STORMWATER MANAGEMENT REPORT

LARRY ROBINSON ARENA

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Prepared for The City of Ottawa
Revision #2 – Re-Issued for Site Plan Control

This report is respectfully submitted to the City of Ottawa in response to the request for engineering services scope of work for the expansion and redevelopment of the Larry Robinson Arena, in Metcalfe.

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Date	Revision #	Issued For	Revision Details
2025-10-07	0	Site Plan Control	
2025-11-06	1		Revised per Latest Arch Site Plan
2026-01-23	2		Re-Issued for Site Plan Control

1 INTRODUCTION

This Stormwater Management Report has been prepared by EVB Engineering on behalf of the City of Ottawa in support of Site Plan Approval for the proposed addition to the Larry Robinson Arena, located at 2785 8th Line Road, Metcalfe Ontario. Legally, the property is known as Part of Lot 22, Concession 8, Geographic Township of Osgoode, City of Ottawa.

The following report encompasses the stormwater management and storm servicing requirements for the proposed building addition and parking lot modifications.

1.1 PRE-CONSULTATION

The City of Ottawa provided feedback in a letter dated February 21, 2024, further to a pre-consultation meeting held on February 15, 2024. The letter may be found in Appendix "A".

1.2 OBJECTIVES

The main objective of the development is to construct an addition and redevelop the site of the Larry Robinson Arena, while meeting all City and other applicable requirements. Design criteria pertaining to stormwater management were established in the above-mentioned pre-consultation letter and are summarized below:

- Site must be adequately serviced with respect to surface run-off control needs.
- Existing stormwater runoff from adjacent site(s) that crosses the property must be accommodated by the proposed stormwater management design, and no adverse effect can be created to the surrounding properties.
- Should impervious areas be expanded, quantity criteria is that the 100-year post-development peak flow rate from the site must be controlled to the 2-year pre-development peak flow rate.
- Run-off calculations are to be performed per the Ottawa Sewer Design Guidelines, section 5.4.
- Legal and sufficient storm outlet from the site.
- Oil/grit separators require Environmental Technology Verification (ETV) protocol for ECA approval.

The current report demonstrates how the above have been achieved.

1.3 EXISTING / PROPOSED INFRASTRUCTURE

The site of the arena is currently serviced by the following infrastructure:

- Private well for domestic water supply
- Private septic system for wastewater treatment & disposal
- 300mmø storm sewer located in the parking lot north of the arena, outletting into the roadside ditch on the south side of Van Rens Street near the intersection of 8th Line Road
- Storm sewer along 8th Line Road, outletting into the roadside ditch on the north side of Van Rens Street near the intersection of 8th Line Road. A catchbasin located on the south side of the arena outlets into this storm sewer.

A new well and septic system will be installed to suit the proposed development as discussed in other reports. Likewise, a short section of new storm sewer will be installed on site to provide an outlet for the addition's roof drains, connecting into the existing 300mmø storm sewer noted above.

No changes are proposed for the storm sewer located on the south side of the arena.

2 STORMWATER SERVICING

2.1 DRAINAGE OUTLETS

The site drains towards and outlets into roadside ditches along Van Rens Street. Most of the site drains overland towards said roadside ditch, while shallow storm sewers provide drainage to small impervious areas directly adjacent to 8th Line Road to the north and south of the existing arena. Maintaining existing drainage patterns and attenuating post-development peak flows to pre-development levels will ensure the adequacy of the outlet from legal and capacity perspectives.

Modifications will be made to the storm sewer located in the parking lot on the north side of the arena to suit new work. No modifications are proposed on the south side of the arena, hence the existing storm sewer will remain as existing.

The site does not currently have stormwater management facilities.

2.2 AVAILABLE CAPACITY

The total capacity of the existing 300mmø storm sewer was calculated to be 99.7 L/s, much greater than the flows from the site as discussed below.

2.3 DRAINAGE PATTERNS

The existing condition was taken as the developed portion of the arena's site, whereas the proposed drainage patterns were established based on the proposed grading. The pre-development condition is shown on FIG.1, while post-development stormwater catchment areas are shown on FIG.2, both of which can be found in Appendix "B".

2.4 WATER QUANTITY CONTROL OBJECTIVE

As previously discussed and should impervious areas be expanded, quantity criteria is that the 100-year post-development peak flow rate from the site must be controlled to the 2-year pre-development peak flow rate.

2.5 WATER QUALITY CONTROL OBJECTIVE

While Low Impact Development (LID) was discussed in pre-consultation with the City of Ottawa, a water quality objective was not explicitly identified. New water quality treatment features are not proposed since the existing overland drainage configuration will be maintained for most of the site, and as the site's features do not lend themselves well to LID or other improvements pertaining to water quality.

2.6 STORMWATER MANAGEMENT CONCEPT

The proposed drainage system will match existing conditions and will consist of overland drainage into the roadside ditch along Van Rens Street.

A new section of storm sewer will also be added to provide drainage to the flat roof of the new building addition. The new roof drains will be flow-controlled, allowing for a maximum flow of 120 USGPM (7.57 L/s) and creating stormwater storage on the roof.

2.7 SETBACKS

Not applicable for this project.

2.8 STORAGE REQUIREMENTS

Stormwater storage will be provided on the roof of the addition such that the post-development peak flow does not exceed the pre-development peak flow.

As shown on FIG.1 and in the runoff calculations found in Appendix "B", an overall pre-development runoff coefficient of 0.741 was calculated, based on runoff coefficients of 0.90 for impervious areas, 0.50 for gravel areas and 0.20 for grassed areas, as per the Ottawa Sewer Design Guidelines (OSDG).

Rainfall intensities were also based on the OSDG, and were calculated based on the time of concentrations for the respective catchment areas. The pre-development time of concentration (A-101) was calculated as 7.53 minutes using the Bransby method with an average slope of 1.26%, flow length of 141.6m and area of 1.257 ha. Likewise, the time of concentration for the post-development overland drainage area (A-201) was calculated as 7.62 minutes with the same average slope and flow length as above, however with a slightly smaller area of 1.118 ha.

The time of concentration for A-202 and A-203 was conservatively taken as 5 minutes as they are small.

As can be seen in Table 2-1 below, the post-development runoff coefficient is marginally higher than the pre-development runoff coefficient at 0.746. Likewise, the post-development uncontrolled peak flow exceeds pre-development peak flow marginally. Flow control roof drains and rooftop storage will therefore be done on the new addition to ensure pre-development peak flows are not exceeded, and the proposed roof of the addition will provide sufficient storage.

Refer to Appendix "B" for the detailed runoff calculations, required storage calculations and provided storage calculations.

TABLE 2-1 - STORMWATER PEAK RUNOFF FOR PRE- AND POST-DEVELOPMENT FLOWS

Return Period (years)	Pre-Development			Post-Development				Req'd Storage (m^3)	Provided Storage (m^3)	Roof Water Depth (m)
	Area (ha)	C Factor	Flow (L/s)	Area (ha)	C Factor	Uncont. Flow (L/s)	Controlled Flow (L/s)			
5	1.257	0.741	309.1	1.257	0.746	311.31	297.49	6.90	7.41	0.10
100	1.257	0.926	663.0	1.257	0.932	643.32	629.51	24.16	25.00	0.15

2.9 DIVERSION OF DRAINAGE CATCHMENT AREAS

Proposed drainage patterns will closely match existing. No capacity issues are expected as the post-development peak flows from the site will be attenuated to less than the pre-development peak flows.

2.10 MINOR & MAJOR DRAINAGE SYSTEMS

Most of the site (area A-201) will be drained through overland sheet drainage towards the storm outlet to match existing conditions, which will provide drainage for the minor and major storm.

Short sections of storm sewers and a catchbasin will provide drainage for the other small areas of the site. New storm sewers were sized to accommodate the peak flow of a storm event with a 5-year return period calculated using the Rational method and the design criteria described above, while the capacity of the existing storm sewer was verified to ensure it can also convey the 5-year storm event. A Manning coefficient of 0.013 was used in sewer sizing calculations, and sewers were designed to achieve a minimum full flow velocity of 0.8 m/s.

The storm sewer system was also evaluated against a 100-year storm to ensure that it can convey the major storm to the outlet. Runoff coefficients were again increase by +25% per the OSDG. As can seen in Appendix "C", the proposed and existing storm sewers can accommodate both the 5-year and 100-year storm events by gravity. Hydraulic grade line (HGL) calculations were therefore not completed. A major overland flow route and flooding extents were also identified on drawing C005 – Site Grading Plan in case of emergency (i.e. blocked catchbasin grate or storm sewer).

Ideal freeboard between finished floor elevation and flooding extents could not be achieved at the arena's existing main entrance due to existing conditions, namely the arena being lower than the street.

With regards to the roof, scuppers in the parapet will be done to provide an emergency outlet for major storms or in case of blockage.

2.11 POTENTIAL IMPACT TO RECEIVING WATERCOURSES & APPROVALS

No issues are expected as the post-development condition closely matches pre-development. This report and design drawings will also be submitted to the South Nation Conservation Authority (SNCA) to obtain necessary approvals.

2.12 QUALITY REQUIREMENTS

As previously noted, while Low Impact Development (LID) was discussed in pre-consultation with the City of Ottawa, a water quality objective was not explicitly identified. New water quality treatment features are not proposed since the existing overland drainage configuration will be maintained for most of the site, and as the site's features do not lend themselves well to LID or other improvements pertaining to water quality.

2.13 FLOOD LEVELS & MINIMUM BUILDING ELEVATIONS

As previously discussed, the storm sewer system has capacity to convey the major storm event to the outlet. However, in the event of catchbasin or sewer blockage, finished grading of the site will allow for runoff from areas A-203, A-204 and A-205 to drain overland towards the north and drainage will be directed away from the building.

The maximum water level in this area will be 0.41 m below the finished floor elevation of the new addition.

2.14 EROSION & SEDIMENT CONTROL MEASURES

Erosion and sediment control measures will be installed at the start of construction and will be maintained throughout construction. Sediment control measures will be removed only once adequate grass cover has been established.

As shown on drawing C002 – Site Plan, Erosion & Sediment Control Plan, new erosion filter sock (Filtrexx Siltsoxx or approved equivalent) will be installed on impervious areas at the bottom of slopes and around catchbasin grates to intercept sediment-laden runoff. It is anticipated that these measures will provide adequate to minimize erosion and sediment transport during construction.

The contractor will be required to monitor the sediment control measures weekly and following any significant storm consisting of 13 mm of precipitation or greater. The contractor will also be responsible to repair and/or make any adjustments to the sediment control measures as required to ensure their proper operation.

2.15 FLOODPLAINS & FILL CONSTRAINTS

Not applicable for this development.

3 APPROVALS AND PERMITS

3.1 CONSERVATION AUTHORITY

This report and design drawings were submitted to the SNCA and approval was obtained. Refer to Appendix “A” for EVB’s response to SNCA comments and for the clearance email from SNCA.

3.2 CHANGES TO MUNICIPAL DRAINS

Not applicable for this development.

3.3 OTHER PERMITS

The proposed development is subject to Site Plan Approval and building permit with the City of Ottawa.

4 CONCLUSION

4.1 CONCLUSIONS & RECOMMENDATIONS

It is concluded that the proposed development meets all stormwater management constraints and associated design criteria. It is recommended that this report and accompanying design drawings and other documentation be submitted to the City of Ottawa in support of the application for Site Plan Approval.

4.2 COMMENTS RECEIVED FROM REVIEW AGENCIES

Comments have not yet been received from review agencies, as the application for review will be made concurrent with the City of Ottawa Site Plan Approval application. Comments and responses will be forwarded to the City when available.

APPENDIX A

Record of City of Ottawa Pre-Consultation
SNCA Communication & Clearance

February 21, 2024 File No.: PC2024-0019

Steve Gauthier
City of Ottawa
Via email: steve.gauthier@ottawa.ca

Subject: Pre-Consultation: Meeting Feedback
Proposed Site Plan Control Application – 2785 8th Line Rd

Please find below information regarding next steps as well as consolidated comments from the above-noted pre-consultation meeting held on February 15, 2024.

Pre-Consultation Preliminary Assessment

1 ☐	**2** ☐	**3** ☐	**4** ☒	**5** ☐

One (1) indicates that considerable major revisions are required while five (5) suggests that the proposal appears to meet the City's key land use policies and guidelines. This assessment is purely advisory and does not consider technical aspects of the proposal or in any way guarantee application approval.

Next Steps

1. A review of the proposal and materials submitted for the above-noted pre-consultation has been undertaken. Please proceed to complete a Phase 2 Pre-consultation Application Form and submit it together with the necessary studies and/or plans to planningcirculations@ottawa.ca.

2. In your subsequent pre-consultation submission, please ensure that all comments or issues detailed herein are addressed. A detailed cover letter stating how each issue has been addressed must be included 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 before the Phase 3 pre-consultation, you may be required to complete or repeat the Phase 2 pre-consultation process.

Supporting Information and Material Requirements

- 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.

    - 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

- 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

Comments:

1. The proposal includes an addition to the north of the current building at the Larry Robinson Arena. This addition plans to increase the square footage of the arena by 6,000 sq ft.

    a. The planned addition will expand and modernize the current change rooms, providing an enhanced barrier-free entrance, expansive lobby areas with accessible seating facilities, and retrofit bleachers to meet accessibility standards.

    b. The site will provide 83 parking spaces in the north and 20 parking spaces in the south. With a reconfiguration of line painting, the total parking spaces can be increased by roughly 7+ spaces.

2. Official Plan:

    a. The subject property is within the village designation of Schedule B9 of the Rural Transect.

    b. The subject property is within the Consolidated Villages Secondary Plan for the Village of Metcalfe and designated Village Park.

    c. As per section 4.6 of the Consolidated Villages Secondary Plan, parks are important elements for complete communities as they provide opportunities for active and passive recreation which is essential to health and well-being for a diverse population. Lands designated as Village Park in the schedules of this plan are typically publicly-owned parks.

        The following policies apply to these lands:

        i. Public parks are permitted in all land use designations.

        ii. Acquisition and development of parklands is guided by policies within the Official Plan

iii. Design and development of parks will ensure adequate connectivity to the surrounding village area.

3. Zoning:

    a. The subject property is zoned Rural Institutional Subzone 4 (RI4).

    b. A community centre, sports arena, and a recreational/athletic facility are all permitted uses within this zone.

    c. RI4 Subzone Provisions

        i. Minimum lot width – 75 m

        ii. Minimum lot area – 1.0 ha

        iii. Minimum front yard setback – 9 m

        iv. Minimum rear yard setback – 10 m

        v. Minimum interior side yard setback – 9 m

        vi. Minimum corner side yard setback – 9 m

        vii. Maximum principal building height – 12 m

        viii. Maximum lot coverage – 30 %

        ix. Minimum landscaped area – 20 %

    d. **Community centre** means a multi-purpose facility that offers a variety of programs of a recreational, cultural, day care, social, community service, informational or instructional nature, and may include, as a portion of it, a medical facility.

    e. **Recreational and athletic facility** means a public place designed and equipped with facilities such as a swimming pool, squash or tennis courts, sports arena, gymnasia, weight-lifting and exercise rooms and used for recreational, fitness or athletic pastimes and / or used to provide instruction in such pastimes, and may include an ancillary sports field.

    f. **Sports arena** includes a rink, arena or sports stadium.

4. Parking requirements

    a. The parking requirements for a recreational and athletic facility are 4 per alley, court, ice sheet, game table or other game surface plus 10 per 100 m^2 of gross floor area used for dining, assembly or common area.

b. The parking requirements for a community centre are 4 per 100 m² of gross floor area.

c. The minimum parking requirements for a sports arena are 1 parking space per 4 fixed seats.

d. The minimum number of bicycle parking spaces required are 1 per 1500 m² of gross floor area.

e. As per section 110 of the zoning by-law, a minimum of 15% of the area of any parking lot, whether a principal or an accessory use, must be provided as perimeter or interior landscaped area comprised of the following:

   i. a landscaped buffer must be provided between the perimeter of the parking lot and a lot line in accordance with Table 110. A driveway may cross the landscaped buffer; and

   ii. in addition to the landscaped buffer, interior landscaping may be provided including various landscaped islands, landscaped medians, pedestrian pathways or public plazas to meet the minimum 15% requirement.

Table 110- Minimum Required Width of a Landscaped Buffer of a Parking Lot (OMB Order, File #PL080959 issued September 18, 2009)

I Location of Landscaped Buffer	Minimum Required Width of Landscaped Buffer		
	II For a parking lot containing 10 or fewer spaces	III For a parking lot containing more than 10 but fewer than 100 spaces	IV For a parking lot containing 100 or more spaces
(a) Abutting a street	3 metres		
(b) Not abutting a street	None	1.5 metres	3 metres

5. Comments:

   a. A Complex Site Plan Control application would be applicable for this proposal.

   b. As discussed during the meeting, please provide the previous communication with the Zoning Team regarding the development. The defined use impacts the parking space requirements.

   c. Based on the plan provided the interior side yard setback does not appear to be met.

d. Is there an easement registered for access to the parking to the south and access to the rear of the property, for the driveway shared with the Metcalfe Agricultural Society?

e. Is there going to be an exterior door along the south face of the building? As currently shown there appears to be parking spaces in front of the door.

f. Please label the parking spaces with a count for each row. There appears to be more parking spaces provided then stated as the total provided.

g. The Site Plan must include areas for recycling collection and snow storage.

h. Please show on the Site Plan the locations for the existing septic and well. It appears the existing well may be located along the southern face of the building by the accessible parking spaces.

i. The parking requirements should address the community centre, ice rink and tennis courts on site.

j. The future Multi-Use Pathway along the rear of the property should consider appropriate buffering or separation from the residential lot adjacent. This path also appears to dead-end at private property, is a further connection on the public land proposed?

6. Submission Requirements

    a. Please submit a Site Plan consistent with the City's Terms of Reference requirements.

Feel free to contact Erica Ogden-Fedak (erica.ogden-fedak@ottawa.ca), Planner, for follow-up questions.

Urban Design

Comments:

Submission Requirements:

7. Urban Design Brief is required. Please see attached customized Terms of Reference to guide the preparation.

    a. The Urban Design Brief should be structured by generally following the headings highlighted under Section 3 – Contents of these Terms of Reference.

    b. The following elements are particularly important for this development application.

i. Architectural features/materiality/murals along the new façade to engage with the public realm.

8. 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) the prepare these drawings and studies. These include:

    a. Site Plan

    b. Landscape Plan

    c. Elevations

Comments on Preliminary Design:

9. Preferably windows would be included along the north side of the new façade but understood that change rooms are proposed within this new interior space. Please consider utilizing a mural or architectural features along this new building face since it faces the public realm.

Feel free to contact Molly Smith (molly.smith@ottawa.ca), Planner, for follow-up questions.

Engineering

10. A topographic plan of survey needs to identify all representative elevation points, currently existing features, including all property lines, bodies of water, vegetation, easements etc. It needs to provide a note that references the horizontal and vertical datums that were used and tied into to complete the project, including the local benchmarks. The survey should show the municipal road ROW and dimension the distance between the road centre line and the site property line.

11. Servicing Study and Report (water/sanitary/SWM)

    (There are no municipal services adjacent the proposed expansion)

    a. Servicing Study and Plans will need to be submitted for review and they need to demonstrate that the site can be adequately serviced by private servicing. The report should comprehensively address the available water quality and quantity. It should identify the required projected water demand for the entire site (existing building and the proposed expansion) and the expected well capacity (sustainably to be in excess of the demand). It should also address sanitary servicing needs for the entire site (existing building and the proposed expansion).

b. The report needs to provide all pertinent calculations and justifications to support any claims made in the report. Any reliance made to other relevant studies should be made and implications clearly stated.

c. Proposed or the existing septic bed sizing needs to be provided, to demonstrate that it will be able to accommodate the generated flows and there is an adequate lot area to provide required nitrate dilution. Comprehensive rationale will need to be provided, which will allow to conclude that the existing hydrogeological and geotechnical conditions were considered, in order to protect the highly vulnerable aquifer onsite.

d. It is not clear, at the moment, if there are existing water wells or septic beds on site. If they are and are planned to service the existing and the proposed expansion, or are planned to be decommissioned or expanded, these intentions need to be included in the report and shown on the site servicing plan.

e. Fire-fighting considerations should also be included in the report to determine fire-fighting flows (volume of water) and potential property area allocation requirements, if water storage tanks need to be implemented (supported by calculations).

f. Erosion and sediment control measures need to be provided.

12. Fire Services.

a. It is the responsibility of the owner to ensure that an adequate water supply for firefighting is provided. The FUS (Fire Underwriters Survey) methodology, as opposed to the OBC methodology shall be applied for all rural areas. Enhanced review will be invoked, should the construction coefficient be chosen less than 1. Total effective floor area needs to be carefully considered. The applicant can contact Allan Evans (Allan.Evans@ottawa.ca) with Ottawa Fire Services to discuss operational matters.

   It needs to be noted that, if required, the FUS firefighting water demands are significant, and this will require substantial water storage on site. The cost of such tanks will not be accepted as cause for deviation.

b. Fire Routes now require designation with By-law through the Site Plan process by contacting fireroutes@ottawa.ca. and the City engineering needs to be cc'd on the communication.

13. Stormwater.

a. A SWM brief report and pre- and post-development drainage plans will be required, and they need to be submitted for review, to confirm that site can be adequately serviced, with respect to surface run-off control needs.

b. The report can be submitted as part of the Site Servicing Study. This report should be completed in accordance with the requirements laid out in the City's Site Servicing Study Terms of Reference. All stormwater management determinations shall have supporting rationale. On-site SWM quantity and quality measures should be contemplated to minimize impact to downstream areas.

c. Any existing stormwater runoff from adjacent site(s) that crosses the property must be accommodated by the proposed stormwater management design. No adverse effect can be created to the surrounding properties.

d. It appears that post-development impervious area is not intended to be expanded, however if it were to expand, the quantity criteria will be that the 100-year post-development peak flow rate from the site must be controlled the 2-year pre-development peak flow rate. The report should provide analysis of the existing conditions (calculate the pre-development composite run-off coefficient 'C') and the proposed conditions (calculate the post-development composite run-off coefficient 'C') and determine if there is excess runoff generated as a result of the proposal.

   While calculating post-construction composite C coefficient, 25% needs to be added to the C value, to incorporate statistical changes in different event frequencies. The run-off calculation coefficients need to be performed, as per OSDG (second edition, October 2012), section 5.4.

e. Best management SWM practices should be contemplated to address stormwater quality considerations.

f. The proposal will need to show legal and sufficient storm outlet from site for both release rate and volume.

g. Snow Storage area should be separated from the septic field locations so there is no snow melt impacting the septic field. In addition, the snow storage areas should drain into the SWM system for discharge from the site.

h. If supported by hydrogeological and geotechnical conditions, Low Impact Development (LID) may be considered on site. Note that the City has released a document titled 'Low Impact Development Technical Guidance Report – Implementation in Areas with Potential Hydrogeological Constraints' which aids sites which may have constraints such as low permeability or high groundwater. If implemented, future maintenance commitment will be required.

   If infiltration features are proposed, the SWM reporting needs to be supported with analysis of hydrogeological and geotechnical conditions and the infiltration capacity of the site, based on infiltration/percolation

testing at the location of the proposed feature, and what, if any, surface run-off water treatment measures are being applied.

i. Note that oil/grit separators, if used, require Environmental Technology Verification (ETV) protocol for ECA approval.

14. The consultant needs to determine if the MECP Environmental Compliance Approval (ECA) is required for the proposed development. Please contact the Ministry of the Environment, Conservation and Parks, Ottawa District Office to arrange a pre-submission consultation:

    a. Charlie Primeau at (613) 521-3450, ext. 251 or Charlie.Primeau@ontario.ca

    b. Please note: Once the development application has been submitted, a request can be made to the City to consider a Transfer of Review (ToR) ECA for SWM works (ponds, ditches, culverts, etc.) for private property, instead of the direct submission ECA. This is subject to approval by the City and MECP. Note that the ECA requirements are currently in transition towards the linear ECA process and more details may become available depending on application submission timeline. It is recommended to check with the City when the development application is submitted to confirm the ECA process at that time.

15. Grading and Drainage.

    a. Grading and Drainage Plans will be required identifying the existing and proposed drainage patterns and their relationship with the surface runoff control.

    b. Post-development Drainage Plan needs to show the 100 - year return storm, overland water flow pattern clearly identified with arrows, for the entire site, with its limit clearly delineated and locations of maximum depth of ponding, to confirm proper drainage, legal downstream outlet from site and protection of the structures and surrounding properties.

    c. Erosion and sediment control plan needs to be provided as well and it will need to show the erosion and sediment control measures.

16. Geotechnical Investigation.

    a. A Geotechnical Study Report will be required. The report should provide sufficient soils and engineering information to confirm that the site is suitable or can be made suitable for development based on the requirements of the Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa.

b. Please note that if sensitive marine clays are identified on site, enhanced geotechnical investigation and exhaustive analysis will be necessary. Investigation of clays should be undertaken with vane shear testing, Atterberg limits testing (from a number of depths in each column), shrinkage, grain size, grade raise restriction, consolidation, compaction sensitivity, remolded strength and liquefaction analysis - amongst others.

c. Earthquake analysis and potential for seismic liquefaction or rapid lowering of shear strength, of any soil type, analysis is also required to be undertaken and details, with clear conclusions, provided in the report.

d. Please note that City mapping indicates that thin soils are anticipated on site with overburden thickness less than 2 m.

e. In sensitive marine clays, trees in proximity to foundations can cause foundation damage. The requirements of the City's Tree Planting in Sensitive Marine Clay Soils – 2017 Guidelines should be contemplated

f. If infiltration measures are proposed onsite (LID), the study should also include infiltration/percolation testing for SWM design within the area proposed for the infiltration features.

g. The groundwater level is to be investigated and the level needs to be derived from spring-time investigation (or longer). Potential ground water table fluctuations need to be identified and their effect on the soil's behaviour needs to be studied and reported. Clear conclusions need to be provided. The foundation drainage needs to be addressed. All conclusions and determinations shall have supporting rationale.

h. Excavation in close proximity to the existing building needs to be addressed and mitigation measures, if required, contemplated.

17. Hydrogeological and Terrain Analysis

a. There are no municipal watermains near the proposed development. A Hydrogeological and Terrain Analysis Report will be required to establish that there is an adequate quantity and quality of groundwater to support the proposed development (in excess of the design demand) and it needs to provide assurance of its sustainability. The requirements for the Hydrogeological and Terrain Analysis Report are outlined in the City of Ottawa Hydrogeological and Terrain Analysis Guidelines, Section 5.0: Site Plans.

The proposed well must be tested to confirm water quantity and quality suitability, prior to site plan approval. Support must be provided for the pump test rate, which should be the maximum day rate (not average weekly use) for the development (conducted for 8 hours or more). The rate should consider the cumulative, existing and proposed use. If

multiple wells are or will be in use, then each well must be tested individually. Pump test rate must be justified.

b. Any water table measurements needed to support the design must be derived from spring-time investigation to assess seasonally high levels.

c. If there are existing water well/s and septic bed/s on site, the report needs to provide an assessment of the physical state of the existing well/s and the septic bed/s, if they are to remain. The consultant should do an inspection of the well/s and confirm that the well/s meet/s current regulation (at a minimum, the inspection should confirm the well structure, minimum casing stickup, grading around the well, etc. – all to meet O.Reg. 903)

   If they need to be decommissioned, the well/s need to be decommissioned in accordance with Well Regulation (O.Reg. 903) under the Ontario Water Resources Act (See O.Reg. 903 - Section 21(3)) and the MECP well decommissioning record must be included in the report. The septic bed/s need/s to be decommissioned in accordance with the OSSO requirements and to the satisfaction of the OSSO. All these details need to be investigated and included in the report.

d. A cumulative impact assessment maybe required if the new site water demand increases significantly compared to the existing situation; the cumulative impact assessment will provide calculations of the potential impact of the increased water extraction on existing nearby well users and the natural environment. This requirement should be discussed during the technical consultation.

e. Based on City Guidelines, the water quality parameters that must be analyzed are the “subdivision suite” known to local well testing companies, as well as trace metals and VOCs. In addition, it is recommended that petroleum hydrocarbons and BTEX also be included in the groundwater sampling. The hydrogeological consultant should also review land uses and, if available, the ESA, to determine if any additional parameters should be included, such as chlorinated solvents, pesticides, etc. The water quality sampling needs to be performed on all wells present and proposed on site.

   If concerns are identified on site and/or on the adjacent properties, an ESA might be required.

f. The local Medical Officer of Health shall be notified if a sodium concentration of 20 mg/l, or greater, is found.

g. Note that the aquifer groundwater quality is anticipated to be good, and quantity of medium to high yield, however the details need to be confirmed through pump test and groundwater sampling results.

h. Note that the onsite well system will provide groundwater which serves the public and thus will be a regulated drinking water system under O.Reg. 319 and must also follow any requirements set by Ottawa Public Health. Any requirements related to the regulated system must be fulfilled prior to the use of the system.

i. If a SWM pond, infiltration trench or similar stormwater management infrastructure is proposed, then supporting information needs to be harmonized and included in the Hydrogeological and Terrain Analysis Report and infiltration, percolation testing needs to be undertaken at the location of the proposed infiltration facility.

j. A Septic System Impact Risk Assessment must be completed as part of the Hydrogeological and Terrain Analysis Report, as per the City's Hydrogeological and Terrain Analysis Report Guidelines and MECP Guideline D-5-4. Please refer to the City of Ottawa HGTA Guidelines for the predictive assessment for commercial/industrial developments (not residential developments). A septic impact assessment is required to confirm that there is sufficient septic dilution to not contaminate the underlying aquifer, resulting from proposed expansion. Enhanced septic design might be required.

k. Since this a site plan application (not lot creation or zoning), the septic treatment (i.e. tertiary treatment with nitrate dilution) may be considered as part of the septic impact assessment calculations. A system certified though NSF or BNQ should be recommended, if advanced treatment is needed to meet nitrate impact targets.

l. If the expected daily design flow is less than 10,000 L/d, the septic permit from the Ottawa Septic System Office must be issued prior to Site Plan Approval being granted.

m. If the sum of the septic flows from all the septic systems onsite is 10,000 L/day or greater, then an ECA will be required from the MECP for the septic system. If design is 10,000 L/day or greater but mitigation measures are proposed (i.e. balancing tanks, etc.) to reduce the daily discharge, a copy of communication with the MECP needs to be provided to the City to confirm if the ECA is required.

n. The report needs to investigate if the site is hydrogelogically sensitive. If the site is hydrogeologically sensitive, then mitigative measures are to be recommended, to protect the underlying supply aquifer, this can include increased casing depth for any new drilled wells, increased separation distance between wells and SWM and septic systems, strategic placement of wells and septic system, based on direction of groundwater flow and existing soil thickness, and additional protective construction measures for the septic systems such as a clay seal or advanced septic treatment.

Note, that thin soils are anticipated on site, with overburden less than 2 m thick, hence enhanced discussion and mitigation of the thin soils is required in the Terrain Analysis.

The report should provide a direction on strategic placement of wells, if new wells are planned; and should discuss protection of all supply wells.

o. Bollards, or other means of preventing vehicle access, will need to be provided between areas with vehicle access and the existing or proposed well(s). The well location should be shown on all plans; the grading plan should indicate that grading around the well meets O.Reg. 903 requirements, i.e. minimum well casing height above ground surface and the land around the well must slope away from the well to prevent pooling.

p. The report should outline the existing and proposed activities onsite and discuss how the aquifer is protected from any potentially contaminating activities. This may include a discussion on how activities are managed through existing and future ECAs.

q. Technical consultation with the hydrogeological report reviewer, Obai, at obai.mohammed@ottawa.ca, is encouraged prior to commencing the field work program, please provide a work plan to the assigned Infrastructure Project Manager for comment in advance of work on-site.

18. Additional observations.

a. The site plan does not comply with the City Terms of reference technical specifications {Plans are to be standard A1 size (594 mm x 841 mm) or Arch D size (609.6 mm x 914.4 mm) sheets}.

b. It is not clear if a new CSP 450 mm culvert is proposed, or an existing culvert is shown at the NE corner driveway.

c. New pathway connection to Van Rens Street is proposed at the NE corner property, across the ditch, however no new culvert was proposed.

d. The site plan shows the building expansion reaching beyond the property line of the parcel on which the expansion is proposed.

e. The proposed building appears to interfere with multiple sanitary, storm and electrical underground features and hydro poles, including a hydro transformer pole. It is not clear if there are any hydro easements on site.

f. Existing water well/s and the septic bed/s need to be shown clearly on the plans.

g. It is not clear if there are any current firefighting provisions on site, such as water tanks, hydrants, etc. If present, they need to be shown on plans.

h. Snow storage areas need to be shown on site. Any portion of the subject property which is intended to be used for permanent or temporary snow storage shall be as shown on the approved Site Plan and Lot Grading and Drainage Plan. Snow storage shall not interfere with approved grading and drainage patterns or servicing. Snow storage areas shall be setback from the property lines, foundations, fencing or landscaping a minimum of 1.5m. Snow storage areas shall not occupy driveways, aisles, required parking spaces or any portion of a road allowance nor be adjacent any well or septic areas.

19. Accessibility.

a. City Accessibility Specialist shall be contacted for applicable accessibility requirements, regulations and standards. The Accessibility Design Standards (Second Edition, November 2015) apply to both new construction and rehabilitation projects involving City owned and operated spaces and facilities.

b. A brief Accessibility Compliance Report outlining compliance with applicable accessibility requirements, prepared by an appropriately skilled professional is to be provided. The purpose of the brief Accessibility Compliance Report is to discuss the accessibility upgrades to the existing building and the accessibility design components of the proposed addition. The report should reference the relevant standards and the design drawings and shall be submitted to the City Accessibility Specialist for review.

20. Site Lighting

a. Exterior site lighting will require certification by a licensed professional engineer confirming the design complies with the following:

b. The location of the fixtures, fixture type (make, model, part number and the mounting height) must be shown on one of the approved plans.

i. Lighting must be designed only using fixtures that meet the criteria for Full Cut-off classification, as recognized by the Illuminating Engineering Society of North America (IESNA or IES), and

ii. It must result in minimal light spillage onto adjacent properties and road ROW. As a guideline, 0.5 foot-candle is normally the maximum allowable spillage.

iii. Lighting Certificate will need to be submitted to the Development Review.

21. Easements/ROW

    a. Easements and rights-of-ways must be shown on the plans. Information on any existing easements details (who involved parties are, registration number, versions of the document including the latest, related by-laws etc.) with all supporting documentation need to be provided with the application.

22. Energy conservation

    a. Energy conservation should be demonstrated throughout design as per section 2.2.3 of the Official Plan (reduction of urban heat, renewable energy, mitigation of climate change impacts) and others.

23. Roads.

    a. 8th Line Road, in Rural Road Network, is a collector road and ROW protection of 26.0 m is required, as per Official plan, Schedule C16 (13 m from the road centre line to the property limit).

    b. Topographic survey will need to confirm the ROW width from the road centre line to the property limit. Road widening might be required, if the ROW width is found to be less than stated above.

    c. Please refer to the City of Ottawa Private Approach By-Law 2003-447 for the entrance design.

24. Permits and Approvals

    a. Please contact the South Nation Conservation Authority (SNCA), MECP, amongst other federal and provincial departments/agencies, to identify all the necessary permits and approvals required to facilitate the expansion. Responsibility rests with the applicant and their consultant for determining which approvals are needed and for obtaining all external agency approvals. The address shall be in good standing with all approval agencies, for example SNCA, prior to approval. Copies of confirmation of correspondence will be required from all approval agencies that a form of assent is given.

    b. Please note that OSSO approval is required prior to site plan approval being given.

    c. If required, an MECP ECA application is not submitted until after City of Ottawa engineering is satisfied that components directly or indirectly aligned with the ECA process concur with standards, directives, and guidelines of the MECP.

d. No construction shall commence until after a commence work notification is given by Development Review.

e. Note that oil/grit separators require Environmental Technology Verification (ETV) protocol for ECA approval.

25. Submission requirements for engineering.

a. Site Plan & Site Servicing Plan

b. Grading Plan

c. Drainage Area Plans

d. Erosion and Sediment Control Plan

e. Lighting Plan Certificate (not required at submission, but for registration)

All identified required plans are to be submitted on standard A1 or Arch D size sheets as per City of Ottawa Servicing and Grading Plan Requirements.

26. Report Submission Requirements.

a. Site Servicing Study and Report (Water &Sanitary; including firefighting considerations)

b. Storm Water Management Report (including Erosion and Sediment Control Measures.)

c. Hydrogeological and Terrain Analysis report.

d. Geotechnical Investigation Report - Earthquake analysis and Seismic liquefaction potential (including rapid lowering of any soil's shear strength) is now required to be provided in the report.

e. Brief Accessibility Compliance Report.

Feel free to contact Derek Kulyk (derek.kulyk@ottawa.ca), Infrastructure Project Manager, for follow-up questions.

Noise

Comments:

27. Noise Study is not required.

Feel free to contact Neeti Paudel (neeti.paudel@ottawa.ca), Transportation Project Manager, for follow-up questions.

Transportation

Comments:

28. Right-of-way protection.

    a. 26m right of way protection is required (13m from the centerline.). Ensure this is shown on the site plan.

29. TIA is not required.

Feel free to contact Neeti Paudel (neeti.paudel@ottawa.ca), Transportation Project Manager, for follow-up questions.

Planning Forestry
Comments:

30. There are City owned trees on the subject property that must be protected through the development. A Tree Conservation Report will be required for the site plan control application. If an EIS is required, the TCR and EIS can be combined. If a Landscape Plan is proposed, alternatively the LP and TCR could be combined.

31. **Tree Conservation Report requirements when there are City owned trees- 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. 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:

        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.

32. Landscape Plan (LP) only required if new trees are proposed. Landscape Plan Terms of Reference must be adhered to: (https://documents.ottawa.ca/sites/documents/files/landscape_tor_en.pd For more information on these requirements please contact hayley.murray@ottawa.ca

    a. Please ensure any retained trees are shown on the LP

    b. Minimum Setbacks

        i. Maintain 1.5m from sidewalk or MUP/cycle track or water service laterals.

        ii. Maintain 2.5m from curb

        iii. Coniferous species require a minimum 4.5m setback from curb, sidewalk, or MUP/cycle track/pathway.

        iv. 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.

        v. Adhere to Ottawa Hydro's planting guidelines (species and setbacks) when planting around overhead primary conductors.

    c. Tree specifications

i. Minimum stock size: 50mm tree caliper for deciduous, 200cm height for coniferous.

ii. Maximize the use of large deciduous species wherever possible to maximize future canopy coverage.

iii. 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.

iv. No root barriers, dead-man anchor systems, or planters are permitted.

v. No tree stakes unless necessary (and only 1 on the prevailing winds side of the tree)

d. Hard surface planting

i. If there are hard surface plantings, a planting detail must be provided.

ii. Curb style planter is highly recommended.

iii. No grates are to be used and if guards are required, City of Ottawa standard (which can be provided) shall be used.

iv. Trees are to be planted at grade.

v. 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

e. Sensitive Marine Clay - Please follow the City's 2017 Tree Planting in Sensitive Marine Clay guidelines.

f. The city requests that consideration be given to planting native species wherever there is a high probability of survival to maturity.

g. 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.

Feel free to contact Hayley Murray (hayley.murray@ottawa.ca), Planning Forester, for follow-up questions.

Environment

Comments:

33. There are no natural heritage features, surface water features, or species at risk habitat affected by the proposed development. The development is occurring in an already-developed area and will have minimal to no effect on the surrounding natural features. No EIS is required.

34. If there are any windows being proposed, then the project should adhere to the City's Bird Safe Design Guidelines.

35. Additional tree plantings are always recommended to help meet the City's forest canopy goals and help to reduce the impacts of climate change and the urban heat island effect. The City prefers native and non-invasive plantings.

Feel free to contact Mark Elliott, (mark.elliott@ottawa.ca) Environmental Planner for follow-up questions.

Other

36. The High Performance Development Standard (HPDS) is a collection of voluntary and required standards that raise the performance of new building projects to achieve sustainable and resilient design. The HPDS was passed by Council on April 13, 2022.

    a. At this time, the HPDS is not in effect and Council has referred the 2023 HPDS Update Report back to staff with direction to bring forward an updated report to Committee with recommendations for revised phasing timelines, resource requirements and associated amendments to the Site Plan Control By-law by no later than Q1 2024.

    b. Please refer to the HPDS information attached and ottawa.ca/HPDS for more information.

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

Yours Truly,

Erica C Ogden-Fedak

Erica C. Ogden-Fedak, MCIP, RPP
Planner II

c.c. Molly Smith, Urban Designer
Derek Kulyk, Infrastructure Project Manager
Neeti Paudel, Transportation Project Manager
Hayley Murray, Planning Forester
Mark Elliott, Environmental Planner

Encl. Study and Plan Identification List
Supplemental Development Information
Technical Agencies to Consult
Urban Design Terms of Reference

Francois Lafleur

From: Francois Lafleur
Sent: Thursday, December 18, 2025 11:08 AM
To: 'James Holland'
Cc: Robert Matthews; Elmer Kalliomaki; Voelker, Kevin; Adam Poapst
Subject: RE: Larry Robinson Arena New Addition - SNC Review

Thanks James.

Temporary erosion protection measures are shown at the outlet of the existing SWM pipe (ditch along Van Rens St). We were not planning on adding permanent erosion protection measures at this location as existing conditions are being mostly maintained and as vegetation coverage in the outlet ditch appeared good.

Regards,

François Lafleur, P. Eng.
Municipal Engineer, EVB Engineering
A 800 Second St. W, Cornwall, ON K6J 1H6
P 613.935.3775 ext. 240
M 613.363.8734 **F** 613.935.6450
W EVBengineering.com

From: James Holland <jholland@nation.on.ca>
Sent: Wednesday, December 17, 2025 11:02 AM
To: Francois Lafleur <Francois.Lafleur@evbengineering.com>
Cc: Robert Matthews <robertm@n45.ca>; Elmer Kalliomaki <elmerk@n45.ca>; Voelker, Kevin <kevin.voelker@ottawa.ca>; Adam Poapst <Adam.Poapst@evbengineering.com>
Subject: RE: Larry Robinson Arena New Addition - SNC Review

Hi Francois,

The quantity control component of the stormwater management design has been reviewed by SNC's engineers. There was only one comment:

1. Would there be any erosion protection measures proposed at the outlet of the existing SWM pipe?

Please note that a permit is not required from South Nation Conservation for the proposed work and the roadside ditch is not a regulated feature under O.Reg. 41/24.

Kind regards,
James

From: Francois Lafleur <Francois.Lafleur@evbengineering.com>
Sent: Tuesday, November 25, 2025 9:27 AM

To: James Holland <jholland@nation.on.ca>
Cc: Robert Matthews <robertm@n45.ca>; Elmer Kalliomaki <elmerk@n45.ca>; Voelker, Kevin <kevin.voelker@ottawa.ca>; Adam Poapst <Adam.Poapst@evbengineering.com>
Subject: Larry Robinson Arena New Addition - SNC Review

External email - if you don't know or can't confirm the identity of the sender, please exercise caution and do not open links or attachments.

Hi James,
We recently prepared our drawings & SWM report for construction of a new addition at the Larry Robinson Arena in Ottawa (Metcalfe) and applied for Site Plan Control.

We'll require SNC approval for the SWM as well; could you please review?

Note, the septic system capacity exceeds 10,000 L/day hence an application has been made with the MECP.

Thanks, and please let me know if anything is unclear.

François Lafleur, P. Eng.
Municipal Engineer, EVB Engineering
A 800 Second St. W, Cornwall, ON K6J 1H6
P 613.935.3775 ext. 240
M 613.363.8734 F 613.935.6450
W EVBengineering.com

James Holland | MCIP RPP, Senior Planner
38 Victoria Street, Box 29, Finch, ON K0C 1K0
Tel: 613-984-2948 or 1-877-984-2948 | Fax: 613-984-2872
nation.on.ca | make a donation

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Francois Lafleur

From: James Holland <jholland@nation.on.ca>
Sent: Friday, January 16, 2026 2:42 PM
To: Francois Lafleur; Voelker, Kevin
Subject: RE: Larry Robinson Arena New Addition - SNC Review

Hi Kevin and Francois,

SNC's comments have been addressed for this technical review.

There is a technical review fee of $900. How should it be invoiced for this project please?

Thanks,
James

From: James Holland
Sent: Monday, December 1, 2025 9:38 AM
To: Francois Lafleur <Francois.Lafleur@evbengineering.com>
Cc: Robert Matthews <robertm@n45.ca>; Elmer Kalliomaki <elmerk@n45.ca>; Voelker, Kevin <kevin.voelker@ottawa.ca>; Adam Poapst <Adam.Poapst@evbengineering.com>
Subject: RE: Larry Robinson Arena New Addition - SNC Review

Hi Francois and Kevin,
SNC will provide a technical review of the quantity control aspect of the stormwater design. Please let me know if there are any questions or concerns.
Thanks
James

From: Francois Lafleur <Francois.Lafleur@evbengineering.com>
Sent: Tuesday, November 25, 2025 9:27 AM
To: James Holland <jholland@nation.on.ca>
Cc: Robert Matthews <robertm@n45.ca>; Elmer Kalliomaki <elmerk@n45.ca>; Voelker, Kevin <kevin.voelker@ottawa.ca>; Adam Poapst <Adam.Poapst@evbengineering.com>
Subject: Larry Robinson Arena New Addition - SNC Review

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Municipal Engineer, EVB Engineering
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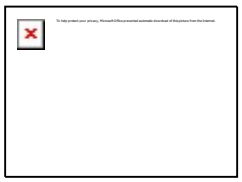

James Holland | MCIP RPP, Senior Planner
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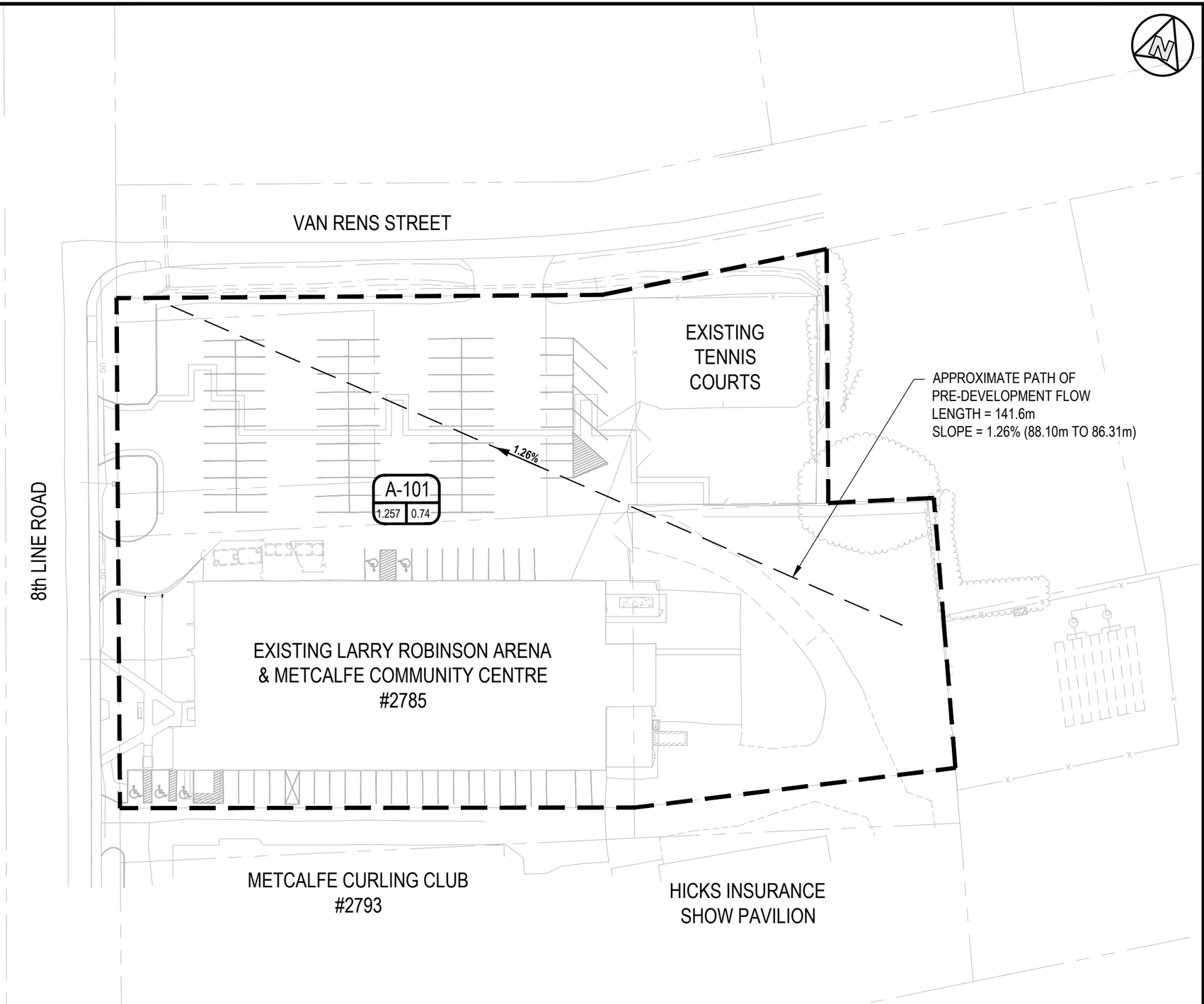
APPENDIX B

FIG.1 – Pre-Development Stormwater Catchment Area
FIG.2 – Post-Development Stormwater Catchment Area
Weighted C Factor Calculations
Pre-Development and Post-Development Runoff Calculations
5 Year Required Storage Calcluations
100 Year Required Storage Calculations



LEGEND:

STORM DRAINAGE BUBBLE

A-101 — AREA LABEL

0.256 | 0.24 — RUNOFF COEFFICIENT / AREA IN ha

STORM DRAINAGE LIMIT

EVB ENGINEERING
800 SECOND STREET WEST
CORNWALL, ONTARIO CANADA, K6J 1H6
TEL: 613-935-3775 | FAX: 613-935-6450
WEBSITE: EVBengineering.com

CLIENT:

CITY OF OTTAWA

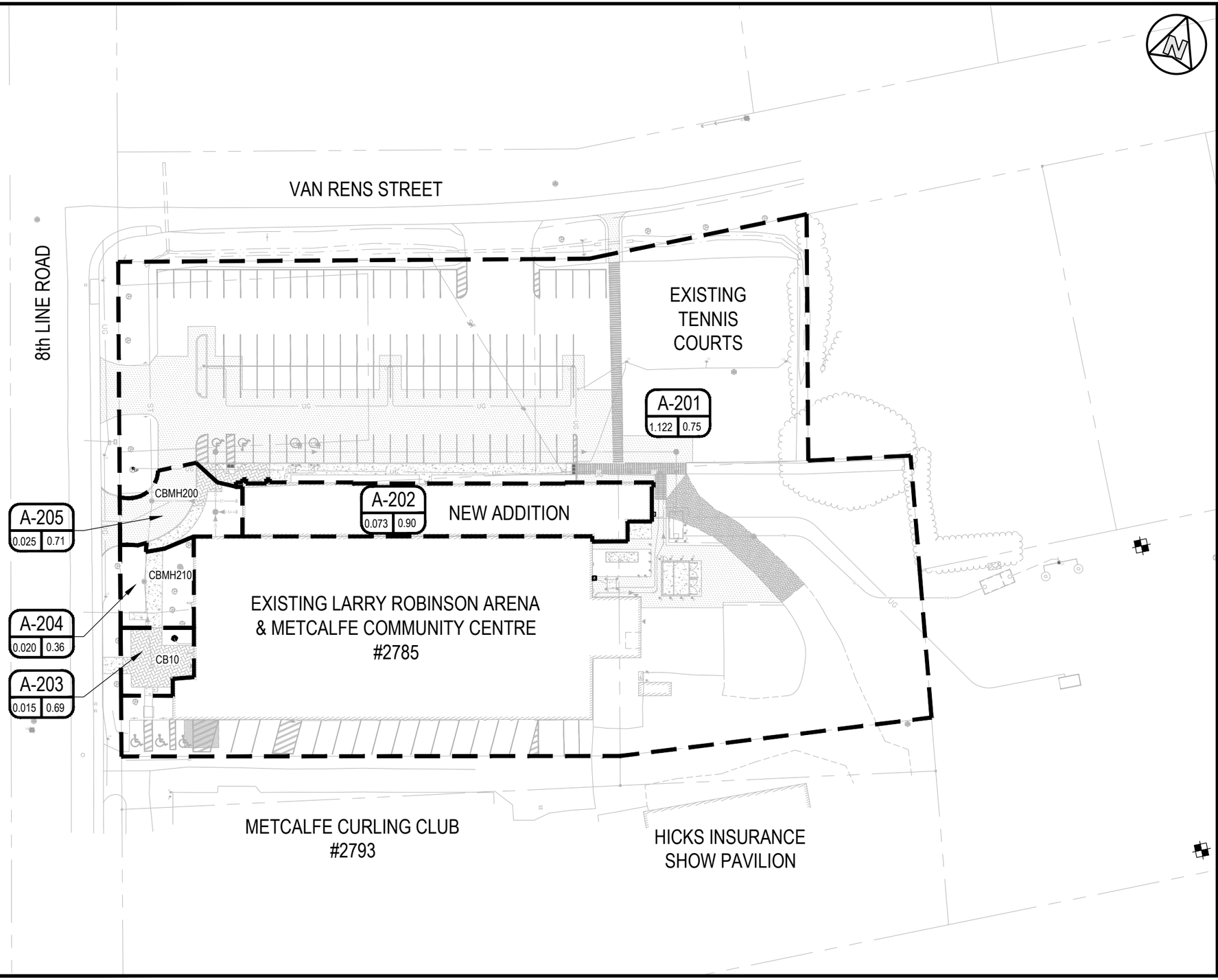
PROJECT:

LARRY ROBINSON ARENA
NEW ADDITION

TITLE:

PRE-DEVELOPMENT
STORMWATER
CATCHMENT AREA

SCALE: 1:750	JOB NO: 23211
DESIGNED BY: FL	DATE: 2025/11/03
DRAWN BY: FL	DRAWING NO. FIG.1
CHECKED BY: JE	



LEGEND:

STORM DRAINAGE BUBBLE

A-101 — AREA LABEL

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AREA IN ha

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800 SECOND STREET WEST
CORNWALL, ONTARIO CANADA, K6J 1H6
TEL: 613-935-3775 | FAX: 613-935-6450
WEBSITE: EVBengineering.com

CLIENT:

CITY OF OTTAWA

PROJECT:

LARRY ROBINSON ARENA
NEW ADDITION

TITLE:

POST-DEVELOPMENT
STORMWATER
CATCHMENT AREA

SCALE: 1:750	JOB NO: 23211
DESIGNED BY: FL	DATE: 2025/11/06
DRAWN BY: FL	DRAWING NO. FIG.2
CHECKED BY: JE	

Weighted C Factor Calculations

Project Name: Larry Robinson Arena
Project No: 23211
Client: City of Ottawa

Designed By: François Lafleur, P.Eng
Reviewed By: Josh Eamon, P.Eng.
Date: 2025/11/06

A-101 (Pre)

SurfaceType	Coefficient	Area (m^2)
Asphalt/Concrete	0.90	6734
Roof	0.90	2582
Gravel	0.50	788
Precast Paving	0.90	59
Grassed & Undeveloped	0.20	2402
Σ Areas		12565
Weighted 'C' Factor		0.741

A-201

SurfaceType	Coefficient	Area (m^2)
Asphalt/Concrete	0.90	5831
Roof	0.90	2582
Gravel	0.50	734
Precast Paving	0.90	0
Grassed & Undeveloped	0.20	2077
Σ Areas		11224
Weighted 'C' Factor		0.74

A-202

SurfaceType	Coefficient	Area (m^2)
Asphalt/Concrete	0.90	0
Roof	0.90	729
Gravel	0.50	0
Precast Paving	0.90	0
Grassed & Undeveloped	0.20	0
Σ Areas		729
Weighted 'C' Factor		0.90

A-203

SurfaceType	Coefficient	Area (m^2)
Asphalt/Concrete	0.90	3
Roof	0.90	0
Gravel	0.50	0
Precast Paving	0.90	104
Grassed & Undeveloped	0.20	47
Σ Areas		154
Weighted 'C' Factor		0.69

A-204

SurfaceType	Coefficient	Area (m^2)
Asphalt/Concrete	0.90	47
Roof	0.90	0
Gravel	0.50	0
Precast Paving	0.90	0
Grassed & Undeveloped	0.20	157
Σ Areas		204
Weighted 'C' Factor		0.36

A-205

SurfaceType	Coefficient	Area (m^2)
Asphalt/Concrete	0.90	183
Roof	0.90	0
Gravel	0.50	0
Precast Paving	0.90	0
Grassed & Undeveloped	0.20	71
Σ Areas		254
Weighted 'C' Factor		0.70

Pre-Development & Post-Development Runoff Calculations

Project Name: Larry Robinson Arena Expansion
Project No: 23211
Client: City of Ottawa

Designed By: François Lafleur, P.Eng
Reviewed By: Josh Eamon, P.Eng
Date: 2025/11/06

Pre-Development Peak Run-off Rates (Allowable)

Contributing Area		Runoff Data						
No.	Ha	C	AC	Tc (min.)*	I (mm/hr)		Q (L/s)	
					5 Year	100 Year	5 Year	100 Year
A-101 (Pre)	1.257	0.74	0.93	7.53	119.39	204.88	309.06	662.97
Total	**1.257**	**0.741**	**0.93**					

*Pre-development time of concentration calculated using the Bransby method due to C>0.4 [Tc=(0.057*L)/(S^0.2*A^0.1)], with an average slope of 1.26%, flow length of 141.6 m and area of 1.257 ha

= C +25%

Uncontrolled Post-Development Peak Run-off Rates

Contributing Area		Runoff Data						
No.	Ha	C	AC	Tc (min.)**	I (mm/hr)		Q (L/s)	
					5 Year	100 Year	5 Year	100 Year
A-201	1.122	0.74	0.84	7.61	118.78	203.83	275.86	591.72
A-202	0.073	0.90	0.07	--	--	--	21.39	21.39
A-203	0.015	0.69	0.01	5.00	141.18	242.70	4.15	8.91
A-204	0.020	0.36	0.01	5.00	141.18	242.70	2.89	6.22
A-205	0.025	0.70	0.02	5.00	141.18	242.70	7.02	15.09
Total	**1.257**	**0.746**	**0.937**				**311.31**	**643.32**

= uncontrolled roof flow provided by mechanical engineer (339 USGPM converted to L/s)

Controlled Post-Development Peak Run-off Rates

Contributing Area		Runoff Data						
No.	Ha	C	AC	Tc (min.)**	I (mm/hr)		Q (L/s)	
					5 Year	100 Year	5 Year	100 Year
A-201	1.122	0.74	0.84	7.61	118.78	203.83	275.86	591.72
A-202	0.073	0.90	0.07	--	--	--	7.57	7.57
A-203	0.015	0.69	0.01	5.00	141.18	242.70	4.15	8.91
A-204	0.020	0.36	0.01	5.00	141.18	242.70	2.89	6.22
A-205	0.025	0.70	0.02	5.00	141.18	242.70	7.02	15.09
Total	**1.257**	**0.746**	**0.937**				**297.49**	**629.51**

= controlled roof flow provided by mechanical engineer (120 USGPM converted to L/s)

**Post-development time of concentration calculated using the Bransby method due to C>0.4 [Tc=(0.057*L)/(S^0.2*A^0.1)], with an average slope of 1.26%, flow length of 141.6 m and area of 1.118 ha. Post-development time of concentration for A-203, A-204 and A-205 was conservatively taken as 5 minutes due to the small size of the areas.

5 Year Required Storage Calculations (Addition Roof)

Project Name: Larry Robinson Arena Expansion
Project No: 23211
Client: City of Ottawa

Designed By: François Lafleur, P.Eng.
Reviewed By: Josh Eamon, P.Eng
Date: 2025/10/07

Rational Method Storage Computation
Storage Rate Method

Contributing Area (Contolled)		
No.	**Ha**	**C**
A-202	0.073	0.90
Σ Areas		**0.073**
Weighted 'C' Factor		**0.90**

	Storm Event	Q (L/s)
Total Allow. Q	5 Year	7.57
Total Actual Q	5 Year	7.57

Time (Min.)	I (mm/hr)	Peak Flow (L/s)	Actual Release Rate (L/s)	Required Storage Rate (L/s)	Required Storage Volume (m^3)
5	141.18	25.75	7.57	18.18	5.45
10	104.19	19.00	7.57	11.43	6.86
15	83.56	15.24	7.57	7.67	6.90
20	70.25	12.81	7.57	5.24	6.29
25	60.90	11.11	7.57	3.54	5.31
30	53.93	9.84	7.57	2.27	4.08
35	48.52	8.85	7.57	1.28	2.69
40	44.18	8.06	7.57	0.49	1.17
45	40.63	7.41	7.57	-0.16	-0.43
50	37.65	6.87	7.57	-0.70	-2.11
55	35.12	6.41	7.57	-1.16	-3.84

100 Year Required Storage Calculations (Addition Roof)

Project Name: Larry Robinson Arena Expansion
Project No: 23211
Client: City of Ottawa

Designed By: François Lafleur, P.Eng.
Reviewed By: Josh Eamon, P.Eng
Date: 2025/10/07

Rational Method Storage Computation
Storage Rate Method

Contributing Area (Contolled)		
No.	**Ha**	**C**
A-202	0.073	0.90
Σ Areas		**0.073**
Weighted 'C' Factor*		**1.13**

* +25% for 100 year storm

	Storm Event	Q (L/s)
Total Allow. Q	100 Year	7.57
Total Actual Q	100 Year	7.57

Time (Min.)	I (mm/hr)	Peak Flow (L/s)	Actual Release Rate (L/s)	Required Storage Rate (L/s)	Required Storage Volume (m^3)
5	242.70	55.34	7.57	47.77	14.33
10	178.56	40.71	7.57	33.14	19.88
15	142.89	32.58	7.57	25.01	22.51
20	119.95	27.35	7.57	19.78	23.73
25	103.85	23.68	7.57	16.11	24.16
30	91.87	20.95	7.57	13.38	24.08
35	82.58	18.83	7.57	11.26	23.64
40	75.15	17.13	7.57	9.56	22.95
45	69.05	15.74	7.57	8.17	22.07
50	63.95	14.58	7.57	7.01	21.03
55	59.62	13.59	7.57	6.02	19.88

Provided Storage Calculations (Addition Roof)

Project Name: Larry Robinson Arena Expansion	**Designed By:** François Lafleur, P.Eng.
Project No: 23211	**Reviewed By:** Josh Eamon, P.Eng
Client: City of Ottawa	**Date:** 2025/10/07

Provided Storage Calculations (Roof)

Water Height (m)	Ponding Distance (m)	Storage per Drain (m3)	Total System Storage (m3)	Comments
0.00	0.00	0.00	0.00	
0.01	0.67	0.00	0.01	
0.02	1.33	0.01	0.06	
0.03	2.00	0.04	0.20	
0.04	2.67	0.09	0.47	
0.05	3.33	0.19	0.93	
0.06	4.00	0.32	1.60	
0.07	4.67	0.51	2.54	
0.08	5.33	0.76	3.79	
0.09	6.00	1.08	5.40	
0.10	6.67	1.48	7.41	5-year Storm
0.11	7.33	1.97	9.86	
0.12	8.00	2.56	12.80	
0.13	8.67	3.25	16.27	
0.14	9.33	4.07	20.33	
0.15	10.00	5.00	25.00	100-year Storm

Roof average slope: 1.5%

# of roof drains: 5 ea

Storage per drain: V = (L*L*h) / 3

APPENDIX C

Storm Sewer Design Sheet – 5 Year Storm
Storm Sewer Design Sheet – 100 Year Storm

Storm Sewer Design Sheet - 5 Year Storm

Client: City of Ottawa

Service Location and Contributing Areas						Runoff Data						Outlet Pipe Data								
Location	Manhole		Contributing Area			C	AC	Σ AC	Tc (min.)	I (mm/hr)	Q (L/s)	Size (mm)	Slope (%)	Qcap (l/s)	Q/Qcap	Velocity (m/s)	Length (m)	Δ Elev (m)	Pipe Inverts	
	From	To	No.	Ha	Σ Areas														U/S	D/S
New building service	Roof	CBMH200	A-202	1.1224	A-202	--	--	--	--	--	7.57	200	1.40%	38.8	0.20	1.24	16.6	0.232	86.16	85.93
Main entrance	CB10	CBMH210	A-203	0.0154	A-203	0.69	0.011	0.011	5.0	141.2	4.15	200	1.00%	32.8	0.13	1.04	15.6	0.156	86.16	86.00
Main entrance	CBMH210	CBMH200	A-204	0.0204	A-203 to 204	0.36	0.007	0.007	5.2	138.6	2.84	200	0.50%	23.2	0.12	0.74	14.82	0.074	85.95	85.88
Existing storm	CBMH210	Ditch	A-205	0.0254	A-202 to A-205	0.70	0.018	0.036	5.6	135.4	21.06	300	1.06%	99.7	0.21	1.41	43.3	0.460	85.78	85.32

Design Parameters

Coefficients

Mannings n = 0.0130

Roof flow from mechanical engineer (120 USGPM converted to L/s)

Designed By:

François Lafleur, P.Eng.

Reviewed By:

Josh Eamon, P.Eng

Dwg. Reference:

C003 - Site Servicing Plan

Project:

Larry Robinson Arena New Addition

Location:

Ottawa, Ontario

Project Number:	Date:	Sheet Number:
23211	23-Jan-26	1/1

Storm Sewer Design Sheet - 100 Year Storm

Client: City of Ottawa

Service Location and Contributing Areas						Runoff Data						Outlet Pipe Data								
Location	Manhole		Contributing Area			C	AC	Σ AC	Tc (min.)	I (mm/hr)	Q (L/s)	Size (mm)	Slope (%)	Qcap (l/s)	Q/Qcap	Velocity (m/s)	Length (m)	Δ Elev (m)	Pipe Inverts	
	From	To	No.	Ha	Σ Areas														U/S	D/S
New building service	Roof	CBMH200	A-202	1.1224	A-202	--	--	--	--	--	7.57	200	1.40%	38.8	0.20	1.24	16.6	0.232	86.16	85.93
Landscape area	CB10	CBMH210	A-203	0.0154	A-203	0.69	0.011	0.011	5.0	242.7	7.13	200	1.00%	32.8	0.22	1.04	15.6	0.156	86.16	86.00
Landscape area	CBMH210	CBMH200	A-204	0.0204	A-203 to 204	0.36	0.007	0.007	5.2	238.3	4.88	200	0.50%	23.2	0.21	0.74	14.82	0.074	85.95	85.88
Existing storm	CBMH210	Ditch	A-205	0.0254	A-202 to A-205	0.70	0.018	0.036	5.6	232.6	30.74	300	1.06%	99.7	0.31	1.41	43.3	0.460	85.78	85.32

Design Parameters

Coefficients

Mannings n = 0.0130

Roof flow from mechanical engineer (120 USGPM converted to L/s)

Designed By:

François Lafleur, P.Eng.

Reviewed By:

Josh Eamon, P.Eng

Dwg. Reference:

C003 - Site Servicing Plan

Project:

Larry Robinson Arena New Addition

Location:

Ottawa, Ontario

Project Number:	Date:	Sheet Number:
23211	23-Jan-26	1/1