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39 Years

255 METCALFE STREET BASEMENT APARTMENTS

Assessment of Adequacy of Public Services Report
(Watermain Only)

BASEMENT APARTMENTS
255 METCALFE STREET

ASSESSMENT OF ADEQUACY OF PUBLIC SERVICES REPORT (WATERMAIN ONLY)

Prepared by:

NOVATECH
Suite 200, 240 Michael Cowpland Drive
Kanata, Ontario
K2M 1P6

September 23, 2022

Ref: R-2022-162
Novatech File No. 121185

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September 23, 2022

255 Metcalfe Street Inc.
c/o Falsetto Homes
52 Sullivan Drive,
Ottawa, Ontario
K2G 1V2

Attention: Mr. Sam Falsetto

Re: Assessment of Adequacy of Public Services Report (Watermain Only)
Basement Apartments
255 Metcalfe Street, Ottawa, ON
Novatech File No.: 121185

Enclosed is a copy of the 'Assessment of Adequacy of Public Services Report – Watermain Only' for the proposed addition of 3 basement apartment units located at 255 Metcalfe Street, in the City of Ottawa. The purpose of this report is to demonstrate that the existing apartment building can be serviced by the existing municipal watermain network surrounding the subject site. This report is being submitted in support of a Site Plan Control application.

Please contact the undersigned, should you have any questions or require additional information.

NOVATECH

François Thauvette, P. Eng.
Senior Project Manager

FT/cv

cc: John Wu (City of Ottawa)

Suite 200, 240 Michael Cowpland Drive, Ottawa ON K2M 1P6 Tel: 613.254.9643 Fax: 613.254.5867 www.novatech-eng.com

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1.0 INTRODUCTION

Novatech has been retained by 255 Metcalfe Street Inc. to assess the adequacy of the existing municipal watermain as it relates to the proposed addition of three (3) basement apartment units in the existing 8-storey residential building located at 255 Metcalfe Street. The purpose of this report is to demonstrate that the existing building can be serviced by the existing municipal infrastructure. This report is being submitted in support of a Site Plan Control application.

1.1 Site Location, Description and Proposed Development

The 0.120-hectare site consists of an existing 8-storey residential building with underground parking accessible off MacLaren Street. The property is located on the southeast corner of Metcalfe and MacLaren Streets and is bordered by other residential and mixed-use buildings. The legal description of the site based on the Geowarehouse is designated as Lots 1 and 2 (East Side of Metcalfe Street) on Registered Plan 15558, City of Ottawa.

Figure 1: Aerial View of the Subject Site

Image Source: geoOttawa (City of Ottawa)

The proposed development will include the addition of three (3) apartment units in the existing 8-storey building, as well as some minor exterior modifications to the building to provide a means of egress for these new basement units.

1.2 Pre-Consultation Information

A pre-consultation meeting was held with the City of Ottawa on July 14, 2022, at which time the client was advised of the general submission requirements. Refer to **Appendix A** for a summary of the correspondence related to the proposed development.

2.0 SITE SERVICING

The objective of this report is to demonstrate that a suitable domestic water supply and appropriate fire protection are available for the existing building. The servicing criteria, water demand and fire flow calculations are to conform to the requirements of the City of Ottawa municipal design guidelines for water distribution systems.

2.1 Water Supply for Domestic Use and Firefighting

The existing building is currently being serviced by the local 300mm dia. DI watermain in MacLaren Street. A 150mm dia. service lateral is located on the north side of the building. No modifications to the existing water service are being proposed as part of the proposed works as the theoretical increase in domestic demand related to the addition of three (3) basement apartment units is expected to be negligible. The subject site is located within the City of Ottawa 1W pressure zone. Refer to **Figure 3** showing the existing watermain infrastructure surrounding the subject site including the existing service lateral and nearby municipal hydrants.

Figure 3: Conceptual Water Servicing Layout

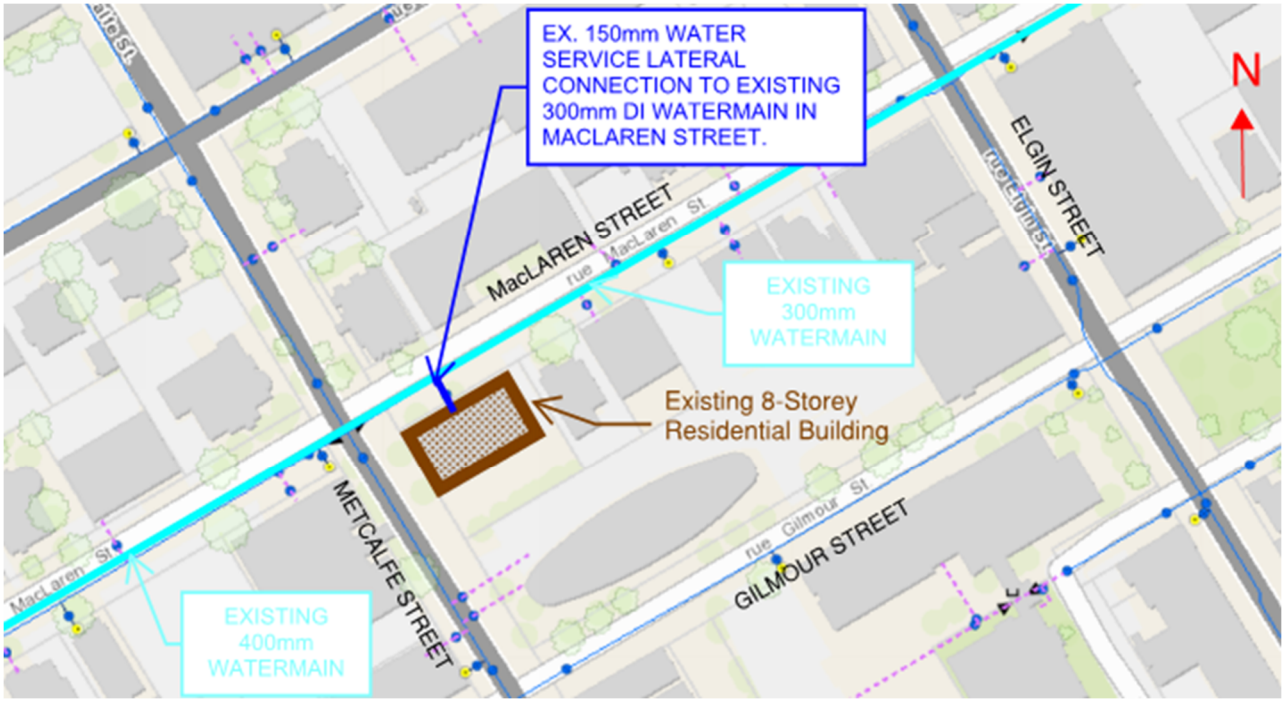

Image Source: geoOttawa (City of Ottawa)

Water demand and fire flow calculations have been prepared based on criteria in the City of Ottawa Design Guidelines for Water Distribution Systems and subsequent Technical Bulletins.

Given the size of the existing building, the fire flow requirements were calculated using the Fire Underwriters Survey (FUS) method, based on general building materials, and building footprint for a non-sprinklered building. Refer to the table below for a summary of the water demands and to **Appendix B** for detailed calculations.

Residential Building	Unit Count	Design Population	Avg. Daily Demand (L/s)	Max. Daily Demand (L/s)	Peak Hour Demand (L/s)	FUS Fire Flow (L/s)
Ex. Building	60	85	0.28	0.69	1.52	233
Ex. Building + 3 units	63	89	0.29	0.72	1.59	

*Represents rounded values

The following design criteria were taken from Section 4.2.2 – 'Watermain Pressure and Demand Objectives' of the City of Ottawa Design Guidelines for Water Distribution:

- Normal operating pressures are to range between 345 kPa (50 psi) and 483 kPa (70 psi) under Max Day demands
- Minimum system pressures are to be 276 kPa (40 psi) under Peak Hour demands
- Minimum system pressures are to be 140 kPa (20 psi) under Max Day + Fire Flow demands

The following table summarizes preliminary hydraulic analysis results based on municipal watermain boundary conditions provided by the City.

Municipal Watermain Boundary Condition	Boundary Condition Head of Water (m)	Normal Operating Pressure Range (psi)	Anticipated WM Pressure (psi)*
Existing Service Connection to the 300mm dia. DI WM in MacLaren Street			
Minimum HGL (Peak Hour Demand)	106.5 m	40 psi (min.)	~ 53 psi
Maximum HGL (Max Day Demand)	115.4 m	50-70 psi	~ 66 psi
HGL Max Day + Fire Flow	108.4 m**	20 psi (min.)	~ 56 psi

*Based on an approximate elevation of 69.4m at the WM connection point in MacLaren Street.

Based on preliminary calculations and correspondence received from the City of Ottawa, it is anticipated that the pressure within the municipal watermain network will be adequate during the Peak Hour and Max Day + Fire Flow Conditions.

A multi-hydrant approach to firefighting is currently required to supply the fire flows calculated above. Based on a review of the geoOttawa website, there appear to be several Class AA (blue bonnet) municipal fire hydrants within 150m of the site. Based on the City of Ottawa Technical Bulletin ISTB-2018-02, Class AA (blue bonnet) hydrants within 75m of the building should provide a maximum capacity of 95 L/s each while hydrants between 75m and 150m should provide a maximum capacity of 63 L/s (at a pressure of 20 PSI). The combined theoretical maximum flow from these hydrants will exceed the Max Day + Fire Flow requirements of the existing building. This multi-hydrant approach to firefighting is in accordance with the City of Ottawa Technical Bulletin ISTB-2018-02.

The following table summarizes the theoretical combined fire flow available from the nearby fire hydrants and compares it to the fire flow demands based on the FUS calculations.

Residential Building	(FUS) Fire Flow Demand (L/s)	Fire Hydrant(s) within 75m (~ 95 L/s each)	Fire Hydrant(s) within 150m (~ 63 L/s each)	Theoretical Combined Available Fire Flow (L/s)
Ex. Building	233	2	2+	**316**

Refer to **Appendix B** for preliminary domestic water demand, FUS fire flow calculations and correspondence with the City of Ottawa related to the municipal watermain network and fire flow available for the proposed development.

3.0 CONCLUSION

Based on our analysis of the information available, the existing municipal watermain should have adequate capacity to service the existing building both in terms of water for domestic use and for firefighting purposes.

NOVATECH

Prepared by:

Chris Visser
Project Coordinator

Reviewed by:

François Thauvette, P. Eng.
Senior Project Manager

APPENDIX A

Correspondence

APPLICANT'S STUDY AND PLAN IDENTIFICATION LIST

Legend: **S** indicates that the study or plan is required with application submission.
A indicates that the study or plan may be required to satisfy a condition of approval/draft approval.

For information and guidance on preparing required studies and plans refer here:

S/A	ENGINEERING		S/A
	1. Site Servicing Plan	**2. Site Servicing Study/Assessment of Adequacy of Public Services:2/3 page memo confirming fire flow**	**S**
	3. Grade Control and Drainage Plan	4. Geotechnical Study / Slope Stability Study	
	5. Composite Utility Plan	6. Groundwater Impact Study	
	7. Servicing Options Report	8. Wellhead Protection Study	
	9. Transportation Impact Assessment (TIA)	10.Erosion and Sediment Control Plan / Brief	
	11.Storm water Management Report / Brief	12.Hydro geological and Terrain Analysis	
	13.Hydraulic Water main Analysis	**14.Noise (due to proximity to an arterial road) – one page explanation/discussion**	**S**
	15.Roadway Modification Functional Design	16.Confederation Line Proximity Study	

S/A	PLANNING / DESIGN / SURVEY		S/A
	17.Draft Plan of Subdivision	18.Plan Showing Layout of Parking Garage (not required unless changes proposed)	
	19.Draft Plan of Condominium	**20.Planning Rationale**	**S**
A	**21.Site Plan – only if changes proposed. Otherwise, survey is fine.**	22.Minimum Distance Separation (MDS)	
	23.Concept Plan Showing Proposed Land Uses and Landscaping	24.Agrology and Soil Capability Study	
	25.Concept Plan Showing Ultimate Use of Land	**26.Cultural Heritage Impact Statement: heritage requirements are being met through the Heritage Permit**	**A**
A	**27.Landscape Plan – only if changes proposed. Otherwise, survey is fine.**	28.Archaeological Resource Assessment Requirements: **S** (site plan) **A** (subdivision, condo)	
S	**29.Survey Plan**	30.Shadow Analysis	
S	**31.Architectural Building Elevation Drawings (dimensioned) – for area of change**	**32.Design Brief (very brief discussion within Planning Rationale)**	**S**
	33.Wind Analysis		

S/A	ENVIRONMENTAL		S/A
	34.Phase 1 Environmental Site Assessment	35.Impact Assessment of Adjacent Waste Disposal/Former Landfill Site	
	36.Phase 2 Environmental Site Assessment (depends on the outcome of Phase 1)	37.Assessment of Landform Features	
	38.Record of Site Condition	39.Mineral Resource Impact Assessment	
	40.Tree Conservation Report	41.Environmental Impact Statement / Impact Assessment of Endangered Species	
	42.Mine Hazard Study / Abandoned Pit or Quarry Study	43.Integrated Environmental Review (Draft, as part of Planning Rationale)	

S/A	ADDITIONAL REQUIREMENTS		S/A
S	44. Applicant's Public Consultation Strategy (may be provided as part of the Planning Rationale)	45.Site Lighting Plan	
	46. Site Lighting Certification Letter	47.	

Meeting Date: July 14, 2022 — Application Type: *Site Plan Control*

File Lead (Assigned Planner):Kersten Nitsche — Infrastructure Approvals Project Manager: John Wu

Site Address (Municipal Address): 255 Metcalfe — *Preliminary Assessment: 1☐ 2☐ 3☐ 4☐ 5

*One (1) indicates that considerable major revisions are required before a planning application is submitted, while five (5) suggests that proposal appears to meet the City's key land use policies and guidelines. **This assessment is purely advisory and does not consider technical aspects of the proposal or in any way guarantee application approval.**

It is important to note that the need for additional studies and plans may result during application review. If following the submission of your application, it is determined that material that is not identified in this checklist is required to achieve complete application status, in accordance with the Planning Act and Official Plan requirements, the Planning, Real Estate and Economic Development Department will notify you of outstanding material required within the required 30 day period. Mandatory pre-application consultation will not shorten the City's standard processing timelines, or guarantee that an application will be approved. It is intended to help educate and inform the applicant about submission requirements as well as municipal processes, policies, and key issues in advance of submitting a formal development application. This list is valid for one year following the meeting date. If the application is not submitted within this timeframe the applicant must again pre-consult with the Planning, Real Estate and Economic Development Department.

APPENDIX B

Preliminary Water Demands, FUS Calculations, Watermain Boundary Conditions, Hydrant Sketch and E-mail Correspondence from the City of Ottawa

255 Metcalfe Street - Existing 8-Storey Residential Building
WATER ANALYSIS

DOMESTIC WATER DEMANDS

Residential Use	Post-Development	
Number of Studio / 1-Bedroom Units	59	
Persons per Studio / 1-Bedroom Unit	1.4	
Number of 2-Bedroom Units	1	
Persons per 2-Bedroom Unit	2.1	
Total Number of Units	60	
Total Design Population	85	
Average Day Demand (280 L/c/day)	**0.28**	L/s/day
Maximum Day Demand (2.5 x avg. day)	**0.69**	**L/s**
Peak Hour Demand (2.2 x max. day)	**1.52**	**L/s**
Commercial/Amenity Use		
Commercial Space	0	m^2
Average Day Demand (28,000 L/ha/day)	**0.00**	**L/s**
Maximum Day Demand (1.5 x avg. day)	**0.00**	**L/s**
Peak Hour Demand (1.8 x max. day)	**0.00**	**L/s**
Total Average Day Demand	**0.28**	**L/s**
Total Maximum Day Demand	**0.69**	**L/s**
Total Peak Hour Demand	**1.52**	**L/s**

BOUNDARY CONDITIONS

Maximum HGL =	115.4	m
Minimum HGL =	106.5	m
Max Day + Fire Flow =	108.4	m

PRESSURE TESTS

: Head(m) to PSI: multiply by 1.42

Watermain Elevation (at connection point) 69.4 m

High Pressure Test = (Max HGL - Avg.Ground Elev.) x 1.42 PSI/m (should be between 50- 70 PSI)

High Pressure = **65.4** PSI

Low Pressure Test = (Min. HGL - Avg. Ground Elev.) x 1.42 PSI/m (should be > 40 PSI)

Low Pressure = **52.8** PSI

Max Day + Fire Flow Test = (Max Day + Fire Flow - Avg. Ground Elev.) x 1.42 PSI/m (should be > 20 PSI)

Max Day + Fire Flow Pressure = **55.5** PSI

255 Metcalfe Street - Existing 8-Storey Residential Building
WATER ANALYSIS

DOMESTIC WATER DEMANDS

Residential Use	Post-Development	
Number of Studio / 1-Bedroom Units	62	incl. 3 new units
Persons per Studio / 1-Bedroom Unit	1.4	
Number of 2-Bedroom Units	1	
Persons per 2-Bedroom Unit	2.1	
Total Number of Units	63	
Total Design Population	89	
Average Day Demand (280 L/c/day)	**0.29**	L/s/day
Maximum Day Demand (2.5 x avg. day)	**0.72**	**L/s**
Peak Hour Demand (2.2 x max. day)	**1.59**	**L/s**
Commercial/Amenity Use		
Commercial Space	0	m^2
Average Day Demand (28,000 L/ha/day)	**0.00**	**L/s**
Maximum Day Demand (1.5 x avg. day)	**0.00**	**L/s**
Peak Hour Demand (1.8 x max. day)	**0.00**	**L/s**
Total Average Day Demand	**0.29**	**L/s**
Total Maximum Day Demand	**0.72**	**L/s**
Total Peak Hour Demand	**1.59**	**L/s**

BOUNDARY CONDITIONS

Maximum HGL =	115.4	m
Minimum HGL =	106.5	m
Max Day + Fire Flow =	108.4	m

PRESSURE TESTS

: Head(m) to PSI: multiply by 1.42

Top of Watermain Elevation (at connection point) 69.4 m

High Pressure Test = (Max HGL - Avg.Ground Elev.) x 1.42 PSI/m (should be between 50- 70 PSI)

High Pressure = **65.4** PSI

Low Pressure Test = (Min. HGL - Avg. Ground Elev.) x 1.42 PSI/m (should be > 40 PSI)

Low Pressure = **52.8** PSI

Max Day + Fire Flow Test = (Max Day + Fire Flow - Avg. Ground Elev.) x 1.42 PSI/m (should be > 20 PSI)

Max Day + Fire Flow Pressure = **55.5** PSI

FUS - Fire Flow Calculations

As per 2020 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 121185
Project Name: 255 Metcalfe Street
Date: 9/8/2022
Input By: F. Thauvette
Reviewed By: F. Thauvette

Legend: Input by User; No Information or Input Required

Building Description: 8-Storey Ex. Residential Building
Type III - Ordinary construction

Step			Choose		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction C	Type V - Wood frame		1.5	0.8	
		Type IV - Mass Timber		Varies		
		Type III - Ordinary construction		1		
		Type II - Non-combustible construction	Yes	0.8		
		Type I - Fire resistive construction (2 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	600			
		Number of Floors/Storeys	8			
		Protected Openings (1 hr)				
		Area of structure considered (m^2)			**3,000**	
	F	**Base fire flow without reductions**				**10,000**
		F = 220 **C** (**A**)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**8,500**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction (100% sprinkler coverage of building used)**			**Reduction**		
	(2)	Adequately Designed System (NFPA 13)		-30%		**0**
		Standard Water Supply		-10%		
		Fully Supervised System		-10%		
				Cumulative Total	**0%**	
5	**Exposure Surcharge (cumulative %, Maximum Exposure Adjustment Charge Used)**				**Surcharge**	
	(3)	North Side	10.1 - 20 m		15%	**5,100**
		East Side	3.1 - 10 m		20%	
		South Side	20.1 - 30 m		10%	
		West Side	10.1 - 20 m		15%	
				Cumulative Total	**60%**	
Results						
6	**(1) + (2) + (3)**	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**14,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**233**
				or	USGPM	3,699
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	3
		Required Volume of Fire Flow (m^3)			m^3	2520

Chris Visser

From: Wu, John <John.Wu@ottawa.ca>
Sent: Thursday, September 22, 2022 8:02 AM
To: Francois Thauvette
Subject: RE: 255 Metcalfe - Proposed addition of 3 basement apartment units - WM Boundary Conditions Request
Attachments: 255 Metcalfe Street September 2022.pdf

Here is the result:

The following are boundary conditions, HGL, for hydraulic analysis at 255 Metcalfe Street (zone 1W) assumed to be connected to the 305 mm watermain on MacLaren (see attached PDF for location).

Minimum HGL: 106.5 m

Maximum HGL: 115.4 m

Max Day + Fire Flow (233 L/s): 108.4 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.

Thanks.

John

From: Francois Thauvette <f.thauvette@novatech-eng.com>
Sent: September 8, 2022 2:44 PM
To: Wu, John <John.Wu@ottawa.ca>
Cc: Nitsche, Kersten <Kersten.Nitsche@ottawa.ca>; Jeffrey Kelly <j.kelly@novatech-eng.com>; Devang Maratha <d.maratha@novatech-eng.com>
Subject: RE: 255 Metcalfe - Proposed addition of 3 basement apartment units - WM Boundary Conditions Request

Hi John,

We are sending this e-mail to request municipal watermain boundary conditions for the above-noted development. This request is to confirm that the existing 8-storey apartment building located at 255 Metcalfe Street has adequate fire protection, should 3 new apartments be added in the basement. The anticipated water demands for the 8-storey apartment building (incl. the 3 new units) are as follows:

- Average Day Demand = 0.29 L/s
- Maximum Day Demand = 0.72 L/s
- Peak Hour Demand = 1.59 L/s
- FUS Fire Flow Demand = 233 L/s

It is understood that a multi-hydrant approach to firefighting is currently required for this existing non-sprinklered building, which is in accordance with the City of Ottawa Technical Bulletin ISTB-2018-02. Based on a review of the geoOttawa website, there appears to be several blue bonnet municipal hydrants in the vicinity of the subject site fed off 300mm dia. and 400mm dia. watermains (i.e., at least 2 within 75m and another 7 between 75m and 150m of the site). Please review the information and provide watermain boundary conditions and more importantly confirm that the existing municipal hydrants currently provide the necessary fire flow protection.

See attached calculation sheets and hydrant sketch for details.

Regards,

François Thauvette, P. Eng., Senior Project Manager | Land Development & Public Sector Engineering
NOVATECH Engineers, Planners & Landscape Architects
Please note that I am working from home. Email or MS Teams are the best ways to contact me.
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext: 219 | Cell: 613.276.0310 | Fax: 613.254.5867

From: Francois Thauvette <f.thauvette@novatech-eng.com>
Sent: Thursday, September 8, 2022 10:26 AM
To: Wu, John <John.Wu@ottawa.ca>
Cc: Nitsche, Kersten <Kersten.Nitsche@ottawa.ca>; Jeffrey Kelly <j.kelly@novatech-eng.com>; Devang Maratha <d.maratha@novatech-eng.com>
Subject: RE: 255 Metcalfe - Proposed addition of 3 basement apartment units

Hi John,

Thank you for the response. We will send you domestic water and (FUS) fire flow demands shortly to obtain municipal watermain boundary conditions, so that we may prepare a Water Servicing Brief.

Regards,

François Thauvette, P. Eng., Senior Project Manager | Land Development & Public Sector Engineering
NOVATECH Engineers, Planners & Landscape Architects
Please note that I am working from home. Email or MS Teams are the best ways to contact me.
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext: 219 | Cell: 613.276.0310 | Fax: 613.254.5867
The information contained in this email message is confidential and is for exclusive use of the addressee.

From: Wu, John <John.Wu@ottawa.ca>
Sent: Thursday, September 8, 2022 9:29 AM
To: Francois Thauvette <f.thauvette@novatech-eng.com>

Cc: Nitsche, Kersten <Kersten.Nitsche@ottawa.ca>; Jeffrey Kelly <j.kelly@novatech-eng.com>
Subject: RE: 255 Metcalfe - Proposed addition of 3 basement apartment units

Hi, Francois:

It is the requirement for fire flow checking to protect the public(new residents here), if the fire flow is not met, we will deny the application.
So, we need such a brief indicating there is no risk of possible fire fighting demand(only this portion required for this application). Boundary condition is the only way we checking it, not by the fire hydrant color coding.

Thanks.

John

From: Francois Thauvette <f.thauvette@novatech-eng.com>
Sent: August 24, 2022 4:17 PM
To: Wu, John <John.Wu@ottawa.ca>
Cc: Nitsche, Kersten <Kersten.Nitsche@ottawa.ca>; Jeffrey Kelly <j.kelly@novatech-eng.com>
Subject: 255 Metcalfe - Proposed addition of 3 basement apartment units

ohn,

I did not attend the pre-consultation meeting for this project, but my understanding is that the intent is to add 3 apartment units in the basement (bachelor/1-bdrm). In this case the increase in average domestic water demands (~0.01 L/s) and increase in peak sanitary sewage flows (~0.05 L/s) would be considered negligible. Since the building envelope/use/construction materials are not changing, there would be no change in the fire flow demand. We are trying to understand the rationale for a servicing brief/memo is required (as indicated on the attached Plans and Studies list).

It is understood that a multi-hydrant approach to firefighting is currently required for this existing building, which is in accordance with the City of Ottawa Technical Bulletin ISTB-2018-02. Based on a review of the geoOttawa website, there appears to be several blue bonnet municipal hydrants in the vicinity of the subject site fed off 300mm dia. and 400mm dia. watermains (i.e., at least 3 within 75m and another 4 between 75m and 150m of the site).

Please review and advise why a servicing brief/memo is required.

Regards,

François Thauvette, P. Eng., Senior Project Manager | Land Development & Public Sector Engineering
NOVATECH Engineers, Planners & Landscape Architects
Please note that I am working from home. Email or MS Teams are the best ways to contact me.
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext: 219 | Cell: 613.276.0310 | Fax: 613.254.5867

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Boundary Conditions for 255 Metcalfe Street

FIRE HYDRANT SKETCH
AND WATER INFRASTRUCTURE