

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT

FOR

**THE SALVATION ARMY
333 MONTREAL ROAD**

CITY OF OTTAWA

PROJECT NO.: 16-893

**SEPTEMBER 2017 – REV 2
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TABLE OF CONTENTS

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

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 |

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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 m²** 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 ² /d |
| Dining Room | 125 L/seat/d |
| Commercial Office | 75 L/9.3m ² /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 Water Supply Guidelines ** 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 ¹ (L/min) | Boundary Condition ² (m H ₂ 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 Water Supply Guidelines . See Appendix 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 Appendix 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 ² /d |
| Dining Room | 125 L/seat/d |
| Commercial Office | 75 L/9.3m ² /d |
| Infiltration and Inflow Allowance | 0.28L/s/ha |
| Sanitary sewers are to be sized employing the Manning's Equation | $Q = \frac{1}{n} AR^{\frac{2}{3}} S^{\frac{1}{2}}$ |
| 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 |
| Extracted from Sections 4 and 6 of the City of Ottawa Sewer Design Guidelines, October 2012. | |

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 m³** 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 m³** 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 m³** 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 m³** 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 ³) | (L/s) | (m ³) | (m ³) |
| 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 |
| Total | 55.2 | 72.4 | 73.4 | 108.7 | 201.0 |

It is anticipated that approximately **108.7 m³** 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 m³** 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:

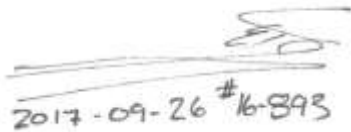
- The watermain boundary conditions have been requested from the City of Ottawa, however they were unavailable at the time of this publication;
- The FUS method for estimating fire flow indicated **16,000 L/min** is required for the proposed development;
- The proposed development is anticipated to have 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 m³** 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.

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Per: Adam D. Fobert, P. Eng.

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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 required 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 watermain if the basic day demand is greater than 50m³/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@dsel.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

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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

www.rvca.ca

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

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

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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

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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 ³ /d | L/min | m ³ /d | L/min | m ³ /d | L/min |
| Total Domestic Demand | 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 ³ /d | L/min | m ³ /d | L/min | m ³ /d | L/min |
| Existing Commercial Floor space | 2.5 L/m ² /d | 883 | 2.21 | 1.5 | 3.3 | 2.3 | 6.0 | 4.1 |
| Office | 75 L/9.3m ² /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 |
| Total I/CI Demand | | | 2.2 | 1.5 | 3.3 | 2.3 | 6.0 | 4.1 |
| Total Demand | | | 2.2 | 1.5 | 3.3 | 2.3 | 6.0 | 4.1 |

* Estimated number of seats at 1seat per 9.3m²

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 | |
| | | | | | m³/d | L/min | m³/d | L/min | m³/d | L/min |
| Total Domestic Demand | | | | 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 ³ /d | L/min | m ³ /d | L/min | m ³ /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 ² /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 ² /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 |
| Total I/CI Demand | | | 82.9 | 57.5 | 124.3 | 86.3 | 223.7 | 155.4 |
| Total Demand | | | 82.9 | 57.5 | 124.3 | 86.3 | 223.7 | 155.4 |

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 m² Total floor area based on FUS Part II section 1

| | |
|------------------|---|
| Fire Flow | 17216.6 L/min |
| | 17000.0 L/min rounded to the nearest 1,000 L/min |

Adjustments

2. Reduction for Occupancy Type

Non-Combustible -25%

| | |
|------------------|----------------------|
| Fire Flow | 12750.0 L/min |
|------------------|----------------------|

3. Reduction for Sprinkler Protection

Sprinklered -50%

| | |
|------------------|--------------------|
| Reduction | -6375 L/min |
|------------------|--------------------|

4. Increase for Separation Distance

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

| | | |
|-------------------|------------|--|
| % Increase | 75% | value not to exceed 75% per FUS Part II, Section 4 |
|-------------------|------------|--|

| | |
|-----------------|---------------------|
| Increase | 9562.5 L/min |
|-----------------|---------------------|

Total Fire Flow

| | | |
|------------------|----------------------|---|
| Fire Flow | 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 |
| | 16000.0 L/min | 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 ₂ O | PSI | kPa | | L/s | L/min |
|-----------|------------|---------------|--------------------|------|-------|--------------------|-----|-------|
| Avg. DD | 118.3 | 58.75 | 59.6 | 84.7 | 584.2 | Fire Flow @ 140kPa | 267 | 16020 |
| Fire Flow | 82.5 | 58.75 | 23.8 | 33.8 | 233.0 | | | |
| Peak Hour | 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@dsel.ca>]
Sent: May 10, 2017 3:55 PM

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 |
|-------------------|-------|------|
| Avg. Daily | 57.5 | 0.96 |
| Max Day | 86.3 | 1.44 |
| Peak Hour | 155.4 | 2.59 |

It 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

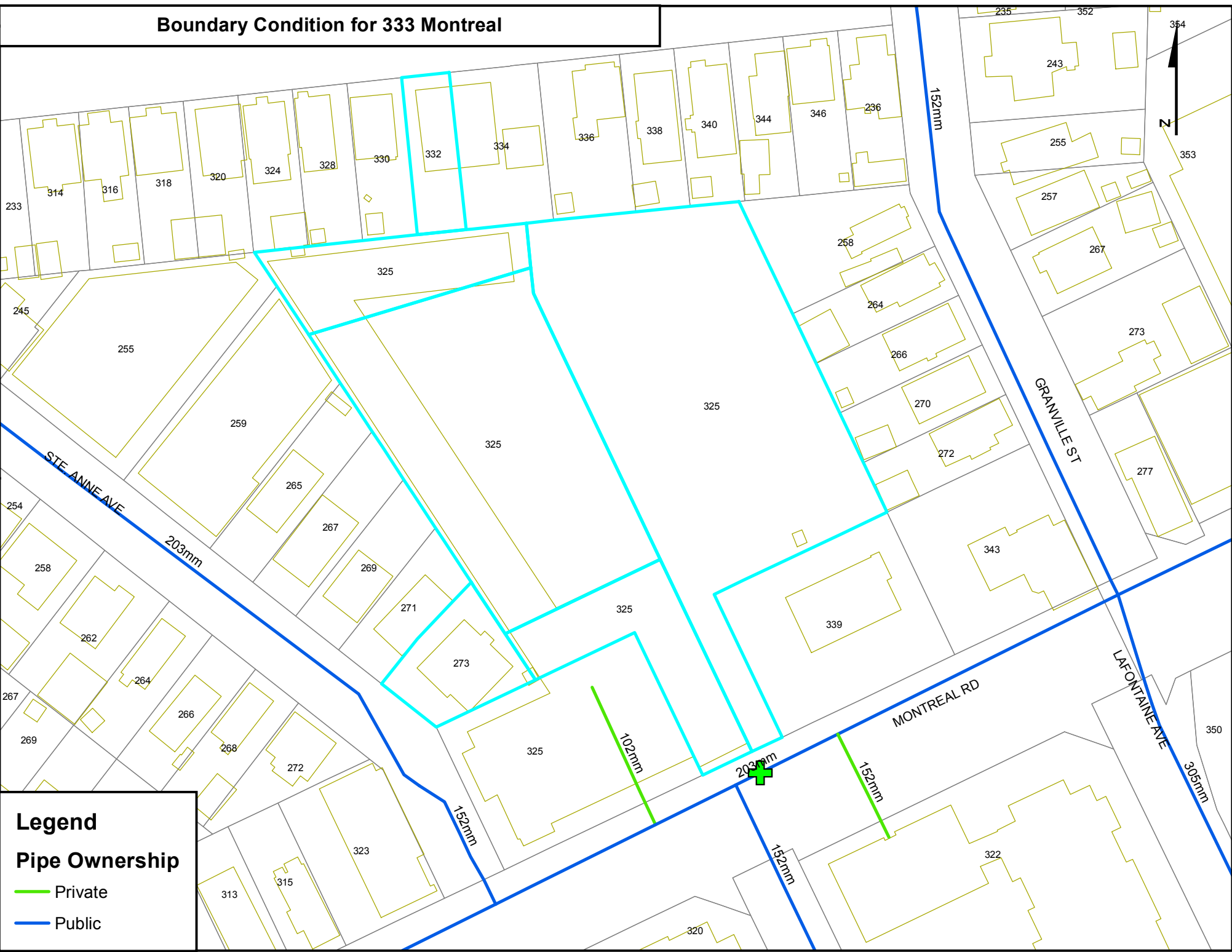
email: agosling@DSEL.ca

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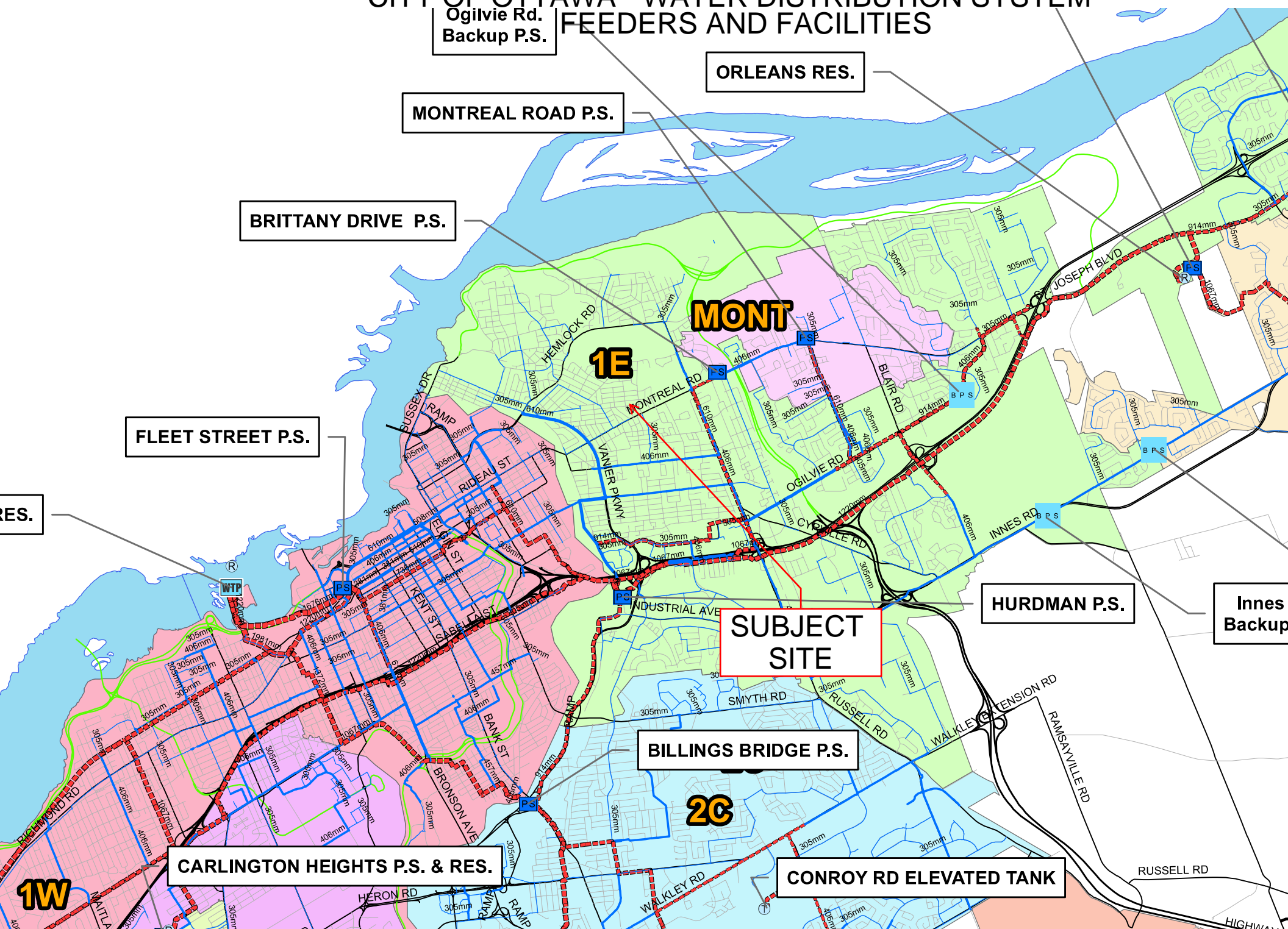
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Boundary Condition for 333 Montreal



CITY OF OTTAWA - WATER DISTRIBUTION SYSTEM FEEDERS AND FACILITIES



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 ² /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 ² /d | 2,605 | 0.45 |
| Addiction Program Rooming | 400 L/person/d | 50 | 0.46 |
| Office | 75 L/9.3m ² /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

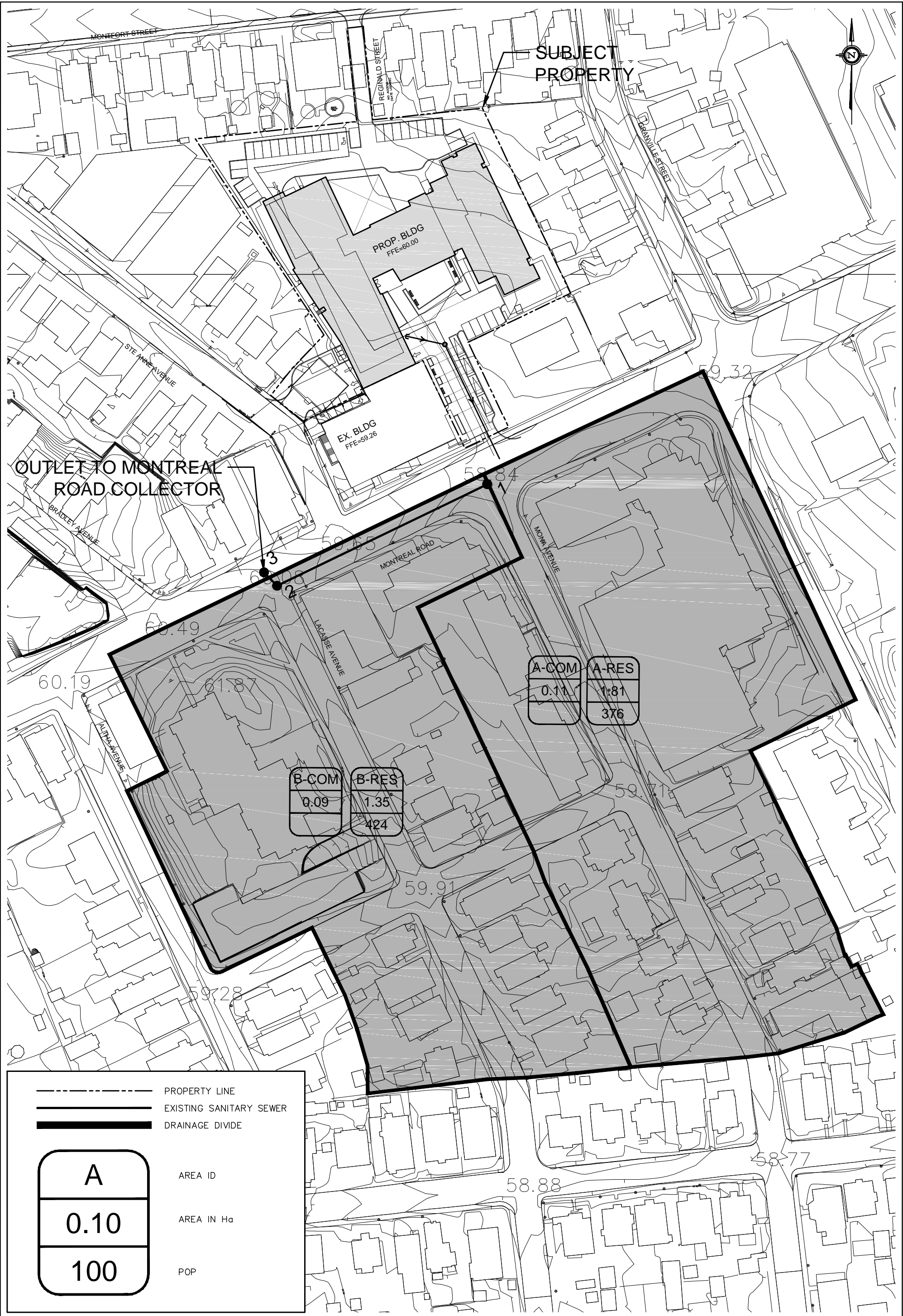
CLIENT: THE SALVATION ARMY
LOCATION: 333 MONTREAL ROAD - EXISTING CONDITIONS
FILE REF: 16-893
DATE: 18-Aug-17

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

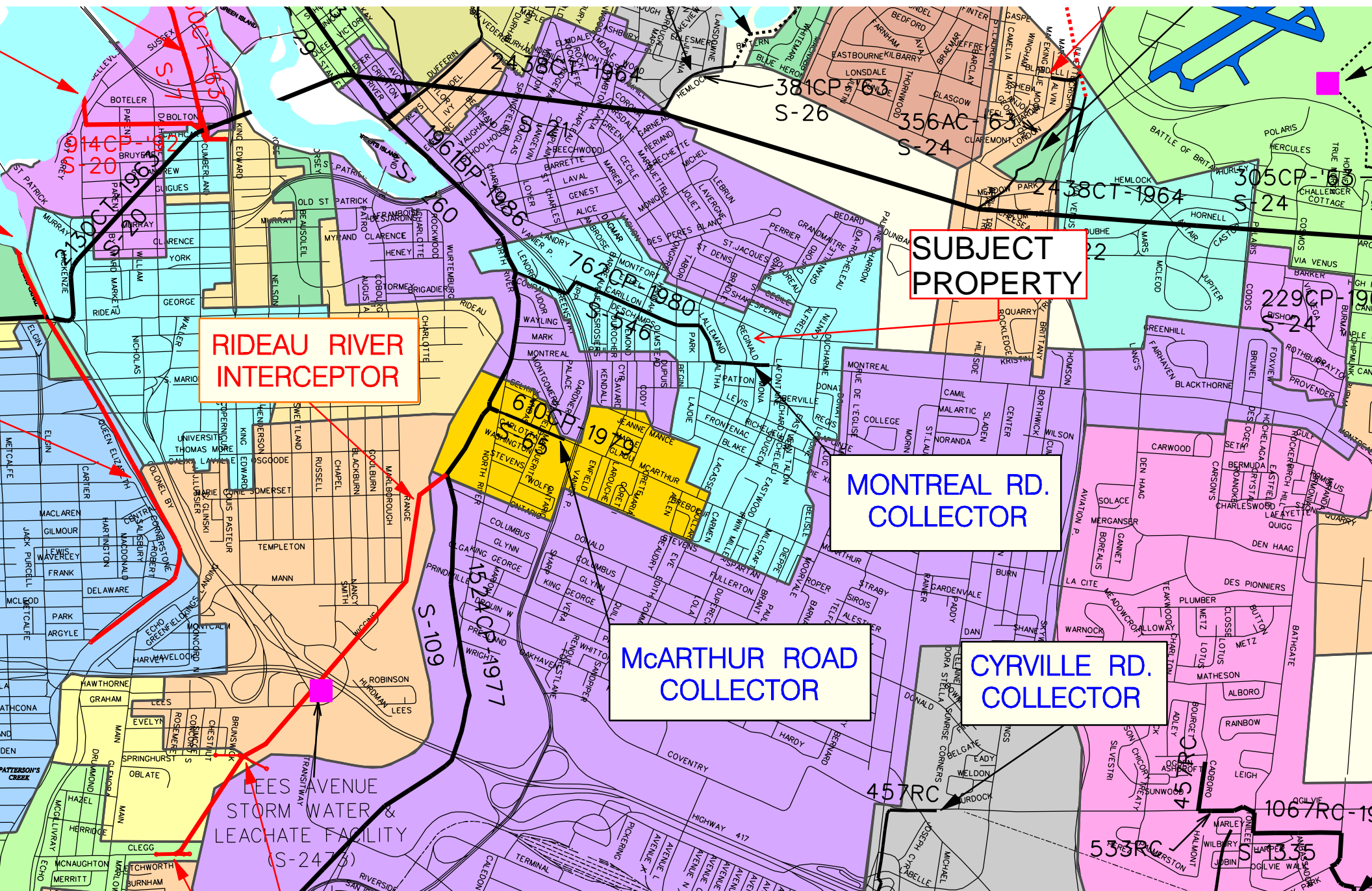


| Location | | | Residential Area and Population | | | | | | | | | Commercial | | Institutional | | Industrial | | Infiltration | | | Total | Pipe Data | | | | | | | | | | |
|----------|----|------|---------------------------------|-----------------|--------|--------|-------|------|------------|-------|-----------|------------------|-------|---------------|------|------------|------|--------------|------------------|------------|------------|-------------------|------------|-------|-------|--------|------------------------|-------|----------|------------------|------------|------|
| Area ID | Up | Down | Area | Number of Units | | | | Pop. | Cumulative | | Peak. | Q _{res} | Area | Accu. | Area | Accu. | Area | Accu. | Q _{CHH} | Total Area | Accu. Area | Infiltration Flow | Total Flow | DIA | Slope | Length | A _{hydraulic} | R | Velocity | Q _{cap} | Q / Q full | |
| | | | (ha) | Singles | Semi's | Town's | Apt's | | Area (ha) | Pop. | Fact. (-) | (L/s) | (ha) | Area (ha) | (ha) | Area (ha) | (ha) | Area (ha) | (L/s) | (ha) | Area (ha) | (L/s) | (L/s) | (mm) | (%) | (m) | (m ²) | (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

| | |
|----------------|---|
| Area | 0.690 ha |
| C | 0.88 Rational Method runoff coefficient |
| L | 58.9 m |
| Up Elev | 62.33 m |
| Dn Elev | 58.93 m |
| Slope | 5.8 % |
| Tc | 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

| | 2-year | 5-year | 100-year |
|----------|---------------|---------------|-----------------|
| i | 120.7 | 165.0 | 284.2 mm/hr |
| Q | 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_c 10.0 min

2-year

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

| 5-year | | | | | | 100-year | | | | |
|-------------------------|--------------|------------------------------|-------------------------------|------------------------------|--|--------------|------------------------------|-------------------------------|------------------------------|--|
| t _c (min) | i (mm/hr) | Q _{actual} (L/s) | Q _{release} (L/s) | Q _{stored} (L/s) | V _{stored} (m ³) | i (mm/hr) | Q _{actual} (L/s) | Q _{release} (L/s) | Q _{stored} (L/s) | V _{stored} (m ³) |
| 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
t_c 10 min, t_c at outlet without restriction

Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations

Estimated Number of Roof Drains

Building Length 134
Building Width 18
Number of Drains 14
m² / Drain 172.1 max 232.25m²/notch as recommended by Zurn for Ottawa

| Roof Top Rating Curve per Zurn Model Z-105-5 | | | | | | |
|--|------------------------|---------------------------------------|---|-----------------------------|----------------------------|-------------------------------|
| d (m) | A (m ²) | V _{acc} (m ³) | V _{avail} (m ³) | Q _{notch} (L/s) | Q _{roof} (L/s) | V _{drawdown} (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

| 5-year | | | | | | 100-year | | | | |
|-------------------------|--------------|------------------------------|-------------------------------|------------------------------|--|--------------|------------------------------|-------------------------------|------------------------------|--|
| t _c (min) | i (mm/hr) | Q _{actual} (L/s) | Q _{release} (L/s) | Q _{stored} (L/s) | V _{stored} (m ³) | i (mm/hr) | Q _{actual} (L/s) | Q _{release} (L/s) | Q _{stored} (L/s) | V _{stored} (m ³) |
| 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 _{roof} | 16.00 L/s | 100-year Q _{roof} | 21.08 L/s |
| 5-year Max. Storage Required | 34.2 m ³ | 100-year Max. Storage Required | 78.5 m ³ |
| 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 STORGE |
|------------|
| 6.0 |

Total Subsurface Storage (m³) 0.0

Stage Attenuated Areas Storage Summary

| | Stage (m) | Surface Storage | | | Surface and Subsurface Storage | | | |
|-----------------|--------------|------------------------------|-----------------------|----------------|--------------------------------|--|---------------------------------|-------------------------------|
| | | Ponding (m ²) | h _o (m) | delta d (m) | V* (m ³) | V _{acc} ** (m ³) | Q _{release} † (L/s) | V _{drawdown} (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_{acc}=Total surface and sub-surface

† Q_{release} = 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 _c (min) | 5-year | | | | | 100-year | | | | |
|-------------------------|--------------|--------------------------------|-------------------------------|------------------------------|--|--------------|--------------------------------|-------------------------------|------------------------------|--|
| | i (mm/hr) | Q _{actual} † (L/s) | Q _{release} (L/s) | Q _{stored} (L/s) | V _{stored} (m ³) | i (mm/hr) | Q _{actual} † (L/s) | Q _{release} (L/s) | Q _{stored} (L/s) | V _{stored} (m ³) |
| 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 _{attenuated} | 5.16 L/s | 100-year Q _{attenuated} | 8.39 L/s |
| 5-year Max. Storage Required | 1.3 m ³ | 100-year Max. Storage Required | 3.4 m ³ |
| Est. 5-year Storage Elevation | 54.72 m | Est. 100-year Storage Elevation | 54.99 m |

Area ID A3
Available Sub-surface Storage
Maintenance Structures

Total Underground Storage (m³) 0
Total Subsurface Storage (m³) 0.0

Stage Attenuated Areas Storage Summary

| | Stage (m) | Surface Storage | | | Surface and Subsurface Storage | | | |
|-----------------|--------------|------------------------------|-----------------------|----------------|--------------------------------|--|---------------------------------|-------------------------------|
| | | Ponding (m ²) | h _s (m) | delta d (m) | V* (m ³) | V _{acc} ** (m ³) | Q _{release} † (L/s) | V _{drawdown} (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 | 2.7 | 0.00 |
| U/G Storage SL | 58.50 | | 0.50 | 0.45 | 0.0 | 0.0 | 8.4 | 0.00 |
| U/G Storage OBV | 58.95 | | 0.95 | 0.45 | 0.0 | 0.0 | 11.6 | 0.00 |
| T/L | 59.50 | 0.4 | 1.50 | 0.55 | 0.0 | 0.0 | 14.6 | 0.00 |
| 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_{acc}=Total surface and sub-surface† Q_{release} = 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 _c (min) | 5-year | | | | | 100-year | | | | |
|-------------------------|--------------|--------------------------------|-------------------------------|------------------------------|--|--------------|--------------------------------|-------------------------------|------------------------------|--|
| | i (mm/hr) | Q _{actual} † (L/s) | Q _{release} (L/s) | Q _{stored} (L/s) | V _{stored} (m ³) | i (mm/hr) | Q _{actual} † (L/s) | Q _{release} (L/s) | Q _{stored} (L/s) | V _{stored} (m ³) |
| 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_{attenuated} 14.97 L/s
5-year Max. Storage Required 1.9 m³
Est. 5-year Storage Elevation 59.57 m

100-year Q_{attenuated} 15.43 L/s
100-year Max. Storage Required 12.6 m³
Est. 100-year Storage Elevation 59.67 m

Area ID A2
Available Sub-surface Storage
Maintenance Structures

Total Subsurface Storage (m³) 0.0

Stage Attenuated Areas Storage Summary

| | Surface Storage | | | | Surface and Subsurface Storage | | | |
|------------------|-----------------|------------------------------|-----------------------|----------------|--------------------------------|--|---------------------------------|-------------------------------|
| | Stage (m) | Ponding (m ²) | h _o (m) | delta d (m) | V* (m ³) | V _{acc} ** (m ³) | Q _{release} † (L/s) | V _{drawdown} (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_{acc}=Total surface and sub-surface

† Q_{release} = 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 _c (min) | 5-year | | | | | 100-year | | | | |
|-------------------------|--------------|--------------------------------|-------------------------------|------------------------------|--|--------------|--------------------------------|-------------------------------|------------------------------|--|
| | i (mm/hr) | Q _{actual} † (L/s) | Q _{release} (L/s) | Q _{stored} (L/s) | V _{stored} (m ³) | i (mm/hr) | Q _{actual} † (L/s) | Q _{release} (L/s) | Q _{stored} (L/s) | V _{stored} (m ³) |
| 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 _{attenuated} | 4.35 L/s | 100-year Q _{attenuated} | 4.47 L/s |
| 5-year Max. Storage Required | 8.9 m ³ | 100-year Max. Storage Required | 25.5 m ³ |
| Est. 5-year Storage Elevation | 59.62 m | Est. 100-year Storage Elevation | 59.69 m |

Area ID A1
Available Sub-surface Storage
Maintenance Structures

Total Structure Storage (m³) 0.0
Total Underground Storage (m³) 68.0

Stage Attenuated Areas Storage Summary

| | Stage (m) | Surface Storage | | | Surface and Subsurface Storage | | | |
|-----------------|--------------|------------------------------|-----------------------|----------------|-------------------------------------|---|--|-------------------------------|
| | | Ponding (m ²) | h _o (m) | delta d (m) | V [*] (m ³) | V _{acc} ^{**} (m ³) | Q _{release} [†] (L/s) | V _{drawdown} (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_{acc}=Total surface and sub-surface

† Q_{release} = 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 _c (min) | 5-year | | | | | 100-year | | | | |
|-------------------------|--------------|---|-------------------------------|------------------------------|--|--------------|---|-------------------------------|------------------------------|--|
| | i (mm/hr) | Q _{actual} [†] (L/s) | Q _{release} (L/s) | Q _{stored} (L/s) | V _{stored} (m ³) | i (mm/hr) | Q _{actual} [†] (L/s) | Q _{release} (L/s) | Q _{stored} (L/s) | V _{stored} (m ³) |
| 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_{attenuated}

11.00 L/s

5-year Max. Storage Required

26.0 m³

Est. 5-year Storage Elevation

57.32 m

100-year Q_{attenuated}

16.02 L/s

100-year Max. Storage Required

67.2 m³

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 ³) | 100-Year Release Rate (L/s) | 100-Year Required Storage (m ³) | 100-Year Available Storage (m ³) |
|-----------------------|------------------------------------|--|--------------------------------------|--|---|
| Unattenuated Areas | 3.7 | 0.0 | 8.0 | 0.0 | 0.0 |
| Attenuated Areas | 35.5 | 38.1 | 44.3 | 108.7 | 123.2 |
| Total | 39.2 | 38.1 | 52.3 | 108.7 | 123.2 |

| Control Area | 5-Year Release Rate (L/s) | 5-Year Required Storage (m ³) | 100-Year Release Rate (L/s) | 100-Year Required Storage (m ³) | 100-Year Available Storage (m ³) |
|-----------------------|------------------------------------|--|--------------------------------------|--|---|
| 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 |
| Total | 55.2 | 72.4 | 73.4 | 108.7 | 201.0 |

| Area ID | Up | Down | Area | C | Indiv AxC | Acc AxC | T _c | I | Q | Sewer Data | | | | | | | | |
|-----------------------------------|-----------|----------|-------|------|-----------|---------|----------------|---------|-------|------------|-------|--------|------------------------|-------|----------|-------|-----------|------------|
| | | | | | | | | | | DIA | Slope | Length | A _{hydraulic} | R | Velocity | Qcap | Time Flow | Q / Q full |
| | | | (ha) | (-) | | | (min) | (mm/hr) | (L/s) | (mm) | (%) | (m) | (m ²) | (m) | (m/s) | (L/s) | (min) | (-) |
| OUTLET TO MONTREAL ROAD: | | | | | | | | | | | | | | | | | | |
| 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 | CBMH101H | 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 | | | | | | | | | | | |
| OUTLET TO MONTFORT STREET: | | | | | | | | | | | | | | | | | | |
| 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

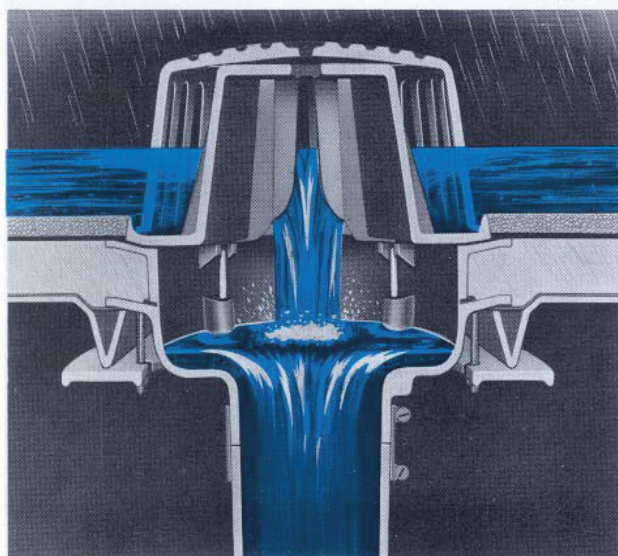
Fewer roof drains, smaller diameter piping, smaller sewer sizes, and lower installation costs are possible with a "Control-Flo" drainage system because roof areas are utilized as temporary storage reservoirs.

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.

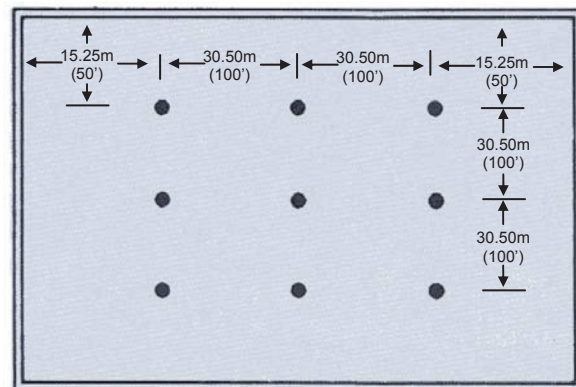


DEFINITION

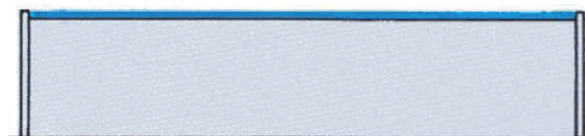
DEAD LEVEL ROOFS

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)

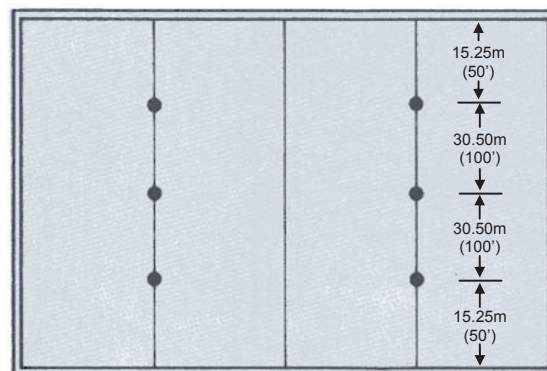


(Section View)

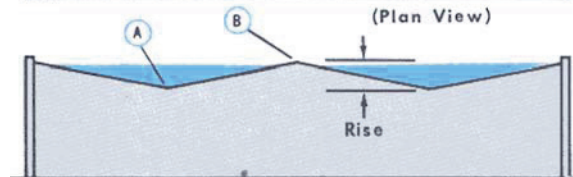
SLOPED ROOFS

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)

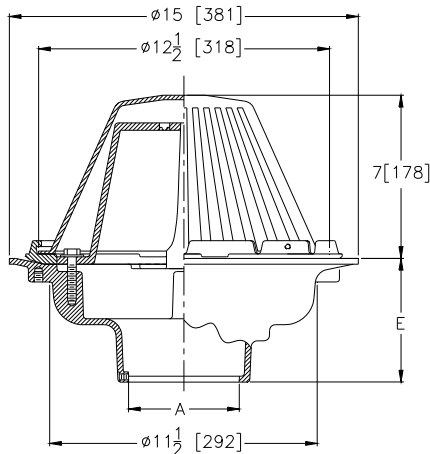


(Section View)

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 (232.25m² (2500 sq. ft.), 464.502m² (5000 sq. ft.), 696.75m² (7500 sq. ft.), 929m² (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 464.50m² (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 m² (2,500 ft.²) to 929m² (10,000 ft.²) 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 232.25m² (2,500 ft.²) are used considerable economy of the "Control-Flo" concept is being lost. The area per notch is limited to 929m² (10,000 ft.²) 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 cm² (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***



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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.

RECALCULATE

SAVE

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](#).

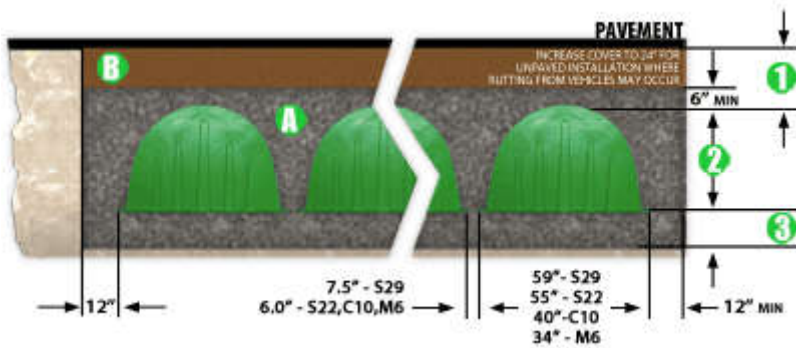
This calculator is provided for your convenience only and is not meant for final quotation and/or engineering



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.

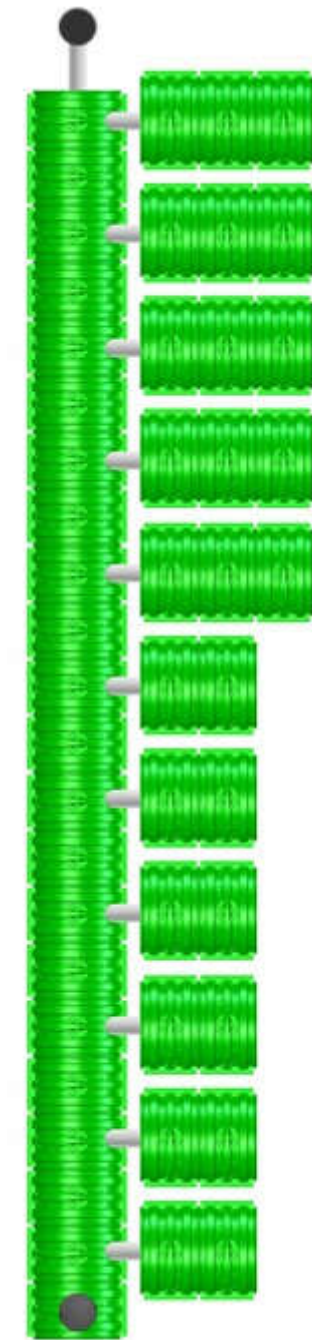
Project Results



- 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



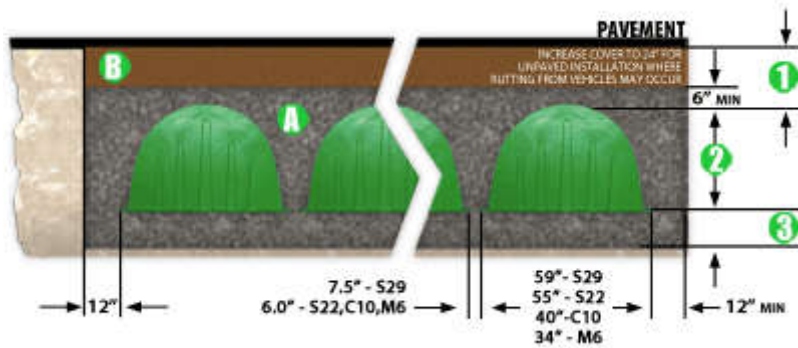
Dimensions 59" x 36" x 35" (WxHxL)

1498.6mm x 914.4mm x 889mm

Weight 32 lbs / 14.5 kg

Bare Chamber Storage 29 ft³ / 0.82 m³

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

| | |
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| Type of header row chambers required: | S-29 |
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| Floors: | 0 |
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Triton Stormwater Solutions, LLC

7600 Grand River Rd, Suite 195

Brighton, Michigan 48114

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



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Site Calculator

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- [Field Diagram](#)
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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):

Length

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.

RECALCULATE

SAVE

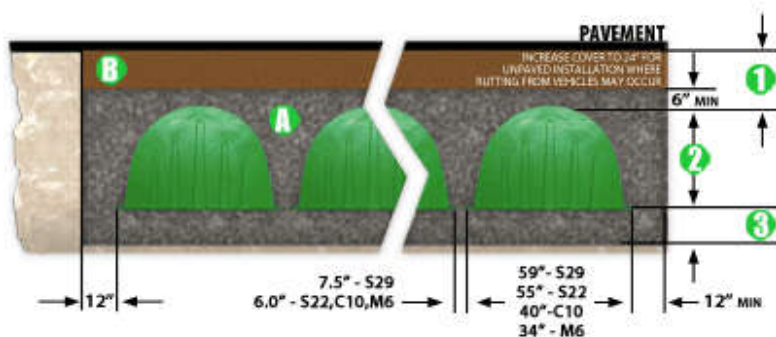
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purposes. Please contact Triton for more information. Need to model out a full system, or need engineering ready calculations? Triton chambers are available for modeling in HydroCAD by clicking on the HydroCAD banner to the left.

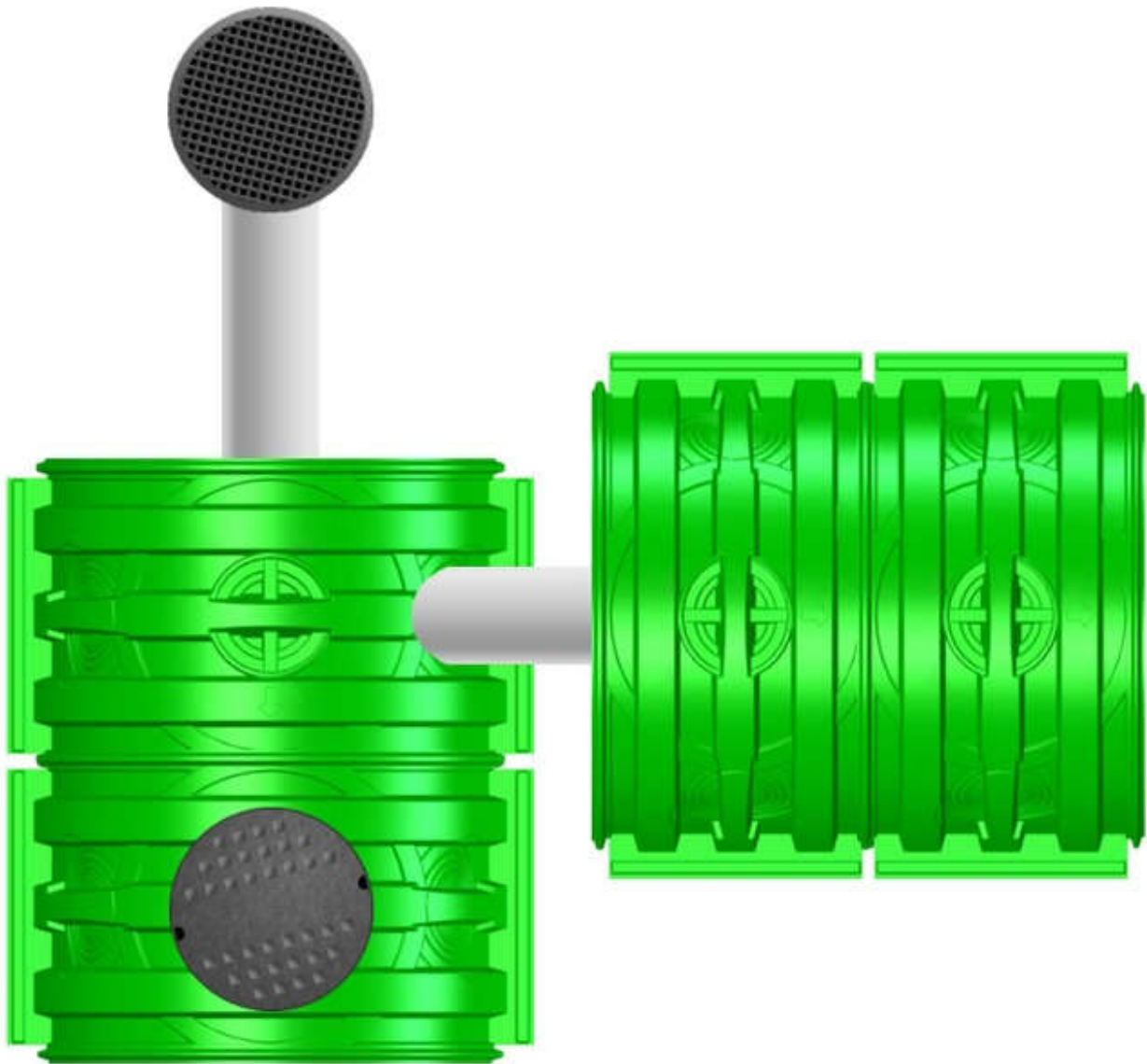
Project Results



- 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**

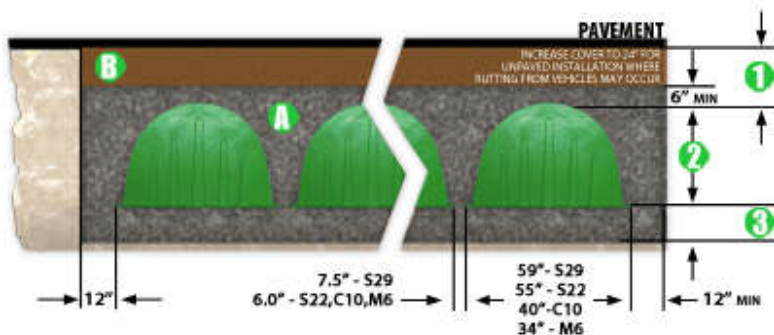
Dimensions 55" x 35" x 30" (WxHxL)

1397mm x 889mm x 762mm

Weight 28 lbs / 12.7 kg

Bare Chamber Storage 23.2 ft³ / 0.66 m³

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 |
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| Actual Trench Length: | 3.624 M |
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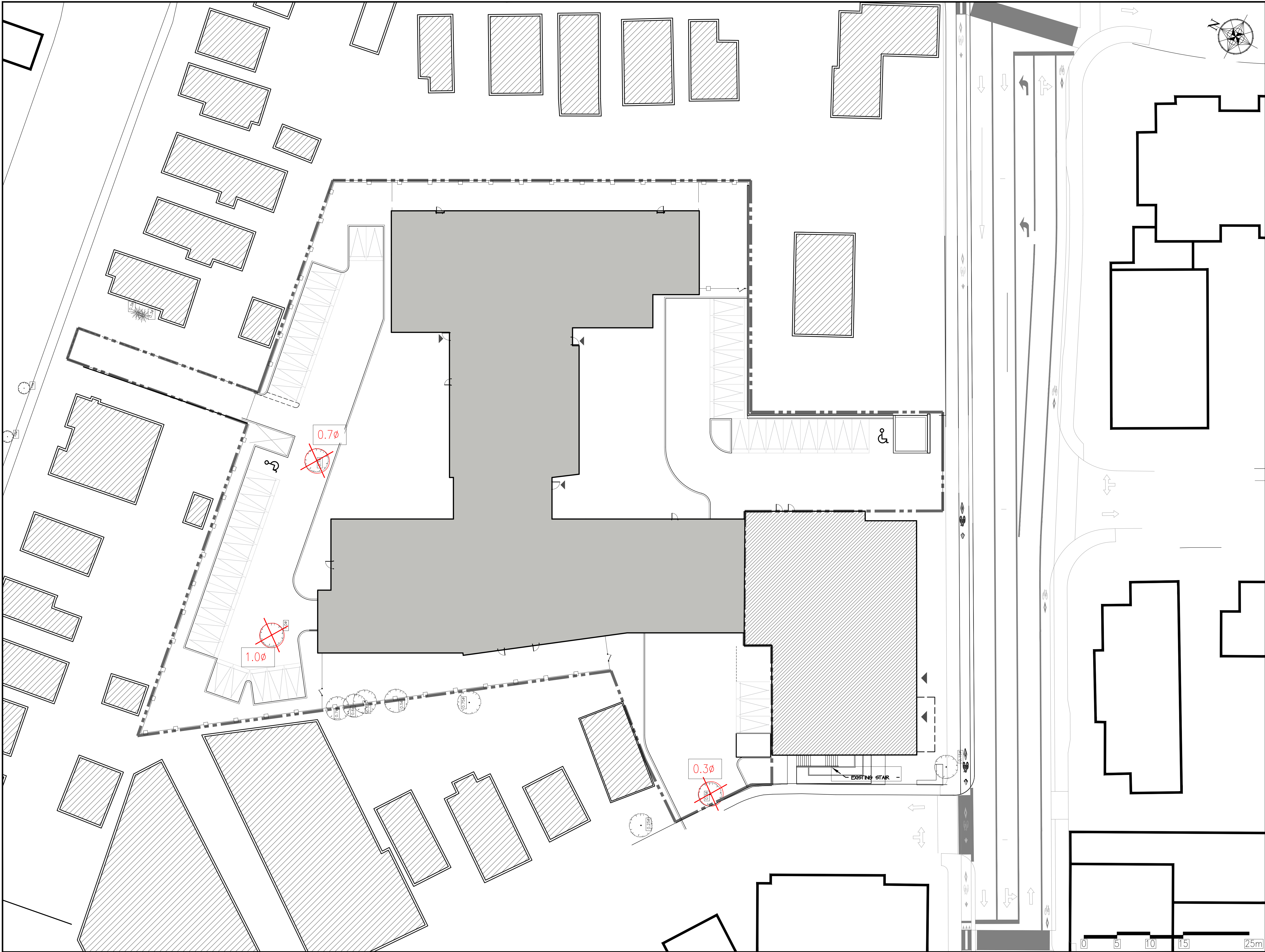
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DRAWINGS / FIGURES



Client

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

LEGEND



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 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

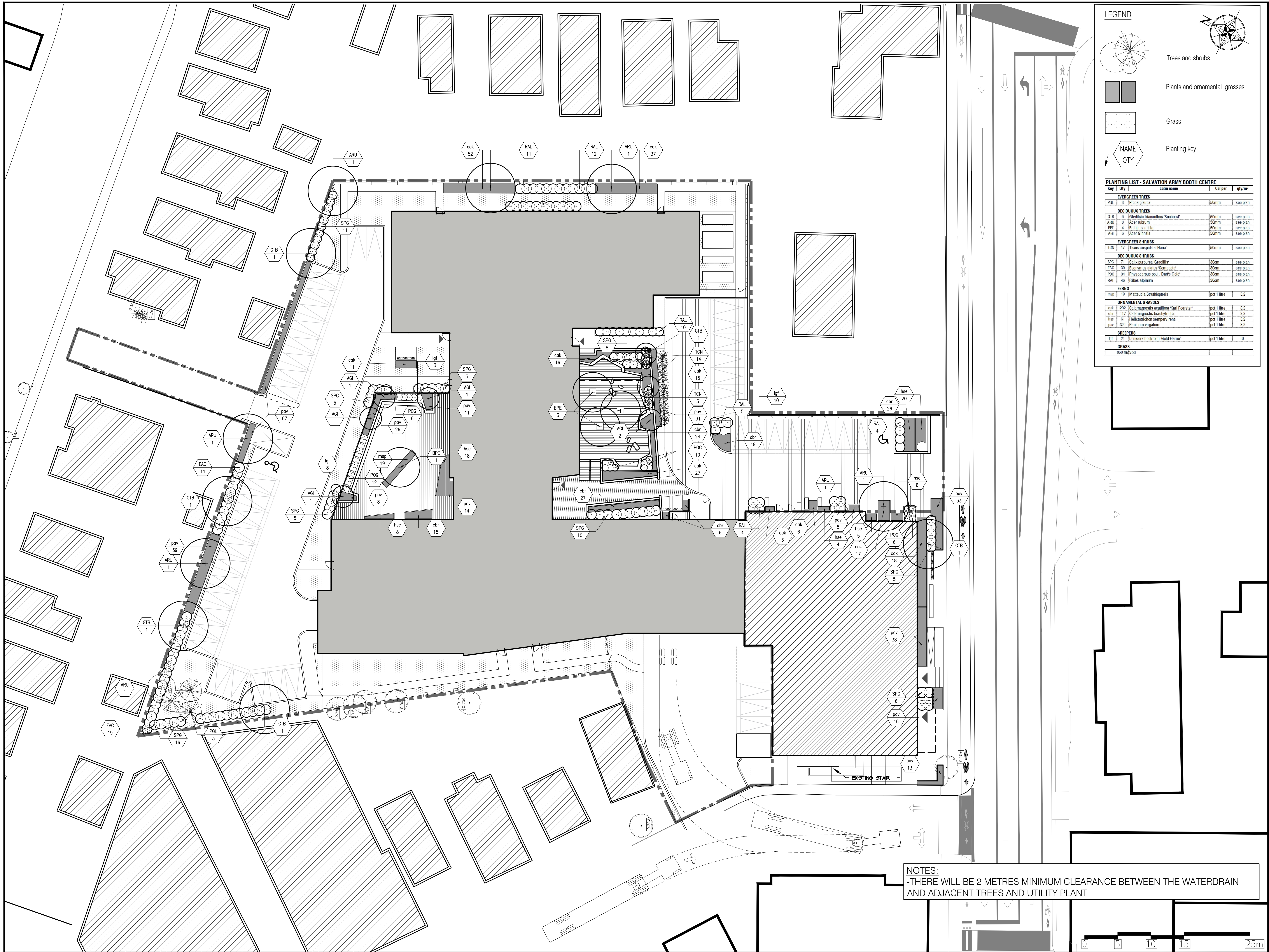
333 MONTREAL ROAD
Ottawa, Ontario

Drawing title

TREE REMOVAL PLAN

SCALE 1:250

| | |
|--------------------------------------|-------|
| Drawn by: B.DALLAS | LA-20 |
| Designed by: B.DALLAS / S.GALLANT | |
| Date: MAY 2017 | |
| 16-427 | |



LEGEND

Trees and shrubs

Plants and ornamental grasses

Grass

NAME

QTY

Planting key

PLANTING LIST - SALVATION ARMY BOOTH CENTRE

| Key | Qty | Latin name | Caliper | qty/m² |
|--------------------|--------|--|-------------|----------|
| EVERGREEN TREES | | | | |
| PGL | 3 | Picea glauca | 50mm | see plan |
| DECIDUOUS TREES | | | | |
| GTB | 6 | Gleditsia triacanthos 'Sunburst' | 50mm | see plan |
| ARU | 6 | Acer rubrum | 50mm | see plan |
| BPE | 4 | Betula pendula | 50mm | see plan |
| AGI | 6 | Acer Ginnala | 50mm | see plan |
| EVERGREEN SHRUBS | | | | |
| TCN | 17 | Taxus cuspidata 'Nana' | 50mm | see plan |
| DECIDUOUS SHRUBS | | | | |
| SPG | 70 | Saxifraga purpurea 'Sirellia' | 30cm | see plan |
| EAC | 30 | Euonymus alatus 'Compass' | 30cm | see plan |
| POG | 34 | Physocarpus opul. 'Darts Gold' | 30cm | see plan |
| RAL | 46 | Ribes alpinum | 30cm | see plan |
| FERNS | | | | |
| map | 19 | Matteuccia Struthiopteris | pot 1 litre | 3,2 |
| ORNAMENTAL GRASSES | | | | |
| cak | 202 | Calamagrostis canadensis 'Karl Foerster' | pot 1 litre | 3,2 |
| cbr | 117 | Calamagrostis brachytricha | pot 1 litre | 3,2 |
| hse | 61 | Helleborichon sempervirens | pot 1 litre | 3,2 |
| pav | 321 | Panicum virgatum | pot 1 litre | 3,2 |
| CREEPERS | | | | |
| lgl | 21 | Lamium heckrottii 'Gold Flame' | pot 1 litre | 6 |
| GRASS | | | | |
| | 800 m2 | Sod | | |

Client

| Revision | | Appr. | Date |
|----------|-------------------|-------|------------|
| 1 | SITE PLAN CONTROL | E.P. | 09/06/2017 |
| 2 | SITE PLAN CONTROL | S.G. | 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
514 949 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

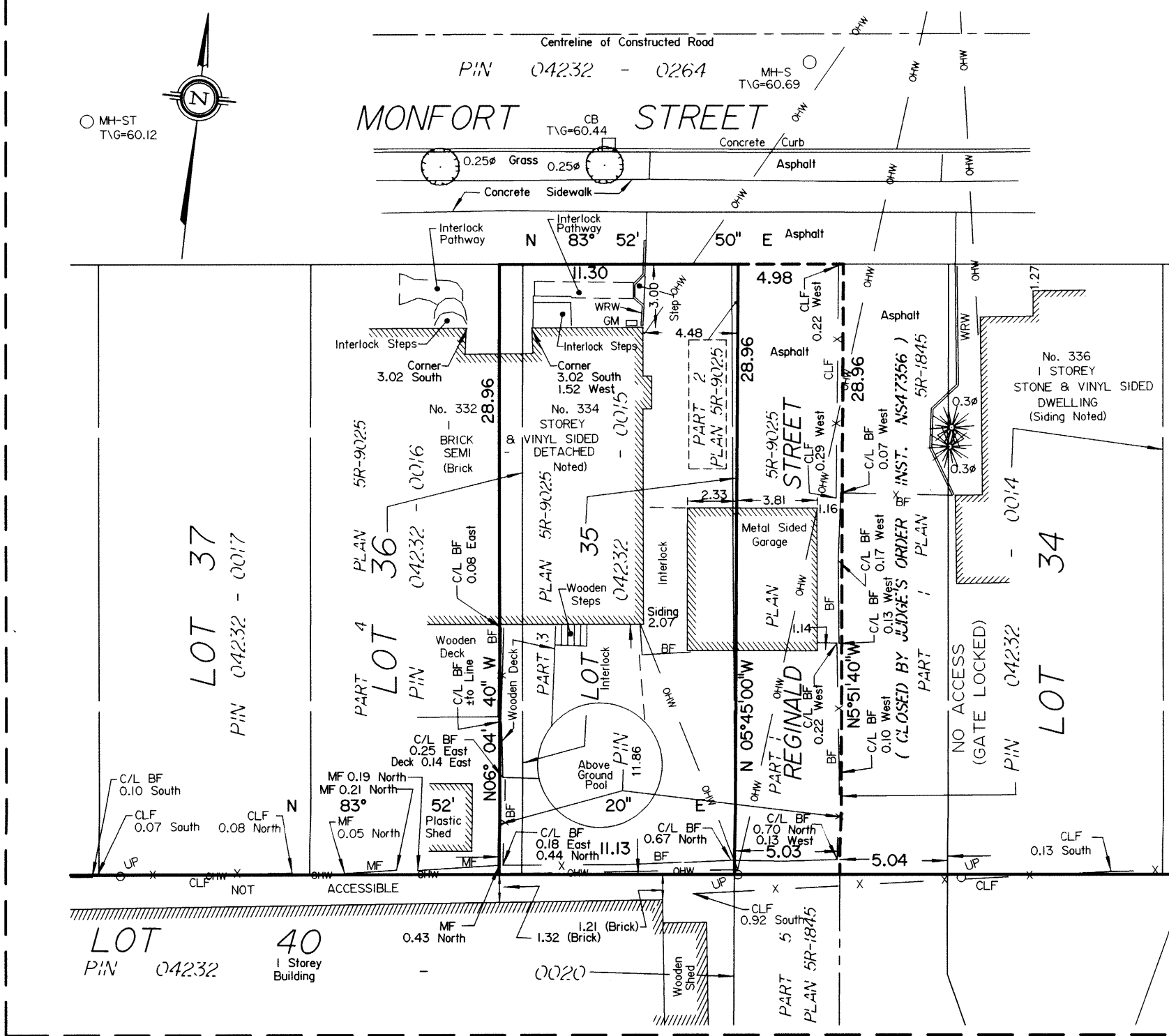
NOTES:

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

SCALE 1:250

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, Vollebakk Ltd.

Scale 1 : 250

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. Herweyer O.L.S.

Notes & Legend

- Denotes
- PH - Fire Hydrant
 - WV - Water Valve
 - VC - Valve Chamber (Waterman)
 - MH-ST - Maintenance Hole (Storm Sewer)
 - MH-S - Maintenance Hole (Sanitary)
 - MH-H - Maintenance Hole (Hydro)
 - GV - 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
 - Inv. - Invert
 - CRW - Concrete Retaining Wall
 - CBRW - Concrete Block Retaining Wall
 - D - Diameter
 - LE - Location of Elevations
 - W - Top of Wall / Concrete Curb Elevation
 - C/L - Centreline
 - PL - Property Line
 - DT - Deciduous Tree
 - LS - Light Standard
 - WRW - Wooden Retaining Wall
 - GM - Gas Meter
 - CT - Coniferous Tree

Bearings are grid and are referred to the Central Meridian of MTM Zone 9 (78°30' West Longitude) NAD-83 (page 6).

LOTS 25 to 31 (both inclusive), 40 to 46 (both inclusive)
PART OF LOTS 47 and 48, PART OF REGINALD STREET
SITE AREA=6378 m²

LOT 35, PART OF LOT 36 AND PART OF REGINALD STREET BEING PARTS 2 AND 3 PLAN 5R-9025
SITE AREA=324.7 m²

PART OF REGINALD STREET BEING PART 1 PLAN 5R-9025
SITE AREA=144.5 m²

ELEVATION NOTES

- Elevations shown are geodetic and are referred to the CGVD2011 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 it's 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 plant by the pertinent utility authority is mandatory before any work involving breaking ground, probing, excavating etc.
- Maintenance holes marked by "U" Underground services and inverts are taken from City of Ottawa Engineering Drawings D-17-06 and S-546.