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- Commercial & Institutional
- Environmental Restoration

Claridge Homes Inc.
110-116 York Street

Servicing and Stormwater Management Report

110-116 York Street

City of Ottawa

Servicing and Stormwater Management Report

Prepared By:

NOVATECH
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Ottawa, Ontario
K2M 1P6

Submitted: March 7th, 2025
Revised: June 12th, 2025
Revised: June 23rd, 2025
Revised: July 29th, 2025

Novatech File: 112142
Ref: R-2024-117

NOVATECH
Engineers, Planners & Landscape Architects

July 29th, 2025

City of Ottawa
Planning, Infrastructure and Economic Development Department
Planning and Infrastructure Approvals Branch
110 Laurier Avenue West, 4th Floor
Ottawa ON, K1P 1J1

Attention: **Vincent Duquette, Infrastructure Project Manager**

Reference: **110-116 York Street**
Servicing and Stormwater Management Report
Our File No.: 112142

Please find enclosed the 'Servicing and Stormwater Management Report' for the above noted development located in the City of Ottawa. This report is being submitted in support of an OPA, ZBLA, and site plan control for 110-116 York Street.

Should you have any questions or require additional information, please contact the undersigned.

Yours truly,

NOVATECH



Greg MacDonald, P. Eng.
Director, Land Development and Public Sector Infrastructure

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

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1.0 INTRODUCTION

Novatech has been retained to prepare a Servicing and Stormwater Management Report for the proposed site plan located at 110-116 York Street within the City of Ottawa. This report is being submitted in support of an OPA, ZBLA, and site plan control for 110-116 York Street. **Figure 1** Key Plan shows the site location.

1.1 Existing Conditions

The subject site is generally bound by York Street to the north, 141 George Street to the south, the Andaz Hotel to the west and 118 York Street to the east. The total area comprises of approximately 0.18 hectares.

Presently the site contains the existing Whiskey Bar, addressed 112 York Street, along the York Street frontage. The remainder of the site presently consists of an aboveground asphalt parking area, with access to Dalhousie and George Street.

The site primarily drains from the south to the north with a +/- 1.56m grade differential across the site. **Figure 2** shows the existing site conditions.

Previous and relevant reports pertaining to the development of this site include:

141 George Servicing and Stormwater Management Report, by Novatech dated September 24th, 2024. Revised June 23, 2025 (Referenced as the George Report).

This report assessed the complete underground parking structure between York Street and Geroge Street to support a revised site plan application for 141 George Street.

- 141 George with 297 residential units, an office area (72.70m^2) and 453m^2 of commercial.
- 110-116 York Street 154 hotel rooms and a Banquet Hall with a maximum capacity of 615 persons and a Bar/Cocktail lounge with a maximum capacity of 235 persons.
- Proposed parking structure will have four (4) levels of parking beneath the development of 141 George and 110-116 York. Parking garage with be accessible via George and Dalhousie Street.

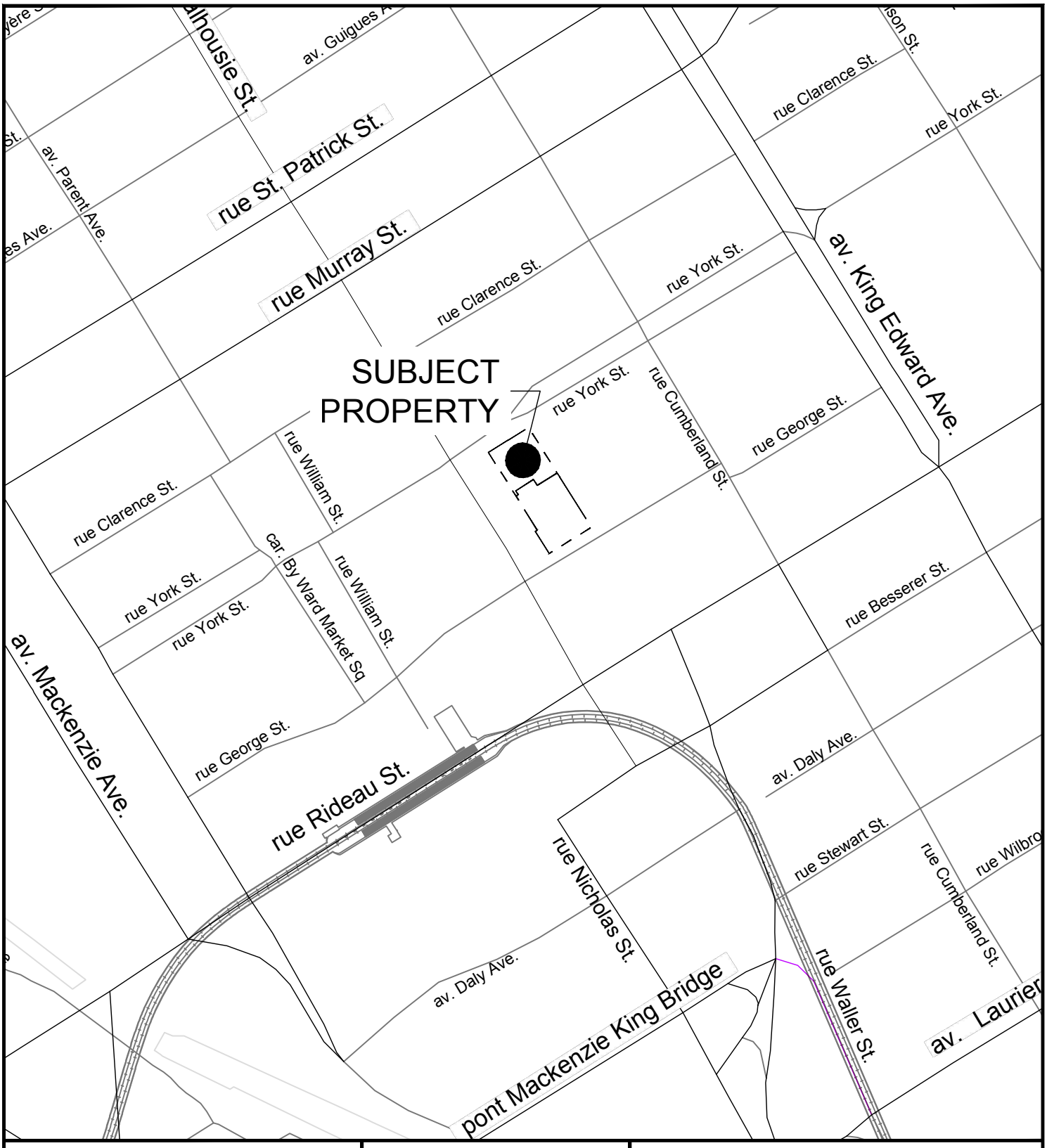
110 York and 141 George Street Serviceability Memo, by Novatech dated March 12, 2024

This memo assessed the serviceability of the development based on a concept which included the following:

- 141 George with 295 residential units and 679 m^2 of commercial area
- 110 York Street with 106 hotel rooms and 793 m^2 of commercial space

Residential / Hotel Development 141 George Street/ 325 Dalhousie Street/110 York Street, Ottawa, Ontario, Servicing Design Brief', by Novatech Engineering dated April 12, 2018

This memo assessed the serviceability of the development based on a concept which included the following:



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Website www.novatech-eng.com

CITY OF OTTAWA

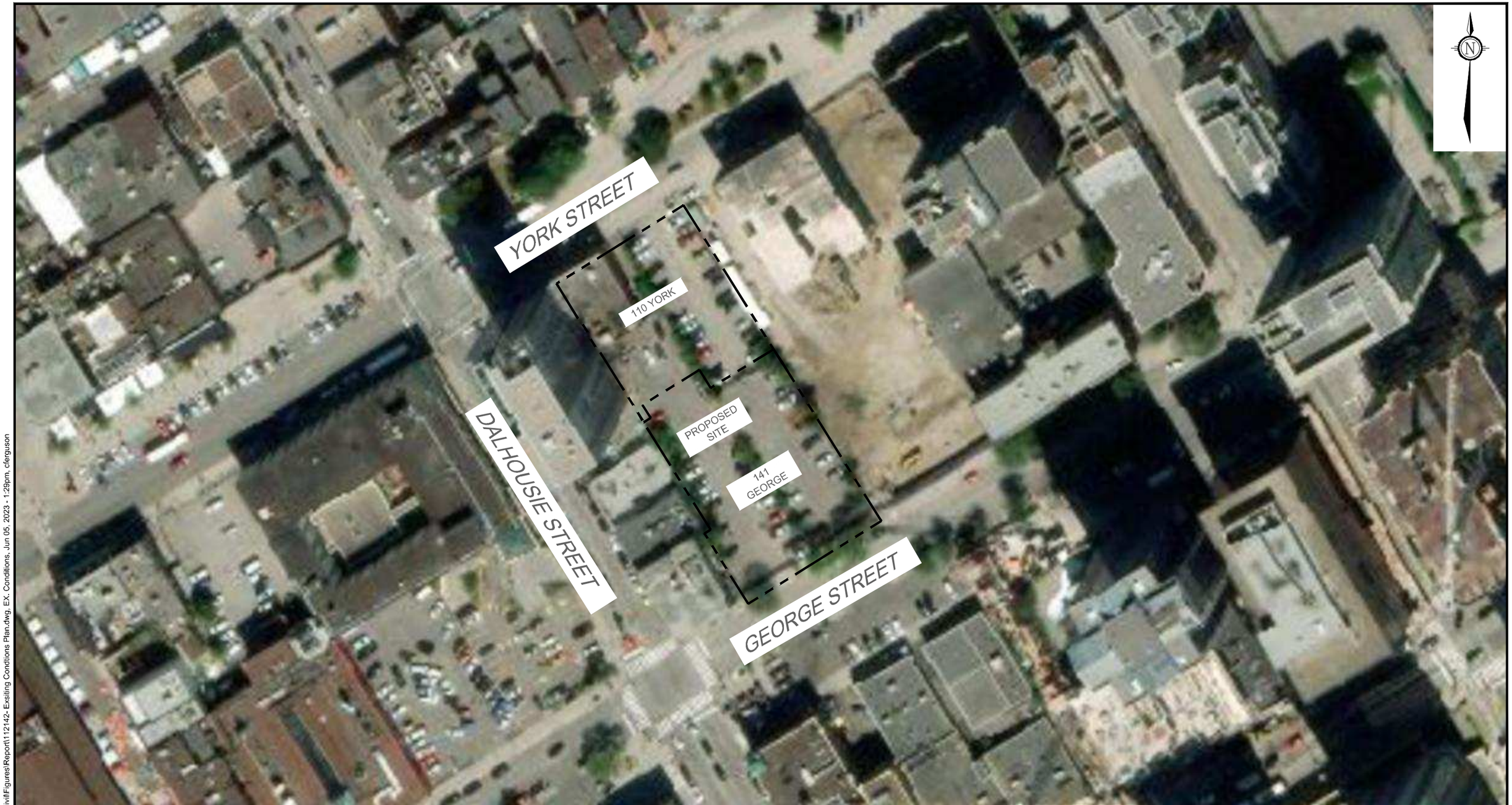
110-116 YORK STREET

KEY PLAN

SCALE: N.T.S

DATE: MAR 2024 | JOB: 112142 | FIGURE: FIGURE 1

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LEGEND

SITE BOUNDARY

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CITY OF OTTAWA
141 GEORGE STREET

EXISTING CONDITIONS

SCALE 1 : 1000 (0 10 20 30 40)

DATE SEPT 2024 | JOB 112142 | FIGURE FIGURE 2

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M:\2012\112142_141 GEORGE-110 YORK\CAD\CivilFigures\Report\112142- Exsiting Conditions Plan.dwg, EX. Conditions, Jun 05, 2023 - 1:29pm, cferguson

- 141 George with 282 residential units and 1097 m^2 of commercial area
- 110 York Street with 128 hotel rooms with connection to the existing Andaz Hotel

Residential / Hotel Development 141 George Street/ 325 Dalhousie Street/, Ottawa, Ontario, Servicing Design Brief (Incl. Interim Condition) by Novatech dated February 14, 2014

This memo assessed the serviceability of the development based on a concept which included the following:

- 141 George with 282 residential units and 1079 m^2 of commercial area
- 325 Dalhousie Street (current Andaz Hotel) with 187 hotel rooms and 292m^2 of commercial space

Site plan approval for the 141 George Street was received based on a 22-storey building with 295 residential units, 679m^2 of commercial area and 288 underground parking spaces on 4 levels of parking within the 141 George Street property.

The historical relevant reports can be found in **Appendix E**.

1.2 Proposed Development

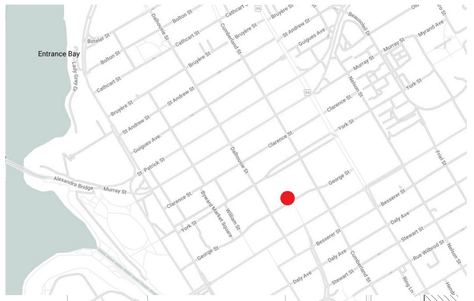
This report is being submitted in support of a revised OPA, Zoning and Site Plan Control for 110-116 York Street to include the complete above grade material.

The proposed 110-116 York Building will consist of 154 hotel rooms and a Banquet Hall with a maximum capacity of 615 persons and a Bar/Cocktail lounge with a maximum capacity of 235 persons.

Access to the proposed underground parking structure will be provided from George Street and Dalhousie Street. The proposed parking structure will have four (4) levels of parking beneath the development of 141 George and 110-116 York.

The entire parking garage under 137-141 George Street and 110-116 York Street will be owned by 137-141 George Street with vehicle and pedestrian easement in favour of the Andaz Hotel (325 Dalhousie) and 110-116 York Street. Since the entire underground parking garage will be owned by 137-141 George Street, interior plumbing in the parking garage will not cross property lines. Easements will be established to permit 110-116 York to access and maintain services and utilities in the underground parking structure.

Figure 3 shows the site plan for the proposed development.



NOTES
• FOR EXISTING SITE CONDITIONS & PROPERTY BOUNDARY INFORMATION, SEE SURVEY PLAN BY ANNIS, O'SULLIVAN, VOLLEBEKK LTD., SUBMITTED SEPARATELY. • FOR EXISTING & NEW GRADES AND SITE SERVICES, SEE CIVIL ENGINEERING PLANS BY NOVATECH ENGINEERING CONSULTANTS, SUBMITTED SEPARATELY. • FOR NEW LANDSCAPING DESIGN, SEE LANDSCAPING PLANS BY JAMES B. LENNOX & ASSOCIATES, SUBMITTED SEPARATELY. • FOR PROPOSED LIGHTING LAYOUT, SEE ELECTRICAL ENGINEERING PLANS BY JAIN CONSULTING, SUBMITTED SEPARATELY. • ZONING GFA INCLUDES AREA MEASURED FROM THE INTERIORS OF OUTSIDE WALLS, AS DEFINED IN CITY OF OTTAWA ZONING BY-LAW DEFINITION (2008-250).

NOTE:
- SNOW STORAGE: SNOW WILL BE HAULED OFF SITE.

SYMBOLS LEGEND

- EXITS
- PATH OF EXIT
- EXISTING BUILDINGS
- AIRWELLS WITH STEEL GRATE
- SNOW MELT AREA
- SIAMESE CONNECTION
- DC — PROPOSED DEPRESSED CURB
- PROPERTY LINE
- DRIVE AISLE — 6000 MIN.
- FIRE ACCESS ROUTE — 6000 MIN.

SOLID WASTE COLLECTION REQUIREMENTS		
ZONING MECHANISM	REGULATION	PROPOSED
Hotel Waste York - 154 units Andaz - 200 units Total = 354 units	**Garbage** (**Compacted**) = 0.053y^3/unit Require 19y^3 **Recycling** (**GMP**) = 0.018y^3/unit Require 7y^3 **Recycling** (**Fibres**) = 0.038y^3/unit Require 14y^3 **Organics** = 240L container/50 units Require 8 containers	**Garbage** (**Compacted**) = 3 x 8y^3 containers Total = 24y^3 **Recycling** (**GMP**) = 2 x 8y^3 containers Total = 16y^3 **Recycling** (**Fibres**) = 2 x 8y^3 containers Total = 16y^3 **Organics** = 8 x 240L containers Total = 1920L

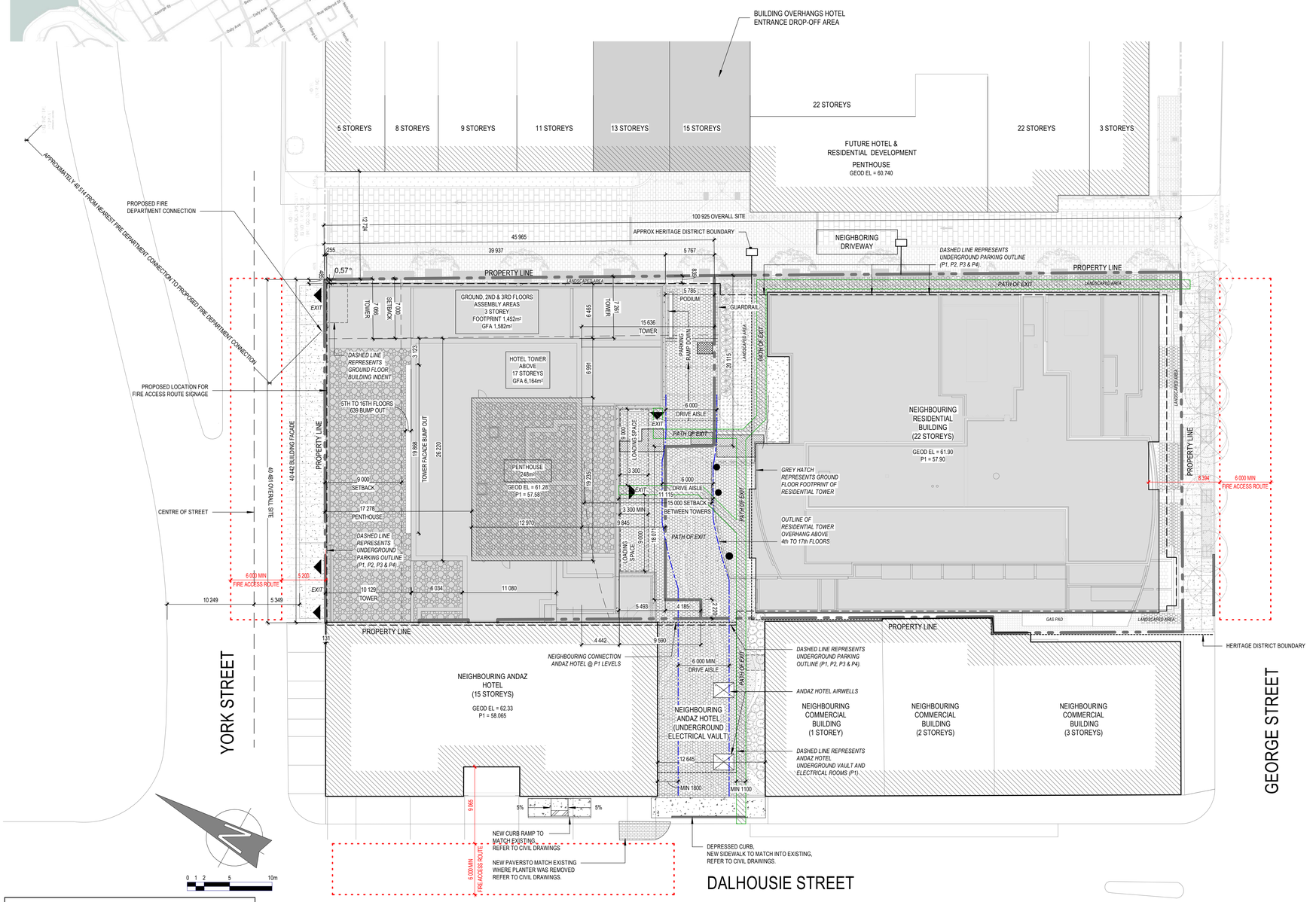
OCCUPANCY	UNITS / STOREYS	PROPOSED ZONING GFA
Hotel Rooms	4th and 17th floors (11 rooms/floor) 5th to 16th floors (11 rooms/floor) Minimum 10% of rooms are required to be Barrier-Free (BF) and distributed throughout the storeys.	424m² x 2 floors= 848m² 443m² x 12 floors=5,316m² TOTAL = 6,164m² 22 of 154 units (14%) provided
Assembly Hotel Administration	Ground floor 2nd floor 3rd floor	647m² /floor 841m² /floor 94m² /floor TOTAL = 1,582m²
	TOTAL	**7,746m²**

MIXED-USE WITH GROUND FLOOR COMMERCIAL - ZONING - MD2 (2919) S489/ MD2 (113) S74
(COMBINED WITH 141 GEORGE STREET - MD2 (2031) S307)

ZONING RULE	REQUIREMENT	PROVIDED
Minimum lot area	No minimum	Combined lots 141 George Street = 3,109.10m² 110 York = 520.72m² 116 York = 1,015.88m² = 4,645.70m²
Minimum lot width	No minimum	40.47m along York Street
Minimum front yard	Maximum 1m	0.05m
Minimum interior side yard	No minimum	West side: connected to adjacent hotel. East side: 0.408m
Minimum rear yard	No minimum	Combined lot with 141 George Street. 5.38m and 5.69m
Maximum building height	12m high within 9m from York. 52m high overall 12m high within 8m from back. As per OUTDATED Schedule 489; not including 116 York. Projections permitted beyond building height. As per Exception 2919 (By-law 2023-502)	12.6m within 10m from York and Podium. 54.3m Tower.
Maximum floor space index	Not applicable	-
Minimum width of landscape area	No minimum except that where a yard is provided and not used for required driveways, aisles, parking, loading spaces, or outdoor commercial patio, the whole yard must be landscaped	Yard used for required driveway, aisles and loading spaces, otherwise whole yard to be landscaped.
Provisions for buildings 10 storeys and higher (By-law 2019-353)	Not applicable. As per Exception 2919 (By-law 2023-502)	-
Ground floor use	100% of ground floor fronting a street (excluding lobby area, mechanical room, and access to other floors for a minimumm depth of 3m, must be occupied by permitted use. Total gross area of lobbies, mechanical rooms and access to other floors must not exceed 50% of ground floor gross area. Hotel lobby may be included in the calculation of ground floor frontage. As per Exception 2919 (By-law 2023-502)	100% of ground fronting York Street (excluding exits from other floors) for a minimumm depth of 3m, is occupied by permitted Hotel use. Total gross area of lobbies, mechanical rooms and access to other floors does not exceed 50% of ground floor gross area. Permitted Hotel use occupies more than 50% of ground floor and separate and direct access is provided on York and Dalhousie Street from existing Hotel building.

AMENITY AND PARKING REQUIREMENTS
ZONING - 110 YORK - MD2 (2919) S489
116 YORK - MD2 (113) S74
(COMBINED WITH 141 GEORGE STREET - MD2 (2031) S307)

ZONING MECHANISM	REGULATION	PROPOSED
Shared Parking **141 GEORGE** **110 & 116 YORK**	None required for Hotel, Residential or Commercial use. 25 visitor parking spaces required 0.083 spaces per unit (Exception 2031)	P1 29 spaces (13 reduced) P2 44 spaces (14 reduced) P3 44 spaces (14 reduced) P4 46 spaces (14 reduced) 6.0m drive aisle provided. P1 17 spaces (11 reduced) P2 38 spaces (10 reduced) P3 39 spaces (10 reduced) P4 41 spaces (10 reduced) **Total: 298 spaces shared between building users. (96 reduced 33%)** 141 George 163 spaces (55 reduced 34%) 110 York 135 spaces (41 reduced 31%) 25 Visitor parking to be clearly marked for 141 GEORGE.
Barrier-Free Parking Combined 110-116 York & 141 George	Requires 9 barrier-free spaces 4 type As 4 type Bs (Traffic and Parking By-Law 2017-301)	George P2,P3,P4 - 1 type A per floor York P1- 1 type A P1,P2,P3 - 2 type B per floor **Total: 10 spaces**
Minimum Bicycle Parking **141 GEORGE** **110 & 116 YORK**	Residential: 0.5 spaces x 297 units = 149 bicycle parking spaces Retail: 1 space per 250m² of GFA 468m² GFA / 250m² = 2 bicycle parking spaces Hotel: 1 per 1000m² of GFA +/-7,746m² GFA/1,000m² = 8 bicycle parking spaces Minimum 50% to be horizontal racks.	Residential: 60 (P1) 66 (P2) 31 (P3) Total 157 spaces Retail : 5 (Exterior) Hotel: 9 (Interior) **Total: 171 spaces** 76 (~44%) vertical mount
Loading (110-116 York)	2 spaces required. Minimum 3.3m width of a loading space. As per Exception 2919 (By-law 2023-502)	2 outdoor spaces provided. Meeting 9m length for parallel application.



SITE PLAN AT GROUND
1 : 250
1 AY100

BUILDING CODE MATRIX - GROSS FLOOR AREAS

GROSS FLOOR AREA	AREA (m²)/ FLOOR	AREA (ft²)/ FLOOR	# OF FLOORS	TOTAL AREA (m²)	TOTAL AREA (ft²)
P4.5, P3.5 & P2.5 LEVELS	1 560 m²	16 790,0 ft²	0	0 m²	0 ft²
P1.5 LEVEL	1 643 m²	17 680,1 ft²	0	0 m²	0 ft²
GROUND FLOOR	1 452 m²	15 631,7 ft²	1	1 452 m²	15 632 ft²
2nd FLOOR	1 483 m²	15 959,5 ft²	1	1 483 m²	15 960 ft²
3rd FLOOR	864 m²	9 296,8 ft²	1	864 m²	9 297 ft²
4th & 17th TYPICAL FLOOR	609 m²	6 554,1 ft²	2	1 218 m²	13 108 ft²
5th TO 16th TYPICAL FLOOR	620 m²	6 674,6 ft²	12	7 441 m²	80 095 ft²
18th FLOOR PENTHOUSE	249 m²	2 679,0 ft²	1	249 m²	2 679 ft²
	8 479 m²	91 265,9 ft²		12 706 m²	136 771 ft²

Gross Area means the total area of all floors above grade measured between the outside surfaces of exterior walls.

GENERAL NOTES

1. These architectural documents are the exclusive property of NEUF architect(e)s inc. and cannot be used, copied, or reproduced without written pre-authorisation.
2. The contractor is responsible for checking and verifying all dimensions with respect to the project. Any discrepancy shall be reported to the architect.
3. The architect must be notified of all errors, omissions, and discrepancies between these documents and those of the other professionals.
4. Do not scale drawings. The dimensions on these documents must be read and not measured.
5. These drawings are to be read in conjuction with all material relevant to the project.

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Seal

NEUF
ARCHITECT(E)S

Client
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Project
110-116 YORK STREET

Location
OTTAWA

No.
13098.00

NO	REVISION	DATE (yyyy.mm.dd)
JJ	FOR COORDINATION	2024.11.15
LL	FOR COORDINATION	2024.11.22
MM	FOR SITE PLAN APPLICATION	2024.11.25
PP	FOR COORDINATION	2024.12.02
QQ	FOR CLIENT REVIEW	2024.12.04
TT	FOR CLIENT REVIEW	2025.01.14
XX	FOR CLIENT USE	2025.01.29
YY	FOR COORDINATION	2025.02.05
ZZ	FOR HERITAGE REPORT	2025.02.17
AAA	FOR SITE PLAN APPROVAL	2025.02.20
BBB	FOR HH SD REVIEW #6	2025.02.20
CCC	FOR COORDINATION	2025.02.20
FFF	FOR COORDINATION	2025.04.03
JJJ	FOR COORDINATION	2025.04.30
LLL	ISSUED FOR SUPERSTRUCTURE PERMIT	2025.05.15
MMM	FOR COORDINATION	2025.06.18

Preliminary Not to be used for construction

Drawn by
SJ

Checked by
LH

DATE (aa.mm.j)
MAY 2023

Scale
As indicated

Drawing Title
SITE PLAN

Revision
MMM

Dwg Number
AY100

D07-12-25-0038

19235

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2.0 GEOTECHNICAL INVESTIGATION

A geotechnical investigation was completed for the development, and a report prepared entitled 'Geotechnical Investigation', Proposed High-Rise Building, 137/141 George Street & 110/116 York Street, Ottawa, Ontario prepared by Paterson Group Inc. dated October 29, 2024 (PG2733-3, Rev 5). The following is a summary of the findings of the report:

- The long-term groundwater table can be expected at a depth of approximately 2.5 to 4.5 m throughout the subject site. It should be noted that groundwater levels are subject to seasonal fluctuations. Therefore, the groundwater levels could vary at the time of construction.
- Practical auger refusal was encountered on the bedrock surface at approximate depths ranging from 3.5 to 5.6 m. Based on the recovered rock core samples, the bedrock was observed to consist of grey limestone, which is poor to good in quality in the upper 1 to 1.5 m, generally becoming excellent in quality with depth.
- Existing foundation walls and other construction debris should be entirely removed from within the building perimeter and within the lateral support zones of the foundation. Under paved areas, existing construction remnants, such as foundation walls, should be excavated to a minimum of 1 m below final grade.
- The excavation side slopes above the groundwater level extending to a maximum depth of 3 m should be cut back at 1H:1V or flatter. The flatter slope is required for excavation below groundwater level. The subsurface soil is considered to be mainly a Type 2 and Type 3 soil according to the Occupational Health and Safety Act and Regulations for Construction Projects. Slopes in excess of 3 m in height should be periodically inspected by the geotechnical consultant.
- A temporary Ministry of Environment, Conservation and Parks (MECP) permit to take water (PTTW) may be required if more than 400,000 L/day of ground and/or surface water are to be pumped during the construction phase.
- For typical ground or surface water volumes being pumped during the construction phase, typically between 50,000 to 400,000 L/day, it is required to register on the Environmental Activity and Sector Registry (EASR).

3.0 WATER SERVICING

There are existing City watermains in all rights-of-way fronting the proposed site. There is an existing 200mm diameter (dia.) watermain within York Street, a 300mm (dia.) watermain in Dalhousie Street, and a 300mm (dia.) watermain within George Street.

It is proposed to service 110-116 York Street with two (2) 150mm diameter services that will connect to the existing 200mm diameter watermain within the York Street right-of-way. The proposed services will be separated by a proposed isolation valve within the right-of-way providing redundancy, as per the City of Ottawa standards.

The building will be sprinkled and equipped with a siamese connections located near the main entrance within 45m of a fire hydrant. Refer to the General Plan of Services drawing (112142-GP-Y) for servicing details.

Water demand calculations have been calculated using criteria from Section 4 of the City of Ottawa Water Distribution Guidelines and the Ontario Building Code as follows:

- Average Day Demand (Hotel) = 225L/person/day
- Hotel Room (Avg.) = 1.8 Persons/unit
- Bar/Cocktail Lounge = 70 L/seat/day
- Banquet Hall = 30L/seat/day
- Residential Peaking Factors
  - Maximum Day = 2.5 x Avg Day
  - Peak Hour = 2.2 x Max Day
- Commercial Peaking Factors
  - Maximum Day = 1.5
- Peak Hour = 1.8

The required fire demand was calculated using the OBC and compared to Fire Underwriters Survey 2020 (FUS) Guidelines. Through correspondence with the architect, it is understood that the proposed building is residential occupancy (Limited Combustible), composed of fire resistive construction (2 hrs.), and will contain a fully supervised sprinkler system designed as per NFPA 13.

The water demand calculations, fire flow calculations and correspondence are provided in **Appendix B** for reference. A summary of the water demand and fire flows 110-116 York Street is provided in **Table 3.1.**

Table 3.1: Water Demand Summary (110-116 York Street)

Hotel Population	Banquet Hall (Seats)	Bar/ Cocktail Lounge (Seats)	Ave. Daily Demand (L/s)	Max. Daily Demand (L/s)	Peak Hour Demand (L/s)	Fire Flow (L/s) - FUS	Fire Flow (L/s) - OBC
227.20	615	235	1.13	1.69	3.04	100	150

Note as per ITSB 2018-02 the fire flow was distributed among several surrounding hydrants during modelling as outlined in **Table 3.2**.

Table 3.2: Maximum Flow to be considered from a given hydrant.

Hydrant Class	Distance to building (m)	Contribution to Fire Flow	
		(L/min)	(L/s)
AA	≤75	5700	95
	>75and ≥150	3800	63.33
A	≤75	3800	63.33
	>75and ≥150	2850	47.50
B	≤75	1900	31.67
	>75and ≥150	1500	25.00
C	≤75	800	13.33
	>75and ≥150	800	13.33

For the purpose of the analysis, and in light of the available pressures, it was assumed off-site hydrants would be rated as Class AA. As the fire flow is calculated as 100 L/s, two (2) hydrants will be required to achieve the required flow. There are presently 2 existing class AA hydrants within the boulevards of York Street and Dalhousie Street within 75m of the proposed building capable of providing a maximum flow of 190L/s as per **Table 3.3**. One hydrant is within 45m of the proposed siamese connection. Refer to **Appendix B** for calculations and the hydrant coverage figure.

The above water demand information was submitted to the City for boundary conditions from the City's water model.

These boundary conditions were used for analyzing the performance of the proposed and existing watermain systems for three theoretical conditions:

1) High Pressure check under Average Day conditions
2) Peak Hour demand
3) Maximum Day + Fire Flow demand.

Refer to **Table 3.3,** for a summary of the proposed boundary conditions and hydraulic analysis.

Table 3.3: Water Boundary Conditions Response (110-116 York Street)

Criteria	Head (m)	Pressure[1] (m)	Pressure (PSI)	Pressure Requirements
Connection (York Street)				
Min HGL	106.3	45.0	63.99	> 40psi
Max HGL	115.4	54.1	76.93	< 80psi
Max Day + Fire Flow	107.6	46.3	65.84	> 20psi

[1]Pressure based on a Finished Floor elevation of 61.28m

The hydraulic analysis indicates that the system can provide adequate pressures and flow to meet the domestic and fire flow requirements for the site. Refer to **Appendix B** for detailed water demand calculations, and City of Ottawa boundary conditions.

4.0 SANITARY SERVICING

There are existing City sanitary sewers in all rights-of-way fronting the proposed site. There is an existing 1200mm sanitary sewer within York Street right-of-way, a 250mm sanitary sewer within Dalhousie Street right-of-way, and a 1980x1500 brick sanitary sewer (horseshoe shape) within George Street right-of-way.

It is proposed to service the 110-116 York Building with a 200mm sanitary service connection to the existing 1200mm sanitary within the York Street right-of-way.

Sanitary flows for the proposed developments were calculated using criteria from Section 4 of the City of Ottawa Sewer Design Guidelines and the Ontario Building Code as follows:

- Hotel Average Flow = 225 L/person/day
- Hotel Room (Avg.) = 1.8 Person/unit
- Bar / Cocktail Lounge flow = 70 L/seat/day
- Banquet Hall = 30L/seat/day
- Residential Peaking Factor = Harmon Equation (max peaking factor = 4.0)
- Commercial Peaking Factor = 1.0
- Peak Extraneous Flows (Infiltration) = 0.33L/s/ha

The peak sanitary flow including infiltration for 110-116 York Street was calculated to be **3.04 L/s**. Detailed sanitary flow calculations are provided in **Appendix C** for reference.

5.0 STORM SERVICING

There is a 675m storm sewer located within the York Street right-of-way, a 450mm storm sewer located in Dalhousie Street right of-way and a 900mm storm sewer within the George Street right-of-way fronting the proposed development.

As part of this application, it is proposed to service the York development with one (1) 250mm storm service connection to the existing 675m storm sewer within the York Street right-of-way. The storm service will convey the uncontrolled foundation drain, trench drain and the controlled flows from the roof drains. Through correspondence with the City it is understood that the existing 100-year HGL within York Street is at an elevation of approximately 60.1m during the 100-yr storm event. The proposed storm services are set to be above the frequent storm event. The proposed service will be installed complete with backflow prevention as the 100-year HGL is higher than the proposed service invert. Additionally, a test port will be provided to give access to City personnel. Refer to the General Plan of Services drawing (112142–GP-Y) for details.

The design criteria used in sizing the storm sewers are summarized below in **Table 5.1.**

Table 5.1: Storm Sewer Design Parameters

Parameter	Design Criteria
Local Roads	2 Year Return Period
Storm Sewer Design	Rational Method
IDF Rainfall Data	Ottawa Sewer Design Guidelines
Initial Time of Concentration (Tc)	10 min
Minimum Velocity	0.8 m/s
Maximum Velocity	3.0 m/s
Minimum Diameter	250 mm

Refer to **Appendix D** for detailed storm drainage area plans and storm sewer design sheets.

6.0 STORM DRAINAGE AND STORMWATER MANAGEMENT (141 GEORGE, 110-116 YORK)

6.1 Design Criteria

Through correspondence with the City of Ottawa, and our knowledge of development requirements in the area, the following criteria have been adopted to control post-development stormwater discharge from the site:

- Control proposed development flows, up to and including the 100-year storm event, to a 5 year allowable release rate calculated using a runoff coefficient (C) of 0.50 and a time of concentration (Tc) of 20 minutes;
- Provide source controls which are in conformity with the City of Ottawa requirements, where possible;
- Limit ponding to 0.15 m for all rooftop storage areas and 0.30 m for all parking storage areas; and
- Provide guidelines to ensure that site preparation and construction is in accordance with the current Best Management Practices for Erosion and Sediment Control.

The approach to the stormwater management design is to determine the allowable release rate for the site, calculate the uncontrolled flow, and ensure that the remaining flow, in combination with the uncontrolled flow, does not exceed the allowable release rate. All proposed development runoff in excess of the allowable release rate, will be attenuated on-site prior to being released into the storm sewers within George Street and York Street.

6.2 Quantity Control

The allowable release rate for the combined York and George Street properties with an area of **0.416 ha** site was calculated to be **40.6 L/s** based on the SWM criteria provided by the City of Ottawa. As noted within the **George Report** this allotment was exceeded slightly for a total release rate of **41.4 L/s.** The drainage is spilt between the two (2) properties with **15.9L/s** allotted for the George Street property and **25.5 L/s** allotted to the York Street property.

Design Storms

The design storms are based on City of Ottawa design storms. Design storms were used for the 5-year and 100-year return periods (i.e. storm events).

Model Parameters

Post-development catchments were modelled based on the proposed site plan and grading as shown on **Drawing 112142-SWM** within **Appendix D**. The building roofs were assumed to have no depression storage.

The York and George sites has been divided into twenty-six (26) areas for the post development condition. The drainage areas are as follows:

Area Andaz:

- Stormwater from the rear of the neighboring Andaz building will sheet drain to an area drain on the York property. These flows will be conveyed uncontrolled through the underground parking garage to the York Street STM service.

Area R-01 to R-18:

- Stormwater from the roof of the York building will be captured and controlled by flow control roof drains prior to releasing to the existing storm sewer servicing the development. The ponding will be limited to 0.15m in depth with overflow scuppers provided for emergencies. Storage of stormwater will be provided for storms up to and including the 100-year event.

Area D-01:

- Stormwater from the small area fronting George Street will flow uncontrolled to the George Street right-of-way.

Area D-02:

- Stormwater from the area North-East of the proposed building will flow uncontrolled to the George Street right-of-way.

Area A-01:

- Stormwater from the area north-west of the proposed George building to the property line adjoining the Andaz and York properties will be captured by an area drain. These flows will be conveyed through the underground parking garage by the internal mechanical plumbing to the proposed George cistern.

Area A-02:

- Stormwater from the area north of the proposed George building, outside of the ground floor units with private access will be captured by an area drain. These flows will be conveyed through the underground parking garage by the internal mechanical plumbing to the proposed George cistern.

Area A-03:

- Stormwater from the area above parking structure within the York building ramp will be captured with a trench drain. These flows will be conveyed uncontrolled through the underground parking garage to the York Street STM service.

Area A-04:

- Stormwater from the area between the York building and the George street property line will be captured within an area drain and trench drain in front of the York street loading zone. These flows will be conveyed uncontrolled through the underground parking garage to the York Street STM service.

Area R-00:

- Stormwater from George Building roof will be captured by uncontrolled roof drains and routed to the proposed cistern by the internal mechanical system.

Table **6.1 below** summarizes the flow, storage required, and storage provided for each of the site drainage areas.

Table 6.1: Post Development Stormwater Management Summary

Area ID	Area (ha)	1:5 Year Weighted Cw	1:100 Year Weighted Cw	Control Device	Outlet Location	2 Year Storm Event				5 Year Storm Event				100 Year Storm Event			
						Release (L/s)	Ponding Depth (m)	Req'd Vol (cu.m)	Max. Vol. Provided (cu.m.)	Release (L/s)	Ponding Depth (m)	Req'd Vol (cu.m)	Max. Vol. Provided (cu.m.)	Release (L/s)	Ponding Depth (m)	Req'd Vol (cu.m)	Max. Vol. Provided (cu.m.)
D-01	0.011	0.90	1.00	N/A	George Street	2.20	N/A	N/A	N/A	2.90	N/A	N/A	N/A	5.60	N/A	N/A	N/A
D-02	0.009	0.90	1.00	N/A	George Street	1.80	N/A	N/A	N/A	2.40	N/A	N/A	N/A	4.70	N/A	N/A	N/A
A-03	0.012	0.90	1.00	N/A	York Street	2.40	N/A	N/A	N/A	3.20	N/A	N/A	N/A	6.10	N/A	N/A	N/A
A-04	0.013	0.90	1.00	N/A	York Street	2.50	N/A	N/A	N/A	3.40	N/A	N/A	N/A	6.60	N/A	N/A	N/A
R-01	0.012	0.90	1.00	Watts Roof Drain (1/4 open)	York Street	0.61	0.051	1.07	10.91	0.65	0.059	1.69	10.91	0.74	0.085	4.09	10.91
R-02	0.012	0.90	1.00	Watts Roof Drain (1/4 open)	York Street	0.63	0.051	1.11	11.22	0.65	0.059	1.75	11.22	0.74	0.850	4.21	11.22
R-03	0.008	0.90	1.00	Watts Roof Drain (1/4 open)	York Street	0.62	0.047	0.52	6.92	0.65	0.056	0.87	6.92	0.73	0.080	2.25	6.92
R-04	0.009	0.90	1.00	Watts Roof Drain (1/4 open)	York Street	0.65	0.057	0.72	7.35	0.68	0.068	1.15	7.35	0.77	0.097	2.91	7.35
R-05	0.009	0.90	1.00	Watts Roof Drain (1/4 open)	York Street	0.32	0.061	0.63	6.50	0.71	0.075	1.03	6.50	0.79	0.102	2.64	6.50
R-06	0.009	0.90	1.00	Watts Roof Drain (1/4 open)	York Street	0.32	0.070	0.62	8.47	0.72	0.080	1.03	8.47	0.80	0.105	2.66	8.47
R-07	0.004	0.90	1.00	Watts Roof Drain (1/4 open)	York Street	0.37	0.029	0.20	3.87	0.44	0.035	0.32	3.87	0.64	0.053	0.75	3.87
R-08	0.007	0.90	1.00	Watts Roof Drain (1/4 open)	York Street	0.56	0.045	0.53	7.49	0.64	0.054	0.83	7.49	0.71	0.077	2.16	7.49
R-09	0.013	0.90	1.00	Watts Roof Drain (1/4 open)	York Street	0.66	0.061	1.27	10.94	0.70	0.072	1.97	10.94	0.78	0.100	4.73	10.94
R-10	0.012	0.90	1.00	Watts Roof Drain (1/4 open)	York Street	0.66	0.059	1.03	9.65	0.69	0.070	1.63	9.65	0.78	0.098	3.98	9.65
R-11	0.007	0.90	1.00	Watts Roof Drain (1/4 open)	York Street	0.56	0.045	0.53	7.25	0.64	0.053	0.81	7.25	0.71	0.077	2.13	7.25
R-12	0.012	0.90	1.00	Watts Roof Drain (1/4 open)	York Street	0.66	0.060	1.10	9.59	0.70	0.072	1.72	9.59	0.78	0.100	4.18	9.59
R-13	0.008	0.90	1.00	Watts Roof Drain (1/4 open)	York Street	0.57	0.046	0.53	6.60	0.64	0.055	0.84	6.60	0.72	0.081	2.18	6.60
R-14	0.007	0.90	1.00	Watts Roof Drain (1/4 open)	York Street	0.56	0.045	0.47	6.20	0.64	0.054	0.74	6.20	0.72	0.079	1.95	6.20
R-15	0.008	0.90	1.00	Watts Roof Drain (1/4 open)	York Street	0.64	0.055	0.51	5.78	0.68	0.067	0.85	5.78	0.77	0.095	2.22	5.78
R-16	0.005	0.90	1.00	Watts Roof Drain (1/4 open)	York Street	0.46	0.036	0.31	3.66	0.55	0.044	0.47	3.66	0.69	0.070	1.21	3.66
R-17	0.003	0.90	1.00	Watts Roof Drain (1/4 open)	York Street	0.29	0.022	0.22	3.26	0.38	0.031	0.30	3.26	0.58	0.047	0.69	3.26
R-18	0.001	0.90	1.00	Watts Roof Drain (1/4 open)	York Street	0.32	0.000	0.00	0.81	0.32	0.000	0.00	0.81	0.32	0.027	0.08	0.81
R-00 / AD-01 / AD-02 (A-02)	0.216	0.90	1.00	Pump	George Street	5.60	0.737	29.25	115.07	5.60	1.115	44.35	115.07	5.60	2.600	103.28	115.07
Post-Development Flow						**23.9**	**-**	**40.6**	**241.5**	**28.6**	**-**	**62.3**	**241.5**	**41.4**	**-**	**148.3**	**241.5**
Allowable External Andaz Flow						**3.4**				**4.6**				**8.8**			
Allowable Release Rate York/George						**40.6**				**40.6**				**40.6**			

Notes:
D-01 and D-02 are uncontrolled flows from 141 George to George Street
AD1 (A-01) ,AD2 (A-02) and R-00 are flows to George Cistern
A-03 - Flows to the York service uncontrolled
A-04 - Flows to the York service uncontrolled
Andaz - The flow from the rear of the existing Andaz is captured by AD4 and conveyed uncontrolled to the york service.
R-01 to R-18 are controlled flows to service 110-116 York which will discharge to the proposed service connecting to York Street right-of-way.

Refer to **Appendix D** for Rational Method calculations and **Drawing SWM**-Stormwater Management Plan.

As summarized in **Table 6.1** above, the final site release rate is **41.4L/s** or **0.8L/s** above the **40.6L/s** allowable release rate. The minor variance is due to the existing site configuration, the requirement to convey the Andaz drainage area uncontrolled through the York property, and the limitations of flow control roof drains. The **0.8 L/s** exceedance is minor, and the post development flows are significantly lower than the existing controlled flows from the site. As such the minor exceedance will not have any negative impacts on the existing city sewers.

6.3 Major Overland Flow Route

A major overland flow route will be provided for storms greater than the 100-year storm event. Stormwater will be directed to the surrounding rights-of-way. The major overland system is shown on the Grading Plan (drawing 112142-GR-Y).

7.0 EROSION AND SEDIMENT CONTROL

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 socks (catchbasin inserts) will be placed in existing and proposed catchbasins and catchbasin manholes, and will remain in place until vegetation has been established and construction is completed;
- Silt fencing will be placed along the surrounding construction limits;
- Mud mats will be installed at the site entrances;
- Strawbale or rock check dams will be installed in swales and ditches;
- The contractor will be required to perform regular street sweeping and cleaning as required, to suppress dust and to provide safe and clean roadways adjacent to the construction site;

Erosion and sediment control measures should be inspected daily and after every rain event to determine maintenance, repair or replacement requirements. Sediments or granulars that enter site sewers shall be removed immediately by the contractor. These measures will be implemented prior to the commencement of construction and maintained in good order until vegetation has been established. Refer to the Erosion and Sediment Control Plan (drawing 112142-ESC-Y) for additional information.

As summarized in **Table 6.1** above, the final site release rate is **41.8L/s** or **1.2L/s** above the **40.6L/s** allowable release rate. The minor variance is due to the existing site configuration, the requirement to convey the Andaz drainage area uncontrolled through the York property, and the limitations of flow control roof drains. The **1.2 L/s** exceedance is minor, and the post development flows are significantly lower than the existing controlled flows from the site. As such the minor exceedance will not have any negative impacts on the existing city sewers.

6.3 Major Overland Flow Route

A major overland flow route will be provided for storms greater than the 100-year storm event. Stormwater will be directed to the surrounding rights-of-way. The major overland system is shown on the Grading Plan (drawing 112142-GR-Y).

7.0 EROSION AND SEDIMENT CONTROL

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Erosion and sediment control measures should be inspected daily and after every rain event to determine maintenance, repair or replacement requirements. Sediments or granulars that enter site sewers shall be removed immediately by the contractor. These measures will be implemented prior to the commencement of construction and maintained in good order until vegetation has been established. Refer to the Erosion and Sediment Control Plan (drawing 112142-ESC-Y) for additional information.

8.0 CONCLUSIONS AND RECOMMENDATIONS

Watermain

The analysis of the existing and proposed watermain network confirms the following:

- The proposed dual 150mm dia. watermain service which connects to the existing 200mm in York Street can service the proposed development.
- There are adequate pressures in the existing watermain infrastructure to meet the required domestic demands for the development.
- There is adequate flow to service the proposed fire protections system.

Sanitary Servicing

The analysis of the existing and proposed sanitary system confirms the following:

- It is proposed to service the development with a proposed 200mm Sanitary service which will connect to existing sewers within the York Street Avenue right-of-way.
- It is anticipated there is adequate capacity within the existing sanitary infrastructure to service.

Stormwater Management

The following provides a summary of the storm sewer and stormwater management system:

- The proposed storm sewer system is to connect to the storm sewers within in the York Street right-of-way.
- Stormwater control is to be provided by a Cistern within the George Street development and rooftop controls for the York Street Development.
- As per existing conditions a major overland flow routes have been provided to the surrounding rights-of-way.
- The existing drainage area from the rear of the Andaz will be conveyed through the York building to the proposed storm service and will be uncontrolled

Erosion and Sediment control

- Erosion and sediment control measures (i.e. filter fabric, catch basin inserts, silt fences, etc.) will be implemented prior to construction and are to remain in place until vegetation is established.

9.0 CLOSURE

The preceding report is respectfully submitted for review and approval. Please contact the undersigned should you have questions or require additional information.

NOVATECH

Prepared by:



Curtis Ferguson, P.Eng.
Project Engineer, Land Development Engineering and Public Sector Infrastructure

Reviewed by:



Greg MacDonald, P.Eng.
Director, Land Development and Public Sector Infrastructure

Appendix A
Pre-Consultation

File No.: PC2024-0101

April 19, 2024

Vincent Denomme
Claridge Homes
Via email: vincent.denomme@claridgehomes.com

Subject: Pre-Consultation: Meeting Feedback
Proposed Official Plan Amendment, Zoning By-law Amendment and Site Plan Control Application – 116-110 York Street

Please find below information regarding next steps as well as consolidated comments from the above-noted pre-consultation meeting held on April 15, 2024.

Pre-Consultation Preliminary Assessment

1 ☐	**2** ☐	**3** ☒	**4** ☐	**5** ☐

One (1) indicates that considerable major revisions are required while five (5) suggests that the 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.

Next Steps

1. A review of the proposal and materials submitted for the above-noted pre-consultation has been undertaken. Please proceed to complete a Phase 2 Pre-consultation Application Form and submit it together with the necessary studies and/or plans to planningcirculations@ottawa.ca.

2. In your subsequent pre-consultation submission, please ensure that all comments or issues detailed herein are addressed. A detailed cover letter stating how each issue has been addressed must be included with the submission materials. Please coordinate the numbering of your responses within the cover letter with the comment numbers herein.

3. Please note, if your development proposal changes significantly in scope, design, or density before the Phase 3 pre-consultation, you may be required to complete or repeat the Phase 2 pre-consultation process.

Supporting Information and Material Requirements

1. The attached **Study and Plan Identification List** outlines the information and material that has been identified, during this phase of pre-consultation, as either required (R) or advised (A) as part of a future complete application submission.

a. The required plans and studies must meet the City's Terms of Reference (ToR) and/or Guidelines, as available on Ottawa.ca. These ToR and Guidelines outline the specific requirements that must be met for each plan or study to be deemed adequate.

Consultation with Technical Agencies

1. You are encouraged to consult with technical agencies early in the development process and throughout the development of your project concept. A list of technical agencies and their contact information is enclosed.

Planning

Comments:

The sites at 110 and 116 York Street, and adjacent sites have history which is best described in the following general Chronology:

- **2012 (December 11) -** the City receives a ZBLA (D02-02-12-0126) and a SPC application (D07-12-12-0199) from Claridge to construct a 17-storey at 321, 325 Dalhousie Street and a 22-storey condo at 137, 141 George Street.

- **2013 (March 25)** – Claridge granted a severance from the CofA to subdivide 321, 325 Dalhousie St, 137 George St, and 110 York Street into three separate parcels of land and establish Rights-Of-Way for access and servicing between lots. (CofA file no. D08-01-13/B-00008 to D08-01-13/B-00010).

- **2013 (April 24)** – Council approved Claridge's ZBLA (D02-02-12-0126) for condo and andaz at 321, 325 Dalhousie Street and a condo at 137, 141 George Street. This decision was appealed by several members of the public ("the neighbours" as per the decision) and an OMB hearing was held September 2013. By January 2014 the OMB issued a decision to approve the application.

- **2014 (April 1)** – the SPC (D07-12-12-0199) associated with the ZBLA for Claridge's condo and andaz at 321, 325 Dalhousie Street and a condo at 137, 141 George Street was approved through delegated authority. By December 12, 2014, the Site Plan Agreement was registered.

- **2018 (April 17)** – Claridge submitted a ZBLA for a 16-storey addition to the 17-storey Andaz (D02-02-18-0038) located on *just* 110 York Street.

- **2018 (July 27)** – Bayview Ottawa Holdings Ltd. (former Owner of 116 York St) submitted a ZBLA for a 17-storey high-rise tower located at 116 York Street containing a hotel (D02-02-18-0071). Staff cited concerns through the application process and on October 2018 the Owner appealed to the OLT.

- **2020 (January 23)** – City Council refused the Bayview Ottawa Holdings Ltd. ZBLA at 116 York St (D02-02-18-0071), in agreement with Staff recommendation.

- **2021 (May 25)** – The OLT hearing was held for the Bayview Ottawa Holdings Ltd. ZBLA at 116 York St (D02-02-18-0071). The Board issued a decision to refuse the application on August 20 2021, in agreement with Council and Staff.

- **2022 (June)** – Council approved a ZBLA at 126 York St and 151 George St (the site abutting 116 York street to the east; File no. D02-02-21-0033) for a 22-storey apartment building and hotel ("Moxy Hotel"). In September 2022 the associated SPC (D07-12-21-0054) was approved. Through the SPA, the City secured a 5 metre wide Public Access Easement across a pedestrian connection that runs from York Street through to George Street, along the property line that abuts 116 York Street.

- **2023 (November 16)** – City receives a Part Lot Control application from Claridge for 137, 141 George Street and 110 York Street to make lot line adjustments based on their proposed addition to their Andaz Hotel (File No. D07-08-23-0036). This application was put on hold following the circulation period pending the development/changes to the Andaz addition.

- **2023 (November 22)** – Council approved Claridge's ZBLA for a 16-storey addition to the 17-storey Andaz (D02-02-18-0038) located on *just* 110 York Street. This decision was appealed in December 2023 by Bayview Ottawa Holdings Ltd. (the former Owners of the adjacent property at 116 York St). Claridge purchased 116 York Street. In March 2024 the appeal was withdrawn.

- **2024 (March 27)** – City approves minor changes/deviations requested by Claridge from the approved Site Plan Control approval from 2014 (D07-12-12-0199) and issues a Permission to Proceed letter for 137, 141 George Street.

- **2024 (March 13)** – City receives a Phase 1 Pre-con request for an OPA/ZBLA/SPC (PC2024-0101) from Claridge. The meeting was held on April 15, 2024. As Claridge now owns 116 York Street, the proposal involves a extending the Andaz addition to be on *both* 110 and 116 York St.

1. An Official Plan (OP) Amendment is required for the proposed building height at 116 York Street as per OP policy 6.6.1 (1)d. Since there is no adopted secondary plan in place, the maximum building height is in accordance with the zoning that was in effect at the time of the adoption of the OP.

2. Section 12.3 of the OP should be interpreted to refer to the need for a planning rationale to address each of the items in 12.3 a) through o).

3. Similar to the property at 110 York Street, a Zoning By-law Amendment will be required to reflect the proposed development. As part of the Phase 2 or 3 pre-application consultation, please submit suggested amendments for review.

4. Section 37 requirements / Community Benefits Charge

    a. The former Section 37 regime has been replaced with a "Community Benefits Charge", By-law No. 2022-307, of 4% of the land value. This charge will be required for ALL buildings that are 5 or more storeys and 10 or more units and will be required at the time of building permit unless the development is subject to an existing registered Section 37 agreement. Questions regarding this change can be directed to Ranbir.Singh@ottawa.ca.

5. Please ensure any application includes reference to applicable Urban Design Guidelines for High-rise Buildings | City of Ottawa

6. Please refer to the ByWard Market Public Realm Plan - ByWard Market Public Realm Plan Recommendations Report (ottawa.ca) for direction on York Street frontage.

7. Street trees (in open planters) are proposed in this portion of York Street along its southern side of York Street (and along 110 and 116 York frontage). Please, refer to Public Realm Design - York Street Lawn & Gardens Section (pages 29-33) in ByWard Market Public Realm Plan for more details. This should be reflected in landscaping plan.

8. We (City) are appreciative of:

    - 10 metre stepback above the three-storey podium from York Street
    - 15 metre tower separation from the approved building at 137/141 George Street
    - No access proposed from York and loading off of Dalhousie
    - Height lower than the original Andaz hotel

9. As initially discussed, the City would like to see 11.5 metres setback of the tower portion from the property line to the east being accommodated as per polices of the Official Plan. Please, review Section 12.3 which requires you to provide a planning rationale explaining how the proposal responds/complies to a number of Official Plan policies, including in Subsection 4.6. Subsection 4.6.6 speaks to sensitive integration of new High-rise developments, separation distances between high-rises (23 m), including that they "shall be shared equally between owners of all properties where High-rise buildings are permitted," and floorplate sizes.

10. As part of heritage application and zoning by-law amendment for 110 York Street, we had obliged the provision of a mural or an artistic installation on the east wall of the building as a condition of Site Plan approval. We'd like to see this explored as it will be highly visible from York and the pedestrian path on 126 York Street.

There is an application process for approval : https://ottawa.ca/en/living-ottawa/environment-conservation-and-climate/public-spaces-and-environmental-programs/mural-program/mural-application.

The Ward Councillor is involved in approval of any proposed mural.

There may be funding available if youth are being invited to create the mural through the Paint it up program - Paint it up! | City of Ottawa

Amanada.Mullins@ottawa.ca is a good contact to discuss as she manages the ByWard Market Public Realm Office and works closely with the Market district authority. Amanda has experience commissioning murals in the district and may have some connections with mural artists.

Katherine.Ingrey@ottawa.ca is in the Public Art team at the City is as good source to help connect the mural initiative to a network of local artists and provide some guidance if Claridge wants to run as a competition.

11. How will the addition at 116 York will interact with public realm and existing heritage building? What's the massing and the functionality of the podium of 116 York addition?

12. Please clarify the relationship between the proposed tower addition to the Andaz and the tower to be built directly east of the site at 126 York and 151 George. In a section image looking west between the blocks of York and George – would there be a separation between the towers seen or do they overlap? Please provide some architectural drawings/sections/renderings as well as dimensions relating to the separation distance between the 'high-rise' elements of both buildings.

13. There is an opportunity to introduce a courtyard space at rear in shared area, please provide details of functions required here and how they will operate.

14. Please clarify what landscaping and/or access is proposed on the roof of the low-rise portion of the addition.

15. Please identify on application what easements will be required to ensure access for different portions of the property onto other parts.

16. Please clarify in Phase 2 pre-application consultation what proposed parking, access, and driveway configuration is intended and if any amendments to zoning are required as a result.

17. Please clarify if related part-lot control application – D07-08-23-0036 must be amended to reflect the new proposed development. The part-lot control application is currently on hold.

Feel free to contact Ann O'Connor and/or Masha Wakula, DR Planners, for follow-up questions

Urban Design

Comments:

Submission Requirements

18. An Urban Design Brief is required. Please see attached customized Terms of Reference to guide the preparation of the submission.

    a. The Urban Design Brief should be structured by generally following the headings highlighted under **Section 3 – Contents of these Terms of Reference**.
    b. Please note that the Urban Design Brief will also serve as the submission to the Urban Design Review Panel (see notes below).

Urban Design Review Panel Review and Report

19. The site is located within a Design Priority Area and is subject to review by the Urban Design Review Panel. UDRP review occurs within the Preconsultation stage. To proceed with a UDRP review, please contact udrp@ottawa.ca.

20. The submission of a UDRP report is a requirement for deeming an application complete. Please follow the instructions provided in the Terms of Reference available here: Urban Design Review Panel Report (ottawa.ca)

Comments on Preliminary Design

21. The following elements of the preliminary design are appreciated:

    a. Two storey podium expression facing York will be an important feature to integrate the building into the heritage context.
    b. Consideration to set-backs to the Tower. Separation to the south (there is sympathetic direction in the high-rise guidelines for over-lapping towers). 7m tower separation to the east may require further study.

22. The following element of the preliminary design are of concern:

    a. Active frontage facing York Street.
    b. Blank wall facing east should consider quality materials showing sensitivity to the heritage nature of the ByWard market and the neighbouring development.

c. Tower floorplate size. Why are the towers connected? Is this the best approach? Shadow impacts will be reviewed.

23. We require additional design information to provide more detailed design recommendations.

This is an exciting project in an area full of potential. We look forward to helping you achieve its goals with the highest level of design resolution. We are happy to assist and answer any questions regarding the above. Good luck.

Engineering

Comments:

24. The Stormwater Management Criteria, for the subject site, is to be based on the following:

    a. Demonstrate the grading and servicing strategy is consistent with approved studies and plans of adjacent development at 137, 141 George St. and 321 and 325 Dalhousie St. Excerpts from relevant studies and plans will need to be discussed and provided in the Appendix of the Site Servicing and SWM report as supporting documentation to the design.

    b. **Water Quantity Control**: In the absence of area specific SWM criteria please control post-development runoff from the subject site, up to and including the 100-year storm event, to a 5-year pre-development level.

        i. The pre-development runoff coefficient will need to be determined as per existing conditions but in no case more than 0.5. [If 0.5 applies it needs to be clearly demonstrated in the report that the pre-development runoff coefficient is greater than 0.5].

        ii. The time of concentration (Tc) used to determine the pre-development condition should be calculated. Tc should not be less than 10 min. since IDF curves become unrealistic at less than 10 min; Tc of 10 minutes shall be used for all post-development calculations.

        iii. Any storm events greater than the established 5-year allowable release rate, up to and including the 100-year storm event, shall be detained on-site. For events greater than 100 years, spillage must be directed to a public ROW and not to neighboring private property.

    c. Application of the IDF information derived from the Meteorological Services of Canada rainfall data, taken from the MacDonald Cartier Airport, collected 1966 to 1997.

d. Please provide a Pre-Development Drainage Area Plan to define the pre-development drainage areas/patterns. Existing drainage patterns shall be maintained and discussed as part of the proposed SWM solution.

e. Ponding Notes:

    i. 100-year spill elevation must be 300mm lower than any building opening or ramp.

    ii. Demonstrate that the stress test spill elevation (100-year +20% event) does not spill onto any permanent structures.

    iii. The maximum permissible ponding depth for the 100-year storm event is 350mm. No spilling to adjacent sites.

    iv. Please note that as per Technical Bulletin PIEDTB-2016-01 section 8.3.11.1 (p.12 of 14) there shall be no surface ponding on private parking areas during the 2-year storm rainfall event.

f. Document how any foundation drainage system will be integrated into the servicing design and show the positive outlet on the plan. Foundation drainage is to be independently connected to sewer main unless being pumped with appropriate back up power, sufficient sized pump and back flow prevention. It is recommended that the foundation drainage system be drained by a sump pump connection to the storm sewer to minimize risk of basement flooding as it will provide the best protection from the uncontrolled sewer system compared to relying on the backwater valve.

g. Please note that the minimum orifice dia. for a plug style ICD is 83mm and the minimum flow rate from a vortex ICD is 6 L/s in order to reduce the likelihood of plugging.

h. If rooftop control and storage is proposed as part of the SWM solutions, sufficient details (Cl. 8.3.8.4) shall be discussed and documented in the report and on the plans. Roof drains are to be connected downstream of any incorporated ICDs within the SWM system and not to the foundation drain system. Provide a Roof Drain Plan as part of the submission.

i. **Underground Storage**: Please note that the Modified Rational Method for storage computation in the Sewer Design Guidelines was originally intended to be used for above ground storage (i.e. parking lot) where the change in head over the orifice varied from 1.5 m to 1.2 m (assuming a 1.2 m deep CB and a max ponding depth of 0.3 m). This change in head was small and hence the release rate fluctuated little, therefore there was no need to use an average release rate.

    i. When underground storage is used, the release rate fluctuates from a maximum peak flow based on maximum head down to a release

rate of zero. This difference is large and has a significant impact on storage requirements. We therefore require that an average release rate equal to 50% of the peak allowable rate shall be applied to estimate the required volume. Alternatively, the consultant may choose to use a submersible pump in the design to ensure a constant release rate. In the event that there is a disagreement from the designer regarding the required storage, The City will require that the designer demonstrate their rationale utilizing dynamic modelling, that will then be reviewed by City modelers in the Water Resources Group. Regarding all proposed UG storage, ground water levels (and in particular HGW levels) will need to be reviewed to ensure that the proposed system does not become surcharged and thereby ineffective.

ii. Provide information on type of underground storage system including product name and model, number of chambers, chamber configuration, confirm invert of chamber system, top of chamber system, required cover over system and details, interior bottom slope (for self-cleansing), chart of storage values, length, width and height, capacity, entry ports (maintenance) etc. UG storage to provide actual 5- and 100-year event storage requirements.

25. General Servicing

a. Provide existing servicing information and the recommended location for the proposed connections. Services should ideally be grouped in a common trench to minimize the number of road cuts. Ideally, this addition should be serviced through the existing services of the adjacent building at 325 Dalhousie St.

b. If severance is planned, this needs to be addressed in servicing to satisfy severance requirements. A plan showing the ultimate parcel configuration and all severance lines is requested to appropriately understand how severance requirements will be met.

c. Where servicing involves three or more service trenches, either a full road width or full lane width 40 mm asphalt overlay will be required, as per amended Road Activity By-Law 2003-445 and City Standard Detail Drawing R10. The extent of the overlay must be shown on the grading plan or a road reinstatement plan.

d. CCTV sewer inspection of city infrastructure is required to record pre and post construction conditions and ensure there is no damage to City Assets.

e. Sewer connections to be made above the springline of the sewer main as per:

i. Std Dwg S11.1 for flexible main sewers – connections made using approved tee or wye fittings.

ii. Std Dwg S11 (For rigid main sewers) – lateral must be less that 50% the diameter of the sewermain.

iii. Std Dwg S11 (For rigid main sewers) – lateral must be less that 50% the diameter of the sewermain.

iv. No submerged outlet connections.

26. Storm Sewer

a. A 675mm dia. concrete storm sewer (1991) is available within York Street.

b. A storm sewer monitoring maintenance hole is required to be installed at the property line (on the private side of the property) as per City of Ottawa Sewer-Use By-Law 2003-514 (14) Monitoring Devices.

27. Sanitary Sewer

a. A 1200 mm dia. PVC Sanitary sewer (1934) is available within York Street.

b. Please provide the new Sanitary sewer discharge and we will confirm if sanitary sewer main has the capacity.

c. Include correspondence from the Architect within the Appendix of the report confirming the number of residential units per building and a unit type breakdown for each of the buildings to support the calculated building populations.

d. Please apply the wastewater design flow parameters in Technical Bulletin PIEDTB-2018-01.

e. Sanitary sewer monitoring maintenance hole is required to be installed at the property line (on the private side of the property) as per City of Ottawa Sewer-Use By-Law 2003-514 (14) Monitoring Devices.

f. A backwater valve is required on the sanitary service for protection.

28. Water:

a. A 200 mm dia. DI watermain (1989) is available within York Street.

b. There is also an existing 150mm dia PVC water service (2006) that appears to be servicing the 116 York parcel. The opportunity to reuse this water service can be explored.

c. Unused existing residential water services are to be blanked at the main.

d. Water Supply Redundancy: As per ISTB-2021-03, Industrial, commercial, institutional service areas with a basic day demand greater than 50 m^3/day and residential areas serving 50 or more dwellings shall be connected with a minimum of two watermains, each their own meter, separated by an isolation valve, to avoid the creation of a vulnerable service area. Ideally, the water system of this addition should be looped with the existing water system at 325 Dalhousie St. to reduce the number of new water services to be installed.

e. Water Boundary condition requests must include the location of the service (map or plan with connection location(s) indicated) and the expected loads required by the proposed development, including calculations. Please provide the following information:

    i. Plan showing the proposed location of service(s).

    ii. Type of development and the amount of fire flow required (L/min). Note: The OBC method can be used if the fire demand for the private property is less than 9,000 L/min. If the OBC fire demand reaches 9000 L/min, then the FUS method is to be used. Fire flow demand requirements are to be based on ISTB-2021-03. Exposure separation distances shall be defined on a figure to support the FUS calculation and required fire flow (RFF).

    iii. Average daily demand: __L/s.

    iv. Maximum daily demand: __L/s.

    v. Maximum hourly daily demand: __L/s.

    vi. Note: Use Table 3-3 of the MOE Design Guidelines for Drinking-Water System to determine Maximum Day and Maximum Hour peaking factors for 0 to 500 persons and use Table 4.2 of the Ottawa Design Guidelines, Water Distribution for 501 to 3,000 persons.

f. Please review Technical Bulletin ISTB-2018-02, maximum fire flow hydrant capacity is provided in Section 3 Table 1 of Appendix I. A hydrant coverage figure shall be provided and demonstrate there is adequate fire protection for the proposal. Two or more public hydrants are anticipated to be required to handle fire flow.

g. A Water Data Card will have to be submitted to size the water meter.

h. Any proposed emergency route is to be to the satisfaction of Fire Services.

29. Grading and Erosion

    a. Post-development site grading shall match existing property line grades in order to minimize disruption to the adjacent residential properties. A topographical plan of survey shall be provided as part of the submission and a note provided on the plans.

    b. Erosion and sediment control plan must be provided.

    c. Street catch basins are not to be located at any proposed entrances.

    d. Depressed driveways/ramps leading to underground garages must maintain a minimum of 350mm of freeboard height above the adjacent ROW and ensure the depth of flow on the adjacent street during the 100-year and stress test events will not spill onto the depressed driveway.

30. Environmental

    a. A Phase I ESA is required to be completed in accordance with Ontario Regulation 153/04 in support of this development proposal to determine the potential for site contamination. Depending on the Phase I recommendations a Phase II ESA may be required.

    b. The Phase I ESA shall provide all the required Environmental Source Information as required by O. Reg. 153/04. ERIS records are available to public at a reasonable cost and need to be included in the ESA report to comply with O.Reg. 153/04 and the Official Plan. The City will not be in a position to approve the Phase I ESA without the inclusion of the ERIS reports.

    c. Official Plan: Section 10. Protection of Health and Safety (ottawa.ca)

31. Environmental Compliance Approval

    a. The consultant shall determine if this project will be subject to an Environmental Compliance Approval (ECA) for Private Sewage Works. It shall be determined if the exemptions set out under Ontario Regulation 525/98: *Approval Exemptions* are satisfied. All regulatory approvals shall be documented and discussed in the report.

    b. Please note that an ECA is required for:

        i. Stormwater management works servicing more than one parcel of land.

        ii. A storm or sanitary sewer servicing multiple parcels.

c. An MECP ECA Private Sewage Works will be required for the proposed development. Please contact the Ministry of the Environment, Conservation and Parks, Ottawa District Office to arrange a pre-submission consultation.

    i. Emily Diamond at (613) 521-3450, ext. 238 or Emily.Diamond@ontario.ca

d. Environmental Compliance Approval | Ontario.ca

32. Geotechnical

a. A Geotechnical Study/Investigation shall be prepared in support of this development proposal.

b. Reducing the groundwater level in this area can lead to potential damages to surrounding structures due to excessive differential settlements of the ground. The impact of groundwater lowering on adjacent properties needs to be discussed and investigated to ensure there will be no short term and long-term damages associated with lowering the groundwater in this area.

c. Geotechnical Study shall be consistent with the Geotechnical Investigation and Reporting Guidelines for Development Applications. Geotechnical Investigation and Reporting (ottawa.ca)

d. If Sensitive marine clay soils are present in this area that are susceptible to soil shrinkage that can lead to foundation and building damages. All six (6) conditions listed in the Tree Planting in Sensitive Marine Clay Soils-2017 Guidelines are required to be satisfied. Note that if the plasticity index of the soil is determined to be less than 40% a minimum separation between a street tree and the proposed building foundations of 4.5m will need to be achieved. A memorandum addressing the Tree in Clay Soil Guidelines prepared by a geotechnical engineer is required to be provided to the City. Tree Planting in Sensitive Marine Clay Soils - 2017 Guidelines (ottawa.ca)

33. Pre-Construction Survey

a. Pre-Construction (Piling/Hoe Ramming or close proximity to City Assets) and/or Pre-Blasting (if applicable) Survey required for any buildings/dwellings in proximity of 75m of site and circulation of notice of vibration/noise to residents within 150 m of site. Conditions for Pre-Construction/ Pre-Blast Survey & Use of Explosives will be applied to agreements. Refer to City's Standard S.P. No. F-1201 entitled Use of Explosives, as amended.

34. Regarding Quantity Estimates

a. Please note that external Garbage and/or bicycle storage structures are to be added to QE under Landscaping as it is subject to securities. In addition, sump pumps for Sanitary and Storm laterals and/or cisterns are to be added to QE under Hard items as it is subject to securities, even though it is internal and is spoken to under SWM and Site Servicing Report and Plan.

Please refer to the City of Ottawa Guide to Preparing Studies and Plans [Engineering]: Planning application submission information and materials. The guide outlines the requirement for a statement to be provided on the plan about where the property boundaries have been derived from.

Feel free to contact Vincent Duquette, Infrastructure Project Manager, for follow-up questions.

Noise

Comments:

35. Noise Study Requirements

    a. A Transportation Noise Assessment is required as the subject development is located within 100m proximity of Dalhousie Street.

    b. A Stationary Noise Assessment is required in order to assess the noise impact of the proposed sources of stationary noise (mechanical HVAC system/equipment) of the development onto the surrounding residential area to ensure the noise levels do not exceed allowable limits specified in the City Environmental Noise Control Guidelines.

    c. https://documents.ottawa.ca/sites/default/files/documents/enviro_noise_guide_en.pdf

Feel free to contact Vincent Duquette, Infrastructure Project Manager, for follow-up questions.

Transportation

Comments:

116 York Street PC2024-0101 – Phase 1

36. York Street is designated as a Local Road – no additional ROW limits are identified in the OP.

37. Dalhousie Street is designated as a Collector Road – no additional ROW limits are identified in the OP.

38. The Screening Form has indicated that TIA Triggers have been met. Please proceed with the TIA Step 2 – Scoping Report. The consultant is to address how they plan to enable and encourage travel by sustainable modes (i.e., to make walking, cycling, transit, carpooling and telework more convenient, accessible, safe, and comfortable). Please complete the City of Ottawa's *TDM Measures Checklist*.

39. All underground and above ground building footprints and permanent walls need to be shown on the plan to confirm that any permanent structure does not extend either above or below into the sight triangles and/or future road widening protection limits.

40. Permanent structures such as curbing, stairs, retaining walls, and underground parking foundation also bicycle parking racks are not to extend into the City's right-of-way limits.

41. The closure of an existing private approach shall reinstate the sidewalk, shoulder, curb, and boulevard to City standards.

42. The Owner acknowledges and agrees that all private accesses to Roads shall comply with the City's Private Approach By-Law being By-Law No. 2003-447 as amended https://ottawa.ca/en/living-ottawa/laws-licences-and-permits/laws/law-z/private-approach-law-no-2003-447 or as approved through the Site Plan control process.

43. The Owner shall be required to enter into maintenance and liability agreement for all pavers, plant and landscaping material placed in the City right-of-way and the Owner shall assume all maintenance and replacement responsibilities in perpetuity.

44. Bicycle parking spaces are required as per Section 111 of the Ottawa Comprehensive Zoning By-law. Bicycle parking spaces should be in safe, secure places near main entrances and preferably protected from the weather.

110 York Street PC2023-0322

Transportation Engineering

45. Section 2.1.2 [Existing] Intersections:

46. Please review the Dalhousie Street / George Street intersection description. The southbound right-turn lane and eastbound left-turn lanes are not mentioned, and high-visibility zebra crosswalks are now provided on all intersection legs. It is also worth noting that parking is permitted in the eastbound and southbound through lanes just upstream of the intersection, which could impact queue storage.

47. Section 2.1.4 [Existing] Pedestrian and Cycling Facilities:

48. Remove references to local cycling routes, as they are no longer a designation with the TMP Part 1 (2023). Note the TMP Part 1 should not be referenced as a "Draft Update".

49. The existing cycling facility on Cumberland Street (Besserer Street to George Street) is worth noting as it provides some cycling connectivity to the site.

50. Section 2.1.6 [Existing] Transit:

51. An image of the OC Transpo network map in this section would be helpful to show context for the transit system in the area, including which study area streets these routes run on. The text states that an excerpt from the OC Transpo System Map is included in Appendix C, but no excerpt of the system map is provided.

52. If multiple bus stops serve the same bus route / direction, consider only listing the bus stop closest to the site. For example, stop #6837 is the closest stop to the site that serves northbound/eastbound Route 6 and 602. Stops #7577, 2322, and #7575 are therefore less relevant and can bit omitted for clarity/brevity.

53. Recommend noting existing transit priority near the site, including transit priority on Rideau Street and the southbound bus lane on King Edward Avenue between Bruyère Street and George Street.

54. Section 2.1.7 Existing Traffic Volumes:

55. It should be acknowledged that the cycling volumes illustrated at the Dalhousie Street / George Street intersection in Figure 7 are lower than typical conditions due to the March count date.

56. Consider whether a weekend peak hour should be analyzed due to the significant commercial land use in the ByWard Market.

57. Section 2.1.8 Collision Records:

58. Please include and discuss collision history on boundary streets George Street and York Street.

59. Explicitly identify whether there are any collision patterns that require further investigation. Also note that the statement "collision patterns [are] defined as the TIA Guidelines as 'more than six collisions in five years' for any one movement" is not entirely true, as a collision pattern may involve more than one movement (e.g., sightline obstructions from a building may cause collisions for multiple movements).

60. Section 2.2.1 Planned Transportation Projects:

61. The infrastructure projects in the 2013 Ottawa Pedestrian and Cycling Plans have been superseded by the 2023 Active Transportation Project List identified as part of the Transportation Master Plan Update. Please remove the reference to projects identified in 2013. In addition, the 2023 Active Transportation Project List is approved and should no longer be listed as a Draft.

62. Recommend discussing the cycling improvements to York Street planned as part of the Byward Market – Somerset Street East Neighbourhood Bikeway (https://ottawa.ca/en/city-hall/public-engagement/projects/byward-market-somerset-street-east-neighbourhood-bikeway#)

63. The ByWard Market Public Realm Plan (2021) recommends modifications to the boundary streets and study area intersections which should be noted in this section.

64. Note that a raised pedestrian crossover (PXO) is proposed on George Street in-line with the Waller Mall as part of the 151 George Street development.

65. Section 2.4 Access Design:

66. Provide the anticipated timing of the planned 137-141 George Street development in relation to the proposed 2026 buildout to this development. Based on the shared access configuration proposed, it is assumed that the 137-141 George Street development will be constructed first, but – if not – interim parking and loading configurations must be considered.

67. Show the planned George Street access on the site plan.

68. Note that the access at Dalhousie Street will require reconstruction in accordance with City standard SC7.1 and extension of the concrete sidewalk across the access. Please depict and dimension on the site plan the extents of the proposed access (width, curb returns, grade, distance to adjacent property line) in accordance with the Private Approach By-law as well as any proposed sidewalk modifications.

69. Consider providing more outdoor bicycle parking than the minimum five proposed if space is available. Note lighting should be provided in the bicycle parking area and consider sheltering the area.

70. Confirm whether the “path of exit” shown at the rear of the building in the site plan is a proposed pedestrian walkway. If so, consider configuring the path of exit to Dalhousie Street such that it provides a straighter path of travel to better accommodate pedestrians with disabilities.

71. As noted, the proposed circulation of loading and servicing vehicles will be described in the TIA Report. Consideration should be made during this analysis for whether vehicles will be expected to back in and out of the site and potential conflicts with the proposed path of exit, cyclists accessing the bike parking at the

rear of the building, and pedestrians on Dalhousie Street. If service vehicles are expected to drive into the site beyond the proposed loading spaces, a drive aisle in accordance with Section 113 of the Zoning By-law must be provided. Commentary should be provided on whether the removal of the existing egress onto York Street will affect existing loading and servicing operations, and how any impacts will be mitigated. A turning template analysis should be carried out to support this analysis.

72. Consider if accessibility improvements can be made the existing hotel loading zone, such as the provision of a curb ramp, or if accessible passenger loading can occur via the Dalhousie Street access.

73. Section 2.5.1 Trip Generation:

74. Per the TIA Guidelines, provide the existing mode shares for the area from the TRANS Origin-Destination Survey and comment on their applicability to the site.

75. Section 2.5.2 Trip Distribution and Assignment:

76. The exclusion of trip distribution and assignment is acceptable given the minimal number of vehicle trips expected to be generated and the site access configuration. However, it should be noted in this section whether the trip generation estimates from this TIA differ from those estimated for the adjacent 137-141 George Street TIA and whether any differences affect previous recommendations for the shared George Street access.

Traffic Signal Design

77. No comments for this current circulation. Traffic Signal Design Unit reserves the right to make future comments based on subsequent submissions.

78. If there are any future proposed changes in the existing roadway geometry that would require the installation of a pedestrian crossover (Type B or Type C), the signalization of an intersection or modifications to an existing signalized intersection, the City of Ottawa Traffic Signal Design Unit would be required to complete a traffic signal plant design and would need to be engaged in reviews during the functional design stage.

Transit Services

79. Update existing on-street hotel zone parking space on Dalhousie per Section 3.2 of the City of Ottawa Accessibility Design Standards to provide a designated accessible passenger loading zone.

Feel free to contact **Wally Dubyk**, Transportation Project Manager, for follow-up questions.

Environment

Comments:

80. Bird-Safe Design Guidelines - Please review and incorporate bird safe design elements. Some of the risk factors include glass and related design traps such as corner glass and fly-through conditions, ventilation grates and open pipes, landscaping, light pollution. More guidance and solutions are available in the guidelines which can be found here: https://documents.ottawa.ca/sites/documents/files/birdsafedesign_guidelines_en.pdf

81. Urban Heat Island - Please review and incorporate bird safe design elements. Some of the risk factors include glass and related design traps such as corner glass and fly-through conditions, ventilation grates and open pipes, landscaping, light pollution. More guidance and solutions are available in the guidelines which can be found here: https://documents.ottawa.ca/sites/documents/files/birdsafedesign_guidelines_en.pdf

Feel free to contact Matthew Hayley, Environmental Planner, for follow-up questions.

Forestry

Comments:

82. Planning Forester - submission requirements. For more information please contact Mark.Richardson@Ottawa.ca

- OPA – none
- Zoning Application
    - Please provide tree planting considerations in the Planning Rational that speaks to proposed species and in particular soil volumes.
    - Please provide proposed tree information in the landscape plan
    - The planning forester will review the application to assess if tree planting options will be impacted by the proposed zoning change
- Site Plan Application
    - If there are trees on site or near the site, a TCR will be required with the site plan application.
    - For your information – should a tree permit be required, it will be issued at/near site plan approval and not during the zoning application process.

Feel free to contact Mark Richardson, Planning Forester, for follow-up questions.

Parkland

Comments:

83. Cash-in-lieu of parkland / parkland dedication

    a. Parkland Dedication By-law No. 2022-280

Feel free to contact Steve Gauthier, Parks Planner, for follow-up questions

Heritage

Comments:

84. The property is designated under Part V of the *Ontario Heritage Act* as part of the ByWard Market Heritage Conservation District (HCD). A new heritage permit and fee will be required to facilitate this application.

85. The application will be reviewed against the applicable HCD policies in place at the time. The proposal should be in keeping with the heritage character of the streetscape through the use of a podium to help transition to the low-scale nature of the HCD.

86. The podium should be clad in red brick and have a strong cornice. These elements should wrap around the corner to the east façade. Heritage staff will provide further comment as the design is completed.

87. Once staff are in receipt of a design package, a heritage pre-application consultation meeting may be set up with the Lowertown Community Association's heritage committee to review the proposal against the HCD plan.

Feel free to contact Ashley Kotarba, Heritage Planner, for follow-up questions.

Conservation Authority

N/A

Community issues

Comments:

88. Warren Waters expressed concern about height and wall of building along George Street. He advised that for the mural, people in the community would enjoy ability for involvement on any mural competition. Letter attached from Lowertown Community Association of November 2023 and their concerns with the originally proposed addition at 110 York Street, that still apply here.

Questions:

89. Does the development appropriately transition to adjacent low-rise neighbourhoods, heritage properties?

90. Does this development contribute to the creation of a positive sense of place by integrating in a manner that helps to activate the public realm?

91. What is the ballroom rooftop to be used for?

92. Does the development support a safe, animated and positive pedestrian street experience by incorporating ground floor entrances that face the street?

93. Developer said no entrances on York but drawings do show an "entrance door" on York. Are the only connections between York Street and the building going to be pedestrian views of ballroom dancers and rooftop party goers?

94. Does the development contribute to the overall architectural diversity by not repeating the Andaz building on the adjacent site?

Other

95. The High Performance Development Standard (HPDS) is a collection of voluntary and required standards that raise the performance of new building projects to achieve sustainable and resilient design. The HPDS was passed by Council on April 13, 2022.

    a. At this time, the HPDS is not in effect and Council has referred the 2023 HPDS Update Report back to staff with direction to bring forward an updated report to Committee with recommendations for revised phasing timelines, resource requirements and associated amendments to the Site Plan Control By-law by no later than 2024.

    b. Please refer to the HPDS information attached and ottawa.ca/HPDS for more information.

Submission Requirements and Fees

1. Applications for Official Plan Amendment, Zoning By-law Amendment, and Site Plan Control will be required
    a. Additional information regarding fees related to planning applications can be found here.
2. The attached **Study and Plan Identification List** outlines the information and material that has been identified as either required (R) or advised (A) as part of a future complete application submission.
    a. The required plans and studies must meet the City's Terms of Reference (ToR) and/or Guidelines, as available on Ottawa.ca. These ToR and

Guidelines outline the specific requirements that must be met for each plan or study to be deemed adequate.

3. All of the above comments or issues should be addressed to ensure the effectiveness of the application submission review.

Should there be any questions, please do not hesitate to contact myself or the contact identified for the above areas / disciplines.

Yours Truly,
Ann O'Connor, Erin O'Connell and Masha Wakula

Encl. Urban Design Brief ToR

c.c. Wally Dubyk
John Wu
Vincent Duquette
Christopher Moise
Ashley Kotarba
Ann O'Connor
Farbod Azimi
Mark Richardson
Matthew Hayley
Amy MacPherson
Warren Waters (Lowertown CA)

File No.: PC2024-0200

June 5, 2024

Vincent Denomme
Claridge Homes(George St) Inc.
Via email: vincent.denomme@claridgehomes.com

Subject: **Pre-Consultation: Meeting Feedback**
Proposed Site Plan Control Revision Application – 137, 141 George Street and 110-116 York Street

Please find below information regarding next steps as well as consolidated comments from the above-noted pre-consultation meeting held on May 28, 2024.

Pre-Consultation Preliminary Assessment

1 ☐	**2** ☐	**3** ☒	**4** ☐	**5** ☐

One (1) indicates that considerable major revisions are required while five (5) suggests that the 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.

Next Steps

1. A review of the proposal and materials submitted for the above-noted pre-consultation has been undertaken. Please proceed to complete a Phase 3 Pre-consultation Application Form and submit it together with the necessary studies and/or plans to planningcirculations@ottawa.ca.

2. In your subsequent pre-consultation submission, please ensure that all comments or issues detailed herein are addressed. A detailed cover letter stating how each issue has been addressed must be included with the submission materials. Please coordinate the numbering of your responses within the cover letter with the comment number(s) herein.

3. Please note, if your development proposal changes significantly in scope, design, or density before the Phase 3 pre-consultation, you may be required to complete or repeat the Phase 2 pre-consultation process.

Supporting Information and Material Requirements

1. The attached **Study and Plan Identification List** outlines the information and material that has been identified, during this phase of pre-consultation, as either required (R) or advised (A) as part of a future complete application submission.

a. The required plans and studies must meet the City's Terms of Reference (ToR) and/or Guidelines, as available on Ottawa.ca. These ToR and Guidelines outline the specific requirements that must be met for each plan or study to be deemed adequate.

Consultation with Technical Agencies

1. You are encouraged to consult with technical agencies early in the development process and throughout the development of your project concept. A list of technical agencies and their contact information is enclosed.

Planning

Comments:

1. From a construction and efficiency perspective, we agree that building this garage all together at once is logical; however, we will want some protections in place because it is premature to what is happening above-grade. We have some concerns with permitting this high volume of parking on such a downtown site in advance of the redevelopment approval at 110 and 116 York Street; and therefore, any approved drawings should essentially close-off the section of parking on 110 and 116 York Street. Punch-out walls can effectively temporarily close off this section of the parking garage as an interim measure. We do not want any functioning parking taking place on 110 and 116 York Street in advance of the Site Plan Approval for that property.

2. We wish to flag the risk to the Owner/applicant that constructing the footings (during the parking garage construction) in advance of the SPC approval for 110 and 116 York Street. The risk is that through the OPA/ZBLA/SPC process, the proposed building is still subject to change throughout the application processes. Should a change be required that affects the footings, it will be the Owner's responsibility to adjust or potentially rebuild accordingly.

3. Please ensure clear communication and the same floor plans are shared between City of Ottawa departments working on this project; namely, Building Permit Office (attn: Terri Hunt) and Right-Of-Way Approvals Office (attn: Tyler McQuillen).

4. In the Scoped Planning Rationale/Planning Cover Letter, clarify the Ownership, easements, and intended users

    a. Clarify the intent of ownership over the parking garage. There is a Part Lot Control application (D07-08-23-0036) to adjust lot line adjustments between 137, 141 George St and 110 York St that is currently on hold. This application does not need to be re-initiated in tandem with this application, but please provide an explanation outlining the general intent

in terms of who will own and operate this shared parking garage and clarify if any easements are anticipated to allow for this shared ownership.

b. It is understood from the pre-con meeting that the garage is intended to be used by visitors to the hotel Andaz (existing and future addition) as well as the people renting within the 137, 141 George St building. It is understood that the first level of underground parking will be for the hotel use and level 2 and 3 will be gated to allow the renters of 137, 141 George St to use their fobs through this restricted access to park. It is also understood there is commercial at grade at 137, 141 George. Please confirm this understanding is correct and outline how this parking garage will function and address any requirements of each use within the Scoped Planning Rationale.

5. Parking calculations:

   a. It is understood that the same number of parking spaces are being proposed through this application as was previously approved through the SPC application at 137, 141 George St (D07-12-12-0199). In the Scoped Planning Rationale, please outline the numbers and layout of what was previously approved (X number of spaces, 6 levels?) compared to what it is now (X number of spaces, 3 levels?).

   b. Provide a chart that has a breakdown of the required and proposed vehicular and bike parking and accessible spaces provided for all developments sharing this underground parking garage. The chart should:

      i. Provide a total for the entire garage of vehicular spaces, bike parking spaces, accessible spaces

      ii. Breakdown the total under associated address and also use within that address.

   c. It is understood that the redevelopment proposal and it's associated unit count at 110 and 116 York St is still subject to change through the future OPA/ZBLA/SPC applications.

6. Illustrate and label on submitted floor plans:

   a. Clearly show and label all property lines on the floor plans

   b. Identify municipal addresses of applicable areas of the plan (understanding the property boundaries may be subject to change through the associated Part Lot Control application)

   c. Punch-out walls. The City wants a punch-out wall on the property line for 110 and 16 York Street. This needs to be built alongside the parking garage to ensure the portion located on 110 and 116 York Street is not

accessible/used in advance of a redevelopment approval (associated OPA, ZBLA, and SPC approval).

d. Dimension parking spaces, drive aisle widths, turning radius', access etc. to ensure compliance with the Zoning By-law Part 4

7. Clarify if any above-grade soft landscaping will be impacted by the location/height of the underground parking garage at specifically 110 and 116 York Street.

8. Speak to any changes (or whether there are no changes) to the vehicular access or underground vehicular circulation.

9. Provide a Zoning Confirmation Report citing the underground parking garage is in compliance with Part 4 – Parking, Queuing and Loading Provisions of the Zoning By-law.

10. For Phase 3 Pre-con and application, in addition to any other staff requirements outlined in the SPIL, please provide the following:

    a. Floor Plans for each level of underground parking (addressing comments above)

    b. Scoped Planning Rationale / Planning Cover letter (addressing comments above)

    c. Zoning Confirmation Report (only for the underground parking garage)

    d. Plan of Survey (if easily available for all properties in question)

Engineering

Comments:

11. The Stormwater Management Criteria, for the subject site, is to be based on the following:

    a. Please update the SWM calculations to account for the added parcel at 116 York.

    b. Demonstrate the servicing strategy is consistent with the studies and plans previously approved under the existing SPC agreement.

    c. Please provide a Pre-Development Drainage Area Plan to define the pre-development drainage areas/patterns. Existing drainage patterns shall be maintained and discussed as part of the proposed SWM solution.

12. General Servicing

    a. Provide existing servicing information and the recommended location for the proposed connections. Services should ideally be grouped in a common trench to minimize the number of road cuts.

    b. Where servicing involves three or more service trenches, either a full road width or full lane width 40 mm asphalt overlay will be required, as per amended Road Activity By-Law 2003-445 and City Standard Detail Drawing R10. The extent of the overlay must be shown on the grading plan or a road reinstatement plan.

    c. CCTV sewer inspection of city infrastructure is required to record pre and post construction conditions and ensure there is no damage to City

13. Storm Sewer

    a. A 675mm dia. concrete storm sewer (1991) is available within York Street.

    b. A storm sewer monitoring maintenance hole is required to be installed at the property line (on the private side of the property) as per City of Ottawa Sewer-Use By-Law 2003-514 (14) Monitoring Devices. If there is no space to accommodate a monitoring maintenance hole, a test port giving access to the city personnel shall be provided.

14. Sanitary Sewer

    a. A 1200 mm dia. concrete Sanitary sewer (1934) is available within York Street.

    b. Please provide the estimated new Sanitary sewer discharge and we will confirm if sanitary sewer main has the capacity.

    c. Please apply the wastewater design flow parameters in Technical Bulletin PIEDTB-2018-01.

    d. Sanitary sewer monitoring maintenance hole is required to be installed at the property line (on the private side of the property) as per City of Ottawa Sewer-Use By-Law 2003-514 (14) Monitoring Devices. If there is no space to accommodate a monitoring maintenance hole, a test port giving access to the city personnel shall be provided.

    e. A backwater valve is required on the sanitary service for protection.

15. Water:

    a. A 200 mm dia. Ductile Iron watermain (1989) is available within York Street.

b. The pre-installation of water service laterals for future use is not typically permitted. For this specific situation we will allow the installation of the pre-installation of the water services, however the connection to the main and commissioning will not be permitted until SPC approval for the hotel addition is obtained.

c. Existing water services are to be blanked at the watermain.

d. Water Supply Redundancy: As per ISTB-2021-03, Industrial, commercial, institutional service areas with a basic day demand greater than 50 m^3/day and residential areas serving 50 or more dwellings shall be connected with a minimum of two watermains, separated by an isolation valve, to avoid the creation of a vulnerable service area. Individual residential facilities with a basic day demand greater than 50 m3/day shall be connected with a minimum of two water services, each their own meter and separated by an isolation valve, to avoid the creation of a vulnerable service area.

e. Water Boundary condition requests must include the location of the service (map or plan with connection location(s) indicated) and the expected loads required by the proposed development, including calculations. Please provide the following information:

    i. Plan showing the proposed location of service(s).

    ii. Type of development and the amount of fire flow required (L/min). Note: The OBC method can be used if the fire demand for the private property is less than 9,000 L/min. If the OBC fire demand reaches 9000 L/min, then the FUS method is to be used. Fire flow demand requirements are to be based on ISTB-2021-03. Exposure separation distances shall be defined on a figure to support the FUS calculation and required fire flow (RFF).

    iii. Average daily demand: __L/s.

    iv. Maximum daily demand: __L/s.

    v. Maximum hourly daily demand: __L/s.

    vi. Note: Use Table 3-3 of the MOE Design Guidelines for Drinking-Water System to determine Maximum Day and Maximum Hour peaking factors for 0 to 500 persons and use Table 4.2 of the Ottawa Design Guidelines, Water Distribution for 501 to 3,000 persons.

f. Please review Technical Bulletin ISTB-2018-02, maximum fire flow hydrant capacity is provided in Section 3 Table 1 of Appendix I. A hydrant coverage figure shall be provided and demonstrate there is adequate fire

protection for the proposal. Two or more public hydrants are anticipated to be required to handle fire flow.

g. A Water Data Card will have to be submitted to size the water meter.

16. Grading and Erosion

a. Post-development site grading shall match existing property line grades in order to minimize disruption to the adjacent residential properties. A topographical plan of survey shall be provided as part of the submission and a note provided on the plans.

b. Erosion and sediment control plan must be provided.

17. Environmental

a. A Phase I ESA is required to be completed in accordance with Ontario Regulation 153/04 to determine the potential for site contamination of the added parcel at 116 York St. Depending on the Phase I recommendations a Phase II ESA may be required.

b. The Phase I ESA shall provide all the required Environmental Source Information as required by O. Reg. 153/04. ERIS records are available to public at a reasonable cost and need to be included in the ESA report to comply with O.Reg. 153/04 and the Official Plan. The City will not be in a position to approve the Phase I ESA without the inclusion of the ERIS reports.

c. Official Plan: Section 10. Protection of Health and Safety (ottawa.ca)

18. Environmental Compliance Approval

a. An Environmental Compliance Approval (ECA) for Private Sewage Works is not required at this stage. However, consideration shall be taken to evaluate the proposed SWM works with respect to the future severance of the site as Stormwater management works servicing more than one parcel of land requires an ECA from the Ministry of the Environment, Conservation and Parks.

b. Environmental Compliance Approval | Ontario.ca

19. Geotechnical

a. A Geotechnical Study/Investigation shall be prepared in support of this development proposal for the added parcel at 116 York St. The geotechnical study shall also be updated to address the proposed changes regarding the depth of excavation and founding depth.

b. Geotechnical Study shall be consistent with the Geotechnical Investigation and Reporting Guidelines for Development Applications. Geotechnical Investigation and Reporting (ottawa.ca)

20. Pre-Construction Survey

a. Pre-Construction (Piling/Hoe Ramming or close proximity to City Assets) and/or Pre-Blasting (if applicable) Survey required for any buildings/dwellings in proximity of 75m of site and circulation of notice of vibration/noise to residents within 150 m of site. Conditions for Pre-Construction/ Pre-Blast Survey & Use of Explosives will be applied to agreements. Refer to City's Standard S.P. No. F-1201 entitled Use of Explosives, as amended.

Please refer to the City of Ottawa Guide to Preparing Studies and Plans [Engineering]: Planning application submission information and materials. The guide outlines the requirement for a statement to be provided on the plan about where the property boundaries have been derived from

Feel free to contact Vincent Duquette, Infrastructure Project Manager, for follow-up questions.

Noise

Comments:

21. Noise requirements

a. A Transportation Noise Assessment is not required at this stage. It will be requested during SPC/ZBLA application for the hotel addition seeing as the subject development is located within 100m proximity of Dalhousie Street.

Feel free to contact Vincent Duquette, Infrastructure Project Manager, for follow-up questions.

Transportation

Comments:

22. Right-of-way protection.

a. See Schedule C16 of the Official Plan.

b. Any requests for exceptions to ROW protection requirements must be discussed with Transportation Planning and concurrence provided by Transportation Planning management.

23. The Screening Form has indicated that TIA Triggers have been met. Please proceed with the TIA Step 3– Forecasting Report. The consultant is to address how they plan to enable and encourage travel by sustainable modes (i.e., to make walking, cycling, transit, carpooling and telework more convenient, accessible, safe, and comfortable). Please complete the City of Ottawa's TDM Measures Checklist.

24. Please provide your response to the previous Transportation comments submitted under PC2024-0101 (Ph1 precon for OPA/ZBLA/SPC for 110, 116 York).

Feel free to contact **Wally Dubyk**, Transportation Project Manager, for follow-up questions.

Submission Requirements and Fees

1. A Site Plan Control Revision Application (to D07-12-12-0199) – Standard is required.
    a. Additional information regarding fees related to planning applications can be found here.
2. The attached **Study and Plan Identification List** outlines the information and material that has been identified as either required (R) or advised (A) as part of a future complete application submission.
    a. The required plans and studies must meet the City's Terms of Reference (ToR) and/or Guidelines, as available on Ottawa.ca. These ToR and Guidelines outline the specific requirements that must be met for each plan or study to be deemed adequate.
3. All of the above comments or issues should be addressed to ensure the effectiveness of the application submission review.

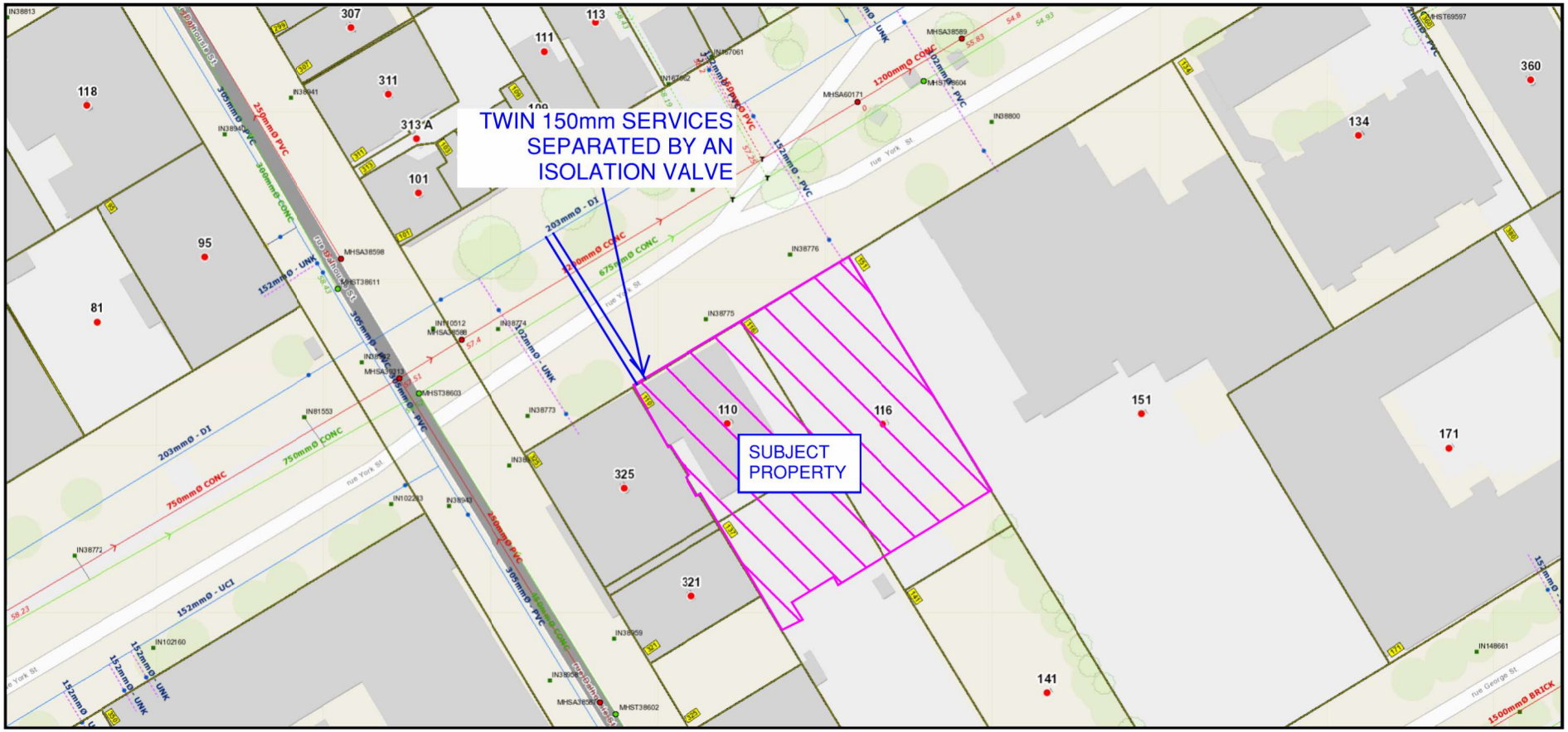
Should there be any questions, please do not hesitate to contact myself or the contact identified for the above areas / disciplines.

Yours Truly,
Ann O'Connor

Encl. Study and Plan Identification List (SPIL)

c.c. Vincent Duquette
John Wu
Wally Dubyk

Appendix B
Water Servicing


TWIN 150mm SERVICES SEPARATED BY AN ISOLATION VALVE
SUBJECT PROPERTY
York St
rue York St
rue George St
203mmØ - DI
750mmØ CONC
675mmØ CONC
1200mmØ CONC
152mmØ - UNK
152mmØ - UCI
152mmØ - PVC
305mmØ - PVC
250mmØ PVC
1500mmØ BRICK
307
311
313 A
101
111
113
118
95
81
325
321
110
116
151
171
134
360
141

Water Demand Design Sheet

NOVATECH
Engineers, Planners & Landscape Architects

Boundary Condition Request

Novatech Project #: 112142
Project Name: 110 York Street
Date: 9/20/2024
Revised: 1/3/2025
Input By: Curtis Ferguson, E.I.T.
Reviewed By: Anthony Mestwarp, P.Eng
Drawing Reference:

Legend: Input by User | No Input Required | Calculated Cells →

Reference: Ottawa Design Guidelines - Water Distribution (2010 and TBs)
MOE Design Guidelines for Drinking-Water Systems (2008)
Fire Underwriter's Survey Guideline (2020)
Ontario Building Code, Part 3 (2012)

Small System = NO

	# of Dwellings	Area (ha.)	Seats	Pop. Equiv.	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Hour Demand (L/s)	Basic Day Demand (m^3/day)
Residential Input								
Singles				0.00	0.00	0.00	0.00	0.0
Semis / Townhomes				0.00	0.00	0.00	0.00	0.0
Apartments (2-BR)				0.00	0.00	0.00	0.00	0.0
Apartments (1-BR)				0.00	0.00	0.00	0.00	0.0
Industrial / Commercial / Institutional (ICI) Input								
Hotel Rooms(Avg)	154			277.20	0.72	1.08	1.95	62.4
Industrial Area - Light					0.00	0.00	0.00	0.0
Industrial Area - Heavy					0.00	0.00	0.00	0.0
Commercial Area					0.00	0.00	0.00	0.0
Institutional Area					0.00	0.00	0.00	0.0
Other Area					0.00	0.00	0.00	0.0
Bar/Cocktail Lounge			235.00	235.00	0.19	0.29	0.51	0.0
Banquet Area			615.00	615.00	0.21	0.32	0.58	0.0
Totals	**154**	**0.00**		**1127.20**	**1.13**	**1.69**	**3.04**	**62.4**

Summary

i. Type of Development and Units:	Mixed-Use Hotel, 154 rooms.		
ii. Site Address:	110-116 York Street		
iii. Proposed Water Service Connection Location(s):	York Street		
iv. Average Day Flow Demand:		1.13	L/s
v. Peak Hour Flow Demand:		3.04	L/s
vi. Maximum Day Flow Demand:		1.69	L/s
vii. Required Fire Flow #1:		6000	L/min
viii. Required Fire Flow #2:			L/min
ix. Required Fire Flow #3:			L/min

Water Demand Design Sheet

NOVATECH
Engineers, Planners & Landscape Architects

Design Parameters

Residential						
Unit Type	**Singles**	**Semis/ Towns**		**Apts (2-BR)**	**Apts (1-BR)**	**Hotel Room (Avg)**
Population Equiv.	3.4	2.7		2.1	1.4	1.8
Dailly Demand	L/per person/day					
Average Demand	280					
Hotel Demand	225					
Basic Demand	225					

Vulnerable Service Area (VSA)
50
< 50 m³/day
> 50 m³/day

Residential Peaking Factors		**Max Day (x Avg Day)**	**Peak Hour (x Avg Day)**
	Pop.		
Small System (If Applicable)	0	9.50	14.30
	30	9.50	14.30
	150	4.90	7.40
Modified	300	3.60	*5.50*
	450	3.00	*5.50*
	500	2.90	*5.50*
Large System (Default)	> 500	2.50	5.50

Institutional / Commercial / Industrial							
Industrial		**Commercial**		**Institutional**	**Other Use**	**Bar/Cocktail Lounge**	**Banquet Hall**
Light	**Heavy**						
L/gross ha/day					L/m²/day	**L/seat/day**	**L/seat/day**
35,000	55,000	28,000		28,000	5	**70.00**	**30.00**
10,000	17,000	17,000		17,000	3		

ICI Peaking Factors	**Max Day (x Avg Day)**		**Peak Hour (x Avg Day)**
	1.50		2.70

FUS - Fire Flow Calculations

NOVATECH
Engineers, Planners & Landscape Architects

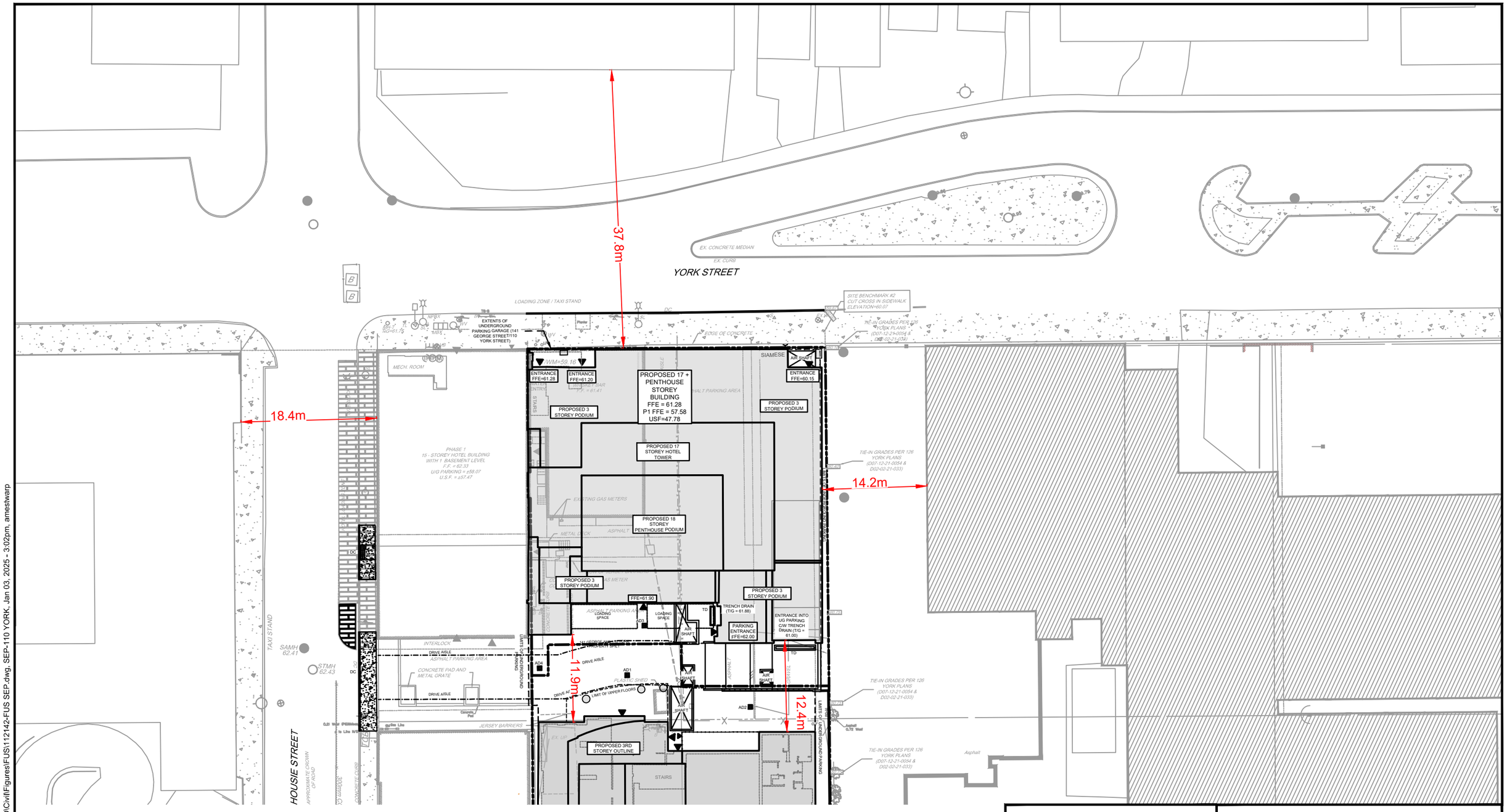
Novatech Project #: 112142
Project Name: 110-116 York
Date: 9/25/2024
Revised 1/3/2025
Input By: Curtis Ferguson, E.I.T.
Reviewed By: Anthony Mestwarp, P.Eng
Drawing Reference: 112142-FUS-Y

Building Description: 17+ Penthouse Storey Hotel
Type I - Fire resistive construction (2 hrs)

Legend: Input by User
No Input Required
Reference: Fire Underwriter's Survey Guideline (2020)

Formula Method

Step			Choose		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction **C**	Type V - Wood frame		1.5	0.6	
		Type IV - Mass Timber		Varies		
		Type III - Ordinary construction		1		
		Type II - Non-combustible construction		0.8		
		Type I - Fire resistive construction (2 hrs)	Yes	0.6		
2	**Floor Area**					
	A	Podium Level Footprint (m^2)	2219.61	1410 (110york), 809.6 (Andaz)		
		Total Floors/Storeys (Podium)	3			
		Tower Footprint (m^2)	1364.61	555 (York), 809.6 (Andaz)		
		Total Floors/Storeys (Tower)	15			
		Protected Openings (1 hr)	Yes			
		A, Total Effective Floor Area (m^2)			**3,329**	
	F	**Base fire flow without reductions**				**8,000**
		$F = 220\ C\ (A)^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**		**FUS Table 3**	**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**6,800**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**		**FUS Table 4**	**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%	-30%	**-3,400**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	Yes	-10%	-10%	
				Cumulative Sub-Total	**-50%**	
		Area of Sprinklered Coverage (m^2)	27128.05	100%		
				Cumulative Total	**-50%**	
5	**Exposure Surcharge per**		**FUS Table 5**		**Surcharge**	
	(3)	North Side	>30m		0%	**3,060**
		East Side	10.1 - 20 m		15%	
		South Side	10.1 - 20 m		15%	
		West Side	10.1 - 20 m		15%	
				Cumulative Total	**45%**	
Results						
6	(1) + (2) + (3)	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**6,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**100**
				or	USGPM	1,585



LEGEND

- PROPERTY LINE
- PROPOSED TACTILE INDICATOR
- PROPOSED ENTRANCE
- DC — PROPOSED DEPRESSED CURB
- 2HR FIREWALL

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Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

CITY OF OTTAWA
110 YORK STREET

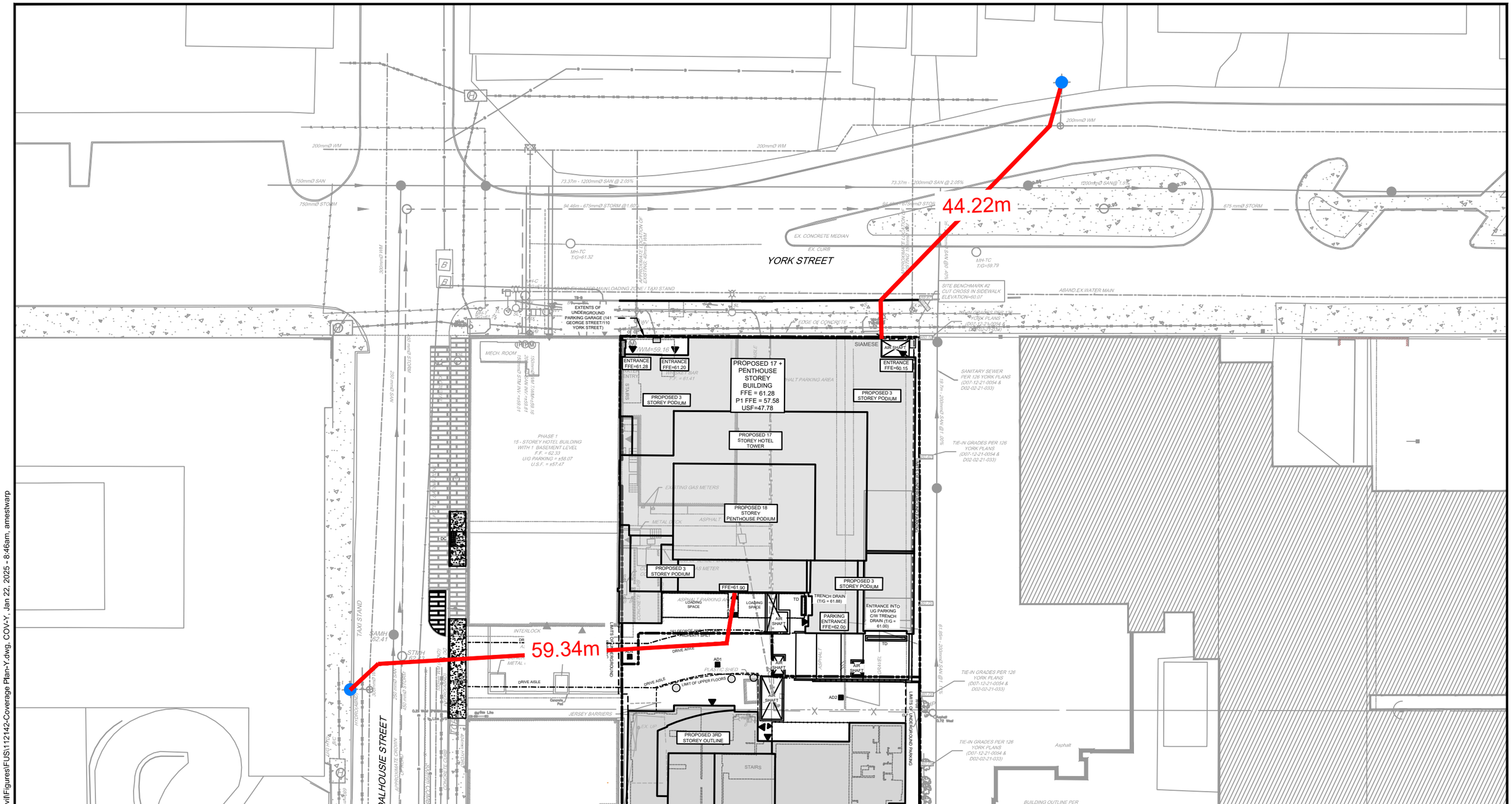
FUS SEPARATION

SCALE 1 : 500 (0, 5m, 10m, 20m)

DATE JUNE 2025 | JOB 112142 | FIGURE FUS-Y

SHT11X17.DWG - 279mmX432mm

M:\2012\112142_141 GEORGE-110 YORK\CAD\Civil\Figures\FUS\112142-FUS SEP.dwg, SEP-110 YORK, Jan 03, 2025 - 3:02pm, amestwarp



LEGEND

- PROPERTY LINE
- PROPOSED SIAMESE CONNECTION
- EXISTING CLASS AA HYDRANT
- PROPOSED HYDRANT
- DISTANCE FROM HYDRANT TO SIAMESE CONNECTION/ BUILDING ENTRANCE

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Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

CITY OF OTTAWA
110 YORK STREET

COVERAGE PLAN

SCALE 1 : 500 (0, 5m, 10m, 20m)
DATE JUNE 2025
JOB 112142
FIGURE COV-Y

M:\2012\112142_141 GEORGE-110 YORK\CAD\Civil\Figures\FUS\112142-Coverage Plan-Y.dwg, COV-Y, Jan 22, 2025 - 8:46am, amestwarp

SHT11X17.DWG - 279mmX432mm

OBC Water Supply for Firefighting Calculation

Based on OBC 2012 (Div. B, Article 3.2.5.7)

References: Ontario Fire Marshal - OBC Fire Fighting Water Supply
Ontario Building Code 2012, Appendix A, Vol 2., A-3.2.5.7

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 112142
Project Name: 110-116 York Street
Date: 9/24/2024
Input By: Curtis Ferguson, E.I.T.
Reviewed By: Greg MacDonald, P.Eng.

Legend
Input by User
No Input Required

Building Description: 17 + Penthouse Storey Mixed-Use Building

Step		Calculation Inputs		Calculation Notes	Value
Minimum Fire Protection Water Supply Volume					
1	**Water Supply Coefficient**				
	Building Classification =	C		From Table 3.1.2.1	
	Water Supply Coefficient - K =			From Table 1 (A3.2.5.7)	**18**
2	**Total Building Volume**				
	Building Width - W	39.92	m		
	Building Length - L	39.90	m	Area (W * L) = 1593 m2	
	Building Height - H	52.4	m		
	Total Building Volume - V =			W * L * H	**83463 m³**
3	**Spatial Coefficient Value**				
	Exposure Distances: (Exterior building face to property/lot line, to street centre, or to mid-point between proposed building and another building on same lot)			**Spatial Coefficients:** From Figure 1 (Spatial Coefficient vs Exposure Distance)	
	North	37.80	m	Sside 1 = **0.00**	
	East	14.20	m	Sside 2 = **0.00**	
	South	12.40	m	Sside 3 = **0.00**	
	West	30 (Firewall)	m	Sside 4 = **0.00**	
	Total of Spacial Coefficient Values - S-Tot as obtained from the formula =			1.0 + (Sside 1 + Sside 2 + Sside 3 + Sside 4) (Max. value = 2.0)	**1.00**
4	**Minimum Fire Protection Water Supply Volume**				
	Q =			$K * V * S_{Tot}$	**1,502,337 L**
Required Minimum Water Supply Flow Rate					
5	**Minimum Water Supply Flow Rate =**			From Table 2 (For water supply from a municipal or industrial water supply system, min. pressure is 140 kPa)	**9,000 L/min** or **150 L/s**
Minimum Fire Protection Water Supply Volume for 30 minutes					
6	**Q =**			= Minimum Water Supply Flow Rate (L/min) * 30 minutes	**270,000 L**
Required Fire Protection Water Supply Volume					
7	**Q =**			Highest volume out of (4) and (6)	**1,502,337 L**
Notes					

From: Sonia Joanis <sjoanis@neuf.ca>
Sent: Monday, January 6, 2025 1:30 PM
To: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Cc: Curtis Ferguson <c.ferguson@novatech-eng.com>; Tyler Martin <tm@goodevestructural.ca>; Pranshu Devgan <pdevgan@jainconsultants.com>; Laura Liu <lliu@jainconsultants.com>; bkhuat@jainconsultants.com; djasarevic@jainconsultants.com; ryan.tuttle@claridgehomes.com; Lu Chen <lc@jbla.ca>; Evelyne Cardinal <ecardinal@neuf.ca>
Subject: RE: York- statistics - 112142

Hi Anthony,

No specific occupant load was discussed.

Code would suggest an occupant load of 235 people for such a large area.

By design, Hyatt has seen the furniture layout and deemed the 130 seats as satisfactory.

The washroom load is based on the larger occupant load.

Regards,

SONIA JOANIS, OAA

Architect. Architecte

T 613 234 2274 ext 138 F 613 234 7453 C 613 314 1175

4th - 10 Rideau Street, Ottawa (ON) K1N 9J1

NEUF ARCHITECTES INC. Confidentialité + Transmission

Montréal. Ottawa. Toronto

50 ans et toujours NEUF . 50 Years and Still NEUF

De : Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Envoyé : 6 janvier 2025 12:50
À : Sonia Joanis <sjoanis@neuf.ca>
Cc : Curtis Ferguson <c.ferguson@novatech-eng.com>; Tyler Martin <tm@goodevestructural.ca>; Pranshu Devgan <pdevgan@jainconsultants.com>; Laura Liu <lliu@jainconsultants.com>; bkhuat@jainconsultants.com; djasarevic@jainconsultants.com; ryan.tuttle@claridgehomes.com; Lu Chen <lc@jbla.ca>; Evelyne Cardinal <ecardinal@neuf.ca>
Objet : RE: York- statistics - 112142

Hi Sonia,

Thanks for confirming. Was there any talk of an anticipated occupancy? The water flows are based on per seat. If not, we can make an assumption based on the meeting room area.

Thanks,

Anthony Mestwarp, P.Eng., Project Manager | Land Development Engineering

NOVATECH

Engineers, Planners & Landscape Architects

240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext. 216

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From: Sonia Joanis <sjoanis@neuf.ca>
Sent: Monday, January 6, 2025 12:29 PM
To: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Cc: Curtis Ferguson <c.ferguson@novatech-eng.com>; Tyler Martin <tm@goodevestructural.ca>; Pranshu Devgan <pdevgan@jainconsultants.com>; Laura Liu <lliu@jainconsultants.com>; bkhuat@jainconsultants.com; djasarevic@jainconsultants.com; ryan.tuttle@claridgehomes.com; Lu Chen <lc@jbla.ca>; Evelyne Cardinal <ecardinal@neuf.ca>
Subject: RE: York- statistics - 112142

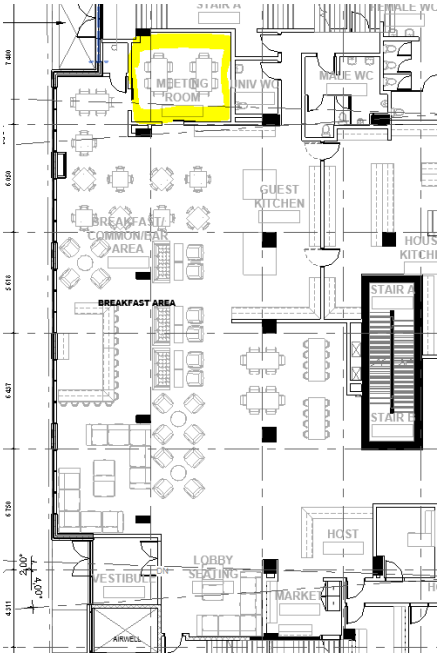
Hi Anthony,

Based on previous discussions with Hyatt, the breakfast/bar area on the ground floor doesn't have a set user group depending on the time of day.

The morning breakfast service will be for the hotel clientel, but the afternoon/evening use of the bar and seating area is not firmly set for client use.

There was talk of potentially having the meeting room on ground floor be a rentable space and potentially having the area act as a restaurant/bar for public use past noon.

I would recommend that your response to the City allows for all of the above, to give Hyatt maximum flexibility of use.



Regards,

SONIA JOANIS, OAA

Architect. Architecte

T 613 234 2274 ext 138 F 613 234 7453 C 613 314 1175

4th - 10 Rideau Street, Ottawa (ON) K1N 9J1

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De : Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Envoyé : 6 janvier 2025 09:54
À : Sonia Joanis <sjoanis@neuf.ca>
Cc : Curtis Ferguson <c.ferguson@novatech-eng.com>; Tyler Martin <tm@goodevestructural.ca>; Pranshu Devgan <pdevgan@jainconsultants.com>; Laura Liu <lliu@jainconsultants.com>; bkhuat@jainconsultants.com; djasarevic@jainconsultants.com; ryan.tuttle@claridgehomes.com; Lu Chen <lc@jbla.ca>; Evelyne Cardinal <ecardinal@neuf.ca>
Objet : RE: York- statistics - 112142

Hi Sonia,

Happy new year.

I got a question from the city reviewer when requesting the water boundary conditions. Can you please confirm that the breakfast/bar on the first floor is only to be used by those in the hotel. If the area is to service the general public, we will also need the number of seats/ maximum occupancy to calculate the additional water demand for the area.

Can you please confirm?

Thanks,

Anthony Mestwarp, P.Eng., Project Manager | Land Development Engineering

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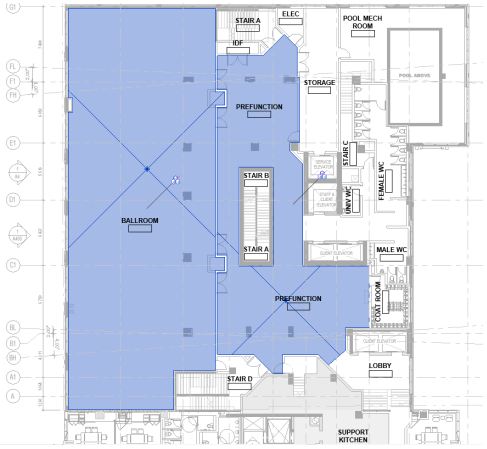
From: Sonia Joanis <sjoanis@neuf.ca>
Sent: Monday, December 16, 2024 3:58 PM
To: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Cc: Curtis Ferguson <c.ferguson@novatech-eng.com>; Tyler Martin <tm@goodevestructural.ca>; Pranshu Devgan <pdevgan@jainconsultants.com>; Laura Liu <lliu@jainconsultants.com>; bkhuat@jainconsultants.com; djasarevic@jainconsultants.com; ryan.tuttle@claridgehomes.com; Lu Chen <lc@jbla.ca>; Evelyne Cardinal <ecardinal@neuf.ca>
Subject: RE: York- statistics - 112142

Hi Anthony,

The 2nd floor will hold a ballroom of approx. 560m^2 with prefunction areas of approx. 265m^2 if we include the circulation.

Currently the new 2nd floor is designed for a maximum occupancy of 615 people, while the ballroom area itself could hold up to 585 people.

The 3rd floor will have a fitness and pool area, to be determined by the hotel whether access/membership would be provided to the public.



Regards,

SONIA JOANIS, OAA

Architect. Architecte

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De : Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Envoyé : 16 décembre 2024 09:19
À : Sonia Joanis <sjoanis@neuf.ca>
Cc : Curtis Ferguson <c.ferguson@novatech-eng.com>; Tyler Martin <tm@goodevestructural.ca>; Pranshu Devgan <pdevgan@jainconsultants.com>; Laura Liu <lliu@jainconsultants.com>; bkhuat@jainconsultants.com; djasarevic@jainconsultants.com; ryan.tuttle@claridgehomes.com; Lu Chen <lc@jbla.ca>; Evelyne Cardinal <ecardinal@neuf.ca>
Objet : RE: York- statistics - 112142

Hi Sonia,

Thanks for confirming. One last question will there be any conference/ banquet halls that will be rented by the public. If so what would the area of the conference rooms be?

Thanks,

Anthony Mestwarp, P.Eng., Project Manager | Land Development Engineering

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Engineers, Planners & Landscape Architects

240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext. 216

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From: Sonia Joanis <sjoanis@neuf.ca>
Sent: Thursday, December 12, 2024 4:21 PM
To: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Cc: Curtis Ferguson <c.ferguson@novatech-eng.com>; Tyler Martin <tm@goodevestructural.ca>; Pranshu Devgan <pdevgan@jainconsultants.com>; Laura Liu <lliu@jainconsultants.com>; bkhuat@jainconsultants.com; djasarevic@jainconsultants.com; ryan.tuttle@claridgehomes.com; Lu Chen <lc@jbla.ca>; Evelyne Cardinal <ecardinal@neuf.ca>
Subject: RE: York- statistics - 112142

Hi Anthony,

Here are the approximate areas per floor, taken from the inside face of exterior walls.

Floor areas from 4th floor up are not finalized and likely subject to adjustments as the layouts get finalized for the tower portion of the building.

P2, P3, P4	1,518m² each floor
P1	1,634m²
Ground	1,380m²
2nd, 3rd	1,410m² each floor
4th to 17th	average 555m² each floor
Penthouse	approx. 225m²

Regards,

SONIA JOANIS, OAA

Architect. Architecte

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De : Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Envoyé : 12 décembre 2024 13:42
À : Sonia Joanis <sjoanis@neuf.ca>
Cc : Curtis Ferguson <c.ferguson@novatech-eng.com>; Tyler Martin <tm@goodevestructural.ca>; Pranshu Devgan <pdevgan@jainconsultants.com>; Laura Liu <lliu@jainconsultants.com>; bkhuat@jainconsultants.com; djasarevic@jainconsultants.com; ryan.tuttle@claridgehomes.com; Lu Chen <lc@jbla.ca>; Evelyne Cardinal <ecardinal@neuf.ca>
Objet : RE: York- statistics - 112142

HI Sonia,

Sorry for the delayed response.

The interior face of the exterior walls will be fine.

Thanks,

Anthony Mestwarp, P.Eng., Project Manager | Land Development Engineering

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From: Sonia Joanis <sjoanis@neuf.ca>
Sent: Thursday, December 12, 2024 9:51 AM
To: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Cc: Curtis Ferguson <c.ferguson@novatech-eng.com>; Tyler Martin <tm@goodevestructural.ca>; Pranshu Devgan <pdevgan@jainconsultants.com>; Laura Liu <lliu@jainconsultants.com>; bkhuat@jainconsultants.com; djasarevic@jainconsultants.com; ryan.tuttle@claridgehomes.com; Lu Chen <lc@jbla.ca>; Evelyne Cardinal <ecardinal@neuf.ca>
Subject: RE: York- statistics - 112142

Hi Anthony,

For 110-116 York;

- 154 hotel rooms.
- No commercial area

- Confirm what parameters you require the areas to be calculated; inside face of exterior walls, outside face of exterior walls, any exclusions?

Regards,

SONIA JOANIS, OAA

Architect. Architecte

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De : Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Envoyé : 12 décembre 2024 07:47
À : Sonia Joanis <sjoanis@neuf.ca>
Cc : Curtis Ferguson <c.ferguson@novatech-eng.com>; Tyler Martin <tm@goodevestructural.ca>; Pranshu Devgan <pdevgan@jainconsultants.com>; Laura Liu <lliu@jainconsultants.com>; bkhuat@jainconsultants.com; djasarevic@jainconsultants.com; ryan.tuttle@claridgehomes.com; Lu Chen <lc@jbla.ca>; Evelyne Cardinal <ecardinal@neuf.ca>
Objet : RE: York- statistics - 112142

Hi Sonia,

For the York building, would you be able to confirm the following as well:

- unit counts,
- commercial areas,
- floor areas of each building level

Thanks,

Anthony Mestwarp, P.Eng., Project Manager | Land Development Engineering

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From: Sonia Joanis <sjoanis@neuf.ca>
Sent: Tuesday, December 10, 2024 10:09 AM
To: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Cc: Curtis Ferguson <c.ferguson@novatech-eng.com>; Tyler Martin <tm@goodevestructural.ca>; Pranshu Devgan <pdevgan@jainconsultants.com>; Laura Liu <lliu@jainconsultants.com>; bkhuat@jainconsultants.com; djasarevic@jainconsultants.com; ryan.tuttle@claridgehomes.com; Lu Chen <lc@jbla.ca>; Evelyne Cardinal <ecardinal@neuf.ca>
Subject: RE: York- statistics - 112142

Hi Anthony,

If you are referring to mechanical shafts, there will be multiple spaces fitting that description and rating at every level.

Regards,

SONIA JOANIS, OAA

Architect. Architecte

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De : Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Envoyé : 10 décembre 2024 10:06
À : Sonia Joanis <sjoanis@neuf.ca>
Cc : Curtis Ferguson <c.ferguson@novatech-eng.com>; Tyler Martin <tm@goodevestructural.ca>; Pranshu Devgan <pdevgan@jainconsultants.com>; Laura Liu <lliu@jainconsultants.com>; bkhuat@jainconsultants.com; djasarevic@jainconsultants.com; ryan.tuttle@claridgehomes.com; Lu Chen <lc@jbla.ca>; Evelyne Cardinal <ecardinal@neuf.ca>
Objet : RE: York- statistics - 112142

Hi Sonia,

The 1hr vertical openings refers to internal openings between floors, mechanical works etc. If you can please confirm [yes/no].

Regards,

Anthony Mestwarp, P.Eng., Project Manager | Land Development Engineering

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From: Sonia Joanis <sjoanis@neuf.ca>
Sent: Tuesday, December 10, 2024 9:59 AM
To: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Cc: Curtis Ferguson <c.ferguson@novatech-eng.com>; Tyler Martin <tm@goodevestructural.ca>; Pranshu Devgan <pdevgan@jainconsultants.com>; Laura Liu <lliu@jainconsultants.com>; bkhuat@jainconsultants.com; djasarevic@jainconsultants.com; ryan.tuttle@claridgehomes.com; Lu Chen <lc@jbla.ca>; Evelyne Cardinal <ecardinal@neuf.ca>
Subject: RE: York- statistics - 112142

Good morning Anthony,

1. The project is non-combustible construction.

Floors and load bearing structures shall have a fire resistance rating of 2 hours.

2. Your question is a bit broad. There will be 1h protected window openings on the exterior wall of the East façade.

Elevator hoists and stairwells will have a 1.5h and 2hr fire resistance rating respectively.

3. Mechanical to advise.
4. Not yet discussed. Considering this project is an addition, can the existing firefighter connections on Dalhousie count? Mechanical to advise.

Regards,

SONIA JOANIS, OAA

Architect. Architecte

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De : Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Envoyé : 10 décembre 2024 08:13
À : Sonia Joanis <sjoanis@neuf.ca>
Cc : Curtis Ferguson <c.ferguson@novatech-eng.com>; Tyler Martin <tm@goodevestructural.ca>; Pranshu Devgan <pdevgan@jainconsultants.com>; Laura Liu <lliu@jainconsultants.com>; bkhuat@jainconsultants.com; djasarevic@jainconsultants.com; ryan.tuttle@claridgehomes.com; Lu Chen <lc@jbla.ca>
Objet : RE: York- statistics - 112142

Hi Sonia,

Can you please confirm the unit counts, commercial areas, and floor areas of the proposed 110 York building, we would like to ensure that we have the most recent information.

Can you also please confirm the building construction/ details as per the below:

1. Construction Material
    a. Type V – Wood Frame
    b. Type IV - Mass Timber
    c. Type III – Ordinary Construction
    d. Type II – Non-combustible construction
    e. Type I – Fire resistive construction (2hrs)
2. Does the building have Protected openings (1hr) [Do vertical openings have minimum 1 hour rating between floors?]
3. Sprinkler system details
    a. Adequately Designed System (NFPA 13) [Yes/No]
    b. Standard Water supply [Yes/No]
    c. Fully Supervised System [Yes/No]
4. Can you confirm the proposed location of the Siamese Connection

Thanks,

Anthony Mestwarp, P.Eng., Project Manager | Land Development Engineering

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Curtis Ferguson

From: Duquette, Vincent <Vincent.Duquette@ottawa.ca>
Sent: Tuesday, February 11, 2025 9:59 AM
To: Anthony Mestwarp
Cc: Wu, John; Curtis Ferguson
Subject: RE: 110 York - Water Connection (112141)
Attachments: 110-116 York Street January 2025.pdf

Follow Up Flag: Follow up
Flag Status: Completed

Hi Anthony,

Please see below results of the boundary conditions.

The following are boundary conditions, HGL, for hydraulic analysis at 110-116 York Street (zone 1W) assumed to be connected via dual connection to the 203mm watermain on York Street (see attached PDF for location).

Minimum HGL = 106.3 m
Maximum HGL = 115.4 m
Max Day + Fire Flow (100 L/s) = 107.6 m

These are for current conditions and are based on computer model simulation.

Disclaimer: The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.

Best Regards,

Vincent Duquette, E.I.T
Project Manager, Infrastructure Approvals | Gestionnaire de projet, Projets d'infrastructure
Development Review – All Ward | Direction de l'examen des projets d'aménagement - Tous les quartiers
Planning, Development and Building Services Department (PDBS)| Direction générale des services de la planification, de l'aménagement et du bâtiment (DGSPAB)
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West | 110 avenue Laurier Ouest
Ottawa, ON K1P 1J1
613.580.2424 ext./poste 14048, vincent.duquette@ottawa.ca

From: Duquette, Vincent
Sent: January 06, 2025 10:15 PM
To: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Cc: Wu, John <John.Wu@ottawa.ca>; Curtis Ferguson <c.ferguson@novatech-eng.com>
Subject: RE: 110 York - Water Connection (112141)

Hi Anthony,

Thanks for the revised demands. They are satisfactory. I have request boundary conditions from our water resource group. Please note that boundary condition results are taking 3-4 weeks to process lately.

Best Regards,

Vincent Duquette, E.I.T
Project Manager, Infrastructure Approvals | Gestionnaire de projet, Projets d'infrastructure
Development Review – All Ward | Direction de l'examen des projets d'aménagement - Tous les quartiers
Planning, Development and Building Services Department (PDBS)| Direction générale des services de la planification, de l'aménagement et du bâtiment (DGSPAB)
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West | 110 avenue Laurier Ouest
Ottawa, ON K1P 1J1
613.580.2424 ext./poste 14048, vincent.duquette@ottawa.ca

From: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Sent: January 06, 2025 4:47 PM
To: Duquette, Vincent <Vincent.Duquette@ottawa.ca>
Cc: Wu, John <John.Wu@ottawa.ca>; Curtis Ferguson <c.ferguson@novatech-eng.com>
Subject: RE: 110 York - Water Connection (112141)

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Hi Vincent,

Thanks for the Feedback.

- We have revised the peaking factors on the hotel units to use the commercial values
- We have updated the basic day demand calculation to reflect the hotel demand of 225L/person/day
- I reconfirmed with the architect if there is the potential for any additional commercial space. They have indicated the potential for a lounge/bar on the ground floor (not confirmed). We have added the Bar/ lounge with maximum potential occupancy to the calculations as well to be conservative.

The updated demands are as follows (and attached):

Average day **1.13L/s**
Max day **1.69 L/s**
Peak Hour **3.04L/s**
Fire flow **100 L/s**

Regards,

Anthony Mestwarp, P.Eng., Project Manager | Land Development Engineering
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From: Duquette, Vincent <Vincent.Duquette@ottawa.ca>
Sent: Sunday, January 5, 2025 10:25 PM
To: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Cc: Wu, John <John.Wu@ottawa.ca>; Curtis Ferguson <c.ferguson@novatech-eng.com>
Subject: RE: 110 York - Water Connection (112141)

Hi Anthony,

I have reviewed the demands submitted and have a couple comments/questions before I request boundary conditions form our water resource group.

- Hotel use is considered commercial. As such commercial peaking factors shall be used.
- The basic day demand in m^3/day appears incorrect.
- Please confirm if the hotel will have any other commercial space (restaurant, bar, retail or other) other than the banquet hall.

Best Regards,

Vincent Duquette, E.I.T
Project Manager, Infrastructure Approvals | Gestionnaire de projet, Projets d'infrastructure
Development Review – All Ward | Direction de l'examen des projets d'aménagement - Tous les quartiers
Planning, Development and Building Services Department (PDBS)| Direction générale des services de la planification, de l'aménagement et du bâtiment (DGSPAB)
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West | 110 avenue Laurier Ouest
Ottawa, ON K1P 1J1
613.580.2424 ext./poste 14048, vincent.duquette@ottawa.ca

From: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Sent: January 03, 2025 2:05 PM
To: Duquette, Vincent <Vincent.Duquette@ottawa.ca>
Cc: Wu, John <John.Wu@ottawa.ca>; Curtis Ferguson <c.ferguson@novatech-eng.com>
Subject: RE: 110 York - Water Connection (112141)

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Hi Vincent,

I am following up on the above noted project for the 110 York Street project. Boundary conditions we previously requested as noted below, although since the request the client purchased additional land and made modifications to the building.

A summary of the updated demands are below and attached.

The proposed expansion will include 154 hotel rooms and a banquet area with a maximum capacity of 615 persons.

Average day **0.94L/s**
Max day **2.13 L/s**
Peak Hour **4.55L/s**
Fire flow **100 L/s**

Can you please provide updated boundary conditions for the 110 York building. Please let us know if you have any questions.

Thanks

Anthony Mestwarp, P.Eng., Project Manager | Land Development Engineering
NOVATECH
Engineers, Planners & Landscape Architects
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From: Duquette, Vincent <Vincent.Duquette@ottawa.ca>
Sent: Tuesday, October 31, 2023 12:52 PM
To: Curtis Ferguson <c.ferguson@novatech-eng.com>
Cc: Wu, John <John.Wu@ottawa.ca>
Subject: RE: 141 George - Water Connection (112141)

Hi Curtis,

The following are boundary conditions, HGL, for hydraulic analysis at 110 York Street (zone1W) assumed to be a dual connection to the 203 mm watermain on York Street (see attached PDF for location).

Minimum HGL = 106.3 m
Maximum HGL = 115.4 m
Max Day + Fire Flow (67 L/s) = 108.5 m

These are for current conditions and are based on computer model simulation.
Disclaimer: The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation.

Best Regards,

Vincent Duquette, E.I.T
Project Manager, Infrastructure Approvals
Planning, Real Estate and Economic Development Department – Direction général de la planification, des biens immobilier et du développement économique
Development Review – Central Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 14048, vincent.duquette@ottawa.ca

From: Curtis Ferguson <c.ferguson@novatech-eng.com>
Sent: October 18, 2023 11:15 AM
To: Duquette, Vincent <Vincent.Duquette@ottawa.ca>
Cc: Wu, John <John.Wu@ottawa.ca>
Subject: RE: 141 George - Water Connection (112141)

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Perfect thanks Vincent – was on my list for today.

See attached FUS calculation, let me know if you require anything further (hydrant spacing and/or separation figures).

Thanks,
Curtis Ferguson, B.A.Sc., E.I.T. | Land Development
NOVATECH
Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 EXT: 331
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From: Duquette, Vincent <Vincent.Duquette@ottawa.ca>
Sent: Wednesday, October 18, 2023 11:09 AM
To: Curtis Ferguson <c.ferguson@novatech-eng.com>
Cc: Wu, John <John.Wu@ottawa.ca>
Subject: RE: 141 George - Water Connection (112141)

Hi Curtis,

We are submitting boundary conditions for 110 York to ensure hydraulic objectives are met. Can you provide supporting calculations on how the 67 L/s fireflow demand was obtained.

Domestic Water Demand Summary (York Building)

Population	Commercial Area (m^2)	Ave. Daily Demand (L/s)	Max. Daily Demand (L/s)	Peak Hour Demand (L/s)	Fire Flow (L/s)
191	793	1.19	2.27	4.59	67

Best Regards,

Vincent Duquette, E.I.T
Project Manager, Infrastructure Approvals
Planning, Real Estate and Economic Development Department – Direction général de la planification, des biens immobilier et du développement économique
Development Review – Central Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 14048, vincent.duquette@ottawa.ca

From: Curtis Ferguson <c.ferguson@novatech-eng.com>
Sent: October 10, 2023 2:45 PM
To: Wu, John <John.Wu@ottawa.ca>
Cc: Duquette, Vincent <Vincent.Duquette@ottawa.ca>
Subject: FW: 141 George - Water Connection (112141)

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Hi John & Vincent,

Our client is curious regarding the watermain servicing connection to George Street.

Will the connection be TVS or will tee's c/w a valve box be sufficient?

FYI, Watermain in George Street is 305mm – DI.

Let me know,
Curtis Ferguson, B.A.Sc., E.I.T. | Land Development
NOVATECH
Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 EXT: 331
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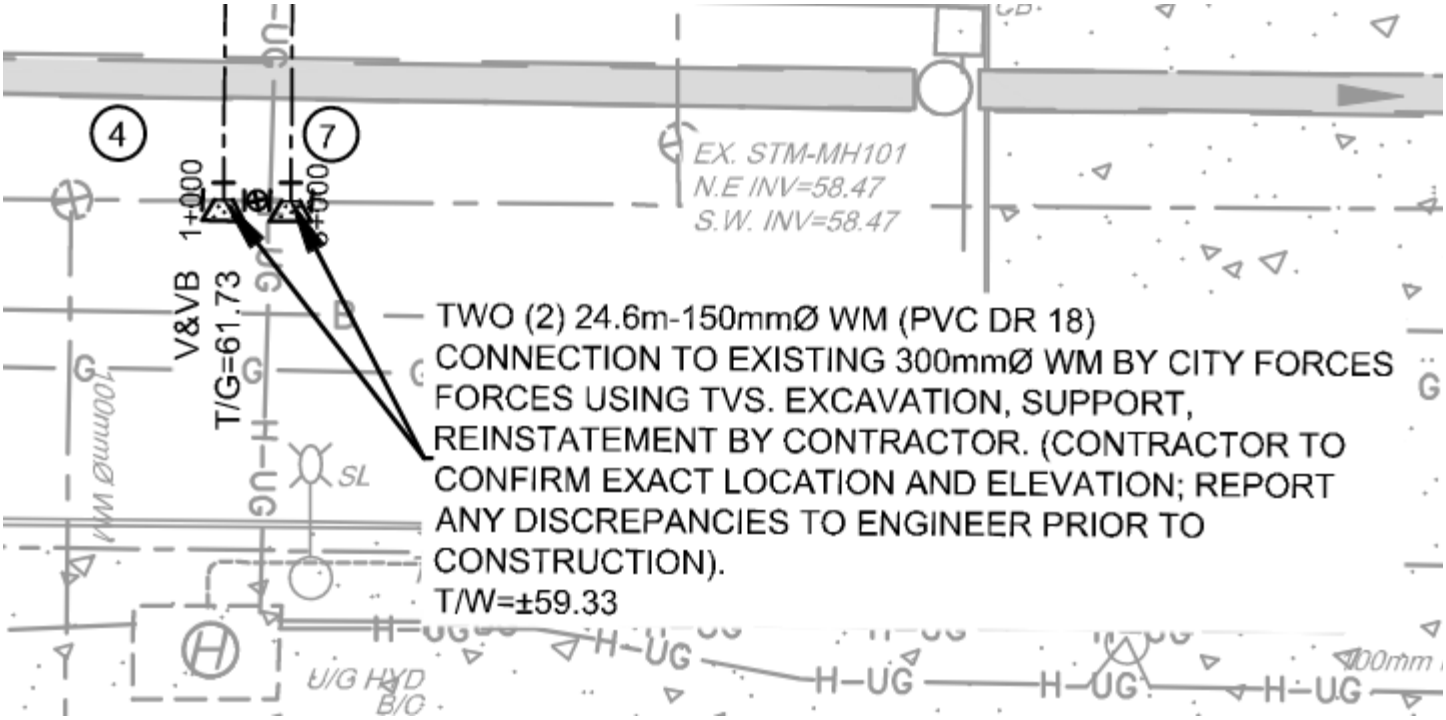
From: Stephen Poon <stephen.poon@claridgehomes.com>
Sent: Thursday, October 5, 2023 4:11 PM
To: Curtis Ferguson <c.ferguson@novatech-eng.com>; Greg MacDonald <g.Macdonald@novatech-eng.com>
Cc: Amanda Arial <amanda.arial@claridgehomes.com>; Vincent Denomme <vincent.denomme@claridgehomes.com>; Carmen Quinteros <carmen.quinteros@claridgehomes.com>
Subject: 141 George - Water Connection

Hi Curtis/Greg,

The current water connection on George shows TVS connection. It used to be two (2) 150x150x150 Tee.

I understand TVS costs more, how much more?

Since we have to add a valve in between the 2 connections, the water line has to be shut off. Do we stay with TVS or two Tee instead?



Regards,

Stephen

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Appendix C
Sanitary Servicing

SANITARY SEWER DESIGN SHEET

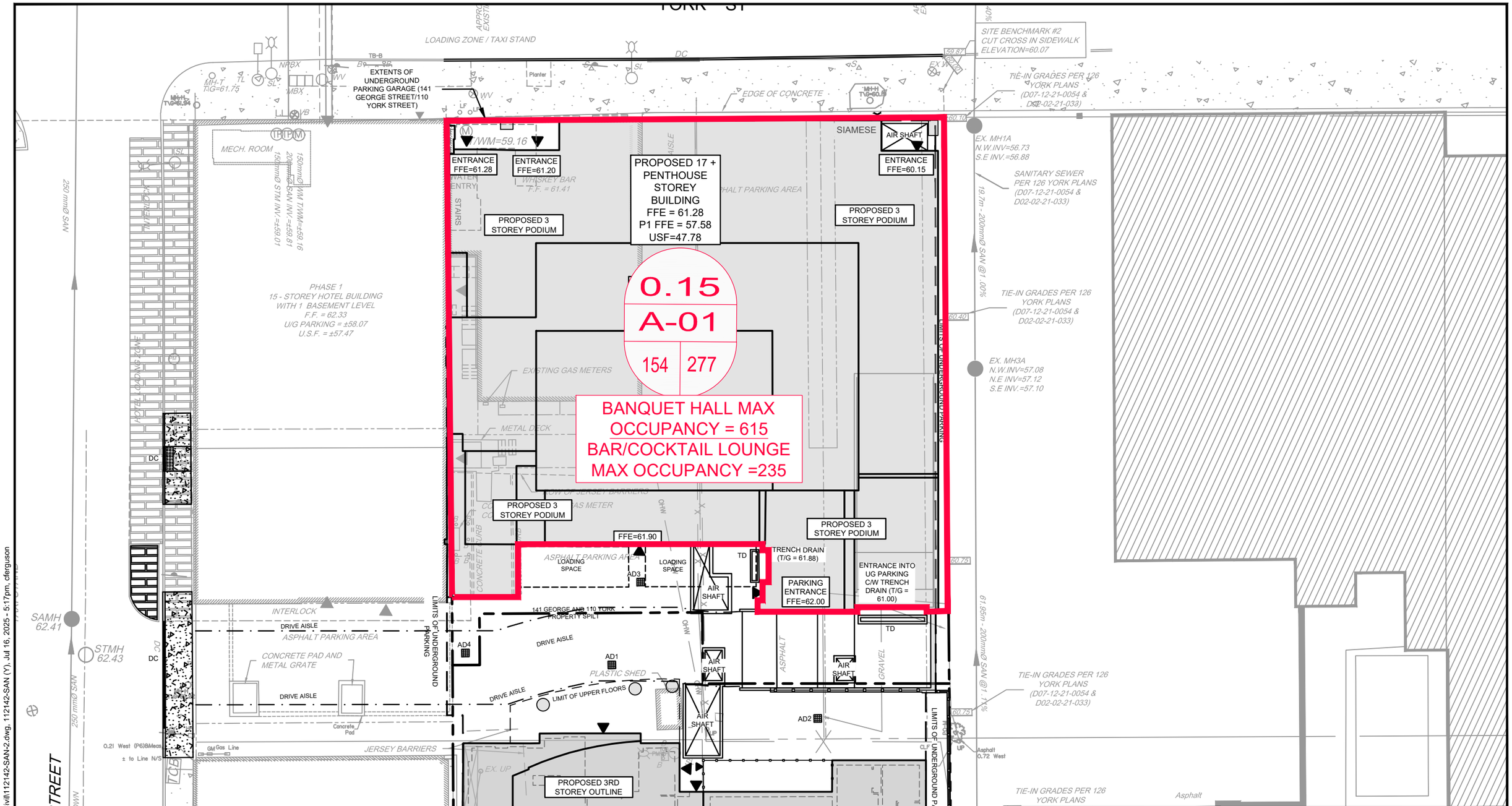
Project Name: 110 York Street
Date Prepared: 10/13/2023
Date Revised: 9/25/2024
Revised: 01/06/2025 (By Anthony Mestwarp)
Revised: 7/16/2025
Input By: Curtis Ferguson, P.Eng.
Reviewed By: Greg MacDonald, P.Eng
Drawing Reference: 112142 - SAN - York Street

USER DESIGN INPUT
CUMULATIVE CELL
CALCULATED DESIGN CELL OUTPUT

NOVATECH
Engineers, Planners & Landscape Architects

LOCATION			DEMAND														DESIGN CAPACITY							
			RESIDENTIAL FLOW						COMMERCIAL FLOW					EXTRANEOUS FLOW				PROPOSED SEWER PIPE SIZING / DESIGN							
AREA	FROM MH	TO MH	HOTEL ROOMS	POPULATION (in 1000's)	CUMULATIVE POPULATION (in 1000's)	Average Pop. Flow Q(q) (L/s)	Design Peaking Factor M	Peak Design Pop. Flow Q(p) (L/s)	Banquet Hall (Seats)	Bar/Cocktail Lounge (Seats)	DESIGN COMMERICAL FLOW (L/s)	COMMERICAL PEAK FACTOR	PEAKED COMMERCIAL FLOW	Total Area (ha.)	Accum. Area (ha.)	DESIGN EXTRAN. FLOW (L/s)	TOTAL DESIGN FLOW (L/s)	PIPE LENGTH (m)	PIPE SIZE (mm) AND MATERIAL	PIPE ID ACTUAL (m)	ROUGH. (n)	DESIGN GRADE (%)	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	Qpeak Design / Qcap
York Street																								
A-01	Stub	EX. 1200mm SAN	154	0.277	0.277	0.72	3.31	2.39	615.000	235	0.40	1.50	0.61	0.15	0.15	0.05	3.04	19.3	200 PVC	0.203	0.013	1.00	34.2	1.06	8.9%
TOTAL			154	0.277	0.277				615.000	615				0.15											

Design Parameters:							
1. Commercial Flow				CAPACITY EQUATION			
-Hotel Room	1.8	Person/ Unit		Q full= (1/n) A R^(2/3)So^(1/2)			
Banquet Hall	30	L/seat/day		Where :	Q full = Capacity (L/s)		
Bar/Cocktail Lounge	70	L/seat/day					
2. q Avg Hotel flow (With Full Housekeeping facilities	225	L/per/day					
3. M = Harmon Formula (maximum of 4.0)							
4. K =	0.8						
5. Commercial Peak Factor					n = Manning coefficient of roughness (0.013)		
-area > 20% of development	1.5				A = Flow area (m^2)		
-area < 20% of development	1.0				R = Wetter perimenter (m)		
6. Extraneous Flows =	0.33	L/sec/ha			So = Pipe Slope/gradient		



LEGEND

- PROPERTY LINE
- PROPOSED SANITARY SEWER AND MANHOLE
- SAN MH — EXISTING SANITARY MANHOLE & SEWER
- SANITARY SEWER DRAINAGE AREA BOUNDARY

0.47 / 20A-19A / 71 | 128

DRAINAGE AREA (ha)
SAN SEWER PIPE RUN
NO. UNITS/HOTEL POPULATION

NOVATECH
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Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

110-116 YORK STREET

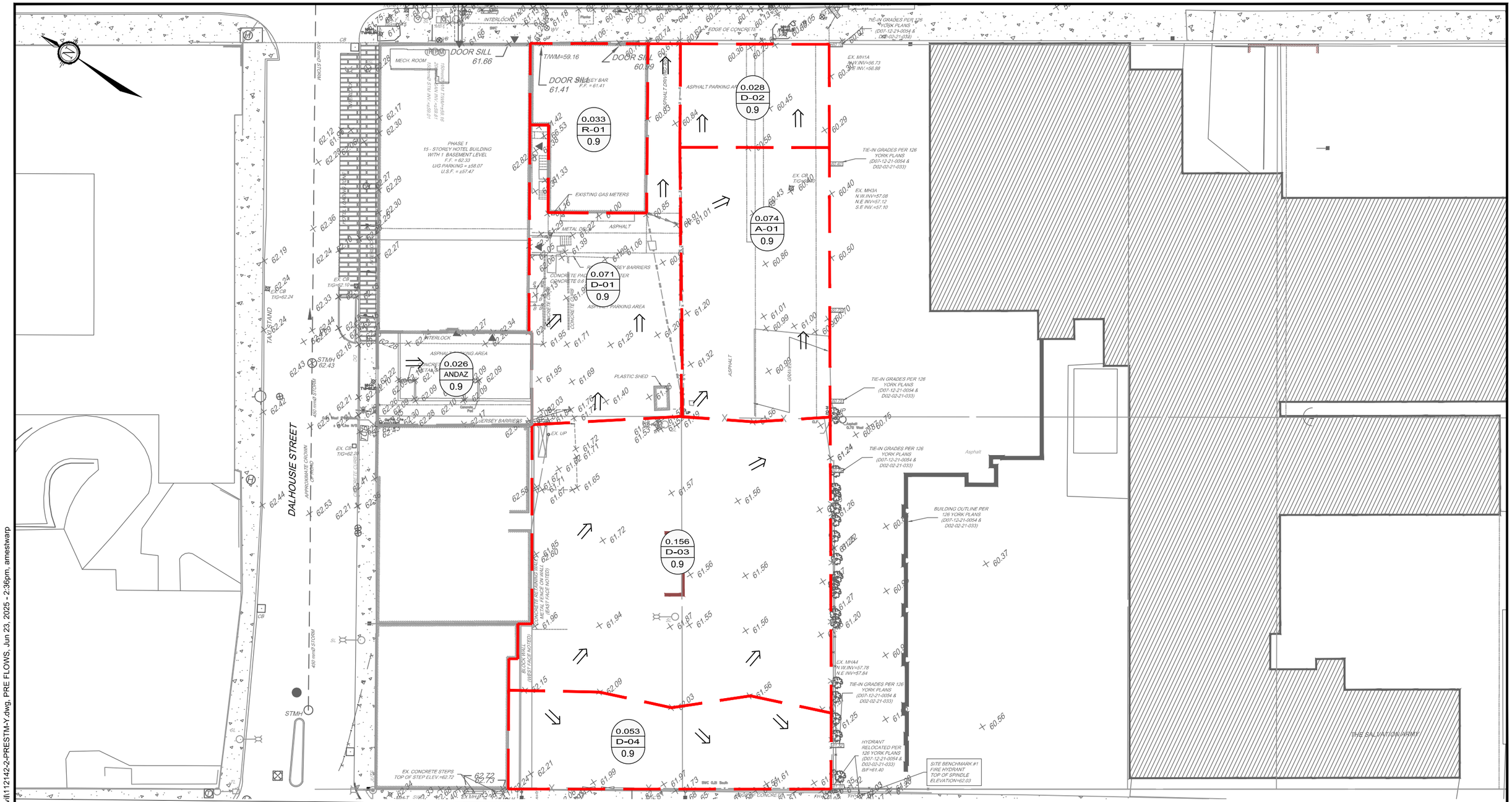
SANITARY DRAINAGE AREA PLAN

SCALE 1 : 300 (0 3 6 9 12)
DATE JUL 2025 | JOB 112142 | FIGURE SAN

SHT11X17.DWG - 279mmX432mm

M:\2012\112142_141 GEORGE-110 YORK\CAD\Civil\112142-SAN-2.dwg, 112142-SAN (Y), Jul 16, 2025 - 5:17pm, cferguson

Appendix D
Storm Servicing



LEGEND

0.03 / R-01 / 0.9	DRAINAGE AREA / AREA ID / C VALUE
	PROPOSED STORM DRAINAGE AREA
CB	*EXISTING CATCHBASIN*
*61.12	*EXISTING GRADES*

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Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

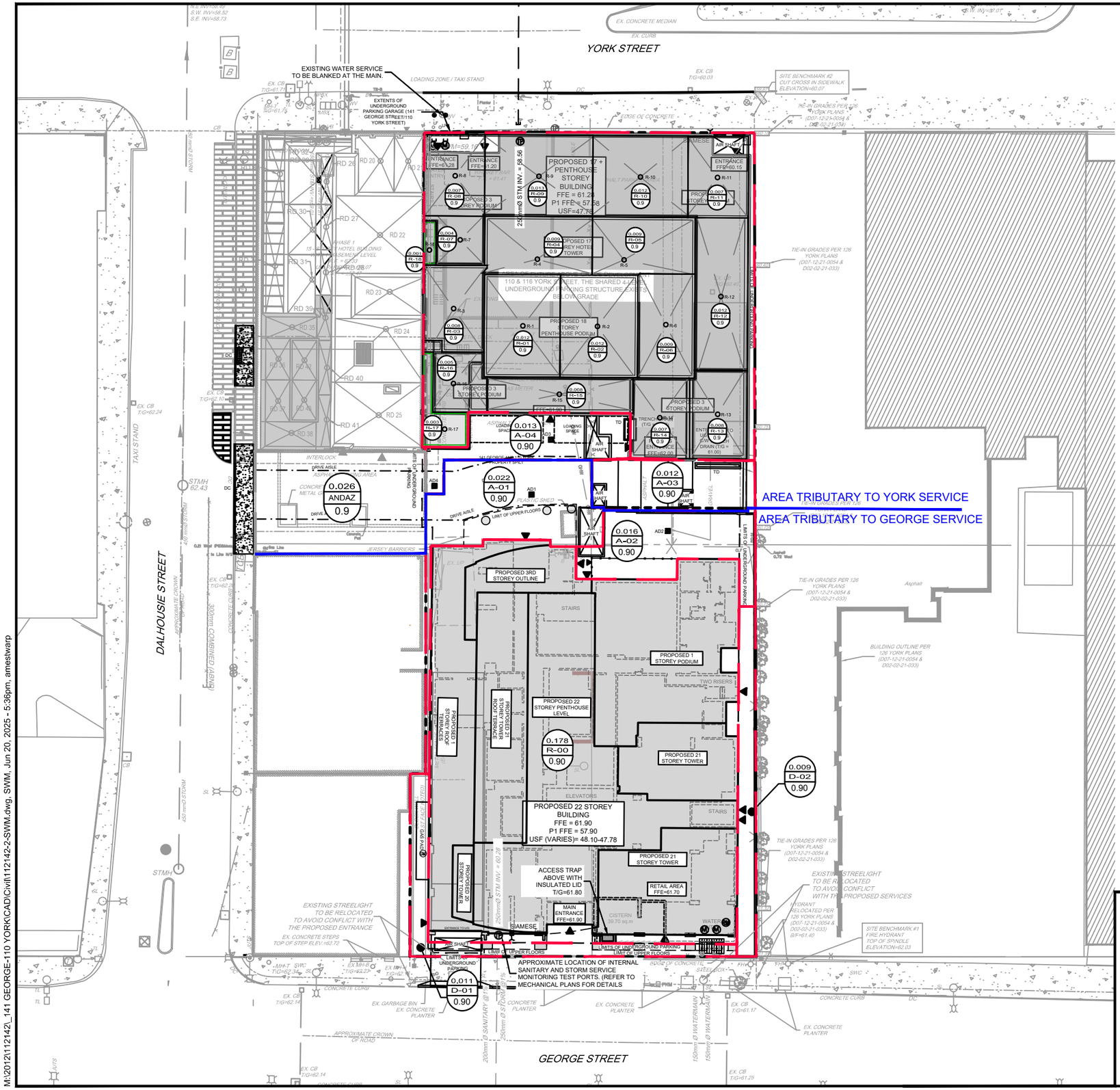
141 GEROGE, 110 & 116 YORK

PRE DEVELOPMENT DRAINAGE FLOWS

SCALE 1 : 500 (0 5 10 15 20)
DATE JUNE 2025
JOB 112142
FIGURE PRE-STM

SHT11X17.DWG 279mmX432mm

M:\2012\112142_141 GEORGE-110 YORK\CAD\Civil\112142-2-PRESTM-Y.dwg, PRE FLOWS, Jun 23, 2025 - 2:36pm, amestwarp



LEGEND

- DRAINAGE AREA LIMITS
- 0.085 / A-16 / 0.78 — DRAINAGE AREA (ha), DRAINAGE AREA ID, RUNOFF COEFFICIENT
- PROPERTY LINE
- PROPOSED CURB
- DC — PROPOSED DEPRESSED CURB
- PROPOSED RETAINING WALL C/W GUARD RAIL
- PROPOSED STORM SEWER AND MANHOLE
- PROPOSED AREA DRAIN
- PROPOSED TRENCH DRAIN
- PROPOSED BUILDING ENTRANCE
- STM MH — EXISTING STORM MANHOLE & SEWER
- CB 1 — EXISTING CATCHBASIN

N

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Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

CITY OF OTTAWA
141 GEORGE STREET & 110 YORK

POST-DEVELOPMENT STORMWATER MANAGEMENT PLAN

SCALE 1 : 500 (0, 5m, 10m, 20m)
DATE JUNE 2025
JOB 112142
FIGURE SWM

M:\2012\112142_141 GEORGE-110 YORK\CADCivil\112142-2-SWM.dwg, SWM, Jun 20, 2025 - 5:36pm, arnestwarp

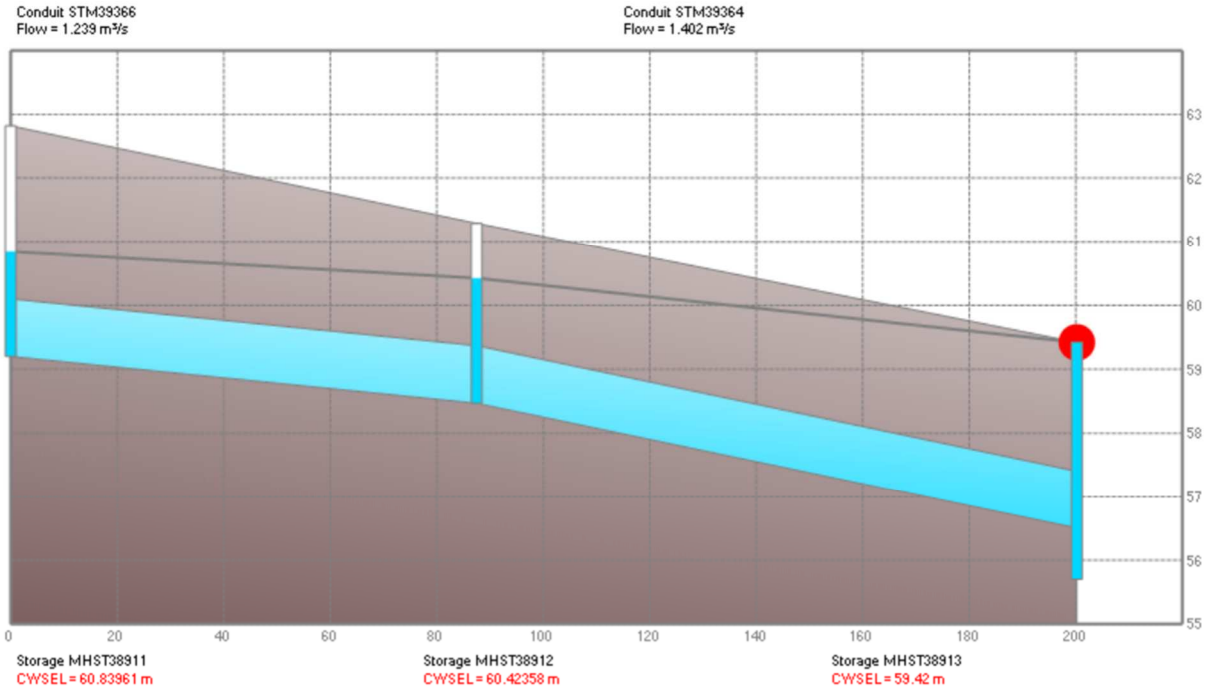
SHT11X17.DWG - 279mmX432mm

From: Duquette, Vincent <Vincent.Duquette@ottawa.ca>
Sent: Friday, May 5, 2023 4:51 PM
To: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Cc: Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>; Wu, John <John.Wu@ottawa.ca>; Greg MacDonald <g.Macdonald@novatech-eng.com>; Curtis Ferguson <c.ferguson@novatech-eng.com>
Subject: RE: 141 George Street - Phase 2 (112142)

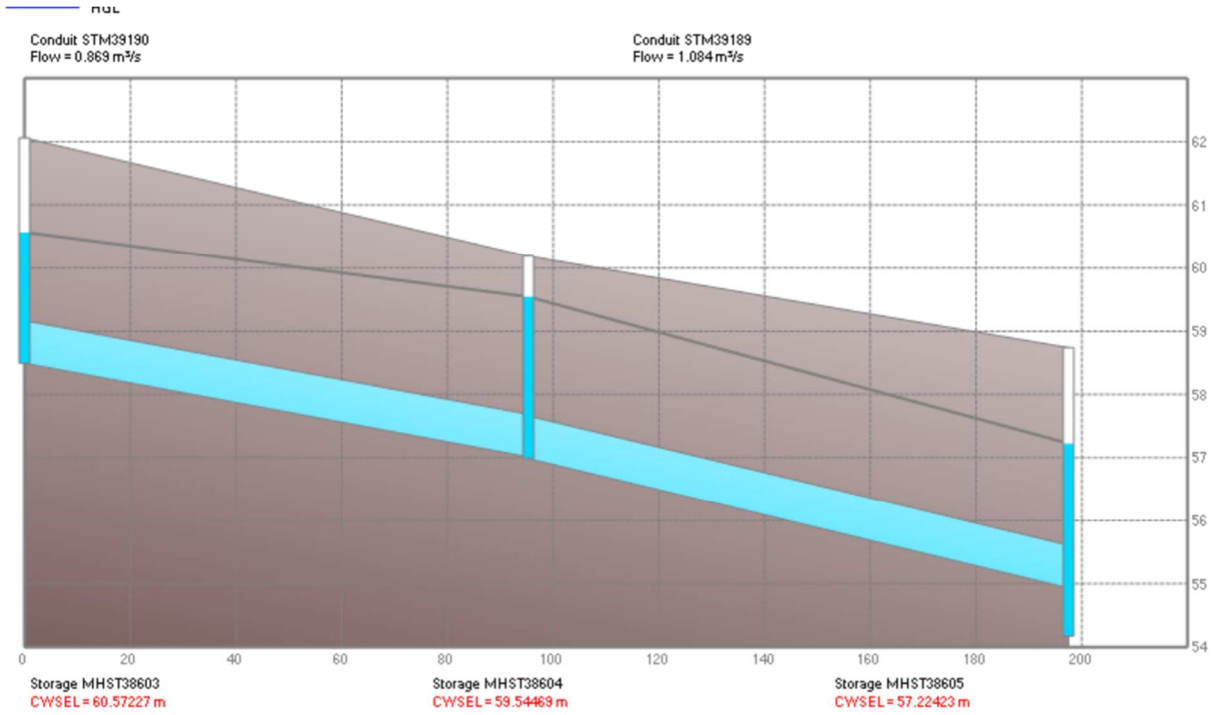
Hi Anthony,

Please see below HGL requested. In these old uncontrolled systems, the 100-year HGL is expected to break out at the surface.

George between Dalhousie and Cumberland



York between Dalhousie and Cumberland



Best Regards,

Vincent Duquette, E.I.T
Project Manager, Infrastructure Approvals
Planning, Real Estate and Economic Development Department – Direction général de la planification, des biens immobilier et du développement économique
Development Review – Central Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 14048, vincent.duquette@ottawa.ca

From: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Sent: April 28, 2023 5:20 PM
To: Duquette, Vincent <Vincent.Duquette@ottawa.ca>
Cc: Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>; Wu, John <John.Wu@ottawa.ca>; Greg MacDonald <g.Macdonald@novatech-eng.com>; Curtis Ferguson <c.ferguson@novatech-eng.com>
Subject: RE: 141 George Street - Phase 2 (112142)

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Hi Vincent,

The requested PDF is attached.

I hope you have a good weekend.

Regards,

Anthony Mestwarp, P.Eng., Project Engineer | Land Development Engineering
NOVATECH
Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext. 216
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From: Duquette, Vincent <Vincent.Duquette@ottawa.ca>
Sent: Friday, April 28, 2023 4:13 PM
To: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Cc: Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>; Wu, John <John.Wu@ottawa.ca>; Greg MacDonald <g.Macdonald@novatech-eng.com>; Curtis Ferguson <c.ferguson@novatech-eng.com>
Subject: RE: 141 George Street - Phase 2 (112142)

Hi Anthony,

I will be reviewing this file in John's absence. Can you please forward me the pdf file highlighting the pipe segments that is mentioned in your previous email. I will then circulate it to asset management to obtain the HGL requested.

Best Regards,

Vincent Duquette, E.I.T
Project Manager, Infrastructure Approvals
Planning, Real Estate and Economic Development Department – Direction général de la planification, des biens immobilier et du développement économique
Development Review – Central Branch
City of Ottawa | Ville d'Ottawa

110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 14048, vincent.duquette@ottawa.ca

From: Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>
Sent: April 28, 2023 10:59 AM
To: Duquette, Vincent <Vincent.Duquette@ottawa.ca>
Cc: Wu, John <John.Wu@ottawa.ca>; Greg MacDonald <g.Macdonald@novatech-eng.com>; Curtis Ferguson <c.ferguson@novatech-eng.com>; Anthony Mestwarp <a.mestwarp@novatech-eng.com>; Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>
Subject: RE: 141 George Street - Phase 2 (112142)

Hi Vincent ,

Please review it.

--

Thanks,

Abdul
Mohammad Abdul Mottalib, P. Eng.
Extension: 27798

From: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Sent: April 28, 2023 10:15 AM
To: Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>
Cc: Wu, John <John.Wu@ottawa.ca>; Greg MacDonald <g.Macdonald@novatech-eng.com>; Curtis Ferguson <c.ferguson@novatech-eng.com>
Subject: FW: 141 George Street - Phase 2 (112142)

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Hi Abdul,

I understand that John is currently out of the office.

Can you please review the below?

Thanks,

Anthony Mestwarp, P.Eng., Project Engineer | Land Development Engineering
NOVATECH
Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext. 216
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From: Anthony Mestwarp
Sent: Friday, April 28, 2023 10:10 AM
To: Wu, John <John.Wu@ottawa.ca>
Cc: Greg MacDonald <g.Macdonald@novatech-eng.com>; Curtis Ferguson <c.ferguson@novatech-eng.com>
Subject: 141 George Street - Phase 2 (112142)

Hi John,

We are working on the design of 141 George Street Phase 2 and would like to confirm the existing storm sewer HGL within the city infrastructure neighboring the site, to ensure there will not be any backflow issues on the proposed connections.

Can you please confirm who would be the engineering reviewer for this project, and if required forward this email to the appropriate contact.

York Street:

Can you please confirm the existing HGL within the 675mm concrete storm sewer within York street between manholes MHST38603 and MHST38604 as highlighted on the attached PDF.

George Street:

Can you please confirm the existing HGL within the 900mm concrete storm sewer within York street between manholes MHST38911 and MHST38912 as highlighted on the attached PDF.

Thanks,

Anthony Mestwarp, P.Eng., Project Engineer | Land Development Engineering
NOVATECH
Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext. 216
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PROJECT #: 112142
PROJECT NAME: 141 George Street/110-116 York Street
LOCATION: City of Ottawa

NOVATECH
Engineers, Planners & Landscape Architects

DATE PREPARED:June 8, 2023
Rev: Aug 21, 2023, Rev: Sept 12, 2023
Rev: Sept 24, 2024
Rev: Jan 23,2025
Rev: June 23rd, 2025

TABLE 1A: Allowable Runoff Coefficient "C"

Area*	"C"
Total	0.50
0.416	

TABLE 1B: Allowable Flows

Outlet Options	Area (ha)	"C"	Tc (min)	$Q_{5\ Year}$ (L/s)	Q_{ALLOW} (L/s)
George Street / York Street	0.416	0.50	20	**40.6**	**40.6**

Time of Concentration	Tc=	20	min
Intensity (2 Year Event)	I_2=	52.03	mm/hr
Intensity (5 Year Event)	I_5=	70.25	mm/hr
Intensity (100 Year Event)	I_{100}=	119.95	mm/hr

100 year Intensity = 1735.688 / (Time in min + 6.014) $^{0.820}$
5 year Intensity = 998.071 / (Time in min + 6.053) $^{0.814}$

Equations:
Flow Equation
Q = 2.78 x C x I x A
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

PROJECT #: 112142
PROJECT NAME: 141 George Street / 110 York Street
LOCATION: City of Ottawa

NOVATECH
Engineers, Planners & Landscape Architects

DATE PREPARED: June 23, 2025

TABLE 1C: Post-Development Runoff Coefficient "C" - Andaz - Uncontrolled Flow

Area	Surface	Ha	"C"	C_{avg}	*C_{100}
Total	Hard	0.026	0.90	0.90	1.00
0.026	Soft	0.000	0.20		

Runoff Coefficient Equation

$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

TABLE 1D: Post-Development Andaz Flows

Outlet Options	Area (ha)	C_{avg}	Tc (min)	$Q_{2\ Year}$ (L/s)	$Q_{5\ Year}$ (L/s)	$Q_{100\ Year}$ (L/s)
York Street	0.026	0.90	10	**3.4**	**4.6**	**8.8**

Time of Concentration	Tc=	20	min
Intensity (2 Year Event)	I_2=	52.03	mm/hr
Intensity (5 Year Event)	I_5=	70.25	mm/hr
Intensity (100 Year Event)	I_{100}=	119.95	mm/hr

100 year Intensity = 1735.688 / (Time in min + 6.014) $^{0.820}$
5 year Intensity = 998.071 / (Time in min + 6.053) $^{0.814}$
2 year Intensity = 732.951 / (Time in min + 6.199) $^{0.810}$

Equations:
Flow Equation
Q = 2.78 x C x I x A
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

PROJECT #: 112142
PROJECT NAME: 141 George Street / 110 York Street
LOCATION: City of Ottawa

NOVATECH
Engineers, Planners & Landscape Architects

DATE PREPARED:June 8, 2023
Revised: Aug 21, 2023
Revised: Sept 12, 2023
Revised: Jan 23,2025
Rev: June 23rd, 2025

TABLE 2A: Post-Development Runoff Coefficient "C" - D-01 - Uncontrolled Flow

Area	Surface	Ha	"C"	C_{avg}	*C_{100}
Total	Hard	0.011	0.90	0.90	1.00
0.011	Soft	0.000	0.20		

Runoff Coefficient Equation

$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

TABLE 2B: Post-Development D-01 Flows

Outlet Options	Area (ha)	C_{avg}	Tc (min)	$Q_{2\ Year}$ (L/s)	$Q_{5\ Year}$ (L/s)	$Q_{100\ Year}$ (L/s)
George Street	0.011	0.90	10	**2.2**	**2.9**	**5.6**

Time of Concentration	Tc=	10	min
Intensity (2 Year Event)	I_2=	76.81	mm/hr
Intensity (5 Year Event)	I_5=	104.19	mm/hr
Intensity (100 Year Event)	I_{100}=	178.56	mm/hr

100 year Intensity = 1735.688 / (Time in min + 6.014) $^{0.820}$
5 year Intensity = 998.071 / (Time in min + 6.053) $^{0.814}$
2 year Intensity = 732.951 / (Time in min + 6.199) $^{0.810}$

Equations:
Flow Equation
Q = 2.78 x C x I x A
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

TABLE 3A: Post-Development Runoff Coefficient "C" - D-02 - Uncontrolled Flow

Area	Surface	Ha	"C"	C_{avg}	*C_{100}
Total	Hard	0.009	0.90	0.90	1.00
0.009	Soft	0.000	0.20		

Runoff Coefficient Equation

$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

TABLE 3B: Post-Development D-02 Flows

Outlet Options	Area (ha)	C_{avg}	Tc (min)	$Q_{2\ Year}$ (L/s)	$Q_{5\ Year}$ (L/s)	$Q_{100\ Year}$ (L/s)
George Street	0.009	0.90	10	**1.8**	**2.4**	**4.7**

Time of Concentration	Tc=	10	min
Intensity (2 Year Event)	I_2=	76.81	mm/hr
Intensity (5 Year Event)	I_5=	104.19	mm/hr
Intensity (100 Year Event)	I_{100}=	178.56	mm/hr

100 year Intensity = 1735.688 / (Time in min + 6.014) $^{0.820}$
5 year Intensity = 998.071 / (Time in min + 6.053) $^{0.814}$
2 year Intensity = 732.951 / (Time in min + 6.199) $^{0.810}$

Equations:
Flow Equation
Q = 2.78 x C x I x A
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

TABLE 4A: Post-Development Runoff Coefficient "C" - A-03 - Uncontrolled Flow

Area	Surface	Ha	"C"	C_{avg}	*C_{100}
Total	Hard	0.012	0.90	0.90	1.00
0.012	Soft	0.000	0.20		

Runoff Coefficient Equation

$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

TABLE 4B: Post-Development A-03 Flows

Outlet Options	Area (ha)	C_{avg}	Tc (min)	$Q_{2\ Year}$ (L/s)	$Q_{5\ Year}$ (L/s)	$Q_{100\ Year}$ (L/s)
York Street	0.012	0.90	10	**2.4**	**3.2**	**6.1**

Time of Concentration	Tc=	10	min
Intensity (2 Year Event)	I_2=	76.81	mm/hr
Intensity (5 Year Event)	I_5=	104.19	mm/hr
Intensity (100 Year Event)	I_{100}=	178.56	mm/hr

100 year Intensity = 1735.688 / (Time in min + 6.014) $^{0.820}$
5 year Intensity = 998.071 / (Time in min + 6.053) $^{0.814}$
2 year Intensity = 732.951 / (Time in min + 6.199) $^{0.810}$

Equations:
Flow Equation
Q = 2.78 x C x I x A
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

TABLE 5A: Post-Development Runoff Coefficient "C" - A-04 - Uncontrolled Flow

Area	Surface	Ha	"C"	C_{avg}	$*C_{100}$
Total	Hard	0.013	0.90	0.90	1.00
0.013	Soft	0.000	0.20		

Runoff Coefficient Equation

$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

TABLE 5B: Post-Development A-04 Flows

Outlet Options	Area (ha)	C_{avg}	Tc (min)	$Q_{2\ Year}$ (L/s)	$Q_{5\ Year}$ (L/s)	$Q_{100\ Year}$ (L/s)
York Street	0.013	0.90	10	**2.5**	**3.4**	**6.6**

Time of Concentration	Tc=	10	min
Intensity (2 Year Event)	I_2=	76.81	mm/hr
Intensity (5 Year Event)	I_5=	104.19	mm/hr
Intensity (100 Year Event)	I_{100}=	178.56	mm/hr

100 year Intensity = 1735.688 / (Time in min + 6.014) $^{0.820}$
5 year Intensity = 998.071 / (Time in min + 6.053) $^{0.814}$
2 year Intensity = 732.951 / (Time in min + 6.199) $^{0.810}$

Equations:
Flow Equation
Q = 2.78 x C x I x A
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

TABLE 6A: Post-Development Runoff Coefficient "C" - R-01

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	$*C_{avg}$
Total	Hard	0.000	0.90	0.90	1.00	1.00
0.012	Roof	0.012	0.90		1.00	
	Soft	0.000	0.20		0.25	

TABLE 6B: 2 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-01

0.012 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
2 YEAR	10	76.81	2.25	0.631	1.61	0.97
	15	61.77	1.81	0.631	1.18	1.06
	20	**52.03**	**1.52**	**0.631**	**0.89**	**1.07**
	25	45.17	1.32	0.631	0.69	1.03
	30	40.04	1.17	0.631	0.54	0.97

TABLE 6C: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-01

0.0116855 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	15	83.56	2.44	0.655	1.79	1.61
	20	70.25	2.05	0.655	1.40	1.68
	25	**60.90**	**1.78**	**0.655**	**1.13**	**1.69**
	30	53.93	1.58	0.655	0.92	1.66
	35	48.52	1.42	0.655	0.76	1.60

TABLE 6D: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-01

0.0116855 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	30	91.87	2.98	0.737	2.25	4.04
	35	82.58	2.68	0.74	1.95	4.08
	40	**75.15**	**2.44**	**0.74**	**1.70**	**4.09**
	45	69.05	2.24	0.74	1.51	4.07
	50	63.95	2.08	0.74	1.34	4.02

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

TABLE 6E: Storage Provided - R-01

Area R-01: Storage Table			
Head (m)	Area* (m^2)	Storage Volume (m^3)	
0.000	0.010	0.00	
0.025	12.820	0.16	
0.050	55.038	1.01	
0.075	105.600	3.02	
0.100	105.600	5.66	
0.125	104.600	8.28	
0.150	105.600	10.91	

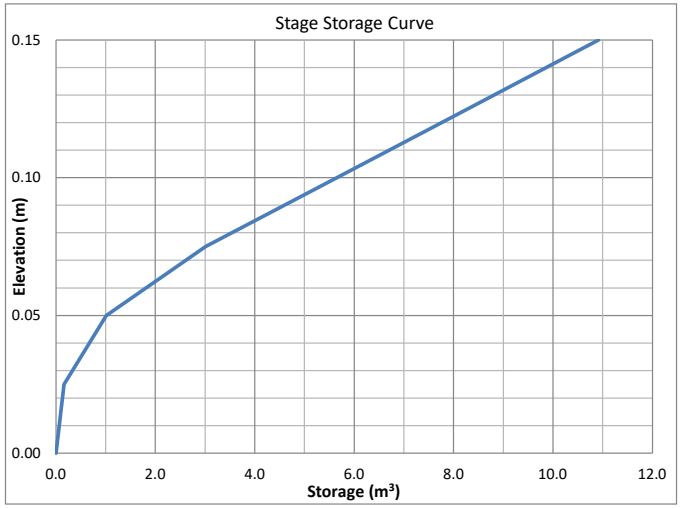


Table 6F: Roof Drain Flows

Roof Drains		
Roof Area	116.855	m²
Qty	1	
Type	Accutrol RD-100-A-ADJ	
Setting	1/4 Open	
Design Head	0.05-0.15	m
Design Flow 1" of head	0.32	L/s (ea)
Design Flow 2" of head	0.63	L/s (ea)
Design Flow 3" of head	0.71	L/s (ea)
Design Flow 4" of head	0.79	L/s (ea)
Design Flow 5" of head	0.87	L/s (ea)
Design Flow 6" of head	0.95	L/s (ea)

Table 6G: Total Roof Storage

Design Event	Roof Drain ID	Flow (L/S)	Head m	Required Volume
2 Year	R-01	0.607	0.051	1.07
5 Year		0.655	0.059	1.69
100 Year		0.737	0.085	4.09

TABLE 7A: Post-Development Runoff Coefficient "C" - R-02

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	$*C_{avg}$
Total	Hard	0.000	0.90	0.90	1.00	1.00
0.012	Roof	0.012	0.90		1.00	
	Soft	0.000	0.20		0.25	

TABLE 7B: 2 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-02

0.012 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
2 YEAR	10	76.81	2.29	0.631	1.66	1.00
	15	61.77	1.84	0.631	1.21	1.09
	20	**52.03**	**1.55**	**0.631**	**0.92**	**1.11**
	25	45.17	1.35	0.631	0.72	1.08
	30	40.04	1.20	0.631	0.56	1.02

TABLE 7C: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-02

0.0119368 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	15	83.56	2.50	0.655	1.84	1.66
	20	70.25	2.10	0.655	1.44	1.73
	25	**60.90**	**1.82**	**0.655**	**1.16**	**1.75**
	30	53.93	1.61	0.655	0.96	1.72
	35	48.52	1.45	0.655	0.79	1.67

TABLE 7D: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-02

0.0119368 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	30	91.87	3.05	0.738	2.31	4.16
	35	82.58	2.74	0.74	2.00	4.20
	40	**75.15**	**2.49**	**0.74**	**1.76**	**4.21**
	45	69.05	2.29	0.74	1.55	4.19
	50	63.95	2.12	0.74	1.38	4.15

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

TABLE 7E: Storage Provided - R-02

Area R-02: Storage Table			
Head (m)	Area* (m^2)	Storage Volume (m^3)	
0.000	0.010	0.00	
0.025	13.151	0.16	
0.050	56.544	1.04	
0.075	108.336	3.10	
0.100	108.336	5.81	
0.125	108.336	8.51	
0.150	108.336	11.22	

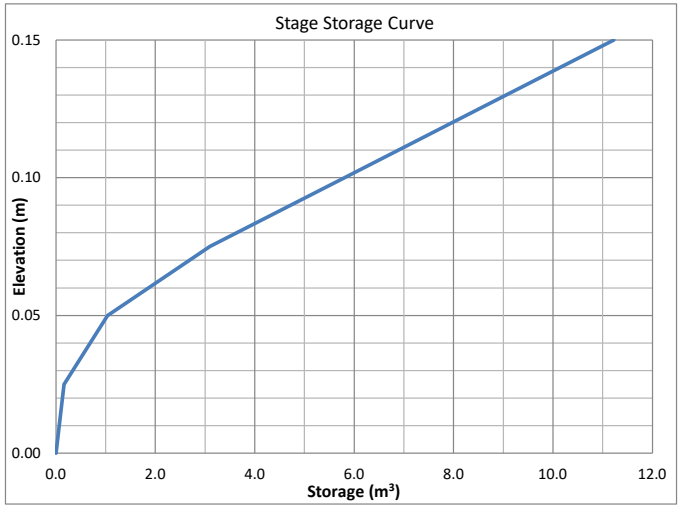


Table 7F: Roof Drain Flows

Roof Drains		
Roof Area	119.368	m²
Qty	1	
Type	Accutrol RD-100-A-ADJ	
Setting	1/4 Open	
Design Head	0.05-0.15	m
Design Flow 1" of head	0.32	L/s (ea)
Design Flow 2" of head	0.63	L/s (ea)
Design Flow 3" of head	0.71	L/s (ea)
Design Flow 4" of head	0.79	L/s (ea)
Design Flow 5" of head	0.87	L/s (ea)
Design Flow 6" of head	0.95	L/s (ea)

Table 7G: Total Roof Storage

Design Event	Roof Drain ID	Flow (L/S)	Head m	Required Volume
2 Year	R-02	0.6325	0.051	1.11
5 Year		0.654	0.059	1.75
100 Year		0.738	0.850	4.21

TABLE 8A: Post-Development Runoff Coefficient "C" - R-03

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	$*C_{avg}$
Total	Hard	0.000	0.90	0.90	1.00	1.00
0.008	Roof	0.008	0.90		1.00	
	Soft	0.000	0.20		0.25	

TABLE 8B: 2 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-03

0.008 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
2 YEAR	0	167.22	3.22	0.618	2.61	0.00
	5	103.57	2.00	0.618	1.38	0.41
	10	**76.81**	**1.48**	**0.618**	**0.86**	**0.52**
	15	61.77	1.19	0.618	0.57	0.52
	20	52.03	1.00	0.618	0.39	0.46

TABLE 8C: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-01

0.0077067 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	5	141.18	2.72	0.646	2.08	0.62
	10	104.19	2.01	0.646	1.36	0.82
	15	**83.56**	**1.61**	**0.646**	**0.96**	**0.87**
	20	70.25	1.35	0.646	0.71	0.85
	25	60.90	1.17	0.646	0.53	0.79

TABLE 8D: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-03

0.0077067 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	15	142.89	3.06	0.726	2.34	2.10
	20	119.95	2.57	0.73	1.84	2.21
	25	**103.85**	**2.22**	**0.73**	**1.50**	**2.25**
	30	91.87	1.97	0.73	1.24	2.24
	35	82.58	1.77	0.73	1.04	2.19

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

TABLE 8E: Storage Provided - R-03

Area R-03: Storage Table			
Head (m)	Area* (m^2)	Storage Volume (m^3)	
0.000	0.010	0.00	
0.025	7.880	0.10	
0.050	30.944	0.58	
0.075	67.975	1.82	
0.100	67.975	3.52	
0.125	67.975	5.22	
0.150	67.975	6.92	

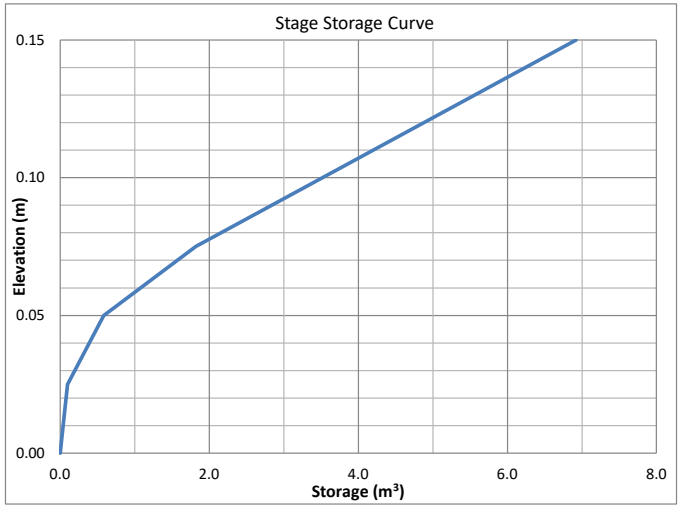


Table 8F: Roof Drain Flows

Roof Drains		
Roof Area	77.067	m²
Qty	1	
Type	Accutrol RD-100-A-ADJ	
Setting	1/4 Open	
Design Head	0.05-0.15	m
Design Flow 1" of head	0.32	L/s (ea)
Design Flow 2" of head	0.63	L/s (ea)
Design Flow 3" of head	0.71	L/s (ea)
Design Flow 4" of head	0.79	L/s (ea)
Design Flow 5" of head	0.87	L/s (ea)
Design Flow 6" of head	0.95	L/s (ea)

Table 8G: Total Roof Storage

Design Event	Roof Drain ID	Flow (L/S)	Head m	Required Volume
2 Year	R-03	0.618	0.047	0.52
5 Year		0.646	0.056	0.87
100 Year		0.726	0.080	2.25

TABLE 9A: Post-Development Runoff Coefficient "C" - R-04

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	$*C_{avg}$
Total	Hard	0.000	0.90	0.90	1.00	1.00
0.009	Roof	0.009	0.90		1.00	
	Soft	0.000	0.20		0.25	

TABLE 9B: 2 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-04

0.009 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
2 YEAR	5	103.57	2.43	0.650	1.78	0.53
	10	76.81	1.80	0.650	1.15	0.69
	15	**61.77**	**1.45**	**0.650**	**0.80**	**0.72**
	20	52.03	1.22	0.650	0.57	0.68
	25	45.17	1.06	0.650	0.41	0.61

TABLE 9C: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-04

0.0093675 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	10	104.19	2.44	0.684	1.76	1.05
	15	83.56	1.96	0.684	1.27	1.15
	20	**70.25**	**1.65**	**0.684**	**0.96**	**1.15**
	25	60.90	1.43	0.684	0.74	1.11
	30	53.93	1.26	0.684	0.58	1.04

TABLE 9D: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-04

0.0093675 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	20	119.95	3.12	0.773	2.35	2.82
	25	103.85	2.70	0.77	1.93	2.90
	30	**91.87**	**2.39**	**0.77**	**1.62**	**2.91**
	35	82.58	2.15	0.77	1.38	2.89
	40	75.15	1.96	0.77	1.18	2.84

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

TABLE 9E: Storage Provided - R-04

Area R-04: Storage Table			
Head (m)	Area* (m^2)	Storage Volume (m^3)	
0.000	0.010	0.00	
0.025	5.809	0.07	
0.050	24.334	0.45	
0.075	54.153	1.43	
0.100	83.872	3.16	
0.125	83.872	5.25	
0.150	83.872	7.35	

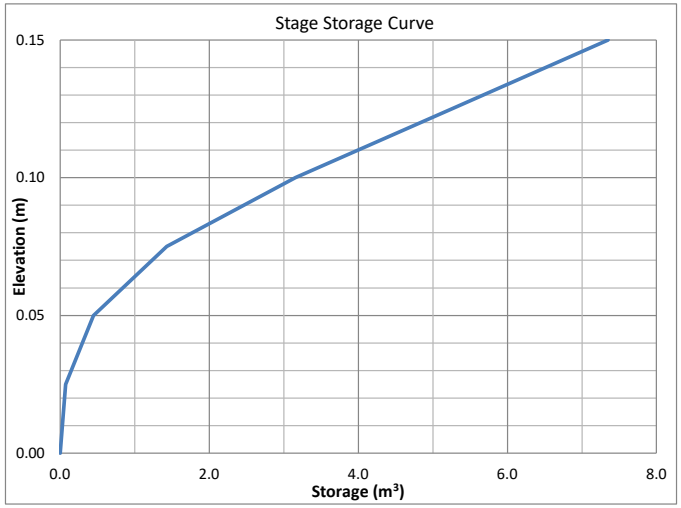


Table 9F: Roof Drain Flows

Roof Drains		
Roof Area	93.675	m²
Qty	1	
Type	Accutrol RD-100-A-ADJ	
Setting	1/4 Open	
Design Head	0.05-0.15	m
Design Flow 1" of head	0.32	L/s (ea)
Design Flow 2" of head	0.63	L/s (ea)
Design Flow 3" of head	0.71	L/s (ea)
Design Flow 4" of head	0.79	L/s (ea)
Design Flow 5" of head	0.87	L/s (ea)
Design Flow 6" of head	0.95	L/s (ea)

Table 9G: Total Roof Storage

Design Event	Roof Drain ID	Flow (L/S)	Head m	Required Volume
2 Year	R-04	0.6497	0.057	0.72
5 Year		0.684	0.068	1.15
100 Year		0.773	0.097	2.91

TABLE 10A: Post-Development Runoff Coefficient "C" - R-05

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	$*C_{avg}$
Total	Hard	0.000	0.90	0.90	1.00	1.00
0.009	Roof	0.009	0.90		1.00	
	Soft	0.000	0.20		0.25	

TABLE 10B: 2 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-05

0.009 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
2 YEAR	5	103.57	2.29	0.663	1.63	0.49
	10	76.81	1.70	0.663	1.03	0.62
	15	**61.77**	**1.36**	**0.663**	**0.70**	**0.63**
	20	52.03	1.15	0.663	0.49	0.58
	25	45.17	1.00	0.663	0.33	0.50

TABLE 10C: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-05

0.0088296 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	5	141.18	3.12	0.706	2.41	0.72
	10	104.19	2.30	0.706	1.60	0.96
	15	**83.56**	**1.85**	**0.706**	**1.14**	**1.03**
	20	70.25	1.55	0.706	0.85	1.02
	25	60.90	1.35	0.706	0.64	0.96

TABLE 10D: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-05

0.0088296 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	15	142.89	3.51	0.789	2.72	2.45
	20	119.95	2.94	0.79	2.16	2.59
	25	**103.85**	**2.55**	**0.79**	**1.76**	**2.64**
	30	91.87	2.26	0.79	1.47	2.64
	35	82.58	2.03	0.79	1.24	2.60

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

TABLE 10E: Storage Provided - R-05

Area R-05: Storage Table			
Head (m)	Area* (m^2)	Storage Volume (m^3)	
0.000	0.010	0.00	
0.025	4.190	0.05	
0.050	17.102	0.32	
0.075	39.242	1.02	
0.100	79.826	2.51	
0.125	79.826	4.51	
0.150	79.826	6.50	

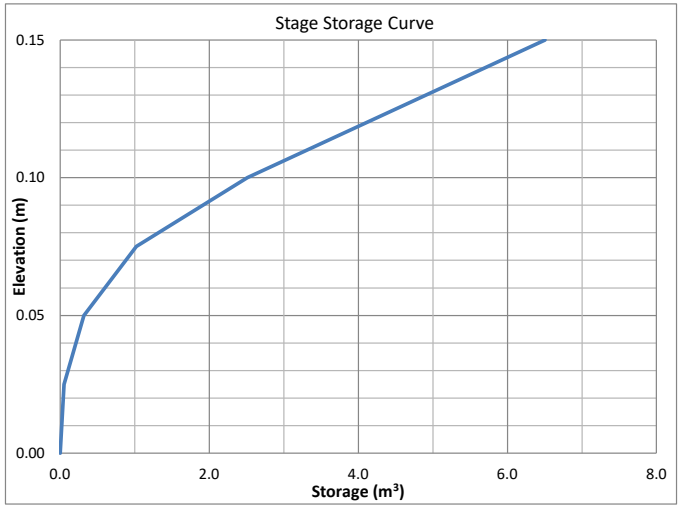


Table 10F: Roof Drain Flows

Roof Drains		
Roof Area	88.296	m²
Qty	1	
Type	Accutrol RD-100-A-ADJ	
Setting	1/4 Open	
Design Head	0.05-0.15	m
Design Flow 1" of head	0.32	L/s (ea)
Design Flow 2" of head	0.63	L/s (ea)
Design Flow 3" of head	0.71	L/s (ea)
Design Flow 4" of head	0.79	L/s (ea)
Design Flow 5" of head	0.87	L/s (ea)
Design Flow 6" of head	0.95	L/s (ea)

Table 10G: Total Roof Storage

Design Event	Roof Drain ID	Flow (L/S)	Head m	Required Volume
2 Year	R-05	0.32	0.061	0.63
5 Year		0.706	0.075	1.03
100 Year		0.789	0.102	2.64

TABLE 11A: Post-Development Runoff Coefficient "C" - R-06

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	$*C_{avg}$
Total	Hard	0.000	0.90	0.90	1.00	1.00
0.009	Roof	0.009	0.90		1.00	
	Soft	0.000	0.20		0.25	

TABLE 11B: 2 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-06

0.009 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
2 YEAR	5	103.57	2.31	0.692	1.62	0.49
	10	76.81	1.71	0.692	1.02	0.61
	15	**61.77**	**1.38**	**0.692**	**0.69**	**0.62**
	20	52.03	1.16	0.692	0.47	0.56
	25	45.17	1.01	0.692	0.32	0.47

TABLE 11C: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-06

0.0089127 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	5	141.18	3.15	0.721	2.43	0.73
	10	104.19	2.32	0.721	1.60	0.96
	15	**83.56**	**1.86**	**0.721**	**1.14**	**1.03**
	20	70.25	1.57	0.721	0.85	1.01
	25	60.90	1.36	0.721	0.64	0.96

TABLE 11D: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-06

0.0089127 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	15	142.89	3.54	0.798	2.74	2.47
	20	119.95	2.97	0.80	2.17	2.61
	25	**103.85**	**2.57**	**0.80**	**1.77**	**2.66**
	30	91.87	2.28	0.80	1.48	2.66
	35	82.58	2.05	0.80	1.25	2.62

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

TABLE 11E: Storage Provided - R-06

Area R-06: Storage Table			
Head (m)	Area* (m^2)	Storage Volume (m^3)	
0.000	0.010	0.00	
0.025	9.149	0.11	
0.050	40.246	0.73	
0.075	82.678	2.27	
0.100	82.678	4.34	
0.125	82.678	6.40	
0.150	82.678	8.47	

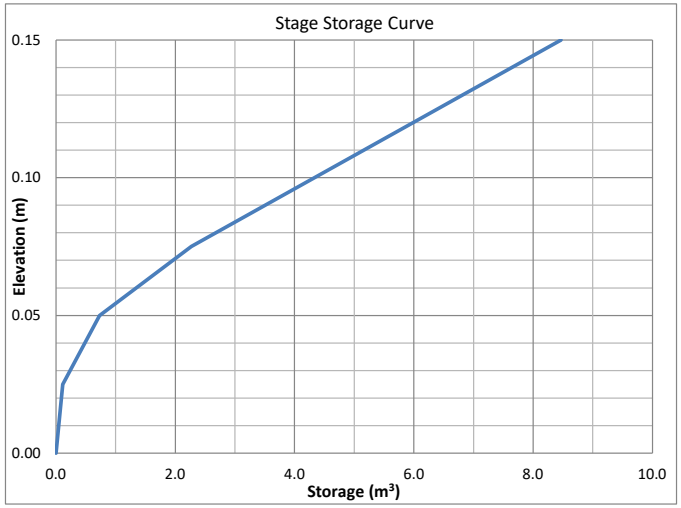


Table 11F: Roof Drain Flows

Roof Drains		
Roof Area	89.127	m²
Qty	1	
Type	Accutrol RD-100-A-ADJ	
Setting	1/4 Open	
Design Head	0.05-0.15	m
Design Flow 1" of head	0.32	L/s (ea)
Design Flow 2" of head	0.63	L/s (ea)
Design Flow 3" of head	0.71	L/s (ea)
Design Flow 4" of head	0.79	L/s (ea)
Design Flow 5" of head	0.87	L/s (ea)
Design Flow 6" of head	0.95	L/s (ea)

Table 11G: Total Roof Storage

Design Event	Roof Drain ID	Flow (L/S)	Head m	Required Volume
2 Year	R-06	0.32	0.070	0.62
5 Year		0.721	0.080	1.03
100 Year		0.798	0.105	2.66

TABLE 12A: Post-Development Runoff Coefficient "C" - R-07

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	$^*C_{avg}$
Total	Hard	0.000	0.90		1.00	
0.004	Roof	0.004	0.90	0.90	1.00	1.00
	Soft	0.000	0.20		0.25	

TABLE 12B: 2 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-07

0.004 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
2 YEAR	0	167.22	1.55	0.370	1.18	0.00
	5	103.57	0.96	0.370	0.59	0.18
	10	**76.81**	**0.71**	**0.370**	**0.34**	**0.20**
	15	61.77	0.57	0.370	0.20	0.18
	20	52.03	0.48	0.370	0.11	0.13

TABLE 12C: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-07

0.0036989 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	0	230.48	2.13	0.435	1.70	0.00
	5	141.18	1.31	0.435	0.87	0.26
	10	**104.19**	**0.96**	**0.435**	**0.53**	**0.32**
	15	83.56	0.77	0.435	0.34	0.30
	20	70.25	0.65	0.435	0.21	0.26

TABLE 12D: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-07

0.0036989 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	5	242.70	2.50	0.639	1.86	0.56
	10	178.56	1.84	0.64	1.20	0.72
	15	**142.89**	**1.47**	**0.64**	**0.83**	**0.75**
	20	119.95	1.23	0.64	0.59	0.71
	25	103.85	1.07	0.64	0.43	0.64

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

TABLE 12E: Storage Provided - R-07

Area R-07: Storage Table			
Head (m)	Area* (m^2)	Storage Volume (m^3)	
0.000	0.010	0.00	
0.025	9.215	0.12	
0.050	32.340	0.63	
0.075	32.340	1.44	
0.100	32.340	2.25	
0.125	32.340	3.06	
0.150	32.340	3.87	

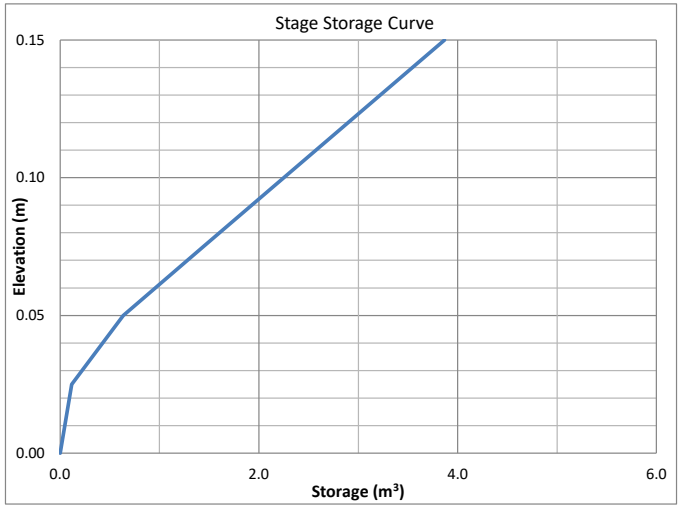


Table 12F: Roof Drain Flows

Roof Drains		
Roof Area	36.989	m²
Qty	1	
Type	Accutrol RD-100-A-ADJ	
Setting	1/4 Open	
Design Head	0.05-0.15	m
Design Flow 1" of head	0.32	L/s (ea)
Design Flow 2" of head	0.63	L/s (ea)
Design Flow 3" of head	0.71	L/s (ea)
Design Flow 4" of head	0.79	L/s (ea)
Design Flow 5" of head	0.87	L/s (ea)
Design Flow 6" of head	0.95	L/s (ea)

Table 12G: Total Roof Storage

Design Event	Roof Drain ID	Flow (L/S)	Head m	Required Volume
2 Year	R-07	0.369	0.029	0.20
5 Year		0.435	0.035	0.32
100 Year		0.639	0.053	0.75

TABLE 13A: Post-Development Runoff Coefficient "C" - R-08

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	$^*C_{avg}$
Total	Hard	0.000	0.90		1.00	
0.007	Roof	0.007	0.90	0.90	1.00	1.00
	Soft	0.000	0.20		0.25	

TABLE 13B: 2 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-08

0.007 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
2 YEAR	5	103.57	1.93	0.560	1.37	0.41
	10	76.81	1.43	0.560	0.87	0.52
	15	**61.77**	**1.15**	**0.560**	**0.59**	**0.53**
	20	52.03	0.97	0.560	0.41	0.49
	25	45.17	0.84	0.560	0.28	0.42

TABLE 13C: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-08

0.0074508 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	5	141.18	2.63	0.639	1.99	0.60
	10	104.19	1.94	0.639	1.30	0.78
	15	**83.56**	**1.56**	**0.639**	**0.92**	**0.83**
	20	70.25	1.31	0.639	0.67	0.80
	25	60.90	1.14	0.639	0.50	0.74

TABLE 13D: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-08

0.0074508 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	15	142.89	2.96	0.713	2.25	2.02
	20	119.95	2.48	0.71	1.77	2.13
	25	**103.85**	**2.15**	**0.71**	**1.44**	**2.16**
	30	91.87	1.90	0.71	1.19	2.14
	35	82.58	1.71	0.71	1.00	2.09

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

TABLE 13E: Storage Provided - R-08

Area R-08: Storage Table			
Head (m)	Area* (m^2)	Storage Volume (m^3)	
0.000	0.010	0.00	
0.025	8.436	0.11	
0.050	34.359	0.64	
0.075	73.346	1.99	
0.100	73.346	3.82	
0.125	73.346	5.65	
0.150	73.346	7.49	

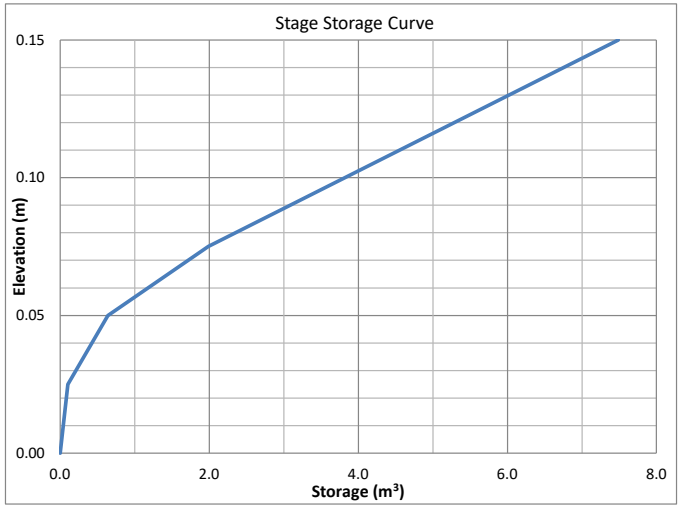


Table 13F: Roof Drain Flows

Roof Drains		
Roof Area	74.508	m²
Qty	1	
Type	Accutrol RD-100-A-ADJ	
Setting	1/4 Open	
Design Head	0.05-0.15	m
Design Flow 1" of head	0.32	L/s (ea)
Design Flow 2" of head	0.63	L/s (ea)
Design Flow 3" of head	0.71	L/s (ea)
Design Flow 4" of head	0.79	L/s (ea)
Design Flow 5" of head	0.87	L/s (ea)
Design Flow 6" of head	0.95	L/s (ea)

Table 13G: Total Roof Storage

Design Event	Roof Drain ID	Flow (L/S)	Head m	Required Volume
2 Year	R-08	0.5597	0.045	0.53
5 Year		0.639	0.054	0.83
100 Year		0.713	0.077	2.16

TABLE 14A: Post-Development Runoff Coefficient "C" - R-09

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	$^*C_{avg}$
Total	Hard	0.000	0.90		1.00	
0.013	Roof	0.013	0.90	0.90	1.00	1.00
	Soft	0.000	0.20		0.25	

TABLE 14B: 2 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-09

0.013 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
2 YEAR	10	76.81	2.54	0.661	1.88	1.13
	15	61.77	2.04	0.661	1.38	1.24
	20	**52.03**	**1.72**	**0.661**	**1.06**	**1.27**
	25	45.17	1.49	0.661	0.83	1.25
	30	40.04	1.32	0.661	0.66	1.19

TABLE 14C: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-09

0.013 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	15	83.56	2.76	0.698	2.06	1.86
	20	70.25	2.32	0.698	1.62	1.95
	25	**60.90**	**2.01**	**0.698**	**1.31**	**1.97**
	30	53.93	1.78	0.698	1.08	1.95
	35	48.52	1.60	0.698	0.90	1.90

TABLE 14D: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-09

0.013 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	30	91.87	3.37	0.785	2.59	4.65
	35	82.58	3.03	0.78	2.25	4.71
	40	**75.15**	**2.76**	**0.78**	**1.97**	**4.73**
	45	69.05	2.53	0.78	1.75	4.72
	50	63.95	2.35	0.78	1.56	4.69

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

TABLE 14E: Storage Provided - R-09

Area R-09: Storage Table			
Head (m)	Area* (m^2)	Storage Volume (m^3)	
0.000	0.010	0.00	
0.025	8.618	0.11	
0.050	35.024	0.65	
0.075	81.954	2.12	
0.100	124.720	4.70	
0.125	124.720	7.82	
0.150	124.720	10.94	

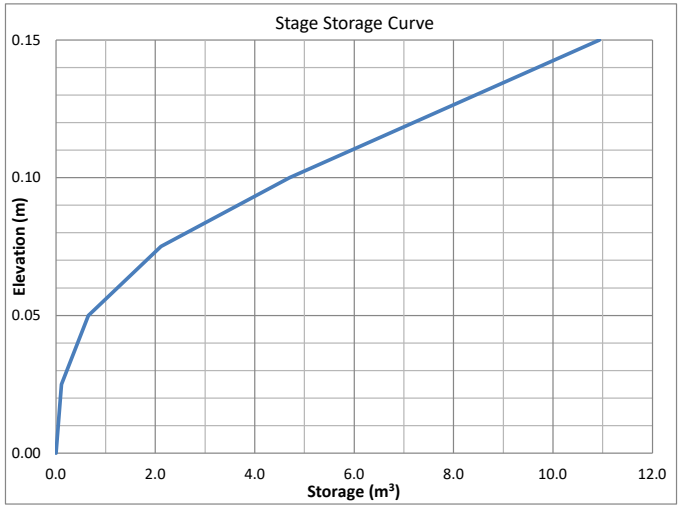


Table 14F: Roof Drain Flows

Roof Drains		
Roof Area	131.987	m²
Qty	1	
Type	Accutrol RD-100-A-ADJ	
Setting	1/4 Open	
Design Head	0.05-0.15	m
Design Flow 1" of head	0.32	L/s (ea)
Design Flow 2" of head	0.63	L/s (ea)
Design Flow 3" of head	0.71	L/s (ea)
Design Flow 4" of head	0.79	L/s (ea)
Design Flow 5" of head	0.87	L/s (ea)
Design Flow 6" of head	0.95	L/s (ea)

Table 14G: Total Roof Storage

Design Event	Roof Drain ID	Flow (L/S)	Head m	Required Volume
2 Year	R-09	0.661	0.061	1.27
5 Year		0.698	0.072	1.97
100 Year		0.785	0.100	4.73

TABLE 15A: Post-Development Runoff Coefficient "C" - R-10

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	$^*C_{avg}$
Total	Hard	0.000	0.90		1.00	
0.012	Roof	0.012	0.90	0.90	1.00	1.00
	Soft	0.000	0.20		0.25	

TABLE 15B: 2 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-10

0.012 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
2 YEAR	10	76.81	2.24	0.656	1.58	0.95
	15	61.77	1.80	0.656	1.14	1.03
	20	**52.03**	**1.52**	**0.656**	**0.86**	**1.03**
	25	45.17	1.32	0.656	0.66	0.99
	30	40.04	1.17	0.656	0.51	0.92

TABLE 15C: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-10

0.012 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	10	104.19	3.03	0.691	2.34	1.41
	15	83.56	2.43	0.691	1.74	1.57
	20	**70.25**	**2.05**	**0.691**	**1.35**	**1.63**
	25	60.90	1.77	0.691	1.08	1.62
	30	53.93	1.57	0.691	0.88	1.58

TABLE 15D: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-10

0.012 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	25	103.85	3.36	0.777	2.58	3.87
	30	91.87	2.97	0.777	2.20	3.95
	35	**82.58**	**2.67**	**0.777**	**1.90**	**3.98**
	40	75.15	2.43	0.777	1.65	3.97
	45	69.05	2.23	0.777	1.46	3.93

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

TABLE 15E: Storage Provided - R-10

Area R-10: Storage Table			
Head (m)	Area* (m^2)	Storage Volume (m^3)	
0.000	0.010	0.00	
0.025	7.630	0.10	
0.050	31.075	0.58	
0.075	72.725	1.88	
0.100	109.866	4.16	
0.125	109.866	6.91	
0.150	109.866	9.65	

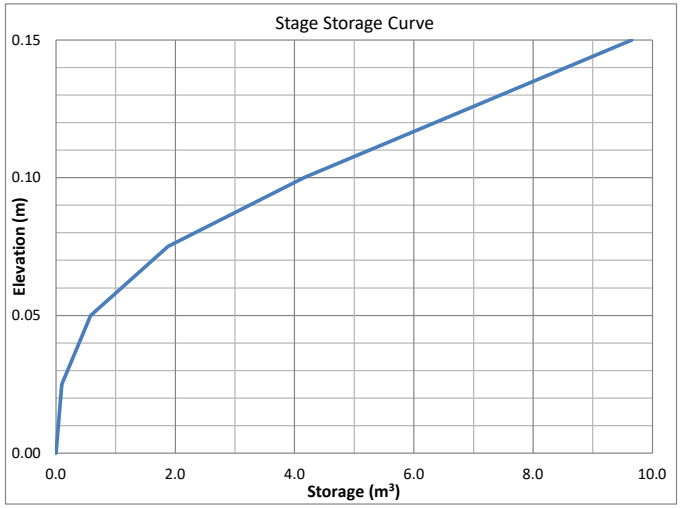


Table 15F: Roof Drain Flows

Roof Drains		
Roof Area	116.393	m^2
Qty	1	
Type	Accutrol RD-100-A-ADJ	
Setting	1/4 Open	
Design Head	0.05-0.15	m
Design Flow 1" of head	0.32	L/s (ea)
Design Flow 2" of head	0.63	L/s (ea)
Design Flow 3" of head	0.71	L/s (ea)
Design Flow 4" of head	0.79	L/s (ea)
Design Flow 5" of head	0.87	L/s (ea)
Design Flow 6" of head	0.95	L/s (ea)

Table 15G: Total Roof Storage

Design Event	Roof Drain ID	Flow (L/S)	Head m	Required Volume
2 Year	R-10	0.656	0.059	1.03
5 Year		0.691	0.070	1.63
100 Year		0.777	0.098	3.98

TABLE 16A: Post-Development Runoff Coefficient "C" - R-11

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	$^*C_{avg}$
Total	Hard	0.000	0.90		1.00	
0.007	Roof	0.007	0.90	0.90	1.00	1.00
	Soft	0.000	0.20		0.25	

TABLE 16B: 2 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-11

0.007 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
2 YEAR	5	103.57	1.91	0.557	1.36	0.41
	10	76.81	1.42	0.557	0.86	0.52
	15	**61.77**	**1.14**	**0.557**	**0.58**	**0.53**
	20	52.03	0.96	0.557	0.40	0.48
	25	45.17	0.83	0.557	0.28	0.42

TABLE 16C: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-11

0.007 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	5	141.18	2.61	0.639	1.97	0.59
	10	104.19	1.92	0.639	1.29	0.77
	15	**83.56**	**1.54**	**0.639**	**0.90**	**0.81**
	20	70.25	1.30	0.639	0.66	0.79
	25	60.90	1.12	0.639	0.49	0.73

TABLE 16D: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-11

0.007 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	15	142.89	2.93	0.714	2.22	2.00
	20	119.95	2.46	0.71	1.75	2.10
	25	**103.85**	**2.13**	**0.71**	**1.42**	**2.13**
	30	91.87	1.88	0.71	1.17	2.11
	35	82.58	1.69	0.71	0.98	2.06

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

TABLE 16E: Storage Provided - R-11

Area R-11: Storage Table			
Head (m)	Area* (m^2)	Storage Volume (m^3)	
0.000	0.010	0.00	
0.025	8.209	0.10	
0.050	34.700	0.64	
0.075	70.570	1.95	
0.100	70.570	3.72	
0.125	70.570	5.48	
0.150	70.570	7.25	

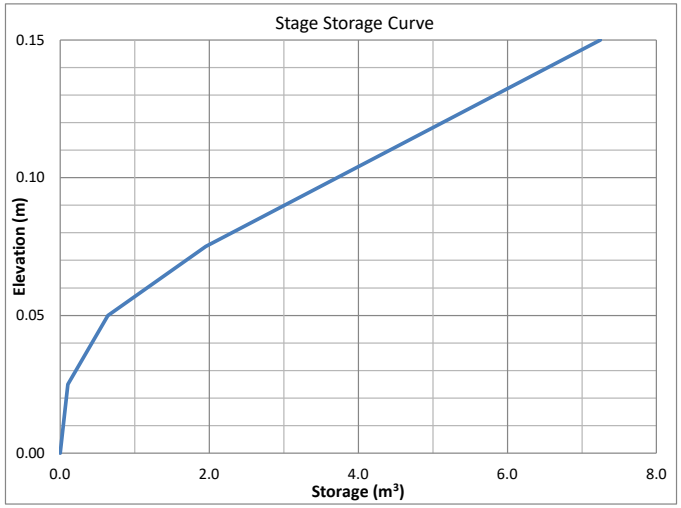


Table 16F: Roof Drain Flows

Roof Drains		
Roof Area	73.802	m²
Qty	1	
Type	Accutrol RD-100-A-ADJ	
Setting	1/4 Open	
Design Head	0.05-0.15	m
Design Flow 1" of head	0.32	L/s (ea)
Design Flow 2" of head	0.63	L/s (ea)
Design Flow 3" of head	0.71	L/s (ea)
Design Flow 4" of head	0.79	L/s (ea)
Design Flow 5" of head	0.87	L/s (ea)
Design Flow 6" of head	0.95	L/s (ea)

Table 16G: Total Roof Storage

Design Event	Roof Drain ID	Flow (L/S)	Head m	Required Volume
2 Year	R-11	0.557	0.045	0.53
5 Year		0.639	0.053	0.81
100 Year		0.714	0.077	2.13

TABLE 17A: Post-Development Runoff Coefficient "C" - R-12

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	$^*C_{avg}$
Total	Hard	0.000	0.90		1.00	
0.012	Roof	0.012	0.90	0.90	1.00	1.00
	Soft	0.000	0.20		0.25	

TABLE 17B: 2 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-12

0.012 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
2 YEAR	10	76.81	2.32	0.660	1.66	1.00
	15	61.77	1.87	0.660	1.21	1.09
	20	**52.03**	**1.57**	**0.660**	**0.91**	**1.10**
	25	45.17	1.37	0.660	0.71	1.06
	30	40.04	1.21	0.660	0.55	0.99

TABLE 17C: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-12

0.012 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	15	83.56	2.53	0.697	1.83	1.65
	20	70.25	2.13	0.697	1.43	1.71
	25	**60.90**	**1.84**	**0.697**	**1.15**	**1.72**
	30	53.93	1.63	0.697	0.93	1.68
	35	48.52	1.47	0.697	0.77	1.62

TABLE 17D: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-12

0.012 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	30	91.87	3.09	0.785	2.30	4.15
	35	82.58	2.78	0.78	1.99	4.18
	40	**75.15**	**2.53**	**0.78**	**1.74**	**4.18**
	45	69.05	2.32	0.78	1.54	4.15
	50	63.95	2.15	0.78	1.37	4.10

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

TABLE 17E: Storage Provided - R-12

Area R-12: Storage Table			
Head (m)	Area* (m^2)	Storage Volume (m^3)	
0.000	0.010	0.00	
0.025	7.519	0.09	
0.050	31.253	0.58	
0.075	71.962	1.87	
0.100	109.125	4.13	
0.125	109.125	6.86	
0.150	109.125	9.59	

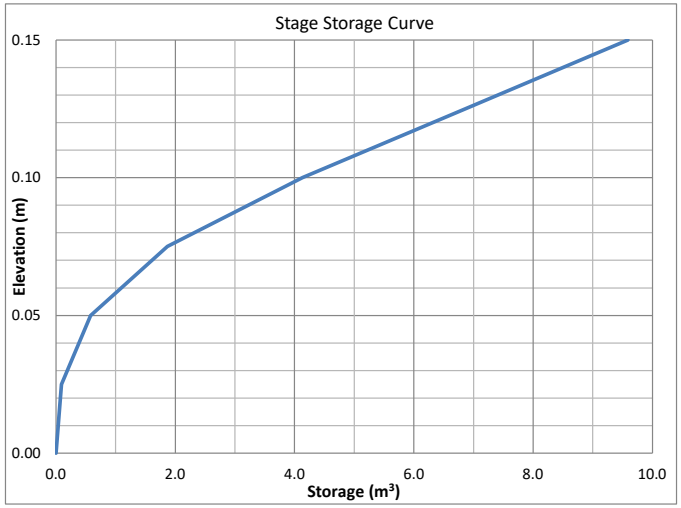


Table 17F: Roof Drain Flows

Roof Drains		
Roof Area	120.935	m²
Qty	1	
Type	Accutrol RD-100-A-ADJ	
Setting	1/4 Open	
Design Head	0.05-0.15	m
Design Flow 1" of head	0.32	L/s (ea)
Design Flow 2" of head	0.63	L/s (ea)
Design Flow 3" of head	0.71	L/s (ea)
Design Flow 4" of head	0.79	L/s (ea)
Design Flow 5" of head	0.87	L/s (ea)
Design Flow 6" of head	0.95	L/s (ea)

Table 17G: Total Roof Storage

Design Event	Roof Drain ID	Flow (L/S)	Head m	Required Volume
2 Year	R-12	0.660	0.060	1.10
5 Year		0.697	0.072	1.72
100 Year		0.785	0.100	4.18

TABLE 18A: Post-Development Runoff Coefficient "C" - R-13

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	$^*C_{avg}$
Total	Hard	0.000	0.90		1.00	
0.008	Roof	0.008	0.90	0.90	1.00	1.00
	Soft	0.000	0.20		0.25	

TABLE 18B: 2 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-13

0.008 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
2 YEAR	5	103.57	1.95	0.575	1.38	0.41
	10	76.81	1.45	0.575	0.87	0.52
	15	**61.77**	**1.16**	**0.575**	**0.59**	**0.53**
	20	52.03	0.98	0.575	0.41	0.49
	25	45.17	0.85	0.575	0.28	0.41

TABLE 18C: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-13

0.008 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	5	141.18	2.66	0.643	2.02	0.61
	10	104.19	1.96	0.643	1.32	0.79
	15	**83.56**	**1.57**	**0.643**	**0.93**	**0.84**
	20	70.25	1.32	0.643	0.68	0.82
	25	60.90	1.15	0.643	0.50	0.76

TABLE 18D: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-13

0.008 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	15	142.89	2.99	0.723	2.27	2.04
	20	119.95	2.51	0.72	1.79	2.15
	25	**103.85**	**2.17**	**0.72**	**1.45**	**2.18**
	30	91.87	1.92	0.72	1.20	2.16
	35	82.58	1.73	0.72	1.01	2.11

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

TABLE 18E: Storage Provided - R-13

Area R-13: Storage Table			
Head (m)	Area* (m^2)	Storage Volume (m^3)	
0.000	0.010	0.00	
0.025	7.795	0.10	
0.050	33.078	0.61	
0.075	63.769	1.82	
0.100	63.769	3.41	
0.125	63.769	5.01	
0.150	63.769	6.60	

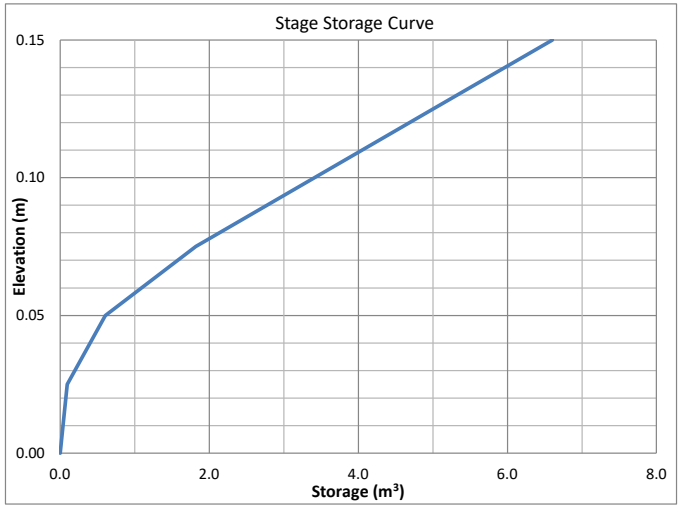


Table 18F: Roof Drain Flows

Roof Drains		
Roof Area	75.330	m²
Qty	1	
Type	Accutrol RD-100-A-ADJ	
Setting	1/4 Open	
Design Head	0.05-0.15	m
Design Flow 1" of head	0.32	L/s (ea)
Design Flow 2" of head	0.63	L/s (ea)
Design Flow 3" of head	0.71	L/s (ea)
Design Flow 4" of head	0.79	L/s (ea)
Design Flow 5" of head	0.87	L/s (ea)
Design Flow 6" of head	0.95	L/s (ea)

Table 18G: Total Roof Storage

Design Event	Roof Drain ID	Flow (L/S)	Head m	Required Volume
2 Year	R-13	0.575	0.046	0.53
5 Year		0.643	0.055	0.84
100 Year		0.723	0.081	2.18

TABLE 19A: Post-Development Runoff Coefficient "C" - R-14

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	$^*C_{avg}$
Total	Hard	0.000	0.90		1.00	
0.007	Roof	0.007	0.90	0.90	1.00	1.00
	Soft	0.000	0.20		0.25	

TABLE 19B: 2 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-14

0.007 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
2 YEAR	5	103.57	1.81	0.557	1.26	0.38
	10	76.81	1.34	0.557	0.79	0.47
	15	**61.77**	**1.08**	**0.557**	**0.52**	**0.47**
	20	52.03	0.91	0.557	0.35	0.42
	25	45.17	0.79	0.557	0.23	0.35

TABLE 19C: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-14

0.007 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	5	141.18	2.47	0.640	1.83	0.55
	10	104.19	1.82	0.640	1.18	0.71
	15	**83.56**	**1.46**	**0.640**	**0.82**	**0.74**
	20	70.25	1.23	0.640	0.59	0.71
	25	60.90	1.07	0.640	0.43	0.64

TABLE 19D: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-14

0.007 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	15	142.89	2.78	0.719	2.06	1.86
	20	119.95	2.33	0.72	1.62	1.94
	25	**103.85**	**2.02**	**0.72**	**1.30**	**1.95**
	30	91.87	1.79	0.72	1.07	1.92
	35	82.58	1.61	0.72	0.89	1.86

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

TABLE 19E: Storage Provided - R-14

Area R-14: Storage Table			
Head (m)	Area* (m^2)	Storage Volume (m^3)	
0.000	0.010	0.00	
0.025	7.329	0.09	
0.050	31.192	0.57	
0.075	59.841	1.71	
0.100	59.841	3.21	
0.125	59.841	4.70	
0.150	59.841	6.20	

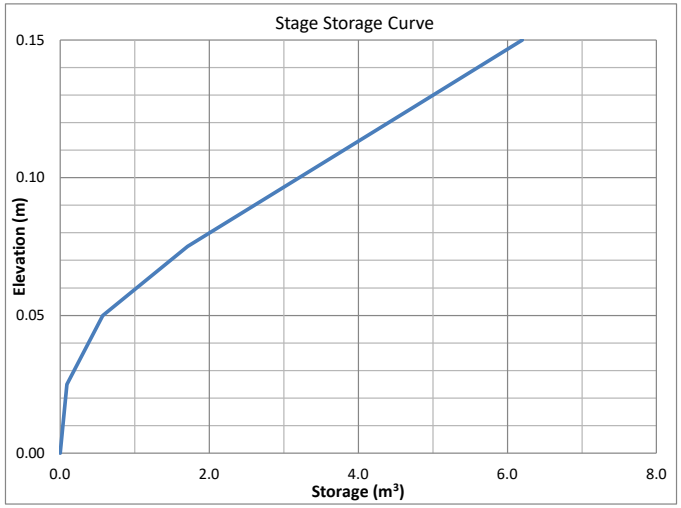


Table 19F: Roof Drain Flows

Roof Drains		
Roof Area	69.982	m²
Qty	1	
Type	Accutrol RD-100-A-ADJ	
Setting	1/4 Open	
Design Head	0.05-0.15	m
Design Flow 1" of head	0.32	L/s (ea)
Design Flow 2" of head	0.63	L/s (ea)
Design Flow 3" of head	0.71	L/s (ea)
Design Flow 4" of head	0.79	L/s (ea)
Design Flow 5" of head	0.87	L/s (ea)
Design Flow 6" of head	0.95	L/s (ea)

Table 18G: Total Roof Storage

Design Event	Roof Drain ID	Flow (L/S)	Head m	Required Volume
2 Year	R-14	0.557	0.045	0.47
5 Year		0.640	0.054	0.74
100 Year		0.719	0.079	1.95

TABLE 20A: Post-Development Runoff Coefficient "C" - R-15

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	$^*C_{avg}$
Total	Hard	0.000	0.90		1.00	
0.008	Roof	0.008	0.90	0.90	1.00	1.00
	Soft	0.000	0.20		0.25	

TABLE 20B: 2 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-15

0.008 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
2 YEAR	0	167.22	3.26	0.645	2.61	0.00
	5	103.57	2.02	0.645	1.37	0.41
	10	**76.81**	**1.50**	**0.645**	**0.85**	**0.51**
	15	61.77	1.20	0.645	0.56	0.50
	20	52.03	1.01	0.645	0.37	0.44

TABLE 20C: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-15

0.008 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	5	141.18	2.75	0.680	2.07	0.62
	10	104.19	2.03	0.680	1.35	0.81
	15	**83.56**	**1.63**	**0.680**	**0.95**	**0.85**
	20	70.25	1.37	0.680	0.69	0.83
	25	60.90	1.19	0.680	0.51	0.76

TABLE 20D: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-15

0.008 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	15	142.89	3.09	0.770	2.32	2.09
	20	119.95	2.60	0.77	1.83	2.19
	25	**103.85**	**2.25**	**0.77**	**1.48**	**2.22**
	30	91.87	1.99	0.77	1.22	2.19
	35	82.58	1.79	0.77	1.02	2.14

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

TABLE 20E: Storage Provided - R-15

Area R-15: Storage Table			
Head (m)	Area* (m^2)	Storage Volume (m^3)	
0.000	0.010	0.00	
0.025	4.683	0.06	
0.050	18.798	0.35	
0.075	41.931	1.11	
0.100	66.382	2.47	
0.125	66.382	4.12	
0.150	66.382	5.78	

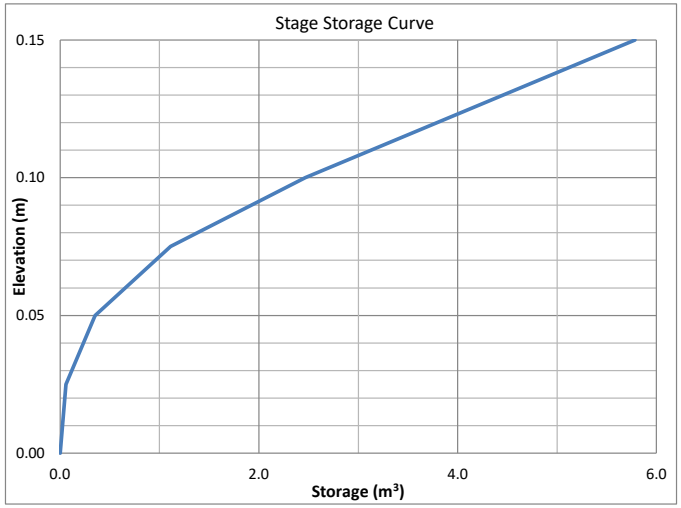


Table 20F: Roof Drain Flows

Roof Drains		
Roof Area	77.867	m²
Qty	1	
Type	Accutrol RD-100-A-ADJ	
Setting	1/4 Open	
Design Head	0.05-0.15	m
Design Flow 1" of head	0.32	L/s (ea)
Design Flow 2" of head	0.63	L/s (ea)
Design Flow 3" of head	0.71	L/s (ea)
Design Flow 4" of head	0.79	L/s (ea)
Design Flow 5" of head	0.87	L/s (ea)
Design Flow 6" of head	0.95	L/s (ea)

Table 20G: Total Roof Storage

Design Event	Roof Drain ID	Flow (L/S)	Head m	Required Volume
2 Year	R-15	0.645	0.055	0.51
5 Year		0.680	0.067	0.85
100 Year		0.770	0.095	2.22

TABLE 21A: Post-Development Runoff Coefficient "C" - R-16

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	$^*C_{avg}$
Total	Hard	0.000	0.90		1.00	
0.005	Roof	0.005	0.90	0.90	1.00	1.00
	Soft	0.000	0.20		0.25	

TABLE 21B: 2 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-16

0.005 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
2 YEAR	0	167.22	2.13	0.455	1.67	0.00
	5	103.57	1.32	0.455	0.86	0.26
	10	**76.81**	**0.98**	**0.455**	**0.52**	**0.31**
	15	61.77	0.79	0.455	0.33	0.30
	20	52.03	0.66	0.455	0.21	0.25

TABLE 21C: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-16

0.005 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	0	230.48	2.93	0.551	2.38	0.00
	5	141.18	1.80	0.551	1.25	0.37
	10	**104.19**	**1.33**	**0.551**	**0.78**	**0.47**
	15	83.56	1.06	0.551	0.51	0.46
	20	70.25	0.89	0.551	0.34	0.41

TABLE 21D: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-16

0.005 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	10	178.56	2.52	0.692	1.83	1.10
	15	142.89	2.02	0.69	1.33	1.20
	20	**119.95**	**1.70**	**0.69**	**1.00**	**1.21**
	25	103.85	1.47	0.69	0.78	1.16
	30	91.87	1.30	0.69	0.61	1.09

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

TABLE 21E: Storage Provided - R-16

Area R-16: Storage Table			
Head (m)	Area* (m^2)	Storage Volume (m^3)	
0.000	0.010	0.00	
0.025	7.592	0.10	
0.050	30.860	0.58	
0.075	30.860	1.35	
0.100	30.860	2.12	
0.125	30.860	2.89	
0.150	30.860	3.66	

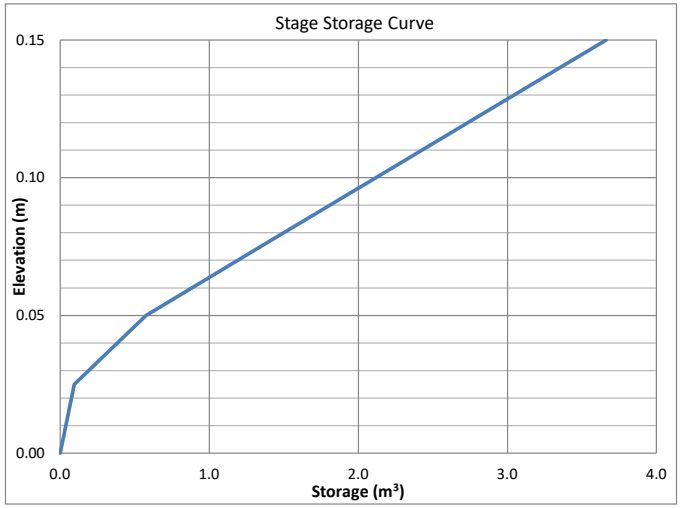


Table 21F: Roof Drain Flows

Roof Drains		
Roof Area	50.861	m²
Qty	1	
Type	Accutrol RD-100-A-ADJ	
Setting	1/4 Open	
Design Head	0.05-0.15	m
Design Flow 1" of head	0.32	L/s (ea)
Design Flow 2" of head	0.63	L/s (ea)
Design Flow 3" of head	0.71	L/s (ea)
Design Flow 4" of head	0.79	L/s (ea)
Design Flow 5" of head	0.87	L/s (ea)
Design Flow 6" of head	0.95	L/s (ea)

Table 21G: Total Roof Storage

Design Event	Roof Drain ID	Flow (L/S)	Head m	Required Volume
2 Year	R-16	0.455	0.036	0.31
5 Year		0.551	0.044	0.47
100 Year		0.692	0.070	1.21

TABLE 22A: Post-Development Runoff Coefficient "C" - R-17

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	$^*C_{avg}$
Total	Hard	0.000	0.90		1.00	
0.003	Roof	0.003	0.90	0.90	1.00	1.00
	Soft	0.000	0.20		0.25	

TABLE 22B: 2 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-17

0.003 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
2 YEAR	0	167.22	1.41	0.285	1.13	0.00
	5	103.57	0.88	0.285	0.59	0.18
	10	**76.81**	**0.65**	**0.285**	**0.36**	**0.22**
	15	61.77	0.52	0.285	0.24	0.21
	20	52.03	0.44	0.285	0.15	0.19

TABLE 22C: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-17

0.003 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	0	230.48	1.95	0.385	1.56	0.00
	5	141.18	1.19	0.385	0.81	0.24
	10	**104.19**	**0.88**	**0.385**	**0.50**	**0.30**
	15	83.56	0.71	0.385	0.32	0.29
	20	70.25	0.59	0.385	0.21	0.25

TABLE 22D: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-17

0.003 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	5	242.70	2.28	0.578	1.70	0.51
	10	178.56	1.68	0.58	1.10	0.66
	15	**142.89**	**1.34**	**0.58**	**0.76**	**0.69**
	20	119.95	1.13	0.58	0.55	0.66
	25	103.85	0.98	0.58	0.40	0.60

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

TABLE 22E: Storage Provided - R-17

Area R-16: Storage Table			
Head (m)	Area* (m^2)	Storage Volume (m^3)	
0.000	0.010	0.00	
0.025	19.469	0.24	
0.050	21.681	0.76	
0.075	23.893	1.33	
0.100	26.110	1.95	
0.125	26.110	2.61	
0.150	26.110	3.26	

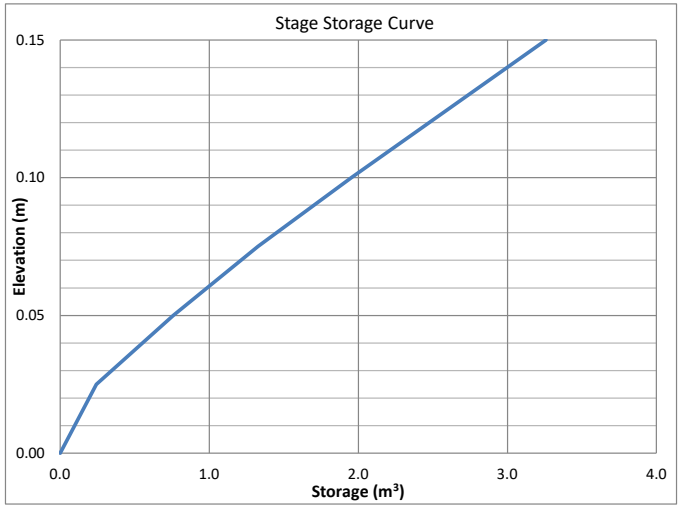


Table 22F: Roof Drain Flows

Roof Drains		
Roof Area	33.789	m²
Qty	1	
Type	Accutrol RD-100-A-ADJ	
Setting	1/4 Open	
Design Head	0.05-0.15	m
Design Flow 1" of head	0.32	L/s (ea)
Design Flow 2" of head	0.63	L/s (ea)
Design Flow 3" of head	0.71	L/s (ea)
Design Flow 4" of head	0.79	L/s (ea)
Design Flow 5" of head	0.87	L/s (ea)
Design Flow 6" of head	0.95	L/s (ea)

Table 22G: Total Roof Storage

Design Event	Roof Drain ID	Flow (L/S)	Head m	Required Volume
2 Year	R-17	0.285	0.022	0.22
5 Year		0.385	0.031	0.30
100 Year		0.578	0.047	0.69

TABLE 23A: Post-Development Runoff Coefficient "C" - R-18

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	$^*C_{avg}$
Total	Hard	0.000	0.90		1.00	
0.001	Roof	0.001	0.90	0.90	1.00	1.00
	Soft	0.000	0.20		0.25	

TABLE 23B: 2 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-18

0.001 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
2 YEAR	**0**	**167.22**	**0.36**	**0.320**	**0.04**	**0.00**

TABLE 23C: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-18

0.001 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	**0**	**230.48**	**0.49**	**0.320**	**0.17**	**0.00**

TABLE 23D: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-18

0.001 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	-5	1716.01	4.05	0.321	3.73	-1.12
	0	398.62	0.94	0.32	0.62	0.00
	5	**242.70**	**0.57**	**0.32**	**0.25**	**0.08**
	10	178.56	0.42	0.32	0.10	0.06
	15	142.89	0.34	0.32	0.02	0.02

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation

$C_s = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

TABLE 23E: Storage Provided - R-18

Area R-16: Storage Table			
Head (m)	Area* (m^2)	Storage Volume (m^3)	
0.000	0.010	0.00	
0.025	5.880	0.07	
0.050	5.880	0.22	
0.075	5.880	0.37	
0.100	5.880	0.51	
0.125	5.880	0.66	
0.150	5.880	0.81	

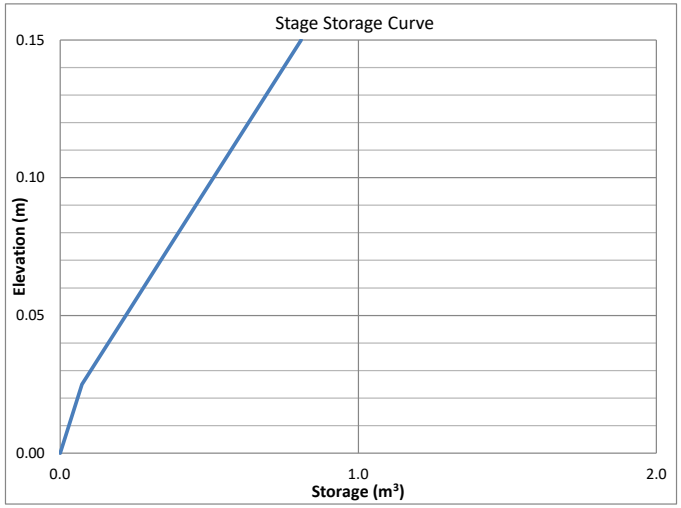


Table 23F: Roof Drain Flows

Roof Drains		
Roof Area	8.495	m²
Qty	1	
Type	Accutrol RD-100-A-ADJ	
Setting	1/4 Open	
Design Head	0.05-0.15	m
Design Flow 1" of head	0.32	L/s (ea)
Design Flow 2" of head	0.63	L/s (ea)
Design Flow 3" of head	0.71	L/s (ea)
Design Flow 4" of head	0.79	L/s (ea)
Design Flow 5" of head	0.87	L/s (ea)
Design Flow 6" of head	0.95	L/s (ea)

Table 23G: Total Roof Storage

Design Event	Roof Drain ID	Flow (L/S)	Head m	Required Volume
2 Year	R-17	0.320	0.000	0.00
5 Year		0.320	0.000	0.00
100 Year		0.321	0.027	0.08

PROJECT #: 112142
PROJECT NAME: 141 George Street
LOCATION: City of Ottawa

NOVATECH
Engineers, Planners & Landscape Architects

DATE PREPARED:June 8, 2023
Rev: Aug 21, 2023, Rev: Sept 12, 2023
Rev: Sept 23, 2024
Rev: Jan 23,2025
Rev: June 23rd, 2025

TABLE 24A: Post-Development Runoff Coefficient "C" - A-01, A-02,R-00 - George Cistern

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	$*C_{avg}$
Total	Hard	0.038	0.90	0.90	1.00	1.00
0.216	Roof	0.178	0.90		1.00	
	Soft	0.000	0.20		0.25	

TABLE 24B: 2 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-01, A-02,R-00

0.216 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
2 YEAR	30	40.04	21.68	5.6	16.08	28.94
	35	36.06	19.52	5.6	13.92	29.23
	40	32.86	**17.79**	**5.6**	**12.19**	**29.25**
	45	30.24	16.37	5.6	10.77	29.08
	50	28.04	15.18	5.6	9.58	28.74

TABLE 24C: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-01, A-02,R-00

0.216 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	40	44.18	23.92	5.6	18.32	43.96
	45	40.63	21.99	5.6	16.39	44.26
	50	**37.65**	**20.38**	**5.6**	**14.78**	**44.35**
	55	35.12	19.01	5.6	13.41	44.26
	60	32.94	17.83	5.6	12.23	44.04

TABLE 24D: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-01, A-02,R-00

0.216 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)*	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	80	44.99	27.06	5.6	21.46	103.01
	85	42.95	25.83	5.6	20.23	103.20
	90	**41.11**	**24.73**	**5.6**	**19.13**	**103.28**
	95	39.43	23.72	5.6	18.12	103.27
	100	37.90	22.80	5.6	17.20	103.18

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

George Street Flow - Reference "Technical Memorandum 110 York Street & 141 George Street Serviceability Memo", Revised: March 12th, 20

Note: Runoff / pump rate was reduced by 4.4L/s to accomdate additional stormwater runoff to 116 York.

TABLE 24E: Structure information - A-01, A-02, R-0(

Structures	Size Dia.(mm)	Area (m^2)	T/G	Bottom of Tank
Tank	-	39.70	61.80	57.90

TABLE 24F: Storage Provided - A-01, A-02,R-0(

Storage Table			
Elevation (m)	System Depth (m)	Tank Volume (m^3)	
57.90	0.00	0.00	
58.000	0.10	3.97	
58.100	0.20	7.94	
58.200	0.30	11.91	
58.300	0.40	15.88	
58.400	0.50	19.85	
58.500	0.60	23.82	
58.600	0.70	27.79	
58.700	0.80	31.76	
58.800	0.90	35.73	
58.900	1.00	39.70	
59.000	1.10	43.67	
59.100	1.20	47.64	
59.200	1.30	51.61	
59.300	1.40	55.58	
59.400	1.50	59.55	
59.500	1.60	63.52	
59.600	1.70	67.49	
59.700	1.80	71.46	
59.800	1.90	75.43	
59.900	2.00	79.40	
60.000	2.10	83.37	
60.100	2.20	87.34	
60.200	2.30	91.31	
60.300	2.40	95.28	
60.400	2.50	99.25	
60.500	2.60	103.22	
60.600	2.70	107.19	
60.700	2.80	111.16	
60.780	2.88	114.34	**Top of Tank (underside of beam)**
60.800	2.90	114.35	
61.300	3.40	114.71	
61.400	3.50	114.78	
61.500	3.60	114.85	
61.600	3.70	114.93	
61.700	3.80	115.00	
61.800	3.90	115.07	**Vented Tank Lid**

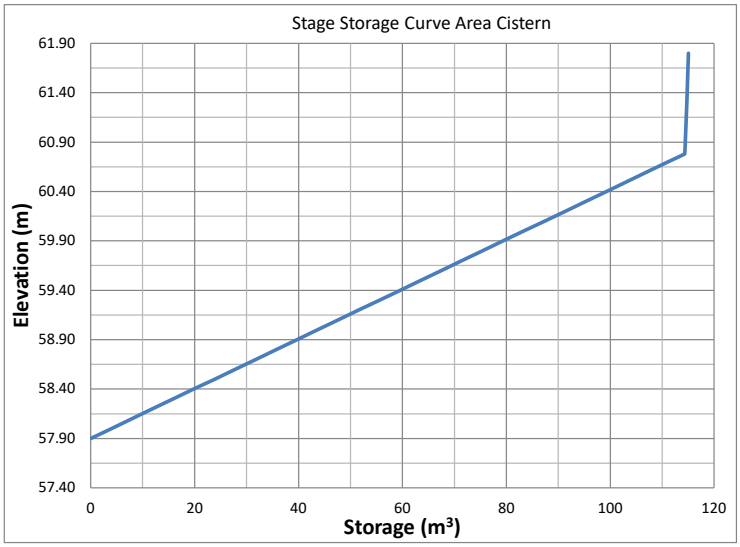


TABLE 24G: Orfice Sizing information - A-01, A-02,R-0(

Control Device
PUMP

Design Event	Flow (L/S)	Head (m)	Elev (m)	Outlet dia. (mm)	Volume (m^3)
1:2 Year	5.6	0.74	58.64	250.00	29.25
1:5 Year	5.6	1.12	59.02	250.00	44.35
1:100 Year	5.6	2.60	60.50	250.00	103.28

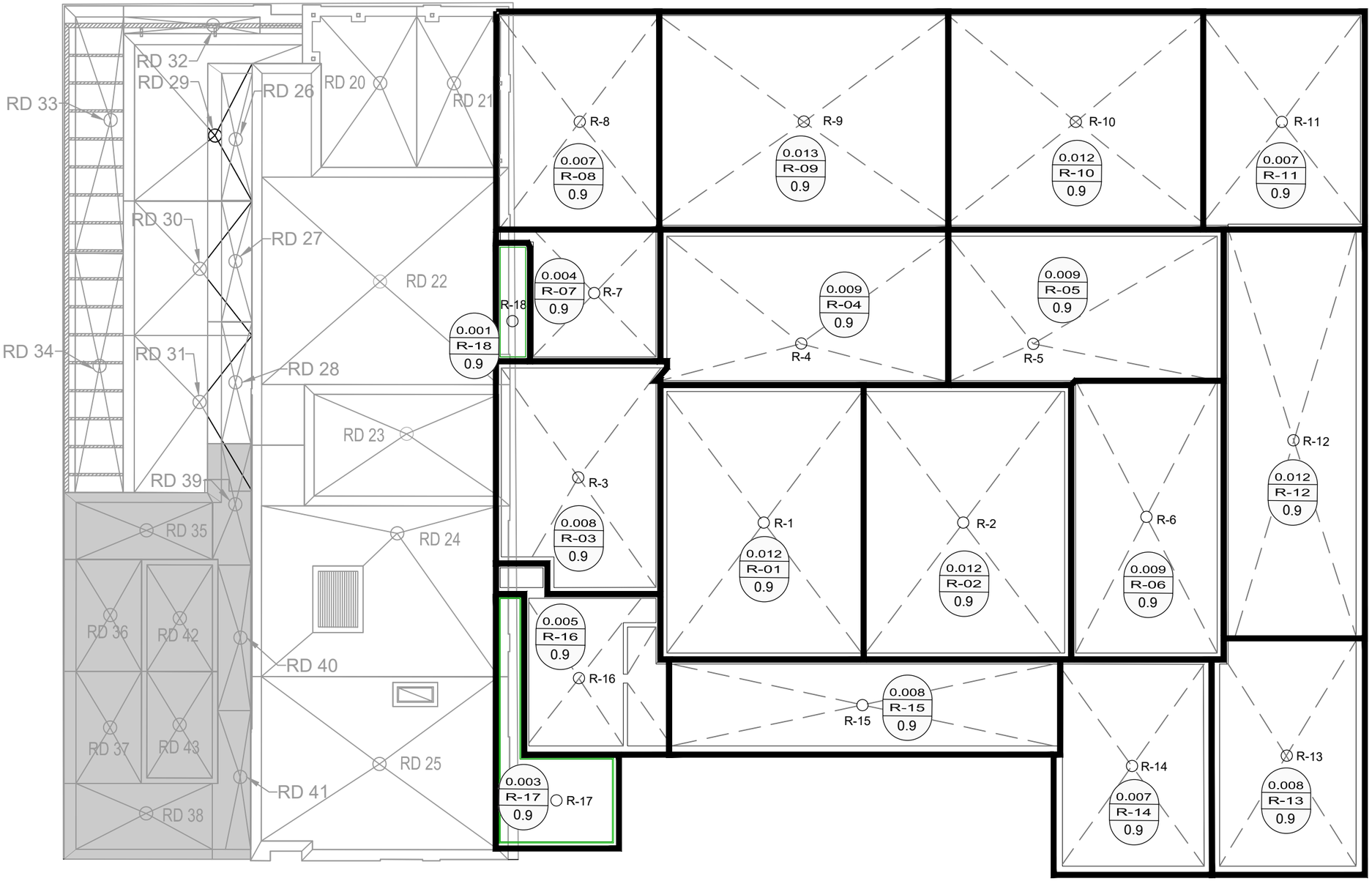
**The design Head is calculated based on the bottom of tank

George Street Flow - Reference "Technical Memorandum 110 York Street & 141 George Street Serviceability Memo", Revised: March 12th, 2024
Note: Runoff / pump rate was reduced by 4.4L/s to accomdate additional stormwater runoff to 116 York.

Table 25: Post-Development Stormwater Management Summary

Area ID	Area (ha)	1:5 Year Weighted Cw	1:100 Year Weighted Cw	Control Device	Outlet Location	2 Year Storm Event				5 Year Storm Event				100 Year Storm Event			
						Release (L/s)	Ponding Depth (m)	Req'd Vol (cu.m)	Max. Vol. Provided (cu.m.)	Release (L/s)	Ponding Depth (m)	Req'd Vol (cu.m)	Max. Vol. Provided (cu.m.)	Release (L/s)	Ponding Depth (m)	Req'd Vol (cu.m)	Max. Vol. Provided (cu.m.)
D-01	0.011	0.90	1.00	N/A	George Street	2.20	N/A	N/A	N/A	2.90	N/A	N/A	N/A	5.60	N/A	N/A	N/A
D-02	0.009	0.90	1.00	N/A	George Street	1.80	N/A	N/A	N/A	2.40	N/A	N/A	N/A	4.70	N/A	N/A	N/A
A-03	0.012	0.90	1.00	N/A	York Street	2.40	N/A	N/A	N/A	3.20	N/A	N/A	N/A	6.10	N/A	N/A	N/A
A-04	0.013	0.90	1.00	N/A	York Street	2.50	N/A	N/A	N/A	3.40	N/A	N/A	N/A	6.60	N/A	N/A	N/A
R-01	0.012	0.90	1.00	Watts Roof Drain (1/4 open)	York Street	0.61	0.051	1.07	10.91	0.65	0.059	1.69	10.91	0.74	0.085	4.09	10.91
R-02	0.012	0.90	1.00	Watts Roof Drain (1/4 open)	York Street	0.63	0.051	1.11	11.22	0.65	0.059	1.75	11.22	0.74	0.850	4.21	11.22
R-03	0.008	0.90	1.00	Watts Roof Drain (1/4 open)	York Street	0.62	0.047	0.52	6.92	0.65	0.056	0.87	6.92	0.73	0.080	2.25	6.92
R-04	0.009	0.90	1.00	Watts Roof Drain (1/4 open)	York Street	0.65	0.057	0.72	7.35	0.68	0.068	1.15	7.35	0.77	0.097	2.91	7.35
R-05	0.009	0.90	1.00	Watts Roof Drain (1/4 open)	York Street	0.32	0.061	0.63	6.50	0.71	0.075	1.03	6.50	0.79	0.102	2.64	6.50
R-06	0.009	0.90	1.00	Watts Roof Drain (1/4 open)	York Street	0.32	0.070	0.62	8.47	0.72	0.080	1.03	8.47	0.80	0.105	2.66	8.47
R-07	0.004	0.90	1.00	Watts Roof Drain (1/4 open)	York Street	0.37	0.029	0.20	3.87	0.44	0.035	0.32	3.87	0.64	0.053	0.75	3.87
R-08	0.007	0.90	1.00	Watts Roof Drain (1/4 open)	York Street	0.56	0.045	0.53	7.49	0.64	0.054	0.83	7.49	0.71	0.077	2.16	7.49
R-09	0.013	0.90	1.00	Watts Roof Drain (1/4 open)	York Street	0.66	0.061	1.27	10.94	0.70	0.072	1.97	10.94	0.78	0.100	4.73	10.94
R-10	0.012	0.90	1.00	Watts Roof Drain (1/4 open)	York Street	0.66	0.059	1.03	9.65	0.69	0.070	1.63	9.65	0.78	0.098	3.98	9.65
R-11	0.007	0.90	1.00	Watts Roof Drain (1/4 open)	York Street	0.56	0.045	0.53	7.25	0.64	0.053	0.81	7.25	0.71	0.077	2.13	7.25
R-12	0.012	0.90	1.00	Watts Roof Drain (1/4 open)	York Street	0.66	0.060	1.10	9.59	0.70	0.072	1.72	9.59	0.78	0.100	4.18	9.59
R-13	0.008	0.90	1.00	Watts Roof Drain (1/4 open)	York Street	0.57	0.046	0.53	6.60	0.64	0.055	0.84	6.60	0.72	0.081	2.18	6.60
R-14	0.007	0.90	1.00	Watts Roof Drain (1/4 open)	York Street	0.56	0.045	0.47	6.20	0.64	0.054	0.74	6.20	0.72	0.079	1.95	6.20
R-15	0.008	0.90	1.00	Watts Roof Drain (1/4 open)	York Street	0.64	0.055	0.51	5.78	0.68	0.067	0.85	5.78	0.77	0.095	2.22	5.78
R-16	0.005	0.90	1.00	Watts Roof Drain (1/4 open)	York Street	0.46	0.036	0.31	3.66	0.55	0.044	0.47	3.66	0.69	0.070	1.21	3.66
R-17	0.003	0.90	1.00	Watts Roof Drain (1/4 open)	York Street	0.29	0.022	0.22	3.26	0.38	0.031	0.30	3.26	0.58	0.047	0.69	3.26
R-18	0.001	0.90	1.00	Watts Roof Drain (1/4 open)	York Street	0.32	0.000	0.00	0.81	0.32	0.000	0.00	0.81	0.32	0.027	0.08	0.81
R-00 / AD-01 / AD-02 (A-02)	0.216	0.90	1.00	Pump	George Street	5.60	0.737	29.25	115.07	5.60	1.115	44.35	115.07	5.60	2.600	103.28	115.07
Post-Development Flow						**23.9**	**-**	**40.6**	**241.5**	**28.6**	**-**	**62.3**	**241.5**	**41.4**	**-**	**148.3**	**241.5**
Allowable External Andaz Flow						**3.4**				**4.6**				**8.8**			
Allowable Release Rate York/George						**40.6**				**40.6**				**40.6**			

Notes:
D-01 and D-02 are uncontrolled flows from 141 George to George Street
AD1 (A-01) ,AD2 (A-02) and R-00 are flows to George Cistern
A-03 - Flows to the York service uncontrolled
A-04 - Flows to the York service uncontrolled
Andaz - The flow from the rear of the existing Andaz is captured by AD4 and conveyed uncontrolled to the york service.
R-01 to R-18 are controlled flows to service 110-116 York which will discharge to the proposed service connecting to York Street right-of-way.



LEGEND

STORM DRAINAGE AREA BOUNDARY

0.9 / R-02 / 0.2 — AREA IN HECTARES / MANHOLE TO MANHOLE / COEFFICIENT

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

110-116 YORK STREET

ROOF PLAN

SCALE 1 : 200 (0 2 4 6 8)

DATE JUNE 2025 | JOB 112142 | FIGURE ROOF

SHT11X17.DWG - 279mmX432mm

M:\2012\112142_141 GEORGE-110 YORK\CAD\Civil\112142-2-ROOF PLAN.dwg, ROOF, Jun 20, 2025 - 1:00pm, amestwarp

Appendix E
Recent and Relevant Reports

"110 York Street & 141 George Street Serviceability Memo", by Novatech Engineering, dated March 12th, 2024

“Residential / Hotel Development 141 Geroge Street / 325 Dalhousie Street/110 York Street, Ottawa, Ontario, Servicing Design Brief", by Novatech Engineering, dated April 12th, 2018

“Residential / Hotel Development 141 Geroge Street / 325 Dalhousie Street/110 York Street, Ottawa, Ontario, Servicing Design Brief (Incl. Interim Condition)", by Novatech Engineering, dated February 14th, 2014

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: **OCTOBER 16TH, 2023**

REVISED: **MARCH 12TH, 2024**

TO: **MR. JOHN WU**

FROM: **GREG MACDONALD, P.ENG & CURTIS FERGUSON, E.I.T.**

RE: **110 YORK STREET & 141 GEORGE STREET**
SERVICEABILITY MEMO
112142

CC: **VINCENT DENOMME (CLARIDGE HOMES), STEPHEN POON (CLARIDGE HOMES),**

Novatech has been retained by Claridge Homes to prepare a Servicing Memo for the proposed site plan located at 141 George Street & 110 York Street within the City of Ottawa.

The following technical memorandum will review the water, sanitary and storm servicing of the proposed development to determine the serviceability of the development.

141 George Street

Sanitary Sewer

There is an existing 1980x1500mm horseshoe sanitary sewer within the George Street right-of-way.

Design Criteria

Sanitary flows for the proposed development were calculated using criteria from Section 4 of the City of Ottawa Sewer Design Guidelines and the Ontario Building Code as follows:

- Residential Average Flow = 280 L/capita/day
- Studio Apartment = 1.4 Person/unit
- 1 Bed apartment = 1.4 Person/unit
- 2 Bed / 1 Bed + Den apartment = 2.1 Person/unit
- 3 Bed / 2 Bed + Den apartment = 3.1 Person/unit
- Professional Office = 75 L/9.3m^2/day
- Retail / Restaurant = 125 L/2m^2/day
- Bar / Cocktail Lounge = 70 L/day/seat (assumed 1 seat per 2m^2)
- Residential Peaking Factor = Harmon Equation (max peaking factor = 4.0)
- Commercial Peaking Factor = 1.0
- Peak Extraneous Flows (Infiltration) = 0.33L/s/ha

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Sanitary Servicing

The tower is proposed to be serviced by a 200mm dia. sanitary sewer. The proposed service will connect to the existing 1980x1500mm sanitary sewer within the George Street right-of-way. It was confirmed through correspondence with the City that the existing sanitary sewer in George Street has adequate capacity for the development. The peak sanitary flow including infiltration for the site development was calculated to be **6.03 L/s.** Detailed sanitary flow calculations, and correspondence can be found in **Appendix A**.

The detailed design of the Andaz Hotel (Phase 1) was completed by Novatech with details provided within the Andaz Servicing Report. The previous design assumed that the George Building was to consist of a 22-storey condominium with 282 units, and 1097m^2 of commercial. The resultant assumed flow for the site was **9.32L/s**. Additionally, the projected flow from George Street was calculated to be **5.62 L/s**. The assumed design flow was lower than currently proposed, approximately a 7 percent increase in flow from the previous design.

Storm Sewer

There is an existing 900mm dia. concrete sewer within George Street right-of-way.

Design Criteria

Storm Sewer Design Parameters

Parameter	Design Criteria
Local Roads	2 Year Return Period
Storm Sewer Design	Rational Method
IDF Rainfall Data	Ottawa Sewer Design Guidelines
Initial Time of Concentration (Tc)	20 min
Minimum Velocity	0.8 m/s
Maximum Velocity	3.0 m/s
Minimum Diameter	250 mm

Storm Servicing

It is proposed to service the proposed development with one (1) 250mm storm service connections to the existing 900m storm sewer within the George Street right-of-way. The service will convey the uncontrolled foundation drain and the controlled flows from the internal stormwater cistern within the parking garage. Through correspondence with the City it is understood that the existing 100-year HGL within George Street is at an elevation of 60.6m during the 100-yr storm event. The proposed services will be installed complete with backflow prevention as the 100-year HGL is close to the proposed service inverts (60.28).

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Water

There is an existing 300mm dia. watermain within George Street right-of-way.

Design Criteria

Water demand calculations have been calculated using criteria from Section 4 of the City of Ottawa Water Distribution Guidelines and the Ontario Building Code as follows:

- Average Domestic Flow = 280L/cap/day
- 1 Bedroom Apartment = 1.4 Persons/unit
- 2 Bedroom Apartment = 2.1 Persons/unit
- 3 Bedroom Apartment = 3.1 Persons/unit
- Office = 75L/9.3m^2/day
- Bar/Cocktail Lounge = 70 L/day/seat
- Restaurant = 125 L/seat/day
- Residential Peaking Factors
  - Maximum Day = 2.5 x Avg Day
  - Peak Hour = 2.2 x Max Day
- Commercial Peaking Factors
  - Maximum Day = 1.5
- Peak Hour= 1.8

The required fire demand was calculated using the Fire Underwriters Survey 2020 (FUS) Guidelines. Through correspondence with the architect, it is understood that the proposed building is residential occupancy (Limited Combustible), composed of fire resistive construction (2 hrs.), and will contain a fully supervised sprinkler system designed as per NFPA 13.

Water Servicing

Domestic Water Demand Summary (George Building)

Population	Commercial Area (m^2)	Ave. Daily Demand (L/s)	Max. Daily Demand (L/s)	Peak Hour Demand (L/s)	Fire Flow (L/s)
502	670	2.03	4.68	10.04	100

Water Boundary Conditions Response (141 George Street)

Criteria	Head (m)	Pressure[1] (m)	Pressure (PSI)	Pressure Requirements
Connection (George Street)				
Min HGL	106.3	44.4	63.08	> 40psi
Max HGL	115.4	53.5	76.01	< 80psi
Max Day + Fire Flow	109.0	47.1	66.91	> 20psi

[1]Pressure based on a Finished Floor elevation of 61.90m

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The hydraulic analysis indicates that the system can provide adequate pressures and flow to meet the domestic and fire flow requirements for the site.

It is proposed to service the George Building with two (2) individual 200mm diameter services. Two (2) services will connect to the existing 300mm diameter watermain within the George Street right-of-way by way of a TVS connection. A valve will be placed on the 300mm main between the two services for redundancy.

110 York Street

Sanitary Sewer

There is an existing 1200mm dia. sanitary sewer within the York Street right-of-way.

Design Criteria

Sanitary flows for the proposed development were calculated using criteria from Section 4 of the City of Ottawa Sewer Design Guidelines and the Ontario Building Code as follows:

- Average Hotel Flow (full housekeeping facilities) = 225 L/capita/day
- Hotel Room = 1.8 person/unit
- Dance Hall (plus restaurant & bar) = 150 L/day/patron (assumed 1 patron per $2m^2$)
- Residential Peaking Factor = Harmon Equation (max peaking factor = 4.0)
- Commercial Peaking Factor = 1.0
- Peak Extraneous Flows (Infiltration) = 0.33L/s/ha

Sanitary Servicing

The building is proposed to be serviced by a 200mm dia. sanitary sewer. The proposed service will connect to the existing 1200mm dia. sanitary sewer within the York Street right-of-way. It was confirmed through correspondence with the City that the existing sanitary sewer in York Street has adequate capacity for the development. The peak sanitary flow including infiltration for the site development was calculated to be **3.13 L/s.** Detailed sanitary flow calculations, and correspondence are attached can be found in **Appendix A**.

Storm Sewer

There is an existing 675mm dia. concrete sewer within George Street right-of-way.

Design Criteria

Storm Sewer Design Parameters

Parameter	Design Criteria
Local Roads	2 Year Return Period
Storm Sewer Design	Rational Method
IDF Rainfall Data	Ottawa Sewer Design Guidelines
Initial Time of Concentration (Tc)	20 min
Minimum Velocity	0.8 m/s
Maximum Velocity	3.0 m/s
Minimum Diameter	250 mm

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Storm Servicing

It is proposed to service the proposed development with two (2) 250mm storm service connections to the existing 675m storm sewer within the York Street right-of-way. One (1) storm service will convey the uncontrolled foundation drain while the second service will convey the controlled flows from the internal stormwater cistern within the parking garage. Through correspondence with the City it is understood that the existing 100-year HGL within York Street is at an elevation of approximately 60.1m during the 100-yr storm event. The proposed services will be installed complete with backflow prevention as the 100-year HGL is higher than the proposed service inverts.

Water

There is an existing 200mm dia. watermain within York Street right-of-way.

Design Criteria

Water demand calculations have been calculated using criteria from Section 4 of the City of Ottawa Water Distribution Guidelines and the Ontario Building Code as follows:

- Average Hotel Flow (full housekeeping facilities) = 225 L/capita/day
- Hotel Room = 1.8 Persons/unit
- Dance Hall (plus restaurant & bar) = 150 L/day/patron (assumed 1 patron per 2m^2)
- Residential Peaking Factors
  - Maximum Day = 2.5 x Avg Day
  - Peak Hour = 2.2 x Max Day
- Commercial Peaking Factors
  - Maximum Day = 1.5
- Peak Hour= 1.8

The required fire demand was calculated using the Fire Underwriters Survey 2020 (FUS) Guidelines. Through correspondence with the architect, it is understood that the proposed building is residential occupancy (Limited Combustible), composed of fire resistive construction (2 hrs.), and will contain a fully supervised sprinkler system designed as per NFPA 13.

Domestic Water Demand Summary (York Building)

Population	Commercial Area (m^2)	Ave. Daily Demand (L/s)	Max. Daily Demand (L/s)	Peak Hour Demand (L/s)	Fire Flow (L/s)
191	793	1.31	2.58	5.26	67

It is proposed to service the York Building with two (2) individual 200mm diameter services. Two (2) services will connect to the existing 200mm diameter watermain within the York Street right-of-way by way of a TVS connection. A valve will be added to the 300mm main between the services to provide redundancy.

Boundary conditions have been requested from the City. We do not anticipate any pressure issues and expect proposed flows to meet the domestic and fire flow requirements for the site.

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Stormwater Management 141 George & 110 York

Design Criteria

Through correspondence with the City of Ottawa, and our knowledge of development requirements in the area, the following criteria have been adopted to control post-development stormwater discharge from the site:

- Control proposed development flows, up to and including the 100-year storm event, to a 5 year allowable release rate calculated using a runoff coefficient (C) of 0.50 and a time of concentration (Tc) of 20 minutes;
- Provide source controls which are in conformity with the City of Ottawa requirements, where possible;
- Limit ponding to 0.15 m for all rooftop storage areas and 0.30 m for all parking storage areas; and
- Provide guidelines to ensure that site preparation and construction is in accordance with the current Best Management Practices for Erosion and Sediment Control.

The approach to the stormwater management design is to determine the allowable release rate for the site, calculate the uncontrolled flow, and ensure that the remaining flow, in combination with the uncontrolled flow, does not exceed the allowable release rate. All proposed development runoff in excess of the allowable release rate, will be attenuated on-site prior to being released into the storm sewers within George Street and York Street.

Quantity Control

The allowable release rate for the 0.419 ha site was calculated to be 40.9 L/s based on the SWM criteria provided by the City of Ottawa, and the Andaz Servicing Report. The Andaz Hotel (Phase 1) consumed 11.3 L/s which leaves an allowable of 29.6 L/s for the remaining development during the 100-year event.

Design Storms

The design storms are based on City of Ottawa design storms. Design storms were used for the 5, and 100 return periods (i.e. storm events).

Model Parameters

Post-development catchments were modelled based on the proposed site plan and grading as shown on **Drawing 112142-SWM** within **Appendix A**. The building roofs were assumed to have no depression storage.

Post development Stormwater Management Summary can be found below.

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Table 15: Post-Development Stormwater Management Summary

Area ID	Area (ha)	1:5 Year Weighted Cw	1:100 Year Weighted Cw	Control Device	Outlet Location	2 Year Storm Event				5 Year Storm Event				100 Year Storm Event			
						Release (L/s)	Ponding Depth (m)	Req'd Vol (cu.m)	Max. Vol. Provided (cu.m.)	Release (L/s)	Ponding Depth (m)	Req'd Vol (cu.m)	Max. Vol. Provided (cu.m.)	Release (L/s)	Ponding Depth (m)	Req'd Vol (cu.m)	Max. Vol. Provided (cu.m.)
D-01	0.011	0.90	1.00	N/A	George Street	2.20	N/A	N/A	N/A	2.90	N/A	N/A	N/A	5.60	N/A	N/A	N/A
D-02	0.011	0.90	1.00	N/A	George Street	2.00	N/A	N/A	N/A	2.80	N/A	N/A	N/A	5.30	N/A	N/A	N/A
D-03	0.004	0.90	1.00	N/A	York Street	0.70	N/A	N/A	N/A	1.00	N/A	N/A	N/A	1.90	N/A	N/A	N/A
Cistern (York)	0.125	0.87	0.96	Pump	York Street	6.80	0.240	10.61	75.99	6.80	0.470	17.26	75.99	6.80	1.380	44.00	75.99
Cistern (George)	0.185	0.90	1.00	Pump	George Street	10.00	0.545	16.96	89.11	10.00	0.955	27.36	89.11	10.00	2.615	69.07	89.11
Post-Development Flow						**21.7**	**-**	**27.6**	**165.1**	**23.5**	**-**	**44.6**	**165.1**	**29.6**	**-**	**113.1**	**165.1**
Total Allowable Release Rate						**29.6**				**29.6**				**29.6**			

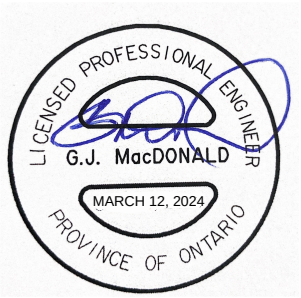
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Prepared by:



Curtis Ferguson, E.I.T.
Land Development Engineering

Reviewed by:



Greg MacDonald, P.Eng
Director, Land Development and Public Sector Infrastructure

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Appendix A

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

From: Duquette, Vincent <Vincent.Duquette@ottawa.ca>
Sent: Tuesday, October 10, 2023 2:22 PM
To: Curtis Ferguson
Cc: Wu, John; Anthony Mestwarp; Greg MacDonald
Subject: RE: 141 George Street / 110 York Street - Sanitary HGL (112142)

Hi Curtis,

Asset Management confirmed there is no capacity concerns for the proposed sanitary flows at 110 York St. and 141 George St.
Furthermore, dropping into the 1200mm dia. sanitary sewer on York St. would be acceptable.

Best Regards,

Vincent Duquette, E.I.T
Project Manager, Infrastructure Approvals
Planning, Real Estate and Economic Development Department – Direction général de la planification, des biens immobilier et du développement économique
Development Review – Central Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 14048, vincent.duquette@ottawa.ca

From: Curtis Ferguson <c.ferguson@novatech-eng.com>
Sent: October 03, 2023 3:28 PM
To: Duquette, Vincent <Vincent.Duquette@ottawa.ca>
Cc: Wu, John <John.Wu@ottawa.ca>; Anthony Mestwarp <a.mestwarp@novatech-eng.com>; Greg MacDonald <g.Macdonald@novatech-eng.com>
Subject: RE: 141 George Street / 110 York Street - Sanitary HGL (112142)

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Hi Vincent,

141 George Street *Sanitary Design Sheet* is attached.

Anticipated for 110 York (building layout coordination is on-going):

- 84 1 Bed Apartments.
- ~ 200m2 of commercial area anticipated.
- Total Design Flow = 1.79 L/s.

Let me know fi you require anything further.

Curtis Ferguson, B.A.Sc., E.I.T. | Land Development

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From: Duquette, Vincent <Vincent.Duquette@ottawa.ca>
Sent: Tuesday, October 3, 2023 2:46 PM
To: Curtis Ferguson <c.ferguson@novatech-eng.com>
Cc: Wu, John <John.Wu@ottawa.ca>; Anthony Mestwarp <a.mestwarp@novatech-eng.com>; Greg MacDonald <g.Macdonald@novatech-eng.com>
Subject: RE: 141 George Street / 110 York Street - Sanitary HGL (112142)

Hi Curtis,

Can you provide calculations showing the anticipated peak sanitary flows going to each sewer and a unit breakdown for the proposed development.

Best Regards,

Vincent Duquette, E.I.T
Project Manager, Infrastructure Approvals
Planning, Real Estate and Economic Development Department – Direction général de la planification, des biens immobilier et du développement économique
Development Review – Central Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 14048, vincent.duquette@ottawa.ca

From: Curtis Ferguson <c.ferguson@novatech-eng.com>
Sent: September 28, 2023 2:12 PM
To: Duquette, Vincent <Vincent.Duquette@ottawa.ca>
Cc: Wu, John <John.Wu@ottawa.ca>; Anthony Mestwarp <a.mestwarp@novatech-eng.com>; Greg MacDonald <g.Macdonald@novatech-eng.com>
Subject: 141 George Street / 110 York Street - Sanitary HGL (112142)

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Good Afternoon Vincent,

Inquiring to see if there is capacity issues for the sanitary system fronting both 110 York Street (MHSA38588 to MHSA60171)/ 141 George Street (MHSA38588 to MHSA60171)? Would setting the invert above the obvert of the sanitary in York (1200mm DIA.) function or would there be surcharging issues in the area?

Thanks,
Curtis Ferguson, B.A.Sc., E.I.T. | Land Development
NOVATECH
Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 EXT: 331
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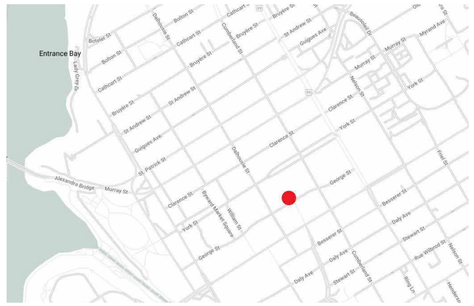
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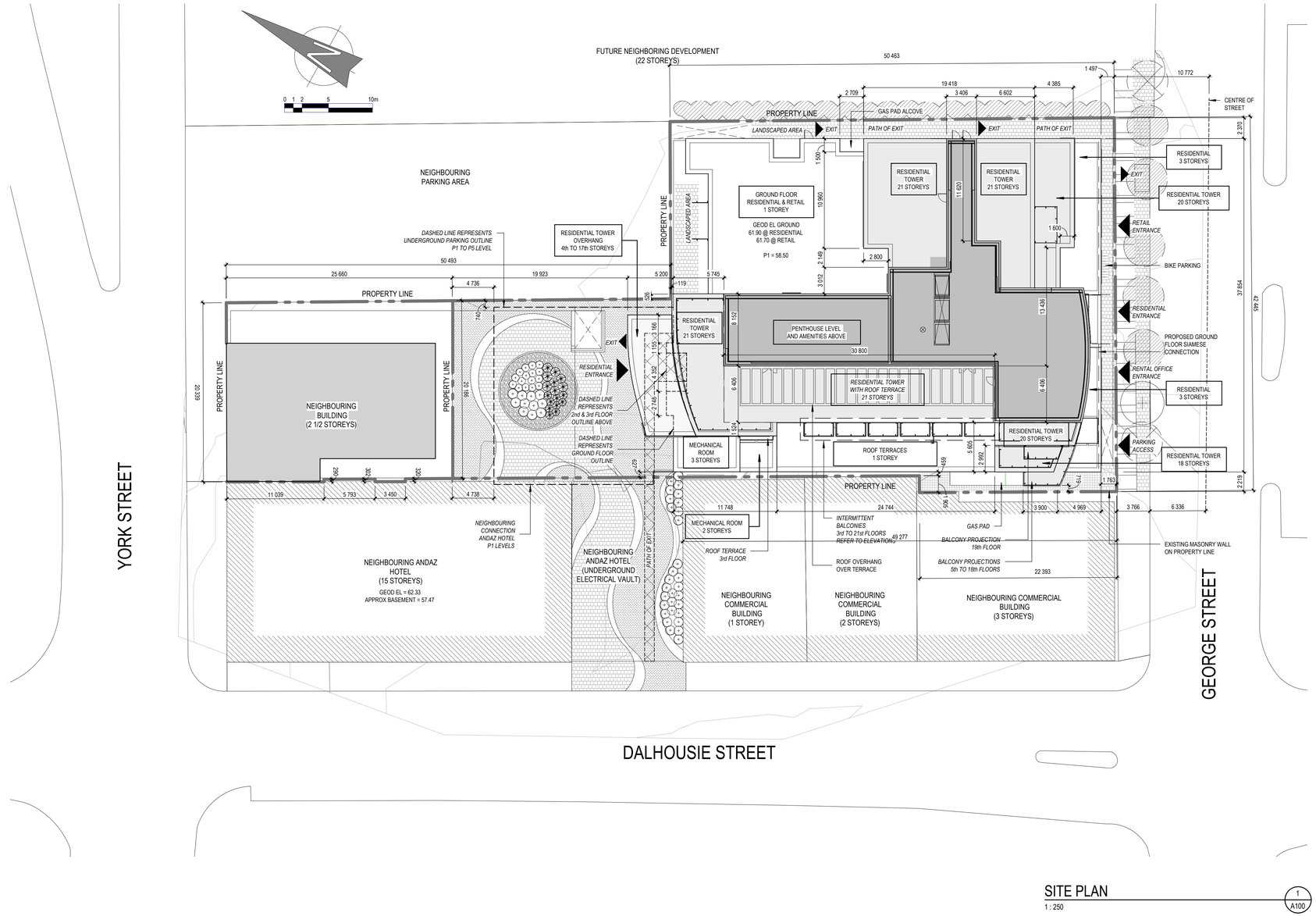
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NOTES
• FOR EXISTING SITE CONDITIONS, SEE SURVEY PLAN BY ANNIS, O'SULLIVAN, VOLLEBEKK LTD., SUBMITTED SEPERATELY. • FOR NEW GRADES AND SITE SERVICES, SEE CIVIL ENGINEERING PLANS BY NOVATECH ENGINEERING CONSULTANTS, SUBMITTED SEPERATELY.

OCCUPANCY	UNITS / STOREYS	PROPOSED ZONING GFA
Residential (Rental)	297 units / Ground to 21st floors	Ground = 227m² 2nd = 807m² 3rd = 1,222m² 4th - 17th = 927m²/ floor 12th = 925m² 18th = 869m² 19th & 20th = 849m² 21st = 772m² TOTAL = 18,571m²
	Minimum 15% (44 units) required to be Barrier-Free (BF) to be distributed throughout residential storeys.	7 x Studios (1BF units = 15%)) 193 x 1 Bedroom (31BF units = 16%) 97 x 2 Bedroom (15BF units = 15%) 47BF units = 15%
Commercial	Ground	Commercial = 455m² Office = 73m²
	TOTAL	**19,099m²**



SITE PLAN

1 : 250

1 / A100

MIXED-USE WITH GROUND FLOOR COMMERCIAL - ZONING - MD2 (2031) S307		
ZONING RULE	REQUIREMENT	PROVIDED
Minimum lot area	No minimum	3,109.10m²
Minimum lot width	No minimum	42.45m on George Street. 20.19m on back portion.
Minimum front yard	No minimum	1.51m on George Street
Minimum interior side yard	No minimum	0.45m on West side of building. 0.00m on East side of building.
Minimum rear yard	No minimum	0.15m to one storey volume. 19.92m to 4th to 17th floor overhang.
Maximum building height	70m as per Schedule 307. No projections permitted beyond building height.	70m all inclusive.
Maximum floor space index	Not applicable	Not applicable
Minimum width of landscape area	No minimum except that where a yard is provided and not used for required driveways, aisles, parking, loading spaces, or outdoor commercial patio, the whole yard must be landscaped	Whole yard to be landscaped.
Provisions for buildings 10 storeys and higher (By-law 2019-353)	Minimum lot area for an interior lot: 1350m² Minimum interior side and rear yard setback for a tower: 7.5m Minimum separation distance between towers on the same lot: 15m.	Minimum lot area met. Site Plan Approval received. Not applicable.
Parking Garage permission	100% of ground floor fronting a street (excluding mechanical room, pedestrian and vehicular access) for a minimumm depth of 3m, must be occupied by permitted use..	100% of ground fronting George Street for a minimumm depth of 3m, is occupied by permitted Commercial use and Office use.
Ground floor use	100% of ground floor fronting a street (excluding lobby area, mechanical room and access to other floors) for a minimumm depth of 3m, must be occupied by select uses. Total gross area of lobbies, mechanical rooms and access to other floors must not exceed 50% of ground floor gross area. Min. 50% of ground floor to be occupied by permitted use subject to a separate and direct access to abutting street.	100% of ground fronting George Street for a minimumm depth of 3m, is occupied by permitted Commercial use. Total gross area of lobbies, mechanical rooms and access to other floors does not exceed 50% of ground floor gross area. Area of permitted Commercial use exceeds 50% of gross floor area and has separate direct access to George Street.

AMENITY AND PARKING REQUIREMENTS ZONING - MD2 (2031) S307 (COMBINED WITH 110 YORK STREET)		
ZONING MECHANISM	REGULATION	PROPOSED
Residential Parking	None Required Minimum 50% to be horizontal racks.	P2 19 spaces P3 51 spaces P4 52 spaces P5 51 spaces 84 horizontal & 67 vertical mount.
Visitor Parking	Residential Area Z (By-law 2016-249); no more than 30 visitor spaces are required per building. Exception #2031; 0.083 spaces x 297 units = 25 visitor parking spaces	P2 30 spaces
Commercial Parking	None Required	P1 5 spaces
Hotel Parking	None Required	P1 27 spaces
Barrier-Free Parking	Requires 3 barrier-free spaces (Traffic and Parking By-Law 2017-301)	P1 to P5 2 spaces per floor Total 10 barrier-free spaces
		Total: 245 spaces
Minimum bicycle parking	Residential: 0.5 spaces x 297 units = 149 bicycle parking spaces Retail: 1 space per 250m² of GFA 470m² GFA / 250m² = 2 bicycle parking spaces	Residential: 16 (P1) 64 (P2) 66 (P3) Retail : 5 (Exterior) **Total: 151 bicycle spaces**
Maximum parking	1.5 per dwelling unit Limited to 446 space for 297 units. (combined with visitor) 1 per 100m² of Commercial gross area. Limited to 5 spaces.	Total parking spaces is under the limit. Commercial parking spaces maximized.
Minimum driveway width	6m	6m
Minimum aisle width	6m	6m
Loading	Exception #2031; None Required.	NA
Amenities Areas	Amenity Area - 6m² per unit = 297 units x 6m² = 1,782m² Communal Amenity Area : Exception #2031; minimum 40% off the required total Amenity Area = 1,782m² x 0.4 = minimum 713m² Layout of Communal Amenity Area - aggregated into areas up to 54m²	Combined Balcony Areas = 1,555m² Ground = 35m² 2nd = 59m² 3rd = 89m² 4th to 17th = 75m²/ floor 18th = 77m² 19th = 85m² 20th = 75m² 21st = 85m² Combined Communal Areas = 729m² Ground = 220m² 2nd = 195m² 21st = 314m² Total = 2,284m²

SOLID WASTE COLLECTION REQUIREMENTS		
ZONING MECHANISM	REGULATION	PROPOSED
Residential Waste	**Garbage (Compacted)** = 0.053y³/unit Require 16y³ **Recycling (GMP)** = 0.018y³/unit Require 6y³ **Recycling (Fibres)** = 0.038y³/unit Require 12y³ **Organics** = 240L container/50 units Require 6 containers	**Garbage (Compacted)** = 5 x 4y³ containers Total = 20y³ **Recycling (GMP)** = 2 x 3y³ containers Total = 6y³ **Recycling (Fibres)** = 3 x 4y³ containers Total = 12y³ **Organics** = 7 x 240L containers Total = 1680L

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2. All dimensions which appear on the documents must be verified by the contractor prior to the commencement of work.
3. The architect must be notified of all errors, omissions, and discrepancies between these documents and those of the other professionals.
4. The dimensions on these documents must be read and not measured.

Mechanical - Electrical Engineer
JAIN
7400 East Danbro Crescent, 2nd Floor Mississauga, Ontario, L5N 6P8
T 905 285 9900 jainconsultants.com

Structural Engineer
Goodeve Structural Inc.
18-77 Auriga Drive, Ottawa ON K2E 7Z7
T 613 226 4558 goodevestructural.ca

Landscape Architect
James B. Lennox & Associates
3932, Carling Avenue, Ottawa, ON, K2H 5A8
T 613 722 5168 jbla.ca

Civil
Novatech Eng. Consultants Ltd.
240, Michael Cowpland Drive, Suite 200, Ottawa ON K2M 1P6
T 613 234 9643 novatech-eng.com

Architect
NEUF Architectes INC.
630, boul. René-Lévesque O. 32e étages, Montréal QC H3B 1S6
T 514 847 1117 NEUFarchitectes.com

Seal

NEUF
ARCHITECT(E)S

Client

CLARIDGE HOMES

Project

141 GEORGE STREET

Location
OTTAWA

No.
12810

NO	REVISION	DATE (yyyy.mm.dd)
F	FOR CLIENT COMMENTS	2023.03.03
G	FOR COORDINATION	2023.03.03
H	FOR COORDINATION	2023.04.17
J	FOR COORDINATION	2023.05.17
N	RE-ISSUED FOR SITE PLAN APPROVAL	2023.06.06
O	FOR COORDINATION	2023.06.09
Q	RE-ISSUED FOR SITE PLAN APPROVAL	2023.07.06
R	FOR COORDINATION	2023.07.07
V	FOR COORDINATION	2023.09.11

Drawn by
SJ

Checked by
LH

DATE (aa.mm.jj)
FEB 2023

Scale
As indicated

Drawing Title

SITE PLAN

Revision
V

Dwg Number
A100

C:\Fichiers Revit Locaux\141GS_12810_ARC_R22_sjoanisiU643X.rvt

From: Vincent Denomme <vincent.denomme@claridgehomes.com>
Sent: Wednesday, October 4, 2023 2:32 PM
To: Curtis Ferguson <c.ferguson@novatech-eng.com>
Cc: Stephen Poon <stephen.poon@claridgehomes.com>
Subject: 110 York

Hi Curtis,

As discussed. Please remove any reference to servicing 110 York on the George Plans.

Also, please prepare a Servicing memo indicating there is sufficient capacity for both projects.

Attached is the site plan prepared for 110 York, there are 106 Hotel rooms. The ground floor has a ball room with back of house/kitchen etc.

SANITARY SEWER DESIGN SHEET

Project Name:	141 George Street
Date Prepared:	5/25/2023
Date Revised:	10/13/2023
Input By:	Curtis Ferguson, E.I.T.
Reviewed By:	Greg MacDonald, P.Eng
Drawing Reference:	112142 - SAN - \141 George Street

USER DESIGN INPUT
CUMULATIVE CELL
CALCULATED DESIGN CELL OUTPUT

NOVATECH
Engineers, Planners & Landscape Architects

LOCATION			DEMAND																	DESIGN CAPACITY							
			RESIDENTIAL FLOW									COMMERCIAL FLOW					EXTRANEOUS FLOW				PROPOSED SEWER PIPE SIZING / DESIGN							
AREA	FROM MH	TO MH	Studio	1 Bed Apartment	2 Bed / 1 Bed + Den Apartment	3 Bed / 2 Bed + Den Apartment	POPULATION (in 1000's)	CUMULATIVE POPULATION (in 1000's)	PEAK FACTOR M	AVG POPULATION FLOW (L/s)	PEAKED DESIGN POP FLOW (L/s)	COMMERICAL Area	CUMULATIVE COMMERICAL Area	DESIGN COMMERICAL FLOW (L/s)	COMMERICAL PEAK FACTOR	PEAKED COMMERCIAL FLOW	Total Area (ha.)	Accum. Area (ha.)	DESIGN EXTRAN. FLOW (L/s)	TOTAL DESIGN FLOW (L/s)	PIPE LENGTH (m)	PIPE SIZE (mm) AND MATERIAL	PIPE ID ACTUAL (m)	ROUGH. (n)	DESIGN GRADE (%)	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	Qpeak Design / Qcap
George Street																												
A-02	Stub	EX. 1980mm x 1500mm SAN	25	147	123	1	0.502	0.502	3.38	1.63	5.50	679.700	679.700	0.40	1.00	0.40	0.39	0.39	0.13	6.03	6.4	250 PVC	0.254	0.013	2.00	87.7	1.73	6.9%
TOTAL			25	147	123	1	0.502	0.502				679.700	679.700				0.39											

7. Commercial Flow

141 George

Use	Area (m2)
Office Area	72.70
Restaurant Area	477.00
Bar/Cocktail Lounge	130.00
Total Com Area	679.70
Total Com Daily Volume (L/s)	34948.79

Use	Daily Demand Volume		Source
Professional Office	75	L/9.3m2/day	**Daily Demands from OBC Table 8.2.1.3**
Retail Restaurent	125	L/2m2/day	
Bar/ Cocktail Lounge (meeting/party room)	70	L/day/seat (1 seat/ 2m2)	**City of Ottawa Sewer Design Guidelines**

Design Parameters:			
1. Residential Flows			
-1 Bed Apartment / Studio	1.4	Person/ Unit	
-2 Bed Apartment	2.1	Person/ Unit	
-3 Bed Apartment	3.1	Person/ Unit	
2. Commercial Flow			
-Restaurant/Lounge	125	L/day/seat	
3. q Avg capita flow	280	L/per/day	
4. M = Harmon Formula (maximum of 4.0)			
5. K =	0.8		
6. Commercial Peak Factor			
-area > 20% of development	1.5		
-area < 20% of development	1.0		
7. Extraneous Flows =	0.33	L/sec/ha	

CAPACITY EQUATION

Q full= (1/n) A R^(2/3)So^(1/2)

Where : Q full = Capacity (L/s)

n = Manning coefficient of roughness (0.013)

A = Flow area (m^2)

R = Wetter perimenter (m)

So = Pipe Slope/gradient

SANITARY SEWER DESIGN SHEET

Project Name:	110 York Street
Date Prepared:	10/13/2023
Date Revised:	10/13/2023
Input By:	Curtis Ferguson, E.I.T.
Reviewed By:	Greg MacDonald, P.Eng
Drawing Reference:	112142 - SAN - ' 110 YorK Street

USER DESIGN INPUT
CUMULATIVE CELL
CALCULATED DESIGN CELL OUTPUT

NOVATECH
Engineers, Planners & Landscape Architects

LOCATION			DEMAND															DESIGN CAPACITY							
			RESIDENTIAL FLOW						COMMERCIAL FLOW					EXTRANEOUS FLOW				PROPOSED SEWER PIPE SIZING / DESIGN							
AREA	FROM MH	TO MH	HOTEL ROOMS	POPULATION (in 1000's)	CUMULATIVE POPULATION (in 1000's)	PEAK FACTOR M	AVG POPULATION FLOW (L/s)	PEAKED DESIGN POP FLOW (L/s)	COMMERICAL Area	CUMULATIVE COMMERICAL Area	DESIGN COMMERICAL FLOW (L/s)	COMMERICAL PEAK FACTOR	PEAKED COMMERCIAL FLOW	Total Area (ha.)	Accum. Area (ha.)	DESIGN EXTRAN. FLOW (L/s)	TOTAL DESIGN FLOW (L/s)	PIPE LENGTH (m)	PIPE SIZE (mm) AND MATERIAL	PIPE ID ACTUAL (m)	ROUGH. (n)	DESIGN GRADE (%)	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	Qpeak Design / Qcap
York Street																									
A-01	Stub	EX. 1200mm SAN	106	0.191	0.191	3.52	0.50	1.75	793.000	793.000	0.69	1.00	0.69	0.80	0.80	0.26	2.70	6.4	250 PVC	0.254	0.013	2.00	87.7	1.73	3.1%
TOTAL			106	0.191	0.191				793.000	793.000				0.80											

7. Commercial Flow

110 York Street

Use	Area (m2)
Dance Hall (c/w restaurant & bar)	793.00
Total Com Area	793.00
Total Com Daily Volume (L/s)	59475.00

Use	Daily Demand Volume		Source
Dance Hall (c/w restaurant & bar)	150	L/day/patron (1 patron/ 2m2)	City of Ottawa Sewer Design Guidelines

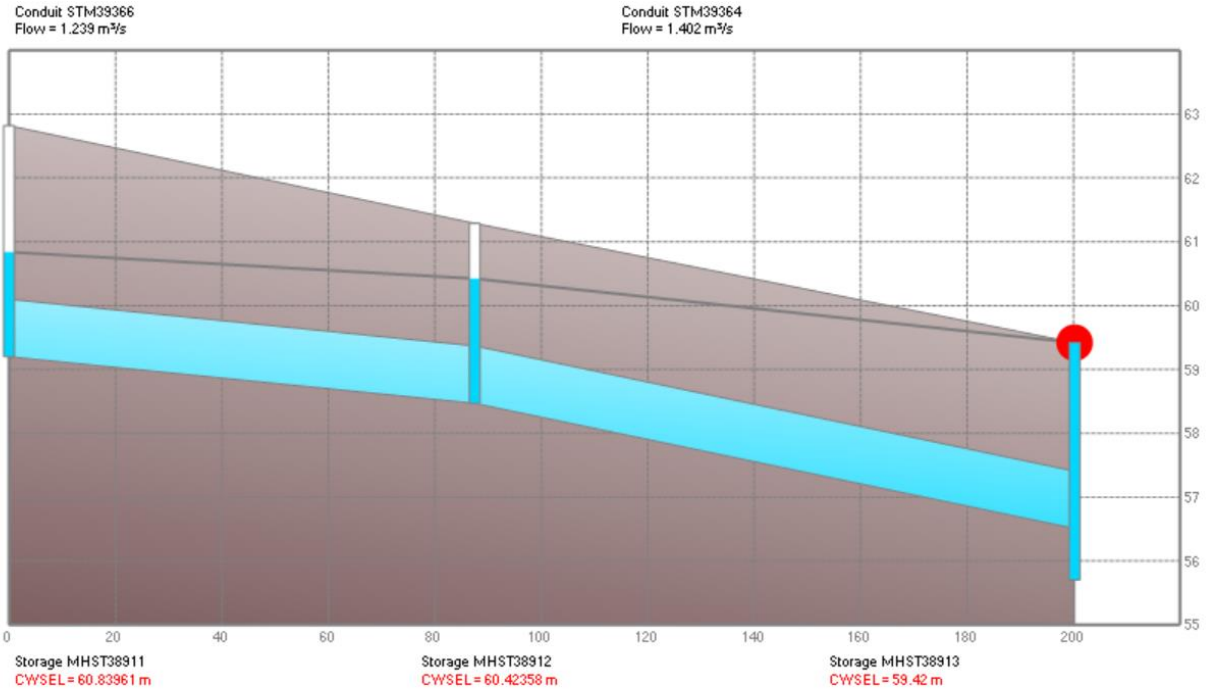
Design Parameters:								
1. Residential Flows				CAPACITY EQUATION				
-Hotel Room	1.8	Person/ Unit		Q full= (1/n) A R^(2/3)So^(1/2)				
2. Commercial Flow				Where :	Q full = Capacity (L/s)			
-Dance hall (c/w restaurant & bar)	150	L/day/patron						
3. q Avg Hotel flow (With Full Housekeeping facilities	225	L/per/day						
4. M = Harmon Formula (maximum of 4.0)					n = Manning coefficient of roughness (0.013)			
5. K =	0.8				A = Flow area (m^2)			
6. Commercial Peak Factor					R = Wetter perimenter (m)			
-area > 20% of development	1.5				So = Pipe Slope/gradient			
-area < 20% of development	1.0							
7. Extraneous Flows =	0.33	L/sec/ha						

From: Duquette, Vincent <Vincent.Duquette@ottawa.ca>
Sent: Friday, May 5, 2023 4:51 PM
To: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Cc: Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>; Wu, John <John.Wu@ottawa.ca>; Greg MacDonald <g.Macdonald@novatech-eng.com>; Curtis Ferguson <c.ferguson@novatech-eng.com>
Subject: RE: 141 George Street - Phase 2 (112142)

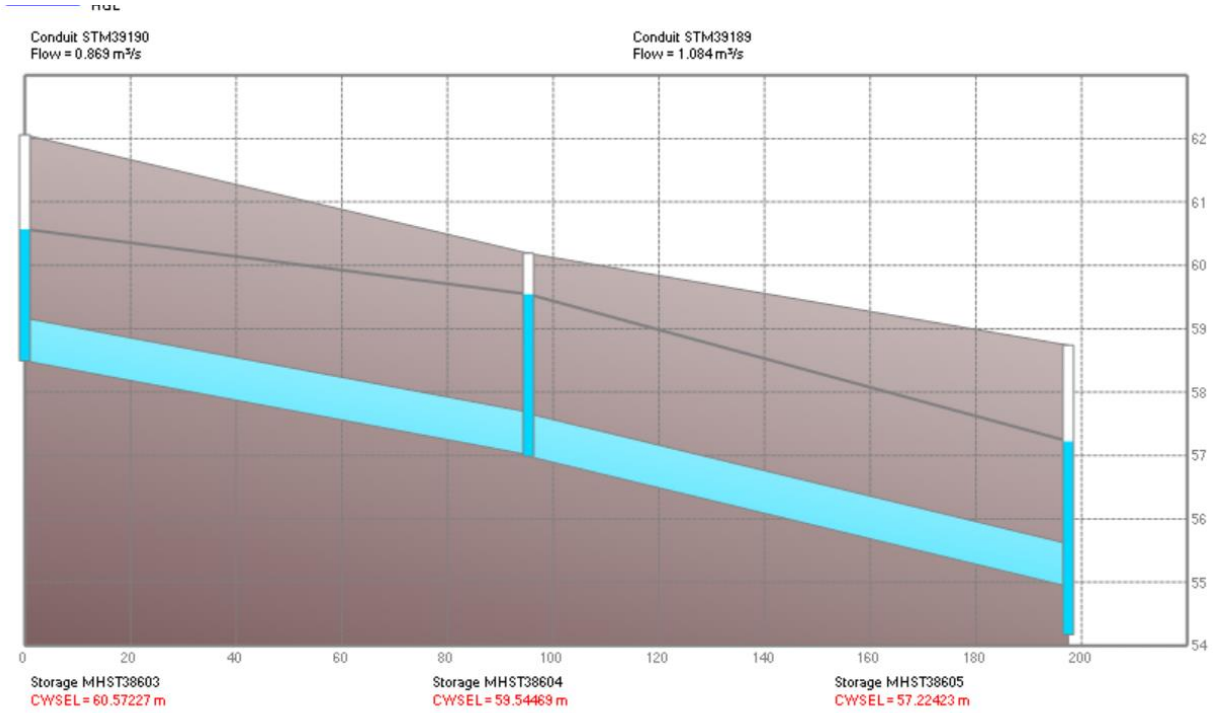
Hi Anthony,

Please see below HGL requested. In these old uncontrolled systems, the 100-year HGL is expected to break out at the surface.

George between Dalhousie and Cumberland



York between Dalhousie and Cumberland



Best Regards,

Vincent Duquette, E.I.T
Project Manager, Infrastructure Approvals
Planning, Real Estate and Economic Development Department – Direction général de la planification, des biens immobilier et du développement économique
Development Review – Central Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 14048, vincent.duquette@ottawa.ca

From: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Sent: April 28, 2023 5:20 PM
To: Duquette, Vincent <Vincent.Duquette@ottawa.ca>
Cc: Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>; Wu, John <John.Wu@ottawa.ca>; Greg MacDonald <g.Macdonald@novatech-eng.com>; Curtis Ferguson <c.ferguson@novatech-eng.com>
Subject: RE: 141 George Street - Phase 2 (112142)

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Hi Vincent,

The requested PDF is attached.

I hope you have a good weekend.

Regards,

Anthony Mestwarp, P.Eng., Project Engineer | Land Development Engineering
NOVATECH
Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext. 216
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From: Duquette, Vincent <Vincent.Duquette@ottawa.ca>
Sent: Friday, April 28, 2023 4:13 PM
To: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Cc: Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>; Wu, John <John.Wu@ottawa.ca>; Greg MacDonald <g.Macdonald@novatech-eng.com>; Curtis Ferguson <c.ferguson@novatech-eng.com>
Subject: RE: 141 George Street - Phase 2 (112142)

Hi Anthony,

I will be reviewing this file in John's absence. Can you please forward me the pdf file highlighting the pipe segments that is mentioned in your previous email. I will then circulate it to asset management to obtain the HGL requested.

Best Regards,

Vincent Duquette, E.I.T
Project Manager, Infrastructure Approvals
Planning, Real Estate and Economic Development Department – Direction général de la planification, des biens immobilier et du développement économique
Development Review – Central Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 14048, vincent.duquette@ottawa.ca

From: Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>
Sent: April 28, 2023 10:59 AM
To: Duquette, Vincent <Vincent.Duquette@ottawa.ca>
Cc: Wu, John <John.Wu@ottawa.ca>; Greg MacDonald <g.Macdonald@novatech-eng.com>; Curtis Ferguson <c.ferguson@novatech-eng.com>; Anthony Mestwarp <a.mestwarp@novatech-eng.com>; Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>
Subject: RE: 141 George Street - Phase 2 (112142)

Hi Vincent ,

Please review it.

--

Thanks,

Abdul
Mohammad Abdul Mottalib, P. Eng.
Extension: 27798

From: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Sent: April 28, 2023 10:15 AM
To: Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>
Cc: Wu, John <John.Wu@ottawa.ca>; Greg MacDonald <g.Macdonald@novatech-eng.com>; Curtis Ferguson <c.ferguson@novatech-eng.com>
Subject: FW: 141 George Street - Phase 2 (112142)

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Hi Abdul,

I understand that John is currently out of the office.

Can you please review the below?

Thanks,

Anthony Mestwarp, P.Eng., Project Engineer | Land Development Engineering
NOVATECH
Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext. 216
The information contained in this email message is confidential and is for exclusive use of the addressee.

From: Anthony Mestwarp
Sent: Friday, April 28, 2023 10:10 AM
To: Wu, John <John.Wu@ottawa.ca>
Cc: Greg MacDonald <g.Macdonald@novatech-eng.com>; Curtis Ferguson <c.ferguson@novatech-eng.com>
Subject: 141 George Street - Phase 2 (112142)

Hi John,

We are working on the design of 141 George Street Phase 2 and would like to confirm the existing storm sewer HGL within the city infrastructure neighboring the site, to ensure there will not be any backflow issues on the proposed connections.

Can you please confirm who would be the engineering reviewer for this project, and if required forward this email to the appropriate contact.

York Street:

Can you please confirm the existing HGL within the 675mm concrete storm sewer within York street between manholes MHST38603 and MHST38604 as highlighted on the attached PDF.

George Street:

Can you please confirm the existing HGL within the 900mm concrete storm sewer within York street between manholes MHST38911 and MHST38912 as highlighted on the attached PDF.

Thanks,

Anthony Mestwarp, P.Eng., Project Engineer | Land Development Engineering
NOVATECH
Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext. 216
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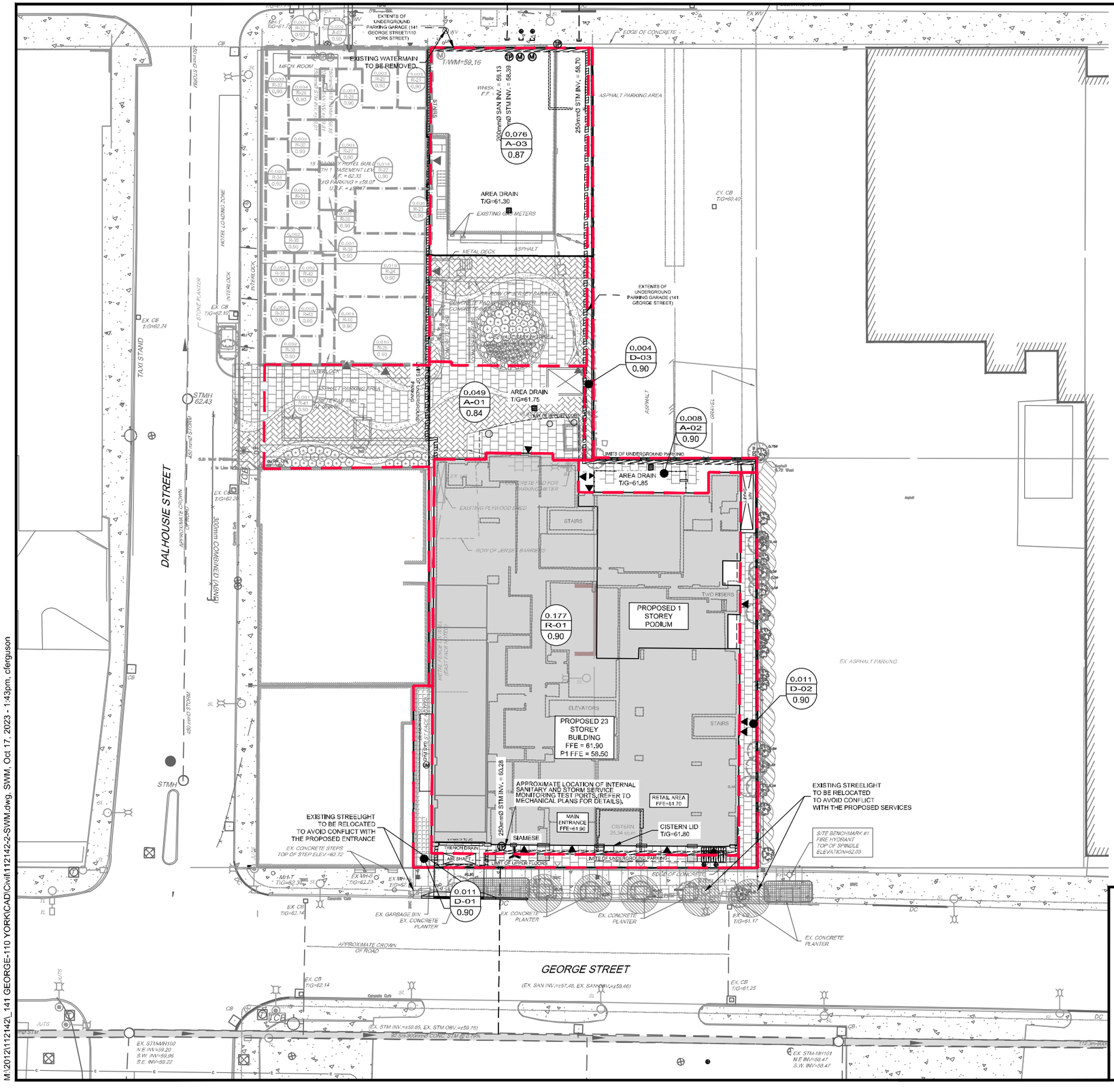
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NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

CITY OF OTTAWA
141 GEORGE STREET

STORMWATER MANAGEMENT PLAN

SCALE 1 : 500 (0, 5m, 10m, 20m)
DATE MARCH 2024
JOB 112142
FIGURE SWM

SHT11X17.DWG - 279mmX432mm

M:\2012\112142_141 GEORGE-110 YORK\CAD\Civil\112142-2-SWM.dwg, SWM, Oct 17, 2023 - 1:43pm, cferguson

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- Community & Residential Developments
- Commercial & Institutional Sites
- Environmental Restoration

35 Years

Residential / Hotel Development 141 George Street / 325 Dalhousie Street / 110 York Street Ottawa, Ontario

Servicing Design Brief

RESIDENTIAL / HOTEL DEVELOPMENT
141 GEORGE STREET / 325 DALHOUSIE STREET / 110 YORK STREET
OTTAWA, ONTARIO

SERVICING DESIGN BRIEF

Prepared by:

NOVATECH
240 Michael Cowpland Drive
Ottawa, Ontario
K2M 1P6

December 07, 2012 (R-2012-171)
February 28, 2013 (R-2013-019)
February 14, 2014
Revised April 12, 2018

File No.: 112142
Report Reference No.: R-2014-020

NOVATECH
Engineers, Planners & Landscape Architects

April 12, 2018

City of Ottawa
Planning and Growth Management Department
Development Review (Urban) Services Branch
Infrastructure Approvals Division
110 Laurier Avenue West, 4th Floor
Ottawa ON, K1P 1J1

Attention: Mr. Richard Buchanan

Dear Sir:

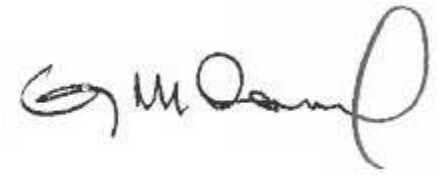
Reference: Residential / Hotel Development
141 George Street / 325 Dalhousie Street
Servicing Design Brief
Our File No.: 112142

Enclosed herein is the revised Servicing Design Brief for the proposed Residential / Hotel development at 141 George Street / 325 Dalhousie Street / 110 York Street, located east of Dalhousie Street between York Street and George Street. This brief is submitted in support of the zoning amendment for the site and outlines how the site will be serviced with sanitary, storm and watermain.

Trusting this report is adequate for your purposes. Should you have any questions, or require additional information, please contact us.

Yours truly,

NOVATECH



Greg MacDonald, P.Eng.
Director | Land Development and Public-Sector Infrastructure

TABLE OF CONTENTS

1.0 INTRODUCTION 1
2.0 SANITARY SEWER 1
3.0 STORMWATER 4
4.0 WATERMAIN 5
4.1 DOMESTIC WATER DEMAND 5
4.2 FIRE DEMAND 6
5.0 CONCLUSIONS 8

List of Figures

Figure 1: Aerial Photo
Figure 2: Conceptual Site Plan
Figure 3: Conceptual Site Servicing Plan

List of Appendices

Appendix A: Hydrant Flow Data/Fire Fighting Information
Appendix B: Servicing Study Guidelines Checklist

1.0 INTRODUCTION

This Servicing Design Brief has been prepared in support of a Zoning By-Law Amendment Application of the property located at 110 York Street. A previous Servicing Design Brief was completed on February 14, 2014 in support of a Zoning By-Law Amendment Application for 141 George Street and 325 Dalhousie Street. The proposed development at that time included a 15-storey hotel with 200 rooms and a 22-storey residential condominium with 282 units with approximately 1097 m^2 of commercial floorspace on the ground floor. This report addresses the proposed hotel expansion on 110 York Street, which will add another 128 hotel rooms.

The subject site is located in the Byward Market, east of Dalhousie Street between York Street and George Street in the City of Ottawa. The existing properties are currently occupied by commercial spaces at 110 York Street (The Whiskey Bar), a 15-story hotel building at 325 Dalhousie Street (constructed in 2015), and a privately-owned surface parking lot. Aerial view of the subject is provided in **Figure 1**.

The proposed development of the site will consist of an 18-storey hotel addition at 110 York Street with 128 units and a 22-storey tower at 141 George Street with 282 condominium units. The condominium building will include approximately 1097 m^2 of commercial floor space located on the ground floor. A total of approximately 288 underground parking spaces will be provided on 4 levels of underground parking. Refer to **Figure 2** for details.

As identified in the City of Ottawa's Zoning By-Law, the site is currently designated as Mixed-Use Downtown (MD2). The minor zoning by-law amendment will revise the site's current designation for the proposed development to deal with building height, parking requirements and any applicable zoning provisions that cannot be met. The specific details regarding the changes proposed to the zoning of the subject site are provided in a Planning Rationale submitted as part of the Zoning By-Law Amendment application.

The subject site is approximately 0.42 ha in area. This servicing design brief will outline how the site will be serviced with sanitary, storm and watermain, and will demonstrate that adequate municipal capacity is available within the existing infrastructure to service the development.

2.0 SANITARY SEWER

The existing Dalhousie Street hotel is serviced by a 200 mm dia. sanitary service that connects to the existing 1200 mm dia. sanitary sewer on York Street. The proposed York Street hotel addition will have a separate 200 mm dia. sanitary service that will connect to the existing 1200 mm dia. sanitary sewer on York Street. The existing 200 mm dia. sanitary service for the 110 York Street property will be abandoned. The proposed condominium development will be serviced by a 200 mm dia. sanitary service that will connect to the existing 1980x1500 mm dia. sanitary sewer on George Street. Refer to **Figure 3** for details.

The proposed development flows are based on the City of Ottawa Sewer Design Guidelines. The calculated sanitary flow estimates for existing and proposed buildings on site will be compared to design flows based on current zoning.



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CITY OF OTTAWA
141 GEORGE STREET / 325 DALHOUSIE STREET / 110 YORK STREET

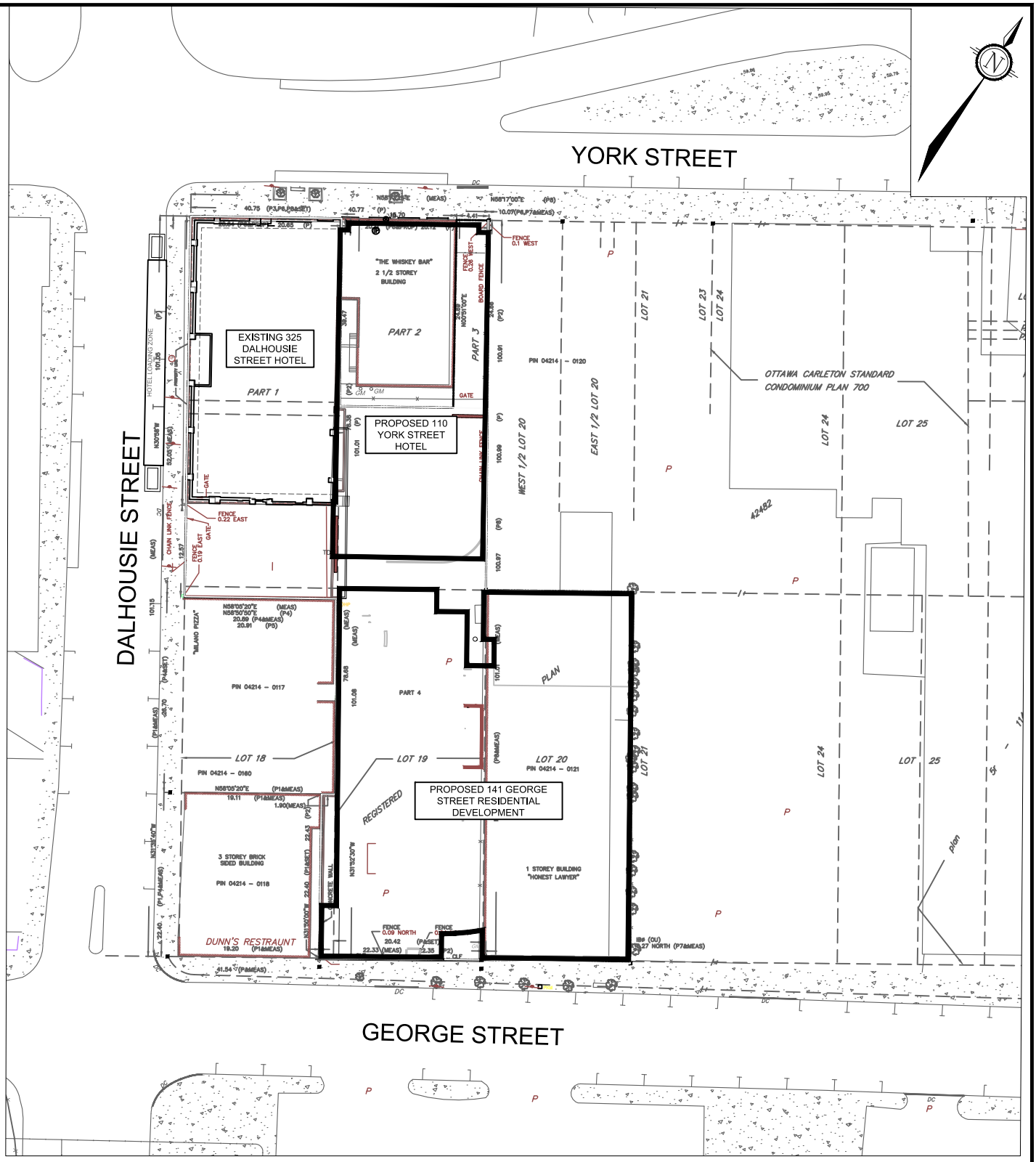
AERIAL PHOTO

SCALE N.T.S

DATE	JOB	FIGURE
APR 2018	112142	FIGURE 1

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SHT8X11.DWG - 216mmx279mm



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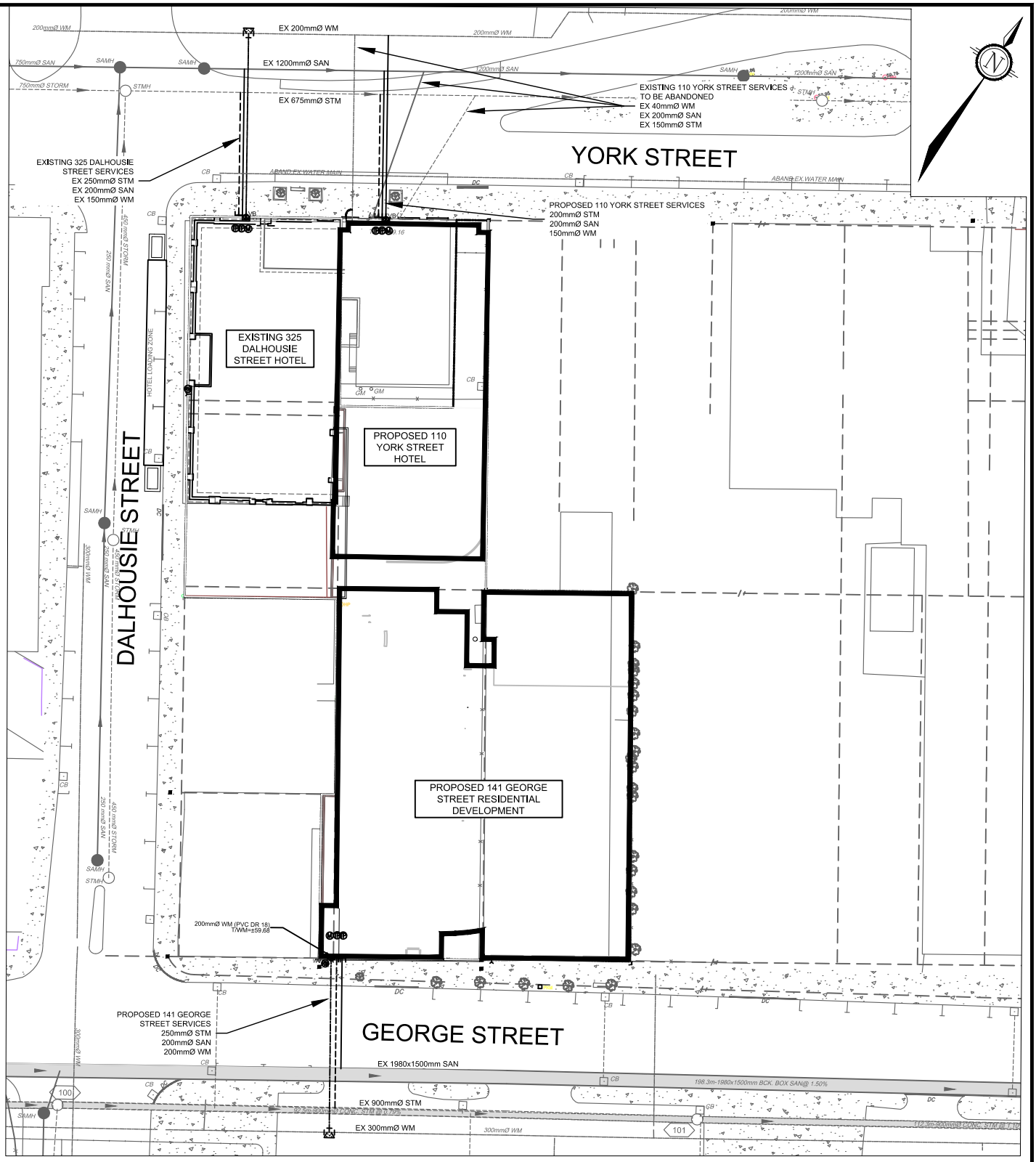
CONCEPTUAL SITE PLAN

SCALE N.T.S

DATE APR 2018 | JOB 112142 | FIGURE FIGURE 2

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CITY OF OTTAWA
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CONCEPTUAL SITE SERVICING PLAN

SCALE N.T.S

DATE APR 2018 | JOB 112142 | FIGURE FIGURE 3

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Sanitary Flows Under Proposed Development

Existing Hotel (Dalhousie Street)

Average Sanitary Flow:

Residential: Q_{SAN} = 200 units x 1.1 persons/unit* x 225 L/cap/day = 49,500 L/day = 0.57 L/s
Restaurant/Bar: Q_{SAN} = 100 seats x 125 L/seat/day = 12,500 L/day = 0.14 L/s
Rooftop Bar: Q_{SAN} = 50 seats x 70 L/seat/day = 3,500 L/day = 0.04 L/s
Staff: Q_{SAN} = 20 staff x 40 L/staff/day = 800 L/day = 0.01 L/s

Total Average Residential Flow = 0.57 L/s
Total Average Commercial Flow = 0.14 L/s + 0.04 L/s + 0.01 L/s = 0.19 L/s
Total Average Sanitary Flow = 0.57 L/s + 0.19 L/s = 0.76 L/s

Peak Sanitary Flow:

Residential Peaking Factor (Harmon Equation) = 3.51
Total Peak Residential Flow = 0.57 L/s x 3.51 = 2.00 L/s
Commercial Peaking Factor = 1.0
Total Peak Commercial Flow = 0.19 L/s x 1.0 = 0.19 L/s

Total Peak Sanitary Flow = 2.00 L/s + 0.19 L/s = 2.19 L/s

** Based on predominantly one person per room (business travel).*

Proposed Hotel (York Street)

Average Sanitary Flow:

Residential: Q_{SAN} = 128 units x 1.1 persons/unit* x 225 L/cap/day = 31,680 L/day = 0.37 L/s
Ballroom/Bar: Q_{SAN} = 50 seats x 70 L/seat/day = 3,500 L/day = 0.04 L/s
Staff: Q_{SAN} = 20 staff x 40 L/staff/day = 800 L/day = 0.01 L/s

Total Average Residential Flow = 0.37 L/s
Total Average Commercial Flow = 0.04 L/s + 0.01 L/s = 0.05 L/s
Total Average Sanitary Flow = 0.37 L/s + 0.05 L/s = 0.42 L/s

Peak Sanitary Flow:

Residential Peaking Factor (Harmon Equation) = 3.56
Total Peak Residential Flow = 0.37 L/s x 3.56 = 1.32 L/s
Commercial Peaking Factor = 1.0
Total Peak Commercial Flow = 0.05 L/s x 1.0 = 0.05 L/s

Total Peak Sanitary Flow = 1.32 L/s + 0.05 L/s = 1.37 L/s

** Based on predominantly one person per room (business travel).*

Proposed Condominium (George Street)

Average Sanitary Flow:

Residential: Q_{SAN} = 282 units x 1.8 persons/unit x 280 L/cap/day = 142,128 L/day = 1.65 L/s
Commercial: Q_{SAN} = 0.1097 ha (1097 m^2) x 28,000 L/ha/d = 3072 L/day = 0.04 L/s

Total Average Sanitary Flow = 1.65 L/s + 0.04 L/s = 1.69 L/s

Peak Sanitary Flow:
Residential Peaking Factor (Harmon Equation) = 3.38
Total Peak Residential Flow = 1.65 L/s x 3.38 = 5.58 L/s
Commercial Peaking Factor = 1.0
Total Peak Commercial Flow = 0.04 L/s x 1.0 = 0.04 L/s

Total Peak Sanitary Flow = 5.58 L/s + 0.04 L/s = 5.62 L/s

Infiltration – Site

Total Site Area = 0.42 ha
Infiltration Flow = 0.33 L/s/ha x 0.42 ha = 0.14 L/s

Site Total

Total Average Sanitary Flow = **2.87 L/s**
Total Peak Sanitary Flow (including infiltration) = **9.32 L/s**

Sanitary Flows Under Current Zoning

Currently, the site is zoned as MD2 – Mixed-Use Downtown. The current zoning by-law permits hotel and a restaurant component as well as residential mid to high use development and a commercial component ancillary to residential. Based on this, sanitary flows are calculated below.

Existing Hotel (Dalhousie Street)

Average Sanitary Flow = 0.76 L/s*
Peak Sanitary Flow = 2.19 L/s*

**See calculations in previous section.*

Existing 110 York Street (The Whiskey Bar)

Average Sanitary Flow:
Bar: Q_{SAN} = 170 seats x 70 L/seat/day = 11,900 L/day = 0.14 L/s
Staff: Q_{SAN} = 6 staff x 40 L/staff/day = 240 L/day = 0.003 L/s

Total Average Sanitary Flow = 0.14 L/s + 0.003 L/s = 0.14 L/s

Total Peak Sanitary Flow:
Commercial Peaking Factor = 1.5

Total Peak Sanitary Flow = 0.14 L/s x 1.5 = 0.21 L/s

Future Residential Development (George Street)

Average Sanitary Flow:
Total Site Area = 0.42 ha
Area Designated for Future Residential Development = 0.21 ha

Population = 0.21 ha x 1800 persons/ha = 378 persons

Total Average Sanitary Flow = 378 persons x 280 L/cap/day = 105,840 L/day = 1.23 L/s

Peak Sanitary Flow:
Residential Peaking Factor (Harmon Equation) = 3.43

Total Peak Residential Flow = 1.23 L/s x 3.43 = 4.22 L/s

Infiltration – Site

Total Site Area = 0.42 ha
Infiltration Flow = 0.33 L/s/ha x 0.42 ha = 0.14 L/s

Site Total

Total Average Sanitary Flow = **2.13 L/s**
Total Peak Sanitary Flow (including infiltration) = **6.76 L/s**

The sanitary flows from the proposed development are in close proximity to the flows calculated under the existing zoning. The existing receiving sewers are a 1200 mm dia. sanitary sewer at ±2.0% slope on York Street with a capacity of approximately 5,750 L/s and a 1500 mm dia. sanitary sewer at ±1.5% slope on George Street with a capacity of approximately 11,650 L/s. Therefore, the proposed development will have negligible impact on the existing municipal sanitary sewer system.

3.0 STORMWATER

Stormwater flows from the site are currently conveyed to the existing storm sewer system via on-site catchbasins and overland flows to York Street, Dalhousie Street, and George Street. The stormwater from the Dalhousie Street hotel as well as the existing building at 110 & 112 York Street is captured by roof drains and outlet through their respective existing service connections. As part of this development, all stormwater will be controlled on site prior to being discharged to the storm system.

The proposed York Street hotel development will be serviced by a new 250 mm dia. storm service that will connect to the existing 675 mm dia. storm sewer on York Street; therefore, the existing 150 mm dia. storm service that is currently connected to the existing 675 mm dia. storm sewer on York Street will need to be abandoned. The new storm service connection to the building will be equipped with a backwater valve.

Furthermore, the proposed condominium development will be serviced by a 250 mm dia. storm service that will connect to the existing 900 mm dia. storm sewer on George Street. The proposed storm service connection to the building will be equipped with a backwater valve. Refer to **Figure 3** for details.

The City will require that on-site stormwater management be implemented to control post-development stormwater discharge for both the 5 & 100 year storm events based on an allowable runoff coefficient (C) of 0.50, a time of concentration (t_c) of 20 minutes, and a 5-year storm control. Stormwater management will be achieved through the use of rooftop controls and surface ponding (as required). Should surplus storage be required, stormwater management

alternatives such as storage tanks or super-pipes will be implemented. Temporary storage will be provided at the surface as required to supply the necessary release rate during all phases until full build out is achieved with underground systems.

The site will be graded such that flows in excess of the 100-year storm event will be conveyed overland to York Street, Dalhousie Street and George Street. Erosion and sediment control measures will be implemented during all phases of construction and inspected regularly.

4.0 WATERMAIN

4.1 Domestic Water Demand

The existing Dalhousie Street hotel is serviced by a 150mm dia. water service that is connected to the existing 200mm dia. watermain in York Street. The proposed York Street hotel development will be serviced by a separate 150 mm dia. water service that will connect to the existing 200 mm dia. watermain on York Street. The existing water service for the 110 York Street property will need to be blanked at the City watermain and abandoned. The proposed condominium development will be serviced by a 200mm dia. water service that will connect to the existing 300 mm dia. watermain on George Street. Refer to **Figure 3** for details.

Estimated domestic daily water demands for the development are roughly the same as the proposed development sanitary flows listed above in Section 2.0:

<u>Existing Hotel (Dalhousie Street)</u>

Residential Average Day Demand = 0.57 L/s
Residential Maximum Day Demand (2.5 x avg. day) = 1.43 L/s
Residential Peak Hour Demand (2.2 x max. day) = 3.15 L/s

Commercial Average Day Demand (Restaurant + Bar + Staff) = 0.19 L/s
Commercial Maximum Day Demand (1.5 x avg. day) = 0.29 L/s
Commercial Peak Hour Demand (1.8 x max. day) = 0.52 L/s

Total Average Day Demand = 0.76 L/s
Total Maximum Day Demand = 1.72 L/s
Total Peak Hour Demand = 3.67 L/s

<u>Proposed Hotel (York Street)</u>

Residential Average Day Demand = 0.37 L/s
Residential Maximum Day Demand (2.5 x avg. day) = 0.93 L/s
Residential Peak Hour Demand (2.2 x max. day) = 2.05 L/s

Commercial Average Day Demand (Ballroom/Bar + Staff) = 0.05 L/s
Commercial Maximum Day Demand (1.5 x avg. day) = 0.08 L/s
Commercial Peak Hour Demand (1.8 x max. day) = 0.14 L/s

Total Average Day Demand = 0.42 L/s
Total Maximum Day Demand = 1.01 L/s
Total Peak Hour Demand = 2.19 L/s

Condominium (George Street)

Residential Average Day Demand = 1.65 L/s
Residential Maximum Day Demand (2.5 x avg. day) = 4.13 L/s
Residential Peak Hour Demand (2.2 x max. day) = 9.09 L/s

Commercial Average Day Demand = 0.04 L/s
Commercial Maximum Day Demand (1.5 x avg. day) = 0.06 L/s
Commercial Peak Hour Demand (1.8 x max. day) = 0.11 L/s

Total Average Day Demand = 1.69 L/s
Total Maximum Day Demand = 4.19 L/s
Total Peak Hour Demand = 9.20 L/s

Based on the data provided by the City, the existing watermains in the area are adequate to service this development. According to hydrant test results, the watermain in the street can deliver in the range of approximately 1000 igpm (±75.8 L/s) at a dynamic pressure greater than 56 psi. A copy of the watermain data is attached in **Appendix A**.

4.2 Fire Demand

Section 4.2.11 of the City of Ottawa Water Design Guidelines reads:

"When calculating the fire flow requirements and affected pipe sizing, designers shall use the method developed by the Fire Underwriters Survey.", and

"The requirements for levels of fire protection on private property are covered in Section 7.2.11 of the Ontario Building Code."

The Fire Underwriters Survey is used to assess the performance of the water distribution system on a "City Block" basis rather than an individual building basis. The Ontario Building Code governs the assessment of fire demand for individual buildings.

Section 7.2.11.1 of the Ontario Building Codes states that the design, construction, installation and testing of fire service mains and water service pipe combined with fire service mains shall be in conformance with NFPA 24.

NFPA 24 is the standard for the "Installation of Private Fire Service Mains and their Appurtenances". Chapter 13 of NFPA 24 discusses sizing the private service fire mains for fire protection systems which shall be approved by the authority having jurisdiction, considering the following factors:

- Construction and Occupancy of the building
- Fire Flow and Pressure of the Water Required
- Adequacy of the Water Supply

Specific to this project the buildings will be sprinklered per Section 3.2.2.45 of the Ontario Building Code (OBC). Section 3.2.5.7 of the OBC requires that an adequate water supply for fire fighting be provided to each building, and references Appendix A of the OBC. Sentence 3 of Section A 3.2.5.7 of the OBC (Appendix A) states that NFPA 13 be used for determining both sprinkler and hose stream demands for a sprinklered building.

The design of the sprinkler system is completed by a Fire Protection Engineer, or typically computed by the sprinkler contractor and approved by the Fire Protection Engineer. The process involves detailed hydraulic calculations based on building layout, pipe runs, head losses, fire pump requirements, etc. At this stage in the development process, these details are not available. However, using Chapter 7 of NFPA 13, it is possible to provide a fairly accurate estimate of the fire demand for the building. This estimate is provided below.

NFPA Chapter 7 Calculation

22 Storey Residential Building – Light Hazard
15 Storey Hotel Building – Light Hazard [incl. restaurant - Ordinary Hazard (Group 1)]
18-Storey Hotel Building – Light Hazard
4 Level Underground Parking (under residential building - serve both) - Ordinary Hazard (Group 1)

Section 7.2.3 of NFPA 13, "Water Demand Requirements – Hydraulic Calculation Methods" is used to estimate the hose stream demand and the sprinkler demand. The water demand for sprinklers is estimated using the most remote area in the building. Figure 7.2.3.1.2 – Area/Density Curves is used for the worst case scenario, which in this case is the Ordinary Hazard Classification in the underground parking garage. For this classification, Figure 7.2.3.1.2 provides a density of 0.15 gpm/ft2 using a coverage of 1500 ft2, or 225 gpm (US).

Table 7.2.3.1.1 is used to determine the hose stream demand. For Ordinary Hazard a total combined inside and outside hose stream demand of 250 gpm is required. Typically, 150 gpm would be drawn off the hydrant and 100 gpm off the hose cabinets.

Therefore, total estimated demand would be 225 gpm + 250 gpm = 475 gpm. Adding an allowance for head losses though out the sprinkler system, an estimated fire demand of between 550 – 600 gpm, or say 600 USgpm (2,270 L/min) would be required. According to the fire hydrant data provided by the City, the 200 mm and 300 mm watermains on York Street and George Street respectively can deliver in the range of 1,000 Igpm (1,200 USgpm) under normal conditions and 2,100 Igpm (2,500 USgpm) at 20 psi residual. The building will also be equipped with a fire pump, if necessary, to provide the minimum residual pressure at the sprinkler heads.

Reference material from NFPA 13 is contained in **Appendix A**.

5.0 CONCLUSIONS

Based on the foregoing, adequate sanitary, storm and water services are available to support this development.

NOVATECH ENGINEERING CONSULTANTS LTD.

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APPENDIX A
Hydrant Flow Data/Fire Fighting Information

FAX TRANSMISSION FORM - Supply Pressure/Flow Capacity

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Our File: 49-01-2006
1 of 2 Page(s)

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Request_dt: 12/09/24-10:14:12
Email: **j.gauthier@novatech-eng.com**

Pressure Only ? (Y):

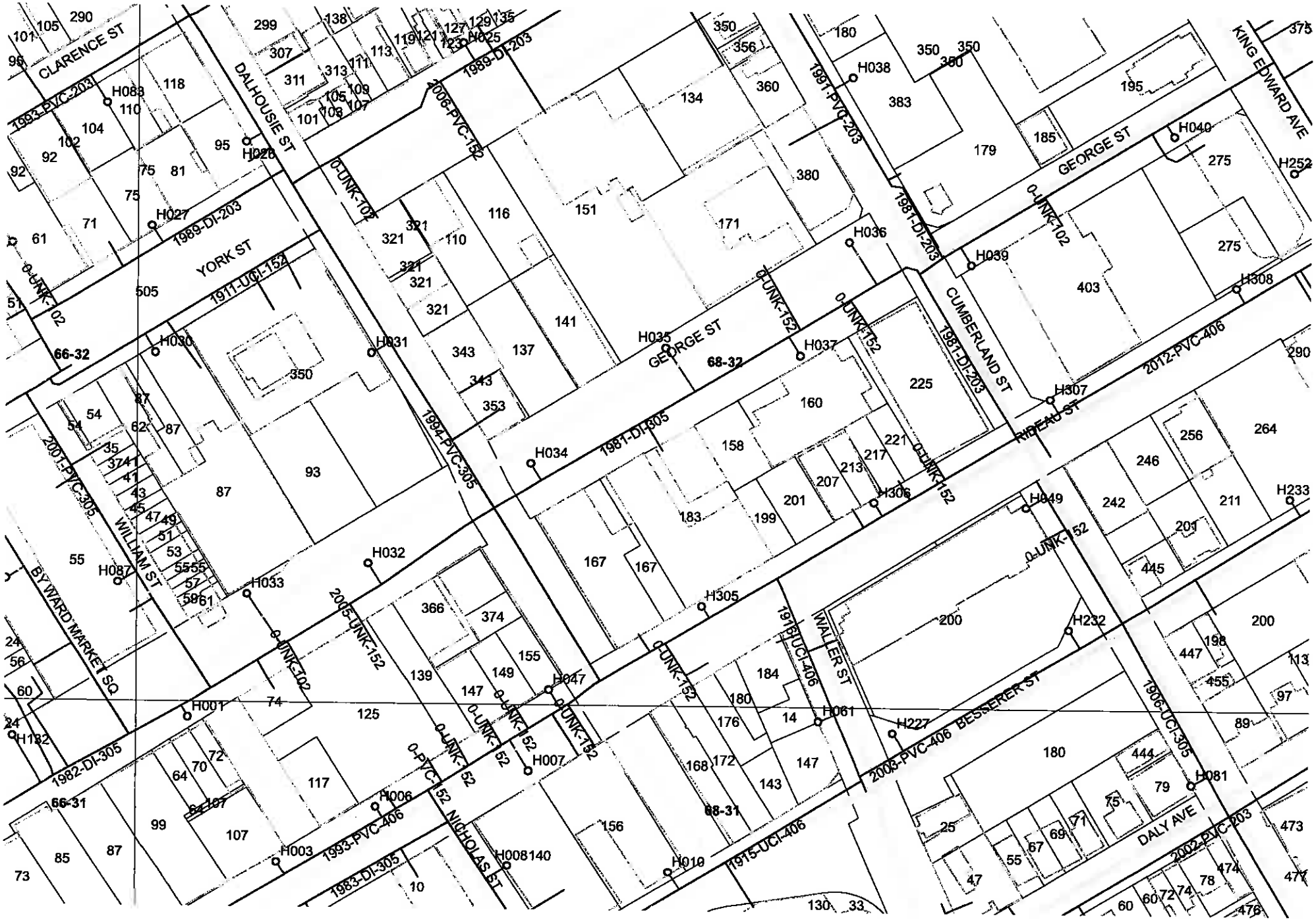
6350

Preferred Response Method:

Inspection Date	Flow Hydrant	Residual Hydrant	Pressure (psi)			Flow (igpm)	
			Static	Dynamic	Pitot	Actual	@ 20 psi
2011/09/26	6832034	6832035	66	>56	46	950	2166
2011/09/26	6832035	6832039	68	>56	52	1010	2135
2011/09/26	6832036	6832039	68	>58	56	1048	2445
2011/09/26	6832037	6832035	66	>56	54	1029	2346
2011/09/27	6832031	6832026	68	>58	56	1048	2445
?	6832029	?	?	?	?	?	?
?	6832215	?	?	?	?	?	?
2011/09/26	6832038	6832039	68	>58	58	1067	2488

Note: the computed flows are approximate and performed for hydrant colour coding purposes, thus these values are not intended for design purposes.

Ref# **6350**


CLARENCE ST
DALHOUSIE ST
YORK ST
GEORGE ST
RIDEAU ST
CUMBERLAND ST
KING EDWARD AVE
BYWARD MARKET SQ
WILLIAM ST
WALLER ST
DALY AVE
NICHOLAS ST
BESSERER ST
1989-DI-203
2006-PVC-152
1991-PVC-203
1911-UCI-152
1994-PVC-305
1981-DI-305
2001-PVC-305
2005-UNK-152
1982-DI-305
1993-PVC-406
1983-DI-305
1915-UCI-406
1976-UCI-406
2003-PVC-406
1906-UCI-305
2002-PVC-203
2012-PVC-406
0-UNK-102
0-UNK-152
0-PVC-152
66-32
68-32
66-31
68-31
H088
H026
H027
H030
H031
H032
H033
H087
H001
H132
H006
H003
H008140
H007
H047
H034
H035
H036
H037
H038
H039
H040
H252
H308
H307
H306
H305
H049
H233
H232
H227
H061
H081
H010

6-4.5.9* For individual fasteners, the loads determined in 6-4.5.6 shall not exceed the allowable loads provided in Figure 6-4.5.9.

The type of fasteners used to secure the bracing assembly to the structure shall be limited to those shown in Figure 6-4.5.9. For connections to wood, through bolts with washers on each end shall be used. Holes for through bolts shall be $^1/_{16}$ in. (1.6 mm) greater than the diameter of the bolt.

Exception No. 1: Where it is not practical to install through bolts due to the thickness of the member or inaccessibility, lag screws shall be permitted. Holes shall be pre-drilled $^1/_8$ in. (3.2 mm) smaller than the maximum root diameter of the lag screw.

Exception No. 2: Other fastening methods are acceptable for use if certified by a registered professional engineer to support the loads determined in accordance with the criteria in 6-4.5.9. Calculations shall be permitted where required by the authority having jurisdiction.

6-4.5.10 Sway bracing assemblies shall be listed for a maximum load rating. The loads shall be reduced as shown in Table 6-4.5.10 for loads that are less than 90 degrees from vertical.

Exception: Where sway bracing utilizing pipe, angles, flats, or rods as shown in Table 6-4.5.8 is used, the components do not require listing. Bracing fittings and connections used with those specific materials shall be listed.

Table 6-4.5.10 Allowable Horizontal Load on Brace Assemblies Based on the Weakest Component of the Brace Assembly

Brace Angle	Allowable Horizontal Load
30–40 degrees from vertical	Listed load rating divided by 2.000
45–59 degrees from vertical	Listed load rating divided by 1.414
60–89 degrees from vertical	Listed load rating divided by 1.155
90 degrees from vertical	Listed load rating

6-4.5.11 Bracing shall be attached directly to feed and cross mains. Each run of pipe between changes in direction shall be provided with both lateral and longitudinal bracing.

Exception: Pipe runs less than 12 ft (3.6 m) in length shall be permitted to be supported by the braces on adjacent runs of pipe.

6-4.5.12 A length of pipe shall not be braced to sections of the building that will move differentially.

6-4.6 Restraint of Branch Lines.

6-4.6.1* Restraint is considered a lesser degree of resisting loads than bracing and shall be provided by use of one of the following:

(1) A listed sway brace assembly

(2) A wraparound U-hook satisfying the requirements of 6-4.5.3, Exception No. 3

(3) No. 12, 440-lb (200-kg) wire installed at least 45 degrees from the vertical plane and anchored on both sides of the pipe

(4) Other approved means

Wire used for restraint shall be located within 2 ft (610 mm) of a hanger. The hanger closest to a wire restraint shall be of a type that resists upward movement of a branch line.

6-4.6.2 The end sprinkler on a line shall be restrained against excessive vertical and lateral movement.

6-4.6.3* Where upward or lateral movement would result in an impact against the building structure, equipment, or finish materials, branch lines shall be restrained at intervals not exceeding 30 ft (9 m).

6-4.6.4* Sprig-ups 4 ft (1.2 m) or longer shall be restrained against lateral movement.

6-4.7 Hangers and Fasteners Subject to Earthquakes.

6-4.7.1 C-type clamps (including beam and large flange clamps) used to attach hangers to the building structure in areas subject to earthquakes shall be equipped with a restraining strap. The restraining strap shall be listed for use with a C-type clamp or shall be a steel strap of not less than 16 gauge thickness and not less than 1 in. (25.4 mm) wide for pipe diameters 8 in. (203 mm) or less and 14 gauge thickness and not less than $1^1/_4$ in. (31.7 mm) wide for pipe diameters greater than 8 in. (203 mm). The restraining strap shall wrap around the beam flange not less than 1 in. (25.4 mm). A lock nut on a C-type clamp shall not be used as a method of restraint. A lip on a "C" or "Z" purlin shall not be used as a method of restraint.

Where purlins or beams do not provide an adequate lip to be secured by a restraining strap, the strap shall be through-bolted or secured by a self-tapping screw.

6-4.7.2 C-type clamps (including beam and large flange clamps), with or without restraining straps, shall not be used to attach braces to the building structure.

6-4.7.3 Powder-driven fasteners shall not be used to attach braces to the building structure.

Exception: Powder-driven fasteners shall be permitted where they are specifically listed for service in resisting lateral loads in areas subject to earthquakes.

6-4.7.4 Powder-driven fasteners shall not be used to attach hangers to the building structure where the systems are required to be protected against earthquakes using a horizontal force factor exceeding 0.50 W_p, where W_p is the weight of the water-filled pipe.

Exception: Powder-driven fasteners shall be permitted where they are specifically listed for horizontal force factors in excess of 0.50 W_p.

Chapter 7 Design Approaches

7-1 General.

7-1.1 Water demand requirements shall be determined from the occupancy hazard fire control approach of Section 7-2.

Exception: Special design approaches as permitted in Section 7-9.

7-1.2 For buildings with two or more adjacent occupancies that are not physically separated by a barrier or partition capable of delaying heat from a fire in one area from fusing sprinklers in the adjacent area, the required sprinkler protection for the more demanding occupancy shall extend 15 ft (4.6 m) beyond its perimeter.

7-2 Occupancy Hazard Fire Control Approach.

7-2.1 Occupancy Classifications.

7-2.1.1 Occupancy classifications for this standard relate to sprinkler installations and their water supplies only. They shall not be used as a general classification of occupancy hazards.

7-2.1.2 Occupancies or portions of occupancies shall be classified according to the quantity and combustibility of contents, the expected rates of heat release, the total potential for energy release, the heights of stockpiles, and the presence of flammable and combustible liquids, using the definitions contained in Section 1-4. Classifications are as follows:

Light hazard

Ordinary hazard (Groups 1 and 2)

Extra hazard (Groups 1 and 2)

Special occupancy hazard *(see Section 7-10)*

7-2.2 Water Demand Requirements — Pipe Schedule Method.

7-2.2.1 Table 7-2.2.1 shall be used in determining the minimum water supply requirements for light and ordinary hazard occupancies protected by systems with pipe sized according to the pipe schedules of Section 8-5. Pressure and flow requirements for extra hazard occupancies shall be based on the hydraulic calculation methods of 7-2.3. The pipe schedule method shall be permitted only for new installations of 5000 ft² (465 m²) or less or for additions or modifications to existing pipe schedule systems sized according to the pipe schedules of Section 8-5. Table 7-2.2.1 shall be used in determining the minimum water supply requirements.

Exception No. 1: The pipe schedule method shall be permitted for use in systems exceeding 5000 ft² (465 m²) where the flows required in Table 7-2.2.1 are available at a minimum residual pressure of 50 psi (3.4 bar) at the highest elevation of sprinkler.

Exception No. 2: The pipe schedule method shall be permitted for additions or modifications to existing extra hazard pipe schedule systems.

7-2.2.2 The lower duration value of Table 7-2.2.1 shall be acceptable only where remote station or central station waterflow alarm service is provided.

7-2.2.3* The residual pressure requirement of Table 7-2.2.1 shall be met at the elevation of the highest sprinkler. *(See the Exceptions to 7-2.2.1).*

7-2.2.4 The lower flow figure of Table 7-2.2.1 shall be permitted only where the building is of noncombustible construction or the potential areas of fire are limited by building size or compartmentation such that no open areas exceed 3000 ft² (279 m²) for light hazard or 4000 ft² (372 m²) for ordinary hazard.

Table 7-2.2.1 Water Supply Requirements for Pipe Schedule Sprinkler Systems

Occupancy Classification	Minimum Residual Pressure Required (psi)	Acceptable Flow at Base of Riser (Including Hose Stream Allowance) (gpm)	Duration (minutes)
Light hazard	15	500–750	30–60
Ordinary hazard	20	850–1500	60–90

For SI units, 1 gpm = 3.785 L/min; 1 psi = 0.0689 bar.

7-2.3 Water Demand Requirements — Hydraulic Calculation Methods.

7-2.3.1 General.

7-2.3.1.1* The minimum water supply requirements for a hydraulically designed occupancy hazard fire control sprinkler system shall be determined by adding the hose stream demand from Table 7-2.3.1.1 to the water supply for sprinklers determined in 7-2.3.1.2. This supply shall be available for the minimum duration specified in Table 7-2.3.1.1.

Exception No. 1: An allowance for inside and outside hose shall not be required where tanks supply sprinklers only.

Exception No. 2: Where pumps taking suction from a private fire service main supply sprinklers only, the pump need not be sized to accommodate inside and outside hose. Such hose allowance shall be considered in evaluating the available water supplies.

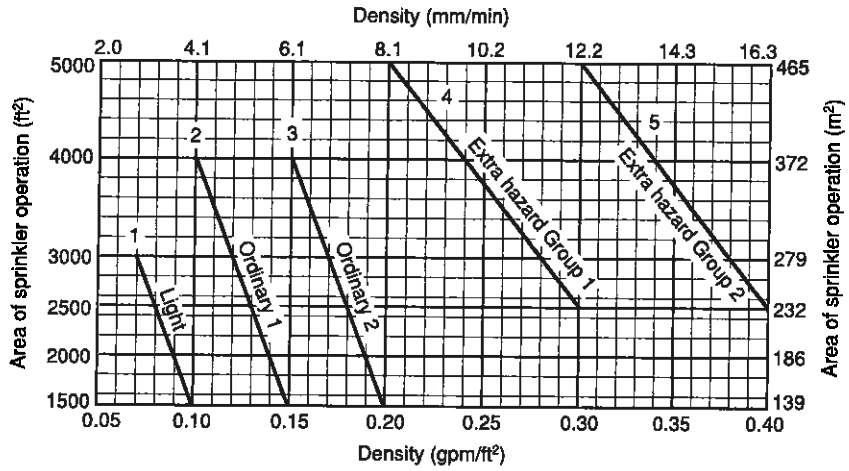
7-2.3.1.2 The water supply for sprinklers only shall be determined either from the area/density curves of Figure 7-2.3.1.2 in accordance with the method of 7-2.3.2 or be based upon the room design method in accordance with 7-2.3.3, at the discretion of the designer. For special areas under consideration, as described in 7-2.3.4, separate hydraulic calculations shall be required in addition to those required by 7-2.3.2 or 7-2.3.3.

Table 7-2.3.1.1† Hose Stream Demand and Water Supply Duration Requirements for Hydraulically Calculated Systems

Occupancy or Commodity Classification	Inside Hose (gpm)	Total Combined Inside and Outside Hose (gpm)	Duration (minutes)
Light hazard	0, 50, or 100	100	30
Ordinary hazard	0, 50, or 100	250	60–90
Extra hazard	0, 50, or 100	500	90–120
Rack storage, Class I, II, and III commodities up to 12 ft (3.7 m) in height	0, 50, or 100	250	90
Rack storage, Class IV commodities up to 10 ft (3.1 m) in height	0, 50, or 100	250	90
Rack storage, Class IV commodities up to 12 ft (3.7 m) in height	0, 50, or 100	500	90
Rack storage, Class I, II, and III commodities over 12 ft (3.7 m) in height	0, 50, or 100	500	90
Rack storage, Class IV commodities over 12 ft (3.7 m) in height and plastic commodities	0, 50, or 100	500	120
General storage, Class I, II, and III commodities over 12 ft (3.7 m) up to 20 ft (6.1 m)	0, 50, or 100	500	90
General storage, Class IV commodities over 12 ft (3.7 m) up to 20 ft (6.1 m)	0, 50, or 100	500	120
General storage, Class I, II, and III commodities over 20 ft (6.1 m) up to 30 ft (9.1 m)	0, 50, or 100	500	120
General storage, Class IV commodities over 20 ft (6.1 m) up to 30 ft (9.1 m)	0, 50, or 100	500	150
General storage, Group A plastics ≤ 5 ft (1.5 m)	0, 50, or 100	250	90
General storage, Group A plastics over 5 ft (1.5 m) up to 20 ft (6.1 m)	0, 50, or 100	500	120
General storage, Group A plastics over 20 ft (6.1 m) up to 25 ft (7.6 m)	0, 50, or 100	500	150

For SI units, 1 gpm = 3.785 L/min.

Figure 7-2.3.1.2 Area/density curves.



7-2.3.1.3 Regardless of which of the two methods is used, the following restrictions shall apply:

(a) For areas of sprinkler operation less than 1500 ft² (139 m²) used for light and ordinary hazard occupancies, the density for 1500 ft² (139 m²) shall be used. For areas of sprinkler operation less than 2500 ft² (232 m²) for extra hazard occupancies, the density for 2500 ft² (232 m²) shall be used.

(b) *For buildings having unsprinklered combustible concealed spaces (as described in 5-13.1.1 and 5-13.7), the minimum area of sprinkler operation shall be 3000 ft² (279 m²).

Exception No. 1: Combustible concealed spaces filled entirely with noncombustible insulation.

*Exception No. 2: *Light or ordinary hazard occupancies where noncombustible or limited combustible ceilings are directly attached to the bottom of solid wood joists so as to create enclosed joist spaces 160 ft³ (4.8 m³) or less in volume.*

*Exception No. 3: *Concealed spaces where the exposed surfaces have a flame spread rating of 25 or less and the materials have been demonstrated to not propagate fire in the form in which they are installed in the space.*

(c) Water demand of sprinklers installed in racks or water curtains shall be added to the ceiling sprinkler water demand at the point of connection. Demands shall be balanced to the higher pressure. *(See Chapter 8.)*

(d) Water demand of sprinklers installed in concealed spaces or under obstructions such as ducts and cutting tables need not be added to ceiling demand.

(e) Where inside hose stations are planned or are required, a total water allowance of 50 gpm (189 L/min) for a single hose station installation or 100 gpm (378 L/min) for a multiple hose station installation shall be added to the sprinkler requirements. The water allowance shall be added in 50-gpm (189-L/min) increments beginning at the most remote hose station, with each increment added at the pressure required by the sprinkler system design at that point.

(f) When hose valves for fire department use are attached to wet pipe sprinkler system risers in accordance with 5-15.5.2, the water supply shall not be required to be added to standpipe demand as determined from NFPA 14, *Standard for the Installation of Standpipe and Hose Systems.*

Exception No. 1: Where the combined sprinkler system demand and hose stream allowance of Table 7-2.3.1.1 exceeds the requirements of NFPA 14, Standard for the Installation of Standpipe and Hose Systems, this higher demand shall be used.

Exception No. 2: For partially sprinklered buildings, the sprinkler demand, not including hose stream allowance, as indicated in Table 7-2.3.1.1 shall be added to the requirements given in NFPA 14, Standard for the Installation of Standpipe and Hose Systems.

(g) Water allowance for outside hose shall be added to the sprinkler and inside hose requirement at the connection to the city water main or a yard hydrant, whichever is closer to the system riser.

(h) The lower duration values in Table 7-2.3.1.1 shall be permitted where remote station or central station waterflow alarm service is provided.

(i) Where pumps, gravity tanks, or pressure tanks supply sprinklers only, requirements for inside and outside hose need not be considered in determining the size of such pumps or tanks.

7-2.3.1.4 Total system water supply requirements shall be determined in accordance with the hydraulic calculation procedures of Section 8-4.

7-2.3.2 Area/Density Method.

7-2.3.2.1 The water supply requirement for sprinklers only shall be calculated from the area/density curves in Figure 7-2.3.1.2 or from Section 7-10 where area/density criteria is specified for special occupancy hazards. When using Figure 7-2.3.1.2, the calculations shall satisfy any single point on the appropriate area/density curve as follows:

(1) Light hazard area/density curve 1
(2) Ordinary hazard (Group 1) area/density curve 2
(3) Ordinary hazard (Group 2) area/density curve 3
(4) Extra hazard (Group 1) area/density curve 4
(5) Extra hazard (Group 2) area/density curve 5

It shall not be necessary to meet all points on the selected curve.

Exception: Sprinkler demand for storage occupancies as determined in Sections 7-3 through 7-8.

7-2.3.2.2 For protection of miscellaneous storage, miscellaneous tire storage, and storage up to 12 ft (3.7 m) in height, the discharge criteria in Table 7-2.3.2.2 shall apply.

Table A-1-4.11 Typical Cotton Bale Types and Approximate Sizes

Bale Type	Dimensions		Average Weight		Volume		Density	
	in.	mm	lb	kg	ft^3	m^3	lb/ft^3	kg/m^3
Gin, flat	55 × 45 × 28	1397 × 1143 × 711	500	226.8	40.1	1.13	12.5	201
Modified gin, flat	55 × 45 × 24	1397 × 1143 × 610	500	226.8	34.4	0.97	14.5	234
Compressed, standard	57 × 29 × 23	1448 × 736 × 584	500	226.8	22.0	0.62	22.7	366
Gin, standard	55 × 31 × 21	1397 × 787 × 533	500	226.9	20.7	0.58	24.2	391
Compressed, universal	58 × 25 × 21	1475 × 635 × 533	500	226.8	17.6	0.50	28.4	454
Gin, universal	55 × 26 × 21	1397 × 660 × 533	500	226.8	17.4	0.49	28.7	463
Compressed, high density	58 × 22 × 21	1473 × 559 × 533	500	226.8	15.5	0.44	32.2	515

A-1-4.11 Baled Cotton. See Table A-1-4.11.

A-1-4.12 Array, Standard (Paper). The occasional presence of partially used rolls on top of columns of otherwise uniform diameter rolls does not appreciably affect the burning characteristics.

A-1-4.12 Roll Paper Storage, Wrapped. Rolls that are completely protected with a heavyweight kraft wrapper on both sides and ends are subject to a reduced degree of fire hazard. Standard methods for wrapping and capping rolls are outlined in Figure A-1-4.12.

In some cases, rolls are protected with laminated wrappers, using two sheets of heavy kraft with a high-temperature wax laminate between the sheets. Where using this method, the overall weight of wax-laminated wrappers should be based on the basis weight per 1000 ft^2 (92.9 m^2) of the outer sheet only, rather than on the combined basis weight of the outer and inner laminated wrapper sheets. A properly applied wrapper can have the effect of changing the class of a given paper to essentially that of the wrapper material. The effect of applying a wrapper to tissue has not been determined by test.

A-1-4.12 Roll Paper Storage Height. The size of rolls and limitations of mechanical handling equipment should be considered in determining maximum storage height.

A-2-1 Occupancy examples in the listings as shown in the various hazard classifications are intended to represent the norm for those occupancy types. Unusual or abnormal fuel loadings or combustible characteristics and susceptibility for changes in these characteristics, for a particular occupancy, are considerations that should be weighed in the selection and classification.

The light hazard classification is intended to encompass residential occupancies; however, this is not intended to preclude the use of listed residential sprinklers in residential occupancies or residential portions of other occupancies.

A-2-1.1 Light hazard occupancies include occupancies having uses and conditions similar to the following:

Churches

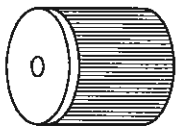
Clubs

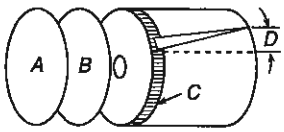
Eaves and overhangs, if of combustible construction with no combustibles beneath

Figure A-1-4.12 Wrapping and capping terms and methods.

Wrapper
Exterior wrapper
Body wrapper — General term for protective wrapping of sides and ends on roll.

Body wrap
Sleeve wrap
Wrap — do not cap — Wrapper placed around circumference of roll. No heads or caps needed.





Heads
Headers — Protection applied to the ends of the rolls (*A* and *B*). Heads do not lap over the end of the roll.

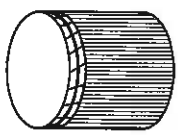
Inside heads — Protection applied to the ends of the rolls next to the roll itself (*B*). The wrapper of the rolls is crimped down over these heads.

Outside heads — Protection applied to the ends of the rolls on the outside (*A*). This head is applied after the wrapper is crimped.

Edge protectors
Edge bands — Refers to extra padding to prevent damage to roll edges (*C*).

Overwrap — The distance the body wrap or wrapper overlaps itself (*D*).

Roll cap — A protective cover placed over the end of a roll. Edges of cap lap over the end of the roll and are secured to the sides of the roll.



Educational
Hospitals
Institutional
Libraries, except large stack rooms
Museums
Nursing or convalescent homes
Offices, including data processing
Residential
Restaurant seating areas
Theaters and auditoriums, excluding stages and prosceniums
Unused attics

A-2-1.2.1 Ordinary hazard occupancies (Group 1) include occupancies having uses and conditions similar to the following:

Automobile parking and showrooms
Bakeries
Beverage manufacturing
Canneries
Dairy products manufacturing and processing
Electronic plants
Glass and glass products manufacturing
Laundries
Restaurant service areas

A-2-1.2.2 Ordinary hazard occupancies (Group 2) include occupancies having uses and conditions similar to the following:

Cereal mills
Chemical plants — ordinary
Confectionery products
Distilleries
Dry cleaners
Feed mills
Horse stables
Leather goods manufacturing
Libraries — large stack room areas
Machine shops
Metal working
Mercantile
Paper and pulp mills
Paper process plants
Piers and wharves
Post offices
Printing and publishing
Repair garages
Resin application area
Stages
Textile manufacturing
Tire manufacturing
Tobacco products manufacturing
Wood machining
Wood product assembly

A-2-1.3.1 Extra hazard occupancies (Group 1) include occupancies having uses and conditions similar to the following:

Aircraft hangars (except as governed by NFPA 409, *Standard on Aircraft Hangars*)
Combustible hydraulic fluid use areas
Die casting
Metal extruding
Plywood and particle board manufacturing
Printing [using inks having flash points below 100°F (38°C)]
Rubber reclaiming, compounding, drying, milling, vulcanizing
Saw mills
Textile picking, opening, blending, garnetting, or carding, combining of cotton, synthetics, wool shoddy, or burlap
Upholstering with plastic foams

A-2-1.3.2 Extra hazard occupancies (Group 2) include occupancies having uses and conditions similar to the following:

Asphalt saturating
Flammable liquids spraying
Flow coating
Manufactured home or modular building assemblies (where finished enclosure is present and has combustible interiors)
Open oil quenching
Plastics processing
Solvent cleaning
Varnish and paint dipping

A-2-1.4 Other NFPA standards contain design criteria for fire control or fire suppression *(see 2-1.4 and Chapter 13)*. While these can form the basis of design criteria, this standard describes the methods of design, installation, fabrication, calculation, and evaluation of water supplies that should be used for the specific design of the system.

Other NFPA standards contain sprinkler system design criteria for fire control or suppression of specific hazards. This information has been either referenced or copied into Chapters 5 and 7 using NFPA's extract policy.

A-2-2 Specification of the type, amount, and arrangement of combustibles for any commodity classification is essentially an attempt to define the potential fire severity, based on its burning characteristics, so the fire can be successfully controlled by the prescribed sprinkler protection for the commodity class. In actual storage situations, however, many storage arrays do not fit precisely into one of the fundamental classifications; therefore, the user needs to make judgments after comparing each classification to the existing storage conditions. Storage arrays consist of thousands of products, which make it impossible to specify all the acceptable variations for any class. As an alternative, a variety of common products are classified in this appendix based on judgment, loss experience, and fire test results.

Table A-2-2 provides examples of commodities not addressed by the classifications in Section 2-2.

Table A-2-2.3 is an alphabetized list of commodities with corresponding classifications.

Tables A-2-2.3.1 through A-2-2.3.4 and A-2-2.4.1 provide examples of commodities within a specific class.

Table A-2-2 Examples of Commodities Not Addressed by the Classifications in Section 2-2

Boxes, Crates
- Empty, wood slatted
Lighters (butane)
- Loose in large containers (Level 3 aerosol)

*Should be treated as idle pallets.

APPENDIX B
Servicing Study Guidelines Checklist

Development Servicing Study Checklist

4.1 General Content	Addressed (Y/N/NA)	Comments
Executive Summary (for larger reports only).	NA	
Date and revision number of the report.	Y	
Location map and plan showing municipal address, boundary, and layout of proposed development.	Y	Figure 1
Plan showing the site and location of all existing services.	Y	Figure 3
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.	Y	Refer to Site Plan
Summary of Pre-consultation Meetings with City and other approval agencies.	N	
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.	NA	
Statement of objectives and servicing criteria.	Y	
Identification of existing and proposed infrastructure available in the immediate area.	Y	
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).	NA	
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 neighboring 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.	NA	
Proposed phasing of the development, if applicable.	NA	
Reference to geotechnical studies and recommendations concerning servicing.	NA	
All preliminary and formal site plan submissions should have the following information:		
Metric scale	Y	
North arrow (including construction North)	Y	
Key plan	Y	Figure 1
Name and contact information of applicant and property owner	N	
Property limits including bearings and dimensions	Y	Figures 2 & 3
Existing and proposed structures and parking areas	Y	Figures 2 & 3
Easements, road widening and rights-of-way	Y	
Adjacent street names	Y	

Development Servicing Study Checklist

4.2 Water	**Addressed (Y/N/NA)**	**Comments**
Confirm consistency with Master Servicing Study, if available.	N/A	
Availability of public infrastructure to service proposed development.	Y	Figure 3
Identification of system constraints.	NA	
Identify boundary conditions.	Y	
Confirmation of adequate domestic supply and pressure.	Y	
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.	Y	
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.	NA	
Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design.	NA	
Address reliability requirements such as appropriate location of shut-off valves.	NA	
Check on the necessity of a pressure zone boundary modification.	NA	
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.	Y	
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.	Y	
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.	NA	
Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Y	
Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	NA	

Development Servicing Study Checklist

4.3 Wastewater	**Addressed (Y/N/NA)**	**Comments**
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).	Y	
Confirm consistency with Master Servicing Study and/or justifications for deviations.	NA	
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.	NA	
Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Y	
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)	NA	
Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	NA	
Description of proposed sewer network including sewers, pumping stations, and forcemains.	Y	
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).	NA	
Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	NA	
Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	NA	
Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	NA	
Special considerations such as contamination, corrosive environment etc.	NA	

Development Servicing Study Checklist

4.4 Stormwater	Addressed (Y/N/NA)	Comments
Description of drainage outlets and downstream constraints including legality of outlet (i.e. municipal drain, right-of-way, watercourse, or private property).	Y	
Analysis of the available capacity in existing public infrastructure.	NA	
A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns and proposed drainage patterns.	NA	
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.	Y	
Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	N/A	
Description of stormwater management concept with facility locations and descriptions with references and supporting information.	Y	
Set-back from private sewage disposal systems.	NA	
Watercourse and hazard lands setbacks.	NA	
Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	NA	
Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	NA	
Storage requirements (complete with calcs) and conveyance capacity for 5 yr and 100 yr events.	N	Will be addressed during detailed design for Site Plan application.
Identification of watercourse within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	NA	
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	Will be addressed during detailed design for Site Plan application.
Any proposed diversion of drainage catchment areas from one outlet to another.	NA	
Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and SWM facilities.	Y	
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.	NA	
Identification of municipal drains and related approval requirements.	NA	
Description of how the conveyance and storage capacity will be achieved for the development.	Y	
100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	N	Will be addressed during detailed design for Site Plan application.
Inclusion of hydraulic analysis including HGL elevations.	NA	
Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	N	Will be addressed during detailed design for Site Plan application.
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.	NA	
Identification of fill constrains related to floodplain and geotechnical investigation.	NA	

Development Servicing Study Checklist

4.5 Approval and Permit Requirements	**Addressed (Y/N/NA)**	**Comments**
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.	NA	
Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.	N	
Changes to Municipal Drains.	N	
Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)	NA	

4.6 Conclusion	**Addressed (Y/N/NA)**	**Comments**
Clearly stated conclusions and recommendations.	Y	
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.	N	
All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario.	Y	

RESIDENTIAL / HOTEL DEVELOPMENT
141 GEORGE STREET / 325 DALHOUSIE STREET
OTTAWA, ONTARIO

SERVICING DESIGN BRIEF
(INCL. INTERIM CONDITION)

Prepared by:

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File No.: 112142
Report Reference No.: R-2014-020
December 07, 2012 (R-2012-171)
February 28, 2013 (R-2013-019)
Revised February 14, 2014

NOVATECH
ENGINEERING
CONSULTANTS LTD.

February 14, 2014

City of Ottawa
Planning and Growth Management Department
Development Review (Urban) Services Branch
Infrastructure Approvals Division
110 Laurier Avenue West, 4th Floor
Ottawa ON, K1P 1J1

Attention: **Mr. John Wu, P. Eng.**

Dear Sir:

Reference: **Residential / Hotel Development**
141 George Street / 325 Dalhousie Street
Servicing Design Brief (Incl. Interim Condition)
Our File No.: 112142

Enclosed herein is the revised Servicing Design Brief (including interim condition) for the proposed Residential / Hotel development at 141 George Street / 325 Dalhousie Street, located east of Dalhousie Street between York Street and George Street. This brief is submitted in support of the zoning amendment and site plan application for the site and outlines how the site will be serviced with sanitary, storm and watermain.

Trusting this report is adequate for your purposes. Should you have any questions, or require additional information, please contact us.

Yours truly,

NOVATECH ENGINEERING CONSULTANTS LTD.

John Riddell, P.Eng.
President

JAG/jag

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Figure 1b: Key Plan
Figure 2: Site Plan
Figure 3: Existing Conditions

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Appendix B: Hydrant Flow Data/Fire Fighting Information
Appendix C: Correspondence
Appendix D: Servicing Study Guidelines Checklist

List of Attached Drawings

161612779v-111-Claridge-325 Dalhousie-rev 1 Topographical Survey

1.0 INTRODUCTION

The proposed Residential / Hotel (141 George Street / 325 Dalhousie Street) development is located in the Byward Market, east of Dalhousie Street between York Street and George Street in the City of Ottawa, as shown in Figure 1a – Aerial Photo and Figure 1b – Key Plan. The existing properties are currently occupied by the Honest Lawyer bar/restaurant, the 11-storey Union du Canada office building as well as privately-owned surface parking lots which serve the office building. The proposed re-development of the site will consist of a 15-storey hotel with 187 units and a 22-storey tower with 282 condominium units (Ph. 1 – 156 & Ph. 2 - 126) to be constructed in three phases. The hotel building will include a rooftop pool as well as approximately 3,145 ft^2 of commercial floor space and the condominium building will include approximately 11,810 ft^2 of commercial floor space (Ph. 1 – ±1,505 ft^2 & Ph. 2 – ±10,300 ft^2), both located on the ground floor. Also, a total of approximately 227 underground parking spaces will be provided on 4 levels of underground parking and 5 surface parking spaces. Refer to Figure 2 – Site Plan for details.

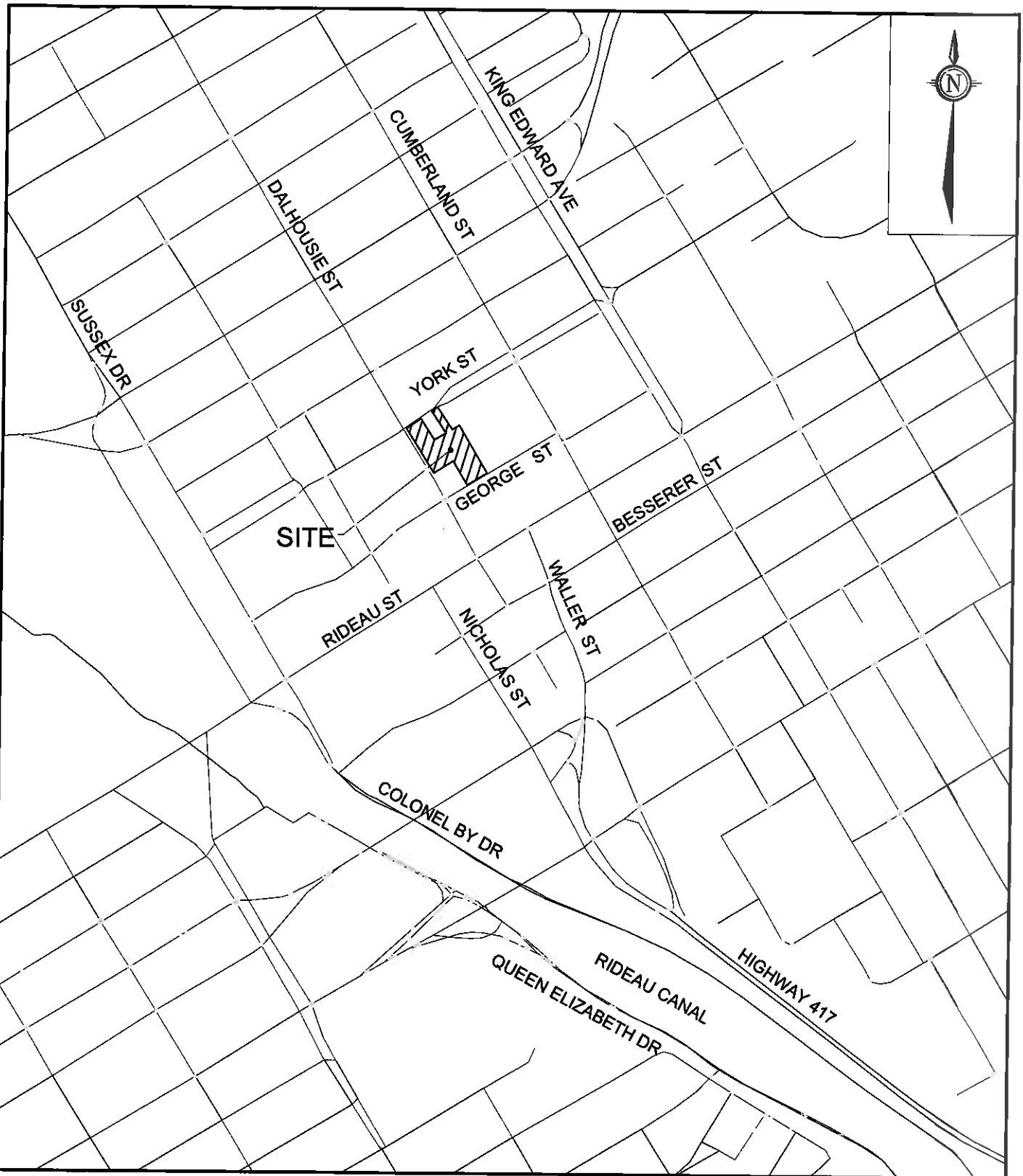
Figure 1a: Aerial Photo of Subject Site



Photo courtesy of www.bing.com/maps

As identified in the City of Ottawa's Zoning By-law (ZBL), this site is currently designated as both MD2 S74 – Mixed-Use Downtown (325 Dalhousie Street) and R5R[235] S76 – Residential Fifth Density (141 George Street). The minor zoning by-law amendment will revise the site's current designation for the proposed development to deal with building height, parking requirements and any applicable zoning provisions that cannot be met. The specific details regarding the changes proposed to the zoning of the subject site are provided in a Planning Rationale submitted as part of the ZBL Amendment application.

The subject site is approximately 0.42 ha in area. The development will have a single two-way ramp access to the underground parking garage located on George Street, mid-block between Dalhousie Street and Cumberland Street. The pick-up/drop-off area outside the main entrance to the hotel/condominiums will be accessed from the existing access driveway at 321 Dalhousie



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CITY OF OTTAWA

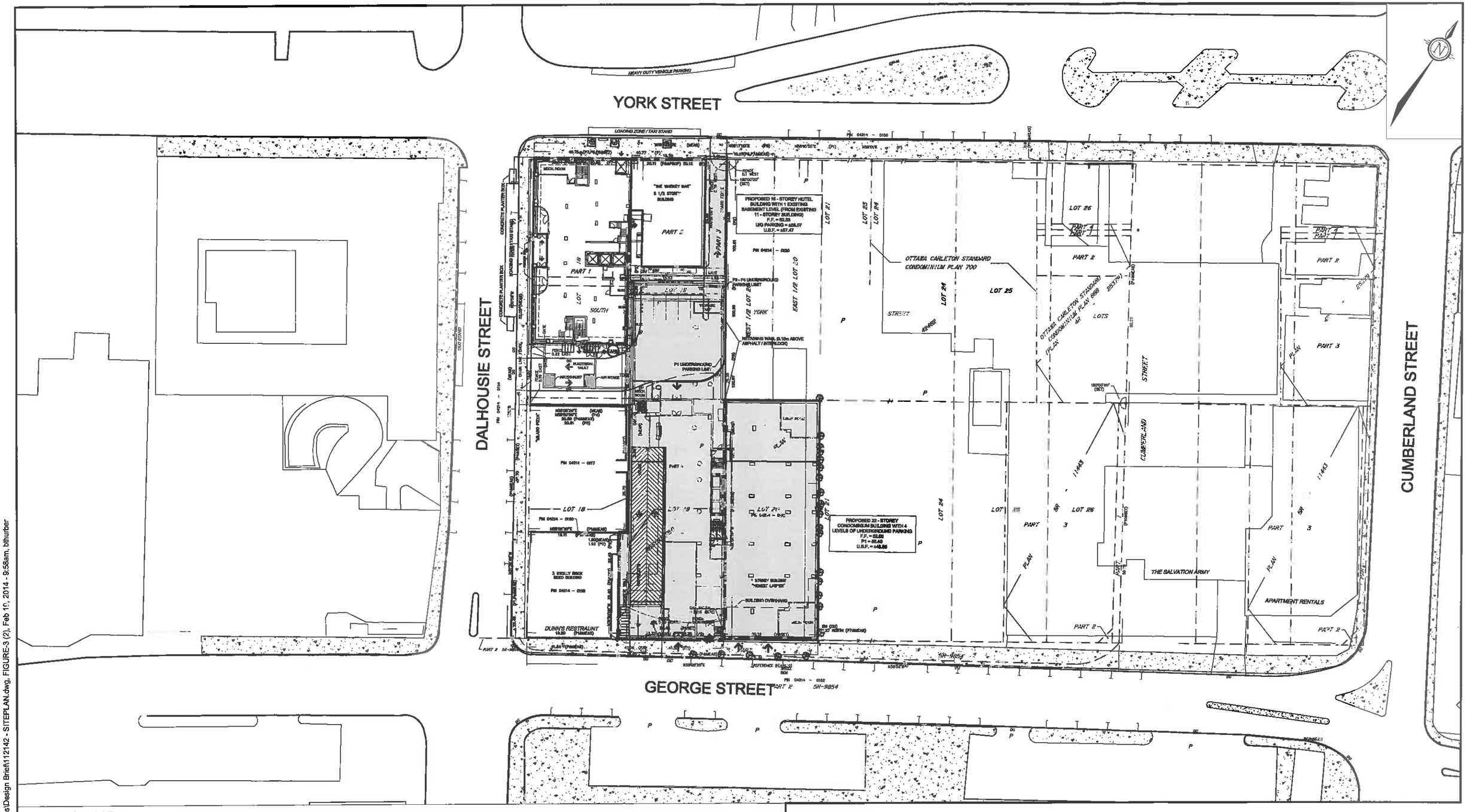
325 DALHOUSIE STREET & 141 GEORGE STREET

KEY PLAN

JAN 2014 112142 FIGURE # 1B

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LEGEND

SITE PLAN AREA

PROPOSED FUTURE DEVELOPMENT (PHASE 2 & 3)

ON STREET PARKING

NTS

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CITY OF OTTAWA
325 DALHOUSIE STREET &
141 GEORGE STREET
SITE PLAN
JAN 2014 112142 FIGURE 2

SHTIIX17.DWG - 278.1mX431mm

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Street, mid-block between George Street and York Street (adjacent to the Union du Canada office building). A secondary right-out egress only will also be provided at 110 York Street, immediately east of The Whiskey Bar. A copy of the topographical survey which shows the property outline is included in the back of this report. Refer to Figure 3 – Existing Conditions. The construction schedule for the proposed development is as follows:

- Phase 1 (hotel) starting in June 2013, build-out expected in 2014;
- Phase 2 (condo ph.1) scheduled for completion in 2015;
- Phase 3 (condo ph. 2) scheduled for completion in 2017 (subject to market demand).

This servicing design brief will outline how the site will be serviced with sanitary, storm and watermain; and will demonstrate that adequate municipal capacity is available within the existing infrastructure to service the development.

2.0 SANITARY SEWER

The proposed hotel development will be serviced by a 200 mm dia. sanitary service that will connect to the existing 1200 mm dia. sanitary sewer on York Street; therefore the existing 200 mm dia. sanitary service that is currently connected to the existing 1200 mm dia. sanitary sewer on York Street will need to be abandoned. The new sanitary service connection to the building will be equipped with a full-port backwater valve. It is to be noted that the attached neighboring 2 ½ storey property has its own existing sanitary service (approx. 200 mm dia.) that also connects to the existing 1200 mm dia. sanitary sewer on York Street (was previously interconnected, but is currently separated).
The hotel will have a rooftop pool with controlled deck drains and the pool drains will be directed to a pump. Both will drain through a dedicated pipe within the building until it connects to the main service prior to exiting the building.

Furthermore, the proposed condominium development will be serviced by a 200 mm dia. sanitary service that will connect to the existing 1980x1500 mm dia. sanitary sewer on George Street. The proposed sanitary service connection to the building will be equipped with a full-port backwater valve.

The proposed development flows are based on the City of Ottawa Sewer Design Guidelines (refer to Appendix A). The flows are comprised of residential, retail, and office space as presented below and are compared to the design flows based on current zoning.

Sanitary Flows Under Proposed Development

Hotel
Residential: Q_{SAN} = 187 units x 1.1 persons/unit* x 350 L/cap/day = 71,995.0 L/day
Restautant: Q_{SAN} = 0.02922 ha (3,145 ft^2) x 50,000 L/ha/d = 1,461.0 L/day

Average Sanitary Flow = 73,456 L/day = 0.85 L/sec
Peak Sanitary Flow = 3.43 L/sec (with Res. PF = 4.14 ∴ use 4.0 ⇒ max, Comm. PF = 1.5)
* Based on predominantly one person per room (business travel).

Condominium – Phase 1
Residential: Q_{SAN} = 156 units x 1.8 persons/unit x 350 L/cap/day = 98,280.0 L/day
Commercial: Q_{SAN} = 0.01398 ha (1,505 ft^2) x 50,000 L/ha/d =699.0 L/day



LEGEND

SITE PLAN AREA

PROPOSED FUTURE DEVELOPMENT (PHASE 2 & 3)

ON STREET PARKING

NTS

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CITY OF OTTAWA

325 DALHOUSIE STREET &
141 GEORGE STREET

EXISTING CONDITIONS

JAN 2014 112142 FIGURE 3

SHTIIX17.DWG - 279mmX431mm

Average Sanitary Flow = 98,979 L/day = 1.15 L/sec
Peak Sanitary Flow = 4.56 L/sec (with Res. PF = 4.09 ∴ use 4.0 ⇒ max, Comm. PF = 1.5)

Condominium – Phase 2
Residential: Q_{SAN} = 126 units x 1.8 persons/unit x 350 L/cap/day = 79,380.0 L/day
Commercial: Q_{SAN} = 0.09569 ha (10,300 ft^2) x 50,000 L/ha/d = 4,784.5 L/day

Average Sanitary Flow = 84,164.5 L/day = 0.97 L/sec
Peak Sanitary Flow = 3.76 L/sec (with Res. PF = 4.13 ∴ use 4.0 ⇒ max, Comm. PF = 1.5)

Infiltration Flow = 0.28L/s/ha x 0.42 ha = 0.12 L/s

Therefore,
Total Average Sanitary Flow = 3.09 L/sec
Total Peak Sanitary Flow = 11.87 L/sec (with PF)

Hotel Rooftop Pool
As per discussion with the pool designers, the pool will use cartridge filters and therefore eliminating the need for backwashes. The only flow from the pool will be when it needs to be emptied for maintenance/closure and from the surrounding roof drains during a rainfall event. This will slightly increase the flows to the sanitary sewer; consequently, this would have negligible impact on the existing City sanitary sewer system.

Pool Drainage Flow = 3.0m x 9.75m x 1.0m* per day = 29.25m^3/day
= 0.34L/s for that day only

* Approximate depth of water in pool.

Sanitary Flows Under Current Zoning

Currently, the site is zoned as both MD2 S74 – Mixed-Use Downtown (325 Dalhousie Street) and R5R[235] S76 – Residential Fifth Density (141 George Street). The current zoning by-law permits hotel and a restaurant component as well as residential mid to high use development and a commercial component ancillary to residential. Based on this, sanitary flows are calculated below. (Zoning flows are calculated using the City's general population densities from Table 4.1 of the City of Ottawa Sewer Design Guidelines)

Site Area = 0.42 ha (0.21 ha each MD and R5 zones)

Commercial Area = 0.21 ha
Existing building = 8,999.73 m^2 (11-storey: 818.16)

Q_{ave} = (8,999.73 m2 + 1,281.84 m^2)* 5 L/m2 = 51,407.85 L/day = 0.59 L/sec
Q_{peak} = 0.59 L/sec * 1.5 = 0.89 L/sec

Residential Area = 0.21 ha
Population density = 1800 persons/ha

Q_{ave} = 0.21 ha * 1800 persons/ha * 350L/person/day = 132,300 L/day = 1.53 L/sec

$P.F. = 1 + \frac{14}{4+\left(\frac{378}{1000}\right)^{1/2}} = 4.03 \therefore$ use 4.0 $\Rightarrow$ max

Q_{peak} = 1.53 L/sec * 4.0 = 6.12 L/sec

Infiltration Flow = 0.28L/s/ha x 0.42 ha = 0.12 L/s

Therefore,
Total Average Sanitary Flow = 2.24 L/sec
Total Peak Sanitary Flow = 7.13 L/sec (with PF)

Therefore, the development sanitary flows under the proposed development are in close proximity to the flows calculated under the existing zoning (note that the existing zoning permits more then what has been accounted for, which would offset the variation); consequently, this would have negligible impact on the existing City sanitary sewer system.

Sanitary Flows Under Existing Conditions

The site in question which is currently occupied by two existing buildings and surface parking lots would generate the following approximate flows:

Existing building at 325 Dalhousie = 8,999.73 m^2 (11-storey: 818.16)

Q_{ave} = 8,999.73 m2 * 5 L/m2 = 44,998.65 L/day = 0.52 L/sec
Q_{peak} = 0.52 L/sec * 1.5 = 0.78 L/sec

Existing building at 141 George Street = 1,128.71 m^2 (1-storey: 1,128.71)

Q_{ave} = (1,128.71 m^2)* 5 L/m2 = 5,643.55 L/day = 0.07 L/sec
Q_{peak} = 0.07 L/sec * 1.5 = 0.11 L/sec

Infiltration Flow = 0.28L/s/ha x 0.42 ha = 0.12 L/s

Therefore,
Total Average Sanitary Flow = 0.71 L/sec
Total Peak Sanitary Flow = 1.01 L/sec (with PF)

Development sanitary flows under proposed zoning are greater than the flows under existing conditions; but as mentioned previously, the existing zoning permits greater development. Also, the existing receiving sewers are a 1200 mm dia. sanitary sewer at ±2.0% slope on York Street with a capacity of approximately 5,750 L/s and a 1500 mm dia. sanitary sewer at ±1.5% slope on George Street with a capacity of approximately 11,650 L/s. Consequently, this would have negligible impact on the existing City sanitary sewer system.

3.0 STORMWATER

Stormwater flows from the site are currently conveyed to the existing storm sewer system via on-site catchbasins and overland flows to York Street, Dalhousie Street as well as George Street. The stormwater from the existing building at 325 Dalhousie Street as well as 110 York Street is captured by roof drains and outlet through their respective existing service connection. As for stormwater from the existing building at 141 George Street, approximately half is captured by roof

drains whereas the balance of the building has a pitched roof. As part of this development, all stormwater will be controlled on site prior to being discharged to the storm system.

The proposed hotel development will be serviced by a new 150 mm dia. storm service that will connect to the existing 675 mm dia. storm sewer on York Street; therefore the existing 150 mm dia. storm service that is currently connected to the existing 675 mm dia. storm sewer on York Street will need to be abandoned. The new storm service connection to the building will be equipped with a backwater valve. Also, a portion of the roof will be directed to sanitary due to the rooftop pool (refer to sanitary section for further details). It is to be noted that the attached neighboring 2 ½ storey property has its own existing storm service (approx. 150 mm dia.) that also connects to the existing 675 mm dia. storm sewer on York Street (was previously interconnected, but is currently separated).

Furthermore, the proposed condominium development will be serviced by a 250 mm dia. storm service that will connect to the existing 900 mm dia. storm sewer on George Street. The proposed storm service connection to the building will be equipped with a backwater valve.

The City will require that on-site stormwater management be implemented to control post-development stormwater discharge for both the 5 & 100 year storm events based on an allowable runoff coefficient (C) of 0.50, a time of concentration (t_c) of 20 minutes, and a 5-year storm control. Stormwater management will be achieved through the use of rooftop controls and surface ponding (as required). Should surplus storage be required, stormwater management alternatives such as storage tanks or super-pipes will be implemented. Temporary storage will be provided at the surface as required to supply the necessary release rate during all phases until full build out is achieved with underground systems.

The site will be graded such that flows in excess of the 100-year storm event will be conveyed overland to York Street, Dalhousie Street and George Street. Erosion and sediment control measures will be implemented during all phases of construction and inspected regularly.

A detailed stormwater management report addressing these requirements is also submitted under separate cover as part of the site plan application.

4.0 WATERMAIN

4.1 Domestic Water Demand

The proposed hotel development will be serviced by a 150 mm dia. water service that will connect to the existing 200 mm dia. watermain on York Street, therefore the existing 150 mm dia. water service that is currently connected to the existing 200 mm dia. watermain on York Street will need to be abandoned. An existing shut off valve is present within the right of way outside the property line of the site as per old City of Ottawa Specifications for the existing service, but a new shut off valve will be provided at the property line of the site as per City of Ottawa Specifications for the new service. The existing water meter is located in the basement level mechanical room of the building (replace in new location as required, refer to mechanical). Similarly, a remote receptacle will be located at the surface near the entrance to the building on the exterior. It is to be noted that the attached neighboring 2 ½ storey property now has its own 40 mm dia. water service that is also connected to the existing 200 mm dia. watermain on York Street (it was previously interconnected). An existing shut off valve is present within the right of way outside the property line of the site as per old City of Ottawa Specifications.

Furthermore, the proposed condominium development will be serviced by a 200 mm dia. water service that will connect to the existing 300 mm dia. watermain on George Street. A shut off valve will be provided at the property line of the site as per City of Ottawa Specifications. The water meter will be located in the basement level mechanical room of the building. Similarly, a remote receptacle will be located at the surface near the entrance to the building on the exterior.

Estimated domestic water demands for the development are roughly the same as the proposed development sanitary flows listed above in Section 2.0.

Hotel
Average daily demand (L/sec): Q_{WATER} = 73,456.0 L/day ÷ 86,400 sec/day = 0.85 L/sec
Using a peak factor of 2.5, the required maximum daily demand yields: Q_{WATER} = 2.13L/sec
Using a peak factor of 2.2, the required maximum hour demand yields: Q_{WATER} = 4.69 L/sec

Condominium – Phase 1
Average daily demand (L/sec): Q_{WATER} = 98,979.0 L/day ÷ 86,400 sec/day = 1.15 L/sec
Using a peak factor of 2.5, the required maximum daily demand yields: Q_{WATER} = 2.88 L/sec
Using a peak factor of 2.2, the required maximum hour demand yields: Q_{WATER} = 6.34 L/sec

Condominium – Phase 2
Average daily demand (L/sec): Q_{WATER} = 84,164.5 L/day ÷ 86,400 sec/day = 0.97 L/sec
Using a peak factor of 2.5, the required maximum daily demand yields: Q_{WATER} = 2.43 L/sec
Using a peak factor of 2.2, the required maximum hour demand yields: Q_{WATER} = 5.35 L/sec

Based on the data provided by the City, the existing watermains in the area are adequate to service this development. According to hydrant test results, the watermain in the street can deliver in the range of approximately 1000 igpm (±75.8 L/sec) at a dynamic pressure greater than 56 psi. A copy of the watermain data is attached in Appendix B.

4.2 Fire Demand

Section 4.2.11 of the City of Ottawa Water Design Guidelines reads:

"When calculating the fire flow requirements and affected pipe sizing, designers shall use the method developed by the Fire Underwriters Survey.", and

"The requirements for levels of fire protection on private property are covered in Section 7.2.11 of the Ontario Building Code."

The Fire Underwriters Survey is used to assess the performance of the water distribution system on a "City Block" basis rather than an individual building basis. The Ontario Building Code governs the assessment of fire demand for individual buildings.

Section 7.2.11.1 of the Ontario Building Codes states that the design, construction, installation and testing of fire service mains and water service pipe combined with fire service mains shall be in conformance with NFPA 24.

NFPA 24 is the standard for the "Installation of Private Fire Service Mains and their Appurtenances". Chapter 13 of NFPA 24 discusses sizing the private service fire mains for fire protection systems which shall be approved by the authority having jurisdiction, considering the following factors:

- Construction and Occupancy of the building

- Fire Flow and Pressure of the Water Required
- Adequacy of the Water Supply

Specific to this project the buildings will be sprinklered per Section 3.2.2.45 of the Ontario Building Code (OBC). Section 3.2.5.7 of the OBC requires that an adequate water supply for fire fighting be provided to each building, and references Appendix A of the OBC. Sentence 3 of Section A 3.2.5.7 of the OBC (Appendix A) states that NFPA 13 be used for determining both sprinkler and hose stream demands for a sprinklered building.

The design of the sprinkler system is completed by a Fire Protection Engineer, or typically computed by the sprinkler contractor and approved by the Fire Protection Engineer. The process involves detailed hydraulic calculations based on building layout, pipe runs, head losses, fire pump requirements, etc. At this stage in the development process, e.g. Site Plan Submission, these details are not available. However, using Chapter 7 of NFPA 13, it is possible to provide a fairly accurate estimate of the fire demand for the building. This estimate is provided below.

NFPA Chapter 7 Calculation

22 Storey Residential Building - Light Hazard
15 Storey Hotel Building - Light Hazard [incl. restaurant - Ordinary Hazard (Group 1)]
4 Level Underground Parking (under residential building - serve both) - Ordinary Hazard (Group 1)

Section 7.2.3 of NFPA 13, "Water Demand Requirements – Hydraulic Calculation Methods" is used to estimate the hose stream demand and the sprinkler demand. The water demand for sprinklers is estimated using the most remote area in the building. Figure 7.2.3.1.2 – Area/Density Curves is used for the worst case scenario, which in this case is the Ordinary Hazard Classification in the underground parking garage. For this classification, Figure 7.2.3.1.2 provides a density of 0.15 gpm/ft2 using a coverage of 1500 ft2, or 225 gpm (US).

Table 7.2.3.1.1 is used to determine the hose stream demand. For Ordinary Hazard a total combined inside and outside hose stream demand of 250 gpm is required. Typically, 150 gpm would be drawn off the hydrant and 100 gpm off the hose cabinets.

Therefore, total estimated demand would be 225 gpm + 250 gpm = 475 gpm. Adding an allowance for head losses though out the sprinkler system, an estimated fire demand of between 550 – 600 gpm, or say 600 USgpm (2,270 L/min) would be required. According to the fire hydrant data provided by the City, the 200 mm and 300 mm watermains on York Street and George Street respectively can deliver in the range of 1,000 lgpm (1,200 USgpm) under normal conditions and 2,100 lgpm (2,500 USgpm) at 20 psi residual. The building will also be equipped with a fire pump, if necessary, to provide the minimum residual pressure at the sprinkler heads.

Reference material from NFPA 13 is contained in Appendix B.

5.0 CONCLUSIONS

Based on the foregoing, adequate sanitary, storm and water services are available to support this development.

NOVATECH ENGINEERING CONSULTANTS LTD.

Prepared by:

Justin Gauthier, B.Eng.
Junior Engineer

Reviewed by:



John Riddell, P.Eng.
President

APPENDIX A
Excerpts from Ottawa Sewer Design Guidelines

specifically the downtown core. The construction of new combined sewer systems is no longer permitted in the City of Ottawa other than for the replacement of existing combined sewers within the City's defined Combined Sewer Area (see Section 5.1.6).

New storm drainage systems cannot be connected to existing combined sewers except as an interim measure where sewer separation is to be ultimately implemented or where circumstances allow no other alternative.

Section 5 discusses combined sewers in greater detail since their design must consider peak storm flows.

4.2.4 Private Sanitary Servicing

Private servicing consists mainly of private sewage collection and treatment systems on individual lots and do not form part of these guidelines.

4.3 GENERAL POPULATION DENSITIES

Pre-zoned Land – When lands are zoned for a specific residential use and detailed information is not available, the following population densities shall apply:

Table 4.1 Population Densities

Unit Type (Min Lot Area M^2)	Zoning (And all similar zonings)	Persons per unit[1]	Units per net ha avg.[2]	Persons (per net ha)[3]	Persons (per gross ha)[4]
Res-Single Family (600)	R1A-B*	3.4	16.7	57	34
Res-Single Family (501)	R1C-E*	3.4	20.0	68	41
Res-Single Family (441)	R1F-H*	3.4	22.7	77	47
Res-Single Family (360)	R1I-K*	3.4	27.8	94	57
Res-Single Family (270)	R1L-N*	3.4	37.1	126	76
Res-Single Family (197)	R1P-Q*	3.4	50.8	173	105
Res-Semi-detached (278)	R2A-B*	2.7	36.0	97	59
Res-Semi-detached (232)	R2C*	2.7	43.1	116	71
Res-Semi-detached (180)	R2D-E*, G*	2.7	55.6	150	91
Res-Semi-detached (135)	R2F*	2.7	74.1	200	121
Townhouse (170)	R3F*, R4A-B*	2.7	58.8	159	96
Townhouse (110)	R3M*	2.7	90.9	246	149
Res-Duplex (441)	R2A-C*	2.3	45.4	104	63
Res-Duplex (360)	R2D*, R3F-G*	2.3	55.6	128	77
Res-Duplex (270)	R2E-F*, R3K*	2.3	74.1	170	103
Res-Duplex (197)	R2G*, R4F*	2.3	101.6	234	141
Res-Triplex (557)	R3A-C*	2.3	53.9	124	75

Unit Type (Min Lot Area M^2)	Zoning (And all similar zonings)	Persons per unit[1]	Units per net ha avg. [2]	Persons (per net ha)[3]	Persons (per gross ha) [4]
Res-Triplex (330)	R3D-E*, H-J*, L*, N*, R4C-E*	2.3	90.9	209	127
Apartments:					
Low Density		1.8	100	180	
Medium Density		1.8	300	540	
High Density		1.8	1000	1800	
Very High Density[5]		1.8	1000 +	1800 +	

*) former City of Ottawa zoning designation.
1) from 1996 census data.
2) new suburban construction, 5-year average (1997-2001), except apartments data which is based on site plans & duplex density which is an assumed average.
3) "net ha" refers to population densities per hectare of purely residential land (i.e. area of the building lots only including private parking and roads but excluding all public road rights-of-way and all other non-residential uses such as parks, stormwater management facilities, commercial developments, schools, community centres, etc.).
4) "gross ha" refers to population densities per hectare of residential and all other non-residential land uses such as streets, schools and parks. Numbers provided apply to large subdivision situations. For smaller residential situations the persons per gross ha will be higher, about 75% of the persons per net ha.
5) apartment densities in the downtown have been as high as 4,000 units/net ha. Proposals with a units/net ha density greater than 1000 will be evaluated on a case-by-case basis.

Development Proposed Land – When the number and type of housing units within a proposed development are known, the calculation of population for the proposed development shall be based on the following:

Table 4.2 Per Unit Populations

Unit Type	Persons Per Unit
Single Family	3.4
Semi-detached	2.7
Duplex	2.3
Townhouse (row)	2.7
Apartments:	
Bachelor	1.4
1 Bedroom	1.4
2 Bedroom	2.1
3 Bedroom	3.1
Average Apt.	1.8

4.4.1 Calculation of Peak Design Flows

The formulae and parameters to be applied in the calculation of peak design flows (standard peak flow design parameters) for new or infill developments are illustrated in Figure 4.3 and described as follows:

Figure 4.3 Peak Flow Design Parameters Summary

AVERAGE WASTEWATER FLOWS:

Residential Average Flow:	350 L/c/day
Commercial Average Flow:	50,000 L/gross ha/d
Institutional Average Flow:	50,000 L/gross ha/d
Average Light Industrial Flow:	35,000 L/gross ha/d
Average Heavy Industrial Flow	55,000 L/gross ha/d

PEAKING FACTORS:

Residential Peak factor: Harmon Equation

$$P.F. = 1 + \left(\frac{14}{4 + \left(\frac{P}{1000} \right)^{\frac{1}{2}}} \right) * K$$

where: P=Population
K=Correction Factor = 1

Commercial Peak factor:	1.5
Institutional Peak factor:	1.5
Industrial Peak Factor:	Per Figure in Appendix 4-B

PEAK EXTRANEOUS FLOWS: (design event)

Infiltration Allowance:	0.28 L/s/effective gross ha (for all areas)
Less than 10 ha.	
Foundation Drain Allowance:	5.0 L/s/gross ha (if necessary for existing partially separated and combined areas only)
10 ha – 100 ha	
Foundation Drain Allowance:	3.0 L/s/gross ha (if necessary for existing partially separated and combined areas only)
Greater than 100 ha	
Foundation Drain Allowance:	2.0 L/s/gross ha (if necessary for existing partially separated and combined areas only)

APPENDIX B
Hydrant Flow Data/Fire Fighting Information

FAX TRANSMISSION FORM - Supply Pressure/Flow Capacity

City of Ottawa
Transportation Utilities and Public Works
Customer Service & Operational Support
951 Clyde Avenue
Ottawa, On, K1Z 5A6
Joseph Hannewyk **email: joseph.hannewyk@ottawa.ca**
Business Consultant/Water Resources Analyst **phone 560-6065 x22617**
fax 728-4183

Date/Time: 12/09/24-10:20:54
Our File: 49-01-2006
1 of 2 Page(s)

To: **Justin Gauthier**
Company: **Novatech Engineering Consultants Ltd.**
Tel: **254-9643x217**
Fax: **254-5867**
Location: **George @ Dalhousie**
Request_dt: 12/09/24-10:14:12
Email: **j.gauthier@novatech-eng.com**

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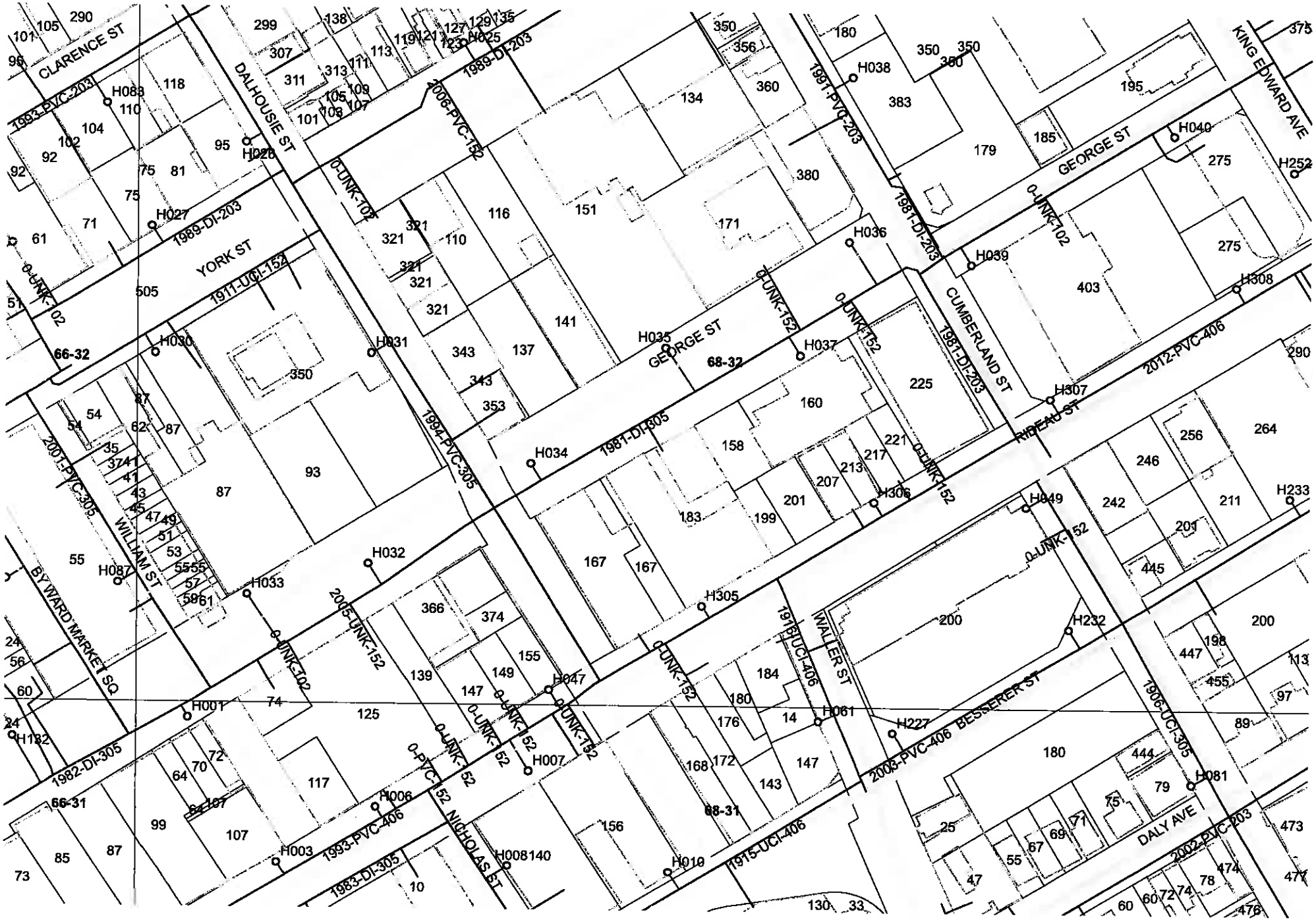
6350

Preferred Response Method:

Inspection Date	Flow Hydrant	Residual Hydrant	Pressure (psi)			Flow (igpm)	
			Static	Dynamic	Pitot	Actual	@ 20 psi
2011/09/26	6832034	6832035	66	>56	46	950	2166
2011/09/26	6832035	6832039	68	>56	52	1010	2135
2011/09/26	6832036	6832039	68	>58	56	1048	2445
2011/09/26	6832037	6832035	66	>56	54	1029	2346
2011/09/27	6832031	6832026	68	>58	56	1048	2445
?	6832029	?	?	?	?	?	?
?	6832215	?	?	?	?	?	?
2011/09/26	6832038	6832039	68	>58	58	1067	2488

Note: the computed flows are approximate and performed for hydrant colour coding purposes, thus these values are not intended for design purposes.

Ref# **6350**


CLARENCE ST
DALHOUSIE ST
YORK ST
GEORGE ST
RIDEAU ST
CUMBERLAND ST
KING EDWARD AVE
BYWARD MARKET SQ
WILLIAM ST
WALLER ST
DALY AVE
NICHOLAS ST
BESSERER ST
1989-DI-203
2006-PVC-152
1991-PVC-203
1911-UCI-152
1994-PVC-305
1981-DI-305
2001-PVC-305
2005-UNK-152
1982-DI-305
1993-PVC-406
1983-DI-305
1915-UCI-406
1976-UCI-406
2003-PVC-406
1906-UCI-305
2002-PVC-203
2012-PVC-406
0-UNK-102
0-UNK-152
0-PVC-152
66-32
68-32
66-31
68-31
H088
H026
H027
H030
H031
H032
H033
H087
H001
H132
H006
H003
H008140
H007
H047
H034
H035
H036
H037
H038
H039
H040
H252
H308
H307
H306
H305
H049
H233
H232
H227
H061
H081
H010

6-4.5.9* For individual fasteners, the loads determined in 6-4.5.6 shall not exceed the allowable loads provided in Figure 6-4.5.9.

The type of fasteners used to secure the bracing assembly to the structure shall be limited to those shown in Figure 6-4.5.9. For connections to wood, through bolts with washers on each end shall be used. Holes for through bolts shall be $^1/_{16}$ in. (1.6 mm) greater than the diameter of the bolt.

Exception No. 1: Where it is not practical to install through bolts due to the thickness of the member or inaccessibility, lag screws shall be permitted. Holes shall be pre-drilled $^1/_8$ in. (3.2 mm) smaller than the maximum root diameter of the lag screw.

Exception No. 2: Other fastening methods are acceptable for use if certified by a registered professional engineer to support the loads determined in accordance with the criteria in 6-4.5.9. Calculations shall be permitted where required by the authority having jurisdiction.

6-4.5.10 Sway bracing assemblies shall be listed for a maximum load rating. The loads shall be reduced as shown in Table 6-4.5.10 for loads that are less than 90 degrees from vertical.

Exception: Where sway bracing utilizing pipe, angles, flats, or rods as shown in Table 6-4.5.8 is used, the components do not require listing. Bracing fittings and connections used with those specific materials shall be listed.

Table 6-4.5.10 Allowable Horizontal Load on Brace Assemblies Based on the Weakest Component of the Brace Assembly

Brace Angle	Allowable Horizontal Load
30–40 degrees from vertical	Listed load rating divided by 2.000
45–59 degrees from vertical	Listed load rating divided by 1.414
60–89 degrees from vertical	Listed load rating divided by 1.155
90 degrees from vertical	Listed load rating

6-4.5.11 Bracing shall be attached directly to feed and cross mains. Each run of pipe between changes in direction shall be provided with both lateral and longitudinal bracing.

Exception: Pipe runs less than 12 ft (3.6 m) in length shall be permitted to be supported by the braces on adjacent runs of pipe.

6-4.5.12 A length of pipe shall not be braced to sections of the building that will move differentially.

6-4.6 Restraint of Branch Lines.

6-4.6.1* Restraint is considered a lesser degree of resisting loads than bracing and shall be provided by use of one of the following:

(1) A listed sway brace assembly

(2) A wraparound U-hook satisfying the requirements of 6-4.5.3, Exception No. 3

(3) No. 12, 440-lb (200-kg) wire installed at least 45 degrees from the vertical plane and anchored on both sides of the pipe

(4) Other approved means

Wire used for restraint shall be located within 2 ft (610 mm) of a hanger. The hanger closest to a wire restraint shall be of a type that resists upward movement of a branch line.

6-4.6.2 The end sprinkler on a line shall be restrained against excessive vertical and lateral movement.

6-4.6.3* Where upward or lateral movement would result in an impact against the building structure, equipment, or finish materials, branch lines shall be restrained at intervals not exceeding 30 ft (9 m).

6-4.6.4* Sprig-ups 4 ft (1.2 m) or longer shall be restrained against lateral movement.

6-4.7 Hangers and Fasteners Subject to Earthquakes.

6-4.7.1 C-type clamps (including beam and large flange clamps) used to attach hangers to the building structure in areas subject to earthquakes shall be equipped with a restraining strap. The restraining strap shall be listed for use with a C-type clamp or shall be a steel strap of not less than 16 gauge thickness and not less than 1 in. (25.4 mm) wide for pipe diameters 8 in. (203 mm) or less and 14 gauge thickness and not less than $1^1/_4$ in. (31.7 mm) wide for pipe diameters greater than 8 in. (203 mm). The restraining strap shall wrap around the beam flange not less than 1 in. (25.4 mm). A lock nut on a C-type clamp shall not be used as a method of restraint. A lip on a "C" or "Z" purlin shall not be used as a method of restraint.

Where purlins or beams do not provide an adequate lip to be secured by a restraining strap, the strap shall be through-bolted or secured by a self-tapping screw.

6-4.7.2 C-type clamps (including beam and large flange clamps), with or without restraining straps, shall not be used to attach braces to the building structure.

6-4.7.3 Powder-driven fasteners shall not be used to attach braces to the building structure.

Exception: Powder-driven fasteners shall be permitted where they are specifically listed for service in resisting lateral loads in areas subject to earthquakes.

6-4.7.4 Powder-driven fasteners shall not be used to attach hangers to the building structure where the systems are required to be protected against earthquakes using a horizontal force factor exceeding 0.50 W_p, where W_p is the weight of the water-filled pipe.

Exception: Powder-driven fasteners shall be permitted where they are specifically listed for horizontal force factors in excess of 0.50 W_p.

Chapter 7 Design Approaches

7-1 General.

7-1.1 Water demand requirements shall be determined from the occupancy hazard fire control approach of Section 7-2.

Exception: Special design approaches as permitted in Section 7-9.

7-1.2 For buildings with two or more adjacent occupancies that are not physically separated by a barrier or partition capable of delaying heat from a fire in one area from fusing sprinklers in the adjacent area, the required sprinkler protection for the more demanding occupancy shall extend 15 ft (4.6 m) beyond its perimeter.

7-2 Occupancy Hazard Fire Control Approach.

7-2.1 Occupancy Classifications.

7-2.1.1 Occupancy classifications for this standard relate to sprinkler installations and their water supplies only. They shall not be used as a general classification of occupancy hazards.

7-2.1.2 Occupancies or portions of occupancies shall be classified according to the quantity and combustibility of contents, the expected rates of heat release, the total potential for energy release, the heights of stockpiles, and the presence of flammable and combustible liquids, using the definitions contained in Section 1-4. Classifications are as follows:

Light hazard

Ordinary hazard (Groups 1 and 2)

Extra hazard (Groups 1 and 2)

Special occupancy hazard *(see Section 7-10)*

7-2.2 Water Demand Requirements — Pipe Schedule Method.

7-2.2.1 Table 7-2.2.1 shall be used in determining the minimum water supply requirements for light and ordinary hazard occupancies protected by systems with pipe sized according to the pipe schedules of Section 8-5. Pressure and flow requirements for extra hazard occupancies shall be based on the hydraulic calculation methods of 7-2.3. The pipe schedule method shall be permitted only for new installations of 5000 ft² (465 m²) or less or for additions or modifications to existing pipe schedule systems sized according to the pipe schedules of Section 8-5. Table 7-2.2.1 shall be used in determining the minimum water supply requirements.

Exception No. 1: The pipe schedule method shall be permitted for use in systems exceeding 5000 ft² (465 m²) where the flows required in Table 7-2.2.1 are available at a minimum residual pressure of 50 psi (3.4 bar) at the highest elevation of sprinkler.

Exception No. 2: The pipe schedule method shall be permitted for additions or modifications to existing extra hazard pipe schedule systems.

7-2.2.2 The lower duration value of Table 7-2.2.1 shall be acceptable only where remote station or central station waterflow alarm service is provided.

7-2.2.3* The residual pressure requirement of Table 7-2.2.1 shall be met at the elevation of the highest sprinkler. *(See the Exceptions to 7-2.2.1).*

7-2.2.4 The lower flow figure of Table 7-2.2.1 shall be permitted only where the building is of noncombustible construction or the potential areas of fire are limited by building size or compartmentation such that no open areas exceed 3000 ft² (279 m²) for light hazard or 4000 ft² (372 m²) for ordinary hazard.

Table 7-2.2.1 Water Supply Requirements for Pipe Schedule Sprinkler Systems

Occupancy Classification	Minimum Residual Pressure Required (psi)	Acceptable Flow at Base of Riser (Including Hose Stream Allowance) (gpm)	Duration (minutes)
Light hazard	15	500–750	30–60
Ordinary hazard	20	850–1500	60–90

For SI units, 1 gpm = 3.785 L/min; 1 psi = 0.0689 bar.

7-2.3 Water Demand Requirements — Hydraulic Calculation Methods.

7-2.3.1 General.

7-2.3.1.1* The minimum water supply requirements for a hydraulically designed occupancy hazard fire control sprinkler system shall be determined by adding the hose stream demand from Table 7-2.3.1.1 to the water supply for sprinklers determined in 7-2.3.1.2. This supply shall be available for the minimum duration specified in Table 7-2.3.1.1.

Exception No. 1: An allowance for inside and outside hose shall not be required where tanks supply sprinklers only.

Exception No. 2: Where pumps taking suction from a private fire service main supply sprinklers only, the pump need not be sized to accommodate inside and outside hose. Such hose allowance shall be considered in evaluating the available water supplies.

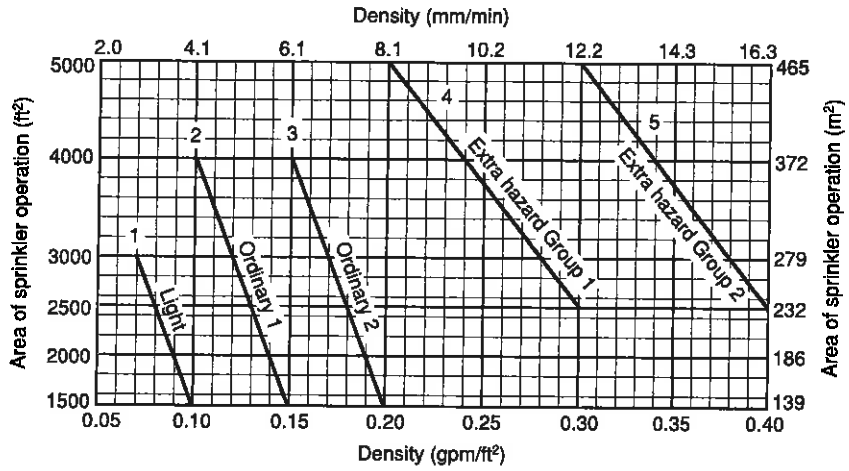
7-2.3.1.2 The water supply for sprinklers only shall be determined either from the area/density curves of Figure 7-2.3.1.2 in accordance with the method of 7-2.3.2 or be based upon the room design method in accordance with 7-2.3.3, at the discretion of the designer. For special areas under consideration, as described in 7-2.3.4, separate hydraulic calculations shall be required in addition to those required by 7-2.3.2 or 7-2.3.3.

Table 7-2.3.1.1† Hose Stream Demand and Water Supply Duration Requirements for Hydraulically Calculated Systems

Occupancy or Commodity Classification	Inside Hose (gpm)	Total Combined Inside and Outside Hose (gpm)	Duration (minutes)
Light hazard	0, 50, or 100	100	30
Ordinary hazard	0, 50, or 100	250	60–90
Extra hazard	0, 50, or 100	500	90–120
Rack storage, Class I, II, and III commodities up to 12 ft (3.7 m) in height	0, 50, or 100	250	90
Rack storage, Class IV commodities up to 10 ft (3.1 m) in height	0, 50, or 100	250	90
Rack storage, Class IV commodities up to 12 ft (3.7 m) in height	0, 50, or 100	500	90
Rack storage, Class I, II, and III commodities over 12 ft (3.7 m) in height	0, 50, or 100	500	90
Rack storage, Class IV commodities over 12 ft (3.7 m) in height and plastic commodities	0, 50, or 100	500	120
General storage, Class I, II, and III commodities over 12 ft (3.7 m) up to 20 ft (6.1 m)	0, 50, or 100	500	90
General storage, Class IV commodities over 12 ft (3.7 m) up to 20 ft (6.1 m)	0, 50, or 100	500	120
General storage, Class I, II, and III commodities over 20 ft (6.1 m) up to 30 ft (9.1 m)	0, 50, or 100	500	120
General storage, Class IV commodities over 20 ft (6.1 m) up to 30 ft (9.1 m)	0, 50, or 100	500	150
General storage, Group A plastics ≤ 5 ft (1.5 m)	0, 50, or 100	250	90
General storage, Group A plastics over 5 ft (1.5 m) up to 20 ft (6.1 m)	0, 50, or 100	500	120
General storage, Group A plastics over 20 ft (6.1 m) up to 25 ft (7.6 m)	0, 50, or 100	500	150

For SI units, 1 gpm = 3.785 L/min.

Figure 7-2.3.1.2 Area/density curves.



7-2.3.1.3 Regardless of which of the two methods is used, the following restrictions shall apply:

(a) For areas of sprinkler operation less than 1500 ft² (139 m²) used for light and ordinary hazard occupancies, the density for 1500 ft² (139 m²) shall be used. For areas of sprinkler operation less than 2500 ft² (232 m²) for extra hazard occupancies, the density for 2500 ft² (232 m²) shall be used.

(b) *For buildings having unsprinklered combustible concealed spaces (as described in 5-13.1.1 and 5-13.7), the minimum area of sprinkler operation shall be 3000 ft² (279 m²).

Exception No. 1: Combustible concealed spaces filled entirely with noncombustible insulation.

*Exception No. 2: *Light or ordinary hazard occupancies where noncombustible or limited combustible ceilings are directly attached to the bottom of solid wood joists so as to create enclosed joist spaces 160 ft³ (4.8 m³) or less in volume.*

*Exception No. 3: *Concealed spaces where the exposed surfaces have a flame spread rating of 25 or less and the materials have been demonstrated to not propagate fire in the form in which they are installed in the space.*

(c) Water demand of sprinklers installed in racks or water curtains shall be added to the ceiling sprinkler water demand at the point of connection. Demands shall be balanced to the higher pressure. *(See Chapter 8.)*

(d) Water demand of sprinklers installed in concealed spaces or under obstructions such as ducts and cutting tables need not be added to ceiling demand.

(e) Where inside hose stations are planned or are required, a total water allowance of 50 gpm (189 L/min) for a single hose station installation or 100 gpm (378 L/min) for a multiple hose station installation shall be added to the sprinkler requirements. The water allowance shall be added in 50-gpm (189-L/min) increments beginning at the most remote hose station, with each increment added at the pressure required by the sprinkler system design at that point.

(f) When hose valves for fire department use are attached to wet pipe sprinkler system risers in accordance with 5-15.5.2, the water supply shall not be required to be added to standpipe demand as determined from NFPA 14, *Standard for the Installation of Standpipe and Hose Systems.*

Exception No. 1: Where the combined sprinkler system demand and hose stream allowance of Table 7-2.3.1.1 exceeds the requirements of NFPA 14, Standard for the Installation of Standpipe and Hose Systems, this higher demand shall be used.

Exception No. 2: For partially sprinklered buildings, the sprinkler demand, not including hose stream allowance, as indicated in Table 7-2.3.1.1 shall be added to the requirements given in NFPA 14, Standard for the Installation of Standpipe and Hose Systems.

(g) Water allowance for outside hose shall be added to the sprinkler and inside hose requirement at the connection to the city water main or a yard hydrant, whichever is closer to the system riser.

(h) The lower duration values in Table 7-2.3.1.1 shall be permitted where remote station or central station waterflow alarm service is provided.

(i) Where pumps, gravity tanks, or pressure tanks supply sprinklers only, requirements for inside and outside hose need not be considered in determining the size of such pumps or tanks.

7-2.3.1.4 Total system water supply requirements shall be determined in accordance with the hydraulic calculation procedures of Section 8-4.

7-2.3.2 Area/Density Method.

7-2.3.2.1 The water supply requirement for sprinklers only shall be calculated from the area/density curves in Figure 7-2.3.1.2 or from Section 7-10 where area/density criteria is specified for special occupancy hazards. When using Figure 7-2.3.1.2, the calculations shall satisfy any single point on the appropriate area/density curve as follows:

(1) Light hazard area/density curve 1
(2) Ordinary hazard (Group 1) area/density curve 2
(3) Ordinary hazard (Group 2) area/density curve 3
(4) Extra hazard (Group 1) area/density curve 4
(5) Extra hazard (Group 2) area/density curve 5

It shall not be necessary to meet all points on the selected curve.

Exception: Sprinkler demand for storage occupancies as determined in Sections 7-3 through 7-8.

7-2.3.2.2 For protection of miscellaneous storage, miscellaneous tire storage, and storage up to 12 ft (3.7 m) in height, the discharge criteria in Table 7-2.3.2.2 shall apply.

Table A-1-4.11 Typical Cotton Bale Types and Approximate Sizes

Bale Type	Dimensions		Average Weight		Volume		Density	
	in.	mm	lb	kg	ft^3	m^3	lb/ft^3	kg/m^3
Gin, flat	55 × 45 × 28	1397 × 1143 × 711	500	226.8	40.1	1.13	12.5	201
Modified gin, flat	55 × 45 × 24	1397 × 1143 × 610	500	226.8	34.4	0.97	14.5	234
Compressed, standard	57 × 29 × 23	1448 × 736 × 584	500	226.8	22.0	0.62	22.7	366
Gin, standard	55 × 31 × 21	1397 × 787 × 533	500	226.9	20.7	0.58	24.2	391
Compressed, universal	58 × 25 × 21	1475 × 635 × 533	500	226.8	17.6	0.50	28.4	454
Gin, universal	55 × 26 × 21	1397 × 660 × 533	500	226.8	17.4	0.49	28.7	463
Compressed, high density	58 × 22 × 21	1473 × 559 × 533	500	226.8	15.5	0.44	32.2	515

A-1-4.11 Baled Cotton. See Table A-1-4.11.

A-1-4.12 Array, Standard (Paper). The occasional presence of partially used rolls on top of columns of otherwise uniform diameter rolls does not appreciably affect the burning characteristics.

A-1-4.12 Roll Paper Storage, Wrapped. Rolls that are completely protected with a heavyweight kraft wrapper on both sides and ends are subject to a reduced degree of fire hazard. Standard methods for wrapping and capping rolls are outlined in Figure A-1-4.12.

In some cases, rolls are protected with laminated wrappers, using two sheets of heavy kraft with a high-temperature wax laminate between the sheets. Where using this method, the overall weight of wax-laminated wrappers should be based on the basis weight per 1000 ft^2 (92.9 m^2) of the outer sheet only, rather than on the combined basis weight of the outer and inner laminated wrapper sheets. A properly applied wrapper can have the effect of changing the class of a given paper to essentially that of the wrapper material. The effect of applying a wrapper to tissue has not been determined by test.

A-1-4.12 Roll Paper Storage Height. The size of rolls and limitations of mechanical handling equipment should be considered in determining maximum storage height.

A-2-1 Occupancy examples in the listings as shown in the various hazard classifications are intended to represent the norm for those occupancy types. Unusual or abnormal fuel loadings or combustible characteristics and susceptibility for changes in these characteristics, for a particular occupancy, are considerations that should be weighed in the selection and classification.

The light hazard classification is intended to encompass residential occupancies; however, this is not intended to preclude the use of listed residential sprinklers in residential occupancies or residential portions of other occupancies.

A-2-1.1 Light hazard occupancies include occupancies having uses and conditions similar to the following:

Churches

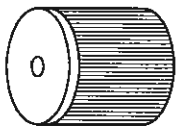
Clubs

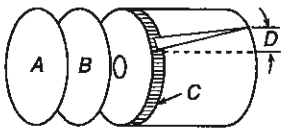
Eaves and overhangs, if of combustible construction with no combustibles beneath

Figure A-1-4.12 Wrapping and capping terms and methods.

Wrapper
Exterior wrapper
Body wrapper — General term for protective wrapping of sides and ends on roll.

Body wrap
Sleeve wrap
Wrap — do not cap — Wrapper placed around circumference of roll. No heads or caps needed.





Heads
Headers — Protection applied to the ends of the rolls (*A* and *B*). Heads do not lap over the end of the roll.

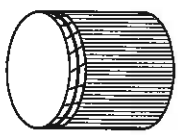
Inside heads — Protection applied to the ends of the rolls next to the roll itself (*B*). The wrapper of the rolls is crimped down over these heads.

Outside heads — Protection applied to the ends of the rolls on the outside (*A*). This head is applied after the wrapper is crimped.

Edge protectors
Edge bands — Refers to extra padding to prevent damage to roll edges (*C*).

Overwrap — The distance the body wrap or wrapper overlaps itself (*D*).

Roll cap — A protective cover placed over the end of a roll. Edges of cap lap over the end of the roll and are secured to the sides of the roll.



Educational
Hospitals
Institutional
Libraries, except large stack rooms
Museums
Nursing or convalescent homes
Offices, including data processing
Residential
Restaurant seating areas
Theaters and auditoriums, excluding stages and prosceniums
Unused attics

A-2-1.2.1 Ordinary hazard occupancies (Group 1) include occupancies having uses and conditions similar to the following:

Automobile parking and showrooms
Bakeries
Beverage manufacturing
Canneries
Dairy products manufacturing and processing
Electronic plants
Glass and glass products manufacturing
Laundries
Restaurant service areas

A-2-1.2.2 Ordinary hazard occupancies (Group 2) include occupancies having uses and conditions similar to the following:

Cereal mills
Chemical plants — ordinary
Confectionery products
Distilleries
Dry cleaners
Feed mills
Horse stables
Leather goods manufacturing
Libraries — large stack room areas
Machine shops
Metal working
Mercantile
Paper and pulp mills
Paper process plants
Piers and wharves
Post offices
Printing and publishing
Repair garages
Resin application area
Stages
Textile manufacturing
Tire manufacturing
Tobacco products manufacturing
Wood machining
Wood product assembly

A-2-1.3.1 Extra hazard occupancies (Group 1) include occupancies having uses and conditions similar to the following:

Aircraft hangars (except as governed by NFPA 409, *Standard on Aircraft Hangars*)
Combustible hydraulic fluid use areas
Die casting
Metal extruding
Plywood and particle board manufacturing
Printing [using inks having flash points below 100°F (38°C)]
Rubber reclaiming, compounding, drying, milling, vulcanizing
Saw mills
Textile picking, opening, blending, garnetting, or carding, combining of cotton, synthetics, wool shoddy, or burlap
Upholstering with plastic foams

A-2-1.3.2 Extra hazard occupancies (Group 2) include occupancies having uses and conditions similar to the following:

Asphalt saturating
Flammable liquids spraying
Flow coating
Manufactured home or modular building assemblies (where finished enclosure is present and has combustible interiors)
Open oil quenching
Plastics processing
Solvent cleaning
Varnish and paint dipping

A-2-1.4 Other NFPA standards contain design criteria for fire control or fire suppression *(see 2-1.4 and Chapter 13)*. While these can form the basis of design criteria, this standard describes the methods of design, installation, fabrication, calculation, and evaluation of water supplies that should be used for the specific design of the system.

Other NFPA standards contain sprinkler system design criteria for fire control or suppression of specific hazards. This information has been either referenced or copied into Chapters 5 and 7 using NFPA's extract policy.

A-2-2 Specification of the type, amount, and arrangement of combustibles for any commodity classification is essentially an attempt to define the potential fire severity, based on its burning characteristics, so the fire can be successfully controlled by the prescribed sprinkler protection for the commodity class. In actual storage situations, however, many storage arrays do not fit precisely into one of the fundamental classifications; therefore, the user needs to make judgments after comparing each classification to the existing storage conditions. Storage arrays consist of thousands of products, which make it impossible to specify all the acceptable variations for any class. As an alternative, a variety of common products are classified in this appendix based on judgment, loss experience, and fire test results.

Table A-2-2 provides examples of commodities not addressed by the classifications in Section 2-2.

Table A-2-2.3 is an alphabetized list of commodities with corresponding classifications.

Tables A-2-2.3.1 through A-2-2.3.4 and A-2-2.4.1 provide examples of commodities within a specific class.

Table A-2-2 Examples of Commodities Not Addressed by the Classifications in Section 2-2

Boxes, Crates
- Empty, wood slatted
Lighters (butane)
- Loose in large containers (Level 3 aerosol)

*Should be treated as idle pallets.

APPENDIX C
Correspondence

APPENDIX D
Servicing Study Guidelines Checklist

NOVATECH ENGINEERING CONSULTANTS LTD.

Project Name: 141 George Street / 325 Dalhousie Street
Project Number: 112142
Date: 01/24/2014

Development Servicing Study Checklist

4.1 General Content	Addressed (Y/N/NA)	Section	Comments
Executive Summary (for larger reports only).	NA		
Date and revision number of the report.	Y	Cover	
Location map and plan showing municipal address, boundary, and layout of proposed development.	Y		Figures 1, 2 and 3
Plan showing the site and location of all existing services.	Y		Figures 2 and 3
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.	Y	1.0	
Summary of Pre-consultation Meetings with City and other approval agencies.	N		
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.	Y	2.0 - 4.0	
Statement of objectives and servicing criteria.	Y		Addressed in Section 2.0, 3.0. 4.0.
Identification of existing and proposed infrastructure available in the immediate area.	Y		Figures 2 and 3
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).	NA		
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 neighboring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.	N		Will be addressed in Site plan application.

Development Servicing Study Checklist

4.1 General Content	Addressed (Y/N/NA)	Section	Comments
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.	NA		
Proposed phasing of the development, if applicable.	NA		
Reference to geotechnical studies and recommendations concerning servicing.	N		
All preliminary and formal site plan submissions should have the following information:			
Metric scale	Y	ALL	
North arrow (including construction North)	Y	ALL	
Key plan	Y	ALL	
Name and contact information of applicant and property owner	Y	ALL	
Property limits including bearings and	Y	ALL	
Existing and proposed structures and parking	Y	ALL	
Easements, road widening and rights-of-way	Y	ALL	
Adjacent street names	Y	ALL	

Development Servicing Study Checklist

4.2 Water	Addressed (Y/N/NA)	Section	Comments
Confirm consistency with Master Servicing Study, if available.	Y	5.0	Also refer to Appendix B for Hydrant Flow data.
Availability of public infrastructure to service proposed development.	Y		Figures 2 and 3
Identification of system constraints.	Y	4.0	
Identify boundary conditions.	Y	4.0	
Confirmation of adequate domestic supply and pressure.	Y	4.0	
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.	Y	4.0	
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.	Y	4.0	
Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design.	NA		
Address reliability requirements such as appropriate location of shut-off valves.	Y	4.0	
Check on the necessity of a pressure zone boundary modification.	NA		
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.	Y	4.0	
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.	Y	4.0	
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.	NA		
Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Y	4.0	
Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	N		Figure 3 shows main.

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4.3 Wastewater	Addressed (Y/N/NA)	Section	Comments
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).	Y	2.0	
Confirm consistency with Master Servicing Study and/or justifications for deviations.	Y	2.0	
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.	Y	2.0	
Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Y	2.0	
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)	Y	2.0	
Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	Y	2.0	
Description of proposed sewer network including sewers, pumping stations, and forcemains.	Y	2.0	Figures 2 and 3
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).	NA		
Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	NA		
Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	NA		
Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	NA		
Special considerations such as contamination, corrosive environment etc.	NA		

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4.4 Stormwater	Addressed (Y/N/NA)	Section	Comments
Description of drainage outlets and downstream constraints including legality of outlet (i.e. municipal drain, right-of-way, watercourse, or private property).	Y	3.0	
Analysis of the available capacity in existing public infrastructure.	Y	3.0	
A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns and proposed drainage patterns.	Y		Figures 2 and 3
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.	Y	3.0	
Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	NA		
Description of stormwater management concept with facility locations and descriptions with references and supporting information.	Y	3.0	
Set-back from private sewage disposal systems.	NA		
Watercourse and hazard lands setbacks.	NA		
Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	NA		
Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	Y	3.0	
Storage requirements (complete with calcs) and conveyance capacity for 5 yr and 100 yr events.	Y	3.0	
Identification of watercourse within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	NA		
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.	Y	3.0	
Any proposed diversion of drainage catchment areas from one outlet to another.	NA		
Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and SWM facilities.	Y	3.0	
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.	NA		

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4.4 Stormwater	Addressed (Y/N/NA)	Section	Comments
Identification of municipal drains and related approval requirements.	NA		
Description of how the conveyance and storage capacity will be achieved for the development.	Y	3.0	
100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	Y	3.0	
Inclusion of hydraulic analysis including HGL elevations.	N		
Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Y	3.0	
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.	NA		
Identification of fill constrains related to floodplain and geotechnical investigation.	NA		

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4.5 Approval and Permit Requirements	Addressed (Y/N/NA)	Section	Comments
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.	NA		
Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.	N		
Changes to Municipal Drains.	N		
Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)	NA		

4.6 Conclusion	Addressed (Y/N/NA)	Section	Comments
Clearly stated conclusions and recommendations.	Y	5.0	
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.	NA		
All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario.	Y	5.0	