		
70	21.9	3.6	3.6		
80	19.8	3.2	3.2		
90	18.1	2.9	2.9		
100	16.7	2.7	2.7		
110	15.6	2.5	2.5		
120	14.6	2.4	2.4		

Subdrainage Area: C102A — Controlled - Tributary
Area (ha): 0.07
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.8	13.0	13.0		
20	52.0	8.8	8.8		
30	40.0	6.8	6.8		
40	32.9	5.6	5.6		
50	28.0	4.7	4.7		
60	24.6	4.2	4.2		
70	21.9	3.7	3.7		
80	19.8	3.4	3.4		
90	18.1	3.1	3.1		
100	16.7	2.8	2.8		
110	15.6	2.6	2.6		
120	14.6	2.5	2.5		

Subdrainage Area: C102B — Controlled - Tributary
Area (ha): 0.06
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.8	12.5	12.5		
20	52.0	8.5	8.5		
30	40.0	6.5	6.5		
40	32.9	5.3	5.3		
50	28.0	4.6	4.6		
60	24.6	4.0	4.0		
70	21.9	3.6	3.6		
80	19.8	3.2	3.2		
90	18.1	3.0	3.0		
100	16.7	2.7	2.7		
110	15.6	2.5	2.5		
120	14.6	2.4	2.4		

Subdrainage Area: C102C — Controlled - Tributary
Area (ha): 0.15
C: 0.80

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.8	25.6	25.6		
20	52.0	17.4	17.4		
30	40.0	13.4	13.4		
40	32.9	11.0	11.0		
50	28.0	9.4	9.4		
60	24.6	8.2	8.2		
70	21.9	7.3	7.3		
80	19.8	6.6	6.6		

Project #160401916, 2760-2770 Sheffield Access Road
Modified Rational Method Calculations for Storage

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.6	138.5	138.5		
20	120.0	93.0	93.0		
30	91.9	71.3	71.3		
40	75.1	58.3	58.3		
50	64.0	49.6	49.6		
60	55.9	43.4	43.4		
70	49.8	38.6	38.6		
80	45.0	34.9	34.9		
90	41.1	31.9	31.9		
100	37.9	29.4	29.4		
110	35.2	27.3	27.3		
120	32.9	25.5	25.5		

Subdrainage Area: EX 2760 — Uncontrolled - Tributary
Area (ha): 0.49
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.6	242.5	242.5		
20	120.0	162.9	162.9		
30	91.9	124.8	124.8		
40	75.1	102.1	102.1		
50	64.0	86.9	86.9		
60	55.9	75.9	75.9		
70	49.8	67.6	67.6		
80	45.0	61.1	61.1		
90	41.1	55.8	55.8		
100	37.9	51.5	51.5		
110	35.2	47.8	47.8		
120	32.9	44.7	44.7		

Subdrainage Area: C101B — Controlled - Tributary
Area (ha): 0.06
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.6	32.2	32.2		
20	120.0	21.6	21.6		
30	91.9	16.6	16.6		
40	75.1	13.5	13.5		
50	64.0	11.5	11.5		
60	55.9	10.1	10.1		
70	49.8	9.0	9.0		
80	45.0	8.1	8.1		
90	41.1	7.4	7.4		
100	37.9	6.8	6.8		
110	35.2	6.3	6.3		
120	32.9	5.9	5.9		

Subdrainage Area: C102A — Controlled - Tributary
Area (ha): 0.07
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.6	33.5	33.5		
20	120.0	22.5	22.5		
30	91.9	17.3	17.3		
40	75.1	14.1	14.1		
50	64.0	12.0	12.0		
60	55.9	10.5	10.5		
70	49.8	9.3	9.3		
80	45.0	8.4	8.4		
90	41.1	7.7	7.7		
100	37.9	7.1	7.1		
110	35.2	6.6	6.6		
120	32.9	6.2	6.2		

Subdrainage Area: C102B — Controlled - Tributary
Area (ha): 0.06
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.6	32.3	32.3		
20	120.0	21.7	21.7		
30	91.9	16.6	16.6		
40	75.1	13.6	13.6		
50	64.0	11.6	11.6		
60	55.9	10.1	10.1		
70	49.8	9.0	9.0		
80	45.0	8.1	8.1		
90	41.1	7.4	7.4		
100	37.9	6.8	6.8		
110	35.2	6.4	6.4		
120	32.9	5.9	5.9		

Subdrainage Area: C102C — Controlled - Tributary
Area (ha): 0.15
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.6	74.5	74.5		
20	120.0	50.0	50.0		
30	91.9	38.3	38.3		
40	75.1	31.3	31.3		
50	64.0	26.7	26.7		
60	55.9	23.3	23.3		
70	49.8	20.8	20.8		
80	45.0	18.8	18.8		

Stormwater Management Calculations

Project #160401916, 2760-2770 Sheffield Access Road
Modified Rational Method Calculations for Storage

90	18.1	6.1	6.1		
100	16.7	5.6	5.6		
110	15.6	5.2	5.2		
120	14.6	4.9	4.9		

Subdrainage Area: C102D — Controlled - Tributary
Area (ha): 0.06
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.8	12.1	12.1		
20	52.0	8.2	8.2		
30	40.0	6.3	6.3		
40	32.9	5.2	5.2		
50	28.0	4.4	4.4		
60	24.6	3.9	3.9		
70	21.9	3.5	3.5		
80	19.8	3.1	3.1		
90	18.1	2.9	2.9		
100	16.7	2.6	2.6		
110	15.6	2.5	2.5		
120	14.6	2.3	2.3		

Subdrainage Area: C103A — Controlled - Tributary
Area (ha): 0.18
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.8	34.3	34.3		
20	52.0	23.3	23.3		
30	40.0	17.9	17.9		
40	32.9	14.7	14.7		
50	28.0	12.5	12.5		
60	24.6	11.0	11.0		
70	21.9	9.8	9.8		
80	19.8	8.9	8.9		
90	18.1	8.1	8.1		
100	16.7	7.5	7.5		
110	15.6	7.0	7.0		
120	14.6	6.5	6.5		

SUMMARY TO OUTLET

		Vrequired	Vavailable*	
Tributary Area	1.449 ha			
Total 2yr Flow to Sewer	227 L/s	0	0 m^3	Ok
Total 2yr Flow Uncontrolled	0 L/s			
Total Area	1.449 ha			
Total 2yr Flow	227 L/s			
Target	241 L/s			

Project #160401916, 2760-2770 Sheffield Access Road
Modified Rational Method Calculations for Storage

90	41.1	17.1	17.1		
100	37.9	15.8	15.8		
110	35.2	14.7	14.7		
120	32.9	13.7	13.7		

Subdrainage Area: C102D — Controlled - Tributary
Area (ha): 0.06
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.6	31.3	31.3		
20	120.0	21.0	21.0		
30	91.9	16.1	16.1		
40	75.1	13.2	13.2		
50	64.0	11.2	11.2		
60	55.9	9.8	9.8		
70	49.8	8.7	8.7		
80	45.0	7.9	7.9		
90	41.1	7.2	7.2		
100	37.9	6.6	6.6		
110	35.2	6.2	6.2		
120	32.9	5.8	5.8		

Subdrainage Area: C103A — Controlled - Tributary
Area (ha): 0.18
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.6	88.7	88.7		
20	120.0	59.6	59.6		
30	91.9	45.6	45.6		
40	75.1	37.3	37.3		
50	64.0	31.8	31.8		
60	55.9	27.8	27.8		
70	49.8	24.7	24.7		
80	45.0	22.4	22.4		
90	41.1	20.4	20.4		
100	37.9	18.8	18.8		
110	35.2	17.5	17.5		
120	32.9	16.3	16.3		

SUMMARY TO OUTLET

		Vrequired	Vavailable*	
Tributary Area	1.449 ha			
Total 100yr Flow to Sewer	259 L/s	0	0 m^3	Ok
Total 100yr Flow Uncontrolled	183 L/s			
Total Area	1.449 ha			
Total 100yr Flow	442 L/s			
Target	475 L/s			

A.2 Correspondence with the City on SWM Quality Control

Wu, Michael

From: Adams, Reed <reed.adams@ottawa.ca>
Sent: February 12, 2024 14:00
To: Wu, Michael
Cc: Gillis, Sheridan
Subject: RE: 2760-2770 Sheffield Road Servicing Stormwater Sewer Capacity and QC criteria

Hi Michael,

For quality control, the requirement would be 80% TSS removal.

As for the capacity in the downstream storm sewer, I've sent an email to one of our water resources engineers and I'll let you know when he gets back to me.

Quick question, have you had a Phase 1 pre-con yet for this site?

Thanks,

Reed

From: Wu, Michael <Michael.Wu@stantec.com>
Sent: February 12, 2024 11:34 AM
To: Adams, Reed <reed.adams@ottawa.ca>
Cc: Gillis, Sheridan <Sheridan.Gillis@stantec.com>
Subject: 2760-2770 Sheffield Road Servicing Stormwater Sewer Capacity and QC criteria

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Good morning, Reed:

We are assessing the stormwater servicing options for a proposed parking lot expansion at the 2760-2770 Sheffield Road industrial site on behalf of Richcraft, and we would like confirmation on a couple of items.

First, does the City have any stormwater quality control criteria at the site for site plan control?

And second, we are looking at the potential to extend the downstream 600 mm diameter storm sewer on Sheffield Road, as highlighted in **red** in the attached sketch, as one of the servicing options. As such, we would like to confirm if there are any spare capacity in the downstream storm sewer if there is available information.

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

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A.3 Storm Sewer Design Sheet

Stantec

2760-2770 Sheffield Road Access Driveway

DATE:	2025-03-18
REVISION:	1
DESIGNED BY:	MW
CHECKED BY:	DT

STORM SEWER DESIGN SHEET
(City of Ottawa)

FILE NUMBER: **160401916**

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	MANNING'S n =	0.013	BEDDING CLASS =	B
b =	6.199	6.053	6.014	6.014	MINIMUM COVER:	2.00	m	
c =	0.810	0.814	0.816	0.820	TIME OF ENTRY	10	min	

LOCATION			DRAINAGE AREA																
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)
C103A	C103A	102	0.18	0.00	0.00	0.00	0.00	0.90	0.00	0.00	0.00	0.161	0.161	0.000	0.000	0.000	0.000	0.000	0.000
C102C, C102B, C102D, C102A	102	101	0.35	0.00	0.00	0.00	0.00	0.86	0.00	0.00	0.00	0.296	0.457	0.000	0.000	0.000	0.000	0.000	0.000
C101B, C101A	101	100	0.12	0.00	0.00	0.00	0.00	0.90	0.00	0.00	0.00	0.112	0.569	0.000	0.000	0.000	0.000	0.000	0.000
	100	EX DICB	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.569	0.000	0.000	0.000	0.000	0.000	0.000

LOCATION			DRAINAGE AREA								PIPE SELECTION										
AREA ID NUMBER	FROM M.H.	TO M.H.	T of C (min)	I_{2-YEAR} (mm/h)	I_{5-YEAR} (mm/h)	$I_{10-YEAR}$ (mm/h)	$I_{100-YEAR}$ (mm/h)	$Q_{CONTROL}$ (L/s)	ACCUM. $Q_{CONTROL}$ (L/s)	Q_{ACT} (CIA/360) (L/s)	LENGTH (m)	PIPE WIDTH OR DIAMETEI (mm)	PIPE HEIGHT (mm)	PIPE SHAPE (-)	MATERIAL (-)	CLASS (-)	SLOPE %	Q_{CAP} (FULL) (L/s)	% FULL (-)	VEL. (FULL) (m/s)
C103A	C103A	102	10.00	76.81	104.19	122.14	178.56	0.0	0.0	34.3	33.5	300	300	CIRCULAR	PVC	-	0.40	60.8	**56.42%**	0.86
C102C, C102B, C102D, C102A	102	101	10.73	74.12	100.49	117.79	172.16	0.0	0.0	94.0	110.6	300	300	CIRCULAR	PVC	-	0.40	60.8	**154.65%**	0.86
C101B, C101A	101	100	12.86	67.32	91.17	106.80	156.03	0.0	0.0	106.4	110.6	300	300	CIRCULAR	PVC	-	0.40	60.8	**174.91%**	0.86
	100	EX DICB	15.00	61.78	83.57	97.87	142.92	0.0	0.0	97.6	6.0	300	300	CIRCULAR	PVC	-	0.40	60.8	**160.51%**	0.86
			15.11									300	300							

Note: Existing outlet sewer is undersized to meet free-flowing sewer design criteria. Please refer to Modified Rational Method analysis for demonstration of restricted minor system release rates.

A.4 Detailed Stormceptor Sizing Reports

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

03/14/2025

Province:	Ontario
City:	Ottawa
Nearest Rainfall Station:	OTTAWA CDA RCS
Climate Station Id:	6105978
Years of Rainfall Data:	20
Site Name:	Access Road
Drainage Area (ha):	1.45
Runoff Coefficient 'c':	0.89

Project Name:	2760-2770 Sheffield Road
Project Number:	160401916
Designer Name:	Michael Wu
Designer Company:	Stantec
Designer Email:	Michael.Wu@stantec.com
Designer Phone:	613-738-6033
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0
Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	41.65
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	
Influent TSS Concentration (mg/L):	200
Estimated Average Annual Sediment Load (kg/yr):	1572
Estimated Average Annual Sediment Volume (L/yr):	1278

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	67
EFO5	75
EFO6	81
EFO8	88
EFO10	93
EFO12	95

Recommended Stormceptor EFO Model: EFO6

Estimated Net Annual Sediment (TSS) Load Reduction (%): 81

Water Quality Runoff Volume Capture (%): > 90

THIRD-PARTY TESTING AND VERIFICATION

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

PERFORMANCE

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

PARTICLE SIZE DISTRIBUTION (PSD)

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

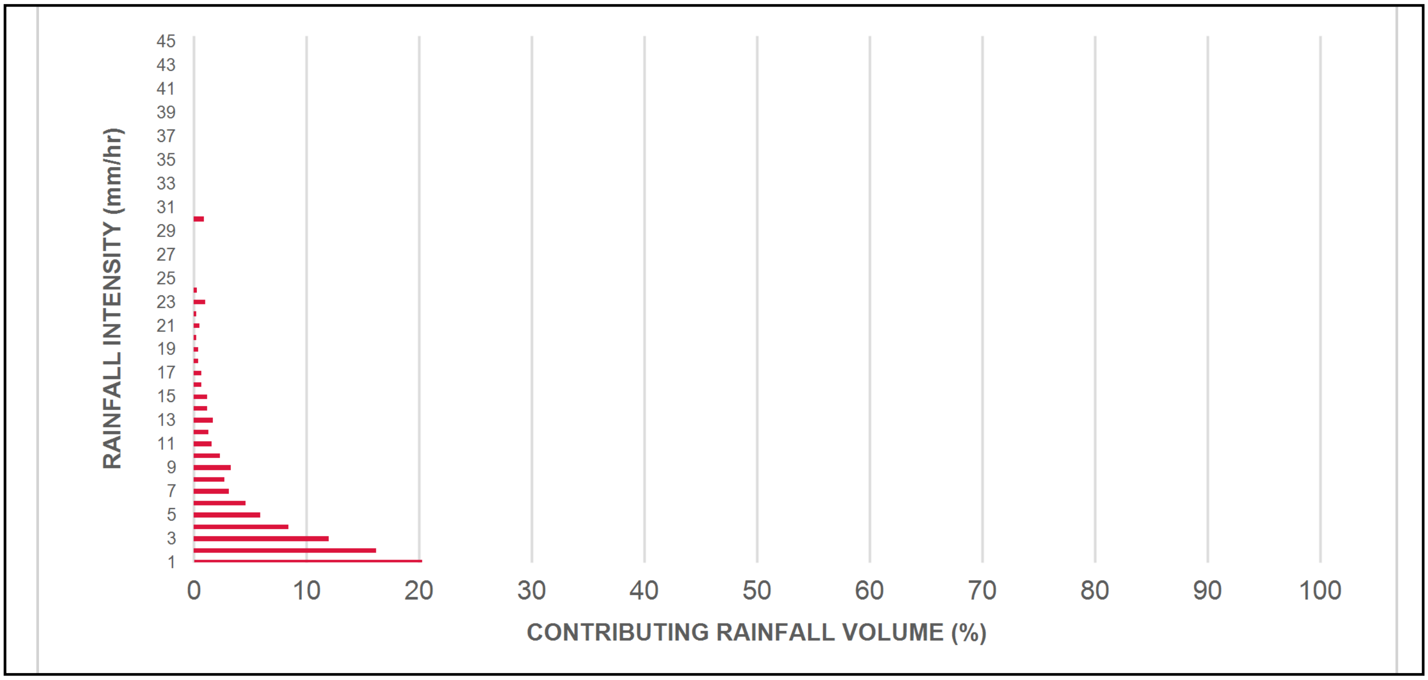
Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

Stormceptor® EF Sizing Report

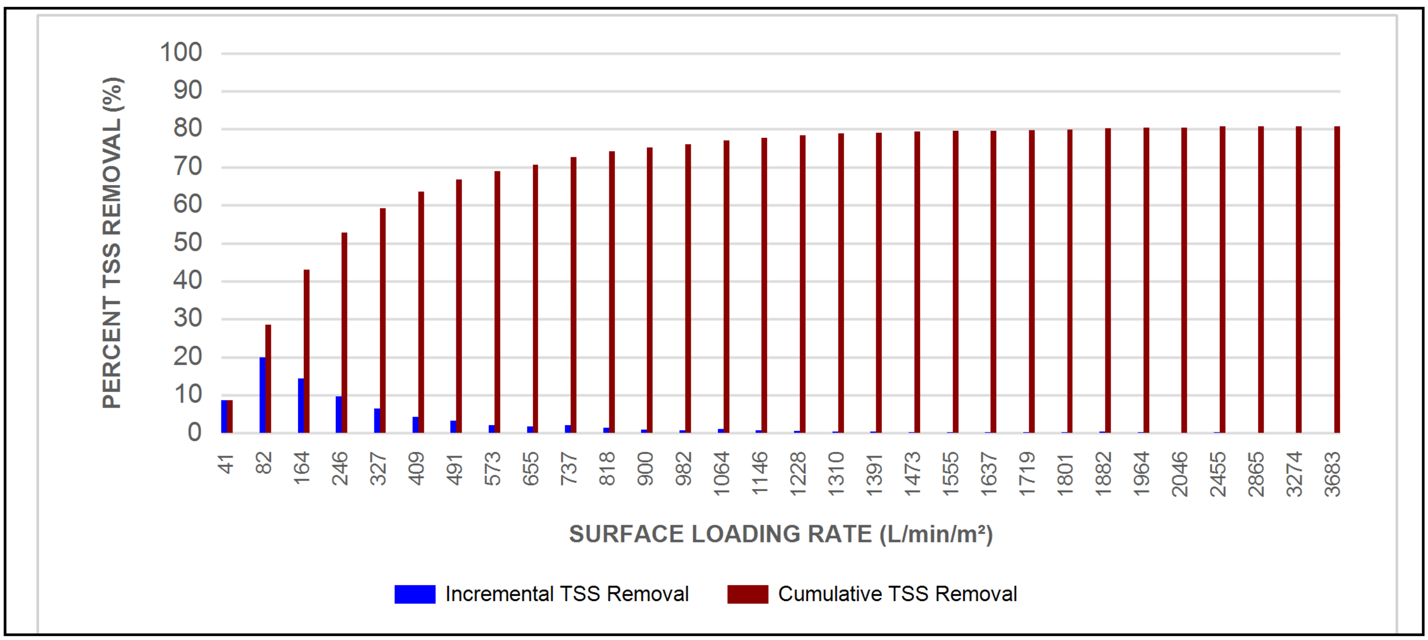
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.6	8.6	1.79	108.0	41.0	100	8.6	8.6
1.00	20.3	29.0	3.59	215.0	82.0	98	20.0	28.6
2.00	16.2	45.2	7.18	431.0	164.0	88	14.3	43.0
3.00	12.0	57.2	10.76	646.0	246.0	81	9.7	52.7
4.00	8.4	65.6	14.35	861.0	327.0	78	6.5	59.2
5.00	5.9	71.6	17.94	1076.0	409.0	73	4.4	63.6
6.00	4.6	76.2	21.53	1292.0	491.0	70	3.2	66.8
7.00	3.1	79.3	25.11	1507.0	573.0	66	2.0	68.9
8.00	2.7	82.0	28.70	1722.0	655.0	64	1.8	70.6
9.00	3.3	85.3	32.29	1937.0	737.0	64	2.1	72.7
10.00	2.3	87.6	35.88	2153.0	818.0	63	1.4	74.2
11.00	1.6	89.2	39.46	2368.0	900.0	62	1.0	75.2
12.00	1.3	90.5	43.05	2583.0	982.0	62	0.8	76.0
13.00	1.7	92.2	46.64	2798.0	1064.0	60	1.0	77.0
14.00	1.2	93.5	50.23	3014.0	1146.0	58	0.7	77.7
15.00	1.2	94.6	53.81	3229.0	1228.0	56	0.7	78.4
16.00	0.7	95.3	57.40	3444.0	1310.0	54	0.4	78.8
17.00	0.7	96.1	60.99	3659.0	1391.0	53	0.4	79.1
18.00	0.4	96.5	64.58	3875.0	1473.0	50	0.2	79.3
19.00	0.4	96.9	68.16	4090.0	1555.0	47	0.2	79.5
20.00	0.2	97.1	71.75	4305.0	1637.0	45	0.1	79.6
21.00	0.5	97.5	75.34	4520.0	1719.0	43	0.2	79.8
22.00	0.2	97.8	78.93	4736.0	1801.0	41	0.1	79.9
23.00	1.0	98.8	82.51	4951.0	1882.0	39	0.4	80.3
24.00	0.3	99.1	86.10	5166.0	1964.0	37	0.1	80.4
25.00	0.0	99.1	89.69	5381.0	2046.0	36	0.0	80.4
30.00	0.9	100.0	107.63	6458.0	2455.0	30	0.3	80.7
35.00	0.0	100.0	125.57	7534.0	2865.0	26	0.0	80.7
40.00	0.0	100.0	143.50	8610.0	3274.0	23	0.0	80.7
45.00	0.0	100.0	161.44	9686.0	3683.0	20	0.0	80.7
Estimated Net Annual Sediment (TSS) Load Reduction =								81 %

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

RAINFALL DATA FROM OTTAWA CDA RCS RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL
FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

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

SCOUR PREVENTION AND ONLINE CONFIGURATION

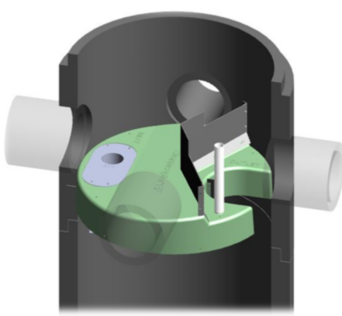
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test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

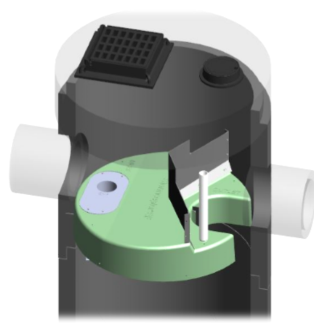
DESIGN FLEXIBILITY

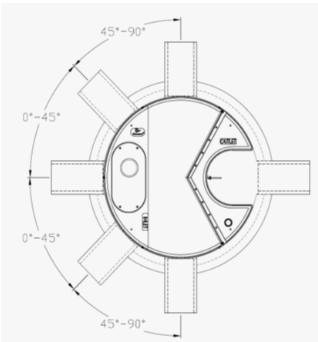
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend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

OIL CAPTURE AND RETENTION

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







INLET-TO-OUTLET DROP

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

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

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

HEAD LOSS

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

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft³)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF5 / EFO5	1.5	5	1.62	5.3	420	111	305	10	2124	75	2612	5758
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

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

** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft³)

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

STANDARD STORMCEPTOR EF/EFO DRAWINGS

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

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

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

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

PART 1 – GENERAL

1.1 WORK INCLUDED

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

1.2 REFERENCE STANDARDS & PROCEDURES

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

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

1.3 SUBMITTALS

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

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

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

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

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

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

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

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

3.2 SIZING METHODOLOGY

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

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

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

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

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

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

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

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

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

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

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

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

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

Appendix B External Report Excerpts

PATERSON GROUP

Geotechnical Investigation

Proposed Industrial Building

2760-2770 Sheffield Road
Ottawa, Ontario

Prepared for Richcraft

Report PG6530 -1 dated January 23, 2023

3.0 Method of Investigation

3.1 Field Investigation

Field Program

The current geotechnical investigation was carried out on January 10th and 11th, 2023, and consisted of a total of nine (9) boreholes (BH 1-23 through BH 9-23) advanced to a maximum depth of 7.3 m below the existing grade. The borehole locations were distributed in a manner to provide general coverage of the subject site, taking into consideration underground services and available access. The approximate locations of the boreholes are shown on Drawing PG6530-1 - Test Hole Location Plan included in Appendix 2.

The boreholes were drilled using a low-clearance track-mounted drill rig operated by a two-person crew. All fieldwork was conducted under the full-time supervision of Paterson personnel under the direction of a senior engineer.

Sampling and In Situ Testing

The soil samples were collected from the boreholes using a 50 mm diameter split-spoon (SS) sampler or from the drill auger and hand auger flights. The samples were initially classified on site, placed in sealed plastic bags, and transported to our laboratory. The depths at which the drill auger, and split-spoon samples were recovered from the boreholes are shown as AU and SS, respectively, on the Soil Profile and Test Data sheets in Appendix 1.

A Standard Penetration Test (SPT) was conducted in conjunction with the recovery of the split spoon samples. The SPT results are recorded as "N" values on the Soil Profile and Test Data sheets. The "N" value is the number of blows required to drive the split spoon sampler 300 mm into the soil after a 150 mm initial penetration using a 63.5 kg hammer falling from a height of 760 mm.

Undrained shear strength testing was carried out in cohesive soils using a field vane apparatus.

The overburden thickness was evaluated by a dynamic cone penetration test (DCPT) completed at boreholes BH 1-23 and BH 4-23. The DCPT consists of driving a steel drill rod, equipped with a 50 mm diameter cone at the tip, using a 63.5 kg hammer falling from a height of 760 mm. The number of blows required to drive the cone into the soil is recorded for each 300 mm increment.

5.0 Discussion

5.1 Geotechnical Assessment

From a geotechnical perspective, the subject site is suitable for the proposed development. It is recommended that the proposed industrial building be founded on conventional spread footings placed on an undisturbed, very to hard silty clay bearing surface.

Due to the presence of a silty clay deposit, a grade raise restriction will apply to the subject site. Permissible grade raise recommendations are discussed in Section 5.3.

The above and other considerations are further discussed in the following sections.

5.2 Site Grading and Preparation

Stripping Depth

Topsoil and fill, such as those containing organic or deleterious materials, should be stripped from under any buildings and other settlement sensitive structures. It is anticipated that the existing fill within the future building footprint, free of deleterious material and significant amounts of organics, can be left in place below the proposed building footprints outside of lateral support zones for the footings. However, it is recommended that the existing fill layer be proof-rolled several times under dry conditions and above freezing temperatures and approved by Paterson personnel at the time of construction. Any poor performing areas noted during the proof-rolling operation should be removed and replaced with an approved fill.

Fill Placement

Engineered fill placed for grading beneath the proposed buildings, where required, should consist of clean imported granular fill, such as Ontario Provincial Standard Specifications (OPSS) Granular A or Granular B Type II. This material should be tested and approved prior to delivery to the site. The fill should be placed in lifts no greater than 300 mm thick and compacted using suitable compaction equipment for the lift thickness. Fill placed beneath the buildings and paved areas should be compacted to at least 98% of the material's standard Proctor maximum dry density (SPMDD).

Non-specified existing fill, along with site-excavated soil, can be used as general landscaping fill where settlement of the ground surface is of minor concern. This material should be spread in thin lifts and at least compacted by the tracks of the spreading equipment to minimize voids. If this material is to be used to build up the subgrade level for areas to be paved, it should be compacted in thin lifts to at least 95% of the material's SPMDD.

5.3 Foundation Design

Bearing Resistance Values – Conventional Spread Footings

Strip footings, up to 3 m wide, and pad footings, up to 5 m wide, placed on an undisturbed, very stiff to hard silty clay bearing surface can be designed using a bearing resistance value at serviceability limit states (SLS) of **150 kPa** and a factored bearing resistance value at ultimate limit states (ULS) of **225 kPa**. A geotechnical resistance factor of 0.5 is applied to the above noted bearing resistance value at ULS.

The above-noted bearing resistance values at SLS for soil bearing surfaces will be subjected to potential post-construction total and differential settlements of 25 and 20 mm, respectively.

An undisturbed soil bearing surface consists of one from which all topsoil and deleterious materials, such as loose, frozen or disturbed soil, whether in situ or not, have been removed, in the dry, prior to the placement of concrete for footings.

Lateral Support

The bearing medium under footing-supported structures is required to be provided with adequate lateral support with respect to excavations and different foundation levels. Adequate lateral support is provided to a silty clay bearing medium when a plane extending down and out from the bottom edge of the footing at a minimum of 1.5H:1V, passes only through in situ soil or engineered fill of the same or higher capacity as the bearing soil.

Permissible Grade Raise

Due to the presence of the silty clay deposit, a permissible grade raise restriction of **2 m** is recommended. A post-development groundwater lowering of 0.5 m was considered in our permissible grade raise calculations.

If higher than permissible grade raises are required, preloading with or without a surcharge, lightweight fill, and/or other measures should be investigated to reduce the risks of unacceptable long-term post construction total and differential settlements.

5.4 Design for Earthquakes

The site class for seismic site response can be taken as **Class D**. If a higher seismic site class is required (Class C), a site-specific shear wave velocity test may be completed to accurately determine the applicable seismic site classification for foundation design of the proposed buildings, as presented in Table 4.1.8.4.A of the Ontario Building Code (OBC) 2012.

Soils underlying the subject site are not susceptible to liquefaction. Reference should be made to the latest revision of the Ontario Building Code 2012 for a full discussion of the earthquake design requirements.

5.5 Slab on Grade Construction

With the removal of all topsoil and fill, containing significant amounts of deleterious or organic materials, the existing fill subgrade or native soil subgrade approved by the geotechnical consultant at the time of excavation will be considered an acceptable subgrade surface on which to commence backfilling for slab-on-grade construction. Where the subgrade consists of the existing fill, a vibratory drum roller should complete several passes over the subgrade surface as a proof-rolling program. Any poor performing areas should be removed and reinstated with an engineered fill, such as OPSS Granular B Type II.

It is recommended that the upper 200 mm of sub-floor fill consists of OPSS Granular A crushed stone. All backfill material within the footprint of the proposed building should be placed in maximum 300 mm thick loose layers and compacted to at least 98% of its SPMDD.

5.6 Pavement Design

Car only parking, heavy truck parking areas and access lanes are proposed at this site. The proposed pavement structures are presented in Tables 3 and 4 on the next page.

Table 3 – Recommended Pavement Structure – Car Only Parking Areas	
Thickness (mm)	**Material Description**
50	**Wear Course –** HL-3 or Superpave 12.5 Asphaltic Concrete
150	**BASE –** OPSS Granular A Crushed Stone
300	**SUBBASE –** OPSS Granular B Type II
Subgrade – Either fill, in-situ soil, or OPSS Granular B Type I or II material placed over fill or in-situ soil.	

Table 4 - Recommended Pavement Structure - Access Lanes/Local Roadways, Loading Areas and Heavy Truck Parking	
Thickness (mm)	**Material Description**
40	**Wear Course** - Superpave 12.5 Asphaltic Concrete
50	**Binder Course** - Superpave 19.0 Asphaltic Concrete
150	**BASE** - OPSS Granular A Crushed Stone
450	**SUBBASE** - OPSS Granular B Type II
SUBGRADE - Either fill, in situ soil, or OPSS Granular B Type I or II material placedover fill or 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 II material. Minimum Performance Graded (PG) 58-34 asphalt cement should be used for this project. The pavement granular base and subbase should be placed in maximum 300 mm thick lifts and compacted to a minimum of 99% 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. For areas where silty clay is encountered at subgrade level, it is recommended that subdrains be installed during the pavement construction as per City of Ottawa standards. The subdrain inverts should be approximately 300 mm below subgrade level. The subgrade surface should be crowned to promote water flow to the drainage lines.

7.0 Recommendations

It is a requirement for the foundation data provided herein to be applicable that the following material testing, and observation program be performed by the geotechnical consultant.

- Review of the grading plan, from a geotechnical perspective.
- Observation of all bearing surfaces prior to the placement of concrete.
- Sampling and testing of the concrete and fill materials.
- 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.
- Field density tests to determine the level of compaction achieved.
- Sampling and testing of the bituminous concrete including mix design reviews.

All excess soils, with the exception of engineered crushed stone fill, generated by construction activities that will be transported on-site or off-site should be handled as per *Ontario Regulation 406/19: On-Site and Excess Soil Management*.

A report confirming that these works have been conducted in general accordance with our recommendations could be issued upon request, following the completion of a satisfactory material testing and observation program by Paterson

8.0 Statement of Limitations

The recommendations provided are in accordance with the present understanding of the project. Paterson requests permission to review the recommendations when the drawings and specifications are completed.

A soils investigation is a limited sampling of a site. Should any conditions at the site be encountered which differ from those at the test locations, Paterson requests immediate notification to permit reassessment of our recommendations.

The recommendations provided herein should only be used by the design professionals associated with this project. They are not intended for contractors bidding on or undertaking the work. The latter should evaluate the factual information provided in this report and determine the suitability and completeness for their intended construction schedule and methods. Additional testing may be required for their purposes.

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 Richcraft, or their agents, is not authorized without review by Paterson for the applicability of our recommendations to the alternative use of the report.

Paterson Group Inc.

Puneet Bandi, M.Eng.

Scott S. Dennis, P.Eng.

Report Distribution:

- ❑ Richcraft (e-mail copy)
- ❑ Paterson Group (1 copy)

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