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 BARRHAVEN CHURCH
102 BILL LEATHEM DRIVE

CITY OF OTTAWA

PROJECT NO.: 16-855

OCTOBER 2016 – REV 2

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT
FOR
102 BILL LEATHEM DRIVE

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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 Zoning By-law Amendment (ZBLA) and Site Plan Control (SPC) at 102 Bill Leathem Drive.

The subject property is located within the City of Ottawa urban boundary, in the Gloucester-South Nepean ward. As illustrated in ***Figure 1***, the subject property is located at the intersection of Bill Leathem Drive and Leiken Drive. Comprised of a single parcel, the subject property measures approximately ***1.41 ha*** and is zoned Light Industrial Zone.

Figure 1: Site Location

The proposed ZBLA and SPC would allow for the development of a 1-story church building fronting onto Bill Leathem Drive. The proposed phased development would include approximately ***1128.0 m²*** in phase I and ***1696.2 m²*** in phase II of congregation areas, office spaces, an assembly hall and associated parking lots, with access from Bill Leathem Drive. A copy of the site plan is included in ***Drawings/Figures***.

The objective of this report is to support the application for ZBLA and SPC by providing sufficient detail to demonstrate that the proposed development is supported by existing and proposed municipal servicing infrastructure and that the site design conforms to current City of Ottawa design standards.

1.1 Existing Conditions

The existing site is currently an undeveloped parcel of land located within the South Merivale Business Park.

A topo survey was completed by Stantec on Geomatics on February 29, 2016 and is included in ***Drawings/Figures***. The elevations range between 90.12m and 89.46m with a grade change of 0.66m 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:

Water Supply

- 305 mm diameter PVC watermain within Bill Leathem Drive
- 400 mm diameter watermain within Leikin Drive

Sanitary Sewers

- 375 mm diameter concrete sewer tributary to Barrhaven Trunk within Bill Leathem Drive
- 750 mm diameter concrete sanitary sewer tributary to Barrhaven Trunk within Leikin Drive

Storm Sewers

- 1350 mm and 1500 diameter concrete storm sewer tributary to Longfields/Davidson Heights Stormwater Management Facility (***LDHSMF***) within Bill Leathem Drive
- 1650-2400 mm diameter concrete storm sewer running along the West edge of the property tributary to ***LDHSMF***
- 525 mm diameter concrete storm sewer tributary to ***LDHSMF*** within Leikin Drive

1.2 Required Permits / Approvals

The proposed development is 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 involves the construction of a single storey church on lands zoned Light Industrial Zone 9. DSEL has reviewed the development's obligation under Section 53 of the Ontario Water Resources act and Ontario Regulation 525/98. Ontario Regulation 525/98 states that Subsection 53 (1) and (3) of the Act do not apply to lands designed as one parcel, that discharge into a storm sewer that is not combined, does not service industrial and or located on industrial land. The Act defines industrial land as *" land used for the production, processing, repair, maintenance or storage of goods or materials, or the processing, storage, transfer or disposal of waste, but does not include land used primarily for the purpose of buying or selling, (a) goods or materials other than fuel, or (b) services other than vehicle repair services."* The proposed development will be developed as a single parcel of land, will outlet into a storm sewer that is not combined, and does not fall within the definition of industrial lands per the Act. Therefore, it is DSEL's opinion that the proposed stormwater management system is exempt from the approval requirements under Section 53 of the Act. DSEL have communicated their opinion to the local MOE office via email, but have not received their feedback at the time of publication. Correspondence is 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)

- **Longfields/Davidson Heights Serviceability Study, City of Nepean**
  Oliver, Mangione, McCalla & Associates Ltd.,
  February 1993,
  (LDH Servicing Study)

3.0 WATER SUPPLY SERVICING

3.1 Existing Water Supply Services

The subject property lies within the City of Ottawa 2W pressure zone as shown by the City of Ottawa water distribution map in ***Appendix B***. An existing 305 mm diameter watermain is located within the Bill Leathem Drive right-of-way in addition to a 400 mm diameter watermain within the Leikin Drive right-of-way.

3.2 Water Supply Servicing Design

It is proposed that the development be serviced via a 50 mm diameter connection to the 305 mm diameter watermain within Bill Leathem Drive. Servicing details for the proposed connection are shown by drawing ***SSP-1*** and ***SSP-2*** included in this report.

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
Church	30 L/seat/d
Assembly Hall	30 L/seat/d
Office	75 L/9.3m^2/d
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 and boundary conditions for the proposed development based on the ***Water Supply Guidelines***.

Table 2
Water Demand and Boundary Conditions
Proposed Conditions – Phase I

Design Parameter	Anticipated Demand[1] (L/min)	Boundary Condition[2] @ Ground Elevation (m H_2O / kPa)	
Average Daily Demand	4.0	58.3	571.9
Max Day + Fire Flow	5.9 + 7,000 = 7,005.9	35.9	352.2
Peak Hour	10.7	35.9	352.2

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 89.3m. See ***Appendix B.***

Table 3 summarizes the anticipated water supply demand and boundary conditions for the proposed development based on the ***Water Supply Guidelines***.

Table 3
Water Demand and Boundary Conditions
Proposed Conditions – Phase II

Design Parameter	Anticipated Demand[1] (L/min)	Boundary Condition[2] @ Ground Elevation (m H_2O / kPa)	
Average Daily Demand	9.0	58.3	571.9
Max Day + Fire Flow	13.5 + 9,000 = 9,013.5	35.1	344.3
Peak Hour	24.3	35.9	352.2

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 89.3m. 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 assumptions were coordinated with the project team:

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

The above assumptions result in an estimated fire flow of approximately ***7,000 L/min*** for Phase I and ***9,000 L/min*** for Phase II.

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 residual pressures exceeds the required pressure range as specified in ***Table 1*** and the ***Water Supply Guidelines***, as a result, pressure reducing valves are required.

3.3 Water Supply Conclusion

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

Boundary conditions provided by the City indicate residual pressures exceeds the required pressure; as a result, pressure reducing valves will be required.

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

4.0 WASTEWATER SERVICING

4.1 Existing Wastewater Services

The subject site lies within the Barrhaven Trunk Sewer catchment area which is tributary to the West Rideau Trunk Collector, as shown by the City sewer mapping included in ***Appendix C***. An existing 375 mm diameter sanitary sewer within Bill Leathem Drive and a 750 mm diameter sanitary sewer within Leikin Drive are available to service the proposed development.

4.2 Wastewater Design

The ***LDH Servicing Study*** used an industrial sanitary flow rate of 45,000 L/ha/day with a peaking factor determined by the MOE industrial sewage graph reproduced in Appendix 4-B of the ***City Guidelines*** to size trunk infrastructure.

Table 4 summarizes sanitary allowance for the subject property which was calculated based on the criteria presented in the ***LDH Servicing Study***. See ***Appendix C*** for detailed calculations.

Table 4
Wastewater Allowance

Design Parameter	Total Flow (L/s)
Estimated Average Dry Weather Flow	0.73
Estimated Peak Dry Weather Flow	2.94
Estimated Peak Wet Weather Flow	3.33

As the sanitary sewer within Leikin Drive is more than 7m below existing grade to avoid deep connections, it is proposed that the development will connect to the 375 mm diameter sanitary sewer within Bill Leathem Drive. Servicing details are shown by ***SSSP-1*** and ***SSP-2*** included with this report.

Table 5 summarizes the ***City Standards*** employed in the design of the proposed wastewater sewer system.

Table 5
Wastewater Design Criteria

Design Parameter	Value
Church	30 L/seat/d
Assembly Hall	30 L/seat/d
Office	75 L/9.3m^2/d
Peaking Factor	Harmon's Peaking Factor. Max 4.0, Min 2.0
Infiltration and Inflow Allowance	0.28L/s/ha
Sanitary sewers are to be sized employing the Manning's Equation	$Q = \frac{1}{n} AR^{2/3} S^{1/2}$
Minimum Sewer Size	200mm 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 6 demonstrates the anticipated peak flow from the proposed Phase I development. See ***Appendix C*** for associated calculations.

Table 6
Summary of Estimated Peak Wastewater Flow – Phase I

Design Parameter	Total Flow (L/s)
Estimated Average Dry Weather Flow	0.08
Estimated Peak Dry Weather Flow	0.12
Estimated Peak Wet Weather Flow	0.51

Table 7 demonstrates the anticipated peak flow from the proposed Phase II development. See ***Appendix C*** for associated calculations.

Table 7
Summary of Estimated Peak Wastewater Flow – Phase II

Design Parameter	Total Flow (L/s)
Estimated Average Dry Weather Flow	0.16
Estimated Peak Dry Weather Flow	0.24
Estimated Peak Wet Weather Flow	0.64

Preliminary estimates of the sanitary flow based on the concept plan provided in ***Drawings/Figures*** anticipates an ultimate peak wet weather flow of ***0.64 L/s***. Detailed calculations are included in ***Appendix C*.**

Based on the analysis above, sufficient capacity is available in the local sewers to accommodate the contemplated development.

4.3 Wastewater Servicing Conclusions

Based on the information from the ***LDH Servicing Study***, sufficient capacity is available to accommodate the anticipated ***0.64 L/s*** ultimate peak wet weather flow from the contemplated development.

The contemplated 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 Rideau River watershed. The existing lands are currently undeveloped and contain no stormwater management controls for flow attenuation. The subject property currently surface drains to the existing right-of-ways fronting the subject property where it is collected by the municipal catchbasin system or sheet drains towards the ***LDHSMF***.

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).

Based on the information from the ***LDH Servicing Study***, the subject site is expected to store up to the 100-year storm event onsite; an excerpt has been included in ***Appendix D*****.**

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:

- Establish an allowable release rate of 48.9 L/s/ha based on the ***LDH Servicing Study*** and the correspondence included in ***Appendix A***.
- Attenuate all storms up to and including the City of Ottawa 100-year design event are to be attenuated on site.
- No quality controls are anticipated as the municipal storm sewers outlet to the ***LDHSMF***.

Based on the above the allowable release rate for the proposed development is ***69.9 L/s***.

5.3 Proposed Stormwater Management System

In order to achieve the allowable post-development stormwater runoff release rate established in ***Section 5.2***, the proposed development will employ surface storage that will outlet to the existing 1350 mm diameter storm sewer within Bill Leathem Drive.

The private stormwater sewer system has been sized to control and store up to the 100-year storm runoff rate in accordance with the ***City Standards***. Detailed layout and sizing is illustrated by ***SSP-1*** and ***SSP-2*** included with this report and the sewer calculation sheet in ***Appendix D***.

A vegetated swale is proposed to promote infiltration and provide storage. The swale is proposed to run along the south side of the building towards a catch basin North East of the building, to capture and direct stormwater runoff from the landscaped areas to the attenuated storm sewers system on site. In Phase I, a temporary swale within the proposed Phase II footprint is proposed to direct stormwater runoff toward the ***LDHSMF***.

Flow from rooftops will discharge to surface to the vegetated swale.

Runoff from the parking area will be attenuated by a 100mm Inlet Control Device (ICD) located in ***STM101***, as illustrated by ***SSP-1*** and ***SSP-2***. Detailed calculations are located in ***Appendix D***.

Stormwater drainage areas are shown by ***SWM-1*** and ***SWM-2*** along with detailed calculations included in ***Appendix D***.

Unattenuated areas will flow overland to the existing municipal right-of-way and ***LDHSMF***. Unattenuated areas will be compensated for in areas with controls. Servicing details are illustrated by ***SSP-1*** and ***SSP-2*** in ***Drawings/Figures***.

Table 8 summarizes the Phase I post-development flow rates, unattenuated areas are compensated for in areas with flow attenuation controls.

Table 8
Stormwater Flow Rate Summary - Phase I

Control Area	5-Year Release Rate	5-Year Storage	100-Year Release Rate	100-Year Storage	100-Year Available Storage
	(L/s)	(m^3)	(L/s)	(m^3)	(m^3)
Unattenuated Areas	14.0	0.0	30.0	0.0	0.0
Attenuated Areas	38.3	84.9	38.9	256.8	291.4
Total	**52.3**	**84.9**	**68.9**	**256.8**	**291.4**

Table 9 summarizes the Phase II post-development flow rates, unattenuated areas are compensated for in areas with flow attenuation controls.

Table 9
Stormwater Flow Rate Summary – Phase II

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	14.0	0.0	29.9	0.0	0.0
Attenuated Areas	38.3	99.8	39.0	296.0	307.9
Total	**52.3**	**99.8**	**68.9**	**296.0**	**307.9**

To attenuate flow to the established release rate of ***69.9 L/s***, it is estimated that approximately ***256.8 m^3*** of storage will be required on site in Phase I, and ***296.0 m^3*** of storage will be required on site in Phase II; 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 Standards***.

To attenuate flow to the established release rate of ***69.9 L/s***, it is estimated that approximately ***296.0 m^3*** of storage will be required.

Based on the **LDH Servicing Study**, stormwater quality controls are not required.

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

6.0 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 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.

7.0 UTILITIES

The proposed development will be coordinated and approved by the utility company having jurisdiction.

8.0 CONCLUSION AND RECOMMENDATIONS

David Schaeffer Engineering Ltd. (DSEL) has been retained to prepare an Assessment of Adequacy of Public Services report in support of the application for a Zoning By-law Amendment (ZBLA) and Site Plan Control (SPC) at 102 Bill Leathem Drive. The preceding report outlines the following:

- The FUS method for estimating fire flow indicated a max of ***9,000 L/min*** is required for the proposed development, based on boundary conditions provided by the City the existing municipal water infrastructure is capable of providing the proposed development with water within the City's required pressure range;
- The contemplated development is anticipated to have a peak wet weather flow of ***0.64 L/s***; Based on the ***LDH Servicing Study,*** the existing municipal sewer infrastructure has sufficient capacity to support the development;
- Based on ***LDH Servicing Study***, the contemplated development is required to attenuate post development flows to an equivalent release rate of ***48.9 L/s/ha***; a max of ***296.0 m^3*** is required to meet the release rate;
- It is proposed that stormwater objectives will be met through storm water retention via surface storage. A 100mm ICD will be installed in ***STM101*** to restrict runoff;
- Based on consultation with the City of Ottawa, stormwater quality controls are not required.

Prepared by,
David Schaeffer Engineering Ltd.

Per: Alison J. Gosling

Reviewed by,
David Schaeffer Engineering Ltd.

Per: Robert D. Freel, P. Eng.

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APPENDIX A

Pre-Consultation

DEVELOPMENT SERVICING STUDY CHECKLIST

16-855 12/04/2016

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.	N/A
☐	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	N/A

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 7.0
☐	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

From: Hall, James <James.Hall@ottawa.ca>
Sent: February-03-15 3:40 PM
To: 'Robert Freel'
Cc: Adam Fobert
Subject: RE: South Merivale Business Park

Hi Bobby, Adam,

I concur with your approach outlined below.

Regards,
Jim

From: Robert Freel [mailto:rfreel@dsel.ca]
Sent: Monday, February 02, 2015 5:44 PM
To: Hall, James
Cc: Adam Fobert
Subject: South Merivale Business Park

Good afternoon James,

As a follow up to your meeting with Adam we have been able to find the following information concerning the South Merivale Business Park with regards to servicing. The information has been extracted from the servicing study for the Longfields/Davidson Heights area attached:

* Sanitary Flow Allowance – 45,000 L/ha/day based on the reference below;
  - Site Plan (pg. 11) indicates an industrial flow was used and the chart at the bottom of (pg. 16) indicates the flow rate assumed based on MOE guidelines.

* Storm Sewers – 0.7 cfs/acre or 48.9L/s/ha based on the references and assumptions below;
  - City of Nepean Design Guidelines indicate storm sewers are to be sized to convey 5-year flow (pg. 44)
  - All CBs are to include inlet restriction to 0.7 cfs (pg. 44)
  - Table 3 (pg. 49) indicates 58 CBs for the subject area 901 (58.5 acres) as show by storm drainage figure (pg. 154)
  - Results in a release rate of 0.7 cfs/acre or 48.9L/s/ha
  - All industrial and commercial lands are to contain the 100-year event. (pg. 22)

Can you confirm the criteria above or if further/updated information is available, provide the relevant information as necessary.

Please feel free to contact Adam or me to discuss.

Thank you,

Bobby Freel, EIT.
DSEL
david schaeffer engineering ltd.

120 Iber Road, Unit 203
Stittsville, ON K2S 1E9
phone: (613) 836-0856 ext.258
cell: (613) 314-7675
email: rfreel@DSEL.ca

Alison Gosling

Subject: FW: 102 Bill Leathem Drive - ECA Requiremetn

Sent: Monday, May 9, 2016 1:02 PM
To: Alison Gosling <agosling@dsel.ca>
Cc: Robert Freel <rfreel@dsel.ca>
Subject: RE: 102 Bill Leathem Drive - ECA Requiremetn

Hi Alison,

I agree that the site would not be considered industrial land therefore providing the proposed SWMF meets the other approval exemption requirements, the site would be exempt from requiring an ECA:

Subsection 53(1) and (3) of the Act do not apply to the use, operation, establishment, alteration, extension or replacement of or a change in a storm water management facility that,

- *(a) is designed to service one lot or parcel of land;*
- *(b) discharges into a storm sewer that is not a combined sewer;*
- *(c) does not service industrial land or a structure located on industrial land; and*
- *(d) is not located on industrial land.*

Let me know if you have any further questions.

Regards,

Emily Diamond
Environmental Officer
Ministry of the Environment and Climate Change

Ottawa District Office
2430 Don Reid Drive
Ottawa, Ontario, K1H 1E1
Tel: 613-521-3450 ext 238
Fax: 613-521-5437
e-mail: emily.diamond@ontario.ca

From: Alison Gosling [mailto:agosling@dsel.ca]
Sent: April-19-16 3:52 PM
To: Diamond, Emily (MOECC)
Cc: Robert Freel
Subject: 102 Bill Leathem Drive - ECA Requiremetn

Good morning Emily,

We just wanted to touch base with you regarding a proposed development we are working on located at 102 Bill Leathem Drive.

The existing site is currently an undeveloped parcel within the South Merivale Business Park. The proposed 1.4ha development consists of a 1-story church building.

The current site surface either drains to the existing right-of-ways fronting the subject property where it is collected by the municipal catchbasin system and directed to or sheet drains overland to the Longfields/Davidson Heights Stormwater Management Facility. Proposed stormwater controls will use subsurface storage, and surface ponding to attenuate the release rate to City of Ottawa requirements.

Our understanding is this project would typically require an Environmental Compliance Approval through the Ministry of the Environment and Climate Change. Due to the industrial zoning it does not fall under the approval exemption set out in Ontario Regulation 525/98 as part of the Ontario Water Resources Act.

Subsection 53(1) and (3) of the Act do not apply to the use, operation, establishment, alteration, extension or replacement of or a change in a storm water management facility that,

- *(a) is designed to service one lot or parcel of land;*
- *(b) discharges into a storm sewer that is not a combined sewer;*
- *(c) does not service industrial land or a structure located on industrial land; and*
- *(d) is not located on industrial land.*

It is our understanding that the intent of the regulation is to regulate and review industrial lands. The proposed development does not contemplate industrial uses, nor does it present opportunities to support this type of use; no loading docks are proposed, there is no propose storage of dangerous goods or use/discharge of industrial chemicals, etc..

We hope you could support and provide a comment with regards to our assumption above that this property should be exempt from requiring an ECA. Please feel free to call to discuss this further.

Thanks in advance,

Alison Gosling
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

The Salvation Army
102 Bill Leathem Drive
Proposed Site Conditions
Phase I

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

			Avg. Daily		Max Day		Peak Hour	
Property Type	**Unit Rate**	**Units**	m^3/d	L/min	m^3/d	L/min	m^3/d	L/min
Church with Kitchen	30 L/seat/d	184	5.52	3.8	8.3	5.8	14.9	10.4
Assembly Hall	30 L/seat/d	40	0.13	0.1	0.2	0.1	0.3	0.2
Office	75 L/9.3m^2/d	6	0.05	0.0	0.1	0.1	0.1	0.1
	Total I/CI Demand		5.7	4.0	8.5	5.9	15.4	10.7
	Total Demand		**5.7**	**4.0**	**8.5**	**5.9**	**15.4**	**10.7**

The Salvation Army
102 Bill Leathem Drive
Proposed Site Conditions
Phase II

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

			Avg. Daily		Max Day		Peak Hour	
Property Type	**Unit Rate**	**Units**	m^3/d	L/min	m^3/d	L/min	m^3/d	L/min
Church with Kitchen	30 L/seat/d	426	12.78	8.9	19.2	13.3	34.5	24.0
Assembly Hall	30 L/seat/d	40	0.13	0.1	0.2	0.1	0.3	0.2
Office	75 L/9.3m^2/d	6	0.05	0.0	0.1	0.1	0.1	0.1
Total I/CI Demand			13.0	9.0	19.4	13.5	35.0	24.3
Total Demand			**13.0**	**9.0**	**19.4**	**13.5**	**35.0**	**24.3**

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: Ordinary Construction

C	1		*Type of Construction Coefficient per FUS Part II, Section 1*
A	1128.0	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	7388.9	L/min	
	7000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Combustible	0%	
Fire Flow	**7000.0**	**L/min**

3. Reduction for Sprinkler Protection

Non-Sprinklered	0%	
Reduction	**0**	**L/min**

4. Increase for Separation Distance

N	>45m	0%	
S	>45m	0%	
E	30.1m-45m	5%	
W	>45m	0%	
	% Increase	**5%**	*value not to exceed 75% per FUS Part II, Section 4*

Increase	**350.0**	**L/min**

Total Fire Flow

Fire Flow	7350.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	7000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by Vandenberg & Wildeboer Architects.
-Calculations based on Fire Underwriters Survey - Part II

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: Ordinary Construction

C	1		*Type of Construction Coefficient per FUS Part II, Section 1*
A	1696.2	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	9060.7	L/min	
	9000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Combustible	0%	
Fire Flow	**9000.0**	**L/min**

3. Reduction for Sprinkler Protection

Non-Sprinklered	0%	
Reduction	**0**	**L/min**

4. Increase for Separation Distance

N	>45m	0%	
S	>45m	0%	
E	30.1m-45m	5%	
W	>45m	0%	
	% Increase	**5%**	*value not to exceed 75% per FUS Part II, Section 4*

Increase	**450.0**	**L/min**

Total Fire Flow

Fire Flow	9450.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	9000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by Vandenberg & Wildeboer Architects.
-Calculations based on Fire Underwriters Survey - Part II

Boundary Conditions at 102 Bill Lethem

Information Provided:

Date provided: 06 Apr 2016

Criteria	Demand (L/s) for Phase-1	Demand (L/s) for Ultimate Cond.
Average Demand	0.07	0.15
Maximum Daily Demand	0.10	0.22
Peak Hourly Demand	0.18	0.40
Fire Flow Demand	117	150
Maximum Daily + Fire Flow Demand	117.1	150.22

Location:

Phase-1:

Results:

Connection-1:

Criteria	Head (m)	Pressure (psi)
Max HGL	147.6	82.9
PKHR	125.2	50.9
MXDY + Fire Flow (117.1 L/s)	125.2	50.9

Phase-2:

Results:

Connection-1:

Criteria	Head (m)	Pressure (psi)
Max HGL	147.6	82.9
PKHR	125.2	50.9
MXDY + Fire Flow (150.22 L/s)	124.4	49.9

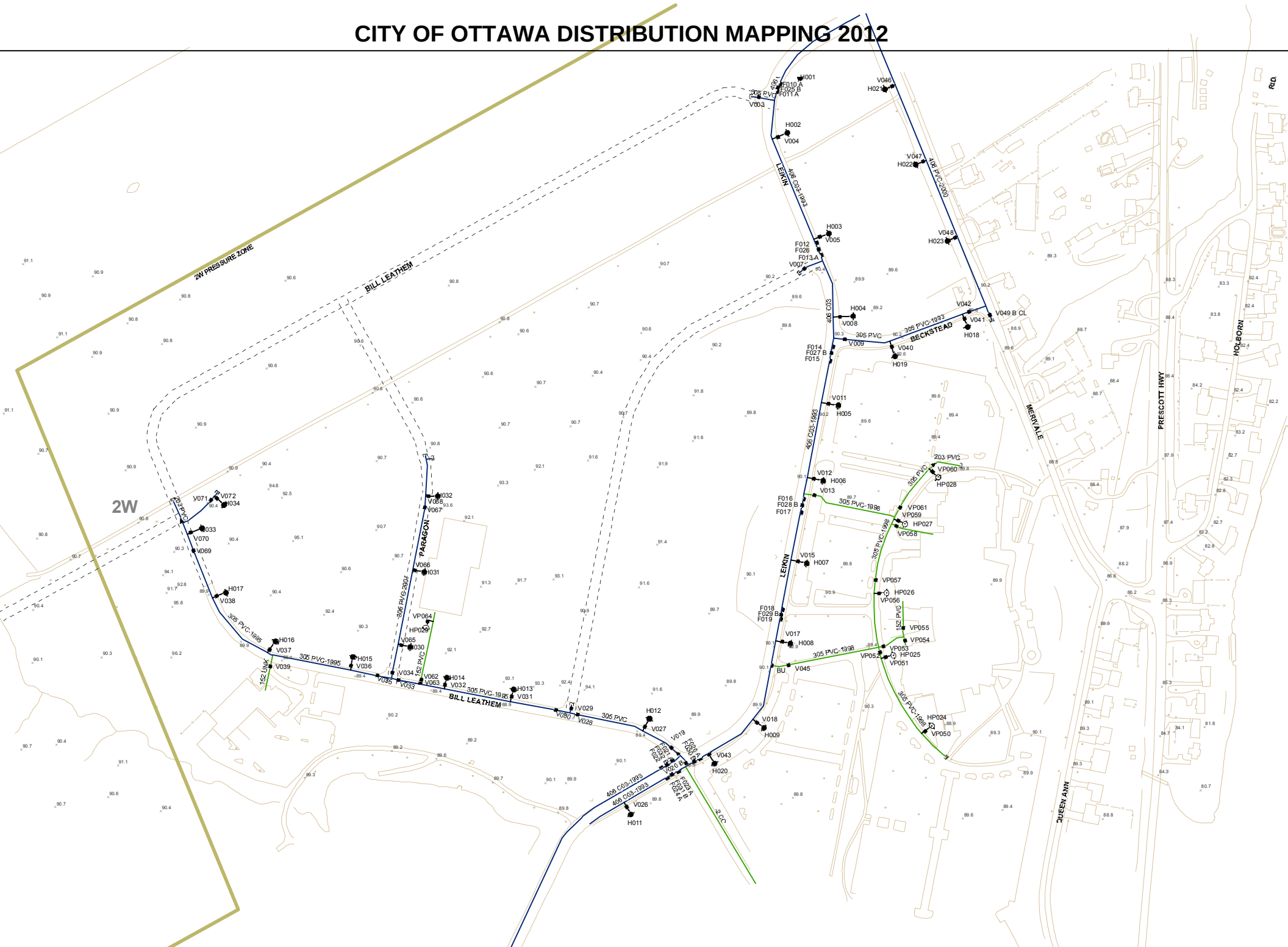
Considerations:

1. According to the City of Ottawa Water Design Guidelines as well as the Ontario Building Code, the maximum pressure at any point within a distribution system shall not exceed 80 psi in occupied areas. Measures should be taken to try to reduce the residual pressure below 80 psi without the use of special pressure control equipment. In circumstances where the residual pressure cannot be reduced below 80 psi without the use of pressure control equipment, a pressure reducing valve (**PRV**) should be installed at site.

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. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.

CITY OF OTTAWA DISTRIBUTION MAPPING 2012



APPENDIX C

Wastewater Collection

The Salvation Army
102 Bill Leathem Drive
Wastewater Allowance

Wastewater Design Flows per Unit Count
Per LDH Servicing Study

Site Area 1.41 **ha**

Extraneous Flow Allowances

Infiltration / Inflow **0.39 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)
Commercial floor space*	5	$L/m^2/d$		0.00
Hospitals	900	L/bed/d		0.00
School	70	L/student/d		0.00
Industrial	45,000	L/gross ha/d	1.4	0.73

Average I/C/I Flow **0.73**

Peak Institutional / Commercial Flow 0.00
Peak Industrial Flow** 2.94
Peak I/C/I Flow **2.94**

** 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	**0.73 L/s**
Total Estimated Peak Dry Weather Flow Rate	**2.94 L/s**
Total Estimated Peak Wet Weather Flow Rate	**3.33 L/s**

The Salvation Army
102 Bill Leathem Drive
Proposed Development
Phase I

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

Site Area 1.41 **ha**

Extraneous Flow Allowances

Infiltration / Inflow	**0.39**	**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)
Church with Kitchen	30 L/seat/d	184	0.06
Assembly Hall	30 L/seat/d	40	0.01
Office	75 L/9.3m^2/d	6	0.00

Average I/C/I Flow	**0.08**
Peak Institutional / Commercial Flow	0.12
Peak Industrial Flow**	0.00
Peak I/C/I Flow	**0.12**

** 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	**0.08 L/s**
Total Estimated Peak Dry Weather Flow Rate	**0.12 L/s**
Total Estimated Peak Wet Weather Flow Rate	**0.51 L/s**

The Salvation Army
102 Bill Leathem Drive
Proposed Development
Phase II

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

Site Area 1.41 **ha**

Extraneous Flow Allowances

Infiltration / Inflow	**0.39**	**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

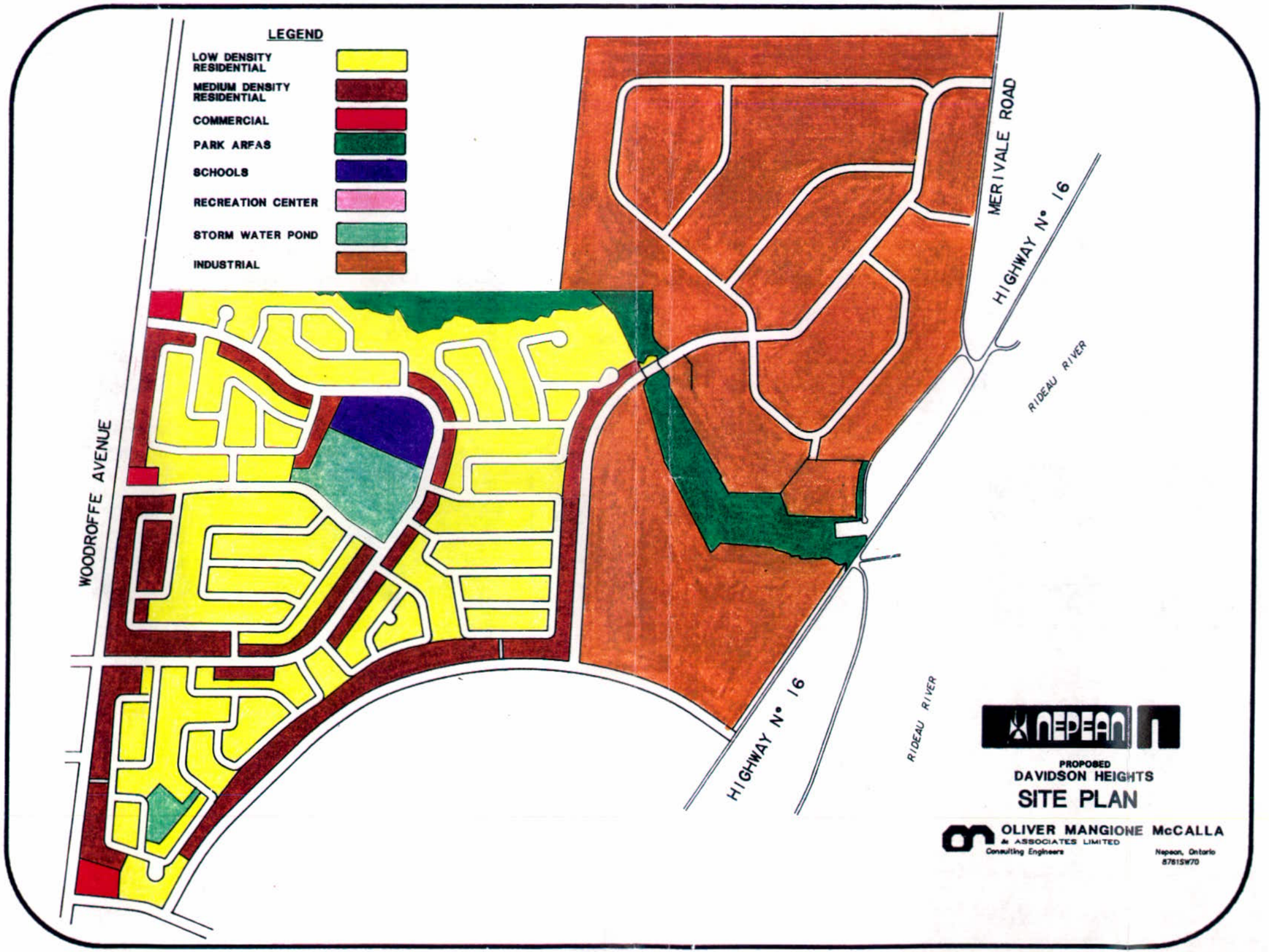
Property Type	Unit Rate	No. of Units	Avg Wastewater (L/s)
Church with Kitchen	30 L/seat/d	426	0.15
Assembly Hall	30 L/seat/d	40	0.01
Office	75 L/9.3m^2/d	6	0.00

Average I/C/I Flow	**0.16**
Peak Institutional / Commercial Flow	0.24
Peak Industrial Flow**	0.00
Peak I/C/I Flow	**0.24**

** 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	**0.16 L/s**
Total Estimated Peak Dry Weather Flow Rate	**0.24 L/s**
Total Estimated Peak Wet Weather Flow Rate	**0.64 L/s**


LEGEND
LOW DENSITY RESIDENTIAL
MEDIUM DENSITY RESIDENTIAL
COMMERCIAL
PARK AREAS
SCHOOLS
RECREATION CENTER
STORM WATER POND
INDUSTRIAL
MERIVALE ROAD
HIGHWAY N° 16
RIDEAU RIVER
WOODROFFE AVENUE
HIGHWAY N° 16
RIDEAU RIVER
NEPEAN
PROPOSED
DAVIDSON HEIGHTS
SITE PLAN
OLIVER MANGIONE McCALLA
& ASSOCIATES LIMITED
Consulting Engineers
Nepean, Ontario
8781SW70

If the West Rideau Collector is not in place before the allowable population growth of 3,200 people is reached, a temporary expansion of the Merivale Pumping Station will be required.

2.2 Proposed Sanitary Sewers

Sketches SK-2 and SK-3 depict the proposed trunk sanitary sewers within the Longfields Community and Davidson Heights respectively. Drawings 91-8461-SAN1 and 91-8461-SAND2 depict the gravity limits of the proposed sanitary sewers in each of the communities, demonstrating how future development areas will be integrated into the proposed trunk sanitary sewer systems. These drawings also depict the information contained on sketches SK-2 and SK-3 in more detail, and are located in the pouches at the back of this report.

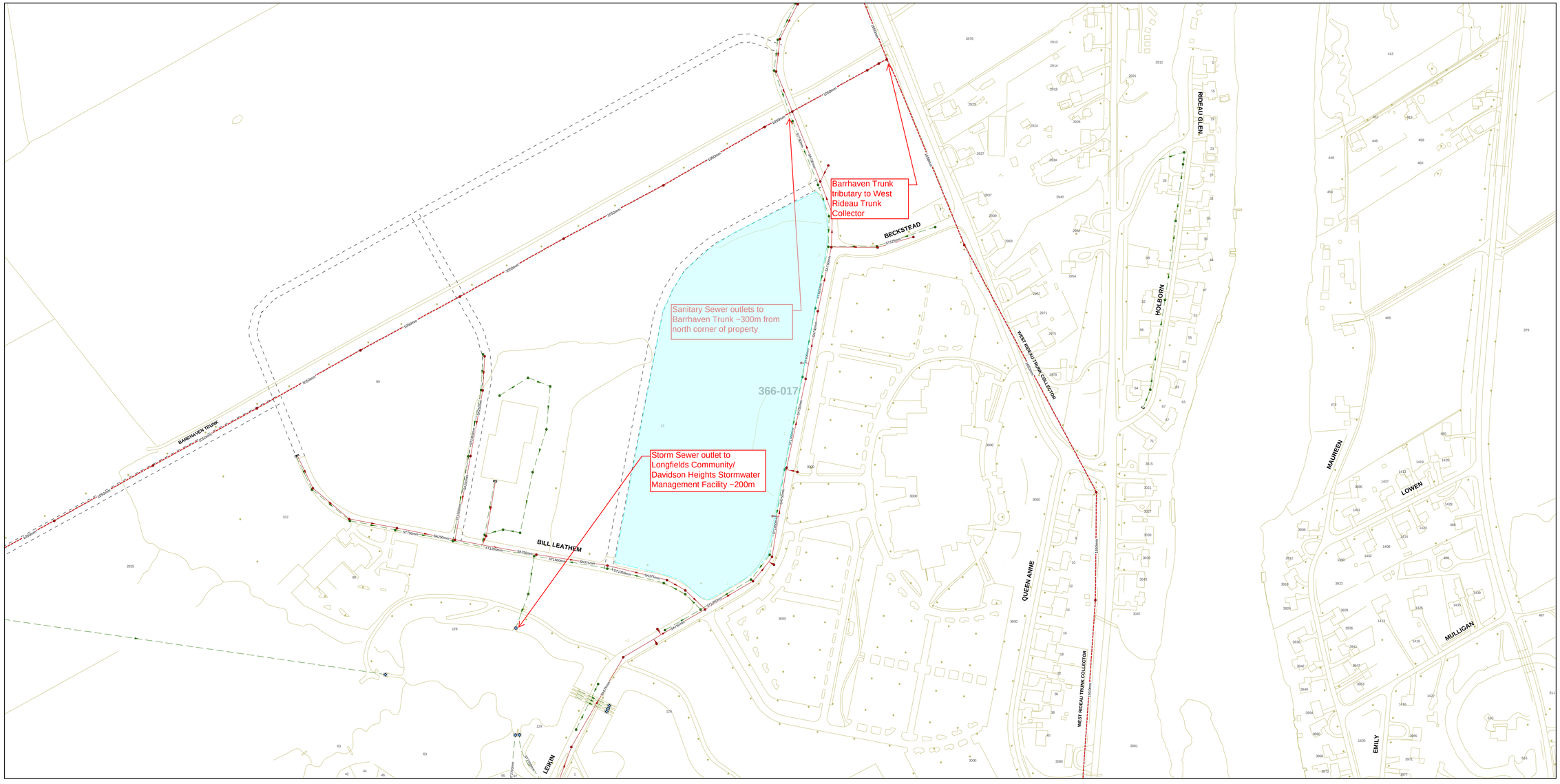
The following design criteria were used to size the trunk facilities.

TABLE 1

SANITARY SEWER DESIGN CRITERIA

DESCRIPTION	DESIGN CRITERIA	PEAKING FACTOR
Residential	450 L/cap/day (* 44.5 people/ha)	Hammon William Equation
Commercial	37,128 L/ha/day (85 persons/ha)	Hammon William Equation
Institutional	37,128 L/ha/day (85 persons/ha)	Hammon William Equation
Industrial	45,000 L/ha/day	MOE Graph
Infiltration	0.11 L/ha/day	

* Provided by City of Nepean Planning Staff



2008
SANITARY & STORM COLLECTION SYSTEM

Department of Infrastructure Services and Community Sustainability

0 25 50 100 150 200 250 Meters

Scale 1 : 2500 approx.

Ottawa ©

Legend

Regulator	Storm Outlet	Sanitary Manhole
Storm Pump Station	Storm Manhole	Sanitary Pipe
Sanitary Pump Station	Storm Pipe	Combined Manhole
Wastewater Treatment Plant	Sanitary Trunk Sewer	Combined Pipe

PIPE EQUIVALENTS

nominal (mm)	actual (inches)	nominal (mm)	actual (inches)	nominal (mm)	actual (inches)
100	4	675	27	1800	72
150	6	750	30	1950	78
200	8	825	33	2025	80
250	10	900	36	2100	84
300	12	975	39	2250	90
375	15	1050	42	2400	96
400	16	1200	48	2550	102
450	18	1350	54	2700	108
525	21	1500	60	2850	114
600	24	1650	66	3000	120

PIPE MATERIALS

ABS - ACRYL BUTADENE STYRENE
AC - ASBESTOS CEMENT
BRICK - BRICK
CLAY - CLAY
CONC - CONCRETE
CONPP - CONCRETE PRESSURE PIPE
CONR - REINFORCED CONCRETE PIPE
CONX - EXTRA STRENGTH CONCRETE PIPE
CORI - CORRUGATED IRON PIPE
CSP - CORRUGATED STEEL PIPE
CSPA - ASPHALT COATED CSP
DI - DUCTILE IRON PIPE
FRP - FIBERGLASS REINFORCED PLASTIC PIPE
GALV - GALVANIZED PIPE
KI - KITEC PIPE
PE - POLYETHYLENE PIPE (DR17)
PP - POLYPROPYLENE PIPE
PVC - POLYVINYL CHLORIDE PIPE
ST - STEEL PIPE
STC - CONCRETE LINED STEEL PIPE
UCI - UNLINED CAST IRON PIPE
UNK - UNKNOWN MATERIAL

364-019	**366-019**	**368-019**
364-018	**366-018**	**368-018**
364-017	**366-017**	**368-017**
364-016	**366-016**	**368-016**
364-015	**366-015**	**368-015**

APPENDIX D

Stormwater Management

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

Target Flow Rate

Area 1.43 ha

5-year
Q 48.9 L/s/ha * Per the Longfields/Davidson Heights Serviceability Study, prepared by Oliver, Mangione, McCalla & Associates,
Q 69.9 L/s dated February 1993

Estimated Post Development Peak Flow from Unattenuated Areas

U1
Total Area 0.247 ha
C 0.220 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)
12.2	93.7	14.2	14.2	0.0	0.0	160.4	30.4	30.4	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

Area ID A1+EX1

Available Sub-surface Storage

Maintenance Structures

Stage Attenuated Areas Storage Summary

	Surface Storage				Surface and Subsurface Storage			
	Stage	A	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	85.97		0.00			0.0	0.0	0.00
Storage Pipe SL	86.23		0.26	0.26	0.0	0.0	10.9	0.00
Storage Pipe OBV	86.50		0.53	0.26	0.0	0.0	15.4	0.00
T/L	89.05	0.4	3.08	2.55	0.3	0.3	37.2	0.00
0.15 m ponding	89.20	689.5	3.23	0.15	35.3	35.7	38.1	0.26
0.3 m ponding	89.35	2990.4	3.38	0.15	255.8	291.4	39.0	2.08

* V=Incremental storage volume

**V_{acc}=Total surface and sub-surface

† $Q_{release}$ = Release rate claclulated from orifice equation

$$V = \frac{1}{3} \times d \times (A_1 + A_2 + \sqrt{A_1 \times A_2})$$

Where *V = Surface Ponding Volume (m^3)*
d = delta d (m)
A = Ponding Area (m^2)

$$Q = C_d \times A \times \sqrt{2 \times g \times (h_o - \frac{1}{2}D)}$$

Where *Q = Release rate (cms)*
C_d =Discharge Coefficient (0.61)
A= Area of the orifice(m^2) 0.008 m²
g =gravitational constant (9.81m/s^2)
$h_{o\,eff}$ =Effective head above the orifice due to waterlevel at outlet
D=Diameter of the orifice (m)

Orifice Location **STM101** **Dia** 100

Total Area 1.18 ha

C 0.47 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	161.8	38.3	123.4	74.1	178.6	346.5	38.9	307.6	184.6
15	83.6	129.7	38.3	91.4	82.3	142.9	277.3	38.9	238.4	214.6
20	70.3	109.1	38.3	70.8	84.9	120.0	232.8	38.9	193.9	232.6
25	60.9	94.5	38.3	56.2	84.3	103.8	201.5	38.9	162.6	243.9
30	53.9	83.7	38.3	45.4	81.7	91.9	178.3	38.9	139.4	250.9
35	48.5	75.3	38.3	37.0	77.7	82.6	160.2	38.9	121.4	254.8
40	44.2	68.6	38.3	30.3	72.7	75.1	145.8	38.9	106.9	256.6
45	40.6	63.1	38.3	24.8	66.9	69.1	134.0	38.9	95.1	256.8
50	37.7	58.5	38.3	20.1	60.4	64.0	124.1	38.9	85.2	255.6
55	35.1	54.5	38.3	16.2	53.5	59.6	115.7	38.9	76.8	253.5
60	32.9	51.1	38.3	12.8	46.2	55.9	108.5	38.9	69.6	250.5
65	31.0	48.2	38.3	9.9	38.6	52.6	102.2	38.9	63.3	246.7
70	29.4	45.6	38.3	7.3	30.6	49.8	96.6	38.9	57.7	242.4
75	27.9	43.3	38.3	5.0	22.4	47.3	91.7	38.9	52.8	237.6
80	26.6	41.2	38.3	2.9	14.1	45.0	87.3	38.9	48.4	232.4
85	25.4	39.4	38.3	1.1	5.5	43.0	83.4	38.9	44.5	226.7
90	24.3	37.7	37.7	0.0	0.0	41.1	79.8	38.9	40.9	220.8
95	23.3	36.2	36.2	0.0	0.0	39.4	76.5	38.9	37.6	214.5
100	22.4	34.8	34.8	0.0	0.0	37.9	73.6	38.9	34.7	207.9
105	21.6	33.5	33.5	0.0	0.0	36.5	70.8	38.9	31.9	201.2
110	20.8	32.3	32.3	0.0	0.0	35.2	68.3	38.9	29.4	194.1

5-year $Q_{attenuated}$ 38.31 L/s **100-year $Q_{attenuated}$ 38.90 L/s**

5-year Max. Storage Required 84.9 m^3 **100-year Max. Storage Required 256.8 m^3**

Est. 5-year Storage Elevation 89.23 m **Est. 100-year Storage Elevation 89.33 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	14.2	0.0	30.4	0.0	0.0
Attenutated Areas	38.3	84.9	38.9	256.8	291.4
Total	**52.5**	**84.9**	**69.2**	**256.8**	**291.4**

										Sewer Data								
Area ID	**Up**	**Down**	**Area**	**C**	**Indiv AxC**	**Acc AxC**	**T_c**	**I**	**Q**	**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)**	**(-)**
A101	CB101	STM103	0.133	0.43	0.06	0.06	10.0	104.2	16.6	200	1.00	11.0	0.031	0.050	1.04	32.8	0.2	0.51
							10.2											
A102	CB102	STM103	0.244	0.34	0.08	0.08	10.0	104.2	23.8	200	1.00	11.0	0.031	0.050	1.04	32.8	0.2	0.73
							10.2											
A103	CB103	STM103	0.180	0.81	0.15	0.15	10.0	104.2	42.3	250	1.00	8.3	0.049	0.063	1.21	59.5	0.1	0.71
							10.1											
A104	CB104	STM103	0.178	0.53	0.10	0.10	10.0	104.2	27.5	250	1.00	8.3	0.049	0.063	1.21	59.5	0.1	0.46
							10.1											
	STM103	STM102	0.000	0.00	0.00	0.38	10.2	103.3	109.2	450	0.20	72.3	0.159	0.113	0.80	127.5	1.5	0.86
	STM102	STM101			0.00	0.38	11.7	96.1	101.6	450	0.20	10.6	0.159	0.113	0.80	127.5	0.2	0.80
							11.9											
A105	CB'L'106	CB'T'107	0.419	0.41	0.17	0.17	10.0	104.2	49.9	300	0.60	32.4	0.071	0.075	1.06	74.9	0.5	0.67
	CB'T'107	CB'T'108			0.00	0.17	10.5	101.6	48.7	300	0.60	28.0	0.071	0.075	1.06	74.9	0.4	0.65
	CB'T'108	CB105			0.00	0.17	10.9	99.4	47.7	300	0.60	24.5	0.071	0.075	1.06	74.9	0.4	0.64
	CB105	STM101			0.00	0.17	11.3	97.6	46.8	300	1.00	15.6	0.071	0.075	1.37	96.7	0.2	0.48
							11.5											
	STM101	STM104	0.000	0.00	0.00	0.55	11.9	95.1	146.2	525	0.16	16.2	0.216	0.131	0.79	172.0	0.3	0.85
	STM104	EX			0.00	0.55	12.2	93.7	144.0	525	0.16	7.3	0.216	0.131	0.79	172.0	0.2	0.84
							12.4											

A101

	Imperv.	Perv	Total
Area	0.044	0.089	0.133
C	0.9	0.2	0.43

A102

	Imperv.	Perv	Total
Area	0.048	0.197	0.244
C	0.9	0.2	0.34

A103

	Imperv.	Perv	Total
Area	0.157	0.023	0.180
C	0.9	0.2	0.81

A104

	Imperv.	Perv	Total
Area	0.085	0.093	0.178
C	0.9	0.2	0.53

A105

	Imperv.	Perv	Total
Area	0.127	0.292	0.419
C	0.9	0.2	0.41

A1

	Imperv.	Perv	Total
Area	0.461	0.694	1.155
C	0.9	0.2	0.48

U1

	Imperv.	Perv	Total
Area	0.007	0.240	0.247
C	0.9	0.2	0.22

EX1

	Imperv.	Perv	Total
Area	0.000	0.028	0.028
C	0.9	0.2	0.20

A1+EX1

	Imperv.	Perv	Total
Area	0.461	0.722	1.183
C	0.9	0.2	0.47

SITE

	Imperv.	Perv	Total
Area	0.468	0.962	1.430
C	0.9	0.2	0.43

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

Target Flow Rate

Area 1.41 ha
C 0.00 Rational Method runoff coefficient

5-year
Q 48.9 L/s/ha * Per the Longfields/Davidson Heights Serviceability Study, prepared by Oliver, Mangione, McCalla &
Q 69.1 L/s Associates, dated February 1993

Estimated Post Development Peak Flow from Unattenuated Areas

U1
Total Area 0.247 ha
C 0.22 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)
12.4	93.1	14.1	14.1	0.0	0.0	159.3	30.1	30.1	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

Area ID A1+EX1

Available Sub-surface Storage

Maintenance Structures

Stage Attenuated Areas Storage Summary

		Surface Storage			Surface and Subsurface Storage			
	Stage	A	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	85.97		0.00			0.0	0.0	0.00
Storage Pipe SL	86.23		0.26	0.26	0.0	0.0	10.9	0.00
Storage Pipe OBV	86.50		0.53	0.26	0.0	0.0	15.4	0.00
T/L	89.05	0.4	3.08	2.55	0.3	0.3	37.2	0.00
0.15 m ponding	89.20	738.7	3.23	0.15	37.8	38.2	38.1	0.28
0.3 m ponding	89.35	3134.5	3.38	0.15	269.7	307.9	39.0	2.19

* V=Incremental storage volume

**V_{acc}=Total surface and sub-surface

† $Q_{release}$ = Release rate claclulated from orifice equation

$$V = \frac{1}{3} \times d \times (A_1 + A_2 + \sqrt{A_1 \times A_2})$$

Where *V = Surface Ponding Volume (m^3)*
d = delta d (m)
A = Ponding Area (m^2)

$$Q = C_d \times A \times \sqrt{2 \times g \times (h_o - \frac{1}{2}D)}$$

Where *Q = Release rate (cms)*
C_d =Discharge Coefficient (0.61)
A= Area of the orifice(m^2) 0.008 m²
g =gravitational constant (9.81m/s^2)
$h_{o\,eff}$ =Effective head above the orifice due to waterlevel at outlet
D=Diameter of the orifice (m)

Orifice Location **STM101** **Dia** 100

Total Area 1.182 ha

C 0.52 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	179.4	38.3	141.0	84.6	178.6	384.3	39.0	345.3	207.2
15	83.6	143.9	38.3	105.5	95.0	142.9	307.5	39.0	268.5	241.7
20	70.3	120.9	38.3	82.6	99.1	120.0	258.1	39.0	219.2	263.0
25	60.9	104.8	38.3	66.5	99.8	103.8	223.5	39.0	184.5	276.8
30	53.9	92.8	38.3	54.5	98.1	91.9	197.7	39.0	158.7	285.7
35	48.5	83.5	38.3	45.2	94.9	82.6	177.7	39.0	138.7	291.4
40	44.2	76.1	38.3	37.7	90.6	75.1	161.7	39.0	122.7	294.6
45	40.6	69.9	38.3	31.6	85.3	69.1	148.6	39.0	109.6	296.0
50	37.7	64.8	38.3	26.5	79.5	64.0	137.6	39.0	98.7	296.0
55	35.1	60.5	38.3	22.1	73.0	59.6	128.3	39.0	89.3	294.8
60	32.9	56.7	38.3	18.4	66.2	55.9	120.3	39.0	81.3	292.7
65	31.0	53.4	38.3	15.1	58.9	52.6	113.3	39.0	74.3	289.9
70	29.4	50.6	38.3	12.2	51.4	49.8	107.2	39.0	68.2	286.3
75	27.9	48.0	38.3	9.7	43.5	47.3	101.7	39.0	62.7	282.2
80	26.6	45.7	38.3	7.4	35.5	45.0	96.8	39.0	57.8	277.7
85	25.4	43.7	38.3	5.3	27.2	43.0	92.4	39.0	53.5	272.7
90	24.3	41.8	38.3	3.5	18.8	41.1	88.5	39.0	49.5	267.3
95	23.3	40.1	38.3	1.8	10.2	39.4	84.9	39.0	45.9	261.6
100	22.4	38.6	38.3	0.2	1.4	37.9	81.6	39.0	42.6	255.6
105	21.6	37.2	37.2	0.0	0.0	36.5	78.5	39.0	39.6	249.3
110	20.8	35.8	35.8	0.0	0.0	35.2	75.8	39.0	36.8	242.8

5-year $Q_{attenuated}$ **38.34 L/s** **100-year $Q_{attenuated}$** **38.98 L/s**

5-year Max. Storage Required **99.8 m^3** **100-year Max. Storage Required** **296.0 m^3**

Est. 5-year Storage Elevation **89.23 m** **Est. 100-year Storage Elevation** **89.34 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	14.1	0.0	30.1	0.0	0.0
Attenutated Areas	38.3	99.8	39.0	296.0	307.9
Total	**52.4**	**99.8**	**69.1**	**296.0**	**307.9**

										Sewer Data								
Area ID	**Up**	**Down**	**Area**	**C**	**Indiv AxC**	**Acc AxC**	**T_c**	**I**	**Q**	**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)**	**(-)**
A101	CB101	STM103	0.133	0.43	0.06	0.06	10.0	104.2	16.6	200	1.00	11.0	0.031	0.050	1.04	32.8	0.2	0.51
							10.2											
A102	CB102	STM103	0.244	0.34	0.08	0.08	10.0	104.2	23.8	200	1.00	11.0	0.031	0.050	1.04	32.8	0.2	0.73
							10.2											
A103	CB103	STM103	0.180	0.81	0.15	0.15	10.0	104.2	42.3	250	1.00	8.3	0.049	0.063	1.21	59.5	0.1	0.71
							10.1											
A104	CB104	STM103	0.178	0.53	0.10	0.10	10.0	104.2	27.5	200	1.00	8.3	0.031	0.050	1.04	32.8	0.1	0.84
							10.1											
	STM103	STM102	0.000	0.00	0.00	0.38	10.2	103.3	109.2	450	0.20	72.3	0.159	0.113	0.80	127.5	1.5	0.86
	STM102	STM101			0.00	0.38	11.7	96.1	101.6	450	0.20	10.6	0.159	0.113	0.80	127.5	0.2	0.80
							11.9											
A105	CB'L'106	CB'T'107	0.419	0.51	0.21	0.21	10.0	104.2	61.6	300	0.60	32.4	0.071	0.075	1.06	74.9	0.5	0.82
	CB'T'107	CB'T'108			0.00	0.21	10.5	101.6	60.0	300	0.60	28.0	0.071	0.075	1.06	74.9	0.4	0.80
	CB'T'108	CB105			0.00	0.21	10.9	99.4	58.8	300	0.60	24.5	0.071	0.075	1.06	74.9	0.4	0.78
	CB105	STM101			0.00	0.21	11.3	97.6	57.7	300	1.00	15.6	0.071	0.075	1.37	96.7	0.2	0.60
							11.5											
	STM101	STM104	0.000	0.00	0.00	0.59	11.9	95.1	156.9	525	0.16	16.2	0.216	0.131	0.79	172.0	0.3	0.91
	STM104	EX			0.00	0.59	12.2	93.7	154.5	525	0.16	7.3	0.216	0.131	0.79	172.0	0.2	0.90
							12.4											

A101

	Imperv.	Perv	Total
Area	0.044	0.089	0.133
C	0.9	0.2	0.43

A102

	Imperv.	Perv	Total
Area	0.048	0.197	0.244
C	0.9	0.2	0.34

A103

	Imperv.	Perv	Total
Area	0.157	0.023	0.180
C	0.9	0.2	0.81

A104

	Imperv.	Perv	Total
Area	0.085	0.093	0.178
C	0.9	0.2	0.53

A105

	Imperv.	Perv	Total
Area	0.184	0.234	0.419
C	0.9	0.2	0.51

U1

	Imperv.	Perv	Total
Area	0.007	0.240	0.247
C	0.9	0.2	0.22

A1

	Imperv.	Perv	Total
Area	0.548	0.607	1.155
C	0.9	0.2	0.53

E1

	Imperv.	Perv	Total
Area	0.000	0.028	0.028
C	0.9	0.2	0.20

A1+EX1

	Imperv.	Perv	Total
Area	0.548	0.635	1.182
C	0.9	0.2	0.52

OLIVER, MANGIONE, McCALLA & ASSOCIATES LIMITED
CONSULTING ENGINEERS, HYDROGEOLOGISTS & PLANNERS

CITY OF NEPEAN
DESIGN GUIDELINES LONGFIELDS/DAVIDSON HEIGHTS
JUNE 10, 1991
REVISION III) & Should be Rev IV June 1992.

1. Drawings should clearly show overland flow routes for both rear yards and streets ensuring flows drain to a storm pond.

2. All storm sewers within Longfields/Davidson Heights Proposed Subdivision should be designed using the Rationale Method with City of Nepean's Standard 5 year IDF curves. The designer should review this sewer size and ensure that the sewer size equals or is larger than the trunk sewer sizes depicted on the Site Servicing Plans 91-8461-D1 and 91-8461-D2.

3. Top of footing elevations should be 0.3 metres (1 foot) above the HGL summarized on Table 1 attached, and should also be 0.3 metres (1 foot) above the obvert of the local storm service used to service the basement. Grading plans should clearly indicate the proposed top of footing elevations.

4. Street road sags are to be a maximum depth of 0.25 metres (10 inches) measured from the top of the catch basin grate to the bottom of the major system overflow.

5. Boulevards should have a minimum of 2 percent crossfall from the property line to the top of the curb. All boulevard grades at the property line should be equal to or greater than the major system overflow for the area, the elevation of the gutter outlet for each road sag should be included on the grading plan.

6. Rear yards will have swale profile grades set at a minimum of 2 percent.

7. Rear yard sags shall be a maximum depth of 0.3 metres (1 foot), measured from the top of the catch basin to the outfall crest of sag.

8. Overland flow routes will have a minimum slope of 0.1 percent (measured from crest to crest) for both rear yards and streets.

9. The grade at the house will be a minimum of 0.3 metres (1 foot) above the major system outlet.

10. Foundation openings for both front and rear yards will be a minimum of 0.4 metres above major system outlets (foundation openings include window sills, and door openings).

11. Rear yard swales are to include drainage tile with geotextile sock, crushed stone, bedding and geotextile cover as per the City of Nepean's design standard (Drawing #NS704).

12. Intermediate catch basins are to be constructed on line with three intermediate catch basins being connected to a standard concrete catch basin equipped with a 0.7 c.f.s. Inlet Control Restrictor (ICD). Tributary drainage areas to a single rear yard ICD should be 0.21 hectares, although 20 percent of rear yard ICD's can drain an area of up to 0.40 hectares.

13. All concrete catch basins are to include a 600 mm sump.

14. All catch basins to include ICD's restricted to 0.7 c.f.s. Designer to supply information on number of ICD's per drainage area. Table III highlights the available number of catch basins for all drainage areas.

    The designer will supply to the City of Nepean a summary of the total number of ICD used and the total corresponding drainage area.

15. All intermediate catch basins are to be installed on private property.

16. The designer is to provide a summary of all available rear yard and street storage, ensuring it corresponds to the information provided on Page 14 of this report.

APPENDIX "2"

LOCATION	IDENTIFICATION NUMBER IN COMPUTER PROGRAM	FLOW RESTRICTION FOR SUB-AREA THAT CONTAINS POND (L/S)	TOTAL CONTRIBUTING DRAINAGE AREA (HA)	MANHOLE NUMBER	TOTAL STORAGE REQUIRED	STORAGE IN ROAD SAGS, PARKING LOTS AND ROOF STORAGE	STORAGE IN REAR YARDS	REQUIRED SIZE OF ATTENUATION FACILITY
Longfields Northwest	58	119	145.3	308	23,326 m^3	10,800	6,000	6,526 m^3
Longfields Northeast	49	99	79.4	29	12,705 m^3	5,000	3,000	4,705 m^3
Longfields Central East	97	79	85.9	107	12,336 m^3	3,800	3,000	5,536 m^3
Longfields South Central	373	238	31.0	49	4,108 m^3	400	740	3,040 m^3
Davidson Heights Central	666	159	97.9	73	17,516 m^3	3,900	5,100	8,516 m^3
Industrial Area	899	No pond	20.0	81	6,131	6,131	-	-
Davidson Heights East	988	No pond	26.5		4,860	2,920	1,940	-

TABLE 3. NUMBER OF ALLOWABLE CB's PER DRAINAGE AREA AND MINIMUM BASEMENT ELEVATIONS

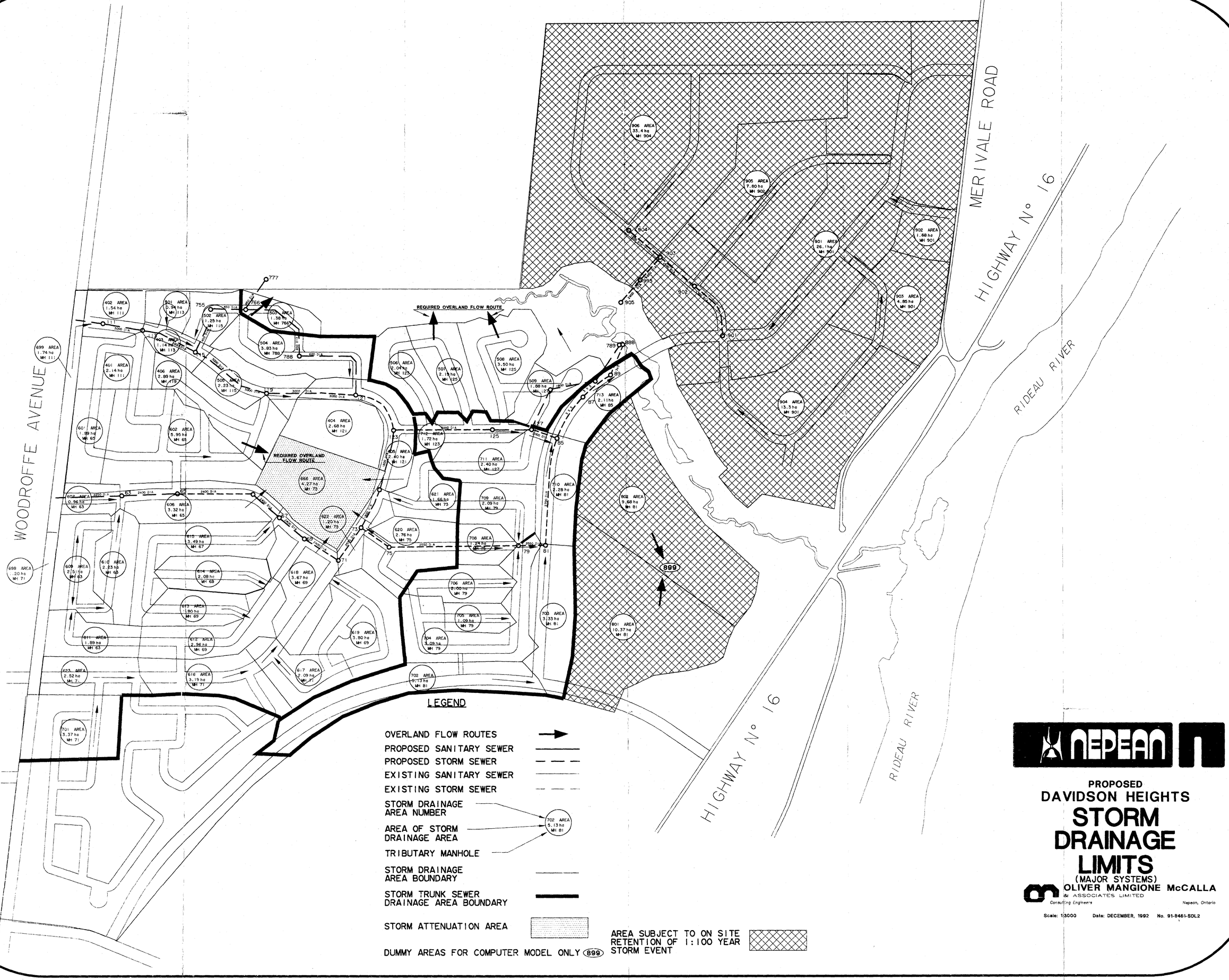
SUBAREA ID.	No. OF CB's	AREA (ACRES)	DESIGNATED MANHOLE	INVERT (m.)	HGL (m.)	MINIMUM BASEMENT ELEVATION (m.)
1	10	7.4	1	95.23	95.56	95.86
2	4	3.1	1	95.23	95.56	95.86
3	4	2.8	1	95.23	95.56	95.86
4	5	3.7	3	93.14	93.53	93.83
5	5	3.7	3	93.14	93.53	93.83
			595	91.87	92.27	92.57
6	2	1.4	5	90.79	91.22	91.52
7	23	17.9	7	90.00	91.01	91.31
8	10	7.9	5	90.79	91.22	91.52
9	1	0.7	7	90.00	91.01	91.31
10	19	14.5	9	89.58	90.84	91.14
11	3	2.2	9	89.58	90.84	91.14
			308	88.46	90.50	90.80
			387	88.15	90.28	90.58
			337	87.27	90.17	90.47
13	8	6.2	388	87.05	90.12	90.42
14	17	13.3	388	87.05	90.12	90.42
26	16	9.7	17	88.55	89.95	90.25
27	9	6.7	215	86.34	89.73	90.03
28	7	5.3	20	88.82	89.92	90.22
23	13	9.9	15	88.39	90.42	90.72
24	6	4.6	15	88.39	90.42	90.72
58	6	23.1	389	86.85	89.93	90.23
50	20	15.7	307	86.80	89.89	90.19
51	16	12.6	307	86.80	89.89	90.19
56	30	23.1	307	86.80	89.89	90.19
			506	86.65	89.73	90.03
			306	86.53	89.70	90.00
57	9	6.8	211	86.73	89.93	90.23
12	8	6.2	11	91.26	91.52	91.82
21	19	14.8	15	88.39	90.42	90.72
53	16	12	305	86.46	89.59	89.89
			515	86.32	89.39	89.69
			516	86.19	89.29	89.59
			517	86.05	89.23	89.53
15	6	11.2	7	90.00	91.01	91.31
16	5	3.9	7	90.00	91.01	91.31
17	13	10	9	89.58	90.84	91.14
18	4	5.6	9	89.58	90.84	91.14
19	6	9.4	205	87.74	90.38	90.68
20	0	2.6	15	88.39	90.42	90.72
22	2	4.8	17	88.55	89.95	90.25
25	2	2	17	88.55	89.95	90.25
			19	88.09	89.86	90.16
			20	88.82	89.92	90.22
			331	87.96	89.78	90.08

TABLE 3. NUMBER OF ALLOWABLE CB's PER DRAINAGE AREA AND MINIMUM BASEMENT ELEVATIONS

SUBAREA ID.	No. OF CB's	AREA (ACRES)	DESIGNATED MANHOLE	INVERT (m.)	HGL (m.)	MINIMUM BASEMENT ELEVATION (m.)
29	0	2	21	88.43	89.84	90.14
33	2	2.9	25	88.06	89.87	90.17
37	6	3.7	29	87.76	89.83	90.13
30	13	10	25	88.06	89.87	90.17
31	18	14.2	335	87.34	89.74	90.04
			536	87.08	89.72	90.02
32	4	2.9	25	88.06	89.87	90.17
34	8	6.4	25	88.06	89.87	90.17
35	8	6.2	29	87.76	89.83	90.13
36	8	5.9	27	88.61	89.91	90.21
			23	87.78	89.84	90.14
38	9	7.3	29	87.76	89.83	90.13
39	7	5.1	29	87.76	89.83	90.13
			541	87.68	89.72	90.02
40	19	14.8	33	86.92	89.58	89.88
41	19	14.6	719	87.77	89.28	89.58
42	24	18.4	419	88.73	89.47	89.77
			559	88.45	89.41	89.71
43	11	8.2	319	88.12	89.37	89.67
44	9	6.7	319	88.12	89.37	89.67
949	20	15.6	919	86.78	88.81	89.11
			579	86.04	88.67	88.97
45	15	11.3	819	87.30	89.03	89.33
946	9	7.3	719	87.77	89.28	89.58
46	14	10.4	35	86.81	89.52	89.82
948	11	8.6	219	85.47	88.50	88.80
48	7	5.1	31	87.18	89.63	89.93
			533	87.03	89.58	89.88
749	4	3.4	27	88.61	89.91	90.21
849	4	3.4	31	87.18	89.63	89.93
49	5	3.7	29	87.76	89.83	90.13
52	21	16.2	305	86.46	89.59	89.89
54	25	19	305	86.46	89.59	89.89
55	13	10.1	105	85.93	89.21	89.51
66			57	SEE SOUTH MODEL		
68			57	SEE SOUTH MODEL		
80	17	13.2	55	87.68	90.47	90.77
81	13	10.1	55	87.68	90.47	90.77
78	1	1.1	53	87.80	90.62	90.92
79	2	1.5	55	87.68	90.47	90.77
82	5	4.1	55	87.68	90.47	90.77
198	14	7.2	57	87.27	90.18	90.48
86	16	12.6	59	86.83	89.65	89.95
87	23	17.7	59	86.83	89.65	89.95
88	15	11.3	109	85.33	88.70	89.00
90	12	9	219	85.47	88.50	88.80

TABLE 3. NUMBER OF ALLOWABLE CB's PER DRAINAGE AREA AND MINIMUM BASEMENT ELEVATIONS

SUBAREA ID.	No. OF CB's	AREA (ACRES)	DESIGNATED MANHOLE	INVERT (m.)	HGL (m.)	MINIMUM BASEMENT ELEVATION (m.)
91	14	10.4	105	85.93	89.21	89.51
92	5	3.8	105	85.93	89.21	89.51
93	14	10.7	109	85.33	88.70	89.00
95	11	8.7	507	85.58	88.90	89.20
			508	85.43	88.79	89.09
96	4	3	105	85.93	89.21	89.51
89	9	6.9	107	85.74	89.08	89.38
85	11	8.4	57	87.27	90.18	90.48
98	23	17.6	107	85.74	89.08	89.38
84	9	6.7	57	87.27	90.18	90.48
97	4	3	107	85.74	89.08	89.38
942	6	4.3	221	84.77	87.66	87.96
943	2	1.5	221	84.77	87.66	87.96
904	37	37.8	901	85.46	86.73	87.03
902	3	3	901	85.46	86.73	87.03
903	6	5.9	901	85.46	86.73	87.03
905	20	21	902	85.17	86.56	86.86
901	58	58.5	901	85.46	86.73	87.03
906	82	82.2	904	85.37	86.64	86.94
			201	88.16	91.01	91.31
			203	87.99	90.75	91.05
			208	88.58	90.70	91.00
			209	87.84	90.37	90.67
			210	87.01	90.14	90.44
			215	86.34	89.73	90.03
			217	86.07	89.40	89.70
			310	87.66	90.20	90.50
			511	87.46	90.15	90.45
			539	88.23	90.43	90.73
			521	86.88	89.97	90.27
			525	86.52	89.79	90.09
			597	86.21	89.49	89.79
			549	85.86	88.95	89.25
			550	85.64	88.69	88.99
			551	85.36	87.95	88.25
			566	84.60	87.48	87.78
			567	84.42	87.31	87.61
			568	84.25	87.14	87.44
			569	84.08	86.97	87.27
			570	83.92	86.81	87.11
			571	83.74	86.64	86.94
			572	83.57	86.48	86.78



NEPEAN

PROPOSED
DAVIDSON HEIGHTS

STORM DRAINAGE LIMITS

(MAJOR SYSTEMS)

OLIVER MANGIONE McCALLA & ASSOCIATES LIMITED
Consulting Engineers
Nepean, Ontario

Scale: 1:3000 Date: DECEMBER, 1992 No. 91-8461-SDL2

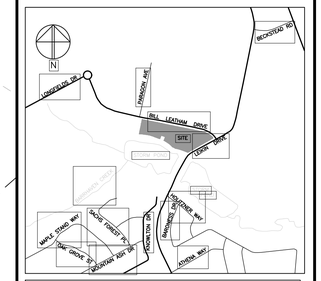
91-8461KW71

DRAWINGS / FIGURES

NO.	REVISION	DATE
1	ISSUED FOR SITE PLAN APPLICATION	
3	UPDATED SITE PLAN FOR REVIEW	APR 11/2016
4	UPDATED SITE PLAN FOR REVIEW	APR 25/2016
5	ISSUED FOR COORDINATION	SEP 30/2016
6	ISSUED FOR COORDINATION	OCT 17/2016
7	RE-ISSUED FOR SITE PLAN CONTROL	OCT 21/2016

Property Information:

Legal Description:
PART OF LOTS 17 & 18
Concession 1 (Rideau Front)
(Geographic Township of Nepean)
City of Ottawa

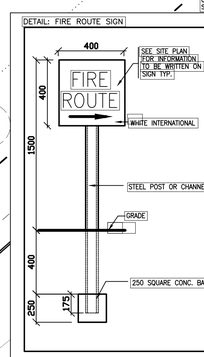


GENERAL NOTES:
1. ALL WALKWAYS TO BE ASPHALT PAVING UNLESS NOTED OTHERWISE.
2. ALL NEW PARKING AREAS TO BE ASPHALT UNLESS NOTED OTHERWISE.
3. REFER TO LEGAL SURVEY FOR SITE SPECIFIC LEGAL INFORMATION.
4. REFER TO CIVIL FOR COMPLETE GRADE INFORMATION.

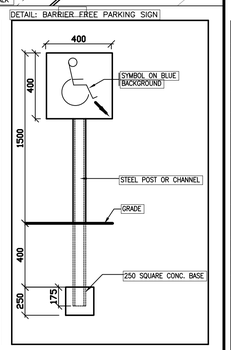
BUILDING AREA (FOOTPRINT): 1128.0 m²
LOT AREA: 19578 m²
ZONE: IL9 – LIGHT INDUSTRIAL

MECHANISM		REQUIRED	PROVIDED
MINIMUM LOT AREA		3000 m²	19578 m²
MINIMUM LOT WIDTH		50 m	± 89.2 m
MINIMUM FRONT YARD SETBACK		6 m	8.5 m
MINIMUM CORNER SIDE YARD SETBACK		6 m	22.4 m
MINIMUM REAR YARD SETBACK		6 m	111.3 m
MAXIMUM LOT COVERAGE		60 %	5.8 %
MAXIMUM BUILDING HEIGHT		22 m	9.55 m
MAXIMUM FLOOR SPACE INDEX		2	0.058
MAX. WIDTH LANDSCAPE AREA (AROUND PARKING LOT)		NO MIN.	N.A.
MIN. WIDTH OF LANDSCAPE AREA	ABUTTING A STREET	3 m	6.5 m
	OTHER CASES:	NO MIN.	N.A.
MIN. # PARKING SPACES	PLACE OF ASSEMBLY, WORSHIP	10/100m² GFA OF ASSEMBLY AREA: MULTI-PURPOSE: 144.8 WORSHIP: 373.7 CHA: 34 NURSERY: WAITING/PRAYER/ MEETING RM. 10 ISAI: 700 m² CARS REQ. 70	91
VEHICLE PARKING SPACE SIZE PROVISIONS		2.6m x 5.2m	2.6 m x 5.2 m
MIN AISLE WIDTH		6.7 m	6.7 m
MIN. # BICYCLE PARKING SPACES		1 PER 1500 m² GFA	6
BICYCLE PARKING SPACE SIZE PROVISIONS		0.6m x 1.8m	0.6 m x 1.8 m
LOADING SPACE		1: 3.5m x 9m	1

DETAIL: FIRE ROUTE SIGN

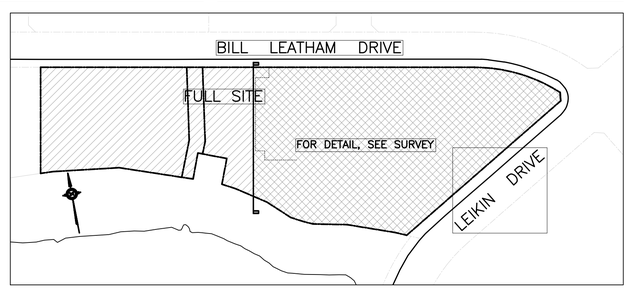


DETAIL: BARRIER FREE PARKING SIGN



LEGEND

MH	EXISTING MANHOLE– SANITARY AND STORM ('E' DENOTES EXISTING)		BICYCLE RACK
CB	EXISTING CATCHBASIN ('E' DENOTES EXISTING)		DESIGNATED BARRIER FREE PARKING SPACE
FH	FIRE HYDRANT	BF	BARRIER FREE PARKING SIGN
U/P	UTILITY POLE	FS	FIRE ROUTE SIGN
GP	GUY WIRE	SN	EXISTING SIGN
LS	LIGHT STANDARD W/POLE BASE ('E' DENOTES EXISTING)	VC	VALVE CHAMBER
	DENOTES BUILDING EXIT	VB	VALVE BOX
	CURB (REFER: CITY OF OTTAWA STANDARDS)		PROPERTY LINE
DC	DEPRESSED CURB (REFER: CITY OF OTTAWA STANDARDS)		PROPERTY SETBACK
	EXISTING TREE (REFER TO LANDSCAPE PLAN)		PROPOSED CONCRETE WALKWAY



ONTARIO ASSOCIATION OF ARCHITECTS
RALPH ALEXANDER VANDENBERG
LICENCE
1308

Vandenberg & Wildeboer
A·R·C·H·I·T·E·C·T·S
www.vwarchitects.ca Telephone: 613.387.0144 Facsimile: 613.271.8609 mail@vwarchitects.ca
• THE OLD STONE LODGE • 160 FLAMBOROUGH WAY • OTTAWA (KANATA) • ONTARIO • K2K 3H9 •

PROJECT TITLE
THE SALVATION ARMY BARRHAVEN CHURCH
NEPEAN

DRAWING TITLE
PHASE 1 SITE PLAN

DESIGNED BY:	RALPH VANDENBERG
DRAWN BY:	LV, MD
START DATE:	2015
SCALE:	AS SHOWN
PROJECT NO.	1502

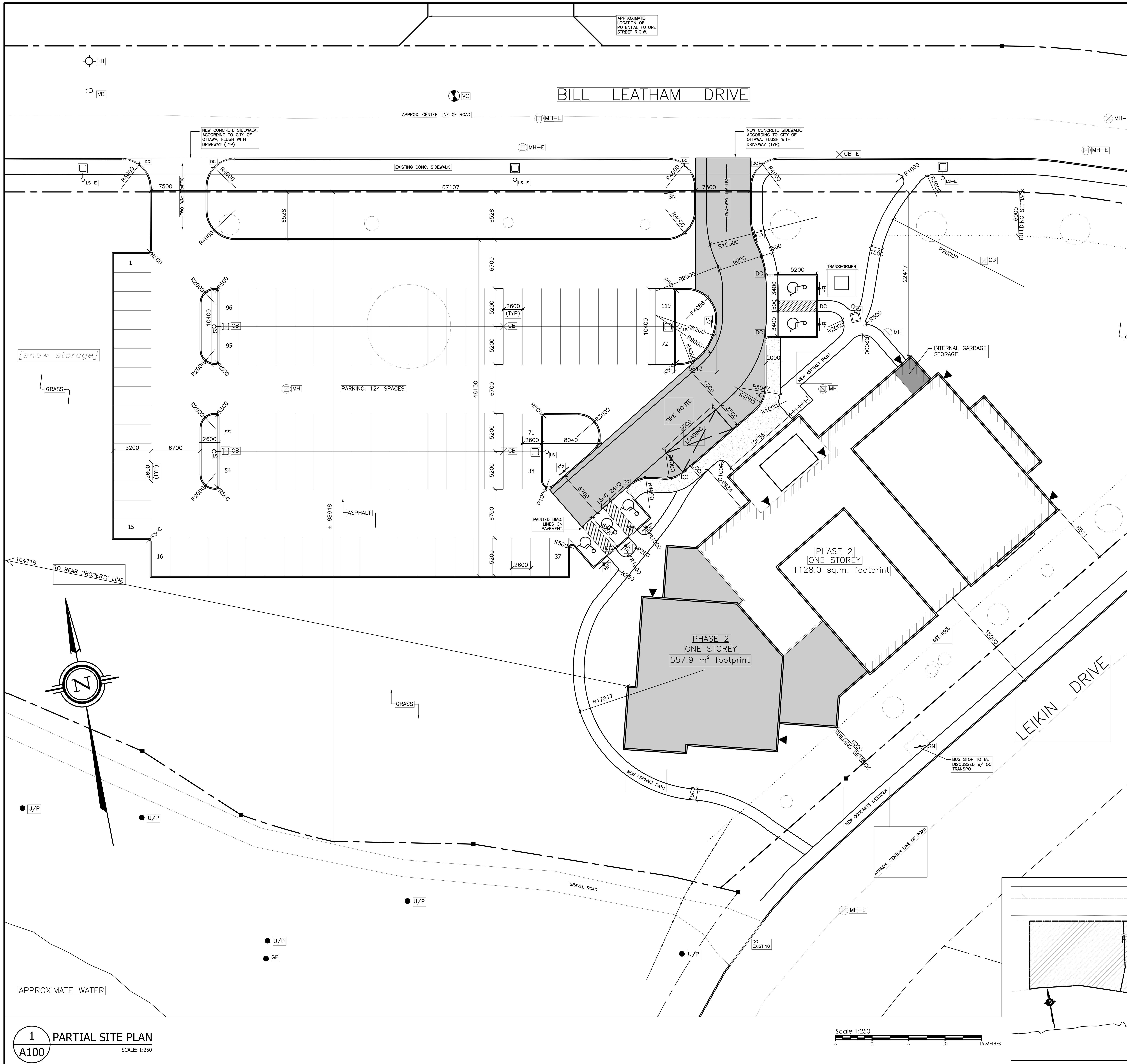
DRAWING No. A100

1 A100 PARTIAL SITE PLAN
SCALE: 1:250

Scale 1:250
5 0 5 10 15 METRES

PLOT DATE: October 21, 2016

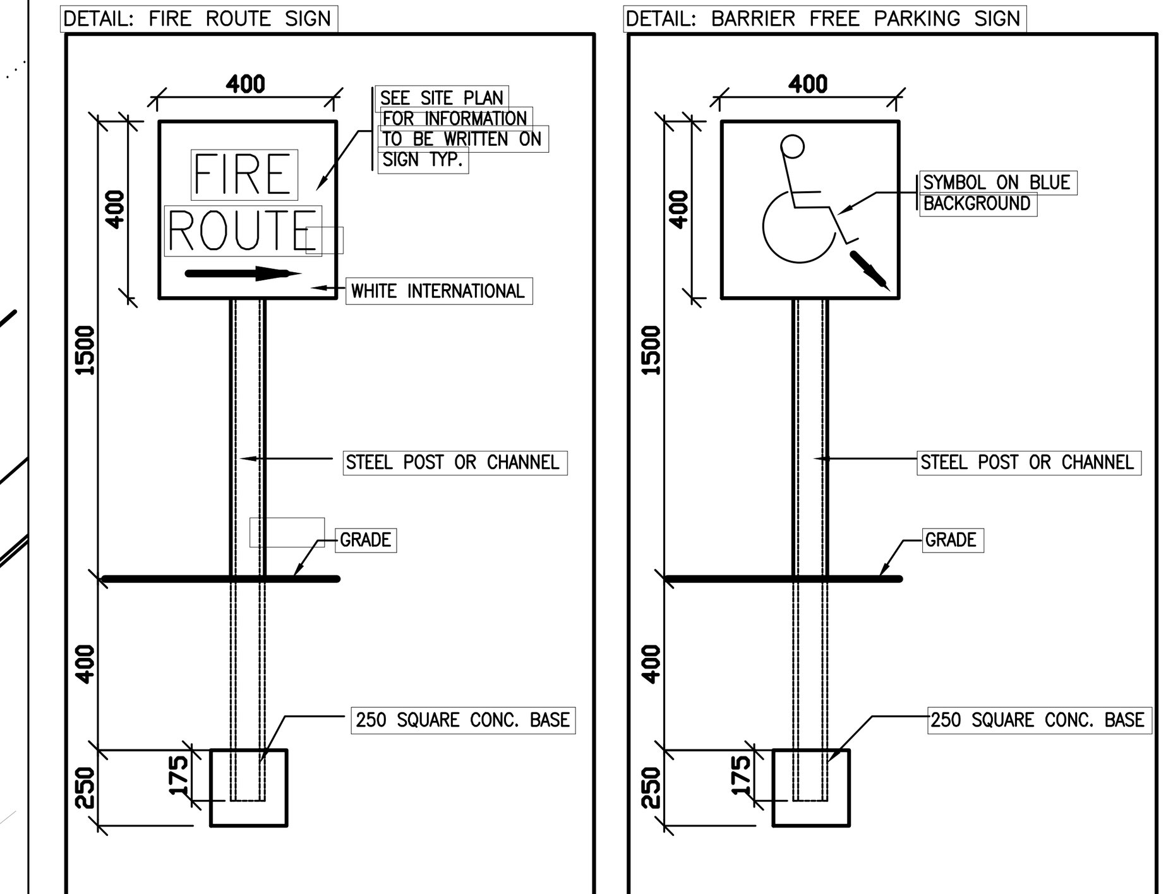
NO.	REVISION	DATE
1	ISSUED FOR SITE PLAN APPLICATION	
3	UPDATED SITE PLAN FOR REVIEW	APR 11/2016
4	UPDATED SITE PLAN FOR REVIEW	APR 25/2016
5	ISSUED FOR COORDINATION	SEP 30/2016
6	ISSUED FOR COORDINATION	OCT 17/2016
7	RE-ISSUED FOR SITE PLAN CONTROL	OCT 21/2016



1 PARTIAL SITE PLAN
A100
SCALE: 1:250

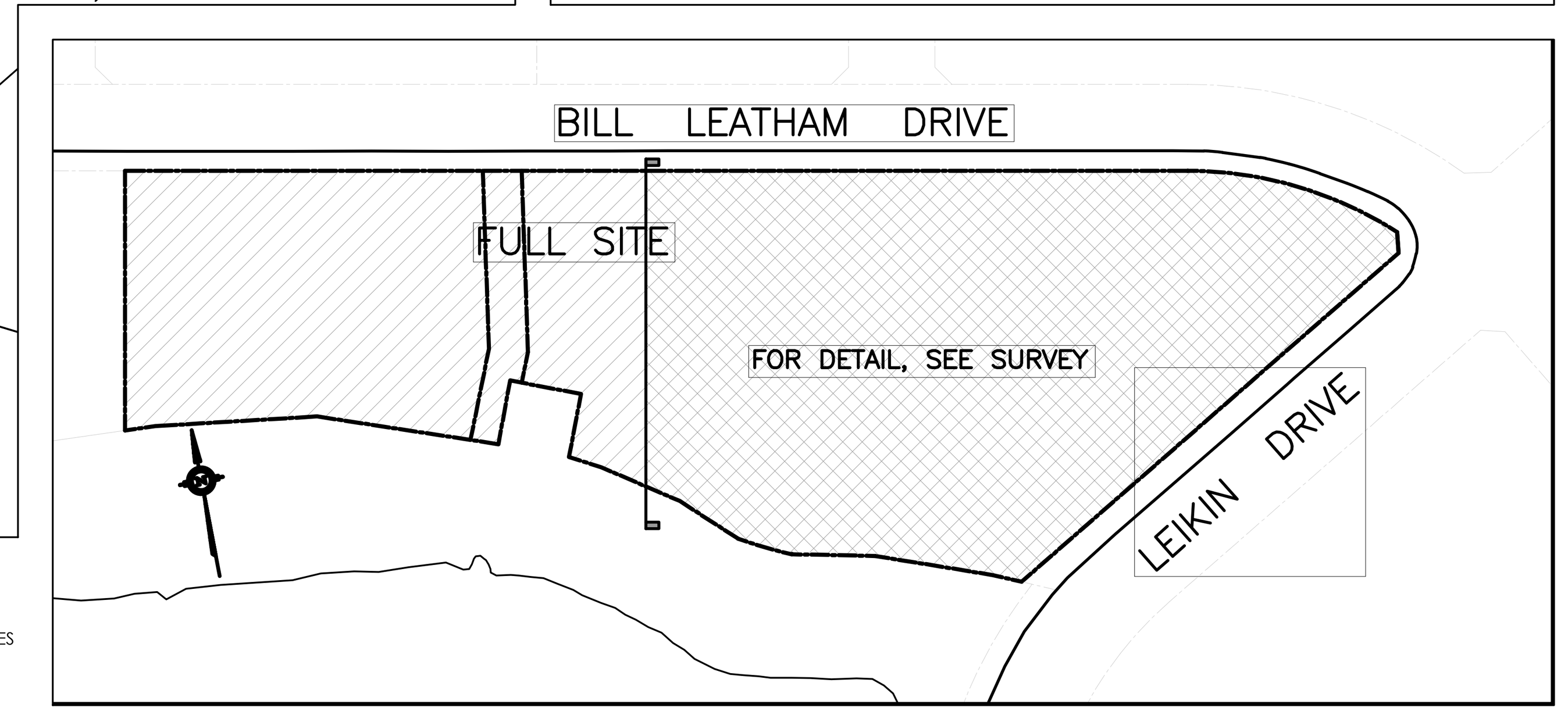
DETAIL: FIRE ROUTE SIGN

DETAIL: BARRIER FREE PARKING SIGN



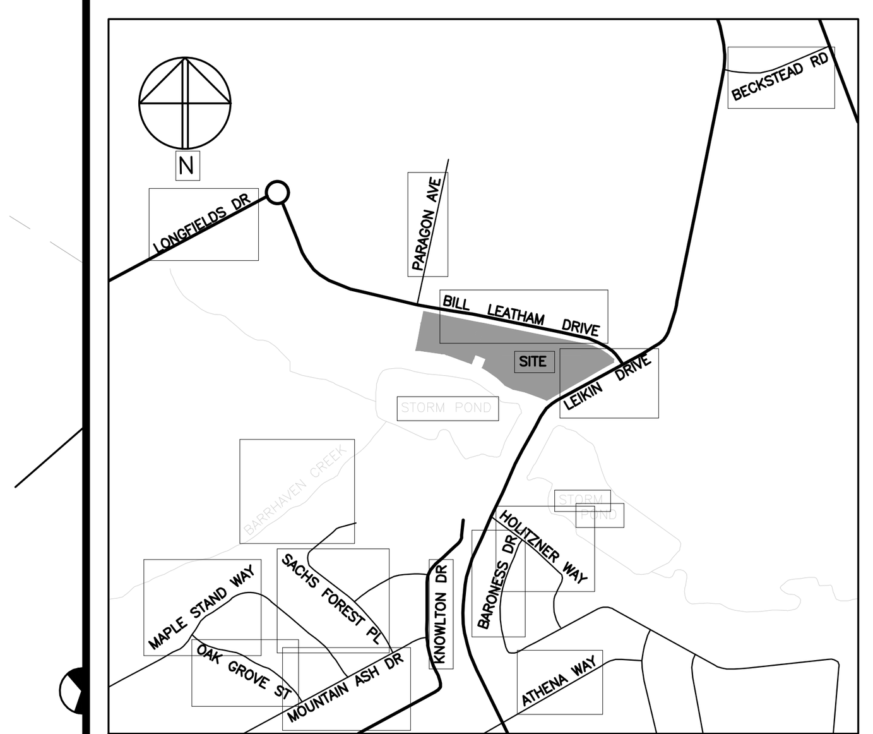
LEGEND

MH	EXISTING MANHOLE–SANITARY AND STORM ('E' DENOTES EXISTING)		BICYCLE RACK
CB	EXISTING CATCHBASIN ('E' DENOTES EXISTING)		DESIGNATED BARRIER FREE PARKING SPACE
FH	FIRE HYDRANT	BF	BARRIER FREE PARKING SIGN
U/P	UTILITY POLE	FS	FIRE ROUTE SIGN
GP	GUY WIRE	SN	EXISTING SIGN
	LIGHT STANDARD W/POLE BASE ('E' DENOTES EXISTING)	VC	VALVE CHAMBER
	DENOTES BUILDING EXIT	VB	VALVE BOX
	CURB (REFER: CITY OF OTTAWA STANDARDS)		PROPERTY LINE
DC	DEPRESSED CURB (REFER: CITY OF OTTAWA STANDARDS)		PROPERTY SETBACK
	EXISTING TREE (REFER TO LANDSCAPE PLAN)		PROPOSED CONCRETE WALKWAY



Property Information:

Legal Description:
PART OF LOTS 17 & 18
Concession 1 (Rideau Front)
(Geographic Township of Nepean)
City of Ottawa



GENERAL NOTES:
1. ALL WALKWAYS TO BE ASPHALT PAVING UNLESS NOTED OTHERWISE.
2. ALL NEW PARKING AREAS TO BE ASPHALT UNLESS NOTED OTHERWISE.
3. REFER TO LEGAL SURVEY FOR SITE SPECIFIC LEGAL INFORMATION.
4. REFER TO CIVIL FOR COMPLETE GRADE INFORMATION.

BUILDING AREA (FOOTPRINT): 1685.9 m²
LOT AREA: 19578 m²
ZONE: IL9 – LIGHT INDUSTRIAL

MECHANISM		REQUIRED	PROVIDED
MINIMUM LOT AREA		3000 m²	19578 m²
MINIMUM LOT WIDTH		50 m	± 89.2 m
MINIMUM FRONT YARD SETBACK		6 m	6 m
MINIMUM CORNER SIDE YARD SETBACK		6 m	22.4 m
MINIMUM REAR YARD SETBACK		6 m	104.7 m
MAXIMUM LOT COVERAGE		60 %	8.66 %
MAXIMUM BUILDING HEIGHT		22 m	11.2 m
MAXIMUM FLOOR SPACE INDEX		2	0.087
MAX. WIDTH LANDSCAPE AREA (AROUND PARKING LOT)		NO MIN.	N.A.
MIN. WIDTH OF LANDSCAPE AREA	ABUTTING A STREET	3 m	6.5 m
	OTHER CASES:	NO MIN.	N.A.
MIN. # PARKING SPACES	PLACE OF ASSEMBLY, WORSHIP	10/100m² GFA OF ASSEMBLY AREA: MULTI-PURPOSE: 114.8 FELLOWSHIP: 167.9 GYM: 373.7 WORSHIP: 370.3 NURSERY: 36 WAITING/PRAYER/MEETING RM: 18 MUSIC RM: 31 SUM: 1112 m² CARS REQ. 111	124
VEHICLE PARKING SPACE SIZE PROVISIONS		2.6m x 5.2m	2.6 m x 5.2 m
MIN AISLE WIDTH		6.7 m	6.7 m
MIN. # BICYCLE PARKING SPACES		1 PER 1500 m² GFA	6
BICYCLE PARKING SPACE SIZE PROVISIONS		0.6m x 1.8m	0.6 m x 1.8 m
LOADING SPACE		1: 3.5m x 9m	1

ONTARIO ASSOCIATION OF ARCHITECTS
RALPH A. VANDEN BERG
LICENCE
4308

Vandenberg & Wildeboer
A·R·C·H·I·T·E·C·T·S
www.vwarchitects.ca Telephone: 613.287.0144 Facsimile: 613.271.8609 mail@vwarchitects.ca
THE OLD STONE LODGE ▫ 160 FLAMBOROUGH WAY ▫ OTTAWA (KANATA) ▫ ONTARIO ▫ K2K 3H9

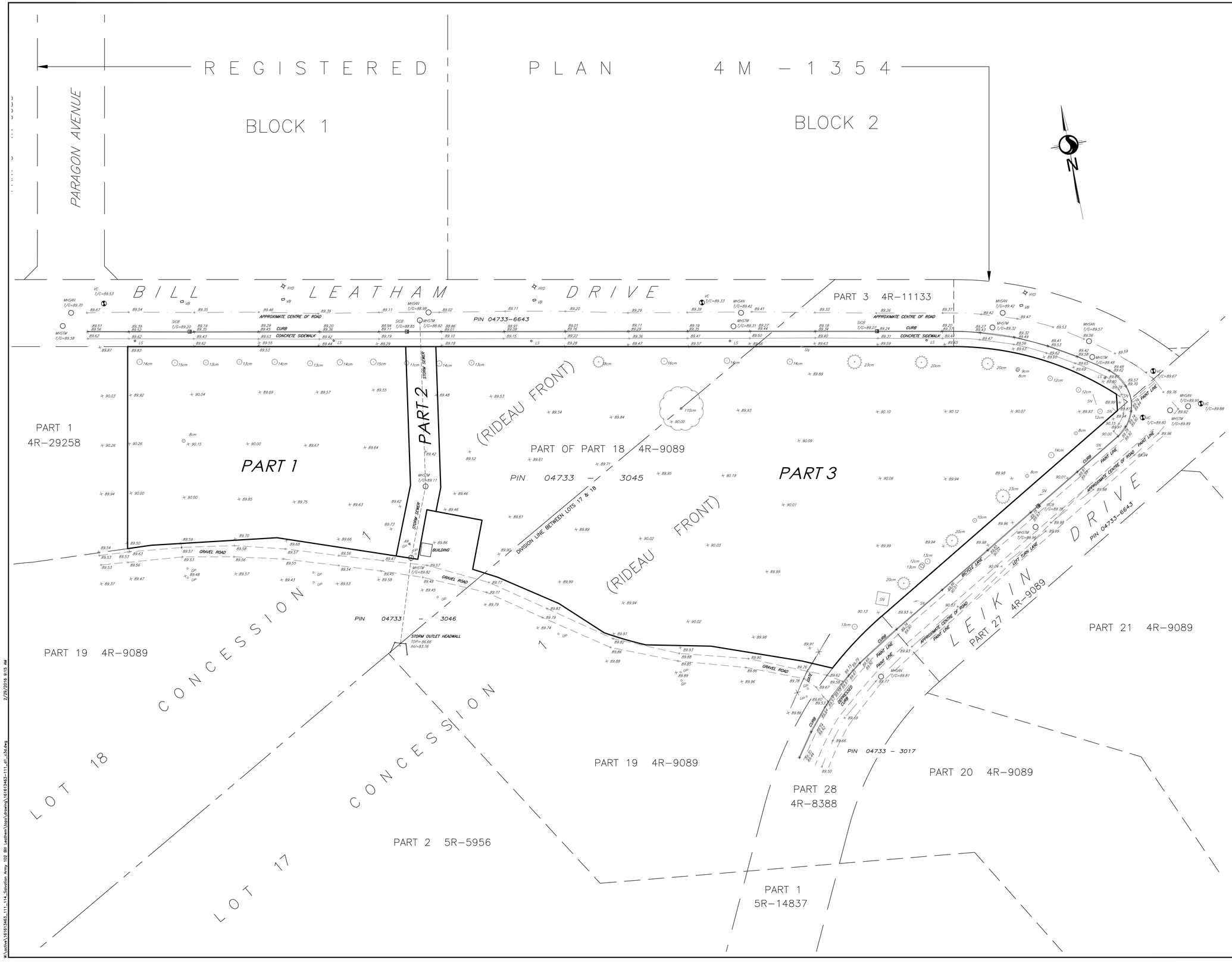
PROJECT TITLE
THE SALVATION ARMY BARRHAVEN CHURCH
NEPEAN

DRAWING TITLE
PHASE 2 SITE PLAN

DESIGNED BY: RALPH VANDENBERG
DRAWN BY: LV, MD
START DATE: 2015
SCALE: AS SHOWN
PROJECT NO. 1502

DRAWING No.
A100

PLOT DATE: October 21, 2016



Stantec

Stantec Geomatics Ltd.
400 - 1331 Clyde Avenue
Ottawa ON
Tel. 613.722.4420
www.stantec.com

TOPOGRAPHIC SKETCH of
PART OF LOTS 17 & 18 CONCESSION 1 (RIDEAU FRONT)
(GEOGRAPHIC TOWNSHIP OF NEPEAN)
CITY OF OTTAWA

Scale 1:500

10 0 10 20 30 METRES

LEGEND (IF APPLICABLE)

ACU	–	AIR CONDITIONING UNIT
AN	–	ANCHOR
AP	–	AIR PUMP
ANT	–	ANTENNA
BH	–	BOREHOLE
BIB	–	HOSE BIB
BKR	–	BIKE RACK
BENCH	–	BENCH
BOL	–	BOLLARD
BOUL	–	BOULDER
CB	–	CATCH BASIN
DCB	–	DOUBLE CB
CBMH	–	CB MANHOLE
DCBMH	–	DOUBLE CB MANHOLE
SICB	–	SIDE INLET CB
CHM	–	CHIMNEY
CSV	–	VALVE CURB STOP
DRN	–	DRAIN
EPOST	–	ELECTRICAL OUTLET
FP	–	FLAG POLE
FL	–	FLOOD LIGHT
FTF	–	FUEL TANK FILLER CAP
GC	–	GARBAGE CAN
GMRK	–	GAS MARKER
GFL	–	PIPE FLANGE (GAS)
GFP	–	GAS FUEL PUMP
GP	–	POLE GUYWIRE
GSR	–	GAS SERVICE REGULATOR
GV	–	GAS VALVE
HIC	–	HICKENBOTTOM
HDS	–	HEADSTONE
HLS	–	LIGHT STANDARD HYDRO
HM	–	HYDRO METER
HTN	–	HYDRO TRANSFORMER
HW	–	HAND WELL
HYD	–	FIRE HYDRANT
JBX	–	JUNCTION BOX
MB	–	MAILBOX
MP	–	MONITORING PIN
MH	–	MAINTENANCE HOLE UNIDENTIFIED
MHB	–	MAINTENANCE HOLE BELL
MHF	–	MAINTENANCE HOLE FIBRE OPTIC
MHH	–	MAINTENANCE HOLE HYDRO
MHI	–	MAINTENANCE HOLE INVERT
MHSA	–	MAINTENANCE HOLE SANITARY
MHSTM	–	MAINTENANCE HOLE STORM
MHT	–	MAINTENANCE HOLE TRAFFIC
MW	–	MONITORING WELL
NPB	–	NEWS PAPER BOX
OLP	–	LIGHT STANDARD ORNAMENTAL
OW	–	OBSERVATION WELL
PIN	–	PROPERTY IDENTIFICATION NUMBER
PLBX	–	PULL BOX
PLQ	–	PLAQUE
PLR	–	PILLAR
POST	–	POST
PZ	–	PIEZIOMETER
RLC	–	RED LIGHT CAMERA
RWSL	–	RAILWAY SIGNAL LIGHT
RWSS	–	RAILWAY SWITCH STAND
SAT	–	SATELLITE DISH
SCLP	–	SCULPTURE
SCP	–	SUMP/CATCH PIT
SCV	–	SPRINKLER CONTROL VALVE
SNH	–	SPRINKLER HEAD
SIA	–	SIAMESE CONNECTION
SN	–	SIGN
SICB	–	SIDE INLET CATCHBASIN
SPAN	–	SOLAR PANEL
SPT	–	SEPTIC TANK
TABLE	–	TABLE
TB BELL	–	TERMINAL BOX - BELL
TB CATV	–	TERMINAL BOX - CABLE
TCB	–	TRAFFIC CONTROL BOX
TPIT	–	TEST PIT
_cm	–	TREE CONIFEROUS (DIAMETER CENTIMETRES)
_cm	–	TREE DECIDUOUS (DIAMETER CENTIMETRES)
TRS	–	TREE STUMP
TSL	–	TRAFFIC SIGNAL LIGHT
UMB	–	MARKER BELL UNDERGROUND
UMC	–	MARKER CABLE UNDERGROUND
UMG	–	MARKER GAS UNDERGROUND
UMO	–	MARKER OIL UNDERGROUND
UP	–	UTILITY POLE
VB	–	VALVE BOX
VC	–	VALVE CHAMBER
WV	–	WATER VALVE
WELL	–	WELL
	–	PROPERTY LINE

VERTICAL DATUM NOTE

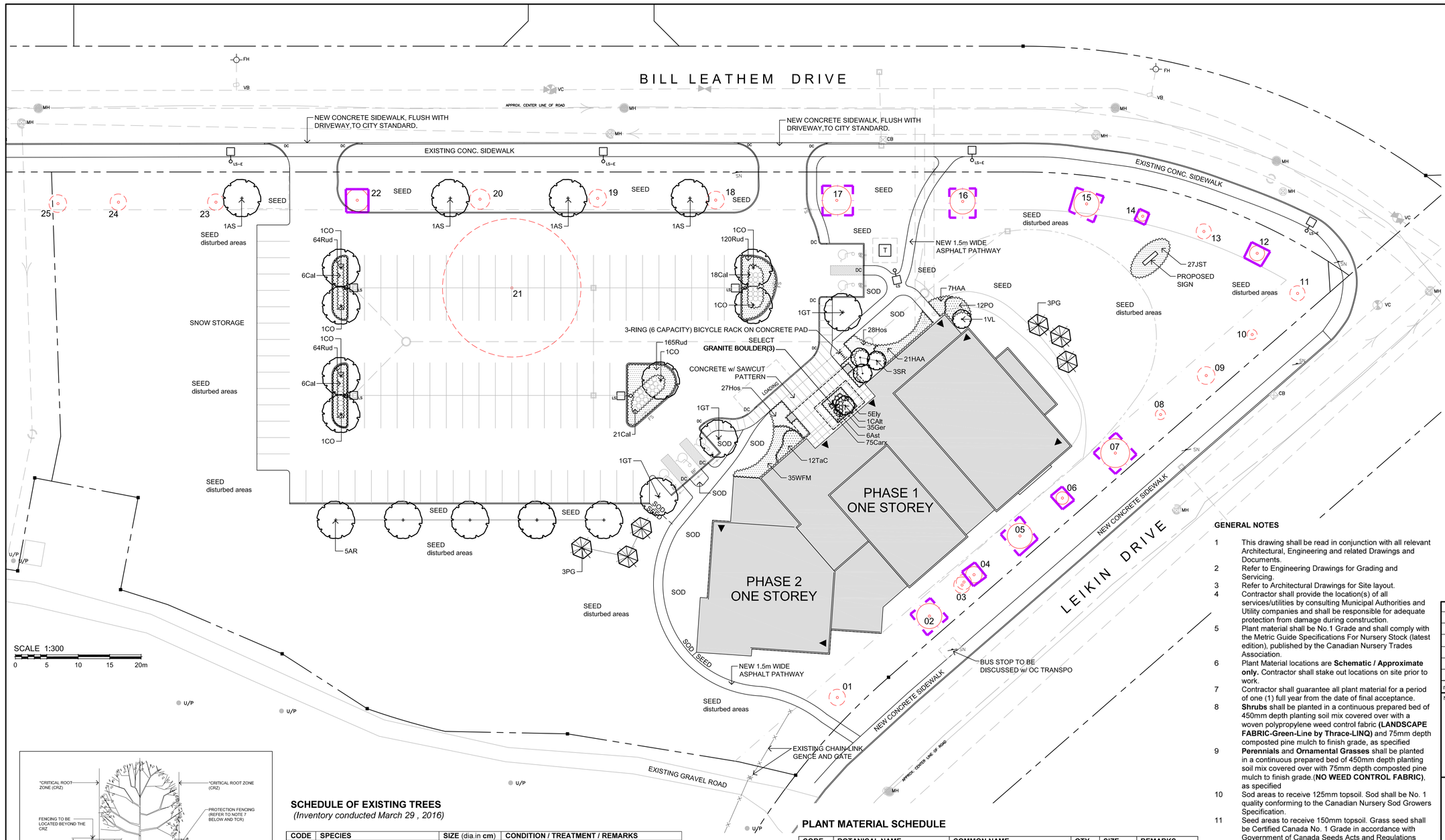
ELEVATIONS SHOWN HEREON ARE GEODETIC (CGVD-1928:1978) AND ARE DERIVED FROM THE CAN-NET VRS NETWORK MONUMENT: OTTAWA ELEVATION=95.205.

HORIZONTAL DATUM NOTE

PROJECTION: UNIVERSAL TRANSVERSE MERCATOR
(MTM, ZONE 9, CM76°30'W)
DATUM: NAD 83 (ORIGINAL)

DRAWN: ME CHECKED: PM: BW FIELD: WO PROJECT No.: 161613463-111

W:\active\161613463_111_114_Solution Army 102 Bill Leathem\Live\drawing\161613463-111_d1_c3d.dwg 2/29/2016 9:15 AM



LEGEND / SYMBOL

- EXISTING TREE TO BERETAINED (Refer to Schedule)
- CRZ (Critical Root Zone)
- EXISTING TREE TO BE REMOVED (Refer to Schedule)
- CRZ (Critical Root Zone)
- PROPOSED DECIDUOUS TREE
- PROPOSED CONIFEROUS TREE
- PROPOSED SHRUBS AND GROUNDCOVER
- TREE PROTECTION BARRIER DETAIL 1/L1.02

NOTES:

7. THE CRITICAL ROOT ZONE (CRZ) IS ESTABLISHED AS BEING 10 cm THE DISTANCE FROM THE TRUNK OF TREE FOR EVERY cm OF TRUNK DBH. THE CRZ IS CALULATED AS DBH x 10cm
1. THE AREA WITHIN THE CRITICAL ROOT ZONE (CRZ) OF ALL EXISTING TREES SHALL BE PROPERLY PROTECTED WITH FENCING AS DETAILED.
2. THE AREA WITHIN THE PROTECTED FENCING SHALL REMAIN UNDISTURBED AND SHALL NOT BE USED FOR THE STORAGE OF MATERIALS, EQUIPMENT OR VEHICLES.
3. PRUNE BRANCHES TO REMOVE DAMAGED LIMBS, DO NOT DAMAGE LEADERS.
4. CUTTING OF ROOTS OR CHANGING OF GRADES AROUND EXISTING TREES TO BE PRESERVED WILL NOT BE PERMITTED WITHOUT THE APPROVAL OF THE CONSULTANT.
5. IF TREES ARE BEING ADVERSELY AFFECTED BY CONSTRUCTION, A WATERING AND FERTILIZING PROGRAM IS TO BE SETUP TO THE SATISFACTION OF THE CITY.
6. TREE PROTECTION FENCING MAY BE REQUIRED AROUND INDIVIDUAL TREES TO REMAIN AND/OR AROUND TREE PRESERVATION ZONES AS IDENTIFIED ON THE PLANS.
7. TREE PROTECTION FENCING OPTIONS (TO BE APPROVED BY CITY):
   - .01 1.2m HT. MIN. SOLID PLYWOOD HOARDING MOUNTED ON WOOD POSTS, 2.4m c/c MIN.
   - .02 1.2m HT. MIN.CHAIN-LINK FENCE MOUNTED ON TUBULAR STEEL SUPPORT POSTS OR 'T' POSTS, 2.4m c/c MIN. 2.4m c/c MIN.
   - .03 1.2m HT. MIN. HIGH VISIBIITY (INTERNATIONAL ORANGE) PLASTIC FABRIC (HIGH DENSITY POLYETYLENE) MOUNTED ON WOOD FRAME w/ TOP AND BOTTOM WOOD RAILS.

1 / L1.02 TREE PROTECTION BARRIER NTS

SCHEDULE OF EXISTING TREES

(Inventory conducted March 29 , 2016)

CODE	SPECIES	SIZE (dia.in cm)	CONDITION / TREATMENT / REMARKS
1	Ash	13	dead / **remove** /
2	Colorado Spruce	20	good / **retain** / protect
3	Manitoba Maple (double-stem)	13/12	invasive / **remove** to promote growth of adjacent Sugar Maple.
4	Sugar Maple	13	good / **retain** / protect
5	Colorado Spruce	20	good / **retain** / protect
6	Sugar Maple	10	good / **retain** / protect
7	Colorado Spruce	23	good / **retain** / protect
8	Ash	8	dead / **remove** /
9	Ash	14	dead / **remove** /
10	Ash	8	dead / **remove** /
11	Ash	12	dead / **remove** /
12	Sugar Maple	12	good / **retain** / protect
13	Ash	12	dead / **remove** /
14	Sugar Maple	9	poor / **retain** / protect
15	Austrian Pine	20	good / **retain** / protect
16	Austrian Pine	20	good / **retain** / protect
17	Austrian Pine	23	good / **retain** / protect
18	Ash	14	dead / **remove** /
19	Ash	14	dead / **remove** /
20	Ash	16	dead / **remove** /
21	Ash		poor/ EAB infected/ top crown dying / **remove** / hazardous
22	Colorado Spruce	20	good / **retain** / protect
23	Ash	13	dead / **remove** /
24	Ash	13	dead / **remove** /
25	Ash	14	dead / **remove** /

PLANT MATERIAL SCHEDULE

CODE	BOTANICAL NAME	COMMON NAME	QTY.	SIZE	REMARKS
DECIDUOUS TREES					
AR	ACER RUBRUM	RED MAPLE	5	60mm cal	B&B, single stem
AS	ACER SACCHARUM	SUGAR MAPLE	4	60mm cal	B&B, single stem
CO	CELTIS OCCIDENTALIS	COMMON HACKBERRY	7	60mm cal	B&B, single stem
GT	GLEDITSIA TRIACANTHOS SKYLINE	SKYLINE HONEYLOCUST	3	60mm cal	B&B, single stem
CONIFEROUS TREES					
PG	PICEA GLAUCA	WHITE SPRUCE	6	180cm ht	B&B
DECIDUOUS SHRUBS					
CAlt	CORNUS ALTERNIFOLIA	PAGODA DOGWOOD	1	150cm ht.	B&B, multi-stem
HAA	HYDRANGEA ARBORESCENS ANNABELLE	ANNABELLE HYDRANGEA	28	50cm ht	potted, 100cm o/c
PO	PHYSOCARPUS OPULIFOLIUS	COMMON NINEBARK	12	50cm ht	potted, 100cm o/c
SR	SYRINGA RETICULATA	JAPANESE TREE LILAC	3	150cm ht	B&B, multi-stem
VL	VIBURNUM LENTAGO	NANNYBERRY	1	150cm ht	B&B, multi-stem
WFM	WEIGELA FLORIDA 'MINUET'	MINUET WEIGELA	35	50cm ht	potted, 80cm o/c
CONIFEROUS SHRUBS					
JST	JUNIPERUS SABINA TAMARISCIFOLIA	TAMARIX JUNIPER	27	50cm spr	potted, 100cm o/c
TaC	TAXUS CANADENSIS	CANADA YEW	12	50cm ht	potted,100cm o/c
PERENNIALS					
Ast	ASTER divaricatus	WHITE WOODLAND ASTER	6	15cm pot	plant 50cm o/c
Ger	GERANIUM maculatum	WILD GERANIUM	35	15cm pot	plant 30cm o/c
Hos	HOSTA 'Big Daddy'	'Big Daddy' HOSTA	55	15cm pot	plant 75cm o/c
Rud	RUDBECKIA hirta	BROWN-EYED SUSAN	413	15cm pot	plant 50cm o/c
ORNAMENTAL GRASSES / SEDGES					
Cal	CALAMAGROSTIS x acutiflora 'Karl Foerster'	KARL FOERSTER REED GRASS	51	15cm pot	plant 75cm o/c
Carx	CAREX eburnea	IVORY SEDGE	75	15cm pot	plant 30cm o/c
Ely	ELYMUS hystrix	BOTTLEBRUSH GRASS	5	15cm pot	plant 60cm o/c

GENERAL NOTES

1. This drawing shall be read in conjunction with all relevant Architectural, Engineering and related Drawings and Documents.
2. Refer to Engineering Drawings for Grading and Servicing.
3. Refer to Architectural Drawings for Site layout.
4. Contractor shall provide the location(s) of all services/utilities by consulting Municipal Authorities and Utility companies and shall be responsible for adequate protection from damage during construction.
5. Plant material shall be No.1 Grade and shall comply with the Metric Guide Specifications For Nursery Stock (latest edition), published by the Canadian Nursery Trades Association.
6. Plant Material locations are **Schematic / Approximate only.** Contractor shall stake out locations on site prior to work.
7. Contractor shall guarantee all plant material for a period of one (1) full year from the date of final acceptance.
8. **Shrubs** shall be planted in a continuous prepared bed of 450mm depth planting soil mix covered over with a woven polypropylene weed control fabric **(LANDSCAPE FABRIC-Green-Line by Thrace-LINQ)** and 75mm depth composted pine mulch to finish grade, as specified
9. **Perennials** and **Ornamental Grasses** shall be planted in a continuous prepared bed of 450mm depth planting soil mix covered over with 75mm depth composted pine mulch to finish grade.(**NO WEED CONTROL FABRIC**), as specified
10. Sod areas to receive 125mm topsoil. Sod shall be No. 1 quality conforming to the Canadian Nursery Sod Growers Specification.
11. Seed areas to receive 150mm topsoil. Grass seed shall be Certified Canada No. 1 Grade in accordance with Government of Canada Seeds Acts and Regulations
12. Reinstate all areas damaged or disturbed beyond the limit of Work.
13. Plant Material substitutions shall not be permitted without written approval from the Consultant.
14. Provide **protection for existing** trees to be retained. Install fencing to dripline (canopy) of each tree or groupings of trees (if close together). No excavation, filling, storage of materials, disposal of chemicals or waste, vehicle traffic or other activity which could cause root zone disturbance or compaction, shall take place within the protected area.
    Where limbs of trees are removed to accommodate construction work, they shall be done in accordance with accepted arboricultural practice.
    Where root systems become exposed due to excavation, carefully trim damaged roots and provide temporary mulch until backfill is undertaken. Keep roots moist at all times.
    Construct wells or retaining walls if grades around trees are to be modified. Root feed all existing trees after construction.
15. Contractor shall advise Consultant a minimum of **48hrs**. prior to proceeding landscape work and any required Field Reviews.
16. **THIS PLAN HAS BEEN PREPARED FOR MUNICIPAL SITE PLAN APPROVAL ONLY AND MAY NOT BE USED FOR ANY OTHER PURPOSE.**

no.	date	revision
2.	OCT, 21/16	PER CITY COMMENTS
1.	APR,19/16	ISSUE FOR SITE PLAN APPROVAL

North Arrow

Stamp: ONTARIO ASSOCIATION OF LANDSCAPE ARCHITECTS — RUDY J. LEVSTEK — OALA MEMBER

Consultant
LEVSTEK CONSULTANTS
LANDSCAPE ARCHITECTS
5871 Hugh Crescent · Ottawa · Ontario · K0A 2W0
613 · 826 · 0518

Client

Project
SALVATION ARMY CHURCH
BARRHAVEN
102 BILL LEATHEM DRIVE

Drawing Title
LANDSCAPE PLAN
PHASE 2

Drawn	Date	Drawing No.
MGB	MAR 2016	L1.02
Scale	Project No.	
1:300	1114	