D.B. Gray Engineering Inc.

Stormwater Management - Grading & Drainage - Storm & Sanitary Sewers - Watermains

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SITE SERVICING & STORMWATER MANAGEMENT REPORT

4405-4409 INNES ROAD
OTTAWA, ONTARIO

REPORT NO. 25061

DECEMBER 16, 2025

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1.0 INTRODUCTION

This report has been prepared in support of the Site Plan Control application for the proposed 2-storey medical facility located at 4405-4409 Innes Road in Ottawa, Ontario. Refer to Pre-Application Consultation meeting notes in Appendix A. This report describes the servicing for the proposed building and stormwater management for the 2,469 sqm property. The property is currently occupied by a building to be demolished.

This report forms part of the site servicing and stormwater management design for the proposed development. Also refer to drawings C-1 to C-12 prepared by D.B. Gray Engineering Inc.

2.0 WATER SERVICING

2.1 WATER SUPPLY FOR FIREFIGHTING

The City of Ottawa has stated *"Regarding fire flow for the site, there will need to be a private hydrant installed on site due to the one across the street not being available as a primary hydrant option due to it being on the other side of an arterial road."* Therefore, a private fire hydrant is required. A private fire hydrant is proposed to be located at the SE corner of the property. It is 25 m unobstructed distance to the front entrance of the proposed building.

In accordance with City of Ottawa Technical Bulletin IWSTB-2024-05, when calculating the required fire flow on private property in urban areas, the Ontario Building Code Method is to be used. Using the Ontario Building Code Method, the required fire flow is calculated to be 2,700 L/min (45 L/s). Refer to calculations in Appendix B.

The boundary conditions in the 600 mm Innes Road municipal watermain provided by the City of Ottawa for the 45 L/s fire flow at the subject property indicate a hydraulic grade line (HGL) of 127.1 m. Refer to Appendix B.

Using EPANET, a model was created to analyze the hydraulics of the private watermain up to the private fire hydrant. Based on a 45.12 L/s demand, and the 127.1 m HGL provided by the City of Ottawa for the 45 L/s fire flow at the subject property, the pressure at the private fire hydrant is determined to be 357 kPa (52 psi). Refer to Appendix B. Since the pressure is above the Ontario Building Code's minimum required pressure of 140 kPa (20 psi), there is an adequate water supply for firefighting.

2.2 DOMESTIC WATER SUPPLY

In accordance with the City of Ottawa Water Design Guidelines for the consumption rate and peaking factors, the average daily demand is calculated to be 0.08 L/s, the maximum daily demand is calculated to be 0.12 L/s and the maximum hourly demand is calculated to be 0.22 L/s. Refer to calculations in Appendix B.

The boundary conditions in the 600 mm Innes Road municipal watermain provided by the City of Ottawa at the subject property indicate a minimum HGL of 127.8 m and a maximum HGL of 130.2 m. Refer to Appendix B. Based on these boundary conditions, the pressure at the water meter is calculated to vary between 381 kPa (55 psi) and 404 kPa (59 psi). This is an acceptable range for the proposed development.

A 50 mm water service connecting to a 150 mm private watermain connecting to the existing 600 mm Innes Road municipal watermain is proposed to service the development.

3.0 SANITARY SERVICING

In accordance with

i. the City of Ottawa Sewer Design Guidelines for the peaking factor, and
ii. City of Ottawa Technical Bulletin ISTB-2018-01 for the average daily flow and infiltration allowance,

the post-development sanitary flow rate is calculated to be 0.20 L/s. A 150 mm sanitary sewer service at 2% slope (21.54 L/s capacity) is proposed to service the development. At the design flow rate the sanitary sewer service will only be at 1% capacity. The proposed 150 mm sanitary sewer service will connect to the existing 250 mm Innes Road municipal sanitary sewer, which at 0.5% slope has a capacity of 42.05 L/s. The City of Ottawa has stated *"A sanitary flow of 0.20 L/s is acceptable."* Refer to Appendix C.

4.0 STORMWATER MANAGEMENT

4.1 QUANTITY CONTROL

The stormwater quantity control criterion is to control the post-development 100-year peak flow rate to the pre-development 5-year peak flow rate using a calculated pre-development runoff coefficient not more than 0.5 and a calculated pre-development time of concentration not less than 10 minutes. It is calculated that the pre-development conditions reflect a 5-year runoff coefficient of 0.41. The 5-year runoff coefficients are increased by 25% to a maximum of 1.00 to calculate the 100-year runoff coefficient. It is calculated that the pre-development conditions reflect a 100-year runoff coefficient of 0.49. Using the Bransby Williams Formula, the pre-development time of concentration is calculated to be 5 minutes. Using the Rational Method with a time of concentration of 10 minutes, the pre-development flow rates are calculated to be 59.87 L/s during the 100-year event and 29.57 L/s during the 5-year event. The Rational and Modified Rational Methods are used to calculate the post-development flow rates and corresponding storage volumes. Refer to calculations in Appendix D.

Drainage Area I (Uncontrolled Flow Off Site – 289 sq.m)
Generally, the perimeter of the property will drain uncontrolled off site. The flow rates are calculated at a time of concentration of 10 minutes.

	100-Year Event	5-Year Event
Maximum Flow Rate	6.19 L/s	3.09 L/s

Drainage Area II (Roof – 560 sq.m)
The 4 roof drains are to be flow control type roof drains, which will restrict the flow of stormwater and cause it to pond on the roof. Each roof drain is to be installed with a single-parabolic slotted weir and release 0.01242 L/s/mm (5 USgpm/in). Roof drains are to be Watts with an Accutrol Weir RD-100-A1 or approved equivalent. The opening at the top of the flow control weir is to be a minimum 50 mm in diameter. A minimum of 4 scuppers each a minimum 400 mm wide are to be installed 150 mm above the roof drains. Refer to architectural for exact locations and details. The roof is to be designed to carry the load of water having a 50 mm depth at the scuppers (i.e. 200 mm depth at the roof drains). Refer to structural.

	100-Year Event	5-Year Event
Maximum Release Rate	6.31 L/s	4.74 L/s
Maximum Depth at Roof Drains	127 mm	95 mm
Maximum Volume Stored	14.84 cu.m	6.27 cu.m

Drainage Area III (1,620 sq.m)
An inlet control device (ICD) located in the outlet pipe of CBMH-5 will restrict the flow of stormwater and cause it to backup into the upstream infrastructure and pond above CB-1, CI-2, CBMH-3, CIMH-4 and CBMH-5. The ICD will be a plug style with a round orifice located at the bottom of the plug c/w a trash basket manufactured by Pedro Plastics or approved equivalent sized by the manufacturer for a release rate of 17.07 L/s at 2.67 m. It is calculated that an orifice area of 3,866 sq.mm (±70 mm dia) with a discharge coefficient of 0.61 will restrict the maximum flow rate to 17.07 L/s at 2.67 m. Based on this orifice, the maximum flow rate during the 5-year event is calculated to be 16.90 L/s at 2.62 m.

	100-Year Event	5-Year Event
Maximum Release Rate	17.07 L/s	16.90 L/s
Maximum Water Elevation	87.76 m	87.70 m
Maximum Volume Stored	42.27 cu.m	14.35 cu.m

Summary
The maximum post-development release rate during the 100-year event is calculated to be 29.57 L/s, which is 51% less than the pre-development flow rate during the 100-year event and equal to the maximum allowable release rate. To achieve the maximum allowable release rate, a maximum storage volume of 57.11 cu.m is required and provided during the 100-year event. The maximum post-development release rate during the 5-year event is calculated to be 24.73 L/s, which is 16% less than the pre-development (maximum allowable) flow rate during the 5-year event. A maximum storage volume of 20.62 cu.m is required and provided during the 5-year event. The post-development reduction in flow is expected to have a positive impact on the 1,500 mm Innes Road municipal storm sewer.

	100-Year Event	5-Year Event
Pre-Development Flow Rate	59.87 L/s	29.57 L/s
Maximum Allowable Release Rate	29.57 L/s	29.57 L/s
Maximum Release Rate	29.57 L/s	24.73 L/s
Maximum Volume Required	57.11 cu.m	20.62 cu.m
Maximum Volume Stored	57.11 cu.m	20.62 cu.m

4.2 QUALITY CONTROL

The stormwater quality control criterion is to provide an enhanced (80% TSS removal) level of protection. An oil grit separator (OGS) manhole is proposed to be located downstream of the inlet control device. Calculations by the manufacturer indicate that the CDS PMSU2015-4 OGS will remove 87.9% of total suspended solids. Refer to calculations in Appendix D.

An Erosion & Sediment Control Plan has been developed to be implemented during construction. Refer to drawings C-8 and C-9 and notes on drawing C-11.

i. Sediment capture filter sock inserts are to be installed in all existing and proposed catch basins and catch basin manholes adjacent to and within the site.
ii. A silt fence barrier is to be installed along the perimeter of the site.
iii. Any material deposited on the public road is to be removed.

4.3 STORM SERVICING

The peak unrestricted roof flow rate during the 2-year event is calculated to be 10.76 L/s. A 150 mm storm sewer service at 2% slope (21.54 L/s capacity) is proposed to service the building. At the peak unrestricted 2-year flow rate the storm sewer service would only be at 50% capacity. The peak restricted roof flow rate during the 2-year event is calculated to be 4.74 L/s. At the peak restricted 2-year flow rate the storm sewer service will only be at 22% capacity. Refer to calculations in Appendix D. The proposed 150 mm storm sewer service will connect to the proposed private storm sewer system downstream of the ICD.

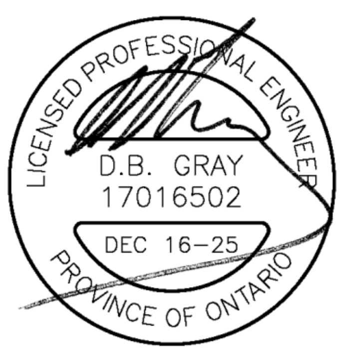
The peak unrestricted flow rate draining into the last sewer segment of the private storm sewer system during the 2-year event is calculated to be 37.35 L/s. A 300 mm storm sewer at 1.5% slope (118.43 L/s capacity) is proposed to connect to the existing 1,500 mm Innes Road municipal storm sewer, which at 0.4% slope has a capacity of 4,672 L/s. At the peak unrestricted 2-year flow rate the proposed 300 mm storm sewer would only be at 32% capacity. The peak restricted flow rate draining into the last sewer segment of the private storm sewer system during the 2-year event is calculated to be 21.26 L/s. At the peak restricted 2-year flow rate the proposed 300 mm storm sewer will only be at 18% capacity. Refer to calculations in Appendix D.

The rainwater leaders inside the building are to be constructed to withstand the pressure from a water column the height of the rainwater leader. Pressure tests are to be performed on the systems in accordance with the mechanical engineer's instructions.

5.0 CONCLUSIONS

1. A private fire hydrant is required and provided.
2. There is an adequate water supply for firefighting.
3. There is an acceptable range of water pressures in the existing municipal water distribution system.
4. The post-development sanitary flow rate will be adequately handled by the proposed sanitary sewer service and existing municipal sanitary sewer.
5. The maximum post-development release rate during the 100-year event will be equal to the maximum allowable release rate.
6. The post-development reduction in stormwater flow is expected to have a positive impact on the existing municipal storm sewer.
7. The proposed OGS will provide an enhanced (80% TSS removal) level of protection.
8. An Erosion & Sediment Control Plan has been developed to be implemented during construction.
9. The peak unrestricted flow rates during the 2-year event will be adequately handled by the proposed storm sewer service and private storm sewer system.
10. The rainwater leaders inside the building are to be constructed to withstand the pressure from a water column the height of the rainwater leader. Pressure tests are to be performed on the systems in accordance with the mechanical engineer's instructions.

Prepared by D.B. Gray Engineering Inc.



APPENDIX A

PRE-APPLICATION CONSULTATION MEETING NOTES

D.B. Gray Engineering Inc.

Ryan Faith <r.faith@dbgrayengineering.com>

Fw: Consultation request- developing of 4405-4409 Innes Road, Orleans, Ottawa

1 message

MAREK JANCZARSKI <marekjan@rogers.com> Tue, May 6, 2025 at 2:04 PM
To: Douglas Gray <d.gray@dbgrayengineering.com>, Ryan Faith <r.faith@dbgrayengineering.com>

good day gentleman,
Please find below assigned contact to city engineering. (Reed Adams) - pls see below.
Please send me a note when they receive any correspondence so i can push the response time.
Ryan, I hope you were able to go through information sent in my firs email. Please indicate if I need to send more.
Below is the list of items sent to me be planning.
I am attachin the geotechnical reporr i case you need it
Pls call me in case you need something
Mark
613-799-4982

----- Forwarded Message -----
From: Belan, Steve <steve.belan@ottawa.ca>
To: MAREK JANCZARSKI <marekjan@rogers.com>
Cc: Armstrong, Justin <justin.armstrong@ottawa.ca>; tlmakecl <tlmakecl@bellnet.ca>; Adams, Reed <reed.adams@ottawa.ca>
Sent: Tuesday, April 15, 2025 at 11:52:15 a.m. EDT
Subject: RE: Consultation request- developing of 4405-4409 Innes Road, Orleans, Ottawa

Mark,

The convention for addressing would be 4405 and 4409 Innes (or 4405/4409 Innes).

Justin has assigned Reed Adams to review the engineering for this file. Reed is cc'ed on this email for Tony to contact.

The list of submission items was given to you verbal at the meeting. Would you send me your notes so that I can confirm those and send you a proper list?

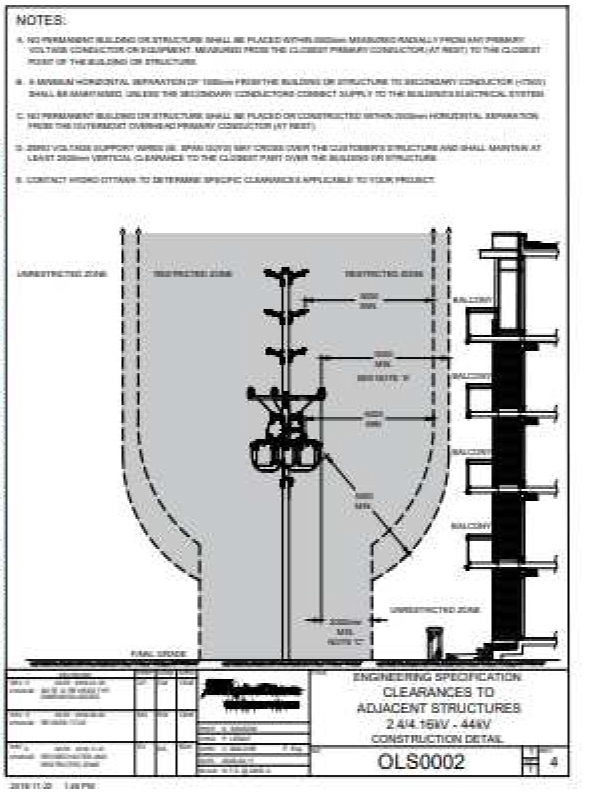
I will not need a pre-con application number or the previous site plan. This will be a new application and will be assigned its own number.

I would be able to help once you are ready to make your application. Generally, all applications are submitted on line to Planning Circulations / Diffusions Planification planningcirculations@ottawa.ca and DR East / EPA Est DREast-EPAEst@ottawa.ca , at that time the application number will be assigned and payment instructions (and file #) will be sent to you by email and the applicant/owner can sign any authorizations at any client service centre.

At the meeting I provided you with a list of plans and studies that we would be looking for to have a complete application. To help with the preparation you will need to follow the City's Terms of Reference and/or Guidelines, as available on Ottawa.ca. These ToR and Guidelines outline the specific requirements that must be met for each plan or study to be deemed adequate.

I will be looking into any possible refund that could be made. In order to do that I will need an email indicating that the owner will be abandoning the last application. I will look into the refund, but as I send, if there is any money it will go back to the person who paid the fee.

Other than the items that I saw at the meeting regarding parking, garbage and hydrants. I would like to point out that there are overhead wires on the northside of Innes and that any building will need to stay out of the pole and line set backs.



Justin has provided the following information regarding the engineering related to this site. Please see below.

Steve Belan, MCIP, RPP

Planner Planning Services, Development Review Services

Planning, Development and Building Services Department (PDBS)

City of Ottawa / Ville d'Ottawa

110 Laurier Avenue West, 4th Floor / 110, avenue Laurier Ouest, 4e étage

Ottawa, ON K1P 1J1

Telephone / tél.: 613-580-2424 ext./poste 27591

E-mail / courriel: Steve.Belan@ottawa.ca

Here are the pre-con notes following our meeting with Marek earlier this week. Still waiting to confirm water frontage. And I think you have all you need for the SPIL correct? Let me know if I am missing anything.

Engineering

Please refer to GeoOttawa with the Water and Wastewater Infrastructure turned on to determine what servicing is available for this site: geoOttawa

Plans and reports can be retrieved at the Information Centre at geoinformation@ottawa.ca.

Please note the following information regarding the engineering design for the above noted site:

1. **Water:**

Frontage charges apply ($190.00 per metre)☐ **Yes**☐ **No**

Accessible Water Main:

*Currently waiting for confirmation from ROW to see whether Frontage Fees are outstanding here.

Submission documents must include:

- Boundary Conditions - civil consultant to request boundary conditions from the City's assigned Project Manager, Development Review. Water boundary conditions request must include the location of the service and the expected loads required by the proposed development. Please provide all the following information:

- Location of service (show on a plan or map)
- Type of development
- Average daily demand: ___ l/s.
- Maximum daily demand: ___l/s.
- Maximum hourly daily demand: ___ l/s.
- Required fire flow and completed FUS Design Declaration if applicable
- Supporting Calculations for all demands listed above and required fire flow as per Ontario Building Code or Fire Underwriter Surveys (See technical Bulletin ISTB-2021-03).

- Watermain system analysis demonstrating adequate pressure as per Section 4.2.2 of the Water Distribution Guidelines.
- Demonstrate adequate hydrant coverage for fire protection. Please review Technical Bulletin ISTB-2018-02, Appendix I Table 1 – maximum flow to be considered from a given hydrant.
- Any proposed emergency route (to be satisfactory to Fire Services).

Note the following additional water-related items relating to discussions had during the December 17th meeting:

- Further discussion will need to take place with City Drinking Water Services related to the acceptability of the proposed connection to the backbone watermain.

- As per the City of Ottawa Water By-Law (By-Law No. 2019-74), an existing water service shall not be connected to a new building unless it meets current City Standards and the water service is inspected and approved for reuse by the Deputy City Manager of Planning and Infrastructure in advance of any connection being made.

- At a quick glance, it does not seem City as-built information for the 610mm backbone watermain does not show water servicing stub information for these properties.

- Existing water services that are unable to be/not being re-used need to be blanked at the watermain.

- Depending on existing service locations, and due to number of service trenches proposed/required in Innes Road, continuous resurfacing requirements may be triggered that will need to be shown on the drawings as well. The following website can be consulted to understand the City's Road Resurfacing policy https://documents.ottawa.ca/sites/default/files/road_cut_policy_scenarios_en.pdf. Resurfacing should be shown on the drawings accordingly.

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2. **Sanitary Sewers:**

Accessible Sanitary Sewer:

A monitoring maintenance hole is required on private property.

- Provide the proposed peak wet weather sanitary flow rate, along with supporting calculations, to our Asset Management team for analysis to demonstrate that there is adequate residual capacity in the receiving and downstream wastewater system to accommodate the proposed development. This information can be provided in an email to the Project Manager, and we will circulate internally.

- Please apply the wastewater design flow parameters in Technical Bulletin PIEDTB-2018-01.

- For laterals connecting to main with 50% pipe diameter or over, provide a manhole.

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3. **Storm Sewers:**

Accessible Storm Sewer:

A monitoring maintenance hole is required on private property.

- For laterals connecting to main with 50% pipe diameter or over, provide a manhole.

Storm Water Management:

- Quality Control:
- Suspended Solids:
  - o Provide Enhanced level of protection (80%) for suspended solids removal.
    - ▪ Confirm ISO 14034 Environmental Technology Verification (ETV) protocol for sizing OGS units.

- Quantity Control:
  - o Design storm for receiving sewer:
  - o Runoff Coefficient: 0.5 or existing, whichever is lesser.
  - o Minor/major system design requirements: Control the 100-year post-development peak flow rate to the 5-year pre-development peak flow rate into the minor system outlet, with all drainage contained on-site up to and including the 100-year event.
  - o Time of concentration (Tc) to be 20 minutes.

- Ponding Notes:
  - o Permissible ponding of 350mm for the 100-year storm event. No spilling to adjacent sites.
  - o At the 100-year ponding elevation, all drainage must be spilled to the Right-of-Way.
  - o 100-year spill elevation from site must be 300mm lower than any building opening.
  - o Demonstrate that the stress test spill elevation (100-year +20% event) does not spill onto any permanent structures.

Geotechnical and Slope Stability:

A new geotechnical investigation will be needed. Refer to City of Ottawa Geotechnical and Slope Stability Guidelines.

MECP ECA Requirements:

- Consultant shall recommend whether site is exempt from ECA or whether one is required. The consultant can discuss with City OM if needed. If required, to be provided after site plan approval.

Additional Notes:

- The pavement age of Innes Road is les than 3-years old. There is therefore currently a road-cut moratorium on Innes Road.
- An ESA that is older than 18 months requires an update.
- Any easement identified should be shown on all plans.

- For any proposed exterior light fixtures, please provide certification from a licensed professional engineer confirming lighting has been designed only using fixtures that meet the criteria for full cut-off classification as recognized by the Illuminating Engineering Society of North America and result in minimal light spillage onto adjacent properties (maximum allowable spillage is 0.5 fc). Additionally, include in the submission the location of the fixtures, fixture type (make, model, part number and mounting height

- Sensitive Marine Clay (SMC) is widely found across Ottawa- geotechnical reports should include Atterberg Limits, consolidation testing, sensitivity values, and vane shear testing.

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3 attachments

PG7514-LET.01 - Geotechnical Investigation Update - April 11, 2025.pdf
5191K

Roof Plan.dwg
491K

Site Plan.dwg
561K

APPENDIX B

WATER SERVICING

D.B. Gray Engineering Inc.

Stormwater Management - Grading & Drainage - Storm & Sanitary Sewers - Watermains

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May 13, 2025

4405-4409 Innes Road

2-Storey Medical Facility

Ottawa, Ontario

FIRE FLOW CALCULATIONS

OBC Method

Q = Required water supply in litres
= KVS_{Total}

K = Water supply coefficient as per OBC A-3.2.5.7. Table 1
= 16 Group D Occupancy, Building is of noncombustible construction with fire separations without fire resistance ratings.

V = Building volume in cubic meters

	Floor Area (sq.m)	Height (m)	Volume (cu.m)
2nd Floor:	560	3.5	1,960
1st Floor:	560	3.6	2,016
			3,976

S_{Total} = Total of spatial coefficients from exposure distances
= $1.0 + S_{Side\ 1} + S_{Side\ 2} + S_{Side\ 3} + S_{Side\ 4}$

	Spatial Coefficient	Exposure Distance (m)	
$S_{Side\ 1}$	0.1	9	(to north property line)
$S_{Side\ 2}$	0	15	(to east property line)
$S_{Side\ 3}$	0	23	(to centerline of road)
$S_{Side\ 4}$	0	35	(to west property line)
S_{Total}	1.1		

Q = 69,978 L
= 2,700 L/min as per OBC A-3.2.5.7. Table 2
= 45 L/s

Boundary Conditions
4405 – 4409 Innes Road

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	5	0.08
Maximum Daily Demand	7	0.12
Peak Hour	13	0.22
Fire Flow Demand #1	2,700	45.00

Location

Results

Connection 1 – Innes Road

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.2	59.8
Peak Hour	127.8	56.4
Max Day plus Fire Flow #1	127.1	55.4

[1] Ground Elevation = 88.1 m

Notes

1. The IWSD has recently updated their water modelling software. Any significant difference between previously received BC results and newly received BC results could be attributed to this update.
2. Any connection to a watermain 400 mm or larger should be approved by DWS as per the Water Design Guidelines Section 2.4 Review by Drinking Water Services.

Disclaimer

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

June 19, 2025

4405-4409 Innes Road

Ottawa, Ontario

EPANET RESULTS

Fire Flow Demand:	45	L/s
Maximum Daily Demand:	0.12	L/s
Fire Flow + Maximum Daily Demand:	45.12	L/s
Fire Flow + Maximum Daily Demand HGL:	127.1	m

Node ID	Demand (L/s)	HGL (m)	Elevation (m)	Pressure (m)	Pressure (kPa)	Pressure (psi)
1 - Reservoir	-45.12	127.1	87.7	39.4	386	56
2 - Fire Hydrant	45.12	124.3	87.9	36.4	357	52

Link ID	Length (m)	Diameter (mm)	Roughness Coefficient	Minor Loss Coefficient	Flow (L/s)	Velocity (m/s)
1 - Reservoir to Fire Hydrant	15.6	150	100	5.10	45.12	2.55

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June 2, 2025

4405-4409 Innes Road

2-Storey Medical Facility

Ottawa, Ontario

WATER DEMAND CALCULATIONS

Average Daily Demand:	0.2469	ha				
	28,000	L/ha/day				
	6,913	L/day				
	24	hour day				
	4.8	L/min	0.08	L/s	1.3	USgpm
Maximum Daily Demand:	1.5	(Peaking factor as per City of Ottawa Water Design Guidelines)				
	7.2	L/min	0.12	L/s	1.9	USgpm
Maximum Hourly Demand:	1.8	(Peaking factor as per City of Ottawa Water Design Guidelines)				
	13.0	L/min	0.22	L/s	3.4	USgpm

Elevation of Water Meter:	88.97	m				
Finished Floor Elevation:	88.07	m				
Minimum HGL:	127.8	m				
Static Pressure at Water Meter:	38.8	m	381	kPa	55	psi
Maximum HGL:	130.2	m				
Static Pressure at Water Meter:	41.2	m	404	kPa	59	psi

APPENDIX C

SANITARY SERVICING

D.B. Gray Engineering Inc.

Stormwater Management - Grading & Drainage - Storm & Sanitary Sewers - Watermains

700 Long Point Circle
Ottawa, Ontario K1T 4E9

613-425-8044
d.gray@dbgrayengineering.com

SANITARY SEWER CALCULATIONS

Project: 4405-4409 Innes Road
2-Storey Medical Facility
Ottawa, Ontario

Date: June 19, 2025

Location		Commercial				Infiltration	Q	Sewer Data						
		Individual	Cumulative			Cumulative	Total							
From	To	Area (ha)	Area (ha)	Peaking Factor	Flow Rate (L/s)	Flow Rate (L/s)	Flow Rate (L/s)	Length (m)	Nominal Diameter (mm)	Actual Diameter (mm)	Slope (%)	Velocity (m/s)	Q_{Full} Capacity (L/s)	Q / Q_{Full}
Proposed Building	Existing 250 SAN	0.2469	0.2469	1.5	0.12	0.08	0.20	11.5	150	150	2	1.22	21.54	1%
Existing 250 mm Innes Road Municipal Sanitary Sewer:									250	250	0.5	0.86	42.05	

Commercial Average Daily Flow: 28,000 L/ha/day
Commercial Peaking Factor: 1.5

Infiltration Allowance: 0.33 L/s/ha

Manning's Roughness Coefficient: 0.013

D.B. Gray Engineering Inc.

Ryan Faith <r.faith@dbgrayengineering.com>

Re: 4405-4409 Innes Road

1 message

Adams, Reed <reed.adams@ottawa.ca> Wed, May 14, 2025 at 11:36 AM
To: Ryan Faith <r.faith@dbgrayengineering.com>
Cc: "Mark J." <marekjan@rogers.com>, Douglas Gray <d.gray@dbgrayengineering.com>

Hi Ryan,

A sanitary flow of 0.20 L/s is acceptable.

Thanks,

Reed

Classified as City of Ottawa - Internal / Ville d'Ottawa - classé interne

---

From: Ryan Faith
Sent: Tuesday, May 13, 2025 8:31 AM
To: Adams, Reed
Cc: Mark J.; Douglas Gray
Subject: 4405-4409 Innes Road

CAUTION: This email originated from an External Sender. Please do not click links or open attachments unless you recognize the source.

ATTENTION : Ce courriel provient d'un expéditeur externe. Ne cliquez sur aucun lien et n'ouvrez pas de pièce jointe, excepté si vous connaissez l'expéditeur.

Hi Reed,

The post-development sanitary flow rate was calculated to be 0.20 L/s. Calculations are attached. Please confirm it is acceptable.

Thanks,

Ryan Faith
D.B. Gray Engineering Inc.
700 Long Point Circle
Ottawa, Ontario K1T 4E9
613-425-8044

'

'

APPENDIX D

STORMWATER MANAGEMENT

Summary Tables

100-Year Event					
Drainage Area	Pre-Development Flow Rate (L/s)	Maximum Allowable Release Rate (L/s)	Maximum Release Rate (L/s)	Maximum Volume Required (cu.m)	Maximum Volume Stored (cu.m)
AREA I (Uncontrolled Flow Off Site)	-	-	6.19	-	-
AREA II (Roof)	-	-	6.31	14.84	14.84
AREA III	-	-	17.07	42.27	42.27
TOTAL	59.87	29.57	29.57	57.11	57.11

5-Year Event					
Drainage Area	Pre-Development Flow Rate (L/s)	Maximum Allowable Release Rate (L/s)	Maximum Release Rate (L/s)	Maximum Volume Required (cu.m)	Maximum Volume Stored (cu.m)
AREA I (Uncontrolled Flow Off Site)	-	-	3.09	-	-
AREA II (Roof)	-	-	4.74	6.27	6.27
AREA III	-	-	16.90	14.35	14.35
TOTAL	29.57	29.57	24.73	20.62	20.62

December 16, 2025

4405-4409 Innes Road

Ottawa, Ontario

Stormwater Management Calculations
Modified Rational Method

Pre-Development Conditions

100-Year Event

			C
Roof Area:	205	sq.m	1.00
Hard Area:	355	sq.m	1.00
Gravel Area:	270	sq.m	0.875
Soft Area:	1,639	sq.m	0.25
Total Catchment Area:	2,469	sq.m	0.49

$$Tc = \frac{0.057 \cdot L}{Sw^{0.2} \cdot A^{0.1}} \text{ min}$$

Sheet Flow Distance (L):	80	m
Slope of Land (Sw):	1.5	%
Area (A):	0.2469	ha
Time of Concentration (Sheet Flow):	5	min
Area (A):	2,469	sq.m
Time of Concentration:	10	min
Rainfall Intensity (i):	179	mm/hr
Runoff Coeficient (C):	0.49	
100-Year Pre-Development Flow Rate (2.78AiC):	59.87	L/s

5-Year Event

			C
Roof Area:	205	sq.m	0.90
Hard Area:	355	sq.m	0.90
Gravel Area:	270	sq.m	0.70
Soft Area:	1,639	sq.m	0.20
Total Catchment Area:	2,469	sq.m	0.41

Area (A):	2,469	sq.m
Time of Concentration:	10	min
Rainfall Intensity (i):	104	mm/hr
Runoff Coeficient (C):	0.41	
5-Year Pre-Development Flow Rate (2.78AiC):	29.57	L/s

100-YEAR EVENT

DRAINAGE AREA I (Uncontrolled Flow Off Site)

(100-YEAR EVENT)

			C
Roof Area:	0	sq.m	1.00
Hard Area:	70	sq.m	1.00
Gravel Area:	0	sq.m	0.875
Soft Area:	219	sq.m	0.25
Total Catchment Area:	289	sq.m	0.43
Area (A):	289	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	179	mm/hr	
Runoff Coeficient (C):	0.43		
Flow Rate (2.78AiC):	6.19	L/s	

DRAINAGE AREA II (Roof)

(100-YEAR EVENT)

				C
Total Catchment Area:	560	sq.m		1.00
No. of Roof Drains:	4			
Slots per Wier:	1	0.01242 L/s/mm/slot (5 USgpm/in/slot)		
Depth at Roof Drains:	127	mm		
Maximum Release Rate:	6.31	L/s		

Pond Area:	351	sq.m
Maximum Volume Stored:	14.84	cu.m
Maximum Volume Required:	14.84	cu.m

Time (min)	i (mm/hr)	2.78AiC (L/s)	Release Rate (L/s)	Stored Rate (L/s)	Required Storage Volume (cu.m)
10	179	27.80	6.31	21.49	12.89
15	143	22.25	6.31	15.94	14.34
20	120	18.67	6.31	12.37	14.84
25	104	16.17	6.31	9.86	14.79
30	92	14.30	6.31	7.99	14.39
35	83	12.86	6.31	6.55	13.75
40	75	11.70	6.31	5.39	12.94
45	69	10.75	6.31	4.44	11.99
50	64	9.96	6.31	3.65	10.94
55	60	9.28	6.31	2.97	9.81
60	56	8.70	6.31	2.39	8.61
65	53	8.20	6.31	1.89	7.36
70	50	7.75	6.31	1.44	6.06
75	47	7.36	6.31	1.05	4.72
80	45	7.00	6.31	0.70	3.34
85	43	6.69	6.31	0.38	1.93
90	41	6.40	6.31	0.09	0.49
95	39	6.14	6.14	0.00	0.00
100	38	5.90	5.90	0.00	0.00
105	36	5.68	5.68	0.00	0.00
110	35	5.48	5.48	0.00	0.00
115	34	5.29	5.29	0.00	0.00
120	33	5.12	5.12	0.00	0.00

DRAINAGE AREA III

(100-YEAR EVENT)

				C
Roof Area:	0	sq.m		1.00
Hard Area:	1,550	sq.m		1.00
Gravel Area:	0	sq.m		0.875
Soft Area:	70	sq.m		0.25
Total Catchment Area:	1,620	sq.m		0.97

Water Elevation:	87.76	m
Head:	2.67	m
Centroid of ICD Orifice:	85.09	m
Invert of Outlet Pipe of CBMH-5:	85.05	m
Orifice Diameter:	70	mm
Orifice Area:	3,866	sq.mm
Discharge Coefficient:	0.61	
Maximum Release Rate:	17.07	L/s

CB/MH	Top Area	Depth	Volume	
CB-1	64	0.12	2.47	cu.m
CI-2	16	0.05	0.25	cu.m
CBMH-3	41	0.12	1.59	cu.m
CIMH-4	31	0.07	0.69	cu.m
CBMH-5	600	0.19	37.28	cu.m

Maximum Volume Stored:	42.27	cu.m
Maximum Volume Required:	42.27	cu.m

DRAINAGE AREA III (Continued)

(100-YEAR EVENT)

Time (min)	i (mm/hr)	2.78AiC (L/s)	Release Rate (L/s)	Stored Rate (L/s)	Required Storage Volume (cu.m)
10	179	77.81	17.07	60.74	36.44
15	143	62.27	17.07	45.20	40.68
20	120	52.27	17.07	35.20	42.24
25	104	45.25	17.07	28.18	42.27
30	92	40.03	17.07	22.96	41.33
35	83	35.98	17.07	18.91	39.71
40	75	32.75	17.07	15.67	37.61
45	69	30.09	17.07	13.02	35.15
50	64	27.87	17.07	10.80	32.39
55	60	25.98	17.07	8.91	29.40
60	56	24.36	17.07	7.28	26.22
65	53	22.94	17.07	5.87	22.89
70	50	21.70	17.07	4.62	19.42
75	47	20.59	17.07	3.52	15.84
80	45	19.61	17.07	2.53	12.16
85	43	18.72	17.07	1.64	8.39
90	41	17.91	17.07	0.84	4.55
95	39	17.18	17.07	0.11	0.63
100	38	16.52	16.52	0.00	0.00
105	36	15.90	15.90	0.00	0.00
110	35	15.34	15.34	0.00	0.00
115	34	14.82	14.82	0.00	0.00
120	33	14.33	14.33	0.00	0.00

5-YEAR EVENT

DRAINAGE AREA I (Uncontrolled Flow Off Site)

(5-YEAR EVENT)

			C
Roof Area:	0	sq.m	0.90
Hard Area:	70	sq.m	0.90
Gravel Area:	0	sq.m	0.70
Soft Area:	219	sq.m	0.20
Total Catchment Area:	289	sq.m	0.37

Area (A):	289	sq.m
Time of Concentration:	10	min
Rainfall Intensity (i):	104	mm/hr
Runoff Coeficient (C):	0.37	
Flow Rate (2.78AiC):	3.09	L/s

DRAINAGE AREA II (Roof)

(5-YEAR EVENT)

				C
Total Catchment Area:	560	sq.m		0.90

No. of Roof Drains:	4				
Slots per Wier:	1	0.01242 L/s/mm/slot (5 USgpm/in/slot)			
Depth at Roof Drains:	95	mm			
Maximum Release Rate:	4.74	L/s	Pond Area:	197	sq.m
			Maximum Volume Stored:	6.27	cu.m
			Maximum Volume Required:	6.27	cu.m

Time (min)	i (mm/hr)	2.78AiC (L/s)	Release Rate (L/s)	Stored Rate (L/s)	Required Storage Volume (cu.m)
10	104	14.60	4.74	9.86	5.92
15	84	11.71	4.74	6.97	6.27
20	70	9.84	4.74	5.11	6.13
25	61	8.53	4.74	3.80	5.70
30	54	7.56	4.74	2.82	5.08
35	49	6.80	4.74	2.06	4.33
40	44	6.19	4.74	1.46	3.49
45	41	5.69	4.74	0.96	2.58
50	38	5.28	4.74	0.54	1.62
55	35	4.92	4.74	0.19	0.61
60	33	4.62	4.62	0.00	0.00

DRAINAGE AREA III

(5-YEAR EVENT)

			C
Roof Area:	0	sq.m	0.90
Hard Area:	1,550	sq.m	0.90
Gravel Area:	0	sq.m	0.70
Soft Area:	70	sq.m	0.20
Total Catchment Area:	1,620	sq.m	0.87

Water Elevation:	87.70	m
Head:	2.62	m
Centroid of ICD Orifice:	85.09	m
Invert of Outlet Pipe of CBMH-5:	85.05	m
Orifice Diameter:	70	mm
Orifice Area:	3,866	sq.mm
Discharge Coefficient:	0.61	
Maximum Release Rate:	16.90	L/s

CB/MH	Top Area	Depth	Volume	
CB-1	19	0.06	0.40	cu.m
CI-2	0	-0.01	0.00	cu.m
CBMH-3	12	0.06	0.26	cu.m
CIMH-4	1	0.01	0.01	cu.m
CBMH-5	308	0.13	13.68	cu.m

Maximum Volume Stored: 14.35 cu.m

Maximum Volume Required: 14.35 cu.m

DRAINAGE AREA III (Continued)

(5-YEAR EVENT)

Time (min)	i (mm/hr)	2.78AiC (L/s)	Release Rate (L/s)	Stored Rate (L/s)	Required Storage Volume (cu.m)
10	104	40.81	16.90	23.91	14.35
15	84	32.73	16.90	15.83	14.24
20	70	27.52	16.90	10.61	12.74
25	61	23.85	16.90	6.95	10.43
30	54	21.12	16.90	4.22	7.60
35	49	19.00	16.90	2.10	4.41
40	44	17.31	16.90	0.40	0.97
45	41	15.91	15.91	0.00	0.00
50	38	14.75	14.75	0.00	0.00
55	35	13.76	13.76	0.00	0.00
60	33	12.90	12.90	0.00	0.00

2-YEAR EVENT

DRAINAGE AREA III

(2-YEAR EVENT)

			C
Roof Area:	0	sq.m	0.90
Hard Area:	1,550	sq.m	0.90
Gravel Area:	0	sq.m	0.70
Soft Area:	70	sq.m	0.20
Total Catchment Area:	1,620	sq.m	0.87

Water Elevation:	87.59	m
Head:	2.50	m
Centroid of ICD Orifice:	85.09	m
Invert of Outlet Pipe of CBMH-5:	85.05	m
Orifice Diameter:	70	mm
Orifice Area:	3,866	sq.mm
Discharge Coefficient:	0.61	
Maximum Release Rate:	16.52	L/s

CB/MH Storage

CB/MH	Invert	Size	Volume	
CB-1	85.39	0.61	0.82	cu.m
CI-2	85.27	0.61	0.86	cu.m
CBMH-3	85.34	1.219	2.62	cu.m
CIMH-4	85.16	1.219	2.83	cu.m
CBMH-5	85.05	1.219	2.96	cu.m

Pipe Storage

From	Invert	To	Invert	Length	Diameter	Volume	
CB-1	85.39	CBMH-3	85.34	11.7	250	0.57	cu.m
CI-2	85.27	CBMH-3	85.26	2	250	0.10	cu.m
CBMH-3	85.34	CIMH-4	85.16	42	250	2.06	cu.m
CIMH-4	85.16	CBMH-5	85.05	24.2	300	1.71	cu.m

Maximum Volume Stored:	14.54	cu.m
Maximum Volume Required:	14.54	cu.m

DRAINAGE AREA III (Continued)

(2-YEAR EVENT)

Time (min)	i (mm/hr)	2.78AiC (L/s)	50% Release Rate (L/s)	Stored Rate (L/s)	Required Storage Volume (cu.m)
10	77	30.08	8.26	21.82	13.09
15	62	24.19	8.26	15.93	14.34
20	52	20.38	8.26	12.12	14.54
25	45	17.69	8.26	9.43	14.15
30	40	15.69	8.26	7.42	13.36
35	36	14.12	8.26	5.86	12.31
40	33	12.87	8.26	4.61	11.07
45	30	11.84	8.26	3.58	9.68
50	28	10.98	8.26	2.72	8.17
55	26	10.25	8.26	1.99	6.57
60	25	9.62	8.26	1.36	4.89
65	23	9.07	8.26	0.81	3.15
70	22	8.58	8.26	0.32	1.35
75	21	8.15	8.15	0.00	0.00
80	20	7.77	7.77	0.00	0.00
85	19	7.42	7.42	0.00	0.00
90	18	7.11	7.11	0.00	0.00

CDS ESTIMATED NET ANNUAL TSS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
AND A FINE PARTICLE SIZE DISTRIBUTION

Echelon Environmental
55 Albert Street, Suite #200 | Markham, ON, L3P 2T4
www.echelonenvironmental.ca info@echelonenvironmental.ca 905-948-0000

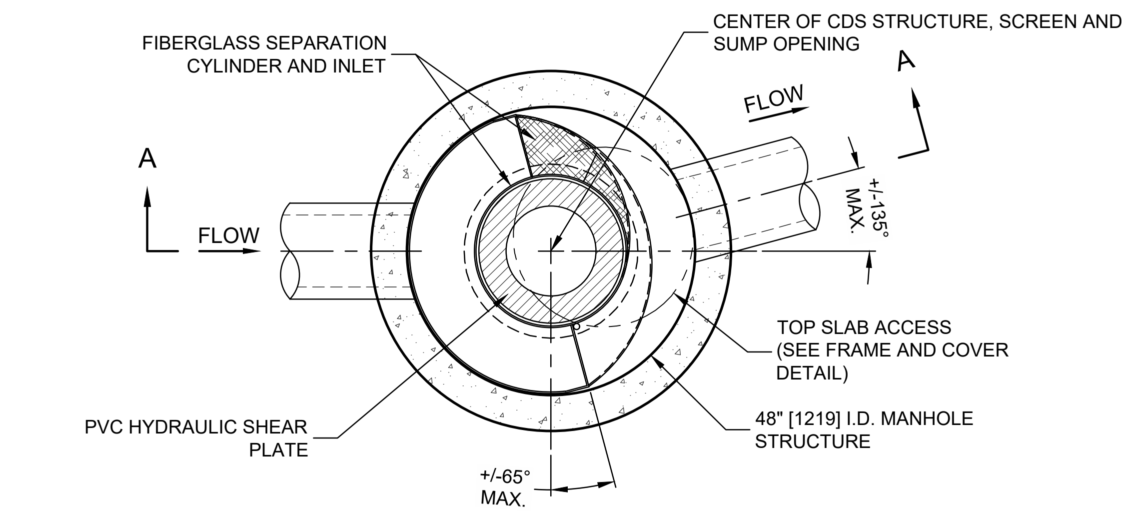
Project Name:	4405-4409 Innes Rd.	**Engineer:**	**D.B. Gray Engineering Inc.**
Location:	Ottawa, ON	**Contact:**	Ryan Faith
OGS ID:	1	**Report Date:**	4-Jun-25

Area:	0.218	ha	**Rainfall Station #**	215	
C Value:	0.88		**Particle Size Distribution**	FINE	
CDS Model:	PMSU2015-4		**CDS Treatment Capacity:**	20	l/s

Rainfall Intensity[1] (mm/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (l/s)	Treated Flowrate (l/s)	Operating Rate (%)	Removal Efficiency (%)	Incremental Removal (%)
0.5	9.2%	9.2%	0.3	0.3	1.3	98.5	9.0
1.0	10.6%	19.8%	0.5	0.5	2.7	98.1	10.4
1.5	9.9%	29.7%	0.8	0.8	4.0	97.7	9.7
2.0	8.4%	38.1%	1.1	1.1	5.4	97.3	8.2
2.5	7.7%	45.8%	1.3	1.3	6.7	96.9	7.5
3.0	5.9%	51.7%	1.6	1.6	8.1	96.5	5.7
3.5	4.4%	56.1%	1.9	1.9	9.4	96.2	4.2
4.0	4.7%	60.7%	2.1	2.1	10.8	95.8	4.5
4.5	3.3%	64.0%	2.4	2.4	12.1	95.4	3.2
5.0	3.0%	67.1%	2.7	2.7	13.5	95.0	2.9
6.0	5.4%	72.4%	3.2	3.2	16.1	94.2	5.1
7.0	4.4%	76.8%	3.7	3.7	18.8	93.5	4.1
8.0	3.5%	80.3%	4.3	4.3	21.5	92.7	3.3
9.0	2.8%	83.2%	4.8	4.8	24.2	91.9	2.6
10.0	2.2%	85.3%	5.3	5.3	26.9	91.1	2.0
15.0	7.0%	92.3%	8.0	8.0	40.4	87.3	6.1
20.0	4.5%	96.9%	10.7	10.7	53.8	83.4	3.8
25.0	1.4%	98.3%	13.3	13.3	67.3	79.6	1.1
30.0	0.7%	99.0%	16.0	16.0	80.7	75.7	0.5
35.0	0.5%	99.5%	18.7	18.7	94.2	71.9	0.3
40.0	0.5%	100.0%	21.3	19.8	100.0	65.2	0.4
45.0	0.0%	100.0%	24.0	19.8	100.0	58.0	0.0
50.0	0.0%	100.0%	26.7	19.8	100.0	52.2	0.0
							94.4

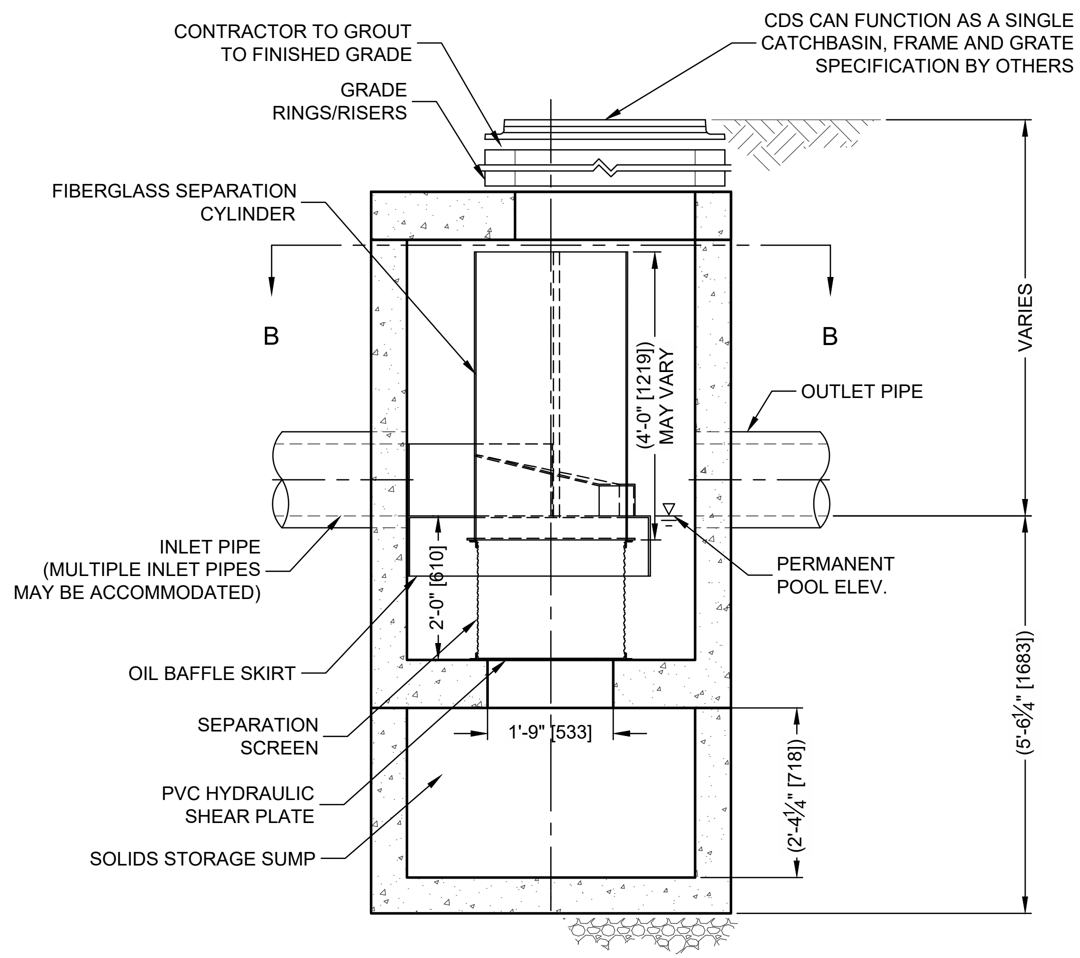
Removal Efficiency Adjustment[2] =	6.5%
Predicted Net Annual TSS Removal Efficiency =	**87.9%**
Predicted Annual Rainfall Treated =	**99.0%**

1 - Based on 42 years of hourly rainfall data from Canadian Station 6105976, Ottawa ON
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.
3 - CDS Efficiency based on testing conducted at the University of Central Florida
4 - CDS design flowrate and scaling based on standard manufacturer model & product specifications



PLAN VIEW B-B

N.T.S.



ELEVATION A-A

N.T.S.

CDS PMSU 2015-4-C DESIGN NOTES

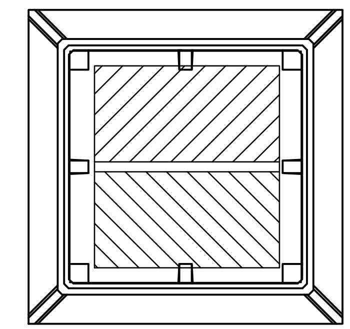
THE STANDARD CDS PMSU 2015-4-C CONFIGURATION IS SHOWN.

ANTI-BUOYANCY SLAB MAY BE INCLUDED (NOT SHOWN).

SUMP DEPTH SHOWN IS TYPICAL, CAN BE EXTENDED AS REQUIRED.

HYDRAULIC CHARACTERISTICS VARY BASED ON PIPE SIZE, MATERIAL, AND CDS UNIT SELECTION. FOR CUSTOM HYDRAULIC ANALYSIS PLEASE CONTACT ECHELON ENVIRONMENTAL.

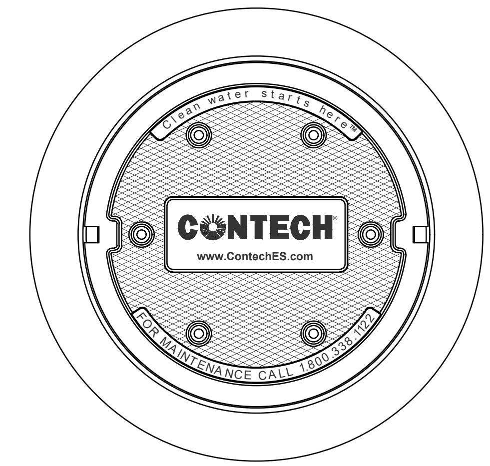
FOR SITE SPECIFIC DRAWINGS PLEASE CONTACT ECHELON ENVIRONMENTAL.



FRAME AND GRATE

(DIMENSIONS VARIES)

N.T.S.



FRAME AND COVER

(DIAMETER VARIES)

N.T.S.

GENERAL NOTES

1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.ContechES.com
4. CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO HS20 LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET HS20 (AASHTO M 306) AND BE CAST WITH THE CONTECH LOGO.
6. IF REQUIRED, PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.

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 CDS MANHOLE STRUCTURE (LIFTING CLUTCHES PROVIDED).
C. CONTRACTOR TO ADD JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS, AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

ECHELON ENVIRONMENTAL

55 ALBERT STREET, MARKHAM ON L3P2T4
CONTACT: INFO@ECHELONENVIRONMENTAL.CA
905-948-0000

CDS PMSU 2015-4-C
ONLINE CDS
STANDARD DETAIL

DATE: 13-FEB-25
REVISION:1
DRAWN BY: PG

◆ Verification Statement ◆ Verification Statement ◆ Verification Statement ◆

VERIFICATION STATEMENT

GLOBE Performance Solutions

Verifies the performance of

CDS Hydrodynamic Separator®

Developed by CONTECH Engineered Solutions LLC
Scarborough, Maine, USA

Registration: GPS-ETV_VR2020-03-31_CDS

In accordance with

ISO 14034:2016

**Environmental Management —
Environmental Technology Verification (ETV)**

John D. Wiebe, PhD
Executive Chairman
GLOBE Performance Solutions

March 31, 2020
Vancouver, BC, Canada

GLOBE
PERFORMANCE
SOLUTIONS

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

Technology description and application

The CDS® is a Stormwater treatment device designed to remove pollutants, including sediment, trash and hydrocarbons from Stormwater runoff. The CDS is typically comprised of a manhole that houses flow and screening controls that use a combination of swirl concentration and continuous deflective separation.

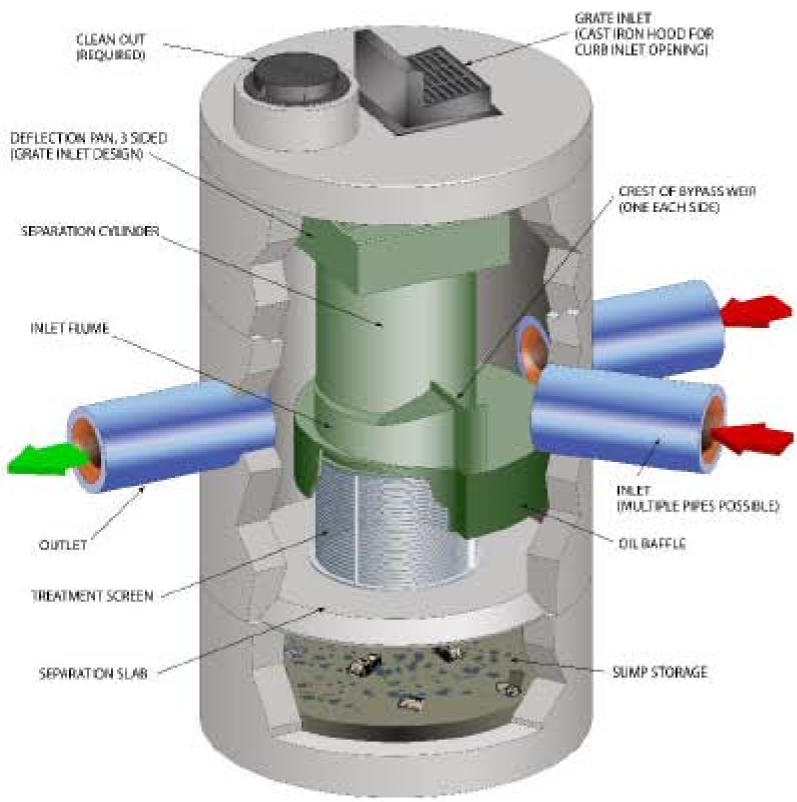


Figure 1. Graphic of typical inline CDS unit and core components.

When stormwater runoff enters the CDS unit's diversion chamber, the diversion pan guides the flow into the unit's separation chamber. The water and associated gross pollutants contained within the separation cylinder are kept in continuous circular motion by the energy generated from the incoming flow. This has the effect of a continuous deflective separation of the pollutants and their eventual deposition into the sump storage below. A perforated screen plate allows the filtered water to pass through to a volute return system and thence to the outlet pipe. The oil and other light liquids are retained within the oil baffle. Figure 1 shows a schematic representation of a typical CDS unit including critical components

Performance conditions

The data and results published in this Technology Fact Sheet were obtained from the testing program conducted on the Contech CDS-4 OGS device, in accordance with the Procedure for Laboratory Testing of Oil-Grit Separators (Version 3.0, June 2014). The Procedure was prepared by the Toronto and Region Conservation Authority (TRCA) for Environment Canada's Environmental Technology Verification (ETV) Program requirements. A copy of the Procedure may be accessed on the Canadian ETV website at www.etvcanada.ca.

Performance claim(s)

Capture test[1]:

During the sediment capture test, the Contech CDS OGS device with a false floor set to 50% of the manufacturer's recommended maximum sediment storage depth and a constant influent test sediment concentration of 200 mg/L, removed 74, 70, 63, 53, 45, 42, 32 and 23 percent of influent sediment by mass at surface loading rates of 40, 80, 200, 400, 600, 1000, 1400 and 1893 L/min/m², respectively.

Scour test[a]:

During the scour test, the Contech CDS OGS device with preloaded test sediment reaching 50% of the manufacturer's recommended maximum sediment storage depth, generated corrected effluent concentrations of 1.8, 6.5, 8.2, 11.2, and 309.3 mg/L during a test run[2] with approximately 5 minute duration surface loading rates of 200, 800, 1400, 2000, and 2600 L/min/m², respectively.

Light liquid re-entrainment test[a]:

During the light liquid re-entrainment test, the Contech CDS OGS device with surrogate low-density polyethylene beads preloaded within the oil collection skirt area, representing floating liquid to a volume equal to a depth of 50.8 mm over the sedimentation area, retained 100, 99.9, 98.6, 99.5, and 99.7 percent of loaded beads by volume during a test run[2] with 5 minutes duration surface loading rates of 200, 800, 1400, 2000, and 2600 L/min/m², respectively.

Performance results

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

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

[2] See variance #1 in "Variances from testing procedure" section below.

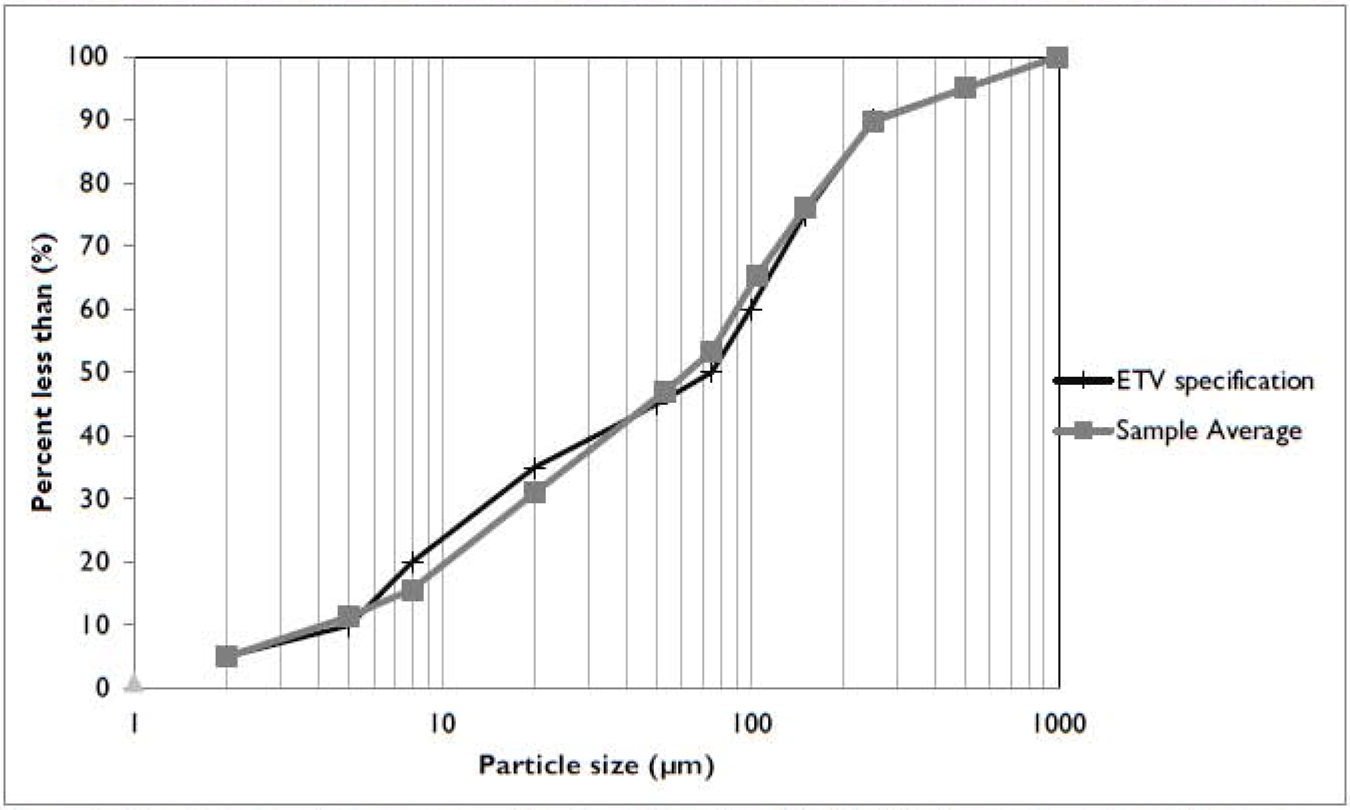


Figure 2. The three sample average particle size distribution (PSD) of the test sediment used for the capture and scour test compared to the specified PSD.

The capacity of the device to retain sediment was determined at eight surface loading rates using the modified mass balance method. This method involved measuring the mass and particle size distribution of the injected and retained sediment for each test run. Performance was evaluated with a false floor simulating the technology filled to 50% of the manufacturer's recommended maximum sediment storage depth. The test was carried out with clean water that maintained a sediment concentration below 20 mg/L. Based on these conditions, removal efficiencies for individual particle size classes and for the test sediment as a whole were determined for each of the tested surface loading rates (Table 1).

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

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

Particle size fraction (µm)	**Surface loading rate (L/min/m²)**							
	40	80	200	400	600	1000	1400	1893
>500	100	100*	66	79	97	100*	84	77
250 - 500	100*	100*	85	95	100*	91	100*	75
150 - 250	99	100*	100*	97	100	75	68	37
105 - 150	100	100*	100*	74	47	45	30	27
75 - 105	90	91	100*	61	33	36	26	18
53 - 75	71	27	54	100	42	44	15	16
20 - 53	65	51	20	8	10	8	5	4
8 - 20	28	22	9	7	1	1	2	1
5 – 8	30	9	0	8	2	0	1	0
<5	11	8	16	2	6	5	2	2
All particle sizes by mass balance	**73.5**	**70.3**	**63.4**	**52.6**	**45.1**	**41.5**	**32.4**	**23.0**

* Removal efficiencies were calculated to be above 100%. Calculated values typically ranged between 101 and 175% (average 126%). Higher values were observed for the >500 µm and 150-250 µm size fractions during the 80 L/min/m² test run. See text and Bulletin # CETV 2016-11-0001 for more information.

Figure 3 compares the particle size distribution (PSD) of the three sample average of the test sediment to the PSD of the retained sediment at each of the tested surface loading rates. As expected, the capture efficiency for fine particles was generally found to decrease as surface loading rates increased.

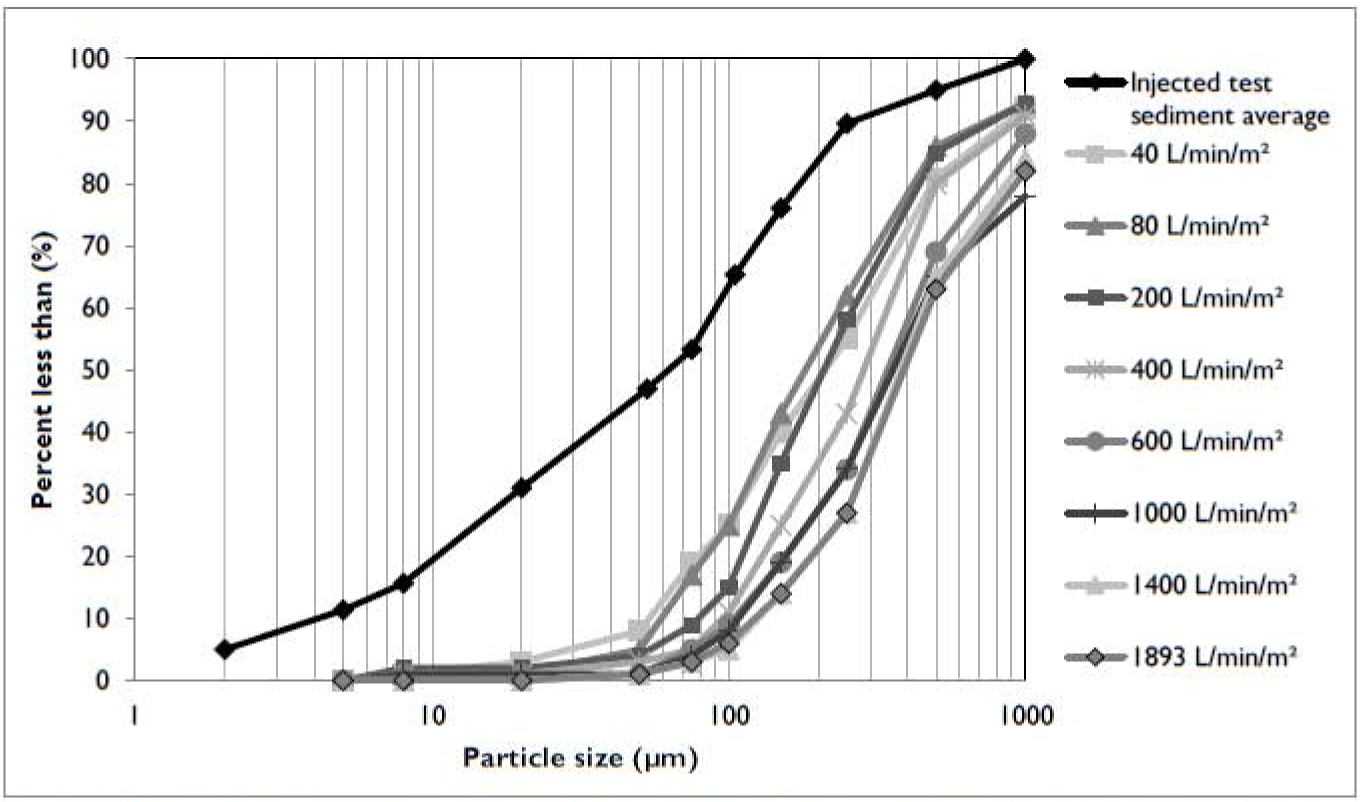


Figure 3. Particle size distribution of retained sediment in relation to the injected test sediment average.

Table 2 shows the results of the sediment scour and re-suspension test. This test involved preloading 10.2 cm of fresh test sediment into the sedimentation sump of the device. The sediment was placed on a false floor to mimic a device filled to 50% of the maximum recommended sediment storage depth. Sediment was also pre-loaded to the same depth on the separation slab (see Figure 1) since sediment was observed to have been deposited in this area during the sediment capture test. Clean water was run through the device at five surface loading rates over a 36 minute period. The test was stopped and started after the second flow rate in order to change flow meters. Each flow rate was maintained for 5 minutes with a one minute transition time between flow rates. Effluent samples were collected at one minute sampling intervals and analyzed for Suspended Sediment Concentration (SSC) and PSD by recognized methods. The effluent samples were subsequently adjusted based on the background concentration of the influent water and the smallest 5% of particles captured during the 40 L/min/m² sediment capture test, as per the method described in Bulletin # CETV 2016-09-0001.

Table 2. Scour test adjusted effluent sediment concentration.

Run	Surface loading rate (L/min/m²)	Run time (min)	Background sample concentration (mg/L)	Adjusted effluent suspended sediment concentration (mg/L)†	Average (mg/L)
1	200	1.03	0.5	1.0	1.8
		2.03		1.6	
		3.03		1.8	
		4.03		1.8	
		5.03		2.6	
2	800	6.23	2.0	5.0	6.5
		7.23		6.7	
		8.23		9.4	
		9.23		5.4	
		10.23		5.9	
3	1400	11.43‡	2.0	3.1	8.2
		12.43		11.0	
		13.43		14.6	
		14.43		7.1	
		15.43		5.2	
4	2000	17.20	3.2	7.3	11.2
		18.20		22.8	
		19.20		6.9	
		20.20		6.8	
		21.20		12.1	
5	2600	22.40	8.5	248.5	309.3
		23.40		83.0	
		24.40		438.9	
		25.40		338.7	
		26.40		437.5	

† The adjusted effluent suspended sediment concentration represents the actual measured effluent concentration minus the smallest 5% of sediment particles (i.e. d5) removed during the 40 L/min/m² capture test, minus the background concentration. For more information see Bulletin # CETV 2016-09-0001.

‡ See variance #1 in "Variances from testing procedure" section below.

The results of the light liquid re-entrainment test used to evaluate the unit's capacity to prevent re-entrainment of light liquids are reported in Table 3. The test involved preloading 58.3 L (corresponding to a 5 cm depth over the collection sump area of 1.17m²) of surrogate low-density polyethylene beads within the oil collection skirt and running clean water through the device at five surface loading rates (200, 800, 1400, 2000, and 2600 L/min/m²) over a 38 minute period. As with the sediment scour test, flow was stopped and started after the second flow rate to change flow meters. Each flow rate was maintained for 5 minutes with approximately 1 minute transition time between flow rates. The effluent flow was screened to capture all re-entrained pellets throughout the test.

Table 3. Light liquid re-entrainment test results.

Target Flow (L/min/m²)	Time Stamp	Collected Volume (L)	Collected Mass (g)	Percent re-entrained by volume	Percent retained by volume
200	10:48:42	27 pellets	0.8	0.01	99.99
800	10:55:09	0.07	41	0.12	99.88
1400	11:06:59	0.8	439	1.37	98.63
2000	11:13:00	0.31	177	0.53	99.47
2600	11:19:00	0.18	98	0.31	99.69
Interim Collection Net		0.025	14.2	0.04	99.96
Total Loaded		58.3	33398	--	--
Total Re-entrained		1.385	770	--	--
Percent Re-entrained and retained		--	--	2.38	97.62

Variances from testing Procedure

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

1. It was necessary to change flow meters during the scour and light liquid re-entrainment test, as the required flows exceeded the minimum and/or maximum range of any single meter. After the loading rate of 800 L/min/m², the flow was gradually shut down and re-initiated through the larger meter immediately after closing the valve controlling flows to the small meter. The transition time of 1-minute for each target flow was followed, resulting in an elapsed time of 3 minutes to reach the next target flow of 1400 L/min/m². This procedure was approved by CETV prior to testing, in recognition that most particles susceptible to scour at low flows would not be in the sump at higher flows. Similarly, re-entrainment of the oil beads was not expected to be significantly affected by the flow meter change.

2. As part of the capture test, evaluation of the 40 L/min/m² surface loading rate was split into 3 parts due to the long duration needed to feed the required minimum of 11.3 kg of test sediment into the unit. At the end of the first and second parts of the test, the flow rates were gradually shutdown to prevent capture of particles that would have been washed out under normal circumstances. The amended procedure was reviewed and approved by the verifier prior to testing.

3. Inflow concentrations during the 40 L/min/m² surface loading rate varied from 162 mg/L to 246 mg/L, which is wider than specified ±25 mg/L range in the Procedure.

Verification

This verification was first completed in March 2017 and is considered valid for subsequent renewal periods every three (3) years thereafter, subject to review and confirmation of the original performance and performance claims. The original verification was completed by the Toronto and Region Conservation Authority of Mississauga, Ontario, Canada using the Canadian ETV Program's General Verification Protocol (June 2012) and taking into account ISO 14034:2016. This ETV renewal is considered to meet the equivalency of an ETV verification completed using the International Standard *ISO 14034:2016 Environmental management – Environmental technology verification (ETV).*

Data and information provided by Contech Engineered Solutions to support the performance claim included the following: Performance test report prepared by Alden Research Laboratory, Inc of Holden, Massachusetts, USA and dated February 2015; the report is based on testing completed in accordance with the Procedure for Laboratory Testing of Oil-Grit Separators (Version 3.0, June 2014).

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

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

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STORM SEWER CALCULATIONS

Rational Method

2-YEAR EVENT

Project: 4405-4409 Innes Road
2-Storey Medical Facility
Ottawa, Ontario

Date: December 16, 2025

Manning's Roughness Coefficient: 0.013

Location		Individual					Cumulative				Sewer Data							
From	To	Roof C = 0.90 (ha)	Hard C = 0.90 (ha)	Gravel C = 0.70 (ha)	Soft C = 0.20 (ha)	2.78AC	2.78AC	Time (min)	Rainfall Intensity (mm/hr)	Q Flow Rate (L/s)	Length (m)	Nominal Diameter (mm)	Actual Diameter (mm)	Slope (%)	Velocity (m/s)	Q_{Full} Capacity (L/s)	Time (min)	Q / Q_{Full}
Roof Drains	CBMH-5	0.0560				0.1401	0.1401	10.00	77	10.76	23	150	150	2	1.22	21.54	0.31	50%
									Restricted flow:	4.74	23	150	150	2	1.22	21.54	0.31	22%
CB-1	CBMH-3		0.0250		0.0040	0.0648	0.0648	10.00	77	4.97	11.7	250	250	0.432	0.80	39.09	0.24	13%
CI-2	CBMH-3		0.0155			0.0388	0.0388	10.00	77	2.98	2	250	250	0.432	0.80	39.09	0.04	8%
CBMH-3	CIMH-4		0.0095		0.0015	0.0246	0.1282	10.24	76	9.72	42	250	250	0.432	0.80	39.09	0.88	25%
CIMH-4	CBMH-5		0.0135		0.0010	0.0343	0.1625	11.12	73	11.82	24.2	300	300	0.432	0.90	63.56	0.45	19%
CBMH-5	MH-6		0.0915		0.0005	0.2292	0.5318	11.57	71	37.89	15.4	300	300	0.34	0.80	56.39	0.32	67%
									Restricted flow:	21.26	15.4	300	300	0.34	0.80	56.39	0.32	38%
MH-6	1500 ST					0.0000	0.5318	11.89	70	37.35	7.6	300	300	1.5	1.68	118.43	0.08	32%
									Restricted flow:	21.26	7.6	300	300	1.5	1.68	118.43	0.08	18%
											Existing 1,500 mm Innes Road Municipal Storm Sewer:	1,500	1,525	0.4	2.56	4,672		