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# 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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**SITE SERVICING PLAN AND STORMWATER MANAGEMENT REPORT**
**FOR**
**910 MARCH ROAD**

**WEXFORD DEVELOPMENTS**

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**SITE SERVICING PLAN AND STORMWATER MANAGEMENT REPORT**
**FOR**
**910 MARCH ROAD**
**WEXFORD DEVELOPMENTS**
**JUNE 2020 – REV 1**

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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**


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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 m²*** of retail space and ***409 m²*** 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 Briarridge 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.

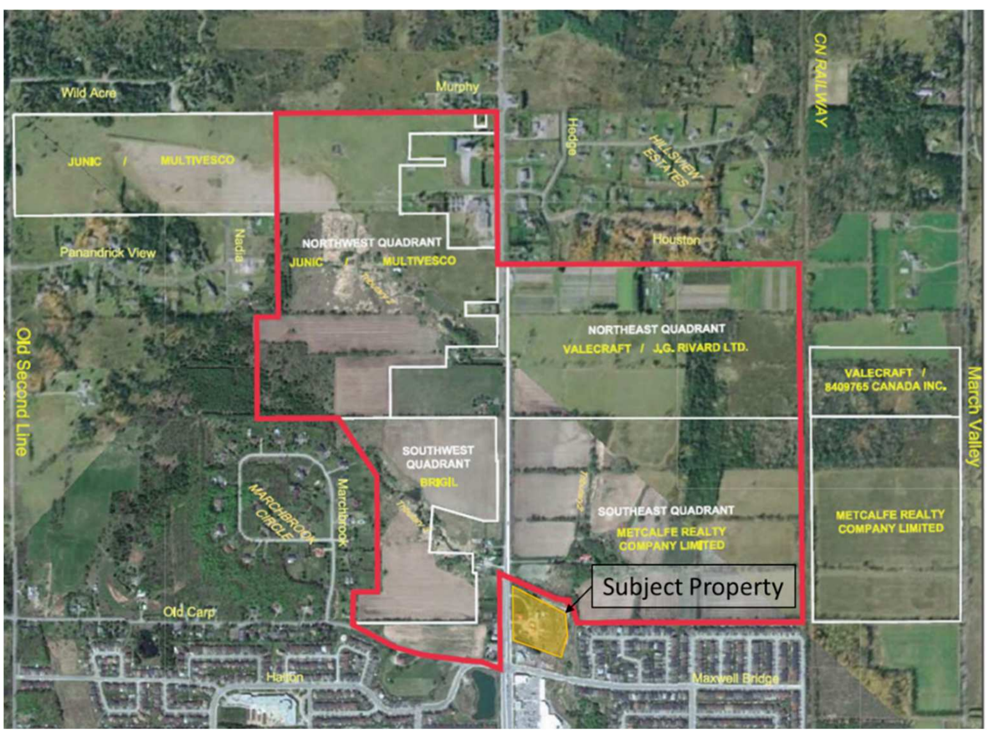


**Figure 3: Kanata North Urban Expansion Area**

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)***


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- **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 $m^3$/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/$m^2$/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 **Water Supply Guidelines***
*** Residential Max. Daily and Max. Hourly peaking factors per MOE Guidelines for Drinking-Water Systems Table 3-3 for 0 to 500 persons.*
*-Table updated to reflect ISD-2010-2*


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***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[1] (L/min) | Boundary Condition[2] (m $H_2O$ / 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 ***Water Supply Guidelines***. See ***Appendix B*** for detailed calculations.
2) Boundary conditions supplied by the City of Ottawa for the demands indicated in the correspondence; assumed ground elevation 78.9m. See ***Appendix 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.


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### 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.


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

| Design Parameter | Value |
|---|---|
| Commercial Floor Space | 5 L/m²/d |
| Restaurant Space | 125 L /9.3m²/ d |
| Infiltration and Inflow Allowance | 0.05 L/s/ha (Dry Weather)<br>0.28 L/s/ha (Wet Weather)<br>0.33 L/s/ha (Total) |
| Sanitary sewers are to be sized employing the Manning's Equation | $Q = \frac{1}{n} A R^{2/3} S^{1/2}$ |
| Minimum Sewer Size | 200 mm diameter |
| Minimum Manning's 'n' | 0.013 |
| Minimum Depth of Cover | 2.5 m from crown of sewer to grade |
| Minimum Full Flowing Velocity | 0.6 m/s |
| Maximum Full Flowing Velocity | 3.0 m/s |
| | |
| *Extracted from Sections 4 and 6 of the City of Ottawa Sewer Design Guidelines, October 2012.* | |

***Table 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 | **5.08** |
| Estimated Peak Dry Weather Flow | **7.58** |
| Estimated Peak Wet Weather Flow | **8.05** |

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

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.


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## 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 m³*** 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 m³*** 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) | ($m^3$) | (L/s) | ($m^3$) | ($m^3$) |
| 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 |
| **Total** | **82.2** | **137.4** | **137.6** | **511.2** | **607.4** |

It is anticipated that approximately ***511.2 m³*** 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 $m^3$*** 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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Per: Brandon N. Chow

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# *APPENDIX A*

## *Pre-Consultation*

# DEVELOPMENT SERVICING STUDY CHECKLIST

17-962 22/06/2020

| 4.1 General Content | | |
|---|---|---|
| ☐ | Executive Summary (for larger reports only). | N/A |
| ☒ | Date and revision number of the report. | Report Cover Sheet |
| ☒ | Location map and plan showing municipal address, boundary, and layout of proposed development. | Drawings/Figures |
| ☒ | Plan showing the site and location of all existing services. | Figure 1 |
| ☒ | Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to applicable subwatershed and watershed plans that provide context to which individual developments must adhere. | Section 1.0 |
| ☒ | Summary of Pre-consultation Meetings with City and other approval agencies. | Section 1.3 |
| ☒ | Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria. | Section 2.1 |
| ☒ | Statement of objectives and servicing criteria. | Section 1.0 |
| ☒ | Identification of existing and proposed infrastructure available in the immediate area. | Sections 3.1, 4.1, 5.1 |
| ☒ | Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available). | Section 1.0 |
| ☒ | 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 |
| ☐ | Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts. | N/A |
| ☒ | Proposed phasing of the development, if applicable. | Section 1.0 |
| ☐ | Reference to geotechnical studies and recommendations concerning servicing. | N/A |
| ☒ | All preliminary and formal site plan submissions should have the following information:<br>-Metric scale<br>-North arrow (including construction North)<br>-Key plan<br>-Name and contact information of applicant and property owner<br>-Property limits including bearings and dimensions<br>-Existing and proposed structures and parking areas<br>-Easements, road widening and rights-of-way<br>-Adjacent street names | N/A |

| 4.2 Development Servicing Report: Water | | |
|---|---|---|
| ☐ | Confirm consistency with Master Servicing Study, if available | N/A |
| ☒ | Availability of public infrastructure to service proposed development | Section 3.1 |
| ☒ | Identification of system constraints | Section 3.1 |
| ☒ | Identify boundary conditions | Section 3.1, 3.2 |
| ☒ | Confirmation of adequate domestic supply and pressure | Section 3.3 |



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

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

## 4.3 Development Servicing Report: Wastewater

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



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

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

## 4.4 Development Servicing Report: Stormwater Checklist

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


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

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

## 4.5 Approval and Permit Requirements: Checklist

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

## 4.6 Conclusion Checklist

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



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

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

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

| Attendee | Role | Organization |
|---|---|---|
| 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.

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 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

---

**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

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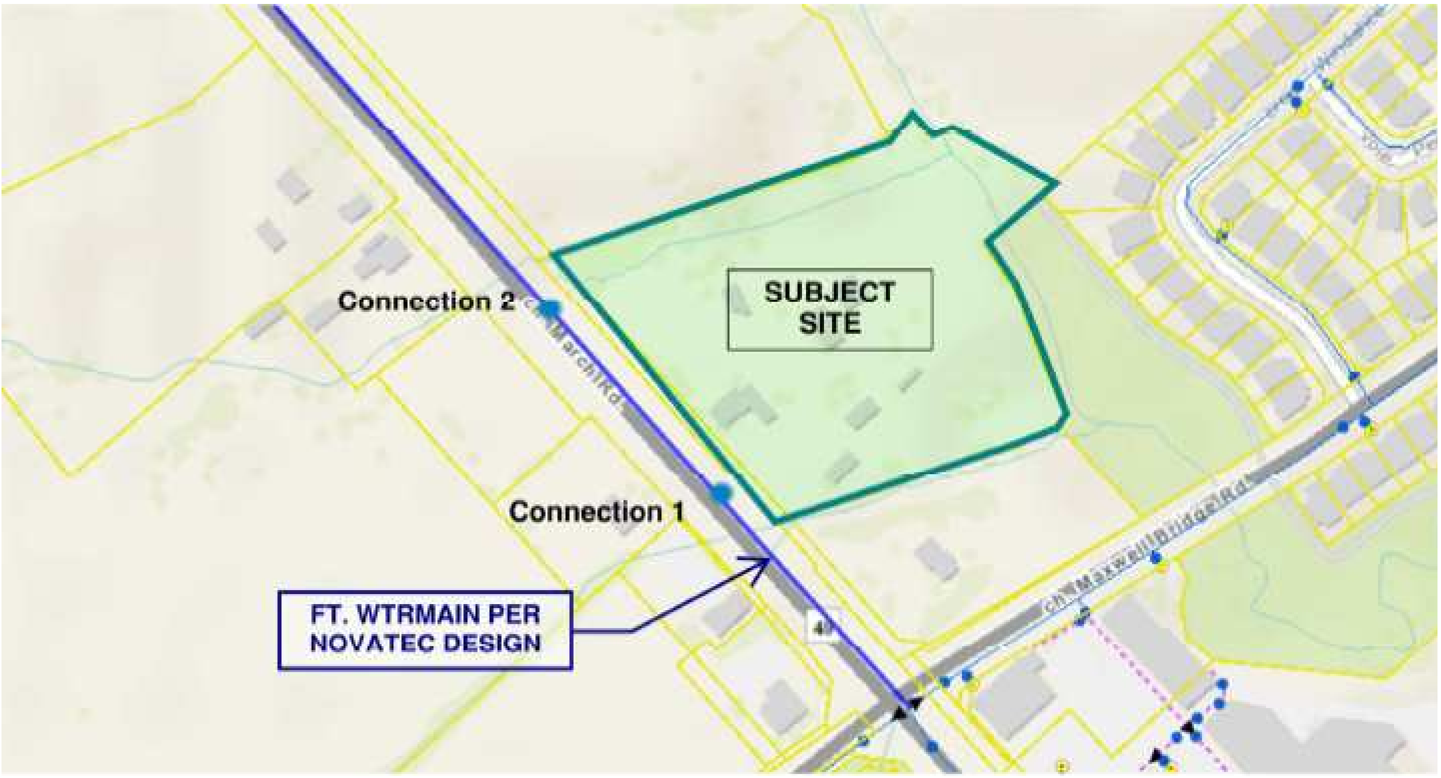
**ATTENTION : Ce courriel provient d’un expéditeur externe. Ne cliquez sur aucun lien et n’ouvrez pas de pièce jointe, excepté si vous connaissez l’expéditeur.**

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 m2 of restaurant space*** and ***2,131 m2*** 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 |
|---|---|---|
| **Avg. Daily** | 10.6 | 0.18 |
| **Max Day** | 16.0 | 0.27 |
| **Peak Hour** | 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@dsel.ca

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'

## Charlotte Kelly

| | |
|---|---|
| **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 |t. 613 253 0006 ext. 229| f. 613 253 0122 | eogden@mvc.on.ca

---

**From:** Charlotte Kelly <CKelly@dsel.ca>
**Sent:** May 8, 2020 4:53 PM
**To:** Matt Craig <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

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# *APPENDIX B*

## *Water Supply*

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

DSEL

**Institutional / Commercial / Industrial Demand**

| Property Type | Unit Rate | | Units | Avg. Daily $m^3/d$ | Avg. Daily L/min | Max Day $m^3/d$ | Max Day L/min | Peak Hour $m^3/d$ | Peak Hour L/min |
|---|---|---|---|---|---|---|---|---|---|
| Hardware Store | 2.5 | $L/m^2/d$ | 1,836 | 4.59 | 3.2 | 6.9 | 4.8 | 12.4 | 8.6 |
| Restaurant 1 * | 125 | L/9.3m2/d | 218 | 2.93 | 2.0 | 4.4 | 3.1 | 7.9 | 5.5 |
| Bank | 2.5 | $L/m^2/d$ | 416 | 1.04 | 0.7 | 1.6 | 1.1 | 2.8 | 2.0 |
| Tim Hortans * | 125 | L/9.3m2/d | 191 | 2.57 | 1.8 | 3.9 | 2.7 | 6.9 | 4.8 |
| Gas Station | 2.5 | $L/m^2/d$ | 249 | 0.62 | 0.4 | 0.9 | 0.6 | 1.7 | 1.2 |
| | | | **Total I/CI Demand** | 11.8 | 8.2 | 17.6 | 12.2 | 31.7 | 22.0 |
| | | | **Total Demand** | **11.8** | **8.2** | **17.6** | **12.2** | **31.7** | **22.0** |

* Estimated number of seats at 1 seat per 9.3 m2

## 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 | $m^2$ | *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 |
|---|---|---|---|---|---|---|
| **N** | Wood Frame | >45m | 0 | 0 | 0 | 0% |
| **S** | Wood Frame | >45m | 15 | 1 | 15 | 0% |
| **E** | Non-Combustible | >45m | 20 | 1 | 20 | 0% |
| **W** | Non-Combustible | >45m | 30 | 4 | 120 | 0% |
| | | **% Increase** | | | | **0%** *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 | $m^2$ | *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 |
|---|---|---|---|---|---|---|
| **N** | Wood Frame | >45m | 0 | 0 | 0 | 0% |
| **S** | Wood Frame | >45m | 0 | 1 | 0 | 0% |
| **E** | Non-Combustible | >45m | 0 | 1 | 0 | 0% |
| **W** | Wood Frame | 20.1m-30m | 30 | 1 | 30 | 8% |
| | | **% Increase** | | | | **8%** *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 | $m^2$ | *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 |
|---|---|---|---|---|---|---|
| **N** | Wood Frame | >45m | 0 | 0 | 0 | 0% |
| **S** | Wood Frame | 10.1m-20m | 25 | 1 | 25 | 12% |
| **E** | Non-Combustible | >45m | 0 | 0 | 0 | 0% |
| **W** | Wood Frame | >45m | 0 | 0 | 0 | 0% |
| | | **% Increase** | | | | **12%** *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 | $m^2$ | *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 |
|---|---|---|---|---|---|---|
| **N** | Non-Combustible | 10.1m-20m | 25 | 1 | 25 | 12% |
| **S** | Wood Frame | >45m | 0 | 0 | 0 | 0% |
| **E** | Non-Combustible | >45m | 0 | 0 | 0 | 0% |
| **W** | Wood Frame | >45m | 0 | 0 | 0 | 0% |
| | | **% Increase** | | | | **12%** *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

| | Head (m) | m $H_2O$ | PSI | kPa |
|---|---|---|---|---|
| Avg. Day | **131.2** | 52.3 | 74.4 | 513.1 |
| Peak Hour | **127** | 48.1 | 68.4 | 471.9 |
| Max Day + FF | **126.9** | 48 | 68.3 | 470.9 |

March Road Connection 2

Grnd Elev 78.9

| | Head (m) | m $H_2O$ | PSI | kPa |
|---|---|---|---|---|
| Avg. Day | **131.2** | 52.3 | 74.4 | 513.1 |
| Peak Hour | **127** | 48.1 | 68.4 | 471.9 |
| Max Day + FF | **126.9** | 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

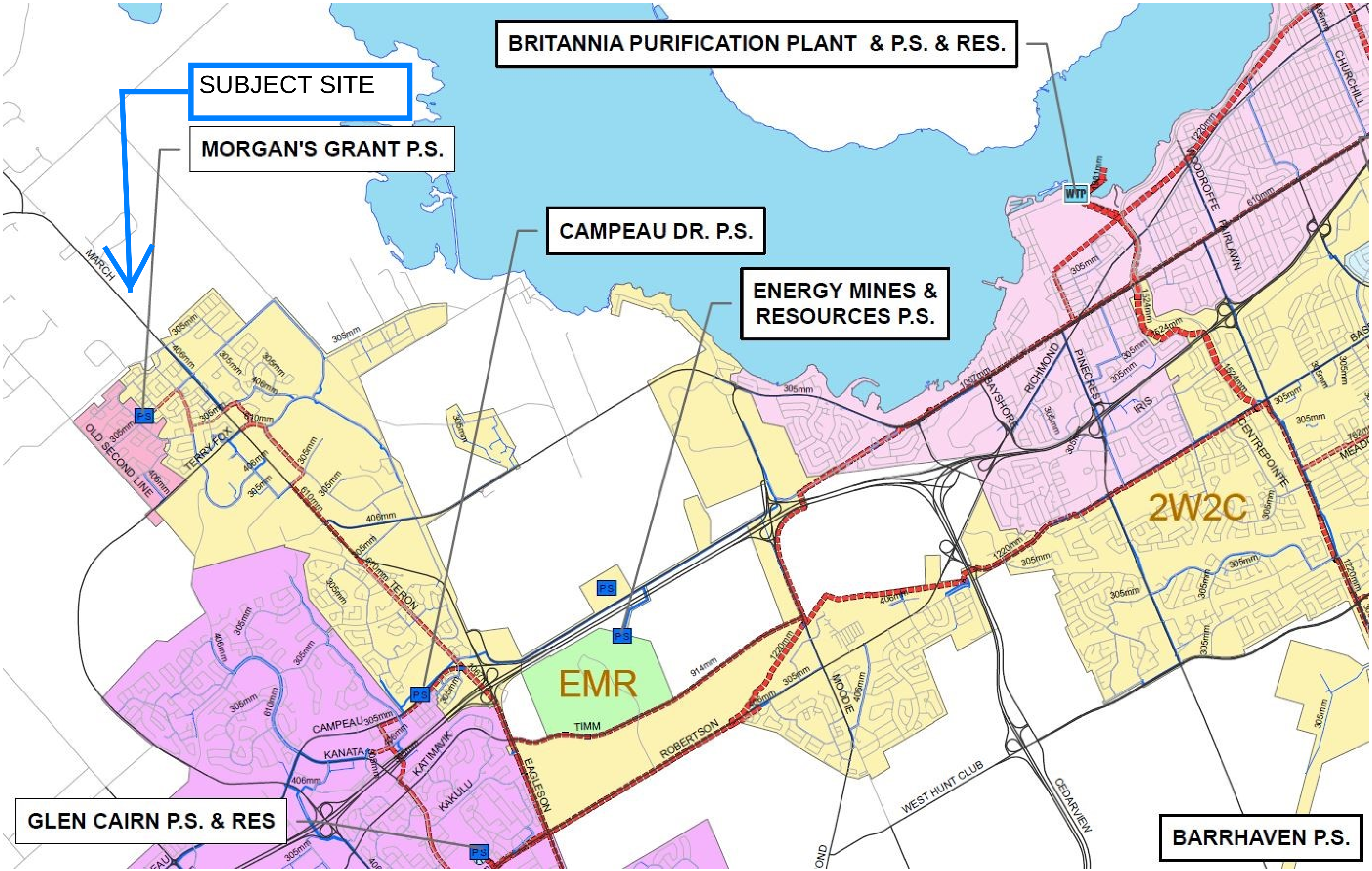
## Pipe Diameter vs. "C" Factor

| 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 H20) |
|---|---|---|
| Max | 552 | 56.3 |
| Rec Max | 480 | 49.0 |
| Rec Min | 350 | 35.7 |
| Min | 275 | 28.1 |

| Location | Average Day (kPa) | Max Day + Fire Flow (kPa) | Peak Hour (kPa) |
|---|---|---|---|
| 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
MARCH
TERRY FOX
OLD SECOND LINE
TERON
CAMPEAU
KANATA
KATIMAVIK
KAKULU
EAGLESON
TIMM
ROBERTSON
MOODIE
WEST HUNT CLUB
CEDARVIEW
BAYSHORE
RICHMOND
PINECREST
IRIS
WOODROFFE
FAIRLAWN
CHURCHILL
CENTREPOINTE
WTP
P.S

# 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                     Elevation       InitLevel       MinLevel        MaxLevel
        Diameter        MinVol          VolCurve

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

[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 | VelocityUnit 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 |

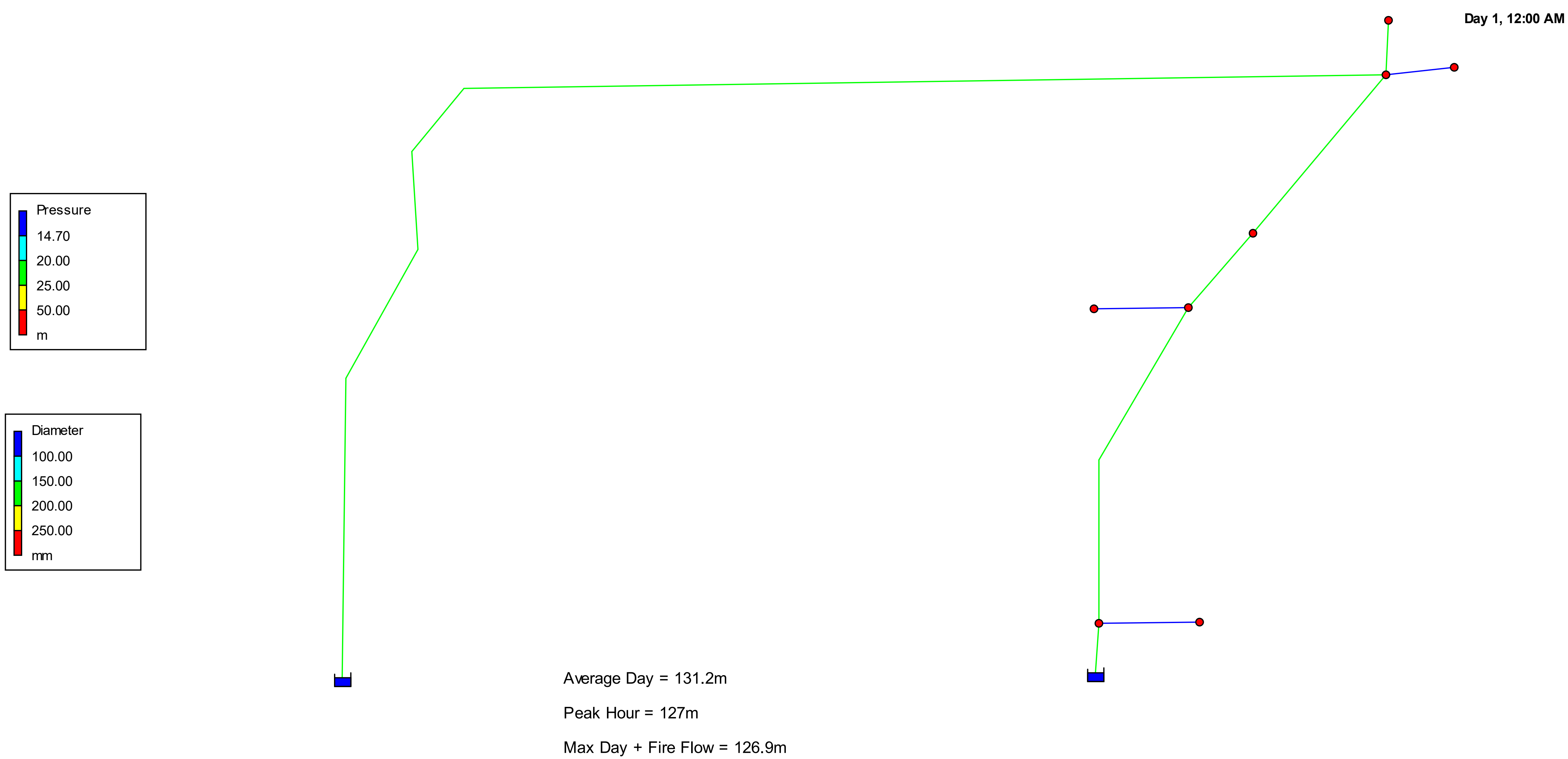
↑

Page 2

Link Results: (continued)

| Link ID | Flow LPM | VelocityUnit m/s | 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                     Elevation       InitLevel       MinLevel        MaxLevel
        Diameter        MinVol          VolCurve

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

[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 | VelocityUnit m/s | Headloss m/km | Status |
|---|---|---|---|---|
| 1 | 2846.85 | 2.68 | 152.46 | Open |
| 2 | 2843.75 | 2.68 | 79.72 | Open |

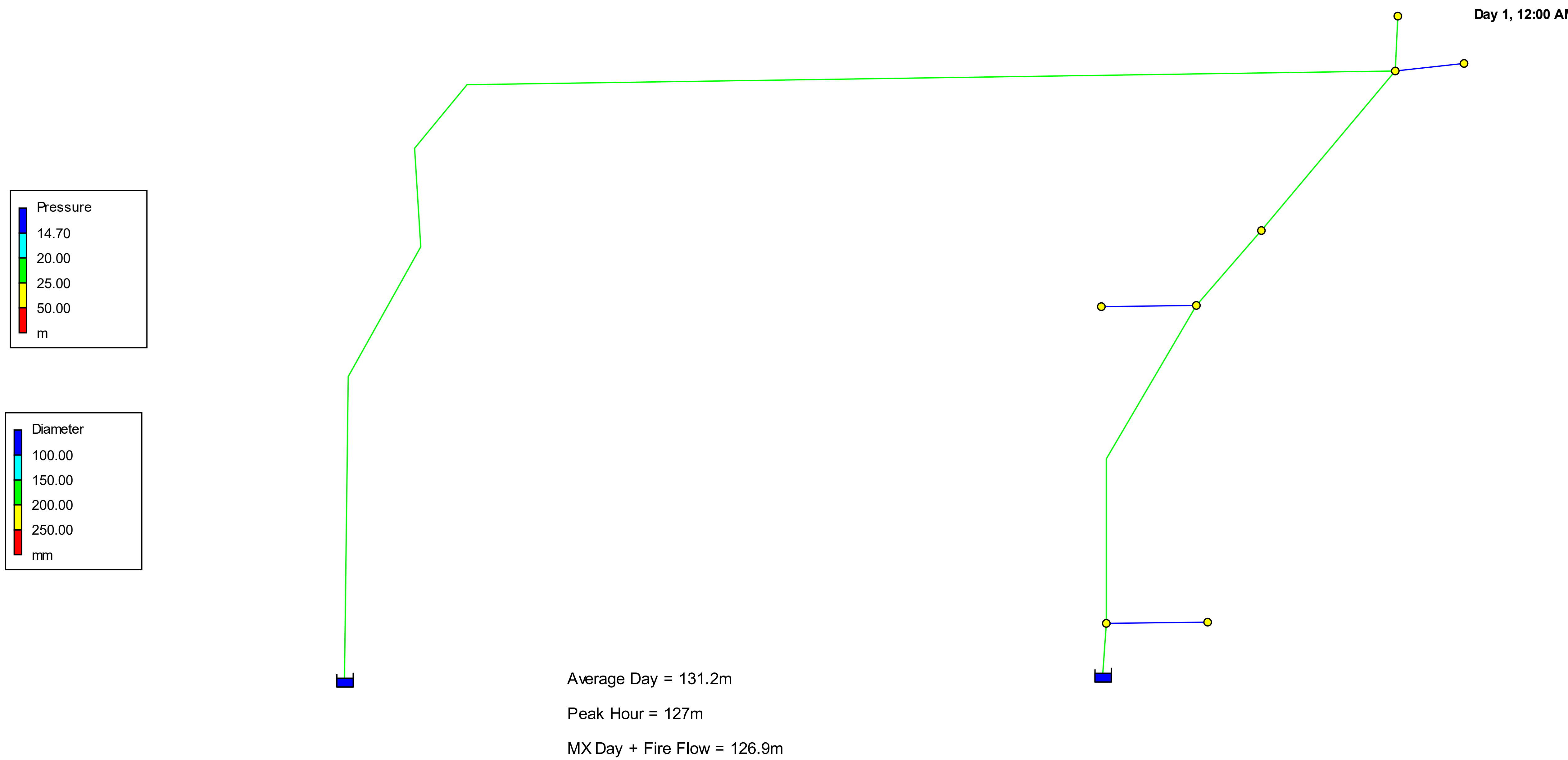
| | | | | |
|---|---|---|---|---|
| 6 | 2840.45 | 2.68 | 119.12 | Open |
| 7 | -2159.55 | 2.04 | 56.33 | Open |
| 8 | -3.10 | 0.03 | 0.06 | Open |
| 9 | 3.30 | 0.03 | 0.07 | Open |



Link Results: (continued)

| Link ID | Flow LPM | VelocityUnit m/s | 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



# 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                     Elevation       InitLevel       MinLevel        MaxLevel
        Diameter        MinVol          VolCurve

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

[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 | VelocityUnit m/s | Headloss m/km | Status |
|---|---|---|---|---|
| 1 | 14.22 | 0.01 | 0.01 | Open |
| 2 | 8.72 | 0.01 | 0.00 | Open |

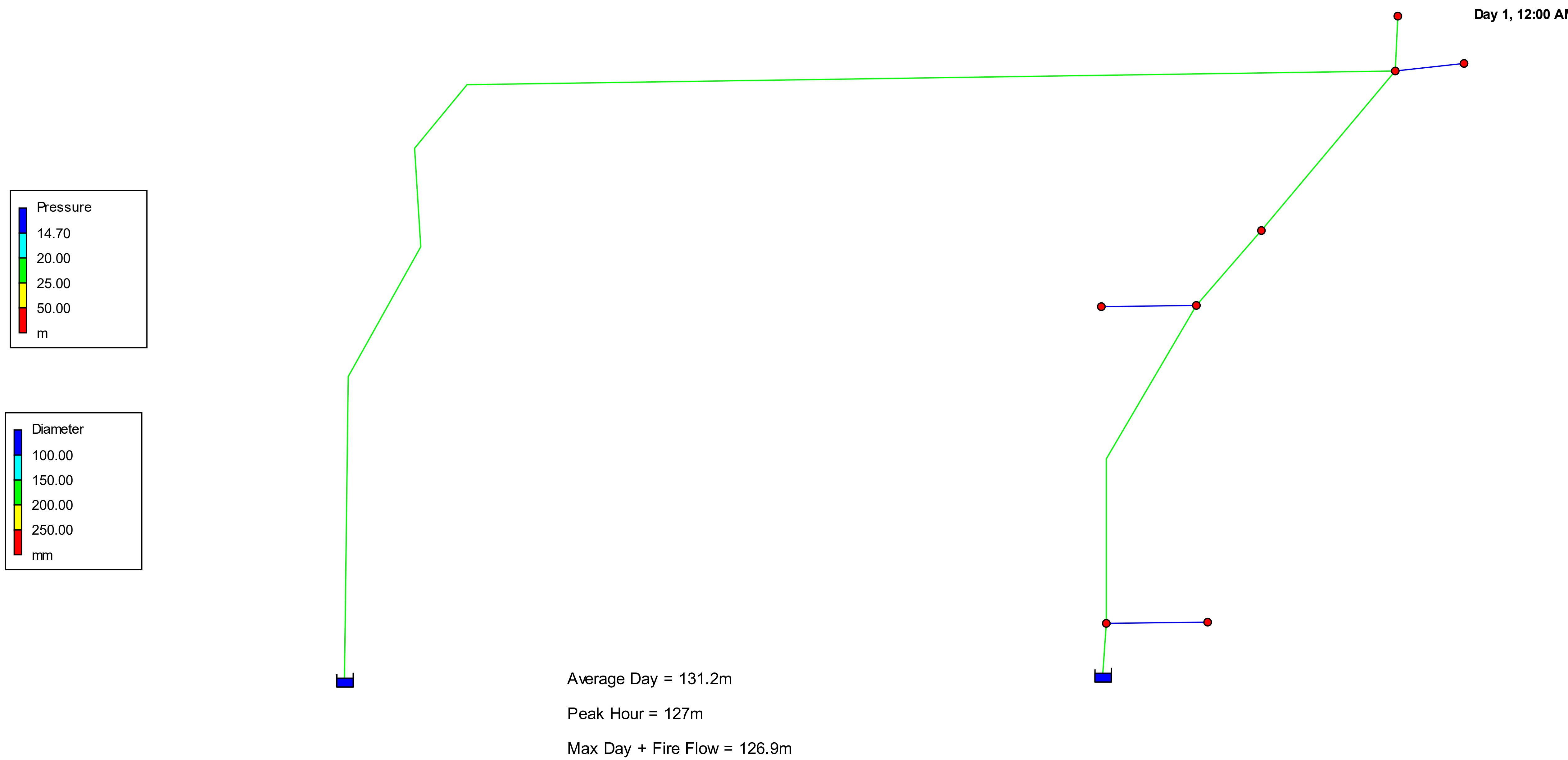
| | | | | |
|---|---|---|---|---|
| 6 | 2.72 | 0.00 | 0.00 | Open |
| 7 | 2.72 | 0.00 | 0.00 | Open |
| 8 | -5.50 | 0.05 | 0.16 | Open |
| 9 | 6.00 | 0.05 | 0.21 | Open |



Link Results: (continued)

| Link ID | Flow LPM | VelocityUnit m/s | 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[1] (psi) |
|---|---|---|
| Maximum HGL | 131.2 | 74.4 |
| Peak Hour | 127.0 | 68.5 |
| Max Day plus Fire 1 | 126.9 | 68.3 |

[1] Ground Elevation = 78.9 m

**Connection 2 – March Rd.**

| Demand Scenario | Head (m) | Pressure[1] (psi) |
|---|---|---|
| Maximum HGL | 131.2 | 74.4 |
| Peak Hour | 127.0 | 68.5 |
| Max Day plus Fire 1 | 126.9 | 68.3 |

[1] 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.*

# *APPENDIX C*

## *Wastewater Collection*

**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 | $L/m^2/d$ | 1,836 | 2.55 |
| Restaurant 1 * | 125 | L/9.3m2/d | 218 | 0.81 |
| Bank | 5.0 | $L/m^2/d$ | 416 | 0.58 |
| Tim Hortans * | 125 | L/9.3m2/d | 191 | 0.71 |
| Gas Station | 5.0 | $L/m^2/d$ | 249 | 0.35 |
| | | | **Average I/C/I Flow** | **5.00** |
| | | | **Peak Institutional / Commercial Flow** | 5.91 |
| | | | **Peak Industrial Flow**** | 1.59 |
| | | | **Peak I/C/I Flow** | **7.50** |

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

| | | |
|---|---|---|
| **Total Estimated Average Dry Weather Flow Rate** | **5.08** | **L/s** |
| **Total Estimated Peak Dry Weather Flow Rate** | **7.58** | **L/s** |
| **Total Estimated Peak Wet Weather Flow Rate** | **8.05** | **L/s** |

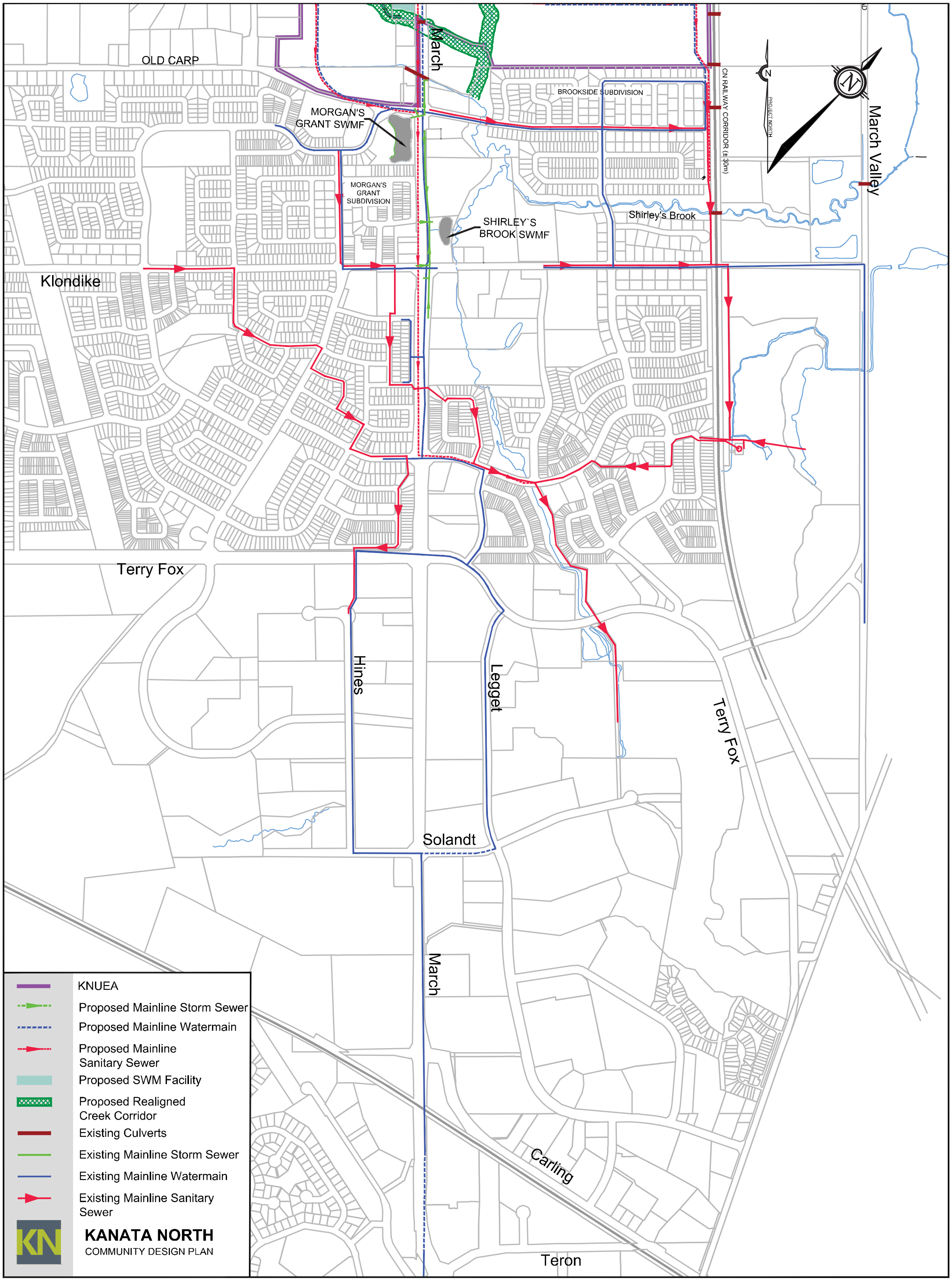



**FIGURE 23** | Proposed Combined Infrastructure Offsite

**KANATA NORTH URBAN EXPANSION AREA**
**COMMUNITY DESIGN PLAN**

TABLE C-6b:
SANITARY SEWER DESIGN SHEET

NOVATECH
Engineers, Planners & Landscape Architects

| LOCATION | | | | RESIDENTIAL AREA AND POPULATION | | | | | | | | | | ICI | | | | | | | | INFILTRATION | | | | FLOW | PIPE | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Cumulative | | | | | IND | | | COMM | | INST | | | | | | | | | | | | | |
| Street | From | To | Total | Dwellings | | Density (Net ha) | | Pop. | Residential | | | Peak | Peak | Area | Accu. | Peak | Area | Accu. | Area | Accu. | Peak | Total | Accu. Area | | Infiltration | Total | Dia | Dia | Slope | Velocity | Capacity | Ratio |
| | Node | Node | Area | SFH | SD/TH | Low[3] | High[4] | | Area | Pop. | | Factor | Flow | | Area | Factor | | Area | | Area | Flow | Area | New | Exist | Flow | Flow | Act | Nom | | (Full) | (Full) | Q/Qfull |
| | | | (ha) | 3.4 | 2.7 | 101 | 161 | | (ha) | New | Exist | | (l/s) | (ha) | (ha) | | (ha) | (ha) | (ha) | (ha) | (l/s) | (ha) | (ha) | | (l/s) | (l/s) | (mm) | (mm) | (%) | (m/s) | (l/s) | (%) |
| | | | | pers/ea | pers/ea | pers/ha | per/ha | | | | | | | | | | | | | | | | | | | | | | | | | |
| **EAST KNCDP** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| E-1 | E-1 | E-3 | 4.47 | | | 3.00 | | 303.0 | 3.00 | **303** | | 4.00 | 4.9 | | | | | | | | 0.0 | 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 | | | | | | | | 0.0 | 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 | | | | | | | | 0.0 | 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 | | | | | | | | 0.0 | 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** | 2.29 | 2.0 | 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 | | | | | | | | 0.0 | 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 | | | | | | | | 0.0 | 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 | | | | | | | | 0.0 | 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 | | | | | | | 2.29 | 2.0 | 3.98 | 52.74 | | 14.8 | 66.5 | 381 | 375 | 0.22 | 0.75 | 85.7 | 78% |
| **Total Flows From East KNUEA** | | | **52.74** | | | | | **3644** | **33.91** | **3644** | | **3.37** | **49.7** | | | | | | | **2.29** | **1.99** | | **52.74** | | **14.77** | **66.49** | | | | | | |
| *X-1 (Brookside Subdivision)** | | *MH 209* | *32.80* | | | | | *2216.1* | *26.04* | | *2216* | *3.55* | *18.2* | | | | *6.76* | *6.76* | | | *2.3* | *32.80* | | *32.80* | *11.5* | *32.0* | | | | | | |
| | | | | *Population from Novatech #103106 Sanitary Sewer Design Sheet | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | *MH 209* | *MH 208* | | | | | | *0.0* | *59.95* | **3644** | *2216* | *3.18* | *63.3* | | | | | *6.76* | | *2.29* | *7.9* | *0.00* | **52.74** | *32.80* | *26.2* | *97.4* | 457 | 450 | 0.20 | 0.81 | 132.9 | 73% |
| | *MH 208* | *MH 207* | | | | | | *0.0* | *59.95* | **3644** | *2216* | *3.18* | *63.3* | | | | | *6.76* | | *2.29* | *7.9* | *0.00* | **52.74** | *32.80* | *26.2* | *97.4* | 457 | 450 | 0.20 | 0.81 | 132.9 | 73% |
| *X-2 (Brookside Subdivision)* | *MH 207* | *MH 206* | *3.12* | | *44* | | | *118.8* | *63.07* | **3644** | *2335* | *3.17* | *64.0* | | | | | *6.76* | | *2.29* | *7.9* | *3.12* | **52.74** | *35.92* | *27.3* | *99.2* | *457* | *450* | *0.20* | *0.81* | *132.9* | *75%* |
| *X-3 (Brookside Subdivision)*** | *MH 206* | *MH 205* | *9.81* | | *244* | | | *658.8* | *72.88* | **3644** | *2994* | *3.13* | *67.9* | | | | | *6.76* | | *2.29* | *7.9* | *9.81* | **52.74** | *45.73* | *30.8* | *106.5* | *457* | *450* | *0.21* | *0.83* | *136.2* | *78%* |
| | | | | **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) | Future | *MH 205* | 20.99 | | | | | | | | | | | 15.85 | 15.85 | 3.6 | | | | | 13.2 | 20.99 | **20.99** | | 5.9 | 19.1 | | | | | | |
| *Briar Ridge Pump Station Access Road* | *MH 205* | *MH 204* | | | | | | | *72.88* | **3644** | *2994* | *3.13* | *67.9* | | *15.85* | *3.6* | | *6.76* | | *2.29* | *21.1* | *0.00* | **73.73** | *45.73* | *36.6* | *125.6* | *457* | *450* | *0.20* | *0.81* | *132.9* | *94%* |
| *Briar Ridge Pump Station Access Road* | *MH 204* | *MH 203* | | | | | | | *72.88* | **3644** | *2994* | *3.13* | *67.9* | | *15.85* | *3.6* | | *6.76* | | *2.29* | *21.1* | *0.00* | **73.73** | *45.73* | *36.6* | *125.6* | *457* | *450* | *0.20* | *0.81* | *132.9* | *94%* |
| *Briar Ridge Pump Station Access Road* | *MH 203* | *MH 202* | | | | | | | *72.88* | **3644** | *2994* | *3.13* | *67.9* | | *15.85* | *3.6* | | *6.76* | | *2.29* | *21.1* | *0.00* | **73.73** | *45.73* | *36.6* | *125.6* | *457* | *450* | *0.25* | *0.91* | *148.6* | *85%* |
| *Briar Ridge Pump Station Access Road* | *MH 202* | *MH 201A* | | | | | | | *72.88* | **3644** | *2994* | *3.13* | *67.9* | | *15.85* | *3.6* | | *6.76* | | *2.29* | *21.1* | *0.00* | **73.73** | *45.73* | *36.6* | *125.6* | *457* | *450* | *0.26* | *0.92* | *151.6* | *83%* |
| *Briar Ridge Pump Station Access Road* | *MH 201A* | *MH 201* | | | | | | | *72.88* | **3644** | *2994* | *3.13* | *67.9* | | *15.85* | *3.6* | | *6.76* | | *2.29* | *21.1* | *0.00* | **73.73** | *45.73* | *36.6* | *125.6* | *457* | *450* | *0.25* | *0.91* | *148.6* | *85%* |
| *Briar Ridge Pump Station Access Road* | *MH 201* | *MH 200* | | | | | | | *72.88* | **3644** | *2994* | *3.13* | *67.9* | | *15.85* | *3.6* | | *6.76* | | *2.29* | *21.1* | *0.00* | **73.73** | *45.73* | *36.6* | *125.6* | *457* | *450* | *0.25* | *0.91* | *148.6* | *85%* |
| *Briar Ridge Pump Station Access Road* | *MH 200* | *EXMH1* | | | | | | | *72.88* | **3644** | *2994* | *3.13* | *67.9* | | *15.85* | *3.6* | | *6.76* | | *2.29* | *21.1* | *0.00* | **73.73** | *45.73* | *36.6* | *125.6* | *457* | *450* | *0.23* | *0.87* | *142.5* | *88%* |
| **RIDDELL VILLAGE (X-4)***** | | *EXMH1* | *42.42* | | | | | *3100* | | | *3100* | *3.43* | *24.6* | | | | | | *2.96* | *2.96* | *1.0* | *42.42* | | *42.42* | *14.8* | *40.5* | | | | | | |
| | | | | ***Population from Novatech #103106 Sanitary Sewer Design Sheet | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | *EXMH1* | *EXMH2* | | | | | | | *72.88* | **3644** | *6094* | *2.97* | *85.6* | | *15.85* | *3.6* | | *6.76* | | *5.25* | *23.6* | *0.00* | **73.73** | *88.15* | *51.5* | *160.8* | *457* | *450* | *0.30* | *0.99* | *162.8* | *99%* |
| | *EXMH2* | *EXMH4* | | | | | | | *72.88* | **3644** | *6094* | *2.97* | *85.6* | | *15.85* | *3.6* | | *6.76* | | *5.25* | *23.6* | *0.00* | **73.73** | *88.15* | *51.5* | *160.8* | *457* | *450* | *0.30* | *0.99* | *162.8* | *99%* |
| X-14 (Future Industrial Lands east of Marshes Golf Course) | *EXMH4* | *EXMH5* | 19.23 | | | | | | *72.88* | **3644** | *6094* | *2.97* | *85.6* | *19.23* | *35.08* | *3.1* | | *6.76* | | *5.25* | *35.6* | *19.23* | **92.96** | *88.15* | *56.9* | *178.1* | *457* | *450* | *0.44* | *1.20* | *197.2* | *90%* |
| | *EXMH5* | *PS* | | | | | | | *72.88* | **3644** | *6094* | *2.97* | *85.6* | | *35.08* | *3.1* | | *6.76* | | *5.25* | *35.6* | *0.00* | **92.96** | *88.15* | *56.9* | *178.1* | *457* | *450* | *0.40* | *1.14* | *188.0* | *95%* |
| **Briar Ridge Pump Station** | | | | | | | | | 72.88 | **3644** | *6094* | 2.97 | 85.6 | | 35.08 | 3.1 | | 6.76 | | 5.25 | 35.6 | 0.00 | **92.96** | *88.15* | 56.9 | 178.1 | | | | | | |
| **WEST KNUEA / MARCH ROAD** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| W-1 | W-1 | W-3 | 7.51 | | | 5.14 | | 519.1 | 5.14 | **519** | | 3.97 | 8.3 | | | | | | | | 0.0 | 7.51 | 7.51 | | 2.1 | 10.4 | 203 | 200 | 0.40 | 0.67 | 21.6 | 48% |
| | | | | | | | | | | | | | 0.0 | | | | | | | | | | | | | | | | | | | |
| W-2 | W-2 | W-3 | 8.94 | | | 2.36 | | 238.4 | 2.36 | **238** | | 4.00 | 3.9 | | | | | | **4.32** | 4.32 | 3.8 | 8.94 | 8.94 | | 2.5 | 10.1 | 203 | 200 | 0.35 | 0.62 | 20.2 | 50% |
| | | | | | | | | | | | | | 0.0 | | | | | | | | | | | | | | | | | | | |
| W-3 | W-3 | W-4 | 6.52 | | | 1.97 | 2.16 | 546.7 | 11.63 | **1304** | | 3.72 | 19.7 | | | | | | | | 0.0 | 6.52 | 22.97 | | 6.4 | 26.1 | 254 | 250 | 0.70 | 1.02 | 51.9 | 50% |
| W-5 | W-5 | W-6 | 4.20 | | | 2.74 | | 276.7 | 2.74 | **277** | | 4.00 | 4.5 | | | | | | | | 0.0 | 4.20 | 4.20 | | 1.2 | 5.7 | 203 | 200 | 0.35 | 0.62 | 20.2 | 28% |
| W-6 | W-6 | W-8 | 4.29 | | | 3.04 | | 307.0 | 5.78 | **584** | | 3.94 | 9.3 | | | | | | | | 0.0 | 4.29 | 8.49 | | 2.4 | 11.7 | 203 | 200 | 0.35 | 0.62 | 20.2 | 58% |
| | | | | | | | | | | | | | 0.0 | | | | | | | | | | | | | | | | | | | |
| W-7 | W-7 | W-8 | 7.39 | | | 4.24 | | 428.2 | 4.24 | **428** | | 4.00 | 6.9 | | | | | | | | 0.0 | 7.39 | 7.39 | | 2.1 | 9.0 | 203 | 200 | 1.60 | 1.33 | 43.2 | 21% |
| W-8 | W-8 | W-9 | 2.85 | | | 1.02 | 0.55 | 191.6 | 11.59 | **1204** | | 3.75 | 18.3 | | | | | | | | 0.0 | 2.85 | 18.73 | | 5.2 | 23.5 | 254 | 250 | 0.35 | 0.72 | 36.7 | 64% |
| W-4 | W-4 | MR-1 | 3.10 | | | | | 0.0 | 23.22 | **2508** | | 3.51 | 35.6 | | | | **0.35** | 0.35 | **0.83** | 5.15 | 4.8 | 3.10 | 26.07 | | 7.3 | 47.7 | 254 | 250 | 1.00 | 1.22 | 62.0 | 77% |
| | | | | | | | | | | | | | 0.0 | | | | | | | | | | | | | | | | | | | |
| W-14 | W-14 | W-15 | 3.79 | | | 0.36 | | 36.4 | 0.36 | **36** | | 4.00 | 0.6 | | | | | | **2.89** | 2.89 | 2.5 | 3.79 | 3.79 | | 1.1 | 4.2 | 203 | 200 | 0.35 | 0.62 | 20.2 | 21% |
| W-15 | W-15 | W-17 | 3.17 | | | 2.20 | | 222.2 | 2.56 | **259** | | 4.00 | 4.2 | | | | | | | | 0.0 | 3.17 | 6.96 | | 1.9 | 6.1 | 203 | 200 | 0.35 | 0.62 | 20.2 | 30% |

**KANATA NORTH URBAN EXPANSION AREA**
**COMMUNITY DESIGN PLAN**

TABLE C-6b:
SANITARY SEWER DESIGN SHEET

NOVATECH
Engineers, Planners & Landscape Architects

| LOCATION | | | RESIDENTIAL AREA AND POPULATION | | | | | | | | | | | ICI | | | | | | | | INFILTRATION | | | | FLOW | PIPE | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Cumulative | | | | | IND | | | COMM | | INST | | | | | | | | | | | | | |
| Street | From Node | To Node | Total Area (ha) | Dwellings SFH 3.4 | Dwellings SD/TH 2.7 | Density (Net ha) Low[3] 101 | Density (Net ha) High[4] 161 | Pop. | Residential Area (ha) | Residential Pop. New | Residential Pop. Exist | Peak Factor | Peak Flow (l/s) | Area (ha) | Accu. Area (ha) | Peak Factor | Area (ha) | Accu. Area (ha) | Area (ha) | Accu. Area (ha) | Peak Flow (l/s) | Total Area (ha) | Accu. Area New (ha) | Accu. Area Exist | Infiltration Flow (l/s) | Total Flow (l/s) | Dia Act (mm) | Dia Nom (mm) | Slope (%) | Velocity (Full) (m/s) | Capacity (Full) (l/s) | Ratio Q/Qfull (%) |
| W-16 | W-16 | W-17 | 6.55 | | | 3.17 | 1.78 | 606.8 | 4.95 | **607** | | 3.93 | 9.7 | | | | | | | | 0.0 | 6.55 | 6.55 | | 1.8 | 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** | 3.05 | | 8.04 | 9.6 | 6.48 | 19.99 | | 5.6 | 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 | | 8.04 | 9.9 | 1.36 | 47.42 | | 13.3 | 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** | 1.38 | **3.77** | 3.77 | 4.5 | 7.17 | 25.90 | | 7.3 | 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 | | 11.81 | 14.4 | 1.37 | 74.69 | | 20.9 | 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 | | | | | | | | 0.0 | 1.53 | 1.53 | | 0.4 | 2.5 | 203 | 200 | 0.70 | 0.88 | 28.6 | 9% |
| W-11 | W-11 | MR-3 | 3.55 | | | | 1.64 | 264.0 | 2.42 | **390** | | 4.00 | 6.3 | | | | **1.08** | 1.08 | | | 0.9 | 3.55 | 5.08 | | 1.4 | 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 | | | | | | | | 0.0 | 3.90 | 3.90 | | 1.1 | 7.8 | 203 | 200 | 0.35 | 0.62 | 20.2 | 39% |
| W-19 | W-19 | MR-3 | 9.23 | | | | | 0.0 | 3.03 | **415** | | 4.00 | 6.7 | | | | **8.83** | 8.83 | | | 7.7 | 9.23 | 13.13 | | 3.7 | 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 | 16.75 | | 11.81 | 24.8 | 4.74 | 97.64 | | 27.3 | 110.4 | 610 | 600 | 0.10 | 0.69 | 202.4 | 55% |
| W-12 | W-12 | X-12 | 11.62 | | | 2.24 | 6.98 | 1350.0 | 9.22 | **1350** | | 3.71 | 20.3 | | | | | | **2.01** | 2.01 | 1.7 | 11.62 | 11.62 | | 3.3 | 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 | | | | | | | | 0.0 | 3.54 | 15.16 | | 4.2 | 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 | | | | | | | | 0.0 | 1.76 | 1.76 | | 0.5 | 5.1 | | | | | | |
| MR-4 (MARCH ROAD) | MR-4 | *MH 186* | 4.71 | | | | | 0.0 | 50.45 | **6120** | | 3.16 | 78.4 | | | | | 16.75 | | 13.82 | 26.5 | 4.71 | 119.27 | | 33.4 | 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* | | *83* | | | *224.1* | *1.29* | | *224* | *4.00* | *2.1* | | | | | | | | *0.0* | *1.29* | | *1.29* | *0.5* | *2.5* | | | | | | |
| | | | **** 83 units obtained from Co-op website (http://www.chaseo.ca/member/blue-heron-co-op/) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *X-7 (Morgans Grant) ***** * | *X-7* | *X-8* | *48.45* | | | | | *3188.0* | *49.74* | | *3188* | *3.42* | *25.2* | | | | | | | | *0.0* | *48.45* | | *49.74* | *17.4* | *42.6* | | | | | | |
| | | | ***** Information obtained from JL Richards #24566, Sanitary Design Sheet, July 2012 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *X-8 (Inverary Drive)* | *X-8* | *MH 186* | *4.31* | *39* | *49* | | | *264.9* | *54.05* | | *3677* | *3.37* | *28.6* | | | | | | | | *0.0* | *4.31* | | *54.05* | *18.9* | *47.6* | | | | | | |
| *Shirley's Brooke Drive* | *MH 186* | *MH 184* | *0.00* | | | | | *0.0* | *104.50* | **6120** | *3677* | *2.96* | *98.7* | | | | | *16.75* | | *13.82* | *26.5* | *0.00* | *119.27* | *54.05* | *52.3* | *177.5* | 610 | 600 | 0.10 | 0.69 | 202.4 | 88% |
| *X-9 (Mckinley Drive)* | *X-9* | *MH 184* | *7.84* | | *117* | | | *315.9* | | | *316* | *4.00* | *2.9* | | | | *2.73* | *2.73* | | | *2.4* | *7.84* | | *7.84* | *2.7* | *8.0* | | | | | | |
| *Shirleys Brooke Drive* | *MH 184* | *MH 182* | *0.00* | | | | | *0.0* | *104.50* | **6120** | *3993* | *2.95* | *100.4* | | | | | *19.48* | | *13.82* | *28.9* | *0.00* | *119.27* | *61.89* | *55.1* | *184.4* | 610 | 600 | 0.10 | 0.69 | 202.4 | 91% |
| *Shirleys Brooke Drive* | *MH 182* | *MH 1* | *0.00* | | | | | *0.0* | *104.50* | **6120** | *3993* | *2.95* | *100.4* | | | | | *19.48* | | *13.82* | *28.9* | *0.00* | *119.27* | *61.89* | *55.1* | *184.4* | 610 | 600 | 0.10 | 0.69 | 202.4 | 91% |
| *X-10 (Sandhill Road)* | | *MH 1* | *11.62* | *9* | *60* | | *5.32* | *1049.1* | *11.62* | | *1049* | *3.79* | *9.2* | | | | | | *2.11* | *2.11* | *1.8* | *11.62* | | *11.62* | *4.1* | *15.1* | | | | | | |
| *X-11* | | *MH 1* | *0.87* | | | | *0.87* | *140.1* | *0.87* | | *140* | *4.00* | *1.3* | | | | | | | | *0.0* | *0.87* | | *0.87* | *0.3* | *1.6* | | | | | | |
| Briar Ridge Pump Station | *PS* | *MH 1* | | | | | | | 72.88 | **3644** | 6094 | 2.97 | 85.623 | 0 | 35.08 | 3.1 | 0.00 | 6.76 | 0.00 | 5.25 | 35.6 | 0.00 | 92.96 | 88.15 | 56.9 | 178.1 | | | | | | |
| EAST MARCH TRUNK | *MH 1* | *EMT* | 0.00 | | | | | 0.0 | 189.87 | **9764** | 11276 | 2.63 | 172.7 | | 35.08 | 3.1 | | 26.24 | | 21.18 | 66.3 | 0.00 | 212.23 | 162.53 | 116.3 | 355.3 | 762 | 750 | 0.10 | 0.80 | 367.1 | 97% |

**DESIGN PARAMETERS**

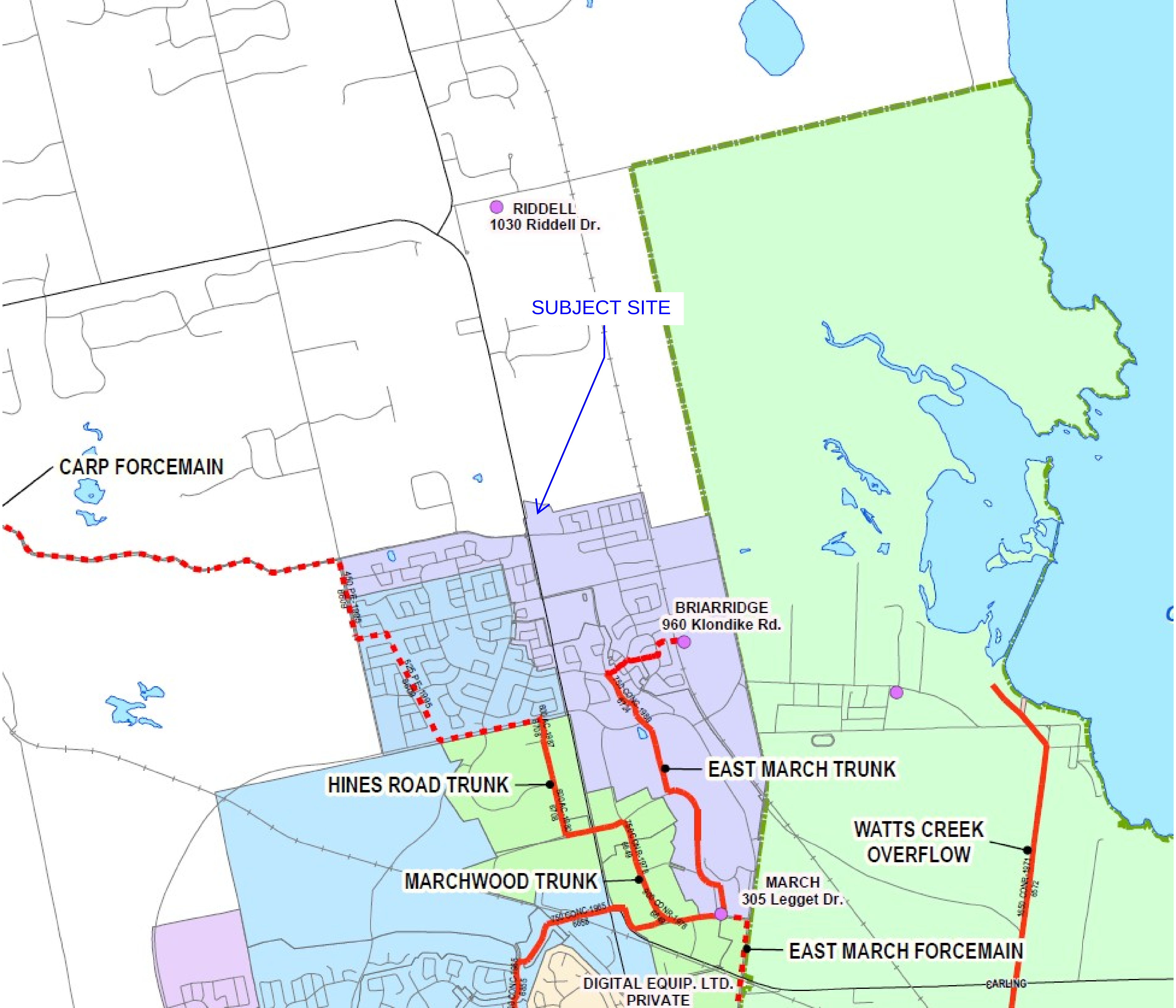
| | | |
|---|---|---|
| Average Daily Flow (Future)= | 350 | L/cap/day |
| Average Daily Flow (Existing)= | 200 | L/cap/day |
| Indust/Comm/Inst Flow (Future)= | 50000 | L/ha/day |
| Indust/Comm/Inst Flow (Existing)= | 20000 | L/ha/day |
| Max Res Peak Factor= | 4.00 | |
| Comm/Inst Peak Factor= | 1.50 | |

| | | |
|---|---|---|
| Industrial Peak Factor= per MOE graph | | |
| Extraneous Flow (Future)= | 0.28 | L/s/ha |
| Extraneous Flow (Existing)= | 0.35 | L/s/ha (Jan 2008 monitored event) |
| Minimum Velocity= | 0.60 | m/s |
| Manning's n= | 0.013 | |

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

Notes:
1. Existing sanitary sewers tributary to, and not receiving flow from the KNUEA Trunk sewer have not been analysed for capacity
2. Existing unit counts obtained from City of Ottawa geoOttawa (2014) parcel counts, unless otherwise indicated
3. Low Density based on (16.6 Singles/net ha * 3.4pers/unit) + (16.5 Towns/net ha * 2.7pers/unit)
4. High Density based on (35.8 Towns/net ha * 2.7pers/unit) + (35.8 Apartments/net ha * 1.8pers/unit)
5. Overall unit counts for the KNCDP 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.
EAST MARCH TRUNK
HINES ROAD TRUNK
WATTS CREEK
OVERFLOW
MARCHWOOD TRUNK
MARCH
305 Legget Dr.
EAST MARCH FORCEMAIN
DIGITAL EQUIP. LTD.
PRIVATE
CARLING

# *APPENDIX D*

## *Stormwater Management*

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

**Existing Drainage Charateristics From Internal Site**

| | | |
|---|---|---|
| **Area** | 1.647 | ha |
| **C** | 0.35 | Rational Method runoff coefficient |
| **L** | 135 | m |
| **Up Elev** | 78.85 | m |
| **Dn Elev** | 74.5 | m |
| **Slope** | 3.2 | % |
| **Tc** | 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**

| | **2-year** | **5-year** | **100-year** | |
|---|---|---|---|---|
| **i** | 53.3 | 72.0 | 122.9 | mm/hr |
| **Q** | 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

| | 2-year | | | | | 100-year | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| $t_c$ (min) | i (mm/hr) | $Q_{actual}$ (L/s) | $Q_{release}$ (L/s) | $Q_{stored}$ (L/s) | $V_{stored}$ ($m^3$) | i (mm/hr) | $Q_{actual}$* (L/s) | $Q_{release}$ (L/s) | $Q_{stored}$ (L/s) | $V_{stored}$ ($m^3$) |
| 10.0 | 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 *Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations*
**$t_c$** 10 min, tc at outlet without restriction

**Estimated Number of Roof Drains**
**Building Length** 54
**Building Width** 34
**Number of Drains** 13
**$m^2$ / Drain** 134.5 max 232.25$m^2$/notch as recommended by Zurn for Ottawa

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

| d (m) | A ($m^2$) | $V_{acc}$ ($m^3$) | $V_{avail}$ ($m^3$) | $Q_{notch}$ (L/s) | $Q_{roof}$ (L/s) | $V_{drawdown}$ (hr) |
|---|---|---|---|---|---|---|
| 0.000 | 0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 0.025 | 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

| | 2-year | | | | | 100-year | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| $t_c$ (min) | i (mm/hr) | $Q_{actual}$ (L/s) | $Q_{release}$ (L/s) | $Q_{stored}$ (L/s) | $V_{stored}$ ($m^3$) | i (mm/hr) | $Q_{actual}$ (L/s) | $Q_{release}$ (L/s) | $Q_{stored}$ (L/s) | $V_{stored}$ ($m^3$) |
| 10 | 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 $Q_{roof}$** | **12.07 L/s** | | **100-year $Q_{roof}$** | **18.76 L/s** |
| **2-year Max. Storage Required** | **14.7 $m^3$** | | **100-year Max. Storage Required** | **51.5 $m^3$** |
| **2-year Storage Depth** | **0.061 m** | | **100-year Storage Depth** | **0.095 m** |
| **2-year Estimated Drawdown Time** | **0.37 hr** | | **)0-year Estimated Drawdown Time** | **0.93 hr** |


DSEL©

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

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

**Total Subsurface Storage ($m^3$)** 429.2

**Stage Attenuated Areas Storage Summary**

| | Stage | Surface Storage | | | Surface and Subsurface Storage | | | |
|---|---|---|---|---|---|---|---|---|
| | Stage | Ponding | $h_o$ | delta d | V* | $V_{acc}$** | $Q_{release}$† | $V_{drawdown}$ |
| | (m) | ($m^2$) | (m) | (m) | ($m^3$) | ($m^3$) | (L/s) | (hr) |
| Orifice INV | 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
**$V_{acc}$=Total surface and sub-surface
† $Q_{release}$ = 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*

| | 2-year | | | | | 100-year | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| $t_c$ | i | $Q_{actual}$‡ | $Q_{release}$ | $Q_{stored}$ | $V_{stored}$ | i | $Q_{actual}$‡ | $Q_{release}$ | $Q_{stored}$ | $V_{stored}$ |
| (min) | (mm/hr) | (L/s) | (L/s) | (L/s) | ($m^3$) | (mm/hr) | (L/s) | (L/s) | (L/s) | ($m^3$) |
| 10 | 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 $Q_{attenuated}$** | **60.96 L/s** | **100-year $Q_{attenuated}$** | **92.29 L/s** |
| **2-year Max. Storage Required** | **122.7 $m^3$** | **100-year Max. Storage Required** | **459.8 $m^3$** |
| **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 ($m^3$) | 100-Year Release Rate (L/s) | 100-Year Required Storage ($m^3$) | 100-Year Available Storage ($m^3$) |
|---|---|---|---|---|---|
| Unattenuated Areas | 9.2 | 0.0 | 26.6 | 0.0 | 0.0 |
| Roof Controls | 12.1 | 14.7 | 18.8 | 51.5 | 145.7 |
| Attenutated Areas | 61.0 | 122.7 | 92.3 | 459.8 | 461.7 |
| **Total** | **82.2** | **137.4** | **137.6** | **511.2** | **607.4** |

| | | | | | | | | | | Sewer Data | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Area ID** | **Up** | **Down** | **Area** | **C** | **Indiv AxC** | **Acc AxC** | **$T_C$** | **I** | **Q** | **DIA** | **Slope** | **Length** | **$A_{hydraulic}$** | **R** | **Velocity** | **Qcap** | **Time Flow** | **Q / Q full** |
| | | | **(ha)** | **(-)** | | | **(min)** | **(mm/hr)** | **(L/s)** | **(mm)** | **(%)** | **(m)** | **($m^2$)** | **(m)** | **(m/s)** | **(L/s)** | **(min)** | **(-)** |
| A111 | CBMH111 | STM107 | 0.135 | 0.70 | 0.09 | 0.09 | 10.0 | 104.2 | 27.4 | 250 | 0.50 | 22.8 | 0.049 | 0.063 | 0.86 | 42.0 | 0.4 | 0.65 |
| | | | | | | | 10.4 | | | | | | | | | | | |
| A110 | CBMH110 | STM 107 | 0.118 | 0.90 | 0.11 | 0.11 | 10.0 | 104.2 | 30.7 | 250 | 0.50 | 7.6 | 0.049 | 0.063 | 0.86 | 42.0 | 0.1 | 0.73 |
| | | | | | | | 10.1 | | | | | | | | | | | |
| | STM 107 | STM 106 | 0.000 | 0.00 | 0.00 | 0.20 | 10.4 | 101.9 | 56.8 | 300 | 0.50 | 13.2 | 0.071 | 0.075 | 0.97 | 68.4 | 0.2 | 0.83 |
| | | | | | | | 10.7 | | | | | | | | | | | |
| BLDG D | STM112 | STM 106 | 0.022 | 0.90 | 0.02 | 0.02 | 10.0 | 104.2 | 5.7 | 250 | 0.50 | 19.5 | 0.049 | 0.063 | 0.86 | 42.0 | 0.4 | 0.14 |
| | | | | | | | 10.4 | | | | | | | | | | | |
| | STM 106 | STM 105 | 0.000 | 0.00 | 0.00 | 0.22 | 10.7 | 100.8 | 61.7 | 300 | 0.50 | 15.1 | 0.071 | 0.075 | 0.97 | 68.4 | 0.3 | 0.90 |
| | | | | | | | 10.9 | | | | | | | | | | | |
| BLDG C | STM109 | STM 105 | 0.044 | 0.90 | 0.04 | 0.04 | 10.0 | 104.2 | 11.5 | 250 | 0.50 | 8.7 | 0.049 | 0.063 | 0.86 | 42.0 | 0.2 | 0.27 |
| | | | | | | | 10.2 | | | | | | | | | | | |
| | 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 | 98.3 | 71.0 | 300 | 2.00 | 11.8 | 0.071 | 0.075 | 1.93 | 136.8 | 0.1 | 0.52 |
| | | | | | | | 11.3 | | | | | | | | | | | |
| 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 | 101.7 | 146.2 | 375 | 1.00 | 19.3 | 0.110 | 0.094 | 1.59 | 175.3 | 0.2 | 0.83 |
| | | | | | | | 10.5 | | | | | | | | | | | |
| 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. | |

ADS Canada

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# 910 MARCH RD
OTTAWA, ONTARIO

## MC-4500 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH MC-4500.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. 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.
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. 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.
6. 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.
7. 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.
8. 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.
9. 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

1. STORMTECH MC-4500 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH MC-4500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. 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.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM - 230 mm (9") SPACING BETWEEN THE CHAMBER ROWS.
7. INLET AND OUTLET MANIFOLDS MUST BE INSERTED A MINIMUM OF 300 mm (12") INTO CHAMBER END CAPS.
8. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE WELL GRADED BETWEEN ¾" AND 2" (20-50 mm).
9. 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.
10. STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
11. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIAL BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
12. 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

1. STORMTECH MC-4500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
2. THE USE OF EQUIPMENT OVER MC-4500 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED 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".
3. 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.

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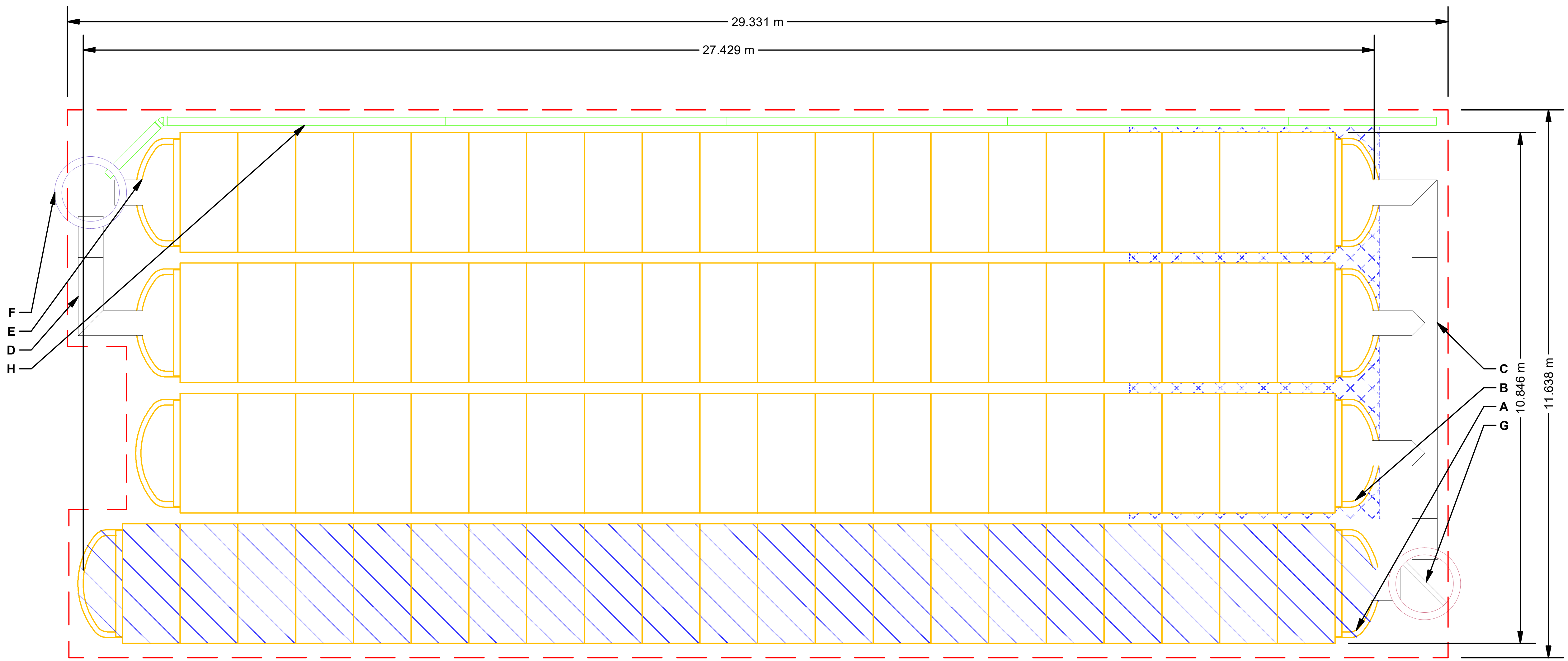
| PROPOSED LAYOUT | |
|---|---|
| 81 | STORMTECH MC-4500 CHAMBERS |
| 8 | STORMTECH MC-4500 END CAPS |
| 305 | STONE ABOVE (mm) |
| 229 | STONE BELOW (mm) |
| 40 | STONE VOID |
| 429.2 | INSTALLED SYSTEM VOLUME (m³) (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED) |
| 336.9 | SYSTEM AREA (m²) |
| 84.4 | SYSTEM PERIMETER (m) |

| CONCEPTUAL ELEVATIONS | |
|---|---|
| MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED): | 3.886 |
| MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC): | 2.515 |
| MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC): | 2.362 |
| MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT): | 2.362 |
| MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT): | 2.362 |
| TOP OF STONE: | 2.057 |
| TOP OF MC-4500 CHAMBER: | 1.753 |
| 600 mm ISOLATOR ROW INVERT: | 0.286 |
| 450 mm x 450 mm BOTTOM MANIFOLD INVERT: | 0.279 |
| 450 mm x 450 mm BOTTOM MANIFOLD INVERT: | 0.279 |
| 450 mm BOTTOM CONNECTION INVERT: | 0.279 |
| BOTTOM OF MC-4500 CHAMBER: | 0.229 |
| UNDERDRAIN INVERT: | 0.000 |
| BOTTOM OF STONE: | 0.000 |

*INVERT ABOVE BASE OF CHAMBER

| PART TYPE | ITEM ON LAYOUT | DESCRIPTION | INVERT* | MAX FLOW |
|---|---|---|---|---|
| PREFABRICATED END CAP | A | 600 mm BOTTOM PARTIAL CUT END CAP/TYP OF ALL 600 mm BOTTOM CONNECTIONS AND ISOLATOR ROWS | 57 mm | |
| PREFABRICATED END CAP | B | 450 mm BOTTOM PARTIAL CUT END CAP/TYP OF ALL 450 mm BOTTOM CONNECTIONS | 50 mm | |
| MANIFOLD | C | 450 mm x 450 mm BOTTOM MANIFOLD, ADS N-12 | 50 mm | |
| MANIFOLD | D | 450 mm x 450 mm BOTTOM MANIFOLD, ADS N-12 | 50 mm | |
| PIPE CONNECTION | E | 450 mm BOTTOM CONNECTION | 50 mm | |
| CONCRETE STRUCTURE | F | OCS (DESIGN BY ENGINEER / PROVIDED BY OTHERS) | | 227 L/s OUT |
| CONCRETE STRUCTURE W/WEIR | G | (DESIGN BY ENGINEER / PROVIDED BY OTHERS) | | 467 L/s IN |
| UNDERDRAIN | H | 150 mm ADS N-12 DUAL WALL PERFORATED HDPE UNDERDRAIN | | |




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.

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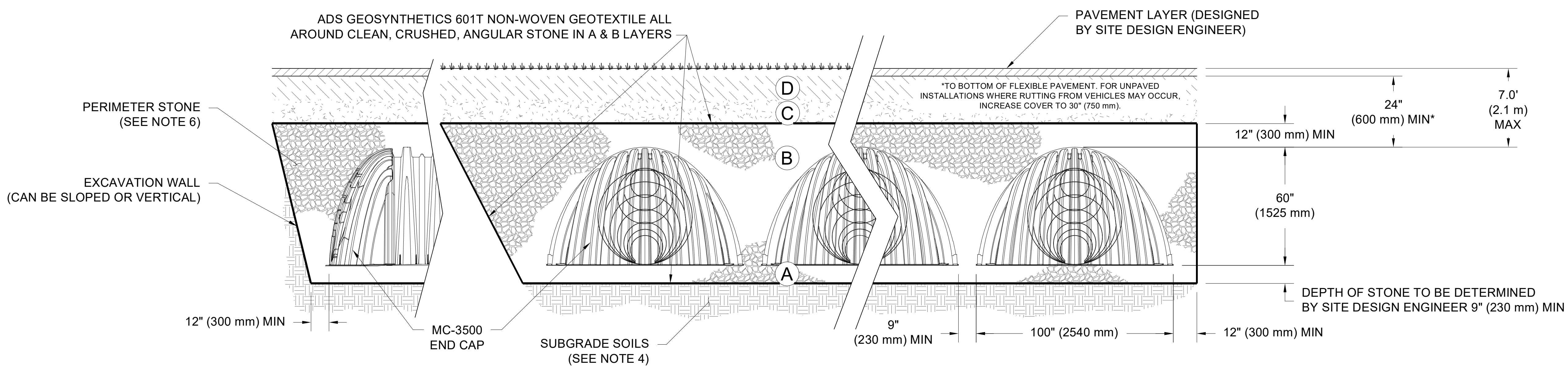
# ACCEPTABLE FILL MATERIALS: STORMTECH MC-4500 CHAMBER SYSTEMS

| | MATERIAL LOCATION | DESCRIPTION | AASHTO MATERIAL CLASSIFICATIONS | COMPACTION / DENSITY REQUIREMENT |
|---|---|---|---|---|
| D | **FINAL FILL:** 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 | ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS. | N/A | PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS. |
| C | **INITIAL FILL:** 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. | GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE.<br><br>MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER. | AASHTO M145[1]<br>A-1, A-2-4, A-3<br><br>OR<br><br>AASHTO M43[1]<br>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 | **EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE. | CLEAN, CRUSHED, ANGULAR STONE | AASHTO M43[1]<br>3, 4 | NO COMPACTION REQUIRED. |
| A | **FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER. | CLEAN, CRUSHED, ANGULAR STONE | AASHTO M43[1]<br>3, 4 | PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3] |

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.

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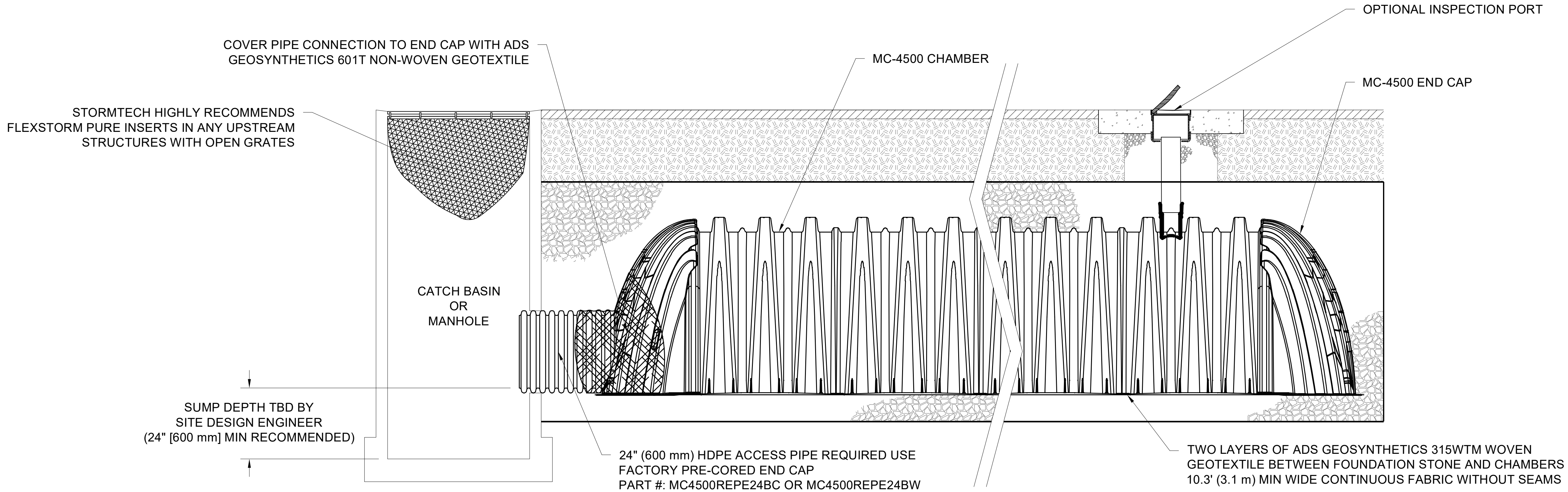


## MC-4500 ISOLATOR ROW DETAIL

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.

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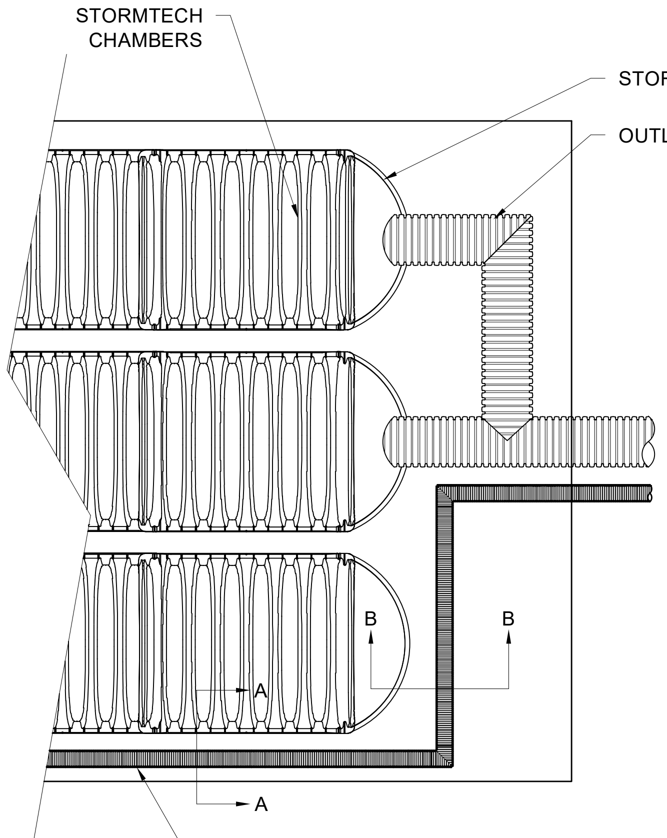
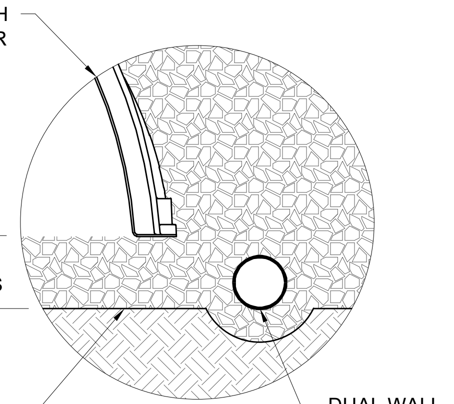
## UNDERDRAIN DETAIL

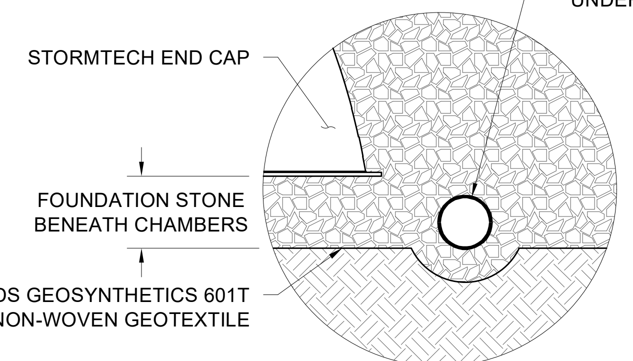
NTS




NUMBER AND SIZE OF UNDERDRAINS PER SITE DESIGN ENGINEER
4" (100 mm) TYP FOR SC-310 & SC-160LP SYSTEMS
6" (150 mm) TYP FOR SC-740, DC-780, MC-3500 & MC-4500 SYSTEMS



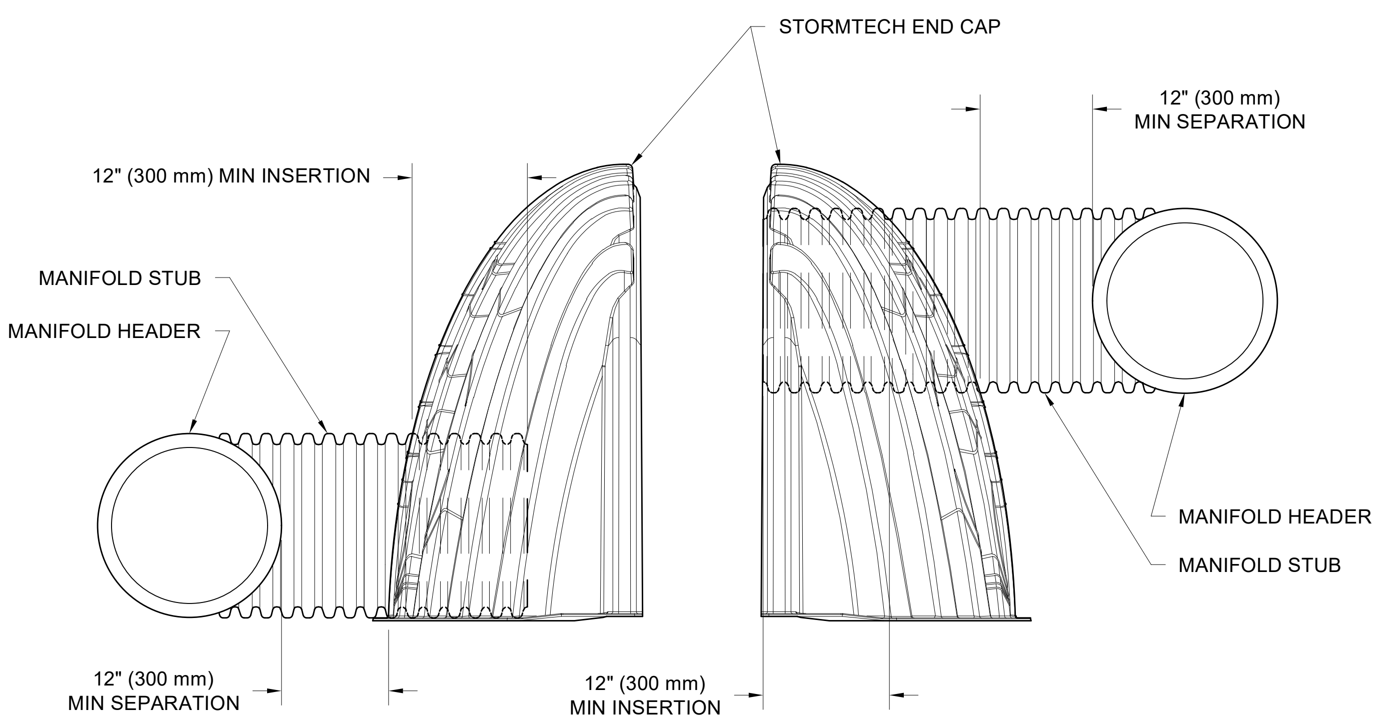

SECTION A-A




SECTION B-B

## MC-SERIES END CAP INSERTION DETAIL

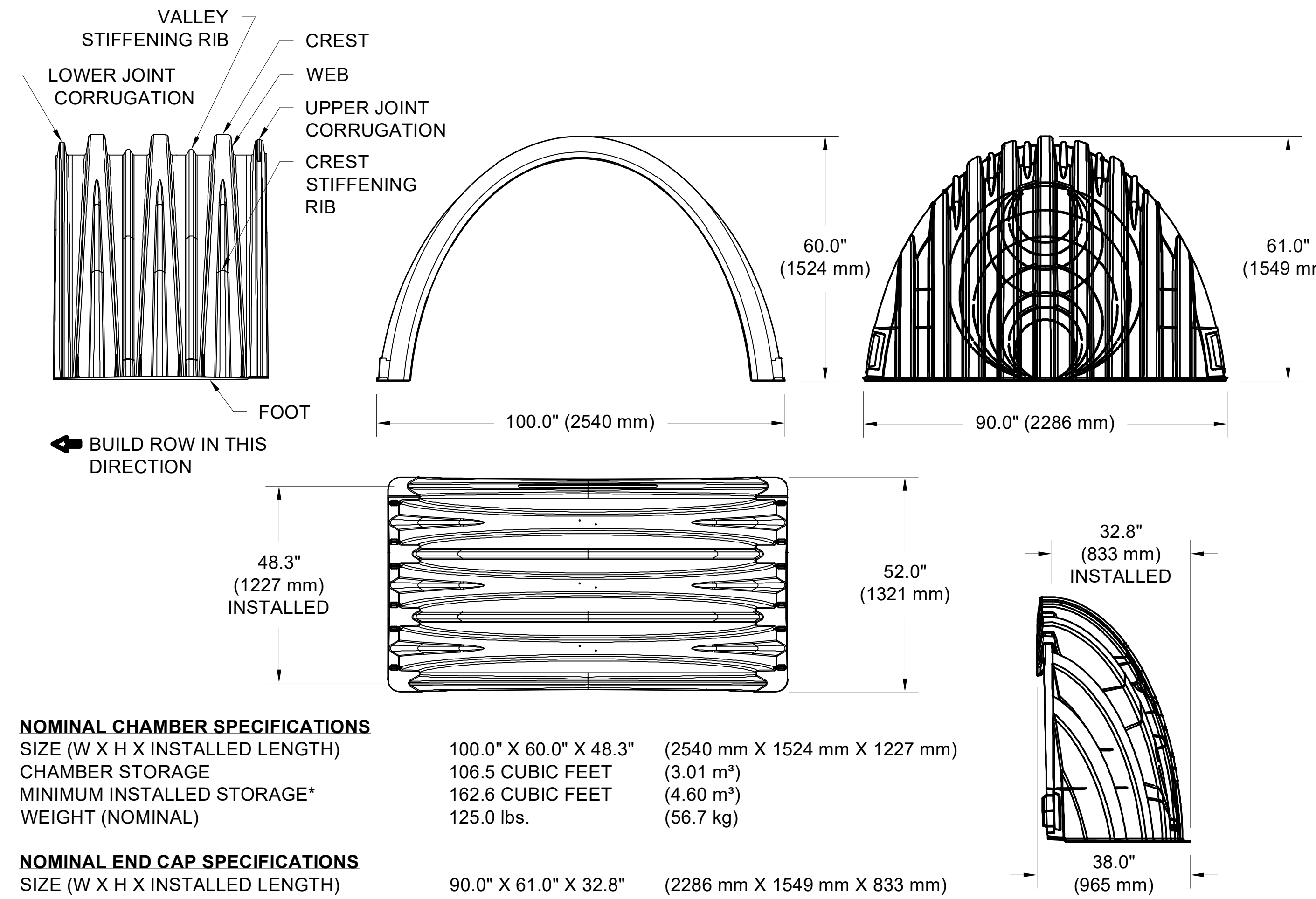
NTS




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

## MC-4500 TECHNICAL SPECIFICATION

NTS




**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 m³) |
| MINIMUM INSTALLED STORAGE* | 162.6 CUBIC FEET | (4.60 m³) |
| WEIGHT (NOMINAL) | 125.0 lbs. | (56.7 kg) |

**NOMINAL END CAP SPECIFICATIONS**

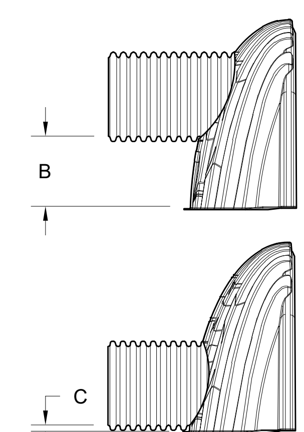
| | | |
|---|---|---|
| SIZE (W X H X INSTALLED LENGTH) | 90.0" X 61.0" X 32.8" | (2286 mm X 1549 mm X 833 mm) |
| END CAP STORAGE | 39.5 CUBIC FEET | (1.12 m³) |
| MINIMUM INSTALLED STORAGE* | 115.3 CUBIC FEET | (3.26 m³) |
| WEIGHT (NOMINAL) | 90 lbs. | (40.8 kg) |

*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 | 6" (150 mm) | 42.54" (1081 mm) | --- |
| MC4500IEPP06B | | --- | 0.86" (22 mm) |
| MC4500IEPP08T | 8" (200 mm) | 40.50" (1029 mm) | --- |
| MC4500IEPP08B | | --- | 1.01" (26 mm) |
| MC4500IEPP10T | 10" (250 mm) | 38.37" (975 mm) | --- |
| MC4500IEPP10B | | --- | 1.33" (34 mm) |
| MC4500IEPP12T | 12" (300 mm) | 35.69" (907 mm) | --- |
| MC4500IEPP12B | | --- | 1.55" (39 mm) |
| MC4500IEPP15T | 15" (375 mm) | 32.72" (831 mm) | --- |
| MC4500IEPP15B | | --- | 1.70" (43 mm) |
| MC4500IEPP18T | 18" (450 mm) | 29.36" (746 mm) | --- |
| MC4500IEPP18TW | | | |
| MC4500IEPP18B | | --- | 1.97" (50 mm) |
| MC4500IEPP18BW | | | |
| MC4500IEPP24T | 24" (600 mm) | 23.05" (585 mm) | --- |
| MC4500IEPP24TW | | | |
| MC4500IEPP24B | | --- | 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




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
DATE:
PROJECT #:

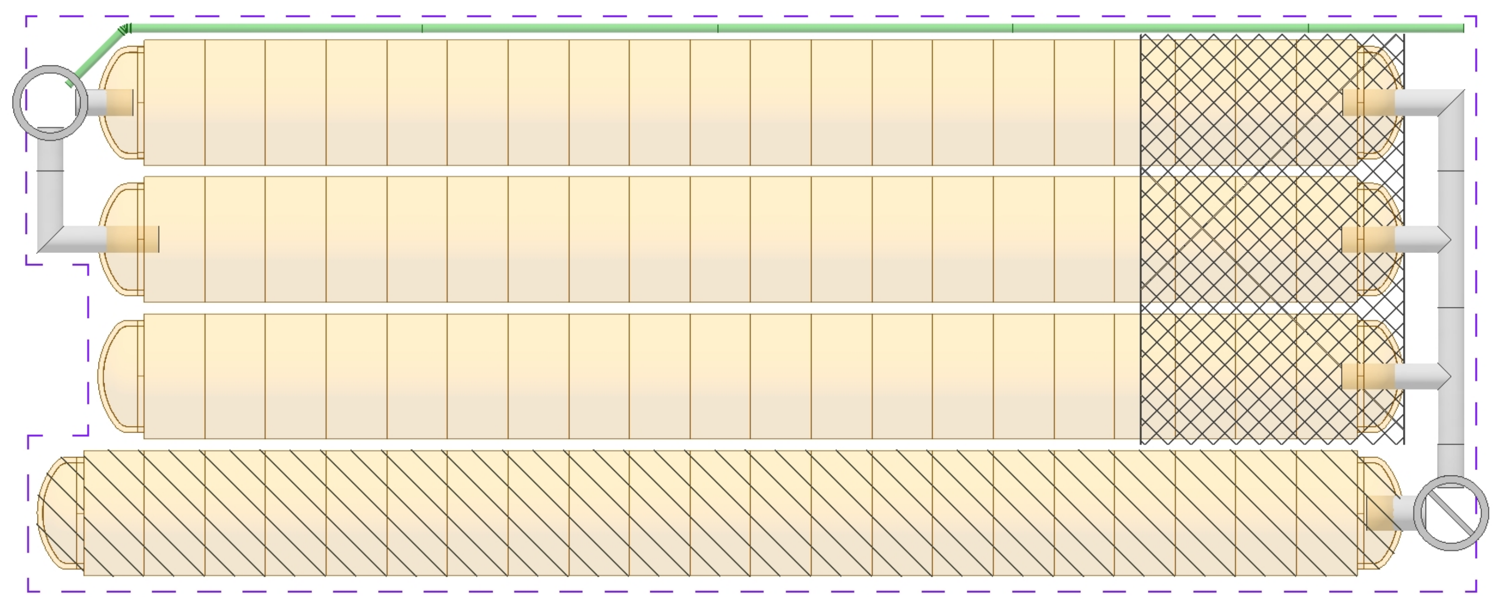
| REV | DRW | CHK | DESCRIPTION |
|---|---|---|---|

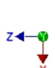

StormTech® Detention · Retention · Water Quality
520 CROMWELL AVENUE | ROCKY HILL | CT | 06067
860-529-8188 | 888-892-2694 | WWW.STORMTECH.COM

ADS Canada
4640 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.




Z
Y
X

Stormceptor®

FORTERRA

# 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 |

| | |
|---|---|
| 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): | |

| | |
|---|---|
| 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: | |

**Net Annual Sediment (TSS) Load Reduction Sizing Summary**

| Stormceptor Model | TSS Removal Provided (%) |
|---|---|
| EFO4 | 63 |
| EFO6 | 74 |
| EFO8 | 81 |
| EFO10 | 84 |
| EFO12 | 87 |

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

imbrium

## THIRD-PARTY TESTING AND VERIFICATION

►**Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® 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® 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.

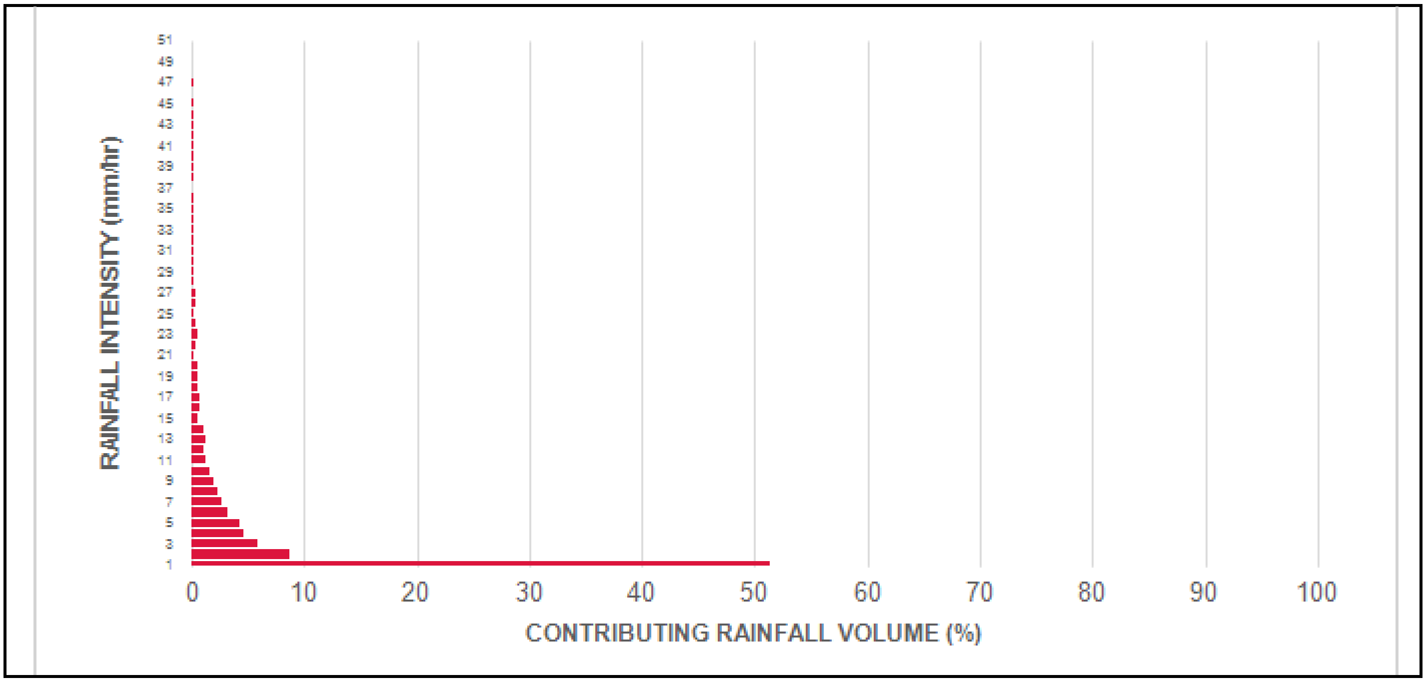
| Particle Size (µm) | Percent Less Than | Particle Size Fraction (µm) | Percent |
|---|---|---|---|
| 1000 | 100 | 500-1000 | 5 |
| 500 | 95 | 250-500 | 5 |
| 250 | 90 | 150-250 | 15 |
| 150 | 75 | 100-150 | 15 |
| 100 | 60 | 75-100 | 10 |
| 75 | 50 | 50-75 | 5 |
| 50 | 45 | 20-50 | 10 |
| 20 | 35 |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

# Stormceptor® EF Sizing Report

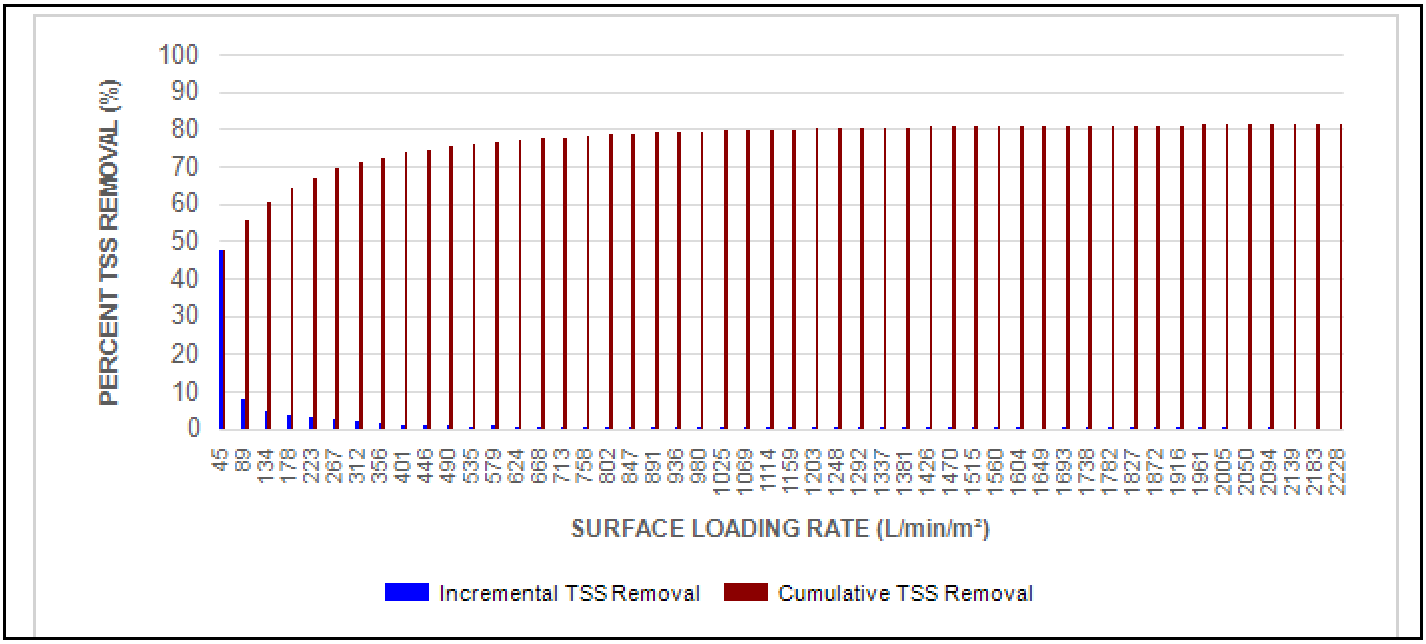
| Rainfall Intensity (mm / hr) | Percent Rainfall Volume (%) | Cumulative Rainfall Volume (%) | Flow Rate (L/s) | Flow Rate (L/min) | Surface Loading Rate (L/min/m²) | Removal Efficiency (%) | Incremental Removal (%) | Cumulative Removal (%) |
|---|---|---|---|---|---|---|---|---|
| 1 | 51.3 | 51.3 | 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 |

| 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 |
| **Estimated Net Annual Sediment (TSS) Load Reduction =** | | | | | | | | **81 %** |

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




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



**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

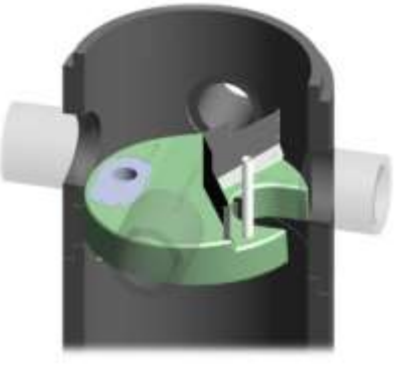
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test 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.

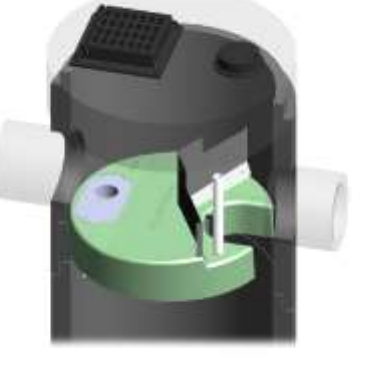
## DESIGN FLEXIBILITY

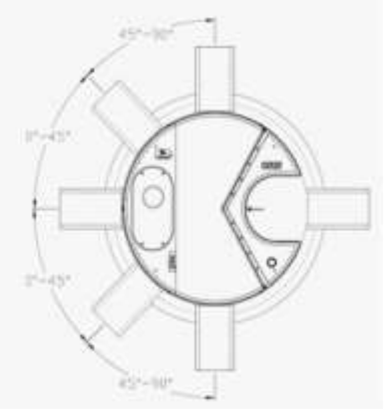
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend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








**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) | ($ft^3$) | (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/$ft^3$ )

| 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 $m^3$ sediment / 265 L oil |
| | 6 ft (1829 mm) Diameter OGS Units: | 3.48 $m^3$ sediment / 609 L oil |
| | 8 ft (2438 mm) Diameter OGS Units: | 8.78 $m^3$ sediment / 1,071 L oil |
| | 10 ft (3048 mm) Diameter OGS Units: | 17.78 $m^3$ sediment / 1,673 L oil |
| | 12 ft (3657 mm) Diameter OGS Units: | 31.23 $m^3$ sediment / 2,476 L oil |

**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/$m^2$.

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/m2 to 2600 L/min/m2) 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 TREAMENT 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 | 4ft (1219mm) Diameter OGS Units: | 1.19m$^3$ sediment / 265L oil |
| | 6ft (1829mm) Diameter OGS Units: | 3.48m$^3$ sediment / 609LI oil |
| | 8ft (2438mm) Diameter OGS Units: | 8.78m$^3$ sediment / 1,071L oil |
| | 10ft (3048mm) Diameter OGS Units: | 17.78m$^3$ sediment / 1,673L oil |
| | 12ft (3657mm) Diameter OGS Units: | 31.23m$^3$ sediment / 2,476L oil |

## 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.

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> 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/$m^2$.

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

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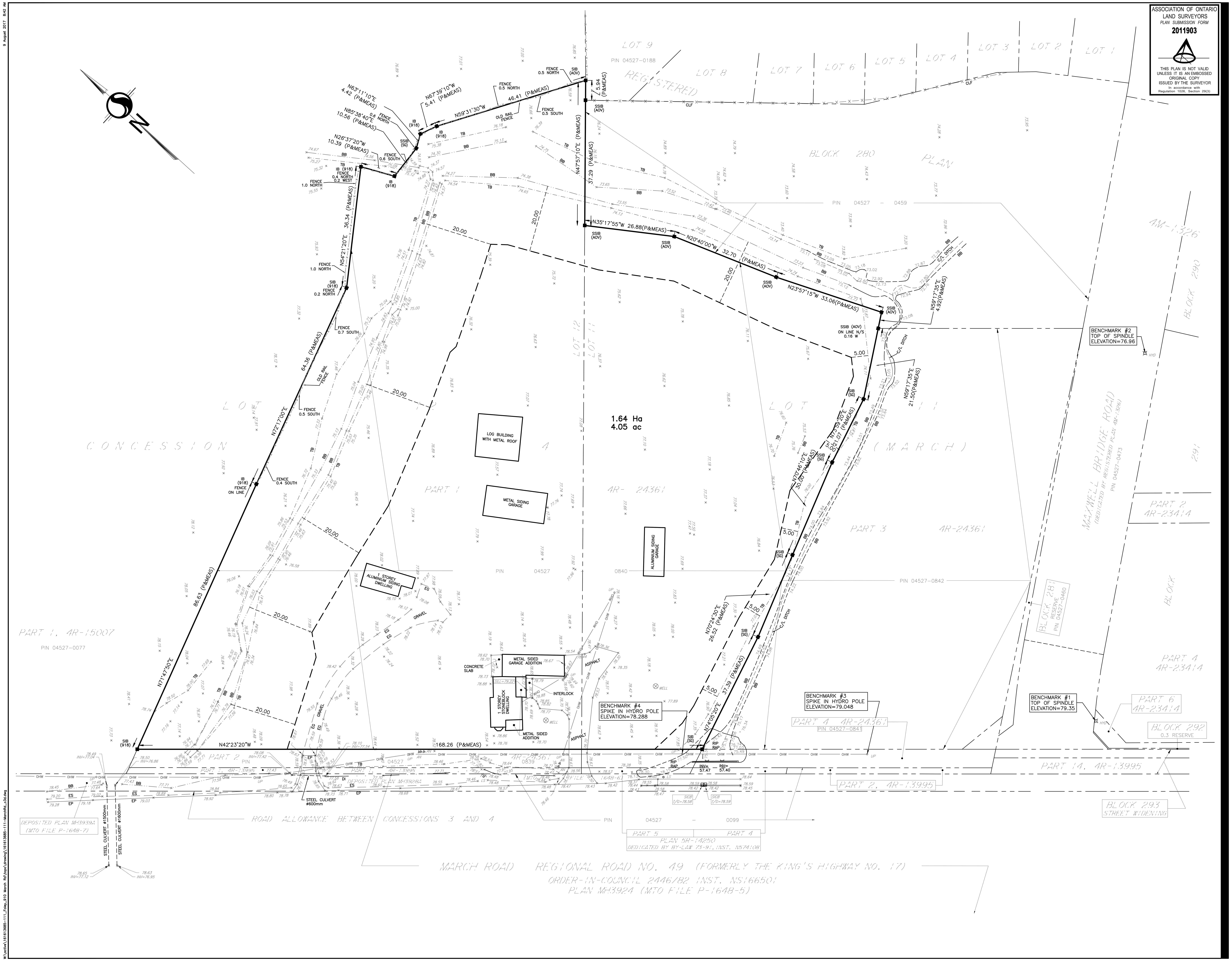
> 3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/$m^2$ to 2600 L/min/$m^2$) 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.

## *DRAWINGS / FIGURES*




Stantec

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TOPOGRAPHIC PLAN OF SURVEY

# PART OF LOTS 11 & 12 CONCESSION 4

(GEOGRAPHIC TOWNSHIP OF MARCH)

## CITY OF OTTAWA

Scale 1:500

10 0 10 20 30 METRES

**METRIC CONVERSION**

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

**GRID SCALE CONVERSION**

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.99994.

**BEARING NOTE**

BEARINGS ARE GRID, DERIVED FROM CAN-NET VRS 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**

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

**SURVEYOR'S CERTIFICATE**

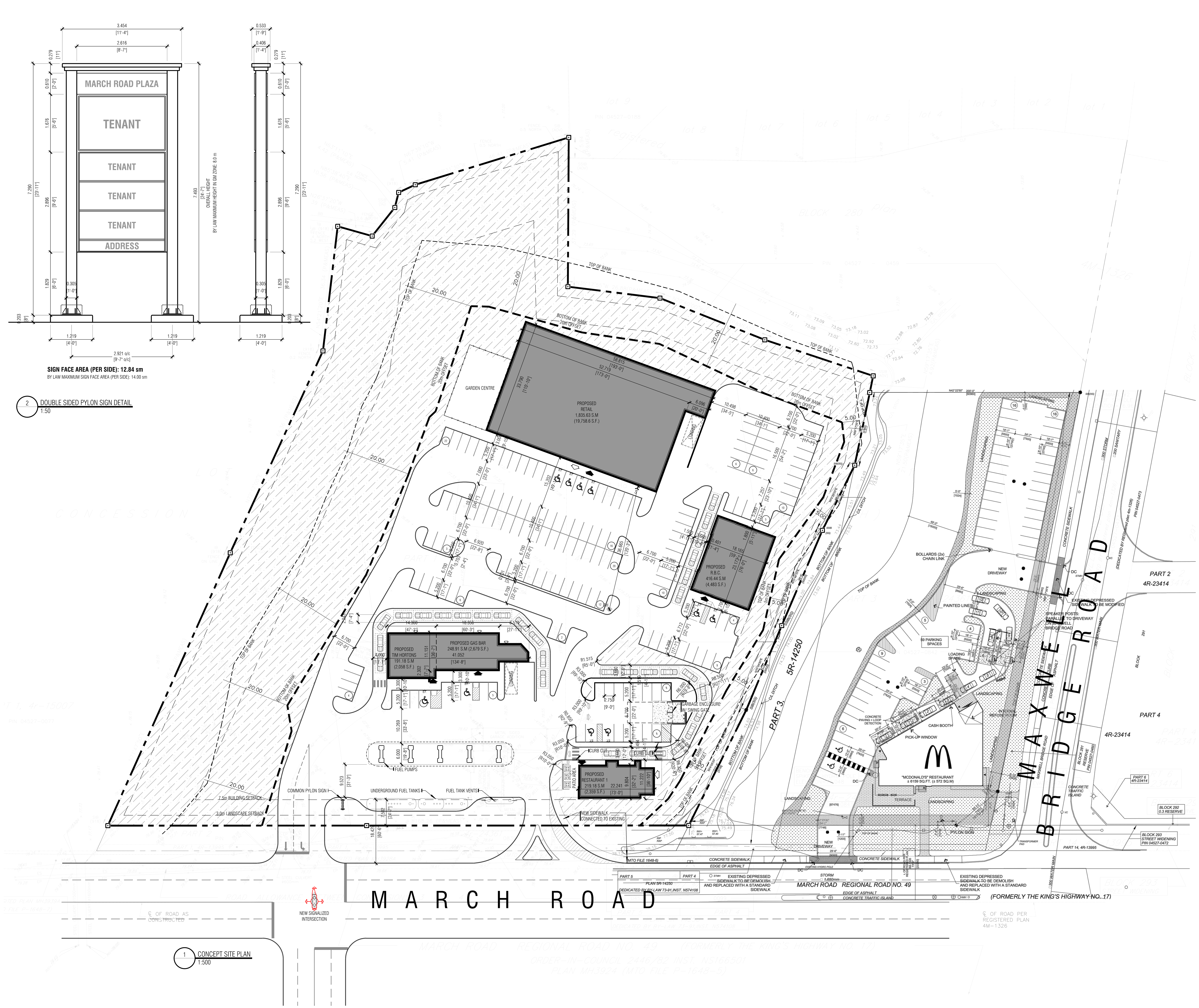
I CERTIFY THAT :

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.

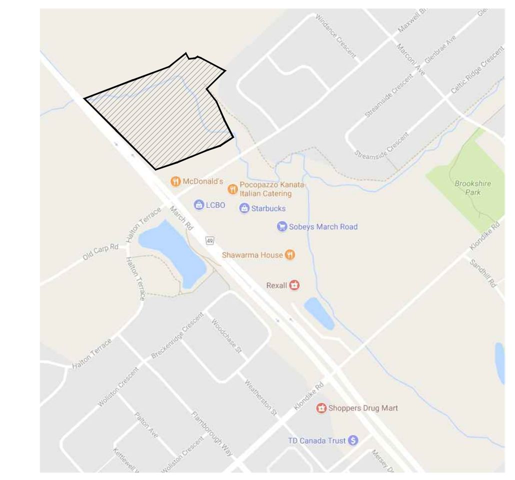
DATE

BRIAN J. WEBSTER
ONTARIO LAND SURVEYOR

DRAWN: CEC CHECKED: * PM: BW FIELD: CA PROJECT No.: 161613685-111

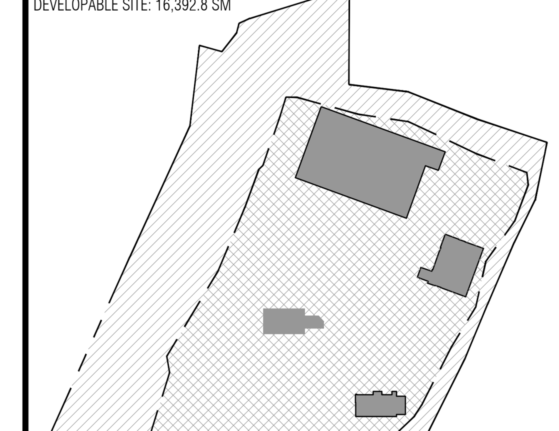



## KEY MAP



## DEVELOPABLE COVERAGE

TOTAL SITE: 27,158 SM
DEVELOPABLE SITE: 16,392.8 SM



**DEVELOPABLE COVERAGE: 16.59%**

## SITE DATA

| | SF | SM | ACRES |
|---|---|---|---|
| TOTAL SITE | 292,330 | 27,158 | 6.71 |
| TOTAL DEVELOPABLE AREA | 176,450 | 16,392.8 | 4.05 |
| PROPOSED BUILDING | | | COVERAGE |
| GAS BAR C/W TIM HORTONS | 4,737 | 440.10 | 1.62% |
| RETAIL | 19,758.6 | 1,835.63 | 6.76% |
| RESTAURANT A | 2,359 | 219.18 | 0.81% |
| ROYAL BANK OF CANADA | 4,483 | 416.44 | 1.53% |
| TOTAL | 31,337.6 | 2,911.35 | 10.02% |

PARKING DATA

| | |
|---|---|
| REQUIRED PARKING (AREA C): | |
| RETAIL: 3.4/100SM | 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.

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

REVISION · ISSUED · APPROVAL

PROJECT FOR:

WEXFORD COMMERCIAL DEVELOPMENTS LTD.

PROJECT:

NEW BUILD

CREEKSIDE LANDING
MARCH ROAD
KANATA, ONTARIO

DRAWING:

# SITE PLAN

| DRAWN: | CHECKED: | JOB NUMBER: |
|---|---|---|
| M.M.W. | S.R. | 17300 |

| DATE (YYYY/MM/DD): | SCALE: |
|---|---|
| 2020.06.25 | AS NOTED |

| DRAWING NUMBER: | REVISION NUMBER: |
|---|---|
| A1.0 | R0 |