

**FUNCTIONAL SERVICING and STORMWATER MANAGEMENT REPORT**

**IN SUPPORT OF**

**PROPOSED DEVELOPMENT FOR  
MATTAMY HOMES**

**ALL OF LOTS 15 AND 16  
AND PART OF LOT 1  
BLOCK "L"  
REGISTERED PLAN 92**

**JAMES ST. AND MARTHA ST.**

**CITY OF BURLINGTON**

**November 6<sup>th</sup> 2017**

**C.E. FILE: 16-051**

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## ***A.O. INTRODUCTION***

The property is located at the intersection of James Street and Martha Street within the City of Burlington. The Municipal address is 2082-2090 James St. The site is located within the downtown area with sparse residential units consisting of both low-rise and high rise apartment buildings as well as single detached units, abutting James St. to the north, Martha St. to the east, and existing Rambo Creek to the south and west. A Key Map showing the location of the Site has been included as Appendix 'A'. The proposed development is an 18 storey (including mechanical penthouse) high-rise building fronting James Street with walk-in access from both James St. and Martha St. and vehicular access from Martha Street only. The total site area is 0.234 hectares, of which only 0.189 hectares is developable due to the presence of Rambo Creek. The developable area has been identified as only land that is on the inside of the proposed Retaining Wall (RW). The area within the property limits that falls outside the proposed RW has been identified as non-developable as it is the area that directly drains to the watercourse/drainage channel.

The proposed development is a residential building consisting of a total of 153 residential units on the 18 stories above ground, and a five (5) storey underground parking to grade. The private roadway enters via Martha St., is self-contained within the property, with no direct connections to James St.

In support of the proposed development, we provide this report to identify the methodology of the municipal servicing and stormwater management. More specifically the report will substantiate the ability to provide municipal sanitary and water servicing and provide a conceptual resolution for StormWater Management (SWM).



## ***B.O. EXISTING TOPOGRAPHICAL CHARACTERISTICS AND DRAINAGE PATTERNS***

The development lands are currently occupied by two (2) single two-storey stucco units and one (1) single two-storey brick unit with asphalt parking areas and driveways. The three (3) properties addressed 2082, 2086, and 2090 James St. are commercial units fronting James St. with individual parking lots at the rear. The majority of the site is therefore developed, however, the creek banks on the east and south are heavily vegetated with mature trees. The existing topography is relatively flat with mild slopes at 4.8% from the north-east to the south-west direction. The overland flow drainage pattern for the Site is generally from north-east to south-east and south-west, draining towards the back of the property and into the existing creek, away from James St. and Martha St. The highest elevation of the Site of 84.02 metres is at the north-east corner, while the lowest elevation is around 81.30 metres on the top of bank, and 80.16 at the creek bottom at the south-west corner. The low flow channel meanders through the site at an average slope of 1.3%.

There is a 6.0 m wide buffer along banks of the creek which is the entire west and south sides of the property.

## ***C.O. STORMWATER MANAGEMENT***

The site is located in the lower Rambo Creek watershed. The watershed is under the jurisdiction of City of Burlington and not regulated by Regional Municipality of Halton. Under existing conditions, the Site is draining to Rambo Creek and therefore, ultimately to Lake Ontario. The development is subject to the ***City of Burlington*** guidelines. This section of the Report (Stormwater Management) demonstrates that the post development storm runoff from the site can be accommodated by the proposed stormwater



management system with on-site controls, and maintaining the allowable site discharge. Quantity control, and Quality control are presented in accordance with City of Burlington requirements.

### **C.1. Proposed Quality Control Measures**

As mentioned, the entire Site is currently draining to Lake Ontario via Rambo Creek. To address quality of stormwater run-off for the development site; quality controls must be implemented for the post-development storm discharge to the existing natural watercourse system. In accordance with MOE guidelines the *water quality target is the long-term average removal of 80% of Total Suspended Solids (TSS) on an annual loading basis from all runoff leaving the proposed development site based on the level of imperviousness.*

Total imperviousness of the Site is at 78.6%. The majority of Site, 59.6%, is covered by roof top and terrace areas; the stormwater runoff captured from these areas is considered ***clean and free of pollutants.***

#### **Oil/Grit Separator**

As indicated on the Conceptual Servicing Plan (DWG. #16-051-SVC) we have proposed installation of an oil / grit separator for the stormwater quality control. A Stormceptor model STC-300 will be installed upstream of Underground Storm Storage Tank, which captures drainage from the development areas. The stormwater will be treated by the Stormceptor before outlet to the proposed Storm Storage Tank from where it will be pumped into the creek. The Stormceptor has been sized according to the controlled site drainage area for level 1 (Enhanced Protection) quality control (min 80% annual TSS removal and treating a min of 90% annual run-off).



The manufacturer/supplier-provided sizing verification software shows that a STC-300 (300 imperial gallons), provides 83% annual TSS removal and treats 97% of the annual runoff volume. Please refer to Appendix 'B': Servicing Plan (DWG. #16-051-SVC) for the location of the proposed STC-300.

#### ***C.4. Storm Water Quantity Control***

The total area of the site is 0.234 Ha. and is located inside the lower Rambo Creek watershed. As identified in Section C.0., post-development drainage for the site is tributary to the existing natural watercourse on the west and south side of the property, consistent with pre-development conditions. Therefore, this existing creek represents the storm outlet for the Site.

As site discharge will be released into the existing natural system, it was restricted to the 2-year storm event flows under pre-development conditions. Therefore, the maximum allowable release rate for the subject site will be restricted to the 2-year pre-development flow rate of **27.91 lps** during the 100-year post-development storm event.

##### ***C.4.1. Roof Drainage Areas***

As per standard practice the roof drainage control and detention design is based on a 100-year storm event. Roof drains are proposed for the entire 18<sup>th</sup> Floor roof area to provide stormwater run-off collection from the roof. Please refer to Appendix 'B': Servicing Plan (DWG. #16-051-SVC) for the locations of the proposed controlled roof drains.

The roof discharge rate for the controlled drain has been designed to a minimum requirement of 42 lps/Ha. The controlled roof area will incorporate two (2) roof drains and a total roof slope of three (3) inches rise from roof drain to section perimeter. The controlled roof discharge will outlet to the internal



storm piping system for the building. Roof drainage area control and storage calculations are provided in a 'spreadsheet' format in Appendix 'C'.

#### **C.4.2. Pavement / Concrete, Building Terrace and Landscaped Drainage Areas**

The 2-year and 100-year events were analyzed under post development conditions. All drainage from paved areas and terraces are captured via area drains, as illustrated on the Site Servicing Plan (Appendix B: DWG. #16-051-SVC). All drainage from landscaped areas is captured via catchbasins, also illustrated on the Site Servicing Plan (Appendix B: DWG. #16-051-SVC). Referring to the 'spreadsheet' quantity analysis calculations (Appendix 'C'); maximum allowable discharge under 100 year storm post-development conditions is limited to the 2 year storm pre-development flow or less. The maximum storage requirement occurs during the 100-year storm event and is equal to **12.18 cu.m**. The required storage will be provided by underground Storage Tank located at the south-east corner of the P1, the top level of the 5-storey underground parking lot.

#### Site Discharge

Site discharge is controlled using a Pump installed on the south-east corner of the proposed Underground Storage Tank which outlets to Rambo Creek. The pump will be designed to ensure the maximum allowable discharge (2-year pre-development) to the natural system is not exceeded. Details of the pumping system will be provided by the mechanical engineer at the Site Plan Application stage. As indicated on the Servicing Plan (Appendix B: DWG. #16-051-SVC), we have provided **100-year storm event** control and conveyance via the proposed stormwater management layout.





### **C.4.3. Storm Water Quantity Control Summary**

Refer to Appendix 'C' for the SWM quantity analysis (using the modified Rationale method) with applicable calculations in a "spreadsheet" format. Refer to these calculations for allowable release rates, post development flow computation, roof top, above and underground storage requirements.

**Table C.1: Quantity Control Summary**

<b>Design Element</b>	<b>Quantity</b>
Allowable Release Rate, 2-yr Predevelopment	27.91 lps
Actual Release Rate (100-yr storm event)	27.91 lps
Required Site Storage during 100-yr Storm event	12.18 cu.m.
Provided Site Storage during 100-yr Storm event *	15.51 cu.m.
Total Roof Release Rate (control roof drains)	3.10 lps
Total Roof Storage Required	12.34 cu.m.
Total Roof Storage Provided	18.50 cu.m.

\* On-site storage is provided inside the Underground Storage Tank unit located within the top parking floor as shown on the Servicing Plan (Appendix B: DWG. #16-051-SVC).



## **D.O. WATER SUPPLY AND DISTRIBUTION**

The water supply capacity must be confirmed to ensure the proposed site plan development can be adequately serviced. An existing 300mm diameter watermain runs along the south side of James St. and another existing 300mm diameter watermain runs along the west side of Martha St. fronting. A 200mm diameter connection is proposed to this existing watermain on Martha St. to provide fire flow protection (sprinkler system) and a parallel 150mm diameter connection to provide domestic water supply for the proposed building. The proposed water service connections will be an 'H' type service connection. Refer to Appendix 'B' for the Servicing Plan (DWG. #16-051-SVC) illustrating the proposed connections.

The total water demand (fire flow and maximum daily demand and supply analysis) for the proposed site will need to be determined. The Hydrant Flow Analysis will be conducted, for the existing 300mm diameter watermain on Martha St. to confirm the pressure / flow relationship of the existing system and analyze the proposed development accordingly. Results will be provided at a later date.

In addition, an existing Fire Hydrant located on Martha St. will be within 45 metres of the proposed building Siamese connection, refer to Appendix B (DWG. #16-051-SVC) for details.

## **E.O. SANITARY SERVICING DESIGN**

The proposed development is residential building consisting of a total of 153 residential units (71 one-bedroom, 66 two-bedroom, and 16 three-bedroom suites). As mentioned, the 18-storey building will front James St. and will have a sanitary service connection directly to the existing sanitary sewer on Martha St. This proposed sewer (200mm dia.) will be constructed from the east side of the property draining east to the existing 300mm diameter sanitary sewer. The peak sanitary flow from the proposed development is calculated as follows:



### Residential Population Estimation

*(based on persons per unit)*

$$= 71 \times 1.4 = 99.4 \text{ persons (1-Bedroom)}$$

$$= 66 \times 2.1 = 138.6 \text{ persons (2-Bedroom)}$$

$$= 16 \times 3.1 = 49.6 \text{ persons (3-Bedroom)}$$

### Average Daily Flow

*(based on 275 litres / capita / day)*

$$= 287.6 \text{ persons} \times 275 / (24 \times 60 \times 60) = 0.915 \text{ litres / second}$$

### Peaking Factor

*(based on the Harmon formula)*

$$K = 1 + 14 / (4 + P^{1/2}), \text{ where } P \text{ is population in thousands}$$

$$K = 1 + 14 / (4 + (287.6/1000)^{1/2}) = 4.09$$

### Maximum Sanitary Flow

*(based on Avg. daily flow times the Peaking factor)*

$$\text{Max. Sanitary Flow} = 0.915 \text{ litres / second} \times 4.09 = 3.74 \text{ litres / second}$$

### Wet Weather Infiltration

*(based on 0.286 litres / second / hectare)*

$$= 0.286 \times 0.23 \text{ Ha} = 0.067 \text{ litres / second}$$

### Total Design Sanitary Flow

*(based on Max. Sanitary Flow + Infiltration)*

$$\text{Total Design Sanitary Flow} = 3.74 + 0.067 = 3.807 \text{ litres / second}$$



To service the site for sanitary sewage and ensuring depth is sufficient to convey gravity flow for the proposed development; a 200mm sanitary sewer at 1.0% gradient is proposed with an outlet to the existing sanitary sewer on Martha St. The service connection will be made at a proposed connection invert elevation of 81.47 metres. Refer to Appendix B for the Servicing Plan (DWG. #16-051-SVC) for details of the sanitary servicing.

As noted; the total flow contribution by the new development to the existing sanitary manhole on Martha St. is 3.807 lps. Therefore, the peak sanitary sewer flow from the proposed development is only 5.6% of the full flow capacity of the receiving sewer main.

## ***F.0. CONCLUSIONS AND RECOMMENDATIONS***

On the basis of our investigation and examination, it is the conclusion of the writers that:

- The stormwater drainage scheme of this area has been maintained.

- Water Quality Control

Given that the majority (59.6%) of Site is covered by roof top and terrace areas; the stormwater runoff captured from these areas is considered ***clean and free of pollutants***.

The drainage from the private access road will be treated via an Oil Grit Separator before entering the Storage Tank.

- Water Quantity Control

The maximum allowable release rate to the municipal sewer is the 2-year pre-development flow rate equal to ***27.91 lps***. On-site storage is provided via an underground Storage Tank, for the development Site from the 2-year up to the 100-year storm event (post-development) ensuring the maximum allowable discharge is maintained.



- The Hydrant flow analysis for the existing municipal water supply needs to be performed; and
- The subject development can be drained for sanitary sewage purposes.

***In summary, the existing municipal services are such that they can support the subject development.***

Respectfully Submitted by:

Shazia Nishat, P.Eng.

Project Engineer

Michael Hall, P.Eng.

Senior Engineer



## ***APPENDIX A***

### ***- KEY MAP***



***APPENDIX B***

***- Servicing Plan: DWG. #16-051-SVC***

***(11x17 inch reduction)***



## ***APPENDIX C***

### ***- Stormwater Management Analysis***