Kollaard Associates
Engineers
210 Prescott Street, Unit 1
P.O. Box 189
Kemptville, Ontario K0G 1J0

Civil • Geotechnical •
Structural • Environmental •
Hydrogeology

(613) 860-0923
FAX: (613) 258-0475

Serviceability Brief
Proposed Residential Development
42 Northside Road
OTTAWA, ONTARIO

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

PROJECT #: 211099

DISTRIBUTION
3 copies – City of Ottawa
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Rev 0 – Issued for Site Plan Approval	January 19, 2022
Rev 1 – Response to 1st Engineering Review Comments	April 18, 2022

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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 a five storey 51 unit apartment building on the property at 42 Northside Road, City of Ottawa. The property is located on the south side of Northside Road immediately east of the west intersection of Thorncliff Place with Northside Road.

The existing site is currently occupied by a 1 storey 197 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 Northside Road which enter the site about 8 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 building fronting onto Thorncliff Place. The proposed building will be serviced from the existing water main and sanitary sewer along Thorncliff Place west of the site. 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.

2 STORMWATER MANAGEMENT DESIGN

The stormwater management design for the site has been completed under a separate report Stormwater Management Report, Proposed Residential Development, 42 Northside Road, Ottawa, Ontario prepared by Kollaard Associates Inc, File No. 211099 dated January 19, 2022.

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 the roof of the building and will be released at a controlled rate during and following a rainstorm event to the existing 375 mm diameter concrete storm sewer along Thorncliff Place.

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 1.02 L/s.
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 laterals from the proposed development will be connected to the existing 200 mm diameter concrete sanitary sewer along Thorncliff Place. The existing sanitary service lateral to Northside Road 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	*(34) x 1.4 ppu:*	*47.6*
Two Bedroom units	*(17) x 2.1 ppu:*	*35.7*
Three Bedroom units	*(0) x 3.1 ppu:*	*0*
Total:		83.3 (84)

$Q_{Domestic}$ = 84x 280 L/person/day x (1/86,400 sec/day) = 0.27 L/sec

Peaking Factor = $1 + \left(\frac{14}{4+\left(\frac{77}{1000}\right)^{1/2}}\right) * 0.8$ = 3.61(4 maximum)

$Q_{Peak\ Domestic}$ = 0.27 L/sec x 3.61 = 0.98 L/sec

Infiltration

$Q_{Infiltration}$ = 0.33 L/ha/sec x 0.12ha = 0.04 L/sec

Total Peak Sanitary Flow = 0.98 + 0.04 = 1.02 L/sec

3.2 Sanitary Service Lateral

The maximum peak sanitary flow for the building is 0.98 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 0.98 L/sec, a single sanitary sewer service lateral of 200 mm diameter at a minimum 1% slope will be sufficient. The new lateral is to be installed at the location indicated on the Site Servicing drawing 211099– SER. It is noted that the material that the existing sanitary sewer along Thorncliff Place is unknown. The proposed sanitary service is to connect to the existing sanitary sewer with a T connection assuming the existing 200 mm sewer is constructed from PVC. However, if the existing sanitary sewer is of rigid construction the connection will require a maintenance hole.

3.3 Sufficiency of Existing Municipal Sanitary Sewer

The existing sanitary sewer along Thorncliff Place consists of 200 mm diameter sanitary sewer with a slope of 0.45 percent. The material the pipe is constructed from is unknown at this time. From the attached sanitary sewer calculation sheet, the capacity of the existing sewer is about 24.32 L/s. The existing sanitary demand is about 1.6 L/s within this sewer. The peak sanitary flow from the proposed development is equal to about 4.2 percent of the capacity of the existing sanitary. Combining the flow from the site with the existing flow results in a total demand of about 2.6 L/s which is about 10.7 percent of the capacity of the existing sewer. As such the proposed increase in sanitary flow as a result of the construction of the apartment building is negligible and there is sufficient available capacity within the existing sewer for the proposed development.

The existing 200 mm diameter sanitary sewer along Thorncliff Place outlets to the existing 375 mm diameter sanitary sewer along Northside Drive. This sanitary sewer increases in diameter eastward along Northside Drive and outlets to the Nepean Trunk Collector about 650 metres northeast of the site.

4 WATERMAIN DESIGN AND WATER DEMAND

The existing water lateral is to be blanked at the watermain on Northside Road to the satisfaction of the City of Ottawa Services. A proposed 150mm diameter lateral will service the building. The service lateral will be connected to the municipal watermain along Thorncliff Place, by means of a "T" connection as indicated on the Site Servicing drawing 211099- SER. The water demand for the site consists of three parts which include: domestic water consumption, sprinkler flow allowance, and fire flow requirement or hose stream demand.

4.1 Fire Flow Requirement or Hose Stream Demand

4.1.1 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 in Appendix B.

4.1.2 Building Construction and Fire Flow Requirement

The proposed building is a 5 storey wood frame building with a foot print per floor which varies from 800 m^2 to 883 m^2 resulting in a total building area of 4103 m^2 or 44,166 ft^2. The building 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 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. Based on the proposed building construction and NFPA 220, Table 4.1.1 and Sentence 4.6, the proposed building would be classified as Type V (111) construction.

From NFPA 1 - Table 18.4.5.2.1 a building classified as being Type V (111) construction would require a fire flow rate of 3,750 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 5,750 L/min for a duration of 4 hours.

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 5,750 L/min was determined. Since a fire flow rate of 5,750 L/min is less than 9,000 L/min, the fire flow demand for the proposed building for firefighting purposes is 5,750 L/min or 95.8 L/sec.

4.2 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
84 persons x 280 L/person/day x (1/86,400 sec/day)

- Average daily demand 0.27 L/s
- Maximum daily demand (factor of 2.5) is 0.27 L/s x 2.5 = 0.68 L/s
- Peak hourly demand (factor of 2.2) = 0.68 L/s x 2.2= 1.50 L/s

It is noted that the proposed unit count in the building increased from 46 to 51 units between the date of the request for boundary conditions and the date of preparation of this brief. It is also noted that the water demand per capita was originally calculated using 350 L/cap/day. As a result, the actual demand is less than that previously submitted for boundary conditions.

4.3 Boundary Conditions

The water demand due to occupancy together with the fire flow requirements were provided to the City of Ottawa in 2021 as follows:

- Amount of fire flow 316.7 L/s
- Average daily water demand 0.31 L/s
- Maximum daily water demand 0.78 L/s
- Peak hourly water demand 1.72 L/s

It is assumed that the water service will be connected to the 203 mm PVC water main along Thorncliff Place.

The following are the boundary conditions, HGL, for hydraulic analysis that were provided by the city of Ottawa in 2021 for the above indicated peak hourly demand and fire flow demand.
Minimum HGL = 126.8 m
Maximum HGL = 132.7 m
Available fire flow at 20 psi = 240 L/s, assuming a ground elevation of 87.6 m

Correspondence with the City of Ottawa is included in Appendix A

Assuming a ground elevation of 87.6 m, a residual pressure of 20 psi (174 kPa) is equal to a HGL of 105.35 m.

4.4 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 building footprint per floor ranges from 800 to 883 square metres. 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 25% of a single floor plus the corresponding floor areas above and below the affected area.

The water demand area would be limited to 883 m^2 x 0.25 x 3 = 221 m^2 x 3 = 663 m^2
A sprinkler demand of 4.1mm/min x 663 m^2 = 2718.3 L/min or 45.3 L/s.

4.5 Water Service Requirements and Pressure Loss Calculations

The maximum and minimum pressures were determined for both the mechanical room (water entry point) and the fifth floor using two water demands. The first water demand consisted of the peak hourly demand of 1.72 L/s. The second water demand consisted of 47 L/s which is equal to the estimated sprinkler flow demand of 45.3 L/s plus the peak hourly demand of 1.7 L/s. The pressure losses were calculated using two different service diameters to determine the minimum required water service size. Using linear interpolation and the provided boundary conditions, a flow rate of 47 L/s was determined to result in an HGL of 122.02 m.

The pressure loss to the mechanical room and to the fifth 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.

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

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

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

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

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

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

100 mm Diameter Service			Grade Elevation		Hydraulic Grade line		Pressure	
Pipe Sections	Along	End	Start m	End m	Start m	End m	P_{start} KPa	P_{end} KPa
Parking Garage Level 1 – Flow Rate of 1.72 L/sec								
Thorncliff (min HGL)	Service	Mechanical Room	85.5	86.5	126.80	126.78	405	395
Thorncliff (max HGL)	Service	Mechanical Room	85.5	86.5	132.70	132.68	463	453
Floor 5 – Flow Rate of 1.72 L/sec								
Thorncliff (min HGL)	Service	5th storey	85.5	102.9	126.80	126.75	405	234
Thorncliff (max HGL)	Service	5th storey	85.5	102.9	132.70	132.65	463	292
Parking Garage Level 1 – Flow Rate of 47 L/sec								
Thorncliff (min HGL)	Service	Mechanical Room	85.5	86.5	122.02	109.61	358	227
Thorncliff (max HGL)	Service	Mechanical Room	85.5	86.5	132.70	120.29	463	331
Floor 5 – Flow Rate of 47 L/sec								
Thorncliff (min HGL)	Service	5th storey	85.5	102.9	122.02	99.54	358	-33
Thorncliff (max HGL)	Service	5th storey	85.5	102.9	132.70	110.22	463	72

150 mm Diameter Service			Grade Elevation		Hydraulic Grade line		Pressure	
Pipe Sections	Along	End	Start m	End m	Start m	End m	P_{start} KPa	P_{end} KPa
Parking Garage Level 1 – Flow Rate of 1.72 L/sec								
Thorncliff (min HGL)	Service	Mechanical Room	85.5	86.5	126.80	126.78	405	395
Thorncliff (max HGL)	Service	Mechanical Room	85.5	86.5	132.70	132.68	463	453
Floor 5 – Flow Rate of 1.72 L/sec								
Thorncliff (min HGL)	Service	5th storey	85.5	102.9	126.80	126.75	405	234
Thorncliff (max HGL)	Service	5th storey	85.5	102.9	132.70	132.65	463	292
Parking Garage Level 1 – Flow Rate of 47 L/sec								
Thorncliff (min HGL)	Service	Mechanical Room	85.5	86.5	122.02	119.77	358	325
Thorncliff (max HGL)	Service	Mechanical Room	85.5	86.5	132.70	130.45	463	431
Floor 5 – Flow Rate of 47 L/sec								
Thorncliff (min HGL)	Service	5th storey	85.5	102.9	122.02	118.53	358	153
Thorncliff (max HGL)	Service	5th storey	85.5	102.9	132.70	129.21	463	258

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 table, when using the 100mm diameter service, the residual pressure on the fifth floor of the building is a function of the initial HGL and losses due to elevation change during domestic water consumption only. There are no significant minor losses. The above minimum HGL provides a minimum water pressure of 234 KPa at the fifth floor. During a higher flow situation when there is a sprinkler demand, the minor losses would increase and the residual pressure at the mechanical room could be reduced to below the minimum allowable pressure of 276 kPa. In order to ensure the residual pressure does not get reduced below 276 kPa in the mechanical room, the service diameter was increased to 150 mm.

When using 150 mm diameter service, the above minimum and maximum HGL provide a water pressure of between 395 KPa and 453 KPa at the proposed building. The minimum residual pressure when there is sprinkler demand, the residual pressure at the mechanical room would be 326 kPa or well above the minimum of 276 kPa. 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. Because the residual pressure at the fifth floor is below the minimum pressure of 276 kPa (40 psi.), it is recommended that a pump be installed.

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

4.6 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 203mm CI

watermain beneath Northside Road. One of the hydrants along the Northside Road is approximately 39 metres east of the east side of the site (59 metres from the main entrance) and the other is less than 150m but greater than 75m. Two class AA hydrants are located on the 203mm PVC watermain along Thorncliff Place. One of the hydrants along Thorncliff Place is across the street from the south west corner of the site (26 metres from the Thorncliff Place entrance) and the other is less than 150m but greater than 75m.

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)
5 Storey Sprinklered Apartment	5750 L/min	2 x 5,700 L/min	2 x 3,800 L/min	19,000 L/min

Since the available fire flow is much greater than the fire flow demand, the existing hydrants will be adequate to meet the fire flow demands.

As previously indicated, the maximum fire flow requirement is 5750 L/min. Therefore the existing nearby hydrants will adequately service fire flow requirements. Since the existing hydrants are within 90 metres of the building entrances, there is no requirement for an additional onsite hydrant to service the proposed building.

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 Northside Road. 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 the roof of the building and discharge will be directed to the existing sewer along Thorncliff Place.

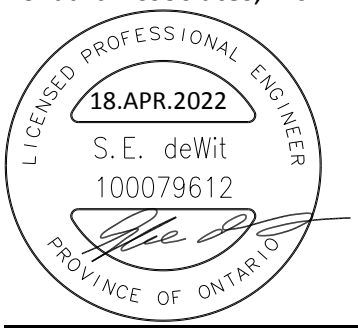
The proposed building will be serviced by a 200 mm diameter PVC sanitary service. The proposed sanitary service will be connected to the existing 200 mm diameter sanitary sewer on Thorncliff Place. The peak sewage flow rate from the proposed development will be 1.02 L/sec.

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 an 150 mm diameter PVC water service. The proposed service will be connected to the existing 203 mm diameter PVC watermain along Thorncliff Place. 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.



Steven deWit, P.Eng.

Appendix A –Correspondence With City of Ottawa

- Boundary Conditions

File Number: PC2021-0295
September 9, 2021

Pre-Consultation Meeting Notes

Site Address: 42 Northside Road
Location: Virtual - Microsoft Teams
Meeting Date: August 23, 2021

Attendees: Colette Gorni – Planner, City of Ottawa
Molly Smith – Planner, City of Ottawa
Abi Dieme – Project Manager (Infrastructure), City of Ottawa
Mike Giampa – Project Manager (Transportation), City of Ottawa
Christopher Moise – Planner (Urban Design), City of Ottawa
Louise Cerveny – Planner (Parks), City of Ottawa
Jeffrey Ren – Co-op Student, City of Ottawa
Eric Lalande – RVCA
Akash Sinha – Rohit Group
Adil Kodian – Rohit Group
Mario Shaker – Rohit Group
Gagan Prince – Rohit Group
Robert Martin – Robert Martin Architects
Luke Boonstra – Robert Martin Architects

Regrets: Sami Rehman – Planner (Environmental), City of Ottawa
Mark Richardson – Planning Forester, City of Ottawa

Applicants Comments:

1. There is an existing zero lot line condition with the church
2. High water table – only 2 levels of underground parking.
3. 1:1 parking ratio (units plus visitor spaces = 1:1)
4. Bicycle parking in the underground parking garage.
5. Main entrance off northside road – double loaded corridor

Planning

1. Official Plan (OP) Designation – General Urban Area
2. Zoning – GM9 H(18.5) – General Mixed Use, Subzone 9, maximum height of 18.5 metres
3. Parking is to be provided at the rates specified for Area C per Schedule 1A:
    a. 1.2 per dwelling unit – apartment dwelling, low rise
    b. 0.2 visitor parking spaces per dwelling unit
    c. 0.5 bicycle parking spaces per dwelling unit

4. As per Section 101(6)(c)(i) of the Zoning By-law, where all parking spaces provided or required for a permitted land use are located below grade in the same building as that land use, the parking required by Table 101 for that land use may be reduced by the lesser of (i) 10 per cent of the required parking spaces, or (ii) 20 parking spaces.
5. Please note that Thorncliff Place is considered the front lot line.
6. The proposed development is subject to Site Plan Control and will require a Complex (Manager Approval, Public Consultation) application. Fees and forms for the above mentioned application can be found here.
7. Through a preliminary review of the provided concept plan, relief from the Zoning By-law is required for the following provisions:

    a. The minimum required rear yard setback for a residential use building on the site is 7.5 metres, as per Table 187(e)(iii) in the Zoning By-law.

    b. The minimum width of landscaped area abutting an institutional zone is 3 metres, as per Table 187(h)(ii) in the Zoning By-law)

    c. 9 visitor parking spaces are required (3 provided at grade).

    If the proposed building is unable to meet the requirements, relief from minimum rear yard setback provision in the Zoning By-law will be required prior to Site Plan Approval. This can be attained through either a minor variance or minor rezoning. Based on the scale of the relief required, staff are of the opinion that a minor rezoning application would most appropriate. Fees and forms for the Zoning By-law Amendment application can be found here. Refer to the Committee of Adjustment comments for more information on the minor variance process.
8. Staff have concerns with the proposed 0 metre rear yard setback, please consider increasing the setback. The Planning Rationale will need demonstrate that the 0 metre will not have an undue adverse impact on the abutting institutional use if they were to redevelop in the future.
9. For more information on electrical servicing, the following link outlines Hydro Ottawa's services for Commercial, Overhead and Underground, and Residential projects, together with contact information for Hydro Ottawa representatives: https://hydroottawa.com/en/accounts-services/accounts/contractors-developers/distribution-system-design
10. Please note that each planning application fee will be reduced by 10 per cent if two or more applications are submitted at the same time and for the same lands.
11. You are encouraged to reach out to Councillor Rick Chiarelli to discuss the proposal prior to submitting a formal application.
12. Please ensure that the submission takes into account appropriate Official Plan policies that are applicable at the time of the submission of the application

    a. If a complete application is received by no later than the day before the new Official Plan is adopted (October 2021), it will be processed on the basis of

existing Official Plan policy provided it is consistent with the 2020 Provincial Policy Statement

b. Applications received after the day before the new Official Plan is adopted (October 2021), will be reviewed and evaluated on the basis of the policies of the new Official Plan, which is consistent with the 2020 Provincial Policy Statement

Please contact Planner Colette Gorni at Colette.Gorni@ottawa.ca if you have any questions or require additional information relating to the comments above.

Committee of Adjustment

1. The Committee of Adjustment is authorized to grant a minor variance if all of the following criteria identified in Section 45(1) of the Planning Act, commonly referred to as the 'four tests', are met:

    1. The variance is minor;
    2. The variance is desirable for the appropriate development or use of the property;
    3. The general intent and purpose of the Zoning By-law is maintained;
    4. The general intent and purpose of the Official Plan is maintained.

    A requirement of a minor variance application is a detailed cover letter and/or report explaining the nature of the application and addressing the four tests of the Planning Act. In your rationale, in addition to the first two tests you should also explain how you are meeting the general intent and purpose of the Zoning by-law as well as Section 2.5.1 and 4.11 of the Official Plan. Section 2.5.1 Designing Ottawa provides the overall direction for assessing neighbourhood compatibility. Section 4.11 - Urban Design and Compatibility identifies general criteria for the evaluation of a specific development relative to policies of Section 2.5.1

2. Please note that Minor Variance applications are handled by the Committee of Adjustment. The Planning Department provides comments on Committee of Adjustment applications; however, the Committee of Adjustment makes the decision. For more information on the Committee of Adjustment, including application forms and fees, please visit: https://ottawa.ca/en/city-hall/planning-and-development/committee-adjustment. For questions pertaining to forms and fees, please contact the Committee of Adjustment directly at CofA@ottawa.ca or at (613)-580-2436.

3. Please note that the Committee of Adjustment process typically takes approximately 12 to 14 weeks from application submission to the end of the appeal period. My understanding is that once your application has been deemed complete it takes four to six weeks before the application is heard at a Committee meeting. The Committee meeting is the official public meeting; however, the Committee strongly recommends applicants consult with the public beforehand. As of June 3, 2020, meetings have been taking place via Zoom.

4. You are encouraged to consult with a Committee of Adjustment Planner before submitting an application to the Committee of Adjustment. Please refer to below contact information.

Please contact Committee of Adjustment Planner Lucy Ramirez at Lucy.Ramirez@ottawa.ca if you have any questions or require additional information relating to a Minor Variance application.

Urban Design

This proposal does not run along one of the City's Design Priority Areas and need not attend the City's UDRP. We appreciate the material provided for the pre-consult and have the following comments/questions regarding the design:

1. Main entrance that faces the public right of way, should employ architectural features that clearly indicate this to the public which is distinguishable from the private entrances.

2. We are supportive of the grade related units with access from the street.

3. **GM zone**: What is the planned context and future of the surrounding properties?

    a. Is the decision not to provide a reduced mass in the SW corner of the lot warranted and supportable?

4. **Rear yard separation**: Is 0m provided a reasonable decision for two storeys? We may have concerns if this results in a large blank wall condition.

    a. Is the location of exterior amenity on the 0m lot line set-back appropriate and sufficiently protected?

5. What is the nature of surrounding commercial? Would more bike parking be appropriate?

6. Is the Corner side yard set-back properly calculated?

    a. Would additional set-back fit better with surrounding development today and future? An illustration of the building alignment with neighbouring properties along Northside Road would help support these decisions;

7. **Facade**: We recommend that the street facing elevations employ quality materials and designed to improve the streetscape;

8. A scoped Design Brief is a required submittal for all Site Plan/Re-zoning applications and can be combined with the Planning Rationale. Please see the Design Brief Terms of Reference provided.

Please contact Urban Design Planner Christopher Moise at Christopher.Moise@ottawa.ca if you have any questions or require additional information relating to the comments above.

Engineering

Water:

1. District Plan No. 2W2C
2. Frontage charges are not applicable to the proposed development.
3. Connection point: 203mm PVC watermain on Thorncliff Place or 203mm CI watermain on Northside Road.
4. Connection to the watermain on Northside Road would be challenging in terms of road cut and traffic management as Northside is a collector Road.

5. Submission documents must include:
    a. Boundary conditions (civil consultant to request boundary conditions from the City's assigned Project Manager, Development Review). Water boundary conditions request must include the location of the service and the expected loads required by the proposed development. Please provide all the following information:
        i. Location of service (show on a plan or map)
        ii. Type of development and the amount of fire flow required (as per FUS, 1999).
        iii. Average daily demand: ___ l/s.
        iv. Maximum daily demand: ___l/s.
        v. Maximum hourly daily demand: ___ l/s.
        vi. Supporting Calculations of the required fire flow and all domestic demands listed above

b. Watermain system analysis demonstrating adequate pressure per section 4.2.2 of the Water Distribution Guidelines.

c. Fire protection (Fire demand, Hydrant Locations)

d. Proposed emergency route (to be satisfactory to Fire Services) to be on municipal street

6. A water meter sizing questionnaire [water card] will have to be completed prior to receiving a water permit (water card will be provided post approval)

Sanitary:

7. Connection Point: 200mm sanitary main on Thorncliffe Place or 375mm concrete main on Northside Road

8. Connection to the sanitary main on Northside Road would be challenging in terms of road cut and traffic management as Northside is a collector Road.

9. A monitoring manhole will be required on private property.

Storm:

10. Connection Point: 375mm storm sewer on Thorncliffe Place or 900mm concrete sewer on Northside Road.

11. Connection to the sanitary main on Northside Road would be challenging in terms of road cut and traffic management as Northside is a collector Road

Stormwater Management:

12. Quality Control: Rideau Valley Conservation Authority to provide criteria.
13. Quantity Control:
    a. Design storm for receiving sewer: 5-year design storm
    b. Runoff coefficient (C): C=0.5 or C=pre-development, whichever is less
    c. Time of concentration (Tc): To be calculated, min Tc=10mins
    d. Allowable flow rate: Control the 100-year event to the 5-year event

Additional Notes

14. Please ensure that all existing and proposed utilities (municipal pipes) must be shown on the servicing plans.
15. No Capital Works Projects that would impact the application has been identified.
16. No moratorium that would impact the application has been identified.

17. Any easement identified should be shown on all plans.
18. For any proposed exterior light fixtures, please provide certification from a licensed professional engineer confirming lighting has been designed only using fixtures that meet the criteria for full cut-off classification as recognized by the Illuminating Engineering Society of North America and result in minimal light spillage onto adjacent properties (maximum allowable spillage is 0.5 fc). Additionally, include in the submission the location of the fixtures, fixture type (make, model, part number and mounting height).
19. For information on preparing required studies and plans refer to: http://ottawa.ca/en/development-application-review-process-0/guide-preparing-studies-and-plans
20. Servicing and site works shall be in accordance with the following documents:
    a. Ottawa Sewer Design Guidelines (October 2012)
    b. Ottawa Design Guidelines – Water Distribution (2010)
    c. Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007)
    d. City of Ottawa Slope Stability Guidelines for Development Applications (revised 2012)
    e. City of Ottawa Environmental Noise Control Guidelines (January, 2016)
    f. City of Ottawa Park and Pathway Development Manual (2012)
    g. City of Ottawa Accessibility Design Standards (2012)
    h. Ottawa Standard Tender Documents (latest version)
21. 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).

Please contact Infrastructure Project Manager Abi Dieme at Abibatou.Dieme@ottawa.ca if you have any questions or require additional information relating to the comments above.

RVCA

1. The RVCA has no concerns. Based on the overall design and site plan, the RVCA will not have any water quality requirements, however encourage best management practices where possible

Please contact the RVCA's Planner, Eric Lalande, at Eric.Lalande@rvca.ca if you have any questions or require additional information relating to the comments above.

Environmental Planning

1. No comments.

Please contact Environmental Planner Sami Rehman at Sami.Rehman@ottawa.ca if you have any questions or require additional information relating to the comments above.

Transportation

1. A TIA is warranted, please proceed to scoping.
    a. The application will not be deemed complete until the submission of the draft step 2-4. Although a full review of the TIA Strategy report (Step 4) is not required prior to an application, it is strongly recommended.
    b. Synchro files are required at Step 4. **Due to the low number of units, steps 3 and 4 may be combined.**
2. No ROW protection.
3. A Road Noise Impact Study is required
4. Access should be as far away from the intersection as possible/feasible. Clear throat requirements as per TAC guidelines for a collector road.

Please contact Transportation Project Manager Mike Giampa at Mike.Giampa@ottawa.ca if you have any questions or require additional information relating to the comments above.

Forestry

1. A Tree Conservation Report (TCR) is required if there any trees greater than 10cm in diameter located on the site. There appears to possibly be a tree in the southeast corner of the site – please confirm. If so, please refer the below requirements.

TCR Requirements

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 combined with eh LP provided all information is supplied
2. 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.
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, as well as off-site trees if the CRZ extends into the developed area, by species, diameter and health condition

5. Please identify trees by ownership – private onsite, private on adjoining site, city owned, co-owned (trees on a property line)

6. The TCR must list all trees on adjacent sites if they have a critical root zone that extends onto the development site

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.

For more information on the process or help with tree retention options, contact Mark Richardson mark.richardson@ottawa.ca or on City of Ottawa.

Next Steps

Please refer to the links to Guide to preparing studies and plans and fees for further 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 do not hesitate to Colette Gorni, at Colette.Gorni@ottawa.ca, if you have any questions.

Subject: RE: Request for Boundary Conditions - 42 Northside Road - PC2021-0295
From: "Dieme, Abi" <Abibatou.Dieme@ottawa.ca>
Date: 30/11/2021, 9:19 a.m.
To: Steve deWit <steve@kollaard.ca>
CC: Akash Sinha <Akash.Sinha@rohitgroup.com>

Hi Steve,

The following are boundary conditions, HGL, for hydraulic analysis at 42 Northside Road (zone 2W2C) assumed to be connected to the 203 mm watermain on Thorncliff Place (see attached PDF for location).

Minimum HGL: 126.8 m

Maximum HGL: 132.7 m

Available fire flow at 20 psi: 240 L/s, assuming a ground elevation of 87.6 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.

Regards,
Abi

From: Steve deWit <steve@kollaard.ca>
Sent: November 10, 2021 10:34 AM
To: Dieme, Abi <Abibatou.Dieme@ottawa.ca>
Cc: Akash Sinha <Akash.Sinha@rohitgroup.com>
Subject: Request for Boundary Conditions - 42 Northside Road - PC2021-0295

Good Morning Abi

I am the civil Engineer retained by Rohit Group to complete the civil engineering design work for the proposed residential development at 42 Northside road.

Please see attached PDF document of our request for Boundary Conditions for this project

Thank you

--

Steven deWit, P.Eng.
Kollaard Associates Inc
210 Prescott Street, Unit 1
P.O. Box 189
Kemptville, Ontario
K0G 1J0 CANADA
t: 613.860.0923 f: 613.258.0475
c: 613.223.4049
www.kollaard.ca

Attachments:

42 Northside Road November 2021.pdf 637 KB

Appendix B – Excerpts from the NFPA standards

- Sprinkler Flow Demand

NFPA 13

5.1 General.

5.1.1 Number of Supplies. Every automatic sprinkler system shall have at least one automatic water supply.

5.1.2 Capacity. Water supplies shall be capable of providing the required flow and pressure for the remote design area determined using the requirements and procedures as specified in Chapters 19 through 26 including hose stream allowance where applicable for the required duration.

19.2.3 Water Demand Requirements — Hydraulic Calculation Methods.

19.2.3.1 General.

19.2.3.1.1 The water demand for sprinklers shall be determined only from one of the following, at the discretion of the designer:

(1) For new systems, the density/area selected from Table 19.2.3.1.1 in accordance with the density/area method of 19.2.3.2
(2) For the evaluation or modification of existing systems, the density/area curves of Figure 19.2.3.1.1 in accordance with the density/area method of 19.2.3.2
(3) The room that creates the greatest demand in accordance with the room design method of 19.2.3.3
(4) Special design areas in accordance with 19.2.3.4

Table 19.2.3.1.1 Density/Area

Hazard	Density/Area [gpm/ft²/ft² (mm/min/m²)]
Light	0.1/1500 or 0.07/3000* (4.1/140 or 2.9/280)
Ordinary Group 1	0.15/1500 or 0.12/3000* (6.1/140 or 4.9/280)
Ordinary Group 2	0.2/1500 or 0.17/3000* (8.1/140 or 6.9/280)
Extra Group 1	0.3/2500 or 0.28/3000* (12.2/230 or 11.4/280)
Extra Group 2	0.4/2500 or 0.38/3000* (16.3/230 or 15.5/280)

*When required by 19.2.3.1.5.

19.2.4 Water Demand.

19.2.4.1* The water demand requirements shall be determined from the following:

(1) Occupancy hazard fire control approach and special design approaches of Chapter 19
(2) Storage design approaches of Chapter 20 through Chapter 25
(3) Special occupancy approaches of Chapter 26

19.2.4.2* The minimum water demand requirements for a sprinkler system shall be determined by adding the hose stream allowance to the water demand for sprinklers.

19.2.5 Water Supplies.

19.2.5.1 The minimum water supply shall be available for the minimum duration specified in Chapter 19.

19.2.6.2* Water allowance for outside hose shall be added to the sprinkler requirement at the connection to the city main or a private fire hydrant, whichever is closer to the system riser.

19.3.3 Water Demand Requirements — Hydraulic Calculation Methods.

19.3.3.1 General.

19.3.3.1.1 The water demand for sprinklers shall be determined only from one of the following, at the discretion of the designer:

(1) Density/area curves of Figure 19.3.3.1.1 in accordance with the density/area method of 19.3.3.2
(2) The room that creates the greatest demand in accordance with the room design method of 19.3.3.3
(3) Special design areas in accordance with 19.3.3.4

19.3.3.1.2 The minimum water supply shall be available for the minimum duration specified in Table 19.3.3.1.2.

19.3.3.1.3 The lower duration values in Table 19.3.3.1.2 shall be permitted where the sprinkler system waterflow alarm device(s) and supervisory device(s) are electrically supervised and such supervision is monitored at an approved, constantly attended location.

Table 19.3.3.1.2 Hose Stream Allowance and Water Supply Duration Requirements for Hydraulically Calculated Systems

Occupancy	Inside Hose		Total Combined Inside and Outside Hose		Duration (minutes)
	gpm	L/min	gpm	L/min	
Light hazard	0, 50, or 100	0, 190, or 380	100	380	30
Ordinary hazard	0, 50, or 100	0, 190, or 380	250	950	60–90
Extra hazard	0, 50, or 100	0, 190, or 380	500	1900	90–120

A.19.3.3.1.5.2(10) The gypsum board (or equivalent material) used as the firestopping will compartment the concealed space and restrict the ability for fire to spread beyond 160 ft^3 (4.5 m^3) zones covering multiple joist channels.

NFPA 1

6.1.8.1.5 Definition — Apartment Building. A building or portion thereof containing three or more dwelling units with independent cooking and bathroom facilities. [***101:***6.1.8.1.5]

13.5 Water Supply.

13.5.1 Private fire service mains shall be installed in accordance with NFPA 13 and NFPA 24.

18.3 Water Supplies.

18.3.1* An approved water supply capable of supplying the required fire flow for fire protection shall be provided to all premises upon which facilities, buildings, or portions of buildings are hereafter constructed or moved into the jurisdiction.

The approved water supply shall be in accordance with Section 18.4.

18.3.1.1* Where no adequate or reliable water distribution system exists, approved reservoirs, pressure tanks, elevated tanks, fire department tanker shuttles, or other approved systems capable of providing the required fire flow shall be permitted.

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.

18.4.3 Modifications.

18.4.3.1 Decreases in Fire Flow Requirements.

18.4.3.1.1* Fire flow requirements shall be permitted to be decreased by the AHJ for isolated buildings or a group of buildings in rural areas or suburban areas where the development of full fire flow requirements is impractical as determined by the AHJ.

18.4.3.1.2 The AHJ shall be authorized to establish conditions on fire flow reductions approved in accordance with 18.4.3.1.1 including, but not limited to, fire sprinkler protection, type of construction of the building, occupancy, development density, building size, and setbacks.

18.4.3.2 Increases in Fire Flow Requirements. The minimum required fire flow shall be permitted to be increased by the AHJ where conditions indicate an unusual susceptibility to group fires or conflagrations. An upward modification shall not be more than twice that required for the building under consideration.

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.

18.4.4.2 Type I (443), Type I (332), and Type II (222) Construction. The fire flow area of a building constructed of Type I (443), Type I (332), and Type II (222) construction shall be the area of the three largest successive floors.

18.4.5 Fire Flow Requirements for Buildings.

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.

18.4.5.3.5 Required fire flow for open parking structures that are not protected throughout by an approved automatic sprinkler system shall be reduced by 75 percent where all of the following conditions are met:

(1) The structure complies with the building code.
(2) The structure is of Type I or Type II construction.
(3) The structure is provided with a Class I standpipe system in accordance with NFPA 14. Class I standpipe systems of the manual dry type shall be permitted.
(4) The resulting fire flow is not less than 1000 gpm (3785 L/min).

18.4.5.4* Required Fire Flow and Automatic Sprinkler System Demand. For a building with an approved fire sprinkler system, the fire flow demand and the fire sprinkler system demand shall not be required to be added together. The water supply shall be capable of delivering the larger of the individual demands.

Table 18.4.5.2.1 Minimum Required Fire Flow and Flow Duration for Buildings

Fire Flow Area ft² (× 0.0929 for m²)					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	
		179,401–191,400	129,601–138,300	79,801–85,100	7750	
		Greater than 191,400	Greater than 138,300	Greater than 85,100	8000	

*Types of construction are based on NFPA 220.
†Measured at 20 psi (139.9 kPa).

NFPA 220

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]

NFPA 220

4.4 Type III (211 or 200) Construction.

4.4.1 Type III Construction. Type III (211 or 200) construction shall be that type in which exterior walls and structural elements that are portions of exterior walls are of approved noncombustible or limited-combustible materials, and in which fire walls, interior structural elements, walls, arches, floors, and roofs are entirely or partially of wood of smaller dimensions than required for Type IV construction or are of approved noncombustible, limited-combustible, or other approved combustible materials. [**5000:**7.2.4.1]

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]