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- Commercial & Institutional
- Environmental Restoration

541 SOMME STREET

Serviceability and Stormwater Management Brief

541 Somme Street
City of Ottawa

Site Servicing and
Stormwater Management Report

Prepared By:

NOVATECH
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario
K2M 1P6

June 03, 2025

Novatech File: 124111
Ref: F-2024-116

NOVATECH
Engineers, Planners & Landscape Architects

June 03, 2025

City of Ottawa
Planning, Infrastructure and Economic Development Department
110 Laurier Avenue West
Ottawa, Ontario, K1P 1J1

Attention: Derek Kulyk, Project Manager

Reference: 541 Somme Street
Ottawa, ON
Site Servicing and Stormwater Management Report
Our File No.: 124111

Enclosed is the revised 'Site Servicing and Stormwater Management Report' prepared for the proposed office and warehouse building located at 541 Somme Street in the City of Ottawa.

This report outlines the servicing and stormwater management design for the project and is submitted in support of a Site Plan Control application.

Please contact the undersigned, should you have any questions or require additional information.

Yours truly,

NOVATECH

Greg MacDonald, P.Eng.
Director, Land Development

Suite 200, 240 Michael Cowpland Drive, Ottawa ON K2M 1P6 Tel: 613.254.9643 Fax: 613.254.5867 www.novatech-eng.com

Table of Contents

Appendices

Attached Drawings

124111-ESC:	Erosion and Sediment Control Plan
124111-GP:	General Plan of Services
124111-GR:	Grading Plan
124111-SWM-PRE:	Pre-Storm Drainage Area Plan
124111-SWM-POST:	Post-Storm Drainage Area Plan
124111-SRF:	Surface Types Figure

1.0 INTRODUCTION

Novatech has been retained to prepare a Site Servicing and Stormwater Management Report for the proposed 541 Somme Street office/warehouse building and outdoor storage area, located on Somme Street within the Hawthorne Industrial Park in the City of Ottawa. This report provides the detailed design for the site servicing, storm drainage and stormwater management for the proposed site, in support of a Site Plan Application for the subject development.

1.1 Location and Existing Site Description

The site is located at 541 Somme Street and is legally described as "Plan of Survey of Part of Blocks 2 and Reserve Block 17 on Registered Plan 4M-1388" on the 4R-36431 Plan. Refer to **Appendix E – Legal Plans** for a copy of the Plan of Survey by Annis, O'Sullivan, Vollebekk Ltd. The site location is also shown in **Figure 1** Key Plan**.**

The site is approximately 0.8 hectares (ha) in area and is currently vacant. The site is bordered by Somme Street to the west, the Hawthorne Industrial Park SWMF to the north, a vacant undeveloped lot to the south and a bedrock resource area to the east. The existing ground surface of most of the subject site is relatively flat. The site is zoned Rural Heavy Industrial (RH). **Figure 2** Existing Conditions shows the existing site conditions.

1.2 Pre-Consultation Information

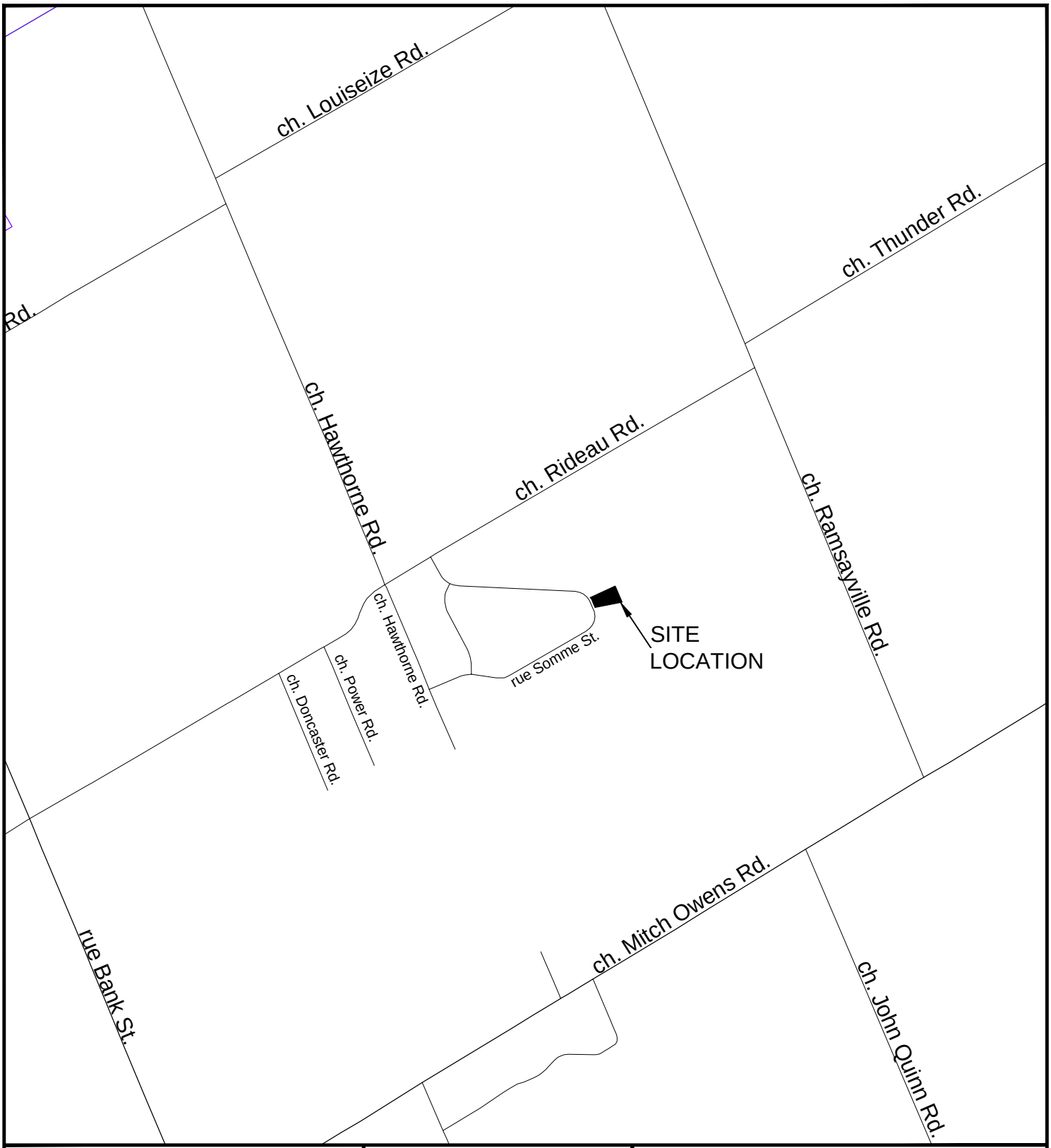
A pre-consultation meeting was held with the City of Ottawa on July 05, 2024, at which time the client was advised of the general submission requirements. Refer to **Appendix A** for a summary of the correspondence related to the proposed development.

1.3 Proposed Development

The proposed development is intended to have a single building onsite. The building will be a warehouse and office with second floor mezzanine. A lean-to will project towards the south lot line. The total building footprint is 416.2 m^2 and the total gross floor area (GFA) of the proposed building is approximately 401.1 m^2.

An asphalt surface parking lot is proposed in front of the proposed building, with access to the site via two entrances from Somme Street.

Refer to **Figure 3** for a copy of the latest Site Plan (by Novatech) showing the general layout of the proposed development.



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CITY OF OTTAWA
541 SOMME STREET

KEY PLAN

SCALE: N.T.S

DATE: FEB 2025 | JOB: 124111 | FIGURE: FIGURE 1

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LEGEND

SITE BOUNDARY

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CITY OF OTTAWA

541 SOMME STREET

EXISTING CONDITIONS

SCALE 1 : 1250 (0 10 20 30 40 50)

DATE FEB 2025 | JOB 124111 | FIGURE FIGURE 2

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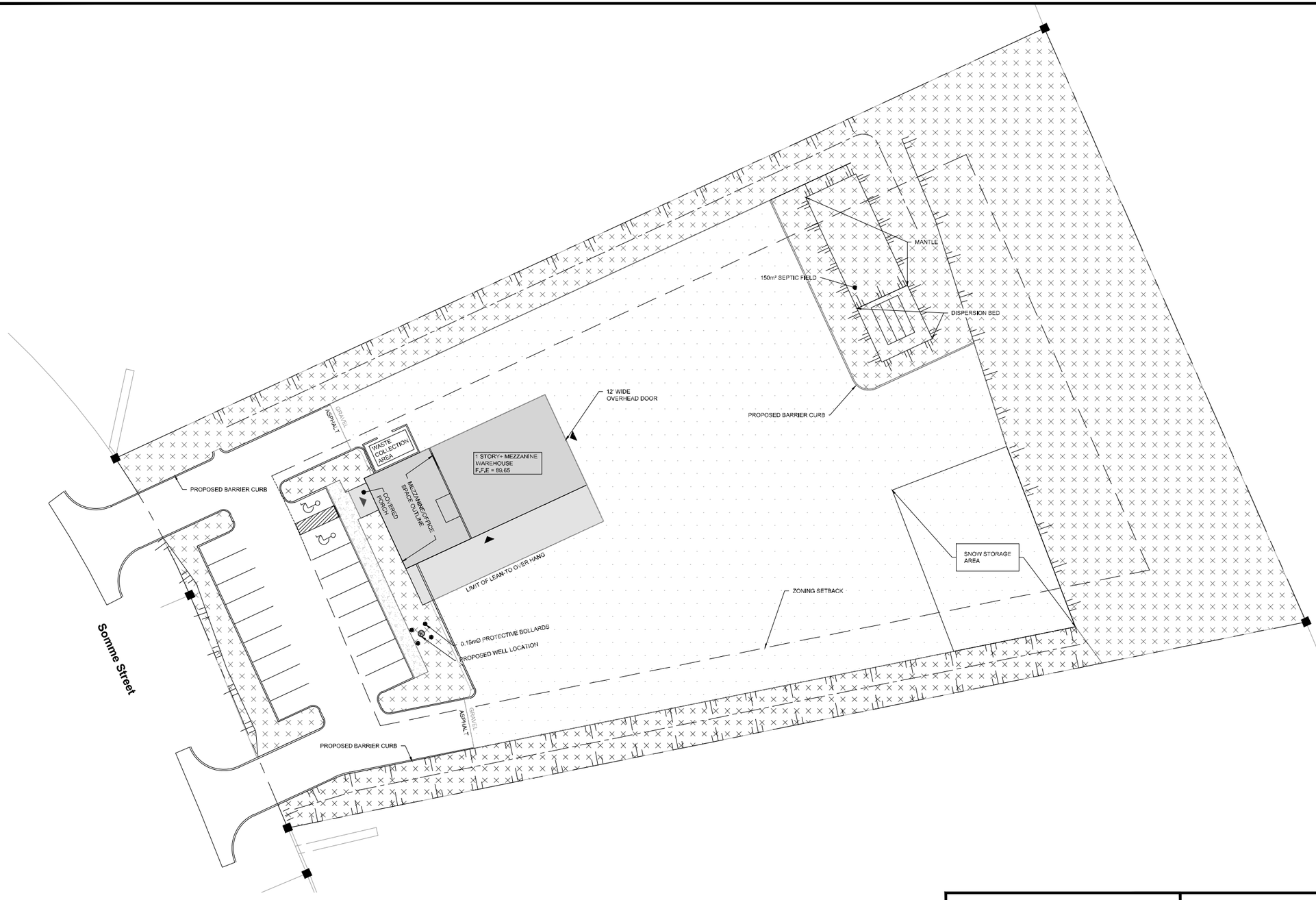

LEGEND

SITE BOUNDARY		3:1 (MAX) TERRACING	
BUILDING		PROPOSED SWALE	
GRAVEL AREA		GRASS AREA	

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CITY OF OTTAWA

541 SOMME STREET

SITE PLAN

SCALE 1 : 500 (0, 5m, 10m, 20m)

DATE JAN 2025 | JOB 124111 | FIGURE FIGURE 3

1.4 Reference Material

The following material has been consulted to develop the servicing and grading design.

1 "Geotechnical Investigation Proposed Commercial Storage Building, 541 Somme Street, Ottawa, Ontario" report (PG7327-1), prepared by Paterson Group Inc., dated November 25, 2024.

2 "Hydrogeological Assessment and Terrain Analysis, Proposed Commercial Development, 541 Somme Street, Ottawa, Ontario" report (PH4991-LET.02 - HATA), prepared by Paterson Group Inc., dated May 29, 2025.

3 "Stormwater Management Report Hawthorne Industrial Park", report (JLR 20983), prepared by J.L. Richards & Associates Limited, dated May 2009.

4 "Shields Creek Subwatershed Study", prepared by City of Ottawa, dated June 2004.

1.5 Geotechnical Investigations

A geotechnical investigation was completed for the proposed development, and a report prepared entitled "Geotechnical Investigation Proposed Commercial Storage Building, 541 Somme Street, Ottawa, Ontario" report (PG7327-1), prepared by Paterson Group Inc., dated November 25, 2024. The following is a summary of the findings of the report:

- Boreholes were advanced to practical refusal; depths ranged from 0.86m to 1.27m, and groundwater was not observed at the time of the investigation. It should be noted that groundwater levels are subject to seasonal fluctuations. Therefore, the groundwater levels could vary at the time of construction.
- The on-site soil testing suggests the subsurface profile generally consists of imported fill material which varies from 0.61m to 1.30m in thickness. The fill was generally observed to consist of loose to compact, grey to brown silty sand to sandy silt with occasional traces of topsoil and gravel.
- The subsoil at this site is considered to be mainly Type 2 and 3 soil according to the Occupational Health and Safety Act and Regulations for Construction Projects. Excavation side slopes above the groundwater level extending to a maximum depth of 3 m should be cut back at 1H:1V or flatter. The flatter slope is required for excavation below groundwater level.
- It is anticipated that groundwater infiltration into the excavations should be low to moderate and controllable using open sumps.
- The Ministry of the Environment, Conservation and Parks (MECP) stipulate the requirements for Permit to Take Water (PTTW) approvals for construction related activities. Under the requirements, specific construction related water taking activities are eligible for Environmental Activity and Sector Registry (EASR). The trigger volume for EASR is water taking more than 50,000 litres/day. Volumes beyond 400,000 litres/day will require the application of a PTTW.

1.6 Approvals

The proposed stormwater conveyance and stormwater management design will require approval from the City of Ottawa and the South Nation Conservation Authority (SNCA). A Ministry of the Environment, Conservation and Parks (MECP) Environmental Compliance Approval (ECA) will be required for the proposed stormwater management, as the site is zoned industrial.

The proposed septic system design will require approval from the Ottawa Septic System Office (OSSO).

2.0 SITE GRADING AND SERVICING

The objective of the site servicing design is to conform to the requirements of the City of Ottawa, to provide suitable sewage outlets and to ensure that a domestic water supply and appropriate fire protection are provided for the proposed development.

2.1 Proposed Servicing and Grading Overview

Since there are no municipal services available on Somme Street, it is proposed to service the proposed building with a drilled well and septic system.

The site will be graded to facilitate stormwater to drain towards two perimeter swales via overland flow. Stormwater runoff from the proposed perimeter swales will be captured by storm drainage structures and conveyed by pipe networks to an Oil Grit Separator unit at the Northwest property line, before discharging to the existing Somme Street roadside ditch.

3.0 SANITARY DISPOSAL

The proposed building will be serviced by an individual sewage disposal system (septic system). The septic system location is shown on the Grading and Servicing plans and is proposed to be a tertiary system, complete with a fully raised (Class IV) tile field.

The design flow was calculated based on the Ontario Building Code (OBC) – Code and Guide for Sewage Systems, 2020 - Part 8 - Section 8.2 and the building information on the architectural drawings. Refer to **Appendix C – Sanitary Design Information** for excepts from the OBC:

Activity	**Floor Area (m2)**	**Flow**	**Total Flow (L/day)**
Office	106	75L per 9.3m2	855
Warehouse	1 overhead doors	150 Per loading bay	150
Total			**1005**

The maximum theoretical design flow based on the above scenario is 1,005 L/day.

A Sewage System Permit will be required from the Ottawa Septic System Office.

4.0 WATER SERVICING

4.1 Domestic Water Supply

The building will be serviced by a new drilled well; the approximate location of the well is shown on the General Plan of Services (124111-GP).

Paterson Group has conducted water testing on the proposed well; the results indicated the well supply cannot be used for drinking water and can only be used for non-potable uses. Paterson held discussions with the City of Ottawa's Hydrogeology Team and confirmed the City would accept the well supply to be used for non-potable site use. Refer to **Appendix B** for a copy of the correspondence and refer to the Hydrogeological Report by Paterson for further details.

Potable water will be brought to site and provided for staff and site visitor consumption.

4.2 Fire Protection

Fire storage requirements are based on the Ontario Building Code (OBC) for a 'low hazard industrial occupancy' with combustible construction and no sprinklers; low hazard industrial occupancies are considered Group F, Division 3 structures per the OBC. As the proposed building is less than 600 m^2, we propose underground fire storage tanks are not required.

Correspondence was established with Allan Evans of the Ottawa Fire Services (OFS). Allan verified that based on the current building design and Major Occupancy Classification, the OFS supported the approach that no on-site fire storage tanks would be required. Refer to **Appendix B** for a copy of the correspondence.

5.0 STORM DRAINAGE AND STORMWATER

5.1 Stormwater Management Criteria and Objectives

The site is located within the Hawthorne Industrial Subdivision. Thus, the Hawthorne Industrial Park Stormwater Management (SWM) Report [2] prepared by J.L. Richards & Associates was consulted for the applicable stormwater management criteria.

The subject site is located within the catchment area of the stormwater management facility (SWMF) designed and constructed for the Hawthorne Industrial Park. This SWMF is a dry pond, designed to provide water quantity control for all sites within its catchment area assuming 70% site imperviousness.

Based on the Hawthorne Industrial Park SWM Report [2] and the current City of Ottawa Sewer Guidelines, the stormwater management criteria and objectives for the site are as follows:

- Stormwater quantity control is provided in the existing downstream dry pond for storms up to and including the 100-year storm event. Should the runoff factor of the entire site exceed 0.70 then individual sites shall provide storage to attenuate post-development peak flows to the equivalent runoff factor of 0.70.
- To control erosion potential, per the Shield's Creek Subwatershed Study, the Hawthorne Industrial Park's 2-year post development flow should be controlled to 50% of the 2-year

pre-development peak flow rate. (This control is provided by the Hawthorne Industrial Park's dry pond, refer to **Appendix D** for excerpts from the report for details).

- Design the storm drainage system to convey post-development flows for all storms up-to and including the 100-year storm event.

- Provide an on-site oil/grit separator to achieve a *normal* level of stormwater quality treatment (corresponding to 80% long term removal of total suspended solids (TSS)) for all flows to the roadside drainage ditch system.

- Provide guidelines to ensure that site preparation and construction is in accordance with the current Best Management Practices for Erosion and Sediment Control.

There are no specific water balance and infiltration requirements for the site due to existing site conditions.

5.2 Existing Conditions

Under existing conditions, the 0.8 ha site is undeveloped. As per the Hawthorne Industrial Park SWM Report [2], the site has previously been used to dispose of fill materials resulting from construction activities. As such, the existing condition of the site does not represent typical 'pre-development' conditions. Due to presence of fill, we have used a runoff coefficient of 0.25 for the site.

Stormwater flows from the site, currently drain either to the existing Somme Street roadside storm drainage ditch or to the eastern and southern sides of the site.

5.3 Allowable Flows

The quantity control criteria for the subject site are to control post-development flows from the site to the allowable flows per the JL Richards report prepared for the industrial subdivision for all storm events up to and including the 100-year design event. The allowable flows correspond to an overall Rational Method runoff coefficient (C_w) of 0.70 for the subject site. The City's current requirement to consider the 1:100-year (plus 25%) was reviewed and used to calculate the 100-year design flows for on-site stormwater infrastructure sizing.

The weighted runoff coefficient was calculated as follows:

Table 2: Runoff Coefficient

Surface Types	Area (ha)	Runoff Coefficient
Building	0.043	1.00
Asphalt Parking	0.084	0.90
Gravel Surface	0.320	0.70
Grass	0.355	0.25
Total	**0.801**	**C_w = 0.54**

As the proposed site runoff factor does not exceed 0.70, no additional stormwater quantity control is required including no downstream analysis of the existing roadside ditches.

Refer to **Appendix D** for a plan showing the Surface Types (124111- SRF) and runoff coefficient calculations.

5.4 Post-Development Conditions

The proposed storm drainage system will consist of grass swales along the perimeter of lot, landscape drains and catch basin manholes located in the swales, and a catch basin in the paved parking area. The flow collected in the stormwater system will be conveyed to the OGS unit located at the northwest property corner, before discharging to the municipal ditch system.

During heavy rainfall events, excess flow will be directed to the roadside ditch, via the spillways, in the grassed swales. The spillways will be used for storm events which exceed the on-site storm system's capacity and provide an overland flow route to the Somme Street roadside ditch which outlet into the Hawthorne Subdivision stormwater management pond. The naturalized area at the back of the property will drain as it does under pre-development conditions.

Refer to the **Grading** (124111-GR) and the **Post Storm Water Management Plan** (124111-SWM-POST) for details.

The proposed development will consist of Six (6) main drainage sub-catchment areas. A brief description of these areas is as follows:

- D-1: Direct Runoff Areas - Runoff from the treed and grassed area at the rear of the property will flow as per existing drainage pattern.
- D-2, D-3: Direct Runoff Area -Runoff from the grass areas at front of the property will flow freely towards the existing the Somme Street roadside ditch as per existing drainage patterns.
- A-1: Uncontrolled Runoff Area - Runoff from the south side of the building, including half of the building roof and its overhang will drain to the southern perimeter swale, via overland flow.
- A-2: Uncontrolled Runoff Area - Runoff from the north side of the building, including half of the building roof will drain to the northern perimeter swale, via overland flow.
- A-3: Uncontrolled Runoff Area- Runoff from the area in front of the building will be drained towards the catch basin located at the parking lot.

The foundation drain system for the building (if required) will be connected to its own storm service from the building. A cleanout/inspection port will be provided inside the building.

.

5.4.1 Summary of Post-Development Flows

The post-development flows from the site for the 2-year, 5-year, and 100-year design events were calculated using the Rational Method. **Table 5.4-A** summarizes the total post-development flows from the site; refer to **Appendix D** for detailed SWM calculations

Table 5.4-A: Stormwater Flow Summary Table

Design Event	Pre-Development Flows (L/s)	Post-Development Flows						
		D-01 (L/s)	D-02 (L/s)	D-03 (L/s)	A-01 (L/s)	A-02 (L/s)	A-03 (L/s)	Total Site Flow (L/s)
2-Year	119.8	9.7	0.1	0.1	39.4	31.30	11.20	91.8
5-Year	162.5	13.1	0.2	0.1	53.5	42.5	15.2	124.6
100-Year	278.5	28.1	0.4	0.3	110.6	86.3	26.6	252.3

Based on Manning's Equation, a 375mm dia. gravity storm sewer at a minimum slope of 0.4% has a full flow conveyance capacity of approximately 115.7 L/s, which is sufficient to convey the typical storm events. In more significant events, the pipe will surcharge and will spill overland to the ditch fronting the development.

The post-development flows are less than the allowable flows for the site for the 2-year, 5-year, and 100-year design storm events.

5.5 Stormwater Quality Control

As per the Hawthorne Industrial Park SWM Report [2], the subject site requires a *normal* level of stormwater quality treatment (70% long-term TSS removal) provided using and oil/grit separator unit. The subject site is located within the jurisdiction of South Nation Conservation Authority (SNCA). However, since the report was issued the City has changed the water quality criteria to the enhanced level treatment. As requested within the pre-consultation minutes, the site will be designed to meet the improved 80% TSS removal criteria.

Echelon Environmental will be retained to model and analyze the tributary area to provide a CDS unit capable of meeting the TSS removal requirements. Details of the proposed CDS treatment unit will be provided once available.

6.0 SITE GRADING

Most of existing site is generally flat at elevations between approximately ±88.8m and ±90.4m The bottom of ditch elevation of the existing storm drainage ditch along Somme Street on the western side of the site is approximately ±87.8m to ±88.3 m. Refer to plan **124111-GR** for details.

The proposed stormwater outlets have been set at an invert level of 87.85m. This is based on the existing storm drainage ditch, with some freeboard provided.

6.1 Major System Overflow Route

In the case of a major rainfall event exceeding the design storms provided for, stormwater from the proposed development will overflow towards the existing storm drainage ditch along Somme Street. The finished floor elevation (FFE) of the proposed building has been set to be a minimum of 0.3m above the major system overflow points. The major system spill points are shown on plan **124111-GR**.

7.0 EROSION AND SEDIMENT CONTROL

To mitigate erosion and to prevent sediment from entering the municipal drainage system, temporary erosion and sediment control measures will be implemented on-site during construction in accordance with the Best Management Practices for Erosion and Sediment Control. This includes the following temporary measures:

- Silt fencing will be placed per OPSS 577 and OPSD 219.110 along the surrounding construction limits, where applicable.
- Filter socks will be placed under the grates of the ditch inlet catch basins and swale catch basins and will remain in place until construction is completed.
- Light duty straw bales will be placed at key locations in the swales;
- Mud mats will be installed at the site entrances.
- Street sweeping and cleaning will be performed, as required, to suppress dust and to provide safe and clean roadways adjacent to the construction site.
- On-site dewatering is to be directed to a sediment trap and/or gravel splash pad and discharged safely to an approved outlet as directed by the engineer.

The temporary erosion and sediment control measures will be implemented prior to construction and will remain in place during all phases of construction. Regular inspection and maintenance of the erosion control measures will be undertaken.

8.0 CONCLUSIONS

This report has been prepared in support of a site plan control application for the proposed 541 Somme Street in the City of Ottawa.

The conclusions are as follows:

- The proposed development is intended to be an office / warehouse building with a total gross floor area (GFA) of approximately 401.1 m^2.
- A new drilled well will supply the site with water for non-potable use (such as hand washing and toilets), potable water will be brought to site and supplied via water supply/refill stations.
- Water for fire protection will not be stored onsite since the building is less then 600m^2 and is classified as Low hazardous Industrial occupancy as per the OBC.
- The proposed septic system is based on a design flow of 1,100 L/day and will be treated with a Tertiary Septic system and Class IV septic field. A Sewage System Permit application will be required from the Ottawa Septic System Office.
- Storm drainage will be provided via overland flow draining to a grassed perimeter swale.
- On-site quantity control of storm runoff prior to discharge into the Somme Street roadside drainage ditch system is not required as the total post-development flows from the site are less than the allowable release rates for the site. The Hawthorne Industrial Park end-of-pipe stormwater management facility (SWMF) will provide quantity control for storm runoff from the site.
- On-site stormwater quality control will be provided using oil-grit separator unit(OGS). It will provide a normal level of water quality treatment corresponding to 80% long-term total suspended solids removal.
- Temporary erosion and sediment control will be provided during construction.

9.0 CLOSURE

The preceding report is respectfully submitted for review and approval. Please contact the undersigned should you have questions or require additional information.

NOVATECH

Prepared by:

Ryan Good, C.E.T
Design Technologist, Land Development and Public Sector Infrastructure

Reviewed by:

Greg MacDonald, P.Eng
Director, Land Development and Public Sector Infrastructure

Appendix A

Pre-Consultation Correspondance

File No.: PC2024-0275

July 11, 2024

Jeff Kelly
NOVATECH Engineers, Planners & Landscape Architects
Via email: j.kelly@novatech-eng.com

Subject: Pre-Consultation: Meeting Feedback
Proposed Site Plan Control Application – 541 Somme Street

Please find below information regarding next steps as well as consolidated comments from the above-noted pre-consultation meeting held on July 5, 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. As a result of Bill 185, you are no longer required to go through a pre-consultation process. However, it is recommended that you apply for a pre-consultation prior to submitting the Site Plan Control application to ensure a complete submission.

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. Official Plan

    a. The subject property is designated Rural Industrial and Logistics as per *Schedule B9 – Rural Transect* of the Official Plan.

        i. 9.3.1 (2) Development on lands designated as Rural Industrial and Logistics shall consider the following:

            1. Building design, Site layout and landscape in a way that maintains and enhances the rural identity and feel of the area in which such development takes place;

            2. Appropriate screening from public roads and adjacent properties using natural vegetation, preferably existing vegetation where possible;

            3. Outdoor amenity areas for employees and landscaping that supports the City's tree canopy targets; and

            4. Accesses are designed to minimize hazards between the road on which the development fronts and its vehicular points of access, such as freight transfer.

        ii. 9.3.2 (1) The following uses are permitted in the Rural industrial and Logistics Area

            1. (b) Transportation, distribution, warehouse and large-scale storage operations

    b. Adjacent to Bedrock Resource Area Overlay

    c. Adjacent to mineral aggregate operations to the south and west of the parcel operated by Lafarge Canada and Tomlinson Group.

    d. Site of former Gloucester Concession 6 Dump

        i. Years of operation and closure – 1920 -1991

2. City of Ottawa Zoning By-law

    a. The subject property is zoned RH - Rural Heavy Industrial Zone.

        i. A warehouse is a permitted use.

ii. An office is permitted as accessory use.

iii. Refuse collection areas must be screened from the street in accordance with Section 110(3) of the Zoning By-law.

iv. Ensure all parking spaces, loading spaces, drive aisles conform with the requirements of Section 101, 107, 113 of the Zoning By-law.

3. Parking requirements

    a. N59 - Warehouse – Area D (Rural) – 0.8 parking spaces per 100m2 of the first 5000 m2 of gross floor area.

    b. N59 – Office – Area D (Rural) – 2.4 parking spaces per 100m2 of gross floor area.

4. Discussion

    a. There is a 30 cm reserve that was placed during the establishment of the industrial subdivision agreement. It can be lifted as per requirements in clause 18 of Schedule F, Section D, of the subdivision agreement.

    b. Show the extent of the storage yards on the plans, including fencing, landscaping to buffer and screen parking and the storage yard. Snow storage needs to be identified as well as any exterior lights and ground-mounted signs (Sign Permit is seperate from site plan).

    c. The severance needs to be perfected before the site plan can be registered. The 30 cm reserve would also need to be lifted.

    d. Fence off the rear area that is still treed.

    e. Provide bollards around septic system, well, and other sensitive facilities (eg fuel tanks).

5. Submission requirements

    All Plans and Studies must meet the requirements of the City's Terms of Reference.

    a. Plan of Survey

    b. Site plan

    c. Landscape plan

    d. Zoning confirmation report

e. Preliminary construction management plan

Feel free to contact Jasdeep Brar (jasdeep.brar@ottawa.ca), Planner I, for follow up questions.

Urban Design

Comments:

6. 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. Concept Plan

    c. Landscape Plan

    d. Elevations

    e. *Floor Plan (conceptual)*

7. **Comments on Preliminary Design** Applicants are to provide a response to these comments with the submission.

    a. Please provide a concept plan illustrating ultimate build out of the property. Please ensure that storage is screened from the public road and that there is adequate space for truck turning to the rear of the building.

    b. For building elevations facing the street, include architectural elements that provide some interest or engagement. The goal is to prevent blank facades facing public streets. Please ensure that entrances face the street.

    c. Consider rotating the building by 90 degrees to increase frontage towards the public street.

    d. Please provide tree planting can be provided in the Somme Street ROW.

    e. Please provide additional screening landscaping and decorative elements (such as low fencing) along the site frontage as well as between the parking and the building.

Feel free to contact Lisa Stern (lisa.stern@ottawa.ca), Urban Designer, for follow up questions.

Engineering

Comments:

8. Site specific information:

    a. The proposal is within former unknown landfill and therefore Impact Assessment Study (Waste Disposal Sites/Former landfills) will be required to ensure that issues of public health and safety are addressed.

    b. In accordance with the Schedule “F” (Special Conditions) of the Subdivision Agreement, the proposal is subject to the Area Specific Development Charge for the Osgoode Greely Erosion Control, By-law No. 2004-315, or as amended, at the time of the building permit application.

    c. It is understood that the identified property, on the concept plan, is subject to Severance Conditions and that the shown severance has not been approved yet.

        Severance process needs to be completed, before the Application can proceed.

9. Topographic plan of survey

    a. The 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.

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

    (There are no municipal services adjacent the proposal)

    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 provide the available water quantity and quality information. It should also identify the required projected water demand for the proposal and the expected well capacity (sustainably to be in excess of the demand) and make direct references to the source of the information used in the reporting (i.e.: Hydrogeological and Terrain Analysis or other, if applicable).

    b. The 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. Rationale will need to be provided,

which will allow to conclude that the existing hydrogeological and geotechnical conditions were considered.

c. Please also note that thin soils are anticipated on site, with the overburden thickness less than 2 meters.

d. Please also note that this site is near Findlay Creek Municipal Drain and within the boundaries of the Shield's Creek and North Castor River, therefore applicable Subwatershed Studies and contamination prevention measures need to be considered.

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. The report needs to provide all pertinent calculations and justifications to support any claims made in the report. Any reliance on relevant studies should be clearly stated. The report should be completed exceeding the minimum requirements laid out in the Site Servicing Study Terms of Reference.

11. Fire Services

a. It is the responsibility of the owner to ensure that an adequate water supply for firefighting is provided. Proposed structures with a footprint of less than 600 sq.m., and not containing a medium or high hazard occupancy can elect to proceed with the Ontario Building Code method for determining required fire flows. Otherwise, the FUS in conjunction with the NFPA 1142 methodologies will need to be considered and OFS support of the proposed findings will be required.

b. 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 issues.

c. 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.

d. 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.

12. Stormwater

a. A Stormwater management (SWM) report and Pre- and Post-development drainage plans will be required, to confirm that the surface run-off can be controlled on site. All stormwater management determinations shall have supporting rationale and should adequately address the site conditions, while considering concurrence with the applicable guidelines, such as, but not necessarily limited to "*Sewer Design Guidelines, Second Edition, document no. SDG002, October 2012, City of Ottawa, including technical bulletins","* Stormwater Management Report – Hawthorne Industrial Park 2009", *"City of Ottawa – Shields Creek – June 2004*" Subwatershed study and North Castor River Subwatershed Study.

b. The proposal will need to show Legal and sufficient storm outlet from site for both release rate and volume. Stormwater cannot be directed to the adjacent properties; it can only be directed to the road ROW. The ditches will need to be shown to provide continuous flow to an outlet.

c. Capacity of the downstream systems needs to be investigated in detail.

d. Since it is a commercial development proposal, within a Rural Heavy Industrial Zoning, on-site SWM measures need to be applied.

e. The SWM quantity criteria should be such, as per existing Subdivision agreement, which states that each site needs to provide a SWM control in accordance with the " Stormwater Management Report – Hawthorne Industrial Park, prepared by J.L Richards & Associates, revised May 2009", which specified that the post-development flows must be controlled to the pre-development levels for storms ranging from 1:2 Year to a 1:100 year recurrence.

f. Stormwater Management approach, runoff volume control should proceed in the following hierarchical order, with each step exhausted before proceeding to the next:

    i. Retention (infiltration, reuse, or evapotranspiration),

    ii. Low Impact Development (LID) filtration, and

    iii. Conventional Stormwater management. Conventional stormwater management should proceed only once Maximum Extent Possible has been attained for Steps 1 and 2 for retention and filtration.

g. The pre-development surface run-off coefficient for the site needs to be determined using the smaller of a run-off coefficient (maximum equivalent 'C' of 0.5 [0.4 in combined areas] or the actual existing run-off coefficient) as per § 8.3.7.3 of the City of Ottawa Sewer Design Guidelines, Second Edition, October 2012, with bulletins.

h. 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 5.4.5

i. A calculated time of concentration (cannot be less than 10 minutes) is required and it needs to be justified.

j. 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.

k. Please note that Findlay Creek Municipal Drain in near the proposal and potential surface run-off impacts from the site need to be investigated.

l. The water quality control should be an enhanced level treatment with 80% (not 70%, as originally specified) long term suspended sediment removal, in part, due to environmental issues in the area; more information is provided below in sub-point (m) in the bullet addressing the Hawthorne Industrial Park below. Reporting of TSS removal shall be extensive and, if peer reviewed and published papers are relied on for conclusions, the conclusions shall be clear, and the report shall show overwhelming agreement.

m. This site is part of the Hawthorne Industrial Park, that was accepted in 2009, and is subject to the conditions of the subdivision agreement. A stormwater management pond was constructed as part as the development of this park. The pond was designed to provide 70% TSS removal, however the current requirement for water quality treatment is an enhanced level of protection which corresponds to 80% TSS removal.

    i. The subdivision agreement, in schedule F, section C, covenant 7 requires an oil/grit separator to be provided on each lot. “Each site will be required to install and maintain, at the Transferee’s expense, an oil/grit separator to provide quality treatment of surface runoff before entering the roadside open ditch/culvert system.”

    ii. A stormwater management report – Hawthorne Industrial Park (2009), appears to show a design runoff coefficient of 0.7, though the consultant should satisfy themselves of such; the quantity control design may merely need to be the difference between the proposed and 0.7. It is suggested that the consultant procure a copy of the stormwater management report for Hawthorne Industrial Park for coordination. The stormwater management report was prepared by J.L. Richards & Associates Limited (J.L.R.

Project #: JLR 20983; City Index #: R-2973) Revision date May 2009.

iii. Stormwater Management Report – Hawthorne Industrial Park (2009) also notes that to control erosion potential, per the Shield's Creek Subwatershed Study, to current levels, the 2-yr post development peak flow rate should be controlled to 50% of the 2-yr pre-development peak flow rate. The consultant should perform this control in addition to the criteria noted above.

n. 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.

o. Supported by hydrogeological and geotechnical conditions, Low Impact Development (LID) needs to be implemented.

i. Low Impact Development (LID) is a stormwater management strategy that seeks to mitigate the impacts of increased runoff and stormwater pollution using practices that help to preserve or to restore pre-development hydrological and ecological functions. LID is a requirement as per the bulletin from the former MOECC (now Ministry of Environment, Conservation and Parks/ "MECP") titled Expectations RE: Stormwater Management released in February 2015. Prior to implementing infiltration style measures there are site characteristics that must be determined. Supporting data collection will involve groundwater monitoring (long term or limited date with a conservative assumption), soil classification, and measured infiltration/percolation testing which will aid the consultant in determining what measures are, or are not, suitable for the site. The infiltration target for sites can at times be determined from an applicable higher-level study, which will also require confirmation through on-site infiltration/percolation testing.

ii. The reporting should identify the treatment train of processes proposed for the development. The Official Plan defines LID as a stormwater management strategy that seeks to mitigate the impacts of increased runoff and stormwater pollution by managing runoff as close to its source as possible. LID comprises a set of site design strategies that minimize runoff through distributed, small scale structural practices that mimic natural or predevelopment hydrology through the processes of infiltration, evapotranspiration, harvesting, filtration and detention of stormwater. These practices can effectively remove nutrients, pathogens and metals from runoff, and they reduce the volume and intensity of stormwater flows.

iii. The City has released a document titled 'Low Impact Development Technical Guidance Report – Implementation in Areas with Potential Hydrogeological Constraints' which aids the consultant on options for sites which may have constraints such as low permeability or high groundwater, which are common constraints for the Ottawa area.

p. Please also note that thin soils are anticipated on site, with the overburden thickness less than 2 meters.

q. Note that the site is within South Nation Conservation Authority Source Water Protection Area with highly vulnerable aquifer on site and Unevaluated Wetlands identified directly to the south of the proposal. The site is also surrounded to the north, south and east with a Significant Groundwater Recharge Area, therefore, given the industrial nature of the site, surface water and groundwater protection measures should be considered in the SWM process.

r. OGS application will likely require ECA approval. Note that oil/grit separators also require Environmental Technology Verification (ETV) protocol for ECA approval.

s. Erosion and sediment control measures need to be provided in the report.

t. As the site is within the boundaries of the Shield's Creek and North Castor River Subwatershed Studies. The following sections are provided for context, but do not reflect all the requirements of the study, which should be read in full by the consultant preparing the design of the works:

i. <u>Shield's Creek Subwatershed Study:</u>

1. Low-capacity Issues – Section 4.7 (p. 4-26, sheet 46),Table 4.7.1 identifies hydraulic capacities of structures with the study area.

2. Water Quality – Section 6.3.2 and 6.3.4.6 (p. 6-15, sheet 116), * "Provide stormwater management to Provincial Policy – Level 2 (MOEE Guidelines, 1999) or Normal Level of Protection (MOE, 2003). This will provide for the control of TSS and generally provides similar control for metals and nutrients."

3. SWM pond canopy – Section 5.6.4/5.6.5 and table 6.2.3 referencing section 95 of Figure 4.10.1, and providing 70% canopy effect surrounding SWM ponds could reduce temperature impacts on downstream receivers.

4. Stormwater Management Measures – Section 6.3.4.4 “At-source controls are generally the most effective means of providing water quality protection. This includes measures such as lot layout, using grassed areas for stormwater, at-source infiltration. These types are typically the most effective controls since they prevent pollutants from entering the drainage system and provide for flow retention at-source, which best replicates headwater systems in a pre-development condition. In addition, at-source and conveyance controls that include infiltration, go towards meeting other objectives such as baseflow protection and temperature reduction.”

5. Infiltration rates - Section 6.3.4.7 (p.6-16, sheet 117)

    a. Table 6.3.2 – Infiltration Targets which provides anticipated infiltration rate depending on the soil types noted.

    b. Figure 5.5.1 – Infiltration Rates provides a map of anticipated infiltration rates.

    c. Figure 5.5.1 seems the site has a range of 50 - 250 mm/hr (paleozoic bedrock) anticipated infiltration rate, based on the shading type in the Hawthorne Industrial Park.

ii. North Castor River Subwatershed Study.

1. Action 6, provides that sites must make efforts to ensure that stormwater or other sources of water contamination be safely discharged to minimize their impact on the water quality of the North Castor River. The report notes that if care is not taken in land-use planning and development, water quality deterioration will be unavoidable, and the ecosystem biota components of the North Castor River could suffer severe degradation.

iii. IMPORTANT:

* Where the Shields Creek Subwatershed Study, North Castor River Subwatershed Study, and the City’s provided quantity and quality criteria do not agree, the more stringent criteria shall be applied.

13. Grading and Drainage.

a. Grading and Drainage Plans (pre-development and post-development) will be required to identify the existing and proposed drainage patterns and their relationship with the surface runoff control.
The Grading and Drainage Plan should propose site, grading, building, and servicing design measures to protect new development from flooding as per policy 6, section 4.7.1 of the Official Plan. The Grading and Drainage Plan forms part of the requirements for Site Plan Control applications noted in the Studies and Plan Identification List, provided with the feedback documents and should be prepared according to the City's Terms of Reference.

b. There is an existing Grading Plan (Site Servicing and Grading) provided for the subdivision, which should be considered in the development of the proposed lot grading.

c. The Plan should have a note that references the horizontal and vertical datums that were used and tied into to complete the project. The drawing should also make reference (on the face of the plan) to a satisfactory site benchmark that can be used by anyone with a level to carry out checks on the particular project.

14. Erosion and Sediment Control.

a. An Erosion and Sediment Control Plan will be required with the Site Plan Control Application, typically included as an addendum to the Site Servicing Study. The plan serves to identify erosion risks and determine controls to be put in place in order to reduce the amount of erosion and sediment deposition that occurs as part of a project. Erosion and sediment control plans shall have regard to Canadian Standards Association (CSA) W202 Erosion and Sediment Control Inspection and Monitoring Standard (as amended).

15. 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 available mapping indicates a potential for shallow overburden or thin soils over paleozoic bedrock (Sandstone & dolostone). Fill is possible on site, as the property is within former unnamed landfill.

c. If sensitive marine clays are found on site, then an 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.

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

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 (this investigation might need to be coordinated with the Hydrogeological and Terrain analysis).

g. The groundwater level is to be investigated and the level needs to be derived from spring-time investigation (or longer). Based on policy, estimates of groundwater level will be dismissed and instead actual recordings are required. 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. The Geotechnical Study will need to include rationalization for the gravel or pavement structure design, including vehicle numbers and loading specific to the proposed uses. The study should contemplate/investigate at a minimum the pavement structure for light-duty and heavy-duty areas and the foundation design. Any improvements required to the potentially existing granular structure on site should be noted in the report and demonstrated clearly on the Grading & Drainage Plan.

i. It appears from the City mapping that the site might have raised slopes near the property lines, towards the back of the property, therefore the Geotechnical study will need to address the overall slope stability on site. <u>The Geotechnical Consultant needs to determine if a separate dedicated Slope Stability Study will be required or provide an adequate justification if it is not required.</u> Please note that there is known importation of fill material, of unknown quality and of historically questionable origin, on site.

16. 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.

b. All proposed wells must be tested to confirm water quantity and quality suitability, prior to the 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 use (total demand on the entire site). If multiple wells will be in use, then each well must be tested individually. Pump test rate must be justified.

c. The site is located at a bedrock aquifer fault/intersection between multiple bedrock aquifers and therefore the anticipated quantity/quality of groundwater is unknown or could be variable.

d. A **30cm reserve** was placed on the lot based on recommendations made in the Subdivision Hydrogeological Report (December 2008) and Letter to the SNCA prepared by Golder Associates (April 2009).

    i. Extended Well Casing: "All wells drilled on the property should be equipped with a minimum of two lengths (approximately 12 metres) of steel well casing or with casing extending a minimum of one metre into competent bedrock, whichever is greater." (Page 6, Golder response letter to SNCA, 2009)

    ii. Site Specific Investigation:

        1. "A site specific investigation should be conducted on each building lot prior to construction. The investigation should note the type of materials present in the area proposed for the sewage disposal bed, the depth to impervious material or water table and an estimate of the hydraulic conductivity of the material. Depending on the specific characteristics of the lot, shallow buried trenches or area beds may be appropriate. On others, a fully raised bed constructed on imported material may be required. It is recommended that sewage disposal systems be located in areas with a minimum of 0.3 metres of soil" (Page 6, Golder response letter to SNCA, 2009)

        2. "Due to the heterogeneity of the fill material, it was not felt that testing of the material would provide useful information that could be extrapolated to the entire site. For that reason,

Golder recommended that a site specific investigation be conducted prior to construction of a septic system on each lot." (Page 3, Golder response letter to SNCA, 2009)

e. Site will likely require an ECA for the SWM.

f. The parameters of water quality that will be tested will be the "subdivision suite" known to local well testing companies, as well as trace metals, VOCs, and PAHs. Requirements are outlined in the City of Ottawa Hydrogeological and Terrain Analysis Guidelines. The report should also provide an assessment of adjacent land uses and, if available, the ESA for concerns and determine if any other parameters need to be tested (i.e. petroleum hydrocarbons, etc.). The subdivision agreement, in schedule F, section C, covenant 10, identifies that testing of Polycyclic Aromatic Hydrocarbons (PAHs) be provided as an additional parameter(s), at a minimum.

   The water quality sampling and testing needs to be performed on all wells proposed on site.

   If concerns are identified on site and/or on the adjacent properties, testing for additional contaminants might be required.

g. If water quality above the MCCRT (Maximum Concentration Considered Treatable) is detected in the supply well/s, then the consultant should contact the reviewer to discuss potential options through a technical consultation, prior to any further field work.

h. If well water is mineralized, then approval from the MECP will be needed to not abandon the well, as required in Ontario Regulation 903 (Section 21). The consultant should also consider the other issues associated with the mineralized water including corrosivity of the water and shortened lifespan of plumbing fixtures and the septic system. Specialized plumbing and fixtures may be beneficial to reduce the long-term issues.

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

j. The report needs to discuss the proposed activities and provide multiple lines of evidence to demonstrate how the aquifer, the existing well users, and the surface water run-off will be protected from any potentially contaminating activities in the long-term, given that the site is surrounded to the north, south and east with a Significant Groundwater Recharge Area. This may include a discussion on how the site activities will be managed through the future ECAs.

k. 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 in the long term. This can include increased casing depth for any new drilled wells, increased separation distance between wells and SWM and septic systems, strategic placement and protection 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 (advance treatments are only applicable in SPA, not in the ZBLA considerations).

l. Note that thin soils are anticipated on site, with the overburden thickness less than 2 meters, hence enhanced discussion and mitigation of the thin soils will be required in the Terrain Analysis.

m. 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.

n. 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, as a result of the proposed activities.

o. Since this application is a site plan (not lot creation or zoning) 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.

p. The subdivision agreement, in schedule F, section C, covenant 15, identifies that the investigation for sewage systems should include the types of materials present, depth to impervious material or the water table and an estimate of the hydraulic conductivity of the material.

q. If system isolation is contemplated, the technical pre-consultation with the reviewer is required to ensure the assessment meets the minimum requirements identified in City Guidelines, and to confirm the minimum onsite testing requirements.

r. 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.

s. 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.

t. If the total water taking from onsite wells will be more than the provincial 50,000 L/day threshold, a PTTW from the MECP will be required.

u. Note that compact gravel will be considered impermeable in the septic impact assessment unless accompanied by field testing to confirm infiltration rates.

v. 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.

w. OSSO septic system permit and the applicable MECP permits will be required prior to SPA approval.

x. Technical consultation with the hydrogeological report reviewer is encouraged prior to commencing the field work program. Please provide a detailed work plan to the assigned Infrastructure Project Manager for comment in advance of the hydrogeological technical consultation.

y. All minimum requirements outlined in the subdivision agreement must be considered. This may include recommendations related the wells, septic systems, stormwater management and fire protection which should be considered should they exceed City and MECP requirements.

17. Phase 1 ESA report.

a. Phase 1 Environmental Site Assessment (ESA) will be required, completed in accordance with Ontario Regulation (O.Reg.) 153/04.

i. The City’s Historic Land Use Inventory identifies that the subdivision lies on the site of a former landfill, known as Gloucester Concession 6 dump.

ii. There is known Importation of Fill Material of Unknown Quality. Soil may be imported fill of questionable origin historically.

iii. There is a private fuel outlet at 3500 Rideau which could be a potential contaminant dependent on groundwater flow direction.

b. A Phase 2 ESA may be required, depending on the outcome of the Phase 1 ESA.

18. Site Lighting.

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

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

ii. 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

iii. 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.

iv. Lighting Certificate will need to be submitted to the City.

19. Additional observations.

a. Concept plan shows the property lines that are subject to severance process, which has not been yet completed.

b. The Concept plan does not show the design of the entire property. Access driveways are shown discontinued.

c. Peripheral edges of the property might have very steep slopes – subject to potential slope stability issues.

d. Proposed water well/s and the septic bed/s locations are not shown on the plans.

e. Snow storage areas need to be shown.

f. Curbs, if proposed, should not extend to the road ROW with granular shoulders.

g. Driveways appear to be too close to the property lines.

h. Driveway corner radii are not shown at the interface with the road edge of pavement. They need to end at the road pavement, a minimum of 3m from the extension of the property lines to the edge of pavement and the corner radii intercept point.

i. Fire routes around the building are not shown.

20. Environmental Compliance Approval (ECA)

a. Based on the information provided during the pre-consultation submission package, it is anticipated that an ECA would be required given the industrial use located on industrial land.

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. Direct submission remains an option for other application types that do not meet the CLI ECA process and are not reviewed through Transfer of Review

c. More information can be determined by contacting the Ministry of the Environment, Conservation and Parks, Ottawa District Office to arrange a pre-submission consultation. Patrick Lalonde at patrick.lalonde@ontario.ca (Site Plan Control).

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

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 is required to 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. Construction Constraints.

a. Any proposed fuel storage tanks will require protection and mitigation measures as they create a potential hazard on the site. A Spill Response and Contingency Plan, in addition to any provincial or federal requirements, will be required to ensure that risks are determined, and mitigation measures put in place.

b. The design should contemplate locations of heavy traffic flow and movement on the site as it relates to the site layout and pavement design requirements.

24. Roads.

a. Pease refer to the City of Ottawa Private Approach By-Law 2003-447 for the entrance design and reach out to the City Transportation department for the acceptable entrance locations and distance.

b. It appears that the placement of the access driveways is too close to the property lines and the driveway corner radii are missing at the driveway/road edge of pavement interface.

c. Please refer for more details to the City Transportation comments.

25. Permits and Approvals.

a. Please contact the South Nation Conservation Authority (SNCA), MECP, OSSO, etc., amongst other federal and provincial departments/agencies, to identify all the necessary permits and approvals required to facilitate the development. Responsibility rests with the developer 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, MECP, OSSO, etc., prior to site plan application approval. Copies of confirmation of correspondence will be required by the City of Ottawa from all approval agencies that a form of assent is given.

b. 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.

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

26. Clarification on Using Historical Reports.

a. It is unlikely that historical reports could be used to support the current application. Some studies, such as those prepared during the plan of subdivision application, may inform the studies prepared as part of this

application, but the focus should be on what information the study provides to the current proposal. Note that many studies remain valid for a period of time or may have been superceded by new regulations, guidelines, etc.

27. Background studies and/or subwatershed studies.

    a. Shield's Creek Subwatershed Study, as detailed in the Site Servicing Study section above, contains but is not limited to the following sections:

        i. Stormwater Design Criteria – Section 4.6.1 (p.4-18, sheet 38),

        ii. Low-capacity Issues – Section 4.7 (p. 4-26, sheet 46),

        iii. Water Quality – Section 6.3.4.6 (p. 6-15, sheet 116),

        iv. SWM pond canopy – Section 5.6.4/5.6.5 and table 6.2.3 referencing section 95 of Figure 4.10.1, and

        v. Infiltration rate - Table 6.3.2 (depending on overburden), Section 6.3.4.7 (p.6-16, sheet 117), shown as Figure 5.5.1 (sheet 213), and required as per Table 7.5.1

    b. North Castor River Subwatershed Study.

        i. Action 6, provides that sites must make efforts to ensure that stormwater or other sources of water contamination be safely discharged to minimize their impact on the water quality of the North Castor River. The report notes that if care is not taken in land-use planning and development, water quality deterioration will be unavoidable, and the ecosystem biota components of the North Castor River could suffer severe degradation.

    c. Where the Shields Creek Subwatershed Study, North Castor River Subwatershed Study, and the City's Sewer Design Guidelines have different criteria, the more stringent criteria should be applied.

28. Plan submission requirements.

    a. Topographic plan of survey.

    b. Site Servicing Plan.

    c. Site Grading Plan.

    d. Site Drainage Area Plans (pre- and post-development).

    e. Site Erosion and Sediment Control Plan.

f. 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.

29. Report submission requirements.

    a. Site Servicing Study/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 Report - Earthquake analysis and Seismic liquefaction and liquefaction-like potential (including rapid lowering of any soil's shear strength) is required to be provided in the report.

    e. Slope Stability Study (may be required)

    f. Phase 1 ESA report (Phase 2, if required).

    g. Impact Assessment Study (Waste Disposal Sites/Former landfills).

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

Noise

Comments:

30. Not required.

Feel free to contact Mike Giampa (mike.giampa@ottawa.ca), TPM, for follow-up questions.

Transportation

Comments:

31. Because the proposed access must be in a curve, please ensure that sightline obstructions are minimized.

32. Right-of-way protection (Rural local).

    a. See Schedule C16 of the Official Plan.

b. Any requests for exceptions to ROW protection requirements must be discussed with Transportation Planning and concurrence provided by Transportation Planning management.

33. A TIA is not required.

Feel free to contact Mike Giampa (mike.giampa@ottawa.ca), Transportation Project Manager, for follow-up questions.

Environment

Comments:

34. A Tree Conservation Report (TCR) is not required for this application, so long as the applicant confirms that there is no intention of removing the trees along the back of the site. If that is the case, then the site plan should be updated to show the trees on site and demonstrate that they are to remain untouched by development.

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

Forestry

Comments:

35. Tree Conservation Report requirements - The following Tree Conservation Report (TCR) requirements have been adapted from the Schedule E of the Urban Tree Protection Guidelines – for more information on these requirements please contact hayley.murray@ottawa.ca

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

    b. 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.

j. Removal of a City tree is not permitted unless justified. If justified, monetary compensation for the value of the tree must be paid before a tree removal permit is issued.

36. Landscape Plan Terms of Reference Requirements for Planting on Private and City Property:

    a. Landscape Plan Terms of Reference must be adhered to: (https://documents.ottawa.ca/sites/documents/files/landscape_tor_en.pdf).

37. Additional Elements for Tree Planting in the Right of Way:

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

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

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

    d. 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.

    e. 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.

f. Tree specifications

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

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

ii. 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.

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

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

g. 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.

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

Parkland

Comments:

38. Payment of cash-in-lieu of conveyance of parkland has been previously satisfied for this site.

39. Should there be a change in use to residential then additional CIL would apply.

Feel free to contact Warren Bedford (warren.bedford@ottawa.ca), Parks Planner, for follow-up questions.

Conservation Authority

Please contact James Holland (jholland@nation.on.ca), Planner, South Nations Conservation Authority, for comments.

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

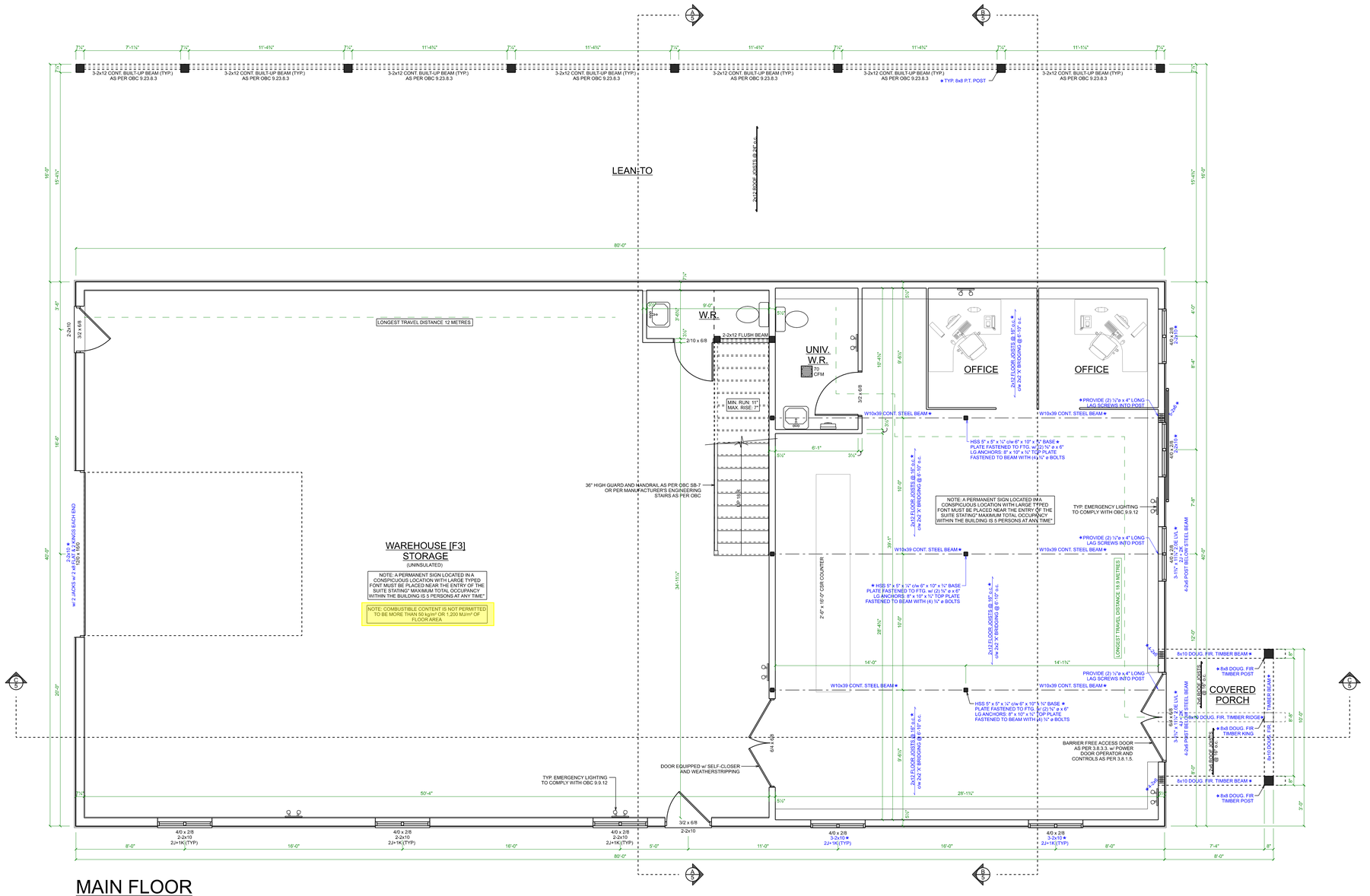
Yours Truly,
Jasdeep Brar and Cheryl McWilliams

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

c.c. Leah Dykstra, Student Planner
Derek Kulyk, Project Manager
Damien Whittaker, Engineer
Mark Elliot, Environmental Planner
Lisa Stern, Urban Designer
Hayley Murray, Forester
Mike Giampa, Transportation Project Manager
Warren Bedford, Parks Planner

Appendix B

Water Calculations



MAIN FLOOR
SCALE: 1/4" = 1'-0"

QUALIFICATION INFORMATION
REQUIRED UNLESS DESIGN IS EXEMPT UNDER DIVISION C-3.2.4.1 OF THE 2012 O.B.C.

JAKOB FABER, BCIN 114291
ELEVATE HOME DESIGN INC., BCIN 118456
THE UNDERSIGNED HAS REVIEWED AND TAKES RESPONSIBILITY FOR THIS DESIGN, AND HAS THE QUALIFICATIONS AND MEETS THE REQUIREMENTS SET OUT IN THE ONTARIO BUILDING CODE TO BE A DESIGNER.

ONTARIO OUTBUILDING

ELEVATE HOME DESIGN

BEATTY LINE N ○ FERGUS ○ ON
WWW.ELEVATEHOMEDESIGN.CA
JAKE@ELEVATEHOMEDESIGN.CA ○ 519-572-4561

40 x 80 WAREHOUSE
TITAN ENVIRONMENTAL
SOMME STREET, BLOCK 2, PART 1
OTTAWA, ON

MAIN FLOOR PLAN

PROJECT NO: 24-001
STARTING DATE: Jan 2, 2024
LAST REVISION DATE: Jan 30, 2025
DRAWN BY: J.F.

SCALE: 1/4" = 1'-0"

2

3.8.3.12. Universal Washrooms

(1) A universal washroom room shall,
(a) be served by a barrier-free path of travel,
(b) have a door that is capable of being locked from the inside and released from the outside in case of emergency and that has,
(i) a graspable latch-operating mechanism located not less than 900 mm and not more than 1 000 mm above the finished floor,
(ii) if it is an outward swinging door, a door pull not less than 140 mm long located on the inside so that its midpoint is not less than 200 mm and not more than 300 mm from the latch side of the door and not less than 900 mm and not more than 1 100 mm above the finished floor, and
(iii) if it is an outward swinging door, a door closer, spring hinges or gravity hinges, so that the door closes automatically,
(c) have one lavatory conforming to Sentences 3.8.3.11.(1), (3) and (4),
(d) have one water closet conforming to Article 3.8.3.9. that is located in accordance with Clause 3.8.3.8.(2)(a) or (b), (See Appendix A.)
(e) have grab bars conforming to,
(i) Sentence 3.8.3.8.(3), if the water closet is located in accordance with Clause 3.8.3.8.(2)(a), or
(ii) Sentence 3.8.3.8.(4), if the water closet is located in accordance with Clause 3.8.3.8.(2)(b),
(f) have no internal dimension between walls that is less than 1 700 mm,
(g) have a coat hook that conforms to Clause 3.8.3.8.(1)(e) and a shelf that is located not more than 1 100 mm above the finished floor and projects not more than 100 mm from the wall,
(h) be designed to permit a wheelchair to turn in an open space not less than 1 700 mm in diameter,
(i) be provided with a door equipped with a power door operator if the door is equipped with a self-closing device,
(j) be provided with a mirror,
(i) installed above a lavatory described in Clause (1)(c), and
(ii) mounted with its bottom edge not more than 1 000 mm above the finished floor or inclined to the vertical to be usable by a person in a wheelchair, and
(k) have lighting controlled by a motion sensor conforming to Sentence 12.2.4.1.(2). (See Appendix A.)
(2) A universal washroom shall have,
(a) an emergency call system that consists of audible and visual signal devices inside and outside of the washroom that are activated by a control device inside the washroom, and
(b) an emergency sign that contains the words IN THE EVENT OF AN EMERGENCY PUSH EMERGENCY BUTTON AND AUDIBLE AND VISUAL SIGNAL WILL ACTIVATE in letters at least 25 mm high with a 5 mm stroke and that is posted above the emergency button. (See Appendix A.)
(3) A clear space not less than 810 mm wide and 1 830 mm long shall be provided in each universal washroom for an adult-size change table. (See Appendix A.)

3.8.3.11. Lavatories (See Appendix A.)

(1) A washroom described in Sentence 3.8.3.12.(1)(c) shall be provided with a lavatory that shall,
(a) be located so that the distance between the centre line of the lavatory and the side wall is not less than 460 mm,
(b) be mounted so that the top of the lavatory is not more than 840 mm above the finished floor,
(c) have a clearance beneath the lavatory not less than,
(i) 920 mm wide,
(ii) 735 mm high at the front edge,
(iii) 685 mm high at a point 205 mm back from the front edge, and
(iv) 350 mm high from a point 300 mm back from the front edge to the wall, (See Appendix A.)
(d) have insulated pipes where they would otherwise present a burn hazard or have water supply temperature limited to a maximum of 43°C, (See Appendix A.)
(e) be equipped with faucets that have lever type handles without spring loading or operate automatically and that are located so that the distance from the centre line of the faucet to the edge of the basin or, where the basin is mounted in a vanity, to the front edge of the vanity, is not more than 485 mm,
(f) have have a minimum 1 370 mm deep floor space to allow for a forward approach, of which a maximum of 500 mm can be located under the lavatory, (See Appendix A.)
(g) have a soap dispenser that is,

3.8.3.11. Lavatories (See Appendix A.)

(i) located to be accessible to persons in wheelchairs,
(ii) located so that the dispensing height is not more than 1 200 mm above the finished floor,
(iii) located not more than 610 mm, measured horizontally, from the edge of the lavatory,
(iv) operable with one hand, and
(h) have a towel dispenser or other hand drying equipment that is,
(i) located to be accessible to persons in wheelchairs,
(ii) located so that the dispensing height is not more than 1 200 mm above the finished floor,
(iii) located not more than 610 mm, measured horizontally, from the edge of the lavatory,
(iv) operable with one hand, and
(iv) located not more than 610 mm, measured horizontally, from the edge of the lavatory.
(3) If dispensing or hand-operated washroom accessories, except those located in water closet stalls or described in Clause (1)(g), are provided, they shall be mounted so that,
(a) the dispensing height is not less than 900 mm and not more than 1 200 mm above the finished floor,
(b) the controls or operating mechanisms are mounted not less than 900 mm and not more than 1 200 mm above the finished floor, and
(c) a minimum 1 370 mm deep floor space is provided in front of the controls or operating mechanisms to allow for a front approach.
(4) Where a shelf is installed above a lavatory required by Sentence (1), it shall,
(a) be located not more than 200 mm above the top of the lavatory and not more than 1 100 mm above the finished floor, and
(b) project not more than 100 mm from the wall.

3.8.3.9. Water Closets (See Appendix A.)

(1) A water closet described in Clause 3.8.3.12.(1)(d) shall,
(a) be equipped with a seat located at not less than 430 mm and not more than 485 mm above the finished floor,
(b) be equipped with hand-operated flushing controls that are easily accessible to a wheelchair user or be automatically operable,
(c) be equipped with a back support where there is no seat lid or tank, and (See Appendix A.)
(d) not have a spring-activated seat. (See Appendix A.)
(2) Hand-operated flushing controls required by Clause (1)(b) shall be operable using a closed fist and with a force of not more than 22.2 N.

3.8.3.8. Water Closet Stalls

(1) Every barrier-free water closet stall in a washroom described in Sentence 3.8.2.3.(3) or (4) shall,
(e) be equipped with a coat hook mounted not more than 1 200 mm above the finished floor on a side wall and projecting not more than 50 mm from the wall,
(2) A water closet described in Clause (1)(c) shall be,
(a) located so that,
(i) the centre line of the water closet is not less than 460 mm and not more than 480 mm from one side wall, and
(ii) a clear transfer space at least 900 mm wide and 1 500 mm deep is provided on the other side of the water closet, or
(b) located so that a clear transfer space at least 900 mm wide and 1 500 mm deep is provided on each side of the water closet. (See Appendix A.)
(3) Where a water closet is located in accordance with Clause 3.8.3.8.(2)(a),
(a) a grab bar conforming to Sentences (5) and (7) shall be provided on the side wall referred to in Subclause (2)(a)(i),
(b) a fold-down grab bar may be provided and, if one is provided, it shall conform to Sentence (8) and be provided on the side of the water closet opposite the grab bar described in Clause (a), and
(c) a grab bar conforming to Sentences (6) and (7) shall be provided on the wall behind the water closet. (See Appendix A.)
(4) Where a water closet is located in accordance with Clause (2)(b),
(a) a fold-down grab bar conforming to Sentence (8) shall be provided on each side of the water closet, and
(b) a grab bar conforming to Sentences (6) and (7) shall be provided on the wall behind the water closet. (See A-3.8.3.8.(3) in Appendix A.)

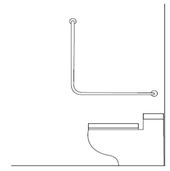
Apendix A

A-3.8.3.8.(3) Additional Grab Bars.

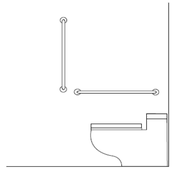
Designers may exceed the minimum requirements found in the Building Code and specify the installation of additional grab bars in other locations. These additional grab bars may be of different configurations and can be installed in other orientations.

A-3.8.3.8.(5) L-Shaped Grab Bar.

L-shaped grab bars provide greater support for people who rely on grab bars to assist them in transferring to and from a standing or seated position. Diagonally mounted grab bars may not be suitable for the downward force necessary for support or for pulling upward. Hands can slip along the bar if it is set in a diagonal position. The use of two straight grab bars located at a 90° angle to one another is not permitted.



Permitted Continuous L-Shaped Grab Bar



Not Permitted Discontinuous L-Shaped Grab Bar

A-3.8.3.9. Water Closets.

Article 7.2.2.5. applies to water closets referenced in Articles 3.8.3.8., 3.8.3.9. and 3.8.3.12. A shelf or projection should not be located behind a water closet such that it could present a hazard.

A-3.8.3.9.(1)(c) Back Support at Water Closets.

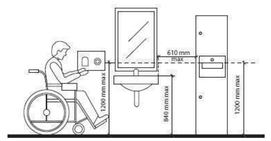
The purpose of the back support is to reduce the chance of imbalance or injury caused by a user leaning against exposed flush valves or pipes. A toilet seat lid, where provided, may be a suitable back support.

A-3.8.3.9.(1) Water Closets.

Wall-mounted water closets or floor models with receding bases are preferable because they provide the least amount of obstruction.

A-3.8.3.11. Washroom Accessories.

Washroom accessories for barrier-free water closets and lavatories must be located within arm's reach of a person in a seated position. Placement of towel dispensers and hand dryers should not require that a person seated in a wheelchair must travel beyond the reach range of the lavatory to dry his or her hands.



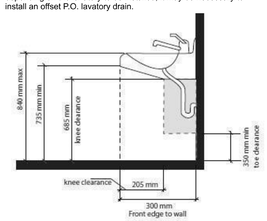
3.8.3.3.(17) POWER DOOR OPERATORS

(17) The control for a power door operator shall
(a) have a face dimension of not less than
(i) 150mm in diameter where the control is circular, or
(ii) 50mm by 100mm where the control is rectangular
(b) be operable using a closed fist
(c) be located so that,
(i) its centre is located not less than 900mm and not more than 1100mm from the finished floor or ground
(d) be located not less than 600 mm and not more than 1500mm beyond the door swing where the door opens towards the control
(e) be located in a clearly visible position, and
(f) contain a sign incorporating the International Symbol of Access

A-3.8.3.11.(1)(c) Clearances Beneath a Lavatory.

Barrier-free lavatories require sufficient knee and toe clearance below to permit a person in a wheelchair to move close enough to the faucet to easily access the water stream.

In order to meet the clearances contained in this Clause, and depending on the lavatory to be installed, it may be necessary to install an offset P.O. lavatory drain.



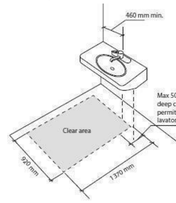
A-3.8.3.11.(1)(d) Pipe Protection.

The pipes referred to in Clause 3.8.3.11.(1)(d) include both supply and waste pipes. The hazard can be prevented by insulating the pipes, by locating the pipes in enclosures, or avoided by limiting the temperature of the hot water to a maximum of 43°C.

UNIVERSAL WASHROOM NOTES

A-3.8.3.11.(1)(f) Clear Space at Lavatory.

The clear space required for the wheelchair user to pull into the fountain may overlap with an adjacent barrier-free path of travel but should not prevent other building users from passing when the barrier-free lavatory is in use.



A-3.8.3.12.(1)(d) Transfer Space.

The transfer space beside a water closet or the approach space at a lavatory must be a clear space with no obstruction or potential obstruction of the space from adjacent elements such as a fold-down change table, or other fixture. The exception to this would be a fold-down grab bar where provided. If a fold down change table is not returned to the folded up position after use, the next user of the space should not be inconvenienced from using the water closet or lavatory due to the transfer or approach spaces being blocked.

A-3.8.3.12.(1) and (3) Universal Washroom.

Unobstructed areas in front of the lavatory, in front of the water closet and on one side of the water closet are necessary for manoeuverability of a wheelchair. The door swing may overlap the turning circle within the universal washroom as long as there is sufficient space for a wheelchair user to manoeuver to clear the door and close the door from a front approach position.
The space for an adult size change table may encroach upon the 1700 mm turning circle only where the change table is movable and is not permanently fixed or stored within the washroom. In that case the table, such as a hospital gurney is brought into the washroom when needed and removed after use. A permanently fixed table may not be appropriate for certain building occupancies due to operational and maintenance considerations.

A-3.8.3.12.(2) Emergency Call System.

The purpose of the emergency call system is to notify other building occupants that a person using the universal washroom requires assistance. The visual signal and alarm should be different from the building fire and smoke alarms and visual signals, where installed, as this call system is for personal, not building, emergencies.

The emergency call button is intended to provide a local visual signal outside of the washroom to alert others that someone in the washroom needs assistance. It is not required to be linked to a central monitoring station. Where central monitoring is not provided, such as in the case of a small building or a standalone washroom in a park, an additional sign informing the washroom users that there is no central monitoring may be appropriate.

12.2.4.1. Motion Sensors

(1) Lighting installed to provide the minimum illumination levels required by this Code may be controlled by motion sensors except where the lighting,
(a) is installed in an exit,
(b) is installed in a corridor serving patients or residents in a Group B, Division 2 or Division 3 occupancy, or
(c) is required to conform to Sentence 3.2.7.1.(6).
(2) Where motion sensors are used to control minimum lighting in a public corridor or corridor providing access to exit for the public, the motion sensors shall be installed with switch controllers equipped for fail-safe operation and illumination timers set for a minimum 15-minute duration.
(3) A motion sensor shall not be used to control emergency lighting.

ENGINEER'S STRUCTURAL NOTES:

GENERAL

1. THE STRUCTURE IS TO BE BUILT IN ACCORDANCE WITH THE REQUIREMENTS OF THE 2012 OBC, AND ANY APPLICABLE REQUIREMENTS OR BY-LAWS OF THE AUTHORITY HAVING JURISDICTION.
2. THE CONTRACTOR SHALL ENSURE THE STABILITY AND THE INTEGRITY OF THE STRUCTURE AT ALL STAGES OF CONSTRUCTION.
3. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING UTILITIES DURING ALL STAGES OF THE WORK.

DESIGN CODE
1. THE STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF THE ONTARIO BUILDING CODE (OBC 2012).
2. ALL REINFORCED CONCRETE ELEMENTS HAVE BEEN DESIGNED IN ACCORDANCE WITH CSA A23.3-24.
3. ALL STRUCTURAL STEEL ELEMENTS HAVE BEEN DESIGNED IN ACCORDANCE WITH CSA S16-24.

LOADING

BUILDING IMPORTANCE CATEGORY = NORMAL

ROOF DL =

MEZZANINE DL = 0.65 kpa
LL = 9.6 kPa

SNOW Ss = 2.4 kPa
Sr = 0.4 kPa

WIND q(1/50) = 0.41 kPa
Iw ULS = 1.0
Iw SLS = 0.75
INTERNAL PRESSURE CATEGORY 2

REINFORCING STEEL

1. REINFORCING STEEL SHALL BE GRADE 400W UNLESS SPECIFIED OTHERWISE.
2. WELDED WIRE FABRIC (WWF) SHALL BE Fy = 386 MPa
2. TENSION LAP SPLICES FOR REINFORCING STEEL BARS SHALL BE CLASS B.
4. LAP SPLICES FOR 152x152 WELDED WIRE FABRIC (WWF) SHALL BE 500mm (1'-8").
3. BAR HOOKS SHALL HAVE STANDARD HOOK DIMENSIONS USING MINIMUM BEND DIAMETERS, WHILE STIRRUPS AND TIES SHALL HAVE MINIMUM HOOK DIMENSIONS. ALL STANDARD HOOKS AND BENDS SHALL BE IN ACCORDANCE WITH CSA A23.1 Cl. 6.6.2.

WOOD

1. WOOD FRAMING DESIGN AND CONSTRUCTION SHALL CONFORM TO CSA O86.
2. UNLESS SPECIFIED OTHERWISE, NAILING SHALL BE IN ACCORDANCE WITH THE OBC 2012.
3. LUMBER SHALL BE SPF No. 1/2 OR BETTER. MOISTURE CONTENT SHALL BE 19% OR LESS.
3. PREFABRICATED WOOD TRUSSES: SHOP DRAWINGS TO INCLUDE ENGINEERED DESIGNS, MATERIAL GRADES, LAYOUT DRAWINGS, BEARING DETAILS, ANCHORAGE DETAILS AND CONNECTION DETAILS BETWEEN TRUSSES, AND TEMPORARY AND PERMANENT BRACING AND BRIDGING DETAILS AFFECTING THE STRUCTURAL CAPACITY OF THE TRUSSES. SHOP DRAWINGS (INCLUDING LAYOUTS) TO BE SIGNED AND SEALED BY A PROFESSIONAL ENGINEER.

CONCRETE

1. CONCRETE SHALL CONFORM TO THE REQUIREMENTS OF CSA A23.1,2,3 FOR MATERIALS AND WORKMANSHIP.

LOCATION	CLASS	STRENGTH
EXTERIOR WALLS	F-2	25 MPA
FOOTINGS	N	20 MPA
PIERS	F-2	25 MPA
INTERIOR SLAB ON GRADE	N	32 MPA

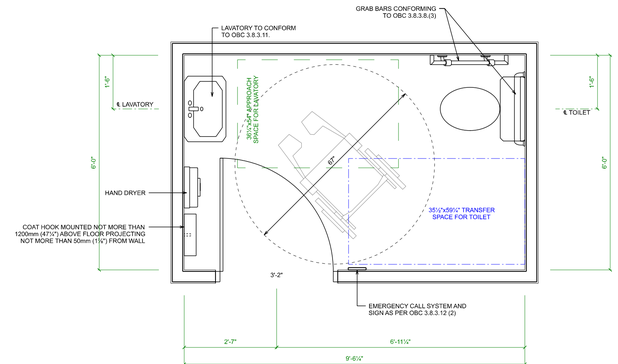
2. TEMPLATES SHALL BE USED TO ENSURE CORRECT PLACEMET OF ANCHORS.
3. PROVIDE CONTROL JOINTS IN SLABS-ON-GRADE AT 4.5m (15ft) ON CENTER EACH WAY, 6 TO 18 HOURS AFTER PLACING CONCRETE. SAW CUT DEPTH TO BE EQUAL TO ON QUARTER OF THE CONCRETE THICKNESS.

STRUCTURAL STEEL

1. STRUCTURAL WIDE FLANGE SHAPES SHALL CONFORM TO CAN/CSA G40.20/G40.21 GRADE 350W OR ASTM A992/A992M GRADE 50.
2. ANGLE AND PLATES SHALL CONFORM TO CAN/CSA G40.20/G40.21 GRADE 300W.
3. HOLLOW STRUCTURAL SECTIONS TO CONFORM TO ASTM A500 GRADE C.
4. ALL WELDING SHALL BE IN ACCORDANCE WITH CSA W59.
5. STRUCTURAL BOLTS SHALL BE ASTM A325/A325M, TYPE 1. BOLT THREADS SHALL BE EXCULDED FROM THE SHEAR PLANES.
6. ALL CONNECTIONS ARE ASSUMED TO BE BEARING TYPE CONNECTIONS. BOLTS SHALL BE SNUG-TIGHT AS DEFINED BY CSA S16.

FOUNDATION

1. CONSTRUCT ALL FOOTINGS ON UNDISTURBED SOIL. EARTH BOTTOMS OF EXCAVATIONS TO BE DRY UNDISTURBED SOIL, LEVEL, FREE FROM LOOSE OR ORGANIC MATERIAL. REPLACE UNSUITABLE MATERIAL WITH GRANULAR MATERIAL COMPACTED TO 98% SPDD.
1. AN ALLOWABLE BEARING PRESSURE CAPACITY OF 115 KPA SHALL BE CONFIRMED DURING CONSTRUCTION AT STRIP FOOTINGS, SPREAD FOOTINGS WITH AND WITHOUT PIERS, AND LEAN-TO PIERS.
2. FOUND FOOTINGS SUSCEPTIBLE TO FROST DAMAGE A MINIMUM OF 6' 0" BELOW FINISHED EXTERIOR GRADE.
3. PROVIDE TEMPORARY FROST PROTECTION DURING CONSTRUCTION, AS REQUIRED, FOR ALL FOOTINGS WHICH ARE NOT FOUNDED A MINIMUM OF 6'0" BELOW GRADE.
4. SLAB-ON-GRADE EXTRUDED POLYSTYRENE INSULATION TO HAVE A MINIMUM COMPRESSIVE STRENGTH OF 240 KPA.



UNIVERSAL WASHROOM DETAIL

SCALE: 1/2" = 1'-0"

TABLE SB 5.5-6–2017 (See Appendix A.)
(Supersedes Table 5.5-6 In 2013 ANSI/ASHRAE/IES 90.1)
Building Envelope Requirements for Climate Zone 6 (A, B) (I-P)

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly Max. U-Value	Insulation Min. R-Value	Assembly Max. U-Value	Insulation Min. R-Value	Assembly Max. U-Value	Insulation Min. R-Value
Roofs						
Insulation Entirely Above Deck	U-0.029	R-35 ci	U-0.029	R-35 ci	U-0.057	R-17 ci
Metal Building [a]	U-0.028	R-25 + R-11 + R-11 Ls	U-0.026	R-25 + R-11 + R-11 Ls	U-0.054	R-19 + R-11 Ls
Attic and Other	U-0.019	R-60	U-0.019	R-60	U-0.031	R-38
Walls, Above Grade						
Mass	U-0.048	R-19 ci	U-0.046	R-20 ci	U-0.091	R-10 ci
Metal Building	U-0.045	R-13 + R-19 ci	U-0.045	R-13 + R-19 ci	U-0.085	R-13 + R-6.5 ci
Steel Framed	U-0.044	R-13 + R-15 ci	U-0.044	R-13 + R-15 ci	U-0.076	R-13 + R-6 ci
Wood Framed and Other	U-0.046	R-13 + R-10 ci	U-0.046	R-13 + R-10 ci	U-0.080	R-13 + R-1 ci
Wall, Below Grade						
Below Grade Wall	C-0.050	R-20 ci	C-0.050	R-20 ci	C-0.119	R-7.5 ci
Floors						
Mass	U-0.046	R-18.7 ci	U-0.046	R-18.7 ci	U-0.078	R-9.7 ci
Steel Joist	U-0.029	R-38 + R-4 ci	U-0.029	R-38 + R-4 ci	U-0.047	R-25
Wood Framed and Other	U-0.024	R-38 + R-3 ci	U-0.024	R-38 + R-3 ci	U-0.046	R-21
Slab-On-Grade Floors						
Unheated	F-0.459	R-15 for 48 in.	F-0.391	R-10 full slab	F-0.730	NR
Heated	F-0.619	R-10 full slab	F-0.604	R-10 full slab	F-0.774	R-15 for 48 in.
Opaque Doors						
Swinging	U-0.45		U-0.45		U-0.63	
Nonswinging	U-0.45		U-0.45		U-0.45	
Fenestration	Assembly Max. U-Value	Assembly Max. SHGC / Min. VT/SHGC	Assembly Max. U-Value	Assembly Max. SHGC / Min. VT/SHGC	Assembly Max. U-Value	Assembly Max. SHGC / Min. VT/SHGC
Vertical Fenestration, 0% - 40% of Wall						
Nonmetal framing: all	U-0.29	0.40 / 1.10	U-0.29	0.40 / 1.10	U-0.41	NR / NR
Metal framing: fixed	U-0.38		U-0.38		U-0.46	
Metal framing: operable	U-0.45		U-0.45		U-0.53	
Metal framing: entrance door	U-0.69		U-0.61		U-0.69	
Skylight, 0% - 3% of Roof						
All types	U-0.45	0.40 / NR	U-0.45	0.40 / NR	U-0.77	NR / NR

The following definitions apply: ci = continuous insulation, Ls = liner system, NR = no (insulation) requirement.
[a] When using the R-value compliance method for metal building roofs, a thermal spacer block is required.

ONTARIO BUILDING CODE MATRIX - PART 9

1	WAREHOUSE (F3) (COMBUSTIBLE CONTENT IS NOT MORE THAN 50 kg/m² OR 1,200 MJ/m² OF FLOOR AREA) 3210 ALBION ROAD SOUTH, OTTAWA		DIV. B - 9.1.1.
2	MAJOR OCCUPANCY(S)	GROUP F DIVISION 3 - LOW HAZARD INDUSTRIAL	9.10.2
3	BUILDING AREA (m²)	416.2 m²	DIV. A - 1.1.3.2.
4	GROSS FLOOR AREA (m²)	401.1 m²	DIV. A - 1.4.1.2.
5	NUMBER OF STORIES	ABOVE GRADE: 1 + MEZZANINE BELOW GRADE: 0	9.10.4
6	HEIGHT OF BUILDING	1 STOREY 6.5m FROM GRADE TO MID-POINT OF ROOF	DIV. A - 1.1.3.2.
7	NUMBER OF STREETS	1	9.10.20
8	SPRINKLER SYSTEM PROPOSED:	ENTIRE BUILDING: BASEMENT ONLY: IN LIEU OF ROOF RATING: NOT REQUIRED: ✓	9.10.8.2.
9	FIRE ALARM REQUIRED:	NO	9.10.18
10	PERMITTED CONSTRUCTION:	COMBUSTIBLE ✓ NON-COMBUSTIBLE	
	ACTUAL CONSTRUCTION:	COMBUSTIBLE ✓ NON-COMBUSTIBLE	
11	OCCUPANT LOAD AREA / OCCUPANCY / FACTOR / OCC. LOAD 293.1 m² / GROUP F3 / POSTED / 10 107.95 m² / GROUP D / POSTED / 10		9.9.1.3 TBL 3.1.17 TBL 3.7.4.7 3.7.4.8.(3)(b)
12	WATER CLOSETS AREA / OCCUPANCY / W.C. OCC. LOAD FACT. / OCC. LOAD / # W.C. REQ'D 293.1 m² / GROUP F3 / POSTED / 10 / 1 107.95 m² / GROUP D / POSTED / 10 / 1		9.9.1.3 TBL 3.1.17 TBL 3.7.4.7 3.7.4.9.
13	HAZARDOUS SUBSTANCES:	NO	
14	CONCEALED SPACE USED AS A PLENUM:	NO	9.10.1.3.(4)
15	FIRE RESISTANCE RATINGS REQUIRED OCCUPANCY / REQ'D F.R.R. / PROVIDED F.R.R. NONE, ONLY ONE MAJOR OCCUPANCY		9.10.9 9.10.9.13 9.10.10.
	FLOOR SYSTEM F.R.R. ROOF SYSTEM F.R.R.	NOT APPLICABLE NOT REQ'D	9.10.8.1
16	SPATIAL SEPARATION ELEV. / WALL FACE / LIMITING DISTANCE / UPO / ACT. % / ALLOW. % / F.R.R. EAST - - - - - N/A WEST - - - - - N/A NORTH - - - - - N/A SOUTH - - - - - N/A NOTE: ALL ALLOWABLE PERCENTAGES OF U.P.O. ARE OVER 25% THEREFORE COMBUSTABLE OR NON COMBUSTABLE CLADDING AND CONSTRUCTION ARE PERMITTED FOR ALL ELEVATIONS		TBL 9.10.14.4 TBL 9.10.14.5
17	NUMBER & LOCATIONS OF EXITS SUITE / OCCUPANCY / AREA / REQ'D EXITS / TRAVEL DIST. (MAX.) / ACTUAL TRAVEL DIST. A / GROUP F3 / 293.1 m² / 2 / 30 m / 24.69 m GROUP D / 107.95 m² / 1 / 45 m / 28.75 m		9.9.7.3 9.9.7.4

ONTARIO FIRE CODE

1	WHERE FIRE EXTINGUISHERS ARE REQUIRED THEY MUST: ○BE LOCATED THROUGHOUT THE BUILDING SO THAT THE MAXIMUM TRAVEL DISTANCE IS 25m ○BE RATED AS 2A PORTABLE EXTINGUISHERS AS PER CAN/ULC-S508 ○BE MOUNTED SO THAT THE TOP OF THE EXTINGUISHER IS NOT MORE THAN 1.5m ABOVE THE FLOOR ○BE INSPECTED AND MAINTAINED IN ACCORDANCE WITH THE REQUIREMENTS OF THE ONTARIO FIRE CODE SECTION 6.2 ○THE LOCATION OF PORTABLE EXTINGUISHERS SHALL BE PROMINENTLY INDICATED BY SIGNS OR MARKINGS IN LARGE FLOOR AREAS AND IN LOCATIONS WHERE VISUAL OBSTRUCTIONS CANNOT BE AVOIDED	6.2.6 6.2.2, 6.2.6A 6.2.4 6.2. 6.2.1.5.

QUALIFICATION INFORMATION

REQUIRED UNLESS DESIGN IS EXEMPT UNDER DIVISION C-3.2.4.1 OF THE 2012 O.B.C.

JAKOB FABER, BCIN 114291
ELEVATE HOME DESIGN INC., BCIN 118456
THE UNDERSIGNED HAS REVIEWED AND TAKES RESPONSIBILITY FOR THIS DESIGN, AND HAS THE QUALIFICATIONS AND MEETS THE REQUIREMENTS SET OUT IN THE ONTARIO BUILDING CODE TO BE A DESIGNER.

ONTARIO OUTBUILDING

ELEVATE HOME DESIGN

BEATTY LINE N ○ FERGUS ○ ON
WWW.ELEVATEHOMEDESIGN.CA
JAKE@ELEVATEHOMEDESIGN.CA ○ 519-572-4561

40 x 80 WAREHOUSE

TITAN ENVIRONMENTAL
SOMME STREET, BLOCK 2, PART 1
OTTAWA, ON

OBC NOTES & UNIVERSAL W.R.

PROJECT NO: 24-001
STARTING DATE: Jan 2, 2024
LAST REVISION DATE: Jan 30, 2025
DRAWN BY: J.F.

SCALE: As Noted

8

Part 1
Compliance and General

Section 1.1. Organization and Application

1.1.1. Organization of this Code

1.1.1.1. Scope of Division A

(1) Division A contains compliance and application provisions and the *objectives* and *functional statements* of this Code.

1.1.1.2. Scope of Division B

(1) Division B contains the *acceptable solutions* of this Code.

1.1.1.3. Scope of Division C

(1) Division C contains the administrative provisions of this Code.

1.1.1.4. Internal Cross-References

(1) If a provision of this Code contains a reference to another provision of this Code but no Division is specified, both provisions are in the same Division of this Code.

1.1.2. Application of Division B (See Appendix A.)

1.1.2.1. Application of Parts 1, 7 and 12

r5 **(1)** Part 1 of Division B applies to all *buildings*.

r5 **(2)** Subject to Article 1.1.2.6., Parts 7 and 12 of Division B apply to all *buildings*.

1.1.2.2. Application of Parts 3, 4, 5 and 6

(1) Subject to Articles 1.1.2.6. and 1.3.1.2., Parts 3, 5 and 6 of Division B apply to all *buildings*,

(a) used for *major occupancies* classified as,

(i) Group A, *assembly occupancies*,

r1 (ii) Group B, *care, care and treatment* or *detention occupancies*, or

(iii) Group F, Division 1, *high hazard industrial occupancies*,

(b) exceeding 600 m^2 in *building area* or exceeding three *storeys* in *building height* and used for *major occupancies* classified as,

(i) Group C, *residential occupancies*,

(ii) Group D, *business and personal services occupancies*,

(iii) Group E, *mercantile occupancies*, or

(iv) Group F, Divisions 2 and 3, *medium hazard industrial occupancies* and *low hazard industrial occupancies*, or

r6 (c) used for *retirement homes*.

(2) Subject to Articles 1.1.2.6. and 1.3.1.2., Part 4 of Division B applies to,
(a) *post-disaster buildings*,
(b) *buildings* described in Sentence (1),
(c) a retaining wall exceeding 1 000 mm in exposed height adjacent to,
  (i) public property,
  (ii) access to a *building*, or
  (iii) private property to which the public is admitted,
(d) a pedestrian bridge appurtenant to a *building*,
(e) a crane runway,
(f) an exterior storage tank and its supporting structure that is not regulated by the *Technical Standards and Safety Act, 2000*,
(g) signs regulated by Section 3.15. of Division B that are not structurally supported by a *building*,
(h) a structure that supports a wind turbine generator having a rated output of more than 3 kW,
(i) an *outdoor pool* that has a water depth greater than 3.5 m at any point, and
(j) a *permanent solid nutrient storage facility* with supporting walls exceeding 1 000 mm in exposed height.

(3) Section 3.11. of Division B applies to *public pools*.

(4) Section 3.12. of Division B applies to *public spas*.

(5) Section 3.15. of Division B applies to signs.

1.1.2.3. Application of Part 8

r5 **(1)** Subject to Article 1.1.2.6., Part 8 of Division B applies to the design, *construction*, operation and maintenance of all *sewage systems* and to the *construction* of *buildings* in the vicinity of *sewage systems*.

1.1.2.4. Application of Part 9

(1) Subject to Articles 1.1.2.6. and 1.3.1.2., Part 9 of Division B applies to all *buildings*,
(a) of three or fewer *storeys* in *building height*,
(b) having a *building area* not exceeding 600 m^2, and
(c) used for *major occupancies* classified as,
r6 (i) Group C, *residential occupancies* other than *buildings* used for *retirement homes*,
  (ii) Group D, *business and personal services occupancies*,
  (iii) Group E, *mercantile occupancies*, or
  (iv) Group F, Divisions 2 and 3, *medium hazard industrial occupancies* and *low hazard industrial occupancies*.

1.1.2.5. Application of Part 10

(1) Part 10 of Division B applies to existing *buildings* requiring a permit under section 10 of the Act.

1.1.2.6. Application of Part 11

(1) Except as provided in Sentence (2), Part 11 of Division B applies to the design and *construction* of existing *buildings*, or parts of existing *buildings*, that have been in existence for at least five years.

(2) If a *building* has been in existence for at least five years but includes an addition that has been in existence for less than five years, Part 11 of Division B applies to the entire *building*.

9.9.12.3. Emergency Lighting

(1) Emergency lighting shall be provided in,
(a) *exits*,
(b) principal routes providing *access to exit* in an open *floor area*,
(c) corridors used by the public,
(d) underground walkways, and
(e) *public corridors*.

(2) Emergency lighting required in Sentence (1) shall be provided from a source of energy separate from the electrical supply for the *building*.

(3) Lighting required in Sentence (1) shall be designed to be automatically actuated for a period of not less than 30 min when the electric lighting in the affected area is interrupted.

(4) Illumination from lighting required in Sentence (1) shall be provided to average levels of not less than 10 lx at floor or tread level.

(5) The minimum value of the illumination required by Sentence (4) shall be not less than 1 1x.

(6) Where incandescent lighting is provided, lighting equal to 1 W/m² of *floor area* shall be considered to meet the requirement in Sentence (4).

(7) Where self-contained emergency lighting units are used, they shall conform to CSA C22.2 No. 141, "Emergency Lighting Equipment".

Section 9.10. Fire Protection

9.10.1. Definitions and Application

9.10.1.1. Support of Noncombustible Construction

(1) Where an assembly is required to be of *noncombustible construction* and to have a *fire-resistance rating*, it shall be supported by *noncombustible construction*.

9.10.1.2. Sloped Roofs

r3 **(1)** For the purposes of this Section, roofs with slopes of 60° or more to the horizontal and that are adjacent to a room or space intended for occupancy shall be considered as a wall.

9.10.1.3. Items Under Part 3 Jurisdiction

(1) Tents, *air-supported structures*, transformer vaults, *walkways*, elevators and escalators shall conform to Part 3.

(2) Where rooms or spaces are intended for an *assembly occupancy*, such rooms or spaces shall conform to Part 3.

(3) *Basements* containing more than 1 *storey* or exceeding 600 m^2 in area shall conform to Part 3.

(4) Where rooms or spaces are intended for the storage, manufacture or use of hazardous or explosive material, such rooms or spaces shall conform to Part 3.

(5) Reserved

(6) Openings through floors that are not protected by shafts or *closures* shall be protected in conformance with Subsection 3.2.8.

(7) Chutes and shafts shall conform to Subsection 3.6.3. except where they are contained entirely within a *dwelling unit*.

(8) Sprinkler systems shall be designed, constructed and installed in conformance with Sentence 3.2.5.7.(1), Articles 3.2.5.13. to 3.2.5.16. and Article 3.2.5.18. (See Appendix A.)

(9) Standpipe and hose systems shall be designed, constructed and installed in conformance with Article 3.2.5.18. and Subsection 3.2.9.

(10) Fire pumps shall be installed in conformance with Articles 3.2.5.18. and 3.2.5.19.

9.10.1.4. Items Under Part 6 Jurisdiction

(1) In kitchens containing commercial cooking equipment used in processes producing grease-laden vapours, the equipment shall be designed and installed in conformance with Part 6. (See Appendix A.)

(2) Where fuel-fired *appliances* are installed on a roof, such *appliances* shall be installed in conformance with Part 6.

9.10.2. Occupancy Classification

9.10.2.1. Occupancy Classification

(1) Every *building* or part of it shall be classified according to its *major occupancy* as belonging to one of the groups or divisions described in Table 9.10.2.1.

r6

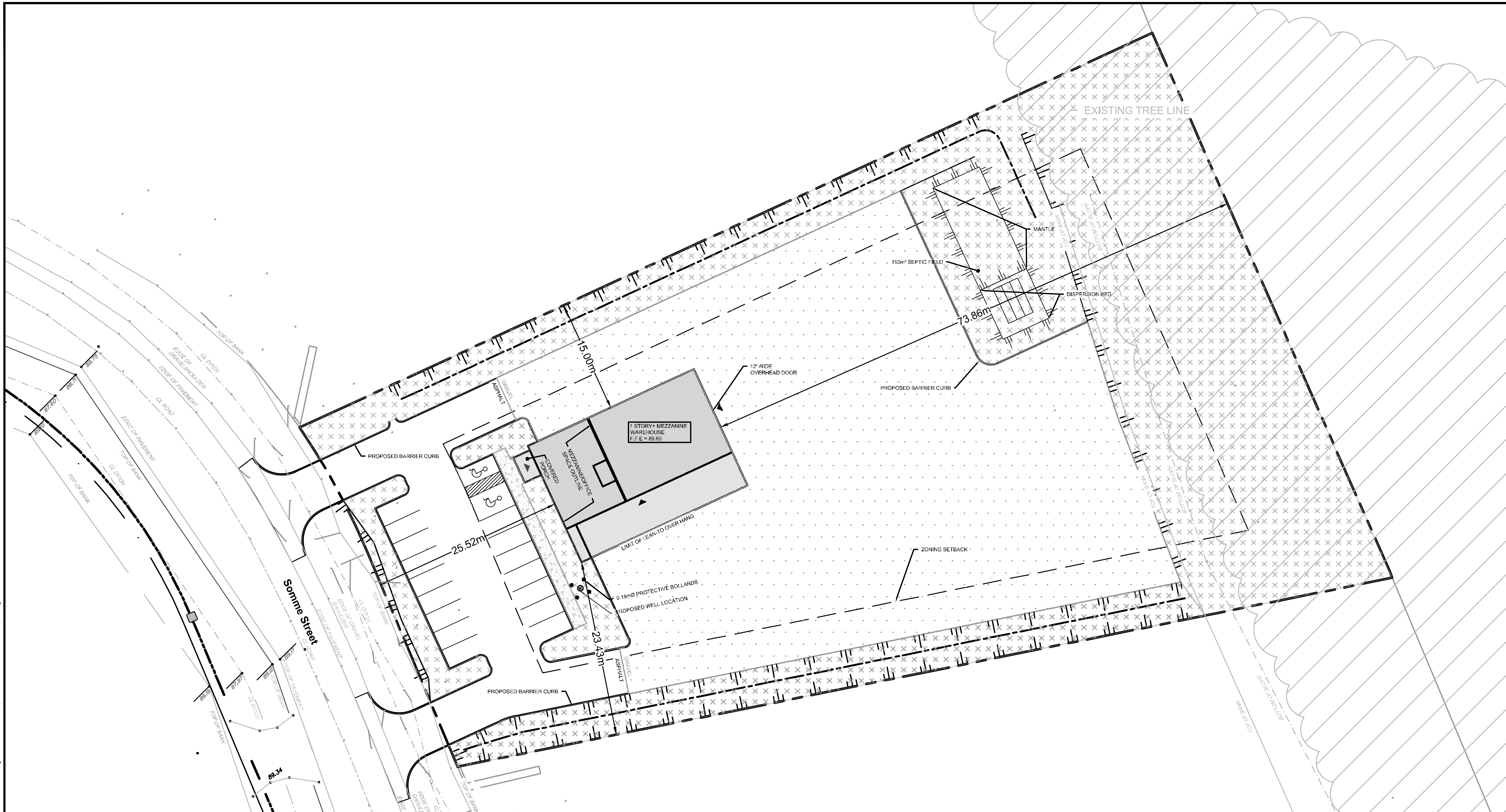
Table 9.10.2.1.
Occupancy Classifications
Forming Part of Sentence 9.10.2.1.(1)

Group	Division	Description of *Major Occupancies*
C	—	*Residential occupancies*
D	—	*Business and personal services occupancies*
E	—	*Mercantile occupancies*
F	2	*Medium hazard industrial occupancies*
F	3	*Low hazard industrial occupancies* (Does not include *storage garages* serving *houses* or individual *dwelling units*)
Column 1	2	3

9.10.2.2. Reserved

9.10.2.3. Major Occupancies Above Other Major Occupancies

(1) Except as permitted in Article 9.10.2.4., in any *building* containing more than 1 *major occupancy* in which one *major occupancy* is located entirely above another, the requirements of Article 9.10.8.1. for each portion of the *building* containing a *major occupancy* shall be applied to that portion as if the entire *building* was of that *major occupancy*.



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CITY OF OTTAWA
541 SOMME STREET

FUS SEPERATION

SCALE	DATE	JOB	FIGURE
1 : 500	JAN 2025	124111	SEP

SHT11X17.DWG - 279mmX432mm

If a public address system is to be used to convey instructions during an emergency, then the requirements of the system are less straightforward. In general, however, a larger number of speakers operating at lower sound levels would be required.

Additional guidance on how to design and evaluate the intelligibility of a communication system can be found in the following documents

- IEC 60268-16, Sound System Equipment — Part 16: Objective Rating of Speech Intelligibility by Speech Transmission Index
- ISO 7240-19, Fire Detection and Alarm Systems — Part 19: Design, Installation, "Commissioning and Service of Sound Systems for Emergency Purposes"
- NEMA SB 50, "Emergency Communications Audio Intelligibility Applications Guide"
- Annex D of NFPA 72, "National Fire Alarm and Signaling Code".

A-3.2.5.4.(1) Fire Department Access for Detention Buildings.

Buildings of Group B, Division 1 used for housing persons who are under restraint include security measures that would prevent normal access by local fire departments. These security measures include fencing around the building site, exterior walls without openings or openings which are either very small or fitted with bars, and doors that are equipped with security hardware that would prevent easy entry. These buildings would have firefighting equipment installed and the staff would be trained to handle any small incipient fires. It is expected that appropriate fire safety planning would be undertaken in conjunction with local fire departments in order that special emergencies could be handled in a cooperative manner.

A-3.2.5.6.(1) Fire Department Access Route.

The design and construction of fire department access routes involves the consideration of many variables, some of which are specified in the requirements in the Building Code. All these variables should be considered in relation to the type and size of fire department vehicles available in the municipality or area where the building will be constructed. It is appropriate, therefore, that the local fire department be consulted prior to the design and construction of access routes.

A-3.2.5.7. Water Supply.

This Article requires that an adequate water supply for firefighting is to be provided for every building. However, farm buildings of low human occupancy under the National Farm Building Code of Canada 1995 are exempted. The water supply requirements for interior fire suppression systems such as sprinkler systems and standpipe and hose systems are contained in other standards, for example, NFPA Standard 13, "Installation of Sprinkler Systems", and NFPA Standard 14, "Installation of Standpipe and Hose Systems". This Appendix note focuses only on water supplies that are considered essential to firefighting by fire department or other trained personnel using fire hoses.

Minimum requirements for water supply for firefighting are relevant mainly to building sites not serviced by municipal water supply systems. For building sites serviced by municipal water supply systems where the water supply duration is not a concern, water supply flow rates at minimum pressures would be the main focus of this Appendix note. However, where municipal water supply capacities are limited, it would be necessary for buildings to have on-site supplemental water supply.

An adequate water supply for firefighting should be an immediately available and accessible water supply with sufficient volume and/or flow to enable fire department personnel using fire hoses to control fire growth until the building is safely evacuated, prevent the fire from spreading to adjacent buildings, limit environmental impact of the fire, and provide a limited measure of property protection.

The sources of water supply for firefighting purposes may be natural or man-made. Natural sources may include ponds, lakes, rivers, streams, bays, creeks, springs, artesian wells, and irrigation canals. Man-made sources may include aboveground tanks, elevated gravity tanks, cisterns, swimming pools, wells, reservoirs, aqueducts, tankers, and hydrants served by a public or private water system. It is imperative that such sources of water be accessible to fire department equipment under all climate conditions.

The available water supply would allow arriving fire department personnel to use the water at their discretion when entering a burning building with hose lines. During the search and evacuation operation, hose streams may be needed for fire suppression to limit fire spread. The duration of the water supply should be sufficient to allow complete search and evacuation of the building. Once the search and rescue operations are complete, additional water may be required for exposure protection or fire suppression to limit property damage.

Fire departments serving remote or rural areas often have to respond to a fire with a transportable water supply of sufficient volume for approximately 5 to 10 minutes when using one or two 38 mm hose lines. This would provide minimal hose streams allowing immediate search and rescue operations in small buildings with simple layouts but limited fire suppression capabilities, especially if a fire is already well-established.

For larger more complex buildings, an on-site water supply for firefighting would be needed to provide an extended duration of hose stream use by the fire department to allow search and evacuation of the building, exposure protection and fire suppression. The volume of this on-site water supply would be dependent on the building size, construction, occupancy, exposure and environmental impact potential, and should be sufficient to allow at least 30 minutes of fire department hose stream use.

The recommendations of this Appendix note are predicated on prompt response by a well equipped fire department using modern firefighting techniques, and buildings being evacuated in accordance with established building fire safety plans and fire department pre-fire plans. For buildings constructed in areas where fire department response is not expected at all or in a reasonable time, sprinkler protection should be considered to ensure safe evacuation.

Elementary and secondary schools usually have a record of well established and practiced fire safety plans which would allow complete evacuations within 4 minutes. Because of this and the inherent high level of supervision in these buildings, a reduction of the water supply for firefighting may be considered. It is suggested that the level of reduction should be determined by the local enforcement authority based on the resources and response time of the fire department, and the size and complexity of the buildings.

When designing open, unheated reservoirs as sources of fire protection water, a 600 mm ice depth allowance should be included in the water volume calculations, except where local winter temperature conditions result in a greater ice depth (as typically found on local lakes or ponds). As well, make-up water supplies should be provided to maintain the design volumes, taking into account volume loss due to evaporation during drought periods.

1. Buildings not Requiring an On-Site Water Supply

(a) A building would not require an on-site water supply for firefighting if the building satisfies the criteria set out in Item 1(b) or Item 1(c) provided that:

(i) the building is serviced by a municipal water supply system that satisfies Item 3(b), or

a6 (ii) the fire department can respond with a transportable water supply of sufficient quantity to allow them to conduct an effective search and evacuation of the building, determined on the basis of other guidelines or standards (such as, NFPA 1142, “Standard on Water Supplies for Suburban and Rural Fire Fighting”).

(b) A building would not require an on-site water supply for firefighting where all of the following criteria are met:

(i) the building area is 200 m^2 or less,

(ii) the building height is 2 storeys or less,

(iii) the building does not contain a care or detention occupancy,

(iv) the building does not require a sprinkler system or a standpipe and hose system,

(v) the limiting distance from the property line is at least 13 m if the building contains a high hazard industrial occupancy, and

(vi) the building constitutes no significant environmental contamination potential due to fire.

(c) A building that exceeds 200 m^2 in building area or 2 storeys in building height and that contains a low hazard industrial occupancy may not require an on-site water supply for firefighting if the combustible loading in the building is insignificant (such as that found in cement plants, steel stock storage sheds, etc.), as determined by the chief building official.

2. Sprinklered Buildings
For sprinklered buildings, water supply additional to that required by the sprinkler systems should be provided for firefighting using fire hoses in accordance with the hose stream demands and water supply durations for different hazard classifications as specified in NFPA 13, "Installation of Sprinkler Systems".

3. Buildings Requiring On-Site Water Supply
(a) Except for sprinklered buildings and as required by Items 3(c) and 3(e), buildings should have a supply of water available for firefighting purposes not less than the quantity derived from the following formula:

$$Q = K \bullet V \bullet S_{tot}$$

where

Q = minimum supply of water in litres

K = water supply coefficient from Table 1

V = total building volume in cubic metres

S_{tot} = total of spatial coefficient values from property line exposures on all sides as obtained from the formula:

$$S_{tot} = 1.0 + [S_{side1} + S_{side2} + S_{side3} + \text{... etc.})]$$

where

S_{side} values are established from Figure 1, as modified by Items 3(d) and 3(f), and

S_{tot} need not exceed 2.0.

(b) Water supply flow rates should not be less than that specified in Table 2. Where the water supply is from a municipal or industrial water supply system, the required flow rate should be available at a minimum pressure of 140 kPa.
(c) The water supply as required in Item 3(a) should not be less than that needed to provide the minimum flow rate specified in Table 2 for a minimum duration of 30 minutes.
(d) Where a masonry wall with a minimum fire-resistance rating of 2 h, and no unprotected openings is provided as an exterior wall, the spatial coefficient (S_{side}) for this side of the building may be considered equal to 0. This masonry wall should be provided with a minimum 150 mm parapet. Firewalls that divide a structure into two or more buildings may be given similar consideration when evaluating the exposure of the buildings to each other.
(e) In elementary or secondary schools, the water supply determined in accordance with Items 3(a) and 3(b) may be reduced. The level of reduction to be applied would be at the discretion of the local enforcement authority, and should not exceed 30 percent.
(f) The spatial coefficient S_{side} may be considered equal to 0 when the exposed building is on the same property and is less than 10 m^2 in building area.

4. Additions to Existing Buildings
(a) Except as permitted in Items 4(b) and 4(c), additions to existing buildings should be provided with a water supply for firefighting as required in Items 3(a) to 3(e). Although under Part 11, Renovation, the required water supply is to be based only on the building volume of the addition, it is recommended that the entire building volume of the expanded facility be used to ensure complete evacuation and safety of all the occupants.
(b) Buildings with new additions falling within any one of the following criteria would not require an additional water supply for firefighting where:
(i) the expanded building complies with all the requirements of Item 1(a),
(ii) the new addition does not exceed 100 m^2 in building area, or
(iii) the new addition exceeds 100 m^2 but does not exceed 400 m^2 in building area, contains an assembly, business and personal services, mercantile or low hazard industrial occupancy, is of noncombustible construction, does not result in a significant increase in exposure to other existing buildings, has no combustible storage or process, and is separated from the existing building by a fire separation with a fire-resistance rating of at least 1 h.
(c) Where a firewall is provided between the new addition and the existing building, the water supply for firefighting may be determined in accordance with Items 1(a) and 3(a), using only the building volume of the new addition.

Table 1					
Water Supply Coefficient - K					
Type of Construction	Classification by Group or Division in Accordance with Table 3.1.2.1. of the Building Code				
	A-2 B-1 B-2 B-3 C D	A-4 F-3	A-1 A-3	E F-2	F-1
Building is of noncombustible construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2., including loadbearing walls, columns and arches.	10	12	14	17	23
Building is of noncombustible construction or of heavy timber construction conforming to Article 3.1.4.6. Floor assemblies are fire separations but with no fire-resistance rating. Roof assemblies, mezzanines, loadbearing walls, columns and arches do not have a fire-resistance rating.	16	19	22	27	37
Building is of combustible construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2., including loadbearing walls, columns and arches. Noncombustible construction may be used in lieu of fire-resistance rating where permitted in Subsection 3.2.2.	18	22	25	31	41
Building is of combustible construction. Floor assemblies are fire separations but with no fire-resistance rating. Roof assemblies, mezzanines, loadbearing walls, columns and arches do not have a fire-resistance rating.	23	28	32	39	53
Column 1	2	3	4	5	6

Table 2	
Part 3 Buildings under the Building Code	Required Minimum Water Supply Flow Rate, L/min
One-storey building with building area not exceeding 600 m²	1 800
All other buildings	2 700 (if Q ≤ 108 000 L)(1) 3 600 (if Q > 108 000 L and ≤ 135 000 L)(1) 4 500 (if Q > 135 000 L and ≤ 162 000 L)(1) 5 400 (if Q > 162 000 L and ≤ 190 000 L)(1) 6 300 (if Q > 190 000 L and ≤ 270 000 L)(1) 9 000 (if Q > 270 000 L)(1)

Notes to Table 2:
(1) $Q = KVS_{tot}$ as referenced in Paragraph 3(a)

FUS - Fire Flow Calculations

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 124111
Project Name: 541 Somme Street
Date: 1/27/2025
Input By: Ryan Good
Reviewed By: Anthony Mestwarp
Drawing Reference: 124111-GP

Legend: Input by User / No Input Required
Reference: Fire Underwriter's Survey Guideline (2020) Formula Method

Building Description: Single Storey Industrial - F-2 Classification
Type V - Wood frame

Step			Choose		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction C	Type V - Wood frame	Yes	1.5	1.5	
		Type IV - Mass Timber		Varies		
		Type III - Ordinary construction		1		
		Type II - Non-combustible construction		0.8		
		Type I - Fire resistive construction (2 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	417			
		Number of Floors/Storeys	1			
		Protected Openings (1 hr) if C<1.0	No			
		Area of structure considered (m^2)			**417**	
	F	**Base fire flow without reductions**				**7,000**
		F = 220 C (A)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**		**FUS Table 3**	**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	0%	**7,000**
		Limited combustible		-15%		
		Combustible	Yes	0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**		**FUS Table 4**	**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	No	-30%		**0**
		Standard Water Supply	No	-10%		
		Fully Supervised System	No	-10%		
				Cumulative Sub-Total	**0%**	
		Area of Sprinklered Coverage (m^2)		0%		
				Cumulative Total	**0%**	
5	**Exposure Surcharge**		**FUS Table 5**		**Surcharge**	
	(3)	North Side	10.1 - 20 m		15%	**1,750**
		East Side	>30m		0%	
		South Side	20.1 - 30 m		10%	
		West Side	>30m		0%	
				Cumulative Total	**25%**	
Results						
6	(1) + (2) + (3)	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**9,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**150**
				or	USGPM	2,378
7	**Storage Volume**	Required Duration of Fire Flow (hours)	**FUS Table 1**		Hours	2
		Required Volume of Fire Flow (m^3)			m^3	1080

OBC Water Supply for Firefighting Calculation

Based on OBC 2012 (Div. B, Article 3.2.5.7)

References: Ontario Fire Marshal - OBC Fire Fighting Water Supply
Ontario Building Code 2012, Appendix A, Vol 2., A-3.2.5.7

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 124111
Project Name: 541 Somme Street
Date: 2/3/2025
Input By: Ryan Good
Reviewed By: Anthony Mestwarp

Legend
Input by User
No Input Required

Building Description: Single Storey Industrial - F-3 Classification - Combustible Construction

Unsprinklered

Step		Calculation Inputs		Calculation Notes	Value
Minimum Fire Protection Water Supply Volume					
1	**Water Supply Coefficient**				
	Building Classification =	F-2		From Table 3.1.2.1	
	Water Supply Coefficient - K =			From Table 1 (A3.2.5.7)	**28**
2	**Total Building Volume**				
	Building Width - W	17.00	m		
	Building Length - L	24.40	m	Area (W * L) = 415 m2	
	Building Height - H	6	m		
	Total Building Volume - V =			W * L * H	**2489 m³**
3	**Spatial Coefficient Value**				
	Exposure Distances: (Exterior building face to property/lot line, to street centre, or to mid-point between proposed building and another building on same lot)			**Spatial Coefficients:** From Figure 1 (Spatial Coefficient vs Exposure Distance)	
	North	15.00	m	Sside 1 = **0.00**	
	East	73.86	m	Sside 2 = **0.00**	
	South	23.43	m	Sside 3 = **0.00**	
	West	25.52	m	Sside 4 = **0.00**	
	Total of Spacial Coefficient Values - S-Tot as obtained from the formula =			1.0 + (Sside 1 + Sside 2 + Sside 3 + Sside 4) (Max. value = 2.0)	**1.00**
4	**Minimum Fire Protection Water Supply Volume**				
	Q =			$K * V * S_{Tot}$	**69,686 L**
Required Minimum Water Supply Flow Rate					
5	**Minimum Water Supply Flow Rate =**			From Table 2 (For water supply from a municipal or industrial water supply system, min. pressure is 140 kPa)	**2,700 L/min** or **45 L/s**
Minimum Fire Protection Water Supply Volume for 30 minutes					
6	**Q =**			= Minimum Water Supply Flow Rate (L/min) * 30 minutes	**81,000 L**
Required Fire Protection Water Supply Volume					
7	**Q =**			Highest volume out of (4) and (6)	**81,000 L**
Notes					

From: Evans, Allan <Allan.Evans@ottawa.ca>
Sent: Thursday, February 27, 2025 9:46 AM
To: Ryan Good <r.good@novatech-eng.com>
Cc: Greg MacDonald <g.Macdonald@novatech-eng.com>; Anthony Mestwarp <a.mestwarp@novatech-eng.com>; Whittaker, Damien <Damien.Whittaker@ottawa.ca>
Subject: RE: 541 Somme Street - On-Site Fire Supply Coordination

Hi Ryan – I concur that OFS will not request a fire water storage tank based upon the information provided.

Building code services is the AHJ so ultimately it will be their final decision. I have cc'd Damien so that he has my comments on record – this may not be his file however so I am hoping he can forward to the appropriate person within his division as needed.

A

Allan Evans

Fire Protection Engineer / Ingénieur de Protection d'Incendies

Prevention Division / Prévention des Incendies

Ottawa Fire Services / Service des Incendies d'Ottawa

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(**(613) 913-2747**|(**(613) 580-2424 x24119**|**6 (613) 580-2866** |**+ Mail Code: 25-102**|**@OFSFPE**

From: Ryan Good <r.good@novatech-eng.com>
Sent: February 27, 2025 9:38 AM
To: Evans, Allan <Allan.Evans@ottawa.ca>
Cc: Greg MacDonald <g.Macdonald@novatech-eng.com>; Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Subject: 541 Somme Street - On-Site Fire Supply Coordination

Hi Allan,

Please note we are working on an Industrial Site Plan development at 541 Somme Street, in the Hawthorne Industrial Park; the City identified you as the OFS contact for coordination. The following are details relating to the project (see attached building plans which include the building statistics and Siteplan for general site layout):

- The intended building use is an office space at the front of the building and a warehouse at the back of the building
- Building Area = 416.2m2
- Major Occupancy Classifications are Group D (107.95m2) and Group F3 (293.1m2)

We are currently proposing that no on-site water supply storage is required for firefighting purposes, on the basis that the building is less than 600m2 and Low Hazardous Industrial occupancy. This is consistent with the approach our team coordinated with you the Techo Bloc development (also <600m2 and Low Industrial occupancy) located at 581 Somme Street.

Let us know if you have any comments or concerns with the details above. If a meeting would be helpful to discuss any details, please confirm a time you are available and we can schedule a Teams meeting.

Thank you,

Ryan Good, C.E.T., Design Technologist | Land Development and Public Sector Infrastructure

NOVATECH

Engineers, Planners & Landscape Architects

240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext: 284 | Cell: 343-364-2246

From: Erik Ardley <EArdley@patersongroup.ca>
Sent: Thursday, May 1, 2025 2:14 PM
To: Michael Killam <MKillam@patersongroup.ca>; Ryan Good <r.good@novatech-eng.com>; Alex Schopf <aschopf@patersongroup.ca>
Cc: Jeffrey Kelly <j.kelly@novatech-eng.com>; Anthony Mestwarp <a.mestwarp@novatech-eng.com>; Lucky Montierro <lucky.montierro@titanenviro.com>; Greg MacDonald <g.Macdonald@novatech-eng.com>
Subject: RE: PH4991 - 541 Somme Street - Well location survey and Water Requirements

Good afternoon Ryan,

We were able to complete the meeting with the City Hydrogeologist today. They agree with the approach of using the well as a non-drinkable water source and have not asked for anything further. As such, we are wrapping up the report and anticipate having it to you for the end of next week.

Please do not heisitate to reach out should you have any questions or concerns,
Thanks,
Erik

ERIK ARDLEY, P.Geo.
Project Manager – Hydrogeology
TEL: **(613) 808-9776**
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OTTAWA ON K2E 7T9
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From: Alex Schopf <aschopf@patersongroup.ca>
Sent: Wednesday, March 26, 2025 10:49 AM
To: Greg MacDonald <g.Macdonald@novatech-eng.com>; Juice Lambert <juice.lambert@titanenviro.com>; Lucky Montierro <lucky.montierro@titanenviro.com>; Ryan Good <r.good@novatech-eng.com>; Michael Killam <MKillam@patersongroup.ca>
Cc: Jeffrey Kelly <j.kelly@novatech-eng.com>; Anthony Mestwarp <a.mestwarp@novatech-eng.com>; Erik Ardley <Eardley@patersongroup.ca>
Subject: RE: PH4991 – 541 Somme Street – Well location survey and Water Requirements

Hi Greg,

While it has been accepted in the past, the City has indicated that it is on a case-by-case basis and therefore it would need to be confirmed with the City before having potable water brought in is proposed in the report. With the clients permission we will reach out to the City to initiate the discussion.

Cheers,

PATERSON GROUP
SOLUTION ORIENTED ENGINEERING

Alexander Schopf, E.I.T, PhD
Hydrogeology Department
TEL: (613) 226-7381 ext. 136
DIRECT: (613) 912-3490
CELL: (613) 807-4147
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From: Greg MacDonald <g.Macdonald@novatech-eng.com>
Sent: Wednesday, March 26, 2025 9:27 AM
To: Alex Schopf <aschopf@patersongroup.ca>; Juice Lambert <juice.lambert@titanenviro.com>; Lucky Montierro <lucky.montierro@titanenviro.com>; Ryan Good <r.good@novatech-eng.com>; Michael Killam <MKillam@patersongroup.ca>
Cc: Jeffrey Kelly <j.kelly@novatech-eng.com>; Anthony Mestwarp <a.mestwarp@novatech-eng.com>; Erik Ardley <EArdley@patersongroup.ca>
Subject: RE: PH4991 - 541 Somme Street - Well location survey and Water Requirements

Thanks Alex. Will the City accept this, e.g. potable water brought in?

Greg MacDonald, P. Eng.
Director, Land Development and Public Sector Infrastructure
NOVATECH
Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 x279 | Cell: 613.890.9705 | Fax: 613.254.5867

From: Alex Schopf <aschopf@patersongroup.ca>
Sent: Wednesday, March 26, 2025 9:20 AM
To: Juice Lambert <juice.lambert@titanenviro.com>; Lucky Montierro <lucky.montierro@titanenviro.com>; Ryan Good <r.good@novatech-eng.com>; Greg MacDonald <g.Macdonald@novatech-eng.com>; Michael Killam <MKillam@patersongroup.ca>
Cc: Jeffrey Kelly <j.kelly@novatech-eng.com>; Anthony Mestwarp <a.mestwarp@novatech-eng.com>; Erik Ardley <EArdley@patersongroup.ca>
Subject: RE: PH4991 - 541 Somme Street - Well location survey and Water Requirements

Good morning Juice and Lucky,

We received the geochemical results from the pumping test. Unfortunately the geochemical results indicate that the water supply encountered by the well is non potable and has encountered potential surficial impacts. The most significant issues are the presence of total coliforms, a dissolved organic carbon concentration of 7.7 mg/L, and a manganese concentration of approximately 2.9 mg/L.

The presence of total coliforms and dissolved organic carbon is typically associated with surficial impacts, however can be associated with potential impacts during the well installation process. In order to determine if the total coliforms are associated with the well installation or with the aquifer, the well will need to be disinfected and purged, after which a resample will need to be collected. This will require renting a pump trailer from Air Rock for two days, one to chlorinate the well and one to purge it. Prior to completing any further work, we recommend that we complete a Hydrogeological consultation with the City Hydrogeologists to ensure that they will accept our proposed approach. We can complete the work on a time and materials basis to keep costs down.

Under the City of Ottawa Hydrogeological Assessment and Terrain Analysis Guidelines (HTAG) annotated Ministry of the Environment, Conservation and Parks (MECP) Procedure D-5-5, the Maximum Concentration Considered Reasonably Treatable (MCCRT) for manganese is 1.0 mg/L. Under the current Federal Guidelines, manganese has a Maximum Acceptable Concentration (MAC) of 0.12 mg/L. The manganese concentration which was measured is approximately 2.89 mg/L, which is approximately 24 times higher than the federal MAC of 0.12 mg/L and approximately 2.5 times the provincial MCCRT. As the manganese concentration is greater than the MCCRT, the Hydrogeological Assessment in support of the Site Plan application would indicate that the water supply could not be used for potable uses (i.e drinking water).

Assuming that the potential surficial impacts are associated with the well installation process, we would still need to address the elevated manganese concentration in the aquifer. This means that regardless of the bacteria presence, the water source cannot be used for drinking water purposes. Additional drinking water (i.e water coolers) would need to be brought in from off site, however the well water can still be used for non-potable uses such as toilets.

Please let us know when you are available to discuss.

Alexander Schopf, E.I.T, PhD
Hydrogeology Department

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Appendix C

Sanitary Design Information

(6) Water softener and iron filter discharge may be directed to the *sewage system* provided the system has been designed to accept such discharges.

(7) *Storm sewage* shall not be discharged into a *sewage system*.

(8) The *interceptor* required in Sentence (4) shall,
(a) have a minimum flow rate as required by Sentence 7.4.4.3.(8) using a 60 second drain down time, and
(b) conform to,
  (i) CSA B481.1, "Testing and Rating of Grease Interceptors Using Lard", or
  (ii) CSA B481.2, "Testing and Rating of Grease Interceptors Using Oil".

Section 8.2. Design Standards

8.2.1. General Requirements

8.2.1.1. Scope

(1) This Subsection applies to the design of *sewage systems*.

8.2.1.2. Site Evaluation

(1) A site evaluation shall be conducted on every site where a new or replacement *sewage system* is to be installed. (See Appendix A.)

(2) The *percolation time* shall be determined by,
(a) conducting percolation tests, or
(b) classifying the *soil* according to one of the following methods,
  (i) the Unified Soil Classification System as described in MMAH Supplementary Standard SB-6, "Percolation Time and Soil Descriptions", or

(ii) the Soil Texture Classification as described in Chapter 3 of USDA, "Soil Survey Manual". (See Appendix A.)

(3) Where the *percolation time* is determined by a percolation test, there shall be a minimum of 3 locations selected, suitably spaced to accurately evaluate the *leaching bed* area, with the highest *percolation time* of the tests being used. (See Appendix A.)

8.2.1.3. Sewage System Design Flows

(1) For *residential occupancies*, the total daily design *sanitary sewage* flow shall be at least the value in Column 2 as determined from Table 8.2.1.3.A. (See Appendix A.)

(2) For all other *occupancies*, the total daily design *sanitary sewage* flow shall be at least the value in Column 2 as determined from Table 8.2.1.3.B. (See Appendix A.)

(3) Where a *building* contains more than one establishment, the total daily design *sanitary sewage* flow shall be the sum of the total daily design *sanitary sewage* flow for each establishment.

(4) Where an *occupancy* is not listed in Table 8.2.1.3.B., the highest of metered flow data from at least 3 similar establishments shall be acceptable for determining the total daily design *sanitary sewage* flow.

Table 8.2.1.3.A.
Residential Occupancy
Forming Part of Sentence 8.2.1.3.(1)

Residential Occupancy	Volume, litres
Apartments, Condominiums, Other Multi-family Dwellings - per person[1]	275
Boarding Houses	
(a) Per person,	
(i) with meals and laundry facilities, or,	200
(ii) without meal or laundry facilities, and	150
(b) Per non-resident staff per 8 hour shift	40
Boarding School - per person	300
Dwellings	
(a) 1 bedroom dwelling	750
(b) 2 bedroom dwelling	1 100
(c) 3 bedroom dwelling	1 600
(d) 4 bedroom dwelling	2 000
(e) 5 bedroom dwelling	2 500
(f) Additional flow for[2]	
(i) each bedroom over 5,	500
(ii) (A) each 10 m^2 (or part of it) over 200 m^2 up to 400 m^2 [3],	100
(B) each 10 m^2 (or part of it) over 400 m^2 up to 600 m^2 [3], and	75
(C) each 10 m^2 (or part of it) over 600 m^2 [3], or	50
(iii) each fixture unit over 20 fixture units	50
Hotels and Motels (excluding bars and restaurants)	
(a) Regular, per room	250
(b) Resort hotel, cottage, per person	500
(c) Self service laundry, add per machine	2 500
Work Camp/Construction Camp, semi-permanent per worker	250
Column 1	2

Notes to Table 8.2.1.3.A.:

(1) The *occupant load* shall be calculated using Subsection 3.1.17.

(2) Where multiple calculations of *sanitary sewage* volume is permitted, the calculation resulting in the highest flow shall be used in determining the design daily *sanitary sewage* flow.

(3) Total finished area, excluding the area of the finished *basement*.

Table 8.2.1.3.B.
Other Occupancies
Forming Part of Sentence 8.2.1.3.(2)

Establishments[1]	Volume, litres
Airports, Bus Terminals, Train Stations, Dock/Port Facilities (Food Services excluded)	
(a) Per passenger, and	20
(b) Per employee per 8 hour shift	40
Assembly Hall - per seat	
(a) No food service, or	8
(b) Food service provided	36
Barber Shop/Beauty Salon - per service chair	650
Bowling Alleys (Food Service not included) - per lane	400
Churches and Similar Places of Worship - per seat	
(a) No kitchen facilities, or	8
(b) Kitchen facilities provided	36
Country Club (excluding Food Service)	
(a) Per resident,	375
(b) Per employee per 8 hour shift, and	50
(c) Per member or patron	40
Day Care Facility per person (staff and children)	75
Dentist Office	
(a) Per wet service chair, and	275
(b) Per dry service chair	190
Doctors Office	
(a) Per practitioner, and	275
(b) Per employee per 8 hour shift	75
Factory (excluding process or cleaning waters) - per employee per 8 hour shift	
(a) No showers, or	75
(b) Including showers	125
Flea Markets[2] (open not more than 3 days per week)	
(a) Per non-food service vendor space,	60
(b) Per food service establishment / 9.25 m^2 of floor space, and	190
(c) Per limited food service outlet	95
Column 1	2

Table 8.2.1.3.B. (Cont'd)
Other Occupancies
Forming Part of Sentence 8.2.1.3.(2)

Establishments[1]	Volume, litres
Food Service Operations	
(a) Restaurant (not 24 hour), per seat	125
(b) Restaurant (24 hour), per seat	200
(c) Restaurant on controlled-access highway, per seat	400
(d) Paper service restaurant, per seat	60
(e) Donut shop, per seat	400
(f) Bar and cocktail lounge, per seat	125
(g) Drive-in restaurant per parking space	60
(h) Take-out restaurant (no seating area)	
(i) per 9.25 m^2 of floor area, and	190
(ii) per employee per 8 hour shift	75
(i) Cafeteria - per meal	12
(j) Food outlet	
(i) excluding delicatessen, bakery and meat department, per 9.25 m^2 of floor space,	40
(ii) per 9.25 m^2 of delicatessen floor space,	190
(iii) per 9.25 m^2 of bakery floor space,	190
(iv) per 9.25 m^2 of meat department floor space, and	380
(v) per water closet	950
Hospitals - per bed	
(a) Including laundry facilities, or	750
(b) Excluding laundry facilities	550
Long-Term Care Homes, etc. - per bed	450
Office Building[3]	
(a) Per employee per 8 hour shift, or	75
(b) Per each 9.3 m^2 of floor space	75
Public Parks	
(a) With toilets only per person, or	20
(b) With bathhouse, showers, and toilets per person	50
Column 1	2

Table 8.2.1.3.B. (Cont'd)
Other Occupancies
Forming Part of Sentence 8.2.1.3.(2)

Establishments[1]	Volume, litres
Recreational Vehicle or Campground Park	
(a) Per site without water or sewer hook-up, or	275
(b) Per site with water and sewer hook-up	425
Schools - per student	
(a) Day school,	30
(b) With showers,	30
(c) With cafeteria, and	30
(d) Per non-teaching employee per 8 hour shift	50
Service Stations (no vehicle washing)[3]	
(a) Per water closet, and	950
(i) per fuel outlet[4], or	560
(ii) per vehicle served	20
Shopping Centre (excluding food and laundry) - per 1.0 m^2 of floor space	5
Stadiums, Race Tracks, Ball Parks - per seat	20
Stores[3]	
(a) Per 1.0 m^2 of floor area, or	5
(b) Per water closet	1 230
Swimming and Bathing Facilities (Public) - per person	40
Theatres	
(a) Indoor, auditoriums per seat,	20
(b) Outdoor, drive-ins per space, or	40
(c) Movie theatres per seat	15
Veterinary Clinics	
(a) Per practitioner,	275
(b) Per employee per 8 hour shift, and	75
(c) Per stall, kennel or cage if floor drain connected	75
Warehouse	
(a) Per water closet, and	950
(b) Per loading bay	150
Column 1	2

Notes to Table 8.2.1.3.B.:

(1) The *occupant load* shall be calculated using Subsection 3.1.17.

(2) Flea markets open more than 3 days per week shall be assessed using the volumes stated under the heading "Stores".

(3) Where multiple calculations of *sanitary sewage* volume is permitted, the calculation resulting in the highest flow shall be used in determining the design daily *sanitary sewage* flow.

(4) The number of fuel outlets is considered the maximum number of fuel nozzles that could be in use at the same time.

8.2.1.4. Clearances (See Appendix A.)

(1) Unless it can be shown to be unnecessary, where the *percolation time* is 10 minutes or greater, the location of all components within a *sewage system* shall be in conformance with the clearances listed in Article 8.2.1.5. or 8.2.1.6.

(2) Unless it can be shown to be unnecessary, where the *percolation time* is less than 10 minutes, the clearances listed in Articles 8.2.1.5. and 8.2.1.6. for wells, lakes, ponds, reservoirs, rivers, springs or streams shall be increased to compensate for the lower *percolation time*.

(3) No *building* shall be *constructed* closer to any part of a *sewage system* than the clearances listed in Article 8.2.1.5. or 8.2.1.6.

(4) If more than one *sewage system* is located on a lot or parcel of land, there shall be no overlap of any part of the systems.

8.2.1.5. Clearance Distances for Class 1, 2 and 3 Sewage Systems

(1) Except as provided in Sentences 8.2.1.4.(1) and (2), no Class 1, 2 or 3 *sewage system* shall have a horizontal distance of less than that permitted by Table 8.2.1.5.

Table 8.2.1.5.
Clearance Distances for Class 1, 2 and 3 Sewage Systems
Forming Part of Sentence 8.2.1.5.(1)

Sewage System	Minimum horizontal distance in metres from a well with watertight casing to a depth of at least 6 m	Minimum horizontal distance in metres from a spring used as a source of *potable* water or well other than a well with a watertight casing to a depth of at least 6 m	Minimum horizontal distance in metres from a lake, river, pond, stream, reservoir, or a spring not used as a source of *potable* water	Minimum horizontal distance in metres from a property line
Earth Pit Privy	15	30	15	3
Privy Vault Pail Privy	10	15	10	3
Greywater System	10	15	15	3
Cesspool	30	60	15	3
Column 1	2	3	4	5

8.2.1.6. Clearances for a Class 4 or 5 Sewage System

(1) Except as provided in Sentences 8.2.1.4.(1) and (2), a *treatment unit* shall not be located closer than the minimum horizontal distances set out in Table 8.2.1.6.A.

(2) Except as provided in Sentences 8.2.1.4.(1) and (2), the centreline of a *distribution pipe* or *leaching chamber* shall not be located closer than the minimum horizontal distances set out in Table 8.2.1.6.B. and these distances shall be increased when required by Sentence 8.7.4.2.(11).

(3) Except as provided in Sentences 8.2.1.4.(1) and (2), a *holding tank* shall not be located closer than the minimum horizontal distances set out in Table 8.2.1.6.C.

Table 8.2.1.6.A.
Minimum Clearances for Treatment Units
Forming Part of Sentence 8.2.1.6.(1)

Object	Minimum Clearance, m
Structure	1.5
Well	15
Lake	15
Pond	15
Reservoir	15
River	15
Spring	15
Stream	15
Property Line	3
Column 1	2

Table 8.2.1.6.B.
Minimum Clearances for Distribution Piping and Leaching Chambers
Forming Part of Sentence 8.2.1.6.(2)

Object	Minimum Clearance, m
Structure	5
Well with a watertight casing to a depth of at least 6 m	15
Any other well	30
Lake	15
Pond	15
Reservoir	15
River	15
Spring not used as a source of *potable* water	15
Stream	15
Property Line	3
Column 1	2

Table 8.2.1.6.C.
Minimum Clearances for Holding Tanks
Forming Part of Sentence 8.2.1.6.(3)

Object	Minimum Clearance, m
Structure	1.5
Well with a watertight casing to a depth of at least 6 m	15
Any other well	15
Spring	15
Property Line	3
Column 1	2

8.2.2. Treatment and Holding Tanks

8.2.2.1. Application

(1) This Subsection applies to any tank used in a *sewage system* for collecting, treating, holding or storing *sanitary sewage*.

8.2.2.2. Tanks

(1) Subject to Sentence (3), a tank that is used as a *treatment unit* in a Class 4 *sewage system* or a *holding tank* in a Class 5 *sewage system* shall conform to the requirements of CSA B66, "Design, Material, and Manufacturing Requirements for Prefabricated Septic Tanks and Sewage Holding Tanks".

(2) Subject to Sentence (3), material standards, access and construction methods and practices for a tank used for other Classes of *sewage systems* shall conform to the requirements of CSA B66, "Design, Material, and Manufacturing Requirements for Prefabricated Septic Tanks and Sewage Holding Tanks".

(3) Tanks referred to in Sentences (1) and (2) are not required to conform to the requirements of Clause 10.2.(j) of CSA B66 "Design, Material, and Manufacturing Requirements for Prefabricated Septic Tanks and Sewage Holding Tanks".

(4) Sentence (2) does not apply to a tank that is an integral part of a prefabricated Class 1 *sewage system*.

(5) Access openings shall be located to facilitate the pumping of all compartments and the servicing of the inlet and outlet of each compartment not accessible by removal of the tank top or part of it.

(6) A tank shall not be covered by *soil* or *leaching bed fill* having a depth greater than the maximum depth of burial that the tank is designed to withstand.

(7) A tank shall be securely anchored when located in an area subject to flooding or where *ground water* levels may cause hydrostatic pressures.

8.2.2.3. Septic Tanks

(1) The minimum *working capacity* of a *septic tank* shall be the greater of 3 600 L and,

(a) in *residential occupancies*, twice the daily design *sanitary sewage* flow, or

(b) in non-*residential occupancies*, three times the daily design *sanitary sewage* flow.

(2) Every *septic tank* shall be constructed in such a manner that any *sanitary sewage* flowing through the tank will pass through at least 2 compartments.

(3) The *working capacity* of the compartments required in Sentence (2) shall be sized such that,

(a) the first compartment is at least 1.3 times the daily design *sanitary sewage* flow but in no case less than 2 400 L, and

(b) each subsequent compartment shall be at least 50% of the first compartment.

(4) Where multiple tanks are to be used to meet the requirements of Sentences (2) and (3), the tanks shall be connected in series such that,

(a) the first tank in the series shall have at least a capacity as calculated in Clause (3)(a), however at no time shall a tank having a *working capacity* of less than 3 600 L be used,

(b) all additional tanks after the first tank, excluding pump or dosing tanks shall have at least a *working capacity* equal to the volume required by Clause (3)(b),

(c) the pipe between the outlet of one tank and the inlet of the next tank in the series shall have a minimum slope of 2 percent,

(d) there shall be no partitions in the tank except where a partition is required to maintain the structural integrity of the tank, in which case openings within the partition shall be provided to allow the free movement of *sanitary sewage* throughout the tank, and

(e) all piping between tanks shall be continuous and shall be connected to the tank through the use of flexible watertight seals that will permit differential movement between the tanks.

(5) Partitions separating the *septic tank* into compartments shall extend at least 150 mm above the liquid level at the outlet, and there shall be one or more openings through or above the partition.

(6) The openings required between compartments referred to in Sentence (2) shall have a total cross-sectional area of at least three times the area of the inlet pipe and be located between the top and a level 150 mm above the liquid level at the outlet to provide for the free flow of air between compartments.

(7) *Sanitary sewage* shall pass from one compartment to another of the *septic tank* as follows:

(a) by means of a device similar to that described in CSA B66, "Design, Material, and Manufacturing Requirements for Prefabricated Septic Tanks and Sewage Holding Tanks" for outlet devices, or

(b) through two or more openings through the partition located in a horizontal line, and evenly spaced across the width of the partition, centred at approximately 40% of the liquid depth below the surface of the liquid, and having a total area of between three and five times that of the cross-sectional area of the inlet pipe.

(8) A *septic tank* shall be of such design and construction as will permit the collection and holding of *sanitary sewage* in it to a depth of not less than 1 000 mm, except that a depth of not less than 900 mm is permitted where the excavation is in rock, or to avoid rupture or displacement of the tank due to *ground water* pressure.

(9) Except as provided in Sentences (10) and (11), every *septic tank* shall be installed in such a manner that the access openings are located not more than 300 mm below the ground surface.

(10) Where the top of the *septic tank* is located more than 300 mm below the ground surface, it shall be equipped with risers that extend from the access opening of the *septic tank* to within 300 mm of the ground surface.

(11) Where risers are used they shall conform to the requirements of CSA B66, "Design, Material, and Manufacturing Requirements for Prefabricated Septic Tanks and Sewage Holding Tanks", and shall have adequate access openings to allow for regular maintenance of the *septic tank*.

8.2.2.4. Holding Tanks

(1) All *holding tanks* shall be of such design and construction as will allow the complete removal of solid matter that can be expected to settle in the *holding tank* through an apparatus or device suitable for allowing the contents of the *holding tank* to be removed from the *holding tank*.

(2) A *holding tank* shall have a *working capacity* of not less than 9 000 L.

(3) Where two or more tanks are used to meet the requirement of Sentence (2), they shall be deemed to be one *holding tank* provided they are connected in such a manner as will allow the *sanitary sewage* contained in them to flow between the tanks.

(4) The *working capacity* of the tanks described in Sentence (3) shall not include any portion of any tank that cannot be completely drained due to the manner in which the connections are made.

Section 8.3. Class 1 Sewage Systems

8.3.1. General Requirements

8.3.1.1. Scope

(1) This Section applies to the *construction* of a Class 1 *sewage system*.

8.3.1.2. Application

(1) Except as provided in Sentence (2), a Class 1 *sewage system* shall be designed to receive only human body waste for disposal.

Table 8.6.2.2.
Other Treatment Unit Effluent Quality Criteria
Forming Part of Sentences 8.6.2.2.(1) and (2)

Classification of *Treatment Unit*(1)	Suspended Solids(2)	$CBOD_5$(2)
Level II	30	25
Level III	15	15
Level IV	10	10
Column 1	2	3

Notes to Table 8.6.2.2.:

(1) The classifications of *treatment units* specified in Column 1 correspond to the levels of treatment described in CAN/BNQ 3680-600, "Onsite Residential Wastewater Treatment Technologies".

(2) Maximum concentration in mg/L based on a 30 day average.

(3) All *treatment units* referred to in Sentences (1) and (2) that contain mechanical components shall be equipped with an audible and visual warning alarm so located to warn the occupants of the *building* served or the operator of the *treatment unit* of a malfunction in the operation of the *treatment unit*.

(4) All *treatment units* referred to in Sentences (1) and (2) shall permit the sampling of the *effluent*.

(5) A *treatment unit* is deemed to comply with Sentences (1) and (2) if it has been certified to CAN/BNQ 3680-600, "Onsite Residential Wastewater Treatment Technologies" using a temperature condition listed under option a) or b) of Clause 8.2.2. of that standard. (See Appendix A.)

(6) Every operator of a *treatment unit* shall obtain, from the manufacturer or distributor of the *treatment unit*, literature that describes the unit in detail and provides complete instructions regarding the operation, servicing, and maintenance requirements of the unit and its related components necessary to ensure the continued proper operation in accordance with the original design and specifications.

8.7.7. Type A Dispersal Beds

8.7.7.1. Construction Requirements

(1) The *treatment unit* used in conjunction with a *leaching bed constructed* as a *Type A dispersal bed* shall provide an *effluent* quality that does not exceed the maximum concentrations set out opposite a Level IV *treatment unit* in Columns 2 and 3 of Table 8.6.2.2.

(2) A *Type A dispersal bed* shall be backfilled with *leaching bed fill* so as to ensure that, after the *leaching bed fill* settles, the surface of the *leaching bed* will not form any depressions.

(3) The combined thickness of the sand layer and the stone layer if utilized of a *Type A dispersal bed* shall not be less than 500 mm.

(4) Except as provided in Sentence (5), the sand layer shall,

(a) be comprised of sand that has,
  (i) a *percolation time* of at least 6 and not more than 10 min, and
  (ii) not more than 5% fines passing through a 0.074 mm (No. 200) sieve,

(b) have a minimum thickness of 300 mm, and

(c) have an area that is not less than the lesser of,
  (i) the area of the stone layer determined in accordance with Sentence (6) or, if *leaching chambers* are used, the area over which the *leaching chambers* are spaced determined in accordance with Sentence (6.1), and
  (ii) the value determined by the formula,

$$A = \frac{QT}{850}$$

where,

A = the area of contact in square metres between the base of the sand and the underlying *soil*,

Q = the total daily design *sanitary sewage* flow in litres, and

T = the lesser of 50 and the *percolation time* of the underlying *soil*.

(5) Where the underlying *soil* has a *percolation time* of more than 15 min, the sand layer referred to in Sentence (4) shall,

(a) extend to at least 15 m beyond the perimeter of the *treatment unit*, or the centrelines of the outer *distribution pipes* or or *leaching chambers* if utilized, in any direction in which the *effluent* entering the *soil* or *leaching bed fill* will move horizontally, and

(b) have an area that is not less than the value determined by the formula,

$$A = \frac{QT}{400}$$

where,

A = the area of contact in square metres between the base of the sand and the underlying *soil*, or *leaching bed fill* if utilized,

Q = the total daily design *sanitary sewage* flow in litres, and

T = the lesser of 50 and the *percolation time* of the underlying *soil*.

(See Appendix A.)

(6) Where a stone layer is used, the stone layer shall,

(a) be rectangular in shape with the long dimension parallel to the site contours,

(b) have a minimum thickness of 200 mm,

(c) be protected in the manner described in Sentence 8.7.3.3.(2), and

(d) be *constructed* such that the bottom of the stone layer is at least 600 mm above the *high ground water table*, rock or *soil* with a *percolation time* of 1 min or less or greater than 50 min.

(e) have a minimum area not less than the value determined by the formula,

$$A = Q/B$$

where,

A = the area of the stone layer in square metres,

B = the following amount,

(i) 50, if the total daily design *sanitary sewage* flow exceeds 3 000 litres, or

(ii) 75, if the total daily design *sanitary sewage* flow does not exceed 3 000 litres, and

Q = the total daily design *sanitary sewage* flow in litres.

(6.1) Where *leaching chambers* are used,

(a) the *Type A dispersal bed* shall be rectangular in shape with the long dimension parallel to the site contours, and

(b) the *leaching chambers* shall,

(i) be evenly spaced over the area calculated in Subclause (iv), with a maximum distance of 200 mm between the exterior edges of the lines of *leaching chamber*,

(ii) be protected in the manner described in Clause 8.7.3.4.(1)(f),

(iii) be *constructed* such that the bottom of the *leaching chambers* is at least 600 mm above the *high ground water table*, rock or *soil* with a *percolation time* of 1 min or less or greater than 50 min, and

(iv) have a minimum area not less than the value determined by the formula,

$$A = Q/B$$

where,

A = the area over which the leaching chambers are spaced, in square metres,

B = the following amount,
(i) 50, if the total daily design *sanitary sewage* flow exceeds 3 000 litres, or
(ii) 75, if the total daily design *sanitary sewage* flow does not exceed 3 000 litres, and

Q = the total daily design *sanitary sewage* flow in litres.

(7) *Leaching bed fill* with a *percolation time* not exceeding 15 min may be used to satisfy the vertical separation requirements of Clause (6)(d) or Subclause (6.1)(b)(iii), provided that the *leaching bed fill* conforms to the requirements specified in Sentence (5) regardless of the *percolation time* of the underlying *soil*.

(8) Where a stone layer is used, the *effluent* shall be evenly distributed within the stone layer to within 600 mm of the perimeter of the stone layer. (See Appendix A.)

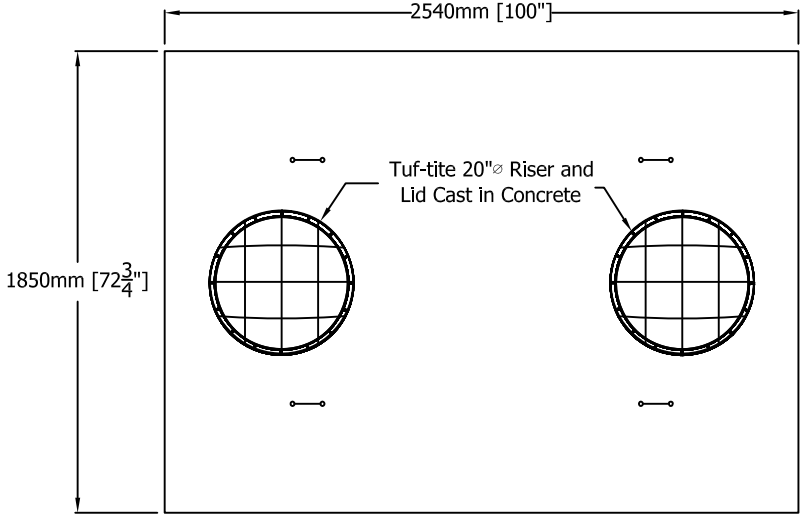
(8.1) Where *leaching chambers* are used, the *effluent* shall be evenly distributed within the area over which the *leaching chambers* are spaced to within 600 mm of the perimeter of that area.

(9) The stone layer or area over which the *leaching chambers* are spaced shall not be located closer than the minimum horizontal distances set out in Table 8.2.1.6.B. and these distances shall be increased when required by Sentence 8.7.4.2.(11).

8.7.8. Type B Dispersal Beds

8.7.8.1. General Requirements

(1) Except as provided in Sentence (2) and Sentence 8.7.8.2.(2), a *Type B dispersal bed* shall conform to the requirements of Article 8.7.2.1.



WORKING VOLUME to liquid depth: 4800L (1050 GAL)
TOTAL VOLUME to underside of lid: 5700L (1250 GAL)

CONCRETE: 32MPa @ 28 DAYS WITH 5-8% AIR-ENTRAINMENT
NON-SULPHATE RESISTANT

REINFORCEMENT: 10M DEFORMED BAR W/MIN 25mm (1") COVER
WALLS AND BASE 2- 10M bar horizontal and vertical spaced evenly
LID @ 375mm O/C EW

WEIGHT: TANK BODY: 3770 KG (8,450 LBS)
LID: 1030 KG (2,300 LBS)
TOTAL: 4800 KG (10,750 LBS)

BURIAL DEPTH: 600mm (24") MAXIMUM EARTH COVER - NON-VEHICULAR TRAFFIC

WATER TIGHTNESS: CON-SEAL CS-102 MASTIC SEALANT BETWEEN LID AND BOTTOM SECTION APPLIED IN FACTORY ACCORDING TO MANUFACTURER'S RECOMMENDED METHOD

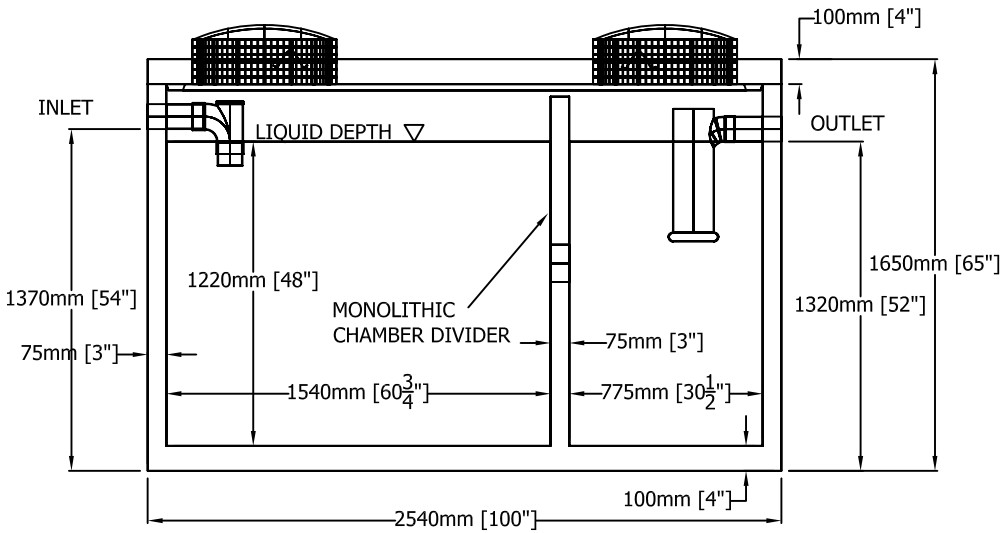
CENTRE WALL MONOLITHIC WITH TANK BODY

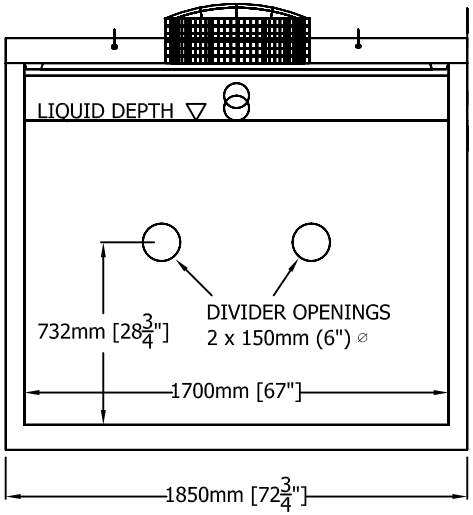
PIPE/WALL CONNECTIONS:
INLET - POLYLOK IV HIGH PRESSURE SEAL CAST IN CONCRETE FITTED WITH 100mm (4") OPEN-TOPPED TEE BAFFLE EXTENDING INTO LIQUID LEVEL 100mm (4").
OUTLET - POLYLOK IV HIGH PRESSURE SEAL CAST IN CONCRETE FITTED WITH TUF-TITE EF-6 EFFLUENT FILTER (1.6mm (1/16)" FILTRATION) EXTENDING INTO LIQUID LEVEL 400mm (16")

ACCESS OPENINGS: TUF-TITE 600mm⌀ ACCESS RISERS AND LID CAST IN CONCRETE. LID SECURED WITH STAINLESS STEEL HARDWARE. LID EXTENDS 150mm ABOVE TOP OF TANK. ADDITIONAL RISERS CAN BE ADDED TO BRING ACCESS TO GRADE.

TANK BODY AND LID LIFTED USING BOYD BROTHERS LTD SUPPLIED RIGGING

CONFORMS TO CSA STANDARD B66-10





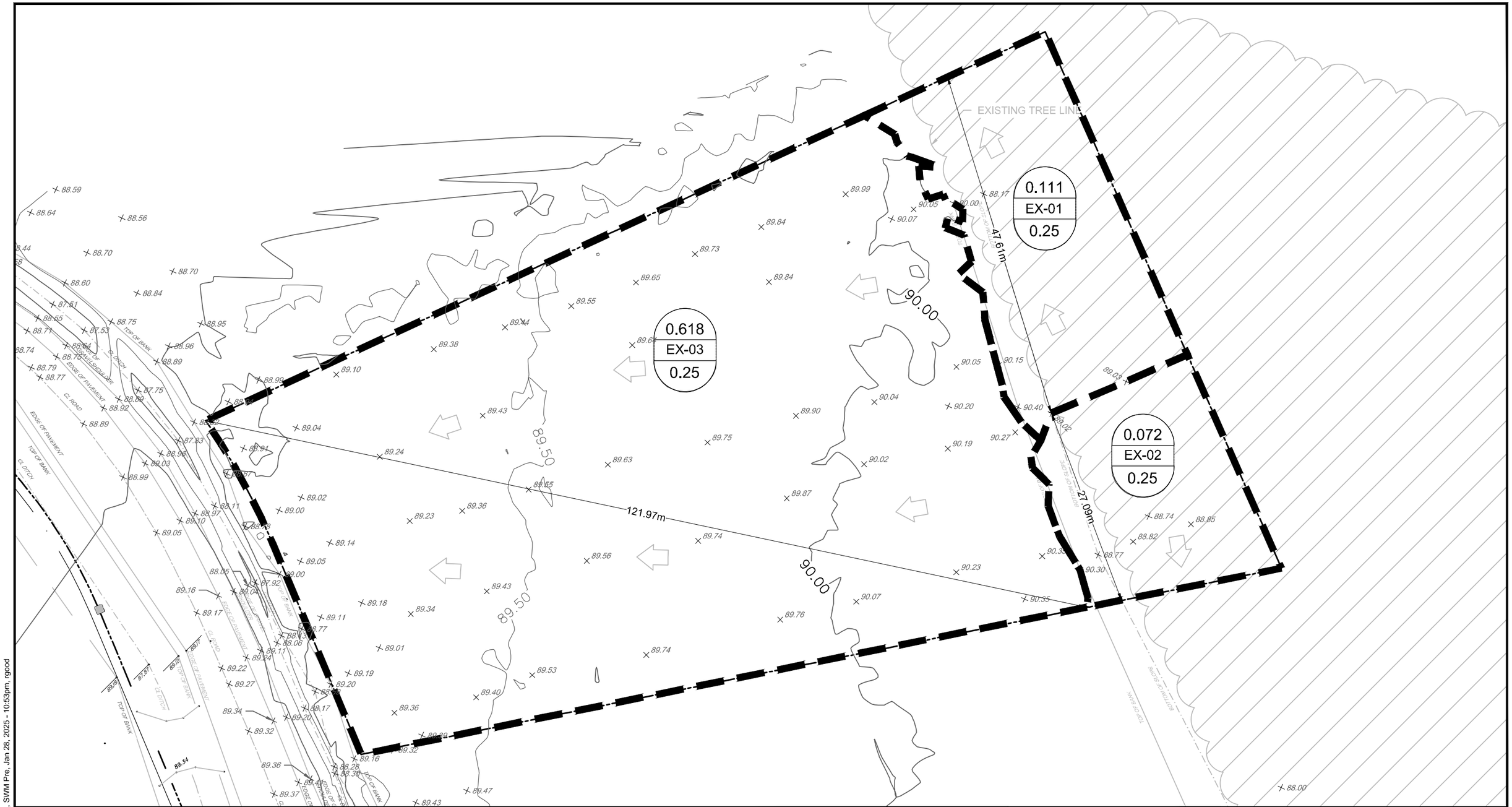
BOYD BROTHERS
5450 CUDDY ST, OSGOODE, ONT, K0A 2W0
tel (613) 826-2318 fax (613) 826-3679
toll free 888-846-6664
website www.boydbrosconcrete.ca
e-mail info@boydbrosconcrete.ca

PRODUCT
4800L (1050 GAL) REGULAR SEPTIC TANK

SERIES NO	MODEL NO	MODELS IN SERIES
4800	4800R	4800R, 3600L
SCALE	REV	DATE
1:30	1.0	MARCH 1, 2011

Appendix D

Stormwater Management Information



LEGEND

PROPOSED PROPERTY LINE

PROPOSED STORM DRAINAGE AREA

0.11 / A-1 / 0.80 — DRAINAGE AREA (HECTARES) DRAINAGE AREA ID

DIRECTION OF EXISTING MAJOR OVERLAND FLOW ROUTE

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

CITY OF OTTAWA
541 SOMME STREET

SWM PLAN (PRE- DEVELOPMENT)

SCALE 1 : 500 (0, 5m, 10m, 20m)

DATE FEB, 2025 | JOB 124111 | FIGURE SWM-1

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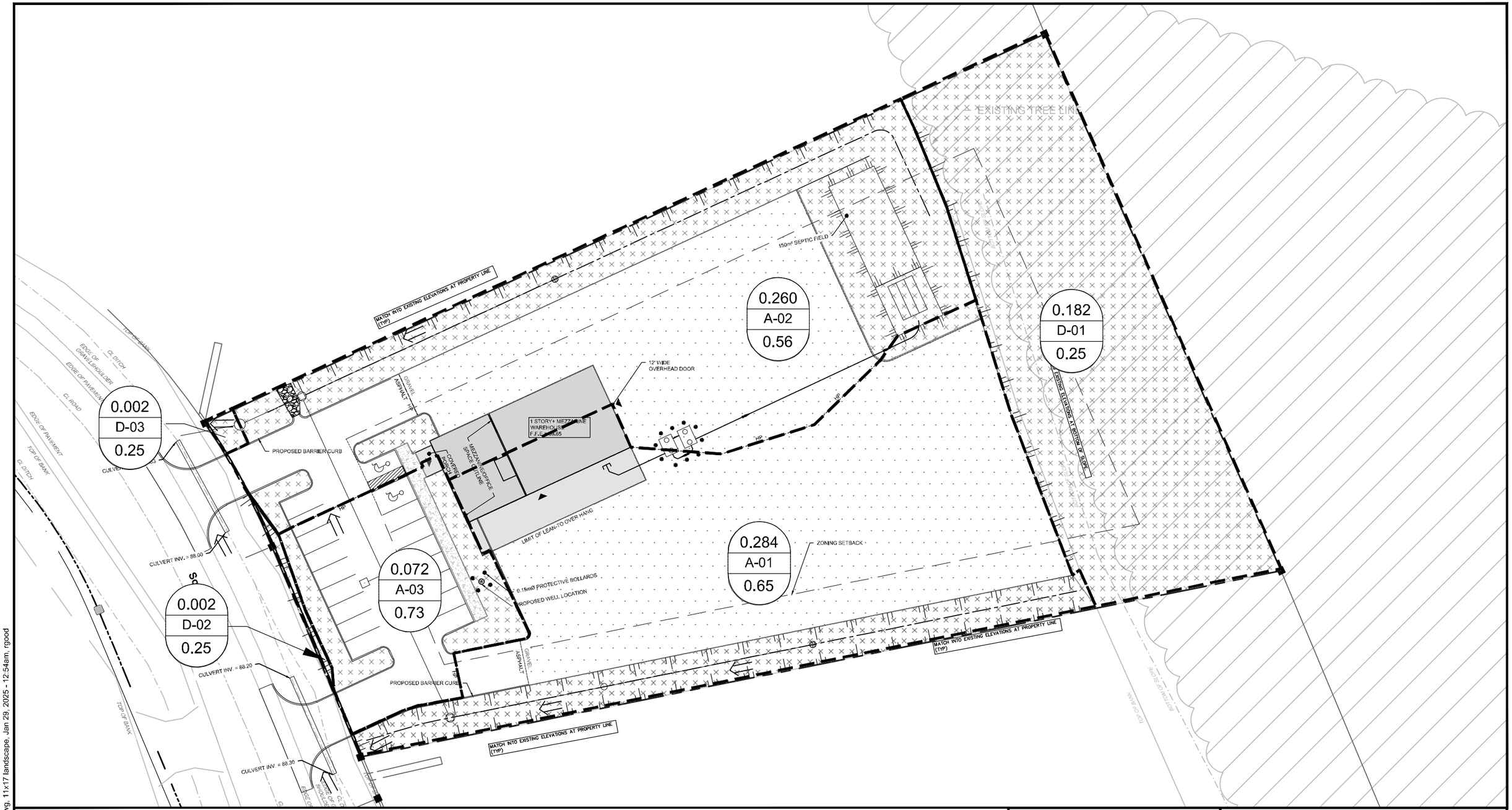

LEGEND

PROPOSED PROPERTY LINE

PROPOSED STORM DRAINAGE AREA

0.11 / A-1 / 0.80 — DRAINAGE AREA (HECTARES) DRAINAGE AREA ID

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Facsimile (613) 254-5867
Website www.novatech-eng.com

CITY OF OTTAWA
541 SOMME STREET

SWM PLAN
POST- DEVELOPMENT)

SCALE 1 : 500 (0, 5m, 10m, 20m)

DATE FEB 2025 | JOB 124111 | FIGURE SWM-2

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SHT11X17.DWG - 279mmX432mm

PROJECT #: 124111
PROJECT NAME: 541 Somme Street
LOCATION: City of Ottawa

NOVATECH
Engineers, Planners & Landscape Architects

DATE PREPARED: February 03, 2025

TABLE 1A: Allowable Runoff Coefficient "C"

Area	"C"
Total	0.25
0.801	

TABLE 1B: Allowable Flows

Outlet Options	Area (ha)	"C"	Tc (min)	$Q_{2\ Year}$ (L/s)	$Q_{2\ Year\ (50\%)}$ (L/s)	$Q_{5\ Year}$ (L/s)	$Q_{100\ Year}$ (L/s)
Hawthorne Industrial Park SWMF	0.801	0.70	10	**119.8**	**59.9**	**162.5**	**278.5**

Time of Concentration	Tc=	10	min
Intensity (2 Year Event)	I_2=	76.81	mm/hr
Intensity (5 Year Event)	I_5=	104.19	mm/hr
Intensity (100 Year Event)	I_{100}=	178.56	mm/hr

100 year Intensity = 1735.688 / (Time in min + 6.014)$^{0.820}$
5 year Intensity = 998.071 / (Time in min + 6.053)$^{0.814}$
2 year Intensity = 732.951 / (Time in min + 6.199)$^{0.810}$

Equations:
Flow Equation
Q = 2.78 x C x I x A
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Time of Concentration - Existing Conditions

Uplands Overland Flow Method

TABLE 2A: Existing Conditions Time of Concentration

Area ID	Overland Flow						Mannings Pipe Flow							Overall
	Length (m)	Elevation U/S (m)	Elevation D/S (m)	Slope (%)	Velocity (m/s)	Travel Time (min)	Pipe Size (mm)	Length (m)	Elevation U/S (m)	Elevation D/S (m)	Slope (%)	Velocity (m/s)	Travel Time (min)	Time of Concentration (min)
EX 01	47.61	89.02	87.10	4.0%	0.60	1.32								5
EX 02	27.09	89.02	88.77	0.9%	0.30	1.51								
EX 03	121.97	90.36	89.16	1.0%	0.34	5.98								

Uplands Velocity Chart

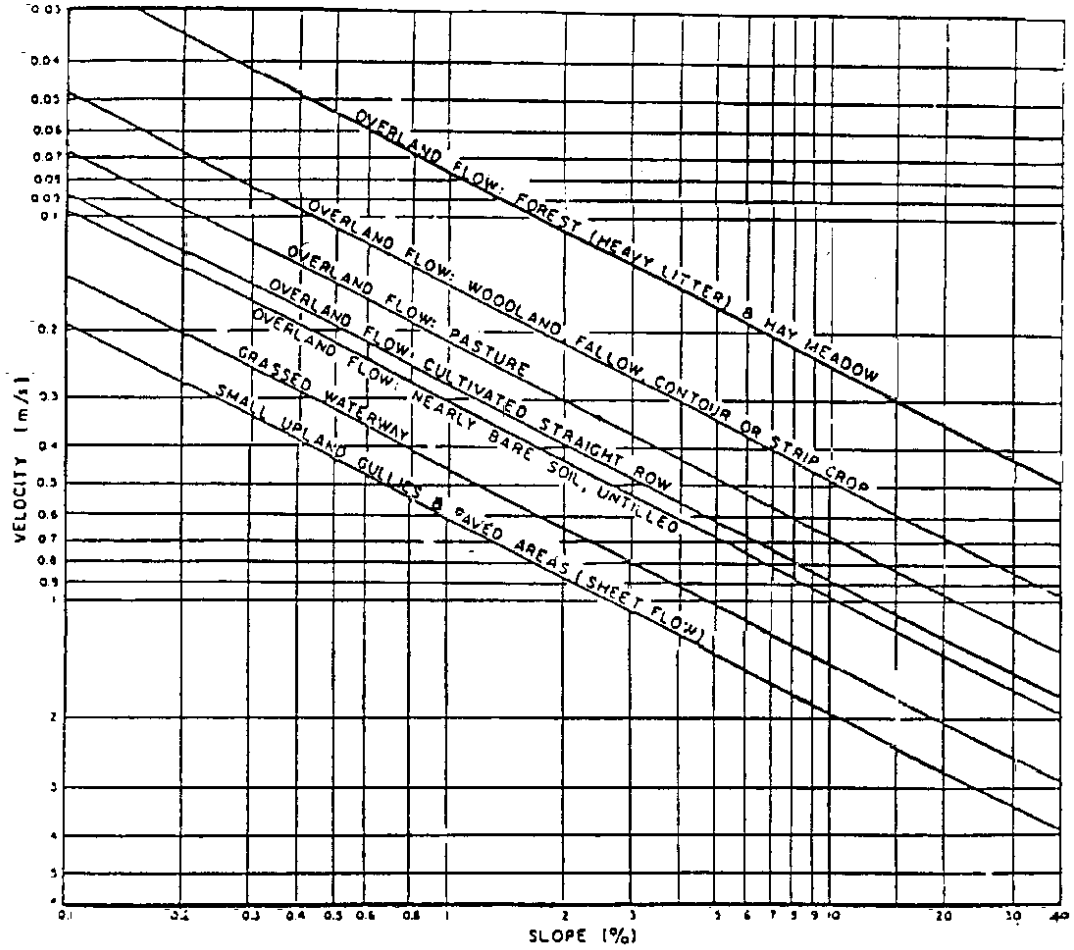

Figure A.5.2: Upland Method for Estimating Time of Concentration
(SCS National Engineering Handbook, 1971)

PROJECT #: 124111
PROJECT NAME: 541 Somme Street
LOCATION: City of Ottawa

NOVATECH
Engineers, Planners & Landscape Architects

DATE PREPARED: February 03, 2025

TABLE 3A: Post-Development Runoff Coefficient "C" - D-01

Area	Surface	Ha	"C"	C_{avg}	*C_{100}
Total	Hard	0.000	0.90	0.25	0.31
0.182	Soft	0.181	0.25		

Runoff Coefficient Equation

$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

TABLE 2B: Post-Development D-01 Flows

Outlet Options	Area (ha)	C_{avg}	Tc (min)	$Q_{2\ Year}$ (L/s)	$Q_{5\ Year}$ (L/s)	$Q_{100\ Year}$ (L/s)
Ditch	0.182	0.25	10	**9.7**	**13.1**	**28.1**

Time of Concentration	Tc=	10	min
Intensity (2 Year Event)	I_2=	76.81	mm/hr
Intensity (5 Year Event)	I_5=	104.19	mm/hr
Intensity (100 Year Event)	I_{100}=	178.56	mm/hr

100 year Intensity = 1735.688 / (Time in min + 6.014) $^{0.820}$
5 year Intensity = 998.071 / (Time in min + 6.053) $^{0.814}$
2 year Intensity = 732.951 / (Time in min + 6.199) $^{0.810}$

Equations:
Flow Equation
Q = 2.78 x C x I x A
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

PROJECT #: 124111
PROJECT NAME: 541 Somme Street
LOCATION: City of Ottawa

NOVATECH
Engineers, Planners & Landscape Architects

DATE PREPARED: February 03, 2025

TABLE 4A: Post-Development Runoff Coefficient "C" - D-02

Area	Surface	Ha	"C"	C_{avg}	*C_{100}
Total	Hard	0.000	0.90	0.25	0.31
0.002	Soft	0.002	0.25		

Runoff Coefficient Equation

$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

TABLE 2B: Post-Development D-01 Flows

Outlet Options	Area (ha)	C_{avg}	Tc (min)	$Q_{2\ Year}$ (L/s)	$Q_{5\ Year}$ (L/s)	$Q_{100\ Year}$ (L/s)
Ditch	0.002	0.25	10	**0.1**	**0.2**	**0.4**

Time of Concentration	Tc=	10	min
Intensity (2 Year Event)	I_2=	76.81	mm/hr
Intensity (5 Year Event)	I_5=	104.19	mm/hr
Intensity (100 Year Event)	I_{100}=	178.56	mm/hr

100 year Intensity = 1735.688 / (Time in min + 6.014) $^{0.820}$
5 year Intensity = 998.071 / (Time in min + 6.053) $^{0.814}$
2 year Intensity = 732.951 / (Time in min + 6.199) $^{0.810}$

Equations:
Flow Equation
Q = 2.78 x C x I x A
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

PROJECT #: 124111
PROJECT NAME: 541 Somme Street
LOCATION: City of Ottawa

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DATE PREPARED: February 03, 2025

TABLE 5A: Post-Development Runoff Coefficient "C" - D-03

Area	Surface	Ha	"C"	C_{avg}	*C_{100}
Total	Hard	0.000	0.90	0.25	0.31
0.002	Soft	0.002	0.25		

Runoff Coefficient Equation

$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

TABLE 2B: Post-Development D-01 Flows

Outlet Options	Area (ha)	C_{avg}	Tc (min)	$Q_{2\ Year}$ (L/s)	$Q_{5\ Year}$ (L/s)	$Q_{100\ Year}$ (L/s)
Ditch	0.002	0.25	10	**0.1**	**0.1**	**0.3**

Time of Concentration	Tc=	10	min
Intensity (2 Year Event)	I_2=	76.81	mm/hr
Intensity (5 Year Event)	I_5=	104.19	mm/hr
Intensity (100 Year Event)	I_{100}=	178.56	mm/hr

100 year Intensity = 1735.688 / (Time in min + 6.014) $^{0.820}$
5 year Intensity = 998.071 / (Time in min + 6.053) $^{0.814}$
2 year Intensity = 732.951 / (Time in min + 6.199) $^{0.810}$

Equations:
Flow Equation
$Q = 2.78 \times C \times I \times A$
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

PROJECT #: 124111
PROJECT NAME: 541 Somme Street
LOCATION: City of Ottawa

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DATE PREPARED: February 03, 2025

TABLE 6A: Post-Development Runoff Coefficient "C" -A-01

Area	Surface	Ha	"C"	C_{avg}	$*C_{100}$
Total	Building	0.027	1.00	0.65	0.79
0.284	Asphalt	0.006	0.90		
	Gravel	0.199	0.70		
	Grass	0.051	0.25		

Runoff Coefficient Equation

$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

TABLE 5B: Post-Development A-01 Flows

Outlet Options	Area (ha)	C_{avg}	Tc (min)	$Q_{2\ Year}$ (L/s)	$Q_{5\ Year}$ (L/s)	$Q_{100\ Year}$ (L/s)
Ditch	0.284	0.65	10	**39.4**	**53.5**	**110.6**

Time of Concentration	Tc=	10	min
Intensity (2 Year Event)	I_2=	76.81	mm/hr
Intensity (5 Year Event)	I_5=	104.19	mm/hr
Intensity (100 Year Event)	I_{100}=	178.56	mm/hr

100 year Intensity = $1735.688 / (\text{Time in min} + 6.014)^{0.820}$
5 year Intensity = $998.071 / (\text{Time in min} + 6.053)^{0.814}$
2 year Intensity = $732.951 / (\text{Time in min} + 6.199)^{0.810}$

Equations:
Flow Equation
$Q = 2.78 \times C \times I \times A$
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

PROJECT #: 124111
PROJECT NAME: 541 Somme Street
LOCATION: City of Ottawa

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DATE PREPARED: February 03, 2025

TABLE 7A: Post-Development Runoff Coefficient "C" -A-02

Area	Surface	Ha	"C"	C_{avg}	$*C_{100}$
Total	Building	0.015	1.00	0.56	0.67
0.260	Asphalt	0.025	0.90		
	Gravel	0.120	0.70		
	Grass	0.100	0.25		

Runoff Coefficient Equation

$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

TABLE 5B: Post-Development A-01 Flows

Outlet Options	Area (ha)	C_{avg}	Tc (min)	$Q_{2\ Year}$ (L/s)	$Q_{5\ Year}$ (L/s)	$Q_{100\ Year}$ (L/s)
Ditch	0.260	0.56	10	**31.3**	**42.5**	**86.3**

Time of Concentration	Tc=	10	min
Intensity (2 Year Event)	I_2=	76.81	mm/hr
Intensity (5 Year Event)	I_5=	104.19	mm/hr
Intensity (100 Year Event)	I_{100}=	178.56	mm/hr

100 year Intensity = $1735.688 / (\text{Time in min} + 6.014)^{0.820}$
5 year Intensity = $998.071 / (\text{Time in min} + 6.053)^{0.814}$
2 year Intensity = $732.951 / (\text{Time in min} + 6.199)^{0.810}$

Equations:
Flow Equation
$Q = 2.78 \times C \times I \times A$
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

TABLE 8A: Post-Development Runoff Coefficient "C" -A-03

Area	Surface	Ha	"C"	C_{avg}	$*C_{100}$
Total	Building	0.001	1.00	0.73	0.75
0.072	Asphalt	0.052	0.90		
	Gravel	0.000	0.70		
	Grass	0.019	0.25		

Runoff Coefficient Equation

$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

TABLE 5B: Post-Development A-01 Flows

Outlet Options	Area (ha)	C_{avg}	Tc (min)	$Q_{2\ Year}$ (L/s)	$Q_{5\ Year}$ (L/s)	$Q_{100\ Year}$ (L/s)
Ditch	0.072	0.73	10	**11.2**	**15.2**	**26.6**

Time of Concentration	Tc=	10	min
Intensity (2 Year Event)	I_2=	76.81	mm/hr
Intensity (5 Year Event)	I_5=	104.19	mm/hr
Intensity (100 Year Event)	I_{100}=	178.56	mm/hr

100 year Intensity = $1735.688 / (\text{Time in min} + 6.014)^{0.820}$
5 year Intensity = $998.071 / (\text{Time in min} + 6.053)^{0.814}$
2 year Intensity = $732.951 / (\text{Time in min} + 6.199)^{0.810}$

Equations:
Flow Equation
Q = 2.78 x C x I x A
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

PROJECT #: 124111
PROJECT NAME: 541 Somme Street
LOCATION: City of Ottawa

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DATE PREPARED: February 03, 2025

Table 9A: Post-Development Stormwater Management Summary

Area ID	Area (ha)	1:2 / 1:5 Year Weighted Cw	1:100 Year Weighted Cw	Control Device	Outlet Location	2 Year Storm Event				5 Year Storm Event				100 Year Storm Event			
						Release (L/s)	Head (m)	Req'd Vol (cu.m)	Max. Vol. Provided (cu.m.)	Release (L/s)	Head (m)	Req'd Vol (cu.m)	Max. Vol. Provided (cu.m.)	Release (L/s)	Head (m)	Req'd Vol (cu.m)	Max. Vol. Provided (cu.m.)
D-01	0.182	0.25	0.31	N/A	Ditch	9.70	N/A	N/A	N/A	13.10	N/A	N/A	N/A	28.10	N/A	N/A	N/A
D-02	0.002	0.25	0.31	N/A	Ditch	0.10	N/A	N/A	N/A	0.20	N/A	N/A	N/A	0.40	N/A	N/A	N/A
D-03	0.002	0.25	0.31	N/A	Ditch	0.10	N/A	N/A	N/A	0.10	N/A	N/A	N/A	0.30	N/A	N/A	N/A
A-01	0.284	0.65	0.79	N/A	Ditch	39.40	N/A	N/A	N/A	53.50	N/A	N/A	N/A	110.60	N/A	N/A	N/A
A-02	0.260	0.56	0.67	N/A	Ditch	31.30	N/A	N/A	N/A	42.50	N/A	N/A	N/A	86.30	N/A	N/A	N/A
A-03	0.072	0.73	0.75	N/A	Ditch	11.20	N/A	N/A	N/A	15.20	N/A	N/A	N/A	26.60	N/A	N/A	N/A
Post-Development Flow						**91.8**	**-**	**0.0**	**0.0**	**124.6**	**-**	**0.0**	**0.0**	**252.3**	**-**	**0.0**	**0.0**
Total Allowable Release Rate						**119.8**				**162.5**				**278.5**			

PROJECT #: 124111
PROJECT NAME: HAWTHORNE LOT 541
LOCATION: City of Ottawa

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DATE PREPARED: January 28, 2025

Surface	Area (Ha)	C	
Building	0.043	1.00	
Asphalt	0.084	0.90	
Gravel	0.320	0.70	
Grass	0.355	0.25	
Total	0.801	0.54	0.672

TABLE 2A: Post-Development Runoff Coefficient "C" - R1 Controlled Roof Area

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	$*C_{avg}$
Total	Hard	0.000	0.90	0.90	1.00	1.00
0.073	Roof	0.073	0.90		1.00	
	Soft	0.000	0.20		0.25	

TABLE 2B: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R1 Controlled Roof Area

0.073 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	40	44.18	8.07	2.2	5.82	13.98
	45	40.63	7.42	2.2	5.17	13.97
	50	**37.65**	**6.88**	**2.2**	**4.63**	**13.89**
	55	35.12	6.42	2.2	4.17	13.76
	60	32.94	6.02	2.2	3.77	13.58

TABLE 2C: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R1 Controlled Roof Area

0.073 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	50	63.95	12.98	4.7	8.28	24.84
	55	59.62	12.10	4.7	7.40	24.42
	60	**55.89**	**11.34**	**4.7**	**6.64**	**23.92**
	65	52.65	10.68	4.7	5.98	23.34
	70	49.79	10.10	4.7	5.40	22.70

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation

$C_s = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

Table 2D: Roof Drain Flows

Roof Drains		
Roof Area	730	m^2
Qty	3	
Type	Accutrol RD-100-A-ADJ	
Setting	3/4 Open	
Design Head	0.05-0.15	m
Design Flow 1" of head	0.32	L/s (ea)
Design Flow 2" of head	0.63	L/s (ea)
Design Flow 3" of head	0.87	L/s (ea)
Design Flow 4" of head	1.10	L/s (ea)
Design Flow 5" of head	1.34	L/s (ea)
Design Flow 6" of head	1.58	L/s (ea)

Table 2E: Total Roof Storage

Storm Event	Roof Drain ID	**Avg Area Per Roof Drain (m^2)	Avg Ponding Depth Per Roof Drain (m)	*Total Volume (m^3)	Total Volume (m^3) Required
5 Year	RD-1	243.3	0.0635	5.15	13.89
	RD-2	243.3	0.0635	5.15	
	RD-3	243.3	0.0635	5.15	-
			Total	**15.45**	**13.89**
100 Year	RD-1	243.3	0.1524	12.36	23.92
	RD-2	243.3	0.1524	12.36	
	RD-3	243.3	0.1524	12.36	-
			Total	**37.08**	**23.92**

*Note: Ponding volumes calculated using cone equation: $V = \frac{Area\ X\ Depth}{3}$

**Note: Roof Drain Area accounts for 10% loss for roof furniture

TABLE 2A: Post-Development Runoff Coefficient "C" - R1 Controlled Roof Area

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	$*C_{avg}$
Total	Hard	0.000	0.90	0.90	1.00	1.00
0.073	Roof	0.073	0.90		1.00	
	Soft	0.000	0.20		0.25	

TABLE 2B: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R1 Controlled Roof Area

0.073 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	40	44.18	8.07	2.0	6.06	14.55
	45	40.63	7.42	2.0	5.41	14.61
	50	**37.65**	**6.88**	**2.0**	**4.87**	**14.60**
	55	35.12	6.42	2.0	4.41	14.54
	60	32.94	6.02	2.0	4.01	14.43

TABLE 2C: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R1 Controlled Roof Area

0.073 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	50	63.95	12.98	2.8	10.18	30.54
	55	59.62	12.10	2.8	9.30	30.69
	60	**55.89**	**11.34**	**2.8**	**8.54**	**30.76**
	65	52.65	10.68	2.8	7.88	30.75
	70	49.79	10.10	2.8	7.30	30.68

Equations:
Flow Equation
$Q = 2.78 \times C \times I \times A$
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation
$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$
$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

Table 2D: Roof Drain Flows

Roof Drains		
Roof Area	730	m^2
Qty	3	
Type	Accutrol RD-100-A-ADJ	
Setting	1/4 Open	
Design Head	0.05-0.15	m
Design Flow 1" of head	0.32	L/s (ea)
Design Flow 2" of head	0.63	L/s (ea)
Design Flow 3" of head	0.71	L/s (ea)
Design Flow 4" of head	0.79	L/s (ea)
Design Flow 5" of head	0.87	L/s (ea)
Design Flow 6" of head	0.95	L/s (ea)

Table 2E: Total Roof Storage

Storm Event	Roof Drain ID	**Avg Area Per Roof Drain (m^2)	Avg Ponding Depth Per Roof Drain (m)	*Total Volume (m^3)	Total Volume (m^3) Required
5 Year	RD-1	243.3	0.0635	5.15	14.60
	RD-2	243.3	0.0635	5.15	
	RD-3	243.3	0.0635	5.15	-
			Total	**15.45**	**14.60**
100 Year	RD-1	243.3	0.1524	12.36	30.76
	RD-2	243.3	0.1524	12.36	
	RD-3	243.3	0.1524	12.36	-
			Total	**37.08**	**30.76**

*Note: Ponding volumes calculated using cone equation: $V = \frac{Area\ X\ Depth}{3}$
**Note: Roof Drain Area accounts for 10% loss for roof furniture

TABLE 2A: Post-Development Runoff Coefficient "C" - R1 Controlled Roof Area

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	$*C_{avg}$
Total	Hard	0.000	0.90	0.90	1.00	1.00
0.073	Roof	0.073	0.90		1.00	
	Soft	0.000	0.20		0.25	

TABLE 2B: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R1 Controlled Roof Area

0.073 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	40	44.18	8.07	2.1	5.94	14.26
	45	40.63	7.42	2.1	5.29	14.28
	50	**37.65**	**6.88**	**2.1**	**4.75**	**14.24**
	55	35.12	6.42	2.1	4.29	14.14
	60	32.94	6.02	2.1	3.89	13.99

TABLE 2C: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R1 Controlled Roof Area

0.073 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	50	63.95	12.98	3.8	9.18	27.54
	55	59.62	12.10	3.8	8.30	27.39
	60	**55.89**	**11.34**	**3.8**	**7.54**	**27.16**
	65	52.65	10.68	3.8	6.88	26.85
	70	49.79	10.10	3.8	6.30	26.48

Equations:
Flow Equation
$Q = 2.78 \times C \times I \times A$
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation
$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$
$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

Table 2D: Roof Drain Flows

Roof Drains		
Roof Area	730	m^2
Qty	3	
Type	Accutrol RD-100-A-ADJ	
Setting	1/2 Open	
Design Head	0.05-0.15	m
Design Flow 1" of head	0.32	L/s (ea)
Design Flow 2" of head	0.63	L/s (ea)
Design Flow 3" of head	0.79	L/s (ea)
Design Flow 4" of head	0.95	L/s (ea)
Design Flow 5" of head	1.10	L/s (ea)
Design Flow 6" of head	1.26	L/s (ea)

Table 2E: Total Roof Storage

Storm Event	Roof Drain ID	**Avg Area Per Roof Drain (m^2)	Avg Ponding Depth Per Roof Drain (m)	*Total Volume (m^3)	Total Volume (m^3) Required
5 Year	RD-1	243.3	0.0635	5.15	14.24
	RD-2	243.3	0.0635	5.15	
	RD-3	243.3	0.0635	5.15	-
			Total	**15.45**	**14.24**
100 Year	RD-1	243.3	0.1524	12.36	27.16
	RD-2	243.3	0.1524	12.36	
	RD-3	243.3	0.1524	12.36	-
			Total	**37.08**	**27.16**

*Note: Ponding volumes calculated using cone equation: $V = \frac{Area\ X\ Depth}{3}$
**Note: Roof Drain Area accounts for 10% loss for roof furniture

TABLE 2A: Post-Development Runoff Coefficient "C" - R1 Controlled Roof Area

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	$*C_{avg}$
Total	Hard	0.000	0.90	0.90	1.00	1.00
0.073	Roof	0.073	0.90		1.00	
	Soft	0.000	0.20		0.25	

TABLE 2B: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R1 Controlled Roof Area

0.073 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	40	44.18	8.07	1.9	6.18	14.83
	45	40.63	7.42	1.9	5.53	14.93
	50	**37.65**	**6.88**	**1.9**	**4.99**	**14.96**
	55	35.12	6.42	1.9	4.53	14.93
	60	32.94	6.02	1.9	4.13	14.86

TABLE 2C: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R1 Controlled Roof Area

0.073 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	50	63.95	12.98	1.9	11.08	33.24
	55	59.62	12.10	1.9	10.20	33.66
	60	**55.89**	**11.34**	**1.9**	**9.44**	**34.00**
	65	52.65	10.68	1.9	8.78	34.26
	70	49.79	10.10	1.9	8.20	34.46

Equations:
Flow Equation
$Q = 2.78 \times C \times I \times A$
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation
$C_s = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$
$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

Table 2D: Roof Drain Flows

Roof Drains		
Roof Area	730	m^2
Qty	3	
Type	Accutrol RD-100-A-ADJ	
Setting	Fully Closed	
Design Head	0.05-0.15	m
Design Flow 1" of head	0.32	L/s (ea)
Design Flow 2" of head	0.63	L/s (ea)
Design Flow 3" of head	0.63	L/s (ea)
Design Flow 4" of head	0.63	L/s (ea)
Design Flow 5" of head	0.63	L/s (ea)
Design Flow 6" of head	0.63	L/s (ea)

Table 2E: Total Roof Storage

Storm Event	Roof Drain ID	**Avg Area Per Roof Drain (m^2)	Avg Ponding Depth Per Roof Drain (m)	*Total Volume (m^3)	Total Volume (m^3) Required
5 Year	RD-1	243.3	0.0635	5.15	14.96
	RD-2	243.3	0.0635	5.15	
	RD-3	243.3	0.0635	5.15	-
			Total	**15.45**	**14.96**
100 Year	RD-1	243.3	0.1524	12.36	34.00
	RD-2	243.3	0.1524	12.36	
	RD-3	243.3	0.1524	12.36	-
			Total	**37.08**	**34.00**

*Note: Ponding volumes calculated using cone equation: $V = \frac{Area\ X\ Depth}{3}$
**Note: Roof Drain Area accounts for 10% loss for roof furniture

PROJECT #: 124111
PROJECT NAME: HAWTHORNE LOT 541
LOCATION: City of Ottawa

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Engineers, Planners & Landscape Architects

DATE PREPARED: Sep 27, 2024

TABLE 9A: Post-Development Runoff Coefficient "C" - A-05

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	$*C_{avg}$
Total	Hard	0.440	0.90	0.73	1.00	0.82
0.973	Roof	0.293	0.90		1.00	
	Soft	0.240	0.20		0.25	

TABLE 9D: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-05

0.973 =Area (ha)
0.82 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable* Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	15	142.89	315.03	83.10	231.93	208.73
	20	119.95	264.45	83.10	181.35	217.61
	25	**103.85**	**228.94**	**83.10**	**145.84**	**218.77**
	30	91.87	202.53	83.10	119.43	214.98
	35	82.58	182.05	83.10	98.95	207.80

* 50% of allowable

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

WEIGHTED C VALUE CALCULATIONS:

TOTAL SITE AREA = 0.801 HECTARES
BUILDING AREA = 0.043 HECTARES C =1.00
ASPHALT AREA = 0.084 HECTARES C = 0.90
GRAVEL AREA = 0.320 HECTARES C = 0.70
GRASS AREA = 0.355 HECTARES C = 0.25
WEIGHTED RUNOFF COEFFICIENT (C) = ((0.043*1)+(0.084*0.90)+(0.320*0.70)+(0.355*0.25))/0.801
WEIGHTED RUNOFF COEFFICIENT (C) = 0.54

LEGEND

BUILDING = 0.043 HECTARES

ASPHALT = 0.084 HECTARES

GRAVEL = 0.320 HECTARES

GRASS = 0.355 HECTARES

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CITY OF OTTAWA
541 SOMME STREET

SURFACE TYPES

SCALE 1 : 500 (0, 5m, 10m, 20m)
DATE FEB 2025
JOB 124111
FIGURE SRF

M:\2024\124111\CAD\Civil\124111-SRF.dwg, 11x17 landscape, Feb 03, 2025 - 2:31pm, rgood

SHT11X17.DWG - 279mmX432mm

EXCERPTS FROM "STORMWATER MANAGEMENT REPORT HAWTHORNE INDUSTRIAL PARK" JL RICHARDS (MAY 2009)

to provide aggregate wash water management to Tomlinson's existing quarry operations on the west side of Hawthorne Road (refer to Appendix 'I' for a copy of the Ministry of the Environment (MOE) Certificate of Approval (C of A) related to these works). In addition to the existing aggregate wash treatment facility, it is proposed to construct separate stormwater management facilities to service water quantity and quality requirements for the HIP.

1.3 Objectives

This Stormwater Managment Report (SWMR) was prepared to demonstrate that the subject lands can be developed as an Industrial Park Subdivision in compliance with the current surface water objectives of the watershed. Since the subject lands drain to Findlay Creek, which is tributary to the North Castor River, storm runoff criteria for this development must be in accordance with the recommendations of the document entitled "Shield's Creek Subwatershed Study, Totten Sims Hubicki Associates, June, 2004", referred throughout this Report as SCSS. More specifically, the above Report provided the following design criteria with regard to stormwater:

Water Quantity

Peak Flow	Post-development peak flows must be controlled to pre-development levels for storm events ranging from a 1:2 year to a 1:100 year recurrence.
Infiltration	Section 5.5 of the SCSS recommends that the quantity and quality of groundwater infiltration be maintained to pre-development rates.
Erosion	The stormwater management strategy for the proposed HIP must be developed to maintain the erosion potential to current levels.

Water Quality

The proposed stormwater management strategy for HIP must be developed to meet a Normal Level of Protection (as per the MOE's publication entitled "Stormwater Management Planning and Design Manual, March, 2003", referred throughout this Report as SWMPDM, which corresponds to a standard approach used in urban development to obtain a targeted total suspended solids (TSS) removal rate of 70%.

2.0 STORM DRAINAGE

2.1 General

Storm servicing for the HIP was designed using the dual drainage concept, also known as the minor/major drainage system. The minor drainage system is mainly comprised of an on-site open ditch and culvert system. The minor system was designed to capture and convey runoff during frequent storm events up to a 1:10 year recurrence. The major system formed by swales/ditches, streets, etc. was sized to accommodate runoff during storm events exceeding 1:10 year up to the 1:100 year recurrence.

The open ditches, culverts and swales were sized using the Rational Method. An inlet time of 15 minutes and runoff coefficients (C-factors) ranging from 0.20 to 0.90 were used in the sizing of the conveyance systems. It should be noted, however, that C-factors used were increased by 10% for the 1:25 year peak flow calculations and by 25% for the 1:100 year recurrence, as per Section 5.4.5.2.1 of the City of Ottawa's Sewer Design Guidelines (November 2004). Rainfall intensities (i.e., Intensity-Duration-Frequency curves (IDF)) required by the Rational Method were also extracted from the City of Ottawa's Sewer Design Guidelines. Peak flow rates for the HIP and Hawthorne Road and Rideau Road are summarized in Table 1 (refer to Appendix 'A' for copies of the Rational Method Design Sheets for the 1:10 year and 1:100 year storm events).

Table 1 - Summary of Peak Flow Rates

Description	Peak Flows (L/s)	
	10 Year	100 Year
Hawthorne Industrial Park (HIP)	5,422	12,814
Hawthorne Road / Rideau Road	3,192	5,417

2.2 Design Criteria

The municipal infrastructure associated with the HIP was designed using the following criteria:

- The HIP open ditch system was sized with sufficient capacity to convey, under free-flowing conditions, the 1:100 year peak flow rate, as calculated by the Rational Method (refer to Appendix 'A' for a copy of the 1:100 year Design Sheet).

- The Hawthorne Road open ditch system was sized with sufficient capacity to convey, under free-flowing conditions, the 1:100 year peak flow rate, as calculated by the Rational Method (refer to Appendix 'A' for a copy of the 1:100 year Design Sheet).

- The existing downstream ditch system along Rideau Road was evaluated to ensure sufficient capacity to convey, under free-flowing conditions, the 1:100 year peak flow rate, as calculated by the Rational Method (refer to Appendix 'A' for a copy of the 1:100 year Design Sheet).

- The culverts included in the HIP and along Hawthorne Road/Rideau Road were sized with sufficient capacity to convey the 1:10 year peak flow rate without overtopping the roadway embankment (refer to Appendix 'A' for a copy of the 1:10 year Design Sheet).

- Given that the receiving watercourse was found to shelter fisheries, the SCSS recommended that a "normal" level of protection be achieved for quality control. To fulfill this requirement, industrial sites must direct runoff to an appropriately sized oil/grit separator unit before stormwater can be conveyed off site to the open roadside ditch/culvert system. To achieve quality control for the internal roads, it is proposed to provide infiltration storage volume in the roadside open ditch system, as per the requirements presented in Table 3.2 of the SWMPDM.

- The SCSS recommended that the erosion potential be maintained to current levels for the receiving water course. To fulfill the above requirement, the two year post-development peak flow will be controlled to 50% of the pre-development peak flow rate.

- Storage volume is to be implemented for the control of the post-development peak flows to pre-development levels for storm events ranging from a 1:2 year to a 1:100 year recurrence to comply with the recommendations of the SCSS.

This Stormwater Management Report (SWMR) has been written to demonstrate that the subject land could be developed in compliance with the above surface water criteria and also prepared in accordance with the SWMPDM. The proposed stormwater management strategy for the HIP was developed to meet a "normal" level of protection, which corresponds to a standard approach used in land development to obtain a targeted TSS removal rate of 70%.

3.0 STORM SERVICING

3.1 General

Peak flow estimation is an important task that is carried out for any proposed development. There are several reasons that explain why flood flow rates are computed as part of site development. The main purpose of these calculations, however, is to allow for the proper configuration and sizing of the proposed conveyance systems to minimize the risk of flooding.

Drainage works are designed for a real or hypothetical storm event that may or may not happen during the lifetime of the facilities. At the onset of the design process, design criteria are adopted that may vary with the type of project, in recognition of the impacts of failure. For this particular project, the level of protection adopted (storm events up to a 1:100 year recurrence) was based on design storm characteristics of an infrequent storm event having a low probability to occur.

3.2 Description of Conveyance Systems and Design Basis

Flowing water can be conveyed to an outlet by either open-channel flow or pipe flow. Storm runoff generated by the subject lands is to be collected and conveyed by a roadside ditch/culvert system before discharging to Findlay Creek via an end-of-pipe stormwater management facility (SWMF).

Sizing of the conveyance systems was carried out using various levels of service. The open ditch system was sized with sufficient capacity to convey, under free-flowing conditions, storm runoff up to the 1:100 year recurrence, while roadway culverts were sized to provide conveyance of the 1:10 year peak flow rates without overtopping the roadway embankments.

As part of this sizing exercise, Storm Drainage Area Plans were prepared and included in this Report (refer to Drawing D-ST1 for the HIP and Drawing D-ST2 for Hawthorne and Rideau Road) that show the delineated area for each of the conveyance segments (i.e., from node location to node location), along with its assigned runoff coefficient (C-factor) based on the type of surface. Since the final development of Hawthorne Industrial Park is unknown at this time, a conservative on-site runoff coefficient (C-factor) of 0.70 was used. Table 2 illustrates the breakdown of a typical site that would generate a weighted runoff coefficient of 0.70.

Table 2 - Typical Potential Land Use Breakdown

Type of Surface	Area (%)	C-Factor
Building	10	1.0
Asphalt Parking	35	0.90
Gravel	35	0.70
Grass	20	0.20
Overall	100	**0.70**

It should be noted that the C-factors shown on the Storm Drainage Area Plans denote those associated with 1:10 year peak flow calculations. As recommended in Section 5.4.5.2.1 of the City of Ottawa's Sewer Design Guidelines, C-factors shown on drawings were increased by 10% and 25% for the 1:25 year and 1:100 year peak flow calculations, respectively (refer to Appendix 'A' for copies of the Rational Method Design Sheets).

3.2.1 Open Ditch System

An open ditch channel is a conduit used to convey flowing water from one location to another, with a free surface. A channel can be classified as either artificial (i.e., manmade) or natural. Artificial channels are those constructed or developed as a result of human activity. This type of conveyance system is usually implemented as a long and mild-sloped channel built in the ground, which provides conveyance of water between two points, with sections of regular geometry and shape. An open ditch system is generally designed to follow site topography and the vertical profile of the adjacent roadway. The most commonly used shapes for open channel ditches are trapezoidal and triangular, with the latter shape utilized mainly for ditches servicing small drainage areas.

The open ditches associated with the HIP and Hawthorne Road were sized with sufficient capacity to convey 1:100 year peak flow rates. As previously noted, the Rational Method Design Sheets (refer to Appendix 'A' for copy of the 1:100 year design sheet) were used to quantify the 1:100 year peak flow rates. The open ditch configuration was carried out utilizing Manning's relationship, along with the proposed geometry and slope of the channel. Two Storm Drainage Area Plans were prepared (refer to Drawings D-ST1 and D-ST2) showing proposed ditch inverts that match those shown on the Rational Method Design Sheets. Based on the ditch sizing exercise, it was determined that triangular shape ditches with 3:1 side slopes and variable depths provided the necessary conveyance of the 1:100 year peak flow rate. The Site Servicing and Grading Plan (refer to Drawing SG) was developed to provide the configuration of open ditch segments.

The existing open ditches along Rideau Road were also evaluated to ensure sufficient capacity was able to convey the 1:100 year peak flow rates resulting from upstream construction works (i.e., construction of Hawthorne Road). The Rational Method Design Sheets (refer to Appendix 'A' for copy of the 1:100 year design sheet) were used to quantify the 1:100 year peak flow rates. An existing 900 mm diameter culvert crossing under Hawthorne Road conveys flow along the north side of Rideau Road (refer to Drawing D-ST2). The capacity of this existing culvert was estimated at 1,400 L/s under a 1.5 m headwater (refer to Appendix 'B' for Culvert Design Summary Table). Upon the review of existing topography, any headwater depths greater than 1.5 m resulted in runoff being directed northerly along Hawthorne Road towards Findlay Creek. In light of the above, the existing open ditches along Rideau Road were evaluated using a conservative plug flow of 1,400 L/s in addition to surface runoff generated by the contributing areas.

3.2.2 Culvert System

The principal function of a culvert is to convey water through an embankment while, at the same time, supporting the weight of the overlying fill and vehicular movement. Culverts can be made of many different materials; steel, polyvinylchloride (PVC), high density polyethylene (HDPE) and concrete. Culverts selected for the HIP and Hawthorne Road are made of corrugated steel, in either round or arch shape. Field observations have shown that there are two major types of culvert flow conditions: inlet control and outlet control.

1. Flow Under Inlet Control

Flow with inlet control means that the discharge capacity of a culvert is controlled at the culvert entrance by the depth of headwater and by the entrance geometry, including the barrel shape, cross sectional area and the type of inlet edge. The roughness and length of the culvert barrel, and the outlet conditions are not factors in determining the culvert capacity. The longitudinal slope reduces headwater only to a small degree and can normally be neglected for conventional culverts flowing in inlet control.

2. Flow Under Outlet Control

Flow with outlet control means that the discharge capacity of a culvert is controlled by the depth of tailwater, including the velocity head within the barrel, the entrance and friction losses. The roughness, length of the culvert barrel, and slope are factors in determining the culvert capacity; the inlet geometry is of lesser importance.

To avoid having to conduct detailed hydraulic computations that would determine the type of flow under which a culvert will probably operate, the procedure recommended by the MTO (refer to MTO's Drainage Management Manual) was utilized. This methodology, referred to as the Conventional Culvert Design procedure, requires that MTO's Design Charts and Design Nomographs be used for both inlet and outlet control conditions. The higher headwater depth that is calculated from those two operating conditions would indicate the type of control and would provide the governing headwater depth. This methodology was utilized to size each culvert crossing, along with the 1:10 year peak flow rates calculated by the Rational Method Design Sheets (refer to Appendix 'A') for each of the conveyance segments. Furthermore, this calculation sheet also provides proposed culvert sizes, along with the type of control and governing depth found when using the conventional culvert design procedure. A summary of the various parameters estimated using MTO's nomographs at each of the culverts has been tabulated using MTO's Form D4-I (refer to Appendix 'B' for Conventional Culvert Design Sheet). This analysis shows that the proposed culvert crossings within the HIP and along Hawthorne Road are capable of conveying the 1:10 year peak flow rates as a minimum, without overtopping any of the roadway embankments. The hydraulic calculations were carried out assuming a roughness coefficient of 0.024 for any of the CSP and CSPA culverts. The Site Servicing and Grading Plan (Drawing SG) shows proposed culvert sizes, lengths and invert elevations at each of the crossings.

The proposed 1030 x 740 mm CSPA culvert crossing under the entrance of the pond access road was of concern due to the high flow rate during the 1:100 year storm event.

There was a possibility that the excess flow overtopping this culvert could short circuit into SWMF via the pond access road. Therefore, an analysis of the flow overtopping the proposed entrance culvert was conducted and the results confirmed that the residual flow would indeed be contained within the right-of-way corridor (refer to Appendix 'J' for desktop calculation).

4.0 WATER BALANCE

Water balance analyses are typically carried out to assess any changes in infiltration to subsurface water-bearing zones as a result of the urbanization (i.e., increase of hard surfaces) of land. The SCSS has identified the need to maintain a necessary level of quantity and quality groundwater recharge via infiltration. Groundwater recharge is required to maintain subsurface base flow to streams and wetlands in addition to maintaining groundwater levels for private and municipal wells. The Hydrogeological Study completed by Golder Associates Limited in 2008 for the HIP identified the site as being underlain by a shallow and deep aquifer separated by an impermeable rock layer. The upper aquifer provided subsurface groundwater flow to streams, while the lower aquifer was the main source for well water supply. Therefore, groundwater recharge for this site was intended to provide subsurface base flow into the receiving Findlay Creek.

Construction fill operations have been active for the HIP since 1994. The results of the geotechnical field investigation conducted by Inspec-Sol Incorporated in 2008 indicates that as much as 5.5 m of fill material (MW7-08) has been placed on parts of the site. The non-native heterogenous fill material is comprised mainly of silty clay and contains trace amounts of road and construction materials. Although the soil component of the fill material exhibits the characteristics of silty clay, the varying composition and density of the remaining portion of the fill affects its permeability in localized areas. Given the above existing conditions, it is difficult to determine how groundwater recharge will behave as subsurface flow in the existing fill matrix, particularly from individual sites within the HIP. The MOE expressed concerns about the use of infiltration strategies on the individual sites given the past history as a construction fill site. Furthermore, the MOE SWMPDM does not endorse the use of infiltration basins on lands zoned for industrial use as there is an increased risk of groundwater contamination should a spill occur on site.

An option was considered to provide infiltration for the entire site at the base of the end-of-pipe Dry Pond facility. Upon further investigation, the geotechnical report indicated

that there was a high groundwater table at the proposed pond location. In addition, in-situ soils in the area exhibited poor drainage properties which would have resulted in long retention times at the base of the pond, making it difficult to meet the water balance deficit requirements for the entire site while attempting to mimic the pre-development hydrological cycle.

Representatives from the City and SNC were consulted, and it was concluded that the SCSS groundwater balance targets for this site would be difficult to meet. It was also recognized that on-site infiltration strategies for this industrial subdivision could have a detrimental effect on groundwater quality and jeopardize the natural ecological integrity of receiving waters. In light of the above, it was decided by the approval authorities that the requirement for the water balance would be waived for the HIP development.

5.0 WATER QUALITY

5.1 General

Urbanization has been found to modify the hydrological regime of a receiving stream if inadequate stormwater management measures are implemented. The potential impacts associated with runoff arise primarily from the amount of urban area that is impervious to rain and snowmelt water. These impervious surfaces increase the amount of direct surface runoff that is generated and is conveyed more efficiently to the receiving stream. As part of the SCSS, fisheries resources have been inventoried along this watercourse, along with its associated tributaries. Given that the receiving watercourses were found to shelter fisheries, the approved document recommended that a "normal" level of protection be achieved. To fulfil this requirement, it is proposed that each individual site provide an oil/grit separator and infiltration storage be provided within the roadside open ditch system, as per the requirements presented in the SWMPDM.

5.2 Water Quality Requirement

Stormwater servicing for the HIP has been developed in accordance with the water quality recommendations of the SCSS (70% TSS removal). To fulfil this requirement, individual sites will be required to provide an oil/grit separator be installed to provide quality treatment (i.e., 70% TSS removal) of surface runoff before entering the roadside open ditch/culvert system. In addition, the oil/grit separator will be able to capture and contain hydrocarbons in the event of an on-site accidental spill.

To fulfill the water quality objectives for the paved portion of the HIP internal roads, it is proposed to provide infiltration within the open roadside ditch system to meet the storage volume requirements presented in Table 3.2 of the SWMPDM. Based on the normal level of service required and an imperviousness of 100% for the internal roads, Table 3.2 yields an extrapolated storage volume requirement of 35 m^3/ha. To achieve this storage volume, a clear stone envelope complete with a 200 mm diameter perforated pipe will be installed at the base of the roadside ditches to meet the required storage volume (Refer to Appendix C for calculations).

The following table presents the calculated infiltration volume required for water quality control and those provided by the roadside open ditch system to meet the recommended MOE Design Guidelines.

Table 3 - Water Quality Infiltration Requirements

Phase	Area (ha)	Infiltration Volume Requirement (m^3)	Infiltration Method	Length of 200 mm diameter Perf. Pipe (m)	Infiltration Volume Provided (m^3)
1	1.58	55.1	Open Ditch	1760	55.3
2	0.21	7.4	Open Ditch	240	7.5
Total	1.79	62.5	Open Ditch	2000	62.8

As shown in the above Table, the infiltration volume provided by the proposed open roadside ditch network (62.8 m^3) exceeds that obtained from Table 3.2 (62.5 m^3) of the SWMPDM. It should be noted that additional storage within the void space of the clear stone envelope was not accounted for and would increase the actual infiltration storage volume shown in Table 3.

6.0 HYDROLOGICAL ANALYSIS

6.1 General

To satisfy the surface water objectives presented in Subsections 1.3 and 2.2, a hydrological analysis was carried out to quantify peak flow rate variations resulting from the development of the proposed HIP. To quantify this variation, the SWMHYMO Stormwater Management Hydrological Model (Version 4.02, July, 1999) was utilized to calculate peak flows during severe storm events.

To carry out the hydrological analysis, three storm drainage plans were developed; one representing the pre-development drainage conditions, one representing the post-development conditions for the current study area, Phase 1, and the other for the post-development drainage conditions, including future development, Phase 2. For each of these plans, subwatershed boundaries were delineated based on existing topography of the site and the proposed overland flow direction following development of the site (refer to Figures 2, 3 and 4 for details).

6.2 Synthetic Design Storm Simulation and Hydrological Parameters

Peak runoff rates were calculated for both pre- and post-development conditions using synthetic design storm event modelling. Peak flow rates were estimated using the 3-hour Chicago Design Storm Event, as this synthetic storm event has been recognized as the most critical event for urban runoff applications (refer to Section 5.4.3.1 of the City of Ottawa's Sewer Design Guidelines). The design storm analysis was completed using volumes derived from the Intensity-Duration-Frequency (IDF) curve equation shown in Section 5.4.2 of the City of Ottawa Sewer Design Guidelines compiled using data from 1967 to 1997.

A SWMHYMO data file was developed to represent both pre- and post-development conditions of the subject area. Simulation of surficial runoff generated from undeveloped subwatersheds was carried out using the "DESIGN NASHYD" command along with the SCS procedure to compute rainfall losses. The SCS procedure uses the Curve Number (CN) method to compute rainfall losses and the Nash unit hydrograph to simulate the hydrological response from undeveloped watersheds. To simulate surface runoff from urban subwatersheds, the "CALIB STANDHYD" command was utilized. Hydrological parameter selection and methodology is described below:

Curve Number (CN)

In order to estimate a Curve Number that represents pre-development conditions, the geotechnical investigation completed by Inspec-Sol, entitled "Geotechnical Study Subdivision Plan, Hawthorne Industrial Park, Lots 26 and 27 Concession 6, Southeast of Hawthorne and Rideau Roads, Ottawa, Ontario" dated December 19, 2008 was used. At the time of this investigation, large amounts of fill material were encountered over the majority of the site, which does not reflect the pre-development conditions. As such, only native soils encountered below fill material were used to establish pre-development condition Curve Numbers. The review of the geotechnical investigation shows native

LEGEND:

UNDEVELOPED BASINS :

SUB-AREA NO. — AREA (ha.)

1	70.0
76	1.5

CURVE NUMBER (CN) — TIME TO PEAK (hrs)

URBANIZED BASINS :

SUB-AREA NO. — AREA (ha.)

5	2.66
97	97

TOTAL IMPERVIOUSNESS (%) — DIRECTLY CONNECTED IMPERVIOUSNESS (%)

APPROXIMATE DRAINAGE AREA BOUNDARY

DIRECTION OF OVERLAND FLOW

RIDEAU ROAD

PAVED SHOULDER

BLOCK 11

BLOCK 13

BLOCK 5

BLOCK 9

BLOCK 4

BLOCK 7

BLOCK 8

BLOCK 6

BLOCK 3

BLOCK 1

BLOCK 2

2	17.0
71	50

3	18.1
71	50

1	19.9
71	50

5	6.8
76	0.37

6	5.3
76	0.80

4	4.0
85	0.17

VACANT (FUTURE DEVELOPMENT BLOCK)

ABANDONED FORMER ALIGNMENT OF FINDLAY CREEK

FINDLAY CREEK MUNICIPAL DRAIN (BY-LAW NO. 2005-141)

SOD FARM

SOMME STREET

HAWTHORNE AVENUE

SAPPERS RIDGE

ESTABLISHED DIVISION LINE BETWEEN LOTS 26 AND 27

ESTABLISHED DIVISION LINE BETWEEN THE EAST AND WEST HALVES OF LOT 26

R.H. TOMLINSON LANDS

CITY OF OTTAWA LANDS

EX. SETTLING PONDS

ACCESS ROAD (BY OTHERS)

ORGAWORLD 10.1ha
(REFER TO APPENDIX 'G')

ORGANICS COMPOSTING FACILITY
FFE=95.00
BSE=93.80

PROPOSED STORMWATER MANAGEMENT POND

EXISTING QUARRY SITE

VACANT LANDS

Proposed Development
(541 Somme Street)

PROJECT:
HAWTHORNE
INDUSTRIAL PARK

DRAWING:
POST DEVELOPMENT – PHASE 1
STORM DRAINAGE AREA
PLAN

J.L.Richards
ENGINEERS·ARCHITECTS·PLANNERS

J.L. Richards
& Associates Limited
864 Lady Ellen Place
Ottawa, ON Canada
K1Z 5M2
Tel: 613 728 3571
Fax: 613 728 6012

DESIGN:	M.B.
DRAWN:	ARM
CHECKED:	G.F.
PLOTTED:	Apr 30, 2009

DRAWING NO.: FIGURE 3

JLR NO: 20983

v:\20983\cad\20983 - FIGURE 3.dwg

soils ranging from silty sand in Blocks 4 and 5, to silty clay in Blocks 3, 5, 7 and 8, to sandstone and limestone in parts of Blocks 2 and 3. These soils have been classified by Inspec-Sol as being associated with hydrologic soil groups (HSG), ranging from "B" to "D" for silty sand to silty clay, respectively. Areas where rock was encountered (i.e., Sandstone and Limestone) were classified as "Rockland." Based on this information and current land usage, as interpreted from aerial photography, a pre-development Curve Number (CN) of 76 has been calculated using the Ministry of Transportation of Ontario (MTO) Chart H2-8. Detailed calculations for the HIP have been included in Appendix 'D'.

Under post-development conditions, it is proposed to provide sufficient grade differential to allow for positive drainage to meet City of Ottawa Design Standards. As the subject lands are to be developed as an Industrial Park with a significant increase in hard surfaces (i.e., buildings, asphalt and gravel), the post-development conditions were, therefore, analysed taking into consideration the low potential of these surfaces to infiltrate storm runoff.

Imperviousness

Surface runoff under post-development conditions is greatly impacted by the imperviousness of its tributary area. Since the final development of the HIP is unknown, a conservative assumption for typical surfaces encountered in similar industrial parks was developed, as illustrated in Table 2. To determine the imperviousness based on the assumed breakdown presented in Table 2, an imperviousness calculation was carried out and is presented in Appendix 'D'. The imperviousness calculation was based on the following assumptions:

- an imperviousness of 100% was assigned for building footprints;
- an imperviousness of 100% was assigned for all asphalt parking surfaces.
- an imperviousness of 70% was assigned for all gravel surfaces; and
- it was assumed that 50% of the total imperviousness (TIMP) 50 % was modelled as directly connected imperviousness (XIMP).

Based on the above, a total imperviousness of 70% was calculated, which is equivalent to a runoff coefficient of 0.7. The hydrological analysis was, therefore, carried out using

a total imperviousness of 70%, consistent with the runoff coefficient used for sizing the open ditch/culvert system.

Time to Peak (T_p)

Time to peak calculations were carried out under pre-development conditions. Time of concentration was first estimated using the Uplands Method Chart based on the various flow paths. Once calculated, the times to peak were set to 67% (i.e., 2/3) of the time of concentration (T_c). Under pre-development conditions, a 90 minute time to peak was calculated (refer to Appendix 'D' for calculations). When modelling post-development conditions, the "CALIB STANDHYD" command was used to calculate the time to peak associated with the proposed site surfaces and grades (refer to Appendix 'E' for SWMHYMO outputs).

6.3 Simulation of Pre- and Post-Development (Uncontrolled) Conditions

The hydrological analysis was carried over the entire HIP under both the pre- and post-development conditions. As stated in Section 6.1, two post-development conditions were investigated, namely, Phase 1 and Phase 2. Phase 1 evaluates servicing for the current Study area, while Phase 2 includes the current Study area along with servicing of an additional 11.2 ha of land to the north east, shown on drawings as "Future Development Block."

Peak flow rates were computed with SWMHYMO using the procedure and parameters described in Subsection 6.2. Table 4 presents the simulated peak runoff rates under a 3 hour Chicago design storm event for both the pre- and post- (uncontrolled) development conditions for the HIP (refer to Appendix 'E' for SWMHYMO data input and output files), along with those under a 4 hour - 25 mm storm.

Table 4 - SWMHYMO Simulation Results

Return Period or Storm Depth	Peak Flow Rates (L/s)		
	Pre-Development	Phase 1 Post-Development (Uncontrolled)	Phase 2 Post-Development (Uncontrolled)
25 mm	252	1,941	2,231
2	467	3,077	3,548
5	826	4,812	5,554
10	1,097	6,135	7,029
25	1,468	7,772	9,013
50	1,767	9,240	10,588
100	2,093	10,662	12,132

Simulation results presented in the above table show that uncontrolled post-development peak flows substantially exceed those obtained under pre-development conditions. Based on the design criterion for water quantity (refer to Subsections 1.3 and 2.2 for details), post-development peak flows should be maintained to their pre-development levels for storm events ranging from a 1:5 year to a 1:100 year recurrence. In addition, the 2-year post-development peak flow should be controlled to 50% of the 2-year pre-development peak flow to satisfy the erosion criterion. Water quantity control measures were, therefore, found to be necessary for the development of this site. Details and stormwater servicing approaches proposed to fulfil the design criteria listed in Subsections 1.3 and 2.2 are presented in the following Subsections.

6.4 Simulation of Phase 1 Post-Development (Controlled) Conditions

Development of the subject lands (i.e., 70 ha, as illustrated on Figure 3) will increase the imperviousness of the subject area. To achieve the surface water objectives listed in Subsections 1.3 and 2.2, it is proposed that an end-of-pipe facility be constructed that would provide storage volume for retention of runoff.

The stormwater management criteria for the development of the HIP consist of maintaining erosion potential and peak flow rates at the pre-development levels. Storm servicing of the Subdivision was, therefore, developed such that all of these requirements were fulfilled, along with the achievement of a "normal" protection level. It

is proposed to implement the following stormwater management servicing approach for the development of the HIP:

End-of-Pipe SWMF (Block 3)

Based on the proposed grading, the end-of-pipe facility was found to generate a volume of 37,240 m^3 (3.25 m depth). A low flow ditch sized for 2 year storm events was also included in the bottom of the end-of-pipe facility to convey flows to the outlet structure. The configuration of the outlet structure would be as follows:

- 1 x 150 mm diameter orifice within a 200 mm diameter Polyvinyl Chloride (PVC) pipe at elevation 82.90 m, which serves as outlet to the facility;
- 2 x 600 mm diameter Corrugated Steel Pipe culvert at elevation 84.80 m, which also serves as outlet to the facility;
- One (1) emergency overflow spillway (6.0 m wide) at elevation 86.15 m, which serves as outlet to the facility during a storm event greater than 1:100 year.

The above configuration was used to develop a Stage-Storage-Discharge relationship that relates the storativity and outlet capabilities of the proposed facility at various geodetic elevations (refer to Appendix 'F' for copy of this Table). This data (storage-discharge table) was then used as input to the SWMHYMO's ROUTE RESERVOIR command.

A SWMHYMO file, representing the post-development controlled conditions of the HIP, was developed incorporating the storage volume and the outflow capability of the proposed end-of-pipe facility. The following table presents the simulated peak runoff rates for the three (3) hour Chicago design storm under the post-development controlled conditions (refer to Appendix 'G' for SWMHYMO data input and output files), along with those under the four (4) hour - 25 mm storm.

Table 5 - SWMHYMO Simulation Results
(Post-Development - Phase 1 Controlled Conditions)

Return Period or Storm Depth	Peak Flow Rates (L/s)	
	Pre-Development	Phase 1 Post-Development (Controlled)[1]
25 mm	252	127
2 year	467	194[2]
5 year	826	359
10 year	1,097	589
25 year	1,468	939
50 year	1,767	1,191
100 year	2,093	1,531

Note: (1) Post-development flow is the sum of flows from the end-of-pipe facility and two uncontrolled Sub-Areas totalling 12.1 ha.

(2) 2 year post-development peak flow less than half the 2-year pre-development peak flow (233 L/s).

Simulation results presented in Table 5 show that the Phase 1 post-development controlled peak flows will be maintained below pre-development levels for the HIP. Consequently, the water quantity objective defined in Subsections 1.3 and 2.2 will be met under Phase 1.

6.5 Simulation of Phase 2 Post-Development (Controlled) Conditions

Development of Phase 2, as depicted on Figure 4, includes the Future Development Block located in the northeast corner of the HIP. This additional land could be serviced by the previously proposed end-of-pipe, without any modifications to facility size or outlet structure. However, a second inlet would be required in the northeast corner of the facility, which could be designed during the detailed design stage of the Future Development Block.

A SWMHYMO file, representing the Phase 2 post-development controlled conditions of the HIP, was developed incorporating the storage volume and the outflow capability of the proposed end-of-pipe facility. The following table presents the simulated peak runoff rates for the three (3) hour Chicago design storm under the Phase 2 post-development

controlled conditions (refer to Appendix 'H' for SWMHYMO data input and output files), along with those under the four (4) hour - 25 mm storm.

Table 6 - SWMHYMO Simulation Results (Post-Development - Phase 2 Controlled Conditions)

Return Period or Storm Depth	Peak Flow Rates (L/s)	
	Pre-Development	Phase 2 Post-Development (Controlled)[1]
25 mm	252	73
2 year	467	156[2]
5 year	826	457
10 year	1,097	729
25 year	1,468	1,051
50 year	1,767	1,348
100 year	2,093	1,515

Note: (1) Post-development flow is the sum of flows from the end-of-pipe facility and one uncontrolled Sub-Area totalling 2.7 ha.

(2) 2-year post-development peak flow less than half the 2 year pre-development peak flow (233 L/s).

Simulation results presented in Table 6 show that the Phase 2 post-development controlled peak flows will be maintained below pre-development levels for the HIP. Consequently, the water quantity objective defined in Subsections 1.3 and 2.2 will also be met under Phase 2.

6.6 Simulation of the July 1, 1979 Historical Storm Event and Flood Potential

6.6.1 Simulation of the July 1, 1979 Historical Storm Event

In addition to designing the major drainage system to convey the 1:100 year storm event, the performance of both the open ditch system and SWMF was also assessed under the July 1, 1979 historical storm event. This historical storm event is defined as a high volume / low intensity storm event (when compared to the 1:100 year event) which

occurred mostly over a three hour period (refer to Table 5.6 in the Ottawa Sewer Design Guidelines). As shown in Table 5.6, the maximum intensity of 106.7 mm/hr only occurred for a 10 minute period (i.e, between the 85 to 95 minute time interval). The 1:100 year storm event intensities used to size the open ditch system were found to exceed the highest intensity of 106.7 mm/hr (refer to Appendix 'A' for 1:100 year Rational Method Sheet) with the exception of the most downstream ditch section (i.e., from Node 19 to Pond) where an intensity of 101.69 mm/hr was rather utilized. If an intensity of 106.7 mm/hr was used, the overall peak flow would increase from 12,814 L/s to 13,430 L/s substantially less than the free-flowing capacity of 52,735 L/s for the proposed ditch configuration. Consequently, the proposed open ditch system has the ability to convey flows generated by the July 1, 1979 storm event.

To supplement the above open ditch analysis, a hydrological analysis was also conducted to assess the performance of the SWMF under the July 1, 1979 storm event. A SWMHYMO file was, therefore, developed for the controlled Phase 2 post-development conditions of the HIP. Simulation results show that the Phase 2 post-development runoff during the July 1, 1979 storm event will be contained within the SWMF with all three of the outlet culverts flowing full in addition to approximately 210 mm of flow depth over the emergency overflow channel (refer to Appendix 'K' for SWMHYMO data input and output files). Therefore, the outlet of the SWMF has sufficient capacity to convey the July 1, 1979 historical storm event via the designated overland flow route without overtopping the banks.

6.6.2 Flood Potential

Draft approval Condition 12 of the draft subdivision conditions by the former Region of Ottawa-Carleton requires that "The owner shall complete a study indicating the extent of potential flooding on the property from Findlay Creek. The study including all models and assumptions shall be to the satisfaction of the South Nation River Conservation Authority." This condition was included as part of the original February 10, 1998 draft conditions (Gloucester File: S-RU-94-03).

Many changes have occurred on-site and adjacent to the site since Condition 12 was included in the draft approval for this site. Improvements to the roadside ditch were made along Rideau Road, immediately adjacent to the site. Surface runoff generated by the lands north of Rideau Road and conveyed to the small tributary located within the HIP site has now been re-directed toward the northeast corner of the site where the existing 3.8 m wide x 2.8 m high multi plate arch culvert crosses Rideau Road. A

municipal drainage report was prepared by Stantec Consulting in 2004 for this section of Findlay Creek which assessed the overall geomorphological conditions and provided recommendations for future maintenance. In addition, the SCSS conducted a flood hazard analysis. The 100 year flows from the Stantec model were plotted along the creeks modelled. Floodlines were shown in Figure 6.2.3 of the report. No floodlines were indicated for the section of Findlay Creek adjacent to the HIP site.

As indicated previously in the Section 4 of this Report, as much as 5.5 m of construction fill has been added to the site since 1994. The placed fill material on the site has eliminated the natural low lying areas and raised the site grade approximately 4.5 m above the top of creek bank. The current site grades will be maintained as a minimum for the development of the HIP subdivision. Therefore, we have no concerns about flooding on the property from Findlay Creek given the above changes to the site and improvements to the adjacent drainage network. Consequently, Condition 12 of the draft approval should be considered as being satisfied on the basis that this condition is out of date based on the current site conditions.

7.0 EROSION AND SEDIMENT CONTROL MEASURES DURING CONSTRUCTION

During construction of the roadway, the collection systems (i.e., ditches, culverts, sewers, etc.) and end-of-pipe facility, appropriate erosion and sediment control measures, as outlined in MNR's "Guidelines on Erosion and Sediment Control for Urban Construction Sites," will be implemented to trap sediment on site. To ensure proper implementation, the proposed measures have been incorporated onto Drawing ESC (Drawing entitled "Erosion and Sedimentation Control Plan"). The measures shown on this Drawing were developed based on topography and site constraints. As a minimum, the following measures will be implemented during construction:

- Supply and installation of straw bale flow check dams (as per OPSD 219.180) at the upstream end of each culvert. Proposed locations of straw bale barriers are indicated on Drawing ESC.

- Supply and installation of topsoil and hydroseed along the entire open ditch system once grading has been completed for a section. Mulching will be carried out immediately after hydroseeding. This will allow for immediate bank stabilization of the system and will prevent sediment ladden from occurring from exposed ditch surfaces.

- Supply and installation of light duty silt fences (as per OPSD 219.110) at the toe of slope surrounding the proposed stormwater management pond (refer to Drawing ESC for details). It is recommended that silt fences also be used to enclose borrow and stockpile areas resulting from topsoil stripping activities or any excavating activities; locations to be determined in the field during grading operations.

- If dewatering and pumping operations become necessary, filtration is proposed using sediment dewatering bags prior to discharge off-site.

All control measures will be carried out in accordance with the following documents:

i) "Guidelines on Erosion and Sediment Control for Urban Construction Sites" published by Ontario Ministries of Natural Resources, Environment, Municipal Affairs and Housing, and Transportation and Communication, Association of Construction Authorities of Ontario, and Urban Development Institute, Ontario, May 1987.

ii) "Erosion and Sediment Control" Training Manual by Ministry of Environment, Spring 1998.

iii) Applicable Regulations and Guidelines of the Ministry of Natural Resources. As a minimum, during the construction of the conveyance systems, the following Stormwater Management Practices will be used:

Any stockpiled material will be kept on flat areas during construction, well away from any natural flow paths. In the event that the stockpile is placed in other areas where potential washoff to the conveyance system is expected, silt fences will be installed to enclose the materials and prevent any washoff to the conveyance system.

8.0 SUMMARY AND CONCLUSION

1. This Stormwater Management Report has been prepared to present a complete approach in achieving the stormwater criteria developed as part of the approved document entitled "Shields Creek Subwatershed Study."

2. Stormwater servicing for the proposed HIP has been designed using the dual drainage concept. Storm servicing will be carried out with the use of an open ditch/culvert system. The open ditch system has been designed to convey the 1:00 year peak flow rates. Similarly, the culverts have been sized to convey the 1:10 year flow without any overtopping.

3. To fulfil the design criteria associated with water quality (as per the SCSS), it is proposed to provide both on-site oil/grit separators and infiltration storage volume within the roadside open ditch system. As per the requirements set out in Table 3.2 of the MOE SWMPDM, a total infiltration volume of 62.5 m^3 is required under Phase 2 to achieve a "normal" level of protection (i.e., TSS removal of 70%).

4. Water balance and infiltration requirements were not implemented due to existing site conditions and proposed industrial use development.

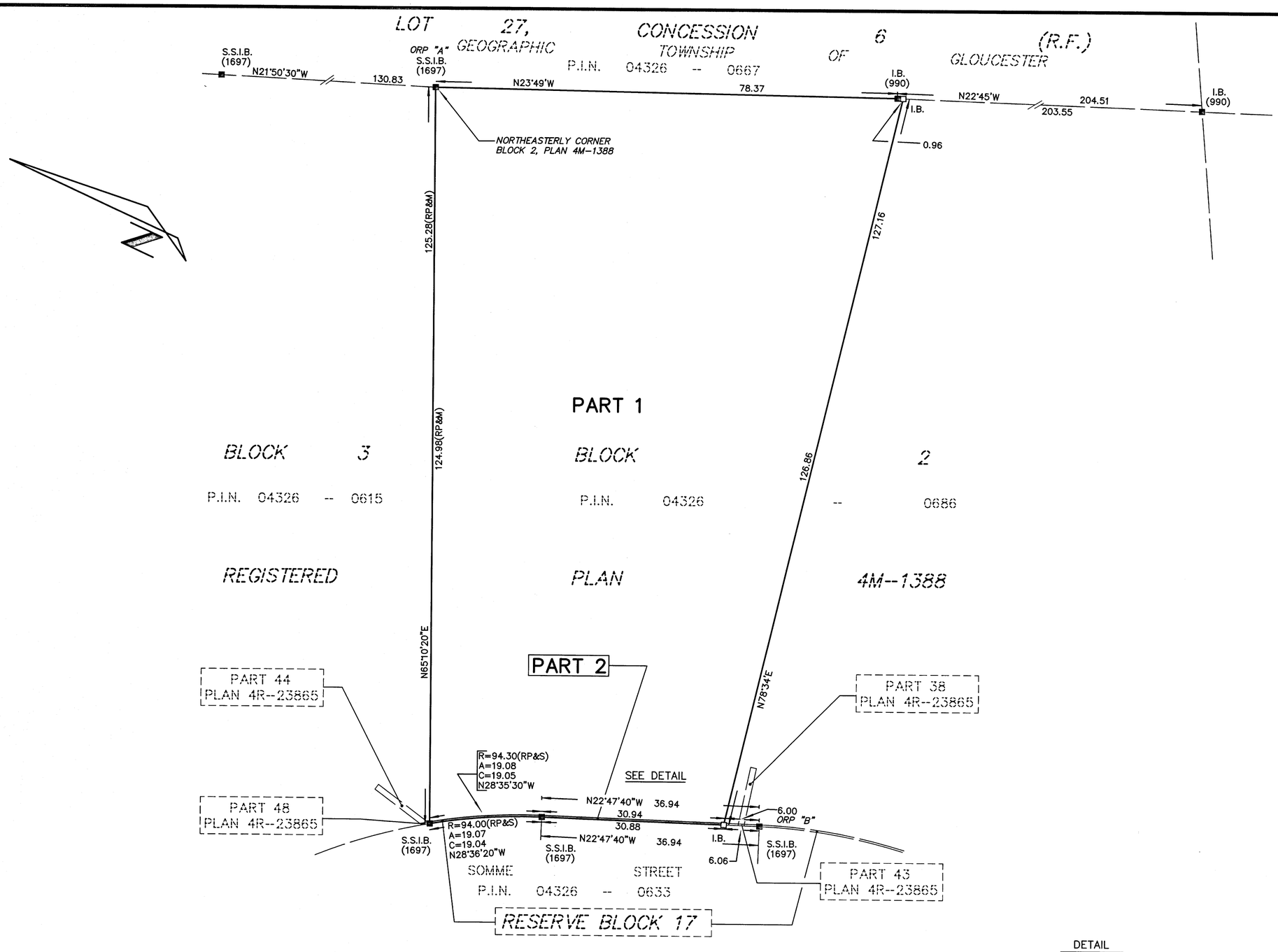
5. The 2-year post-development peak flow will be controlled to 50% of the 2-year pre-development peak flow. Therefore, meeting the SCSS recommendations associated with erosion potential.

6. Simulation results presented in Tables 5 and 6 show that proposed infrastructure will maintain peak flows below pre-development levels for both Phase 1 and Phase 2 of the HIP. Consequently, this design criterion (peak flow control) will be fulfilled.

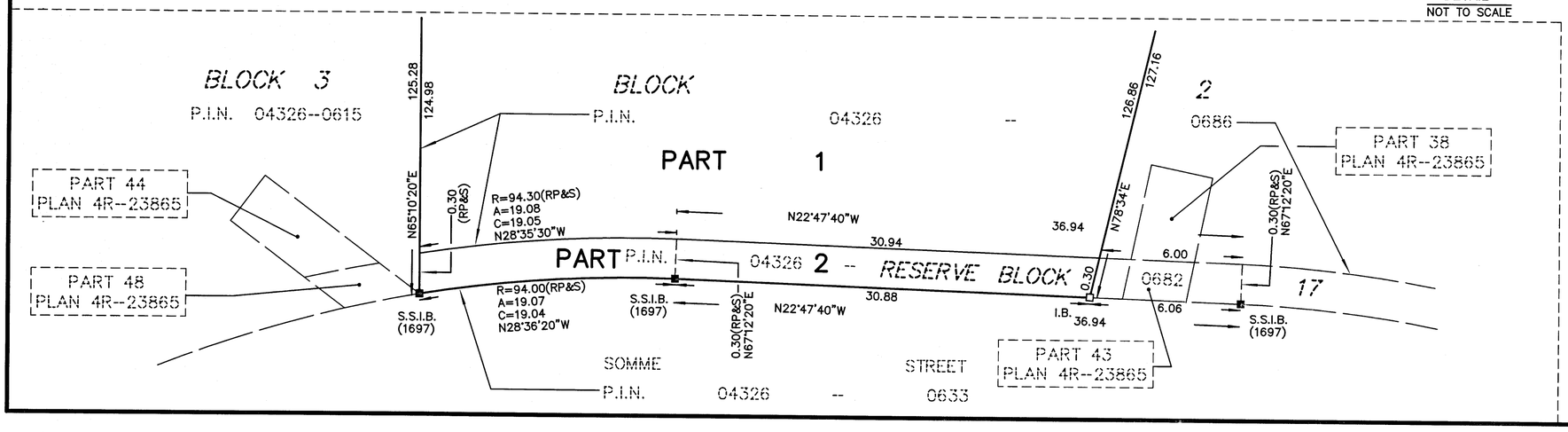
7. A detailed Erosion and Sedimentation Control Plan has been prepared to reduce the impact of construction activities on Findlay Creek.

Appendix E

Legal Plan



DETAIL
NOT TO SCALE



I REQUIRE THIS PLAN TO BE DEPOSITED UNDER THE LAND TITLES ACT.

DATE OCTOBER 3, 2024

J.P. SHIPMAN

PLAN 4R- 36431

RECEIVED AND DEPOSITED

DATE October 7, 2024

Yang Liu

REPRESENTATIVE FOR LAND REGISTRAR FOR THE LAND TITLES DIVISION OF OTTAWA-CARLETON (No.4)

PLAN OF SURVEY OF

PART OF BLOCKS 2 AND RESERVE BLOCK 17 REGISTERED PLAN 4M-1388

CITY OF OTTAWA

SCALE 1:500

0 5 10 15 20 30 40 50

METRES

SCHEDULE			
PART	BLOCK	PLAN	P.I.N.
1	PART OF 2	4M-1388	PART OF 04326-0686
2	PART OF RESERVE BLOCK 17		PART OF 04326-0682

METRIC

DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

NOTES

BEARINGS SHOWN ON THIS PLAN ARE GRID BEARINGS, DERIVED FROM CAN-NET 2016 REAL TIME NETWORK OBSERVATIONS ON OBSERVED REFERENCE POINTS (ORP "A" AND ORP "B") SHOWN HEREON, HAVING A BEARING BETWEEN THEM OF N41°08'10"E AND ARE REFERENCED TO THE CENTRAL MERIDIAN OF MTM ZONE 9 (76° 30' WEST LONGITUDE), NAD 83 (CSRS)(2010)

DISTANCES SHOWN ON THIS PLAN ARE HORIZONTAL GROUND DISTANCES AND CAN BE CONVERTED TO GRID DISTANCES BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.999954.

S.I.B.	DENOTES 0.025 SQ., 1.2 LONG, STANDARD IRON BAR
S.S.I.B.	DENOTES 0.025 SQ., 0.6 LONG, SHORT STANDARD IRON BAR
I.B.	DENOTES 0.016 SQ., 0.6 LONG, IRON BAR
R.I.B.	DENOTES ROUND IRON BAR
■	DENOTES SURVEY MONUMENT FOUND
□	DENOTES SURVEY MONUMENT PLANTED
WIT.	DENOTES WITNESS
S.U.	DENOTES SOURCE UNKNOWN
990	DENOTES J.G. PAYETTE, O.L.S.
1697	DENOTES J.P. SHIPMAN, O.L.S.
RP	DENOTES REGISTERED PLAN 4M-1388
M	DENOTES MEASURED
S	DENOTES SET

OBSERVED REFERENCE POINTS (ORP): MTM ZONE 9, NAD 83(CSRS)(2010)		
POINT IDENTIFICATION	NORTHING	EASTING
ORP A	5018932.24	379697.87
ORP B	5018828.88	379607.59

COORDINATES SHOWN TO URBAN ACCURACY IN ACCORDANCE WITH O.REG 216/10, SECTIONS 14, AND 31 TO 35 (BOTH INCLUSIVE).

COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

(1) THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM;

(2) THE SURVEY WAS COMPLETED ON THE 12th DAY OF SEPTEMBER, 2024.

OCTOBER 3, 2024
DATE

J.P. SHIPMAN
ONTARIO LAND SURVEYOR

THIS PLAN OF SURVEY RELATES TO AOLS PLAN SUBMISSION FORM NUMBER 2218812

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