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Civil • Geotechnical •
Structural • Environmental •
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Serviceability Brief

Proposed Residential Development
3430 Carling Avenue
OTTAWA, ONTARIO

Prepared For:
Rohit Communities Ontario Inc.
550 91 Street SW, Suite 101
Edmonton, Alberta
T6X 0V1

PROJECT #: 220978

DISTRIBUTION
3 copies – City of Ottawa
1 copy – Rohit Communities Ontario Inc.
1 copy – Kollaard Associates Inc.

Rev 0 – Issued for Site Plan Approval	December 14, 2022
Rev 1 – Response to First Review Comments	April 4, 2023
Rev 2 – Response to Review Comments	July 24, 2023
Rev 3 – Revised for updated servicing	December 11, 2023

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APPENDIX

1 INTRODUCTION

This brief has been prepared in support of a site plan control application to the City of Ottawa to construct two-six storey mid-rise apartment buildings, having a total of 186 units, on the property at 3430 Carling Avenue, City of Ottawa. The property is located on the south side of Carling Avenue, between Ullswater Drive and Crystal Beach Drive.

The existing site is currently occupied by a 1 storey 852 square metre commercial building. The majority of the remainder of the site area is surfaced with asphaltic concrete pavement. The existing building is provided with water and sanitary services from Carling Avenue which enter the site about 45 metres west of the east property line.

It is understood that the owner of the subject property intends to demolish the existing building and construct the proposed apartment buildings fronting onto Carling Avenue. The proposed building will be serviced by new services connecting to the water main and sanitary sewer along Carling Avenue. The existing services of the building to be demolished will be abandoned in accordance with City of Ottawa standards.

This brief presents a description of the proposed servicing and an analysis of the adequacy of the existing sanitary sewers and water main to accommodate the sewer and water demands associated with the proposed development. This brief also presents a summary of the stormwater management requirements for the site.

2 STORMWATER MANAGEMENT DESIGN

The stormwater management design for the site has been completed under a separate report Stormwater Management Report, Proposed Residential Development, 3430 Carling Avenue, Ottawa, Ontario prepared by Kollaard Associates Inc, File No. 220978 Revision 3 dated December 11, 2023.

The stormwater management for the site consists of controlling the post-development release rate from the stormwater originating on the roof such that the total post-development runoff rate from the site during a 100 year design storm is less than the runoff rate from a 5 year storm assuming pre-development site conditions equal to a runoff coefficient of C = 0.5. Stormwater will be temporarily stored on site and will be released at a controlled rate during and following a rainstorm event to the existing 600 mm diameter concrete storm sewer along Carling Avenue.

3 SANITARY DESIGN

Sewage discharges will be domestic in type and in compliance with the City of Ottawa Sewer Use By-law. The anticipated peak sanitary flow will be a total of approximately 4.02 L/s (assuming 198 units).

The sanitary sewage flow for the building was calculated based on the City of Ottawa Sewer Design Guidelines (as modified by the Technical Bulletins) and the Ontario Building Code (O.B.C Table 8.2.1.3A).

The sanitary service lateral from the proposed development will be connected to the existing 375 mm diameter concrete sanitary sewer along Carling Avenue. The existing sanitary service lateral to Carling Avenue will be blanked at the property line.

3.1 Design Flows

The residential design flows were calculated using the Ottawa Sewer Guidelines – Technical Bulletin ISTB-2018-01.

Residential

Total domestic pop:		
Bachelor units	*(0) x 1.4 ppu:*	*0*
One Bedroom units	*(93) x 1.4 ppu:*	*130.2*
Two Bedroom units	*(93) x 2.1 ppu:*	*195.3*
Three Bedroom units	*(0) x 3.1 ppu:*	*0*
Total:		325.5 (326)

$Q_{Domestic}$ = 326x 280 L/person/day x (1/86,400 sec/day) = 1.06 L/sec

$$\text{Peaking Factor} = 1 + \left(\frac{14}{4+\left(\frac{326}{1000}\right)^{1/2}}\right) * 0.8 = 3.45 \text{(4 maximum)}$$

$Q_{Peak\ Domestic}$ = 1.06 L/sec x 3.45 = 3.66 L/sec

Infiltration

$Q_{Infiltration}$ = 0.33 L/ha/sec x 0.62ha = 0.20 L/sec

Total Peak Sanitary Flow = 3.66 + 0.20 = 3.86 L/sec

3.2 Sanitary Service Lateral

The maximum peak sanitary flow for the building is 4.02 L/sec. The Ontario Building Code specifies minimum pipe size and maximum hydraulic loading for sanitary sewer pipe. OBC 7.4.10.8 (2) states "Horizontal sanitary drainage pipe shall be designed to carry no more than 65% of its full capacity." The capacity of the proposed 200 mm diameter PVC sanitary sewer lateral at a minimum slope of 1% is 32.8 L/sec. Since 0.65 x 32.8 = 21.32 L/s is much greater than 3.86 L/sec, a single sanitary sewer service lateral of 200 mm diameter at a minimum 1% slope will be sufficient.

A 1200 mm diameter sanitary inspection and sampling maintenance hole will be installed in line with the sanitary service. This maintenance hole will be located within the Carling Avenue right of way with a maintenance and liability agreement clause added to the site plan agreement.

The new lateral is to be installed at the location indicated on the Site Servicing drawing 220978– SER. The proposed sanitary service is to connect to the existing 375 mm diameter PVC sanitary sewer with a T connection.

Due to the depth of the existing sanitary sewer main the sanitary lateral will be installed at a slope of about 11%. Sewer design calculations for a 200 mm diameter PVC sanitary sewer at 11% indicate a full flow velocity of about 3.75 m/s which is greater than the maximum allowable flow velocity of 3 m/s in a sanitary sewer. The actual flow velocity for the peak design flow rate of 3.86 L/s is 1.72 m/s which is within the allowable velocity range of 0.6 to 3.0 m/s.

3.3 Sufficiency of Existing Municipal Sanitary Sewer

The existing sanitary sewer along Carling Avenue consists of 375 mm diameter PVC sanitary sewer with a slope of 0.19 percent. From previous correspondences with the City of Ottawa as part of the J.L. Richards Limited Report No.: 3114-001, it was provided that the existing sanitary service is capable of handling an increase in flows by 5.16 L/s. The maximum peak sanitary flow as calculated above for the proposed development is 3.86 L/s, which is less than the previously accepted threshold as outlined by the City of Ottawa.

4 WATERMAIN DESIGN AND WATER DEMAND

The existing water lateral is to be blanked at the watermain on Carling Avenue to the satisfaction of the City of Ottawa Services. The building will be provided with two 150 mm diameter water services. The proposed water service laterals will be connected to the 305 mm

diameter CI municipal Watermain on Carling Avenue and will be separate from each other by an existing valve on the watermain. Both services will be connected by means of "T" connections as indicated on the Site Servicing drawing 220978- SER. The water demand for the site consists of three parts which include: domestic water consumption, sprinkler flow allowance, and fire flow requirement.

4.1 Fire Flow Requirement

4.1.1 Calculation Procedure

The fire flow requirement was calculated for the proposed buildings to ensure that there is adequate flow available to put out a fire within the proposed building should it occur. The fire flow calculation determines the minimum water flow or volume required to be available for firefighting purposes to be used by firefighters. In accordance to City of Ottawa Technical Bulletin ISTB-2021-03, the fire flow requirement calculation for private property is to first consider the Ontario Building Code (OBC). If the fire protection requirement from the OBC yields a fire flow greater than 9,000 L/min then the Fire Underwriters Survey (FUS) shall be used to determine the Fire Flow Demand.

Technical Bulletin ISTB-2021-03 provides the following direction with respect to the calculation of the fire flow requirement.

> "The requirements for levels of fire protection on private property in urban areas are covered in Section 7.2.11 of the Ontario Building code. If this approach yields a fire flow greater than 9,000 L/min then the Fire Underwriters Survey method shall be used to determine these requirements instead."

The Ontario Building Code 7.2.11.1. Design, Construction, Installation and Testing states the following:

> "(1) Except as provided in Articles 7.2.11.2. to 7.2.11.4., and 7.3.7.2, the design, construction, installation and testing of fire service mains and water service pipe combined with fire service mains shall be in conformance with NFPA 24, "Installation Of Private Fire Service Mains And Their Appurtenances"."

As apparent by the title and its content, NFPA 24 is intended to provide a standard for the installation of private fire service mains and their appurtenances. It is not intended to provide direction on the calculation of fire water supply requirements.

The requirements in the Ontario Building for determining the fire protection on private property are covered in Section 3.2.5.7 which states the following:

"(1) An adequate water supply for firefighting shall be provided for every building."

Additional guidance is provided in OBC Div B A-3.2.5.7

"2. Sprinklered Buildings

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

Further review of NFPA 13 indicates that the standard does not provide water supply calculations for firefighting purposes. Water supply calculations for a sprinklered building are provided in NFPA 1 – Fire Code Chapter 18, Fire Department Access and Water Supply.

Details of the calculation procedure including excerpts from the NFPA standards are provided within Appendix B

4.1.2 Building Construction and Construction Type Consideration

The proposed buildings are 6 storey wood frame buildings with maximum foot prints of 1339 m^2 for the west building and 1236 m^2 for the east building. The footprints of the upper storeys are reduced from the lower storeys. This results in total building areas of 6636.5 m^2 and 5957.2 m^2 for the west building and east building respectively. The buildings will be equipped with a fully automatic and monitored sprinkler system. The interior walls between units will be constructed having a minimum rating of 1 hour. Each floor within the building will also be constructed with a minimum fire rating of 1 hour.. The exterior wall will be covered with non combustible gladding, have non combustible insulation and will be covered on the interior with 16 mm Type X drywall. This results in an exterior wall assembly having a minimum fire rating of at least 1 hour. Based on the proposed building construction and NFPA 220, Table 4.1.1 and Sentence 4.6, the proposed building can be classified as Type (000) construction.

4.1.3 Fire Flow or Hose Stream Demand

The fire flow demand calculation has been included in Appendix B. Based on the NFPA calculations with the above building construction, the fire flow requirement for the proposed west and east buildings is 6,860 L/min or 114.3 L/s.

4.2 Sprinkler Flow Allowance

The sprinkler flow allowance is ultimately determined by the Mechanical Engineer during design for building permit purposes. However, at this time no mechanical engineer has been retained. For the purposes of verifying the adequacy of the available water supply and the

required building service size, the sprinkler flow allowance has been determined in keeping with NFPS 13 Chapter 19.2.3. Excerpts of the NFPA 13 are included in Appendix B.

From Annex A of NFPA 13, the proposed residential building occupancy classification is Light hazard. From table 19.2.3.1.1 the minimum sprinkler water supply is 0.1 gpm /ft^2 using a minimum area of 1500 ft^2 or 4.1mm/min using a minimum area of 140 m^2. As previously indicated, the maximum building footprint per floor ranges from 1236 to 1339 m^2 for the east and west buildings respectively. Assuming that the sprinkler system will be designed to limit the sprinkler discharge to the area affected by a fire, the water demand area will be limited. For the purposes of estimating the sprinkler flow allowance, it was assumed that the sprinkler discharge would be limited to 20% of a single floor plus the corresponding floor area above the affected area.

The water demand area would be limited to 1339 m^2 x 0.2 x 2 = 268 m^2 x 2 = 536 m^2

A sprinkler demand of 4.1mm/min x 536 m^2 = 2198 L/min or 36.6 L/s.

4.3 Domestic Water Demand

The water demand for the proposed development was calculated based on the City of Ottawa Water Distribution Design Guidelines (as amended) as follows:

Residential

326 persons x 280 L/person/day x (1/86,400 sec/day)

- Average daily demand 1.06 L/s
- Maximum daily demand (factor of 2.5) is 1.06 L/s x 2.5 = 2.64 L/s
- Peak hourly demand (factor of 2.2) = 2.64 L/s x 2.2= 5.81 L/s

4.4 Boundary Conditions

The water demand due to occupancy together with the fire flow requirements were provided to the City of Ottawa on March 6, 2023. The information provided as part of the report was as follows:

- Amount of fire flow 166.7 L/s with fire walls*
- Amount of fire flow 216.7 L/s without fire walls*
- Average daily water demand 1.04 L/s
- Maximum daily water demand 2.61 L/s
- Peak hourly water demand 5.74 L/s

*The fire flow calculations were revised following the request for boundary conditions.

It is assumed that the water service will be connected to the 305 mm CI water main along Carling Avenue.

The following are the boundary conditions, HGL, for hydraulic analysis that were provided by the city of Ottawa in response to the above indicated peak hourly demand and fire flow demand.

Minimum HGL = 105.6m
Maximum HGL = 115.6 m

Max Day + Fire Flow (166.7 L/s): 84.2 m (Connection 1)

Max Day + Fire Flow (166.7 L/s): 84.2 m (Connection 2)

Available Fire Flow at 20 psi: 189 L/s, assuming a ground elevation of 64.5 m

Correspondence with the City of Ottawa is included in Appendix A

4.5 Combined Total Flow Demand

The peak hourly demand is 5.81 L/s
The fire flow demand is 114.3 L/s
The sprinkler demand is 36.6 L/s

Total Fire Flow Demand + sprinkler demand = 150.9 L/s

Total Water Demand is 156.7 L/s.

Since the available flow at 20 psi is 189 L/s there is sufficient water supply to meet the total water demand.

4.6 Water Service Requirements and Pressure Loss Calculations

The maximum and minimum pressures were determined for both the mechanical room (water entry point) and the sixth floor using two water demand scenarios. The pressure losses were calculated assuming a 152mm diameter service. Using the provided maximum HGL of 115.6 m and linear interpolation, a flow rate of (36.6 L/s + 1.1 L/s) 37.7 L/s was determined to result in a maximum HGL of 106.8 m. Using the provided minimum HGL of 105.6 m and linear interpolation, a flow rate of (36.6 L/s + 5.8 L/s) 42.4 L/s was determined to result in a minimum HGL of 100.50 m.

During the first scenario, only the residential water demand was considered. The maximum pressure was determined using the maximum HGL and the average daily water demand of 1.1 m/s. The minimum pressure was determined using the minimum HGL and the maximum hourly water demand of 5.8 L/s.

During the second scenario, the sprinkler demand was added to the residential water demand. The maximum pressure was determined using an HGL of 106.8 m. The minimum pressure was determined using an HGL of 100.5 m.

The pressure loss to the mechanical room and to the sixth floor of the proposed building was calculated using Bernoulli's Equation in Combination with the Darcy – Weisbach Equation and the Colebrook Equation. The equations are shown below.

$$H_P + Z_1 - Z_2 + \frac{P_1 - P_2}{S} + \frac{V_1^2 - V_2^2}{2g} = h_f + h_m \quad \text{where:}$$

$$h_m = K_m \frac{V^2}{2g} \qquad \mathrm{Re} = \frac{VD}{\nu} \qquad Q = VA \qquad A = \frac{\pi}{4} D^2$$

$$\text{Darcy – Weisbach Equation: } h_f = f \frac{L}{D} \frac{V^2}{2g} \quad \text{where:}$$

$$\text{If laminar flow } \left(\mathrm{Re} < 4000 \text{ and any } \frac{e}{D}\right), \quad f = \frac{64}{\mathrm{Re}}$$

$$\text{If turbulent flow } \left(4000 \le \mathrm{Re} \le 10^8 \text{ and } 0 \le \frac{e}{D} < 0.05\right), \text{ then}$$

$$\text{Colebrook Equation: } \frac{1}{\sqrt{f}} = -2.0 \log\left(\frac{e/D}{3.7} + \frac{2.51}{\mathrm{Re}\sqrt{f}}\right)$$

150 mm Diameter Service Pipe Sections	Along	End	Grade Elevation Start m	Grade Elevation End m	Hydraulic Grade line Start m	Hydraulic Grade line End m	Pressure P_{start} KPa	Pressure P_{end} KPa
First Scenario								
Parking Garage Level 1								
Carling (min HGL)	Service	Mechanical Room	64.5	63.2	105.6	105.57	403	415
Carling (max HGL)	Service	Mechanical Room	64.5	63.2	115.5	115.6	501	514
Floor 6								
Carling (min HGL)	Service	6th storey	64.5	83.8	105.6	105.53	403	213
Carling (max HGL)	Service	6th storey	64.5	83.8	115.6	115.5	501	312
Second Scenario								
Parking Garage Level 1								
Carling (min HGL)	Service	Mechanical Room	64.5	63.2	100.5	98.6	353	347
Carling (max HGL)	Service	Mechanical Room	64.5	63.2	108.4	106.8	430	428
Floor 6								
Carling (min HGL)	Service	6th storey	64.5	83.8	99.6	96.6	344	125
Carling (max HGL)	Service	6th storey	64.5	83.8	107.2	104.8	419	206

In general conformance with the MOE Guidelines, and City of Ottawa Technical Bulletin ISD-2010-2, the desired range in pressure should be approximately 350KPa (50psi) to 480KPa (70psi) during normal operating conditions. Additionally the distribution system shall be sized so that under maximum hourly demand conditions the pressures are not less than 276 kPa (40 psi.). As per the Ontario Building Code, the maximum pressure should not exceed 552KPa (80psi).

Based on the results of the analysis as presented in the above tables, when using 152 mm diameter service, the above minimum and maximum HGL provide a water pressure of between 415 KPa and 514 KPa at the proposed building. The minimum residual pressure, calculated at the mechanical room, when there is sprinkler demand would be 347 kPa or well above the minimum of 276 kPa. However the residual pressure at the sixth floor will be below the minimum pressure of 276 kPa (40 psi.) during minimum HGL conditions assuming Residential flow only and will be below 276 kPa in all senarios when there is sprinkler demand. As such, an internal booster pump will be required to ensure adequate pressure and flow in the top storeys of the building.

The City Boundary Conditions are provided based on computer modeling of the water network. During construction, a pressure check is to be completed to determine that the pressure in the system at the building does not exceed 552 KPa. If the pressure does exceed 552 Kpa a pressure reducing valve would have to be installed downstream of the isolation valve and water meter in the building.

Based on the above calculations and in consideration of the proposed building sprinkler demand a 150mm diameter service is proposed.

4.7 Existing Fire Hydrants

City of Ottawa Technical Bulletin ISTB-2018-02 Appendix I Table 1 provides guidance with respect to the contribution of nearby fire hydrants to the required fire flow. From this table, a Class AA hydrant can contribute a maximum flow of 5,700 L/min when located less than 75 metres from the building and 3,800 L/min when located between 75 and 150 metres from the building.

Four Class AA fire hydrants have been located in the vicinity of the development and are considered for fire flow requirements. Two of the hydrants are located on the 305mm CI watermain beneath Carling Avenue. The first hydrant is located on the subject property, and the other is located on the north side of Carling Avenue adjacent to the western property line approximately 31m from the subject property. One of the hydrants is located on a 203mm DI along Elterwater Avenue is approximately 33 metres south of the site.

One class AA hydrant, located on the 152mm DI watermain along Sunny Brae Avenue across the road from the north east property corner (approximately 94 metres from the subject property), is less than 150m but greater than 75m from the site.

Building	Fire Flow Demand (L/min)	Fire Hydrant(s) within 75m x Hydrant Contribution	Fire Hydrant(s) within 150 m x Hydrant Contribution	Combined Available Fire Flow (L/min)
6 Storey Sprinklered Apartment	11,000 L/min	3 x 5,700 L/min	1 x 3,800 L/min	20,900 L/min

Notwithstanding the above:

The flows provided for in City of Ottawa Technical Bulletin ISTB-2018-02 Appendix I Table 1 are the fire hydrant capacities based on hydrant class and distances to proposed buildings. Those flows are not available flows but the maximum flows that can be obtained from a hydrant.

The available fire flow at the watermain at 20psi is 11,340 L/min. This was provided by the City on May 4, 2023 as part of the updated boundary condition request. As such, the above calculated combined available flow of 20,900 L/min overestimates the actual available flow of 11,340 L/min.

There are enough fire hydrants to accommodate a required fire flow of 6,860 L/min.

Since the calculated flow demand of 6,860 L/min is less than the maximum theoretical flow from the hydrants and is less than the available flow of 11,340 L/min, the existing nearby hydrants will adequately service fire flow requirements. Since there is an existing fire hydrant on the subject site, as well as all building entrances being within 90 metres of en existing hydrant, there is no requirement for an additional onsite hydrant to service the proposed buildings.

5 CONCLUSIONS

This report addresses the adequacy of the existing municipal sanitary sewer system and watermain to service the proposed development of the residential use building on Carling Avenue. The report also provides a summary of the stormwater management design presented under separate cover. Based on the analysis and summary provided in this report, the conclusions are as follows:

Stormwater management for the site has been designed to ensure that post-development runoff rate from the site during a 100 year storm event does not exceed the pre-development runoff rate during a 5-year storm assuming an average runoff coefficient of C = 0.5 for pre-development runoff conditions. Stormwater storage will be provided on site and released at a controlled rate. Discharge will be directed to the existing sewer along Carling Avenue.

The proposed buildings will be serviced by a 200 mm diameter PVC sanitary service. The proposed sanitary service will be connected to the existing 375 mm diameter sanitary sewer on Carling Avenue. The peak sewage flow rate from the proposed development will be 3.86 L/sec. The existing municipal sanitary sewer should have adequate capacity to accommodate the increase in peak flow. The City has not identified any capacity issues in the existing sanitary sewer system.

The proposed building will be serviced by two 150 mm diameter PVC water services. The proposed services will be connected to the existing 305 mm diameter CI watermain along Carling Avenue. There is sufficient capacity and pressure within the municipal water system adjacent the site to meet the domestic and fire flow requirements.

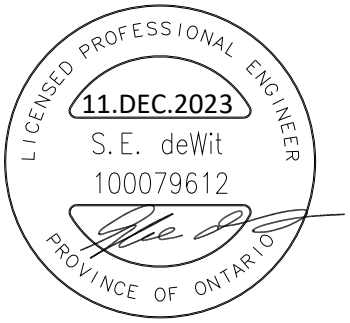
We trust that this report provides sufficient information for your present purposes. If you have any questions concerning this report or if we can be of any further assistance to you on this project, please do not hesitate to contact our office.

Sincerely,
Kollaard Associates Inc.

Prepared by:

Nick Recoskie, P.Eng.

Reviewed by:



Steve deWit, P.Eng.

Appendix A – Correspondence With City of Ottawa

- Boundary Conditions
- Correspondence regarding Fire Flow Calculations
- Pre-consultation Notes

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March 6, 2023

Julie Candow
Project Manager
Planning Infrastructure & Economic Development Department
Planning Services.

Re: Boundary Conditions 3430 Carling Avenue
City File # D02-02-21-0082, D07-12-22-0177

Kollaard Associates Inc has been retained by Rohit Group to complete the Site Servicing Plan and Site Servicing Report for the proposed residential development at 3430 Carling Avenue in the City of Ottawa.

Could you provide us with the boundary conditions for the property based on the following information:

Type of Development: Residential (Two 6-storey, 98-units and 88-units respectively, wood frame residential apartment buildings)
Location of Services: Carling Avenue
Amount of Fire Flow: 216.7 L/s (without firewalls)
Amount of Fire Flow: 166.7 L/s (with firewalls)
Average daily water demand: 1.04 L/s
Maximum daily water demand: 2.61 L/s
Maximum Hourly water demand: 5.74 L/s
Peak sanitary flow: 3.79 L/s

Please note:

- The sanitary calculations have been completed using Technical Bulletin ISTB-2018-01. The water demand calculations have been completed using Technical Bulletin ISTB-2021-03.
- Fire flow is based on FUS 2020 calculations and takes into account the methodology provided in Technical Bulletin ISTB-2018-02 and ISTB-2021-03
- Design calculation spread sheets for FUS, Water and Sanitary are attached
- The waterservices will be connected to the Watermain as shown on the attached Servicing Drawing.220978-Civil-SER

If there are any questions related to the above please contact the undersigned.

Sincerely,
KOLLAARD ASSOCIATES INC.

Steven deWit, P.Eng.

Subject: RE: Request for Boundary Conditions for 3430 Carling Ave - File Number D07-12-22-0177
From: "Candow, Julie" <julie.candow@ottawa.ca>
Date: 2023-05-04, 11:26 a.m.
To: Nick Recoskie <nick@kollaard.ca>
CC: Steven deWit <steve@kollaard.ca>

Hi Nick,

I apologize for the delay on these boundary conditions. See below.

The following are boundary conditions, HGL, for hydraulic analysis at 3430 Carling Avenue (zone 1W) with two connections to the 305 mm watermain on Carling Avenue (see attached PDF for location).

Both Connections:

Minimum HGL: 105.6 m

Maximum HGL: 115.6 m

Max Day + Fire Flow (166.7 L/s): 84.2 m (Connection 1)

Max Day + Fire Flow (166.7 L/s): 84.2 m (Connection 2)

Available Fire Flow at 20 psi: 189 L/s, assuming a ground elevation of 64.5 m

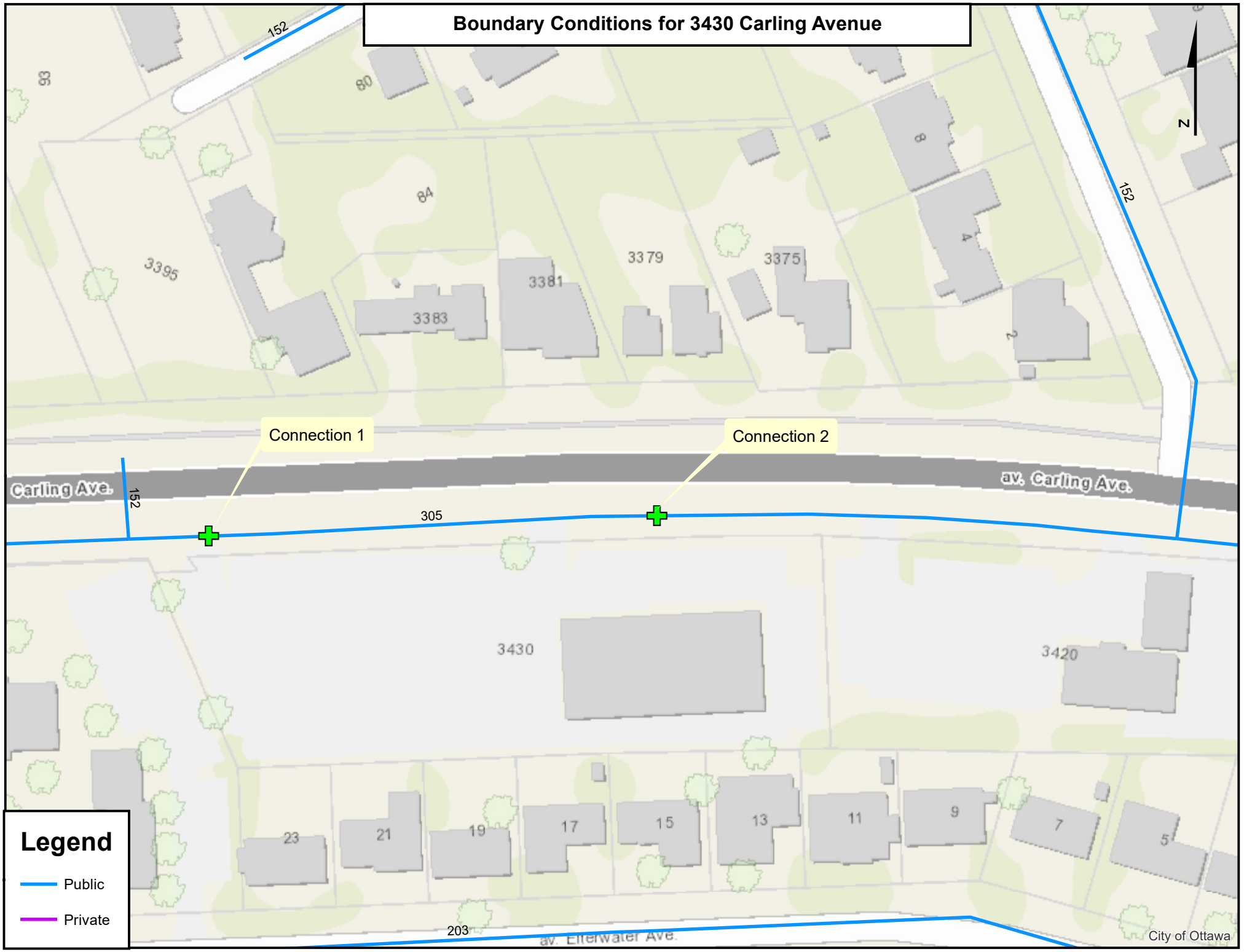
These are for current conditions and are based on computer model simulation.

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

Julie Candow, P.Eng
Project Manager
Planning, Real Estate and Economic Development Department - West Branch
City of Ottawa
110 Laurier Avenue West Ottawa, ON
613.580.2424 ext. 13850

Please take note that due to the current COVID situation, I am working remotely and phone communication may not be reliable at this time. The best way to reach me is by email.

From: Nick Recoskie <nick@kollaard.ca>
Sent: March 06, 2023 12:59 PM
To: Candow, Julie <julie.candow@ottawa.ca>
Cc: Steven deWit <steve@kollaard.ca>
Subject: Re: Request for Boundary Conditions for 3430 Carling Ave - File Number D07-12-22-0177


Boundary Conditions for 3430 Carling Avenue
Connection 1
Connection 2
Carling Ave.
av. Carling Ave.
152
305
203
av. Elterwater Ave.
3430
3420
3395
3379
3375
3381
3383
Legend
Public
Private
City of Ottawa

Subject: RE: Fire Flow Calculations for 3430 Carling Ave - File Number D07-12-22-0177
From: "Candow, Julie" <julie.candow@ottawa.ca>
Date: 2023-05-15, 2:21 p.m.
To: Steven deWit <steve@kollaard.ca>
CC: Nick Recoskie <nick@kollaard.ca>

Hi Steven,

The fire flow calculations presented using NFPA standards have been accepted by the City.

You will see the following comment forthcoming in the consolidated comment response package from the City.

> *Please have the civil and architectural consultant complete, sign and stamp the attached FUS CLASSIFICATION DECLARATION FOR MULTI-STOREY BUILDINGS.*
> *Response: Have also sent request to Project manager to consider alternate fire flow calculation. Waiting for response from City of Ottawa. Correspondence is Attached in Appendix A of the Servicing Brief.*
> *City Response (May 2023): Updated fire flow calculations were provided by Kollaard on May 10th. The alternate fire flow calculations using NFPA standards and generating a fire flow of 6,860 L/min or 114.3 L/sec have been accepted by the City. Please update the report accordingly to reference these alternate calculations and either attach the approved Memo as an appendix or update the report text as needed. The BC's provided can still be used as they provide a conservative design given the fire flow demand assumed within the BC request was 166.7 L/s.*

Julie Candow, P.Eng
Project Manager
Planning, Real Estate and Economic Development Department - West Branch
City of Ottawa
110 Laurier Avenue West Ottawa, ON
613.580.2424 ext. 13850

Please take note that due to the current COVID situation, I am working remotely and phone communication may not be reliable at this time. The best way to reach me is by email.

From: Steven deWit <steve@kollaard.ca>
Sent: May 10, 2023 4:50 PM
To: Candow, Julie <julie.candow@ottawa.ca>
Cc: Nick Recoskie <nick@kollaard.ca>
Subject: Re: Fire Flow Calculations for 3430 Carling Ave - File Number D07-12-22-0177

Good Afternoon Julie

I have revised the document to include additional information and calculations

Please see attached

File No.:
Date: March 2, 2021

3430 Carling
Pre-Consultation Meeting Minutes
Meeting Date: February 22, 2021

Attendee	Role	Organization
Lisa Stern	Planner	City of Ottawa
Randolph Wang	Urban Designer	
Neeti Paudel	Transportation	
Reid Shepherd	Parks Planner	
Jessica Valic	Infrastructure PM	
Mark Richardson	Forester	
Miguel Tremblay	Planner	Fotenn
Nico Church	Planner	
Edward Hayes		
Lucie Dalrymple		
Randy Koolwine		
Guy Forget		
Raphael Esposito		
Mark Baker		

Comments from the Applicant:

1. Develop two 9 storey buildings on a 4 storey podium on the subject lands.

Planning Comments:

1. The proposal is subject to a Major Zoning Bylaw Amendment and Complex Site Plan application. The application form, timeline and fees can be found here.
2. The subject lands are designated General Urban Area in the City's Official Plan and are zoned GM20[2628]H18.5. The site specific exception permits a non-accessory parking lot as a temporary use on the subject lands.
3. The permitted FSI on the site is 2.0, as such Section 37 applies to the proposal.
4. Cash-in-lieu of parkland and associated appraisal fee will be required as a condition of approval as per the Parkland Dedication Bylaw.
5. The site is not located within a target area of intensification as identified under Section 2.2.2 Policy 3, nor is the site located in proximity to rapid transit. Building heights within the General Urban Area will be predominantly low-rise. High-rise may be considered for sites that are in proximity to frequent transit or are in an area already characterized by taller buildings but still subject to compatibility analysis.
6. Although the larger deep parcels at the west and east ends of block permit heights up to 34m, the property to the east zoned LC (Local Commercial) Zone has a permitted height of 12m.
7. It will be up to the applicant to demonstrate what compatibility measures are put in place such that the proposal fits well with the abutting low-rise residential homes as well as those across Carling.
8. The planning rationale should discuss existing context of the surrounding area and demonstrate compatibility with abutting uses including the low rise residential across Carling and should discuss transitions including landscaping along the northerly property line and access/circulation.
9. Please consult with the Ward Councillor prior to submission.

Urban Design:

1. A Design Brief is required as part of the submission. The Terms of Reference of the Design Brief is attached for convenience. The proposed 9-storey buildings are significantly taller than the surrounding buildings. Therefore, a wind study is required in addition to a shadow study. The standard Terms of Reference for a wind study can be found here.
2. With respect to the design concept presented at the preconsulation meeting:
    a. The narrow bar building (approximately 16m in depth) concept is quite refreshing.
    b. The intent to stagger the two buildings is also appreciated. However, the placement of the buildings should take into considerations a number of factors, including the ability to provide effective built form transition to the low-rise area to the south. While a continuous street wall condition along Carling may not be most desirable at this location, it is conceivable that locating the proposed buildings as further away from the low-rise area will be most effective to address concerns of transition.
    c. Considerations should be given to differentiating the two buildings with respect to both massing and architecture.
    d. The proposed 4-storey podium may be inappropriate for the context. Considerations should be given to a 2 or 3 storey podium to reflect the form of the existing buildings in the vicinities.
    e. Please demonstrate how transition will occur at the back of the site. The 45 degree angular plane is a common tool to use to measure the effectiveness of built form transition.
    f. Please ensure the provision of a landscape buffer along the rear fence as required by zoning to allow for landscape screening and healthy growth of canopy trees.
    g. The site is isolated from the surrounding neighbourhood. Sufficient at grade amenity spaces should be provided at the rear of the property.
3. It is important to explore a few site plan and massing options in the next step. A second preconsultation may be required once these options are developed.

Forestry:

1. a Tree Conservation Report (TCR) must be supplied for review along with the suite of other plans/reports required by the City
    a. an approved TCR is a requirement of Site Plan approval.
    b. The TCR may be combines with the Landscape Plan
2. As of January 1 2021, any removal of privately or publicly (City) owned trees 10cm or larger in 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.
3. The Planning Forester from Planning and Growth Management as well as foresters from Forestry Services will review the submitted TCR
    a. If tree removal is required, both municipal and privately-owned trees will be addressed in a single permit issued through the Planning Forester
    b. Compensation may be required for city owned trees – if so, it will need to be paid prior to the release of the tree permit
4. the TCR must list all trees on site by species, diameter and health condition
5. the TCR must list all trees on adjacent sites if they have a critical root zone that extends onto the development site

6. Trees should be identified by ownership – Privately owned on-site trees; Privately owned off-site trees; City owned trees; Co-owned trees (growing on a property boundary)
7. If trees are to be removed, the TCR must clearly show where they are, and document the reason they cannot be retained
8. 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
    a. the location of tree protection fencing must be shown on a plan
    b. show the critical root zone of the retained trees
    c. if excavation will occur within the critical root zone, please show the limits of excavation
9. 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.
10. For more information on the process or help with tree retention options, contact Mark Richardson mark.richardson@ottawa.ca or on City of Ottawa

Transportation:

1. Follow Traffic Impact Assessment Guidelines
    a. Start this process as soon as possible.
    b. Applicant advised that their application will not be deemed complete until the submission of the draft step 1-4, including the functional draft RMA package (if applicable) and/or monitoring report (if applicable). Collaboration and communication between development proponents and City staff are required at the end of every step of the TIA process.
    c. Request base mapping asap if RMA is required. Contact Engineering Services (https://ottawa.ca/en/city-hall/planning-and-development/engineering-services)
2. Noise Impact Studies required for the following:
    a. Road
    b. Stationary (due to the proximity to neighbouring exposed mechanical equipment) or (if there will be any exposed mechanical equipment due to the proximity to neighbouring noise sensitive land uses)
3. Clear throat requirements for more than 250 apartment units on an arterial/major collector is 40m.
4. Right of way protection on Carling Road at this location is 44.5m. Ensure this is protected.
5. On site plan:
    a. Show all details of the roads abutting the site up to and including the opposite curb; include such items as pavement markings, accesses and/or sidewalks.
    b. Turning templates will be required for all accesses showing the largest vehicle to access the site; required for internal movements and at all access (entering and exiting and going in both directions).
    c. Show all curb radii measurements; ensure that all curb radii are reduced as much as possible
    d. Show lane/aisle widths.
    e. Sidewalk is to be continuous across access as per City Specification 7.1.
6. The City recommends development on private property be in accordance with the Accessibility Design Standards (AODA legislation). As the site proposed is residential, it is suggested that the design conforms to the Site Plan Checklist, which summarizes AODA requirements (attached).

Engineering:

Water

Available Watermain: 305mm (CI)

- Per WDG 4.3.1, where basic demand is greater than 50 m3/day, there shall be a minimum of two water services, separated by an isolation valve, to avoid creation of vulnerable service area
- Per WDG 4.4.7.2, District Meter Area (DMA) Chamber is required for services greater than 150mm in diameter

Boundary Conditions

Request prior to first submission. Contact assigned City Infrastructure Project Manager with the following information:

- Location of service(s)
- Type of development and required fire flow (per FUS method – include FUS calculation sheet with boundary condition request)
- Average Daily Demand (l/s)
- Maximum Hourly Demand (l/s)
- Maximum Daily Demand (l/s)

Sanitary

Available Sanitary Sewer: 375mm PVC

- There may be limited capacity in the downstream sewer system. Coordination will be required to determine if the existing sanitary sewer system has sufficient capacity to support the proposed development. Please confirm the proposed sanitary demands for the proposed development, calculated using the most up to date SDG, and provide to the City of Ottawa Infrastructure Project Manager.

Storm

Available Storm Sewer: 600mm (CONC)

- Roof drains to be connected downstream of any incorporated ICD within the SWM system.
- Where service lateral connection is greater than 50% of the diameter of the main sewer, a maintenance hole will be required at the connection.

Stormwater Management

- Quantity Control
    - Required for the site up to and including the 100-yr storm event.
    - Control to the 2-year storm event
    - Time of Concentration (Tc): pre-development or maximum=10min
    - Allowable runoff coefficient(c): Lesser of pre-development or c=0.5.
    - If underground/inline stormwater storage is proposed, an average release rate equal to 50% of the determined peak allowable rate must be used. Otherwise, disregard the underground/inline storage as available storage or provide modeling to support the proposed design. The reasoning for this restriction is that the discharge rate at full storage is not representative of the discharge rate for more frequent storm events. Halving the discharge rate compensates for the inaccuracies of the modified rational method when underground storage is used.
    - Provide both pre and post development stormwater management plans, showing individual drainage areas and their respective coefficients.
    - If roof storage is proposed, please provide a roof drainage plan showing the 5 and 100-year storm ponding levels. Include the roof drain type, opening settings, and flow rate.

- Quality Control: Please consult with the Mississippi Valley Conservation Authority (MVCA) regarding water quality control restrictions for the subject site. Include correspondence in report.
- Ministry of Environment, Conservation, and Parks (MECP): Designer to determine if approval for sewage works under Section 53 of OWRA is required and to determine the type of application required. Reviews will be done through Transfer of Review or Direct Submission.

Phase I and Phase II ESA

- Phase I ESA is a requirement; Phase II ESA requirement will be dependent on the result of the Phase I ESA.
- Phase I ESA must include Ecolog ERIS Report.
- Phase I ESAs and Phase II ESAs must conform to clause 4.8.4 of the Official Plan that requires that development applications conform to Ontario Regulation 153/04.
- Phase I/II ESA to comment on the need for a Record of Site Condition for property development.

Geotechnical Investigation

- Required for entire development area
- Retaining walls greater than 1.0m must be designed by a Professional Engineer. Plans to be submitted with the Application.

Exterior Lighting

- If exterior light fixtures are proposed, provide a plan showing the location of all exterior fixtures and include a table providing fixture details (make, model, mounting heights). 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), resulting in minimal light spillage onto adjacent properties (as a guideline, 0.5 fc is normally the maximum allowable spillage). Provide certification from a relevant Professional Engineer.

Other

- Road cut moratorium in place on Carling Avenue. Road cuts may be prohibited in upcoming years and/or road cut fees increased. Specifics can be discussed when application is submitted.

General Information

1. The Servicing Study Guidelines for Development Applications are available at the following address: https://ottawa.ca/en/city-hall/planning-and-development/information-developers/development-application-review-process/development-application-submission/guide-preparing-studies-and-plans#servicing-study-guidelines-development-applications
2. Servicing and site works shall be in accordance with the following documents:

- Ottawa Sewer Design Guidelines (October 2012) (including subsequent Technical Bulletins)
- Ottawa Design Guidelines – Water Distribution (2010) (including subsequent Technical Bulletins)
- Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007)
- Ottawa Standard Tender Documents (latest version)

3. 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) 580-2424 x.44455).

4. Any proposed work in utility easements requires written consent of easement owner.
5. All submitted report and plan pdf documents to be flattened and unsecured to allow for editing.
6. All documents prepared by Engineers shall be signed and dated on the seal.

Please refer to the links to "Guide to preparing studies and plans" and fees for general information. Additional information is available related to building permits, development charges, and the Accessibility Design Standards. Be aware that other fees and permits may be required, outside of the development review process. You may obtain background drawings by contacting informationcentre@ottawa.ca.

These pre-con comments are valid for one year. If you submit a development application(s) after this time, you may be required to meet for another pre-consultation meeting and/or the submission requirements may change. You are as well encouraged to contact us for a follow-up meeting if the plan/concept will be further refined.
Please contact me at Lisa.Stern@ottawa.ca or at 613-580-2424 extension 21108 if you have any questions.

Appendix B – Fire Flow Calculations per NFPA

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Engineers
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1 Fire Flow Requirement or Hose Stream Demand

NFPA 1

> **3.3.128 Fire Flow.** The flow rate of a water supply, measured at 20 psi (137.9 kPa) residual pressure, that is available for fire fighting.

1.1 Calculation Procedure

The fire flow requirement was calculated for the proposed building to ensure that there is adequate flow available to put out a fire within the proposed building should it occur. The fire flow calculation determines the minimum water flow or volume required to be available for firefighting purposes to be used by firefighters. In accordance to City of Ottawa Technical Bulletin ISTB-2021-03, the fire flow requirement calculation for private property is to first consider the Ontario Building Code (OBC). If the fire protection requirement from the OBC yields a fire flow greater than 9,000 L/min then the Fire Underwriters Survey (FUS) shall be used to determine the Fire Flow Demand.

Technical Bulletin ISTB-2021-03 provides the following direction with respect to the calculation of the fire flow requirement.

> "The requirements for levels of fire protection on private property in urban areas are covered in Section 7.2.11 of the Ontario Building code. If this approach yields a fire flow greater than 9,000 L/min then the Fire Underwriters Survey method shall be used to determine these requirements instead."

The Ontario Building Code 7.2.11.1. Design, Construction, Installation and Testing states the following:

> "(1) Except as provided in Articles 7.2.11.2. to 7.2.11.4., and 7.3.7.2, the design, construction, installation and testing of fire service mains and water service pipecombined with fire service mains shall be in conformance with NFPA 24, "Installation Of Private Fire Service Mains And Their Appurtenances"."

As apparent by the title and its content, NFPA 24 is intended to provide a standard for the installation of private fire service mains and their appurtenances. It is not intended to provide direction on the calculation of fire water supply requirements.

The requirements in the Ontario Building for determining the fire protection on private property are covered in Section 3.2.5.7 which states the following:

"(1) An adequate water supply for firefighting shall be provided for every building."

Additional guidance is provided in OBC Div B A-3.2.5.7

"2. Sprinklered Buildings

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

Further review of NFPA 13 indicates that the standard does not provide water supply calculations for firefighting purposes. Water supply calculations for a sprinklered building are provided in NFPA 1 – Fire Code. Specifically, Chapter 18, Fire Department Access and Water Supply. The fire flow requirements for a sprinklered building are provided in Table 18.4.5.2.1 based on fire flow area (total building foot print) and building classification. Building classification is provided in NFPA 220 and is divided into 5 major classes based on fire resistive rating of various components and building construction.

Excerpts from the NFPA standards are included within the text of this document.

2 Building Construction and Fire Flow Requirement

There are two proposed buildings on site connected by a shared underground parking garage. The parking garage is of concrete construction.

The proposed buildings are 6 storey wood frame buildings. From the site plan prepared by Project 1 Studio Architects: The gross floor area of the West building is 6638.51 m^2 (71,456 ft^2); the gross floor area of the East building is 5957.18 m^2 (64,123 ft^2). The two buildings are separated by 11.6 metres.

NFPA1

3.3.14.4 ***Fire Flow Area.*** The floor area, in square feet, used to determine the required fire flow.

18.4.4 Fire Flow Area.

18.4.4.1 General. The fire flow area shall be the total floor area of all floor levels of a building except as modified in 18.4.4.2.

The buildings will be equipped with a fully automatic and monitored sprinkler system. The exterior wall assemblies will be covered with non combustible cladding, and be constructed of a wall assembly providing a minimum fire rating of at least 1 hour. The interior walls between

units will be constructed having a minimum rating of 1 hour. Each floor within the building will also be constructed with a minimum fire rating of 1 hour. It is noted however that the fire resistance ratings have not been determined by in accordance with NFPA 220 Sentence 5.1. Based on the proposed building construction and NFPA 220, Table 4.1.1 and Sentence 4.6, the proposed building would be classified as either Type V (111) or Type (000) construction.

NFPA 220

Chapter 5 Fire Resistance Rating Requirements for Structural Elements

5.1 Fire Resistance Rating Requirements.

5.1.1 The fire resistance ratings of structural elements and building assemblies shall be determined in accordance with Section 8.2 in *NFPA 5000* or 8.2.3 in NFPA *101*.

Table 4.1.1 Fire Resistance Ratings for Type I through Type V Construction (hr)

	Type I		Type II			Type III		Type IV	Type V	
Construction Element	**442**	**332**	**222**	**111**	**000**	**211**	**200**	**2HH**	**111**	**000**
Exterior Bearing Walls[a]										
Supporting more than one floor, columns, or other bearing walls	4	3	2	1	0[b]	2	2	2	1	0[b]
Supporting one floor only	4	3	2	1	0[b]	2	2	2	1	0[b]
Supporting a roof only	4	3	1	1	0[b]	2	2	2	1	0[b]
Interior Bearing Walls										
Supporting more than one floor, columns, or other bearing walls	4	3	2	1	0	1	0	2	1	0
Supporting one floor only	3	2	2	1	0	1	0	1	1	0
Supporting roofs only	3	2	1	1	0	1	0	1	1	0
Columns										
Supporting more than one floor, columns, or other bearing walls	4	3	2	1	0	1	0	H	1	0
Supporting one floor only	3	2	2	1	0	1	0	H	1	0
Supporting roofs only	3	2	1	1	0	1	0	H	1	0
Beams, Girders, Trusses, and Arches										
Supporting more than one floor, columns, or other bearing walls	4	3	2	1	0	1	0	H	1	0
Supporting one floor only	2	2	2	1	0	1	0	H	1	0
Supporting roofs only	2	2	1	1	0	1	0	H	1	0
Floor-Ceiling Assemblies	2	2	2	1	0	1	0	H	1	0
Roof-Ceiling Assemblies	2	1½	1	1	0	1	0	H	1	0
Interior Nonbearing Walls	0	0	0	0	0	0	0	0	0	0
Exterior Nonbearing Walls[c]	0[b]	0[b]	0[b]	0[b]	0[b]	0[b]	0[b]	0[b]	0[b]	0[b]

H: heavy timber members *(see text for requirements).*
[a]See *NFPA 5000*, 7.3.2.1.
[b]See *NFPA 5000*, Section 7.3.
[c]See 4.3.2.12, 4.4.2.3, and 4.5.6.8.
[5000: Table 7.2.1.1]

Note NFPA 220 Table 4.1.1 and NFPA 5000 Table 7.2.1.1 are essentially the same.

NFPA 220

4.1.4 Materials shall be in accordance with all of the following, except as modified by any special requirements in Section 4.3:

(1) *NFPA 5000*, Chapter 41, Concrete
(2) *NFPA 5000*, Chapter 42, Aluminum
(3) *NFPA 5000*, Chapter 43, Masonry
(4) *NFPA 5000*, Chapter 44, Steel
(5) *NFPA 5000*, Chapter 45, Wood
(6) *NFPA 5000*, Chapter 46, Glass and Glazing
(7) *NFPA 5000*, Chapter 47, Gypsum Board, Lath, and Plaster
(8) *NFPA 5000*, Chapter 48, Plastics

[**5000:**7.2.1.4]

Chapter 4 Types of Construction

NFPA 220

4.1 General.

4.1.1* Buildings and structures shall be classified according to their type of construction, which shall be based upon one of five basic types of construction designated as Type I, Type II, Type III, Type IV, and Type V, with fire resistance ratings not less than those specified in Table 4.1.1 and Sections 4.3 through 4.6, and with fire resistance ratings meeting the requirements of Chapter 5. [**5000:**7.2.1.1]

NFPA 220

4.6 Type V (111 or 000) Construction. Type V (111 or 000) construction shall be that type in which structural elements, walls, arches, floors, and roofs are entirely or partially of wood or other approved material. [**5000:**7.2.6]

NFPA 5000

7.2.6 Type V(111 or 000) Construction. Type V(111 or 000) construction shall be that type in which structural elements, walls, arches, floors, and roofs are entirely or partially of wood or other approved material.

NFPA 5000

Table 7.3.2.1 Fire Resistance Ratings for Exterior Walls (hr)

Occupancy Classification	Horizontal Separation ft (m)				Opening Protectives
	0 to 5 (0 to 1.5)	>5 to ≤10 (>1.5 to ≤3)	>10 to ≤30 (>3 to ≤9)	>30 (>9)	
Assembly, educational, day care, healthcare, ambulatory health care, detention and correctional, residential, residential board and care, business, industrial, and storage occupancies with low hazard contents	1	1	0	0	See Table 7.3.5(a).

NFPA 1

18.4 Fire Flow Requirements for Buildings.

18.4.1* Scope.

18.4.1.1* The procedure determining fire flow requirements for buildings hereafter constructed or moved into the jurisdiction shall be in accordance with Section 18.4.

18.4.1.2 Section 18.4 shall not apply to structures other than buildings.

18.4.2 Definitions. See definitions 3.3.14.4, Fire Flow Area, and 3.3.128, Fire Flow.

From NFPA 1 - Table 18.4.5.2.1 below, a building classified as being Type V (111) construction with a fire area (GFA) of 71,456 ft^2 would require a fire flow rate of 4,750 USgpm or 17,979 L/min for a duration of 3 hours. Assuming however, that the proposed building was classified to be the most onerous classification of a sprinklered building, which is Type V (000), the required fire flow would be 7,250 USgpm or 27,441 L/min for a duration of 4 hours.

Table 18.4.5.2.1 Minimum Required Fire Flow and Flow Duration for Buildings

Fire Flow Area ft^2 (× 0.0929 for m^2)					Fire Flow gpm† (× 3.785 for L/min)	Flow Duration (hours)
I(443), I(332), II(222)*	II(111), III(211)*	IV(2HH), V(111)*	II(000), III(200)*	V(000)*		
0–22,700	0–12,700	0–8200	0–5900	0–3600	1500	2
22,701–30,200	12,701–17,000	8201–10,900	5901–7900	3601–4800	1750	
30,201–38,700	17,001–21,800	10,901–12,900	7901–9800	4801–6200	2000	
38,701–48,300	21,801–24,200	12,901–17,400	9801–12,600	6201–7700	2250	
48,301–59,000	24,201–33,200	17,401–21,300	12,601–15,400	7701–9400	2500	
59,001–70,900	33,201–39,700	21,301–25,500	15,401–18,400	9401–11,300	2750	
70,901–83,700	39,701–47,100	25,501–30,100	18,401–21,800	11,301–13,400	3000	3
83,701–97,700	47,101–54,900	30,101–35,200	21,801–25,900	13,401–15,600	3250	
97,701–112,700	54,901–63,400	35,201–40,600	25,901–29,300	15,601–18,000	3500	
112,701–128,700	63,401–72,400	40,601–46,400	29,301–33,500	18,001–20,600	3750	
128,701–145,900	72,401–82,100	46,401–52,500	33,501–37,900	20,601–23,300	4000	4
145,901–164,200	82,101–92,400	52,501–59,100	37,901–42,700	23,301–26,300	4250	
164,201–183,400	92,401–103,100	59,101–66,000	42,701–47,700	26,301–29,300	4500	
183,401–203,700	103,101–114,600	66,001–73,300	47,701–53,000	29,301–32,600	4750	
203,701–225,200	114,601–126,700	73,301–81,100	53,001–58,600	32,601–36,000	5000	
225,201–247,700	126,701–139,400	81,101–89,200	58,601–65,400	36,001–39,600	5250	
247,701–271,200	139,401–152,600	89,201–97,700	65,401–70,600	39,601–43,400	5500	
271,201–295,900	152,601–166,500	97,701–106,500	70,601–77,000	43,401–47,400	5750	
Greater than 295,900	Greater than 166,500	106,501–115,800	77,001–83,700	47,401–51,500	6000	
		115,801–125,500	83,701–90,600	51,501–55,700	6250	
		125,501–135,500	90,601–97,900	55,701–60,200	6500	
		135,501–145,800	97,901–106,800	60,201–64,800	6750	
		145,801–156,700	106,801–113,200	64,801–69,600	7000	
		156,701–167,900	113,201–121,300	69,601–74,600	7250	
		167,901–179,400	121,301–129,600	74,601–79,800	7500	

NGPA 1

18.4.5.3 Buildings Other Than One- and Two-Family Dwellings.

18.4.5.3.1* The minimum fire flow and flow duration for buildings other than one- and two-family dwellings shall be as specified in Table 18.4.5.2.1.

18.4.5.3.2 Required fire flow shall be reduced by 75 percent when the building is protected throughout by an approved automatic sprinkler system. The resulting fire flow shall not be less than 1000 gpm (3785 L/min).

18.4.5.3.3 Required fire flow shall be reduced by 75 percent when the building is protected throughout by an approved automatic sprinkler system, which utilizes quick response sprinklers throughout. The resulting fire flow shall not be less than 600 gpm (2270 L/min).

18.4.5.3.4* Required fire flow for buildings protected by an approved automatic sprinkler system shall not exceed 2000 gpm (7571 L/min) for 2 hours.

Based on NFPA 1 - 18.4.5.3.2 “the required fire flow shall be reduced by 75 percent when the building is protected throughout by an approved automatic sprinkler system. The resulting fire flow shall not be less than 1000 gpm (3,785 L/min)” and NFPA 1 - 18.4.5.3.4 “the required fire flow for buildings protected by an approved automatic sprinkler system shall not exceed 2000 gpm (7571 L/m) for 2 hours”.

As such the fire demand for the proposed building assuming Type V (III) construction is 17,979 – 17,979 x 0.75 = 4,495 L/min or assuming Type V (000) construction is 27,441 – 27,441 x 0.75 = 6,860 L/min.

It is understood that the building classification as Type V(111) is dependent on 1 hour fire ratings for the exterior bearing walls, interior bearing walls, columns, beams, floor/ceiling assemblies, and floor/roof assemblies. As previously indicated, these resistances have not been verified in accordance with NFPA 220 Sentence 5.1. As such, it is considered that the fire flow requirement of 6,860 L/min calculated for the Type V(000) building should be used.

Based on Technical Bulletin ISTB-2021-03, the fire flow requirements are first to be determined using the Ontario Building Code for a building in an urban area. The Ontario building code references and directs a designer to the National Fire Protection Association (NFPA) Codes and Standards for fire flow calculations with a sprinklered building. Using the NFPA standards in accordance with OBC Div B A-3.2.5.7.2. Sprinklered Buildings a maximum fire flow rate of 7,570 L/min was determined. Since a fire flow rate of 6,860 L/min is less than 9,000 L/min, the fire flow demand for the proposed building for firefighting purposes is 6,860 L/min or 114.3 L/sec.