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SITE SERVICING & STORMWATER MANAGEMENT REPORT

193 NORICE STREET
OTTAWA, ONTARIO

REPORT NO. 23104

AUGUST 9, 2024

CONTENTS

LIST OF APPENDICES

1.0 INTRODUCTION

This report has been prepared in support of the revision to a previously approved Site Plan Control application for the proposed 4-storey, 35-unit residential building located at 193 Norice Street in Ottawa, Ontario. The property is currently vacant. Refer to Pre-Application Consultation meeting notes in Appendix A.

This report forms part of the site servicing and stormwater management design for the proposed development. Also refer to drawings C-1 to C-5 prepared by D.B. Gray Engineering Inc.

2.0 WATER SERVICING

2.1 WATER SUPPLY FOR FIREFIGHTING

The proposed building will have a sprinkler system with the fire department connection located east of the overhead door. 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 199 Norice Street. It is ±40 m unobstructed distance to the proposed fire department connection, which is less than the maximum 45 m permitted by the Ontario Building Code; therefore, a private fire hydrant is not required.

In accordance with City of Ottawa Technical Bulletin ISTB-2021-03, when calculating the required fire flow where pipe sizing is not affected, the Ontario Building Code Method is to be used. Using the Ontario Building Code Method, the required fire flow was calculated to be 9,000 L/min (150 L/s). In accordance with City of Ottawa Technical Bulletin ISTB-2021-03, 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 was subsequently 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 150 mm Norice Street municipal watermain provided by the City of Ottawa for the 133.3 L/s fire flow at the subject property indicate a hydraulic grade line (HGL) of 105.0 m. Refer to Appendix B. This HGL calculates to 168 kPa (24 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.

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

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

The existing municipal Class AA fire hydrant serving the fire department connection discussed above can contribute 5,700 L/min (95 L/s). There is also an existing municipal Class AA fire hydrant within 150 m of the proposed building located in front of 183 Norice Street. It can contribute 3,800 L/min (63.3 L/s). The aggregate flow of the two contributing fire hydrants is 9,500 L/min (158.3 L/s), which is greater than the required fire flow of 8,000 L/min (133.3 L/s).

2.2 DOMESTIC WATER SUPPLY

In accordance with

i. the City of Ottawa Water Design Guidelines for the populations,
ii. City of Ottawa Technical Bulletin ISTB-2021-03 for the consumption rate, and
iii. the Ministry of the Environment Water Design Guidelines for the peaking factors, and

based on the 5 – 2 bedroom apartment units, 15 – 3 bedroom apartment units, 12 – 4 bedroom apartment units and 3 – 5 bedroom apartment units, the average daily demand was calculated to be 0.4 L/s, the maximum daily demand was calculated to be 2.3 L/s and the maximum hourly demand was calculated to be 3.4 L/s. Refer to calculations in Appendix B.

Note that the population of a single family dwelling was used for the 4 bedroom apartment units and 5 bedroom apartment units.

The boundary conditions in the 150 mm Norice Street municipal watermain provided by the City of Ottawa at the subject property indicate a minimum HGL of 125.6 m and a maximum HGL of 133.4 m. Refer to Appendix B. Based on these boundary conditions, the pressure at the water meter is calculated to vary between 392 kPa (57 psi) and 469 kPa (68 psi). This is an acceptable range for the proposed development.

A 150 mm water service connecting to the existing 150 mm Norice Street 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

In accordance with

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

based on the 5 – 2 bedroom apartment units, 15 – 3 bedroom apartment units, 12 – 4 bedroom apartment units and 3 – 5 bedroom apartment units, the post-development sanitary flow rate was calculated to be 1.17 L/s. A 200 mm sanitary sewer service at 2% slope (46.38 L/s capacity) is proposed to service the development. At the design flow rate the sanitary sewer service will only be at 3% of its capacity. The proposed 200 mm sanitary sewer service will connect to the existing 250 mm Norice Street municipal sanitary sewer, which at 0.28% slope has a capacity of 31.47 L/s. Refer to calculations in Appendix C. The proposed development is expected to have an acceptable impact on the 250 mm Norice Street municipal sanitary sewer.

Note that the population of a single family dwelling was used for the 4 bedroom apartment units and 5 bedroom apartment units.

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

4.0 STORMWATER MANAGEMENT

4.1 QUANTITY CONTROL

Using the Rational Method with a time of concentration of 10 minutes, the pre-development flow rates were calculated to be 28.21 L/s during the 100-year event, 14.01 L/s during the 5-year event and 10.33 L/s during the 2-year event. The Rational and Modified Rational Methods were used to calculate the post-development flow rates and corresponding storage volumes. Refer to calculations in Appendix D.

Drainage Area I (Uncontrolled Flow Off Site – 530 sq.m)
Other than roof storage, stormwater from the property will drain uncontrolled off site. The flow rates are calculated at a time of concentration of 10 minutes.

	100-Year Event	5-Year Event	2-Year Event
Maximum Flow Rate	13.28 L/s	6.72 L/s	4.95 L/s

Drainage Area II (Roof – 873 sq.m)
The 2 roof drains are to be flow control type roof drains, which will restrict the flow of stormwater and cause it to pond on the roof. Each roof drain is to be installed with a single-parabolic slotted weir and release 0.01242 L/s/mm (5 USgpm/in). Roof drains are to be Watts with an Accutrol Weir RD-100-A1 or approved equivalent. The opening at the top of the flow control weir is to be a minimum 50 mm in diameter. A minimum of 12 scuppers each a minimum 215 mm wide are to be installed 150 mm above the roof drains. Refer to architectural for exact locations and details. The roof is to be designed to carry the load of water having a 50 mm depth at the scuppers (i.e. 200 mm depth at the roof drains). Refer to structural.

	100-Year Event	5-Year Event	2-Year Event
Maximum Release Rate	3.62 L/s	2.79 L/s	2.47 L/s
Maximum Depth at Roof Drains	146 mm	112 mm	99 mm
Maximum Volume Stored	35.81 cu.m	16.46 cu.m	11.36 cu.m

Summary
The maximum post-development release rate during the 100-year event was calculated to be 16.90 L/s, which is 40% less than the pre-development flow rate during the 100-year event. A maximum storage volume of 35.81 cu.m is required and provided during the 100-year event. The maximum post-development release rate during the 5-year event was calculated to be 9.51 L/s, which is 32% less than the pre-development flow rate during the 5-year event. A maximum storage volume of 16.46 cu.m is required and provided during the 5-year event. The maximum post-development release rate during the 2-year event was calculated to be 7.42 L/s, which is 28% less than the pre-development flow rate during the 2-year event. A maximum storage volume of 11.36 cu.m is required and provided during the 2-year event. The post-development reduction in flow is expected to have a positive impact on the 300 mm Norice Street municipal storm sewer.

	100-Year Event	5-Year Event	2-Year Event
Pre-Development Flow Rate	28.21 L/s	14.01 L/s	10.33 L/s
Maximum Release Rate	16.90 L/s	9.51 L/s	7.42 L/s
Maximum Volume Required	35.81 cu.m	16.46 cu.m	11.36 cu.m
Maximum Volume Stored	35.81 cu.m	16.46 cu.m	11.36 cu.m

4.2 QUALITY CONTROL

It is expected that runoff from the roof and landscape areas will be considered clean and that permanent quality control measures will not be required.

An Erosion & Sediment Control Plan has been developed to be implemented during construction. Refer to drawing C-2 and notes on drawing C-3. Sediment capture filter sock inserts are to be installed in all existing catch-basins and catch-basin/manholes adjacent to the site, and any material deposited on the public road is to be removed.

4.3 STORM SERVICING

The peak unrestricted roof flow rate during the 100-year event was calculated to be 56.61 L/s. A 250 mm storm sewer service at 2% slope (84.10 L/s capacity) is proposed to service the development. At the design flow rate the storm sewer service will only be at 67% of its capacity. The proposed 250 mm storm sewer service will connect to the existing 300 mm Norice Street municipal storm sewer, which at 0.40% slope has a capacity of 61.16 L/s. Refer to calculations in Appendix D.

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

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

5.0 CONCLUSIONS

1. A private fire hydrant is not required.
2. There is an adequate water supply for firefighting from the existing municipal water distribution system.
3. There is an acceptable range of water pressures in the existing municipal water distribution system.
4. The post-development sanitary flow rate will be adequately handled by the proposed sanitary sewer service.
5. The proposed development is expected to have an acceptable impact on the existing municipal sanitary sewer.
6. The maximum post-development release rate during the 100-year event will be less than the pre-development flow rate during the 100-year event; the maximum post-development release rate during the 5-year event will be less than the pre-development flow rate during the 5-year event; and the maximum post-development release rate during the 2-year event will be less than the pre-development flow rate during the 2-year event.
7. The post-development reduction in stormwater flow is expected to have a positive impact on the existing municipal storm sewer.
8. It is expected that permanent quality control measures will not be required.
9. An Erosion & Sediment Control Plan has been developed to be implemented during construction.
10. The peak unrestricted roof flow rate during the 100-year event will be adequately handled by the proposed storm sewer service.
11. The rainwater leaders inside the building are to be constructed to withstand the pressure from a water column the height of the rainwater leader. Pressure tests are to be performed on the systems in accordance with the mechanical engineer's instructions.

Prepared by D.B. Gray Engineering Inc.

APPENDIX A

PRE-APPLICATION CONSULTATION MEETING NOTES

File No.: PC2023-0327

Peter Hume
HP Urban
Via email: peter.hume@hpurban.ca

Subject: **Pre-Consultation: Meeting Feedback**
Proposed Site Plan Control Application – 193 Norice Street

Please find below information regarding next steps as well as consolidated comments from the above-noted pre-consultation meeting held on December 5, 2023.

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 3 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

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

Comments:

1. Outer Urban Transect, Evolving Neighbourhood overlay
2. Current Zoning: LC[2127} – exception speaks to prohibited land use (recreational facility * restaurant)
3. Process:
    a. Please proceed with Phase 3 Pre-Consultation application
    b. Full new Complex Site Plan application is required
        i. Cannot proceed with a Site Plan Revision application as the time lapsing since last approval has been too long (5+years)
4. If previous plans & studies are to be used – you will need previous owner's approval/agreement that you have permission to update & include in your new application. This can be in the form of a letter
5. Please provide description & calculation of amenity space
    a. Where is it located?
6. Waste management
    a. Where will garbage/recycling be located on site? In parking garage?
    b. Please provide room measurements
    c. Please provide pickup details
7. Landscape is required.
    a. Please demonstrate tree plantings – see tree's notes below
8. Parking requirements
    a. Please provide parking counts
    b. Please provide parking space measurements
9. Site lighting: please provide outdoor lighting details on elevations
10. Zoning confirmation report is required

11. Please provide details regarding any easements on the Site Plan

    a. An updated survey plan is required

Urban Design

Submission Requirements

12. Urban Design Brief. Please update the Design Brief prepared previously for the approved site plan. 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. For the purpose of this submission, it will be useful to include both the previously approved plan and the currently proposed plan for comparison purpose.

13. Additional drawings and studies are required as shown on the ASPIL. 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. Building Elevations
    d. Building Floor Plans

Comments on the Revised Design

14. Urban design has no concerns about the site plan and building massing.

15. On the front elevation, the area labeled MP-03 is framed by a material labeled MP-01. Is this framing necessarily? Would it make sense to simply use MP-01 to create horizontal datum lines? (see image below)

Engineering

Infrastructure

Existing public services:

16. Norice Street

    - 203mm DI watermain
    - 250 mm PVC sanitary (preferred connection)
    - 450 mm ConR. sanitary
    - 300mm PE storm

Water

Boundary conditions:

Civil consultant must request boundary conditions from the City's assigned Project Manager prior to first submission.

17. Water boundary condition requests must include the location of the service(s) and the expected loads required by the proposed developments. Please provide all the following information:

    - Location of service(s)
    - Type of development and the amount of fire flow required (**as per FUS, 2020**)
    - Average daily demand: ___ L/s
    - Maximum daily demand: ___ L/s
    - Maximum hourly daily demand: ___ L/s

18. Fire protection (Fire demand, Hydrant Locations)

General comments

19. A District Metering Area Chamber (DMA) is required for services 150mm or greater in diameter.

20. Service areas with a basic demand greater than 50 m3/day shall be connected with a minimum of two water services, separated by an isolation valve, to avoid creation of vulnerable service area.

21. The servicing report must include updated water boundary conditions.

Sanitary

General comments

22. Please submit sanitary demands with the water boundary conditions to identify any capacity constraints.

Stormwater

General comments

23. Ensure that the proposed drive ramp entrance to the underground parking garage is protected from the major overland flow route.

    - A minimum freeboard elevation of 350mm from highpoint of the ramp to the street spill elevation.
    - A minimum freeboard elevation of 300mm from the invert of the ramp drain to the 100 year HGL of the storm sewer.
    - In general conformity of City of Ottawa Standard S17.

24. The foundation drain and drive ramp trench drain must be connected downstream of any flow restrictors.

25. Quantity Control:

    - Post-development to pre-development, maximum allowable run-off coefficient C = 0.5
    - Allowable flowrate: Control the 100-year storm events to the 5-year storm event.
    - No ponding in the parking or drive lanes within the 5-year event

Grading and Drainage

26. Existing drainage patterns must be maintained for the surrounding neighbourhood.

27. The proposed development should directed all drainage from the site towards the street.

28. Drainage from the proposed parking areas or drive lanes should not be directed towards neighbouring properties.

Existing Studies and New Design Briefs

29. The existing geotechnical report can be reused if the proposed development is proposing the same type of foundation type discussed in the report, otherwise an updated memo is required for any changes from the report.

30. The existing servicing report can be reused and updates for the existing designs if applicable

    - New water boundary conditions as per FUS 2020 demands must be included
    - Update to the domestic water demand if population count has changed
    - Update to the sanitary demands if population count has changed. Pipe sizing may not be required if demands are within 3 L/s
    - Update to the stormwater management design for these changes, but not limited to:
        - if the roof storage area has changed. The storage height permitted on roof is 150mm.
        - If the impervious area has increased. Changes to the drive lane, path less than 2.0m width, bike racks are exempted.
        - Changes to the stormwater storage capacity
        - Changes to ICD sizes or locations

31. Roof -top sign off memo is required from a mechanical engineer and structural engineer.

References and Resources

32. As per section 53 of the Professional Engineers Act, O. Reg 941/40, R.S.O. 1990, all documents prepared by engineers must be signed and dated on the seal.

33. City of Ottawa Links to Preparing Studies and Plans

34. To request City of Ottawa plan(s) or report information please contact the City of Ottawa Information Centre InformationCentre@ottawa.ca (613) 580-2424 ext. 44455

35. geoOttawa

Feel free to contact Rubina Rasool, Infrastructure Project Manager, for follow-up questions.

Noise

Comments:

36. Noise Impact Studies required for the following:

a. Road, as the site is within proximity of Woodroffe Avenue (arterial/transit priority corridor) and Norice Street (collector)
b. Rail, as the site is within proximity of the Beachburg Rail Corridor

37.

Feel free to contact Rochelle Fortier, TPM, for follow-up questions.

Transportation

Comments:

38. A TIA will not be required, but TDM measures are strongly recommended as the site is in proximity of transit priority measures on Woodroffe and within 600m of the future Tallwoods station. Fill out and provide TDM measures checklists.

39. Ensure that the development proposal complies with the Right-of-Way protection requirements - See Schedule C16 of the Official Plan.

    a. ROW must be unincumbered and conveyed at no cost to the City. Note that conveyance of the ROW will be required prior to registration of the SP agreement. Additional information on the conveyance process can be provided upon request.
    b. Any requests for exceptions to ROW protection requirements must be discussed with Transportation Planning and concurrence provided by Transportation Planning management.

40. TMP includes:

    a. Extension of the LRT line 1 (Stage 3) and new Tallwoods Station (2031 Network Concept, not included in Affordable Network)

41. As the site proposed is residential, AODA legislation applies for all areas accessible to the public (i.e. outdoor pathways, parking, etc.).

42. The site plan currently shows the existing sidewalk as “concrete pavers”. Please note that if using pavers within the City ROW, a maintenance and liability agreement is required.

43. On site plan:

    a. Ensure site accesses meet the City’s Private Approach Bylaw and all driveways/aisles meet the requirements outlined in Section 107 of the Zoning By-law.
    b. Show all details of the roads abutting the site; include such items as pavement markings, accesses and/or sidewalks.
    c. Clear throat requirements for apartments with less than 100 units on a collector is 8m. Ensure this length is provided. The clear throat length is measured from the ends of the driveway curb return radii at the roadway and the point of first conflict on-site. Note the minimum throat length provided must be maintained with the future ROW protection (as applicable).

d. 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).
e. Show dimensions for site elements (i.e. lane/aisle widths, access width and throat length, parking stalls, sidewalks, pedestrian pathways, etc.)
f. Sidewalk is to be continuous across access as per City Specification 7.1.
g. Show slope of garage ramp on site plan.
    i. Note that underground ramps should be limited to a 12% grade and must contain a subsurface melting device when exceeding 6%. Ramp grades greater than 15% can be psychological barriers to some drivers.
    ii. When the underground parking ramp's break over slope exceeds 8%, a vertical-curve transition or a transition slope of half the ramp slope should be used. Without this transition, bottoming out of vehicles may occur.
h. Parking stalls at the end of dead-end parking aisles require adequate turning around space.
i. Grey out any area that will not be impacted by this application.

44.

Feel free to contact **Rochelle Fortier**, Transportation Project Manager, for follow-up questions.

Environment and Trees

Tree Comments:

45. A Tree Conservation Report is required with this application in accordance with Schedule E of the Tree Protection By-law. The TIR is to confirm whether there are any protected trees on the subject or adjacent properties which could be impacted by the development as proposed, and to provide direction on how to prevent or mitigate tree impacts through the design.

46. If there are any impacts to boundary or adjacent trees, permission is required from all owners, otherwise a removal permit cannot be issued.

47. A Landscape Plan is required with this application, in accordance with the Landscape Plan Terms of Reference, to show available softscape areas for tree planting, meeting the soil volume recommendations below:

Tree Type/Size	Single Tree Soil Volume (m3)	Multiple Tree Soil Volume (m3/tree)
Ornamental	15	9
Columnar	15	9
Small	20	12
Medium	25	15
Large	30	18
Conifer	25	15

48. Please confirm the setbacks from the proposed underground parking to the property lines, to confirm where space is available for tree planting. Preference is to provide sufficient space for planting large-growing trees that will not be impacted by future parking structure maintenance.

49. Section 4.8.2 of the New Official Plan provides strong direction to maintain the urban forest canopy and its ecosystem services during intensification noting when considering the impacts on individual trees, planning and development decisions, including Committee of Adjustment decisions, shall give priority to the retention and protection of large, healthy trees over replacement plantings and compensation. Applications must address the cumulative impacts on the urban forest, over time and space, with the goal of 40% urban forest canopy cover in mind. Site plan control applications must create tree planting areas within the site and in the adjacent boulevard, meeting the City's soil volume requirements and planting standards.

50. The Official Plan requires that "On urban properties subject to site plan control or community planning permits, development shall create tree planting areas within the site and in the adjacent boulevard, as applicable, that meet the soil volume requirements in any applicable City standards or best management practices or in accordance with the recommendation of a Landscape Architect;"

51. A permit is required prior to any tree removal on site. The tree permit will be released upon site plan approval. Please contact the planner associated with the file or the Planning Forester, Nancy Young (Nancy.young@ottawa.ca) for information on obtaining the tree permit.

52. To ensure that no harm is caused to breeding birds, tree removal and vegetation clearing should be avoided during the migratory bird season (April 15 – August 15) as specified by The City of Ottawa's Environmental Impact Study Guidelines.

TCR requirements

53. a Tree Conservation Report (TCR) must be supplied for review along with the suite of other plans/reports required by the City

    a. an approved TCR is a requirement of Site Plan approval.
    b. The TCR may be combined with the LP provided all information is supplied

54. Any removal of privately-owned trees 10cm or larger in diameter, or 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.

55. Compensation may be required for the removal of city owned trees.

56. The TCR must contain 2 separate plans:

    b. Plan/Map 1 - show existing conditions with tree cover information
    c. Plan/Map 2 - show proposed development with tree cover information
    d. Please ensure retained trees are shown on the landscape plan

57. the TCR must list all trees on site, as well as off-site trees if the CRZ extends into the developed area, by species, diameter and health condition please identify trees by ownership – private onsite, private on adjoining site, city owned, co-owned (trees on a property line)

58. If trees are to be removed, the TCR must clearly show where they are, and document the reason they cannot be retained

59. 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

    e. the location of tree protection fencing must be shown on the plan
    f. show the critical root zone of the retained trees

60. 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.

61. For more information on the process or help with tree retention options, contact Nancy Young (Nancy.young@ottawa.ca) or on City of Ottawa

LP tree planting requirements:

62. Minimum Setbacks

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

    b. Maintain 2.5m from curb

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

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

63. Tree specifications

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

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

    c. Tree planting on city property shall be in accordance with the City of Ottawa's Tree Planting Specification; and include watering and warranty as described in the specification (can be provided by Forestry Services).

    d. Plant native trees whenever possible

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

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

64. Hard surface planting

a. Curb style planter is highly recommended

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

c. Trees are to be planted at grade

65. Soil Volume:

a. Please document on the LP that adequate soil volumes can be met:

Tree Type/Size	Single Tree Soil Volume (m3)	Multiple Tree Soil Volume (m3/tree)
Ornamental	15	9
Columnar	15	9
Small	20	12
Medium	25	15
Large	30	18
Conifer	25	15

66. Sensitive Marine Clay

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

Tree Canopy

67. The landscape plan shall show how the proposed tree planting will replace and increase canopy cover on the site over time, to support the City's 40% urban forest canopy cover target.

68. At a site level, efforts shall be made to provide as much canopy cover as possible, through tree planting and tree retention, with an aim of 40% canopy cover at 40 years, as appropriate. Indicate on the plan the projected future canopy cover at 40 years for the site.

Feel free to contact Mark Elliot, Environmental Planner, or Nancy Young, Forester, for follow-up questions.

Parkland

Comments:

69. Cash-in-lieu of parkland will be required

    a. Parkland Dedication By-law No. 2022-280

Feel free to contact Louise Cerveny, Parks Planner, for follow-up questions.

Other

70. 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,
Kieran Watson, Planner, File Lead

c.c. Sam Mansour
Rubina Rasool, IPM'
Rochelle Fortier, TPM
Randolph Wang, Urban Design
Mark Elliot, Environmental Planner
Louise Cerveny, Parks Planner
Nancy Young, Planning Forester

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

March 5, 2024

193 Norice Street
4-Storey Residential 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

Level 4:	870.34	sq.m
Level 3:	870.34	sq.m
Level 2:	870.34	sq.m
Level 1:	864.71	sq.m
	3,475.73	sq.m

RFF = 10,376 L/min
= 10,000 L/min (rounded to nearest 1,000 L/min)

Occupancy and Contents Adjustment Factor
-15% Limited Combustible Contents

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

RFF = 8,500 L/min

Automatic Sprinkler Protection Credit

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

= 3,400 L/min Automatic Sprinkler Protection Credit

Exposure Adjustment Charge

Side	Charge	Distance	Construction	Length	Storeys	Factor
North	0%	over 30 m				
East	15%	3.1 m to 10 m	Type V	10	1	10
South	0%	over 30 m				
West	15%	3.1 m to 10 m	Type V	16	1	16

30% Exposure Adjustment Charge

= 2,550 L/min Exposure Adjustment Charge

RFF = 7,650 L/min

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

= 133.3 L/s

133.3 L/s Fire Flow HGL: 105.0 m

Elevation at Fire Hydrant: 87.9 m

Static Pressure at Fire Hydrant: 17.1 m 168 kPa 24 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

March 5, 2024

193 Norice Street

4-Storey Residential Building

Ottawa, Ontario

WATER DEMAND CALCULATIONS

	Number of Units	Persons per Unit	Population
Single Family:	15	3.4	51
1 Bedroom:	0	1.4	0
2 Bedroom:	5	2.1	10.5
3 Bedroom:	15	3.1	46.5
Average:	0	1.8	0
Total:	35		108

Average Daily Demand:	280	L/capita/day				
	21.0	L/min	0.4	L/s	5.5	USgpm
Maximum Daily Demand:	6.5	(Peaking factor for a population of 108 interpolated from MOE Design Guidelines for Drinking Water Systems Table 3-3)				
	136.7	L/min	2.3	L/s	36.1	USgpm
Maximum Hourly Demand:	9.8	(Peaking factor for a population of 108 interpolated from MOE Design Guidelines for Drinking Water Systems Table 3-3)				
	206.1	L/min	3.4	L/s	54.4	USgpm

Elevation of Water Meter:	85.58	m				
Basement Floor Elevation:	84.68	m				
Minimum HGL:	125.6	m				
Static Pressure at Water Meter:	40.0	m	392	kPa	57	psi
Maximum HGL:	133.4	m				
Static Pressure at Water Meter:	47.8	m	469	kPa	68	psi

D.B. Gray Engineering Inc.

Ryan Faith <r.faith@dbgrayengineering.com>

RE: Request for Boundary Conditions - 193 Norice Street

1 message

Rasool, Rubina <Rubina.Rasool@ottawa.ca> Tue, Mar 5, 2024 at 7:02 AM
To: Ryan Faith <r.faith@dbgrayengineering.com>
Cc: Douglas Gray <d.gray@dbgrayengineering.com>

Hello,

Please see below for the water boundary conditions at 193 Norice Street.

The following are boundary conditions, HGL, for hydraulic analysis at 193 Norice Street (zone 2W2C) assumed to be connected to the 152mm watermain on Norice Street (see attached PDF for location).

Minimum HGL: 125.6 m

Maximum HGL: 133.4 m
Max Day + Fire Flow (133.3/s): 105.0 m

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

Disclaimer: The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation.

Thank you,

Rubina

Rubina Rasool

Project Manager

Planning, Infrastructure and Economic Development Department

Development Review – West Branch

City of Ottawa

110 Laurier Avenue West Ottawa, ON K1P 1J1

613-580-2424 Ext. 24221

rubina.rasool@ottawa.ca

From: Ryan Faith <r.faith@dbgrayengineering.com>
Sent: February 05, 2024 8:37 AM
To: Rasool, Rubina <Rubina.Rasool@ottawa.ca>
Cc: Douglas Gray <d.gray@dbgrayengineering.com>
Subject: Re: Request for Boundary Conditions - 193 Norice Street

Hi Rubina,

See attached.

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

On Mon, Feb 5, 2024 at 8:23 AM Rasool, Rubina <Rubina.Rasool@ottawa.ca> wrote:

> Hi Ryan,
>
> Would you be able to include a connection location map.
>
> Furthermore, there are no sanitary capacity concerns for the proposed site based on the demand provided.
>
> Thank you,

Rubina

Rubina Rasool

Project Manager

Planning, Infrastructure and Economic Development Department

Development Review – West Branch

City of Ottawa

110 Laurier Avenue West Ottawa, ON K1P 1J1

613-580-2424 Ext. 24221

rubina.rasool@ottawa.ca

From: Ryan Faith <r.faith@dbgrayengineering.com>
Sent: January 29, 2024 4:44 PM
To: Rasool, Rubina <Rubina.Rasool@ottawa.ca>
Cc: Douglas Gray <d.gray@dbgrayengineering.com>
Subject: Request for Boundary Conditions - 193 Norice Street

Hi Rubina,

Please provide the boundary conditions for the 150 mm Norice Street municipal watermain at 193 Norice Street. We have calculated the following expected demands:

Fire flow demand: 133.3 L/s
Average daily demand: 0.4 L/s
Maximum daily demand: 2.3 L/s
Maximum hourly demand: 3.4 L/s

Fire flow + maximum daily demand: 135.6 L/s

Calculations are attached. Note that the population of a single family dwelling was used for the 4 bedroom apartment units and 5 bedroom apartment units.

Thanks,

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

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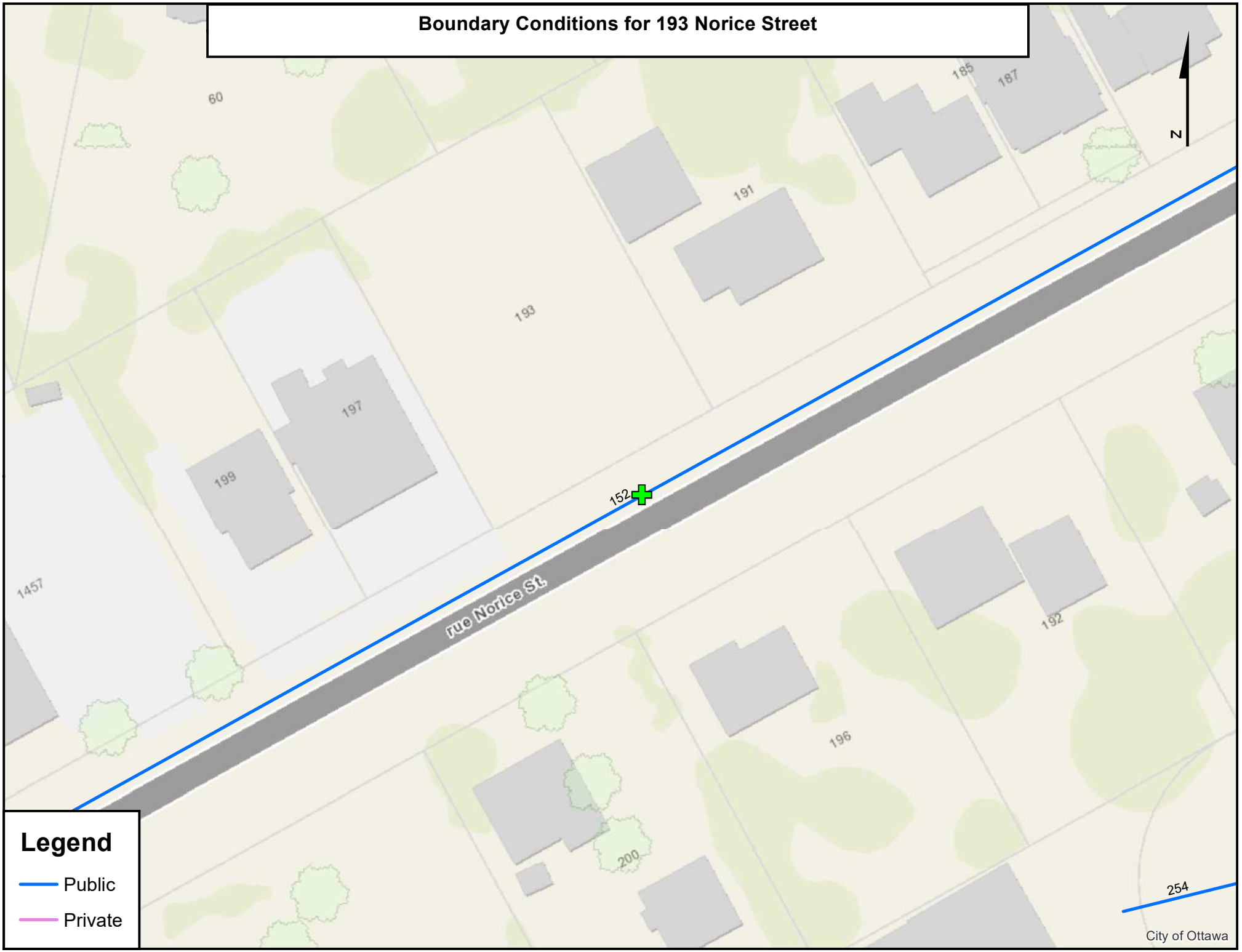
193 Norice Street February 2024.pdf
444K

Boundary Conditions for 193 Norice Street



APPENDIX C

SANITARY SERVICING

D.B. Gray Engineering Inc.

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

700 Long Point Circle
Ottawa, Ontario K1T 4E9

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

SANITARY SEWER CALCULATIONS

Project: 193 Norice Street
4-Storey Residential Building
Ottawa, Ontario

Date: October 6, 2023

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

		Residential													Commercial				Infiltration			Q	Sewer Data						
		Individual									Cumulative				Individual	Cumulative			Individual	Cumulative									
Location		Single	Semi	Duplex	Apartment	Apartment	Apartment	Apartment	Area	Population	Area	Population	Peaking	Flow Rate	Area	Area	Peaking	Flow Rate	Area	Area	Flow Rate	Total	Length	Nominal	Actual	Slope	Velocity	Q_{Full}	
From	To	Family	Detached		(1 Bed)	(2 Bed)	(3 Bed)	(Average)	(ha)		(ha)		Factor	(L/s)	(ha)	(ha)	Factor	(L/s)	(ha)	(ha)	(L/s)	Flow Rate (L/s)	(m)	Diameter (mm)	Diameter (mm)	(%)	(m/s)	Capacity (L/s)	Q / Q_{Full}
		ppu = 3.4	ppu = 2.7	ppu = 2.3	ppu = 1.4	ppu = 2.1	ppu = 3.1	ppu = 1.8																					
Proposed Building	Existing 250 SAN	15				5	15		0.1403	108.0	0.1403	108.0	3.2	1.12					0.1403	0.1403	0.05	1.17	9.7	200	200	2	1.48	46.38	3%
																							Existing 250 mm Norice Street Municipal Sanitary Sewer:		250	250	0.28	0.64	31.47	

APPENDIX D

STORMWATER MANAGEMENT

SUMMARY TABLES

100-YEAR EVENT

Drainage Area	Pre-Development Flow Rate (L/s)	Maximum Release Rate (L/s)	Maximum Volume Required (cu.m)	Maximum Volume Stored (cu.m)
AREA I (Uncontrolled Flow Off Site)	-	13.28	-	-
AREA II (Roof)	-	3.62	35.81	35.81
TOTAL	28.21	16.90	35.81	35.81

5-YEAR EVENT

Drainage Area	Pre-Development Flow Rate (L/s)	Maximum Release Rate (L/s)	Maximum Volume Required (cu.m)	Maximum Volume Stored (cu.m)
AREA I (Uncontrolled Flow Off Site)	-	6.72	-	-
AREA II (Roof)	-	2.79	16.46	16.46
TOTAL	14.01	9.51	16.46	16.46

2-YEAR EVENT

Drainage Area	Pre-Development Flow Rate (L/s)	Maximum Release Rate (L/s)	Maximum Volume Required (cu.m)	Maximum Volume Stored (cu.m)
AREA I (Uncontrolled Flow Off Site)	-	4.95	-	-
AREA II (Roof)	-	2.47	11.36	11.36
TOTAL	10.33	7.42	11.36	11.36

October 6, 2023

193 Norice Street

Ottawa, Ontario

STORMWATER MANAGEMENT CALCULATIONS
Modified Rational Method

PRE-DEVELOPMENT CONDITIONS

100-YEAR EVENT

			C
Roof Area:	180	sq.m	1.00
Hard Area:	110	sq.m	1.00
Soft Area:	1,113	sq.m	0.25
Total Catchment Area:	1,403	sq.m	0.41
Area (A):	1,403	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	179	mm/hr	
Runoff Coeficient (C):	0.41		
100-Year Pre-Development Flow Rate (2.78AiC):	28.21	L/s	

5-YEAR EVENT

			C
Roof Area:	180	sq.m	0.90
Hard Area:	110	sq.m	0.90
Soft Area:	1,113	sq.m	0.20
Total Catchment Area:	1,403	sq.m	0.34
Area (A):	1,403	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	104	mm/hr	
Runoff Coeficient (C):	0.34		
5-Year Pre-Development Flow Rate (2.78AiC):	14.01	L/s	

2-YEAR EVENT

			C
Roof Area:	180	sq.m	0.90
Hard Area:	110	sq.m	0.90
Soft Area:	1,113	sq.m	0.20
Total Catchment Area:	1,403	sq.m	0.34
Area (A):	1,403	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	77	mm/hr	
Runoff Coeficient (C):	0.34		
2-Year Pre-Development Flow Rate (2.78AiC):	10.33	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:	180	sq.m	1.00
Gravel Area:	0	sq.m	0.875
Soft Area:	350	sq.m	0.25
Total Catchment Area:	530	sq.m	0.50

Area (A):	530	sq.m
Time of Concentration:	10	min
Rainfall Intensity (i):	179	mm/hr
Runoff Coeficient (C):	0.50	
Flow Rate (2.78AiC):	13.28	L/s

DRAINAGE AREA II (Roof)

(100-YEAR EVENT)

			C
Total Catchment Area:	873	sq.m	1.00

No. of Roof Drains:	2	
Slots per Wier:	1	0.01242 L/s/mm/slot (5 USgpm/in/slot)
Depth at Roof Drains:	146	mm
Maximum Release Rate:	3.62	L/s

Pond Area:	737	sq.m
Maximum Volume Stored:	35.81	cu.m
Maximum Volume Required:	35.81	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	43.34	3.62	39.72	23.83
15	143	34.68	3.62	31.06	27.95
20	120	29.11	3.62	25.49	30.59
25	104	25.20	3.62	21.58	32.38
30	92	22.30	3.62	18.68	33.62
35	83	20.04	3.62	16.42	34.49
40	75	18.24	3.62	14.62	35.08
45	69	16.76	3.62	13.14	35.48
50	64	15.52	3.62	11.90	35.71
55	60	14.47	3.62	10.85	35.81
60	56	13.57	3.62	9.95	35.81
65	53	12.78	3.62	9.16	35.72
70	50	12.08	3.62	8.46	35.55
75	47	11.47	3.62	7.85	35.32
80	45	10.92	3.62	7.30	35.04
85	43	10.42	3.62	6.81	34.71
90	41	9.98	3.62	6.36	34.34
95	39	9.57	3.62	5.95	33.92
100	38	9.20	3.62	5.58	33.48
105	36	8.86	3.62	5.24	33.00
110	35	8.54	3.62	4.92	32.50
115	34	8.25	3.62	4.63	31.97
120	33	7.98	3.62	4.36	31.42

5-YEAR EVENT

DRAINAGE AREA I (Uncontrolled Flow Off Site)

(5-YEAR EVENT)

			C
Roof Area:	0	sq.m	0.90
Hard Area:	180	sq.m	0.90
Gravel Area:	0	sq.m	0.70
Soft Area:	350	sq.m	0.20
Total Catchment Area:	530	sq.m	0.44

Area (A):	530	sq.m
Time of Concentration:	10	min
Rainfall Intensity (i):	104	mm/hr
Runoff Coeficient (C):	0.44	
Flow Rate (2.78AiC):	6.72	L/s

DRAINAGE AREA II (Roof)

(5-YEAR EVENT)

			C
Total Catchment Area:	873	sq.m	0.90

No. of Roof Drains:	2	
Slots per Wier:	1	0.01242 L/s/mm/slot (5 USgpm/in/slot)
Depth at Roof Drains:	112	mm
Maximum Release Rate:	2.79	L/s

Pond Area:	439	sq.m
Maximum Volume Stored:	16.46	cu.m
Maximum Volume Required:	16.46	cu.m

Time (min)	i (mm/hr)	2.78AiC (L/s)	Release Rate (L/s)	Stored Rate (L/s)	Required Storage Volume (cu.m)
10	104	22.76	2.79	19.97	11.98
15	84	18.25	2.79	15.46	13.91
20	70	15.34	2.79	12.55	15.06
25	61	13.30	2.79	10.51	15.76
30	54	11.78	2.79	8.99	16.18
35	49	10.60	2.79	7.80	16.39
40	44	9.65	2.79	6.86	16.46
45	41	8.87	2.79	6.08	16.42
50	38	8.22	2.79	5.43	16.29
55	35	7.67	2.79	4.88	16.10
60	33	7.20	2.79	4.40	15.85
65	31	6.78	2.79	3.99	15.55
70	29	6.42	2.79	3.62	15.22
75	28	6.09	2.79	3.30	14.84
80	27	5.80	2.79	3.01	14.44
85	25	5.54	2.79	2.75	14.02
90	24	5.31	2.79	2.51	13.57
95	23	5.09	2.79	2.30	13.10
100	22	4.89	2.79	2.10	12.61
105	22	4.71	2.79	1.92	12.10
110	21	4.55	2.79	1.76	11.58
115	20	4.39	2.79	1.60	11.05
120	19	4.25	2.79	1.46	10.51

2-YEAR EVENT

DRAINAGE AREA I (Uncontrolled Flow Off Site)

(2-YEAR EVENT)

			C
Roof Area:	0	sq.m	0.90
Hard Area:	180	sq.m	0.90
Gravel Area:	0	sq.m	0.70
Soft Area:	350	sq.m	0.20
Total Catchment Area:	530	sq.m	0.44

Area (A):	530	sq.m
Time of Concentration:	10	min
Rainfall Intensity (i):	77	mm/hr
Runoff Coeficient (C):	0.44	
Flow Rate (2.78AiC):	4.95	L/s

DRAINAGE AREA II (Roof)

(2-YEAR EVENT)

			C
Total Catchment Area:	873	sq.m	0.90

No. of Roof Drains:	2	
Slots per Wier:	1	0.01242 L/s/mm/slot (5 USgpm/in/slot)
Depth at Roof Drains:	99	mm
Maximum Release Rate:	2.47	L/s

Pond Area:	343	sq.m
Maximum Volume Stored:	11.36	cu.m
Maximum Volume Required:	11.36	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	16.78	2.47	14.31	8.58
15	62	13.49	2.47	11.02	9.92
20	52	11.36	2.47	8.90	10.68
25	45	9.87	2.47	7.40	11.10
30	40	8.75	2.47	6.28	11.30
35	36	7.88	2.47	5.41	11.36
40	33	7.18	2.47	4.71	11.30
45	30	6.61	2.47	4.14	11.17
50	28	6.12	2.47	3.66	10.97
55	26	5.72	2.47	3.25	10.72
60	25	5.36	2.47	2.90	10.43
65	23	5.06	2.47	2.59	10.10
70	22	4.79	2.47	2.32	9.74
75	21	4.55	2.47	2.08	9.35
80	20	4.33	2.47	1.86	8.94
85	19	4.14	2.47	1.67	8.52
90	18	3.96	2.47	1.49	8.07
95	17	3.80	2.47	1.34	7.61
100	17	3.66	2.47	1.19	7.14
105	16	3.52	2.47	1.06	6.65
110	16	3.40	2.47	0.93	6.16
115	15	3.29	2.47	0.82	5.65
120	15	3.18	2.47	0.71	5.13

D.B. Gray Engineering Inc.

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

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STORM SEWER CALCULATIONS

Rational Method

100-YEAR EVENT

Project: 193 Norice Street
4-Storey Residential Building
Ottawa, Ontario

Date: October 6, 2023

Manning's Roughness Coefficient: 0.013

Location		Individual					Cumulative				Sewer Data							
From	To	Roof C = 1.00 (ha)	Hard C = 1.00 (ha)	Gravel C = 0.875 (ha)	Soft C = 0.25 (ha)	2.78AC	2.78AC	Time (min)	Rainfall Intensity (mm/hr)	Q Flow Rate (L/s)	Length (m)	Nominal Diameter (mm)	Actual Diameter (mm)	Slope (%)	Velocity (m/s)	Q_{Full} Capacity (L/s)	Time (min)	Q / Q_{Full}
Roof Drains	250 ST	0.0873				0.2427	0.2427	10.00	179	43.34								
Area Drains	250 ST		0.0180		0.0350	0.0744	0.0744	10.00	179	13.28								
Proposed Building	Existing 300 ST					0.0000	0.3171	10.00	179	56.61	3.2	250	250	2	1.71	84.10	0.03	67%
											Existing 300 mm Norice Street Municipal Storm Sewer:	300	300	0.40	0.87	61.16		