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Queensway-Carleton Hospital Overall Campus Part 4 Expansion

Site Servicing Report

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**QUEENSWAY-CARLETON HOSPITAL
PART 4 EXPANSION**

SITE SERVICING REPORT

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November 28, 2025

Ref: R-2025-078
Novatech File No. 123089

November 28, 2025

Parkin Architects Limited
200 Laurier Avenue West, 3rd floor
Ottawa, Ontario
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Attention: Derek Judson

**Re: Queensway-Carleton Hospital: Part 4 Expansion
Site Servicing Report
3045 Baseline Road, Ottawa, ON
Novatech File No.: 123089**

Enclosed is a copy of the Site Servicing Report prepared for the proposed Queensway Carleton Hospital: Part 4 Expansion located at 3045 Baseline Road. This report addresses the approach to site servicing and is submitted in support of the Site Plan Control application.

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

NOVATECH



François Thauvette, P. Eng.
Senior Project Manager

cc: Sue Sallaj Ginn (QCH)
Mohammed Fawzi (City of Ottawa)
Daniel Vancek (VR Eng.)
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1.0 INTRODUCTION

The Queensway-Carleton Hospital (QCH) is undergoing another facility expansion to meet the growing demands of the Greater Ottawa community. The proposed Part 4 expansion will include new Hospital buildings, building expansions and renovations, the construction of a new multi-storey parking garage, the extension of the Ring Road along the west side of the campus, internal roadway re-alignments as well as parking lot modifications. The QCH has retained Novatech to complete the site servicing, grading, and stormwater management design for the proposed expansion phase. As part of the proposed works, the existing infrastructure systems (i.e., sewers, watermains and utilities) are being reviewed and upgraded to meet the needs of the Part 4 campus expansion, while also considering future Master Plan expansion phases. One of the central objectives is to upgrade sewers and watermains and to ensure they will be relocated where they will not be impacted by future development phases. Another important goal is to ensure the overall sequencing of the work will minimize disruptions to Hospital operations during construction. This report addresses the approach to the QCH campus site servicing and is being submitted in support of the Site Plan Control application.

1.1 Site Location, Description and General Campus History

The Queensway-Carleton Hospital is located at 3045 Baseline Road and situated on a 20.2-hectare property administered by the National Capital Commission (NCC). The site's north-western entrance off Richmond Road and south-eastern entrance off Baseline Road are connected by John Sutherland Drive. Residential properties and Highway 416 border the subject site to the north-east and south-west, respectively. The legal description of the property is designated as Part of Lot 16, Concession 2 (O.F.), Geographic Township of Nepean, City of Ottawa. Refer to **Figure 1** for an aerial view of the QCH campus.

Figure 1 - Aerial View of the Subject Site



Image Source: geoOttawa (City of Ottawa)

First constructed in the mid 1970s, the Hospital campus has undergone several facility expansions, including various building additions and parking lot modifications. A brief overview of the past QCH expansion projects is as follows:

- The 1998 expansion phase included a small Hospital addition and construction of the Ring Road on the west side of the campus as well as the construction of several parking lots. Portions of the existing storm sewer and watermain were also replaced to accommodate the Hospital expansion as well as anticipated future developments.
- In 2003, the expansion phase included the construction of the Emergency building on the east side of the Hospital, a new parking lot in the northwest corner of the campus, and the reconfiguration of some existing parking lots.
- In 2005, the Operations Room addition was constructed as well as the removal of some of the existing storm sewers within the loading dock area.
- In 2008, the expansion phase included construction of a Power Plan addition, Cancer Centre, multi-level parking structure, and surface parking lots on the north side of the campus. A new on-site sanitary pump station including twin forcemains was also constructed in response to capacity concerns within the Graham Creek Sanitary Sewer, with most campus sanitary flows being re-directed to the Lynwood Sanitary Collector south of Baseline Road. Portions of the existing storm sewer and watermain were also replaced to accommodate the Hospital expansion.
- The 2012 expansion phase included construction of a Surgical Centre addition, MRI Centre, and Main Entry building, as well as modifications to the alignment of the Ring Road on the west side of the campus. Additionally, portions of the existing storm sewer and watermain were replaced to accommodate the proposed Hospital expansion.
- In 2023, the Mental Health Wing, located within the southwest portion of the campus, was expanded.

1.2 Pre-Consultation Information

A pre-consultation meeting was held with the City of Ottawa on May 23, 2024, at which time the client was advised of the general submission requirements. Subsequent meetings were held with the National Capital Commission (NCC) and City staff to further discuss the project and approach to site servicing, drainage, and stormwater management.

The subject site is located within the jurisdiction of the Rideau Valley Conservation Authority (RVCA). Based on feedback from the City of Ottawa, on-site stormwater management, including both quantity and quality control measures, will be required.

Refer to **Appendix A** for a summary of the correspondence related to the proposed development.

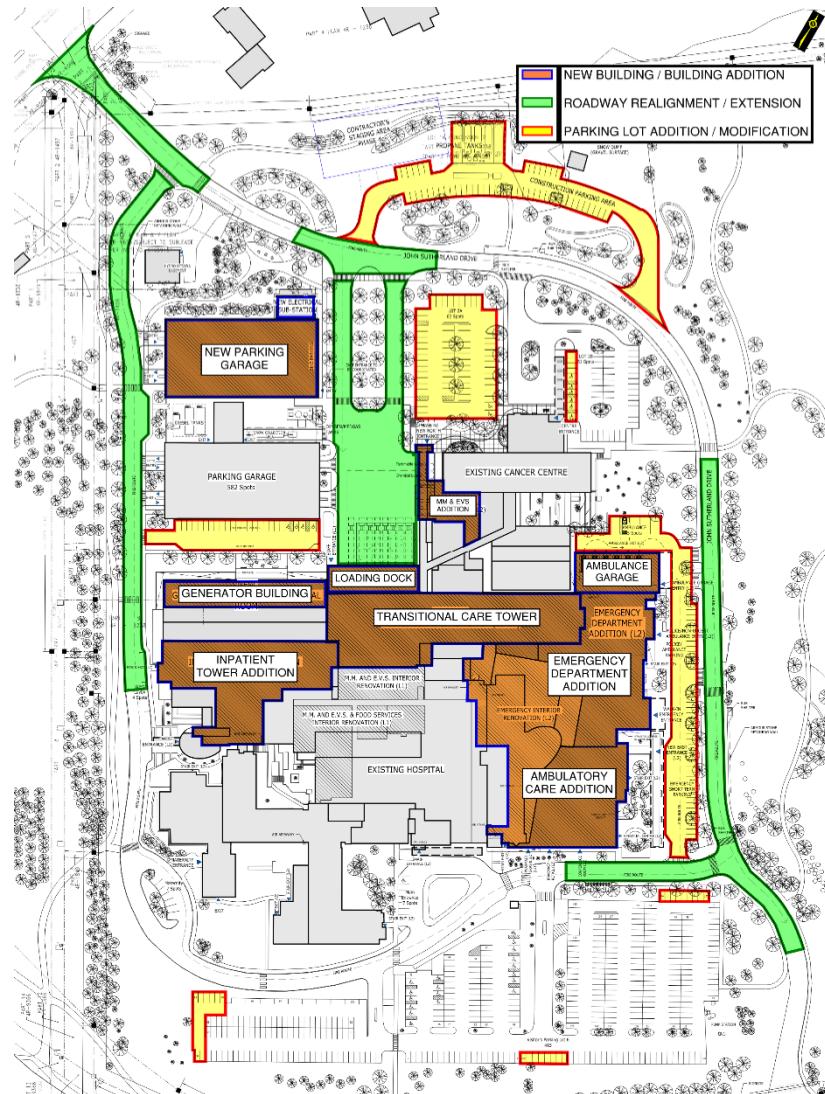
1.3 Proposed Development

The proposed Part 4 expansion will include new medical facilities and ancillary buildings, including an Ambulance Garage, Generator building, Electrical Sub-Station, Materials

Management & Environmental Services (MM & EVS) building, and Loading Dock adjacent to the Materials Management addition. The proposed works will also include building additions and renovations at the Emergency Department, Ambulatory Care, Inpatient Tower and Transitional Care Tower. The increased demand for on-site parking will be provided by the construction of a new Multi-Storey Parking Garage as well as modifications to the various surface parking lots on the QCH campus. Proposed roadwork includes the extension of the west Ring Road as well as the re-alignment of the central loading dock area and portions of John Sutherland Drive.

As part of the proposed Part 4 expansion works, the existing infrastructure systems (i.e., sanitary sewage, domestic water and storm drainage) are being reviewed and upgraded. Portions of the existing sewer systems and watermain will be removed and realigned, while new segments will be extended adjacent to the proposed development. The proposed development will be phased appropriately to ensure minimal disruptions to the Hospital's operations during construction. Refer to **Figure 2** for new building locations and proposed roadworks within the QCH campus.

Figure 2 – New Buildings and Roadworks Locations



1.4 Reference Material

The following design guidelines have been used to establish the servicing and stormwater management requirements for the proposed development:

- Ottawa Sewer Design Guidelines (2012) and Technical Bulletins (2010-present)
- Ottawa Design Guidelines for Water Distribution (2010) & Tech. Bulletins (2010-present)
- Ministry of the Environment Design Guidelines for Sewage Works (2008)
- Ministry of the Environment Design Guidelines for Drinking Water Systems (2008)
- Fire Underwriters Survey (FUS) Water Supply for Public Fire protection

The following reports and studies were reviewed and/or prepared as part of the design process:

- ¹ Queensway-Carleton Hospital Cancer Centre – Sanitary Pump Station Design Brief, prepared by Novatech Engineering Consultants Ltd., dated June 2008.
- ² Queensway-Carleton Hospital Cancer Centre – Hydraulic Network Analysis, prepared by Novatech Engineering Consultants Ltd., dated May 29, 2007.
- ³ Queensway-Carleton Hospital Part 3 Expansion Servicing Design Brief, prepared by Novatech Engineering Consultants Ltd., dated July 16, 2010.
- ⁴ Queensway-Carleton Hospital Part 4 Expansion – Stormwater Management Report, prepared by Novatech, dated November 28, 2025.
- ⁵ Geotechnical Investigation – Queensway-Carleton Hospital Expansion, prepared by WSP, dated April 10, 2025.

The details of the proposed QCH Part 4 stormwater management (SWM) design will be addressed in a separate report entitled: Queensway Carleton Hospital Part 4 Expansion – Stormwater Management Report⁴.

2.0 SITE SERVICING

The objective of the site servicing design is to provide proper sewage outlets, a suitable domestic water supply and to ensure that appropriate fire protection is provided for the QCH campus. The servicing criteria, the expected sewage flows, and water demands are to conform to the requirements of the City of Ottawa municipal design guidelines for sewer and water distribution systems. Refer to the enclosed plans and subsequent sections of the report for further details.

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

2.1 Sanitary Sewage

Sanitary flows from the QCH campus are currently being directed towards two distinct outlets. Sewage flows from the northern portion of the campus, including the Cancer Centre, Bunkers and multi-level parking structure are being directed towards the Graham Creek sanitary trunk

sewer located along the east property line; while sewage flows from the remainder of the campus are currently being directed towards the Lynwood sanitary collector sewer, located south of Baseline Road. The on-site sanitary pump station was constructed as part of the 2008 Cancer Centre expansion phase to alleviate capacity constraints within the Graham Creek sanitary trunk (the original Hospital sanitary sewer outlet). As described in the QCH Sanitary Pump Station Design Brief¹, the original hospital sanitary outlet to the Graham Creek sanitary trunk sewer on the east side of EX. SAN MH 19 was repurposed to provide emergency sanitary overflow for the pump station. Furthermore, future QCH expansion flows should generally be directed to the Lynwood sanitary collector sewer. The sanitary pump station and twin forcemains have been sized to convey the anticipated future peak flows of **76 L/s** and potentially an ultimate flow of **100 L/s** from the southern portion of the QCH campus.

Under post-development conditions, the campus sanitary sewage flows will continue to be divided between the two sewer outlets described above. In order to accommodate the proposed Part 4 development, portions of the gravity sanitary sewer systems will need to be removed, re-aligned or extended.

Sewage flows from the new multi-level parking structure, Materials Management and Loading Dock buildings will be directed to the north sewer system flowing to the Graham Creek sanitary trunk. The negligible additional flows (from floor drains) should have minimal to no impact on the downstream sewer system.

Sewage flows from the remainder of the campus will be directed to the sanitary pump station and thus the Lynwood sanitary collector sewer. An extension of the sanitary sewer system within the re-aligned portion of John Sutherland Drive will service the proposed Emergency Department Addition, Ambulance Garage and Transitional Care Tower on the east side of the campus. Similarly, a short sanitary sewer extension along the west Ring Road will be necessary to service the new Generator Building and to accommodate the anticipated future Part 5 Expansion. The Inpatient Tower (vertical building expansion) will be serviced via the existing James Beach building service(s). All new sanitary service laterals will be equipped with a backflow preventer. Refer to **Figure 3** for details of the on-site sanitary sewer drainage plan.

Figure 3: Sanitary Sewer Drainage Plan

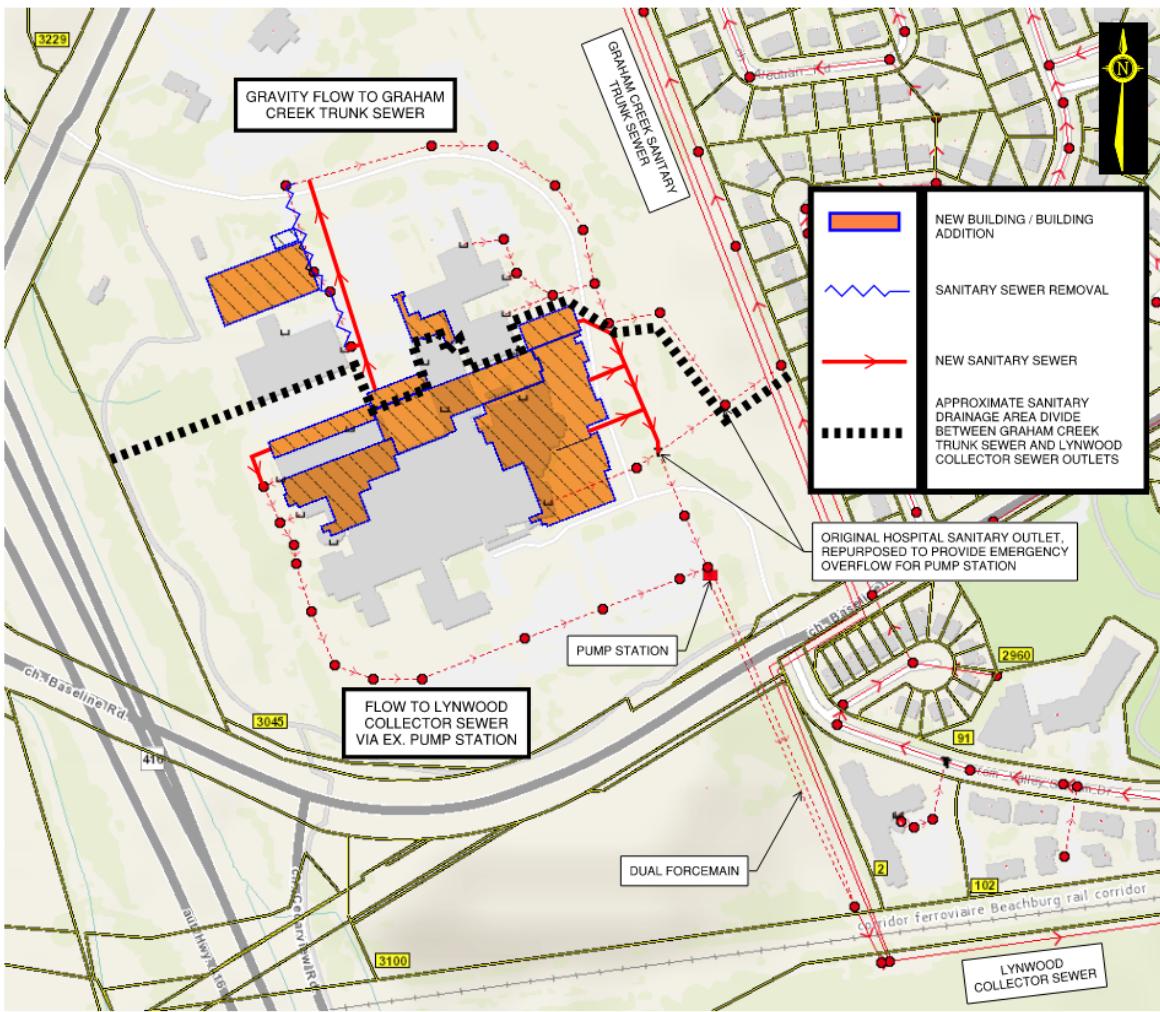


Image Source: geoOttawa (City of Ottawa)

2.1.1 Post-Development Sanitary Flows

The City of Ottawa design criteria were used to calculate the theoretical sanitary flows for the proposed QCH Part 4 campus expansion. The following design criteria were taken from the City of Ottawa Sewer Design Guidelines, Appendix 4-A.3, and/or from subsequent Technical Bulletins:

QCH Campus – Institutional Use

- Average Daily Sewage Flow (Hospital Beds): 900 L/bed/day
- Average Daily Sewage Flow (Patient Visits): 25 L/c/day
- Average Daily Sewage Flow (Medical Staff): 275 L/c/day
- Average Daily Sewage Flow (General Staff): 75 L/c/day
- Average Daily Sewage Flow (Hand-wash Ambulances): 200 L/car/day
- Institutional Peaking Factor = 1.5
- Infiltration Allowance: 0.33 L/s/ha (ISTB-2018-01)

Peak sanitary sewage flows for the Hospital are identified below as a combination of existing flows and additional Part 4 expansion flows. To avoid recalculating existing flows, existing values have been taken directly from the previously approved QCH Sanitary Pump Station Design Brief¹. New Part 4 expansion flows were established using design populations in accordance with the City of Ottawa Sewer Design Guidelines.

The design populations for the proposed Part 4 expansion are based on the following staff and patient numbers provided by the architect:

- Design Population (Hospital Beds): 61 Inpatient, 112 Transitional Care, 20 Emergency
- Design Population (Daily Visits): 91 Inpatient, 185 Transitional Care, 52 Emergency
- Design Population (Medical Staff): 77 Inpatient, 70 Transitional Care, 37 Emergency
- Design Population (General Staff): 13 MM & EVS, 25 Loading Dock, 11 Food Services

Table 1 identifies the theoretical peak flows for the QCH campus, including the proposed Part 4 expansion, based on the design criteria listed above.

Table 1: Theoretical Post-Development Sanitary Flows

Site	Use	Design Population /Area**	Average Flow (L/s)***	Peaking Factor	Peak Flow Incl. Infiltration (L/s)
Sanitary Flows to Graham Creek Trunk Sanitary Sewer					
Existing Cancer Centre Flows*	-	-	-	-	22.70
New Parking Garage	-	0.27 ha.	-	-	0.09
MM & EVS Addition	Storage	0.04 ha.	-	-	0.01
Loading Dock Building	Storage	0.19 ha.	-	-	0.06
Sub-Total	-	-	-	1.5	22.86
Sanitary Flows to Lynwood Collector Sanitary Sewer (via Pump Station)					
Existing Part 1 Campus Flows*	-	-	-	-	23.80
Existing Part 2 Campus Flows*	-	-	-	-	21.90
Existing Part 3 Campus Flows*	-	-	-	-	8.10
Generator Building	M&E Room	0.10 ha.	-	-	0.03
Inpatient Tower Addition	Beds	61	0.91	1.5	1.36
	Patient Visits	91			
	Med. Staff	77			
Ambulance Garage	Hand-wash Ambulances	6	0.01	1.5	0.04
		0.07 ha.	-	-	

Transitional Care Tower Addition	Beds	112	1.44	1.5	2.16
	Patient Visits	185			
	Med. Staff	70			
Emergency Department Addition & Ambulatory Care	Beds	20	0.34	1.5	0.64
	Patient Visits	52			
	Med. Staff	37			
	-	0.41 ha.	-	-	
Food Services – Interior Renovation	Gen. Staff	11	<0.01	1.5	0.01
Sub-Total	-	-	2.71	1.5	58.04

*Existing campus flows taken directly from the previously approved 'Sanitary Pump Station Design Brief' (R-2007-095)¹, which are based on conservative values using fixture units.

**Part 4 Design populations are based on staff and patient numbers provided by the architect.

***Total average flow rate does not include existing campus average sanitary flows.

As indicated above, the peak sanitary flows being directed to the Graham Creek Trunk Sewer are anticipated to increase by 0.16 L/s, or ~0.7% when compared to existing peak flows. This increase is deemed negligible and should have minimal to no impact on the downstream sewer system.

The peak sanitary flows directed to the Lynwood Collector are generally consistent with the anticipated peak flows presented in the QCH Sanitary Pump Station Design Brief¹ and demonstrate that there is still a lot of capacity remaining within the sanitary pump station and twin forcemains to accommodate future QCH campus expansion phases. Furthermore, the existing hospital flows were previously established using fixture units; therefore, the existing flow rates are conservative values that typically exceed flows calculated based on design populations.

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

2.2 Water for Domestic Use and Fire Protection

The QCH campus is located within the City of Ottawa 2W2C watermain pressure zone. The Hospital buildings are currently being supplied by a private looped 200mm-300mm dia. watermain network fed off the 1200mm dia. feedermain in Baseline Road. Two (2) bulk water meter chambers located on the two incoming water supplies, constructed as part of the 2008 Cancer Centre expansion phase, currently monitor the water consumption for the entire QCH campus. Based on a review of the QCH Hydraulic Network Analysis Report², the looped watermain network currently provides adequate system pressures for the campus during both Maximum Day + Fire Flow and Peak Hour conditions. Refer to **Figure 4** for a plan showing the existing watermain infrastructure currently servicing the QCH Campus and the proposed watermain modifications under the Part 4 expansion.

Figure 4: Existing and Proposed Watermain Infrastructure

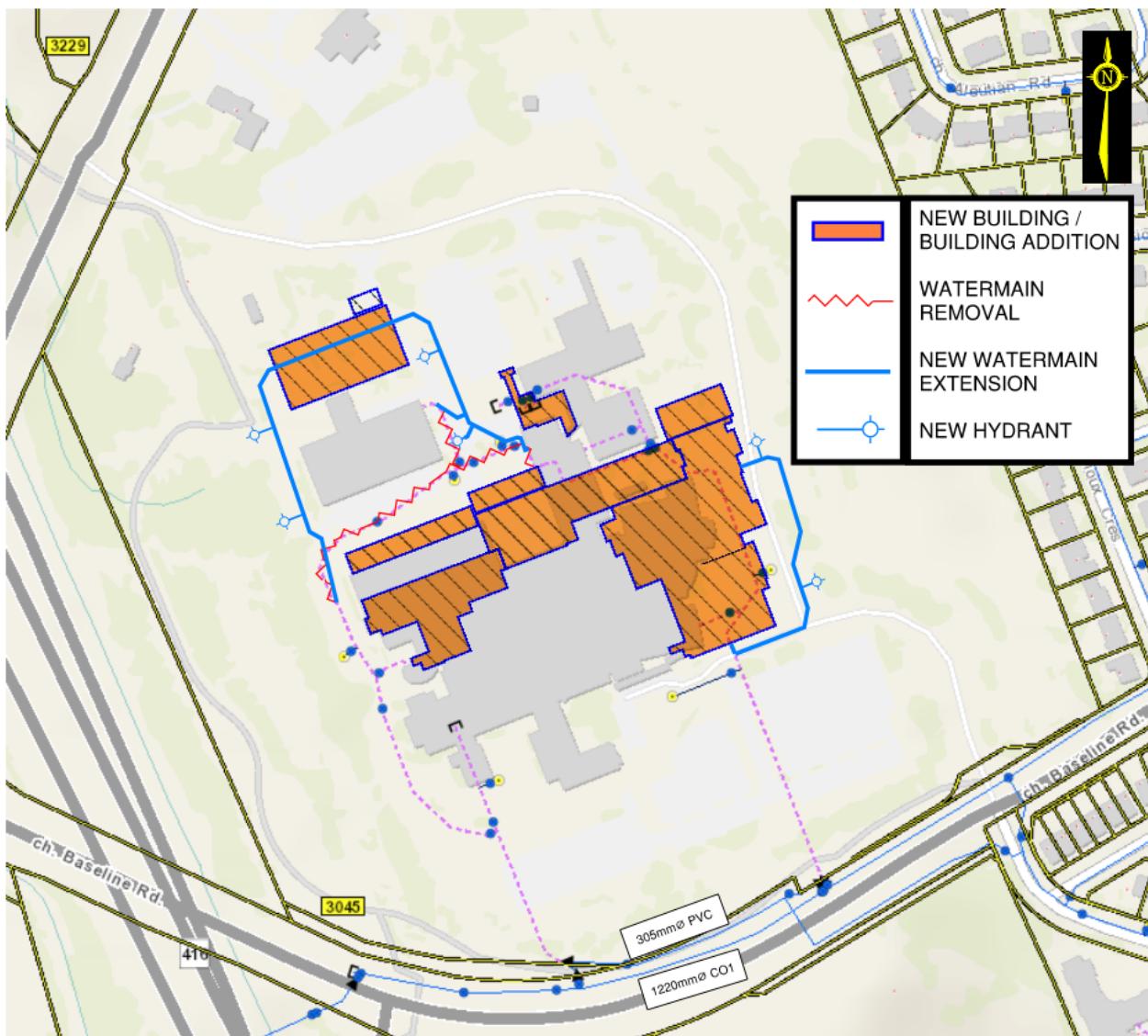


Image Source: geoOttawa (City of Ottawa)

Under post-development conditions, the QCH campus, including the Part 4 expansion (new buildings) will continue to be fed by the private looped watermain network. In order to accommodate the proposed Part 4 development, portions of the private watermain will need to be removed, re-aligned or extended, including pipes along the new west side Ring Road, within the loading dock area and along the realigned portion of John Sutherland Drive on the east side of the campus. Certain buildings will be fed via new building services, while other buildings will be fed by extending internal plumbing from adjacent buildings. Due to the proposed watermain modifications, the location and spacing of the on-site hydrants has been reviewed to ensure adequate coverage is provided for all buildings (existing and new). The proposed buildings, excluding the new multi-level parking structure, will be fully sprinklered with their respective fire department (siamese) connections located within 45m of a nearby fire hydrant.

2.2.1 Water Demands and Watermain Analysis

The City of Ottawa design criteria were used to calculate theoretical water demands for the proposed QCH Part 4 campus expansion. The Fire Underwriters Survey (FUS) method was used to calculate the fire flow requirements for the new buildings based on information provided by the architect (i.e., building materials, occupancy hazards, etc.). The following design criteria were taken from the City of Ottawa Water Distribution Guidelines and/or from subsequent Technical Bulletins:

QCH Campus – Institutional Uses

- Average Daily Water Demands (Hospital Beds): 900 L/bed/day
- Average Daily Water Demands (Daily Patient Visits): 25 L/bed/day
- Average Daily Water Demands (Medical Staff): 275 L/c/day
- Average Daily Water Demands (Employees): 75 L/c/day
- Average Daily Water Demand (Hand-wash Ambulances): 200 L/car/day
- Maximum Day Demand Peaking Factor = $1.5 \times \text{Avg. Day Demand}$ (City Water Table 4.2)
- Peak Hour Demand Peaking Factor = $1.8 \times \text{Max. Day Demand}$ (City Water Table 4.2)

The design populations for the QCH campus, including the Part 4 expansion, are based on the following staff and patient numbers provided by the architect, which have been divided based on the water entry points to the hospital:

- Design Population (Hospital Beds): 228 Main Hospital, 252 James Beach Centre
- Design Population (Daily Patient Visits): 782 Main Hospital, 192 James Beach Centre
- Design Population (Medical Staff): 727 Main Hospital, 116 James Beach Centre
- Design Population (General Staff): 415 Main Hospital

As noted in Section 2.1.1. above, the existing hospital sanitary flows were established using fixture units which yield conservative values that exceed flows established using design populations. The theoretical domestic water demands for the QCH campus and Part 4 expansion are based on design populations and will therefore yield lower values when compared to the existing sanitary flows.

Table 2 identifies the theoretical domestic water demands for the QCH campus and Part 4 expansion based on the above design criteria.

Table 2: Theoretical Water Demand for Proposed Part 4 Expansion

Building ID	Use	Design Population*	Avg. Day Demand (L/s)	Max. Day Demand (L/s)	Peak Hour Demand (L/s)
Water Supplied by (Looped) Watermain in Loading Dock and John Sutherland Drive					
Main Hospital Water Supply: Ex. Hospital, Cancer Centre, and New Part 4 Building Additions (excluding James Beach	Beds	228	2.38	3.56	6.41
	Patient Visits	782	0.23	0.34	0.61
	Medical Staff	727	2.32	3.47	6.25
	General Staff	415	0.36	0.54	0.97

Centre with Inpatient Tower Addition)	Hand-Wash Ambulances	6	0.01	0.02	0.04
Existing Parking Garage	Not included in calculations				
New Parking Garage					
Sub-Total	-	-	5.3	7.9	14.3
Water Supplied by (Looped) Watermain in Existing West Ring Road					
Existing James Beach Centre with New Inpatient Tower Addition	Beds	252	2.63	3.94	7.09
	Patient Visits	190	0.05	0.08	0.15
	Medical Staff	116	0.37	0.55	0.99
	Sub-Total	-	-	3.0	4.6
Total	-	-	8.3	12.5	22.5

**Existing Hospital and Part 4 Design populations are based on staff and patient numbers provided by the architect.

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

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

Preliminary domestic water demands, and fire flow requirements were provided to the City of Ottawa to obtain municipal watermain boundary conditions. **Table 2.1** summarize preliminary hydraulic analysis results based on municipal watermain boundary conditions provided by the City of Ottawa.

Table 2.1: Hydraulic Boundary Conditions Provided by the City

Municipal Watermain Boundary Condition	Boundary Condition	Normal Operating Pressure Range (psi)	Anticipated WM Pressure (psi)*
Connection #1 – 200/300mm dia. WM fed off 1200mm WM in Baseline Rd. R.O.W.			
Minimum HGL (Peak Hour Demand)	127.3 m	40 psi (min.)	~ 66 psi
Maximum HGL (Max Day Demand)	131.9 m	50 - 70 psi	~ 72 psi
HGL Max Day + Fire Flow (50-183 L/s)	127.8 m to 127.4 m	20 psi (min.)	~ 66 psi
Connection #2 - 200/300mm dia. WM fed off 1200mm WM in Baseline Rd. R.O.W.			
Minimum HGL (Peak Hour Demand)	127.3 m	40 psi (min.)	~ 68 psi
Maximum HGL (Max Day Demand)	131.9 m	50 - 70 psi	~ 75 psi

HGL Max Day + Fire Flow (50-183 L/s)	127.8 m to 127.3 m	20 psi (min.)	~ 68 psi
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*Based on approximate watermain elevations of 80.8m at service connection location #1 (Baseline Rd. R.O.W.) and 78.8 m at connection location #2 (Baseline Rd. R.O.W.). Design pressure = (HGL – watermain elevation) x 1.42197 PSI/m.

The hydraulic model EPANET was used to analyze the performance of the proposed watermain configuration for the following three (3) theoretical conditions:

- Maximum Day + Fire Flow Demand (various locations)
- Peak Hour Demand
- Maximum HGL

Tables 2.2, 2.3 and 2.4 summarize the hydraulic model results under the various theoretical conditions.

Table 2.2: Maximum Day + Fire Flow Demand (Various Locations)

Operating Condition	Minimum System Pressure	Maximum System Pressure
Max Day Demands: 7.90 L/s at J11 (Main Hospital Water Supply), 4.60 L/s at J30 (James Beach Centre) Fire Flow Demand 167 L/s (New Parking Garage): 84 L/s at J21 and J23 (New Hydrants 4 and 5)	Minimum system pressure of 41.0 psi is available at Node J18 (New Hydrant 5)	Maximum system pressure of 69.3 psi is available at Node J01 (Ex. reducer north of Connection #2)
Max Day Demands: 7.90 L/s at J11 (Main Hospital Water Supply), 4.60 L/s at J30 (James Beach Centre) Fire Flow Demand 50 L/s (Generator/MEP Room): 50 L/s at J25 (New Hydrant 6)	Minimum system pressure of 67.1 psi is available at Nodes J35 and J36 (Ex. Hydrant north of Connection #1)	Maximum system pressure of 76.0 psi is available at Node J11 (New watermain in loading dock area)

<p>Max Day Demands: 7.90 L/s at J11 (Main Hospital Water Supply), 4.60 L/s at J30 (James Beach Centre)</p> <p>Fire Flow Demand 50 L/s (Loading Dock Building): 50 L/s at J15 (New Hydrant 3)</p>	<p>Minimum system pressure of 67.1 psi is available at Nodes J35 and J36 (Ex. Hydrant north of Connection #1)</p>	<p>Maximum system pressure of 74.5 psi is available at Node J17 (New watermain in loading dock area)</p>
<p>Max Day Demands: 7.90 L/s at J11 (Main Hospital Water Supply), 4.60 L/s at J30 (James Beach Centre)</p> <p>Fire Flow Demand 50 L/s (M.M., E.V.S., and Plant Offices Building): 50 L/s at J15 (New Hydrant 3)</p>	<p>Minimum system pressure of 67.1 psi is available at Nodes J35 and J36 (Ex. Hydrant north of Connection #1)</p>	<p>Maximum system pressure of 74.5 psi is available at Node J17 (New watermain in loading dock area)</p>
<p>Max Day Demands: 7.90 L/s at J11 (Main Hospital Water Supply), 4.60 L/s at J30 (James Beach Centre)</p> <p>Fire Flow Demand 183 L/s (Ex. James Beach Centre with New Inpatient Tower Addition): 92 L/s at J25 and J28 (New Hydrant 6 and Ex. Hydrant)</p>	<p>Minimum system pressure of 37.0 psi is available at Node J28 (Ex. Hydrant west of James Beach Centre)</p>	<p>Maximum system pressure of 69.2 psi is available at Node J01 (Ex. reducer north of Connection #2)</p>
<p>Max Day Demands: 7.90 L/s at J11 (Main Hospital Water Supply), 4.60 L/s at J30 (James Beach Centre)</p> <p>Fire Flow Demand 183 L/s (New Transitional Care Tower Addition to Ex. Main Hospital): 61 L/s at J09 and J15 (New Hydrants 2 and 3)</p>	<p>Minimum system pressure of 37.6 psi is available at Node J09 (New Hydrant 2)</p>	<p>Maximum system pressure of 69.2 psi is available at Node J34 (Ex. reducer north of Connection #1)</p>

Max Day Demands: 7.90 L/s at J11 (Main Hospital Water Supply), 4.60 L/s at J30 (James Beach Centre) Fire Flow Demand 100 L/s (Emergency Department Addition & Outpatient Ambulatory Care Centre): 50 L/s at J07 and J09 (New Hydrants 1 and 2)	Minimum system pressure of 61.5 psi is available at Node J09 (New Hydrant 2)	Maximum system pressure of 71.0 psi is available at Nodes J31, J32, and J33 (Ex. Hydrant south of Maternity Ward)
Max Day Demands: 7.90 L/s at J11 (Main Hospital Water Supply), 4.60 L/s at J30 (James Beach Centre) Fire Flow Demand 50 L/s (Ambulance Garage): 50 L/s at J09 (New Hydrant 2)	Minimum system pressure of 67.1 psi is available at Nodes J35 and J36 (Ex. Hydrant north of Connection #1)	Maximum system pressure of 76.1 psi is available at Node J17 (New watermain in loading dock area)

Table 2.3: Peak Hour Demand

Operating Condition	Minimum System Pressure	Maximum System Pressure
Peak Hour Demands: 14.30 L/s at J11 (Main Hospital Water Supply), 8.20 L/s at J30 (James Beach Centre)	Minimum system pressure of 66.4 psi is available at Nodes J35 and J36 (Ex. Hydrant north of Connection #1)	Maximum system pressure of 78.2 psi is available at Node J17 (New watermain in loading dock area)

Table 2.4: Maximum HGL

Operating Condition	Minimum System Pressure	Maximum System Pressure
Max Day Demands: 7.90 L/s at J11 (Main Hospital Water Supply), 4.60 L/s at J30 (James Beach Centre)	Minimum system pressure of 72.9 psi is available at Nodes J35 and J36 (Ex. Hydrant north of Connection #1)	Maximum system pressure of 85.1 psi is available at Node J17 (New watermain in loading dock area)

The modelling results indicate that the looped watermain will provide adequate system flows and pressures during all conditions (i.e., Max Day + Fire Flow, Peak Hour and Max HGL).

Pressure reducing valves will be required as system pressures are expected to exceed 80 psi as indicated in the table above.

Booster pump(s) are anticipated to be required to provide adequate water pressure to the upper floors of the Part 4 expansion buildings. Refer to **Appendix D** for City of Ottawa boundary conditions, the hydraulic modeling schematics, modeling results and correspondence from the City of Ottawa.

As indicated in the model, a multi-hydrant approach to firefighting will be required to supply adequate fire flow to the proposed development using new and existing private on-site hydrants fed off the looped watermain network. Based on the City of Ottawa Technical Bulletin ISTB-2018-02, Class AA (blue bonnet) hydrants within 75m of a building have a maximum capacity 95 L/s while hydrants between 75m and 150m of a building have a maximum capacity of 63 L/s (at a pressure of 20 PSI). The combined maximum flow from the nearby hydrants will provide the Max Day + Fire Flow requirement for the Part 4 expansion buildings assuming a looped system. **Table 2.5** summarizes the total theoretical combined fire flow available from the nearby private fire hydrants and compares it to the fire flow demands based on FUS calculations assuming a looped system.

Table 2.5: Theoretical Fire Protection Summary Table

Building I.D.	Fire Flow Demand (L/s)	Fire Hydrant(s) within 75m (~ 95 L/s each)	Fire Hydrant(s) within 150m (~ 63 L/s each)	Theoretical Combined Available Fire Flow (L/s)
Water Supplied by Existing and New Private Hydrants				
New Parking Garage	167	3	1	>167
Generator Building	50	3	1	>50
Loading Dock Building	50	1	2	>50
M.M. & E.V.S. Addition	50	2	0	>50
Existing James Beach Centre with New Inpatient Tower Addition	183	3	2	>183
New Transitional Care Tower Addition to Ex. Main Hospital	183	1	3	>183
Emergency Department Addition and Outpatient Ambulatory Care Centre	100	2	0	>100
Ambulance Garage	50	1	1	>50

Refer to **Appendix D** for City of Ottawa boundary conditions, the hydraulic modeling schematics, modeling results and correspondence from the City of Ottawa.

3.0 STORM DRAINAGE AND STORMWATER MANAGEMENT

The details of the proposed QCH campus stormwater management (SWM) design will be addressed in a separate report entitled Queensway Carleton Hospital Part 4 Expansion – Stormwater Management Report⁴. Refer to **Figure 5** for a plan showing the existing storm sewers servicing the QCH Campus and the proposed storm sewer modifications for the Part 4 expansion.

Figure 5: Storm Sewer Drainage Plan

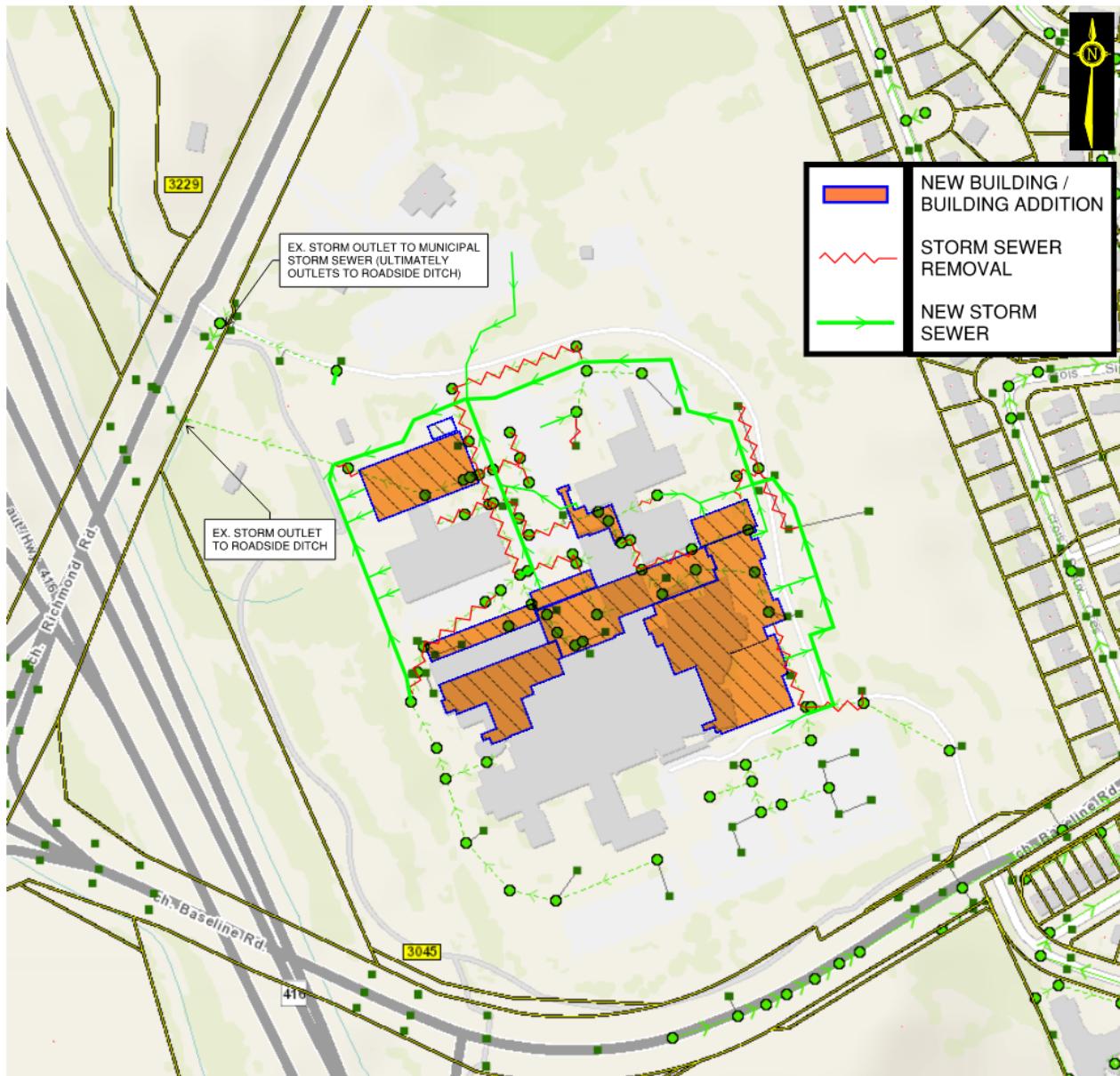


Image Source: geoOttawa (City of Ottawa)

4.0 GEOTECHNICAL INVESTIGATIONS

The Geotechnical Investigation – Queensway Carleton Hospital Expansion (CA0033714.1722, dated April 10, 2025) has been prepared by WSP for the QCH Campus Part 4 Expansion. Refer to the Geotechnical Report⁵ for subsurface conditions, construction recommendations and geotechnical inspection requirements.

5.0 CONCLUSION

This report has been prepared in support of the site plan control application for the proposed Queensway Carleton Hospital Part 4 Expansion, located at 3045 Baseline Road, in Ottawa.

The conclusions are as follows:

- Sanitary sewage flows will continue to be divided between the two sewer outlets (Graham Creek Trunk Sewer and Lynwood Collector Sewer via on-site Pump Station). Portions of the gravity sanitary sewer systems will need to be removed, realigned or extended to accommodate the Part 4 Expansion.
 - The peak sanitary flows calculated indicate that the increase in flows to the Graham Creek Trunk Sewer are negligible and should have minimal to no impact on the downstream sewer system.
 - The calculations also demonstrate that there is still a lot of capacity remaining within the on-site sanitary pump station and twin forcemains to accommodate the proposed Part 4 expansion as well as future QCH campus expansion phases.
- Water supply for domestic and fire flow purposes will continue to be supplied by the private looped watermain network. Portions of the existing private watermain will need to be removed, realigned, or extended to accommodate the Part 4 Expansion. Adequate water and system pressures will exist throughout the watermain network under the specified “Max Day + Fire Flow” and “Peak Hour” conditions as indicated by the hydraulic modelling results.
- The proposed Part 4 expansion buildings, excluding the new multi-level parking structure, will be fully sprinklered.

It is recommended that the proposed site servicing design be approved for implementation.

NOVATECH

Prepared by:



Kynan D'sa, B.A.Sc.
CAD Designer

Reviewed by:

François Thauvette, P. Eng
Senior Project Manager



APPENDIX A

Project Correspondence

June 6, 2024

Derek Judson
Parkin
Via email: judson@parkin.ca

**Subject: Pre-Consultation: Meeting Feedback
Proposed Site Plan Control Application – 3045 Baseline Road**

Please find below information regarding next steps as well as consolidated comments from the above-noted pre-consultation meeting held on May 23, 2024.

Pre-Consultation Preliminary Assessment

1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input checked="" type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
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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 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. Site is located in the Greenbelt Transect of the Official Plan
2. Current Zoning: RI[307r] H(20) (Rural Institutional Zone, Urban Exception 307r, height restriction 20) & O1[434r] (Parks and Open Space Zone, Urban Exception 434r)
 - a. Additional height proposed will require a Zoning Bylaw Amendment application
3. Site Plan application required
4. Consultation is required with the Ministry of Transportation due to proximity to Highway 417.
 - a. We recommend consultation with MTO prior to full application submission
5. There looks to be a residence located at the NW end of John Sutherland Drive that may be impacted by the proposed road connection
 - a. Consulttaion with this homeowner will be required
 - b. Is this a land lease agreement with the NCC? Not sure as propertie details are not available at this time.
6. Please reach out to the RVCA for consultation prior to application submission
7. The Active Transportation Network traverses the site. The new proposed road alignment causes a disruption to the current routes.
 - a. Please consider the bike bath realignment
 - b. Please consider pathway connections at the intersection of Richmond Road and John Sutherland Road



- c. Please consider pathway realignment at the intersection of Baseline Road and Cedarview Road.

Process Comments

- 8. Site Plan Control & Zoning By-Law Amendment applications can no longer run concurrently
 - a. Pre-Consultation for both applications can be done together
 - b. Applications to separate at time of full submission
- 9. Consultation/ Application process with the NCC
 - a. The NCC has a separate and distinct review process for development applications
 - b. Recommendation to coordinate submission requirements with the NCC – ideally creating one set of submission requirements to be shared between the City and the NCC
 - i. City Staff will wait until further consultation has been done with the NCC before providing a Studies and Plans Identification List (SPIL) so no materials will be duplicated
 - ii. Updated survey plan for proper lotting may be required
- 10. Please reach out to Ted Horton (ted.horton@ncc-ccn.ca) to begin pre-consultation process with the NCC

Urban Design

Comments:

- 11. Submission requirements:
 - a. A Design Brief will be required but will be minimal in terms of requirements. A terms of reference will be provided in the follow-up.
 - b. Site plan
 - c. Landscape plan
 - d. Elevations
- 12. For new buildings, please avoid blank facades. Incorporating windows, doors and architectural treatments to reduce blank facades from the public realm should be sought. For parking garages, please utilize plantings to hide and screen blank walls with all-season plantings.



13. Please ensure there are clear pedestrian linkages from new structures to entrances.
14. Please provide bicycle parking in close proximity to building entrances. Bicycle parking that is covered would be optimal.

Engineering

General Comments:

15. With the development being spread throughout different parts of the site, the applicant should first ensure that they have reviewed all previous studies and plans developed for the site.
16. Existing public services (main connections) have been listed in these comments. It is the responsibility of the applicant to confirm the existing infrastructure on site and to demonstrate adequate outlets/connections to City infrastructure.
17. During the pre-consultation meeting the applicant asked if an update to the previously developed servicing report report would be acceptable or if a new report would be required for this proposal. Please contact Ryan Brault to further discuss.

Water:

Existing Public Services:

1220mm, SE of site, Baseline Road, Backbone Infrastructure

Boundary Conditions:

18. Request Boundary Conditions prior to first submission. Contact assigned City Infrastructure Project Manager with the following information:
 - a. Location of service(s)
 - b. Type of development
 - c. Fire flow (per FUS method – include FUS calculation sheet with boundary condition request – boundary conditions will not be requested without fire flow calculations)
 - d. Average Daily Demand (l/s)
 - e. Maximum Hourly Demand (l/s)
 - f. Maximum Daily Demand (l/s)

General Comments:



19. Per WDG 4.3.1, where basic demand is greater than 50 m³ /day, there shall be a minimum of two water services, separated by an isolation valve, to avoid creation of vulnerable service area.
20. Per WDG 4.4.7.2, District Meter Area (DMA) Chamber is required for services greater than 150mm in diameter.

SANITARY

Existing Public Services:

- 525mm (conc.), E boundary of site
- 245mm (conc.), S of site, S of E-W rail corridor
 - Existing forcemain to collector sewer

General Comments:

21. Please submit anticipated sanitary demands.
22. Analysis and demonstration that there is sufficient/adequate residual capacity to accommodate any increase in wastewater flows in the receiving and downstream wastewater systems are required to be provided.

STORMWATER

Existing Infrastructure/Systems:

- Ditch, NW of site, at Richmond Road

General Comments:

23. Quantity Control:
 - a. Allowable runoff coefficient(c): Lesser of pre-development or c=0.5.
 - b. Time of Concentration (Tc): pre-development or maximum=10min.
 - c. Site should be controlled Post=Pre up to the the 100-year storm event
24. Quality Control:
 - a. Normal level of treatment is required: minimum 70% TSS removal

GEOTECHNICAL INVESTIGATION

25. A geotechnical report is required for this development proposal.

GENERAL INFORMATION/OTHER



26. Topographic information and design grades to be tied to proper geodetic benchmark along with proper description of the Geodetic Benchmark used.
27. All submitted report and plan are to be provided in *.pdf documents (documents shall be flattened and unsecured)

REFERENCES AND RESOURCES

28. Record drawings and utility plans are also available for purchase from the City (Contact the City's Information Centre by email at InformationCentre@ottawa.ca or by phone at (613) 580-2424 x.44455).
29. Servicing and site works shall be in accordance with the following documents:
 - a. Previous studies/master plans developed for the site
 - b. General City of Ottawa guidelines (including technical bulletins)
30. geoOttawa - <https://maps.ottawa.ca/geoOttawa/>

Feel free to contact Ryan Brault ((613) 580-2424 ext. 32540, ryan.brault@ottawa.ca), Project Manager, for follow-up questions.

Noise

Comments:

31. Noise Impact Studies required for the following:
 - a. Road, as the site is within proximity to Highway 417, Richmond Road and Baseline Road.
 - b. Rail
 - c. Stationary, due to the proximity to neighboring exposed mechanical equipment and/or if there will be any exposed mechanical equipment due to the proximity to neighboring noise sensitive land uses.

Feel free to contact Josiane Gervais, TPM, for follow-up questions.

Transportation

Comments:

32. Follow Transportation Impact Assessment Guidelines:

- a. Note that the [TIA Guidelines](#) have been updated to align with the new pre-application consultation process. The changes are available on the City's website.
- b. A Transportation Impact Assessment is required. Please submit the Scoping report to iosiane.gervais@ottawa.ca at your earliest convenience or, at the latest, as part of the Phase 2 pre-con package. Should a Phase 2 pre-con be waived, the applicant is still responsible to submit the Scoping Report and must allow for a 14 day circulation period.
- c. The Strategy Report must be submitted for review at the latest with the Phase 3 pre-con package. The applicant is still encouraged to submit the Strategy Report to the TMP before submission of the Phase 3 pre-con package and allow for a 14 day circulation period.
- d. Changes to the Baseline/Cedarview intersection will trigger an RMA. Since an RMA is required to support the proposed development, the functional plan and/or RMA plans must be submitted with the formal submission to deem complete. Request base mapping asap via [Engineering Services](#)
- e. There are constraints with the existing structure over Hwy 417 that could impact the potential for adding an eastbound left-turn lane.

33. ROW Protection:

- a. Ensure that the development proposal complies with the Right-of-Way protection requirements of the Official Plan's [Schedule C16](#).
- b. Any requests for exceptions to ROW protection requirements must be discussed with Transportation Planning and concurrence provided by Transportation Planning management.
- c. If required, ROW must be unencumbered and conveyed at no cost to the City. Note that conveyance of the ROW/corner triangle will be required prior to registration of the SP agreement. Additional information on the conveyance process can be provided upon request.

34. [Transportation Master Plan](#) includes:

- a. Transit Priority Corridor (Isolated Measures) (Affordable Network) along Baseline and Richmond Road
- b. BRT (2031 Network Concept) along Baseline and Richmond Road

35. Nearby [planned construction and infrastructure projects](#) include:

- a. road resurfacing along Baseline, planned in 3-5 years; and

- b. Transit Priority work planned in 1-2 years (for more information contact PM Chris Ogilvie)
- 36. There are numerous transit stops along the property frontage and throughout the site. An upgrade to stop #1391 may be required as part of the proposed intersection work. OC Transpo may also wish to adjust service along the new road for more direct access to the expanded inpatient building. Therefore new bus stops may be added onto the road which should be considered.
- 37. As the proposed site is institutional and for general public use, AODA legislation applies.
 - a. Ensure all crosswalks located internally on the site provide a TWSI at the depressed curb, per requirements of the Integrated Accessibility Standards Regulation under the AODA.
 - b. Clearly define accessible parking stalls and ensure they meet AODA standards (include an access aisle next to the parking stall and a pedestrian curb ramp at the end of the access aisle, as required).
 - c. Please consider using the City's [Accessibility Design Standards](#), which provide a summary of AODA requirements.
- 38. On site plan:
 - a. Ensure site access meets the City's Private Approach Bylaw.
 - b. Ensure drive aisle meets Part 4 – Parking, Queueing and Loading Provisions of the Zoning By-law.
 - c. Show all details of the roads abutting the site; include such items as pavement markings, accesses and/or sidewalks.
 - d. Turning movement diagrams required for all accesses showing the largest vehicle to access/egress the site.
 - e. Turning movement diagrams required for internal movements (loading areas, garbage).
 - f. Show all curb radii measurements; ensure that all curb radii are reduced as much as possible and fall within TAC guidelines (Figure 8.5.1).
 - g. Show dimensions for site elements (i.e. lane/aisle widths, access width and throat length, parking stalls, sidewalks, pedestrian pathways, etc.)
 - h. Sidewalk is to be continuous across accesses as per City Specification 7.1.



- i. Show details of parking stalls within proposed lots. Parking stalls at the end of dead-end parking aisles require adequate turning around space.
- j. Show slope of garage ramps on site plan. Note that underground ramps should be limited to a 12% grade and must contain a subsurface melting device when exceeding 6% if exposed to the elements. Ramp grades greater than 15% can be psychological barriers to some drivers. When parking ramp's break over slope exceeds 8%, a vertical-curve transition or a transition slope of half the ramp slope should be used. Without this transition, bottoming out of vehicles may occur.
- k. Note areas that will not be impacted by this application.

Feel free to contact Josiane Gervais, Transportation Project Manager, for follow-up questions.

Environment

Comments:

- 39. The access road is within an area designated as a Greenbelt Natural Linkage Area, which is a designation that triggers an Environmental Impact Study (EIS) for development. The EIS will need to address all NCC requirements and the City will accept a different format if that is what is required to meet NCC needs. If the road is removed from the area designated Greenbelt Natural Linkage Area, we could support waiving the EIS since there would be no development within that feature/area.
- 40. The EIS will need to address both Federally and Provincially listed species.
- 41. 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
- 42. Urban Heat Island - Please add features that reduce the urban heat island effect (see OP 10.3.3) produced by the parking lot and a building footprint. For example, this impact can be reduced by adding large canopy trees, green roofs or vegetation walls, or constructing the parking lot or building differently.

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

Forestry

Comments:

43. Priority should be given to the retention of trees and softscape areas that could accommodate future tree plantings. Consider altering the design of the connections to John Sutherland Dr. and Baseline Rd to make use of the existing road network on site, rather than converting greenspace to paved surfaces.
44. To mitigate the increase in paved areas, the Landscape Plan should include a tree planting plan that focuses on providing shade to the proposed parking lots, along pedestrian connections, and waiting/drop-off areas.
45. The following Tree Conservation Report (TCR) guidelines have been adapted from the Schedule E of the Tree Protection By-law – for more information on these requirements please contact julian.alvarez-barkham@ottawa.ca
 - a. A Tree Conservation Report (TCR) must be supplied for review along with the suite of other plans/reports required by the City
 - i. An approved TCR is a requirement of Site Plan approval.
 - b. Any removal of privately-owned trees 10cm or larger in diameter within the urban area, or city-owned trees of any diameter requires a tree permit issued under the Tree Protection Bylaw (Bylaw 2020 – 340); the permit will be based on an approved TCR and made available at or near plan approval.
 - c. The TCR must contain 2 separate plans:
 - i. Plan/Map 1 - show existing conditions with tree cover information.
 - ii. Plan/Map 2 - show proposed development with tree cover information.
 - d. The TCR must list all trees on site, as well as off-site trees if the CRZ (critical root zone) extends into the developed area, by species, diameter, and health condition.
 - i. For ease of review, the Planning Forester suggests that all trees be numbered and referenced in an inventory table.
 - e. Please identify trees by ownership – private onsite, private on adjoining site, city owned, co-owned (trees on a property line)
 - f. If trees are to be removed, the TCR must clearly show where they are, and document the reason they cannot be retained.
 - i. Compensation may be required for the removal of city owned trees.
 - g. The removal of trees on a property line will require the permission of both property owners.
 - h. All retained trees must be shown, and all retained trees within the area impacted by the development process must be protected as per City guidelines available on the Tree Protection Specification or by searching Ottawa.ca.
 - i. The location of tree protection fencing must be shown on the plan.

- ii. Show the critical root zone of the retained trees.
- i. The City encourages the retention of healthy trees; if possible, please seek opportunities for retention of trees that will contribute to the design/function of the site.

46. The following Landscape Plan (LP) guidelines have been adapted from Schedule E of the Tree Protection By-law – for more information on these requirements please contact julian.alvarez-barkham@ottawa.ca

- a. Please ensure any retained trees are shown on the LP.
- b. Minimum Setbacks
 - i. Maintain 1.5m from sidewalk or MUP/cycle track or water service laterals.
 - ii. Maintain 2.5m from curb.
 - iii. Coniferous species require a minimum 4.5m setback from curb, sidewalk, or MUP/cycle track/pathway.
 - iv. Maintain 7.5m between large growing trees, and 4m between small growing trees. Park or open space planting should consider 10m spacing, except where otherwise approved in naturalization / afforestation areas.
 - v. Adhere to Ottawa Hydro's planting guidelines (species and setbacks) when planting around overhead primary conductors.
- b. Tree specifications
 - i. Minimum stock size: 50mm tree caliper for deciduous, 200cm height for coniferous.
 - ii. Maximize the use of large deciduous species wherever possible to maximize future canopy coverage.
 - c. Tree planting on city property shall be in accordance with the City of Ottawa's Tree Planting Specification; and if possible, include watering and warranty as described in the specification.
 - d. No root barriers, dead-man anchor systems, or planters are permitted.
 - e. No tree stakes unless necessary (and only 1 on the prevailing winds side of the tree)
 - f. Hard surface planting
 - i. If there are hard surface plantings, a planting detail must be provided.
 - ii. Curb style planter design is highly recommended.
 - iii. No grates are to be used and if guards are required, City of Ottawa standard (which can be provided) shall be used.
 - c. Trees are to be planted at grade.
 - d. Soil Volume - Please demonstrate as per the **Landscape Plan Terms of Reference** that the available soil volumes for new plantings will meet or exceed the following:

Tree Type/Size	Single Tree Soil Volume (m ³)	Multiple Tree Soil Volume (m ³ /tree)
Ornamental	15	9
Columnar	15	9
Small	20	12
Medium	25	15
Large	30	18
Conifer	25	15

- i. It is strongly suggested that the proposed species list include a column listing the available soil volume.
- e. Sensitive Marine Clay - Please follow the City's 2017 Tree Planting in Sensitive Marine Clay guidelines.
- f. The City requests that consideration be given to planting native species wherever there is a high probability of survival to maturity.
- g. Efforts shall be made to provide as much future canopy cover as possible at a site level, through tree planting and tree retention. The Landscape Plan shall show/document that the proposed tree planting and retention will contribute to the City's overall canopy cover over time. **Please provide a projection of the future canopy cover for the site to 40 years.**

Feel free to contact Julian Alvarez-Barkham, Forester, for follow-up questions.

Parkland

Comments: Parkland comments to be provided at a later date.

Other

47. 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 Q1 2024.
- b. Please refer to ottawa.ca/HPDS for more information.



Submission Requirements and Fees

1. 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.
2. 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,
Kieran Watson

Encl. List Applicable Information

c.c. Insert contacts to be cc'd

APPENDIX B

Development Servicing Study Checklist

Servicing study guidelines for development applications

4. Development Servicing Study Checklist

The following section describes the checklist of the required content of servicing studies. It is expected that the proponent will address each one of the following items for the study to be deemed complete and ready for review by City of Ottawa Infrastructure Approvals staff.

The level of required detail in the Servicing Study will increase depending on the type of application. For example, for Official Plan amendments and re-zoning applications, the main issues will be to determine the capacity requirements for the proposed change in land use and confirm this against the existing capacity constraint, and to define the solutions, phasing of works and the financing of works to address the capacity constraint. For subdivisions and site plans, the above will be required with additional detailed information supporting the servicing within the development boundary.

4.1 General Content

- Executive Summary (for larger reports only).
- Date and revision number of the report.
- Location map and plan showing municipal address, boundary, and layout of proposed development.
- Plan showing the site and location of all existing services.
- Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.
- Summary of Pre-consultation Meetings with City and other approval agencies.
- Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria.
- Statement of objectives and servicing criteria.
- Identification of existing and proposed infrastructure available in the immediate area.
- Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).
- Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.
- Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.
- Proposed phasing of the development, if applicable.

- Reference to geotechnical studies and recommendations concerning servicing.
- All preliminary and formal site plan submissions should have the following information:
 - Metric scale
 - North arrow (including construction North)
 - Key plan
 - Name and contact information of applicant and property owner
 - Property limits including bearings and dimensions
 - Existing and proposed structures and parking areas
 - Easements, road widening and rights-of-way
 - Adjacent street names

4.2 Development Servicing Report: Water

- Confirm consistency with Master Servicing Study, if available
- Availability of public infrastructure to service proposed development
- Identification of system constraints
- Identify boundary conditions
- Confirmation of adequate domestic supply and pressure
- Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development.
- Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.
- Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design
- Address reliability requirements such as appropriate location of shut-off valves
- Check on the necessity of a pressure zone boundary modification.
- Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range

- Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.
- Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.
- Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.
- Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.

4.3 Development Servicing Report: Wastewater

- Summary of proposed design criteria (Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).
- Confirm consistency with Master Servicing Study and/or justifications for deviations.
- Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers.
- Description of existing sanitary sewer available for discharge of wastewater from proposed development.
- Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable)
- Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.
- Description of proposed sewer network including sewers, pumping stations, and forcemains.
- Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).
- Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.
- Force main capacity in terms of operational redundancy, surge pressure and maximum flow velocity.
- Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.
- Special considerations such as contamination, corrosive environment etc.

4.4 Development Servicing Report: Stormwater Checklist

- Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)
- Analysis of available capacity in existing public infrastructure.
- A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.
- Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.
- Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.
- Description of the stormwater management concept with facility locations and descriptions with references and supporting information.
- Set-back from private sewage disposal systems.
- Watercourse and hazard lands setbacks.
- Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.
- Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.
- Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).
- Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.
- Calculate pre and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.
- Any proposed diversion of drainage catchment areas from one outlet to another.
- Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.
- If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100 year return period storm event.
- Identification of potential impacts to receiving watercourses
- Identification of municipal drains and related approval requirements.
- Descriptions of how the conveyance and storage capacity will be achieved for the development.
- 100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.

- Inclusion of hydraulic analysis including hydraulic grade line elevations.
- Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.
- Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.
- Identification of fill constraints related to floodplain and geotechnical investigation.

4.5 Approval and Permit Requirements: Checklist

The Servicing Study shall provide a list of applicable permits and regulatory approvals necessary for the proposed development as well as the relevant issues affecting each approval. The approval and permitting shall include but not be limited to the following:

- Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in the Act.
- Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.
- Changes to Municipal Drains.
- Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)

4.6 Conclusion Checklist

- Clearly stated conclusions and recommendations
- Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.
- All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario

APPENDIX C

Sanitary Sewage Calculations

Queensway Carleton Hospital - Part 4 Expansion

3045 Baseline Road

SANITARY SEWAGE ANALYSIS -SUMMARY

Peak Sanitary Flows Directed to Graham Creek Trunk Sewer		
Existing Cancer Centre Flows*	22.70	L/s
New Parking Garage	0.09	L/s
MM & EVS Addition	0.01	L/s
Loading Dock Building	0.06	L/s
Total Peak San. Flow to Graham Creek Trunk Sewer	22.87	L/s

Peak Sanitary Flows Directed to Lynwood Collector (via Pump Station)		
Existing Part 1 Campus Flows*	23.80	L/s
Existing Part 2 Campus Flows*	21.90	L/s
Existing Part 3 Campus Flows*	8.10	L/s
Generator Building	0.03	L/s
Inpatient Tower Addition	1.36	L/s
Ambulance Garage	0.04	L/s
Transitional Care Tower	2.16	L/s
Emergency Department & Ambulatory Care Addition	0.65	L/s
Food Services - Interior Renovation	0.01	L/s
Total Peak San. Flow to Lynwood Collector (via Pump Station)	58.06	L/s

*Existing campus flows taken directly from the previously approved 'Sanitary Pump Station Design Brief' (R-2007-095).

**Design populations are based on a staff & volumes estimate that was provided by the architect.

Queensway Carleton Hospital - Part 4 Expansion

New Parking Garage

SANITARY SEWAGE ANALYSIS

Extraneous Flow		
Area	0.272	ha
Infiltration Allowance	0.33	L/s/ha
Peak Extraneous Flows	0.09	L/s
Total Peak Sanitary Flow	0.09	L/s

Queensway Carleton Hospital - Part 4 Expansion

MM & EVS Addition

SANITARY SEWAGE ANALYSIS

Extraneous Flow		
Area	0.039	ha
Infiltration Allowance	0.33	L/s/ha
Peak Extraneous Flows	0.01	L/s
Total Peak Sanitary Flow	0.01	L/s

**Queensway Carleton Hospital - Part 4 Expansion
Loading Dock Building
SANITARY SEWAGE ANALYSIS**

Extraneous Flow		
Area	0.195	ha
Infiltration Allowance	0.33	L/s/ha
Peak Extraneous Flows	0.06	L/s
Total Peak Sanitary Flow	0.06	L/s

Queensway Carleton Hospital - Part 4 Expansion

Generator Building

SANITARY SEWAGE ANALYSIS

Extraneous Flow		
Area	0.104	ha
Infiltration Allowance	0.33	L/s/ha
Peak Extraneous Flows	0.03	L/s
Total Peak Sanitary Flow	0.03	L/s

Queensway Carleton Hospital - Part 4 Expansion

Inpatient Tower Addition

SANITARY SEWAGE ANALYSIS

Peak Sanitary Flow - Hospital Beds		
Number of Beds	61	Beds
Average Daily Sanitary Flows	900	L/bed/day
Peaking Factor	1.50	
Peak Hospital Bed Flows	0.95	L/s
Peak Sanitary Flow - Patients		
Anticipated Average Daily Patient Visits	91	Patients
Average Daily Sanitary Flows	25	L/c/day
Peaking Factor	1.50	
Peak Patient Flows	0.04	L/s
Peak Sanitary Flow - Medical Staff		
Medical Staff Design Population	77	Staff
Average Daily Sanitary Flows	275	L/c/day
Peaking Factor	1.50	
Peak Medical Staff Flows	0.37	L/s
Extraneous Flow		
N/A - Vertical Addition Only		
Total Peak Sanitary Flow	1.36	L/s

Queensway Carleton Hospital - Part 4 Expansion

Ambulance Garage

SANITARY SEWAGE ANALYSIS

Peak Sanitary Flow		
Number of Ambulance Bays	6	Vehicles
Average Daily Sanitary Flows (Hand-wash)	200	L/car/day
Peaking Factor	1.50	
Peak General Staff Flows	0.02	L/s
Extraneous Flow		
Area	0.071	ha
Infiltration Allowance	0.33	L/s/ha
Peak Extraneous Flows	0.02	L/s
Total Peak Sanitary Flow	0.04	L/s

**Queensway Carleton Hospital - Part 4 Expansion
Transitional Care Tower
SANITARY SEWAGE ANALYSIS**

Peak Sanitary Flow - Institutional Use (Hospital)		
Number of Beds	112	Beds
Average Daily Sanitary Flows	900	L/bed/day
Peaking Factor	1.50	
Peak Institutional Use Flows	1.75	L/s
Peak Sanitary Flow - Patients		
Anticipated Average Daily Patient Visits	185	Patients
Average Daily Sanitary Flows	25	L/c/day
Peaking Factor	1.50	
Peak Patient Flows	0.08	L/s
Peak Sanitary Flow - Medical Staff		
Medical Staff Design Population	70	Staff
Average Daily Sanitary Flows	275	L/c/day
Peaking Factor	1.50	
Peak Medical Staff Flows	0.33	L/s
Extraneous Flow		
N/A - Vertical Addition Only		
Total Peak Sanitary Flow	2.16	L/s

**Queensway Carleton Hospital - Part 4 Expansion
Emergency Department & Ambulatory Care Addition
SANITARY SEWAGE ANALYSIS**

Peak Sanitary Flow - Institutional Use (Hospital)		
Number of Beds	20	Beds
Average Daily Sanitary Flows	900	L/bed/day
Peaking Factor	1.50	
Peak Institutional Use Flows	0.31	L/s
Peak Sanitary Flow - Patients		
Anticipated Average Daily Patient Visits	52	Patients
Average Daily Sanitary Flows	25	L/c/day
Peaking Factor	1.50	
Peak Patient Flows	0.02	L/s
Peak Sanitary Flow - Medical Staff		
Medical Staff Design Population	37	Staff
Average Daily Sanitary Flows	275	L/c/day
Peaking Factor	1.50	
Peak Medical Staff Flows	0.18	L/s
Extraneous Flow		
Area	0.407	ha
Infiltration Allowance	0.33	L/s/ha
Peak Extraneous Flows	0.13	L/s
Total Peak Sanitary Flow	0.65	L/s

Queensway Carleton Hospital - Part 4 Expansion

Food Services - Interior Renovation

SANITARY SEWAGE ANALYSIS

Peak Sanitary Flow		
General Staff Design Population	11	Staff
Average Daily Sanitary Flows	75	L/c/day
Peaking Factor	1.50	
Peak General Staff Flows	0.01	L/s
Extraneous Flow		
N/A - Interior Renovation Only		
Total Peak Sanitary Flow	0.01	L/s

APPENDIX D

Water Demands, FUS Calculations, Watermain Boundary Conditions, Schematic of the Hydraulic Model, Modeling Results

Queensway Carleton Hospital - Part 4 Expansion

Summary

POST-DEVELOPMENT WATER DEMANDS

DOMESTIC WATER DEMANDS

Existing Hospital and New Building Additions	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Hour Demand (L/s)
Main Hospital Water Supply: Existing Hospital / Cancer Centre and New Part 4 Expansions (Excluding James Beach Centre & Inpatient Tower Addition)	5.3	7.9	14.3
Existing James Beach Centre & New Inpatient Tower Addition	3.0	4.6	8.2
Total	8.3	12.5	22.5

BOUNDARY CONDITIONS - CONNECTION #1 (WEST) - 305mm dia. WM IN BASELINE ROAD

Minimum HGL (Peak Hour) =	127.3	m
Maximum HGL =	131.9	m
Max Day + Fire Flow (183.0 L/s) =	127.4	m

BOUNDARY CONDITIONS - CONNECTION #2 (EAST) - 305mm dia. WM IN BASELINE ROAD

Minimum HGL (Peak Hour) =	127.3	m
Maximum HGL =	131.9	m
Max Day + Fire Flow (183.0 L/s) =	127.3	m

PRESSURE TESTS

	CONNECTION #1	CONNECTION #2	UNITS
Existing watermain elevation at connection	80.8	78.8	m
Low Pressure Pressure = (Min. HGL - (Existing Ground Elevation - Watermain Elevation)) x 1.42 PSI/m (should be > 40 PSI)	66.0	68.0	PSI
High Pressure Pressure = (Max HGL - (Existing Ground Elevation - Watermain Elevation)) x 1.42 PSI/m (should be between 50- 70 PSI)	72.0	75.0	PSI
Max Day + Fire Flow Pressure = (Max Day + Fire Flow - (Existing Ground Elevation -Watermain Elevation)) x 1.42 PSI/m (should be > 20 PSI)	66.0	68.0	PSI

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

PSI

m OF HEAD

1.42197 1

Queensway Carleton Hospital - Part 4 Expansion

Main Hospital Water Supply: Existing Hospital / Cancer Centre and New Part 4 Expansions (Excluding James Beach Centre & Inpatient Tower Addition)

POST-DEVELOPMENT WATER DEMANDS

DOMESTIC WATER DEMAND

Institutional Use (Hospital)		Post-Development	
Number of Beds		228	Beds
Average Day Demand (900 L/bed/day)		2.38	L/s
Maximum Day Demand (1.5 x avg. day)		3.56	L/s
Peak Hour Demand (1.8 x max. day)		6.41	L/s
Patient Water Demands			
Anticipated Average Daily Patient Visits		782	Patients
Average Day Demand (25 L/c/day)		0.23	L/s
Maximum Day Demand (1.5 x avg. day)		0.34	L/s
Peak Hour Demand (1.8 x max. day)		0.61	L/s
Medical Staff Water Demands			
Anticipated Max. Medical Staff per daytime shift		727	Staff
Average Day Demand (275 L/c/day)		2.32	L/s
Maximum Day Demand (1.5 x avg. day)		3.47	L/s
Peak Hour Demand (1.8 x max. day)		6.25	L/s
General Staff Water Demands			
Anticipated Max. General Staff per daytime shift		415	Staff
Average Day Demand (75 L/c/day)		0.36	L/s
Maximum Day Demand (1.5 x avg. day)		0.54	L/s
Peak Hour Demand (1.8 x max. day)		0.97	L/s
Ambulance Garage Water Demands			
Number of Ambulance Bays		6	Vehicles
Average Day Demand (200 L/v/day)		0.01	L/s
Maximum Day Demand (1.5 x avg. day)		0.02	L/s
Peak Hour Demand (1.8 x max. day)		0.04	L/s
TOTALS			
Average Day Demand		5.3	L/s
Maximum Day Demand		7.9	L/s
Peak Hour Demand		14.3	L/s

Queensway Carleton Hospital - Part 4 Expansion
Existing James Beach Centre & New Inpatient Tower Addition
POST-DEVELOPMENT WATER DEMANDS

DOMESTIC WATER DEMAND

Institutional Use (Hospital)		Post-Development	
Number of Beds		252	Beds
Average Day Demand (900 L/bed/day)		2.63	L/s
Maximum Day Demand (1.5 x avg. day)		3.94	L/s
Peak Hour Demand (1.8 x max. day)		7.09	L/s
Patient Water Demands			
Anticipated Average Daily Patient Visits		190	Patients
Average Day Demand (25 L/c/day)		0.05	L/s
Maximum Day Demand (1.5 x avg. day)		0.08	L/s
Peak Hour Demand (1.8 x max. day)		0.15	L/s
Staff Water Demands			
Max. Medical Staff per daytime shift		116	Staff
Average Day Demand (275 L/c/day)		0.37	L/s
Maximum Day Demand (1.5 x avg. day)		0.55	L/s
Peak Hour Demand (1.8 x max. day)		0.99	L/s
TOTALS			
Average Day Demand		3.0	L/s
Maximum Day Demand		4.6	L/s
Peak Hour Demand		8.2	L/s

FUS - Fire Flow Calculations



Engineers, Planners & Landscape Architects

Novatech Project #: 123089
Project Name: QCH Part 4 Expansion
Date: 9/10/2025
Input By: K. D'sa
Reviewed By: François Thauvette

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

Building Description: 7-Storey Open Air Parking Garage
Type II - Non-combustible construction

Step		Choose		Value Used	Total Fire Flow (L/min)
Base Fire Flow					
1	Construction Material		Multiplier		
	Coefficient related to type of construction C	Type V - Wood frame	1.5	0.8	
		Type IV - Mass Timber	Varies		
		Type III - Ordinary construction	1		
		Type II - Non-combustible construction	Yes		0.8
2	Floor Area				
	A	Building Footprint (m ²)	2720	2,720	
		Number of Floors/Storeys	1		
		Protected Openings (1 hr) if C<1.0	No		
		Area of structure considered (m ²)			
2	F	Base fire flow without reductions		9,000	
		$F = 220 C (A)^{0.5}$			
Reductions or Surcharges					
3	Occupancy hazard reduction or surcharge		FUS Table 3	Reduction/Surcharge	
	(1)	Non-combustible		-25%	9,000
		Limited combustible		-15%	
		Combustible	Yes	0%	
		Free burning		15%	
4	Sprinkler Reduction		FUS Table 4	Reduction	
	(2)	Adequately Designed System (NFPA 13)		-30%	0
		Standard Water Supply		-10%	
		Fully Supervised System		-10%	
		Cumulative Sub-Total		0%	
	Area of Sprinklered Coverage (m²)			0%	
			Cumulative Total	0%	
5	Exposure Surcharge		FUS Table 6	Surcharge	
	(3)	North Side	10.1 - 20 m	3%	1,260
		East Side	>30m	0%	
		South Side	0 - 3 m	11%	
		West Side	>30m	0%	
			Cumulative Total	14%	
Results					
6	(1) + (2) + (3)	Total Required Fire Flow, rounded to nearest 1000L/min		L/min	10,000
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s
				or	USGPM
					2,642

FUS - Fire Flow Calculations



Engineers, Planners & Landscape Architects

Novatech Project #: 123089

Project Name: QCH Part 4 Expansion

Date: 9/10/2025

Input By: K. D'sa

Reviewed By: François Thauvette

Legend: Input by User

No Input Required

Reference: Fire Underwriter's Survey Guideline (2020)

Formula Method

Building Description: 1-Storey Generator Building

Type II - Non-combustible construction

Step		Choose		Value Used	Total Fire Flow (L/min)
Base Fire Flow					
1	Construction Material		Multiplier		
	Coefficient related to type of construction C	Type V - Wood frame	1.5	0.8	
		Type IV - Mass Timber	Varies		
		Type III - Ordinary construction	1		
		Type II - Non-combustible construction	Yes		0.8
2	Floor Area				
	A	Building Footprint (m ²)	1064	1,064	
		Number of Floors/Storeys	1		
		Protected Openings (1 hr) if C<1.0	No		
		Area of structure considered (m ²)			1,064
	F	Base fire flow without reductions		6,000	
		$F = 220 C (A)^{0.5}$			
Reductions or Surcharges					
3	Occupancy hazard reduction or surcharge		FUS Table 3	Reduction/Surcharge	
	(1)	Non-combustible		-25%	6,000
		Limited combustible		-15%	
		Combustible	Yes	0%	
		Free burning		15%	
4	Sprinkler Reduction		FUS Table 4	Reduction	
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%	-3,000
		Standard Water Supply	Yes	-10%	
		Fully Supervised System	Yes	-10%	
		Cumulative Sub-Total		-50%	
	Area of Sprinklered Coverage (m²)		1,064	100%	Cumulative Total
				-50%	
5	Exposure Surcharge		FUS Table 6	Surcharge	
	(3)	North Side	20.1 - 30 m	2%	120
		East Side	2Hr Firewall	0%	
		South Side	2Hr Firewall	0%	
		West Side	>30m	0%	
			Cumulative Total	2%	
Results					
6	(1) + (2) + (3)	Total Required Fire Flow, rounded to nearest 1000L/min		L/min	3,000
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s
				or	USGPM
					793

FUS - Fire Flow Calculations



Engineers, Planners & Landscape Architects

Novatech Project #: 123089

Project Name: QCH Part 4 Expansion

Date: 11/10/2025

Input By: K. D'sa

Reviewed By: François Thauvette

Legend: Input by User

No Input Required

Reference: Fire Underwriter's Survey Guideline (2020)

Formula Method

Building Description: 2-Storey Loading Dock Building

Type II - Non-combustible construction

Step		Choose		Value Used	Total Fire Flow (L/min)
Base Fire Flow					
1	Construction Material		Multiplier		
	Coefficient related to type of construction C	Type V - Wood frame	1.5	0.8	
		Type IV - Mass Timber	Varies		
		Type III - Ordinary construction	1		
		Type II - Non-combustible construction	Yes		0.8
2	Floor Area				
	A	Building Footprint (m ²)	580	1,160	
		Number of Floors/Storeys	2		
		Protected Openings (1 hr) if C<1.0	No		
	Area of structure considered (m ²)				1,160
	F	Base fire flow without reductions			
		$F = 220 C (A)^{0.5}$			
Reductions or Surcharges					
3	Occupancy hazard reduction or surcharge		FUS Table 3	Reduction/Surcharge	
	(1)	Non-combustible		-25%	6,000
		Limited combustible		-15%	
		Combustible	Yes	0%	
		Free burning		15%	
4	Sprinkler Reduction		FUS Table 4	Reduction	
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%	-3,000
		Standard Water Supply	Yes	-10%	
		Fully Supervised System	Yes	-10%	
		Cumulative Sub-Total		-50%	
	Area of Sprinklered Coverage (m ²)		1,160	100%	
			Cumulative Total		-50%
5	Exposure Surcharge		FUS Table 5	Surcharge	
	(3)	North Side	>30m	0	0
		East Side	2Hr Firewall		
		South Side	2Hr Firewall		
		West Side	2Hr Firewall		
Results					
6	(1) + (2) + (3)	Total Required Fire Flow, rounded to nearest 1000L/min		L/min	3,000
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s 50
				or	USGPM 793

FUS - Fire Flow Calculations



Engineers, Planners & Landscape Architects

Novatech Project #: 123089

Project Name: QCH Part 4 Expansion

Date: 9/10/2025

Input By: K. D'sa

Reviewed By: François Thauvette

Legend: Input by User

No Input Required

Reference: Fire Underwriter's Survey Guideline (2020)

Formula Method

Building Description: 2-Storey M.M., E.V.S., and Plant Offices Building

Type II - Non-combustible construction

Step		Choose		Value Used	Total Fire Flow (L/min)		
Base Fire Flow							
1	Construction Material		Multiplier				
	Coefficient related to type of construction C	Type V - Wood frame	1.5	0.8			
		Type IV - Mass Timber	Varies				
		Type III - Ordinary construction	1				
		Type II - Non-combustible construction	Yes		0.8		
2	Floor Area						
	A	Building Footprint (m ²)	592	1,184			
		Number of Floors/Storeys	2				
		Protected Openings (1 hr) if C<1.0	No				
	F	Area of structure considered (m ²)			6,000		
		Base fire flow without reductions					
3	Reductions or Surcharges		FUS Table 3		Reduction/Surcharge		
	(1)	Non-combustible	-25%	0%	6,000		
		Limited combustible	-15%				
		Combustible	0%				
		Free burning	15%				
	(2)	Rapid burning	25%				
		FUS Table 4		Reduction			
		Adequately Designed System (NFPA 13)	Yes	-30%	-3,000		
		Standard Water Supply	Yes	-10%			
		Fully Supervised System	Yes	-10%			
4		Cumulative Sub-Total		-50%			
		Area of Sprinklered Coverage (m ²)	1,184	100%			
		Cumulative Total		-50%			
5	Exposure Surcharge		FUS Table 5		Surcharge		
	(3)	North Side	2Hr Firewall	0%	0		
		East Side	2Hr Firewall				
		South Side	2Hr Firewall				
		West Side	>30m				
6	Results		Cumulative Total		0%		
	(1) + (2) + (3)	Total Required Fire Flow, rounded to nearest 1000L/min		L/min	3,000		
		(2,000 L/min < Fire Flow < 45,000 L/min)		or L/s	50		
				or USGPM	793		

FUS - Fire Flow Calculations



Novatech Project #: 123089

Project Name: QCH Part 4 Expansion

Date: 9/10/2025

Input By: K. D'sa

Reviewed By: François Thauvette

Legend: Input by User

No Input Required

Reference: Fire Underwriter's Survey Guideline (2020)

Formula Method

Building Description: 4-Storey Existing James Beach Centre with 3-Storey Inpatient Tower Addition
Type II - Non-combustible construction

Step		Choose		Value Used	Total Fire Flow (L/min)
Base Fire Flow					
1	Construction Material		Multiplier		
	Coefficient related to type of construction C	Type V - Wood frame	1.5	0.8	
		Type IV - Mass Timber	Varies		
		Type III - Ordinary construction	1		
		Type II - Non-combustible construction	Yes		0.8
2	Floor Area				
	A	Podium Level Footprint (m ²)	4532		
		Total Floors/Storeys (Podium)	4		
		Tower Footprint (m ²)	2526		
		Total Floors/Storeys (Tower)	3		
	F	Protected Openings (1 hr)	No		
		A, Total Effective Floor Area (m ²)		17,385	
	Base fire flow without reductions				
	$F = 220 C (A)^{0.5}$				
Reductions or Surcharges					
3	Occupancy hazard reduction or surcharge		FUS Table 3	Reduction/Surcharge	
	(1)	Non-combustible		-25%	19,550
		Limited combustible	Yes	-15%	
		Combustible		0%	
		Free burning		15%	
4	Sprinkler Reduction		FUS Table 4	Reduction	
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%	-9,775
		Standard Water Supply	Yes	-10%	
		Fully Supervised System	Yes	-10%	
		Cumulative Sub-Total		-50%	
	(3)	Area of Sprinklered Coverage (m ²)	25,706	100%	
		Cumulative Total		-50%	
5	Exposure Surcharge per		FUS Table 6	Surcharge	
	(3)	North Side	2Hr Firewall	0%	1,369
		East Side	2Hr Firewall	0%	
		South Side	3.1 - 10 m	7%	
		West Side	>30m	0%	
	Cumulative Total		7%		
Results					
6	(1) + (2) + (3)	Total Required Fire Flow, rounded to nearest 1000L/min		L/min	11,000
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s
				or	USGPM
				2,906	

FUS - Fire Flow Calculations



Engineers, Planners & Landscape Architects

Novatech Project #: 123089

Project Name: QCH Part 4 Expansion

Date: 9/10/2025

Input By: K. D'sa

Reviewed By: François Thauvette

Legend: Input by User

No Input Required

Reference: Fire Underwriter's Survey Guideline (2020)

Formula Method

Building Description: 5-Storey Transitional Care Tower Addition to Ex. 2-Storey Hospital

Type II - Non-combustible construction

Step		Choose		Value Used	Total Fire Flow (L/min)	
Base Fire Flow						
1	Construction Material		Multiplier			
	Coefficient related to type of construction C	Type V - Wood frame	1.5	0.8		
		Type IV - Mass Timber	Varies			
		Type III - Ordinary construction	1			
		Type II - Non-combustible construction	Yes		0.8	
2	Floor Area					
	A	Building Footprint (m ²)	3346	15,057		
		Number of Floors/Storeys	7			
		Protected Openings (1 hr) if C<1.0	No			
		Area of structure considered (m ²)			15,057	
2	F	Base fire flow without reductions		22,000		
		$F = 220 C (A)^{0.5}$				
Reductions or Surcharges						
3	Occupancy hazard reduction or surcharge		FUS Table 3	Reduction/Surcharge		
	(1)	Non-combustible		-25%	22,000	
		Limited combustible		-15%		
		Combustible	Yes	0%		
		Free burning		15%		
4	Sprinkler Reduction		FUS Table 4	Reduction		
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%	-11,000	
		Standard Water Supply	Yes	-10%		
		Fully Supervised System	Yes	-10%		
		Cumulative Sub-Total		-50%		
	Area of Sprinklered Coverage (m²)		23,422	100%	Cumulative Total	
5	Exposure Surcharge		FUS Table 5		Surcharge	
	(3)	North Side	2Hr Firewall	0%	0	
		East Side	2Hr Firewall			
		South Side	2Hr Firewall			
		West Side	2Hr Firewall			
Results						
6	(1) + (2) + (3)	Total Required Fire Flow, rounded to nearest 1000L/min		L/min	11,000	
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	
				or	USGPM	
					2,906	

FUS - Fire Flow Calculations



Engineers, Planners & Landscape Architects

Novatech Project #: 123089

Project Name: QCH Part 4 Expansion

Date: 11/10/2025

Input By: K. D'sa

Reviewed By: François Thauvette

Legend: Input by User

No Input Required

Reference: Fire Underwriter's Survey Guideline (2020)

Formula Method

Building Description: 1-Storey Emergency Department and Ambulatory Care Addition

Type II - Non-combustible construction

Step		Choose		Value Used	Total Fire Flow (L/min)
Base Fire Flow					
1	Construction Material		Multiplier		
	Coefficient related to type of construction C	Type V - Wood frame	1.5	0.8	
		Type IV - Mass Timber	Varies		
		Type III - Ordinary construction	1		
		Type II - Non-combustible construction	Yes		0.8
2	Floor Area				
	A	Building Footprint (m ²)	7236	7,236	
		Number of Floors/Storeys	1		
		Protected Openings (1 hr) if C<1.0	No		
	Area of structure considered (m ²)				7,236
2	F	Base fire flow without reductions		15,000	
		$F = 220 C (A)^{0.5}$			
Reductions or Surcharges					
3	Occupancy hazard reduction or surcharge		FUS Table 3	Reduction/Surcharge	
	(1)	Non-combustible	Yes	-25%	12,750
		Limited combustible	Yes	-15%	
		Combustible	Yes	0%	
		Free burning	Yes	15%	
4	Sprinkler Reduction		FUS Table 4	Reduction	
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%	-6,375
		Standard Water Supply	Yes	-10%	
		Fully Supervised System	Yes	-10%	
		Cumulative Sub-Total		-50%	
	Area of Sprinklered Coverage (m ²)		7,236	100%	Cumulative Total
				-50%	
5	Exposure Surcharge		FUS Table 5	Surcharge	
	(3)	North Side	2Hr Firewall	0%	0
		East Side	>30m	0%	
		South Side	>30m	0%	
		West Side	2Hr Firewall	0%	
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
				or	USGPM
					1,585

FUS - Fire Flow Calculations



Engineers, Planners & Landscape Architects

Novatech Project #: 123089

Project Name: QCH Part 4 Expansion

Date: 9/10/2025

Input By: K. D'sa

Reviewed By: François Thauvette

Legend: Input by User

No Input Required

Reference: Fire Underwriter's Survey Guideline (2020)

Formula Method

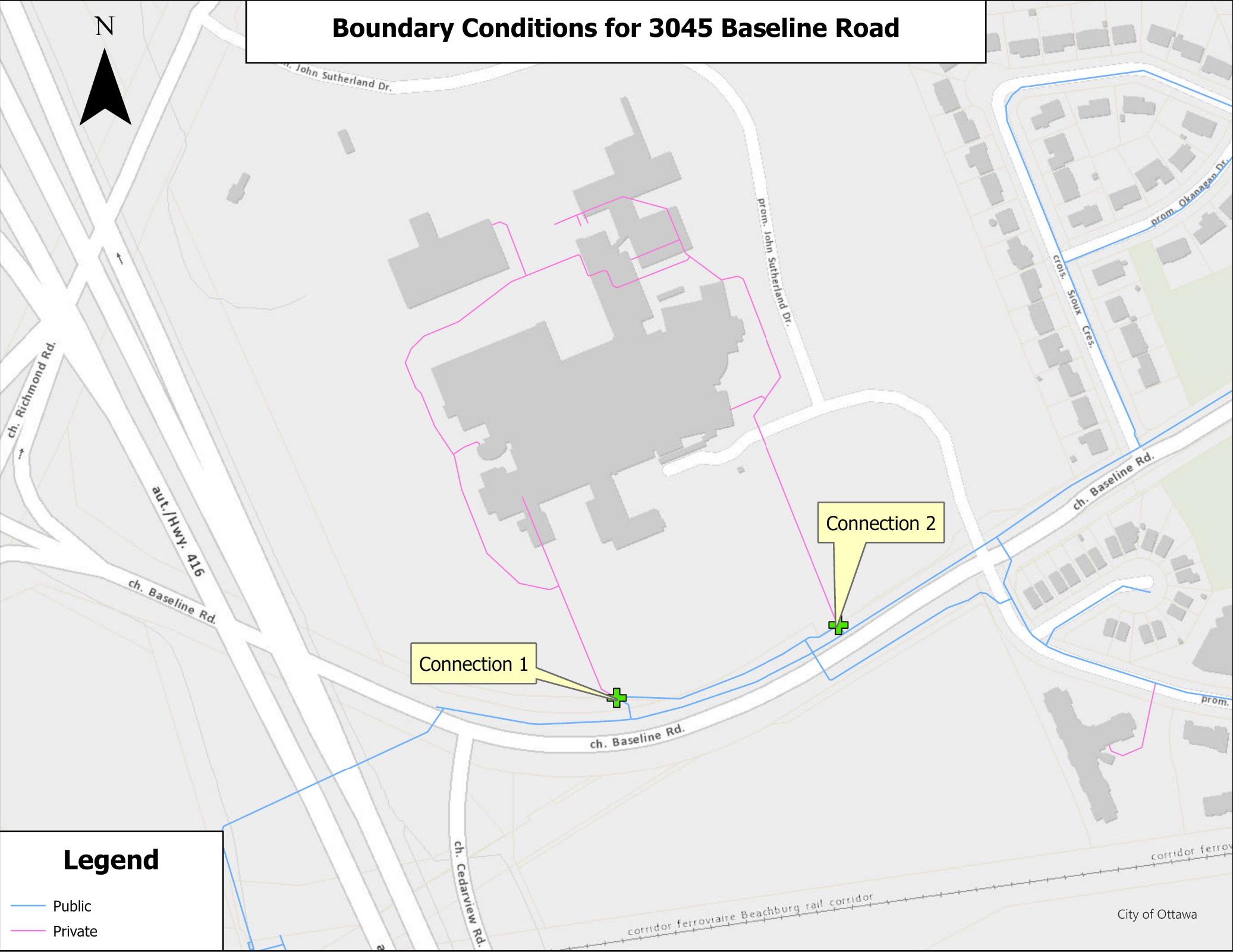
Building Description: 1-Storey Ambulance Garage

Type II - Non-combustible construction

Step		Choose		Value Used	Total Fire Flow (L/min)		
Base Fire Flow							
1	Construction Material		Multiplier				
	Coefficient related to type of construction C	Type V - Wood frame	1.5	0.8			
		Type IV - Mass Timber	Varies				
		Type III - Ordinary construction	1				
		Type II - Non-combustible construction	Yes		0.8		
2	Floor Area						
	A	Building Footprint (m ²)	741	741			
		Number of Floors/Storeys	1				
		Protected Openings (1 hr) if C<1.0	No				
	Area of structure considered (m ²)				5,000		
3	(1)	Base fire flow without reductions					
		$F = 220 C (A)^{0.5}$					
4	Reductions or Surcharges		FUS Table 3		Reduction/Surcharge		
	(2)	Non-combustible		-25%	5,000		
		Limited combustible		-15%			
		Combustible		0%			
		Free burning		15%			
5	Sprinkler Reduction		FUS Table 4		Reduction		
	(3)	Adequately Designed System (NFPA 13)		-30%	-2,500		
		Standard Water Supply		-10%			
		Fully Supervised System		-10%			
				-50%			
6	Exposure Surcharge		FUS Table 6		Surcharge		
	(4)	North Side		0%	500		
		East Side		0%			
		South Side		0%			
		West Side		10%			
Results							
6	(1) + (2) + (3)	Total Required Fire Flow, rounded to nearest 1000L/min		L/min			
		(2,000 L/min < Fire Flow < 45,000 L/min)		or			
				L/s			
				50			
				or			
				USGPM			
				793			

Boundary Conditions for 3045 Baseline Road

N



Legend

- Public
- Private

corridor ferroviaire Beachburg rail corridor

City of Ottawa

Kynan Dsa

From: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Sent: Thursday, September 18, 2025 10:32 AM
To: Francois Thauvette
Cc: Kynan Dsa
Subject: RE: 3045 Baseline Road - QCH Part 4 Expansion - Request for Municipal WM Boundary Conditions (123089)
Attachments: 3045 Baseline Road September 2025.pdf

Hi Francois,

The following are boundary conditions, HGL, for hydraulic analysis at 3045 Baseline Road (zone 2W2C) assumed to be connected via two (2) connections to the 305mm watermain on Baseline Road and looped internally. (see attached PDF for location).

Connection 1 – Baseline Road (west):

Minimum HGL = 127.3 m
Maximum HGL = 131.9 m
Max Day + Fire Flow (50.0 L/s) = 127.8 m
Max Day + Fire Flow (100.0 L/s) = 127.7 m
Max Day + Fire Flow (167.0 L/s) = 127.4 m
Max Day + Fire Flow (183.0 L/s) = 127.4 m

Connection 2 – Baseline Road (east):

Minimum HGL = 127.3 m
Maximum HGL = 131.9 m
Max Day + Fire Flow (50.0 L/s) = 127.8 m
Max Day + Fire Flow (100.0 L/s) = 127.7 m
Max Day + Fire Flow (167.0 L/s) = 127.4 m
Max Day + Fire Flow (183.0 L/s) = 127.3 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. "The IWSD has recently updated their water modelling software. Any significant difference between previously received BC results and newly received BC results could be attributed to this update."

Best Regards,

Mohammed Fawzi, P.Eng.

Senior Project Manager (A), Infrastructure Projects

Development Review – West Branch

Planning, Development and Building Services Department (PDDBS) | 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 70120, Mohammed.Fawzi@ottawa.ca

Classified as City of Ottawa - Internal / Ville d'Ottawa - classé interne

From: Fawzi, Mohammed
Sent: September 12, 2025 9:33 AM
To: Francois Thauvette <f.thauvette@novatech-eng.com>
Cc: Kynan Dsa <k.dsa@novatech-eng.com>
Subject: RE: 3045 Baseline Road - QCH Part 4 Expansion - Request for Municipal WM Boundary Conditions (123089)

Thanks for confirming Francois.

This is to confirm your request for boundary conditions is in the queue. Could you also send me the proposed sanitary peak flow? I'll also verify if there are concerns regarding capacity, even though the difference in flow will likely be very small.

Best Regards,

Mohammed Fawzi, P.Eng.

Senior Project Manager (A), Infrastructure Projects

Development Review – West Branch

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 70120, Mohammed.Fawzi@ottawa.ca

From: Francois Thauvette <f.thauvette@novatech-eng.com>

Sent: September 12, 2025 8:17 AM

To: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>

Cc: Kynan Dsa <k.dsa@novatech-eng.com>

Subject: RE: 3045 Baseline Road - QCH Part 4 Expansion - Request for Municipal WM Boundary Conditions (123089)

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Hi Mohammed,

Please refer to **Open Parking Garages** section of the attached 2020 FUS Guidelines (on page 23).

Correspondence from the architect confirming all the parameters used in the FUS calculations will be included in the report.

Regards,

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

NOVATECH

Engineers, Planners & Landscape Architects

240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | T: 613.254.9643 Ext: 219 | C: 613.276.0310

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From: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>

Sent: Friday, September 12, 2025 8:05 AM

To: Francois Thauvette <f.thauvette@novatech-eng.com>

Cc: Kynan Dsa <k.dsa@novatech-eng.com>

Subject: RE: 3045 Baseline Road - QCH Part 4 Expansion - Request for Municipal WM Boundary Conditions (123089)

Hi Francois,

Thank you for your email. Can you please confirm why only 1-storey was considered for the 7-storey open air parking garage? Please also note that during Site Plan Review, we will require an email or letter from the architect confirming all the parameters used in the FUS calculations. These parameters would include, firewalls, sprinkler reductions, and coefficient values.

Thanks Francois.

Best Regards,

Mohammed Fawzi, P.Eng.

Senior Project Manager (A), Infrastructure Projects

Development Review – West Branch

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 70120, Mohammed.Fawzi@ottawa.ca

From: Francois Thauvette <f.thauvette@novatech-eng.com>
Sent: September 11, 2025 3:15 PM
To: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Cc: Kynan Dsa <k.dsa@novatech-eng.com>
Subject: FW: 3045 Baseline Road - QCH Part 4 Expansion - Request for Municipal WM Boundary Conditions (123089)

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Hi Mohammed,

We are sending this e-mail to request municipal watermain boundary conditions for the proposed Part 4 campus expansion at the Queensway Carleton Hospital. Please see e-mail below and attachments for details.

Let us know if you require any clarifications.

Regards,

François Thauvette, P. Eng., Sr. Project Manager | Land Development & Public-Sector Engineering
NOVATECH

Engineers, Planners & Landscape Architects

240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | T: 613.254.9643 Ext: 219 | C: 613.276.0310

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From: Kynan Dsa <k.dsa@novatech-eng.com>
Sent: Wednesday, September 10, 2025 4:04 PM
To: Francois Thauvette <f.thauvette@novatech-eng.com>
Subject: 3045 Baseline Road - QCH Part 4 Expansion - Request for Municipal WM Boundary Conditions (123089)

Hi François,

As discussed, please forward the e-mail below to the City of Ottawa to request municipal watermain boundary conditions for the QCH Part 4 Expansion project.

We are sending this e-mail to request municipal watermain boundary conditions to complete a hydraulic network analysis for the Queensway Carleton Hospital (QCH) Part 4 Expansion. The proposed development includes building additions to the existing hospital, a new open-air parking garage, and interior renovations to the existing hospital building.

The existing hospital is currently serviced by a private 203mm dia. looped watermain network, which has two connections to the existing 305mm dia. municipal watermain fed off the 1200mm dia. feedermain in Baseline Road (per geoOttawa). No modifications or new connections to municipal watermain infrastructure are proposed, however modifications to the private looped watermain network will be

required to accommodate the proposed development. The sizing of the modified portions of the private looped watermain and spacing of the on-site hydrants will be based on the fire flow requirements (calculated per FUS guidelines) and modelling results. We assume that City hydraulic modelling already accounts for fire flow demands for the existing hospital buildings, therefore the fire flow calculations are based on the new buildings and building additions only. The total Part 4 Expansion post-development water demands for the entire campus are as follows:

- Average Day Demand = 8.0 L/s
- Maximum Day Demand = 12.0 L/s
- Peak Hour Demand = 21.7 L/s
- Maximum Fire Flow Demand Range (New Buildings / Building Additions only) = 50-183 L/s

Refer to the attached domestic water demand and FUS fire flow calculation sheets and accompanying marked-up Site Plan for further details.

Please review and let us know if you have any questions or concerns.

Thanks,

Kynan D'sa, B.A.Sc. (Engineering) (He/Him)

NOVATECH

Engineers, Planners & Landscape Architects

240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6

Tel: 613.254.9643 Ext. 276 | Cell: 705.821.2278

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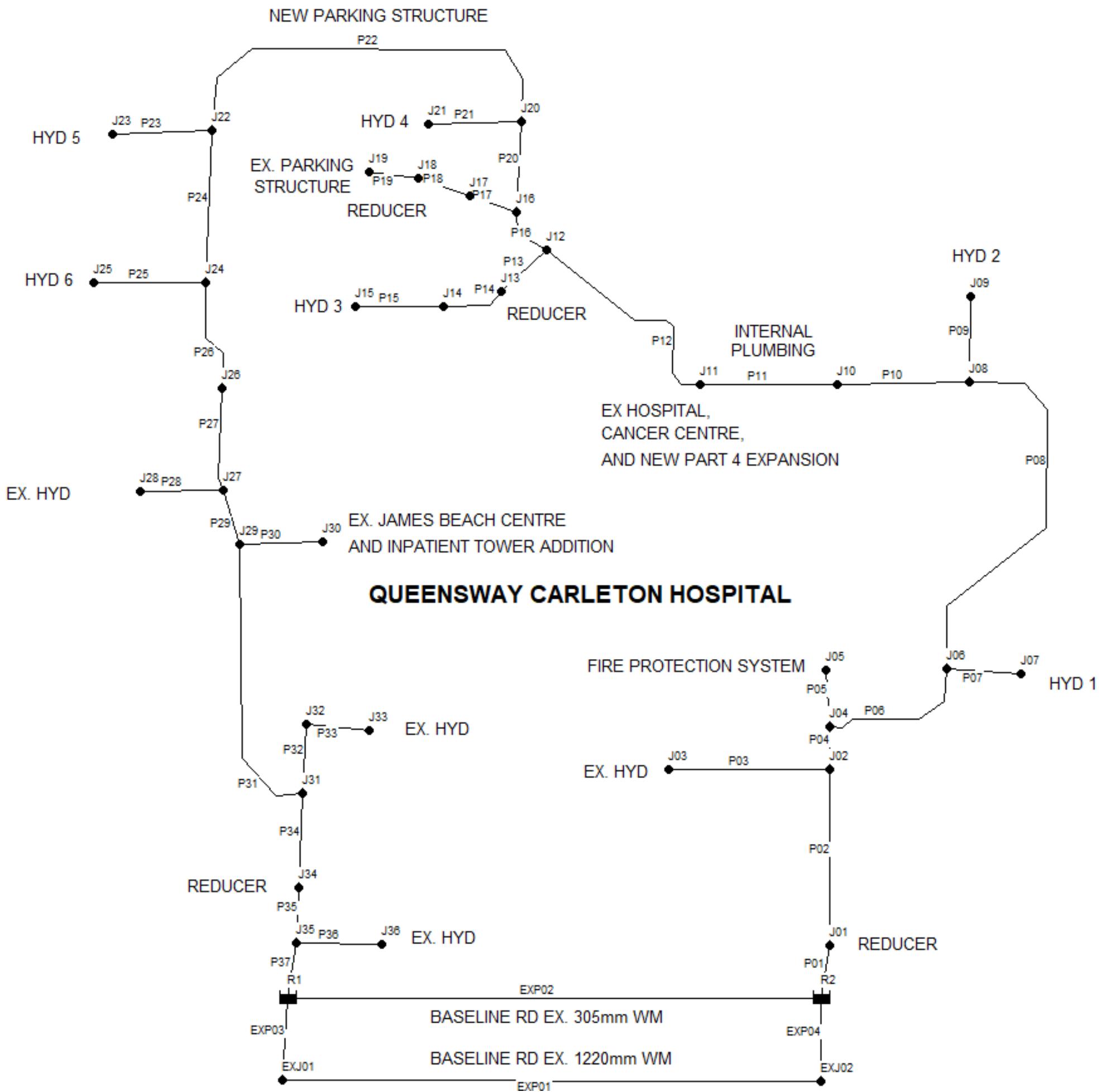
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HYDRAULIC MODEL SCHEMATIC



3045 Baseline Road - Queensway Carleton Hospital Part 4 Expansion
Water Model Results

Max Day + Fire Flow Demand (New Parking Garage)
 Network Table - Nodes

Node ID	Elevation m	Demand L/s	Head m	Pressure kPa	Pressure psi
Junc J01	78.60	0.00	127.37	48.77	478.43 69.39
Junc J02	76.05	0.00	121.80	45.75	448.81 65.09
Junc J03	76.10	0.00	121.80	45.70	448.32 65.02
Junc J04	75.91	0.00	121.46	45.55	446.85 64.81
Junc J05	76.33	0.00	121.46	45.13	442.73 64.21
Junc J06	76.25	0.00	118.34	42.09	412.90 59.89
Junc J07	76.30	0.00	118.34	42.04	412.41 59.82
Junc J08	76.49	0.00	115.09	38.60	378.67 54.92
Junc J09	76.55	0.00	115.09	38.54	378.08 54.84
Junc J10	76.80	0.00	114.03	37.23	365.23 52.97
Junc J11	72.45	7.90	107.70	35.25	345.80 50.15
Junc J12	72.57	0.00	106.29	33.72	330.79 47.98
Junc J13	72.49	0.00	106.29	33.80	331.58 48.09
Junc J14	71.93	0.00	106.29	34.36	337.07 48.89
Junc J15	72.50	0.00	106.29	33.79	331.48 48.08
Junc J16	72.69	0.00	106.13	33.44	328.05 47.58
Junc J17	71.91	0.00	106.13	34.22	335.70 48.69
Junc J18	73.35	0.00	106.13	32.78	321.57 46.64
Junc J19	73.45	0.00	106.13	32.68	320.59 46.50
Junc J20	73.72	0.00	104.70	30.98	303.91 44.08
Junc J21	73.72	84.00	104.26	30.54	299.60 43.45
Junc J22	74.41	0.00	104.86	30.45	298.71 43.32
Junc J23	74.45	84.00	103.31	28.86	283.12 41.06
Junc J24	74.77	0.00	107.99	33.22	325.89 47.27
Junc J25	74.80	0.00	107.99	33.19	325.59 47.22
Junc J26	76.15	0.00	111.11	34.96	342.96 49.74
Junc J27	76.49	0.00	112.73	36.24	355.51 51.56
Junc J28	76.50	0.00	112.73	36.23	355.42 51.55
Junc J29	76.50	0.00	113.83	37.33	366.21 53.11
Junc J30	76.75	4.60	113.83	37.08	363.75 52.76
Junc J31	76.60	0.00	121.41	44.81	439.59 63.76
Junc J32	76.60	0.00	121.41	44.81	439.59 63.76
Junc J33	76.60	0.00	121.41	44.81	439.59 63.76
Junc J34	78.60	0.00	127.21	48.61	476.86 69.16
Junc J35	80.60	0.00	127.30	46.70	458.13 66.45
Junc J36	80.60	0.00	127.30	46.70	458.13 66.45
Resrv R1	127.40	-100.63	127.40	0.00	0.00
Resrv R2	127.40	-79.87	127.40	0.00	0.00

Min= **41.06**
 Max= **69.39**

Max Day + Fire Flow Demand (New Parking Garage)
 Network Table - Links

Link ID	Length m	Diameter mm	Roughness	Flow L/s	Velocity m/s	Unit Headloss m/km
Pipe P01	6	-80.48	1.14	5.0	1.14	4.99
Pipe P02	132	80.48	2.56	42.2	2.56	42.21
Pipe P03	49	0	0	0.0	0.00	0.00
Pipe P04	8	80.48	2.56	42.2	2.56	42.21
Pipe P05	4.8	0	0	0.0	0.00	0.00
Pipe P06	74	80.48	2.56	42.2	2.56	42.21
Pipe P07	4	0	0	0.0	0.00	0.00
Pipe P08	77	80.48	2.56	42.2	2.56	42.21
Pipe P09	5	0	0	0.0	0.00	0.00
Pipe P10	25	80.48	2.56	42.2	2.56	42.21
Pipe P11	150	80.48	2.56	42.2	2.56	42.21
Pipe P12	40.5	72.58	2.31	34.9	2.31	34.86
Pipe P13	8	0	0	0.0	0.00	0.00
Pipe P14	2.6	0	0	0.0	0.00	0.00
Pipe P15	4.8	0	0	0.0	0.00	0.00
Pipe P16	4.5	72.58	2.31	34.9	2.31	34.85
Pipe P17	8.5	0	0	0.0	0.00	0.00
Pipe P18	7.4	0	0	0.0	0.00	0.00
Pipe P19	8.2	0	0	0.0	0.00	0.00
Pipe P20	41	72.58	2.31	34.9	2.31	34.86
Pipe P21	2	84	4.75	221.3	4.75	221.34
Pipe P22	139	-11.42	0.36	1.1	0.36	1.13
Pipe P23	7	84	4.75	221.3	4.75	221.34
Pipe P24	54	-95.42	3.04	57.9	3.04	57.86
Pipe P25	7	0	0	0.0	0.00	0.00
Pipe P26	54	-95.42	3.04	57.9	3.04	57.86
Pipe P27	28	-95.42	3.04	57.9	3.04	57.86
Pipe P28	9	0	0	0.0	0.00	0.00
Pipe P29	19	-95.42	3.04	57.9	3.04	57.86
Pipe P30	20	4.6	0.15	0.2	0.15	0.21
Pipe P31	120	-100.02	3.18	63.1	3.18	63.13
Pipe P32	27	0	0	0.0	0.00	0.00
Pipe P33	16	0	0	0.0	0.00	0.00
Pipe P34	92	-100.02	3.18	63.1	3.18	63.13
Pipe P35	12	-100.02	1.42	7.5	1.42	7.46
Pipe P36	7	0	0	0.0	0.00	0.00
Pipe P37	13	100.02	1.42	7.5	1.42	7.46

3045 Baseline Road - Queensway Carleton Hospital Part 4 Expansion
Water Model Results

Max Day + Fire Flow Demand (Generator / MEP Room)
 Network Table - Nodes

Node ID	Elevation m	Demand L/s	Head m	Pressure kPa	Pressure psi	Pressure psi
Junc J01	78.60	0.00	127.80	49.20	482.65	70.00
Junc J02	76.05	0.00	127.15	51.10	501.29	72.71
Junc J03	76.10	0.00	127.15	51.05	500.80	72.63
Junc J04	75.91	0.00	127.11	51.20	502.27	72.85
Junc J05	76.33	0.00	127.11	50.78	498.15	72.25
Junc J06	76.25	0.00	126.74	50.49	495.31	71.84
Junc J07	76.30	0.00	126.74	50.44	494.82	71.77
Junc J08	76.49	0.00	126.36	49.87	489.22	70.96
Junc J09	76.55	0.00	126.36	49.81	488.64	70.87
Junc J10	76.80	0.00	126.24	49.44	485.01	70.34
Junc J11	72.45	7.90	125.50	53.05	520.42	75.48
Junc J12	72.57	0.00	125.40	52.83	518.26	75.17
Junc J13	72.49	0.00	125.40	52.91	519.05	75.28
Junc J14	71.93	0.00	125.40	53.47	524.54	76.08
Junc J15	72.50	0.00	125.40	52.90	518.95	75.27
Junc J16	72.69	0.00	125.39	52.70	516.99	74.98
Junc J17	71.91	0.00	125.39	53.48	524.64	76.09
Junc J18	73.35	0.00	125.39	52.04	510.51	74.04
Junc J19	73.45	0.00	125.39	51.94	509.53	73.90
Junc J20	73.72	0.00	125.29	51.57	505.90	73.37
Junc J21	73.72	0.00	125.29	51.57	505.90	73.37
Junc J22	74.41	0.00	124.95	50.54	495.80	71.91
Junc J23	74.45	0.00	124.95	50.50	495.41	71.85
Junc J24	74.77	0.00	124.82	50.05	490.99	71.21
Junc J25	74.80	50.00	124.22	49.42	484.81	70.32
Junc J26	76.15	0.00	125.25	49.10	481.67	69.86
Junc J27	76.49	0.00	125.47	48.98	480.49	69.69
Junc J28	76.50	0.00	125.47	48.97	480.40	69.68
Junc J29	76.50	0.00	125.62	49.12	481.87	69.89
Junc J30	76.75	4.60	125.62	48.87	479.41	69.53
Junc J31	76.60	0.00	126.84	50.24	492.85	71.48
Junc J32	76.60	0.00	126.84	50.24	492.85	71.48
Junc J33	76.60	0.00	126.84	50.24	492.85	71.48
Junc J34	78.60	0.00	127.77	49.17	482.36	69.96
Junc J35	80.60	0.00	127.78	47.18	462.84	67.13
Junc J36	80.60	0.00	127.78	47.18	462.84	67.13
Resrv R1	127.80	-37.40	127.80	0.00	0.00	0.00
Resrv R2	127.80	-25.10	127.80	0.00	0.00	0.00

Min= 67.13
 Max= 76.09

Max Day + Fire Flow Demand (Generator / MEP Room)
 Network Table - Links

Link ID	Length m	Diameter mm	Roughness	Flow L/s	Velocity m/s	Unit Headloss m/km
Pipe P01	6	300	120	-25.2	0.36	0.58
Pipe P02	132	200	110	25.2	0.80	4.92
Pipe P03	49	150	100	0.0	0.00	0.00
Pipe P04	8	200	110	25.2	0.80	4.93
Pipe P05	4.8	200	110	0.0	0.00	0.00
Pipe P06	74	200	110	25.2	0.80	4.92
Pipe P07	4	150	100	0.0	0.00	0.00
Pipe P08	77	200	110	25.2	0.80	4.92
Pipe P09	5	150	100	0.0	0.00	0.00
Pipe P10	25	200	110	25.2	0.80	4.92
Pipe P11	150	200	110	25.2	0.80	4.92
Pipe P12	40.5	200	110	17.3	0.55	2.46
Pipe P13	8	200	110	0.0	0.00	0.00
Pipe P14	2.6	150	100	0.0	0.00	0.00
Pipe P15	4.8	150	100	0.0	0.00	0.00
Pipe P16	4.5	200	110	17.3	0.55	2.46
Pipe P17	8.5	200	110	0.0	0.00	0.00
Pipe P18	7.4	200	110	0.0	0.00	0.00
Pipe P19	8.2	150	100	0.0	0.00	0.00
Pipe P20	41	200	110	17.3	0.55	2.46
Pipe P21	2	150	100	0.0	0.00	0.00
Pipe P22	139	200	110	17.3	0.55	2.46
Pipe P23	7	150	100	0.0	0.00	0.00
Pipe P24	54	200	110	17.3	0.55	2.46
Pipe P25	7	150	100	50.0	2.83	84.68
Pipe P26	54	200	110	-32.7	1.04	7.95
Pipe P27	28	200	110	-32.7	1.04	7.95
Pipe P28	9	150	100	0.0	0.00	0.00
Pipe P29	19	200	110	-32.7	1.04	7.95
Pipe P30	20	200	110	4.6	0.15	0.21
Pipe P31	120	200	110	-37.3	1.19	10.14
Pipe P32	27	200	110	0.0	0.00	0.00
Pipe P33	16	150	100	0.0	0.00	0.00
Pipe P34	92	200	110	-37.3	1.19	10.14
Pipe P35	12	300	120	-37.3	0.53	1.20
Pipe P36	7	150	100	0.0	0.00	0.00
Pipe P37	13	300	120	37.3	0.53	1.20

3045 Baseline Road - Queensway Carleton Hospital Part 4 Expansion
Water Model Results

Max Day + Fire Flow Demand (Loading Dock Building)
 Network Table - Nodes

Node ID	Elevation m	Demand L/s	Head m	Pressure kPa	Pressure psi
Junc J01	78.60	0.00	127.79	49.19	482.55
Junc J02	76.05	0.00	126.85	50.80	498.35
Junc J03	76.10	0.00	126.85	50.75	497.86
Junc J04	75.91	0.00	126.79	50.88	499.13
Junc J05	76.33	0.00	126.79	50.46	495.01
Junc J06	76.25	0.00	126.26	50.01	490.60
Junc J07	76.30	0.00	126.26	49.96	490.11
Junc J08	76.49	0.00	125.71	49.22	482.85
Junc J09	76.55	0.00	125.71	49.16	482.26
Junc J10	76.80	0.00	125.53	48.73	478.04
Junc J11	72.45	7.90	124.46	52.01	510.22
Junc J12	72.57	0.00	124.29	51.72	507.37
Junc J13	72.49	0.00	124.15	51.66	506.78
Junc J14	71.93	0.00	123.93	52.00	510.12
Junc J15	72.50	50.00	123.53	51.03	500.60
Junc J16	72.69	0.00	124.32	51.63	506.49
Junc J17	71.91	0.00	124.32	52.41	514.14
Junc J18	73.35	0.00	124.32	50.97	500.02
Junc J19	73.45	0.00	124.32	50.87	499.03
Junc J20	73.72	0.00	124.55	50.83	498.64
Junc J21	73.72	0.00	124.55	50.83	498.64
Junc J22	74.41	0.00	125.32	50.91	499.43
Junc J23	74.45	0.00	125.32	50.87	499.03
Junc J24	74.77	0.00	125.63	50.86	498.94
Junc J25	74.80	0.00	125.63	50.83	498.64
Junc J26	76.15	0.00	125.93	49.78	488.34
Junc J27	76.49	0.00	126.08	49.59	486.48
Junc J28	76.50	0.00	126.08	49.58	486.38
Junc J29	76.50	0.00	126.19	49.69	487.46
Junc J30	76.75	4.60	126.19	49.44	485.01
Junc J31	76.60	0.00	127.09	50.49	495.31
Junc J32	76.60	0.00	127.09	50.49	495.31
Junc J33	76.60	0.00	127.09	50.49	495.31
Junc J34	78.60	0.00	127.78	49.18	482.46
Junc J35	80.60	0.00	127.79	47.19	462.93
Junc J36	80.60	0.00	127.79	47.19	462.93
Resrv R1	127.80	-31.76	127.80	0.00	0.00
Resrv R2	127.80	-30.74	127.80	0.00	0.00

Min= 67.14
 Max= 74.57

Max Day + Fire Flow Demand (Loading Dock Building)
 Network Table - Links

Link ID	Length m	Diameter mm	Roughness	Flow L/s	Velocity m/s	Unit Headloss m/km
Pipe P01	6	300	120	-30.9	0.44	0.85
Pipe P02	132	200	110	30.9	0.98	7.16
Pipe P03	49	150	100	0.0	0.00	0.00
Pipe P04	8	200	110	30.9	0.98	7.16
Pipe P05	4.8	200	110	0.0	0.00	0.00
Pipe P06	74	200	110	30.9	0.98	7.16
Pipe P07	4	150	100	0.0	0.00	0.00
Pipe P08	77	200	110	30.9	0.98	7.16
Pipe P09	5	150	100	0.0	0.00	0.00
Pipe P10	25	200	110	30.9	0.98	7.16
Pipe P11	150	200	110	30.9	0.98	7.16
Pipe P12	40.5	200	110	23.0	0.73	4.14
Pipe P13	8	200	110	50.0	1.59	17.48
Pipe P14	2.6	150	100	50.0	2.83	84.68
Pipe P15	4.8	150	100	50.0	2.83	84.68
Pipe P16	4.5	200	110	-27.0	0.86	5.59
Pipe P17	8.5	200	110	0.0	0.00	0.00
Pipe P18	7.4	200	110	0.0	0.00	0.00
Pipe P19	8.2	150	100	0.0	0.00	0.00
Pipe P20	41	200	110	-27.0	0.86	5.59
Pipe P21	2	150	100	0.0	0.00	0.00
Pipe P22	139	200	110	-27.0	0.86	5.59
Pipe P23	7	150	100	0.0	0.00	0.00
Pipe P24	54	200	110	-27.0	0.86	5.59
Pipe P25	7	150	100	0.0	0.00	0.00
Pipe P26	54	200	110	-27.0	0.86	5.59
Pipe P27	28	200	110	-27.0	0.86	5.59
Pipe P28	9	150	100	0.0	0.00	0.00
Pipe P29	19	200	110	-27.0	0.86	5.59
Pipe P30	20	200	110	4.6	0.15	0.21
Pipe P31	120	200	110	-31.6	1.01	7.48
Pipe P32	27	200	110	0.0	0.00	0.00
Pipe P33	16	150	100	0.0	0.00	0.00
Pipe P34	92	200	110	-31.6	1.01	7.48
Pipe P35	12	300	120	-31.6	0.45	0.88
Pipe P36	7	150	100	0.0	0.00	0.00
Pipe P37	13	300	120	31.6	0.45	0.88

3045 Baseline Road - Queensway Carleton Hospital Part 4 Expansion
Water Model Results

Max Day + Fire Flow Demand (M.M., E.V.S., and Plant Offices Building)
 Network Table - Nodes

Node ID	Elevation m	Demand L/s	Head m	Pressure kPa	Pressure psi
Junc J01	78.60	0.00	127.79	49.19	482.55
Junc J02	76.05	0.00	126.85	50.80	498.35
Junc J03	76.10	0.00	126.85	50.75	497.86
Junc J04	75.91	0.00	126.79	50.88	499.13
Junc J05	76.33	0.00	126.79	50.46	495.01
Junc J06	76.25	0.00	126.26	50.01	490.60
Junc J07	76.30	0.00	126.26	49.96	490.11
Junc J08	76.49	0.00	125.71	49.22	482.85
Junc J09	76.55	0.00	125.71	49.16	482.26
Junc J10	76.80	0.00	125.53	48.73	478.04
Junc J11	72.45	7.90	124.46	52.01	510.22
Junc J12	72.57	0.00	124.29	51.72	507.37
Junc J13	72.49	0.00	124.15	51.66	506.78
Junc J14	71.93	0.00	123.93	52.00	510.12
Junc J15	72.50	50.00	123.53	51.03	500.60
Junc J16	72.69	0.00	124.32	51.63	506.49
Junc J17	71.91	0.00	124.32	52.41	514.14
Junc J18	73.35	0.00	124.32	50.97	500.02
Junc J19	73.45	0.00	124.32	50.87	499.03
Junc J20	73.72	0.00	124.55	50.83	498.64
Junc J21	73.72	0.00	124.55	50.83	498.64
Junc J22	74.41	0.00	125.32	50.91	499.43
Junc J23	74.45	0.00	125.32	50.87	499.03
Junc J24	74.77	0.00	125.63	50.86	498.94
Junc J25	74.80	0.00	125.63	50.83	498.64
Junc J26	76.15	0.00	125.93	49.78	488.34
Junc J27	76.49	0.00	126.08	49.59	486.48
Junc J28	76.50	0.00	126.08	49.58	486.38
Junc J29	76.50	0.00	126.19	49.69	487.46
Junc J30	76.75	4.60	126.19	49.44	485.01
Junc J31	76.60	0.00	127.09	50.49	495.31
Junc J32	76.60	0.00	127.09	50.49	495.31
Junc J33	76.60	0.00	127.09	50.49	495.31
Junc J34	78.60	0.00	127.78	49.18	482.46
Junc J35	80.60	0.00	127.79	47.19	462.93
Junc J36	80.60	0.00	127.79	47.19	462.93
Resrv R1	127.80	-31.76	127.80	0.00	0.00
Resrv R2	127.80	-30.74	127.80	0.00	0.00

Min= 67.14
 Max= 74.57

Max Day + Fire Flow Demand (M.M., E.V.S., and Plant Offices Building)
 Network Table - Links

Link ID	Length m	Diameter mm	Roughness	Flow L/s	Velocity m/s	Unit Headloss m/km
Pipe P01	6	300	120	-30.9	0.44	0.85
Pipe P02	132	200	110	30.9	0.98	7.16
Pipe P03	49	150	100	0.0	0.00	0.00
Pipe P04	8	200	110	30.9	0.98	7.16
Pipe P05	4.8	200	110	0.0	0.00	0.00
Pipe P06	74	200	110	30.9	0.98	7.16
Pipe P07	4	150	100	0.0	0.00	0.00
Pipe P08	77	200	110	30.9	0.98	7.16
Pipe P09	5	150	100	0.0	0.00	0.00
Pipe P10	25	200	110	30.9	0.98	7.16
Pipe P11	150	200	110	30.9	0.98	7.16
Pipe P12	40.5	200	110	23.0	0.73	4.14
Pipe P13	8	200	110	50.0	1.59	17.48
Pipe P14	2.6	150	100	50.0	2.83	84.68
Pipe P15	4.8	150	100	50.0	2.83	84.68
Pipe P16	4.5	200	110	-27.0	0.86	5.59
Pipe P17	8.5	200	110	0.0	0.00	0.00
Pipe P18	7.4	200	110	0.0	0.00	0.00
Pipe P19	8.2	150	100	0.0	0.00	0.00
Pipe P20	41	200	110	-27.0	0.86	5.59
Pipe P21	2	150	100	0.0	0.00	0.00
Pipe P22	139	200	110	-27.0	0.86	5.59
Pipe P23	7	150	100	0.0	0.00	0.00
Pipe P24	54	200	110	-27.0	0.86	5.59
Pipe P25	7	150	100	0.0	0.00	0.00
Pipe P26	54	200	110	-27.0	0.86	5.59
Pipe P27	28	200	110	-27.0	0.86	5.59
Pipe P28	9	150	100	0.0	0.00	0.00
Pipe P29	19	200	110	-27.0	0.86	5.59
Pipe P30	20	200	110	4.6	0.15	0.21
Pipe P31	120	200	110	-31.6	1.01	7.48
Pipe P32	27	200	110	0.0	0.00	0.00
Pipe P33	16	150	100	0.0	0.00	0.00
Pipe P34	92	200	110	-31.6	1.01	7.48
Pipe P35	12	300	120	-31.6	0.45	0.88
Pipe P36	7	150	100	0.0	0.00	0.00
Pipe P37	13	300	120	31.6	0.45	0.88

3045 Baseline Road - Queensway Carleton Hospital Part 4 Expansion
Water Model Results

Max Day + Fire Flow Demand (Ex. James Beach Centre & New Inpatient Tower Addition)
 Network Table - Nodes

Node ID	Elevation m	Demand L/s	Head m	Pressure kPa	Pressure psi
Junc J01	78.60	0.00	127.28	48.68	477.55
Junc J02	76.05	0.00	122.90	46.85	459.60
Junc J03	76.10	0.00	122.90	46.80	459.11
Junc J04	75.91	0.00	122.63	46.72	458.32
Junc J05	76.33	0.00	122.63	46.30	454.20
Junc J06	76.25	0.00	120.18	43.93	430.95
Junc J07	76.30	0.00	120.18	43.88	430.46
Junc J08	76.49	0.00	117.63	41.14	403.58
Junc J09	76.55	0.00	117.63	41.08	402.99
Junc J10	76.80	0.00	116.80	40.00	392.40
Junc J11	72.45	7.90	111.82	39.37	386.22
Junc J12	72.57	0.00	110.74	38.17	374.45
Junc J13	72.49	0.00	110.74	38.25	375.23
Junc J14	71.93	0.00	110.74	38.81	380.73
Junc J15	72.50	0.00	110.74	38.24	375.13
Junc J16	72.69	0.00	110.62	37.93	372.09
Junc J17	71.91	0.00	110.62	38.71	379.75
Junc J18	73.35	0.00	110.62	37.27	365.62
Junc J19	73.45	0.00	110.62	37.17	364.64
Junc J20	73.72	0.00	109.53	35.81	351.30
Junc J21	73.72	0.00	109.53	35.81	351.30
Junc J22	74.41	0.00	105.83	31.42	308.23
Junc J23	74.45	0.00	105.83	31.38	307.84
Junc J24	74.77	0.00	104.39	29.62	290.57
Junc J25	74.80	92.00	102.56	27.76	272.33
Junc J26	76.15	0.00	104.74	28.59	280.47
Junc J27	76.49	0.00	104.92	28.43	278.90
Junc J28	76.50	92.00	102.57	26.07	255.75
Junc J29	76.50	0.00	106.64	30.14	295.67
Junc J30	76.75	4.60	106.63	29.88	293.12
Junc J31	76.60	0.00	118.23	41.63	408.39
Junc J32	76.60	0.00	118.23	41.63	408.39
Junc J33	76.60	0.00	118.23	41.63	408.39
Junc J34	78.60	0.00	127.11	48.51	475.88
Junc J35	80.60	0.00	127.25	46.65	457.64
Junc J36	80.60	0.00	127.25	46.65	457.64
Resrv R1	127.40	-225.97	127.40	0.00	0.00
Resrv R2	127.30	29.47	127.30	0.00	0.00

Min= 37.09
 Max= 69.26

Max Day + Fire Flow Demand (Ex. James Beach Centre & New Inpatient Tower Addition)
 Network Table - Links

Link ID	Length m	Diameter mm	Roughness	Flow L/s	Velocity m/s	Unit Headloss m/km
Pipe P01	6	300	120	-70.7	1.00	3.92
Pipe P02	132	200	110	70.7	2.25	33.16
Pipe P03	49	150	100	0.0	0.00	0.00
Pipe P04	8	200	110	70.7	2.25	33.16
Pipe P05	4.8	200	110	0.0	0.00	0.00
Pipe P06	74	200	110	70.7	2.25	33.16
Pipe P07	4	150	100	0.0	0.00	0.00
Pipe P08	77	200	110	70.7	2.25	33.16
Pipe P09	5	150	100	0.0	0.00	0.00
Pipe P10	25	200	110	70.7	2.25	33.16
Pipe P11	150	200	110	70.7	2.25	33.16
Pipe P12	40.5	200	110	62.8	2.00	26.63
Pipe P13	8	200	110	0.0	0.00	0.00
Pipe P14	2.6	150	100	0.0	0.00	0.00
Pipe P15	4.8	150	100	0.0	0.00	0.00
Pipe P16	4.5	200	110	62.8	2.00	26.63
Pipe P17	8.5	200	110	0.0	0.00	0.00
Pipe P18	7.4	200	110	0.0	0.00	0.00
Pipe P19	8.2	150	100	0.0	0.00	0.00
Pipe P20	41	200	110	62.8	2.00	26.63
Pipe P21	2	150	100	0.0	0.00	0.00
Pipe P22	139	200	110	62.8	2.00	26.63
Pipe P23	7	150	100	0.0	0.00	0.00
Pipe P24	54	200	110	62.8	2.00	26.63
Pipe P25	7	150	100	92.0	5.21	261.95
Pipe P26	54	200	110	-29.2	0.93	6.47
Pipe P27	28	200	110	-29.2	0.93	6.47
Pipe P28	9	150	100	92.0	5.21	261.96
Pipe P29	19	200	110	-121.2	3.86	90.16
Pipe P30	20	200	110	4.6	0.15	0.21
Pipe P31	120	200	110	-125.8	4.01	96.59
Pipe P32	27	200	110	0.0	0.00	0.00
Pipe P33	16	150	100	0.0	0.00	0.00
Pipe P34	92	200	110	-125.8	4.01	96.59
Pipe P35	12	300	120	-125.8	1.78	11.41
Pipe P36	7	150	100	0.0	0.00	0.00
Pipe P37	13	300	120	125.8	1.78	11.41

3045 Baseline Road - Queensway Carleton Hospital Part 4 Expansion
Water Model Results

Max Day + Fire Flow Demand (Transitional Care Tower Addition to Ex. Hospital)
 Network Table - Nodes

Node ID	Elevation m	Demand L/s	Head m	Pressure kPa	Pressure psi	Pressure psi
Junc J01	78.60	0.00	127.24	48.64	477.16	69.21
Junc J02	76.05	0.00	116.86	40.81	400.35	58.07
Junc J03	76.10	0.00	116.86	40.76	399.86	57.99
Junc J04	75.91	0.00	116.23	40.32	395.54	57.37
Junc J05	76.33	0.00	116.23	39.90	391.42	56.77
Junc J06	76.25	0.00	110.40	34.15	335.01	48.59
Junc J07	76.30	0.00	110.40	34.10	334.52	48.52
Junc J08	76.49	0.00	104.34	27.85	273.21	39.63
Junc J09	76.55	92.00	103.03	26.48	259.77	37.68
Junc J10	76.80	0.00	104.26	27.46	269.38	39.07
Junc J11	72.45	7.90	103.75	31.30	307.05	44.53
Junc J12	72.57	0.00	103.69	31.12	305.29	44.28
Junc J13	72.49	0.00	103.26	30.77	301.85	43.78
Junc J14	71.93	0.00	102.58	30.65	300.68	43.61
Junc J15	72.50	92.00	101.32	28.82	282.72	41.01
Junc J16	72.69	0.00	103.88	31.19	305.97	44.38
Junc J17	71.91	0.00	103.88	31.97	313.63	45.49
Junc J18	73.35	0.00	103.88	30.53	299.50	43.44
Junc J19	73.45	0.00	103.88	30.43	298.52	43.30
Junc J20	73.72	0.00	105.56	31.84	312.35	45.30
Junc J21	73.72	0.00	105.56	31.84	312.35	45.30
Junc J22	74.41	0.00	111.26	36.85	361.50	52.43
Junc J23	74.45	0.00	111.26	36.81	361.11	52.37
Junc J24	74.77	0.00	113.47	38.70	379.65	55.06
Junc J25	74.80	0.00	113.47	38.67	379.35	55.02
Junc J26	76.15	0.00	115.69	39.54	387.89	56.26
Junc J27	76.49	0.00	116.83	40.34	395.74	57.40
Junc J28	76.50	0.00	116.83	40.33	395.64	57.38
Junc J29	76.50	0.00	117.61	41.11	403.29	58.49
Junc J30	76.75	4.60	117.61	40.86	400.84	58.14
Junc J31	76.60	0.00	123.08	46.48	455.97	66.13
Junc J32	76.60	0.00	123.08	46.48	455.97	66.13
Junc J33	76.60	0.00	123.08	46.48	455.97	66.13
Junc J34	78.60	0.00	127.27	48.67	477.45	69.25
Junc J35	80.60	0.00	127.33	46.73	458.42	66.49
Junc J36	80.60	0.00	127.33	46.73	458.42	66.49
Resrv R1	127.40	-183.96	127.40	0.00	0.00	0.00
Resrv R2	127.30	-12.54	127.30	0.00	0.00	0.00

Min= 37.68
 Max= 69.25

Max Day + Fire Flow Demand (Transitional Care Tower Addition to Ex. Hospital)
 Network Table - Links

Link ID	Length m	Diameter mm	Roughness	Flow L/s	Velocity m/s	Unit Headloss m/km
Pipe P01	6	300	120	-112.7	1.59	9.29
Pipe P02	132	200	110	112.7	3.59	78.70
Pipe P03	49	150	100	0.0	0.00	0.00
Pipe P04	8	200	110	112.7	3.59	78.70
Pipe P05	4.8	200	110	0.0	0.00	0.00
Pipe P06	74	200	110	112.7	3.59	78.70
Pipe P07	4	150	100	0.0	0.00	0.00
Pipe P08	77	200	110	112.7	3.59	78.70
Pipe P09	5	150	100	92.0	5.21	261.95
Pipe P10	25	200	110	20.7	0.66	3.40
Pipe P11	150	200	110	20.7	0.66	3.40
Pipe P12	40.5	200	110	12.8	0.41	1.39
Pipe P13	8	200	110	92.0	2.93	54.07
Pipe P14	2.6	150	100	92.0	5.21	261.95
Pipe P15	4.8	150	100	92.0	5.21	261.95
Pipe P16	4.5	200	110	-79.2	2.52	41.01
Pipe P17	8.5	200	110	0.0	0.00	0.00
Pipe P18	7.4	200	110	0.0	0.00	0.00
Pipe P19	8.2	150	100	0.0	0.00	0.00
Pipe P20	41	200	110	-79.2	2.52	41.01
Pipe P21	2	150	100	0.0	0.00	0.00
Pipe P22	139	200	110	-79.2	2.52	41.01
Pipe P23	7	150	100	0.0	0.00	0.00
Pipe P24	54	200	110	-79.2	2.52	41.01
Pipe P25	7	150	100	0.0	0.00	0.00
Pipe P26	54	200	110	-79.2	2.52	41.01
Pipe P27	28	200	110	-79.2	2.52	41.01
Pipe P28	9	150	100	0.0	0.00	0.00
Pipe P29	19	200	110	-79.2	2.52	41.01
Pipe P30	20	200	110	4.6	0.15	0.21
Pipe P31	120	200	110	-83.8	2.67	45.53
Pipe P32	27	200	110	0.0	0.00	0.00
Pipe P33	16	150	100	0.0	0.00	0.00
Pipe P34	92	200	110	-83.8	2.67	45.53
Pipe P35	12	300	120	-83.8	1.19	5.38
Pipe P36	7	150	100	0.0	0.00	0.00
Pipe P37	13	300	120	83.8	1.19	5.38

3045 Baseline Road - Queensway Carleton Hospital Part 4 Expansion
Water Model Results

Max Day + Fire Flow Demand (Emergency Department Addition & Outpatient Ambulatory Care Centre)
 Network Table - Nodes

Node ID	Elevation m	Demand L/s	Head m	Pressure kPa	Pressure psi	Pressure psi
Junc J01	78.60	0.00	127.68	49.08	481.47	69.83
Junc J02	76.05	0.00	123.24	47.19	462.93	67.14
Junc J03	76.10	0.00	123.24	47.14	462.44	67.07
Junc J04	75.91	0.00	122.97	47.06	461.66	66.96
Junc J05	76.33	0.00	122.97	46.64	457.54	66.36
Junc J06	76.25	0.00	120.48	44.23	433.90	62.93
Junc J07	76.30	50.00	120.14	43.84	430.07	62.38
Junc J08	76.49	0.00	120.21	43.72	428.89	62.21
Junc J09	76.55	50.00	119.78	43.23	424.09	61.51
Junc J10	76.80	0.00	120.36	43.56	427.32	61.98
Junc J11	72.45	7.90	121.31	48.86	479.32	69.52
Junc J12	72.57	0.00	121.71	49.14	482.06	69.92
Junc J13	72.49	0.00	121.71	49.22	482.85	70.03
Junc J14	71.93	0.00	121.71	49.78	488.34	70.83
Junc J15	72.50	0.00	121.71	49.21	482.75	70.02
Junc J16	72.69	0.00	121.75	49.06	481.28	69.80
Junc J17	71.91	0.00	121.75	49.84	488.93	70.91
Junc J18	73.35	0.00	121.75	48.40	474.80	68.86
Junc J19	73.45	0.00	121.75	48.30	473.82	68.72
Junc J20	73.72	0.00	122.16	48.44	475.20	68.92
Junc J21	73.72	0.00	122.16	48.44	475.20	68.92
Junc J22	74.41	0.00	123.53	49.12	481.87	69.89
Junc J23	74.45	0.00	123.53	49.08	481.47	69.83
Junc J24	74.77	0.00	124.06	49.29	483.53	70.13
Junc J25	74.80	0.00	124.06	49.26	483.24	70.09
Junc J26	76.15	0.00	124.60	48.45	475.29	68.94
Junc J27	76.49	0.00	124.87	48.38	474.61	68.84
Junc J28	76.50	0.00	124.87	48.37	474.51	68.82
Junc J29	76.50	0.00	125.06	48.56	476.37	69.09
Junc J30	76.75	4.60	125.06	48.31	473.92	68.74
Junc J31	76.60	0.00	126.53	49.93	489.81	71.04
Junc J32	76.60	0.00	126.53	49.93	489.81	71.04
Junc J33	76.60	0.00	126.53	49.93	489.81	71.04
Junc J34	78.60	0.00	127.66	49.06	481.28	69.80
Junc J35	80.60	0.00	127.68	47.08	461.85	66.99
Junc J36	80.60	0.00	127.68	47.08	461.85	66.99
Resrv R1	127.70	-41.60	127.70	0.00	0.00	0.00
Resrv R2	127.70	-70.90	127.70	0.00	0.00	0.00

Min= 61.51
 Max= 71.04

Max Day + Fire Flow Demand (Emergency Department Addition & Outpatient Ambulatory Care Centre)
 Network Table - Links

Link ID	Length m	Diameter mm	Roughness	Flow L/s	Velocity m/s	Unit Headloss m/km
Pipe P01	6	300	120	-71.2	1.01	3.97
Pipe P02	132	200	110	71.2	2.27	33.62
Pipe P03	49	150	100	0.0	0.00	0.00
Pipe P04	8	200	110	71.2	2.27	33.62
Pipe P05	4.8	200	110	0.0	0.00	0.00
Pipe P06	74	200	110	71.2	2.27	33.62
Pipe P07	4	150	100	50.0	2.83	84.68
Pipe P08	77	200	110	21.2	0.67	3.56
Pipe P09	5	150	100	50.0	2.83	84.68
Pipe P10	25	200	110	-28.8	0.92	6.30
Pipe P11	150	200	110	-28.8	0.92	6.30
Pipe P12	40.5	200	110	-36.7	1.17	9.87
Pipe P13	8	200	110	0.0	0.00	0.00
Pipe P14	2.6	150	100	0.0	0.00	0.00
Pipe P15	4.8	150	100	0.0	0.00	0.00
Pipe P16	4.5	200	110	-36.7	1.17	9.87
Pipe P17	8.5	200	110	0.0	0.00	0.00
Pipe P18	7.4	200	110	0.0	0.00	0.00
Pipe P19	8.2	150	100	0.0	0.00	0.00
Pipe P20	41	200	110	-36.7	1.17	9.87
Pipe P21	2	150	100	0.0	0.00	0.00
Pipe P22	139	200	110	-36.7	1.17	9.87
Pipe P23	7	150	100	0.0	0.00	0.00
Pipe P24	54	200	110	-36.7	1.17	9.87
Pipe P25	7	150	100	0.0	0.00	0.00
Pipe P26	54	200	110	-36.7	1.17	9.87
Pipe P27	28	200	110	-36.7	1.17	9.87
Pipe P28	9	150	100	0.0	0.00	0.00
Pipe P29	19	200	110	-36.7	1.17	9.87
Pipe P30	20	200	110	4.6	0.15	0.21
Pipe P31	120	200	110	-41.3	1.32	12.28
Pipe P32	27	200	110	0.0	0.00	0.00
Pipe P33	16	150	100	0.0	0.00	0.00
Pipe P34	92	200	110	-41.3	1.32	12.28
Pipe P35	12	300	120	-41.3	0.58	1.45
Pipe P36	7	150	100	0.0	0.00	0.00
Pipe P37	13	300	120	41.3	0.58	1.45

3045 Baseline Road - Queensway Carleton Hospital Part 4 Expansion
Water Model Results

Max Day + Fire Flow Demand (Ambulance Garage)
 Network Table - Nodes

Node ID	Elevation m	Demand L/s	Head m	Pressure kPa	Pressure psi
Junc J01	78.60	0.00	127.79	49.19	482.55
Junc J02	76.05	0.00	126.52	50.47	495.11
Junc J03	76.10	0.00	126.52	50.42	494.62
Junc J04	75.91	0.00	126.44	50.53	495.70
Junc J05	76.33	0.00	126.44	50.11	491.58
Junc J06	76.25	0.00	125.73	49.48	485.40
Junc J07	76.30	0.00	125.73	49.43	484.91
Junc J08	76.49	0.00	124.98	48.49	475.69
Junc J09	76.55	50.00	124.56	48.01	470.98
Junc J10	76.80	0.00	125.02	48.22	473.04
Junc J11	72.45	7.90	125.26	52.81	518.07
Junc J12	72.57	0.00	125.41	52.84	518.36
Junc J13	72.49	0.00	125.41	52.92	519.15
Junc J14	71.93	0.00	125.41	53.48	524.64
Junc J15	72.50	0.00	125.41	52.91	519.05
Junc J16	72.69	0.00	125.43	52.74	517.38
Junc J17	71.91	0.00	125.43	53.52	525.03
Junc J18	73.35	0.00	125.43	52.08	510.90
Junc J19	73.45	0.00	125.43	51.98	509.92
Junc J20	73.72	0.00	125.58	51.86	508.75
Junc J21	73.72	0.00	125.58	51.86	508.75
Junc J22	74.41	0.00	126.09	51.68	506.98
Junc J23	74.45	0.00	126.09	51.64	506.59
Junc J24	74.77	0.00	126.29	51.52	505.41
Junc J25	74.80	0.00	126.29	51.49	505.12
Junc J26	76.15	0.00	126.49	50.34	493.84
Junc J27	76.49	0.00	126.59	50.10	491.48
Junc J28	76.50	0.00	126.59	50.09	491.38
Junc J29	76.50	0.00	126.66	50.16	492.07
Junc J30	76.75	4.60	126.66	49.91	489.62
Junc J31	76.60	0.00	127.30	50.70	497.37
Junc J32	76.60	0.00	127.30	50.70	497.37
Junc J33	76.60	0.00	127.30	50.70	497.37
Junc J34	78.60	0.00	127.78	49.18	482.46
Junc J35	80.60	0.00	127.79	47.19	462.93
Junc J36	80.60	0.00	127.79	47.19	462.93
Resrv R1	127.80	-26.33	127.80	0.00	0.00
Resrv R2	127.80	-36.17	127.80	0.00	0.00

Min= 67.14
 Max= 76.15

Max Day + Fire Flow Demand (Ambulance Garage)
 Network Table - Links

Link ID	Length m	Diameter mm	Roughness	Flow L/s	Velocity m/s	Unit Headloss m/km
Pipe P01	6	300	120	-36.3	0.51	1.14
Pipe P02	132	200	110	36.3	1.16	9.66
Pipe P03	49	150	100	0.0	0.00	0.00
Pipe P04	8	200	110	36.3	1.16	9.66
Pipe P05	4.8	200	110	0.0	0.00	0.00
Pipe P06	74	200	110	36.3	1.16	9.66
Pipe P07	4	150	100	0.0	0.00	0.00
Pipe P08	77	200	110	36.3	1.16	9.66
Pipe P09	5	150	100	50.0	2.83	84.68
Pipe P10	25	200	110	-13.7	0.44	1.59
Pipe P11	150	200	110	-13.7	0.44	1.59
Pipe P12	40.5	200	110	-21.6	0.69	3.69
Pipe P13	8	200	110	0.0	0.00	0.00
Pipe P14	2.6	150	100	0.0	0.00	0.00
Pipe P15	4.8	150	100	0.0	0.00	0.00
Pipe P16	4.5	200	110	-21.6	0.69	3.70
Pipe P17	8.5	200	110	0.0	0.00	0.00
Pipe P18	7.4	200	110	0.0	0.00	0.00
Pipe P19	8.2	150	100	0.0	0.00	0.00
Pipe P20	41	200	110	-21.6	0.69	3.69
Pipe P21	2	150	100	0.0	0.00	0.00
Pipe P22	139	200	110	-21.6	0.69	3.69
Pipe P23	7	150	100	0.0	0.00	0.00
Pipe P24	54	200	110	-21.6	0.69	3.69
Pipe P25	7	150	100	0.0	0.00	0.00
Pipe P26	54	200	110	-21.6	0.69	3.69
Pipe P27	28	200	110	-21.6	0.69	3.69
Pipe P28	9	150	100	0.0	0.00	0.00
Pipe P29	19	200	110	-21.6	0.69	3.69
Pipe P30	20	200	110	4.6	0.15	0.21
Pipe P31	120	200	110	-26.2	0.83	5.28
Pipe P32	27	200	110	0.0	0.00	0.00
Pipe P33	16	150	100	0.0	0.00	0.00
Pipe P34	92	200	110	-26.2	0.83	5.28
Pipe P35	12	300	120	-26.2	0.37	0.62
Pipe P36	7	150	100	0.0	0.00	0.00
Pipe P37	13	300	120	26.2	0.37	0.62

3045 Baseline Road - Queensway Carleton Hospital Part 4 Expansion
Water Model Results

Peak Hour Demand
 Network Table - Nodes

Node ID	Elevation m	Demand L/s	Head m	Pressure kPa	Pressure psi
Junc J01	78.60	0.00	127.30	48.70	477.75
Junc J02	76.05	0.00	127.19	51.14	501.68
Junc J03	76.10	0.00	127.19	51.09	501.19
Junc J04	75.91	0.00	127.18	51.27	502.96
Junc J05	76.33	0.00	127.18	50.85	498.84
Junc J06	76.25	0.00	127.12	50.87	499.03
Junc J07	76.30	0.00	127.12	50.82	498.54
Junc J08	76.49	0.00	127.06	50.57	496.09
Junc J09	76.55	0.00	127.06	50.51	495.50
Junc J10	76.80	0.00	127.04	50.24	492.85
Junc J11	72.45	14.30	126.91	54.46	534.25
Junc J12	72.57	0.00	126.92	54.35	533.17
Junc J13	72.49	0.00	126.92	54.43	533.96
Junc J14	71.93	0.00	126.92	54.99	539.45
Junc J15	72.50	0.00	126.92	54.42	533.86
Junc J16	72.69	0.00	126.92	54.23	532.00
Junc J17	71.91	0.00	126.92	55.01	539.65
Junc J18	73.35	0.00	126.92	53.57	525.52
Junc J19	73.45	0.00	126.92	53.47	524.54
Junc J20	73.72	0.00	126.93	53.21	521.99
Junc J21	73.72	0.00	126.93	53.21	521.99
Junc J22	74.41	0.00	126.96	52.55	515.52
Junc J23	74.45	0.00	126.96	52.51	515.12
Junc J24	74.77	0.00	126.97	52.20	512.08
Junc J25	74.80	0.00	126.97	52.17	511.79
Junc J26	76.15	0.00	126.99	50.84	498.74
Junc J27	76.49	0.00	126.99	50.50	495.41
Junc J28	76.50	0.00	126.99	50.49	495.31
Junc J29	76.50	0.00	127.00	50.50	495.41
Junc J30	76.75	8.20	126.98	50.23	492.76
Junc J31	76.60	0.00	127.17	50.57	496.09
Junc J32	76.60	0.00	127.17	50.57	496.09
Junc J33	76.60	0.00	127.17	50.57	496.09
Junc J34	78.60	0.00	127.30	48.70	477.75
Junc J35	80.60	0.00	127.30	46.70	458.13
Junc J36	80.60	0.00	127.30	46.70	458.13
Resrv R1	127.30	-12.93	127.30	0.00	0.00
Resrv R2	127.30	-9.57	127.30	0.00	0.00

Min= 66.45
 Max= 78.27

Peak Hour Demand
 Network Table - Links

Link ID	Length m	Diameter mm	Roughness	Flow L/s	Velocity m/s	Unit Headloss m/km
Pipe P01	6	300	120	-9.6	0.14	0.10
Pipe P02	132	200	110	9.6	0.31	0.83
Pipe P03	49	150	100	0.0	0.00	0.00
Pipe P04	8	200	110	9.6	0.31	0.83
Pipe P05	4.8	200	110	0.0	0.00	0.00
Pipe P06	74	200	110	9.6	0.31	0.83
Pipe P07	4	150	100	0.0	0.00	0.00
Pipe P08	77	200	110	9.6	0.31	0.83
Pipe P09	5	150	100	0.0	0.00	0.00
Pipe P10	25	200	110	9.6	0.31	0.83
Pipe P11	150	200	110	9.6	0.31	0.83
Pipe P12	40.5	200	110	-4.7	0.15	0.22
Pipe P13	8	200	110	0.0	0.00	0.00
Pipe P14	2.6	150	100	0.0	0.00	0.00
Pipe P15	4.8	150	100	0.0	0.00	0.00
Pipe P16	4.5	200	110	-4.7	0.15	0.22
Pipe P17	8.5	200	110	0.0	0.00	0.00
Pipe P18	7.4	200	110	0.0	0.00	0.00
Pipe P19	8.2	150	100	0.0	0.00	0.00
Pipe P20	41	200	110	-4.7	0.15	0.22
Pipe P21	2	150	100	0.0	0.00	0.00
Pipe P22	139	200	110	-4.7	0.15	0.22
Pipe P23	7	150	100	0.0	0.00	0.00
Pipe P24	54	200	110	-4.7	0.15	0.22
Pipe P25	7	150	100	0.0	0.00	0.00
Pipe P26	54	200	110	-4.7	0.15	0.22
Pipe P27	28	200	110	-4.7	0.15	0.22
Pipe P28	9	150	100	0.0	0.00	0.00
Pipe P29	19	200	110	-4.7	0.15	0.22
Pipe P30	20	200	110	8.2	0.26	0.61
Pipe P31	120	200	110	-12.9	0.41	1.42
Pipe P32	27	200	110	0.0	0.00	0.00
Pipe P33	16	150	100	0.0	0.00	0.00
Pipe P34	92	200	110	-12.9	0.41	1.42
Pipe P35	12	300	120	-12.9	0.18	0.17
Pipe P36	7	150	100	0.0	0.00	0.00
Pipe P37	13	300	120	12.9	0.18	0.17

3045 Baseline Road - Queensway Carleton Hospital Part 4 Expansion
Water Model Results

Max HGL

Network Table - Nodes

Node ID	Elevation m	Demand L/s	Head m	Pressure kPa	Pressure psi
Junc J01	78.60	0.00	131.90	53.30	522.87
Junc J02	76.05	0.00	131.86	55.81	547.50
Junc J03	76.10	0.00	131.86	55.76	547.01
Junc J04	75.91	0.00	131.86	55.95	548.87
Junc J05	76.33	0.00	131.86	55.53	544.75
Junc J06	76.25	0.00	131.84	55.59	545.34
Junc J07	76.30	0.00	131.84	55.54	544.85
Junc J08	76.49	0.00	131.82	55.33	542.79
Junc J09	76.55	0.00	131.82	55.27	542.20
Junc J10	76.80	0.00	131.81	55.01	539.65
Junc J11	72.45	7.90	131.77	59.32	581.93
Junc J12	72.57	0.00	131.77	59.20	580.75
Junc J13	72.49	0.00	131.77	59.28	581.54
Junc J14	71.93	0.00	131.77	59.84	587.03
Junc J15	72.50	0.00	131.77	59.27	581.44
Junc J16	72.69	0.00	131.77	59.08	579.57
Junc J17	71.91	0.00	131.77	59.86	587.23
Junc J18	73.35	0.00	131.77	58.42	573.10
Junc J19	73.45	0.00	131.77	58.32	572.12
Junc J20	73.72	0.00	131.78	58.06	569.57
Junc J21	73.72	0.00	131.78	58.06	569.57
Junc J22	74.41	0.00	131.79	57.38	562.90
Junc J23	74.45	0.00	131.79	57.34	562.51
Junc J24	74.77	0.00	131.79	57.02	559.37
Junc J25	74.80	0.00	131.79	56.99	559.07
Junc J26	76.15	0.00	131.79	55.64	545.83
Junc J27	76.49	0.00	131.80	55.31	542.59
Junc J28	76.50	0.00	131.80	55.30	542.49
Junc J29	76.50	0.00	131.80	55.30	542.49
Junc J30	76.75	4.60	131.79	55.04	539.94
Junc J31	76.60	0.00	131.85	55.25	542.00
Junc J32	76.60	0.00	131.85	55.25	542.00
Junc J33	76.60	0.00	131.85	55.25	542.00
Junc J34	78.60	0.00	131.90	53.30	522.87
Junc J35	80.60	0.00	131.90	51.30	503.25
Junc J36	80.60	0.00	131.90	51.30	503.25
Resrv R1	131.90	-7.19	131.90	0.00	0.00
Resrv R2	131.90	-5.31	131.90	0.00	0.00

Min= 72.99
 Max= 85.17


Max HGL

Network Table - Links

Link ID	Length m	Diameter mm	Roughness	Flow L/s	Velocity m/s	Unit Headloss m/km
Pipe P01	6	300	120	-5.3	0.08	0.03
Pipe P02	132	200	110	5.3	0.17	0.28
Pipe P03	49	150	100	0.0	0.00	0.00
Pipe P04	8	200	110	5.3	0.17	0.28
Pipe P05	4.8	200	110	0.0	0.00	0.00
Pipe P06	74	200	110	5.3	0.17	0.28
Pipe P07	4	150	100	0.0	0.00	0.00
Pipe P08	77	200	110	5.3	0.17	0.28
Pipe P09	5	150	100	0.0	0.00	0.00
Pipe P10	25	200	110	5.3	0.17	0.28
Pipe P11	150	200	110	5.3	0.17	0.28
Pipe P12	40.5	200	110	-2.6	0.08	0.07
Pipe P13	8	200	110	0.0	0.00	0.00
Pipe P14	2.6	150	100	0.0	0.00	0.00
Pipe P15	4.8	150	100	0.0	0.00	0.00
Pipe P16	4.5	200	110	-2.6	0.08	0.07
Pipe P17	8.5	200	110	0.0	0.00	0.00
Pipe P18	7.4	200	110	0.0	0.00	0.00
Pipe P19	8.2	150	100	0.0	0.00	0.00
Pipe P20	41	200	110	-2.6	0.08	0.07
Pipe P21	2	150	100	0.0	0.00	0.00
Pipe P22	139	200	110	-2.6	0.08	0.07
Pipe P23	7	150	100	0.0	0.00	0.00
Pipe P24	54	200	110	-2.6	0.08	0.07
Pipe P25	7	150	100	0.0	0.00	0.00
Pipe P26	54	200	110	-2.6	0.08	0.07
Pipe P27	28	200	110	-2.6	0.08	0.07
Pipe P28	9	150	100	0.0	0.00	0.00
Pipe P29	19	200	110	-2.6	0.08	0.07
Pipe P30	20	200	110	4.6	0.15	0.21
Pipe P31	120	200	110	-7.2	0.23	0.48
Pipe P32	27	200	110	0.0	0.00	0.00
Pipe P33	16	150	100	0.0	0.00	0.00
Pipe P34	92	200	110	-7.2	0.23	0.48
Pipe P35	12	300	120	-7.2	0.10	0.06
Pipe P36	7	150	100	0.0	0.00	0.00
Pipe P37	13	300	120	7.2	0.10	0.06

APPENDIX E

Engineering Plans



NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWER LINES AND OVERHEAD UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.



Queensway Carleton
Hospital

1. ISSUED FOR SITE PLAN CONTROL APPROVAL


NOV 28/25 FST

No. REVISION DATE BY

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FST	APPROVED

FOR REVIEW ONLY	
	NOVATECH Engineers, Planners & Landscape Architects Suite 200, 220 Michael Clewlow Drive, Ottawa, Ontario K2B 7P6 (613) 254-9643 (613) 254-5567 www.novatech.ca

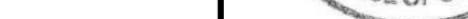
LOCATION	GENERAL PLAN OF SERVICES PART 4 EXPANSION	PROJECT NO.
CITY OF OTTAWA QUEENSWAY CARLETON HOSPITAL		123089
DRAWING NAME	GENERAL PLAN OF SERVICES PART 4 EXPANSION	REV #1
Telephone Facsimile Website	(613) 254-9643 (613) 254-5567 www.novatech.ca	DRAWING NO. 123089-GP1



NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS,
WATERMAINS, SEWERS AND OTHER
UNDERGROUND AND OVERGROUND UTILITIES AND
STRUCTURES IS NOT NECESSARILY SHOWN ON
THE CONTRACT DRAWINGS, AND WHERE SHOWN,
THE ACCURACY OF THE POSITION OF SUCH
UTILITIES AND STRUCTURES IS NOT GUARANTEED.
BEFORE STARTING WORK, DETERMINE THE EXACT
LOCATION OF ALL SUCH UTILITIES AND
STRUCTURES AND ASSUME ALL LIABILITY FOR
DAMAGE TO THEM.



Queensway Carleton
Hospital

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NOTE: THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWER LINES, UTILITY LINES, AND OVERHEAD UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.



Queensway Carleton
Hospital

REFER TO PLAN 123089-GR1 FOR CONTINUATION

REFER TO PLAN 123089-NDT FOR ADDITIONAL NOTES, DETAILS AND TABLES

1. ISSUED FOR SITE PLAN CONTROL APPROVAL	NOV 28/25	FST	SCALE	DESIGN
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				FST
				APPROVED
				FST

FOR REVIEW ONLY
<p>F. S. THAULI, P.Eng. PROFESSIONAL ENGINEER NOV 28/25</p> <p>LICENSED PROFESSIONAL ENGINEER PROVINCE OF ONTARIO NOV 28/25</p>

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 400 Blair Crescent
Ottawa, Ontario, Canada K2B 1P6
(613) 254-9643
(613) 254-5867
www.novatech.com

LOCATION
CITY OF OTTAWA
QUEENSWAY CARLETON HOSPITAL
DRAWING NAME
GRADING AND EROSION &
SEDIMENT CONTROL PLAN
PART 4 EXPANSION
PROJECT NO.
123089
REV.
REV #1
DRAWING NO.
123089
PRODUCT NO.
123089-GR1

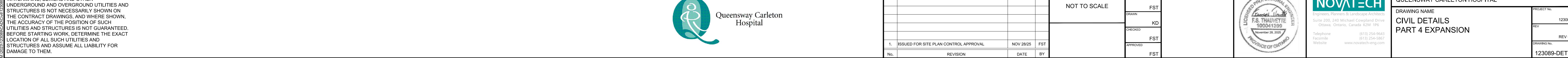

GENERAL NOTES:

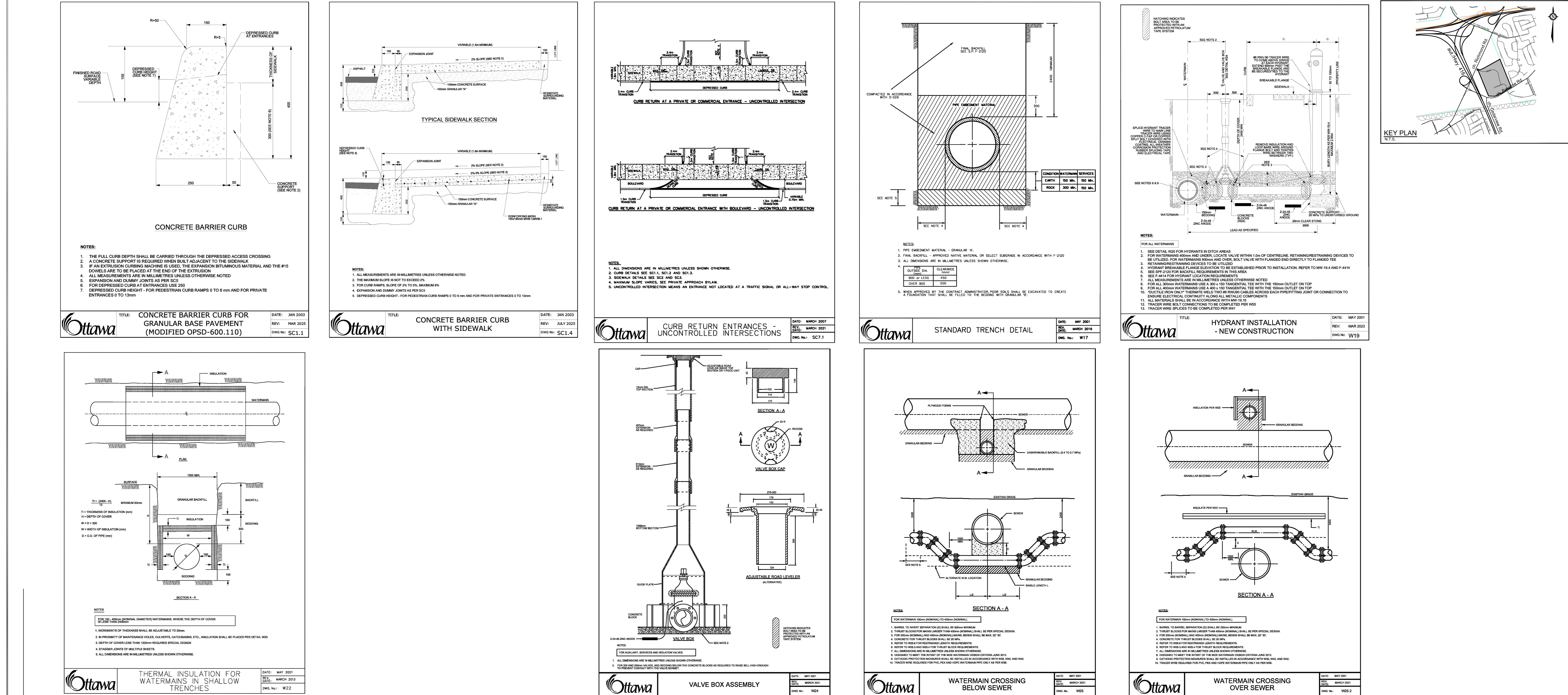
1. COORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
2. DETERMINE THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION. PROTECT AND ASSUME RESPONSIBILITY FOR ALL EXISTING UTILITIES NOT SHOWN ON THIS DRAWING.
3. OBTAIN ALL NECESSARY PERMITS AND APPROVALS FROM THE CITY OF OTTAWA BEFORE COMMENCING CONSTRUCTION.
4. BEFORE COMMENCING CONSTRUCTION OBTAIN AND PROVIDE PROOF OF COMPREHENSIVE, ALL RISK AND OPERATIONAL LIABILITY INSURANCE FOR \$5,000,000.00. INSURANCE POLICY TO INCLUDE THE CONTRACTOR AND ARCHITECTS AS NAMED.
5. COMPLY WITH ALL WORKING DRAWINGS, THE MOST CURRENT CITY OF OTTAWA STANDARDS AND SPECIFICATIONS DURING THE CURRENT CONSTRUCTION CYCLE. ALL CONTRACTORS AND ARCHITECTS ARE RESPONSIBLE FOR ALL RELEVANT REFERENCES TO OPSIS, OPSD & AWA GUIDELINES - ALL CURRENT VERSIONS AND "AS AMENDED".
6. RESTORE ALL WORKED-ON AREAS ON-SITE AND OFF-SITE, INCLUDING TRENCHES AND SURFACES ON PAVED ROAD ALLOWANCES TO DENSITIES AND STANDARDS AS SHOWN ON THE CONTRACT DRAWINGS. THE CONTRACTOR AND ARCHITECTS ARE RESPONSIBLE FOR ALL RELEVANT REFERENCES TO OPSIS, OPSD & AWA GUIDELINES - ALL CURRENT VERSIONS AND "AS AMENDED".
7. REMOVE FROM SITE ALL EXCESS EXCAVATED MATERIAL, ORGANIC MATERIAL AND DEBRIS UNLESS OTHERWISE INSTRUCTED BY ENGINEER. EXCAVATE AND REMOVE FROM SITE AND CONTAMINATED MATERIAL. ALL CONTAMINATED MATERIAL SHALL BE DISPOSED OF AT A LICENSED LANDFILL FACILITY.
8. LEAVE EXCAVATED AREAS CLEAN AND SMOOTH.
9. REFER TO THE GEOTECHNICAL REPORT (CA00371A-1722, DATED APRIL 10, 2016) PREPARED BY WSP CANADA INC. FOR SUBSURFACE CONDITIONS, CONSTRUCTION RECOMMENDATIONS, AND GEOTECHNICAL INSPECTION REQUIREMENTS. THE GEOTECHNICAL CONSULTANT SHALL REVIEW ON-SITE CONDITIONS AFTER EXCAVATION PRIOR TO PLACEMENT OF THE GRANULAR MATERIAL.
10. REFER TO THE 2008 PAVING & SITE SERVICES REPORT (TP-2008-GR2) AND THE "OCH 1" & STORMWATER MANAGEMENT REPORT (R-2025-GR2), PREPARED BY NOVATECH ENGINEERING CONSULTANTS LTD.
11. SAW CUT AND KEY GRIND ASPHALT AT ALL ROAD CUTS AND ASPHALT TIE POINTS AS PER CITY OF OTTAWA STANDARDS (R10).
12. PROVIDE LINE PAVING PAINTING.
13. CONTRACTOR TO PROVIDE THE CONSULTANT WITH GRADING PLANS AS-BUILT ELEVATIONS OF ALL DESIGN GRADES SHOWN ON PLANS 123089-GR1 AND 123089-GR2.
14. CONTRACTOR TO PROVIDE THE CONSULTANT WITH SERVING PLANS OF 123089-P1 & 123089-GP2 INDICATING ALL SERVING AS-BUILT ELEVATIONS, STRUCTURE LOCATIONS, VALVE AND HYDRANT LOCATIONS, TMM ELEVATIONS AND ANY ALIGNMENT CHANGES, ETC.

SEWER NOTES:

1. SUPPLY AND CONSTRUCT ALL SEWERS AND APPURTENANCES IN ACCORDANCE WITH THE MOST CURRENT CITY OF OTTAWA STANDARDS AND SPECIFICATIONS - ALL CURRENT VERSIONS AND "AS AMENDED".
2. SPECIFICATIONS

REFERENCE	SPEC. NO.
OPSIS	705.010
STORM / SANITARY MANHOLE (1200mm)	701.011
STORM / SANITARY MANHOLE (1500mm)	701.012
STORM / CATCHBASIN (600x600mm)	701.013
STORM / CATCHBASIN (1800mm)	701.014
STORM / CATCHBASIN (2400mm)	701.015
STORM / CATCHBASIN (3000mm)	701.016
STORM / CATCHBASIN (3600mm)	701.017
STORM / CATCHBASIN (4200mm)	701.018
STORM / CATCHBASIN (4800mm)	701.019
STORM / CATCHBASIN (5400mm)	701.020
STORM / CATCHBASIN (6000mm)	701.021
STORM / CATCHBASIN (6600mm)	701.022
STORM / CATCHBASIN (7200mm)	701.023
STORM / CATCHBASIN (7800mm)	701.024
STORM / CATCHBASIN (8400mm)	701.025
STORM / CATCHBASIN (9000mm)	701.026
STORM / CATCHBASIN (9600mm)	701.027
STORM / CATCHBASIN (10200mm)	701.028
STORM / CATCHBASIN (10800mm)	701.029
STORM / CATCHBASIN (11400mm)	701.030
STORM / CATCHBASIN (12000mm)	701.031
STORM / CATCHBASIN (12600mm)	701.032
STORM / CATCHBASIN (13200mm)	701.033
STORM / CATCHBASIN (13800mm)	701.034
STORM / CATCHBASIN (14400mm)	701.035
STORM / CATCHBASIN (15000mm)	701.036
STORM / CATCHBASIN (15600mm)	701.037
STORM / CATCHBASIN (16200mm)	701.038
STORM / CATCHBASIN (16800mm)	701.039
STORM / CATCHBASIN (17400mm)	701.040
STORM / CATCHBASIN (18000mm)	701.041
STORM / CATCHBASIN (18600mm)	701.042
STORM / CATCHBASIN (19200mm)	701.043
STORM / CATCHBASIN (19800mm)	701.044
STORM / CATCHBASIN (20400mm)	701.045
STORM / CATCHBASIN (21000mm)	701.046
STORM / CATCHBASIN (21600mm)	701.047
STORM / CATCHBASIN (22200mm)	701.048
STORM / CATCHBASIN (22800mm)	701.049
STORM / CATCHBASIN (23400mm)	701.050
STORM / CATCHBASIN (24000mm)	701.051
STORM / CATCHBASIN (24600mm)	701.052
STORM / CATCHBASIN (25200mm)	701.053
STORM / CATCHBASIN (25800mm)	701.054
STORM / CATCHBASIN (26400mm)	701.055
STORM / CATCHBASIN (27000mm)	701.056
STORM / CATCHBASIN (27600mm)	701.057
STORM / CATCHBASIN (28200mm)	701.058
STORM / CATCHBASIN (28800mm)	701.059
STORM / CATCHBASIN (29400mm)	701.060
STORM / CATCHBASIN (30000mm)	701.061
STORM / CATCHBASIN (30600mm)	701.062
STORM / CATCHBASIN (31200mm)	701.063
STORM / CATCHBASIN (31800mm)	701.064
STORM / CATCHBASIN (32400mm)	701.065
STORM / CATCHBASIN (33000mm)	701.066
STORM / CATCHBASIN (33600mm)	701.067
STORM / CATCHBASIN (34200mm)	701.068
STORM / CATCHBASIN (34800mm)	701.069
STORM / CATCHBASIN (35400mm)	701.070
STORM / CATCHBASIN (36000mm)	701.071
STORM / CATCHBASIN (36600mm)	701.072
STORM / CATCHBASIN (37200mm)	701.073
STORM / CATCHBASIN (37800mm)	701.074
STORM / CATCHBASIN (38400mm)	701.075
STORM / CATCHBASIN (39000mm)	701.076
STORM / CATCHBASIN (39600mm)	701.077
STORM / CATCHBASIN (40200mm)	701.078
STORM / CATCHBASIN (40800mm)	701.079
STORM / CATCHBASIN (41400mm)	701.080
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STORM / CATCHBASIN (43200mm)	701.083
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STORM / CATCHBASIN (45600mm)	701.087
STORM / CATCHBASIN (46200mm)	701.088
STORM / CATCHBASIN (46800mm)	701.089
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STORM / CATCHBASIN (48000mm)	701.091
STORM / CATCHBASIN (48600mm)	701.092
STORM / CATCHBASIN (49200mm)	701.093
STORM / CATCHBASIN (49800mm)	701.094
STORM / CATCHBASIN (50400mm)	701.095
STORM / CATCHBASIN (51000mm)	701.096
STORM / CATCHBASIN (51600mm)	701.097
STORM / CATCHBASIN (52200mm)	701.098
STORM / CATCHBASIN (52800mm)	701.099
STORM / CATCHBASIN (53400mm)	701.100
STORM / CATCHBASIN (54000mm)	701.101
STORM / CATCHBASIN (54600mm)	701.102
STORM / CATCHBASIN (55200mm)	701.103
STORM / CATCHBASIN (55800mm)	701.104
STORM / CATCHBASIN (56400mm)	701.105
STORM / CATCHBASIN (57000mm)	701.106
STORM / CATCHBASIN (57600mm)	701.107
STORM / CATCHBASIN (58200mm)	701.108
STORM / CATCHBASIN (58800mm)	701.109
STORM / CATCHBASIN (59400mm)	701.110
STORM / CATCHBASIN (60000mm)	701.111
STORM / CATCHBASIN (60600mm)	701.112
STORM / CATCHBASIN (61200mm)	701.113
STORM / CATCHBASIN (61800mm)	701.114
STORM / CATCHBASIN (62400mm)	701.115
STORM / CATCHBASIN (63000mm)	701.116
STORM / CATCHBASIN (63600mm)	701.117
STORM / CATCHBASIN (64200mm)	701.118
STORM / CATCHBASIN (64800mm)	701.119
STORM / CATCHBASIN (65400mm)	701.120
STORM / CATCHBASIN (66000mm)	701.121
STORM / CATCHBASIN (66600mm)	701.122
STORM / CATCHBASIN (67200mm)	701.123
STORM / CATCHBASIN (67800mm)	701.124
STORM / CATCHBASIN (68400mm)	701.125
STORM / CATCHBASIN (69000mm)	701.126
STORM / CATCHBASIN (69600mm)	701.127
STORM / CATCHBASIN (70200mm)	701.128
STORM / CATCHBASIN (70800mm)	701.129
STORM / CATCHBASIN (71400mm)	701.130
STORM / CATCHBASIN (72000mm)	701.131
STORM / CATCHBASIN (72600mm)	701.132
STORM / CATCHBASIN (73200mm)	701.133
STORM / CATCHBASIN (73800mm)	701.134
STORM / CATCHBASIN (74400mm)	701.135
STORM / CATCHBASIN (75000mm)	701.136
STORM / CATCHBASIN (75600mm)	701.137
STORM / CATCHBASIN (76200mm)	701.138
STORM / CATCHBASIN (76800mm)	701.139
STORM / CATCHBASIN (77400mm)	701.140
STORM / CATCHBASIN (78000mm)	701.141
STORM / CATCHBASIN (78600mm)	701.142
STORM / CATCHBASIN (79200mm)	701.143
STORM / CATCHBASIN (79800mm)	701.144
STORM / CATCHBASIN (80400mm)	701.145
STORM / CATCHBASIN (81000mm)	701.146
STORM / CATCHBASIN (81600mm)	701.147
STORM / CATCHBASIN (82200mm)	701.148
STORM / CATCHBASIN (82800mm)	701.149
STORM / CATCHBASIN (83400mm)	701.150
STORM / CATCHBASIN (84000mm)	701.151
STORM / CATCHBASIN (84600mm)	701.152
STORM / CATCHBASIN (85200mm)	701.153
STORM / CATCHBASIN (85800mm)	701.154
STORM / CATCHBASIN (86400mm)	701.155
STORM / CATCHBASIN (87000mm)	701.156
STORM / CATCHBASIN (87600mm)	701.157
STORM / CATCHBASIN (88200mm)	701.158
STORM / CATCHBASIN (88800mm)	701.159
STORM / CATCHBASIN (89400mm)	701.160
STORM / CATCHBASIN (90000mm)	701.161
STORM / CATCHBASIN (90600mm)	701.162
STORM / CATCHBASIN (91200mm)	701.163
STORM / CATCHBASIN (91800mm)	701.164
STORM / CATCHBASIN (92400mm)	701.165
STORM / CATCHBASIN (93000mm)	701.166
STORM / CATCHBASIN (93600mm)	701.167
STORM / CATCHBASIN (94200mm)	701.168
STORM / CATCHBASIN (94800mm)	701.169
STORM / CATCHBASIN (95400mm)	701.170
STORM / CATCHBASIN (96000mm)	701.171
STORM / CATCHBASIN (96600mm)	701.172
STORM / CATCHBASIN (97200mm)	701.173
STORM / CATCHBASIN (97800mm)	701.174
STORM / CATCHBASIN (98400mm)	701.175
STORM / CATCHBASIN (99000mm)	701.176
STORM / CATCHBASIN (99600mm)	701.177
STORM / CATCHBASIN (100200mm)	701.178
STORM / CATCHBASIN (100800mm)	701.179
STORM / CATCHBASIN (101400mm)	701.180
STORM / CATCHBASIN (102000mm)	701.181
STORM / CATCHBASIN (102600mm)	701.182
STORM / CATCHBASIN (103200mm)	701.183
STORM / CATCHBASIN (103800mm)	701.184
STORM / CATCHBASIN (104400mm)	701.185
STORM / CATCHBASIN (105000mm)	701.186
STORM / CATCHBASIN (105600mm)	701.187
STORM / CATCHBASIN (106200mm)	701.188
STORM / CATCHBASIN (106800mm)	701.189
STORM / CATCHBASIN (107400mm)	701.190
STORM / CATCHBASIN (108000mm)	701.191





NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS,
WATERMAINS, SEWERS AND OTHER
UNDERGROUND AND OVERGROUND UTILITIES AND
STRUCTURES IS NOT NECESSARILY SHOWN ON
THE CONTRACT DRAWINGS, AND WHERE SHOWN,
THE ACCURACY OF THE POSITION OF SUCH
UTILITIES AND STRUCTURES IS NOT GUARANTEED.
BEFORE STARTING WORK, DETERMINE THE EXACT
LOCATION OF ALL SUCH UTILITIES AND
STRUCTURES AND ASSUME ALL LIABILITY FOR
DAMAGE TO THEM.



Queensway Carleton Hospital

ALL PROJECT NOTES, DETAILS AND SPECIFICATIONS ARE
TO MEET THE MOST CURRENT AND AMENDED VERSIONS
OF THE CITY OF OTTAWA AND PROVINCIAL STANDARDS

THIS PLAN IS TO BE READ IN CONJUNCTION WITH CIVIL
ANS 123089-GP1, 123089-GP2, 123089-GR1, AND 123089-GR2

 CH Architects 123 Main Street Suite 1000 Ottawa, Ontario K1A 1M1 613-555-1234 613-555-1235 info@ch-architects.ca	LOCATION CITY OF OTTAWA QUEENSWAY CARLETON HOSPITAL
	DRAWING NAME CIVIL DETAILS PART 4 EXPANSION
	PROJECT No. 1234567890
	REV R
	DRAWING No. 123089-DF