NOVATECH
Engineers, Planners & Landscape Architects

T E C H N I C A L M E M O R A N D U M

DATE: **JULY 31, 2020**

TO: **MIKE WIEBE**

FROM: **FRANÇOIS THAUVETTE**

RE: **ASSESSMENT OF ADEQUACY OF PUBLIC SERVICES**
PROPOSED MIXED-USE DEVELOPMENT- 1335 & 1339 BANK STREET

PROJECT: **119210 (NOVATECH REPORT REF. # R-2019-195)**

Novatech has been retained by Lofty Riverside Development to assess the adequacy of the existing public services related to the proposed re-development of the 1335 & 1339 Bank Street properties. The proposed mixed-use development will consist of a 26-storey residential tower with a 6-storey podium, ground floor commercial space (i.e. café/bar, fitness gym), underground parking as well as indoor and outdoor amenity spaces. The purpose of this assessment is to demonstrate that the proposed development can be serviced by the existing municipal infrastructure surrounding the subject site.

This assessment includes a review of approximately 120m of the municipal sanitary sewer along Bank Street, from the southbound section of Riverside Drive down to the 1200mm dia. Rideau River collector sewer in the northbound section of Riverside Drive, south of the site. Also included in the assessment is the review of the watermain network adjacent to the subject site. The intent is to service the proposed development by extending new services to the municipal sanitary sewer and watermain in Bank Street. Stormwater from the site will be directed to the municipal storm sewer in Riverside Drive, north of the site, which outlets to the Rideau River.

Figure 1: Aerial View of the Subject Site

The subject site currently consists of two (2) separate properties located on the east side of Bank Street, which cover a total area of approximately 0.28 hectares. The existing sites include:

- a used car dealership (1335 Bank Street), located immediately south of the Rideau River and Riverside Drive (southbound), and
- a Harvey's Restaurant and associated parking lot (1339 Bank Street), located immediately to the south of the used car dealership

The properties will be merged to accommodate the proposed mixed-use development. As indicated on **Figure 1**, a multi-storey commercial tower and associated parking lot abuts the property to the northeast.

The Serviceability Report (R-816-65A), dated October 2017, prepared by T.L. Mak Engineering Consultants Ltd. for the proposed development of a 16-storey mixed-use building on the 1335 Bank Street property was also reviewed to compare the results of the current assessment with the values previously submitted to the City of Ottawa.

Based on recent discussions with the City of Ottawa, it is understood that infrastructure upgrades to the municipal watermain network will be required to provide redundancy and adequate fire flow to the surrounding area. We are currently discussing watermain options with the City and working towards a feasible solution for the development.

Sanitary Servicing

The existing commercial properties on the east side (1335 & 1339) and west side (1330, 1340 & 1346) of Bank Street, are currently being serviced by the existing 225mm dia. sanitary sewer in Bank Street. It is assumed that the property at 2211 Riverside Drive is also tributary to the sanitary sewer in Bank Street. There are no other upstream properties contributing flow to this sewer segment. The municipal sanitary sewer in Bank Street flows south and outlets into the 1200mm dia. Rideau River collector sewer located within the northbound section of Riverside Drive, south of the site.

Based on criteria in Section 4 of the City of Ottawa Sewer Design Guidelines, the total theoretical peak sanitary flows from the existing commercial sites (1335 & 1339 Bank Street), tributary to the 225mm dia. sewer, were calculated to be approximately 0.34 L/s. Detailed sanitary flow calculations are provided in **Appendix A** for reference. The existing flows calculated for the 1335 Bank Street property are consistent with the values calculated in the Serviceability Report (R-816-65A), prepared by T.L. Mak Engineering Consultants Ltd.

Sanitary flows for the proposed mixed-use development (1335 & 1339 Bank Street), were calculated using the Ottawa Sewer Design Guidelines, based on information provided by the architect. Under post-development conditions, the total theoretical peak sanitary flow has increased to approximately 6.85 L/s. Detailed sanitary flow calculations are provided in **Appendix A** for reference. Contributing flows from the properties on the west side of Bank Street are assumed to remained unchanged.

An analysis of the existing 225mm dia. sanitary sewer system was completed to estimate the total peak flows tributary to this sewer, including flows from the west side of Bank Street, down to the 1200m dia. sanitary collector sewer in Riverside Drive. The City's geoOttawa website was used to determine existing sanitary sewer sizes, invert elevations, and the tributary drainage areas. Despite the increase in total theoretical flow, the analysis demonstrates that existing municipal infrastructure has enough excess capacity to service the proposed mixed-use development. Refer to the Pre-Development and Post-Development Sanitary Sewer Drainage Area Plans, sanitary sewage calculations and to the Post-Development Sanitary Sewer Design Sheet provided in **Appendix A** for

details. It should however be noted that a 225mm dia. (9") sewer is no longer a typical size used for new infrastructure. Given the size of the existing sanitary sewer in the street, it is assumed that the proposed building will be serviced by a 200mm dia. (8") sanitary service at a minimum slope of 1.0%.

Although the details of the City of Ottawa Bank Street Renewal project are unknown at this time, it is anticipated the sanitary sewer in Bank Street, adjacent to the proposed development, will be replaced and upsized. An updated analysis will be provided as part of the detailed design phase of this project.

Water for Domestic Use and Firefighting

The existing commercial properties on the east side of Bank Street are currently being serviced by the existing 200mm dia. watermain in Bank Street. It is expected that under post-development conditions, the proposed development will continue to be serviced by the municipal watermain in Bank Street. As per City of Ottawa Technical Bulletin (ISDTB-2014-02), the proposed development will require a second water service, as the daily water demands are greater than 50m^3/day (0.58 L/s). It is assumed that the building will be sprinklered and therefore serviced by two 150mm dia. water services, separated by an isolation valve.

Preliminary water demand and fire flow calculations have been prepared for the proposed development based on criteria in Section 4 of the City of Ottawa Design Guidelines for Water Distribution Systems. The fire flows are calculated using the Fire Underwriters Survey (FUS) method, based on general assumptions and information provided by the architect, including building materials, a design population of 623 residents (i.e. 388 residential units) and approximately 1,861m^2 of commercial space. Preliminary water demands and fire flows are summarized in in the table below.

Proposed Building Use (1335 & 1339 Bank St.)	Avg. Daily Demand (L/s)	Max. Daily Demand (L/s)	Peak Hour Demand (L/s)	Fire Flow (L/s)
Residential + Commercial	2.6 L/s	6.4 L/s	14.0 L/s	167 L/s

The domestic water demands represent approximately three and a half (3.5) times the domestic demands calculated in the Serviceability Report (R-816-65A), previously prepared by T.L. Mak Engineering Consultants Ltd., however these latter values were for a 16-storey mixed-use development on the 1335 Bank Street property only. The proposed FUS fire flow has increased, due to the size and design of the building (now including a 26-storey residential tower with a 6-storey podium covering both the 1335 & 1339 Bank Street properties).

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 of Ottawa.

Municipal Watermain Boundary Condition	Boundary Condition	Normal Operating Pressure Range (psi)	Anticipated WM Pressure (psi)*
Minimum HGL (Peak Hour Demand)	121.0 m	40 psi (min.)	~ 61 psi
Maximum HGL (Max Day Demand)	131.0 m	50-70 psi	~ 71 psi
HGL (Max Day + Fire Flow)	Information Not Provided by City**	20 psi (min.)	> 20 psi

*Based on an approximate Bank Street roadway elevation of 60.3m.

**Due to theoretical low fire flow availability in the area.

Based on preliminary calculations, it is anticipated that the pressure within the municipal watermain will exceed the upper end of the normal operating pressure range during Max Day Conditions. Pressure reducing valves (PRV) may be required given the high system pressures. Given the height of the proposed tower, it is anticipated that a booster pump(s) will be required to provide adequate water pressure to the upper floors of the tower.

Based on correspondence from the City of Ottawa, the theoretical maximum fire flow available within this area is 90 L/s. This assumes a dead-end scenario due to the closure of municipal valves between pressure zones and a non-looped watermain network through the Riverside Hospital. Although this scenario is unlikely, the theoretical fire flow available (as provided by the City of Ottawa) is less than what is required by the proposed development (and other developments in the area). ***As stated above, it is understood that infrastructure upgrades to the municipal watermain network will be required to provide redundancy and adequate fire flow to the surrounding area, including the proposed development. The current option being proposed by the City of Ottawa would be to extend an additional local watermain along the west side of Bank Street from the existing 1200mm dia. feeder main in Riverside Drive and loop the it with the existing municipal watermain along the east side of Bank Street. It is understood that the existing watermain will be replaced and upsized as part of the Bank Street renewal project in the future. Additional discussions related to the watermain (i.e. preferred solution, timing of works, funding /cost sharing, etc.) will be required.*** A multi-hydrant approach to firefighting will be required to supply the fire flow calculated above. This approach is in accordance with the City of Ottawa Technical Bulletin ISTB-2018-02. A complete analysis will be provided as part of the detailed design phase of the project, based on discussions with the City of Ottawa.

Refer to **Appendix B** for preliminary domestic water demand, FUS fire flow calculations, correspondence with the City of Ottawa as well as possible watermain options being considered.

Storm Drainage and Stormwater Management

On-site stormwater management (SWM) will be required given the proximity of the site to the Rideau River. A SWM design and report, including both on-site stormwater quantity control and stormwater quality control (as required), will be prepared as part of the Site Plan Control application. The SWM criteria have been provided based on pre-consultation meetings with the City of Ottawa and the Rideau Valley Conservation Authority (RVCA). The allowable release rate from the site will be calculated using the Rational Method, with a maximum allowable runoff coefficient of C=0.5, a time of concentration of 10 minutes and a 5-year rainfall intensity from City of Ottawa IDF curves. Based

on discussions with the architect, it is anticipated that all stormwater runoff from the building roofs and rooftop amenity areas will be directed to an internal SWM storage tank and the peak flows will be controlled to meet the City of Ottawa quantity control requirements. A complete SWM analysis will be provided as part of the detailed design phase of the project.

Conclusion

Based on our analysis of the information available, the existing municipal sanitary and storm sewers should have enough capacity to service the proposed mixed-use development. On-site stormwater management will be implemented to meet the requirements of the City of Ottawa and the Rideau Valley Conservation Authority (RVCA). ***The City of Ottawa has acknowledged that infrastructure upgrades to the municipal watermain network will be required to provide redundancy and adequate fire flow to the surrounding area, including the proposed development. We are currently discussing watermain options with the City of Ottawa and working towards finding a feasible solution for the proposed development.*** Further details will be provided as part of the Site Plan Control application.

NOVATECH

Prepared by:

Stephen Matthews, B.A. (Env.)
Senior Design Technologist

Reviewed by:

François Thauvette, P. Eng.
Senior Project Manager

APPENDIX A

Sanitary Drainage Area Plans, Sanitary Sewage Calculations & Sewer Design Sheet

LEGEND

- 0.26 / 32594 / 0 0 — DRAINAGE AREA (ha), DOWNSTREAM MAINTENANCE HOLE, # of RESIDENTIAL UNITS / PEAK FLOW
- 0.14 / COMMERCIAL / 1 0.1 — COMMERCIAL DEVELOPMENT AREA (ha), DEVELOPMENT TYPE, # of COMMERCIAL UNITS / PEAK FLOW
- SANITARY SEWER, MH AND FLOW DIRECTION
- DRAINAGE AREA BOUNDARY

RIDEAU RIVER
RIVERSIDE DRIVE
BANK STREET
MHSA02549
MHSA01407
MHSA01408
MHSA 32594
225mmØ SAN
1200mmØ SANITARY TRUNK
0.11 COMM / INST 1 0.1
0.14 COMM / INST 1 0.1
0.17 COMM / INST 1 0.1
0.20 COMM / INST 1 0.1
0.12 COMM / INST 1 0.1
0.09 COMM / INST 1 0.1
0.26 32594 0 0

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ADEQUACY OF PUBLIC SERVICES - SANITARY

EXISTING SANITARY DRAINAGE AREA PLAN

SCALE 1 : 1000 (0 10 20 30 40)
DATE JULY 2020
JOB 119210
FIGURE EX-SAN

SHT11X17.DWG - 279mmX432mm

1335 & 1339 Bank Street
PRE-DEVELOPMENT SANITARY FLOWS

Commercial Use - 1335 Bank Street			
Site Area	0.114	ha	
Average Commercial Flow (Currently)	28,000	L/ha/day	
Average Commercial Flow (Previously)	50,000	L/ha/day	
Commercial Peaking Factor	1.5		
Peak Commercial Flow	**0.10**	**L/s**	Based on 50,000 L/ha/day
Commercial Use - 1339 Bank Street			
Site Area	0.169	ha	
Average Commercial Flow (Currently)	28,000	L/ha/day	
Average Commercial Flow (Previously)	50,000	L/ha/day	
Commercial Peaking Factor	1.5		
Peak Commercial Flow	**0.15**	**L/s**	Based on 50,000 L/ha/day
Site Area	0.283	ha	
Infiltration Allowance	0.33	L/s/ha	
Peak Extraneous Flows	**0.09**	**L/s**	
Total Peak Sanitary Flow	**0.34**	**L/s**	

LEGEND

- 0.28 / 32594 / 388 | 6.7 — DRAINAGE AREA (ha) / DOWNSTREAM MAINTENANCE HOLE / # of RESIDENTIAL UNITS / PEAK FLOW
- 0.19 / COMMERCIAL / 1 | 0.2 — COMMERCIAL DEVELOPMENT AREA (ha) / DEVELOPMENT TYPE / # of COMMERCIAL UNITS / PEAK FLOW
- SANITARY SEWER, MH AND FLOW DIRECTION
- DRAINAGE AREA BOUNDARY
- PROPOSED SITE BOUNDARY

N

RIDEAU RIVER

RIVERSIDE DRIVE

BANK STREET

SITE

0.28 / 32594 / 388 | 6.7

0.19 / COMMERCIAL / 1 | 0.2

0.26 / 32594 / 0 | 0

0.14 / COMM / INST / 1 | 0.1

0.20 / COMM / INST / 1 | 0.1

0.12 / COMM / INST / 1 | 0.1

0.09 / COMM / INST / 1 | 0.1

MHSA02549

MHSA01407

MHSA01408

MHSA 32594

225mmØ SAN

1200mmØ SANITARY TRUNK

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ADEQUACY OF PUBLIC SERVICES - SANITARY

PROPOSED SANITARY DRAINAGE AREA PLAN

SCALE 1 : 1000 (0 10 20 30 40)

DATE JULY 2020 | JOB 119210 | FIGURE PR-SAN

SHT11X17.DWG - 279mmX432mm

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1335 & 1339 Bank Street: [26-Storey Tower with 6-Storey Podium]
POST-DEVELOPMENT SANITARY FLOWS

Residential Use		
Number of Studio / 1-Bedroom Units	308	
Persons per Studio / 1-Bedroom Unit	1.4	
Number of 2-Bedroom Units	56	
Persons per 2-Bedroom Unit	2.1	
Number of 3-Bedroom Units	24	
Persons per 3-Bedroom Unit	3.1	
Total Number of Units	388	
Design Population	623	
Average Daily Flow	280	L/c/day
Peak Factor (Harmon Formula)	3.30	
Peak Residential Flow	**6.66**	**L/s**
Commercial/Amenity Use		
Commercial Space	1,861	m^2
Average Commercial Flow	2.8	$L/m^2/day$
Commercial Peaking Factor	1.5	
Peak Commercial Flow	**0.09**	**L/s**
Site Area	0.282	ha
Infiltration Allowance	0.33	L/s/ha
Peak Extraneous Flows	**0.09**	**L/s**
Total Peak Sanitary Flow	**6.85**	**L/s**

Floor 1: Commercial and Amenity Space
Floors 2 to 6: 5 storeys x (32 x Bach/1-Bdrm units + 1 x 2-Bdrm units + 1 x 3-Bdrm unit) per floor
Floor 7: (6 x Bach/1-Bdrm units + 0 x 2-Bdrm units + 1 x 3-Bdrm unit), amenity and outdoor space
Floor 8: (6 x Bach/1-Bdrm units + 0 x 2-Bdrm units + 1 x 3-Bdrm unit), amenity space
Floors 9 to 25: 17 storeys x (8 x Bach/1-Bdrm units + 3 x 2-Bdrm units + 1 x 3-Bdrm units) per floor
Floor 26: Penthouse Amentity Space

PROJECT #: 119210
PROJECT NAME: 1335 1339 Bank Street
LOCATION: CITY OF OTTAWA

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DATE: July 30, 2020
PREPARED BY: SM
REVIEWED BY: FST

Post-Development Sanitary Flow Calculations

Location			Residential		Commercial / Institutional		Residential Cumulative		Peak Factor		Commercial / Institutional		Residential	Infiltration		Foundation		PEAK DESIGN FLOW (l/s)	Pipe Data					
Street / Area	From	To	Population	Area (ha)	Area (ha)	Accu. Area (ha)	Pop.	Area (ha)	Res Peak Factor	Comm Peak Factor	Peak Flow (l/s)	Accu. Peak Flow	Acc. Peak Flow (l/s)	Infilt. Flow (l/s)	Accu Infil. Flow	Found. Flow (l/s)	Accu Found. Flow		Size (mm)	Slope (%)	Length (m)	Capacity (l/s)	Full Flow Vel. (m/s)	Q/Q_{full} (%)
Bank Street	SA32593	SA32594	623	0.28	0.74	0.74	623	0.28	3.3	1.5	0.36	0.36	6.74	0.34	0.34	2.75	2.75	**10.19**	225	0.35	102.3	26.5	0.67	38.4%
Bank Street	SA32594	SA01408	0	0.32	0.00	0.74	623	0.60	3.3	1.5	0.00	0.36	6.74	0.11	0.44	0.00	2.75	**10.29**	225	0.30	16.2	24.6	0.62	41.9%

Green cells include both existing (west side) numbers and proposed development (east side) numbers

City of Ottawa Sewer Design Guidelines

Studio / 1-Bedroom Apartment Unit	1.4	persons/unit	
2-Bedroom Apartment Unit	2.1	persons/unit	
3-Bedroom Apartment Unit	3.1	persons/unit	
Average Domestic Flow	280	L/person/day	
Institutional / Commercial Flow	28,000	L/ha/day	
Extraneous Flows	0.33	L/s/ha	
Foundation Drain Allowance	5.0	L/s/ha	(use 5.0 L/s/ha for tributary areas < 10 ha; 3.0 L/s/ha for tributary areas >10 ha and < 100 ha; 2.0 L/s/ha for tributary areas >100 ha)
Residential Peaking Factor	Harmon Equation, Correction Factor = 0.8		
Institutional / Commercial Peaking Factor	1.5		

Notes:
The number of units in the apartment building has been taken from preliminary architectural design plans.
Existing pipe information has been taken from the City of Ottawa geoOttawa website.
A foundation drain allowance has been accounted for along only those existing streets that do not have a separated storm sewer as indicated on the geoOttawa website.

APPENDIX B

Preliminary Domestic Water Demand, FUS Fire Flow Calculations
and E-mail correspondence from the City of Ottawa

1335 & 1339 Bank Street: [26-Storey Tower with 6-Storey Podium]
WATER ANALYSIS

DOMESTIC WATER DEMAND

Residential Use		
Number of Studio / 1-Bedroom Units	308	
Persons per Studio / 1-Bedroom Unit	1.4	
Number of 2-Bedroom Units	56	
Persons per 2-Bedroom Unit	2.1	
Number of 3-Bedroom Units	24	
Persons per 3-Bedroom Unit	3.1	
Total Number of Units	388	
Total Design Population	623	
Average Day Demand (350 L/c/day)	**2.52**	**L/s**
Maximum Day Demand (2.5 x avg. day)	**6.31**	**L/s**
Peak Hour Demand (2.2 x max. day)	**13.88**	**L/s**
Commercial/Amenity Use		
Commercial Space	1,861	m^2
Average Day Demand (28,000 L/ha/day)	**0.06**	**L/s**
Maximum Day Demand (1.5 x avg. day)	**0.09**	**L/s**
Peak Hour Demand (1.8 x max. day)	**0.16**	**L/s**
Total Average Day Demand	**2.58**	**L/s**
Total Maximum Day Demand	**6.40**	**L/s**
Total Peak Hour Demand	**14.04**	**L/s**

Floor 1: Commercial and Amenity Space
Floors 2 to 6: 5 storeys x (32 x Bach/1-Bdrm units + 1 x 2-Bdrm units + 1 x 3-Bdrm unit) per floor
Floor 7: (6 x Bach/1-Bdrm units + 0 x 2-Bdrm units + 1 x 3-Bdrm unit), amenity and outdoor space
Floor 8: (6 x Bach/1-Bdrm units + 0 x 2-Bdrm units + 1 x 3-Bdrm unit), amenity space
Floors 9 to 25: 17 storeys x (8 x Bach/1-Bdrm units + 3 x 2-Bdrm units + 1 x 3-Bdrm units) per floor
Floor 26: Penthouse Amentity Space

BOUNDARY CONDITIONS (Provided by City of Ottawa)

Maximum HGL =	131	m
Minimum HGL =	121	m
Max Day + Fire Flow =	Not Provided by City	

PSI	m OF HEAD
1.42197	1

PRESSURE TESTS

To convert Head(m) to PSI: multiply by 1.42

Average Ground Elevation 60.3 m

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

High Pressure = **70.7** PSI

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

Low Pressure = **60.7** PSI

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

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Novatech Project #: 119210
Project Name: 1335 & 1339 Bank Street
Date: 7/10/2020
Input By: S.Matthews
Reviewed By: F.Thauvette

Legend: Input by User; No Information or Input Required

Building Description: 26-Storey Building with a 6-Storey Podium
Fire Resistive Construction

Step			Choose		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction **C**	Wood frame		1.5	0.6	
		Ordinary construction		1		
		Non-combustible construction		0.8		
		Modified Fire resistive construction (2 hrs)	Yes	0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Podium Level Footprint (m^2)	2035			
		Total Floors/Storeys (Podium)	6			
		Tower Footprint (m^2)	869			
		Total Floors/Storeys (Tower)	20			
		Protected Openings (1 hr)				
		Area of structure considered (m^2)			**9,878**	
	F	**Base fire flow without reductions**				**13,000**
		F = 220 **C** (**A**)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**11,050**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**			**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%	-30%	**-4,420**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	No	-10%		
				Cumulative Total	**-40%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	> 45.1m		0%	**3,315**
		East Side	10.1 - 20 m		15%	
		South Side	30.1- 45 m		5%	
		West Side	20.1 - 30 m		10%	
				Cumulative Total	**30%**	
Results						
6	(1) + (2) + (3)	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**10,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**167**
				or	USGPM	2,642
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	2
		Required Volume of Fire Flow (m^3)			m^3	1200

Francois Thauvette

From: Baker, Adam <adam.baker@ottawa.ca>
Sent: Thursday, July 30, 2020 3:33 PM
To: Christine McCuaig
Cc: Francois Thauvette; Kevin McMahon; Pierre Boulet; George Gaty; dougv@hobinarc.com; Xu, Lily; James, Douglas; Shillington, Jeffrey; Lodoen Unseth, Kelby
Subject: RE: Bank Street - Servicing Issues - 1335/1339 Bank Street

Hello,

In response to the memo of Lloyd Phillips & Associates (dated July 9, 2020) and two accompanying geoOttawa Capture sketches showing the five options to provide a secondary watermain feed for redundancy to 1335 and 1339 Bank Street, please find below information:

- Option 1 – This option will not provide the required redundancy to the site.
- Option 2 – This option will not provide the required redundancy to the site (will not provide required fire flows).
- Option 3 – This option, which proposes a connection to the 914mm backbone watermain is not an available option because this main is operated on a different pressure zone than the proposed site.
- Option 4 & 5 – This general layout is viable in terms of providing the secondary watermain feed for redundancy to the project site. There are a few considerations:
    - Several utility poles are located in the sidewalk which will conflict with the proposed route of Option 5.
    - These layouts need to connect to and upsize the existing 203mm watermain running east-west on Riverside Drive to provide the required looping (illustrated below).
    - Consider connecting to the 1220mm watermain trunk rather than the 610mm as this would shorten the length of the proposed watermain and eliminate a watermain trunk crossing.

In terms of implementing the proposed watermain infrastructure, this will be a development driven project. The City is undertaking the Bank street infrastructure renewal project, currently scheduled for 2022, and will upgrade the existing 203mm diameter watermain to a 305mm diameter watermain (including in front of the subject properties – Riverside to Riverside) which will, based on current proposed water demands for the site, meet the primary domestic and fire demands. Cost-sharing of the construction of either Option 4 or 5 can be explored with the City through coordination of the proposed watermain works with this project to provide the required secondary feed for redundancy.

Thank you,

Adam Baker, EIT
Project Manager
Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique
Development Review - South 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 26552, Adam.Baker@ottawa.ca

From: Christine McCuaig <christine@lloydphillips.com>
Sent: July 21, 2020 9:21 AM
To: Xu, Lily <Lily.Xu@ottawa.ca>; James, Douglas <Douglas.James@ottawa.ca>; Baker, Adam <adam.baker@ottawa.ca>; Shillington, Jeffrey <jeff.shillington@ottawa.ca>; Lodoen Unseth, Kelby <Kelby.LodoenUnseth@ottawa.ca>
Cc: Francois Thauvette <f.thauvette@novatech-eng.com>; Kevin McMahon <kevin@loftydevelopments.com>; Pierre Boulet <pierreb@bouletconstruction.com>; George Gaty <ggaty@elkproperty.com>; dougv@hobinarc.com
Subject: Bank Street - Servicing Issues - 1335/1339 Bank Street

Hello Lily,

As you know, we are currently stalled until we can finalize a path forward to address the servicing constraints. On June 30th, we had a Teams meeting and the City requested options from Novatech. Francois prepared these and sent them to the City on July 2nd (email attached). We have not heard any response since.

I understand this is a larger issue, but we need to move forward with this project and request input and response from City staff on the presented options in order to service this proposal.

It would be greatly appreciated if you could obtain a response as soon as possible, ideally in the next couple days, so that our submission can be finalized.

Regards,
Christine

--

/

Christine McCuaig, RPP MCIP M.PI
Senior Planner | Lloyd Phillips & Associates Ltd.
christine@lloydphillips.com
24 Kirkstall Avenue, Ottawa, ON, K2G 3M5
(c) 613-850-8345

***AS OF AUGUST 1ST - NEW CONTACT DETAILS WILL BE**:*
christine@q9planning.com | 613-850-8345
www.q9planning.com

'

'

Francois Thauvette

From: Francois Thauvette
Sent: Thursday, July 2, 2020 2:36 PM
To: 'Baker, Adam'; Mottalib, Abdul
Cc: 'Mike Wiebe'; 'dougv@hobinarc.com'; 'Shillington, Jeffrey'; Lee Sheets
Subject: RE: 1335/1339 Bank Site Servicing (Watermain)
Attachments: geoOttawaCapture(WM).pdf; geoOttawaCapture(WM2).pdf

Hi Adam and Abdul,

As requested during our Teams meeting on Tuesday (June 30), please find attached two (2) sketches showing possible watermain work (extensions) that might alleviate the (lack of) redundancy and (low) fire flow issues related to the current configuration of the municipal watermain network in the area. These options are for review and discussion purposes. Please let us know if any of these options may be feasible from the City's perspective. The City's water modelling group will have to analyze the various scenarios to determine the impact the suggested improvements may have on the municipal watermain network. By no means is this an exhaustive list of possible options. Depending on the City's review and modelling results, other options and/or multiple options may be required (i.e. Option 2 & 3) to meet the requirements of the future developments in the area. Options 3, 4 and/or 5 could be coordinated with the on-going Bank Street Renewal project.

Regards,

François Thauvette, P. Eng., Senior Project Manager | Land Development & Public Sector Engineering
NOVATECH Engineers, Planners & Landscape Architects
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
Sent: Friday, June 26, 2020 2:02 PM
To: 'Baker, Adam' <adam.baker@ottawa.ca>
Cc: 'Mike Wiebe' <mike@loftydevelopments.com>; dougv@hobinarc.com; 'Shillington, Jeffrey' <jeff.shillington@ottawa.ca>; Lee Sheets <l.sheets@novatech-eng.com>
Subject: RE: 1335/1339 Bank Site Servicing (Watermain)

Hi Adam,

Would the City have recent hydrant flow data for the hydrants in close proximity to our site (i.e. **Hydrants 368027-H024**, **368027-H025** and **368027-H064**)? I suspect that the fire flow is greater than the theoretical maximum of 90 L/s (previous provided by the City), as the private valves on the Riverside Hospital campus are likely open (the Hospital likely needs a redundant feed). If the valves are indeed open, then the watermain network is looped to the system on the east side of the Transitway.

If no data is available, could these hydrants be tested, so we can confirm the fire flow available? As discussed during our Teams Meeting on June 24/20, this has an impact on the entire area, including the Hospital as well as the residential and commercial properties, not just our site.

Also, does the City know if the watermain at the end of Sarah Billings Place is capped on the east or west side of the Transitway? If capped on the east side of the Transitway, it would be easy to extend the watermain (approx. 60m) onto

the Hospital property, to create a watermain loop that would be independent of the private Hospital watermain network. An easement may be required. See marked-up sketch (geoOttawa screen shot) for details.

Please also confirm when the City's water modelling group will be available to meet via Teams.

Regards,

François Thauvette, P. Eng., Senior Project Manager | Land Development & Public Sector Engineering
NOVATECH Engineers, Planners & Landscape Architects
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
Sent: Thursday, June 25, 2020 4:02 PM
To: Baker, Adam <adam.baker@ottawa.ca>
Cc: Mike Wiebe <mike@loftydevelopments.com>
Subject: RE: 1335/1339 Bank Site Servicing

Hi Adam,

Have you had any luck scheduling a meeting with the City's water modelling group?

Regards,

François Thauvette, P. Eng., Senior Project Manager | Land Development & Public Sector Engineering
NOVATECH Engineers, Planners & Landscape Architects
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: Baker, Adam <adam.baker@ottawa.ca>
Sent: Monday, June 22, 2020 11:23 AM
To: Francois Thauvette <f.thauvette@novatech-eng.com>
Subject: RE: 1335/1339 Bank Site Servicing

Hi Francois,

Yes, I've attached a screenshot of those invited to the meeting. Please feel free to forward the invite on if there's anyone else to include.

Thanks,
Adam

-----Original Appointment-----
From: Francois Thauvette <f.thauvette@novatech-eng.com>
Sent: June 22, 2020 10:45 AM

To: Baker, Adam
Subject: Accepted: 1335/1339 Bank Site Servicing
When: June 24, 2020 10:00 AM-12:00 PM (UTC-05:00) Eastern Time (US & Canada).
Where: Microsoft Teams Meeting

I can't see from the invitation, but I'm assuming that all others (i.e. architect, client, etc.) have also been invited to the meeting?

Regards,

François Thauvette, P. Eng., Senior Project Manager | Land Development & Public Sector Engineering
NOVATECH Engineers, Planners & Landscape Architects
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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geo Ottawa

I want to ...

1335 bank

Option 1 (Interim solution):
Agreement with Hospital to keep valves open at all times

Option 2:
Could the City extend the WM to create a looped system, independent of the private Hospital WM network?

Rivière Rideau River

Transitway

Corridor ferroviaire Beachburg rail corridor

av Norwood Ave

rue Heath St

ch Crestview Rd

ch Westlane Rd

W Billings Ave

place Sarah Billings Pl

Bridge Creek Dr

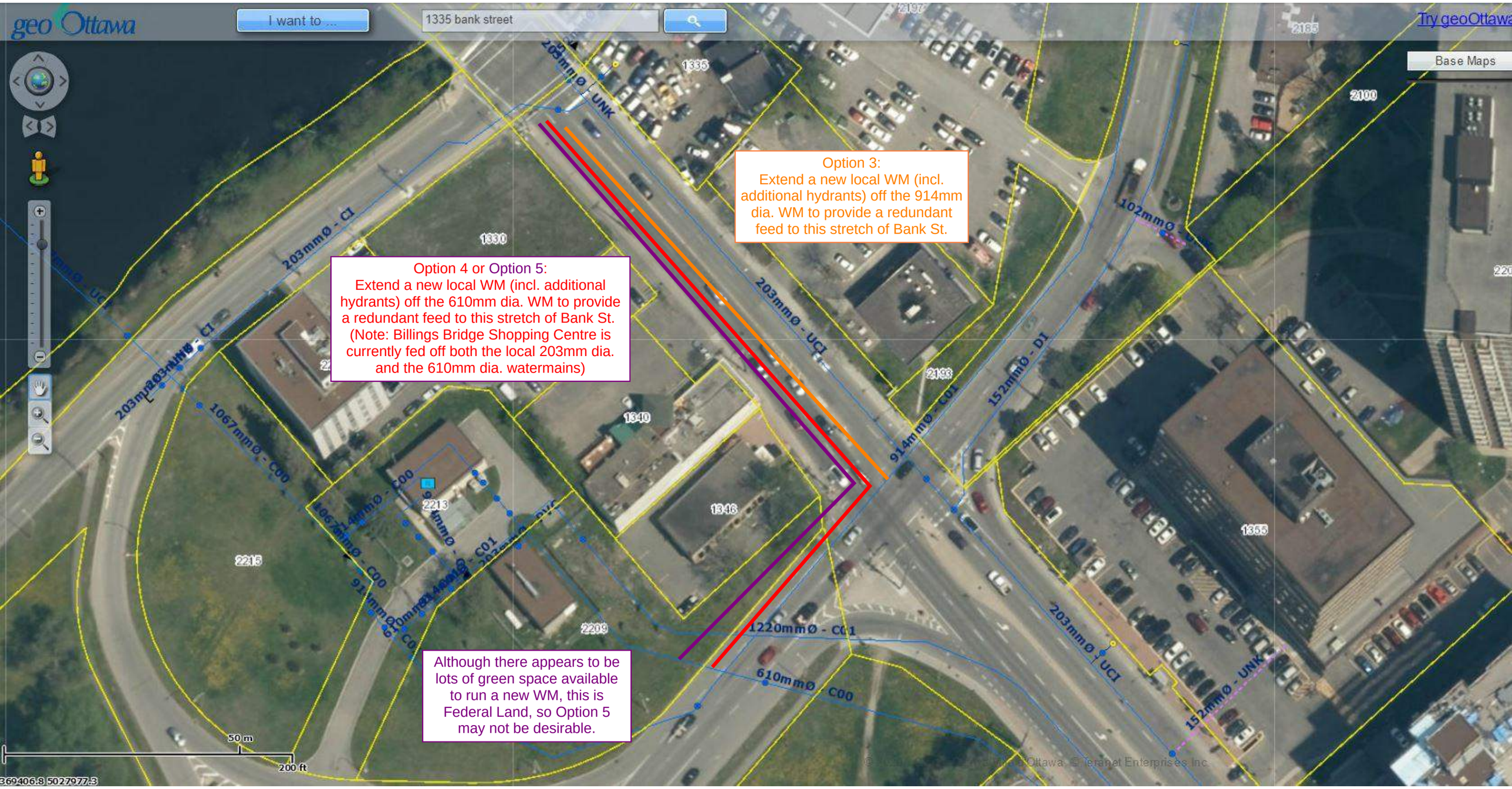
from Riverside Dr

ch Pleasant Park Rd

200 m

500 ft

69428.7 5028924.2


geo Ottawa
I want to ...
1335 bank street
Try geoOttawa
Base Maps
Option 3:
Extend a new local WM (incl. additional hydrants) off the 914mm dia. WM to provide a redundant feed to this stretch of Bank St.
Option 4 or Option 5:
Extend a new local WM (incl. additional hydrants) off the 610mm dia. WM to provide a redundant feed to this stretch of Bank St. (Note: Billings Bridge Shopping Centre is currently fed off both the local 203mm dia. and the 610mm dia. watermains)
Although there appears to be lots of green space available to run a new WM, this is Federal Land, so Option 5 may not be desirable.
203mmØ - UNK
203mmØ - CI
1067mmØ - C00
914mmØ - C01
203mmØ - UCI
102mmØ
152mmØ - DI
1220mmØ - C01
610mmØ - C00
152mmØ - UNK
1335
1330
1340
1346
2213
2215
2209
2193
2100
2185
1355
50 m
200 ft
369406.8 5027977.3
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Francois Thauvette

From: Baker, Adam <adam.baker@ottawa.ca>
Sent: Tuesday, June 16, 2020 3:55 PM
To: Francois Thauvette
Cc: Steve Matthews; Oram, Cody; Shillington, Jeffrey
Subject: RE: 1335 & 1339 Bank Street - Redevelopment - WM Boundary Condition Request
Attachments: Current configuration.pdf

Hi Francois,

Please find the response for your inquiry on the fire flow below with attached water map:

"The results provided are based on current configuration as shown in the attached figure. The 914mm watermain on Riverside is currently set up to be on 1W pressure, which is how Production normally operates. By doing so, the old 203mm UCI on Bank st is the main supply to the area in question, including the hydrants. You will not be able to pull more than 90L/s from the surrounding hydrants before which pressure falls below 20psi. The reason we didn't provide an HGL during fire is because the HGL/pressure is below 20psi based on their fire flow."

As well, unfortunately we have also determined that it is not feasible to use the 203mm watermain on Riverside west of Bank street to provide redundancy in case of a watermain break on Bank. The City's water departments are currently looking into available options that would be available to provide water service redundancy for these properties.

Once they have completed their due diligence, I am looking to set up a meeting with Novatech and include members of the City water department so that these issues can be discussed directly with them. I will be sure to keep you posted on any updated information that I receive in the meantime.

Thank you,
Adam

Adam Baker, EIT
Engineering Intern
Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique
Development Review - South 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 26552, Adam.Baker@ottawa.ca

From: Francois Thauvette <f.thauvette@novatech-eng.com>
Sent: June 16, 2020 12:26 PM
To: Baker, Adam <adam.baker@ottawa.ca>
Cc: Steve Matthews <S.Matthews@novatech-eng.com>
Subject: RE: 1335 & 1339 Bank Street - Redevelopment - WM Boundary Condition Request

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Hi Adam,

Have you received any additional response from the water modelling group? Please advise.

Regards,

François Thauvette, P. Eng., Senior Project Manager | Land Development & Public Sector Engineering
NOVATECH Engineers, Planners & Landscape Architects
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: Baker, Adam <adam.baker@ottawa.ca>
Sent: Friday, June 12, 2020 11:46 AM
To: Francois Thauvette <f.thauvette@novatech-eng.com>
Cc: Steve Matthews <S.Matthews@novatech-eng.com>
Subject: RE: 1335 & 1339 Bank Street - Redevelopment - WM Boundary Condition Request

Hi Francois,

I forwarded your question regarding the fire flow to our water modelling group yesterday. I have made them aware that you and your client are very eager to submit. I will call you/set up a Teams meeting as soon as I hear back.

Thanks,
Adam

Adam Baker, EIT
Engineering Intern
Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique
Development Review - South 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 26552, Adam.Baker@ottawa.ca

From: Francois Thauvette <f.thauvette@novatech-eng.com>
Sent: June 12, 2020 10:46 AM
To: Baker, Adam <adam.baker@ottawa.ca>
Cc: Steve Matthews <S.Matthews@novatech-eng.com>
Subject: RE: 1335 & 1339 Bank Street - Redevelopment - WM Boundary Condition Request

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Hi Adam,

Any chance you are available to chat via Teams? The client is very eager to submit, but we haven't received a response to the e-mail below.

Regards,

François Thauvette, P. Eng., Senior Project Manager | Land Development & Public Sector Engineering
NOVATECH Engineers, Planners & Landscape Architects
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
Sent: Thursday, June 11, 2020 2:00 PM
To: Baker, Adam <adam.baker@ottawa.ca>
Cc: Steve Matthews <S.Matthews@novatech-eng.com>
Subject: RE: 1335 & 1339 Bank Street - Redevelopment - WM Boundary Condition Request

Hi Adam,

We have a concern with the following statement, provided in the e-mail below: *The total available flow @ 20psi using all hydrants within 150m of property is 90 L/s.* Is this correct? It seems very low and should be addressed…

Please also provide the HGL during Max Day + Fire Flow conditions.

I will send you a Teams meeting invitation to discuss. What time works best for you?

Regards,

François Thauvette, P. Eng., Senior Project Manager | Land Development & Public Sector Engineering
NOVATECH Engineers, Planners & Landscape Architects
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: Baker, Adam <adam.baker@ottawa.ca>
Sent: Thursday, June 11, 2020 1:27 PM
To: Francois Thauvette <f.thauvette@novatech-eng.com>
Cc: Steve Matthews <S.Matthews@novatech-eng.com>
Subject: RE: 1335 & 1339 Bank Street - Redevelopment - WM Boundary Condition Request

Hi Francois,

We are still in the process of verifying that the unused watermain length along the portion of Riverside to the west of Bank could be put into use if there is a watermain break to provide temporary service to these properties in the case of a watermain break on Bank Street. I anticipate having an answer for you on this by the end of next week. If this is not a possibility, we will need to work with you further on how to provide water service redundancy for this development.

That being said, I understand that you and your client are very eager to submit the application. As such, I've provided the tentative boundary conditions below, which is based upon the proposed twin services, separated by a watermain valve, connecting on the 203mm Bank Street watermain:

The following are boundary conditions, HGL, for hydraulic analysis at 1335-1339 Bank St (zone 2W2C) assumed to be connected to the 203mm Bank St (see attached PDF for location).

Minimum HGL = 121.0m

Maximum HGL = 131.0m. *The maximum pressure is estimated to be more than 80 psi. A pressure check at completion of construction is recommended to determine if pressure control is required.*

Multi-Hydrant Analysis

The total available flow @ 20psi using all hydrants within 150m of property is 90 L/s.

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.

Pleased to discuss further. Feel free to send over a Teams invite if you want to chat.

Thanks,
Adam

Adam Baker, EIT
Engineering Intern
Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique
Development Review - South 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 26552, Adam.Baker@ottawa.ca

From: Francois Thauvette <f.thauvette@novatech-eng.com>
Sent: June 11, 2020 12:16 PM
To: Baker, Adam <adam.baker@ottawa.ca>
Subject: RE: 1335 & 1339 Bank Street - Redevelopment - WM Boundary Condition Request

Hi Adam,

I am available any time if you want to chat via Teams (re: WM boundary conditions). My preference would be to call via Teams rather than by cell phone (if possible).

Regards,

François Thauvette, P. Eng., Senior Project Manager | Land Development & Public Sector Engineering

NOVATECH Engineers, Planners & Landscape Architects
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: Baker, Adam <adam.baker@ottawa.ca>
Sent: Wednesday, June 10, 2020 10:45 AM
To: Francois Thauvette <f.thauvette@novatech-eng.com>
Cc: Steve Matthews <S.Matthews@novatech-eng.com>
Subject: RE: 1335 & 1339 Bank Street - Redevelopment - WM Boundary Condition Request

Hi Francois,

I've been working with our water resources group with regards to the water service redundancy on this site. Would you be available around 11:30 today for a Microsoft Teams call to discuss this?

Thanks,
Adam

Adam Baker, EIT
Engineering Intern
Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique
Development Review - South 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 26552, Adam.Baker@ottawa.ca

From: Francois Thauvette <f.thauvette@novatech-eng.com>
Sent: June 10, 2020 9:57 AM
To: Baker, Adam <adam.baker@ottawa.ca>
Cc: Steve Matthews <S.Matthews@novatech-eng.com>
Subject: RE: 1335 & 1339 Bank Street - Redevelopment - WM Boundary Condition Request

Hi Adam,

Any chance we can obtain the watermain boundary conditions today? The request was sent in over a week ago and the client is very eager to submit the Adequacy of Public Services report for OPA and ZBL amendments.

Regards,

François Thauvette, P. Eng., Senior Project Manager | Land Development & Public Sector Engineering
NOVATECH Engineers, Planners & Landscape Architects
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: Tuesday, June 2, 2020 4:25 PM

To: Baker, Adam <adam.baker@ottawa.ca>
Cc: Steve Matthews <S.Matthews@novatech-eng.com>
Subject: 1335 & 1339 Bank Street - Redevelopment - WM Boundary Condition Request

Hi Adam,

We are working on the proposed 25-storey mixed-use development at 1335 & 1339 Bank Street. The properties will be merged and the new building will replace the old car dealership (1335) and Harvey's restaurant (1339) sites.

We are sending you this e-mail to request watermain boundary conditions for the 200mm dia. WM in Bank Street (as shown on geoOttawa). The anticipated water demands for the proposed site are as follows:

- Average Day Demand = 2.54 L/s
- Maximum Day Demand = 6.31 L/s
- Peak Hour Demand = 13.85 L/s
- Maximum Fire Flow Demand = 167 L/s (see attached FUS calculations for details)

Please note that we anticipate requiring two (2) water services due to the high domestic demands. These will likely be located near the NW property corner. A multi-hydrant approach to firefighting is also anticipated to be required. Based on a review of geoOttawa, there are a few hydrants within 75m of the subject site, one of which is near the NW corner of the subject site. A hydraulic analysis will be completed, once the WM boundary conditions are provided by the City.

We are aware that a Bank Street Renewal project is underway, including roadway modifications as well as underground infrastructure upgrades, but have no information regarding this project. Would you be able to provide us with preliminary plans related to the Bank Street Renewal project, s this will have an impact on our grading and servicing design. Our understanding is that the City PM for the Bank Street Project is Roxanne Tubb (roxanne.tubb@ottawa.ca).

Please send us an e-mail should you require any additional information.

Regards,

François Thauvette, P. Eng., Senior Project Manager | Land Development & Public Sector Engineering
NOVATECH Engineers, Planners & Landscape Architects
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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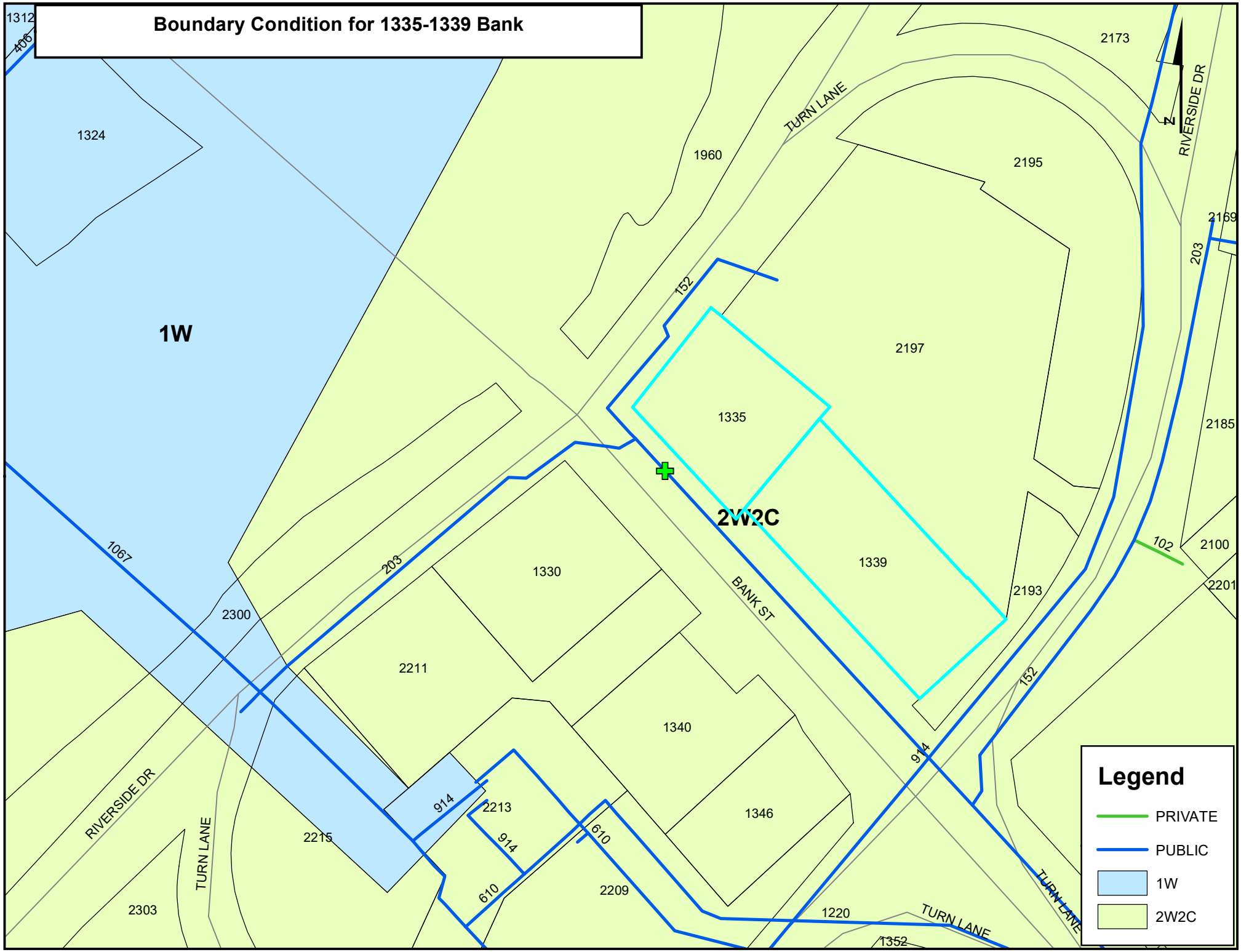
Boundary Condition for 1335-1339 Bank
1312
406
1324
1W
1960
TURN LANE
2173
RIVERSIDE DR
N
2195
2169
203
152
2197
1335
2W2C
1339
2185
2100
102
2201
1067
203
1330
BANK ST
2193
2300
2211
1340
914
152
RIVERSIDE DR
TURN LANE
914
2213
2215
610
914
1346
610
2209
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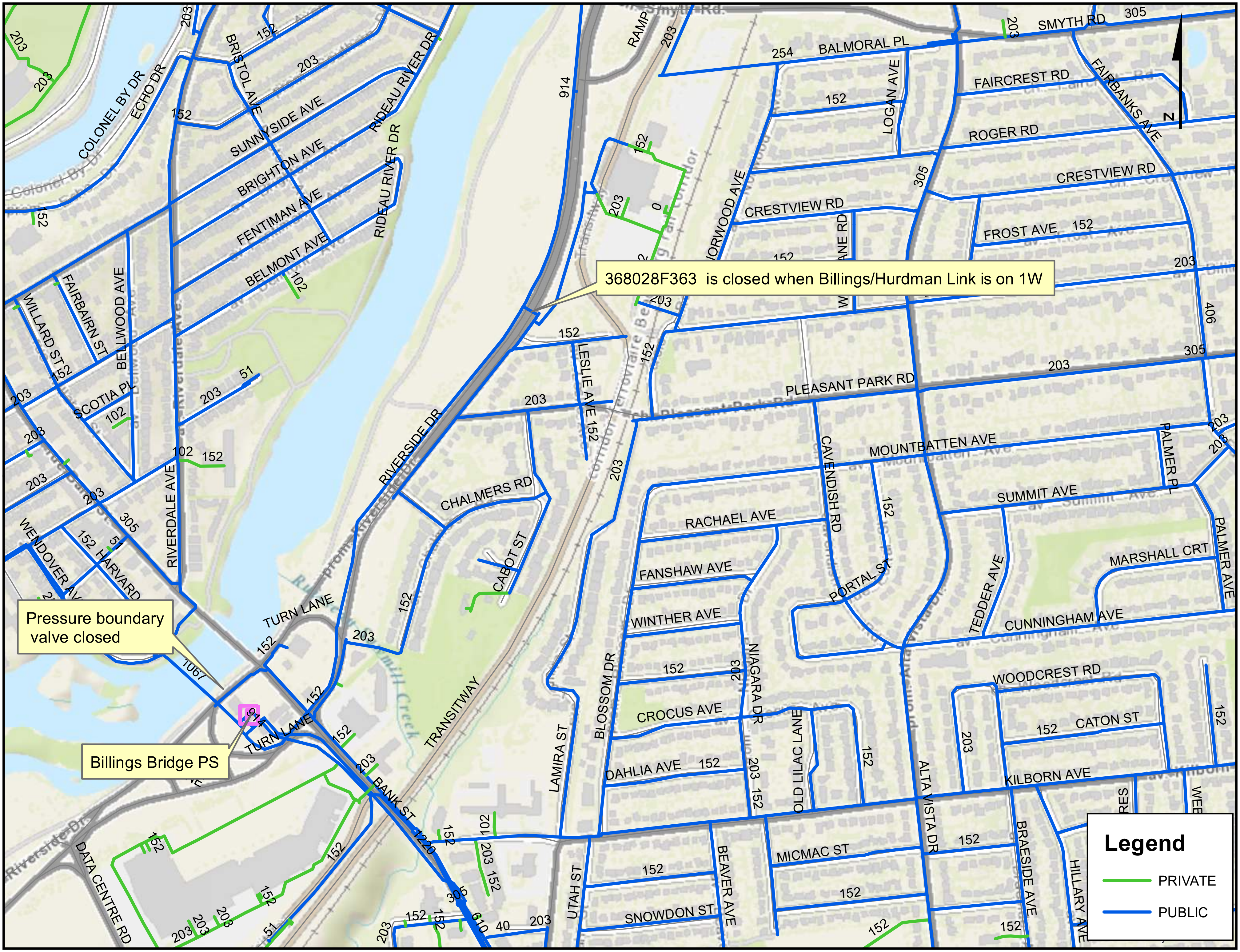
1220
TURN LANE
TURN LANE
1352
Legend
PRIVATE
PUBLIC
1W
2W2C


368028F363 is closed when Billings/Hurdman Link is on 1W
Pressure boundary valve closed
Billings Bridge PS
Legend
PRIVATE
PUBLIC
N
SMYTH RD
BALMORAL PL
FAIRCREST RD
ROGER RD
CRESTVIEW RD
FROST AVE
FAIRBANKS AVE
LOGAN AVE
NORWOOD AVE
PLEASANT PARK RD
MOUNTBATTEN AVE
SUMMIT AVE
MARSHALL CRT
CUNNINGHAM AVE
WOODCREST RD
CATON ST
KILBORN AVE
PALMER PL
PALMER AVE
TEDDER AVE
BRAESIDE AVE
HILLARY AVE
ALTA VISTA DR
MICMAC ST
SNOWDON ST
BEAVER AVE
UTAH ST
LAMIRA ST
BLOSSOM DR
RACHAEL AVE
FANSHAW AVE
WINTHER AVE
CROCUS AVE
DAHLIA AVE
NIAGARA DR
OLD LILAC LANE
CAVENDISH RD
PORTAL ST
LESLIE AVE
CHALMERS RD
CABOT ST
TRANSITWAY
RIVERSIDE DR
TURN LANE
BANK ST
DATA CENTRE RD
RIVERDALE AVE
WENDOVER AVE
HARVARD
SCOTIA PL
WILLARD ST
FAIRBAIRN ST
BELLWOOD AVE
BELMONT AVE
FENTIMAN AVE
BRIGHTON AVE
SUNNYSIDE AVE
BRISTOL AVE
RIDEAU RIVER DR
COLONEL BY DR
ECHO DR
RAMP