PROPOSED NINE-STOREY APARTMENT BUILDING

RESIDENTIAL DEVELOPMENT SITE

PART OF LOT L CONCESSION A (RIDEAU FRONT)

GEOGRAPHICAL TOWNSHIP OF NEPEAN

1110 FISHER AVENUE

CITY OF OTTAWA

SERVICEABILITY REPORT

REPORT No. R-818-71A

T.L. MAK ENGINEERING CONSULTANTS LTD.

MAY 2019

FILE REF. No. 818-71

1.) INTRODUCTION

The proposed development is to redevelop the existing residential lot described as Part of Lot L Concession A (Rideau Front) by constructing a nine-storey residential apartment building on Fisher Avenue.

The municipal address of the said property is referenced as 1110 Fisher Avenue. The site is located on the west side of Fisher Avenue and situated south of Trent Street and north of Baseline Road.

The size of the site development property under consideration is ± 0.1353 hectares after road widening. In addition to the nine-storey apartment building, the other development features will comprise of ground surface parking, three-level underground parking in the building with a positive slope driveway to Fisher Avenue, front and rear yard landscape areas, etc. to meet the City of Ottawa site plan requirements.

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

2.) EXISTING SITE CONDITIONS AND SERVICING

Presently, on the said residential property there is a two-storey vinyl sided residential building and a detached wooden frame garage occupying the site. A gravel laneway located north of the existing house provides vehicular access to the lot and for car parking. Also, situated south of the house is an existing asphalt driveway for additional car parking.

The rear half of the existing lot is primarily grass area with some landscaping. Topography of the site is such that the land slopes predominantly from north to south at an approximate gradient of ± 2%. Grading around the existing house is found to be sloping away from the building.

As for the availability of underground services, the following existing municipal services along Fisher Avenue in front of this property are available for connection: a 225 mm diameter sanitary sewer and a 300 mm diameter watermain. A newly proposed 300 mm diameter storm sewer will be constructed by the developer and available in front of this site as part of the site development works.

A new 300 mm diameter storm sewer approximately 69.5 m long is proposed to be constructed on Fisher Avenue to service this site. The new storm sewer is proposed to be outletting into the existing storm manhole located on Trent Street and just south of the Fisher/Trent roadway intersection. Along Trent Street is a 300 mm diameter storm pipe flowing in a southerly direction towards Chevrier Street.

3.) PROPOSED RESIDENTIAL APARTMENT BUILDING SITE

One vehicle entrance located at the north side of the said property is proposed to provide access in and out of the three-level underground parking for this apartment building. The building is

designed such that vehicle entry to the P1, P2, and P3 parking levels will be via an asphalt driveway to Fisher Avenue from this entranceway. There is a vehicle exit way proposed for out traffic located approximately 20.0 m south of the vehicle entranceway.

A.) Water Supply

The owner's representative indicated that the building will be installed with a sprinkler system. Consequently, the building is proposed to be serviced via a 150 mm diameter water service and sized to minimize head losses to the building from the 300 mm diameter watermain on Fisher Avenue.

The multi-unit residential building located at 1110 Fisher Avenue is proposed to have a total of nine floors and a mechanical penthouse. The building will be comprised of 1-bedroom and 2-bedroom units. The following boundary conditions for 1110 Fisher Avenue which is to be connected to the 300 mm diameter watermain along Fisher Avenue were provided by the City of Ottawa on May 13, 2019. See Appendix A for details. The ground elevation at this location is approximately 81.5 m.

- Minimum HGL = 125.5 m
- Maximum HGL = 134.5 m
- MXDY (0.964 L/s) + Fire Flow (200 L/s) = 114.0 m

The City has indicated that for the calculated Fire Underwriter Survey (FUS) fire flow of 200L/s (see Appendix A) the resulting hydraulic gradeline is 114.0 m. This corresponds to a residual pressure of 319 kPa (46 psi). This is well above the minimum residual pressure requirement of 140 kPa (20 psi).

During peak hour flow conditions, the resulting minimum hydraulic gradeline of 125.5 m corresponds to a peak hour pressure of 431 kPa (63 psi). This value is well above the minimum pressure requirement of 276 kPa (40 psi).

With respect to the maximum pressure check during average day demands, the resulting maximum hydraulic gradeline of 134.5 m corresponds to a pressure of 520 kPa (75 psi). This value is less than the maximum pressure objective of 552 kPa (80 psi).

As per the City's latest Technical Bulletin (ISTB-2018-02), the maximum flow contribution to be considered for a Class AA hydrant is 5,700 L/min, if this hydrant is within 75 m of the proposed building. If the hydrant is located further than 75 m, but within 150 m, a flow contribution of 3,800 L/min must be considered. Considering the 12,000 L/min fire flow requirement for the proposed building, three hydrants would be required to service the building at 1110 Fisher Avenue. As per the attached screen capture from geoOttawa taken on May 13, 2019, and confirmed via desktop survey (refer to Appendix B), there is one hydrant located within 75 m of the property, as well as two additional hydrants within 150 m. The number of existing hydrants would meet the intent of ISTB-2018-02's maximum flow per hydrant (calculated as 13,300 L/min). A new fire hydrant will be implemented on the road right of way

of Fisher Avenue front of this property, connected to the watermain along Fisher Avenue, which would benefit the fire protection of the proposed property.

In conclusion, based on the boundary condition provided for the 300 mm diameter watermain on Fisher Avenue, provides the anticipated demand flows within the pressure objectives during peak demand and basic demand conditions as per the City of Ottawa's Drinking Water Design Guidelines. With respect to fire flow, the boundary condition information demonstrates sufficient fire flow per the FUS requirements and this will be provided through the one hydrant within 75 m of the proposed building (5,700 L/min), as well as two additional hydrants within 150 m (7,600 L/min).

B.) Sanitary Flow

Peak sanitary flow for this 62-unit residential apartment building is estimated at Q = 1.27 L/s with an infiltration rate of 0.04 L/s. This flow will enter the existing 225 mm diameter sanitary sewer on Fisher Avenue via the proposed 150 mm diameter PVC sanitary service lateral from the nine-storey residential building.

The existing site peak sanitary flow for two separate semi-detached residential buildings on this site is Q = 0.22 L/s with an infiltration rate of 0.04 L/s. The net increase in peak flow from this proposed development is 1.05 L/s into the existing 225 mm diameter sanitary sewer which is not expected to negatively impact the existing municipal sewer.

C.) Storm Flow

Storm-water outlet for this proposed development property will be a proposed 300 mm diameter storm sewer approximately 69.5 m in length and consisting of (2) new manholes to be constructed in front of this property and along Fisher Avenue to outlet into an existing storm manhole located at the northwest quadrant of the Trent/Fisher Avenue intersection. Storm-water attenuation on-site will be accomplished by (2) controlled roof drains on top of the mechanical room, controlled roof drain on top of the building garage entrance, (2) controlled landscape drains draining the grass areas at the rear of the building, and storage tanks in the building (below Parking Level 3). Storm-water ponding is designed on the rooftop of the mechanical room and garage entrance as well as the grassed area behind the building and internal storage tank. Storm-water pumps from the building holding tanks/pumping chambers will pump out to the municipal outlet at an allowable rate of 4.12 L/s..

Based on the residential site plan from the owner's architect, the average post-development runoff coefficient is estimated at C = 0.68 and A = 0.1353 ha.

An estimation of the pre-development flow condition was carried out using the criteria set out by the City of Ottawa.

Since the existing storm sewer system was built pre-1970's, pre-development or allowable flow rate for this residential area is the 2-year storm event where the lesser of Cpre or C = 0.5 (max.) runoff value can be used and t_c = 10 minutes.

Therefore, based on this calculation, it would appear that on-site retention would be required for this proposed residential property development site since the post-development C = 0.68 which is greater than the pre-development C= 0.38.

Storage volume for the 5-year and up to 100-year event will be stored on the rooftop of the mechanical room, garage entrance, the rear yard grass area of the building, and the storage tanks below P3 in the building.

In order to control the 5-year storm-water release rate off-site to an allowable rate of 11.02 L/s, a site storage volume of approximately 15.66 m^3 (min.) is required during the 5-year event. We estimate that approximately 7.11 m^3 (min.) of rooftop storage, 2.72 m^3 of landscape grass area storage and 5.83 m^3 (min.) storage volume from the remainder of the uncontrolled roof area are necessary to attenuate the 5-year storm event.

Based on the proposed design as shown (on Dwg. No. 818-71, SWM-l), the available flat rooftop storage is 8.20 m^3 from the (3) flat roof areas #1, #2, and #3.

During the 5-year storm event for Roof Area #1, the ponding depth on this rooftop is estimated at 110 mm at the drain and 0 mm at the roof perimeter assuming a 1.7% (min.) roof pitch to the drain. The rooftop storage available is 2.89 m^3 which is greater than the required volume of 2.47 m^3.

For Roof Area #2, the ponding depth on this rooftop is estimated at 110 mm at the drain and 0 mm at the roof perimeter assuming a 1.7% (min.) roof pitch to the drain. The rooftop storage available is 2.89 m^3 which is greater than the required volume of 2.47 m^3.

For Roof Area #3, the ponding depth is estimated at 110 mm at the drain and 0 mm at the roof perimeter assuming a 1.3% (min.) roof pitch to the drain. The rooftop storage available is 2.42 m^3 which is greater than the required volume of 2.17 m^3.

For Landscape Area #4, the ponding depth is estimated at 100 mm at the drain. The landscape area storage available is 1.67 m^3 which is greater than the required volume of 1.38 m^3.

For Landscape Area #5, the ponding depth is estimated at 100 mm at the drain. The landscape area storage available is 1.58 m^3 which is greater than the required volume of 1.34 m^3.

As for the remaining storage volume of 5.83 m^3 (min.) required from the remainder of the uncontrolled rooftops, it is proposed that the underground concrete storage tank(s) be provided with an effective storage of 5.93 m^3. In total the 5-year available site storage volume is 17.38 m^3 which is greater than the required storage volume of 15.66 m^3. Pump out rate from the holding tank and storage tank configuration to be determined by the owner's mechanical engineer is at 4.12 L/s.

During the 100-year storm event, in order to control the 100-year storm-water release rate off-site to an allowable rate of 11.02 L/s, a site storage volume of approximately 39.58 m^3 (min.) is required during the 100-year event. We estimate that approximately 17.41 m^3 (min.) of rooftop

storage, 8.35 m^3 (min.) of landscape grass area storage and 13.82 m^3 (min.) storage volume from the remainder of the uncontrolled roof area are necessary to attenuate the 100-year storm event.

Based on the proposed design as shown (on Dwg. No. 818-71, SWM-1), the available flat rooftop storage is 21.33 m^3 from the (3) flat roof areas #1, #2, and #3.

For Roof Area #1, the ponding depth on this rooftop is estimated at 150 mm at the drain and 0 mm above the roof perimeter assuming a 1.7% (min.) roof pitch to the drain. The rooftop storage available is 7.29 m^3 which is greater than the required volume of 6.02 m^3.

For Roof Area #2, the ponding depth on this rooftop is estimated at 150 mm at the drain and 0 mm above the roof perimeter assuming a 1.7% (min.) roof pitch to the drain. The rooftop storage available is 7.29 m^3 which is greater than the required volume of 6.02 m^3.

For Roof Area #3, the ponding depth on this rooftop is estimated at 150 mm at the drain and 0 mm above the roof perimeter assuming a 1.3% (min.) roof pitch to the drain. The rooftop storage available is 6.75 m^3 which is greater than the required volume of 5.37 m^3.

For Landscape Area #4, the ponding depth is estimated at 150 mm at the drain and 0 mm above the roof perimeter. The landscape area storage available is 5.54 m^3 which is greater than the required volume of 4.24 m^3.

For Landscape Area #5, the ponding depth is estimated at 150 mm at the drain and 0 mm above the roof perimeter. The landscape area storage available is 5.12 m^3 which is greater than the required volume of 4.11 m^3.

As for the remaining storage volume of 13.82 m^3 (min.) required from the remainder of the uncontrolled rooftop, it is proposed that the underground concrete storage tank(s) be provided with a minimum effective storage volume of 2.0 x 15.06 m^3 = 30.12 m^3 (min.). We would recommend a storage tank with an effective volume of (3.65 m x 2.5 m x 1.65 m= 15.06 m^3) be connected to a holding tank/pumping chamber the same size as the storage tank (3.65 m x 2.5 m x 1.65 m = 15.06 m^3) which houses the duplex pumps set at a pump out rate of 4.12 L/s. The total available storage volume from the (2) tanks is 30.12 m^3. In total, the 100-year available storage volume is 62.11 m^3 which is greater than the required storage volume of 39.58 m^3. (See Appendix B for details.)

Therefore, by grading the site to the proposed grades and installing the proposed controlled roof and landscape drains and concrete storage/holding tanks as detailed in this report and shown on the Proposed Site Servicing and Grading Plan Dwg. No. 818-71, G-l, and Proposed Rooftop Storm-water Management Plan Dwg. No. 818-71 SWM-1, the designed storm-water storage volume available will be able to attenuate flow from this site to 11.02 L/s. The pump out rate from the underground holding tank/pumping chamber is 4.12 L/s with pumps (duplex) to be designed by the owner's mechanical engineer.

The pump out rate from the underground holding tank/pumping chamber is 4.12 L/s with pumps (duplex) to be designed by the owner's mechanical engineer.

A backup pumping chamber and pumping system is recommended to discharge and outlet to street level in case of emergencies or problems from the main pump(s) and chamber located below P3.

Roof drain storm water from the holding tanks will outlet separately via a designated 125 mm diameter PVC storm lateral located at the front of the building which then directs flow to the proposed 300 mm diameter storm sewer along Fisher Avenue.

Building weeping tile drainage will outlet separately via a 150 diameter PVC storm lateral located at the front of the building to the proposed 300 mm diameter storm sewer from holding tanks located below P3 parking complete with duplex sump pumps.

No roof drainage or rear yard landscape drainage is permitted to outlet into the weeping tile holding tanks or into the proposed 150 mm storm lateral which is designated for weepjng tile drainage only.

4.) 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 silt fence barrier (as per OPSD 219.110 and associated specifications) along Fisher Avenue and all other areas that sheet drain off-site. Maintenance hole sediment barriers to be AMOCO 4555 nonwoven geotextile or approved equivalent.

PREPARED BY T. L. MAK ENGINEERING CONSULTANTS LTD.

TONY L. MAK, P. ENG.

PROPOSED NINE-STOREY APARTMENT BUILDING

RESIDENTIAL DEVELOPMENT SITE

1110 FISHER AVENUE

CITY OF OTTAWA

APPENDIX A

CITY OF OTTAWA

WATER DATA

BOUNDARY CONDITIONS

TL Mak

From: Sharif, Sharif [sharif.sharif@ottawa.ca]
Sent: Monday, May 13, 2019 2:16 PM
To: TL Mak
Subject: RE: 1110 Fisher Ave. Water Service Corridor
Attachments: 1110 Fisher May 2019.pdf

Hello Tony,

Here is the requested water boundary condition.

The following are boundary conditions, HGL, for hydraulic analysis at 1110 Fisher (zone 2W) assumed to be connected to the 305mm on Fisher (see attached PDF for location).

Minimum HGL = 125.5m

Maximum HGL = 134.5m

MaxDay + Fireflow (200 L/s) = 114.0m

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.

Thanks.

Sharif

From: TL Mak <tlmakecl@bellnet.ca>
Sent: May 09, 2019 12:27 PM
To: Sharif, Sharif <sharif.sharif@ottawa.ca>
Cc: enzo@prestigeottawa.com
Subject: 1110 Fisher Ave. Water Service Corridor

Hi Sharif,

As requested, attached please find the pdf of the approximate location of building water service for you use. Please provide us with water boundary conditions asap.

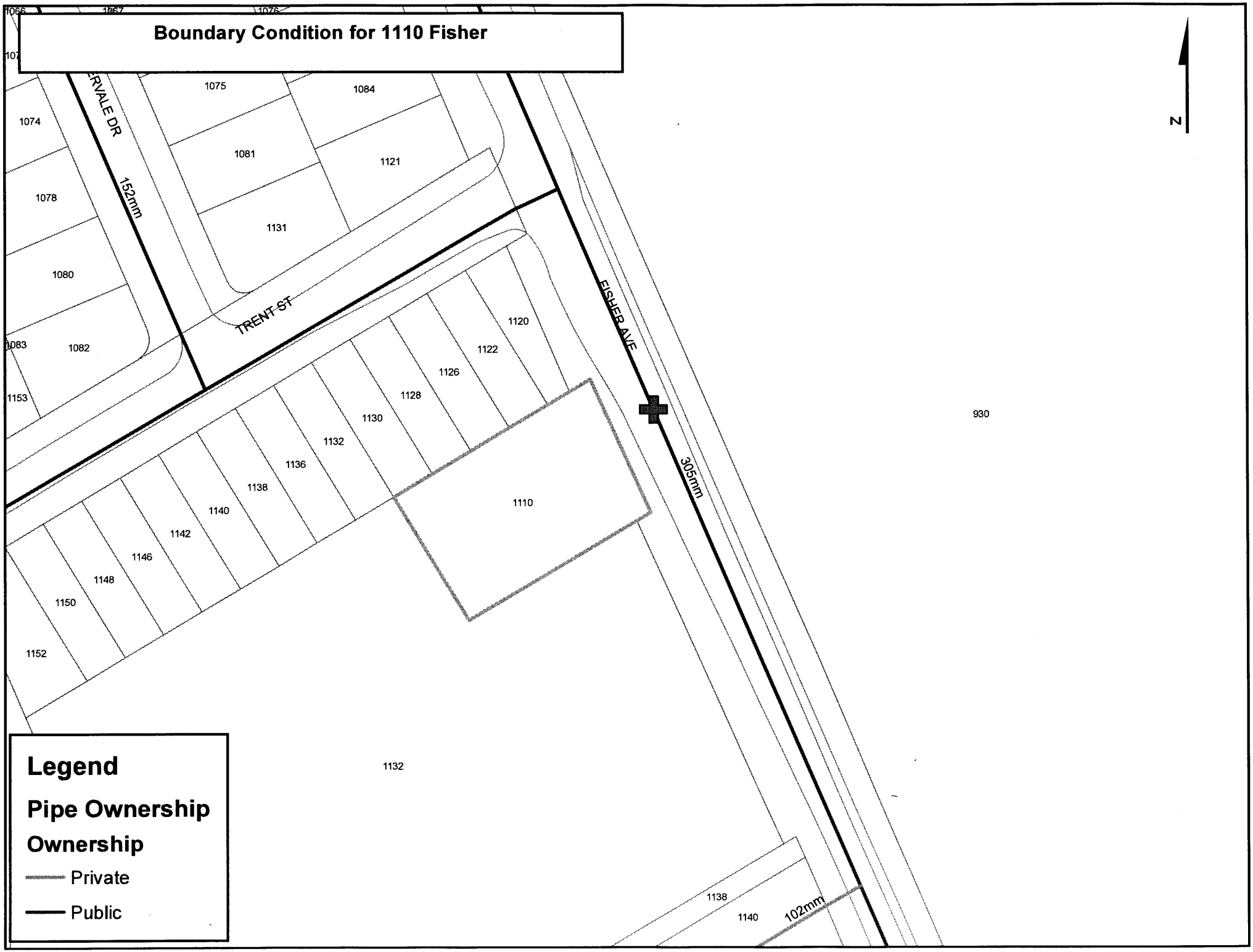
Thank you.

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

From: Grace Ulak [mailto:graceulak@gmail.com]
Sent: Thursday, May 09, 2019 11:58 AM
To: Tony Mak
Subject: 818-71-GS-1-Model.pdf

Hi Tony,
Please check and let me know if is ok
Grace

Sent from Mail for Windows 10


Boundary Condition for 1110 Fisher
N
1066
1067
1076
1075
1084
1074
1081
1121
1078
1131
1080
1083
1082
1153
1120
1122
1126
1128
1130
1132
1136
1138
1140
1142
1146
1148
1150
1152
1110
930
1132
1138
1140
RVALE DR
152mm
TRENT ST
FISHER AVE
305mm
102mm
Legend
Pipe Ownership
Ownership
Private
Public

TL Mak

From: TL Mak [tlmakecl@bellnet.ca]
Sent: Wednesday, May 08, 2019 4:06 PM
To: 'sharif.sharif@ottawa.ca'
Cc: 'enzo@prestigeottawa.com'
Subject: 1110 Fisher Avenue Water boundary conditions
Attachments: STANTEC_FUS_FIREFLOW_CALCULATOR_1110Fisher_AMG.pdf

Hi Sharif,

The proposed multi-unit residential building located at 1110 Fisher Avenue is to have a total of 9 floors and a mechanical penthouse. The building will be comprised of 1-bedroom, and 2-bedroom units. The building is proposed to be serviced from the 300 mm diameter watermain along Fisher Avenue.

The domestic demands were calculated using the City of Ottawa's Water Design Guidelines where the residential consumption rate of 350 L/cap/d is used to estimate average day demands (AVDY). Maximum day (MXDY) demands were calculated by multiplying AVDY by a factor of 2.5. Peak hourly (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. The PPU value of semi-detached unit was used to estimate the domestic demands. **Table 1** shows the estimated domestic demands of the proposed building.

Table 1 - Estimated Domestic Demand

Unit Type	Number of Units	PPU	Consumption	BSDY		MXDY		PKHR	
			L/cap/d	L/d	L/s	L/d	L/s	L/d	L/s
1-bedroom	50	1.4	350	24,500	0.284	61,250	0.709	134,750	1.560
2-bedroom	12	2.1	350	8,820	0.102	22,050	0.255	48,510	0.561
Total	**62**	-	-	**33,320**	**0.386**	**83,300**	**0.964**	**183,260**	**2.121**

The fire flow required was determined following the Fire Underwriter Survey (FUS) method and is provided in the attached. The proposed building is classified as ordinary construction with building contents assumed to be limited in combustibility. It is understood the building will have a sprinkler system, assumed to be standard, and fully automated. The resulting FUS fire flow is 12,000 L/min (200 L/s) for a duration of 2.50 hours.

In summary:
AVDY = 33,320 L/d (0.386 L/s)
MXDY = 83,300 L/d (0.964 L/s)
PKHR = 183,260 L/d (2.121 L/s)
Fire Flow = 12,000 L/min (200 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.

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

PROPOSED NINE-STOREY APARTMENT BUILDING

RESIDENTIAL DEVELOPMENT SITE

1110 FISHER AVENUE

CITY OF OTTAWA

APPENDIX B

FUS FIRE FLOW CALCULATIONS

AND

EXISTING FIRE HYDRANT LOCATION

FROM

GeoOTTAWA MAY 13, 2019

Stantec

FUS Fire Flow Calculation

Calculations based on: "*Water Supply for Public Fire Protection*" by Fire Underwriters' Survey, 1999

Stantec Project #: 163401084
Project Name: 1110 Fisher
Date: May 6, 2019
Data inputted by: Alexandre Mineault-Guitard, M.A.Sc., EIT
Data reviewed by: Kevin Alemany, M.A.Sc., P.Eng.

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

Notes:

Table A: Fire Underwriters Survey Determination of Required Fire Flow - Long Method

Step	Task	Term	Options	Multiplier Associated with Option	Choose:	Value Used	Unit	Total Fire Flow (L/min)
		Framing Material						
1	Choose Frame Used for Construction of Unit	Coefficient related to type of construction (C)	Wood Frame	1.5	Ordinary construction	1	m	
			Ordinary construction	1				
			Non-combustible construction	0.8				
			Fire resistive construction (< 2 hrs)	0.7				
			Fire resistive construction (> 2 hrs)	0.6				
		Floor Space Area						
2	Choose Type of Housing (if TH, Enter Number of Units Per TH Block)	Type of Housing	Single Family	1	Other (Comm, Ind, Apt etc.)	62	Units	
			Townhouse - indicate # of units	1				
			Other (Comm, Ind, Apt etc.)	62				
2.2	# of Storeys	Number of Floors/Storeys in the Unit (do not include basement if 50% below grade):			9	9	Storeys	
3	Enter Ground Floor Area of One Unit	Average Floor Area (A) based total floor area of all floors (non-fire resistive construction):			574 Square Metres (m2)	5,164	Area in Square Meters (m^2)	
4	Obtain Required Fire Flow without Reductions	Required Fire Flow (without reductions or increases per FUS) (F = 220 * C * √A) Round to nearest 1000L/min						16,000
5	Apply Factors Affecting Burning	**Reductions/Increases Due to Factors Affecting Burning**						
5.1	Choose Combustibility of Building Contents	Occupancy content hazard reduction or surcharge	Non-combustible	-0.25	Limited combustible	-0.15	N/A	13,600
			Limited combustible	-0.15				
			Combustible	0				
			Free burning	0.15				
			Rapid burning	0.25				
5.2	Choose Reduction Due to Presence of Sprinklers	Sprinkler reduction	Adequate Sprinkler conforms to NFPA13	-0.3	Adequate Sprinkler conforms to NFPA13	-0.3	N/A	-4,080
			None	0				
		Water Supply Credit	Water supply is standard for sprinkler and fire dept. hose line	-0.1	Water supply is standard for sprinkler and fire dept. hose line	-0.1	N/A	-1,360
			Water supply is not standard or N/A	0				
		Sprinkler Supervision Credit	Sprinkler system is fully supervised	-0.1	Sprinkler system is fully supervised	-0.1	N/A	-1,360
			Sprinkler not fully supervised or N/A	0				
5.3	Choose Separation Distance Between Units	Exposure Distance Between Units	North Side	0 to 3.0m	0.25	0.4	m	5,440
			East Side	45.1m or greater	0			
			South Side	10.1 to 20.0m	0.15			
			West Side	45.1m or greater	0			
6	Obtain Required Fire Flow, Duration & Volume	*Total Required Fire Flow, rounded to nearest 1000 L/min, with max/min limits applied:*						12,000
		Total Required Fire Flow (above) in L/s:						200
		Required Duration of Fire Flow (hrs)						2.50
		Required Volume of Fire Flow (m^3)						1,800

Stantec

Supporting Hydraulic Calculations

Stantec Project #: 163401084
Project Name: 1110 Fisher Avenue
Date: May 13, 2019
Data inputted by: Alexandre Mineault-Guitard, M.A.Sc., EIT
Data reviewed by: Kevin Alemany, M.A.Sc., P.Eng.

Boundary Conditions provided by the City

Scenario 1: Peak Hour (Min HGL): 125.5 m; and
Scenario 2: Average Day (Max HGL): 134.5 m;
Scenario 3: Maximum Day Hour and Fire Flow: 114 m.

Sample Calculations

HGL (m) = hp + hz *(1)*

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

For Scenario 1, we have:

HGL(m) = 125.5 and hz (m) = 81.5.

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

hp (m) = HGL - hz

∴ hp = 125.5 - 81.5 m = 44 m.

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

P (kPa) = (ρ * g * hp) / 1000 *(2)*

where: ρ = density of water = 1000 kg/m^3; and g = gravitational acceleration = 9.81 m/s^2.

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

P (kPa) = (1000 * 9.81 * 44) / 1000

∴ P = 431 kPa.

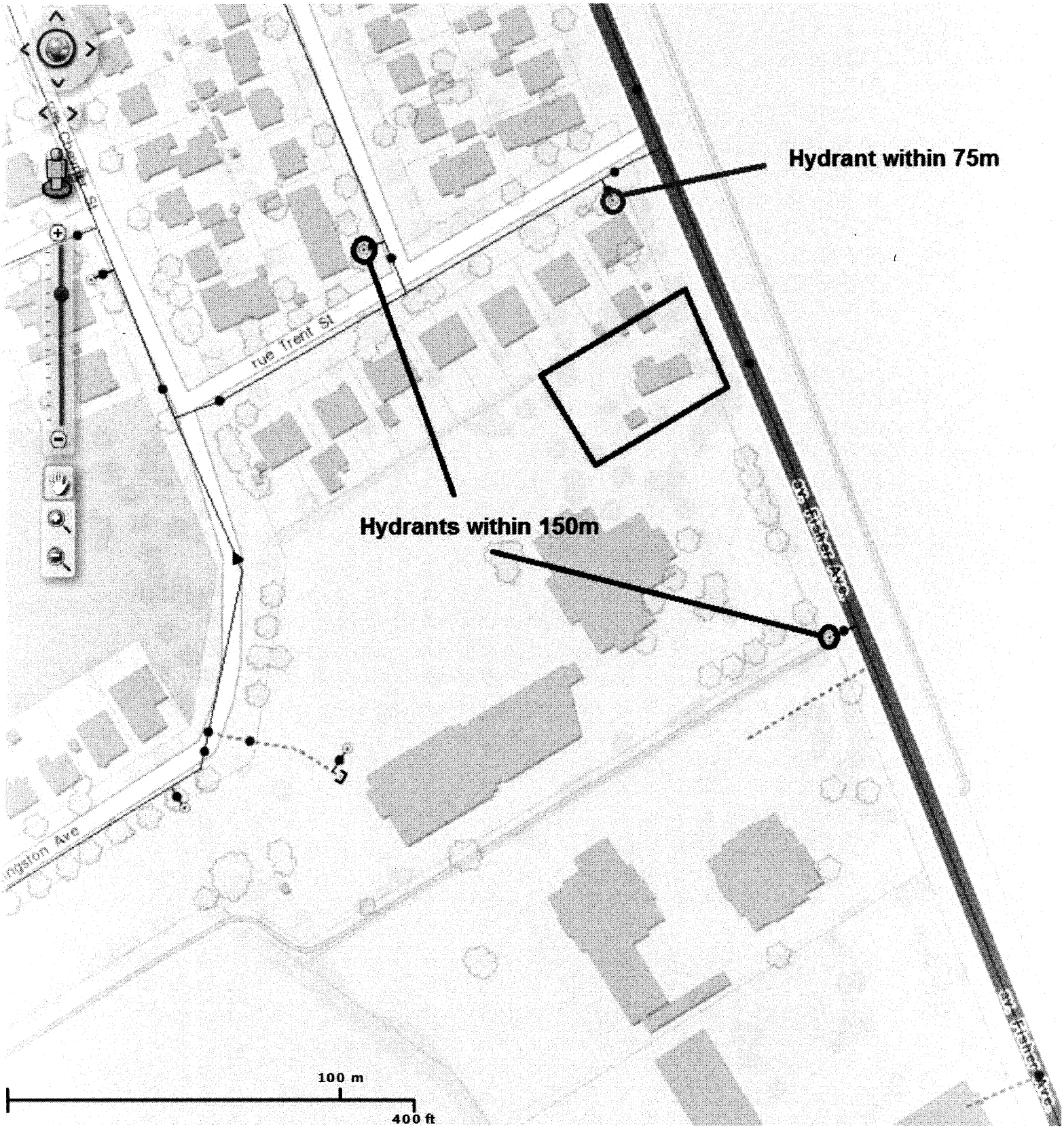
Considering that 1 kPa = 0.145 psi, the pressure under Scenario 1 is equal to:

P = 63 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 = 46 psi.

To summarize:

Scenario 1: Minimum Pressure under Peak Hour Demand: 431 kPa (63 psi)
Scenario 2: Maximum Pressure under Average Day Demand: 520 kPa (75 psi)
Scenario 3: Minimum Pressure under Maximum Day + Fire Flow Demand: 319 kPa (46 psi)


Hydrant within 75m
Hydrants within 150m
rue Trent St
Kingston Ave
100 m
400 ft

PROPOSED NINE-STOREY APARTMENT BUILDING

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CITY OF OTTAWA

APPENDIX C

SANITARY SEWER DESIGN SHEET

PAGE 1 OF 1

SANITARY SEWER DESIGN SHEET

q = average daily per capita flow (280 L/cap. d)
I = unit of peak extraneous flow (0.28 L/ha. s)
M = peaking factor = 4
Q (p) = peak population flow (L/s)
Q (i) = peak extraneous flow (L/s)
Q (d) = peak design flow

DENSITY

1 BEDROOM APT. = 1.4 ppu
2 BEDROOM APT. = 2.1 ppu

$M = 1 + \frac{14}{4 + \sqrt{P}}$ where P population in 1000's

$Q(p) = \frac{PqM}{86.4}$ (L/s)

Q(i) = IA (L/s) where A = area in hectares

Q(d) = Q(p) + Q(i) (L/s)

LOCATION			INDIVIDUAL		CUMULATIVE		Peaking factor M	Pop. flow Q(p) (L/s)	Peak extraneous flow Q(i) (L/s)	Peak design flow Q(d) (L/s)	PROPOSED SEWER						
STREET	FROM	TO	Pop.	Area A (hectares)	Pop.	Area A (hectares)					Length (m)	Pipe size (mm)	Type of pipe	Grade %	Capacity (L/s) n=0.013	Full flow velocity (m/s)	Actual velocity at Q(d)
					RESIDENTIAL												
1110 FISHER AVENUE	SITE	EX. 225Ø SAN. SEWER	(50 x 1.4 ppu) + (12 x 2.1 ppu)														
			95.2	0.136	95.2	0.136	4	1.23	0.04	1.27	18.5	150	PVC	1.0 (min.)	19.8	1.12	

LICENSED PROFESSIONAL ENGINEER
05/17/19
TONY L.M. MAK
PROVINCE OF ONTARIO

DESIGN	TLM	PROJECT	1110 FISHER AVENUE
CHECKED	TLM		PROPOSED NINE STOREY APARTMENT
DATE	MAY 2019		BUILDING SITE - CITY OF OTTAWA

SHEET No. 1 of 1

(FILE # 818-71)

PROPOSED NINE-STOREY APARTMENT BUILDING

RESIDENTIAL DEVELOPMENT SITE

1110 FISHER AVENUE

CITY OF OTTAWA

APPENDIX D

DEVELOPMENT SERVICING STUDY CHECKLIST

SUMMARY

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 defendable 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 feedermains, 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