Proposed 3 Tower High-Rise Development
383 Albert Street and 340 Queen Street
Claridge Homes

Development Servicing Study and Stormwater Management Report

Prepared by:

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August 15, 2018

Novatech File No. 109111
Ref: R-2018-026

NOVATECH
Engineers, Planners & Landscape Architects

August 15, 2018

Claridge Homes
210 Gladstone Avenue
Ottawa, Ontario
K2P 0Y6

Attention: Mr. Neil Malhotra

Dear Sir:

Re: Development Servicing Study and Stormwater Management Report
Proposed 3 Tower High-Rise Development
383 Albert Street and 340 Queen Street
Ottawa, ON
Novatech File No.: 109111

Enclosed is a copy of the 'Development Servicing Study and Stormwater Management Report' prepared for the proposed development located at 383 Albert Street and 340 Queen Street, in the City of Ottawa. This report addresses the approach to site servicing and stormwater management and is submitted in support of a re-zoning application and a site plan control application.

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

Yours truly,

NOVATECH

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

FT/lb

cc: City of Ottawa
S+A Engineering

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1.0 INTRODUCTION

A new development consisting of three (3) high-rise towers is being proposed by Claridge Homes and Novatech has been retained to complete the site servicing and stormwater management design for this project.

A Servicing Brief and a Stormwater Management Report were previously completed in October 2013 in support of a Site Plan application for the proposed development. The concept for the proposed development has since been revised and is presented in this report.

1.1 Purpose

This report addresses the approach to site servicing and stormwater management for the proposed development and is being submitted in support of a re-zoning application and a site plan control application.

1.2 Location and Site Description

The site to be re-developed is located at 383 Albert Street and 340 Queen Street in the City of Ottawa and is approximately 0.385 hectares (ha) in area. The site is bordered by Queen Street to the north, Lyon Street N. to the east, Albert Street to the south, and existing high-rise buildings to the west. The site, shown in **Figure 1**, is currently occupied by a 2-storey building with commercial uses and a surface parking lot with an area of approximately 0.3 ha. The "West Entrance" to the Lyon Street LRT underground station is currently under construction in the northern corner of the site.

Figure 1: Aerial Plan of the Site (with LRT Station Entrance and the general proposed tower locations shown in red)

Image Source: geoOttawa (City of Ottawa)

1.3 Pre-Consultation Information

A pre-consultation meeting was held with the City of Ottawa on November 15, 2017, at which time the client was advised of the general submission requirements. The Rideau Valley Conservation Authority (RVCA) was consulted regarding the proposed development and a pre-consultation meeting has been requested with the Ministry of the Environment, Conservation and Parks (MOE). Refer to **Appendix A** for a summary of the correspondence related to the proposed development.

1.4 Reference Material

[1] Geotechnical Investigation Report, prepared by Paterson Group.

2.0 PROPOSED DEVELOPMENT

The proposed development will consist of three (3) high-rise towers, located above a common 2-storey podium and a multi-level underground parking structure. The proposed towers are as follows:

- Tower 'A': a 23-storey condominium building with ± 229 residential units and shared condo amenity areas;
- Tower 'B': a 6-storey building with ± 110 hotel rooms. The top floor of Tower 'B' will include a hotel bar;
- Tower 'C': a 24-storey building with ± 90 hotel rooms on the 6 lower levels and ± 160 residential rental units on the 18 upper levels.

The ground level of the common podium will consist of entrance lobbies to the three towers, commercial floor space (approximately 2,170m^2 Gross Floor Area) and the "West Entrance" to the Lyon Street LRT underground station. The second level of the podium will be for various hotel usages, and include a restaurant and function rooms. The second level will also include a mezzanine over approximately 1/4 of the building footprint for hotel and maintenance uses.

The development will have a single two-way vehicular ramp access to the underground parking garage and a lay-by area for the hotel and retail space located along Albert Street.

The existing building on site will be demolished to accommodate the proposed development. It is anticipated that construction will be phased.

3.0 SITE SERVICING

The objective of the site servicing design is to conform to the requirements of the City of Ottawa, to provide suitable sewage outlets and to ensure that a domestic water supply and appropriate fire protection are provided for the proposed development.

Servicing criteria, expected sewage flows and water demands for the proposed development have been established using the City of Ottawa design guidelines for sewer systems and water distribution.

In general, the proposed development will be serviced by extending new services to the municipal sewers and watermains in Lyon and Albert Streets. Refer to the subsequent sections of the report and to the attached drawings **109111-GP1** and **109111-GP2** for further details.

The City of Ottawa Servicing Study Guidelines for Development Applications requires that a Development Servicing Study Checklist be included to confirm that each applicable item is deemed complete and ready for review by City of Ottawa Infrastructure Approvals. A completed checklist in enclosed in **Appendix B.**

3.1 Sanitary Sewer

The proposed development will be serviced by extending new sanitary services to the existing municipal sanitary sewers in Lyon and Albert Streets. To determine if the municipal sanitary sewers in Lyon and Albert Streets have adequate capacity to accommodate the design flows from the proposed development, the capacities of the existing sanitary sewers and the pre-development conditions of the tributary areas have been analyzed.

The sanitary sewer segments analyzed as part of this report are the existing 375mm dia. sanitary sewer in Lyon Street and the 375mm dia. sanitary sewer in Albert Street. The existing 600mm dia. trunk sewer in Lyon Street, downstream of the sewers described above, is not included in the analysis.

3.1.1 Design Criteria

The City of Ottawa and Ontario Building Code (OBC) design criteria were used to calculate existing and proposed sanitary flows. The following design criteria were taken from Section 4 – 'Sanitary Sewer Systems' and Appendix 4-A – 'Daily Sewage Flow for Various Types of Establishments' of the City of Ottawa Sewer Design Guidelines, incorporating the revisions as per Technical Bulletin ISTB-2018-01.

<u>Residential / Hotel</u>

- Residential Units (Average Apartment): 1.8 people / unit
- Residential Units (1-bedroom/Studio Apartment): 1.4 people / unit
- Residential Units (2-bedroom Apartment): 2.1 people / unit
- Average Daily Hotel Room Occupancy: 1.5 people / room

- Average Daily Residential Sewage Flow: 280 L / person / day
- Average Daily Hotel Sewage Flow: 225 L / person / day
- Residential / Hotel Peaking Factor: Per Harmon Equation (Max. 4.0, Correction Factor=0.8)

<u>Commercial / Restaurant / Bar</u>

- Average Commercial Flow: 28,000 L / gross ha / day
- Restaurant (3 meals/day): 200 L / seat / day
- Hotel Bar / Cocktail Lounge: 70 L / seat / day
- Commercial Peaking Factor: 1.5 if commercial contribution >20%, otherwise 1.0

<u>Infiltration Allowance</u>

- Infiltration Allowance (Dry Weather): 0.05 L / s / gross ha (all areas)
- Infiltration Allowance (Wet Weather): 0.28 L / s / gross ha (all areas)
- Infiltration Allowance (Total I/I): 0.33 L / s / gross ha (all areas)

3.1.2 Existing Municipal Sewer Capacities

Based on as-built information obtained from the City of Ottawa, the capacities of the two pipe segments analyzed were calculated using the Manning Formula to be as shown in **Table 3.1-A** below.

Table 3.1-A: Existing Sanitary Sewer Capacities

Sanitary Sewer Size and Street	Approximate Sewer Slope	Approximate Sewer Capacity
375mm dia. – Lyon St.	0.57%	138.0 L/s
375mm dia. – Albert St.	1.85%	248.6 L/s

3.1.3 Pre-Development Conditions

3.1.3.1 Subject Site

The existing two-storey building on site (to be demolished) is currently serviced by an existing 250mm dia. sanitary sewer in Queen Street. The estimated sanitary flows from the existing building (approximately 1,600m^2 commercial area) with restaurant/retail usage are:

- Average Sanitary Flow = 0.05 L/s
- Peak Wet Weather Sanitary Flow = 0.21 L/s

Refer to **Appendix C** for detailed calculations.

3.1.3.2 Off-Site Tributary Area

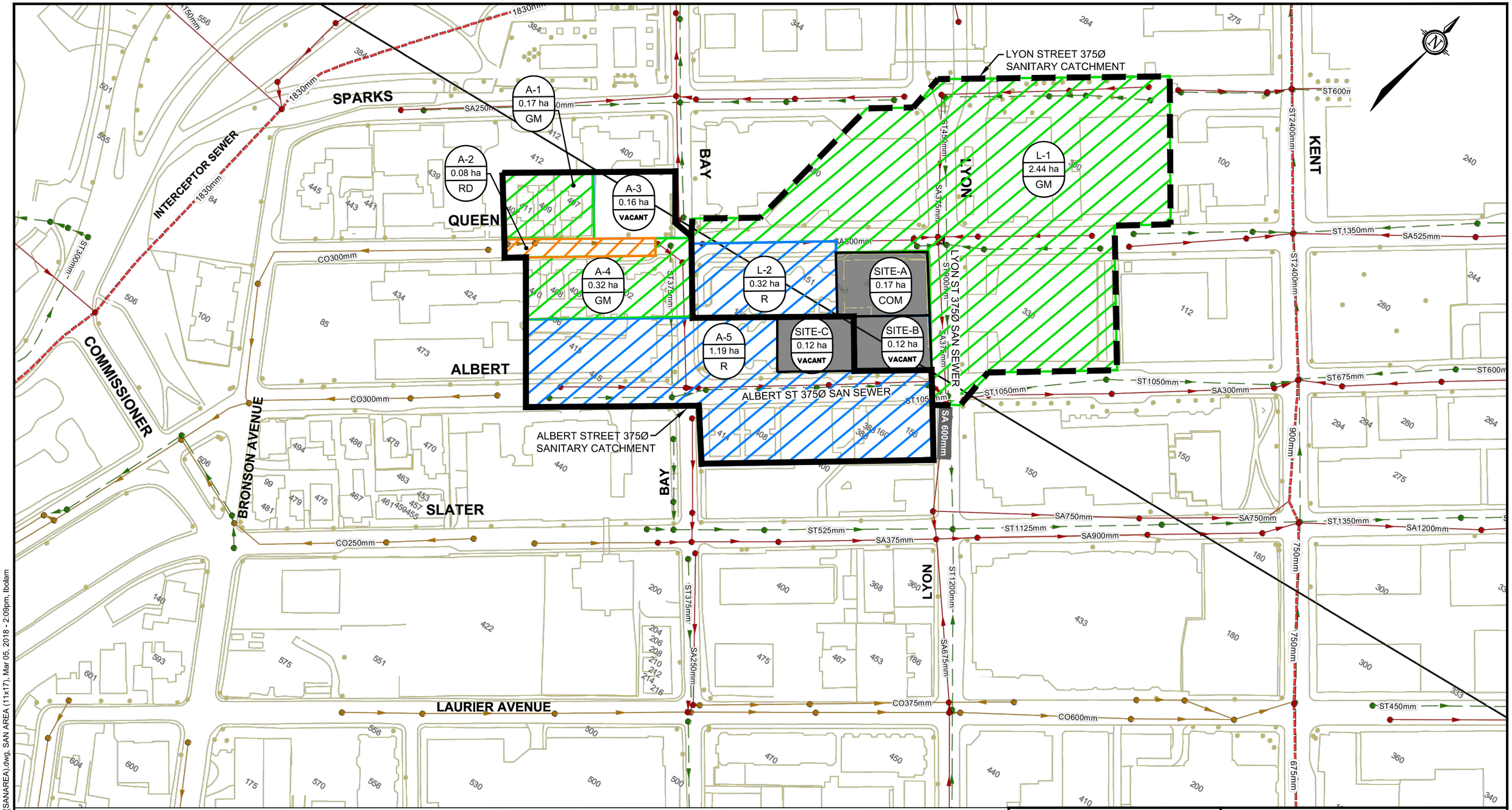
The geoOttawa website and the City of Ottawa Sewer Distribution Maps were used to determine the drainage areas tributary to the existing sanitary sewers in Lyon and Albert Streets adjacent to the site. Google aerial maps and the 'Street View' tool were then used to determine the type of occupancy and existing use of the various buildings within the respective tributary areas. Refer to **Figure 2 (Sanitary Sewer Tributary Area Plan)** for details.

Table 3.1-B summarizes the existing sanitary sewer capacities, respective tributary areas, estimated pre-development flows and remaining available capacity in the sewers.

The estimated pre-development flows include sanitary sewage as well as storm flows from the upstream combined sewers. The contributing roadway drainage from the upstream combined sewers was calculated using the 2-year rainfall intensity (City of Ottawa IDF curves) and a time of concentration of 10 minutes. Larger storm events were not considered due to previous advice from the City that the catch basins connected to the combined sewer sections will be equipped with inlet control devices (ICD).

Table 3.1-B: Theoretical Pre-Development Tributary Sanitary Drainage Area Flows

Sanitary Sewer Size and Street	Approximate Sewer Capacity	Tributary Area (ha)	Estimated Peak Wet Weather Pre-Development Flow	Remaining Capacity Available
375mm dia. – Lyon St.	138.0 L/s	3.05	12.5 L/s	125.5 L/s
375mm dia. – Albert St.	248.6 L/s	2.04	23.6 L/s	225 L/s



LEGEND

- RESIDENTIAL TRIBUTARY (R)
- ROADWAY DRAINAGE INTO COMBINED SEWER (RD)
- GENERAL MIXED USE (GM)
- SUBJECT SITE
- A-2 / 0.17ha / GM — AREA ID (A=ALBERT ST, L=LYON ST); DRAINAGE AREA (ha); EXISTING USE

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383 ALBERT STREET, 340 QUEEN STREET

TRIBUTARY SANITARY DRAINAGE AREA PLAN

SCALE 1 : 2000 (0 20 40 60 80)

DATE MAR 2018 | JOB 109111 | FIGURE FIGURE 2

Based on the values above, there appears to be significant capacity available in both sanitary sewers. Refer to the Sanitary Sewer Design Sheet in **Appendix C** for detailed calculations.

3.1.4 Post-Development Conditions

Under post-development conditions, each new Tower will have a 200mm dia. sanitary service. Towers 'A' and 'B' will be serviced by connecting to the existing 375mm dia. sanitary sewer in Lyon Street, while Tower 'C' will connect to the existing 375mm dia. sanitary sewer in Albert Street.

At this stage, it is assumed that the commercial area on the ground floor of the common podium will be split relatively evenly between the three sanitary service connections. It is assumed that the hotel areas on the second floor of the podium, including the hotel restaurant, will be serviced via the Tower 'B' service connection. **Table 3.1-C** details the sanitary design flows for the proposed development.

Table 3.1-C: Sanitary Design Flows for Proposed Development

Tower	Use	Unit Count / Seats / Commercial Floor Area	Design Population (people)	Average Post-Dev. Flow (L/s)	Peak Post-Dev. Flow (L/s)
'A'	Residential	156 x bachelor/1-bdrm 73 x 2-bdrm	371	1.20	3.91 [1]
	Commercial [2]	725 m^2	-	0.02	0.02
	Subtotal 'A'	**-**	***371***	***1.22***	***3.99*** [3]
'B'	Hotel	110 x 1-bdrm	165	0.43	1.40 [1]
	Restaurant/Bar	150 seats/175 seats	-	0.51	0.51
	Commercial [2]	725 m^2	-		
	Subtotal 'B'	**-**	***165***	***0.94***	***1.95*** [3]
'C'	Hotel	90 x 1-bdrm	135	0.35	3.88 [1]
	Residential	109 x bachelor/1-bdrm 51 x 2-bdrm	259	0.84	
	Commercial [2]	725 m^2	-	0.02	0.02
	Subtotal 'C'	**-**	***394***	***1.21***	***3.94*** [3]
		Total Site	**930**	**3.37 L/s**	**9.88 L/s** [3]

[1] Hotel/Residential Peaking Factor = 3.26 (per Harmon Equation).
[2] Commercial flows are assumed to be split equally between the 3 Towers.
[3] Subtotal and total site flows are Peak Wet Weather Flows which include an infiltration allowance of 0.33 L/s/gross ha.

Based on Manning's Equation, a 200mm dia. sanitary gravity service at a minimum slope of 1.0% has a full flow conveyance capacity of approximately 34.2 L/s, which is sufficient to convey the theoretical sanitary design flows calculated above for each tower. Refer to the Sanitary Sewer Design Sheet in **Appendix C** for detailed calculations.

Table 3.1-D summarizes the post-development tributary sanitary peak flows in relation to the approximate capacities of the two municipal sanitary sewers.

Table 3.1-D: **Post-Development Tributary Sanitary Drainage Area Peak Flows**

Sanitary Sewer Size and Street	Peak Off-Site Flow	Peak Post-Dev. Site Flow	Total Peak Post-Dev. Sewer Flow	Approximate Sewer Capacity
375mm dia. – Lyon St.	12.2 L/s	5.94 L/s *(Tower 'A' + 'B')*	18.2 L/s	138.0 L/s
375mm dia. – Albert St.	23.2 L/s	3.94 L/s *(Tower 'C')*	27.1 L/s	248.6 L/s

Based on the calculated flows, both the existing 375mm dia. sanitary sewers in Lyon Street and in Albert Street are estimated to have sufficient capacity to accommodate the proposed development. Refer to the Sanitary Sewer Design Sheet in **Appendix C** for detailed calculations.

Since the proposed footprint will almost encompass the entire site area, there will be no space for monitoring manholes within the property limits. It is anticipated that internal test ports will likely be required on each building service for sampling purposes. The test ports will be located within the underground parking levels.

The proposed sanitary service connections to the buildings will be equipped with full-port backwater valves (design by the mechanical consultant). The existing sanitary service from the existing building connected to Queen Street will be capped and abandoned.

3.2 Water

The proposed development will be serviced by separate water services to the existing 200mm dia. watermains on Lyon Street N. and Albert Street. The looped municipal watermain network around the proposed development includes 200mm dia. watermains on Albert, Lyon and Bay Streets as well as a larger 400mm dia. watermain on Queen Street.

3.2.1 Design Criteria

The City of Ottawa and Ontario Building Code (OBC) design criteria were used to calculate the theoretical water demands for the proposed development. The following design criteria were taken from Section 4 of the Ottawa Design Guidelines – Water Distribution:

Residential (including hotel rooms)

- Residential Units (1-bedroom/Bachelor Apartment): 1.4 people / unit
- Residential Units (2-bedroom Apartment): 2.1 people / unit
- Average Daily Hotel Bed Occupancy: 1.5 people / bed

- Average Day Demand Residential: 350 L / person / day
- Average Day Demand Hotel: 225 L / person / day

- Residential / Hotel Maximum Day Demand: 2.5 x Avg. Day Demand
- Residential / Hotel Peak Hour Demand: 2.2 x Max Day Demand

Commercial / Restaurant / Bar

- Average Day Demand Commercial: 28,000 L / gross ha / day
- Average Day Demand Restaurant (3 meals/day): 200 L / seat / day
- Average Day Demand Hotel Bar: 70 L / seat / day

- Commercial Maximum Day Demand: 1.5 x Avg. Day Demand
- Commercial Peak Hour Demand: 1.8 x Max Day Demand

3.2.2 Pre-Development Conditions

The existing two-storey building on site (to be demolished) is currently serviced by a connection to the existing 400mm dia. watermain in Queen Street. This water service will be removed and blanked at the main.

3.2.3 Post-Development Conditions

Under post-development conditions, each tower will have a 200mm dia. water service. Internal looping of the water services for the towers is also being proposed for redundancy purposes.

The proposed water services have been sized to provide both the required domestic water demand and fire flow. A shut-off valve will be provided on each service at the property line.

The water meters will be in the parking level mechanical rooms of the respective Towers. Remote meters will be located on the exterior of the buildings, near the main entrances.

3.2.4 Average, Maximum Day and Peak Hour Demands

The theoretical water demands for the proposed development are given in **Table 3.2-A**, based on the design criteria in Section 3.2.1.

Table 3.2-A: Theoretical Design Water Demands for Proposed Development

Tower	Use	Average Water Demand (L/s)		Maximum Day Demand (L/s)	Peak Hour Demand (L/s)
		Domestic	Commercial		
'A'	Residential	1.50	-	3.75	8.25
	Commercial	-	0.02	0.03	0.05
	Subtotal 'A'	***1.52***		***3.78 L/s***	***8.30***
'B'	Hotel	0.43	-	1.08	2.37
	Restaurant / Bar	-	0.51	0.77	1.38
	Commercial	-			
	Subtotal 'B'	***0.94***		***1.84***	***3.74***
'C'	Hotel	1.40	-	3.50	7.70
	Residential				
	Commercial	-	0.02	0.03	0.05
	Subtotal 'C'	***1.42***		***3.53***	***7.75***
Total Site		**3.88 L/s**		**9.15 L/s**	**19.80 L/s**

3.2.5 Water Supply for Fire-Fighting

The Fire Underwriters Survey (FUS) was used to estimate fire flow requirements for the proposed development. In the absence of detailed architectural information, some assumptions were made regarding the building construction. A fire-resistive construction was assumed due to the large size and type of occupancy for the proposed building. Also, the proposed Towers will be fully sprinklered and supplied with a fire department siamese connection(s), located within 45m of the existing municipal fire hydrant(s).

The fire flow requirements include both sprinkler system and hose allowances in accordance with the OBC and NFPA 13. The sprinkler system will be designed by the fire protection (sprinkler) contractor at the detailed design stage as this process involves detailed hydraulic calculations based on building layout, pipe runs, head losses, fire pump requirements, etc. Booster pumps will be required to provide adequate service pressure on the upper floors.

It should be noted that fire flow requirements calculated using the FUS method tend to generate higher values when compared to flows being calculated using the OBC and NFPA.

Table 3.2-B summarizes the Fire Flow Requirements for the proposed development based on FUS calculations.

Table 3.2-B: Fire Flow Requirements for the Proposed Development

Type of Uses	Fire Flow Demand
Hotel, Residential & Commercial	183 L/s

Refer to **Appendix D** for a copy of the preliminary FUS fire flow calculations.

3.2.6 Boundary Conditions and Summary of Watermain Analysis Results

Preliminary water demands and fire flow requirements for the proposed development were provided to the City of Ottawa. These values were used to generate the municipal watermain network boundary conditions. **Table 3.2-C** summarizes the boundary conditions provided by the City of Ottawa for the existing municipal watermain network.

Table 3.2-C: Hydraulic Boundary Condition Provided by the City

Municipal Watermain Boundary Condition	Lyon St. Watermain (Tower 'A')	Lyon St. Watermain (Tower 'B')	Albert St. Watermain (Tower 'C')
Minimum HGL	107.2m	107.2m	107.2m
Maximum HGL	116.2m	116.2m	116.2m
Max Day + Fire Flow	95.0m	99.6m	92.5m

Refer to **Appendix D** for a copy of the correspondence from the City of Ottawa.

Table 3.2-D summarizes the theoretical water demands for the Towers under the various operating conditions and compares the anticipated operating pressures at the watermains to the normal operating pressures outlined in the City of Ottawa Design Guidelines. It is assumed that hydraulic losses in the 200mm water services are negligible. Furthermore, the proposed towers will be equipped with booster pumps to increase pressure for the upper floors

Table 3.2-D: Water Analysis Results Summary

Condition	Water Service Connection Location	Total Water Demand (L/s)	Approximate Design Operating Pressures (psi) / Relative Head (m)	Normal Municipal Operating Pressures (psi)
Tower 'A'				
Average Demand	Lyon Street	1.52	61 psi (42.89m)	50-70 psi
Max Day + Fire Flow Demand		187.11	31 psi (21.67m)	20 psi (Min.)
Peak Hour Demand		8.30	48 psi (33.89m)	40-70 psi
Tower 'B'				
Average Demand	Lyon Street	0.94	61 psi (42.77m)	50-70 psi
Max Day + Fire Flow Demand		185.17	37 psi (26.17m)	20 psi (Min.)
Peak Hour Demand		3.74	48 psi (33.77m)	40-70 psi
Tower 'C'				
Average Demand	Albert Street	1.42	61 psi (42.57m)	50-70 psi
Max Day + Fire Flow Demand		186.86	27 psi (18.87m)	20 psi (Min.)
Peak Hour Demand		7.75	48 psi (33.57m)	40-70 psi

As indicated in the summary table above, the existing watermains in Lyon and Albert Streets should have sufficient water supply for the proposed development. Furthermore, the existing municipal watermains will provide adequate system pressures for both 'Max Day + Fire Flow' and 'Peak Hour' conditions, within the normal operating pressure ranges specified by the City of Ottawa.

Refer to **Appendix D** for detailed calculations.

4.0 STORM AND STORMWATER MANAGEMENT

Stormwater from the proposed development will be discharged to the existing 900mm dia. storm sewer on Lyon Street N. via a common storm service. The proposed storm service will be equipped with a backwater valve.

4.1 Stormwater Management Criteria and Objectives

The stormwater management criteria and objectives for the site are as follows:

- Provide a dual drainage system (i.e. minor and major system flows).

- Control the post-development flows from the site to an allowable release rate corresponding to the 5-year peak flow using a runoff coefficient of 0.5 and a 20-minute rainfall intensity derived from City of Ottawa IDF curves, as specified by the City of Ottawa. Post-development peak flows will be controlled for storms up to and including the 100-year design event, prior to being released into the municipal storm sewer in Lyon Street.
- Provide an internal stormwater storage tank with a sufficient volume to accommodate the runoff from the tower roofs and podium area.
- Provide guidelines to ensure that site preparation and construction is in accordance with the current Best Management Practices for Erosion and Sediment Control.

4.2 Pre-Development Conditions and Allowable Release Rate

Under existing conditions, the 0.394 ha site is occupied by a 2-storey building and a surface parking lot and is fully impervious. Stormwater flows from the site are currently conveyed to the existing storm sewer system via overland flows to Queen Street, Lyon Street N. and Albert Street. It is unknown if any stormwater quantity or quality control measures are currently provided on site.

The uncontrolled pre-development flows for the 5-year and the 100-year design events and the allowable release rate for the site were calculated using the Rational Method and are summarized in **Table 4.2-A**.

Table 4.2-A: Pre-Development Flows and Allowable Release Rates

Design Event	Pre-Development Uncontrolled Flow	Allowable Release Rate
5-year	102.7 L/s	38.5 L/s
100-year	195.6 L/s	38.5 L/s

Refer to **Appendix E** for detailed calculations.

4.3 Post-Development Conditions

Under post-development conditions, Towers ‘A’, ‘B’ and ‘C’ will be serviced by a 250mm dia. common storm service connected to the existing 900mm dia. storm sewer in Lyon Street.

The proposed development will consist of two (2) drainage sub-catchment areas, as shown on attached drawing **109111-SWM**. A brief description of these sub-catchment areas is as follows:

- Runoff from the street-level area around the exterior of the building (Area G-1) will continue to drain uncontrolled towards the municipal Right-of-Ways.
- Runoff from the proposed Tower roofs, the podium roof area and a small street-level area around the rear exterior of the building (Area R-1) will be controlled via an internal stormwater storage tank.

The post-development flows for the site were calculated using the Rational Method and are detailed in the subsequent sections of the report. The Modified Rational Method was used to determine the requirement storage volumes for both the 5-year and 100-year design events. Refer to **Appendix E** for detailed SWM calculations.

4.3.1 Area G-1 – Uncontrolled Direct Runoff

The uncontrolled post-development flows from this small sub-catchment area (0.049 ha) are shown in **Table 4.3-A.**

Table 4.3-A: Post-Development Uncontrolled Flows

Design Event	Post-Development Uncontrolled Flow
5-year	12.8 L/s
100-year	24.3 L/s

4.3.2 Area R-1 – Controlled Flow from Podium and Tower Roofs

Stormwater runoff from the rooftop areas and a small street-level area around the rear exterior of the building (0.345 ha total) will be captured by a series of roof and podium drains and directed to an internal stormwater storage tank. The minimum storage volume required is approximately 142m^3. Stormwater from the tank will be discharged to the municipal storm sewer either by gravity or be pumped up to the proposed storm service. The location of the internal stormwater storage tank remains to be confirmed.

Either an ICD or a pump (designed by the mechanical consultant) will be required to control flow from the internal stormwater storage tank to a maximum rate of 14.1 L/s (223.5 USGPM). A "stand-by" pump will be required for emergency and/or maintenance purposes. An emergency power supply will also need to be provided if flows are not discharged by gravity. The storm service will be equipped with a backflow prevention device to protect the building from any potential sewer back-ups.

The maximum release rate was established to meet the target allowable site release rate for the 100-year storm event. Post-development peak flows from the site will be significantly less than the pre-development flows.

Table 4.3-B summarizes the post-development design flows and required stormwater storage volumes required for Area R-1.

Table 4.3-B: Post-Development Controlled Flows and Storage Tank Volumes

Design Event	Post-Development Controlled Flow	Minimum Storage Volume Required	Storage Volume Provided
5-year	14.1 L/s	58 m³	> 145 m³
100-year	14.1 L/s	142 m³	

Refer to **Appendix E** for detailed calculations.

4.3.3 Summary of Post-Development Flows

Table 4.3-C compares the post-development flows from the total site (Areas G-1 and R-1) to the allowable release rate specified by the City of Ottawa and to the uncontrolled pre-development flows the 5-year and the 100-year design events.

Table 4.3-C: Stormwater Flow Comparison Table

Design Event	Pre-Development		Post-Development		
	Uncontrolled Flow (L/s)	Allowable Release Rate (L/s)	Uncontrolled Flow (L/s)	Controlled Flow (L/s)	Total Flow (L/s)
5-Year	102.7	38.5	12.8	14.1	26.9
100-Year	195.6	38.5	24.3	14.1	38.5

4.4 Stormwater Quality Control

The subject site is located within the jurisdiction of the Rideau Valley Conservation Authority (RVCA). Based on discussions with the RVCA, stormwater quality control will not be required as the proposed development does not include any surface parking, all parking will be underground. The proposed surfaces (tower roofs, landscaped areas and podium) are deemed clean for protecting surface water and aquatic habitat. Refer to **Appendix A** for correspondence from the RVCA.

5.0 SITE GRADING

The existing site is generally flat, with an elevation drop of approximately 0.9m from the entrance to the underground parking levels on Albert Street (+/-73.9m) to the intersection of Queen and Lyon Streets (+/- 73.0m). The finished floor elevations (FFE) of the proposed Towers will vary slightly and have been set to accommodate the elevations of the sidewalks along Queen, Lyon and Albert Street. Refer to plan **109111-GR** for details.

5.1 Major System Overflow Route

In the case of a major rainfall event exceeding the design storms provided for, stormwater from the building roof will overflow towards the adjacent municipal Right-of-Ways. The tower floor elevations have been set to be a minimum of 0.3m above the major system overflow points in the adjacent streets. The major system overflow route is shown on plan **109111-GR**.

6.0 GEOTECHNICAL INVESTIGATIONS

A Geotechnical Investigation Report has been prepared by Paterson Group for the proposed project. Refer to the Geotechnical Report[1] for subsurface conditions, construction recommendations and geotechnical inspection requirements.

7.0 EROSION AND SEDIMENT CONTROL

To mitigate erosion and to prevent sediment from entering the storm sewer system, temporary erosion and sediment control measures will be implemented on-site during construction in accordance with the Best Management Practices for Erosion and Sediment Control. This includes the following temporary measures:

- Filter bags will be placed under the grates of nearby catchbasins, manholes and will remain in place until construction is completed.

- Silt fencing will be placed per OPSS 577 and OPSD 219.110 along the surrounding construction limits, where applicable.
- Mud mats will be installed at the site entrances.
- Street sweeping and cleaning will be performed, as required, to suppress dust and to provide safe and clean roadways adjacent to the construction site.
- On-site dewatering is to be directed to a sediment trap and/or gravel splash pad and discharged safely to an approved outlet as directed by the engineer.

The temporary erosion and sediment control measures will be implemented prior to construction and will remain in place during all phases of construction. Regular inspection and maintenance of the erosion control measures will be undertaken.

8.0 CONCLUSION

This report has been prepared in support of a re-zoning application and a site plan control application for the properties located at 383 Albert Street and 340 Queen Street. The proposed development will consist of three (3) high-rise Towers, including a 23-storey residential building (Tower 'A'), a 6-storey hotel building (Tower 'B') and a 24-storey mixed hotel and residential building (Tower 'C') above a common 2-storey podium and an underground parking structure.

The conclusions are as follows:

- The existing building and parking lot will be demolished to accommodate the proposed development.
- The proposed 3 tower development will include a total of 389 residential units, 200 hotel beds, a hotel restaurant, a hotel bar, and approximately 2,170 m2 of commercial space.
- Towers 'A' and 'B' will be serviced by extending new services to the municipal sewers and watermain in Lyon Street North, while Tower 'C' will be serviced off the municipal infrastructure in Albert Street.
- Based on an analysis of the existing municipal sanitary sewers adjacent to the site and their upstream tributary areas, the municipal sanitary sewers in the adjacent streets have adequate capacity to accommodate the proposed development.
- The proposed development will be sprinklered and supplied with a fire department Siamese connection. The Siamese connection will be located within 45m of an existing municipal fire hydrant, along the adjacent streets. Based on hydraulic boundary conditions provided by the City of Ottawa, the existing municipal water system has adequate capacity to accommodate the proposed development.
- On-site stormwater quantity control will be provided by using an internal stormwater storage tank with a controlled outlet.
- The total post-development site flows will be approximately 26.9 L/s during the 5-year design event and 38.5 L/s during the 100-year design event, both less than or equal to the allowable release rate of 38.5 L/s. This represents a significant reduction in total site flows when compared to current conditions.
- On-site stormwater quality control is not required, nor being provided.
- Temporary erosion and sediment controls are being provided during construction.

It is recommended that the Development Servicing Study and Stormwater Management Report be approved for implementation.

NOVATECH

Prepared by:	Reviewed by:
Lydia Bolam, B.Eng. E.I.T.	François Thauvette, P. Eng. Senior Project Manager Land Development & Public-Sector Engineering

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 to:

http://ottawa.ca/en/development-application-review-process-0/guide-preparing-studies-and-plans

S/A	Number of copies	ENGINEERING		S/A	Number of copies
S	**15**	**1. Site Servicing Plan**	**2. Assessment of Adequacy of Public Services / Site Servicing Study / Brief**	**S**	**3**
S	**15**	**3. Grade Control and Drainage Plan**	**4. Geotechnical Study / Slope Stability Study**	**S**	**3**
	2	5. Composite Utility Plan	6. Groundwater Impact Study		6
	5	7. Servicing Options Report	8. Wellhead Protection Study		6
S	**3**	**9. Community Transportation Study and / or Transportation Impact Study / Brief – use new TIA guidelines. Send Screening and Scoping to City for review before moving past those steps**	**10.Erosion and Sediment Control Plan / Brief**	**S**	**3**
S	**3**	**11.Storm water Management Report / Brief**	12.Hydro geological and Terrain Analysis		8
	3	13.Hydraulic Water main Analysis	**14.Noise / Vibration Study**	**S**	**3**
A	**15**	**15.Roadway Modification Design Plan – if modifications proposed**	**16.Confederation Line Proximity Study – Level 3 Study**	**S**	**3**

S/A	Number of copies	PLANNING / DESIGN / SURVEY		S/A	Number of copies
	50	17.Draft Plan of Subdivision	**18.Plan Showing Layout of Parking Garage**	**S**	**15**
	30	19.Draft Plan of Condominium	**20.Planning Rationale**	**S**	**3**
S	**15**	**21.Site Plan**	22.Minimum Distance Separation (MDS)		3
	20	23.Concept Plan Showing Proposed Land Uses and Landscaping	24.Agrology and Soil Capability Study		5
	3	25.Concept Plan Showing Ultimate Use of Land	26.Cultural Heritage Impact Statement		3
S	**15**	**27.Landscape Plan**	28.Archaeological Resource Assessment Requirements: **S** (site plan) **A** (subdivision, condo)		3
S	**2**	**29.Survey Plan**	**30.Shadow Analysis**	**S**	**3**
S	**15**	**31.Architectural Building Elevation Drawings (dimensioned)**	**32.Design Brief (includes the Design Review Panel Submission Requirements)**	**S**	**Available online**
S	**3**	**33.Wind Analysis – and snow drift**			

S/A	Number of copies	ENVIRONMENTAL		S/A	Number of copies
S	**3**	**34.Phase 1 Environmental Site Assessment**	35.Impact Assessment of Adjacent Waste Disposal/Former Landfill Site		6
S	**3**	**36.Phase 2 Environmental Site Assessment (required at submission if Phase 1 indicates Phase 2 is required)**	37.Assessment of Landform Features		7
S	**4**	**38.Record of Site Condition – if required**	39.Mineral Resource Impact Assessment		4
	10	40.Tree Conservation Report	**41.Environmental Impact Statement / Impact Assessment of Endangered Species (peregrine falcon and chimney swifts)**	**S**	**3**
	4	42.Mine Hazard Study / Abandoned Pit or Quarry Study	43.Integrated Environmental Review (Draft, as part of Planning Rationale)		3

S/A	Number of copies	ADDITIONAL REQUIREMENTS		S/A	Number of copies
		44.	45.		

Meeting Date: November 15, 2017

Application Type: Site Plan Control

File Lead (Assigned Planner): Kersten Nitsche

Infrastructure Approvals Project Manager: Richard Buchanan

Site Address (Municipal Address): 383 Albert Street/340 Queen Street

*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, Infrastructure 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, Infrastructure and Economic Development Department*.*

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S/A	Number of copies	ADDITIONAL REQUIREMENTS		S/A	Number of copies
		44.	45.		

Meeting Date: November 15, 2017

File Lead (Assigned Planner): Kersten Nitsche

Site Address (Municipal Address): 383 Albert Street/340 Queen Street

Application Type: Zoning By-law Amendment

Infrastructure Approvals Project Manager: Richard Buchanan

*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.**

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Visit us: Ottawa.ca/planning
Visitez-nous : Ottawa.ca/urbanisme

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Francois Thauvette

From: Eric Lalande <eric.lalande@rvca.ca>
Sent: Wednesday, July 18, 2018 2:16 PM
To: Francois Thauvette
Cc: Lydia Bolam
Subject: Re: RVCA pre-consultation - Proposed development at 383 Albert St. & 340 Queen St.

Hi Francois,

Typically for projects less than 2k from the outlet would require 80%TSS removal. However, the RVCA considers rooftop runoff as clean for the purposes of water quality control requirements. If the entirety of the site is covered by rooftop there are no further Quality requirments. Any at grade parking would necessitate water qualty to be included.

Please provide rationale bases on my comments above in your stormwater report as part of the planning application.

Thanks

Eric Lalande MCIP RPP
Planner, RVCA
613-692-3571 x1137

From: Francois Thauvette <f.thauvette@novatech-eng.com>
Sent: July 18, 2018 2:03:14 PM
To: Eric Lalande
Cc: Lydia Bolam
Subject: RVCA pre-consultation - Proposed development at 383 Albert St. & 340 Queen St.

Hi Eric,

We are working on a proposed 3 high-rise tower (residential and hotel) development for Claridge at 383 albert Street and 340 Queen Street, in downtown Ottawa. The towers and podium will cover the entire property. Parking will be provided below grade and all stormwater runoff from the tower roofs and podium deck will be directed to an internal tank, where flows will be attenuated prior to being released into the storm trunk sewers in Albert and Lyon Streets. Storm flows will ultimately travel less than 1km before outletting into the Ottawa River to the north. Please confirm the on-site quality control requirements, if any, for this development.

We will be using this e-mail as a record of our pre-consultation with the RVCA.

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

APPENDIX B

Development Servicing Study Checklist

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

N/A ☐ 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.

N/A ☐ 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.

N/A ☐ 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.

N/A ☐ 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.

N/A ☐ 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

N/A ☐ 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.

N/A ☐ 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

N/A ☐ 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.

N/A ☐ 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).

N/A ☐ 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)

N/A ☐ Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.

N/A ☐ Description of proposed sewer network including sewers, pumping stations, and forcemains.

N/A ☐ 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).

N/A ☐ Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.

N/A ☐ Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.

N/A ☐ 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.

N/A ☐ 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.

N/A ☐ Set-back from private sewage disposal systems.

N/A ☐ 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.

N/A ☐ Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.

- [x] Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).
- [ ] N/A Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.
- [x] 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.
- [ ] N/A Any proposed diversion of drainage catchment areas from one outlet to another.
- [x] Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.
- [ ] N/A 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.
- [ ] N/A Identification of potential impacts to receiving watercourses
- [ ] N/A Identification of municipal drains and related approval requirements.
- [x] Descriptions of how the conveyance and storage capacity will be achieved for the development.
- [x] 100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.
- [ ] N/A Inclusion of hydraulic analysis including hydraulic grade line elevations.
- [x] Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.
- [ ] N/A 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.
- [ ] N/A 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:

NOTED ☐ 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.

N/A ☐ Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.

N/A ☐ Changes to Municipal Drains.

N/A ☐ 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

TBD ☐ 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

APPENDIX C

Sanitary Sewer Design Sheet

PROJECT #: 109111
PROJECT NAME: 383 ALBERT STREET / 340 QUEEN STREET
LOCATION: CITY OF OTTAWA

SANITARY SEWER DESIGN SHEET

NOVATECH
Engineers, Planners & Landscape Architects

LOCATION			Residential / Hotel								Commercial / Mixed Downtown						Extraneous/Roadway			TOTAL FLOWS			PIPE					
			Residential			Hotel			Cumulative					Cumulative			Infiltration Allowance		Roadway	Average Dry	Peak Dry	Peak Wet						
Area ID	Use	Total Area	Units	Pop. *	Avg Flow	Beds	Avg Flow	Total Pop. **	Peak Factor	Res. Peak Flow	Retail / Office Gross Floor Space	Restaurant	Bar/Cocktail Lounge	Avg Flow	Peak Factor	Comm. Peak Flow	Dry (I/I dry)	Wet (I/I wet)	(wet only) C=0.90	Weather Flow (ADWF)	Weather Flow (PDWF)	Weather Flow (PWWW)	Dia Act	Dia Nom	Slope	Velocity (Full)	Capacity (Full)	Ratio Q/Qfull
		(ha)		(persons)	(l/s)		(l/s)	(persons)		(l/s)	(m^2)	(seats)	(seats)	(l/s)		(l/s)	(l/s)	(l/s)	(l/s)	(l/s)	(l/s)	(l/s)	(mm)	(mm)	(%)	(m/s)	(l/s)	(%)
				1.80 pers/unit	280 L/pers	1.50 pers/room	225 L/pers				280 L/100m2	200 L/seat	70 L/seat				0.05 L/s/ha	0.28 L/s/ha										
THEORETICAL PRE-DEVELOPMENT																												
Flow to Albert Street Sanitary Sewer																												
A-1	Apartments	0.17	9	16				16																				
A-2	Road Drainage	0.08																	15.43									
A-3	Vacant (Parking lot)	0.16																										
A-4	Hotel & Commercial	0.32				180		270			1320	100																
A-5	Hotel & Residential	1.19	103	185		200		485			2960	25																
Site-C	Vacant (Parking lot)	0.12															0.01	0.03		0.01	0.01	0.04						
Totals (Albert St)		**2.04**	**112**	**202**	**0.65**	**380**	**1.48**	**772**	**3.30**	**7.05**	**4280**	**125**		**0.43**	**1.0**	**0.43**	**0.10**	**0.57**	**15.43**	**2.67**	**7.58**	**23.58**	**381**	**375**	**1.85**	**2.18**	**248.6**	**9%**
Flow to Lyon Street Sanitary Sewer																												
L-1	Hotel & Commercial	2.44				410		615			73450	150	50															
L-2	Apartments	0.32	105	189				189																				
Site-A	Ex. Commercial/Restaurant Bldg	0.17							N/A	0.0	1600			0.05	1.5	0.08	0.01	0.05		0.06	0.09	0.13						
Site-B	Vacant (Parking lot)	0.12							N/A	0.0					N/A	0.00	0.01	0.03		0.01	0.01	0.04						
Totals (Lyon St)		**3.05**	**105**	**189**	**0.61**	**410**	**1.60**	**804**	**3.29**	**7.28**	**75050**	**150**	**50**	**2.82**	**1.5**	**4.23**	**0.15**	**0.85**	**0.00**	**5.19**	**11.66**	**12.51**	**381**	**375**	**0.57**	**1.21**	**138.0**	**9%**
THEORETICAL POST-DEVELOPMENT																												
Flow to Albert Street Sanitary Sewer																												
A-1	Apartments	0.17	9	16	0.05			16																				
A-2	Road Drainage	0.08																	15.43									
A-3	Parking	0.16																										
A-4	Hotel & Commercial	0.32				176	0.69	264			1320	100																
A-5	Hotel & Residential	1.19	103	185	0.60	197	0.77	481			2960	25																
Site-C	Hotel, Residential & Commercial	0.12	165	*259*	0.84	90	0.35	394	3.26	3.88	725			0.02	1.0	0.02	0.01	0.03		1.22	3.91	3.94	203	200	1.00	1.05	34.2	12%
Totals (Albert St)		**2.04**	**277**	**460**	**1.49**	**463**	**1.81**	**1155**	**3.21**	**10.58**	**5005**	**125**		**0.45**	**1.0**	**0.45**	**0.10**	**0.57**	**15.43**	**3.85**	**11.13**	**27.14**	**381**	**375**	**1.85**	**2.18**	**248.6**	**11%**
Flow to Lyon Street Sanitary Sewer																												
L-1	Hotel & Commercial	2.44				410	1.60	615			73450	150	50															
L-2	Apartments	0.32	105	189	0.61			189																				
Site-A	Residential & Commercial	0.17	229	*371*	1.20			371	3.26	3.91	725			0.02	1.0	0.02	0.01	0.05		1.23	3.95	3.99	203	200	1.00	1.05	34.2	12%
Site-B	Hotel & Commercial	0.12	0	*0*	0.00	110	0.43	165	3.26	1.40	725	150	175	0.51	1.0	0.51	0.01	0.03		0.95	1.92	1.95	203	200	1.00	1.05	34.2	6%
Totals (Lyon St)		**3.05**	**334**	**560**	**1.81**	**520**	**2.03**	**1340**	**3.17**	**12.20**	**74900**	**300**	**225**	**3.30**	**1.5**	**4.96**	**0.15**	**0.85**	**0.00**	**7.30**	**17.31**	**18.16**	**381**	**375**	**0.57**	**1.21**	**138.0**	**13%**

DESIGN PARAMETERS

Average Daily Flow (residential)=	280 L/cap/day	Infiltration Allowance (DW)	0.05	L/s/ha
Average Daily Flow (Hotel)=	225 L/pers/day	Infiltration Allowance (WW)	0.028	L/s/ha
Commercial Flow	28000 L/gross ha/day	Infiltration Allowance (Total)	0.33	L/s/ha
Res Peak Factor=	Per Harmon Equation, 0.8 correction factor	Minimum Velocity=	0.60	m/s
	For Site, total pop. (930 people) PF = 3.26	Manning's n=	0.013	
Max Res Peak Factor=	4.00			
Comm/Inst Peak Factor=	1.5 if commercial contribution > 20%, otherwise use		1.0	

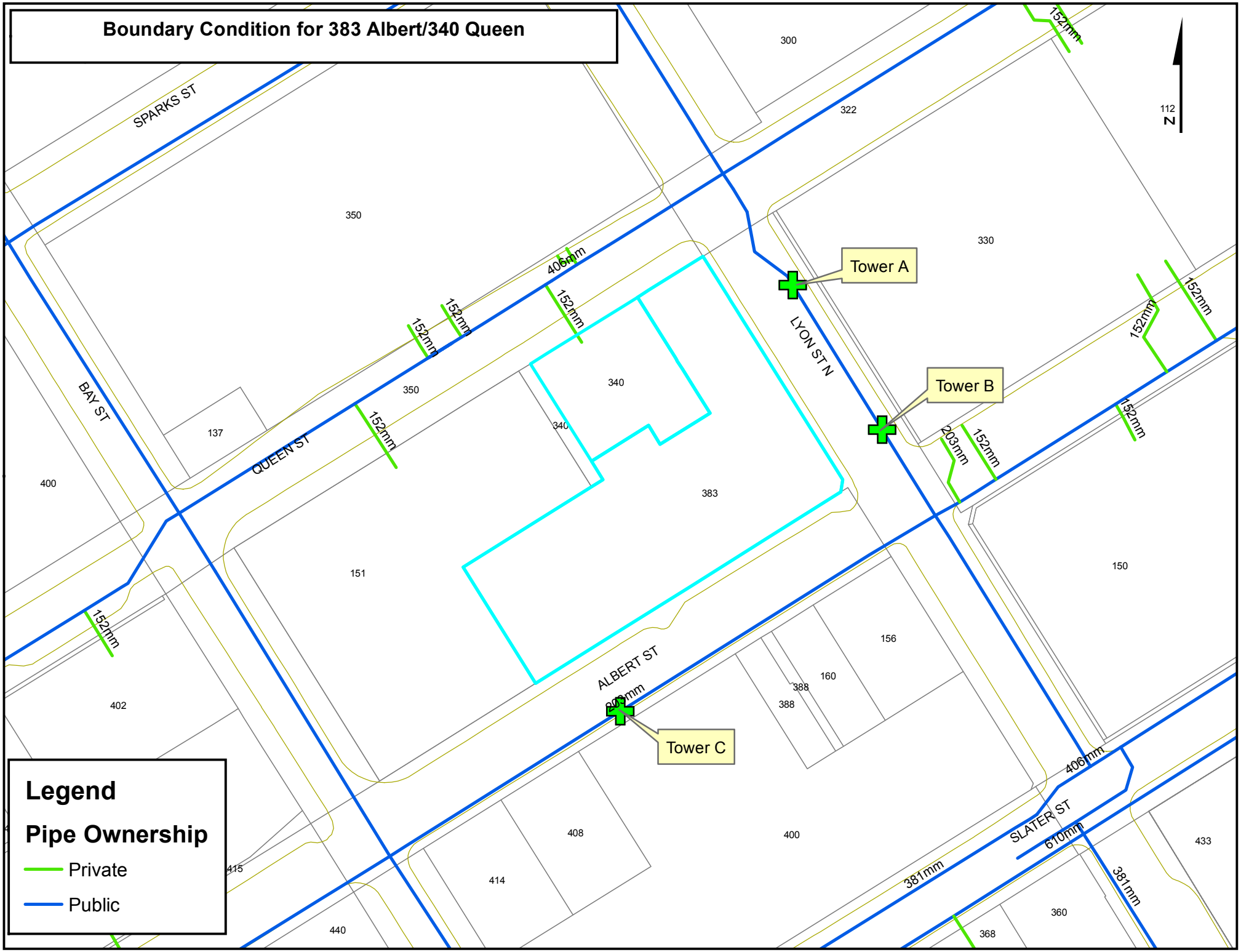
Designed: LGB
Checked: FST
Dwg. Reference: 109111 Figure A2

PROJECT: 383 Albert Street / 340 Queen Street
CLIENT: Claridge Homes Development
Date: June 15, 2018

Notes:
* Residential Population calculated based on an average occupancy for off-site tributary catchments, occupancy per unit for proposed development concept plan)
- Residential Units (Average Apartment): 1.8 people / unit
- Residential Units (1-bedroom/Studio Apartment): 1.4 people / unit
- Residential Units (2-bedroom Apartment): 2.1 people / unit

APPENDIX D

Water Demands, Boundary Conditions and FUS Calculation


Boundary Condition for 383 Albert/340 Queen
SPARKS ST
BAY ST
QUEEN ST
LYON ST N
ALBERT ST
SLATER ST
Tower A
Tower B
Tower C
152mm
406mm
203mm
610mm
381mm
300
322
330
350
340
383
137
400
151
150
156
160
388
402
408
414
415
433
360
368
440
112
N
Legend
Pipe Ownership
Private
Public

Francois Thauvette

From: Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>
Sent: Thursday, March 8, 2018 8:44 AM
To: Francois Thauvette; Wu, John
Subject: FW: 383 Albert St. / 340 Queens St. - Request for WM Boundary Conditions
Attachments: 383 Albert March 2018.pdf

As requested please see below.

Thanks,

Abdul Mottalib, P. Eng.

From: ……..
Sent: March 08, 2018 7:54 AM
To: Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>
Subject: RE: 383 Albert St. / 340 Queens St. - Request for WM Boundary Conditions

Please refer to Guidelines and Technical bulletin ISDTB-2014-02 concerning basic day demands greater than 0.5 L/s.

The following are boundary conditions, HGL, for hydraulic analysis at 383 Albert/340 Queen (zone 1W) assumed to be connected to the 203mm on Lyon and Albert (see attached PDF for location).

Minimum HGL = 107.2m, same at all connections

Maximum HGL = 116.2m, same at all connections

Max Day + Fire Flow (183 L/s) = 95.0m, Tower A

Max Day + Fire Flow (183 L/s) = 99.6m, Tower B

Max Day + Fire Flow (183 L/s) = 92.5m, Tower C

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.

From: Francois Thauvette [mailto:f.thauvette@novatech-eng.com]
Sent: March 02, 2018 3:42 PM
To: Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>
Subject: FW: 383 Albert St. / 340 Queens St. - Request for WM Boundary Conditions

Hi Abdul,

In John Wu's absence, can you please review and provide watermain boundary conditions? See e-mail below and attachments for details.

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, March 2, 2018 3:40 PM
To: Wu, John <John.Wu@ottawa.ca>
Subject: 383 Albert St. / 340 Queens St. - Request for WM Boundary Conditions

Hi John,

Please provide the municipal WM boundary conditions for the existing 200mm dia. watermains in Lyon and Albert Streets. Towers A and B will connect to the watermain in Lyon Street, while Tower C will connect to the watermain in Albert Street. See attached sketch for proposed building locations. Based on preliminary calculations, using the City of Ottawa guidelines for drinking water systems, the water demands for the proposed development are as follows:

Tower 'A': (incl. 1/3 commercial demands)
- Average Day Demand = 1.53 L/s (see table below)
- Max Day Demand = 3.28 L/s (see table below)
- Peak Hour Demand = 6.88 L/s (see Table below)

Tower 'B': (incl. 1/3 commercial demands)
- Average Day Demand = 0.91 L/s (see table below)
- Max Day Demand = 2.22 L/s (see table below)
- Peak Hour Demand = 4.85 L/s (see Table below)

Tower 'C': (incl. 1/3 commercial demands)
- Average Day Demand = 1.25 L/s (see table below)
- Max Day Demand = 3.07 L/s (see table below)
- Peak Hour Demand = 6.72 L/s (see Table below)

Theoretical Water Demand for Proposed Development

Tower ID	Type of Uses (Hotel, Residential, Commercial)	Average Water Demand (L/s)			Max Day (L/s)	Peak Hour (L/s)
		Hotel	Residential	Commercial		
Tower 'A'	Hotel Rooms	0.98	-	-	2.45	5.39
Tower 'A'	Restaurant/ Bar	-	-	0.49	0.74	1.33
Tower 'B'	Residential	-	0.85	-	2.13	4.69
Tower 'C'	Residential	-	1.19	-	2.98	6.56
Site (A,B,C)	Commercial	-	-	0.18	0.27	0.49
Total Site	All above	**0.98**	**2.04**	**0.67**	**8.57**	**18.46**

· Fire Flow (For entire development) = 183 L/s (refer to the attached FUS calculations sheet).

Please review and provide municipal watermain boundary conditions.

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

'

'

WATER DEMAND CALCULATION SHEET

FILE NO.: 109111

DATE: June 25, 2018

NOVATECH
Engineers, Planners & Landscape Architects

WATER DEMAND

TOWER	DOMESTIC					COMMERCIAL			AVER. DAILY DEMAND (l/s)			MAX. DAILY DEMAND (l/s)			PEAK HOURLY DEMAND (l/s)			TOTAL MAX DAILY + MAX. FIRE DEMAND (l/s)
	RENTAL / CONDO			HOTEL		RESTAURANT	BAR	COMMERCIAL										
	NUMBER OF UNITS		POP'N	NUMBER OF ROOMS	POP'N	NUMBER OF SEATS	NUMBER OF SEATS	GROSS AREA (m2)										
	BACHELOR / 1-BEDROOM	2-BEDROOM	(pers)		(pers)				RES.	NON-RES.	TOTAL	RES.	NON-RES.	TOTAL	RES.	NON-RES.	TOTAL	TOTAL
A	156	73	371					725	1.50	0.02	1.52	3.75	0.03	3.78	8.25	0.05	8.30	187.11
B	0	0	0	110	165	150	175	725	0.43	0.51	0.94	1.08	0.77	1.84	2.37	1.38	3.74	185.17
C	109	51	259	90	135			725	1.40	0.02	1.42	3.50	0.03	3.53	7.70	0.05	7.75	186.86
TOTAL	**265**	**124**	**630**	**200**	**300**	**150**	**175**	**2,175**	**3.33**	**0.55**	**3.88**	**8.33**	**0.83**	**9.15**	**18.32**	**1.49**	**19.80**	**-**

ASSUMPTIONS:

RESIDENTIAL POPULATION DENSITY:	-Bachelor / 1-bedroom	1.4	Pers/unit
	-2-bedroom	2.1	Pers/unit
	-Hotel Room	1.5	Pers/bed (assuming 1 double bed per room)
RESTAURANT/BAR:	-Bachelor / 1-bedroom	1.4	Pers/unit
	-2-bedroom	2.1	Pers/unit
AVER. DAILY DEMAND:	- Residential	350	L / pers / day
	- Hotel	225	L / pers / day
	- Commercial	28000	L / ha. / day
	- Hotel Restaurant	200	L / seat / day
	- Hotel Bar	70	L / seat / day
MAX. DAILY DEMAND:	- Residential	2.5	* aver. day
	- Commercial	1.5	* aver. day
PEAK HOURLY DEMAND:	- Residential	2.2	* max. day
	- Commercial	1.8	* max. day
FIRE FLOW:	- Total	11,000	l/min. = **183 l/s**

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 109111
Project Name: 383 Albert St. / 340 Queen St.
Date: 8/8/2018
Input By: Lydia Bolam
Reviewed By: François Thauvette

Legend: Input by User; No Information or Input Required

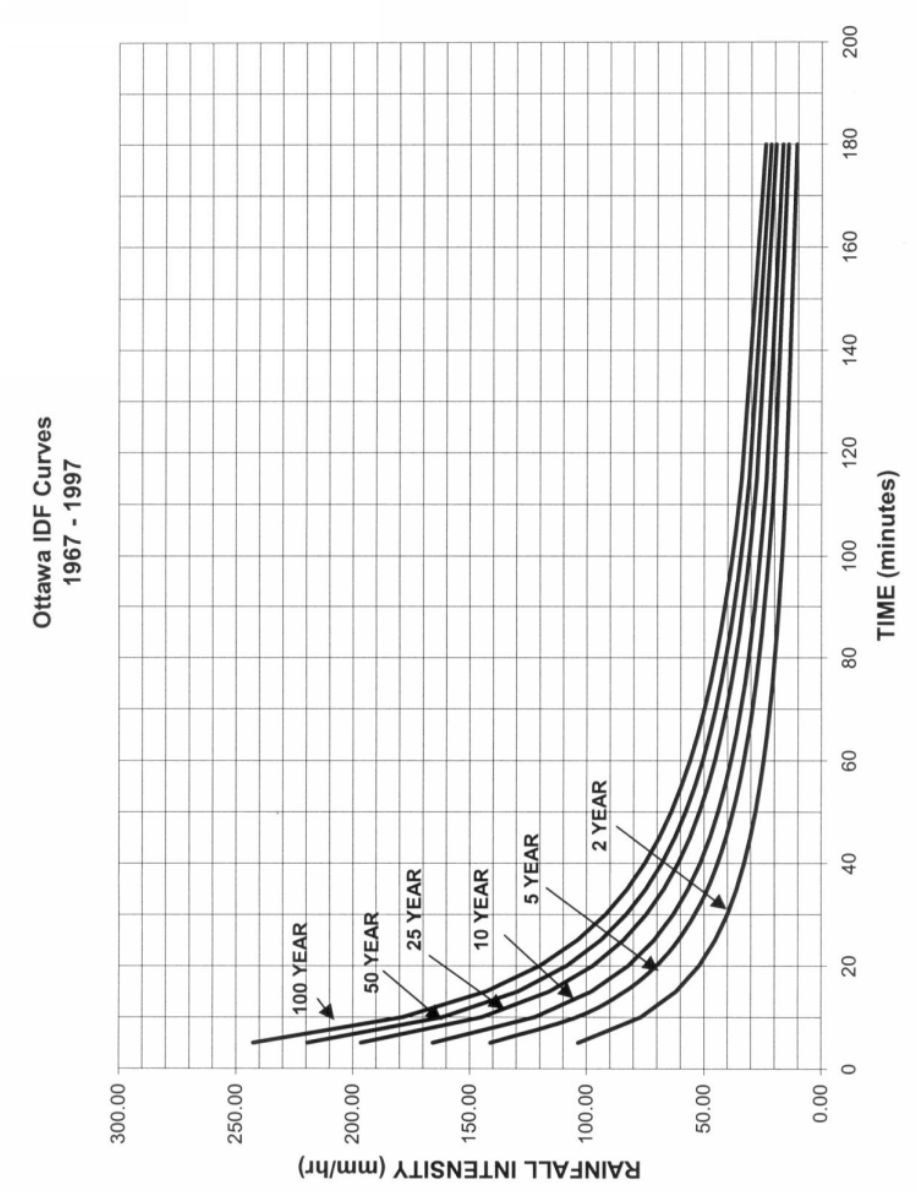
Building Description: Towers A, B, C and Podium
Fire Resistive Construction

Step			Choose	Multiplier Options	Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**					
	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 (> 2 hrs)		0.6		
2	**Floor Area**					
	A	Podium Level Footprint (m^2)	3380			
		Total Floors/Storeys (Podium)	3			
		Tower Footprint (m^2)	2510			
		Total Floors/Storeys (Tower)	24			
		Protected Openings (1 hr)	Yes			
		Area of structure considered (m^2)			**5,070**	
	F	**Base fire flow without reductions**				**9,000**
		$F = 220\ C\ (A)^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**					
	(1)	Non-combustible		-25%	0%	**9,000**
		Limited combustible		-15%		
		Combustible	Yes	0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**					
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%	-30%	**-3,600**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	No	-10%		
				Cumulative Total	**-40%**	
5	**Exposure Surcharge (cumulative %)**					
	(3)	North Side	20.1 - 30 m		10%	**5,400**
		East Side	20.1 - 30 m		10%	
		South Side	10.1 - 20 m		15%	
		West Side	0 - 3 m		25%	
					Cumulative Total **60%**	
Results						
6	**(1) + (2) + (3)**	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**11,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**183**
				or	USGPM	2,906
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	2
		Required Volume of Fire Flow (m^3)			m^3	1320

APPENDIX E

IDF Curves and SWM Calculations

APPENDIX 5-A OTTAWA INTENSITY DURATION FREQUENCY (IDF) CURVE



PROJECT #: 109111
PROJECT NAME: 383 ALBERT ST / 340 QUEEN ST
LOCATION: CITY OF OTTAWA

STORMWATER MANAGEMENT DESIGN SHEET

NOVATECH
Engineers, Planners & Landscape Architects

Pre - Development Site Flows									Target Allowable Flow (L/s)
Description	A (ha)	A imp (ha) C=0.9	A grav (ha) C=0.6	A perv (ha) C=0.2	C_5	C_{100}	Uncontrolled Flows (L/s)		
							5 year	100 year	C=0.5, 5-Yr (L/s)
Site Area - Existing Building and Parking Lot	0.394	0.394	0.00	0.00	0.90	1.00	102.7	195.6	38.5
							t_c=10mins	t_c=10mins	t_c=20mins

Post - Development : Uncontrolled Site Flows									
Area	Description	A (ha)	A imp (ha) C=0.9	A grav (ha) C=0.6	A perv (ha) C=0.2	C_5	C_{100}	Uncontrolled Flow (L/s)	
								5 year	100 year
G-1	Uncontrolled Direct Runoff - To ROWs	0.049	0.049	0	0	0.90	1.00	12.8	24.3
R-1	Uncontrolled Roof and Rear Exterior	0.345	0.345	0	0	0.90	1.00	89.9	171.3
	Totals	**0.394**	**0.394**	**0.00**	**0.00**	0.90	1.00	**102.7**	**195.6**
								t_c=10mins	t_c=10mins

Post - Development : Total Flows for Controlled Site						
Area	Description	Flow (L/s)		Storage Required (m^3)		Provided (m^3)
		5 year	100 year	5 year	100 year	
G-1	Uncontrolled Direct Runoff - To ROWs	12.8	24.3	- - -	- - -	N/A
R-1	Controlled Roof and Rear Exterior	14.1	14.1	58.4	142.2	142.2
	Totals	**26.9**	**38.5**	**58.4**	**142.2**	**142.2**
	Over-Controlled by:	11.6	0.0			

383 Albert St / 340 Queen St
Project No. 109111
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-1 **Roof and Rear Exterior**

OTTAWA IDF CURVE

Area =	0.345	ha	Qallow =	14.1	L/s
C =	0.90		Vol(max) =	**58.4**	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	121.86	107.76	32.33
10	104.19	89.94	75.84	45.50
15	83.56	72.13	58.03	52.22
20	70.25	60.64	46.54	55.85
25	60.90	52.56	38.46	57.70
30	53.93	46.55	32.45	58.41
35	48.52	41.88	27.78	58.34
40	44.18	38.14	24.04	57.69
45	40.63	35.07	20.97	56.62
50	37.65	32.50	18.40	55.21
55	35.12	30.32	16.22	53.52
60	32.94	28.44	14.34	51.61
65	31.04	26.80	12.70	49.52
70	29.37	25.35	11.25	47.26
75	27.89	24.07	9.97	44.88
90	24.29	20.97	6.87	37.07
105	21.58	18.63	4.53	28.54
120	19.47	16.80	2.70	19.47
135	17.76	15.33	1.23	10.00
150	16.36	14.12	0.02	0.21

383 Albert St / 340 Queen St
Project No. 109111
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-1 **Roof and Rear Exterior**

OTTAWA IDF CURVE

Area =	0.345	ha	Qallow =	14.1	L/s
C =	1.00		Vol(max) =	**142.2**	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	232.78	218.68	65.60
10	178.56	171.26	157.16	94.29
15	142.89	137.05	122.95	110.65
20	119.95	115.04	100.94	121.13
25	103.85	99.60	85.50	128.25
30	91.87	88.11	74.01	133.22
35	82.58	79.20	65.10	136.71
40	75.15	72.07	57.97	139.13
45	69.05	66.23	52.13	140.74
50	63.95	61.34	47.24	141.72
55	59.62	57.19	43.09	142.18
60	55.89	53.61	39.51	142.23
65	52.65	50.49	36.39	141.93
70	49.79	47.75	33.65	141.34
75	47.26	45.32	31.22	140.50
90	41.11	39.43	25.33	136.78
105	36.50	35.00	20.90	131.70
120	32.89	31.55	17.45	125.64
135	30.00	28.77	14.67	118.83
150	27.61	26.48	12.38	111.43

383 Albert St / 340 Queen St
Project No. 109111
REQUIRED STORAGE - 1:100 YEAR EVENT + 20%
AREA R-1 **Roof and Rear Exterior**

OTTAWA IDF CURVE

Area =	0.345	ha	Qallow =	14.1	L/s
C =	1.00		Vol(max) =	**181.5**	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	279.33	265.23	79.57
10	214.27	205.51	191.41	114.84
15	171.47	164.46	150.36	135.32
20	143.94	138.05	123.95	148.74
25	124.62	119.52	105.42	158.13
30	110.24	105.73	91.63	164.94
35	99.09	95.04	80.94	169.98
40	90.17	86.49	72.39	173.73
45	82.86	79.47	65.37	176.50
50	76.74	73.61	59.51	178.52
55	71.55	68.62	54.52	179.92
60	67.07	64.33	50.23	180.83
65	63.18	60.59	46.49	181.32
70	59.75	57.30	43.20	181.46
75	56.71	54.39	40.29	181.29
90	49.33	47.32	33.22	179.36
105	43.80	42.01	27.91	175.81
120	39.47	37.86	23.76	171.07
135	36.00	34.52	20.42	165.43
150	33.13	31.78	17.68	159.10