265 CATHERINE STREET SERVICING AND STORMWATER MANAGEMENT REPORT

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Prepared for:
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1 Introduction

Stantec Consulting Ltd. has been commissioned by 11034936 Canada Inc. to prepare the following Servicing and Stormwater Management Report in support of a Site Plan Control application for the proposed development located at 265 Catherine Street in the City of Ottawa.

The site is 1.0 ha in area and is situated along the north side of Catherine Street, the south side of Arlington Avenue, the west side of Kent Street, and the east side of Lyon Street North. The site is currently zoned GM [1875] S271 and consists of the former Greyhound bus terminal. The site is bounded by Catherine Street to the south, Kent Street to the east, Lyon Street North to the west, and Arlington Avenue to the north, as shown in **Figure 1-1** below.

Figure 1-1: Key Plan of Site

The 1.0 ha site will be developed in two phases and comprises of three residential high-rises with 1021 residential units, two six-storey podiums connected via a pedestrian skybridge, and 1894.9 m^2 of commercial spaces, seven 3-storey townhouses, and a 0.1 ha park at the northeast of the site. The proposed buildings will include 436 one-bedroom units, 140 one-bedroom units with dens, 400 two-bedroom units with dens, and 45 three-bedroom units. Quadrangle Architects Ltd. has prepared a site plan dated May 8, 2023, which defines the proposed development (see **Appendix B**).

1.1 Objective

This site servicing and stormwater management (SWM) report presents a servicing scheme that is free of conflicts, provides on-site servicing in accordance with City of Ottawa Design Guidelines, and uses the existing municipal infrastructure in accordance with any limitations communicated during consultation with the City of Ottawa staff. Details of the existing infrastructure located within the Catherine Street, Lyon Street North, Kent Street, and Arlington Avenue right of ways (ROW) were obtained from available as-built drawings and site topographic survey.

Criteria and constraints provided by the City of Ottawa have been used as a basis for the detailed servicing design of the proposed development. Specific and potential development constraints to be addressed are as follows:

- Potable Water Servicing
    - Estimated water demands to characterize the proposed feed(s) for the proposed development which will be serviced from either the existing 127 mm diameter watermains within the Catherine Street and Kent Street ROWs, or the existing 203 mm diameter watermains within the Lyon Street North and Arlington Avenue ROWs.
    - Watermain servicing for the development is to be able to provide average day and maximum day (including peak hour) demands (i.e., non-emergency conditions) at pressures within the acceptable range of 345 to 552 kPa (50 to 80 psi)
    - Under fire flow (emergency) conditions, the water distribution system is to maintain a minimum pressure greater than 140 kPa (20 psi)
- Wastewater (Sanitary) Servicing
    - Define and size the sanitary service lateral which will be connected to the existing 300 mm diameter combined sewers within the Catherine Street ROW, the 450 mm diameter combined sewer within the Lyon Street North ROW, or the 375 mm diameter combined sewer within the Kent Street ROW.
- Storm Sewer Servicing
    - Define major and minor conveyance systems in conjunction with the proposed grading plan.
    - Determine the stormwater management storage requirements to meet the allowable release rate for the site.
    - Define and size the proposed storm service lateral that will be connected to the existing 525 mm and 600 mm diameter municipal storm sewer within the Arlington Avenue ROW.
- Prepare a grading plan in accordance with the proposed site plan and existing grades.

The accompanying drawings included in **Appendix G** of this report illustrate the proposed internal servicing scheme for the site.

2 Background

Documents referenced in preparing of this stormwater and servicing report for the 265 Catherine Street development include:

- *City of Ottawa Sewer Design Guidelines* (SDG), City of Ottawa, October 2012, including all subsequent technical bulletins
- *City of Ottawa Design Guidelines – Water Distribution*, City of Ottawa, July 2010, including all subsequent technical bulletins
- *Design Guidelines for Drinking Water Systems*, Ministry of the Environment, Conservation, and Parks (MECP), 2008
- *Fire Protection Water Supply Guideline* for Part 3 in the Ontario Building Code, Office of the Fire Marshal (OFM), October 2020
- *Water Supply for Public Fire Protection*, Fire Underwriters Survey (FUS), 2020
- *Geotechnical Investigation – Proposed Mixed-Use Development, 265 Catherine Street, Ottawa, Ontario,* Paterson Group Inc., August 13, 2021

3 Water Servicing

3.1 Background

The proposed building is in Pressure Zone 1W of the City of Ottawa's Water Distribution System. The existing watermains along the boundaries of the site consists of a 203 mm diameter duct iron watermain within Arlington Avenue, 203 mm diameter UCI watermain within Lyon Street North, and 127 mm diameter UCI watermains within Catherine and Kent Streets. There are existing fire hydrants on Arlington Avenue and Catherine Street. According to the Catherine Street as-builts dated 1999 provided by the City, there were plans to upsize the 127 mm diameter watermain to 203 mm, though there are no indications from the infrastructure maps on GeoOttawa or the provided UCC plans that the upsizing has taken place.

3.2 Water Demands

3.2.1 POTABLE (DOMESTIC) WATER DEMANDS

For each phase of development, water demands were estimated based on the unit mix of the site plan provided by Quadrangle Architects Ltd. (see **Appendix B**) Building A is a 26-storey mixed-use high-rise building with a six-storey podium with 73 one-bedroom units, 83 one bedroom units with dens, 108 two-bedroom units with dens, 25 three-bedroom units, and 830.9 m^2 of commercial space. Building B comprises of two mixed-use high-rise buildings, one 36-storey and the other 40-storey, with a six-storey podium with 363 one-bedroom units, 57 one-bedroom units with dens, 292 two-bedroom units with dens, 20 three-bedroom units, and 1064 m^2 of commercial space. Building C will be developed with 7 three-storey townhouse units.

The City of Ottawa Water Distribution Guidelines (July 2010) and ISTB 2021-03 Technical Bulletin were used to determine water demands based on projected population densities for residential areas and peaking factors. The population was estimated using an occupancy of 1.4 persons per unit for one-bedroom apartments, 2.1 persons per unit for one-bedroom with den, 3.1 persons per unit for two-bedroom apartments with den and three-bedroom apartments, and 2.7 persons per unit for townhouses.

A daily rate of 280 L/cap/day has been used to estimate average daily (AVDY) potable water demand for the residential units, and 28000 L/gross ha/day for the commercial spaces. Maximum day (MXDY) demands were determined by multiplying the AVDY demands by a factor of 2.5 for residential areas and 1.5 for commercial areas. Peak hourly (PKHR) demands were determined by multiplying the MXDY by a factor of 2.2 for residential areas and 1.8 for commercial areas. The estimated demands for each commercial and residential plot are summarized in **Table 3-1** below.

Table 3-1: Estimated Water Demands

Block/ Building	Comm. Area (m^2)	Total Apartment Units	Total Townhome Units	Population	AVDY (L/s)	MXDY (L/s)	PKHR (L/s)
A	1187.1	289	0	689	2.2	5.6	12.4
B	1064.0	732	0	1595	5.2	12.9	28.5
C	0	0	7	19	0.1	0.2	0.3
Total	**2251.1**	**1021**	**7**	**2303**	**7.5**	**18.7**	**41.2**

3.2.2 FIRE FLOW DEMANDS

Based on the site plan, the fire flow requirement was calculated in accordance with Fire Underwriters Survey (FUS) methodology. Through correspondence with the architect (see **Appendix A.4**), Buildings A and B will be constructed out of cast-in-place concrete, sprinklered, and the vertical separations between the floors will be equipped with all the necessary fire separations required by code.

As such, they were estimated based on a building of non-combustible construction type with two-hour fire rated structural members, and full protections of all vertical openings (one hour fire rating), and the final sprinkler design to conform to the NFPA 13 standard. The gross floor area of the largest floor + 25 % of the gross floor area of two additional floors were used in the FUS calculation for the two high-rises, as per Page 22 of the *Fire Underwriters Survey's Water Supply for Public Fire Protection* (2020).

As for Building C, through correspondence with the architect, it is confirmed that the set of three-storey townhouses would likely be of wood frame construction type and not sprinklered. Thus, the gross floor area of all three floors of the townhouses were used in the FUS calculation.

The worst-case scenario for the fire flow was at Buildings B and C, in which their required fire flows were both determined to be 166.7 L/s (10,000 L/min). Detailed fire flow calculations per the FUS methodology are provided in **Appendix A.2**.

3.3 Level of Servicing

3.3.1 BOUNDARY CONDITIONS

The estimated domestic potable water demands, and fire flow demands, were used to define the level of servicing required for the proposed development from the municipal watermain and hydrants within the Catherine Street, Lyon Street North, Kent Street, and Arlington Avenue ROWs. **Table 3-2** outlines the boundary conditions initially provided by the City of Ottawa on April 13, 2023.

Table 3-2: Boundary Conditions

Connection	Catherine Street	Lyon Street North	Arlington Avenue	Kent Street
Min. HGL (m)	80.4	104.9	105.9	97.8
Max. HGL (m)	115.3			115.2
Available Fire Flow (L/s)	46	187	270	64

Discussions with the mechanical consultant and architect indicate that as the towers exceeds 84 metres in height, the site will be required to be serviced from two separate watermains located on opposite sides of the site for adequate servicing. However, the initial boundary conditions provided indicate that the 127 mm diameter watermains on Catherine Street and Kent Street cannot provide the required fire flow, and spurred by the discussions with the mechanical consultant, it is proposed that the two watermains will need to be upsized to 203 mm to provide looping around the site and meet the required fire flow, which was met as shown in the upsized Kent Street and Catherine Street boundary conditions provided by the City on May 9, 2023 and outlined in **Table 3-3** below (See **Appendix A.3** for correspondence).

Table 3-3: Upsized Catherine and Kent Boundary Conditions

Connection	Catherine Street	Kent Street
Min. HGL (m)	95.7	105.9
Max. HGL (m)	115.2	115.3
MXDY+FF (166.7 L/s) (m)	84.8	95.4

3.3.2 ALLOWABLE DOMESTIC PRESSURES

The desired normal operating pressure range in occupied areas as per the City of Ottawa 2010 Water Distribution Design Guidelines is 345 kPa to 552 kPa (50 psi to 80 psi) under a condition of maximum daily flow and no less than 276 kPa (40 psi) under a condition of maximum hourly demand. Furthermore, the maximum pressure at any point in the water distribution should not exceed 689 kPa (100 psi) as per the Ontario Building/Plumbing Code; pressure reducing measures are required to service areas where pressures greater than 552 kPa (80 psi) are anticipated in occupied areas.

The proposed finished floor elevation at the ground floor of 68.9 m will serve as the ground floor elevation for the calculation of residual pressures at ground level. As per the boundary conditions, the on-site pressures are expected to range from 362.8 kPa to 453.9 kPa (52.6 psi to 65.8 psi) under normal operating conditions, which are within the normal operating pressure range defined by the City of Ottawa design guidelines as within 276 kPa to 552 kPa (40 psi to 80 psi). It is anticipated that booster pumps will be required to service the upper floors of the townhouses and towers.

3.3.3 ALLOWABLE FIRE FLOW PRESSURES

The boundary conditions provided by the City of Ottawa indicate that the upsized watermain within Kent Street is expected to maintain a residual pressure of 26.55 m equivalent to 260.3 kPa (37.7 psi) under the

worst-case fire flow conditions. This demonstrates that with the upsizing and complete looping, the watermains and nearby hydrants can provide the required fire flows while maintaining a residual pressure of 20 psi.

3.3.4 FIRE HYDRANT COVERAGE

The building will be sprinklered and two Siamese (fire department) connections are to be provided, one each at the main entrances along Catherine Street for each phase. There are five hydrants in the proximity of the proposed development site, as shown in **Figure 3-1**. The distance of each hydrant from the proposed building is less than 115 m.

According to the NFPA 1 Table 18.5.4.3 in Appendix I of the City of Ottawa Technical Bulletin ISTB-2018-02, a hydrant situated less than 76 m away from a building can supply a maximum capacity of 5,678 L/min. Hence, the required fire flow for this site (10,000 L/min) can be achieved with the two hydrants along Catherine Street. See **Appendix A.5** for fire hydrant coverage table calculations and NFPA Table 18.5.4.3.

Figure 3-1: Fire Hydrant Coverage Sketch

As per Section 3.2.5.16 of the Ontario Building Code, the distance between the fire department connection and hydrant cannot be more than 45 m and is unobstructed. As HYD-02 is located across Kent Street from the site and is more than 45 m from the Phase 1 fire department connection, a new fire

hydrant is proposed on site to provide an unobstructed distance less than 45 m to the Phase 1 fire department connection and meet the OBC requirements.

3.4 Proposed Water Servicing

The development will be serviced by two 150 mm building service connections, one will be connected to the 203 mm diameter watermain on Arlington Avenue, and the other to the watermain on Catherine Street. As the site is required to be serviced by two service laterals on opposite sides of the site, the existing 127 mm diameter watermains on Catherine Street and Kent Street will need to be upsized to complete a block-looping around the site, as highlighted in yellow in **Figure 3-2** below, where a new fire hydrant will be installed on Catherine Street. The sizing of the service connections is to be confirmed by the mechanical consultant.

Figure 3-2: Sketch of proposed watermain upsizing in Catherine Street and Kent Street

The proposed water servicing is shown on **Drawing SSP-1** contained in **Appendix G**. Based on the City of Ottawa Water Design Guidelines, once the Catherine Street and Kent Street watermains are upsized to provide complete block-looping around the site, the watermains can provide adequate fire and domestic flows for the subject site.

Thermal insulation is required on the water service lateral to Arlington Avenue, as there is less than 2.4 m cover provided per W22. Booster pumps are required for both the towers and the townhouses. The mechanical consultant or plumbing contractor will ultimately be responsible to confirm building pressures are adequate to meet building code requirements.

4 Wastewater Servicing

The subject site at 265 Catherine Street is located within a City of Ottawa combined sewage area. The existing sewers adjacent to the development site consist of a pair of combined sewers, one 300 mm in diameter and the other 1800 mm in diameter, within Catherine Street, a pair of combined sewers, one 450 mm in diameter and the other 1350 mm in diameter, within Lyon Street North, a 1200 mm diameter combined sewer within Arlington Avenue, and a 375 mm diameter combined sewer and the 3000 mm diameter Combined Sewage Storage Tunnel (CSST) within Kent Street.

4.1 Design Criteria

As outlined in the City of Ottawa Sewer Design Guidelines and the MECP Design Guidelines for Sewage Works, the following criteria were used to calculate the estimated wastewater flow rates and to determine the size and location of the sanitary service lateral:

- Minimum velocity = 0.6 m/s (0.8 m/s for upstream sections)
- Maximum velocity = 3.0 m/s
- Manning roughness coefficient for all smooth wall pipes = 0.013
- Minimum size of sanitary sewer service = 135 mm
- Minimum grade of sanitary sewer service = 1.0 % (2.0 % preferred)
- Average wastewater generation = 280 L/person/day (per City Design Guidelines)
- Peak Factor = based on Harmon Equation; maximum of 4.0 (residential)
- Harmon correction factor = 0.8
- Infiltration allowance = 0.33 L/s/ha (per City Design Guidelines)
- Minimum cover for sewer service connections – 2.0 m
- Population density for one-bedroom apartments – 1.4 persons/apartment
- Population density for one-bedroom with den apartments – 2.1 persons/apartment
- Population density for two-bedroom with den and three-bedroom apartments – 3.1 persons/apartment
- Population density for general townhome – 2.7 persons/unit
- Average commercial wastewater generation – 28,000 L/ha/day of building space

4.2 Wastewater Generation and Servicing Design

A sanitary sewer design sheet was prepared and is included in **Appendix C.1.** The estimated wastewater flows to be generated are based on the current site plan and consists of 436 one-bedroom units, 140 one-bedroom units with dens, 400 two-bedroom units with dens, 45 three-bedroom units, 7 three-storey townhouses, and 0.189 ha of commercial space. The peak wastewater flows were calculated to be 26.8 L/s for the entire site, with sub-totals for each building also provided in the design sheet. The anticipated wastewater peak flow generated from the proposed development is summarized in **Table 4-1** below:

The lands to be conveyed to the proposed park do not form part of the site plan development and were not considered as part of the sanitary sewage calculations.

Table 4-1 - Estimated Total Wastewater Peak Flow

Residential Units				Commercial Areas			Infiltration Flow (L/s)	Total Peak Flow (L/s)
Number of Units	Population	Peak Factor	Peak Flow (L/s)	Area (ha)	Peak Factor	Peak Flow (L/s)		
1028	2303	3.537	26.4	0.189	1.50	0.1	0.4	26.8
Total Estimated Wastewater Peak Flow (L/s):								**26.8**

1. Design residential flow based on 280 L/p/day and design commercial flow based on 28,000 L/ha/day.
2. Peak factor for residential units calculated using Harmon's formula and taken as 1.50 for commercial areas.
3. Residential population estimated based on 1.4 persons/unit for one-bedroom apartments, 2.1 persons/unit for one-bedroom units with dens, 3.1 persons/unit for two-bedroom units with dens and three-bedroom units, and 2.7 persons/unit for townhouses.
4. Infiltration design flow equals 0.33 L/s/ha.

Design of internal plumbing and associated mechanical systems for the buildings on site is to be completed by the buildings' mechanical engineer.

A backflow preventer will be required for the proposed building in accordance with the City of Ottawa Sewer Design Guidelines. This requirement will be coordinated with the building's mechanical engineer.

The peak sanitary wastewater design flow is well within the target release rate calculated in **Section 5.4.1**, and serves as a constraint for stormwater release rate in the separate system. The anticipated peak wastewater flows for the proposed development were provided to the City of Ottawa staff to evaluate the adequacy of the receiving municipal combined sewer system in the vicinity of the site and downstream network, and the City has provided the go-ahead for the proposed sanitary discharge into the 1200 mm combined sewer in Arlington Avenue.

4.3 Proposed Sanitary Servicing

A 200 mm diameter sanitary building service, complete with full port backwater valve as per City standard S14.1, is recommended to service the proposed development. The sanitary lateral is be equipped with a sanitary monitor manhole, anchored as per S.P. No. F-4070, before connecting to the sewer main with a riser pipe as per City standard S11.1. The proposed sanitary servicing is shown on **Drawing SSP-1** and **Drawing SA-1** in **Appendix G**.

Existing connections are to be abandoned and full port backwater valves installed on the proposed sanitary service within the site to prevent any surcharge from the downstream sewer main from impacting the proposed property. A sump pump will be required for sewage discharge from the mechanical room. Sizing of the service lateral, sump pit, and sump pump are to be confirmed by the mechanical consultant.

5 Stormwater Management and Servicing

5.1 Objectives

The goal of this stormwater servicing and stormwater management (SWM) plan is to determine the measures necessary to control the quantity and quality of stormwater released from the proposed development to meet the criteria established during the consultation process with City of Ottawa staff, and to provide sufficient details required for approval.

5.2 Stormwater Management (SWM) Criteria

The Stormwater Management (SWM) criteria were established by combining current design practices outlined by the City of Ottawa Sewer Design Guidelines (SDG) (October 2012), review of project pre-consultation notes with the City of Ottawa, and through consultation with City of Ottawa staff. The following summarizes the criteria, with the source of each criterion indicated in brackets:

General

- Use of the dual drainage principle (City of Ottawa SDG)
- Wherever feasible and practical, site-level measures should be used to reduce and control the volume and rate of runoff (City of Ottawa SDG)
- Assess impact of 100-year event outlined in the City of Ottawa Sewer Design Guidelines on the major and minor drainage systems (City of Ottawa SDG)

Storm Sewer & Inlet Controls

- Discharge for each storm event to be restricted to a 2-year storm event pre-development rate with a maximum pre-development C coefficient of 0.4 (City of Ottawa pre-consultation, **Appendix F**)
- Peak flows generated from events greater than the 2-year and including the 100-year storm must be detained on site (City of Ottawa pre-consultation, **Appendix F**)
- The preferred stormwater system outlet for this site is the 525 mm and 600 mm diameter storm sewer within the Arlington Avenue ROW. (City of Ottawa pre-consultation, **Appendix F**)
- The foundation drainage system is to be independently connected to sewer main unless being pumped with appropriate back up power, sufficient sized pump, and backflow prevention. (City of Ottawa pre-consultation, **Appendix F**)
- T_c should be not less than 10 minutes since IDF curves become unrealistic at less than 10 min (City of Ottawa SDG).

Surface Storage & Overland Flow

- Building openings to be a minimum of 0.30 m above the 100-year water level (City of Ottawa SDG)
- Maximum depth of flow under either static or dynamic conditions shall be less than 0.30 m (City of Ottawa SDG)

- Provide adequate emergency overflow conveyance off-site with a minimum vertical clearance of 15 cm between the spill elevation and the ground elevation at the building envelope in the proximity of the flow route or ponding area (City of Ottawa SDG)

5.3 Existing Conditions

The existing site (1.0 ha) is dominated by roofs and asphalt pavement with only around 395.5 m^2 in soft area, as such the overall site pre-development runoff coefficient was established to be C=0.87, in which the hard surface areas use a coefficient of 0.90 while soft surface areas have a coefficient of 0.20. This exceeds the maximum permissible pre-development runoff coefficient of C=0.4 identified in the City of Ottawa pre-consultation for this site. Therefore, the pre-development runoff coefficient of 0.4 was used for the site analysis.

The pre-development release rates for the site have been determined using the rational method and the drainage characteristics identified above. A time of concentration for the pre-development area (12 minutes) was assigned based on the relatively large site area, its high impervious area, and its proximity to the stormwater outfall. The peak pre-development flow rates shown in **Table 5-1** have been calculated using the rational method as follows:

$$Q = 2.78\,(C)(I)(A)$$

Where:
$Q = peak\ flow\ rate, L/s$
$C = site\ runoff\ coefficient$
$I = rainfall\ intensity, mm/hr\ (per\ City\ of\ Ottawa\ IDF\ curves)$
$A = drainage\ area, ha$

Table 5-1: Peak Pre-Development Flow Rates

Design Storm	Pre-Development Flow Rate (L/s) for C=0.4, A=1.0 ha, t_c = 12 min
2-year	**80.05**
100-year	**185.7**

Given the outer perimeters of the site will continue to drain uncontrolled to the surrounding rights of way as per existing conditions, only the roofs and controlled portions of the site, excluding the park, were considered for the target release rate. Furthermore, the site's location in the combined sewer area, as summarized in **Section 4,** has provided for a restrictive target release for the site, in which the stormwater contributions to the sewers are to be restricted to the 2-year pre-development release rate.

As such, the target release rate for the site is summarized in **Table 5-2** below:

Table 5-2: Target Release Rate

	Area (ha)	Target Flow Rate to Combined Sewer (L/s)	Less Peak Sanitary Discharge (L/s)
Controlled Site	0.749	58	31

A target release rate of 58. L/s was obtained using a C of 0.4 and a 2-year storm event for the roof and controlled areas of the site, with the design focusing on measures adopted to provide a storm servicing approach that restricts a 100-year peak storm run-off to the target release rate calculated as 31 L/s as shown in **Table 5-2**. To meet the stormwater quantity control criteria, two stormwater cisterns are proposed to attenuate peak run-off, one for each of the two development phases.

5.4 Stormwater Management Design

The site is to be serviced by two proposed 300 mm diameter storm sewer, which will collect stormwater discharge from the cisterns and connect to the existing 525 mm diameter and 600 mm diameter storm sewers on Arlington Avenue. The site has been subdivided into catchment areas to effectively collect, store, and convey runoff at flowrates not exceeding the target release rate established by consultation with the City of Ottawa (refer to **Drawing SD-1** in **Appendix G** for drainage areas).

Two stormwater cisterns located in the underground parking area are proposed to attenuate peak flows from the rooftop areas from the towers and the townhouses and the common areas. Area drains will convey stormwater runoff from the surface to the stormwater cisterns via the internal plumbing of the buildings. The stormwater cisterns will be pumped at controlled rates to monitor manholes which outlets to the 525 mm and 600 mm diameter storm sewer on Arlington Avenue via 300 mm diameter pipes. The stormwater cisterns' locations will be coordinated by building's architect in conjunction with mechanical and structural engineers.

Footing drainage will be independent of the internal stormwater cistern quantity control system while sharing the same outlet. The mechanical design for the weeping tile system will include dedicated storm pits and duplex pumps to pump the weeping tile drainage to the storm main downstream of the cistern.

The proposed site plan, drainage areas and proposed storm sewer infrastructure are shown on **Drawing SD-1** and **SSP-1** in **Appendix G**.

5.4.1 QUANTITY CONTROL: STORAGE REQUIREMENTS

The Modified Rational Method (MRM) was used to assess the flow rate and volume of runoff generated under post-development conditions. The site was subdivided into sub-catchments tributary to separate quantity control measures and subject to different inlet controls. **Drawing SD-1** shows the delineated sub-catchment areas. The MRM spreadsheet is included in **Appendix D.1.**

The following assumptions were made in the creation of the storm drainage plan and accompanying MRM spreadsheet:

- Restricted combined release rate is 58.2 L/s. Upon deducting the sanitary peak flow of 26.9 L/s, the storm target release is 31.3 L/s.
- Excess run-off that cannot be captured as surface storage due to grading constraints is to sheet flow uncontrolled to the adjacent roadways (areas UNC-1 and UNC-2).
- Stormwater cistern equipped with mechanical pump to attenuate peak flows from the cistern will be used to manage stormwater flows from the site.

5.4.1.1 Uncontrolled Areas

Uncontrolled areas represent drainage areas that cannot be graded to enter the storm sewer system and are not captured by the proposed storm cistern. As such, they will sheet drain off the site to the adjacent roadways (see **Drawing SD-1**).

Table 5-3: Peak Uncontrolled 2- and 100-Year run-off

Area IDs	Area (ha)	2-Yr uncontrolled peak flow (L/s)	100-Yr uncontrolled peak flow (L/s)
UNC-1	0.036	6.69	17.9
UNC-2	0.110	16.7	48.5

Based on discussions with the City of Ottawa staff, overland flow from all uncontrolled drainage areas will not be considered in the overall development peak discharge rate as it contributes to the controlled system within the public roadways, which are equipped with ICDs.

5.4.1.2 Stormwater Cisterns

As part of the stormwater management design of the site development, two stormwater cisterns located in the underground parking area and equipped with mechanical pumps are proposed to attenuate peak flows from drainage areas CIST 1-1 to CIST 1-4 for Cistern 1 and CIST 2-1 to CIST 2-4 for Cistern 2. The final location of the cisterns within the proposed building is to be coordinated by the architect with mechanical and structural engineers.

Cistern 1 for Phase 1 is to be designed to provide a minimum active storage volume of 130 m^3 with a maximum controlled release rate of 12.48 L/s, while Cistern 2 for Phase 2 is to be designed to provide a minimum active storage volume of 180 m^3 with a maximum controlled release rate of 18.89 L/s. The stormwater cisterns are to discharge at the specified controlled release rate using a pump.

Table 5-5 summarizes the respective flow rates and volume of retained stormwater in the 2-year and 100-year storm events.

Table 5-4: Proposed Cistern 2 and 100-Year Storage Requirement

Cistern	Storm Return Period	Area IDs	Drainage Area (ha)	$Q_{release}$ (L/s)	$V_{required}$ (m^3)	$V_{available}$ (m^3)	Total V (m^3)
1	2-year	CIST 1-1 to CIST 1-4	0.298	12.5	31.6	130	310
	100-year				121.8		
2	2-year	CIST 2-1 to CIST 2-4	0.451	18.9	42.9	180	
	100-year				172.0		

5.4.1.3 Results

The proposed stormwater management plan provides adequate attenuation to meet the target release rate for the 2 and 100-year storm events as shown in **Table 5-5** below.

Table 5-5: Estimated Post-Development Discharge

Area Type	2-Year (L/s)	100-Year (L/s)	Target (L/s)
Uncontrolled	7.50	79.3	58.21
Controlled Areas	31.36		
Sanitary Contributions	26.85		
Total Flow to Sewer	**58.21**		

Flows from the uncontrolled areas are not considered in the overall release rate for the site as detailed in **Section 5.4.1.1.**

5.4.2 QUALITY CONTROL

Through correspondence with the City of Ottawa, it was confirmed that no stormwater quality control measures apply, as the 525 mm and 600 mm diameter storm sewer in Arlington Avenue ultimately discharges into the 1350 mm diameter combined sewer in Lyon Street North.

5.5 Proposed Stormwater Servicing

Two 300 mm diameter stormwater building services, complete with full port backwater valve as per City standard S14.1, are proposed for the storm service discharge, as per **Drawing SSP-1** and **Drawing SD-1** in **Appendix G**. A stormwater sump and pump are required for the proposed foundation drain, and the roof drains are to be connected to the cisterns.

The combined foundation drain, roof drain, and subdrain flows will outlet to the cistern, which then pumps the discharge at a controlled rate and to the existing 525 mm and 600 mm diameter storm sewer within the Arlington Avenue ROW. The laterals are to connect to the main as per City standard S11 via monitoring manholes. The proposed stormwater servicing is shown on **Drawing SSP-1** and **SD-1** in **Appendix G**.

6 Site Grading

The proposed re-development site, excluding the park, measures approximately 0.90 ha in area and consists of the former Greyhound bus terminal and asphalt area, with small patches of grassland. The topography across the site generally slopes from the middle towards the Arlington Avenue ROW at the north and the Catherine Street ROW at the south. A detailed grading plan (see **Drawing GP-1** in **Appendix G**) has been provided to satisfy the stormwater management requirements, as detailed in **Section 5**, adhere to any grade raise restrictions for the site, and provide for minimum cover requirements for storm and sanitary sewers where possible. Site grading has been established to provide emergency overland flow routes required for stormwater management.

7 Utilities

Overhead (OH) hydro-wires run east-west on the north side of Catherine Street and south side of Arlington Avenue, and north-south on the east side of Lyon Street North and on the west side of Kent Street, terminating halfway along the east property line of the site. All utilities within the work area will require relocation during construction. The existing utility poles within the public right of way are to be protected during construction.

As the site is surrounded by existing residential and commercial development, Hydro Ottawa, Bell, Rogers, and Enbridge servicing is readily available through existing infrastructure to service this site. The exact size, location, and routing of utilities will be finalized after design circulation. Existing overhead wires and utility plants may need to be temporarily moved/reconfigured to allow sufficient clearance for the movement of heavy machinery required for construction. The relocation of existing utilities will be coordinated with the individual utility providers upon design circulation.

8 Approvals

The proposed development lies on a private site under singular ownership, and as the storm discharge drains to an existing storm sewer outlet, therefore, the site will not require an Environmental Compliance Approval (ECA) from the Ministry of the Environment, Conservation and Parks (MECP) under O.Reg. 525/98.

For ground or surface water volumes being pumped during the construction phase, typically between 50,000 to 400,000 L/day, it is required to register on the Environmental Activity and Sector Registry (EASR). It is possible that groundwater may be encountered during the foundation excavation on this site. A minimum of two to four weeks should be allotted for completion of the EASR registration and the preparation of the Water Taking and Discharge Plan by a Qualified Person as stipulated under O.Reg. 63/16. An MECP Permit to Take Water (PTTW), which is required for dewatering volumes exceeding 400,000L/day, is not anticipated for the site.

9 Erosion and Sediment Control During Construction

To protect downstream water quality and prevent sediment build-up in catch basins and storm sewers, erosion and sediment control measures must be implemented during construction. The following recommendations will be included in the contract documents and communicated to the Contractor.

1. Implement best management practices to provide appropriate protection of the existing and proposed drainage system and the receiving water course(s).
2. Limit the extent of the exposed soils at any given time.
3. Re-vegetate exposed areas as soon as possible.
4. Minimize the area to be cleared and grubbed.
5. Protect exposed slopes with geotextiles, geogrid, or synthetic mulches.
6. Install silt barriers/fencing around the perimeter of the site as indicated in **Drawing ECDS-1** in **Appendix G** to prevent the migration of sediment offsite.
7. Install trackout control mats (mud mats) at the entrance/egress to prevent migration of sediment into the public ROW.
8. Provide sediment traps and basins during dewatering works.
9. Install sediment traps (such as SiltSack® by Terrafix) between catch basins and frames.
10. Schedule the construction works at times which avoid flooding due to seasonal rains.

The Contractor will also be required to complete inspections and guarantee the proper performance of their erosion and sediment control measures at least after every rainfall. The inspections are to include:

- Verification that water is not flowing under silt barriers.
- Cleaning and changing the sediment traps placed on catch basins.

Refer to **Drawing ECDS-1** in **Appendix G** for the proposed location of silt fences, sediment traps, and other erosion control measures.

10 Geotechnical Investigation

A geotechnical investigation report was prepared by Paterson Group on August 13, 2021 to provide an assessment of the subsurface conditions found at the site. Three (3) boreholes, numbered BH 1-20 to BH 3-20, were advanced to a maximum depth of 14.7 metres below the existing ground surface in the investigation carried out on August 19, 2020. The information obtained from the field investigation will guide the detailed design of the site and identify development constraints.

The subsurface profile encountered at the test hole locations are characterized primarily by a layer of concrete or asphaltic concrete underlain by fill extending to an approximate depth of 0.6 m to 2.3 m below the existing ground surface. The fill material was observed to generally consist of brown silty sand with crushed stone and occasional brick, metal, and plastic fragments and underlain by a silty clay deposit and silty clay layer. In addition, the silty clay deposit generally consisted of brown silty clay, with the glacial till deposit underlain the silty clay deposit consisting of a grey sandy silt, clayey silt or silty clay with gravel, cobbles, and boulders.

From available geological mapping, the bedrock consists of interbedded limestone and shale of the Verulam formation and shale of the Billings formation at depths ranging from 10 m to 15 m. Groundwater levels were measured from monitoring wells at all three boreholes in the August 2020 investigation and are expected to be 4 metres to 5 metres below the existing ground surface within the silty clay layer, though as groundwater levels are subject to seasonal fluctuations, they could vary at the time of construction.

Based on Paterson's recommendations, the site is suitable for the proposed development. It is recommended that the foundation support for the proposed mixed-use high-rise buildings consist of either a raft foundation bearing on the stiff silty clay and compact glacial till deposit, or a deep foundation extending to the bedrock surface. Due to the presence of the silty clay deposit, grading is subject to a permissible grade raise restriction of 2.0 m.

The recommended rigid pavement structure is further presented in **Table 6-1** below.

Table 6-1: Recommended Pavement Structure

Material	Car-only Parking Areas	Access Lanes, Ramp and Heavy Truck Parking Areas
Wear Course – HL-3 or Superpave 12.5 Asphaltic Concrete	50 mm	40 mm
Binder Course – HL-8 or Superpave 19.0 Asphaltic Concrete	-	50 mm
BASE – OPSS Granular A Crushed Stone	150 mm	
SUBBASE – OPSS Granular B Type II	300 mm	450 mm

Refer to the full geotechnical report attached in **Appendix E** for further details.

11 Conclusions

11.1 Water Servicing

Based on the supplied boundary conditions for existing watermains and calculated domestic and fire flow demands for the subject site, the adjacent watermain on Arlington Avenue has sufficient capacity to sustain both the required domestic and emergency fire flow demands for the development. As the site is required to be serviced by two service laterals on opposite sides of the site, the existing 127 mm diameter watermains on Catherine Street and Kent Street will need to be upsized to complete a block-looping around the site. Booster pump(s) are required to provide adequate pressures to the towers' upper stories. The proposed development requires two 150 mm diameter water service laterals on street located on opposite sides of the site, as such one will be connected to the existing 203 mm diameter watermain in Arlington Avenue and the other to the upsized watermain in Catherine Street, where a new fire hydrant will be located within. Sizing of the water service and requirements for booster pump(s) are to be confirmed by the mechanical consultant.

11.2 Sanitary Servicing

The proposed sanitary sewer service will consist of a 200 mm diameter sanitary service lateral, a sanitary sump pit, a monitor manhole, and sump pump directing wastewater to the existing 1200 mm diameter combined sewer on Arlington Avenue. Existing connections are to be abandoned and full port backwater valves installed on the proposed sanitary service within the site to prevent any surcharge from the downstream sewer main from impacting the proposed property. A sump pump will be required for sewage discharge from the mechanical room. Sizing of the service lateral, sump pit, and sump pump are to be confirmed by the mechanical consultant.

11.3 Stormwater Servicing and Management

Cisterns in the underground parking has been proposed to limit the stormwater discharge rate for all rainfall events up to and including the 100-year event to a peak 2-year predevelopment release rate. The remaining site area drains uncontrolled to the adjacent surrounding ROWs as per existing conditions.

Two 300 mm diameter storm service laterals are proposed for the building's foundation drain and internal storm sewer system, which is to be mechanically pumped and include a full port backwater valve. The roof drains and ramp drain are to be connected through internal plumbing to the cistern, which will pump discharge at a controlled rate through the service lateral and the backwater valve to the 525 mm and 600 mm diameter municipal storm sewer in the Arlington Avenue ROW. Sizing of the service lateral, cistern, and foundation drain pump are to be confirmed by the mechanical consultant.

11.4 Grading

Site grading has been designed to provide an adequate emergency overland flow route. All four sides drain uncontrolled to the adjacent right-of-ways as per existing conditions.

11.5 Erosion and Sediment Control During Construction

Erosion and sediment control measures and best management practices outlined in this report and included in the drawing set, will be implemented during construction to reduce the impact on adjacent properties, the public ROW, and existing facilities.

11.6 Geotechnical Investigation

Based on the geotechnical investigation, the site is considered suitable for the proposed building, and it is recommended that the foundation support for the proposed mixed-use high-rise buildings consist of either a raft foundation bearing on the stiff silty clay and compact glacial till deposit, or a deep foundation extending to the bedrock surface. Due to the presence of the silty clay deposit, grading is subject to a permissible grade raise restriction of 2.0 m.

11.7 Utilities

The site is situated within an established neighbourhood, hence existing utility infrastructure is readily available to service the proposed development. Overhead wires along all boundaries of the site will need to be accommodated during construction. It is anticipated that existing infrastructure will be sufficient to provide a means of distribution for the proposed site. Exact size, location and routing of utilities will be finalized after design circulation.

11.8 Approvals

This site will not be subjected to the Ministry of the Environment, Conservation and Parks (MECP) Environmental Compliance Approval (ECA) process under O.Reg. 525/98. For the expected dewatering needs of 50,000 to 400,000 L/day, the proponent will need to register on the MECP's Environmental Activity and Sector Registry (EASR). A Permit to Take Water, for dewatering needs in excess of 400,000 L/day, is not anticipated for this site.

APPENDICES

Appendix A Water Demands

A.1 Domestic Water Demands

265 Catherine Street - Domestic Water Demand Estimates

Site Plan provided by Quadrangle Architects Ltd. (2023-05-08)
Project Number: 160401663

Population densities as per City of Ottawa Water Design Guidelines[6]:		
1 Bedroom	1.4	ppu
2 Bedroom	2.1	ppu
3 Bedroom	3.1	ppu
Townhouses	2.7	ppu

Demand conversion factors as per MECP Guidelines and Ottawa Design Guidelines - Water Distribution[5]:		
Residential	280	L/cap/day
Commercial	28000	L/gross ha/day

Building ID	Area (ha)	1 Bedroom	1 Bedroom + Den[4]	2 Bedroom + Den[4]	3 Bedroom	Townhomes	Population	Avg. Day Demand		Max. Day Demand [1, 2]		Peak Hour Demand [1, 2]	
								(L/min)	(L/s)	(L/min)	(L/s)	(L/min)	(L/s)
A Commercial	0.083	-	-	-	-	-	-	1.6	0.0	2.4	0.0	4.4	0.1
B Commercial	0.106	-	-	-	-	-	-	2.1	0.0	3.1	0.1	5.6	0.1
Commercial Total	**0.189**							**3.7**	**0.1**	**5.5**	**0.1**	**9.9**	**0.2**
A Residential	-	73	83	108	25		689	133.9	2.2	334.8	5.6	736.6	12.3
B Residential	-	363	57	292	20		1,595	310.2	5.2	775.4	12.9	1705.9	28.4
C Residential	-					7	19	3.7	0.1	9.2	0.2	20.2	0.3
Residential Total		**436**	**140**	**400**	**45**	**7**	**2303**	**447.8**	**7.5**	**1119.4**	**18.7**	**2462.7**	**41.0**
Total Site :	**0.189**	**436**	**140**	**400**	**45**	**7**	**2303**	**451.5**	**7.5**	**1124.9**	**18.7**	**2472.7**	**41.2**

Notes:

1 Water demand criteria used to estimate peak demand rates for residential areas are as follows:
maximum day demand rate = 2.5 x average day demand rate
peak hour demand rate = 2.2 x maximum day demand rate (as per Technical Bulletin ISD-2010-02)

2 Water demand criteria used to estimate peak demand rates for commercial/amenity areas are as follows:
maximum day demand rate = 1.5 x average day demand rate
peak hour demand rate = 1.8 x maximum day demand rate (as per Technical Bulletin ISD-2010-02)

3 Number of apartment units as per **Quadrangle Architects Ltd. GFA Suite** statistics table (2023-05-08).

4 Assumption that "1 bedroom with den" has density of 2.1 ppu, "2-bedroom with den" has density of 3.1 ppu

5 As per Table 4.2 from the City of Ottawa Water Design Guidelines and Technical Bulletin ISTB-2021-03, the average daily rate of water demand for residential areas: 280 L/cap/day

6 Population densities provided as per Table 4.1 from the City of Ottawa Water Design Guidelines

A.2 Fire Flow Demands (FUS 2020)

FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

Stantec Project #: 160401663
Project Name: 265 Catherine Street
Date: 2023-03-22
Fire Flow Calculation #: 1
Description: Building A, 6-Storey Podium and 26-Storey High-Rise Tower
Podium Footprint: 2455.9 m^2. Tower Footprint: 750 m^2.

Notes: Footprint areas as per Quadrangle Architects Limited Site Plan provided March 17, 2023.

Step	Task	Notes										Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Type II - Noncombustible Construction / Type IV-A - Mass Timber Construction										0.8	-
2	Determine Effective Floor Area	Sum of Largest Floor + 25% of Two Additional Floors					Vertical Openings Protected?					YES	-
		2455.9	2455.9	2195.8								3618.825	-
3	Determine Required Fire Flow	($F = 220 \times C \times A^{1/2}$). Round to nearest 1000 L/min										-	11000
4	Determine Occupancy Charge	Limited Combustible										-15%	9350
5	Determine Sprinkler Reduction	Conforms to NFPA 13										-30%	-4675
		Standard Water Supply										-10%	
		Fully Supervised										-10%	
		% Coverage of Sprinkler System										100%	
6	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	Firewall / Sprinklered ?				-	-
		North	20.1 to 30	75.74	3	> 100	Type V	NO				10%	3273
		East	> 30	0	0	0-20	Type V	NO				0%	
		South	20.1 to 30	75.82	2	> 100	Type V	NO				10%	
		West	10.1 to 20	52.59	3	> 100	Type V	NO				15%	
7	Determine Final Required Fire Flow	Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min											8000
		Total Required Fire Flow in L/s											133.3
		Required Duration of Fire Flow (hrs)											2.00
		Required Volume of Fire Flow (m^3)											960

FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

Stantec Project #: 160401663
Project Name: 265 Catherine Street
Date: 2023-03-22
Fire Flow Calculation #: 2
Description: Building B, 6-Storey Podium with 36-Storey and 40-Storey High-Rise Towers
Podium Footprint: 2968.9 m^2. Tower Footprint: 750 m^2 each.

Notes: Footprint areas as per Quadrangle Architects Limited Site Plan provided March 17, 2023.

Step	Task	Notes										Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Type II - Noncombustible Construction / Type IV-A - Mass Timber Construction										0.8	-
2	Determine Effective Floor Area	Sum of Largest Floor + 25% of Two Additional Floors					Vertical Openings Protected?					YES	-
		2968.9	2665.5	2665.5								4301.65	-
3	Determine Required Fire Flow	($F = 220 \times C \times A^{1/2}$). Round to nearest 1000 L/min										-	12000
4	Determine Occupancy Charge	Limited Combustible										-15%	10200
5	Determine Sprinkler Reduction	Conforms to NFPA 13										-30%	-5100
		Standard Water Supply										-10%	
		Fully Supervised										-10%	
		% Coverage of Sprinkler System										100%	
6	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	Firewall / Sprinklered ?				-	-
		North	10.1 to 20	83.57	3	> 100	Type V	NO				15%	4590
		East	3.1 to 10	52.96	3	> 100	Type V	NO				20%	
		South	20.1 to 30	83.57	2	> 100	Type I-II - Unprotected Openings	YES				0%	
		West	20.1 to 30	52.96	3	> 100	Type V	NO				10%	
7	Determine Final Required Fire Flow	Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min											10000
		Total Required Fire Flow in L/s											166.7
		Required Duration of Fire Flow (hrs)											2.00
		Required Volume of Fire Flow (m^3)											1200

FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

Stantec Project #: 160401663
Project Name: 265 Catherine Street
Date: 2023-03-22
Fire Flow Calculation #: 3
Description: Building C, 3-Storey Stacked Townhouses
Townhouses Footprint: 404.4 m^2.

Notes: Footprint areas as per Quadrangle Architects Limited Site Plan provided March 17, 2023.

Step	Task	Notes										Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Type V - Wood Frame / Type IV-D - Mass Timber Construction										1.5	-
2	Determine Effective Floor Area	Sum of All Floor Areas										-	-
		404.4	404.4	284.1								1092.9	-
3	Determine Required Fire Flow	($F = 220 \times C \times A^{1/2}$). Round to nearest 1000 L/min										-	11000
4	Determine Occupancy Charge	Limited Combustible										-15%	9350
5	Determine Sprinkler Reduction	None										0%	0
		Non-Standard Water Supply or N/A										0%	
		Not Fully Supervised or N/A										0%	
		% Coverage of Sprinkler System										0%	
6	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	Firewall / Sprinklered ?				-	-
		North	20.1 to 30	40.21	3	> 100	Type V	NO				10%	935
		East	10.1 to 20	10.86	3	21-49	Type I-II - Unprotected Openings	YES				0%	
		South	10.1 to 20	40.21	2	81-100	Type I-II - Unprotected Openings	YES				0%	
		West	3.1 to 10	10.86	3	21-49	Type I-II - Unprotected Openings	YES				0%	
7	Determine Final Required Fire Flow	Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min											10000
		Total Required Fire Flow in L/s											166.7
		Required Duration of Fire Flow (hrs)											2.00
		Required Volume of Fire Flow (m^3)											1200

A.3 Boundary Conditions

Wu, Michael

From: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Sent: Thursday, 13 April, 2023 13:05
To: Wu, Michael
Cc: Ford, Matthew
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation
Attachments: 265 Catherine Street April 2023.pdf

Hi Michael,

Please note that the Fire demand request of 316.7 L/s was not met. Next steps: Take measures to lower the fire demand, identify hydrants to request for a multi-hydrant analysis.

The following are boundary conditions, HGL, for hydraulic analysis at 265 Catherine Street (zone 1W) assumed to be connected to either the 127 mm watermain on Catherine Street, OR the 203 mm watermain on Lyon Street, OR the 203 mm watermain on Arlington Avenue, OR the 127 mm on Kent Street (see attached PDF for location).

Connection	Min HGL (m)	Maximum HGL (m)
Catherine Street	80.4	115.3
Lyon Street	104.9	115.3
Arlington Avenue	105.9	115.3
Kent Street	97.8	115.2

Fire Flow:

Available Fire flow at 20 psi: 46 L/s assuming ground elevation of 68.2 m (Catherine Connection)

Available Fire flow at 20 psi: 187 L/s assuming ground elevation of 67.6 m (Lyon Connection)

Available Fire flow at 20 psi: 270 L/s assuming ground elevation of 68.0 m (Arlington Connection)

Available Fire flow at 20 psi: 64 L/s assuming ground elevation of 68.6 m (Kent Connection)

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

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

Best Regards,

Mohammed Fawzi, P.Eng.
Project Manager
Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique
Development Review - Central Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 20120, Mohammed.Fawzi@ottawa.ca

Please note that due to the current situation, I am working remotely. Email is currently the best way to contact me

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From: Wu, Michael <Michael.Wu@stantec.com>
Sent: April 11, 2023 11:45 AM
To: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Good morning, Mohammed, hope you are well. Just checking in to see when we could expect to receive the boundary conditions, the combined sewer capacity confirmation and the existing water consumption data for the site (if possible).

Thanks,

Michael Wu, EIT
Civil Engineering Intern, Community Development

Work: (613) 738-6033
Mobile: (613) 858-0548
michael.wu@stantec.com

Stantec
300 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

From: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Sent: Wednesday, 29 March, 2023 14:50
To: Wu, Michael <Michael.Wu@stantec.com>

Cc: Ford, Matthew <Matthew.Ford@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Hi Michael,

Received.

I will get back to you as soon as possible. Thank you.

Best Regards,

Mohammed Fawzi, P.Eng.
Project Manager
Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique
Development Review - Central Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 20120, Mohammed.Fawzi@ottawa.ca

Please note that due to the current situation, I am working remotely. Email is currently the best way to contact me

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From: Wu, Michael <Michael.Wu@stantec.com>
Sent: March 29, 2023 1:18 PM
To: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>
Subject: 265 Catherine Street Combined Sewer Capacity Confirmation

Good afternoon, Mohammed:

In addition to the hydraulic boundary conditions, as part of the servicing for the proposed development on 265 Catherine Street, we would like to confirm if there is sufficient capacity downstream of the 450 mm diameter combined sewers in Lyon Street North, 300 mm diameter combined sewers in Catherine Street, 375 mm diameter combined sewers in Kent Street, and the 1200 mm diameter trunk combined sewers in Arlington Avenue to receive an additional peak flow of 26.8 L/s from the proposed development.

Please find our sanitary design sheet and location map attached for your information. Furthermore, we were wondering if there are any existing water consumption data for the site during its use as a Greyhound bus terminal.

Thank you,

Michael Wu, EIT
Civil Engineering Intern, Community Development

Work: (613) 738-6033
Mobile: (613) 858-0548
michael.wu@stantec.com

Stantec
300 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

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Wu, Michael

From: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Sent: Tuesday, 9 May, 2023 10:24
To: Wu, Michael
Cc: Ford, Matthew; Sharp, Mike; Thiffault, Dustin; Kilborn, Kris
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation
Attachments: 265 Catherine Street REVISED April 2023.pdf

Hi Michael,

From a node hydraulic assessment option 1 **does not** provide the RFF. A Multi-Hydrant Analysis (MHA) for Option 1 can be simulated but you would need to identify the hydrants for the MHA.

The following are boundary conditions, HGL, for hydraulic analysis at 265 Catherine Street (zone 1W) assumed to be connected to Catherine Street or Kent Street with watermain upgrade to a 203 mm from Lyon to Kent Street (Option 1) OR a 203 mm watermain upgrade from Lyon to Kent Steet and Catherine Street to Arlington Avenue (Option 2).

	Option 1 203 mm Upgrade from Lyon to Kent		Option 2 203 mm Upgrade from Lyon to Kent and from Catherine to Arlington	
Connection	Min HGL (m)	Max HGL (m)	Min HGL (m)	Max HGL (m)
Catherine Street	100.5	115.2	95.7	115.2
Kent Street	105.1	115.3	105.9	115.3

<u>Fire Flow:</u>

Option 1:

Available Fire flow at 20 psi: 102 L/s assuming ground elevation of 68.2 m (Catherine Connection)

Available Fire flow at 20 psi: 75.3 L/s assuming ground elevation of 68.6 m (Kent Connection)

Option 2:

Max Day + Fire Flow (166.7 L/s): 84.8 m (Catherine Connection)

Max Day + Fire Flow (166.7 L/s): 95.4 m (Kent Connection)

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.

<kris.kilborn@stantec.com>; Thiffault, Dustin <dustin.thiffault@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Hi Mohammed, thanks for the response.

And as a quick follow-up, does the City have any objections to using the 1800 mm diameter combined sewer on Catherine Street for the sanitary and storm discharge from the site? As a refresher, we anticipate around 26.88 L/s of sanitary discharge from the site.

Thanks,

Michael Wu, EIT
Civil Engineering Intern, Community Development

Work: (613) 738-6033
Mobile: (613) 858-0548
michael.wu@stantec.com

Stantec
300 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

From: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Sent: Monday, 24 April, 2023 08:32
To: Wu, Michael <Michael.Wu@stantec.com>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>; Sharp, Mike <Mike.Sharp@stantec.com>; Kilborn, Kris <kris.kilborn@stantec.com>; Thiffault, Dustin <Dustin.Thiffault@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Hi Michael,

Thank you for the revised boundary conditions.

I can confirm there are no current scheduled City projects in the vicinity of the site.

Thank you.

Best Regards,

Mohammed Fawzi, P.Eng.
Project Manager
Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique
Development Review - Central Branch

City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 20120, Mohammed.Fawzi@ottawa.ca

Please note that due to the current situation, I am working remotely. Email is currently the best way to contact me

---

From: Wu, Michael <Michael.Wu@stantec.com>
Sent: April 21, 2023 3:21 PM
To: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>; Sharp, Mike <Mike.Sharp@stantec.com>; Kilborn, Kris <kris.kilborn@stantec.com>; Thiffault, Dustin <dustin.thiffault@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Good afternoon, Mohammed:

As a quick follow-up, we would like to submit revised boundary conditions for the 265 Catherine Street site with updated fire flow demands at the same connection points.

While the revised worst case fire flow demands from the site has been reduced to 166.7 L/s (10000 L/min), connecting to the Lyon Street North and Arlington Avenue 203 mm diameter watermains would be a challenge, not least by the site's servicing be consolidated at Catherine Street, where the building's main entrance will be at.

As such, as part of the updated boundary condition request, we would like to obtain the hydraulic boundary conditions for the site under the following scenarios:

1. Upsizing the Catherine Street watermain to a 203 mm diameter watermain from Kent Street to Lyon Street North only
2. Upsizing both the Catherine Street and Kent Street watermains to 203 mm diameter within the vicinity of the site

Attached are the revised fire flow calculations and sketches of the two proposed upsizing options detailing the range of the proposed upsizing.

In addition, please advise if there are other design considerations for other ongoing City projects in the vicinity that could impact the site.

Please let me know if you have any further questions or comments.

Thanks,

Michael Wu, EIT

Civil Engineering Intern, Community Development

Work: (613) 738-6033
Mobile: (613) 858-0548
michael.wu@stantec.com

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Ottawa ON K2C 3G4

From: Wu, Michael
Sent: Wednesday, 19 April, 2023 15:35
To: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>; Sharp, Mike <Mike.Sharp@stantec.com>; Kilborn, Kris <kris.kilborn@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Good afternoon, Mohammed:

Just a quick question, is it possible for you to provide the HGL at the four connections under the max day + fire flow conditions with the fire flow demand of 166.7 L/s?

Thanks,

Michael Wu, EIT
Civil Engineering Intern, Community Development

Work: (613) 738-6033
Mobile: (613) 858-0548
michael.wu@stantec.com

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From: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Sent: Wednesday, 19 April, 2023 11:50
To: Wu, Michael <Michael.Wu@stantec.com>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>; Thiffault, Dustin <Dustin.Thiffault@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Hi Michael,

Thank you for confirming.

As a heads up, please note that a letter or email confirmation by the architect confirming the parameters used in the fire flow calculations is required. Parameters to be confirmed applicable are

A.4 Correspondence With Architect on Construction Type and Vertical Opening Protections

Wu, Michael

From: Ryan Lupien <rlupien@bdpquadrangle.com>
Sent: Wednesday, 19 April, 2023 13:42
To: Wu, Michael
Cc: Kilborn, Kris; Sharp, Mike; Ford, Matthew; Ghazi Ziben
Subject: RE: 265 Catherine Street Roof Plan Question

Hi,

Yes, we will maintain all necessary fire-separations required by code. Fresh air shafts will be enclosed in a fire-rated assembly and will likely have fire-dampers behind the vents in the walls, not at the floors. The mechanical engineer will specify fire-dampers where they are required between fire compartments.

Does this answer your question? I'm not quite sure I understand the reason for asking.

Regards,

BDP Quadrangle
Ryan Lupien (he/him/his)
Senior Associate, Senior Architect
t 416 598 1240 x 249

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From: Wu, Michael <Michael.Wu@stantec.com>
Sent: Wednesday, April 19, 2023 1:14 PM
To: Ryan Lupien <rlupien@bdpquadrangle.com>
Cc: Kilborn, Kris <kris.kilborn@stantec.com>; Sharp, Mike <Mike.Sharp@stantec.com>; Ford, Matthew <Matthew.Ford@stantec.com>; Ghazi Ziben <GZiben@bdpquadrangle.com>
Subject: RE: 265 Catherine Street Roof Plan Question

Good afternoon, Ryan, one quick follow-up:

Can you confirm that the vertical openings (between floors) for Buildings A and B are going to be **protected** per the fire code requirements outlined in the Ontario and National Building Codes?

Thanks,

Michael Wu, EIT
Civil Engineering Intern, Community Development

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michael.wu@stantec.com

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Stantec

From: Wu, Michael
Sent: Wednesday, 19 April, 2023 09:38
To: Ryan Lupien <rlupien@bdpquadrangle.com>
Cc: Kilborn, Kris <kris.kilborn@stantec.com>; Sharp, Mike <Mike.Sharp@stantec.com>; Ford, Matthew <Matthew.Ford@stantec.com>; Ghazi Ziben <GZiben@bdpquadrangle.com>; Shannon Card <scard@nak-design.com>
Subject: RE: 265 Catherine Street Roof Plan Question

Perfect, thanks for the update.

Michael Wu, EIT
Civil Engineering Intern, Community Development

Work: (613) 738-6033
Mobile: (613) 858-0548
michael.wu@stantec.com

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From: Ryan Lupien <rlupien@bdpquadrangle.com>
Sent: Wednesday, 19 April, 2023 09:36
To: Wu, Michael <Michael.Wu@stantec.com>
Cc: Kilborn, Kris <kris.kilborn@stantec.com>; Sharp, Mike <Mike.Sharp@stantec.com>; Ford, Matthew <Matthew.Ford@stantec.com>; Ghazi Ziben <GZiben@bdpquadrangle.com>; Shannon Card <scard@nak-design.com>
Subject: RE: 265 Catherine Street Roof Plan Question

Hi Michael,

Yes, we will include bi-level roof drains on the roof of the podium – we are just waiting to receive the landscape design to place into our drawings. Generally, we will slope the concrete under the roof topping to a maximum of 100 mm; therefore, a drain will be placed roughly 5 m in from the perimeter and be spaced roughly 10 m apart internally to achieve a 2% slope. Additionally, we will be required by code to include for emergency overflow scuppers on all roofs and terraces every 30 m which we will add in during detailed design at building permit stage. We will also add in drains in our model to the site to match the coordinated landscape/civil design locations.

Regards,

BDP Quadrangle
Ryan Lupien (he/him/his)
Senior Associate, Senior Architect
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From: Wu, Michael <Michael.Wu@stantec.com>
Sent: Wednesday, April 19, 2023 9:29 AM
To: Ryan Lupien <rlupien@bdpquadrangle.com>

Cc: Kilborn, Kris <kris.kilborn@stantec.com>; Sharp, Mike <Mike.Sharp@stantec.com>; Ford, Matthew <Matthew.Ford@stantec.com>; Ghazi Ziben <GZiben@bdpquadrangle.com>
Subject: 265 Catherine Street Roof Plan Question

Good morning, Ryan:

I have a quick question on the site plan provided on April 17th. In the roof plan, it seems that only the three towers are shown to be equipped with roof drains, whereas the seventh-floor podiums, including the pedestrian bridge, and the townhouses are not shown to have any drains.

As such, I was wondering if you could confirm that there would be drains for the seventh-floor podiums, the pedestrian bridge and for the townhouses or if updated roof plans can be provided.

Thanks,

Michael Wu, EIT
Civil Engineering Intern, Community Development

Work: (613) 738-6033
Mobile: (613) 858-0548
michael.wu@stantec.com

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Wu, Michael

From: Ryan Lupien <rlupien@bdpquadrangle.com>
Sent: Thursday, 23 March, 2023 09:52
To: Wu, Michael; Kilborn, Kris
Cc: Ghazi Ziben; Ford, Matthew; Sharp, Mike
Subject: RE: 265 Catherine Street - Grading

Hi Michael,

Buildings A and B are high-rise residential and will be cast-in-place concrete construction and they will be required to be sprinklered including the parking garage and possibly the pedestrian link between the market and the art space. We are hoping that the townhouse Building C will also be constructed out of cast-in-place concrete, but it is possible that this building could be constructed as a Part 9 building and be constructed out of wood and it may not need to be sprinklered as a result.

We will be locating a fire department connection at each of the main entrances along Catherine Street – we don't know if we'll need additional connections at this point. We would prefer free-standing connections, so we don't have to interrupt the building façade. We still need to locate them on our drawing, but we also haven't been able to identify the locations of all the fire hydrants – it looks like there is one at the southwest corner of the site. Perhaps you could highlight them for us and propose new ones if needed? The fire department connection/main entrances need to be within 45 m of the nearest fire hydrant.

Thank you,

BDP Quadrangle
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Senior Associate, Senior Architect
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From: Wu, Michael <Michael.Wu@stantec.com>
Sent: Thursday, March 23, 2023 9:28 AM
To: Ryan Lupien <rlupien@bdpquadrangle.com>; Kilborn, Kris <kris.kilborn@stantec.com>
Cc: Ghazi Ziben <GZiben@bdpquadrangle.com>; Ford, Matthew <Matthew.Ford@stantec.com>; Sharp, Mike <Mike.Sharp@stantec.com>
Subject: RE: 265 Catherine Street - Grading

Good morning, Ryan:

I was wondering if you could provide us the construction type for the three buildings and whether they will be sprinklered, we would need them for when we request the hydraulic boundary conditions from the City.

As well, could you also provide us the fire department connection locations?

Thanks,

Michael Wu, EIT

Civil Engineering Intern, Community Development

Work: (613) 738-6033
Mobile: (613) 858-0548
michael.wu@stantec.com

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From: Sharp, Mike <Mike.Sharp@stantec.com>
Sent: Thursday, 23 March, 2023 07:09
To: Ryan Lupien <rlupien@bdpquadrangle.com>; Shannon Card <scard@nak-design.com>; Kilborn, Kris <kris.kilborn@stantec.com>
Cc: Ghazi Ziben <GZiben@bdpquadrangle.com>; Jennifer Hemmings <jhemmings@nak-design.com>; Ford, Matthew <Matthew.Ford@stantec.com>; Wu, Michael <Michael.Wu@stantec.com>
Subject: RE: 265 Catherine Street - Grading

Thanks Ryan

I reviewed the pre-consult documents and there was no mention of services to be provided. The city usually requests dedicated stm, san and water services be provided for parks. I will propose them for SPA and we can get feedback.

Thanks
Mike

Mike Sharp C.E.T.
Civil Engineering Technologist

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Fax: 613 722-2799
Mike.Sharp@stantec.com

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From: Ryan Lupien <rlupien@bdpquadrangle.com>
Sent: Wednesday, March 22, 2023 4:49 PM
To: Sharp, Mike <Mike.Sharp@stantec.com>; Shannon Card <scard@nak-design.com>; Kilborn, Kris <kris.kilborn@stantec.com>
Cc: Ghazi Ziben <GZiben@bdpquadrangle.com>; Jennifer Hemmings <jhemmings@nak-design.com>; Ford, Matthew <Matthew.Ford@stantec.com>; Wu, Michael <Michael.Wu@stantec.com>
Subject: RE: 265 Catherine Street - Grading

Hi Shannon, Mike,

Mike, I'm not sure the answer to your question about the park area being included in the calculations or not, but we had discussed that Landscape will propose a design for the park area for the submission. We adjusted the grade of the exit and moving room on the west side of Building B to suit your markup. We have not yet done a review of each of the grade points in your drawing yet.

Please find attached a slightly updated CAD plan. There were two minimal building footprint changes at the main residential entrances along Catherine Street. The client requested that we provide a narrower entrance design. This will affect the two planting elements in those locations unfortunately. We removed all our outdated landscape background elements except the retractable bollards. We'll replace with a new landscape CAD background once it is ready. We will eventually have to show some type of area boundary to prove that there is at least 25% pedestrian open space as per the zoning bylaw.

The air shafts are highlighted. I think most of them will be fine, however the one along at the north of the market shifts the transformer over to the east a small amount. Additionally, we would like to maintain an entrance into the market from the middle window segment so that we can keep all the windows on the east end as overhead doors to allow the market to open. This will affect the trees there. Will you be able to work with this? Could you locate a separate tree in front of each of the building piers instead?

The air shaft at the southeast corner of the park will affect the paving pattern you have planned there. This shaft could shift south to be closer to the building if that helps. Let me know what is preferred.

We could have a call between us if you like tomorrow.

Thank you,

BDP Quadrangle
Ryan Lupien (he/him/his)
Senior Associate, Senior Architect
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From: Sharp, Mike <Mike.Sharp@stantec.com>
Sent: Wednesday, March 22, 2023 10:41 AM
To: Shannon Card <scard@nak-design.com>; Ryan Lupien <rlupien@bdpquadrangle.com>; Kilborn, Kris <kris.kilborn@stantec.com>
Cc: Ghazi Ziben <GZiben@bdpquadrangle.com>; Jennifer Hemmings <jhemmings@nak-design.com>; Ford, Matthew <Matthew.Ford@stantec.com>; Wu, Michael <Michael.Wu@stantec.com>
Subject: RE: 265 Catherine Street - Grading

Hi Ryan, Shannon

Are we designing the park servicing and grading as well? Some projects I've been on we do and others we don't. The landscaping shows design features in the park and I just need to know if I'm including this area in the storm sewer design.

Thanks
Mike

Mike Sharp C.E.T.
Civil Engineering Technologist

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From: Shannon Card <scard@nak-design.com>
Sent: Tuesday, March 21, 2023 4:35 PM
To: Sharp, Mike <Mike.Sharp@stantec.com>; Ryan Lupien <rlupien@bdpquadrangle.com>; Kilborn, Kris <kris.kilborn@stantec.com>
Cc: Ghazi Ziben <GZiben@bdpquadrangle.com>; Jennifer Hemmings <jhemmings@nak-design.com>; Ford, Matthew <Matthew.Ford@stantec.com>; Wu, Michael <Michael.Wu@stantec.com>
Subject: RE: 265 Catherine Street - Grading

Hi Mike, Ryan,

Please see attached landscape ground floor for coordination. Note that I will be issuing a full design update tomorrow morning that will aid in describing the updated concept – but wanted to get the CAD out to start coordinating grading, services etc.

Mike, we're proposing the amenity space on the west end of the site have some level of exposed stormwater management incorporated. Essentially, we'd like to explore incorporating permeable pavements or even elevated pavements with sunken planting beds – like a concrete boardwalk. We will share some precedent imagery with the design update tomorrow morning that will aid in illustrating the design intent on this side, but happy to have a call to discuss this in more detail and review design alternatives.

Thank you,
Shannon

From: Sharp, Mike <Mike.Sharp@stantec.com>
Sent: Tuesday, March 21, 2023 11:51 AM
To: Ryan Lupien <rlupien@bdpquadrangle.com>; Kilborn, Kris <kris.kilborn@stantec.com>
Cc: Ghazi Ziben <GZiben@bdpquadrangle.com>; Shannon Card <scard@nak-design.com>; Jennifer Hemmings <jhemmings@nak-design.com>; Ford, Matthew <Matthew.Ford@stantec.com>; Wu, Michael <Michael.Wu@stantec.com>
Subject: RE: 265 Catherine Street - Grading

Good morning, Ryan, please see latest grading for coordination. Please review the secondary exit and moving entrance for building B. We had to adjust the grades slightly to accommodate existing tie ins. I think all other access points are working well.

We are currently working on SPA design drawings and have been coordinating with Shannon with the landscape development. Once we have landscape, we will be able to provide you with a cistern volume required.

As the plans develop, we will have area drains (AD) and trench drains (TD) to coordinate with mechanical, structural, architectural, landscape. Preliminary locations have been indicated on the grading plan. These will be required to connect through the building and into the stormwater cistern.

Take care,
Mike

Mike Sharp C.E.T.
Civil Engineering Technologist

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Cell:613 558-5204
Fax: 613 722-2799
Mike.Sharp@stantec.com

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From: Ryan Lupien <rlupien@bdpquadrangle.com>
Sent: Monday, February 27, 2023 9:16 AM
To: Sharp, Mike <Mike.Sharp@stantec.com>; Kilborn, Kris <kris.kilborn@stantec.com>
Cc: Ghazi Ziben <GZiben@bdpquadrangle.com>; Shannon Card <scard@nak-design.com>; Jennifer Hemmings <jhemmings@nak-design.com>
Subject: RE: 265 Catherine Street - Grading

Hi Mike,

Okay, we will work with the proposed grades. Thank you for letting me know.

Regards,

BDP Quadrangle
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Senior Associate, Senior Architect
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From: Sharp, Mike <Mike.Sharp@stantec.com>
Sent: Monday, February 27, 2023 9:13 AM
To: Ryan Lupien <rlupien@bdpquadrangle.com>; Kilborn, Kris <kris.kilborn@stantec.com>
Cc: Ghazi Ziben <GZiben@bdpquadrangle.com>; Shannon Card <scard@nak-design.com>; Jennifer Hemmings <jhemmings@nak-design.com>
Subject: RE: 265 Catherine Street - Grading

Hi Ryan, I really can't lower that entrance, I'm already at min slope out to the road. If I add low points with catchbasins, there will be a ponding elevation. I then must set any floors in that area 0.3m above the ponding area. If you want that to use the 68.65 as the FFE everywhere then you will have to accommodate a ramp at the front entrance and adjust the floor elevations at the loading doors, and make additional ramps/stairs that have access to Lyon Street.

Mike

Mike Sharp C.E.T.
Civil Engineering Technologist

Direct: 613 784-2208
Cell:613 558-5204
Fax: 613 722-2799
Mike.Sharp@stantec.com

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From: Ryan Lupien <rlupien@bdpquadrangle.com>
Sent: Friday, February 24, 2023 1:38 PM
To: Sharp, Mike <Mike.Sharp@stantec.com>; Kilborn, Kris <kris.kilborn@stantec.com>
Cc: Ghazi Ziben <GZiben@bdpquadrangle.com>; Shannon Card <scard@nak-design.com>; Jennifer Hemmings <jhemmings@nak-design.com>
Subject: RE: 265 Catherine Street - Grading

Hi Mike,

Thanks for the update. Things are looking good. One question though, if you refer to the attached, would it be possible to get the secondary residential entrance at the back to be the same elevation as the main lobby? We can work with keeping the amenity to the right at 68.65, but we will have to work out some location to make this transition. We can make the steps in the Artspace and market work.

We'll now use these lobby grades to start adjusting our model.

Thank you,

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From: Sharp, Mike <Mike.Sharp@stantec.com>
Sent: Friday, February 24, 2023 11:07 AM
To: Ryan Lupien <rlupien@bdpquadrangle.com>; Kilborn, Kris <kris.kilborn@stantec.com>
Cc: Ghazi Ziben <GZiben@bdpquadrangle.com>
Subject: RE: 265 Catherine Street - Grading

Good morning, Ryan. Please see attached the revised grading as discussed. Please review and let me know if you have any comments.
Thx

Mike

Mike Sharp C.E.T.
Civil Engineering Technologist

Direct: 613 784-2208
Cell:613 558-5204
Fax: 613 722-2799
Mike.Sharp@stantec.com

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From: Ryan Lupien <rlupien@bdpquadrangle.com>
Sent: Wednesday, February 22, 2023 3:12 PM
To: Sharp, Mike <Mike.Sharp@stantec.com>; Kilborn, Kris <kris.kilborn@stantec.com>
Cc: Ghazi Ziben <GZiben@bdpquadrangle.com>
Subject: RE: 265 Catherine Street - Grading

Hi,

I am available for the rest of today up until about 5:00. Tomorrow is a bit busy with meetings and I'm free most of the day on Friday. If you are able today, it would be preferable to allow us to get going on the modelling work on our end.

Let me know.

Thanks,

BDP Quadrangle
Ryan Lupien (he/him/his)
Senior Associate, Senior Architect
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From: Sharp, Mike <Mike.Sharp@stantec.com>
Sent: Wednesday, February 22, 2023 2:44 PM
To: Ryan Lupien <rlupien@bdpquadrangle.com>; Kilborn, Kris <kris.kilborn@stantec.com>
Cc: Ghazi Ziben <GZiben@bdpquadrangle.com>
Subject: RE: 265 Catherine Street - Grading

Hi Ryan, I have reviewed the mark ups, and I was wondering if we could have a quick meeting to discuss. I think in general all comments can be accommodated with a few minor grading changes and with the addition of ramps in the building as shown on the markup. I want to ensure I understand where all the access points are etc. I hope to be able to provide something back shortly, using the FFE's that I have started with and the ones that have been added on the markup.

Thanks

Mike

Mike Sharp C.E.T.
Civil Engineering Technologist

Direct: 613 784-2208
Cell:613 558-5204
Fax: 613 722-2799
Mike.Sharp@stantec.com

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300 - 1331 Clyde Avenue
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From: Ryan Lupien <rlupien@bdpquadrangle.com>
Sent: Wednesday, February 22, 2023 2:14 PM
To: Kilborn, Kris <kris.kilborn@stantec.com>; Sharp, Mike <Mike.Sharp@stantec.com>
Cc: Ghazi Ziben <GZiben@bdpquadrangle.com>
Subject: 265 Catherine Street - Grading

Hi Kris, Mike,

We are wondering if you have had a chance to look at the grading mark-ups we sent. We would really like to be able to begin establishing the grades in the Revit model based on this coordination.

Please let us know what you think about our markups. We can have quick call to discuss as well.

Thanks,

BDP Quadrangle
Ryan Lupien (he/him/his)
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A.5 Fire Hydrant Coverage Calculations

Stantec	Project:	**265 Catherine Street**	160401663
	TABLE 1: FIRE HYDRANT COVERAGE TABLE		
	Revision:	1	Prepared By: MW
	Revision Date:	2023-05-10	Checked By:

Description	Hydrants[1]			Total Available Fire Flow (L/min)	Total Required Fire Flow[2] (L/min)
	HYD-01	**HYD-02**	**Proposed**		
265 Catherine Street					
Distance from fire department connection (m)	41.7	49.1	21.7	-	-
Maximum fire flow capacity[3] (L/min)	5,678	5,678	5,678	**17,034**	10,000

NFPA 1 Table 18.5.4.3	
Distance to Building (m)	Maximum Capacity (L/min)
≤ 76	**5,678**
> 76 and ≤ 152	**3,785**
> 152 and ≤ 305	**2,839**

Notes:

1. Hydrant locations as per GeoOttawa accessed May 10, 2023. Refer to fire hydrant coverage sketch (Figure 3-1).
2. See OBC Calculations, Appendix A.2 for fire flow requirements.
3. See NFPA 1 Table 18.5.4.3 in Appendix I of the City of Ottawa Technical Bulletin ISTB-2018-02 for maxiumim fire flow capacity of hydrants by distance to building.

Appendix B Site Plan by Quadrangle Architects Ltd. (May 8, 2023)

REVISION RECORD

ISSUE RECORD

BDP.
Quadrangle

Quadrangle Architects Limited

265 Catherine Street, Ottawa

for
Brigil

21007	1 : 150	GZ	RJL
PROJECT	SCALE	DRAWN	REVIEWED

Ground Floor Plan

A200.S

1 A200.S Ground Floor Plan

Appendix C Sanitary

C.1 Sanitary Calculation Sheet

Stantec

SUBDIVISION:

265 Catherine Street

DATE: 2023-05-08
REVISION: 1
DESIGNED BY: MW
CHECKED BY: -

SANITARY SEWER DESIGN SHEET
(City of Ottawa)

FILE NUMBER: 160401663

DESIGN PARAMETERS

MAX PEAK FACTOR (RES.)=	4.0	AVG. DAILY FLOW / PERSON	280 l/p/day	MINIMUM VELOCITY	0.60 m/s
MIN PEAK FACTOR (RES.)=	2.0	COMMERCIAL	28,000 l/ha/day	MAXIMUM VELOCITY	3.00 m/s
PEAKING FACTOR (INDUSTRIAL):	2.4	INDUSTRIAL (HEAVY)	55,000 l/ha/day	MANNINGS n	0.013
PEAKING FACTOR (ICI >20%):	1.5	INDUSTRIAL (LIGHT)	35,000 l/ha/day	BEDDING CLASS	B
PERSONS / 1 BEDROOM	1.4	INSTITUTIONAL	28,000 l/ha/day	MINIMUM COVER	2.50 m
PERSONS / 2 BEDROOM	2.1	INFILTRATION	0.33 l/s/Ha	HARMON CORRECTION FACTOR	0.8
PERSONS / 3 BEDROOM	3.1				
PERSONS / TOWNHOME	2.7				

LOCATION			RESIDENTIAL AREA AND POPULATION									COMMERCIAL		INDUSTRIAL (L)		INDUSTRIAL (H)		INSTITUTIONAL		GREEN / UNUSED		C+I+I	INFILTRATION			TOTAL	PIPE							
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA	1 BEDOOM	2 BEDROOM	3 BEDROOM	TOWN	POP.	CUMULATIVE AREA	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	PEAK FLOW	TOTAL AREA	ACCU. AREA	INFILT. FLOW	FLOW	LENGTH	DIA	MATERIAL	CLASS	SLOPE	CAP. (FULL)	CAP. V PEAK FLOW	VEL. (FULL)
			(ha)						(ha)			(l/s)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(l/s)	(ha)	(ha)	(l/s)	(l/s)	(m)	(mm)			(%)	(l/s)	(%)	(m/s)
R2B (BLDG C)	BLDG C	LATERAL 2	0.039	0	0	0	7	19	0.039	19	4.000	0.2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.086	0.086	0.0	0.125	0.125	0.0	0.3	11.4	200	PVC	SDR 35	1.00	33.4	**0.86%**	1.05
R2A (BLDG B)	BLDG B	BLDG C	0.300	363	57	312	0	1595	0.339	1614	3.656	19.1	0.106	0.106	0.000	0.000	0.000	0.000	0.000	0.000	0.086	0.171	0.1	0.492	0.617	0.2	19.4	11.4	200	PVC	SDR 35	1.00	33.4	**57.96%**	1.05
R1A (BLDG A)	BLDG A	LATERAL 1	0.246	73	83	133	0	689	0.585	2303	3.537	26.4	0.083	0.189	0.000	0.000	0.000	0.000	0.000	0.000	0.138	0.309	0.1	0.467	1.084	0.4	26.8	11.4	200	PVC	SDR 35	1.00	33.4	**80.30%**	1.05

C.2 Correspondence with City on Sanitary Sewer Capacity

Wu, Michael

From: Kilborn, Kris
Sent: Thursday, 27 April, 2023 09:54
To: Fawzi, Mohammed
Cc: Ford, Matthew; Sharp, Mike; Thiffault, Dustin; Wu, Michael
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Good morning Mohammed and thanks for the chat about 265 Catherine Project.

As discussed, our submission will include san and storm connections to the Arlington Street Sewer. The Development will have two sets of san/storm connections to the Arlington
Sewer to coincide with phasing and to ensure mechanical can design the site. As this is a large site spanning an entire City block.
As we have minimal room for onsite monitoring manholes we will be showing these within the municipal right of way. City can comment and the owner may have to enter into an encroachment agreement with the City.
For now, we will show W3 Chambers on the water services (which will also be within the right of way) which you could review if chambers are required on all.

Thanks for checking in on the boundary conditions. It appears we will need to install new watermain along Catherine and Kent which we will show and submit in plan view only for this submission.

Sincerely

Kris Kilborn
Principal, Community Development
Business Center Practice Leader

Mobile: 613 297-0571
Fax: 613 722-2799
kris.kilborn@stantec.com
Stantec
300 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

The Ottawa office is open however many staff are working remotely. To contact me please use email, or my mobile and leave a message.
Please note our reception is on the 3rd floor.

From: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Sent: Wednesday, April 26, 2023 10:54 AM
To: Kilborn, Kris <kris.kilborn@stantec.com>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>; Sharp, Mike <Mike.Sharp@stantec.com>; Thiffault, Dustin <Dustin.Thiffault@stantec.com>; Wu, Michael <Michael.Wu@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Hi Kris,

I'm available today until 4:00pm – so feel free to send an invite. I would recommend we include Asset Management though as I mentioned they are the ones who would approve a connection to a trunk sewer.

Best Regards,

Mohammed Fawzi, P.Eng.
Project Manager
Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique
Development Review - Central Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 20120, Mohammed.Fawzi@ottawa.ca

Please note that due to the current situation, I am working remotely. Email is currently the best way to contact me

---

From: Kilborn, Kris <kris.kilborn@stantec.com>
Sent: April 25, 2023 2:56 PM
To: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>; Sharp, Mike <Mike.Sharp@stantec.com>; Thiffault, Dustin <dustin.thiffault@stantec.com>; Wu, Michael <Michael.Wu@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Hey Mohammed do you have time for a quick call this afternoon. Would just like to review our plans with you and show you our drawings and why
We are requesting to connect to Catherine.

I could send out a team's meeting request.
Thanks, and let me know.

Sincerely

Kris Kilborn
Principal, Community Development
Business Center Practice Leader

Mobile: 613 297-0571
Fax: 613 722-2799
kris.kilborn@stantec.com
Stantec
300 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

The Ottawa office is open however many staff are working remotely. To contact me please use email, or my mobile and leave a message.
Please note our reception is on the 3rd floor.

From: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Sent: Tuesday, April 25, 2023 1:35 PM
To: Kilborn, Kris <kris.kilborn@stantec.com>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>; Sharp, Mike <Mike.Sharp@stantec.com>; Thiffault, Dustin <Dustin.Thiffault@stantec.com>; Wu, Michael <Michael.Wu@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Hi Kris,

I can definitely get the City's Asset Management Branch involved in our discussion as they would be the ones ultimately making the decision as to whether or not we can connect to the trunk sewer. Prior to doing so, could you confirm why we cannot connect to the 450mm dia. pipe on Lyon Street?

Thanks Kris.

Best Regards,

Mohammed Fawzi, P.Eng.
Project Manager
Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique
Development Review - Central Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 20120, Mohammed.Fawzi@ottawa.ca

Please note that due to the current situation, I am working remotely. Email is currently the best way to contact me

---

From: Kilborn, Kris <kris.kilborn@stantec.com>
Sent: April 25, 2023 11:18 AM
To: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>; Wu, Michael <Michael.Wu@stantec.com>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>; Sharp, Mike <Mike.Sharp@stantec.com>; Thiffault, Dustin <dustin.thiffault@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Mohammed

We have design and installed connections to deep Trunk Sewers on other high rise projects in the City and we require this connection for our phase 1 development.
As you can appreciate this development is a full City block which will be constructed in phases and require connection to the 1800dia. In previous emails you mentioned that
We should not connect to the existing brick sewer on Arlington and our hands are a bit tied now.

Could we set up a call to discuss.

Sincerely

Kris Kilborn
Principal, Community Development
Business Center Practice Leader

Mobile: 613 297-0571
Fax: 613 722-2799
kris.kilborn@stantec.com
Stantec
300 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

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Please note our reception is on the 3rd floor.

From: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Sent: Tuesday, April 25, 2023 10:50 AM
To: Wu, Michael <Michael.Wu@stantec.com>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>; Sharp, Mike <Mike.Sharp@stantec.com>; Kilborn, Kris <kris.kilborn@stantec.com>; Thiffault, Dustin <Dustin.Thiffault@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Hi Michael,

Unfortunately the City would not permit a connection to such a large deep trunk sewer.

Thank you.

Best Regards,

Mohammed Fawzi, P.Eng.
Project Manager
Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique
Development Review - Central Branch

City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 20120, Mohammed.Fawzi@ottawa.ca

Please note that due to the current situation, I am working remotely. Email is currently the best way to contact me

---

From: Wu, Michael <Michael.Wu@stantec.com>
Sent: April 24, 2023 12:14 PM
To: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>; Sharp, Mike <Mike.Sharp@stantec.com>; Kilborn, Kris <kris.kilborn@stantec.com>; Thiffault, Dustin <dustin.thiffault@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Hi Mohammed, thanks for the response.

And as a quick follow-up, does the City have any objections to using the 1800 mm diameter combined sewer on Catherine Street for the sanitary and storm discharge from the site? As a refresher, we anticipate around 26.88 L/s of sanitary discharge from the site.

Thanks,

Michael Wu, EIT
Civil Engineering Intern, Community Development

Work: (613) 738-6033
Mobile: (613) 858-0548
michael.wu@stantec.com

Stantec
300 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

From: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Sent: Monday, 24 April, 2023 08:32
To: Wu, Michael <Michael.Wu@stantec.com>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>; Sharp, Mike <Mike.Sharp@stantec.com>; Kilborn, Kris <kris.kilborn@stantec.com>; Thiffault, Dustin <Dustin.Thiffault@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Hi Michael,

Thank you for the revised boundary conditions.

I can confirm there are no current scheduled City projects in the vicinity of the site.

Thank you.

Best Regards,

Mohammed Fawzi, P.Eng.
Project Manager
Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique
Development Review - Central Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 20120, Mohammed.Fawzi@ottawa.ca

Please note that due to the current situation, I am working remotely. Email is currently the best way to contact me

---

From: Wu, Michael <Michael.Wu@stantec.com>
Sent: April 21, 2023 3:21 PM
To: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>; Sharp, Mike <Mike.Sharp@stantec.com>; Kilborn, Kris <kris.kilborn@stantec.com>; Thiffault, Dustin <dustin.thiffault@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Good afternoon, Mohammed:

As a quick follow-up, we would like to submit revised boundary conditions for the 265 Catherine Street site with updated fire flow demands at the same connection points.

While the revised worst case fire flow demands from the site has been reduced to 166.7 L/s (10000 L/min), connecting to the Lyon Street North and Arlington Avenue 203 mm diameter watermains would be a challenge, not least by the site's servicing be consolidated at Catherine Street, where the building's main entrance will be at.

As such, as part of the updated boundary condition request, we would like to obtain the hydraulic boundary conditions for the site under the following scenarios:

1. Upsizing the Catherine Street watermain to a 203 mm diameter watermain from Kent Street to Lyon Street North only

2. Upsizing both the Catherine Street and Kent Street watermains to 203 mm diameter within the vicinity of the site

Attached are the revised fire flow calculations and sketches of the two proposed upsizing options detailing the range of the proposed upsizing.

In addition, please advise if there are other design considerations for other ongoing City projects in the vicinity that could impact the site.

Please let me know if you have any further questions or comments.

Thanks,

Michael Wu, EIT
Civil Engineering Intern, Community Development

Work: (613) 738-6033
Mobile: (613) 858-0548
michael.wu@stantec.com

Stantec
300 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

From: Wu, Michael
Sent: Wednesday, 19 April, 2023 15:35
To: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>; Sharp, Mike <Mike.Sharp@stantec.com>; Kilborn, Kris <kris.kilborn@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Good afternoon, Mohammed:

Just a quick question, is it possible for you to provide the HGL at the four connections under the max day + fire flow conditions with the fire flow demand of 166.7 L/s?

Thanks,

Michael Wu, EIT
Civil Engineering Intern, Community Development

Work: (613) 738-6033
Mobile: (613) 858-0548
michael.wu@stantec.com

Stantec
300 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

From: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Sent: Wednesday, 19 April, 2023 11:50
To: Wu, Michael <Michael.Wu@stantec.com>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>; Thiffault, Dustin <Dustin.Thiffault@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Hi Michael,

Thank you for confirming.

As a heads up, please note that a letter or email confirmation by the architect confirming the parameters used in the fire flow calculations is required. Parameters to be confirmed applicable are confirming that the vertical openings are protected, type of construction, occupancy charge and sprinkler reductions. This can be appended to the Servicing Report.

Thanks Michael.

Best Regards,

Mohammed Fawzi, P.Eng.
Project Manager
Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique
Development Review - Central Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 20120, Mohammed.Fawzi@ottawa.ca

Please note that due to the current situation, I am working remotely. Email is currently the best way to contact me

From: Wu, Michael <Michael.Wu@stantec.com>
Sent: April 18, 2023 4:37 PM
To: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>; Thiffault, Dustin <dustin.thiffault@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Good afternoon, Mohammed:

As a follow-up, we have decided to update the fire flow demand calculation approach.

Specifically, for the FUS “protected vertical openings” classification for the two high-rise buildings on site, as the main openings between the floors are the elevator shafts and emergency exit stairwell, they would have already been subjected to the strictest fire protection measures outlined in the Ontario Building Code and the National Building Code, therefore it is reasoned that the two high-rises be classified as having protected vertical openings.

Under this approach, Building B’s fire flow demand is reduced to 166.7 L/s (10,000 L/min), which is adequate for the watermains on Arlington Avenue and Lyon Street North to provide their respective fire flows while maintaining a residual pressure of 20 psi.

Please let me know if you have any questions or comments to this new approach.

Thanks,

Michael Wu, EIT
Civil Engineering Intern, Community Development

Work: (613) 738-6033
Mobile: (613) 858-0548
michael.wu@stantec.com

Stantec
300 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

From: Wu, Michael
Sent: Thursday, 13 April, 2023 13:23
To: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Perfect, thanks for the information.

Michael Wu, EIT
Civil Engineering Intern, Community Development

Work: (613) 738-6033
Mobile: (613) 858-0548
michael.wu@stantec.com

Stantec
300 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

From: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Sent: Thursday, 13 April, 2023 13:05
To: Wu, Michael <Michael.Wu@stantec.com>

Cc: Ford, Matthew <Matthew.Ford@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Hi Michael,

Please note that the Fire demand request of 316.7 L/s was not met. Next steps: Take measures to lower the fire demand, identify hydrants to request for a multi-hydrant analysis.

The following are boundary conditions, HGL, for hydraulic analysis at 265 Catherine Street (zone 1W) assumed to be connected to either the 127 mm watermain on Catherine Street, OR the 203 mm watermain on Lyon Street, OR the 203 mm watermain on Arlington Avenue, OR the 127 mm on Kent Street (see attached PDF for location).

Connection	Min HGL (m)	Maximum HGL (m)
Catherine Street	80.4	115.3
Lyon Street	104.9	115.3
Arlington Avenue	105.9	115.3
Kent Street	97.8	115.2

Fire Flow:

Available Fire flow at 20 psi: 46 L/s assuming ground elevation of 68.2 m (Catherine Connection)

Available Fire flow at 20 psi: 187 L/s assuming ground elevation of 67.6 m (Lyon Connection)

Available Fire flow at 20 psi: 270 L/s assuming ground elevation of 68.0 m (Arlington Connection)

Available Fire flow at 20 psi: 64 L/s assuming ground elevation of 68.6 m (Kent Connection)

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

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

Best Regards,

Mohammed Fawzi, P.Eng.
Project Manager
Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique
Development Review - Central Branch
City of Ottawa | Ville d'Ottawa

110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 20120, Mohammed.Fawzi@ottawa.ca

Please note that due to the current situation, I am working remotely. Email is currently the best way to contact me

---

From: Wu, Michael <Michael.Wu@stantec.com>
Sent: April 11, 2023 11:45 AM
To: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Good morning, Mohammed, hope you are well. Just checking in to see when we could expect to receive the boundary conditions, the combined sewer capacity confirmation and the existing water consumption data for the site (if possible).

Thanks,

Michael Wu, EIT
Civil Engineering Intern, Community Development

Work: (613) 738-6033
Mobile: (613) 858-0548
michael.wu@stantec.com

Stantec
300 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

From: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Sent: Wednesday, 29 March, 2023 14:50
To: Wu, Michael <Michael.Wu@stantec.com>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Hi Michael,

Received.

I will get back to you as soon as possible. Thank you.

Best Regards,

Mohammed Fawzi, P.Eng.
Project Manager
Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique
Development Review - Central Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 20120, Mohammed.Fawzi@ottawa.ca

Please note that due to the current situation, I am working remotely. Email is currently the best way to contact me

---

From: Wu, Michael <Michael.Wu@stantec.com>
Sent: March 29, 2023 1:18 PM
To: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>
Subject: 265 Catherine Street Combined Sewer Capacity Confirmation

Good afternoon, Mohammed:

In addition to the hydraulic boundary conditions, as part of the servicing for the proposed development on 265 Catherine Street, we would like to confirm if there is sufficient capacity downstream of the 450 mm diameter combined sewers in Lyon Street North, 300 mm diameter combined sewers in Catherine Street, 375 mm diameter combined sewers in Kent Street, and the 1200 mm diameter trunk combined sewers in Arlington Avenue to receive an additional peak flow of 26.8 L/s from the proposed development.

Please find our sanitary design sheet and location map attached for your information. Furthermore, we were wondering if there are any existing water consumption data for the site during its use as a Greyhound bus terminal.

Thank you,

Michael Wu, EIT
Civil Engineering Intern, Community Development

Work: (613) 738-6033
Mobile: (613) 858-0548
michael.wu@stantec.com

Stantec
300 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

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Appendix D Stormwater Servicing

D.1 Modified Rational Method Sheet

Stormwater Management Calculations

File No: **160401663**
Project: **265 Catherine Street**
Date: **02-May-23**

SWM Approach:
Post-development to Pre-development flows

Post-Development Site Conditions:

Overall Runoff Coefficient for Site and Sub-Catchment Areas

Runoff Coefficient Table

Catchment Type	Sub-catchment Area ID / Description		Area (ha) "A"	Runoff Coefficient "C"	"A x C"		Overall Runoff Coefficient
Uncontrolled - Park	UNC-PARK	Hard	0.002	0.9	0.002		
		Soft	0.010	0.2	0.002		
		Subtotal	0.012			0.00396	0.330
Controlled - Park	PARK	Hard	0.056	0.9	0.050		
		Soft	0.031	0.2	0.006		
		Subtotal	0.087			0.05655	0.650
Uncontrolled - Non-Tributary	UNC-2	Hard	0.080	0.9	0.072		
		Soft	0.030	0.2	0.006		
		Subtotal	0.11			0.0781	0.710
Uncontrolled - Non-Tributary	UNC-1	Hard	0.034	0.9	0.031		
		Soft	0.002	0.2	0.000		
		Subtotal	0.036			0.03132	0.870
Uncontrolled - Non-Tributary	CIST 2-4	Hard	0.041	0.9	0.037		
		Soft	0.021	0.2	0.004		
		Subtotal	0.062			0.04092	0.660
Uncontrolled - Non-Tributary	CIST 2-3	Hard	0.025	0.9	0.022		
		Soft	0.019	0.2	0.004		
		Subtotal	0.044			0.02596	0.590
Uncontrolled - Non-Tributary	CIST 2-2	Hard	0.041	0.9	0.037		
		Soft	0.000	0.2	0.000		
		Subtotal	0.041			0.0369	0.900
Controlled - Tributary	CIST 2-1	Hard	0.304	0.9	0.274		
		Soft	0.000	0.2	0.000		
		Subtotal	0.304			0.2736	0.900
Uncontrolled - Non-Tributary	CIST 1-4	Hard	0.019	0.9	0.017		
		Soft	0.000	0.2	0.000		
		Subtotal	0.019			0.0171	0.900
Uncontrolled - Non-Tributary	CIST 1-3	Hard	0.011	0.9	0.010		
		Soft	0.000	0.2	0.000		
		Subtotal	0.011			0.0099	0.900
Uncontrolled - Non-Tributary	CIST 1-2	Hard	0.022	0.9	0.020		
		Soft	0.000	0.2	0.000		
		Subtotal	0.022			0.0198	0.900
Controlled - Tributary	CIST 1-1	Hard	0.246	0.9	0.221		
		Soft	0.000	0.2	0.000		
		Subtotal	0.246			0.2214	0.900
Total (Exclude Park)			**0.895**			**0.755**	
Overall Runoff Coefficient= C:							**0.84**

Total Roof Areas	**0.000 ha**
Total Tributary Surface Areas (Controlled and Uncontrolled)	**0.749 ha**
Total Tributary Area to Outlet	**0.749 ha**
Total Uncontrolled Areas (Non-Tributary)	**0.146 ha**
Park Area	**0.099 ha**
Total Site (Exclude Park)	**0.895 ha**

Stormwater Management Calculations

Project #160401663, 265 Catherine Street
Modified Rational Method Calculations for Storage

2 yr Intensity
City of Ottawa

$I = a/(t + b)^c$

a =	732.951
b =	6.199
c =	0.81

t (min)	I (mm/hr)
10	76.81
20	52.03
30	40.04
40	32.86
50	28.04
60	24.56
70	21.91
80	19.83
90	18.14
100	16.75
110	15.57
120	14.56

2 YEAR Predevelopment Target Release from Portion of Site

Subdrainage Area: Predevelopment Tributary Area to Outlet
Area (ha): 0.7490
C: 0.40

Typical Time of Concentration

tc (min)	I (2 yr) (mm/hr)	Qtarget (L/s)
12	69.89	**58.21**

Sanitary **26.85** **L/s**
Target 31.36 L/s

2 YEAR Modified Rational Method for Entire Site

Subdrainage Area: UNC-PARK — Uncontrolled - Park
Area (ha): 0.01
C: 0.33

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	0.85	0.85		
20	52.03	0.57	0.57		
30	40.04	0.44	0.44		
40	32.86	0.36	0.36		
50	28.04	0.31	0.31		
60	24.56	0.27	0.27		
70	21.91	0.24	0.24		
80	19.83	0.22	0.22		
90	18.14	0.20	0.20		
100	16.75	0.18	0.18		
110	15.57	0.17	0.17		
120	14.56	0.16	0.16		

Subdrainage Area: PARK — Controlled - Park
Area (ha): 0.09
C: 0.65

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	12.07	12.07	0.00	**0.00**
20	52.03	8.18	8.18	0.00	**0.00**
30	40.04	6.30	6.30	0.00	**0.00**
40	32.86	5.17	5.17	0.00	**0.00**
50	28.04	4.41	4.41	0.00	**0.00**
60	24.56	3.86	3.86	0.00	**0.00**
70	21.91	3.44	3.44	0.00	**0.00**
80	19.83	3.12	3.12	0.00	**0.00**
90	18.14	2.85	2.85	0.00	**0.00**
100	16.75	2.63	2.63	0.00	**0.00**
110	15.57	2.45	2.45	0.00	**0.00**
120	14.56	2.29	2.29	0.00	**0.00**

Storage: Above CB

Orifice Equation: $Q = CdA(2gh)^{0.5}$ Where C = 0.57
Orifice Diameter: 102.00 mm
Invert Elevation 66.83 m
T/G Elevation 68.60 m
Max Ponding Depth 0.00 m
Downstream W/L 0.00 m

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
5-year Water Level	68.60	1.77	27.54	0.00	4.70	OK

Subdrainage Area: UNC-2 — Uncontrolled - Non-Tributary
Area (ha): 0.11
C: 0.71

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	16.68	16.68		
20	52.03	11.30	11.30		
30	40.04	8.69	8.69		
40	32.86	7.14	7.14		
50	28.04	6.09	6.09		
60	24.56	5.33	5.33		
70	21.91	4.76	4.76		
80	19.83	4.31	4.31		
90	18.14	3.94	3.94		
100	16.75	3.64	3.64		
110	15.57	3.38	3.38		
120	14.56	3.16	3.16		

Subdrainage Area: UNC-1 — Uncontrolled - Non-Tributary
Area (ha): 0.04
C: 0.87

tc	I (2 yr)	Qactual	Qrelease	Qstored	Vstored

Project #160401663, 265 Catherine Street
Modified Rational Method Calculations for Storage

100 yr Intensity
City of Ottawa

$I = a/(t + b)^c$

a =	1735.688
b =	6.014
c =	0.820

t (min)	I (mm/hr)
10	178.56
20	119.95
30	91.87
40	75.15
50	63.95
60	55.89
70	49.79
80	44.99
90	41.11
100	37.90
110	35.20
120	32.89

100 YEAR Predevelopment Target Release from Portion of Site

Subdrainage Area: Predevelopment Tributary Area to Outlet
Area (ha): 0.7490
C: 0.40

Estimated Time of Concentration after Development

tc (min)	I (100 yr) (mm/hr)	Q100yr (L/s)
10	178.56	**148.72**

100 YEAR Modified Rational Method for Entire Site

Subdrainage Area: UNC-PARK — Uncontrolled - Park
Area (ha): 0.01
C: 0.41

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	2.46	2.46		
20	119.95	1.65	1.65		
30	91.87	1.26	1.26		
40	75.15	1.03	1.03		
50	63.95	0.88	0.88		
60	55.89	0.77	0.77		
70	49.79	0.69	0.69		
80	44.99	0.62	0.62		
90	41.11	0.57	0.57		
100	37.90	0.52	0.52		
110	35.20	0.48	0.48		
120	32.89	0.45	0.45		

Subdrainage Area: PARK — Controlled - Park
Area (ha): 0.09
C: 0.81

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	35.09	28.39	6.70	**4.02**
20	119.95	23.57	23.57	0.00	0.00
30	91.87	18.05	18.05	0.00	0.00
40	75.15	14.77	14.77	0.00	0.00
50	63.95	12.57	12.57	0.00	0.00
60	55.89	10.98	10.98	0.00	0.00
70	49.79	9.78	9.78	0.00	0.00
80	44.99	8.84	8.84	0.00	0.00
90	41.11	8.08	8.08	0.00	0.00
100	37.90	7.45	7.45	0.00	0.00
110	35.20	6.92	6.92	0.00	0.00
120	32.89	6.46	6.46	0.00	0.00

Storage: Surface Storage Above CB

Orifice Equation: $Q = CdA(2gh)^{0.5}$ Where C = 0.57
Orifice Diameter: 102.00 mm
Invert Elevation 66.83 m
T/G Elevation 68.60 m
Max Ponding Depth 0.11 m
Downstream W/L 66.67 m

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
100-year Water Level	68.71	1.88	28.39	4.02	4.70	OK
					0.68	

Subdrainage Area: UNC-2 — Uncontrolled - Non-Tributary
Area (ha): 0.11
C: 0.89

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	48.46	48.46		
20	119.95	32.55	32.55		
30	91.87	24.93	24.93		
40	75.15	20.39	20.39		
50	63.95	17.36	17.36		
60	55.89	15.17	15.17		
70	49.79	13.51	13.51		
80	44.99	12.21	12.21		
90	41.11	11.16	11.16		
100	37.90	10.29	10.29		
110	35.20	9.55	9.55		
120	32.89	8.93	8.93		

Subdrainage Area: UNC-1 — Uncontrolled - Non-Tributary
Area (ha): 0.04
C: 1.00

tc	I (100 yr)	Qactual	Qrelease	Qstored	Vstored

Stormwater Management Calculations

Project #160401663, 265 Catherine Street
Modified Rational Method Calculations for Storage

(min)	(mm/hr)	(L/s)	(L/s)	(L/s)	(m^3)
10	76.81	6.69	6.69		
20	52.03	4.53	4.53		
30	40.04	3.49	3.49		
40	32.86	2.86	2.86		
50	28.04	2.44	2.44		
60	24.56	2.14	2.14		
70	21.91	1.91	1.91		
80	19.83	1.73	1.73		
90	18.14	1.58	1.58		
100	16.75	1.46	1.46		
110	15.57	1.36	1.36		
120	14.56	1.27	1.27		

Subdrainage Area: CIST 2-4 — Uncontrolled - Non-Tributary
Area (ha): 0.06
C: 0.66

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	8.74	8.74		
20	52.03	5.92	5.92		
30	40.04	4.56	4.56		
40	32.86	3.74	3.74		
50	28.04	3.19	3.19		
60	24.56	2.79	2.79		
70	21.91	2.49	2.49		
80	19.83	2.26	2.26		
90	18.14	2.06	2.06		
100	16.75	1.91	1.91		
110	15.57	1.77	1.77		
120	14.56	1.66	1.66		

Subdrainage Area: CIST 2-3 — Uncontrolled - Non-Tributary
Area (ha): 0.04
C: 0.59

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	5.54	5.54		
20	52.03	3.76	3.76		
30	40.04	2.89	2.89		
40	32.86	2.37	2.37		
50	28.04	2.02	2.02		
60	24.56	1.77	1.77		
70	21.91	1.58	1.58		
80	19.83	1.43	1.43		
90	18.14	1.31	1.31		
100	16.75	1.21	1.21		
110	15.57	1.12	1.12		
120	14.56	1.05	1.05		

Subdrainage Area: CIST 2-2 — Uncontrolled - Non-Tributary
Area (ha): 0.04
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	7.88	7.88		
20	52.03	5.34	5.34		
30	40.04	4.11	4.11		
40	32.86	3.37	3.37		
50	28.04	2.88	2.88		
60	24.56	2.52	2.52		
70	21.91	2.25	2.25		
80	19.83	2.03	2.03		
90	18.14	1.86	1.86		
100	16.75	1.72	1.72		
110	15.57	1.60	1.60		
120	14.56	1.49	1.49		

Subdrainage Area: CIST 2-1 — Controlled - Tributary
Area (ha): 0.30
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	80.58	18.89	61.69	37.02
20	52.03	54.59	18.89	35.70	**42.84**
30	40.04	42.01	18.89	23.13	41.63
40	32.86	34.48	18.89	15.59	37.42
50	28.04	29.42	18.89	10.53	31.60
60	24.56	25.76	18.89	6.88	24.76
70	21.91	22.99	18.89	4.10	17.24
80	19.83	20.80	18.89	1.92	9.21
90	18.14	19.03	18.89	0.15	0.80
100	16.75	17.57	17.57	0.00	0.00
110	15.57	16.33	16.33	0.00	0.00
120	14.56	15.28	15.28	0.00	0.00

Notes:
1) All flows from subcatchment areas CIST 2-1 - CIST 2-4 outlet to Cistern 2
2) Discharge to be controlled to 18.89 L/s

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
5-year Water Level	-	-	18.89	42.84	180.00	OK

Subdrainage Area: CIST 1-4 — Uncontrolled - Non-Tributary
Area (ha): 0.02
C: 0.90

tc	I (2 yr)	Qactual	Qrelease	Qstored	Vstored

Project #160401663, 265 Catherine Street
Modified Rational Method Calculations for Storage

(min)	(mm/hr)	(L/s)	(L/s)	(L/s)	(m^3)
10	178.56	17.87	17.87		
20	119.95	12.00	12.00		
30	91.87	9.19	9.19		
40	75.15	7.52	7.52		
50	63.95	6.40	6.40		
60	55.89	5.59	5.59		
70	49.79	4.98	4.98		
80	44.99	4.50	4.50		
90	41.11	4.11	4.11		
100	37.90	3.79	3.79		
110	35.20	3.52	3.52		
120	32.89	3.29	3.29		

Subdrainage Area: CIST 2-4 — Uncontrolled - Non-Tributary
Area (ha): 0.06
C: 0.83

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	25.39	25.39		
20	119.95	17.06	17.06		
30	91.87	13.06	13.06		
40	75.15	10.69	10.69		
50	63.95	9.09	9.09		
60	55.89	7.95	7.95		
70	49.79	7.08	7.08		
80	44.99	6.40	6.40		
90	41.11	5.85	5.85		
100	37.90	5.39	5.39		
110	35.20	5.01	5.01		
120	32.89	4.68	4.68		

Subdrainage Area: CIST 2-3 — Uncontrolled - Non-Tributary
Area (ha): 0.04
C: 0.74

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	16.11	16.11		
20	119.95	10.82	10.82		
30	91.87	8.29	8.29		
40	75.15	6.78	6.78		
50	63.95	5.77	5.77		
60	55.89	5.04	5.04		
70	49.79	4.49	4.49		
80	44.99	4.06	4.06		
90	41.11	3.71	3.71		
100	37.90	3.42	3.42		
110	35.20	3.18	3.18		
120	32.89	2.97	2.97		

Subdrainage Area: CIST 2-2 — Uncontrolled - Non-Tributary
Area (ha): 0.04
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	20.35	20.35		
20	119.95	13.67	13.67		
30	91.87	10.47	10.47		
40	75.15	8.57	8.57		
50	63.95	7.29	7.29		
60	55.89	6.37	6.37		
70	49.79	5.68	5.68		
80	44.99	5.13	5.13		
90	41.11	4.69	4.69		
100	37.90	4.32	4.32		
110	35.20	4.01	4.01		
120	32.89	3.75	3.75		

Subdrainage Area: CIST 2-1 — Controlled - Tributary
Area (ha): 0.30
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	212.75	18.89	193.87	116.32
20	119.95	142.92	18.89	124.04	148.84
30	91.87	109.46	18.89	90.58	163.04
40	75.15	89.54	18.89	70.65	169.56
50	63.95	76.20	18.89	57.32	**171.95**
60	55.89	66.60	18.89	47.71	171.77
70	49.79	59.32	18.89	40.44	169.85
80	44.99	53.61	18.89	34.72	166.67
90	41.11	48.98	18.89	30.10	162.53
100	37.90	45.16	18.89	26.28	157.66
110	35.20	41.94	18.89	23.06	152.19
120	32.89	39.19	18.89	20.31	146.23

Notes:
1) All flows from subcatchment areas CIST 2-1 - CIST 2-4 outlet to Cistern 2
2) Discharge to be controlled to 18.89 L/s

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
100-year Water Level	-	-	18.89	171.95	180.00	OK
					8.05	

Subdrainage Area: CIST 1-4 — Uncontrolled - Non-Tributary
Area (ha): 0.02
C: 1.00

tc	I (100 yr)	Qactual	Qrelease	Qstored	Vstored

Stormwater Management Calculations

Project #160401663, 265 Catherine Street
Modified Rational Method Calculations for Storage

(min)	(mm/hr)	(L/s)	(L/s)	(L/s)	(m^3)
10	76.81	3.65	3.65		
20	52.03	2.47	2.47		
30	40.04	1.90	1.90		
40	32.86	1.56	1.56		
50	28.04	1.33	1.33		
60	24.56	1.17	1.17		
70	21.91	1.04	1.04		
80	19.83	0.94	0.94		
90	18.14	0.86	0.86		
100	16.75	0.80	0.80		
110	15.57	0.74	0.74		
120	14.56	0.69	0.69		

Subdrainage Area: CIST 1-3 — Uncontrolled - Non-Tributary
Area (ha): 0.01
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	2.11	2.11		
20	52.03	1.43	1.43		
30	40.04	1.10	1.10		
40	32.86	0.90	0.90		
50	28.04	0.77	0.77		
60	24.56	0.68	0.68		
70	21.91	0.60	0.60		
80	19.83	0.55	0.55		
90	18.14	0.50	0.50		
100	16.75	0.46	0.46		
110	15.57	0.43	0.43		
120	14.56	0.40	0.40		

Subdrainage Area: CIST 1-2 — Uncontrolled - Non-Tributary
Area (ha): 0.02
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	4.23	4.23		
20	52.03	2.86	2.86		
30	40.04	2.20	2.20		
40	32.86	1.81	1.81		
50	28.04	1.54	1.54		
60	24.56	1.35	1.35		
70	21.91	1.21	1.21		
80	19.83	1.09	1.09		
90	18.14	1.00	1.00		
100	16.75	0.92	0.92		
110	15.57	0.86	0.86		
120	14.56	0.80	0.80		

Subdrainage Area: CIST 1-1 — Controlled - Tributary
Area (ha): 0.25
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	57.27	12.48	44.79	26.87
20	52.03	38.79	12.48	26.32	**31.58**
30	40.04	29.86	12.48	17.38	31.28
40	32.86	24.50	12.48	12.03	28.86
50	28.04	20.91	12.48	8.43	25.29
60	24.56	18.31	12.48	5.83	20.99
70	21.91	16.34	12.48	3.86	16.21
80	19.83	14.79	12.48	2.31	11.07
90	18.14	13.53	12.48	1.05	5.66
100	16.75	12.49	12.48	0.01	0.05
110	15.57	11.61	11.61	0.00	0.00
120	14.56	10.86	10.86	0.00	0.00

Notes:
1) All flows from subcatchment areas CIST 1-1 to CIST 1-4 outlet to Cistern 1
2) Discharge to be controlled to 12.48 L/s

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
2-year Water Level	-	-	12.48	31.58	130.00	OK

SUMMARY TO OUTLET

			Vrequired	Vavailable*	
Tributary to Cistern 1	0.298	ha			
Total 2yr Flow to Cistern 1	57.27	L/s	74.42	310.00 m^3	Ok
Total 2yr Flow from Cistern 1	12.48	L/s			
Tributary to Cistern 2	0.451	ha			
Total 2yr Flow to Cistern 2	80.58	L/s			
Total 2yr Flow from Cistern 2	18.89	L/s			
Total Controlled Area	0.749	ha			
Total 2yr Uncontrolled Flow from Site	23.36	L/s			
Total Uncontrolled Area	0.146	ha			
Total 2yr Flow from Park	28.39	L/s			
Total Park Area	0.099	ha			
Total 2yr Flow to Sewer from Cistern	31.36	L/s			
Target	31.36	L/s			

Project #160401663, 265 Catherine Street
Modified Rational Method Calculations for Storage

(min)	(mm/hr)	(L/s)	(L/s)	(L/s)	(m^3)
10	178.56	9.43	9.43		
20	119.95	6.34	6.34		
30	91.87	4.85	4.85		
40	75.15	3.97	3.97		
50	63.95	3.38	3.38		
60	55.89	2.95	2.95		
70	49.79	2.63	2.63		
80	44.99	2.38	2.38		
90	41.11	2.17	2.17		
100	37.90	2.00	2.00		
110	35.20	1.86	1.86		
120	32.89	1.74	1.74		

Subdrainage Area: CIST 1-3 — Uncontrolled - Non-Tributary
Area (ha): 0.01
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	5.46	5.46		
20	119.95	3.67	3.67		
30	91.87	2.81	2.81		
40	75.15	2.30	2.30		
50	63.95	1.96	1.96		
60	55.89	1.71	1.71		
70	49.79	1.52	1.52		
80	44.99	1.38	1.38		
90	41.11	1.26	1.26		
100	37.90	1.16	1.16		
110	35.20	1.08	1.08		
120	32.89	1.01	1.01		

Subdrainage Area: CIST 1-2 — Uncontrolled - Non-Tributary
Area (ha): 0.02
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	10.92	10.92		
20	119.95	7.34	7.34		
30	91.87	5.62	5.62		
40	75.15	4.60	4.60		
50	63.95	3.91	3.91		
60	55.89	3.42	3.42		
70	49.79	3.05	3.05		
80	44.99	2.75	2.75		
90	41.11	2.51	2.51		
100	37.90	2.32	2.32		
110	35.20	2.15	2.15		
120	32.89	2.01	2.01		

Subdrainage Area: CIST 1-1 — Controlled - Tributary
Area (ha): 0.25
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	147.93	12.48	135.45	81.27
20	119.95	99.37	12.48	86.89	104.27
30	91.87	76.11	12.48	63.63	114.53
40	75.15	62.25	12.48	49.78	119.46
50	63.95	52.98	12.48	40.50	121.51
60	55.89	46.31	12.48	33.83	**121.78**
70	49.79	41.25	12.48	28.77	120.83
80	44.99	37.27	12.48	24.79	119.01
90	41.11	34.06	12.48	21.58	116.53
100	37.90	31.40	12.48	18.92	113.53
110	35.20	29.16	12.48	16.68	110.12
120	32.89	27.25	12.48	14.77	106.37

Notes:
1) All flows from subcatchment areas CIST 1-1 to CIST 1-4 outlet to Cistern 1
2) Discharge to be controlled to 12.48 L/s

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
100-year Water Level	-	-	12.48	121.78	130.00	OK
					8.22	

SUMMARY TO OUTLET

			Vrequired	Vavailable*	
Tributary to Cistern 1	0.298	ha			
Total 100yr Flow to Cistern 1	147.93	L/s	293.73	310.00 m^3	Ok
Total 100yr Flow from Cistern 1	12.48	L/s			
Tributary to Cistern 2	0.451	ha			
Total 100yr Flow to Cistern 2	212.75	L/s			
Total 100yr Flow from Cistern 2	18.89	L/s			
Total Controlled Area	0.749	ha			
Total 100yr Uncontrolled Flow from Site	66.33	L/s			
Total Uncontrolled Area	0.146	ha			
Total 100yr Flow from Park	30.84	L/s			
Total Park Area	0.099	ha			
Total 100yr Flow to Sewer from Cistern	31.36	L/s			
Target	31.36	L/s			

D.2 Storm Sewer Design Sheet

Stantec

265 Catherine Street

DATE: 2023-05-10
REVISION: 1
DESIGNED BY: MW
CHECKED BY: -

FILE NUMBER: **160401663**

STORM SEWER DESIGN SHEET
(City of Ottawa)

DESIGN PARAMETERS

$I = a / (t+b)^c$ (As per City of Ottawa Guidelines, 2012)

	1:2 yr	1:5 yr	1:10 yr	1:100 yr
a =	732.951	998.071	1174.184	1735.688
b =	6.199	6.053	6.014	6.014
c =	0.810	0.814	0.816	0.820

MANNING'S n = 0.013 BEDDING CLASS = B
MINIMUM COVER: 2.00 m
TIME OF ENTRY 10 min

LOCATION			DRAINAGE AREA																						PIPE SELECTION									
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA (2-YEAR) (ha)	AREA (5-YEAR) (ha)	AREA (10-YEAR) (ha)	AREA (100-YEAR) (ha)	AREA (ROOF) (ha)	C (2-YEAR) (-)	C (5-YEAR) (-)	C (10-YEAR) (-)	C (100-YEAR) (-)	A x C (2-YEAR) (ha)	ACCUM AxC (2YR) (ha)	A x C (5-YEAR) (ha)	ACCUM. AxC (5YR) (ha)	A x C (10-YEAR) (ha)	ACCUM. AxC (10YR) (ha)	A x C (100-YEAR) (ha)	ACCUM. AxC (100YR) (ha)	T of C (min)	$I_{2\text{-YEAR}}$ (mm/h)	$I_{5\text{-YEAR}}$ (mm/h)	$I_{10\text{-YEAR}}$ (mm/h)	$I_{100\text{-YEAR}}$ (mm/h)	$Q_{CONTROL}$ (L/s)	ACCUM. $Q_{CONTROL}$ (L/s)	Q_{ACT} (CIA/360) (L/s)	LENGTH (m)	PIPE WIDTH OR DIAMETE (mm)	PIPE HEIGHT (mm)	PIPE SHAPE (-)	MATERIAL (-)	CLASS (-)	SLOPE %	Q_{CAP} (FULL) (L/s)	% FULL (-)	VEL. (FULL) (m/s)	TIME OF FLOW (min)
CISTERN 1	Phase 1	101	0.30	0.00	0.00	0.00	0.00	0.90	0.00	0.00	0.00	0.268	0.268	0.000	0.000	0.000	0.000	0.000	0.000	10.00	76.81	104.19	122.14	178.56	0.0	0.0	57.2	2.3	300	300	CIRCULAR	CONCRETE	-	1.00	96.2	**59.51%**	1.37	0.03
																				10.03																	
CISTERN 2	Phase 2	200	0.45	0.00	0.00	0.00	0.00	0.84	0.00	0.00	0.00	0.377	0.377	0.000	0.000	0.000	0.000	0.000	0.000	10.00	76.81	104.19	122.14	178.56	0.0	0.0	80.5	2.6	300	300	CIRCULAR	CONCRETE	-	1.00	96.2	**83.74%**	1.37	0.03
																				10.03																	

D.3 SWM Quality Control Measures

Wu, Michael

From: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Sent: Wednesday, 3 May, 2023 13:35
To: Wu, Michael
Cc: Ford, Matthew; Sharp, Mike; Thiffault, Dustin; Kilborn, Kris
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Hi Michael,

There are no stormwater quality controls for the Arlington Sewers. The 600mm storm sewer on Arlington leads to a combined sewer.

Thanks for confirming Michael.

Best Regards,

Mohammed Fawzi, P.Eng.
Project Manager
Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique
Development Review - Central Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 20120, Mohammed.Fawzi@ottawa.ca

Please note that due to the current situation, I am working remotely. Email is currently the best way to contact me

---

From: Wu, Michael <Michael.Wu@stantec.com>
Sent: May 02, 2023 2:25 PM
To: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>; Sharp, Mike <Mike.Sharp@stantec.com>; Thiffault, Dustin <dustin.thiffault@stantec.com>; Kilborn, Kris <kris.kilborn@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

On a side note, Mohammed, since we are now proposing to have the stormwater discharge to the 525 mm and 600 mm storm sewer in Arlington Avenue, does that impact what stormwater quality control criteria the site would be subject to?

Thanks,

Michael Wu, EIT
Civil Engineering Intern, Community Development

Work: (613) 738-6033
Mobile: (613) 858-0548
michael.wu@stantec.com

Stantec
300 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

From: Wu, Michael
Sent: Tuesday, 2 May, 2023 13:41
To: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>; Sharp, Mike <Mike.Sharp@stantec.com>; Thiffault, Dustin <Dustin.Thiffault@stantec.com>; Kilborn, Kris <kris.kilborn@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Hi Mohammed, understood. Thanks for the update anyways.

Michael Wu, EIT
Civil Engineering Intern, Community Development

Work: (613) 738-6033
Mobile: (613) 858-0548
michael.wu@stantec.com

Stantec
300 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

From: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Sent: Tuesday, 2 May, 2023 13:40
To: Wu, Michael <Michael.Wu@stantec.com>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>; Sharp, Mike <Mike.Sharp@stantec.com>; Thiffault, Dustin <Dustin.Thiffault@stantec.com>; Kilborn, Kris <kris.kilborn@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Hi Michael,

My apologies for the wait but the Water Resources Group is quite busy at the moment and as such boundary conditions may take up to two weeks. As for the SWM quality control criteria, this would not be applicable given that we are proposing to discharge to a combined sewer.

Thanks Michael.

Best Regards,

Mohammed Fawzi, P.Eng.
Project Manager
Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique
Development Review - Central Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 20120, Mohammed.Fawzi@ottawa.ca

Please note that due to the current situation, I am working remotely. Email is currently the best way to contact me

---

From: Wu, Michael <Michael.Wu@stantec.com>
Sent: May 01, 2023 4:22 PM
To: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>; Sharp, Mike <Mike.Sharp@stantec.com>; Thiffault, Dustin <dustin.thiffault@stantec.com>; Kilborn, Kris <kris.kilborn@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Good afternoon, Mohammed:

I just want to do a quick follow up on the revised boundary conditions for the site. Since we are proposing to upsize the Catherine Street and Kent Street watermains to service the site, is there a timeline on when we can expect the revised boundary conditions that account for the upsizing at those two streets?

On a side note, it is my understanding that the City now provides the SWM quality control criteria as a result of Bill 23. As such, given we are to control the stormwater discharge from the site to a 2-year predevelopment release rate with a C no more than 0.50, what quality control measures are the site subjected to?

Thanks,

Michael Wu, EIT
Civil Engineering Intern, Community Development

Work: (613) 738-6033
Mobile: (613) 858-0548
michael.wu@stantec.com

Stantec
300 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

From: Kilborn, Kris <kris.kilborn@stantec.com>
Sent: Thursday, 27 April, 2023 09:54
To: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>; Sharp, Mike <Mike.Sharp@stantec.com>; Thiffault, Dustin <Dustin.Thiffault@stantec.com>; Wu, Michael <Michael.Wu@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Good morning Mohammed and thanks for the chat about 265 Catherine Project.

As discussed, our submission will include san and storm connections to the Arlington Street Sewer. The Development will have two sets of san/storm connections to the Arlington
Sewer to coincide with phasing and to ensure mechanical can design the site. As this is a large site spanning an entire City block.
As we have minimal room for onsite monitoring manholes we will be showing these within the municipal right of way. City can comment and the owner may have to enter into an encroachment agreement with the City.
For now, we will show W3 Chambers on the water services (which will also be within the right of way) which you could review if chambers are required on all.

Thanks for checking in on the boundary conditions. It appears we will need to install new watermain along Catherine and Kent which we will show and submit in plan view only for this submission.

Sincerely

Kris Kilborn
Principal, Community Development
Business Center Practice Leader

Mobile: 613 297-0571
Fax: 613 722-2799
kris.kilborn@stantec.com
Stantec
300 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

The Ottawa office is open however many staff are working remotely. To contact me please use email, or my mobile and leave a message.
Please note our reception is on the 3rd floor.

From: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Sent: Wednesday, April 26, 2023 10:54 AM
To: Kilborn, Kris <kris.kilborn@stantec.com>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>; Sharp, Mike <Mike.Sharp@stantec.com>; Thiffault, Dustin <Dustin.Thiffault@stantec.com>; Wu, Michael <Michael.Wu@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Hi Kris,

I'm available today until 4:00pm – so feel free to send an invite. I would recommend we include Asset Management though as I mentioned they are the ones who would approve a connection to a trunk sewer.

Best Regards,

Mohammed Fawzi, P.Eng.
Project Manager
Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique
Development Review - Central Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 20120, Mohammed.Fawzi@ottawa.ca

Please note that due to the current situation, I am working remotely. Email is currently the best way to contact me

---

From: Kilborn, Kris <kris.kilborn@stantec.com>
Sent: April 25, 2023 2:56 PM
To: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>; Sharp, Mike <Mike.Sharp@stantec.com>; Thiffault, Dustin <dustin.thiffault@stantec.com>; Wu, Michael <Michael.Wu@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Hey Mohammed do you have time for a quick call this afternoon. Would just like to review our plans with you and show you our drawings and why
We are requesting to connect to Catherine.

I could send out a team's meeting request.
Thanks, and let me know.

Sincerely

Kris Kilborn
Principal, Community Development
Business Center Practice Leader

Mobile: 613 297-0571
Fax: 613 722-2799
kris.kilborn@stantec.com
Stantec
300 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

The Ottawa office is open however many staff are working remotely. To contact me please use email, or my mobile and leave a message.
Please note our reception is on the 3rd floor.

From: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Sent: Tuesday, April 25, 2023 1:35 PM
To: Kilborn, Kris <kris.kilborn@stantec.com>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>; Sharp, Mike <Mike.Sharp@stantec.com>; Thiffault, Dustin <Dustin.Thiffault@stantec.com>; Wu, Michael <Michael.Wu@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Hi Kris,

I can definitely get the City's Asset Management Branch involved in our discussion as they would be the ones ultimately making the decision as to whether or not we can connect to the trunk sewer. Prior to doing so, could you confirm why we cannot connect to the 450mm dia. pipe on Lyon Street?

Thanks Kris.

Best Regards,

Mohammed Fawzi, P.Eng.
Project Manager
Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique
Development Review - Central Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 20120, Mohammed.Fawzi@ottawa.ca

Please note that due to the current situation, I am working remotely. Email is currently the best way to contact me

---

From: Kilborn, Kris <kris.kilborn@stantec.com>
Sent: April 25, 2023 11:18 AM
To: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>; Wu, Michael <Michael.Wu@stantec.com>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>; Sharp, Mike <Mike.Sharp@stantec.com>; Thiffault, Dustin <dustin.thiffault@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Mohammed

We have design and installed connections to deep Trunk Sewers on other high rise projects in the City and we require this connection for our phase 1 development.
As you can appreciate this development is a full City block which will be constructed in phases and require connection to the 1800dia. In previous emails you mentioned that
We should not connect to the existing brick sewer on Arlington and our hands are a bit tied now.

Could we set up a call to discuss.

Sincerely

Kris Kilborn
Principal, Community Development
Business Center Practice Leader

Mobile: 613 297-0571
Fax: 613 722-2799
kris.kilborn@stantec.com
Stantec
300 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

The Ottawa office is open however many staff are working remotely. To contact me please use email, or my mobile and leave a message.
Please note our reception is on the 3rd floor.

From: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Sent: Tuesday, April 25, 2023 10:50 AM
To: Wu, Michael <Michael.Wu@stantec.com>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>; Sharp, Mike <Mike.Sharp@stantec.com>; Kilborn, Kris <kris.kilborn@stantec.com>; Thiffault, Dustin <Dustin.Thiffault@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Hi Michael,

Unfortunately the City would not permit a connection to such a large deep trunk sewer.

Thank you.

Best Regards,

Mohammed Fawzi, P.Eng.
Project Manager
Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique
Development Review - Central Branch

City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 20120, Mohammed.Fawzi@ottawa.ca

Please note that due to the current situation, I am working remotely. Email is currently the best way to contact me

---

From: Wu, Michael <Michael.Wu@stantec.com>
Sent: April 24, 2023 12:14 PM
To: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>; Sharp, Mike <Mike.Sharp@stantec.com>; Kilborn, Kris <kris.kilborn@stantec.com>; Thiffault, Dustin <dustin.thiffault@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Hi Mohammed, thanks for the response.

And as a quick follow-up, does the City have any objections to using the 1800 mm diameter combined sewer on Catherine Street for the sanitary and storm discharge from the site? As a refresher, we anticipate around 26.88 L/s of sanitary discharge from the site.

Thanks,

Michael Wu, EIT
Civil Engineering Intern, Community Development

Work: (613) 738-6033
Mobile: (613) 858-0548
michael.wu@stantec.com

Stantec
300 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

From: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Sent: Monday, 24 April, 2023 08:32
To: Wu, Michael <Michael.Wu@stantec.com>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>; Sharp, Mike <Mike.Sharp@stantec.com>; Kilborn, Kris <kris.kilborn@stantec.com>; Thiffault, Dustin <Dustin.Thiffault@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Hi Michael,

Thank you for the revised boundary conditions.

I can confirm there are no current scheduled City projects in the vicinity of the site.

Thank you.

Best Regards,

Mohammed Fawzi, P.Eng.
Project Manager
Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique
Development Review - Central Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 20120, Mohammed.Fawzi@ottawa.ca

Please note that due to the current situation, I am working remotely. Email is currently the best way to contact me

---

From: Wu, Michael <Michael.Wu@stantec.com>
Sent: April 21, 2023 3:21 PM
To: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>; Sharp, Mike <Mike.Sharp@stantec.com>; Kilborn, Kris <kris.kilborn@stantec.com>; Thiffault, Dustin <dustin.thiffault@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Good afternoon, Mohammed:

As a quick follow-up, we would like to submit revised boundary conditions for the 265 Catherine Street site with updated fire flow demands at the same connection points.

While the revised worst case fire flow demands from the site has been reduced to 166.7 L/s (10000 L/min), connecting to the Lyon Street North and Arlington Avenue 203 mm diameter watermains would be a challenge, not least by the site's servicing be consolidated at Catherine Street, where the building's main entrance will be at.

As such, as part of the updated boundary condition request, we would like to obtain the hydraulic boundary conditions for the site under the following scenarios:

1. Upsizing the Catherine Street watermain to a 203 mm diameter watermain from Kent Street to Lyon Street North only

2. Upsizing both the Catherine Street and Kent Street watermains to 203 mm diameter within the vicinity of the site

Attached are the revised fire flow calculations and sketches of the two proposed upsizing options detailing the range of the proposed upsizing.

In addition, please advise if there are other design considerations for other ongoing City projects in the vicinity that could impact the site.

Please let me know if you have any further questions or comments.

Thanks,

Michael Wu, EIT
Civil Engineering Intern, Community Development

Work: (613) 738-6033
Mobile: (613) 858-0548
michael.wu@stantec.com

Stantec
300 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

From: Wu, Michael
Sent: Wednesday, 19 April, 2023 15:35
To: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>; Sharp, Mike <Mike.Sharp@stantec.com>; Kilborn, Kris <kris.kilborn@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Good afternoon, Mohammed:

Just a quick question, is it possible for you to provide the HGL at the four connections under the max day + fire flow conditions with the fire flow demand of 166.7 L/s?

Thanks,

Michael Wu, EIT
Civil Engineering Intern, Community Development

Work: (613) 738-6033
Mobile: (613) 858-0548
michael.wu@stantec.com

Stantec
300 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

From: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Sent: Wednesday, 19 April, 2023 11:50
To: Wu, Michael <Michael.Wu@stantec.com>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>; Thiffault, Dustin <Dustin.Thiffault@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Hi Michael,

Thank you for confirming.

As a heads up, please note that a letter or email confirmation by the architect confirming the parameters used in the fire flow calculations is required. Parameters to be confirmed applicable are confirming that the vertical openings are protected, type of construction, occupancy charge and sprinkler reductions. This can be appended to the Servicing Report.

Thanks Michael.

Best Regards,

Mohammed Fawzi, P.Eng.
Project Manager
Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique
Development Review - Central Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 20120, Mohammed.Fawzi@ottawa.ca

Please note that due to the current situation, I am working remotely. Email is currently the best way to contact me

From: Wu, Michael <Michael.Wu@stantec.com>
Sent: April 18, 2023 4:37 PM
To: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>; Thiffault, Dustin <dustin.thiffault@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Good afternoon, Mohammed:

As a follow-up, we have decided to update the fire flow demand calculation approach.

Specifically, for the FUS “protected vertical openings” classification for the two high-rise buildings on site, as the main openings between the floors are the elevator shafts and emergency exit stairwell, they would have already been subjected to the strictest fire protection measures outlined in the Ontario Building Code and the National Building Code, therefore it is reasoned that the two high-rises be classified as having protected vertical openings.

Under this approach, Building B’s fire flow demand is reduced to 166.7 L/s (10,000 L/min), which is adequate for the watermains on Arlington Avenue and Lyon Street North to provide their respective fire flows while maintaining a residual pressure of 20 psi.

Please let me know if you have any questions or comments to this new approach.

Thanks,

Michael Wu, EIT
Civil Engineering Intern, Community Development

Work: (613) 738-6033
Mobile: (613) 858-0548
michael.wu@stantec.com

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Ottawa ON K2C 3G4

From: Wu, Michael
Sent: Thursday, 13 April, 2023 13:23
To: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Perfect, thanks for the information.

Michael Wu, EIT
Civil Engineering Intern, Community Development

Work: (613) 738-6033
Mobile: (613) 858-0548
michael.wu@stantec.com

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Ottawa ON K2C 3G4

From: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Sent: Thursday, 13 April, 2023 13:05
To: Wu, Michael <Michael.Wu@stantec.com>

Cc: Ford, Matthew <Matthew.Ford@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Hi Michael,

Please note that the Fire demand request of 316.7 L/s was not met. Next steps: Take measures to lower the fire demand, identify hydrants to request for a multi-hydrant analysis.

The following are boundary conditions, HGL, for hydraulic analysis at 265 Catherine Street (zone 1W) assumed to be connected to either the 127 mm watermain on Catherine Street, OR the 203 mm watermain on Lyon Street, OR the 203 mm watermain on Arlington Avenue, OR the 127 mm on Kent Street (see attached PDF for location).

Connection	Min HGL (m)	Maximum HGL (m)
Catherine Street	80.4	115.3
Lyon Street	104.9	115.3
Arlington Avenue	105.9	115.3
Kent Street	97.8	115.2

Fire Flow:

Available Fire flow at 20 psi: 46 L/s assuming ground elevation of 68.2 m (Catherine Connection)

Available Fire flow at 20 psi: 187 L/s assuming ground elevation of 67.6 m (Lyon Connection)

Available Fire flow at 20 psi: 270 L/s assuming ground elevation of 68.0 m (Arlington Connection)

Available Fire flow at 20 psi: 64 L/s assuming ground elevation of 68.6 m (Kent Connection)

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

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

Best Regards,

Mohammed Fawzi, P.Eng.
Project Manager
Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique
Development Review - Central Branch
City of Ottawa | Ville d'Ottawa

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613.580.2424 ext./poste 20120, Mohammed.Fawzi@ottawa.ca

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From: Wu, Michael <Michael.Wu@stantec.com>
Sent: April 11, 2023 11:45 AM
To: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Good morning, Mohammed, hope you are well. Just checking in to see when we could expect to receive the boundary conditions, the combined sewer capacity confirmation and the existing water consumption data for the site (if possible).

Thanks,

Michael Wu, EIT
Civil Engineering Intern, Community Development

Work: (613) 738-6033
Mobile: (613) 858-0548
michael.wu@stantec.com

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300 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

From: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Sent: Wednesday, 29 March, 2023 14:50
To: Wu, Michael <Michael.Wu@stantec.com>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>
Subject: RE: 265 Catherine Street Combined Sewer Capacity Confirmation

Hi Michael,

Received.

I will get back to you as soon as possible. Thank you.

Best Regards,

Mohammed Fawzi, P.Eng.
Project Manager
Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique
Development Review - Central Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 20120, Mohammed.Fawzi@ottawa.ca

Please note that due to the current situation, I am working remotely. Email is currently the best way to contact me

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From: Wu, Michael <Michael.Wu@stantec.com>
Sent: March 29, 2023 1:18 PM
To: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Cc: Ford, Matthew <Matthew.Ford@stantec.com>
Subject: 265 Catherine Street Combined Sewer Capacity Confirmation

Good afternoon, Mohammed:

In addition to the hydraulic boundary conditions, as part of the servicing for the proposed development on 265 Catherine Street, we would like to confirm if there is sufficient capacity downstream of the 450 mm diameter combined sewers in Lyon Street North, 300 mm diameter combined sewers in Catherine Street, 375 mm diameter combined sewers in Kent Street, and the 1200 mm diameter trunk combined sewers in Arlington Avenue to receive an additional peak flow of 26.8 L/s from the proposed development.

Please find our sanitary design sheet and location map attached for your information. Furthermore, we were wondering if there are any existing water consumption data for the site during its use as a Greyhound bus terminal.

Thank you,

Michael Wu, EIT
Civil Engineering Intern, Community Development

Work: (613) 738-6033
Mobile: (613) 858-0548
michael.wu@stantec.com

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Appendix E Background Studies

Geotechnical Engineering

Environmental Engineering

Hydrogeology

Geological Engineering

Materials Testing

Building Science

Noise and Vibration Studies

Paterson Group Inc.
Consulting Engineers
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patersongroup

Geotechnical Investigation

Proposed Mixed-Use Development
265 Catherine Street
Ottawa, Ontario

Prepared For

Brigil

August 13, 2021

Report PG5933-1

Table of Contents

Appendices

1.0 Introduction

Paterson Group (Paterson) was commissioned by Brigil to conduct complete a geotechnical report for the proposed mixed-use development to be located at 265 Catherine Street in the City of Ottawa, Ontario (refer to Figure 1 - Key Plan in Appendix 2 of this report).

The objectives of the geotechnical investigation were to:

- ❏ Determine the subsoil and groundwater conditions at this site by means of boreholes.
- ❏ Provide geotechnical recommendations for the design of the proposed development including construction considerations which may affect the design.

The following report has been prepared specifically and solely for the aforementioned project which is described herein. It contains our findings and includes geotechnical recommendations pertaining to the design and construction of the subject development as they are understood at the time of writing this report.

2.0 Proposed Project

Based on the current concept drawings, it is understood that the proposed development will consist of several mid-rise to hi-rise mixed-use buildings. It is understood that the subject site will be provided two to three levels of underground parking whose footprints are anticipated to occupy the majority of the subject site and provide a common podium to all the proposed structures. At-grade access lanes, parking areas and landscaping areas are also anticipated as part of the proposed development. It is further anticipated that the existing building will be demolished as part of the proposed development.

3.0 Method of Investigation

3.1 Field Investigation

Field Program

Paterson previously conducted a series of field program for the subject site. The most recent investigation was carried out on August 19, 2020. At that time, 3 boreholes (BH 1 through BH 5) were advanced to a maximum depth of 14.7 m below the existing ground surface. Paterson had previously carried out an investigation on August 24 and 25, 2010. At that time, six (6) boreholes were advanced to a maximum sampling depth of 6 m and five (5) of the boreholes were extended to inferred bedrock based on practical refusal to augering. A previous investigation was carried out by others in August of 1971. At that time, five (5) boreholes were advanced to a maximum depth fo 12.5 m.

The borehole locations were distributed in a manner to provide general coverage of the subject site. The approximate locations of the test holes are shown on Drawing PG5933-1 - Test Hole Location Plan included in Appendix 2.

The boreholes were advanced using a truck-mounted auger drill rig operated by a two-person crew. The drilling procedure consisted of augering to the required depths at the selected locations, and sampling and testing the overburden. All fieldwork was conducted under the full-time supervision of our personnel under the direction of a senior engineer.

Sampling and In Situ Testing

Soil samples were collected from the boreholes using two different techniques, namely, sampled directly from the auger flights (AU) or collected using a 50 mm diameter split-spoon (SS) sampler. All samples were visually inspected and initially classified on site and subsequently placed in sealed plastic bags. All samples were transported to our laboratory for further examination and classification. The depths at which the auger and split spoon samples were recovered from the boreholes are shown as AU and SS, respectively, on the Soil Profile and Test Data sheets presented in Appendix 1.

A Standard Penetration Test (SPT) was conducted at each borehole in conjunction with the recovery of the split spoon samples. The SPT results are recorded as "N" values on the Soil Profile and Test Data sheets. The "N" value is the number of blows required to drive the split spoon sampler 300 mm into the soil after a 150 mm initial penetration using a 63.5 kg hammer falling from a height of 760 mm.

Undrained shear strength testing, using a vane apparatus, was carried out at regular intervals of depth in cohesive soils.

The overburden thickness was evaluated by a dynamic cone penetration test (DCPT) completed at BH 2-20. The DCPT consists of driving a steel drill rod, equipped with a 50 mm diameter cone at the tip, using a 63.5 kg hammer falling from a height of 760 mm. The number of blows required to drive the cone into the soil is recorded for each 300 mm increment.

The subsurface conditions observed in the test holes were recorded in detail in the field. The soil profiles are presented on the Soil Profile and Test Data sheets in Appendix 1 of this report.

Groundwater

Groundwater monitoring wells were installed in BH1-20, BH 2-20 and BH 3-20 to permit monitoring of the groundwater levels subsequent to the completion of the sampling program. A flexible polyethylene standpipe was installed within boreholes from the previous investigation to measure the stabilized groundwater levels subsequent to completion of the sampling program.

3.2 Field Survey

The test hole locations were selected by Paterson to provide general coverage of the proposed development taking into consideration the existing site features and underground utilities. The test hole locations and ground surface elevation at each test hole location were surveyed by Paterson with respect to a geodetic datum. The location of the test holes and ground surface elevation at each test hole location are presented on Drawing PG5933-1 - Test Hole Location Plan in Appendix 2.

3.3 Laboratory Testing

Soil samples were recovered from the subject site and visually examined in our laboratory to review the results of the field logging.

3.4 Analytical Testing

One (1) soil sample was submitted for analytical testing to assess the potential for exposed ferrous metals and the potential of sulphate attacks against subsurface concrete structures. The sample was analyzed to determine its concentration of sulphate and chloride along with its resistivity and pH. The laboratory test results are shown in Appendix 1 and are discussed in Section 6.7.

4.0 Observations

4.1 Surface Conditions

Currently, the subject site is occupied by a bus terminal building with associated asphalt covered parking areas and access lanes. The subject site is approximately at grade with surrounding streets.

The site is bordered by Catherine Street to the south, Lyon Street to the west, Arlington Avenue and further by residential dwellings to the north and Kent Street to the east. The existing ground surface across the subject site is relatively flat and at grade with adjacent properties.

4.2 Subsurface Profile

Overburden

Generally, the subsurface profile at the test hole locations consists of concrete or asphaltic concrete underlain by fill extending to an approximate depth of 0.6 to 2.3 m below the existing ground surface. The fill was generally observed to consist of a compact brown silty sand with crushed stone and occasional brick, metal, and plastic fragments.

A native silty sand layer and/or silty clay deposit was encountered underlying the fill. The silty clay deposit was observed to consist of a very stiff to stiff, brown silty clay, becoming a stiff grey silty clay below an approximate depths ranging between 3.0 to 7.6 m below the existing ground surface.

Underlying the silty clay deposit below approximate depths ranging between 4.4 to 9.7 m, a glacial till layer was encountered. The glacial till deposit was observed to consist of a grey sandy silt, clayey silt or silty clay with gravel, cobbles and boulders.

Practical refusal to augering or the DCPT was encountered at depths ranging from 7.4 to 11.7 m below the existing ground surface.

Bedrock

Based on available geological mapping, the subject site is located in an area where the bedrock consists of interbedded limestone and shale of the Verulam Formation and shale of the Billings Formation at depths ranging from 10 to 15 m.

4.3 Groundwater

Groundwater levels measured in the standpipes are summarized in Table 1.

Table 1 - Summary of Groundwater Level Readings

Test Hole Number	Ground Surface Elevation (m)	Groundwater Depth (m)	Groundwater Elevation (m)	Recording Date
BH 1-20*	68.62	4.60	64.02	September 1, 2020
BH 2-20*	68.46	Dry	-	September 1, 2020
BH 3-20*	68.11	4.26	63.85	September 1, 2020
BH 1	-	3.48	-	September 16, 2010
BH 2	-	5.32	-	September 16, 2010
BH 3	-	5.30	-	September 16, 2010
BH 4	-	N/A	-	September 16, 2010
BH 5	-	4.59	-	September 16, 2010
BH 6	-	2.18	-	September 16, 2010

Note: The ground surface elevations from the current investigation are referenced to a geodetic datum.
* - Borehole fitted with monitoring well.

It should be noted that the groundwater levels could be influenced by surface water infiltrating the backfilled boreholes. Long-term groundwater levels can also be estimated based on the observed colour and consistency of the recovered soil samples. Based on these observations, the long-term groundwater table can be expected at approximately 4 to 5 m below ground surface within the silty clay layer. The recorded groundwater levels are noted on the applicable Soil Profile and Test Data sheet presented in Appendix 1.

It should be noted that groundwater levels are subject to seasonal fluctuations. Therefore, the groundwater level could vary at the time of construction.

5.0 Discussion

5.1 Geotechnical Assessment

From a geotechnical perspective, the subject site is considered suitable for the proposed development. Based on the subsurface conditions encountered in the test holes and the anticipated building loads, it is recommended that foundation support for the proposed high-rise buildings consist of:

- ❏ a raft foundation bearing on the undisturbed, stiff silty clay and compact glacial till deposit, or
- ❏ a deep foundation, such as end-bearing piles, which extends to the bedrock surface

Due to the presence of the silty clay deposit, a permissible grade raise restriction will be required for the proposed grading.

The above and other considerations are further discussed in the following sections.

5.2 Site Grading and Preparation

Stripping Depth

Topsoil and deleterious fill, such as those containing organic materials, should be stripped from under any buildings, paved areas and other settlement sensitive structures. Existing construction debris should be entirely removed from within the perimeter of all buildings.

Protection of Subgrade (Raft Foundation)

Where a raft foundation is utilized, it is recommended that a minimum 50 mm thick lean concrete mud slab be placed on the undisturbed, silty clay or glacial till subgrade shortly after the completion of the excavation. The main purpose of the mud slab is to reduce the risk of disturbance of the subgrade under the traffic of workers and equipment.

The final excavation to the raft bearing surface level and the placing of the mud slab should be done in smaller sections to avoid exposing large areas of the silty clay or glacial till to potential disturbance due to drying.

Compacted Granular Fill Working Platform (Pile Foundation)

Should the proposed high-rise building be supported on a driven pile foundation, the use of heavy equipment would be required to install the piles (i.e. pile driving crane). It is conventional practice to install a compacted granular fill layer, at a convenient elevation, to allow the equipment to access the site without getting stuck and causing significant disturbance.

A typical working platform could consist of 0.6 m of OPSS Granular B, Type II crushed stone which is placed and compacted to a minimum of 98% of its standard Proctor maximum dry density (SPMDD) in lifts not exceeding 300 mm in thickness.

Once the piles have been driven and cut off, the working platform can be regraded, and soil tracked in, or soil pumping up from the pile installation locations, can be bladed off and the surface can be topped up, if necessary, and re-compacted to act as the substrate for further fill placement for the basement slab.

Fill Placement

Fill used for grading beneath the proposed building should consist of clean imported granular fill, such as Ontario Provincial Standard Specifications (OPSS) Granular A or Granular B Type II. This material should be tested and approved prior to delivery to the site. The fill should be placed in lifts no greater than 300 mm thick and compacted using suitable compaction equipment for the lift thickness. Fill placed beneath the building and paved areas should be compacted to at least 98% of the material's standard Proctor maximum dry density (SPMDD).

Non-specified existing fill, along with site-excavated soil, can be used as general landscaping fill where settlement of the ground surface is of minor concern. This material should be spread in thin lifts and at least compacted by the tracks of the spreading equipment to minimize voids. If this material is to be used to build up the subgrade level for areas to be paved, it should be compacted in thin lifts to at least 95% of the material's SPMDD.

Non-specified existing fill and site-excavated soils are not suitable for use as backfill against foundation walls unless used in conjunction with a composite drainage membrane.

5.3 Foundation Design

Raft Foundation

Based on the anticipated loads, it is recommended that foundation support for the high-rise portion of the proposed building consist of a raft foundation bearing on the undisturbed, stiff silty clay or compact glacial till deposit.

A raft foundation may also be required for the portion of the proposed building beyond the footprint of the high-rise. For 2 levels of underground parking, it is anticipated that the excavation will extend to a depth such that the underside of the raft slab would be placed between geodetic elevations of 61.5 to 62.5 m. The contact pressure provided considers the stress relief associated with the soil removal required for 2 levels of underground parking.

The amount of settlement of the raft slab will be dependent on the sustained raft contact pressure. The loading conditions for the contact pressure are based on sustained loads, that are generally taken to be 100% Dead Load and 50% Live Load.

For 2 levels of underground parking, a bearing resistance value at SLS (contact pressure) of **175 kPa** will be considered acceptable for a raft supported on the undisturbed, stiff silty clay or undisturbed glacial till. It should be noted that the weight of the raft slab and everything above must be included when designing with this value. The factored bearing resistance (contact pressure) at ULS can be taken as **260 kPa**. For this case, the modulus of subgrade reaction was calculated to be **5.0 MPa/m** for a contact pressure of **175 kPa**.

The raft foundation design is required to consider the relative stiffness of the reinforced concrete slab and the supporting bearing medium. A geotechnical resistance factor of 0.5 was applied to the bearing resistance values at ULS.

Based on the following assumptions for the raft foundation, the proposed building can be designed using the above parameters with a total and differential settlement of 25 and 15 mm, respectively.

End Bearing Pile Foundation

If the raft slab bearing resistance values are insufficient for the proposed high-rise building, a deep foundation system driven to refusal in the bedrock will be recommended for foundation support of the proposed building. For deep foundations, concrete-filled steel pipe piles are generally utilized in the Ottawa area. Applicable pile resistance values at SLS and ULS are given in Table 2. A resistance factor of 0.4 has been incorporated into the factored ULS values. Note that these are all geotechnical axial resistance values.

The geotechnical pile resistance values were estimated using the Hiley dynamic formula, to be confirmed during pile installation with a program of dynamic monitoring. Re-striking of all piles at least once will also be required after at least 48 hours have elapsed since initial driving.

Table 2 - Pile Foundation Design Data

Pile Outside Diameter (mm)	Pile Wall Thickness (mm)	Geotechnical Axial Resistance		Final Set (blows/ 12 mm)	Transferred Hammer Energy (kJ)
		SLS (kN)	Factored at ULS (kN)		
245	9	940	1130	10	29
245	11	1175	1410	10	35
245	13	1375	1650	10	42

The minimum centre-to-centre pile spacing is 2.5 times the pile diameter. The closer the piles are spaced, however, the more potential that the driving of subsequent piles in a group could have influence on piles in the group that have already been driven. These effects, primarily consisting of uplift of previously driven piles, are checked as part of the field review of the pile driving operations.

Prior to the commencement of production pile driving, a limited number of indicator piles should be installed across the site. It is recommended that each indicator pile be dynamically load tested to evaluate pile stresses, hammer efficiency, pile load transfer, and end-of-driving criteria for end-bearing in the bedrock.

Buildings founded on piles driven to refusal in the bedrock will have negligible post-construction settlement.

Spread Footing Foundations

Foundations may consist of strip footings, up to 4 m wide, and pad footings, up to 8 m wide, placed over an undisturbed, very stiff to stiff silty clay bearing surface using bearing resistance values at Serviceability Limit State (SLS) of **160 kPa** and factored bearing resistance values at Ultimate Limit States (ULS) of **250 kPa**. A geotechnical resistance factor of 0.5 was applied to the bearing resistance value at ULS.

An undisturbed soil bearing surface consists of one from which all topsoil and deleterious materials, such as loose, frozen or disturbed soil, whether in situ or not, have been removed, in the dry, prior to the placement of concrete for footings.

The bearing resistance values at SLS for conventional style footings will be subjected to potential post-construction total and differential settlements of 25 and 20 mm, respectively.

The bearing medium under footing-supported structures is required to be provided with adequate lateral support with respect to excavations and different foundation levels. Adequate lateral support is provided to a silty clay or glacial till bearing medium when a plane extending down and out from the bottom edge of the footing at a minimum of 1.5H:1V, passes only through in situ soil or engineered fill of the same or higher capacity as the soil.

Permissible Grade Raise

Due to the presence of the silty clay deposit, a permissible grade raise restriction of **2.0 m** is recommended for grading at the subject site.

If higher than permissible grade raises are required, preloading with or without a surcharge, lightweight fill, and/or other measures should be investigated to reduce the risks of unacceptable long-term post construction total and differential settlements.

5.4 Design for Earthquakes

The site class for seismic site response can be taken as **Class D**, however, a site specific shear wave velocity test could be completed to determine if a seismic Site Class C is applicable for foundation design of the proposed building with two underground parking levels. The soils underlying the subject site are not susceptible to liquefaction. Reference should be made to the latest revision of the Ontario Building Code 2012 for a full discussion of the earthquake design requirements.

5.5 Basement Slab

Where a raft slab is utilized, a granular layer of OPSS Granular A will be required to allow for the installation of sub-floor services above the raft slab foundation. The thickness of the OPSS Granular A crushed stone will be dependent on the piping requirements.

For portions of the proposed building founded on footings or piles, it is recommended that the upper 200 mm of subfloor fill consists of 19 mm clear crushed stone. All backfill material within the footprint of the proposed building should be placed in maximum 300 mm thick loose layers and compacted to at least 98% of its SPMDD.

A sub-slab drainage system, consisting of lines of perforated drainage pipe sub-drains connected to a positive outlet, should be provided under the lowest level floor slab. The spacing of the sub-slab drainage pipes can be determined at the time of construction to confirm groundwater infiltration levels, if any. This is discussed further in Subsection 6.1.

5.6 Basement Wall

There are several combinations of backfill materials and retained soils that could be applicable for the basement walls of the subject structure. However, the conditions can be well-represented by assuming the retained soil consists of a material with an angle of internal friction of 30 degrees and a bulk (drained) unit weight of 20 kN/m^3.

Where undrained conditions are anticipated (i.e. below the groundwater level), the applicable effective (undrained) unit weight of the retained soil can be taken as 13 kN/m^3, where applicable. A hydrostatic pressure should be added to the total static earth pressure when using the effective unit weight.

Lateral Earth Pressures

The static horizontal earth pressure (p_o) can be calculated using a triangular earth pressure distribution equal to $K_o \cdot \gamma \cdot H$ where:

K_o = at-rest earth pressure coefficient of the applicable retained soil (0.5)
γ = unit weight of fill of the applicable retained soil (kN/m^3)
H = height of the wall (m)

An additional pressure having a magnitude equal to $K_o \cdot q$ and acting on the entire height of the wall should be added to the above diagram for any surcharge loading, q (kPa), that may be placed at ground surface adjacent to the wall. The surcharge pressure will only be applicable for static analyses and should not be used in conjunction with the seismic loading case.

Actual earth pressures could be higher than the “at-rest” case if care is not exercised during the compaction of the backfill materials to maintain a minimum separation of 0.3 m from the walls with the compaction equipment.

Seismic Earth Pressures

The total seismic force (P_{AE}) includes both the earth force component (P_o) and the seismic component (ΔP_{AE}).

The seismic earth force (ΔP_{AE}) can be calculated using $0.375 \cdot a_c \cdot \gamma \cdot H^2/g$ where:

a_c = $(1.45-a_{max}/g)a_{max}$
γ = unit weight of fill of the applicable retained soil (kN/m^3)
H = height of the wall (m)
g = gravity, 9.81 m/s^2

The peak ground acceleration, (a_{max}), for the Ottawa area is 0.32g according to OBC 2012. Note that the vertical seismic coefficient is assumed to be zero.

The earth force component (P_o) under seismic conditions can be calculated using $P_o = 0.5\ K_o\ \gamma\ H^2$, where $K_o = 0.5$ for the soil conditions noted above.
The total earth force (P_{AE}) is considered to act at a height, h (m), from the base of the wall, where:

$h = \{P_o \cdot (H/3) + \Delta P_{AE} \cdot (0.6 \cdot H)\}/P_{AE}$

The earth forces calculated are unfactored. For the ULS case, the earth loads should be factored as live loads, as per OBC 2012.

5.7 Pavement Structure

Car only parking areas, heavy truck parking areas and access lanes are anticipated at this site. The proposed pavement structures are presented in Tables 3 and 4.

Table 3 - Recommended Pavement Structure - Car Only Parking Areas

Thickness (mm)	Material Description
50	**Wear Course** - HL-3 or Superpave 12.5 Asphaltic Concrete
150	**BASE** - OPSS Granular A Crushed Stone
300	**SUBBASE** - OPSS Granular B Type II
SUBGRADE - In situ soil, or OPSS Granular B Type I or II material placed over in situ soil	

Table 4 - Recommended Pavement Structure
Access Lanes, Ramp and Heavy Truck Parking Areas

Thickness (mm)	Material Description
40	**Wear Course** - HL-3 or Superpave 12.5 Asphaltic Concrete
50	**Binder Course** - HL-8 or Superpave 19.0 Asphaltic Concrete
150	**BASE** - OPSS Granular A Crushed Stone
450	**SUBBASE** - OPSS Granular B Type II
SUBGRADE - In situ soil, or OPSS Granular B Type I or II material placed over in situ soil	

Minimum Performance Graded (PG) 58-34 asphalt cement should be used for this project.

If soft spots develop in the subgrade during compaction or due to construction traffic, the affected areas should be excavated and replaced with OPSS Granular B Type II material.

The pavement granular base and subbase should be placed in maximum 300 mm thick lifts and compacted to a minimum of 99% of the material's SPMDD using suitable vibratory equipment.

Pavement Structure Drainage

Satisfactory performance of the pavement structure is largely dependent on maintaining the contact zone between the subgrade material and the base stone in a dry condition. Failure to provide adequate drainage under conditions of heavy wheel loading can result in the fine subgrade soil being pumped into the voids in the stone subbase, thereby reducing load carrying capacity.

Due to the low permeability of the subgrade materials consideration should be given to installing subdrains during the pavement construction as per City of Ottawa standards. The subdrain inverts should be approximately 300 mm below subgrade level. The subgrade surface should be crowned to promote water flow to the drainage lines.

6.0 Design and Construction Precautions

6.1 Foundation Drainage and Backfill

Foundation Drainage and Waterproofing

For the proposed underground parking levels, it is expected that the building foundation walls will be placed in close proximity to the site boundaries. Therefore, it is recommended that the foundation walls be blind poured against a drainage system and waterproofing system fastened to the shoring system.

Waterproofing of the foundation walls is recommended and the membrane is to be installed from 300 mm above the proposed P1 level to the bottom of foundation. It is further recommended to extend the membrane a minimum of 600 mm horizontally below the exterior footing as per Figure 2 - Water Suppression System in Appendix 2.

It is also recommended that a composite drainage system, such as Delta Drain 6000 or equivalent, be installed between the waterproofing membrane and the foundation wall, and extend from the exterior finished grade to the founding elevation (underside of footing or raft slab). The purpose of the composite drainage system is to direct any water infiltration resulting from a breach of the waterproofing membrane to the building sump pit. It is recommended that 150 mm diameter sleeves at 3 m centres be cast in the foundation wall at the perimeter footing or raft slab interface to allow the infiltration of water to flow to an interior perimeter underfloor drainage pipe. The perimeter drainage pipe should direct water to sump pit(s) within the lower basement area.

Foundation Raft Slab Construction Joints

It is expected that the raft slab, where utilized, will be poured in sections. For the construction joint at each pour, a rubber water stop along with a chemical grout (Xypex or equivalent) should be applied to the entire vertical joint of the slab. Furthermore, a rubber water stop should be incorporated in the horizontal interface between the foundation wall and the raft slab.

Sub-slab Drainage

Sub-slab drainage will be required to control water infiltration below the lowest level floor slabs. For preliminary design purposes, we recommend that 100 or 150 mm perforated pipes be placed at approximate 6 m centres. The spacing of the sub-slab drainage system should be confirmed at the time of completing the excavation when water infiltration can be better assessed.

Foundation Backfill

Where space is available for conventional wall construction, backfill against the exterior sides of the foundation walls should consist of free-draining, non-frost susceptible granular materials. Imported granular materials, such as clean sand or OPSS Granular A crushed stone, should be used for this purpose.

6.2 Protection of Footings Against Frost Action

Perimeter foundations of heated structures are required to be insulated against the deleterious effects of frost action. A minimum of 1.5 m of soil cover, or a minimum of 0.6 m of soil cover in conjunction with adequate foundation insulation, should be provided.

Exterior unheated foundations, such as those for isolated exterior piers, are more prone to deleterious movement associated with frost action than the exterior walls of the heated structure and require additional protection, such as soil cover of 2.1 m or an equivalent combination of soil cover and foundation insulation.

The foundations for the underground parking levels are expected to have sufficient frost protection due to the founding depth. However, it has been our experience that insufficient soil cover is typically provided to entrance ramps to underground parking garages. Paterson requests permission to review design drawings prior to construction to ensure proper frost protection is provided for these areas.

6.3 Excavation Side Slopes

The side slopes of excavations in the soil and fill overburden materials should either be excavated at acceptable slopes or retained by shoring systems from the beginning of the excavation until the structure is backfilled. Given the proximity of the underground parking levels to the property lines, it is expected that a temporary shoring will be required to support the excavation for this proposed development.

Unsupported Excavations

The excavation side slopes above the groundwater level extending to a maximum depth of 3 m should be excavated at 1H:1V or shallower. The shallower slope is required for excavation below groundwater level. The subsurface soils are considered to be a Type 2 and 3 soil according to the Occupational Health and Safety Act and Regulations for Construction Projects.

Excavated soil should not be stockpiled directly at the top of excavations and heavy equipment should be kept away from the excavation sides.

Slopes in excess of 3 m in height should be periodically inspected by the geotechnical consultant in order to detect if the slopes are exhibiting signs of distress.

A trench box is recommended to protect personnel working in trenches with steep or vertical sides. Services are expected to be installed by "cut and cover" methods and excavations should not remain open for extended periods of time.

Temporary Shoring

Temporary shoring will be required for the overburden soil to complete the required excavations where insufficient room is available for open cut methods. The shoring requirements designed by a structural engineer specializing in those works will depend on the depth of the excavation, the proximity of the adjacent structures and the elevation of the adjacent building foundations and underground services. The design and implementation of these temporary systems will be the responsibility of the excavation contractor and their design team. Inspections and approval of the temporary system will also be the responsibility of the designer.

Geotechnical information provided below is to assist the designer in completing a suitable and safe shoring system. The designer should take into account the impact of a significant precipitation event and designate design measures to ensure that a precipitation will not negatively impact the shoring system or soils supported by the system. Any changes to the approved shoring design system should be reported immediately to the owner's structural design prior to implementation.

The temporary system could consist of soldier pile and lagging system or interlocking steel sheet piling. Any additional loading due to street traffic, construction equipment, adjacent structures and facilities, etc., should be included to the earth pressures described below. These systems could be cantilevered, anchored or braced. Generally, it is expected that the shoring systems will be provided with tie-back rock anchors to ensure their stability. The shoring system is recommended to be adequately supported to resist toe failure and inspected to ensure that the sheet piles extend well below the excavation base. It should be noted if consideration is being given to utilizing a raker style support for the shoring system that lateral movements can occur and the structural engineer should ensure that the design selected minimizes these movements to tolerable levels.

The earth pressures acting on the shoring system may be calculated with the following parameters.

Table 5 - Soil Parameters	
Parameters	**Values**
Active Earth Pressure Coefficient (K_a)	0.33
Passive Earth Pressure Coefficient (K_p)	3
At-Rest Earth Pressure Coefficient (K_o)	0.5
Unit Weight (γ), kN/m^3	21
Submerged Unit Weight (γ), kN/m^3	13

The active earth pressure should be calculated where wall movements are permissible while the at-rest pressure should be calculated if no movement is permissible. The dry unit weight should be calculated above the groundwater level while the effective unit weight should be calculated below the groundwater level.

The hydrostatic groundwater pressure should be included to the earth pressure distribution wherever the effective unit weight are calculated for earth pressures. If the groundwater level is lowered, the dry unit weight for the soil/bedrock should be calculated full weight, with no hydrostatic groundwater pressure component. For design purposes, the minimum factor of safety of 1.5 should be calculated.

6.4 Pipe Bedding and Backfill

Bedding and backfill materials should be in accordance with the most recent Material Specifications and Standard Detail Drawings from the Department of Public Works and Services, Infrastructure Services Branch of the City of Ottawa.

The pipe bedding for sewer and water pipes placed on a relatively dry, undisturbed subgrade surface should consist of at least 150 mm of OPSS Granular A material. The material should be placed in maximum 300 mm thick lifts and compacted to a minimum of 99% of its SPMDD. The bedding material should extend at least to the spring line of the pipe.

The cover material, which should consist of OPSS Granular A, should extend from the spring line of the pipe to at least 300 mm above the obvert of the pipe. The material should be placed in maximum 300 mm thick lifts and compacted to a minimum of 99% of its SPMDD.

Generally, it should be possible to re-use the moist (not wet) silty clay above the cover material if the excavation and filling operations are carried out in dry weather conditions. Wet silty clay material will be difficult to re-use, as the high water contents make compacting impractical without an extensive drying period.

Where hard surface areas are considered above the trench backfill, the trench backfill material within the frost zone (about 1.8 m below finished grade) should match the soils exposed at the trench walls to minimize differential frost heaving. The trench backfill should be placed in maximum 300 mm thick loose lifts and compacted to a minimum of 95% of the material's SPMDD.

6.5 Groundwater Control

The contractor should be prepared to direct water away from all bearing surfaces and subgrades, regardless of the source, to prevent disturbance to the founding medium. The rate of flow of groundwater into the excavation through the overburden should be low to moderate for the conditions expected at this site. It is anticipated that pumping from open sumps will be sufficient to control the groundwater influx through the sides of the excavations.

Groundwater Control for Building Construction

A temporary Ministry of the Environment, Conservation, and Parks (MECP) permit to take water (PTTW) may be required for this project if more than 400,000 L/day of ground and/or surface water is to be pumped during the construction phase. A minimum of 4 to 5 months should be allowed for completion of the PTTW application package and issuance of the permit by the MECP.

For typical ground or surface water volumes being pumped during the construction phase, between 50,000 to 400,000 L/day, it is required to register on the Environmental Activity and Sector Registry (EASR). A minimum of two to four weeks should be allotted for completion of the EASR registration and the Water Taking and Discharge Plan to be prepared by a Qualified Person as stipulated under O.Reg. 63/16. If a project qualifies for a PTTW based upon anticipated conditions, an EASR will not be allowed as a temporary dewatering measure while awaiting the MECP review of the PTTW application.

Long-term Groundwater Control

Our recommendations for the proposed building's long-term groundwater control are presented in Subsection 6.1. Any groundwater which breaches the building's perimeter groundwater infiltration control system will be directed to the sump pit. Provided the proposed groundwater infiltration control system is properly implemented and approved by the geotechnical consultant at the time of construction, it is expected that long-term groundwater flow will be very low to negligible (ie.- less than 30,000 L/day).

Impacts on Neighbouring Structures

Based on our observations, the groundwater level is anticipated at a 4 to 5 m depth and within the silty clay layer. Therefore, a local groundwater lowering is anticipated under short-term conditions due to construction of the proposed building. Since the proposed development will be founded below the long term groundwater level, a groundwater infiltration control system has been recommended to lessen the effects of water infiltration. Any long term dewatering of the site will be minimal and should have no adverse effects to the surrounding buildings or structures. The short term dewatering during the excavation program will be managed by the excavation contractor, as discussed above.

6.6 Winter Construction

Precautions must be taken if winter construction is considered for this project.

The subsoil conditions at this site mostly consist of frost susceptible materials. In the presence of water and freezing conditions, ice could form within the soil mass. Heaving and settlement upon thawing could occur.

In the event of construction during below zero temperatures, the founding stratum should be protected from freezing temperatures by the use of straw, propane heaters, tarpaulins or other suitable means. In this regard, the base of the excavations should be insulated from sub-zero temperatures immediately upon exposure and until such time as heat is adequately supplied to the building and the footings are protected with sufficient soil cover to prevent freezing at founding level.

The trench excavations should be carried out in a manner to avoid the introduction of frozen materials, snow or ice into the trenches.

6.7 Corrosion Potential and Sulphate

The results of analytical testing show that the sulphate content is less than 0.1%. This result is indicative that Type 10 Portland cement (normal cement) would be appropriate for this site. The chloride content and the pH of the sample indicate that they are not significant factors in creating a corrosive environment for exposed ferrous metals at this site, whereas the resistivity is indicative of n aggressive to very aggressive corrosive environment.

7.0 Recommendations

A materials testing and observation services program is a requirement for the provided foundation design data to be applicable. The following aspects of the program should be performed by the geotechnical consultant:

- ❏ Review of the grading plan from a geotechnical perspective.
- ❏ Review the Contractor's design of the temporary shoring system.
- ❏ Review of waterproofing details for elevator shaft and building sump pits.
- ❏ Review and inspection of the foundation waterproofing system and all foundation drainage systems.
- ❏ Observation of all bearing surfaces prior to the placement of concrete.
- ❏ Sampling and testing of the concrete and fill materials used.
- ❏ Periodic observation of the condition of unsupported excavation side slopes in excess of 3 m in height, if applicable.
- ❏ Observation of all subgrades prior to backfilling.
- ❏ Field density tests to determine the level of compaction achieved.
- ❏ Sampling and testing of the bituminous concrete including mix design reviews.

A report confirming that these works have been conducted in general accordance with our recommendations could be issued, upon request, following the completion of a satisfactory materials testing and observation program by the geotechnical consultant.

8.0 Statement of Limitations

The recommendations provided in this report are in accordance with our present understanding of the project. We request permission to review our recommendations when the drawings and specifications are completed.

A geotechnical investigation is a limited sampling of a site. Should any conditions at the site be encountered which differ from those at the test locations, we request immediate notification to permit reassessment of our recommendations.

The recommendations provided herein should only be used by the design professionals associated with this project. They are not intended for contractors bidding on or undertaking the work. The latter should evaluate the factual information provided in this report and determine its suitability and completeness for their intended construction schedule and methods. Additional testing may be required for their purposes.

The present report applies only to the project described in this document. Use of this report for purposes other than those described herein or by person(s) other than Brigil or their agents is not authorized without review by Paterson for the applicability of our recommendations to the altered use of the report.

Paterson Group Inc.

Joey R. Villeneuve, M.A.Sc., P.Eng.. David J. GIlbert, P.Eng.

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APPENDIX 1

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

SOIL PROFILE AND TEST DATA SHEETS BY OTHERS

ANALYTICAL TESTING RESULTS

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Preliminary Geotechnical Investigation
Prop. High-Rise Building - 265 Catherine Street
Ottawa, Ontario

DATUM Geodetic

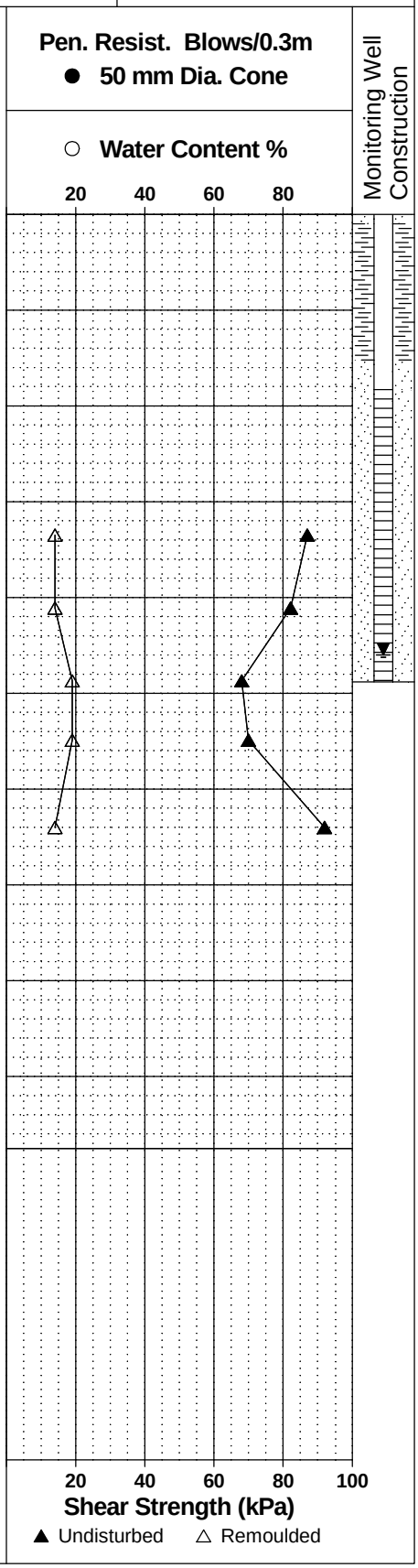
FILE NO. PG5498

REMARKS

HOLE NO. BH 1-20

BORINGS BY CME-55 Low Clearance Drill **DATE** August 19, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	68.62
Asphaltic concrete 0.10		AU	1				
FILL: Brown silty sand 0.63		SS	2	75	50+	1	67.62
FILL: Brown silty sand with gravel, cobbles and debris (wood, bricks)		SS	3	58	18	2	66.62
2.29		SS	4	75	2		
Compact, brown **SILTY SAND** 3.05		SS	5	100	P	3	65.62
		SS	6	100	P	4	64.62
Stiff, grey **SILTY CLAY,** some fine sand seams		SS	7	38	P	5	63.62
7.62		SS	8	100	2	6	62.62
Grey **SILTY CLAY,** trace silty sand		SS	9	100	2	7	61.62
9.75						8	60.62
End of Borehole						9	59.62
(GWL @ 4.60m - Sept. 1, 2020)							



patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Preliminary Geotechnical Investigation
Prop. High-Rise Building - 265 Catherine Street
Ottawa, Ontario

DATUM Geodetic

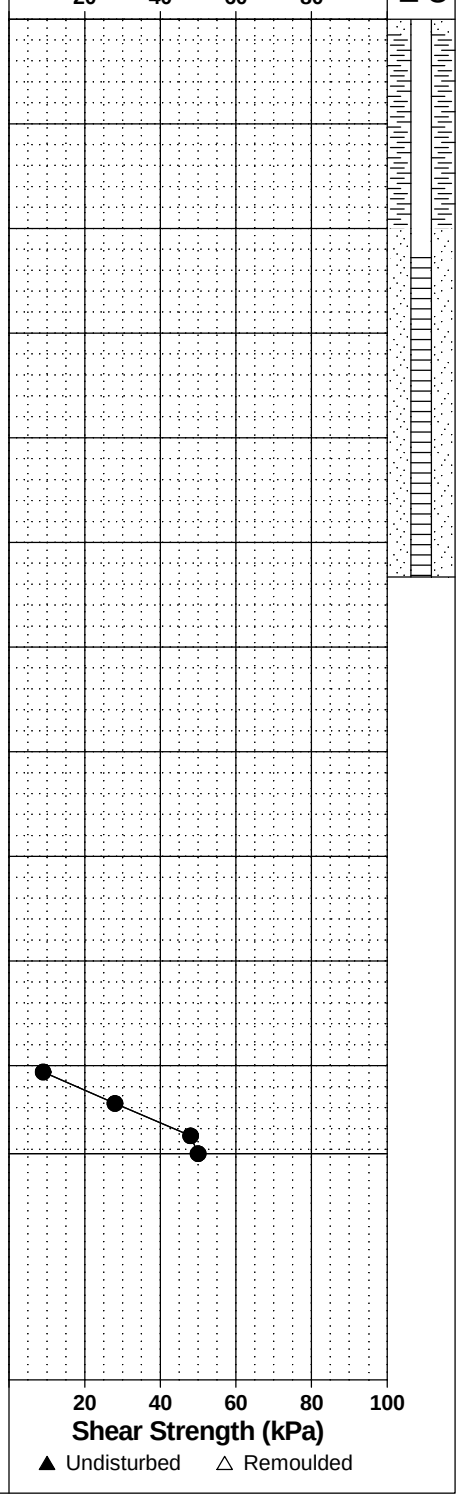
FILE NO. PG5498

REMARKS

HOLE NO. BH 2-20

BORINGS BY CME-55 Low Clearance Drill **DATE** August 19, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	68.46
Asphaltic concrete 0.10		AU	1				
FILL: Brown silty sand with crushed stone 0.60							
		SS	2	54	16	1	67.46
FILL: Brown silty sand with gravel, trace wood and brick		SS	3	18	9	2	66.46
2.13		SS	4	100	4	3	65.46
		SS	5	100	2		
		SS	6	100	4	4	64.46
		SS	7	100	2	5	63.46
Brown **SILTY CLAY,** trace brown silty sand		SS	8	100	3		
		SS	9	100	4	6	62.46
		SS	10	100	2	7	61.46
9.14						8	60.46
GLACIAL TILL: Grey clayey silty sand with gravel, cobbles and boulders 9.75		SS	11	58	3	9	59.46
Dynamic Cone Penetration Test commenced at 9.75m depth. Inferred **GLACIAL TILL** 10.84						10	58.46
End of Borehole							
Practical DCPT refusal at 10.84m depth.							
(BH dry - Sept. 1, 2020)							



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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Preliminary Geotechnical Investigation
Prop. High-Rise Building - 265 Catherine Street
Ottawa, Ontario

DATUM Geodetic

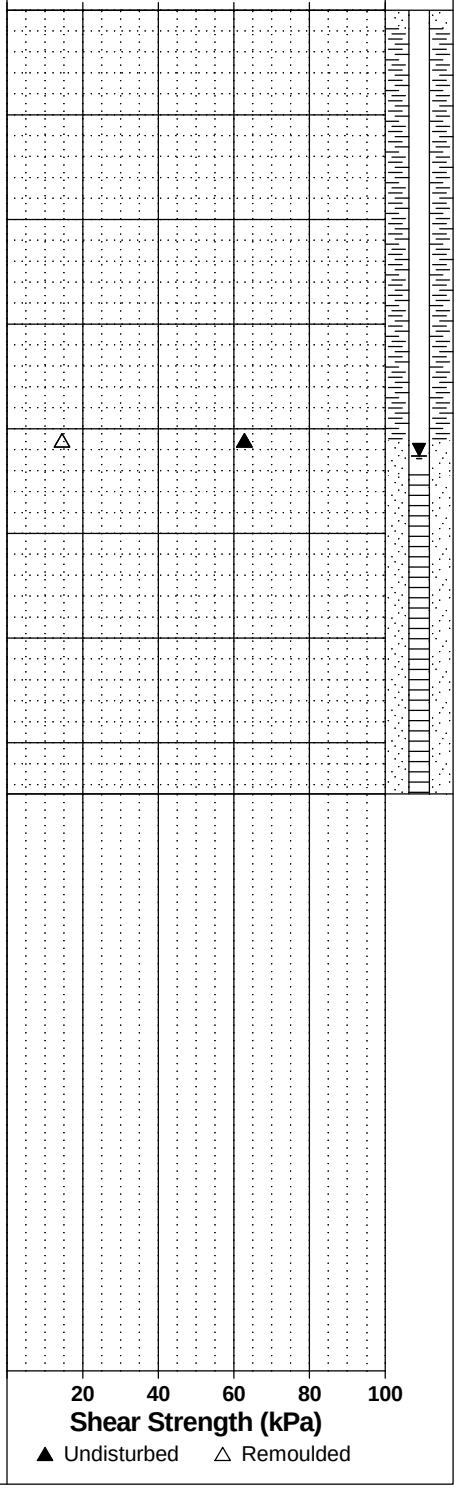
FILE NO. PG5498

REMARKS

HOLE NO. BH 3-20

BORINGS BY CME-55 Low Clearance Drill **DATE** August 19, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Monitoring Well Construction
GROUND SURFACE						0	68.11		
Asphaltic concrete 0.10		AU	1						
FILL: Brown silty sand with silty clay and crushed stone 0.60									
Loose to compact, brown **SILTY SAND,** some organics		SS	2	38	9	1	67.11		
2.13		SS	3	67	13	2	66.11		
Stiff, grey **SILTY CLAY** with sandy silt		SS	4	100	2	3	65.11		
		SS	5	100	2				
4.42		SS	6	100	P	4	64.11		
GLACIAL TILL: Compact, grey sandy silt with some clay, gravel and cobbles 5.33		SS	7	42	11	5	63.11		
		SS	8	62	4				
GLACIAL TILL: Grey clayey silty sand with gravel, cobbles and boulders		SS	8	46	7	6	62.11		
7.49						7	61.11		
End of Borehole									
Practical refusal to augering at 7.49m depth.									
(GWL @ 4.26m - August 28, 2020)									



SYMBOLS AND TERMS

SOIL DESCRIPTION

Behavioural properties, such as structure and strength, take precedence over particle gradation in describing soils. Terminology describing soil structure are as follows:

Desiccated	-	having visible signs of weathering by oxidation of clay minerals, shrinkage cracks, etc.
Fissured	-	having cracks, and hence a blocky structure.
Varved	-	composed of regular alternating layers of silt and clay.
Stratified	-	composed of alternating layers of different soil types, e.g. silt and sand or silt and clay.
Well-Graded	-	Having wide range in grain sizes and substantial amounts of all intermediate particle sizes (see Grain Size Distribution).
Uniformly-Graded	-	Predominantly of one grain size (see Grain Size Distribution).

The standard terminology to describe the relative strength of cohesionless soils is the compactness condition, usually inferred from the results of the Standard Penetration Test (SPT) 'N' value. The SPT N value is the number of blows of a 63.5 kg hammer, falling 760 mm, required to drive a 51 mm O.D. split spoon sampler 300 mm into the soil after an initial penetration of 150 mm. An SPT N value of "P" denotes that the split-spoon sampler was pushed 300 mm into the soil without the use of a falling hammer.

Compactness Condition	'N' Value	Relative Density %
Very Loose	<4	<15
Loose	4-10	15-35
Compact	10-30	35-65
Dense	30-50	65-85
Very Dense	>50	>85

The standard terminology to describe the strength of cohesive soils is the consistency, which is based on the undisturbed undrained shear strength as measured by the in situ or laboratory shear vane tests, unconfined compression tests, or occasionally by the Standard Penetration Test (SPT). Note that the typical correlations of undrained shear strength to SPT N value (tabulated below) tend to underestimate the consistency for sensitive silty clays, so Paterson reviews the applicable split spoon samples in the laboratory to provide a more representative consistency value based on tactile examination.

Consistency	Undrained Shear Strength (kPa)	'N' Value
Very Soft	<12	<2
Soft	12-25	2-4
Firm	25-50	4-8
Stiff	50-100	8-15
Very Stiff	100-200	15-30
Hard	>200	>30

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

Cohesive soils can also be classified according to their “sensitivity”. The sensitivity, S_t, is the ratio between the undisturbed undrained shear strength and the remoulded undrained shear strength of the soil. The classes of sensitivity may be defined as follows:

Low Sensitivity:	$S_t < 2$
Medium Sensitivity:	$2 < S_t < 4$
Sensitive:	$4 < S_t < 8$
Extra Sensitive:	$8 < S_t < 16$
Quick Clay:	$S_t > 16$

ROCK DESCRIPTION

The structural description of the bedrock mass is based on the Rock Quality Designation (RQD).

The RQD classification is based on a modified core recovery percentage in which all pieces of sound core over 100 mm long are counted as recovery. The smaller pieces are considered to be a result of closely-spaced discontinuities (resulting from shearing, jointing, faulting, or weathering) in the rock mass and are not counted. RQD is ideally determined from NQ or larger size core. However, it can be used on smaller core sizes, such as BQ, if the bulk of the fractures caused by drilling stresses (called “mechanical breaks”) are easily distinguishable from the normal in situ fractures.

RQD %	**ROCK QUALITY**
90-100	Excellent, intact, very sound
75-90	Good, massive, moderately jointed or sound
50-75	Fair, blocky and seamy, fractured
25-50	Poor, shattered and very seamy or blocky, severely fractured
0-25	Very poor, crushed, very severely fractured

SAMPLE TYPES

SS	-	Split spoon sample (obtained in conjunction with the performing of the Standard Penetration Test (SPT))
TW	-	Thin wall tube or Shelby tube, generally recovered using a piston sampler
G	-	"Grab" sample from test pit or surface materials
AU	-	Auger sample or bulk sample
WS	-	Wash sample
RC	-	Rock core sample (Core bit size BQ, NQ, HQ, etc.). Rock core samples are obtained with the use of standard diamond drilling bits.

SYMBOLS AND TERMS (continued)

PLASTICITY LIMITS AND GRAIN SIZE DISTRIBUTION

WC%	-	Natural water content or water content of sample, %
LL	-	Liquid Limit, % (water content above which soil behaves as a liquid)
PL	-	Plastic Limit, % (water content above which soil behaves plastically)
PI	-	Plasticity Index, % (difference between LL and PL)
Dxx	-	Grain size at which xx% of the soil, by weight, is of finer grain sizes These grain size descriptions are not used below 0.075 mm grain size
D10	-	Grain size at which 10% of the soil is finer (effective grain size)
D60	-	Grain size at which 60% of the soil is finer
Cc	-	Concavity coefficient = $(D30)^2 / (D10 \times D60)$
Cu	-	Uniformity coefficient = D60 / D10

Cc and Cu are used to assess the grading of sands and gravels:
Well-graded gravels have: $1 < Cc < 3$ and $Cu > 4$
Well-graded sands have: $1 < Cc < 3$ and $Cu > 6$
Sands and gravels not meeting the above requirements are poorly-graded or uniformly-graded.
Cc and Cu are not applicable for the description of soils with more than 10% silt and clay (more than 10% finer than 0.075 mm or the #200 sieve)

CONSOLIDATION TEST

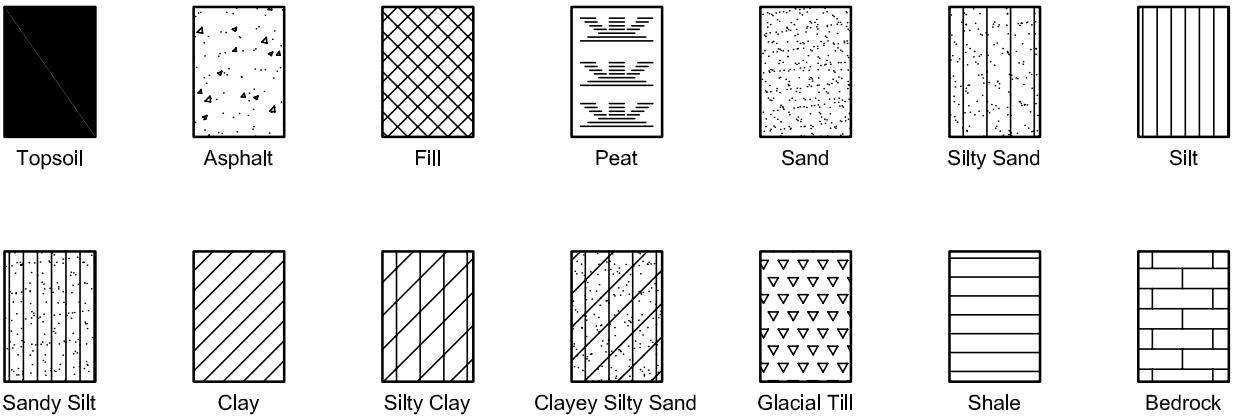
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void Ratio		Initial sample void ratio = volume of voids / volume of solids
Wo	-	Initial water content (at start of consolidation test)

PERMEABILITY TEST

k	-	Coefficient of permeability or hydraulic conductivity is a measure of the ability of water to flow through the sample. The value of k is measured at a specified unit weight for (remoulded) cohesionless soil samples, because its value will vary with the unit weight or density of the sample during the test.

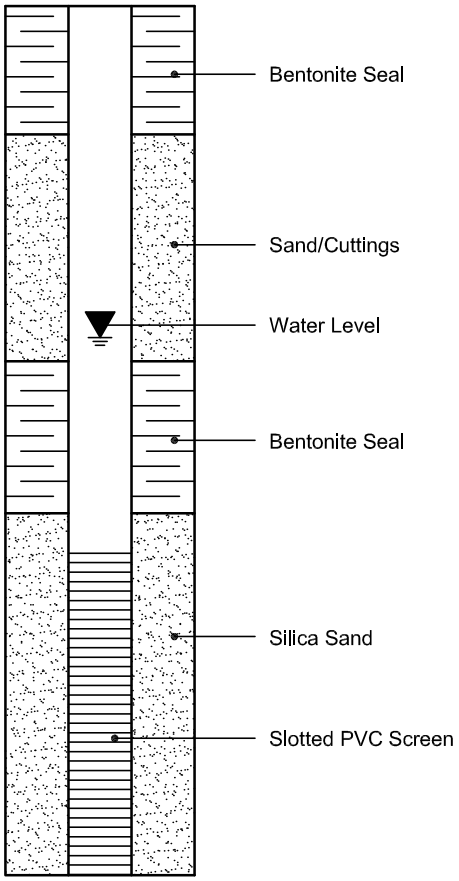
SYMBOLS AND TERMS (continued)

STRATA PLOT

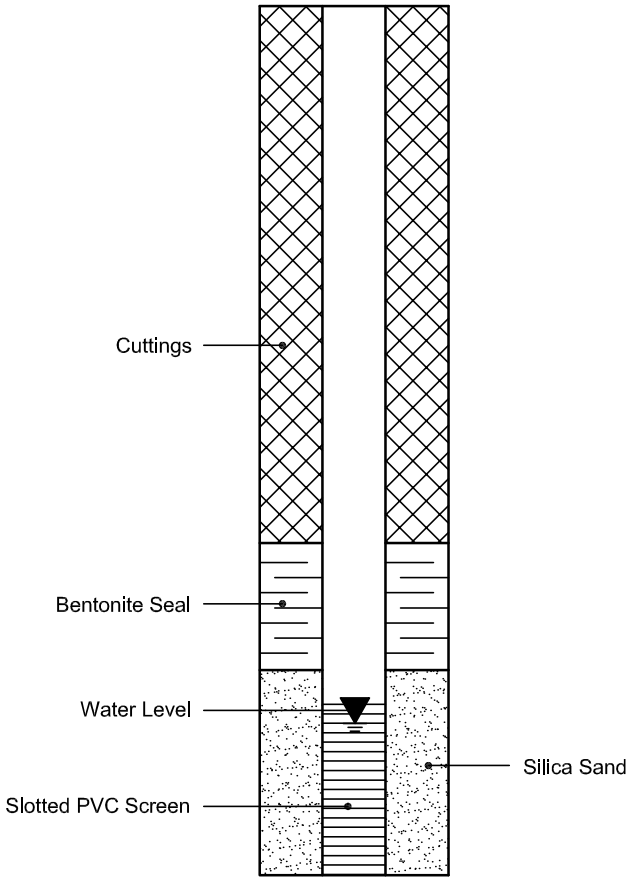


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



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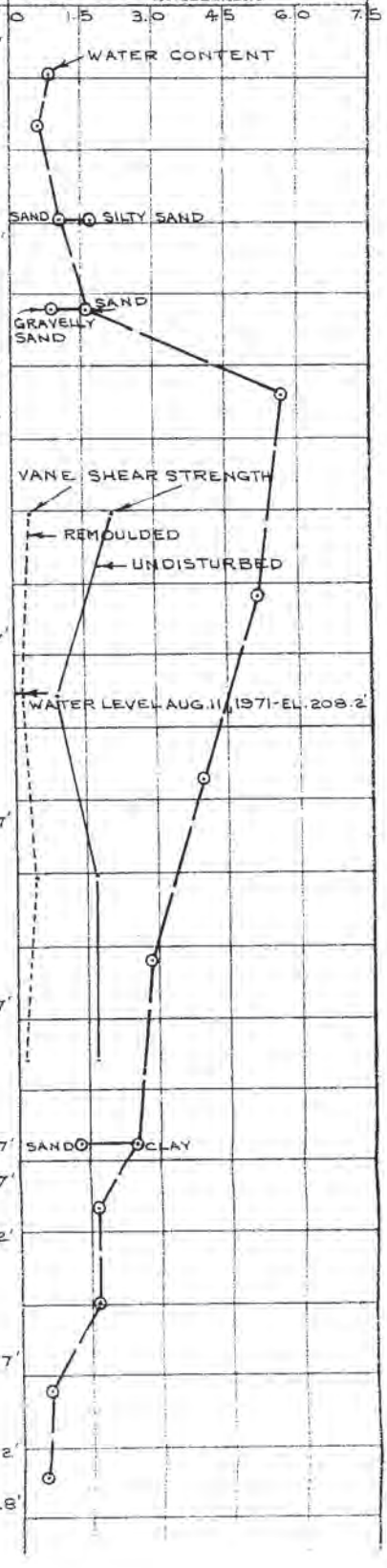
KENT & LYON

ELEVATION OF GROUND SURFACE (ZERO DEPTH) 227.2' DATE AUG. 6, 1971
NIVEAU DU SOL (PROFONDEUR ZÉRO)
NOTES B.M. (ELEV. 231.49') GEODETIC. SOUTHEAST CORNER OF KENT & McLEOD

HOLE / FORAGE No. 1

Compressive Strength K.S.F. Resistance à la Compression K/Pd.²	Small Scale Penetrometer K.S.F. Petit Pénétromètre K/Pd.²	Essai-Standard Penetration Blows/ft.-Coups/pi	Sample No. Échantillon	DESCRIPTION OF SOIL / DU SOL (Ground Surface = Niveau du Sol)	Depth in Feet Profondeur-Pied	Elevation Niveau
				FILL - SAND, GRAVEL & CRUSHED STONE	0'	227.2'
					1.0'	226.2'
		11	1-1	MEDIUM DENSE FINE & VERY FINE SAND WITH A ½" SILTY VERY FINE SAND LAYER		
		12 (10 FOR 6")	1-2			
		21	1-3		6.5'	220.7'
		31 (32 FOR 6")	1-4	DENSE FINE & VERY FINE SAND WITH SOME SILT & A 2" GRAVELLY SAND LAYER	10.0'	217.2'
	1.5, 1.6, 1.4	5	1-5	MEDIUM SOFT GRAY CLAY WITH SOME SILT	11.5'	215.7'
	2.4, 3.2, 2.2 2.2, 2.5, 2.6 R-0.2		1-6	STIFF GRAY CLAY WITH SOME SILT WITH A FEW FISSURES	17.5'	209.7'
	3.2, 2.6, 3.0 2.8, 3.4, 3.2 2.2, 2.2, 2.0 2.4, 2.0, 2.2 R-0.2		1-7	STIFF SILTY GRAY CLAY WITH A FEW FISSURES	22.5'	204.7'
	1.2, 1.4, 1.4 1.4, 1.4, 1.2 R-0.0		1-8	MEDIUM SOFT SILTY GRAY CLAY WITH A TRACE OF VERY FINE SAND	27.5'	199.7'
	2.5, 2.4, 2.6 2.2, 2.5, 2.2 2.0, 2.2, 2.4 2.0, 2.2, 1.6 R-0.0		1-9	STIFF SILTY GRAY CLAY WITH A FEW FISSURES	31.5'	195.7'
				STIFF SILTY GRAY CLAY WITH SOME ½" TO ½" MEDIUM & FINE SAND LAYERS	32.5'	194.7'
		22	1-10	MEDIUM DENSE CLAYEY SILT WITH SOME VERY FINE SAND & A TRACE OF GRAVEL	34.0'	193.2'
		21	1-11	MEDIUM DENSE VERY FINE SAND WITH A LITTLE SILT & A TRACE OF GRAVEL	37.5'	189.7'
		26	1-12	MEDIUM DENSE TILL	40.0'	187.2'
		100	1-13	VERY DENSE SILTY TILL	41.4'	185.8'
				LIMESTONE		

PROBING OR VANE TEST — SONDAGE OU ESSAI AU MOULINET
MARTEAU---HAMMER — NO CASING
CHUTE LIBRE---DROP — SANS TUBAGE
BARRE---DIA. ROD
BLOWS/FOOT OR CYCLOPS/FEET OU — SHEAR STRENGTH K.S.F. RÉSISTANCE AU CISAILLEMENT, K/PD.²



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KENT & LYON

ELEVATION OF GROUND SURFACE (ZERO DEPTH) 225.2' DATE AUG. 9, 1971
NIVEAU DU SOL (PROFONDEUR ZERO)
NOTES SEE PLATE No. 2

HOLE FORAGE No. 2

Compressive Strength K.S.F. Résistance à la Compression K/Pd.2	Small Scale Penetrometer K.S.F. Petit Pénétromètre K/Pd.2	Essai - Standard Penetration Blows/ft.-Coups/pd	No. Sample Echantillon	DESCRIPTION OF SOIL DU SOL — Ground Surface — Niveau du Sol	Depth in Feet Profondeur - Pied	Elevation Niveau
		13	2-1	FILL- SAND WITH SOME CLAY & SILT & WITH A TRACE OF GRAVEL, CINDERS & ORGANIC MATERIAL	0'	225.2'
		12	2-2			
		11	2-3			
					7.5'	217.7'
	1.2, 1.4, 1.4	8	2-4	MEDIUM SOFT TO STIFF BROWNISH GRAY CLAY WITH SOME SILT & A FEW FISSURES		
	2.6, 2.4, 2.4					
	2.6, 2.8, 2.8					
	3.0, 3.0, 3.2					
	3.4, 3.2, 3.6		2-5			
	1.8, 1.8, 1.6					
	R-0.0				12.5'	212.7'
	2.4, 2.0, 2.6			STIFF GRAY CLAY WITH SOME SILT		
	3.2, 3.4, 3.2					
	3.6, 3.6, 3.6					
	2.5, 2.4, 2.6		2-6			
	2.8, 2.6, 2.5					
	R-0.0					
	2.8, 2.6, 2.5					
	3.0, 2.6, 2.8					
	2.4, 2.6, 2.4					
	2.6, 3.0, 3.4		2-7			
	2.6, 2.4, 2.4					
	R-0.0					
				BOTTOM OF HOLE	24.0'	201.2'

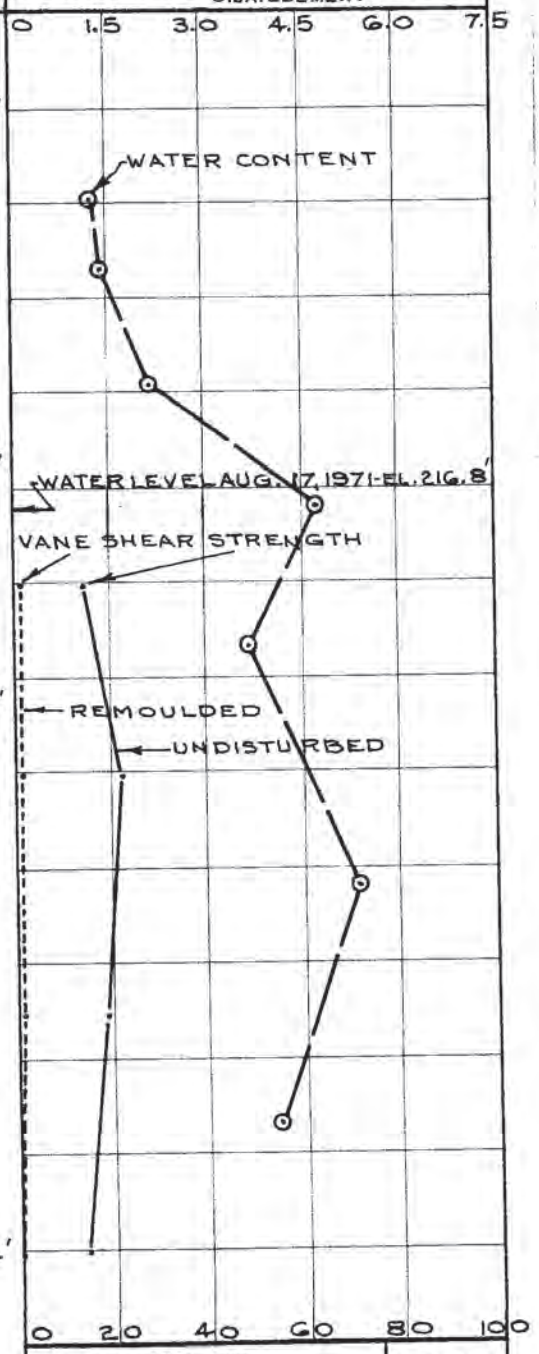
R = REMOULDED - REMANIE
CR = CORE RECOVERY / CAROTTE RECUPEREE

~~PROBING OR~~ VANE TEST — ~~SONDAGE OU~~ ESSAI AU MOULINET

MARTEAU----HAMMER
CHUTE LIBRE---DROP

NO CASING SANS TUBAGE
BARRE-----DIA. ROD

~~BLOWS/FOOT OR~~ SHEAR STRENGTH K.S.F.
~~COUPS/PIED OU~~ RÉSISTANCE AU CISAILLEMENT K/PD.2



WATER CONTENT
%TENEUR EN EAU
NATURAL NATURELLE ⊙
LIQUID LIMIT LIMITE DE LIQUIDITÉ ⊡
PLASTIC LIMIT LIMITE DE PLASTICITÉ △

PLATE PLAQUE No. 3

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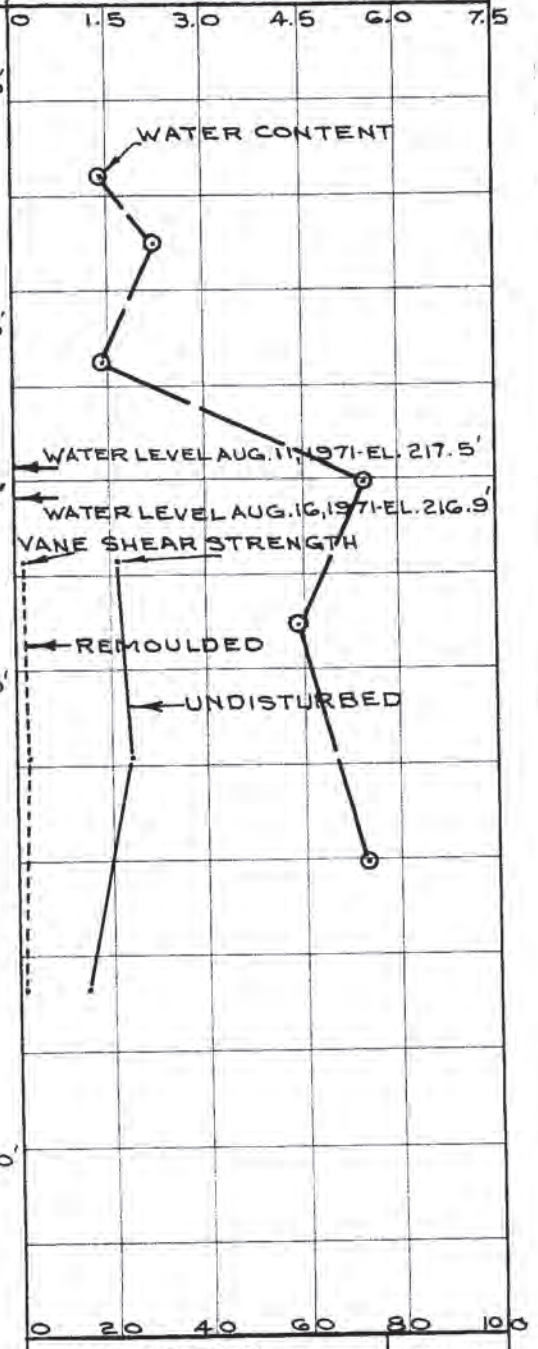
KENT & LYON

ELEVATION OF GROUND SURFACE (ZERO DEPTH) 225.5' DATE AUG. 9, 1971
NIVEAU DU SOL (PROFONDEUR ZERO)
NOTES SEE PLATE No. 2

HOLE FORAGE No. 3

Compressive Strength K.S.F. Résistance à la Compression K/Pd.2	Small Scale Penetrometer K.S.F. Petit Pénétromètre K/Pd.2	Essai - Standard Penetration Blows/Ft.-Coups/pd.	No. Sample Echantillon	DESCRIPTION OF SOIL DU SOL (Ground Surface – Niveau du Sol)	Depth in Feet Profondeur - Pied	Elevation Niveau
		7	3-1	FILL- SAND WITH SOME CLAY & A LITTLE BRICK & CINDERS & WITH A TRACE OF GLASS & METAL	0'	225.5'
		4	3-2			
		9	3-3	LOOSE SILTY FINE & VERY FINE SAND	5.0'	220.5'
		4	3-4		8.7'	216.8'
	2.6, 2.8, 2.8 2.8, 2.6, 2.8 2.2, 2.4, 2.2 2.4, 2.0, 2.2 1.0, 1.2, 1.2 R-0.0		3-5	MEDIUM SOFT TO STIFF BROWNISH GRAY CLAY WITH SOME SILT & A FEW FISSURES	12.5'	213.0'
	3.2, 3.4, 3.2 2.5, 2.4, 2.6 2.8, 2.8, 2.8 4.2, 4.2, 4.2 3.0, 3.0, 2.8 R-0.0		3-6	STIFF SILTY GRAY CLAY		
	3.5, 3.4, 3.2 3.6, 3.6, 3.8 3.6, 3.8, 3.8 3.4, 3.6, 3.8 2.6, 2.5, 2.4 R-0.0		3-7		22.5'	203.0'
				BOTTOM OF HOLE		

~~PROBING OR~~ VANE TEST — ~~SONDAGE OU~~ ESSAI AU MOULINET
MARTEAU----HAMMER — NO CASING SANS TUBAGE
CHUTE LIBRE---DROP — BARRE-----DIA. ROD
~~BLOWS/FOOT OR~~ SHEAR STRENGTH K.S.F.
~~COUPS/PIED OU~~ RÉSISTANCE AU, K/PD.2 CISAILLEMENT



WATER CONTENT
%TENEUR EN EAU
NATURAL NATURELLE ⊙
LIQUID LIMIT LIMITE DE LIQUIDITÉ ⊡
PLASTIC LIMIT LIMITE DE PLASTICITÉ △

PLATE PLAQUE No. 4

R = REMOULDED-REMANIE
CR = CORE RECOVERY CAROTTE RECUPEREE

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KENT & LYON

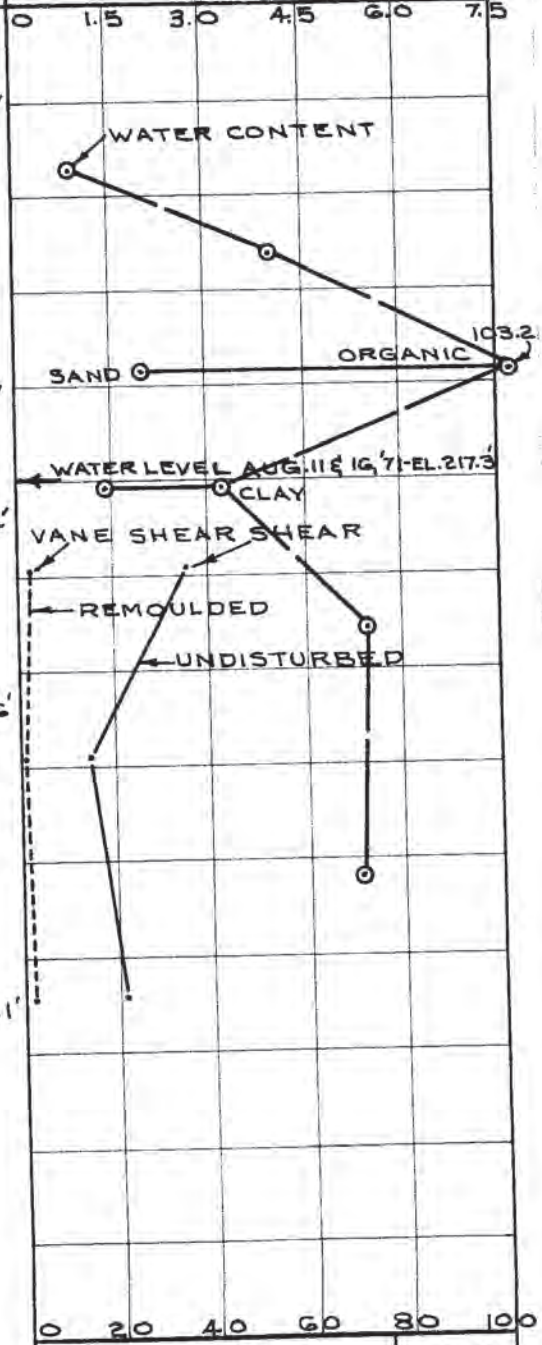
ELEVATION OF GROUND SURFACE (ZERO DEPTH) NIVEAU DU SOL (PROFONDEUR ZERO) 225.1' DATE AUG. 9, 1971

NOTES SEE PLATE No. 2

HOLE FORAGE No. 4

Compressive Strength K.S.F. Résistance à la Compression K/Pd.2	Small Scale Penetrometer K.S.F. Petit Pénétromètre K/Pd.2	Essai - Standard Penetration Blows/ft.-Coups/pd	Sample No. Echantillon	DESCRIPTION OF SOIL DU SOL Ground Surface – Niveau du Sol	Depth in Feet Profondeur - Pied	Elevation Niveau
		51	4-1	FILL - SAND & ORGANIC MATERIAL WITH SOME BROKEN ROCK & A TRACE OF WOOD & GRAVEL		
		15	4-2			
		5 6 FOR 6"	4-3		6.0'	219.1'
	5.5, 5.4, 5.5	G5	4-4	FILL - SILTY VERY FINE SAND & BROWNISH GRAY CLAY WITH SOME SAND & GRAVEL	8.7'	216.4'
	2.2, 1.6, 1.8 2.5, 2.5, 2.2 2.4, 3.2, 2.0 2.6, 2.6, 3.0 2.2, 1.8, 2.0 R-0.4		4-5	MEDIUM SOFT TO STIFF SILTY BROWNISH GRAY CLAY WITH SOME FISSURES	12.5'	212.6'
	4.4, 4.2, 4.2 3.5, 3.6, 3.5 3.8, 3.8, 3.8 3.4, 2.8, 2.8 3.6, 3.5, 3.5 R-0.2		4-6	STIFF TO VERY STIFF SILTY GRAY CLAY WITH SOME FISSURES	19.0'	206.1'
				BOTTOM OF HOLE		

PROBING OR VANE TEST — SONDAGE OU ESSAI AU MOULINET
MARTEAU----HAMMER, CHUTE LIBRE---DROP — NO CASING SANS TUBAGE, BARRE-----DIA. ROD
BLOWS/FOOT OR COUPS/PIED OU — SHEAR STRENGTH K.S.F. RÉSISTANCE AU CISAILLEMENT K/PD.2



WATER CONTENT %TENEUR EN EAU
NATURAL NATURELLE ⊙
LIQUID LIMIT LIMITE DE LIQUIDITÉ ⊡
PLASTIC LIMIT LIMITE DE PLASTICITÉ △

PLATE PLAQUE No. 5

R = REMOULDED-REMANIE
CR = CORE RECOVERY CAROTTE RECUPEREE

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ELEVATION OF GROUND SURFACE (ZERO DEPTH) 223.7' DATE AUG. 10, 1971

NIVEAU DU SOL (PROFONDEUR ZERO)

NOTES SEE PLATE No. 2

HOLE FORAGE No. 5

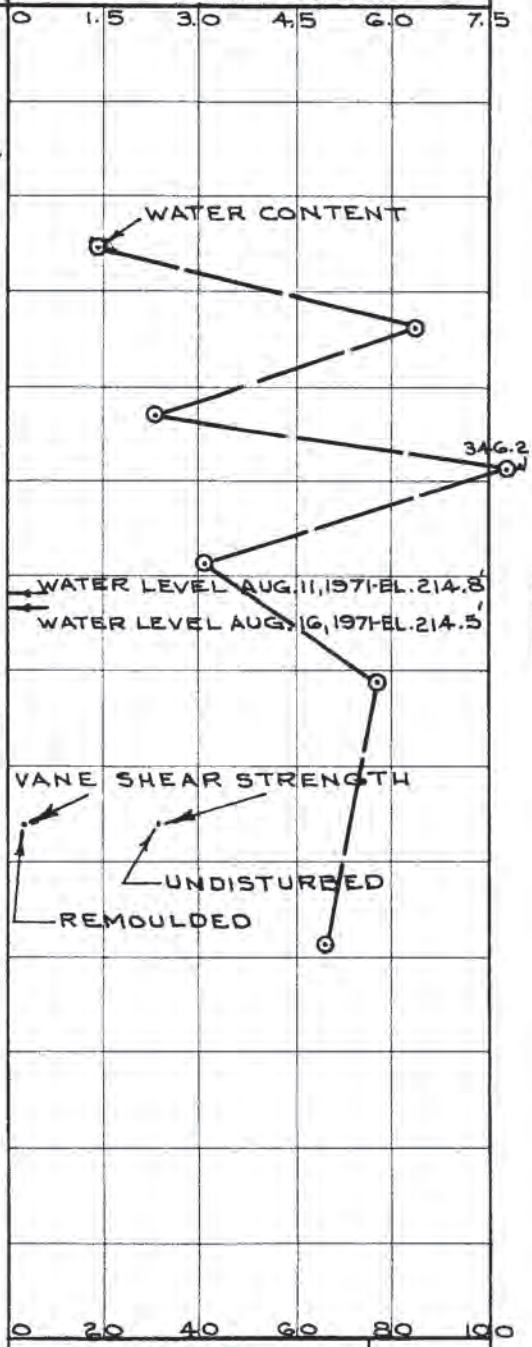
Compressive Strength K.S.F. Résistance à la Compression K/Pd.2	Small Scale Penetrometer K.S.F. Petit Pénétromètre K/Pd.2	Essai - Standard Penetration Blows/ft.-Coups/pd	Sample No. Echantillon	DESCRIPTION OF SOIL DU SOL — Ground Surface — Niveau du Sol	Depth in Feet Profondeur - Pied	Elevation Niveau
		5	5-1	FILL - SAND & ORGANIC MATERIAL WITH SOME GRAVEL, A LITTLE CLAY, ASHES & WOOD & A TRACE OF GLASS	0'	223.7'
		4	5-2			
		4	5-3			
			5-4		6.0'	217.7'
		3	5-5	FILL - SILTY VERY FINE SAND & FIBROUS ORGANIC MATERIAL & A 1" STONE		
	0.6, 0.4, 0.8	2 for 18"	5-6	SOFT SILTY GRAY CLAY	10.7'	213.0'
					11.5'	212.2'
	2.6, 2.4, 2.5 2.2, 3.6, 2.4 3.4, 3.2, 3.4 4.4, 3.2, 3.5 3.0, 2.8, 2.6 R-0.5		5-7	STIFF SILTY GRAY CLAY WITH A FEW FISSURES & A 1/64" VERTICAL FINE SAND LAYER & A FEW 1/8" TO 1/4" CLAYEY FINE SAND LAYERS	18.0'	205.7'
				BOTTOM OF HOLE		

PROBING OR VANE TEST — SONDAGE OU ESSAI AU MOULINET

MARTEAU---HAMMER, CHUTE LIBRE---DROP — NO CASING SANS TUBAGE, BARRE-----DIA. ROD

BLOWS/FOOT OR SHEAR STRENGTH K.S.F.

COUPS/PIED OU RÉSISTANCE AU CISAILLEMENT K/PD.2



R = REMOULDED - REMANIE

CR = CORE RECOVERY - CAROTTE RECUPEREE

WATER CONTENT %TENEUR EN EAU

NATURAL NATURELLE ⊙

LIQUID LIMIT LIMITE DE LIQUIDITÉ □

PLASTIC LIMIT LIMITE DE PLASTICITÉ △

PLATE PLAQUE No. 6

Certificate of Analysis

Report Date: 26-Aug-2020

Client: **Paterson Group Consulting Engineers**

Order Date: 20-Aug-2020

Client PO: **30690**

Project Description: PE2703

	Client ID:	BH3-20 SS4	-	-	-
	Sample Date:	19-Aug-20 09:00	-	-	-
	Sample ID:	2034480-01	-	-	-
	MDL/Units	Soil	-	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	59.6	-	-	-
General Inorganics					
pH	0.05 pH Units	7.40	-	-	-
Resistivity	0.10 Ohm.m	3.33	-	-	-
Anions					
Chloride	5 ug/g dry	1780	-	-	-
Sulphate	5 ug/g dry	398	-	-	-

APPENDIX 2

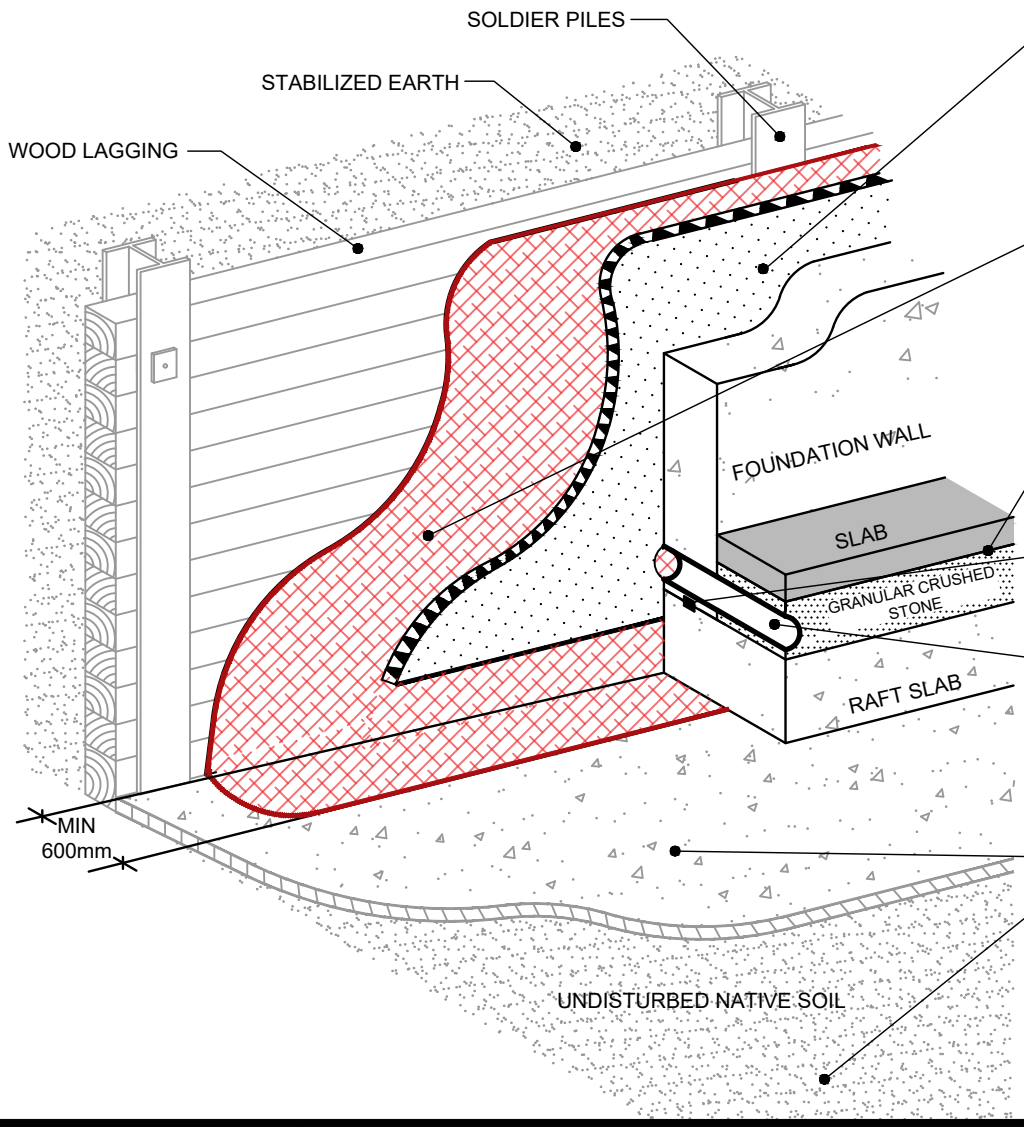
FIGURE 1 - KEY PLAN

FIGURE 2 - WATER SUPPRESSION SYSTEM

DRAWING PG5933-1 - TEST HOLE LOCATION PLAN

FIGURE 1

KEY PLAN



COMPOSITE FOUNDATION DRAINAGE MEMBRANE 6000 SERIES MEMBRANE BY DELTA DRAIN, G100N BY MIRADRAIN OR EQUIVALENT. INSTALL IN HORIZONTAL LIFTS WITH MINIMUM 150mm HORIZONTAL AND VERTICAL OVERLAP IN SHINGLE FASHION WITH GEOTEXTILE FACING AWAY FROM THE APPLICATOR. MECHANICALLY SECURE VERTICAL AND HORIZONTAL JOINTS WITH 3M TAPE OR EQUIVALENT.

150miL GRANULAR BENTONITE SURFACING LAMINATED TO 20miL THICK HDPE MEMBRANE. INSTALL IN HORIZONTAL LIFTS TO MANUFACTURERS SPECIFICATIONS IN SHINGLE FASHION WITH THE HDPE SIDE FACING APPLICATOR TO AN ADEQUATELY PREPARED SUBSTRATE SURFACE. WATER PROOFING MEMBRANE TO EXTEND A MINIMUM OF 600mm BELOW RAFT AND UP TO 300mm ABOVE THE P1 FLOOR SLAB.

OPSS GRANULAR "A" COMPACTED TO 100% OF THE MATERIALS STANDARD PROCTOR MAXIMUM DRY DENSITY (SPMDD) PLACED IN MAXIMUM 300mm THICK LIFTS

BENTONITE WATERSTOP SUCH AS WATERSTOP RX OR EQUIVALENT

150mm DIAMETER SOLID PVC SLEEVE PLACED THROUGH THE GRANULAR A LAYER AT APPROXIMATELY 3m SPACING AROUND THE EXTERIOR PERIMETER OF THE STRUCTURE. THE SLEEVES SHOULD BE MECHANICALLY CONNECTED TO THE COMPOSITE FOUNDATION DRAINAGE MEMBRANE AND THE 150mm DIAMETER INTERIOR SUBFLOOR DRAINAGE SYSTEM GRAVITY CONNECTED TO THE SUMP PIT.

MINIMUM 50mm THICK, 15 MPa CONCRETE MUD SLAB

UNDISTURBED STIFF SILTY CLAY AND/OR GLACIAL TILL APPROVED BY THE GEAOTECHNICAL CONSULTANT

IT IS RECOMMENDED THAT PERIODIC INSPECTIONS BE COMPLETED BY THE GEOTECHNICAL CONSULTANT AT THE TIME OF CONSTRUCTION DURING THE INSTALLATION OF THE FOUNDATION DRAINAGE AREA.

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consulting engineers

154 Colonnade Road South
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www.patersongroup.ca

BRIGIL CONSTRUCTION

PROPOSED HI-RISE BUILDING

265 CATHERINE STREET

OTTAWA, ONTARIO

Title:

WATER SUPPRESSION SYSTEM

Scale: NTS	**Date:** 08/2021
Drawn by: NFRV	**Report No.:** PG5933
Checked by: DP	**Drawing No.:** FIG. 2
Approved by: DJG	**Revision No.:**

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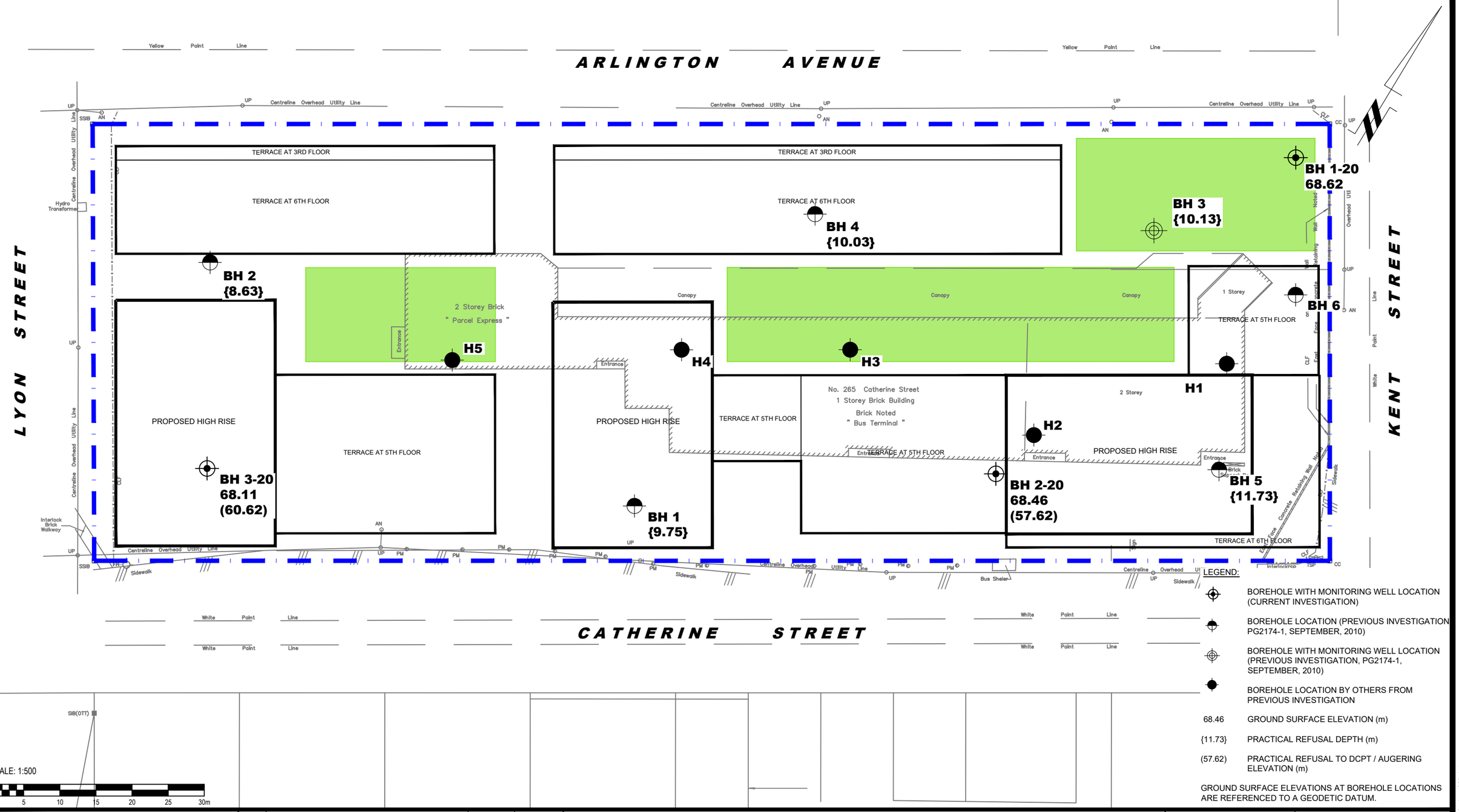

LEGEND:

- BOREHOLE WITH MONITORING WELL LOCATION (CURRENT INVESTIGATION)
- BOREHOLE LOCATION (PREVIOUS INVESTIGATION PG2174-1, SEPTEMBER, 2010)
- BOREHOLE WITH MONITORING WELL LOCATION (PREVIOUS INVESTIGATION, PG2174-1, SEPTEMBER, 2010)
- BOREHOLE LOCATION BY OTHERS FROM PREVIOUS INVESTIGATION

68.46 GROUND SURFACE ELEVATION (m)

{11.73} PRACTICAL REFUSAL DEPTH (m)

(57.62) PRACTICAL REFUSAL TO DCPT / AUGERING ELEVATION (m)

GROUND SURFACE ELEVATIONS AT BOREHOLE LOCATIONS ARE REFERENCED TO A GEODETIC DATUM.

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Tel: (613) 226-7381 Fax: (613) 226-6344

NO.	REVISIONS	DATE	INITIAL

BRIGIL CONSTRUCTION

PRELIMINARY GEOTECHNICAL INVESTIGATION
PROPOSED HI-RISE BUILDING - 265 CATHERINE STREET

OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:500	Date: 07/2021
Drawn by: RCG	Report No.: PG5933-1
Checked by: BN	Dwg. No.: PG5933-1
Approved by: JV	Revision No.:

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Appendix F Preconsultation

Kilborn, Kris

From: Bernier, John <John.Bernier@ottawa.ca>
Sent: Monday, May 2, 2022 2:51 PM
To: John Moser
Cc: Dubyk, Wally; Jean-Luc Rivard; Wang, Randolph; Patel, Parthvi; McCreight, Andrew; Fawzi, Mohammed; Walker, Max; 'Kirsten Beale'; Philip Thibert; 'Mary Huang'; 'Nakanishi, Alice'; Russett, Mike; Richardson, Mark; Ryan Lupien; Kilborn, Kris; Heather Rolleston; Jessy Desjardins
Subject: 265 Catherine (Greyhound site) - PC2022-0057 - Follow-up
Attachments: 19M-01044-00cm Trip Generation Manual Summary Report FINAL.pdf; TRANS Trip Calculator-PM.xlsx; NCHRP_Report_684_estimator_update_073113.xlsx; 19M-01044-00 Trip Generation Manual Background Report_FINAL.pdf; design_brief_TOR_265 Catherine.pdf; 265 Catherine - PRE-APPLICATION Consultation form.pdf; 265 Presentation - 2022-04-01 - BDPQ Revised.pdf; Pre-con Applicant's Study and Plan Identification List.docx

Good afternoon John,

Sorry for the delay. Please refer to the below [and/or attached notes] regarding the Pre-Application Consultation (pre-con) Meeting held on April 6th, 2022 for the property at 265 Catherine Street for a mixed-use development consisting of 40, 36, and 28 storey towers. The proposal included 6-storey podiums with commercial, retail, and amenity space. A portion of the site is dedicated to a on-site public park which complimented semi-private landscaped areas. I have attached the required Plans & Study List for application submission.

Below [or attached] are staff's preliminary comments based on the information available at the time of pre-con meeting:

Planning Comments – John Bernier:

- **Relevant Policies:**
  - **Old OP:** 3.6.1 General Urban Area
  - **New OP:** Downtown Core Transect/ Minor Corridor
    - Consult the New Official Plan
  - **Secondary Plan**: Centertown Secondary Plan will become the amalgamated 'Central and East Downtown Core Secondary Plan'
  - **Zoning:** General Mixed-use, with except 1875, height schedule 271

- **Comments:**
  - **Public consultation**:
    - I see that three community workshops done - please provide detail of this in your planning rationale and prepare to have a further public meeting once the application has been submitted.
      - Looking for the dates of previous meetings, what you heard from the community, and the progression of the design.
    - Please provide a public consultation strategy, this may be included in the Planning Rationale.

  - **Height:**

- We would like to see good policy argument for the replacement heights proposed and how this impacts the city views of parliament.
- You've acknowledged in your policy context slide that the heights within this development need to achieve appropriate transition to the mid-rise and low density areas to the north. How is this able to be achieved when low-rise immediately to the north?
- If we allow increased height it would open it up for more heights south of the site and potentially south of the highway. We would like to see this considered in your Planning Rationale.

- **Site and Building Design**
  - New OP: Floorplate size should generally be limited to 750 square metres for residential building
  - Min 23m separation between towers.
  - Original OPA/Rezoning required Privately-Owned Public Spaces (min 25% of the site), we would like for that to carry forward into future designs.
  - Corner site triangles on all four sides will be required - as well as ROW protections.
    - I note that your underground parking garage does not consider this.

- **Application Details:**
  - Until there is a replacement of Section 37 (Community Benefits Charges By-law), additional heights and densities will require community benefits. Please include an as-of-right GFA calculation vs. proposed.

- **Phasing**
  - Please provide us with a clear phasing plan and strategy in the Planning Rationale.
  - I would suggest that the first phase conform to the current policies, i.e. Maximum heights of 25-storeys.

- **Future Meeting**
  - As your project evolves we are open to having another meeting.

Policy Planning – Max Walker:

- Generally, the proposal seems to conform with the direction provided in the Secondary Plan and new OP, which encourages high-rise development to buffer the highway, varied building heights, and quality architecture design to positively contribute to the sense of place. The project's success rest, in my opinion, principally on providing good transition and varied and articulated built forms.
- To minimize impacts on neighbouring properties and on the public realm, transition in building heights shall be designed in accordance with applicable design guidelines. Please consider policies in section 4.6.6 and pay special attention to policies 5, 8 and 9.
- It is also important to note that the site is located within a Tier 2 design priority area. This is an area of national and regional importance to defining Ottawa's image. This area should support moderate pedestrian volumes and is characterized by its regional attractions related to leisure, entertainment, nature and culture. In this regard, it is especially important to consider Policy 4.2.6(1). This policy notes that the visual integrity and symbolic primacy of the Parliament Buildings and other national symbols, as seen from Confederation Boulevard, the main approach routes to the Parliamentary Precinct and from other key viewpoints and view

sequences is protected. The area to which view protection applies can be extended through development or supplementary planning processes, to apply to lands where the City determines that height and foreground controls are necessary in accordance with the intent of Schedule C6A, Schedule C6B, Schedule C6C and the National Capital Commission's Canada's Capital Views Protection, or its successor document.

- The site is located within the Downtown transect along a Minor Corridor. Please ensure that the policy objectives of 5.1.4 are achieved. On Downtown Core Minor Corridors, all buildings shall have active entrances facing the Minor Corridor, regardless of use. While permission for a higher building is permitted through a secondary plan, the height of such buildings shall, with respect to the wall heights directly adjacent to a street, be proportionate to the width of the abutting right of way and consistent with the objectives in the urban design section on Mid-rise and High-rise built form in Subsection 4.6.6, Policies 7), 8) and 9).
- The porosity of the site is also another important feature of the proposed development; excellent. Providing for safe, direct and convenient pedestrian and cycling networks and crossings, including along desire lines is an important direction of the new Official as well as the Secondary Plan. Policy 20 of the latter document states that any future development of 265 Catherine Street within the height limit of the zoning in place on January 23rd, 2014 will include a minimum of 25 percent of the lot area as a POPS. It is encouraged to maintain and enhance the provision of strong public realm elements that also enhance the local mobility network.
- The important part for the development proponent will ensure that the proposal is consistent with both the existing and new OP. It is important to note that the New OP does not have legal status, and while approved in principle by Council and does represent Council's intent, it does not preclude an application to amend the existing OP. An incoming application should continue to be "tested" against the new OP, but the document in force is what is existing. However, suppose an amendment is not in line with the new Official Plan; in that case, we should seriously consider whether there would be a recommendation for an amendment authorized to the new Official Plan.
- Please let me know if you have any questions regarding the foregoing and I would be happy to schedule a short meeting with you and the applicant to discuss the appropriate process.

Urban Design Comments – Randolph Wang:

1. A Design Brief is required as part of the submission. The Terms of Reference of the Design Brief is attached for convenience. Please note:
    a. Both a wind study and a shadow study is required.
    b. The context study should include a broader area.
    c. The site is subject to the Centretown Community Design Plan and the Centretown Secondary Plan, which recently has been amalgamated into the Central and East Downtown Core Secondary Plan. The CDP and the Secondary Plan provide specific vision for the community and the area where the property is situated. The context study should include images and renderings that show the proposed development in both the existing and planned context. The context study should examine the potential impacts of the proposed development on the CDP and Secondary Plan vision for the area.
    d. Please study views of the proposed buildings from the various vantage points identified in Schedule C6-A - Views, Viewsheds, and View Sequences of the Parliament Buildings and other National Symbols of the new Official Plan. The intent of the study will be to ensure absolute no impact on the Parliamentary Buildings and National Symbols.
    e. Please study views of the proposed buildings from adjacent heritage sites, important institutions, such as the Museum of Nature, and open spaces, to make sure no adverse impacts.

f. Please study the views of the proposed building from various vantage points within the neibourhood, along the adjacent streets, and on the highway.

2. The site is within a Design Priority Area. The proposed development will be subject to formal review by the City's Urban Design Review Panel. Information on scheduling and submission can be found on the UDRP website. Given the complexity of the development, UDRP informal review prior to the submission is also recommended.
3. A few high-level design comments on the concept presented at the meeting:
    a. The overall approach to built form and public realm design, including site porosity, is appreciated.
    b. The concept displays considerable merits with respect to the public realm vision, which includes a series of connected yet differentiated privately owned public spaces -- the NS mid-block connection, the animated urban plaza on the east side of the site, and the quieter residential courtyard on the west side of the site. However, the requirements for a public park on site will result in significant changes to the concept for the better.
    c. The ground floor plan of these buildings, including the location and design of the garage ramp, should support the vision and intent of the public spaces. In this regard, the propose to locate the ramp under Tower 2 is more favorable comparing with the proposal to locate the ramp under Tower 3.
    d. The concept displays a clear intent to provide built form transition. However, the rationale should be future developed and clarified and evaluated based on their impactions. The 3-storey towns and 6-storey mixed-use building are appropriate for Arlington. The 6-storey podium is also appropriate for Catherine Street. Consideration should be given to lowering the podium of Tower 1 from 6-storey to a maximum 4 storeys. Considerations should also be given to lowering the podium of Tower 2 to allow for more light into the public spaces and opening up sky views of the courtyard.
    e. The tower floor plates should respect policies of the CDP and Secondary Plan as well as the City's guidelines for high-rise buildings and be reduced to a maximum of 750m².
    f. While the reasoning behind the pursuit of a rectangular shape floor plate was well explained and appreciated, the design of these towers should take into consideration other factors. Tower 1 is particularly concerning and should be designed with a more compact floor plate. Strategic differentiation of tower floor plates would also make sense with respect to the overall massing composition of towers (three towers of the same floor plate but different heights may be awkward).
    g. Please be mindful of the hydro wires available on the streets. The applicants are highly encouraged to consider burring the hydro wires.

Parks Comments – Mike Russet:

- Site generates +/- 1034.56m2 parkland dedication @ 10% of site calculation;
- PRCS (Parks Planning) requests consideration for full dedication of the required parkland;
- PRCS requests location of the future park block dedication fronting onto Arlington Ave;
- parkland dedication must be free-&-clear of all encumbrances – no strata park considerations, therefore underground garage within/under future parkland dedication not permitted, no Limiting Distance (LDA);
- future parkland connectivity to and design considerations for landscaped open space of importance;
- consider any trigger of Section 37 and/or community benefits requirements to include design & construction of the future park block.

Engineering Comments – Mohammad Fawzi:

Water Boundary Conditions:

Will be provided at request of consultant. Requests must include the location of the service and the expected loads required by the proposed development. Please provide the following and submit Fire Flow Calculation Sheet per FUS method with the request:

- Location of service
- Type of development and amount of required fire flow (per FUS method – include FUS calculation sheet with request)
- Average Daily Demand (l/s)
- Maximum Hourly Demand (l/s)
- Maximum Daily Demand (l/s)
- Water Supply Redundancy – Fire Flow:
  Applicant to ensure that a second service with an inline valve chamber be provided where the average daily demand exceeds 50 m^3 / day (0.5787 l/s per day)

Water services larger than 19 mm require a Water Data Card. Please complete card and submit.

Stormwater Management:

- Coefficient (C) of runoff determined **as per existing conditions** but in no case more than 0.4
- TC = To be calculated, minimum 10 minutes
- Any storm events greater than 2 year, up to 100 year, and including 100-year storm event must be detained on site.
- Foundation drains are to be independently connected to sewer main unless being pumped with appropriate back up power, sufficient sized pump and back flow prevention.
- Roof drains are to be connected downstream of any incorporated ICD within the SWM system.

Stormwater management criteria (Quality Control)

Include a section in the SWM report concerning quality control requirements. It is the consultant's responsibility to check with the relevant Conservation Authority for quality control issues and include this information in the SWM report.

Phase I and Phase II ESA:

- Phase I ESA is required; Phase II ESA may be required depending on the results of the Phase I ESA. Phase I ESA must include an EcoLog ERIS Report.
- Phase I ESA and Phase II ESAs must conform to clause 4.8.4 of the Official Plan that requires that development applications conform to Ontario Regulation 153/04.

Required Studies

- Servicing and Stormwater Management Report
- Geotechnical Study
- Phase I ESA
- Phase II ESA (depends on outcome of Phase I)
- Noise Study (proximity to Highway 417)

Required Plans

- Site Servicing Plan
- Grade Control and Drainage Plan
- Erosion and Sediment Control Plan (Can be combined with grading plan)

Relevant information

1. The Servicing Study Guidelines for Development Applications are available at the following address: https://ottawa.ca/en/city-hall/planning-and-development/information-developers/development-application-review-process/development-application-submission/guide-preparing-studies-and-plans#servicing-study-guidelines-development-applications
2. Servicing and site works shall be in accordance with the following documents:
   - ⇨ Ottawa Sewer Design Guidelines (October 2012)
   - ⇨ Ottawa Design Guidelines – Water Distribution (2010)
   - ⇨ Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007)
   - ⇨ City of Ottawa Slope Stability Guidelines for Development Applications (revised 2012)
   - ⇨ City of Ottawa Environmental Noise Control Guidelines (January, 2016)
   - ⇨ City of Ottawa Park and Pathway Development Manual (2012)
   - ⇨ City of Ottawa Accessibility Design Standards (2012)
   - ⇨ Ottawa Standard Tender Documents (latest version)
   - ⇨ Ontario Provincial Standards for Roads & Public Works (2013)
3. 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).
4. Any proposed work in utility easements requires written consent of easement owner.

Forestry Comments – Mark Richardson
TCR requirements:

1. a Tree Conservation Report (TCR) must be supplied for review along with the suite of other plans/reports required by the City
   a. an approved TCR is a requirement of Site Plan approval.
   b. The TCR may be combined with the LP provided all information is supplied
2. Any removal of privately-owned trees 10cm or larger in diameter, 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.
3. The Planning Forester from Planning and Growth Management as well as foresters from Forestry Services will review the submitted TCR
   a. If tree removal is required, both municipal and privately-owned trees will be addressed in a single permit issued through the Planning Forester
   b. Compensation may be required for city owned trees – if so, it will need to be paid prior to the release of the tree permit
4. the TCR must list all trees on site, as well as off-site trees if the CRZ extends into the developed area, by species, diameter and health condition
5. please identify trees by ownership – private onsite, private on adjoining site, city owned, co-owned (trees on a property line)
6. If trees are to be removed, the TCR must clearly show where they are, and document the reason they cannot be retained

7. 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 at Tree Protection Specification or by searching Ottawa.ca
8. 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.
9. For more information on the process or help with tree retention options, contact Mark Richardson mark.richardson@ottawa.ca or on City of Ottawa

LP tree planting requirements:

For additional information on the following please contact tracy.smith@Ottawa.ca

Minimum Setbacks

- Maintain 1.5m from sidewalk or MUP/cycle track.
- Maintain 2.5m from curb
- Coniferous species require a minimum 4.5m setback from curb, sidewalk or MUP/cycle track/pathway.
- 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. Adhere to Ottawa Hydro's planting guidelines (species and setbacks) when planting around overhead primary conductors.

Tree specifications

- Minimum stock size: 50mm tree caliper for deciduous, 200cm height for coniferous.
- Maximize the use of large deciduous species wherever possible to maximize future canopy coverage
- Tree planting on city property shall be in accordance with the City of Ottawa's Tree Planting Specification; and include watering and warranty as described in the specification (can be provided by Forestry Services).
- Plant native trees whenever possible
- No root barriers, dead-man anchor systems, or planters are permitted.
- No tree stakes unless necessary (and only 1 on the prevailing winds side of the tree)

Hard surface planting

- Curb style planter is highly recommended
- No grates are to be used and if guards are required, City of Ottawa standard (which can be provided) shall be used.
- Trees are to be planted at grade

Soil Volume

- Please ensure adequate soil volumes are met:

Tree Type/Size	Single Tree Soil Volume (m3)	Multiple Tree Soil Volume (m3/tree)
Ornamental	15	9
Columnar	15	9
Small	20	12
Medium	25	15
Large	30	18
Conifer	25	15

Please note that these soil volumes are not applicable in cases with Sensitive Marine Clay.

Sensitive Marine Clay

- Please follow the City's 2017 Tree Planting in Sensitive Marine Clay guidelines

Tree Canopy Cover

- The landscape plan shall show how the proposed tree planting will replace and increase canopy cover on the site over time, to support the City's 40% urban forest canopy cover target.
- At a site level, efforts shall be made to provide as much canopy cover as possible, through tree planting and tree retention, with an aim of 40% canopy cover at 40 years, as appropriate.
- Indicate on the plan the projected future canopy cover at 40 years for the site.

Transportation Comments – Wally Dubyk:

Road Resurfacing along Catherine Street is targeted to start this season.

Sewer Lining along Kent Street is targeted to start 1-2 years.

Update to the TIA Guideline Forecasting Report

- We would like to inform all consultants making TIA Forecasting Report submissions to the City of Ottawa as part of a development application, that all new applications (pre-consultation meetings dated after March 3, 2021) must use the NEW TRANS Trip Generation Manual when forecasting site generated trips using this manual (see attached).
- The TRANS committee (a joint transportation planning committee serving the National Capital region) finalized a new manual early in March 2021. The document will be available in French and English on the TRANS website http://www.ncr-trans-rcn.ca/surveys/2009-trip-generation.
- The new manual has simplified the conversion from vehicle trips to person trips and then trips by modal share. The City has also developed a spreadsheet that will apply the factors of location and building type to quickly provide the existing trip numbers by mode share.

A Screening Form is to be submitted to determine if a transportation study is required. Consultants should fill in the form in Appendix 'B'. Click on the website: www.ottawa.ca/TIA

Catherine Street is designated as an Arterial road within the City's Official Plan with a ROW protection limit of 23.0 metres. The ROW protection limit and the offset distance (11.5 metres) are to be dimensioned from the existing centerline of pavement and shown on the drawings. The Certified Ontario Land Surveyor is to confirm the ROW protected limits and any portion that may fall within the private property to be conveyed to the City.

ROW interpretation – Land for a road widening will be taken equally from both sides of a road, measured from the centreline in existence at the time of the widening if required by the City. The centreline is a line running down the middle of a road surface, equidistant from both edges of the pavement. In determining the centreline, paved shoulders, bus lay-bys, auxiliary lanes, turning lanes and other special circumstances are not included in the road surface.

Kent Street is designated as an Arterial road within the City's Official Plan with a ROW protection limit of 20.0 metres. Maximum land requirement from property abutting existing ROW (0.90 m). Subject to

widening/easement policy. The ROW protection limit is to be dimensioned on the drawings. The Certified Ontario Land Surveyor is to confirm the ROW protected limits and any portion that may fall within the private property to be conveyed to the City.

Lyon Street is designated as an Arterial road within the City's Official Plan with a ROW protection limit of 20.0 metres. Maximum land requirement from property abutting existing ROW (0.90 m). Subject to widening/easement policy. The ROW protection limit is to be dimensioned on the drawings. The Certified Ontario Land Surveyor is to confirm the ROW protected limits and any portion that may fall within the private property to be conveyed to the City.

A 5.0 metres x 5.0 metres sight triangle would be required at the intersection of Kent Street Arlington Avenue. The sight triangle area is to be conveyed to the City and is to be shown on all drawings. The sight triangle dimensions are to be measured from the ROW protected limits.

A 5.0 metres x 5.0 metres sight triangle would be required at the intersection of Lyon Street and Catherine Street. The sight triangle area is to be conveyed to the City and is to be shown on all drawings. The sight triangle dimensions are to be measured from the ROW protected

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

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

The concrete sidewalks should be 2.0 metres in width and be continuous and depressed through the proposed accesses.

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

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

The City does not recommend a lay-by along Catherine Street within the City's ROW.

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

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

Relocating an existing roadway curbing by 30 cm will require a RMA report and approval by the delegated authority. Please confirm if you are triggering an RMA.

A construction Traffic Management Plan is to be provided for approval by the Senior Engineer, Traffic Management, Transportation Services Dept.

Comments from Centretown Community Association:

Mary Huang:

I would also like to thank the developer for doing consultation early in the planning process and including open public spaces in the development. I agree with a lot of the points Alice brought up and bring up some of my own points.

1. There have been very few family sized units being built in Centretown. I think with such a large piece of land and a school next door and other schools nearby, it might be nice to get 15-20% 3 bedrooms. I am pretty sure there will be a lot of interest in the larger units.

2. In the visioning workshop, a question was posed about accessibility standards. It was indicated at the time they plan to build to minimum Ontario Building Code which is 15% and more visitable. With the growing seniors population which is expected to be 25% of the city of Ottawa in 2035, I think the Ontario Building Code is behind the needs from the changing demographic. In view that housing is likely to be built for 50+ years, I hope the applicant would give serious consideration to build to universal standards and be more accessible with wider corridors and wider doors upfront. The additional cost is small if planned at the beginning whereas trying to retrofit afterwards would be very expensive and difficult. I think it would be good if all units are at least visitable with a portion of the units with accessible features such as roll in / walk in shower. Some people consider barrier free showers a high end feature and it would be attractive for aging seniors with mobility issues or people with disability.
https://www.accessiblehousingnetwork.org/accessible-housing

3. I understand it is hard to create deeply affordable units without government subsidies. With the applicant asking for significant density increases over zoning for the land. The City of Ottawa's declared a housing and homelessness emergency and plans to introduce Inclusionary Zoning, I hope the project could figure out a way to do some moderately affordable housing units or like LeBreton Flats Library parcel find a non profit partner for some of the units. Another example from Toronto is Daniel Corp with WoodGreen and the City of Toronto.

4. I live in a market rental of CCOC at Arlington & Lyon and I suspect a 40 story tower and a 36 story tower would significantly shadow the smaller houses and lowrises in the area. If the plan is to ask for quite a significant increase in density, I hope it includes plans for a combination of offers on the previous 3 points. Arlington and especially Lyon are narrower streets than others that have 6 storey buildings. Have the appropriate studies been done for sun/shadow and wind?

5. There are apparently underground waterways not far from there and soil conditions may need additional measures to support the weight of such tall buildings. Were there some engineering studies on that topic?

6. Before the pandemic, Lyon onramp to the Queensway are often backed up during rush hour since the Catherine to Arlington block is a very short block and there is a traffic light at Catherine and Lyon. With the additional cars from the development that would be more of a bottleneck. Has a traffic study been done?

Alice Nakanishi:

1. I think there will be concerns from the neighbours about a 36-storey tower and a 40-storey tower with a 6-storey podium when the nearby newer developments on Catherine Street have a number

of storeys in the 20s. We recently had a meeting for another development where the City planner suggested that a 4-storey podium would provide a better experience at the pedestrian level. Pedestrians would find a 6-storey podium more overpowering than a 4-storey podium.
2. I am concerned with any blasting that may be used to build the underground parking lot. The rest of the neighbourhood has older heritage houses. Owners would be concerned about any damage to their property due to vibrations from blasting.
3. We ask for more family sized units. Glashan Public School for Grades 7 & 8 is across the street from this site. Glebe C.I. and Lisgar C. I high schools are within walking distance.
4. We ask for more bike parking and visitor parking spots, as well as electrical vehicle charging stations.
5. Appreciate the plans showing that nothing, e.g., parking lot, would be built underneath where the trees would be planted. We have been fooled by another developer who had shown locations of trees on their site plan; however, it wasn't pointed out the walls of the underground parking lot would be a couple of metres from the surface. The trees had no chance of surviving.
6. Appreciate the plans showing open space for the public to walk through, as well as to sit and enjoy. Opportunities for art performances and gardens. Opportunities for retail businesses and professional services.
7. The entrance to the underground parking should probably be closer to Lyon Street instead of Kent Street. With vehicles coming off the Queensway there would be a bottleneck of traffic flow if the parking entrance is closer to Kent & Catherine Streets.
8. We ask that some units will be more affordable.
9. We thank the developer for engaging the community much earlier in the planning process and allow us the opportunity to provide feedback. Since this site has at least 3 sides facing a street I understood that it can qualify and be developed as a landmark site (or something like that). I had suggested to the developer at one of the earlier meetings that since people, especially tourists, coming off the Queensway would probably see this site first then maybe it can be developed and viewed as a gateway to the downtown core. A positive experience as they head downtown.

Other

You are encouraged to contact the Ward Councillor, Catherine McKenney

Please refer to the links to "Guide to preparing studies and plans" and fees for general information. Additional information is available related to building permits, development charges, and the Accessibility Design Standards. Be aware that other fees and permits may be required, outside of the development review process. You may obtain background drawings by contacting informationcentre@ottawa.ca.

These pre-con comments are valid for one year. If you submit a development application(s) after this time, you may be required to meet for another pre-consultation meeting and/or the submission requirements may change. You are as well encouraged to contact us for a follow-up meeting if the plan/concept will be further refined.

Please do not hesitate to contact me if you have any questions.

Regards,

John Bernier, MCIP, RPP
Planner II | *Urbaniste II*
Development Review, Central | *Examen des projets d'aménagement, Central*
Planning, Real Estate and Economic Development Department | Direction générale de la planification, des biens immobiliers et du développement

City of Ottawa | *Ville d'Ottawa*
110 Laurier Avenue West. Ottawa, ON | *110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1*
613.580.2424 ext./poste 21576
ottawa.ca/planning / ottawa.ca/urbanisme

Please note that during the current public health emergency I am working remotely. Email is the easiest and most reliable way of reaching me at this time. Thank you for your cooperation.

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Appendix G Drawings