D.B. Gray Engineering Inc.

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

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SITE SERVICING & STORMWATER MANAGEMENT REPORT

DICKIE MOORE RENTALS
1547 LAGAN WAY
OTTAWA, ONTARIO

REPORT NO. 24022

DECEMBER 16, 2025
REVISED APRIL 7, 2026
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1.0 INTRODUCTION

This report has been prepared in support of the Site Plan Control application for the proposed light industrial warehouse located at 1547 Lagan Way in Ottawa, Ontario. This report describes the servicing for the proposed building and stormwater management for the 1.04 ha of developed property. The property is currently occupied by a light industrial warehouse to be demolished. Refer to Pre-Application Consultation meeting notes in Appendix A.

This report forms part of the site servicing and stormwater management design for the proposed development. Also refer to drawings C-1 to C-13 prepared by D.B. Gray Engineering Inc.

2.0 WATER SERVICING

2.1 WATER SUPPLY FOR FIREFIGHTING

The proposed building will have a fully supervised sprinkler system with the fire department connection located at the SW corner of the building. The sprinkler system is to be designed, installed and maintained in accordance with NFPA standards and the Fire Underwriters Survey. Refer to Appendix B. There is an existing municipal Class AA fire hydrant located at the SW corner of the proposed building. It is 25 m unobstructed distance to the proposed fire department connection for the proposed building, which is less than the maximum 45 m required by the Ontario Building Code; therefore, a private fire hydrant is not required.

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 9,000 L/min (150 L/s) for the proposed building. In accordance with City of Ottawa Technical Bulletin IWSTB-2024-05, when the Ontario Building Code Method yields a required fire flow of 9,000 L/min (150 L/s), the Fire Underwriters Survey Method is to be used instead. Using the Fire Underwriters Survey Method, the required fire flow is calculated to be 9,000 L/min (150 L/s) for the proposed building. Refer to calculations in Appendix B.

The City of Ottawa indicated that 165 L/s is available. Refer to Appendix B. Therefore, there is an adequate water supply for firefighting from the existing municipal water distribution system.

In accordance with City of Ottawa Technical Bulletin ISTB-2018-02, the aggregate flow of all contributing fire hydrants within 150 m of the building shall not be less than the required fire flow. In accordance with City of Ottawa Technical Bulletin ISTB-2018-02 Appendix I:

Class	Distance (m)	Contribution (L/min)
AA	≤ 75	5,700
	> 75 and ≤ 150	3,800

The existing municipal Class AA fire hydrant serving the fire department connection discussed above can contribute 5,700 L/min (95 L/s). There is another existing municipal Class AA fire hydrant within 75 m of

the proposed building located at the NW corner of the proposed building. It can also contribute 5,700 L/min (95 L/s). The aggregate flow of the two contributing fire hydrants is 11,400 L/min (190 L/s), which is greater than the required fire flow of 9,000 L/min (150 L/s).

2.2 DOMESTIC WATER SUPPLY

In accordance with

i. the City of Ottawa Sewer Design Guidelines Appendix 4-A for the daily flows, and
ii. the City of Ottawa Water Design Guidelines for the peaking factors, and

based on the 41 – proposed building employees, 16 – small car washes per day, 16 – large car washes per day, 10 – proposed building floor drains, the average daily demand is calculated to be 0.2 L/s, the maximum daily demand is calculated to be 0.3 L/s and the maximum hourly demand is calculated to be 0.5 L/s. Refer to calculations in Appendix B.

The boundary conditions in the 200 mm Lagan Way municipal watermain provided by the City of Ottawa at the subject property indicate a minimum HGL of 110.5 m and a maximum HGL of 118.2 m. Refer to Appendix B. Based on these boundary conditions, the pressure at the water meter is calculated to vary between 440 kPa (64 psi) and 515 kPa (75 psi) at the proposed building. This is an acceptable range for the proposed development.

A 150 mm water service connecting to the existing 200 mm Lagan Way municipal watermain is proposed to service the sprinkler system of the building. The same 150 mm water service will provide an adequate domestic water supply. As per City of Ottawa Water Design Guidelines section 4.4.8.2 a district metering area (DMA) chamber is proposed.

3.0 SANITARY SERVICING

In accordance with

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

the post-development sanitary flow rate is calculated to be 4.66 L/s. Refer to calculations in Appendix C.

A 150 mm sanitary sewer service at 1% slope (14.43 L/s capacity) is proposed to service the building. Refer to calculations in Appendix C. The proposed sanitary sewer service will connect to the proposed private sanitary sewer system.

A 200 mm private sanitary sewer at 0.65% slope (26.80 L/s capacity) is proposed to service the development. At the design flow rate the 200 mm sanitary sewer will only be at 17% capacity. The proposed 200 mm sanitary sewer will connect to the existing 250 mm Lagan Way municipal sanitary sewer, which at 0.38% slope has a capacity of 37.05 L/s. Refer to calculations in Appendix C.

The pre-development sanitary flow rate is calculated to be 4.66 L/s. Refer to calculations in Appendix C. The proposed development is expected to have a negligible impact on the existing municipal sanitary sewer.

The basement plumbing fixtures will drain to a sanitary sump and be pumped to a sanitary drain. The point of connection to the sanitary drain is to be at high level in the basement. Refer to mechanical.

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 2-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 0.77. 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 0.93. Using the Bransby Williams Formula, the pre-development time of concentration is calculated to be 9 minutes. Using the Rational Method with a time of concentration of 10 minutes, the pre-development flow rates are calculated to be 476.49 L/s during the 100-year event and 230.09 L/s during the 5-year event. Using the Rational Method with a time of concentration of 10 minutes and runoff coefficient of 0.5, the maximum allowable release rate is calculated to be 110.52 L/s. In addition, the City requires that the climate change event (100-yr + 20%) needs to be analyzed to confirm that the ponding limits do not reach the building's lowest opening. 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 – 1,380 sq.m)
The flow rates are calculated at a time of concentration of 10 minutes.

	100-Year Event + 20%	100-Year Event	5-Year Event	2-Year Event
Maximum Flow Rate	45.12 L/s	37.60 L/s	19.04 L/s	14.04 L/s

Drainage Area II (Proposed Building Roof – 2,250 sq.m)
The 6 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 12 scuppers each a minimum 550 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 + 20%	100-Year Event	5-Year Event	2-Year Event
Maximum Release Rate	15.74 L/s	10.78 L/s	8.30 L/s	7.32 L/s
Maximum Depth at Roof Drains	150 mm	145 mm	111 mm	98 mm
Maximum Volume Stored	97.60 cu.m	87.66 cu.m	39.93 cu.m	27.40 cu.m

Drainage Area III (6,722 sq.m)
An inlet control device (ICD) located in the outlet pipe of MH-12 will restrict the flow of stormwater and cause it to backup into the upstream infrastructure and pond above catch basins CB-4, CB/MH-5, CB-6, CB/MH-7, CB-8, CB/MH-9, CB-10, CB/MH-11, and in the detention area. The ICD will be a plug style with a round orifice located at the bottom of the plug manufactured by Pedro Plastics or approved

equivalent sized by the manufacturer for a release rate of 62.09 L/s at 1.97 m. It is calculated that an orifice area of 16,382 sq.mm (±144 mm dia) with a discharge coefficient of 0.61 will restrict the maximum flow rate to 62.09 L/s at 1.97 m. Based on this orifice, the maximum flow rate during the 5-year event is calculated to be 61.22 L/s at 1.91 m; and be 58.36 L/s at 1.74 m during the 2-year event.

	100-Year Event + 20%	100-Year Event	5-Year Event	2-Year Event
Maximum Release Rate	103.76 L/s	62.09 L/s	61.22 L/s	58.36 L/s
Maximum Water Elevation	68.73 m	68.73 m	68.68 m	67.50m
Maximum Volume Stored	194.96 cu.m	194.96 cu.m	103.55 cu.m	38.35 cu.m

Summary

The maximum post-development release rate during the 100-year event is calculated to be 110.52 L/s, which is 77% 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 during the 100-year event, a maximum storage volume of 282.62 cu.m is required and provided. The maximum post-development release rate during the 5-year event is calculated to be 88.56 L/s, which is 62% less than the pre-development flow rate and 20% less than the maximum allowable release rate. The maximum post-development release rate during the 2-year event is calculated to be 79.72 L/s, which is 28% less than the pre-development flow rate and the maximum allowable release rate. The post-development reduction in flow is expected to have a positive impact on the 600 mm Lagan Way municipal storm sewer.

Since the surface ponding spillover elevation is equal to the 100-year ponding elevation, during the climate change event (100-yr + 20%) the ponding limits do not change from the 100-year event and do not reach the building's lowest opening.

	100-Year Event + 20%	100-Year Event	5-Year Event	2-Year Event
Pre-Development Flow Rate	571.79 L/s	476.49 L/s	230.09 L/s	110.52 L/s
Maximum Allowable Release Rate	-	110.52 L/s	110.52 L/s	110.52 L/s
Maximum Release Rate	164.62 L/s	110.52 L/s	88.56 L/s	79.72 L/s
Maximum Volume Required	292.56 cu.m	282.62 cu.m	143.48 cu.m	65.75 cu.m
Maximum Volume Stored	292.56 cu.m	282.62 cu.m	143.48 cu.m	65.75 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 PMSU-3020-6 OGS will remove 81.0% 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 drawing C-8 and C-9 and notes on drawing C-12. 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, and any material deposited on the public road is to be removed.

It is expected that the Ministry of Environment, Conservation and Parks (MECP) will consider the property "industrial lands" and an Environmental Activity and Sector Registry (EASR) registration, or an Environmental Compliance Approval (ECA) will be required for the proposed stormwater management facility.

4.3 STORM SERVICING

The peak unrestricted proposed building roof flow rate during the 2-year event is calculated to be 48.6 L/s. A 300 mm storm sewer service at 2% slope (135.5 L/s capacity) is proposed to service the proposed building. At the design flow rate the storm sewer service will only be at 36% capacity. The proposed 300 mm storm sewer service will connect to the proposed private storm sewer system downstream of the ICDs. Refer to calculations in Appendix D.

The peak unrestricted flow rate draining into the private storm sewer system during the 2-year event is calculated to be 203.6 L/s. A 525 mm storm sewer at 0.3% slope (245.2 L/s capacity) is proposed to connect to the existing 600 mm Lagan Way municipal storm sewer, which at 0.36% slope has a capacity of 385.0 L/s. At the design flow rate the proposed 525 mm storm sewer will be at 83% capacity. Refer to calculations in Appendix D.

The rainwater leaders inside the buildings 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.

The foundation drains will drain to a storm sump and be pumped to a storm drain. The point of connection to the storm drain is to be at high level in the basement. Refer to mechanical.

5.0 CONCLUSIONS

1. A private fire hydrant is not required.

2. There is an adequate water supply for firefighting from the existing municipal water distribution system.

3. There is an acceptable range of water pressures in the existing municipal water distribution system.

4. The post-development sanitary flow rates will be adequately handled by the proposed sanitary sewer services and private sanitary sewer system.

5. The proposed development is expected to have a negligible impact on the existing municipal sanitary sewer.

6. The maximum post-development release rate during the 100-year event is calculated to be 77% less than the pre-development flow rate during the 100-year event and equal to the maximum allowable release rate.

7. The post-development reduction in flow is expected to have a positive impact on the 600 mm Lagan Way municipal storm sewer.

8. Since the surface ponding spillover elevation is equal to the 100-year ponding elevation, during the climate change event (100-yr + 20%) the ponding limits do not change from the 100-year event and do not reach the building's lowest opening.

9. The proposed OGS will provide an enhanced (80% TSS removal) level of protection.

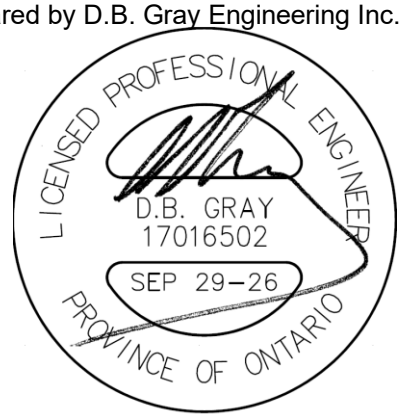
10. An Erosion & Sediment Control Plan has been developed to be implemented during construction.

11. The peak unrestricted flow rates during the 2-year event will be adequately handled by the proposed storm sewer services and private storm sewer system.

12. The rainwater leaders inside the buildings 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.

13. It is expected that the Ministry of Environment, Conservation and Parks (MECP) will consider the property "industrial lands" and an Environmental Activity and Sector Registry (EASR) registration, or an Environmental Compliance Approval (ECA) will be required for the proposed stormwater management facility.

Prepared by D.B. Gray Engineering Inc.



NOT VALID UNLESS SIGNED & DATED

APPENDIX A

WATER SERVICING

D.B. Gray Engineering Inc.

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October 28, 2025

1547 Lagan Way

2 Proposed Warehouse Buildings

Ottawa, Ontario

FIRE FLOW CALCULATIONS

FUS Method

Proposed Building

RFF = Required Fire Flow in litres per minute
= $220CA^{0.5}$

C = Construction Coefficient related to the type of construction of the building
= 1.5 Type V Wood Frame Construction

A = Total Effective Floor Area in square meters of the building

Mezzanine:	665	sq.m
1st Floor:	2,240	sq.m
	2,905	sq.m

RFF = 17,786 L/min
= 18,000 L/min (rounded to nearest 1,000 L/min)

Occupancy and Contents Adjustment Factor

-2%	0%	Charge for combustible Occupancy (461 sq.m. Salesroom)
	15%	Charge for Free-burning Occupancy (1074 sq.m. Repair garage)
	-15%	Charge for Limited-burning Occupancy (1370 sq.m. Offices)

= -275 L/min Occupancy and Contents Adjustment Factor

RFF = 17,725 L/min

Automatic Sprinkler Protection Credit

30%	Sprinkler system designed, installed and maintained in accordance with NFPA standards
10%	Standard water supply for both the sprinkler system and fire department hose lines
10%	Fully supervised sprinkler system

= 8,862 L/min Automatic Sprinkler Protection Credit

Exposure Adjustment Charge

Side	Charge	Distance	Construction	Length	Storeys	Factor
North	0%	over 30 m				
East	0%	over 30 m				
South	0%	over 30 m				
West	0%	over 30 m				

0% Exposure Adjustment Charge

= 0 L/min Exposure Adjustment Charge

RFF = 8,862 L/min
= 9,000 L/min (rounded to nearest 1,000 L/min)
= 150.0 L/s

Future Building

RFF = Required Fire Flow in litres per minute
= $220CA^{0.5}$

C = Construction Coefficient related to the type of construction of the building
= 1.5 Type V Wood Frame Construction

A = Total Effective Floor Area in square meters of the building
1st Floor: 910 sq.m

910 sq.m

RFF = 9,955 L/min
= 10,000 L/min (rounded to nearest 1,000 L/min)

Occupancy and Contents Adjustment Factor
15% Charge for Free-burning Occupancy

= 1,500 L/min Occupancy and Contents Adjustment Factor

RFF = 11,500 L/min

Automatic Sprinkler Protection Credit
30% Sprinkler system designed, installed and maintained in accordance with NFPA standards
10% Standard water supply for both the sprinkler system and fire department hose lines

= 4,000 L/min Automatic Sprinkler Protection Credit

Exposure Adjustment Charge

Side	Charge	Distance	Construction	Length	Storeys	Factor
North	0%	over 30 m				0
East	0%	over 30 m				
South	4%	20.1 m to 30 m	Type V	23	2	46
West	0%	over 30 m				

4% Exposure Adjustment Charge

= 400 L/min Exposure Adjustment Charge

RFF = 6,400 L/min
= 6,000 L/min (rounded to nearest 1,000 L/min)
= 100.0 L/s

WATER SUPPLY
FOR
PUBLIC FIRE PROTECTION

A Guide to Recommended Practice in Canada

2020

Fire Underwriters Survey

Automatic Sprinkler Protection

The required fire flow may be reduced by up to 50 percent for complete Automatic Sprinkler Protection depending upon adequacy of the system. Where only part of a building is protected by Automatic Sprinkler Protection, credit should be interpolated by determining the percentage of the Total Floor Area being protected by the automatic sprinkler system.

To be able to apply the full 50 percent reduction, the following areas should be reviewed to determine the appropriate level of credit for having Automatic Sprinkler Protection as per the table below:

Table 4 Sprinkler Credits

Automatic Sprinkler System Design	Credit	
	With complete building coverage	With partial building coverage of X%
Automatic sprinkler protection designed and installed in accordance with NFPA 13	30%	30% × Percentage of Total Floor Area Serviced by Sprinkler System
Water supply is standard for both the system and Fire Department hose lines	10%	10% × Percentage of Total Floor Area Serviced by Sprinkler System
Fully supervised system	10%	10% × Percentage of Total Floor Area Serviced by Sprinkler System

Automatic Sprinkler Protection Designed and Installed in Accordance with Applicable NFPA Standards (30%)

The initial credit for Automatic Sprinkler Protection is a maximum of 30% based on the system being designed and installed in accordance with the applicable criteria of NFPA 13, *Standard for Installation of Sprinkler Systems,* NFPA 13R, *Standard for the Installation of Sprinkler Systems in Low-Rise Residential* Occupancies, or NFPA 13D, *Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes* and being maintained in accordance with the applicable criteria of NFPA 25, *Standard for the Inspections, Testing and Maintenance of Water-Based Fire* (see Recognition of Automatic Sprinkler Protection).

Water Supply is Standard for both the Sprinkler System and Fire Department Hose Lines (10%)

To qualify to apply an additional 10% reduction, a water supply that is standard for both the sprinkler system and fire department hose lines is required, to qualify the following conditions should be satisfied:

a) Sprinkler system is supplied by a pressurized water supply system (public or private) that is designed and built with no major non-conformance issues (i.e. water supply system is designed in accordance with Part 1 of the Water Supply for Public Fire Protection to qualify for fire insurance grading recognition).
b) Calculated demand for maximum sprinkler design area operation in addition to hose stream requirements are below the available water supply curve (at the corresponding flow rate and pressure). An appropriate safety margin is used to take into account the difference between the available water supply curve at the time of hydrant flow testing as compared to the available water supply curve during Maximum Day Demand.

c) Volume of water available is adequate for the total flow rate including the maximum sprinkler design area operation plus required hose streams plus Maximum Day Demand for the full duration of the design fire event.
d) Residual pressure at all points in the water supply system can be maintained at not less than 150 kPa during the flowing of the sprinkler and required hose streams (plus Maximum Day Demand).

Fully Supervised System (10%)

To qualify to apply an additional 10% reduction, an automatic sprinkler system should be fully supervised. The purpose of the supervisory signal is to ensure that malfunctions of the automatic sprinkler system will be discovered and corrected promptly, while the water flow alarm serves to notify emergency services of the fire as soon as the automatic sprinkler system activates.

- a distinctive supervisory signal to indicate conditions that could impair the satisfactory operation of the sprinkler system (a fault alarm), which is to sound and be displayed, either at a location within the building that is constantly attended by qualified personnel (such as a security room), or at an approved remotely located receiving facility (such as a monitoring facility of the sprinkler system manufacturer); and
- a water flow alarm to indicate that the sprinkler system has been activated, which is to be transmitted to an approved, proprietary alarm-receiving facility, a remote station, a central station or the fire department.

Additional Reductions for Community Level Automatic Sprinkler Protection of Area

Buildings located within communities or subdivisions that are completely sprinkler protected may apply up to a maximum additional 25% reduction in required fire flows beyond the normal maximum of 50% reduction for sprinkler protection of an individual building.
This additional reduction may be applied where all the following conditions are met:

a) the community has a bylaw requiring all buildings that may be built within 30 m of the subject building to be fully sprinkler protected. I.e. future development will not create unsprinklered buildings within 30 m of the subject building, and
b) all buildings within 30 meters of the subject building are fully sprinkler protected with systems that are designed and installed in accordance with the applicable criteria of NFPA 13, *Standard for Installation of Sprinkler Systems,* NFPA 13R, *Standard for the Installation of Sprinkler Systems in Low-Rise Residential* Occupancies, or NFPA 13D, *Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes,* and
c) the community has in place a Fire Prevention Program that provides a system of ensuring that installed fire sprinkler systems are inspected, tested, and maintained in accordance with NFPA 25: *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, and
d) the community maintains the pressure and flow rate requirements for fire sprinkler installations. I.e. the community does not make significant reductions to the operating pressures or flows across the distribution network.

Adjustment of Sprinkler Reductions for Community Level Oversight of Sprinkler Maintenance, Testing and Water Supply Requirements

The reduction in required fire flows for sprinkler protection may be reduced or eliminated if

a) the community does not have a Fire Prevention Program that provides a system of ensuring that installed fire sprinkler systems are inspected, tested, and maintained in accordance with NFPA 25: *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, or
b) the community does not maintain the pressure and flow rate requirements for fire sprinkler installations, or otherwise allows the flow rates and pressure levels that were available during sprinkler system design to significantly degrade, increasing the probability of inadequate water supply for effective sprinkler operation.

Recognition of Automatic Sprinkler Protection

A property should be considered as "sprinkler protected" for the purposes of determining required fire flows, if the building has an automatic fire sprinkler system:

- designed and installed throughout all areas in accordance with NFPA 13, *Standard for Installation of Sprinkler Systems*, and maintained in accordance with the NFPA 25, *Standard for the Inspections, Testing and Maintenance of Water-Based Fire Protection Systems*, and
- supplied by water infrastructure capable of meeting all pressure and flow requirements of the sprinkler system concurrently with Max Day Demand (if connected to a domestic system)

Evidence of the sprinkler system design, installation should be acquired from the party responsible for the building (the owner, building engineer or property manager) or the municipal fire prevention office.

On site, the sprinkler system should carry test tags verifying that a qualified person has conducted tests including:

- flushing and hydrostatic tests of both the underground and overhead piping in accordance with NFPA 13;
- full-flow main drain test within the previous 48 months.
- dry-pipe trip test (if applicable) conducted within the last 48 months
- fire-pump test (if applicable) conducted within the last 48 months

Items of Note for Sprinkler Systems

i. It is important to note that installation of automatic sprinkler systems provides a highly effective and reliable system of fire protection however, this does not preclude the need for manual fire flows entirely as some fires, for various reasons, grow beyond the capability of sprinkler protection to be effective, and in these cases, manual fire fighting intervention is required.

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December 16, 2025

1547 Lagan Way

Proposed and Future Buildings

Ottawa, Ontario

WATER DEMAND CALCULATIONS

		Proposed Building				
Employee	41	ea	75	L/day	3075	L/day
Car wash	16	Small car per day	200	L/day	3200	L/day
Car wash	16	Large car per day	400	L/day	6400	L/day
Floor drain	10	ea	375	L/day	3750	L/day
		Future Building				
Employee	16	ea	75	L/day	1200	L/day
Floor drain	8	ea	375	L/day	3000	L/day

Total	20,625	L/day				
	24	hour day				
	14.3	L/min	0.2	L/s	3.8	USgpm
Maximum Daily Demand:	1.5	(Peaking factor as per City of Ottawa Water Design Guidelines)				
	21.5	L/min	0.4	L/s	5.7	USgpm
Maximum Hourly Demand:	1.8	(Peaking factor as per City of Ottawa Water Design Guidelines)				
	38.7	L/min	0.6	L/s	10.2	USgpm

	Proposed Building					
Elevation of Water Meter:	65.66	m ASL				
Finish Floor Elevation:	64.76	m ASL				
			Static Pressure at Water Meter			
MINIMUM HGL:	110.5	m ASL	64	psi	440	kPa
MAXIMUM HGL:	118.2	m ASL	75	psi	515	kPa
	Future Building					
Elevation of Water Meter:	70.23	m ASL				
Finish Floor Elevation:	69.33	m ASL				
			Static Pressure at Water Meter			
MINIMUM HGL:	110.5	m ASL	57	psi	395	kPa
MAXIMUM HGL:	118.2	m ASL	68	psi	470	kPa

D.B. Gray Engineering Inc.

Laurent Brosseau <l.brosseau@dbgrayengineering.com>

RE: Request for boundary conditions - 1547 Lagan Way

1 message

Cassidy, Tyler <tyler.cassidy@ottawa.ca> Wed, May 14, 2025 at 9:18 AM
To: laurent Brosseau <l.brosseau@dbgrayengineering.com>
Cc: Douglas Gray <d.gray@dbgrayengineering.com>

Hi Laurent,

Please find below the boundary conditions for 1547 Lagan Way:

Please note that requested Fire Flow Requirements of 216.7 L/s [Building D], 200 L/s [Building C] was not met. Maximum available FF at 20psi is provided.

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

The following are boundary conditions, HGL, for hydraulic analysis at 1547 Lagan Way (zone 1E) assumed to be connected to the 203 mm watermain on Lagan Way (see attached PDF for location).

-

Minimum HGL: 110.5 m

Maximum HGL: 118.2 m

Available fire flow at 20 psi: 165 L/s, assuming ground elevation of 69.2 m

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

Disclaimer:

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

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

Thank you,

Tyler Cassidy, P.Eng

Infrastructure Project Manager,

Planning, Development and Building Services department (PDBS)/ Direction générale des services de la planification, de l'aménagement et du bâtiment (DGSPAB) - South Branch

City of Ottawa | Ville d'Ottawa

110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1

613.580.2424 ext./poste 12977, Tyler.Cassidy@ottawa.ca

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

---

From: Cassidy, Tyler
Sent: April 16, 2025 2:43 PM

To: laurent Brosseau <l.brosseau@dbgrayengineering.com>
Cc: Douglas Gray <d.gray@dbgrayengineering.com>; Adams, Reed <reed.adams@ottawa.ca>
Subject: RE: Request for boundary conditions - 1547 Lagan Way

Hi Laurent,

I've forwarded your request to our Water Resources group. Please allow for up to 10 business days for the results to be provided.

Thank you,

Tyler Cassidy, P.Eng

Infrastructure Project Manager,

Planning, Development and Building Services department (PDBS)/ Direction générale des services de la planification, de l'aménagement et du bâtiment (DGSPAB) - South Branch

City of Ottawa | Ville d'Ottawa

110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1

613.580.2424 ext./poste 12977, Tyler.Cassidy@ottawa.ca

From: Adams, Reed <reed.adams@ottawa.ca>
Sent: April 16, 2025 1:20 PM
To: laurent Brosseau <l.brosseau@dbgrayengineering.com>; Cassidy, Tyler <tyler.cassidy@ottawa.ca>
Cc: Douglas Gray <d.gray@dbgrayengineering.com>
Subject: Re: Request for boundary conditions - 1547 Lagan Way

Hi Laurent,

I've cc'd Tyler who will be taking over this file and will be able to help you out.

Thanks,

Reed

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

---

From: Laurent Brosseau
Sent: Tuesday, April 15, 2025 9:33 AM
To: Adams, Reed
Cc: Douglas Gray
Subject: Request for boundary conditions - 1547 Lagan Way

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,

Please provide the boundary conditions for the 200mm Lagan Way municipal watermain at 1547 Lagan Way. Approximate proposed point of connection is attached. We have calculated the following expected demands:

Fire flow demand: 216.7 L/s (Building D)
Average daily demand: 0.2 L/s, 17.3 cu.m/day

Maximum daily demand: 0.3 L/s
Maximum hourly demand: 0.5 L/s

Calculations are attached.

Thank you

Laurent Brosseau

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

This e-mail originates from the City of Ottawa e-mail system. Any distribution, use or copying of this e-mail or the information it contains by other than the intended recipient(s) is unauthorized. Thank you.

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'

APPENDIX B

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

1547 Lagan Way
Ottawa, Ontario

March 4, 2026

Residential Average Daily Flow:	280 L/capita/day	Residential Peaking Factor:	Harmon Formula
Commercial Average Daily Flow:	28,000 L/ha/day	Harmon Formula Correction Factor:	0.8
Institutional Average Daily Flow:	28,000 L/ha/day	Commercial Peaking Factor:	1.5
Light Industrial Average Daily Flow:	35,000 L/ha/day	Institutional Peaking Factor:	1.5
Heavy Industrial Average Daily Flow:	55,000 L/ha/day	Industrial Peaking Factor:	Ministry of the Environment
Infiltration Allowance:	0.33 L/s/ha	Manning's Roughness Coefficient:	0.013

		Residential													Non-Residential				Infiltration			Q	Sewer Data						
		Individual									Cumulative				Individual		Cumulative		Individual	Cumulative		Total							
Location		Single	Semi		Apartment				Area	Population	Area	Population	Peaking	Flow Rate	Area	Daily Flow	Peaking	Flow Rate	Area	Area	Flow Rate	Flow Rate	Length	Nominal	Actual	Slope	Velocity	Q_{Full}	
From	To	Family	Detached	Duplex	(1 Bed)	(2 Bed)	(3 Bed)	(Average)	(ha)		(ha)		Factor	(L/s)	(ha)	L/ha/day	Factor	(L/s)	(ha)	(ha)	(L/s)	(L/s)	(m)	Diameter (mm)	Diameter (mm)	(%)	(m/s)	Capacity (L/s)	Q / Q_{Full}
		ppu = 3.4	ppu = 2.7	ppu = 2.3	ppu = 1.4	ppu = 2.1	ppu = 3.1	ppu = 1.8																					
Exist. Bld	250 SAN									0	0.0000	0	3.2	0.00	1.6627	35,000	6.1	4.11	1.6627	1.6627	0.55	4.66	15.1	150	147	1	0.85	14.43	0.32
Prop. Bld	MH-SA.1									0	0.0000	0	3.2	0.00	0.0000	35,000	6.1	0.00	0.0000	0.0000	0.00	0.00	15.1	150	147	1	0.85	14.43	0.00
MH-SA.1	MH-SA.2									0	0.0000	0	3.2	0.00	1.6627	35,000	6.1	4.11	1.6627	1.6627	0.55	4.66	8.1	200	201	0.65	0.84	26.80	0.17
MH-SA.2	250 SAN									0	0.0000	0	3.2	0.00	0.0000	35,000	6.1	4.11	0.0000	1.6627	0.55	4.66	10.1	200	201	0.65	0.84	26.80	0.17
																				250 mm Lagan Way Sanitary Sewer:				250	251	0.38	0.75	37.05	

APPENDIX C

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)	-	-	37.60	-	-
AREA II (Proposed Building Roof)	-	-	10.78	87.66	87.66
AREA III	-	-	62.09	194.96	194.96
TOTAL	476.49	110.52	110.48	282.62	282.62

100-YEAR EVENT + 20%

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)	-	-	45.12	-	-
AREA II (Proposed Building Roof)	-	-	15.74	97.60	97.60
AREA III	-	-	103.76	194.96	194.96
TOTAL	571.79	-	164.62	292.56	292.56

SUMMARY TABLES (continued)

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)	-	-	19.04	-	-
AREA II (Proposed Building Roof)	-	-	8.30	39.93	39.93
AREA III	-	-	61.22	103.55	103.55
TOTAL	230.09	110.52	88.56	143.48	143.48

2-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)	-	-	14.04	-	-
AREA II (Proposed Building Roof)	-	-	7.32	27.40	27.40
AREA III	-	-	58.36	38.35	38.35
TOTAL	110.52	110.52	79.72	65.75	65.75

September 24, 2026

1547 Lagan Way

Ottawa, Ontario

STORMWATER MANAGEMENT CALCULATIONS
Modified Rational Method

PRE-DEVELOPMENT CONDITIONS

100-YEAR EVENT

			C
Roof Area:	1,015	sq.m	1.00
Hard Area:	1,628	sq.m	1.00
Gravel Area:	6,705	sq.m	1.00
Soft Area:	1,004	sq.m	0.25
Total Catchment Area:	10,352	sq.m	0.93

Bransby Williams Formula

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

Sheet Flow Distance (L):	155	m
Slope of Land (Sw):	0.9	%
Area (A):	1.0352	ha
Time of Concentration (Sheet Flow):	9.0	min
Time of Concentration:	10	min
Rainfall Intensity (i):	179	mm/hr
100-Year Pre-Development Flow Rate (2.78AiC):	476.49	L/s
(100-Year +20% Pre-Development Flow Rate :	571.79	L/s)

5-YEAR EVENT

			C
Roof Area:	1,015	sq.m	0.90
Hard Area:	1,628	sq.m	0.90
Gravel Area:	6,705	sq.m	0.80
Soft Area:	1,004	sq.m	0.20
Total Catchment Area:	10,352	sq.m	0.77
Time of Concentration:	10	min	
Rainfall Intensity (i):	104	mm/hr	
5-Year Pre-Development Flow Rate (2.78AiC):	230.09	L/s	

2-YEAR FLOW RATE & MAXIMUM ALLOWABLE RELEASE RATE

Area (A):	10,352	sq.m
Time of Concentration:	10	min
Rainfall Intensity (i):	77	mm/hr
Runoff Coeficient (C):	0.50	
Maximum Allowable Release Rate (2.78AiC):	110.52	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:	514	sq.m	1.00
Gravel Area:	36	sq.m	1.00
Soft Area:	830	sq.m	0.25
Total Catchment Area:	1,380	sq.m	0.55
Area (A):	1,380	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	179	mm/hr	
Runoff Coeficient (C):	0.55		
Flow Rate (2.78AiC):	37.60	L/s	

DRAINAGE AREA II (Proposed Building Roof)

(100-YEAR EVENT)

			C
Total Catchment Area:	2,250	sq.m	1.00

No. of Roof Drains: 6

Slots per Wier: 1 0.01242 L/s/mm/slot (5 USgpm/in/slot)

Depth at Roof Drains: 145 mm

Maximum Release Rate: 10.78 L/s

Pond Area: 1,817 sq.m

Maximum Volume Stored: 87.66 cu.m

Maximum Volume Required: 87.66 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	111.69	10.78	100.90	60.54
15	143	89.38	10.78	78.60	70.74
20	120	75.03	10.78	64.24	77.09
25	104	64.96	10.78	54.17	81.26
30	92	57.46	10.78	46.68	84.02
35	83	51.65	10.78	40.87	85.82
40	75	47.00	10.78	36.22	86.92
45	69	43.19	10.78	32.41	87.50
50	64	40.00	10.78	29.22	87.66
55	60	37.29	10.78	26.51	87.48
60	56	34.96	10.78	24.18	87.04
65	53	32.93	10.78	22.15	86.37
70	50	31.14	10.78	20.36	85.51
75	47	29.56	10.78	18.77	84.48
80	45	28.14	10.78	17.36	83.31
85	43	26.87	10.78	16.08	82.02
90	41	25.71	10.78	14.93	80.62
95	39	24.67	10.78	13.88	79.13
100	38	23.71	10.78	12.92	77.54
105	36	22.83	10.78	12.04	75.88
110	35	22.02	10.78	11.23	74.15
115	34	21.27	10.78	10.49	72.35
120	33	20.58	10.78	9.79	70.50
125	32	19.93	10.78	9.14	68.59
130	31	19.33	10.78	8.54	66.63
135	30	18.76	10.78	7.98	64.62
140	29	18.23	10.78	7.45	62.58
145	28	17.74	10.78	6.95	60.49
150	28	17.27	10.78	6.49	58.37
180	24	14.95	10.78	4.17	45.00
210	21	13.23	10.78	2.44	30.76
240	19	11.89	10.78	1.10	15.89
270	17	10.82	10.78	0.03	0.53
300	16	9.94	9.94	0.00	0.00

DRAINAGE AREA III

(100-YEAR EVENT)

			C
Roof Area:	0	sq.m	1.00
Hard Area:	5,263	sq.m	1.00
Detention Area:	152	sq.m	1.00
Gravel Area:	1,215	sq.m	1.00
Soft Area:	92	sq.m	0.25
Total Catchment Area:	6,722	sq.m	0.99

Water Elevation:	68.73	m
Head:	1.97	m
Centroid of ICD Orifice: (ICD in Outlet Pipe of MH-12)	66.76	m
Invert of Outlet Pipe of MH-12:	66.69	m
Orifice Diameter:	144	mm
Orifice Area:	16,382	sq.mm
Discharge Coefficient:	0.61	
Maximum Release Rate:	62.09	L/s

Volume above Catch-Basins

CB/MH	Top Area (sq.m)	Depth (m)	Volume	
CB-4	135	0.15	6.76	cu.m
CB/MH-5	327	0.20	21.82	cu.m
CB-6	223	0.20	14.88	cu.m
CB/MH-7	605	0.20	40.37	cu.m
CB-8	318	0.20	21.22	cu.m
CB/MH-9	289	0.20	19.29	cu.m
CB-10	74	0.11	2.72	cu.m
CB/MH-11	83	0.13	3.60	cu.m
Detention Area	133	1.45	64.29	cu.m
		Maximum Volume Stored:	194.96	cu.m
		Maximum Volume Required:	194.96	cu.m

DRAINAGE AREA III (Continued)

(100-YEAR EVENT)

Time (min)	i (mm/hr)	2.78AiC (L/s)	ICD Release Rate (L/s)	Stored Rate (L/s)	Required Storage Volume (cu.m)
10	179	330.25	62.09	268.16	160.89
15	143	264.29	62.09	202.19	181.98
20	120	221.85	62.09	159.76	191.71
25	104	192.07	62.09	129.98	194.96
30	92	169.91	62.09	107.82	194.08
35	83	152.73	62.09	90.64	190.34
40	75	138.98	62.09	76.89	184.54
45	69	127.71	62.09	65.62	177.17
50	64	118.29	62.09	56.19	168.58
55	60	110.28	62.09	48.18	159.00
60	56	103.38	62.09	41.29	148.63
75	47	87.40	62.09	25.31	113.88
90	41	76.04	62.09	13.94	75.29
105	36	67.50	62.09	5.41	34.08
120	33	60.84	60.84	0.00	0.00
135	30	55.48	55.48	0.00	0.00
150	28	51.07	51.07	0.00	0.00
165	26	47.36	47.36	0.00	0.00
180	24	44.21	44.21	0.00	0.00
195	22	41.48	41.48	0.00	0.00
210	21	39.11	39.11	0.00	0.00
240	19	35.15	35.15	0.00	0.00
270	17	31.99	31.99	0.00	0.00
300	16	29.39	29.39	0.00	0.00
330	15	27.22	27.22	0.00	0.00
360	14	25.38	25.38	0.00	0.00
390	13	23.79	23.79	0.00	0.00
420	12	22.41	22.41	0.00	0.00

100-YEAR EVENT +20%

DRAINAGE AREA I (Uncontrolled Flow Off Site)

(100-YEAR EVENT + 20%)

			C
Roof Area:	0	sq.m	1.00
Hard Area:	514	sq.m	1.00
Gravel Area:	36	sq.m	1.00
Soft Area:	830	sq.m	0.25
Total Catchment Area:	1,380	sq.m	0.55
Area (A):	1,380	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	214	mm/hr	
Runoff Coeficient (C):	0.55		
Flow Rate (2.78AiC):	45.12	L/s	

DRAINAGE AREA II (Proposed Building Roof)

(100-YEAR EVENT + 20%)

			C
Total Catchment Area:	2,250	sq.m	1.00

No. of Roof Drains:	6	
Slots per Wier:	1	0.01242 L/s/mm/slot (5 USgpm/in/slot)
Depth at Roof Drains:	150	mm
Maximum Roof Drains Release Rate:	11.18	L/s
Maximum Scupper Release Rate:	4.56	L/s
Maximum Release Rate:	15.74	L/s

Pond Area:	1,952	sq.m
Maximum Volume Stored:	97.60	cu.m
Maximum Volume Required:	97.60	cu.m

Time (min)	i (mm/hr)	2.78AiC (L/s)	Roof Drains Release Rate (L/s)	Overflow Release Rate (L/s)	Total Release Rate (L/s)	Stored Rate (L/s)	Required Storage Volume (cu.m)
10	214	134.03	11.18	0.00	11.18	122.85	73.71
15	171	107.26	11.18	0.00	11.18	96.08	86.47
20	144	90.03	11.18	0.00	11.18	78.86	94.63
25	125	77.95	11.18	1.70	12.88	65.07	97.60
30	110	68.96	11.18	3.56	14.73	54.22	97.60
35	99	61.98	11.18	4.33	15.51	46.48	97.60
40	90	56.40	11.18	4.56	15.74	40.67	97.60
45	83	51.83	11.18	4.50	15.68	36.15	97.60
50	77	48.00	11.18	4.29	15.47	32.53	97.60
55	72	44.75	11.18	4.00	15.18	29.58	97.60
60	67	41.95	11.18	3.67	14.84	27.11	97.60
65	63	39.52	11.18	3.31	14.49	25.03	97.60
70	60	37.37	11.18	2.96	14.13	23.24	97.60
75	57	35.47	11.18	2.60	13.78	21.69	97.60
80	54	33.77	11.18	2.26	13.44	20.33	97.60
85	52	32.24	11.18	1.93	13.10	19.14	97.60
90	49	30.86	11.18	1.61	12.78	18.07	97.60
95	47	29.60	11.18	1.30	12.48	17.12	97.60
100	45	28.45	11.18	1.01	12.18	16.27	97.60
105	44	27.39	11.18	0.72	11.90	15.49	97.60
110	42	26.42	11.18	0.46	11.64	14.79	97.60
115	41	25.52	11.18	0.20	11.38	14.14	97.60
120	39	24.69	11.18	0.00	11.18	13.51	97.29
125	38	23.92	11.18	0.00	11.18	12.74	95.53
130	37	23.19	11.18	0.00	11.18	12.01	93.71
135	36	22.52	11.18	0.00	11.18	11.34	91.84
140	35	21.88	11.18	0.00	11.18	10.70	89.91
145	34	21.29	11.18	0.00	11.18	10.11	87.94
150	33	20.72	11.18	0.00	11.18	9.55	85.92
180	29	17.94	11.18	0.00	11.18	6.76	73.04
210	25	15.87	11.18	0.00	11.18	4.69	59.13
240	23	14.27	11.18	0.00	11.18	3.09	44.46
270	21	12.98	11.18	0.00	11.18	1.80	29.21
300	19	11.93	11.18	0.00	11.18	0.75	13.50

DRAINAGE AREA III

(100-YEAR EVENT + 20%)

			C
Roof Area:	0	sq.m	1.00
Hard Area:	5,263	sq.m	1.00
Detention Area:	152	sq.m	1.00
Gravel Area:	1,215	sq.m	1.00
Soft Area:	92	sq.m	0.25
Total Catchment Area:	6,722	sq.m	0.99

Water Elevation:	68.73	m
Head:	1.97	m
Centroid of ICD Orifice: (ICD in Outlet Pipe of CB/MH-13)	66.76	m
Invert of Outlet Pipe of CB/MH-13:	66.69	m
Orifice Diameter:	144	mm
Orifice Area:	16,382	sq.mm
Discharge Coefficient:	0.61	
Maximum ICD Release Rate:	62.09	L/s
Maximum Overflow Release Rate:	41.66	L/s
Maximum Release Rate:	103.76	L/s

Volume above Catch-Basins

CB/MH	Top Area (sq.m)	Depth (m)	Volume	
CB-4	135	0.15	6.76	cu.m
CB/MH-5	327	0.20	21.82	cu.m
CB-6	223	0.20	14.88	cu.m
CB-7	605	0.20	40.37	cu.m
CB-8	318	0.20	21.22	cu.m
CB/MH-9	289	0.20	19.29	cu.m
CB-10	74	0.11	2.72	cu.m
CB/MH-11	83	0.13	3.60	cu.m
Detention Area	133	1.45	64.29	cu.m
Maximum Volume Stored:			194.96	cu.m
Maximum Volume Required:			194.96	cu.m

DRAINAGE AREA III (Continued)

(100-YEAR EVENT + 20%)

Time (min)	i (mm/hr)	2.78AiC (L/s)	ICD Release Rate (L/s)	Overflow Release Rate (L/s)	Total Release Rate (L/s)	Stored Rate (L/s)	Required Storage Volume (cu.m)
10	214	396.30	62.09	9.27	71.37	324.93	194.96
15	171	317.15	62.09	38.43	100.52	216.62	194.96
20	144	266.22	62.09	41.66	103.76	162.47	194.96
25	125	230.48	62.09	38.42	100.51	129.97	194.96
30	110	203.90	62.09	33.49	95.58	108.31	194.96
35	99	183.28	62.09	28.35	90.44	92.84	194.96
40	90	166.78	62.09	23.45	85.55	81.23	194.96
45	83	153.25	62.09	18.95	81.05	72.21	194.96
50	77	141.94	62.09	14.86	76.96	64.99	194.96
55	72	132.33	62.09	11.16	73.25	59.08	194.96
60	67	124.05	62.09	7.81	69.90	54.16	194.96
75	57	104.88	62.09	0.00	62.09	42.79	192.54
90	49	91.24	62.09	0.00	62.09	29.15	157.41
105	44	81.00	62.09	0.00	62.09	18.91	119.14
120	39	73.01	62.09	0.00	62.09	10.92	78.59
135	36	66.58	62.09	0.00	62.09	4.48	36.31
150	33	61.28	61.28	0.00	61.28	0.00	0.00
165	31	56.84	56.84	0.00	56.84	0.00	0.00
180	29	53.05	53.05	0.00	53.05	0.00	0.00
195	27	49.78	49.78	0.00	49.78	0.00	0.00
210	25	46.93	46.93	0.00	46.93	0.00	0.00
240	23	42.18	42.18	0.00	42.18	0.00	0.00
270	21	38.38	38.38	0.00	38.38	0.00	0.00
300	19	35.27	35.27	0.00	35.27	0.00	0.00
330	18	32.67	32.67	0.00	32.67	0.00	0.00
360	16	30.45	30.45	0.00	30.45	0.00	0.00
390	15	28.55	28.55	0.00	28.55	0.00	0.00
420	15	26.89	26.89	0.00	26.89	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:	514	sq.m	0.90
Gravel Area:	36	sq.m	0.80
Soft Area:	830	sq.m	0.20
Total Catchment Area:	1,380	sq.m	0.48
Area (A):	1,380	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	104	mm/hr	
Runoff Coeficient (C):	0.48		
Flow Rate (2.78AiC):	19.04	L/s	

DRAINAGE AREA II (Proposed Building Roof)

(5-YEAR EVENT)

			C
Total Catchment Area:	2,250	sq.m	0.90

No. of Roof Drains: 6

Slots per Wier: 1 0.01242 L/s/mm/slot (5 USgpm/in/slot)

Depth at Roof Drains: 111 mm

Maximum Release Rate: 8.30 L/s

Pond Area: 1,076 sq.m

Maximum Volume Stored: 39.93 cu.m

Maximum Volume Required: 39.93 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	58.66	8.30	50.36	30.21
15	84	47.04	8.30	38.74	34.87
20	70	39.55	8.30	31.25	37.50
25	61	34.28	8.30	25.98	38.97
30	54	30.36	8.30	22.06	39.71
35	49	27.31	8.30	19.01	39.93
40	44	24.87	8.30	16.58	39.78
45	41	22.87	8.30	14.57	39.35
50	38	21.20	8.30	12.90	38.70
55	35	19.77	8.30	11.47	37.87
60	33	18.55	8.30	10.25	36.89
65	31	17.48	8.30	9.18	35.79
70	29	16.53	8.30	8.24	34.59
75	28	15.70	8.30	7.40	33.31
80	27	14.95	8.30	6.65	31.94
85	25	14.28	8.30	5.98	30.51
90	24	13.67	8.30	5.37	29.02
95	23	13.12	8.30	4.82	27.48
100	22	12.61	8.30	4.32	25.89
105	22	12.15	8.30	3.85	24.26
110	21	11.72	8.30	3.42	22.60
115	20	11.33	8.30	3.03	20.89
120	19	10.96	8.30	2.66	19.16
125	19	10.62	8.30	2.32	17.40
130	18	10.30	8.30	2.00	15.61
135	18	10.00	8.30	1.70	13.79
140	17	9.72	8.30	1.42	11.95
145	17	9.46	8.30	1.16	10.09
150	16	9.21	8.30	0.91	8.21
180	14	7.98	7.98	0.00	0.00
210	13	7.07	7.07	0.00	0.00
240	11	6.36	6.36	0.00	0.00
270	10	5.79	5.79	0.00	0.00
300	9	5.32	5.32	0.00	0.00

DRAINAGE AREA III

(5-YEAR EVENT)

			C
Roof Area:	0	sq.m	0.90
Hard Area:	5,263	sq.m	0.90
Detention Area:	152	sq.m	1.00
Gravel Area:	1,215	sq.m	0.80
Soft Area:	92	sq.m	0.20
Total Catchment Area:	6,722	sq.m	0.87

Water Elevation:	68.68	m
Head:	1.91	m
Centroid of ICD Orifice: (ICD in Outlet Pipe of MH-12)	66.76	m
Invert of Outlet Pipe of MH-12:	66.69	m
Orifice Diameter:	144	mm
Orifice Area:	16,382	sq.mm
Discharge Coefficient:	0.61	
Maximum Release Rate:	61.22	L/s

Volume above Catch-Basins

CB/MH	Top Area (sq.m)	Depth (m)	Volume	
CB-4	41	0.10	1.31	cu.m
CB/MH-5	155	0.15	7.48	cu.m
CB-6	117	0.15	5.67	cu.m
CB/MH-7	318	0.15	15.38	cu.m
CB-8	167	0.15	8.09	cu.m
CB/MH-9	152	0.15	7.35	cu.m
CB-10	19	0.06	0.34	cu.m
CB/MH-11	28	0.08	0.69	cu.m
Detention Area	123	1.40	57.25	cu.m
		Maximum Volume Stored:	103.55	cu.m
		Maximum Volume Required:	103.55	cu.m

DRAINAGE AREA III (Continued)

(5-YEAR EVENT)

Time (min)	i (mm/hr)	2.78AiC (L/s)	ICD Release Rate (L/s)	Stored Rate (L/s)	Required Storage Volume (cu.m)
10	104	170.29	30.61	139.68	83.81
15	84	136.57	30.61	105.96	95.36
20	70	114.82	30.61	84.21	101.05
25	61	99.53	30.61	68.92	103.38
30	54	88.14	30.61	57.53	103.55
35	49	79.30	30.61	48.69	102.24
40	44	72.21	30.61	41.61	99.85
45	41	66.40	30.61	35.79	96.64
50	38	61.54	30.61	30.93	92.79
55	35	57.41	30.61	26.80	88.43
60	33	53.84	30.61	23.23	83.64
75	28	45.58	30.61	14.97	67.37
90	24	39.70	30.61	9.09	49.07
105	22	35.27	30.61	4.66	29.39
120	19	31.82	30.61	1.21	8.70
135	18	29.03	29.03	0.00	0.00
150	16	26.74	26.74	0.00	0.00
165	15	24.82	24.82	0.00	0.00
180	14	23.18	23.18	0.00	0.00
195	13	21.76	21.76	0.00	0.00
210	13	20.52	20.52	0.00	0.00
240	11	18.46	18.46	0.00	0.00
270	10	16.81	16.81	0.00	0.00
300	9	15.46	15.46	0.00	0.00
330	9	14.32	14.32	0.00	0.00
360	8	13.36	13.36	0.00	0.00
390	8	12.53	12.53	0.00	0.00
420	7	11.81	11.81	0.00	0.00

2-YEAR EVENT

DRAINAGE AREA I (Uncontrolled Flow Off Site)

(2-YEAR EVENT)

			C
Roof Area:	0	sq.m	0.90
Hard Area:	514	sq.m	0.90
Gravel Area:	36	sq.m	0.80
Soft Area:	830	sq.m	0.20
Total Catchment Area:	1,380	sq.m	0.48
Area (A):	1,380	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	77	mm/hr	
Runoff Coeficient (C):	0.48		
Flow Rate (2.78AiC):	14.04	L/s	

DRAINAGE AREA II (Roof)

(2-YEAR EVENT)

			C
Total Catchment Area:	2,250	sq.m	0.90

No. of Roof Drains: 6

Slots per Wier: 1 0.01242 L/s/mm/slot (5 USgpm/in/slot)

Depth at Roof Drains: 98 mm

Maximum Release Rate: 7.32 L/s

Pond Area: 837 sq.m

Maximum Volume Stored: 27.40 cu.m

Maximum Volume Required: 27.40 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	77	43.24	7.32	35.92	21.55
15	62	34.77	7.32	27.45	24.71
20	52	29.29	7.32	21.97	26.37
25	45	25.43	7.32	18.11	27.16
30	40	22.54	7.32	15.22	27.40
35	36	20.30	7.32	12.98	27.26
40	33	18.50	7.32	11.18	26.84
45	30	17.02	7.32	9.70	26.20
50	28	15.79	7.32	8.47	25.40
55	26	14.73	7.32	7.41	24.46
60	25	13.82	7.32	6.51	23.42
65	23	13.03	7.32	5.71	22.28
70	22	12.34	7.32	5.02	21.07
75	21	11.72	7.32	4.40	19.79
80	20	11.16	7.32	3.84	18.45
85	19	10.66	7.32	3.35	17.06
90	18	10.21	7.32	2.89	15.63
95	17	9.80	7.32	2.48	14.16
100	17	9.43	7.32	2.11	12.65
105	16	9.08	7.32	1.76	11.11
110	16	8.76	7.32	1.45	9.54
115	15	8.47	7.32	1.15	7.94
120	15	8.20	7.32	0.88	6.32
125	14	7.94	7.32	0.62	4.68
130	14	7.71	7.32	0.39	3.02
135	13	7.48	7.32	0.17	1.34
140	13	7.28	7.28	0.00	0.00
145	13	7.08	7.08	0.00	0.00
150	12	6.90	6.90	0.00	0.00
180	11	5.98	5.98	0.00	0.00
210	9	5.30	5.30	0.00	0.00
240	8	4.77	4.77	0.00	0.00
270	8	4.35	4.35	0.00	0.00
300	7	4.00	4.00	0.00	0.00

DRAINAGE AREA III

(2-YEAR EVENT)

			C
Roof Area:	0	sq.m	0.90
Hard Area:	5,263	sq.m	0.90
Gravel Area:	1,215	sq.m	0.80
Soft Area:	92	sq.m	0.20
Total Catchment Area:	6,570	sq.m	0.87

Water Elevation:	68.50	m
Head:	1.74	m
Centroid of ICD Orifice: (ICD in Outlet Pipe of MH-12)	66.76	m
Invert of Outlet Pipe of MH-12:	66.69	m
Orifice Diameter:	144	mm
Orifice Area:	16,382	sq.mm
Discharge Coefficient:	0.61	
Maximum Release Rate:	58.36	L/s

Volume above Catch-Basins

CB/MH	Top Area (sq.m)	Depth (m)	Volume	
CB-4	38	0.00	0.00	cu.m
CB/MH-5	7	0.00	0.00	cu.m
CB-6	5	0.00	0.00	cu.m
CB/MH-7	13	0.00	0.00	cu.m
CB-8	7	0.00	0.00	cu.m
CB/MH-9	6	0.00	0.00	cu.m
CB-10	87	0.00	0.00	cu.m
CB/MH-11	48	0.00	0.00	cu.m
Detention Area	94	1.22	38.35	cu.m

Maximum Volume Stored:	38.35	cu.m
Maximum Volume Required:	38.35	cu.m

DRAINAGE AREA III (Continued)

(2-YEAR EVENT)

Time (min)	i (mm/hr)	2.78AiC (L/s)	ICD Release Rate (L/s)	Stored Rate (L/s)	Required Storage Volume (cu.m)
10	77	122.28	58.36	63.92	38.35
15	62	98.34	58.36	39.98	35.98
20	52	82.84	58.36	24.48	29.37
25	45	71.91	58.36	13.55	20.32
30	40	63.75	58.36	5.39	9.71
35	36	57.41	57.41	0.00	0.00
40	33	52.32	52.32	0.00	0.00
45	30	48.15	48.15	0.00	0.00
50	28	44.65	44.65	0.00	0.00
55	26	41.67	41.67	0.00	0.00
60	25	39.10	39.10	0.00	0.00
65	23	36.86	36.86	0.00	0.00
70	22	34.89	34.89	0.00	0.00
75	21	33.14	33.14	0.00	0.00
80	20	31.57	31.57	0.00	0.00
85	19	30.16	30.16	0.00	0.00
90	18	28.89	28.89	0.00	0.00
95	17	27.72	27.72	0.00	0.00
100	17	26.66	26.66	0.00	0.00
105	16	25.69	25.69	0.00	0.00
110	16	24.79	24.79	0.00	0.00
115	15	23.96	23.96	0.00	0.00
120	15	23.18	23.18	0.00	0.00
125	14	22.47	22.47	0.00	0.00
130	14	21.80	21.80	0.00	0.00
135	13	21.17	21.17	0.00	0.00
140	13	20.58	20.58	0.00	0.00
145	13	20.03	20.03	0.00	0.00
150	12	19.51	19.51	0.00	0.00
180	11	16.92	16.92	0.00	0.00
210	9	14.99	14.99	0.00	0.00
240	8	13.49	13.49	0.00	0.00
270	8	12.29	12.29	0.00	0.00
300	7	11.31	11.31	0.00	0.00

D.B. Gray Engineering Inc.

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

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STORM SEWER CALCULATIONS

Rational Method

2-YEAR EVENT

Project: 1547 Lagan Way
Ottawa, Ontario

Date: September 24, 2026

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}
CB-1	Prop Bld		0.0284			0.0711	0.0711	10.00	77	5.5	2.6	250	251	2	1.72	85.0	0.0	0.06
Prop Bld	CB-2	0.2250				0.5630	0.6340	10.03	77	48.6	4.9	300	299	2	1.93	135.5	0.0	0.36
							Flow Control Roof Drains Release Rate:			7.32	4.9	300	299	2	1.93	135.5	0.0	0.05
CB-2	MH-3		0.0320		0.0272	0.0952	0.7292	10.07	77	55.8	20.3	300	299	0.4	0.86	60.6	0.4	0.92
MH-3	CB/MH-13					0.0000	0.7292	10.46	75	54.8	59.3	300	299	0.37	0.83	58.3	1.2	0.94
CB-4	CB/MH-5		0.0394			0.0986	0.0986	10.00	77	7.6	6.3	250	251	0.43	0.80	39.4	0.1	0.19
CB/MH-5	CB/MH-9		0.0568	0.0012	0.0111	0.1506	0.2492	10.13	76	19.0	36.4	250	251	0.43	0.80	39.4	0.8	0.48
CB-6	CB/MH-9		0.0228		0.0036	0.0590	0.0590	10.00	77	4.5	16.5	250	251	0.43	0.80	39.4	0.3	0.12
Detention Area	CB/MH-7		0.0152	0.0075		0.0526	0.1117	10.00	77	8.6	14.4	250	251	0.43	0.80	39.4	0.3	0.22
CB/MH-7	CB/MH-9		0.1298	0.0301		0.3833	0.3833	10.00	77	29.4	14.4	250	251	0.43	0.80	39.4	0.3	0.75
CB-8	CB/MH-9		0.1212	0.0527		0.4058	0.4058	10.00	77	31.2	9.8	250	251	0.43	0.80	39.4	0.2	0.79
CB/MH-9	CB/MH-11		0.0249	0.0214		0.1039	1.2013	10.89	74	88.3	93	450	457	0.195	0.80	131.2	1.9	0.67
CB-10	CB/MH-11		0.0631			0.1579	0.1579	10.00	77	12.1	3.1	250	251	0.43	0.80	39.4	0.1	0.31
CB/MH-11	MH-12		0.0346	0.8730		1.7854	3.1446	12.83	67	212.0	36.6	450	457	0.195	0.80	131.2	0.8	1.62
MH-12	MH-13					0.0000	3.1446	13.59	65	205.3	9.8	525	533	0.16	0.80	179.1	0.2	1.15
								ICD Release Rate:		58.36	9.8	525	533	0.16	0.80	179.1	0.2	0.33
MH-13	EXIST. 600 ST					0.0000	3.1446	13.80	65	203.6	15.4	525	533	0.3	1.10	245.2	0.2	0.83
CB-27	EXIST. 750 ST		0.0099	0.0022	0.0030	0.0307	0.0307	10.00	77	2.4	11.8	250	251	1	1.21	60.1	0.2	0.04
								Existing 600 mm Municpal Storm Sewer:				600	610	0.36	1.32	385.0		
								Existing 750 mm Municpal Storm Sewer:				750	762	0.41	1.63	743.7		