

**SITE SERVICING PLAN AND  
STORMWATER MANAGEMENT  
REPORT**

**FOR**

**WEXFORD DEVELOPMENTS  
910 MARCH ROAD**

**CITY OF OTTAWA**

PROJECT NO.: 17-962  
CITY APPLICATION NO.: D07-12-XX-XXXX

JUNE 2020 – REV 1  
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FOR  
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## **1.0 INTRODUCTION**

David Schaeffer Engineering Limited (DSEL) has been retained by Wexford Developments to prepare a Site Servicing and Stormwater Management report in support of the application for a Zoning By-law Amendment (ZBLA) and Site Plan Control (SPC) at 910 March Road.

The subject property is located within the City of Ottawa urban boundary, in the West Carleton – March ward. As illustrated in **Figure 1**, the subject property is located north of the intersection of March Road and Maxwell Bridge Road. Comprised of a single parcel the subject property measures approximately **2.70 ha** and is zoned rural countryside Zone (RU).



**Figure 1: Site Location**

The proposed SPC would allow for the development of a commercial complex consisting of four buildings fronting onto an internal drive aisle. The proposed development would include approximately **2,501 m<sup>2</sup>** of retail space and **409 m<sup>2</sup>** of restaurant space with access from March Road. A copy of the Site Plan is included in **Drawings/Figures**.

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

## 1.1 Existing Conditions

The existing site includes two single family homes consisting of asphalt and gravel driveways. The site also contains four storage buildings and several sea containers. Based on the **Phase I – Environmental Site Assessment** prepared by Paterson Group (**Phase I ESA**), the existing house is serviced via a private well and septic system.

The site generally slopes from west to east. The elevations range between 78.5m to 74.5m and is tributary to Shirley's Brook. **Figure 2** below illustrates the Mississippi Valley Conservation Authority (MVCA) regulatory limits in yellow and floodplain mapping in red. Not that MVCA permits are required for any proposed development within the regulatory limits. Parking lots and drive aisles are permitted, whereas buildings and structures are refused.



**Figure 2: MVCA Regulatory Limits**

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

### Maxwell Bridge Road

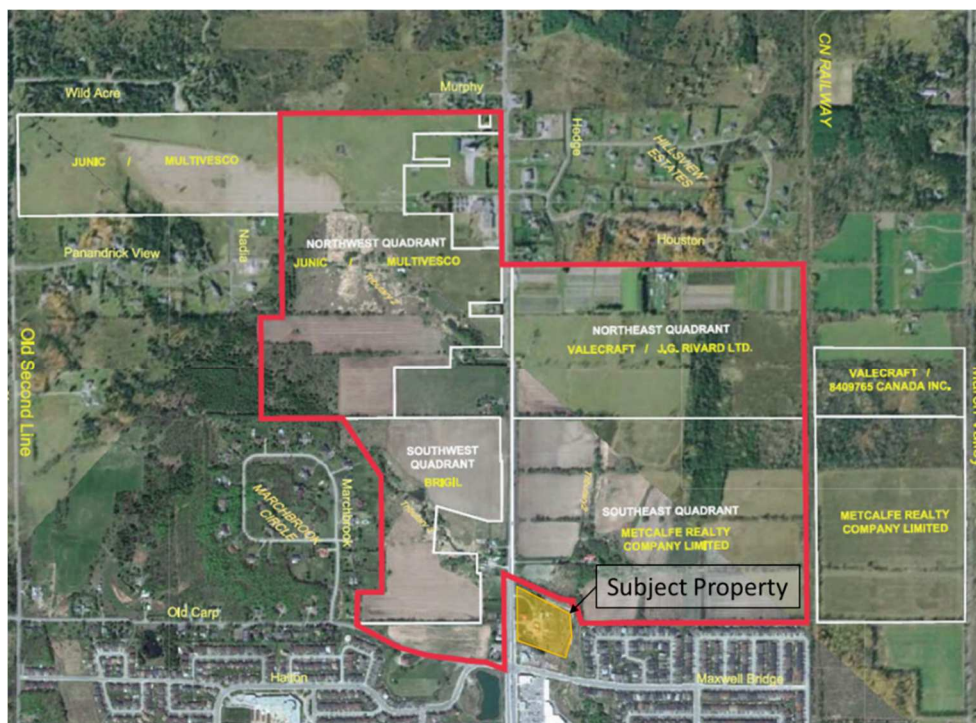
- 305 mm diameter PVC watermain;
- 200 mm diameter PVC sanitary sewer tributary to the Briaridge Pump Station at 960 Klondike Road.
- 300 mm diameter concrete storm sewer tributary to Shirleys Brook at March Valley Road

### March Road

- Existing rural road drainage ditch directing flow to a tributary of Shirley's Brook.

## 1.1 Planned Infrastructure

A Master Servicing Study was prepared in support of the Kanata North Community Design Plan. The Kanata North Urban Expansion area is depicted in *Figure 3*. *Figure 3* was extracted from the Kanata North CDP prepared by Novatech.



**Figure 3: Kanata North Urban Expansion Area**

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New services are contemplated along March Road along the frontage of the subject property including:

- 400 mm diameter watermain
- 600 mm diameter sanitary sewer tributary to the East March Trunk Sewer.

A reduced copy of the planned infrastructure has been included at the rear of this report. The planned infrastructure is anticipated to be installed within 2021, prior to 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.

It is proposed that the development will create a new outlet to one of the existing watercourses (Shirley's Brook). The proposed connection will require an Environmental Compliance Approval (ECA) from the Ministry of the Environment and Climate Change (MECP). It is required to submit the ECA directly to the MECP. The application to the MECP needs to be endorsed by the City.

Furthermore, Conservation Authority approval is required for the outlet to the watercourse. The application can be made once engineering approvals are in place.

## **1.3 Pre-consultation**

Pre-consultation correspondence, along with the servicing guidelines checklist, is 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)**
  - **Technical Bulletin ISTB-2018-01**  
City of Ottawa, March 21, 2018.  
**(ISTB-2018-01)**
  - **Technical Bulletin ISTB-2018-03**  
City of Ottawa, March 21, 2018.  
**(ISTB-2018-03)**
- **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)**
  - **Technical Bulletin ISDTB-2018-02**  
City of Ottawa, March 21, 2018.  
**(ISDTB-2018-02)**
- **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)**

- 
- **Geotechnical Investigation - 910 March Road (PG5119-1)**  
Paterson Group, November 13 2019.  
***(Geotechnical Report)***
  
  - **Phase I – Environmental Site Assessment - 910 March Road**  
Paterson Group, November 05 2019.  
***(Phase I ESA)***
  
  - **Kanata North Community Design Plan – Master Servicing Study**  
Novatech, June 28 2016.  
***(KNCDP-MSS)***

### 3.0 WATER SUPPLY SERVICING

#### 3.1 Existing Water Supply Services

The subject property lies within the City of Ottawa 2W pressure zone, as shown by the Pressure Zone map in **Appendix B**. A local 406 mm diameter watermain is being constructed within the March Road right-of-way and is anticipated to be available to service the site once completed in 2021.

Based on the **Phase I ESA**, the existing house is serviced via a private well.

#### 3.2 Water Supply Servicing Design

It is proposed to service the development by connecting to the future 406 mm diameter watermain within March road via a 203 mm diameter internal looped watermain.

In accordance with City of Ottawa technical bulletin ISDTB-2014-02, redundant service connections will be required due to an estimated design flow of greater than 50 m<sup>3</sup>/day.

Based on the **Kanata North Community Design Plan – Master Servicing Study (KNCDP-MSS)** drawings provided by Novatech, there are two planned fire hydrants fronting the property along March road. In order to provide adequate protection an additional internal hydrant is proposed.

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

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

Design Parameter	Value
Commercial Retail	2.5 L/m <sup>2</sup> /d
Restaurant	125 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 <b>Water Supply Guidelines</b> ** Residential Max. Daily and Max. Hourly peaking factors per MOE Guidelines for Drinking-Water Systems Table 3-3 for 0 to 500 persons. -Table updated to reflect ISD-2010-2	

**Table 2**, below, summarizes the estimated water supply demand and boundary conditions for the proposed development based on the **Water Supply Guidelines**.

**Table 2**  
**Water Demand and Boundary Conditions**  
**Proposed Conditions**

Design Parameter	Proposed Demand <sup>1</sup> (L/min)	Boundary Condition <sup>2</sup> (m H <sub>2</sub> O / kPa)
Average Daily Demand	8.2	52.3 / 513.1
Max Day + Fire Flow	12.2 + 5000= 5012.2	48.0 / 471.9
Peak Hour	22.0	48.1 / 470.9
1) Water demand calculation per <b>Water Supply Guidelines</b> . See <b>Appendix B</b> for detailed calculations. 2) Boundary conditions supplied by the City of Ottawa for the demands indicated in the correspondence; assumed ground elevation 78.9m. See <b>Appendix B</b> .		

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

Fire flow requirements were estimated per City of Ottawa Technical Bulletin **ISTB-2018-02**. The following parameters were coordinated with the architect:

- Type of construction – Non-Combustible Construction;
- Occupancy type – Combustible; and
- Sprinkler Protection – Fully supervised-sprinklered System.

The above assumptions result in an estimated maximum fire flow of approximately **5000 L/min**. A certified fire protection system specialist would/may need to be employed to design the building fire suppression system and confirm the actual fire flow demand.

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

The City provided both the anticipated minimum and maximum water pressures, as well as, the estimated water pressure during fire flow demand for the demands indicated by the correspondence in **Appendix B**. As shown by **Table 2**, above, the minimum and maximum pressures fall within the required range identified in **Table 1**.

Based on the updated Site Plan, the estimated water demand for the site decreased by approximately 10%. It is not anticipated to have a significant impact on the previously provided boundary conditions.

The existing private well will require decommissioning in accordance with geotechnical recommendations.

### 3.2.1 EPANet Water Modelling

EPANet was utilized to determine the availability of pressures throughout the internal watermain 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 for the contemplated demands as well as the pressures the watermain provided the fire hydrant during fire flow conditions.

**Table 3**, below, summarizes the output reports. Detailed calculations and model schematics for each scenario are included in **Appendix B**. The model indicates that pressures during average day, max day and peak hour are within the **Water Supply Guidelines** recommended range.

**Table 3**  
**Model Simulation Output Summary**

Location	Average Day (kPa)	Max Day + Fire Flow (kPa)	Peak Hour (kPa)
Node 3	539.9	467.3	498.7
Node 4	537.8	389.4	496.6
Node 5	552.3	404.9	511.1
BLDG B (Node Bank)	556.2	408.8	515.0
FH	548.4	375.9	507.2
BLDG C (Node GasStation)	538.6	390.1	497.4
BLDG A (Node Hardware)	556.3	408.9	515.1
BLDG D (Node Rest1)	535.1	462.4	493.8

### 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 updated Site Plan, the estimated water demand for the site decreased by approximately 10%. It is not anticipated to have a significant impact on the previously provided boundary conditions.

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The estimated water demand was submitted to the City of Ottawa for establishing boundary conditions. The City provided both the anticipated minimum and maximum water pressures, as well as, the estimated water pressure during fire flow. The minimum and maximum pressures fall within the required range identified in **Table 1**. Based on boundary conditions provided by the City the existing municipal water infrastructure is capable of providing the proposed development with water within the City's required pressure range.

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

## **4.0 WASTEWATER SERVICING**

### **4.1 Existing Wastewater Services**

The subject property lies within the East March Trunk sewer catchment area, as shown by the **Trunk Sanitary Sewers and Collection Areas Map**, included in **Appendix C**.

Based on **Phase I ESA**, the existing house is serviced via a private septic system.

### **4.2 Wastewater Design**

It is anticipated that the proposed development will be serviced by the future 600 mm sanitary trunk sewer to be constructed along March Road from Shirley's Brook Drive to Maxwell Bridge per the **KNCDP-MSS**. The development is proposed to connect to the future sanitary sewer via a proposed 250 mm internal sanitary sewer. Refer to, **SSP-1**, in **Drawings/Figures** for sanitary servicing layout.

The site area was not included in the **KNCDP-MSS** sanitary design sheet provided in **Appendix C** however the site will be tributary to Drainage Area **MR-2**. The **KNCDP-MSS** demonstrates a residual capacity of **118.4 L/s** in the future sanitary sewer fronting the development.

**Table 4**, below, summarizes the **City Standards** employed in the design of the proposed wastewater sewer system.

**Table 4**  
**Wastewater Design Criteria**

Design Parameter	Value
Commercial Floor Space	5 L/m <sup>2</sup> /d
Restaurant Space	125 L /9.3m <sup>2</sup> / d
Infiltration and Inflow Allowance	0.05 L/s/ha (Dry Weather) 0.28 L/s/ha (Wet Weather) 0.33 L/s/ha (Total)
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
<i>Extracted from Sections 4 and 6 of the City of Ottawa Sewer Design Guidelines, October 2012.</i>	

**Table 5**, below, demonstrates the estimated peak flow from the proposed development. See **Appendix C** for associated calculations.

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

Design Parameter	Total Flow (L/s)
Estimated Average Dry Weather Flow	<b>5.08</b>
Estimated Peak Dry Weather Flow	<b>7.58</b>
Estimated Peak Wet Weather Flow	<b>8.05</b>

The estimated sanitary flow based on the **Site Plan**, included in **Drawings/Figures**, results in a peak wet weather flow of **8.05 L/s**.

The subject site was not contemplated in the **KNCDP-MSS** however there is an available capacity **118.4 L/s**. As per the **KNCDP-MSS** sanitary design sheet provided in **Appendix C**, the most restrictive leg of pipe up to the Briar Ridge Pump Station has a contemplate capacity of **18 L/s** (202.4 L/s Capacity – 184.4 L/s Flow), which is sufficient to convey the proposed increase in flow.

The existing septic system will require decommissioning in accordance with geotechnical recommendation.

### 4.3 Wastewater Servicing Conclusions

The site is tributary to the East March Trunk sewer. The development is estimated to generate a peak wet weather flow of **8.05 L/s** to be directed to the future 600 mm sanitary sewer within March Road. Coordination with City staff is required to confirm the future

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600 mm sanitary has sufficient capacity to accommodate the flow increase of **8.05 L/s** 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 Shirley's Brook via a tributary creek located within the Ottawa West sub-watershed.

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

It was assumed that the existing development contained no stormwater management controls for flow attenuation. The estimated pre-development peak flows for the 2, 5, and 100-year events are summarized in **Table 6**, below:

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

City of Ottawa Design Storm	Estimated Peak Flow Rate (L/s)
2-year	85.3
5-year	115.2
100-year	245.9

### 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 Post-development stormwater runoff release is to be controlled to predevelopment conditions;
- Attenuate all storms up to and including the City of Ottawa 100-year design event on site; and
- Provide quality controls to an enhanced level of treatment for the proposed development due to the site's distance from the outlet; correspondence with the MVCA is included in **Appendix A**.

Based on the above the allowable release rate for the proposed development is **85.3 L/s** and **245.9 L/s** for the 2-year and 100-year storm events, respectively.

### 5.3 Proposed Stormwater Management System

It is proposed that the stormwater outlet from the development will be to Shirley’s Brook located directly East of the development.

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

Runoff from the proposed path east of the development (Area U1) will maintain existing flow patterns and convey flow to Shirley’s Creek.

As indicated by drawing **GP-1** and by the stormwater calculations included in **Appendix D**, runoff from the parking area and landscaped areas (BLDG B,C,&D and Areas, A102,A103, 105, 106A, 106B A110, and A111) will flow to catch basins and will be attenuated by a **165 mm ICD** or an approved equivalent at the outlet side of storm maintenance hole STM102 prior to discharging to the existing Shirley’s Brook. Approximately **429 m<sup>3</sup>** of subsurface storage will be provided via a Stormtech MC 4500 Chambers or an approved equivalent.

Flow from BLDGA will be controlled before discharging to the storm sewer system. Approximately **51.5 m<sup>3</sup>** of storage will be provided by rooftop storage. 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**.

**Table 7**, below, summarizes post-development flow rates. Unattenuated areas will be compensated for in areas with flow attenuation controls.

**Table 7  
 Stormwater Flow Rate Summary**

Control Area	2-Year Release Rate	2-Year Required Storage	100-Year Release Rate	100-Year Required Storage	100-Year Available Storage
	(L/s)	(m <sup>3</sup> )	(L/s)	(m <sup>3</sup> )	(m <sup>3</sup> )
Unattenuated Areas	9.2	0.0	26.6	0.0	0.0
Roof Controls	12.1	14.7	18.8	51.5	145.7
Attenuated Areas	61.0	122.7	92.3	459.8	461.7
<b>Total</b>	<b>82.2</b>	<b>137.4</b>	<b>137.6</b>	<b>511.2</b>	<b>607.4</b>

It is anticipated that approximately **511.2 m<sup>3</sup>** of storage will be required on site to attenuate flow to the established 2-year release rate of **85.3 L/s**; storage calculations are contained within **Appendix D**.

Quality controls are proposed to be provided via a Stormceptor EF08 Oil-Grit Separator or an approved equivalent. Details of the OGS are provided within **Appendix D**.

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## 5.4 Stormwater Servicing Conclusions

Post development stormwater runoff will be required to be restricted to the allowable target release rate for storm events up to and including the 100-year storm in accordance with City of Ottawa **City Standards**. The allowable release rate for the proposed development is **85.3 L/s** and **245.9 L/s** for the 2-year and 100-year storm events, respectively.

Based on consultation with the RVCA, stormwater quality controls are required and will be provided via a Stormceptor OGS EF08 or an approved equivalent.

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

## 6.0 UTILITIES

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

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; and
- 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; and
- Clean and change filter cloth at catch basins.

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## 8.0 CONCLUSION AND RECOMMENDATIONS

David Schaeffer Engineering Ltd. (DSEL) has been retained by Wexford Developments to prepare a Site Servicing and Stormwater Management report in support of the application for a Site Plan Control at 910 March Road. The preceding report outlines the following:

- Based on boundary conditions provided by the City the existing municipal water infrastructure is capable of providing the proposed development with water within the City's required pressure range;
- The FUS method for estimating fire flow indicated **5,000 L/min** is required for the contemplated development,
- The contemplated development is anticipated to have a peak wet weather flow of **8.05 L/s**; Based on the **KNCDP-MSS** the future municipal sewer infrastructure has sufficient capacity to support the development;
- Based on **City staff**, the proposed development is **85.3 L/s** and **245.9 L/s** for the 2-year and 100-year storm events, respectively;
- It is proposed that stormwater objectives may be met through storm water retention via roof top, surface and subsurface storage, it is anticipated that **511.2 m<sup>3</sup>** of onsite storage will be required to attenuate flow to the established release rate above;
- Based on consultation with the MVCA, stormwater quality controls are required and will be provided via a Stormceptor OGS EF08;
- Any development on the subject property may require Ontario Water Resources Act (OWRA) s.53 approval from the Ministry of the Environment and Climate Change (MECP) stormwater discharge.

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

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



Per: Charlotte M. Kelly



Per: Adam D. Fobert, P.Eng

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



Per: Brandon N. Chow

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***APPENDIX A***

***Pre-Consultation***

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# DEVELOPMENT SERVICING STUDY CHECKLIST

17-962

22/06/2020

4.1 General Content		
<input type="checkbox"/>	Executive Summary (for larger reports only).	N/A
<input checked="" type="checkbox"/>	Date and revision number of the report.	Report Cover Sheet
<input checked="" type="checkbox"/>	Location map and plan showing municipal address, boundary, and layout of proposed development.	Drawings/Figures
<input checked="" type="checkbox"/>	Plan showing the site and location of all existing services.	Figure 1
<input checked="" type="checkbox"/>	Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.	Section 1.0
<input checked="" type="checkbox"/>	Summary of Pre-consultation Meetings with City and other approval agencies.	Section 1.3
<input checked="" type="checkbox"/>	Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defensible design criteria.	Section 2.1
<input checked="" type="checkbox"/>	Statement of objectives and servicing criteria.	Section 1.0
<input checked="" type="checkbox"/>	Identification of existing and proposed infrastructure available in the immediate area.	Sections 3.1, 4.1, 5.1
<input checked="" type="checkbox"/>	Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).	Section 1.0
<input checked="" type="checkbox"/>	Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.	Drawings/Figures
<input type="checkbox"/>	Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.	N/A
<input checked="" type="checkbox"/>	Proposed phasing of the development, if applicable.	Section 1.0
<input type="checkbox"/>	Reference to geotechnical studies and recommendations concerning servicing.	N/A
<input checked="" type="checkbox"/>	All preliminary and formal site plan submissions should have the following information: -Metric scale -North arrow (including construction North) -Key plan -Name and contact information of applicant and property owner -Property limits including bearings and dimensions -Existing and proposed structures and parking areas -Easements, road widening and rights-of-way -Adjacent street names	N/A
4.2 Development Servicing Report: Water		
<input type="checkbox"/>	Confirm consistency with Master Servicing Study, if available	N/A
<input checked="" type="checkbox"/>	Availability of public infrastructure to service proposed development	Section 3.1
<input checked="" type="checkbox"/>	Identification of system constraints	Section 3.1
<input checked="" type="checkbox"/>	Identify boundary conditions	Section 3.1, 3.2
<input checked="" type="checkbox"/>	Confirmation of adequate domestic supply and pressure	Section 3.3

<input checked="" type="checkbox"/>	Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter’s Survey. Output should show available fire flow at locations throughout the development.	Section 3.2
<input type="checkbox"/>	Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.	N/A
<input type="checkbox"/>	Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design	N/A
<input type="checkbox"/>	Address reliability requirements such as appropriate location of shut-off valves	N/A
<input type="checkbox"/>	Check on the necessity of a pressure zone boundary modification	N/A
<input checked="" type="checkbox"/>	Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range	Section 3.2, 3.3
<input type="checkbox"/>	Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.	N/A
<input type="checkbox"/>	Description of off-site required feeder mains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.	N/A
<input checked="" type="checkbox"/>	Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Section 3.2
<input type="checkbox"/>	Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	N/A

**4.3 Development Servicing Report: Wastewater**

<input checked="" type="checkbox"/>	Summary of proposed design criteria (Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).	Section 4.2
<input checked="" type="checkbox"/>	Confirm consistency with Master Servicing Study and/or justifications for deviations.	Section 4.2
<input type="checkbox"/>	Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers.	N/A
<input checked="" type="checkbox"/>	Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Section 4.1
<input checked="" type="checkbox"/>	Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable)	Section 4.2
<input checked="" type="checkbox"/>	Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix ‘C’) format.	Section 4.2, Appendix C
<input checked="" type="checkbox"/>	Description of proposed sewer network including sewers, pumping stations, and forcemains.	Section 4.2
<input type="checkbox"/>	Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).	N/A

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

#### 4.4 Development Servicing Report: Stormwater Checklist

<input checked="" type="checkbox"/>	Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)	Section 5.1
<input checked="" type="checkbox"/>	Analysis of available capacity in existing public infrastructure.	Section 5.1, Appendix D
<input checked="" type="checkbox"/>	A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.	Drawings/Figures
<input checked="" type="checkbox"/>	Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.	Section 5.2
<input checked="" type="checkbox"/>	Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	Section 5.3
<input checked="" type="checkbox"/>	Description of the stormwater management concept with facility locations and descriptions with references and supporting information	Section 5.3
<input type="checkbox"/>	Set-back from private sewage disposal systems.	N/A
<input type="checkbox"/>	Watercourse and hazard lands setbacks.	N/A
<input type="checkbox"/>	Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	N/A
<input type="checkbox"/>	Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	N/A
<input checked="" type="checkbox"/>	Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).	Section 5.3
<input type="checkbox"/>	Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	N/A
<input checked="" type="checkbox"/>	Calculate pre and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.	Section 5.1, 5.3
<input type="checkbox"/>	Any proposed diversion of drainage catchment areas from one outlet to another.	N/A
<input type="checkbox"/>	Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.	N/A
<input type="checkbox"/>	If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100-year return period storm event.	N/A
<input type="checkbox"/>	Identification of potential impacts to receiving watercourses	N/A
<input type="checkbox"/>	Identification of municipal drains and related approval requirements.	N/A

<input checked="" type="checkbox"/>	Descriptions of how the conveyance and storage capacity will be achieved for the development.	Section 5.3
<input type="checkbox"/>	100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	N/A
<input type="checkbox"/>	Inclusion of hydraulic analysis including hydraulic grade line elevations.	N/A
<input checked="" type="checkbox"/>	Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Section 7.0
<input type="checkbox"/>	Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.	N/A
<input type="checkbox"/>	Identification of fill constraints related to floodplain and geotechnical investigation.	N/A

**4.5 Approval and Permit Requirements: Checklist**

<input checked="" type="checkbox"/>	Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement ct. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in the Act.	Section 1.2
<input type="checkbox"/>	Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.	N/A
<input type="checkbox"/>	Changes to Municipal Drains.	N/A
<input type="checkbox"/>	Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)	N/A

**4.6 Conclusion Checklist**

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

**910 March Road**  
**Pre-Consultation Meeting Minutes**

Location: Room 4103E, City Hall  
Date: December 16, 2019, 9 to 10am

<b>Attendee</b>	<b>Role</b>	<b>Organization</b>
Stream Shen	Planner	City of Ottawa
Julie Candow	Project Manager (Civil)	
Melanie Knight	Urban Designer	
Matthew Hayley	Planner (Environment)	
Mike Giampa	Project Manager (Transportation)	
Samantha Gatchene	Planning Assistant	
Matt Craig	Manager	MVCA
John Price	Engineer	
Jack Stirling	Consultant	Stirling Group
Michael Foley	Owner	Wexford Commercial Developments

**Comments from Applicant**

1. The applicant is proposing a commercial development with a gas bar with Tim Hortons (with drive-thru), two restaurant pads, and a home hardware or grocery store.
2. The applicant is proposing a signalized intersection on March Road to be jointly constructed with the Brigil subdivision across the street. Another right-in right-out entrance is also proposed south of the signalized intersection.
3. The applicant indicate they plan on tying into the proposed sanitary and watermain along March.

**Planning Comments**

1. This is a pre-consultation for a Major Zoning By-law Amendment and Site Plan Control application, Complex, subject to Public Consultation. Application form, timeline and fees can be found [here](#).
2. Please provide an internal walkway system connecting the site to the existing sidewalk along March Road.

3. Please oriented restaurant 1 to front March Road.
4. Please include landscaped islands and trees within the parking lot area.
5. Cash-in-lieu of parkland and associated appraisal fee will be required as a condition of approval as per the [Parkland Dedication Bylaw](#).
6. Please consult with the Ward Councillor prior to submission.

### Engineering Comments

1. The Stormwater Management Criteria for the subject site is to be based on the following:
  - i. The post-development release rate is to be controlled to the pre-development release rate for all storms (2-yr up to 100-yr). The pre-development release rate shall be calculated using:
    - a. The IDF information derived from the Meteorological Services of Canada rainfall data, taken from the MacDonald Cartier Airport, collected 1966 to 1997.
    - b. The pre-development runoff coefficient or a maximum equivalent 'C' of 0.5, whichever is less.
    - c. The pre-development time of concentration or a minimum 'Tc' of 10 minutes, whichever is higher.
  - ii. Onsite storm runoff, in excess of the allowable release rate, must be detained on site up to the 100-yr storm.
2. Contact the Mississippi Valley Conservation Authority (MVCA) for quality control requirements. Please include correspondence from the MVCA in the stormwater management report.
3. The subject property has been included in the overall sanitary sewer drainage area plan associated with the 600mm diameter trunk sanitary sewer to be constructed on March Road from Shirley's Brook Drive north to the future Street 1 to service the Kanata North Urban Expansion Area. The sanitary sewer release rate shall be restricted to the allocations set in the above noted sanitary sewer drainage area plan and associated sanitary sewer design sheet. Construction of the 600mm diameter trunk sanitary sewer is anticipated to be complete at the end of the 2021 construction season. It is encouraged to combine construction efforts when developing the subject site to limit road cuts on March Road.
4. To service the Kanata North Urban Expansion area, a 400mm diameter watermain will also be extended up March Road from Maxwell Bridge Road to future Street 1. The subject site can connect to this future watermain. Construction of the 400mm watermain is anticipated to be complete at the end of the 2021 construction season. It is encouraged to combine construction efforts when developing the subject site to limit road cuts on March Road.

5. Water Boundary condition requests must include the location of the service and the expected loads required by the proposed development. Please provide the following information:
  - i. Location of service
  - ii. Type of development and the amount of fire flow required (as per FUS, 1999).
  - iii. Average daily demand: \_\_\_ l/s.
  - iv. Maximum daily demand: \_\_\_ l/s.
  - v. Maximum hourly daily demand: \_\_\_ l/s.
6. An MECP Environmental Compliance Approval (direct submission) will be required due to the proposed minor and major storm outlet to the existing Shirley's Brook tributary.
7. Phase 1 ESAs and Phase 2 ESAs must conform to clause 4.8.4 of the Official Plan that requires that development applications conform to Ontario Regulation 153/04.

#### Transportation Comments

1. Follow Traffic Impact Assessment Guidelines – Traffic Impact Assessment will be required.
  - a. Start this process immediately.
  - b. If a traffic signal is proposed on March Road, this will trigger a RMA.
    - i. Request base mapping as soon as possible. Contact Engineering Services (<https://ottawa.ca/en/city-hall/planning-and-development/engineering-services>)
  - c. Applicant advised that their application will not be deemed complete until the submission of the draft step 1-4, including the functional draft RMA package
2. Please complete a stationary noise study.
3. The developer will be responsible for the construction and maintenance cost (if not warranted) of the intersection.

#### MVCA Comment

1. Please provide enhanced quality treatment (80% TSS removal)

#### Environment Comments

- An EIS is required due to the presence of Blanding's turtle habitat. It will need to address the setback to the watercourses.

- Needs to address setbacks, City policy for watercourse setbacks is 15 m from top of bank/30 m from normal highwater mark.
  - Blanding's turtle - permit required, Blanding's turtle category 2 and 3 habitat is present on the site.
- TCR - needed and can be combined with the EIS

Please refer to the links to "[Guide to preparing studies and plans](#)" and [fees](#) for general information. Additional information is available related to [building permits, development charges, and the Accessibility Design Standards](#). Be aware that other fees and permits may be required, outside of the development review process. You may obtain background drawings by contacting [informationcentre@ottawa.ca](mailto:informationcentre@ottawa.ca).

These pre-con comments are valid for one year. If you submit a development application(s) after this time, you may be required to meet for another pre-consultation meeting and/or the submission requirements may change. You are as well encouraged to contact us for a follow-up meeting if the plan/concept will be further refined.

Please contact me at [stream.shen@ottawa.ca](mailto:stream.shen@ottawa.ca) or at 613-580-2424 extension 24488 if you have any questions.

Sincerely,



Stream Shen MCIP RPP  
Planner II  
Development Review - West



## Charlotte Kelly

---

**From:** Candow, Julie <julie.candow@ottawa.ca>  
**Sent:** May 22, 2020 11:55 AM  
**To:** Charlotte Kelly  
**Cc:** Brandon Chow  
**Subject:** RE: 910 March Road - Boundary Condition Request  
**Attachments:** 910 March Road\_Boundary Conditions\_21May2020.docx

Hi Charlotte,

See attached boundary conditions.

**Julie Candow, P.Eng.**

Project Manager - Infrastructure Approvals

City of Ottawa

Development Review - West Branch

Tel: 613-580-2424 x 13850

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**From:** Charlotte Kelly <CKelly@dsel.ca>  
**Sent:** May 08, 2020 12:07 PM  
**To:** Candow, Julie <julie.candow@ottawa.ca>  
**Cc:** Brandon Chow <BChow@dsel.ca>  
**Subject:** 910 March Road - Boundary Condition Request

**CAUTION: This email originated from an External Sender. Please do not click links or open attachments unless you recognize the source.**

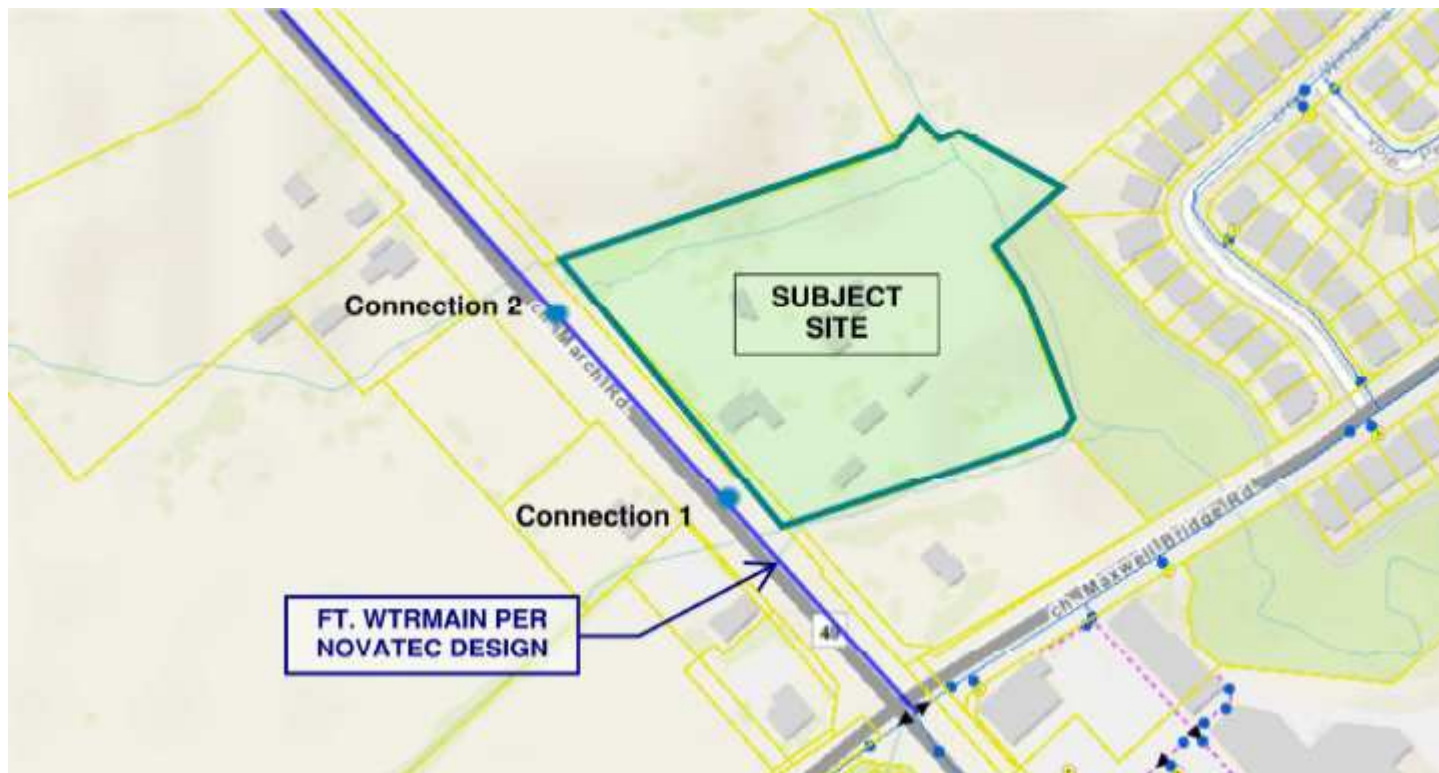
**ATTENTION : Ce courriel provient d'un expéditeur externe. Ne cliquez sur aucun lien et n'ouvrez pas de pièce jointe, excepté si vous connaissez l'expéditeur.**

Good afternoon Julie,

We would like to kindly request boundary conditions for the contemplated development at 910 March Road using the following proposed development demands:

1. Location of Service / Street Number: 910 March Road
2. Type of development and the amount of fire flow required for the contemplated development:
  - Type of development: The contemplated development includes four commercial buildings based on the concept plan attached.
  - The development is contemplated to consist of **744 m<sup>2</sup> of restaurant space** and **2,131 m<sup>2</sup>** of commercial space serviced via an internal looped watermain.
  - Contemplated Connections:
    - Connection 1 to future 406 mm diameter watermain within March Road.
    - Connection 2 to future 406 mm diameter watermain within March Road.
  - Fire demand based on Technical Bulletin ISTB-2018-02 has been used to estimate a max fire demand of **5,000 L/min**. Refer to the attached for detailed calculations.

Demand	L/min	L/s
<b>Avg. Daily</b>	10.6	0.18
<b>Max Day</b>	16.0	0.27
<b>Peak Hour</b>	28.7	0.48



Please let me know if you have any questions.

Thank-you,

Charlotte Kelly, E.I.T.  
Junior Engineering Designer

## **DSEL**

**david schaeffer engineering ltd.**

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

**phone:** (613) 836-0856 ext.511

**email:** [ckelly@dssel.ca](mailto:ckelly@dssel.ca)

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## Charlotte Kelly

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**From:** Erica Ogden <eogden@mvc.on.ca>  
**Sent:** May 19, 2020 11:20 AM  
**To:** Charlotte Kelly  
**Cc:** Matt Craig  
**Subject:** RE: Quality Control Requirements - 910 March Road  
**Attachments:** 910 March Road Map.pdf

Hello Charlotte,

Thank you for your e-mail. Matt has asked me to review the proposed Site Plan for the commercial development of 910 March Road.

The subject property is regulated by MVCA under Ontario Regulation 153/06 and is surrounded by the Tributaries of Shirley's Brook. Attached is a map of the regulated area on the subject property including the 1:100 year floodplain. As the stormwater for the proposed commercial development will outlet directly to Shirley's Brook, an enhanced level of water quality treatment (80% long-term TSS removal) is required.

The City requires a setback of 15 metres from the top of bank of a watercourse or 30 metres from the normal highwater mark, whichever is greater.

The subject property is located immediately adjacent to the Kanata North Community Design Plan. For this area, extensive work has been completed to develop an Environmental Management Plan and Master Servicing Strategy. While the subject property is not within the Kanata North Community Design Plan area, the mitigation and protection measures outlined for the Tributaries of Shirley's Brook would be beneficial to take into consideration.

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

Thank you,

**Erica C. Ogden, MCIP, RPP | Environmental Planner | Mississippi Valley Conservation Authority**  
10970 Highway 7, Carleton Place, ON K7C 3P1  
[www.mvc.on.ca](http://www.mvc.on.ca) | t. 613 253 0006 ext. 229 | f. 613 253 0122 | [eogden@mvc.on.ca](mailto:eogden@mvc.on.ca)

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**From:** Charlotte Kelly <[CKelly@dsel.ca](mailto:CKelly@dsel.ca)>  
**Sent:** May 8, 2020 4:53 PM  
**To:** Matt Craig <[mcraig@mvc.on.ca](mailto:mcraig@mvc.on.ca)>  
**Subject:** Quality Control Requirements - 910 March Road

Good Afternoon Matt,

We wanted to touch base with you regarding a development at 910 March Road.

The existing site conditions consists of mainly landscaped areas with several small structures (Houses, workshops, sheds ect.) as demonstrated in **Figure 1**, below.

The development involves the construction of a commercial complex with above ground parking areas as shown in the attached contemplated Site Plan. Based on the information available, the development contemplates discharging stormwater directly to Shirley's Brook.

We anticipate that quality controls will be required as the development proposes to outlet stormwater directly into Shirley's Brook. Can you please review and provide recommendations?

Please feel free to contact me to discuss.



Figure 1: Existing Site Limits

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

**phone:** (613) 836-0856 ext.511

**email:** [ckelly@dsel.ca](mailto:ckelly@dsel.ca)

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***APPENDIX B***

***Water Supply***

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



**Institutional / Commercial / Industrial Demand**

Property Type	Unit Rate	Units	Avg. Daily		Max Day		Peak Hour	
			m <sup>3</sup> /d	L/min	m <sup>3</sup> /d	L/min	m <sup>3</sup> /d	L/min
Hardware Store	2.5 L/m <sup>2</sup> /d	1,836	4.59	3.2	6.9	4.8	12.4	8.6
Restaurant 1 *	125 L/9.3m <sup>2</sup> /d	218	2.93	2.0	4.4	3.1	7.9	5.5
Bank	2.5 L/m <sup>2</sup> /d	416	1.04	0.7	1.6	1.1	2.8	2.0
Tim Hortans *	125 L/9.3m <sup>2</sup> /d	191	2.57	1.8	3.9	2.7	6.9	4.8
Gas Station	2.5 L/m <sup>2</sup> /d	249	0.62	0.4	0.9	0.6	1.7	1.2
<b>Total I/CI Demand</b>			<b>11.8</b>	<b>8.2</b>	<b>17.6</b>	<b>12.2</b>	<b>31.7</b>	<b>22.0</b>
<b>Total Demand</b>			<b>11.8</b>	<b>8.2</b>	<b>17.6</b>	<b>12.2</b>	<b>31.7</b>	<b>22.0</b>

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

## Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999



### Fire Flow Required

#### 1. Base Requirement

$$F = 220C\sqrt{A}$$

L/min

Where *F* is the fire flow, *C* is the Type of construction and *A* is the Total floor area

Type of Construction:

Non-Combustible Construction

**C** 0.8 Type of Construction Coefficient per FUS Part II, Section 1  
**A** 219.2 m<sup>2</sup> Total floor area based on FUS Part II section 1

**Fire Flow** 2605.6 L/min  
**3000.0 L/min** rounded to the nearest 1,000 L/min

### Adjustments

#### 2. Reduction for Occupancy Type

Combustible 0%

**Fire Flow** 3000.0 L/min

#### 3. Reduction for Sprinkler Protection

Sprinklered - Supervised -50%

**Reduction** -1500 L/min

#### 4. Increase for Separation Distance

Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC	
<b>N</b> Wood Frame	>45m	0	0	0	0	0%
<b>S</b> Wood Frame	>45m	15	1	15	0%	
<b>E</b> Non-Combustible	>45m	20	1	20	0%	
<b>W</b> Non-Combustible	>45m	30	4	120	0%	
<b>% Increase</b>						<b>0%</b> value not to exceed 75%

**Increase** 0.0 L/min

Lw = Length of the Exposed Wall

Ha = number of storeys of the adjacent structure. Max 5 stories

LH = Length-height factor of exposed wall. Value rounded up.

EC = Exposure Charge

### Total Fire Flow

**Fire Flow** 2000.0 L/min fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4  
**2000.0 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 Underwriters Survey - Part II

## Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999



### Fire Flow Required

#### 1. Base Requirement

$$F = 220C\sqrt{A}$$

L/min

Where *F* is the fire flow, *C* is the Type of construction and *A* is the Total floor area

Type of Construction:

Non-Combustible Construction

**C** 0.8 Type of Construction Coefficient per FUS Part II, Section 1  
**A** 440.1 m<sup>2</sup> Total floor area based on FUS Part II section 1

**Fire Flow** 3692.3 L/min  
**4000.0 L/min** rounded to the nearest 1,000 L/min

### Adjustments

#### 2. Reduction for Occupancy Type

Combustible 0%

**Fire Flow** 4000.0 L/min

#### 3. Reduction for Sprinkler Protection

Sprinklered - Supervised -50%

**Reduction** -2000 L/min

#### 4. Increase for Separation Distance

Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC	
<b>N</b> Wood Frame	>45m	0	0	0	0	0%
<b>S</b> Wood Frame	>45m	0	1	0	0	0%
<b>E</b> Non-Combustible	>45m	0	1	0	0	0%
<b>W</b> Wood Frame	20.1m-30m	30	1	30	30	8%
	<b>% Increase</b>					<b>8%</b> value not to exceed 75%

**Increase** 320.0 L/min

Lw = Length of the Exposed Wall

Ha = number of storeys of the adjacent structure. Max 5 stories

LH = Length-height factor of exposed wall. Value rounded up.

EC = Exposure Charge

### Total Fire Flow

**Fire Flow** 2320.0 L/min fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4  
**2000.0 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 Underwriters Survey - Part II

**Fire Flow Estimation per Fire Underwriters Survey**

Water Supply For Public Fire Protection - 1999



**Fire Flow Required**

**1. Base Requirement**

$$F = 220C\sqrt{A}$$

L/min

Where *F* is the fire flow, *C* is the Type of construction and *A* is the Total floor area

Type of Construction:

Non-Combustible Construction

**C** 0.8 Type of Construction Coefficient per FUS Part II, Section 1  
**A** 416.4 m<sup>2</sup> Total floor area based on FUS Part II section 1

**Fire Flow** 3591.6 L/min  
**4000.0 L/min** rounded to the nearest 1,000 L/min

**Adjustments**

**2. Reduction for Occupancy Type**

Combustible 0%

**Fire Flow** 4000.0 L/min

**3. Reduction for Sprinkler Protection**

Sprinklered - Supervised -50%

**Reduction** -2000 L/min

**4. Increase for Separation Distance**

Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC	
<b>N</b> Wood Frame	>45m	0	0	0	0	0%
<b>S</b> Wood Frame	10.1m-20m	25	1	25	12%	
<b>E</b> Non-Combustible	>45m	0	0	0	0	0%
<b>W</b> Wood Frame	>45m	0	0	0	0	0%
<b>% Increase</b>						<b>12%</b> value not to exceed 75%

**Increase** 480.0 L/min

Lw = Length of the Exposed Wall  
 Ha = number of storeys of the adjacent structure. Max 5 stories  
 LH = Length-height factor of exposed wall. Value rounded up.  
 EC = Exposure Charge

**Total Fire Flow**

**Fire Flow** 2480.0 L/min fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4  
**2000.0 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 Underwriters Survey - Part II

## Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999



### Fire Flow Required

#### 1. Base Requirement

$$F = 220C\sqrt{A}$$

L/min

Where *F* is the fire flow, *C* is the Type of construction and *A* is the Total floor area

Type of Construction:

Non-Combustible Construction

**C** 0.8 Type of Construction Coefficient per FUS Part II, Section 1  
**A** 1835.6 m<sup>2</sup> Total floor area based on FUS Part II section 1

**Fire Flow** 7540.6 L/min  
**8000.0 L/min** rounded to the nearest 1,000 L/min

### Adjustments

#### 2. Reduction for Occupancy Type

Combustible 0%

**Fire Flow** 8000.0 L/min

#### 3. Reduction for Sprinkler Protection

Sprinklered - Supervised -50%

**Reduction** -4000 L/min

#### 4. Increase for Separation Distance

Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC	
<b>N</b> Non-Combustible	10.1m-20m	25	1	25	12%	
<b>S</b> Wood Frame	>45m	0	0	0	0%	
<b>E</b> Non-Combustible	>45m	0	0	0	0%	
<b>W</b> Wood Frame	>45m	0	0	0	0%	
	<b>% Increase</b>				<b>12%</b>	value not to exceed 75%

**Increase** 960.0 L/min

Lw = Length of the Exposed Wall

Ha = number of storeys of the adjacent structure. Max 5 stories

LH = Length-height factor of exposed wall. Value rounded up.

EC = Exposure Charge

### Total Fire Flow

**Fire Flow** 4960.0 L/min fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4  
**5000.0 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 Underwriters Survey - Part II

## Boundary Conditions Unit Conversion

March Road Connection 1  
Grnd Elev 78.9

	<b>Head (m)</b>	<b>m H<sub>2</sub>O</b>	<b>PSI</b>	<b>kPa</b>
Avg. Day	<b>131.2</b>	52.3	74.4	513.1
Peak Hour	<b>127</b>	48.1	68.4	471.9
Max Day + FF	<b>126.9</b>	48	68.3	470.9

March Road Connection 2  
Grnd Elev 78.9

	<b>Head (m)</b>	<b>m H<sub>2</sub>O</b>	<b>PSI</b>	<b>kPa</b>
Avg. Day	<b>131.2</b>	52.3	74.4	513.1
Peak Hour	<b>127</b>	48.1	68.4	471.9
Max Day + FF	<b>126.9</b>	48	68.3	470.9

### 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

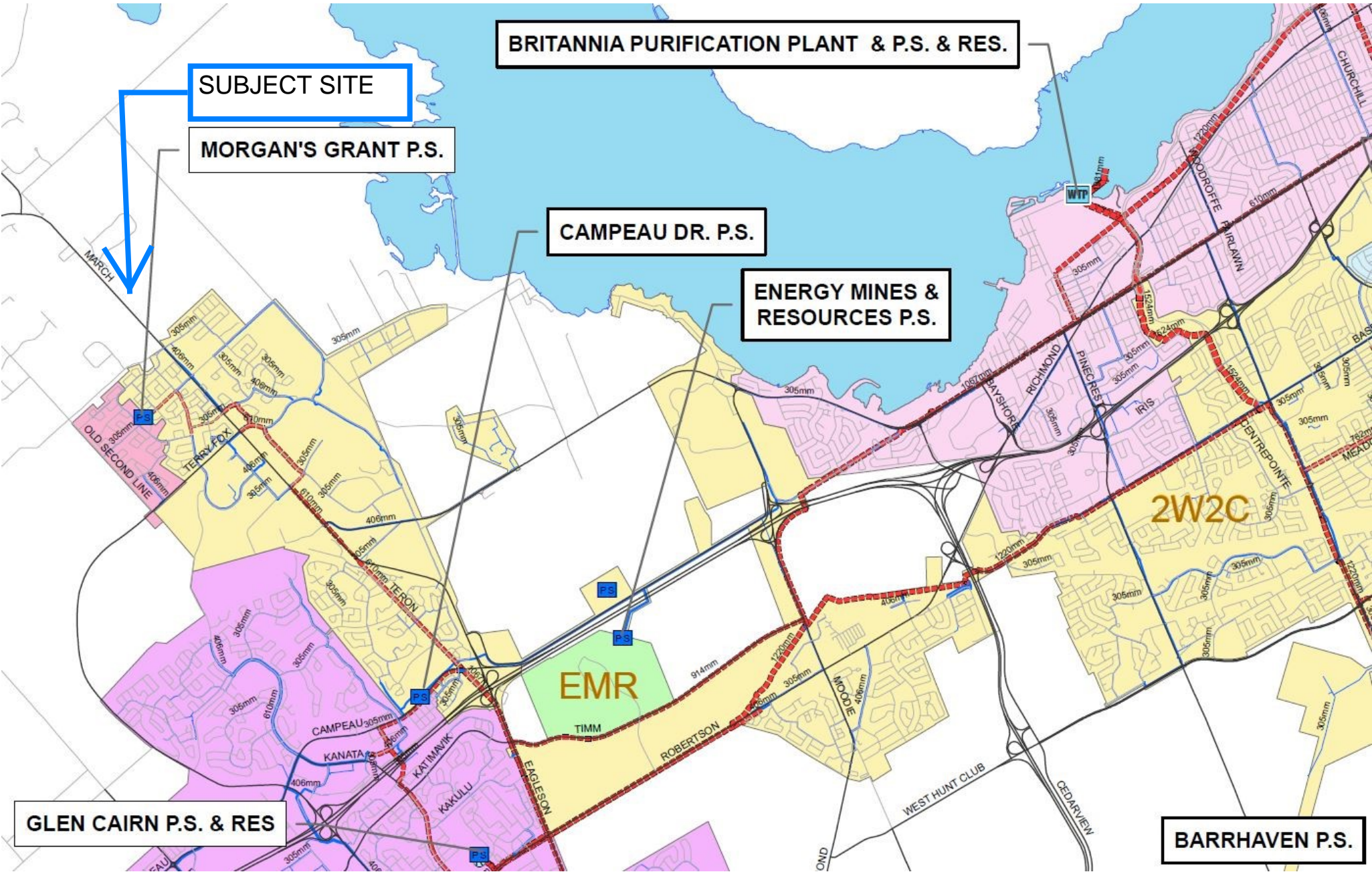
### Node Pressures

Kpa	Pressure (kPa)	Pressure (m H2O)
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)
3	539.9	467.3	498.7
4	537.8	389.4	496.6
5	552.3	404.9	511.1
Bank	556.2	408.8	515.0
FH	548.4	375.9	507.2
GasStationTims	538.6	390.1	497.4
Hardware	556.3	408.9	515.1
Rest1	535.1	462.4	493.8







BRITANNIA PURIFICATION PLANT & P.S. & RES.

SUBJECT SITE

MORGAN'S GRANT P.S.

CAMPEAU DR. P.S.

ENERGY MINES & RESOURCES P.S.

GLEN CAIRN P.S. & RES

BARRHAVEN P.S.

EMR

2W2C



# AVERAGE DAY DEMAND INPUT FILE EPANET 910 MARCH ROAD

[TITLE]

[JUNCTIONS]

;ID	Elev	Demand	Pattern
3	76.16	0	
4	76.38	0	
5	74.90	0	
FH	75.3	0	
Bank	74.50	0.7	
Hardware	74.49	3.2	
Rest1	76.65	2	
GasStationTims	76.30	2.2	

[RESERVOIRS]

;ID	Head	Pattern
1	131.2	
2	131.2	

[TANKS]

;ID	Diameter	Elevation MinVol	InitLevel VolCurve	MinLevel	MaxLevel
-----	----------	---------------------	-----------------------	----------	----------

[PIPES]

;ID	Diameter	Node1 Roughness	MinorLoss	Node2	Status	Length
1	150	100	4.2	3	Open	20.4
2	150	100	.8	4	Open	96.78
6	150	100	2.4	FH	Open	20.6
7	150	100	2.2	5	Open	45.3
8	50	Rest1 100	2.8	3	Open	30.7
9	50	4 100	2.4	GasStationTims	Open	9.4
11	50	5 100	2.8	Bank	Open	9.8
12	150	5 100	3.2	Hardware	Open	33.4
13	150	5 100	5.6	2	Open	206

[PUMPS]

;ID	Node1	Node2	Parameters
-----	-------	-------	------------

[VALVES]

;ID	Node1	Node2	Diameter
-----	-------	-------	----------

	Type	Setting	MinorLoss	
[TAGS]				
[DEMANDS]				
;Junction		Demand	Pattern	Category
[STATUS]				
;ID		Status/Setting		
[PATTERNS]				
;ID		Multipliers		
[CURVES]				
;ID		X-Value	Y-Value	
[CONTROLS]				
[RULES]				
[ENERGY]				
Global Efficiency		75		
Global Price		0		
Demand Charge		0		
[EMITTERS]				
;Junction		Coefficient		
[QUALITY]				
;Node		InitQual		
[SOURCES]				
;Node		Type	Quality	Pattern
[REACTIONS]				
;Type		Pipe/Tank	Coefficient	
[REACTIONS]				
Order Bulk		1		
Order Tank		1		
Order Wall		1		
Global Bulk		0		
Global Wall		0		
Limiting Potential		0		
Roughness Correlation		0		
[MIXING]				
;Tank		Model		

[TIMES]

Duration	0
Hydraulic Timestep	1:00
Quality Timestep	0:05
Pattern Timestep	1:00
Pattern Start	0:00
Report Timestep	1:00
Report Start	0:00
Start ClockTime	12 am
Statistic	None

[REPORT]

Status	No
Summary	No
Page	0

[OPTIONS]

Units	LPM
Headloss	H-W
Specific Gravity	1
Viscosity	1
Trials	40
Accuracy	0.001
CHECKFREQ	2
MAXCHECK	10
DAMPLIMIT	0
Unbalanced	Continue 10
Pattern	1
Demand Multiplier	1.0
Emitter Exponent	0.5
Quality	None mg/L
Diffusivity	1
Tolerance	0.01

[COORDINATES]

;Node	X-Coord	Y-Coord
3	9651.36	2261.90
4	10790.82	6258.50
5	13273.81	9200.68
FH	11590.14	7193.88
Bank	14124.15	9285.71
Hardware	13307.82	9880.95
Rest1	10926.87	2278.91
GasStationTims	9600.34	6241.50
1	9617.35	1598.64
2	144.56	1530.61

[VERTICES]

;Link	X-Coord	Y-Coord
2	9651.36	4336.73

13	1675.17	9013.61
13	1011.90	8231.29
13	1096.94	6989.80
13	178.57	5357.14

[LABELS]

;X-Coord	Y-Coord	Label & Anchor Node
2917.43	1688.07	"Average Day = 131.2m"
2917.43	1247.71	"Peak Hour = 127m"
2917.43	807.34	"Max Day + Fire Flow = 126.9m"

[BACKDROP]

DIMENSIONS	0.00	0.00	10000.00
10000.00			
UNITS	None		
FILE			
OFFSET	0.00	0.00	

[END]

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

Input File: 910-March-Average-day.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	1	3	20.4	150
2	3	4	96.78	150
6	4	FH	20.6	150
7	FH	5	45.3	150
8	Rest1	3	30.7	50
9	4	GasStationTims	9.4	50
11	5	Bank	9.8	50
12	5	Hardware	33.4	150
13	5	2	206	150

Node Results:

Node ID	Demand LPM	Head m	Pressure m	Quality
3	0.00	131.20	55.04	0.00
4	0.00	131.20	54.82	0.00
5	0.00	131.20	56.30	0.00
FH	0.00	131.20	55.90	0.00
Bank	0.70	131.20	56.70	0.00
Hardware	3.20	131.20	56.71	0.00
Rest1	2.00	131.20	54.55	0.00
GasStationTims	2.20	131.20	54.90	0.00
1	-5.22	131.20	0.00	0.00 Reservoir
2	-2.88	131.20	0.00	0.00 Reservoir

Link Results:

Link ID	Flow LPM	Velocity m/s	Headloss m/km	Status
1	5.22	0.00	0.00	Open
2	3.22	0.00	0.00	Open

6	1.02	0.00	0.00	Open
7	1.02	0.00	0.00	Open
8	-2.00	0.02	0.02	Open
9	2.20	0.02	0.03	Open



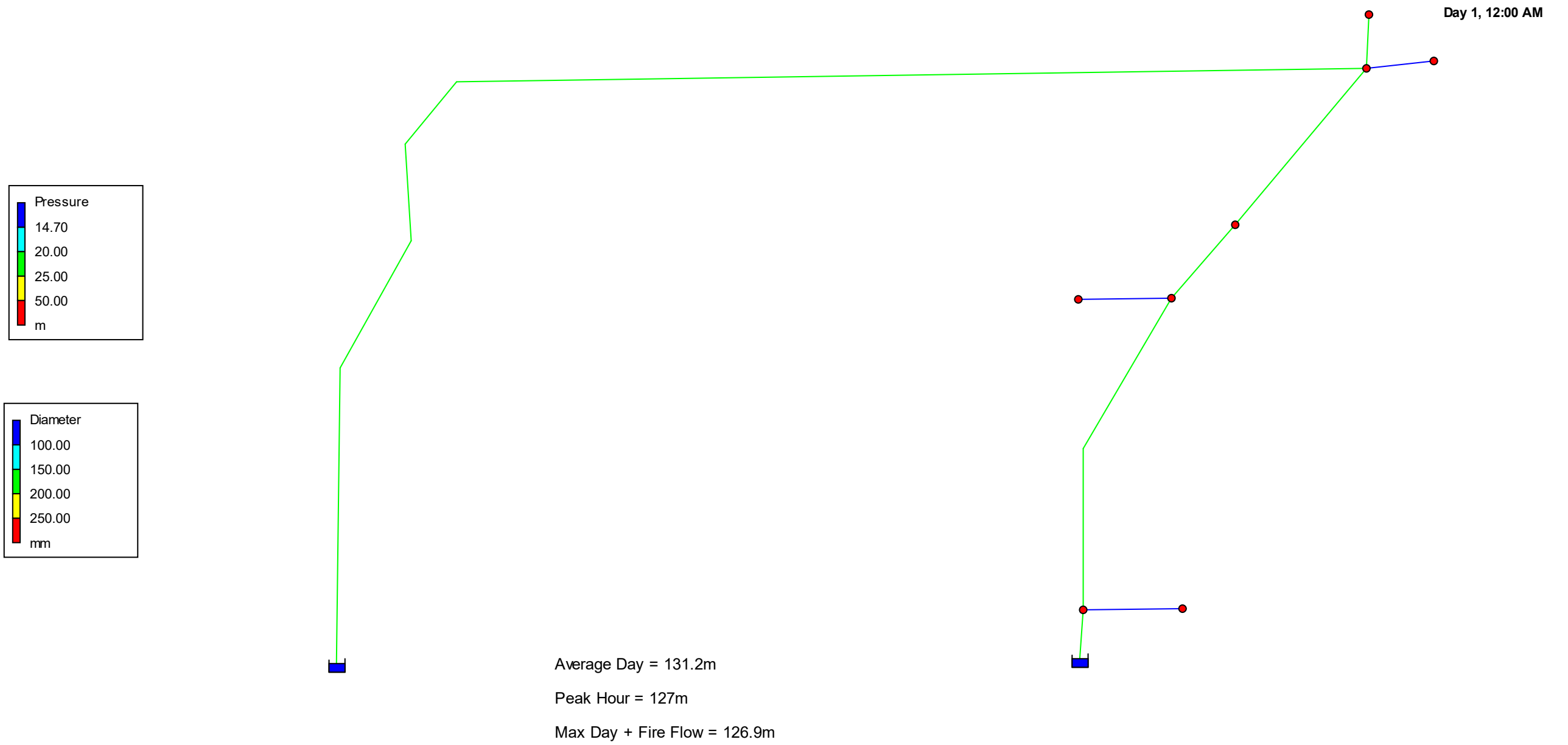
Page 2

Link Results: (continued)

Link ID	Flow LPM	Velocity m/s	Unit Headloss m/km	Status
11	0.70	0.01	0.00	Open
12	3.20	0.00	0.00	Open
13	-2.88	0.00	0.00	Open



# 910 March Road - Average Day Demand





**MAX DAY + FF DEMAND  
INPUT FILE EPANET  
910 MARCH ROAD**

[TITLE]

[JUNCTIONS]

;ID	Elev	Demand	Pattern
3	76.16	0	
4	76.38	0	
5	74.90	0	
FH	75.3	5000	
Bank	74.50	1.1	
Hardware	74.49	4.8	
Rest1	76.65	3.1	
GasStationTims	76.30	3.3	

[RESERVOIRS]

;ID	Head	Pattern
1	126.9	
2	126.9	

[TANKS]

;ID	Diameter	Elevation MinVol	InitLevel VolCurve	MinLevel	MaxLevel
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[PIPES]

;ID	Diameter	Node1 Roughness	MinorLoss	Node2	Status	Length
1	150	100	4.2	3	Open	20.4
2	150	100	.8	4	Open	96.78
6	150	100	2.4	FH	Open	20.6
7	150	100	2.2	5	Open	45.3
8	50	Rest1 100	2.8	3	Open	30.7
9	50	4 100	2.4	GasStationTims	Open	9.4
11	50	5 100	2.8	Bank	Open	9.8
12	150	5 100	3.2	Hardware	Open	33.4
13	150	5 100	5.6	2	Open	206

[PUMPS]

;ID	Node1	Node2	Parameters
-----	-------	-------	------------

[VALVES]

;ID	Node1	Node2	Diameter
-----	-------	-------	----------

	Type	Setting	MinorLoss	
[TAGS]				
[DEMANDS]				
;Junction		Demand	Pattern	Category
[STATUS]				
;ID		Status/Setting		
[PATTERNS]				
;ID		Multipliers		
[CURVES]				
;ID		X-Value	Y-Value	
[CONTROLS]				
[RULES]				
[ENERGY]				
Global Efficiency		75		
Global Price		0		
Demand Charge		0		
[EMITTERS]				
;Junction		Coefficient		
[QUALITY]				
;Node		InitQual		
[SOURCES]				
;Node		Type	Quality	Pattern
[REACTIONS]				
;Type		Pipe/Tank	Coefficient	
[REACTIONS]				
Order Bulk		1		
Order Tank		1		
Order Wall		1		
Global Bulk		0		
Global Wall		0		
Limiting Potential		0		
Roughness Correlation		0		
[MIXING]				
;Tank		Model		

[TIMES]

Duration	0
Hydraulic Timestep	1:00
Quality Timestep	0:05
Pattern Timestep	1:00
Pattern Start	0:00
Report Timestep	1:00
Report Start	0:00
Start ClockTime	12 am
Statistic	None

[REPORT]

Status	No
Summary	No
Page	0

[OPTIONS]

Units	LPM
Headloss	H-W
Specific Gravity	1
Viscosity	1
Trials	40
Accuracy	0.001
CHECKFREQ	2
MAXCHECK	10
DAMPLIMIT	0
Unbalanced	Continue 10
Pattern	1
Demand Multiplier	1.0
Emitter Exponent	0.5
Quality	None mg/L
Diffusivity	1
Tolerance	0.01

[COORDINATES]

;Node	X-Coord	Y-Coord
3	9651.36	2261.90
4	10790.82	6258.50
5	13273.81	9200.68
FH	11590.14	7193.88
Bank	14124.15	9285.71
Hardware	13307.82	9880.95
Rest1	10926.87	2278.91
GasStationTims	9600.34	6241.50
1	9617.35	1598.64
2	144.56	1530.61

[VERTICES]

;Link	X-Coord	Y-Coord
2	9651.36	4336.73

13	1675.17	9013.61
13	1011.90	8231.29
13	1096.94	6989.80
13	178.57	5357.14

[LABELS]

;X-Coord	Y-Coord	Label & Anchor Node
2917.43	1688.07	"Average Day = 131.2m"
2917.43	1247.71	"Peak Hour = 127m"
2917.43	807.34	"MX Day + Fire Flow = 126.9m"

[BACKDROP]

DIMENSIONS	0.00	0.00	10000.00
10000.00			
UNITS	None		
FILE			
OFFSET	0.00	0.00	

[END]

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

Input File: 910-March-Fire-Flow.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	1	3	20.4	150
2	3	4	96.78	150
6	4	FH	20.6	150
7	FH	5	45.3	150
8	Rest1	3	30.7	50
9	4	GasStationTims	9.4	50
11	5	Bank	9.8	50
12	5	Hardware	33.4	150
13	5	2	206	150

Node Results:

Node ID	Demand LPM	Head m	Pressure m	Quality
3	0.00	123.79	47.63	0.00
4	0.00	116.07	39.69	0.00
5	0.00	116.17	41.27	0.00
FH	5000.00	113.62	38.32	0.00
Bank	1.10	116.17	41.67	0.00
Hardware	4.80	116.17	41.68	0.00
Rest1	3.10	123.79	47.14	0.00
GasStationTims	3.30	116.07	39.77	0.00
1	-2846.85	126.90	0.00	0.00 Reservoir
2	-2165.45	126.90	0.00	0.00 Reservoir

Link Results:

Link ID	Flow LPM	Velocity m/s	Headloss m/km	Status
1	2846.85	2.68	152.46	Open
2	2843.75	2.68	79.72	Open

6	2840.45	2.68	119.12	Open
7	-2159.55	2.04	56.33	Open
8	-3.10	0.03	0.06	Open
9	3.30	0.03	0.07	Open



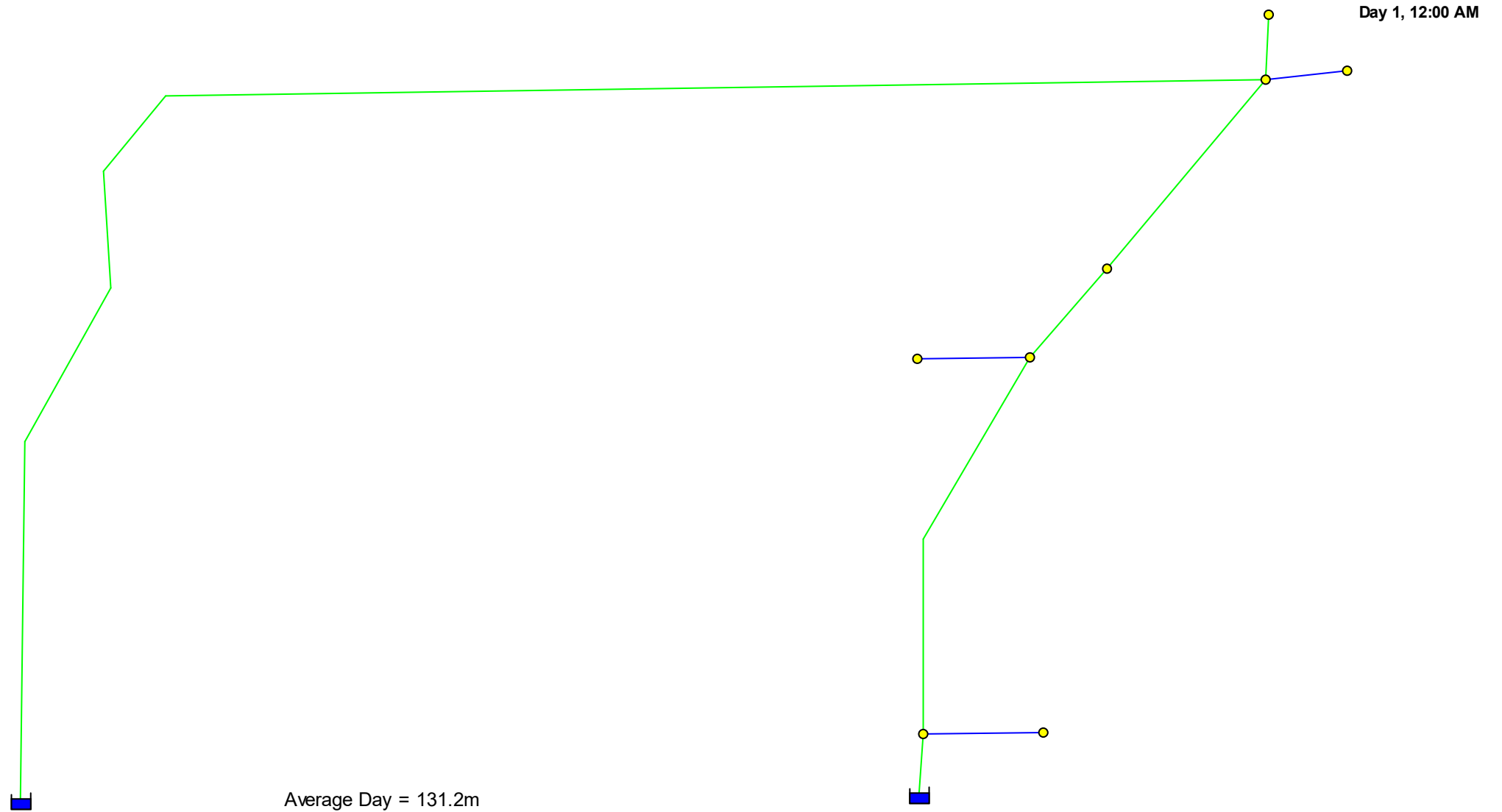
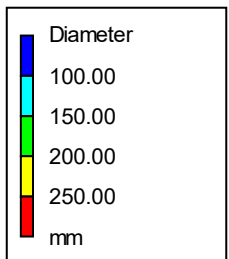
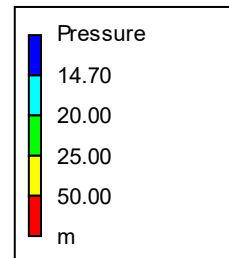
Page 2

Link Results: (continued)

Link ID	Flow LPM	Velocity m/s	Unit Headloss m/km	Status
11	1.10	0.01	0.01	Open
12	4.80	0.00	0.00	Open
13	-2165.45	2.04	52.08	Open



# 910 March Road - MAX DAY + FF Demand



Average Day = 131.2m

Peak Hour = 127m

MX Day + Fire Flow = 126.9m



# PEAK HPUR DEMAND INPUT FILE EPANET 910 MARCH ROAD

[TITLE]

[JUNCTIONS]

;ID	Elev	Demand	Pattern
3	76.16	0	
4	76.38	0	
5	74.90	0	
FH	75.3	0	
Bank	74.50	2.0	
Hardware	74.49	8.6	
Rest1	76.65	5.5	
GasStationTims	76.30	6	

[RESERVOIRS]

;ID	Head	Pattern
1	127	
2	127	

[TANKS]

;ID	Diameter	Elevation MinVol	InitLevel VolCurve	MinLevel	MaxLevel
-----	----------	---------------------	-----------------------	----------	----------

[PIPES]

;ID	Diameter	Node1 Roughness	MinorLoss	Node2	Status	Length
1	150	100	4.2	3	Open	20.4
2	150	100	.8	4	Open	96.78
6	150	100	2.4	FH	Open	20.6
7	150	100	2.2	5	Open	45.3
8	50	Rest1 100	2.8	3	Open	30.7
9	50	4 100	2.4	GasStationTims	Open	9.4
11	50	5 100	2.8	Bank	Open	9.8
12	150	5 100	3.2	Hardware	Open	33.4
13	150	5 100	5.6	2	Open	206

[PUMPS]

;ID	Node1	Node2	Parameters
-----	-------	-------	------------

[VALVES]

;ID	Node1	Node2	Diameter
-----	-------	-------	----------

	Type	Setting	MinorLoss	
[TAGS]				
[DEMANDS]				
;Junction		Demand	Pattern	Category
[STATUS]				
;ID		Status/Setting		
[PATTERNS]				
;ID		Multipliers		
[CURVES]				
;ID		X-Value	Y-Value	
[CONTROLS]				
[RULES]				
[ENERGY]				
Global Efficiency		75		
Global Price		0		
Demand Charge		0		
[EMITTERS]				
;Junction		Coefficient		
[QUALITY]				
;Node		InitQual		
[SOURCES]				
;Node		Type	Quality	Pattern
[REACTIONS]				
;Type		Pipe/Tank	Coefficient	
[REACTIONS]				
Order Bulk		1		
Order Tank		1		
Order Wall		1		
Global Bulk		0		
Global Wall		0		
Limiting Potential		0		
Roughness Correlation		0		
[MIXING]				
;Tank		Model		

[TIMES]

Duration	0
Hydraulic Timestep	1:00
Quality Timestep	0:05
Pattern Timestep	1:00
Pattern Start	0:00
Report Timestep	1:00
Report Start	0:00
Start ClockTime	12 am
Statistic	None

[REPORT]

Status	No
Summary	No
Page	0

[OPTIONS]

Units	LPM
Headloss	H-W
Specific Gravity	1
Viscosity	1
Trials	40
Accuracy	0.001
CHECKFREQ	2
MAXCHECK	10
DAMPLIMIT	0
Unbalanced	Continue 10
Pattern	1
Demand Multiplier	1.0
Emitter Exponent	0.5
Quality	None mg/L
Diffusivity	1
Tolerance	0.01

[COORDINATES]

;Node	X-Coord	Y-Coord
3	9651.36	2261.90
4	10790.82	6258.50
5	13273.81	9200.68
FH	11590.14	7193.88
Bank	14124.15	9285.71
Hardware	13307.82	9880.95
Rest1	10926.87	2278.91
GasStationTims	9600.34	6241.50
1	9617.35	1598.64
2	144.56	1530.61

[VERTICES]

;Link	X-Coord	Y-Coord
2	9651.36	4336.73

13	1675.17	9013.61
13	1011.90	8231.29
13	1096.94	6989.80
13	178.57	5357.14

[LABELS]

;X-Coord	Y-Coord	Label & Anchor Node
2917.43	1688.07	"Average Day = 131.2m"
2917.43	1247.71	"Peak Hour = 127m"
2917.43	807.34	"Max Day + Fire Flow = 126.9m"

[BACKDROP]

DIMENSIONS	0.00	0.00	10000.00
10000.00			
UNITS	None		
FILE			
OFFSET	0.00	0.00	

[END]

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

Input File: 910-March-Peak-Hour.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	1	3	20.4	150
2	3	4	96.78	150
6	4	FH	20.6	150
7	FH	5	45.3	150
8	Rest1	3	30.7	50
9	4	GasStationTims	9.4	50
11	5	Bank	9.8	50
12	5	Hardware	33.4	150
13	5	2	206	150

Node Results:

Node ID	Demand LPM	Head m	Pressure m	Quality
3	0.00	127.00	50.84	0.00
4	0.00	127.00	50.62	0.00
5	0.00	127.00	52.10	0.00
FH	0.00	127.00	51.70	0.00
Bank	2.00	127.00	52.50	0.00
Hardware	8.60	127.00	52.51	0.00
Rest1	5.50	126.99	50.34	0.00
GasStationTims	6.00	127.00	50.70	0.00
1	-14.22	127.00	0.00	0.00 Reservoir
2	-7.88	127.00	0.00	0.00 Reservoir

Link Results:

Link ID	Flow LPM	Velocity m/s	Headloss m/km	Status
1	14.22	0.01	0.01	Open
2	8.72	0.01	0.00	Open

6	2.72	0.00	0.00	Open
7	2.72	0.00	0.00	Open
8	-5.50	0.05	0.16	Open
9	6.00	0.05	0.21	Open



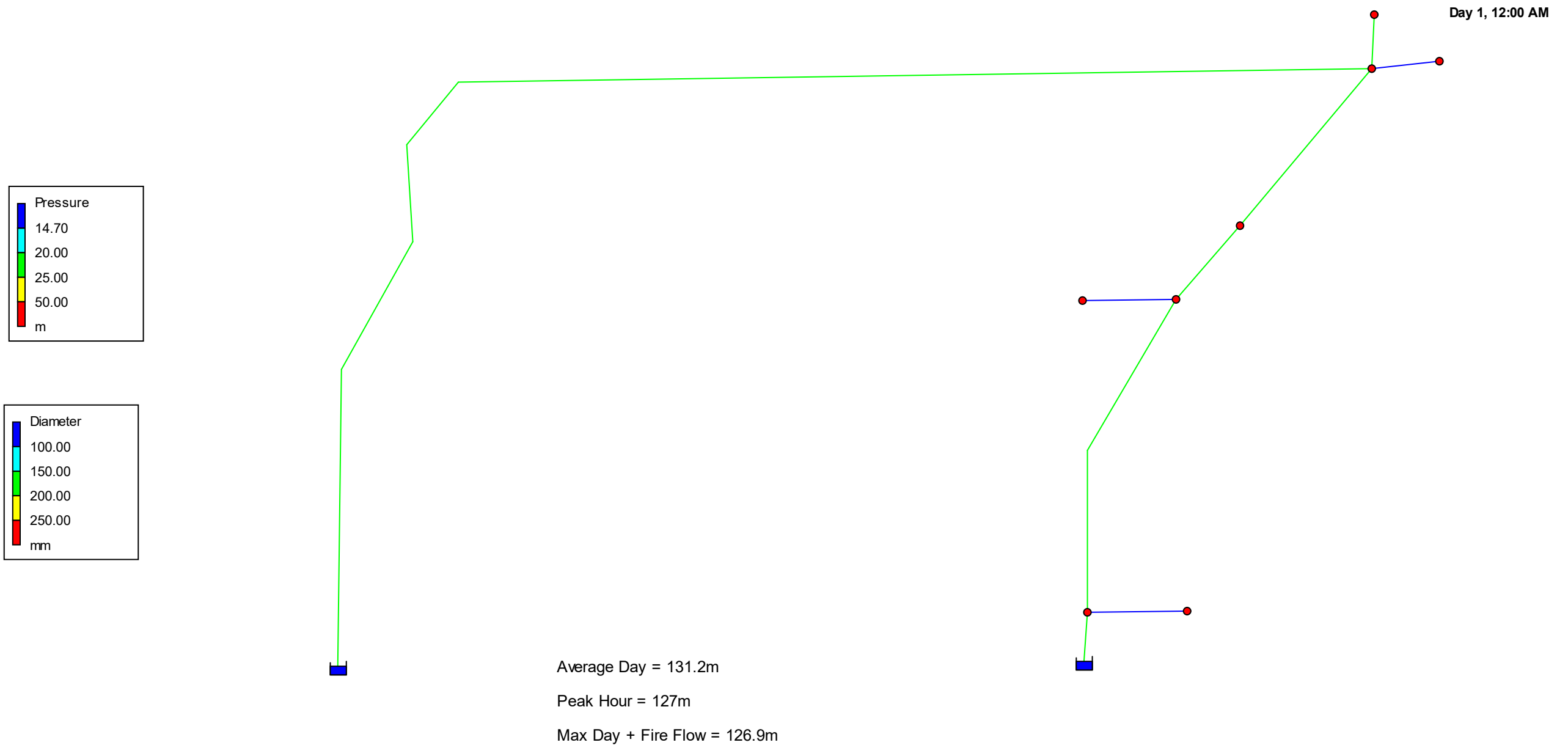
Page 2

Link Results: (continued)

Link ID	Flow LPM	Velocity m/s	Unit Headloss m/km	Status
11	2.00	0.02	0.03	Open
12	8.60	0.01	0.00	Open
13	-7.88	0.01	0.00	Open



# 910 March Road - Peak Hour Demand





## Boundary Conditions 910 March Road

### Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	11	0.18
Maximum Daily Demand	16	0.27
Peak Hour	29	0.48
Fire Flow Demand #1	5,000	83.33

### Location



### Results

#### Connection 1 – March Rd.

Demand Scenario	Head (m)	Pressure <sup>1</sup> (psi)
Maximum HGL	131.2	74.4
Peak Hour	127.0	68.5
Max Day plus Fire 1	126.9	68.3

<sup>1</sup> Ground Elevation = 78.9 m

**Connection 2 – March Rd.**

<b>Demand Scenario</b>	<b>Head (m)</b>	<b>Pressure<sup>1</sup> (psi)</b>
Maximum HGL	131.2	74.4
Peak Hour	127.0	68.5
Max Day plus Fire 1	126.9	68.3

<sup>1</sup> Ground Elevation = 78.9 m

**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.*

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***APPENDIX C***

***Wastewater Collection***

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



Site Area 1.647 ha

**Extraneous Flow Allowances**

Infiltration / Inflow (Dry)	0.08 L/s
Infiltration / Inflow (Wet)	0.46 L/s
Infiltration / Inflow (Total)	0.54 L/s

**Institutional / Commercial / Industrial Contributions**

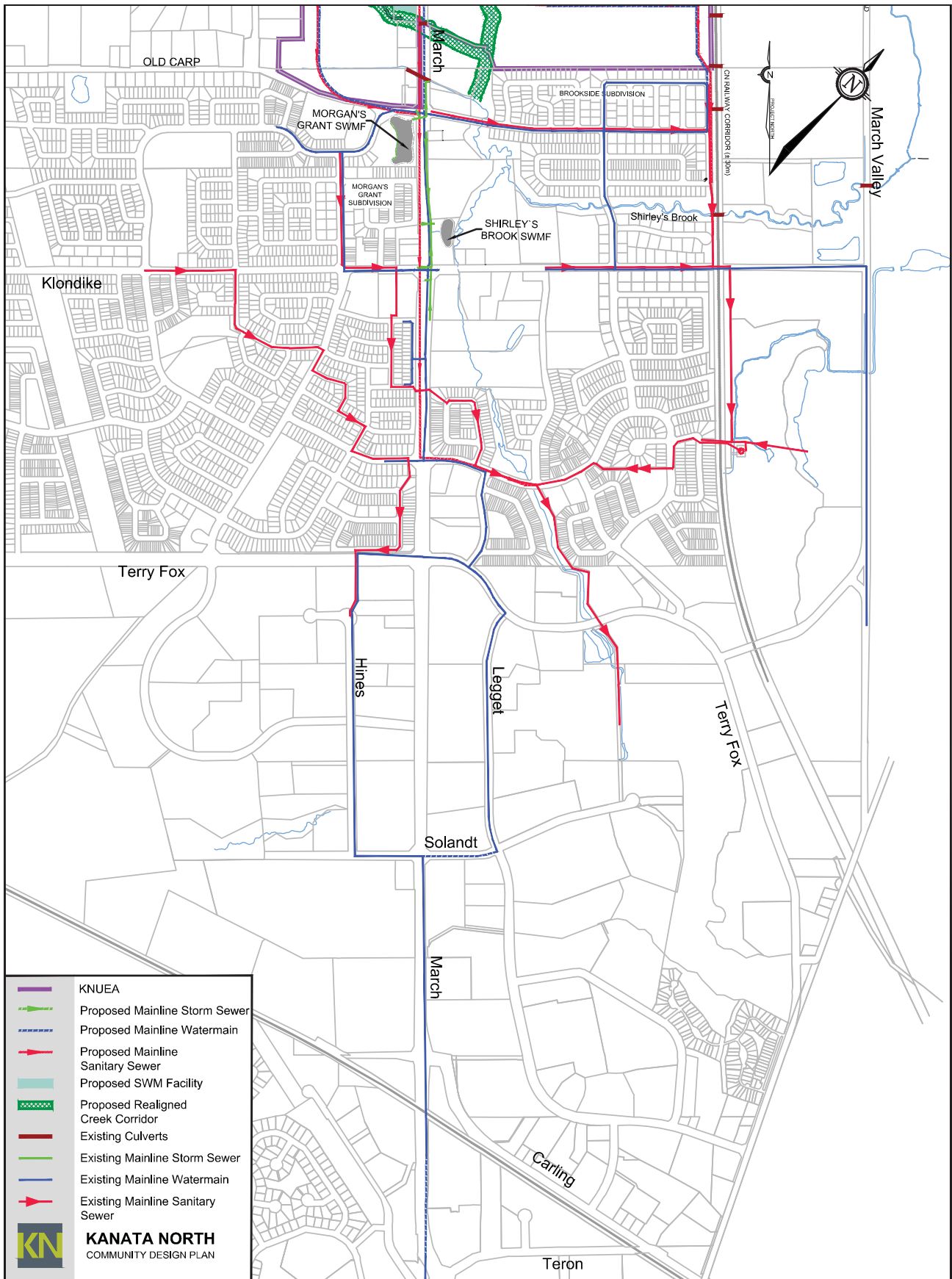
Property Type	Unit Rate	No. of Units	Avg Wastewater (L/s)
Hardware Store	5.0 L/m <sup>2</sup> /d	1,836	2.55
Restaurant 1 *	125 L/9.3m <sup>2</sup> /d	218	0.81
Bank	5.0 L/m <sup>2</sup> /d	416	0.58
Tim Hortans *	125 L/9.3m <sup>2</sup> /d	191	0.71
Gas Station	5.0 L/m <sup>2</sup> /d	249	0.35
<b>Average I/C/I Flow</b>			<b>5.00</b>
<b>Peak Institutional / Commercial Flow</b>			5.91
<b>Peak Industrial Flow**</b>			1.59
<b>Peak I/C/I Flow</b>			<b>7.50</b>

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

<b>Total Estimated Average Dry Weather Flow Rate</b>	<b>5.08 L/s</b>
<b>Total Estimated Peak Dry Weather Flow Rate</b>	<b>7.58 L/s</b>
<b>Total Estimated Peak Wet Weather Flow Rate</b>	<b>8.05 L/s</b>







**FIGURE 23** | Proposed Combined Infrastructure Offsite

RESIDENTIAL AREA AND POPULATION										ICI				INFILTRATION				FLOW				PIPE																			
Cumulative										IND		COMM		INST		Total Area		Accu. Area		Exist		Total Flow		Dia Act		Slope		Velocity Capacity		Ratio											
Street	From Node	To Node	Total Area (ha)	Dwellings SFH	Density Low <sup>3</sup>	Density High <sup>4</sup>	Pop. per/ha	Area (ha)	Residential Pop.	Peak Factor	Peak Flow (l/s)	Area (ha)	Accu. Area (ha)	Area (ha)	Peak Flow (l/s)	Area (ha)	Area (ha)	Area (ha)	Total Area (ha)	Accu. Area (ha)	Exist (ha)	Infiltration Flow (l/s)	Total Flow (l/s)	Dia Act (mm)	Dia Nom (mm)	Slope (%)	Velocity (m/s)	Capacity (Full) (l/s)	Ratio Q/Ofull (%)												
<b>EAST KNCDP</b>																																									
E-1	E-1	E-3	4.47		3.00		303.0	3.00	303	4.00	4.9								4.47	4.47		1.3	6.2	203	200	0.40	0.67	21.6	28%												
E-2	E-2	E-3	5.91		4.29		433.3	7.29	736	3.88	11.6								5.91	10.38		2.9	14.5	203	200	0.35	0.62	20.2	72%												
E-3	E-3	E-6	9.42		6.51		657.5	13.80	1394	3.70	20.9								9.42	19.80		5.5	26.4	254	250	0.40	0.77	39.2	67%												
E-4	E-4	E-5	6.89		3.12	1.36	534.1	3.12	534	3.96	8.6								6.89	6.89		1.9	10.5	203	200	1.00	1.05	34.2	31%												
E-5	E-5	E-9	4.70		1.46		147.5	4.58	682	3.90	10.8		2.29		2.0	2.29			4.70	11.59		3.2	16.0	203	200	0.35	0.62	20.2	79%												
E-6	E-6	E-9	3.28		2.32		234.3	16.12	1628	3.65	24.1								3.28	23.08		6.5	30.6	305	300	0.25	0.69	50.4	61%												
E-7	E-7	E-8	10.04		7.21		728.2	7.21	728	3.88	11.5								10.04	10.04		2.8	14.3	203	200	0.40	0.67	21.6	66%												
E-8	E-8	E-9	4.05		2.94		296.9	10.15	1025	3.79	15.8								4.05	14.09		3.9	19.7	254	250	0.30	0.67	33.9	58%												
E-9	E-9	MH 209	3.98		3.06		309.1	33.91	3644	3.37	49.7								3.98	52.74		14.8	66.5	381	375	0.22	0.75	85.7	78%												
<b>Total Flows From East KNUEA</b>			<b>52.74</b>		<b>33.91</b>		<b>3644</b>	<b>33.91</b>	<b>3644</b>	<b>3.37</b>	<b>49.7</b>		<b>2.29</b>		<b>1.99</b>	<b>2.29</b>			<b>32.80</b>	<b>52.74</b>		<b>14.77</b>	<b>66.49</b>																		
*Population from Novatech #103106 Sanitary Sewer Design Sheet													6.76	6.76		2.3	2.3			32.80			11.5	32.0																	
**244 TH units = 107 Units from Novatech #103106 Sanitary Sewer Design Sheet, plus future 137 units North of Klondike and West of Marconi (5.67ha @ 65pers/ha)																																									
X-13 (Future Industrial Lands)										15.85	15.85	3.6																													
Briar Ridge Pump Station Access Road													72.88	3644	2994	3.13	67.9																								
Briar Ridge Pump Station Access Road													72.88	3644	2994	3.13	67.9																								
Briar Ridge Pump Station Access Road													72.88	3644	2994	3.13	67.9																								
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Briar Ridge Pump Station Access Road													72.88	3644	2994	3.13	67.9																								
Briar Ridge Pump Station Access Road													72.88	3644	2994	3.13	67.9																								
RIDDELL VILLAGE (X-4)**													3100		3100	3.43	24.6																								
EXMH1																																									
EXMH2													72.88	3644	6094	2.97	85.6																								
EXMH4													72.88	3644	6094	2.97	85.6																								
EXMH5 (Future Industrial Lands east of Marshes Golf Course)													72.88	3644	6094	2.97	85.6																								
EXMH5 PS													72.88	3644	6094	2.97	85.6																								
Briar Ridge Pump Station													72.88	3644	6094	2.97	85.6																								
WEST KNUEA / MARCH ROAD																																									
W-1	W-1	W-3	7.51		5.14		519.1	5.14	519	3.97	8.3																														
W-2	W-2	W-3	8.94		2.36		238.4	2.36	238	4.00	3.9																														
W-3	W-3	W-4	6.52		1.97	2.16	546.7	11.63	1304	3.72	19.7																														
W-5	W-5	W-6	4.20		2.74		276.7	2.74	277	4.00	4.5																														
W-6	W-6	W-8	4.29		3.04		307.0	5.78	584	3.94	9.3																														
W-7	W-7	W-8	7.39		4.24		428.2	4.24	428	4.00	6.9																														
W-8	W-8	W-9	2.85		1.02	0.55	191.6	11.59	1204	3.75	18.3																														
W-4	W-4	MR-1	3.10				0.0	23.22	2508	3.51	35.6																														
W-14	W-14	W-15	3.79		0.36		36.4	0.36	36	4.00	0.6																														
W-15	W-15	W-17	3.17		2.20		222.2	2.56	259	4.00	4.2																														

RESIDENTIAL AREA AND POPULATION										ICI				INFILTRATION				FLOW				PIPE									
Cumulative										IND		COMM		INST		Accu. Area		Exist		Infiltration		Total		Dia		Velocity		Capacity		Ratio	
Street	From Node	To Node	Total Area (ha)	Dwellings SFH	SD/TH	Density (Net ha)	High <sup>4</sup>	Pop.	Area (ha)	Residential Pop.	Peak Factor	Peak Flow (l/s)	Area (ha)	Accu. Area (ha)	Area (ha)	Peak Flow (l/s)	Area (ha)	Accu. Area (ha)	Area (ha)	New (ha)	Exist (ha)	Flow (l/s)	Flow (l/s)	Total Flow (l/s)	Act (mm)	Nom (mm)	Slope (%)	Velocity (Full) (m/s)	Capacity (Full) (l/s)	Q/Ofull (%)	
W-16	W-16	W-17	6.55	3.4	2.7	3.17	1.78	606.8	4.95	607	3.93	9.7				0.0				6.55	6.55	1.8	11.5	11.5	203	200	0.35	0.62	20.2	57%	
W-17	W-17	MR-1	3.43					0.0	7.51	865	3.84	13.5		3.05		9.6		8.04		19.99		5.6	28.7	28.7	254	250	0.30	0.67	33.9	84%	
MR-1 (MARCH ROAD)	MR-1	MR-2	1.36					0.0	30.73	3373	3.40	46.4		3.40		9.9		8.04		47.42		13.3	69.6	69.6	610	600	0.10	0.69	202.4	34%	
W-9	W-9	MR-2	7.17			1.13	181.9	1.13	182	4.00	2.9			1.38		4.5		3.77		25.90		7.3	14.7	14.7	203	200	1.20	1.15	37.4	39%	
MR-2 (MARCH ROAD)	MR-2	MR-3	1.37					0.0	33.23	3555	3.38	48.7		4.78		14.4		11.81		74.69		20.9	84.0	84.0	610	600	0.10	0.69	202.4	41%	
W-10	W-10	W-11	1.53			0.78	125.6	0.78	126	4.00	2.0			1.08		0.0		2.01		1.53		0.4	2.5	2.5	203	200	0.70	0.88	28.6	9%	
W-11	W-11	MR-3	3.55			1.64	284.0	2.42	390	4.00	6.3			1.08		0.9		3.55		5.08		1.4	8.7	8.7	203	200	0.70	0.88	28.6	30%	
W-18	W-18	W-19	3.90			1.21	1.82	415.2	3.03	415	4.00	6.7		8.83		0.0		8.83		13.13		3.7	18.1	18.1	254	250	0.25	0.61	31.0	58%	
W-19	W-19	MR-3	9.23					0.0	3.03	415	4.00	6.7		8.83		7.7		8.83		13.13		3.7	18.1	18.1	254	250	0.25	0.61	31.0	58%	
MR-3 (MARCH ROAD)	MR-3	MR-4	4.74					0.0	38.68	4360	3.30	58.3		2.06		24.8		11.81		97.64		27.3	110.4	110.4	610	600	0.10	0.69	202.4	55%	
W-12	W-12	X-12	11.62			6.98	1350.0	9.22	1350	3.71	20.3			2.01		1.7		2.01		11.62		3.3	25.3	25.3	254	250	0.30	0.67	33.9	75%	
X-12 (BIDGOOD / HALTON TERRACE)	X-12	MR-4	3.54			0.79	127.2	10.01	1477	3.68	22.0			2.01		0.0		2.01		15.16		4.2	26.3	26.3	254	250	1.00	1.22	62.0	42%	
X-5 (760 & 788 March Road)	X-5	MR-4	1.76			1.76	283.4	1.76	283	4.00	4.6			2.06		0.0		2.06		1.76		0.5	5.1	5.1							
MR-4 (MARCH ROAD)	MR-4	MH 186	4.71					0.0	50.45	6120	3.16	78.4		16.75		26.5		13.82		119.27		33.4	138.3	138.3	610	600	0.10	0.69	202.4	68%	
X-6 (750 March Road, Blue Heron Co-op Homes)****	X-6	X-8	1.29					224.1	1.29	224	4.00	2.1				0.0						0.5	2.5	2.5							
X-7 (Morgans Grant) *****	X-7	X-8	48.45					3188.0	49.74	3188	3.42	25.2				0.0				49.74		17.4	42.6	42.6							
X-8 (Inverary Drive)	X-8	MH 186	4.31					264.9	54.05	3677	3.37	28.6				0.0				54.05		18.9	47.6	47.6							
Shirley's Brooke Drive	MH 186	MH 184	0.00					0.0	104.50	6120	2.96	98.7		16.75		26.5		13.82		119.27		52.3	177.5	177.5	610	600	0.10	0.69	202.4	88%	
X-9 (Mckinley Drive)	X-9	MH 184	7.84					315.9		316	4.00	2.9		2.73		2.4				7.84		2.7	8.0	8.0							
Shirleys Brooke Drive	MH 184	MH 182	0.00					0.0	104.50	3993	2.95	100.4		19.48		28.9		13.82		119.27		55.1	184.4	184.4	610	600	0.10	0.69	202.4	91%	
Shirleys Brooke Drive	MH 182	MH 1	0.00					0.0	104.50	3993	2.95	100.4		19.48		28.9		13.82		119.27		55.1	184.4	184.4	610	600	0.10	0.69	202.4	91%	
X-10 (Sandhill Road)	MH 1	MH 1	11.62			5.32	1049.1	11.62		1049	3.79	9.2				1.8		2.11				4.1	15.1	15.1							
X-11	MH 1	MH 1	0.87			0.87	140.1	0.87		140	4.00	1.3				0.0						0.3	1.6	1.6							
Briar Ridge Pump Station	PS	MH 1						72.88		6094	2.97	85.623		0.00		35.6		5.25		92.96		56.9	178.1	178.1							
EAST MARCH TRUNK	MH 1	EMT	0.00					0.0	189.87	9764	2.63	172.7		26.24		66.3		21.18		212.23		116.3	355.3	355.3	762	750	0.10	0.80	367.1	97%	

DESIGN PARAMETERS	
Average Daily Flow (Future)=	350 L/cap/day
Average Daily Flow (Existing)=	200 L/cap/day
Indust/Comm/Inst Flow (Future)=	50000 L/h/day
Indust/Comm/Inst Flow (Existing)=	20000 L/h/day
Max Res Peak Factor=	4.00
Comm/Inst Peak Factor=	1.50
Industrial Peak Factor= per MOE graph	0.28 L/s/ha
Extraneous Flow (Future)=	0.35 L/s/ha (Jan 2008 monitored event)
Extraneous Flow (Existing)=	0.60 m/s
Minimum Velocity=	0.013
Manning's n=	

Designed:	Alex McAuley
Checked:	CJR
Dwg. Reference:	112117-SAN1 112117-SAN2
PROJECT:	Kanata North Community Design Plan
CLIENT:	Kanata North Land Owners
Date:	May, 2016

- Notes:
- Existing sanitary sewers tributary to, and not receiving flow from the KNUEA Trunk sewer have not been analysed for capacity
  - Existing unit counts obtained from City of Ottawa geoOttawa (2014) parcel counts, unless otherwise indicated
  - Low Density based on (16.6 Singles/net ha \* 3.4pers/unit) + (16.5 Towns/net ha \* 2.7pers/unit)
  - High Density based on (35.8 Towns/net ha \* 2.7pers/unit) + (35.8 Apartments/net ha \* 1.8pers/unit)
  - Overall unit counts for the KNCDDP are based on Demonstration Plan "A-24", plus 10% to allow for flexibility in unit type distribution

Upgraded Existing Sanitary Sewers



RIDDELL  
1030 Riddell Dr.

SUBJECT SITE

CARP FORCEMAIN

BRIARRIDGE  
960 Klondike Rd.

HINES ROAD TRUNK

EAST MARCH TRUNK

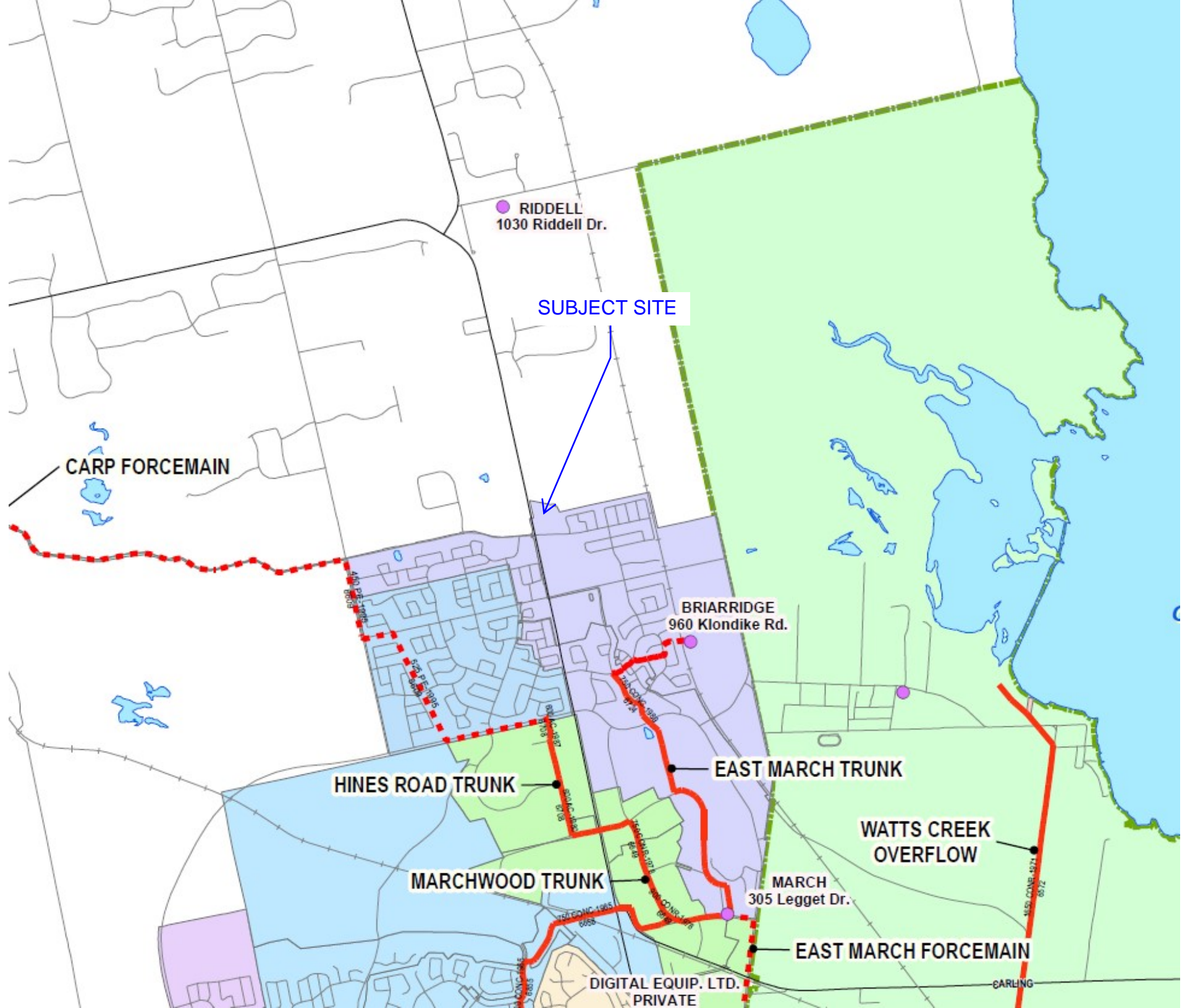
WATTS CREEK  
OVERFLOW

MARCHWOOD TRUNK

MARCH  
305 Legget Dr.

EAST MARCH FORCEMAIN

DIGITAL EQUIP. LTD.  
PRIVATE





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***APPENDIX D***

***Stormwater Management***

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



**Existing Drainage Characteristics From Internal Site**

<b>Area</b>	1.647 ha
<b>C</b>	0.35 Rational Method runoff coefficient
<b>L</b>	135 m
<b>Up Elev</b>	78.85 m
<b>Dn Elev</b>	74.5 m
<b>Slope</b>	3.2 %
<b>Tc</b>	19.2 min

1) Time of Concentration per Federal Aviation Administration

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

tc, in minutes

C, rational method coefficient, (-)

L, length in ft

S, average watershed slope in %

**Estimated Peak Flow**

	<b>2-year</b>	<b>5-year</b>	<b>100-year</b>
<b>i</b>	53.3	72.0	122.9 mm/hr
<b>Q</b>	85.3	115.2	245.9 L/s

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



Target Flow Rate

	2-year	100-year
i	53.3	122.9 mm/hr
Q	85.3	245.9 L/s

Estimated Post Development Peak Flow from Unattenuated Areas

Area ID	U1
Total Area	0.195 ha
C	0.22 Rational Method runoff coefficient

t <sub>c</sub> (min)	2-year					100-year				
	i (mm/hr)	Q <sub>actual</sub> (L/s)	Q <sub>release</sub> (L/s)	Q <sub>stored</sub> (L/s)	V <sub>stored</sub> (m <sup>3</sup> )	i (mm/hr)	Q <sub>actual</sub> (L/s)	Q <sub>release</sub> (L/s)	Q <sub>stored</sub> (L/s)	V <sub>stored</sub> (m <sup>3</sup> )
10.0	76.8	9.2	9.2	0.0	0.0	178.6	26.6	26.6	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
Roof Area	0.184 ha
Avail Storage Area	0.175
C	0.90 Rational Method runoff coefficient
t <sub>c</sub>	10 min, t <sub>c</sub> at outlet without restriction

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

Estimated Number of Roof Drains

Building Length	54
Building Width	34
Number of Drains	13
m <sup>2</sup> / Drain	134.5 max 232.25m <sup>2</sup> /notch as recommended by Zurn for Ottawa

Roof Top Rating Curve per Zurn Model Z-105-5						
d (m)	A (m <sup>2</sup> )	V <sub>acc</sub> (m <sup>3</sup> )	V <sub>avail</sub> (m <sup>3</sup> )	Q <sub>notch</sub> (L/s)	Q <sub>roof</sub> (L/s)	V <sub>drawdown</sub> (hr)
0.000	0	0.0	0.0	0.00	0.00	0.00
0.025	109.3	0.9	0.9	0.38	4.94	0.05
0.050	437.0	6.4	7.3	0.77	10.01	0.23
0.075	983.3	17.3	24.6	1.14	14.82	0.55
0.100	1748.0	33.7	58.3	1.52	19.76	1.03
0.125	1748.0	43.7	102.0	1.90	24.70	1.52
0.150	1748.0	43.7	145.7	2.28	29.64	1.93

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

t <sub>c</sub> (min)	2-year					100-year				
	i (mm/hr)	Q <sub>actual</sub> (L/s)	Q <sub>release</sub> (L/s)	Q <sub>stored</sub> (L/s)	V <sub>stored</sub> (m <sup>3</sup> )	i (mm/hr)	Q <sub>actual</sub> (L/s)	Q <sub>release</sub> (L/s)	Q <sub>stored</sub> (L/s)	V <sub>stored</sub> (m <sup>3</sup> )
10	76.8	35.3	12.1	23.3	14.0	178.6	91.3	18.8	72.5	43.5
15	61.8	28.4	12.1	16.3	14.7	142.9	73.0	18.8	54.3	48.8
20	52.0	23.9	12.1	11.9	14.2	120.0	61.3	18.8	42.5	51.1
25	45.2	20.8	12.1	8.7	13.1	103.8	53.1	18.8	34.3	51.5
30	40.0	18.4	12.1	6.3	11.4	91.9	47.0	18.8	28.2	50.7
35	36.1	16.6	12.1	4.5	9.5	82.6	42.2	18.8	23.4	49.2
40	32.9	15.1	12.1	3.0	7.3	75.1	38.4	18.8	19.6	47.1
45	30.2	13.9	12.1	1.8	5.0	69.1	35.3	18.8	16.5	44.6
50	28.0	12.9	12.1	0.8	2.5	64.0	32.7	18.8	13.9	41.8
55	26.2	12.0	12.0	0.0	0.0	59.6	30.5	18.8	11.7	38.6
60	24.6	11.3	11.3	0.0	0.0	55.9	28.6	18.8	9.8	35.3
65	23.2	10.6	10.6	0.0	0.0	52.6	26.9	18.8	8.1	31.8
70	21.9	10.1	10.1	0.0	0.0	49.8	25.4	18.8	6.7	28.1
75	20.8	9.6	9.6	0.0	0.0	47.3	24.2	18.8	5.4	24.3
80	19.8	9.1	9.1	0.0	0.0	45.0	23.0	18.8	4.2	20.3
85	18.9	8.7	8.7	0.0	0.0	43.0	22.0	18.8	3.2	16.3
90	18.1	8.3	8.3	0.0	0.0	41.1	21.0	18.8	2.2	12.1
95	17.4	8.0	8.0	0.0	0.0	39.4	20.2	18.8	1.4	7.9
100	16.7	7.7	7.7	0.0	0.0	37.9	19.4	18.8	0.6	3.7
105	16.1	7.4	7.4	0.0	0.0	36.5	18.7	18.7	0.0	0.0
110	15.6	7.2	7.2	0.0	0.0	35.2	18.0	18.0	0.0	0.0

2-year Q <sub>roof</sub>	12.07 L/s	100-year Q <sub>roof</sub>	18.76 L/s
2-year Max. Storage Required	14.7 m <sup>3</sup>	100-year Max. Storage Required	51.5 m <sup>3</sup>
2-year Storage Depth	0.061 m	100-year Storage Depth	0.095 m
2-year Estimated Drawdown Time	0.37 hr	100-year Estimated Drawdown Time	0.93 hr

**Estimated Post Development Peak Flow from Attenuated Areas**

Area ID **A**  
Available Sub-surface Storage

Total Subsurface Storage (m<sup>3</sup>) 429.2

**Stage Attenuated Areas Storage Summary**

Stage	Surface Storage				Surface and Subsurface Storage			
	Ponding (m)	Ponding (m <sup>2</sup> )	h <sub>o</sub> (m)	delta d (m)	V* (m <sup>3</sup> )	V <sub>acc</sub> ** (m <sup>3</sup> )	Q <sub>release</sub> † (L/s)	V <sub>drawdown</sub> (hr)
Orifice INV	74.04		0.00			0.0	0.0	0.00
Storage Pipe INV	74.75		0.71	0.71		0.0	48.7	0.00
Storage Pipe SL	75.52		1.47	0.77	214.6	214.6	70.2	0.85
Storage Pipe OBV	76.28		2.24	0.77	214.6	429.2	86.5	1.38
T/L	76.35	0.4	2.31	0.07		429.2	87.8	1.36
0.15m Ponding	76.50	168.5	2.46	0.15	8.8	438.0	90.6	1.34
0.25m Ponding	76.60	313.2	2.56	0.10	23.7	461.7	92.4	1.39

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

Orifice Location **STM101** Dia 165  
 Total Area 1.270 ha  
 C 0.82 Rational Method runoff coefficient *Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations*

t <sub>c</sub> (min)	2-year					100-year				
	i (mm/hr)	Q <sub>actual</sub> † (L/s)	Q <sub>release</sub> (L/s)	Q <sub>stored</sub> (L/s)	V <sub>stored</sub> (m <sup>3</sup> )	i (mm/hr)	Q <sub>actual</sub> † (L/s)	Q <sub>release</sub> (L/s)	Q <sub>stored</sub> (L/s)	V <sub>stored</sub> (m <sup>3</sup> )
10	76.8	234.3	61.0	173.3	104.0	178.6	648.7	92.3	556.4	333.8
15	61.8	190.8	61.0	129.8	116.8	142.9	522.9	92.3	430.6	387.5
20	52.0	162.6	61.0	101.6	122.0	120.0	441.9	92.3	349.6	419.6
25	45.2	142.7	61.0	81.8	122.7	103.8	385.1	92.3	292.8	439.2
30	40.0	127.9	61.0	66.9	120.5	91.9	342.9	92.3	250.6	451.0
35	36.1	116.4	61.0	55.4	116.4	82.6	310.1	92.3	217.8	457.4
40	32.9	107.1	61.0	46.2	110.8	75.1	283.9	92.3	191.6	459.8
45	30.2	99.5	61.0	38.6	104.2	69.1	262.4	92.3	170.1	459.2
50	28.0	93.2	61.0	32.2	96.7	64.0	244.4	92.3	152.1	456.3
55	26.2	87.8	61.0	26.8	88.5	59.6	229.1	92.3	136.8	451.5
60	24.6	83.1	61.0	22.2	79.7	55.9	215.9	92.3	123.7	445.2
65	23.2	79.0	61.0	18.1	70.5	52.6	204.5	92.3	112.2	437.6
70	21.9	75.5	61.0	14.5	60.9	49.8	194.4	92.3	102.1	428.9
75	20.8	72.3	61.0	11.3	50.9	47.3	185.5	92.3	93.2	419.3
80	19.8	69.4	61.0	8.5	40.7	45.0	177.5	92.3	85.2	408.9
85	18.9	66.9	61.0	5.9	30.2	43.0	170.3	92.3	78.0	397.8
90	18.1	64.6	61.0	3.6	19.4	41.1	163.8	92.3	71.5	386.1
95	17.4	62.4	61.0	1.5	8.5	39.4	157.9	92.3	65.6	373.9
100	16.7	60.5	60.5	0.0	0.0	37.9	152.5	92.3	60.2	361.1
105	16.1	58.7	58.7	0.0	0.0	36.5	147.5	92.3	55.2	348.0
110	15.6	57.1	57.1	0.0	0.0	35.2	142.9	92.3	50.7	334.4

2-year Q<sub>attenuated</sub> 60.96 L/s      100-year Q<sub>attenuated</sub> 92.29 L/s  
 2-year Max. Storage Required 122.7 m<sup>3</sup>      100-year Max. Storage Required 459.8 m<sup>3</sup>  
 Est. 2-year Storage Elevation 75.19 m      Est. 100-year Storage Elevation 76.59 m

**Summary of Release Rates and Storage Volumes**

Control Area	2-Year Release Rate (L/s)	2-Year Required Storage (m <sup>3</sup> )	100-Year Release Rate (L/s)	100-Year Required Storage (m <sup>3</sup> )	100-Year Available Storage (m <sup>3</sup> )
Unattenuated Areas	9.2	0.0	26.6	0.0	0.0
Roof Controls	12.1	14.7	18.8	51.5	145.7
Attenuated Areas	61.0	122.7	92.3	459.8	461.7
<b>Total</b>	<b>82.2</b>	<b>137.4</b>	<b>137.6</b>	<b>511.2</b>	<b>607.4</b>



Area ID	Up	Down	Area (ha)	C (-)	Indiv AxC	Acc AxC	T <sub>c</sub> (min)	I (mm/hr)	Q (L/s)	Sewer Data								
										DIA (mm)	Slope (%)	Length (m)	A <sub>hydraulic</sub> (m <sup>2</sup> )	R (m)	Velocity (m/s)	Qcap (L/s)	Time Flow (min)	Q / Q full (-)
A111	CBMH111	STM107	0.135	0.70	0.09	0.09	10.0 10.4	104.2	27.4	250	0.50	22.8	0.049	0.063	0.86	42.0	0.4	0.65
A110	CBMH110	STM 107	0.118	0.90	0.11	0.11	10.0 10.1	104.2	30.7	250	0.50	7.6	0.049	0.063	0.86	42.0	0.1	0.73
	STM 107	STM 106	0.000	0.00	0.00	0.20	10.4 10.7	101.9	56.8	300	0.50	13.2	0.071	0.075	0.97	68.4	0.2	0.83
BLDG D	STM112	STM 106	0.022	0.90	0.02	0.02	10.0 10.4	104.2	5.7	250	0.50	19.5	0.049	0.063	0.86	42.0	0.4	0.14
	STM 106	STM 105	0.000	0.00	0.00	0.22	10.7 10.9	100.8	61.7	300	0.50	15.1	0.071	0.075	0.97	68.4	0.3	0.90
BLDG C	STM109	STM 105	0.044	0.90	0.04	0.04	10.0 10.2	104.2	11.5	250	0.50	8.7	0.049	0.063	0.86	42.0	0.2	0.27
	STM 105	STM 104	0.000	0.00	0.00	0.26	10.9	99.5	71.9	300	2.00	30.3	0.071	0.075	1.93	136.8	0.3	0.53
	STM 104	STM 103	0.000	0.00	0.00	0.26	11.2 11.3	98.3	71.0	300	2.00	11.8	0.071	0.075	1.93	136.8	0.1	0.52
A108B	STM108B	STM10108A	0.399	0.80	0.32	0.32	10.0	104.2	92.4	375	1.00	46.7	0.110	0.094	1.59	175.3	0.5	0.53
A108A	STM10108A	STM 103	0.248	0.80	0.20	0.52	10.5 10.5	101.7	146.2	375	1.00	19.3	0.110	0.094	1.59	175.3	0.2	0.83
A103, BLDG B	STM 103	STM 102	0.051	0.90	0.05	0.63	11.3	97.8	169.9	525	0.50	41.8	0.216	0.131	1.40	304.1	0.5	0.56
A102	STM 102	STM 101	0.150	0.90	0.14	0.76	11.8	95.6	201.9	525	0.50	2.8	0.216	0.131	1.40	304.1	0.0	0.66
BLDG A	STM 101	OGS	0.000	0.00	0.00	0.76	11.8	95.5	220.3	525	0.50	6.5	0.216	0.131	1.40	304.1	0.1	0.72
	OGS	HW100	0.000	0.00	0.00	0.76	11.9	95.1	200.9	525	0.50	28.4	0.216	0.131	1.40	304.1	0.3	0.66



PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER	
ADS SALES REP	
PROJECT NO.	



910 MARCH RD  
OTTAWA, ONTARIO

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## MC-4500 STORMTECH CHAMBER SPECIFICATIONS

- CHAMBERS SHALL BE STORMTECH MC-4500.
- CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
- CHAMBERS SHALL BE CERTIFIED TO CSA B184, "POLYMERIC SUB-SURFACE STORMWATER MANAGEMENT STRUCTURES", AND MEET THE REQUIREMENTS OF ASTM F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 60x101.
- CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
- THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE CSA S6 CL-625 TRUCK AND THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
- CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
- REQUIREMENTS FOR HANDLING AND INSTALLATION:
  - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
  - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 75 mm (3").
  - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 500 LBS/IN/IN. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 23° C / 73° F), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
- ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
  - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
  - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
  - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
- CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

## IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF MC-4500 CHAMBER SYSTEM

- STORMTECH MC-4500 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
- STORMTECH MC-4500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
- CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
  - STONESHOOTER LOCATED OFF THE CHAMBER BED.
  - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
  - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
- THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
- JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
- MAINTAIN MINIMUM - 230 mm (9") SPACING BETWEEN THE CHAMBER ROWS.
- INLET AND OUTLET MANIFOLDS MUST BE INSERTED A MINIMUM OF 300 mm (12") INTO CHAMBER END CAPS.
- EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE WELL GRADED BETWEEN ¾" AND 2" (20-50 mm).
- STONE SHALL BE BROUGHT UP EVENLY AROUND CHAMBERS SO AS NOT TO DISTORT THE CHAMBER SHAPE. STONE DEPTHS SHOULD NEVER DIFFER BY MORE THAN 300 mm (12") BETWEEN ADJACENT CHAMBER ROWS.
- STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
- THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIAL BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
- ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

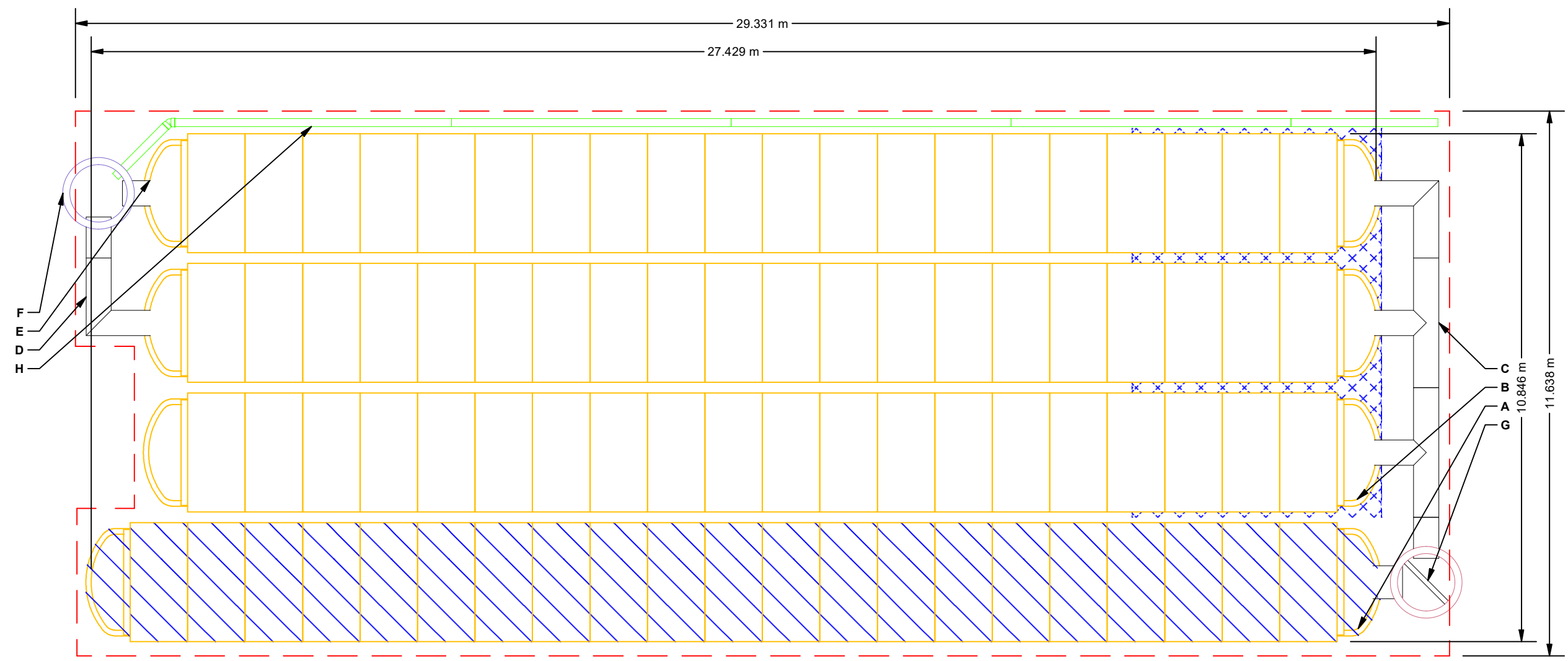
## NOTES FOR CONSTRUCTION EQUIPMENT




- STORMTECH MC-4500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
- THE USE OF EQUIPMENT OVER MC-4500 CHAMBERS IS LIMITED:
  - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
  - NO RUBBER TIRE LOADER, DUMP TRUCK, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
  - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
- FULL 900 mm (36") OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

**USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY USING THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.**

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

PROPOSED LAYOUT		CONCEPTUAL ELEVATIONS		*INVERT ABOVE BASE OF CHAMBER				
				PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
81	STORMTECH MC-4500 CHAMBERS	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	3.886	PREFABRICATED END CAP	A	600 mm BOTTOM PARTIAL CUT END CAP/TYP OF ALL 600 mm BOTTOM CONNECTIONS AND ISOLATOR ROWS	57 mm	
8	STORMTECH MC-4500 END CAPS	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	2.515	PREFABRICATED END CAP	B	450 mm BOTTOM PARTIAL CUT END CAP/TYP OF ALL 450 mm BOTTOM CONNECTIONS	50 mm	
305	STONE ABOVE (mm)	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	2.362	MANIFOLD	C	450 mm x 450 mm BOTTOM MANIFOLD, ADS N-12	50 mm	
229	STONE BELOW (mm)	MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	2.362	MANIFOLD	D	450 mm x 450 mm BOTTOM MANIFOLD, ADS N-12	50 mm	
40	STONE VOID	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	2.362	PIPE CONNECTION	E	450 mm BOTTOM CONNECTION	50 mm	
429.2	INSTALLED SYSTEM VOLUME (m³) (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)	TOP OF STONE:	2.057	CONCRETE STRUCTURE	F	OCS (DESIGN BY ENGINEER / PROVIDED BY OTHERS)		227 L/s OUT
		TOP OF MC-4500 CHAMBER:	1.753	W/WEIFR	G	(DESIGN BY ENGINEER / PROVIDED BY OTHERS)		467 L/s IN
		600 mm ISOLATOR ROW INVERT:	0.286	UNDERDRAIN	H	150 mm ADS N-12 DUAL WALL PERFORATED HDPE UNDERDRAIN		
		450 mm x 450 mm BOTTOM MANIFOLD INVERT:	0.279					
336.9	SYSTEM AREA (m²)	450 mm x 450 mm BOTTOM MANIFOLD INVERT:	0.279					
84.4	SYSTEM PERIMETER (m)	450 mm BOTTOM CONNECTION INVERT:	0.279					
		BOTTOM OF MC-4500 CHAMBER:	0.229					
		UNDERDRAIN INVERT:	0.000					
		BOTTOM OF STONE:	0.000					



-  ISOLATOR ROW (SEE DETAIL)
-  PLACE MINIMUM 5.334 m OF ADS GEOSYNTHETICS 315WTM WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS
-  BED LIMITS

**NOTES**

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH NOTE #6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.
- **NOT FOR CONSTRUCTION:** THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.

<b>StormTech</b> <small>Prevention - Retention - Water Quality</small> 520 CROMWELL AVENUE   ROCKY HILL   CT   06067 860-528-8188   866-892-2694   <a href="http://www.stormtech.com">www.stormtech.com</a>	<b>Scale = 1 : 100</b>	SHEET <b>2 OF 5</b>	<b>910 MARCH RD</b> <b>OTTAWA, ONTARIO</b> DRAWN: BC CHECKED: N/A DATE: PROJECT #:
<b>StormTech Canada</b> 4840 TRUEMAN BLVD HILLIARD, OH 43026 1-800-733-7473	THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.		

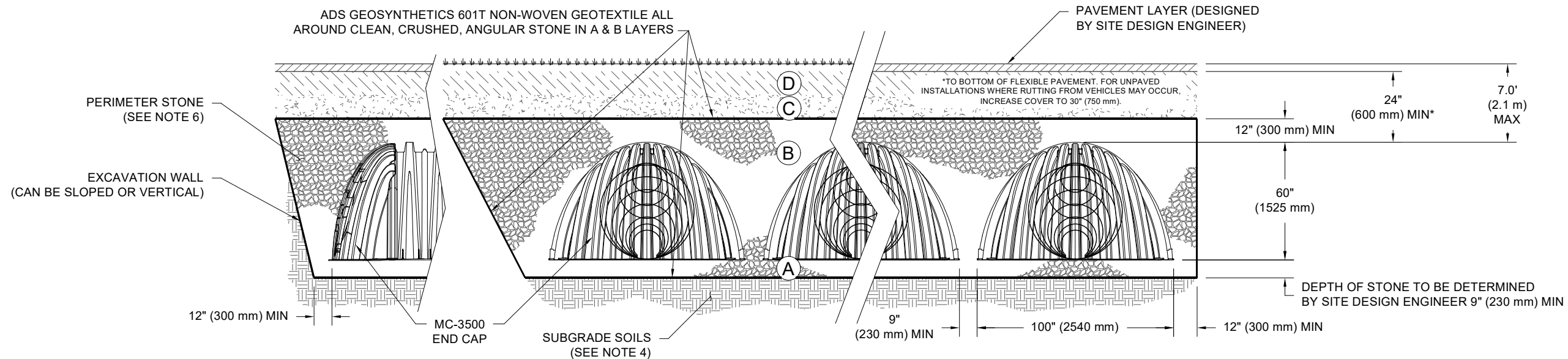


## ACCEPTABLE FILL MATERIALS: STORMTECH MC-4500 CHAMBER SYSTEMS

MATERIAL LOCATION	DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	<b>FINAL FILL:</b> FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	<b>INITIAL FILL:</b> FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 24" (600 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	AASHTO M145 <sup>1</sup> A-1, A-2-4, A-3  OR AASHTO M43 <sup>1</sup> 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
B	<b>EMBEDMENT STONE:</b> FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	AASHTO M43 <sup>1</sup> 3, 4	NO COMPACTION REQUIRED.
A	<b>FOUNDATION STONE:</b> FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	AASHTO M43 <sup>1</sup> 3, 4	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE. <sup>2,3</sup>

**PLEASE NOTE:**

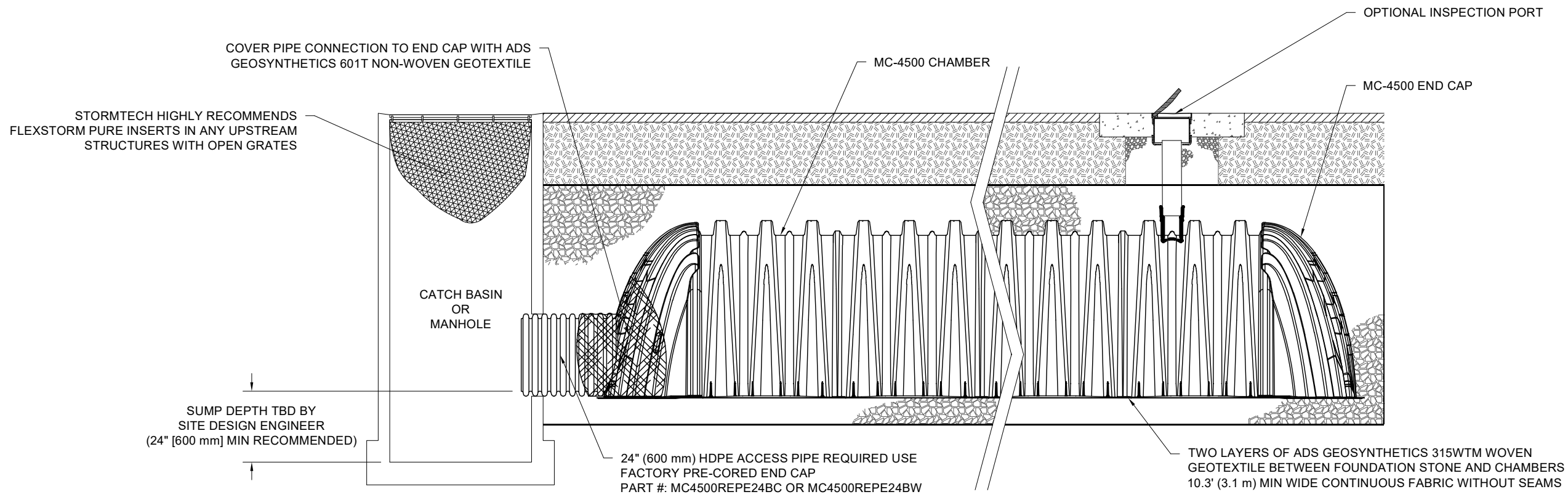
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9" (230 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



**NOTES:**

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 60x101
2. MC-4500 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
  - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
  - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
  - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 500 LBS/IN/IN. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

910 MARCH RD OTTAWA, ONTARIO	DRAWN: BC	DATE:	PROJECT #:	CHECKED: N/A
DESCRIPTION	CHK	DRW	REV	REV
<p style="font-size: small; margin: 0;">520 CROMWELL AVENUE   ROCKY HILL   CT   06067 860-528-8188   888-892-2894   www.stormtech.com</p>				
<p style="font-size: small; margin: 0;">4840 TRUEMAN BLVD HILLIARD, OH 43026 1-800-733-7473</p>				
<p style="font-size: x-small; margin: 0;">THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.</p>				
<p style="margin: 0;">SHEET <b>3 OF 5</b></p>				



**MC-4500 ISOLATOR ROW DETAIL**  
NTS

**INSPECTION & MAINTENANCE**

- STEP 1) INSPECT ISOLATOR ROW FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
    - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
    - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
    - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
    - A.4. LOWER A CAMERA INTO ISOLATOR ROW FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
    - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
  - B. ALL ISOLATOR ROWS
    - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW
    - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW THROUGH OUTLET PIPE
      - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
      - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
    - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- STEP 2) CLEAN OUT ISOLATOR ROW USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
  - B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
  - C. VACUUM STRUCTURE SUMP AS REQUIRED
- STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.
- STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

**NOTES**

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

	910 MARCH RD OTTAWA, ONTARIO	DRAWN: BC	DATE:	PROJECT #:	CHECKED: N/A
DESCRIPTION					
CHK					
DRW					
REV					

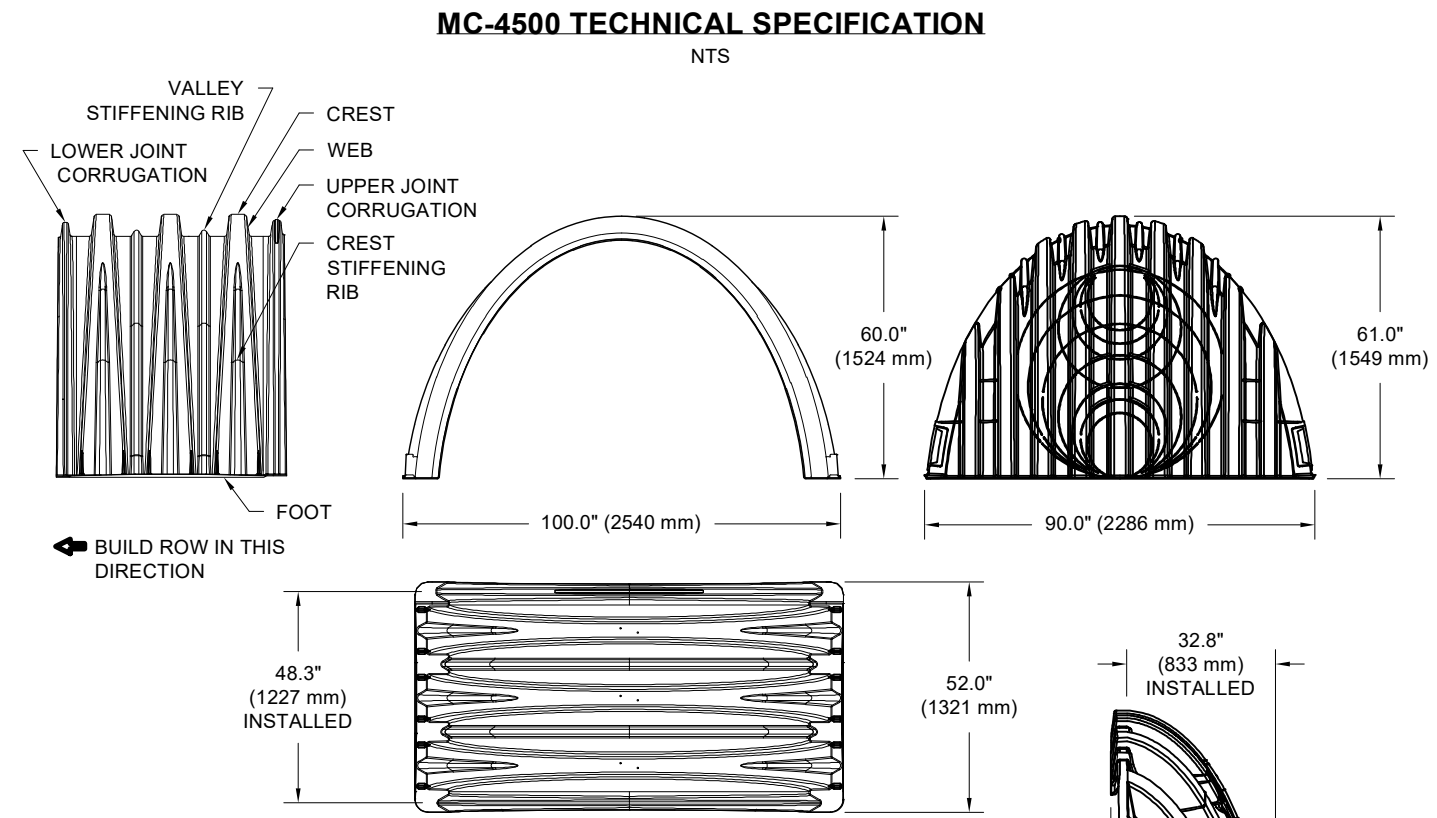
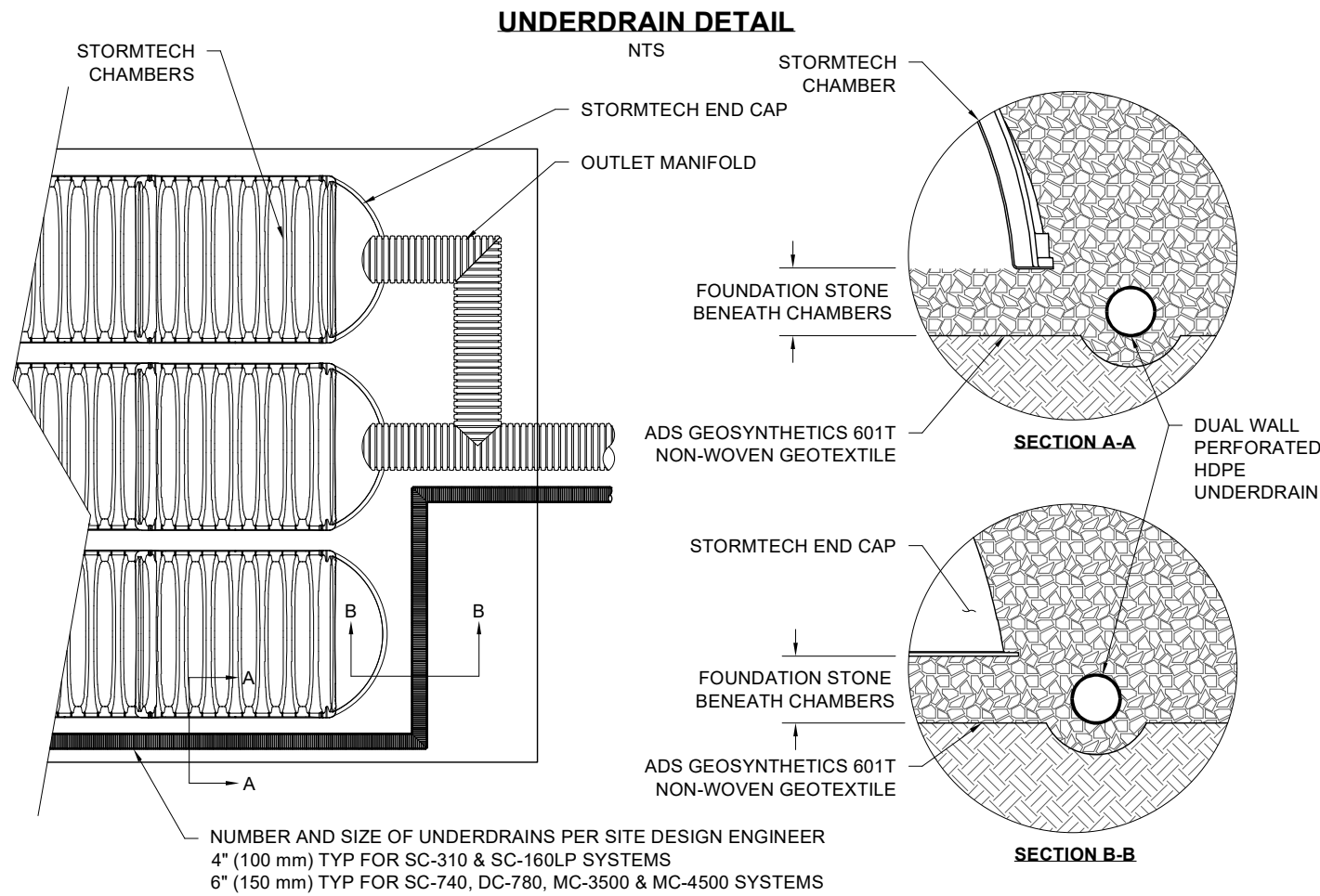
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Prevention - Retention - Water Quality

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SHEET	4 OF 5
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**NOMINAL CHAMBER SPECIFICATIONS**

SIZE (W X H X INSTALLED LENGTH)	100.0" X 60.0" X 48.3"	(2540 mm X 1524 mm X 1227 mm)
CHAMBER STORAGE	106.5 CUBIC FEET	(3.01 m <sup>3</sup> )
MINIMUM INSTALLED STORAGE*	162.6 CUBIC FEET	(4.60 m <sup>3</sup> )
WEIGHT (NOMINAL)	125.0 lbs.	(56.7 kg)

**NOMINAL END CAP SPECIFICATIONS**

SIZE (W X H X INSTALLED LENGTH)	90.0" X 61.0" X 32.8"	(2286 mm X 1549 mm X 833 mm)
END CAP STORAGE	39.5 CUBIC FEET	(1.12 m <sup>3</sup> )
MINIMUM INSTALLED STORAGE*	115.3 CUBIC FEET	(3.26 m <sup>3</sup> )
WEIGHT (NOMINAL)	90 lbs.	(40.8 kg)

\*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION AND BETWEEN CHAMBERS, 12" (305 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY.

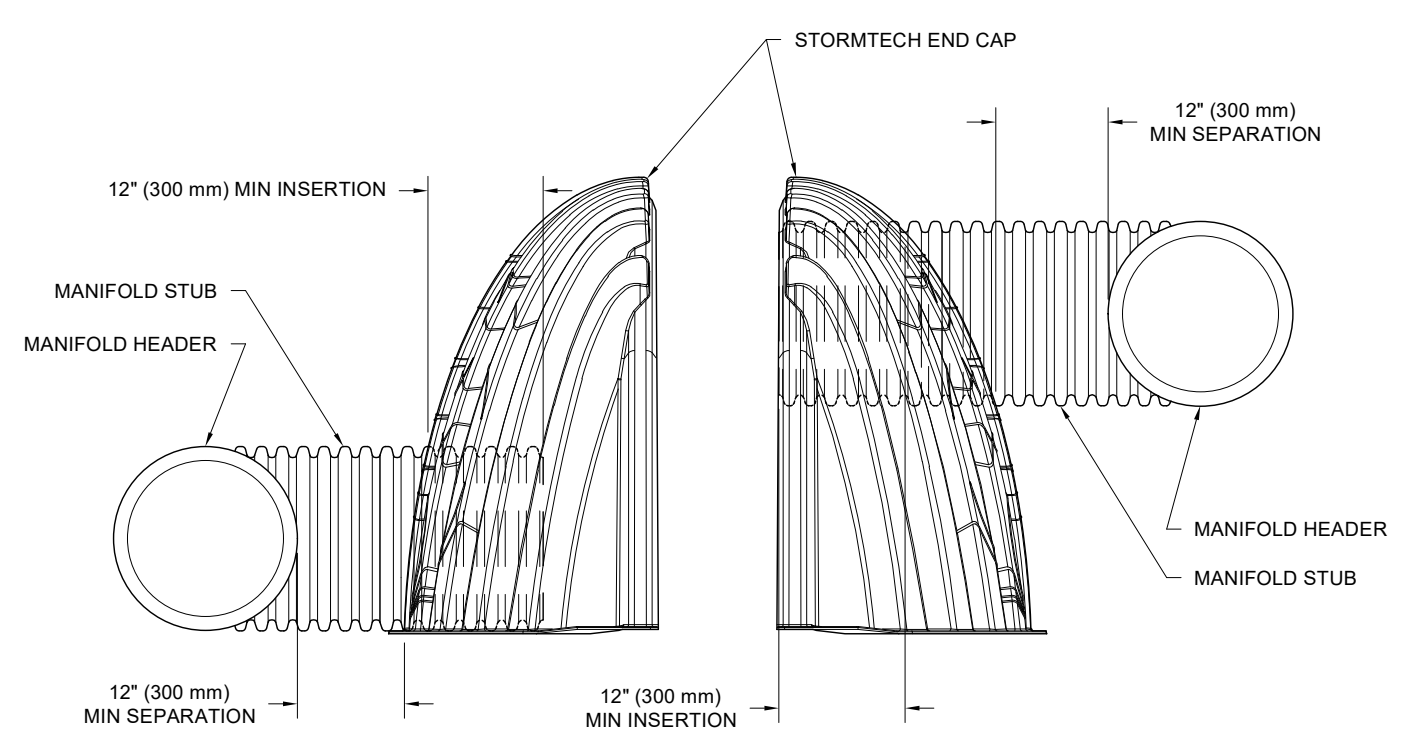
PARTIAL CUT HOLES AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"  
PARTIAL CUT HOLES AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"  
END CAPS WITH A PREFABRICATED WELDED STUB END WITH "W"

PART #	STUB	B	C
MC4500IEPP06T		42.54" (1081 mm)	---
MC4500IEPP06B	6" (150 mm)	---	0.86" (22 mm)
MC4500IEPP08T		40.50" (1029 mm)	---
MC4500IEPP08B	8" (200 mm)	---	1.01" (26 mm)
MC4500IEPP10T		38.37" (975 mm)	---
MC4500IEPP10B	10" (250 mm)	---	1.33" (34 mm)
MC4500IEPP12T		35.69" (907 mm)	---
MC4500IEPP12B	12" (300 mm)	---	1.55" (39 mm)
MC4500IEPP15T		32.72" (831 mm)	---
MC4500IEPP15B	15" (375 mm)	---	1.70" (43 mm)
MC4500IEPP18T		29.36" (746 mm)	---
MC4500IEPP18TW			
MC4500IEPP18B	18" (450 mm)	---	1.97" (50 mm)
MC4500IEPP18BW			
MC4500IEPP24T		23.05" (585 mm)	---
MC4500IEPP24TW			
MC4500IEPP24B	24" (600 mm)	---	2.26" (57 mm)
MC4500IEPP24BW			
MC4500IEPP30BW	30" (750 mm)	---	2.95" (75 mm)
MC4500IEPP36BW	36" (900 mm)	---	3.25" (83 mm)
MC4500IEPP42BW	42" (1050 mm)	---	3.55" (90 mm)

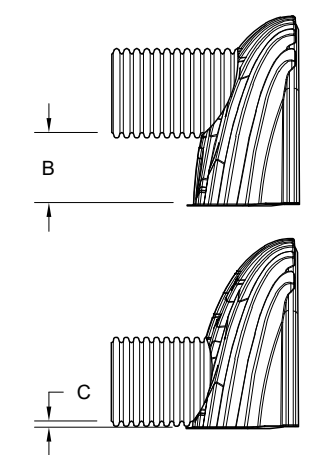
NOTE: ALL DIMENSIONS ARE NOMINAL

### MC-SERIES END CAP INSERTION DETAIL

NTS



NOTE: MANIFOLD STUB MUST BE LAID HORIZONTAL FOR A PROPER FIT IN END CAP OPENING.



CUSTOM PARTIAL CUT INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS. CUSTOM INVERT LOCATIONS ON THE MC-4500 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm). THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHEST POSSIBLE FOR THE PIPE SIZE.

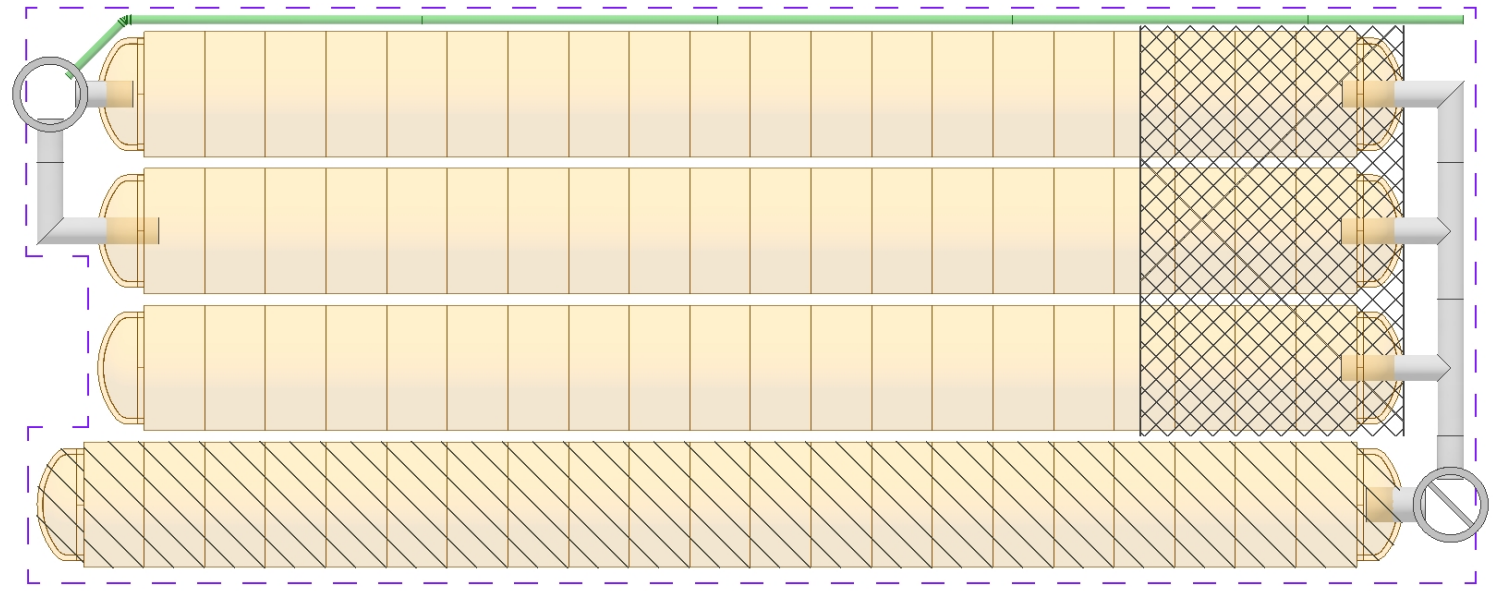
	910 MARCH RD OTTAWA, ONTARIO	DRAWN: BC	CHECKED: N/A	
DESCRIPTION		DATE:	PROJECT #:	
DRW	CHK			
REV				

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SHEET  
**5 OF 5**

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Stormceptor® EF Sizing Report

**ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD  
REDUCTION STORMCEPTOR®**

06/19/2020

Province:	Ontario
City:	Ottawa
Nearest Rainfall Station:	OTTAWA MACDONALD-CARTIER INT'L AP
NCDC Rainfall Station Id:	6000
Years of Rainfall Data:	37

Project Name:	910 March Rd.
Project Number:	-
Designer Name:	Brandon O'Leary
Designer Company:	Forterra
Designer Email:	brandon.oleary@forterrabp.com
Designer Phone:	(905) 630-0359
EOR Name:	Brandon Chow
EOR Company:	David Schaeffer Engineering Ltd.
EOR Email/Phone:	

Site Name:	910 March Rd.
Drainage Area (ha):	1.46
Runoff Coefficient 'c':	0.86

Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0
Required Water Quality Runoff Volume Capture (%):	90.0

Require Hydrocarbon Spill Capture?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	

Net Annual Sediment (TSS) Load Reduction Sizing Summary	
Stormceptor Model	TSS Removal Provided (%)
EFO4	63
EFO6	74
<b>EFO8</b>	<b>81</b>
EFO10	84
EFO12	87

**Recommended Stormceptor EFO Model: EFO8**  
**Estimated Net Annual Sediment (TSS) Load Reduction (%): 81**  
**Water Quality Runoff Volume Capture (%): > 90**



## Stormceptor<sup>®</sup> EF Sizing Report

### THIRD-PARTY TESTING AND VERIFICATION

► **Stormceptor<sup>®</sup> EF and Stormceptor<sup>®</sup> EFO** are the latest evolutions in the Stormceptor<sup>®</sup> oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

### PERFORMANCE

► **Stormceptor<sup>®</sup> EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterways.

### PARTICLE SIZE DISTRIBUTION (PSD)

► The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

Stormceptor® EF Sizing Report

Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
1	51.3	51.3	3.49	209.0	45.0	93	47.7	47.7
2	8.7	60.0	6.98	419.0	89.0	88	7.6	55.4
3	5.8	65.8	10.47	628.0	134.0	84	4.8	60.2
4	4.6	70.4	13.96	838.0	178.0	79	3.6	63.9
5	4.2	74.6	17.45	1047.0	223.0	74	3.1	67.0
6	3.2	77.8	20.94	1257.0	267.0	71	2.3	69.2
7	2.6	80.4	24.43	1466.0	312.0	66	1.7	70.9
8	2.4	82.8	27.92	1675.0	356.0	63	1.5	72.4
9	1.9	84.7	31.42	1885.0	401.0	58	1.1	73.5
10	1.6	86.3	34.91	2094.0	446.0	57	0.9	74.5
11	1.3	87.6	38.40	2304.0	490.0	55	0.7	75.2
12	1.1	88.7	41.89	2513.0	535.0	54	0.6	75.8
13	1.3	90.0	45.38	2723.0	579.0	53	0.7	76.5
14	1.1	91.1	48.87	2932.0	624.0	52	0.6	77.0
15	0.6	91.7	52.36	3142.0	668.0	52	0.3	77.3
16	0.8	92.5	55.85	3351.0	713.0	51	0.4	77.7
17	0.7	93.2	59.34	3560.0	758.0	51	0.4	78.1
18	0.5	93.7	62.83	3770.0	802.0	51	0.3	78.4
19	0.6	94.3	66.32	3979.0	847.0	51	0.3	78.7
20	0.5	94.8	69.81	4189.0	891.0	51	0.3	78.9
21	0.2	95.0	73.30	4398.0	936.0	50	0.1	79.0
22	0.4	95.4	76.79	4608.0	980.0	50	0.2	79.2
23	0.5	95.9	80.28	4817.0	1025.0	50	0.2	79.5
24	0.4	96.3	83.77	5026.0	1069.0	49	0.2	79.7
25	0.1	96.4	87.26	5236.0	1114.0	49	0.0	79.7



Stormceptor® EF Sizing Report

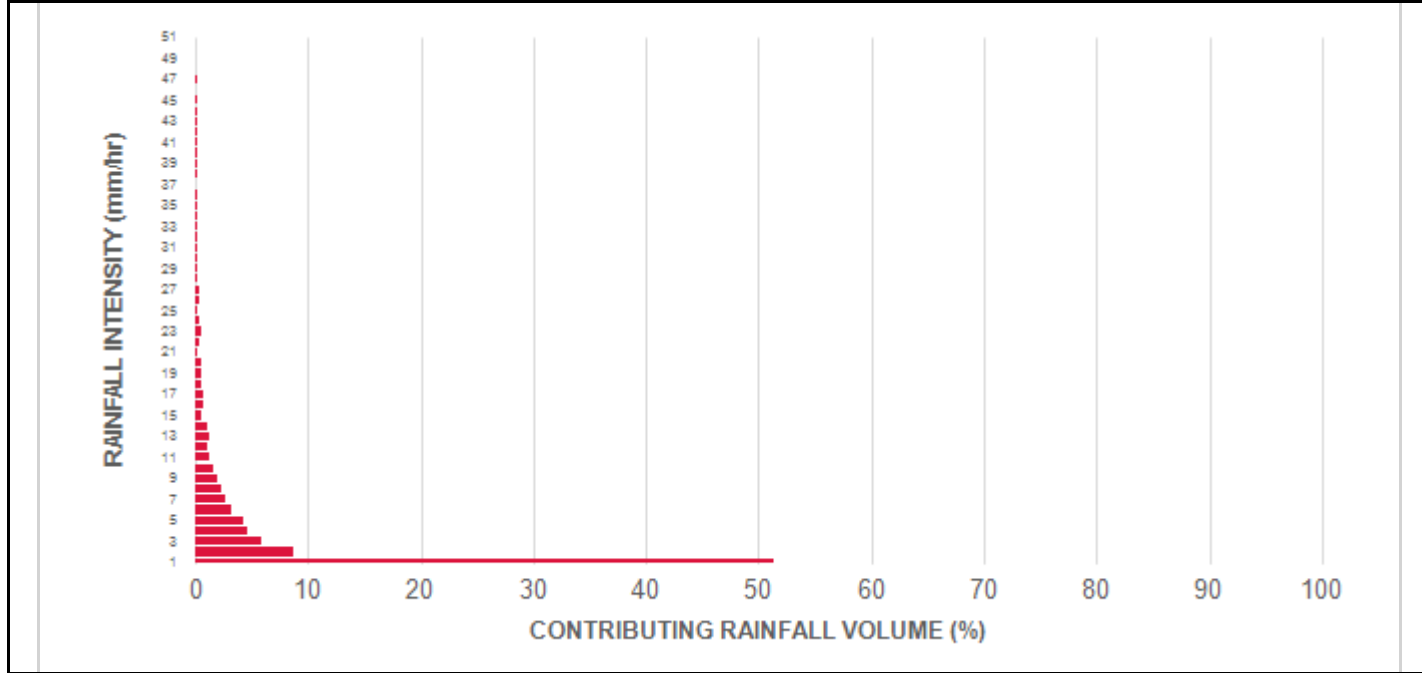
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
26	0.3	96.7	90.75	5445.0	1159.0	49	0.1	79.9
27	0.4	97.1	94.25	5655.0	1203.0	48	0.2	80.1
28	0.2	97.3	97.74	5864.0	1248.0	48	0.1	80.1
29	0.2	97.5	101.23	6074.0	1292.0	47	0.1	80.2
30	0.2	97.7	104.72	6283.0	1337.0	47	0.1	80.3
31	0.1	97.8	108.21	6492.0	1381.0	46	0.0	80.4
32	0.2	98.0	111.70	6702.0	1426.0	45	0.1	80.5
33	0.1	98.1	115.19	6911.0	1470.0	44	0.0	80.5
34	0.1	98.2	118.68	7121.0	1515.0	43	0.0	80.6
35	0.1	98.3	122.17	7330.0	1560.0	41	0.0	80.6
36	0.2	98.5	125.66	7540.0	1604.0	40	0.1	80.7
37	0.0	98.5	129.15	7749.0	1649.0	39	0.0	80.7
38	0.1	98.6	132.64	7958.0	1693.0	38	0.0	80.7
39	0.1	98.7	136.13	8168.0	1738.0	37	0.0	80.8
40	0.1	98.8	139.62	8377.0	1782.0	36	0.0	80.8
41	0.1	98.9	143.11	8587.0	1827.0	35	0.0	80.8
42	0.1	99.0	146.60	8796.0	1872.0	34	0.0	80.9
43	0.2	99.2	150.09	9006.0	1916.0	34	0.1	80.9
44	0.1	99.3	153.58	9215.0	1961.0	33	0.0	81.0
45	0.1	99.4	157.08	9425.0	2005.0	32	0.0	81.0
46	0.0	99.4	160.57	9634.0	2050.0	31	0.0	81.0
47	0.1	99.5	164.06	9843.0	2094.0	31	0.0	81.0
48	0.0	99.5	167.55	10053.0	2139.0	30	0.0	81.0
49	0.0	99.5	171.04	10262.0	2183.0	30	0.0	81.0
50	0.0	99.5	174.53	10472.0	2228.0	29	0.0	81.0
<b>Estimated Net Annual Sediment (TSS) Load Reduction =</b>								<b>81 %</b>



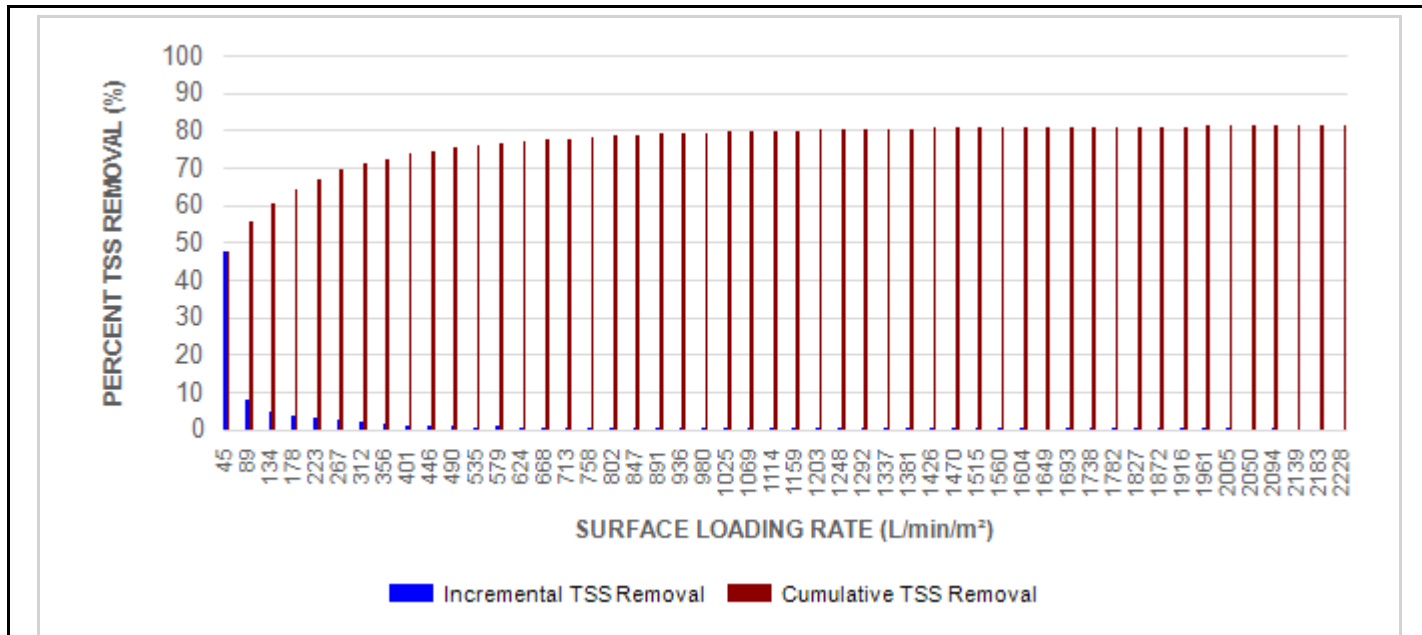


Stormceptor® **EF** Sizing Report

**RAINFALL DATA FROM OTTAWA MACDONALD-CARTIER INT'L AP RAINFALL STATION**



**INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL**



Stormceptor® EF Sizing Report

Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

**SCOUR PREVENTION AND ONLINE CONFIGURATION**

► Stormceptor® EF and EFO feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

**DESIGN FLEXIBILITY**

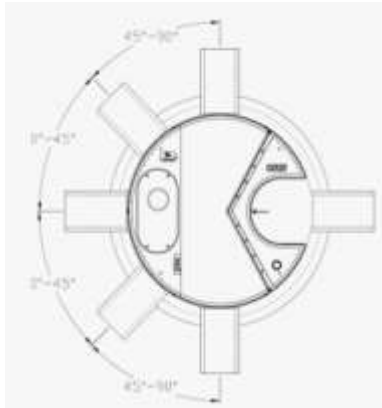
► Stormceptor® EF and EFO offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

**OIL CAPTURE AND RETENTION**

► While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, Stormceptor® EFO has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.



Stormceptor® EF Sizing Report



**INLET-TO-OUTLET DROP**

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.

0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.

45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

**HEAD LOSS**

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1.

For submerged conditions the applicable K value is 3.0.

**Pollutant Capacity**

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft³)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	197	52	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	348	92	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	545	144	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	874	231	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	1219	322	610	24	31220	1103	49952	137875

\*Increased sump depth may be added to increase sediment storage capacity

\*\* Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft³ )

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

**STANDARD STORMCEPTOR EF/EFO DRAWINGS**

For standard details, please visit <http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef>

**STANDARD STORMCEPTOR EF/EFO SPECIFICATION**

For specifications, please visit <http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef>



## STANDARD PERFORMANCE SPECIFICATION FOR “OIL GRIT SEPARATOR” (OGS) STORMWATER QUALITY TREATMENT DEVICE

### PART 1 – GENERAL

#### 1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

#### 1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program’s **Procedure for Laboratory Testing of Oil-Grit Separators**

#### 1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

### PART 2 – PRODUCTS

#### 2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The minimum sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m <sup>3</sup> sediment / 265 L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m <sup>3</sup> sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m <sup>3</sup> sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m <sup>3</sup> sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m <sup>3</sup> sediment / 2,476 L oil

## Stormceptor<sup>®</sup> EF Sizing Report

### PART 3 – PERFORMANCE & DESIGN

#### 3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

#### 3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing shall be determined using historical rainfall data and a sediment removal performance curve derived from the actual third-party verified laboratory testing data. The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

#### 3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators**.

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m<sup>2</sup>.

#### 3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators**, with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to assess whether light liquids captured after a spill are effectively retained at high flow rates.

3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m<sup>2</sup> to 2600 L/min/m<sup>2</sup>) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators**. However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.

# STANDARD PERFORMANCE SPECIFICATION FOR “OIL GRIT SEPARATOR” (OGS) STORMWATER QUALITY TREATMENT DEVICE

## PART 1 – GENERAL

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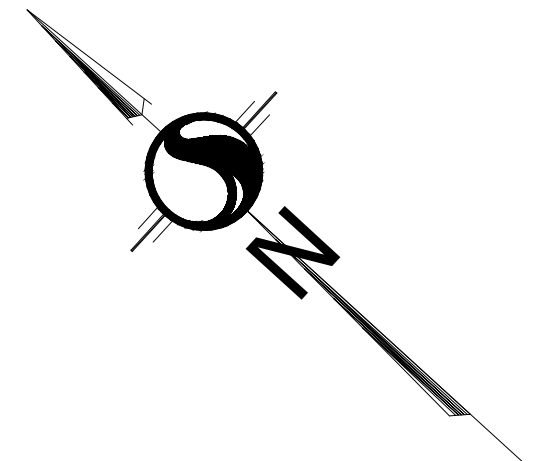
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***DRAWINGS / FIGURES***

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ASSOCIATION OF ONTARIO  
LAND SURVEYORS  
PLAN SUBMISSION FORM  
2011903

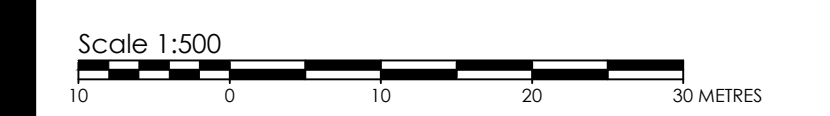
THIS PLAN IS NOT VALID  
UNLESS IT IS AN EMBOSSED  
ORIGINAL COPY  
ISSUED BY THE SURVEYOR  
IN ACCORDANCE WITH  
REGULATION 163R, SECTION 29(2)



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

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**TOPOGRAPHIC PLAN OF SURVEY  
PART OF LOTS 11 & 12  
CONCESSION 4  
(GEOGRAPHIC TOWNSHIP OF MARCH)  
CITY OF OTTAWA**



**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 0.99994.

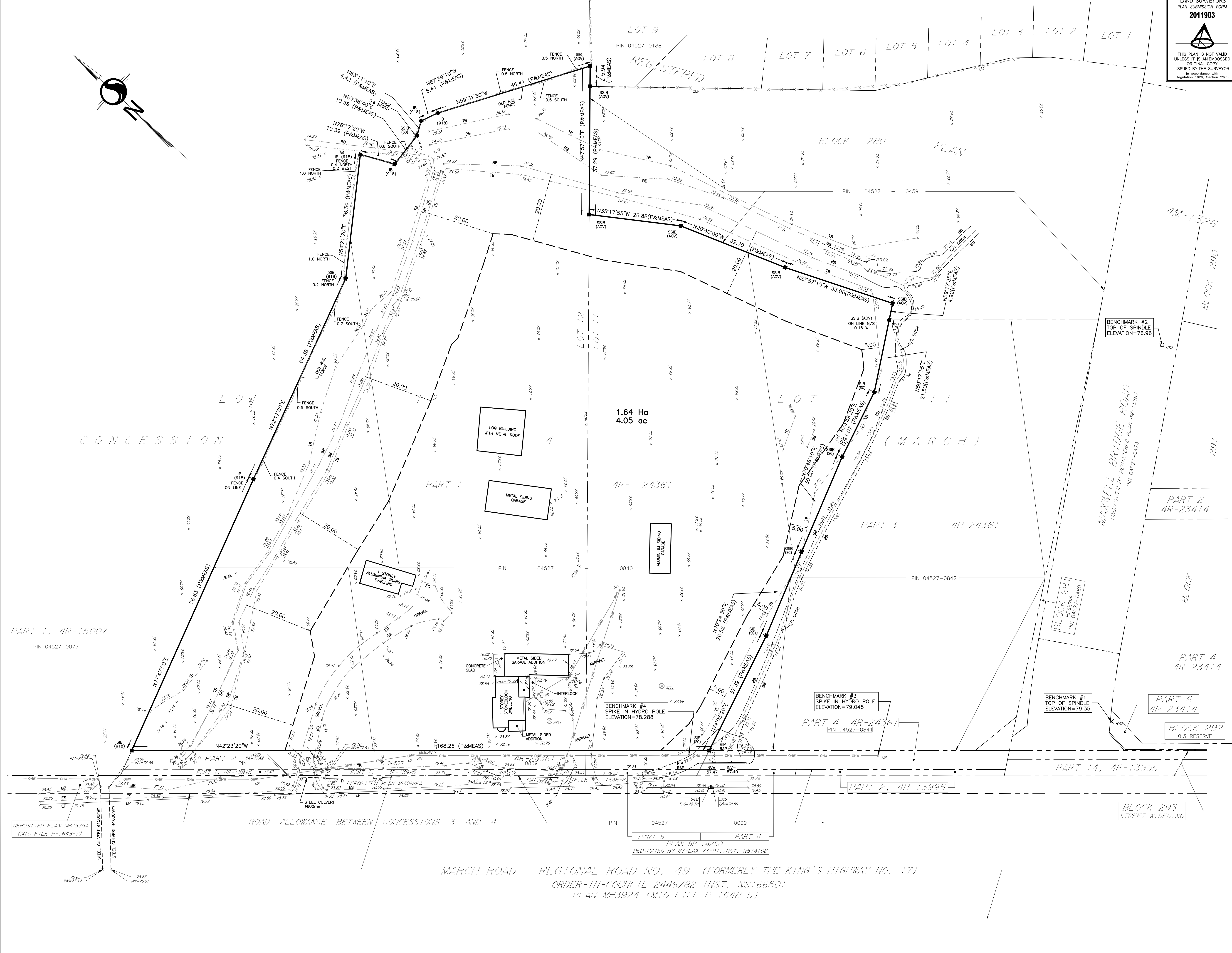
**BEARING NOTE**  
BEARINGS ARE GRID, DERIVED FROM CAN-NET VBS NETWORK GPS OBSERVATIONS ON NCC HORIZONTAL CONTROL MONUMENTS 19773035 AND 19680191, CENTRAL MERIDIAN, 76° 30' WEST LONGITUDE MTM ZONE 9, NAD83 (ORIGINAL).

19773035 N:5006060.42 E:324888.04  
19680191 N:5033564.26 E:388064.94

**ELEVATION NOTE**  
ELEVATIONS ARE GEODETIC BASED ON A SURVEY BY AOV DATED JULY 10, 2015. POSITION OF SITE BENCHMARKS #1 AND #2 AS SHOWN HEREON.

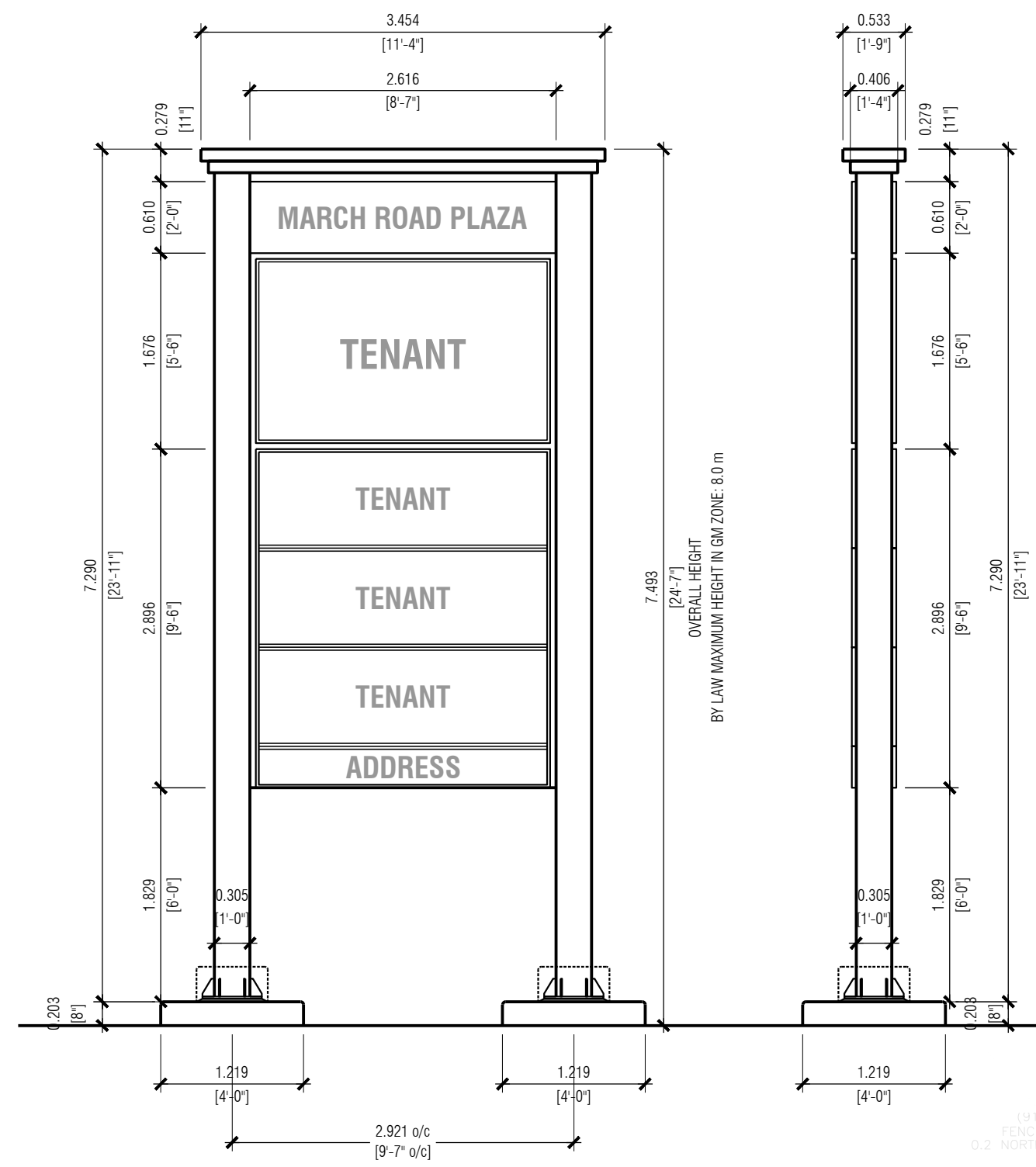
**LEGEND**

SYMBOL	DENOTES	FOUND MONUMENTS
■	ANCHOR	ANCHOR
□	CONCRETE PIN	CONCRETE PIN
IB	IRON BAR	IRON BAR
IBB	ROUND IRON BAR	ROUND IRON BAR
SIB	STANDARD IRON BAR	STANDARD IRON BAR
SSIB	SHORT STANDARD IRON BAR	SHORT STANDARD IRON BAR
CP	CUT CROSS	CUT CROSS
CP	CONCRETE PIN	CONCRETE PIN
WIT	WITNESS	WITNESS
PIN	PROPERTY IDENTIFICATION NUMBER	PROPERTY IDENTIFICATION NUMBER
MEAS	MEASURED	MEASURED
PROP	PROPORTIONED	PROPORTIONED
OU	ORIGIN UNKNOWN	ORIGIN UNKNOWN
SG	STANTEC GEOMATICS LTD.	STANTEC GEOMATICS LTD.
ORP	OBSERVED REFERENCE POINT	OBSERVED REFERENCE POINT
P	PLAN 4R-24361	PLAN 4R-24361
ES	EDGE OF SHOULDER	EDGE OF SHOULDER
EP	EDGE OF ASPHALT	EDGE OF ASPHALT
DI	DITCH	DITCH
TI	TOP OF BANK	TOP OF BANK
TB	BOTTOM OF BANK	BOTTOM OF BANK
EG	EDGE OF GRAVEL	EDGE OF GRAVEL
T/G	TOP OF GRATE	TOP OF GRATE
AW	ANCHOR	ANCHOR
SCP	SIDE INLET CB	SIDE INLET CB
HYD	FIRE HYDRANT	FIRE HYDRANT
UP	UTILITY POLE	UTILITY POLE
LS	LIGHT STANDARD	LIGHT STANDARD
WELL	WELL	WELL



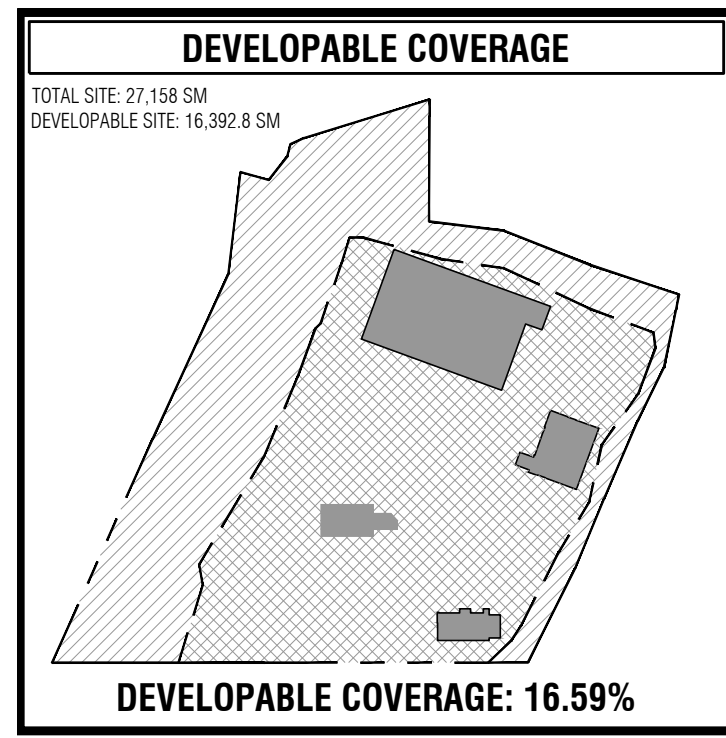
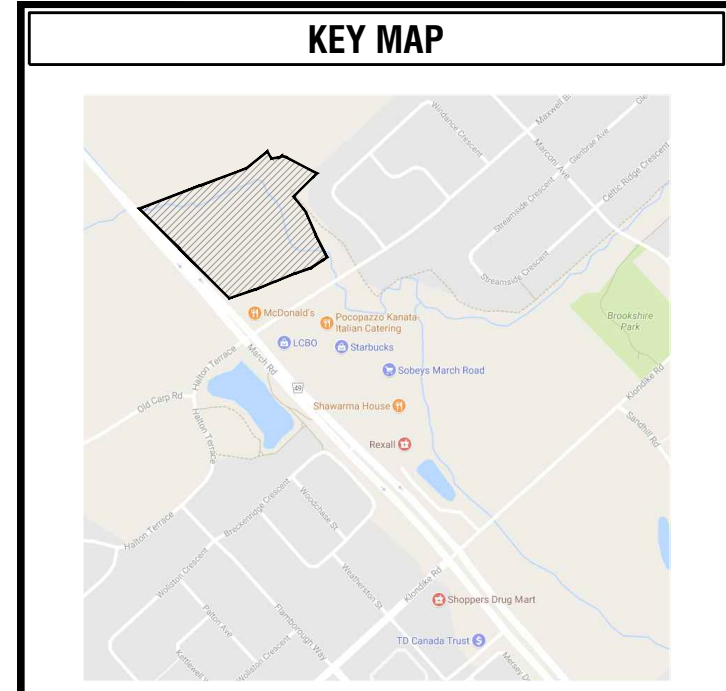
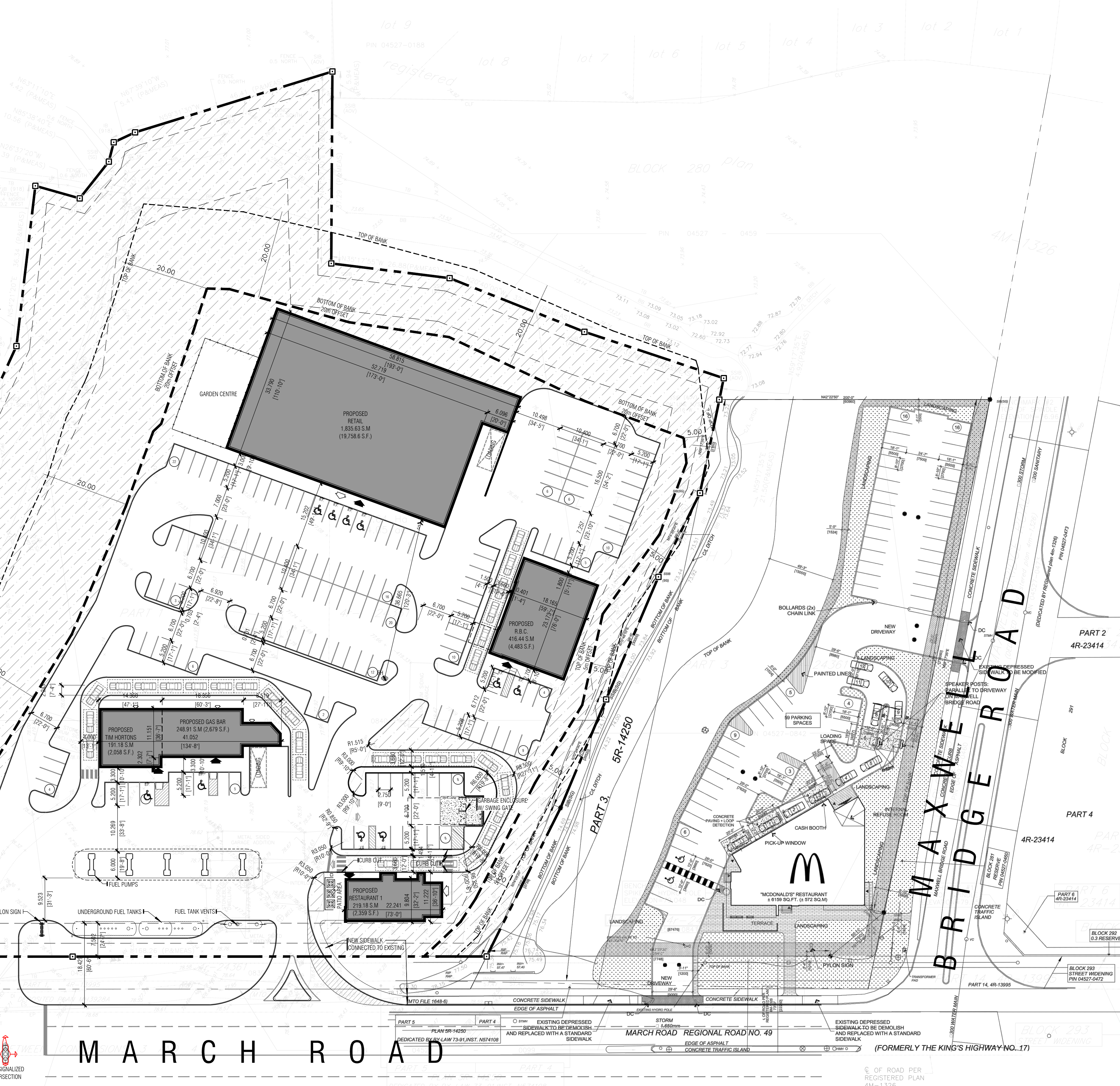
**SURVEYOR'S CERTIFICATE**  
I CERTIFY THAT:  
1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE REGULATIONS MADE UNDER THEM.  
2. THE SURVEY WAS COMPLETED ON THE 27TH DAY OF JUNE, 2017.

DATE: \_\_\_\_\_  
BRIAN J. WEBSTER  
ONTARIO LAND SURVEYOR



SIGN FACE AREA (PER SIDE): 12.84 sm  
BY LAW MAXIMUM SIGN FACE AREA (PER SIDE): 14.00 sm

2 DOUBLE SIDED PYLON SIGN DETAIL  
1:50



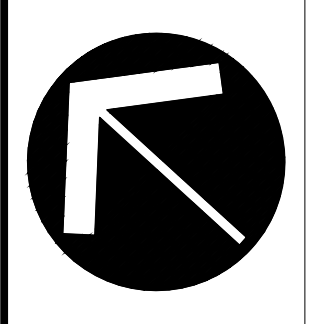
**SITE DATA**

	SF	SM	ACRES
TOTAL SITE	272,230	27,158	6.71
TOTAL DEVELOPABLE AREA	174,450	16,392.8	4.09
PROPOSED BUILDING COVERAGE			
GAS BAR C/W TIM HORTONS	4,737	440.10	1.02%
RETAIL	19,758.6	1,935.63	6.76%
RESTAURANT A	2,359	219.18	0.81%
ROYAL BANK OF CANADA	4,483	416.44	1.53%
TOTAL	37,337.6	3,611.35	13.02%
PARKING DATA			
REQUIRED PARKING (AREA C):			
RETAIL: 3.41/100SM		63 SPACES	
GAS BAR: NONE		0 SPACES	
RESTAURANT: 10/100 SM (41.036=42)		42 SPACES	
BANK: 3.4/100SM		15 SPACES	
TOTAL REQUIRED PARKING		120 SPACES	
PROVIDED PARKING		150 SPACES	
PROVIDED BARRIER FREE PARKING		10 SPACES	
TOTAL PROVIDED PARKING		160 SPACES	
REGULAR PARKING SPACE: 2.6m x 5.2m			
BARRIER FREE PARKING SPACE: (WITH 1.5m ACCESS AISLE)			
TYPE A: 3.4m x 5.2m			
TYPE B: 2.4m x 5.2m			
LANDSCAPING REQUIRED		15%	
LANDSCAPING PROVIDED		46.7%	

**LEGEND**

	PROPERTY LINE
	BUILDING SETBACK
	EDGE OF BANK
	EDGE OF BANK OFFSET
	IRON BAR
	BARRIER FREE PARKING
	TRAFFIC FLOW ARROWS
	PARKING COUNT
	GARBAGE BIN
	SIGNALIZED INTERSECTION
	SECONDARY ENTRANCE
	PRINCIPLE ENTRANCE
	PEDESTRIAN CROSSWALK
	NO PARK ZONE
	BARRIER FREE SIGN
	FIRE DEPARTMENT CONNECTION
	FIRE HYDRANT

IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO:  
 - CHECK AND VERIFY ALL DIMENSIONS ON SITE;  
 - REPORT ALL ERRORS AND/OR OMISSIONS TO GREYSTONE BEFORE CONTINUING WITH ANY WORK.  
 THESE DRAWINGS MAY NOT BE USED FOR CONSTRUCTION UNLESS NOTED OTHERWISE.  
 THESE DRAWINGS ARE NOT TO BE SCALED. ERRORS MADE BY PERSONS SCALING THESE DRAWINGS SHALL NOT BE THE RESPONSIBILITY OF GREYSTONE.  
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**Greystone**  
 Kitchener: 110 Conestoga College Blvd, Unit 1116  
 Kitchener, Ontario N2P 2N6  
 (519) 896-1010 ext.100  
 info@greystoneinc.ca  
 www.greystoneinc.ca  
 Toronto: 2999 Lakeshore Blvd. West  
 Toronto, Ontario M8V 1J8  
 (416) 951-6466

REV.	DESCRIPTION	DATE
2	ISSUED FOR SPA	06.26.20
1	ISSUED FOR CLIENT REVIEW	03.27.20

PROJECT FOR: **WEXFORD COMMERCIAL DEVELOPMENTS LTD.**

PROJECT: NEW BUILD  
 CREEKSIDE LANDING  
 MARCH ROAD  
 KANATA, ONTARIO

DRAWING: **SITE PLAN**

DRAWN: M.M.W.	CHECKED: S.R.	JOB NUMBER: 17300
DATE (YYYY/MM/DD): 2020.06.25	SCALE: AS NOTED	
DRAWING NUMBER: A1.0	REVISION NUMBER: R0	

FILE: \Greystone Design Group Inc\2017\17300 - March Rd. - March Rd. - March Rd. A1.0.R0 (2020.06.26) (dwg)  
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