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SITE SERVICING AND STORMWATER MANAGEMENT

FOR

2073945 ONTARIO INC
6150 HAZELDEAN ROAD – PHASE I

CITY OF OTTAWA

PROJECT NO.: 17-933

JULY 2018 – REV 1
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SITE SERVICING AND STORMWATER MANAGEMENT
FOR
6150 HAZELDEAN ROAD – PHASE I

2073945 ONTARIO INC

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SITE SERVICING AND STORMWATER MANAGEMENT FOR 6150 HAZELDEAN ROAD – PHASE I 2073945 ONTARIO INC JULY 2018 – REV 1

CITY OF OTTAWA PROJECT NO.: 17-933

1.0 INTRODUCTION

David Schaeffer Engineering Limited (DSEL) has been retained by 2073945 Ontario Inc. to prepare a Site Servicing and Stormwater Management report in support of the application for Site Plan Control (SPC) at 6150 Hazeldean Road.

The subject property is located within the City of Ottawa urban boundary, in the Stittsville ward. As illustrated in ***Figure 1***, the subject property is located north of the Neil Avenue and McCooeye Lane intersection and is bound by Hazeldean Road and Neil Avenue. The subject property is comprised of a single parcel of land, which measures approximately ***0.68 ha*** and is zoned Arterial Main Street (AM9).

Figure 1: Site Location

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The proposed SPC would allow for the Phase I development, which is located at the North side of the subject site. The proposed development would include a ***465 m²*** 1-storey restaurant and a ***937 m²*** 2-storey office building, within ***0.38 ha*** of the existing site. A copy of the Site Plan, prepared by Alexander Wilson Architect Inc., is included in ***Drawings/Figures***.

The objective of this report is to demonstrate that the proposed development is supported by existing municipal services.

1.1 Existing Conditions

The existing site is currently an asphalt parking lot with minimal vegetation. The elevations range between 117.56m and 117.96m, with a minimal grade change of approximately 0.40m from the Northeast to the Southwest corner of the property.

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

Hazeldean Road

- 762 mm diameter concrete lined steel watermain
- 2400 mm x 1200 mm concrete storm sewer tributary to the Poole Creek Watershed
- 375 mm PVC storm sewer tributary to the Poole Creek Watershed

Neil Avenue

- 203 mm diameter ductile iron watermain
- 250 mm diameter PVC sanitary sewer tributary to the Stittsville Trunk, located on the South East of the subject site

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.

An Environmental Compliance Approval (ECA) application, under the Transfer of Review Process, will be required for the proposed sanitary extension located within the City right-of-way. Offsite sanitary extension to be submitted under a separate cover.

1.3 Pre-consultation

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

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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)

- **Jackson Trails Subdivision Serviceability,**
  City of Ottawa, Prepared by CCL/IBI
  February 2006.
  (JTSS)

- **Geotechnical Investigation,**
  Paterson Group, PG3712-1, January 15, 2016.
  (Geotechnical Report)

- **Sanitary Extension Design Brief,**
  DSEL, July 2018.
  (Sanitary Extension Design Brief)

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3.0 WATER SUPPLY SERVICING

3.1 Existing Water Supply Services

The subject property lies within the 3W pressure zone, as shown by the City of Ottawa water distribution mapping included in ***Appendix B***. The existing site is serviceable via the existing 762 mm diameter watermain located within the Hazeldean Road right-of-way and via the existing 203 mm diameter watermain located within the Neil Avenue right-of-way. Based on information provided by a City of Ottawa As-built, there is an existing 203 mm diameter stub connected to the 762 mm diameter watermain located near the North West corner of the site.

3.2 Water Supply Servicing Design

It is proposed that the Phase I development be serviced by an internal watermain with a connection to the existing 203 mm diameter stub located North West of the site. As coordinated with City staff, a 200 mm diameter local watermain is to be extended along Hazeldean Road to service the site. Refer to drawing **SSP-1** for a detailed servicing layout.

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
Restaurant	125 L/seat/d
Office	75 L/seat/d
Commercial Maximum Daily Demand	1.5 x avg. day
Commercial Maximum Hour Demand	1.8 x max. day
Minimum Watermain Size	150 mm diameter
Minimum Depth of Cover	2.4 m from top of watermain to finished grade
During normal operating conditions desired operating pressure is within	350 kPa and 480 kPa
During normal operating conditions pressure must not drop below	275 kPa
During normal operating conditions pressure must not exceed	552 kPa
During fire flow operating pressure must not drop below	140 kPa
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 estimated water supply demand for the proposed development based on the ***Water Supply Guidelines***.

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Table 2
Proposed Water Demand

Design Parameter	Estimated Demand[1] (L/min)	Boundary Condition Hazeldean Road[2] (m H_2O / kPa)
Average Daily Demand	9.6	42.3 / 415.1
Max Day + Fire Flow	14.4 + 7,000 = 7,014.4	40.7 / 399.4
Peak Hour	25.9	39.5 / 387.6

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 117.99m. 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 assumed:

- Type of construction - Ordinary Construction
- Occupancy type (Building A) – Combustible
- Occupancy type (Building B) – Limited Combustible
- Sprinkler Protection – Non-Sprinkler System

The above assumptions result in an estimated fire flow demands, as shown below in ***Table 3.***

Table 3
FUS - Estimated Fire flow Summary

	Anticipated Demand (L/min)
Building A	7,000
Building B	7,000

The above assumptions result in an estimated maximum fire flow of approximately ***7,000 L/min***, noting that actual building materials selected will affect the estimated flow.

The City of Ottawa was contacted to obtain boundary conditions associated with the estimated water demand as indicated in ***Table 2***. Based on the boundary conditions provided it is anticipated that the existing municipal infrastructure will supply the required

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demands with pressures within the City's recommended range. Correspondence with the City has been included in ***Appendix B***.

3.2.1 EPANet Water Modelling

EPANet was utilized to determine pipe sizing and the availability of pressures throughout the system during average day demand, max day plus fire flow, and peak hour demands. The static model determines pressures based on the available head obtained from the boundary conditions provided by the City of Ottawa.

The model utilizes the Hazen-Williams equation to determine pressure drop, while the pipe properties, including friction factors, have been selected in accordance with Table 4.4 of the ***Water Supply Guidelines***. The model was prepared to assess the available pressure to the proposed building as well as the pressures the watermain provided the fire hydrant during fire flow conditions.

Table 4 summarizes the output reports and model schematics for each scenario. The model indicates that pressures during average day, max day and peak hour are within the **Water Supply Guidelines** recommended range.

Table 4
Model Simulation Output Summary

Location	Average Day (kPa)	Max Day + Fire Flow (kPa)	Peak Hour (kPa)
N3 (FIRE HYDRANT)	441.9	333.0	414.5
N1	441.5	400.7	414.1
N2	441.5	346.9	414.1
N4	439.8	345.1	412.3
N5	441.9	346.7	413.9
N6 (OFFICE)	443.8	349.1	411.7
N7 (RESTAURANT)	439.2	344.5	416.3

3.3 Water Supply Conclusion

Estimated water demand under proposed conditions was submitted to the City of Ottawa for establishing boundary conditions. Based on the boundary conditions provided and the EPANet model prepared, it is calculated that the existing municipal infrastructure will supply the required demands with pressures within the City's recommended range.

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

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4.0 WASTEWATER SERVICING

4.1 Existing Wastewater Services

The subject site lies within the Jackson Trails Pump Station catchment area, as shown by the ***Jackson Trails Subdivision Serviceability Report (JTSS),*** included in ***Appendix C***. An existing 250 mm diameter PVC sanitary sewer is located within the Neil Avenue right-of-way, South East of the subject site.

The subject property currently has no service connections to the local sanitary sewer infrastructure.

4.2 Wastewater Design

Based on the ***JTSS***, the Jackson Trails pump station (JTPS) located near the intersection of Stittsville Main Street and Hazeldean Road was contemplated to service the former Stittsville Flea Market area and Taggart lands. Excerpts from the report are included in ***Appendix C***.

As shown by drawing ***501B*** in the ***JTSS,*** 14.61 ha, including the 0.68 ha site, was contemplated to outlet to the JTPS. Associated calculation sheets are included in ***Appendix C***. The proposed development will require an extension of the existing municipal sewers to the site through the Neil Avenue right-of-way. The ***Sanitary Extension Design Brief*** detailing the sanitary sewer extension within Neil Avenue will be submitted to the City under a separate cover.

It is proposed that the Phase I development be serviced by a 250 m diameter sanitary sewer connected to the extended 250 mm diameter sanitary sewer within Neil Avenue. A detailed servicing layout is specified by drawing ***SSP-1.***

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

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Table 5
Wastewater Design Criteria

Design Parameter	Value
Restaurant	125 L/seat/d
Office	75 L/seat/d
Commercial Peaking Factor	1.0
Infiltration and Inflow Allowance	0.28 L/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	200 mm diameter
Minimum Manning's 'n'	0.013
Minimum Depth of Cover	2.5 m from crown of sewer to grade
Minimum Full Flowing Velocity	0.6 m/s
Maximum Full Flowing Velocity	3.0 m/s
Extracted from Sections 4 and 6 of the City of Ottawa Sewer Design Guidelines, October 2012.	

Table 6 demonstrates the estimated peak flow based on development stats provided by Alexander Wilson Architects Incorporated (AWA). See ***Appendix C*** for associated calculations.

Table 6
Summary of Estimated Peak Wastewater Flow

Design Parameter	Total Flow (L/s)
Estimated Average Dry Weather Flow	0.16
Estimated Peak Dry Weather Flow	0.09
Estimated Peak Wet Weather Flow	0.18

The estimated peak wet weather sanitary flow, based on the site plan included in ***Drawings/Figures,*** is ***0.18 L/s***.

As shown by the ***JTSS*** and accompanying calculations sheets, sufficient wastewater capacity is available for the proposed site.

4.3 Wastewater Servicing Conclusions

The site is tributary to the JTPS; based on the JTSS and accompanying calculation sheets, sufficient capacity is available to accommodate the estimated ***0.18 L/s*** peak wet weather flow from the proposed development.

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

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5.0 STORMWATER MANAGEMENT

5.1 Existing Stormwater Services

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

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

It was determined that the existing development contained no stormwater management controls for flow attenuation. The current site surface drains both to Hazeldean Road and to an existing ditch on the south side of Neil Avenue. Based on the Topographic Survey prepared by Stantec Geomatics Ltd., included in ***Drawings/Figures***, the existing area of the property directing flow towards Hazeldean road is approximately ***0.445 ha*** (Area EX1) with a calculated rational method coefficient of ***0.87*** as shown by drawing ***STM-1*** included in ***Appendix D***. The estimated pre-development peak flows directed to Hazeldean Road for the 2, 5 and 100-year storm are summarized in ***Table 7:***

Table 7
Summary of Existing Peak Storm Flow Rates Directed to Hazeldean Road

City of Ottawa Design Storm	Estimated Peak Flow Rate (L/s)
2-year	96.0
5-year	130.5
100-year	249.2

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:

- Control to an allowable release rate based on a Rational Method Coefficient of 0.50, employing the City of Ottawa IDF parameters for a 5-year storm with a time of concentration greater than or equal to 10 minutes.
- Attenuate all storms up to and including the 100-year design event on site.
- Provide an enhanced level of quality control for the proposed development due to the site's proximity to Poole Creek; correspondence with the MVCA is included in ***Appendix A***.

Based on the above the allowable release rate for the proposed development is ***54.4 L/s***, resulting in a 78% decrease in stormwater outletting towards Hazeldean Road.

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5.3 Proposed Stormwater Management System

It is proposed that the stormwater from the proposed development outlet to the existing 1200mm x 2400mm storm sewer within the Hazeldean Road right-of-way.

In order to achieve the allowable post-development stormwater runoff release rate established in Section 5.2 above, the proposed development will employ rooftop and surface storage.

The proposed system has been sized to accommodate Phase I only. Runoff from the site will be directed to a catchbasin system; approximately ***58.5 m³*** of storage will be provided by surface ponding and catchbasins. Runoff from the site will be attenuated by a ***75 mm*** diameter ICD located on the outlet side of ***CB5,*** a ***75 mm*** diameter ICD or an approved equivalent located on the outlet side of ***CBMH103*** and a Tempest LMF55 ICD or an approved equivalent located on the outlet side of ***CBMH101***. Detailed calculations are located in ***Appendix D***.

To meet stormwater quality criteria specified by MVCA, a Stormceptor STC750 oil/grit separator or an approved equivalent will be installed downstream of ***STM102*** and the catchbasins collecting runoff, as shown by ***SSP-1,*** in ***Drawings/Figures***. This will provide an enhanced level of quality control (80% TSS removal) in accordance with the MVCA requirement. Stormceptor sizing has been included in ***Appendix D***.

Flow from rooftops will be controlled before discharging to the storm sewer system. The release rate and storage calculations for roof top attenuation were estimated based on Zurn Industries Ltd. design guidelines for Model Z-105-5 Control-Flo Single Notch drains. Other products may be specified provided that the restricted release rate and sufficient storage is provided to meet or exceed the values in ***Appendix D***.

Drawing ***SWM-1***, located in ***Drawings / Figures***, illustrates the site sub-drainage catchment areas. Detailed stormwater calculations can be found in ***Appendix D***.

Table 9 summarizes the storage requirements and release rate.

Table 8
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 Area U1	5.1	0.0	9.8	0.0	0.0
Attenuated Area (A1, A2, A3, A4, A5)	42.0	27.8	44.3	74.4	109.9
Total	**47.1**	**27.8**	**54.1**	**74.4**	**109.9**

As indicated in ***Table 8***, it is estimated that ***74.4 m³*** of onsite storage, provided via rooftop and surface ponding, will be required to attenuate stormwater runoff to the established

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release rate of ***54.4 L/s***. Detailed storage calculations are contained within ***Appendix D***. Maximum ponding levels and overland flow routes are illustrated by Drawing ***SWM-1,*** included in the ***Drawing/Figures.***

5.4 Stormwater Servicing Conclusions

In accordance with ***City Standards,*** post development stormwater runoff will be attenuated onsite for storm events up to and including the 1:100 year event. An estimated ***74.4 m³*** of storage will be required to meet the post-development allowable release rate of ***54.4 L/s*** to the existing storm sewer in Hazeldean Road, a net reduction of approximately 78% in stormwater outletting towards Hazeldean Road.

To meet an enhanced level of treatment (80% TSS removal), a Stormceptor STC750 oil/grit separator or an approved equivalent is to be installed.

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

6.0 UTILITIES

Utility servicing will be coordinated with the individual utility companies prior to site development.

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7.0 EROSION AND SEDIMENT CONTROL

Soil erosion occurs naturally and is a function of soil type, climate and topography. During construction the extent of erosion losses is exaggerated due to the removal of vegetation and the top layer of soil becoming agitated.

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

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

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

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

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

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

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

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

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8.0 CONCLUSION AND RECOMMENDATIONS

David Schaeffer Engineering Limited (DSEL) has been retained by 2073945 Ontario Inc. to prepare a Site Servicing and Stormwater Management report in support of the application for Site Plan Control (SPC) at 6150 Hazeldean Road. The preceding report outlines the following:

- Based on the boundary conditions provided by the City and the EPANet model prepared, it is estimated that the existing municipal infrastructure will supply the required demands with pressures within the City's recommended range;
- The ***FUS*** method for estimating fire flow indicated ***7,000 L/min*** is required for the proposed development;
- The proposed development is estimated to have a peak wet weather flow of ***0.18 L/s***; Based on the sanitary analysis, the existing municipal sewer infrastructure has sufficient capacity to support the development;
- Based on coordination with the City of Ottawa, the proposed Phase I development will be required to attenuate post development flows to an equivalent release rate of ***54.4 L/s*** for all storms up to and including the 100-year storm event;
- It is proposed that stormwater objectives are met through storm water retention via rooftop and surface storage, it is proposed that ***109.9 m³*** of onsite storage will be provided to attenuate flow to the established release rate above;
- To meet an enhanced level of treatment (80% TSS removal), a Stormceptor STC750 oil/grit separator or an approved equivalent is to be installed.

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APPENDIX A

Pre-Consultation

DEVELOPMENT SERVICING STUDY CHECKLIST

17-933 08/06/2018

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, EX-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 1.1, 3.1, 4.1, 5.1
☐	Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).	N/A
☒	Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.	GP-1
☐	Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.	N/A
☒	Proposed phasing of the development, if applicable.	Section 1.0, SP-1
☒	Reference to geotechnical studies and recommendations concerning servicing.	Section 2.1
☒	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	SP-1

4.2 Development Servicing Report: Water		
☐	Confirm consistency with Master Servicing Study, if available	N/A
☒	Availability of public infrastructure to service proposed development	Section 3.1
☒	Identification of system constraints	Section 3.1
☒	Identify boundary conditions	Section 3.2
☒	Confirmation of adequate domestic supply and pressure	Section 3.2, 3.2.1, 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.	Section 3.2.1
☒	Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design	Section 3.2.1
☐	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, 3.2.1, 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.	SSP-1
☐	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.	Section 3.2.1, Appendix B

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.	Section 4.2, Appendix C
☐	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, Appendix C
☒	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.	N/A
☒	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, SWM-1
☐	Set-back from private sewage disposal systems.	N/A
☐	Watercourse and hazard lands setbacks.	N/A
☒	Record of pre-consultation with the City of Ottawa 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 7.0
☐	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 5.1
☐	Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.	N/A
☐	Changes to Municipal Drains.	N/A
☐	Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)	N/A

4.6 Conclusion Checklist

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

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

Alison Gosling

From: Kuruvilla, Santhosh <Santhosh.Kuruvilla@ottawa.ca>
Sent: Thursday, May 17, 2018 8:57 AM
To: Alison Gosling
Cc: Robert Freel
Subject: FW: 17-933 6150 Hazeldean Road - Pre-consultation

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Alison,

I forgot to include one thing in my email that I sent you yesterday.

As part of the submission package (plans and report), you will have to submit a drainage area plan for the existing condition. Only the drainage area that currently drains to Hazeldean Road is allowed to drain to Hazeldean Road for the proposed condition.

If you have any questions, please let me know.

Thanks,

Santhosh

From: Kuruvilla, Santhosh
Sent: Wednesday, May 16, 2018 2:56 PM
To: 'Alison Gosling' <AGosling@dsel.ca>
Cc: Robert Freel <RFreel@dsel.ca>
Subject: RE: 17-933 6150 Hazeldean Road - Pre-consultation

Hi Alison,

Thanks for your email. My responses are provided below in red text.

If you have any questions, please let me know.

Thanks,

Santhosh
Ext. 27599

From: Alison Gosling <AGosling@dsel.ca>
Sent: Tuesday, May 15, 2018 9:51 AM
To: Kuruvilla, Santhosh <Santhosh.Kuruvilla@ottawa.ca>
Cc: Robert Freel <RFreel@dsel.ca>
Subject: 17-933 6150 Hazeldean Road - Pre-consultation

Good morning Santhosh,

We would like to confirm capacity of the municipal infrastructure along with Stormwater Management criteria for the site based on the pre-consultation meeting with the City on June 1, 2017.

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

Water:

- There is an existing 203mm diameter watermain within the Neil Avenue right-of-way and an existing 762mm diameter watermain within the Hazeldean Road right-of-way.
- It is contemplated that the proposed development will connect to the existing 203mm diameter watermain stub located at the North West corner of the site (location to the be confirmed), serviced by the existing 762mm diameter watermain within the Hazeldean Road. You need to field verify the exact location of the existing stub fronting Hazeldean Road. If the existing stub is located within the frontage of this property, you are allowed to make a connection to this existing stub to service 6150 Hazeldean Rd. If the existing stub is outside the property limit of 6150 Hazeldean Road, you may not be able to make a connection to it. Further discussion is required or you need an alternative service connection.

Sanitary:

- There is an existing 250mm diameter sanitary sewer south of 6130 Hazeldean Road within the Neil Avenue right-of-way.
- It is contemplated that the proposed development will extend the sanitary sewer within the Neil Avenue to the South East corner of the subject site.

Storm:

- There is an existing 375mm diameter storm sewer along the North side of the Hazeldean Road right-of-way and an existing 2400mm diameter storm sewer along the South Side of the Hazeldean Road right-of-way.
- It is contemplated that the proposed development will connect to the existing 2400mm diameter storm sewer within Hazeldean Road. Connection to 2400 mm diameter storm sewer require approval from Asset Management Unit. Plans needs to be circulated to Asset Management during site plan application process.
- Based on City guidelines it is anticipated the site would need to be controlled to a release rate based on a 5-year event for a Rational Method coefficient of 0.5 at a calculated time of concentration greater than 10 minutes. In the absence of storm drainage area plan or storm sewer design sheets of Hazeldean Road, pre-development condition will be determined using the smaller of a runoff coefficient of 0.5 or the actual existing site runoff coefficient

Can you confirm the background information and assumptions above?

Please let us know if any updates are required.

Thank you,

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

DSEL
david schaeffer engineering ltd.

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

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

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'

Alison Gosling

From: Alison Gosling
Sent: Wednesday, May 9, 2018 10:32 AM
To: 'Myra Van Die'
Cc: Charlotte Kelly
Subject: 6150 Hazeldean Road - MVCA Requirements

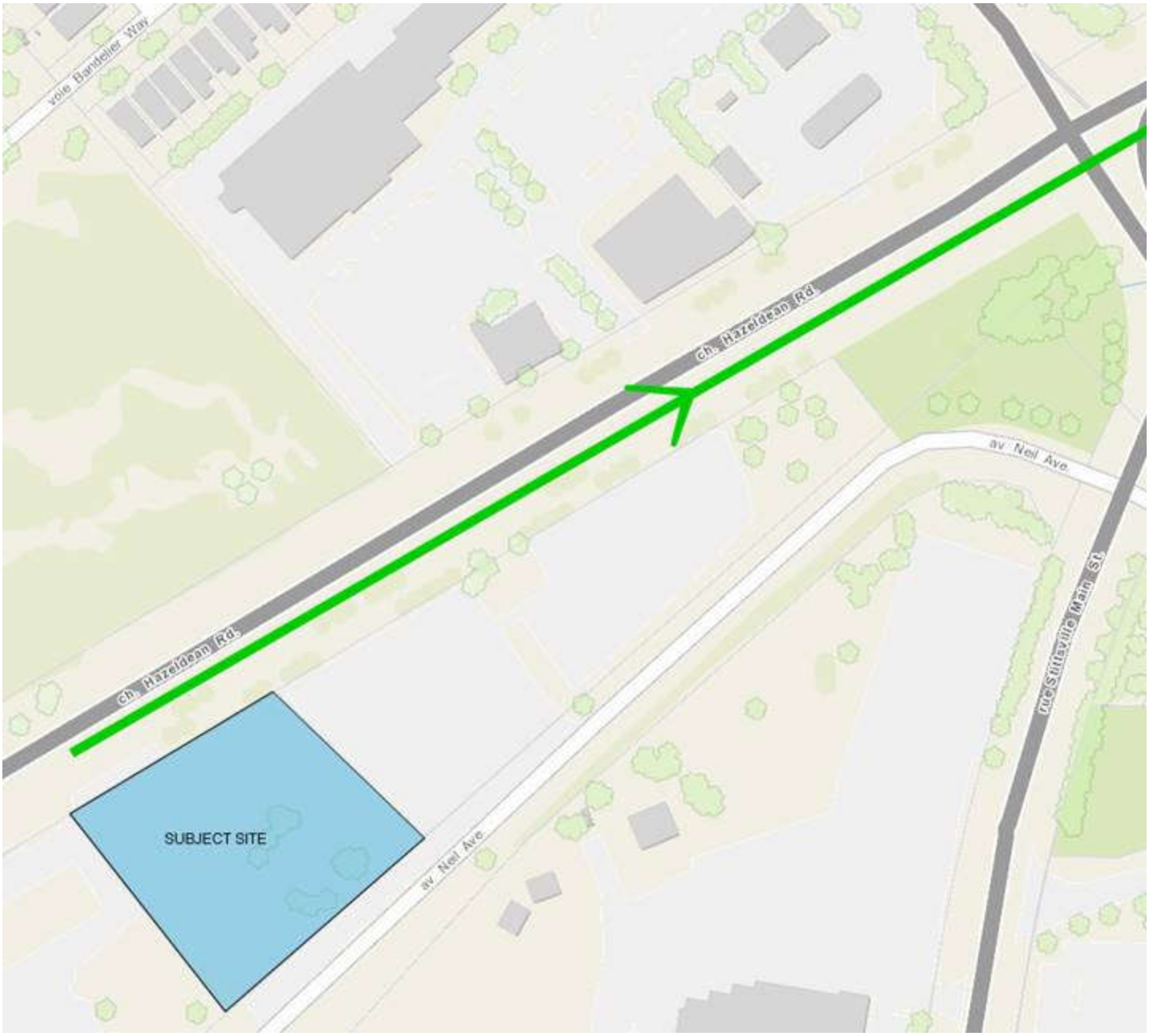
Good morning Myra,

We wanted to touch base with you regarding a development we are working on located at 6150 Hazeldean Road, Stittsville.

The stormwater collected from the site travels approximately 0.43 km until discharging into Poole Creek (just upstream of the Amberwood Golf Course).

The development proposes to construct a 1-storey restaurant, a 2-storey office building and a 5-storey, 80 unit apartment building. There will be surface parking for both the restaurant and office. The apartment building will have underground parking. The development will discharge stormwater to the existing 2400x1200 mm storm sewer within Hazeldean Road.

Can you please provide a comment regarding quality controls that may be required for the site?



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

Thanks in advance,

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

DSEL
david schaeffer engineering ltd.

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

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

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APPENDIX B

Water Supply

2073945 Ontario Inc.
6150 Hazeldean Road
Proposed Site Conditions - Phase I

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

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**
Office	75	L/9.3m^2/d	937	7.55	5.2	11.3	7.9	20.4	14.2
Restaurant	125	L/9.3m2/d	465	6.25	4.3	9.4	6.5	16.9	11.7
Industrial - Light	35,000	L/gross ha/d		0.00	0.0	0.0	0.0	0.0	0.0
Industrial - Heavy	55,000	L/gross ha/d		0.00	0.0	0.0	0.0	0.0	0.0
		Total I/CI Demand		13.8	9.6	20.7	14.4	37.3	25.9
		Total Demand		**13.8**	**9.6**	**20.7**	**14.4**	**37.3**	**25.9**

* Estimated number of seats at 1 seat per 9.3 m2

2073945 Ontario Inc.
6150 Hazeldean Road
FUS-Fire Flow Demand - Building A

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	464.8	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	4743.0	L/min	
	5000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Combustible	0%	
Fire Flow	**5000.0**	**L/min**

3. Reduction for Sprinkler Protection

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

4. Increase for Separation Distance

N	>45m	0%	
S	20.1m-30m	10%	
E	20.1m-30m	10%	
W	3.1m-10m	20%	
	% Increase	**40%**	*value not to exceed 75% per FUS Part II, Section 4*
	Increase	**2000.0**	**L/min**

Total Fire Flow

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

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by _____.
-Calculations based on Fire Under ``

2073945 Ontario Inc.
6150 Hazeldean Road
FUS-Fire Flow Demand - Building B

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required

1. Base Requirement

$F = 220C\sqrt{A}$ 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	936.6	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	6732.9	L/min	
	7000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%	
Fire Flow	**5950.0**	**L/min**

3. Reduction for Sprinkler Protection

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

4. Increase for Separation Distance

N	>45m	0%	
S	20.1m-30m	10%	
E	>45m	0%	
W	20.1m-30m	10%	
	% Increase	**20%**	*value not to exceed 75% per FUS Part II, Section 4*
	Increase	**1190.0**	**L/min**

Total Fire Flow

Fire Flow	7140.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section*
	7000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by _____.
-Calculations based on Fire Under ``

Boundary Conditions Unit Conversion

Connection 1

	Height (m)	Elevation (m)	m H_2O	PSI	kPa	
Avg. DD	160.3	118.0	42.3	60.2	415.1	118.0
Fire Flow	158.7	118.0	40.7	57.9	399.4	118.0
Peak Hour	157.5	118.0	39.5	56.2	387.6	118.0

Connection 2

	Height (m)	Elevation (m)	m H_2O	PSI	kPa
Avg. DD	160.3	118.1	42.2	60.0	414.0
Fire Flow	154.6	118.1	36.5	51.9	358.1
Peak Hour	157.3	118.1	39.2	55.8	384.6

``

Minor Loss Coefficients

Fitting		Loss Coefficient
Globe valve, fully open		10
Angle valve, fully open		5
Swing check valve, fully open		2.5
Gate valve, fully open		0.2
Short-radius elbow		0.9
Medium-radius elbow		0.8
Long-radius elbow		0.6
45 degree elbow		0.4
Closed return bend		2.2
Standard tee - flow through run		0.6
Standard tee - flow through branch		1.8
Square Entrance		0.5
Exit		1

*Minor loss coefficients based on EPANET 2 USERS MANUAL, dated September 2000

Pipe Diameter vs. "C" Factor

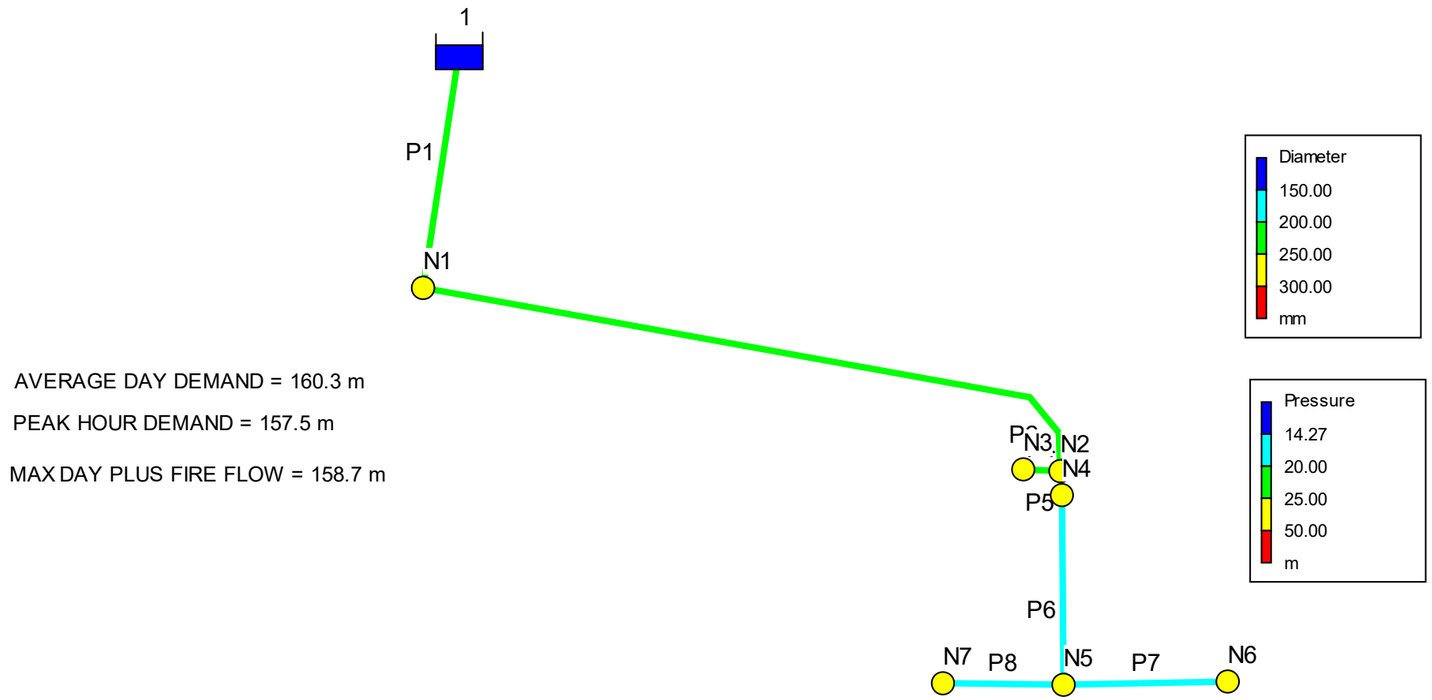
Pipe Diameter (m)	C-Factor
150	100
200 to 250	110
300 to 600	120
Over 600	130

Node Pressures

Kpa	Pressure (kPa)	Pressure (m H20)
Max	552	56.3
Rec Max	480	49.0
Rec Min	350	35.7
Min	275	28.1

Location	Average Day (kPa)	Max Day + Fire Flow (kPa)	Peak Hour (kPa)
N3 (FIRE HYDRANT)	441.9	333.0	414.5
N1	441.5	400.7	414.1
N2	441.5	346.9	414.1
N4	439.8	345.1	412.3
N5	441.9	346.7	413.9
N6 (OFFICE)	443.8	349.1	411.7
N7 (REST.)	439.2	344.5	416.3

6150 HAZELDEAN ROAD - AVERAGE DAY DEMAND



AVERAGE DAY DEMAND = 160.3 m

PEAK HOUR DEMAND = 157.5 m

MAX DAY PLUS FIRE FLOW = 158.7 m

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**********************************************************************
*                            E P A N E T                             *
*                     Hydraulic and Water Quality                    *
*                     Analysis for Pipe Networks                     *
*                           Version 2.0                              *
**********************************************************************
```

Input File: AVGDAYINPUT_V2.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
P1	1	N1	15.7	203
P2	N1	N2	48	203
P5	N2	N4	1.95	200
P6	N4	N5	12.76	150
P8	N5	N7	8	150
P7	N5	N6	11.1	150
P4	N2	N3	2.21	200

Node Results:

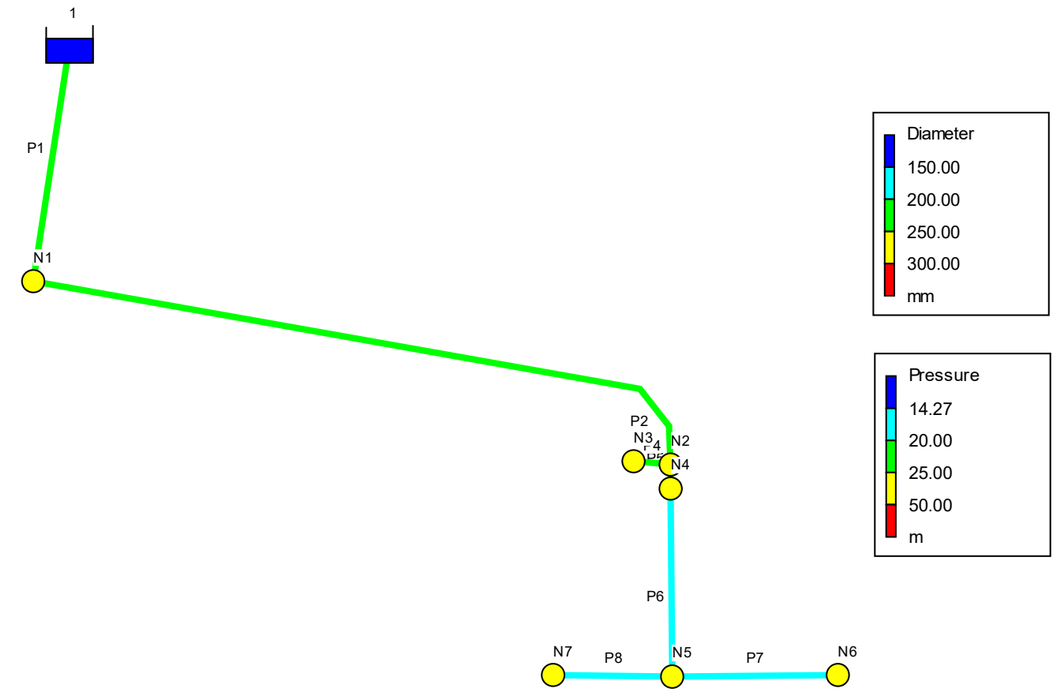
Node ID	Demand LPM	Head m	Pressure m	Quality	
N1	0.00	160.30	45.01	0.00	
N2	0.00	160.30	45.01	0.00	
N3	0.00	160.30	45.05	0.00	
N4	0.00	160.30	44.83	0.00	
N5	0.00	160.30	44.99	0.00	
N7	4.30	160.30	44.77	0.00	
N6	5.20	160.30	45.24	0.00	
1	-9.50	160.30	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPM	VelocityUnit m/s	Headloss m/km	Status
P1	9.50	0.00	0.00	Open
P2	9.50	0.00	0.00	Open
P5	9.50	0.01	0.00	Open
P6	9.50	0.01	0.00	Open

P8	4.30	0.00	0.00	Open
P7	5.20	0.00	0.00	Open
P4	0.00	0.00	0.00	Open

6150 HAZELDEAN ROAD - MAX DAY PLUS FIRE FLOW DEMAND



AVERAGE DAY DEMAND = 160.3 m

PEAK HOUR DEMAND = 157.5 m

MAX DAY PLUS FIRE FLOW = 158.7 m

```
**************************************************************
*                          E P A N E T                       *
*                  Hydraulic and Water Quality               *
*                  Analysis for Pipe Networks                *
*                        Version 2.0                         *
**************************************************************

Input File: MAXDAY_V2.net
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Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
P1	1	N1	15.7	203
P2	N1	N2	48	203
P5	N2	N4	1.95	200
P6	N4	N5	12.76	150
P8	N5	N7	8	150
P7	N5	N6	11.1	150
P4	N2	N3	2.21	200

Node Results:

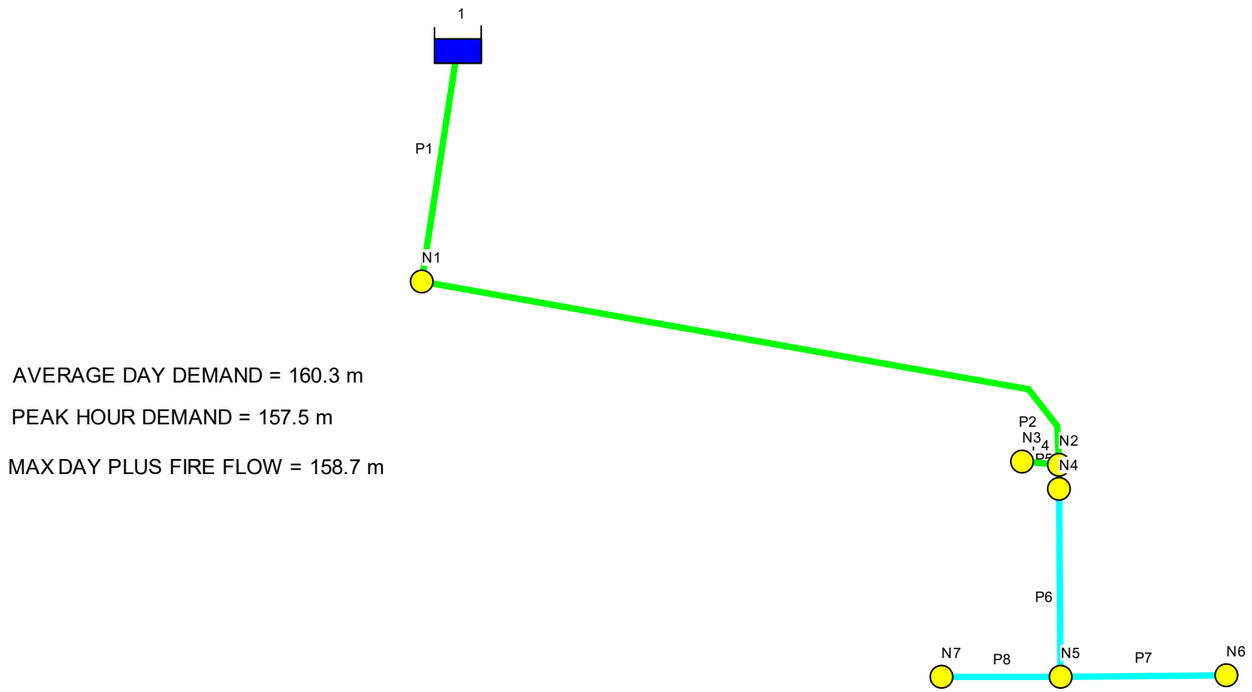
Node ID	Demand LPM	Head m	Pressure m	Quality	
N1	0.00	156.14	40.85	0.00	
N2	0.00	150.65	35.36	0.00	
N3	7000.00	149.20	33.95	0.00	
N4	0.00	150.65	35.18	0.00	
N5	0.00	150.65	35.34	0.00	
N7	6.50	150.65	35.12	0.00	
N6	7.90	150.65	35.59	0.00	
1	-7014.40	158.70	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPM	Velocity m/s	Unit Headloss m/km	Status
P1	7014.40	3.61	163.04	Open
P2	7014.40	3.61	114.38	Open
P5	14.40	0.01	0.00	Open
P6	14.40	0.01	0.01	Open

P8	6.50	0.01	0.00	Open
P7	7.90	0.01	0.00	Open
P4	7000.00	3.71	656.13	Open

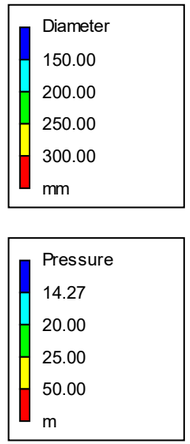
6150 HAZELDEAN ROAD - PEAK HOUR DEMAND



AVERAGE DAY DEMAND = 160.3 m

PEAK HOUR DEMAND = 157.5 m

MAX DAY PLUS FIRE FLOW = 158.7 m



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*                            E P A N E T                             *
*                     Hydraulic and Water Quality                    *
*                     Analysis for Pipe Networks                     *
*                           Version 2.0                              *
**********************************************************************

Input File: PEAKHOUR_V2.net
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Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
P1	1	N1	15.7	203
P2	N1	N2	48	203
P5	N2	N4	1.95	200
P6	N4	N5	12.76	150
P8	N5	N7	8	150
P7	N5	N6	11.1	150
P4	N2	N3	2.21	200

Node Results:

Node ID	Demand LPM	Head m	Pressure m	Quality	
N1	0.00	157.50	42.21	0.00	
N2	0.00	157.50	42.21	0.00	
N3	0.00	157.50	42.25	0.00	
N4	0.00	157.50	42.03	0.00	
N5	0.00	157.50	42.19	0.00	
N7	11.70	157.50	41.97	0.00	
N6	14.20	157.50	42.44	0.00	
1	-25.90	157.50	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPM	Velocity m/s	Unit Headloss m/km	Status
P1	25.90	0.01	0.00	Open
P2	25.90	0.01	0.00	Open
P5	25.90	0.01	0.01	Open
P6	25.90	0.02	0.02	Open

P8	11.70	0.01	0.00	Open
P7	14.20	0.01	0.00	Open
P4	0.00	0.00	0.00	Open

Charlotte Kelly

From: Charlotte Kelly
Sent: May 23, 2018 1:23 PM
To: 'Kuruvilla, Santhosh'
Cc: Adam Fobert; Alison Gosling
Subject: RE: 6150 Hazeldean Road - Boundary Condition Request
Attachments: 2018-05-23_FUS-CALCS.pdf

Hi Santhosh,

Included in the following email is all of the required information:

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

1. Location of Service / Street Number: 6150 Hazeldean Road

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

- The proposed development consists of a 1-storey restaurant (Building A) and a 2-storey office building (Building B).
- It is anticipated that the development will have a **single** connection to be serviced from the existing ***203 mm*** diameter watermain connecting to the ***762 mm*** diameter watermain within Hazeldean Road, as shown by the attached map.
- A maximum resulting fire Flow of ***7,000L/min*** is anticipated for the development per Technical Bulletin ISTB-2018-02.
- Fire demand based on FUS has been used to calculate fire demand for each building.

FUS fire flow calculations are included in the attached PDF titled "2018-05-23_FUS-CALCS.pdf".

3.

	L/min	L/s
Avg. Daily	9.6	0.16
Max Day	14.4	0.24
Peak Hour	25.9	0.43

Please contact Adam or I if you have any further questions.

Thank-you,

Charlotte Kelly, E.I.T.
Project Coordinator / Junior Designer

DSEL
david schaeffer engineering ltd.

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

BOUNDARY CONDITIONS

Boundary Conditions For: 6150 Hazeldean Rd

Date of Boundary Conditions: 2018-May-31

Provided Information:

Scenario	Demand	
	L/min	L/s
Average Daily Demand	9.6	0.16
Maximum Daily Demand	14.4	0.24
Peak Hour	25.9	0.43
Fire Flow #1 Demand	7000	116.7

Number Of Connections: 2

Location:

Results:

Connection #: 1

BOUNDARY CONDITIONS

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	160.3	60.2
Peak Hour	157.5	56.1
Max Day Plus Fire (7,000) L/min	158.7	57.9

[1]Elevation: **117.99 m**

Connection #: 2

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	160.3	60.1
Peak Hour	157.3	55.8
Max Day Plus Fire (7,000) L/min	154.6	51.9

[1]Elevation: **118.07 m**

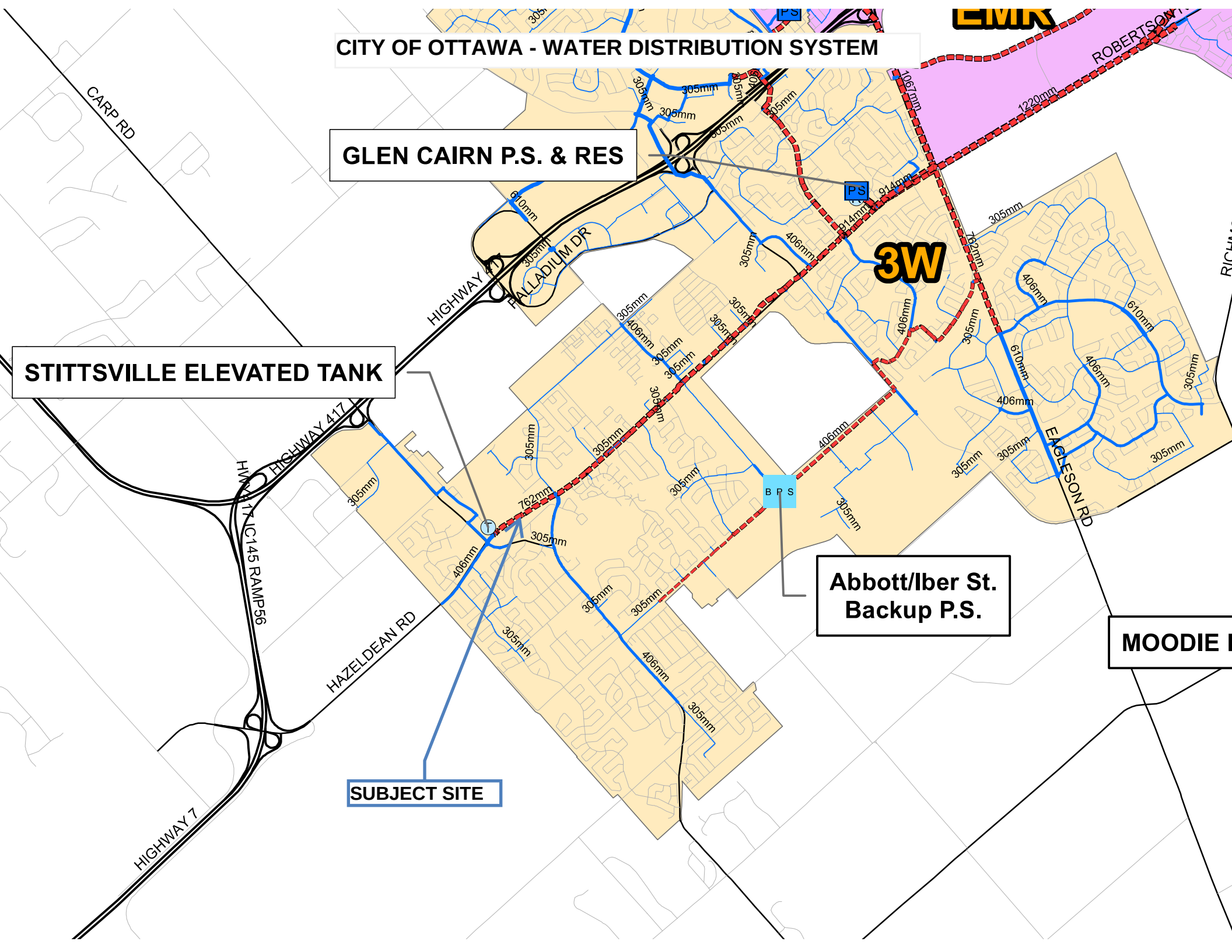
Notes:

1) As per the Ontario Building Code in areas that may be occupied, the static pressure at any fixture shall not exceed 552 kPa (80 psi.) Pressure control measures to be considered are as follows, in order of preference:

a) If possible, systems to be designed to residual pressures of 345 to 552 kPa (50 to 80 psi) in all occupied areas outside of the public right-of-way without special pressure control equipment.
b) Pressure reducing valves to be installed immediately downstream of the isolation valve in the home/ building, located downstream of the meter so it is owner maintained.

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 - WATER DISTRICT SYSTEM
GLEN CAIRN P.S. & RES
STITTSVILLE ELEVATED TANK
Abbott/Iber St. Backup P.S.
SUBJECT SITE
3W
CARP RD
HIGHWAY 417
HWY 417 IC145 RAMP56
HAZELDEAN RD
HIGHWAY 7
HIGHWAY 417
PALLADIUM DR
EAGLESON RD
ROBERTSON
MOODIE
PS
BPS
914mm
762mm
610mm
406mm
305mm

APPENDIX C

Wastewater Collection

2073945 Ontario Inc.
6150 Hazeldean Road
Proposed Site Conditions (Phase 1)

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

Site Area 0.341 **ha**

Extraneous Flow Allowances

Infiltration / Inflow	**0.10**	**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)
Restaurant	125 L/9.3m2/d	465	0.07
Office	75 L/9.3m2/d	937	0.09
Average I/C/I Flow			**0.16**
Peak Institutional / Commercial Flow			0.09
Peak I/C/I Flow			**0.09**

** assuming a 12 hour commercial operation*
***Estimated number of seats at 1 seat per 9.3 m2*

Total Estimated Average Dry Weather Flow Rate	**0.16**	**L/s**
Total Estimated Peak Dry Weather Flow Rate	**0.09**	**L/s**
Total Estimated Peak Wet Weather Flow Rate	**0.18**	**L/s**

DSEL©

SANITARY SEWER CALCULATION SHEET

CLIENT: **2073945 Ontario Inc.**
LOCATION: **Neil Ave.**
FILE REF: **17-933**
DATE: **5-Jul-18**

DESIGN PARAMETERS

Avg. Daily Flow Res.	280	L/p/d	Peak Fact Res. Per Harmons: Min = 2.0, Max =4.0		Infiltration / Inflow	0.28	L/s/ha
Avg. Daily Flow Comn	50,000	L/ha/d	Peak Fact. Comm.	1	Min. Pipe Velocity	0.60	m/s full flowing
Avg. Daily Flow Instit.	50,000	L/ha/d	Peak Fact. Instit.	1	Max. Pipe Velocity	3.00	m/s full flowing
Avg. Daily Flow Indus	35,000	L/ha/d	Peak Fact. Indust. per MOE graph		Mannings N	0.013	

Location			Residential Area and Population										Commercial		Institutional		Industrial			Infiltration				Pipe Data							
Area ID	Up	Down	Area	Number of Units by type				Pop.	Cumulative Area	Cumulative Pop.	Peak. Fact.	Q_{res}	Area†	Accu. Area	Area	Accu. Area	Area	Accu. Area	Q_{C+I+I}	Total Area	Accu. Area	Infiltration Flow	Total Flow	DIA	Slope	Length	$A_{hydraulic}$	R	Velocity	Q_{cap}	Q / Q full
			(ha)	Singles	Semi's	Town's	Apt's		(ha)		(-)	(L/s)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(L/s)	(ha)	(ha)	(L/s)	(L/s)	(mm)	(%)	(m)	(m^2)	(m)	(m/s)	(L/s)	(-)
Neil Avenue	SAN105	SAN104	0.000					0.0	0.000	0.0	4.00	0.00	14.61	14.61		0.00		0.00	12.7	14.610	14.610	4.1	16.8	250	0.50	41.3	0.049	0.063	0.86	42.0	0.40
	SAN104	SAN103D	0.000					0.0	0.000	0.0	4.00	0.00		14.61		0.00		0.00	12.7	0.000	14.610	4.1	16.8	250	0.52	28.5	0.049	0.063	0.87	42.9	0.39
	SAN103D	SAN103C	0.000					0.0	0.000	0.0	4.00	0.00		14.61		0.00		0.00	12.7	0.000	14.610	4.1	16.8	250	0.24	58.1	0.049	0.063	0.59	29.1	0.58
Stittsville Main	SAN103C	SAN103B	0.000					0.0	0.000	0.0	4.00	0.00		14.61		0.00		0.00	12.7	0.000	14.610	4.1	16.8	250	0.24	32.6	0.049	0.063	0.59	29.1	0.58
	SAN103B	SAN103	0.000					0.0	0.000	0.0	4.00	0.00		14.61		0.00		0.00	12.7	0.000	14.610	4.1	16.8	250	0.26	23.3	0.049	0.063	0.62	30.3	0.55
	SAN103	SAN102	0.000					0.0	0.000	0.0	4.00	0.00		14.61		0.00		0.00	12.7	0.000	14.610	4.1	16.8	250	0.25	19.0	0.049	0.063	0.61	29.7	0.56
	SAN102	SAN101	0.000					0.0	0.000	0.0	4.00	0.00		14.61		0.00		0.00	12.7	0.000	14.610	4.1	16.8	250	0.33	27.5	0.049	0.063	0.70	34.2	0.49
	SAN101	SAN100	0.000					0.0	0.000	0.0	4.00	0.00		14.61		0.00		0.00	12.7	0.000	14.610	4.1	16.8	250	0.68	26.6	0.049	0.063	1.00	49.0	0.34

† Please note that contemplated tributary Commercial Area has been taken from Jackson Trails Serviceability Report prepared by CCL/IBI.

EXCERPTS FROM:
JACKSON TRAILS SUBDIVISION SERVICABILITY REPORT

PREPARED FOR

TAGGART RESIDENTIAL DEVELOPMENTS LIMITED

PREPARED BY

CUMMING COCKBURN LIMITED
A DIVISION OF IBI GROUP

CITY OF OTTAWA

PROJECT: 3613-LD

REVISED: FEBRUARY 2006

The report, which is included in Appendix B identifies the means necessary to meet municipal requirements which include but are not limited to the following:

- *Average Daily Demand*

Residential	300 l/cap/day
Industrial/Commercial/Institutional	22,000 l/ha/day

- *Maximum Daily Demand*

Residential Greater than 750 Dwellings	800 l/cap/day
Residential Less than 750 Dwellings	1,000 l/cap/day
Industrial/Commercial/Institutional	35,000 l/ha/day

- *Maximum Hourly Demand*

Residential Greater than 750 Dwellings	2.63 x peak day	=	2,104 l/cap/day
Residential Less than 750 Dwellings	2.63 x peak day	=	2,630 l/cap/day
Industrial/Commercial/Institutional	1.62 x peak day	=	56,700 l/ha/day

- Minimum static pressure during max hour – 275 kPa
- Minimum static pressure during max day and fire flows – 140 kPa

5.0 SANITARY SEWERS

Although the proposed Jackson Trails subdivision lies within the City's urban boundaries, earlier developments in surrounding areas failed to provide an adequate wastewater outlet for the lands. In April 2004, Cumming Cockburn Limited, on behalf of the landowners, completed a Wastewater Serviceability Study for the Taggart and surrounding lands. That study identified a wastewater servicing strategy for a total area of 126 hectares. The report recommended that existing spare capacity in the local Fringewood Trunk Sewer be used on an interim basis until such time as an alternative outlet could be provided. The alternative outlet is currently under consideration as part of the Kanata West Serviceability Study. Both interim and ultimate servicing strategies for the Jackson Trails development will require a wastewater pumping station.

The north Stittsville area has developed in a sporadic fashion incorporating numerous small pumping stations. Two of these stations are located near the Taggart lands. One, which is a private station, services the former Stittsville Flea Market area located south of Hazeldean Road and the second services the small Echo Woods subdivision east of Carp Road.

The Jackson Trails station will be sized to include the drainage area tributary to both of those stations. The actual drainage area is shown in Figure 4 and includes all lands north of

MAPLE GROVE ROAD
HARTIN STREET
SPRING BROOK
JACKSON TRAILS
Discover your path to life...
STORM POND (2.32 ha)
CONSERVATION (8.87 ha)
MIXED RESIDENTIAL (DRAFT PLAN)
MIXED RESIDENTIAL (DRAFT PLAN) (36.96 ha)
COMMERCIAL (6.47 ha)
MIXED USE (1.70 ha)
JACKSON TRAILS
JACKSON TRAILS PUMP STATION
MAIN STREET
HAZELDEAN ROAD
COMMERCIAL (18.25 ha)
EXISTING PUMP STATION
CONSERVATION (5.43 ha)
MIXED RESIDENTIAL (41.02 ha)
EXISTING PUMP STATION
ECHO WOODS
CARP ROAD
CCL/IBI
Dillon Consulting Limited
JACKSON TRAILS SUBDIVISION
SERVICEABILITY REPORT
DRAINAGE AREAS AND LAND USES
DATE JAN. 2006
SCALE N.T.S.
DWG. NO. FIGURE 4
J:\0-CAD\ccd\Land\3613-LD Jackson Trail\SERVICEABILITY\FIGURE 4-LAND USE.dwg Layout Name: FIGURE 4 Last Saved By: mmilne Jan 17, 2006 - 8:40am

Hazeldean Road, south of the extension of Maple Grove Road, east of Carp Road and the former Stittsville Flea Market area.

The total area tributary to the proposed station is about 126 hectares. Most of the drainage area will develop as low to medium density residential. Figure 4 also indicates the land uses expected for the total area. Highway commercial type developments will be assumed for the former Stittsville Flea Market area as well as other lands north of and fronting Hazeldean Road.

All sanitary sewers within the development will be designed to meet City and MOE standards which include but are not limited to the following:

- Average residential flow 350 l/c/day
- Peak residential factor Harmon Formula
- Infiltration allowance 0.28 l/ha/sec
- Population density

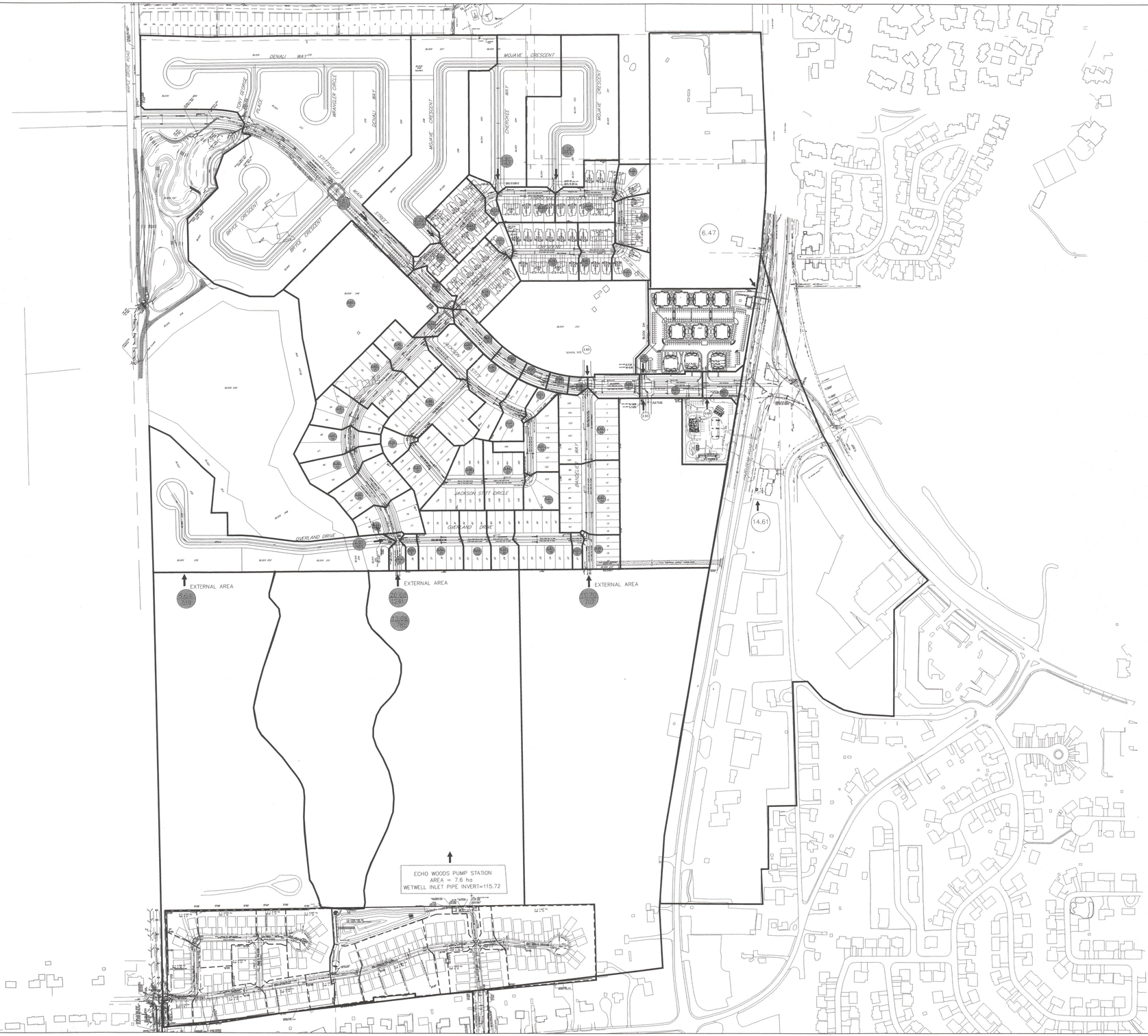
Single-Family	3.4 persons/unit
Semi-Detached	2.7 persons/unit
Row Townhouse	2.7 persons/unit
Stacked Townhouse	2.3 persons/unit

- Minimum pipe size 200mm diameter

For more detailed information on the sanitary sewer design, please refer to Appendix C.

Sanitary sewer flow from the proposed Jackson Trails development will be collected by a trunk sanitary sewer on Stittsville Main Street. The sanitary flow will be carried south to Hazeldean Road where the sewer will continue eastwards towards the pump station. Once it has reached the pump station, the flow will be pumped through forcemains running east on Hazeldean Road. The detail sanitary sewer design sheets and associated drainage area plan are included in Appendix C.

The proposed deep sanitary sewer in Hazeldean Road will be constructed under existing municipal utilities such as communication duct banks and gas mains. These utilities will have to be supported during sewer evacuation work. Support is usually successful using steel beams which are capable of holding existing infrastructure for the short period of time an excavation is open. Such work is done in consultation with the various utility owners.



NO.	DATE	BY	REVISION
0.	05:11:02	T.R.B.	ISSUED FOR MUNICIPAL APPROVAL
1.	06:01:13	T.R.B.	REVISED AS PER CITY COMMENTS
2.	06:02:02		REVISED AS PER CITY COMMENTS

LEGEND :

0.22 / 11 — SUBDRAINAGE AREA IN HECTARES / POPULATION

NOTES :

ASSUMED POPULATION FOR EXTERNAL AREA IS BASED ON 60 pp/ha

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TAGGART RESIDENTIAL DEVELOPMENTS LTD.

Ottawa

CCL/IBI
Cumming Cockburn Limited
1770 WOODWARD DR., OTTAWA (613)225-1311

L. LICENSED PROFESSIONAL ENGINEER
J. I. MOFFATT
PROVINCE OF ONTARIO

L. LICENSED PROFESSIONAL ENGINEER
T.R. BRULE
PROVINCE OF ONTARIO

JACKSON TRAILS SUBDIVISION

EXTERNAL SANITARY DRAINAGE AREA PLAN

SCALE:	1:2500		
DRAWN:	M.M.	DATE:	JULY '05
DESIGN:	T.R.B.	DATE:	JULY '05
CHECKED:	J.I.M.	DATE:	JULY '05

PROJECT NO.	DRAWING NO.
3613-LD	501B

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CCL/IBI
1770 WOODWARD DRIVE
OTTAWA, ONTARIO
K2C OP8

SANITARY SEWER DESIGN SHEET
PROJECT: JACKSON TRAILS
LOCATION: CITY OF OTTAWA
DEVELOPE TARTAN LAND DEVELOPMENT

JOB #: 3613-LD
DATE PRINTED: 1-Mar-06
DESIGN: TB
FILE: 3613-LD Sewers.xls

LOCATION			INDIVIDUAL					CUM. RES. FLOW			CUM. COM. & INST. FLOW				INFILTRATION			TOTAL	PROPOSED SEWER						
STREET	FROM MH	TO MH	RESID. UNITS Singles	Towns Semis	Condo	RES. AREA (Ha)	POP.	POP.	PEAK FACT.	PEAK FLOW (l/s)	IND. AREA (Ha)	CUM. AREA (Ha)	PEAK FACT.	PEAK FLOW (l/s)	INCR. AREA (Ha)	CUM. AREA (Ha)	FLOW (l/s)	DESIGN FLOW (l/s)	CAP. l/s	PIPE (mm)	LGTH. (m)	SLOPE %	VEL. (full) m/s	AVAIL. CAP. (l/s)	AVAIL. CAP. (%)
Stittsville Main Street		48 A				9.87	592.2	592	3.9353	9.55					9.87	9.87	2.76	**12.32**	**55.24**	300	83.0	0.30	0.76	42.92	78%
Horseshoe Way	29 A	30 A		4		0.25	10.8	11	4.00	0.18					0.25	0.25	0.07	**0.25**	**27.60**	200	12.7	0.65	0.85	27.35	99%
Horseshoe Way	30 A	31 A		10		0.36	27.0	38	4.00	0.62					0.36	0.61	0.17	**0.79**	**20.24**	200	64.0	0.35	0.62	19.45	96%
Horseshoe Way	31 A	32 A		4		0.22	10.8	49	4.00	0.80					0.22	0.83	0.23	**1.03**	**20.24**	200	11.4	0.35	0.62	19.21	95%
Horseshoe Way	32 A	33 A		17		0.54	45.9	95	4.00	1.55					0.54	1.37	0.38	**1.93**	**20.24**	200	87.0	0.35	0.62	18.30	90%
Mojave Crescent		33 A				1.76	105.6	106	4.00	1.73					1.76	1.76	0.49	**2.22**	**20.24**	200	20.5	0.35	0.62	18.01	89%
Horseshoe Way	33 A	34 A		10		0.39	27.0	227	4.00	3.72					0.39	3.52	0.99	**4.71**	**20.24**	200	82.0	0.35	0.62	15.53	77%
Cherokee Way		34 A				1.97	118.2	118	4.00	1.94					1.97	1.97	0.55	**2.49**	**20.24**	200	20.0	0.35	0.62	17.75	88%
Horseshoe Way	34 A	35 A		2		0.13	5.4	351	4.00	5.75					0.13	5.62	1.57	**7.33**	**20.24**	200	18.6	0.35	0.62	12.91	64%
Horseshoe Way	35 A	36 A		22		0.64	59.4	410	4.00	6.73					0.64	6.26	1.75	**8.48**	**20.24**	200	90.6	0.35	0.62	11.76	58%
Mojave Crescent		36 A				2.79	167.4	167	4.00	2.75					2.79	2.79	0.78	**3.53**	**20.24**	200	20.0	0.35	0.62	16.71	83%
Horseshoe Way	36 A	48 A		5		0.20	13.5	591	3.9358	9.54					0.20	9.25	2.59	**12.13**	**110.54**	300	54.0	1.20	1.52	98.42	89%
Stittsville Main Street	48 A	47 A				0.19	0.0	1183	3.7517	18.20					0.19	19.31	5.41	**23.61**	**55.24**	300	78.0	0.30	0.76	31.63	57%
Horseshoe Way	29 A	28 A		13		0.41	35.1	35	4.00	0.58					0.41	0.41	0.11	**0.69**	**27.60**	200	47.8	0.65	0.85	26.91	97%
Horseshoe Way	28 A	27 A		24		0.78	64.8	100	4.00	1.64					0.78	1.19	0.33	**1.97**	**20.24**	200	97.5	0.35	0.62	18.26	90%
Horseshoe Way	27 A	26 A		2		0.11	5.4	105	4.00	1.73					0.11	1.30	0.36	**2.09**	**20.24**	200	10.4	0.35	0.62	18.14	90%
Horseshoe Way	26 A	47 A		22		0.74	59.4	165	4.00	2.70					0.74	2.04	0.57	**3.27**	**20.24**	200	109.0	0.35	0.62	16.96	84%
Overland Drive		8 A				11.45	687.0	687	3.8992	10.98					11.45	11.45	3.21	**14.19**	**50.42**	300	30.0	0.25	0.69	36.23	72%
Kimpton Drive		8 A				20.68	1240.8	1241	3.7376	19.01					20.68	20.68	5.79	**24.80**	**45.09**	300	15.0	0.20	0.62	20.29	45%
Overland Drive	11 A	10 A	6			0.33	20.4	20	4.00	0.33					0.33	0.33	0.09	**0.43**	**54.09**	200	37.4	2.50	1.67	53.67	99%
Overland Drive	10 A	9 A	9			0.50	30.6	51	4.00	0.84					0.50	0.83	0.23	**1.07**	**69.27**	200	65.0	4.10	2.14	68.20	98%
Overland Drive	9 A	8 A	1			0.10	3.4	54	4.00	0.89					0.10	0.93	0.26	**1.15**	**67.95**	250	28.6	1.20	1.34	66.80	98%

Where Q = average daily per capita flow (350 l/cap.d.) or (0.0041l/sec./cap)
I = Unit of peak extraneous flow (0.28 l/sec/ha)
M = Residential Peaking factor = Harmon Peaking Factor , M = 1+(14/(4+P^0.5)) , where P = population in thousands
Q(p) = Peak population flow (l/s)
Q(i) = peak extraneous flow (l/s)
Population Density = 3.4 per single family, 2.7 per semi-detached and row towhnhouse units and 2.3 per stacked townhouse unit
Commercial, Office Space and School - Average flow 50,000 l/ha/day (0.58 l/s/ha) with Peaking Factor = 1.5
Undeveloped or Other Lands = 60 persons/gross hectare

REV. # 1: January 31-06

CCL/IBI
1770 WOODWARD DRIVE
OTTAWA, ONTARIO
K2C OP8

SANITARY SEWER DESIGN SHEET
PROJECT: JACKSON TRAILS
LOCATION: CITY OF OTTAWA
DEVELOPE TARTAN LAND DEVELOPMENT

JOB #: 3613-LD
DATE PRINTED: 1-Mar-06
DESIGN: TB
FILE: 3613-LD Sewers.xls

LOCATION			INDIVIDUAL					CUM. RES. FLOW			CUM. COM. & INST. FLOW				INFILTRATION			TOTAL	PROPOSED SEWER						
STREET	FROM MH	TO MH	RESID. UNITS			RES. AREA (Ha)	POP.	POP.	PEAK FACT.	PEAK FLOW (l/s)	IND. AREA (Ha)	CUM. AREA (Ha)	PEAK FACT.	PEAK FLOW (l/s)	INCR. AREA (Ha)	CUM. AREA (Ha)	FLOW (l/s)	DESIGN FLOW (l/s)	CAP. l/s	PIPE (mm)	LGTH. (m)	SLOPE %	VEL. (full) m/s	AVAIL. CAP. (l/s)	AVAIL. CAP. (%)
			Singles	Towns Semis	Condo																				
Kimpton Drive	8 A	7 A	5			0.42	17.0	1999	3.5859	29.39					0.42	33.48	9.37	**38.77**	**81.86**	375	50.3	0.20	0.72	43.09	53%
Kimpton Drive	7 A	6 A	7			0.55	23.8	2023	3.5819	29.71					0.55	34.03	9.53	**39.24**	**81.86**	375	61.7	0.20	0.72	42.62	52%
Kimpton Drive	6 A	5 A	3			0.38	10.2	2033	3.5802	29.85					0.38	34.41	9.63	**39.48**	**81.86**	375	31.6	0.20	0.72	42.38	52%
Kimpton Drive	5 A	4 A	3			0.41	10.2	2043	3.5785	29.98					0.41	34.82	9.75	**39.73**	**81.86**	375	33.9	0.20	0.72	42.13	51%
Kimpton Drive	4 A	3 A	5			0.41	17.0	2060	3.5757	30.21					0.41	35.23	9.86	**40.07**	**81.86**	375	38.9	0.20	0.72	41.79	51%
Kimpton Drive	3 A	2 A	9			0.65	30.6	2091	3.5707	30.61					0.65	35.88	10.05	**40.66**	**81.86**	375	63.8	0.20	0.72	41.20	50%
Kimpton Drive	2 A	1 A	6			0.45	20.4	2111	3.5674	30.88					0.45	36.33	10.17	**41.05**	**81.86**	375	65.6	0.20	0.72	40.80	50%
Jackson Stitt Circle	21 A	22 A	8			0.44	27.2	27	4.00	0.45					0.44	0.44	0.12	**0.57**	**27.60**	200	56.4	0.65	0.85	27.03	98%
Jackson Stitt Circle	22 A	23 A	8			0.56	27.2	54	4.00	0.89					0.56	1.00	0.28	**1.17**	**59.28**	200	59.2	3.00	1.83	58.11	98%
Jackson Stitt Circle	23 A	24 A	9			0.57	30.6	85	4.00	1.39					0.57	1.57	0.44	**1.83**	**55.16**	200	71.8	2.60	1.70	53.33	97%
Jackson Stitt Circle	24 A	25 A	2			0.16	6.8	92	4.00	1.51					0.16	1.73	0.48	**1.99**	**36.69**	250	10.5	0.35	0.72	34.70	95%
Jackson Stitt Circle	25 A	16 A	13			0.88	44.2	136	4.00	2.23					0.88	2.61	0.73	**2.96**	**36.69**	250	111.6	0.35	0.72	33.72	92%
Jackson Stitt Circle	21 A	20 A	3			0.27	10.2	10	4.00	0.17					0.27	0.27	0.08	**0.24**	**64.02**	200	10.6	3.50	1.97	63.77	100%
Jackson Stitt Circle	20 A	19 A	7			0.51	23.8	34	4.00	0.56					0.51	0.78	0.22	**0.78**	**70.96**	200	80.1	4.30	2.19	70.18	99%
Jackson Stitt Circle	19 A	18 A	1			0.11	3.4	37	4.00	0.61					0.11	0.89	0.25	**0.86**	**48.38**	200	7.5	2.00	1.49	47.52	98%
Jackson Stitt Circle	18 A	17 A	4			0.31	13.6	51	4.00	0.84					0.31	1.20	0.34	**1.17**	**36.69**	250	41.7	0.35	0.72	35.51	97%
Jackson Stitt Circle	17 A	16 A	6			0.49	20.4	71	4.00	1.17					0.49	1.69	0.47	**1.64**	**36.69**	250	57.0	0.35	0.72	35.04	96%
Jackson Stitt Circle	16 A	1 A	4			0.35	13.6	221	4.00	3.62					0.35	4.65	1.30	**4.93**	**69.37**	250	85.0	1.25	1.37	64.44	93%
Kimpton Drive	1 A	47 A				0.13	0.0	2332	3.5329	33.78					0.13	41.11	11.51	**45.30**	**81.86**	375	56.0	0.20	0.72	36.56	45%
Stittsville Main Street	47 A	46 A				0.21	0.0	3680	3.3655	50.78					0.21	62.67	17.55	**68.33**	**115.25**	450	88.7	0.15	0.70	46.92	41%
Stittsville Main Street	46 A	45 A				0.12	0.0	3680	3.3655	50.78					0.12	62.79	17.58	**68.36**	**115.25**	450	45.0	0.15	0.70	46.89	41%
Stittsville Main Street	45 A	44 A				0.10	0.0	3680	3.3655	50.78					0.10	62.89	17.61	**68.39**	**115.25**	450	31.2	0.15	0.70	46.86	41%
Stittsville Main Street	44 A	43 A				0.08	0.0	3680	3.3655	50.78					0.08	62.97	17.63	**68.41**	**115.25**	450	44.4	0.15	0.70	46.84	41%
Stittsville Main Street	43 A	42 A				0.06	0.0	3680	3.3655	50.78					0.06	63.03	17.65	**68.43**	**115.25**	450	20.3	0.15	0.70	46.82	41%
External - School		42 A									2.65		1.50	2.3	2.65	2.65	0.74	**3.05**	**36.69**	250	18.0	0.35	0.72	33.64	92%
Overland Drive	11 A	12 A	6			0.33	20.4	20	4.00	0.33					0.33	0.33	0.09	**0.43**	**54.09**	200	34.8	2.50	1.67	53.67	99%
Overland Drive	12 A	13 A	11			0.61	37.4	58	4.00	0.95					0.61	0.94	0.26	**1.21**	**68.43**	200	82.6	4.00	2.11	67.21	98%
Overland Drive	13 A	14 A	1			0.07	3.4	61	4.00	1.00					0.07	1.01	0.28	**1.29**	**62.02**	250	26.1	1.00	1.22	60.73	98%

Where Q = average daily per capita flow (350 l/cap.d.) or (0.0041l/sec./cap)
I = Unit of peak extraneous flow (0.28 l/sec/ha)
M = Residential Peaking factor = Harmon Peaking Factor , M = 1+(14/(4+P^0.5)) , where P = population in thousands
Q(p) = Peak population flow (l/s)
Q(i) = peak extraneous flow (l/s)
Population Density = 3.4 per single family, 2.7 per semi-detached and row townhnouse units and 2.3 per stacked townhouse unit
Commercial, Office Space and School - Average flow 50,000 l/ha/day (0.58 l/s/ha) with Peaking Factor = 1.5
Undeveloped or Other Lands = 60 persons/gross hectare

REV. # 1: January 31-06

CCL/IBI
1770 WOODWARD DRIVE
OTTAWA, ONTARIO
K2C OP8

SANITARY SEWER DESIGN SHEET
PROJECT: JACKSON TRAILS
LOCATION: CITY OF OTTAWA
DEVELOPE TARTAN LAND DEVELOPMENT

JOB #: 3613-LD
DATE PRINTED: 1-Mar-06
DESIGN: TB
FILE: 3613-LD Sewers.xls

LOCATION			INDIVIDUAL					CUM. RES. FLOW			CUM. COM. & INST. FLOW				INFILTRATION			TOTAL	PROPOSED SEWER						
STREET	FROM MH	TO MH	RESID. UNITS			RES. AREA (Ha)	POP.	POP.	PEAK FACT.	PEAK FLOW (l/s)	IND. AREA (Ha)	CUM. AREA (Ha)	PEAK FACT.	PEAK FLOW (l/s)	INCR. AREA (Ha)	CUM. AREA (Ha)	FLOW (l/s)	DESIGN FLOW (l/s)	CAP. l/s	PIPE (mm)	LGTH. (m)	SLOPE %	VEL. (full) m/s	AVAIL. CAP. (l/s)	AVAIL. CAP. (%)
			Singles	Towns Semis	Condo																				
Bandelier Way		14 A				11.96	717.6	718	3.8883	11.44					11.96	11.96	3.35	**14.79**	**45.09**	300	15.0	0.20	0.62	30.30	67%
Bandelier Way	14 A	15 A	16			0.87	54.4	833	3.8497	13.15					0.87	13.84	3.88	**17.03**	**45.09**	300	107.8	0.20	0.62	28.07	62%
Bandelier Way	15 A	42 A	13			0.82	44.2	877	3.8359	13.80					0.82	14.66	4.10	**17.90**	**71.36**	300	102.2	0.50	0.98	53.46	75%
Stittsville Main Street	42 A	41 A				0.25	0.0	4558	3.2820	61.33		2.65	1.50	2.31	0.25	80.59	22.57	**86.20**	**115.25**	450	79.4	0.15	0.70	29.05	25%
External - Mixed Use		41 A			10	0.44	23.0	23	4.00	0.38					0.44	0.44	0.12	**0.50**	**34.21**	200	22.0	1.00	1.06	33.71	99%
External - Commercial		41 A									2.93		1.50	2.55	2.93	2.93	0.82	**3.37**	**36.69**	250	22.0	0.35	0.72	33.32	91%
Stittsville Main Street	41 A	39 A				0.31	0.0	4581	3.2800	61.60		5.58	1.50	4.85	0.31	84.27	23.60	**90.05**	**115.25**	450	91.8	0.15	0.70	25.20	22%
External - Mixed Use		39 A			110	1.32	253.0	253	4.00	4.15					1.32	1.32	0.37	**4.52**	**20.24**	200	25.0	0.35	0.62	15.72	78%
External - Gas Station		39 A									0.60		1.50	0.52	0.60	0.60	0.17	**0.69**	**34.21**	200	18.0	1.00	1.06	33.52	98%
Stittsville Main Street	39 A	38 A				0.20	0.0	4834	3.2586	64.58		6.18	1.50	5.38	0.20	86.39	24.19	**94.15**	**115.25**	450	67.0	0.15	0.70	21.10	18%
External - Commercial		38 A	Stittsville Main								14.61		1.50	12.71	14.61	14.61	4.09	**16.80**	**45.09**	300	15.0	0.20	0.62	28.29	63%
Hazeldean Raod	38 A	37 A					0.0	4834	3.2586	64.58		20.79	1.50	18.09		101.00	28.28	**110.95**	**132.98**	450	125.3	0.20	0.81	22.03	17%
External - Commercial		37 A									6.47		1.50	5.63	6.47	6.47	1.81	**7.44**	**39.22**	250	58.5	0.40	0.77	31.78	81%
Pump Station	37 A	PS						4834	3.2586	64.58		27.26	1.50	23.72		107.47	30.09	**118.39**	**132.98**	450	19.5	0.20	0.81	14.59	11%
		units	166	135	120	80	ha				27.26				107.47										
		pop.	564	365	276	3629	4834					107.47	ha												

4834

Where Q = average daily per capita flow (350 l/cap.d.) or (0.0041l/sec./cap)
I = Unit of peak extraneous flow (0.28 l/sec/ha)
M = Residential Peaking factor = Harmon Peaking Factor , M = 1+(14/(4+P^0.5)) , where P = population in thousands
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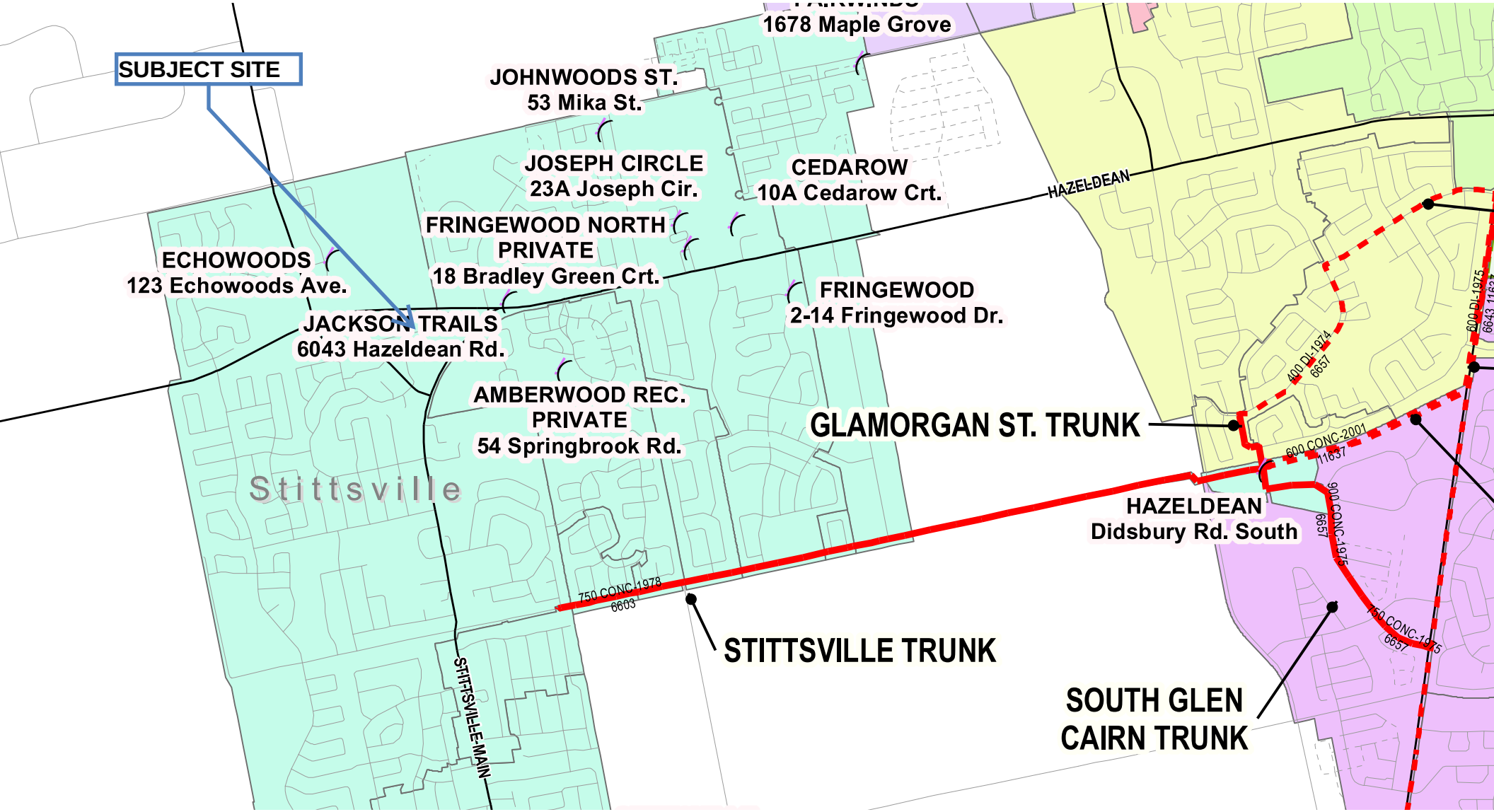
Undeveloped or Other Lands = 60 persons/gross hectare

REV. # 1: January 31-06

CITY OF OTTAWA - SANITARY TRUNK AND COLLECTION AREAS



APPENDIX D

Stormwater Management

2073945 Ontario Inc.
6150 Hazeldean Road - Phase I
Existing Flow to Hazeldean Road

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

Existing Drainage Characteristic From Internal Site

Area	0.445	ha
C	0.87	Rational Method runoff coefficient
L	64.8	m
Up Elev	117.84	m
Dn Elev	117.48	m
Slope	0.6	%
Tc	7.3	min

5-year	**Imp.**	**Perv.**	**Total**
Area	0.427	0.018	0.445
C	0.9	0.2	0.87

100-year	**Imp.**	**Perv.**	**Total**
Area	0.427	0.018	0.445
C	1.0	0.25	0.97

1) Time of Concentration per Federal Aviation Administration

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

tc, in minutes
C, rational method coefficient, (-)
L, length in ft
S, average watershed slope in %

Estimated Peak Flow

	2-year	**5-year**	**100-year**	
i	89.1	121.1	207.9	mm/hr
Q	96.0	130.5	249.2	L/s

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

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

Target Flow Rate

Area	0.376	ha
C	0.50	Rational Method runoff coefficient
t_c	10.0	min

	5-year	
i	104.2	mm/hr
Q	54.4	L/s

Estimated Post Development Peak Flow from Unattenuated Areas

Area ID	**U1**	
Total Area	0.028	ha
C	0.66	Rational Method runoff coefficient

5-year	**Imp.**	**Perv.**	**Total**
Area	0.018	0.010	0.028
C	0.9	0.2	0.66

100-year	**Imp.**	**Perv.**	**Total**
Area	0.018	0.010	0.028
C	1	0.25	0.74

	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)**
11.0	99.3	5.1	5.1	0.0	0.0	170.1	9.8	9.8	0.0	0.0

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

Estimated Post Development Peak Flow from Attenuated Areas

Building ID	**BLDG A (A1)**	
Roof Area	0.046	ha
Avail Storage Area	0.044	
C	0.90	Rational Method runoff coefficient
t_c	10	min, tc at outlet without restriction

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

Estimated Number of Roof Drains		
Building Length	24	
Building Width	18	
Number of Drains	2	
m^2 / Drain	220.7	max 232.25m^2/notch as recommended by Zurn for Ottawa

Roof Top Rating Curve per Zurn Model Z-105-5

d (m)	**A (m^2)**	**V_{acc} (m^3)**	**V_{avail} (m^3)**	**Q_{notch} (L/s)**	**Q_{roof} (L/s)**	**$V_{drawdown}$ (hr)**
0.000	0	0.0	0.0	0.00	0.00	0.00
0.025	27.6	0.2	0.2	0.38	0.76	0.08
0.050	110.4	1.6	1.8	0.77	1.54	0.37
0.075	248.3	4.4	6.2	1.14	2.28	0.91
0.100	441.4	8.5	14.7	1.52	3.04	1.68
0.125	441.4	11.0	25.8	1.90	3.80	2.49
0.150	441.4	11.0	36.8	2.28	4.56	3.16

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

	5-year					**100-year**				
t_c (min)	**i (mm/hr)**	**Q_{actual} (L/s)**	**$Q_{release}$ (L/s)**	**Q_{stored} (L/s)**	**V_{stored} (m^3)**	**i (mm/hr)**	**Q_{actual} (L/s)**	**$Q_{release}$ (L/s)**	**Q_{stored} (L/s)**	**V_{stored} (m^3)**
10	104.2	12.1	2.4	9.7	5.8	178.6	23.0	3.1	19.9	12.0
15	83.6	9.7	2.4	7.3	6.6	142.9	18.4	3.1	15.3	13.8
20	70.3	8.2	2.4	5.8	7.0	120.0	15.5	3.1	12.4	14.8
25	60.9	7.1	2.4	4.7	7.1	103.8	13.4	3.1	10.3	15.4
30	53.9	6.3	2.4	3.9	7.0	91.9	11.9	3.1	8.7	15.7
35	48.5	5.6	2.4	3.3	6.9	82.6	10.7	3.1	7.5	15.8
40	44.2	5.1	2.4	2.8	6.7	75.1	9.7	3.1	6.6	15.8
45	40.6	4.7	2.4	2.4	6.4	69.1	8.9	3.1	5.8	15.6
50	37.7	4.4	2.4	2.0	6.0	64.0	8.3	3.1	5.1	15.4
55	35.1	4.1	2.4	1.7	5.7	59.6	7.7	3.1	4.6	15.1
60	32.9	3.8	2.4	1.5	5.3	55.9	7.2	3.1	4.1	14.8
65	31.0	3.6	2.4	1.2	4.9	52.6	6.8	3.1	3.7	14.3
70	29.4	3.4	2.4	1.1	4.4	49.8	6.4	3.1	3.3	13.9
75	27.9	3.2	2.4	0.9	4.0	47.3	6.1	3.1	3.0	13.4
80	26.6	3.1	2.4	0.7	3.5	45.0	5.8	3.1	2.7	12.9
85	25.4	2.9	2.4	0.6	3.0	43.0	5.5	3.1	2.4	12.4
90	24.3	2.8	2.4	0.5	2.5	41.1	5.3	3.1	2.2	11.8
95	23.3	2.7	2.4	0.3	2.0	39.4	5.1	3.1	2.0	11.2
100	22.4	2.6	2.4	0.2	1.5	37.9	4.9	3.1	1.8	10.7
105	21.6	2.5	2.4	0.1	0.9	36.5	4.7	3.1	1.6	10.0
110	20.8	2.4	2.4	0.1	0.4	35.2	4.5	3.1	1.4	9.4

5-year Q_{roof}	**2.36**	**L/s**	**100-year Q_{roof}**	**3.12**	**L/s**
5-year Max. Storage Required	**7.1**	**m^3**	**100-year Max. Storage Required**	**15.8**	**m^3**
5-year Storage Depth	**0.078**	**m**	**100-year Storage Depth**	**0.103**	**m**
5-year Estimated Drawdown Time	**0.99**	**hr**	**00-year Estimated Drawdown Time**	**1.77**	**hr**

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Building ID	**BLDG B (A3)**		
Roof Area	0.046	ha	
Avail Storage Area	0.044		
C	0.90	Rational Method runoff coefficient	*Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations*
t_c	10	min, tc at outlet without restriction	

Estimated Number of Roof Drains		
Building Length	14	
Building Width	32	
Number of Drains	2	
m^2 / Drain	219.8	max 232.25m^2/notch as recommended by Zurn for Ottawa

Roof Top Rating Curve per Zurn Model Z-105-5

d	A	V_{acc}	V_{avail}	Q_{notch}	Q_{roof}	$V_{drawdown}$
(m)	(m^2)	(m^3)	(m^3)	(L/s)	(L/s)	(hr)
0.000	0	0.0	0.0	0.00	0.00	0.00
0.025	27.5	0.2	0.2	0.38	0.76	0.08
0.050	109.9	1.6	1.8	0.77	1.54	0.37
0.075	247.3	4.4	6.2	1.14	2.28	0.90
0.100	439.7	8.5	14.7	1.52	3.04	1.68
0.125	439.7	11.0	25.6	1.90	3.80	2.48
0.150	439.7	11.0	36.6	2.28	4.56	3.15

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

	5-year					100-year				
t_c	i	Q_{actual}	$Q_{release}$	Q_{stored}	V_{stored}	i	Q_{actual}	$Q_{release}$	Q_{stored}	V_{stored}
(min)	(mm/hr)	(L/s)	(L/s)	(L/s)	(m^3)	(mm/hr)	(L/s)	(L/s)	(L/s)	(m^3)
10	104.2	12.1	2.4	9.7	5.8	178.6	23.0	3.1	19.8	11.9
15	83.6	9.7	2.4	7.3	6.6	142.9	18.4	3.1	15.3	13.7
20	70.3	8.1	2.4	5.8	6.9	120.0	15.4	3.1	12.3	14.8
25	60.9	7.0	2.4	4.7	7.0	103.8	13.3	3.1	10.2	15.3
30	53.9	6.2	2.4	3.9	7.0	91.9	11.8	3.1	8.7	15.6
35	48.5	5.6	2.4	3.3	6.8	82.6	10.6	3.1	7.5	15.7
40	44.2	5.1	2.4	2.8	6.6	75.1	9.7	3.1	6.5	15.7
45	40.6	4.7	2.4	2.3	6.3	69.1	8.9	3.1	5.8	15.6
50	37.7	4.4	2.4	2.0	6.0	64.0	8.2	3.1	5.1	15.3
55	35.1	4.1	2.4	1.7	5.6	59.6	7.7	3.1	4.5	15.0
60	32.9	3.8	2.4	1.5	5.2	55.9	7.2	3.1	4.1	14.6
65	31.0	3.6	2.4	1.2	4.8	52.6	6.8	3.1	3.7	14.2
70	29.4	3.4	2.4	1.0	4.4	49.8	6.4	3.1	3.3	13.8
75	27.9	3.2	2.4	0.9	3.9	47.3	6.1	3.1	3.0	13.3
80	26.6	3.1	2.4	0.7	3.4	45.0	5.8	3.1	2.7	12.8
85	25.4	2.9	2.4	0.6	2.9	43.0	5.5	3.1	2.4	12.3
90	24.3	2.8	2.4	0.5	2.4	41.1	5.3	3.1	2.2	11.7
95	23.3	2.7	2.4	0.3	1.9	39.4	5.1	3.1	2.0	11.1
100	22.4	2.6	2.4	0.2	1.4	37.9	4.9	3.1	1.8	10.5
105	21.6	2.5	2.4	0.1	0.9	36.5	4.7	3.1	1.6	9.9
110	20.8	2.4	2.4	0.1	0.3	35.2	4.5	3.1	1.4	9.3

5-year Q_{roof}	**2.36**	**L/s**	**100-year Q_{roof}**	**3.12**	**L/s**
5-year Max. Storage Required	**7.0**	**m^3**	**100-year Max. Storage Required**	**15.7**	**m^3**
5-year Storage Depth	**0.078**	**m**	**100-year Storage Depth**	**0.102**	**m**
5-year Estimated Drawdown Time	**0.98**	**hr**	**00-year Estimated Drawdown Time**	**1.76**	**hr**

Estimated Post Development Peak Flow from Attenuated Areas

Area ID **A4**

5-year	Imp.	Perv.	Total
Area	0.058	0.019	0.077
C	0.9	0.2	0.73

100-year	Imp.	Perv.	Total
Area	0.058	0.019	0.077
C	1	0.25	0.82

Stage Attenuated Areas Storage Summary

		Surface Storage			Surface and Subsurface Storage			
	Stage	Ponding	h_o	delta d	V*	V_{acc}**	$Q_{release}$†	$V_{drawdown}$
	(m)	(m^2)	(m)	(m)	(m^3)	(m^3)	(L/s)	(hr)
Orifice INV	115.26		0.00			0.0	0	0.00
Storage Pipe SL	115.39		0.13	0.13	0.0	0.0	1	0.00
Storage Pipe OBV	115.51		0.25	0.13	0.0	0.0	1.5	0.00
T/L	117.51	0.4	2.25	2.00	0.3	0.3	4	0.02
0.05m Ponding	117.56	32.4	2.30	0.05	0.6	0.9	4.1	0.06
0.10m Ponding	117.61	118.8	2.35	0.05	3.6	4.4	4.2	0.29
0.15m Ponding	117.66	240.3	2.40	0.05	8.8	13.2	4.25	0.86
0.19m Ponding	117.70	334.4	2.44	0.04	11.4	24.7	4.3	1.59

* V=Incremental storage volume

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

† $Q_{release}$ = Release rate calculated from Tempest LMF Flow Curve

Orifice Location **CBMH101** **Dia** LMF55

Total Area 0.077 ha

C 0.73 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)
1	203.5	31.6	4.2	27.4	1.6	351.4	61.2	4.3	56.9	3.4
2	182.7	28.4	4.2	24.2	2.9	315.0	54.9	4.3	50.6	6.1
3	166.1	25.8	4.2	21.6	3.9	286.0	49.8	4.3	45.6	8.2
4	152.5	23.7	4.2	19.5	4.7	262.4	45.7	4.3	41.4	9.9
5	141.2	22.0	4.2	17.7	5.3	242.7	42.3	4.3	38.0	11.4
6	131.6	20.5	4.2	16.2	5.8	226.0	39.4	4.3	35.1	12.6
7	123.3	19.2	4.2	15.0	6.3	211.7	36.9	4.3	32.6	13.7
8	116.1	18.1	4.2	13.8	6.6	199.2	34.7	4.3	30.4	14.6
9	109.8	17.1	4.2	12.9	6.9	188.3	32.8	4.3	28.5	15.4
10	104.2	16.2	4.2	12.0	7.2	178.6	31.1	4.3	26.8	16.1
11	99.2	15.4	4.2	11.2	7.4	169.9	29.6	4.3	25.3	16.7
12	94.7	14.7	4.2	10.5	7.6	162.1	28.2	4.3	24.0	17.3
13	90.6	14.1	4.2	9.9	7.7	155.1	27.0	4.3	22.7	17.7
14	86.9	13.5	4.2	9.3	7.8	148.7	25.9	4.3	21.6	18.2
15	83.6	13.0	4.2	8.8	7.9	142.9	24.9	4.3	20.6	18.6
16	80.5	12.5	4.2	8.3	8.0	137.5	24.0	4.3	19.7	18.9
17	77.6	12.1	4.2	7.8	8.0	132.6	23.1	4.3	18.8	19.2
18	75.0	11.7	4.2	7.4	8.0	128.1	22.3	4.3	18.0	19.5
19	72.5	11.3	4.2	7.1	8.0	123.9	21.6	4.3	17.3	19.7
20	70.3	10.9	4.2	6.7	8.0	120.0	20.9	4.3	16.6	19.9
21	68.1	10.6	4.2	6.4	8.0	116.3	20.3	4.3	16.0	20.1

5-year $Q_{attenuated}$ **4.22 L/s** **100-year $Q_{attenuated}$** **4.28 L/s**

5-year Max. Storage Required **8.0 m^3** **100-year Max. Storage Required** **20.1 m^3**

Est. 5-year Storage Elevation **117.63 m** **Est. 100-year Storage Elevation** **117.68 m**

Area ID **A5**

5-year	Imp.	Perv.	Total
Area	0.090	0.048	0.138
C	0.9	0.2	0.66

100-year	Imp.	Perv.	Total
Area	0.090	0.048	0.138
C	1	0.25	0.74

Stage Attenuated Areas Storage Summary

		Surface Storage			Surface and Subsurface Storage			
	Stage	Ponding	h_o	delta d	V*	V_{acc}**	$Q_{release}$†	$V_{drawdown}$
	(m)	(m^2)	(m)	(m)	(m^3)	(m^3)	(L/s)	(hr)
Orifice INV	114.80		0.00			0.0	0	0.00
Storage Pipe SL	114.93		0.13	0.13	0.0	0.0	4.2	0.00
Storage Pipe OBV	115.05		0.25	0.13	0.0	0.0	6.0	0.00
T/L	117.05	0.4	2.25	2.00	0.3	0.3	17.9	0.00
0.05m Ponding	117.10	26.9	2.30	0.05	0.5	0.8	18.1	0.01
0.10m Ponding	117.15	107.5	2.35	0.05	3.1	3.9	18.3	0.06
0.15m Ponding	117.20	229.9	2.40	0.05	8.2	12.2	18.5	0.18
0.20m Ponding	117.25	347.4	2.45	0.05	14.3	26.5	18.7	0.39
0.21m Ponding	117.26	366.9	2.46	0.01	3.6	30.1	18.7	0.45

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

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

Orifice Location **CBMH103** **Dia** 75
Total Area 0.138 ha
C 0.66 Rational Method runoff coefficient *Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations*

	5-year					100-year				
t_c	i	Q_{actual}‡	$Q_{release}$	Q_{stored}	V_{stored}	i	Q_{actual}‡	$Q_{release}$	Q_{stored}	V_{stored}
(min)	(mm/hr)	(L/s)	(L/s)	(L/s)	(m^3)	(mm/hr)	(L/s)	(L/s)	(L/s)	(m^3)
1	203.5	51.1	18.3	32.7	2.0	351.4	99.3	18.6	80.7	4.8
2	182.7	45.8	18.3	27.5	3.3	315.0	89.0	18.6	70.4	8.4
3	166.1	41.7	18.3	23.3	4.2	286.0	80.8	18.6	62.2	11.2
4	152.5	38.3	18.3	19.9	4.8	262.4	74.1	18.6	55.5	13.3
5	141.2	35.4	18.3	17.1	5.1	242.7	68.6	18.6	50.0	15.0
6	131.6	33.0	18.3	14.7	5.3	226.0	63.9	18.6	45.3	16.3
7	123.3	30.9	18.3	12.6	5.3	211.7	59.8	18.6	41.2	17.3
8	116.1	29.1	18.3	10.8	5.2	199.2	56.3	18.6	37.7	18.1
9	109.8	27.5	18.3	9.2	5.0	188.3	53.2	18.6	34.6	18.7
10	104.2	26.1	18.3	7.8	4.7	178.6	50.4	18.6	31.9	19.1
11	99.2	24.9	18.3	6.6	4.3	169.9	48.0	18.6	29.4	19.4
12	94.7	23.8	18.3	5.4	3.9	162.1	45.8	18.6	27.2	19.6
13	90.6	22.7	18.3	4.4	3.4	155.1	43.8	18.6	25.2	19.7
14	86.9	21.8	18.3	3.5	2.9	148.7	42.0	18.6	23.4	19.7
15	83.6	21.0	18.3	2.6	2.4	142.9	40.4	18.6	21.8	19.6
16	80.5	20.2	18.3	1.9	1.8	137.5	38.9	18.6	20.3	19.5
17	77.6	19.5	18.3	1.1	1.2	132.6	37.5	18.6	18.9	19.3
18	75.0	18.8	18.3	0.5	0.5	128.1	36.2	18.6	17.6	19.0
19	72.5	18.2	18.2	0.0	0.0	123.9	35.0	18.6	16.4	18.7
20	70.3	17.6	17.6	0.0	0.0	120.0	33.9	18.6	15.3	18.4
21	68.1	17.1	17.1	0.0	0.0	116.3	32.9	18.6	14.3	18.0

5-year $Q_{attenuated}$ **18.33 L/s**
5-year Max. Storage Required **5.3 m^3**
Est. 5-year Storage Elevation **117.16 m**

100-year $Q_{attenuated}$ **18.59 L/s**
100-year Max. Storage Required **19.7 m^3**
Est. 100-year Storage Elevation **117.23 m**

Area ID **A2**

5-year	Imp.	Perv.	Total
Area	0.036	0.005	0.041
C	0.9	0.2	0.82

100-year	Imp.	Perv.	Total
Area	0.036	0.005	0.041
C	1	0.25	0.92

Stage Attenuated Areas Storage Summary

		Surface Storage			Surface and Subsurface Storage			
	Stage	Ponding	h_o	delta d	V*	V_{acc}**	$Q_{release}$†	$V_{drawdown}$
	(m)	(m^2)	(m)	(m)	(m^3)	(m^3)	(L/s)	(hr)
Orifice INV	115.83		0.00			0.0	0.0	0.00
Storage Pipe SL	116.28		0.45	0.45	0.0	0.0	8.0	0.00
Storage Pipe OBV	116.73		0.90	0.45	0.0	0.0	11.3	0.00
T/L	117.33	0.4	1.50	0.60	0.1	0.1	14.6	0.00
0.05m Ponding	117.38	19.9	1.55	0.05	0.4	0.5	14.9	0.01
0.10m Ponding	117.43	61.9	1.60	0.05	1.9	2.4	15.1	0.04
0.12m Ponding	117.45	69.9	1.62	0.02	1.3	3.7	15.2	0.07

* V=Incremental storage volume

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

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

Orifice Location **CB5** **Dia** 75
Total Area 0.041 ha
C 0.82 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)
1	203.5	19.0	14.7	4.3	0.3	351.4	36.6	15.1	21.5	1.3
2	182.7	17.1	14.7	2.3	0.3	315.0	32.8	15.1	17.7	2.1
3	166.1	15.5	14.7	0.8	0.1	286.0	29.8	15.1	14.7	2.6
4	152.5	14.2	14.2	0.0	0.0	262.4	27.4	15.1	12.2	2.9
5	141.2	13.2	13.2	0.0	0.0	242.7	25.3	15.1	10.2	3.0
6	131.6	12.3	12.3	0.0	0.0	226.0	23.6	15.1	8.4	3.0
7	123.3	11.5	11.5	0.0	0.0	211.7	22.1	15.1	6.9	2.9
8	116.1	10.8	10.8	0.0	0.0	199.2	20.8	15.1	5.6	2.7
9	109.8	10.3	10.3	0.0	0.0	188.3	19.6	15.1	4.5	2.4
10	104.2	9.7	9.7	0.0	0.0	178.6	18.6	15.1	3.5	2.1
11	99.2	9.3	9.3	0.0	0.0	169.9	17.7	15.1	2.6	1.7
12	94.7	8.8	8.8	0.0	0.0	162.1	16.9	15.1	1.8	1.3
13	90.6	8.5	8.5	0.0	0.0	155.1	16.2	15.1	1.0	0.8
14	86.9	8.1	8.1	0.0	0.0	148.7	15.5	15.1	0.4	0.3
15	83.6	7.8	7.8	0.0	0.0	142.9	14.9	15.1	0.0	0.0
16	80.5	7.5	7.5	0.0	0.0	137.5	14.3	15.1	0.0	0.0
17	77.6	7.2	7.2	0.0	0.0	132.6	13.8	15.1	0.0	0.0
18	75.0	7.0	7.0	0.0	0.0	128.1	13.4	15.1	0.0	0.0
19	72.5	6.8	6.8	0.0	0.0	123.9	12.9	15.1	0.0	0.0
20	70.3	6.6	6.6	0.0	0.0	120.0	12.5	15.1	0.0	0.0
21	68.1	6.4	6.4	0.0	0.0	116.3	12.1	15.1	0.0	0.0

5-year $Q_{attenuated}$ **14.74 L/s**
5-year Max. Storage Required **0.3 m^3**
Est. 5-year Storage Elevation **117.36 m**

100-year $Q_{attenuated}$ **15.14 L/s**
100-year Max. Storage Required **3.0 m^3**
Est. 100-year Storage Elevation **117.44 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)
U1	5.1	0.0	9.8	0.0	0.0
BLDGA (A1)	2.4	7.1	3.1	15.8	25.8
BLDGB (A3)	2.4	7.1	3.1	15.7	25.6
A4	4.2	8.0	4.3	20.1	24.7
A5	18.3	5.3	18.6	19.7	30.1
A2	14.7	0.3	15.1	3.0	3.7
Total	**47.1**	**27.8**	**54.1**	**74.4**	**109.9**

6150 Hazeldean Road - Phase I
Storm Sewer Calculation Sheet

										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)	(-)
A4	CBMH101	STM102	0.077	0.73	0.06	0.06	10.0	104.2	16.2	250	0.50	12.8	0.049	0.063	0.86	42.0	0.2	0.39
							10.2											
A5	STM103	STM102	0.138	0.90	0.12	0.12	10.0	104.2	35.9	250	0.50	15.4	0.049	0.063	0.86	42.0	0.3	0.85
							10.3											
A1	BLDG A	STM102	0.046	0.90	0.04	0.04	10.0	104.2	12.0	250	1.00	12.9	0.049	0.063	1.21	59.5	0.2	0.20
							10.2											
A3	BLDG B	STM102	0.046	0.90	0.04	0.04	10.0	104.2	12.0	250	1.00	6.3	0.049	0.063	1.21	59.5	0.1	0.20
							10.1											
A2	CB5	STM102	0.041	0.82	0.03	0.03	10.0	104.2	9.7	250	1.00	2.1	0.049	0.063	1.21	59.5	0.0	0.16
							10.0											
	STM102	STM104			0.00	0.30	10.3	102.6	84.6	375	0.30	29.9	0.110	0.094	0.87	96.0	0.6	0.88
	STM104	EX. STM			0.00	0.30	10.9	99.8	82.2	375	3.50	18.0	0.110	0.094	2.97	328.0	0.1	0.25
							11.0											

A4	Imp.	Perv.	Total
Area	0.058	0.019	0.077
C	0.9	0.2	0.73

A5	Imp.	Perv.	Total
Area	0.090	0.048	0.138
C	0.9	0.2	0.66

A1 (BLDG A	Imp.	Perv.	Total
Area	0.046		0.046
C	0.9	0.2	0.90

A3 (BLDG B	Imp.	Perv.	Total
Area	0.046	0.000	0.046
C	0.9	0.2	0.90

A2	Imp.	Perv.	Total
Area	0.036	0.005	0.041
C	0.9	0.2	0.82

LEGEND

U1	DRAINAGE AREA ID
4.010	AREA IN Ha
0.19	RATIONAL METHOD RUNOFF COEFFICIENT
	PROPERTY LINE
	DRAINAGE DIVIDE
	EXISTING STORM SEWER

EX1
0.445
0.87

LONGEST PATH=84.8m

2400X1200 MM STORM SEWER

CONCRETE SIDEWALK

BICYCLE LANE

GRAVEL

GRASS

WOOD RETAINING WALL

STEPS

BUILDING REMAINS

TOP OF BANK

BOTTOM OF BANK

CHAIN LINK FENCE

66.64

10.15

SIB(OU) 0.06 SOUTH 0.27 EAST (PL&SET)

SIB(OU) 0.08 SOUTH

IB(SG) 0.2 BG

IB(SG)

SIB(SG)

50 MM GAS

BELL

UP OHW

UP OHW B

INV=117.38

INV=117.41

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6150 HAZELDEAN ROAD - EXISTING DRAINAGE TO HAZELDEAN ROAD

PROJ NO.:	17-933
DRAWN BY:	CMK
DATE:	2018-06-12
SCALE:	1:500
FIGURE NO.:	STM-1

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Detailed Stormceptor Sizing Report – 6150 Hazeldean Rd.

Project Information & Location			
Project Name	6150 Hazeldean Rd.	**Project Number**	-
City	Stittsville	**State/ Province**	Ontario
Country	Canada	**Date**	5/22/2018
Designer Information		**EOR Information (optional)**	
Name	Brandon O'Leary	**Name**	Alison Gosling
Company	Forterra	**Company**	David Schaeffer Engineering Ltd.
Phone #	905-630-0359	**Phone #**	
Email	brandon.oleary@forterrabp.com	**Email**	

Stormwater Treatment Recommendation

The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	6150 Hazeldean Rd.
Recommended Stormceptor Model	STC 750
Target TSS Removal (%)	80.0
TSS Removal (%) Provided	84
PSD	Fine Distribution
Rainfall Station	OTTAWA MACDONALD-CARTIER INT'L A

The recommended Stormceptor model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary		
Stormceptor Model	**% TSS Removal Provided**	**% Runoff Volume Captured Provided**
STC 300	76	94
STC 750	84	98
STC 1000	86	98
STC 1500	86	98
STC 2000	88	100
STC 3000	90	100
STC 4000	92	100
STC 5000	93	100
STC 6000	94	100
STC 9000	96	100
STC 10000	96	100
STC 14000	97	100
StormceptorMAX	Custom	Custom

Stormceptor
The Stormceptor oil and sediment separator is sized to treat stormwater runoff by removing pollutants through gravity separation and flotation. Stormceptor's patented design generates positive TSS removal for each rainfall event, including large storms. Significant levels of pollutants such as heavy metals, free oils and nutrients are prevented from entering natural water resources and the re-suspension of previously captured sediment (scour) does not occur.
Stormceptor provides a high level of TSS removal for small frequent storm events that represent the majority of annual rainfall volume and pollutant load. Positive treatment continues for large infrequent events, however, such events have little impact on the average annual TSS removal as they represent a small percentage of the total runoff volume and pollutant load.

Design Methodology
Stormceptor is sized using PCSWMM for Stormceptor, a continuous simulation model based on US EPA SWMM. The program calculates hydrology using local historical rainfall data and specified site parameters. With US EPA SWMM's precision, every Stormceptor unit is designed to achieve a defined water quality objective. The TSS removal data presented follows US EPA guidelines to reduce the average annual TSS load. The Stormceptor's unit process for TSS removal is settling. The settling model calculates TSS removal by analyzing:
• Site parameters
• Continuous historical rainfall data, including duration, distribution, peaks & inter-event dry periods
• Particle size distribution, and associated settling velocities (Stokes Law, corrected for drag)
• TSS load
• Detention time of the system

Hydrology Analysis
PCSWMM for Stormceptor calculates annual hydrology with the US EPA SWMM and local continuous historical rainfall data. Performance calculations of Stormceptor are based on the average annual removal of TSS for the selected site parameters. The Stormceptor is engineered to capture sediment particles by treating the required average annual runoff volume, ensuring positive removal efficiency is maintained during each rainfall event, and preventing negative removal efficiency (scour). Smaller recurring storms account for the majority of rainfall events and average annual runoff volume, as observed in the historical rainfall data analyses presented in this section.

Rainfall Station			
State/Province	Ontario	**Total Number of Rainfall Events**	4819
Rainfall Station Name	OTTAWA MACDONALD-CARTIER INT'L A	**Total Rainfall (mm)**	20978.1
Station ID #	6000	**Average Annual Rainfall (mm)**	567.0
Coordinates	45°19'N, 75°40'W	**Total Evaporation (mm)**	1546.5
Elevation (ft)	370	**Total Infiltration (mm)**	3763.1
Years of Rainfall Data	37	**Total Rainfall that is Runoff (mm)**	15668.5

Notes
• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules. • Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed. • For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

Drainage Area	
Total Area (ha)	0.335
Imperviousness %	82

Up Stream Storage	
Storage (ha-m)	Discharge (cms)
0.000	0.000

Water Quality Objective	
TSS Removal (%)	80.0
Runoff Volume Capture (%)	90.00
Oil Spill Capture Volume (L)	
Peak Conveyed Flow Rate (L/s)	
Water Quality Flow Rate (L/s)	

Up Stream Flow Diversion	
Max. Flow to Stormceptor (cms)	

Design Details	
Stormceptor Inlet Invert Elev (m)	
Stormceptor Outlet Invert Elev (m)	
Stormceptor Rim Elev (m)	
Normal Water Level Elevation (m)	
Pipe Diameter (mm)	
Pipe Material	
Multiple Inlets (Y/N)	No
Grate Inlet (Y/N)	No

Particle Size Distribution (PSD)

Removing the smallest fraction of particulates from runoff ensures the majority of pollutants, such as metals, hydrocarbons and nutrients are captured. The table below identifies the Particle Size Distribution (PSD) that was selected to define TSS removal for the Stormceptor design.

Fine Distribution		
Particle Diameter (microns)	Distribution %	Specific Gravity
20.0	20.0	1.30
60.0	20.0	1.80
150.0	20.0	2.20
400.0	20.0	2.65
2000.0	20.0	2.65

Site Name	6150 Hazeldean Rd.

Site Details

Drainage Area

Total Area (ha)	0.335
Imperviousness %	82

Surface Characteristics

Width (m)	116.00
Slope %	2
Impervious Depression Storage (mm)	0.508
Pervious Depression Storage (mm)	5.08
Impervious Manning's n	0.015
Pervious Manning's n	0.25

Maintenance Frequency

Maintenance Frequency (months) >	12

Infiltration Parameters

Horton's equation is used to estimate infiltration

Max. Infiltration Rate (mm/hr)	61.98
Min. Infiltration Rate (mm/hr)	10.16
Decay Rate (1/sec)	0.00055
Regeneration Rate (1/sec)	0.01

Evaporation

Daily Evaporation Rate (mm/day)	2.54

Dry Weather Flow

Dry Weather Flow (lps)	0

Winter Months

Winter Infiltration	0

TSS Loading Parameters

TSS Loading Function	Build Up/ Wash-off

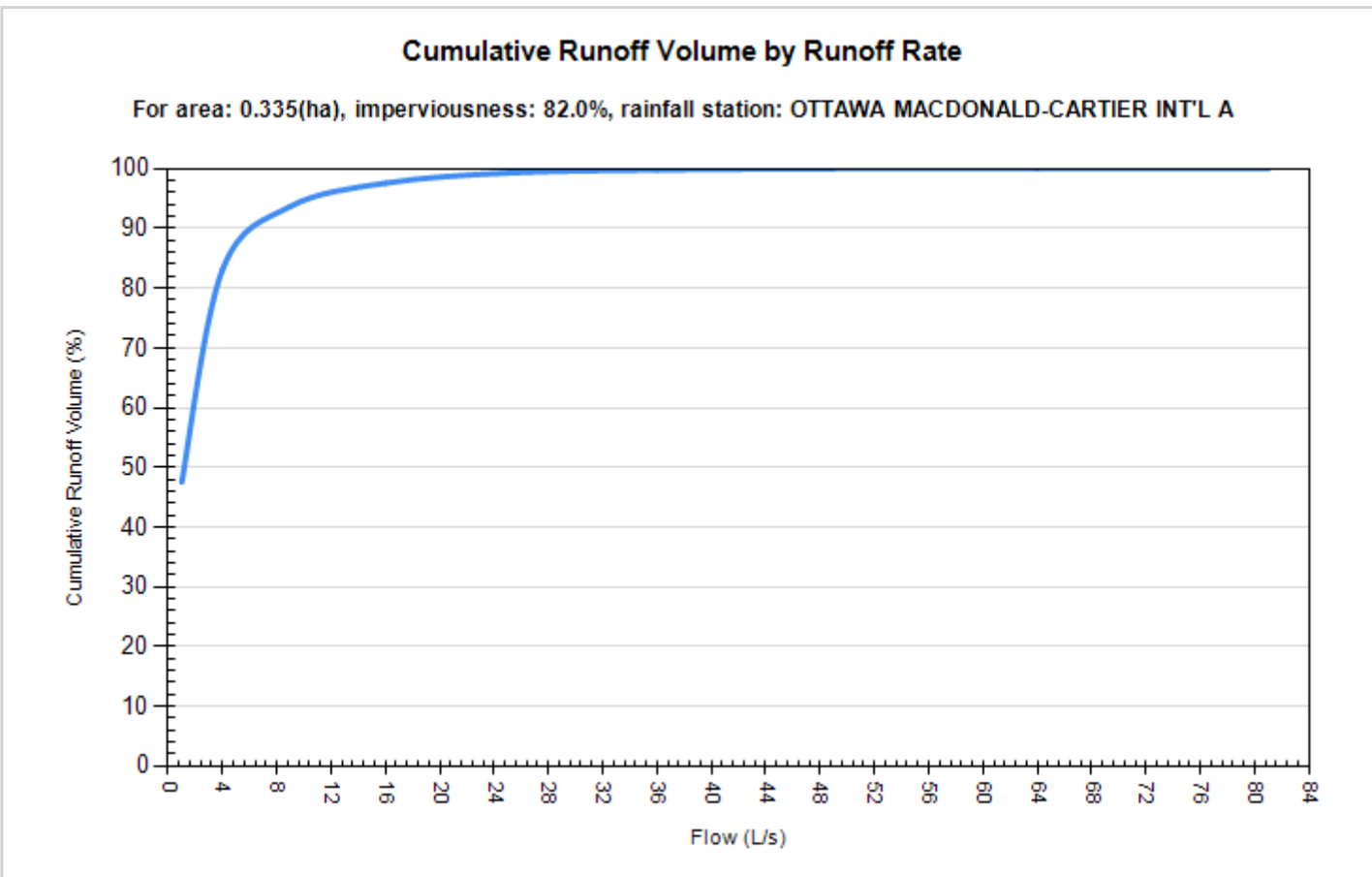
Buildup/Wash-off Parameters

Target Event Mean Conc. (EMC) mg/L	125
Exponential Buildup Power	0.40
Exponential Washoff Exponent	0.20

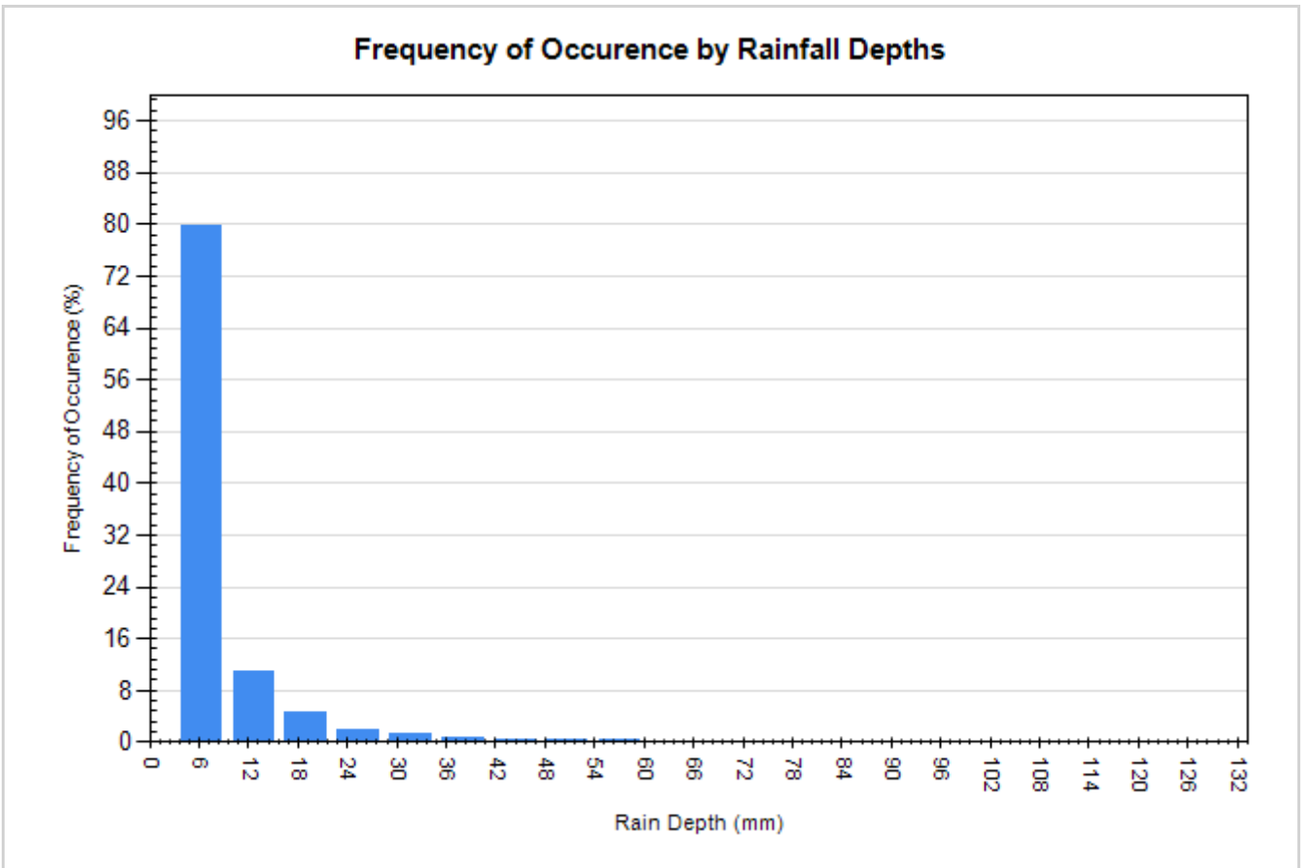
TSS Availability Parameters

Availability Constant A	0.057
Availability Factor B	0.04
Availability Exponent C	1.10
Min. Particle Size Affected by Availability (micron)	400

Cumulative Runoff Volume by Runoff Rate			
Runoff Rate (L/s)	**Runoff Volume (m³)**	**Volume Over (m³)**	**Cumulative Runoff Volume (%)**
1	25094	27760	47.5
4	43932	8916	83.1
9	49504	3343	93.7
16	51600	1246	97.6
25	52450	395	99.3
36	52762	84	99.8
49	52835	10	100.0
64	52845	0	100.0
81	52845	0	100.0



Rainfall Event Analysis				
Rainfall Depth (mm)	**No. of Events**	**Percentage of Total Events (%)**	**Total Volume (mm)**	**Percentage of Annual Volume (%)**
6.35	3843	79.7	5885	28.1
12.70	520	10.8	4643	22.1
19.05	225	4.7	3470	16.5
25.40	98	2.0	2144	10.2
31.75	58	1.2	1639	7.8
38.10	32	0.7	1118	5.3
44.45	24	0.5	996	4.7
50.80	9	0.2	416	2.0
57.15	5	0.1	272	1.3
63.50	1	0.0	63	0.3
69.85	1	0.0	64	0.3
76.20	1	0.0	76	0.4
82.55	0	0.0	0	0.0
88.90	1	0.0	84	0.4
95.25	0	0.0	0	0.0
101.60	0	0.0	0	0.0
107.95	0	0.0	0	0.0
114.30	1	0.0	109	0.5
120.65	0	0.0	0	0.0
127.00	0	0.0	0	0.0



For Stormceptor Specifications and Drawings Please Visit:
http://www.imbriumsystems.com/technical-specifications

Zurn Roof Drains

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

THE ZURN "CONTROL-FLO CONCEPT"

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

WHAT IS "CONTROL-FLO"?

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

CUTS DRAINAGE COSTS

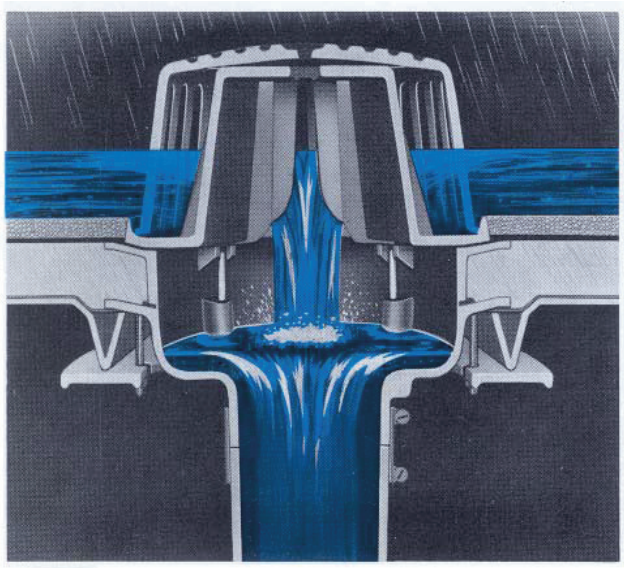
Fewer roof drains, smaller diameter piping, smaller sewer sizes, and lower installation costs are possible with a "Control-Flo" drainage system because roof areas are utilized as temporary storage reservoirs.

REDUCES PROBABILITY OF STORM DAMAGE

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

THANKS TO EXCLUSIVE ZURN "AQUA-WEIR" ACTION

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

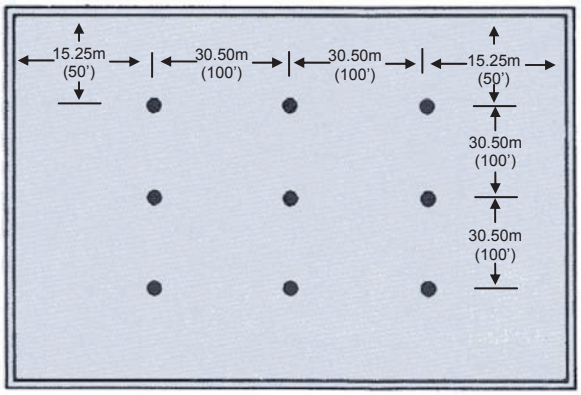


DEFINITION

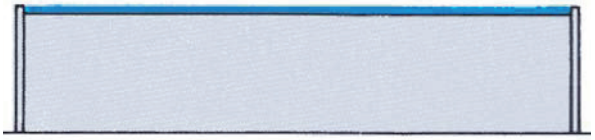
DEAD LEVEL ROOFS

DIAGRAM "A"

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



(Plan View)



(Section View)

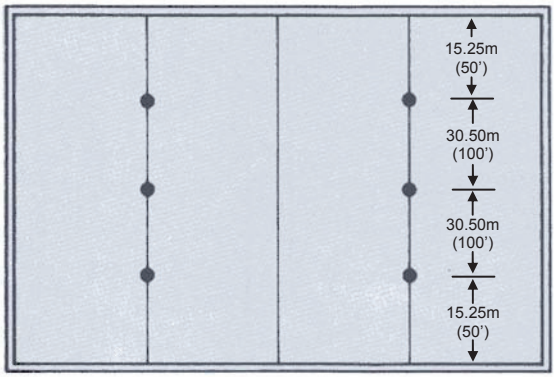
SLOPED ROOFS

DIAGRAM "B"

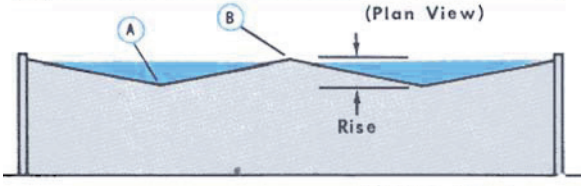
A sloped roof is one designed commonly with a shallow slope. The Zurn "Control-Flo" drainage system can be applied to any slope which results in a total rise up to 152mm (6").

The total rise of a roof as calculated for "Control-Flo" application is defined as the vertical increase in height in inches, from the low point or valley of a sloping roof (A) to the top of the sloping section (B). (Example: a roof that slopes 3mm (1/8") per foot having a 7.25m (24') span would have a rise of 7.25m x 3mm or 76mm (24' x 1/8" or 3")).

Measurements shown are for maximum distances.



(Plan View)

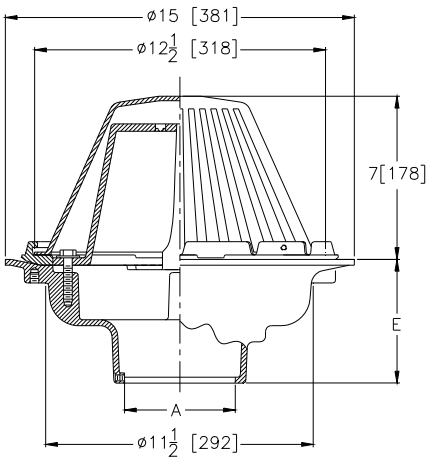


(Section View)

Dimensions and other measurements given in metric and imperial forms.

Economical Roof Drainage Installations

SPECIFICATION DATA



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

ROOF DESIGN RECOMMENDATIONS

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

GENERAL INFORMATION

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

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

GENERAL RECOMMENDATIONS

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

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

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

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

ROOF USED AS TEMPORARY RETENTION

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

ROOF LOADING AND RUN-OFF RATES

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

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

ADDITIONAL NOTCH RATINGS

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

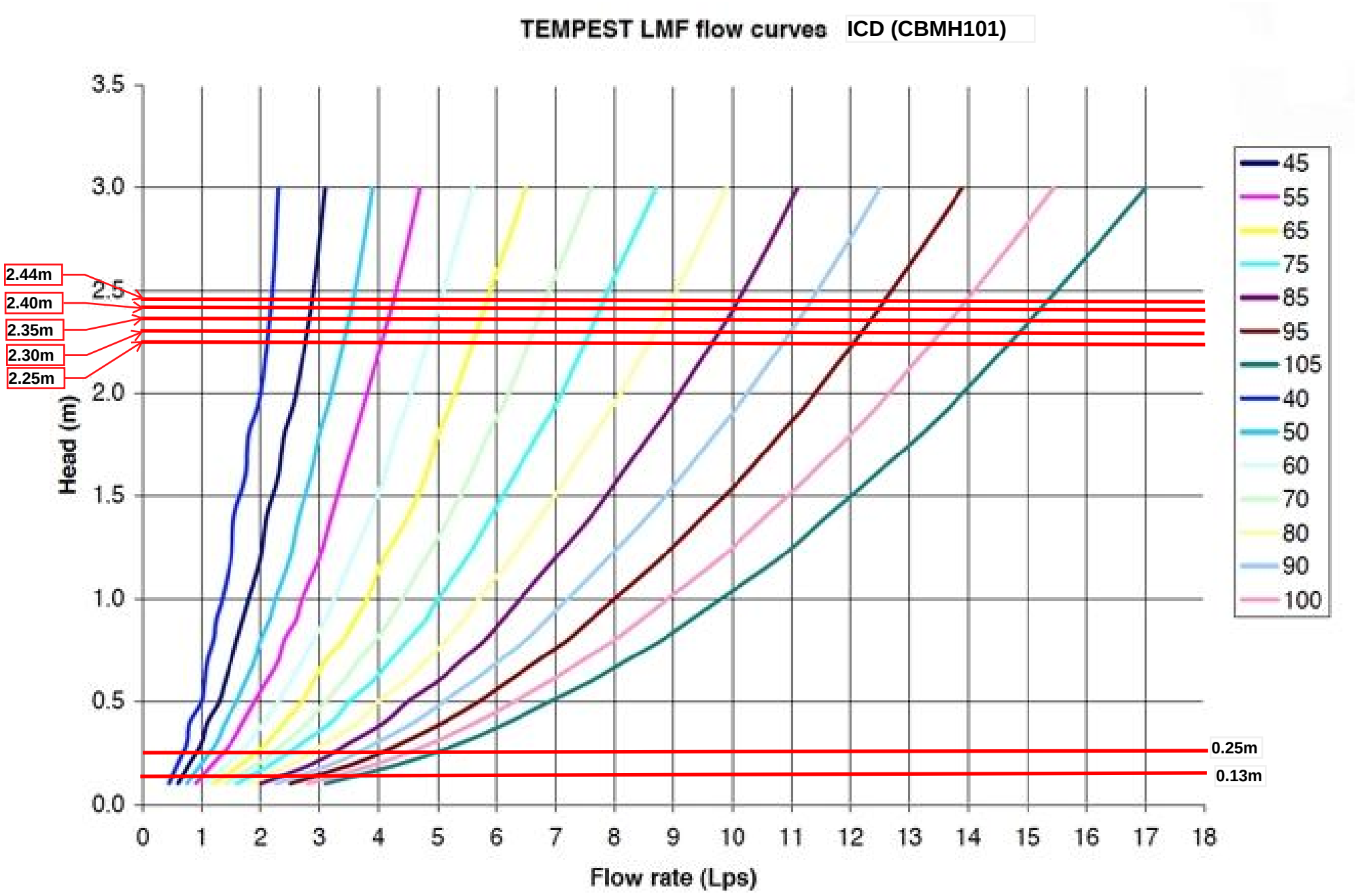
Should you require design criteria for locations outside of Canada or for special project applications please contact Zurn Industries Limited, Mississauga, Ontario.

LEADER AND DRAIN PIPE SIZING

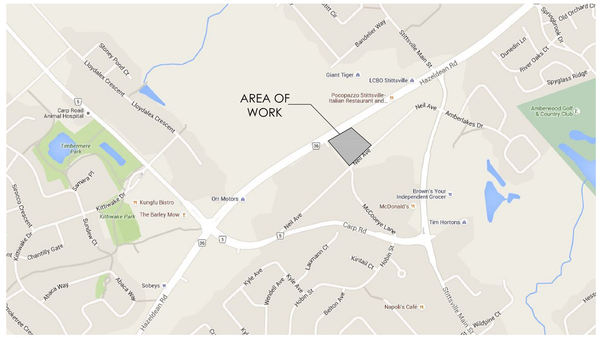
Since all data in the “Selecta-Drain” Chart is based on the 50-year-storm it is possible to exceed the water depth listed in these charts if a 100-year or 1000-year storm would occur. Therefore, for good design it is recommended that scuppers or other methods be used to limit water depth to the design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

PROPER DRAIN LOCATION

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


TEMPEST LMF flow curves ICD (CBMH101)
Head (m)
Flow rate (Lps)
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
2.44m
2.40m
2.35m
2.30m
2.25m
0.25m
0.13m
45
55
65
75
85
95
105
40
50
60
70
80
90
100

DRAWINGS / FIGURES



2 SP01 KEY PLAN
SCALE: NTS

ZONING - AM9 (ARTERIAL MAINSTREET ZONE)

	REQUIRED	VARIANCE	PROPOSED PHASE 1
LOT AREA	NO MINIMUM		6,843.7m² (0.684Ha)
LOT WIDTH	NO MINIMUM		82.3m
FRONT YARD SETBACK	NO MINIMUM		COMPLIES
INTERIOR SIDE YARD SETBACK	NO MINIMUM		COMPLIES
REAR YARD SETBACK	10m		COMPLIES
BUILDING HEIGHT	15m		COMPLIES
LOT COVERAGE:			
BUILDING FOOTPRINT (COMBINED)			927.6m² 27%
PAVED AREA - ASPHALT			1598.5m² 47%
HARD LANDSCAPE AREA - SIDEWALK			431.5m² 13%
SOFT LANDSCAPE AREA - GRASS			455.9m² 13%
PHASE I DEVELOPMENT AREA			3413.5m²
PHASE II DEVELOPMENT AREA			3430.2m²
GROSS FLOOR AREA (COMBINED)	N/A		11,660.0m²
LANDSCAPE BUFFER FOR PARKING (MIN)	3m		COMPLIES
PARKING REQUIRED	84 SPACES		84 SPACES

VEHICULAR PARKING SUMMARY

REQUIRED PARKING

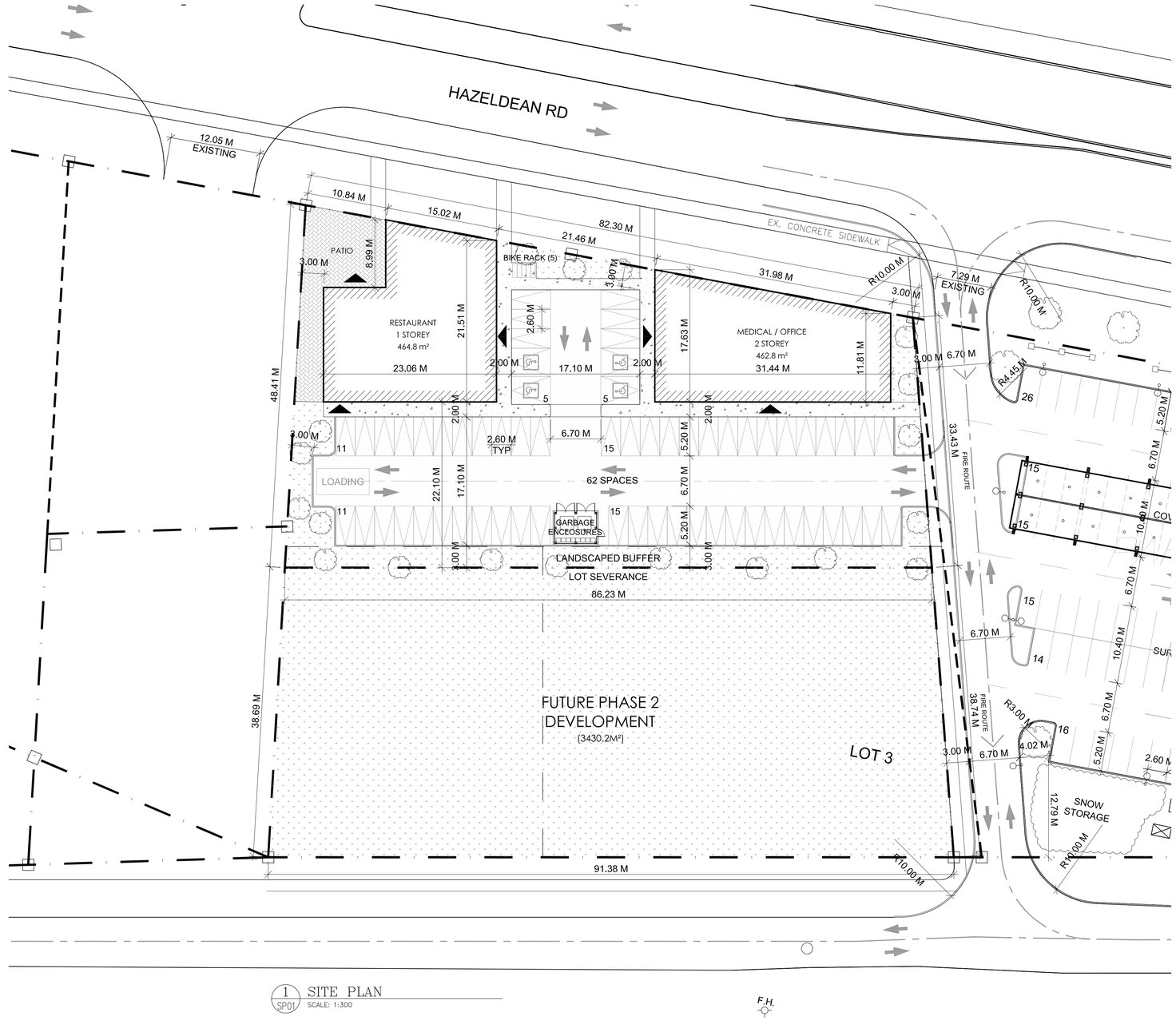
USE	AREA	RATIO	REQUIRED
RESTAURANT	464.8m²	(10/100m²)	46
1F - MEDICAL	462.8m²	(4.0/100m²)	19
2F - MEDICAL	462.8m²	(4.0/100m²)	19
TOTAL	**1390.4m² GFA**		**84 SPACES**

PROVIDED (ON GRADE) *62 (ON SITE) + 22 (SECTION 93)* = **84 SPACES**

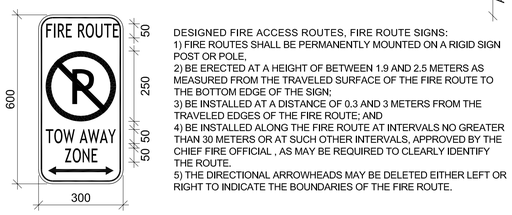
BICYCLE PARKING SUMMARY

REQUIRED PARKING	RESTAURANT	OFFICE/RETAIL	TOTAL
	1/1500m²=1	*1/1500m²=1*	*2 REQUIRED*
PROVIDED			
TOTAL			***5 PS***

NOTES:
- EXISTING SITE ACCESS HAS BEEN BUILT AS PER SC7.1
- SNOW WILL BE REMOVED OFF-STREET
- 1.5 HIGH LANDSCAPE SCREEN TO BE PROVIDED ALONG NEW LOT SEVERANCE



1 SP01 SITE PLAN
SCALE: 1:300



ACCESSIBLE PARKING SPACE SIGN

DESIGNED FIRE ACCESS ROUTES, FIRE ROUTE SIGNS:
1) FIRE ROUTES SHALL BE PERMANENTLY MOUNTED ON A RIGID SIGN POST OR POLE.
2) BE ERECTED AT A HEIGHT OF BETWEEN 1.9 AND 2.5 METERS AS MEASURED FROM THE TRAVELED SURFACE OF THE FIRE ROUTE TO THE BOTTOM EDGE OF THE SIGN;
3) BE INSTALLED AT A DISTANCE OF 0.3 AND 3 METERS FROM THE TRAVELED EDGES OF THE FIRE ROUTE; AND
4) BE INSTALLED ALONG THE FIRE ROUTE AT INTERVALS NO GREATER THAN 30 METERS OR AT SUCH OTHER INTERVALS, APPROVED BY THE CHIEF FIRE OFFICIAL , AS MAY BE REQUIRED TO CLEARLY IDENTIFY THE ROUTE.
5) THE DIRECTIONAL ARROWHEADS MAY BE DELETED EITHER LEFT OR RIGHT TO INDICATE THE BOUNDARIES OF THE FIRE ROUTE.

LEGEND

- HEAVY DUTY PAVEMENT STRUCTURE
- GRASS
- UNIT PAVING
- SHRUB BED
- RIVERSTONE
- C.I.P. CONCRETE
- ASPHALT PAVING
- FIRE ROUTE
- PROPERTY LINE TO BE REMOVED
- TRAFFIC DIRECTION
- LIGHT STANDARD
- FIRE DEPARTMENT CONNECTION
- ENTRANCE/EXIT
- FIRE HYDRANT

[redacted]

DO NOT SCALE DRAWINGS

CHECK AND VERIFY ALL DIMENSIONS BEFORE PROCEEDING WITH THE WORK.

DRAWINGS NOT TO BE USED FOR CONSTRUCTION UNLESS STAMPED AND SIGNED BY THE CONSULTANT.

THESE DRAWINGS HAVE BEEN DESIGNED IN CONFORMANCE WITH THE ONTARIO BUILDING CODE.

Revisions and Issues

REV.	DATE	DESCRIPTION
1	2018.03.12	REISSUED FOR REVIEW
2		
3		
4		
5		

[redacted]

Alexander Wilson Architect Inc
Admiralty Place
103-20 Gore Street
Kingston, ON K7L 2L1
T: 613-545-3744
F: 613-545-1411

Stamp

Project

HAZELDEAN PLAZA

CITY FILE :
6176 HAZELDEAN RD
STITTSVILLE, ONTARIO

Drawing

SITE PLAN

Drawn By	PBK
Checked By	SW
Scale	AS NOTED
Date	JAN 2018
Project No.	1733
Revision	1
Drawing No.	PLAN NO. 17103 SP01

1:1

W:\active\161613850_111_Jackson_Hazeldean_CT\topographical\drawing\161613850_111_D1_C3D.dwg

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www.stantec.com

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TOPOGRAPHIC SURVEY of

PART OF LOT 24
CONCESSION 12
GEOGRAPHIC TOWNSHIP OF GOULBOURN
CITY OF OTTAWA

Stantec Geomatics Ltd.

Scale 1 : 400

16 12 8 4 0 8 16 Metres

METRIC CONVERSION

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

GRID SCALE CONVERSION

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.999996.

BEARING NOTE

BEARINGS HEREON ARE GRID BEARINGS DERIVED FROM NCC HORIZONTAL CONTROL MONUMENTS 19791036 (N5023341.265, E426511.941) AND 19781206 (N5012622.040, E430459.727) AND ARE REFERRED TO THE CENTRAL MERIDIAN 76° 30' WEST LONGITUDE OF THE 3° MTM ONTARIO COORDINATE SYSTEM, NAD83 (ORIGINAL) ZONE 9.

ELEVATION NOTE

ELEVATIONS SHOWN HEREON ARE GEODETIC (CGVD-1928:1978) AND ARE DERIVED FROM A STANTEC GEOMATICS LTD. BENCHMARK LOCATED AT THE NORTH EASTERLY CORNER OF PART 4, 4R-19735 HAVING AN ELEVATION OF 125.45 METRES.

NOTE

UNDERGROUND UTILITIES SHOWN HEREON ARE APPROXIMATE AND SHOULD BE VERIFIED IN THE FIELD PRIOR TO CONSTRUCTION.

SURVEYOR'S CERTIFICATE:

I HEREBY CERTIFY THAT :

1. THIS PLAN AND SURVEY ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, SURVEYORS ACT AND THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON THE 1ST DAY OF DECEMBER, 2015.

DATED : DECEMBER 17, 2015   BRIAN J. WEBSTER
BRIAN J. WEBSTER
ONTARIO LAND SURVEYOR

REVISION NOTE: PLAN WAS REVISED TO SHOW ADDITIONAL TOPOGRAPHIC INFORMATION ON STITTSVILLE MAIN ON MAY 10, 2016.

DATED : ____________   ____________
BRIAN J. WEBSTER
ONTARIO LAND SURVEYOR

REVISION NOTE: PLAN WAS REVISED TO SHOW ADDITIONAL TOPOGRAPHIC INFORMATION ON STITTSVILLE MAIN, THE WESTERLY PORTION OF THE PROPERTY AND NEIL AVENUE ON APRIL 18, 2018.

DATED : ____________   ____________
BRIAN J. WEBSTER
ONTARIO LAND SURVEYOR

LEGEND

Symbol		Description
■	DENOTES	FOUND MONUMENTS
□	"	SET MONUMENTS
IB	"	IRON BAR
IBØ	"	ROUND IRON BAR
SIB	"	STANDARD IRON BAR
SSIB	"	SHORT STANDARD IRON BAR
CC	"	CUT CROSS
CP	"	CONCRETE PIN
BM	"	BENCHMARK
CM	"	CONCRETE MONUMENT
HCM	"	HORIZONTAL CONTROL MONUMENT
WIT	"	WITNESS
PIN	"	PROPERTY IDENTIFICATION NUMBER
MEAS	"	MEASURED
BG	"	BELOW GRADE
NW	"	NAIL AND WASHER
PL	"	PLAN 4R-21452
OU	"	ORIGIN UNKNOWN
SG	"	STANTEC GEOMATICS LTD.
ACU	"	AIR CONDITIONING UNIT
AN	"	ANCHOR
AP	"	AIR PUMP
ANT	"	ANTENNA
TCB	"	TRAFFIC CONTROL BOX
TPIT	"	TEST PIT
TRC	"	TREE CONIFEROUS
TRD	"	TREE DECIDUOUS
TRS	"	TREE STUMP
TSL	"	TRAFFIC SIGNAL LIGHT
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
SPT	"	SEPTIC TANK
TABLE	"	TABLE
TB BELL	"	TERMINAL BOX - BELL
TB CATV	"	TERMINAL BOX - CABLE
	"	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
MHST	"	MAINTENANCE HOLE STORM
MHT	"	MAINTENANCE HOLE TRAFFIC
MW	"	MONITORING WELL
NPB	"	NEWS PAPER BOX
OLP	"	LIGHT STANDARD ORNAMENTAL
OW	"	OBSERVATION WELL
PKM	"	PARKING METER
PLR	"	PILLAR
POST	"	POST
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

DRAWN: CT CHECKED: BW PM: CT FIELD: CA PROJECT No.: 161613439