david schaeffer engineering ltd

120 Iber Road, Suite 103
Ottawa, Ontario K2S 1E9
Tel. (613)836-0856
Fax (613) 836-7183
www.DSEL.ca

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT

FOR

THE SALVATION ARMY
333 MONTREAL ROAD

CITY OF OTTAWA

PROJECT NO.: 16-893

JUNE 2017 – REV 1

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT
FOR
333 MONTREAL ROAD

THE SALVATION ARMY

TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

**FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT
FOR
333 MONTREAL ROAD
THE SALVATION ARMY
JUNE 2017 – REV 1**

**CITY OF OTTAWA
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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 ***9569 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_2O / 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 requird.

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	$Q = \frac{1}{n} A R^{2/3} S^{1/2}$
Minimum Sewer Size	250mm diameter
Minimum Manning's 'n'	0.013
Minimum Depth of Cover	2.5m from crown of sewer to grade
Minimum Full Flowing Velocity	0.6m/s
Maximum Full Flowing Velocity	3.0m/s

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	0.34

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	2.59
Estimated Peak Wet Weather Flow	2.78

The estimated sanitary flow based on the Site Plan provided in ***Drawings/Figures*** anticipates a peak wet weather flow of ***2.78 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 ***2.78 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 up to and including the City of Ottawa 100-year design event are to be attenuated on site.
- 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 the stormwater outlet from the proposed development will be to the 525 mm diameter storm sewer within Montreal Road via a 525mm diameter service lateral to the existing 2100m diameter storm tunnel within Montfort Street via a 300mm diameter storm sewer.

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

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***.

Area A1 located within the parking area south of the proposed building is tributary to the storm sewer within Montreal Road. Approximately ***2.6 m³*** of storage will be provided by catchbasins and manholes along with a ***213 m³*** underground storage via a Brentwood ST-24 and ST-36 or an approved equivalent storage system and will be attenuated by a ***135mm*** ICD located in ***STM101***. 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 ***34.4 m³*** of storage will be provided by surface ponding and catchbasins and will be attenuated by a ***Tempest LMF85*** 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 ***6.0 m³*** of storage will be provided by surface ponding and catchbasins along with a ***24.2 m³*** underground storage via a Brentwood ST-36 or an approved equivalent storage system and will be attenuated by a ***Tempest LMF60*** 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 ***10.0 m³*** underground storage via a Brentwood ST-30 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***.

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***. 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	1.9	0.0	4.0	0.0	0.0
Montfort Street	15.4	17.7	18.5	51.0	75.1
Montreal Road	38.8	112.1	50.7	203.1	203.8
Total	**56.2**	**129.9**	**73.2**	**254.1**	**278.9**

It is anticipated that approximately ***254.1 m^3*** 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 ***254.1 m^3*** 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 ***2.78 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 ***254.1*** $\boldsymbol{m^3}$ of onsite storage will be required to attenuate flow to the established release rate above;
- Based on consultation with the RVCA, stormwater quality controls are not required.

Prepared by,
David Schaeffer Engineering Ltd.

Per: Alison J. Gosling, EIT.

Reviewed by,
David Schaeffer Engineering Ltd.

LICENSED PROFESSIONAL ENGINEER
R. D. FREEL
100163197
2017-06-01
PROVINCE OF ONTARIO
16-893

Per: Robert D. Freel, P. Eng.

Reviewed by,
David Schaeffer Engineering Ltd.

LICENSED PROFESSIONAL ENGINEER
A. D. FOBERT
100090626
2017-06-01
PROVINCE OF ONTARIO
JOB #16-893

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		
☐	Executive Summary (for larger reports only).	N/A
☒	Date and revision number of the report.	Report Cover Sheet
☒	Location map and plan showing municipal address, boundary, and layout of proposed development.	Drawings/Figures
☒	Plan showing the site and location of all existing services.	Figure 1
☒	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
☒	Summary of Pre-consultation Meetings with City and other approval agencies.	Section 1.3
☒	Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria.	Section 2.1
☒	Statement of objectives and servicing criteria.	Section 1.0
☒	Identification of existing and proposed infrastructure available in the immediate area.	Sections 3.1, 4.1, 5.1
☐	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
☒	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
☐	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
☐	Proposed phasing of the development, if applicable.	N/A
☒	Reference to geotechnical studies and recommendations concerning servicing.	Section 1.4
☒	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		
☐	Confirm consistency with Master Servicing Study, if available	N/A
☒	Availability of public infrastructure to service proposed development	Section 3.1
☒	Identification of system constraints	Section 3.1
☒	Identify boundary conditions	Section 3.1, 3.2
☒	Confirmation of adequate domestic supply and pressure	Section 3.3

*Extracted from the City of Ottawa-Servicing Study Guidelines for Development Applications

☒	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
☐	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
☐	Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design	N/A
☐	Address reliability requirements such as appropriate location of shut-off valves	N/A
☐	Check on the necessity of a pressure zone boundary modification	N/A
☒	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
☐	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
☐	Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.	N/A
☒	Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Section 3.2
☐	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

☒	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
☐	Confirm consistency with Master Servicing Study and/or justifications for deviations.	N/A
☐	Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers.	N/A
☒	Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Section 4.1
☒	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
☒	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
☒	Description of proposed sewer network including sewers, pumping stations, and forcemains.	Section 4.2
☐	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

*Extracted from the City of Ottawa-Servicing Study Guidelines for Development Applications

☐	Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	N/A
☐	Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	N/A
☐	Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	N/A
☐	Special considerations such as contamination, corrosive environment etc.	N/A

4.4 Development Servicing Report: Stormwater Checklist

☒	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
☒	Analysis of available capacity in existing public infrastructure.	Section 5.1, Appendix D
☒	A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.	Drawings/Figures
☒	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
☒	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
☒	Description of the stormwater management concept with facility locations and descriptions with references and supporting information	Section 5.3
☐	Set-back from private sewage disposal systems.	N/A
☐	Watercourse and hazard lands setbacks.	N/A
☒	Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	Appendix A
☐	Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	N/A
☒	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
☐	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
☒	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
☐	Any proposed diversion of drainage catchment areas from one outlet to another.	N/A
☐	Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.	N/A
☐	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
☐	Identification of potential impacts to receiving watercourses	N/A
☐	Identification of municipal drains and related approval requirements.	N/A

*Extracted from the City of Ottawa-Servicing Study Guidelines for Development Applications

☒	Descriptions of how the conveyance and storage capacity will be achieved for the development.	Section 5.3
☐	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
☐	Inclusion of hydraulic analysis including hydraulic grade line elevations.	N/A
☒	Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Section 6.0
☐	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
☐	Identification of fill constraints related to floodplain and geotechnical investigation.	N/A

4.5 Approval and Permit Requirements: Checklist

☒	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
☐	Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.	N/A
☐	Changes to Municipal Drains.	N/A
☐	Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)	N/A

4.6 Conclusion Checklist

☒	Clearly stated conclusions and recommendations	Section 8.0
☐	Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.	
☐	All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario	

*Extracted from the City of Ottawa-Servicing Study Guidelines for Development Applications

Alison Gosling

From: Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>
Sent: Thursday, December 8, 2016 10:44 AM
To: Alison Gosling
Cc: Robert Freel; black@fotenn.com; Mottalib, Abdul; O'Connell, Erin
Subject: RE: 333 Montreal Road Pre-consult - Engineering Criteria
Attachments: ServicingGuidelines_ final_Dec2009.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Good morning Alison,

Water:

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

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

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

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

Please note proposed development will require 2 separate service connections from the city watermains if the basic day demand is greater than $50m^3$/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

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

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

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 m^3/d	Avg. Daily L/min	Max Day m^3/d	Max Day L/min	Peak Hour m^3/d	Peak Hour 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 $9.3m^2$

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
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

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

Type of Construction: Non-Combustible Construction

C	0.8		*Type of Construction Coefficient per FUS Part II, Section 1*
A	9569.0	m^2	*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_2O	PSI	kPa
Avg. DD	118.3	58.75	59.6	84.7	584.2
Fire Flow	82.5	58.75	23.8	33.8	233.0
Peak Hour	109.5	58.75	50.8	72.2	497.9

	L/s	L/min
Fire Flow @ 140kPa	267	16020

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

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

Good afternoon Abdul,

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

1. Location of Service / Street Number: 333 Montreal Road

2. Type of development and the amount of fire flow required for the proposed development:

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

3.

	L/min	L/s
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,

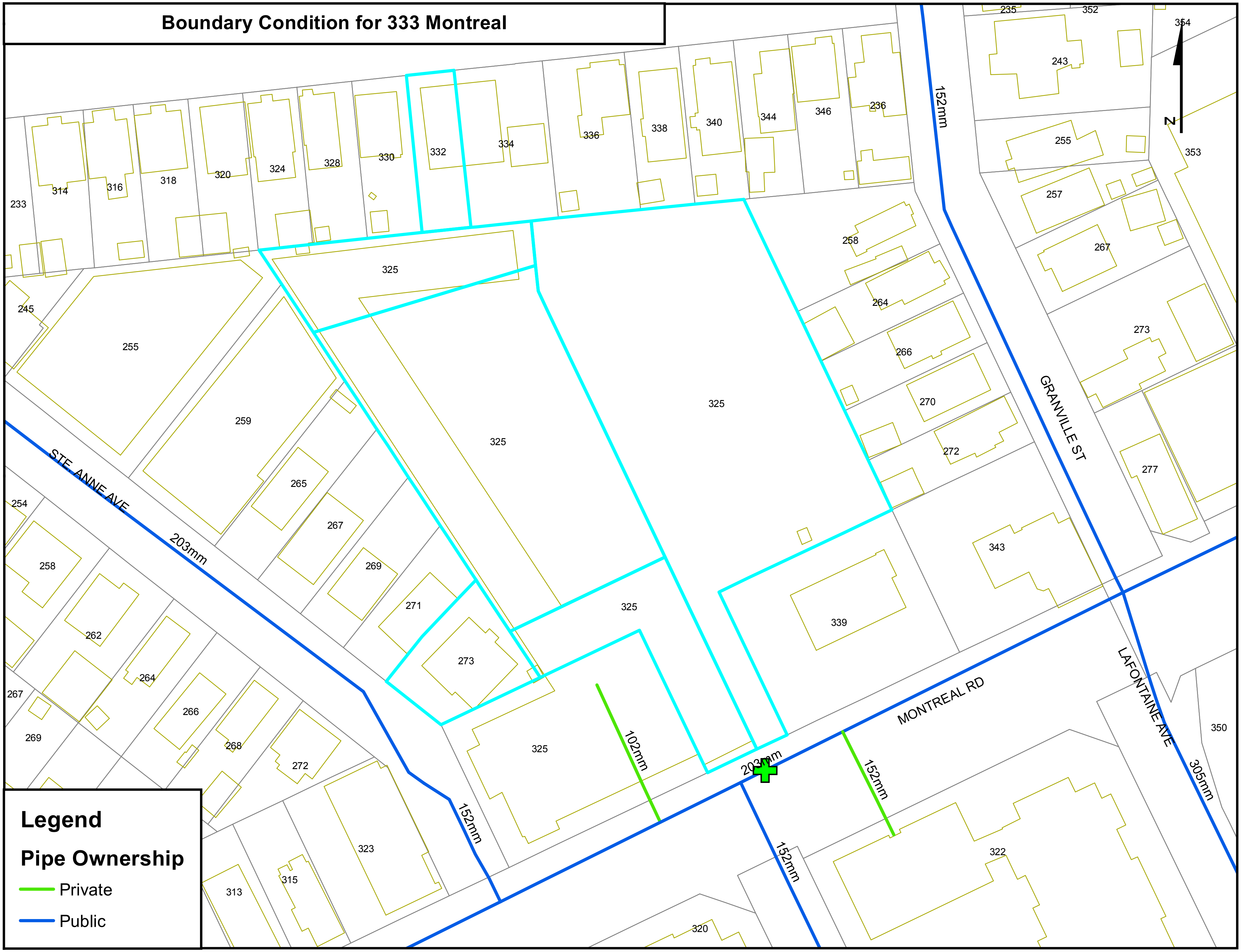
Alison Gosling, E.I.T.
Project Coordinator / Junior Designer

DSEL
david schaeffer engineering ltd.

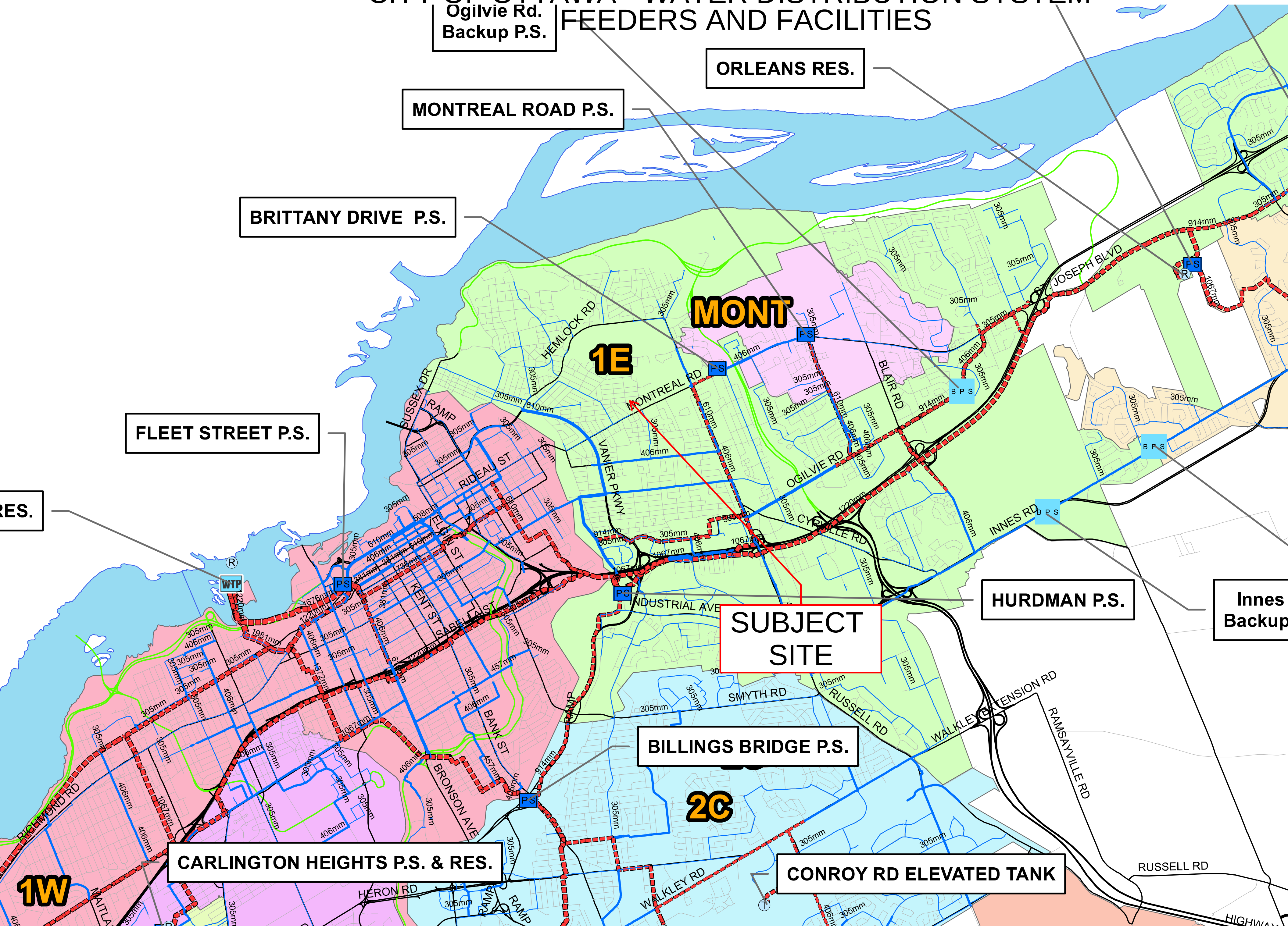
120 Iber Road, Unit 103
Stittsville, ON K2S 1E9

phone: (613) 836-0856 ext.542
fax: (613) 836-7183
email: agosling@DSEL.ca

Boundary Condition for 333 Montreal



CITY OF OTTAWA - WATER DISTRIBUTION SYSTEM
FEEDERS AND FACILITIES



2016-11-17_893

APPENDIX C

Wastewater Collection

The Salvation Army
333 Montreal Road
ExistingSite Conditions

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**

333 Montreal Road
Proposed Site Conditions

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 2.59
Peak Industrial Flow** 0.00
Peak I/C/I Flow **2.59**

** 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	**2.59**	**L/s**
Total Estimated Peak Wet Weather Flow Rate	**2.78**	**L/s**

SANITARY SEWER CALCULATION SHEET

CLIENT: **THE SALVATION ARMY**
LOCATION: **333 MONTREAL ROAD - EXISTING CONDITIONS**
FILE REF: **16-893**
DATE: **10-May-17**

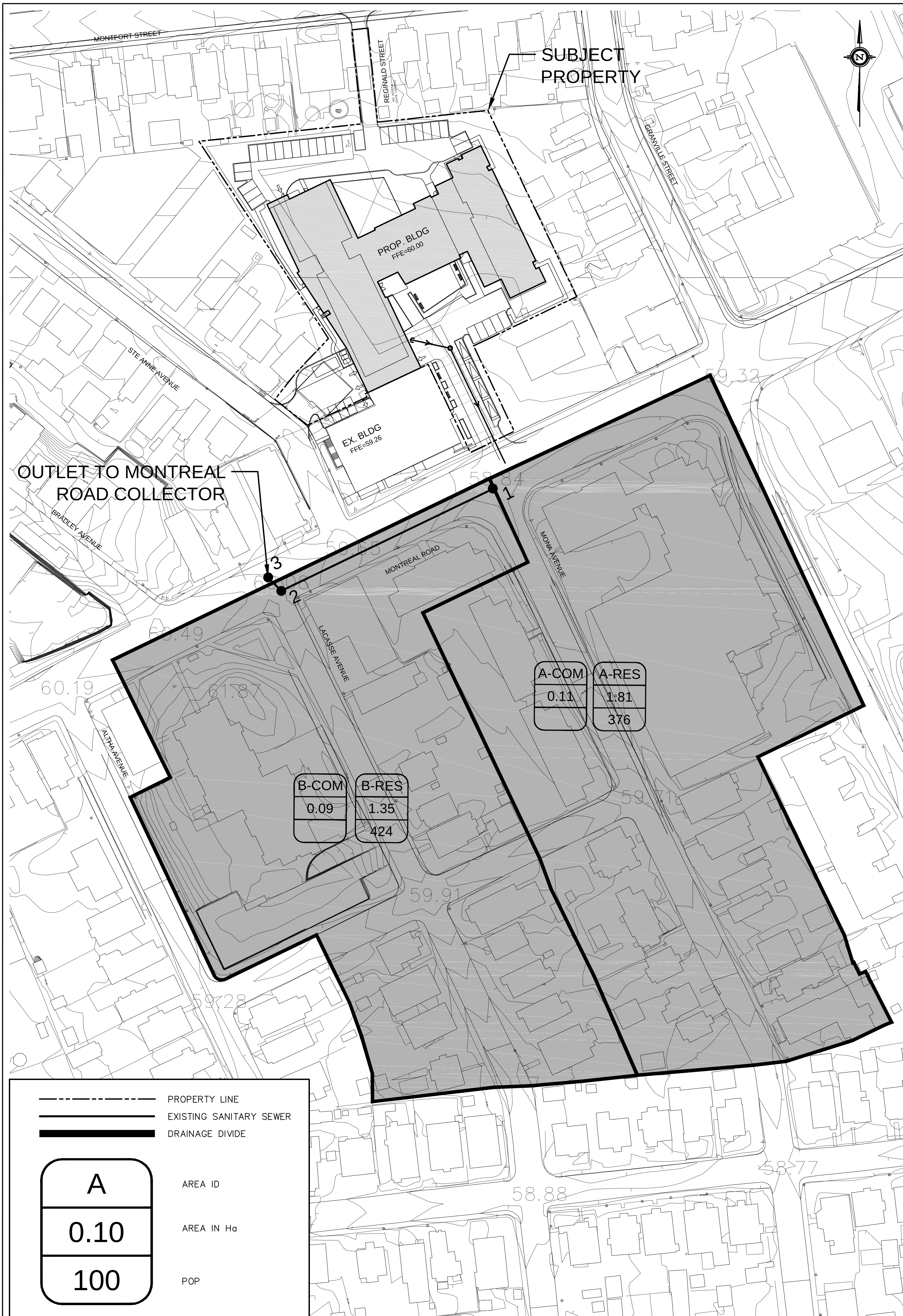
DESIGN PARAMETERS

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

Location			Residential Area and Population										Commercial		Institutional	
Area ID	Up	Down	Area (ha)	Number of Units by type: Singles	Semi's	Town's	Apt's	Pop.	Cumulative Area (ha)	Cumulative Pop.	Peak. Fact. (-)	Q_{res} (L/s)	Area (ha)	Accu. Area (ha)	Area (ha)	Accu. Area (ha)
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
Area B	2	3	1.35	3			230	424.0	3.157	800.0	3.86	12.51	0.09	0.09		0.00

Location	Industrial			Infiltration				Pipe Data							
Area ID	Area (ha)	Accu. Area (ha)	Q_{C+I+I} (L/s)	Total Area (ha)	Accu. Area (ha)	Infiltration Flow (L/s)	Total Flow (L/s)	DIA (mm)	Slope (%)	Length (m)	$A_{hydraulic}$ (m^2)	R (m)	Velocity (m/s)	Q_{cap} (L/s)	Q / Q full (-)
Area A		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		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



DSEL
david schaeffer engineering ltd
SMART SUBDIVISIONS™

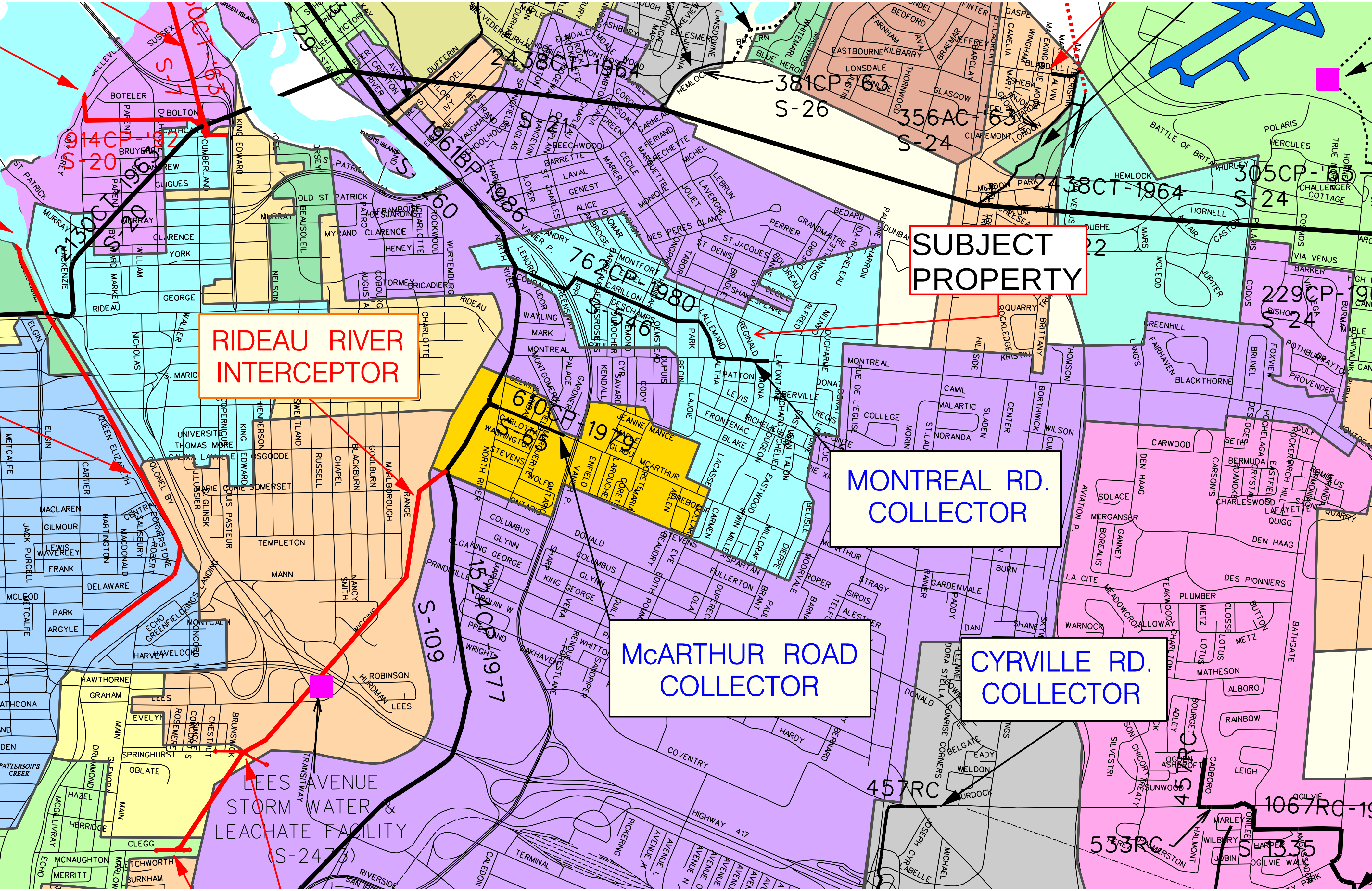
120 Iber Road Unit 103
Stittsville, Ontario, K2S 1E9
Tel. (613) 836-0856
Fax. (613) 836-7183
www.DSEL.ca

333 MONTREAL ROAD
SANITARY ANALYSIS

PROJ NO.:	16-893
DRAWN BY:	AJG
DATE:	2017-06-01
SCALE:	NTS
FIGURE NO.:	SAN-1

z:\projects\16-893_salvation_army-montreal_road\b_design\b2_drawings\b2-2_main (dsel)\spa_sub1\cad\2017-06-01_893_spa_awt.dwg

Trunk Sanitary Sewers & Collection Areas



APPENDIX D

Stormwater Management

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

Existing Drainage Charateristics 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	0.013	ha
C	0.57	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)**
12.5	92.4	1.9	1.9	0.0	0.0	158.2	4.0	4.0	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	0.957	ha
Avail Storage Area	0.909	
C	0.90	Rational Method runoff coefficient
t_c	10	min, tc 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	39	
m^2 / Drain	233.1	max 232.25m^2/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	568.2	4.7	4.7	0.38	14.82	0.09
0.050	2272.6	33.1	37.9	0.77	30.03	0.40
0.075	5113.4	90.0	127.8	1.14	44.46	0.96
0.100	9090.6	175.2	303.0	1.52	59.28	1.78
0.125	9090.6	227.3	530.3	1.90	74.10	2.63
0.150	9090.6	227.3	757.5	2.28	88.92	3.34

* 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	249.3	46.3	203.0	121.8	178.6	474.6	61.2	413.4	248.1
15	83.6	199.9	46.3	153.6	138.3	142.9	379.8	61.2	318.6	286.8
20	70.3	168.1	46.3	121.8	146.2	120.0	318.8	61.2	257.6	309.2
25	60.9	145.7	46.3	99.4	149.1	103.8	276.0	61.2	214.8	322.2
30	53.9	129.0	46.3	82.7	148.9	91.9	244.2	61.2	183.0	329.4
35	48.5	116.1	46.3	69.8	146.6	82.6	219.5	61.2	158.3	332.4
40	44.2	105.7	46.3	59.4	142.7	75.1	199.7	61.2	138.5	332.5
45	40.6	97.2	46.3	50.9	137.5	69.1	183.5	61.2	122.3	330.3
50	37.7	90.1	46.3	43.8	131.4	64.0	170.0	61.2	108.8	326.4
55	35.1	84.0	46.3	37.8	124.6	59.6	158.5	61.2	97.3	321.0
60	32.9	78.8	46.3	32.5	117.2	55.9	148.6	61.2	87.4	314.5
65	31.0	74.3	46.3	28.0	109.2	52.6	139.9	61.2	78.7	307.1
70	29.4	70.3	46.3	24.0	100.8	49.8	132.3	61.2	71.1	298.8
75	27.9	66.7	46.3	20.5	92.0	47.3	125.6	61.2	64.4	289.8
80	26.6	63.5	46.3	17.3	83.0	45.0	119.6	61.2	58.4	280.3
85	25.4	60.7	46.3	14.4	73.6	43.0	114.2	61.2	53.0	270.2
90	24.3	58.1	46.3	11.8	64.0	41.1	109.3	61.2	48.1	259.6
95	23.3	55.8	46.3	9.5	54.1	39.4	104.8	61.2	43.6	248.6
100	22.4	53.6	46.3	7.3	44.1	37.9	100.7	61.2	39.5	237.3
105	21.6	51.6	46.3	5.4	33.8	36.5	97.0	61.2	35.8	225.6
110	20.8	49.8	46.3	3.6	23.4	35.2	93.6	61.2	32.4	213.6

5-year Q_{roof}	**46.26**	**L/s**	**100-year Q_{roof}**	**61.20**	**L/s**
5-year Max. Storage Required	**149.1**	**m^3**	**100-year Max. Storage Required**	**332.5**	**m^3**
5-year Storage Depth	**0.078**	**m**	**100-year Storage Depth**	**0.103**	**m**
5-year Estimated Drawdown Time	**1.06**	**hr**	**100-year Estimated Drawdown Time**	**1.89**	**hr**

Estimated Post Development Peak Flow from Attenuated Areas

Area ID A4
Available Sub-surface Storage
Maintenance Structures

ID	CB202B
Structure Dia./Area (mm/mm^2)	360
T/L*	59.92
INV	54.49
Depth	5.43
$V_{structure}$ (m^3)	0.6

U/G STORG.
10.0

Total Subsurface Storage (m^3) 10.6

Stage Attenuated Areas Storage Summary

		Surface Storage			Surface and Subsurface Storage			
	Stage	Ponding	h_o	delta d	V*	V_{acc}**	$Q_{release}$†	$V_{drawdown}$
	(m)	(m^2)	(m)	(m)	(m^3)	(m^3)	(L/s)	(hr)
Orifice INV	54.49		0.00			0.0	0.0	0.00
U/G STORAGE SL	54.87		0.38	0.38	5.0	5.0	7.4	0.19
U/G STORAGE OBV	55.25		0.76	0.38	5.0	10.0	10.4	0.27
T/L	55.92		1.43	0.67	0.6	10.6	14.3	0.21

* 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 0.024 ha
C 0.90 Rational Method runoff coefficient *Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations*

	5-year					100-year				
t_c	i	Q_{actual}‡	$Q_{release}$	Q_{stored}	V_{stored}	i	Q_{actual}‡	$Q_{release}$	Q_{stored}	V_{stored}
(min)	(mm/hr)	(L/s)	(L/s)	(L/s)	(m^3)	(mm/hr)	(L/s)	(L/s)	(L/s)	(m^3)
10	104.2	6.2	2.9	3.3	2.0	178.6	11.9	5.6	6.3	3.8
15	83.6	5.0	2.9	2.1	1.9	142.9	9.5	5.6	3.9	3.5
20	70.3	4.2	2.9	1.3	1.5	120.0	8.0	5.6	2.4	2.9
25	60.9	3.6	2.9	0.7	1.1	103.8	6.9	5.6	1.3	2.0
30	53.9	3.2	2.9	0.3	0.5	91.9	6.1	5.6	0.5	1.0
35	48.5	2.9	2.9	0.0	0.0	82.6	5.5	5.6	0.0	0.0
40	44.2	2.6	2.6	0.0	0.0	75.1	5.0	5.6	0.0	0.0
45	40.6	2.4	2.4	0.0	0.0	69.1	4.6	5.6	0.0	0.0
50	37.7	2.3	2.3	0.0	0.0	64.0	4.3	5.6	0.0	0.0
55	35.1	2.1	2.1	0.0	0.0	59.6	4.0	5.6	0.0	0.0
60	32.9	2.0	2.0	0.0	0.0	55.9	3.7	5.6	0.0	0.0
65	31.0	1.9	1.9	0.0	0.0	52.6	3.5	5.6	0.0	0.0
70	29.4	1.8	1.8	0.0	0.0	49.8	3.3	5.6	0.0	0.0
75	27.9	1.7	1.7	0.0	0.0	47.3	3.1	5.6	0.0	0.0
80	26.6	1.6	1.6	0.0	0.0	45.0	3.0	5.6	0.0	0.0
85	25.4	1.5	1.5	0.0	0.0	43.0	2.9	5.6	0.0	0.0
90	24.3	1.5	1.5	0.0	0.0	41.1	2.7	5.6	0.0	0.0
95	23.3	1.4	1.4	0.0	0.0	39.4	2.6	5.6	0.0	0.0
100	22.4	1.3	1.3	0.0	0.0	37.9	2.5	5.6	0.0	0.0
105	21.6	1.3	1.3	0.0	0.0	36.5	2.4	5.6	0.0	0.0
110	20.8	1.2	1.2	0.0	0.0	35.2	2.3	5.6	0.0	0.0

5-year $Q_{attenuated}$	**2.93 L/s**	**100-year $Q_{attenuated}$**	**5.57 L/s**
5-year Max. Storage Required	**2.0 m^3**	**100-year Max. Storage Required**	**3.8 m^3**
Est. 5-year Storage Elevation	**54.64 m**	**Est. 100-year Storage Elevation**	**54.78 m**

Area ID A3
Available Sub-surface Storage
Maintenance Structures

ID	CB202A
Structure Dia./Area (mm/mm²)	360
T/L*	59.50
INV	58.00
Depth	1.50
$V_{structure}$ (m^3)	0.2

*Top of lid or max ponding elevation = 59.65

Total Underground Storage (m^3) 6
Total Subsurface Storage (m^3) 0.2

Stage Attenuated Areas Storage Summary

		Surface Storage			Surface and Subsurface Storage			
	Stage	Ponding	h_o	delta d	V*	V_{acc}**	$Q_{release}$†	$V_{drawdown}$
	(m)	(m^2)	(m)	(m)	(m^3)	(m^3)	(L/s)	(hr)
Orifice INV	58.00		0.00			0.0	0	0.00
U/G Storage INV	58.05		0.05	0.05	0.1	0.1	1	0.02
U/G Storage SL	58.50		0.50	0.45	3.0	3.1	2.3	0.37
U/G Storage OBV	58.95		0.95	0.45	3.0	6.1	3.2	0.53
T/L	59.50	0.4	1.50	0.55	0.1	6.2	4	0.43
0.10m Ponding	59.60	89.8	1.60	0.10	3.2	9.4	4.1	0.63
0.15m Ponding	59.65	216.5	1.65	0.05	7.4	16.8	4.2	1.11
0.20m Ponding	59.70	323.6	1.70	0.05	13.4	30.2	4.3	1.95

* V=Incremental storage volume
**V_{acc}=Total surface and sub-surface
† $Q_{release}$ = Release rate calculated from Tempest LMF Graph

Orifice Location **CB202A** **Dia** Tempest LMF60
Total Area 0.080 ha
C 0.84 Rational Method runoff coefficient *Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations*

	5-year					100-year				
t_c	i	Q_{actual}‡	$Q_{release}$	Q_{stored}	V_{stored}	i	Q_{actual}‡	$Q_{release}$	Q_{stored}	V_{stored}
(min)	(mm/hr)	(L/s)	(L/s)	(L/s)	(m^3)	(mm/hr)	(L/s)	(L/s)	(L/s)	(m^3)
10	104.2	19.3	4.1	15.2	9.1	178.6	39.6	4.3	35.3	21.2
15	83.6	15.5	4.1	11.4	10.2	142.9	31.7	4.3	27.4	24.6
20	70.3	13.0	4.1	8.9	10.7	120.0	26.6	4.3	22.3	26.8
25	60.9	11.3	4.1	7.2	10.7	103.8	23.0	4.3	18.7	28.1
30	53.9	10.0	4.1	5.9	10.6	91.9	20.4	4.3	16.1	28.9
35	48.5	9.0	4.1	4.9	10.2	82.6	18.3	4.3	14.0	29.4
40	44.2	8.2	4.1	4.1	9.7	75.1	16.7	4.3	12.4	29.7
45	40.6	7.5	4.1	3.4	9.2	69.1	15.3	4.3	11.0	29.7
50	37.7	7.0	4.1	2.9	8.6	64.0	14.2	4.3	9.9	29.7
55	35.1	6.5	4.1	2.4	7.9	59.6	13.2	4.3	8.9	29.4
60	32.9	6.1	4.1	2.0	7.1	55.9	12.4	4.3	8.1	29.1
65	31.0	5.7	4.1	1.6	6.3	52.6	11.7	4.3	7.4	28.8
70	29.4	5.4	4.1	1.3	5.5	49.8	11.0	4.3	6.7	28.3
75	27.9	5.2	4.1	1.0	4.7	47.3	10.5	4.3	6.2	27.8
80	26.6	4.9	4.1	0.8	3.8	45.0	10.0	4.3	5.7	27.3
85	25.4	4.7	4.1	0.6	2.9	43.0	9.5	4.3	5.2	26.7
90	24.3	4.5	4.1	0.4	2.0	41.1	9.1	4.3	4.8	26.0
95	23.3	4.3	4.1	0.2	1.1	39.4	8.7	4.3	4.4	25.3
100	22.4	4.1	4.1	0.0	0.2	37.9	8.4	4.3	4.1	24.6
105	21.6	4.0	4.0	0.0	0.0	36.5	8.1	4.3	3.8	23.9
110	20.8	3.9	3.9	0.0	0.0	35.2	7.8	4.3	3.5	23.2

5-year $Q_{attenuated}$	**4.12 L/s**	**100-year $Q_{attenuated}$**	**4.30 L/s**
5-year Max. Storage Required	**10.7 m^3**	**100-year Max. Storage Required**	**29.7 m^3**
Est. 5-year Storage Elevation	**59.61 m**	**Est. 100-year Storage Elevation**	**59.70 m**

Area ID A2
Available Sub-surface Storage
Maintenance Structures

ID	STM203	CB203A	CB203B
Structure Dia./Area (mm/mm^2)	1200	360	360
T/L*	59.60	59.50	59.50
INV	57.79	58.00	58.00
Depth	1.81	1.50	1.50
$V_{structure}$ (m^3)	2.0	0.2	0.2

Sewers

ID	200mm	250mm	300mm	375mm	450mm	525mm	750mm	825mm	U/G STORG.
Storage Pipe Dia (mm)	0	250	0	0	0	0	0	0	
L (m)	0	20.8	0	0	0	0	0	0	
V_{sewer} (m^3)	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

*Top of lid or max ponding elevation = 59.65

Total Subsurface Storage (m^3) 3.4

Stage Attenuated Areas Storage Summary

		Surface Storage			Surface and Subsurface Storage			
	Stage	Ponding	h_o	delta d	V*	V_{acc}**	$Q_{release}$†	$V_{drawdown}$
	(m)	(m^2)	(m)	(m)	(m^3)	(m^3)	(L/s)	(hr)
Orifice INV	57.79		0.00			0.0	0	0.00
Storage Pipe SL	57.91		0.12	0.12	1.1	1.1	2.3	0.14
Storage Pipe OBV	58.04		0.25	0.13	1.1	2.3	3.3	0.19
T/L	59.50	0.4	1.71	1.46	1.1	3.4	8.3	0.11
0.10m Ponding	59.60	133.3	1.81	0.10	4.7	8.1	8.6	0.26
0.15m Ponding	59.65	248.9	1.86	0.05	9.4	17.5	8.6	0.56
0.20m Ponding	59.70	435.3	1.91	0.05	16.9	34.4	8.8	1.09

* V=Incremental storage volume
**V_{acc}=Total surface and sub-surface
† $Q_{release}$ = Release rate calculated from TEMPEST LMF Graph

Orifice Location **STM203** **Dia** Tempest LMF85
Total Area 0.070 ha
C 0.83 Rational Method runoff coefficient *Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations*

	5-year					100-year				
t_c	i	Q_{actual}‡	$Q_{release}$	Q_{stored}	V_{stored}	i	Q_{actual}‡	$Q_{release}$	Q_{stored}	V_{stored}
(min)	(mm/hr)	(L/s)	(L/s)	(L/s)	(m^3)	(mm/hr)	(L/s)	(L/s)	(L/s)	(m^3)
10	104.2	16.8	8.4	8.4	5.0	178.6	34.5	8.6	25.9	15.6
15	83.6	13.5	8.4	5.1	4.6	142.9	27.6	8.6	19.0	17.1
20	70.3	11.3	8.4	2.9	3.5	120.0	23.2	8.6	14.6	17.5
25	60.9	9.8	8.4	1.4	2.1	103.8	20.1	8.6	11.5	17.2
30	53.9	8.7	8.4	0.3	0.5	91.9	17.8	8.6	9.2	16.5
35	48.5	7.8	7.8	0.0	0.0	82.6	16.0	8.6	7.4	15.5
40	44.2	7.1	7.1	0.0	0.0	75.1	14.5	8.6	5.9	14.2
45	40.6	6.5	6.5	0.0	0.0	69.1	13.4	8.6	4.8	12.8
50	37.7	6.1	6.1	0.0	0.0	64.0	12.4	8.6	3.8	11.3
55	35.1	5.7	5.7	0.0	0.0	59.6	11.5	8.6	2.9	9.7
60	32.9	5.3	5.3	0.0	0.0	55.9	10.8	8.6	2.2	8.0
65	31.0	5.0	5.0	0.0	0.0	52.6	10.2	8.6	1.6	6.2
70	29.4	4.7	4.7	0.0	0.0	49.8	9.6	8.6	1.0	4.3
75	27.9	4.5	4.5	0.0	0.0	47.3	9.1	8.6	0.5	2.4
80	26.6	4.3	4.3	0.0	0.0	45.0	8.7	8.6	0.1	0.5
85	25.4	4.1	4.1	0.0	0.0	43.0	8.3	8.6	0.0	0.0
90	24.3	3.9	3.9	0.0	0.0	41.1	8.0	8.6	0.0	0.0
95	23.3	3.8	3.8	0.0	0.0	39.4	7.6	8.6	0.0	0.0
100	22.4	3.6	3.6	0.0	0.0	37.9	7.3	8.6	0.0	0.0
105	21.6	3.5	3.5	0.0	0.0	36.5	7.1	8.6	0.0	0.0
110	20.8	3.4	3.4	0.0	0.0	35.2	6.8	8.6	0.0	0.0

5-year $Q_{attenuated}$ **8.41 L/s** | **100-year $Q_{attenuated}$** **8.60 L/s**
5-year Max. Storage Required **5.0 m^3** | **100-year Max. Storage Required** **17.5 m^3**
Est. 5-year Storage Elevation **59.54 m** | **Est. 100-year Storage Elevation** **59.65 m**

Area ID A1
Available Sub-surface Storage
Maintenance Structures

ID	STM101	STM102	CICB101A	CB101B	CB101C	CB102A
Structure Dia./Area (mm/mm^2)	1200	1200	360	360	360	360
T/L*	58.77	58.77	58.71	58.68	58.77	58.70
INV	56.83	5.98	57.21	57.18	57.65	57.20
Depth	1.94	52.79	1.50	1.50	1.12	1.50
$V_{structure}$ (m^3)	2.2	59.7	0.2	0.2	0.1	0.2

Sewers

ID	200mm	250mm	300mm	375mm	450mm	525mm	600mm	825mm	U/G STORG.
Storage Pipe Dia (mm)	0	250	0	375	0	0	0	0	
L (m)	0	63	0	28.3	0	0	0	0	
V_{sewer} (m^3)	0.0	3.1	0.0	3.1	0.0	0.0	0.0	0.0	202.4

*Top of lid or max ponding elevation = 58.77

Total Structure Storage (m^3) 2.2
Total Underground Storage (m^3) 202.4

Stage Attenuated Areas Storage Summary

		Surface Storage			Surface and Subsurface Storage			
	Stage	**Ponding**	**h_o**	**delta d**	**V***	**V_{acc}****	**$Q_{release}$†**	**$V_{drawdown}$**
	(m)	**(m^2)**	**(m)**	**(m)**	**(m^3)**	**(m^3)**	**(L/s)**	**(hr)**
Orifice INV	56.83		0.00		0.72	0.0	0.0	0.00
U/G STORAGE INV	57.01		0.18	0.18	0.72	0.7	16.4	0.01
U/G STORAGE SL	57.77		0.94	0.76	101.2	101.9	37.5	0.75
U/G STORAGE OBV	58.53		1.70	0.76	101.2	203.1	50.5	1.12
T/L	58.80		1.97	0.27	0.72	203.8	54.3	1.04

* V=Incremental storage volume
**V_{acc}=Total surface and sub-surface
† $Q_{release}$ = Release rate calculated from orifice equation

Orifice Location **STM101** **Dia** 135
Total Area 0.255 ha
C 0.65 Rational Method runoff coefficient *Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations*

	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	94.2	38.8	55.3	33.2	178.6	163.8	50.7	113.2	67.9
15	83.6	84.7	38.8	45.8	41.3	142.9	143.3	50.7	92.7	83.4
20	70.3	78.6	38.8	39.7	47.7	120.0	130.1	50.7	79.5	95.4
25	60.9	74.3	38.8	35.4	53.1	103.8	120.9	50.7	70.2	105.3
30	53.9	71.1	38.8	32.2	58.0	91.9	114.0	50.7	63.3	114.0
35	48.5	68.6	38.8	29.7	62.4	82.6	108.7	50.7	58.0	121.8
40	44.2	66.6	38.8	27.7	66.6	75.1	104.4	50.7	53.7	129.0
45	40.6	64.9	38.8	26.1	70.5	69.1	100.9	50.7	50.2	135.6
50	37.7	63.6	38.8	24.7	74.2	64.0	98.0	50.7	47.3	141.9
55	35.1	62.4	38.8	23.6	77.8	59.6	95.5	50.7	44.8	147.9
60	32.9	61.4	38.8	22.6	81.2	55.9	93.3	50.7	42.7	153.6
65	31.0	60.5	38.8	21.7	84.6	52.6	91.5	50.7	40.8	159.1
70	29.4	59.8	38.8	20.9	87.9	49.8	89.8	50.7	39.2	164.5
75	27.9	59.1	38.8	20.2	91.1	47.3	88.4	50.7	37.7	169.7
80	26.6	58.5	38.8	19.6	94.2	45.0	87.1	50.7	36.4	174.7
85	25.4	57.9	38.8	19.1	97.3	43.0	85.9	50.7	35.2	179.7
90	24.3	57.4	38.8	18.6	100.3	41.1	84.8	50.7	34.2	184.5
95	23.3	57.0	38.8	18.1	103.3	39.4	83.9	50.7	33.2	189.3
100	22.4	56.6	38.8	17.7	106.3	37.9	83.0	50.7	32.3	194.0
105	21.6	56.2	38.8	17.3	109.2	36.5	82.2	50.7	31.5	198.6
110	20.8	55.8	38.8	17.0	112.1	35.2	81.4	50.7	30.8	203.1

5-year $Q_{attenuated}$ **38.85 L/s** **100-year $Q_{attenuated}$** **50.66 L/s**
5-year Max. Storage Required **112.1 m^3** **100-year Max. Storage Required** **203.1 m^3**
Est. 5-year Storage Elevation **57.85 m** **Est. 100-year Storage Elevation** **58.55 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	1.9	0.0	4.0	0.0	0.0
Attentuated Areas	54.3	129.9	69.1	254.1	241.2
Total	**56.2**	**129.9**	**73.1**	**254.1**	**241.2**

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	1.9	0.0	4.0	0.0	0.0
Montfort Street	15.4	17.7	18.5	51.0	75.1
Montreal Road	38.8	112.1	50.7	203.1	203.8
Total	**56.2**	**129.9**	**73.1**	**254.1**	**278.9**

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	CB'T'102D	0.078	0.55	0.04	0.04	10.0	104.2	12.5	250	0.50	19	0.049	0.063	0.86	42.0	0.4	0.30
	CB'T'102D	CB'T'102C				0.04	10.4	102.3	12.3	250	0.50	24.6	0.049	0.063	0.86	42.0	0.5	0.29
	CB'T'102C	CB'T'102B				0.04	10.8	99.9	12.0	250	0.50	16.4	0.049	0.063	0.86	42.0	0.3	0.28
	CB'T'102B	CB102A				0.04	11.2	98.4	11.8	250	1.00	15.7	0.049	0.063	1.21	59.5	0.2	0.20
	CB102A	STM102				0.04	11.4	97.4	11.7	250	0.50	31	0.049	0.063	0.86	42.0	0.6	0.28
							12.0											
101C	CB'L'101G	CB'T'101F	0.109	0.56	0.06	0.06	10.0	104.2	17.7	250	0.60	21.9	0.049	0.063	0.94	46.1	0.4	0.38
	CB'T'101F	CB'T'101E				0.06	10.4	102.2	17.4	250	0.60	24.6	0.049	0.063	0.94	46.1	0.4	0.38
	CB'T'101E	CB'T'101D				0.06	10.8	100.0	17.0	250	0.60	20.9	0.049	0.063	0.94	46.1	0.4	0.37
	CB'T'101D	CB101C				0.06	11.2	98.3	16.7	250	0.60	9.9	0.049	0.063	0.94	46.1	0.2	0.36
	CB101C	STM102				0.06	11.4	97.5	16.6	250	1.00	8.3	0.049	0.063	1.21	59.5	0.1	0.28
							11.5											
101A	CB101A/B	STM102	0.068	0.90	0.06	0.06	10.0	104.2	17.7	250	1.00	5.7	0.049	0.063	1.21	59.5	0.1	0.30
							10.1											
BLDG*	BLDG	STM102	0.254	0.90	0.23	0.23	10.0	104.2	61.2	300	1.00	5.7	0.071	0.075	1.37	96.7	0.1	0.63
							10.1											
	STM102	STM101				0.17	12.0	94.8	104.8	375	0.50	28.3	0.110	0.094	1.12	124.0	0.4	0.85
	STM101	EX. STM				0.17	12.4	93.0	104.0	375	1.00	13.2	0.110	0.094	1.59	175.3	0.1	0.59
							12.5											
OUTLET TO MONTFORT STREET:																		
203B	CB203B	STM203	0.026	0.90	0.02	0.02	10.0	104.2	6.7	250	1.00	18.4	0.049	0.063	1.21	59.5	0.3	0.11
							10.3											
203A	CB203A	STM203	0.044	0.80	0.03	0.03	10.0	104.2	10.0	250	1.00	2.4	0.049	0.063	1.21	59.5	0.0	0.17
							10.0											
	STM203	STM202				0.06	10.3	102.9	16.6	250	0.50	17.3	0.049	0.063	0.86	42.0	0.3	0.39
							10.6											
202A	CB202A	STM202	0.080	0.84	0.07	0.07	10.0	104.2	19.3	250	1.00	15.9	0.049	0.063	1.21	59.5	0.2	0.32
							10.2											
202B	CB202B	STM202	0.024	0.90	0.02	0.02	10.0	104.2	6.2	250	1.00	13	0.049	0.063	1.21	59.5	0.2	0.10
							10.2											
	STM202	STM201				0.15	10.6	101.2	41.1	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	39.9	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	0.068	0.000	0.068
C	0.9	0.2	0.90

101C	Imp.	Perv.	Total
Area	0.056	0.053	0.109
C	0.9	0.2	0.56

102A	Imp.	Perv.	Total
Area	0.039	0.039	0.078
C	0.9	0.2	0.55

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	0.000	0.026
C	0.9	0.2	0.90

203A	Imp.	Perv.	Total
Area	0.037	0.006	0.044
C	0.9	0.2	0.80

202A	Imp.	Perv.	Total
Area	0.072	0.007	0.080
C	0.9	0.2	0.84

202B	Imp.	Perv.	Total
Area	0.024	0.000	0.024
C	0.9	0.2	0.90

Zurn Roof Drains

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

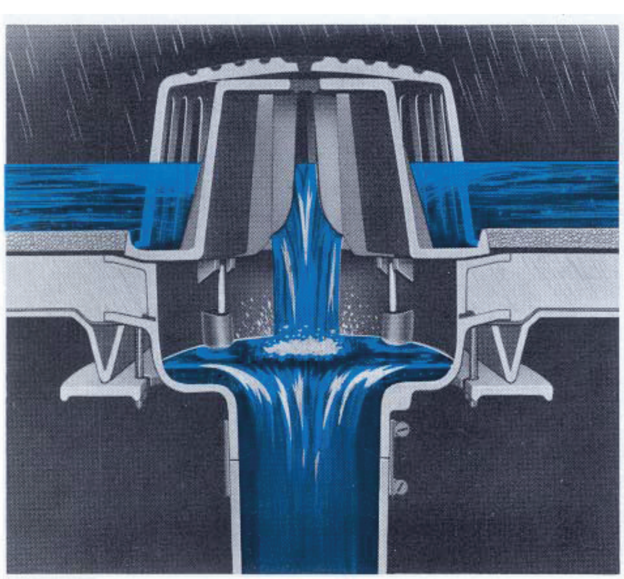
Fewer roof drains, smaller diameter piping, smaller sewer sizes, and lower installation costs are possible with a “Control-Flo” drainage system because roof areas are utilized as temporary storage reservoirs.

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.

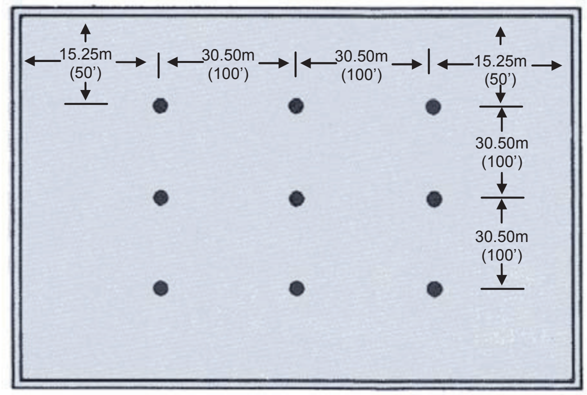


DEFINITION

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.



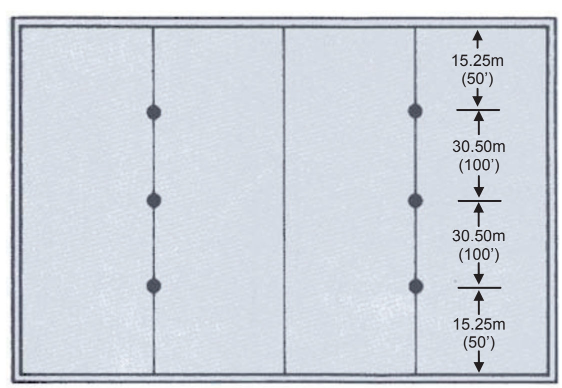
(Plan View)

(Section View)

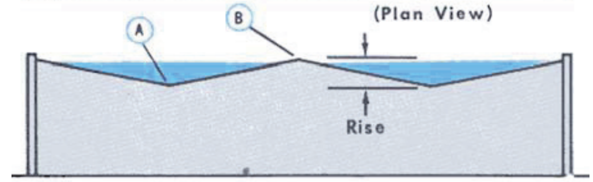
SLOPED ROOFS

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.



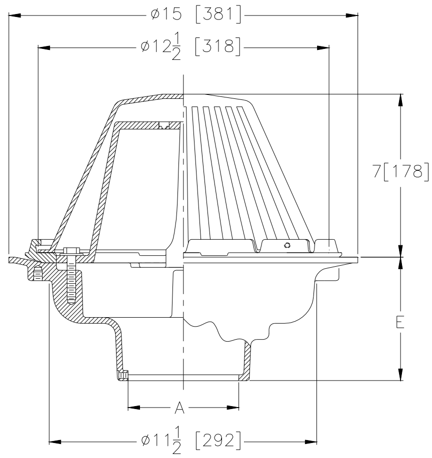
(Plan View)



(Section View)

Dimensions and other measurements given in metric and imperial forms.

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 over-flow scuppers in parapet walls.

GENERAL INFORMATION

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

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

GENERAL RECOMMENDATIONS

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

NOTE: An equivalent depth is that depth of water attained at the drains at the lowest line or valley of the roof with all other conditions such as notch area and rainfall intensity being equal. For Toronto, Ontario a notch area rating of 464.50m^2 (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.

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

ROOF USED AS TEMPORARY RETENTION

The key to economical "Control-Flo" is the utilization of large roof areas to temporarily store the maximum amount of water without overloading average roofs or creating excessive draindown time during periods of heavy rainfall. The data shown in the "Selecta-Drain" Chart enables the engineer to select notch area ratings from 232.25 m^2 (2,500 $ft.^2$) to 929m^2 (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 232.25m^2 (2,500 $ft.^2$) are used considerable economy of the "Control-Flo" concept is being lost. The area per notch is limited to 929m^2 (10,000 $ft.^2$) to keep the draindown time within reasonable limits. Extensive studies show that stresses due to water load on a sloping roof for any fixed set of conditions are very nearly the same as those on a dead-level roof. A sloping roof tends to concentrate more water in the valleys and increase the water depth at this point. The greater depth around the drain leads to a faster run-off rate, particularly a faster early run -off rate. As a result, the total volume of water stored on the roof is less, and the total load on the sloping roof is less. By using the same area on the sloping roof as on the dead-level roof the increase in roof stresses due to increased water depth in the valleys is offset by the decrease in the total load due to less water stored. The net result of the maximum roof stress is approximately the same for any single span rise and fixed set of conditions. A fixed set of conditions, would be the same notch area, the same frequency store, and the same locality.

SPECIAL CONSIDERATIONS FOR STRUCTURAL SAFETY: Normal practice of roof design is based on 18kg (40 lbs.) per 929 cm^2 (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.

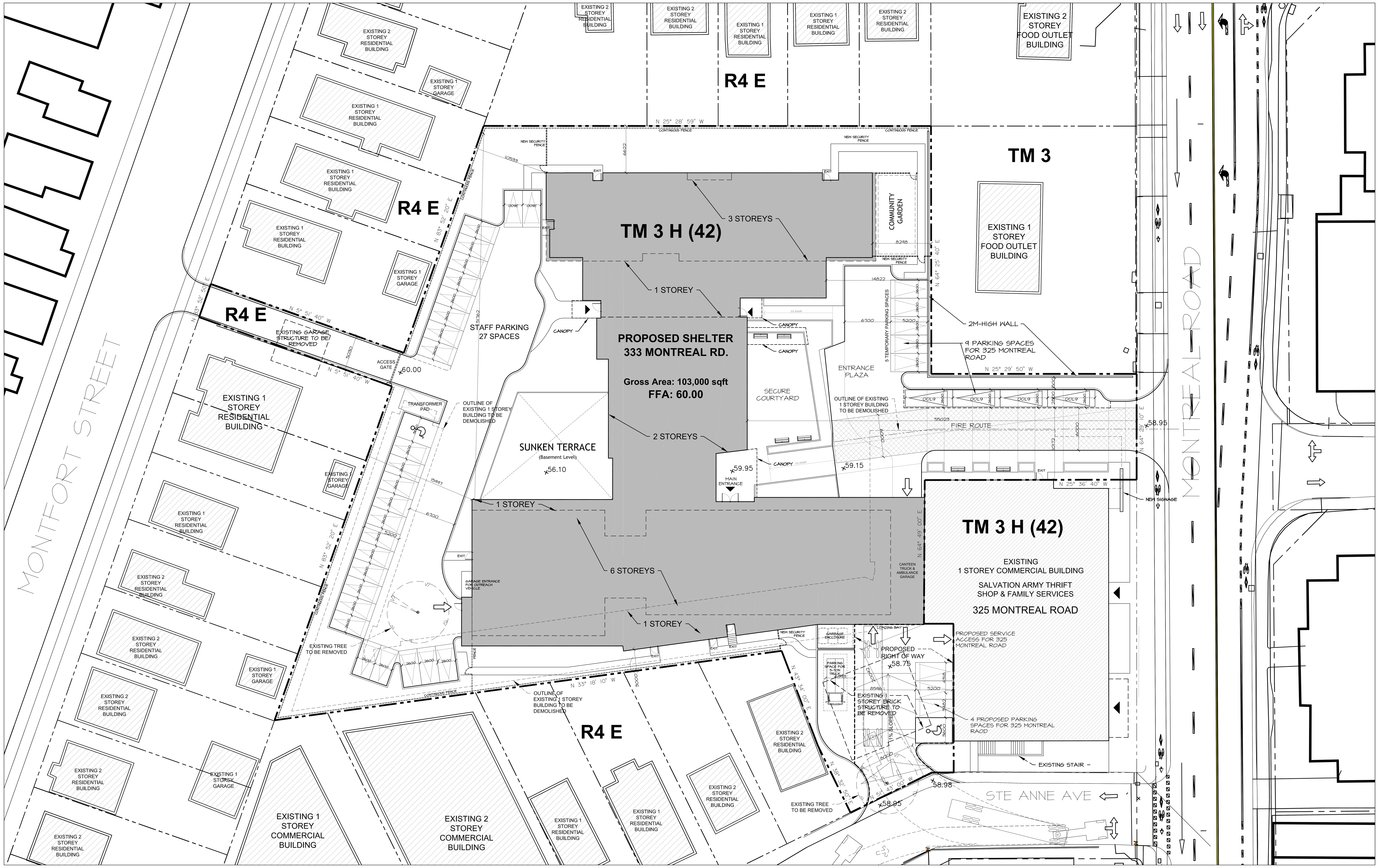
LEADER AND DRAIN PIPE SIZING

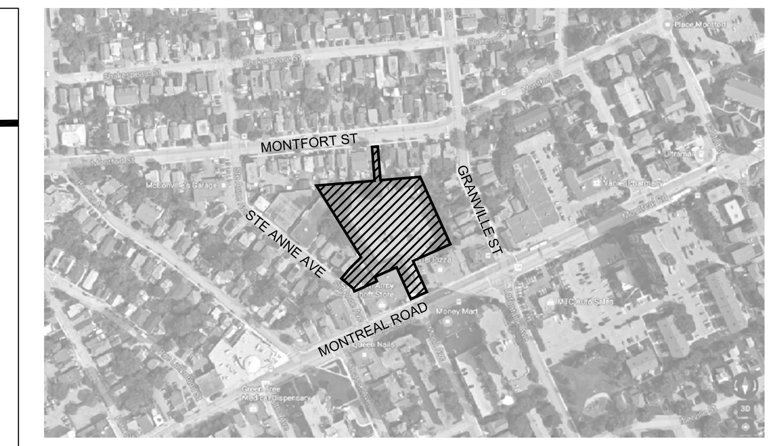
Since all data in the "Selecta-Drain" Chart is based on the 50-year-storm it is possible to exceed the water depth listed in these charts if a 100-year or 1000-year storm would occur. Therefore, for good design it is recommended that scuppers or other methods be used to limit water depth to the design 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.

DRAWINGS / FIGURES





LOCATION MAP

SITE INFORMATION

SURVEY INFORMATION TAKEN FROM:

- TOPOGRAPHICAL PLAN OF LOTS 25 TO 31, 35, 40 TO 46.
- PART OF LOTS 36, 47, 48, 53
- AND PART OF REGINALD STREET (CLOSED BY JUDGE'S ORDER INST. NS47356)
- REGISTERED PLAN NO. 246,
- CITY OF OTTAWA

PREPARED BY ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
NOVEMBER 30, 2016.

SITE SUMMARY

	EXISTING	PROPOSED
ZONING	TM3 H (42)	TM3 (XX) H (42)
SITE AREA	6967sq.m	6967sq.m
USE	MOTEL	SHELTER

ZONING SUMMARY

	REQUIRED	PROPOSED
MINIMUM LOT AREA	NO MINIMUM	(XX)
MINIMUM LOT WIDTH	NO MINIMUM	(XX)
MAXIMUM FRONT YARD SETBACK	2m	55m
INTERIOR SIDE YARD SETBACK: BETWEEN NON-RES. AND NON-RES. / BETWEEN NON-RES. AND RES.	3m MAX / 3m MIN	0m MIN / 3m MIN
CORNER SIDE YARD SETBACK	5m MIN	23m MIN
REAR YARD SETBACK ABUTTING A RESIDENTIAL ZONE	7.5m MIN	10.5m MIN
BUILDING HEIGHT: FOR A DISTANCE OF 20m FROM FRONT LOT LINE	6.7m MIN	0m MIN
MAXIMUM HEIGHT	42m MAX	21m MAX
MAXIMUM HEIGHT WITH A REAR LOT LINE ABUTTING AN R4 ZONE WITH A 45° ANGULAR PLANE MEASURED AT A HEIGHT OF 15M FROM A POINT7.5m FROM THE REAR LOT LINE.	AT 16m SETBACK MAX HEIGHT IS 23.5m	21m MAX
MINIMUM WIDTH OF LANDSCAPED AREA ABUTTING A RESIDENTIAL ZONE	1.4m	3m

PARKING REQUIREMENTS

SHELTER 333 MONTREAL ROAD PARKING

	REQUIRED	PROPOSED
1 SPACE PER 100sq.ft OF GFA	(XX)	(XX)

COMMERCIAL 325 MONTREAL ROAD PARKING

	REQUIRED	PROPOSED
RETAIL STORE 1.25 SPACE PER 100sq.ft OF GFA (609sq.m)	7.6	
COMMUNITY HEALTH AND RESOURCE CENTRE .75 SPACE PER 100sq.ft OF GFA (195sq.m) PARTIALLY ON GROUND FLOOR AND PARTIALLY IN BASEMENT	0	
	7.6	13

NOTE: MONTREAL ROAD RIGHT OF WAY (ROW) SHOWN AS PER CURRENTLY PROPOSED

NEW BUILDING
FIRE ROUTE
EXISTING BUILDINGS
TREES TO BE REMOVED

0m 5m 10m 20m 50m

CONSULTANTS

URBAN PLANNING CONSULTANTS:
FOTENN PLANNING & DESIGN
233 McLEOD ST
OTTAWA, ON, K2P 0Z8
TEL 613-730-5709

CIVIL ENGINEERING:
DSEL - DAVID SCHAEFFER ENG. LTD.
120 IBER ROAD, SUITE 103
OTTAWA, ON, K2S 1E9
TEL 613-836-0856

GEOTECHNICAL:
PATERSON GROUP
154 COLONNADE ROAD SOUTH
OTTAWA, ON, K2E 7J5
TEL 613-226-7381

STRUCTURAL ENGINEER:
CUNLIFFE & ASSOCIATES
1737 WOODWARD DR - SUITE 102
OTTAWA, ON, K2C 0P9
TEL 613-729-7242

MECH/ELEC ENGINEER:
GOODKEY WEEDMARK
1688 WOODWARD DR
OTTAWA, ON, K2C 3R8
TEL 613-727-5111

ACOUSTICAL CONSULTANTS:
GRADIENT WIND ENGINEERING INC.
127 WALGREEN ROAD
OTTAWA, ON, K0A 1L0
TEL 613-836-0934

SURVEYOR:
ANNIS, O'SULLIVAN, VOLLEBEKK, LTD.
14 CONCORUSE GATE
NEPEAN, ON, K2E 7S6
TEL 613-727-0850

LANDSCAPE ARCHITECT:
PROJET PAYSAGE
24 MOUNT-ROYAL OUEST, BUREAU 801
MONTREAL, QC, H2T 2S2
TEL 613-849-7700

SECURITY CONSULTANTS:
SECURITY THROUGH SAFE DESIGN INC.
2650 QUEENSVIEW DRIVE, SUITE 209
OTTAWA, ON, K2B 8H6
TEL 613-863-1833

no.	date	revision
1	18/05/2017	ISSUED FOR UDRP

Giving Hope Today

HOBIN
63 PAMILLA ST.
Ottawa, Ontario
K1S 3K7

613-238-7200 Fax: 613-235-2005
Email: mail@hobinarc.com

project
333 MONTREAL ROAD

drawing title
SITE PLAN

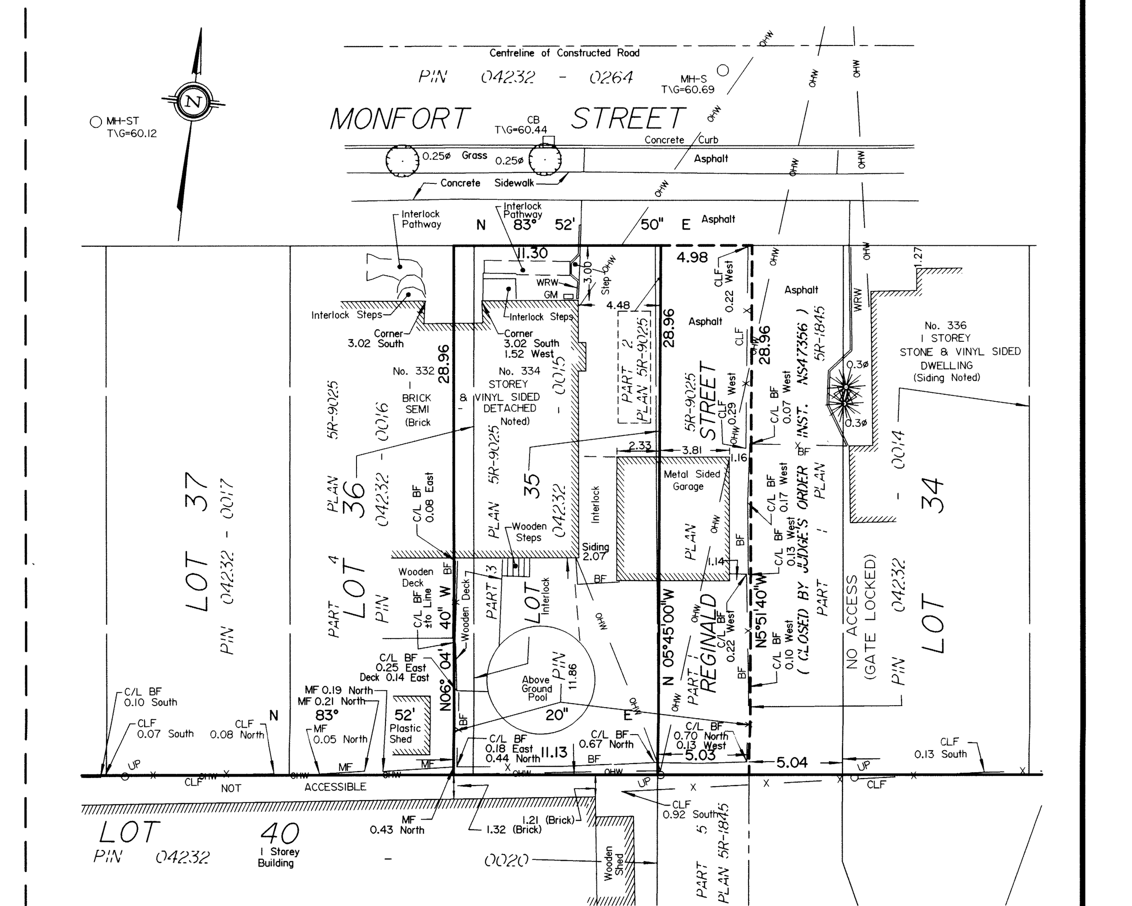
drawn	date	scale
BM	17/04/19	1:250

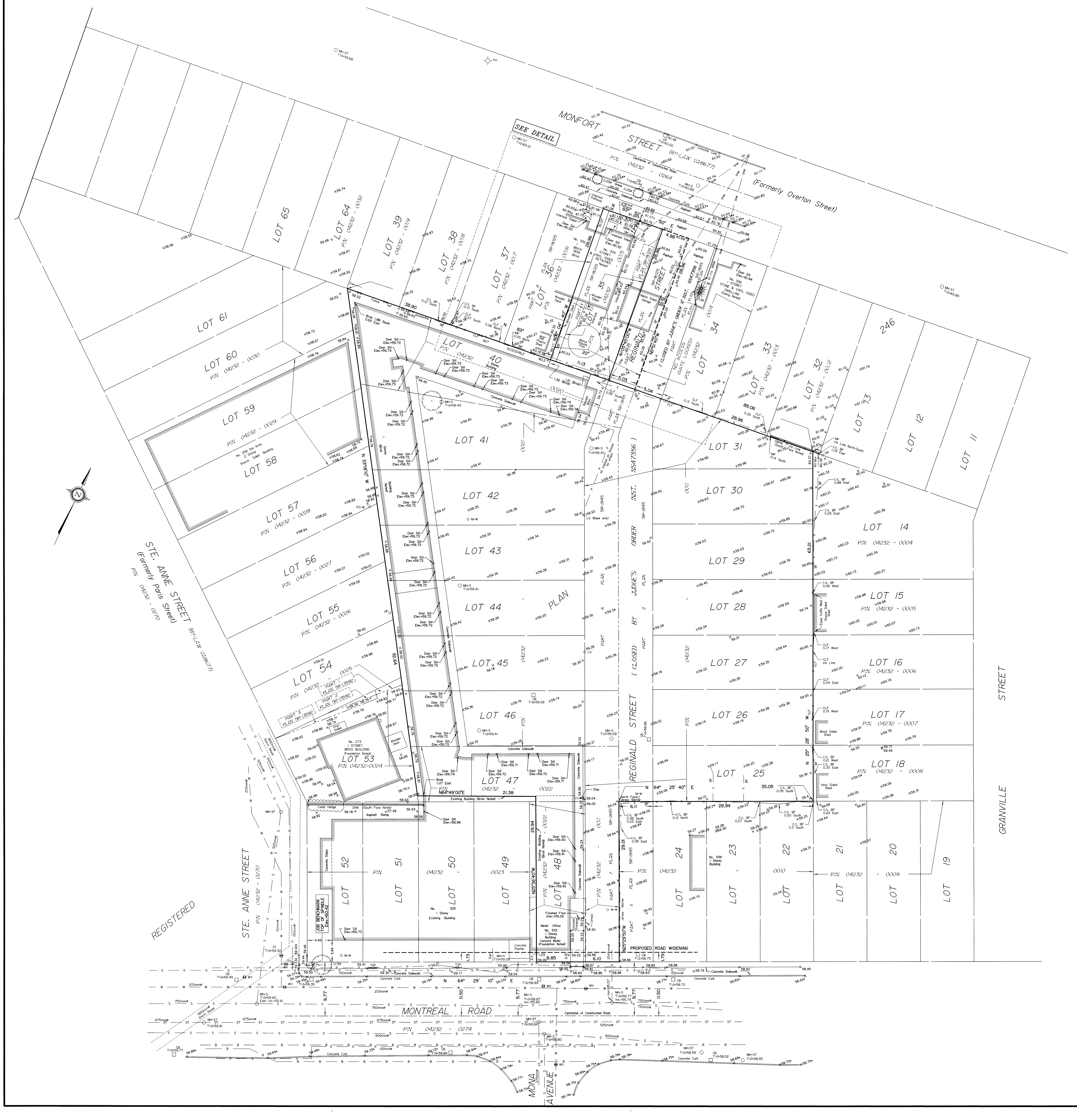
project
1650

drawing no.
A-001

DATE-PLOT

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, Vollebekk Ltd.

Scale 1 : 250

10 7.5 5.0 2.5 0 5 10 Metres

Metric

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

Nov. 30, 2016
Date

E.H. Herweyer O.L.S.

Notes & Legend

	Denotes	
FH	"	Fire Hydrant
WV	"	Water Valve
VC	"	Valve Chamber (Watermain)
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
M-W	"	Monitoring Well
UP	"	Utility Pole
PO-W	"	Wood Pole
T/G	"	Top of Grate
Inv.	"	Invert
CRW	"	Concrete Retaining Wall
CBRW	"	Concrete Block Retaining Wall
Ø	"	Diameter
+ 65.00	"	Location of Elevations
+ 65.00*	"	Top of Wall / Concrete Curb Elevation
C/L	"	Centreline
	"	Property Line
	"	Deciduous Tree
LS	"	Light Standard
WRW	"	Wooden Retaining Wall
GM	"	Gas Meter
	"	Coniferous Tree

Bearings are grid and are referred to the Central Meridian of MTM Zone 9 (76°30' West Longitude) NAD-83 (original).

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

1. Elevations shown are geodetic and are referred to the CGVD28 geodetic datum.
2. 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

1. 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.
2. Only visible surface utilities were located.
3. A field location of underground plant by the pertinent utility authority is mandatory before any work involving breaking ground, probing, excavating etc.
4. Maintenance holes marked by *, Underground services and Inverts are taken from City of Ottawa Engineering Drawings D-17-06 and S-546.

ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
14 Concourse Gate, Suite 500
Nepean, Ont. K2E 7S6
Phone: (613) 727-0850 / Fax: (613) 727-1079
Email: Nepean@aovltd.com
Ontario Land Surveyors

Job No. 19241-16 Lts 25 To 31 PL 246 T D2 | ig