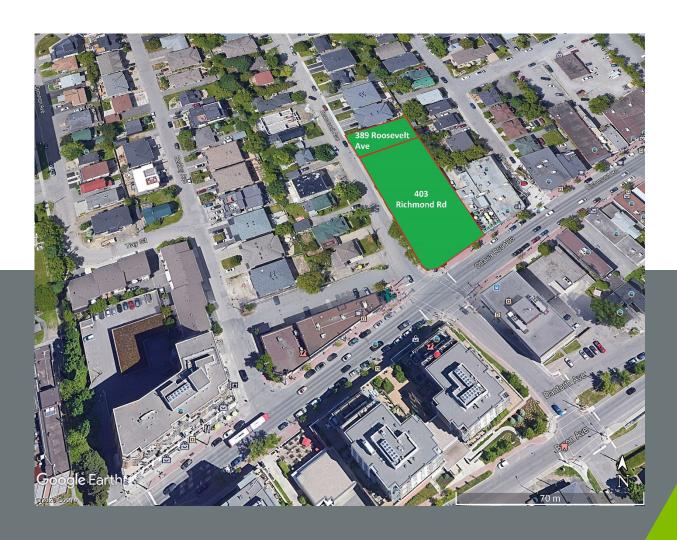
# **The Hazelton Westboro**

# **Site Servicing and Stormwater Management Report**

403 Richmond Road & 389 Roosevelt Avenue

City of Ottawa, Ontario





CIMA+ file number: A001046 April 7, 2022

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## Site Servicing and Stormwater Management Report

403 Richmond Road & 389 Roosevelt Avenue

City of Ottawa, Ontario

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April 8, 2022



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### 1. Introduction

CIMA+ was retained by Starwood Group Inc. to prepare a Site Servicing and Stormwater Management Report for the proposed construction of a nine (9)-storey mixed-use (ground floor retail and 141 residential units) building with an amenity room penthouse, hereafter referred to as The Hazelton Westboro, located at 403 Richmond Road and 389 Roosevelt Avenue in Ottawa, Ontario.

The purpose of this assessment is to confirm that the proposed development can be adequately serviced by the existing municipal infrastructure (water, sanitary, and storm) surrounding the site. This assessment shall be used in support of the application for Site Plan Control.

### 1.1 Site Description and Proposed Development

The site is located at the northeast quadrant of the intersection of Richmond Road and Roosevelt Avenue (refer to **Figure 1** below). 403 Richmond Road is currently comprised of a funeral home with surface parking. The funeral home shares a party wall with the adjacent property to the east (395 Richmond Rd), while 389 Roosevelt Avenue comprises a two-storey private residential building. The combined site area (403 Richmond and 389 Roosevelt) measures approximately 0.26 ha.

Generally, the site is bounded by a private residential dwelling to the north, a commercial building to the east, Richmond Road to the south, and Roosevelt Avenue to the west.



Figure 1: Site Location - Plan View.



The Hazelton Westboro proposed development is a nine (9)-storey, mixed use residential and commercial tower, with 141 residential units, expected to include approximately 237 residents, three (3) underground parking levels comprising nearly the entire site area, and an amenity room penthouse. The commercial floor space on the ground floor measures approximately 422 m² and the common areas, including amenity rooms and party room, measure approximately 409 m². Refer to **Figure 2** for a conceptual site plan of the proposed development (prepared by Roderick Lahey Architects Inc.).

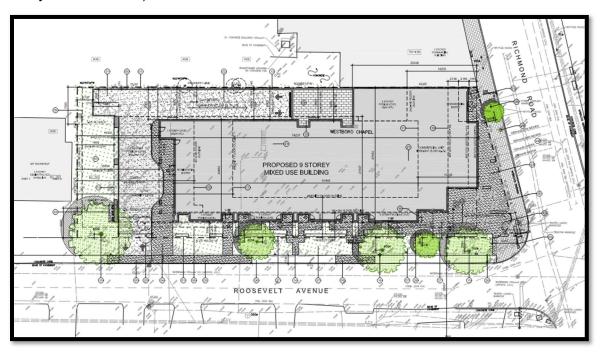


Figure 2: Conceptual Site Plan.

### 1.2 Review of Available Background Documentation

The following design guidelines have been used to estimate the theoretical servicing requirements for the proposed development; while geoOttawa, a detailed topographic survey prepared by CIMA+ (**Appendix B**), and the available as-built drawings (**Appendix A**) provided by the City of Ottawa Information Centre have been used to determine the existing municipal services location, size, material, and inverts fronting the site.

- + Ottawa Sewer Design Guidelines (October 2012), as amended by all applicable Technical Bulletins.
- + Ottawa Design Guidelines Water Distribution (2010), as amended by all applicable Technical Bulletins.
- Ministry of the Environment Design Guidelines for Sewage Works (2008).
- Ministry of the Environment Stormwater Management Planning and Design Manual (2003).
- Ministry of the Environment Design Guidelines for Drinking-Water Systems (2008).
- Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection (1999).
- + Geotechnical Investigation, Proposed Multi-Storey Building, 403 Richmond Road Ottawa by Paterson Group Inc. dated July 15, 2020.



Findings from the Geotechnical Investigation Report prepared by Paterson Group Inc. have relevance on the site servicing and stormwater management, including but not limited to groundwater level and blasting. A summary of the applicable findings and recommendations are as follows, while the full Report can be found in **Appendix H**:

- Based on available geological mapping, the bedrock in the area consists of limestone and dolomite interbedded of the Gulf River formation with an overburden drift thickness of 1 to 2 m.
- + Based on the bedrock encountered in the area, it is expected that line-drilling in conjunction with hoe-ramming or controlled blasting will be required to remove the bedrock. In areas of weathered bedrock and where only a small quantity of bedrock is to be removed, bedrock removal may be possible by hoe-ramming.
- + Prior to considering blasting operations, the effects on the existing services, buildings and other structures should be addressed. A pre-blast or construction survey located in proximity of the blasting operations should be conducted prior to commencing construction. The extent of the survey should be determined by the blasting consultant and sufficient to respond to any inquiries/claims related to the blasting operations.
- The blasting operations should be planned and conducted under the supervision of a licensed professional engineer who is an experienced blasting consultant.
- Excavation side slopes in sound bedrock could be completed with almost vertical side walls.
- + The groundwater level is estimated to be between 4 to 5 m below the existing grade. It is important to note that groundwater levels are subject to seasonal fluctuations. Therefore, groundwater levels could differ at the time of construction.
- + A temporary Ministry of the Environment, Conservation and Parks (MECP) permit to take water (PTTW) Category 3 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 4 to 5 months should be allowed for completion of the PTTW application package and issuance of the permit by the MECP. It is understood that the permit application will be initiated by the geotechnical consultant.
- + A composite foundation drainage system (such as Miradrain G100N, Delta Drain 6000 or equivalent) will be applied to the prepared vertical bedrock surface from the ground surface to the proposed founding elevation.
- + It is anticipated that underfloor drainage will be required to control water infiltration. For preliminary design purposes, it's recommended that 150 mm perforated pipes be placed within each bay. The spacing of the underfloor drainage system should be confirmed at the time of completing the excavation when water infiltration can be better assessed.
- + It is recommended that 150 mm diameter sleeves at 3 m centres be cast in the footing or at the foundation wall/footing interface to allow the infiltration of water to flow to the interior perimeter drainage pipe. The perimeter drainage pipe and underfloor drainage system should direct water to sump pit(s) within the lower basement area.

### 1.3 Existing Infrastructure

As identified using the detailed topographic survey, geoOttawa, and the available Utility Record Drawings provided by the City of Ottawa Information Centre, the following municipal infrastructure are available within the right-of-way fronting the proposed development site (refer to **Appendix B** for Existing Conditions Plan).



#### **Richmond Road**

- + 305 mm diameter PVC watermain (preferred primary water connection point).
- + 300 mm diameter PVC sanitary sewer.
- + 600 mm diameter Concrete storm sewer.

#### **Roosevelt Avenue**

- + 305 mm diameter PVC watermain that reduces to a 152 mm diameter Cast Iron (UCI) watermain (preferred secondary water connection point to 152 mm watermain).
- + 300 mm diameter Concrete sanitary sewer (preferred sanitary connection point).
- + 300 mm diameter Concrete storm sewer that terminates approximately 40 m north of the intersection with Richmond Road (preferred storm connection point).

### 1.4 Consultation and Permits

In response to the pre-consultation requirements defined in the City's Development Servicing Study Checklist, the following agencies were consulted in support of the preparation of this report. The Development Servicing Study Checklist as well as all relevant correspondence with the consulted agencies can be found in **Appendix A**.

### **City of Ottawa**

The City of Ottawa Information Centre was contacted to obtain any Reports, Studies, Engineering, and/or Utility Plans including sanitary sewer, storm sewer, watermain, gas, etc. within or adjacent to the site location. The available engineering plans and utility plans were provided. No existing reports or studies were available.

CIMA+ also contacted Mark Fraser from the City of Ottawa's Planning, Infrastructure and Economic Development Department to obtain any site-specific servicing and stormwater management design criteria for the proposed development. The provided comments and criteria relevant to the Site Servicing and Stormwater Management Report are referenced within the appropriate sections of this report.

### Rideau Valley Conservation Authority (RVCA)

The subject site falls under the jurisdiction of the Rideau Valley Conservation Authority (RVCA). CIMA+ contacted Jamie Batchelor from the RVCA to identify any Natural Heritage/Hazards features that may impact the development as well as any Storm Water Management Criteria for the site and required approvals/permits. These criteria are addressed in *Section 4* of this Report.

### Ministry of the Environment, Conservation and Parks (MECP)

CIMA+ has determined that the proposed development in question falls within the exemption requirements for an Environmental Compliance Approval (ECA) as per O.Reg. 525/98, section 3(a), and Ontario Water Resources Act section 53.6(c) when considering the following:

- 1. Currently comprised of two (2) parcels of land that are to be combined into one (1) parcel, the existing 0.26-ha site currently consists of a funeral home which is zoned traditional main street (TM) and a single-family home which is zoned Residential Third Density (R3S).
- 2. The proposed sewage works, and stormwater management facility will service a single parcel of land; and
- 3. The property does not discharge into a combined sewer, and it will not be used for industrial purposes.



Correspondence has been provided to the local district office (refer to **Appendix A**).

### 2. Water Servicing

### 2.1 Water Supply Design Criteria

The design criteria for determining the water demand requirements for the proposed development follow the parameters outlined in the Ottawa Design Guidelines – Water Distribution (2010) and associated technical bulletins, as well as the MOE Design Guidelines for Drinking-Water Systems (2008). Namely, the following parameters have been used in determining the water demands:

Table 2-1: Water Supply Design Criteria

Table 2-1: Water Supply Design Criteria				
Design Criterion <sup>1</sup>	Residential Areas	Commercial Areas		
Average Day Demand	350 L/capita/day	28,000 L/gross hectare/day		
Maximum Daily Demand	4.1 × average daily demand <sup>1</sup>	1.5 × average daily demand		
Maximum (Peak) Hour Demand	6.2 × average daily demand <sup>1</sup>	1.8 × maximum daily demand		
Populations – 1 Bedroom Unit	1.4 Persons Per Unit	N/A		
Populations – 2 Bedroom Unit	2.1 Persons Per Unit	N/A		
Populations – 3 Bedroom Unit	3.1 Persons Per Unit	N/A		
Desired Operating Pressure under Normal Operating Conditions	50 to 70 psi			
Minimum Operating Pressure under Normal Operating Conditions	40 psi			
Maximum Operating Pressure under Normal Operating Conditions	80 psi			
Minimum Operating Pressure under Maximum Daily Demand + Fire Flow	20 psi			

In addition to those design criteria identified in **Table 2-1**, the following comments and criteria identified by the City as part of the pre-consultation must be considered in the water supply servicing strategy:

- The subject site is located within the 1W pressure zone.
- + Residential buildings with a basic day demand greater than 50 m³/day (0.57 L/s) are required to be connected to a minimum of two (2) water services separated by an isolation valve to avoid a vulnerable service area. Given the subject site is on a corner lot the City will not support the installation of a new isolation valve on the City watermain to satisfy this requirement. Thus, if the basic day demand for this site exceeds 50m³/day there shall be a

<sup>&</sup>lt;sup>1</sup> Note that residential peaking factors were selected from **Table 3-3** of the MOE Design Guidelines for Drinking-Water Systems for 0 to 500 persons.



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primary water service to Richmond Rd. and a secondary connection to Roosevelt Ave. to provide redundant supply, utilizing the existing isolation valves to avoid a vulnerable service area.

- + Fire flow demand requirements shall be based on the Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection 1999 and Technical Bulletin ISTB-2018-02.
- + A primary fire hydrant is required to be within 45 m of the Siamese connection and within 90 m (travel path not radius) of the front door of each building as per OBC and Ottawa Fire Services requirements.
- + Exposure separation distances shall be defined on a figure to support the FUS calculation and required fire flow (RFF).
- + Hydrant capacity shall be assessed if relying on any public hydrants to provide fire protection, particularly if high design fire flows are being proposed, to demonstrate the Required Fire Flow (RFF) can be achieved. Identification of which hydrants are being considered to meet the RFF on a fire hydrant coverage figure is required as part of the boundary conditions request.

### 2.2 Proposed Water Supply Servicing and Calculations

#### **Water Demands**

The water supply demands for the proposed development are presented in **Table 2-2** below. The demands were developed utilizing the development statistics (i.e., residential units and commercial floor area) provided by Roderick Lahey Architects Inc. and those design criteria identified in *Section 2.1*. Refer to **Appendix D** for detailed calculations.

Demand Type	Average Daily Demand (L/s)	Maximum Daily Demand (L/s)	Maximum (Peak) Hour Demand (L/s)
Residential	0.96	3.94	5.95
Commercial	0.03	0.04	0.07
Total	0.99	3.98	6.03

Table 2-2: Water Demands

Given the basic day demand exceeds 50 m³/day (or 0.57 L/s) a minimum of two (2) water service connections, separated by an isolation valve, are required to provide redundant supply and avoid a vulnerable service area.

### **Proposed Water Supply Connection Point(s)**

In accordance with the City's request to avoid the installation of a new isolation valve on the City watermain given the development's position on a corner lot, a primary water service to Richmond Rd. and a secondary connection to Roosevelt Ave. is proposed. The existing isolation valves between the two connection points will be utilized to avoid a vulnerable service area. Refer to **Appendix C** for proposed connection points.



### **Primary Hydrant and Siamese Location**

The Fire Department (Siamese) Connection is proposed at the southwest corner of the building. The nearest hydrant is located on the east side of Roosevelt Ave., approximately 30 m from the northeast quadrant of the intersection with Richmond Rd. This hydrant is located approximately 10.4 m from the proposed Siamese location and is well within 90 m of the front door. Refer to **Appendix D** (Figure 3 – Hydrant Coverage) for location of existing hydrant.

### Required Fire Flow (RFF)

The required fire flow for the site was developed using the Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection 1999 and Technical Bulletin ISTB-2018-02. It was determined that an RFF of **6,000 L/min (100 L/s)** would be required to provide adequate protection.

It was assumed that multiple municipal hydrants would be required to meet the fire flow requirements and a fire hydrant coverage figure was prepared is support of the boundary conditions request from the City.

Refer to **Appendix D** for detailed calculations, including supporting figures for exposure distances and hydrant coverage.

### **Municipal Boundary Conditions**

Using the proposed demands, required fire flow and supporting figures the City provided boundary conditions for hydraulic analysis for current conditions, based on computer model simulation. The boundary conditions are as follows:

Table 2-3: Watermain Boundary Conditions

Hydraulic Condition	Boundary (Head	Condition
(HGL = Hydraulic Grade Line)	Richmond Rd. 305 mm dia.	Roosevelt Ave. 152 mm dia.
Minimum HGL	108.5	108.5
Maximum HGL	115.0	115.0

A Multi-Hydrant Analysis was performed by the City utilizing the two nearest available hydrants on Roosevelt Ave. as identified on the Hydrant Coverage Figure prepared by CIMA+ (refer to **Appendix D**). The total available flow from these hydrants is as follows:

Table 2-4: Available Hydrant Flows

Hydrant ID	Available Flow (L/s)
362027H067	85
362028H045	30
Total	115



### **Hydraulic Analysis - Water Supply Adequacy**

A hydraulic analysis was completed utilizing the boundary condition information provided by the City for the proposed development in order to confirm that there is adequate flow and pressure in the water distribution system to meet the required water demands. The following Table summarizes the available flow and pressure in the system under each demand scenario:

Table 2-5: Water Supply Adequacy - Hydraulic Analysis

		Available Flo	ow/Pressure			
Demand Type	Proposed Demand (L/s)	Design Operating Pressure (Relative Head) (m)	Design Operating Pressure (psi)	Desired Flow/Pressure Objective	Flow/Pressure Objective Achieved?	
Average Daily Demand	0.99	47.6	68	50 to 70 psi	Yes	
Maximum Day Demand + Fire Flow	103.98	115 L/s @ 20 psi		≥ 20 psi	Yes	
Maximum (Peak) Hour Demand	6.03	41.1	58	50 to 70 psi	Yes	

#### NOTES:

- 1. Required fire flow demand was calculated as 6,000 L/min (100 L/s).
- 2. The minimum HGL elevation at Connection Points 1 and 2 is 108.5 m and the maximum HGL elevation is 115.0 m.
- 3. Boundary conditions for Connection 1 to Richmond Road assumes a ground elevation of 67.40 m.
- 4. Boundary conditions for Connection 2 to Roosevelt Avenue assumes a ground elevation of 67.40 m.

### 2.3 Water Supply Summary and Conclusions

The water supply design for the proposed development follows the parameters outlined in the Ottawa Design Guidelines – Water Distribution (2010) and associated technical bulletins, as well as the MOE Design Guidelines for Drinking-Water Systems (2008).

There is adequate flow and pressure in the water distribution system to meet the required water demands for the proposed development.

Water Data Card for service connection is to be completed and submitted once design has been finalized and in preparation for Commence Work Notification and Water Permit Application.



## 3. Sanitary Servicing

### 3.1 Sanitary Servicing Design Criteria

The design criteria for determining the sanitary peak flow rates for the proposed development follow the parameters outlined in the City of Ottawa Sewer Design Guidelines, 2012 as amended by all Technical Bulletins. Namely, the following parameters have been used in determining the peak sanitary flow rates:

Table 3-1: Sanitary Peak Flow Determination Design Criteria

Design Criterion	Residential Areas	Commercial Areas	
Base Flow	280 L/capita/day	28,000 L/gross hectare/day	
Populations – 1 Bedroom Unit	1.4 Persons Per Unit	N/A	
Populations – 2 Bedroom Unit	2.1 Persons Per Unit	N/A	
Populations – 3 Bedroom Unit	3.1 Persons Per Unit	N/A	
Peaking Factor	Determined by Harmon Equation $P.F. = 1 + \left[\frac{1}{4 + \left(\frac{P}{1,000}\right)^{\frac{1}{2}}}\right] \times 0.8$ (P = population; P.F. = peaking factor) $Maximum \ P.F. = 4.0$ $Minimum \ P.F. = 2.0$	1.5 if Commercial Contribution > 20% 1.0 if Commercial Contribution < 20%	
Dry Weather Infiltration Rate	0.05 L/s/effective gross hectare (for all areas)		
Wet Weather Infiltration	0.28 L/s/effective gross hectare (for all areas)		
Total Infiltration Allowance	0.33 L/s/effective gross hectare (for all areas)		

## 3.2 Proposed Sanitary Servicing and Calculations

### **Proposed Sanitary Peak Flows**

The estimated peak flows from the proposed development based on the design criteria listed in **Table 3-1** are outlined in the following Table.



Table 3-2: Peak Sanitary Flows

Flow Type	Total Flow Rate (L/s)
Total Estimated Average Dry Weather Flow Rate	0.79
Total Estimated Peak Dry Weather Flow Rate	2.71
Total Estimated Peak Wet Weather Flow Rate	2.78

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

### **Proposed Sanitary Service Connection Point**

The proposed sanitary service will connect to the existing 300 mm diameter Concrete sanitary sewer within the right-of-way of Roosevelt Ave. Wastewater flows to the West Nepean Trunk Collector sewer system. Refer to **Appendix C** for proposed connection points.

Per Ottawa Sewer Design Guidelines (2012), Section 6.2.14 a drop structure is required at the proposed sanitary maintenance hole MH-1 in accordance with OPSD 1003.010 to accommodate a drop of greater than 600 mm. This is due to a crossing with the existing municipal watermain within the right-of-way.

Per Ottawa Sewer Design Guidelines (2012), Section 4.4.4.11 a new maintenance hole is required on the mainline when considering the mainline pipe is concrete and the service (200 mm) is greater than 50% of the mainline diameter (300 mm).

### 3.3 Sanitary Servicing Summary and Conclusions

The sanitary servicing design for the proposed development conforms to the requirements of the City of Ottawa Sewer Design Guidelines, 2012, as amended by all applicable Technical Bulletins.

Peak wastewater demands were provided to the City, who confirmed that there is adequate residual capacity in the city system to accommodate the proposed wastewater flow (refer to **Appendix E**).

### 4. Storm Servicing and Stormwater Management

### 4.1 Background

As previously mentioned, the subject site of 403 Richmond Road currently occupies a funeral home with surface parking. Based on available recent survey information the site is relatively flat and generally follows the gradient along Roosevelt Avenue sloping gently from south to north with an approximate change in gradient of 350 mm across the site. The site is nearly entirely impervious with no existing stormwater measures on site (i.e., catch basins, sewers, etc.) and it is thus assumed that there are no current stormwater management controls on site. As such storm runoff generally sheet flows and outlets to Roosevelt Avenue at the northwest site entrances. A small portion of unattenuated flow outlets to Richmond Road at the southernmost entrance. Refer to Pre-development Drainage Area Map in **Appendix F**.

The portion of the site located at 389 Roosevelt occupies a single-family dwelling, with asphalt driveway, stone pathway, wooden shed and grassed lawn area. Again, it appears that there are no current stormwater management controls on site. Based on the available topographic



information the direction of major overland flow is unclear with a minimum elevation of 67.130 m at the rear lot line and a minimum elevation of 67.190 m at Roosevelt Avenue. Given there are no rear lot drainage features identified on geoOttawa it is expected that the outlet for this site area is also to Roosevelt Ave. at the driveway location.

Considering there are no current stormwater systems on site and that it is assumed that there are no flow attenuation controls the anticipated peak flows for the existing site are as follows (refer to **Appendix F**):

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Storm Event	Release Flow (L/s)
2-year	43.27
5-year	58.70
100-year	122.50

Table 4-1: Pre-Development Peak Release Flows – Existing Site

Ultimately storm runoff from the site enters the municipal system along Roosevelt Ave. Stormwater drains to the Dominion Overflow trunk sewer system prior to discharging to the Ottawa River approximately 650 m downstream from the site. Refer to **Appendix F** for sketch demonstrating the flow path to the ultimate outlet.

The site is located in an older sewer system area of the City, which is uncontrolled and is subject to surcharge for events greater than the 2-year storm. The stormwater management solution must account for the impacts of the receiving system's hydraulic grade line when surcharged, specifically where underground storage is proposed.

### 4.2 Storm Servicing Strategy and Design Criteria

The design of the major and minor storm systems must ensure that the following criteria are upheld under post-development conditions, in keeping with the requirements of the City and the Rideau Valley Conservation Authority (refer to **Appendix A**).

- + The allowable release rate for the site shall coincide with the 2-year storm event under predevelopment conditions.
- + The allowable release rate shall take into consideration any increase in uncontrolled runoff from the boulevard being converted to a hard surface (concrete, interlocking paving stone, etc.).
- + The pre-development runoff coefficient (C) shall be a maximum equivalent 'C' of 0.50, or the actual existing site runoff coefficient, whichever is less.
- + The pre-development Time of Concentration (Tc) shall be calculated using an appropriate method and must not be less than 10 minutes.
- + A Tc of 10 minutes shall be used for all post-development calculations.
- + Storm runoff in excess of the allowable 2-year pre-development release rate, up to and including the 100-year storm event, must be detained on site.
- Where an underground storage tank or cistern is proposed it must be equipped with backflow prevention as well as a submersible pump to ensure a consistent release rate from the building



to ensure the on-site stormwater management controls will not be overwhelmed in the event the 300 mm storm sewer main within Roosevelt Ave. becomes surcharged. The design of the pump is to be completed by the mechanical engineer.

- + Given the receiving storm sewer is subject to surcharge, the hydraulic grade line under surcharged conditions must be considered in the design of underground retention.
- Overland flow will generally be directed to Roosevelt Avenue.
- + The north end landscaped portion will drain to a grass swale, with perforated subdrain, running along the perimeter of the site (refer to **Appendix C**). Stormwater retained in the swale will drain into the perforated subdrain through catch basins and infiltration. The perforated subdrain will outlet into a standard catch basin, which will house a vortex ICD controlling flow and storage in this area.
- + To address concerns about roadway drainage spilling into the underground parking, the entrance to the underground parking is a minimum of 300 mm higher than the spill point at the street.
- + Foundation drains will be pumped with appropriate back up power, sufficient sized pump, and back flow prevention, thus negating the need for an independent connection to the sewer main.
- + The roof drain leaders will be utilizing a pressurized drainpipe type to provide additional protection in the event of surcharge in the municipal system.
- + Adjustable flow control roof drains type ES-WD-RD-ACCUTROLADJ-CAN are utilized in roof areas where controlled flow and storage are identified (refer to **Appendix G**).
- + Considering no long-term surface parking spots are being proposed and rainwater from landscaping and rooftop drainage is considered to be clean for the purpose of protecting water quality and aquatic habitat, the RVCA would not require any additional onsite water quality control measures save and except best management practices.
- + Raingardens and alternative low impact development would be strongly encouraged by RVCA to meet the best management practice requirement.
- + RVCA's typical trigger for onsite water quality control via mechanical separation would be six (6) long-term surface parking spaces or greater.

# 4.3 Proposed Storm Servicing and Stormwater Management Design and Calculations

### **Proposed Storm Service Connection Point**

Based on communications with the City, it is understood that the preferred and anticipated stormwater connection from the proposed development will discharge to the existing 300 mm concrete storm sewer on Roosevelt Avenue. Refer to **Appendix C** for proposed connection points.

Per Ottawa Sewer Design Guidelines (2012), Section 6.2.14 a drop structure is required at proposed storm maintenance hole MH-1 in accordance with OPSD 1003.020 to accommodate a drop of greater than 1200 mm. This is due to a crossing with the existing municipal water within the right-of-way.



A new maintenance hole is required on the mainline when considering the mainline pipe is concrete and the service (250 mm) is greater than 50% of the mainline diameter (300 mm).

### Pre-development (Allowable) Release Rates

The pre-development release rates are summarized in the following Table:

Table 4-2: Pre-development (Allowable) Release Rate (2-year event)

Catchment ID	Area (ha)	Runoff Coefficient (C)	Time of Concentration (Tc) (minutes)	Rainfall Intensity (mm/hr)	Release Rate (L/s)
Subject Site	0.26	0.50	10	76.81	27.74

The storm runoff under post-development conditions for the site area must be controlled to the allowable 2-year pre-development release rate of **27.74 L/s**, up to and including the 100-year storm event.

### **Post Development Flow Rates and Stormwater Quantity Control**

The anticipated post-development flow rates and required storage when controlled to the allowable pre-development release rate are summarized in the following Table.

Table 4-3: Post-development Flow Rate and Storage Summary

Control Area	100-year Release Rate (L/s)	100-year Storage Volume (m³)
A1 (Controlled Roof Area)	1.90	24.5
A2 (Areas to Swale)	9.59	11.0
A3 (Areas to Underground Tank)	16.25	22.0
NC1 (Uncontrolled Areas)	0.00	-
Total	27.74	57.5

As a result of proposed development, the area of hard surface within the unattenuated area (boulevard) is expected to decrease, further reducing stormwater flows compared to existing conditions.

As demonstrated in **Table 4-3** an anticipated storage volume of **57.5** m³ shall be required on-site via roof retention, storage in the proposed swale and perforated subdrain at the north and west site areas (refer to **Appendix C**), and underground storage (internal cistern) to restrict stormwater discharge to the allowable release rate of **27.74** L/s. Refer to **Appendix F** for detailed stormwater storage calculations and **Appendix C** for Stormwater Management Plan.

The storm water tank will be equipped with backflow prevention, appropriate emergency overflow outlet, as well as a submersible pump to meet the SWM design intent and ensure the on-site



stormwater management controls will not be overwhelmed in the event the 300 mm storm sewer main within Roosevelt Ave. becomes surcharged.

Below ground storage requirements have been determined using the full flow rate considering a submersible pump will be provided at the outlet of the internal cistern to ensure a consistent release rate. The cistern and pump can be accessed via the parking level P1 and STM MH-2 for maintenance purposes (refer to **Appendix C**).

### **Stormwater Quality Control**

Rainwater from landscaping and rooftop drainage is considered to be clean for the purpose of protecting water quality and aquatic habitat.

Through consultation with the Rideau Valley Conservation Authority (RVCA) (refer to **Appendix A**) it was confirmed that they would not require any additional onsite water quality control measures save and except best management practices.

RVCA also confirmed that a mechanical separator for hydrocarbon removal will not be required as the typical trigger for on-site water quality control via mechanical separation is six (6) surface parking spaces or greater.

Low impact development measures including grassed swale has been provided to meet best management practices for quality control of surface runoff.

# 4.4 Storm Servicing and Stormwater Management Summary and Conclusions

The storm servicing design for the proposed development conforms to the requirements of the City of Ottawa Sewer Design Guidelines, 2012, as amended by all applicable Technical Bulletins.

An anticipated storage volume of **57.5** m³ shall be required on-site via roof retention, storage in the proposed swale with perforated subdrain, and underground storage (internal cistern) to restrict stormwater discharge to the allowable release rate of **27.74** L/s.

A memorandum shall be provided from the mechanical engineer for the project confirming that the roof will be designed to meet the stormwater management objectives with flow control drains and roof spill scuppers in accordance with requirements of clause 7.4.10.4 of the OBC.

### 5. Conclusion

The purpose of this assessment is to confirm that the proposed development can be adequately serviced using the existing municipal infrastructure (water, sanitary, and storm) surrounding the site. This assessment shall be used in support of a Site Plan Control Application (SPC) to allow for the construction of one (1) nine (9)-storey residential tower with ground floor commercial space and an amenity penthouse.

The important information and findings as a result of this assessment are as follows:

+ The proposed mixed-use commercial and residential building is expected to include 141 apartment units with a population of approximately 237 persons and have a total commercial area of approximately 831 m² (including ground floor commercial areas, amenity rooms, and party room). There will be three (3) levels of underground parking spanning the majority of the site area.



- + The proposed development falls within the exemption requirements for an Environmental Compliance Approval (ECA) as per O.Reg. 525/98, section 3(a), and Ontario Water Resources Act section 53.6(c).
- + The anticipated water demands for the proposed site are 0.99 L/s (average day), 103.98 L/s (max day + fire flow), and 6.03 L/s (peak hour). The boundary conditions received from the City of Ottawa indicate that the existing watermain network can provide the required water demands for the proposed site.
- + Water Data Card for service connection is to be completed and submitted once design has been finalized and in preparation for Commence Work Notification and Water Permit Application.
- + The estimated sanitary flow for the proposed development is **0.79** L/s (average dry weather), **2.71** L/s (peak dry weather), and **2.78** L/s (peak wet weather). The City of Ottawa has indicated that the existing sanitary sewer network near the proposed site can accept the peak wet weather sanitary flow of the proposed development.
- + Storm runoff in excess of the allowable 2-year pre-development release rate, up to and including the 100-year storm event, will be detained on site via roof retention, swale with perforated subdrain, and an internal cistern prior to being discharged to the municipal storm sewer system.
- + The allowable stormwater release rate for the proposed site is **27.74** L/s. It is expected that this will be achieved by means of underground retention (cistern). To achieve this release rate, a storage volume of **57.5** m³ is required on-site.
- + The existing site is nearly entirely impervious with no existing stormwater measures on site (i.e., catch basins, sewers, etc.) and it is thus assumed that there are no current stormwater management controls on site. Thus, stormwater flows from the redeveloped site are anticipated to be considerably less than the stormwater flows from the existing site.
- Low Impact Development (LID) measures in the form of a grassed swale are incorporated in the Stormwater Management Plan for the site, which will provide quality control of surface runoff.
- + As a result of the conclusions drawn by the previous points, it is expected that the proposed development can be serviced by the existing municipal services network surrounding the site.

We trust this Site Servicing and Stormwater Management Report is to your satisfaction. If you have any questions regarding this report, please do not hesitate to contact any of the signatories.





Appendix A Pre-consultation Correspondence







### Servicing study guidelines for development applications

### 4. Development Servicing Study Checklist

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

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

### 4.1 General Content

Executive Summary (for larger reports only).

Proposed phasing of the development, if applicable.

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

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Reference to geotechnical studies and recommendations concerning servicing.
All preliminary and formal site plan submissions should have the following information:  • Metric scale
North arrow (including construction North)
∘ Key plan
Name and contact information of applicant and property owner
Property limits including bearings and dimensions
∘ Existing and proposed structures and parking areas
∘ Easements, road widening and rights-of-way
∘ Adjacent street names
rajacent cu cet names
4.2 Development Servicing Report: Water
Confirm consistency with Master Servicing Study, if available
Availability of public infrastructure to service proposed development
Identification of system constraints
Identify boundary conditions
Confirmation of adequate domestic supply and pressure
Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development.
Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.
Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design
Address reliability requirements such as appropriate location of shut-off valves
Check on the necessity of a pressure zone boundary modification.
Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range





Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.
Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.
Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.
Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.
4.3 Development Servicing Report: Wastewater
Summary of proposed design criteria (Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).
Confirm consistency with Master Servicing Study and/or justifications for deviations.
Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers.
Description of existing sanitary sewer available for discharge of wastewater from proposed development.
Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable)
Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.
Description of proposed sewer network including sewers, pumping stations, and forcemains.
Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).
Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.
Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.
Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.
Special considerations such as contamination, corrosive environment etc.





### 4.4 Development Servicing Report: Stormwater Checklist

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





Inclusion of hydraulic analysis including hydraulic grade line elevations.
Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.
Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.
Identification of fill constraints related to floodplain and geotechnical investigation.
4.5 Approval and Permit Requirements: Checklist
The Servicing Study shall provide a list of applicable permits and regulatory approvals necessary for the proposed development as well as the relevant issues affecting each approval. The approval and permitting shall include but not be limited to the following:
Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in the Act.
Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.
Changes to Municipal Drains.
Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)
4.6 Conclusion Checklist
Clearly stated conclusions and recommendations
Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.
All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario

	Servicing Study Guidelines for Development Applications	
4. Develor	oment Servicing Study Checklist	
4.1 Genera		
Required Co		Reference Location
	Executive Summary (for larger reports only).	N/A
V	Date and revision number of the report.	Cover Sheet
<u> </u>	Location map and plan showing municipal address, boundary, and layout of proposed development.	Report Figures
<u> </u>	Plan showing the site and location of all existing services.	Appendix B
<u> </u>	Development statistics, land use, density, adherence to zoning and official plan, and reference to	Section 1.1
	applicable subwatershed and watershed plans that provide context to which individual developments	C 1 1
<u> </u>	Summary of Pre-consultation Meetings with City and other approval agencies.	Section 1.4
✓	Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the	Section 1.2 & 1.4
	proponent must provide justification and develop a defendable design criteria.	
<b>V</b>	Statement of objectives and servicing criteria.	Section 1.0, 2.1, 3.1 & 4.2
<u> </u>	Identification of existing and proposed infrastructure available in the immediate area.	Section 1.3 & Appendix B
	Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially	N/A
_	impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).	•
<b>✓</b>	Concept level master grading plan to confirm existing and proposed grades in the development. This is	Section 4 and Appendix C
	required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighbouring properties. This is also required to confirm that the	
	proposed grading will not impede existing major system flow paths.	
	Identification of potential impacts of proposed piped services on private services (such as wells and septic	N/A
	fields on adjacent lands) and mitigation required to address potential impacts.	
	Proposed phasing of the development, if applicable.	N/A
<b>✓</b>	Reference to geotechnical studies and recommendations concerning servicing.	Section 1.2 & Appendix H
	All preliminary and formal site plan submissions should have the following information:	N/A
	- Metric scale;	
	- North Arrow (including construction North); - Key Plan;	
	- Name and contact information of applicant and property owner;	
	- Property limits including bearings and dimensions;	
	- Existing and proposed structures and parking areas;	
	- Easements, road widening and rights-of-way;	
4.2 D l -	- Adjacent street names.	
	opment Servicing Report: Water	
Required Co		Reference Location
	Confirm consistency with Master Servicing Study, if available	N/A
<u> </u>	Availability of public infrastructure to service proposed development	Section 1.3 & Appendix B
<u> </u>	Identification of system constraints	Section 2.1 & 2.2
<u> </u>	Identify boundary conditions	Section 2.2
<u> </u>	Confirmation of adequate domestic supply and pressure	Section 2.2 & 2.3
<b>7</b>	Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development.	Section 2.2 & 2.3
V	Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.	Section 2.1 & 2.2
	Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design	N/A
7	Address reliability requirements such as appropriate location of shut-off valves	Section 2.2 & Appendix C
	Check on the necessity of a pressure zone boundary modification.	N/A
<b>V</b>	Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average	Table 2-5
	day, peak hour and fire flow conditions provide water within the required pressure range	
V	Description of the proposed water distribution network, including locations of proposed connections to	Section 2.2, Appendix C &
	the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.	Appendix D
	Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.	N/A

<b>✓ 1.3 Develo</b>	Servicing Study Guidelines for Development Applications	
	Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Section 2.3
4.3 Develo	Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	N/A
	opment Servicing Report: Wastewater	
<b>Required Co</b>	<u>-                                      </u>	Reference Location
<b>V</b>	Summary of proposed design criteria (Note: Wet-weather flow criteria should not deviate from the City of	Section 3.1
_	Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used	
	to justify capacity requirements for proposed infrastructure).	
	Confirm consistency with Master Servicing Study and/or justifications for deviations.	N/A
	Consideration of local conditions that may contribute to extraneous flows that are higher than the	N/A
_	recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers.	
V	Description of existing sanitary sewer available for discharge of wastewater from proposed development	Section 1.3, 3.2 & Appendix B
V	Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable)	Section 3.3
V	Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	Section 3.2 & Appendix E
<b>4</b>	Description of proposed sewer network including sewers, pumping stations, and forcemains.	Section 3.2
	Discussion of previously identified environmental constraints and impact on servicing (environmental	N/A
_	constraints are related to limitations imposed on the development in order to preserve the physical	
	condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).	
	Pumping stations: impacts of proposed development on existing pumping stations or requirements for	N/A
	new pumping station to service development.	
	Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	N/A
	Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	N/A
	Special considerations such as contamination, corrosive environment etc.	N/A
4.4 Develo	opment Servicing Report: Stormwater Checklist	
Required Co		Reference Location
V	Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal	Section 4.1
	drain, right-of-way, watercourse, or private property)	
<b>7</b>	Analysis of available capacity in existing public infrastructure.	Section 4.1
	A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage	Appendix C & F
	patterns, and proposed drainage pattern.	Continu 4.2
<b>✓</b>	Water quantity control objective (e.g. controlling post-development peak flows to pre-development level	Section 4.2
	for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year	
	return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative	
	effects.	
7	Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	Section 4.2
	Description of the stormwater management concept with facility locations and descriptions with	Section 4.3, 4.4 & Appendix
<b>V</b>	references and supporting information.	C
	references and supporting information.  Set-back from private sewage disposal systems.	C N/A
	Set-back from private sewage disposal systems.	N/A
	Set-back from private sewage disposal systems.  Watercourse and hazard lands setbacks.	N/A N/A
	Set-back from private sewage disposal systems.  Watercourse and hazard lands setbacks.  Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	N/A N/A Appendix A
	Set-back from private sewage disposal systems.  Watercourse and hazard lands setbacks.  Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.  Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	N/A N/A Appendix A N/A
	Set-back from private sewage disposal systems.  Watercourse and hazard lands setbacks.  Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.  Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.  Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).	N/A N/A Appendix A
□	Set-back from private sewage disposal systems.  Watercourse and hazard lands setbacks.  Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.  Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.  Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year	N/A N/A Appendix A N/A
	Set-back from private sewage disposal systems.  Watercourse and hazard lands setbacks.  Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.  Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.  Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).  Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.  Calculate pre and post development peak flow rates including a description of existing site conditions and	N/A N/A Appendix A  N/A Section 4.3 & Appendix F
	Set-back from private sewage disposal systems.  Watercourse and hazard lands setbacks.  Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.  Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.  Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).  Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.  Calculate pre and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.	N/A N/A Appendix A  N/A Section 4.3 & Appendix F  N/A
	Set-back from private sewage disposal systems.  Watercourse and hazard lands setbacks.  Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.  Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.  Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).  Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.  Calculate pre and post development peak flow rates including a description of existing site conditions and	N/A N/A Appendix A  N/A Section 4.3 & Appendix F  N/A Section 4.1 & 4.3

	Servicing Study Guidelines for Development Applications	
	If quantity control is not proposed, demonstration that downstream system has adequate capacity for the	N/A
	post-development flows up to and including the 100 year return period storm event.	
	Identification of potential impacts to receiving watercourses	N/A
	Identification of municipal drains and related approval requirements.	N/A
V	Descriptions of how the conveyance and storage capacity will be achieved for the development.	Section 4.3 and 4.4
V	100 year flood levels and major flow routing to protect proposed development from flooding for	Section 4 and Appendix C
	establishing minimum building elevations (MBE) and overall grading.	
	Inclusion of hydraulic analysis including hydraulic grade line elevations.	N/A
	Description of approach to erosion and sediment control during construction for the protection of	N/A
	receiving watercourse or drainage corridors.	
	Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate	N/A
	Conservation Authority. The proponent may be required to delineate floodplain elevations to the	
	satisfaction of the Conservation Authority if such information is not available or if information does not	
	match current conditions.	
	Identification of fill constraints related to floodplain and geotechnical investigation.	N/A
	val and Permit Requirements: Checklist	
Required Content		Reference Location
	Conservation Authority as the designated approval agency for modification of floodplain, potential impact	N/A
	on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes	
	and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and	
	Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the	
	Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in the Act.	
	Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.	N/A
	Changes to Municipal Drains.	N/A
	Other permits (National Capital Commission, Parks Canada, Public Works and Government Services	N/A
	Canada, Ministry of Transportation etc.)	
4.6 Conclu	sion Checklist	
Required Co	ontent	Reference Location
V	Clearly stated conclusions and recommendations	Section 5.0
V	Comments received from review agencies including the City of Ottawa and information on how the	Appendix A
	comments were addressed. Final sign-off from the responsible reviewing agency.	
7	All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario	Signature Page

 From:
 Fraser, Mark

 To:
 Tim Kennedy

 Cc:
 Christian Lavoie-Lebel

**Subject:** RE: 403 Richmond Road - Servicing Requirements and Design Criteria

**Date:** Monday, June 08, 2020 3:36:38 PM

Attachments: <u>image001.jpg</u>

image002.jpg

PC 403 Richmond Rd. and 389 Roosevelt Ave..msg

#### Hi Tim.

Please see the attached email for servicing and SWM criteria. An Assessment of Adequacy of Public Services Report with a conceptual servicing and SWM plan will be required in support of an application for OPA and ZBLA at 403 Richmond Rd. and 389 Roosevelt Ave.

If you have any questions or require any clarification on the information provided in the attached email please let me know.

Regards,

#### Mark Fraser, P. Eng.

Project Manager, Planning Services Development Review Central Branch City of Ottawa | Ville d'Ottawa

Planning, Infrastructure and Economic Development Department

110 Laurier Avenue West. 4th Floor, Ottawa ON, K1P 1J1

Tel:613.580.2424 ext. 27791

Fax: 613-580-2576 Mail: Code 01-14

Email: Mark.Fraser@ottawa.ca

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**From:** Tim Kennedy

**Sent:** June 08, 2020 6:49 AM

To: Fraser, Mark

Cc: Christian Lavoie-Lebel

**Subject:** 403 Richmond Road - Servicing Requirements and Design Criteria

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#### Good morning Mark,

I was given your contact information by my colleague Christian who noted you would be the planner on file for this project. I will be assisting with the civil design and I am hoping you have some availability this week to discuss the servicing requirements and design criteria for the above mentioned development. Also I understand you are looking for a servicing and SWM report for the zoning application and I am wondering what exactly you will require at this stage.

My availability this week is generally between 9:30 and 1:30. Could you let me know which day and time works best on your end?

Looking forward to collaborating on this one.

Regards,		
TIM KENNEDY, P.Eng.		
Project Manager / Infrastructure		
<b>T</b> 613-860-2462 ext. 6620 <b>M</b> 613-462-3627 <b>F</b> 613-860-1870		
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•

From: Fraser, Mark To: O"Connor, Ann

Subject: PC\_403 Richmond Rd. and 389 Roosevelt Ave.

Attachments: image001.png

image002.jpg

2020-05-27 - Concept.pdf

200601 403 Rich Prelim Servicing.pdf Servicing Report Template Final Version.docx

Hi Ann.

Please forward the below information to the applicant regarding a development proposal at 403 Richmond Rd. and 389 Roosevelt Ave. for a 10-storey mixed-use building (ground floor retail and 174 residential units). Note that the information is considered preliminary and the assigned Development Review Project Manager may modify and/or add additional requirements and conditions upon review of an application if deemed necessary.

#### Comments:

- An application to consolidate the parcels of land will be required otherwise the proposed stormwater works will be servicing more than one parcel of land and thus does not meet the exemption set out in O.Reg. 525/98. This would mean an ECA would be required regardless of who owns the parcels.
- Concerns about roadway drainage spilling into the underground parking garage. Please make sure that the entrance to the underground garage is 0.30m higher than the spill point on the street. Entrance should not be located within a sag (low point) in the road.
- A deep excavation and dewatering operations have the potential to cause damages to the neighboring adjacent buildings/structures. Document that construction activities (excavation, dewatering, vibrations associated with construction, etc.) will not have an impact on any adjacent buildings and infrastructure.
- A Record of Site Condition (RSC) in accordance with O.Reg. 153/04 will be required to be filed and acknowledged by the Ministry prior to issuance of a building permit due to a change in property use from commercial to residential. Subsection 11(2) of O. Reg. 153/04 stipulates that the term "change in use" does not include a reference to the zoning of the property under municipal by-law and therefore refers to a change in the actual use of the property.

#### Changes of use, s. 168.3.1 (1) (b) of the Act

- **14.** A person shall not change the use of property for the purposes of clause 168.3.1 (1) (b) of the Act in any of the following manners:
- 5. A change from commercial use to more than one type of property use including any or all of the following types of property use:
  - i. Agricultural or other use
  - ii. Institutional use
  - iii. Parkland use
  - iv. Residential use
- Development to be serviced from Roosevelt Ave. (local street). Location and construction of the proposed services shall not impact the existing street trees that have identified to be retained (4.5m setback required). Location of the services will be subject to review.

#### General:

 It is the sole responsibility of the consultant to investigate the location of existing underground utilities in the proposed servicing area to avoid any conflict with utilities. The location of existing utilities and services shall be documented on an Existing Conditions Plan.

- All underground and above ground building footprints and permanent walls need to be shown on the plans to confirm that any permanent structure does not extend either above or below into the existing property lines and sight triangles and/or future road widening protection limits.
- Please note that the proposed servicing design and site works shall be in accordance with the following documents:
  - Ottawa Sewer Design Guidelines (October 2012)
  - Technical Bulletin PIEDTB-2016-01
  - Technical Bulletins ISTB-2018-01, ISTB-2018-02 and ISTB-2018-03.
  - 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 Accessibility Design Standards (November 2015) (City recommends development be in accordance with these standards on private property)
  - Ottawa Standard Tender Documents (latest version)
  - Ontario Provincial Standards for Roads & Public Works (2013)
  - Record drawings and utility plans are also available for purchase from the City (Contact the City's Information Centre by email at <u>InformationCentre@ottawa.ca</u> or by phone at (613) 580-424 x.44455). Include copies in the Appendix of the report as supporting documentation.

#### Disclaimer:

The City of Ottawa does not guarantee the accuracy or completeness of the data and information contained on the above image(s) and does not assume any responsibility or liability with respect to any damage or loss arising from the use or interpretation of the image(s) provided. This image is for schematic purposes only.

#### Stormwater Management Criteria (Quantity and Quality Control) and Information:

- This site is located in an older sewer system area of the City.
- The storm sewer system in this area was designed to a 2-year level of service not a 5-year system.
- Water Quantity Control: In the absence of area specific SWM criteria please control post-development runoff, up to and including the 100-year storm event, to a 2-year pre-development level. The pre-development runoff coefficient will need to be determined using the smaller of a runoff coefficient of C=0.5 or the actual existing site runoff coefficient. The time of concentration used to determine the pre-development condition will be the larger of 10min. or the calculated time of concentration. [Tc should not be less than 10 min. since IDF curves become unrealistic at less than 10 min; T<sub>c</sub> of 10 minutes shall be used for all post-development calculations].
- Any storm events greater than the calculated 2-year allowable release rate, up to and including the 100-year storm event, shall be detained on-site by appropriate SWM measures to avoid impact on the downstream sewer system.
- Compare pre-development flows to post-developments flows in the SWM report.
- The receiving storm sewer system is uncontrolled therefore subject to surcharge (HGL will be elevated for events greater than the 2-year). The impact from the receiving system HGL will need to be considered if proposing underground storage The SWM solution will need to be designed accordingly.

- If rooftop control and storage is considered as part of the SWM solution sufficient details (Cl. 8.3.8.4) shall be discussed and documented in the report and on the plans. A <u>roof drainage plan and detailed roof drain summary table</u> with supporting drain manufacturer information will be required. The roof drainage plan will need to document roof drain type, flow rates, emergency scupper locations and spill over elevations and ponding areas.
- Water Quality Control: Please consult with the local conservation authority (RVCA) regarding water quality criteria and requirements prior to submission of an application. It is consultant's responsibility to check with the RVCA for quality control issues and include this information in the SWM report. Please contact RVCA for further information and provide correspondence in the Appendix of the report.
- Please note that the HGL within the receiving sewer system will need to be assessed if underground storage (cistern) is proposed as part of the stormwater management solution to ensure the system does not become surcharged and thereby ineffective do to a loss in available storage.
- Underground Storage: Underground storage volumes are to be based on 50% peak flow rates or use dynamic compute model. The Modified Rational Method for storage computation in the Sewer Design Guidelines was originally intended to be used for above ground storage (i.e. parking lot) where the change in head over the orifice varied from 1.5 m to 1.2 m (assuming a 1.2 m deep CB and a max ponding depth of 0.3 m). This change in head was small and hence the release rate fluctuated little, therefore there was no need to use an average release rate.

When underground storage is used, the release rate fluctuates from a maximum peak flow based on maximum head down to a release rate of zero. This difference is large and has a significant impact on storage requirements. We therefore require that an average release rate equal to 50% of the peak allowable rate shall be applied to estimate the required volume. Alternatively, the consultant may choose to use a submersible pump in the design to ensure a constant release rate.

In the event that there is a disagreement from the designer regarding the required storage, The City will require that the designer demonstrate their rationale utilizing dynamic modelling, that will then be reviewed by City modellers in the Water Resources Group.

Note that the above will added to upcoming revised Sewer Design Guidelines to account for underground storage, which is now widely used.

- If a storage tank (internal cistern) is considered as part of the SWM solution sufficient details and system information will need to be provided. A detailed cross-section of such system with sufficient details and information (HWLs, release rate, volume, location, size (dimensions), control device, emergency flow outlet and backflow protection, etc.) will need to be provided. An appropriate emergency overflow location will need to be determined and documented. Backup power supply necessary if pump controlled.
- Please include a Pre-Development Drainage Area Plan to define the pre-development drainage areas/patterns. Existing drainage patterns shall be maintained and discussed as part of the proposed SWM solution. Positive drainage away from the building shall be achieved and exiting grades along the property line are to be maintain. Runoff to any adjacent lands will not be permitted.
- The allowable release rate shall take into consideration any increase in uncontrolled runoff from the boulevard being converted to a hard surface (concrete, interlocking paving stone, etc.).

#### Storm Sewer:

• The sewer system in this area is uncontrolled and therefore it can surcharge.

A 300mm dia. Conc. storm sewer is available within Roosevelt Ave. The site shall be serviced from this sewer system (local road). Stormwater drains to the Dominion Overflow trunk sewer system and discharged to the Ottawa River.

- For concrete sewer pipe, maintenance manholes shall be installed when the service is greater than 50% of the diameter of the mainline concrete pipe.
- A storm sewer monitoring maintenance hole is required to be installed at the property line (on the private side of the property) as per City of Ottawa Sewer-Use By-Law 2003-514 (14) *Monitoring Devices* as the site will have a commercial component with the residential development.
- As-built drawings of the existing services within the vicinity of the site are available and to be reviewed in order to determine proper servicing and SWM plan for the subject site(s).
- Foundation drainage system details are to be discussed in the report and document how the system will be integrated into the servicing design. Please note that foundation drain is to be independently connected to sewermain unless being pumped with appropriate back up power, sufficient sized pump and back flow prevention.

#### **Sanitary Sewer:**

- A 300mm dia. Conc. sanitary sewer is located within Roosevelt Ave. The site shall be serviced from this sewer system (local road). Wastewater flows to the West Nepean Trunk Collector sewer system.
- For concrete sewer pipe, maintenance manholes shall be installed when the service is greater than 50% of the diameter of the mainline concrete pipe. The sanitary service should be located in an area that will allow for a perpendicular connection to the sewer and have no bends in the pipe. The proposed location of the sanitary service will not allow for a structure to be installed due to the watermain crossing.
- An analysis and demonstration that there is sufficient/adequate residual capacity to accommodate any increase in wastewater flows in the receiving and downstream wastewater system is required to be provided. It is suggested to calculate the total peak wastewater demand for the proposed development and send it to the City as soon as possible in advance of a submission of an application, as an initial step to determine whether or not there is enough capacity in the city system to accommodate the proposed wastewater flow. Please note that it takes approx. 10 business days to get a response back from the internal circulation.
- The sanitary sewer criteria shall reflect the new *Technical Bulletin PIEDTB-2018-01*.
- A sanitary sewer monitoring maintenance hole is required to be installed at the property line (on the private side of the property) as per City of Ottawa Sewer-Use By-Law 2003-514 (14) *Monitoring Devices* as the site will have a commercial component with the residential development.
- A backwater valve is required on the sanitary service for protection (mandatory now anyways) as this area has experience flooding in the past due to surcharging of the West Nepean Collector sewer.
- If the groundwater is found to be contaminated and treatment is determined to be required it is a requirement per the Sewer Use By-law that remediated groundwater is to be directed to the sanitary sewer.

#### Water:

- A 152mm dia. UCI watermain is located within Roosevelt Ave. and a 305mm dia. PVC watermain is located within Richmond Rd.
- Water Supply Redundancy: Residential buildings with a basic day demand greater than 50m³/day (0.57 L/s) are required to be connected to a minimum of two water services separated by an isolation valve to avoid a vulnerable service area as per the Ottawa Design Guidelines Water Distribution, WDG001, July 2010 Clause 4.3.1 Configuration. This proposed development will required

two (2) separate water service connections if the basic day demand for this site exceeds 50m<sup>3</sup>/day. There shall be a primary water service (Richmond Rd) and a secondary connection (Roosevelt Ave.). This is a corner lot so we will not support the installation of a new isolation valve on the City watermain to satisfy this requirement.

- Include a **hydrant coverage figure** and **demonstrate there is adequate fire protection** for the building per *Technical Bulletin ISTB-2018-02* . Multiple municipal hydrants will be required for fire protection.
- Boundary conditions, HGL, shall be requested and a hydraulic analysis completed to show that there is adequate flow and pressure in the water distribution system to meet the required water demands.
   Use <u>Table 3-3 of the MOE Design Guidelines for Drinking-Water System</u> to determine Maximum Day and Maximum Hour peaking factors for 0 to 500 persons. provide the following information to the City of Ottawa via email to request water distribution network boundary conditions for the subject site. Please note that once this information has been provided to the City of Ottawa it <u>takes approximately 5-10 business days</u> to receive boundary conditions.
  - Type of Development and Units
  - Site Address (Street Number and Name)
  - Location of service(s).
  - A plan showing the proposed water service connection locations.
  - Average Daily Demand (L/s)
  - Maximum Daily Demand (L/s)
  - Peak Hour Demand (L/s)
  - Required Fire Flow (L/min) FUS calculations are to be provided with request for boundary conditions.

[Fire flow demand requirements shall be based on Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection

1999 and Technical Bulletin ISTB-2018-02]

Exposure separation distances shall be defined on a figure to support the FUS calculation and required fore flow (RFF).

Fire flow demands will be inputted as point loads at each connection separately unless otherwise noted. A multi-hydrant analysis can be requested if necessary.

- If fire protection is provided by existing municipal hydrants, hydrant capacity shall be assessed to demonstrate the RFF can be achieved. Identify which hydrants are being considered to meet the RFF on a **fire hydrant coverage figure** as part of the boundary conditions request.
- Hydrant capacity shall be assessed if relying on any public hydrants to provide fire protection particularly if high design fire flows are being proposed to demonstrate the RFF can be achieved.
   Refer to Table 1: Maximum flow to be considered from a given hydrant in Appendix I of Technical Bulletin ISTB-2018-02. Appropriate fire protection mitigation measures shall be investigated/proposed to lower the RFF for the site to an appropriate level.
- The subject site is located within the 1W Pressure Zone.

#### **Permits and Approvals:**

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

#### **Source Protection Policy Screening:**

- The address lies within the Mississippi-Rideau Source Protection Region and is subject to the policies of the Mississippi-Rideau Source Protection Plan.
- The entire property lies within the Surface Water Intake Protection Zone (IPZ) for the Ottawa River (Lemieux) Intake, IPZ-2 (vulnerability score of 8.1) where significant threat policies apply. Policies are only applicable for significant drinking water threat activities as outlined in the Clean Water Act.
  - The *Clean Water Act* Tables of Circumstances identify circumstances under which certain activities would be considered a significant threat to drinking water within certain designated vulnerable area, and the Mississippi-Rideau Source Protection Plan contains policies related to significant drinking water threat activities to protect the drinking water supply.
  - Activities that may be considered a significant drinking water threat within the IPZ-2 (score 8.1) include the following:
    - Untreated stormwater from a stormwater retention pond
      - Note that a stormwater management facility is only considered a significant drinking water threat within this zone if the facility drains more than 100 ha of industrial/commercial land.
    - Sewage treatment plant effluent discharges
    - Combined sewer discharge from a stormwater outlet
    - Sewage treatment plant bypass discharge
    - Industrial effluent discharge
    - Waste disposal site
    - Agricultural activities (application or storage of manure or chemical fertilizers or pesticides, or use of land for livestock grazing)
  - Based on the information provided in your email, the proposed activity does not meet the
    circumstances to be considered a significant drinking water threat, thus there are no
    applicable legally-binding source protection policies.
- The area is <u>not</u> within a Wellhead Protection Area (WHPA).
- The area is located within a Highly Vulnerable Aquifer (HVA). Note that there are <u>no legally binding</u> <u>policies</u> under the Mississippi-Rideau Source Protection Plan for activities within Highly Vulnerable Aquifers.
- The area is <u>not</u> within a Significant Groundwater Recharge Area.

#### **Capital Woks:**

 As per GeoOttawa no capital works are proposed on Roosevelt Ave. or Richmond Rd (at this location).

Sight Triangle and Any Road widening Requirement (By Transportation Project Manager Mike Giampa)
Required Engineering Plans and Studies in Support of OPA and ZBLA applications:

#### **PLANS:**

- Conceptual Servicing and SWM Plan
- Legal Survey

#### **REPORTS:**

- Assessment of Adequacy of Public Services
- Geotechnical Study
- Noise Feasibility Study
- Phase I ESA (in accordance with Ontario Regulation 153/04)
- Phase II ESA (Depending on recommendations of Phase I ESA)

# Wind Study

# Required Engineering Plans and Studies in Support of SPC application:

#### PLANS:

- Existing Conditions and Removals Plan
- Site Servicing Plan
- Grade Control and Drainage Plan
- Erosion and Sediment Control Plan
- Pre-Development Drainage Area Plan
- Post-Development Drainage Area Plan
- Roof Drainage Plan w/ Roof Drain Summary Table (if rooftop SWM storage is being considered)
- Stormwater Storage System Detail (Cistern Details from the Mechanical Engineer if being considered)
- Foundation Drainage System Details
- Legal Survey Plan
- Site Lighting Plan, Photometric Plan and Site Lighting Certification Letter

#### **REPORTS:**

- Site Servicing and Stormwater Management Report
- Geotechnical Study/Investigation
- Detailed Noise Study (Transportation Noise Assessment and Stationary Noise Assessment)
- Phase I ESA (in accordance with Ontario Regulation 153/04)
- Phase II ESA (Depending on recommendations of Phase I ESA)
- An Record of Site Condition (RSC) is required (due to more sensitive land use). Phase I and Phase II (if necessary) shall speak to RSC requirement.
- Wind Study (Type 1 Wind Analysis)

## **Servicing Report Template and Guidelines:**

Please find attached the Servicing Report Template & Study Guidelines" and prepare the servicing study accordingly. For capacity issue, please see section 3.2.1 page 3-3 and follow this section. A completed checklist with corresponding references from the servicing study is mandatory for the completeness of the study. Please add a completed checklist in the report. Please ensure you are using current guidelines, by-laws and standards.

# Please refer to the City of Ottawa Guide to Preparing Studies and Plans [Engineering]:

https://ottawa.ca/en/planning-development-and-construction/developing-property/development-application-review-process/development-application-submission/guide-preparing-studies-and-plans

Phase One Environmental Site Assessment (Official Plan Section 4.8.4):

- A Phase I ESA is required to be completed in accordance with Ontario Regulation 153/04 (not per CSA standards) in support of this development proposal to determine the potential for site contamination. Depending on the Phase I recommendations a Phase II ESA may be required in accordance with Ontario Regulation 153/04.
- The Phase I ESA, and if applicable Phase II ESA shall discuss requirement to file a RSC with the Ministry. A **Record of Site Condition (RSC)** in accordance with O.Reg. 153/04 will be required to be filed and acknowledged by the Ministry prior to issuance of a building permit due to a change in property use from commercial (less sensitive) to residential (more sensitive). As per the Official Plan (4.8.4) we do not consider an RSC acknowledged by the Ministry until either its has been confirmed that it will not be audited or it has passed the Ministry audit.
- Please also note that in the event soil and/or groundwater contamination is identified on this site

and the proposal is for a more sensitive land use, the MECP will require approximately 1-1.5 years to review the RSC. PIED will apply appropriate conditions, based on Environmental Protection Act (Section 168.3.1 (1)) and O.Reg. 153/04 (Parts IV and V) regarding requirements for RSC prior to building permit issuance. Dependent on the levels/types of contamination, timelines for building permit issuance may be longer than expected and we recommend applicant speak to Building Code Services, at the earliest convenience, so as to discuss these timelines in more detail, if deemed applicable.

■ Environmental Risk Information Services (ERIS) report is required to be included as part of the Phase LESA

https://www.ontario.ca/page/guide-completing-phase-one-environmental-site-assessments-under-ontario-regulation-15304

https://www.ontario.ca/laws/regulation/040153#BK43

# **Geotechnical Investigation** (Official Plan Section 4.8.3):

- A Geotechnical Study/Investigation shall be prepared in support of this development proposal.
- Discuss and investigate the impact if any on the lowering of the groundwater level has on any
  adjacent properties as reducing the groundwater level can lead to potential damages to
  surrounding structures due to excessive differential settlements of the ground.
- Geotechnical Study shall be consistent with the Geotechnical Investigation and Reporting Guidelines for Development Applications.

https://documents.ottawa.ca/sites/default/files/documents/cap137602.pdf

## **Noise Study:**

- A **Transportation Noise Assessment** will be required as the subject development is located within 100m of Richmond Road (arterial road/transit priority corridor identified on Schedule D) and Byron Ave. (collector road), proximity to Sir John A. McDonald Parkway (freeway) and within 300m of the proposed LRT corridor.
- A **Stationary Noise Assessment** is required in order to assess the noise impact of the proposed sources of stationary noise (mechanical HVAC system/equipment) of the development onto the surrounding residential area to ensure the noise levels do not exceed allowable limits specified in the City Environmental Noise Control Guidelines.
- Noise Study shall be consistent with the City's Environmental Noise Control Guidelines.
   <a href="https://documents.ottawa.ca/sites/default/files/documents/enviro\_noise\_guide\_en.pdf">https://documents.ottawa.ca/sites/default/files/documents/enviro\_noise\_guide\_en.pdf</a>

#### Wind Study:

 10-storeys or more or a proposed building is more than twice the height of adjacent existing buildings and is greater than five storeys in height is subject to the submission of a Wind Study.

https://documents.ottawa.ca/sites/documents/files/torwindanalysis\_en.pdf

## **Exterior Site Lighting:**

Any proposed light fixtures (both pole-mounted and wall mounted) must be part of the approved Site Plan. All external light fixtures must meet the criteria for Full Cut-off Classification as recognized by the Illuminating Engineering Society of North America (IESNA or IES), and must result in minimal light spillage onto adjacent properties (as a guideline, 0.5 fc is normally the maximum allowable spillage). In order to satisfy these criteria, the please provide the City with a Site Lighting Plan, Photometric Plan and Certification (Statement) Letter from an acceptable professional engineer stating that the design is compliant.

Please note that these comments are considered preliminary based on the information available to date

and therefore maybe amended as additional details become available and presented to the City. It is the responsibility of the applicant and their representatives/consultants to verify information provided by the City. The applicant may contact me for any follow-up questions related to engineering/infrastructure prior to submission of an application if necessary.

If you have any questions or require any clarification please let me know.

Regards,

# Mark Fraser, P. Eng.

Project Manager, Planning Services
Development Review Central Branch
City of Ottawa | Ville d'Ottawa
Planning, Infrastructure and Economic Development Department
110 Laurier Avenue West. 4th Floor, Ottawa ON, K1P 1J1
Tel:613.580.2424 ext. 27791

Fax: 613-580-2576 Mail: Code 01-14

Email: Mark.Fraser@ottawa.ca

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From: <u>ISD Information Centre / Centre Information</u>

To: <u>Tim Kennedy</u>

Subject: RE: 20-0571 - 403 Richmond Rd. and 389 Roosevelt Ave - Servicing Capacity Assessment - Information Request

**Date:** Friday, June 12, 2020 4:03:00 PM

Attachments: 2179p&p1.pdf

13695p&p01.pdf L9-1.pdf

20-0571 Richmond & Roosevelt.dwg

20-0571 Work Order.xlsx

Good afternoon Tim,

Attached are the plans and work order for the locations requested.

The City of Ottawa's Financial Services Branch will send out an invoice at the end of the month. The work orders will no longer be included with the invoice. Please retain the attached work order for your records.

For any additional information regarding this information, please contact the Information Centre.

Thank you.

Nick Havelock

Geospatial Analytics Technology & Solutions, Information Centre:

Phone: 613-580-2424 Ext 44455 Email: informationcentre@ottawa.ca

**From:** Tim Kennedy <Tim.Kennedy@cima.ca>

Sent: June 11, 2020 3:16 PM

To: ISD Information Centre / Centre Information <informationcentre@ottawa.ca>

Subject: Re: 20-0571 - 403 Richmond Rd. and 389 Roosevelt Ave - Servicing Capacity Assessment -

Information Request

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Hi Nick,

Thanks for this and yes please proceed.

Tim

Sent from my iPhone

On Jun 11, 2020, at 2:02 PM, ISD Information Centre / Centre Information <informationcentre@ottawa.ca> wrote:

Good afternoon Tim,

Your estimate for the UCC portion of this request is ACAD .dwg  $-1 \times $143.00$ .

Your estimate for the drawings showing existing infrastructure:  $3 \times $16.00$ .

Please let us know if you would like to proceed or if you have any questions or concerns.

Thank you, Nick Havelock

GIS & Data Management Branch - Information Centre

Phone: 613-580-2424 x 44455

Email: informationcentre@ottawa.ca

**From:** Tim Kennedy < <u>Tim.Kennedy@cima.ca</u>>

**Sent:** June 10, 2020 8:40 AM

**To:** ISD Information Centre / Centre Information <<u>informationcentre@ottawa.ca</u>> **Cc:** Christian Lavoie-Lebel <<u>Christian.Lavoie-Lebel@cima.ca</u>>; Anne-Julie Cardinal <<u>Anne-Julie.Cardinal@cima.ca</u>>

**Subject:** 20-0571 - 403 Richmond Rd. and 389 Roosevelt Ave - Servicing Capacity Assessment - Information Request

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ATTENTION : Ce courriel provient d'un expéditeur externe. Ne cliquez sur aucun lien et n'ouvrez pas de pièce jointe, excepté si vous connaissez l'expéditeur.

We are working with a client on a servicing capacity assessment for zoning bylaw amendment at 403 Richmond Rd. and 389 Roosevelt Ave (see attached key plan).

Our client is considering a servicing connection for the proposed development to Roosevelt and/or Richmond Road. Could you please provide any available background information for the existing services and utilities that may be present at these locations, including but not limited to watermain, storm, and sanitary sewer, gas, hydro, street lighting, Bell, Rogers, etc. If you could provide a list of any information you have on file and the associated fees for obtaining these it would be much appreciated.

Also CAD of available utility plans would be preferable.

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TIM KENNEDY, P.Eng.

Project Manager / Infrastructure

**T** 613-860-2462 ext. 6620 **M** 613-462-3627 **F** 613-860-1870 110–240 Catherine Street, Ottawa, ON K2P 2G8 CANADA

Notice to our customers on the COVID-19

<image001.jpg>

<image002.jpg>

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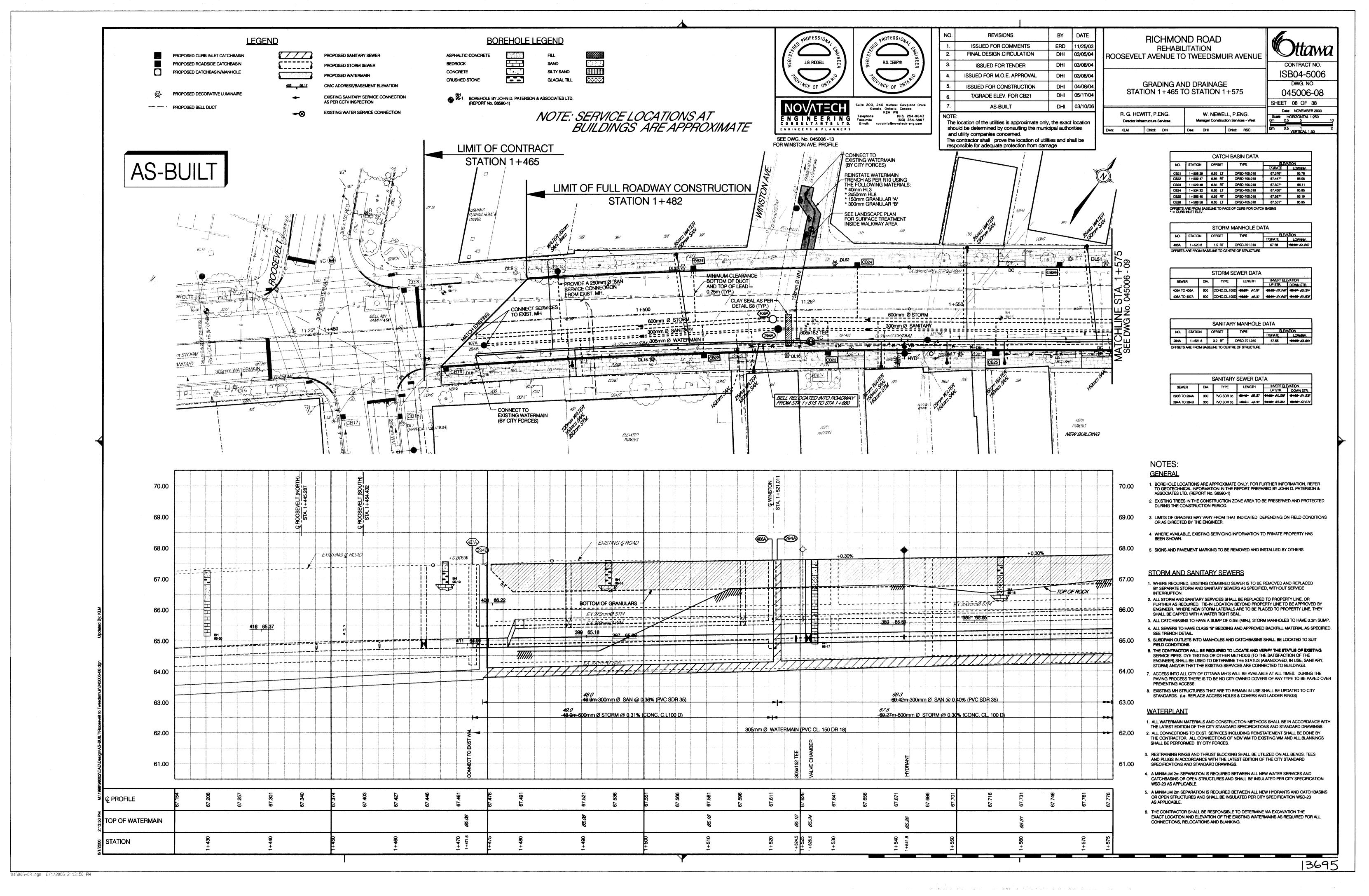
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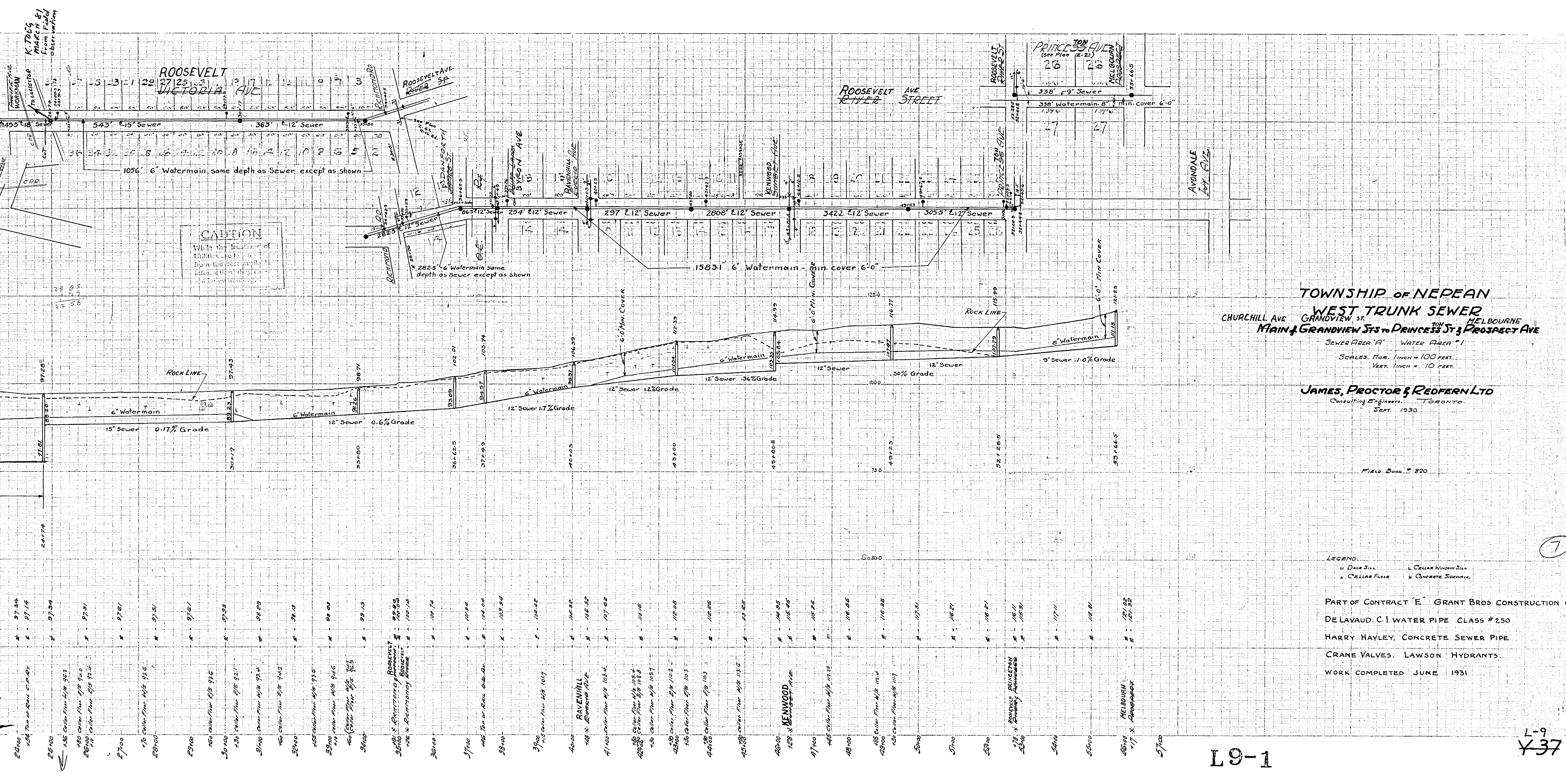
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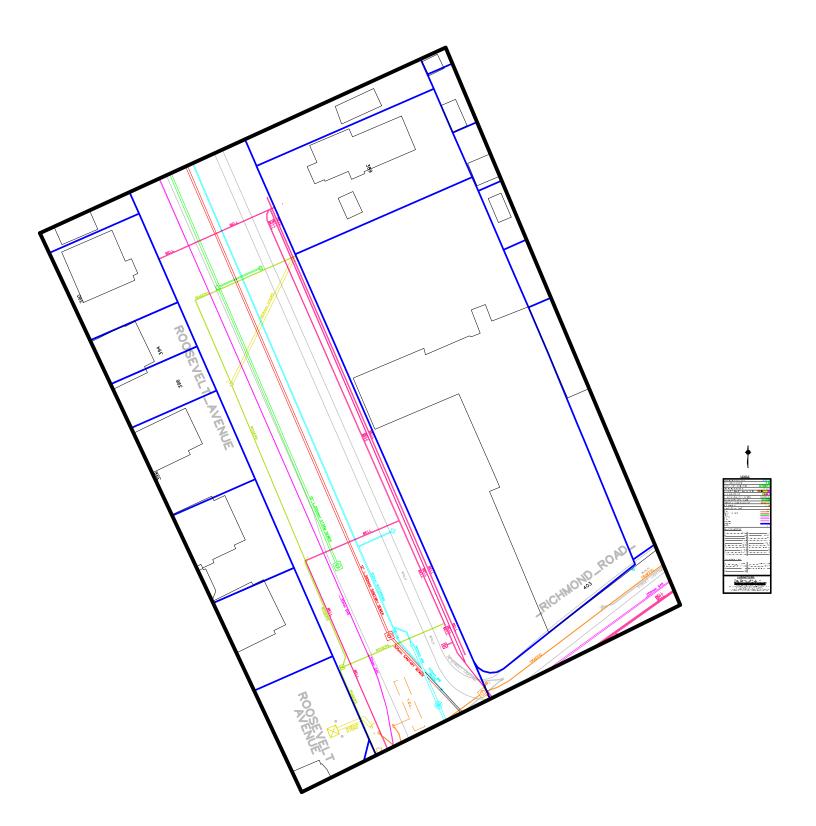
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2179 5 OF //









From: <u>Tim Kennedy</u>

To: <u>Eastern Ottawa (MECP)</u>

Cc: <u>Jaymeson Adams; Christian Lavoie-Lebel; MOECCOttawaSewage@ontario.ca</u>

Subject: RE: 403 Richmond Rd. and 389 Roosevelt Ave - Servicing Capacity Assessment - MECP Pre-consult

**Date:** Thursday, July 02, 2020 6:13:00 PM

Attachments: <u>image001.jpg</u>

image002.jpg

# Good evening Jéhanne,

To further clarify we are not looking for a formal pre-consult but rather just wanted to inform the MECP of the project and to confirm that it has been determined that the proposed development qualifies for the ECA exemption under Reg. 525/98 of OWRA.

Best Regards,

# TIM KENNEDY, P.Eng.

Project Manager / Infrastructure

T 613 860-2462 ext. 6620 M 613 462-3627

## CIMA+

From: Eastern Ottawa (MECP) < Environment. Ottawa@ontario.ca>

**Sent:** Tuesday, June 23, 2020 3:17 PM **To:** Tim Kennedy < Tim. Kennedy @ cima.ca>

**Cc:** Jaymeson Adams < Jaymeson. Adams@cima.ca>; Christian Lavoie-Lebel < Christian. Lavoie-

Lebel@cima.ca>

Subject: RE: 403 Richmond Rd. and 389 Roosevelt Ave - Servicing Capacity Assessment - MECP Pre-

consult

# Good afternoon,

Please fill out the Pre-Submission Consultation Form attached and send back to the specified email in the form (MOECCOttawaSewage@ontario.ca).

Once we receive your form we will be able to move forward with your pre-consult.

Thank you,

#### Jéhanne Hurlbut

Administrative Assistant | Drinking Water & Environmental Compliance Division Ministry of the Environment, Conservation and Parks 2430 Don Reid Drive, Unit 103, Ottawa ON <a href="mailto:jehanne.hurlbut@ontario.ca">jehanne.hurlbut@ontario.ca</a> (613) 301-4160

**From:** Tim Kennedy < <u>Tim.Kennedy@cima.ca</u>>

**Sent:** June 22, 2020 11:48 AM

**To:** Eastern Ottawa (MECP) < <u>Environment.Ottawa@ontario.ca</u>>

**Cc:** Jaymeson Adams < <u>Jaymeson.Adams@cima.ca</u>>; Christian Lavoie-Lebel < <u>Christian.Lavoie-Lebel@cima.ca</u>>

Subject: 403 Richmond Rd. and 389 Roosevelt Ave - Servicing Capacity Assessment - MECP Pre-

consult

# CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

To whom it may concern,

We are currently performing an Adequacy of Public Services Report in support of a zoning by-law amendment application for a proposed development located at 403 Richmond Road and 389 Roosevelt Ave in Ottawa, Ontario (See attached key plan). The proposed development involves the construction of a 10-storey mixed-use residential and commercial building. The subject site is located within the Ottawa River West subwatershed.

We have determined that the proposed development in question falls within the exemption requirements for an Environmental Compliance Approval (ECA) as per O.Reg. 525/98, section 3(a), and <u>Ontario Water Resources Act</u> section 53.6(c) when considering the following:

- 1. Currently comprised of two (2) parcels of land that are to be combined into one (1) parcel, the existing 0.21-ha site currently consists of a funeral home which is zoned traditional mainstreet (TM) and a single family home which is zoned Residential Third Density (R3S);
- 2. The proposed sewage works and stormwater management facility will service a single parcel of land:
- 3. The property does not discharge into a combined sewer and it will not be used for industrial purposes.

Would you be able to confirm our assumption that the proposed development is indeed exempt and a no further pre-submission consultation is required.

Please feel free to contact me if you have any questions, need to discuss, or require further information.

Best regards,

TIM KENNEDY, P.Eng.

Project Manager / Infrastructure

**T** 613-860-2462 ext. 6620 **M** 613-462-3627 **F** 613-860-1870 110–240 Catherine Street, Ottawa, ON K2P 2G8 CANADA

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From: Jamie Batchelor
To: Tim Kennedy

Cc: Jaymeson Adams; Christian Lavoie-Lebel; Eric Lalande

Subject: RE: 403 Richmond Rd. and 389 Roosevelt Ave - Servicing Capacity Assessment - RVCA Pre-consult

Date: Thursday, July 02, 2020 1:27:33 PM
Attachments: image005.jpg

image005.jpg image006.jpg image001.jpg

Good Afternoon Tim,

Based on our understanding of the project, no surface parking spots are being proposed. Rainwater from landscaping and rooftop drainage is considered to be clean for the purpose of protecting water quality and aquatic habitat. Therefore, the RVCA would not require any additional onsite water quality control measures save and except best management practices. The raingardens and alternative low impact development would be strongly encouraged to meet the best management practice requirement.

The RVCA's typical trigger for onsite water quality control via mechanical separation would be 6 surface parking spaces or greater.

The RVCA will defer all stormwater issues related to quantity control to the City for comment in this instance as stormwater will be discharging to an existing storm sewer.

Jamie Batchelor, MCIP, RPP Planner, ext. 1191 Jamie.batchelor@rvca.ca



From: Tim Kennedy <Tim.Kennedy@cima.ca> Sent: Thursday, July 2, 2020 11:01 AM

To: Jamie Batchelor < jamie.batchelor@rvca.ca>

Cc: Jaymeson Adams <a href="Adams@cima.ca">Adams@cima.ca</a>; Christian Lavoie-Lebel <a href="Christian.Lavoie-Lebel@cima.ca">Christian.Lavoie-Lebel@cima.ca</a></a>
Subject: RE: 403 Richmond Rd. and 389 Roosevelt Ave - Servicing Capacity Assessment - RVCA Pre-consult

Hi Jamie,

Just following up on my email below. Did you get a chance to look at these items?

We are planning to complete the SWM design first thing next week so we can submit our report to the City by end of next week. If we could get your input by end of this week that would be greatly appreciated.

Thanks,

TIM KENNEDY, P.Eng.
Project Manager / Infrastructure
T 613 860-2462 ext. 6620 M 613 462-3627

CIMA+

From: Tim Kennedy

**Sent:** Monday, June 22, 2020 11:13 AM **To:** Jamie Batchelor < <u>jamie.batchelor@rvca.ca</u>>

**Cc:** Jaymeson Adams < <u>Jaymeson.Adams@cima.ca</u>>; Christian Lavoie-Lebel < <u>Christian.Lavoie-Lebel@cima.ca</u>> **Subject:** 403 Richmond Rd. and 389 Roosevelt Ave - Servicing Capacity Assessment - RVCA Pre-consult

Hello Jamie,

We are currently performing an Adequacy of Public Services Report in support of a zoning by-law amendment application for a proposed

development located at 403 Richmond Road and 389 Roosevelt Ave in Ottawa, Ontario (See attached key plan). The proposed development involves the construction of a 10-storey mixed-use residential and commercial building.

I wanted to get your input on Natural Heritage/Hazards features that may impact the development as well as any Storm Water Management Criteria for the site and required approvals/permits.

A few specific items for your consideration as follows:

- 1. The stormwater collected from the site travels approximately 650 m to the Ottawa River. The flow path is highlighted in the attached key plan.
- 2. The development will connect to the existing 300 mm Ø storm sewer within Roosevelt Avenue and will discharge primarily rooftop stormwater.
  - a. Will quality control for rooftop areas be required?
  - b. Considering parking will be underground, with limited exterior hard surface at the ground level would a mechanical separator still be required for hydrocarbon removal?
  - c. Would the use of raingardens or alternative low impact development stormwater measures meet RVCA's requirements for enhanced quality control for this site?
  - d. Should an internal/underground storage tank be required and provided with detention time for settlement of suspended solids would this meet the requirement for enhanced quality control for this site?

Please do not hesitate to contact me if you have any questions, want to discuss or need clarification.

Thank you,

**TIM KENNEDY,** P.Eng. Project Manager / Infrastructure

T 613-860-2462 ext. 6620 M 613-462-3627 F 613-860-1870 110-240 Catherine Street, Ottawa, ON K2P 2G8 CANADA

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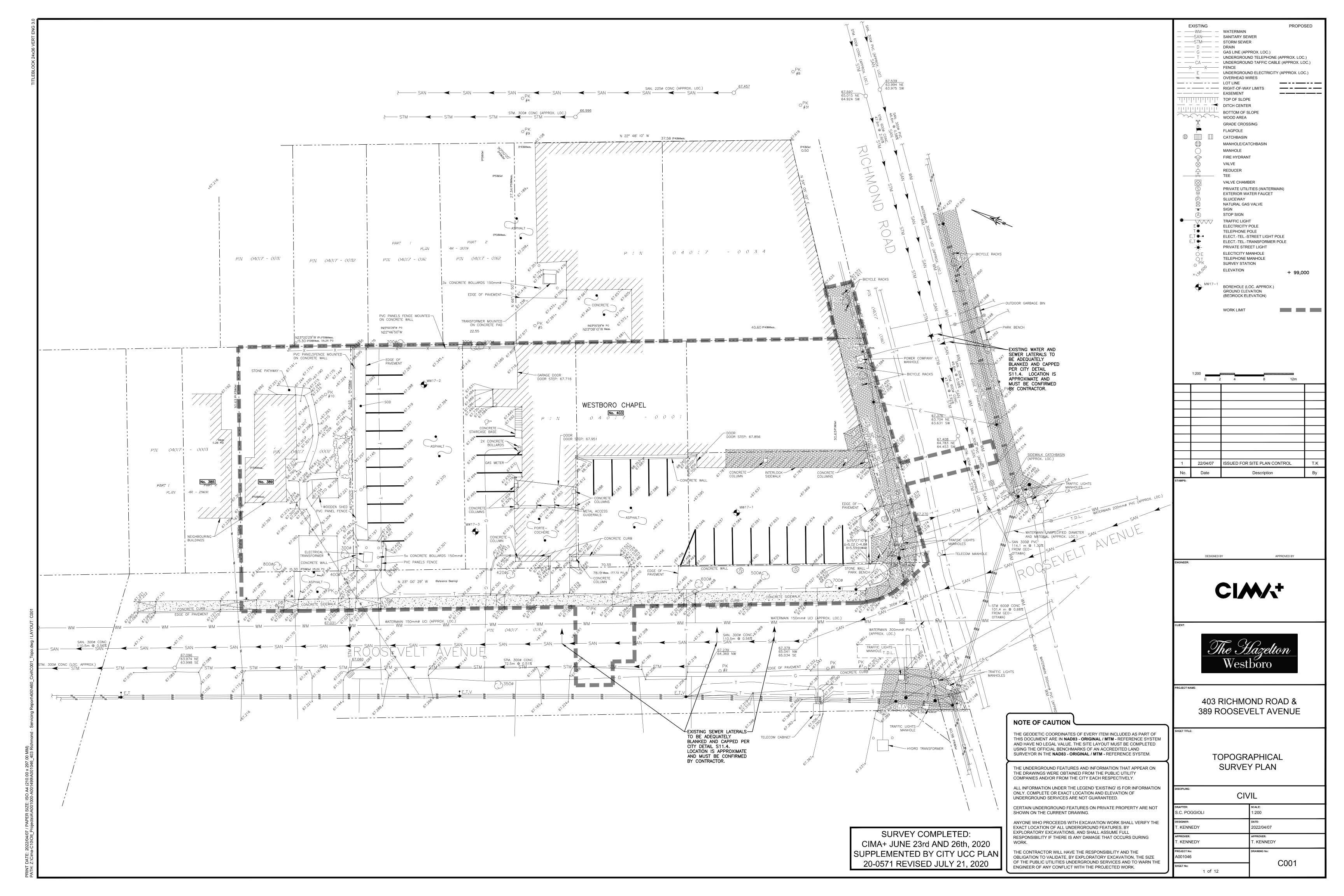
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B

Appendix B Existing Conditions Plan





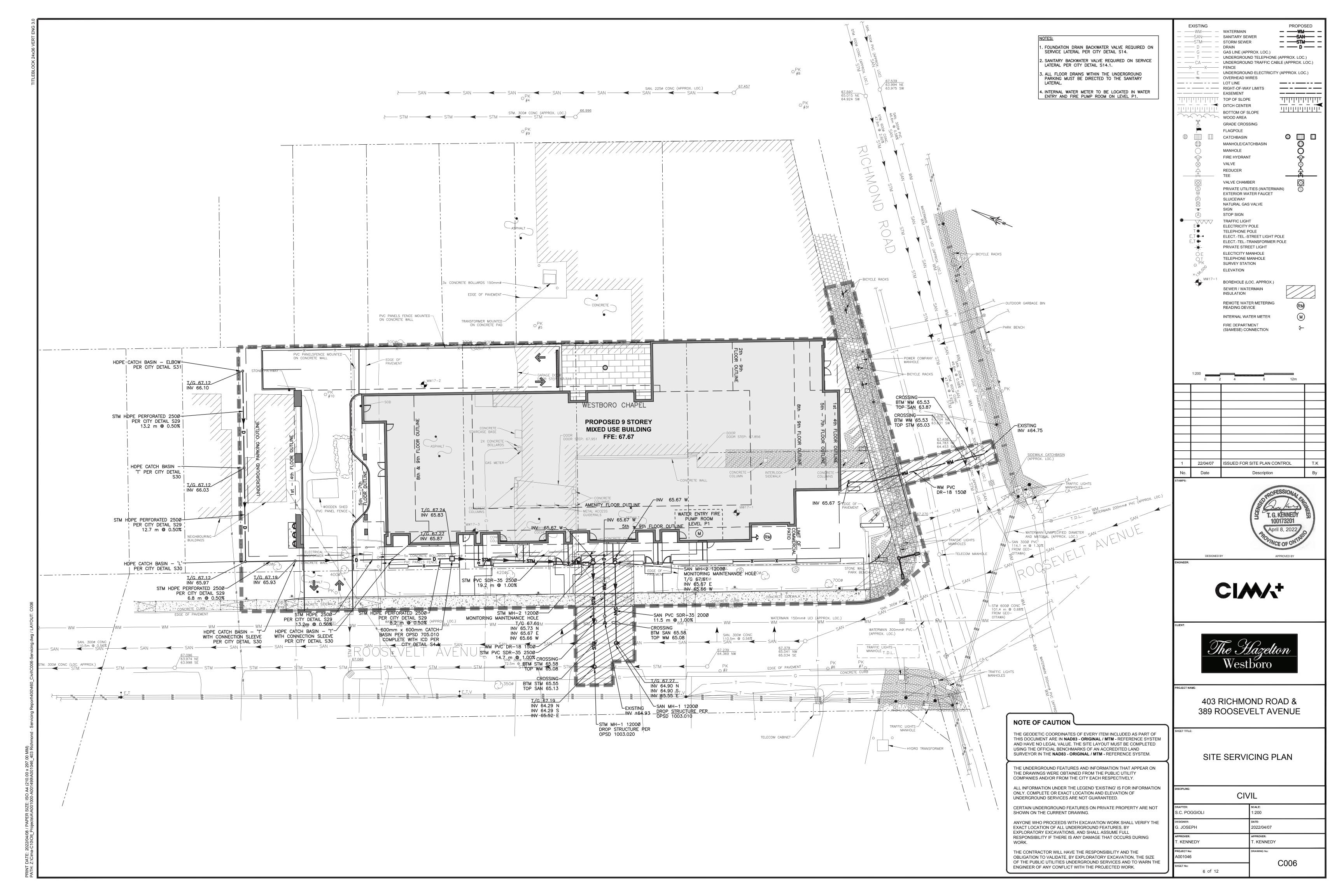


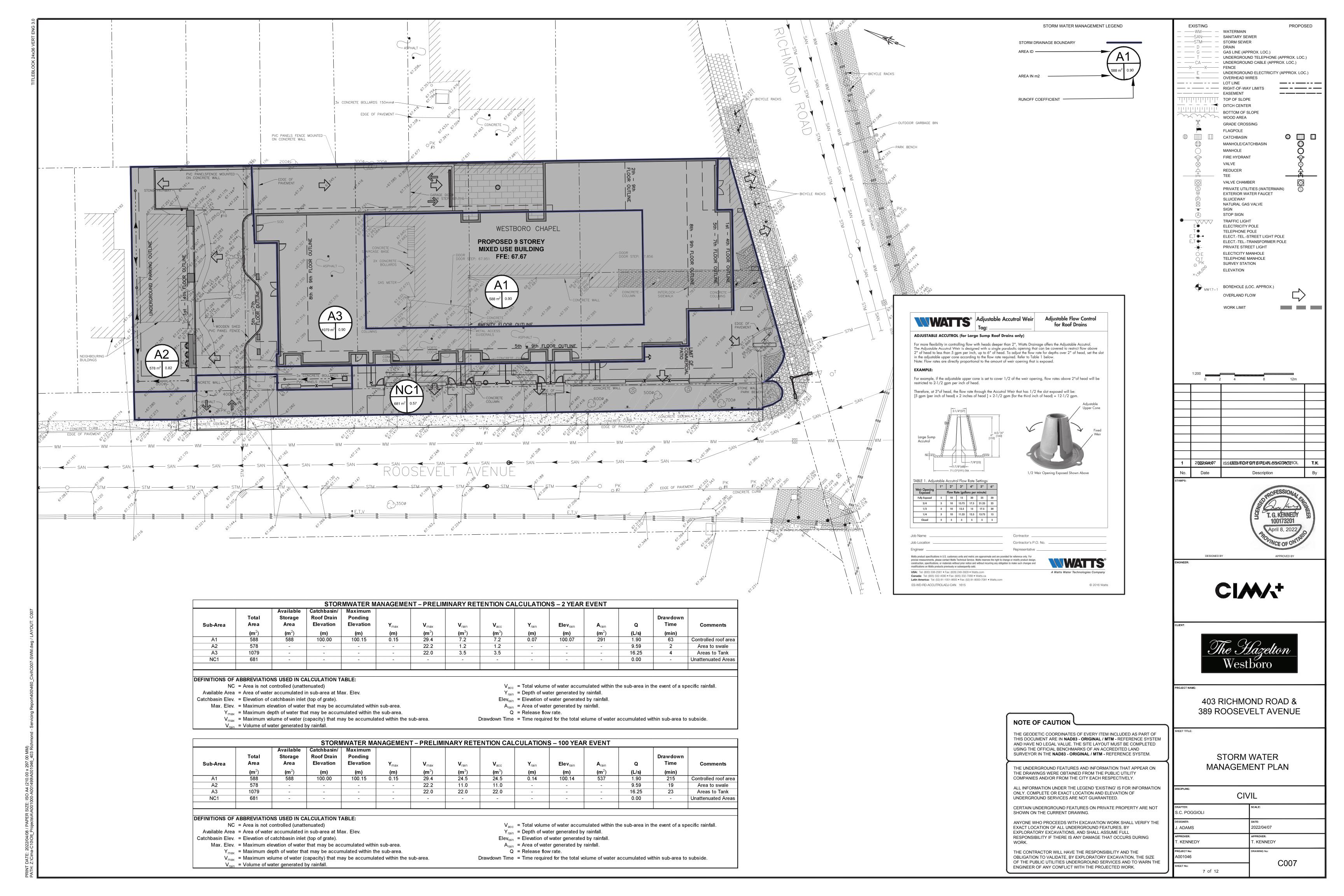


Appendix C Site Servicing and Stormwater Management Plan









Appendix D Water Supply Design Calculations





PROJECT NAME: 403 Richmond Road and 389 Roosevelt Avenue

Multi-use Development (Commercial/Residential)

CIMA+ PROJECT NUMBER: A001046

**CLIENT:** Starwood Group Inc.

PROJECT STATUS: Detailed Design (Site Plan Control)

# WATER CONSUMPTION CALCULATIONS

## **APPLICABLE DESIGN GUIDELINES:**

- 1. Ottawa Design Guidelines Water Distribution (2010)
- 2. City of Ottawa Technical Bulletin ISTB-2018-02, ISDTB-2014-02 and ISD-2010-02
- 3. MOE Design Guidelines for Drinking-Water Systems

# **RESIDENTIAL AND COMMERCIAL WATER DEMANDS:**

#### **RESIDENTIAL DESIGN CRITERIA:**

Residential Average Day Demand: 350 L/c/day

Maximum Day Peaking Factor:
4.1 x Average Daily Demand
Maximum (Peak Hour) Peaking Factor:
6.2 x Average Daily Demand

#### **EQUIVALENT POPULATION:**

Unit Type	Number of Units	Persons Per Unit	Population
1 Bedroom Unit	21	1.4	29
1 Bedroom + Den Unit	70	1.4	98
2 Bedroom Unit	25	2.1	53
2 Bedroom + Den Unit	20	2.1	42
3 Bedroom Unit	1	3.1	3
3 Bedroom + Den Unit	4	3.1	12
Total	141		237

## Per Unit Populations:

Table 4.1 Per Unit Populations			
Unit Type	Persons Per Unit		
Single Family	3.4		
Semi-detached	2.7		
Duplex	2.3		
Townhouse (row)	2.7		
Apartments:			
Bachelor	1.4		
1 Bedroom	1.4		
2 Bedroom	2.1		
3 Bedroom	3.1		
Average Apt.	1.8		

## **COMMERCIAL DESIGN CRITERIA:**

Contributing Commercial Area: 0.083 gross ha (including commercial area, amenity rooms, and party room)

Commercial Average Day Demand: 28,000 L/gross ha/d

Maximum Day Peaking Factor:

1.5 x Average Daily Demand
Maximum (Peak Hour) Peaking Factor:

1.8 x Maximum Daily Demand

# **WATER DEMANDS:**

Demand Type	Average Daily Demand (L/s)	Maximum Daily Demand (L/s)	Maximum (Peak) Hour Demand (L/s)
Residential	0.96	3.94	5.95
Commercial	0.03	0.04	0.07
Total	0.99	3.98	6.03

# NOTES:

- 1. Maximum Day and Maximum Hour residential peaking factors determined using Table 3-3 of the MOE Design Guidelines for Drinking-Water System for 0 to 500 persons.
- 2. Given basic day demand greater than 50 m³/day (0.57 L/s), two connections, separated by an isolation valve required. Furthermore given location on corner lot, City will not support the addition of an isolation valve on the main line, thus one connection to Richmond Rd and one connection to Roosevelt Ave. required.

Prepared by: Jaymeson Adams, EIT Date: 2022-04-07

Verified by: \_\_\_\_ Tim Kennedy, P.Eng. \_\_\_\_ Date: \_\_2022-04-07

PEO# 100173201



PROJECT NAME: 403 Richmond Road and 389 Roosevelt Avenue Multi-use Development (Commercial/Residential)

CIMA+ PROJECT NUMBER: A001046

CLIENT: Starwood Group Inc.

PROJECT STATUS: Detailed Design (Site Plan Control)

#### FIRE FLOW ASSESSMENT

## **APPLICABLE DESIGN GUIDELINES:**

- 1. Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection, 1999
- 2. Ottawa Design Guidelines Water Distribution (2010) including Appendix H per ISTB-2018-02
- 3. City of Ottawa Technical Bulletin ISTB-2018-02
- 4. MOE Design Guidelines for Drinking-Water Systems

## STEP A - DETERMINE THE TYPE OF CONSTRUCTION

Type of Construction	Coefficient (C)	Value Selected (C)
Fire-resistive Construction (> 3 hours)	0.6	
Non-combustible Construction	0.8	0.6
Ordinary Construction	1	0.0
Wood Frame Construction	1.5	

## STEP B - DETERMINE THE FLOOR AREA

Floor/Level	Floor Area Per Level (sq. ft.)	Floor Area Per Level (m2)	Fire Resistive Building	Protected Openings (one hour rating)	Area of Structure Considered (m2)
Gross Floor Area (GFA) Ground Level:	14,649	1,361			-
GFA Level 2:	17,029	1,582			396
GFA Level 3:	17,029	1,582			1,582
GFA Level 4:	17,029	1,582			396
GFA Level 5:	13,277	1,233	YES	YES	-
GFA Level 6:	13,277	1,233	169	YES	-
GFA Level 7:	13,277	1,233			-
GFA Level 8:	11,124	1,033			-
GFA Level 9:	11,124	1,033			-
Mechanical Penthouse:	5,486	510			-
TOTAL FLOOR AREA (A):	133,301	12,384			2,373

## STEP C - DETERMINE THE HEIGHT IN STOREYS

Floor/Level	Number of Storeys	Percent of Floor Area Considered
Ground Level:	1	-
Level 2:	1	25%
Level 3:	1	100%
Level 4:	1	25%
Level 5:	1	-
Level 6:	1	-
Level 7:	1	-
Level 8:	1	-
Level 9:	1	-
Mechanical Penthouse:	1	-
HEIGHT IN STOREYS:	10	

# STEP D - DETERMINE BASE FIRE FLOW (ROUND TO NEAREST 1,000 L/min)

 $F = 220C\sqrt{A}$ 

Where

F is the required fire flow in L/min

C is the coefficient related to the type of construction, and;

A is the total floor area of the building in m<sup>2</sup>

Coefficient Related to Type of Construction (C) = 0.6Floor Area Considered (A) = 2,373 m<sup>2</sup>

REQUIRED (BASE) FIRE FLOW (F) = 6000 L/min (Rounded to Nearest 1,000 L/min)



PROJECT NAME: 403 Richmond Road and 389 Roosevelt Avenue Multi-use Development (Commercial/Residential)

CIMA+ PROJECT NUMBER: A001046

CLIENT: Starwood Group Inc.

PROJECT STATUS: Detailed Design (Site Plan Control)

#### FIRE ELOW ASSESSMENT

# STEP E - DETERMINE THE INCREASE OR DECREASE FOR OCCUPANCY AND APPLY TO STEP D (STEP D x STEP E, DO NOT ROUND)

Occupancy Class	Occupancy Factor	Value Selected (C)
Non-combustible	0.75	
Limited combustible	0.85	
Combustible	1.00	1.00
Free burning	1.15	
Rapid burning	1.25	

REQUIRED (BASE) FIRE FLOW (F) = 6000 L/min (Not rounded)

# STEP F - DETERMINE THE DECREASE, IF ANY, FOR AUTOMATIC SPRINKLER PROTECTION AND APPLY TO VALUE IN STEP D ABOVE (DO NOT ROUND)

Sprinkler System Design	Sprinkler Design Charge	Value Selected (C)	Total Charge
Automatic sprinkler system conforming to NFPA standards	-30%	Yes	-30%
Standard water supply	-10%	Yes	-10%
Fully supervised system	-10%	No	0%
TOTAL CHARGE FOR SPRINKLER SYSTEM			-40%

DECREASE FOR SPRINKLER PROTECTION = -2400 L/min (Not rounded)

## STEP G - DETERMINE THE TOTAL INCREASE FOR EXPOSURES AND APPLY TO VALUE IN STEP D ABOVE (DO NOT ROUND)

Façade	Separation Distance (m)	Length-height Factor of Exposed Wall (m-storeys)	of Exposed	Total Charge
North Façade	6	40	Wood Frame	18%
East Façade (fire/party wall)	0	N/A	N/A	10%
South Façade	25	80	Fire Resistive or Ordinary with Unprotected Openings	8%
West Façade	27	18	Wood Frame	8%
TOTAL CHARGE FOR EXPOSURES				44%

INCREASE FOR EXPOSURES = 2640 L/min (Not rounded)

# STEP H - DETERMINE FIRE FLOW INCLUDING ALL INCREASES AND REDUCTIONS ((STEP E + STEP F + STEP G, ROUND TO NEAREST 1,000 L/min)

TOTAL REQUIRED FIRE FLOW (RFF) =	6000 L/min (Rounded to Nearest 1,000 L/min)
	100 L/s
	1585 USGPM



PROJECT NAME: 403 Richmond Road and 389 Roosevelt Avenue Multi-use Development (Commercial/Residential)

CIMA+ PROJECT NUMBER: A001046

CLIENT: Starwood Group Inc.

PROJECT STATUS: Detailed Design (Site Plan Control)

#### FIRE FLOW ASSESSMENT

#### NOTES/COMMENTS:

#### STEP A - DETERMINE THE TYPE OF CONSTRUCTION

1. No notes or comments

#### STEP B - DETERMINE THE FLOOR AREA

- 1. Assumed vertical openings and exterior vertical communications are properly protected (one hour rating), thus only the area of the largest floor plus 25% of each of the two immediately adjoining floors accounted for per Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection, 1999
- 2. Per the Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection, 1999, Note E: Fire Walls In determining floor areas, a fire wall that meets or exceeds the requirements of the current edition of the National Building Code of Canada (provided this necessitates a fire resistance rating of 2 or more hours) may be deemed to subdivide the building into more than one area or may, as a party wall, separate the building from an adjoining building. It is assumed that the party wall to the east will have a fire-resistance rating of at least two hours.

## STEP C - DETERMINE THE HEIGHT IN STOREYS

1. Two levels of underground parking not considered as they are at least 50% below grade (note F of Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection, 1999)

## STEP D - DETERMINE BASE FIRE FLOW (ROUND TO NEAREST 1,000 L/min)

1. No notes or comments.

#### STEP E - DETERMINE THE INCREASE OR DECREASE FOR OCCUPANCY AND APPLY TO STEP D (STEP D x STEP E, DO NOT ROUND)

1. Occupancy selected assuming commercial establishment will fall under C-3 occupancy type.

# STEP F - DETERMINE THE DECREASE, IF ANY, FOR AUTOMATIC SPRINKLER PROTECTION AND APPLY TO VALUE IN STEP D ABOVE (DO NOT ROUND)

Assumes sprinkler system will not be fully supervised.

#### STEP G - DETERMINE THE TOTAL INCREASE FOR EXPOSURES AND APPLY TO VALUE IN STEP D ABOVE (DO NOT ROUND)

1. Assumes adjoining wall to east is an unpierced party wall considered to form a boundary when determining floor areas warranting a 10% exposure charge per Note E of the Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection, 1999

#### STEP H - DETERMINE FIRE FLOW INCLUDING ALL INCREASES AND REDUCTIONS ((STEP E + STEP G, ROUND TO NEAREST 1,000 L/min)

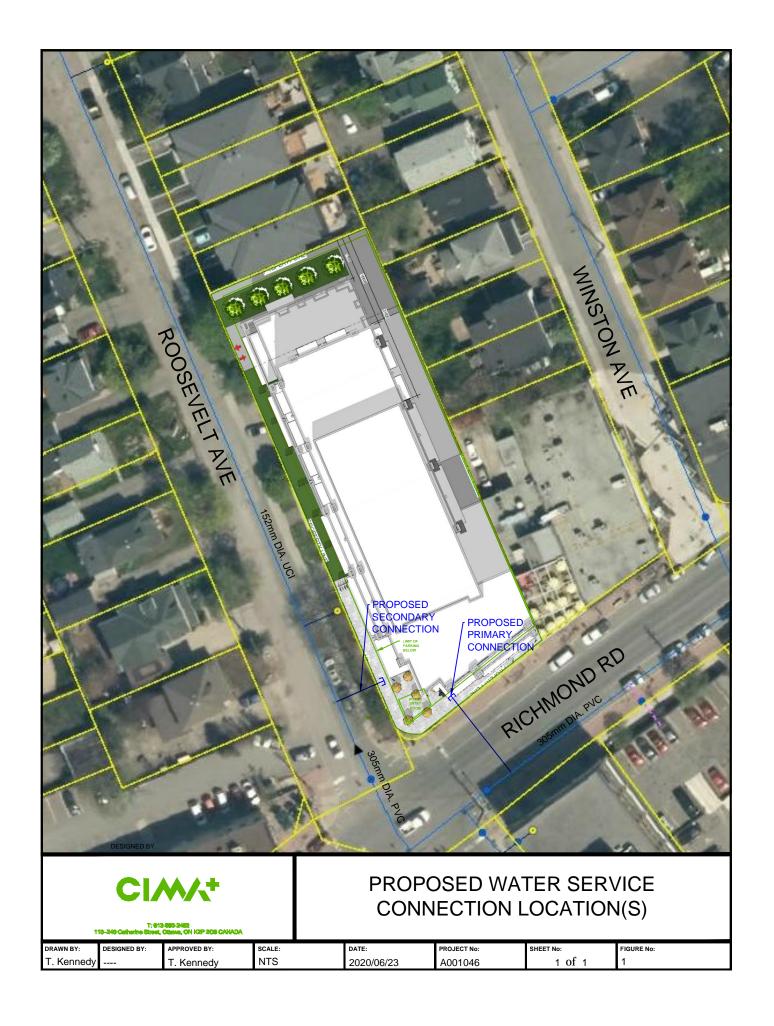
1. No notes or comments.

Prepared by: Jaymeson Adams, EIT Date: 2022-04-07

Verified by: Tim Kennedy, P.Eng. Date: 2022-04-07

PEO# 100173201

Z:Cima-C10/Ott\_Projects/A/A001000-A001499/A001046\_403 Richmond - Servicing Report/300/360\_Civil/220218\_Site Plan Control/03\_WM/[220407\_Water Demands and Analysis.xlsx|Fire Flow









403 Richmond Road and 389 Roosevelt Avenue PROJECT NAME: Multi-use Development (Commercial/Residential) A001046

CIMA+ PROJECT NUMBER:

**CLIENT:** Starwood Group Inc.

**PROJECT STATUS:** Detailed Design (Site Plan Control)

## **HYDRAULIC ANALYSIS - WATER**

#### **APPLICABLE DESIGN GUIDELINES:**

- 1. Ottawa Design Guidelines Water Distribution (2010)
- 2. City of Ottawa Technical Bulletin ISDTB-2014-02 and ISD-2010-02
- 3. MOE Design Guidelines for Drinking-Water Systems

## **MUNICIPAL BOUNDARY CONDITIONS**

# HYDRAULIC BOUNDARY CONDITIONS (PROVIDED BY THE CITY OF OTTAWA):

Hydraulic Condition	Boundary Condition (Head) (m)		
(HGL = Hydraulic Grade Line)	Richmond Rd. 305 mm dia.	Roosevelt Ave. 152 mm dia.	
Minimum HGL	108.5	108.5	
Maximum HGL	115.0	115.0	
Maximum Day + Fire Flow	N/A	N/A	

## AVAILABLE HYDRANT FLOWS - MULTI-HYDRANT ANALYSIS (PROVIDED BY THE CITY OF OTTAWA):

Hydrant ID	Available Flow (L/s)
362027H067	85
362028H045	30
Total	115

# HYDRAULIC ANALYSIS - WATER SUPPLY ADEQUACY (FLOW AND PRESSURE)

# **DESIGN CRITERIA - WATERMAIN PRESSURE AND DEMAND OBJECTIVES:**

Demand Type	Minimum Pressure (psi)	Desired Minimum Pressure (psi)	Desired Maximum Pressure (psi)	Maximum Pressure (psi)
Average Daily Demand	40.0	50.0	70.0	80.0
Maximum Daily Demand + Fire Flow	20.0			
Maximum (Peak) Hour Demand	40.0			

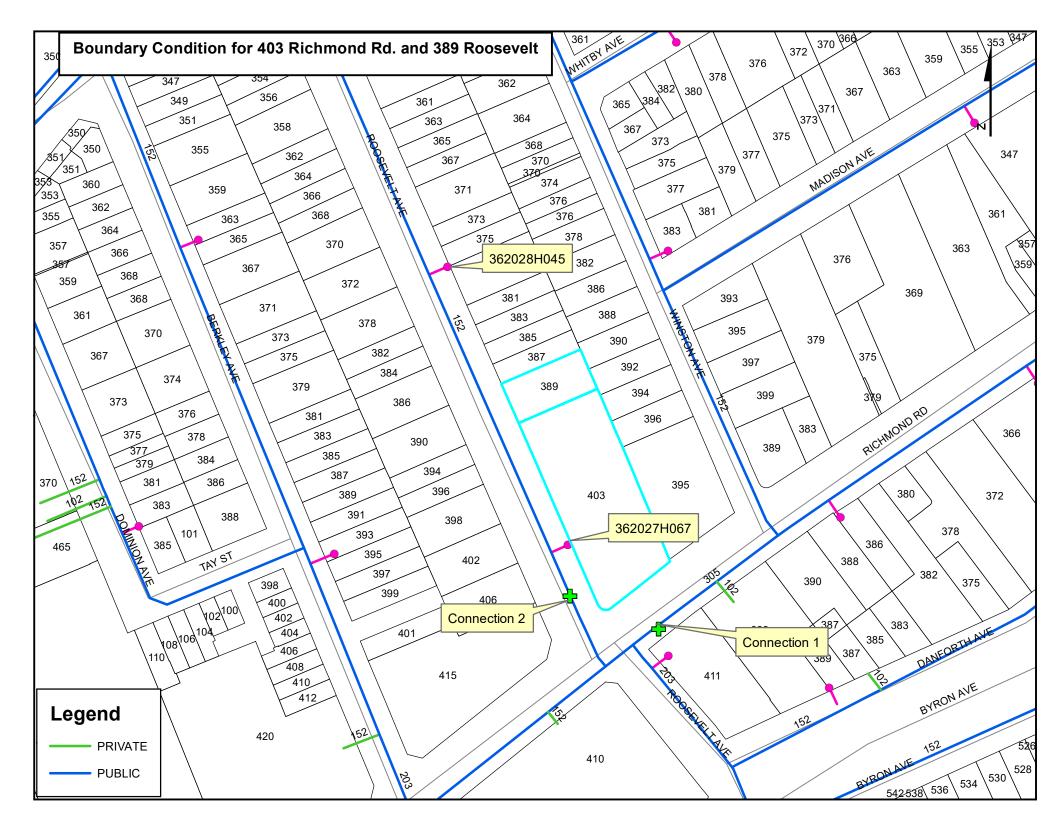
# WATERMAIN PRESSURE AND DEMAND ANALYSIS SUMMARY - PROPOSED DEVELOPMENT:

	Proposed Demand (L/s)	Available Flow/Pressure			
Demand Type		Design Operating Pressure <sup>1</sup> (Relative Head) (m)	Design Operating Pressure (psi)	Flow/Pressure Objective Achieved?	
Average Daily Demand	0.99	47.6	68	YES	
Maximum Daily Demand + Fire Flow	103.98	115 L/s @ 20 psi		YES	
Maximum (Peak) Hour Demand	6.03	41.1	58	YES	

<sup>1.</sup> Assumed ground elevation for connections 1 and 2 (m) =

# NOTES:

Prepared by:	Jaymeson Adams, EIT	Date:	2022-04-07
Verified by:	Tim Kennedy, P.Eng.	Date:	2022-04-07
	DEO# 100172201	_	



From: Fraser, Mark
To: Tim Kennedy

Cc: Christian Lavoie-Lebel; Jaymeson Adams

Subject: RE: 403 Richmond Rd. and 389 Roosevelt Ave. - Water Demands - Boundary Condition Request

**Date:** Tuesday, June 30, 2020 1:45:52 PM

Attachments: 403 Richmond Rd - 389 Roosevelt June 2020.pdf

1 200625 Water Demands and Fire Flow R1.pdf

2 200624 Fire Flow.pdf

3 200623 Figure 1 - Connections.pdf 4 200623 Figure 2 - Exposure Separation.pdf 5 200623 Figure 3 - Hydrant Coverage.pdf

Hi Tim,

Please find below boundary conditions, HGL, for hydraulic analysis at **403 Richmond Rd. and 389 Roosevelt Ave.** (zone 1W) assumed to be connected to the 305mm dia. watermain on Richmond Rd. and 152mm dia. watermain on Roosevelt Ave. (see attached PDF for location).

## **Domestic and Fire Flow Demands:**

Type of Development: The proposed development involves the construction of one (1) 10-storey mixed-use building (residential and ground floor commercial space). A total of 174 residential units are being proposed.

Average Day Demand = 1.13 L/s Maximum Day Demand = 4.29 L/s Peak Hour Demand = 6.41 L/s Fire Flow Demand = 6,000 L/min

Please include a memorandum from the Architect in the Report as supporting documentation regarding building construction to confirm the parameters and assumptions applied in the FUS method RFF calculation are accurate and confirming the unit type breakdown and commercial area of the building applied to the domestic water demand calculations are accurate.

Minimum HGL = 108.5m Maximum HGL = 115.0m

A Multi-Hydrant Analysis was performed with the two available hydrants identified by the consultant (see attached PDF for the hydrant locations). The total available flow (115 L/s) from these two fire hydrants exceeds the required fire flow (100 L/s).

Hydrant	<b>Available Flow</b>		
362027H067	85 L/s		
362028H045	30 L/s		
Total	115 L/s		

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

**Disclaimer:** The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a

variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation.

Let us know if you have any questions.

Regards,

# Mark Fraser, P. Eng.

Project Manager, Planning Services
Development Review Central Branch
City of Ottawa | Ville d'Ottawa
Planning, Infrastructure and Economic Development Department
110 Laurier Avenue West. 4th Floor, Ottawa ON, K1P 1J1
Tel:613.580.2424 ext. 27791

Fax: 613-580-2576 Mail: Code 01-14

Email: Mark.Fraser@ottawa.ca

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From: Tim Kennedy <Tim.Kennedy@cima.ca>

**Sent:** June 25, 2020 7:01 AM

**To:** Fraser, Mark < Mark. Fraser@ottawa.ca>

**Cc:** Christian Lavoie-Lebel < Christian.Lavoie-Lebel@cima.ca>; Jaymeson Adams

<Jaymeson.Adams@cima.ca>

Subject: RE: 403 Richmond Rd. and 389 Roosevelt Ave. - Water Demands - Boundary Condition

Request

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Hi Mark,

Apologies but small correction to the demands below and attached.

Regards.

**TIM KENNEDY**, P.Eng. Project Manager / Infrastructure **T** 613 860-2462 ext. 6620 **M** 613 462-3627

# CIMA+

**From:** Tim Kennedy

**Sent:** Thursday, June 25, 2020 6:33 AM **To:** Fraser, Mark < <u>Mark.Fraser@ottawa.ca</u>>

**Cc:** Christian Lavoie-Lebel < <u>Christian.Lavoie-Lebel@cima.ca</u>>; Jaymeson Adams

<Jaymeson.Adams@cima.ca>

Subject: 403 Richmond Rd. and 389 Roosevelt Ave. - Water Demands - Boundary Condition Request

Good morning Mark,

We would like to kindly request boundary conditions for the proposed development at **403 Richmond Road and 389 Roosevelt Ave**. Please find the proposed development information below and detailed calculations and associated figures attached (including: (1) Water Demand Calculations, (2) Fire Flow Calculations, (3) Figure 1 - Proposed Water Service Connection Locations, (4) Figure 2 - Exposure Separation Distances, (5) Figure 3 - Fire Hydrant Coverage and (6) Architectural Concept Plans for reference):

- 1. **Type of Development and Units:** The proposed development involves the construction of one (1) 10-storey mixed-use building (residential and ground floor commercial space). There is a total of **174 residential units**. An underground 2-level parking garage extending the footprint of the site is also proposed.
- 2. Site Address: 403 Richmond Rd. and 389 Roosevelt Ave.
- 3. Location of Services: Please see attached Figure 1.
  - a. Richmond Road 305 mm diameter PVC watermain.
  - b. Roosevelt Avenue 305 mm diameter PVC watermain reducing to 152 mm diameter UCI watermain.
- 4. Plan showing Proposed Water Connections: Please see attached Figure 1.
  - a. Primary connection to Richmond Road 305 mm dia. watermain;
  - b. Secondary connection to Roosevelt Avenue 152 mm dia. watermain.
- 5. Average Daily Demand: 1.13 L/s
- 6. Maximum Daily Demand: 4.84 L/s 4.29 L/s
- 7. **Peak Hour Demand:** 7.27 L/s 6.41 L/s
- 8. Required Fire Flow (RFF): 6,000 L/min

If you have any questions or concerns please do not hesitate to contact me.

Best regards,

Project Manager / Infrastructure

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•

E

Appendix E Sanitary Servicing Design Calculations





403 Richmond Road and 389 Roosevelt Avenue **PROJECT NAME:** 

Multi-use Development (Commercial/Residential)

CIMA+ PROJECT NUMBER: A001046

CLIENT: Starwood Group Inc.

**PROJECT STATUS:** Detailed Design (Site Plan Control)

## **WASTEWATER PEAK FLOW DETERMINATION**

#### **APPLICABLE DESIGN GUIDELINES:**

- 1. City of Ottawa Sewer Design Guidelines, 2012
- 2. City of Ottawa Technical Bulletin ISTB-2018-01

## **DOMESTIC CONTRIBUTIONS:**

# **RESIDENTIAL DESIGN CRITERIA:**

Residential Average Flow: (1) Residential Peak Factor (P.F.): 280 L/c/day

Harmon Equation (Min 2.0 and Max 4.0)

P.F.= 1 + 
$$\left(\frac{14}{4 + \left(\frac{P}{1000}\right)^{\frac{1}{2}}}\right) * K$$
 where:

P=Population

K=Correction Factor = 0.8

#### Per Unit Populations:

Unit Type Persons Per Uni				
Single Family	3.4			
Semi-detached	2.7			
Duplex	2.3			
Townhouse (row)	2.7			
Apartments:				
Bachelor	1.4			
1 Bedroom	1.4			
2 Bedroom	2.1			
3 Bedroom	3.1			
Average Apt.	1.8			

#### **AVERAGE FLOW - DOMESTIC:**

Unit Type	Number of Units	Persons Per Unit	Population	Average Flow (L/s)
1 Bedroom Unit	21	1.4	29	0.09
1 Bedroom + Den Unit	70	1.4	98	0.32
2 Bedroom Unit	25	2.1	53	0.17
2 Bedroom + Den Unit	20	2.1	42	0.14
3 Bedroom Unit	1	3.1	3	0.01
3 Bedroom + Den Unit	4	3.1	12	0.04
Total	141		237	0.77

### **PEAK FLOW - DOMESTIC:**

Population: (2) 237 persons Average Dry Weather Flow:  $(3) = (1) \times (2)$ 0.77 L/s Peaking Factor (P.F.): (4) Peak Domestic Flow:  $(5) = (3) \times (4)$ 2.69 L/s

# **COMMERCIAL & INSTITUTIONAL CONTRIBUTIONS:**

## **COMMERCIAL AND INSTITUTIONAL DESIGN CRITERIA:**

Commercial Average Flow: (6) 28,000 L/gross ha/d

Commercial Peak Factor: 1.5 if commercial contribution >20%, otherwise use 1.0

**AVERAGE FLOW - COMMERCIAL:** 

0.083 Contributing Commercial Area: (7) gross ha (including commercial area, amenity rooms, and party room)

Average Dry Weather Flow:  $(8) = (6) \times (7)$ 0.03 L/s

**PEAK FLOW - COMMERCIAL:** 

Percent Commercial Area Contribution: 6% (GFA/Commercial Floor Area)

Peaking Factor: (9) 1 00

Peak Commercial Flow: (10) = (8) x (9) 0.03 L/s

# **EXTRANEOUS FLOW CONTRIBUTION - INFLOW AND INFILTRATION:**

**EXTRANEOUS DESIGN CRITERIA:** 

Dry Weather Infiltration: 0.05 L/s/effective gross ha (for all areas) Wet Weather Infiltration: 0.28 L/s/effective gross ha (for all areas)

**PEAK FLOW - EXTRANEOUS:** 

Effective Gross Area: (11) 0.21 ha

L/s/effective gross ha (for all areas) Total Infiltration Allowance: (12) 0.33

Peak Extraneous Flow: (13) = (11) x (12) 0.07



PROJECT NAME: 403 Richmond Road and 389 Roosevelt Avenue Multi-use Development (Commercial/Residential)

CIMA+ PROJECT NUMBER: A001046

**CLIENT:** Starwood Group Inc.

**PROJECT STATUS:** Detailed Design (Site Plan Control)

# **WASTEWATER PEAK FLOW DETERMINATION**

Total Estimated Avg. Dry Weather Flow Rate:

Total Estimated Peak Dry Weather Flow Rate:

Total Estimated Peak Wet Weather Flow Rate:

2.71 L/s

Total Estimated Peak Wet Weather Flow Rate:

2.78 L/s

Prepared by: Jaymeson Adams, EIT Date: 2022-04-07

Verified by: Tim Kennedy, P.Eng. Date: 2022-04-07

PEO# 100173201

Z:\Cima-C10\Ott\_Projects\A\A001000-A001499\A001046\_403 Richmond - Servicing Report\300\360\_Civil\220218\_Site Plan Control\01\_SAN\\[220407\_Sanitary Flow.xlsx|Sheet1

From: Fraser, Mark
To: Tim Kennedy

Cc: Christian Lavoie-Lebel; Jaymeson Adams

Subject: RE: 403 Richmond Rd. and 389 Roosevelt Ave. - Peak Wastewater Demand - Capacity Confirmation

**Date:** Thursday, June 25, 2020 9:56:53 AM

Attachments: <u>image001.jpg</u>

image002.jpg

200616 Sanitary Flow revuTK.pdf 2020-05-27 - Concept.pdf

Hi Tim,

The Water Resources Assets Unit has reviewed the proposed peak wastewater flow of 3.13 L/s estimated to be generated from the subject redevelopment proposal and have no issues.

Regards,

# Mark Fraser, P. Eng.

Project Manager, Planning Services
Development Review Central Branch
City of Ottawa | Ville d'Ottawa
Planning, Infrastructure and Economic Development Department
110 Laurier Avenue West. 4th Floor, Ottawa ON, K1P 1J1
Tel:613.580.2424 ext. 27791

Fax: 613-580-2576 Mail: Code 01-14

Email: Mark.Fraser@ottawa.ca

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**From:** Tim Kennedy <Tim.Kennedy@cima.ca>

**Sent:** June 17, 2020 12:40 PM

**To:** Fraser, Mark < Mark. Fraser@ottawa.ca>

Cc: Christian Lavoie-Lebel < Christian. Lavoie-Lebel@cima.ca>; Jaymeson Adams

<Jaymeson.Adams@cima.ca>

Subject: 403 Richmond Rd. and 389 Roosevelt Ave. - Peak Wastewater Demand - Capacity

Confirmation

CAUTION: This email originated from an External Sender. Please do not click links or open attachments unless you recognize the source.

ATTENTION : Ce courriel provient d'un expéditeur externe. Ne cliquez sur aucun lien et n'ouvrez pas de pièce jointe, excepté si vous connaissez l'expéditeur.

We would like to kindly submit the anticipated sanitary demands for the proposed development at **403 Richmond Road and 389 Roosevelt Ave**. Please find the proposed development information below and detailed calculations attached (I have also attached the Architectural Concept Plans for reference):

- 1. <u>Type of Development and Units:</u> The proposed development involves the construction of one (1) 10-storey mixed-use building (residential and commercial space). There is a total of **174 residential units**. An underground 2-level parking garage extending the footprint of the site is also proposed.
- 2. Site Address: 403 Richmond Road and 389 Roosevelt Ave.
- 3. **Location of Services:** connection to existing 300 mm diameter concrete sanitary sewer on Roosevelt Avenue with new maintenance hole on sewer main anticipated.
- 4. Total Estimated Average Dry Weather Flow Rate: 0.91 L/s
- 5. **Total Estimated Peak Dry Weather Flow Rate:** 3.06 L/s
- 6. Total Estimated Peak Wet Weather Flow Rate: 3.13 L/s

Could you please confirm if there is enough capacity in the City system to accommodate the proposed wastewater flow. Note that I will be out of the office next week, however you can contact Christian or Jaymeson (cc'd above) if you require anything further while I am away.

Best regards,

# TIM KENNEDY, P.Eng.

Project Manager / Infrastructure

**T** 613-860-2462 ext. 6620 **M** 613-462-3627 **F** 613-860-1870 110–240 Catherine Street, Ottawa, ON K2P 2G8 CANADA

Notice to our customers on the COVID-19



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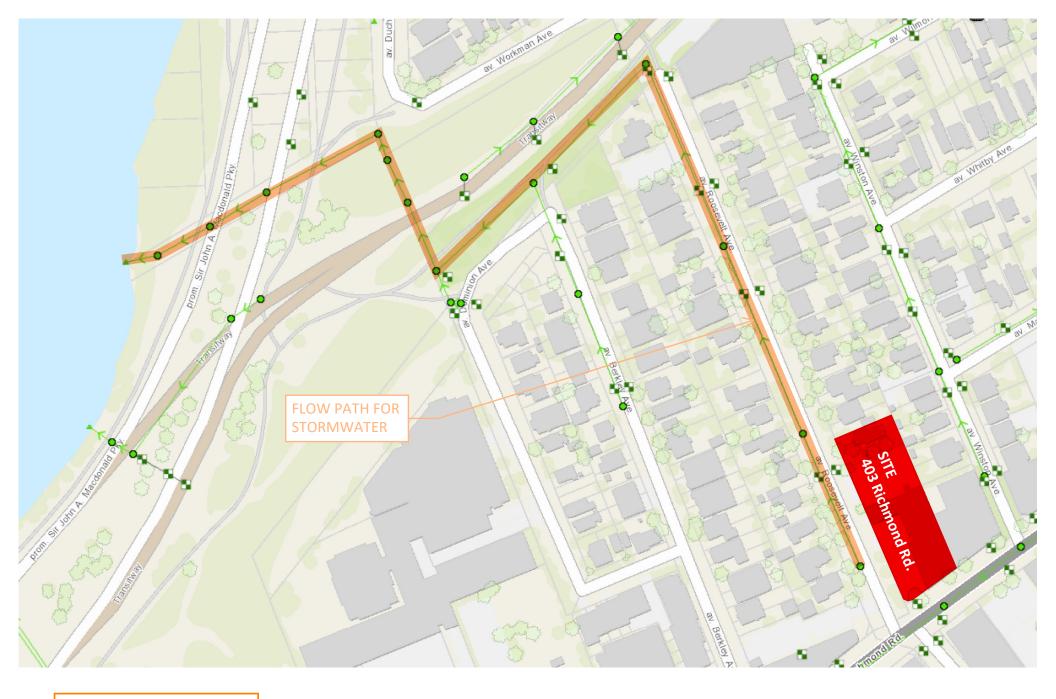
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Appendix F Storm Servicing and Stormwater Management Calculations





JAYMESON ADAMS, EIT A001046 2020-06-30



Multi-use Development (Commercial/Residential)

CIMA+ PROJECT NUMBER: A001046

**CLIENT:** Starwood Group Inc.

**PROJECT STATUS:** Detailed Design (Site Plan Control)

# STORM PRE-DEVELOPMENT FLOW

#### **APPLICABLE DESIGN GUIDELINES:**

1. City of Ottawa Sewer Design Guidelines, 2012

# PRE-DEVELOPMENT FLOW DETERMINATION:

#### **DESIGN CRITERIA:**

Design Storm (year):	2	
IDF Regression Constants: (a)	732.951	
(b)	6.199	
(c)	0.810	
IDF Curve Equation (mm/hr):	I = a / (Time	e in min + b) <sup>c</sup>
Rational Formula (L/s):	Q = 2.78C*I*A	where: Q = Flow (L/s) C = Runoff Coefficient I = Rainfall Intensity (mm/hr) A = Area (hectares)

#### ALLOWABLE RELEASE RATE - SUMMARY:

Catchment ID	Area (A) ha	Runoff Coefficient (C)	Time of Concentration (tc)	Intensity (I) <sub>mm/hr</sub>		Release Flow Per Unit Area (Q/ha) L/s/ha
Subject Site	0.26	0.50	10	76.81	27.74	106.67

#### NOTES:

- 1. Calculated Time of Concentration (tc) using Bransby Williams (C > 0.4) is 7 min. Minimum Tc of 10 min used per City Standard...
- 2. Calculated runoff coefficient (C) equal to 0.78 for 2-year event. Maximum C of 0.50 used per City Standard.
- 3. IDF Parameters per City of Ottawa Sewer Design Guidelines, 2012 (Macdonald-Cartier International Airport)

 Verified by:
 Tim Kennedy, P.Eng.
 Date:
 2022-04-07

 PEO# 100173201
 Date:
 2022-04-07



Multi-use Development (Commercial/Residential)

CIMA+ PROJECT NUMBER: A001046

**CLIENT:** Starwood Group Inc.

**PROJECT STATUS:** Detailed Design (Site Plan Control)

# STORM PRE-DEVELOPMENT FLOW - EXISTING SITE FLOWS

# **APPLICABLE DESIGN GUIDELINES:**

1. City of Ottawa Sewer Design Guidelines, 2012

# PRE-DEVELOPMENT FLOW DETERMINATION - 2-YEAR EVENT: DESIGN CRITERIA:

Design Storm (year):	2	
IDF Regression Constants: (a) (b) (c)	732.951 6.199 0.810	
IDF Curve Equation (mm/hr):	I = a / (Time	e in min + b) <sup>c</sup>
Rational Formula (L/s):	Q = 2.78C*I*A	where: Q = Flow (L/s) C = Runoff Coefficient I = Rainfall Intensity (mm/hr) A = Area (hectares)

#### ALLOWABLE RELEASE RATE - SUMMARY:

Catchment ID	Area (A) ha	Runoff Coefficient (C)	Time of Concentration (tc)	Intensity (I) <sub>mm/hr</sub>	Release Rate (Q) L/s	Release Flow Per Unit Area (Q/ha) L/s/ha
Subject Site	0.26	0.78	10	76.81	43.27	166.41

# PRE-DEVELOPMENT FLOW DETERMINATION - 5-YEAR EVENT: DESIGN CRITERIA:

Design Storm (year):	5	
IDF Regression Constants: (a)	998.071	
(b)	6.053	
(c)	0.814	

### **ALLOWABLE RELEASE RATE - SUMMARY:**

Catchment ID	Area (A) ha	Runoff Coefficient (C)	Time of Concentration (tc)	Intensity (I) mm/hr	Release Rate (Q) L/s	Release Flow Per Unit Area (Q/ha) L/s/ha
Subject Site	0.26	0.78	10	104.19	58.70	225.75

# PRE-DEVELOPMENT FLOW DETERMINATION - 100-YEAR EVENT: DESIGN CRITERIA:

Design Storm (year):	100	
IDF Regression Constants: (a)	1735.688	
(b)	6.014	
(c)	0.820	

# **ALLOWABLE RELEASE RATE - SUMMARY:**

Cotohmont ID	Area	Runoff Coefficient	Time of Concentration	Intensity	Release Rate	Release Flow Per Unit Area
Catchment ID	( <b>A</b> ) ha	(C)	(tc)	( <b>I)</b> mm/hr	(Q) L/s	(Q/ha) L/s/ha
Subject Site	0.26	0.95	10	178.56	122.51	471.20



Multi-use Development (Commercial/Residential)

CIMA+ PROJECT NUMBER: A001046

**CLIENT:** Starwood Group Inc.

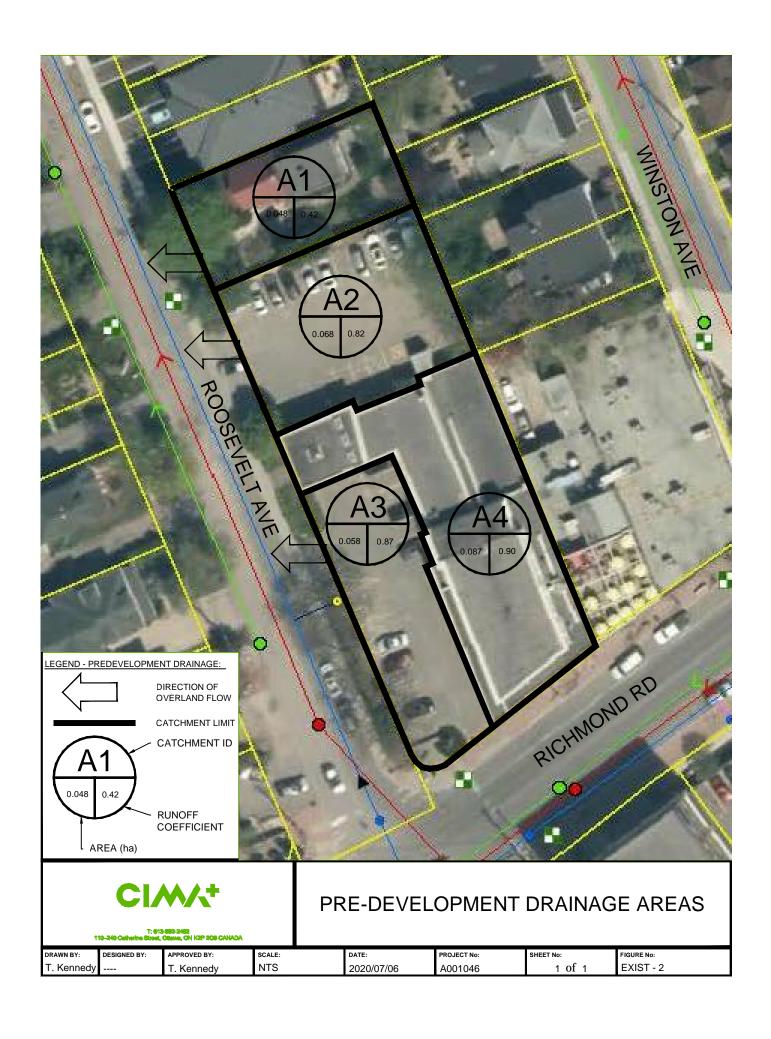
**PROJECT STATUS:** Detailed Design (Site Plan Control)

# STORM PRE-DEVELOPMENT FLOW - EXISTING SITE FLOWS

# NOTES:

- 1. Calculated Time of Concentration (tc) using Bransby Williams (C > 0.4) is 7 min. Minimum Tc of 10 min used per City Standard.
- 2. Calculated runoff coefficient (C) equal to 0.78 for 2-year event and 0.95 for 100-year event.
- 3. IDF Parameters per City of Ottawa Sewer Design Guidelines, 2012 (Macdonald-Cartier International Airport)

Prepared by: _	Jaymeson Adams, EIT	Date:	2022-04-07
Verified by:	Tim Kennedy, P.Eng.	Date:	2022-04-07
_	PEO# 100173201	_	





Multi-use Development (Commercial/Residential)

CIMA+ PROJECT NUMBER: A001046

**CLIENT:** Starwood Group Inc.

PROJECT STATUS: Detailed Design (Site Plan Control)

# STORM PRE- VS POST DEVELOPMENT FLOW - UNATTENUATED AREAS (100-YEAR)

### **APPLICABLE DESIGN GUIDELINES:**

1. City of Ottawa Sewer Design Guidelines, 2012

# PRE- vs POST-DEVELOPMENT FLOW DETERMINATION FOR UNATTENUATED AREAS: DESIGN CRITERIA:

Design Storm (year):	100	
IDF Regression Constants: (a) (b) (c)	1735.688 6.014 0.820	
IDF Curve Equation (mm/hr):	I = a / (Time	e in min + b) <sup>c</sup>
Rational Formula (L/s):	Q = 2.78C*I*A	where: Q = Flow (L/s) C = Runoff Coefficient I = Rainfall Intensity (mm/hr) A = Area (hectares)

### RELEASE RATE SUMMARY - UNATTENUATED AREAS - PRE- vs POST-DEVELOPMENT (100-year):

Design Event	Area (A)	Runoff	Time of Concentration (tc)	Intensity (I) mm/hr		Release Flow Per Unit Area (Q/ha) L/s/ha
Pre-development	0.07	0.80	10	178.56	29.4	396.80
Post-development	0.07 0.72		10	178.56	25.0	357.12
Variance (Post minus Pre)					-4.4	

#### NOTES

1. Calculated Time of Concentration (tc) using Bransby Williams (C > 0.4) is 7 min. Minimum Tc of 10 min used per City Standard...

2. IDF Parameters per City of Ottawa Sewer Design Guidelines, 2012 (Macdonald-Cartier International Airport)

Prepared by: \_\_\_\_\_ Jaymeson Adams, EIT \_\_\_\_ Date: \_\_\_\_ 2022-04-07

Verified by: Tim Kennedy, P.Eng. Date: 2022-04-07
PEO# 100173201



Multi-use Development (Commercial/Residential)

CIMA+ PROJECT NUMBER: A001046

**CLIENT:** Starwood Group Inc.

**PROJECT STATUS:** Detailed Design (Site Plan Control)

#### STORMWATER MANAGEMENT - PRELIMINARY RETENTION CALCULATIONS - 2 YEAR EVENT

#### APPLICABLE DESIGN GUIDELINES:

1. City of Ottawa Sewer Design Guidelines, 2012

# STORMWATER MANAGEMENT SUMMARY - STORAGE AND DRAWDOWN:

#### **DESIGN CRITERIA:**

 Rainfall event
 2 years

 Roof Flows
 1.90 L/s

 Ground Area to Swale
 9.59 L/s

 Areas to Tank
 16.25 L/s

 Unattenuated Flow (2 year)
 0.00 L/s

 Allowable Release Rate
 27.74 L/s

Sub-Area	Total Area (m²)	Available Storage Area (m²)	Catchbasin/ Roof Drain Elevation (m)	Maximum Ponding Elevation (m)	Y <sub>max</sub> (m)	$oldsymbol{V}_{ ext{max}}$ ( $oldsymbol{m}^3$ )	$oldsymbol{V_{rain}}{(m^3)}$	$ m V_{acc}$ $(m^3)$	Y <sub>rain</sub> (m)	Elev <sub>rain</sub> (m)	A <sub>rain</sub> (m²)	Q (L/s)	Drawdown Time (min)	Comments
A1	588	588	100.00	100.15	0.15	29.4	7.2	7.2	0.07	100.07	291	1.90	63	Controlled roof area
A2	578	-	-	-	-	22.2	1.2	1.2	-	-	-	9.59	2	Area to swale
A3	1079	-	-	-	-	22.0	3.5	3.5	-	-	-	16.25	4	Areas to Tank
NC1	681	-	-	-	-	-	-	-	-	- 1	-	0.00	-	Unattenuated Areas
Total	2927	588				73.6	11.9	11.9				27.74		

#### DEFINITIONS OF ABBREVIATIONS USED IN CALCULATION TABLE:

NC = Area is not controlled (unattenuated)

Available Area = Area of water accumulated in sub-area at Max. Elev.

Catchbasin Elev. = Elevation of catchbasin inlet (top of grate).

Max. Elev. = Maximum elevation of water that may be accumulated within sub-area.

 $Y_{max}$  = Maximum depth of water that may be accumulated within the sub-area.

 $V_{max}$  = Maximum volume of water (capacity) that may be accumulated within the sub-area.

V<sub>rain</sub> = Volume of water generated by rainfall.

V<sub>acc</sub> = Total volume of water accumulated within the sub-area in the event of a specific rainfall.

 $Y_{rain}$  = Depth of water generated by rainfall.

 $Elev_{rain}$  = Elevation of water generated by rainfall.

A<sub>rain</sub> = Area of water generated by rainfall.

Q = Release flow rate.

Drawdown Time = Time required for the total volume of water accumulated within sub-area to subside.

Prepared by: \_\_\_\_\_Jaymeson Adams, EIT \_\_\_\_ Date: \_\_2022-04-07

Verified by: Tim Kennedy, P.Eng. Date: 2022-04-07

PEO# 100173201



PROJECT NAME: 403 Richmond Road and 389 Roosevelt Avenue Multi-use Development (Commercial/Residential)

A001046 CIMA+ PROJECT NUMBER:

Starwood Group Inc. CLIENT:

PROJECT STATUS: Detailed Design (Site Plan Control)

# RETENTION CALCULATIONS FOR FOR SUB-CATCHMENT AREA A1 APPLICABLE DESIGN GUIDELINES:

1. City of Ottawa Sewer Design Guidelines, 2012

# REQUIRED STORAGE VOLUME DETERMINATION:

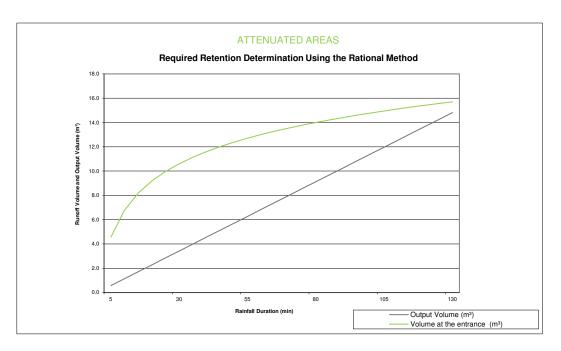
**DESIGN CRITERIA:** 

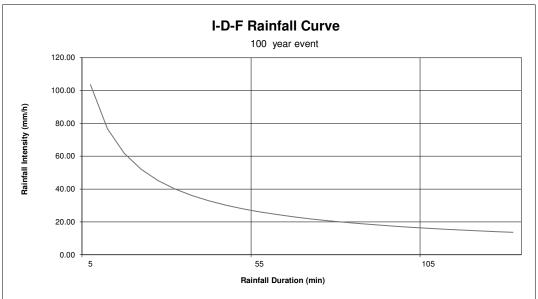
Rainfall Station:	City of Ottawa Sewer Design Guidelines, 2012 (Macdonald-Cartier Airport)					
Release Rate Per Unit Area (Q/ha):	32.30 L/s/ha					
Area (A):	0.0588 ha					
Runoff Coefficient (C):	0.90					
Rainfall Event:	2 year					
Release Rate (Q):	0.0019 m <sup>3</sup> /s					
Discharge Factor (K):	1					

Regression Constants	2 year	5 year	10 year	25 year	50 year	100 year
Α	732.951	998.071	1174.184	1402.844	1569.58	1735.688
В	6.199	6.053	6.014	6.018	6.014	6.014
С	0.810	0.814	0.816	0.819	0.82	0.82

Required Retention Volume:

Rainfall	Rainfall	Runoff	Output	Retention
Duration	Intensity	Volume	Volume	Volume
(min)	(mm/h)	(m³)	(m³)	(m³)
Τ	1	CIAT	kQT	(3)-(4)
(1)	(2)	(3)	(4)	(5)
5.0	103.6	4.6	0.6	4.0
10.0	76.8	6.8	1.1	5.6
15.0	61.8	8.2	1.7	6.5
20.0	52.0	9.2	2.3	6.9
25.0	45.2	10.0	2.9	7.1
30.0	40.0	10.6	3.4	7.2
35.0	36.1	11.1	4.0	7.1
40.0	32.9	11.6	4.6	7.0
45.0	30.2	12.0	5.1	6.9
50.0	28.0	12.4	5.7	6.7
55.0	26.2	12.7	6.3	6.4
60.0	24.6	13.0	6.8	6.2
65.0	23.2	13.3	7.4	5.9
70.0	21.9	13.5	8.0	5.6
75.0	20.8	13.8	8.6	5.2
80.0	19.8	14.0	9.1	4.9
85.0	18.9	14.2	9.7	4.5
90.0	18.1	14.4	10.3	4.1
95.0	17.4	14.6	10.8	3.8
100.0	16.7	14.8	11.4	3.4
105.0	16.1	14.9	12.0	3.0
110.0	15.6	15.1	12.5	2.6
115.0	15.0	15.3	13.1	2.2
120.0	14.6	15.4	13.7	1.7
125.0	14.1	15.6	14.3	1.3
130.0	13.7	15.7	14.8	0.9
Design Volume:				7.2





Prepared by: \_\_\_\_\_ Jaymeson Adams, EIT \_\_\_\_ Date: \_\_2022-04-07

 Verified by:
 Tim Kennedy, P.Eng.
 Date:
 2022-04-07

 PEO# 100173201



Multi-use Development (Commercial/Residential)

A001046 CIMA+ PROJECT NUMBER:

Starwood Group Inc. CLIENT:

PROJECT STATUS: Detailed Design (Site Plan Control)

# **RETENTION CALCULATIONS FOR FOR SUB-CATCHMENT AREA A2**

# APPLICABLE DESIGN GUIDELINES:

1. City of Ottawa Sewer Design Guidelines, 2012

# REQUIRED STORAGE VOLUME DETERMINATION:

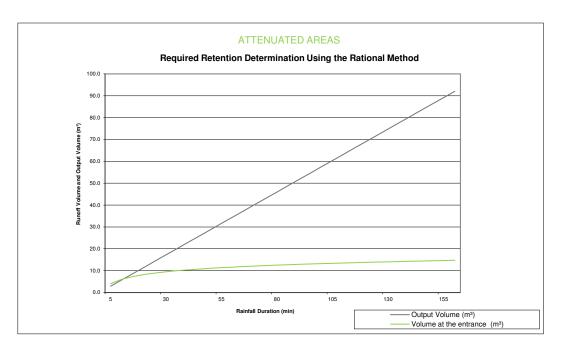
# **DESIGN CRITERIA:**

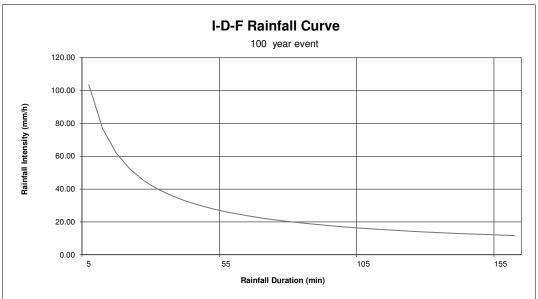
Rainfall Station:	City of Ottawa Sewer Design Guidelines, 2012 (Macdonald-Cartier Airport)					
Release Rate Per Unit Area (Q/ha):	165.80 L/s/ha					
Area (A):	0.0578 ha					
Runoff Coefficient (C):	0.82					
Rainfall Event:	2 year					
Release Rate (Q):	0.0096 m³/s					
Discharge Factor (K):	1					

Regression Constants	2 year	5 year	10 year	25 year	50 year	100 year
Α	732.951	998.071	1174.184	1402.844	1569.58	1735.688
В	6.199	6.053	6.014	6.018	6.014	6.014
С	0.810	0.814	0.816	0.819	0.82	0.82

Required Retention Volume: 1.2 m<sup>3</sup>

Rainfall	Rainfall	Runoff	Output	Retention
Duration	Intensity	Volume	Volume	Volume
(min)		(m³)	(m³)	(m³)
T		CIAT	kQT	(3)-(4)
(1)	(2)	(3)	(4)	(5)
5.0	103.6	4.1	2.9	1.2
10.0	76.8	6.1	5.8	0.3
15.0	61.8	7.3	8.6	-1.3
20.0	52.0	8.2	11.5	-3.3
25.0	45.2	8.9	14.4	-5.5
30.0	40.0	9.5	17.3	-7.8
35.0	36.1	10.0	20.1	-10.2
40.0	32.9	10.4	23.0	-12.6
45.0	30.2	10.8	25.9	-15.1
50.0	28.0	11.1	28.8	-17.7
55.0	26.2	11.4	31.6	-20.3
60.0	24.6	11.6	34.5	-22.9
65.0	23.2	11.9	37.4	-25.5
70.0	21.9	12.1	40.3	-28.2
75.0	20.8	12.3	43.2	-30.8
80.0	19.8	12.5	46.0	-33.5
85.0	18.9	12.7	48.9	-36.2
90.0	18.1	12.9	51.8	-38.9
95.0	17.4	13.1	54.7	-41.6
100.0	16.7	13.2	57.5	-44.3
105.0	16.1	13.4	60.4	-47.0
110.0	15.6	13.5	63.3	-49.8
115.0	15.0	13.7	66.2	-52.5
120.0	14.6	13.8	69.0	-55.2
125.0	14.1	13.9	71.9	-58.0
130.0	13.7	14.1	74.8	-60.7
135.0	13.3	14.2	77.7	-63.5
140.0	12.9	14.3	80.6	-66.3
145.0	12.6	14.4	83.4	-69.0
150.0	12.3	14.5	86.3	-71.8
155.0	11.9	14.6	89.2	-74.6
160.0	11.7	14.7	92.1	-77.3
Design Volume:				1.2





Jaymeson Adams, EIT Prepared by: Date: 2022-04-07

Tim Kennedy, P.Eng. PEO# 100173201 Verified by: Date: 2022-04-07



PROJECT NAME: 403 Richmond Road and 389 Roosevelt Avenue Multi-use Development (Commercial/Residential)

1001010

CIMA+ PROJECT NUMBER: A001046

CLIENT: Starwood Group Inc.

PROJECT STATUS: Detailed Design (Site Plan Control)

# RETENTION CALCULATIONS FOR FOR SUB-CATCHMENT AREA A3

# APPLICABLE DESIGN GUIDELINES:

1. City of Ottawa Sewer Design Guidelines, 2012

# REQUIRED STORAGE VOLUME DETERMINATION:

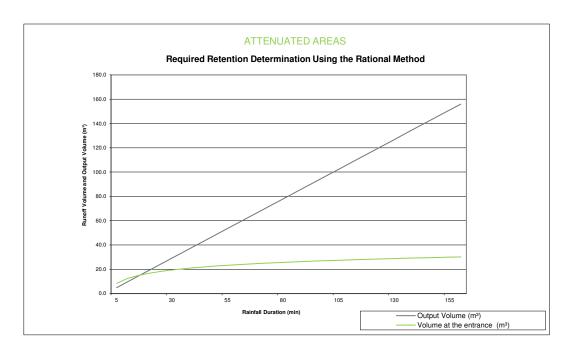
#### **DESIGN CRITERIA:**

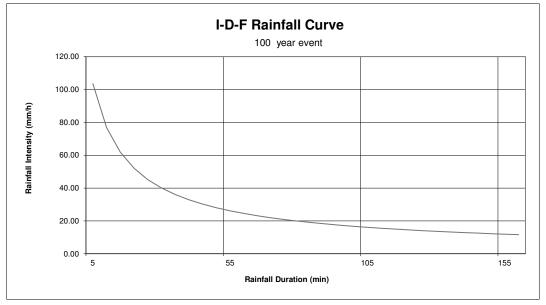
Rainfall Station:	City of Ottawa Sewer Design Guidelines, 2012 (Macdonald-Cartier Airport)					
Release Rate Per Unit Area (Q/ha):	150.56 L/s/ha					
Area (A):	0.1079 ha					
Runoff Coefficient (C):	0.90					
Rainfall Event:	2 year					
Release Rate (Q):	0.0162 m³/s					
Discharge Factor (K):	1					

Regression Constants	2 year	5 year	10 year	25 year	50 year	100 year
Α	732.951	998.071	1174.184	1402.844	1569.58	1735.688
В	6.199	6.053	6.014	6.018	6.014	6.014
С	0.810	0.814	0.816	0.819	0.82	0.82

Required Retention Volume: 3.5 m<sup>3</sup>

Rainfall	Rainfall	Runoff	Output	Retention
Duration	Intensity	Volume	Volume	Volume
(min)		(m³)	(m³)	(m³)
T		CIAT	kQT	(3)-(4)
(1)	(2)	(3)	(4)	(5)
5.0	103.6	8.4	4.9	3.5
10.0	76.8	12.4	9.7	2.7
15.0	61.8	15.0	14.6	0.4
20.0	52.0	16.8	19.5	-2.7
25.0	45.2	18.3	24.4	-6.1
30.0	40.0	19.4	29.2	-9.8
35.0	36.1	20.4	34.1	-13.7
40.0	32.9	21.3	39.0	-17.7
45.0	30.2	22.0	43.9	-21.8
50.0	28.0	22.7	48.7	-26.0
55.0	26.2	23.3	53.6	-30.3
60.0	24.6	23.9	58.5	-34.6
65.0	23.2	24.4	63.4	-39.0
70.0	21.9	24.8	68.2	-43.4
75.0	20.8	25.3	73.1	-47.8
80.0	19.8	25.7	78.0	-52.3
85.0	18.9	26.1	82.9	-56.8
90.0	18.1	26.4	87.7	-61.3
95.0	17.4	26.8	92.6	-65.8
100.0	16.7	27.1	97.5	-70.4
105.0	16.1	27.4	102.4	-74.9
110.0	15.6	27.7	107.2	-79.5
115.0	15.0	28.0	112.1	-84.1
120.0	14.6	28.3	117.0	-88.7
125.0	14.1	28.6	121.9	-93.3
130.0	13.7	28.8	126.7	-97.9
135.0	13.3	29.1	131.6	-102.6
140.0	12.9	29.3	136.5	-107.2
145.0	12.6	29.5	141.4	-111.8
150.0	12.3	29.7	146.2	-116.5
155.0	11.9	30.0	151.1	-121.1
160.0	11.7	30.2	156.0	-125.8
Design Volume:				3.5





Prepared by: \_\_\_\_\_ Jaymeson Adams, EIT \_\_\_\_ Date: \_\_2022-04-07

 Verified by:
 Tim Kennedy, P.Eng.
 Date:
 2022-04-07

 PEO# 100173201



Multi-use Development (Commercial/Residential)

CIMA+ PROJECT NUMBER: A001046

**CLIENT:** Starwood Group Inc.

**PROJECT STATUS:** Detailed Design (Site Plan Control)

#### STORMWATER MANAGEMENT - PRELIMINARY RETENTION CALCULATIONS - 100 YEAR EVENT

#### APPLICABLE DESIGN GUIDELINES:

1. City of Ottawa Sewer Design Guidelines, 2012

### STORMWATER MANAGEMENT SUMMARY - STORAGE AND DRAWDOWN:

#### **DESIGN CRITERIA:**

 Rainfall event
 100 years

 Roof Flows
 1.90 L/s

 Ground Area to Swale
 9.59 L/s

 Areas to Tank
 16.25 L/s

 Unattenuated Flow (100 year)
 0.00 L/s

 Allowable Release Rate
 27.74 L/s

Sub-Area	Total Area (m²)	Available Storage Area (m²)	Catchbasin/ Roof Drain Elevation (m)	Maximum Ponding Elevation (m)	Y <sub>max</sub> (m)	$oldsymbol{V}_{ extsf{max}}$ ( $oldsymbol{m}^3$ )	V <sub>rain</sub> (m³)	V <sub>acc</sub> (m³)	Y <sub>rain</sub> (m)	Elev <sub>rain</sub> (m)	A <sub>rain</sub> (m²)	Q (L/s)	Drawdown Time (min)	Comments
A1	588	588	100.00	100.15	0.15	29.4	24.5	24.5	0.14	100.14	537	1.90	215	Controlled roof area
A2	578	-	-	-	-	22.2	11.0	11.0	-	-	-	9.59	19	Area to swale
A3	1079	-	-	-	-	22.0	22.0	22.0	-	-	-	16.25	23	Areas to Tank
NC1	681	-	-	-	-	-	-	-	-	-	-	0.00	=	Unattenuated Areas
Total	2927	588				73.6	57.5	57.5				27.74		

#### DEFINITIONS OF ABBREVIATIONS USED IN CALCULATION TABLE:

NC = Area is not controlled (unattenuated)

Available Area = Area of water accumulated in sub-area at Max. Elev.

Catchbasin Elev. = Elevation of catchbasin inlet (top of grate).

Max. Elev. = Maximum elevation of water that may be accumulated within sub-area.

 $Y_{max}$  = Maximum depth of water that may be accumulated within the sub-area.

 $V_{max}$  = Maximum volume of water (capacity) that may be accumulated within the sub-area.

 $V_{rain}$  = Volume of water generated by rainfall.

V<sub>acc</sub> = Total volume of water accumulated within the sub-area in the event of a specific rainfall.

 $Y_{rain}$  = Depth of water generated by rainfall.

 $Elev_{rain}$  = Elevation of water generated by rainfall.

A<sub>rain</sub> = Area of water generated by rainfall.

Q = Release flow rate.

Drawdown Time = Time required for the total volume of water accumulated within sub-area to subside.

Prepared by: Jaymeson Adams, EIT Date: 2022-04-07

Verified by: Tim Kennedy, P.Eng. Date: 2022-04-07

PEO# 100173201



PROJECT NAME: 403 Richmond Road and 389 Roosevelt Avenue Multi-use Development (Commercial/Residential)

A001046 CIMA+ PROJECT NUMBER:

Starwood Group Inc. CLIENT:

PROJECT STATUS: Detailed Design (Site Plan Control)

# RETENTION CALCULATIONS FOR FOR SUB-CATCHMENT AREA A1 APPLICABLE DESIGN GUIDELINES:

1. City of Ottawa Sewer Design Guidelines, 2012

# REQUIRED STORAGE VOLUME DETERMINATION:

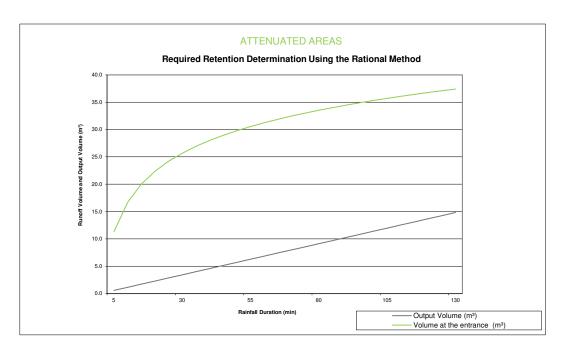
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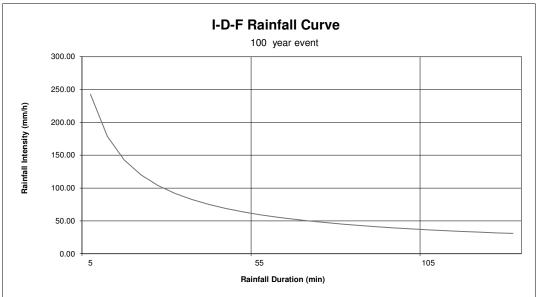
Rainfall Station:	City of Ottawa Sewer Design Guidelines, 2012 (Macdonald-Cartier Airport)					
Release Rate Per Unit Area (Q/ha):	32.30 L/s/ha					
Area (A):	0.0588 ha					
Runoff Coefficient (C):	0.95					
Rainfall Event:	100 year					
Release Rate (Q):	0.0019 m³/s					
Discharge Factor (K):	1					

Regression Constants	2 year	5 year	10 year	25 year	50 year	100 year
Α	732.951	998.071	1174.184	1402.844	1569.58	1735.688
В	6.199	6.053	6.014	6.018	6.014	6.014
С	0.810	0.814	0.816	0.819	0.82	0.82

Required Retention Volume:

Rainfall	Rainfall	Runoff	Output	Retention
Duration	Intensity	Volume	Volume	Volume
(min)	(mm/h)	(m³)	(m³)	(m³)
T	1	CIAT	kQT	(3)-(4)
(1)	(2)	(3)	(4)	(5)
5.0	242.7	11.3	0.6	10.7
10.0	178.6	16.6	1.1	15.5
15.0	142.9	20.0	1.7	18.3
20.0	120.0	22.3	2.3	20.1
25.0	103.8	24.2	2.9	21.3
30.0	91.9	25.7	3.4	22.3
35.0	82.6	26.9	4.0	22.9
40.0	75.1	28.0	4.6	23.4
45.0	69.1	28.9	5.1	23.8
50.0	64.0	29.8	5.7	24.1
55.0	59.6	30.5	6.3	24.3
60.0	55.9	31.2	6.8	24.4
65.0	52.6	31.9	7.4	24.5
70.0	49.8	32.5	8.0	24.5
75.0	47.3	33.0	8.6	24.5
80.0	45.0	33.5	9.1	24.4
85.0	43.0	34.0	9.7	24.3
90.0	41.1	34.5	10.3	24.2
95.0	39.4	34.9	10.8	24.1
100.0	37.9	35.3	11.4	23.9
105.0	36.5	35.7	12.0	23.7
110.0	35.2	36.1	12.5	23.5
115.0	34.0	36.4	13.1	23.3
120.0	32.9	36.8	13.7	23.1
125.0	31.9	37.1	14.3	22.8
130.0	30.9	37.4	14.8	22.6
Design Volume:				24.5





Prepared by: \_\_\_\_\_ Jaymeson Adams, EIT \_\_\_\_ Date: \_\_2022-04-07

 Verified by:
 Tim Kennedy, P.Eng.
 Date:
 2022-04-07

 PEO# 100173201



Multi-use Development (Commercial/Residential)

A001046 CIMA+ PROJECT NUMBER:

Starwood Group Inc. CLIENT:

PROJECT STATUS: Detailed Design (Site Plan Control)

# **RETENTION CALCULATIONS FOR FOR SUB-CATCHMENT AREA A2**

# APPLICABLE DESIGN GUIDELINES:

1. City of Ottawa Sewer Design Guidelines, 2012

# REQUIRED STORAGE VOLUME DETERMINATION:

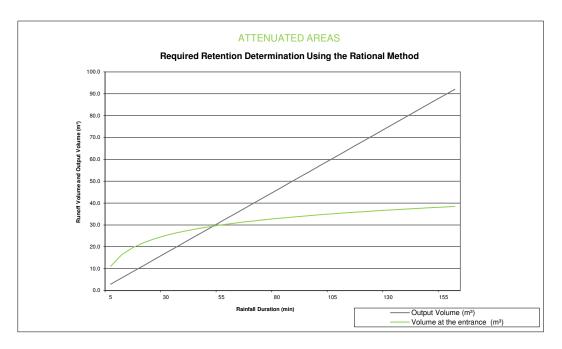
# **DESIGN CRITERIA:**

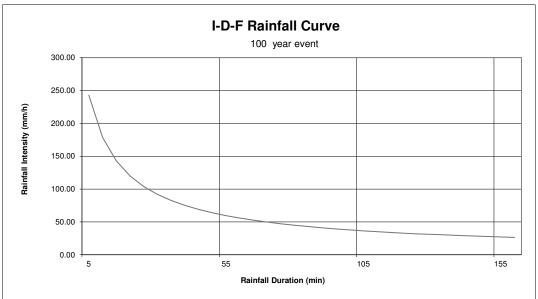
Rainfall Station:	City of Ottawa Sewer Design Guidelines, 2012 (Macdonald-Cartier Airport)		
Release Rate Per Unit Area (Q/ha):	165.80 L/s/ha		
Area (A):	0.0578 ha		
Runoff Coefficient (C):	0.95		
Rainfall Event:	100 year		
Release Rate (Q):	0.0096 m³/s		
Discharge Factor (K):	1		

Regression Constants	2 year	5 year	10 year	25 year	50 year	100 year
Α	732.951	998.071	1174.184	1402.844	1569.58	1735.688
В	6.199	6.053	6.014	6.018	6.014	6.014
С	0.810	0.814	0.816	0.819	0.82	0.82

Required Retention Volume: 11.0 m<sup>3</sup>

Rainfall	Rainfall	Runoff	Output	Retention
Duration	Intensity	Volume	Volume	Volume
(min)	(mm/h)	(m³)	(m³)	(m³)
T	1	CIAT	kQT	(3)-(4)
(1)	(2)	(3)	(4)	(5)
5.0	242.7	11.1	2.9	8.2
10.0	178.6	16.4	5.8	10.6
15.0	142.9	19.6	8.6	11.0
20.0	120.0	22.0	11.5	10.5
25.0	103.8	23.8	14.4	9.4
30.0	91.9	25.2	17.3	8.0
35.0	82.6	26.5	20.1	6.3
40.0	75.1	27.5	23.0	4.5
45.0	69.1	28.5	25.9	2.6
50.0	64.0	29.3	28.8	0.5
55.0	59.6	30.0	31.6	-1.6
60.0	55.9	30.7	34.5	-3.8
65.0	52.6	31.3	37.4	-6.1
70.0	49.8	31.9	40.3	-8.4
75.0	47.3	32.5	43.2	-10.7
80.0	45.0	33.0	46.0	-13.1
85.0	43.0	33.4	48.9	-15.5
90.0	41.1	33.9	51.8	-17.9
95.0	39.4	34.3	54.7	-20.4
100.0	37.9	34.7	57.5	-22.8
105.0	36.5	35.1	60.4	-25.3
110.0	35.2	35.5	63.3	-27.8
115.0	34.0	35.8	66.2	-30.4
120.0	32.9	36.2	69.0	-32.9
125.0	31.9	36.5	71.9	-35.4
130.0	30.9	36.8	74.8	-38.0
135.0	30.0	37.1	77.7	-40.6
140.0	29.2	37.4	80.6	-43.2
145.0	28.4	37.7	83.4	-45.8
150.0	27.6	37.9	86.3	-48.4
155.0	26.9	38.2	89.2	-51.0
160.0	26.2	38.4	92.1	-53.6
Design Volume:				11.0





Jaymeson Adams, EIT Prepared by: Date: 2022-04-07

Tim Kennedy, P.Eng. PEO# 100173201 Verified by: Date: 2022-04-07



PROJECT NAME: 403 Richmond Road and 389 Roosevelt Avenue Multi-use Development (Commercial/Residential)

CIMA+ PROJECT NUMBER: A001046

CLIENT: Starwood Group Inc.

PROJECT STATUS: Detailed Design (Site Plan Control)

# RETENTION CALCULATIONS FOR FOR SUB-CATCHMENT AREA A3

# APPLICABLE DESIGN GUIDELINES:

1. City of Ottawa Sewer Design Guidelines, 2012

# REQUIRED STORAGE VOLUME DETERMINATION:

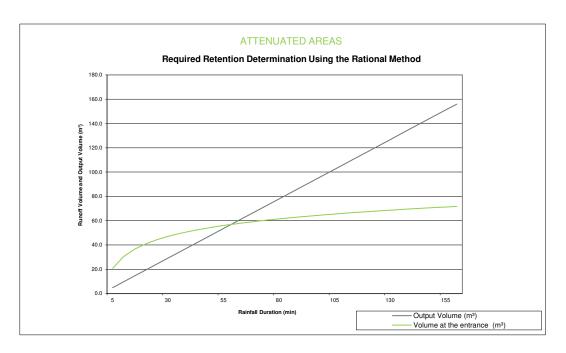
#### **DESIGN CRITERIA:**

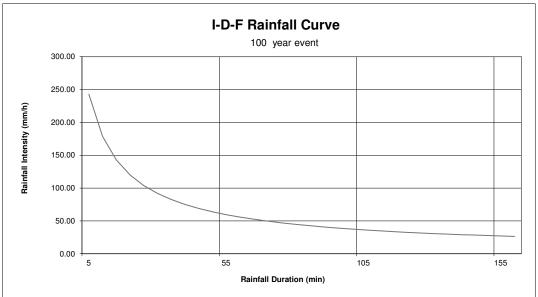
Rainfall Station:	City of Ottawa Sewer Design Guidelines, 2012 (Macdonald-Cartier Airport)		
Release Rate Per Unit Area (Q/ha):	150.56 L/s/ha		
Area (A):	0.1079 ha		
Runoff Coefficient (C):	0.95		
Rainfall Event:	100 year		
Release Rate (Q):	0.0162 m³/s		
Discharge Factor (K):	1		

Regression Constants	2 year	5 year	10 year	25 year	50 year	100 year
Α	732.951	998.071	1174.184	1402.844	1569.58	1735.688
В	6.199	6.053	6.014	6.018	6.014	6.014
С	0.810	0.814	0.816	0.819	0.82	0.82

Required Retention Volume: 22.0 m<sup>3</sup>

Rainfall	Rainfall	Runoff	Output	Retention
Duration	Intensity	Volume	Volume	Volume
(min)	(mm/h)	(m³)	(m³)	(m³)
Τ	1	CIAT	kQT	(3)-(4)
(1)	(2)	(3)	(4)	(5)
5.0	242.7	20.7	4.9	15.9
10.0	178.6	30.5	9.7	20.8
15.0	142.9	36.6	14.6	22.0
20.0	120.0	41.0	19.5	21.5
25.0	103.8	44.4	24.4	20.0
30.0	91.9	47.1	29.2	17.8
35.0	82.6	49.4	34.1	15.3
40.0	75.1	51.4	39.0	12.4
45.0	69.1	53.1	43.9	9.2
50.0	64.0	54.6	48.7	5.9
55.0	59.6	56.0	53.6	2.4
60.0	55.9	57.3	58.5	-1.2
65.0	52.6	58.5	63.4	-4.9
70.0	49.8	59.6	68.2	-8.7
75.0	47.3	60.6	73.1	-12.6
80.0	45.0	61.5	78.0	-16.5
85.0	43.0	62.4	82.9	-20.5
90.0	41.1	63.2	87.7	-24.5
95.0	39.4	64.0	92.6	-28.6
100.0	37.9	64.8	97.5	-32.7
105.0	36.5	65.5	102.4	-36.9
110.0	35.2	66.2	107.2	-41.1
115.0	34.0	66.8	112.1	-45.3
120.0	32.9	67.4	117.0	-49.5
125.0	31.9	68.0	121.9	-53.8
130.0	30.9	68.6	126.7	-58.1
135.0	30.0	69.2	131.6	-62.4
140.0	29.2	69.7	136.5	-66.7
145.0	28.4	70.3	141.4	-71.1
150.0	27.6	70.8	146.2	-75.5
155.0	26.9	71.3	151.1	-79.8
160.0	26.2	71.7	156.0	-84.2
Design Volume:				22.0





Prepared by: Jaymeson Adams, EIT Date: 2022-04-07

Tim Kennedy, P.Eng. PEO# 100173201 Verified by: Date: 2022-04-07

G

Appendix G Technical References







# Adjustable Accutrol Weir

# Adjustable Flow Control for Roof Drains

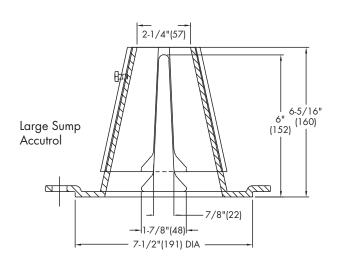
# ADJUSTABLE ACCUTROL (for Large Sump Roof Drains only)

For more flexibility in controlling flow with heads deeper than 2", Watts Drainage offers the Adjustable Accutrol. The Adjustable Accutrol Weir is designed with a single parabolic opening that can be covered to restrict flow above 2" of head to less than 5 gpm per inch, up to 6" of head. To adjust the flow rate for depths over 2" of head, set the slot in the adjustable upper cone according to the flow rate required. Refer to Table 1 below. Note: Flow rates are directly proportional to the amount of weir opening that is exposed.

#### **EXAMPLE:**

For example, if the adjustable upper cone is set to cover 1/2 of the weir opening, flow rates above 2"of head will be restricted to 2-1/2 gpm per inch of head.

Therefore, at 3" of head, the flow rate through the Accutrol Weir that has 1/2 the slot exposed will be: [5 gpm (per inch of head)  $\times$  2 inches of head] + 2-1/2 gpm (for the third inch of head) = 12-1/2 gpm.



Upper Cone

Fixed Weir

Adjustable

1/2 Weir Opening Exposed Shown Above

TABLE 1. Adjustable Accutrol Flow Rate Settings

Weir Onening	1"	2"	3"	4"	5"	6"
Weir Opening Exposed	Flow Rate (gallons per minute)					
Fully Exposed	5	10	15	20	25	30
3/4	5	10	13.75	17.5	21.25	25
1/2	5	10	12.5	15	17.5	20
1/4	5	10	11.25	12.5	13.75	15
Closed	5	5	5	5	5	5

Job Name	Contractor
Job Location	Contractor's P.O. No.
Engineer	Representative

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Н

Appendix H
Geotechnical Report (by Paterson Group Inc.)





# patersongroup

**Consulting Engineers** 

July 15, 2020 Report PG5101-LET.02 Ottawa, Ontario K2E 7J5 **Tel: (613) 226-7381** 

154 Colonnade Road South

Fax: (613) 226-6344

# Starwood Group Inc.

188 Eglinton Avenue East, Suite 800 Toronto, ON M4P 2X7

Geotechnical Engineering Environmental Engineering Hydrogeology Geological Engineering Materials Testing Building Science Archaeological Services

Attention: Mr. Bruce Greenberg

www.patersongroup.ca

Subject: **Preliminary Geotechnical Investigation** 

Proposed Multi-Storey Building 403 Richmond Road - Ottawa

Dear Sir,

Paterson Group (Paterson) was commissioned by Starwood Group to prepare a preliminary geotechnical investigation report based on the available subsoil and groundwater information for the proposed multi-storey building at 403 Richmond Road in the City of Ottawa.

# 1.0 Background Information

It's understood that the proposed development will consist of a 9 storey building with 1 to 2 levels of underground parking which is expected to occupy the majority of the site. It's expected that the proposed multi-storey building will be serviced with municipal water and sewer. The subject site is currently occupied by an existing two storey funeral home with associated asphalt covered car parking and access lanes. The site is generally flat and at grade with the adjacent roadways and neighbouring properties. It is our understanding that the existing structure will be demolished prior to construction to accommodate the proposed multi-storey building.

A field program for the geotechnical investigation was completed by others on February 9, 2017. At the time, a total of 3 boreholes were advanced to a maximum depth of 4.4 m below existing ground surface at selected locations across the site to provided general coverage of the proposed development taking into consideration of existing site features. All three boreholes were instrumented with a monitoring well installation to evaluate the groundwater conditions at the subject site. The approximate location of the test holes are presented on Drawing PG5101-1 - Test Hole Location Plan appended to this report.

Page 2

File: PG5101-LET.02

# 2.0 Available Geotechnical Information

# **Subsoil Conditions**

Based on our review of the available subsoil and groundwater information recovered by others, the subsurface profile at the test hole locations consists of asphaltic concrete underlain by a brown silty sand fill with varying amounts of gravel extending to a maximum depth of 1.1 m below existing ground surface at the test hole locations. A grey limestone interbedded with black shale was encountered directly below the overlying fill material at all three borehole locations.

# **Bedrock**

As part of the geotechnical field investigation, the bedrock was cored at all three test hole locations to confirm bedrock and assess its quality. The recovery value of 100% and RQD values varied between 20 and 80% which are indicative of a fair to good quality bedrock.

Based on available geological mapping, the bedrock in the area consists of limestone and dolomite interbedded of the Gulf River formation with an overburden drift thickness of 1 to 2 m.

# Groundwater

Upon reviewing the existing groundwater data collected by others, the groundwater level is estimated to be between 4 to 5 m below the existing grade. It is important to note that groundwater levels are subject to seasonal fluctuations. Therefore groundwater levels could differ at the time of construction.

# 3.0 Geotechnical Assessment

From a geotechnical perspective, the subject site is satisfactory for the proposed development. It's expected that the proposed building will be founded on conventional spread footings placed on a clean, surface sounded bedrock bearing surface.

Bedrock removal will be required to complete the underground parking levels. Hoe ramming is an option where only small quantities of bedrock need to be removed. Line drilling and controlled blasting where large quantities of bedrock need to be removed is recommended. The blasting operations should be planned and completed under the guidance of a professional engineer with experience in blasting operations.

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

Page 3

File: PG5101-LET.02

# **Site Grading and Preparation**

Due to the shallow bedrock depth at the subject site and the anticipated founding level for the proposed building, all existing overburden material will be excavated from within the proposed building footprint. Bedrock removal will be required for the construction of the parking garage level.

# **Bedrock Removal**

Based on the bedrock encountered in the area, it is expected that line-drilling in conjunction with hoe-ramming or controlled blasting will be required to remove the bedrock. In areas of weathered bedrock and where only a small quantity of bedrock is to be removed, bedrock removal may be possible by hoe-ramming.

Prior to considering blasting operations, the effects on the existing services, buildings and other structures should be addressed. A pre-blast or construction survey located in proximity of the blasting operations should be conducted prior to commencing construction. The extent of the survey should be determined by the blasting consultant and sufficient to respond to any inquiries/claims related to the blasting operations.

As a general guideline, peak particle velocity (measured at the structures) should not exceed 25 mm/s during the blasting program to reduce the risks of damage to the existing structures.

The blasting operations should be planned and conducted under the supervision of a licensed professional engineer who is an experienced blasting consultant.

Excavation side slopes in sound bedrock could be completed with almost vertical side walls. Where bedrock is of lower quality, the excavation face should be free of any loose rock. An area specific review should be completed by the geotechnical consultant at the time of construction to determine if rock bolting or other remedial measures are required to provide a safe excavation face for areas where low quality bedrock is encountered.

# **Vibration Considerations**

Construction operations could cause vibrations, and possibly, sources of nuisance to the community. Therefore, means to reduce the vibration levels as much as possible should be incorporated in the construction operations to maintain a cooperative environment with the residents.

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The following construction equipment could cause vibrations: piling equipment, hoe ram, compactor, dozer, crane, truck traffic, etc. The construction of the shoring system with soldier piles, should it be utilized, would require these pieces of equipment. Vibrations, caused by blasting or construction operations could cause detrimental vibrations on the adjoining buildings and structures. Therefore, it is recommended that all vibrations be limited.

Two parameters determine the recommended vibration limit, the maximum peak particle velocity and the frequency. For low frequency vibrations, the maximum allowable peak particle velocity is less than that for high frequency vibrations. As a guideline, the peak particle velocity should be less than 15 mm/s between frequencies of 4 to 12 Hz, and 50 mm/s above a frequency of 40 Hz (interpolate between 12 and 40 Hz). These guidelines are for current construction standards. These guidelines are above perceptible human level and, in some cases, could be very disturbing to some people. Therefore, a preconstruction survey is recommended to minimize the risks of claims during or following the construction of the proposed building.

# **Fill Placement**

Fill used for grading beneath the building areas should consist, unless otherwise specified, 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 proposed building areas should be compacted to at least 98% of its standard Proctor maximum dry density (SPMDD).

Non-specified existing fill along with site-excavated soil can be used as general landscaping fill and beneath parking areas where settlement of the ground surface is of minor concern. In landscaped areas, these materials should be spread in thin lifts and at least compacted by the tracks of the spreading equipment to minimize voids. If these materials are to be used to build up the subgrade level for areas to be paved, they should be compacted in thin lifts to a minimum density of 95% of their respective SPMDD. Non-specified existing fill and site-excavated soils are not suitable for use as backfill against foundation walls unless a composite drainage blanket connected to a perimeter drainage system is provided.

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# **Foundation Design**

Based on the subsurface profile encountered, limestone and shale bedrock is expected to be encountered at the founding levels.

For auxiliary structures (canopy and shallow foundations), footings placed on a clean surface sounded limestone bedrock surface can be designed using a factored bearing resistance value at ultimate limit states (ULS) of **2,500 kPa**, incorporating a geotechnical resistance factor of 0.5.

A clean, surface-sounded bedrock bearing surface should be free of loose materials, and have no near surface seams, voids, fissures or open joints which can be detected from surface sounding with a rock hammer.

For the building foundations, a factored bearing resistance value at ULS of **6,000 kPa**, incorporating a geotechnical resistance factor of 0.5, is available for footings founded on the sound bedrock at depth.

# **Settlement**

Footings bearing on an acceptable bedrock bearing surface and designed using the bearing resistance values provided herein will be subjected to negligible potential post-construction total and differential settlements.

# **Lateral Support**

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 sound bedrock bearing medium when a plane extending down and out from the bottom edge of the footing at a minimum of 1H:6V (or flatter) passes only through sound bedrock or a material of the same or higher capacity as the bedrock, such as concrete. A weathered bedrock bearing medium will require a lateral support zone of 1H:1V (or flatter).

# **Design for Earthquakes**

For preliminary design purposes, the site class for seismic site response can be taken as **Class A**. With this higher seismic site class, a site specific shear wave velocity test will be required for the detail geotechnical report to accurately determine the applicable seismic site classification for foundation design of the proposed building, as presented in Table 4.1.8.4.A of the Ontario Building Code (OBC) 2012.

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Soil 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.

# **Basement Slab**

All overburden soil will be removed from the subject site leaving the bedrock as the founding medium for the lower basement floor slab. It is expected that the basement area will be mostly parking and the recommended rigid pavement structure noted in Subsection 5.8 will be applicable. However, if storage or other uses of the lower level where a concrete floor slab will be used, it is recommended that the upper 300 mm of sub-slab 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.

In consideration of the groundwater conditions encountered at the time of the fieldwork, a subfloor drainage system, consisting of lines of perforated drainage pipe subdrains connected to a positive outlet, should be provided in the clear stone under the lower basement floor (discussed in Section 4.0).

# **Basement Wall**

It's expected that a portion of the basement walls are to be poured against a composite drainage blanket, which will be placed against the exposed bedrock face. A nominal coefficient of at-rest earth pressure of 0.01 is recommended in conjunction with a dry unit weight of 23.5 kN/m³ (effective unit weight of 15.5 kN/m³). A seismic earth pressure component will not be applicable for the foundation wall, which is to be poured against the bedrock face. It is expected that the seismic earth pressure will be transferred to the underground floor slabs, which should be designed to accommodate these pressures. A hydrostatic groundwater pressure should be added for the portion below the groundwater level.

Two distinct conditions, static and seismic, should be reviewed for design calculations. The parameters for design calculations for the two conditions are presented below.

# **Static Conditions**

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

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 $K_{o}$  = at-rest earth pressure coefficient of the applicable retained soil, 0.5

 $\gamma$  = unit weight of fill of the applicable retained soil (kN/m<sup>3</sup>)

H = height of the wall (m)

An additional pressure with 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 Conditions**

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

The seismic earth force ( $\Delta P_{AE}$ ) could be calculated using  $\Delta P_{AE} = 0.375 \cdot a_c \cdot \gamma \cdot H^2/g$ , where:

 $a_c = (1.45 - a_{max}/g)a_{max}$ 

 $\gamma$  = unit weight of fill of the applicable retained soil (kN/m<sup>3</sup>)

H = height of the wall (m)

 $g = gravity, 9.81 \text{ m/s}^2$ 

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

The earth force component ( $P_o$ ) under seismic conditions could be calculated using  $P_o = 0.5 \text{ K}_o \gamma \text{ H}^2$ , where  $K_o = 0.5 \text{ for the soil conditions presented above}$ .

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.

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# **Pavement Structure**

For design purpose, the pavement structure in the following tables are recommended to be used for the design of car parking areas and access lanes.

Table 1 - Recommended Pavement Structure - Access Lanes				
Thickness (mm)	Material Description			
40	Wear Course - Superpave 12.5 Asphaltic Concrete			
50	Binder Course - Superpave 19.0 Asphaltic Concrete			
150	BASE - OPSS Granular A Crushed Stone			
400	SUBBASE - OPSS Granular B Type II			
SUBGRADE - Existing im	SUBGRADE - Existing imported fill, or OPSS Granular B Type I or II material placed over bedrock.			

Table 2 - Recommended Flexible Pavement Structure - Surface Parking (if any)				
Thickness (mm)	Material Description			
50	Wear Course - Superpave 12.5 Asphaltic Concrete			
150	BASE - OPSS Granular A Crushed Stone			
300	SUBBASE - OPSS Granular B Type II			
SUBGRADE - Existing imported fill, or OPSS Granular B Type I or II material placed over bedrock.				

Table 3 - Recommended Rigid Pavement Structure - Lower Parking Level				
Thickness (mm)	Material Description			
125	32 MPa Concrete - Exposure Class C2			
300	BASE - OPSS Granular A Crushed Stone			
SUBGRADE - Existing imported fill, or OPSS Granular B Type I or II material placed over bedrock.				

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

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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 98% of the material's SPMDD using suitable vibratory equipment.

### **Pavement Structure Drainage**

Satisfactory performance of the pavement structure is largely dependent on keeping 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 its load carrying capacity.

### 4.0 Design and Construction Precautions

### **Foundation Drainage**

It is recommended that a perimeter foundation drainage system be provided for the proposed structure. It is expected that insufficient room is available for exterior backfill. It is suggested that this system could be as follows:

- Bedrock vertical surface should be prepared to receive the proposed membrane for the underground parking levels. The surface will be prepared by grinding or using shotcrete to smooth out angular sections for the placement of the composite foundation drainage board.
- The composite foundation (such as Miradrain G100N, Delta Drain 6000 or equivalent) will be applied to the prepared vertical bedrock surface from the ground surface to the proposed founding elevation.
- It'is recommended that 150 mm diameter sleeves at 3 m centres be cast in the footing or at the foundation wall/footing interface to allow the infiltration of water to flow to the interior perimeter drainage pipe. The perimeter drainage pipe and underfloor drainage system should direct water to sump pit(s) within the lower basement area.

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### **Underfloor Drainage**

It is anticipated that underfloor drainage will be required to control water infiltration. For preliminary design purposes, it's recommended that 150 mm perforated pipes be placed within each bay. The spacing of the underfloor drainage system should be confirmed at the time of completing the excavation when water infiltration can be better assessed.

### Foundation Backfill

If applicable, backfill against the exterior sides of the foundation walls should consist of free-draining non frost susceptible granular materials. The greater part of the site excavated materials will be frost susceptible and, as such, are not recommended for reuse as backfill against the foundation walls, unless used in conjunction with a drainage geocomposite, such as Miradrain G100N or Delta Drain 6000, connected to the perimeter foundation drainage system. Imported granular materials, such as clean sand or OPSS Granular B Type I granular material, should otherwise be used for this purpose.

### **Protection of Footings Against Frost Action**

Perimeter footings of heated structures are required to be insulted against the deleterious effect of frost action. A minimum 1.5 m thick soil cover (or equivalent) should be provided in this regard. A minimum of 2.1 m thick soil cover (or equivalent) should be provided for other unheated footings.

### **Unsupported Excavations**

The side slopes of excavations in the soil and fill overburden materials should be either cut back at acceptable slopes or should be retained by shoring systems from the start of the excavation until the structure is backfilled. It is assumed that sufficient room will be available for the greater part of the excavation to be undertaken by open-cut methods (i.e. unsupported excavations).

The excavation side slopes above the groundwater level extending to a maximum depth of 3 m should be cut back at 1H:1V or flatter. The flatter slope is required for excavation below groundwater level. The subsoil at this site is considered to be mainly Type 2 and 3 soil according to the Occupational Health and Safety Act and Regulations for Construction Projects.

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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. It is recommended that a trench box be used at all times to protect personnel working in trenches with steep or vertical sides. It is expected that services will be installed by "cut and cover" methods and excavations will not be left open for extended periods of time.

### **Temporary Shoring**

With shallow bedrock at 1 m below the existing grade, a temporary shoring system may not be required. Further recommendations will be provided in the detailed geotechnical investigation report.

### **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. Infiltration levels are anticipated to be low through the excavation face. The groundwater infiltration will be controllable with open sumps and pumps.

A temporary Ministry of the Environment, Conservation and Parks (MECP) permit to take water (PTTW) Category 3 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 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, typically between 25,000 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**

Any groundwater encountered along the building's perimeter or underfloor drainage system will be directed to the proposed building's sump pit. Provided the proposed groundwater infiltration control system is properly implemented and approved by the

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geotechnical consultant at the time of construction, it is expected that groundwater flow will be low (i.e.- less than 25,000 L/day) with peak periods noted after rain events. A more accurate estimate can be provided during the final geotechnical investigation program.

### **Impacts on Neighbouring Structures**

A local groundwater lowering is anticipated under short term conditions due to construction of the proposed building. It should be noted that the extent of any significant groundwater lowering will take place within a limited range of the subject site due to the minimal temporary groundwater lowering.

The neighbouring structures are expected to be founded on bedrock. No adverse effects are expected due to groundwater lowering on neighbouring structures.

### Winter Construction

Precautions must be taken if winter construction is considered for this project. Where excavations are completed in proximity of existing structures which may be adversely affected due to the freezing conditions. In particular, where a shoring system is constructed, the soil behind the shoring system will be subjected to freezing conditions and could result in heaving of the structure(s) placed within or above frozen soil. Provisions should be made in the contract document to protect the walls of the excavations from freezing, if applicable.

In the event of construction during below zero temperatures, the founding stratum should be protected from freezing temperatures by the installation of straw, propane heaters and tarpaulins or other suitable means. 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.

Trench excavations and pavement construction are difficult activities to complete during freezing conditions without introducing frost in the subgrade or in the excavation walls and bottoms. Precautions should be considered if such activities are to be completed during freezing conditions. Additional information could be provided, if required.

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### 5.0 Recommendations

Further testing and observation services program are required to confirm geotechnical recommendations. The following aspects of the program should be performed by Paterson:

Undertake a detailed geotechnical investigation report based on the proposed final design and issue a final geotechnical investigation report.
Review the bedrock stabilization and excavation requirements.
Review proposed elevator waterproofing and foundation drainage design and requirements.
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.

A report confirming that the construction has been conducted in general accordance with Paterson's recommendations could be issued upon the completion of a satisfactory inspection program by the geotechnical consultant.

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#### Statement of Limitations 6.0

The preliminary recommendations provided in the report are in accordance with Paterson's present understanding of the project. Paterson requests permission to review the recommendations when the drawings and specifications are completed.

Further, as noted in Section 5.0, a site specific investigation consisting of boreholes should be completed prior to construction to confirm our design recommendations which are based on nearby investigations and an investigations done by others.

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 Starwood Group Inc., or their agents, is not authorized without review by Paterson Group for the applicability of our recommendations to the altered use of the report.

Best Regards,

### Paterson Group Inc.

Carlos P. Da Silva, P.Eng., ing., QP<sub>ESA</sub>

## **Attachments**

- Boreholes by Others
- Drawing PG5101-1 - Test Hole Location Plan

#### **Report Distribution**

- Starwood Group Inc. (Ontario) Ltd. (3 copies)
- Paterson Group (1 copy)



### Monitoring Well: MW17-1

Project:

Phase II ESA and Geotechnical Assessment

Client:

A. L. Tubman Ltd.

Location:

403 Richmond Road, Ottawa, ON

Number:

122170005.200

Field investigator: R. Lee

Contractor:

George Downing Estate Drilling Ltd.

**Drilling method:** 

Solid Stem Auger / HQ Core

Date started/completed: 09-Feb-2017

Ground surface elevation: 99.53 m RTD

Top of casing elevation:

99.39 m RTD

Easting: Northing: 440745 5026659

	SUBSURFACE PROFILE			SAMPLE DETAILS								INSTALLATION DETAILS		
Depth		Graphic Log	Lithologic Description	Elevation (m RTD) Depth (m BGS)	Sample Number	Sample Type	Recovery	RQD	Fractures per 1.52m	N Value	Lab Analyses	%LEL Comb  20 40 60 80  1 1 1 1  ppm OTOV  200 400 600 800	Diagram	Description
(ft)	(m)		Ground Surface 100 mm ASPHALT FILL: light to dark brown, silty sand, some gravel Light to dark brown, SILTY SAND (possible fill)	99.53 0.00 99.43 0.10 99.23 0.30	1	GS	n/a	n/a	n/a	n/a	Metals, PAH, pH, PHC F1-F4, VOC	<5		Flushmount protection cover with concrete seal  Backfilled with bentonite
2	- 1		Fair quality, light grey LIMESTONE	98.56 0.97	2	ss	50%	n/a	n/a	60		<5		>50 mm ID schedule PVC pipe
4 —			- Iron oxidation in fractures											
6 —	- 2		Fair quality, interlayered grey LIMESTONE and dark grey SHALE	97.70	В1	CORE	100%	34" 59%	2.5	n/a				
8 —	- 3			96.18						u				Backfilled with sillisand 50 mm ID slotted schedule 40 PVC
12 —	- 4		Fair quality, light grey LIMESTONE to SHALEY LIMESTONE	3.35	B2	CORE	100%	40.5" 52%	2.5	п/а			<b>x</b>	Groundwater Level 3,48 m BGS 17-Feb-17
14 —			End of Borehole	95.11 4.42										
16 —	- 5													
Sai	nd Pa	al Interval	1.37 - 4.42 m BGS al: 0.61 - 4.42 m BGS : 0.23 - 0.61 m BGS	m S G	otes:  BGS - m S - split-sp S - grab s pm - parts a - not av	poon san ample per milli	nple				PHC F1-F4 - pe VOC - volatile o	e size c aromatic hydroca troleum hydrocarb rganic compounds	on fraction	
Stantec			Drawn By/Checked By: M. Ford / R. Lee						projection	-				

### Monitoring Well: MW17-2

Project:

Phase II ESA and Geotechnical Assessment

Client:

A. L. Tubman Ltd.

Location:

403 Richmond Road, Ottawa, ON

Number:

122170005.200

Field investigator: R. Lee

Contractor:

**Drilling method:** 

Solid Stem Auger / HQ Core

Date started/completed:

09-Feb-2017 Ground surface elevation: 99.26 m RTD

Top of casing elevation:

99.16 m RTD

Easting:

440744

George Downing Estate Drilling Ltd. Northing: 5026703 SUBSURFACE PROFILE SAMPLE DETAILS INSTALLATION DETAILS %LEL Elevation (m RTD) Depth (m BGS) Diagram Sample Type Recovery Rob Graphic Lithologic Description Lab Analyses Description Depth Log ppm OTOV (ft) (m) Ground Surface ASPHALT 99.26 Flushmount protective cover with concrete seal 99,16 FILL: dark brown, clayey sand to 0.10 sandy clay, with gravel 1% Metals, PAH, PHC F1-F4, VOC 98.95 GS n/a n/a n/a n/a Dark brown, SILTY SAND, with some 0.30 Backfilled with clay (possible fill) bentonite 50 mm ID schedule 40 PVC pipe 1% 50% n/a n/a 60 SS 98.19 Good quality, light grey LIMESTONE with SHALE laminations 1.07 - Iron oxidation in fractures 46.5" В1 CORE 100% 2.5 n/a 96.51 Backfilled with silica Poor quality, dark grey interlayered SHALE and LIMESTONE 2.74 50 mm ID slotted schedule 40 PVC pipe 10 100% B2 CORE 2.5 n/a 63% 95.55 12 Fair quality, grey LIMESTONE to SHALEY LIMESTONE 3.70 Groundwater Level: 3.70 m BGS 17-Feb-17 14 94.84 End of Borehole 4.42

Screen Interval: Sand Pack Interval: Well Seal Interval:

STANTEC BOREHOLE AND WELL V2 122170005 200\_BHLOGS.GPJ STANTEC - DATA TEMPLATE.GDT 3/9/17 MIFORD

16

1.37 - 4.42 m BGS 0.61 - 4.42 m BGS 0.23 - 0.61 m BGS

Stantec

Notes: m BGS - metres below ground surface

SS - split-spoon sample GS - grab sample

ppm - parts per million by volume n/a - not available

CORE - HQ core size

PAH - polycyclic aromatic hydrocarbons
PHC F1-F4 - petroleum hydrocarbon fractions 1 to 4
VOC - volatile organic compounds

Easting and Northing coordinates based on UTM 17T

### Monitoring Well: MW17-3

Project:

Phase II ESA and Geotechnical Assessment

Client:

A. L. Tubman Ltd.

Location:

403 Richmond Road, Ottawa, ON

Number:

122170005.200

Field investigator: R. Lee

Contractor:

George Downing Estate Drilling Ltd.

Drilling method:

Solid Stem Auger / HQ Core

Date started/completed: 09-Feb-2017

Ground surface elevation: 99.27 m RTD

Top of casing elevation: Easting:

99.19 m RTD

Northing:

440729 5026693

			SUBSURFACE PROFILE						SAI	MPLE DETAI	LS		INS	STALLATION DETAILS
Dep	oth (m)	Graphic Log	Lithologic Description  Ground Surface	Elevation (m RTD) Depth (m BGS)	Sample	Sample Type	Recovery	RQD	Fractures per 1.52m	N Value	Lab Analyses	%LEL Comb▲  20 40 60 80  1 1 1 1  ppm OTOV .	Diagram	Description
	-		FILL: dark brown, clayey sand, with gravel  Dark brown, SILTY SAND, with some clay (possible fill)	0,00 99,17 0.10 98,97 0.30	1	GS	n/a	n/a	n/a	n/a	Metals, PAH, PHC F1-F4, VOC	<5		Flushmount protecticover with concrete seal     Backfilled with bentonite
2 —	- 1		Decreasility light group IMESTONIC	98.21	2	ss	50%	n/a	n/a	50 / 0.1 m		<5		`50 mm ID schedule PVC pipe
4 —	- - -		Poor quality, light grey LIMESTONE  - Highly fractured and highly weathered zone between 1.4 to 1.6 mBGS	1.07	B1	CORE	100%	10" 20%	10	n/a				
8 —	-		- Highly fractured and highly weathered zone between 2.1 to 2.3 m   BGS	96.99	В2	CORE	100%	18" 75%	5	n/a				Backfilled with silic sand
12 —	_ 3 _ _ _ _ 4		Good quality, light grey SHALEY LIMETONE to LIMESTONE	95.92	вз	CORE	100%	46" 80%	5	n/a				50 mm ID slotted schedule 40 PVC p — Groundwater Level 3.16 m BGS 17-Feb-17
14 —	_		End of Borehole	94.85										
16 —	- 5													
S	and Pa	al Interval		m S G pi	lotes:  n BGS - m S - split-s SS - grab s pm - parts /a - not av	poon sar sample s per milli	nple				PHC F1-F4 - pe VOC - volatile o Easting and No	re size c aromatic hydroca troleum hydrocarb organic compounds rthing coordinates	on fraction	
(		) 5	tantec		Dr	awn By/Ch	ecked By	⁄∷M. Fo	rd / R. Le	20	projection			Sheet 1 of 1

#### SYMBOLS AND TERMS USED ON BOREHOLE/MONITORING WELL RECORDS

#### **SOIL DESCRIPTION**

Terminology describing common soil genesis:

Rootmat	<ul> <li>vegetation, roots and moss with organic matter and topsoil typically forming a mattress at the ground surface</li> </ul>
Topsoil	- mixture of soil and humus capable of supporting vegetative growth
Peat	- mixture of visible and invisible fragments of decayed organic matter
Till	- unstratified glacial deposit which may range from clay to boulders
Fill	- material below the surface identified as placed by humans (excluding buried services)

Terminology describing soil structure:

Desiccated	- having visible signs of weathering by oxidization 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 successions of different soil types, e.g. silt and sand
Layer	- > 75 mm in thickness
Seam	- 2 mm to 75 mm in thickness
Parting	- < 2 mm in thickness

#### Terminology describing soil types:

The classification of soil types are made on the basis of grain size and plasticity in accordance with the Unified Soil Classification System (USCS) (ASTM D 2487 or D 2488) which excludes particles larger than 75 mm. For particles larger than 75 mm, and for defining percent clay fraction in hydrometer results, definitions proposed by Canadian Foundation Engineering Manual, 4th Edition are used. The USCS provides a group symbol (e.g. SM) and group name (e.g. silty sand) for identification.

#### Terminology describing cobbles, boulders, and non-matrix materials (organic matter or debris):

Terminology describing materials outside the USCS, (e.g. particles larger than 75 mm, visible organic matter, and construction debris) is based upon the proportion of these materials present:

Trace, or occasional	Less than 10%
Some	10-20%
Frequent	> 20%

### Terminology describing compactness of cohesionless soils:

The standard terminology to describe cohesionless soils includes compactness (formerly "relative density"), as determined by the Standard Penetration Test (SPT) N-Value - also known as N-Index. The SPT N-Value is described further on page 3. A relationship between compactness condition and N-Value is shown in the following table.

Compactness Condition	SPT N-Value
Very Loose	<4
Loose	4-10
Compact	10-30
Dense	30-50
Very Dense	>50

#### Terminology describing consistency of cohesive soils:

The standard terminology to describe cohesive soils includes the consistency, which is based on undrained shear strength as measured by *in situ* vane tests, penetrometer tests, or unconfined compression tests. Consistency may be crudely estimated from SPT N-Value based on the correlation shown in the following table (Terzaghi and Peck, 1967). The correlation to SPT N-Value is used with caution as it is only very approximate.

Canalatanass	Undrained Sh	Approximate	
Consistency	kips/sq.ft.	kPa	SPT N-Value
Very Soft	<0.25	<12.5	<2
Soft	0.25 - 0.5	12.5 - 25	2-4
Firm	0.5 - 1.0	25 - 50	4-8
Stiff	1.0 - 2.0	50 – 100	8-15
Very Stiff	2.0 - 4.0	100 - 200	15-30
Hard	>4.0	>200	>30

#### **ROCK DESCRIPTION**

Except where specified below, terminology for describing rock is as defined by the International Society for Rock Mechanics (ISRM) 2007 publication "The Complete ISRM Suggested Methods for Rock Characterization, Testing and Monitoring: 1974-2006"

Terminology describing rock quality:

3, 4, 4, 4, 4, 4, 4, 4, 4, 4, 4, 4, 4, 4,				
RQD	Rock Mass Quality			
0-25	Very Poor Quality			
25-50	Poor Quality			
50-75	Fair Quality			
75-90	Good Quality			
90-100	Excellent Quality			

Alternate (Colloquial) Rock Mass Quality					
Very Severely Fractured	Crushed				
Severely Fractured	Shattered or Very Blocky				
Fractured	Blocky				
Moderately Jointed	Sound				
Intact	Very Sound				

**RQD (Rock Quality Designation)** denotes the percentage of intact and sound rock retrieved from a borehole of any orientation. All pieces of intact and sound rock core equal to or greater than 100 mm (4 in.) long are summed and divided by the total length of the core run. RQD is determined in accordance with ASTM D6032.

**SCR (Solid Core Recovery)** denotes the percentage of solid core (cylindrical) retrieved from a borehole of any orientation. All pieces of solid (cylindrical) core are summed and divided by the total length of the core run (It excludes all portions of core pieces that are not fully cylindrical as well as crushed or rubble zones).

**Fracture Index (FI)** is defined as the number of naturally occurring fractures within a given length of core. The Fracture Index is reported as a simple count of natural occurring fractures.

Terminology describing rock with respect to discontinuity and bedding spacing:

Spacing (mm)	Discontinuities	Bedding
>6000	Extremely Wide	-
2000-6000	Very Wide	Very Thick
600-2000	Wide	Thick
200-600	Moderate	Medium
60-200	Close	Thin
20-60	Very Close	Very Thin
<20	Extremely Close	Laminated
<6		Thinly Laminated

Terminology describing rock strength:

entimology describing fock shelight.						
Strength Classification	Grade	Unconfined Compressive Strength (MPa)				
Extremely Weak	RO	<1				
Very Weak	R1	1 – 5				
Weak	R2	5 – 25				
Medium Strong	R3	25 – 50				
Strong	R4	50 – 100				
Very Strong	R5	100 – 250				
Extremely Strong	R6	>250				

Terminology describing rock weathering:

Term	Symbol	Description
Fresh	W1	No visible signs of rock weathering. Slight discoloration along major discontinuities
Slightly	W2	Discoloration indicates weathering of rock on discontinuity surfaces.  All the rock material may be discolored.
Moderately	W3	Less than half the rock is decomposed and/or disintegrated into soil.
Highly	W4	More than half the rock is decomposed and/or disintegrated into soil.
Completely	W5	All the rock material is decomposed and/or disintegrated into soil.  The original mass structure is still largely intact.
Residual Soil	W6	All the rock converted to soil. Structure and fabric destroyed.

#### STRATA PLOT

Strata plots symbolize the soil or bedrock description. They are combinations of the following basic symbols. The dimensions within the strata symbols are not indicative of the particle size, layer thickness, etc.



### **SAMPLE TYPE**

SS	Split spoon sample (obtained by performing the Standard Penetration Test)	
ST	Shelby tube or thin wall tube	
DP	Direct-Push sample (small diameter tube sampler hydraulically advanced)	
PS	Piston sample	
BS	Bulk sample	
HQ, NQ, BQ, etc.	Rock core samples obtained with the use of standard size diamond coring bits.	

### **WATER LEVEL MEASUREMENT**



measured in standpipe, piezometer, or well



inferred

#### **RECOVERY**

For soil samples, the recovery is recorded as the length of the soil sample recovered. For rock core, recovery is defined as the total cumulative length of all core recovered in the core barrel divided by the length drilled and is recorded as a percentage on a per run basis.

#### **N-VALUE**

Numbers in this column are the field results of the Standard Penetration Test: the number of blows of a 140 pound (63.5 kg) hammer falling 30 inches (760 mm), required to drive a 2 inch (50.8 mm) O.D. split spoon sampler one foot (300 mm) into the soil. In accordance with ASTM D1586, the N-Value equals the sum of the number of blows (N) required to drive the sampler over the interval of 6 to 18 in. (150 to 450 mm). However, when a 24 in. (610 mm) sampler is used, the number of blows (N) required to drive the sampler over the interval of 12 to 24 in. (300 to 610 mm) may be reported if this value is lower. For split spoon samples where insufficient penetration was achieved and N-Values cannot be presented, the number of blows are reported over sampler penetration in millimetres (e.g. 50/75). Some design methods make use of N-values corrected for various factors such as overburden pressure, energy ratio, borehole diameter, etc. No corrections have been applied to the N-values presented on the log.

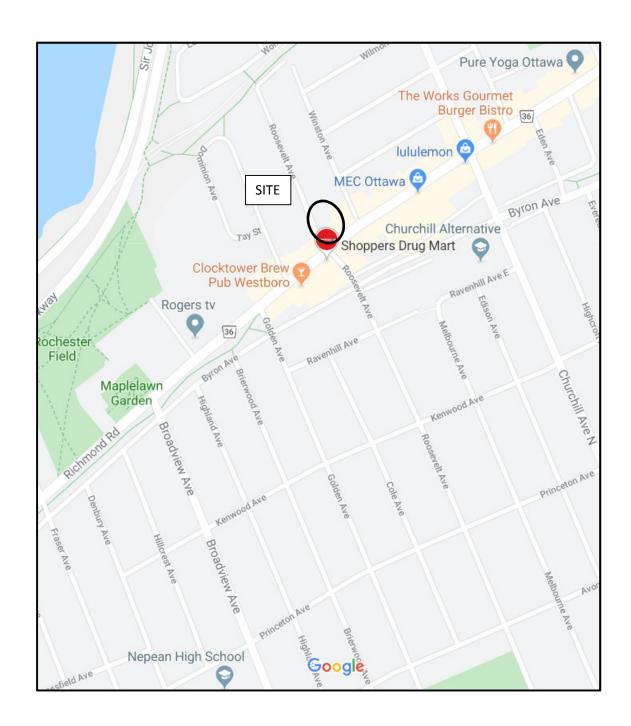
#### DYNAMIC CONE PENETRATION TEST (DCPT)

Dynamic cone penetration tests are performed using a standard 60 degree apex cone connected to 'A' size drill rods with the same standard fall height and weight as the Standard Penetration Test. The DCPT value is the number of blows of the hammer required to drive the cone one foot (300 mm) into the soil. The DCPT is used as a probe to assess soil variability.

### **OTHER TESTS**

S	Sieve analysis		
Н	Hydrometer analysis		
k	Laboratory permeability		
Y	Unit weight		
Gs	Specific gravity of soil particles		
CD	Consolidated drained triaxial		
CU	Consolidated undrained triaxial with pore		
	pressure measurements		
UU	Unconsolidated undrained triaxial		
DS	Direct Shear		
С	Consolidation		
Qυ	Unconfined compression		
Ip	Point Load Index (Ip on Borehole Record equals		
	I <sub>P</sub> (50) in which the index is corrected to a		
	reference diameter of 50 mm)		

	Single packer permeability test; test interval from depth shown to bottom of borehole
	Double packer permeability test; test interval as indicated
0	Falling head permeability test using casing
, and the second	Falling head permeability test using well point or piezometer



# FIGURE 1

**KEY PLAN** 

patersongroup

