

PROPOSED SIX (6) STOREY RESIDENTIAL APARTMENT

BUILDING LOT DEVELOPMENT SITE

71 RUSSELL AVENUE

LOT 14

EAST SIDE OF RUSSELL AVENUE

R-PLAN 58319

CITY OF OTTAWA

SERVICEABILITY REPORT

REPORT No. R-825-96A

T.L. MAK ENGINEERING CONSULTANTS LTD.

JANUARY 2026

REFERENCE FILE NUMBER 825-96

Introduction

The developer of this property is proposing to redevelop the existing residential lot described as Lot 14 East Side of Russell Avenue Registered Plan 58319 in the City of Ottawa by constructing a six (6) storey residential apartment building comprising of twenty-eight (28)-units, including twelve (2-bedroom) units, fourteen (1-bedroom) units and two (2) bachelor units.

The municipal address of this property is referenced as 71 Russell Avenue and it is located in the City Ward (12 – Rideau-Vanier). The site is situated on the east side of Russell Avenue, south of Osgoode Street and north of Somerset Street East, see site plan in Appendix A and legal survey plan in Appendix B for details.

The area of this property is ±0.0757 hectares. In addition to the six (6) storey residential building, the other development features will comprise of concrete walkway access to the front of the building and along the north and south side of the building, including soft landscaping at the rear yard and amenity area at the rear of the property, etc., to meet the City of Ottawa’s site plan requirements.

A site geotechnical report was prepared by the owner’s soils engineer Paterson Group entitled “Geotechnical Investigation – Proposed Multi-Storey Building” 71 Russell Avenue (Project No. PG7696-1) dated September 16, 2025 for this proposed development property.

This serviceability report will provide the City of Ottawa with our serviceability brief to address the proposed servicing scheme for this site.

Existing Site Conditions and Servicing

This property in 2018 was occupied by a two and one half (2 ½) storey brick sided residential building. The existing house is located near at the north front half on this property facing Russell Avenue with an existing asphalt driveway abutting and located south of the existing house which provided vehicle access and parking for this lot. For additional details of the site’s pre-development conditions, refer to the coloured Google Image (2019 and 2024) and aerial photography from (GeoOttawa 2022) in Appendix B.

Approximately 74.0% of this site is currently permeable surface covered and consisting of grass/landscaped areas with the remaining areas being roof areas, asphalt driveway, porches and frame decks. Most of the landscape areas are concentrated at the rear of lot and along the south portion of the lot.

The topography of the land is found to be graded primarily to drain from front to the rear of the lot (west to east). The existing gradient of the property is sloping approximately 19.6% from front to back.

The existing house water service and sanitary service lateral currently servicing the existing dwelling on 71 Russell Avenue will be removed. The existing water services shall be blanked at the main and the existing house laterals shall be capped at the front property line for re-development of this lot.

As for the availability of underground municipal services, there are existing municipal services along Russell Avenue in front of this property consisting of a 300mm diameter combined sewer and a 200mm diameter PVC watermain for development of this property. Refer to the City of Ottawa Russell Avenue UCC drawing and As-Built plan and profile drawing included in Appendix C for details.

Because the site will be connecting to and outletting into the existing combined sewer located within the Russell Avenue road right of way in the City of Ottawa, therefore, an approval for exemption under Ontario Regulations was applied to MECP since on-site storm water management (SWM) water discharge from this site will outlet flow into a combined sewer.

Proposed Residential Apartment Building Site

Vehicle laneway and parking spaces for the building are not required for this property. Concrete pavers are proposed along the front, north and south side of the new building for pedestrian access to the various building entries.

A. Water Supply

The proposed building is located within Pressure Zone 1W at 71 Russell Avenue, and is a 6-storey apartment building (4-stories above grade, 2-stories partially below grade). The apartment building contains 28 units consisting of twelve (12) 2-bedroom units, fourteen (14) 1-bedroom units, and two (2) bachelor units. Each floor covers an average gross floor area of approximately 447.7 m² based on the submitted building plans. The building is to be serviced by a 200 mm diameter watermain along Russell Avenue. The proposed average grade at 71 Russell Avenue is approximately 62.4 m.

Demand Projections

The domestic demands were calculated using the City of Ottawa's Water Design Guidelines, where the residential consumption rate of 280 L/cap/d was used to estimate average day demands (AVDY). Persons per unit (PPU) for each unit were estimated based on the City of Ottawa's Water Design Guidelines.

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factor of 8.8. Peak hour (PKHR) demands were calculated by multiplying AVDY by a factor of 13.3. Persons per unit (PPU) for each unit were estimated based on the City of Ottawa’s Water Design Guidelines. **Table 1** shows the estimated domestic demands of the proposed building.

Table 1: Estimated Domestic Demands

Unit Type	Unit Count	PPU	Population	Consumption	AVDY		MXDY		PKHR	
					L/d	L/s	L/d	L/s	L/d	L/s
Apartment, Bachelor / Studio	2	1.4	3	280	784	0.01	6,919	0.08	10,418	0.12
Apartment, 1-Bedroom	14	1.4	20	280	5,488	0.06	48,433	0.56	72,925	0.84
Apartment, 2-Bedroom	12	2.1	25	280	7,056	0.08	62,272	0.72	93,760	1.09
Total	28				13,328	0.15	117,624	1.36	177,102	2.05

As per the City of Ottawa’s Water Design Guidelines (and Technical Bulletin IWSTB-2024-05), the Fire Underwriter Survey (FUS) method is to be used for fire flow requirements affecting municipal watermain sizing; with regards to fire protection on private property and not requiring new watermains, these are covered by the Ontario Building Code (OBC), using the OBC’s Office of the Fire Marshal (OFM) method. If the required flow using the OBC/OFM method yields 9,000 L/min for the property, Technical Bulletin IWSTB-2024-05 specifies the Fire Underwriters Survey (FUS) method to be used instead.

It is understood that the building will have a sprinkler system, assumed to be conform to NFPA 13 and fully supervised, and it is assumed that the building has fire separations and fire resistance ratings in accordance with the Ontario Building Code. The lower floor of the proposed building is more than 50% below ground. The resulting total required fire flow using the OFM method is 9,000 L/min. Therefore, the FUS method was used to identify the fire flow requirement, which resulted in a fire flow requirement of 15,000 L/min (250 L/s) for a duration of 3 hours.

Details are provided in the attached under **Fire Flow Calculations** found in Appendix D. Furthermore, **Figure 1** in Appendix D provides separation distances for the FUS calculations. The proposed **Site Plan** attached in Appendix D was used to determine distances from the proposed building to the property lines.

In summary, the estimated water demands for the proposed building are as follows:

- AVDY = 13,328 L/d (0.15 L/s)
- MXDY = 117,624 L/d (1.36 L/s);
- PKHR = 177,102 L/d (2.05 L/s); and,
- Fire Flow = 15,000 L/min (250 L/s)

Boundary Conditions

The hydraulic gradeline (HGL) boundary conditions for 71 Russell Avenue, as presented in **Table 2**, were provided by the City on December 1, 2025 (see attached **Water Boundary Conditions Email** in Appendix D).

Table 2: Boundary Conditions

Demand Scenario	Head (m)
Minimum HGL (Peak Hour)	106.5
Maximum HGL (Average Day)	115.0
Maximum Day + Fire Flow (250 L/s)	102.0

Hydraulic Analysis

Peak Hour & Average Day

During peak hour demands, the resulting minimum hydraulic gradeline of 106.5 m corresponds to a peak hour pressure of 432 kPa (63 psi). This value is above the minimum pressure objective of 276 kPa (40 psi) for residential buildings up to two storeys. Adding 5 psi¹ per floor above two stories, to account for headloss due to elevation and pipe losses, a minimum pressure of 345 kPa (50 psi) would be required for the fourth floor. The peak hour pressure at ground level is above this objective.

During average day demands, the resulting maximum hydraulic gradeline of 115.0 m corresponds to a maximum pressure of 515 kPa (75 psi). This value is below the maximum pressure objective of 552 kPa (80 psi) and therefore considered acceptable.

Supporting hydraulic calculations are attached in Appendix D.

Maximum Day + Fire Flow

A maximum day plus fire flow (15,000 L/min) hydraulic gradeline of 102.0 m corresponds to a residual pressure of 388 kPa (56 psi) at this location, which is above the minimal residual pressure requirement of 140 kPa (20 psi).

Based on Table 1 of Appendix I of the City of Ottawa Technical Bulletin ISTB-2018-02 and a desktop review (i.e., Google Street View) to confirm hydrant class, three (3) hydrants are located in the vicinity of the proposed building. Two (2) hydrants are Class AA hydrants are within 75 m, both with a capacity contribution of up to 5,700 L/min. Four (4) other Class AA hydrants are within 150 m

¹ It is noted that the design of the building's plumbing system could have an impact on the anticipated pressures on the higher floors.

from the site, with a capacity contribution of up to 3,800 L/min. The combined hydrant flow coverage for 71 Russell Avenue is therefore 26,600 L/min, which is above the FUS required fire flow of 15,000 L/min.

The hydrant coverage is illustrated in **Figure 2** attached in Appendix D. A breakdown of the hydrant coverage is summarized in **Table 3**.

Table 3: Fire Hydrant Coverage

Building	Fire Flow Demand (L/min)	Fire Hydrants				Combined Hydrant Flow Coverage (L/min)	
		Hydrant Class	Within 75 m		Between 75 m and 150 m		
			Quantity	Max Contrib. to RFF	Quantity		Max Contrib. to RFF
71 Russell Avenue	15,000	AA	2	5,700	4	3,800	26,600
		A					
		B					
		C					

In conclusion, based on the boundary condition provided, the local watermain network along Russell Avenue provides adequate fire flow capacity, as per the Fire Underwriters Survey (FUS) method, to the proposed building at 71 Russell Avenue. Resulting pressures during anticipated demand flows meet the pressure objectives during average and peak demand conditions, as per the City of Ottawa’s Drinking Water Design Guidelines.

B. Sanitary Flow

The peak sanitary flow for the 28 units, which comprise of twelve (2-bedroom), fourteen (1-bedroom) units and two bachelor units, is estimated at $Q = 0.59$ L/s with an infiltration rate of 0.03 L/s. Refer to Appendix E sheet 1 of 1 regarding sanitary flow calculations. This flow will enter the existing 300mm diameter combined sewer on Russell Avenue via the proposed 150 mm diameter PVC sanitary service lateral from the six (6)-storey residential apartment building.

The existing peak sanitary flow of the site from the single detached dwelling unit is $Q = 0.07$ L/s with an infiltration rate of 0.03 L/s. The net increase in flow from this proposed development is 0.52 L/s which is not expected to negatively impact the existing 300mm dia. combined sewer.

Waste water from the Russell Avenue 300mm dia. combined sewer then in turn outlets south into the existing 450mm dia. combined sewer at Russell Avenue then further north and into the existing downstream 1800mm dia. brick combined collector sewer located along the Somerset Street East road right-of-way corridor which further direct sewage flow northeast ward.

C. Storm Flow

The storm-water outlet for the proposed development property will be the existing 300mm diameter combined sewer located within the Russell Avenue road right-of-way. Stormwater attenuation on site will be accomplished by means of rooftop storage with controlled roof drains that regulate flow off site.

The building foundation weeping-tile drainage system shall have its own separate pipe for gravity flow where weeping-tile water is outletted via a 150mm diameter storm pipe to the existing 300mm diameter combined sewer. The storm-water outlet for the rooftop water from roof drains will be a separately designated proposed 150mm diameter PVC pipe that will also be outletted directly into the existing 300mm diameter combined sewer. The 150mm dia. roof water drain pipe will “wye” into the 150mm dia. weeping tile storm lateral on private property and outlet to the existing Russell Avenue combined sewer.

Four (4) roof drains are proposed for this apartment building to restrict flow at a rate of 0.95 L/s each or $4 \times 0.95 \text{ L/s} = 3.80 \text{ L/s}$ into the Russell Avenue combined sewer. The maximum allowable flow rate off-site is estimated at 6.17 L/s based on the 2-Year pre-development allowable flow conditions.

Based on the residential site plan from the owner’s architect, the average post-development runoff coefficient is estimated at $C = 0.75$ and $A = 0.0757$ hectares.

An estimation of the pre-development flow condition was carried out using the criteria accepted by the City of Ottawa. If post-development C value exceeds the lesser of the $C_{pre} = 0.38$ or $C_{allow} = 0.4$ (max) then SWM is required. So from our calculations, the $C_{pre} = 0.38$ value will be used at $t_c = 10$ minutes for pre-development allowable flow calculation off-site.

The pre-development calculated flow rate into the 300mm dia. combined sewer for this residential area is the lesser of either the two (2)-year storm event where $C_{pre} = 0.4$ (max.) runoff value or the average C_{pre} value which is 0.38 using $t_c = 10$ minutes. Because for this site $C_{post} = 0.75$ is greater than $C_{pre} = 0.38$ then SWM measures are required.

Therefore, based on our calculation, on-site retention is required for this proposed development site, because the site post-development C value of 0.75 is greater than the $C_{pre} = 0.38$.

The storage volume for the five (5)-year and up to the 100-year storm event will be stored by means of flat rooftop at the top of the 6-storey apartment building. Also refer to the site Stormwater Management Report (Report No. R-825-96) for further details.

Conclusion

At this proposed residential site and to develop this lot to house a 28 unit apartment building on a 0.0757 ha. parcel of land, the estimated allowable flow off-site is calculated at 6.17 L/s based on City of Ottawa Drainage and Stormwater Management (SWM) criteria of 2-Year pre-development flow at $C_{pre} = 0.38$. For on-site SWM attenuation, the flat roof top of the proposed apartment building will be utilized and (4) controlled roof drains are incorporated each with a controlled maximum release rate of 0.95 L/s (15.0 U.S. gal/min.) under a maximum head of 150 mm. The controlled flow from this site at the 5-Year event totals to 3.16 L/s and 3.80 L/s for the 100-Year event for the post development condition. The uncontrolled 5-Year post development flow from the remainder of the site is estimated at 4.78 L/s and 9.42 L/s for the 100-year event respectively.

During the five (5)-year storm event for the flat rooftop storage, the ponding depth of rooftop area 1, 2, 3 and 4 is estimated at 100 mm at the drain and 0mm at the roof perimeter, assuming a 1.7% minimum roof pitch to the drain. The rooftop storage available at Roof Area 1 is 1.49 m³, at Roof Area 2 is 2.01 m³, at Roof Area 3 is 1.17 m³ and the rooftop storage available at Roof Area 4 is 1.70 m³, for a total of 6.37 m³, which is greater than the required volume of 5.68 m³.

During the 100-year storm event for the flat rooftop storage, the ponding depth of Roof Area 1, 2, 3 and 4 is estimated at 150 mm at the drain and 0mm at the roof perimeter, assuming a 1.7% minimum roof pitch to the drain. The rooftop storage available at Roof Area 1 is 4.55 m³, at Roof Area 2 is 6.59 m³, at Roof Area 3 is 4.15 m³ and the rooftop storage available at Roof Area 4 is 5.31 m³, for a total of 20.60 m³, which is greater than the required volume of 13.82 m³.

Therefore, by means of flat building rooftop storage and grading the site to the proposed grades as shown on the Proposed Grading and Servicing Plan and Proposed Rooftop Stormwater Management Plan Dwg. 825-96 G-1 and 825-96 SWM-1 respectively, the desirable five (5)-Year storm and 100-Year storm event detention volume of 6.37 m³ and 20.60 m³ respectively will be available on site. Refer to Appendix D for detailed calculations of available storage volumes.

Thus for this development site, the 5-Year maximum post development flow draining off-site is the controlled roof top flow plus the uncontrolled flow from the remainder of the site totals to 7.94 L/s (4.78 L/s + 3.16 L/s) which is slightly 1.77 L/s above the allowable 6.17 L/s. For storm events up to and including 100-Year, the estimated maximum post development flow draining off-site is 13.22 L/s (9.42 L/s + 3.80 L/s) which exceeds the site allowable of 6.17 L/s by 7.05 L/s for this site.

However, in comparing the pre-development flow of the current site conditions to the post development flow, the SWM regulated flow plus uncontrolled flow from the proposed site under the post development conditions at the 5-Year event = 7.94 L/s and the 100 year event = 13.22 L/s where both of the post development flow events are less than the current pre-development flow estimate for the site at 5-Year $p_{re} = 8.33$ L/s and 100-Year $p_{re} = 16.91$ L/s. Therefore with this

proposed development, stormwater flow is improved from that of the existing condition for the 5-Year event and at the 100-Year event under the proposed post-development conditions.

The building weeping tile drainage will outlet via its separate 150mm diameter PVC storm lateral. The roof drains will be outletted also via a separate 150mm PVC storm lateral from the apartment building which "wye" into the proposed 150mm dia. weeping tile storm lateral, whereupon both laterals are outletting to the existing Russell Avenue 300 mm diameter combined sewer with only one (1) storm lateral connection. The City of Ottawa recommends that pressurized drain pipe material be used in the building for the roof drain leader pipe in the event of surcharging on the City's combined sewer system. Refer to the proposed site grading and servicing plan Dwg. 825-96 G-1 for details.

Erosion and Sediment Control

The contractor shall implement Best Management Practices to provide for protection of the receiving storm sewer during construction activities. These practices are required to ensure no sediment and/or associated pollutants are released to the receiving watercourse. These practices include installation of a "siltsack" catch basin sediment control device or equal in catch basins as recommended by manufacturer on-site and off-site within the Russell Avenue road right-of-way adjacent to this property. Siltsack shall be inspected every 2 to 3 weeks and after every major storm. The deposits will be disposed of as per the requirements of the contract. See Dwg. No. 825-96 ESC-1 for details.

Refer to Appendix F for the summary of the Development Servicing Study Checklist that is applicable to this development.

PREPARED BY T.L. MAK ENGINEERING CONSULTANTS LTD.



TONY L. MAK, P.ENG



PROPOSED SIX (6) STOREY RESIDENTIAL APARTMENT

BUILDING LOT DEVELOPMENT SITE

71 RUSSELL AVENUE

LOT 14

EAST SIDE OF RUSSELL AVENUE

R-PLAN 58319

CITY OF OTTAWA

APPENDIX A

SITE PLAN

BY

LAWRENCE ARCHITECTS

PROPOSED SIX (6) STOREY RESIDENTIAL APARTMENT

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71 RUSSELL AVENUE

LOT 14

EAST SIDE OF RUSSELL AVENUE

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APPENDIX B

SITE PRE-DEVELOPMENT CONDITION

**GOOGLE IMAGE 2019 & 2024, AERIAL PHOTOGRAPHY 2022
(GEOOTTAWA),**

TOPOGRAPHICAL SURVEY PLAN (DATED JANUARY 18, 2019)

[BY FARLEY SMITH AND DENIS SURVEYING LTD.]

AND

TOPOGRAPHICAL SURVEY PLAN (DATED SEPTEMBER 11, 2025)

[BY FARLEY SMITH AND DENIS SURVEYING LTD.]









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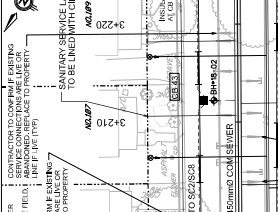
APPENDIX C

RUSSELL AVENUE

CITY OF OTTAWA

PLAN AND PROFILE

DRAWINGS



NOTE: The drawings are for informational purposes only. The contractor is responsible for verifying the accuracy of the information provided in the drawings and for obtaining all necessary permits and approvals. The contractor is also responsible for obtaining all necessary permits and approvals for the construction of the project.

No.	Description	By	Date
1	ISSUED FOR EXISTING TREATMENT PLANT CIRCULATION	CB	17/02/18
2	ISSUED FOR EXISTING TREATMENT PLANT CIRCULATION	CB	03/02/19
3	ISSUED FOR EXISTING TREATMENT PLANT CIRCULATION	CB	03/02/19
4	ISSUED FOR EXISTING TREATMENT PLANT CIRCULATION	CB	10/02/19
5	ISSUED FOR EXISTING TREATMENT PLANT CIRCULATION	CB	06/05/19
6	ISSUED FOR EXISTING TREATMENT PLANT CIRCULATION	CB	16/05/20
7	ISSUED WITH AS-BUILT DRAWINGS	CB	23/05/22

NOTE:
1. WATER SERVICE INSTALLATION AT SEWER
CONNECTION SHALL BE INSTALLED AT
CROSSING UNDER SEWER (MIN 1M)
COVER CANNOT BE ACHIEVED

NO.	STRUCTURE TYPE / SIZE
COM 213	CRSD 70 x 810 - 1200mm Ø COM DROP PIPE (CRSD 100x110)

1. MAINTENANCE HOLES TO BE BENCHMARKED PER OSD 70424.
2. MAINTENANCE HOLES TO BE 500mm DIA UNLESS SHOWN OTHERWISE.
3. MAINTENANCE HOLES TO HAVE SELF-LEVELLING FRAMES AND COVERS.

NO.	STATION	DEPTH	COVER	STRUCTURE	INVERT	INVERT	NO.
1	CB 42	3+165.0	3.0	CRSD 70x200	164.50	164.50	NA
2	CB 43	3+175.0	3.0	CRSD 70x200	164.00	164.00	NA
3	CB 44	3+225.0	4.0	CRSD 70x200	161.00	161.00	NA
4	CB 45	3+225.0	4.0	CRSD 70x200	161.00	161.00	NA

1. OFFSET MEASURED FROM ROAD ALIGNMENT CONTROL TO FACE OF CURB.
2. GRATE ELEVATIONS ARE GROUND EDGE OF PAVEMENT.
3. ALL CATCH BASINS LEAD TO BE 300mm PVC DIA UNLESS SHOWN OTHERWISE FOR STANDARD CONCRETE CATCH BASINS (OSD 70410).
4. ALL CATCH BASINS TO INCLUDE 600mm SUMP.
5. LENGTH MEASURED FROM CENTRELINE OF STRUCTURE TO CENTRELINE OF SEWER.
6. INLET CONTROL DEPTH (ICD) V = 10% OF FRAME DEPTH UNLESS OTHERWISE REFER TO CONTRACT SPECIFICATIONS FOR DETAILS
7. ** SHALLOW CATCH BASIN

AS BUILT NOTE:
ALL NUMERICAL VALUES THAT ARE NOT STROKED OUT AND REPLACED IN ITALSICS ON AS BUILT DRAWINGS ARE CONSIDERED TO BE DESIGN VALUES ONLY AND NOT MEASURED IN THE FIELD

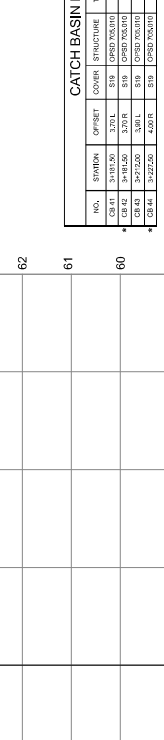
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STATION	TOP OF WATERMAIN	STORM INVERT	COMBINED INVERT
3+180	64.197	61.700	61.700
3+170	60.572	62.006	62.006
3+172.5	61.748	62.550	62.550
3+180.10	61.717	61.781	61.781
3+190	60.778	60.800	60.800
3+200	60.704	60.200	60.200
3+210	59.374	58.070	58.070
3+220	58.888	57.200	57.200
3+230	58.566	56.500	56.500

25.0m - 500mm Ø COM SEWER
PVC DR35 @ 3% SLOPE

25.0m - 450mm COM SEWER CONC. 10-0 @ 3% SLOPE

25.0m - 150mm DIA. SUBURBAN WATERMAIN
PVC DR35 @ 3% SLOPE



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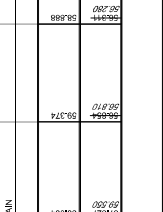
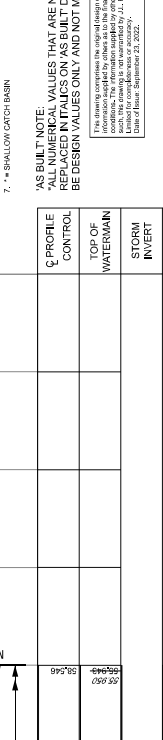
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3+180.10	61.717	61.781	61.781
3+190	60.778	60.800	60.800
3+200	60.704	60.200	60.200
3+210	59.374	58.070	58.070
3+220	58.888	57.200	57.200
3+230	58.566	56.500	56.500

25.0m - 500mm Ø COM SEWER
PVC DR35 @ 3% SLOPE

25.0m - 450mm COM SEWER CONC. 10-0 @ 3% SLOPE

25.0m - 150mm DIA. SUBURBAN WATERMAIN
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1. OFFSET MEASURED FROM ROAD ALIGNMENT CONTROL TO FACE OF CURB.
2. GRATE ELEVATIONS ARE GROUND EDGE OF PAVEMENT.
3. ALL CATCH BASINS LEAD TO BE 300mm PVC DIA UNLESS SHOWN OTHERWISE FOR STANDARD CONCRETE CATCH BASINS (OSD 70410).
4. ALL CATCH BASINS TO INCLUDE 600mm SUMP.
5. LENGTH MEASURED FROM CENTRELINE OF STRUCTURE TO CENTRELINE OF SEWER.
6. INLET CONTROL DEPTH (ICD) V = 10% OF FRAME DEPTH UNLESS OTHERWISE REFER TO CONTRACT SPECIFICATIONS FOR DETAILS
7. ** SHALLOW CATCH BASIN

AS BUILT NOTE:
ALL NUMERICAL VALUES THAT ARE NOT STROKED OUT AND REPLACED IN ITALSICS ON AS BUILT DRAWINGS ARE CONSIDERED TO BE DESIGN VALUES ONLY AND NOT MEASURED IN THE FIELD

This drawing represents the design of the project. It is not intended to be used for construction. The information is provided for informational purposes only. The contractor is responsible for obtaining all necessary permits and approvals for the construction of the project.

STATION	TOP OF WATERMAIN	STORM INVERT	COMBINED INVERT
3+180	64.197	61.700	61.700
3+170	60.572	62.006	62.006
3+172.5	61.748	62.550	62.550
3+180.10	61.717	61.781	61.781
3+190	60.778	60.800	60.800
3+200	60.704	60.200	60.200
3+210	59.374	58.070	58.070
3+220	58.888	57.200	57.200
3+230	58.566	56.500	56.500

25.0m - 500mm Ø COM SEWER
PVC DR35 @ 3% SLOPE

25.0m - 450mm COM SEWER CONC. 10-0 @ 3% SLOPE

25.0m - 150mm DIA. SUBURBAN WATERMAIN
PVC DR35 @ 3% SLOPE



NOTE:
1. WATER SERVICE INSTALLATION AT SEWER
CONNECTION SHALL BE INSTALLED AT
CROSSING UNDER SEWER (MIN 1M)
COVER CANNOT BE ACHIEVED

NO.	STRUCTURE TYPE / SIZE
COM 213	CRSD 70 x 810 - 1200mm Ø COM DROP PIPE (CRSD 100x110)

1. MAINTENANCE HOLES TO BE BENCHMARKED PER OSD 70424.
2. MAINTENANCE HOLES TO BE 500mm DIA UNLESS SHOWN OTHERWISE.
3. MAINTENANCE HOLES TO HAVE SELF-LEVELLING FRAMES AND COVERS.

NO.	STATION	DEPTH	COVER	STRUCTURE	INVERT	INVERT	NO.
1	CB 42	3+165.0	3.0	CRSD 70x200	164.50	164.50	NA
2	CB 43	3+175.0	3.0	CRSD 70x200	164.00	164.00	NA
3	CB 44	3+225.0	4.0	CRSD 70x200	161.00	161.00	NA
4	CB 45	3+225.0	4.0	CRSD 70x200	161.00	161.00	NA

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5. LENGTH MEASURED FROM CENTRELINE OF STRUCTURE TO CENTRELINE OF SEWER.
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7. ** SHALLOW CATCH BASIN

PROPOSED SIX (6) STOREY RESIDENTIAL APARTMENT

BUILDING LOT DEVELOPMENT SITE

71 RUSSELL AVENUE

LOT 14

EAST SIDE OF RUSSELL AVENUE

R-PLAN 58319

CITY OF OTTAWA

APPENDIX D

CITY OF OTTAWA

- **SITE PLAN AND ARCHITECTURAL DRAWINGS**
- **WATER BOUNDARY CONDITIONS E-MAIL**
- **FIRE FLOW CALCULATION – OFM**
- **FUS EXPOSURE DISTANCES – FIGURE 1**
- **SUPPORTING HYDRAULIC CALCULATIONS**
- **HYDRANT SPACING – FIGURE 2**

ATTACHMENT 1 : SITE PLAN AND ARCHITECTURAL DRAWINGS



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ARCHITECTS

Russell Development

71 RUSSELL AVE
ISSUED FOR COORDINATION
2025.12.23

ARCHITECTURAL PLANNER STRUCTURAL CIVIL LANDSCAPE MECHANICAL / ELECTRICAL

LAWRENCE
ARCHITECTS



Q9 PLANNING + DESIGN
43 ECCLES ST. UNIT C
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(P) 613 565-6546



T. L. MAK ENGINEERING CONSULTANTS LTD
1455 YOVILLE DR.
ORLANDO, ONTARIO K0C 6Z7
(P) 613 651-5616

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LANDSCAPE ARCHITECTS
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JAMES B. LENNOX & ASSOCIATES
3322 CARLING AVE.
OTTAWA, ONTARIO K2M 5A8
(P) 613 742-5166

TBD

TBD

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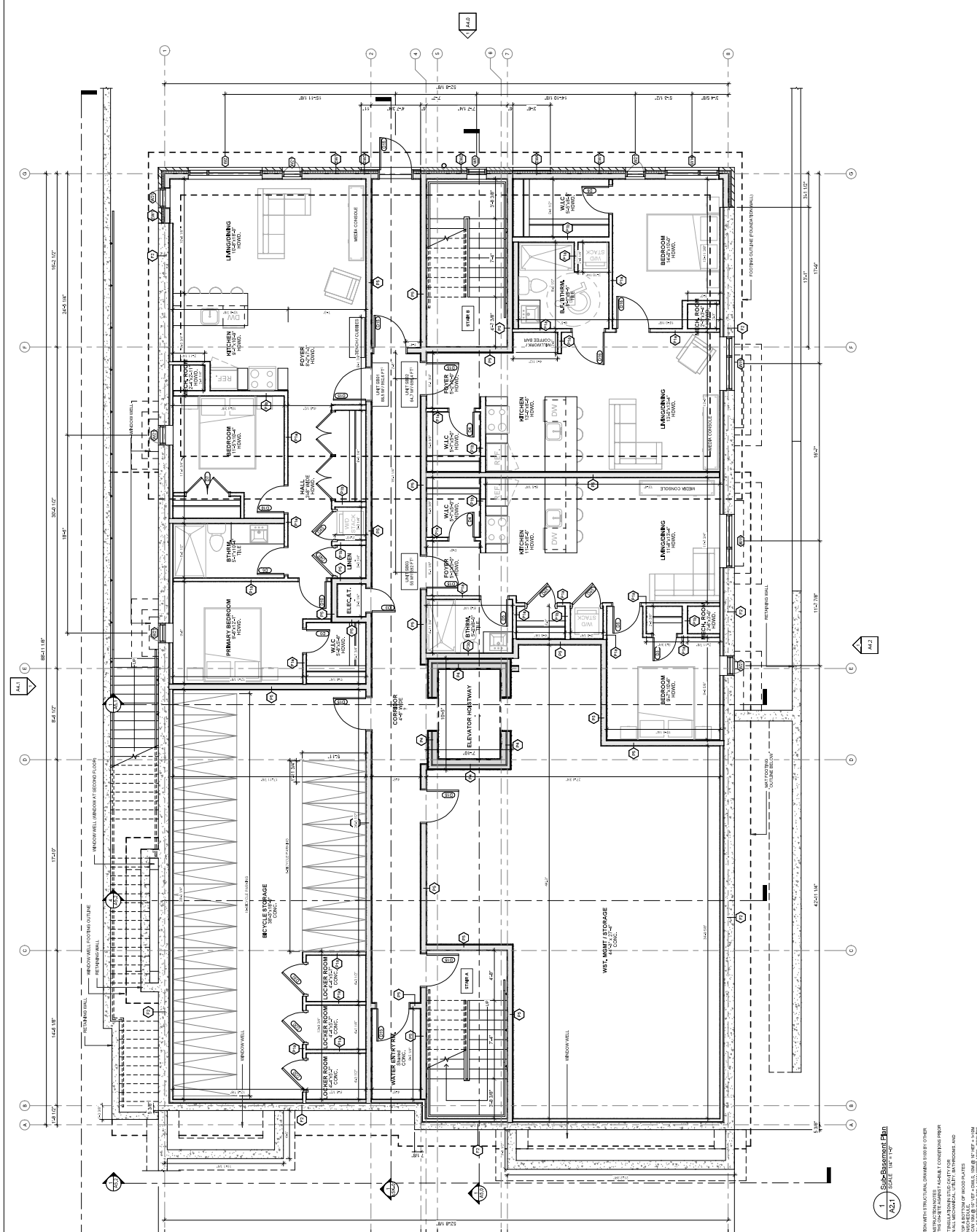
Sub-Basement Plan
 SCALE: 1/8" = 1'-0"

NO.	DATE	DESCRIPTION
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19	10/15/2014	ISSUED FOR PERMITS
20	10/15/2014	ISSUED FOR PERMITS

1 Sub-Basement Plan
 SCALE: 1/8" = 1'-0"

NOTES:
 1. CONSULT THE FIELD CONSULTANTS WITH STRUCTURAL DRAWINGS BY OTHER DISCIPLINES.
 2. PROVIDE ALL DIMENSIONS UNLESS OTHERWISE NOTED.
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1 Sub-Basement Plan
 SCALE: 1/8" = 1'-0"



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Sub-Basement Plan
 SCALE: 1/8" = 1'-0"

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20	10/15/2014	ISSUED FOR PERMITS

1 Sub-Basement Plan
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1 Sub-Basement Plan
 SCALE: 1/8" = 1'-0"

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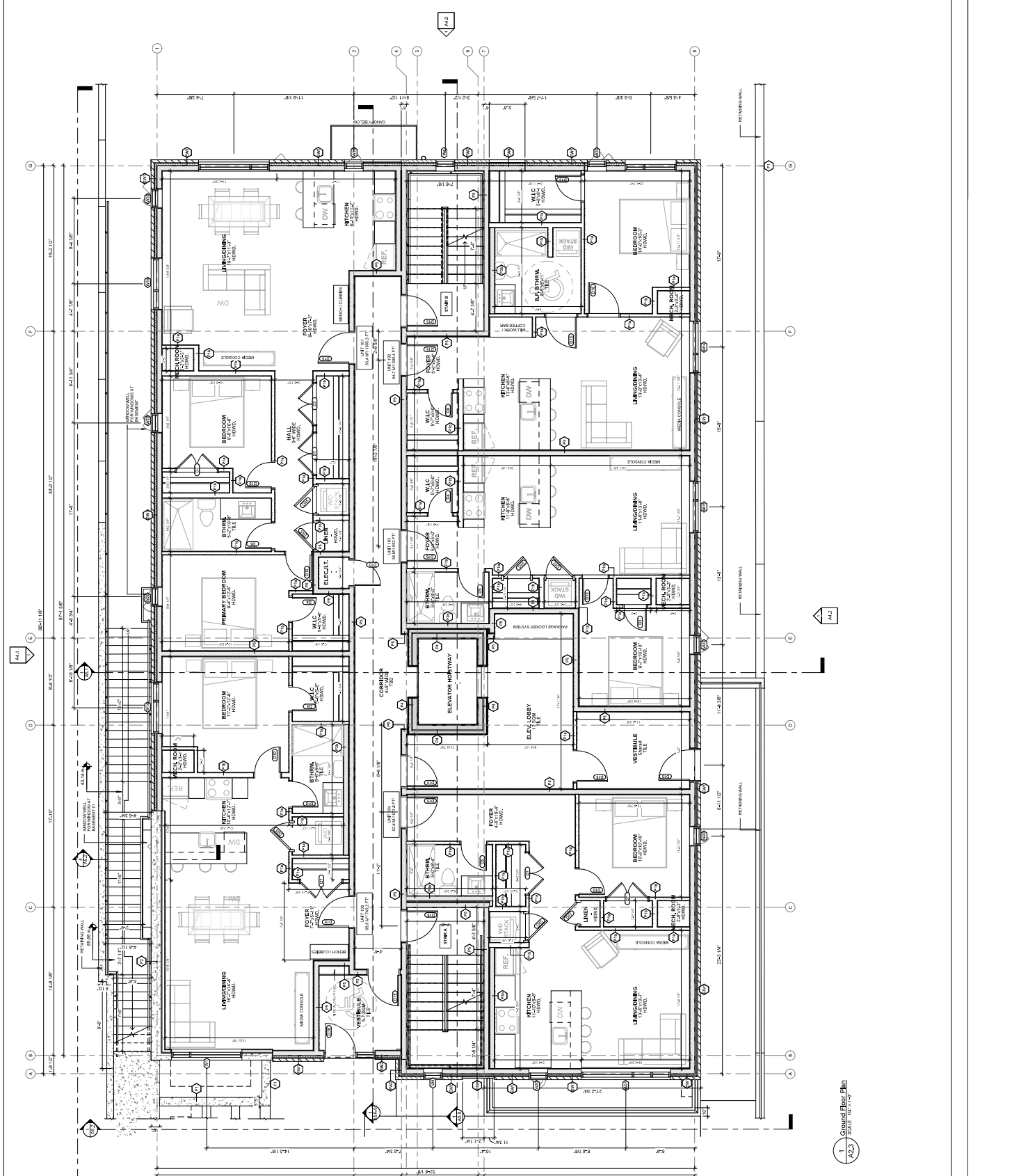
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A2.3
 SCALE: 1/8" = 1'-0"



1 Ground Floor Plan
 A2.3
 SCALE: 1/8" = 1'-0"

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THIRD FLOOR PLAN
 PROJECT: [REDACTED]
 SHEET: [REDACTED]
 DATE: [REDACTED]
 DRAWN BY: [REDACTED]
 CHECKED BY: [REDACTED]
 APPROVED BY: [REDACTED]

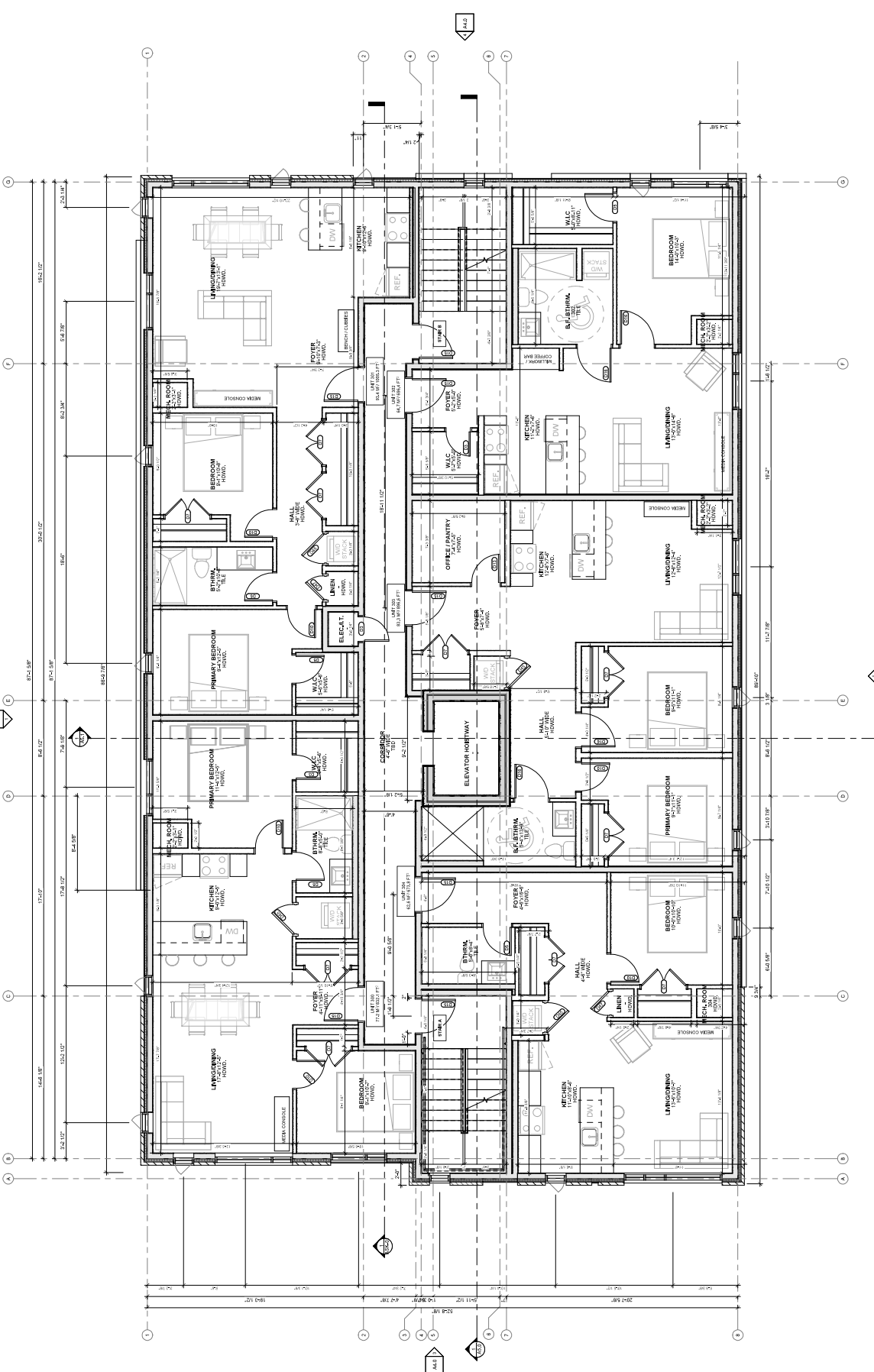
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THIRD FLOOR PLAN
 PROJECT: [REDACTED]
 SHEET: [REDACTED]
 DATE: [REDACTED]
 DRAWN BY: [REDACTED]
 CHECKED BY: [REDACTED]
 APPROVED BY: [REDACTED]

A2.5
 SCALE: 1/8" = 1'-0"
 DATE: [REDACTED]
 DRAWN BY: [REDACTED]
 CHECKED BY: [REDACTED]
 APPROVED BY: [REDACTED]



1 Third Floor Plan
 A2.5 SCALE: 1/8" = 1'-0"

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Russell Development
 2100 MILL LANE
 BUILDING PERSPECTIVE

PROJECT:
 2100 MILL LANE
 BUILDING PERSPECTIVE

DATE:
 08/14/14

SCALE:
 1/8" = 1'-0"

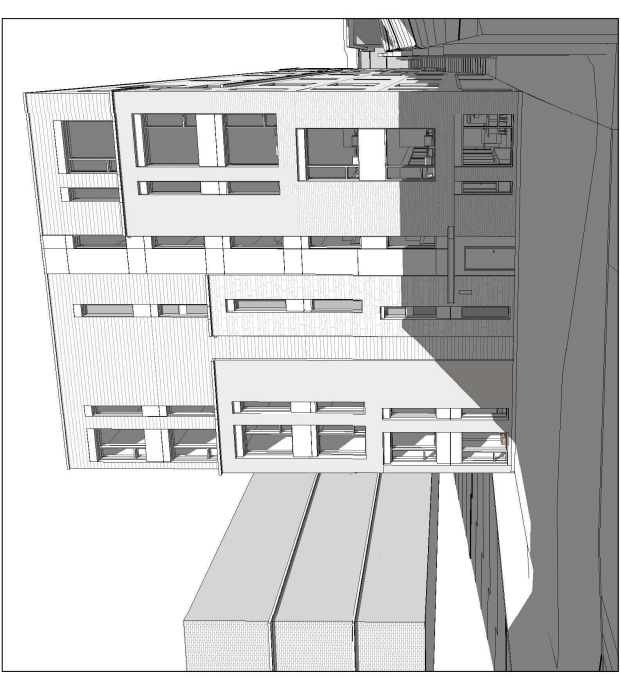
PROJECT NO.:
 14-001

DATE:
 08/14/14

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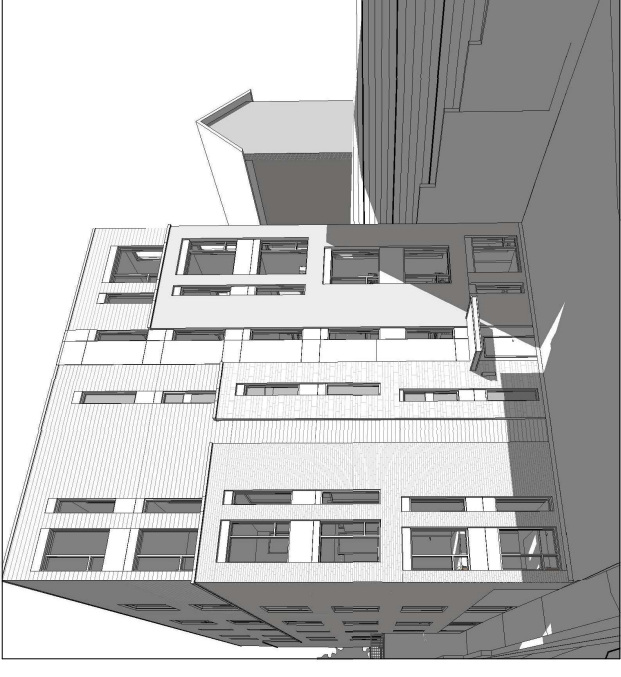
3 FRONT PERSPECTIVE 2
 A4.3 SCALE



4 REAR PERSPECTIVE 2
 A4.3 SCALE



1 FRONT PERSPECTIVE 1
 A4.3 SCALE



2 REAR PERSPECTIVE 1
 A4.3 SCALE

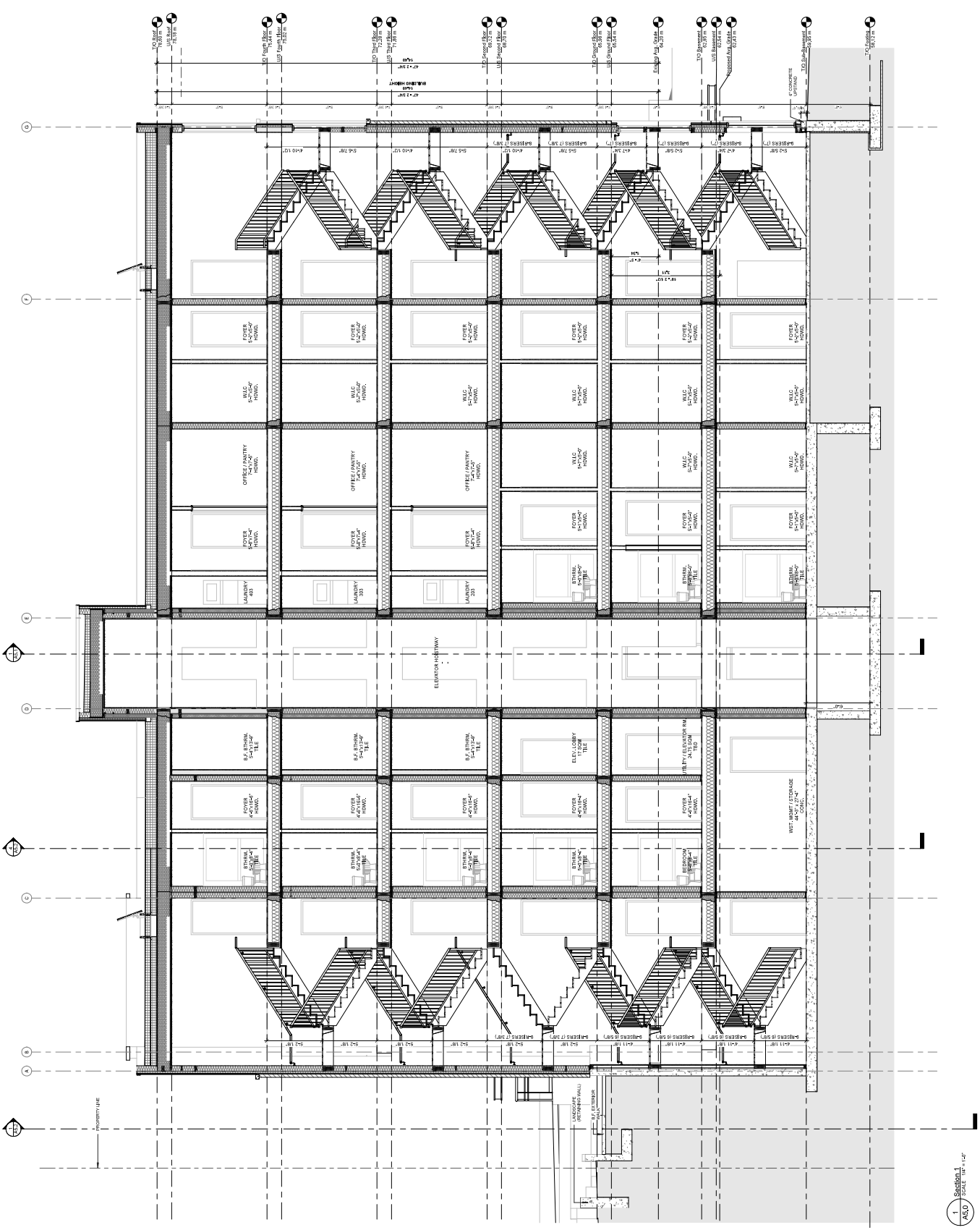
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Russell Development
 200 MILL ST
 FREEHOLD, NJ 07728

BUILDING SECTIONS
 PROJECT: 200 MILL ST
 SHEET: A5.0

NO.	DESCRIPTION	DATE
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100	ISSUED FOR PERMIT	08/14/14



Section 1
 1/4" = 1'-0"

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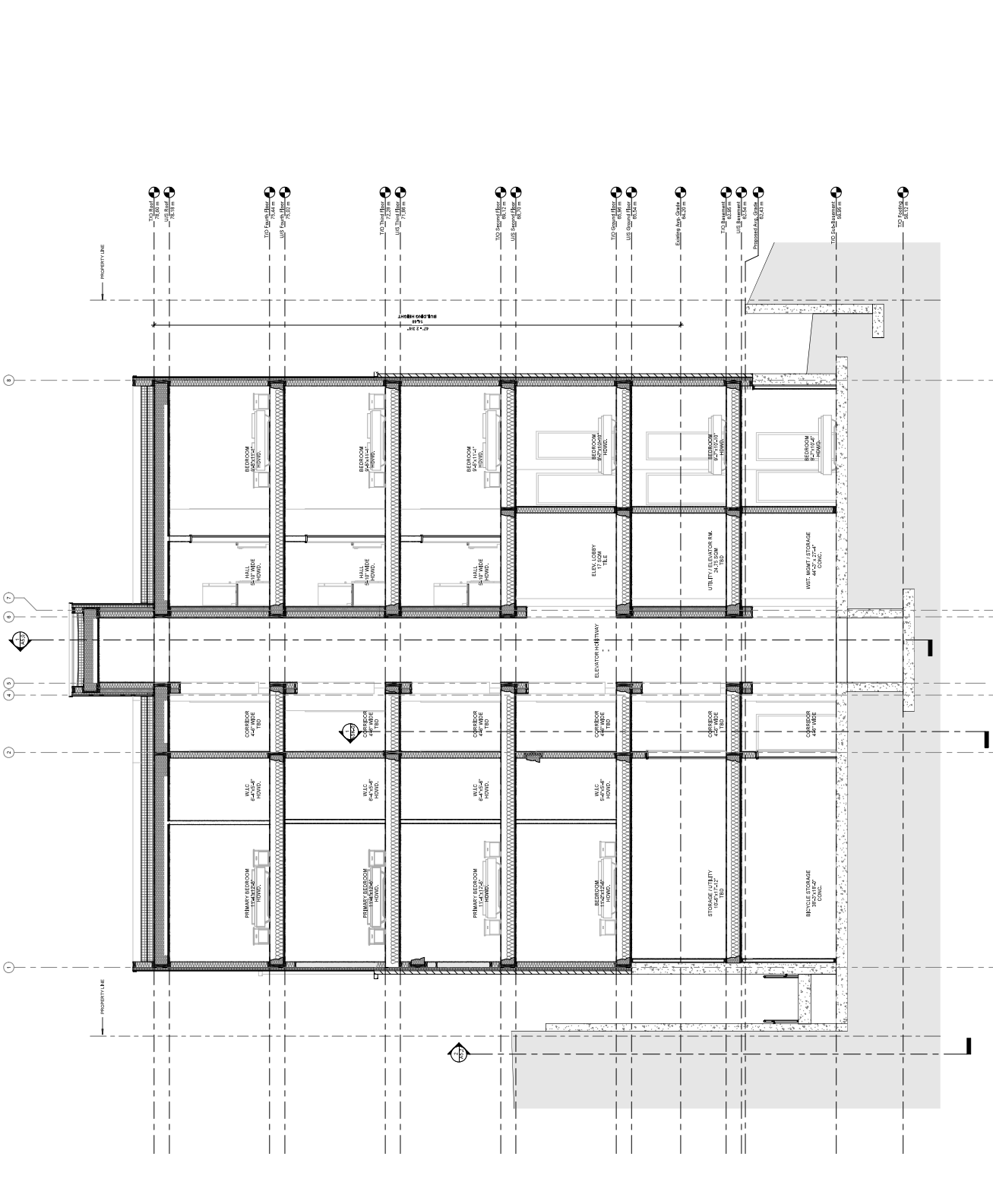
NO.	DATE	DESCRIPTION
01	10/15/2014	ISSUED FOR PERMITS
02	10/15/2014	ISSUED FOR PERMITS
03	10/15/2014	ISSUED FOR PERMITS
04	10/15/2014	ISSUED FOR PERMITS
05	10/15/2014	ISSUED FOR PERMITS
06	10/15/2014	ISSUED FOR PERMITS
07	10/15/2014	ISSUED FOR PERMITS
08	10/15/2014	ISSUED FOR PERMITS
09	10/15/2014	ISSUED FOR PERMITS
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11	10/15/2014	ISSUED FOR PERMITS
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48	10/15/2014	ISSUED FOR PERMITS
49	10/15/2014	ISSUED FOR PERMITS
50	10/15/2014	ISSUED FOR PERMITS

LAWRENCE ARCHITECTS
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Russell Development
 2000 BROADWAY, SUITE 2000, NEW YORK, NY 10018
 TEL: 212.693.9000 FAX: 212.693.9001
 WWW.RUSSELLDEVELOPMENT.COM

PROJECT: 2000 BROADWAY, SUITE 2000, NEW YORK, NY 10018
DATE: 10/15/2014
SCALE: 1/8" = 1'-0"
NO.: 20000135418
DATE: 10/15/2014
NO.: 10/15/2014

A5.1



ATTACHMENT 2 : WATER BOUNDARY CONDITIONS E-MAIL

From: [Tony Mak](#)
To: [Mineault-Guitard, Alexandre](#)
Date: Monday, December 1, 2025 5:56:27 PM
Attachments: [image001.png](#)
[71 Russell Avenue November 2025.pdf](#)

Hi Alex,

Attached please find the Water Boundary Conditions received from the City today for your calculation use.

Thank you,

Tony Mak, P. Eng.

T.L. Mak Engineering Consultants Ltd.
1455 Youville Drive, Suite 218
Ottawa, ON. K1C 6Z7
Tel. 613-837-5516 | Fax: 613-837-5277
E-mail: tlmakecl@bellnet.ca

From: Wessel, Shawn [<mailto:shawn.wessel@ottawa.ca>]
Sent: December 1, 2025 2:22 PM
To: [tlmakecl](#)
Cc: Hughes, Brett; David Aston
Subject: RE: 71 Russell Road - Water Boundary Conditions Request

Hello and good afternoon, Tony.

Please find the requested BC information for this site, below and attached:

The following are boundary conditions, HGL, for hydraulic analysis at 71 Russell Avenue (zone 1W) assumed to be connected via the 203 mm watermain on Russell Avenue. (see attached PDF for location).

-

Minimum HGL = 106.5 m

Maximum HGL = 115.0 m

Max Day + Fire Flow (250.0 L/s) = 102.0 m

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

Disclaimer: The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best

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

Thank you

Regards,

Shawn Wessel, A.Sc.T.,rcji

Pronouns: he/him | Pronom: il

Project Manager - Infrastructure Approvals

Gestionnaire de projet – Approbation des demandes d’infrastructures

Development Review Central Branch | Direction de l’examen des projets d’aménagement, Centrale
Planning, Development & Building Services Department (PDBS) | Direction générale des services de la planification, de
l’aménagement et du bâtiment (DGSPAB)

City of Ottawa | Ville d'Ottawa

110 Laurier Ave. W. | 110, avenue Laurier Ouest, Ottawa ON K1P 1J1

(613) 580 2424 Ext. | Poste 33017

Int. Mail Code | Code de Courrier Interne 01-14

shawn.wessel@ottawa.ca

 Please consider the environment before printing this email

Out of Office Alert :



Classified as City of Ottawa - Internal / Ville d'Ottawa - classé interne

From: Tony Mak <tlmakecl@bellnet.ca>

Sent: Wednesday, November 19, 2025 10:04 AM

To: Wessel, Shawn <shawn.wessel@ottawa.ca>

Cc: Hughes, Brett <brett.hughes@ottawa.ca>; David Aston <dave@jerseydevelopments.ca>

Subject: 71 Russell Road - Water Boundary Conditions Request

CAUTION: This email originated from an External Sender. Please do not click links or open

attachments unless you recognize the source.

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Hi Shawn,

Regarding this site, we are requesting for water boundary conditions from the City of Ottawa to be provided for our hydraulic analysis. The particulars are as follows:

The proposed building is located within Pressure Zone 1W at 71 Russell Avenue, and is a 6-story apartment building (4-stories above grade, 2-stories partially below grade). The apartment building contains 28 units consisting of twelve (12) 2-bedroom units, fourteen (14) 1-bedroom units, and two (2) bachelor units.

Each floor covers an average gross floor area of approximately 447.7 m² based on the submitted building plans. The building is to be serviced by a 200 mm diameter watermain along Russell Avenue.

The domestic demands were calculated using the City of Ottawa's Water Design Guidelines, where the residential consumption rate of 280 L/cap/d was used to estimate average day demands (AVDY). Peaking factors are from Table 3-3 of the MECP Design Guidelines for Drinking Water Systems . Maximum day (MXDY) demands were calculated by multiplying AVDY demands by a factor of 8.8. Peak hour (PKHR) demands were calculated by multiplying AVDY by a factor of 13.3. Persons per unit (PPU) for each unit were estimated based on the City of Ottawa's Water Design Guidelines. **Table 1** shows the estimated domestic demands of the existing building.

Table 1: Estimated Domestic Demand

Unit Type	Unit Count	PPU	Consumption (L/c/d)	AVDY		MXDY		PKHR	
				L/d	L/s	L/d	L/s	L/d	L/s
Apartment, Bachelor / Studio	2	1.4	280	784	0.01	6,919	0.08	10,418	0.12
Apartment, 1-Bedroom	14	1.4	280	5,488	0.06	48,433	0.56	72,925	0.84
Apartment, 2-Bedroom	12	2.1	280	7,056	0.08	62,272	0.72	93,760	1.09
Total	28			13,328	0.15	117,624	1.36	177,102	2.05

As per the City of Ottawa's Water Design Guidelines (and Technical Bulletin IWSTB-2024-05), the Fire Underwriter Survey (FUS) method is to be used for fire flow requirements affecting municipal watermain sizing; with regards to fire protection on private property and not requiring new watermains, these are covered by the Ontario Building Code (OBC), using the OBC's Office of the Fire Marshal (OFM) method. If the required flow using the OBC/OFM method yields 9,000 L/min for the property, Technical Bulletin IWSTB-2024-05 specifies the FUS method to be used instead.

It is understood that the building will have a sprinkler system, assumed to be conformed to NFPA 13 and fully supervised, and it is assumed that the building has fire separations and fire resistance ratings in accordance with the Ontario Building Code. The lower floor of the proposed building is more than 50% below ground. The resulting total required fire flow using the OFM method is 9,000 L/min. Therefore, the FUS method was used to identify the fire flow requirement, which resulted in a fire flow

requirement of 15,000 L/min (250 L/s) for a duration of 3 hours.

In summary:

- AVDY = 13,328 L/d (0.15 L/s);
- MXDY = 117,624 L/d (1.36 L/s);
- PKHR = 177,102 L/d (2.05 L/s); and,
- Fire Flow = 15,000 L/min (250 L/s).

The City is requested to provide boundary conditions for the Average Day, Maximum Day, Peak Hour and Fire Flow conditions indicated above.

Thank you for your prompt attention to this matter. Please forward the boundary conditions as soon as possible.

Have a great weekend.

Regards,

Tony Mak, P. Eng.

T.L. Mak Engineering Consultants Ltd.
1455 Youville Drive, Suite 218
Ottawa, ON. K1C 6Z7
Tel. 613-837-5516 | Fax: 613-837-5277
E-mail: tlmakecl@bellnet.ca

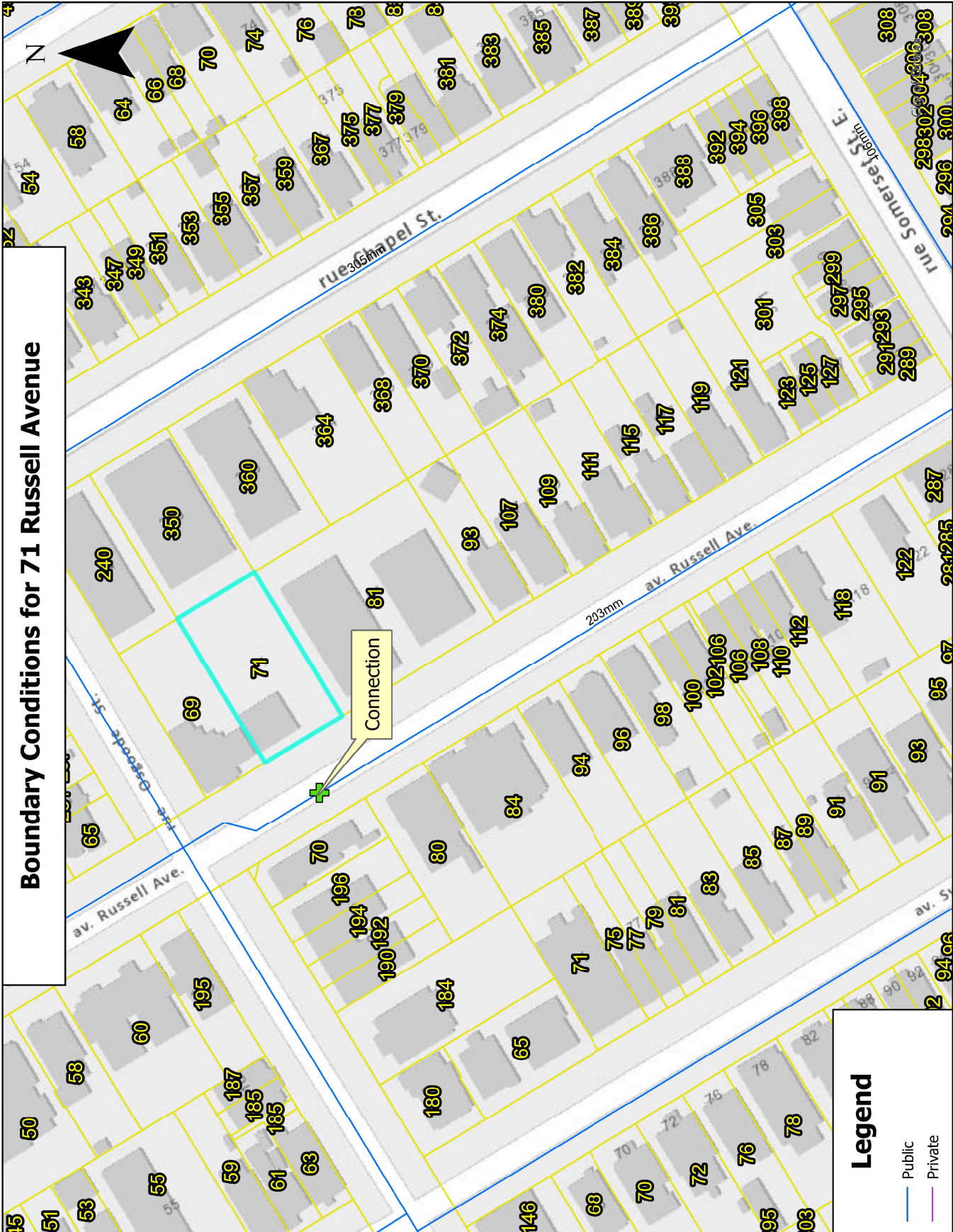
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Boundary Conditions for 71 Russell Avenue

Legend

- Public
- Private

ATTACHMENT 3 : FIRE FLOW CALCULATION – OFM



FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

Stantec Project #: 163401084
 Project Name: 71 Russell Road
 Date: 11/17/2025
 Fire Flow Calculation #: 2
 Description: Residential
 Notes: 71 Russell Avenues comprises of a 6-storey residential apartment building. The 28-unit apartment building has twelve 2-bedroom units, fourteen 1-bedroom units, and two bachelor units. The proposed building is wood frame construction, and assumed to have fire separations and fire resistance ratings in accordance with the Ontario Building Code. It is understood that the building will have a sprinkler system, and has a basement (more than 50% below ground).

Data inputted by: Melissa Nelson, P.Eng
 Data reviewed by: Alexandre Mineault-G, P.Eng.

Step	Task	Notes	Value Used	Req'd Fire Flow (L/min)	
1	Determine Type of Construction	Type V - Wood Frame / Type IV-D - Mass Timber Construction (F = 220 x C x A ^{1/2}). Round to nearest 1000 L/min	1.5	-	
2	Determine Effective Floor Area		YES	-	
3	Determine Required Fire Flow		2,239	-	
4	Determine Occupancy Charge	Limited Combustible	-	16,000	
5	Determine Sprinkler Reduction	Conforms to NFPA 13	-15%	13,600	
		Standard Water Supply	-30%		
		Fully Supervised	-10%	-6800	
5A	Determine Bylaw Requirement	% Coverage of Sprinkler System	100%		
6	Determine Increase for Exposures (Max. 75%)	Community bylaw requiring all building that may be built within 30m of subject building to be fully sprinkler protected	NO	-	
		Direction			
		Exposure Distance (m)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	Firewall / Sprinklered ?
		Exposed Length (m)	Exposed Height (Stories)	Type V	NO
		20.1 to 30	3	Type V	NO
0 to 3	2	Type V	NO		
10.1 to 20	4	Type V	NO		
3.1 to 10	3	Type V	NO		
7	Determine Final Required Fire Flow	Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min		15,000	
		Total Required Fire Flow in L/s		250	
		Required Duration of Fire Flow (hrs)		3.00	
		Required Volume of Fire Flow (m ³)		2,700	

Fire Flow Calculations as per the Ontario Building Code (OBC)



OFM Fire Flow Calculation

Calculations based on *Fire Protection Water Supply Guideline for Part 3 in the Ontario Building Code* by the Office of the Fire Marshal (OFM 1999)

Stantec Project 163401084
 Project Name: 71 Russell Road
 Date: 11/17/2025
 Fire Flow Calc 1
 Description: Residential

Data inputted by: Melissa Nelson P.Eng.
 Data reviewed by: Alexandre Mineault-G, P.Eng.

Notes: 71 Russell Avenues comprises of a 6-storey residential apartment building. The 28-unit apartment building has twelve 2-bedroom units, fourteen 1-bedroom units, and two bachelor units. The proposed building is wood frame construction, and assumed to have fire separations and fire resistance ratings in accordance with the Ontario Building Code. It is understood that the building will have a sprinkler system, and has a basement (more than 50% below ground).

Office of the Fire Marshal Determination of Required Fire Protection Water Supply							
Step	Task	Notes	Multiplier Associated with Option	Value Used			
1							
General Building Details							
1.1	Enter Number of Storeys	Number of Floors/Storeys in the Unit (incl. basement):		6	6	Storeys	
1.2	Choose Type of Housing (if TH, Enter Number of Units Per TH Block)	Type of Housing	Single Family	0	Other (Comm, Ind, Apt etc.)	Units	
			Townhouse - indicate # of units	0			
			Other (Comm, Ind, Apt etc.)	28			
1.3	Choose Presence of Sprinklers	Sprinklers?		Yes	Yes	N/A	
1.4	Choose Presence of Firewalls	Firewall separations?		None	None	N/A	
1.5	Choose Presence of Stand-Pipe System	Stand-pipe system?		None	None	N/A	
2							
Determining Water Supply Coefficient K							
2.1	Choose Type of Construction	Type of Construction	Non-combustible construction + fire separations + fire-resistance ratings in accordance with Section 3.2.2 of OBC	Type I	Type III	N/A	
			Non-combustible construction + fire separations + no fire-resistance rating	Type II			
			Combustible construction + fire separations + fire-resistance ratings in accordance with Section 3.2.2 of OBC	Type III			
			Combustible construction + fire separations + no fire-resistance rating	Type IV			
2.2	Choose Classification	Occupancy Classification (OBC)	A-2, B-1, B-2, B-3, C, D	18	C	A-2, B-1, B-2, B-3, C, D	
			A-4, F-3	22			
			A-1, A-3	25			
			E, F-2	31			
			F-1	41			
2.3	Water Supply Coefficient (K)	Water Supply Coefficient K		18	18	N/A	
3							
Determining Building Volume V							
3.1	Enter Ground Floor Area of One Unit	Floor Space Area			448	448	Area in Square Meters (m ²)
		Average Floor Area (A) :		Square Metres (m2)			
3.2	Building Height (h)	Building Height			59.0	18.5	Height in Meters (m)
		Bottom Elevation :		Meters (m)			
		Top Elevation :		Meters (m)			
3.3	Building Volume (V)	Building Volume V = A * h		8,310	8,310	Volume in Meters Cube (m ³)	
4							
Determining Spatial Coefficient S							
4.1	Choose Exposure Distances from Building to Property Line	Exposure Distance from Building to Property Line in Meters (m)	North Side	1.7	0.50	0.99	Distance in Meters (m)
			Property Line to Street Centreline (Street Facing)	0.6			
			Total Exposure Distance	2.3			
			East Side	7.5	0.00		
			Property Line to Street Centreline (Street Facing)	6.2			
			Total Exposure Distance	13.7			
			South Side	2.0	0.49		
			Property Line to Street Centreline (Street Facing)	3.1			
			Total Exposure Distance	5.1			
			West Side	10.8	0.00		
Property Line to Street Centreline (Street Facing)	2.6						
Total Exposure Distance	13.4						
4.2	Total Spatial Coefficient (S _{tot})	Total Spatial Coefficient S _{tot} = 1 + Σ S _x		1.99	1.99	N/A	
5							
Determining Required Minimum Supply of Water Q and Fire Flow							
5.1	Obtain Required Fire Volume, Flow & Duration	Minimum Supply of Water, rounded to nearest 1,000 L; Q = K*V*S _{tot}			297,000 L		
		Required Minimum Water Supply Flow Rate (L/min)			9,000 L/min		
		Required Minimum Water Supply Flow Rate (L/s)			150 L/s		
		Required Minimum Duration of Fire Flow (min)			40 min		

ATTACHMENT 4 : FIGURE 1 – FUS EXPOSURE DISTANCES

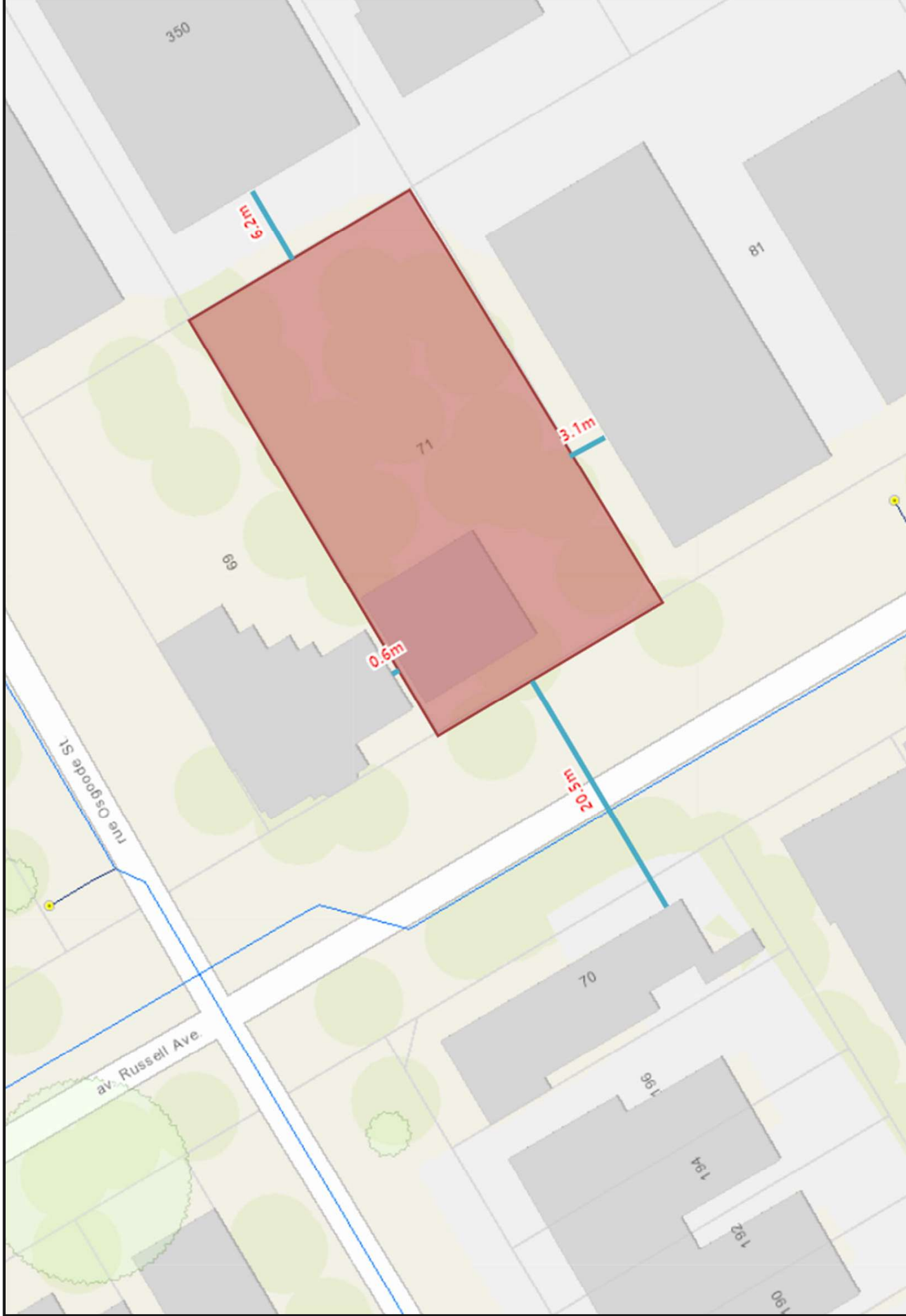


Figure 1: FUS Exposure Distances (Property Line to Adjacent Buildings)

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ATTACHMENT 5 : SUPPORTING HYDRAULIC CALCULATIONS



Supporting Hydraulic Calculations

Stantec Project #: 163401084

Project Name: 71 Russell Road

Date: December 4, 2025

Data inputted by: Melissa Nelson, P.Eng.

Data reviewed by: Alexandre Mineault-G, P.Eng.

Boundary Conditions provided by the City:

Scenario 1: Peak Hour (Min HGL): 106.5 m;

Scenario 2: Average Day (Max HGL): 115.0 m; and

Scenario 3: Maximum Day plus Fire Flow: 102.0 m.

Sample Calculations

$$HGL (m) = hp + hz \quad (1)$$

where: hp = Pressure Head (m); and hz = Elevation Head (m), estimated from topography.

For Scenario 1, we have:

$$HGL(m) = 106.5 \text{ and } hz (m) = 62.43.$$

Rearranging Equation 1, we can calculate the Pressure Head (hp) as follow:

$$hp (m) = HGL - hz$$

$$\therefore hp = 106.5 - 62.4 \text{ m} = 44.1 \text{ m.}$$

To convert from Pressure Head (m) to a pressure value (kPa), the following equation can be used:

$$P (\text{kPa}) = (\rho * g * hp) / 1000 \quad (2)$$

where: ρ = density of water = 1000 kg/m³; and g = gravitational acceleration = 9.81 m/s².

Using Equation 2, we can calculate the Pressure Head (hp) as follow:

$$P (\text{kPa}) = (1000 * 9.81 * 44.07) / 1000$$

$$\therefore P = 432 \text{ kPa.}$$

Considering that 1 kPa = 0.145 psi, the pressure under Scenario 1 is equal to:

$$P = 63 \text{ psi.}$$

Applying the same procedures, the pressures under Scenario 2 and Scenario 3 are calculated as follows:

Scenario 2: P = 75 psi; and Scenario 3: P = 56 psi.

To summarize:

Scenario 1: Minimum Pressure under Peak Hour Demand: 432 kPa (63 psi)
Scenario 2: Maximum Pressure under Average Day Demand: 515 kPa (75 psi)
Scenario 3: Minimum Pressure under Maximum Day + Fire Flow Demand: 388 kPa (56 psi)

ATTACHMENT 6 : FIGURE 2 – HYDRANT SPACING

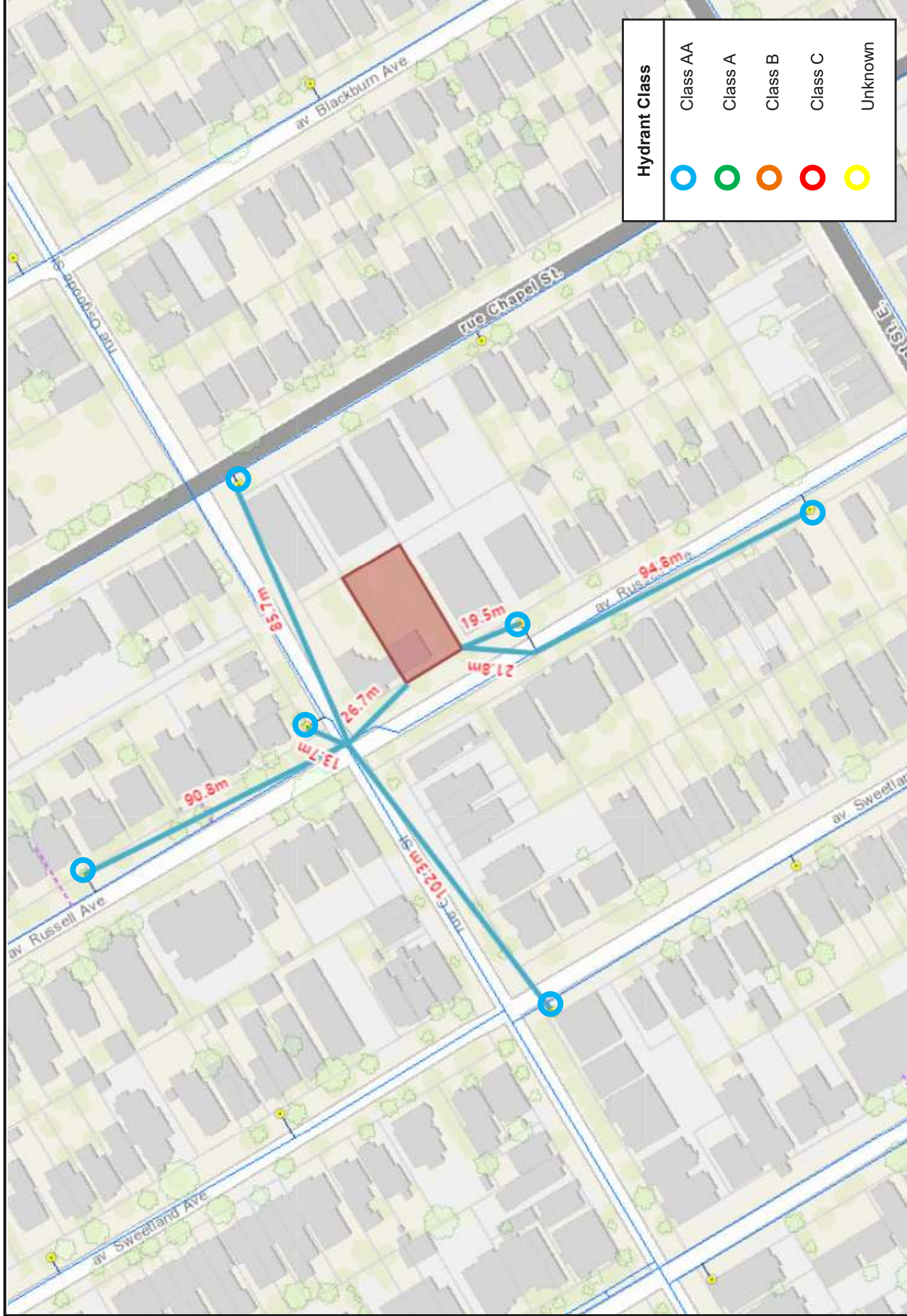


Figure 2: Hydrant Spacing

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PROPOSED SIX (6) STOREY RESIDENTIAL APARTMENT

BUILDING LOT DEVELOPMENT SITE

71 RUSSELL AVENUE

LOT 14

EAST SIDE OF RUSSELL AVENUE

R-PLAN 58319

CITY OF OTTAWA

APPENDIX E

CITY OF OTTAWA

SANITARY SEWER DESIGN SHEET

SHEET No. 1 OF 1

PROPOSED SIX (6) STOREY RESIDENTIAL APARTMENT

BUILDING LOT DEVELOPMENT SITE

71 RUSSELL AVENUE

LOT 14

EAST SIDE OF RUSSELL AVENUE

R-PLAN 58319

CITY OF OTTAWA

APPENDIX F

DEVELOPMENT SERVICING STUDY CHECKLIST SUMMARY

Servicing study guidelines for development applications

4. Development Servicing Study Checklist

The following section describes the checklist of the required content of servicing studies. It is expected that the proponent will address each one of the following items for the study to be deemed complete and ready for review by City of Ottawa Infrastructure Approvals staff.

The level of required detail in the Servicing Study will increase depending on the type of application. For example, for Official Plan amendments and re-zoning applications, the main issues will be to determine the capacity requirements for the proposed change in land use and confirm this against the existing capacity constraint, and to define the solutions, phasing of works and the financing of works to address the capacity constraint. For subdivisions and site plans, the above will be required with additional detailed information supporting the servicing within the development boundary.

4.1 General Content

- Executive Summary (for larger reports only).
- Date and revision number of the report.
- Location map and plan showing municipal address, boundary, and layout of proposed development.
- Plan showing the site and location of all existing services.
- Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.
- Summary of Pre-consultation Meetings with City and other approval agencies.
- Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defensible design criteria.
- Statement of objectives and servicing criteria.
- Identification of existing and proposed infrastructure available in the immediate area.
- Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).
- Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.
- Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.
- Proposed phasing of the development, if applicable.

- Reference to geotechnical studies and recommendations concerning servicing.

- All preliminary and formal site plan submissions should have the following information:
 - Metric scale

 - North arrow (including construction North)

 - Key plan

 - Name and contact information of applicant and property owner

 - Property limits including bearings and dimensions

 - Existing and proposed structures and parking areas

 - Easements, road widening and rights-of-way

 - Adjacent street names

4.2 Development Servicing Report: Water

- Confirm consistency with Master Servicing Study, if available
- Availability of public infrastructure to service proposed development
- Identification of system constraints
- Identify boundary conditions
- Confirmation of adequate domestic supply and pressure
- Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development.
- Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.
- Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design
- Address reliability requirements such as appropriate location of shut-off valves
- Check on the necessity of a pressure zone boundary modification.
- Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range

- Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.
- Description of off-site required feeder mains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.
- Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.
- Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.

4.3 Development Servicing Report: Wastewater

- Summary of proposed design criteria (Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).
- Confirm consistency with Master Servicing Study and/or justifications for deviations.
- Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers.
- Description of existing sanitary sewer available for discharge of wastewater from proposed development.
- Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable)
- Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.
- Description of proposed sewer network including sewers, pumping stations, and forcemains.
- Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).
- Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.
- Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.
- Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.
- Special considerations such as contamination, corrosive environment etc.

4.4 Development Servicing Report: Stormwater Checklist

- Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)
- Analysis of available capacity in existing public infrastructure.
- A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.
- Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.
- Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.
- Description of the stormwater management concept with facility locations and descriptions with references and supporting information.
- Set-back from private sewage disposal systems.
- Watercourse and hazard lands setbacks.
- Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.
- Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.
- Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).
- Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.
- Calculate pre and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.
- Any proposed diversion of drainage catchment areas from one outlet to another.
- Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.
- If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100 year return period storm event.
- Identification of potential impacts to receiving watercourses
- Identification of municipal drains and related approval requirements.
- Descriptions of how the conveyance and storage capacity will be achieved for the development.
- 100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.

- Inclusion of hydraulic analysis including hydraulic grade line elevations.
- Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.
- Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.
- Identification of fill constraints related to floodplain and geotechnical investigation.

4.5 Approval and Permit Requirements: Checklist

The Servicing Study shall provide a list of applicable permits and regulatory approvals necessary for the proposed development as well as the relevant issues affecting each approval. The approval and permitting shall include but not be limited to the following:

- Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in the Act.
- Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.
- Changes to Municipal Drains.
- Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)

4.6 Conclusion Checklist

- Clearly stated conclusions and recommendations
- Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.
- All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario