Servicing and Stormwater Management Report
1166 Bank Street, Ottawa, ON

Client:
Ambassador Realty Inc.
185 Somerset Street West
Ottawa, ON K2P 0J2

EXP Project Number: OTT-22018175-A0

Prepared By:

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Date Submitted:
    February 07, 2023
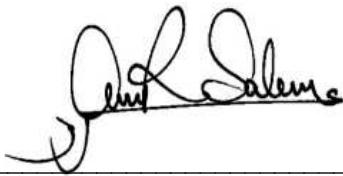Rev 1: August 01, 2023
Rev 2: January 16, 2024

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Type of Document:
Site Plan Control Application

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Date Submitted:
          February 07, 2023
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Legal Notification

This report was prepared by EXP Services Inc. for the account of **Ambassador Realty Inc.**

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. EXP Services Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this project.

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List of Appendices

1   Introduction

Ambassador Realty Inc. has retained EXP Services Inc. (EXP) to undertake a site servicing and stormwater management study in support of a Site Plan Control application for a 6-storey mixed-use building located at 1166 Bank Street. The ground floor is proposed to be commercial retail space with an area of approximately 438 m^2 and the remaining floors will include 45 residential units. The building is also proposed to have underground parking.

The area to be developed is approximately 0.1 hectares and is located at the northwest corner of the intersection of Bank Street and Grove Avenue. The site currently contains a convenience corner store and surface paved parking lot. Please refer to Figure 1 **Appendix A** for a Location Plan.

The description of the subject property is noted below:

- Lot 81, Part of Lots 80 and 82

- Registered Plan 109930

This report will discuss the existing conditions of the site and the proposed site servicing and stormwater management for the development. It will also address sediment and erosion control measures that will need to be implemented for this project. This report provides a design brief for submission, along with the engineering drawings, for City review and approval.

A pre-consultation meeting took place with the City on November 21, 2021. Please refer to the meeting notes included in **Appendix A**.

2   References

Various documents were referred to in preparing the current report including:

- Sewer Design Guidelines, Second Edition, Document SDG002, October 2012, City of Ottawa (Guidelines)

- City of Ottawa Water Distribution Design Guidelines, July 2010 (WDG001)

- Fire Underwriters Survey, Water Supply for Public Fire Protection (FUS), 2020

- Geotechnical Investigation Report, Proposed Multi-Storey Building, 1166 Bank Street, Ottawa, Ontario by Paterson Group, dated May 18, 2022 (Report PG6191-1)

3   Sanitary Sewer Design

3.1   Existing & Proposed Conditions

There is an existing 375 mm diameter PVC sanitary sewer in Bank Street and a 1050 mm diameter brick sanitary sewer in Grove Avenue which are both adjacent to the subject site. It is our understanding

that the sanitary service for the existing convenience corner store connects to the 1050 mm diameter sewer in Grove Avenue.

The new building is proposed to be serviced via a new 200mm sanitary service connected to the existing 1050mm diameter sewer within Grove Avenue. Existing services are to be blanked at main and removed.

3.2 Peak Design Flow

The anticipated peak sanitary flows from the proposed development have been calculated as per the City of Ottawa Guidelines (SDG02, 2012) and Technical Bulletin ISTB-2018-01. The anticipated peak sanitary flows are as follows:

Commercial Retail Avg. Daily Flow:	2.8 L/m²/day
Commercial Retail Area:	438 m²
Commercial Peak Factor:	1.5
Residential Design Flow:	280 L/capita/day
Estimated Residential Population:	65.1
Residential Peak Factor:	Harmon Equation
Extraneous Flow:	0.33 L/s/effective gross ha
Peak Design Flow:	**0.90 L/s**

The new building is proposed to be serviced by a new sanitary service that will be connected to the sanitary sewer in Grove Avenue. It is understood that the City of Ottawa will be replacing the sanitary sewer in Grove Avenue in 2023 and 2024. Coordination will be required between this development and the City rehabilitation project.

As the site is currently used as a commercial site the estimated sanitary flow to the Grove Avenue sanitary sewer is approximately 0.08 L/s. Therefore, the increase in sanitary flow to the Grove Avenue sanitary sewer as a result of this development would be approximately 0.82 L/s.

The sanitary service will be 200 mm in diameter and will have a minimum slope of 1.0%. At this slope, the sanitary service will have a capacity of 32.8 L/s and a full flow velocity of 1.21 m/s, which will be sufficient to service the proposed building. Refer to **Appendix B** for detailed sanitary sewer design sheet.

All underground parking drains will direct flows to the sanitary service lateral. A sanitary sump pump is required to pump collected flows from the underground garage to the building's sanitary service lateral, details of sump pump to be provided by a mechanical engineer.

4   Water Supply

4.1 Existing & Proposed Conditions

There is an existing 305 mm diameter PVC watermain in Bank Street and a 152 mm diameter UCI watermain in Grove Avenue which are both adjacent to the subject site. It is our understanding that the water service for the existing Quickie corner store connects to the 152 mm diameter watermain in Grove Avenue.

There are 7 municipal hydrants (color: blue, Class AA) within 150m of the new building. Please refer to Figure 2 in **Appendix C** for the locations of the existing hydrants.

The new building is proposed to be serviced via a new single 150mm diameter water service connecting to the existing 152mm diameter watermain within Grove Avenue.

The existing water service will be blanked at the watermain within grove Avenue by City of Ottawa forces. Refer to Existing Conditions and Removals Plan C100.

4.2   Required Fire Flow

The fire flow demand calculations were prepared based on the Fire Underwriters Survey (FUS, 2020) criteria and Technical Bulletin 2018-02. The proposed building will have a wood frame and limited combustible contents. The structure will have a fully supervised sprinkler system that confirms to NFPA13. The required fire flow was determined to be **267 L/s**. Refer to **Appendix C** for detailed fire flow demand calculations.

4.3   Water Demands

The domestic water demands for the proposed building were calculated as per the City of Ottawa Water Distribution Guidelines. Commercial average consumption rate, residential demands, and peak factors were used for the demands calculations. Refer to **Appendix C** for detailed water demand calculations. The proposed development's domestic demands were determined as follows:

<u>Areas</u>

Gross site area	=	0.1015 ha
Ground floor commercial area	=	438.13 m²

<u>Number of Residential Units</u>

1- bedroom units	=	42
2- bedroom units	=	3

<u>Population/Occupant Load</u>

37 units x 1.8 persons per unit	=	65.1

<u>Demand Rates</u>

Average Residential Demands (L/person/day)	=	280
Average Commercial Demands (L/m²/day)	=	2.80

<u>Peaking Factors</u>

Max Day Residential Peaking Factor	=	8.15 x avg. day
Max Day Commercial Peaking Factor	=	1.5 x avg. day
Peak Hour Residential Peaking Factor	=	12.28 x avg. day
Peak Hour Commercial Peaking Factor	=	1.8 x avg. day

<u>Water Demands</u>

Avg. Residential Demands = 65.1 x 280 x (1/86,400 sec/day)	=	0.211 L/sec
Avg. Commercial Demands = 438.13 x 2.8 x (1/86,400 sec/day)	=	0.014 L/sec
Total Average Day Demands	**=**	**0.23 L/sec**

Maximum Day Demands = (0.211 L/sec x 8.15) + (0.014 L/sec x 1.5) **=** **1.74 L/sec**

Peak Hour Demands = (0.211 L/sec x 12.28) + (0.014 L/sec x 1.8) **=** **2.63 L/sec**

The average day, maximum day, and peak hourly demands for the proposed building are **0.23 L/sec, 1.74 L/sec, 2.63 L/sec** respectively.

4.4 Watermain Analysis

Based on the water demands calculated in Section 4.3, the City of Ottawa provided boundary conditions for a connection to Grove Avenue. A copy of the correspondence received from the City is provided in **Appendix C** of this report.

The following hydraulic grade line (HGL) boundary conditions were provided for a connection at the existing watermain within grove Ave (Scenario 2):

- Minimum HGL = 104.0 m

- Maximum HGL = 114.6 m

- Max Day + Fire Flow (267 L/sec) = 98.3 m.

Assuming an existing ground elevation of 61.96 m at the connection, the following pressures were calculated for the corresponding scenarios above;

- Average Demand → (114.6 – 61.96) x 9.81 = 514.40 kPa

- Peak Hour Demand → (104.0 – 61.96) x 9.81 = 412.41 kPa

- Max Day + Fireflow (267L/s) → (98.3 – 61.96) x 9.81 = 356.50 kPa

All calculated pressures fall within the desired pressure range as per City of Ottawa Water Design Guidelines.

4.5   Review of Hydrant Spacing

A review of the hydrant spacing was completed to ensure compliance with Appendix I of Technical Bulletin ISTB-2018-02. As per Section 3 of Appendix I all hydrants within 150 meters were reviewed to assess the total possible contribution of flow from these hydrants. For each hydrant, the distance to the proposed building was estimated to calculate the fire flow contribution.

The Hydrant Spacing Chart in **Appendix C** summarizes all fire hydrants within a 150m distance from the proposed building. For each hydrant the distance measured along a fire route or roadway and its contribution to the required fire flow are provided in this table. Figure 2 in **Appendix C** illustrates the hydrant locations in proximity to the site.

All hydrants under consideration are rated AA (Painted light blue) as per the City of Ottawa – Water Distribution Systems (2010) guidelines. Therefore, the available flow from each of these hydrants is considered as 5700 L/min if within 75 m distance from the proposed development or 3800 L/min if within

75 m to 150 m distance from the proposed development. There are 7 existing hydrants found to be accessible in the vicinity of the proposed development.

Based on above noted information, a total of **32,300 L/min** (**538 L/sec**) flow is available from the 7 existing hydrants for firefighting purposes. Therefore, no new hydrants have been proposed for the proposed development.

5   Stormwater Management

5.1   Existing & Proposed Conditions

Stormwater runoff from the subject property is tributary to the City of Ottawa sewer system located within the City of Ottawa. As such, approvals for proposed developments within this area are under the approval authority of the City of Ottawa.

Flows that influence the watershed in which the subject property is located are further reviewed by the principal authority. The subject property is located within the Lower Rideau River watershed and is therefore subject to review by the Rideau Valley Conservation Authority (RVCA).

Currently, there is an existing 300mm concrete storm sewer within Grove Avenue and a 450mm concrete storm sewer within Bank Street along the subject property. The new building is proposed to be serviced via a new 250 mm diameter storm service connected to the existing 300 mm diameter storm sewer in Grove Avenue.

5.2   Storm Design Criteria

The storm sewer system was designed in conformance with the City of Ottawa Sewer Design Guidelines (SDG02, 2012). The stormwater servicing design criteria for the proposed development was identified in the pre-consultation meeting, refer to **Appendix A** for pre-consultation meeting notes. The identified criteria are as follow:

- Average runoff coefficients were calculated for each inlet drainage area using a runoff coefficient of 0.20 for pervious surfaces and 0.90 for impervious surfaces.

- Estimated storage volumes are based on the Modified Rational Method.

- The allowable post-development release rate, up to the 100-year storm event, shall not exceed the pre-development peak flow during 5-year storm event. The allowable peak flow shall be determined by estimating the pre-development average runoff coefficient or 0.5, whichever is less.

- Flows from storm events greater than the 100-year return period will be directed overland towards existing roadways.

5.3   Allowable Release Rate

The allowable release rate for the site was established using the criteria outlined in Section 5.2 and a time of concentration of 10 minutes.

The following pre-development parameters were used to determine the allowable release rates from the proposed site using the Rational Formula:

$Q_{ALL} = 2.78 * C_{AVG} * I_T * A$

where:

Q_{ALL} = Allowable release rate (L/s)

C_{AVG} = Average runoff coefficient

I_T = Average rainfall intensity (mm/h) for return period T and time of concentration, Tc (minutes)

A = Drainage Area (hectares)

Rainfall intensities for the 5-year storm were taken from IDF data for Ottawa. Using a time of concentration (Tc) of 10 min, a runoff coefficient of 0.50, and a total development area of 0.102 ha, the allowable release rate for the site is determined for the 5-year storm is as follows:

$I_5 = 998.071 / (Tc+6.053)^{0.814}$

$Q_{ALL} = 14.70$ L/s

The allowable post-development release rate for the site will therefore be **14.70 L/s.** Please refer to **Appendix D** for detailed calculations.

5.4 Post-Development Conditions

5.4.1 Quantity Control

Runoff coefficients used for the post-development conditions were based on actual areas measured in AutoCAD. Runoff coefficients for impervious surfaces (roofs, asphalt, and concrete) were taken as 0.90, whereas pervious surfaces (grass/landscaping) were taken as 0.20.

Post development runoff will be detained on-site for storms up to and including the 100-year storm. The storage volumes required to attenuate the 100-year post-development flow were calculated using the Modified Rational Method. The required SWM storage volumes will be achieved using rooftop storage.

The following catchment areas are outlined on Drawing C400:

- Catchment areas S01 and S02 consist of the proposed building's rooftop footprint. Runoff in these drainage areas will be captured via seven roof drains with controls.

- Catchment area S03 consist of the proposed building's rooftop and garage rooftop footprint. Runoff in these drainage areas will be captured via seven roof drains without controls, to be directed to a proposed underground cister in the basement from where it will be pumped to the storm service lateral.

- Catchment area S04 consists of the proposed ramp to the underground parking garage. Flows will be captured via proposed trench drain, and will be conveyed to the underground cistern in the basement from where it will be pumped to the storm service lateral.

- Catchment area S05 consists of paved and landscaped areas surrounding the proposed building. Flows in this catchment are uncontrolled and sheet drain towards the Grove Avenue

right-of-way.. Flows will be captured via proposed trench drain, and will be conveyed to the sump in the basement from where is will be pumped to the storm service lateral.

- Catchment area S06 consists of mainly paved areas surrounding the proposed building. Flows in this catchment are uncontrolled and sheet drain towards Bank Street right-of-way.

Table 5.1 below summarizes post-development storage and release rates.Table 5.1 Summary of Post-Development Flows

Area No.	Area (ha)	Max Release Rate (L/s)	Storage Required (m³)	Available Storage (m³)
		100-yr	100-yr (MRM)	
S01	0.005	0.32	1.5	2.2
S02	0.050	1.92	21.3	22.0
S03	0.013	2.50	5.4	10.0
S04	0.008			
S05 *	0.019	6.25	N/A	N/A
S06*	0.006	3.18	N/A	N/A
TOTAL	*0.1015*	*14.17*	*26.30*	*31.60*
Uncontrolled Drainage Areas				

Flows collected from the proposed building's rooftop in drainage areas S01 and S02 will be captured via **seven (7) WATTS Adjustable Accutrol Weir** roof drains with **closed weir**, each of which will be restricting the discharge rate to a maximum of **0.32 L/s** at a maximum corresponding head of **0.15m.** Collectively, **22.8 m³** of rooftop storage is required in these drainage areas to restrict flows to the allowable release rate.

Flows collected from the proposed building's rooftop in drainage areas S03 will be captured via **seven (7) WATTS Adjustable Accutrol Weir** roof drains with **no controls,** to be directed to a proposed undergound cistern**.** Flows from underground parking ramp in drainage area S04 will be collected via trench drain and conveyed to the underground cistern as well. The proposed cistern is required to provide a minimum storage of **5.4 m³** to be pumped at a constant release rate of **2.5 L/s** to the storm service outlet pipe. Cistern and pump to be designed by a mechanical engineer.

A new proposed 250mm diameter storm service lateral is proposed to service the new building and connect to the existing storm manhole within Grove Avenue.The new storm service lateral will direct the following captured flows;

- Controlled flows from the roof drains in S01 & S02; roof drain connection to the storm service lateral is to be made **downstream** of the proposed backwater valve.

- Uncontrolled flow from the roof drains in S03 and from the trench drain in S04 will be conveyed to the underground cistern in the basement from where it will be pumped to the storm service lateral ata constant release rate of 2.5 L/s.

- Flow from the foundation drains will be discharged to a sump in basement from where it will be pumped to the storm service lateral.

Refer to **Appendix D** for all detailed stormwater management calculations and roof drain details.

5.4.2 Quality Control

The RVCA was contacted to confirm if any stormwater quality control requirements apply to this site. The RVCA confirmed that they do not have any quality control requirements that apply for this site. Please see correspondence with the RVCA in **Appendix A**.

6 Erosion and Sediment Control

During all construction activities, erosion and sedimentation shall be controlled by the following techniques:

- Extent of exposed soils shall be limited at any given time;

- Exposed areas shall be re-vegetated as soon as possible;

- Minimize the area to be cleared and disruption of adjacent areas;

- Siltsack or approved equivalent shall be installed inside all catch basins, catch basin manholes, and storm manholes as identified on the erosion and sediment control plan;

- Visual inspection shall be completed daily on sediment control barriers and any damage repaired immediately. Care will be taken to prevent damage during construction operations;

- In some cases, barriers may be removed temporarily to accommodate the construction operations. The affected barriers will be reinstated at night when construction is completed;

- Sediment control devices will be cleaned of accumulated silt as required. The deposits will be disposed of as per the requirements of the contract;

- During construction, if the engineer believes that additional prevention methods are required to control erosion and sedimentation, the contractor will install additional silt fences or other methods as required to the satisfaction of the engineer; and,

- Construction and maintenance requirements for erosion and sediment controls are to comply with Ontario Provincial Standard Specification (OPSS) 805.

7 Conclusions

This report provides the sanitary, watermain, and stormwater design for the proposed building at 1166 Bank Street, in Ottawa, Ontario. This report should be read in conjunction with the engineering drawing package prepared by EXP. The results of the report are as follows:

- The new building will be serviced by a new 200 mm diameter sanitary service which will adequately service the proposed development. Flows from underground parking drains will be pumped to the sanitary service lateral via a sanitary sump pump, to be designed by a mechanical engineer.

- The new building will be serviced by a 150 mm diameter water service which will adequately service the proposed development.

- The new building will be serviced by a new 250 mm diameter storm service which will adequately service the proposed development.

- Stormwater management will be achieved by restricting all storms up to the 100-year event to the allowable release rate. The quantity control criteria for the site is to restrict the 100-year post-development release rate to the 5-year pre-development flow using a runoff coefficient of 0.5, as identified by the City of Ottawa.

- Required on-site storage volumes will be achieved using a combination of roof top storage via flow-controlled roof drains and underground cistern with pump, to be designed by a mechanical engineer. Runoff along frontage of proposed building will flow uncontrolled towards the City right of way.

- Flows from foundation drainage are to be conveyed to sump in basement and pumped to proposed storm service lateral.

- No stormwater quality control measures are required for this site.

- Overland flow routes have been provided for the subject site.

- Temporary erosion and sediment control measures for the subject site have been identified.

- During all construction activities, erosion and sedimentation shall be controlled.

Appendix A – Background Information

- **Figure 1: Site Location Plan**

- **City of Ottawa Pre-Consultation Meeting Notes**

- **Correspondence with Rideau Valley Conservation Authority (RVCA)**

Appendix B – Sanitary Design

- **Sanitary Sewer Design Sheet**

Appendix C – Watermain Design

- **FUS 2020 Calculations**

- **FUS Exposure Distances Figure**

- **Water Demand Calculations**

- **Boundary Conditions**

- **Figure 2 – Hydrant Location Plan**

- **Hydrant Flow Calculations**

Appendix D – Stormwater Design

- **Stormwater Management Calculations**

- **Roof Drain Specifications**

Appendix A – Background Information

- **Figure 1: Site Location Plan**

- **City of Ottawa Pre-Consultation Meeting Notes**

- **Correspondence with Rideau Valley Conservation Authority (RVCA)**

PROJECT LOCATION

31

Hopewell Ave

Belmont Ave

Willard St

Scotia Pl

Glen Ave

Bank St

Grosvenor Ave

Grove Ave

Ossington Ave

Cameron Ave

Cameron Ave

N

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HORIZONTAL   1:2000

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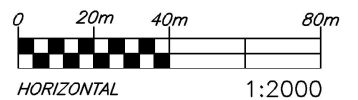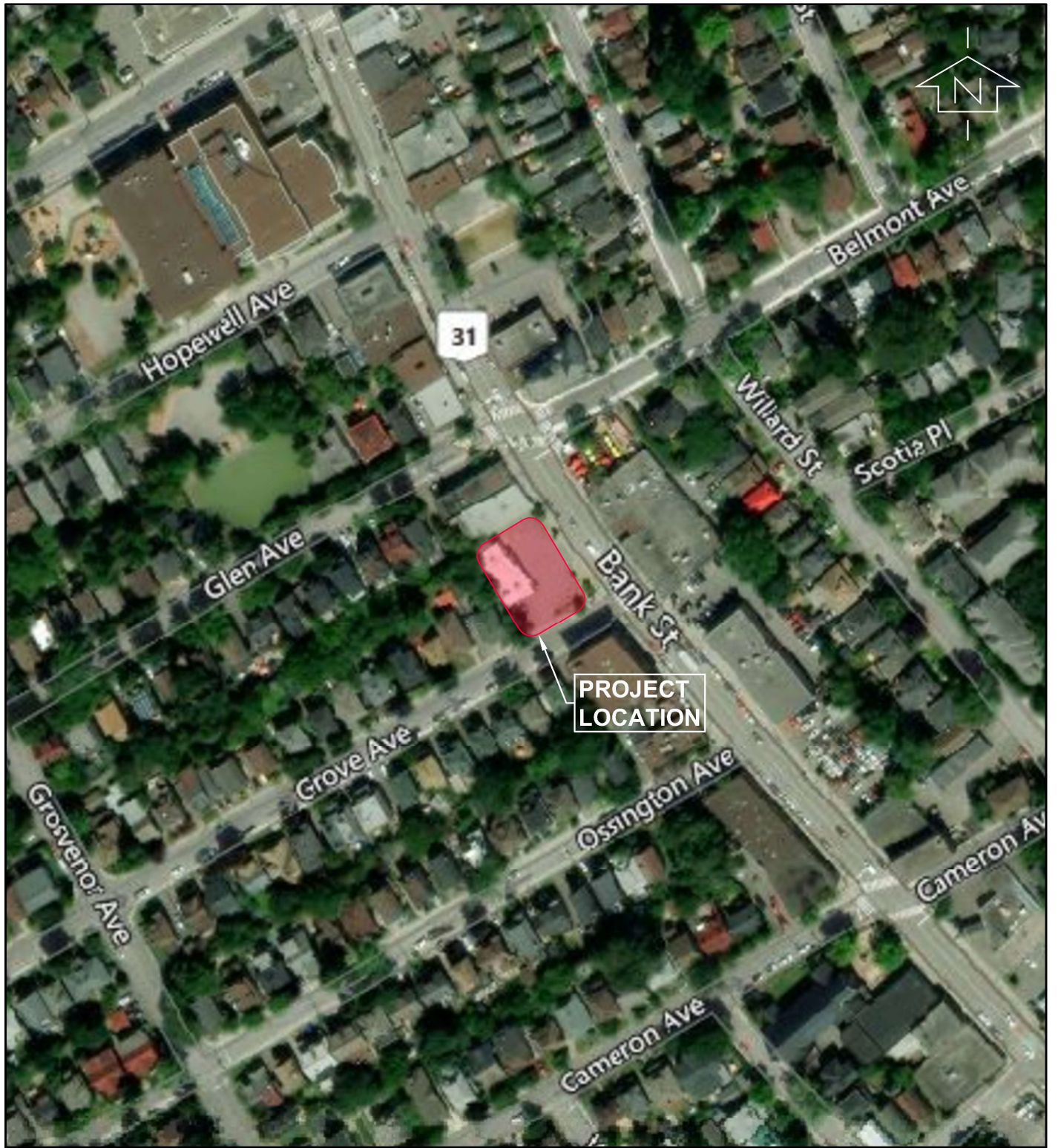
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1166 BANK STREET

PROJECT LOCATION PLAN

| SCALE | 1:2000 |
| SKETCH NO | |

FIG 1

<u>Pre-Application Consultation Meeting Notes</u>

1166 Bank Street
File Number: PC2021-0371
November 16, 2021, via Zoom

Attendees:

City of Ottawa:
Seana Turkington, File Lead
Margot Linker, Student Planner
Matthew Ippersiel, Urban Design
Jessica Button, Planner
Craig Hamilton, Planner
Wally Dubyk, Transportation
Mark Richardson, Forester
Reza Bakhit, Project Manager
Matthew Hayley, Environmental Planner

Applicant Team:
Arthur Loeb, Owner
Toon Dreessen, Architect

Old Ottawa South Community Association:
Sophie Beecher
Carol Brascoupe

Subject: 1166 Bank Street

<u>Meeting Notes:</u>
Opening & attendee introduction
- Introduction of meeting attendees.
- Planning staff can confirm that an NDA has been signed.

Proposal Overview
- Proposing 34 unit, six-storey apartment building. This will be a sustainable structure.
  - Shorter timeframe for construction.
- Proposing a raised intersection crossing Grove Avenue to slow traffic, and to turn the first 100 metres of Grove into a two-way street to serve the building.
  - This area of Grove will be paved in large concreate slabs that well give a sense of crossing a "shared zone". Landscaping is proposed at the end of this two-way traffic section.
- There is an existing laneway adjacent to the site that will be preserved as a landscaped space.
- This proposal includes 16 underground parking spaces, 36 indoor bicycle spaces and 16 exterior bicycle spaces.

- The ground floor space includes exterior bicycle parking, indoor bicycle parking, and four commercial units.
- Second, third and fourth floors step out, while the fifth-floor steps back in.
- Proposal provides a mix of bachelor, one bedroom, and 2-bedroom units.
- Building is stepped back on north side after the first storey.
- Building materials on elevations include terracotta panels and brick.

Staff Comments

Civil Engineering (Reza Bakhit)
- Note that the information is considered **preliminary** and the assigned Development Review Project Manager may modify and/or add additional requirements and conditions upon review of an application if deemed necessary.

General:

- It is the sole responsibility of the consultant to investigate the location of existing underground utilities in the proposed servicing area and submit a request for locates to avoid conflict(s). The location of existing utilities and services shall be documented on an **Existing Conditions Plan**.
- Any easements on the subject site shall be identified and respected by any development proposal and shall adhere to the conditions identified in the easement agreement. A **legal survey plan** shall be provided and all easements shall be shown on the engineering plans.
- A deep excavation and dewatering operations have the potential to cause damages to the neighboring adjacent buildings/ City infrastructure. Document that construction activities (excavation, dewatering, vibrations associated with construction, etc.) will not have an impact on any adjacent buildings and infrastructure.
- A **Record of Site Condition (RSC) in accordance with O.Reg.** 153/04 will be required to be filed and acknowledged by the Ministry prior to issuance of a building permit due to a change to a more sensitive property use.
- Reference documents for information purposes :
  - Ottawa Sewer Design Guidelines (October 2012)
  - Technical Bulletin PIEDTB-2016-01
  - Technical Bulletins ISTB-2018-01, ISTB-2018-02, ISTB-2018-03, and ISTB-2021-03
  - Ottawa Design Guidelines - Water Distribution (2010)
  - Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007)
  - City of Ottawa Slope Stability Guidelines for Development Applications (revised 2012)
  - City of Ottawa Environmental Noise Control Guidelines (January 2016)
  - City of Ottawa Accessibility Design Standards (2012) (City recommends development be in accordance with these standards on private property)
  - Ottawa Standard Tender Documents (latest version)
  - Ontario Provincial Standards for Roads & Public Works (2013)
  - Record drawings and utility plans are also available for purchase from the City (Contact the City's Information Centre by email at InformationCentre@ottawa.ca or by phone at (613) 580-424 x.44455).

- Please note that this is the applicant responsibility to refer to the latest applicable guidelines while preparing reports and studies.
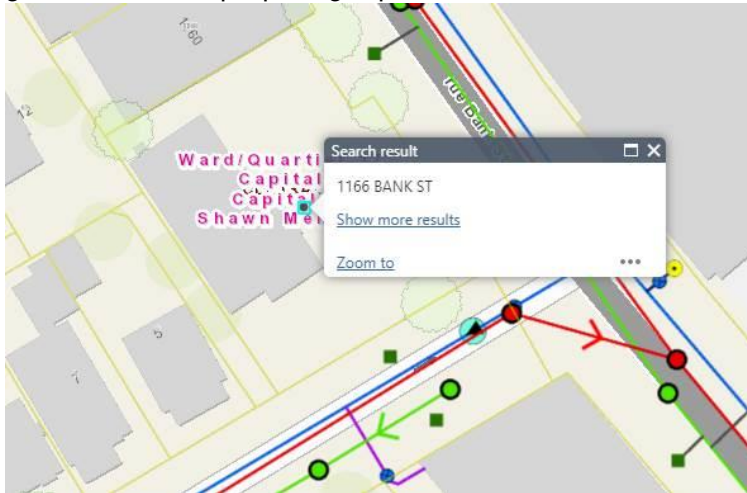
Disclaimer:

- *The City of Ottawa does not guarantee the accuracy or completeness of the data and information contained on the above image(s) and does not assume any responsibility or liability with respect to any damage or loss arising from the use or interpretation of the image(s) provided. This image is for schematic purposes only.*

Stormwater Management Criteria and Information:

- **Water Quantity Control:** In the absence of area specific SWM criteria please control post-development runoff from the subject site, up to and including the **100-year storm event**, to **a 5-year pre-development level.** The pre-development runoff coefficient will need to be determined **as per existing conditions** but in no case more than 0.5. [**If 0.5 applies it needs to be clearly demonstrated in the report that the pre-development runoff coefficient is greater than 0.5**]. The time of concentration (T_c) used to determine the pre-development condition should be calculated. *Tc should not be less than 10 min. since IDF curves become unrealistic at less than 10 min; T_c of 10 minutes shall be used for all post-development calculations*].
- Any storm events greater than the established **5-year allowable** release rate, up to and including the **100-year storm event**, shall be detained on-site. The SWM measures required to avoid impact on downstream sewer system will be subject to review.
- Please note that foundation drainage is to be independently connected to the storm sewer main unless being pumped with appropriate back up power, sufficient sized pump and back flow prevention. **It is recommended that the foundation drainage system be drained by a sump pump connection to the storm sewer to minimize risk of basement flooding as it will provide the best protection from the uncontrolled sewer system compared to relying on the backwater valve.**
- **Water Quality Control:** Please consult with the local conservation authority (RVCA) regarding water quality criteria prior to submission of a Site Plan Control Proposal application to establish any water quality control restrictions, criteria and measures for the site. Correspondence and clearance shall be provided in the Appendix of the report.

- Please note that as per *Technical Bulletin PIEDTB-2016-01 section 8.3.11.1 (p.12 of 14)* **there shall be no surface ponding on private parking areas during the 5-year storm rainfall event**.
- **If Underground Storage proposed:** Please note that the Modified Rational Method for storage computation in the Sewer Design Guidelines was originally intended to be used for above ground storage (i.e. parking lot) where the change in head over the orifice varied from 1.5 m to 1.2 m (assuming a 1.2 m deep CB and a max ponding depth of 0.3 m). This change in head was small and hence the release rate fluctuated little, therefore there was no need to use an average release rate.
    - When underground storage is used, the release rate fluctuates from a maximum peak flow based on maximum head down to a release rate of zero. This difference is large and has a significant impact on storage requirements. **We therefore require that an average release rate equal to 50% of the peak allowable rate shall be applied to estimate the required volume. Alternatively, the consultant may choose to use a submersible pump in the design to ensure a constant release rate.**
    - In the event that there is a disagreement from the designer regarding the required storage, The City will require that the designer demonstrate their rationale utilizing dynamic modelling, that will then be reviewed by City modellers in the Water Resources Group.
    - Please provide information on UG storage pipe. Provide required cover over pipe and details, chart of storage values, capacity etc. How will this pipe be cleaned of sediment and debris?
    - Provide information on type of underground storage system including product name and model, number of chambers, chamber configuration, confirm invert of chamber system, top of chamber system, required cover over system and details, interior bottom slope (for self-cleansing), chart of storage values, length, width and height, capacity, entry ports (maintenance) etc.

    - Provide a cross section of underground chamber system showing invert and obvert/top, major and minor HWLs, top of ground, system volume provided during major and minor events. UG storage to provide actual 2- and 100-year event storage requirements.
    - In regard to all proposed UG storage, ground water levels (and in particular HGW levels) will need to be reviewed to ensure that the proposed system does not become surcharged and thereby ineffective.
    - Modeling can be provided to ensure capacity for both storm and sanitary sewers for the proposed development by City's Water Distribution Dept. – Modeling Group, through PM and upon request.

- Please note that the minimum orifice dia. for a plug style **ICD is 83mm and the minimum flow rate from a vortex ICD is 6 L/s** in order to reduce the likelihood of plugging.
- Post-development site grading shall match existing property line grades in order to minimize disruption to the adjacent residential properties. A **topographical plan of survey** shall be provided as part of the submission and a note provided on the plans.

- Please provide a **Pre-Development Drainage Area Plan** to define the pre-development drainage areas/patterns. **Existing drainage patterns shall be maintained and discussed as part of the proposed SWM solution**.
- **If rooftop control and storage is proposed** as part of the SWM solutions sufficient details (Cl. 8.3.8.4) shall be discussed and document in the report and on the plans. Roof drains are to be connected downstream of any incorporated ICDs within the SWM system and not to the foundation drain system. Provide a **Roof Drain Plan** as part of the submission.
- Considering the size and the existing condition of the site, and the fact that the proposed building occupy the majority of the site area, it would be acceptable to control the roof portion only and leave the remainder of the site uncontrol as long as the uncontrolled portion is directed towards the right of way. This approach should be discussed in the SWM report. Also, the grading plan should clearly demonstrate that the runoff from the uncontrolled portion of the site will be directed towards the ROW
- If **Window wells** are proposed, they are to be indirectly connected to the footing drains. A detail of window well with indirect connection is required, as is a note at window well location speaking to indirect connection.
- There must be at least **15cm of vertical clearance** between the spill elevation and the ground elevation at the building envelope that is in proximity of the flow route or ponding area. The exception in this case would be at reverse sloped loading dock locations. At these locations, a minimum of 15cm of vertical clearance must be provided below loading dock openings. Ensure to provide discussion in report and ensure grading plan matches if applicable.
- Rear yard on grade parking to be permeable pavement. Refer to City Standard Detail Drawings SC26 (maintenance/temp parking areas), SC27 or permeable asphalt materials. No gravel or stone dust parking areas permitted.

Storm Sewer:

- A 450mm dia. CONC storm sewer (2003) is available within Bank street**.**
- A 300mm dia. CONC storm sewer (1974) is available within Grove Ave.

Sanitary Sewer:

- A 375 mm dia. PVC Sanitary sewer (2003) is available within Bank street**.**
- A 1050mm mm dia. Brick Sanitary sewer (1950) is available Grove Ave.
- Please provide the new Sanitary sewer discharge and we confirm if sanitary sewer main has the capacity. An analysis and demonstration that there is sufficient/adequate residual capacity to accommodate any increase in wastewater flows in the receiving and downstream wastewater system is required to be provided. Needs to be demonstrated that there is adequate capacity to support any increase in wastewater flow.
- Please apply the wastewater design flow parameters *in Technical Bulletin PIEDTB-2018-01.*
- Sanitary sewer monitoring maintenance hole is required to be installed at the property line (on the private side of the property) as per City of Ottawa Sewer-Use By-Law 2003-514 (14) *Monitoring Devices*.
- A backwater valve is required on the sanitary service for protection.

Water:

- A 305 mm dia. PVC watermain (2003) is available within Bank street**.**
- A 152mm dia. UCI watermain (1913) is available within Grove Ave.
- Existing residential service to be blanked at the main.

- **Water Supply Redundancy:** Residential buildings with a basic day demand greater than 50m³/day (0.57 L/s) are required to be connected to a minimum of two water services separated by an isolation valve to avoid a vulnerable service area as per the *Ottawa Design Guidelines - Water Distribution, WDG001, July 2010 Clause 4.3.1 Configuration.* The basic day demand for this site not expected to exceed 50m³/day.
- Please **review Technical Bulletin ISTB-2018-0**, maximum fire flow hydrant capacity is provided in Section 3 Table 1 of Appendix I. A **hydrant coverage figure** shall be provided and **demonstrate there is adequate fire protection for the proposal**. Two or more public hydrants are anticipated to be required to handle fire flow.
- Boundary conditions are required to confirm that the require fire flows can be achieved as well as availability of the domestic water pressure on the City street in front of the development. Use Table 3-3 of the MOE Design Guidelines for Drinking-Water System to determine Maximum Day and Maximum Hour peaking factors for 0 to 500 persons and use Table 4.2 of the Ottawa Design Guidelines, Water Distribution for 501 to 3,000 persons. Please provide the following information to the City of Ottawa via email to request water distribution network boundary conditions for the subject site. Please note that once this information has been provided to the City of Ottawa it takes approximately 5-10 business days to receive boundary conditions.
- Type of Development and Units
- Site Address
- A plan showing the proposed water service connection location.
- **Average Daily Demand** (L/s)
- **Maximum Daily Demand** (L/s)
- **Peak Hour Demand** (L/s)
- **Fire Flow** (L/min)
- *[Fire flow demand requirements shall be based on ISTB-2021-03]*
- *Note: The OBC method can be used if the fire demand for the private property is less than 9,000 L/min. If the OBC fire demand reaches 9000 L/min, then the FUS method is to be used.*
- *Exposure separation distances shall be defined on a figure to support the FUS calculation and required fore flow (RFF).*

- **Hydrant capacity shall be assessed to demonstrate the RFF can be achieved**. Please identify which hydrants are being considered to meet the RFF on a fire hydrant coverage plan as part of the boundary conditions request.

Snow Storage:

- Any portion of the subject property which is intended to be used for permanent or temporary snow storage shall be as shown on the approved site plan and grading plan. Snow storage shall not interfere with approved grading and drainage patters or servicing. Snow storage areas shall be setback from the property lines, foundations, fencing or landscaping a minimum of 1.5m. Snow storage areas shall not occupy driveways, aisles, required parking spaces or any portion of a road allowance. If snow is to be removed from the site please indicate this on the plan(s).

Gas pressure regulating station:

- A gas pressure regulating station may be required depending on HVAC needs (typically for 12+ units). Be sure to include this on the Grading, Site Servicing, SWM and

Landscape plans. This is to ensure that there are no barriers for overland flow routes (SWM) or conflicts with any proposed grading or landscape features with installed structures and has nothing to do with supply and demand of any product.

Gas Pressure
Regulating Station.pdf

Regarding Quantity Estimates:

- Please note that external Garbage and/or bicycle storage structures are to be added to QE under Landscaping as it is subject to securities.In addition, sump pumps for Sanitary and Storm laterals and/or cisterns are to be added to QE under Hard items as it is subject to securities, even though it is internal and is spoken to under SWM and Site Servicing Report and Plan.

CCTV sewer inspection:

- CCTV sewer inspection required for pre and post construction conditions to ensure no damage happens to City Assets surrounding site.

Road Reinstatement:

- Where servicing involves three or more service trenches, either a full road width or full lane width 40 mm asphalt overlay will be required, as per amended Road Activity By-Law 2003-445 and City Standard Detail Drawing R10. The amount of overlay will depend on condition of roadway and width of roadway(s).

Required Engineering Plans and Studies:

PLANS:

- Existing Conditions and Removals Plan
- Site Servicing Plan
- Grade Control and Drainage Plan
- Erosion and Sediment Control Plan
- Roof Drainage Plan (If rooftop storage proposed)
- Foundation Drainage System Detail (if applicable)
- Topographical survey

REPORTS:

- Site Servicing and Stormwater Management Report
- Geotechnical Study/Investigation
- Noise Control Study
- Phase I ESA
- Phase II ESA (Depending on recommendations of Phase I ESA)
- RSC (Record of the site Conditions)
- Site lighting certificate

- Please refer to the **City of Ottawa Guide to Preparing Studies and Plans [Engineering]:**
- Specific information has been incorporated into both the Guide to Preparing Studies and Plans for a site plan. The guide outlines the requirement for a statement to be provided on the plan about where the property boundaries have been derived from.
- Added to the general information for servicing and grading plans is a note that an **O.L.S**. should be engaged when reporting on or relating information to property boundaries or existing conditions. The importance of engaging an **O.L.S**. for development projects is emphasized.

Phase One Environmental Site Assessment:

- A Phase I ESA is required to be completed in accordance with Ontario Regulation 153/04 in support of this development proposal to determine the potential for site contamination. Depending on the Phase I recommendations a Phase II ESA may be required.
- The Phase I ESA shall provide all the required Environmental Source Information as required by O. Reg. 153/04. ERIS records are available to public at a reasonable cost and need to be included in the ESA report to comply with O.Reg. 153/04 and the Official Plan. The City will not be in a position to approve the Phase I ESA without the inclusion of the ERIS reports.
- Official Plan Section 4.8.4: https://ottawa.ca/en/city-hall/planning-and-development/official-plan-and-master-plans/official-plan/volume-1-official-plan/section-4-review-development-applications#4-8-protection-health-and-safety

RSC (Record of the site Conditions):

- A RSC is required when changing the land use (zoning) of a property to a more sensitive land use.
  Submitting a record of site condition | Ontario.ca

Geotechnical Investigation:

- A Geotechnical Study/Investigation shall be prepared in support of this development proposal.
- Reducing the groundwater level in this area can lead to potential damages to surrounding structures due to excessive differential settlements of the ground. The impact of groundwater lowering on adjacent properties needs to be discussed and investigated to ensure there will be no short term and long term damages associated with lowering the groundwater in this area.
- Geotechnical Study shall be consistent with the **Geotechnical Investigation and Reporting Guidelines for Development Applications**.
  https://documents.ottawa.ca/sites/documents/files/geotech_report_en.pdf

Noise Study:

- A **Transportation Noise Assessment** is required as the subject development is located within 100m proximity of an Arterial Road
- A **Stationary Noise Assessment** is required in order to assess the noise impact of the proposed sources of stationary noise (mechanical HVAC system/equipment) of the

development onto the surrounding residential area to ensure the noise levels do not exceed allowable limits specified in the City Environmental Noise Control Guidelines. https://documents.ottawa.ca/sites/default/files/documents/enviro_noise_guide_en.pdf

Exterior Site Lighting:

- Any proposed light fixtures (both pole-mounted and wall mounted) must be part of the approved Site Plan. All external light fixtures must meet the criteria for Full Cut-off Classification as recognized by the Illuminating Engineering Society of North America (IESNA or IES), and must result in minimal light spillage onto adjacent properties (as a guideline, 0.5 fc is normally the maximum allowable spillage). In order to satisfy these criteria, the please provide the City with a **Certification (Statement) Letter** from an acceptable professional engineer stating that the design is compliant.

Construction approach – Please contact the Right-of-Ways Permit Office TMconstruction@ottawa.ca early in the Site Plan process to determine the ability to construct site and copy File Lead (Seana.Turkington@ottawa.ca) on this request.

- Please note that these comments are considered preliminary based on the information available to date and therefore maybe amended as additional details become available and presented to the City. It is the responsibility of the applicant to verify the above information. The applicant may contact me for follow-up questions related to engineering/infrastructure prior to submission of an application if necessary.

Transportation (Wally Dubyk)
- Road, Sewer and Water works schedules to start 2-3 years.
- A Screening Form is to be submitted to determine if a transportation study is required. Consultants should fill in the form in Appendix 'B'. Click on the website: www.ottawa.ca/TIA
- Bank Street is designated as an Arterial road within the City's Official Plan with a ROW protection limit of 23.0 metres. The ROW protection limit and the offset distance (11.5 metres) are to be dimensioned from the existing centerline of pavement and shown on the drawings. The Certified Ontario Land Surveyor is to confirm the ROW protected limits and any portion that may fall within the private property to be conveyed to the City.
- ROW interpretation – Land for a road widening will be taken equally from both sides of a road, measured from the centreline in existence at the time of the widening if required by the City. The centreline is a line running down the middle of a road surface, equidistant from both edges of the pavement. In determining the centreline, paved shoulders, bus lay-bys, auxiliary lanes, turning lanes and other special circumstances are not included in the road surface.

Site Plan - General Comments

- A 5.0 metres x 5.0 metres sight triangle would be required at the intersection of Bank Street and Grove Avenue. The sight triangle area is to be conveyed to the City and is to be shown on all drawings. The sight triangle dimensions are to be measured from the ROW protected limits.

- The Owner(s) will be responsible for obtaining Roadway Modification Approval from the City for any roadway modification. For detailed information on how to obtain RMA, please contact jason.endrawis@ottawa.ca
- A separate pavement markings and signage drawings are to be provided.
- The Owner is responsible for identifying the type and location of existing signage that will be removed from within the Right-of-Way to accommodate the development site. The Owner is responsible for providing the General Manager with a detailed drawing identifying the type and position of the existing signs and roadway pavement markings along the site frontage.
- The closure of an existing private approach shall reinstate the sidewalk, shoulder, curb and boulevard to City standards.
- The Owner acknowledges and agrees that all private accesses to Roads shall comply with the City's Private Approach By-Law being By-Law No. 2003-447 as amended, or as approved through the Site Plan control process.
- Ramp grades are to be provided on drawings
- No private approach shall be constructed so that the distance between the nearest limit of a private approach and the nearest intersecting street line is less than the distance set out in Column 3 of the Private Approach By-Law No.: 2003-447, Section 25 (l).
  Example:20-99 parking spaces requires 18.0 metres from nearest intersecting street line
- The existing bus pad and shelter relocation to be addressed.
- The proponent is to provide an access grade that does not exceed 2% within the private property <u>for a minimum distance of 6.0 metres from the **ROW limits**</u>. This is a critical safe distance to allow a driver to stop at the top of the ramp and have a good sight angle of pedestrians. If ramp exceeds 6% grade, a subsurface melting element will be required.
- The consultant should review the sight distance to the access and any obstructions that may hinder the view of the driver.
- The Tactile Walking Surface Indicator (TWSI) should be provided at pedestrian crossings. Under the Integrated Accessibility Standards of the Accessibility for Ontarians with Disabilities Act, 2005, and the City of Ottawa Accessibility Design Standards, TWSI's are required for new construction and the redevelopment of elements in public spaces, such as for exterior paths of travel (e.g. sidewalks and at the top of stairs).
- The concrete sidewalk is to meet City standards and be 2.0 metres in width and to be continuous along property frontage and depressed through the proposed access (please refer to the City's sidewalk and curb standard
- Bicycle parking spaces are required as per Section 111 of the Ottawa Comprehensive Zoning By-law. Bicycle parking spaces should be located in safe, secure places near main entrances and preferably protected from the weather.
- Please keep in mind that on street parking is not a viable option for tenants. Ensure that potential tenants are aware that there is no provision for parking.

- A construction Traffic Management Plan is to be provided for approval by the Senior Engineer, Traffic Management, Transportation Services Dept.

Forester (Mark Richardson)
- TCR required.
- Address all of the trees with critical root zone that extends onto the site.

- Encourage tree retention to maximum extent possible.

TCR requirements:

- For Site Plan Control - a Tree Conservation Report (TCR) must be supplied for review along with the suite of other plans/reports required by the City
    - o an approved TCR is a requirement of Site Plan approval.
    - o The TCR may be combined with the LP provided all information is supplied
- For Zoning only – a TCR is not mandatory although it is suggested.
    - o Note that if zoning influences the ability to retain trees on adjacent properties, the City may require a TCR
    - o Note that if zoning reduces the ability to plant medium or large at maturity acceptable trees, the staff may seek a redesign option
- As of January 1 2021, any removal of privately-owned trees 10cm or larger in diameter, or publicly (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.
- The Planning Forester from Planning and Growth Management as well as foresters from Forestry Services will review the submitted TCR
    - o If tree removal is required, both municipal and privately-owned trees will be addressed in a single permit issued through the Planning Forester
    - o Compensation may be required for city owned trees – if so, it will need to be paid prior to the release of the tree permit
- the TCR must list all trees on site, as well as off-site trees if the CRZ extends into the developed area, by species, diameter and health condition
- please identify trees by ownership – private onsite, private on adjoining site, city owned, co-owned (trees on a property line)
- the TCR must list all trees on adjacent sites if they have a critical root zone that extends onto the development site
- If trees are to be removed, the TCR must clearly show where they are, and document the reason they cannot be retained
- 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
    - o the location of tree protection fencing must be shown on a plan
    - o show the critical root zone of the retained trees
    - o if excavation will occur within the critical root zone, please show the limits of excavation
- 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.
- For more information on the process or help with tree retention options, contact Mark Richardson mark.richardson@ottawa.ca or on City of Ottawa

LP tree planting requirements:

- For additional information on the following please contact tracy.smith@Ottawa.ca

Minimum Setbacks

- Maintain 1.5m from sidewalk or MUP/cycle track.
- Maintain 2.5m from curb

- Coniferous species require a minimum 4.5m setback from curb, sidewalk or MUP/cycle track/pathway.
- Maintain 7.5m between large growing trees, and 4m between small growing trees. Park or open space planting should consider 10m spacing.
- Adhere to Ottawa Hydro's planting guidelines (species and setbacks) when planting around overhead primary conductors.

Tree specifications

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

Hard surface planting

- Curb style planter is highly recommended
- No grates are to be used and if guards are required, City of Ottawa standard (which can be provided) shall be used.
- Trees are to be planted at grade

Soil Volume

- Please ensure adequate soil volumes are met:

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

- Please note that these soil volumes are not applicable in cases with Sensitive Marine Clay.

Sensitive Marine Clay

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

Environmental Planning (Matthew Hayley)

- Given the height of the proposal (mid to high rise) the proposal will need to review and incorporate bird safe design elements. Some of the risk factors include glass and related design traps such as corner glass and fly-through conditions, ventilation grates and open pipes, landscaping, light pollution. More guidance and solutions are available in the guidelines which can be found here: https://ottawa.ca/en/planning-development-and-construction/developing-property/development-application-review-process/development-application-submission/guide-preparing-studies-and-plans .
- Consider street trees on the adjacent streets or on the private property.
    o Keep some street tress in the patio area.

Urban Design (Matthew Ippersiel)
- Note the overhang facing Bank. This is generally discouraged on TM streets to maintain a consistent street wall on the street edge.
    o Suggest raising ground floor or reduce the overhang to help meet TM objectives.
- Would like to see the façade drawn out and capture opportunities for patio space, as well as a bit more landscaping on this site.
- Regarding the slope for the entrance into the garage there are safety concerns to consider.
- Pleased to see bike parking provided. However, there are concerns for safety of bicyclists parking accessing their bicycle from current location in the garage.
- This site is located in a design priority area. Encourage increasing architectural expression. The brick found in the area should be incorporated.
    o Proposal has brick and stone in lower level, terracotta and composite panel on upper levels.
    o Adding texture.
- Keep in mind and consider the visibility of the mechanical penthouse.
- This application will be subject to the URDP.
- Submission will require a design brief.
- Terms of reference will be provided in follow up notes.

Planning (Craig Hamilton)
- The Committee of Adjustment appears to be booking ~2 months out.
- A variance is required to permit a northerly side yard setback of 0m for the first floor, whereas the zoning by-law requires a setback of 1.2m interior side yard setback;
- Maximum height permitted is currently capped at 15m within the H suffix of the zone;
- Please note that the required front yard setback changes based on the use proposed on the ground floor (3m FYS required when commercial patio is located on the ground floor, plus additional setback for any portion of the building above 15m in height);
- Terraces atop available roof space were mentioned – please note that terraces should be evaluated against s.55(8) for permitted sizes and applicable setbacks (or s.65 if balconies are proposed);
- Please refer to s.107(1)(a)(iii) and s.107(1)(c)(ii) for drive aisle widths permitted for parking garages of 20 or less spaces within apartments – there may be additional room to accommodate bicycle parking and garbage/storage areas.
- If you decide to pursue variances, it is generally recommended that an application be submitted to CofA following receipt of at least the first round of comments provided as part of the Site Plan review process.

Planning (Seana Turkington)
- Site Plan application will need to take into the current OP and new OP if you apply before the new OP gets adopted by MMAH. Most restrictive provisions apply.
- A 45-degree angular plane should be illustrated. Please consider maintaining the 45 degree angular plane, so as to provide transition to the low-rise residential abutting the site to the rear.
- Additional landscaping is encouraged on this site. Would like to see proposed landscaping to include species native to Ottawa area. For further information, please visit: https://ottawa.ca/en/living-ottawa/environment-conservation-and-climate/wildlife-and-plants/plants
- There are safety concerns with the proposed location for bike parking on exit ramp. Consider moving the bicycle parking to a different location on site.
- Please note that the laneway at the rear of the site ad abutting 5 Grove Avenue is publicly owned and unmaintained.
- Under new OP, property is designated inner urban transect.
- The proposed ramp is 6.4 metres wide. Consider reducing this, which will give additional space in terms of planters.
- Staff have concerns with rear outdoor patio adjacent to residential.
  - Please consider introducing someSlandscaping to provide a buffer address sensitive residential uses to the rear.
- Consider tree survival in planters. Ensure planters are large enough.
- Bird friendly design guidelines should be discussed in planning rationale.
- On-site sign posted on property and application will be subject to public consultation, as the proposal triggers a Complex Site Plan Control application
- Will circulate OC-Transpo if you submit a formal application.
- It is understood consideration is also being given to a potential minor Zoning By-law Amendment. Accordingly, a studies and plans list for a Zoning Amendment will be provided separate from the Site Plan requirements. If a formal Zoning Amendment is submitted, a public consultation strategy (which may be included in the planning rationale) is required per Provincial requirements.

Planning (Jessica Button)
- Echo concerns regarding patio at rear.
- Consider opportunities to provide something in area between two buildings such as landscaping or rooftop amenities.
- Bus stop at the corner of the intersection.
- Trees and streetscaping along Grove frontage.

Comments from Community Association:
- Be aware that the bus stop in front of the building serves two buses.
- Value aesthetics of the buildings.
  - First floor looks squished and unbalanced.
  - Newer buildings in the area have more height on the first floor.
  - Street fronts aligned with sidewalk.

- o Height is going to shock some people. Value the setback after the fourth floor. Would like to see the 45-degree angle respected.
  - o Stone and brick are welcome to the first storey, would like to see this expanded to the 2nd to fourth floor.
- Concerns regarding the intersection. The existing bump out was installed for pedestrian safety. The loading zone will have garbage trucks coming around the corner which could be a problem.
- Narrowing of Grove will be narrowed by 1.5 metres.
- Triangle at the corner should be maintained.
- Consider that a lot of Ubers might be coming in and out of the site, creating a lot of traffic on Grove and U-turns might be dangerous.
- Laneway is untraveled and has previously been requested to be annexed by 5 Grove. Looking for the trees to be maintained.
- Coming into the driveway, screening should be high enough so that high beams of someone's car will not shine into windows of neighbouring house.
- Consider 3 bedroom units.

Next Steps:
- Consider waving the Community Association member's NDA if you plan to consult with the community.
- Recommend that you consult with the Community Association and the Ward Councillor pre-application.

Karlinda Hinds

From:	Eric Lalande <eric.lalande@rvca.ca>
Sent:	Tuesday, January 10, 2023 11:59 AM
To:	Amr Salem
Subject:	FW: exp22018175 - 1166 Bank St - SWM Quality Control
Attachments:	2022-12-09_3038_SITE PLAN_COORD.pdf

Hi Amr,

The RVCA has no quality control requirements based on the site plan provided (as attached). Best management practices are encouraged where feasible.

Thank you,

Eric Lalande, MCIP, RPP
Planner, RVCA
613-692-3571 x1137

From: Jamie Batchelor <jamie.batchelor@rvca.ca>
Sent: Tuesday, January 10, 2023 11:36 AM
To: Eric Lalande <eric.lalande@rvca.ca>
Subject: FW: exp22018175 - 1166 Bank St - SWM Quality Control

Hi Eric,

Did you want to respond to Amr on this one?

Jamie Batchelor, MCIP, RPP
Planner, ext. 1191
Jamie.batchelor@rvca.ca

Rideau Valley Conservation Authority

3889 Rideau Valley Drive
PO Box 599, Manotick ON K4M 1A5
T 613-692-3571 | 1-800-267-3504 **F** 613-692-0831 | www.rvca.ca

From: Amr Salem <Amr.Salem@exp.com>
Sent: Monday, January 9, 2023 10:35 AM
To: Jamie Batchelor <jamie.batchelor@rvca.ca>
Cc: Karlinda Hinds <Karlinda.Hinds@exp.com>
Subject: exp22018175 - 1166 Bank St - SWM Quality Control

Hello Jamie,

I hope you had a great break!

I'm looking to get your input on stormwater quality control criteria for our proposed 6-storey residential development at 1166 Bank Street.

As per Site Plan attached, a 6-storey apartment building with underground parking lot is proposed, consisting of approx. 38 units. Majority of site runoff would be collected at the building's rooftop and hence would be considered clean. Collected runoff is proposed to travel approx. 400m within municipal services before outlet at Rideau River – see snapshot below.

Can you please confirm SWM quality control criteria?
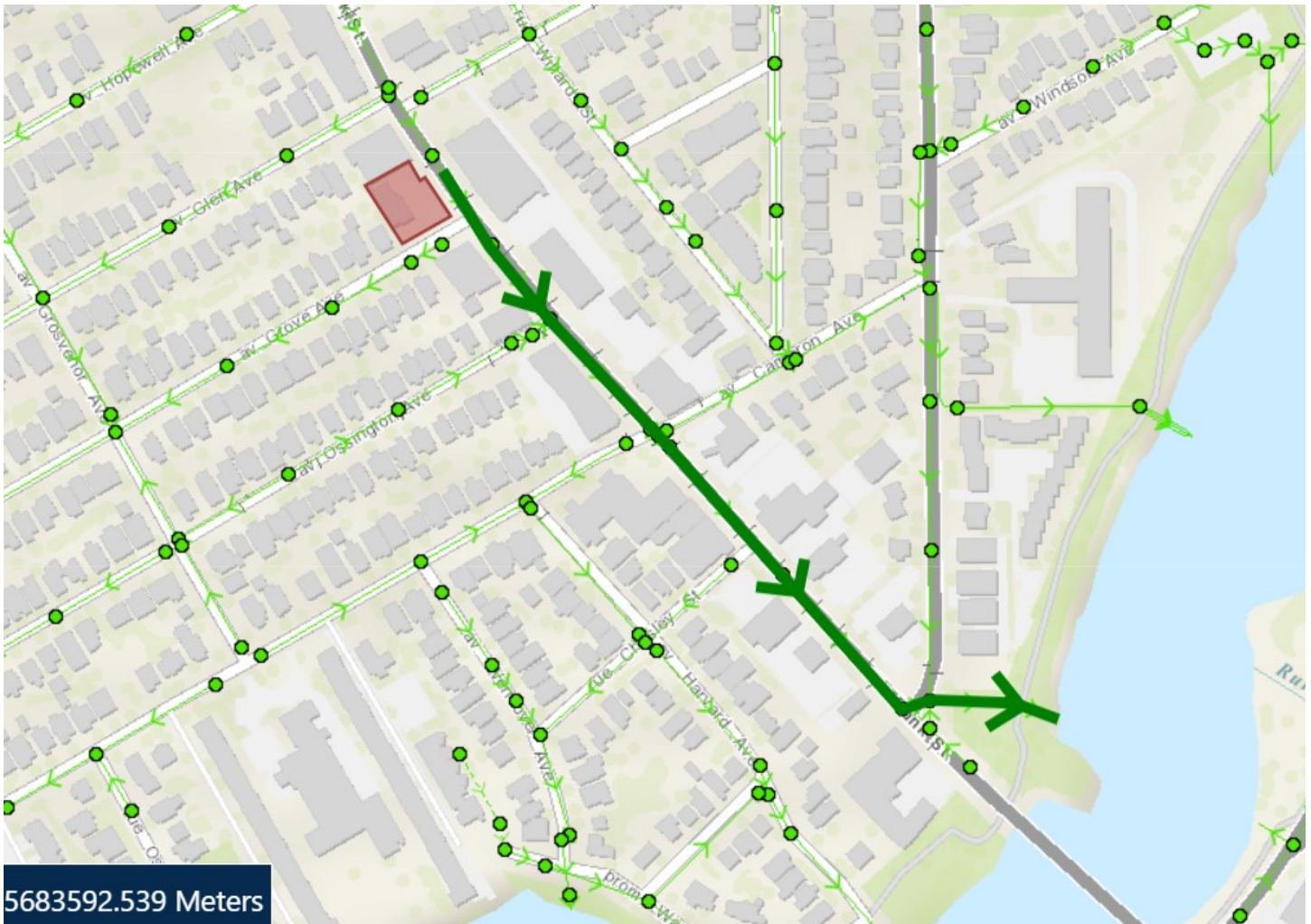
5683592.539 Meters

Thank you,

Amr Salem, P.Eng., PMP
EXP | Project Engineer
t : +1.613.688.1899 | e : amr.salem@exp.com
2650 Queensview Drive
Suite 100
Ottawa, ON K2B 8H6
CANADA

exp.com | *legal disclaimer*

keep it green, read from the screen

Appendix B – Sanitary Design

- **Sanitary Sewer Design Sheet**

TABLE B1: SANITARY SEWER CALCULATION SHEET

| | LOCATION | | | | RESEDENTIAL AREAS AND POPULATIONS | | | | | | | | | | | | | | COMMERCIAL | | | INFILTRATION | | | | SEWER DATA | | | | | | |
| | | | | | NUMBER OF UNITS | | | | | | | | | POPULATION | | | | AREA (m2) | | | AREA (ha) | | | | | | | | | | |
Scenario	U/S MH	D/S MH	Desc	Area (ha)	Singles	Semis	2-Bed Towns	3-Bed Towns	Average Apt	1-Bed Apt.	2-Bed Apt.	3-Bed Apt.	4-Bed Apt.	INDIV	ACCU	Peak Factor	Peak Flow (L/sec)	INDIV	ACCU	Peak Flow (L/sec)	INDIV	ACCU	INFILT FLOW (L/s)	TOTAL FLOW (L/s)	Nom Dia (mm)	Actual Dia (mm)	Slope (%)	Length (m)	Capacity (L/sec)	Q/Q$_{CAP}$ (%)	Full Velocity (m/s)
Existing			*Ex. Commerical store*	*0.1015*														*1015*	*1015*	*0.049*	*0.102*	*0.102*	*0.033*	*0.08*							
Proposed	**Bldg**	**ex. SAN**	**Proposed Bldg**	**0.1015**						42	3			65.1	65.1	4.00	0.84	438	438	0.021	0.102	0.102	0.033	0.90	200	200.00	1.00	6.6	32.8	3%	1.21

Residential Avg. Daily Flow, q (L/p/day) =	280					Unit Type	Persons/Unit	
Commercial Avg. Daily Flow (L/m2/day) =	2.8	Residential Peaking Factor, M =	1 + (14/(4+P^0.5)) * K	Peak Population Flow, (L/sec) = P*q*M/86.4		Bachelor Apt Unit	1.4	
		Commercial Peak Factor =	1.5	Peak Extraneous Flow, (L/sec) = I*Ac		1-Bed Apt Unit	1.4	
		Institutional Peak Factor =	1.5	A$_c$ = Cumulative Area (hectares)		2-Bed Apt Unit	2.1	
				P = Population (thousands)				
		Residential Correction Factor, K =	0.80	Sewer Capacity, Qcap (L/sec) = 1/N S^½ R^⅔ Ac				
		Manning N =	0.013					
		Peak extraneous flow, I (L/s/ha) =	0.33					

Designed:	Project:
A.Salem, P.Eng., PMP	1166 Bank Street
Checked:	Location:
Karlinda Hinds P.Eng	Ottawa, ON
File Reference:	Page No:
22018175 - SANITARY- Sewer Design Sheet Jan 2024.xlsx	**1 of 1**

Appendix C – Watermain Design

- **FUS 2020 Calculations**

- **FUS Exposure Distances Figure**

- **Water Demand Calculations**

- **Boundary Conditions**

- **Figure 2 – Hydrant Location Plan**

- **Hydrant Flow Calculations**

1166 Bank St
FIRE FLOW REQURIEMENTS BASED ON FIRE UNDERWRITERS SURVEY(FUS) 2020
PROJECT: OTT-22018175-A0
Building No: **1166 Bank St**

An estimate of the Fire Flow required for a given fire area may be estimated by:

$$F = 220 * C * SQRT(A)$$

where:

F = required fire flow in litres per minute

A = total floor area in m^2 (including all storeys, but excluding basements at least 50% below grade)

C = coefficient related to the type of construction

Task	Options	Multiplier	Input				Value Used	Fire Flow Total (L/min)
Choose Building Frame (C)	Wood Frame	1.5	Wood Frame				1.5	
	Ordinary Construction	1						
	Non-combustible Construction	0.8						
	Fire Resistive Construction	0.6						
Input Building Floor Areas (A)			Area	% Used	Area Used	Comment	2980.9 m²	
	Upper Floors		2,981	100%	2,981			
	Basement (At least 50% below grade, not included)							
Fire Flow (F)	F = 220 * C * SQRT(A)							18,017
Fire Flow (F)	Rounded to nearest 1,000							**18,000**

Reductions/Increases Due to Factors Effecting Burning

Task	Options	Multiplier	Input							Value Used	Fire Flow Change (L/min)	Fire Flow Total (L/min)
Choose Combustibility of Building Contents	Non-combustible	-25%	Limited Combustible							-15%	-2,700	15,300
	Limited Combustible	-15%										
	Combustible	0%										
	Free Burning	15%										
	Rapid Burning	25%										
Choose Reduction Due to Sprinkler System	**Adequate** Sprinkler Conforms to NFPA13	-30%	Adequate Sprinkler Conforms to NFPA13							-30%	-4,590	10,710
	No Sprinkler	0%										
	Standard Water Supply for Fire Department Hose Line and for Sprinkler System	-10%	Standard Water Supply for Fire Department Hose Line and for Sprinkler System							-10%	-1,530	9,180
	Not Standard Water Supply or Unavailable	0%										
	Fully Supervised Sprinkler System	-10%	Fully Supervised Sprinkler System							-10%	-1,530	7,650
	Not Fully Supervised or N/A	0%										
Choose Structure Exposure Distance	Exposures	Separation Dist (m)	Cond	Separation Conditon	Exposed Wall type	Exposed Wall Length (Adjacent Structure)				Total Charge (%)	Total Exposure Charge (L/min)	
						Length (m)	No of Storeys	Length-Height Factor	Sub-Conditon	Charge (%)		
	Side 1 (north)	0	1	0 to 3	Type V	23.3	1	23.3	1B	21%	55%	8,415	16,065
	Side 2 (west)	8.2	2	3.1 to 10	Type V	12.5	2	25	2B	16%			
	Side 3 (south)	18.8	3	10.1 to 20	Type IV-III (U)	20	4	80	3D	8%			
	Side 4 (east)	19.6	3	10.1 to 20	Type V	17.1	1	17.1	3A	10%			
Obtain Required Fire Flow				Total Required Fire Flow, Rounded to the Nearest 1,000 L/min =								**16,000**
				Total Required Fire Flow, L/s =								**267**

Exposure Charges for Exposing Walls of Wood Frame Construciton (from Table G5)

Type V	Wood Frame
Type IV-III (U)	Mass Timber or Ordinary with Unprotected Openings
Type IV-III (P)	Mass Timber or Ordinary with Protected Openings
Type II-I (U)	Noncombustible or Fire Resistive with Unprotected Openings
Type II-I (P)	Noncombustible or Fire Resistive with Protected Openings

Conditons for Separation

Separation Dist	Condition
0m to 3m	1
3.1m to 10m	2
10.1m to 20m	3
20.1m to 30m	4
> 30.1m	5

Table B-2

FUS EXPOSURE DISTANCES FIGURE
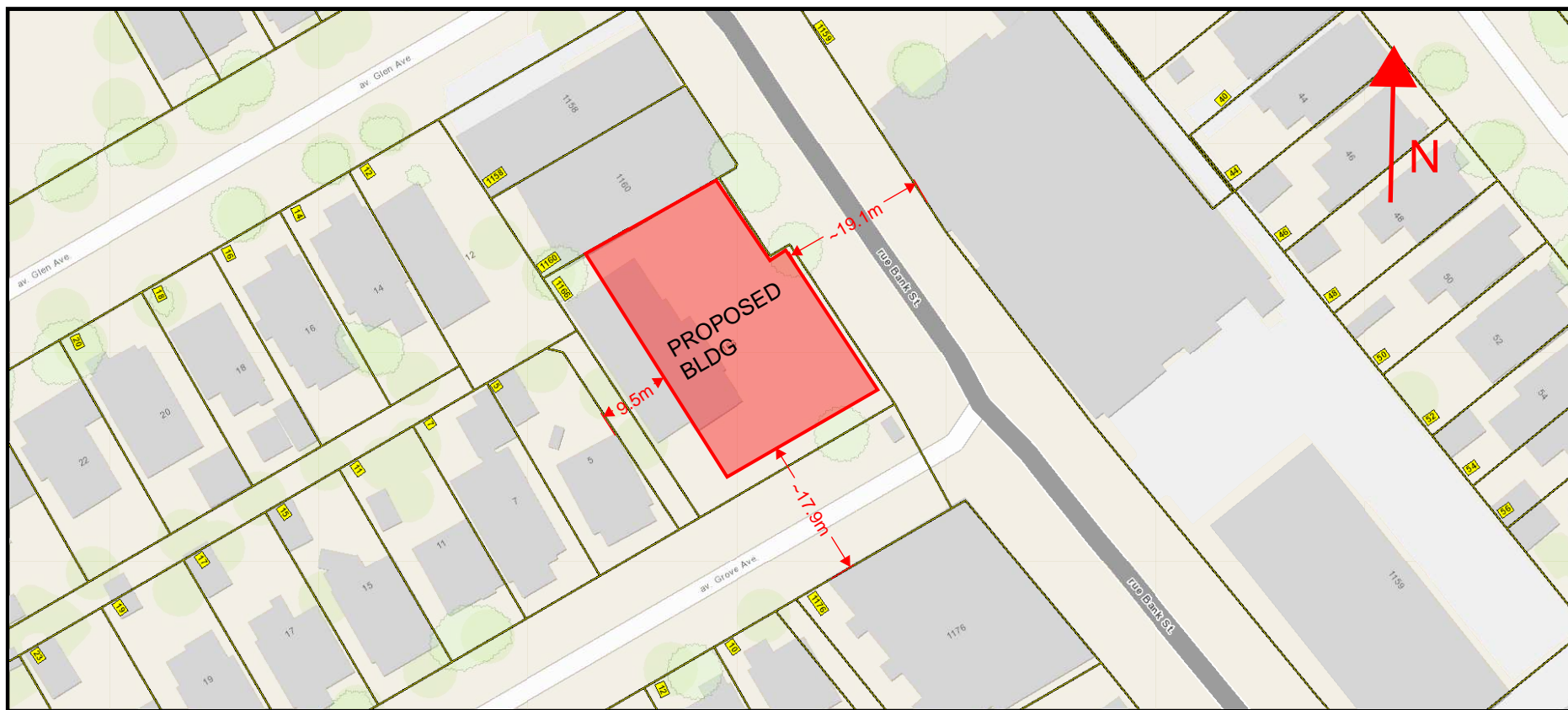
TABLE B1

Water Demand Chart

Junction Number (Building)	No. of Units										Total Pop	Residential Demands					Commercial & Amenities						Total Demands in (L/sec)		
	Singles/Semis/Towns				Apartments							Avg Day Demand (L/day)	Max Day Peaking Factor	Max Hour Peaking Factor	Max Day Demand (L/day)	Peak Hourly Demand (L/day)	Area (m²)	Avg Demand (L/day)	Peaking Factors (x Avg Day)		Max Day Demand (L/day)	Peak Hour Demand (L/day)	Avg Day (L/s)	Max Day (L/s)	Peak Hour (L/s)
	Single Famility	Semi	Duplex	Townhome	Bachelor	1-Bed Apt	2-Bed Apt	3-Bed Apt	4-Bed Apt	Avg Apt.									Max Day	Peak Hour					
Apartment Bldg						42	3				65.1	18,228	8.15	12.28	148,640	223,872	438.1300	1,227	1.5	2.7	1,840	3,312	0.23	1.74	2.63
Totals =						42	3				65.1	18,228			148,640	223,872					1,840	3,312	0.23	1.74	2.63

Unit Densities	Persons/Unit		Residential		
Singles	3.4		Residential Consumption (L/pers/day) =	280	
Semi-Detached	2.7		Max Day Peaking Factor (* avg day) =	2.5	8.15
Duplex	2.3		Peak Hour Factor (* avg day) =	5.5	12.28
Townhome	2.7				
Bachelor Apt Unit	1.4		**Industrrial/Commercial/Institutional Water Consumption**		
1-Bed Apt Unit	1.4		Light Industrial (L/gross ha/day) =	35,000	
2-Bed Apt Unit	2.1		Heavy Industrial (L/gross ha/day) =	55,000	
3-Bed Apt Unit	3.1		Commer/Instit (L/m² floor/day) =	3	
4-Bed Apt Unit	4.1		Max Day Peaking Factor (* avg day) =	1.5	
Avg. Apt Unit	1.8		Peak Hour Factor (* avg day) =	2.7	

Based on MECP Table 3-3. Less than 500 persons

Project:	
1166 Bank Street	
Designed:	Location:
A.Salem P.Eng., PMP	
Checked:	Ottawa, Ontario
File Reference:	Page No:
22018175 - Water Demand Chart - Jan 2024.xlsx	1 of 1

Amr Salem

From: Bakhit, Reza <reza.bakhit@ottawa.ca>
Sent: Friday, January 6, 2023 10:51 AM
To: Amr Salem
Cc: Karlinda Hinds; Alam Ansari
Subject: RE: OTT-22018175-A0 - 1166 Bank St - Boundary Condition Request
Attachments: 1166 Bank Street December 2022.pdf

Hi Amr,

Hope you had a nice holiday.

The following are boundary conditions, HGL, for hydraulic analysis at 1166 Bank Street (zone 1W) assumed to be connected to either the 305 mm on Bank Street (Scenario 1) OR the 203 mm on Grove Avenue (Scenario 2). See attached PDF for location.

Both Connections:

Minimum HGL: 104.0 m

Maximum HGL: 114.6 m

Max Day + FF (267 L/s): 104.0 m (Scenario 1), 98.3 m (Scenario 2)

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

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

Regards,

Reza Bakhit, P.Eng, C.E.T
Project Manager
Planning, Real Estate and Economic Development Department / Direction générale de la planification, des biens immobiliers et du développement économique
Development Review - Centeral Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1

613.580.2424 ext./poste 19346, reza.bakhit@ottawa.ca
Please note: Given the current pandemic, I will be working from home until further notice; reaching me by email is the easiest. I will be checking my voicemail, just not as frequently as I normally would be.

From: Amr Salem <Amr.Salem@exp.com>
Sent: Thursday, December 15, 2022 11:46 AM
To: Bakhit, Reza <reza.bakhit@ottawa.ca>
Cc: Karlinda Hinds <Karlinda.Hinds@exp.com>; Alam Ansari <alam.ansari@exp.com>
Subject: OTT-22018175-A0 - 1166 Bank St - Boundary Condition Request

Good morning,

I'd like to kindly request boundary conditions for our proposed development at 1166 bank Street using the following proposed development demands;

- Location of Service / Street Number; **1166 Bank Street**
- Type of Development: **6-Storey residential building comprised approx. of 38 units.** *(See siteplan attached for reference)*
- Proposed Connection point:
    - **Scenario A – connection to the existing 300mm watermain within Bank Street**
    - **Scenario B – connection to the existing 200mm watermain within Grove Ave**

- Please provide pressures for the following water demand scenarios; *(Calculations attached for reference)*

2

	L/s
Avg. Daily	**0.22**
Max Day + FUS	**1.78 + 267**
Peak Hour	**2.68**

- Available Hydrants: **It was determined that 4 public hydrants in near proximity of the subject lot are available to provide 17,033 L/min**. Please see attached *Hydrant Coverage Plan* for location of nearby available hydrants.

Thank you,

Amr Salem, P.Eng., PMP
EXP | Project Engineer
t : +1.613.688.1899 | e : amr.salem@exp.com
2650 Queensview Drive
Suite 100
Ottawa, ON K2B 8H6
CANADA
exp.com | *legal disclaimer*
keep it green, read from the screenmm dia watermain within Bank Street

'

'

Boundary Conditions for 1166 Bank Street
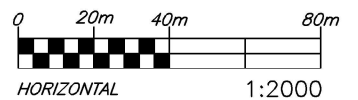
1158

1160

12

1166

5

7

rue Bank St.

Scenario 1

Scenario 2

av. Grove Ave.

N

Legend

— Private

— Public

City of Ottawa

150m RADIUS

75m RADIUS

31

Hopewell Ave

Belmont Ave

Willard St

Scotia Pl

Bank St

Glen Ave

PROJECT
LOCATION

Grove Ave

Grosvenor Ave

Ossington Ave

Cameron Ave

Cameron Ave

N

0   20m   40m   80m

HORIZONTAL   1:2000

DESIGN	———
DRAWN	KH
DATE	FEB 2023
FILE NO	22018175

1166 BANK STREET

HYDRANT LOCATION PLAN

SCALE	1:2000
SKETCH NO	FIG 2

AVAILABLE FIRE FLOWS BASED ON HYDRANT SPACING

Hydrant #	Location	City / Private	Color Code	Accessible (yes/no)	1166 Bank Street	
					[1]Dist (m)	[2]Fire Flow Contrib (L/min)
1	1147 Bank Street	CITY	BLUE	Yes	45	5,700
2	1159 Bank Street	CITY	BLUE	Yes	20	5,700
3	17 Grove Ave	CITY	BLUE	Yes	60	5,700
4	27 Glen Ave	CITY	BLUE	Yes	130	3,800
5	1111 Bank Street	CITY	BLUE	Yes	130	3,800
6	197 Belmont Ave	CITY	BLUE	Yes	115	3,800
7	1201 Bank Street	CITY	BLUE	Yes	85	3,800
Total (L/min)						32,300
Total (L/sec)						538
FUS RFF in L/min						267
Meets Requreiment (Yes/No)						Yes

Notes:

1) Distance is measured along a road or fire route.

2) Fire Flow Contribution for Class AA Hydrant from Table 1 of Appendix I, ISTB-2018-02

Appendix D – Stormwater Design

- **Stormwater Management Calculations**

- **Roof Drain Specifications**

TABLE C2: CALCULATION OF AVERAGE RUNOFF COEFFICIENTS FOR PRE-DEVELOPMENT CONDTIONS

Area No.	Concrete / Pavers C=0.90		Gravel C=0.75		Grassed Areas C=0.20		Sum AC	Total Area (m²)	C_{AVG}	Comments
	Area (m²)	A * C	Area (m²)	A * C	Area (m²)	A * C				
E1	1015.16	913.6					913.6	1015.16	0.90	
Total	*1015.16*	*913.64*					*913.64*	**1015.16**	**0.90**	

TABLE C3: ESTIMATION OF ALLOWABLE PEAK FLOWS (Based on Max C=0.50 with Tc=10mins & 2-yr Storm)

Area No	Outlet Location	Area (ha)	Time of Conc, Tc (min)	Storm = 2 yr			Storm = 5 yr			Storm = 100 yr		
				I_2 (mm/hr)	Cavg	Q_{ALLOW} (L/sec)	I_5 (mm/hr)	Cavg	Q_{ALLOW} (L/sec)	I_5 (mm/hr)	Cavg	Q_{ALLOW} (L/sec)
E1	Existing Parking Lot	0.10	10	76.81	0.50	**10.84**	104.19	0.50	14.70	178.56	0.63	31.49
Total		**0.10**				**10.84**			**14.70**			**31.49**

Notes

1) Intensity, I = 732.951/(Tc+6.199)$^{0.810}$ (2-year, City of 0ttawa)

2) Intensity, I = 998.071/(Tc+6.053)$^{0.814}$ (5-year, City of 0ttawa)

3) Intensity, I = 1735.688/(Tc+6.014)$^{0.820}$ (100-year, City of Ottawa)

4) Cavg for 100-year is increased by 25% to a maximum of 1.0

5) Allowable Capture Rate is based on 2-year storm at Tc=10 min or calculated value greater than 10 and maximum Cavg=0.5

Allowable Discharge (based on 5-yr storm)

TABLE C4: AVERAGE RUNOFF COEFFICIENTS FOR POST-DEVELOPMENT CONDITIONS

$C_{ASPH/CONC}$ = 0.90 C_{ROOF} = 0.90 C_{GRASS} = 0.20 $C_{PERM-STONES}$ = 0.40

Area No.	Asphalt & Conc Areas (m²)	A * C_{ASPH}	Roof Areas (m²)	A * C_{ROOF}	Grassed Areas (m²)	A * C_{GRASS}	Permeable Pavers Area (m²)	A*$C_{PERM-STONES}$	Sum AC	Total Area (m²)	C_{AVG} (see note)	Comment
S01			45.40	*40.86*					40.86	45.40	0.90	upper roof
S02			504.30	*453.87*					453.87	504.30	0.90	lower roof
S03			132.00	*118.80*					118.80	132.00	0.90	2nd lower roof
S04	77.00	*69.30*							69.30	77.00	0.90	Ramp - Trench Drain Outlet
S05	89.00	*80.10*			103.50	*20.70*			100.80	192.50	0.52	Uncontrolled - Grove Ave
S06	64.00	*57.60*							57.60	64.00	0.90	Uncontrolled - Bank Street
Totals									**841.23**	**1015.20**	**0.83**	

Notes

1) Cavg derived with area calculated from CAD.

TABLE C5: SUMMARY OF POST-DEVELOPMENT PEAK FLOWS (Uncontrolled and Controlled)

Area No	Area (ha)	Time of Conc, Tc (min)	C_{AVG}	I_2 (mm/hr)	Q (L/sec)	Q_{CAP} (L/sec)	C_{AVG}	I_5 (mm/hr)	Q (L/sec)	Q_{CAP} (L/sec)	C_{AVG}	I_{100} (mm/hr)	Q (L/sec)	Q_{CAP} (L/sec)
				Storm = 2 yr				Storm = 5 yr				Storm = 100 yr		
S01	0.005	10	0.90	76.81	0.87	(0.32)	0.90	104.19	1.18	(0.32)	1.00	178.56	2.25	(0.32)
S02	0.050	10	0.90	76.81	9.69	(1.92)	0.90	104.19	13.15	(1.92)	1.00	178.56	25.03	(1.92)
S03	0.021	10	0.90	76.81	4.02	(2.50)	0.90	104.19	5.45	(2.50)	1.00	178.56	10.37	(2.50)
S04														
S05	0.019	10	0.52	76.81	2.15	2.15	0.52	104.19	2.92	2.92	0.65	178.56	6.25	6.25
S06	0.006	10	0.90	76.81	1.23	1.23	0.90	104.19	1.67	1.67	1.00	178.56	3.18	3.18
TOTAL	**0.1015**				*17.96*	**8.12**			*24.37*	**9.33**			*47.09*	**14.17**
Allowable rates for comparison						**14.70**				**14.70**				**14.70**

Notes

1) Intensity, I = 732.951/(Tc+6.199)$^{0.810}$ (2-year, City of Ottawa)

2) Intensity, I = 998.071/(Tc+6.053)$^{0.814}$ (5-year, City of Ottawa)

3) Intensity, I = 1735.688/(Tc+6.014)$^{0.820}$ (100-year, City of Ottawa)

4) Cavg for 100-year is increased by 25% to a maximum of 1.0

5) Time of Concentration, Tc = __10 mins__

*6) For Flows under column Qcap which are shown in brackets **(0.0)**, denotes flows that are controlled*

TABLE C6: SUMMARY OF POST DEVELOPMENT STORAGE & RELEASE RATES

Area No.	Area (ha)	2-yr	5-yr	100-yr	2-yr (MRM)	5-yr (MRM)	100-yr (MRM)	Surface Ponding	Pipe	Roof	UG Chamber/ Tank	Total	Control Method
		Max Release Rate (L/s)			**¹ Storage Required (m³)**			**Storage Provided (m³)**					
S01	0.005	0.32	0.32	**0.32**	0.3	0.6	**1.5**			2.2		2.2	*ROOF CONTROLS*
S02	0.050	1.92	1.92	**1.92**	5.7	8.8	**21.3**			22.0		22.0	*ROOF CONTROLS*
S03	0.021	2.50	2.50	**2.50**	0.9	1.8	**5.4**				10.0	10.0	*CISTERN PUMP*
S04													
S05	0.019	2.15	2.92	**6.25**									*uncontrolled*
S06	0.006	1.23	1.67	**3.18**									*uncontrolled*
Totals	**0.1015**	**8.12**	**9.33**	**14.17**	**6.9**	**11.2**	**28.2**				**24.20**	**10.00**	**34.20**

Notes

1) The storage required is based on the Modified Rational Method (MRM) for the relase rates noted.

Storage Volumes for 2-year, 5-Year and 100-Year Storms (MRM)

Area No: **S01**

C_{AVG} = 0.90 (2-yr)
C_{AVG} = 0.90 (5-yr)
C_{AVG} = 1.00 (100-yr, Max 1.0)
Time Interval = 5.00 (mins)
Drainage Area = 0.0045 (hectares)

Actual Release Rate (L/sec) = 0.32
Percentage of Actual Rate (City of Ottawa requirement) = 100% (50% when U/G storage used)
Release Rate Used for Estimation of 100-year Storage (L/sec) = 0.32

Duration (mins)	Release Rate = 0.32 (L/sec) Return Period = 2 (years) IDF Parameters, A = 733.0, B = 0.810 ($I = A/(T_c+C)$, C = 6.199)					Release Rate = 0.32 (L/sec) Return Period = 5 (years) IDF Parameters, A = 998.1, B = 0.814 ($I = A/(T_c+C)$, C = 6.053)					Release Rate = 0.32 (L/sec) Return Period = 100 (years) IDF Parameters, A = 1735.7, B = 0.820 ($I = A/(T_c+C)$, C = 6.014)				
	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m³)	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m³)	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m³)
0	167.2	1.9	0.3	1.6	0.0	230.5	2.6	0.3	2.3	0.0	398.6	5.0	0.3	4.7	0.0
5	103.6	1.2	0.3	0.9	0.3	141.2	1.6	0.3	1.3	0.4	242.7	3.1	0.3	2.7	0.8
10	76.8	0.9	0.3	0.6	0.3	104.2	1.2	0.3	0.9	0.5	178.6	2.3	0.3	1.9	1.2
15	61.8	0.7	0.3	0.4	0.3	83.6	0.9	0.3	0.6	0.6	142.9	1.8	0.3	1.5	1.3
20	52.0	0.6	0.3	0.3	0.3	70.3	0.8	0.3	0.5	0.6	120.0	1.5	0.3	1.2	1.4
25	45.2	0.5	0.3	0.2	0.3	60.9	0.7	0.3	0.4	0.6	103.8	1.3	0.3	1.0	1.5
30	40.0	0.5	0.3	0.1	0.2	53.9	0.6	0.3	0.3	0.5	91.9	1.2	0.3	0.8	1.5
35	36.1	0.4	0.3	0.1	0.2	48.5	0.6	0.3	0.2	0.5	82.6	1.0	0.3	0.7	1.5
40	32.9	0.4	0.3	0.1	0.1	44.2	0.5	0.3	0.2	0.4	75.1	0.9	0.3	0.6	1.5
45	30.2	0.3	0.3	0.0	0.1	40.6	0.5	0.3	0.1	0.4	69.1	0.9	0.3	0.6	1.5
50	28.0	0.3	0.3	0.0	0.0	37.7	0.4	0.3	0.1	0.3	64.0	0.8	0.3	0.5	1.5
55	26.2	0.3	0.3	0.0	-0.1	35.1	0.4	0.3	0.1	0.3	59.6	0.8	0.3	0.4	1.4
60	24.6	0.3	0.3	0.0	-0.1	32.9	0.4	0.3	0.1	0.2	55.9	0.7	0.3	0.4	1.4
65	23.2	0.3	0.3	-0.1	-0.2	31.0	0.4	0.3	0.0	0.1	52.6	0.7	0.3	0.3	1.3
70	21.9	0.2	0.3	-0.1	-0.3	29.4	0.3	0.3	0.0	0.1	49.8	0.6	0.3	0.3	1.3
75	20.8	0.2	0.3	-0.1	-0.4	27.9	0.3	0.3	0.0	0.0	47.3	0.6	0.3	0.3	1.2
80	19.8	0.2	0.3	-0.1	-0.5	26.6	0.3	0.3	0.0	-0.1	45.0	0.6	0.3	0.2	1.2
85	18.9	0.2	0.3	-0.1	-0.5	25.4	0.3	0.3	0.0	-0.2	43.0	0.5	0.3	0.2	1.1
90	18.1	0.2	0.3	-0.1	-0.6	24.3	0.3	0.3	0.0	-0.2	41.1	0.5	0.3	0.2	1.1
95	17.4	0.2	0.3	-0.1	-0.7	23.3	0.3	0.3	-0.1	-0.3	39.4	0.5	0.3	0.2	1.0
100	16.7	0.2	0.3	-0.1	-0.8	22.4	0.3	0.3	-0.1	-0.4	37.9	0.5	0.3	0.2	1.0
Max =				0.3					0.6					1.5	

Notes
1) Peak flow is equal to the product of 2.78 x C x I x A
2) Rainfall Intensity, I = A/(Tc+C)^B
3) Release Rate = Min (Release Rate, Peak Flow)
4) Storage Rate = Peak Flow - Release Rate
5) Storage = Duration x Storage Rate
6) Maximum Storage = Max Storage Over Duration
7) Parameters a,b,c are for City of Ottawa

$V = (l*w)*h/3 = Ah/3$
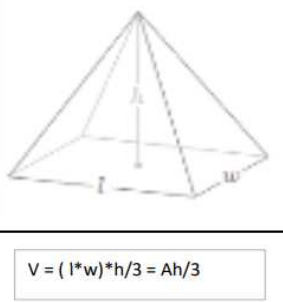
ROOFTOP AVAILABLE VOLUME:
A_{EFF} = 45
Trapezoidal Volume
V = A x h x 1/3
V = 45 x 0.15 x 1/3
V = 2.2 m3

IDF curve equations (Intensity in mm/hr)
100 year Intensity = 1735.688 / (Time in min + 6.014)$^{0.820}$
50 year Intensity = 1569.580 / (Time in min + 6.014)$^{0.820}$
25 year Intensity = 1402.884 / (Time in min + 6.018)$^{0.819}$
10 year Intensity = 1174.184 / (Time in min + 6.014)$^{0.816}$
5 year Intensity = 998.071 / (Time in min + 6.053)$^{0.814}$
2 year Intensity = 732.951 / (Time in min + 6.199)$^{0.810}$

Storage Volumes for 2-year, 5-Year and 100-Year Storms (MRM)

Area No: **S02**

C_{AVG} = 0.90 (2-yr)
C_{AVG} = 0.90 (5-yr)
C_{AVG} = 1.00 (100-yr, Max 1.0)
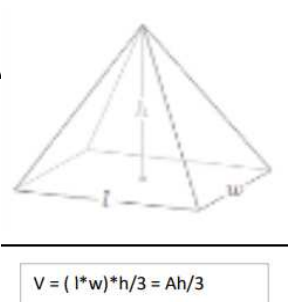Time Interval = 5.00 (mins)
Drainage Area = 0.0504 (hectares)

Actual Release Rate (L/sec) = 1.92
Percentage of Actual Rate (City of Ottawa requirement) = 100% (Set to 50% when U/G storage used)
Release Rate Used for Estimation of 100-year Storage (L/sec) = 1.92

Duration (mins)	Release Rate = 1.92 (L/sec) Return Period = 2 (years) IDF Parameters, A = 733.0, B = 0.810 (I = A/(Tc+C), C = 6.199					Release Rate = 1.92 (L/sec) Return Period = 5 (years) IDF Parameters, A = 998.1, B = 0.814 (I = A/(Tc+C), C = 6.053					Release Rate = 1.92 (L/sec) Return Period = 100 (years) IDF Parameters, A = 1735.7, B = 0.820 (I = A/(Tc+C), C = 6.014				
	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m³)	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m³)	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m³)
0	167.2	21.1	1.9	19.2	0.0	230.5	29.1	1.9	27.2	0.0	398.6	55.9	1.9	54.0	0.0
5	103.6	13.1	1.9	11.1	3.3	141.2	17.8	1.9	15.9	4.8	242.7	34.0	1.9	32.1	9.6
10	76.8	9.7	1.9	7.8	4.7	104.2	13.1	1.9	11.2	6.7	178.6	25.0	1.9	23.1	13.9
15	61.8	7.8	1.9	5.9	5.3	83.6	10.5	1.9	8.6	7.8	142.9	20.0	1.9	18.1	16.3
20	52.0	6.6	1.9	4.6	5.6	70.3	8.9	1.9	6.9	8.3	120.0	16.8	1.9	14.9	17.9
25	45.2	5.7	1.9	3.8	5.7	60.9	7.7	1.9	5.8	8.6	103.8	14.6	1.9	12.6	19.0
30	40.0	5.1	1.9	3.1	5.6	53.9	6.8	1.9	4.9	8.8	91.9	12.9	1.9	11.0	19.7
35	36.1	4.5	1.9	2.6	5.5	48.5	6.1	1.9	4.2	8.8	82.6	11.6	1.9	9.7	20.3
40	32.9	4.1	1.9	2.2	5.3	44.2	5.6	1.9	3.7	8.8	75.1	10.5	1.9	8.6	20.7
45	30.2	3.8	1.9	1.9	5.1	40.6	5.1	1.9	3.2	8.7	69.1	9.7	1.9	7.8	21.0
50	28.0	3.5	1.9	1.6	4.9	37.7	4.8	1.9	2.8	8.5	64.0	9.0	1.9	7.0	21.1
55	26.2	3.3	1.9	1.4	4.6	35.1	4.4	1.9	2.5	8.3	59.6	8.4	1.9	6.4	21.2
60	24.6	3.1	1.9	1.2	4.2	32.9	4.2	1.9	2.2	8.1	55.9	7.8	1.9	5.9	21.3
65	23.2	2.9	1.9	1.0	3.9	31.0	3.9	1.9	2.0	7.8	52.6	7.4	1.9	5.5	21.3
70	21.9	2.8	1.9	0.8	3.5	29.4	3.7	1.9	1.8	7.5	49.8	7.0	1.9	5.1	21.3
75	20.8	2.6	1.9	0.7	3.2	27.9	3.5	1.9	1.6	7.2	47.3	6.6	1.9	4.7	21.2
80	19.8	2.5	1.9	0.6	2.8	26.6	3.4	1.9	1.4	6.9	45.0	6.3	1.9	4.4	21.1
85	18.9	2.4	1.9	0.5	2.4	25.4	3.2	1.9	1.3	6.5	43.0	6.0	1.9	4.1	20.9
90	18.1	2.3	1.9	0.4	2.0	24.3	3.1	1.9	1.1	6.2	41.1	5.8	1.9	3.8	20.8
95	17.4	2.2	1.9	0.3	1.6	23.3	2.9	1.9	1.0	5.8	39.4	5.5	1.9	3.6	20.6
100	16.7	2.1	1.9	0.2	1.2	22.4	2.8	1.9	0.9	5.4	37.9	5.3	1.9	3.4	20.4
Max =					5.7					8.8					21.3

Notes
1) Peak flow is equal to the product of 2.78 x C x I x A
2) Rainfall Intensity, I = A/(Tc+C)^B
3) Release Rate = Min (Release Rate, Peak Flow)
4) Storage Rate = Peak Flow - Release Rate
5) Storage = Duration x Storage Rate
6) Maximium Storage = Max Storage Over Duration
7) Parameters a,b,c are for City of Ottawa

$V = (l*w)*h/3 = Ah/3$

ROOFTOP AVAILABLE VOLUME:
A EFF = 440 m2
Trapezoidal Volume
V = A x h x 1/3
V = 430 x 0.15 x 1/3
V = 22.0 m3

IDF curve equations (Intensity in mm/hr)
100 year Intensity = 1735.688 / (Time in min + 6.014)$^{0.820}$
50 year Intensity = 1569.580 / (Time in min + 6.014)$^{0.820}$
25 year Intensity = 1402.884 / (Time in min + 6.018)$^{0.819}$
10 year Intensity = 1174.184 / (Time in min + 6.014)$^{0.816}$
5 year Intensity = 998.071 / (Time in min + 6.053)$^{0.814}$
2 year Intensity = 732.951 / (Time in min + 6.199)$^{0.810}$

Storage Volumes for 2-year, 5-Year and 100-Year Storms (MRM)

Area No: **S03 + S04 CISTERN CONTROL**

C_{AVG} = 0.90 (2-yr)
C_{AVG} = 0.90 (5-yr)
C_{AVG} = 1.00 (100-yr, Max 1.0)   Actual Release Rate (L/sec) = 2.50
Time Interval = 10.00 (mins)   Percentage of Actual Rate (City of Ottawa requirement) = 100% (50% when U/G storage used)
Drainage Area = 0.0209 (hectares)   Release Rate Used for Estimation of 100-year Storage (L/sec) = 2.50

Duration (mins)	Release Rate = 2.50 (L/sec) Return Period = 2 (years) IDF Parameters, A = 733.0, B = 0.810 (I = A/(T_c+C), C = 6.199					Release Rate = 2.50 (L/sec) Return Period = 5 (years) IDF Parameters, A = 998.1, B = 0.814 (I = A/(T_c+C), C = 6.053					Release Rate = 2.50 (L/sec) Return Period = 100 (years) IDF Parameters, A = 1735.7, B = 0.820 (I = A/(T_c+C), C = 6.014				
	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m³)	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m³)	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m³)
10	76.8	4.0	2.5	1.5	0.9	104.2	5.4	2.5	2.9	1.8	178.6	10.4	2.5	7.9	4.7
20	52.0	2.7	2.5	0.2	0.3	70.3	3.7	2.5	1.2	1.4	120.0	7.0	2.5	4.5	5.4
30	40.0	2.1	2.5	-0.4	-0.7	53.9	2.8	2.5	0.3	0.6	91.9	5.3	2.5	2.8	5.1
40	32.9	1.7	2.5	-0.8	-1.9	44.2	2.3	2.5	-0.2	-0.5	75.1	4.4	2.5	1.9	4.5
50	28.0	1.5	2.5	-1.0	-3.1	37.7	2.0	2.5	-0.5	-1.6	64.0	3.7	2.5	1.2	3.6
60	24.6	1.3	2.5	-1.2	-4.4	32.9	1.7	2.5	-0.8	-2.8	55.9	3.2	2.5	0.7	2.7
70	21.9	1.1	2.5	-1.4	-5.7	29.4	1.5	2.5	-1.0	-4.0	49.8	2.9	2.5	0.4	1.7
80	19.8	1.0	2.5	-1.5	-7.0	26.6	1.4	2.5	-1.1	-5.3	45.0	2.6	2.5	0.1	0.5
90	18.1	0.9	2.5	-1.6	-8.4	24.3	1.3	2.5	-1.2	-6.6	41.1	2.4	2.5	-0.1	-0.6
100	16.7	0.9	2.5	-1.6	-9.7	22.4	1.2	2.5	-1.3	-8.0	37.9	2.2	2.5	-0.3	-1.8
110	15.6	0.8	2.5	-1.7	-11.1	20.8	1.1	2.5	-1.4	-9.3	35.2	2.0	2.5	-0.5	-3.0
120	14.6	0.8	2.5	-1.7	-12.5	19.5	1.0	2.5	-1.5	-10.7	32.9	1.9	2.5	-0.6	-4.2
130	13.7	0.7	2.5	-1.8	-13.9	18.3	1.0	2.5	-1.5	-12.0	30.9	1.8	2.5	-0.7	-5.5
140	12.9	0.7	2.5	-1.8	-15.3	17.3	0.9	2.5	-1.6	-13.4	29.2	1.7	2.5	-0.8	-6.8
150	12.3	0.6	2.5	-1.9	-16.7	16.4	0.9	2.5	-1.6	-14.8	27.6	1.6	2.5	-0.9	-8.1
160	11.7	0.6	2.5	-1.9	-18.2	15.6	0.8	2.5	-1.7	-16.2	26.2	1.5	2.5	-1.0	-9.4
170	11.1	0.6	2.5	-1.9	-19.6	14.8	0.8	2.5	-1.7	-17.6	25.0	1.5	2.5	-1.0	-10.7
180	10.6	0.6	2.5	-1.9	-21.0	14.2	0.7	2.5	-1.8	-19.0	23.9	1.4	2.5	-1.1	-12.0
190	10.2	0.5	2.5	-2.0	-22.4	13.6	0.7	2.5	-1.8	-20.4	22.9	1.3	2.5	-1.2	-13.3
200	9.8	0.5	2.5	-2.0	-23.9	13.0	0.7	2.5	-1.8	-21.8	22.0	1.3	2.5	-1.2	-14.7
210	9.4	0.5	2.5	-2.0	-25.3	12.6	0.7	2.5	-1.8	-23.2	21.1	1.2	2.5	-1.3	-16.0
Max =					0.9					1.8					5.4

IDF curve equations (Intensity in mm/hr)

100 year Intensity = 1735.688 / (Time in min + 6.014)^{0.820}
50 year Intensity = 1569.580 / (Time in min + 6.014)^{0.820}
25 year Intensity = 1402.884 / (Time in min + 6.018)^{0.819}
10 year Intensity = 1174.184 / (Time in min + 6.014)^{0.816}
5 year Intensity = 998.071 / (Time in min + 6.053)^{0.814}
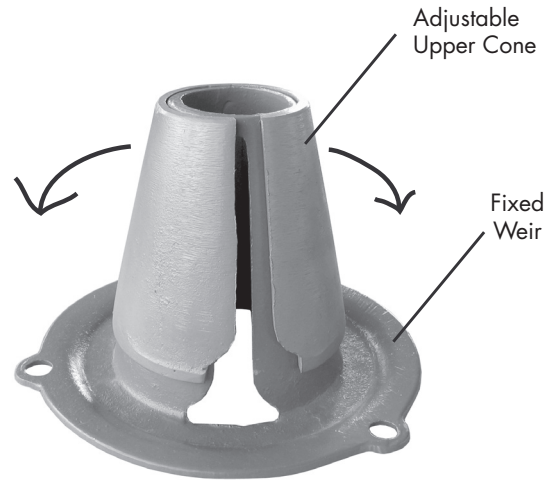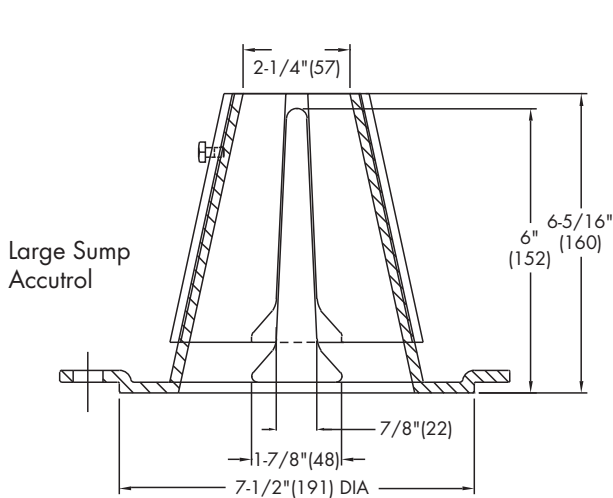2 year Intensity = 732.951 / (Time in min + 6.199)^{0.810}

ADJUSTABLE ACCUTROL (for Large Sump Roof Drains only)

For more flexibility in controlling flow with heads deeper than 2", Watts Drainage offers the Adjustable Accutrol.
The Adjustable Accutrol Weir is designed with a single parabolic opening that can be covered to restrict flow above
2" of head to less than 5 gpm per inch, up to 6" of head. To adjust the flow rate for depths over 2" of head, set the slot
in the adjustable upper cone according to the flow rate required. Refer to Table 1 below.
Note: Flow rates are directly proportional to the amount of weir opening that is exposed.

EXAMPLE:

For example, if the adjustable upper cone is set to cover 1/2 of the weir opening, flow rates above 2"of head will be
restricted to 2-1/2 gpm per inch of head.

Therefore, at 3"of head, the flow rate through the Accutrol Weir that has 1/2 the slot exposed will be:
[5 gpm (per inch of head) x 2 inches of head] + 2-1/2 gpm (for the third inch of head) = 12-1/2 gpm.

Large Sump
Accutrol

2-1/4"(57)

6-5/16"
(160)

6"
(152)

7/8"(22)

1-7/8"(48)

7-1/2"(191) DIA

Adjustable
Upper Cone

Fixed
Weir

1/2 Weir Opening Exposed Shown Above

TABLE 1. Adjustable Accutrol Flow Rate Settings

Weir Opening Exposed	1"	2"	3"	4"	5"	6"
	Flow Rate (gallons per minute)					
Fully Exposed	5	10	15	20	25	30
3/4	5	10	13.75	17.5	21.25	25
1/2	5	10	12.5	15	17.5	20
1/4	5	10	11.25	12.5	13.75	15
Closed	5	5	5	5	5	5

Job Name _____

Job Location _____

Engineer _____

Contractor _____

Contractor's P.O. No. _____

Representative _____

WATTS®

A Watts Water Technologies Company