

# **FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT**

**FOR**

**THE SALVATION ARMY  
333 MONTREAL ROAD**

**CITY OF OTTAWA**

**PROJECT NO.: 16-893**

**SEPTEMBER 2017 – REV 2  
© DSEL**



**FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT  
FOR  
333 MONTREAL ROAD  
THE SALVATION ARMY**

**TABLE OF CONTENTS**

<b>1.0</b>	<b>INTRODUCTION .....</b>	<b>1</b>
1.1	Existing Conditions .....	2
1.2	Required Permits / Approvals .....	2
1.3	Pre-consultation.....	3
<b>2.0</b>	<b>GUIDELINES, PREVIOUS STUDIES, AND REPORTS.....</b>	<b>4</b>
2.1	Existing Studies, Guidelines, and Reports.....	4
<b>3.0</b>	<b>WATER SUPPLY SERVICING .....</b>	<b>5</b>
3.1	Existing Water Supply Services .....	5
3.2	Water Supply Servicing Design .....	5
3.3	Water Supply Conclusion .....	6
<b>4.0</b>	<b>WASTEWATER SERVICING.....</b>	<b>8</b>
4.1	Existing Wastewater Services .....	8
4.2	Wastewater Design .....	8
4.3	Wastewater Servicing Conclusions .....	9
<b>5.0</b>	<b>STORMWATER MANAGEMENT .....</b>	<b>10</b>
5.1	Existing Stormwater Services .....	10
5.2	Post-development Stormwater Management Target .....	10
5.3	Proposed Stormwater Management System .....	11
5.4	Stormwater Servicing Conclusions .....	12
<b>6.0</b>	<b>UTILITIES.....</b>	<b>13</b>
<b>7.0</b>	<b>EROSION AND SEDIMENT CONTROL .....</b>	<b>14</b>
<b>8.0</b>	<b>CONCLUSION AND RECOMMENDATIONS .....</b>	<b>15</b>

---

## **FIGURES**

Figure 1 Site Location

## **TABLES**

Table 1 Water Supply Design Criteria  
Table 2 Water Demand Proposed Site Conditions  
Table 3 Wastewater Design Criteria  
Table 4 Summary of Estimated Existing Peak Wastewater Flow  
Table 5 Summary of Estimated Peak Wastewater Flow  
Table 6 Summary of Existing Peak Storm Flow Rates  
Table 7 Summary of Release Rates and Discharge Location

## **APPENDICES**

Appendix A Pre-consultation Notes  
Appendix B Water Supply  
Appendix C Wastewater Collection  
Appendix D Stormwater Management  
Drawings / Figures Proposed Site Plan

**FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT  
FOR  
333 MONTREAL ROAD  
THE SALVATION ARMY  
SEPTEMBER 2017 – REV 2**

**CITY OF OTTAWA  
PROJECT NO.: 16-893**

## **1.0 INTRODUCTION**

David Schaeffer Engineering Limited (DSEL) has been retained to prepare a Functional Servicing and Stormwater Management report in support of the application for a Site Plan Control (SPC) and Zoning By-law Amendment (ZBLA) at 333 Montreal Road.

The subject property is located within the City of Ottawa urban boundary, in the Rideau-Vanier ward. As illustrated in **Figure 1**, the subject property is located at the intersection of Montreal Road and Ste Anne Avenue. Comprised of a five parcels of land to be combined into one parcel, the subject property measures approximately **0.69 ha** and is zoned Traditional Mainstreet (TM3).



**Figure 1: Site Location**

---

The proposed SPC and ZBLA would allow for the development of a multi-purpose building comprised of a 6-storey tower on the west side of the site transforming to a 3-storey tower moving east. The proposed **6,159 m<sup>2</sup>** development would contain common areas, office spaces, boarding rooms, a dining hall, and associated underground and above ground parking lots, with access from Montreal Road and Montfort Street. A copy of the proposed site plan is included in **Drawings/Figures**.

The objective of this report is to provide sufficient detail to support the application for SPC.

## 1.1 Existing Conditions

The existing site was previously a motel consisting of asphalt parking lots and few vegetated areas. The elevations range between 60.50m and 59.50m with an elevation change of 1.0m from the Northeast to the Southwest corner of the property.

Sewer and watermain mapping collected from the City of Ottawa indicate that the following services exist across the property frontages within the adjacent municipal right-of-ways:

### Montreal Road Avenue

- 200 mm diameter watermain
- 600 mm diameter concrete sanitary sewer tributary to the Montreal Road Collector
- 525 mm diameter concrete storm sewer tributary to the Ottawa East sub-watershed
- 750 mm diameter concrete sanitary trunk sewer

### Montfort Street

- 150 mm diameter watermain
- 225 mm diameter concrete sanitary sewer tributary to the Montreal Road Collector
- 300 mm diameter storm sewer tributary to the Ste Anne Avenue storm tunnel
- 2100 mm diameter concrete storm tunnel tributary to the Ottawa River

## 1.2 Required Permits / Approvals

The proposed development will be subject to the site plan control approval process. The City of Ottawa must approve the engineering design drawings and reports prior to the issuance of site plan control.

The proposed development is a single parcel of land that is not industrial and would outlet to a storm sewer. As a result, the stormwater management system is exempt from sections 53(1) and (3) of the Ontario Water Resources Act under Ontario Regulation 525/98. Correspondence with the MOE has been included in **Appendix A**.

### **1.3 Pre-consultation**

Pre-consultation correspondence, along with the servicing guidelines checklist, is located in ***Appendix A***.

---

## 2.0 GUIDELINES, PREVIOUS STUDIES, AND REPORTS

### 2.1 Existing Studies, Guidelines, and Reports

The following studies were utilized in the preparation of this report.

- **Ottawa Sewer Design Guidelines,**  
City of Ottawa, *SDG002*, October 2012  
**(City Standards)**
- **Ottawa Design Guidelines – Water Distribution**  
City of Ottawa, July 2010.  
**(Water Supply Guidelines)**
  - **Technical Bulletin ISD-2010-2**  
City of Ottawa, December 15, 2010.  
**(ISD-2010-2)**
  - **Technical Bulletin ISDTB-2014-02**  
City of Ottawa, May 27, 2014.  
**(ISDTB-2014-02)**
- **Design Guidelines for Sewage Works,**  
Ministry of the Environment, 2008.  
**(MOE Design Guidelines)**
- **Stormwater Planning and Design Manual,**  
Ministry of the Environment, March 2003.  
**(SWMP Design Manual)**
- **Ontario Building Code Compendium**  
Ministry of Municipal Affairs and Housing Building Development Branch,  
January 1, 2010 Update  
**(OBC)**
- **Water Supply for Public Fire Protection**  
Fire Underwriters Survey, 1999.  
**(FUS)**
- **Geotechnical Investigation**  
Paterson Group Inc., PG3970-2, March 6, 2017.  
**(Geotechnical Report)**

### 3.0 WATER SUPPLY SERVICING

#### 3.1 Existing Water Supply Services

The subject property lies within the City of Ottawa 1E pressure zone, as shown by the Water Distribution System map included in **Appendix B**. A local 200 mm diameter watermain exists within the Montreal Road right-of-way, and a local 150 mm diameter watermain exists within the Ste Anne Avenue right-of-way.

#### 3.2 Water Supply Servicing Design

The development proposes a dual connection to the existing 200mm diameter watermain within the Montreal Road right-of-way via a 150mm water service.

**Table 1** summarizes the **Water Supply Guidelines** employed in the preparation of the preliminary water demand estimate.

**Table 1**  
**Water Supply Design Criteria**

Design Parameter	Value
Rooming	150 L/person/d
Addiction Program Rooming	400 L/person/d
Community Centre	15 L/m <sup>2</sup> /d
Dining Room	125 L/seat/d
Commercial Office	75 L/9.3m <sup>2</sup> /d
Commercial Maximum Daily Demand	1.5 x avg. day
Commercial Maximum Hour Demand	1.8 x max. day
Minimum Watermain Size	150mm diameter
Minimum Depth of Cover	2.4m from top of watermain to finished grade
During normal operating conditions desired operating pressure is within	350kPa and 480kPa
During normal operating conditions pressure must not drop below	275kPa
During normal operating conditions pressure must not exceed	552kPa
During fire flow operating pressure must not drop below	140kPa
*Daily average based on Appendix 4-A from <b>Water Supply Guidelines</b> ** Residential Max. Daily and Max. Hourly peaking factors per MOE Guidelines for Drinking-Water Systems Table 3-3 for 0 to 500 persons. -Table updated to reflect ISD-2010-2	

**Table 2** summarizes the anticipated water supply demand for the proposed development based on the **Water Supply Guidelines**.

**Table 2**  
**Water Demand**  
**Proposed Site Conditions**

Design Parameter	Anticipated Demand <sup>1</sup> (L/min)	Boundary Condition <sup>2</sup> (m H <sub>2</sub> O / kPa)
Average Daily Demand	57.5	59.6 / 584.2
Max Day + Fire Flow	86.3 + 16,000 = 16,086.3	23.8 / 233.0
Peak Hour	155.4	50.8 / 497.9
1) Water demand calculation per <b>Water Supply Guidelines</b> . See <b>Appendix B</b> for detailed calculations. 2) Boundary conditions supplied by the City of Ottawa for the demands indicated in the correspondence; assumed ground elevation 58.75m. See <b>Appendix B</b> .		

Fire flow requirements are to be determined in accordance with Local Guidelines (**FUS**), City of Ottawa **Water Supply Guidelines**, and the Ontario Building Code.

Using the **FUS** method a conservative estimation of fire flow had been established. The following parameters were coordinated with Hobin Architects Inc.:

- Type of construction – Non-combustible Construction
- Occupancy type – Non-Combustible
- Sprinkler Protection – Supervised Sprinkler System

The above assumptions result in an estimated fire flow of approximately **16,000 L/min**, actual building materials selected will affect the estimated flow. A certified fire protection system specialist would need to be employed to design the building fire suppression system and confirm the actual fire flow demand.

The City of Ottawa was contacted to obtain boundary conditions associated with the estimated water demand as indicated in the boundary request correspondence included in **Appendix B**.

The City provided both the anticipated minimum and maximum water pressures, as well as the estimated water pressure during fire flow demand for the demands as indicated by the correspondence in **Appendix B**. Initial boundary conditions obtained indicate that pressures during average day demand exceeds the required pressure range as specified in **Table 1** and the **Water Supply Guidelines**; therefore, pressure reducing valves may be required.

### 3.3 Water Supply Conclusion

Anticipated water demand under proposed conditions was submitted to the City of Ottawa for establishing boundary conditions.

---

The anticipated water demand under proposed conditions was submitted to the City of Ottawa for establishing boundary conditions. As demonstrated by **Table 2**, based on the City's model, pressures during average day demand exceeds the required pressure range identified within the **Water Supply Guidelines**, therefore, pressure reducing valves may be required.

The proposed water supply design conforms to all relevant City Guidelines and Policies.

## 4.0 WASTEWATER SERVICING

### 4.1 Existing Wastewater Services

The subject site lies within the Montreal Road Collector Sewer catchment area, as shown by the City sewer mapping included in **Appendix C**. An existing 600 mm diameter sanitary sewer within Montreal Road right-of-way and an existing 525 mm diameter sanitary sewer within the Ste Anne Avenue right-of-way is available to service the proposed development.

The existing site consists of commercial lands contributing wastewater to the local Montreal Road sewer system, tributary to the Montreal Road Collector sewer approximately 200m downstream of the site.

### 4.2 Wastewater Design

It is proposed that the development connect to the 750mm diameter sanitary sewer within Montreal Road via a 250mm diameter sanitary sewer.

**Table 3** summarizes the **City Standards** employed in the design of the proposed wastewater sewer system.

**Table 3**  
**Wastewater Design Criteria**

Design Parameter	Value
Rooming	150 L/person/d
Addiction Program Rooming	400 L/person/d
Community Centre	15 L/m <sup>2</sup> /d
Dining Room	125 L/seat/d
Commercial Office	75 L/9.3m <sup>2</sup> /d
Infiltration and Inflow Allowance	0.28L/s/ha
Sanitary sewers are to be sized employing the Manning's Equation	$Q = \frac{1}{n} AR^{2/3} S^{1/2}$
Minimum Sewer Size	250mm diameter
Minimum Manning's 'n'	0.013
Minimum Depth of Cover	2.5m from crown of sewer to grade
Minimum Full Flowing Velocity	0.6m/s
Maximum Full Flowing Velocity	3.0m/s
<i>Extracted from Sections 4 and 6 of the City of Ottawa Sewer Design Guidelines, October 2012.</i>	

**Table 4 and Table 5** demonstrate the anticipated existing and estimated peak flows, respectively. See **Appendix C** for associated calculations.

**Table 4**  
**Summary of Estimated Existing Peak Wastewater Flow**

Design Parameter	Total Flow (L/s)
Estimated Average Dry Weather Flow	0.10
Estimated Peak Dry Weather Flow	0.15
Estimated Peak Wet Weather Flow	0.35

**Table 5**  
**Summary of Estimated Peak Wastewater Flow**

Design Parameter	Total Flow (L/s)
Estimated Average Dry Weather Flow	3.13
Estimated Peak Dry Weather Flow	4.69
Estimated Peak Wet Weather Flow	4.88

The estimated sanitary flow based on the Site Plan provided in *Drawings/Figures* anticipates a peak wet weather flow of **4.88 L/s**.

A sanitary analysis was conducted for the local municipal sanitary sewers located across the frontage of the subject property in order to assess the available capacity. The catchment area serviced by the Montreal Road sanitary sewer was identified and evaluated by reviewing existing development and zoning within the area. The analysis was conducted from the site to the upstream extents of the drainage area located near the intersection of Montreal Road and Granville Street, as shown by the sanitary drainage plan **SAN-1** in *Drawings/Figures*.

City of Ottawa Sewer Design Guidelines (2004) Figure 4.3 'Peak Flow Design Parameters' were employed to generate a conservative estimate of the existing wastewater flow conditions within the sewer.

Based on the sanitary analysis, the controlling section of the local sewer system is located at the intersection of Montreal Road and Lacasse Avenue (section 2-3) with an available residual capacity of **67.4 L/s**; detailed calculations are included in **Appendix C**.

The analysis above indicates that sufficient capacity is available in the local sewers to accommodate the proposed development.

### **4.3 Wastewater Servicing Conclusions**

The site is tributary to the Montreal Road Collector sewer; based on the sanitary analysis sufficient capacity is available to accommodate the anticipated **4.88 L/s** peak wet weather flow from the proposed development.

The proposed wastewater design conforms to all relevant **City Standards**.

---

## 5.0 STORMWATER MANAGEMENT

### 5.1 Existing Stormwater Services

Stormwater runoff from the subject property is tributary to the City of Ottawa sewer system located within the Ottawa Central sub-watershed. As such, approvals for proposed development within this area are under the approval authority of the City of Ottawa.

Flows that influence the watershed in which the subject property is located are further reviewed by the principal authority. The subject property is located within the Ottawa River watershed, and is therefore subject to review by the Rideau Valley Conservation Authority (RVCA). Consultation with the RVCA is located in **Appendix A**.

It was determined that the existing development contained no stormwater management controls for flow attenuation. The estimated pre-development peak flows for the 2, 5, and 100-year are summarized in **Table 5**:

**Table 6**  
**Summary of Existing Peak Storm Flow Rates**

City of Ottawa Design Storm	Estimated Peak Flow Rate (L/s)
2-year	203.5
5-year	278.3
100-year	544.7

### 5.2 Post-development Stormwater Management Target

Stormwater management requirements for the proposed development were reviewed with the City of Ottawa, where the proposed development is required to:

- Meet an allowable release rate based on a Rational Method Coefficient of 0.50, employing the City of Ottawa IDF parameters for a 2-year storm with a time of concentration equal to or greater than 10 minutes.
- Attenuate all storms on site up to and including the City of Ottawa 100-year design event.
- Quality controls are not required for the proposed development due to the site's distance from the outlet; correspondence with the RVCA is included in **Appendix A**.

Based on the above the allowable release rate for the proposed development is **73.6 L/s**.

---

### 5.3 Proposed Stormwater Management System

It is proposed that stormwater from the proposed development outlet to both the 525 mm diameter storm sewer within Montreal Road via a 375mm diameter storm sewer and the existing 2100mm diameter storm tunnel within Montfort Street via a 300mm diameter storm sewer.

Runoff from the parking area north of the proposed development will be directed to a catchbasin system tributary to Montfort Street and runoff from the remaining areas will be directed to a catchbasin system tributary to Montreal Road, as illustrated by **SSP-1** and **SWM-1**.

To meet the stormwater objectives the proposed development will contain a combination of roof top flow attenuation along with surface and subsurface storage system.

Flow from rooftops will be controlled before discharging to the private storm sewer system tributary to the Montreal Road storm sewer. The release rate and storage calculations for roof top attenuation were estimated based on Zurn Industries Ltd. design guidelines for Model Z-105-5 Control-Flo Single Notch drains. According to the Control-Flo Roof Drainage System Specification Drainage sheets notch ratings, each notch releases 5 G.P.M. per inch of head; relevant literature is provided in **Appendix D**. Each building's roof uses the Zurn recommended number of notches for the area and produces a rating curve based on the above criteria; detailed calculations are included in **Appendix D**.

Area A1 located within the parking area south of the proposed building is tributary to the storm sewer within Montreal Road. Approximately **68.0 m<sup>3</sup>** of underground storage via a Triton S-29 or an approved equivalent storage system and will be attenuated by an **85mm** ICD located in **CBMH101B**. Detailed calculations are located in **Appendix D**.

Area A2 located within the parking area north of the proposed building is tributary to the storm sewer within Montfort Street. Approximately **30.5 m<sup>3</sup>** of storage will be provided by surface ponding and will be attenuated by a **Tempest LMF60** ICD located in **STM203**. Detailed calculations are located in **Appendix D**.

Area A3 located within the parking area north of the proposed building is tributary to the storm sewer within Montfort Street. Approximately **18.8 m<sup>3</sup>** of storage will be provided by surface ponding and will be attenuated by a **75mm** ICD located in **CB202A**. Detailed calculations are located in **Appendix D**.

Area A4 collects runoff from the depressed patio area located north of the proposed building is tributary to the storm sewer within Montfort Street. A **6.0 m<sup>3</sup>** underground storage via a Triton S-22 or an approved equivalent storage system and will be attenuated by a **75mm** ICD located in **CB202B**. Underground storage unit sized to ensure that the depressed area can contain the 100-year storm. Detailed calculations are located in **Appendix D**.

Other products may be specified provided that the restricted release rate and sufficient storage is provided to meet or exceed the values in the detailed calculations.

**Table 7** summarize post-development flow rates.

**Table 7  
 Summary of Release Rates and Discharge Location**

Control Area	5-Year Release Rate	5-Year Storage	100-Year Release Rate	100-Year Required Storage	100-Year Available Storage
	(L/s)	(m <sup>3</sup> )	(L/s)	(m <sup>3</sup> )	(m <sup>3</sup> )
Unattenuated Areas	3.7	0.0	8.0	0.0	0.0
Montfort Street	24.5	12.2	28.3	41.5	55.2
Montreal Road	27.0	60.2	37.1	67.2	145.7
<b>Total</b>	<b>55.2</b>	<b>72.4</b>	<b>73.4</b>	<b>108.7</b>	<b>201.0</b>

It is anticipated that approximately **108.7 m<sup>3</sup>** of storage will be required on site to attenuate flow to the established release rate of **73.6 L/s**; storage calculations are contained within **Appendix D**.

#### 5.4 Stormwater Servicing Conclusions

Post development stormwater runoff will be required to be restricted to the allowable target release rate for storm events up to and including the 100-year storm in accordance with City of Ottawa **City Standards**. The post-development allowable release rate was calculated as **73.6 L/s** based on consultation with the City of Ottawa. It is estimated that **108.7 m<sup>3</sup>** will be required to meet this release rate.

Based on consultation with the RVCA, stormwater quality controls are not required.

The proposed stormwater design conforms to all relevant **City Standards** and Policies for approval.

## **6.0 UTILITIES**

Gas, Hydro services currently exist within the Montreal Road right-of-way. Utility servicing will be coordinated with the individual utility companies prior to site development.

---

## 7.0 EROSION AND SEDIMENT CONTROL

Soil erosion occurs naturally and is a function of soil type, climate and topography. The extent of erosion losses is exaggerated during construction where vegetation has been removed and the top layer of soil becomes agitated.

Prior to topsoil stripping, earthworks or underground construction, erosion and sediment controls will be implemented and will be maintained throughout construction.

Silt fence will be installed around the perimeter of the site and will be cleaned and maintained throughout construction. Silt fence will remain in place until the working areas have been stabilized and re-vegetated.

Catch basins will have SILTSACKS or an approved equivalent installed under the grate during construction to protect from silt entering the storm sewer system.

A mud mat will be installed at the construction access in order to prevent mud tracking onto adjacent roads.

Erosion and sediment controls must be in place during construction. The following recommendations to the contractor will be included in contract documents.

- Limit extent of exposed soils at any given time.
- Re-vegetate exposed areas as soon as possible.
- Minimize the area to be cleared and grubbed.
- Protect exposed slopes with plastic or synthetic mulches.
- Install silt fence to prevent sediment from entering existing ditches.
- No refueling or cleaning of equipment near existing watercourses.
- Provide sediment traps and basins during dewatering.
- Install filter cloth between catch basins and frames.
- Plan construction at proper time to avoid flooding.

Establish material stockpiles away from watercourses, so that barriers and filters may be installed.

The contractor will, at every rainfall, complete inspections and guarantee proper performance. The inspection is to include:

- Verification that water is not flowing under silt barriers.
- Clean and change filter cloth at catch basins.

---

## 8.0 CONCLUSION AND RECOMMENDATIONS

David Schaeffer Engineering Ltd. (DSEL) has been retained to prepare a Functional Servicing and Stormwater Management report in support of the application for a Site Plan Control (SPC) and Zoning By-law Amendment (ZBLA) at 333 Montreal Road. The preceding report outlines the following:

- The watermain boundary conditions have been requested from the City of Ottawa, however they were unavailable at the time of this publication;
- The FUS method for estimating fire flow indicated **16,000 L/min** is required for the proposed development;
- The proposed development is anticipated to have a peak wet weather flow of **4.88 L/s**; Based on the sanitary analysis conducted the existing municipal sewer infrastructure has sufficient capacity to support the development;
- Based on consultation with the City of Ottawa, the proposed development will be required to attenuate post development flows to an equivalent release rate of **73.6 L/s** for all storms up to and including the 100-year storm event;
- It is contemplated that stormwater objectives may be met through storm water retention via roof top, surface and subsurface storage, it is anticipated that **108.7 m<sup>3</sup>** of onsite storage will be required to attenuate flow to the established release rate above;
- Based on consultation with the RVCA, stormwater quality controls are not required.

---

Prepared by,  
**David Schaeffer Engineering Ltd.**

Reviewed by,  
**David Schaeffer Engineering Ltd.**

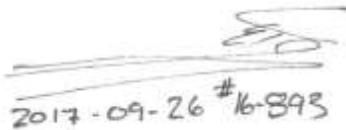


Per: Alison J. Gosling, EIT.



Per: Robert D. Freel, P. Eng.

Reviewed by,  
**David Schaeffer Engineering Ltd.**



Per: Adam D. Fobert, P. Eng.

---

---

***APPENDIX A***

***Pre-Consultation***

---

---



# DEVELOPMENT SERVICING STUDY CHECKLIST

11-534

24/11/2016

4.1 General Content		
<input type="checkbox"/>	Executive Summary (for larger reports only).	N/A
<input checked="" type="checkbox"/>	Date and revision number of the report.	Report Cover Sheet
<input checked="" type="checkbox"/>	Location map and plan showing municipal address, boundary, and layout of proposed development.	Drawings/Figures
<input checked="" type="checkbox"/>	Plan showing the site and location of all existing services.	Figure 1
<input checked="" type="checkbox"/>	Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.	Section 1.0
<input checked="" type="checkbox"/>	Summary of Pre-consultation Meetings with City and other approval agencies.	Section 1.3
<input checked="" type="checkbox"/>	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 defensible design criteria.	Section 2.1
<input checked="" type="checkbox"/>	Statement of objectives and servicing criteria.	Section 1.0
<input checked="" type="checkbox"/>	Identification of existing and proposed infrastructure available in the immediate area.	Sections 3.1, 4.1, 5.1
<input type="checkbox"/>	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).	N/A
<input checked="" type="checkbox"/>	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.	GP-1
<input type="checkbox"/>	Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.	N/A
<input type="checkbox"/>	Proposed phasing of the development, if applicable.	N/A
<input checked="" type="checkbox"/>	Reference to geotechnical studies and recommendations concerning servicing.	Section 1.4
<input checked="" type="checkbox"/>	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	SSP-1
4.2 Development Servicing Report: Water		
<input type="checkbox"/>	Confirm consistency with Master Servicing Study, if available	N/A
<input checked="" type="checkbox"/>	Availability of public infrastructure to service proposed development	Section 3.1
<input checked="" type="checkbox"/>	Identification of system constraints	Section 3.1
<input checked="" type="checkbox"/>	Identify boundary conditions	Section 3.1, 3.2
<input checked="" type="checkbox"/>	Confirmation of adequate domestic supply and pressure	Section 3.3

<input checked="" type="checkbox"/>	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 3.2
<input type="checkbox"/>	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.	N/A
<input type="checkbox"/>	Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design	N/A
<input type="checkbox"/>	Address reliability requirements such as appropriate location of shut-off valves	N/A
<input type="checkbox"/>	Check on the necessity of a pressure zone boundary modification	N/A
<input checked="" type="checkbox"/>	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	Section 3.2, 3.3
<input type="checkbox"/>	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.	N/A
<input type="checkbox"/>	Description of off-site required feeder mains, 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
<input checked="" type="checkbox"/>	Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Section 3.2
<input type="checkbox"/>	Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	N/A

**4.3 Development Servicing Report: Wastewater**

<input checked="" type="checkbox"/>	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).	Section 4.2
<input type="checkbox"/>	Confirm consistency with Master Servicing Study and/or justifications for deviations.	N/A
<input type="checkbox"/>	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.	N/A
<input checked="" type="checkbox"/>	Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Section 4.1
<input checked="" type="checkbox"/>	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 4.2
<input checked="" type="checkbox"/>	Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix ‘C’) format.	Section 4.2, Appendix C
<input checked="" type="checkbox"/>	Description of proposed sewer network including sewers, pumping stations, and forcemains.	Section 4.2
<input type="checkbox"/>	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).	N/A

<input type="checkbox"/>	Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	N/A
<input type="checkbox"/>	Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	N/A
<input type="checkbox"/>	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
<input type="checkbox"/>	Special considerations such as contamination, corrosive environment etc.	N/A

#### 4.4 Development Servicing Report: Stormwater Checklist

<input checked="" type="checkbox"/>	Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)	Section 5.1
<input checked="" type="checkbox"/>	Analysis of available capacity in existing public infrastructure.	Section 5.1, Appendix D
<input checked="" type="checkbox"/>	A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.	Drawings/Figures
<input checked="" type="checkbox"/>	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.	Section 5.2
<input checked="" type="checkbox"/>	Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	Section 5.2
<input checked="" type="checkbox"/>	Description of the stormwater management concept with facility locations and descriptions with references and supporting information	Section 5.3
<input type="checkbox"/>	Set-back from private sewage disposal systems.	N/A
<input type="checkbox"/>	Watercourse and hazard lands setbacks.	N/A
<input checked="" type="checkbox"/>	Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	Appendix A
<input type="checkbox"/>	Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	N/A
<input checked="" type="checkbox"/>	Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).	Section 5.3
<input type="checkbox"/>	Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	N/A
<input checked="" type="checkbox"/>	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.	Section 5.1, 5.3
<input type="checkbox"/>	Any proposed diversion of drainage catchment areas from one outlet to another.	N/A
<input type="checkbox"/>	Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.	N/A
<input type="checkbox"/>	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.	N/A
<input type="checkbox"/>	Identification of potential impacts to receiving watercourses	N/A
<input type="checkbox"/>	Identification of municipal drains and related approval requirements.	N/A

<input checked="" type="checkbox"/>	Descriptions of how the conveyance and storage capacity will be achieved for the development.	Section 5.3
<input type="checkbox"/>	100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	N/A
<input type="checkbox"/>	Inclusion of hydraulic analysis including hydraulic grade line elevations.	N/A
<input checked="" type="checkbox"/>	Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Section 6.0
<input type="checkbox"/>	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.	N/A
<input type="checkbox"/>	Identification of fill constraints related to floodplain and geotechnical investigation.	N/A

**4.5 Approval and Permit Requirements: Checklist**

<input checked="" type="checkbox"/>	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 ct. 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.	Section 1.2
<input type="checkbox"/>	Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.	N/A
<input type="checkbox"/>	Changes to Municipal Drains.	N/A
<input type="checkbox"/>	Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)	N/A

**4.6 Conclusion Checklist**

<input checked="" type="checkbox"/>	Clearly stated conclusions and recommendations	Section 8.0
<input type="checkbox"/>	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.	
<input type="checkbox"/>	All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario	

## Alison Gosling

---

**From:** Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>  
**Sent:** Thursday, December 8, 2016 10:44 AM  
**To:** Alison Gosling  
**Cc:** Robert Freel; black@fotenn.com; Mottalib, Abdul; O'Connell, Erin  
**Subject:** RE: 333 Montreal Road Pre-consult - Engineering Criteria  
**Attachments:** ServicingGuidelines\_final\_Dec2009.pdf

**Follow Up Flag:** Follow up  
**Flag Status:** Flagged

Good morning Alison,

### Water:

Yes, it is 200mm, I checked the Arc Explorer map. will you be using the existing service lateral? If you use existing water service lateral, then you do not need new water boundary conditions otherwise please send me the following information to obtain water boundary conditions from us.

### **Required information for Water boundary conditions (not required if you're using existing service)**

Boundary conditions are required to confirm that the require fire flows can be achieved as well as availability of the domestic water pressure on the city street in front of the development. Please use Table 3-3 of the MOE Design Guidelines for Drinking-Water System to determine Maximum Day and Maximum Hour peaking factors for 0 to 500 persons and use Table 4.2 of the Ottawa Design Guidelines, Water Distribution for 501 to 3,000 persons.

1. Location of Service
2. Street Number & Name
3. Type of development and units
4. Amount of fire flow required \_\_\_l/s (Calculation as per the FUS Method).
5. Average daily demand:-l/s
6. Maximum daily demand:-l/s
7. Maximum hourly daily demand:-l/s

Please note proposed development will require 2 separate service connections from the city watermains if the basic day demand is greater than 50m<sup>3</sup>/day to avoid the creation of a vulnerable service area. Two water meters will be required for two service connections and the service connections will have to be looped.

### Sanitary

Yes it is 750mm as per Arc Explorer map, but it is a trunk sewer, please use city standard S13 to connect sanitary lateral to the trunk/collector sewer.

### Storm

Yes, there is a 675 mm storm sewer on Montreal Road, but it was constructed in 1965. The other one located on Monfort Street, which is 300mm and was constructed in 1963.

Any sewers constructed before 1970 needs to be control on a 2 year storm event i.e. any storm events greater than 2 year, up to 100 year, including 100 storm event must be detained on site. You can use coefficient of run-off i.e. value of C maximum 0.5 to calculate the allowable release rate from the site.

I would request you that you add a quality control section in the SWM report and add the consultation information with the RVC in the section. In addition, please include the written confirmation letter/email from the RVCA as an appendix in the report.

### **Servicing Guideline**

I have attached here a digital copy of the servicing guidelines, please follow the guidelines while preparing your servicing report for this site.

Thanks,

Abdul Mottalib, P. Eng.

---

**From:** Alison Gosling [mailto:AGosling@dse.ca]  
**Sent:** December 07, 2016 5:05 PM  
**To:** Mottalib, Abdul  
**Cc:** Robert Freel; black@fotenn.com  
**Subject:** 333 Montreal Road Pre-consult - Engineering Criteria

Good afternoon Abdul,

We would like to confirm capacity of the municipal infrastructure along with Stormwater Management criteria for the site based on the pre-consultation meeting with the City on December 6, 2016.

To summarize, based on the information we were able to obtain, the surrounding municipal infrastructure exists:

#### **Water:**

- It appears that the site is currently serviced via the 200 diameter watermain within Montreal Road.
- It is contemplated that the proposed development will maintain a connection to this watermain.

#### **Sanitary:**

- The existing site is currently serviced via the 750 mm diameter Montreal Road collector.
- It is contemplated that the proposed development will maintain a connection to this sanitary sewer.

#### **Storm:**

- It appears that the existing site is currently serviced via the 675 mm diameter concrete storm sewer tributary to the Ottawa East sub-watershed within Montreal Road.
- It is contemplated that the proposed development will service the front of the property via the storm sewer within Montreal Road and the rear of the property to the 300 mm diameter storm sewer within Montfort Street.
- Based on City guidelines it is anticipated the site would need to be controlled to a release rate based on a 5-year event for a Rational Method coefficient of 0.5 at a calculated time of concentration; based on consultation with the RVCA, due to the distance from the outlet quality controls will not be required.

Based on the pre-consultation meeting, it is our understanding that you indicated that capacity for the proposed development within Montreal Road and Montfort Street is not a concern.

Can you confirm the background information and assumptions above?

Please let us know if any updates are required.

Thanks in advance,

Alison Gosling, E.I.T.  
Project Coordinator / Junior Designer

## **DSEL**

**david schaeffer engineering ltd.**

120 Iber Road, Unit 103  
Stittsville, ON K2S 1E9

**phone:** (613) 836-0856 ext.542

**fax:** (613) 836-7183

**email:** [agosling@DSEL.ca](mailto:agosling@DSEL.ca)

This email, including any attachments, is for the sole use of the intended recipient(s) and may contain private, confidential, and privileged information. Any unauthorized review, use, disclosure, or distribution is prohibited. If you are not the intended recipient, or if this information has been inappropriately forwarded to you, please contact the sender by reply email and destroy all copies of the original.

This e-mail originates from the City of Ottawa e-mail system. Any distribution, use or copying of this e-mail or the information it contains by other than the intended recipient(s) is unauthorized. Thank you.

Le présent courriel a été expédié par le système de courriels de la Ville d'Ottawa. Toute distribution, utilisation ou reproduction du courriel ou des renseignements qui s'y trouvent par une personne autre que son destinataire prévu est interdite. Je vous remercie de votre collaboration.



## Alison Gosling

---

**From:** Jocelyn Chandler <jocelyn.chandler@rvca.ca>  
**Sent:** Thursday, October 27, 2016 7:11 PM  
**To:** Alison Gosling  
**Cc:** Robert Freel  
**Subject:** RE: 333 Montreal Road - RVCA

**Follow Up Flag:** Follow up  
**Flag Status:** Completed

Hello Alison,

Our data reflects the information you have provided below with respect to the route and outlet for the municipal stormwater system servicing the site. Based on the distance from the receiving watercourse (the Ottawa River), the RVCA will not be advising that additional quality controls are required for stormwater in the redevelopment of this property.

Jocelyn

Jocelyn Chandler M.Pl. MCIP, RPP  
Planner, RVCA

t) 613-692-3571 x1137

f) 613-692-0831

[jocelyn.chandler@rvca.ca](mailto:jocelyn.chandler@rvca.ca)

[www.rvca.ca](http://www.rvca.ca)

mail: Box 599 3889 Rideau Valley Dr., Manotick, ON K4M 1A5

courier: 3889 Rideau Valley Dr., Nepean, ON K2C 3H1

*This message may contain information that is privileged or confidential and is intended for the use of the individual(s) or entity named above. This material may contain confidential or personal information which may be subject to the provisions of the Municipal Freedom of Information & Protection of Privacy Act. If you are not the intended recipient of this email, any use, review, revision, retransmission, distribution, dissemination, copying, printing or otherwise use of, or taking any action in reliance upon this email, is strictly prohibited. If you have received this email in error, please contact the sender and delete the original and any copy of the email and any print out thereof, immediately. Your cooperation is appreciated.*

---

**From:** Alison Gosling [mailto:AGosling@dsel.ca]  
**Sent:** Thursday, October 27, 2016 9:32 AM  
**To:** Jocelyn Chandler <jocelyn.chandler@rvca.ca>  
**Cc:** Robert Freel <RFreel@dsel.ca>  
**Subject:** 333 Montreal Road - RVCA

Good morning Jocelyn,

We wanted to touch base with you regarding a commercial development we are working on located at 333 Montreal Road.

The existing stormwater on site discharges to the Ste Anne Avenue storm sewer. The stormwater collected in the municipal sewer from the site travels approximately 3.4 km to a direct outlet into the Ottawa River in proximity to the Hillsdale and Rockcliffe Parkway intersection.

The development proposes to construct a new building and repurpose a nearby hotel. To incorporate a new building on site, the development will eliminate a portion of the existing parking lot and replace with an underground parking lot.

Can you provide a comment regarding quality controls that maybe required for the site.



Please feel free to call if you have any questions or you would like to discuss.

Thanks in advance,

Alison Gosling, E.I.T.  
Project Coordinator / Junior Designer

## **DSEL**

**david schaeffer engineering ltd.**

120 Iber Road, Unit 103  
Stittsville, ON K2S 1E9

**phone:** (613) 836-0856 ext.542

**fax:** (613) 836-7183

**email:** [agosling@DSEL.ca](mailto:agosling@DSEL.ca)

This email, including any attachments, is for the sole use of the intended recipient(s) and may contain private, confidential, and privileged information. Any unauthorized review, use, disclosure, or distribution is prohibited. If you are not the intended recipient, or if this information has been inappropriately forwarded to you, please contact the sender by reply email and destroy all copies of the original.

---

---

***APPENDIX B***

***Water Supply***

---

---



Water Demand Design Flows per Unit Count  
City of Ottawa - Water Distribution Guidelines, July 2010



Domestic Demand

Type of Housing	Per / Unit	Units	Pop
Single Family	3.4		0
Semi-detached	2.7		0
Townhouse	2.7		0
Apartment			0
Bachelor	1.4		0
1 Bedroom	1.4		0
2 Bedroom	2.1		0
3 Bedroom	3.1		0
Average	1.8		0

	Pop	Avg. Daily		Max Day		Peak Hour	
		m <sup>3</sup> /d	L/min	m <sup>3</sup> /d	L/min	m <sup>3</sup> /d	L/min
<b>Total Domestic Demand</b>	0	0.0	0.0	0.0	0.0	0.0	0.0

Institutional / Commercial / Industrial Demand

Property Type	Unit Rate	Units	Avg. Daily		Max Day		Peak Hour	
			m <sup>3</sup> /d	L/min	m <sup>3</sup> /d	L/min	m <sup>3</sup> /d	L/min
Existing Commercial Floor space	2.5 L/m <sup>2</sup> /d	883	2.21	1.5	3.3	2.3	6.0	4.1
Office	75 L/9.3m <sup>2</sup> /d		0.00	0.0	0.0	0.0	0.0	0.0
Restaurant*	125 L/seat/d		0.00	0.0	0.0	0.0	0.0	0.0
Industrial - Light	35,000 L/gross ha/d		0.00	0.0	0.0	0.0	0.0	0.0
Industrial - Heavy	55,000 L/gross ha/d		0.00	0.0	0.0	0.0	0.0	0.0
<b>Total I/CI Demand</b>			<b>2.2</b>	<b>1.5</b>	<b>3.3</b>	<b>2.3</b>	<b>6.0</b>	<b>4.1</b>
<b>Total Demand</b>			<b>2.2</b>	<b>1.5</b>	<b>3.3</b>	<b>2.3</b>	<b>6.0</b>	<b>4.1</b>

\* Estimated number of seats at 1 seat per 9.3m<sup>2</sup>

Water Demand Design Flows per Unit Count  
City of Ottawa - Water Distribution Guidelines, July 2010



**Domestic Demand**

Type of Housing	Per / Unit	Units	Pop
Single Family	3.4		0
Semi-detached	2.7		0
Townhouse	2.7		0
Apartment			0
Bachelor	1.4		0
1 Bedroom	1.4		0
2 Bedroom	2.1		0
3 Bedroom	3.1		0
Average	1.8		0

	Pop	Avg. Daily		Max Day		Peak Hour	
		m <sup>3</sup> /d	L/min	m <sup>3</sup> /d	L/min	m <sup>3</sup> /d	L/min
<b>Total Domestic Demand</b>	0	0.0	0.0	0.0	0.0	0.0	0.0

**Institutional / Commercial / Industrial Demand**

Property Type	Unit Rate	Units	Avg. Daily		Max Day		Peak Hour	
			m <sup>3</sup> /d	L/min	m <sup>3</sup> /d	L/min	m <sup>3</sup> /d	L/min
Rooming	150 L/person/d	300	45.00	31.3	67.5	46.9	121.5	84.4
Dining Room	125 L/seat/d	200	25.00	17.4	37.5	26.0	67.5	46.9
Community Centre	15 L/m <sup>2</sup> /d	2,605	4.20	2.9	6.3	4.4	11.3	7.9
Addiction Program Rooming	400 L/person/d	50	2.15	1.5	3.2	2.2	5.8	4.0
Office	75 L/9.3m <sup>2</sup> /d	808	6.51	4.5	9.8	6.8	17.6	12.2
Industrial - Light	35,000 L/gross ha/d		0.00	0.0	0.0	0.0	0.0	0.0
Industrial - Heavy	55,000 L/gross ha/d		0.00	0.0	0.0	0.0	0.0	0.0
<b>Total I/CI Demand</b>			<b>82.9</b>	<b>57.5</b>	<b>124.3</b>	<b>86.3</b>	<b>223.7</b>	<b>155.4</b>
<b>Total Demand</b>			<b>82.9</b>	<b>57.5</b>	<b>124.3</b>	<b>86.3</b>	<b>223.7</b>	<b>155.4</b>

## Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999



### Fire Flow Required

#### 1. Base Requirement

$$F = 220C\sqrt{A} \text{ L/min} \quad \text{Where } F \text{ is the fire flow, } C \text{ is the Type of construction and } A \text{ is the Total floor area}$$

Type of Construction: **Non-Combustible Construction**

**C** 0.8 Type of Construction Coefficient per FUS Part II, Section 1  
**A** 9569.0 m<sup>2</sup> Total floor area based on FUS Part II section 1

<b>Fire Flow</b>	17216.6 L/min
	<b>17000.0 L/min</b> rounded to the nearest 1,000 L/min

### Adjustments

#### 2. Reduction for Occupancy Type

**Non-Combustible** -25%

<b>Fire Flow</b>	<b>12750.0 L/min</b>
------------------	----------------------

#### 3. Reduction for Sprinkler Protection

**Sprinklered** -50%

<b>Reduction</b>	<b>-6375 L/min</b>
------------------	--------------------

#### 4. Increase for Separation Distance

**N** 20.1m-30m 10%  
**S** 0m-3m 25%  
**E** 3.1m-10m 20%  
**W** 3.1m-10m 20%

<b>% Increase</b>	<b>75%</b>	value not to exceed 75% per FUS Part II, Section 4
-------------------	------------	--

<b>Increase</b>	<b>9562.5 L/min</b>
-----------------	---------------------

### Total Fire Flow

<b>Fire Flow</b>	15937.5 L/min	fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4
	<b>16000.0 L/min</b>	rounded to the nearest 1,000 L/min

**Notes:**  
-Type of construction, Occupancy Type and Sprinkler Protection information provided by Hobin Architecture Inc.  
-Calculations based on Fire Underwriters Survey - Part II

**Boundary Conditions Unit Conversion**

	Height (m)	Elevation (m)	m H <sub>2</sub> O	PSI	kPa		L/s	L/min
<b>Avg. DD</b>	118.3	58.75	59.6	84.7	584.2	Fire Flow @ 140kPa	267	16020
<b>Fire Flow</b>	82.5	58.75	23.8	33.8	233.0			
<b>Peak Hour</b>	109.5	58.75	50.8	72.2	497.9			

## Alison Gosling

---

**From:** Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>  
**Sent:** Tuesday, May 16, 2017 2:46 PM  
**To:** Alison Gosling  
**Cc:** Mottalib, Abdul  
**Subject:** FW: 333 Montreal Road - Boundary condition request  
**Attachments:** 333 Montreal May 2017.pdf

Please see the information below as requested.

Thanks,

Abdul Mottalib, P. Eng.

---

**From:** .....  
**Sent:** May 16, 2017 1:37 PM  
**To:** Mottalib, Abdul  
**Cc:** .....  
**Subject:** RE: 333 Montreal Road - Boundary condition request

Hi Abdul,

Please see below.

The following are boundary conditions, HGL, for hydraulic analysis at 333 Montreal (zone 1E) assumed to be connected to the 203 mm on Montreal Rd (see attached PDF for location).

Minimum HGL = 109.5 m

Maximum HGL = 118.3 m

Max Day (1.44 L/s) + Fire Flow (267 L/s) = 82.5 m

The maximum pressure is estimated to be above 80 psi. A pressure check at completion of construction is recommended to determine if pressure control is required.

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.*

Thanks,

---

**From:** Alison Gosling [<mailto:AGosling@dssel.ca>]  
**Sent:** May 10, 2017 3:55 PM

**To:** Mottalib, Abdul  
**Subject:** 333 Montreal Road - Boundary condition request

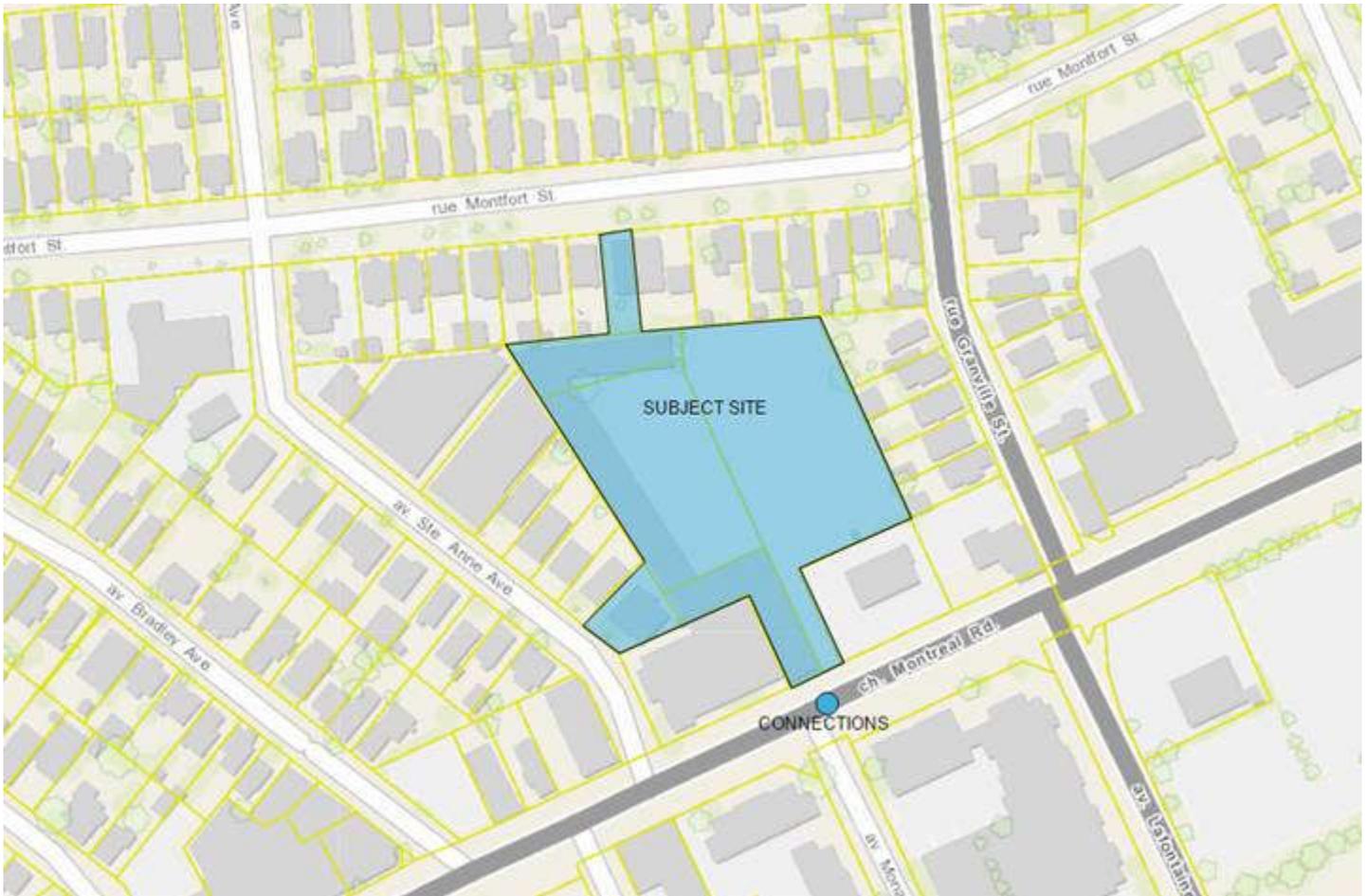
Good afternoon Abdul,

We would like to request water boundary conditions for 333 Montreal Road using the following proposed development demands:

1. Location of Service / Street Number: 333 Montreal Road
2. Type of development and the amount of fire flow required for the proposed development:
  - The proposed development is a multi-use Salvation Army building containing boarding rooms, a community area, a dining area, offices and meeting rooms and a rehabilitation centre.
  - It is anticipated that the development will have a dual connection to be serviced from the existing 200 mm diameter watermain within Montreal Road, as shown by the attached map.
  - Fire demand based on FUS will be used to calculate fire demand, 16,000 L/min is expected.
- 3.

	L/min	L/s
<b>Avg. Daily</b>	57.5	0.96
<b>Max Day</b>	86.3	1.44
<b>Peak Hour</b>	155.4	2.59

If you have any questions please feel free to contact me.



Thank you,

Alison Gosling, E.I.T.  
Project Coordinator / Junior Designer

## **DSEL**

**david schaeffer engineering ltd.**

120 Iber Road, Unit 103  
Stittsville, ON K2S 1E9

**phone:** (613) 836-0856 ext.542

**fax:** (613) 836-7183

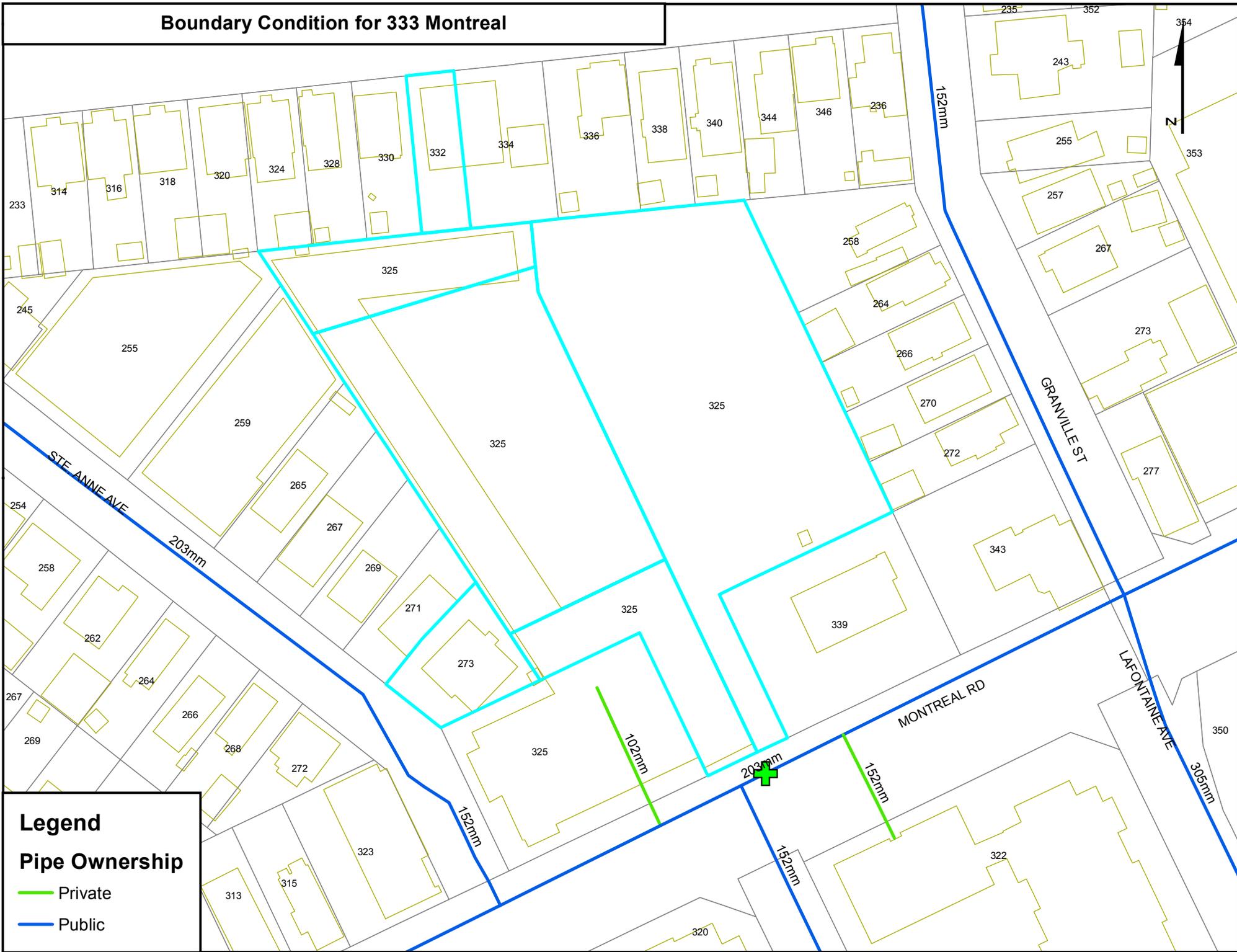
**email:** [agosling@DSEL.ca](mailto:agosling@DSEL.ca)

This email, including any attachments, is for the sole use of the intended recipient(s) and may contain private, confidential, and privileged information. Any unauthorized review, use, disclosure, or distribution is prohibited. If you are not the intended recipient, or if this information has been inappropriately forwarded to you, please contact the sender by reply email and destroy all copies of the original.

This e-mail originates from the City of Ottawa e-mail system. Any distribution, use or copying of this e-mail or the information it contains by other than the intended recipient(s) is unauthorized. Thank you.

Le présent courriel a été expédié par le système de courriels de la Ville d'Ottawa. Toute distribution, utilisation ou reproduction du courriel ou des renseignements qui s'y trouvent par une personne autre que son destinataire prévu est interdite. Je vous remercie de votre collaboration.

# Boundary Condition for 333 Montreal



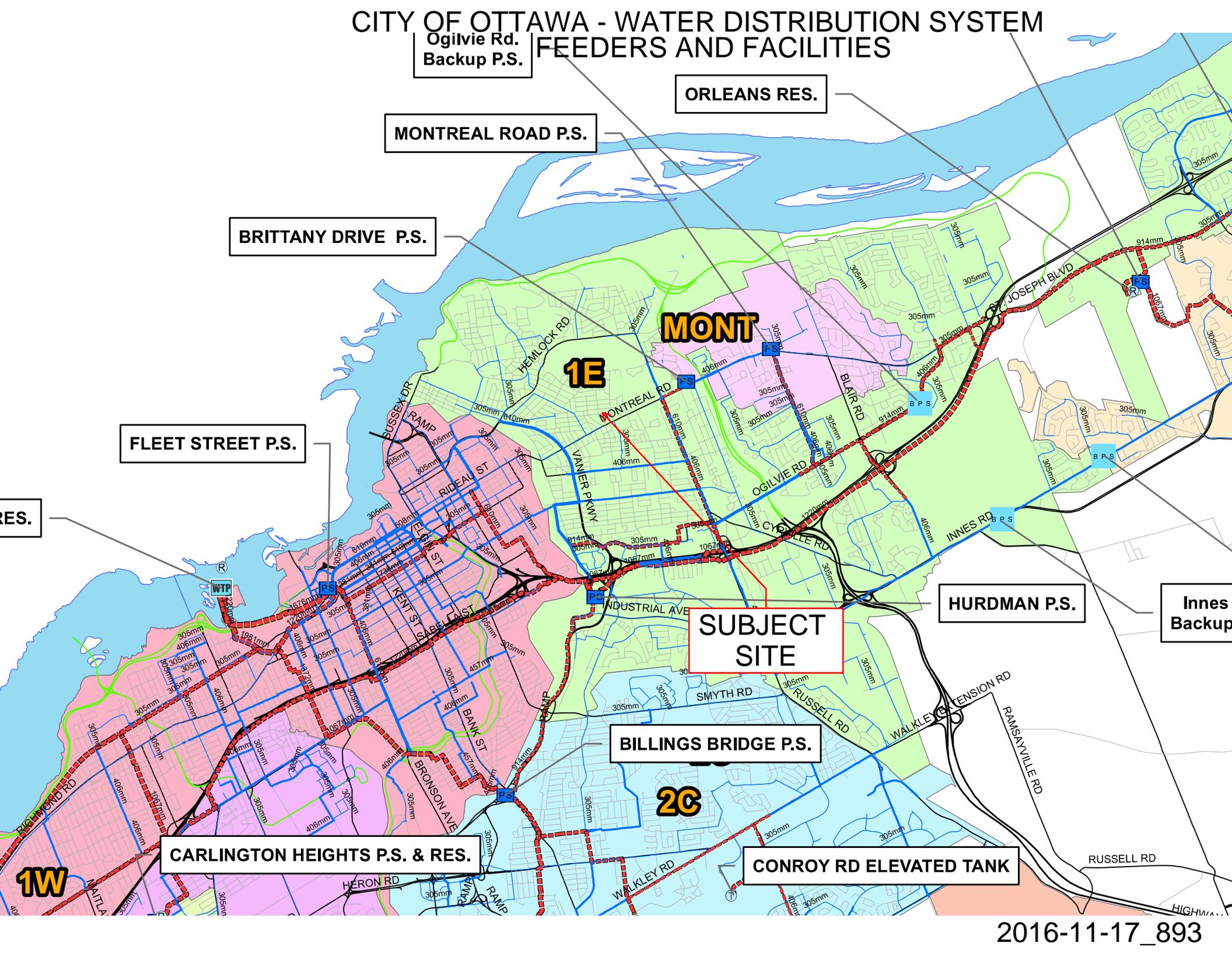
**Legend**

**Pipe Ownership**

- Private (green line)
- Public (blue line)

# CITY OF OTTAWA - WATER DISTRIBUTION SYSTEM

## FEEDERS AND FACILITIES



Ogilvie Rd.  
Backup P.S.

ORLEANS RES.

MONTREAL ROAD P.S.

BRITTANY DRIVE P.S.

FLEET STREET P.S.

RES.

HURDMAN P.S.

Innes  
Backup

BILLINGS BRIDGE P.S.

CARLINGTON HEIGHTS P.S. & RES.

CONROY RD ELEVATED TANK



---

---

***APPENDIX C***

***Wastewater Collection***

---

---



Existing Wastewater Design Flows per Unit Count  
City of Ottawa Sewer Design Guidelines, 2004



Site Area 0.690 ha

Extraneous Flow Allowances

Infiltration / Inflow 0.19 L/s

Domestic Contributions

Unit Type	Unit Rate	Units	Pop
Single Family	3.4		0
Semi-detached and duplex	2.7		0
Duplex	2.3		0
Townhouse	2.7		0
Apartment			
Bachelor	1.4		0
1 Bedroom	1.4		0
2 Bedroom	2.1		0
3 Bedroom	3.1		0
Average	1.8		0

Total Pop 0

Average Domestic Flow 0.00 L/s

Peaking Factor 4

Peak Domestic Flow 0.00 L/s

Institutional / Commercial / Industrial Contributions

Property Type	Unit Rate	No. of Units	Avg Wastewater (L/s)
Commercial floor space*	5 L/m <sup>2</sup> /d	883	0.10
Hospitals	900 L/bed/d		0.00
School	70 L/student/d		0.00
Industrial - Light**	35,000 L/gross ha/d		0.00
Industrial - Heavy**	55,000 L/gross ha/d		0.00

Average I/C/I Flow 0.10

Peak Institutional / Commercial Flow 0.15

Peak Industrial Flow\*\* 0.00

Peak I/C/I Flow 0.15

\* assuming a 12 hour commercial operation

\*\* peak industrial flow per City of Ottawa Sewer Design Guidelines Appendix 4B

Total Estimated Average Dry Weather Flow Rate	0.10 L/s
Total Estimated Peak Dry Weather Flow Rate	0.15 L/s
Total Estimated Peak Wet Weather Flow Rate	0.35 L/s

Wastewater Design Flows per Unit Count  
City of Ottawa Sewer Design Guidelines, 2004



Site Area 0.690 ha

Extraneous Flow Allowances  
Infiltration / Inflow 0.19 L/s

Domestic Contributions

Unit Type	Unit Rate	Units	Pop
Single Family	3.4		0
Semi-detached and duplex	2.7		0
Townhouse	2.7		0
Stacked Townhouse	2.3		0
Apartment			
Bachelor	1.4		0
1 Bedroom	1.4		0
2 Bedroom	2.1		0
3 Bedroom	3.1		0
Average	1.8		0

Total Pop 0

Average Domestic Flow 0.00 L/s

Peaking Factor 4.00

Peak Domestic Flow 0.00 L/s

Institutional / Commercial / Industrial Contributions

Property Type	Unit Rate	No. of Units	Avg Wastewater (L/s)
Rooming	150 L/person/d	300	0.52
Dining Room	125 L/seat/d	200	0.29
Community Centre	15 L/m <sup>2</sup> /d	2,605	0.45
Addiction Program Rooming	400 L/person/d	50	0.46
Office	75 L/9.3m <sup>2</sup> /d	808	1.40
Industrial - Light**	35,000 L/gross ha/d		0.00
Industrial - Heavy**	55,000 L/gross ha/d		0.00

Average I/C/I Flow 3.13

Peak Institutional / Commercial Flow 4.69

Peak Industrial Flow\*\* 0.00

Peak I/C/I Flow 4.69

\* assuming a 12 hour commercial operation

\*\* peak industrial flow per City of Ottawa Sewer Design Guidelines Appendix 4B

Total Estimated Average Dry Weather Flow Rate	3.13 L/s
Total Estimated Peak Dry Weather Flow Rate	4.69 L/s
Total Estimated Peak Wet Weather Flow Rate	4.88 L/s

**SANITARY SEWER CALCULATION SHEET**

CLIENT: **THE SALVATION ARMY**  
 LOCATION: **333 MONTREAL ROAD - EXISTING CONDITIONS**  
 FILE REF: **16-893**  
 DATE: **18-Aug-17**

**DESIGN PARAMETERS**

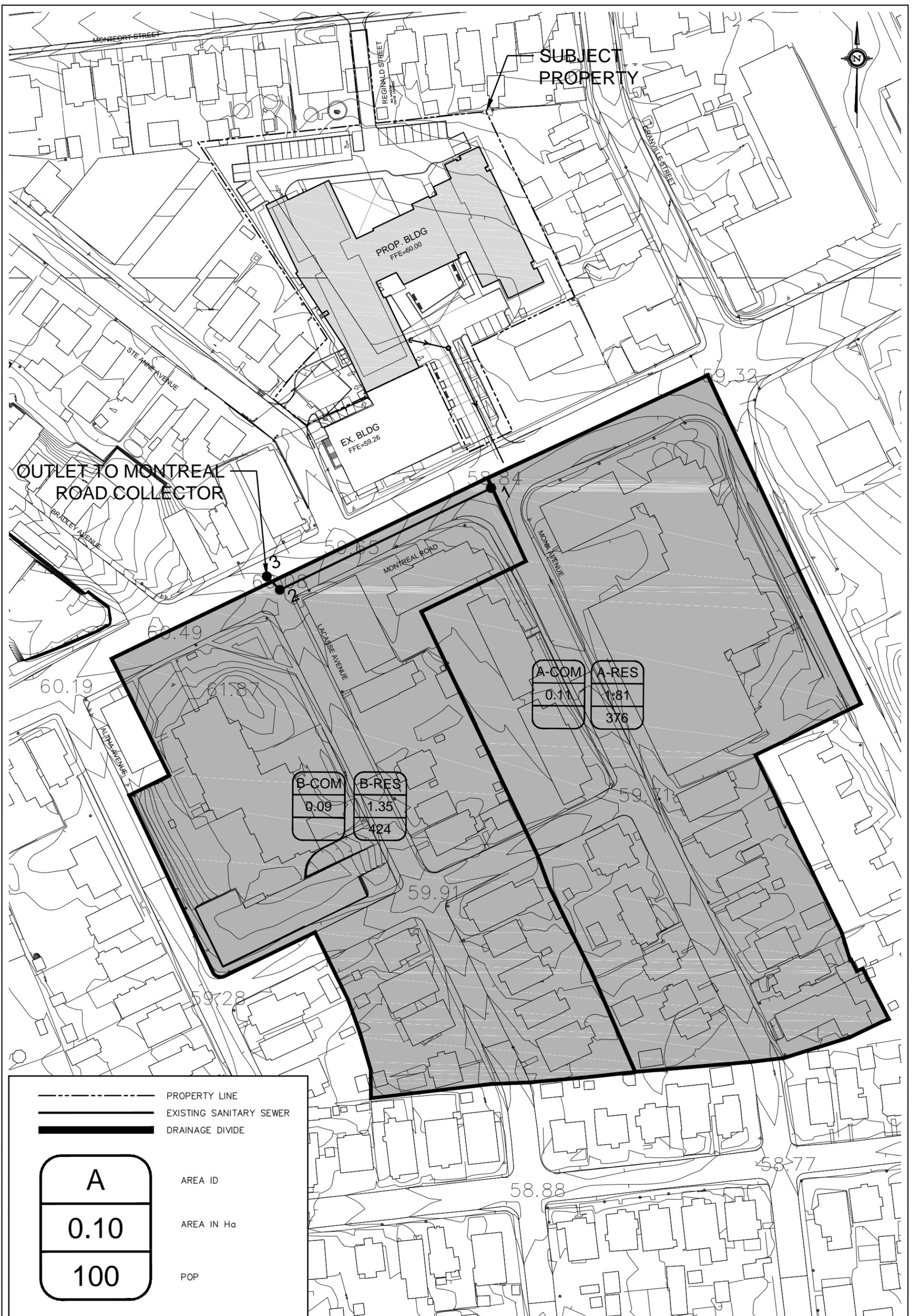
Avg. Daily Flow Res.	350 L/p/d	Peak Fact Res. Per Harmons: Min = 2.0, Max =4.0	Infiltration / Inflow	0.28 L/s/ha	
Avg. Daily Flow Comm	50,000 L/ha/d	Peak Fact. Comm.	1.5	Min. Pipe Velocity	0.60 m/s full flowing
Avg. Daily Flow Instit.	50,000 L/ha/d	Peak Fact. Instit.	1.5	Max. Pipe Velocity	3.00 m/s full flowing
Avg. Daily Flow Indust	35,000 L/ha/d	Peak Fact. Indust. per MOE graph		Mannings N	0.013



Location			Residential Area and Population										Commercial			Institutional			Industrial			Infiltration			Pipe Data							
Area ID	Up	Down	Area	Number of Units				Pop.	Cumulative	Peak.	Q <sub>res</sub>	Area	Accu.	Area	Accu.	Area	Accu.	Q <sub>CHH</sub>	Total	Accu.	Infiltration	Total	DIA	Slope	Length	A <sub>hydraulic</sub>	R	Velocity	Q <sub>cap</sub>	Q / Q full		
			(ha)	Singles	Semi's	Town's	Apt's		(ha)	Pop.	Fact.	(-)	(L/s)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(L/s)	(ha)	(ha)	(L/s)	(L/s)	(mm)	(%)	(m)	(m <sup>2</sup> )	(m)	(m/s)	(L/s)	(-)
Area A	1	2	1.81	13		3		180	376.0	1.805	376.0	4.00	6.09	0.11	0.11		0.00		0.00	0.1	1.916	1.916	0.537	6.73	600	0.40	73.2	0.283	0.150	1.37	388.3	0.02
Area B	2	3	1.35	3				230	424.0	3.157	800.0	3.86	12.51	0.09	0.09		0.00		0.00	0.1	1.447	3.363	0.942	13.53	300	0.70	5.5	0.071	0.075	1.14	80.9	0.17

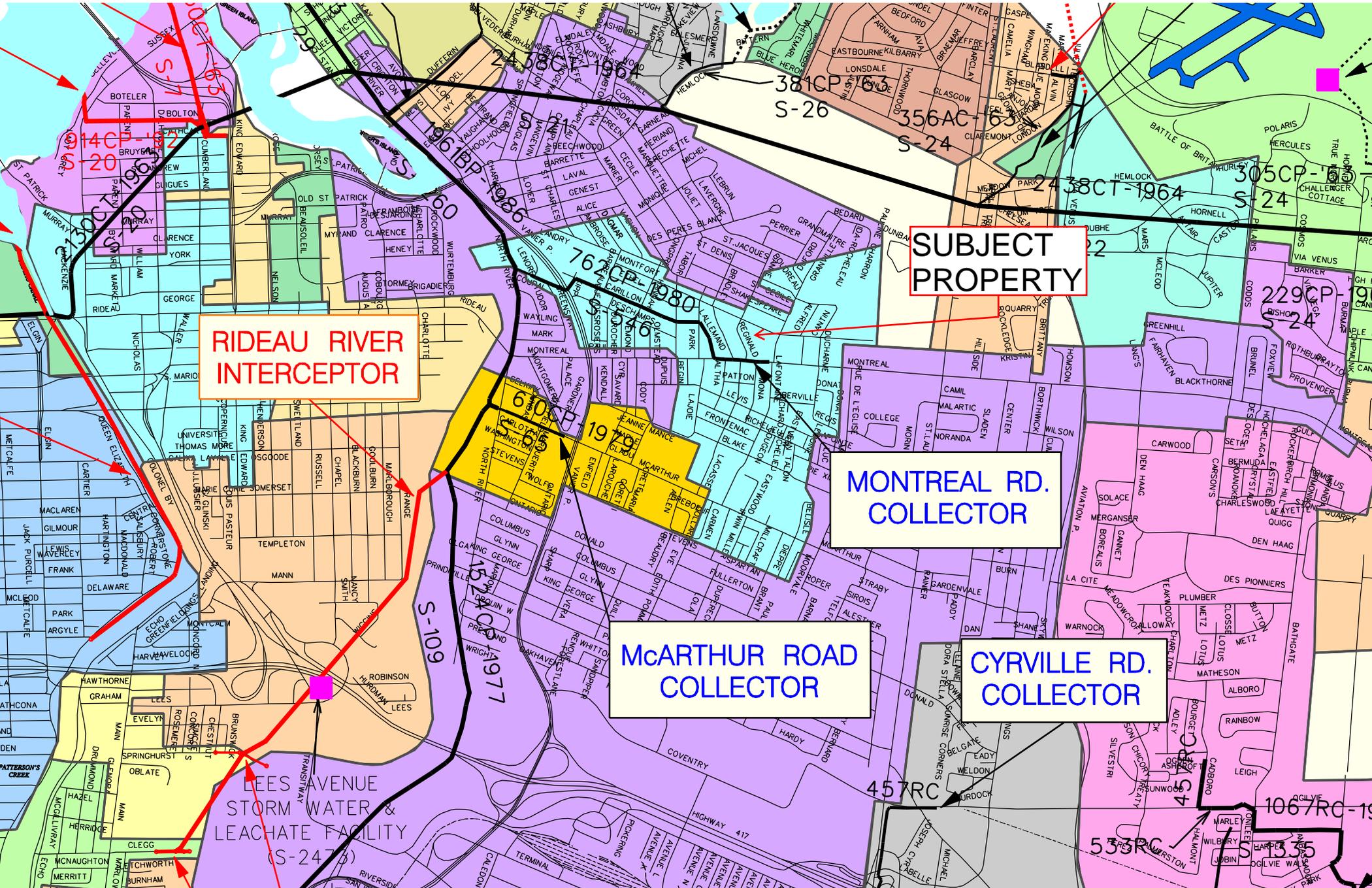
\* Note that minimum slopes were assumed based on Table 6.2 from the Ottawa Sewer Design Guidelines







# Trunk Sanitary Sewers & Collection Areas





---

---

***APPENDIX D***

***Stormwater Management***

---

---



**Estimated Peak Stormwater Flow Rate**  
City of Ottawa Sewer Design Guidelines, 2012



**Existing Drainage Characteristics From Internal Site**

<b>Area</b>	0.690 ha
<b>C</b>	0.88 Rational Method runoff coefficient
<b>L</b>	58.9 m
<b>Up Elev</b>	62.33 m
<b>Dn Elev</b>	58.93 m
<b>Slope</b>	5.8 %
<b>Tc</b>	3.1 min

1) Time of Concentration per Federal Aviation Administration

$$t_c = \frac{1.8(1.1 - C)L^{0.5}}{S^{0.333}}$$

tc, in minutes

C, rational method coefficient, (-)

L, length in ft

S, average watershed slope in %

**Estimated Peak Flow**

	<b>2-year</b>	<b>5-year</b>	<b>100-year</b>
<b>i</b>	120.7	165.0	284.2 mm/hr
<b>Q</b>	203.5	278.3	544.7 L/s

*Note:*

*C value for the 100-year storm is increased by 25%, to a maximum of 1.0 per Ottawa Sewer Design Guidelines (5.4.5.2.1)*

Stormwater - Proposed Development  
City of Ottawa Sewer Design Guidelines, 2012



Target Flow Rate

Area	0.690 ha
C	0.50 Rational Method runoff coefficient
t <sub>c</sub>	10.0 min
<b>2-year</b>	
i	76.8 mm/hr
Q	73.6 L/s

Estimated Post Development Peak Flow from Unattenuated Areas

Area ID	U1
Total Area	0.020 ha
C	0.71 Rational Method runoff coefficient

t <sub>c</sub> (min)	5-year					100-year				
	i (mm/hr)	Q <sub>actual</sub> (L/s)	Q <sub>release</sub> (L/s)	Q <sub>stored</sub> (L/s)	V <sub>stored</sub> (m <sup>3</sup> )	i (mm/hr)	Q <sub>actual</sub> (L/s)	Q <sub>release</sub> (L/s)	Q <sub>stored</sub> (L/s)	V <sub>stored</sub> (m <sup>3</sup> )
12.6	92.2	3.7	3.7	0.0	0.0	157.9	8.0	8.0	0.0	0.0

Note:  
C value for the 100-year storm is increased by 25%, to a maximum of 1.0 per Ottawa Sewer Design Guidelines (5.4.5.2.1)

Estimated Post Development Peak Flow from Attenuated Areas

Building ID	BLDG	
Roof Area	0.254 ha	
Avail Storage Area	0.241	
C	0.90 Rational Method runoff coefficient	Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations
t <sub>c</sub>	10 min, t <sub>c</sub> at outlet without restriction	

Estimated Number of Roof Drains

Building Length	134
Building Width	18
Number of Drains	14
m <sup>2</sup> / Drain	172.1 max 232.25m <sup>2</sup> /notch as recommended by Zurn for Ottawa

d (m)	A (m <sup>2</sup> )	V <sub>acc</sub> (m <sup>3</sup> )	V <sub>avail</sub> (m <sup>3</sup> )	Q <sub>notch</sub> (L/s)	Q <sub>roof</sub> (L/s)	V <sub>drawdown</sub> (hr)
0.000	0	0.0	0.0	0.00	0.00	0.00
0.025	150.6	1.3	1.3	0.38	5.32	0.07
0.050	602.3	8.8	10.0	0.77	10.78	0.29
0.075	1355.1	23.8	33.9	1.14	15.96	0.71
0.100	2409.0	46.4	80.3	1.52	21.28	1.31
0.125	2409.0	60.2	140.5	1.90	26.60	1.94
0.150	2409.0	60.2	200.8	2.28	31.92	2.47

\* Assumes one notch opening per drain, assumes maximum slope of 10cm

t <sub>c</sub> (min)	5-year					100-year				
	i (mm/hr)	Q <sub>actual</sub> (L/s)	Q <sub>release</sub> (L/s)	Q <sub>stored</sub> (L/s)	V <sub>stored</sub> (m <sup>3</sup> )	i (mm/hr)	Q <sub>actual</sub> (L/s)	Q <sub>release</sub> (L/s)	Q <sub>stored</sub> (L/s)	V <sub>stored</sub> (m <sup>3</sup> )
10	104.2	66.1	16.0	50.1	30.0	178.6	125.8	21.1	104.7	62.8
15	83.6	53.0	16.0	37.0	33.3	142.9	100.7	21.1	79.6	71.6
20	70.3	44.5	16.0	28.5	34.2	120.0	84.5	21.1	63.4	76.1
25	60.9	38.6	16.0	22.6	33.9	103.8	73.1	21.1	52.1	78.1
30	53.9	34.2	16.0	18.2	32.7	91.9	64.7	21.1	43.6	78.5
35	48.5	30.8	16.0	14.8	31.0	82.6	58.2	21.1	37.1	77.9
40	44.2	28.0	16.0	12.0	28.8	75.1	52.9	21.1	31.9	76.4
45	40.6	25.8	16.0	9.8	26.3	69.1	48.6	21.1	27.6	74.4
50	37.7	23.9	16.0	7.9	23.6	64.0	45.0	21.1	24.0	71.9
55	35.1	22.3	16.0	6.3	20.7	59.6	42.0	21.1	20.9	69.0
60	32.9	20.9	16.0	4.9	17.6	55.9	39.4	21.1	18.3	65.9
65	31.0	19.7	16.0	3.7	14.3	52.6	37.1	21.1	16.0	62.4
70	29.4	18.6	16.0	2.6	11.0	49.8	35.1	21.1	14.0	58.8
75	27.9	17.7	16.0	1.7	7.6	47.3	33.3	21.1	12.2	54.9
80	26.6	16.8	16.0	0.8	4.0	45.0	31.7	21.1	10.6	50.9
85	25.4	16.1	16.0	0.1	0.4	43.0	30.3	21.1	9.2	46.8
90	24.3	15.4	15.4	0.0	0.0	41.1	29.0	21.1	7.9	42.6
95	23.3	14.8	14.8	0.0	0.0	39.4	27.8	21.1	6.7	38.2
100	22.4	14.2	14.2	0.0	0.0	37.9	26.7	21.1	5.6	33.7
105	21.6	13.7	13.7	0.0	0.0	36.5	25.7	21.1	4.6	29.2
110	20.8	13.2	13.2	0.0	0.0	35.2	24.8	21.1	3.7	24.5

5-year Q <sub>roof</sub>	16.00 L/s	100-year Q <sub>roof</sub>	21.08 L/s
5-year Max. Storage Required	34.2 m <sup>3</sup>	100-year Max. Storage Required	78.5 m <sup>3</sup>
5-year Storage Depth	0.075 m	100-year Storage Depth	0.099 m
5-year Estimated Drawdown Time	0.71 hr	100-year Estimated Drawdown Time	1.29 hr

Estimated Post Development Peak Flow from Attenuated Areas

Area ID A4  
Available Sub-surface Storage  
Maintenance Structures

U/G STORG.
6.0

Total Subsurface Storage (m<sup>3</sup>) 0.0

Stage Attenuated Areas Storage Summary

	Stage (m)	Surface Storage			Surface and Subsurface Storage			
		Ponding (m <sup>2</sup> )	h <sub>o</sub> (m)	delta d (m)	V* (m <sup>3</sup> )	V <sub>acc</sub> ** (m <sup>3</sup> )	Q <sub>release</sub> † (L/s)	V <sub>drawdown</sub> (hr)
Orifice INV	54.49		0.00			0.0	0.0	0.00
U/G STORAGE INV	54.55		0.06	0.06	0.0	0.0	2.9	0.00
U/G STORAGE SL	54.99		0.44	0.38	3.0	3.0	8.0	0.10
U/G STORAGE OBV	55.44		0.89	0.44	3.0	6.0	11.2	0.15
T/L	55.92		1.37	0.48	0.0	6.0	14.0	0.12

\* V=Incremental storage volume  
\*\*V<sub>acc</sub>=Total surface and sub-surface  
† Q<sub>release</sub> = Release rate calculated from orifice equation

Orifice Location CB202B Dia 75  
Total Area 0.028 ha  
C 0.90 Rational Method runoff coefficient *Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations*

t <sub>c</sub> (min)	5-year					100-year				
	i (mm/hr)	Q <sub>actual</sub> † (L/s)	Q <sub>release</sub> (L/s)	Q <sub>stored</sub> (L/s)	V <sub>stored</sub> (m <sup>3</sup> )	i (mm/hr)	Q <sub>actual</sub> † (L/s)	Q <sub>release</sub> (L/s)	Q <sub>stored</sub> (L/s)	V <sub>stored</sub> (m <sup>3</sup> )
10	104.2	7.4	5.2	2.2	1.3	178.6	14.1	8.4	5.7	3.4
15	83.6	5.9	5.2	0.8	0.7	142.9	11.3	8.4	2.9	2.6
20	70.3	5.0	5.0	0.0	0.0	120.0	9.4	8.4	1.1	1.3
25	60.9	4.3	4.3	0.0	0.0	103.8	8.2	8.4	0.0	0.0
30	53.9	3.8	3.8	0.0	0.0	91.9	7.2	8.4	0.0	0.0
35	48.5	3.4	3.4	0.0	0.0	82.6	6.5	8.4	0.0	0.0
40	44.2	3.1	3.1	0.0	0.0	75.1	5.9	8.4	0.0	0.0
45	40.6	2.9	2.9	0.0	0.0	69.1	5.4	8.4	0.0	0.0
50	37.7	2.7	2.7	0.0	0.0	64.0	5.0	8.4	0.0	0.0
55	35.1	2.5	2.5	0.0	0.0	59.6	4.7	8.4	0.0	0.0
60	32.9	2.3	2.3	0.0	0.0	55.9	4.4	8.4	0.0	0.0
65	31.0	2.2	2.2	0.0	0.0	52.6	4.1	8.4	0.0	0.0
70	29.4	2.1	2.1	0.0	0.0	49.8	3.9	8.4	0.0	0.0
75	27.9	2.0	2.0	0.0	0.0	47.3	3.7	8.4	0.0	0.0
80	26.6	1.9	1.9	0.0	0.0	45.0	3.5	8.4	0.0	0.0
85	25.4	1.8	1.8	0.0	0.0	43.0	3.4	8.4	0.0	0.0
90	24.3	1.7	1.7	0.0	0.0	41.1	3.2	8.4	0.0	0.0
95	23.3	1.7	1.7	0.0	0.0	39.4	3.1	8.4	0.0	0.0
100	22.4	1.6	1.6	0.0	0.0	37.9	3.0	8.4	0.0	0.0
105	21.6	1.5	1.5	0.0	0.0	36.5	2.9	8.4	0.0	0.0
110	20.8	1.5	1.5	0.0	0.0	35.2	2.8	8.4	0.0	0.0

5-year Q<sub>attenuated</sub> 5.16 L/s  
5-year Max. Storage Required 1.3 m<sup>3</sup>  
Est. 5-year Storage Elevation 54.72 m

100-year Q<sub>attenuated</sub> 8.39 L/s  
100-year Max. Storage Required 3.4 m<sup>3</sup>  
Est. 100-year Storage Elevation 54.99 m

Area ID A3  
Available Sub-surface Storage  
Maintenance Structures

Total Underground Storage (m<sup>3</sup>) 0  
Total Subsurface Storage (m<sup>3</sup>) 0.0

Stage Attenuated Areas Storage Summary

	Surface Storage				Surface and Subsurface Storage			
	Stage (m)	Ponding (m <sup>2</sup> )	h <sub>o</sub> (m)	delta d (m)	V* (m <sup>3</sup> )	V <sub>acc</sub> ** (m <sup>3</sup> )	Q <sub>release</sub> † (L/s)	V <sub>drawdown</sub> (hr)
Orifice INV	58.00		0.00			0.0	0.0	0.00
U/G Storage INV	58.05		0.05	0.05	0.0	0.0	0.0	2.7
U/G Storage SL	58.50		0.50	0.45	0.0	0.0	0.0	8.4
U/G Storage DBV	58.95		0.95	0.45	0.0	0.0	0.0	11.6
T/L	59.50	0.4	1.50	0.55	0.0	0.0	0.0	14.6
0.10m Ponding	59.60	72.6	1.60	0.10	2.6	2.6	15.1	0.05
0.15m Ponding	59.65	163.2	1.65	0.05	5.7	8.4	15.3	0.15
0.20m Ponding	59.70	257.1	1.70	0.05	10.4	18.8	15.6	0.34

\* V=Incremental storage volume  
\*\*V<sub>acc</sub>=Total surface and sub-surface  
† Q<sub>release</sub> = Release rate calculated from orifice equation

Orifice Location CB202A Dia 75  
Total Area 0.073  
C 0.85 Rational Method runoff coefficient *Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations*

t <sub>c</sub> (min)	5-year					100-year				
	i (mm/hr)	Q <sub>actual</sub> † (L/s)	Q <sub>release</sub> (L/s)	Q <sub>stored</sub> (L/s)	V <sub>stored</sub> (m <sup>3</sup> )	i (mm/hr)	Q <sub>actual</sub> † (L/s)	Q <sub>release</sub> (L/s)	Q <sub>stored</sub> (L/s)	V <sub>stored</sub> (m <sup>3</sup> )
10	104.2	18.1	15.0	3.1	1.9	178.6	36.3	15.4	20.9	12.6
15	83.6	14.5	14.5	0.0	0.0	142.9	29.1	15.4	13.7	12.3
20	70.3	12.2	12.2	0.0	0.0	120.0	24.4	15.4	9.0	10.8
25	60.9	10.6	10.6	0.0	0.0	103.8	21.1	15.4	5.7	8.6
30	53.9	9.4	9.4	0.0	0.0	91.9	18.7	15.4	3.3	5.9
35	48.5	8.4	8.4	0.0	0.0	82.6	16.8	15.4	1.4	2.9
40	44.2	7.7	7.7	0.0	0.0	75.1	15.3	15.4	0.0	0.0
45	40.6	7.1	7.1	0.0	0.0	69.1	14.1	15.4	0.0	0.0
50	37.7	6.5	6.5	0.0	0.0	64.0	13.0	15.4	0.0	0.0
55	35.1	6.1	6.1	0.0	0.0	59.6	12.1	15.4	0.0	0.0
60	32.9	5.7	5.7	0.0	0.0	55.9	11.4	15.4	0.0	0.0
65	31.0	5.4	5.4	0.0	0.0	52.6	10.7	15.4	0.0	0.0
70	29.4	5.1	5.1	0.0	0.0	49.8	10.1	15.4	0.0	0.0
75	27.9	4.8	4.8	0.0	0.0	47.3	9.6	15.4	0.0	0.0
80	26.6	4.6	4.6	0.0	0.0	45.0	9.2	15.4	0.0	0.0
85	25.4	4.4	4.4	0.0	0.0	43.0	8.7	15.4	0.0	0.0
90	24.3	4.2	4.2	0.0	0.0	41.1	8.4	15.4	0.0	0.0
95	23.3	4.1	4.1	0.0	0.0	39.4	8.0	15.4	0.0	0.0
100	22.4	3.9	3.9	0.0	0.0	37.9	7.7	15.4	0.0	0.0
105	21.6	3.8	3.8	0.0	0.0	36.5	7.4	15.4	0.0	0.0
110	20.8	3.6	3.6	0.0	0.0	35.2	7.2	15.4	0.0	0.0

5-year Q<sub>attenuated</sub> 14.97 L/s  
5-year Max. Storage Required 1.9 m<sup>3</sup>  
Est. 5-year Storage Elevation 59.57 m  
100-year Q<sub>attenuated</sub> 15.43 L/s  
100-year Max. Storage Required 12.6 m<sup>3</sup>  
Est. 100-year Storage Elevation 59.67 m

Area ID A2  
Available Sub-surface Storage  
Maintenance Structures

Total Subsurface Storage (m<sup>3</sup>) 0.0

Stage Attenuated Areas Storage Summary

Stage	Surface Storage				Surface and Subsurface Storage			
	Ponding (m)	h <sub>o</sub> (m <sup>2</sup> )	h <sub>o</sub> (m)	delta d (m)	V* (m <sup>3</sup> )	V <sub>acc</sub> ** (m <sup>3</sup> )	Q <sub>release</sub> † (L/s)	V <sub>drawdown</sub> (hr)
Orifice INV	57.79		0.00			0.0	0	0.00
Storage Pipe SL	57.91		0.12	0.12	0.0	0.0	1	0.00
Storage Pipe OBV	58.04		0.25	0.13	0.0	0.0	1.5	0.00
T/L	59.50	0.4	1.71	1.46	0.0	0.0	4.2	0.00
0.10m Ponding	59.60	124.5	1.81	0.10	4.4	4.4	4.3	0.28
0.15m Ponding	59.65	252.0	1.86	0.05	9.2	13.6	4.4	0.86
0.20m Ponding	59.70	429.8	1.91	0.05	16.8	30.5	4.5	1.88

\* V=Incremental storage volume  
\*\*V<sub>acc</sub>=Total surface and sub-surface  
† Q<sub>release</sub> = Release rate calculated from TEMPEST LMF Graph

Orifice Location STM203 Dia LMF60  
Total Area 0.072 ha  
C 0.84 Rational Method runoff coefficient *Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations*

t <sub>c</sub> (min)	5-year					100-year				
	i (mm/hr)	Q <sub>actual</sub> † (L/s)	Q <sub>release</sub> (L/s)	Q <sub>stored</sub> (L/s)	V <sub>stored</sub> (m <sup>3</sup> )	i (mm/hr)	Q <sub>actual</sub> † (L/s)	Q <sub>release</sub> (L/s)	Q <sub>stored</sub> (L/s)	V <sub>stored</sub> (m <sup>3</sup> )
10	104.2	17.5	4.4	13.2	7.9	178.6	35.9	4.5	31.4	18.9
15	83.6	14.0	4.4	9.7	8.7	142.9	28.7	4.5	24.3	21.8
20	70.3	11.8	4.4	7.5	8.9	120.0	24.1	4.5	19.7	23.6
25	60.9	10.2	4.4	5.9	8.8	103.8	20.9	4.5	16.4	24.6
30	53.9	9.1	4.4	4.7	8.5	91.9	18.5	4.5	14.0	25.2
35	48.5	8.2	4.4	3.8	8.0	82.6	16.6	4.5	12.1	25.5
40	44.2	7.4	4.4	3.1	7.4	75.1	15.1	4.5	10.6	25.5
45	40.6	6.8	4.4	2.5	6.7	69.1	13.9	4.5	9.4	25.4
50	37.7	6.3	4.4	2.0	5.9	64.0	12.9	4.5	8.4	25.2
55	35.1	5.9	4.4	1.6	5.1	59.6	12.0	4.5	7.5	24.8
60	32.9	5.5	4.4	1.2	4.3	55.9	11.2	4.5	6.8	24.4
65	31.0	5.2	4.4	0.9	3.4	52.6	10.6	4.5	6.1	23.9
70	29.4	4.9	4.4	0.6	2.5	49.8	10.0	4.5	5.5	23.3
75	27.9	4.7	4.4	0.3	1.5	47.3	9.5	4.5	5.0	22.7
80	26.6	4.5	4.4	0.1	0.5	45.0	9.0	4.5	4.6	22.0
85	25.4	4.3	4.3	0.0	0.0	43.0	8.6	4.5	4.2	21.3
90	24.3	4.1	4.1	0.0	0.0	41.1	8.3	4.5	3.8	20.5
95	23.3	3.9	3.9	0.0	0.0	39.4	7.9	4.5	3.5	19.7
100	22.4	3.8	3.8	0.0	0.0	37.9	7.6	4.5	3.2	18.9
105	21.6	3.6	3.6	0.0	0.0	36.5	7.3	4.5	2.9	18.1
110	20.8	3.5	3.5	0.0	0.0	35.2	7.1	4.5	2.6	17.2

5-year Q<sub>attenuated</sub> 4.35 L/s  
5-year Max. Storage Required 8.9 m<sup>3</sup>  
Est. 5-year Storage Elevation 59.62 m

100-year Q<sub>attenuated</sub> 4.47 L/s  
100-year Max. Storage Required 25.5 m<sup>3</sup>  
Est. 100-year Storage Elevation 59.69 m

Area ID A1  
Available Sub-surface Storage  
Maintenance Structures

Total Structure Storage (m<sup>3</sup>) 0.0  
Total Underground Storage (m<sup>3</sup>) 68.0

Stage Attenuated Areas Storage Summary

Stage	Surface Storage			Surface and Subsurface Storage			
	Ponding (m)	h <sub>o</sub> (m)	delta d (m)	V* (m <sup>3</sup> )	V <sub>acc</sub> ** (m <sup>3</sup> )	Q <sub>release</sub> † (L/s)	V <sub>drawdown</sub> (hr)
Orifice INV	56.78	0.00		0.00	0.0	0.0	0.00
U/G STORAGE INV	56.97	0.19	0.19	0.00	0.0	6.7	0.00
U/G STORAGE SL	57.43	0.65	0.46	34.0	34.0	12.3	0.77
U/G STORAGE OBV	57.88	1.10	0.46	34.0	68.0	16.1	1.17
T/L	58.88	2.10	1.00	0.00	68.0	22.2	0.85

\* V=Incremental storage volume  
\*\*V<sub>acc</sub>=Total surface and sub-surface  
† Q<sub>release</sub> = Release rate calculated from orifice equation

Orifice Location CBMH101B Dia 85  
Total Area 0.248 ha  
C 0.67 Rational Method runoff coefficient *Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations*

t <sub>c</sub> (min)	5-year					100-year				
	i (mm/hr)	Q <sub>actual</sub> † (L/s)	Q <sub>release</sub> (L/s)	Q <sub>stored</sub> (L/s)	V <sub>stored</sub> (m <sup>3</sup> )	i (mm/hr)	Q <sub>actual</sub> † (L/s)	Q <sub>release</sub> (L/s)	Q <sub>stored</sub> (L/s)	V <sub>stored</sub> (m <sup>3</sup> )
10	104.2	48.4	11.0	37.4	22.4	178.6	103.7	16.0	87.7	52.6
15	83.6	38.8	11.0	27.8	25.0	142.9	83.0	16.0	67.0	60.3
20	70.3	32.6	11.0	21.6	26.0	120.0	69.7	16.0	53.6	64.4
25	60.9	28.3	11.0	17.3	25.9	103.8	60.3	16.0	44.3	66.4
30	53.9	25.1	11.0	14.1	25.3	91.9	53.4	16.0	37.3	67.2
35	48.5	22.5	11.0	11.5	24.2	82.6	48.0	16.0	31.9	67.1
40	44.2	20.5	11.0	9.5	22.9	75.1	43.6	16.0	27.6	66.3
45	40.6	18.9	11.0	7.9	21.3	69.1	40.1	16.0	24.1	65.0
50	37.7	17.5	11.0	6.5	19.5	64.0	37.1	16.0	21.1	63.4
55	35.1	16.3	11.0	5.3	17.6	59.6	34.6	16.0	18.6	61.4
60	32.9	15.3	11.0	4.3	15.5	55.9	32.5	16.0	16.4	59.2
65	31.0	14.4	11.0	3.4	13.4	52.6	30.6	16.0	14.6	56.8
70	29.4	13.6	11.0	2.6	11.1	49.8	28.9	16.0	12.9	54.2
75	27.9	13.0	11.0	2.0	8.8	47.3	27.4	16.0	11.4	51.4
80	26.6	12.3	11.0	1.3	6.4	45.0	26.1	16.0	10.1	48.5
85	25.4	11.8	11.0	0.8	4.0	43.0	24.9	16.0	8.9	45.5
90	24.3	11.3	11.0	0.3	1.5	41.1	23.9	16.0	7.9	42.4
95	23.3	10.8	10.8	0.0	0.0	39.4	22.9	16.0	6.9	39.2
100	22.4	10.4	10.4	0.0	0.0	37.9	22.0	16.0	6.0	35.9
105	21.6	10.0	10.0	0.0	0.0	36.5	21.2	16.0	5.2	32.6
110	20.8	9.7	9.7	0.0	0.0	35.2	20.4	16.0	4.4	29.2

5-year Q<sub>attenuated</sub> 11.00 L/s  
5-year Max. Storage Required 26.0 m<sup>3</sup>  
Est. 5-year Storage Elevation 57.32 m  
100-year Q<sub>attenuated</sub> 16.02 L/s  
100-year Max. Storage Required 67.2 m<sup>3</sup>  
Est. 100-year Storage Elevation 57.87 m

Summary of Release Rates and Storage Volumes

Control Area	5-Year Release Rate (L/s)	5-Year Required Storage (m <sup>3</sup> )	100-Year Release Rate (L/s)	100-Year Required Storage (m <sup>3</sup> )	100-Year Available Storage (m <sup>3</sup> )
Unattenuated Areas	3.7	0.0	8.0	0.0	0.0
Attenuated Areas	35.5	38.1	44.3	108.7	123.2
<b>Total</b>	<b>39.2</b>	<b>38.1</b>	<b>52.3</b>	<b>108.7</b>	<b>123.2</b>

Control Area	5-Year Release Rate (L/s)	5-Year Required Storage (m <sup>3</sup> )	100-Year Release Rate (L/s)	100-Year Required Storage (m <sup>3</sup> )	100-Year Available Storage (m <sup>3</sup> )
Unattenuated Areas	3.7	0.0	8.0	0.0	0.0
Montfort Street	24.5	12.2	28.3	41.5	55.2
Montreal Road	27.0	60.2	37.1	67.2	145.7
<b>Total</b>	<b>55.2</b>	<b>72.4</b>	<b>73.4</b>	<b>108.7</b>	<b>201.0</b>

Area ID	Up	Down	Area (ha)	C (-)	Indiv AxC	Acc AxC	T <sub>c</sub> (min)	I (mm/hr)	Q (L/s)	Sewer Data								
										DIA (mm)	Slope (%)	Length (m)	A <sub>hydraulic</sub> (m <sup>2</sup> )	R (m)	Velocity (m/s)	Qcap (L/s)	Time Flow (min)	Q / Q full (-)
<b>OUTLET TO MONTREAL ROAD:</b>																		
102A	CB'L'102E	CBT'102D	0.091	0.54	0.05	0.05	10.0	104.2	14.3	250	0.50	19	0.049	0.063	0.86	42.0	0.4	0.34
	CBT'102D	CBT'102C				0.05	10.4	102.3	14.0	250	0.50	24.6	0.049	0.063	0.86	42.0	0.5	0.33
	CBT'102C	CBT'102B				0.05	10.8	99.9	13.7	250	0.50	14.1	0.049	0.063	0.86	42.0	0.3	0.33
	CBT'102B	CB102A				0.05	11.1	98.6	13.5	250	0.43	15.3	0.049	0.063	0.79	39.0	0.3	0.35
	CB102A	STM102				0.05	11.4	97.1	13.3	300	0.34	33.7	0.071	0.075	0.80	56.4	0.7	0.24
							12.1											
101C	CB'L'101H	CBT'101G	0.100	0.65	0.06	0.06	10.0	104.2	18.8	250	0.50	12.1	0.049	0.063	0.86	42.0	0.2	0.45
	CBT'101G	CBT'101F				0.00	10.2	103.0	0.0	250	0.50	28.5	0.049	0.063	0.86	42.0	0.6	0.00
	CBT'101F	CBT'101E				0.00	10.8	100.2	0.0	250	0.50	11.5	0.049	0.063	0.86	42.0	0.2	0.00
	CBT'101E	CBT'101D				0.06	11.0	99.1	17.9	250	0.50	11.6	0.049	0.063	0.86	42.0	0.2	0.42
	CBT'101D	CB101C				0.06	11.2	98.1	17.7	250	0.50	15.9	0.049	0.063	0.86	42.0	0.3	0.42
	CB101C	STM102				0.06	11.5	96.7	17.4	250	1.00	5.7	0.049	0.063	1.21	59.5	0.1	0.29
							11.6											
101A	STM102	CBMH101I	0.058	0.87	0.05	0.16	12.1	94.1	43.0	300	0.50	14.2	0.071	0.075	0.97	68.4	0.2	0.63
	CBMH101B	STM101				0.16	12.4	93.1	42.6	300	0.70	4.5	0.071	0.075	1.14	80.9	0.1	0.53
							12.5											
BLDG*	BLDG	STM104	0.254	0.90	0.23	0.23	10.0	104.2	35.1	200	1.00	14.2	0.031	0.050	1.04	32.8	0.2	1.07
	STM104	STM101					10.2	103.0	35.1	250	0.80	27.1	0.049	0.063	1.08	53.2	0.4	0.66
							10.6											
	STM101	EX. STM				0.39	12.5	92.8	136.4	375	1.00	13.2	0.110	0.094	1.59	175.3	0.1	0.78
							12.6											
<b>OUTLET TO MONTFORT STREET:</b>																		
203B	CB203B	STM203	0.027	0.86	0.02	0.02	10.0	104.2	6.8	250	1.00	18.4	0.049	0.063	1.21	59.5	0.3	0.11
							10.3											
203A	CB203A	STM203	0.044	0.82	0.04	0.04	10.0	104.2	10.5	250	1.00	2.4	0.049	0.063	1.21	59.5	0.0	0.18
							10.0											
	STM203	STM202				0.06	10.3	102.9	17.1	250	0.50	17.3	0.049	0.063	0.86	42.0	0.3	0.41
							10.6											
202A	CB202A	STM202	0.072	0.84	0.06	0.06	10.0	104.2	17.5	250	1.00	15.9	0.049	0.063	1.21	59.5	0.2	0.29
							10.2											
202B	CB202B	STM202	0.028	0.90	0.03	0.03	10.0	104.2	7.4	250	1.00	13	0.049	0.063	1.21	59.5	0.2	0.12
							10.2											
	STM202	STM201				0.15	10.6	101.2	41.0	300	0.50	36	0.071	0.075	0.97	68.4	0.6	0.60
	STM201	EX. STM				0.15	11.2	98.2	39.8	300	1.00	16.3	0.071	0.075	1.37	96.7	0.2	0.41
							11.4											

**OUTLET TO MONTREAL ROAD:**

101A	Imp.	Perv.	Total
Area	0.056	0.002	0.058
C	0.9	0.2	0.87

101C	Imp.	Perv.	Total
Area	0.064	0.036	0.100
C	0.9	0.2	0.65

102A	Imp.	Perv.	Total
Area	0.044	0.046	0.091
C	0.9	0.2	0.54

BLDG	Imp.	Perv.	Total
Area	0.254	0.000	0.254
C	0.9	0.2	0.90

**OUTLET TO MONTFORT STREET:**

203B	Imp.	Perv.	Total
Area	0.026	0.002	0.027
C	0.9	0.2	0.86

203A	Imp.	Perv.	Total
Area	0.039	0.005	0.044
C	0.9	0.2	0.82

202A	Imp.	Perv.	Total
Area	0.068	0.005	0.072
C	0.9	0.2	0.84

202B	Imp.	Perv.	Total
Area	0.028	0.000	0.028
C	0.9	0.2	0.90



---

---

***Zurn Roof Drains***

---

---



# Control-Flo...Today's Successful Answer to More

## THE ZURN "CONTROL-FLO CONCEPT"

Originally, Zurn introduced the scientifically-advanced "Control-Flo" drainage principle for dead-level roofs. Today, after thousands of successful applications in modern, large dead-level roof areas, Zurn engineers have adapted the comprehensive "Control-Flo" data to **sloped roof** areas.

## WHAT IS "CONTROL-FLO"?

It is an advanced method of removing rain water off dead-level or sloped roofs. As contrasted with conventional drainage practices, which attempt to drain off storm water as quickly as it falls on the roof's surface, "Control-Flo" drains the roof at a controlled rate. Excess water accumulates on the roof under controlled conditions...then drains off at a lower rate after a storm abates.

## CUTS DRAINAGE COSTS

Fewer roof drains, smaller diameter piping, smaller sewer sizes, and lower installation costs are possible with a "Control-Flo" drainage system because roof areas are utilized as temporary storage reservoirs.

## REDUCES PROBABILITY OF STORM DAMAGE

Lightens load on combination sewers by reducing rate of water drained from roof tops during severe storms thereby reducing probability of flooded sewers, and consequent backflow into basements and other low areas.

## THANKS TO EXCLUSIVE ZURN "AQUA-WEIR" ACTION

Key to successful "Control-Flo" drainage is a unique scientifically-designed weir containing accurately calibrated notches with sides formed by parabolic curves which provide flow rates directly proportional to the head. Shape and size of notches are based on predetermined flow rates, and all factors involved in roof drainage to assure permanent regulation of drainage flow rates for specific geographic locations and rainfall intensities.

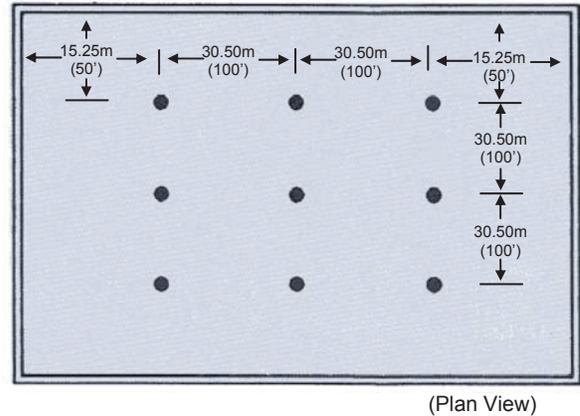


## DEFINITION

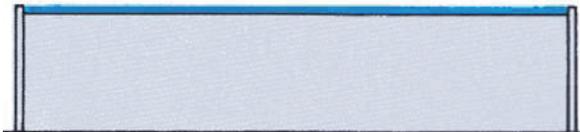
### DEAD LEVEL ROOFS

#### DIAGRAM "A"

A dead-level roof for purposes of applying the Zurn "Control-Flo" drainage principle is one which has been designed for zero slope across its entire surface. Measurements shown are for maximum distances.



(Plan View)

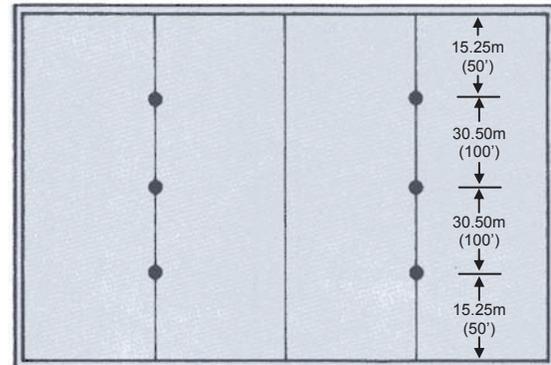


(Section View)

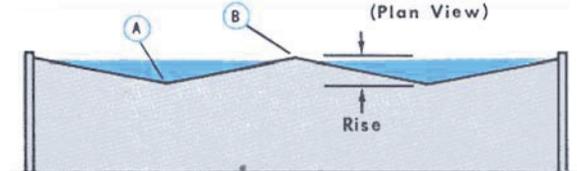
### SLOPED ROOFS

#### DIAGRAM "B"

A sloped roof is one designed commonly with a shallow slope. The Zurn "Control-Flo" drainage system can be applied to any slope which results in a total rise up to 152mm (6"). The total rise of a roof as calculated for "Control-Flo" application is defined as the vertical increase in height in inches, from the low point or valley of a sloping roof (A) to the top of the sloping section (B). (Example: a roof that slopes 3mm (1/8") per foot having a 7.25m (24') span would have a rise of 7.25m x 3mm or 76mm (24' x 1/8" or 3"). Measurements shown are for maximum distances.



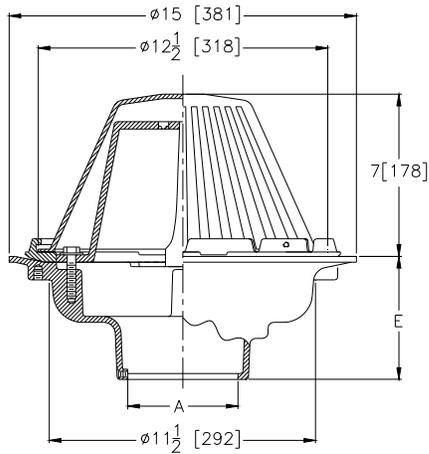
(Plan View)



(Section View)

# Economical Roof Drainage Installations

## SPECIFICATION DATA



**ENGINEERING SPECIFICATION:** ZURN Z-105 "Control-Flo" roof drain for dead-level or sloped roof construction, Dura-Coated cast iron body. "Control-Flo" weir shall be linear functioning with integral membrane flashing clamp/gravel guard and Poly-Dome. All data shall be verified proportional to flow rates.

## ROOF DESIGN RECOMMENDATIONS

Basic roofing design should incorporate protection that will prevent roof overloading by installing adequate overflow scuppers in parapet walls.

## GENERAL INFORMATION

The "Control-Flo" roof drainage data is tabulated for four areas (232.25m<sup>2</sup> (2500 sq. ft.), 464.502m<sup>2</sup> (5000 sq. ft.), 696.75m<sup>2</sup> (7500 sq. ft.), 929m<sup>2</sup> (10,000 sq. ft.) notch areas ratings) for each locality. For each notch area rating the maximum discharge in L.P.M. (G.P.M.) - draindown in hours, and maximum water depth at the drain in inches for a dead level roof — 51mm (2 inch) rise — 102mm (4 inch) rise and 152mm (6 inch) rise—are tabulated. The rise is the total change in elevation from the valley to the peak. Values for areas, rise or combination thereof other than those listed, can be arrived at by extrapolation. All data listed is based on the fifty-year return frequency storm. In other words the maximum conditions as listed will occur on the average of once every fifty years.

**NOTE:** The tabulated "Control-Flo" data enables the individual engineer to select his own design limiting condition. The limiting condition can be draindown time, roof load factor, or maximum water depth at the drain. If draindown time is the limiting factor because of possible freezing conditions, it must be recognized that the maximum time listed will occur on the average of once every 50 years and would most likely be during a heavy summer thunder storm. Average winter draindown times would be much shorter in duration than those listed.

## GENERAL RECOMMENDATIONS

On sloping roofs, we recommend a design depth referred to as an equivalent depth. An equivalent depth is the depth of water attained at the drains that results in the same roof stresses as those realized on a dead-level roof. In all cases this equivalent depth is almost equal to that attained by using the same notch area rating for the different rises to 152mm (6"). With the same depth of water at the drain the roof stresses will decrease with increasing total rise. Therefore, it would be possible to have a depth in excess of 152mm (6") at the drain on a sloping roof without exceeding stresses normally encountered in a 152mm (6") depth on a dead-level roof. However, it is recommended that scuppers be placed to limit the maximum water depth on any roof to 152mm (6") to prevent the overflow of the weirs on the drains and consequent overloading of drain piping. In the few cases where the data shows a flow rate in excess of 136 L.P.M. (30 G.P.M.) if all drains and drain lines are sized according to recommendations, and the one storm in fifty years occurs, the only consequence will be a brief flow through the scuppers or over-flow drains.

**NOTE:** An equivalent depth is that depth of water attained at the drains at the lowest line or valley of the roof with all other conditions such as notch area and rainfall intensity being equal. For Toronto, Ontario a notch area rating of 464.50m<sup>2</sup> (5,000 sq. ft.) results in a 74mm (2.9 inch) depth on a dead level roof for a 50-year storm. For the same notch area and conditions, equivalent depths for a 51mm (2"), 102mm (4") and 152mm (6") rise respectively on a sloped roof would be 86mm (3.4"), 104mm (4.1") and 124mm (4.9"). Roof stresses will be approximately equal in all cases.



## Control-Flo Drain Selection Is Quick and Easy...

The exclusive Zurn "Selecta-Drain" Chart (pages 8—11) tabulates selection data for 34 localities in Canada. Proper use of this chart constitutes your best assurance of sure, safe, economical application of Zurn "Control-Flo" systems for your specific geographical area. If the "Selecta-Drain Chart does not cover your specific design criteria, contact Zurn Industries Limited, Mississauga, Ontario, for additional data for your locality. Listed below is additional information pertinent to proper engineering of the "Control-Flo" system.

### ROOF USED AS TEMPORARY RETENTION

The key to economical "Control-Flo" is the utilization of large roof areas to temporarily store the maximum amount of water without overloading average roofs or creating excessive draindown time during periods of heavy rainfall. The data shown in the "Selecta-Drain" Chart enables the engineer to select notch area ratings from 232.25 m<sup>2</sup> (2,500 ft.<sup>2</sup>) to 929m<sup>2</sup> (10,000 ft.<sup>2</sup>) and to accurately predict all other design factors such as maximum roof load, L.P.M. (G.P.M.) discharge, draindown time and water depth at the drain. Obviously, as design factors permit the notch area rating to increase the resulting money saved in being able to use small leaders and drain lines will also increase.

### ROOF LOADING AND RUN-OFF RATES

The four values listed in the "Selecta-Drain" Chart for notch area ratings for different localities will normally span the range of good design. If areas per notch below 232.25m<sup>2</sup> (2,500 ft.<sup>2</sup>) are used considerable economy of the "Control-Flo" concept is being lost. The area per notch is limited to 929m<sup>2</sup> (10,000 ft.<sup>2</sup>) to keep the drain-down time within reasonable limits. Extensive studies show that stresses due to water load on a sloping roof for any fixed set of conditions are very nearly the same as those on a dead-level roof. A sloping roof tends to concentrate more water in the valleys and increase the water depth at this point. The greater depth around the drain leads to a faster run-off rate, particularly a faster early run-off rate. As a result, the total volume of water stored on the roof is less, and the total load on the sloping roof is less. By using the same area on the sloping roof as on the dead-level roof the increase in roof stresses due to increased water depth in the valleys is offset by the decrease in the total load due to less water stored. The net result of the maximum roof stress is approximately the same for any single span rise and fixed set of conditions. A fixed set of conditions, would be the same notch area, the same frequency store, and the same locality.

**SPECIAL CONSIDERATIONS FOR STRUCTURAL SAFETY:** Normal practice of roof design is based on 18kg (40 lbs.) per 929 cm<sup>2</sup> ( sq ft.). (Subject to local codes and by-laws.) Thus it is extremely important that design is in accordance with normal load factors so deflection will be slight enough in any bay to prevent progressive deflection which could cause water depths to load the roof beyond its design limits.

### ADDITIONAL NOTCH RATINGS

The "Selecta-Drain" Chart along with Tables I and II enables the engineer to select "Control-Flo" Drains and drain pipe sizes for most Canadian applications. These calculations are computed for a proportional flow weir that is sized to give a flow of 23 L.P.M. (5 G.P.M.) per inch of head. The 23 L.P.M. (5 G.P.M.) per inch of head notch opening is selected as the bases of design as it offers the most economical installation as applied to actual rainfall experienced in Canada.

Should you require design criteria for locations outside of Canada or for special project applications please contact Zurn Industries Limited, Mississauga, Ontario.

### LEADER AND DRAIN PIPE SIZING

Since all data in the "Selecta-Drain" Chart is based on the 50-year-storm it is possible to exceed the water depth listed in these charts if a 100-year or 1000-year storm would occur. Therefore, for good design it is recommended that scuppers or other methods be used to limit water depth to the design depth and tables I and II be used to size the leaders and drain pipes. If the roof is capable of supporting more water than the design depth it is permissible to locate the scuppers or other overflow means at a height that will allow a greater water depth on the roof. However, in this case the leader and drain pipes should be sized to handle the higher flow rates possible based on a flow rate of 23 L.P.M. (5 G.P.M.) per inch of depth at the drain.

### PROPER DRAIN LOCATION

The following good design practice is recommended for selecting the proper number of "Control-Flo" drains for a given area. **On dead-level roofs**, drains should be located no further than 15.25m (50 feet) from edge of roof and no further than 30.50m (100 feet) between drains. See diagram "A" page 2. **On sloping roofs**, drains should be located in the valleys at a distance no greater than 15.25m (50 feet) from each end of the valleys and no further than 30.50m (100 feet) between drains. See diagram "B" page 2. Compliance with these recommendations will assure good run off regardless of wind direction.

---

---

**TRITON STORMWATER SOLUTIONS**

***Underground Storage Unit  
Area A1***

---

---





- [Home](#)
- |
- [Contact Us](#)
- |
- [My Account](#)
- |
- [Log In](#)
- 
- 
  
- [About Us](#)
  - [Our Story](#)
  - [Partners](#)
  - [Sales/Distributors](#)
  - [Press Releases](#)
- [Video](#)
  - [Animation](#)
  - [Bird Strike](#)
  - [Double Stack Video](#)
  - [Metric Installation](#)
  - [Overview Video](#)
- [Site Calculator](#)
- [Resources](#)
  - [Product Support](#)
  - [Commercial Installation](#)
  - [Residential Installation](#)
  - [Homeowners](#)
  - [System Design](#)
  - [Installation Manual](#)
  - [Downloads](#)
- [Case Studies](#)
  - [Archives](#)
  - [Press Releases](#)
- [Products](#)
  - [Product Listing](#)
  - [Comparisons](#)
  - [Downloads](#)

## Site Calculator

- [System Builder](#)
- [Field Diagram](#)
- [Summary](#)

## Parameters

Units:  ▾

Storage Volume:  Cu. M

Chamber Selection:  ▾ [\[+\]](#)

Header Row Position:  ▾

Fill Over Embedment Stone:  cm

### Embedment Stone:

Over:

Under:

Porosity:

### Controlled By (in M):

▾

### Accessories:

Dumpsters:  ▾

Bins:  ▾

Floors:

### Double Stacked

Double Stacked?:

Lower Chamber:  ▾

Stone Between:

Note: After making an input change you must hit recalculate to update the Field Diagram and Project Results.

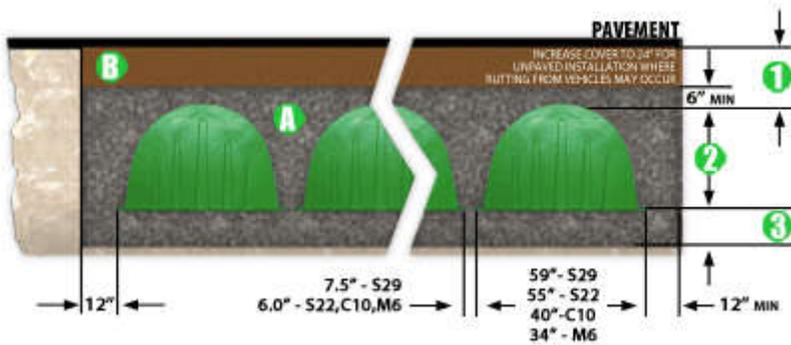
**NOTICE:** This calculator works best in when used with [Firefox](#) browser. If using Internet Explorer, please be sure to [disable Protected Mode](#). This calculator has shown issues when used in Chrome with AdBlock enabled. If using Chrome, please [disable AdBlock](#).

This calculator is provided for your convenience only and is not meant for final quotation and/or engineering



purposes. Please contact Triton for more information. Need to model out a full system, or need engineering ready calculations? Triton chambers are available for modeling in HydroCAD by clicking on the HydroCAD banner to the left.

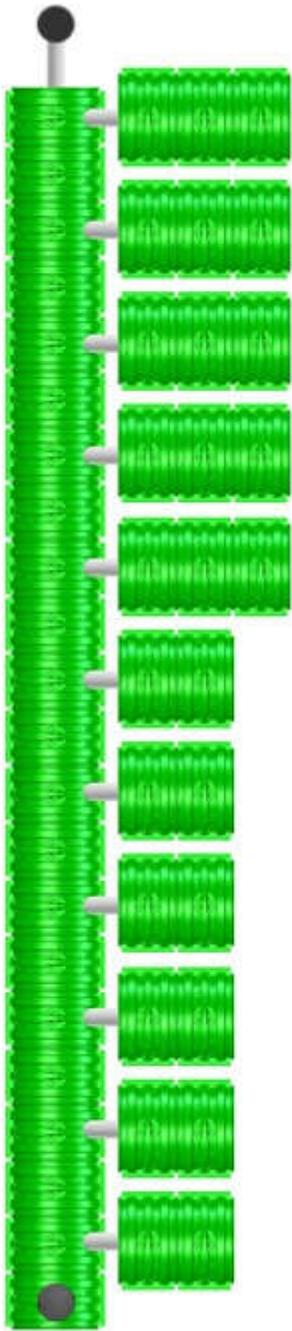
## Project Results



- ① Total Cover Over Chambers: 45.72 cm
- ② Height of Chamber: 91.44 cm
- ③ Embedment Stone Under Chambers: 15.24 cm
- A Volume of Embedment Stone Required: 74 Cu. M
- B Volume of Fill Material Required: 28 Cu. M

Total Storage Provided:	68.4 Cu. M
Type of Distribution Chambers:	S-29
# of Distribution Chambers Required:	27
# of end caps required:	24
Type of header row chambers required:	S-29
# of header row chambers required:	22
Floors:	0
Bins:	0
Dumpsters:	0
Required Bed Size:	92.93 Sq. M
Volume of Embedment Stone Required:	74.79 Cu. M
Volume of Fill Material Required:	28.32 Cu. M
Volume of Excavation:	141.62 Cu. M
Area of Filter Fabric:	151.18 Sq. M
# of Chambers long:	3
# of rows:	11
Actual Trench Length:	4.891 M
Actual Trench Width:	18.999 M

## Field Diagram



**WIRE DIAGRAM**

### Chamber Type



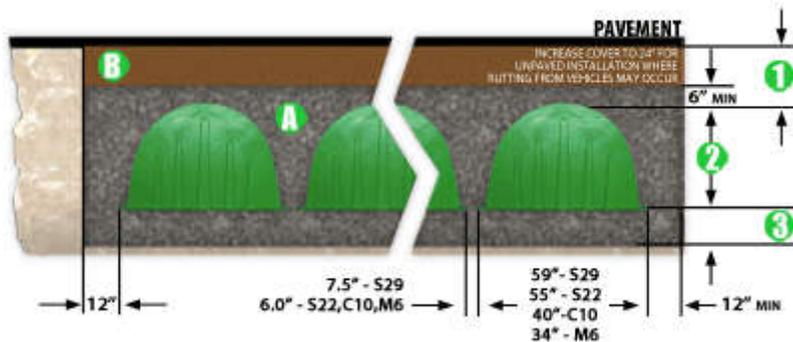
**Dimensions** 59" x 36" x 35" (WxHxL)

1498.6mm x 914.4mm x 889mm

**Weight** 32 lbs / 14.5 kg

**Bare Chamber Storage** 29 ft<sup>3</sup> / 0.82 m<sup>3</sup>

## Project Results



- ① Total Cover Over Chambers: 45.72 cm
- ② Height of Chamber: 91.44 cm
- ③ Embedment Stone Under Chambers: 15.24 cm
- A Volume of Embedment Stone Required: 74 Cu. M
- B Volume of Fill Material Required: 28 Cu. M

Total Storage Provided:	68.4 Cu. M
Type of Distribution Chambers:	S-29
# of Distribution Chambers Required:	27
# of end caps required:	24
Type of header row chambers required:	S-29
# of header row chambers required:	22
Floors:	0
Bins:	0
Dumpsters:	0
Required Bed Size:	92.93 Sq. M
Volume of Embedment Stone Required:	74.79 Cu. M
Volume of Fill Material Required:	28.32 Cu. M
Volume of Excavation:	141.62 Cu. M

Area of Filter Fabric: 151.18 Sq. M  
# of Chambers long: 3  
# of rows: 11  
Actual Trench Length: 4.891 M  
Actual Trench Width: 18.999 M



***Triton Stormwater Solutions, LLC***

*7600 Grand River Rd, Suite 195*

*Brighton, Michigan 48114*

*Phone: (810) 222-7652 - Fax: (810) 222-1769*



- 
- 
- [How We Got Started](#)
- |
- [Latest News](#)
- |
- [Case Studies](#)
- |
- [Contact Us](#)
- |
- [Products](#)
- |
- [Site Calculator](#)

© 2007-2015 [Triton Stormwater Solutions](#). All Rights Reserved.

Hosting and website support provided by [ProWeb Technology Solutions](#)



---

---

**TRITON STORMWATER SOLUTIONS**

***Underground Storage Unit  
Area A4***

---

---





- [Home](#)
- |
- [Contact Us](#)
- |
- [My Account](#)
- |
- [Log In](#)
- 
- 
  
- [About Us](#)
  - [Our Story](#)
  - [Partners](#)
  - [Sales/Distributors](#)
  - [Press Releases](#)
- [Video](#)
  - [Animation](#)
  - [Bird Strike](#)
  - [Double Stack Video](#)
  - [Metric Installation](#)
  - [Overview Video](#)
- [Site Calculator](#)
- [Resources](#)
  - [Product Support](#)
  - [Commercial Installation](#)
  - [Residential Installation](#)
  - [Homeowners](#)
  - [System Design](#)
  - [Installation Manual](#)
  - [Downloads](#)
- [Case Studies](#)
  - [Archives](#)
  - [Press Releases](#)
- [Products](#)
  - [Product Listing](#)
  - [Comparisons](#)
  - [Downloads](#)

## Site Calculator

- [System Builder](#)

- [Field Diagram](#)
- [Summary](#)

## Parameters

Units:  ▾  
 Storage Volume:  Cu. M  
 Chamber Selection:  ▾   
 Header Row Position:  ▾  
 Fill Over Embedment Stone:  cm

### Embedment Stone:

Over:   
 Under:   
 Porosity:

### Controlled By (in M):

▾

### Accessories:

Dumpsters:  ▾  
 Bins:  ▾  
 Floors:

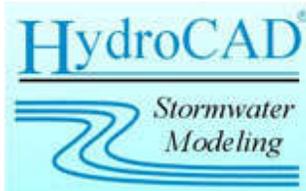
### Double Stacked

Double Stacked?:   
 Lower Chamber:  ▾  
 Stone Between:

Note: After making an input change you must hit recalculate to update the Field Diagram and Project Results.

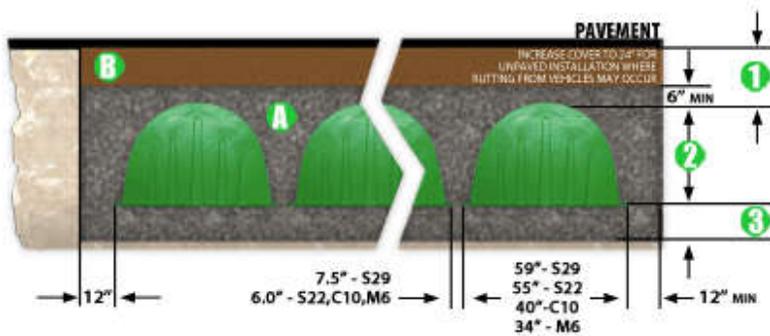
**NOTICE:** This calculator works best in when used with [Firefox](#) browser. If using Internet Explorer, please be sure to [disable Protected Mode](#). This calculator has shown issues when used in Chrome with AdBlock enabled. If using Chrome, please [disable AdBlock](#).

This calculator is provided for your convenience only and is not meant for final quotation and/or engineering



purposes. Please contact Triton for more information. Need to model out a full system, or need engineering ready calculations? Triton chambers are available for modeling in HydroCAD by clicking on the HydroCAD banner to the left.

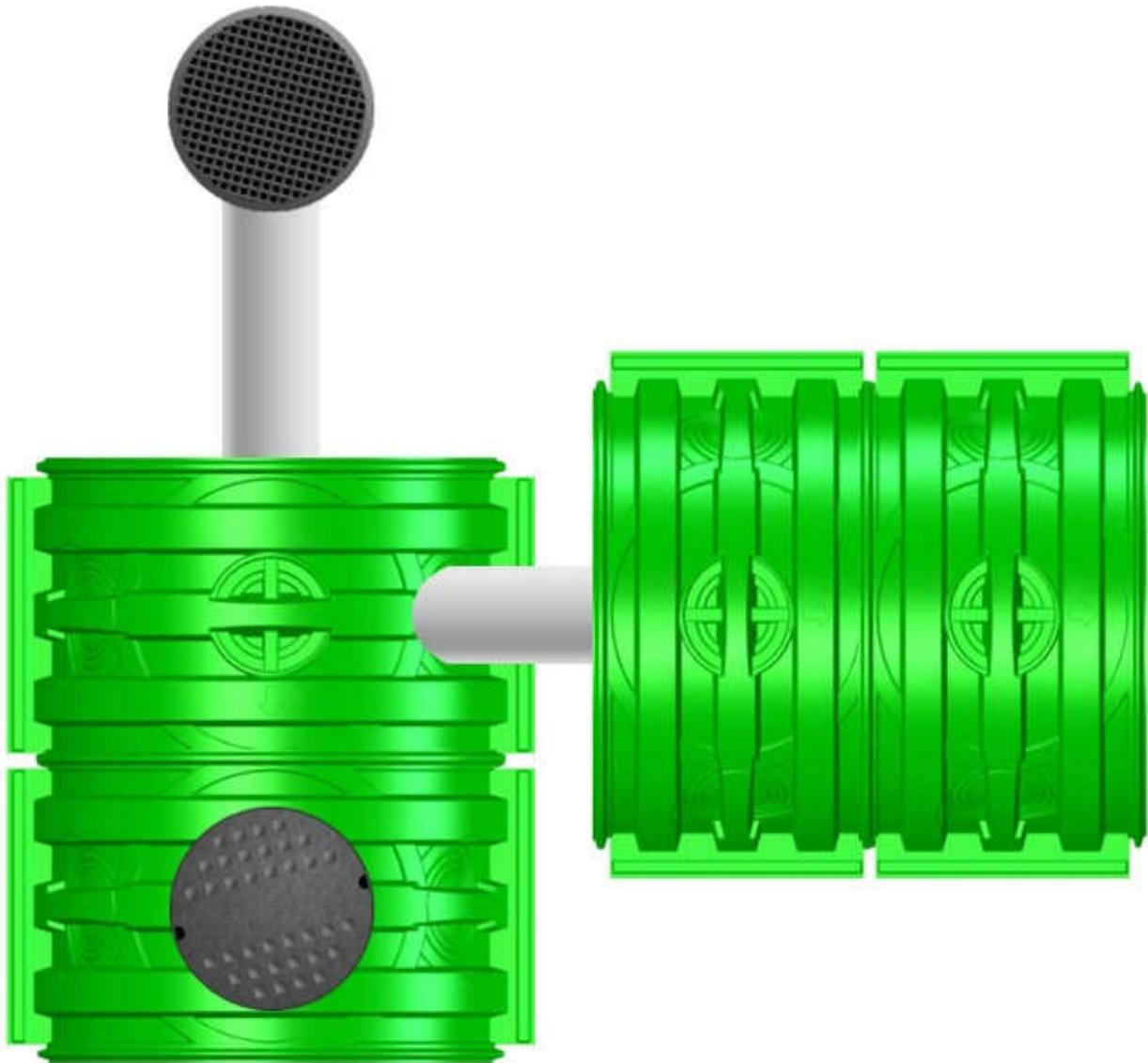
## Project Results



- 1 Total Cover Over Chambers: 45.72 cm
- 2 Height of Chamber: 88.7476 cm
- 3 Embedment Stone Under Chambers: 15.24 cm
- A Volume of Embedment Stone Required: 5 Cu. M
- B Volume of Fill Material Required: 2 Cu. M

Total Storage Provided:	5.5 Cu. M
Type of Distribution Chambers:	S-22
# of Distribution Chambers Required:	2
# of end caps required:	4
Type of header row chambers required:	S-22 Header
# of header row chambers required:	2
Floors:	0
Bins:	0
Dumpsters:	0
Required Bed Size:	7.27 Sq. M
Volume of Embedment Stone Required:	5.21 Cu. M
Volume of Fill Material Required:	2.22 Cu. M
Volume of Excavation:	10.89 Cu. M
Area of Filter Fabric:	20.7 Sq. M
# of Chambers long:	2
# of rows:	1
Actual Trench Length:	3.624 M
Actual Trench Width:	2.007 M

## Field Diagram



**WIRE DIAGRAM**

**Chamber Type**



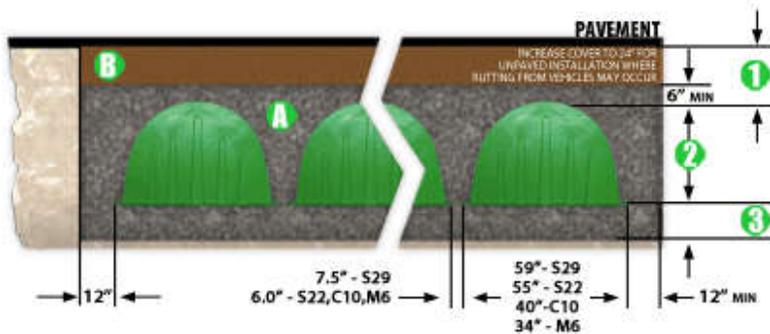
**Dimensions** 55" x 35" x 30" (WxHxL)

1397mm x 889mm x 762mm

**Weight** 28 lbs / 12.7 kg

**Bare Chamber Storage** 23.2 ft<sup>3</sup> / 0.66 m<sup>3</sup>

## Project Results



- ① Total Cover Over Chambers: 45.72 cm
- ② Height of Chamber: 88.7476 cm
- ③ Embedment Stone Under Chambers: 15.24 cm
- A Volume of Embedment Stone Required: 5 Cu. M
- B Volume of Fill Material Required: 2 Cu. M

Total Storage Provided:	5.5 Cu. M
Type of Distribution Chambers:	S-22
# of Distribution Chambers Required:	2
# of end caps required:	4
Type of header row chambers required:	S-22 Header
# of header row chambers required:	2
Floors:	0
Bins:	0
Dumpsters:	0
Required Bed Size:	7.27 Sq. M
Volume of Embedment Stone Required:	5.21 Cu. M
Volume of Fill Material Required:	2.22 Cu. M
Volume of Excavation:	10.89 Cu. M
Area of Filter Fabric:	20.7 Sq. M
# of Chambers long:	2
# of rows:	1
Actual Trench Length:	3.624 M
Actual Trench Width:	2.007 M



**Triton Stormwater Solutions, LLC**  
7600 Grand River Rd, Suite 195

Brighton, Michigan 48114

Phone: (810) 222-7652 - Fax: (810) 222-1769



- 
- 
- [How We Got Started](#)
- |
- [Latest News](#)
- |
- [Case Studies](#)
- |
- [Contact Us](#)
- |
- [Products](#)
- |
- [Site Calculator](#)

© 2007-2015 [Triton Stormwater Solutions](#). All Rights Reserved.

Hosting and website support provided by [ProWeb Technology Solutions](#)



powered by xspnd

---

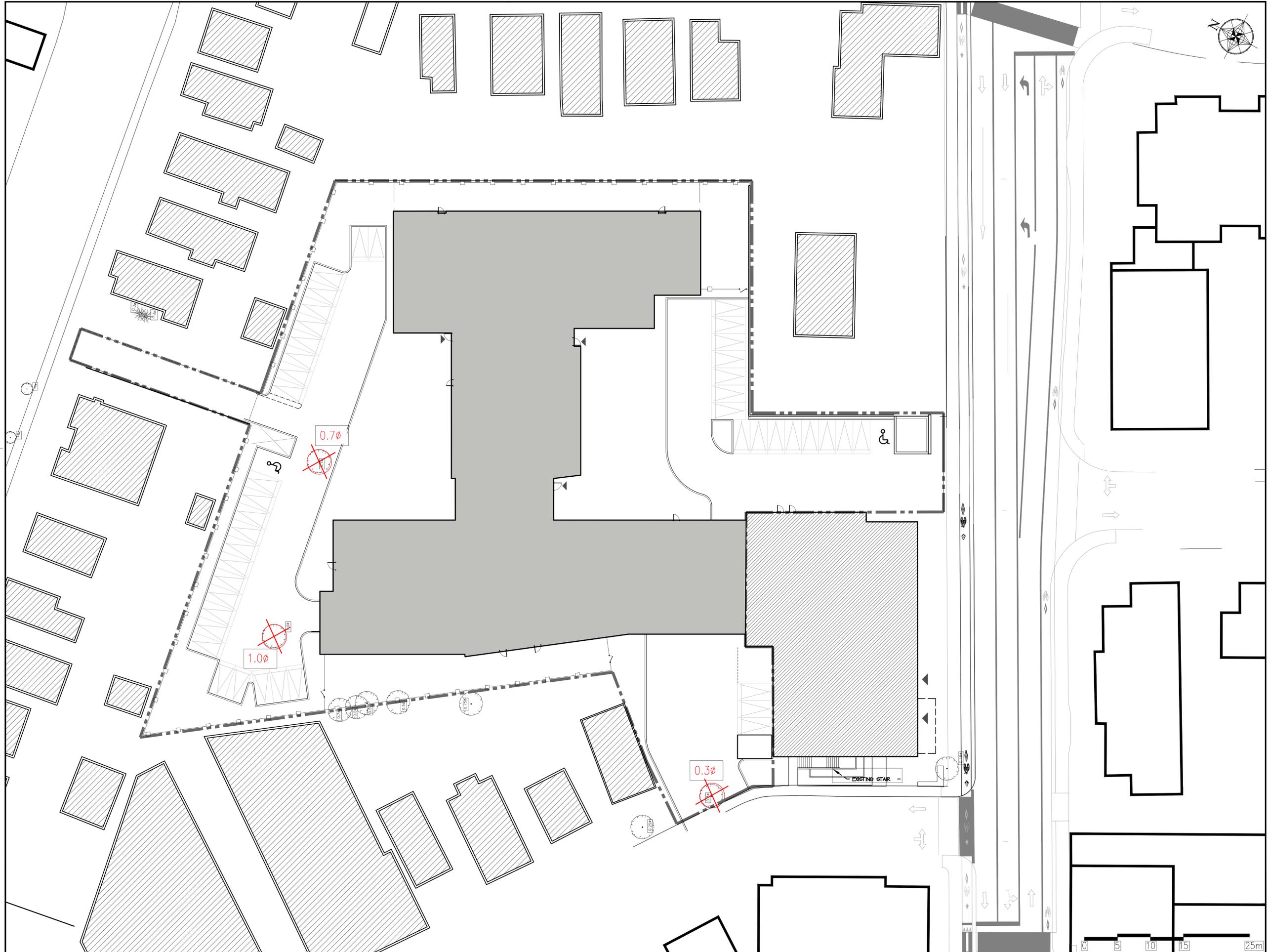
---

***DRAWINGS / FIGURES***

---

---





Client: **THE SALVATION ARMY**

Revision			
No.	Description	Appr.	Date
1	SITE PLAN CONTROL	E.P.	06/06/2017
2	SITE PLAN CONTROL	S.G.	26/09/2017

**LEGEND**

TREE TO BE REMOVED

- Note :**
- It is the responsibility of the appropriate contractor or official to report any errors, omissions or discrepancies on this plan with actual site conditions to the Landscape Architect before proceeding with construction.
  - The Contractor must not cut down any existing vegetation without the approval of the Project Director.
  - Implantation of the works on site must be approved by the Project Director.
  - The Contractor must use the Cad file for implantation of all work. The contractor must verify the amounts specified in the schedule and notify the landscape architect of any errors, omissions or contradictions before the close of the bid.
  - Existing grades indicated on the plan come from the survey provided by the owner.
  - The contractor is to notify all utility companies and authorities prior to any excavation and ascertain locations of underground services.
  - The contractor is to reinstaate all areas and items damaged as a result of construction activity.
  - The contractor is to comply with all pertinent codes and by-laws.
  - The contractor is to maintain a positive surface run-off throughout the entire construction period.
  - The Landscape Architect is not responsible for subsurface conditions.
  - The contractor is to stake the proposed location of all plant material in conjunction with the Landscape Architect prior to excavation.
  - All trees within 1m of underground utility trenches are to be excavated by hand.
  - Remove all protective wrapping from tree trunks after installation.
  - Staking of trees shall only be performed if necessary.
  - Ensure that mulch is pulled back a min. distance of 75mm from base of tree trunk.

APPROVED  REFUSED

THIS \_\_\_\_ DAY OF \_\_\_\_\_, 20\_\_

**DOUGLAS JAMES, MCIP, RPP**  
 (A) MANAGER, DEVELOPMENT REVIEW CENTRAL  
 PLANNING, INFRASTRUCTURE & ECONOMIC  
 DEVELOPMENT DEPARTMENT, CITY OF OTTAWA

**PROJET | PAYSAGE**  
 24 Mont-Royal Ouest, Suite 801  
 Montréal, QC, H2T 2S2  
 514 849 7700

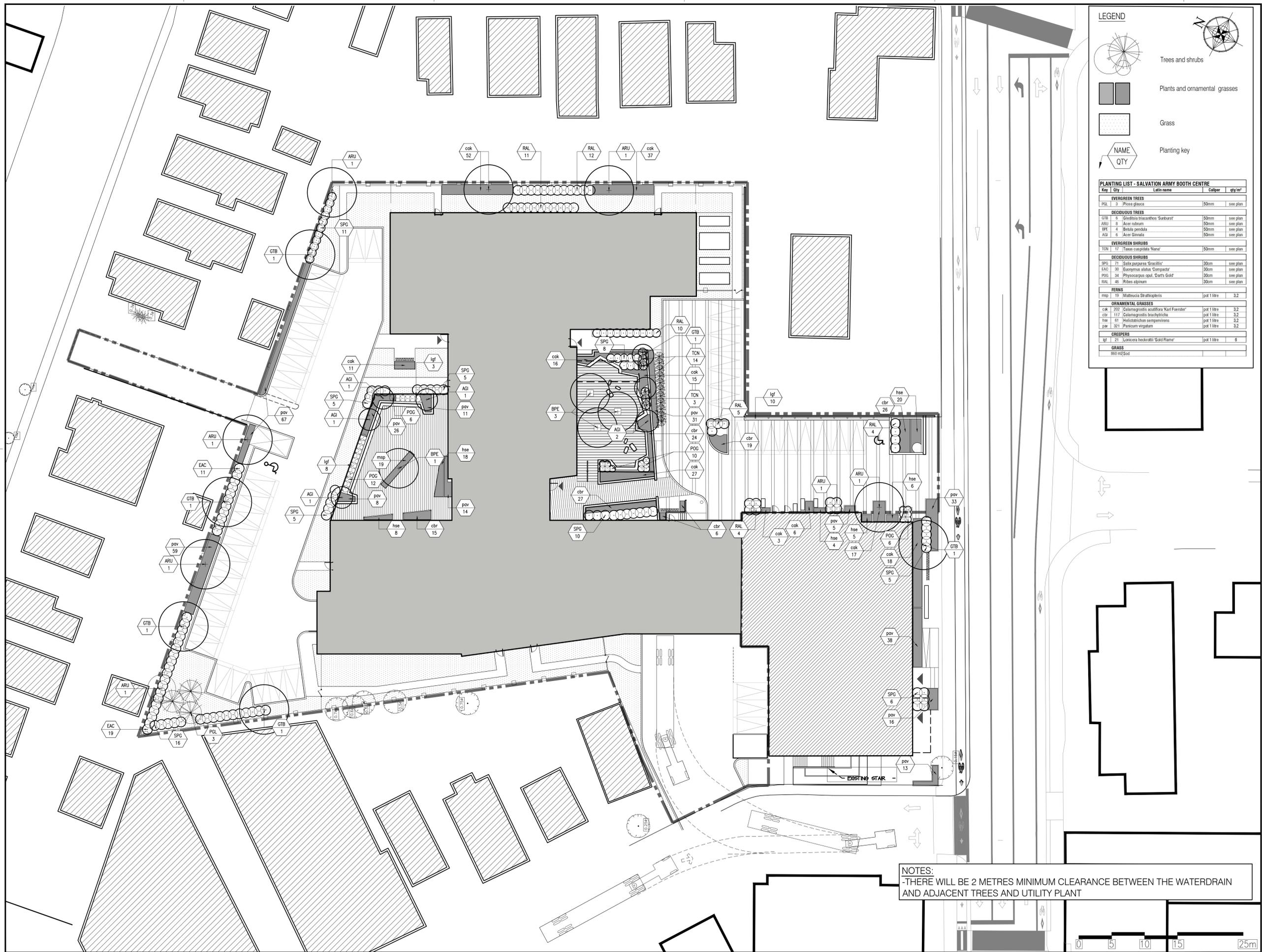
Professional seal

Project name  
**333 MONTREAL ROAD**  
 Ottawa, Ontario

Drawing title  
**TREE REMOVAL PLAN**  
 SCALE 1:250

Drawn by: <b>B.DALLAS</b>	Sheet No. <b>LA-20</b>
Designed by: <b>B.DALLAS / S.GALLANT</b>	
Date: <b>MAY 2017</b>	
<b>16-427</b>	

FILE NUMBER D07-12-17-0077



**LEGEND**

Trees and shrubs

Plants and ornamental grasses

Grass

Planting key

NAME  
QTY

**PLANTING LIST - SALVATION ARMY BOOTH CENTRE**

Key	Qty	Latin name	Caliper	qty/m <sup>2</sup>
<b>EVERGREEN TREES</b>				
PGL	3	<i>Picea glauca</i>	50mm	see plan
<b>DECIDUOUS TREES</b>				
GTB	6	<i>Gleditsia thurcathos</i> Sunburst	50mm	see plan
JARU	6	<i>Acer rubrum</i>	50mm	see plan
BPE	4	<i>Betula pendula</i>	50mm	see plan
AGI	6	<i>Acer glabrum</i>	50mm	see plan
<b>EVERGREEN SHRUBS</b>				
TCN	17	<i>Taxus canadensis</i> 'Nana'	50mm	see plan
<b>DECIDUOUS SHRUBS</b>				
SPG	71	<i>Salix purpurea</i> 'Sirocillo'	30cm	see plan
EAC	30	<i>Eranthis alba</i> 'Compass'	30cm	see plan
POG	34	<i>Physocarpus opul.</i> 'Daria Gold'	30cm	see plan
RAL	46	<i>Ribes alpinum</i>	30cm	see plan
<b>FERNS</b>				
mfp	19	<i>Mattuccia struthiopteris</i>	pot 1 litre	3.2
<b>ORNAMENTAL GRASSES</b>				
cak	232	<i>Calamagrostis canadensis</i> 'Karl Foerster'	pot 1 litre	3.2
cbr	117	<i>Calamagrostis brachytricha</i>	pot 1 litre	3.2
hse	61	<i>Helleborus scaberrimus</i>	pot 1 litre	3.2
pav	321	<i>Panicum virgatum</i>	pot 1 litre	3.2
<b>DRYERS</b>				
sf	23	<i>Lonicera heckrothii</i> 'Gold Flame'	pot 1 litre	6
<b>GRASS</b>				
	860	mq Sod		

Client:

Revision			
No	Description	Appr	Date
1	SITE PLAN CONTROL	E.P.	08/06/2017
2	SITE PLAN CONTROL	S.O.	26/09/2017

- Note:**
- It is the responsibility of the appropriate contractor or official to report any errors, omissions or discrepancies on this plan with actual site conditions to the Landscape Architect before proceeding with construction.
  - The Contractor must not cut down any existing vegetation without the approval of the Project Director.
  - Implantation of the works on site must be approved by the Project Director.
  - The Contractor must use the Cad file for implementation of all work. The contractor must verify the amounts specified in the schedule and notify the landscape architect of any errors, omissions or contradictions before the close of the bid.
  - Existing grades indicated on the plan come from the survey provided by the owner.
  - The contractor is to notify all utility companies and authorities prior to any excavation and ascertain locations of underground services.
  - The contractor is to reinstate all areas and items damaged as a result of construction activity.
  - The contractor is to comply with all pertinent codes and by-laws.
  - The contractor is to maintain a positive surface run-off throughout the entire construction period.
  - The Landscape Architect is not responsible for subsurface conditions.
  - The contractor is to stake the proposed location of all plant material in conjunction with the Landscape Architect prior to excavation.
  - All trees within 1m of underground utility trenches are to be excavated by hand.
  - Remove all protective wrapping from tree trunks after installation.
  - Staking of trees shall only be performed if necessary.
  - Ensure that mulch is pulled back a min. distance of 75mm from base of tree trunk.

APPROVED  REFUSED

THIS \_\_\_ DAY OF \_\_\_\_\_, 20\_\_

DOUGLAS JAMES, MCIP, RPP  
(A) MANAGER, DEVELOPMENT REVIEW CENTRAL  
PLANNING, INFRASTRUCTURE & ECONOMIC  
DEVELOPMENT DEPARTMENT, CITY OF OTTAWA

**PROJET | PAYSAGE**  
24 Mont-Royal Ouest, Suite 801  
Montréal, QC, H2T 2S2  
514 849 7700

Professional seal

Project name  
**333 MONTREAL ROAD**  
Ottawa, Ontario

Drawing title  
**PLANTING PLAN**

Drawn by:  
B. DALLAS

Designed by:  
B. DALLAS / S. GALLANT

Date:  
MAY 2017

Sheet No.  
**LA-40**

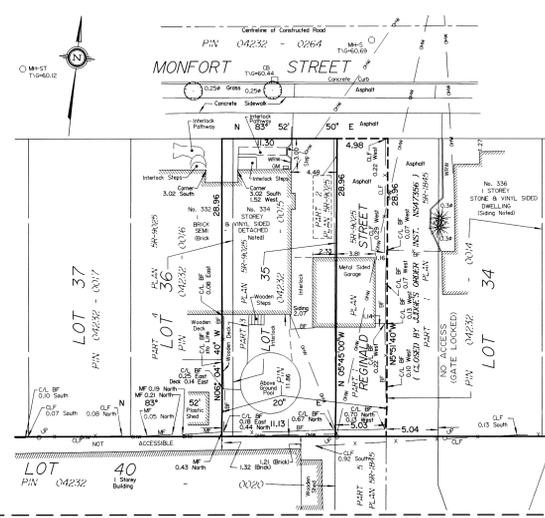
16-427

**NOTES:**  
- THERE WILL BE 2 METRES MINIMUM CLEARANCE BETWEEN THE WATERDRAIN AND ADJACENT TREES AND UTILITY PLANT



FILE NUMBER D07-12-17-0077

DETAIL SCALE 1:250



TOPOGRAPHICAL PLAN OF  
 LOTS 25 to 31 (both inclusive)  
 LOT 35,  
 40 to 46 (both inclusive)  
 PART OF 36  
 PART OF 47 and 48  
 PART OF REGINALD STREET  
 (Closed by Judge's Order Inst. NS47356 )  
 REGISTERED PLAN 246  
 CITY OF OTTAWA

Prepared by Annis, O'Sullivan, Vollebek Ltd.

Scale 1 : 250  
 0 5 10 15 20 Metres

Metric  
 DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND  
 CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

Nov 30 2016  
 Date  
 E.H. Henweyer O.L.S.

Notes & Legend

- |        |                                       |
|--------|---------------------------------------|
| ○ FH   | Fire Hydrant                          |
| ⊕ W    | Water Valve                           |
| ⊕ VC   | Valve Chamber (Waterman)              |
| ⊕ MS   | Maintenance Hole (Storm Sewer)        |
| ⊕ MS-S | Maintenance Hole (Sanitary)           |
| ⊕ MH   | Maintenance Hole (Hydro)              |
| ⊕ V    | Gas Valve                             |
| — ST   | Underground Storm Sewer               |
| — S    | Underground Sanitary Sewer            |
| — W    | Underground Water                     |
| — P    | Underground Power                     |
| — G    | Underground Gas                       |
| — B    | Underground Bell                      |
| □ CB   | Catch Basin                           |
| CLF    | Chain Link Fence                      |
| BF     | Board Fence                           |
| MF     | Metal Fence                           |
| ⊕ TSP  | Traffic Signal Post                   |
| ⊕ MW   | Monitoring Well                       |
| ⊕ UP   | Utility Pole                          |
| ⊕ PS-W | Wood Pole                             |
| T/G    | Top of Grate                          |
| Invt.  | Invert                                |
| CRW    | Concrete Retaining Wall               |
| CBRW   | Concrete Block Retaining Wall         |
| ⊕      | Diameter                              |
| ⊕ ELEV | Location of Elevations                |
| ⊕ W/C  | Top of Wall / Concrete Curb Elevation |
| C/L    | Centreline                            |
| —      | Property Line                         |
| ○ LS   | Light Standard                        |
| WRW    | Wooden Retaining Wall                 |
| ⊕ GM   | Gas Meter                             |
| ⊕      | Coniferous Tree                       |
| ⊕      | Deciduous Tree                        |

Bearings are given and are referred to  
 the Central Meridian of MTM Zone 9 (78°30' West Longitude )  
 NAD-83 (approx.)

LOTS 25 to 31 (both inclusive), 40 to 46 (both inclusive)  
 PART OF LOTS 47 and 48, PART OF REGINALD STREET  
 SITE AREA=6378 m<sup>2</sup>

LOT 35, PART OF LOT 36 AND PART OF REGINALD  
 STREET BEING PARTS 2 AND 3 PLAN 5R-9025  
 SITE AREA=324.7 m<sup>2</sup>

PART OF REGINALD STREET  
 BEING PART 1 PLAN 5R-9025  
 SITE AREA=144.5 m<sup>2</sup>

ELEVATION NOTES

- Elevations shown are geoidic and are referred to the CGVD08 geoidic datum.
- It is the responsibility of the user of this information to verify that the job benchmark has not been altered or disturbed and that its relative elevation and description agrees with the information shown on this drawing.

UTILITY NOTES

- This drawing cannot be accepted as acknowledging all of the utilities and it will be the responsibility of the user to contact the respective utility authorities for confirmation.
- Only visible surface utilities were located.
- A field location of underground plans by the pertinent utility authority is mandatory before any work involving breaking ground, probing, excavating, etc.
- Maintenance holes marked with "U", Underground services and Inverts are taken from City of Ottawa Engineering Drawings D-17-05 and S-546.

