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SITE SERVICING & STORMWATER MANAGEMENT REPORT

DYMON STORAGE
5210 INNES ROAD
OTTAWA, ONTARIO

REPORT NO. 21025

JUNE 16, 2026

CONTENTS

1.0 INTRODUCTION

2.0 WATER SERVICING

- 2.1 WATER SUPPLY FOR FIREFIGHTING
- 2.2 DOMESTIC WATER SUPPLY

3.0 SANITARY SERVICING

4.0 STORMWATER MANAGEMENT

- 4.1 QUANTITY CONTROL
- 4.2 QUALITY CONTROL
- 4.3 STORM SERVICING

5.0 CONCLUSIONS

LIST OF APPENDICES

A PRE-CONSULTATION: MEETING FEEDBACK

B WATER SERVICING

C SANITARY SERVICING

D STORMWATER MANAGEMENT

1.0 INTRODUCTION

This report has been prepared in support of the Site Plan Control application for the proposed 5-storey Dymon Storage building located at 5210 Innes Road in Ottawa, Ontario. This report describes the servicing for the proposed building and stormwater management for the 4,646 sq.m property. Refer to Pre-Consultation: Meeting Feedback in Appendix A.

This report forms part of the site servicing and stormwater management design for the proposed development. Also refer to Drawing No. C-1 to C-6 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 on the Trim Road facade. 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 in front of the subject property on the Trim Road frontage. It is 40 m unobstructed distance to the proposed fire department connection, which is less than the maximum 45 m required by the Ontario Building Code.

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). 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 8,000 L/min (133.3 L/s). Refer to calculations in Appendix B.

The building is to be of noncombustible construction (Type II) in accordance with the Fire Underwriters Survey. Refer to Appendix B.

The boundary conditions in the 400 mm Trim Road municipal watermain provided by the City of Ottawa at the subject property indicate a hydraulic grade line (HGL) of 126.8 m for the 133.3 L/s fire flow. Refer to Appendix B. This HGL calculates to 376 kPa (55 psi). 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 from the existing municipal water distribution system.

The aggregate flow of all contributing fire hydrants within 150 m of the building shall not be less than the required fire flow. 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 1985 Trim Road on the Innes Road frontage. 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 8,000 L/min (133.3 L/s).

2.2 DOMESTIC WATER SUPPLY

The average daily demand is calculated to be 0.15 L/s, the maximum daily demand is calculated to be 0.23 L/s and the maximum hourly demand is calculated to be 0.41 L/s. Refer to calculations in Appendix B.

The boundary conditions in the 400 mm Trim Road municipal watermain provided by the City of Ottawa at the subject property indicate a minimum HGL of 126.8 m and a maximum HGL of 130.3 m. Refer to Appendix B. Based on these boundary conditions, the pressure at the water meter is calculated to vary between 360 kPa (52 psi) and 394 kPa (57 psi). This is an acceptable range for the proposed development.

A 150 mm water service connecting to the existing 400 mm Trim Road municipal watermain is proposed to service the sprinkler system. The same 150 mm water service will provide an adequate domestic water supply.

3.0 SANITARY SERVICING

The post-development sanitary flow rate is calculated to be 0.38 L/s. A 200 mm sanitary sewer service at 2% slope (46.38 L/s capacity) is proposed to service the building. At the design flow rate the sanitary sewer service will only be at 1% capacity. The proposed 200 mm sanitary sewer service will connect to the proposed private sanitary sewer system. A 200 mm private sanitary sewer at 0.32% slope (18.55 L/s capacity) is proposed to service the development. At the design flow rate the 200 mm sanitary sewer will only be at 2% capacity. The proposed 200 mm sanitary sewer will connect to the existing 525 mm Trim Road municipal sanitary sewer, which at 0.125% slope has a capacity of 158.31 L/s. Refer to calculations in Appendix C. The proposed development is expected to have an acceptable impact on the 525 mm Trim Road municipal sanitary sewer.

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 the Rational Method with a time of concentration of 10 minutes and runoff coefficient of 0.30, the maximum allowable release rate is calculated to be 29.76 L/s. The Rational and Modified Rational Methods are used to calculate the post-development flow rates and corresponding storage volumes. The 2-year runoff coefficients are increased by 25% to a maximum of 1.00 to calculate the 100-year runoff coefficients. Refer to calculations in Appendix D.

Drainage Area I (Uncontrolled Flow Off Site – 946 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	2-Year Event
Maximum Flow Rate	20.12 L/s	7.40 L/s

Drainage Area II (Roof – 1,900 sq.m)

The 15 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. Roof drains are to be Watts RD-100 c/w a Watts Adjustable Accutrol Weir in the closed position and release 0.31545 L/s (5 USgpm). The opening at the top of the flow control weir is to be a minimum 50 mm in diameter. A minimum of 7 scuppers each a minimum 800 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	2-Year Event
Maximum Release Rate	4.73 L/s	4.73 L/s
Maximum Depth at Roof Drains	145 mm	83 mm
Maximum Volume Stored	91.76 cu.m	26.14 cu.m

Drainage Area III (1,800 sq.m)

An inlet control device (ICD) located in the outlet pipe of CB/MH-7 will restrict the flow of stormwater and cause it to backup into the upstream infrastructure. The ICD will be a Hydrovex vortex style manufactured by Veolia or approved equivalent sized by the manufacturer for a release rate of 9.64 L/s at 2.38 m. It is determined that a 100 VHV-1 will restrict the maximum flow rate to 9.64 L/s at 2.38 m. Based on this orifice, the maximum flow rate during the 2-year event is calculated to be 6.67 L/s at 1.14 m. Since some of the restricted stormwater is proposed to be stored using underground infrastructure, an average release rate equal to 50% of the maximum release rate is used to calculate the required storage volumes. The underground infrastructure will include 54 – Soleno HydroStor HS75 open bottom chambers or approved equivalent surrounded by clear stone wrapped in geotextile fabric.

	100-Year Event	2-Year Event
Maximum Release Rate	9.64 L/s	6.67 L/s
Maximum Water Elevation	88.73 m	87.49 m
Maximum Volume Stored	160.59 cu.m	68.94 cu.m

Summary
The maximum post-development release rate during the 100-year event is calculated to be 29.76 L/s, which is equal to the maximum allowable release rate. To achieve the maximum allowable release rate, a maximum storage volume of 252.34 cu.m is required and provided during the 100-year event. The maximum post-development release rate during the 2-year event is calculated to be 14.07 L/s, which is 53% less than the maximum allowable release rate. A maximum storage volume of 95.08 cu.m is required and provided during the 2-year event. The proposed development is expected to have an acceptable impact on the 1,200 mm Trim Road municipal storm sewer.

	100-Year Event	5-Year Event
Maximum Allowable Release Rate	29.76 L/s	29.76 L/s
Maximum Release Rate	29.76 L/s	14.07 L/s
Maximum Volume Required	252.34 cu.m	95.08 cu.m
Maximum Volume Stored	252.34 cu.m	95.08 cu.m

4.2 QUALITY CONTROL

The Pre-Consultation: Meeting Feedback states *"The Greater Cardinal Creek Subwatershed Management Plan (SMP) is applicable to the site, which includes the retention of the first 5mm of rainfall events (i.e. first flush), including the roof of the proposed building, as outlined in Table 4.1 of the SMP."* Refer to Appendix A. The clear stone bedding for the open bottom chambers discussed above will provide onsite retention of the first 5 mm of rainfall events. Runoff from Drainage Areas II & III representing 80% of the subject property will be conveyed to the open bottom chambers and clear stone bedding. A 5 mm rainfall event is calculated to be 16.65 cu.m. Refer to calculations in Appendix D.

The Pre-Consultation: Meeting Feedback states *"80% TSS removal is required for quality control"* Refer to Appendix A. The open bottom chambers and clear stone bedding discussed above will promote infiltration. Runoff from Drainage Areas II & III representing 80% of the subject property will be conveyed to the open bottom chambers and clear stone bedding. In accordance with the Ministry of the Environment Stormwater Management Planning and Design Manual Table 3.2, it is calculated that an infiltration trench with a volume of 16.65 cu.m is required. Refer to calculations in Appendix D.

In accordance with the Hydrogeological Investigation, an infiltration rate of 8 mm/hr is used to calculate the draw down time. The storage volume of the clear stone bedding for the open bottom chambers is calculated to be 17.73 cu.m with a 10 hr draw down time, which is greater than the required 5 mm rainfall and 80% TSS removal volumes of 16.65 cu.m. Refer to calculations in Appendix D.

An Erosion & Sediment Control Plan has been developed to be implemented during construction. Refer to Drawing No. C-3 and notes on Drawing No. C-4.

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 restricted roof flow rate during the 2-year event is calculated to be 4.73 L/s. A 250 mm storm sewer service at 2% slope (84.10 L/s capacity) is proposed to service the roof drains. At the peak restricted 2-year flow rate the storm sewer service will only be at 6% capacity. Refer to calculations in Appendix D. The proposed 250 mm storm sewer service will connect to the proposed private storm sewer system upstream of the ICD. 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.

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 9.07 L/s. A 250 mm storm sewer at 0.432% slope (39.09 L/s capacity) is proposed to connect to the existing 1,200 mm Trim Road municipal storm sewer, which at 0.125% slope has a capacity of 1,437 L/s. At the peak restricted 2-year flow rate the proposed 250 mm storm sewer will only be at 23% capacity. Refer to calculations in Appendix D.

5.0 CONCLUSIONS

1. There is an adequate water supply for firefighting from the existing municipal water distribution system.
2. There is an acceptable range of water pressures in the existing municipal water distribution system.
3. The post-development sanitary flow rates will be adequately handled by the proposed sanitary sewer service and private sanitary sewer system.
4. The proposed development is expected to have an acceptable impact on the 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 proposed development is expected to have an acceptable impact on the existing municipal storm sewer.
7. The clear stone bedding for the open bottom chambers will provide onsite retention of the first 5 mm of rainfall events.
8. The infiltration promoted by the open bottom chambers and clear stone bedding will provide an enhanced (80% TSS removal) level of protection.
9. An Erosion & Sediment Control Plan has been developed to be implemented during construction.
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.

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

Prepared by D.B. Gray Engineering Inc.

APPENDIX A

PRE-CONSULTATION: MEETING FEEDBACK

File No.: PC2025-0318

December 24, 2025

Nico Church
Fotenn Consultants Inc.
Via email: church@fotenn.com

Subject: **Pre-Consultation: Meeting Feedback**
Proposed Zoning By-law Amendment and Site Plan Control Applications – 5210 Innes Road

Please find below information regarding next steps as well as consolidated comments from the above-noted pre-consultation meeting held on December 18, 2025.

Next Steps

1. A review of the proposal and materials submitted for the above-noted pre-consultation has been undertaken. For your next submission, please submit the required Application Form, together with the necessary studies and/or plans to planningcirculations@ottawa.ca, copy (cc:) to the file lead and planning support.

2. In your subsequent pre-consultation or application submission, please ensure that all comments or issues detailed herein are addressed. A detailed cover letter stating how each issue has been addressed is requested with the submission materials. Please coordinate the numbering of your responses within the cover letter with the comment number(s) herein.

3. Please note, if your development proposal changes significantly in scope, design, or density it is recommended that a subsequent pre-consultation application be submitted.

Supporting Information and Material Requirements

1. The attached **Study and Plan Identification List** outlines the information and material that has been identified, during this phase of pre-consultation, as either required (R) or advised (A) as part of a future complete application submission.

    a. The required plans and studies must meet the City's Terms of Reference (ToR) 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.

Consultation with Technical Agencies

1. You are encouraged to consult with technical agencies early in the development process and throughout the development of your project concept. A list of technical agencies and their contact information is enclosed.

Planning

General Comments:

1. The subject site is located within the area identified in the City's Brownfields Redevelopment Community Improvement Plan; please review for any applicable considerations for this application.

2. An Archaeological Assessment is required as the site has been identified as having archaeological potential.

Official Plan:

3. The subject site is designated Neighbourhood within the Suburban Transect, with the Future Neighbourhood Overlay.

4. The property is at the intersection of two arterial roads: Trim Road to the west, also a Minor Corridor, and Innes Road to the north.

Zoning By-law (By-law No. 2008-250)

5. Under the City's current Zoning By-law, the site is zoned General Mixed-Use Zone Urban Exception 2943 (GM[2943]). The proposal is to rezone the property to GM[XXXX] to permit a 5-storey self-storage building, where the specific relief to the standard GM zone would be for building height increase, lantern feature increase, reduced setback for outdoor refuse collection, and reduced parking.

New Draft Zoning By-law (By-law No. 2026-50)

6. Please note that the new Zoning By-law is expected to come into effect in 2026. It is currently in final draft form, but changes may still occur prior to approval.

Feel free to contact Colleen Ivits for follow-up questions.

Noise

Comments:

7. No comments at this time.

Feel free to contact Colleen Ivits for follow-up questions.

Urban Design

Comments:

8. An Urban Design Brief is not required.

9. The site is located in a Design Priority Area, however, given the site history (and previous approval) as well as the scale of development, UD staff do not feel that UDRP is needed.

10. Additional drawings and studies are required as shown on the SPIL. Please follow the terms of references (Planning application submission information and materials | City of Ottawa) to prepare these drawings and studies. These include:
    a. Site Plan

b. Landscape Plan
c. Building Elevations
d. Floor Plans (recommended)

11. UD staff are looking to see the proposed development shifted to the corner of Innes and Trim.

12. UD staff would like the proposed surface parking shifted to the eastern driveway.

13. If drive-through queuing is a concern, please endeavor to locate it internal to the site.

14. UD staff are also looking to see tree planting within the public realm and along the perimeter of the property

15. UD staff have no concerns with the proposed height increase for the lantern, however, this should be marked on a zoning schedule.

Feel free to contact Nader Kadri for follow-up questions.

Engineering

Comments:

16. Since there was a previous submission for the site, addendums/memos (where appropriate) can be provided for reports where appropriate (i.e. geotechnical report and hydrogeological report).

17. A revision to the previously submitted site servicing report can be provided.

18. The following stormwater management criteria for the site still apply:
    a. The stormwater management criteria for the site have been discussed during previous pre-consultations for this site and can be found below:
        i. Flow to the minor storm sewer system is restricted to the runoff from a storm event with a 2-year return period. Stormwater runoff in excess of the 2-year storm , up to and including the 100-year storm event +20% stress test, must be detained on site.
        ii. The Greater Cardinal Creek Subwatershed Management Plan (SMP) is applicable to the site, which includes the retention of the first 5mm of rainfall events (i.e. first flush), including the roof of the proposed building, as outlined in Table 4.1 of the SMP.
        iii. Ensure no overland flow for all storms up to and including the 100-year event. Provide adequate emergency overflow conveyance off-site
        iv. Soils mapping shows sensitive marine clays in this area. It is anticipated that the groundwater level is high in this area.
        v. 80% TSS removal is required for quality control

19. Available services (Storm, Sanitary and/or Water Supply)
    a. Trim Road:
        i. 525mm sanitary sewer
        ii. 1200mm storm sewer
        iii. 406mm watermain
    b. Innes Road:
        i. 450mm storm sewer
        ii. 305mm watermain
    a. Services should ideally be grouped in a common trench to minimize the number of road cuts.
    b. A monitoring maintenance hole is require and should be located in an accessible location on private property near the property line (ie. Not in a parking area).
    c. Sewer connections to be made above the springline of the sewermain as per:
        i. Std Dwg S11.1 for flexible main sewers – connections made using approved tee or wye fittings.
        ii. Std Dwg S11 (For rigid main sewers) – lateral must be less that 50% the diameter of the sewermain,
        iii. Std Dwg S11.2 (for rigid main sewers using bell end insert method) – for larger diameter laterals where manufactured inserts are not available; lateral must be less that 50% the diameter of the sewermain,
        iv. Connections to manholes permitted when the connection is to rigid main sewers where the lateral exceeds 50% the diameter of the sewermain. – Connect obvert to obvert with the outlet pipe unless pipes are a similar size.

20. Water
    a. Capacity
    b. Water Data Card (future requirement)
    c. Water Boundary condition requests must include the location of the service (map or plan with connection location(s) indicated) and the expected loads required by the proposed development, including calculations. Please provide the following information:
        i. Location of service
        ii. Type of development

iii. The amount of fire flow required (per OBC or FUS).
iv. Average daily demand: ___ l/s.
v. Maximum daily demand: ___l/s.
vi. Maximum hourly daily demand: ___ l/s.

Feel free to contact Reed Adams for follow-up questions.

Transportation

Comments:

21. Follow Transportation Impact Assessment Guidelines:
    a. A Transportation Impact Assessment is required.
    b. The Strategy Report (including Synchro files) must be submitted with the formal submission to deem complete. The applicant is strongly encouraged to submit the Strategy Report to the TPM prior to formal submission and allow for a 14 day circulation period.
    c. Note an addendum to the previous TIA is acceptable.

22. ROW Protection:
    a. Ensure that the development proposal complies with the Right-of-Way protection requirements of the Official Plan's Schedule C16.There is ROW protection listed along the site frontage.
        i. Innes between Trim and the East urban limit has protection of 37.5m.
        ii. Trim, between Innes and the south urban limit has protection of 37.5m, with an additional 5.0 m on the rural side that may be required to construct a rural cross-section.
        iii. Corner triangles are required (measure on the property line/ROW protected line; no structure above or below this triangle), arterial to arterial: two overlapping 5 metre x 15 metre triangles.
    b. Any requests for exceptions to ROW protection requirements must be discussed with Transportation Planning and concurrence provided by Transportation Planning management.

23. Transportation Master Plan includes Transit Priority Isolated Measures along the Trim Road frontage (Affordable Network)

24. Nearby planned construction and infrastructure projects includes road resurfacing along Trim, from Innes southbound. The work is targeted to start in 1-2 years, but there is no project manager assigned.

25. A Surface Transportation Noise Study is not required, because the proposal is not a noise sensitive land use.

26. The following comments applicable to the Site Plan:
    a. upgrade existing transit stop #0595 to include a paved shelter pad to the specifications of the City.
    b. As the proposed site is commercial and for general public use, AODA legislation applies.

i. Ensure all crosswalks located internally on the site provide a TWSI at the depressed curb, per requirements of the Integrated Accessibility Standards Regulation under the AODA.
ii. Clearly define accessible parking stalls and ensure they meet AODA standards (include an access aisle next to the parking stall and a pedestrian curb ramp at the end of the access aisle, as required).
iii. Please consider using the City's Accessibility Design Standards, which provide a summary of AODA requirements.

c. Ensure site access meets the City's Private Approach Bylaw. The proposed access radius and concrete apron at the Innes Road egress fall outside of the subject property.
d. Show all details of the roads abutting the site; include such items as pavement markings, signage, accesses, on-street parking, and/or sidewalks.
e. Turning movement diagrams required for all accesses showing the largest vehicle to access/egress the site.
f. Turning movement diagrams required for internal movements (loading areas, garbage).
g. It is understood heavy vehicles must be accommodated on this site. The use of concrete aprons to accommodate turning movements of heavy vehicles is appreciated.
h. Show all curb radii measurements; ensure that all curb radii are reduced as much as possible and fall within TAC guidelines (Figure 8.5.1).
i. Show dimensions for site elements (i.e. lane/aisle widths, access width and throat length, parking stalls, sidewalks, pedestrian pathways, etc.)
j. Sidewalk is to be continuous across accesses as per City Specification 7.1.

Feel free to contact Josiane Gervais for follow-up questions.

Environment

Comments:

27. Please be mindful of the city's long-term urban forest canopy target of 40%. Trees help reduce the urban heat island effect, provide shade, help with health and wellbeing, and other environmental factors. (OP Sections 2.1, 2.2.1, 4.8.2)

28. Trees should be thought of upfront and early in the process, especially considering marine clay may be present. (OP Section 4.8.2(3e))

29. Green roofs and light-colored roofs designs are encouraged. (OP Section 4.6.4)

30. An Environmental Impact Statement (EIS) is not required.

Feel free to contact Kim MacDonald for follow-up questions.

Forestry

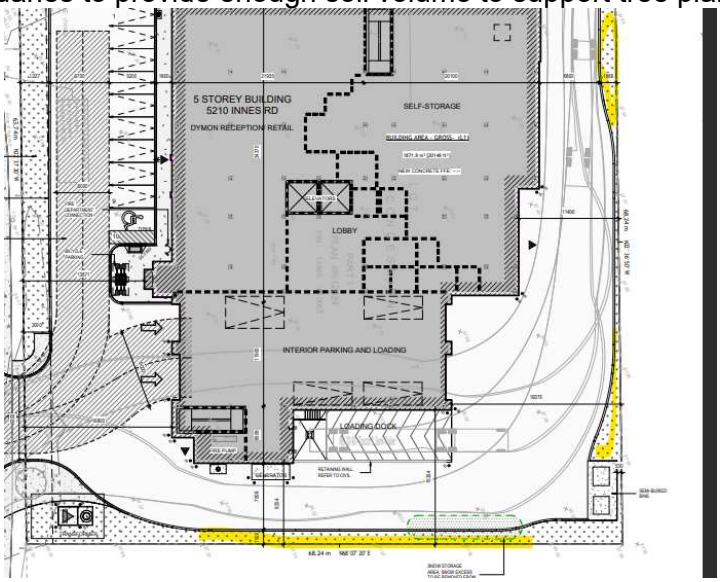
Comments:

31. A Tree Conservation Report and Landscape Plan are submission requirements.

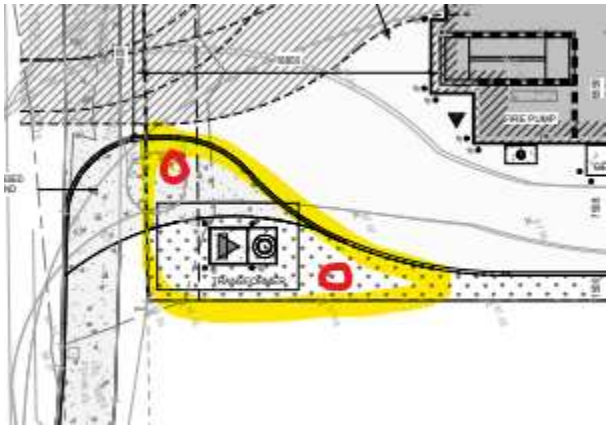
32. City trees, no matter their size, are protected under the Tree Protection By-law. Removal of a City tree is not permitted unless justified. The entrance off of Trim Road is forcing removal of a City tree in the Right of Way. Please justify why no alternative design, that would allow for retention, is feasible.

33. Plant large canopy trees, at a 7.5m spacing, along Trim. Smaller canopy trees will need to be accommodated along Innes Road, since there are overhead wires.

34. The City is working towards a 40% canopy cover target (OP Section 4.8.2, policy 2).
    a. Increase the size of the landscape buffer along the south and east property boundaries to provide enough soil volume to support tree planting.



    b. Increase the size of the landscape island on the south end of the Trim Road entrance to support two trees (photo):



35. Tree Conservation Report requirements. The following Tree Conservation Report (TCR) requirements have been adapted from the Schedule E of the Urban Tree Protection Guidelines – for more information on these requirements please contact hayley.murray@ottawa.ca
    a. A Tree Conservation Report (TCR) must be supplied for review along with the suite of other plans/reports required by the City

b. Any tree 10 cm in diameter or greater and City-owned trees of any diameter requires a tree permit issued under the Tree Protection Bylaw (Bylaw 2020 – 340); the permit will be based on an approved TCR and made available at or near plan approval.
c. The TCR must contain 2 separate plans/maps:
    i. Plan/Map 1 - show existing conditions with tree cover information.
    ii. Plan/Map 2 - show proposed development with tree cover information.
d. The TCR must list all trees on site, as well as off-site trees if the CRZ (critical root zone) extends into the developed area, by species, diameter, and health condition. Please note that averages can be used if there are forested areas.
e. Please identify trees by ownership – private onsite, private on adjoining site, city owned, co-owned (trees on a property line)
f. If trees are to be removed, the TCR must clearly show where they are, and document the reason they cannot be retained.
g. The removal of trees on a property line will require the permission of both property owners.
h. All retained trees must be shown, and all retained trees within the area impacted by the development process must be protected as per City guidelines available at Tree Protection Specification or by searching Ottawa.ca
i. The City encourages the retention of healthy trees; if possible, please seek opportunities for retention of trees that will contribute to the design/function of the site.
j. Removal of a City tree is not permitted unless justified. If justified, monetary compensation for the value of the tree must be paid before a tree removal permit is issued.

36. Landscape Plan (LP) requirements.
    a. Landscape Plan Terms of Reference must be adhered to for all tree planting: Click Here. For more information on these requirements please contact hayley.murray@ottawa.ca

37. Additional Elements for Tree Planting in the Right of Way:
    a. Please ensure any retained trees are shown on the LP
    b. Sensitive Marine Clay - Please follow the City's 2017 Tree Planting in Sensitive Marine Clay guidelines.
    c. Soil Volume - Please demonstrate as per the Landscape Plan Terms of Reference that the available soil volumes for new plantings will meet or exceed the minimum soil volumes requested.
    d. The city requests that consideration be given to planting native species wherever there is a high probability of survival to maturity.
    e. Efforts shall be made to provide as much future canopy cover as possible at a site level, through tree planting and tree retention. The Landscape Plan shall show/document that the proposed tree planting and retention will contribute to the City's overall canopy cover over time. Please provide a projection of the future canopy cover for the site to 40 years
    f. Minimum Setbacks
        iii. Maintain 1.5m from sidewalk or MUP/cycle track or water service laterals.
        iv. Maintain 2.5m from curb
        v. Coniferous species require a minimum 4.5m setback from curb, sidewalk, or MUP/cycle track/pathway.

vi. Maintain 7.5m between large growing trees, and 4m between small growing trees. Park or open space planting should consider 10m spacing, except where otherwise approved in naturalization / afforestation areas.
vii. Adhere to Ottawa Hydro's planting guidelines (species and setbacks) when planting around overhead primary conductors.

g. Tree specifications
viii. Minimum stock size: 50mm tree caliper for deciduous, 200cm height for coniferous.
ix. Maximize the use of large deciduous species wherever possible to maximize future canopy coverage.
x. Tree planting on city property shall be in accordance with the City of Ottawa's Tree Planting Specification; and if possible, include watering and warranty as described in the specification.
xi. No root barriers, dead-man anchor systems, or planters are permitted.
xii. No tree stakes unless necessary (and only 1 on the prevailing winds side of the tree)

Feel free to contact Hayley Murray for follow-up questions.

Parkland

Comments:

38. Prior to registration of the Site Plan Agreement, the Owner acknowledges and agrees to pay cash-in-lieu of conveyance of parkland. Pursuant to the City's Parkland Dedication By-law, being By-law No. 2022-280, as amended, 40% of said funds collected shall be directed to City wide funds, and 60% shall be directed to Ward 19 funds. The Owner shall also pay the parkland appraisal fee of $850.00 plus H.S.T. of $110.50, as referenced in Schedule "B" herein.

Feel free to contact Phil Castro for follow-up questions.

Submission Requirements and Fees

1. Additional information regarding fees related to Zoning By-Law Amendment applications can be found here.
2. Additional information regarding fees related to Site Plan Control applications can be found here.
3. The attached **Study and Plan Identification List** outlines the information and material that has been identified as either required (R) or advised (A) as part of a future complete application submission.
    a. The required plans and studies must meet the City's Terms of Reference (ToR) 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.
4. All of the above comments or issues should be addressed to ensure the effectiveness of the application submission review.

Should there be any questions, please do not hesitate to contact myself or the contact identified for the above areas / disciplines.

Yours Truly,
Colleen Ivits

Encl. Study and Plan Identification List
List of Technical Agencies
Supplementary Development Information

c.c.
Reed Adams
Justin Armstrong
Phil Castro
Josiane Gervais
Mike Giampa
Nader Kadri
Kelly Livingstone
Kim MacDonald
Hayley Murray

APPENDIX B

WATER 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

January 29, 2026

5210 Innes Road

5-Storey Dymon Storage Building

Ottawa, Ontario

FIRE FLOW CALCULATIONS

FUS Method

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

C = Construction Coefficient related to the type of construction of the building
= 0.8 Type II Noncombustible Construction

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

5th Floor:	1,850	50%	925	sq.m Effective Floor Area
4th Floor:	1,850	50%	925	sq.m Effective Floor Area
3rd Floor:	1,850	50%	925	sq.m Effective Floor Area
2nd Floor:	1,850	100%	1,850	sq.m Effective Floor Area
1st Floor:	1,850	100%	1,850	sq.m Effective Floor Area
	9,250	sq.m	6,475	sq.m Total Effective Floor Area

RFF = 14,162 L/min
= 14,000 L/min (rounded to nearest 1,000 L/min)

Occupancy and Contents Adjustment Factor
15% Free Burning Contents

= 2,100 L/min Occupancy and Contents Adjustment Factor

RFF = 16,100 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

= 8,050 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 = 8,050 L/min
= 8,000 L/min (rounded to nearest 1,000 L/min)
= 133.3 L/s

133.3 L/s Fire Flow HGL: 126.8 m

Elevation at Fire Hydrant: 88.4 m

Static Pressure at Fire Hydrant: 38.4 m 376 kPa 55 psi

WATER SUPPLY
FOR
PUBLIC FIRE PROTECTION

A Guide to Recommended Practice in Canada

2020

Fire Underwriters Survey

Construction Coefficient (C)

Note that the construction typology used by the insurance industry and public fire protection differs from the terms of reference in the National Building Code of Canada (NBC).

The following Construction Types and Coefficients are used in the required fire flow formula:

C	=	1.5 for **Type V** Wood Frame Construction
	=	0.8 for **Type IV-A** Mass Timber Construction
	=	0.9 for **Type IV-B** Mass Timber Construction
	=	1.0 for **Type IV-C** Mass Timber Construction
	=	1.5 for **Type IV-D** Mass Timber Construction
	=	1.0 for **Type III** Ordinary Construction
	=	0.8 for **Type II** Noncombustible Construction
	=	0.6 for **Type I** Fire Resistive Construction

When determining the predominate Construction Coefficient of a building, the following reference terms are used by fire underwriters and fire departments.

Wood Frame Construction (Type V)
A building is considered to be of Wood Frame construction (Type V) when structural elements, walls, arches, floors, and roofs are constructed entirely or partially of wood or other material.

Note: Includes buildings with exterior wall assemblies that are constructed with any materials that do not have a fire resistance rating that meets the acceptance criteria of CAN/ULC-S114. May include exterior surface brick, stone, or other masonry materials where they do not meet the acceptance criteria.

Mass Timber (Type IV)
Mass timber construction, including Encapsulated Mass Timber, Heavy Timber and other forms of Mass Timber are considered as one of the following sub-types relating to the fire resistance ratings of assemblies as follows:

- Type IV-A (Encapsulated Mass Timber)
    - A building is considered to be of Mass Timber Type IV-A (Encapsulated Mass Timber) construction when structural elements, walls, arches, and floors have a minimum 2-hour fire resistance rating and the roof has a minimum 1 hour fire resistance rating. Additionally all elements of the building must meet the requirements set out for Encapsulated Mass Timber Construction within the 2020 National Building Code of Canada . For types of mass timber construction that do not fully meet these criteria, treat as Type IV-B, Type IV-C or Type IV-D.
- Type IV-B (Rated Mass Timber)
    - A building is considered to be of Mass Timber Type IV-B (Rated Mass Timber) construction when the building assemblies include mass timber construction elements and all structural elements, exterior walls, interior bearing walls and roof have a minimum 1-hour fire resistance rating.

- Type IV-C (Ordinary Mass Timber)
    - A building is considered to be of Mass Timber Type IV-C (Partially Rated Mass Timber) construction when exterior walls are of Mass Timber construction with a minimum 1-hour fire resistance rating. Other structural elements, interior bearing walls and the roof may not have a fire resistance rating.
- Type IV-D (Un-Rated Mass Timber)
    - A building is considered to be of Mass Timber Type IV-D (Un-Rated Mass Timber) construction when exterior walls do not have a minimum 1-hour fire resistance rating, regardless of the fire resistance rating of other structural elements, interior bearing walls and the roof.

Ordinary Construction (Type III also known as joisted masonry)

A building is considered to be of Ordinary construction (Type III) when exterior walls are of masonry construction (or other approved material) with a minimum 1-hour fire resistance rating, but where other elements such as interior walls, arches, floors and/or roof do not have a minimum 1 hour fire resistance rating.

Noncombustible Construction (Type II)

A building is considered to be of Noncombustible construction (Type II) when all structural elements, walls, arches, floors, and roofs are constructed with a minimum 1-hour fire resistance rating and are constructed with noncombustible materials.

Fire-Resistive Construction (Type I)

A building is considered to be of Fire-resistive construction (Type I) when all structural elements, walls, arches, floors, and roofs are constructed with a minimum 2-hour fire resistance rating, and all materials used in the construction of the structural elements, walls, arches, floors, and roofs are constructed with noncombustible materials.

Items of Note Regarding Construction Coefficients

i. Unprotected noncombustible construction (example unprotected steel) should be considered within ordinary construction or noncombustible construction based on the minimum fire resistance rating of the structural elements, exterior walls, and interior bearing walls;
    - If minimum fire resistance rating of exterior walls is 1 hr, apply Ordinary Construction Coefficient (1.0)
    - If minimum fire resistance rating of all structural elements, walls, arches, floors, and roofs is 1 hr, apply Noncombustible Construction Coefficient (0.8).

ii. If a building cannot be defined within a single Construction Coefficient, the Construction Coefficient is determined by the predominate Construction Coefficient that makes up more than 66% or over of the Total Floor Area.

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.

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

January 29, 2026

5210 Innes Road

5-Storey Dymon Storage Building

Ottawa, Ontario

WATER DEMAND CALCULATIONS

Average Daily Demand:	0.4646	ha				
	28,000	L/ha/day				
	13,009	L/day				
	24	hour day				
	9.0	L/min	0.15	L/s	2.4	USgpm
Maximum Daily Demand:	1.5	(Peaking factor as per City of Ottawa Water Design Guidelines)				
	13.6	L/min	0.23	L/s	3.6	USgpm
Maximum Hourly Demand:	1.8	(Peaking factor as per City of Ottawa Water Design Guidelines)				
	24.4	L/min	0.41	L/s	6.4	USgpm

Elevation of Water Meter:	90.12	m				
Finished Floor Elevation:	89.22	m				
Minimum HGL:	126.8	m				
Static Pressure at Water Meter:	36.7	m	360	kPa	52	psi
Maximum HGL:	130.3	m				
Static Pressure at Water Meter:	40.2	m	394	kPa	57	psi

Boundary Conditions
5210 Innes Road

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	9.0	0.15
Maximum Daily Demand	13.6	0.23
Peak Hour	24.4	0.41
Fire Flow Demand #1	8,000	133.33

Location

Results

Connection 1 – Trim Road

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.3	59.0
Peak Hour	126.8	54.0
Max Day plus Fire Flow #1	126.8	54.0

[1] Ground Elevation = 88.8 m

Notes

1. 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.

APPENDIX C

SANITARY SERVICING

SANITARY SEWER CALCULATIONS

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

Project: 5210 Innes Road
5-Storey Dymon Storage Building
Ottawa, Ontario

Date: April 10, 2026

Location		Commercial				Infiltration	Q	Sewer Data						
		Individual	Cumulative			Cumulative	Total		Nominal	Actual			Q_{Full}	
From	To	Area (ha)	Area (ha)	Peaking Factor	Flow Rate (L/s)	Flow Rate (L/s)	Flow Rate (L/s)	Length (m)	Diameter (mm)	Diameter (mm)	Slope (%)	Velocity (m/s)	Capacity (L/s)	Q / Q_{Full}
Building	MH-SA.1	0.4646	0.4646	1.5	0.23	0.15	0.38	18.9	200	200	2	1.48	46.38	1%
MH-SA.1	525 SAN	0.0000	0.4646	1.5	0.23	0.15	0.38	35.9	200	200	0.32	0.59	18.55	2%
							Existing 525 mm Trim Road Municipal Sanitary Sewer:		525	533	0.125	0.71	158.31	

Commercial Average Daily Flow:	28,000	L/ha/day
Commercial Peaking Factor:	1.5	
Institutional Average Daily Flow:	28,000	L/ha/day
Institutional Peaking Factor:	1.5	
Light Industrial Average Daily Flow:	35,000	L/ha/day
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	

APPENDIX D

STORMWATER MANAGEMENT

SUMMARY TABLES

100-YEAR EVENT

Drainage Area	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)	-	20.12	-	-
AREA II (Roof)	-	4.73	91.76	91.76
AREA III	-	9.64	160.59	160.59
TOTAL (AREA I + AREA III)	29.76	29.76	252.34	252.34

2-YEAR EVENT

Drainage Area	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)	-	7.40	-	-
AREA II (Roof)	-	4.73	26.14	26.14
AREA III	-	6.67	68.94	68.94
TOTAL (AREA I + AREA III)	29.76	14.07	95.08	95.08

June 16, 2026

5210 Innes Road

Ottawa, Ontario

STORMWATER MANAGEMENT CALCULATIONS

Modified Rational Method

MAXIMUM ALLOWABLE RELEASE RATE

Flat Pasture, Clay and Silt Loam Area (A):	4,646	sq.m
Time of Concentration:	10	min
Rainfall Intensity (i):	77	mm/hr
Runoff Coeficient (C):	0.30	
Maximum Allowable Release Rate (2.78AiC):	29.76	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:	225	sq.m	1.00
Gravel Area:	0	sq.m	1.00
Soft Area:	721	sq.m	0.25
Total Catchment Area:	946	sq.m	0.43
Area (A):	946	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	179	mm/hr	
Runoff Coeficient (C):	0.43		
Flow Rate (2.78AiC):	20.12	L/s	

DRAINAGE AREA II (Roof)

(100-YEAR EVENT)

				C
Total Catchment Area:	1,900	sq.m		1.00
No. of Roof Drains:	15			
Wier Opening:	Closed			
Depth at Roof Drains:	145	mm		
Maximum Release Rate:	4.73	L/s	Pond Area:	1,472 sq.m
			Maximum Volume Stored:	91.76 cu.m
			Maximum Volume Required:	91.76 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	94.31	4.73	89.58	53.75
15	143	75.48	4.73	70.74	63.67
20	120	63.36	4.73	58.63	70.35
25	104	54.85	4.73	50.12	75.18
30	92	48.52	4.73	43.79	78.83
35	83	43.62	4.73	38.89	81.66
40	75	39.69	4.73	34.96	83.90
45	69	36.47	4.73	31.74	85.70
50	64	33.78	4.73	29.05	87.15
55	60	31.49	4.73	26.76	88.31
60	56	29.52	4.73	24.79	89.25
65	53	27.81	4.73	23.08	90.00
70	50	26.30	4.73	21.57	90.58
75	47	24.96	4.73	20.23	91.03
80	45	23.76	4.73	19.03	91.36
85	43	22.69	4.73	17.96	91.58
90	41	21.71	4.73	16.98	91.71
95	39	20.83	4.73	16.10	91.76
100	38	20.02	4.73	15.29	91.73
105	36	19.28	4.73	14.55	91.64
110	35	18.59	4.73	13.86	91.49
115	34	17.96	4.73	13.23	91.29
120	33	17.38	4.73	12.64	91.03
125	32	16.83	4.73	12.10	90.73
130	31	16.32	4.73	11.59	90.39
135	30	15.84	4.73	11.11	90.01
140	29	15.40	4.73	10.67	89.60
145	28	14.98	4.73	10.25	89.15

DRAINAGE AREA II (Roof)

(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)
150	28	14.58	4.73	9.85	88.67
155	27	14.21	4.73	9.48	88.16
160	26	13.86	4.73	9.13	87.63
165	26	13.53	4.73	8.79	87.07
170	25	13.21	4.73	8.48	86.48
175	24	12.91	4.73	8.18	85.88
180	24	12.63	4.73	7.89	85.25
185	23	12.35	4.73	7.62	84.60
190	23	12.09	4.73	7.36	83.94
195	22	11.85	4.73	7.12	83.25
200	22	11.61	4.73	6.88	82.55
205	22	11.39	4.73	6.65	81.84
210	21	11.17	4.73	6.44	81.10
215	21	10.96	4.73	6.23	80.36
220	20	10.76	4.73	6.03	79.59
225	20	10.57	4.73	5.84	78.82
230	20	10.39	4.73	5.65	78.03
235	19	10.21	4.73	5.48	77.23
240	19	10.04	4.73	5.31	76.42
245	19	9.87	4.73	5.14	75.60
250	18	9.72	4.73	4.98	74.77
255	18	9.56	4.73	4.83	73.92
260	18	9.42	4.73	4.68	73.07
265	18	9.27	4.73	4.54	72.20
270	17	9.13	4.73	4.40	71.33
275	17	9.00	4.73	4.27	70.45
280	17	8.87	4.73	4.14	69.56
285	17	8.75	4.73	4.02	68.66
290	16	8.63	4.73	3.89	67.75
295	16	8.51	4.73	3.78	66.84
300	16	8.39	4.73	3.66	65.92
305	16	8.28	4.73	3.55	64.99
310	15	8.18	4.73	3.44	64.05
315	15	8.07	4.73	3.34	63.11
320	15	7.97	4.73	3.24	62.16
325	15	7.87	4.73	3.14	61.20
330	15	7.77	4.73	3.04	60.24
335	15	7.68	4.73	2.95	59.27
340	14	7.59	4.73	2.86	58.30
345	14	7.50	4.73	2.77	57.32
350	14	7.41	4.73	2.68	56.33
355	14	7.33	4.73	2.60	55.34

DRAINAGE AREA II (Roof)

(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)
360	14	7.25	4.73	2.52	54.35
365	14	7.17	4.73	2.44	53.34
370	13	7.09	4.73	2.36	52.34
375	13	7.01	4.73	2.28	51.33
380	13	6.94	4.73	2.21	50.31
385	13	6.87	4.73	2.13	49.29
390	13	6.79	4.73	2.06	48.26
395	13	6.72	4.73	1.99	47.24
400	13	6.66	4.73	1.93	46.20
405	12	6.59	4.73	1.86	45.16
410	12	6.53	4.73	1.79	44.12
415	12	6.46	4.73	1.73	43.08
420	12	6.40	4.73	1.67	42.03
425	12	6.34	4.73	1.61	40.97
430	12	6.28	4.73	1.55	39.92
435	12	6.22	4.73	1.49	38.85
440	12	6.16	4.73	1.43	37.79
445	12	6.11	4.73	1.38	36.72
450	11	6.05	4.73	1.32	35.65
455	11	6.00	4.73	1.27	34.58
460	11	5.95	4.73	1.21	33.50
465	11	5.89	4.73	1.16	32.42
470	11	5.84	4.73	1.11	31.33
475	11	5.79	4.73	1.06	30.24
480	11	5.74	4.73	1.01	29.15
485	11	5.70	4.73	0.96	28.06
490	11	5.65	4.73	0.92	26.96
495	11	5.60	4.73	0.87	25.87
500	11	5.56	4.73	0.83	24.76
505	10	5.51	4.73	0.78	23.66
510	10	5.47	4.73	0.74	22.55
515	10	5.43	4.73	0.69	21.44
520	10	5.38	4.73	0.65	20.33
525	10	5.34	4.73	0.61	19.21
530	10	5.30	4.73	0.57	18.10
535	10	5.26	4.73	0.53	16.98
540	10	5.22	4.73	0.49	15.86
545	10	5.18	4.73	0.45	14.73
550	10	5.14	4.73	0.41	13.60
555	10	5.11	4.73	0.37	12.47
560	10	5.07	4.73	0.34	11.34
565	10	5.03	4.73	0.30	10.21

DRAINAGE AREA II (Roof)

(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)
570	9	5.00	4.73	0.27	9.07
575	9	4.96	4.73	0.23	7.94
580	9	4.93	4.73	0.20	6.80
585	9	4.89	4.73	0.16	5.65
590	9	4.86	4.73	0.13	4.51
595	9	4.83	4.73	0.09	3.36
600	9	4.79	4.73	0.06	2.22
605	9	4.76	4.73	0.03	1.07
610	9	4.73	4.73	0.00	0.00
615	9	4.70	4.70	0.00	0.00
620	9	4.67	4.67	0.00	0.00
625	9	4.64	4.64	0.00	0.00
630	9	4.61	4.61	0.00	0.00
635	9	4.58	4.58	0.00	0.00

DRAINAGE AREA III

(100-YEAR EVENT)

			C
Roof Area:	0	sq.m	1.00
Hard Area:	1,800	sq.m	1.00
Gravel Area:	0	sq.m	1.00
Soft Area:	0	sq.m	0.25
Total Catchment Area:	1,800	sq.m	1.00

Water Elevation:	88.73	m
Head:	2.38	m
Centroid of ICD Orifice:	86.35	m
Invert of Outlet Pipe of CB/MH-7:	86.30	m
Orifice Diameter:	100	mm
Orifice Area:	7,854	sq.mm
Discharge Coefficient:	0.18	
Maximum Release Rate:	9.64	L/s

DRAINAGE AREA III

(100-YEAR EVENT)

Surface Storage

CB/MH	Top Area	Depth	Volume	
CB/MH-6	50	0.12	2.00	cu.m
CB/MH-7	25	0.12	1.00	cu.m

Chamber Storage

Section	No. of Chambers	Volume Per Chamber	No. of Rows	No. of End Caps	Volume Per End Cap	Volume	
A	8	1.32	1	2	0.10	10.76	cu.m
B	8	1.32	1	2	0.10	10.76	cu.m
C	14	1.32	2	4	0.10	18.88	cu.m
D	24	1.32	2	4	0.10	32.08	cu.m

Clear Stone Storage

Section	Length	Width	Depth	Volume	40% Voids	
A	18.386	1.905	1.11	28.08	11.23	cu.m
B	18.386	1.905	1.11	28.08	11.23	cu.m
C	16.230	3.429	1.11	42.84	17.14	cu.m
D	27.010	3.429	1.11	70.63	28.25	cu.m

CB/MH Storage

CB/MH	Invert	Size	Volume	
CB/MH-1	87.21	1.219	1.77	cu.m
CB/MH-2	87.21	1.219	1.77	cu.m
CB/MH-3	87.21	1.219	1.77	cu.m
CB/MH-4	87.21	1.219	1.77	cu.m
CB/MH-5	86.52	1.219	2.58	cu.m
CB/MH-6	86.36	1.219	2.77	cu.m
CB/MH-7	86.30	1.219	2.84	cu.m

Pipe Storage

From	Invert	To	Invert	Length	Diameter	Volume	
CB/MH-5	86.52	CB/MH-6	86.36	27.6	250	1.35	cu.m
CB/MH-6	86.36	CB/MH-7	86.30	12.5	250	0.61	cu.m

Maximum Volume Stored: 160.59 cu.m

Maximum Volume Required: 160.59 cu.m

DRAINAGE AREA III

(100-YEAR EVENT)

Time (min)	i (mm/hr)	2.78AiC (L/s)	Roof Inflow (L/s)	50% Release Rate (L/s)	Stored Rate (L/s)	Required Storage Volume (cu.m)
10	179	89.35	4.73	4.82	89.26	53.56
15	143	71.50	4.73	4.82	71.41	64.27
20	120	60.02	4.73	4.82	59.93	71.92
25	104	51.97	4.73	4.82	51.87	77.81
30	92	45.97	4.73	4.82	45.88	82.58
35	83	41.32	4.73	4.82	41.23	86.59
40	75	37.60	4.73	4.82	37.51	90.03
45	69	34.55	4.73	4.82	34.46	93.05
50	64	32.00	4.73	4.82	31.91	95.74
55	60	29.84	4.73	4.82	29.75	98.16
60	56	27.97	4.73	4.82	27.88	100.36
65	53	26.34	4.73	4.82	26.25	102.39
70	50	24.91	4.73	4.82	24.82	104.26
75	47	23.65	4.73	4.82	23.56	106.00
80	45	22.51	4.73	4.82	22.42	107.63
85	43	21.49	4.73	4.82	21.40	109.16
90	41	20.57	4.73	4.82	20.48	110.60
95	39	19.73	4.73	4.82	19.64	111.96
100	38	18.97	4.73	4.82	18.88	113.26
105	36	18.26	4.73	4.82	18.17	114.49
110	35	17.62	4.73	4.82	17.52	115.66
115	34	17.02	4.73	4.82	16.93	116.79
120	33	16.46	4.73	4.82	16.37	117.86
125	32	15.94	4.73	4.82	15.85	118.90
130	31	15.46	4.73	4.82	15.37	119.89
135	30	15.01	4.73	4.82	14.92	120.85
140	29	14.59	4.73	4.82	14.50	121.78
145	28	14.19	4.73	4.82	14.10	122.67
150	28	13.82	4.73	4.82	13.73	123.53
155	27	13.46	4.73	4.82	13.37	124.37
160	26	13.13	4.73	4.82	13.04	125.18
165	26	12.81	4.73	4.82	12.72	125.97
170	25	12.52	4.73	4.82	12.42	126.73
175	24	12.23	4.73	4.82	12.14	127.48
180	24	11.96	4.73	4.82	11.87	128.20
185	23	11.70	4.73	4.82	11.61	128.90
190	23	11.46	4.73	4.82	11.37	129.59
195	22	11.22	4.73	4.82	11.13	130.26
200	22	11.00	4.73	4.82	10.91	130.91
205	22	10.79	4.73	4.82	10.70	131.55
210	21	10.58	4.73	4.82	10.49	132.18
215	21	10.38	4.73	4.82	10.29	132.79

DRAINAGE AREA III

(100-YEAR EVENT)

Time (min)	i (mm/hr)	2.78AiC (L/s)	Roof Inflow (L/s)	50% Release Rate (L/s)	Stored Rate (L/s)	Required Storage Volume (cu.m)
220	20	10.20	4.73	4.82	10.10	133.38
225	20	10.01	4.73	4.82	9.92	133.97
230	20	9.84	4.73	4.82	9.75	134.54
235	19	9.67	4.73	4.82	9.58	135.10
240	19	9.51	4.73	4.82	9.42	135.65
245	19	9.35	4.73	4.82	9.26	136.19
250	18	9.20	4.73	4.82	9.11	136.71
255	18	9.06	4.73	4.82	8.97	137.23
260	18	8.92	4.73	4.82	8.83	137.74
265	18	8.78	4.73	4.82	8.69	138.24
270	17	8.65	4.73	4.82	8.56	138.73
275	17	8.53	4.73	4.82	8.44	139.21
280	17	8.41	4.73	4.82	8.31	139.69
285	17	8.29	4.73	4.82	8.20	140.15
290	16	8.17	4.73	4.82	8.08	140.61
295	16	8.06	4.73	4.82	7.97	141.06
300	16	7.95	4.73	4.82	7.86	141.51
305	16	7.85	4.73	4.82	7.76	141.95
310	15	7.75	4.73	4.82	7.65	142.38
315	15	7.65	4.73	4.82	7.56	142.80
320	15	7.55	4.73	4.82	7.46	143.22
325	15	7.46	4.73	4.82	7.37	143.63
330	15	7.37	4.73	4.82	7.27	144.04
335	15	7.28	4.73	4.82	7.19	144.44
340	14	7.19	4.73	4.82	7.10	144.83
345	14	7.11	4.73	4.82	7.02	145.22
350	14	7.02	4.73	4.82	6.93	145.60
355	14	6.94	4.73	4.82	6.85	145.98
360	14	6.87	4.73	4.82	6.78	146.36
365	14	6.79	4.73	4.82	6.70	146.72
370	13	6.72	4.73	4.82	6.63	147.09
375	13	6.64	4.73	4.82	6.55	147.45
380	13	6.57	4.73	4.82	6.48	147.80
385	13	6.50	4.73	4.82	6.41	148.15
390	13	6.44	4.73	4.82	6.35	148.50
395	13	6.37	4.73	4.82	6.28	148.84
400	13	6.31	4.73	4.82	6.22	149.18
405	12	6.24	4.73	4.82	6.15	149.52
410	12	6.18	4.73	4.82	6.09	149.85
415	12	6.12	4.73	4.82	6.03	150.17
420	12	6.06	4.73	4.82	5.97	150.50
425	12	6.00	4.73	4.82	5.91	150.82

DRAINAGE AREA III

(100-YEAR EVENT)

Time (min)	i (mm/hr)	2.78AiC (L/s)	Roof Inflow (L/s)	50% Release Rate (L/s)	Stored Rate (L/s)	Required Storage Volume (cu.m)
430	12	5.95	4.73	4.82	5.86	151.13
435	12	5.89	4.73	4.82	5.80	151.45
440	12	5.84	4.73	4.82	5.75	151.75
445	12	5.79	4.73	4.82	5.70	152.06
450	11	5.73	4.73	4.82	5.64	152.36
455	11	5.68	4.73	4.82	5.59	152.66
460	11	5.63	4.73	4.82	5.54	152.96
465	11	5.58	4.73	4.82	5.49	153.25
470	11	5.54	4.73	4.82	5.44	153.54
475	11	5.49	4.73	4.82	5.40	153.83
480	11	5.44	4.73	4.82	5.35	154.11
485	11	5.40	4.73	4.82	5.31	154.40
490	11	5.35	4.73	4.82	5.26	154.68
495	11	5.31	4.73	4.82	5.22	154.95
500	11	5.26	4.73	4.82	5.17	155.23
505	10	5.22	4.73	4.82	5.13	155.50
510	10	5.18	4.73	4.82	5.09	155.77
515	10	5.14	4.73	4.82	5.05	156.03
520	10	5.10	4.73	4.82	5.01	156.30
525	10	5.06	4.73	4.82	4.97	156.56
530	10	5.02	4.73	4.82	4.93	156.82
535	10	4.98	4.73	4.82	4.89	157.07
540	10	4.95	4.73	4.82	4.86	157.33
545	10	4.91	4.73	4.82	4.82	157.58
550	10	4.87	4.73	4.82	4.78	157.83
555	10	4.84	4.73	4.82	4.75	158.08
560	10	4.80	4.73	4.82	4.71	158.32
565	10	4.77	4.73	4.82	4.68	158.57
570	9	4.73	4.73	4.82	4.64	158.81
575	9	4.70	4.73	4.82	4.61	159.05
580	9	4.67	4.73	4.82	4.58	159.29
585	9	4.64	4.73	4.82	4.54	159.52
590	9	4.60	4.73	4.82	4.51	159.76
595	9	4.57	4.73	4.82	4.48	159.99
600	9	4.54	4.73	4.82	4.45	160.22
605	9	4.51	4.73	4.82	4.42	160.45
610	9	4.48	4.73	4.82	4.39	160.59
615	9	4.45	4.70	4.82	4.33	159.66
620	9	4.42	4.67	4.82	4.27	158.72
625	9	4.39	4.64	4.82	4.21	157.79
630	9	4.36	4.61	4.82	4.15	156.85
635	9	4.34	4.58	4.82	4.09	155.91

2-YEAR EVENT

DRAINAGE AREA I (Uncontrolled Flow Off Site)

(2-YEAR EVENT)

			C
Roof Area:	0	sq.m	0.90
Hard Area:	225	sq.m	0.90
Gravel Area:	0	sq.m	0.80
Soft Area:	721	sq.m	0.20
Total Catchment Area:	946	sq.m	0.37
Area (A):	946	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	77	mm/hr	
Runoff Coeficient (C):	0.37		
Flow Rate (2.78AiC):	7.40	L/s	

DRAINAGE AREA II (Roof)

(2-YEAR EVENT)

			C
Total Catchment Area:	1,900	sq.m	0.90

No. of Roof Drains: 15
Wier Opening: Closed

Depth at Roof Drains: 83 mm

Maximum Release Rate: 4.73 L/s

Pond Area: 696 sq.m

Maximum Volume Stored: 26.14 cu.m

Maximum Volume Required: 26.14 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	36.51	4.73	31.78	19.07
15	62	29.36	4.73	24.63	22.17
20	52	24.73	4.73	20.00	24.00
25	45	21.47	4.73	16.74	25.11
30	40	19.04	4.73	14.30	25.75
35	36	17.14	4.73	12.41	26.06
40	33	15.62	4.73	10.89	26.14
45	30	14.38	4.73	9.64	26.04
50	28	13.33	4.73	8.60	25.80
55	26	12.44	4.73	7.71	25.44
60	25	11.67	4.73	6.94	24.99
65	23	11.01	4.73	6.27	24.47
70	22	10.42	4.73	5.69	23.88
75	21	9.89	4.73	5.16	23.23
80	20	9.43	4.73	4.69	22.54
85	19	9.01	4.73	4.27	21.80
90	18	8.62	4.73	3.89	21.02
95	17	8.28	4.73	3.55	20.21
100	17	7.96	4.73	3.23	19.37
105	16	7.67	4.73	2.94	18.51
110	16	7.40	4.73	2.67	17.62
115	15	7.15	4.73	2.42	16.71
120	15	6.92	4.73	2.19	15.77
125	14	6.71	4.73	1.98	14.82
130	14	6.51	4.73	1.78	13.85
135	13	6.32	4.73	1.59	12.87
140	13	6.14	4.73	1.41	11.87
145	13	5.98	4.73	1.25	10.86

DRAINAGE AREA II (Roof)

(2-YEAR EVENT)

Time (min)	i (mm/hr)	2.78AiC (L/s)	Release Rate (L/s)	Stored Rate (L/s)	Required Storage Volume (cu.m)
150	12	5.82	4.73	1.09	9.83
155	12	5.68	4.73	0.95	8.79
160	12	5.54	4.73	0.81	7.75
165	11	5.41	4.73	0.68	6.69
170	11	5.28	4.73	0.55	5.62
175	11	5.16	4.73	0.43	4.54
180	11	5.05	4.73	0.32	3.46
185	10	4.94	4.73	0.21	2.36
190	10	4.84	4.73	0.11	1.26
195	10	4.74	4.73	0.01	0.15
200	10	4.65	4.65	0.00	0.00
205	10	4.56	4.56	0.00	0.00
210	9	4.48	4.48	0.00	0.00
215	9	4.39	4.39	0.00	0.00
220	9	4.31	4.31	0.00	0.00
225	9	4.24	4.24	0.00	0.00
230	9	4.17	4.17	0.00	0.00
235	9	4.10	4.10	0.00	0.00
240	8	4.03	4.03	0.00	0.00
245	8	3.96	3.96	0.00	0.00
250	8	3.90	3.90	0.00	0.00
255	8	3.84	3.84	0.00	0.00
260	8	3.78	3.78	0.00	0.00
265	8	3.73	3.73	0.00	0.00
270	8	3.67	3.67	0.00	0.00
275	8	3.62	3.62	0.00	0.00
280	8	3.57	3.57	0.00	0.00
285	7	3.52	3.52	0.00	0.00
290	7	3.47	3.47	0.00	0.00
295	7	3.42	3.42	0.00	0.00
300	7	3.38	3.38	0.00	0.00
305	7	3.33	3.33	0.00	0.00
310	7	3.29	3.29	0.00	0.00
315	7	3.25	3.25	0.00	0.00
320	7	3.21	3.21	0.00	0.00
325	7	3.17	3.17	0.00	0.00
330	7	3.13	3.13	0.00	0.00
335	7	3.09	3.09	0.00	0.00
340	6	3.06	3.06	0.00	0.00
345	6	3.02	3.02	0.00	0.00
350	6	2.99	2.99	0.00	0.00
355	6	2.95	2.95	0.00	0.00

DRAINAGE AREA III

(2-YEAR EVENT)

			C
Roof Area:	0	sq.m	0.90
Hard Area:	1,800	sq.m	0.90
Gravel Area:	0	sq.m	0.80
Soft Area:	0	sq.m	0.20
Total Catchment Area:	1,800	sq.m	0.90

Water Elevation:	87.49	m
Head:	1.14	m
Centroid of ICD Orifice:	86.35	m
Invert of Outlet Pipe of CB/MH-7:	86.30	m
Orifice Diameter:	100	mm
Orifice Area:	7,854	sq.mm
Discharge Coefficient:	0.18	
Maximum Release Rate:	6.67	L/s

Surface Storage

CB/MH	Top Area	Depth	Volume	
CB/MH-6	0	-1.12	0.00	cu.m
CB/MH-7	0	-1.12	0.00	cu.m

Chamber Storage

Section	No. of Chambers	Stage Volume	No. of Rows	No. of End Caps	Stage Volume	Volume	
A	8	0.6	1	2	0.05	4.90	cu.m
B	8	0.6	1	2	0.05	4.90	cu.m
C	14	0.6	2	4	0.05	8.60	cu.m
D	24	0.6	2	4	0.05	14.60	cu.m

Clear Stone Storage

Section	Length	Width	Depth	Volume	40% Voids	
A	18.386	1.905	0.48	11.97	4.79	cu.m
B	18.386	1.905	0.48	11.97	4.79	cu.m
C	16.230	3.429	0.48	18.20	7.28	cu.m
D	27.010	3.429	0.48	30.00	12.00	cu.m

CB/MH Storage

CB/MH	Invert	Size	Volume	
CB/MH-1	87.21	1.219	0.32	cu.m
CB/MH-2	87.21	1.219	0.32	cu.m
CB/MH-3	87.21	1.219	0.32	cu.m
CB/MH-4	87.21	1.219	0.32	cu.m
CB/MH-5	86.52	1.219	1.13	cu.m
CB/MH-6	86.36	1.219	1.32	cu.m
CB/MH-7	86.30	1.219	1.39	cu.m

Pipe Storage

From	Invert	To	Invert	Length	Diameter	Volume	
CB/MH-5	86.52	CB/MH-6	86.36	27.6	250	1.35	cu.m
CB/MH-6	86.36	CB/MH-7	86.30	12.5	250	0.61	cu.m

Maximum Volume Stored: 68.94 cu.m

Maximum Volume Required: 68.94 cu.m

DRAINAGE AREA III

(2-YEAR EVENT)

Time (min)	i (mm/hr)	2.78AiC (L/s)	Roof Inflow (L/s)	50% Release Rate (L/s)	Stored Rate (L/s)	Required Storage Volume (cu.m)
10	77	34.59	4.73	3.33	35.99	21.59
15	62	27.82	4.73	3.33	29.22	26.29
20	52	23.43	4.73	3.33	24.83	29.80
25	45	20.34	4.73	3.33	21.74	32.61
30	40	18.03	4.73	3.33	19.43	34.98
35	36	16.24	4.73	3.33	17.64	37.04
40	33	14.80	4.73	3.33	16.20	38.88
45	30	13.62	4.73	3.33	15.02	40.54
50	28	12.63	4.73	3.33	14.03	42.08
55	26	11.79	4.73	3.33	13.18	43.51
60	25	11.06	4.73	3.33	12.46	44.85
65	23	10.43	4.73	3.33	11.82	46.11
70	22	9.87	4.73	3.33	11.27	47.32
75	21	9.37	4.73	3.33	10.77	48.47
80	20	8.93	4.73	3.33	10.33	49.58
85	19	8.53	4.73	3.33	9.93	50.64
90	18	8.17	4.73	3.33	9.57	51.67
95	17	7.84	4.73	3.33	9.24	52.67
100	17	7.54	4.73	3.33	8.94	53.64
105	16	7.27	4.73	3.33	8.66	54.58
110	16	7.01	4.73	3.33	8.41	55.50
115	15	6.78	4.73	3.33	8.17	56.40
120	15	6.56	4.73	3.33	7.96	57.28
125	14	6.35	4.73	3.33	7.75	58.15
130	14	6.17	4.73	3.33	7.56	58.99
135	13	5.99	4.73	3.33	7.39	59.83
140	13	5.82	4.73	3.33	7.22	60.64
145	13	5.67	4.73	3.33	7.06	61.45
150	12	5.52	4.73	3.33	6.92	62.24
155	12	5.38	4.73	3.33	6.78	63.02
160	12	5.25	4.73	3.33	6.65	63.79
165	11	5.12	4.73	3.33	6.52	64.55
170	11	5.00	4.73	3.33	6.40	65.31
175	11	4.89	4.73	3.33	6.29	66.05
180	11	4.79	4.73	3.33	6.18	66.78
185	10	4.68	4.73	3.33	6.08	67.51
190	10	4.59	4.73	3.33	5.99	68.23
195	10	4.49	4.73	3.33	5.89	68.94
200	10	4.41	4.65	3.33	5.72	68.68
205	10	4.32	4.56	3.33	5.55	68.26
210	9	4.24	4.48	3.33	5.38	67.82
215	9	4.16	4.39	3.33	5.22	67.37

DRAINAGE AREA III

(2-YEAR EVENT)

Time (min)	i (mm/hr)	2.78AiC (L/s)	Roof Inflow (L/s)	50% Release Rate (L/s)	Stored Rate (L/s)	Required Storage Volume (cu.m)
220	9	4.09	4.31	3.33	5.07	66.91
225	9	4.02	4.24	3.33	4.92	66.44
230	9	3.95	4.17	3.33	4.78	65.96
235	9	3.88	4.10	3.33	4.64	65.47
240	8	3.82	4.03	3.33	4.51	64.97
245	8	3.76	3.96	3.33	4.39	64.46
250	8	3.70	3.90	3.33	4.26	63.94
255	8	3.64	3.84	3.33	4.14	63.42
260	8	3.58	3.78	3.33	4.03	62.88
265	8	3.53	3.73	3.33	3.92	62.34
270	8	3.48	3.67	3.33	3.81	61.79
275	8	3.43	3.62	3.33	3.71	61.23
280	8	3.38	3.57	3.33	3.61	60.67
285	7	3.33	3.52	3.33	3.51	60.10
290	7	3.29	3.47	3.33	3.42	59.52
295	7	3.24	3.42	3.33	3.33	58.93
300	7	3.20	3.38	3.33	3.24	58.34
305	7	3.16	3.33	3.33	3.16	57.75
310	7	3.12	3.29	3.33	3.07	57.15
315	7	3.08	3.25	3.33	2.99	56.54
320	7	3.04	3.21	3.33	2.91	55.93
325	7	3.00	3.17	3.33	2.84	55.31
330	7	2.97	3.13	3.33	2.76	54.69
335	7	2.93	3.09	3.33	2.69	54.06
340	6	2.90	3.06	3.33	2.62	53.43
345	6	2.86	3.02	3.33	2.55	52.79
350	6	2.83	2.99	3.33	2.48	52.15
355	6	2.80	2.95	3.33	2.42	51.50

June 16, 2026

5210 Innes Road

Ottawa, Ontario

INFILTRATION CALCULATIONS
(5 mm Retention)

DRAINAGE AREAS II & III

			C
Roof Area:	1,900	sq.m	0.90
Hard Area:	1,800	sq.m	0.90
Gravel Area:	0	sq.m	0.80
Soft Area:	0	sq.m	0.20
Total Catchment Area:	3,700	sq.m	0.90
Rainfall:	5	mm	
Volume Required:	16.65	cu.m	

Clear Stone Bedding Storage

Section	Length	Width	Depth	Volume	40% Voids	
A	18.386	1.905	0.203	7.11	2.84	cu.m
B	18.386	1.905	0.203	7.11	2.84	cu.m
C	16.230	3.429	0.203	11.30	4.52	cu.m
D	27.010	3.429	0.203	18.80	7.52	cu.m

Volume Stored:	17.73	cu.m
Infiltration Rate:	8	mm/hr
Draw Down Time:	10	hr

June 16, 2026

5210 Innes Road

Ottawa, Ontario

INFILTRATION CALCULATIONS
(80% TSS Removal)

DRAINAGE AREAS II & III

Roof Area:	1,900	sq.m
Hard Area:	1,800	sq.m
Gravel Area:	0	sq.m
Soft Area:	0	sq.m
Total Catchment Area:	3,700	sq.m
Impervious Level:	100	%
Volume Required:	45.00	cu.m/ha (extrapolated from MOE Stormwater Management Planning and Design Manual Table 3.2)
	16.65	cu.m

Clear Stone Bedding Storage

Section	Length	Width	Depth	Volume	40% Voids	
A	18.386	1.905	0.203	7.11	2.84	cu.m
C	18.386	1.905	0.203	7.11	2.84	cu.m
C	16.230	3.429	0.203	11.30	4.52	cu.m
D	27.010	3.429	0.203	18.80	7.52	cu.m

Volume Stored:	17.73	cu.m
Infiltration Rate:	8	mm/hr
Draw Down Time:	10	hr

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

STORM SEWER CALCULATIONS

Rational Method

2-YEAR EVENT

Project: 5210 Innes Road
5-Storey Dymon Storage Building
Ottawa, Ontario

Date: June 16, 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 = 0.80 (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/MH-1	CB/MH-7		0.0500			0.1251	0.1251	10.00	77	9.61	8 - Soleno HydroStor HS75 Chambers							
Roof Drains	CB/MH-2	0.1900				0.4754	0.4754	10.00	77	36.51	5	250	250	2	1.71	84.10	0.05	43%
							Flow through flow control roof drains:			4.73	5	250	250	2	1.71	84.10	0.05	6%
CB/MH-2	CB/MH-3		0.0175			0.0438	0.5192	10.00	77	39.87	8 - Soleno HydroStor HS75 Chambers							
								Restricted upstream flow:		8.09								
CB/MH-3	CB/MH-4		0.0325			0.0813	0.6005	10.00	77	46.12	14 - Soleno HydroStor HS75 Chambers							
								Restricted upstream flow:		14.34								
CB/MH-4	CB/MH-5		0.0200			0.0500	0.6505	10.00	77	49.96	22 - Soleno HydroStor HS75 Chambers							
								Restricted upstream flow:		18.18								
CB/MH-5	CB/MH-6		0.0225			0.0563	0.7068	10.00	77	54.29	27.6	250	250	0.58	0.92	45.29	0.50	120%
								Restricted upstream flow:		22.51	27.6	250	250	0.58	0.92	45.29	0.50	50%
CB/MH-6	CB/MH-7		0.0200			0.0500	0.7569	10.00	77	58.13	12.5	250	250	0.432	0.80	39.09	0.26	149%
								Restricted upstream flow:		26.35	12.5	250	250	0.432	0.80	39.09	0.26	67%
CB/MH-7	MH-11		0.0175			0.0438	0.9257	10.00	77	71.10	3.6	250	250	0.432	0.80	39.09	0.08	182%
								Flow through inlet control device:		6.67	3.6	250	250	0.432	0.80	39.09	0.08	17%
CB-8	MH-9		0.0125			0.0313	0.0313	10.00	77	2.40	4.8	250	250	0.432	0.80	39.09	0.10	6%
MH-9	MH-10					0.0000	0.0313	10.00	77	2.40	24.1	250	250	0.432	0.80	39.09	0.50	6%
MH-10	MH-11					0.0000	0.0313	10.00	77	2.40	14.7	250	250	0.432	0.80	39.09	0.31	6%
MH-11	1200 ST					0.0000	0.9570	10.00	77	73.50	32	250	250	0.432	0.80	39.09	0.67	188%
								Restricted upstream flow:		9.07	32	250	250	0.432	0.80	39.09	0.67	23%
										Existing 1,200 mm Trim Road Municipal Storm Sewer:		1,200	1,219	0.125	1.23	1,437		