

**PROPOSED  
FOUR STOREY APARTMENT BUILDING SITE  
LOT 15 WEST CAMBRIDGE STREET NORTH  
SOUTH OF STONE BOUNDARY  
R-PLAN 33  
370 CAMBRIDGE STREET NORTH  
CITY OF OTTAWA**

**SERVICEABILITY REPORT  
REPORT No. R-821-155A**

**T.L. MAK ENGINEERING CONSULTANTS LTD.**

**JULY 2022**

**REFERENCE FILE NUMBER 821-155**

## **Introduction**

The developer of this property is proposing to redevelop the existing residential lot described as Lot 15 West Cambridge Street North R-Plan 33 by constructing a four (4) storey residential apartment building consisting of two (2) bachelor apartments, ten (10) 1-bedroom apartments, six (6)-bedroom apartments and two (3)-bedroom apartments totalling 20 residential units.

The municipal address of this property is referenced as 370 Cambridge Street North and it is located in the City Ward (14 - Somerset). The site is situated on the north side of Cambridge Street North, north of Raymond Street and south of Arlington Avenue, see site plan and legal survey plan in Appendix A for details.

The area of this property is  $\pm 0.063$  hectares. In addition to the (4)-storey residential building, the other development features will comprise of an interlock paver access to the front entrance way and interlock paver access along both the north and south side yard to the side entrances of the building, an amenity area in the rear yard, as well as visitor bicycle parking, (4) asphalt vehicle parking spaces including landscaped areas throughout the site, etc., to meet the City of Ottawa's site plan requirements.

A site geotechnical report was prepared by the owner's soils engineer, Kollaard Associates, entitled Geotechnical Investigation Report (Project No. 220214) dated April 8, 2022.

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 is currently occupied by a two storey residential building, which is a two (2)-storey brick and vinyl sided dwelling encompassed by concrete surfaces with asphalt parking area and wood sided garage located at the rear of the property. Vehicle access is via the existing Arthur Laneway along the rear of this property. For additional details of the site's pre-development conditions, refer to the coloured Google Image (2019) and aerial photography from (GeoOttawa 2021) in Appendix B.

The site is primarily hard impermeable surfaced that are covered with building roof areas, asphalt parking, concrete walkway surfaces, etc. The remainder of the lot is generally grass or landscape areas. Pre-development coefficient of runoff is estimated at  $C = 0.68$ .

The topography of the land is found to be gently sloping from west to east or (back to front) with an average slope of  $\pm 1.6\%$ .

The existing house water and sanitary service lateral currently servicing the existing dwelling on 370 Cambridge Street North 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 Cambridge Street North in front of this property consisting of a 375mm diameter combined sewer and a 200mm diameter watermain for development of this property. Refer to the City of Ottawa Cambridge Street North UCC drawing and As-Built plan and profile drawings included in Appendix C for details.

Because the site is located within a combined sewer shed, therefore, the approval exemption under Ontario Regulations 525/98 would not apply since storm water discharges from this site will outlet flow into a combined sewer and not a storm sewer. Thus, an Environmental Compliance Approval (ECA) application will be required to be submitted to the Ministry.

### **Proposed Residential Apartment Building Site**

Vehicle access to this site will be via the existing Arthur Laneway located at the rear of this lot. There are (4) vehicle parking spaces provided for vehicle parking at the rear of the building. Interlock pavers are proposed at the front, as well as the north and south side of the new building for pedestrian access to the side entrances.

#### **A. Water Supply**

The proposed building located within Pressure Zone 1W at 370 Cambridge Street North is a 4-storey residential apartment building with a basement. The building contains twenty (20) total units, namely two (2) bachelor units, ten (10) 1-bedroom units, six (6) 2-bedroom units, and two (2) 3-bedroom units. The average floor area is approximately 340 m<sup>2</sup>, for a total gross floor area of approximately 1,352 m<sup>2</sup> (excluding the basement). The building is to be serviced by the 200 mm diameter watermain along Cambridge Street North.

The ground elevation on the property is approximately 71.7 m, as obtained from geoOttawa elevation contours (**Figure 1** in Appendix D), and the Site Survey Plan provided to Stantec (see attached **Site Survey Plan** in Appendix D).

#### **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). Maximum day (MXDY) demands were calculated by multiplying AVDY demands by a factor of 2.5. Peak hour (PKHR) demands were calculated by multiplying MXDY

by a factor of 2.2. 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 Demand**

Unit Type	Unit Count	PPU	Consumption Rate (L/c/d)	AVDY		MXDY		PKHR	
				L/d	L/s	L/d	L/s	L/d	L/s
Apartment, Bachelor	2	1.4	280	784	0.01	1,960	0.02	4,312	0.05
Apartment, 1-Bedroom	10	1.4		3,920	0.05	9,800	0.11	21,560	0.25
Apartment, 2-Bedroom	6	2.1		3,528	0.04	8,820	0.10	19,404	0.22
Apartment, 3-Bedroom	2	3.1		1,736	0.02	4,340	0.05	9,548	0.11
<b>Total</b>	<b>20</b>			<b>9,968</b>	<b>0.12</b>	<b>24,920</b>	<b>0.29</b>	<b>54,824</b>	<b>0.63</b>

The City had previously indicated that the City’s Fire Marshall and various City departments are currently reviewing fire flow requirements for low- and mid-rise buildings. As per the City of Ottawa’s Water Design Guidelines, the FUS method is to be used for fire flow requirements affecting watermain sizing; with regards to fire protection on private property and not requiring new watermains, these are covered by the Ontario Building Code (OBC).

As such, the fire flow requirement was also determined following the OBC’s Office of the Fire Marshal (OFM) method. The proposed building will be of wood frame construction, where floors are fire separations, but without fire-resistance ratings. The resulting total required fire flow (RFF) for a sprinklered building is 6,300 L/min (105 L/s) for a minimum duration of 40 min. Details are provided in the attached **OFM Fire Flow Calculations** in Appendix D. The proposed **Site Plan** attached in Appendix D was used to determine distances from the proposed building to the property lines. For street facing sides, **Figure 2** in Appendix D provides separation distances from the street.

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

- AVDY = 9,968 L/d (0.12 L/s)
- MXDY = 24,920 L/d (0.29 L/s);
- PKHR = 54,824 L/d (0.63 L/s); and,
- Fire Flow = 6,300 L/min (105 L/s).

**Boundary Conditions**

The hydraulic gradeline (HGL) boundary conditions for 370 Cambridge Street North, as presented in **Table 2**, were provided by the City on May 26, 2022 (see attached **Water Boundary Conditions** Email in Appendix D).

**Table 2 : Boundary Conditions**

<b>Demand Scenario</b>	<b>Head (m)</b>
Minimum HGL (Peak Hour)	107.0
Maximum HGL (Average Day)	115.2
Maximum Day + Fire Flow (105 L/s)	108.8

## Hydraulic Analysis

### **Peak Hour & Average Day**

During peak hour demands, the resulting minimum hydraulic gradeline of 107.0 m corresponds to a peak hour pressure of 346 kPa (50 psi). This value is above the minimum pressure objective of 276 kPa (40 psi) for residential buildings up to two storeys. The peak hour pressure exceeds this objective and is therefore considered acceptable. Given that this apartment building consists of a total of 4 storeys, further consideration will be needed to service the higher floors. Adding 5 psi per floor above two stories (i.e., 2 additional floors), a minimum pressure of 346 kPa (50 psi) would be required for the fourth floor. The peak hour pressure calculated is equal to this objective and is therefore considered acceptable.

During average day demands, the resulting maximum hydraulic gradeline of 115.2 m corresponds to a maximum pressure of 426 kPa (62 psi). This value is less than the maximum pressure objective of 552 kPa (80 psi) and is therefore considered acceptable.

**Supporting hydraulic calculations** are attached in Appendix D.

### **Maximum Day + Fire Flow**

A maximum day plus fire flow hydraulic gradeline of 108.8 m corresponds to a residual pressure of 364 kPa (53 psi) at this location and is well above the minimum residual pressure requirements 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, four (4) Class AA hydrants are located in the vicinity of the proposed building. Two (2) Class AA hydrants within 75 m from the site, each with a capacity contribution of up to 5,700 L/min. Two (2) other Class AA hydrants are within 150 m from the site, each with a capacity contribution of up to 3,800 L/min. As such, the combined hydrant flow coverage for the building is estimated to be 19,000 L/min, which is above the OFM required fire flow (RFF) of 6,300 L/min.

Hydrant coverage and classes are illustrated in **Figure 3** attached in Appendix D. A breakdown of available hydrant flow is summarized in **Table 3**.

**Table 3 : Fire Hydrant Coverage**

Building	Calculated Fire Flow Demand (L/min)	Fire Hydrants					Combined Hydrant Flow Coverage (L/min)
		Hydrant Class	Within 75 m		Between 76 m and 150 m		
			Quantity	Contrib. to RFF	Quantity	Contrib. to RFF	
370 Cambridge Street N	OFM: 6,300	AA	2	5,700	2	3,800	19,000
		A					
		B					
		C					

In conclusion, based on the boundary condition provided, the 200 mm diameter watermain on Cambridge Street North (intended service line connection) provides adequate fire flow capacity as per the OBC’s Office of the Fire Marshal (OFM) method to the proposed development at 370 Cambridge Street North.

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 proposed 20 residential units, which comprise of two (2) bachelor units, ten (10) 1-bedroom units, six (2)-bedroom units and two (2) 3-bedroom units, is estimated at  $Q = 0.44$  L/s with an infiltration rate of 0.02 L/s. Please refer to Appendix E regarding sanitary flow calculations. This flow will enter the existing 375mm diameter combined sewer on Cambridge Street North via the proposed 150mm diameter PVC sanitary service lateral from the four (4)-storey residential apartment building.

Peak waste water flow from water usage is typical for an apartment building of this size. No additional amenities are proposed.

The existing peak sanitary flow of the site for single detached dwelling unit is  $Q = 0.06$  L/s with an infiltration rate of 0.02 L/s. The net increase in flow from this proposed development is 0.38 L/.

The peak sanitary flow of 0.44 L/s will be subtracted from the net allowable controlled release rate regarding storm-water management controlled for this site into the existing combined sewer.

Waste water from the Cambridge Street North 375mm dia. combined sewer then in turn outlets further north into the existing 900mm dia. Gladstone Avenue concrete combined

collector sewer located north of this site. Waste water flow from this collector sewer then flows further west along Gladstone Avenue.

### C. Storm Flow

The storm-water outlet for the proposed development property will be the existing 375mm diameter combined sewer located on Cambridge Street North. Stormwater attenuation on site will be accomplished by means of rooftop storage with controlled roof drains that regulate flow off site.

Two (2) roof drains are proposed for this apartment building that will restrict maximum flow to a rate of 0.95 L/s each or  $2 \times 0.95 \text{ L/s} = 1.90 \text{ L/s}$  under a head of 150mm into the Cambridge Street North combined sewer. The calculated net allowable controlled release rate from this site is estimated at 5.40 L/s under the 2 year pre-development event.

At this development site, for storm events up to the 100-year event the maximum post development flow draining off-site is the controlled roof top flow plus the 100-year uncontrolled flow from the site draining to the front and peak sanitary flow which totals to 10.34 L/s ( $1.90 \text{ L/s} + 8.00 \text{ L/s} + 0.44 \text{ L/s}$ ) and is 4.94 L/s greater than the allowable flow of 5.40 L/s.

Based on the residential site plan from the owner's architect, the average post-development runoff coefficient is estimated at  $C = 0.76$  and  $A = 0.063$  hectares.

An estimation of the 2-year 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  $C_{pre} = 0.68$  or  $C_{allow} = 0.4$  (max) then SWM is required. So from our calculations, the  $C_{allow} = 0.4$  value will be used at  $t_c = 10$  minutes for pre-development allowable flow calculation off-site.

The pre-development flow rate calculated into a combined sewer for this residential area is the lesser of the two (2)-Year storm event where  $C_{allow} = 0.4$  (max.) runoff value and  $t_c = 10$  minutes or the average  $C_{pre}$  value which is 0.68 using  $t_c = 10$  minutes. Because this site  $C_{post} = 0.76$  and  $C_{allow} = 0.4$  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 0.76 is greater than the  $C_{allow} = 0.4$ .

The storage volume for the two (2)-year and up to the 100-year storm event will be stored by means of flat rooftop on the top of the fourth floor of the apartment building. Also refer to the site storm drainage report (Report No. R-821-155) for further details.

To control the two (2)-Year storm-water release rate off-site from roof top to a rate of 1.90 L/s, a site storage volume of approximately 3.95 m<sup>3</sup> minimum is required during the two (2)-year event.

During the two (2)-year storm event for the flat rooftop storage, the ponding depth of Roof Area 1 and 2 is estimated at 100 mm at the drain and 0mm at the roof perimeter, assuming a 1.5% minimum roof pitch to the drain. The rooftop storage available at Roof Area 1 is 2.67 m<sup>3</sup> and the rooftop storage available at Roof Area 2 is 2.47 m<sup>3</sup>, for a total of 5.14 m<sup>3</sup>, which is greater than the required volume of 3.95 m<sup>3</sup>.

To control the 100-year storm-water release rate off site from roof top to a rate of 1.90 L/s, a site storage volume of approximately 14.13 m<sup>3</sup> minimum is required during the 100-year event. During the 100-year storm event for the flat rooftop storage, the ponding depth of Roof Area 1 and 2 is estimated at 150 mm at the drain and 0 mm at the roof perimeter, assuming a 1.5% minimum roof pitch to the drain. The rooftop storage available at Roof Area 1 is 9.50 m<sup>3</sup> and the rooftop storage available at Roof Area 2 is 8.46 m<sup>3</sup>, for a total of 17.96 m<sup>3</sup>, which is greater than the required volume of 14.13 m<sup>3</sup>.

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. 821-155 G-1 and 821-155 SWM-1 respectively, the desirable two (2)-year storm and 100-year storm event detention volume of 5.14 m<sup>3</sup> and 17.96 m<sup>3</sup> respectively will be available on site.

At this development site for storm events up to the 100-year event, the maximum post development flow draining off-site is the controlled roof top flow plus the 100-year uncontrolled flow from the site draining to the front and peak sanitary flow totals to 10.34 L/s (1.90 L/s + 8.00 L/s + 0.44 L/s) which is 4.94 L/s greater than the allowable flow of 5.40 L/s and considered acceptable by the City of Ottawa for a small site of this lot size.

In comparing the pre-development flow of the current site conditions to the post development flow as shown on Page No. 6 and 7 of the Storm Drainage Report (Report No. R-821-155), the SWM regulated flow plus uncontrolled flow from the proposed site under the post development conditions at the 2-year event = 5.09 L/s and the 100 year event = 10.34 L/s whereupon both of the post development flow events are less than current pre-development flow estimate for the site at 2-Year  $p_{re}$  = 9.18 L/s and 100-Year  $p_{re}$  = 23.77 L/s. Therefore with this proposed development, stormwater flow is improved from that of the existing condition.

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, where upon both laterals are connected directly to the existing Cambridge Street North 375mm



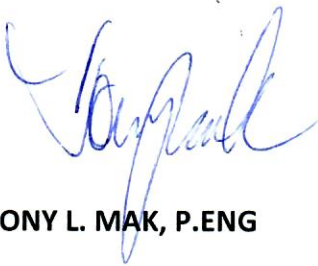
diameter storm sewer. The City of Ottawa recommends that pressurized drain pipe material be used in the building for the roof drain leader pipe in the event of surcharging in the City combined sewer system. Refer to the proposed site grading and servicing plan Dwg. 821-155 G-1 for details.

### **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 Cambridge Street North road right of way adjacent to this property. Siltsack shall be inspected every 2 to 3 weeks and after major storm. The deposits will be disposed of as per the requirements of the contract. See Dwg. #821-155 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**



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**FOUR STOREY APARTMENT BUILDING SITE**  
**LOT 15 WEST CAMBRIDGE STREET NORTH**  
**SOUTH OF STONE BOUNDARY**  
**R-PLAN 33**  
**370 CAMBRIDGE STREET NORTH**  
**CITY OF OTTAWA**

**APPENDIX A**  
**SITE PLAN AND LEGAL SURVEY PLAN**



**SWAYKOR'S REAL PROPERTY REPORT**  
**PART 1** Plan of  
**LOT 16** of  
**ARLINGTON AVENUE NORTH**  
**SOUTH STAKE BOUNDARY**  
**REGISTERED PLAN 33**  
**CITY OF OTTAWA**  
 Surveyed by Anns, O'Sullivan, Voleibekki Ltd

Scale 1:100  
 Metric  
 PART 1 OF THIS PLAN MUST BE READ IN CONJUNCTION WITH SURVEY REPORT DA 87-1, DATED 10/25/2021

**Surveyor's Certificate**  
 I, the undersigned, being duly sworn, do hereby certify that the above is a true and correct copy of the original plan as filed in the Office of the Registrar of Plans, City of Ottawa, Ontario, and that the same is a true and correct copy of the original plan as filed in the Office of the Registrar of Plans, City of Ottawa, Ontario.

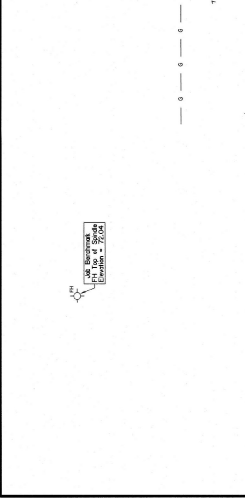
*Anns, O'Sullivan, Voleibekki Ltd*  
 Date: 19/02/21  
 Ottawa, Ontario

**Notes & Legend**

—○— Survey Instrument Trained  
 —○— Survey Instrument Untrained  
 —○— Street Elevation in Feet  
 —○— Street Elevation in Meters  
 —○— Concrete Pin  
 —○— Round Nail Pin  
 —○— Metal  
 —○— Brass  
 —○— Steel  
 —○— Aluminum  
 —○— PVC  
 —○— Cast Iron  
 —○— Cast Steel  
 —○— Cast Aluminum  
 —○— Cast Bronze  
 —○— Cast Inconel  
 —○— Cast Titanium  
 —○— Cast Stainless Steel  
 —○— Cast Invar  
 —○— Cast Zirconium  
 —○— Cast Nickel  
 —○— Cast Copper  
 —○— Cast Magnesium  
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 —○— Cast Copper  
 —○— Cast Magnesium  
 —○— Cast Lead  
 —○— Cast Tin  
 —○— Cast Zinc

**UTILITY NOTES**  
 1. This drawing is based on an underground utility map provided by the City of Ottawa, Ontario, dated 10/25/2021.  
 2. The utility map is based on a survey conducted by the City of Ottawa, Ontario, in 2018.  
 3. The utility map is based on a survey conducted by the City of Ottawa, Ontario, in 2018.  
 4. The utility map is based on a survey conducted by the City of Ottawa, Ontario, in 2018.  
 5. The utility map is based on a survey conducted by the City of Ottawa, Ontario, in 2018.

**ELEVATION NOTES**  
 1. Elevation notes are provided and are based on the 1985 datum.  
 2. The elevation notes are based on a survey conducted by the City of Ottawa, Ontario, in 2018.  
 3. The elevation notes are based on a survey conducted by the City of Ottawa, Ontario, in 2018.  
 4. The elevation notes are based on a survey conducted by the City of Ottawa, Ontario, in 2018.  
 5. The elevation notes are based on a survey conducted by the City of Ottawa, Ontario, in 2018.



ARLINGTON AVENUE  
 REGISTERED PLAN 33  
 LOT 13  
 LOT 14  
 LOT 15  
 LOT 16  
 CAMBRIDGE STREET NORTH  
 RAYMOND STREET

**RESOLUTION OF CONFLICT**  
 A PLAN SUBMITTED TO THE REGISTRAR OF PLANS  
 V-14480  
 THE PLAN IS NOT VALID UNLESS IT IS REGISTERED WITH THE REGISTRAR OF PLANS, CITY OF OTTAWA, ONTARIO.  
 THE REGISTRAR OF PLANS, CITY OF OTTAWA, ONTARIO, IS NOT RESPONSIBLE FOR THE ACCURACY OF THE INFORMATION CONTAINED IN THIS PLAN.

**ANNS, O'SULLIVAN, VOLEIBEKKI LTD.**  
 1000 BAYVIEW AVENUE, SUITE 100  
 SCARBOROUGH, ONTARIO M1S 5B5  
 TEL: (416) 291-8800 FAX: (416) 291-8809  
 WWW.AOSVLTD.COM

**Notes & Legend**

—○— Survey Instrument Trained  
 —○— Survey Instrument Untrained  
 —○— Street Elevation in Feet  
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 —○— Cast Nickel  
 —○— Cast Copper  
 —○— Cast Magnesium  
 —○— Cast Lead  
 —○— Cast Tin  
 —○— Cast Zinc

**Notes on Off-Drawings:**  
 The center of the lot is located at the intersection of the centerlines of Raymond Street and Cambridge Street North. The lot is bounded by the centerlines of these streets. The lot is bounded by the centerlines of these streets. The lot is bounded by the centerlines of these streets.

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CITY OF OTTAWA**

**APPENDIX B  
SITE PRE-DEVELOPMENT CONDITION  
GOOGLE IMAGE (2019)  
AND  
AERIAL PHOTOGRAPHY 2021 (GEOOTTAWA)**



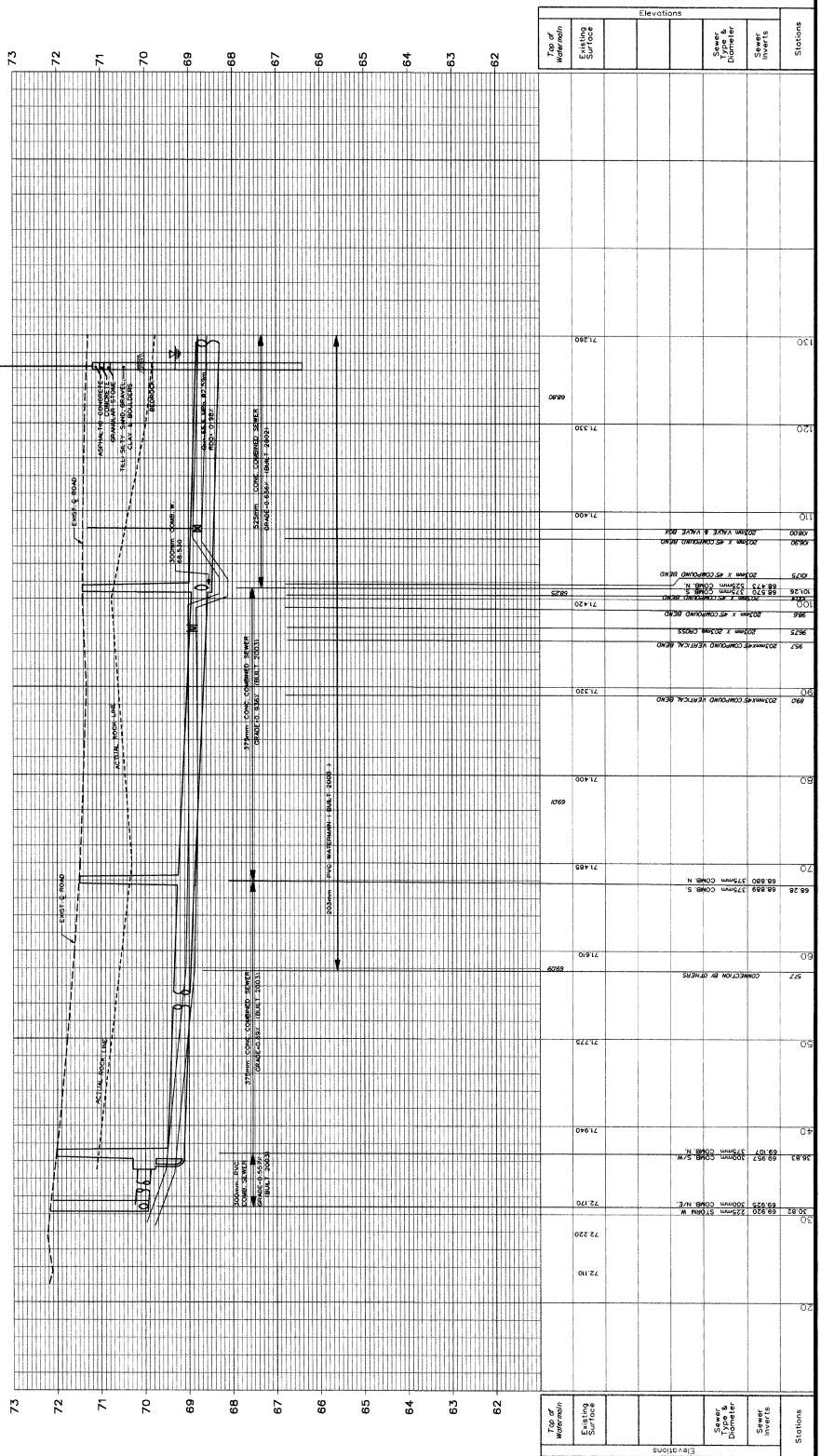
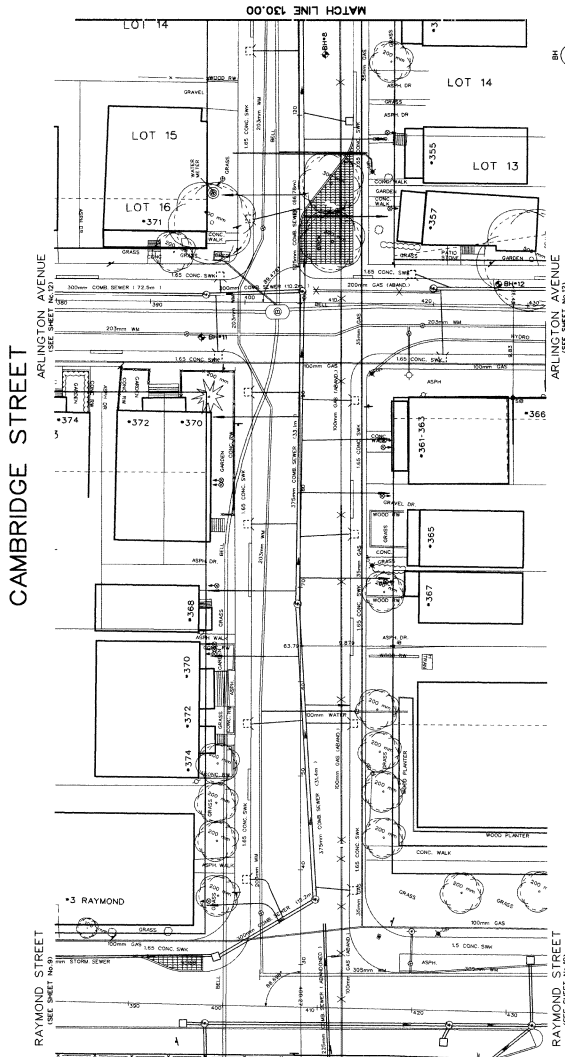






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**APPENDIX C  
CAMBRIDGE STREET NORTH  
CITY OF OTTAWA  
PLAN AND PROFILE  
AND  
UCC DRAWINGS**



**Revisions:**

No.	Date	Description	Drawn By	Approved By

**Design:**

DESIGNED BY: I. BHATIA  
 CHECKED BY: J. FRANK  
 DRAWN BY: M. LANGE & PARTNERS

**DATE:** 2012  
**SCALE:** AS SHOWN

**Find Measurement & Rehabil Information**

CONTRACTOR: WATSON & SEWER  
 PROJECT NO.: 02-3335  
 SHEET NO.: 01/1011

**As-Built Notes:**

1. Soil information taken from: Mel Levas Engineering Ltd (2001)
2. This plan supersedes in whole or in part plan #855-019-0102-388
3. While illustrations and utility shows are taken from the best available information, they should be approved prior to construction.
4. See section notes for details regarding construction of the existing sewer & watermain.
5. Benchmarks taken prior to construction.
6. See typical cross sections for road structure materials/details.
7. Ministry of Environment Approval # Sewer: 0278-5M-02CT Water: 5281-5M-01BU

**Legal Survey Notes:**

Boundary information shown here has been completed and calculated from distances shown to survey monuments and for reference purposes only. Survey monuments may not define property boundaries. No warranty is made as to the accuracy of the information shown here. THIS IS NOT A PLAN OF SURVEY. It is intended for use as a guide only. It is not to be used for any legal purposes. It is not to be used for any legal purposes. It is not to be used for any legal purposes.

**Ottawa**  
 Transportation, Utilities and Public Works  
 Infrastructure Services Branch  
 10 LAUREL AVENUE WEST, OTTAWA, ONTARIO, K1P 0J1

**Rosemarie Leclair**  
 CONSULTANT

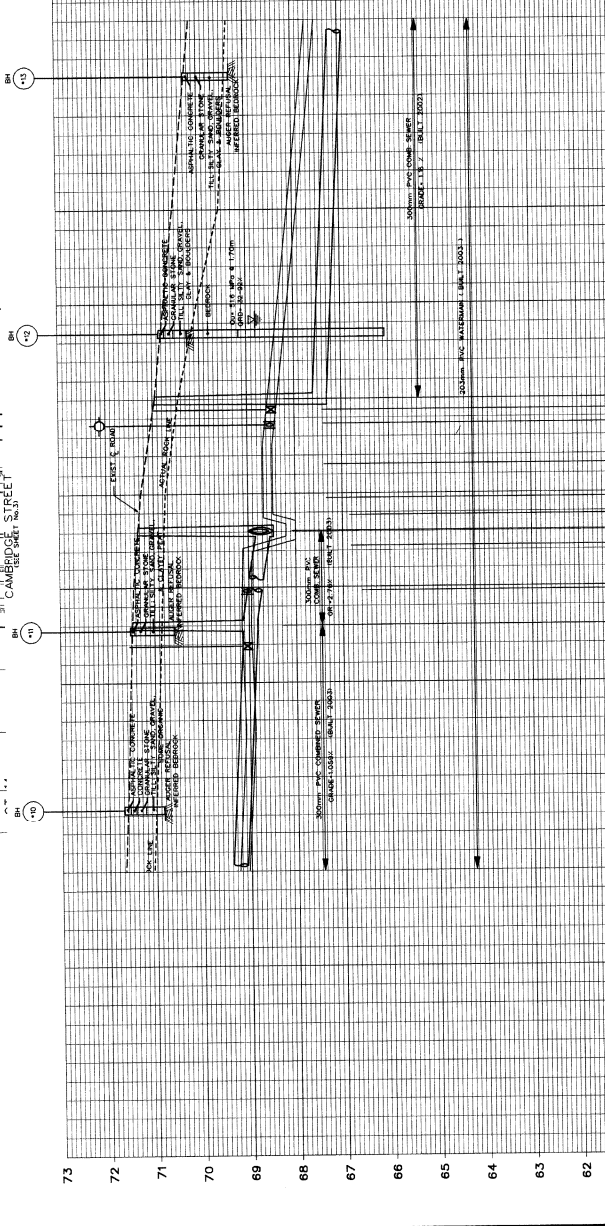
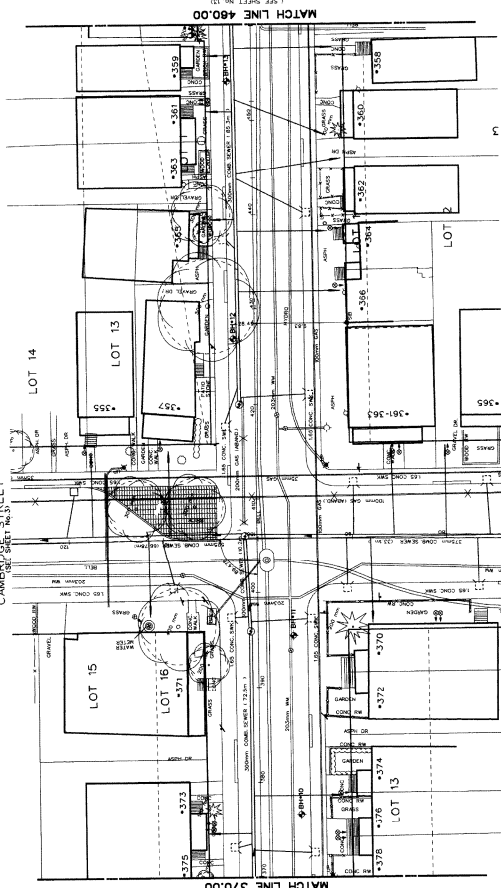
**Richard Hewitt, P.Eng.**  
 CONSULTANT

**CAMBRIDGE STREET**  
 RAYMOND STREET TO STA. 130.00

PROJECT NO.: 02-3335  
 SHEET NO.: 01/1011  
 DATE: 2012  
 SCALE: AS SHOWN

Top of Manhole	Existing Surface	Station
71.90	72.220	0+00
72.10	72.220	0+10
72.10	72.220	0+20
72.10	72.220	0+30
72.10	72.220	0+40
72.10	72.220	0+50
72.10	72.220	0+60
72.10	72.220	0+70
72.10	72.220	0+80
72.10	72.220	0+90
72.10	72.220	1+00

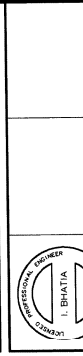




Top of Watermain	Existing Surface	Elevations	Station
			370.00
			380.00
			390.00
			400.00
			410.00
			420.00
			430.00
			440.00
			450.00
			460.00
			470.00
			480.00

No.	Date	Description	Drawn By	Approved By

Design	Checked By	Date	Checked By	Date



**Project Information**  
 Project Name: 3335 ARLINGTON AVENUE  
 Client: ...  
 Date: ...

- At-Built Notes:**
1. Scale information taken from ...
  2. This plan supersedes ...
  3. While illustrations and utilities shown are taken from ...
  4. The actual work line was recorded during construction of the existing ...
  5. Boreholes taken prior to construction.
  6. See typical cross sections for road structure materials depths.
  7. Ministry of Environment Approval # ...

**Legal Survey Notes:**

This plan has been prepared and calculated from ...

**Ottawa**  
 Transportation, Utilities and Public Works  
 Infrastructure Services Branch  
 10 LAUREL AVENUE WEST, OTTAWA, ONTARIO, K9P 1J7

**Rosemarie Leclair**  
 Project Manager

**Richard Hewitt, P.Eng.**  
 Branch Director

**ARLINGTON AVENUE**  
 STA.370.00 TO STA.480.00

02-3335  
 3335  
 1150  
 1150

Top of Watermain	Existing Surface	Elevations	Station
			370.00
			380.00
			390.00
			400.00
			410.00
			420.00
			430.00
			440.00
			450.00
			460.00
			470.00
			480.00



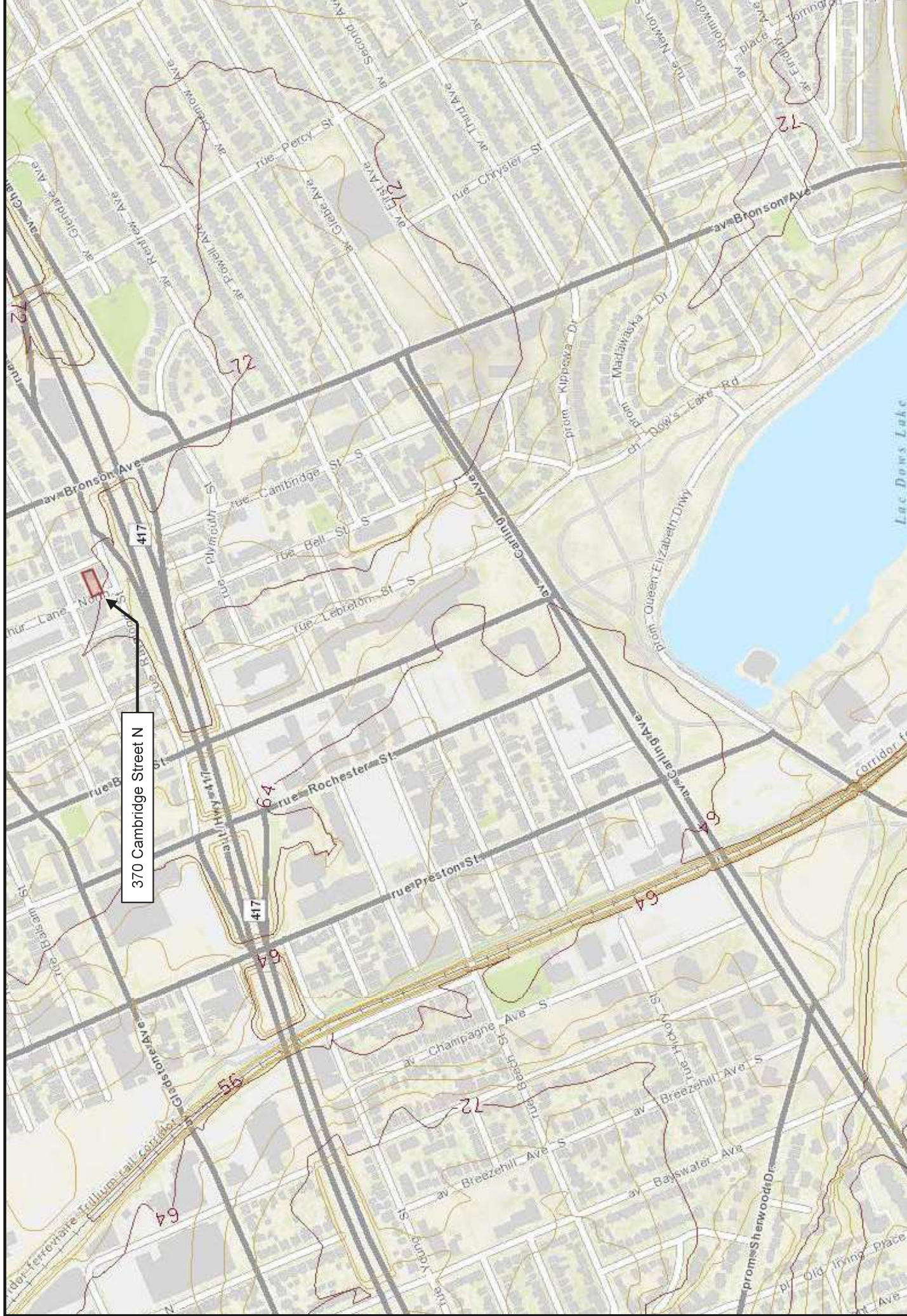
**PROPOSED  
FOUR STOREY APARTMENT BUILDING SITE  
LOT 15 WEST CAMBRIDGE STREET NORTH  
SOUTH OF STONE BOUNDARY  
R-PLAN 33  
370 CAMBRIDGE STREET NORTH  
CITY OF OTTAWA**

**APPENDIX D**

**CITY OF OTTAWA**

- **ELEVATION CONTOURS (FIGURE 1)**
- **SITE SURVEY PLAN**
- **SITE PLAN AND ARCHITECTURAL DRAWINGS**
- **OFM FIRE FLOW CALCULATIONS**
- **OFM EXPOSURE DISTANCES (FIGURE 2)**
- **WATER DATA BOUNDARY CONDITIONS**
- **SUPPORTING HYDRAULIC CALCULATIONS**
- **HYDRANT SPACING (FIGURE 3)**

**ATTACHMENT 1 : FIGURE 1 – ELEVATION CONTOURS**



**Figure 1: Elevation Contours**

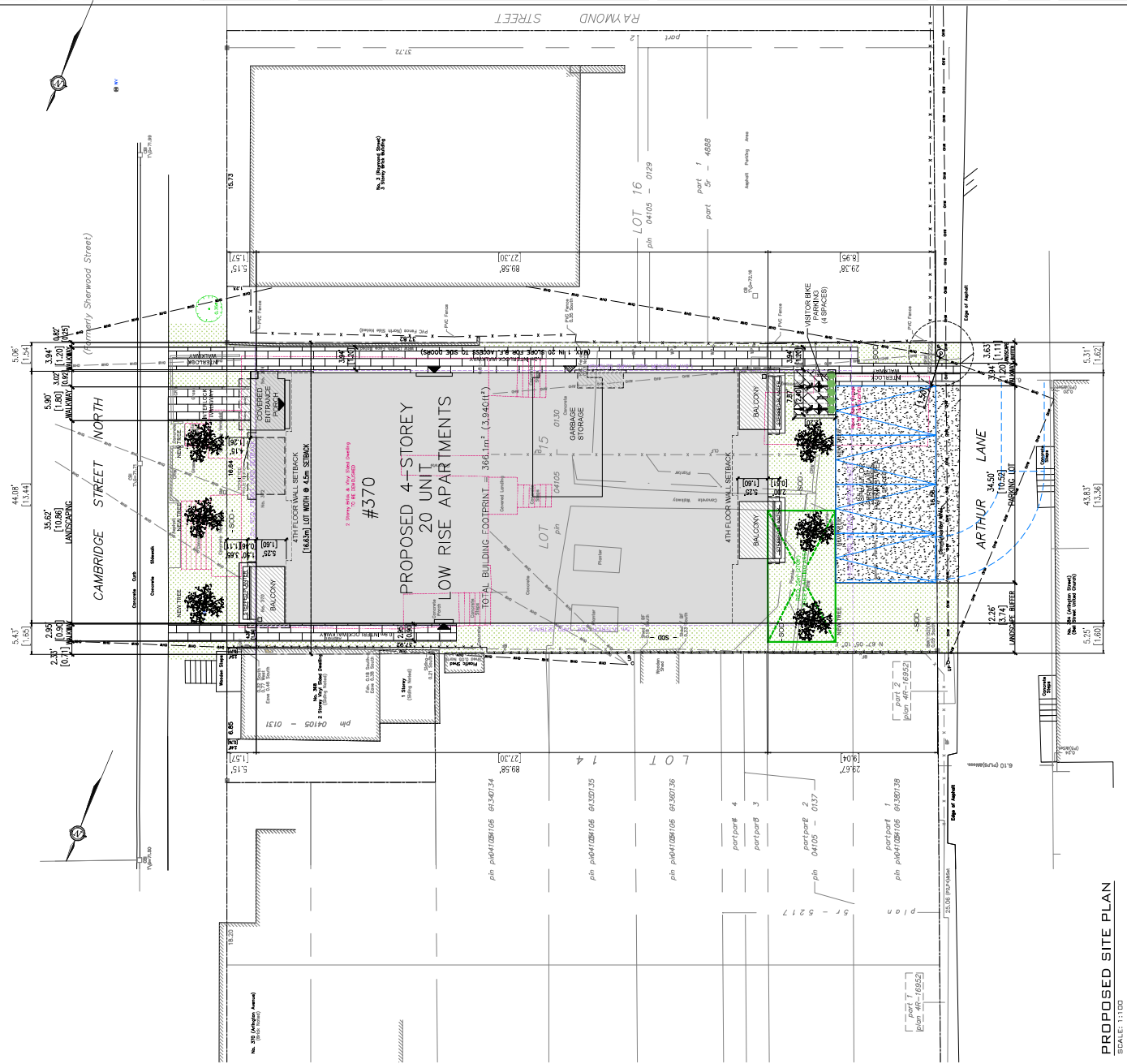
Source: geoOttawa 2022; Contains information licensed under the Open Government Licence – City of Ottawa.



## **ATTACHMENT 2 : SITE SURVEY PLAN**



**ATTACHMENT 3 : SITE PLAN AND ARCHITECTURAL DRAWINGS**



**VEHICLE PARKING:**  
 4 SURFACE PARKING SPACES (REQ. 0408)  
 4 BICYCLE PARKING SPACES (REQ. 0408)  
 4 COVERED BIKE PARKING SPACES (REQ. 0408)

**LOT DETAILS:**  
 LOT AREA: 427.38 m<sup>2</sup> (4,628.58 sq ft)  
 LOT DEPTH: 57.15 m (613.12 ft)  
 LOT WIDTH: 7.42 m (80.74 ft)  
 FRONT YARD AREA: 24.8m<sup>2</sup> (267.48 sq ft)  
 REAR YARD AREA: 148.3m<sup>2</sup> (1,601.18 sq ft)  
 AREA OF SOFT LANDSCAPING: 75.3m<sup>2</sup> (814.11 sq ft) (50% OF REAR YARD AREA) (REQ. 0408)  
 4 SURFACE PARKING SPACES ACCESSED FROM REAR LANE

**BUILDING DETAILS:**  
 BUILDING HEIGHT: 14.5m (47.57 ft)  
 BUILDING FOOTPRINT: 366.1m<sup>2</sup> (3,946.11 sq ft)  
 DOUBLE-SEDED 4th FLOOR  
 4th FLOOR WALL SETBACK  
 INTERNAL BIKE ROOMS (10 SPACES)  
 4 BALCONIES (ALL UNITS EXCEPT BACHELORS)

**UNIT DETAILS:**  
 20 BACHELOR UNITS (8 B.F.)  
 20 2-BEDROOM UNITS (8 B.F.)

**GENERAL NOTES:**  
 1. THE OPERATIONAL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CITY OF OTTAWA'S ZONING BY-LAW AND THE CITY OF OTTAWA'S BUILDING BY-LAW.  
 2. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED.  
 3. THE PROPOSED BUILDING SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE CITY OF OTTAWA'S BUILDING BY-LAW AND THE CITY OF OTTAWA'S ZONING BY-LAW.  
 4. THE OWNER SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE CITY OF OTTAWA.

**SECTION 11 - BICYCLE PARKING SPACE DESIGN AND INSTALLATION**  
 1.1. THE BICYCLE PARKING SPACES SHALL BE DESIGNED AND INSTALLED IN ACCORDANCE WITH THE CITY OF OTTAWA'S BICYCLE PARKING BY-LAW.  
 1.2. THE BICYCLE PARKING SPACES SHALL BE PROVIDED FOR EACH UNIT.  
 1.3. THE BICYCLE PARKING SPACES SHALL BE PROVIDED FOR EACH UNIT.  
 1.4. THE BICYCLE PARKING SPACES SHALL BE PROVIDED FOR EACH UNIT.

**SECTION 12 - MINIMUM VEHICLE PARKING SPACES**  
 12.1. THE MINIMUM VEHICLE PARKING SPACES SHALL BE PROVIDED FOR EACH UNIT.  
 12.2. THE MINIMUM VEHICLE PARKING SPACES SHALL BE PROVIDED FOR EACH UNIT.  
 12.3. THE MINIMUM VEHICLE PARKING SPACES SHALL BE PROVIDED FOR EACH UNIT.

**KEY PLAN**

ADDRESS: 2200 CAMBRIDGE STREET NORTH, UNIT 101, OTTAWA, ONTARIO  
 LEGAL DESCRIPTION: LOT 101, PART OF THE SOUTH OF STURGE BOUNDARY, WARD 14, DISTRICT 10  
 ZONING: M10-1 (MEDIUM DENSITY RESIDENTIAL)

TYPE OF PARKING	ZONING (REQ.)	PROPOSED
VEHICLE PARKING	4	4
BICYCLE PARKING	4	4
COVERED BIKE PARKING	4	4
LOT AREA	427.38m <sup>2</sup>	427.38m <sup>2</sup>
FRONT YARD AREA	24.8m <sup>2</sup>	24.8m <sup>2</sup>
REAR YARD AREA	148.3m <sup>2</sup>	148.3m <sup>2</sup>
AREA OF SOFT LANDSCAPING	75.3m <sup>2</sup>	75.3m <sup>2</sup>
4th FLOOR WALL SETBACK	1.5m	1.5m
REAR YARD SETBACK	1.5m	1.5m
FRONT YARD SETBACK	1.5m	1.5m

**SECTION 13 - MINIMUM VEHICLE PARKING SPACES**  
 13.1. THE MINIMUM VEHICLE PARKING SPACES SHALL BE PROVIDED FOR EACH UNIT.  
 13.2. THE MINIMUM VEHICLE PARKING SPACES SHALL BE PROVIDED FOR EACH UNIT.  
 13.3. THE MINIMUM VEHICLE PARKING SPACES SHALL BE PROVIDED FOR EACH UNIT.

**SECTION 14 - MINIMUM VEHICLE PARKING SPACES**  
 14.1. THE MINIMUM VEHICLE PARKING SPACES SHALL BE PROVIDED FOR EACH UNIT.  
 14.2. THE MINIMUM VEHICLE PARKING SPACES SHALL BE PROVIDED FOR EACH UNIT.  
 14.3. THE MINIMUM VEHICLE PARKING SPACES SHALL BE PROVIDED FOR EACH UNIT.

**SECTION 15 - MINIMUM VEHICLE PARKING SPACES**  
 15.1. THE MINIMUM VEHICLE PARKING SPACES SHALL BE PROVIDED FOR EACH UNIT.  
 15.2. THE MINIMUM VEHICLE PARKING SPACES SHALL BE PROVIDED FOR EACH UNIT.  
 15.3. THE MINIMUM VEHICLE PARKING SPACES SHALL BE PROVIDED FOR EACH UNIT.

**SECTION 16 - MINIMUM VEHICLE PARKING SPACES**  
 16.1. THE MINIMUM VEHICLE PARKING SPACES SHALL BE PROVIDED FOR EACH UNIT.  
 16.2. THE MINIMUM VEHICLE PARKING SPACES SHALL BE PROVIDED FOR EACH UNIT.  
 16.3. THE MINIMUM VEHICLE PARKING SPACES SHALL BE PROVIDED FOR EACH UNIT.

# PRELIMINARY CONCEPT FOR REVIEW & COMMENTS

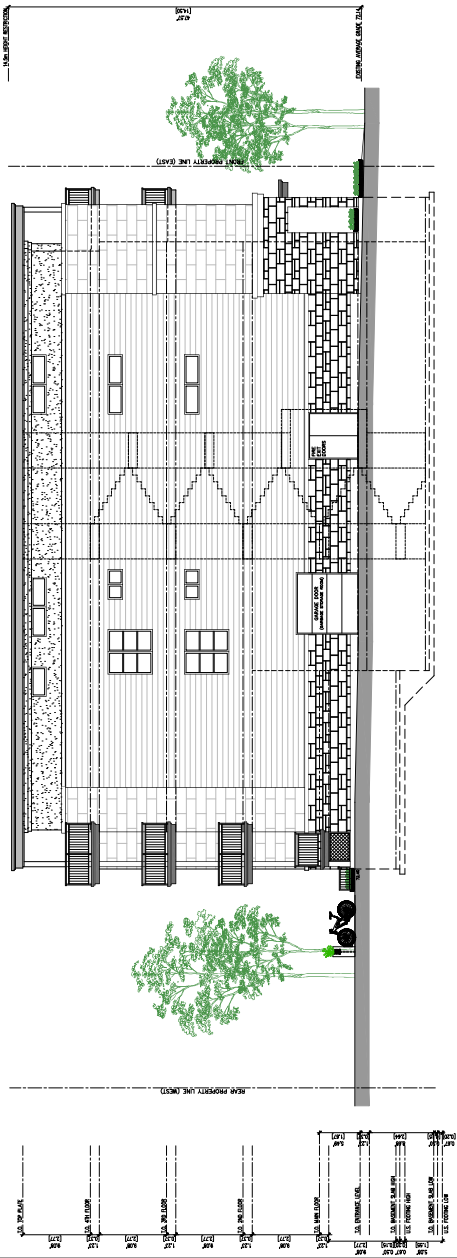


**MIRROA DESIGN**  
INCORPORATED SINCE 1988  
CUSTOM HOME DESIGN  
PROJECT MANAGEMENT

NO. COURSE DATE  
DITAMA, ONTARIO  
L4H 4P7  
TEL: 613-292-8553  
FAX: 613-292-9085  
CONTACT@MIRROADESIGN.COM  
WWW.MIRROADESIGN.COM



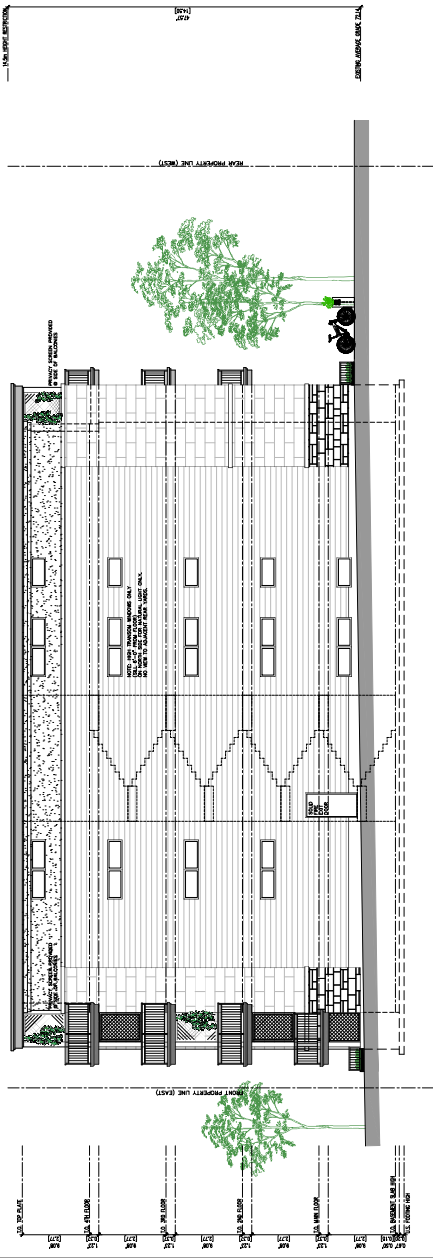
FRONT ELEVATION (EAST)  
SCALE: 1/8" = 1'-0"



LEFT SIDE ELEVATION (SOUTH)  
SCALE: 1/8" = 1'-0"



REAR ELEVATION (WEST)  
SCALE: 1/8" = 1'-0"



RIGHT SIDE ELEVATION (NORTH)  
SCALE: 1/8" = 1'-0"

**GENERAL NOTES:**

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF OTTAWA'S ZONING BY-LAW AND THE NATIONAL BUILDING CODE OF CANADA.
2. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF OTTAWA'S ZONING BY-LAW AND THE NATIONAL BUILDING CODE OF CANADA.
3. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF OTTAWA'S ZONING BY-LAW AND THE NATIONAL BUILDING CODE OF CANADA.
4. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF OTTAWA'S ZONING BY-LAW AND THE NATIONAL BUILDING CODE OF CANADA.

NO.	DESCRIPTION & DATE	REVISIONS
1		

**SHEET TITLE:**  
970 CAMBRIDGE STREET NORTH  
OTTAWA, ON  
PROPOSED 4-STORY, LOW-RISE  
APARTMENT BUILDING

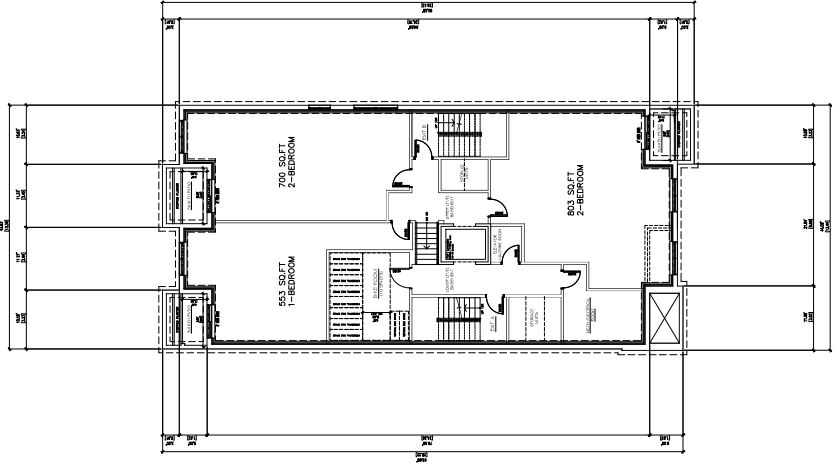
**SHEET TITLE:**  
PROPOSED ELEVATIONS

**SCALE:** AS SHOWN  
**DWG. NO.:**  
**DATE:** DECEMBER 2021  
**PRINT DATE:**

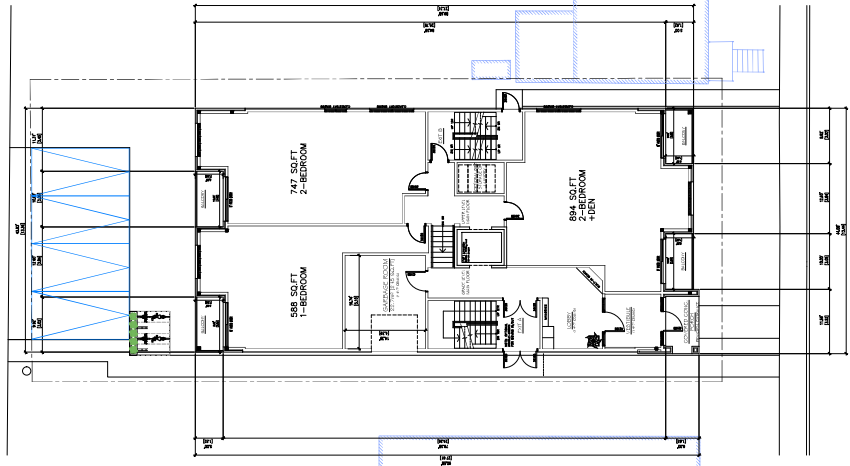
**A1.2**

**PRELIMINARY CONCEPT FOR REVIEW & COMMENTS**

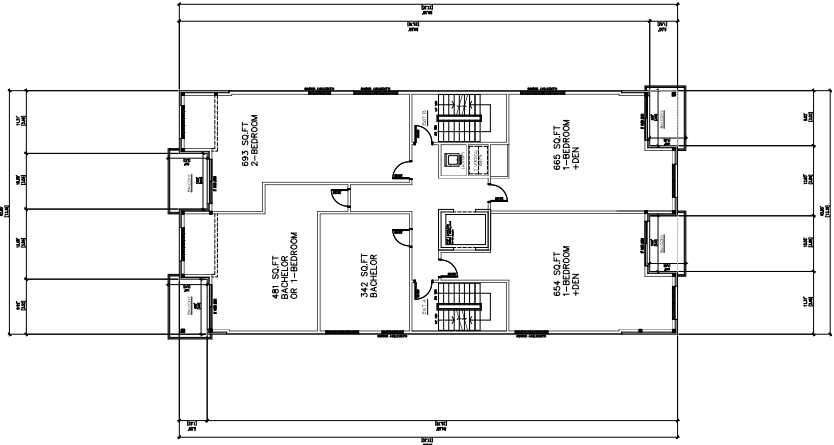
**MD**  
**MIRROA DESIGN**  
 INCORPORATED SINCE 1988  
 CUSTOM HOME DESIGN  
 PROJECT MANAGEMENT  
 150 COURSE DATE  
 UNIT #7  
 OTTAWA, ONTARIO  
 K2E 7V7  
 TEL: 613-274-2553  
 FAX: 613-274-7085  
 CONTACT@MIRROADESIGN.COM  
 WWW.MIRROADESIGN.COM



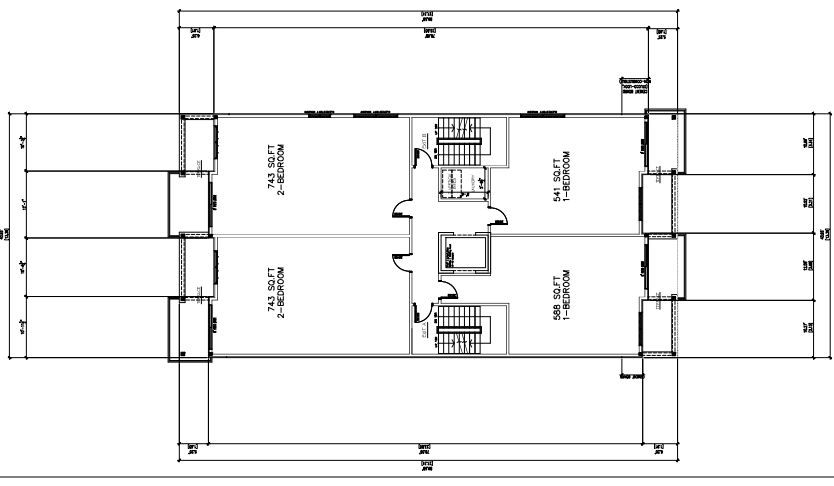
**BASEMENT PLAN**  
 SCALE: 3/32" = 1'-0"



**GROUND FLOOR PLAN**  
 SCALE: 3/32" = 1'-0"



**2-3 FLOOR PLAN**  
 SCALE: 3/32" = 1'-0"



**4TH FLOOR PLAN**  
 SCALE: 3/32" = 1'-0"

**GENERAL NOTES:**  
 1. THIS DRAWING IS A PRELIMINARY CONCEPT FOR REVIEW AND COMMENTS. IT IS NOT TO BE USED FOR CONSTRUCTION.  
 2. ALL WORK AND MATERIALS TO BE IN ACCORDANCE WITH THE 2018 NATIONAL BUILDING CODE.  
 3. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED.  
 4. SEE NOTES ON THE DRAWING FOR FURTHER INFORMATION.

NO.	DESCRIPTION & DATE	REVISIONS
1		

**APP TITLE:**  
 370 CAMBRIDGE STREET NORTH  
 PROPOSED 4-STORY LENSURE  
 APARTMENT BUILDING

**SHEET TITLE:**  
 PROPOSED FLOOR PLANS

SCALE: AS SHOWN	DWG. NO.:
DRAWN: N.D.	
CHECKED:	
DATE: DECEMBER 2021	

**A2.2**  
 PRINT DATE:

## **ATTACHMENT 4 : OFM FIRE FLOW CALCULATIONS**



# 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: 370 Cambridge St. N  
 Date: May 19, 2022  
 Data inputted by: Alexandre Mineault-G., M.A.Sc., ing., P.Eng.  
 Data reviewed by: Kevin Alemany, M.A.Sc., P.Eng.

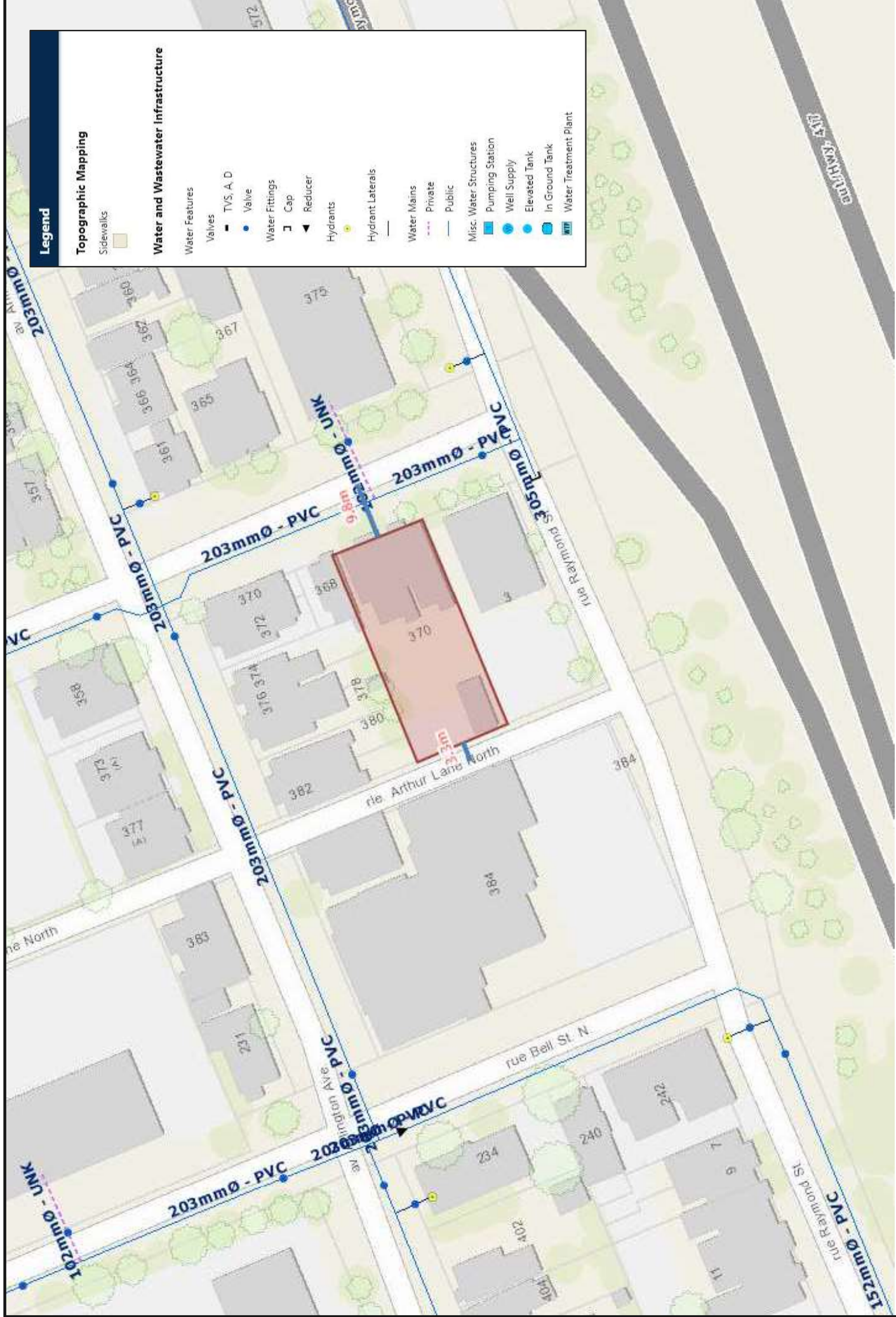
Fire Flow Calculation #: 1  
 Building Type/Description/Name: Residential

**Table A: Office of the Fire Marshal Determination of Required Fire Protection Water Supply**

Step	Task	Term	Options	Multiplier Associated with Option	Choose:	Value Used	Unit
<b>1 General Building Details</b>							
1.1	Enter Number of Storeys	Number of Floors/Storeys in the Unit (incl. basement):			5	5	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.)	20	Units
			Townhouse - indicate # of units	0			
			Other (Comm, Ind, Apt etc.)	20			
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
<b>2 Determining Water Supply Coefficient K</b>							
2.1	Choose Type of Construction	Type of Construction	<b>Type of Construction</b>				
			Non-combustible construction + fire separations + fire-resistance ratings in accordance with Section 3.2.2 of OBC	Type I	Type IV	N/A	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)	<b>Building Classification</b>				
			A-2, B-1, B-2, B-3, C, D	23	C	A-2, B-1, B-2, B-3, C, D	N/A
			A-4, F-3	28			
			A-1, A-3	32			
			E, F-2	39			
F-1	53						
2.3	Water Supply Coefficient (K)	Water Supply Coefficient K			23	23	N/A
<b>3 Determining Building Volume V</b>							
3.1	Enter Ground Floor Area of One Unit	<b>Floor Space Area</b>					
		Average Floor Area (A) :			340	340	Area in Square Meters (m <sup>2</sup> )
3.2	Building Height (h)	<b>Building Height</b>					
		Bottom Elevation :			0.0	15.7	Height in Meters (m)
		Meters (m)			15.7		
Top Elevation :			Meters (m)				
3.3	Building Volume (V)	Building Volume $V = A * h$			5,340	5,340	Volume in Meters Cube (m <sup>3</sup> )
<b>4 Determining Spatial Coefficient S</b>							
4.1	Choose Exposure Distances from Building to Property Line	Exposure Distance from Building to Property Line in Meters (m)	<b>North Side</b>		0.50	1.22	Distance in Meters (m)
			Property Line to Street Centreline (Street Facing)	1.5			
			Total Exposure Distance	0			
			<b>East Side</b>		0.00		
			Property Line to Street Centreline (Street Facing)	1.5			
			Total Exposure Distance	9.8			
			<b>South Side</b>		0.50		
			Property Line to Street Centreline (Street Facing)	1.5			
			Total Exposure Distance	11.3			
			<b>West Side</b>		0.22		
Property Line to Street Centreline (Street Facing)	1.5						
Total Exposure Distance	4.5						
<b>West Side</b>		0.22					
Property Line to Street Centreline (Street Facing)	4.5						
Total Exposure Distance	3.3						
<b>West Side</b>		0.22					
Property Line to Street Centreline (Street Facing)	7.8						
Total Exposure Distance	7.8						
4.2	Total Spatial Coefficient	Total Spatial Coefficient $S_{tot} = 1 + \sum S_x$			2.00	2.00	N/A
<b>5 Determining Required Minimum Supply of Water Q and Fire Flow</b>							
5.1	Obtain Required Fire Volume, Flow & Duration	<i>Minimum Supply of Water, rounded to nearest 1,000 L; <math>Q = K^*V^*S_{tot}</math></i>				246,000 L	
		<i>Required Minimum Water Supply Flow Rate (L/min)</i>				6,300 L/min	
		<i>Required Minimum Water Supply Flow Rate (L/s)</i>				105 L/s	
		<i>Required Minimum Duration of Fire Flow (min)</i>				40 min	



**ATTACHMENT 5 : FIGURE 2 – OFM EXPOSURE DISTANCES**



**Figure 2: OFM Exposure Distances (Property Line to Street)**

Source: geoOttawa 2022; Contains information licensed under the Open Government Licence – City of Ottawa.

**ATTACHMENT 6 : WATER DATA BOUNDARY CONDITIONS**

## Mineault-Guitard, Alexandre

---

**From:** TL MaK <tlmakecl@bellnet.ca>  
**Sent:** Thursday, May 26, 2022 10:35 AM  
**To:** Alemany, Kevin  
**Cc:** Mineault-Guitard, Alexandre  
**Subject:** RE: 370 Cambridge Street North - Water Boundary Conditions Request  
**Attachments:** 370 Cambridge Street North May 2022.pdf

Hi Kevin,

Attached please find water boundary conditions received today from the City of Ottawa regarding 370 Cambridge Street North.

Could you please proceed with your calculations at your earliest convenience for our serviceability report preparation.

Let us know if you have any questions or comments.

Regards,

Tony Mak

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](mailto:tlmakecl@bellnet.ca)

---

**From:** Bakhit, Reza [<mailto:reza.bakhit@ottawa.ca>]  
**Sent:** May 26, 2022 8:46 AM  
**To:** TL MaK  
**Subject:** RE: 370 Cambridge Street North - Water Boundary Conditions Request

Hi Tony,

The following are boundary conditions, HGL, for hydraulic analysis at 370 Cambridge Street N (zone 1W) assumed to be connected to the 203 mm watermain on Cambridge Street North (see attached PDF for location).

Minimum HGL: 107.0 m

Maximum HGL: 115.2 m

Max Day + Fire Flow (105 L/s): 108.8 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,

**Reza Bakhit, P.Eng, C.E.T**

Project Manager

Planning, Real Estate and Economic Development Department / Direction générale de la planification, des biens immobiliers et du développement économique

Development Review - Central Branch

City of Ottawa | Ville d'Ottawa

110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1

613.580.2424 ext./poste 19346, [reza.bakhit@ottawa.ca](mailto:reza.bakhit@ottawa.ca)

**Please note: Given the current pandemic, I will be working from home until further notice; reaching me by email is the easiest. I will be checking my voicemail, just not as frequently as I normally would be.**

---

**From:** TL MaK <tlmakecl@bellnet.ca>

**Sent:** Thursday, May 19, 2022 5:28 PM

**To:** Bakhit, Reza <reza.bakhit@ottawa.ca>

**Subject:** RE: 370 Cambridge Street North - 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.**

**ATTENTION : Ce courriel provient d'un expéditeur externe. Ne cliquez sur aucun lien et n'ouvrez pas de pièce jointe, excepté si vous connaissez l'expéditeur.**

Hi Reza,

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 370 Cambridge Street N is a 4-storey residential apartment building with a basement. The building contains twenty (20) total units, namely two (2) bachelor units, ten (10) 1-bedroom units, six (6) 2-bedroom units, and two (2) 3-bedroom units. The average floor area is approximately 338 m<sup>2</sup>, for a total gross floor area of approximately 1,352 m<sup>2</sup> (excluding the basement). The building is to be serviced by the 200 mm diameter watermain along Cambridge Street N.

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). Maximum day (MXDY) demands were calculated by multiplying AVDY demands by a factor of 2.5. Peak hour (PKHR) demands were calculated by multiplying MXDY by a factor of 2.2. 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 Demand**

Unit Type	Unit Count	PPU	Consumption Rate (L/c/d)	AVDY		MXDY		PKHR	
				L/d	L/s	L/d	L/s	L/d	L/s
Apartment, Bachelor	2	1.4	280	784	0.01	1,960	0.02	4,312	0.05

Apartment, 1-Bedroom	10	1.4	3,920	0.05	9,800	0.11	21,560	0.25
Apartment, 2-Bedroom	6	2.1	3,528	0.04	8,820	0.10	19,404	0.22
Apartment, 3-Bedroom	2	3.1	1,736	0.02	4,340	0.05	9,548	0.11
<b>Total</b>	<b>20</b>		<b>9,968</b>	<b>0.12</b>	<b>24,920</b>	<b>0.29</b>	<b>54,824</b>	<b>0.63</b>

The City had previously indicated that the City's Fire Marshall and various City departments are currently reviewing fire flow requirements for low- and mid-rise buildings. As per the City of Ottawa's Water Design Guidelines, the FUS method is to be used for fire flow requirements affecting watermain sizing; with regards to fire protection on private property and not requiring new watermains, these are covered by the Ontario Building Code (OBC).

As such, the fire flow requirement was also determined following the OBC's Office of the Fire Marshal (OFM) method. The proposed building will be of wood frame construction, where floors are fire separations, but without fire-resistance ratings. The resulting total required fire flow (RFF) for a sprinklered building is 6,300 L/min (105 L/s) for a minimum duration of 40 min.

In summary:

- AVDY = 9,968 L/d (0.12 L/s);
- MXDY = 24,920 L/d (0.29 L/s);
- PKHR = 54,824 L/d (0.63 L/s); and
- Fire Flow = 6,300 L/min (105 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 good day.

Regards,

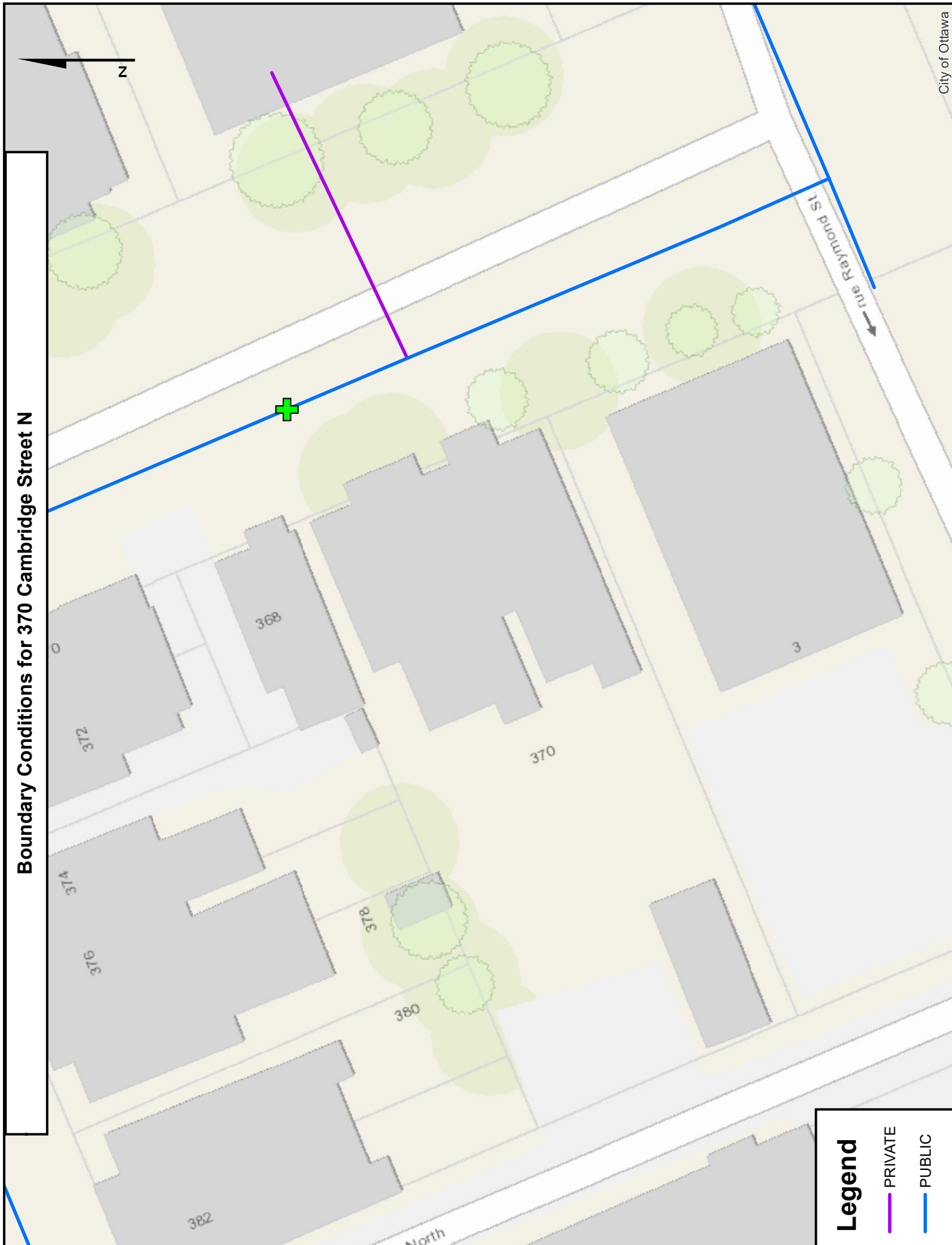
Tony Mak

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: [tmakecl@bellnet.ca](mailto:tmakecl@bellnet.ca)

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Boundary Conditions for 370 Cambridge Street N





## **ATTACHMENT 7 : SUPPORTING HYDRAULIC CALCULATIONS**



### Supporting Hydraulic Calculations

Stantec Project #: 163401084

Project Name: 370 Cambridge Street N

Date: May 27, 2022

Data inputted by: Alexandre Mineault-G, M.A.Sc., ing., P.Eng.

Data reviewed by: Kevin Alemany, M.A.Sc., P.Eng.

#### Boundary Conditions provided by the City:

Scenario 1: Peak Hour (Min HGL): 107.0 m;

Scenario 2: Average Day (Max HGL): 115.2 m; and

Scenario 3: Maximum Day plus Fire Flow: 108.8 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:

$$HGL(m) = 107 \text{ and } hz (m) = 71.7.$$

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

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

$$\therefore hp = 107.0 - 71.7 \text{ m} = 35.3 \text{ m}.$$

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:  $\rho$  = density of water = 1000 kg/m<sup>3</sup>; and g = gravitational acceleration = 9.81 m/s<sup>2</sup>.

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

$$P (\text{kPa}) = (1000 * 9.81 * 35.3) / 1000$$

$$\therefore P = 346 \text{ kPa}.$$

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

$$P = 50 \text{ psi}.$$

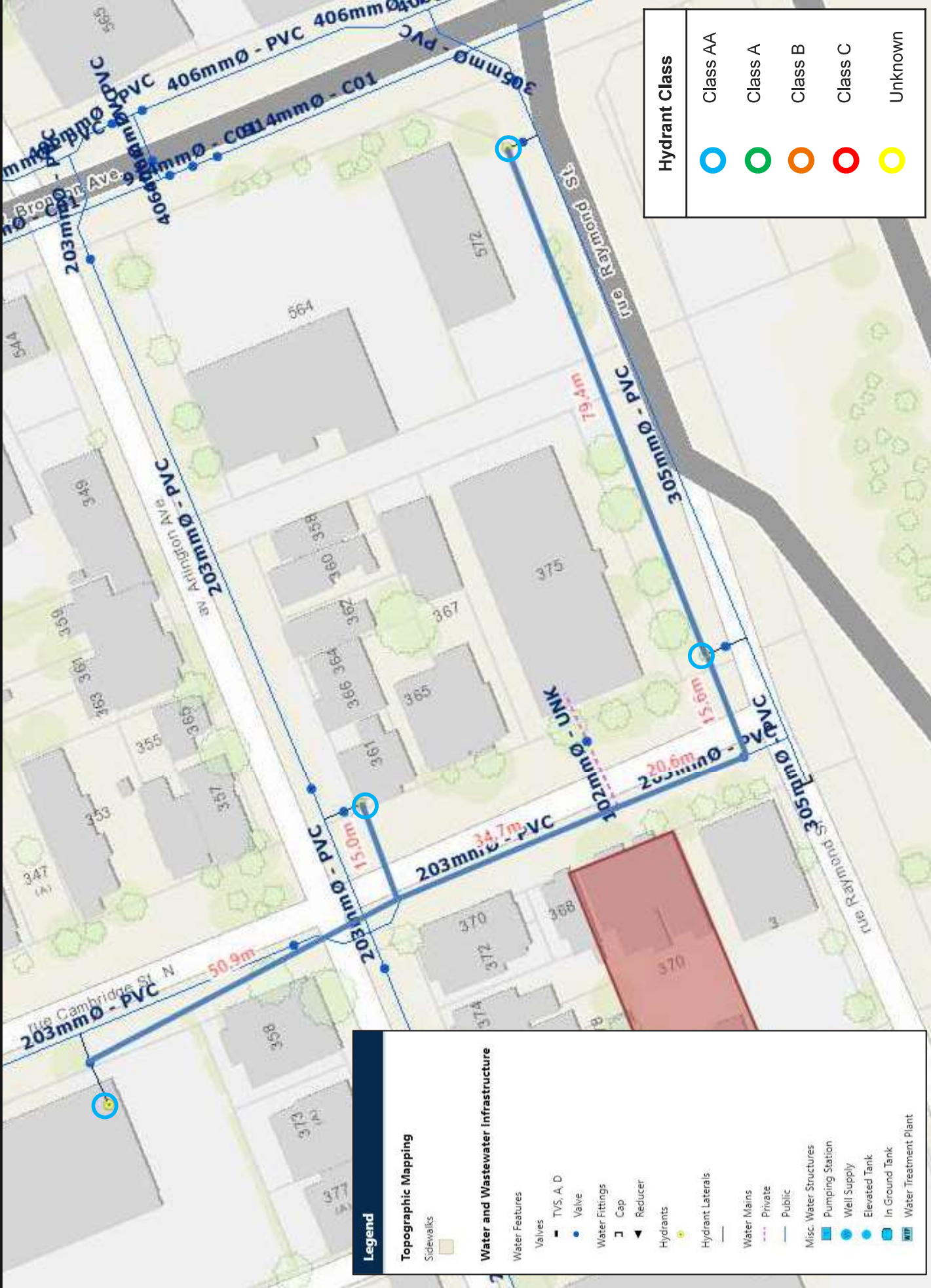
Applying the same procedures, the pressures under Scenario 2 and Scenario 3 are calculated as follows:

Scenario 2: P = 62 psi; and Scenario 3: P = 53 psi.

To summarize:

Scenario 1: Minimum Pressure under Peak Hour Demand: 346 kPa (50 psi)
Scenario 2: Maximum Pressure under Average Day Demand: 426 kPa (62 psi)
Scenario 3: Minimum Pressure under Maximum Day + Fire Flow Demand: 364 kPa (53 psi)

**ATTACHMENT 8 : FIGURE 3 – HYDRANT SPACING**



**Legend**

**Topographic Mapping**

- Sidewalks

**Water and Wastewater Infrastructure**

Water Features

- Valves
  - TVS, A, D
  - Valve
- Water Fittings
  - Cap
  - Reducer
- Hydrants

Hydrant Laterals

- Water Mains
  - Private
  - Public
- Misc. Water Structures
  - Pumping Station
  - Well Supply
  - Elevated Tank
  - In Ground Tank
  - Water Treatment Plant

Hydrant Class	
Class AA	
Class A	
Class B	
Class C	
Unknown	

**Figure 3: Hydrant Spacing**

Source: geoOttawa 2022; Contains information licensed under the Open Government Licence – City of Ottawa.

**PROPOSED  
FOUR STOREY APARTMENT BUILDING SITE  
LOT 15 WEST CAMBRIDGE STREET NORTH  
SOUTH OF STONE BOUNDARY  
R-PLAN 33  
370 CAMBRIDGE STREET NORTH  
CITY OF OTTAWA**

**APPENDIX E  
CITY OF OTTAWA  
SANITARY SEWER DESIGN SHEET  
SHEET No. 1 OF 1**

# SANITARY SEWER DESIGN SHEET

- q = average daily per capita flow (200 L/cap. d)
- i = unit of peak extraneous flow (0.23 L/ha. s)
- M = peaking factor 4.0 (MAX)
- Q (p) = peak population flow (L/s)
- Q (I) = peak extraneous flow (L/s)
- Q (d) = peak design flow

- $M = 1 + \frac{14}{4 + \sqrt{p}}$  where P = population in 1000's  
K = 20.8
- Q(p) = PqM (L/s)
- 56.4
- Q (I) = IA (L/s) where A = area in hectares
- Q (d) = Q(p) + Q(I) (L/s)

LOCATION		INDIVIDUAL		CUMULATIVE		Peaking factor	Pop. flow	Peak extraneous flow	Peak design flow	Length	Pipe size	Type of pipe	Grade %	Capacity	Full flow velocity	Actual velocity
STREET	FROM	TO	Area (hectares)	Pop.	Area A (hectares)	M	Q(p) (L/s)	Q(I) (L/s)	Q(d) (L/s)	(m)	(mm)			(L/s)	(m/s)	at Q(d)
#370 CAMBRIDGE STREET NORTH	SITE	EX-302D COMBINED SEWER	0.063	35.6	0.063	3.67	0.42	0.02	0.44	14.5	150	PVC	1.0	19.8	1.12	



DESIGN: TLM  
 CHECKED: TLM  
 DATE: JULY 2022

PROJECT: 370 CAMBRIDGE STREET NORTH  
 PROPOSED FOUR STOREY APARTMENT  
 BUILDING SITE - CITY OF OTTAWA

SHEET NO. 1 of 1

FILE# 821-155

**PROPOSED  
FOUR STOREY APARTMENT BUILDING SITE  
LOT 15 WEST CAMBRIDGE STREET NORTH  
SOUTH OF STONE BOUNDARY  
R-PLAN 33  
370 CAMBRIDGE STREET NORTH  
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