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37 Years

# 200 Baribeau Street
# Ottawa, Ontario

## Servicing Design Brief

# 200 BARIBEAU STREET
# OTTAWA, ONTARIO

# SERVICING DESIGN BRIEF

Prepared For:

Parkriver Properties

Prepared By:

**NOVATECH**
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario
K2M 1P6

August 24, 2020
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Revised: February 5, 2021

Novatech File: 119068
Ref: R-2020-104

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Engineers, Planners & Landscape Architects

February 5, 2021

City of Ottawa
Infrastructure Services and Community Sustainability
110 Laurier Avenue West, 4th Floor
Ottawa, ON K1P 1J1

**Attention:** **Jean-Charles Renaud, Planner II**

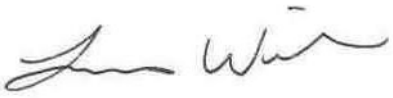
**Reference:** **200 Baribeau Street**
**Servicing Design Brief**
**Our File No.: 119068**

Enclosed for your review and approval is the Servicing Design Brief for the proposed 200 Baribeau Street development.

If you have any questions or comments, please do not hesitate to contact us.

Sincerely,

**NOVATECH**



Lucas Wilson, P.Eng.
Project Coordinator



Suite 200, 240 Michael Cowpland Drive, Ottawa ON K2M 1P6 Tel: 613.254.9643 Fax: 613.254.5867 www.novatech-eng.com

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# 1.0 INTRODUCTION

## 1.1 Background

Novatech has been retained to prepare a Servicing Design Brief for the 200 Baribeau Street Development, located in the City of Ottawa. The site will be developed by Parkriver Properties.

The development is located in the Vanier neighborhood, on the west side of Baribeau Street and consists of the properties located at 200 Baribeau Street and 127 Carillon Street. **Figure 1** shows the location of the development lands.

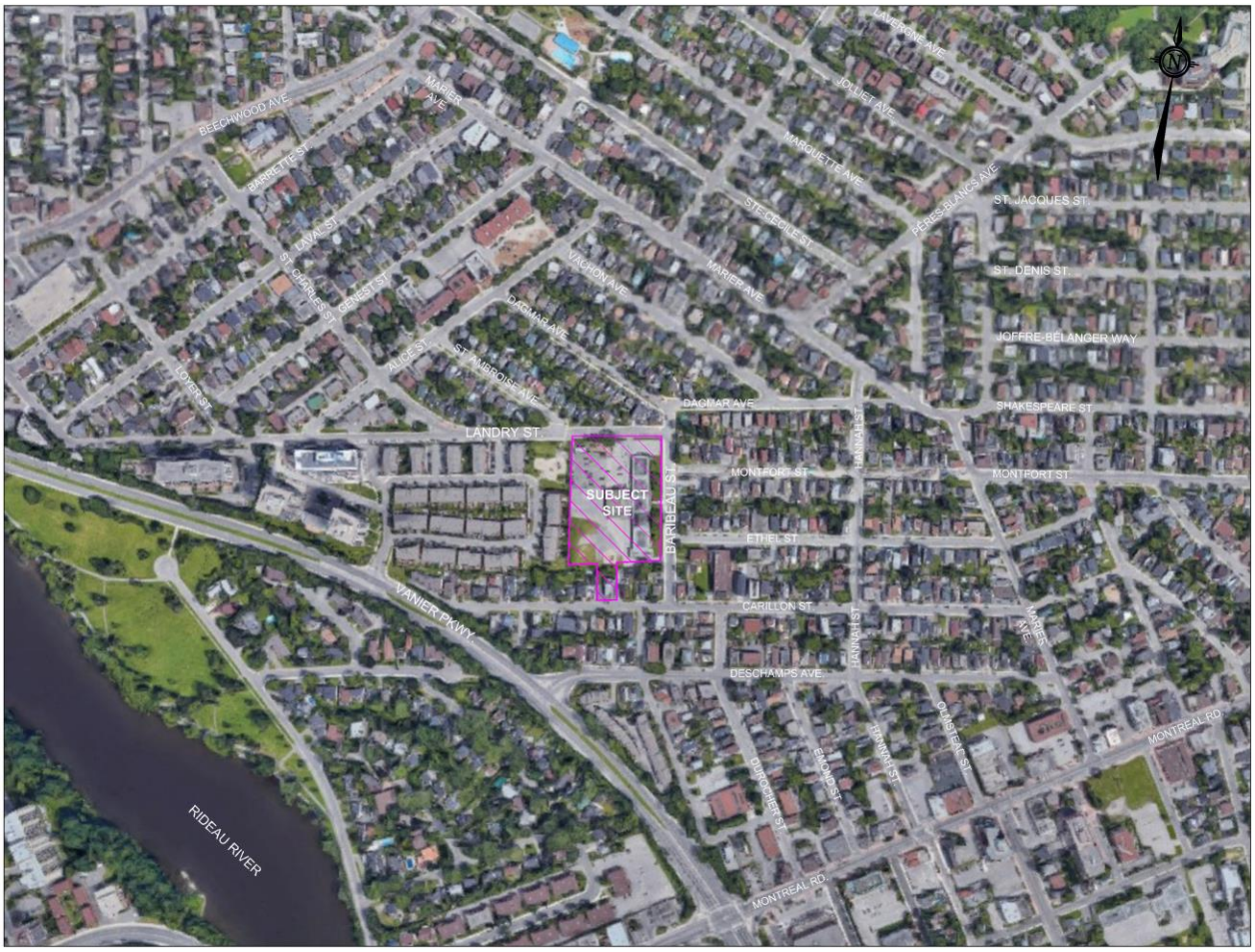



**Figure 1: Key Plan**

The proposed site is approximately 1.33ha and will be bordered by Landry Street to the north, Baribeau Street to the east and existing residential to the west and south.

This Servicing Design Brief provides information on the considerations and approach by which Novatech has analyzed the existing site information for the 200 Baribeau Street development, and details how the development lands will be serviced while meeting the City requirements and all other relevant regulations.

This report should be read in conjunction with the following:

- Geotechnical Investigation, Proposed Residential Development, 200 Baribeau Street - Ottawa, Ontario prepared by Paterson Group, dated July 15, 2019 (Project:PG4951-1).

## 1.2 Land Use

The site will consist of thirteen townhome buildings with a total of 91 units. The proposed Site Plan is shown below in **Figure 2**.

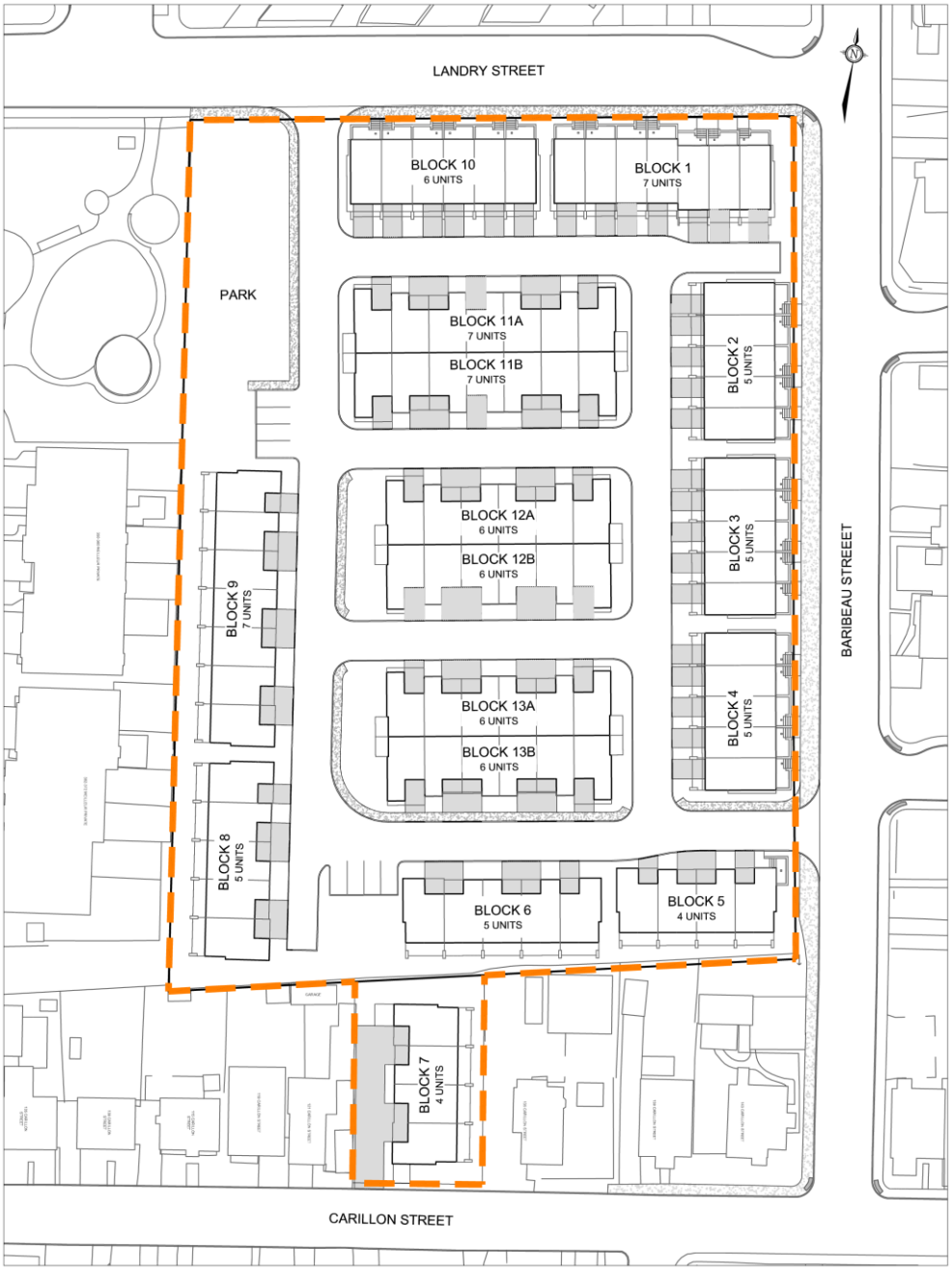



**Figure 2: Site Plan**

# 2.0 ROADWAYS

## 2.1 Existing Conditions

Currently the site can be accessed from Landry Street, Baribeau Street and Carillon Street, all classified as local roadways in the 2013 City of Ottawa Transportation Master Plan (TMP).

## 2.2 Proposed Conditions

The development will be accessed from entrances off Landry Street, Baribeau Street and Carillon Street. The site contains a series of 6.0m private roads.

## 2.3 Roadway Design

Paterson Group has prepared a Geotechnical Investigation report for the development (July 15th, 2019) that provides recommendations for roadway structure, servicing and foundations. The recommended roadway structure is as follows:

**Table 2-1: Roadway Structure**

| Roadway Material Description | Pavement Structure |
|---|---|
| | Layer Thickness (mm) |
| **Private Road** | |
| Asphalt Wear Course: Superpave 12.5 (Class B) | 40 |
| Asphalt Binder Course: Superpave 19.0 (Class B) | 50 |
| Base: Granular A | 150 |
| Sub-Base: Granular B – Type II | 400 |
| **Total** | **640** |

# 3.0 GRADING

## 3.1 Existing Conditions

The lands along the north and east property lines at 200 Baribeau Street slope towards the adjacent public roadways (Landry Street and Baribeau Street). The remaining portion of the subject lands are directed to an existing catchbasin located within the playing field. The lands at 127 Carillon Street slope north towards the shared property line with 200 Baribeau Street with a small portion along Carillion Street sloping to the public right-of-way.

A geotechnical investigation was carried out by Paterson Group, practical refusal was encountered at 6.4m below ground surface at borehole 4. Groundwater was recorded between 0.82m and 1.55m below the ground surface, on April 25th, 2019.

## 3.2 Proposed Conditions

The site will be graded to ensure the minimum clearances are provided per the City of Ottawa and RVCA policies listed below:

- Underside of slab must have a minimum of 0.30m clearance above the 100-year flood level of 56.44m;
- All building openings, including garage, must be at least 0.30m above the 100-year flood level;
- Terracing grades at proposed buildings must be a minimum of 0.15m above the 100-year flood level.

The front yards located along Landry Street, Baribeau Street and Carillon Street will tie into the back of curb and existing back of sidewalk. The rear-yards of Blocks 5, 6, 7, 8 and 9 and the park lands will tie into the existing grades along the south and west property lines. For detailed grading refer to drawing 120057-GR.

The proposed grading will fall within these ranges:

- Landscaped Area: Minimum 2% - Maximum 6%
- Rearyard Swales: Minimum 1.5% (1.0% with subdrain)
- Maximum Terracing Grade of 3H:1V

# 4.0 EROSION AND SEDIMENT CONTROL

Erosion and sediment control measures will be implemented during construction in accordance with the "Guidelines on Erosion and Sediment Control for Urban Construction Sites" (Government of Ontario, May 1987). Typical erosion and sediment control measures recommended include, but are not limited to, the use of silt fences around perimeter of site, filter fabric or inserts under catch basin/maintenance hole lids, heavy duty silt fence barrier, straw bale check dams, rock check dams, turbidity curtain, dewatering trap, temporary water passage system, riprap, mud mats, silt bags for dewatering operations, topsoil and sod to disturbed areas and natural grassed waterways. Dewatering and sediment control techniques will be developed for the individual situations based on the above guidelines and utilizing typical measures to ensure erosion and sediment control is controlled in an acceptable manner and there is no negative impact to adjacent lands, water bodies or water treatment/conveyance facilities.

The following erosion and sediment control measures will be implemented during construction. Details are provided on the Erosion and Sediment Control Plan.

- All erosion and sediment control measures are to be installed to the satisfaction of the engineer, the municipality and the conservation authority prior to undertaking any site alterations (filling, grading, removal of vegetation, etc.) and remain present during all phases of site preparation and construction.

- A qualified inspector should conduct daily visits during construction to ensure that the contractor is working in accordance with the design drawings and that mitigation measures are being implemented as specified.
    - A light duty silt fence barrier is to be installed in the locations shown on the Erosion and Sediment Control & Removals Plan (**119068-ESC).**
    - Terrafix Siltsoxx are to be placed under all new and existing catchbasins and storm manhole covers as shown on Erosion and Sediment Control & Removals Plan (**119068-ESC)**.
    - After complete build-out, all sewers are to be inspected and cleaned and all sediment and construction fencing shall be removed.
- The contractor shall ensure that proper dust control is provided with the application of water (and if required, calcium chloride) during dry periods.
- The contractor shall immediately report to the engineer or inspector any accidental discharges of sediment material into any ditch or sewer system. Appropriate response measures shall be carried out by the contractor without delay.
- The contractor acknowledges that failure to implement erosion and sediment control measures may result in penalties imposed by any applicable regulatory agency.

Temporary erosion and sediment control measures would be implemented both prior to commencement and during construction in accordance with the “Guidelines on Erosion and Sediment Control for Urban Construction Sites”, (Government of Ontario, May 1987).

## 5.0 SANITARY SEWERS

### 5.1 Existing Conditions

An existing 250mm diameter sanitary sewer runs along Baribeau Street and outlets to a 750mm trunk sanitary sewer in Carillon Street.

### 5.2 Proposed Conditions

The peak design flow parameters in **Table 5-1** have been used in the sewer capacity analysis.

Unit and population densities and all other design parameters are specified in the City of Ottawa Sewer Design Guidelines.

Sanitary flow from the site is proposed to connect into the 750mm diameter sanitary sewer in Carillon Street. The sanitary sewer layout is shown on 119068-GP (**Appendix C**), and the design sheet is attached in **Appendix A**. The site (approx. 1.33ha) will outlet to the 750mm trunk sanitary sewer (Carillon Street) with a peak design flow of 3.1 L/s.

**Table 5-1: Proposed Sanitary Sewer Design Parameters**

| Parameter | Design Parameter |
|---|---|
| Town Unit Population | 2.7 people/unit |
| Existing Apartment Unit Population (127 Carillon Street) | 1.8 people/unit |
| Residential Flow Rate, Average Daily | 280 L/cap/day |
| Residential Peaking Factor | Harmon Equation (min=2.0, max=4.0) |
| Infiltration Rate | 0.33 L/s/ha |
| Minimum Pipe Size | 200 mm |
| Minimum Velocity | 0.6 m/s |
| Maximum Velocity | 3.0 m/s |

The existing school demand of 60 L/person/day was calculated using Appendix 4-A in the City of Ottawa Sewer Design Guidelines. The school contains 18 classrooms with 22 students per class (396 students). With one teacher per classroom an estimate of 415 people was used to determine an accurate existing peak flow:

$Q_{POP}$ = (415 ppl * 60 L/day) / 86400 = 0.29 L/s

With the inclusion of infiltration, the total design flow from the existing school is calculates as:

$Q_{PK\ DESIGN}$ = (0.33 L/s/ha * 1.27 ha) + 0.29 L/s = 0.71 L/s

The existing 7-unit building located at 127 Carillon Street has a peak design flow of 0.2 L/s (using 1.8 people/unit with an infiltration area of 0.065 ha). With the addition of the school site at 200 Baribeau Street, the total existing peak flow being directed to the sanitary sewers is 0.91 L/s.

The proposed peak design flow of 3.1 L/s represents an increase of 2.2 L/s being directed to the existing 750mm diameter sanitary trunk sewer in Carillon Street. The existing 750mm sanitary sewer runs at 0.76% with a full flow conveyance capacity of 1,012.5 L/s. The increase of 2.2 L/s from pre to post development corresponds to 0.20% of the total capacity. The introduction of such a small increase of flow into the existing sanitary system will not have a significant impact.

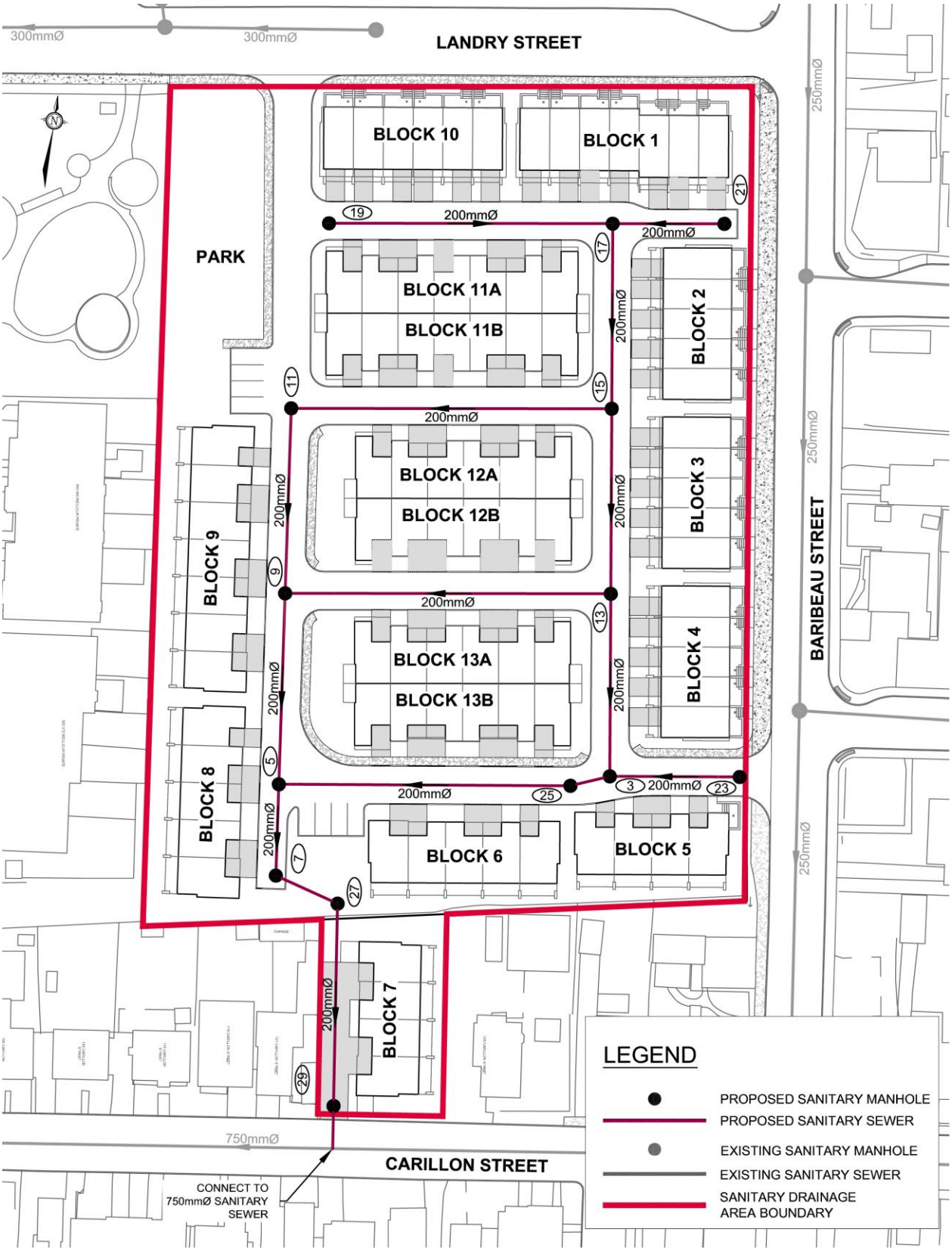



**Figure 3: Sanitary Sewer Network**

# 6.0 STORMWATER MANAGEMENT

## 6.1 Stormwater Management Criteria

The following stormwater management criteria for the proposed development were prepared in accordance with the City of Ottawa Sewer Design Guidelines (October 2012) and RVCA policies.

- Provide a dual drainage system (i.e. minor and major system flows);
- Control the runoff to the existing storm system in Carillon Street to the allowable release rates Specified in **Section 6.1.1** using on-site storage;
- Ensure that ponding is confined within the parking areas at a maximum depth of 0.30 m for both static ponding and dynamic flow;
- Provide guidelines to ensure that site preparation and construction is in accordance with the current Best Management Practices for Erosion and Sediment Control.

### *6.1.1 Allowable Release Rate*

The allowable release rate for the development has been calculated using the Rational Method with the following parameters:

- Drainage Area
    - 1.33 ha (site boundary)
- Runoff Coefficient
    - 0.50 (based on City of Ottawa criteria)
- Rainfall Intensity
    - Based on City of Ottawa IDF data (Ottawa Sewer Design Guidelines)
        - Time-of-Concentration = 10 minutes

The allowable release rate based on the above parameters is 142.4 L/s for all storms up to and including the 100-year storm event.

## 6.2 Existing Conditions

The development is located within the Rideau Valley Conservation Authority jurisdiction and is within the 100-year floodplain zone. Under existing conditions, the area fronting onto Baribeau Street and the parking area adjacent to Landry Street flow directly to the public roadways. The remainder of the site is directed to a catchbasin located within the playing field directing flows to the existing storm sewer system in the public roadways. A 525mm diameter storm sewer is located within Landry Street, storm sewers ranging from 600mm to 900mm are located within Baribeau Street and 1050mm diameter storm sewers are located within Carillon Street.

## 6.3 Proposed Conditions

Catch basins located within the private roadway and landscaped areas will be controlled with inlet control devices (ICDs). Runoff from the site will be routed to the 1050mm diameter storm sewer in Carillon Street. Catch basins located within the private roadway and landscaped areas will be controlled with inlet control devises (ICDs) in order to meet the allowable release rate in

**Section 6.1.1**. Underground storage will be provided using StormTech STC-310 storage chambers.

The site grading uses a maximum static ponding depth of 150mm in the private roadways to ensure that the dynamic ponding depth during the 100-year event do not exceed 300mm. The underside of slab elevation for each building has been set at least 300mm above the 100-year floodplain level of 56.44m. In addition, all building opening have been set a minimum of 300mm above the 100-year floodplain level.

**Figure 5** outlines the proposed storm sewer system layout, and how it will connect to the existing network along Carillon Street.

### *6.3.1 Minor System Design*

The storm sewers comprising the minor system have been designed based on the criteria outlined in the Ottawa Sewer Design Guidelines using the principles of dual drainage. The design criteria used in sizing the storm sewers are summarized in **Table 6-1** and **Table 6-2**.

The proposed storm sewers have been designed using the Rational Method to convey peak flow associated with a 2-year rainfall event. The storm sewer design sheets are provided in **Appendix A**. The corresponding Storm Drainage Area Plan (Drawing 119068-STM) is provided in **Appendix C**.

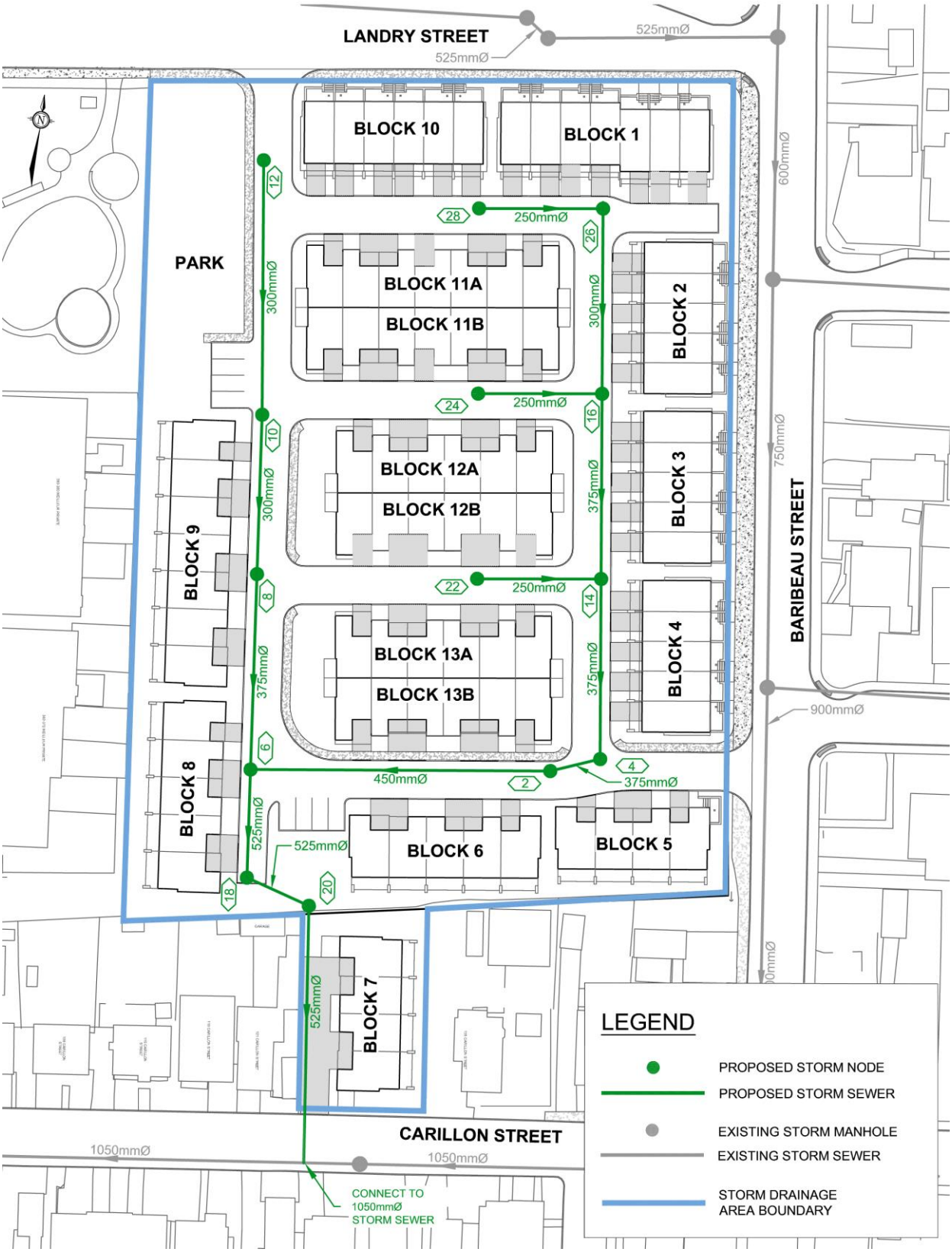



**Figure 4: Storm Sewer Network**

**Table 6-1: Storm Sewer Design Parameters**

| Parameter | Design Criteria |
|---|---|
| Private Roads | 2 Year Return Period |
| Storm Sewer Design | Rational Method/AutoDesk Storm Analysis |
| IDF Rainfall Data | Ottawa Sewer Design Guidelines |
| Initial Time of Concentration ($T_c$) | 10 min |
| Minimum Velocity | 0.8 m/s |
| Maximum Velocity | 3.0 m/s |
| Minimum Diameter | 250 mm |

**Table 6-2: Runoff Coefficients**

| Land Use | Runoff Coefficient |
|---|---|
| Hard Surface | 0.90 |
| Soft Surface | 0.20 |

### *6.3.2 Major System Design*

The site has been designed to convey runoff from storms that exceed the minor system capacity to the approved major system outlet within the existing pathway easement in the southwest corner of the site leading to Kipp Street. The roadway area has been graded to ensure that the 100-year peak overland flows are confined within the site at a maximum flow depth of 300mm. The design of the major system conforms to the design standards outlined in Section 5.5 (Major System Considerations) of the City of Ottawa Sewer Design Guidelines (October 2012).

The existing site provides an emergency overland flow route for Landry Street and Baribeau Street. The proposed site grading will maintain these emergency overland flow routes through the park land and rear-yards of Blocks 8 and 9 for Landry Street and through the rear-yards of Blocks 5 and 6 for Baribeau Street. Prior discussion with the City of Ottawa regarding the design of the emergency overland flow routes is provided in **Appendix D**.

## 6.4 Hydrologic & Hydraulic Modeling

The *City of Ottawa Sewer Design Guidelines* (October 2012) require hydrologic modelling for all dual drainage systems. The performance of the proposed storm drainage system for the site was evaluated using the *PCWMM* hydrologic/hydraulic modeling software.

*Design Storms*

The hydrologic analysis was completed using the following synthetic design storms and historical storms. The IDF parameters used to generate the design storms were taken from the Sewer Design Guidelines.

*3 Hour Chicago Storms*:
25mm 3-hr Chicago storm
2-year 3hr Chicago storm
5-year 3hr Chicago storm
100-year 3hr Chicago storm

12 *Hour SCS Storms*:
2-year 12-hr SCS storm
5-year 24hr Chicago storm
100-year 24hr Chicago storm

The 3-hour Chicago distribution generates the highest peak flows for both the minor and major systems and was determined to be the critical storm distribution for the design of the storm drainage system.

The proposed drainage system has also been stress tested using a 3-hour Chicago design storm that has a 20% higher intensity and total volume compared to the 100-year event.

*Model Development*

The PCSWMM model accounts for both minor and major system flows (*dual drainage*), including the routing of flows through the storm sewer network (*minor system*), and overland along the road network (*major system*). The results of the analysis were used to;

- Determine the total major and minor system runoff from the site;
- Size the ICDs for each inlet to the storm sewer system;
- Calculate the storm sewer hydraulic grade line (HGL) for the 100-year storm event; and
- Ensure no ponding in the right-of-way remains at the end of all storm events.

The model is capable of accounting for both static and dynamic storage within the private roadways and landscaped areas, including the overland flow across all high points. The 100-year flow depths computed by the model represent the total (static + dynamic) ponding depths at low points for areas in road sags.

*Storm Drainage Area Plan & Subcatchment Parameters*

The development has been divided into subcatchments based on the drainage areas tributary to each inlet of the proposed storm sewer system. The catchment areas are shown on the Storm Drainage Area Plan provided as drawing **119068-STM** in **Appendix C**.

The hydrologic parameters for each subcatchment were developed based on the Site Plan (**Figure 2**) and the Storm Drainage Area Plan specified above. Subcatchment parameters are outlined in **Table 6-3**.

**Table 6-3: Subcatchment Model Parameters**

| Area ID | Catchment Area (ha) | Runoff Coefficient (C) | Percent Impervious (%) | Zero Imperv. (%) | Flow Length (m) | Equivalent Width (m) | Average Slope (%) |
|---|---|---|---|---|---|---|---|
| A-01 | 0.044 | 0.26 | 9 | 0 | 10 | 44 | 0.5 |
| A-02 | 0.047 | 0.83 | 89 | 43 | 15 | 31 | 0.5 |
| A-03 | 0.101 | 0.81 | 87 | 59 | 15 | 67 | 0.5 |
| A-04 | 0.072 | 0.8 | 86 | 53 | 10 | 72 | 0.5 |
| A-05 | 0.074 | 0.77 | 81 | 50 | 10 | 74 | 0.5 |
| A-06 | 0.092 | 0.85 | 94 | 57 | 10 | 92 | 0.5 |
| A-07 | 0.066 | 0.76 | 80 | 26 | 15 | 44 | 0.5 |
| A-08 | 0.041 | 0.32 | 17 | 0 | 10 | 41 | 0.5 |
| A-09 | 0.025 | 0.51 | 44 | 100 | 10 | 25 | 0.5 |
| A-10 | 0.026 | 0.5 | 42 | 95 | 10 | 26 | 0.5 |
| A-11 | 0.087 | 0.69 | 70 | 31 | 15 | 58 | 0.5 |
| A-12 | 0.093 | 0.85 | 94 | 58 | 15 | 62 | 0.5 |

| Area ID | Catchment Area (ha) | Runoff Coefficient (C) | Percent Impervious (%) | Zero Imperv. (%) | Flow Length (m) | Equivalent Width (m) | Average Slope (%) |
|---|---|---|---|---|---|---|---|
| A-13 | 0.084 | 0.77 | 81 | 50 | 10 | 84 | 0.5 |
| A-14 | 0.089 | 0.79 | 84 | 44 | 15 | 59 | 0.5 |
| A-15 | 0.06 | 0.83 | 90 | 48 | 15 | 40 | 0.5 |
| A-16 | 0.074 | 0.69 | 70 | 23 | 15 | 49 | 0.5 |
| A-17 | 0.026 | 0.52 | 46 | 95 | 10 | 26 | 0.5 |
| A-18 | 0.025 | 0.31 | 16 | 95 | 10 | 25 | 0.5 |
| A-19 | 0.02 | 0.59 | 55 | 100 | 10 | 20 | 0.5 |
| A-20 | 0.028 | 0.5 | 43 | 100 | 10 | 28 | 0.5 |
| A-21 | 0.032 | 0.7 | 72 | 39 | 20 | 16 | 0.5 |
| A-22 | 0.026 | 0.52 | 46 | 95 | 10 | 26 | 0.5 |
| A-23 | 0.008 | 0.38 | 25 | 95 | 10 | 8 | 0.5 |
| B-01 | 0.035 | 0.54 | 49 | 0 | 10 | 35 | 0.5 |
| B-02 | 0.051 | 0.43 | 33 | 0 | 10 | 51 | 0.5 |
| B-03 | 0.007 | 0.5 | 43 | 0 | 6 | 12 | 0.5 |
| **TOTAL** | **1.33 ha** | **0.69** | **70%** | **-** | **-** | **-** | **-** |

*Infiltration*

Infiltration losses for all catchment areas were modeled using Horton's infiltration equation, which defines the infiltration capacity of the soil over the duration of a precipitation event using a decay function that ranges from an initial maximum infiltration rate to a minimum rate as the storm progresses. The default values for the Sewer Design Guidelines were used for all catchments.

Horton's Equation:
$f(t) = f_c + (f_o - f_c)e^{-k(t)}$

Initial infiltration rate: $f_o$ = 76.2 mm/hr
Final infiltration rate: $f_c$ = 13.2 mm/hr
Decay Coefficient: k = 4.14/hr

*Depression Storage*

The default values for depression storage in the Sewer Design Guidelines were used for all catchments. Residential rooftops were assumed to provide no depression storage.

- Depression Storage (pervious areas): 4.67 mm
- Depression Storage (impervious areas): 1.57 mm

*Equivalent Width*

Equivalent Width' refers to the width of the sub-catchment flow path. This parameter is calculated as described in the Sewer Design Guidelines, Section 5.4.5.6. The flow paths used to calculate the equivalent widths are shown on the PCSWMM schematics provided in **Appendix B**.

*Impervious Values*

Impervious (TIMP) values for each subcatchment area were calculated based on the proposed Site Plan (**Figure 2**) and correspond to the Runoff Coefficients used in the Rational Method calculations using the equation:

$$\%imp = \frac{C - 0.2}{0.7}$$

### *6.4.1 Stormwater Storage*

Underground and surface storage are represented in the PCSWMM model using storage nodes and storage curves. Refer to **Appendix B** for additional details.

Underground Storage

Underground storage will be provided using StormTech STC-310 (arch type) storage chambers connected to CBs 7, 9, 11 and 12. The underground storage chambers are required to prevent major system flow being directed off-site.

The StormTech chambers have the following dimensions:

- Stone foundation depth = 150mm (min)
- Stone cover = 230mm
- Stone porosity = 40%
- Size (L x W x H) = 2170mm x 864mm x 406mm
- Chamber / minimum installed storage = 0.40 $m^3$ / 0.90 $m^3$

The storage volumes were determined using the StormTech design calculator based on the configurations shown on the General Plan of Services (Drawing 119068-GP). Documentation for the StormTech storage chambers is provided in **Appendix B**.

Surface Storage

In addition to the underground storage provided, surface storage will be provided to attenuate peak flows to the allowable release rates. Surface storage will consist of ponding above each catchbasin within the private roadways and landscaped areas.

A summary of the underground and surface storage is provided in **Table 6-4**. The extent of surface ponding is shown on the Storm Drainage Area Plan (119068-STM).

**Table 6-4: Total Storage Provided (Surface and Underground)**

| Structure ID | STM Area ID | Max Static Ponding Depth (m) | Storage Provided ($m^3$) | | | Number of StormTech STC-310 Storage Chambers |
|---|---|---|---|---|---|---|
| | | | Underground[1] | Surface[2] | TOTAL | |
| ***Catchbasins within Private Roadway*** | | | | | | |
| CB01 | A14 | 0.15 | - | 15.0 | 15.0 | - |
| CB02 | A15 | 0.15 | - | 8.0 | 8.0 | - |
| CB03 | A11 | 0.15 | - | 15.9 | 15.9 | - |
| CB04 | A07 | 0.15 | - | 18.1 | 18.1 | - |
| CB05 | A02 | 0.15 | - | 7.6 | 7.6 | - |
| CB06 | A13 | 0.15 | - | 14.1 | 14.1 | - |
| CB07 | A12 | 0.15 | 21.0 | 13.0 | 34.0 | 16 |
| CB08 | A05 | 0.15 | - | 11.4 | 11.4 | - |
| CB09 | A06 | 0.15 | 21.0 | 13.1 | 34.1 | 16 |
| CB10 | A04 | 0.15 | - | 12.6 | 12.6 | - |
| CB11 | A03 | 0.15 | 21.0 | 12.6 | 33.6 | 16 |
| CB12 | A16 | 0.12 | 25.7 | 14.1 | 39.8 | 20 |

Inlet Control Devices (ICDs)

All catch basins will be fitted with Ipex Tempest LMF ICDs as specified in the Tempest documentation package provided in **Appendix B** and shown on the General Plan of Services (119068-GP).

## 6.5 Results of Hydrologic / Hydraulic Analysis

The model was used to evaluate the performance of the proposed storm drainage system for 200 Baribeau Street.

### *6.5.1 Minor System*

Inflows to the storm sewer were modeled based on the characteristics of each inlet. All the catch basins in the roadways are located at low points. Inflows to the storm sewer are based on the ICD specified for the inlet and the maximum depth of ponding. ICDs have been sized to limit the outlet peak flows to the allowable release rate of 142.4 L/s. All catch basins will be fitted with Ipex Tempest LMF ICDs as specified in the Tempest documentation package provided in **Appendix B** and shown on the General Plan of Services (119068-GP). Details are outlined as follows in **Table 6.4**.

The Rational Method design sheets (**Appendix B**) were used to calculate the required storm sewer sizes based on capturing the peak flow at each inlet to the storm sewer for a 2-year design return period.

**Table 6-5: Inlet Control Devices & Design Flows**

| Structure ID | ICD Size & Inlet Rate | | | | | | |
|---|---|---|---|---|---|---|---|
| | ICD Type | T/G (m) | Orifice Invert (m) | 100-year Head on Orifice (m) | 2-year Orifice Peak Flow* (L/s) | 5-year Orifice Peak Flow* (L/s) | 100-year Orifice Peak Flow* (L/s) |
| CB01 | Tempest LMF (Vortex 85) | 56.43 | 55.03 | 1.63 | 7.7 | 7.8 | 7.9 |
| CB02 | Tempest LMF (Vortex 85) | 56.38 | 54.98 | 1.65 | 7.6 | 7.8 | 7.9 |
| CB03 | Tempest LMF (Vortex 85) | 56.43 | 55.03 | 1.55 | 7.9 | 8.0 | 8.1 |
| CB04 | Tempest LMF (Vortex 77) | 56.50 | 55.10 | 1.53 | 6.3 | 6.4 | 6.5 |
| CB05 | Tempest LMF (Vortex 77) | 56.56 | 55.16 | 1.56 | 6.3 | 6.4 | 6.6 |
| CB06 | Tempest LMF (Vortex 77) | 56.48 | 55.08 | 1.62 | 6.4 | 6.5 | 6.6 |
| CB07 | Tempest LMF (Vortex 77) | 56.57 | 55.14 | 1.58 | 3.5 | 3.9 | 6.0 |
| CB08 | Tempest LMF (Vortex 77) | 56.55 | 55.15 | 1.61 | 6.4 | 6.4 | 6.7 |
| CB09 | Tempest LFM (Vortex 77) | 56.61 | 55.18 | 1.58 | 3.5 | 3.9 | 6.0 |
| CB10 | Tempest LMF (Vortex 77) | 56.63 | 55.23 | 1.60 | 6.4 | 6.5 | 6.7 |
| CB11 | Tempest LMF (Vortex 77) | 56.67 | 55.24 | 1.62 | 3.5 | 3.9 | 6.1 |
| CB12 | Tempest LMF (Vortex 77) | 56.38 | 54.95 | 1.53 | 2.9 | 3.3 | 6.2 |
| RYCB1 | Tempest LMF (Vortex 73) | 55.80 | 53.99 | 1.85 | 3.9 | 5.6 | 6.3 |
| RYCB3 | Tempest LMF (Vortex 87) | 55.59 | 53.99 | 1.86 | 6.1 | 9.2 | 9.1 |
| RYCB6 | Tempest LMF (Vortex 87) | 55.41 | 53.75 | 1.90 | 8.4 | 10.6 | 8.7 |

**PCSWMM model results for a 3-hour Chicago storm distribution.*

### *6.5.2 Major System*

The major system network was evaluated using the PCSWMM model to ensure that the ponding depths conform to City standards. A summary of ponding depths at each inlet for the 2-year, 5-year, 100-year and 100-year (+20%) events are provided in **Appendix B**. The maximum static and dynamic ponding depths within the roadways are less than 0.3m during all events.

As the allowable release rate of 142.4 L/s is less than the ultimate 2-year peak flows, there will be some ponding during the 2-year storm event. This ponding will last for an average of 18 minutes and will be clear by the end of the 2-year storm event. For a 3-hour Chicago Storm Distribution, ponding will typically begin around 1 hour and 05 minutes from the beginning of the storm event, ending at the latest at 1 hours 34 minutes from the beginning of the storm event. While this is contrary to the current City of Ottawa Stormwater Criteria outlined in Technical Bulletin PIEDTB-2016-01, the maximum 2-year ponding depth peaks at a depth of 0.07m with no ponding occurring at the end of the storm event.

**Table 6-6: Overland Flow Results (100-year Event)**

| Structure | T/G | Max. Static Ponding (Spill Depth) | | 100-yr Event (3hr) | | | |
|---|---|---|---|---|---|---|---|
| | | Elev. | Depth | Elev. | Depth | Cascading | Cascade Depth (m) |
| | (m) | (m) | (m) | (m) | (m) | Flow? | |
| CB01 | 56.43 | 56.58 | 0.15 | 56.66 | 0.23 | Y | 0.08 |
| CB02 | 56.38 | 56.53 | 0.15 | 56.63 | 0.25 | Y | 0.10 |
| CB03 | 56.43 | 56.58 | 0.15 | 56.58 | 0.15 | N | 0.00 |
| CB04 | 56.50 | 56.65 | 0.15 | 56.63 | 0.13 | N | 0.00 |
| CB05 | 56.56 | 56.71 | 0.15 | 56.72 | 0.16 | Y | 0.01 |
| CB06 | 56.48 | 56.63 | 0.15 | 56.70 | 0.22 | Y | 0.07 |
| CB07 | 56.57 | 56.72 | 0.15 | 56.72 | 0.15 | N | 0.00 |
| CB08 | 56.55 | 56.70 | 0.15 | 56.76 | 0.21 | Y | 0.06 |
| CB09 | 56.61 | 56.76 | 0.15 | 56.76 | 0.15 | N | 0.00 |
| CB10 | 56.63 | 56.78 | 0.15 | 56.83 | 0.20 | Y | 0.05 |
| CB11 | 56.67 | 56.82 | 0.15 | 56.86 | 0.19 | Y | 0.04 |
| CB12 | 56.38 | 56.50 | 0.12 | 56.48 | 0.10 | N | 0.00 |

An expanded table of the ponding depths at low points in the roadway (including the stress-test event) is provided in **Appendix B**. Based on these results, the proposed storm drainage system will not experience any adverse flooding even with a 20% increase to the 100-year event.

**Table 6-7: Ponding Times**

| ICD/ CB | Ponding Time* (h:mm) | | |
|---|---|---|---|
| | 2-year | 5-year | 100-year |
| CB1 | 0:25 | 0:44 | 1:31 |
| CB2 | 0:10 | 0:25 | 1:03 |
| CB3 | 0:14 | 0:32 | 1:23 |

| | | | |
|---|---|---|---|
| CB4 | 0:16 | 0:34 | 1:23 |
| CB5 | 0:07 | 0:21 | 1:02 |
| CB6 | 0:29 | 0:50 | 1:39 |
| CB7 | 0:00 | 0:00 | 1:32 |
| CB8 | 0:22 | 0:42 | 1:24 |
| CB9 | 0:00 | 0:00 | 1:30 |
| CB10 | 0:23 | 0:43 | 1:25 |
| CB11 | 0:00 | 0:00 | 1:37 |
| CB12 | 0:00 | 0:00 | 0:58 |

*Ponding time occurs during the *peak for the 3-hour storm event.*

### *6.5.3 Hydraulic Grade Line*

The results of the analysis were used to determine if there would be any surcharging from the storm sewer system during the 100-year storm event. **Appendix B** provides a summary of the 100-year HGL elevation at each storm manhole within the proposed development, as well as a summary of the HGL elevations for a 20% increase (rainfall intensity and total precipitation) in the 100-year design event. The results of the HGL analysis and the stress testing indicates that the storm sewer does surcharge during the 100-year event and 100-year+20% storm event.

The results of the HGL analysis were used to ensure that a minimum freeboard of 0.50m is provided between the 100-year HGL and the designed underside of slab elevations (all buildings are slab on grade). The 100-year HGL elevations at each storm manhole with respect to the lowest adjacent underside of slab elevation are provided in **Table 6-8**.

**Table 6-8: 100-year HGL Elevations**

| Manhole ID | MH Invert Elevation (m) | T/G Elevation (m) | HGL Elevation - 100yr3hr (m) | Design USS (m) | Clearance (100yr) (m) |
|---|---|---|---|---|---|
| MH02 | 52.82 | 56.47 | 55.13 | 56.73 | 1.6 |
| MH04 | 52.98 | 56.52 | 55.14 | 56.71 | 1.57 |
| MH06 | 52.27 | 56.43 | 55.11 | 56.65 | 1.54 |
| MH08 | 52.73 | 56.46 | 55.12 | 56.70 | 1.58 |
| MH10 | 53.06 | 56.59 | 55.13 | 56.70 | 1.57 |
| MH12 | 53.38 | 56.75 | 55.13 | 56.91 | 1.78 |
| MH14 | 53.18 | 56.50 | 55.15 | 56.75 | 1.60 |
| MH16 | 53.34 | 56.59 | 55.16 | 56.81 | 1.65 |
| MH18 | 52.09 | 56.50 | 55.10 | 56.65 | 1.55 |
| MH20 | 51.99 | 55.52 | 55.09 | 56.65 | 1.56 |
| MH22 | 53.51 | 56.64 | 55.16 | 56.75 | 1.59 |
| MH24 | 53.66 | 56.66 | 55.16 | 56.82 | 1.66 |
| MH26 | 53.63 | 56.69 | 55.16 | 56.88 | 1.72 |
| MH28 | 53.88 | 56.73 | 55.17 | 56.91 | 1.74 |

**Downstream 'fixed' outfall condition set at 55.05m (Based on profile provided by the City of Ottawa located in Appendix B). Initial depths based on fixed outfall elevation of 55.05m.*

An expanded table showing the results of the stress test (100-year +20% event) and the HGL elevations is provided in **Appendix B**. The stress test indicates that the HGL elevations will be below the USS elevations for this event.

### *6.5.4 Peak Flows*

The overall release rates from the ICDs were added to determine the overall release rate from the site. The results of this analysis indicate that the allowable release rate will be met for each storm event. Refer to **Table 6-9** for the modelled peak flows for each storm event.

The results of the PCSWMM analysis indicate that outflows from the proposed development will not exceed the allowable release rate for all storm events.

**Table 6-9: Summary of Peak Flows**

| Design Event | Allowable Release Rate (L/s) | Controlled Minor System Release Rate (L/s) | Uncontrolled Minor System Release Rate (L/s) | Total Minor System Release Rate (L/s) |
|---|---|---|---|---|
| 2-year | 142.4 | 86.7 | 8.1 | 94.8 |
| 5-year | | 96.1 | 14.8 | 110.9 |
| 100-year | | 105.4 | 36.4 | 141.8 |
| 100-year (+20%) | - | 101.4 | 47.0 | 148.4 |

**PCSWMM Model results for a 3-hr Chicago storm distribution.*

As mentioned above in **Section 6.3.2**, the existing site provides an emergency overland flow route for Landry Street (through the park land and rear-yards of Blocks 8 and 9) and Baribeau Street (through the rear-yards of Block 5 and 6), outletting to the pathway block connecting to Kipp Street. Through coordination with the City of Ottawa (**Appendix D**) Novatech has assumed potential 100-year overland flows of 190 L/s from Landry Street and 1,000 L/s from Baribeau Street. With the combination of surface storage and underground storage chambers, most of the major system from the 100-year storm event is contained on-site. During the 100-year storm event 50.0 L/s of major system flow from the rear-yards is directed to Kipp Street at RYCB5. The overland flow at RYCB5 is the result of maintaining the grade of the existing overland flow route through the rear-yards as we are unable to raise the existing grade enough to provide additional storage. The additional 50.0 L/s from the site is insignificant compared to the assumed flows from Landry Street and Baribeau Street.

# 7.0 WATER

## 7.1 Existing Conditions

The proposed development is located inside the 1E Pressure Zone. A 300mm diameter watermain runs along Landry Street, a 200mm diameter watermain runs along Baribeau Street and a 150mm diameter watermain runs along Carillon Street.

## 7.2 Proposed Conditions

The site will have three connection points to the existing watermains, one to the 300mm watermain in Landry Street, one to the 200 mm watermain in Baribeau Street and one to the 150mm watermain in Carillon Street.

A series of 150mm and 200mm diameter watermains are proposed and will provide capacity to maintain appropriate pressures and fire flows throughout the development. **Figure 5** provides a high-level schematic of the proposed water distribution system.

The watermain boundary conditions below were obtained from the City of Ottawa (July 2020) and has been included in **Appendix A**:

Boundary Condition 1 – Landry Street (300mm watermain)
Max Day + FF of 183 L/s = 110.0m
Max Day + FF of 333 L/s = 104.0m
Peak Hour = 109.5m
Maximum HGL = 118.5m

Boundary Condition 2 – Baribeau Street (200mm watermain)
Max Day + FF of 183 L/s = 109.0m
Max Day + FF of 333 L/s = 101.0m
Peak Hour = 109.5m
Maximum HGL = 118.5m

City of Ottawa watermain design criteria are outlined in **Table 7.1**.

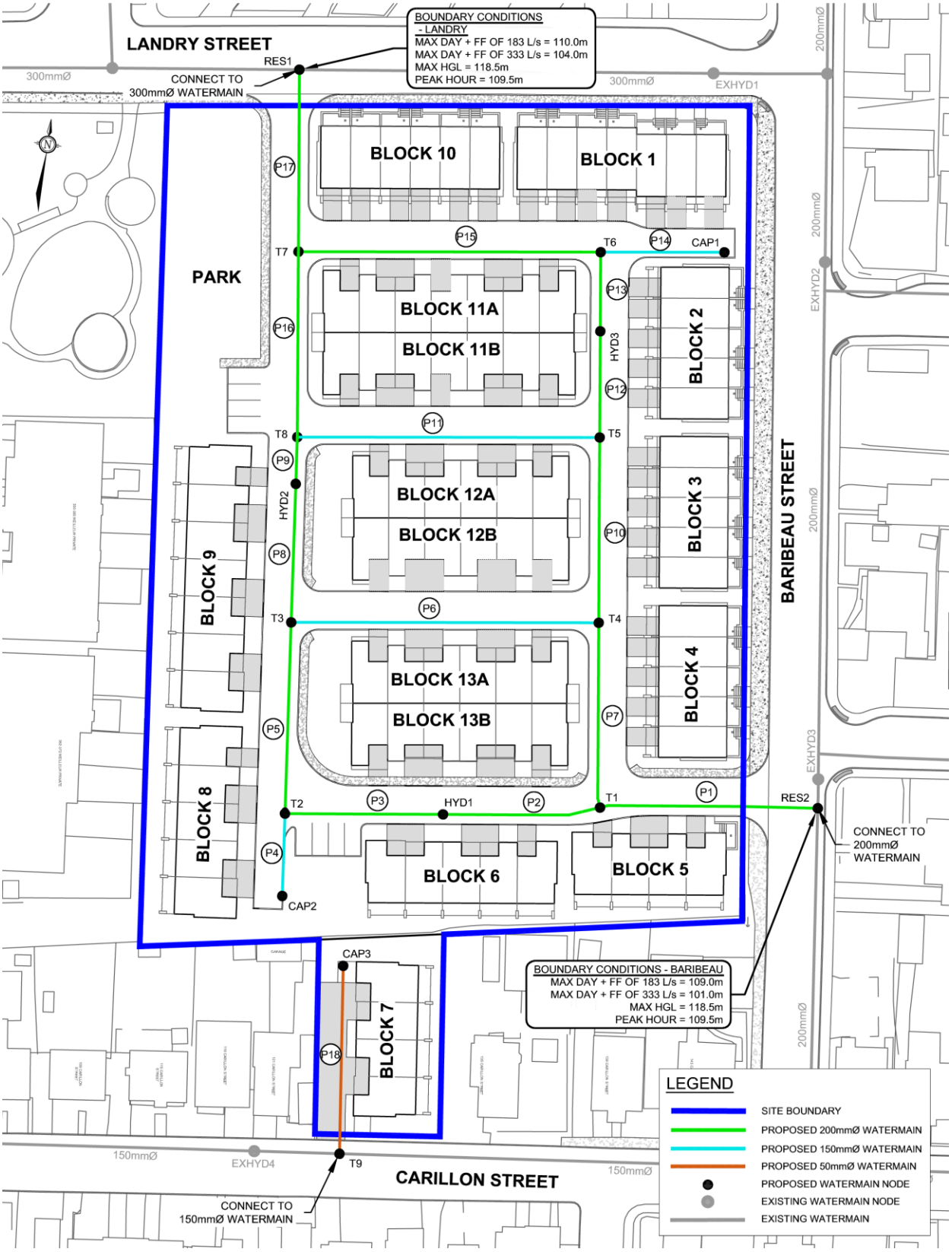



**Figure 5: Watermain Layout**

**Table 7-1: Watermain Design Criteria**

| Design Parameter | Design Criteria |
|---|---|
| Town Population | 2.7 people/unit |
| Residential Demand | 280 L/c/d |
| Maximum Day Demand | 2.5 x Average Day |
| Peak Hour Demand | 2.2 x Maximum Day |
| Fire Demand | 183 to 317 L/s |
| Maximum Pressure | 690 kPa (100psi) unoccupied areas |
| Maximum Pressure | 552 kPa (80psi) occupied areas outside of ROW |
| Minimum Pressure | 275 kPa (40 psi) except during fire flow |
| Minimum Pressure | 140 kPa (20 psi) fire flow conditions |

**Table 7-2: Water Flow Summary**

| | Units | Population | Average Day Demand (L/s) | Maximum Day Demand (L/s) | Peak Hour Demand (L/s) |
|---|---|---|---|---|---|
| **Back-to-Back Towns** | 91 | 246 | 0.796 | 1.991 | 4.379 |
| **Total** | **91** | **246** | **0.796** | **1.991** | **4.379** |

Based on the fire underwriters survey, the fire flows were calculated as 200 L/s (Blocks 5 and 7), 217 L/s (Blocks 2, 3, 4, 6, 8 and 10), 233 L/s (Blocks 1 and 9), 300 L/s (Blocks 12 and 13) and 317 L/s (Block 11). Hydrant grades and distances to structures are illustrated on the Fire Hydrant Coverage Plan in **Appendix A**. Fire flow calculations are provided in **Appendix A**.

The proposed watermain was modeled using EPANET 2 (See 119068-GP for detailed watermain layout).

A summary of the model results is shown below in **Table 7.3**, **Table 7.4** and **Table 7.5**. Full model results are included in **Appendix A**.

**Table 7-3: Summary of Hydraulic Model Results - Maximum Day + Fire Flow**

| Operating Condition | Minimum Pressure |
|---|---|
| 233 L/s at Block 1 | 481.67 kPa (HYD3) |
| 217 L/s at Block 2 | 489.62 kPa (HYD3) |
| 217 L/s at Block 3 & 4 | 472.65 kPa (HYD3) |
| 200 L/s at Block 5 | 498.74 kPa (HYD1) |
| 217 L/s at Block 6 | 471.08 kPa (HYD2) |
| 200 L/s at Block 7 | 444.69 kPa (EXHYD4) |
| 217 L/s at Block 8 | 476.28 kPa (HYD2) |
| 233 L/s at Block 9 | 460.09 kPa (HYD2) |
| 217 L/s at Block 10 | 475.88 kPa (HYD3) |
| 317 L/s at Block 11 | 417.22 kPa (HYD2) |
| 300 L/s at Block 12 & 13 | 415.85 kPa (HYD2) |

**Table 7-4: Summary of Hydraulic Model Results - Peak Hour Demand**

| Operating Condition | Maximum Pressure | Minimum Pressure |
|---|---|---|
| 4.379 L/s through system | 523.66 kPa (CAP3) | 517.38 kPa (T6) |

The hydraulic modelling summarized above highlights the maximum and minimum system pressures during Peak Hour conditions, and the minimum system pressures during the Maximum Day + Fire condition. Since the Maximum Day + Fire Flow pressures are above the minimum 140 kPa, and the Peak Hour Pressures onsite fall within the normal operating pressure range (345 kPa to 552 kPa) we conclude the proposed water design will adequately service the development.

**Table 7-5: Summary of Hydraulic Model Results – Maximum Pressure Check**

| Operating Condition | Maximum Pressure | Minimum Pressure |
|---|---|---|
| 0.796 L/s through system | 612.14 kPa (CAP3) | 605.67 kPa (T6) |

The average day pressures throughout the system are above 552 kPa, therefore pressure reducing valves are required.

Water retention was analyzed at each node during average day demand. The maximum age throughout the system is within City standards.

## 8.0 CONCLUSIONS AND RECOMMENDATIONS

The report conclusions are as follows:

1) The proposed storm system will control post-development flow to the allowable release rate of 142.4 L/s.

2) The proposed sanitary sewer conforms to City design criteria and provides a gravity outlet for the development site. There is capacity in the downstream sanitary sewers to accommodate the design flow into the Carillon Street sanitary sewers.

3) Connection to the watermains in Baribeau Street, Landry Street and Carillon Street will provide municipal water service to the development.

4) There is adequate fire protection for the proposed development, in accordance with the Fire Underwriter's Survey.

5) The proposed infrastructure (sanitary, storm and water) complies with City of Ottawa design standards.

6) The proposed grading provides a minimum 0.30m clearance between the RVCA regulatory flood level of 56.44m and the underside of slab of all living levels.

This report is respectfully submitted for review and approval. Please contact the undersigned should you have questions or require additional information.

Sincerely,

**NOVATECH**

Prepared By:




Lucas Wilson, P.Eng.
Project Coordinator

Reviewed By:




Mark Bissett, P.Eng.
Senior Project Manager

## APPENDIX A: Design Sheets

Storm Sewer Design Sheet (Rational Method)
Sanitary Sewer Design Sheet
Watermain Boundary Conditions
Watermain Modelling
Fire Flow Calculations
Fire Hydrant Coverage Plan

**200 Baribeau Street**

**Project No.: 119068**

# STORM SEWER DESIGN SHEET

**FLOW RATES BASED ON RATIONAL METHOD**

NOVATECH
Engineers, Planners & Landscape Architects

| LOCATION | | | | AREA (ha) | | | FLOW | | | | | | | TOTAL FLOW | SEWER DATA | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Street | Catchment ID | From Manhole | To Manhole | Area (ha) | C | AC (ha) | Indiv 2.78 AC | Accum 2.78 AC | Time of Concentration | Rainfall Intensity 2 Year (mm/hr) | Rainfall Intensity 5 Year (mm/hr) | Rainfall Intensity 10 Year (mm/hr) | Peak Flow (L/s) | Total Peak Flow, Q (L/s) | Dia. (m) Actual | Dia. (mm) | Type | Slope (%) | Length (m) | Capacity (L/s) | Velocity (m/s) | Flow Time (min) | Ratio Q/Q full |
| | **A2, A7** | MH12 | MH10 | 0.113 | 0.79 | 0.09 | 0.248 | 0.248 | 10.00 | 76.81 | | | 19.1 | 19.1 | 0.305 | 300 | PVC | 1.00 | 40.9 | 100.8 | 1.38 | 0.49 | 19% |
| | | | | | | 0.00 | 0.000 | 0.000 | 10.00 | | | | | | | | | | | | | | |
| | | | | | | 0.00 | 0.000 | 0.000 | 10.00 | | | | | | | | | | | | | | |
| | **A1, A8, A9** | MH10 | MH8 | 0.110 | 0.34 | 0.04 | 0.104 | 0.352 | 10.49 | 74.96 | | | 26.4 | 26.4 | 0.305 | 300 | PVC | 1.00 | 25.7 | 100.8 | 1.38 | 0.31 | 26% |
| | | | | | | 0.00 | 0.000 | 0.000 | 10.49 | | | | | | | | | | | | | | |
| | | | | | | 0.00 | 0.000 | 0.000 | 10.49 | | | | | | | | | | | | | | |
| | **A11** | MH8 | MH6 | 0.087 | 0.69 | 0.06 | 0.167 | 0.519 | 10.80 | 73.85 | | | 38.3 | 38.3 | 0.381 | 375 | PVC | 1.00 | 31.5 | 182.8 | 1.60 | 0.33 | 21% |
| | | | | | | 0.00 | 0.000 | 0.000 | 10.80 | | | | | | | | | | | | | | |
| | | | | | | 0.00 | 0.000 | 0.000 | 10.80 | | | | | | | | | | | | | | |
| | **A3, A4** | MH26 | MH16 | 0.173 | 0.81 | 0.14 | 0.390 | 0.390 | 10.00 | 76.81 | | | 29.9 | 29.9 | 0.305 | 300 | PVC | 0.75 | 29.8 | 87.3 | 1.20 | 0.42 | 34% |
| | | | | | | 0.00 | 0.000 | 0.000 | 10.00 | | | | | | | | | | | | | | |
| | | | | | | 0.00 | 0.000 | 0.000 | 10.00 | | | | | | | | | | | | | | |
| | **A5, A6** | MH16 | MH14 | 0.166 | 0.82 | 0.14 | 0.378 | 0.768 | 10.42 | 75.25 | | | 57.8 | 57.8 | 0.381 | 375 | PVC | 0.50 | 29.8 | 129.2 | 1.13 | 0.44 | 45% |
| | | | | | | 0.00 | 0.000 | 0.000 | 10.42 | | | | | | | | | | | | | | |
| | | | | | | 0.00 | 0.000 | 0.000 | 10.42 | | | | | | | | | | | | | | |
| | **A12, A13** | MH14 | MH4 | 0.177 | 0.81 | 0.14 | 0.399 | 1.167 | 10.85 | 73.68 | | | 85.9 | 85.9 | 0.381 | 375 | PVC | 0.50 | 29.0 | 129.2 | 1.13 | 0.43 | 67% |
| | | | | | | 0.00 | 0.000 | 0.000 | 10.85 | | | | | | | | | | | | | | |
| | | | | | | 0.00 | 0.000 | 0.000 | 10.85 | | | | | | | | | | | | | | |
| | | MH4 | MH2 | | | 0.00 | 0.000 | 1.167 | 11.28 | 72.22 | | | 84.2 | 84.2 | 0.381 | 375 | PVC | 1.00 | 8.3 | 182.8 | 1.60 | 0.09 | 46% |
| | | | | | | 0.00 | 0.000 | 0.000 | 11.28 | | | | | | | | | | | | | | |
| | | | | | | 0.00 | 0.000 | 0.000 | 11.28 | | | | | | | | | | | | | | |
| | **A14, A15** | MH2 | MH6 | 0.149 | 0.81 | 0.12 | 0.336 | 1.502 | 11.37 | 71.93 | | | 108.0 | 108.0 | 0.457 | 450 | Conc | 1.00 | 48.2 | 297.2 | 1.81 | 0.44 | 36% |
| | | | | | | 0.00 | 0.000 | 0.000 | 11.37 | | | | | | | | | | | | | | |
| | | | | | | 0.00 | 0.000 | 0.000 | 11.37 | | | | | | | | | | | | | | |
| | **A16** | MH6 | MH18 | 0.074 | 0.69 | 0.05 | 0.142 | 2.163 | 11.81 | 70.49 | | | 152.5 | 152.5 | 0.533 | 525 | Conc | 1.00 | 17.4 | 448.4 | 2.01 | 0.14 | 34% |
| | | | | | | 0.00 | 0.000 | 0.000 | 11.81 | | | | | | | | | | | | | | |
| | | | | | | 0.00 | 0.000 | 0.000 | 11.81 | | | | | | | | | | | | | | |
| | **A10, A17, A18, A21, A23** | MH18 | MH20 | 0.117 | 0.51 | 0.06 | 0.166 | 2.329 | 11.95 | 70.04 | | | 163.1 | 163.1 | 0.533 | 525 | Conc | 1.00 | 11.0 | 448.4 | 2.01 | 0.09 | 36% |
| | | | | | | 0.00 | 0.000 | 0.000 | 11.95 | | | | | | | | | | | | | | |
| | | | | | | 0.00 | 0.000 | 0.000 | 11.95 | | | | | | | | | | | | | | |
| | **A19, A20, A22** | MH20 | EX | 0.074 | 0.53 | 0.04 | 0.109 | 2.438 | 12.05 | 69.75 | | | 170.1 | 170.1 | 0.533 | 525 | Conc | 1.00 | 41.4 | 448.4 | 2.01 | 0.34 | 38% |
| | | | | | | 0.00 | 0.000 | 0.000 | 12.05 | | | | | | | | | | | | | | |
| | | | | | | 0.00 | 0.000 | 0.000 | 12.05 | | | | | | | | | | | | | | |

Q = 2.78 AIC, where

Q = Peak Flow in Litres per Second (L/s)

A = Area in hectares (ha)

I = Rainfall Intensity (mm/hr), 2 year storm

C = Runoff Coefficient

LICENSED PROFESSIONAL ENGINEER
L. R. WILSON
100160065
2021.02.05
PROVINCE OF ONTARIO

| | |
|---|---|
| **Consultant:** | **Novatech** |
| **Date:** | January 29, 2021 |
| **Design By:** | Lucas Wilson |
| **Client:** | **Dwg. Reference:** / **Checked By:** |
| Parkriver Properties | 119068-STM / MAB |

# 200 Baribeau Street - Sanitary Sewer Design Sheet

| AREA | | | RESIDENTIAL | | | | | | | INFILTRATION | | | | PIPE | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SINGLES | | Towns | | | | | | | | | | | | | | | | |
| ID | From | To | Units | Pop. | Units | Pop. | Accum. Pop. | Peak Factor | Peak Flow (l/s) | Total Area (ha) | Accum. Area (ha) | Infilt. Flow (l/s) | **Total Flow (l/s)** | Size (mm) | Slope (%) | Length (m) | Capacity (l/s) | Full Flow Vel. (m/s) | Actual Vel. (m/s) | $Q/Q_{full}$ (%) | d/D |
| **200 BARIBEAU STREET** | | | | | | | | | | | | | | | | | | | | | |
| | **19** | **17** | 0 | 0.0 | 16 | 43.2 | 43.2 | 3.7 | 0.5 | 0.15 | 0.15 | 0.0 | 0.6 | 200 | 0.65 | 45.7 | 27.6 | 0.85 | 0.28 | 2.0% | 0.108 |
| | **21** | **17** | 0 | 0.0 | 4 | 10.8 | 10.8 | 3.7 | 0.1 | 0.04 | 0.04 | 0.0 | 0.1 | 200 | 0.65 | 18.0 | 27.6 | 0.85 | 0.19 | 0.5% | 0.000 |
| | **17** | **15** | 0 | 0.0 | 5 | 13.5 | 67.5 | 3.6 | 0.8 | 0.06 | 0.25 | 0.1 | 0.9 | 200 | 0.35 | 29.8 | 20.2 | 0.62 | 0.26 | 4.3% | 0.153 |
| | **15** | **11** | 0 | 0.0 | 13 | 35.1 | 102.6 | 3.6 | 1.2 | 0.12 | 0.37 | 0.1 | 1.3 | 200 | 0.35 | 51.6 | 20.2 | 0.62 | 0.29 | 6.5% | 0.187 |
| | **11** | **9** | 0 | 0.0 | 4 | 10.8 | 113.4 | 3.6 | 1.3 | 0.07 | 0.44 | 0.1 | 1.5 | 200 | 0.35 | 29.8 | 20.2 | 0.62 | 0.30 | 7.2% | 0.202 |
| | **13** | **9** | 0 | 0.0 | 12 | 32.4 | 32.4 | 3.7 | 0.4 | 0.11 | 0.11 | 0.0 | 0.4 | 200 | 0.65 | 52.5 | 27.6 | 0.85 | 0.26 | 1.5% | 0.077 |
| | **9** | **5** | 0 | 0.0 | 5 | 13.5 | 159.3 | 3.5 | 1.8 | 0.08 | 0.63 | 0.2 | 2.0 | 200 | 0.35 | 30.8 | 20.2 | 0.62 | 0.33 | 10.1% | 0.077 |
| | **15** | **13** | 0 | 0.0 | 5 | 13.5 | 13.5 | 3.7 | 0.2 | 0.07 | 0.07 | 0.0 | 0.2 | 200 | 0.65 | 29.8 | 27.6 | 0.85 | 0.21 | 0.7% | 0.077 |
| | **13** | **3** | 0 | 0.0 | 5 | 13.5 | 27.0 | 3.7 | 0.3 | 0.06 | 0.13 | 0.0 | 0.4 | 200 | 0.35 | 29.4 | 20.2 | 0.62 | 0.20 | 1.8% | 0.077 |
| | **23** | **3** | 0 | 0.0 | 3 | 8.1 | 8.1 | 3.7 | 0.1 | 0.04 | 0.04 | 0.0 | 0.1 | 200 | 0.65 | 20.9 | 27.6 | 0.85 | 0.16 | 0.4% | 0.077 |
| | **3** | **25** | 0 | 0.0 | 1 | 2.7 | 37.8 | 3.7 | 0.4 | 0.01 | 0.18 | 0.1 | 0.5 | 200 | 0.35 | 6.5 | 20.2 | 0.62 | 0.23 | 2.5% | 0.077 |
| | **25** | **5** | 0 | 0.0 | 11 | 29.7 | 67.5 | 3.6 | 0.8 | 0.12 | 0.30 | 0.1 | 0.9 | 200 | 0.35 | 47.0 | 20.2 | 0.62 | 0.27 | 4.4% | 0.077 |
| | **5** | **7** | 0 | 0.0 | 3 | 8.1 | 234.9 | 3.5 | 2.7 | 0.03 | 0.96 | 0.3 | 3.0 | 200 | 0.35 | 14.7 | 20.2 | 0.62 | 0.37 | 14.7% | 0.077 |
| | **7** | **27** | 0 | 0.0 | 0 | 0.0 | 234.9 | 3.5 | 2.7 | 0.02 | 0.98 | 0.3 | 3.0 | 200 | 0.35 | 10.9 | 20.2 | 0.62 | 0.37 | 14.7% | 0.077 |
| | **27** | **29** | 0 | 0.0 | 4 | 10.8 | 245.7 | 3.5 | 2.8 | 0.06 | 1.04 | 0.3 | 3.1 | 200 | 0.35 | 32.6 | 20.2 | 0.62 | 0.38 | 15.4% | 0.077 |
| | **29** | **EX** | 0 | 0.0 | 0 | 0.0 | 245.7 | 3.5 | 2.8 | 0.00 | 1.04 | 0.3 | 3.1 | 200 | 0.35 | 6.9 | 20.2 | 0.62 | 0.38 | 15.4% | 0.297 |

**Design Parameters:**

| | | | **Population Density:** | | |
|---|---|---|---|---|---|
| Avg Flow/Person = | 280 | l/day | | ppl/unit | units/net ha |
| Comm./Inst. Flow = | 28000 | l/ha/day | Apartment | 1.80 | 90 |
| Infiltration = | 0.33 | l/s/ha | Singles | 3.40 | |
| Pipe Friction n = | 0.013 | | Towns | 2.70 | 60 |

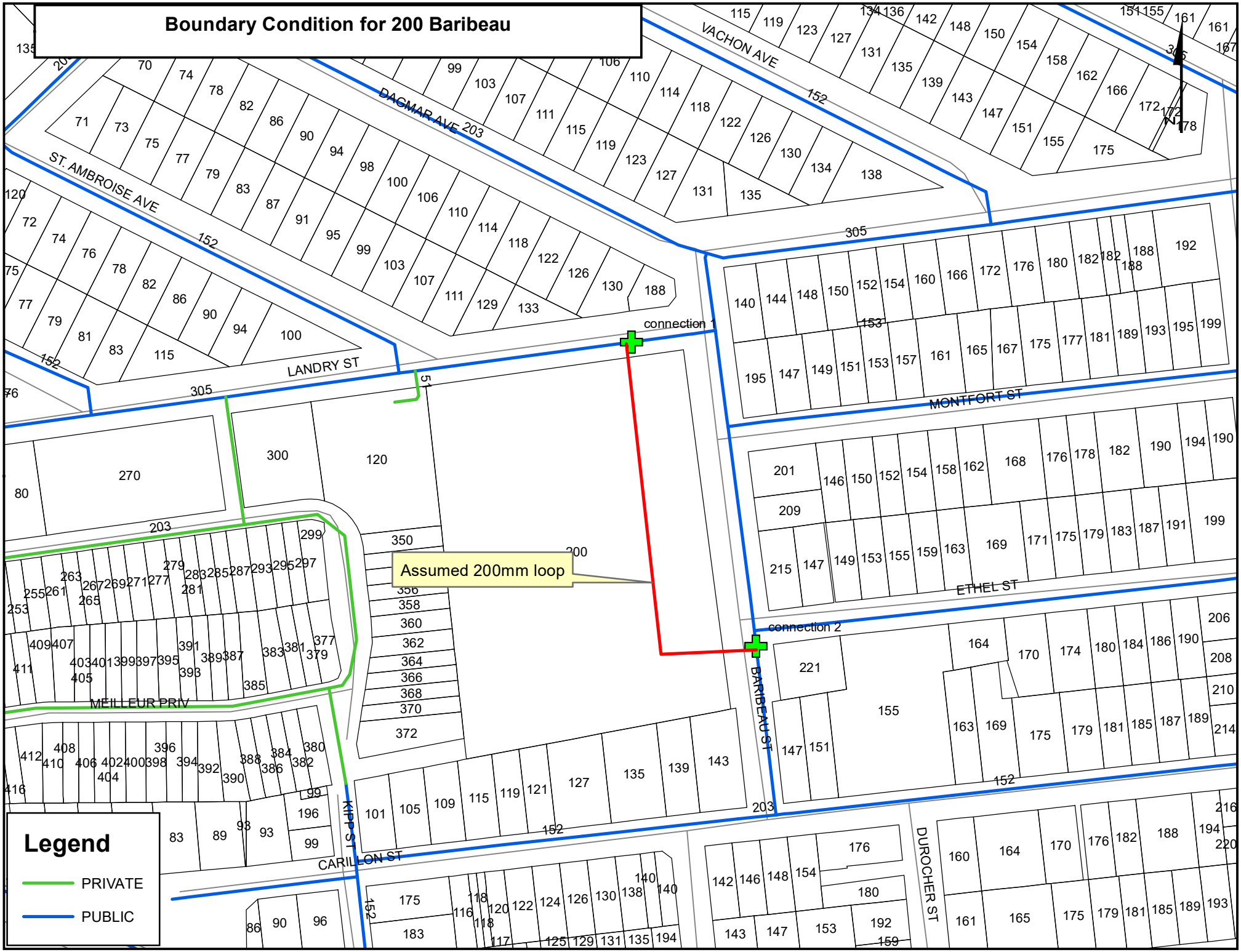
Residential Peaking Factor = Harmon Equation (max 4, min 2)

**Project: 200 Baribeau Street (119068)**
Designed: LRW
Checked: MAB
Date: January 21, 2021






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Boundary Condition for 200 Baribeau
Assumed 200mm loop
connection 1
connection 2
VACHON AVE
DAGMAR AVE
ST. AMBROISE AVE
LANDRY ST
MONTFORT ST
ETHEL ST
BARIBEAU ST
MEILLEUR PRIV
KIPP ST
CARILLON ST
DUROCHER ST
Legend
PRIVATE
PUBLIC

## Lucas Wilson

**From:** Wu, John <John.Wu@ottawa.ca>
**Sent:** Monday, July 27, 2020 12:17 PM
**To:** Lucas Wilson
**Subject:** RE: Fir flow and boundary condition for 200 Baribeau
**Attachments:** 200 Baribeau July 2020.pdf

The following are boundary conditions, HGL, for hydraulic analysis at 200 Baribeau (zone 1E) assumed to be connected to the 305mm on Landry and 203mm on Baribeau (see attached PDF for location).

A 200mm private watermain was assumed between both connections as requested.

| | 305mm on Landry | 203mm on Baribeau |
|---|---|---|
| Minimum HGL | 109.5m | 109.5m |
| Maximum HGL | 118.5m* | 118.5m* |
| MaxDay + Fireflow (183 L/s) | 110.0m | 109.0m |
| MaxDay + Fireflow (333L/s) | 104.0m | 101.0m |

*The maximum pressure is estimated to be above 80 psi. A pressure check at completion of construction is recommended to determine if pressure control is required.*

These are for current conditions and are based on computer model simulation.

*Disclaimer: The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation.*

John

---

**From:** Lucas Wilson <l.wilson@novatech-eng.com>
**Sent:** July 27, 2020 8:32 AM
**To:** Wu, John <John.Wu@ottawa.ca>
**Subject:** RE: Fir flow and boundary condition for 200 Baribeau

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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 morning John,

Just wanted to follow up on 200 Baribeau and if you've heard anything from water modelling in regards to the boundary conditions.

Thanks,
**Lucas Wilson**, P.Eng., Project Coordinator | Engineering
**NOVATECH** Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON K2M 1P6 | Tel: 613.254.9643 Ext: 282 | Fax: 613.254.5867
The information contained in this email message is confidential and is for exclusive use of the addressee.

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**From:** Lucas Wilson
**Sent:** Monday, July 13, 2020 10:17 AM
**To:** 'John.Wu@ottawa.ca' <John.Wu@ottawa.ca>
**Cc:** Mark Bissett <m.bissett@novatech-eng.com>
**Subject:** RE: Fir flow and boundary condition for 200 Baribeau

John,

Thanks for the quick response. The link between the two connection points is a 200mm diameter watermain approximately 175m in length. We will be using a range of fire flows depending on the Block being modelled. Block 1 has the lowest fire flow of 183 L/s and Block 10 being the highest with a fire flow of 333 L/s. The City typically provides the pressures for the highest and lowest fire flows and requests that we interpolate for the remaining fire flows.

Thanks,
**Lucas Wilson**, P.Eng., Project Coordinator | Engineering
**NOVATECH** Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON K2M 1P6 | Tel: 613.254.9643 Ext: 282 | Fax: 613.254.5867
The information contained in this email message is confidential and is for exclusive use of the addressee.

---

**From:** Wu, John <John.Wu@ottawa.ca>
**Sent:** Monday, July 13, 2020 9:14 AM
**To:** Mark Bissett <m.bissett@novatech-eng.com>; Mark Bissett <m.bissett@novatech-eng.com>
**Cc:** Renaud, Jean-Charles <Jean-Charles.Renaud@ottawa.ca>
**Subject:** Fir flow and boundary condition for 200 Baribeau

Hi, Lucas:

Please let me know which Fire flow you try to use and what kind of link( size of water main and distance) between the two connection points

I can forward to City's Model group to do the boundary condition for you.

Thanks.

**John Wu**, P.Eng.
Project Manager, Infrastructure Approval
Development Review (Urban Services)

Gestionnaire de projet, Approbation de L'infrastructure
Examen des projects d'amenagement (Services urbains)
Planning, Infrastructure and Economic Development Department
Services de planification, d'infrastructure et de développement économique
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West. Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 27734, fax/téléc:613-560-6006, john.wu@ottawa.ca

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## 200 Baribeau Street
## Water Demand

| | Area (ha) | Units | Population | Average Day Demand (L/s) | Maximum Day Demand (L/s) | Peak Hour Demand (L/s) |
|---|---|---|---|---|---|---|
| **Towns** | N/A | 91 | 246 | 0.796 | 1.991 | 4.379 |
| **Total** | **0.00** | **91** | **246** | **0.796** | **1.991** | **4.379** |

**Water Demand Parameters**

| | | |
|---|---|---|
| Towns | 2.7 | ppl/unit |
| Residential Demand | 280 | L/c/day |
| Residential Max Day | 2.5 | x Avg Day |
| Residential Peak Hour | 2.2 | x Max Day |
| Residential Fire Flow | 183 - 317 | L/s |

# 200 Baribeau Street - Watermain Demand

| Node | Towns | Total Population | Average Day Residential Demand (L/s) | Maximum Day Residential Demand (L/s) | Peak Hour Residential Demand (L/s) |
|---|---|---|---|---|---|
| **HYD1** | 11 | 30 | 0.096 | 0.241 | 0.529 |
| **HYD2** | 3 | 8 | 0.026 | 0.066 | 0.144 |
| **HYD3** | 3 | 8 | 0.026 | 0.066 | 0.144 |
| **CAP1** | 3 | 8 | 0.026 | 0.066 | 0.144 |
| **CAP2** | 2 | 5 | 0.018 | 0.044 | 0.096 |
| **CAP3** | 4 | 11 | 0.035 | 0.088 | 0.193 |
| **T1** | 6 | 16 | 0.053 | 0.131 | 0.289 |
| **T2** | 3 | 8 | 0.026 | 0.066 | 0.144 |
| **T3** | 10 | 27 | 0.088 | 0.219 | 0.481 |
| **T4** | 11 | 30 | 0.096 | 0.241 | 0.529 |
| **T5** | 11 | 30 | 0.096 | 0.241 | 0.529 |
| **T6** | 8 | 22 | 0.070 | 0.175 | 0.385 |
| **T7** | 9 | 24 | 0.079 | 0.197 | 0.433 |
| **T8** | 7 | 19 | 0.061 | 0.153 | 0.337 |
| **T9** | 0 | 0 | 0.000 | 0.000 | 0.000 |
| **Total** | **91** | **246** | **0.796** | **1.991** | **4.379** |

**Water Demand Parameters**

| | | | | | |
|---|---|---|---|---|---|
| Singles | 3.4 | ppl/unit | Residential Max Day | 2.5 | x Avg Day |
| Towns | 2.7 | ppl/unit | Residential Peak Hour | 2.2 | x Max Day |
| Residential Demand | 280 | L/c/day | Residential Fire Flow | 183 - 317 | L/s |



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# 200 Baribeau Street - Watermain Analysis

**Network Table - Nodes - (Peak Hour)**

| Node ID | Elevation m | Demand LPS | Head m | Pressure m | Pressure kPa | Pressure psi |
|---|---|---|---|---|---|---|
| Junc HYD1 | 56.45 | 0.53 | 109.5 | 53.05 | 520.42 | 75.48 |
| Junc HYD2 | 56.66 | 0.14 | 109.5 | 52.84 | 518.36 | 75.18 |
| Junc HYD3 | 56.75 | 0.14 | 109.5 | 52.75 | 517.48 | 75.05 |
| Junc T1 | 56.55 | 0.29 | 109.5 | 52.95 | 519.44 | 75.34 |
| Junc T2 | 56.44 | 0.14 | 109.5 | 53.06 | 520.52 | 75.49 |
| Junc T3 | 56.44 | 0.48 | 109.5 | 53.06 | 520.52 | 75.49 |
| Junc T4 | 56.59 | 0.53 | 109.5 | 52.91 | 519.05 | 75.28 |
| Junc T5 | 56.66 | 0.53 | 109.5 | 52.84 | 518.36 | 75.18 |
| Junc T6 | 56.76 | 0.38 | 109.5 | 52.74 | 517.38 | 75.04 |
| Junc T7 | 56.66 | 0.43 | 109.5 | 52.84 | 518.36 | 75.18 |
| Junc T8 | 56.61 | 0.34 | 109.5 | 52.89 | 518.85 | 75.25 |
| Junc T9 | 56.5 | 0 | 109.5 | 53 | 519.93 | 75.41 |
| Junc CAP1 | 56.7 | 0.14 | 109.5 | 52.8 | 517.97 | 75.12 |
| Junc CAP2 | 56.54 | 0.1 | 109.5 | 52.96 | 519.54 | 75.35 |
| Junc CAP3 | 56.1 | 0.19 | 109.48 | 53.38 | 523.66 | 75.95 |
| Resvr RES1 | 109.5 | -2.25 | 109.5 | 0 | 0.00 | 0.00 |
| Resvr RES2 | 109.5 | -2.12 | 109.5 | 0 | 0.00 | 0.00 |

**Network Table - Links - (Peak Hour)**

| Link ID | Length m | Diameter mm | Roughness | Flow LPS | Velocity m/s | Headloss m/km | Friction Factor |
|---|---|---|---|---|---|---|---|
| Pipe P1 | 35 | 204 | 110 | 2.02 | 0.06 | 0.04 | 0.044 |
| Pipe P2 | 25 | 204 | 110 | 0.89 | 0.03 | 0.01 | 0.050 |
| Pipe P3 | 25 | 204 | 110 | 0.36 | 0.01 | 0.00 | 0.062 |
| Pipe P4 | 15 | 155 | 100 | 0.10 | 0.01 | 0.00 | 0.073 |
| Pipe P5 | 31 | 204 | 110 | 0.12 | 0.00 | 0.00 | 0.000 |
| Pipe P6 | 50 | 155 | 100 | -0.09 | 0.00 | 0.00 | 0.073 |
| Pipe P7 | 30 | 204 | 110 | 0.85 | 0.03 | 0.01 | 0.050 |
| Pipe P8 | 22 | 204 | 110 | -0.27 | 0.01 | 0.00 | 0.048 |
| Pipe P9 | 8 | 204 | 110 | -0.42 | 0.01 | 0.00 | 0.061 |
| Pipe P10 | 30 | 204 | 110 | 0.23 | 0.01 | 0.00 | 0.052 |
| Pipe P11 | 49 | 155 | 100 | 0.21 | 0.01 | 0.00 | 0.055 |
| Pipe P12 | 17 | 204 | 110 | -0.09 | 0.00 | 0.00 | 0.000 |
| Pipe P13 | 13 | 204 | 110 | -0.24 | 0.01 | 0.00 | 0.056 |
| Pipe P14 | 20 | 155 | 100 | -0.14 | 0.01 | 0.00 | 0.073 |
| Pipe P15 | 49 | 204 | 110 | -0.76 | 0.02 | 0.01 | 0.050 |
| Pipe P16 | 30 | 204 | 110 | -0.97 | 0.03 | 0.01 | 0.049 |
| Pipe P17 | 29 | 204 | 110 | -2.16 | 0.07 | 0.05 | 0.043 |
| Pipe P18 | 30 | 50 | 100 | 0.19 | 0.10 | 0.61 | 0.062 |



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# 200 Baribeau Street - Watermain Analysis

**Network Table - Nodes - (Max Pressure Check)**

| Node ID | Elevation m | Demand LPS | Head m | Pressure m | Pressure kPa | Pressure psi | Age Hours |
|---|---|---|---|---|---|---|---|
| Junc HYD1 | 56.45 | 0.1 | 118.5 | 62.05 | 608.71 | 88.29 | 2.3 |
| Junc HYD2 | 56.66 | 0.03 | 118.5 | 61.84 | 606.65 | 87.99 | 3.11 |
| Junc HYD3 | 56.75 | 0.03 | 118.5 | 61.75 | 605.77 | 87.86 | 6.54 |
| Junc T1 | 56.55 | 0.05 | 118.5 | 61.95 | 607.73 | 88.14 | 0.87 |
| Junc T2 | 56.44 | 0.03 | 118.5 | 62.06 | 608.81 | 88.30 | 5.86 |
| Junc T3 | 56.44 | 0.09 | 118.5 | 62.06 | 608.81 | 88.30 | 12.1 |
| Junc T4 | 56.59 | 0.1 | 118.5 | 61.91 | 607.34 | 88.09 | 2.63 |
| Junc T5 | 56.66 | 0.1 | 118.5 | 61.84 | 606.65 | 87.99 | 12.2 |
| Junc T6 | 56.76 | 0.07 | 118.5 | 61.74 | 605.67 | 87.84 | 3.85 |
| Junc T7 | 56.66 | 0.08 | 118.5 | 61.84 | 606.65 | 87.99 | 0.68 |
| Junc T8 | 56.61 | 0.06 | 118.5 | 61.89 | 607.14 | 88.06 | 2.22 |
| Junc T9 | 56.5 | 0 | 118.5 | 62 | 608.22 | 88.21 | 3 |
| Junc CAP1 | 56.7 | 0.03 | 118.5 | 61.8 | 606.26 | 87.93 | 7.86 |
| Junc CAP2 | 56.54 | 0.02 | 118.5 | 61.96 | 607.83 | 88.16 | 10.22 |
| Junc CAP3 | 56.1 | 0.04 | 118.5 | 62.4 | 612.14 | 88.78 | 3.47 |
| Resvr RES1 | 118.5 | -1.2 | 118.5 | 0 | 0.00 | 0.00 | 0 |
| Resvr RES2 | 118.5 | -0.77 | 118.5 | 0 | 0.00 | 0.00 | 0 |

**Network Table - Links - (Max Pressure Check)**

| Link ID | Length m | Diameter mm | Roughness | Flow LPS | Velocity m/s | Headloss m/km | Friction Factor |
|---|---|---|---|---|---|---|---|
| Pipe P1 | 35 | 204 | 110 | 0.37 | 0.01 | 0.00 | 0.059 |
| Pipe P2 | 25 | 204 | 110 | 0.16 | 0.00 | 0.00 | 0.061 |
| Pipe P3 | 25 | 204 | 110 | 0.06 | 0.00 | 0.00 | 0.000 |
| Pipe P4 | 15 | 155 | 100 | 0.02 | 0.00 | 0.00 | 0.000 |
| Pipe P5 | 31 | 204 | 110 | 0.02 | 0.00 | 0.00 | 0.000 |
| Pipe P6 | 50 | 155 | 100 | -0.02 | 0.00 | 0.00 | 0.000 |
| Pipe P7 | 30 | 204 | 110 | 0.15 | 0.00 | 0.00 | 0.057 |
| Pipe P8 | 22 | 204 | 110 | -0.05 | 0.00 | 0.00 | 0.000 |
| Pipe P9 | 8 | 204 | 110 | -0.08 | 0.00 | 0.00 | 0.000 |
| Pipe P10 | 30 | 204 | 110 | 0.04 | 0.00 | 0.00 | 0.000 |
| Pipe P11 | 49 | 155 | 100 | 0.04 | 0.00 | 0.00 | 0.000 |
| Pipe P12 | 17 | 204 | 110 | -0.02 | 0.00 | 0.00 | 0.000 |
| Pipe P13 | 13 | 204 | 110 | -0.04 | 0.00 | 0.00 | 0.000 |
| Pipe P14 | 20 | 155 | 100 | -0.03 | 0.00 | 0.00 | 0.000 |
| Pipe P15 | 49 | 204 | 110 | -0.14 | 0.00 | 0.00 | 0.085 |
| Pipe P16 | 30 | 204 | 110 | -0.18 | 0.01 | 0.00 | 0.087 |
| Pipe P17 | 29 | 204 | 110 | -0.39 | 0.01 | 0.00 | 0.053 |
| Pipe P18 | 30 | 50 | 100 | 0.04 | 0.02 | 0.03 | 0.079 |



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# 200 Baribeau Street - Watermain Analysis

**Network Table - Nodes - (Fire Flow Summary)**

| Fire Flow | | Minimum Pressure | | |
|---|---|---|---|---|
| LOCATION | Flow (L/s) | Pressure (kPa) | Pressure (PSI) | Node |
| B1 | 233 | 481.67 | 69.86 | HYD3 |
| B2 | 217 | 489.62 | 71.01 | HYD3 |
| B3/B4 | 217 | 472.65 | 68.55 | HYD3 |
| B5 | 200 | 498.74 | 72.34 | HYD1 |
| B6 | 217 | 471.08 | 68.32 | HYD2 |
| B7 | 200 | 444.69 | 64.50 | EXHYD4 |
| B8 | 217 | 476.28 | 69.08 | HYD2 |
| B9 | 233 | 460.09 | 66.73 | HYD2 |
| B10 | 217 | 475.88 | 69.02 | HYD3 |
| B11 | 317 | 417.22 | 60.51 | HYD2 |
| B12/B13 | 300 | 415.85 | 60.31 | HYD2 |

# 200 Baribeau Street - Watermain Analysis

**Network Table - Nodes (Max Day + FF 'Block 1')**

| Node ID | Elevation m | Demand LPS | Head m | Pressure m | Pressure kPa | Pressure psi |
|---|---|---|---|---|---|---|
| Junc HYD1 | 56.45 | 0.24 | 106.29 | 49.84 | 488.93 | 70.91 |
| Junc HYD2 | 56.66 | 0.07 | 106.34 | 49.68 | 487.36 | 70.69 |
| Junc HYD3 | 56.75 | 95.07 | 105.85 | 49.1 | 481.67 | 69.86 |
| Junc EXHYD1 | 56.43 | 95 | 107.69 | 51.26 | 502.86 | 72.93 |
| Junc EXHYD2 | 56.05 | 43 | 106.54 | 50.49 | 495.31 | 71.84 |
| Junc EXHYD3 | 55.72 | 0 | 106.31 | 50.59 | 496.29 | 71.98 |
| Junc EXHYD4 | 56.35 | 0 | 107.11 | 50.76 | 497.96 | 72.22 |
| Junc T1 | 56.55 | 0.13 | 106.28 | 49.73 | 487.85 | 70.76 |
| Junc T2 | 56.44 | 0.07 | 106.3 | 49.86 | 489.13 | 70.94 |
| Junc T3 | 56.44 | 0.22 | 106.31 | 49.87 | 489.22 | 70.96 |
| Junc T4 | 56.59 | 0.24 | 106.22 | 49.63 | 486.87 | 70.61 |
| Junc T5 | 56.66 | 0.24 | 106.11 | 49.45 | 485.10 | 70.36 |
| Junc T6 | 56.76 | 0.17 | 106.02 | 49.26 | 483.24 | 70.09 |
| Junc T7 | 56.66 | 0.2 | 106.69 | 50.03 | 490.79 | 71.18 |
| Junc T8 | 56.61 | 0.15 | 106.35 | 49.74 | 487.95 | 70.77 |
| Junc T9 | 56.5 | 0 | 107 | 50.5 | 495.41 | 71.85 |
| Junc CAP1 | 56.7 | 0.07 | 106.02 | 49.32 | 483.83 | 70.17 |
| Junc CAP2 | 56.54 | 0.04 | 106.3 | 49.76 | 488.15 | 70.80 |
| Junc CAP3 | 56.1 | 0.09 | 107 | 50.9 | 499.33 | 72.42 |
| Resvr RES1 | 108 | -260.23 | 108 | 0 | 0.00 | 0.00 |
| Resvr RES2 | 106.3 | 25.23 | 106.3 | 0 | 0.00 | 0.00 |

**Network Table - Links (Max Day + FF 'Block 1')**

| Link ID | Length m | Diameter mm | Roughness | Flow LPS | Velocity m/s | Headloss m/km | Friction Factor |
|---|---|---|---|---|---|---|---|
| Pipe P1 | 35 | 204 | 110 | 9.29 | 0.28 | 0.70 | 0.035 |
| Pipe P2 | 25 | 204 | 110 | -6.75 | 0.21 | 0.39 | 0.037 |
| Pipe P3 | 25 | 204 | 110 | -6.99 | 0.21 | 0.41 | 0.036 |
| Pipe P4 | 15 | 155 | 100 | 0.04 | 0.00 | 0.00 | 0.000 |
| Pipe P5 | 31 | 204 | 110 | -7.10 | 0.22 | 0.43 | 0.036 |
| Pipe P6 | 50 | 155 | 100 | 6.86 | 0.36 | 1.82 | 0.042 |
| Pipe P7 | 30 | 204 | 110 | 15.91 | 0.49 | 1.90 | 0.032 |
| Pipe P8 | 22 | 204 | 110 | -14.18 | 0.43 | 1.54 | 0.033 |
| Pipe P9 | 8 | 204 | 110 | -14.24 | 0.44 | 1.55 | 0.033 |
| Pipe P10 | 30 | 204 | 110 | 22.53 | 0.69 | 3.63 | 0.031 |
| Pipe P11 | 49 | 155 | 100 | 26.84 | 0.82 | 5.02 | 0.030 |
| Pipe P12 | 17 | 204 | 110 | 49.13 | 1.50 | 15.37 | 0.027 |
| Pipe P13 | 13 | 204 | 110 | -45.94 | 1.41 | 13.57 | 0.028 |
| Pipe P14 | 20 | 155 | 100 | -0.07 | 0.00 | 0.00 | 0.000 |
| Pipe P15 | 49 | 204 | 110 | -46.18 | 1.41 | 13.70 | 0.027 |
| Pipe P16 | 30 | 204 | 110 | -41.24 | 1.26 | 11.11 | 0.028 |
| Pipe P17 | 29 | 204 | 110 | -87.61 | 2.68 | 44.85 | 0.025 |
| Pipe P18 | 30 | 50 | 100 | 0.09 | 0.04 | 0.14 | 0.069 |



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# 200 Baribeau Street - Watermain Analysis

**Network Table - Nodes (Max Day + FF 'Block 2')**

| Node ID | Elevation m | Demand LPS | Head m | Pressure m | Pressure kPa | Pressure psi |
|---|---|---|---|---|---|---|
| Junc HYD1 | 56.45 | 0.24 | 107.14 | 50.69 | 497.27 | 72.12 |
| Junc HYD2 | 56.66 | 0.07 | 107.17 | 50.51 | 495.50 | 71.87 |
| Junc HYD3 | 56.75 | 95.07 | 106.66 | 49.91 | 489.62 | 71.01 |
| Junc EXHYD1 | 56.43 | 27 | 108.46 | 52.03 | 510.41 | 74.03 |
| Junc EXHYD2 | 56.05 | 95 | 106.91 | 50.86 | 498.94 | 72.36 |
| Junc EXHYD3 | 55.72 | 0 | 107.18 | 51.46 | 504.82 | 73.22 |
| Junc EXHYD4 | 56.35 | 0 | 107.87 | 51.52 | 505.41 | 73.30 |
| Junc T1 | 56.55 | 0.13 | 107.14 | 50.59 | 496.29 | 71.98 |
| Junc T2 | 56.44 | 0.07 | 107.14 | 50.7 | 497.37 | 72.14 |
| Junc T3 | 56.44 | 0.22 | 107.15 | 50.71 | 497.47 | 72.15 |
| Junc T4 | 56.59 | 0.24 | 107.07 | 50.48 | 495.21 | 71.82 |
| Junc T5 | 56.66 | 0.24 | 106.94 | 50.28 | 493.25 | 71.54 |
| Junc T6 | 56.76 | 0.17 | 106.82 | 50.06 | 491.09 | 71.23 |
| Junc T7 | 56.66 | 0.2 | 107.44 | 50.78 | 498.15 | 72.25 |
| Junc T8 | 56.61 | 0.15 | 107.17 | 50.56 | 495.99 | 71.94 |
| Junc T9 | 56.5 | 0 | 107.78 | 51.28 | 503.06 | 72.96 |
| Junc CAP1 | 56.7 | 0.07 | 106.82 | 50.12 | 491.68 | 71.31 |
| Junc CAP2 | 56.54 | 0.04 | 107.14 | 50.6 | 496.39 | 71.99 |
| Junc CAP3 | 56.1 | 0.09 | 107.77 | 51.67 | 506.88 | 73.52 |
| Resvr RES1 | 108.6 | -196.03 | 108.6 | 0 | 0.00 | 0.00 |
| Resvr RES2 | 107.2 | -22.96 | 107.2 | 0 | 0.00 | 0.00 |

**Network Table - Links (Max Day + FF 'Block 2')**

| Link ID | Length m | Diameter mm | Roughness | Flow LPS | Velocity m/s | Headloss m/km | Friction Factor |
|---|---|---|---|---|---|---|---|
| Pipe P1 | 35 | 204 | 110 | 15.17 | 0.46 | 1.74 | 0.032 |
| Pipe P2 | 25 | 204 | 110 | -3.27 | 0.10 | 0.10 | 0.041 |
| Pipe P3 | 25 | 204 | 110 | -3.51 | 0.11 | 0.12 | 0.040 |
| Pipe P4 | 15 | 155 | 100 | 0.04 | 0.00 | 0.00 | 0.000 |
| Pipe P5 | 31 | 204 | 110 | -3.62 | 0.11 | 0.12 | 0.040 |
| Pipe P6 | 50 | 155 | 100 | 6.55 | 0.35 | 1.67 | 0.042 |
| Pipe P7 | 30 | 204 | 110 | 18.31 | 0.56 | 2.47 | 0.032 |
| Pipe P8 | 22 | 204 | 110 | -10.39 | 0.32 | 0.86 | 0.034 |
| Pipe P9 | 8 | 204 | 110 | -10.46 | 0.32 | 0.88 | 0.034 |
| Pipe P10 | 30 | 204 | 110 | 24.62 | 0.75 | 4.27 | 0.030 |
| Pipe P11 | 49 | 155 | 100 | 26.35 | 0.81 | 4.85 | 0.030 |
| Pipe P12 | 17 | 204 | 110 | 50.73 | 1.55 | 16.30 | 0.027 |
| Pipe P13 | 13 | 204 | 110 | -44.34 | 1.36 | 12.71 | 0.028 |
| Pipe P14 | 20 | 155 | 100 | -0.07 | 0.00 | 0.00 | 0.116 |
| Pipe P15 | 49 | 204 | 110 | -44.58 | 1.36 | 12.83 | 0.028 |
| Pipe P16 | 30 | 204 | 110 | -36.96 | 1.13 | 9.07 | 0.028 |
| Pipe P17 | 29 | 204 | 110 | -81.74 | 2.50 | 39.44 | 0.025 |
| Pipe P18 | 30 | 50 | 100 | 0.09 | 0.04 | 0.14 | 0.069 |



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# 200 Baribeau Street - Watermain Analysis

**Network Table - Nodes (Max Day + FF 'Block 3 & 4')**

| Node ID | Elevation m | Demand LPS | Head m | Pressure m | Pressure kPa | Pressure psi |
|---|---|---|---|---|---|---|
| Junc HYD1 | 56.45 | 95.24 | 104.71 | 48.26 | 473.43 | 68.67 |
| Junc HYD2 | 56.66 | 27.07 | 105.13 | 48.47 | 475.49 | 68.96 |
| Junc HYD3 | 56.75 | 95.07 | 104.93 | 48.18 | 472.65 | 68.55 |
| Junc EXHYD1 | 56.43 | 0 | 108.58 | 52.15 | 511.59 | 74.20 |
| Junc EXHYD2 | 56.05 | 0 | 108.09 | 52.04 | 510.51 | 74.04 |
| Junc EXHYD3 | 55.72 | 0 | 107.25 | 51.53 | 505.51 | 73.32 |
| Junc EXHYD4 | 56.35 | 0 | 107.87 | 51.52 | 505.41 | 73.30 |
| Junc T1 | 56.55 | 0.13 | 105.38 | 48.83 | 479.02 | 69.48 |
| Junc T2 | 56.44 | 0.07 | 104.87 | 48.43 | 475.10 | 68.91 |
| Junc T3 | 56.44 | 0.22 | 105.06 | 48.62 | 476.96 | 69.18 |
| Junc T4 | 56.59 | 0.24 | 105.2 | 48.61 | 476.86 | 69.16 |
| Junc T5 | 56.66 | 0.24 | 105.11 | 48.45 | 475.29 | 68.94 |
| Junc T6 | 56.76 | 0.17 | 105.17 | 48.41 | 474.90 | 68.88 |
| Junc T7 | 56.66 | 0.2 | 106.1 | 49.44 | 485.01 | 70.34 |
| Junc T8 | 56.61 | 0.15 | 105.25 | 48.64 | 477.16 | 69.21 |
| Junc T9 | 56.5 | 0 | 107.78 | 51.28 | 503.06 | 72.96 |
| Junc CAP1 | 56.7 | 0.07 | 105.17 | 48.47 | 475.49 | 68.96 |
| Junc CAP2 | 56.54 | 0.04 | 104.87 | 48.33 | 474.12 | 68.76 |
| Junc CAP3 | 56.1 | 0.09 | 107.77 | 51.67 | 506.88 | 73.52 |
| Resvr RES1 | 108.6 | -176.93 | 108.6 | 0 | 0.00 | 0.00 |
| Resvr RES2 | 107.2 | -42.07 | 107.2 | 0 | 0.00 | 0.00 |

**Network Table - Links (Max Day + FF 'Block 3 & 4')**

| Link ID | Length m | Diameter mm | Roughness | Flow LPS | Velocity m/s | Headloss m/km | Friction Factor |
|---|---|---|---|---|---|---|---|
| Pipe P1 | 35 | 204 | 110 | 94.86 | 2.90 | 51.96 | 0.025 |
| Pipe P2 | 25 | 204 | 110 | 65.33 | 2.00 | 26.05 | 0.026 |
| Pipe P3 | 25 | 204 | 110 | -29.91 | 0.92 | 6.13 | 0.029 |
| Pipe P4 | 15 | 155 | 100 | 0.04 | 0.00 | 0.00 | 0.000 |
| Pipe P5 | 31 | 204 | 110 | -30.02 | 0.92 | 6.17 | 0.029 |
| Pipe P6 | 50 | 155 | 100 | -8.67 | 0.46 | 2.81 | 0.041 |
| Pipe P7 | 30 | 204 | 110 | 29.39 | 0.90 | 5.93 | 0.029 |
| Pipe P8 | 22 | 204 | 110 | -21.57 | 0.66 | 3.35 | 0.031 |
| Pipe P9 | 8 | 204 | 110 | -48.64 | 1.49 | 15.08 | 0.027 |
| Pipe P10 | 30 | 204 | 110 | 20.48 | 0.63 | 3.04 | 0.031 |
| Pipe P11 | 49 | 155 | 100 | 19.81 | 0.61 | 2.86 | 0.031 |
| Pipe P12 | 17 | 204 | 110 | 40.05 | 1.23 | 10.53 | 0.028 |
| Pipe P13 | 13 | 204 | 110 | -55.01 | 1.68 | 18.94 | 0.027 |
| Pipe P14 | 20 | 155 | 100 | -0.07 | 0.00 | 0.00 | 0.116 |
| Pipe P15 | 49 | 204 | 110 | -55.25 | 1.69 | 19.10 | 0.027 |
| Pipe P16 | 30 | 204 | 110 | -68.60 | 2.10 | 28.51 | 0.026 |
| Pipe P17 | 29 | 204 | 110 | -124.05 | 3.80 | 85.41 | 0.024 |
| Pipe P18 | 30 | 50 | 100 | 0.09 | 0.04 | 0.14 | 0.069 |



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# 200 Baribeau Street - Watermain Analysis

**Network Table - Nodes (Max Day + FF 'Block 5')**

| Node ID | Elevation m | Demand LPS | Head m | Pressure m | Pressure kPa | Pressure psi |
|---|---|---|---|---|---|---|
| Junc HYD1 | 56.45 | 95.24 | 107.29 | 50.84 | 498.74 | 72.34 |
| Junc HYD2 | 56.66 | 0.07 | 108.01 | 51.35 | 503.74 | 73.06 |
| Junc HYD3 | 56.75 | 10.07 | 108.07 | 51.32 | 503.45 | 73.02 |
| Junc EXHYD1 | 56.43 | 0 | 109.28 | 52.85 | 518.46 | 75.20 |
| Junc EXHYD2 | 56.05 | 0 | 108.81 | 52.76 | 517.58 | 75.07 |
| Junc EXHYD3 | 55.72 | 95 | 108 | 52.28 | 512.87 | 74.39 |
| Junc EXHYD4 | 56.35 | 0 | 108.67 | 52.32 | 513.26 | 74.44 |
| Junc T1 | 56.55 | 0.13 | 107.8 | 51.25 | 502.76 | 72.92 |
| Junc T2 | 56.44 | 0.07 | 107.53 | 51.09 | 501.19 | 72.69 |
| Junc T3 | 56.44 | 0.22 | 107.84 | 51.4 | 504.23 | 73.13 |
| Junc T4 | 56.59 | 0.24 | 107.89 | 51.3 | 503.25 | 72.99 |
| Junc T5 | 56.66 | 0.24 | 108.03 | 51.37 | 503.94 | 73.09 |
| Junc T6 | 56.76 | 0.17 | 108.14 | 51.38 | 504.04 | 73.10 |
| Junc T7 | 56.66 | 0.2 | 108.41 | 51.75 | 507.67 | 73.63 |
| Junc T8 | 56.61 | 0.15 | 108.06 | 51.45 | 504.72 | 73.20 |
| Junc T9 | 56.5 | 0 | 108.59 | 52.09 | 511.00 | 74.11 |
| Junc CAP1 | 56.7 | 0.07 | 108.14 | 51.44 | 504.63 | 73.19 |
| Junc CAP2 | 56.54 | 0.04 | 107.53 | 50.99 | 500.21 | 72.55 |
| Junc CAP3 | 56.1 | 0.09 | 108.59 | 52.49 | 514.93 | 74.68 |
| Resvr RES1 | 109.3 | -121.88 | 109.3 | 0 | 0.00 | 0.00 |
| Resvr RES2 | 108.1 | -80.11 | 108.1 | 0 | 0.00 | 0.00 |

**Network Table - Links (Max Day + FF 'Block 5')**

| Link ID | Length m | Diameter mm | Roughness | Flow LPS | Velocity m/s | Headloss m/km | Friction Factor |
|---|---|---|---|---|---|---|---|
| Pipe P1 | 35 | 204 | 110 | 36.02 | 1.10 | 8.65 | 0.029 |
| Pipe P2 | 25 | 204 | 110 | 56.77 | 1.74 | 20.08 | 0.027 |
| Pipe P3 | 25 | 204 | 110 | -38.47 | 1.18 | 9.77 | 0.028 |
| Pipe P4 | 15 | 155 | 100 | 0.04 | 0.00 | 0.00 | 0.347 |
| Pipe P5 | 31 | 204 | 110 | -38.58 | 1.18 | 9.82 | 0.028 |
| Pipe P6 | 50 | 155 | 100 | -5.18 | 0.27 | 1.08 | 0.044 |
| Pipe P7 | 30 | 204 | 110 | -20.88 | 0.64 | 3.15 | 0.031 |
| Pipe P8 | 22 | 204 | 110 | -33.62 | 1.03 | 7.61 | 0.029 |
| Pipe P9 | 8 | 204 | 110 | -33.68 | 1.03 | 7.64 | 0.029 |
| Pipe P10 | 30 | 204 | 110 | -26.30 | 0.80 | 4.83 | 0.030 |
| Pipe P11 | 49 | 155 | 100 | 8.57 | 0.26 | 0.61 | 0.035 |
| Pipe P12 | 17 | 204 | 110 | -17.97 | 0.55 | 2.38 | 0.032 |
| Pipe P13 | 13 | 204 | 110 | -28.03 | 0.86 | 5.44 | 0.030 |
| Pipe P14 | 20 | 155 | 100 | -0.07 | 0.00 | 0.00 | 0.116 |
| Pipe P15 | 49 | 204 | 110 | -28.27 | 0.87 | 5.52 | 0.030 |
| Pipe P16 | 30 | 204 | 110 | -42.41 | 1.30 | 11.70 | 0.028 |
| Pipe P17 | 29 | 204 | 110 | -70.88 | 2.17 | 30.29 | 0.026 |
| Pipe P18 | 30 | 50 | 100 | 0.09 | 0.04 | 0.14 | 0.069 |



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# 200 Baribeau Street - Watermain Analysis

**Network Table - Nodes (Max Day + FF 'Block 6')**

| Node ID | Elevation m | Demand LPS | Head m | Pressure m | Pressure kPa | Pressure psi |
|---|---|---|---|---|---|---|
| Junc HYD1 | 56.45 | 95.24 | 104.5 | 48.05 | 471.37 | 68.37 |
| Junc HYD2 | 56.66 | 95.07 | 104.68 | 48.02 | 471.08 | 68.32 |
| Junc HYD3 | 56.75 | 27.07 | 105.29 | 48.54 | 476.18 | 69.06 |
| Junc EXHYD1 | 56.43 | 0 | 108.58 | 52.15 | 511.59 | 74.20 |
| Junc EXHYD2 | 56.05 | 0 | 108.09 | 52.04 | 510.51 | 74.04 |
| Junc EXHYD3 | 55.72 | 0 | 107.25 | 51.53 | 505.51 | 73.32 |
| Junc EXHYD4 | 56.35 | 0 | 107.87 | 51.52 | 505.41 | 73.30 |
| Junc T1 | 56.55 | 0.13 | 105.34 | 48.79 | 478.63 | 69.42 |
| Junc T2 | 56.44 | 0.07 | 104.58 | 48.14 | 472.25 | 68.49 |
| Junc T3 | 56.44 | 0.22 | 104.68 | 48.24 | 473.23 | 68.64 |
| Junc T4 | 56.59 | 0.24 | 105.25 | 48.66 | 477.35 | 69.23 |
| Junc T5 | 56.66 | 0.24 | 105.25 | 48.59 | 476.67 | 69.13 |
| Junc T6 | 56.76 | 0.17 | 105.46 | 48.7 | 477.75 | 69.29 |
| Junc T7 | 56.66 | 0.2 | 106.13 | 49.47 | 485.30 | 70.39 |
| Junc T8 | 56.61 | 0.15 | 105.09 | 48.48 | 475.59 | 68.98 |
| Junc T9 | 56.5 | 0 | 107.78 | 51.28 | 503.06 | 72.96 |
| Junc CAP1 | 56.7 | 0.07 | 105.46 | 48.76 | 478.34 | 69.38 |
| Junc CAP2 | 56.54 | 0.04 | 104.58 | 48.04 | 471.27 | 68.35 |
| Junc CAP3 | 56.1 | 0.09 | 107.77 | 51.67 | 506.88 | 73.52 |
| Resvr RES1 | 108.6 | -176 | 108.6 | 0 | 0.00 | 0.00 |
| Resvr RES2 | 107.2 | -42.99 | 107.2 | 0 | 0.00 | 0.00 |

**Network Table - Links (Max Day + FF 'Block 6')**

| Link ID | Length m | Diameter mm | Roughness | Flow LPS | Velocity m/s | Headloss m/km | Friction Factor |
|---|---|---|---|---|---|---|---|
| Pipe P1 | 35 | 204 | 110 | 95.78 | 2.93 | 52.90 | 0.025 |
| Pipe P2 | 25 | 204 | 110 | 74.47 | 2.28 | 33.19 | 0.026 |
| Pipe P3 | 25 | 204 | 110 | -20.77 | 0.64 | 3.12 | 0.031 |
| Pipe P4 | 15 | 155 | 100 | 0.04 | 0.00 | 0.00 | 0.000 |
| Pipe P5 | 31 | 204 | 110 | -20.88 | 0.64 | 3.15 | 0.031 |
| Pipe P6 | 50 | 155 | 100 | -18.57 | 0.98 | 11.52 | 0.036 |
| Pipe P7 | 30 | 204 | 110 | 21.18 | 0.65 | 3.23 | 0.031 |
| Pipe P8 | 22 | 204 | 110 | -2.53 | 0.08 | 0.06 | 0.042 |
| Pipe P9 | 8 | 204 | 110 | -97.60 | 2.99 | 54.78 | 0.025 |
| Pipe P10 | 30 | 204 | 110 | 2.37 | 0.07 | 0.06 | 0.042 |
| Pipe P11 | 49 | 155 | 100 | -21.11 | 0.65 | 3.21 | 0.031 |
| Pipe P12 | 17 | 204 | 110 | -18.98 | 0.58 | 2.64 | 0.031 |
| Pipe P13 | 13 | 204 | 110 | -46.04 | 1.41 | 13.63 | 0.027 |
| Pipe P14 | 20 | 155 | 100 | -0.07 | 0.00 | 0.00 | 0.116 |
| Pipe P15 | 49 | 204 | 110 | -46.29 | 1.42 | 13.76 | 0.027 |
| Pipe P16 | 30 | 204 | 110 | -76.64 | 2.34 | 35.01 | 0.025 |
| Pipe P17 | 29 | 204 | 110 | -123.13 | 3.77 | 84.24 | 0.024 |
| Pipe P18 | 30 | 50 | 100 | 0.09 | 0.04 | 0.14 | 0.069 |



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# 200 Baribeau Street - Watermain Analysis

**Network Table - Nodes (Max Day + FF 'Block 7')**

| Node ID | Elevation m | Demand LPS | Head m | Pressure m | Pressure kPa | Pressure psi |
|---|---|---|---|---|---|---|
| Junc HYD1 | 56.45 | 95.24 | 107.27 | 50.82 | 498.54 | 72.31 |
| Junc HYD2 | 56.66 | 10.07 | 107.96 | 51.3 | 503.25 | 72.99 |
| Junc HYD3 | 56.75 | 0.07 | 108.13 | 51.38 | 504.04 | 73.10 |
| Junc EXHYD1 | 56.43 | 0 | 109.28 | 52.85 | 518.46 | 75.20 |
| Junc EXHYD2 | 56.05 | 0 | 108.86 | 52.81 | 518.07 | 75.14 |
| Junc EXHYD3 | 55.72 | 0 | 108.14 | 52.42 | 514.24 | 74.58 |
| Junc EXHYD4 | 56.35 | 95 | 101.68 | 45.33 | 444.69 | 64.50 |
| Junc T1 | 56.55 | 0.13 | 107.79 | 51.24 | 502.66 | 72.91 |
| Junc T2 | 56.44 | 0.07 | 107.51 | 51.07 | 501.00 | 72.66 |
| Junc T3 | 56.44 | 0.22 | 107.81 | 51.37 | 503.94 | 73.09 |
| Junc T4 | 56.59 | 0.24 | 107.89 | 51.3 | 503.25 | 72.99 |
| Junc T5 | 56.66 | 0.24 | 108.04 | 51.38 | 504.04 | 73.10 |
| Junc T6 | 56.76 | 0.17 | 108.19 | 51.43 | 504.53 | 73.18 |
| Junc T7 | 56.66 | 0.2 | 108.42 | 51.76 | 507.77 | 73.65 |
| Junc T8 | 56.61 | 0.15 | 108.05 | 51.44 | 504.63 | 73.19 |
| Junc T9 | 56.5 | 0 | 102.55 | 46.05 | 451.75 | 65.52 |
| Junc CAP1 | 56.7 | 0.07 | 108.19 | 51.49 | 505.12 | 73.26 |
| Junc CAP2 | 56.54 | 0.04 | 107.51 | 50.97 | 500.02 | 72.52 |
| Junc CAP3 | 56.1 | 0.09 | 102.55 | 46.45 | 455.67 | 66.09 |
| Resvr RES1 | 109.3 | -155.24 | 109.3 | 0 | 0.00 | 0.00 |
| Resvr RES2 | 108.1 | -46.75 | 108.1 | 0 | 0.00 | 0.00 |

**Network Table - Links (Max Day + FF 'Block 7')**

| Link ID | Length m | Diameter mm | Roughness | Flow LPS | Velocity m/s | Headloss m/km | Friction Factor |
|---|---|---|---|---|---|---|---|
| Pipe P1 | 35 | 204 | 110 | 36.38 | 1.11 | 8.81 | 0.028 |
| Pipe P2 | 25 | 204 | 110 | 57.33 | 1.75 | 20.45 | 0.027 |
| Pipe P3 | 25 | 204 | 110 | -37.91 | 1.16 | 9.51 | 0.028 |
| Pipe P4 | 15 | 155 | 100 | 0.04 | 0.00 | 0.00 | 0.000 |
| Pipe P5 | 31 | 204 | 110 | -38.02 | 1.16 | 9.56 | 0.028 |
| Pipe P6 | 50 | 155 | 100 | -6.39 | 0.34 | 1.60 | 0.042 |
| Pipe P7 | 30 | 204 | 110 | -21.08 | 0.64 | 3.21 | 0.031 |
| Pipe P8 | 22 | 204 | 110 | -31.85 | 0.97 | 6.89 | 0.029 |
| Pipe P9 | 8 | 204 | 110 | -41.92 | 1.28 | 11.45 | 0.028 |
| Pipe P10 | 30 | 204 | 110 | -27.71 | 0.85 | 5.32 | 0.030 |
| Pipe P11 | 49 | 155 | 100 | 1.96 | 0.06 | 0.04 | 0.044 |
| Pipe P12 | 17 | 204 | 110 | -25.99 | 0.80 | 4.72 | 0.030 |
| Pipe P13 | 13 | 204 | 110 | -26.06 | 0.80 | 4.75 | 0.030 |
| Pipe P14 | 20 | 155 | 100 | -0.07 | 0.00 | 0.00 | 0.116 |
| Pipe P15 | 49 | 204 | 110 | -26.30 | 0.80 | 4.83 | 0.030 |
| Pipe P16 | 30 | 204 | 110 | -44.03 | 1.35 | 12.54 | 0.028 |
| Pipe P17 | 29 | 204 | 110 | -70.53 | 2.16 | 30.01 | 0.026 |
| Pipe P18 | 30 | 50 | 100 | 0.09 | 0.04 | 0.14 | 0.069 |



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# 200 Baribeau Street - Watermain Analysis

**Network Table - Nodes (Max Day + FF 'Block 8')**

| Node ID | Elevation m | Demand LPS | Head m | Pressure m | Pressure kPa | Pressure psi |
|---|---|---|---|---|---|---|
| Junc HYD1 | 56.45 | 95.24 | 105.01 | 48.56 | 476.37 | 69.09 |
| Junc HYD2 | 56.66 | 95.07 | 105.21 | 48.55 | 476.28 | 69.08 |
| Junc HYD3 | 56.75 | 0.07 | 106 | 49.25 | 483.14 | 70.07 |
| Junc EXHYD1 | 56.43 | 0 | 108.58 | 52.15 | 511.59 | 74.20 |
| Junc EXHYD2 | 56.05 | 0 | 108.08 | 52.03 | 510.41 | 74.03 |
| Junc EXHYD3 | 55.72 | 27 | 107.21 | 51.49 | 505.12 | 73.26 |
| Junc EXHYD4 | 56.35 | 0 | 107.87 | 51.52 | 505.41 | 73.30 |
| Junc T1 | 56.55 | 0.13 | 105.83 | 49.28 | 483.44 | 70.12 |
| Junc T2 | 56.44 | 0.07 | 105.1 | 48.66 | 477.35 | 69.23 |
| Junc T3 | 56.44 | 0.22 | 105.21 | 48.77 | 478.43 | 69.39 |
| Junc T4 | 56.59 | 0.24 | 105.81 | 49.22 | 482.85 | 70.03 |
| Junc T5 | 56.66 | 0.24 | 105.85 | 49.19 | 482.55 | 69.99 |
| Junc T6 | 56.76 | 0.17 | 106.12 | 49.36 | 484.22 | 70.23 |
| Junc T7 | 56.66 | 0.2 | 106.58 | 49.92 | 489.72 | 71.03 |
| Junc T8 | 56.61 | 0.15 | 105.63 | 49.02 | 480.89 | 69.75 |
| Junc T9 | 56.5 | 0 | 107.78 | 51.28 | 503.06 | 72.96 |
| Junc CAP1 | 56.7 | 0.07 | 106.12 | 49.42 | 484.81 | 70.32 |
| Junc CAP2 | 56.54 | 0.04 | 105.1 | 48.56 | 476.37 | 69.09 |
| Junc CAP3 | 56.1 | 0.09 | 107.77 | 51.67 | 506.88 | 73.52 |
| Resvr RES1 | 108.6 | -164.2 | 108.6 | 0 | 0.00 | 0.00 |
| Resvr RES2 | 107.2 | -54.8 | 107.2 | 0 | 0.00 | 0.00 |

**Network Table - Links (Max Day + FF 'Block 8')**

| Link ID | Length m | Diameter mm | Roughness | Flow LPS | Velocity m/s | Headloss m/km | Friction Factor |
|---|---|---|---|---|---|---|---|
| Pipe P1 | 35 | 204 | 110 | 81.27 | 2.49 | 39.02 | 0.025 |
| Pipe P2 | 25 | 204 | 110 | 73.27 | 2.24 | 32.21 | 0.026 |
| Pipe P3 | 25 | 204 | 110 | -21.97 | 0.67 | 3.46 | 0.031 |
| Pipe P4 | 15 | 155 | 100 | 0.04 | 0.00 | 0.00 | 0.000 |
| Pipe P5 | 31 | 204 | 110 | -22.08 | 0.68 | 3.49 | 0.031 |
| Pipe P6 | 50 | 155 | 100 | -19.20 | 1.02 | 12.27 | 0.036 |
| Pipe P7 | 30 | 204 | 110 | 7.87 | 0.24 | 0.52 | 0.036 |
| Pipe P8 | 22 | 204 | 110 | -3.10 | 0.09 | 0.09 | 0.041 |
| Pipe P9 | 8 | 204 | 110 | -98.17 | 3.00 | 55.37 | 0.025 |
| Pipe P10 | 30 | 204 | 110 | -11.57 | 0.35 | 1.06 | 0.034 |
| Pipe P11 | 49 | 155 | 100 | -25.45 | 0.78 | 4.54 | 0.030 |
| Pipe P12 | 17 | 204 | 110 | -37.26 | 1.14 | 9.21 | 0.028 |
| Pipe P13 | 13 | 204 | 110 | -37.33 | 1.14 | 9.24 | 0.028 |
| Pipe P14 | 20 | 155 | 100 | -0.07 | 0.00 | 0.00 | 0.000 |
| Pipe P15 | 49 | 204 | 110 | -37.57 | 1.15 | 9.35 | 0.028 |
| Pipe P16 | 30 | 204 | 110 | -72.87 | 2.23 | 31.89 | 0.026 |
| Pipe P17 | 29 | 204 | 110 | -110.64 | 3.38 | 69.10 | 0.024 |
| Pipe P18 | 30 | 50 | 100 | 0.09 | 0.04 | 0.14 | 0.069 |



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# 200 Baribeau Street - Watermain Analysis

**Network Table - Nodes (Max Day + FF 'Block 9')**

| Node ID | Elevation m | Demand LPS | Head m | Pressure m | Pressure kPa | Pressure psi |
|---|---|---|---|---|---|---|
| Junc HYD1 | 56.45 | 95.24 | 103.39 | 46.94 | 460.48 | 66.79 |
| Junc HYD2 | 56.66 | 95.07 | 103.56 | 46.9 | 460.09 | 66.73 |
| Junc HYD3 | 56.75 | 43.07 | 104.08 | 47.33 | 464.31 | 67.34 |
| Junc EXHYD1 | 56.43 | 0 | 107.97 | 51.54 | 505.61 | 73.33 |
| Junc EXHYD2 | 56.05 | 0 | 107.38 | 51.33 | 503.55 | 73.03 |
| Junc EXHYD3 | 55.72 | 0 | 106.36 | 50.64 | 496.78 | 72.05 |
| Junc EXHYD4 | 56.35 | 0 | 107.11 | 50.76 | 497.96 | 72.22 |
| Junc T1 | 56.55 | 0.13 | 104.24 | 47.69 | 467.84 | 67.85 |
| Junc T2 | 56.44 | 0.07 | 103.46 | 47.02 | 461.27 | 66.90 |
| Junc T3 | 56.44 | 0.22 | 103.56 | 47.12 | 462.25 | 67.04 |
| Junc T4 | 56.59 | 0.24 | 104.09 | 47.5 | 465.98 | 67.58 |
| Junc T5 | 56.66 | 0.24 | 104.07 | 47.41 | 465.09 | 67.46 |
| Junc T6 | 56.76 | 0.17 | 104.3 | 47.54 | 466.37 | 67.64 |
| Junc T7 | 56.66 | 0.2 | 105.13 | 48.47 | 475.49 | 68.96 |
| Junc T8 | 56.61 | 0.15 | 103.97 | 47.36 | 464.60 | 67.38 |
| Junc T9 | 56.5 | 0 | 107 | 50.5 | 495.41 | 71.85 |
| Junc CAP1 | 56.7 | 0.07 | 104.3 | 47.6 | 466.96 | 67.73 |
| Junc CAP2 | 56.54 | 0.04 | 103.46 | 46.92 | 460.29 | 66.76 |
| Junc CAP3 | 56.1 | 0.09 | 107 | 50.9 | 499.33 | 72.42 |
| Resvr RES1 | 108 | -192.22 | 108 | 0 | 0.00 | 0.00 |
| Resvr RES2 | 106.3 | -42.77 | 106.3 | 0 | 0.00 | 0.00 |

**Network Table - Links (Max Day + FF 'Block 9')**

| Link ID | Length m | Diameter mm | Roughness | Flow LPS | Velocity m/s | Headloss m/km | Friction Factor |
|---|---|---|---|---|---|---|---|
| Pipe P1 | 35 | 204 | 110 | 101.40 | 3.10 | 58.80 | 0.024 |
| Pipe P2 | 25 | 204 | 110 | 74.83 | 2.29 | 33.49 | 0.026 |
| Pipe P3 | 25 | 204 | 110 | -20.42 | 0.62 | 3.02 | 0.031 |
| Pipe P4 | 15 | 155 | 100 | 0.04 | 0.00 | 0.00 | 0.000 |
| Pipe P5 | 31 | 204 | 110 | -20.53 | 0.63 | 3.05 | 0.031 |
| Pipe P6 | 50 | 155 | 100 | -17.93 | 0.95 | 10.80 | 0.036 |
| Pipe P7 | 30 | 204 | 110 | 26.44 | 0.81 | 4.88 | 0.030 |
| Pipe P8 | 22 | 204 | 110 | -2.82 | 0.09 | 0.08 | 0.042 |
| Pipe P9 | 8 | 204 | 110 | -97.88 | 2.99 | 55.08 | 0.025 |
| Pipe P10 | 30 | 204 | 110 | 8.28 | 0.25 | 0.57 | 0.035 |
| Pipe P11 | 49 | 155 | 100 | -16.82 | 0.51 | 2.11 | 0.032 |
| Pipe P12 | 17 | 204 | 110 | -8.79 | 0.27 | 0.63 | 0.035 |
| Pipe P13 | 13 | 204 | 110 | -51.85 | 1.59 | 16.98 | 0.027 |
| Pipe P14 | 20 | 155 | 100 | -0.07 | 0.00 | 0.00 | 0.116 |
| Pipe P15 | 49 | 204 | 110 | -52.09 | 1.59 | 17.13 | 0.027 |
| Pipe P16 | 30 | 204 | 110 | -81.22 | 2.48 | 38.98 | 0.025 |
| Pipe P17 | 29 | 204 | 110 | -133.51 | 4.08 | 97.86 | 0.023 |
| Pipe P18 | 30 | 50 | 100 | 0.09 | 0.04 | 0.14 | 0.069 |



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# 200 Baribeau Street - Watermain Analysis

**Network Table - Nodes (Max Day + FF 'Block 10')**

| Node ID | Elevation m | Demand LPS | Head m | Pressure m | Pressure kPa | Pressure psi |
|---|---|---|---|---|---|---|
| Junc HYD1 | 56.45 | 0.24 | 105.91 | 49.46 | 485.20 | 70.37 |
| Junc HYD2 | 56.66 | 95.07 | 105.35 | 48.69 | 477.65 | 69.28 |
| Junc HYD3 | 56.75 | 95.07 | 105.26 | 48.51 | 475.88 | 69.02 |
| Junc EXHYD1 | 56.43 | 27 | 108.54 | 52.11 | 511.20 | 74.14 |
| Junc EXHYD2 | 56.05 | 0 | 108.07 | 52.02 | 510.32 | 74.02 |
| Junc EXHYD3 | 55.72 | 0 | 107.25 | 51.53 | 505.51 | 73.32 |
| Junc EXHYD4 | 56.35 | 0 | 107.87 | 51.52 | 505.41 | 73.30 |
| Junc T1 | 56.55 | 0.13 | 106.06 | 49.51 | 485.69 | 70.44 |
| Junc T2 | 56.44 | 0.07 | 105.75 | 49.31 | 483.73 | 70.16 |
| Junc T3 | 56.44 | 0.22 | 105.57 | 49.13 | 481.97 | 69.90 |
| Junc T4 | 56.59 | 0.24 | 105.7 | 49.11 | 481.77 | 69.87 |
| Junc T5 | 56.66 | 0.24 | 105.47 | 48.81 | 478.83 | 69.45 |
| Junc T6 | 56.76 | 0.17 | 105.47 | 48.71 | 477.85 | 69.31 |
| Junc T7 | 56.66 | 0.2 | 106.3 | 49.64 | 486.97 | 70.63 |
| Junc T8 | 56.61 | 0.15 | 105.5 | 48.89 | 479.61 | 69.56 |
| Junc T9 | 56.5 | 0 | 107.78 | 51.28 | 503.06 | 72.96 |
| Junc CAP1 | 56.7 | 0.07 | 105.47 | 48.77 | 478.43 | 69.39 |
| Junc CAP2 | 56.54 | 0.04 | 105.75 | 49.21 | 482.75 | 70.02 |
| Junc CAP3 | 56.1 | 0.09 | 107.77 | 51.67 | 506.88 | 73.52 |
| Resvr RES1 | 108.6 | -197.77 | 108.6 | 0 | 0.00 | 0.00 |
| Resvr RES2 | 107.2 | -21.22 | 107.2 | 0 | 0.00 | 0.00 |

**Network Table - Links (Max Day + FF 'Block 10')**

| Link ID | Length m | Diameter mm | Roughness | Flow LPS | Velocity m/s | Headloss m/km | Friction Factor |
|---|---|---|---|---|---|---|---|
| Pipe P1 | 35 | 204 | 110 | 73.42 | 2.25 | 32.34 | 0.026 |
| Pipe P2 | 25 | 204 | 110 | 30.09 | 0.92 | 6.20 | 0.029 |
| Pipe P3 | 25 | 204 | 110 | 29.85 | 0.91 | 6.10 | 0.029 |
| Pipe P4 | 15 | 155 | 100 | 0.04 | 0.00 | 0.00 | 0.347 |
| Pipe P5 | 31 | 204 | 110 | 29.74 | 0.91 | 6.06 | 0.029 |
| Pipe P6 | 50 | 155 | 100 | -8.64 | 0.46 | 2.79 | 0.041 |
| Pipe P7 | 30 | 204 | 110 | 43.21 | 1.32 | 12.11 | 0.028 |
| Pipe P8 | 22 | 204 | 110 | 38.15 | 1.17 | 9.62 | 0.028 |
| Pipe P9 | 8 | 204 | 110 | -56.91 | 1.74 | 20.17 | 0.027 |
| Pipe P10 | 30 | 204 | 110 | 34.33 | 1.05 | 7.91 | 0.029 |
| Pipe P11 | 49 | 155 | 100 | 9.29 | 0.28 | 0.70 | 0.035 |
| Pipe P12 | 17 | 204 | 110 | 43.38 | 1.33 | 12.20 | 0.028 |
| Pipe P13 | 13 | 204 | 110 | -51.69 | 1.58 | 16.88 | 0.027 |
| Pipe P14 | 20 | 155 | 100 | -0.07 | 0.00 | 0.00 | 0.116 |
| Pipe P15 | 49 | 204 | 110 | -51.93 | 1.59 | 17.03 | 0.027 |
| Pipe P16 | 30 | 204 | 110 | -66.36 | 2.03 | 26.81 | 0.026 |
| Pipe P17 | 29 | 204 | 110 | -118.48 | 3.62 | 78.45 | 0.024 |
| Pipe P18 | 30 | 50 | 100 | 0.09 | 0.04 | 0.14 | 0.069 |



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# 200 Baribeau Street - Watermain Analysis

**Network Table - Nodes (Max Day + FF 'Block 11')**

| Node ID | Elevation m | Demand LPS | Head m | Pressure m | Pressure kPa | Pressure psi |
|---|---|---|---|---|---|---|
| Junc HYD1 | 56.45 | 63.24 | 99.22 | 42.77 | 419.57 | 60.85 |
| Junc HYD2 | 56.66 | 95.07 | 99.19 | 42.53 | 417.22 | 60.51 |
| Junc HYD3 | 56.75 | 95.07 | 99.34 | 42.59 | 417.81 | 60.60 |
| Junc EXHYD1 | 56.43 | 0 | 104.49 | 48.06 | 471.47 | 68.38 |
| Junc EXHYD2 | 56.05 | 64 | 102.28 | 46.23 | 453.52 | 65.78 |
| Junc EXHYD3 | 55.72 | 0 | 101.92 | 46.2 | 453.22 | 65.73 |
| Junc EXHYD4 | 56.35 | 0 | 103.19 | 46.84 | 459.50 | 66.64 |
| Junc T1 | 56.55 | 0.13 | 99.85 | 43.3 | 424.77 | 61.61 |
| Junc T2 | 56.44 | 0.07 | 99.22 | 42.78 | 419.67 | 60.87 |
| Junc T3 | 56.44 | 0.22 | 99.22 | 42.78 | 419.67 | 60.87 |
| Junc T4 | 56.59 | 0.24 | 99.57 | 42.98 | 421.63 | 61.15 |
| Junc T5 | 56.66 | 0.24 | 99.45 | 42.79 | 419.77 | 60.88 |
| Junc T6 | 56.76 | 0.17 | 99.66 | 42.9 | 420.85 | 61.04 |
| Junc T7 | 56.66 | 0.2 | 100.87 | 44.21 | 433.70 | 62.90 |
| Junc T8 | 56.61 | 0.15 | 99.48 | 42.87 | 420.55 | 61.00 |
| Junc T9 | 56.5 | 0 | 103.01 | 46.51 | 456.26 | 66.18 |
| Junc CAP1 | 56.7 | 0.07 | 99.66 | 42.96 | 421.44 | 61.12 |
| Junc CAP2 | 56.54 | 0.04 | 99.22 | 42.68 | 418.69 | 60.73 |
| Junc CAP3 | 56.1 | 0.09 | 103.01 | 46.91 | 460.19 | 66.74 |
| Resvr RES1 | 104.6 | -262.19 | 104.6 | 0 | 0.00 | 0.00 |
| Resvr RES2 | 101.9 | -56.81 | 101.9 | 0 | 0.00 | 0.00 |

**Network Table - Links (Max Day + FF 'Block 11')**

| Link ID | Length m | Diameter mm | Roughness | Flow LPS | Velocity m/s | Headloss m/km | Friction Factor |
|---|---|---|---|---|---|---|---|
| Pipe P1 | 35 | 204 | 110 | 101.11 | 3.09 | 58.49 | 0.024 |
| Pipe P2 | 25 | 204 | 110 | 63.34 | 1.94 | 24.60 | 0.026 |
| Pipe P3 | 25 | 204 | 110 | 0.10 | 0.00 | 0.00 | 0.151 |
| Pipe P4 | 15 | 155 | 100 | 0.04 | 0.00 | 0.00 | 0.000 |
| Pipe P5 | 31 | 204 | 110 | -0.01 | 0.00 | 0.00 | 0.000 |
| Pipe P6 | 50 | 155 | 100 | -14.16 | 0.75 | 6.98 | 0.038 |
| Pipe P7 | 30 | 204 | 110 | 37.64 | 1.15 | 9.38 | 0.028 |
| Pipe P8 | 22 | 204 | 110 | 13.93 | 0.43 | 1.49 | 0.033 |
| Pipe P9 | 8 | 204 | 110 | -81.14 | 2.48 | 38.91 | 0.025 |
| Pipe P10 | 30 | 204 | 110 | 23.24 | 0.71 | 3.84 | 0.030 |
| Pipe P11 | 49 | 155 | 100 | 8.30 | 0.25 | 0.57 | 0.035 |
| Pipe P12 | 17 | 204 | 110 | 31.30 | 0.96 | 6.67 | 0.029 |
| Pipe P13 | 13 | 204 | 110 | -63.76 | 1.95 | 24.90 | 0.026 |
| Pipe P14 | 20 | 155 | 100 | -0.07 | 0.00 | 0.00 | 0.116 |
| Pipe P15 | 49 | 204 | 110 | -64.00 | 1.96 | 25.08 | 0.026 |
| Pipe P16 | 30 | 204 | 110 | -89.59 | 2.74 | 46.75 | 0.025 |
| Pipe P17 | 29 | 204 | 110 | -153.79 | 4.71 | 127.17 | 0.023 |
| Pipe P18 | 30 | 50 | 100 | 0.09 | 0.04 | 0.14 | 0.069 |



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# 200 Baribeau Street - Watermain Analysis

**Network Table - Nodes (Max Day + FF 'Block 12 & 13')**

| Node ID | Elevation m | Demand LPS | Head m | Pressure m | Pressure kPa | Pressure psi |
|---|---|---|---|---|---|---|
| Junc HYD1 | 56.45 | 95.24 | 98.95 | 42.5 | 416.93 | 60.47 |
| Junc HYD2 | 56.66 | 95.07 | 99.05 | 42.39 | 415.85 | 60.31 |
| Junc HYD3 | 56.75 | 95.07 | 99.34 | 42.59 | 417.81 | 60.60 |
| Junc EXHYD1 | 56.43 | 0 | 105.26 | 48.83 | 479.02 | 69.48 |
| Junc EXHYD2 | 56.05 | 0 | 104.38 | 48.33 | 474.12 | 68.76 |
| Junc EXHYD3 | 55.72 | 15 | 102.85 | 47.13 | 462.35 | 67.06 |
| Junc EXHYD4 | 56.35 | 0 | 104 | 47.65 | 467.45 | 67.80 |
| Junc T1 | 56.55 | 0.13 | 99.9 | 43.35 | 425.26 | 61.68 |
| Junc T2 | 56.44 | 0.07 | 99 | 42.56 | 417.51 | 60.56 |
| Junc T3 | 56.44 | 0.22 | 99.05 | 42.61 | 418.00 | 60.63 |
| Junc T4 | 56.59 | 0.24 | 99.56 | 42.97 | 421.54 | 61.14 |
| Junc T5 | 56.66 | 0.24 | 99.43 | 42.77 | 419.57 | 60.85 |
| Junc T6 | 56.76 | 0.17 | 99.69 | 42.93 | 421.14 | 61.08 |
| Junc T7 | 56.66 | 0.2 | 101.05 | 44.39 | 435.47 | 63.16 |
| Junc T8 | 56.61 | 0.15 | 99.44 | 42.83 | 420.16 | 60.94 |
| Junc T9 | 56.5 | 0 | 103.83 | 47.33 | 464.31 | 67.34 |
| Junc CAP1 | 56.7 | 0.07 | 99.69 | 42.99 | 421.73 | 61.17 |
| Junc CAP2 | 56.54 | 0.04 | 99 | 42.46 | 416.53 | 60.41 |
| Junc CAP3 | 56.1 | 0.09 | 103.83 | 47.73 | 468.23 | 67.91 |
| Resvr RES1 | 105.3 | -237.88 | 105.3 | 0 | 0.00 | 0.00 |
| Resvr RES2 | 102.8 | -64.12 | 102.8 | 0 | 0.00 | 0.00 |

**Network Table - Links (Max Day + FF 'Block 12 & 13')**

| Link ID | Length m | Diameter mm | Roughness | Flow LPS | Velocity m/s | Headloss m/km | Friction Factor |
|---|---|---|---|---|---|---|---|
| Pipe P1 | 35 | 204 | 110 | 121.81 | 3.73 | 82.57 | 0.024 |
| Pipe P2 | 25 | 204 | 110 | 79.54 | 2.43 | 37.50 | 0.025 |
| Pipe P3 | 25 | 204 | 110 | -15.70 | 0.48 | 1.86 | 0.032 |
| Pipe P4 | 15 | 155 | 100 | 0.04 | 0.00 | 0.00 | 0.000 |
| Pipe P5 | 31 | 204 | 110 | -15.81 | 0.48 | 1.88 | 0.032 |
| Pipe P6 | 50 | 155 | 100 | -17.35 | 0.92 | 10.16 | 0.037 |
| Pipe P7 | 30 | 204 | 110 | 42.13 | 1.29 | 11.56 | 0.028 |
| Pipe P8 | 22 | 204 | 110 | 1.32 | 0.04 | 0.02 | 0.046 |
| Pipe P9 | 8 | 204 | 110 | -93.75 | 2.87 | 50.84 | 0.025 |
| Pipe P10 | 30 | 204 | 110 | 24.55 | 0.75 | 4.25 | 0.030 |
| Pipe P11 | 49 | 155 | 100 | 3.16 | 0.10 | 0.10 | 0.041 |
| Pipe P12 | 17 | 204 | 110 | 27.47 | 0.84 | 5.23 | 0.030 |
| Pipe P13 | 13 | 204 | 110 | -67.60 | 2.07 | 27.75 | 0.026 |
| Pipe P14 | 20 | 155 | 100 | -0.07 | 0.00 | 0.00 | 0.116 |
| Pipe P15 | 49 | 204 | 110 | -67.84 | 2.08 | 27.93 | 0.026 |
| Pipe P16 | 30 | 204 | 110 | -97.06 | 2.97 | 54.22 | 0.025 |
| Pipe P17 | 29 | 204 | 110 | -165.10 | 5.05 | 145.02 | 0.023 |
| Pipe P18 | 30 | 50 | 100 | 0.09 | 0.04 | 0.14 | 0.069 |



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# FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

**Novatech Project #:** 119068
**Project Name:** 200 Baribeau Street
**Date:** 1/21/2021
**Input By:** Lucas Wilson
**Reviewed By:** Mark Bissett

Legend: No Information or Input Required

**Building Description:** Block 1 - 7 Units
**Wood frame**

| Step | | | Input | | Value Used | Total Fire Flow (L/min) |
|---|---|---|---|---|---|---|
| **Base Fire Flow** | | | | | | |
| 1 | **Construction Material** | | | **Multiplier** | | |
| | **Coefficient related to type of construction C** | Wood frame | Yes | 1.5 | 1.5 | |
| | | Ordinary construction | | 1 | | |
| | | Non-combustible construction | | 0.8 | | |
| | | Modified Fire resistive construction (2 hrs) | | 0.6 | | |
| | | Fire resistive construction (> 3 hrs) | | 0.6 | | |
| 2 | **Floor Area** | | | | | |
| | **A** | Building Footprint ($m^2$) | 336 | | | |
| | | Number of Floors/Storeys | 3 | | | |
| | | Area of structure considered ($m^2$) | | | **1,008** | |
| | **F** | **Base fire flow without reductions** | | | | **10,000** |
| | | **F** = 220 **C** (**A**)$^{0.5}$ | | | | |
| **Reductions or Surcharges** | | | | | | |
| 3 | **Occupancy hazard reduction or surcharge** | | | **Reduction/Surcharge** | | |
| | **(1)** | Non-combustible | | -25% | -15% | **8,500** |
| | | Limited combustible | Yes | -15% | | |
| | | Combustible | | 0% | | |
| | | Free burning | | 15% | | |
| | | Rapid burning | | 25% | | |
| 4 | **Sprinkler Reduction** | | | **Reduction** | | |
| | **(2)** | Adequately Designed System (NFPA 13) | | -30% | | **0** |
| | | Standard Water Supply | | -10% | | |
| | | Fully Supervised System | | -10% | | |
| | | | | **Cumulative Total** | **0%** | |
| 5 | **Exposure Surcharge (cumulative %)** | | | | **Surcharge** | |
| | **(3)** | North Side | 20.1 - 30 m | | 10% | **5,100** |
| | | East Side | 20.1 - 30 m | | 10% | |
| | | South Side | 10.1 - 20 m | | 15% | |
| | | West Side | 0 - 3 m | | 25% | |
| | | | | **Cumulative Total** | **60%** | |
| **Results** | | | | | | |
| 6 | **(1) + (2) + (3)** | **Total Required Fire Flow, rounded to nearest 1000L/min** | | | **L/min** | **14,000** |
| | | (2,000 L/min < Fire Flow < 45,000 L/min) | | or | L/s | **233** |
| | | | | or | USGPM | 3,699 |
| 7 | **Storage Volume** | Required Duration of Fire Flow (hours) | | | Hours | 3 |
| | | Required Volume of Fire Flow ($m^3$) | | | $m^3$ | 2520 |

# FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

**Novatech Project #:** 119068
**Project Name:** 200 Baribeau
**Date:** 1/21/2021
**Input By:** Lucas Wilson
**Reviewed By:** Mark Bissett

Legend: Input by User; No Information or Input Required

**Building Description:** Block 2, 3 & 4 - 5 Units
**Wood frame**

| Step | | | Input | | Value Used | Total Fire Flow (L/min) |
|---|---|---|---|---|---|---|
| **Base Fire Flow** | | | | | | |
| 1 | **Construction Material** | | | **Multiplier** | | |
| | **Coefficient related to type of construction** **C** | Wood frame | Yes | 1.5 | 1.5 | |
| | | Ordinary construction | | 1 | | |
| | | Non-combustible construction | | 0.8 | | |
| | | Modified Fire resistive construction (2 hrs) | | 0.6 | | |
| | | Fire resistive construction (> 3 hrs) | | 0.6 | | |
| 2 | **Floor Area** | | | | | |
| | **A** | Building Footprint ($m^2$) | 268 | | | |
| | | Number of Floors/Storeys | 3 | | | |
| | | Area of structure considered ($m^2$) | | | **804** | |
| | **F** | **Base fire flow without reductions** | | | | **9,000** |
| | | **F** = 220 **C** (**A**)$^{0.5}$ | | | | |
| **Reductions or Surcharges** | | | | | | |
| 3 | **Occupancy hazard reduction or surcharge** | | | **Reduction/Surcharge** | | |
| | **(1)** | Non-combustible | | -25% | -15% | **7,650** |
| | | Limited combustible | Yes | -15% | | |
| | | Combustible | | 0% | | |
| | | Free burning | | 15% | | |
| | | Rapid burning | | 25% | | |
| 4 | **Sprinkler Reduction** | | | **Reduction** | | |
| | **(2)** | Adequately Designed System (NFPA 13) | | -30% | | **0** |
| | | Standard Water Supply | | -10% | | |
| | | Fully Supervised System | | -10% | | |
| | | | | **Cumulative Total** | **0%** | |
| 5 | **Exposure Surcharge (cumulative %)** | | | | **Surcharge** | |
| | **(3)** | North Side | 0 - 3 m | | 25% | **5,738** |
| | | East Side | 20.1 - 30 m | | 10% | |
| | | South Side | 0 - 3 m | | 25% | |
| | | West Side | 10.1 - 20 m | | 15% | |
| | | | | **Cumulative Total** | **75%** | |
| **Results** | | | | | | |
| 6 | **(1) + (2) + (3)** | **Total Required Fire Flow, rounded to nearest 1000L/min** | | | **L/min** | **13,000** |
| | | (2,000 L/min < Fire Flow < 45,000 L/min) | | or | L/s | **217** |
| | | | | or | USGPM | 3,435 |
| 7 | **Storage Volume** | Required Duration of Fire Flow (hours) | | | Hours | 2.5 |
| | | Required Volume of Fire Flow ($m^3$) | | | $m^3$ | 1950 |

# FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

**Novatech Project #:** 119068
**Project Name:** 200 Baribeau
**Date:** 1/21/2021
**Input By:** Lucas Wilson
**Reviewed By:** Mark Bissett

Legend: Input by User; No Information or Input Required

**Building Description:** Block 5 - 4 Units
**Wood frame**

| Step | | | Input | | Value Used | Total Fire Flow (L/min) |
|---|---|---|---|---|---|---|
| **Base Fire Flow** | | | | | | |
| 1 | **Construction Material** | | | **Multiplier** | | |
| | **Coefficient related to type of construction** C | Wood frame | Yes | 1.5 | 1.5 | |
| | | Ordinary construction | | 1 | | |
| | | Non-combustible construction | | 0.8 | | |
| | | Modified Fire resistive construction (2 hrs) | | 0.6 | | |
| | | Fire resistive construction (> 3 hrs) | | 0.6 | | |
| 2 | **Floor Area** | | | | | |
| | A | Building Footprint ($m^2$) | 215 | | | |
| | | Number of Floors/Storeys | 3 | | | |
| | | Area of structure considered ($m^2$) | | | **645** | |
| | F | **Base fire flow without reductions** | | | | **8,000** |
| | | F = 220 C (A)$^{0.5}$ | | | | |
| **Reductions or Surcharges** | | | | | | |
| 3 | **Occupancy hazard reduction or surcharge** | | | **Reduction/Surcharge** | | |
| | (1) | Non-combustible | | -25% | -15% | **6,800** |
| | | Limited combustible | Yes | -15% | | |
| | | Combustible | | 0% | | |
| | | Free burning | | 15% | | |
| | | Rapid burning | | 25% | | |
| 4 | **Sprinkler Reduction** | | | **Reduction** | | |
| | (2) | Adequately Designed System (NFPA 13) | | -30% | | **0** |
| | | Standard Water Supply | | -10% | | |
| | | Fully Supervised System | | -10% | | |
| | | | | **Cumulative Total** | **0%** | |
| 5 | **Exposure Surcharge (cumulative %)** | | | | **Surcharge** | |
| | (3) | North Side | 10.1 - 20 m | | 15% | **4,760** |
| | | East Side | 20.1 - 30 m | | 10% | |
| | | South Side | 3.1 - 10 m | | 20% | |
| | | West Side | 0 - 3 m | | 25% | |
| | | | | **Cumulative Total** | **70%** | |
| **Results** | | | | | | |
| 6 | (1) + (2) + (3) | **Total Required Fire Flow, rounded to nearest 1000L/min** | | | **L/min** | **12,000** |
| | | (2,000 L/min < Fire Flow < 45,000 L/min) | | or | L/s | **200** |
| | | | | or | USGPM | 3,170 |
| 7 | **Storage Volume** | Required Duration of Fire Flow (hours) | | | Hours | 2.5 |
| | | Required Volume of Fire Flow ($m^3$) | | | $m^3$ | 1800 |

# FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

**Novatech Project #:** 119068
**Project Name:** 200 Baribeau
**Date:** 1/21/2021
**Input By:** Lucas Wilson
**Reviewed By:** Mark Bissett

Legend: No Information or Input Required

**Building Description:** Block 6 - 5 Units
**Wood frame**

| Step | | | Input | | Value Used | Total Fire Flow (L/min) |
|---|---|---|---|---|---|---|
| **Base Fire Flow** | | | | | | |
| 1 | **Construction Material** | | | **Multiplier** | | |
| | **Coefficient related to type of construction** **C** | Wood frame | Yes | 1.5 | 1.5 | |
| | | Ordinary construction | | 1 | | |
| | | Non-combustible construction | | 0.8 | | |
| | | Modified Fire resistive construction (2 hrs) | | 0.6 | | |
| | | Fire resistive construction (> 3 hrs) | | 0.6 | | |
| 2 | **Floor Area** | | | | | |
| | **A** | Building Footprint ($m^2$) | 268 | | | |
| | | Number of Floors/Storeys | 3 | | | |
| | | Area of structure considered ($m^2$) | | | **804** | |
| | **F** | **Base fire flow without reductions** | | | | **9,000** |
| | | **F** = 220 **C** (**A**)$^{0.5}$ | | | | |
| **Reductions or Surcharges** | | | | | | |
| 3 | **Occupancy hazard reduction or surcharge** | | | **Reduction/Surcharge** | | |
| | **(1)** | Non-combustible | | -25% | -15% | **7,650** |
| | | Limited combustible | Yes | -15% | | |
| | | Combustible | | 0% | | |
| | | Free burning | | 15% | | |
| | | Rapid burning | | 25% | | |
| 4 | **Sprinkler Reduction** | | | **Reduction** | | |
| | **(2)** | Adequately Designed System (NFPA 13) | | -30% | | **0** |
| | | Standard Water Supply | | -10% | | |
| | | Fully Supervised System | | -10% | | |
| | | | | **Cumulative Total** | **0%** | |
| 5 | **Exposure Surcharge (cumulative %)** | | | | **Surcharge** | |
| | **(3)** | North Side | 10.1 - 20 m | | 15% | **5,355** |
| | | East Side | 0 - 3 m | | 25% | |
| | | South Side | 3.1 - 10 m | | 20% | |
| | | West Side | 20.1 - 30 m | | 10% | |
| | | | | **Cumulative Total** | **70%** | |
| **Results** | | | | | | |
| 6 | **(1) + (2) + (3)** | **Total Required Fire Flow, rounded to nearest 1000L/min** | | | **L/min** | **13,000** |
| | | (2,000 L/min < Fire Flow < 45,000 L/min) | | or | L/s | **217** |
| | | | | or | USGPM | 3,435 |
| 7 | **Storage Volume** | Required Duration of Fire Flow (hours) | | | Hours | 2.5 |
| | | Required Volume of Fire Flow ($m^3$) | | | $m^3$ | 1950 |

# FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

**Novatech Project #:** 119068
**Project Name:** 200 Baribeau
**Date:** 1/21/2021
**Input By:** Lucas Wilson
**Reviewed By:** Mark Bissett

Legend: No Information or Input Required

**Building Description:** Block 7 - 4 Units
**Wood frame**

| Step | | | Input | | Value Used | Total Fire Flow (L/min) |
|---|---|---|---|---|---|---|
| **Base Fire Flow** | | | | | | |
| 1 | **Construction Material** | | | **Multiplier** | | |
| | **Coefficient related to type of construction** **C** | Wood frame | Yes | 1.5 | 1.5 | |
| | | Ordinary construction | | 1 | | |
| | | Non-combustible construction | | 0.8 | | |
| | | Modified Fire resistive construction (2 hrs) | | 0.6 | | |
| | | Fire resistive construction (> 3 hrs) | | 0.6 | | |
| 2 | **Floor Area** | | | | | |
| | **A** | Building Footprint ($m^2$) | 215 | | | |
| | | Number of Floors/Storeys | 3 | | | |
| | | Area of structure considered ($m^2$) | | | **645** | |
| | **F** | **Base fire flow without reductions** | | | | **8,000** |
| | | **F** = 220 **C** (**A**)$^{0.5}$ | | | | |
| **Reductions or Surcharges** | | | | | | |
| 3 | **Occupancy hazard reduction or surcharge** | | | **Reduction/Surcharge** | | |
| | **(1)** | Non-combustible | | -25% | -15% | **6,800** |
| | | Limited combustible | Yes | -15% | | |
| | | Combustible | | 0% | | |
| | | Free burning | | 15% | | |
| | | Rapid burning | | 25% | | |
| 4 | **Sprinkler Reduction** | | | **Reduction** | | |
| | **(2)** | Adequately Designed System (NFPA 13) | | -30% | | **0** |
| | | Standard Water Supply | | -10% | | |
| | | Fully Supervised System | | -10% | | |
| | | | | **Cumulative Total** | **0%** | |
| 5 | **Exposure Surcharge (cumulative %)** | | | | **Surcharge** | |
| | **(3)** | North Side | 3.1 - 10 m | | 20% | **5,100** |
| | | East Side | 3.1 - 10 m | | 20% | |
| | | South Side | 10.1 - 20 m | | 15% | |
| | | West Side | 3.1 - 10 m | | 20% | |
| | | | | **Cumulative Total** | **75%** | |
| **Results** | | | | | | |
| 6 | **(1) + (2) + (3)** | **Total Required Fire Flow, rounded to nearest 1000L/min** | | | **L/min** | **12,000** |
| | | (2,000 L/min < Fire Flow < 45,000 L/min) | | or | L/s | **200** |
| | | | | or | USGPM | 3,170 |
| 7 | **Storage Volume** | Required Duration of Fire Flow (hours) | | | Hours | 2.5 |
| | | Required Volume of Fire Flow ($m^3$) | | | $m^3$ | 1800 |

# FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

**Novatech Project #:** 119068
**Project Name:** 200 Baribeau
**Date:** 1/21/2021
**Input By:** Lucas Wilson
**Reviewed By:** Mark Bissett

Legend: No Information or Input Required

**Building Description:** Block 8 - 5 Units
**Wood frame**

| Step | | | Input | | Value Used | Total Fire Flow (L/min) |
|---|---|---|---|---|---|---|
| **Base Fire Flow** | | | | | | |
| 1 | **Construction Material** | | | **Multiplier** | | |
| | **Coefficient related to type of construction** C | Wood frame | Yes | 1.5 | 1.5 | |
| | | Ordinary construction | | 1 | | |
| | | Non-combustible construction | | 0.8 | | |
| | | Modified Fire resistive construction (2 hrs) | | 0.6 | | |
| | | Fire resistive construction (> 3 hrs) | | 0.6 | | |
| 2 | **Floor Area** | | | | | |
| | A | Building Footprint ($m^2$) | 268 | | | |
| | | Number of Floors/Storeys | 3 | | | |
| | | Area of structure considered ($m^2$) | | | **804** | |
| | F | **Base fire flow without reductions** | | | | **9,000** |
| | | F = 220 C (A)$^{0.5}$ | | | | |
| **Reductions or Surcharges** | | | | | | |
| 3 | **Occupancy hazard reduction or surcharge** | | | **Reduction/Surcharge** | | |
| | (1) | Non-combustible | | -25% | -15% | **7,650** |
| | | Limited combustible | Yes | -15% | | |
| | | Combustible | | 0% | | |
| | | Free burning | | 15% | | |
| | | Rapid burning | | 25% | | |
| 4 | **Sprinkler Reduction** | | | **Reduction** | | |
| | (2) | Adequately Designed System (NFPA 13) | | -30% | | **0** |
| | | Standard Water Supply | | -10% | | |
| | | Fully Supervised System | | -10% | | |
| | | | | **Cumulative Total** | **0%** | |
| 5 | **Exposure Surcharge (cumulative %)** | | | | **Surcharge** | |
| | (3) | North Side | 0 - 3 m | | 25% | **5,355** |
| | | East Side | 20.1 - 30 m | | 10% | |
| | | South Side | 3.1 - 10 m | | 20% | |
| | | West Side | 10.1 - 20 m | | 15% | |
| | | | | **Cumulative Total** | **70%** | |
| **Results** | | | | | | |
| 6 | (1) + (2) + (3) | **Total Required Fire Flow, rounded to nearest 1000L/min** | | | **L/min** | **13,000** |
| | | (2,000 L/min < Fire Flow < 45,000 L/min) | | or | L/s | **217** |
| | | | | or | USGPM | 3,435 |
| 7 | **Storage Volume** | Required Duration of Fire Flow (hours) | | | Hours | 2.5 |
| | | Required Volume of Fire Flow ($m^3$) | | | $m^3$ | 1950 |

# FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

**Novatech Project #:** 119068
**Project Name:** 200 Baribeau
**Date:** 1/21/2021
**Input By:** Lucas Wilson
**Reviewed By:** Mark Bissett

Legend: No Information or Input Required

**Building Description:** Block 9 - 7 Units
**Wood frame**

| Step | | | Input | | Value Used | Total Fire Flow (L/min) |
|---|---|---|---|---|---|---|
| **Base Fire Flow** | | | | | | |
| 1 | **Construction Material** | | | **Multiplier** | | |
| | **Coefficient related to type of construction** **C** | Wood frame | Yes | 1.5 | 1.5 | |
| | | Ordinary construction | | 1 | | |
| | | Non-combustible construction | | 0.8 | | |
| | | Modified Fire resistive construction (2 hrs) | | 0.6 | | |
| | | Fire resistive construction (> 3 hrs) | | 0.6 | | |
| 2 | **Floor Area** | | | | | |
| | **A** | Building Footprint ($m^2$) | 372 | | | |
| | | Number of Floors/Storeys | 3 | | | |
| | | Area of structure considered ($m^2$) | | | **1,116** | |
| | **F** | **Base fire flow without reductions** | | | | **11,000** |
| | | **F** = 220 **C** (**A**)$^{0.5}$ | | | | |
| **Reductions or Surcharges** | | | | | | |
| 3 | **Occupancy hazard reduction or surcharge** | | | **Reduction/Surcharge** | | |
| | **(1)** | Non-combustible | | -25% | -15% | **9,350** |
| | | Limited combustible | Yes | -15% | | |
| | | Combustible | | 0% | | |
| | | Free burning | | 15% | | |
| | | Rapid burning | | 25% | | |
| 4 | **Sprinkler Reduction** | | | **Reduction** | | |
| | **(2)** | Adequately Designed System (NFPA 13) | | -30% | | **0** |
| | | Standard Water Supply | | -10% | | |
| | | Fully Supervised System | | -10% | | |
| | | | | **Cumulative Total** | **0%** | |
| 5 | **Exposure Surcharge (cumulative %)** | | | | **Surcharge** | |
| | **(3)** | North Side | > 45.1m | | 0% | **5,143** |
| | | East Side | 10.1 - 20 m | | 15% | |
| | | South Side | 0 - 3 m | | 25% | |
| | | West Side | 10.1 - 20 m | | 15% | |
| | | | | **Cumulative Total** | **55%** | |
| **Results** | | | | | | |
| 6 | **(1) + (2) + (3)** | **Total Required Fire Flow, rounded to nearest 1000L/min** | | | **L/min** | **14,000** |
| | | (2,000 L/min < Fire Flow < 45,000 L/min) | | or | L/s | **233** |
| | | | | or | USGPM | 3,699 |
| 7 | **Storage Volume** | Required Duration of Fire Flow (hours) | | | Hours | 3 |
| | | Required Volume of Fire Flow ($m^3$) | | | $m^3$ | 2520 |

# FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

**Novatech Project #:** 119068
**Project Name:** 200 Baribeau
**Date:** 1/21/2021
**Input By:** Lucas Wilson
**Reviewed By:** Mark Bissett

Legend: Input by User; No Information or Input Required

**Building Description:** Block 10 - 6 Units
**Wood frame**

| Step | | | Input | | Value Used | Total Fire Flow (L/min) |
|---|---|---|---|---|---|---|
| **Base Fire Flow** | | | | | | |
| 1 | **Construction Material** | | | **Multiplier** | | |
| | **Coefficient related to type of construction** **C** | Wood frame | Yes | 1.5 | 1.5 | |
| | | Ordinary construction | | 1 | | |
| | | Non-combustible construction | | 0.8 | | |
| | | Modified Fire resistive construction (2 hrs) | | 0.6 | | |
| | | Fire resistive construction (> 3 hrs) | | 0.6 | | |
| 2 | **Floor Area** | | | | | |
| | **A** | Building Footprint ($m^2$) | 288 | | | |
| | | Number of Floors/Storeys | 3 | | | |
| | | Area of structure considered ($m^2$) | | | **864** | |
| | **F** | **Base fire flow without reductions** | | | | **10,000** |
| | | **F** = 220 **C** (**A**)$^{0.5}$ | | | | |
| **Reductions or Surcharges** | | | | | | |
| 3 | **Occupancy hazard reduction or surcharge** | | | **Reduction/Surcharge** | | |
| | **(1)** | Non-combustible | | -25% | -15% | **8,500** |
| | | Limited combustible | Yes | -15% | | |
| | | Combustible | | 0% | | |
| | | Free burning | | 15% | | |
| | | Rapid burning | | 25% | | |
| 4 | **Sprinkler Reduction** | | | **Reduction** | | |
| | **(2)** | Adequately Designed System (NFPA 13) | | -30% | | **0** |
| | | Standard Water Supply | | -10% | | |
| | | Fully Supervised System | | -10% | | |
| | | | | **Cumulative Total** | **0%** | |
| 5 | **Exposure Surcharge (cumulative %)** | | | | **Surcharge** | |
| | **(3)** | North Side | 20.1 - 30 m | | 10% | **4,250** |
| | | East Side | 0 - 3 m | | 25% | |
| | | South Side | 10.1 - 20 m | | 15% | |
| | | West Side | > 45.1m | | 0% | |
| | | | | **Cumulative Total** | **50%** | |
| **Results** | | | | | | |
| 6 | **(1) + (2) + (3)** | **Total Required Fire Flow, rounded to nearest 1000L/min** | | | **L/min** | **13,000** |
| | | (2,000 L/min < Fire Flow < 45,000 L/min) | | or | L/s | **217** |
| | | | | or | USGPM | 3,435 |
| 7 | **Storage Volume** | Required Duration of Fire Flow (hours) | | | Hours | 2.5 |
| | | Required Volume of Fire Flow ($m^3$) | | | $m^3$ | 1950 |

# FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

**Novatech Project #:** 119068
**Project Name:** 200 Baribeau
**Date:** 1/21/2021
**Input By:** Lucas Wilson
**Reviewed By:** Mark Bissett

Legend: Input by User; No Information or Input Required

**Building Description:** Block 11 - 14 Units
**Wood frame**

| Step | | | Input | | Value Used | Total Fire Flow (L/min) |
|---|---|---|---|---|---|---|
| **Base Fire Flow** | | | | | | |
| 1 | **Construction Material** | | | **Multiplier** | | |
| | **Coefficient related to type of construction** C | Wood frame | Yes | 1.5 | 1.5 | |
| | | Ordinary construction | | 1 | | |
| | | Non-combustible construction | | 0.8 | | |
| | | Modified Fire resistive construction (2 hrs) | | 0.6 | | |
| | | Fire resistive construction (> 3 hrs) | | 0.6 | | |
| 2 | **Floor Area** | | | | | |
| | A | Building Footprint ($m^2$) | 650 | | | |
| | | Number of Floors/Storeys | 3 | | | |
| | | Area of structure considered ($m^2$) | | | **1,950** | |
| | F | **Base fire flow without reductions** | | | | **15,000** |
| | | F = 220 C (A)$^{0.5}$ | | | | |
| **Reductions or Surcharges** | | | | | | |
| 3 | **Occupancy hazard reduction or surcharge** | | | **Reduction/Surcharge** | | |
| | (1) | Non-combustible | | -25% | -15% | **12,750** |
| | | Limited combustible | Yes | -15% | | |
| | | Combustible | | 0% | | |
| | | Free burning | | 15% | | |
| | | Rapid burning | | 25% | | |
| 4 | **Sprinkler Reduction** | | | **Reduction** | | |
| | (2) | Adequately Designed System (NFPA 13) | | -30% | | **0** |
| | | Standard Water Supply | | -10% | | |
| | | Fully Supervised System | | -10% | | |
| | | | | **Cumulative Total** | **0%** | |
| 5 | **Exposure Surcharge (cumulative %)** | | | | **Surcharge** | |
| | (3) | North Side | 10.1 - 20 m | | 15% | **6,375** |
| | | East Side | 10.1 - 20 m | | 15% | |
| | | South Side | 10.1 - 20 m | | 15% | |
| | | West Side | 30.1- 45 m | | 5% | |
| | | | | **Cumulative Total** | **50%** | |
| **Results** | | | | | | |
| 6 | (1) + (2) + (3) | **Total Required Fire Flow, rounded to nearest 1000L/min** | | | **L/min** | **19,000** |
| | | (2,000 L/min < Fire Flow < 45,000 L/min) | | or | L/s | **317** |
| | | | | or | USGPM | 5,020 |
| 7 | **Storage Volume** | Required Duration of Fire Flow (hours) | | | Hours | 4 |
| | | Required Volume of Fire Flow ($m^3$) | | | $m^3$ | 4560 |

# FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

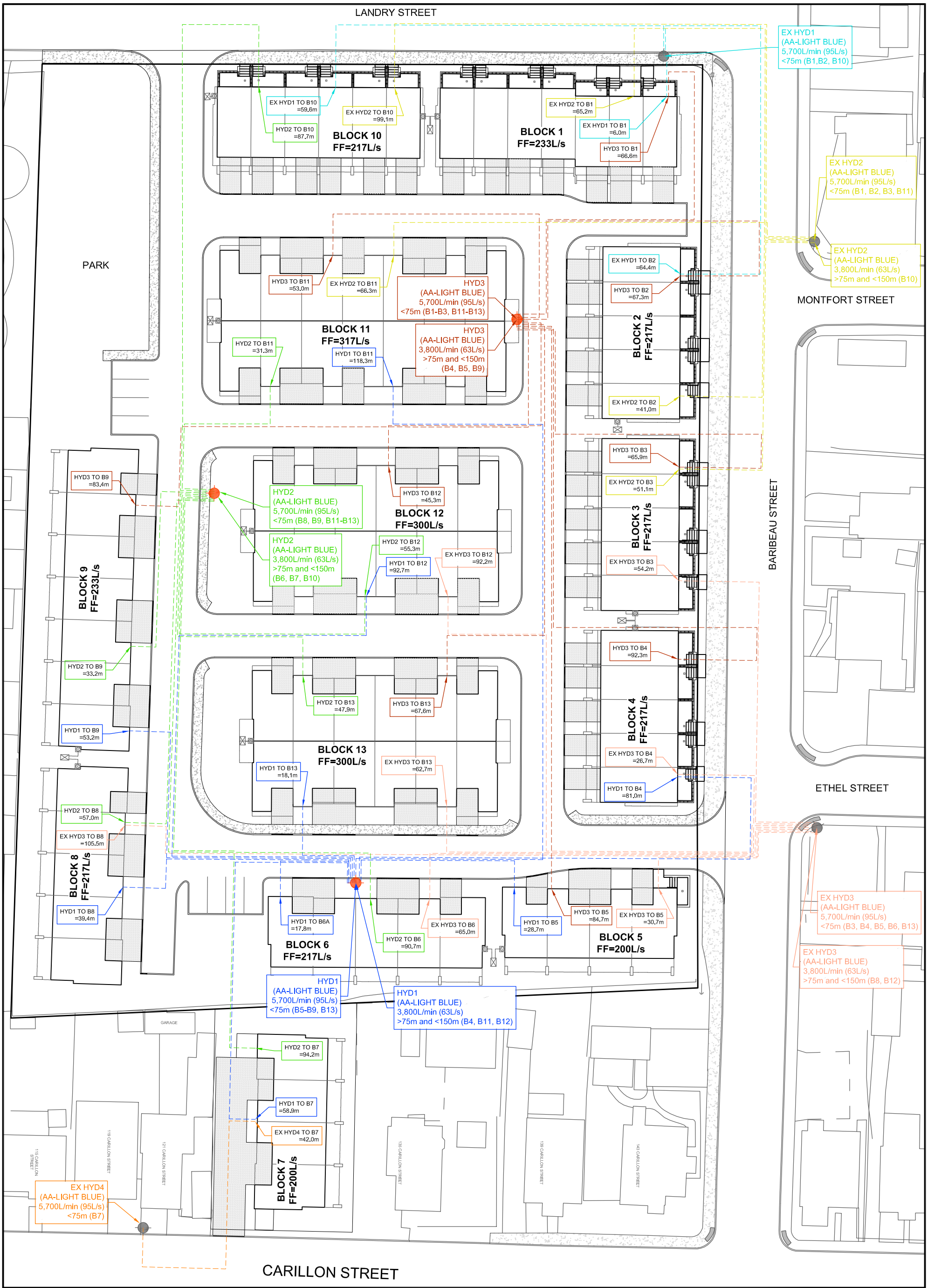
NOVATECH
Engineers, Planners & Landscape Architects

**Novatech Project #:** 119068
**Project Name:** 200 Baribeau
**Date:** 1/21/2021
**Input By:** Lucas Wilson
**Reviewed By:** Mark Bissett

Legend: Input by User; No Information or Input Required

**Building Description:** Block 12 & 13 - 12 Units
**Wood frame**

| Step | | | Input | | Value Used | Total Fire Flow (L/min) |
|---|---|---|---|---|---|---|
| **Base Fire Flow** | | | | | | |
| 1 | **Construction Material** | | | **Multiplier** | | |
| | **Coefficient related to type of construction** C | Wood frame | Yes | 1.5 | 1.5 | |
| | | Ordinary construction | | 1 | | |
| | | Non-combustible construction | | 0.8 | | |
| | | Modified Fire resistive construction (2 hrs) | | 0.6 | | |
| | | Fire resistive construction (> 3 hrs) | | 0.6 | | |
| 2 | **Floor Area** | | | | | |
| | A | Building Footprint ($m^2$) | 557 | | | |
| | | Number of Floors/Storeys | 3 | | | |
| | | Area of structure considered ($m^2$) | | | **1,671** | |
| | F | **Base fire flow without reductions** | | | | **13,000** |
| | | F = 220 C (A)$^{0.5}$ | | | | |
| **Reductions or Surcharges** | | | | | | |
| 3 | **Occupancy hazard reduction or surcharge** | | | **Reduction/Surcharge** | | |
| | (1) | Non-combustible | | -25% | -15% | **11,050** |
| | | Limited combustible | Yes | -15% | | |
| | | Combustible | | 0% | | |
| | | Free burning | | 15% | | |
| | | Rapid burning | | 25% | | |
| 4 | **Sprinkler Reduction** | | | **Reduction** | | |
| | (2) | Adequately Designed System (NFPA 13) | | -30% | | **0** |
| | | Standard Water Supply | | -10% | | |
| | | Fully Supervised System | | -10% | | |
| | | | | **Cumulative Total** | **0%** | |
| 5 | **Exposure Surcharge (cumulative %)** | | | | **Surcharge** | |
| | (3) | North Side | 10.1 - 20 m | | 15% | **6,630** |
| | | East Side | 10.1 - 20 m | | 15% | |
| | | South Side | 10.1 - 20 m | | 15% | |
| | | West Side | 10.1 - 20 m | | 15% | |
| | | | | **Cumulative Total** | **60%** | |
| **Results** | | | | | | |
| 6 | (1) + (2) + (3) | **Total Required Fire Flow, rounded to nearest 1000L/min** | | | **L/min** | **18,000** |
| | | (2,000 L/min < Fire Flow < 45,000 L/min) | | or | L/s | **300** |
| | | | | or | USGPM | 4,756 |
| 7 | **Storage Volume** | Required Duration of Fire Flow (hours) | | | Hours | 4 |
| | | Required Volume of Fire Flow ($m^3$) | | | $m^3$ | 4320 |





NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com


**LEGEND**

- ROUTE FROM PROPOSED BUILDING TO HYD 1
- ROUTE FROM PROPOSED BUILDING TO HYD 2
- ROUTE FROM PROPOSED BUILDING TO HYD 3
- ROUTE FROM PROPOSED BUILDING TO EX HYD1
- ROUTE FROM PROPOSED BUILDING TO EX HYD2
- ROUTE FROM PROPOSED BUILDING TO EX HYD3
- ROUTE FROM PROPOSED BUILDING TO EX HYD4
- FIRE HYDRANT

# CITY OF OTTAWA
# 200 BARIBEAU STREET

## FIRE HYDRANT COVERAGE PLAN

SCALE 1 : 500 (0, 5, 10, 15, 20)

DATE FEB 2021 | JOB 119068 | FIGURE FIG-6

M:\2019\119068\CAD\Design\Figures\Design Brief\119068-HYDCoverage.dwg, FIG6, Feb 03, 2021 - 10:21am, lwilson

SHT11X17.DWG - 279mmX432mm

# APPENDIX B

SWM Calculations

# 200 Baribeau Street (119068)
# Pre-Development Peak Flow Calculations

NOVATECH
Engineers, Planners & Landscape Architects

## EXISTING CONDITIONS

**Existing Catchment Parameters**

| Catchment ID | Areas (ha) | Runoff Coefficient |
|---|---|---|
| | Total | C |
| TOTAL | 1.334 | 0.50 |

**Pre-Development Peak Flows**

| Catchment ID | Rainfall Intensity (mm/hr)[1] | Peak Flows (L/s) |
|---|---|---|
| | 2-year | 2-year |
| Site Boundary (existing conditions) | 76.81 | 142.4 |

[1] *Tc is based on Uplands Method.*

Notes:

Rainfall Intensity from City of Ottawa Sewer Design Guidelines (Oct. 2012)

- 100 year Intensity = $1735.688 / (Tc + 6.014)^{0.820}$
- 5 year Intensity = $998.071 / (Tc + 6.053)^{0.814}$
- 2 year Intensity = $732.951 / (Tc + 6.199)^{0.810}$

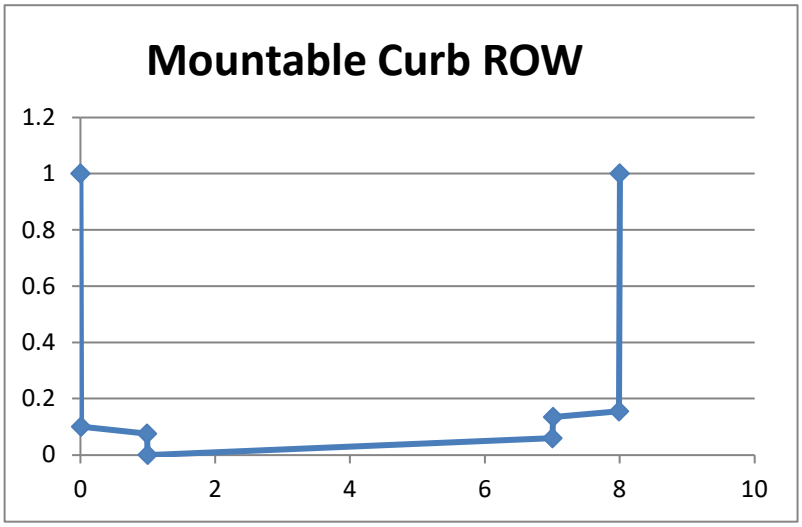
Q(peak flow) = 2.78 x C x I x A

- C is the runoff coefficient
- I is the rainfall intensity
- A is the total drainage area

# 200 Baribeau Street (119068)
## Roadway Cross-Sections

Engineers, Planners & Landscape Architects

| Mountable Curb and Gutter | |
|---|---|
| **Distance** | **Elevation** |
| 0 | 1 |
| 0.01 | 0.1 |
| 0.99 | 0.075 |
| 1 | 0 |
| 7 | 0.06 |
| 7.01 | 0.135 |
| 7.99 | 0.155 |
| 8 | 1 |



**200 Baribeau Street (119068)**
**PCSWMM Storage Curves (surface storage)**

NOVATECH
Engineers, Planners & Landscape Architects

| CB1-Storage | | |
|---|---|---|
| Depth (m) | Area ($m^2$) | Volume ($m^3$) |
| 0.00 | 0.36 | 0.00 |
| 1.40 | 0.36 | 0.50 |
| 1.55 | 200.00 | 15.53 |
| 1.56 | 0.00 | 16.53 |
| 2.40 | 0.00 | 16.53 |

| CB2-Storage | | |
|---|---|---|
| Depth (m) | Area ($m^2$) | Volume ($m^3$) |
| 0.00 | 0.36 | 0.00 |
| 1.40 | 0.36 | 0.50 |
| 1.55 | 106.00 | 8.48 |
| 1.56 | 0.00 | 9.01 |
| 2.40 | 0.00 | 9.01 |

| CB3-Storage | | |
|---|---|---|
| Depth (m) | Area ($m^2$) | Volume ($m^3$) |
| 0.00 | 0.36 | 0.00 |
| 1.40 | 0.36 | 0.50 |
| 1.55 | 212.00 | 16.43 |
| 1.56 | 0.00 | 17.49 |
| 2.40 | 0.00 | 17.49 |

| CB4-Storage | | |
|---|---|---|
| Depth (m) | Area ($m^2$) | Volume ($m^3$) |
| 0.00 | 0.36 | 0.00 |
| 1.40 | 0.36 | 0.50 |
| 1.55 | 241.00 | 18.61 |
| 1.56 | 0.00 | 19.81 |
| 2.40 | 0.00 | 19.81 |

| CB5-Storage | | |
|---|---|---|
| Depth (m) | Area ($m^2$) | Volume ($m^3$) |
| 0.00 | 0.36 | 0.00 |
| 1.40 | 0.36 | 0.50 |
| 1.55 | 101.00 | 8.11 |
| 1.56 | 0.00 | 8.61 |
| 2.40 | 0.00 | 8.61 |

| CB6-Storage | | |
|---|---|---|
| Depth (m) | Area ($m^2$) | Volume ($m^3$) |
| 0.00 | 0.36 | 0.00 |
| 1.40 | 0.36 | 0.50 |
| 1.55 | 188.00 | 14.63 |
| 1.56 | 0.00 | 15.57 |
| 2.40 | 0.00 | 15.57 |

| CB7-Storage | | |
|---|---|---|
| Depth (m) | Area ($m^2$) | Volume ($m^3$) |
| 0.00 | 0.00 | 0.00 |
| 0.64 | 65.60 | 20.99 |
| 0.65 | 0.36 | 21.32 |
| 1.28 | 0.36 | 21.55 |
| 1.43 | 173.00 | 34.55 |
| 1.44 | 0.00 | 35.42 |
| 2.28 | 0.00 | 35.42 |

| CB8-Storage | | |
|---|---|---|
| Depth (m) | Area ($m^2$) | Volume ($m^3$) |
| 0.00 | 0.36 | 0.00 |
| 1.40 | 0.36 | 0.50 |
| 1.55 | 152.00 | 11.93 |
| 1.56 | 0.00 | 12.69 |
| 2.40 | 0.00 | 12.69 |

| CB9-Storage | | |
|---|---|---|
| Depth (m) | Area ($m^2$) | Volume ($m^3$) |
| 0.00 | 0.00 | 0.00 |
| 0.64 | 65.60 | 20.99 |
| 0.65 | 0.36 | 21.32 |
| 1.28 | 0.36 | 21.55 |
| 1.43 | 174.00 | 34.63 |
| 1.44 | 0.00 | 35.50 |
| 2.28 | 0.00 | 35.50 |

| CB10-Storage | | |
|---|---|---|
| Depth (m) | Area (m2) | Volume (m3) |
| 0.00 | 0.36 | 0.00 |
| 1.40 | 0.36 | 0.50 |
| 1.55 | 168.00 | 13.13 |
| 1.56 | 0.00 | 13.97 |
| 2.40 | 0.00 | 13.97 |

| CB11-Storage | | |
|---|---|---|
| Depth (m) | Area (m2) | Volume (m3) |
| 0.00 | 0.00 | 0.00 |
| 0.64 | 65.60 | 20.99 |
| 0.65 | 0.36 | 21.32 |
| 1.28 | 0.36 | 21.55 |
| 1.43 | 168.00 | 34.18 |
| 1.44 | 0.00 | 35.02 |
| 2.28 | 0.00 | 35.02 |

| CB12-Storage | | |
|---|---|---|
| Depth (m) | Area (m2) | Volume (m3) |
| 0.00 | 0.00 | 0.00 |
| 0.64 | 80.30 | 25.70 |
| 0.65 | 0.36 | 26.10 |
| 1.28 | 0.36 | 26.33 |
| 1.40 | 234.00 | 40.39 |
| 1.41 | 0.00 | 41.56 |
| 2.28 | 0.00 | 41.56 |

## 200 Baribeau Street (119068)
## PCSWMM Model Results (Ponding)

NOVATECH
Engineers, Planners & Landscape Architects

| CB ID | Invert Elev. (m) | Rim Elev. (m) | Spill Elev. (m) | Ponding Depth (m) | HGL Elev. (m)[1] | | | | Ponding Depth (m) | | | | Spill Depth (m) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2-yr | 5-yr | 100-yr | 100-yr (+20%) | 2-yr | 5-yr | 100-yr | 100-yr (+20%) | 2-yr | 5-yr | 100-yr | 100-yr (+20%) |
| CB01 | 55.03 | 56.43 | 56.58 | 0.15 | 56.50 | 56.53 | 56.66 | 56.72 | 0.07 | 0.10 | 0.23 | 0.29 | 0.00 | 0.00 | 0.08 | 0.14 |
| CB02 | 54.98 | 56.38 | 56.53 | 0.15 | 56.42 | 56.47 | 56.63 | 56.70 | 0.04 | 0.09 | 0.25 | 0.32 | 0.00 | 0.00 | 0.10 | 0.17 |
| CB03 | 55.03 | 56.43 | 56.58 | 0.15 | 56.47 | 56.51 | 56.58 | 56.67 | 0.04 | 0.08 | 0.15 | 0.24 | 0.00 | 0.00 | 0.00 | 0.09 |
| CB04 | 55.10 | 56.50 | 56.65 | 0.15 | 56.54 | 56.57 | 56.63 | 56.73 | 0.04 | 0.07 | 0.13 | 0.23 | 0.00 | 0.00 | 0.00 | 0.08 |
| CB05 | 55.16 | 56.56 | 56.71 | 0.15 | 56.59 | 56.63 | 56.72 | 56.78 | 0.03 | 0.07 | 0.16 | 0.22 | 0.00 | 0.00 | 0.01 | 0.07 |
| CB06 | 55.08 | 56.48 | 56.63 | 0.15 | 56.55 | 56.58 | 56.70 | 56.75 | 0.07 | 0.10 | 0.22 | 0.27 | 0.00 | 0.00 | 0.07 | 0.12 |
| CB07 | 55.29 | 56.57 | 56.72 | 0.15 | 55.79 | 55.90 | 56.72 | 56.77 | 0.00 | 0.00 | 0.15 | 0.20 | 0.00 | 0.00 | 0.00 | 0.05 |
| CB08 | 55.15 | 56.55 | 56.70 | 0.15 | 56.61 | 56.65 | 56.76 | 56.80 | 0.06 | 0.10 | 0.21 | 0.25 | 0.00 | 0.00 | 0.06 | 0.10 |
| CB09 | 55.33 | 56.61 | 56.76 | 0.15 | 55.83 | 55.94 | 56.76 | 56.81 | 0.00 | 0.00 | 0.15 | 0.20 | 0.00 | 0.00 | 0.00 | 0.05 |
| CB10 | 55.23 | 56.63 | 56.78 | 0.15 | 56.70 | 56.73 | 56.83 | 56.86 | 0.07 | 0.10 | 0.20 | 0.23 | 0.00 | 0.00 | 0.05 | 0.08 |
| CB11 | 55.39 | 56.67 | 56.82 | 0.15 | 55.89 | 56.01 | 56.86 | 56.89 | 0.00 | 0.00 | 0.19 | 0.22 | 0.00 | 0.00 | 0.04 | 0.07 |
| CB12 | 55.10 | 56.38 | 56.50 | 0.12 | 55.42 | 55.51 | 56.48 | 56.64 | 0.00 | 0.00 | 0.10 | 0.26 | 0.00 | 0.00 | 0.00 | 0.14 |
| LCB1 | 54.26 | 55.66 | 55.85 | 0.19 | 54.41 | 54.85 | 55.86 | 55.88 | 0.00 | 0.00 | 0.20 | 0.22 | 0.00 | 0.00 | 0.01 | 0.03 |
| LCB2 | 54.44 | 55.65 | 55.80 | 0.15 | 54.48 | 54.60 | 55.89 | 55.91 | 0.00 | 0.00 | 0.24 | 0.26 | 0.00 | 0.00 | 0.09 | 0.11 |
| LCB3 | 54.22 | 55.55 | 55.75 | 0.20 | 54.29 | 54.60 | 55.84 | 55.88 | 0.00 | 0.00 | 0.29 | 0.33 | 0.00 | 0.00 | 0.09 | 0.13 |
| LCB4 | 54.50 | 55.50 | 55.70 | 0.20 | 54.53 | 54.62 | 55.69 | 55.78 | 0.00 | 0.00 | 0.19 | 0.28 | 0.00 | 0.00 | 0.00 | 0.08 |
| LCB5 | 54.25 | 55.45 | 55.65 | 0.20 | 54.31 | 54.62 | 55.66 | 55.73 | 0.00 | 0.00 | 0.21 | 0.28 | 0.00 | 0.00 | 0.01 | 0.08 |
| RYCB3 | 54.03 | 55.59 | 55.75 | 0.16 | 54.41 | 54.85 | 55.85 | 55.87 | 0.00 | 0.00 | 0.26 | 0.28 | 0.00 | 0.00 | 0.10 | 0.12 |
| RYCB4 | 54.65 | 55.65 | 55.90 | 0.25 | 54.67 | 54.69 | 55.89 | 55.93 | 0.00 | 0.00 | 0.24 | 0.28 | 0.00 | 0.00 | 0.00 | 0.03 |
| RYCB5 | 54.02 | 55.25 | 55.50 | 0.25 | 54.30 | 54.62 | 55.61 | 55.71 | 0.00 | 0.00 | 0.36 | 0.46 | 0.00 | 0.00 | 0.11 | 0.21 |
| RYCB6 | 53.75 | 55.41 | 55.65 | 0.24 | 54.30 | 54.62 | 55.65 | 55.82 | 0.00 | 0.00 | 0.24 | 0.41 | 0.00 | 0.00 | 0.00 | 0.17 |

[1] *3-hour Chicago Storm.*

## 200 Baribeau Street (119068)
## Summary of Hydraulic Grade Line (HGL) Elevations

NOVATECH
Engineers, Planners & Landscape Architects

| MH ID | Obvert Elevation (m) | T/G Elevation (m) | HGL Elevation[1] (m) | Surcharge (m) | Clearance from T/G (m) | HGL in Stress Test[1] (m) |
|---|---|---|---|---|---|---|
| MH02 | 53.27 | 56.47 | 55.13 | 2 | 1.34 | 55.32 |
| MH04 | 53.36 | 56.52 | 55.14 | 2 | 1.38 | 55.33 |
| MH06 | 52.80 | 56.43 | 55.11 | 2 | 1.32 | 55.30 |
| MH08 | 53.11 | 56.46 | 55.12 | 2 | 1.34 | 55.31 |
| MH10 | 53.36 | 56.59 | 55.13 | 2 | 1.46 | 55.32 |
| MH12 | 53.77 | 56.75 | 55.13 | 1 | 1.62 | 55.32 |
| MH14 | 53.56 | 56.50 | 55.15 | 2 | 1.35 | 55.35 |
| MH16 | 53.72 | 56.59 | 55.16 | 1 | 1.43 | 55.35 |
| MH18 | 52.62 | 56.50 | 55.10 | 2 | 1.40 | 55.29 |
| MH20 | 52.52 | 55.52 | 55.09 | 3 | 0.43 | 55.29 |
| MH22 | 53.76 | 56.64 | 55.16 | 1 | 1.48 | 55.35 |
| MH24 | 53.91 | 56.66 | 55.16 | 1 | 1.50 | 55.36 |
| MH26 | 53.93 | 56.69 | 55.16 | 1 | 1.53 | 55.36 |
| MH28 | 54.13 | 56.73 | 55.17 | 1 | 1.56 | 55.36 |

[1] *3-hour Chicago Storm.*

# 200 Baribeau Street (119068)
# PCSWMM Model Output
# 100yr 3-hour Chicago Storm

NOVATECH
Engineers, Planners & Landscape Architects

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.013)
  ---------------------------------------------------------------

  *************
  Element Count
  *************
  Number of rain gages ...... 1
  Number of subcatchments ... 26
  Number of nodes ........... 60
  Number of links ........... 78
  Number of pollutants ...... 0
  Number of land uses ....... 0


  ****************
  Raingage Summary
  ****************
                                                Data       Recording
  Name                 Data Source              Type       Interval
  ---------------------------------------------------------------
  RG_1                 C3hr-100yr               INTENSITY  10 min.


  ********************
  Subcatchment Summary
  ********************
  Name                 Area     Width    %Imperv    %Slope Rain Gage            Outlet
  ------------------------------------------------------------------------------------------------
---
  A-01                 0.04     44.00      9.10    0.5000 RG_1                 RYCB4
  A-02                 0.05     31.33     89.40    0.5000 RG_1                 CB05
  A-03                 0.10     67.33     87.10    0.5000 RG_1                 CB11
  A-04                 0.07     72.00     86.10    0.5000 RG_1                 CB10
  A-05                 0.07     74.00     81.10    0.5000 RG_1                 CB08
  A-06                 0.09     92.00     93.50    0.5000 RG_1                 CB09
  A-07                 0.07     44.00     80.30    0.5000 RG_1                 CB04
  A-08                 0.04     41.00     17.10    0.5000 RG_1                 LCB2
  A-09                 0.03     25.00     44.00    0.5000 RG_1                 LCB3
  A-10                 0.03     26.00     42.30    0.5000 RG_1                 LCB4
  A-11                 0.09     58.00     70.10    0.5000 RG_1                 CB03
  A-12                 0.09     62.00     93.50    0.5000 RG_1                 CB07
  A-13                 0.08     84.00     81.00    0.5000 RG_1                 CB06
  A-14                 0.09     59.33     84.30    0.5000 RG_1                 CB01
  A-15                 0.06     40.00     90.00    0.5000 RG_1                 CB02
  A-16                 0.07     49.33     70.30    0.5000 RG_1                 CB12
  A-17                 0.03     26.00     46.20    0.5000 RG_1                 LCB5
  A-18                 0.03     25.00     16.00    0.5000 RG_1                 RYCB6
  A-19                 0.02     20.00     55.00    0.5000 RG_1                 RYCB3
  A-20                 0.03     28.00     42.90    0.5000 RG_1                 LCB1
  A-21                 0.03     16.00     71.90    0.5000 RG_1                 RYCB6
  A-22                 0.03     26.00     46.20    0.5000 RG_1                 RYCB3
  A-23                 0.01      8.00     25.00    0.5000 RG_1                 RYCB5
  B-01                 0.04     35.00     48.60    0.5000 RG_1                 OF1
  B-02                 0.05     51.00     33.30    0.5000 RG_1                 OF1
  B-03                 0.01     11.67     42.90    0.5000 RG_1                 OF3


  ************
  Node Summary
  ************
                                        Invert      Max.    Ponded    External
  Name                 Type               Elev.     Depth      Area    Inflow
  ---------------------------------------------------------------------------
  CB02-Dummy           JUNCTION          52.57      3.84       0.0
  HP-CB01              JUNCTION          56.58      1.00       0.0
  HP-CB02              JUNCTION          56.53      1.00       0.0
  HP-CB03              JUNCTION          56.58      1.00       0.0
  HP-CB04              JUNCTION          56.65      1.00       0.0
  HP-CB05              JUNCTION          56.71      1.00       0.0
  HP-CB06              JUNCTION          56.63      1.00       0.0
  HP-CB07              JUNCTION          56.72      1.00       0.0
  HP-CB08              JUNCTION          56.70      1.00       0.0
  HP-CB09              JUNCTION          56.76      1.00       0.0
  HP-CB10              JUNCTION          56.78      1.00       0.0
  HP-CB11              JUNCTION          56.82      1.00       0.0
  HP-CB12              JUNCTION          56.50      1.00       0.0
  HP-LCB1              JUNCTION          55.85      1.00       0.0
  HP-LCB3              JUNCTION          55.75      1.00       0.0
  HP-LCB4              JUNCTION          55.70      1.00       0.0
  HP-LCB5              JUNCTION          55.65      1.00       0.0
  HP-LCB6              JUNCTION          55.65      1.00       0.0
  HP-RYCB3             JUNCTION          55.75      1.00       0.0
  HP-RYCB4             JUNCTION          55.90      1.00       0.0
  HP-RYCB5             OUTFALL           55.50      1.00       0.0
  OF1                  OUTFALL           56.00      0.00       0.0
  OF2                  OUTFALL           51.05      1.06       0.0
  OF3                  OUTFALL           56.50      0.00       0.0
  CB01                 STORAGE           55.03      2.40       0.0
  CB02                 STORAGE           54.98      2.40       0.0
  CB03                 STORAGE           55.03      2.40       0.0
  CB04                 STORAGE           55.10      2.40       0.0
  CB05                 STORAGE           55.16      2.40       0.0
  CB06                 STORAGE           55.08      2.40       0.0
  CB07                 STORAGE           55.29      2.28       0.0
  CB08                 STORAGE           55.15      2.40       0.0
  CB09                 STORAGE           55.33      2.28       0.0
  CB10                 STORAGE           55.23      2.40       0.0
  CB11                 STORAGE           55.39      2.28       0.0
  CB12                 STORAGE           55.10      2.28       0.0
  LCB1                 STORAGE           54.26      2.40       0.0
  LCB2                 STORAGE           54.44      2.21       0.0
  LCB3                 STORAGE           54.22      2.33       0.0
  LCB4                 STORAGE           54.50      2.00       0.0
  LCB5                 STORAGE           54.25      2.20       0.0
  MH02                 STORAGE           52.82      3.65       0.0
  MH04                 STORAGE           52.98      3.54       0.0
  MH06                 STORAGE           52.27      4.16       0.0
  MH08                 STORAGE           52.73      3.73       0.0
  MH10                 STORAGE           53.06      3.53       0.0
  MH12                 STORAGE           53.38      3.37       0.0
  MH14                 STORAGE           53.18      3.32       0.0
  MH16                 STORAGE           53.34      3.25       0.0
  MH18                 STORAGE           52.09      4.41       0.0
  MH20                 STORAGE           51.99      3.53       0.0
  MH22                 STORAGE           53.51      3.13       0.0
  MH24                 STORAGE           53.66      3.00       0.0
  MH26                 STORAGE           53.63      3.06       0.0
  MH28                 STORAGE           53.88      2.85       0.0
  RYCB1                STORAGE           53.99      2.81       0.0
  RYCB3                STORAGE           54.03      2.56       0.0
  RYCB4                STORAGE           54.65      2.00       0.0
  RYCB5                STORAGE           54.02      2.23       0.0
  RYCB6                STORAGE           53.75      2.66       0.0


  ************
  Link Summary
  ************
  Name                 From Node          To Node            Type           Length    %Slope Roughness
  ---------------------------------------------------------------------------------------------------
  Dummy-MH06           CB02-Dummy         MH06               CONDUIT          22.8    1.0088    0.0130
  LCB1-RYCB3           LCB1               RYCB3              CONDUIT          22.5    0.9778    0.0130
  LCB2-RYCB1           LCB2               RYCB1              CONDUIT          13.5    1.0371    0.0130
  LCB3-RYCB1           LCB3               RYCB1              CONDUIT          15.3    0.9804    0.0130
  LCB4-LCB5            LCB4               LCB5               CONDUIT          25.0    1.0001    0.0130
  LCB5-RYCB5           LCB5               RYCB5              CONDUIT          17.3    0.9827    0.0130
  MH02-CB02-Dummy      MH02               CB02-Dummy         CONDUIT          25.5    0.9804    0.0130
  MH02-OF2             MH20               OF2                CONDUIT          41.4    0.9904    0.0130
  MH04-MH02            MH04               MH02               CONDUIT           8.3    0.9639    0.0130
  MH06-MH18            MH06               MH18               CONDUIT          17.4    0.9771    0.0130
  MH08-MH06            MH08               MH06               CONDUIT          31.5    0.9842    0.0130
  MH10-MH8             MH10               MH08               CONDUIT          25.7    1.0117    0.0130
  MH12-MH10            MH12               MH10               CONDUIT          40.9    1.0025    0.0130
  MH14-MH4             MH14               MH04               CONDUIT          29.0    0.4828    0.0130
  MH16-MH14            MH16               MH14               CONDUIT          29.8    0.5034    0.0130
  MH18-MH20            MH18               MH20               CONDUIT          11.0    0.9091    0.0130
  MH22-MH14            MH22               MH14               CONDUIT          19.9    1.0051    0.0130
  MH24-MH16            MH24               MH16               CONDUIT          19.9    1.0051    0.0130
  MH26-MH16            MH26               MH16               CONDUIT          29.8    0.7383    0.0130
  MH28-MH26            MH28               MH26               CONDUIT          20.0    1.0001    0.0130
  MS-CB01              CB01               HP-CB01            CONDUIT           3.0   -5.0063    0.2500
  MS-CB02              CB02               HP-CB02            CONDUIT           3.0   -5.0063    0.2500
  MS-CB03              CB03               HP-CB03            CONDUIT           3.0   -5.0063    0.2500
  MS-CB04              CB04               HP-CB04            CONDUIT           3.0   -5.0063    0.2500
  MS-CB05              CB05               HP-CB05            CONDUIT           3.0   -5.0063    0.2500
  MS-CB06              CB06               HP-CB06            CONDUIT           3.0   -5.0063    0.2500
  MS-CB07              CB07               HP-CB07            CONDUIT           3.0   -5.0063    0.2500
  MS-CB08              CB08               HP-CB08            CONDUIT           3.0   -5.0063    0.2500
  MS-CB09              CB09               HP-CB09            CONDUIT           3.0   -5.0063    0.2500
  MS-CB10              CB10               HP-CB10            CONDUIT           3.0   -5.0063    0.2500
  MS-CB11              CB11               HP-CB11            CONDUIT           3.0   -5.0063    0.2500
  MS-CB12              CB12               HP-CB12            CONDUIT           3.0   -4.0032    0.2500
  MS-HP-CB01           HP-CB01            CB02               CONDUIT           3.0    6.6815    0.2500
```

| | | | | | | |
|---|---|---|---|---|---|---|
| MS-HP-CB02 | HP-CB02 | CB12 | CONDUIT | 3.0 | 5.0063 | 0.2500 |
| MS-HP-CB03 | HP-CB03 | CB12 | CONDUIT | 3.0 | 6.6815 | 0.2500 |
| MS-HP-CB04 | HP-CB04 | CB03 | CONDUIT | 3.0 | 7.3531 | 0.2500 |
| MS-HP-CB05 | HP-CB05 | CB04 | CONDUIT | 3.0 | 7.0172 | 0.2500 |
| MS-HP-CB06 | HP-CB06 | CB01 | CONDUIT | 3.0 | 6.6815 | 0.2500 |
| MS-HP-CB07 | HP-CB07 | CB03 | CONDUIT | 3.0 | 9.7122 | 0.2500 |
| MS-HP-CB08 | HP-CB08 | CB06 | CONDUIT | 3.0 | 7.3531 | 0.2500 |
| MS-HP-CB09 | HP-CB09 | CB04 | CONDUIT | 3.0 | 8.6994 | 0.2500 |
| MS-HP-CB10 | HP-CB10 | CB08 | CONDUIT | 3.0 | 7.6893 | 0.2500 |
| MS-HP-CB11 | HP-CB11 | CB05 | CONDUIT | 3.0 | 8.6994 | 0.2500 |
| MS-HP-CB12 | HP-CB12 | RYCB6 | CONDUIT | 3.0 | 37.3632 | 0.0350 |
| MS-HP-LCB1 | HP-LCB1 | RYCB3 | CONDUIT | 10.7 | 2.4254 | 0.0350 |
| MS-HP-LCB2 | RYCB1 | LCB3 | CONDUIT | 17.9 | 1.3975 | 0.0350 |
| MS-HP-LCB3 | HP-LCB3 | LCB4 | CONDUIT | 15.2 | 1.6463 | 0.0350 |
| MS-HP-LCB4 | HP-LCB4 | LCB5 | CONDUIT | 15.0 | 1.6669 | 0.0350 |
| MS-HP-LCB5 | HP-LCB5 | RYCB5 | CONDUIT | 7.3 | 5.4877 | 0.0350 |
| MS-HP-LCB6 | HP-LCB6 | RYCB5 | CONDUIT | 8.3 | 4.8307 | 0.0350 |
| MS-HP-RYCB3 | HP-RYCB3 | RYCB6 | CONDUIT | 22.3 | 1.5270 | 0.0350 |
| MS-HP-RYCB4 | HP-RYCB4 | LCB2 | CONDUIT | 14.4 | 1.7396 | 0.0350 |
| MS-LCB1 | LCB1 | HP-LCB1 | CONDUIT | 12.4 | -1.5354 | 0.0350 |
| MS-LCB2 | LCB2 | RYCB1 | CONDUIT | 11.5 | -1.3068 | 0.0350 |
| MS-LCB3 | LCB3 | HP-LCB3 | CONDUIT | 8.5 | -2.3555 | 0.0350 |
| MS-LCB4 | LCB4 | HP-LCB4 | CONDUIT | 10.0 | -2.0004 | 0.0350 |
| MS-LCB5 | LCB5 | HP-LCB5 | CONDUIT | 10.0 | -2.0004 | 0.0350 |
| MS-RYCB3 | RYCB3 | HP-RYCB3 | CONDUIT | 11.6 | -1.3779 | 0.0350 |
| MS-RYCB4 | RYCB4 | HP-RYCB4 | CONDUIT | 7.4 | -3.3662 | 0.0350 |
| MS-RYCB5 | RYCB5 | HP-RYCB5 | CONDUIT | 3.0 | -8.2462 | 0.0350 |
| MS-RYCB6 | RYCB6 | HP-LCB6 | CONDUIT | 13.5 | -1.7785 | 0.0350 |
| RYCB4-LCB2 | RYCB4 | LCB2 | CONDUIT | 21.2 | 0.9906 | 0.0130 |
| RYCB5-RYCB6 | RYCB5 | RYCB6 | CONDUIT | 21.6 | 1.0186 | 0.0130 |
| CB01-ICD | CB01 | MH02 | ORIFICE | | | |
| CB02-ICD | CB02 | CB02-Dummy | ORIFICE | | | |
| CB03-ICD | CB03 | MH08 | ORIFICE | | | |
| CB04-ICD | CB04 | MH10 | ORIFICE | | | |
| CB05-ICD | CB05 | MH12 | ORIFICE | | | |
| CB06-ICD | CB06 | MH14 | ORIFICE | | | |
| CB07-ICD | CB07 | MH22 | ORIFICE | | | |
| CB08-ICD | CB08 | MH16 | ORIFICE | | | |
| CB09-ICD | CB09 | MH24 | ORIFICE | | | |
| CB10-ICD | CB10 | MH26 | ORIFICE | | | |
| CB11-ICD | CB11 | MH28 | ORIFICE | | | |
| CB12-ICD | CB12 | MH06 | ORIFICE | | | |
| RYCB1-ICD | RYCB1 | MH10 | ORIFICE | | | |
| RYCB3-ICD | RYCB3 | MH20 | ORIFICE | | | |
| RYCB6-ICD | RYCB6 | MH20 | ORIFICE | | | |

**********
Cross Section Summary
**********

| Conduit | Shape | Full Depth | Full Area | Hyd. Rad. | Max. Width | No. of Barrels | Full Flow |
|---|---|---|---|---|---|---|---|
| Dummy-MH06 | CIRCULAR | 0.45 | 0.16 | 0.11 | 0.45 | 1 | 286.38 |
| LCB1-RYCB3 | CIRCULAR | 0.25 | 0.05 | 0.06 | 0.25 | 1 | 58.81 |
| LCB2-RYCB1 | CIRCULAR | 0.25 | 0.05 | 0.06 | 0.25 | 1 | 60.56 |
| LCB3-RYCB1 | CIRCULAR | 0.25 | 0.05 | 0.06 | 0.25 | 1 | 58.89 |
| LCB4-LCB5 | CIRCULAR | 0.25 | 0.05 | 0.06 | 0.25 | 1 | 59.47 |
| LCB5-RYCB5 | CIRCULAR | 0.25 | 0.05 | 0.06 | 0.25 | 1 | 58.95 |
| MH02-CB02-Dummy | CIRCULAR | 0.45 | 0.16 | 0.11 | 0.45 | 1 | 282.32 |
| MH02-OF2 | CIRCULAR | 0.53 | 0.22 | 0.13 | 0.53 | 1 | 428.02 |
| MH04-MH02 | CIRCULAR | 0.38 | 0.11 | 0.09 | 0.38 | 1 | 172.15 |
| MH06-MH18 | CIRCULAR | 0.53 | 0.22 | 0.13 | 0.53 | 1 | 425.13 |
| MH08-MH06 | CIRCULAR | 0.38 | 0.11 | 0.09 | 0.38 | 1 | 173.95 |
| MH10-MH8 | CIRCULAR | 0.30 | 0.07 | 0.07 | 0.30 | 1 | 97.27 |
| MH12-MH10 | CIRCULAR | 0.30 | 0.07 | 0.07 | 0.30 | 1 | 96.83 |
| MH14-MH4 | CIRCULAR | 0.38 | 0.11 | 0.09 | 0.38 | 1 | 121.83 |
| MH16-MH14 | CIRCULAR | 0.38 | 0.11 | 0.09 | 0.38 | 1 | 124.40 |
| MH18-MH20 | CIRCULAR | 0.53 | 0.22 | 0.13 | 0.53 | 1 | 410.08 |
| MH22-MH14 | CIRCULAR | 0.25 | 0.05 | 0.06 | 0.25 | 1 | 59.62 |
| MH24-MH16 | CIRCULAR | 0.25 | 0.05 | 0.06 | 0.25 | 1 | 59.62 |
| MH26-MH16 | CIRCULAR | 0.30 | 0.07 | 0.07 | 0.30 | 1 | 83.09 |
| MH28-MH26 | CIRCULAR | 0.25 | 0.05 | 0.06 | 0.25 | 1 | 59.47 |
| MS-CB01 | Road_Transect | 1.00 | 7.58 | 2.60 | 8.00 | 1 | 12829.66 |
| MS-CB02 | Road_Transect | 1.00 | 7.58 | 2.60 | 8.00 | 1 | 12829.66 |
| MS-CB03 | Road_Transect | 1.00 | 7.58 | 2.60 | 8.00 | 1 | 12829.66 |
| MS-CB04 | Road_Transect | 1.00 | 7.58 | 2.60 | 8.00 | 1 | 12829.66 |
| MS-CB05 | Road_Transect | 1.00 | 7.58 | 2.60 | 8.00 | 1 | 12829.66 |
| MS-CB06 | Road_Transect | 1.00 | 7.58 | 2.60 | 8.00 | 1 | 12829.66 |
| MS-CB07 | Road_Transect | 1.00 | 7.58 | 2.60 | 8.00 | 1 | 12829.66 |
| MS-CB08 | Road_Transect | 1.00 | 7.58 | 2.60 | 8.00 | 1 | 12829.66 |
| MS-CB09 | Road_Transect | 1.00 | 7.58 | 2.60 | 8.00 | 1 | 12829.66 |
| MS-CB10 | Road_Transect | 1.00 | 7.58 | 2.60 | 8.00 | 1 | 12829.66 |
| MS-CB11 | Road_Transect | 1.00 | 7.58 | 2.60 | 8.00 | 1 | 12829.66 |
| MS-CB12 | Road_Transect | 1.00 | 7.58 | 2.60 | 8.00 | 1 | 11472.61 |
| MS-HP-CB01 | Road_Transect | 1.00 | 7.58 | 2.60 | 8.00 | 1 | 14821.65 |
| MS-HP-CB02 | Road_Transect | 1.00 | 7.58 | 2.60 | 8.00 | 1 | 12829.66 |
| MS-HP-CB03 | Road_Transect | 1.00 | 7.58 | 2.60 | 8.00 | 1 | 14821.65 |
| MS-HP-CB04 | Road_Transect | 1.00 | 7.58 | 2.60 | 8.00 | 1 | 15548.72 |
| MS-HP-CB05 | Road_Transect | 1.00 | 7.58 | 2.60 | 8.00 | 1 | 15189.41 |
| MS-HP-CB06 | Road_Transect | 1.00 | 7.58 | 2.60 | 8.00 | 1 | 14821.65 |
| MS-HP-CB07 | Road_Transect | 1.00 | 7.58 | 2.60 | 8.00 | 1 | 17869.66 |
| MS-HP-CB08 | Road_Transect | 1.00 | 7.58 | 2.60 | 8.00 | 1 | 15548.72 |
| MS-HP-CB09 | Road_Transect | 1.00 | 7.58 | 2.60 | 8.00 | 1 | 16912.32 |
| MS-HP-CB10 | Road_Transect | 1.00 | 7.58 | 2.60 | 8.00 | 1 | 15900.17 |
| MS-HP-CB11 | Road_Transect | 1.00 | 7.58 | 2.60 | 8.00 | 1 | 16912.32 |
| MS-HP-CB12 | RECT_OPEN | 1.00 | 3.00 | 0.60 | 3.00 | 1 | 37273.69 |
| MS-HP-LCB1 | TRAPEZOIDAL | 1.00 | 3.15 | 0.49 | 6.15 | 1 | 8670.85 |
| MS-HP-LCB2 | TRAPEZOIDAL | 1.00 | 3.15 | 0.49 | 6.15 | 1 | 6581.77 |
| MS-HP-LCB3 | TRAPEZOIDAL | 1.00 | 3.15 | 0.49 | 6.15 | 1 | 7143.62 |
| MS-HP-LCB4 | TRAPEZOIDAL | 1.00 | 3.15 | 0.49 | 6.15 | 1 | 7188.26 |
| MS-HP-LCB5 | TRAPEZOIDAL | 1.00 | 3.15 | 0.49 | 6.15 | 1 | 13042.60 |
| MS-HP-LCB6 | TRAPEZOIDAL | 1.00 | 3.15 | 0.49 | 6.15 | 1 | 12237.00 |
| MS-HP-RYCB3 | TRAPEZOIDAL | 1.00 | 3.15 | 0.49 | 6.15 | 1 | 6880.08 |
| MS-HP-RYCB4 | TRAPEZOIDAL | 1.00 | 3.15 | 0.49 | 6.15 | 1 | 7343.42 |
| MS-LCB1 | TRAPEZOIDAL | 1.00 | 3.15 | 0.49 | 6.15 | 1 | 6898.92 |
| MS-LCB2 | TRAPEZOIDAL | 1.00 | 3.15 | 0.49 | 6.15 | 1 | 6364.75 |
| MS-LCB3 | TRAPEZOIDAL | 1.00 | 3.15 | 0.49 | 6.15 | 1 | 8545.03 |
| MS-LCB4 | TRAPEZOIDAL | 1.00 | 3.15 | 0.49 | 6.15 | 1 | 7874.58 |
| MS-LCB5 | TRAPEZOIDAL | 1.00 | 3.15 | 0.49 | 6.15 | 1 | 7874.58 |
| MS-RYCB3 | TRAPEZOIDAL | 1.00 | 3.15 | 0.49 | 6.15 | 1 | 6535.48 |
| MS-RYCB4 | TRAPEZOIDAL | 1.00 | 3.15 | 0.49 | 6.15 | 1 | 10215.00 |
| MS-RYCB5 | TRAPEZOIDAL | 1.00 | 3.15 | 0.49 | 6.15 | 1 | 15988.04 |
| MS-RYCB6 | TRAPEZOIDAL | 1.00 | 3.15 | 0.49 | 6.15 | 1 | 7424.90 |
| RYCB4-LCB2 | CIRCULAR | 0.25 | 0.05 | 0.06 | 0.25 | 1 | 59.19 |
| RYCB5-RYCB6 | CIRCULAR | 0.25 | 0.05 | 0.06 | 0.25 | 1 | 60.02 |

**********
Transect Summary
**********

Transect Road_Transect
Area:

| | | | | |
|---|---|---|---|---|
| 0.0026 | 0.0106 | 0.0238 | 0.0397 | 0.0571 |
| 0.0756 | 0.0941 | 0.1145 | 0.1355 | 0.1566 |
| 0.1777 | 0.1987 | 0.2198 | 0.2408 | 0.2619 |
| 0.2830 | 0.3040 | 0.3251 | 0.3462 | 0.3673 |
| 0.3883 | 0.4094 | 0.4305 | 0.4516 | 0.4726 |
| 0.4937 | 0.5148 | 0.5359 | 0.5570 | 0.5781 |
| 0.5991 | 0.6202 | 0.6413 | 0.6624 | 0.6835 |
| 0.7046 | 0.7257 | 0.7468 | 0.7679 | 0.7890 |
| 0.8101 | 0.8312 | 0.8523 | 0.8734 | 0.8945 |
| 0.9156 | 0.9367 | 0.9578 | 0.9789 | 1.0000 |

Hrad:

| | | | | |
|---|---|---|---|---|
| 0.0038 | 0.0076 | 0.0114 | 0.0183 | 0.0234 |
| 0.0307 | 0.0381 | 0.0491 | 0.0681 | 0.0910 |
| 0.1162 | 0.1427 | 0.1700 | 0.1977 | 0.2255 |
| 0.2533 | 0.2810 | 0.3084 | 0.3355 | 0.3623 |
| 0.3888 | 0.4148 | 0.4405 | 0.4658 | 0.4906 |
| 0.5151 | 0.5391 | 0.5628 | 0.5861 | 0.6090 |
| 0.6316 | 0.6537 | 0.6756 | 0.6970 | 0.7182 |
| 0.7390 | 0.7595 | 0.7796 | 0.7995 | 0.8191 |
| 0.8384 | 0.8574 | 0.8761 | 0.8945 | 0.9127 |
| 0.9307 | 0.9484 | 0.9658 | 0.9830 | 1.0000 |

Width:

| | | | | |
|---|---|---|---|---|
| 0.2503 | 0.5007 | 0.7510 | 0.7761 | 0.8744 |
| 0.8748 | 0.9057 | 0.9976 | 0.9976 | 0.9977 |
| 0.9978 | 0.9978 | 0.9979 | 0.9979 | 0.9980 |
| 0.9980 | 0.9981 | 0.9982 | 0.9982 | 0.9983 |
| 0.9983 | 0.9984 | 0.9985 | 0.9985 | 0.9986 |
| 0.9986 | 0.9987 | 0.9987 | 0.9988 | 0.9989 |
| 0.9989 | 0.9990 | 0.9990 | 0.9991 | 0.9991 |
| 0.9992 | 0.9993 | 0.9993 | 0.9994 | 0.9994 |
| 0.9995 | 0.9995 | 0.9996 | 0.9997 | 0.9997 |
| 0.9998 | 0.9998 | 0.9999 | 0.9999 | 1.0000 |

**********
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
**********

```
***************
Analysis Options
***************
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... HORTON
Flow Routing Method ..... DYNWAVE
Surcharge Method ..... EXTRAN
Starting Date ..... 07/29/2020 00:00:00
Ending Date ..... 07/30/2020 00:00:00
Antecedent Dry Days ..... 0.0
Report Time Step ..... 00:01:00
Wet Time Step ..... 00:05:00
Dry Time Step ..... 00:05:00
Routing Time Step ..... 5.00 sec
Variable Time Step ..... YES
Maximum Trials ..... 8
Number of Threads ..... 4
Head Tolerance ..... 0.001500 m


**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......         0.096        71.667
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         0.018        13.385
Surface Runoff ...........         0.078        58.423
Final Storage ............         0.001         0.568
Continuity Error (%) .....        -0.990


**************************        Volume         Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------      ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.078         0.777
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.002
External Outflow .........         0.078         0.778
Flooding Loss ............         0.000         0.000
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.009         0.086
Final Stored Volume ......         0.009         0.086
Continuity Error (%) .....         0.170


*************************
Highest Continuity Errors
*************************
Node RYCB5 (3.59%)
Node CB11 (-1.97%)


***************************
Time-Step Critical Elements
***************************
Link MS-RYCB5 (1.72%)
Link MS-CB02 (1.67%)


********************************
Highest Flow Instability Indexes
********************************
Link RYCB3-ICD (121)
Link RYCB6-ICD (120)
Link CB01-ICD (108)
Link CB03-ICD (94)
Link MH18-MH20 (83)


*************************
```

```
  Routing Time Step Summary
  *************************
  Minimum Time Step           :     0.94 sec
  Average Time Step           :     4.90 sec
  Maximum Time Step           :     5.00 sec
  Percent in Steady State     :     0.00
  Average Iterations per Step :     2.02
  Percent Not Converging      :     0.18


  ***************************
  Subcatchment Runoff Summary
  ***************************

  ---------------------------------------------------------------------------------------------------------------
----------------------
                                 Total      Total      Total      Total     Imperv      Perv      Total
Total     Peak  Runoff
                                Precip      Runon       Evap      Infil    Runoff    Runoff    Runoff
Runoff   Runoff   Coeff
  Subcatchment                      mm         mm         mm         mm         mm        mm        mm
10^6 ltr      LPS
  ---------------------------------------------------------------------------------------------------------------
----------------------
  A-01                           71.67       0.00       0.00      41.30       6.39     24.76     31.15
0.01    12.62   0.435
  A-02                           71.67       0.00       0.00       4.67      63.57      3.27     66.84
0.03    22.91   0.933
  A-03                           71.67       0.00       0.00       5.69      62.14      3.93     66.07
0.07    48.98   0.922
  A-04                           71.67       0.00       0.00       6.11      61.25      4.32     65.57
0.05    34.93   0.915
  A-05                           71.67       0.00       0.00       8.33      57.64      5.76     63.40
0.05    35.52   0.885
  A-06                           71.67       0.00       0.00       2.85      66.59      2.10     68.69
0.06    45.19   0.958
  A-07                           71.67       0.00       0.00       8.73      56.86      5.83     62.69
0.04    31.36   0.875
  A-08                           71.67       0.00       0.00      37.54      12.00     22.76     34.76
0.01    12.95   0.485
  A-09                           71.67       0.00       0.00      25.09      31.58     15.85     47.43
0.01    10.07   0.662
  A-10                           71.67       0.00       0.00      25.87      30.32     16.30     46.62
0.01    10.35   0.651
  A-11                           71.67       0.00       0.00      13.33      49.66      8.60     58.26
0.05    39.47   0.813
  A-12                           71.67       0.00       0.00       2.85      66.71      2.06     68.77
0.06    45.67   0.960
  A-13                           71.67       0.00       0.00       8.38      57.57      5.79     63.36
0.05    40.31   0.884
  A-14                           71.67       0.00       0.00       6.93      59.94      4.72     64.66
0.06    42.84   0.902
  A-15                           71.67       0.00       0.00       4.40      64.07      3.10     67.16
0.04    29.28   0.937
  A-16                           71.67       0.00       0.00      13.24      49.72      8.55     58.26
0.04    33.61   0.813
  A-17                           71.67       0.00       0.00      24.08      33.12     15.28     48.40
0.01    10.64   0.675
  A-18                           71.67       0.00       0.00      38.06      11.46     23.04     34.50
0.01     7.80   0.481
  A-19                           71.67       0.00       0.00      20.06      39.48     12.94     52.42
0.01     8.64   0.731
  A-20                           71.67       0.00       0.00      25.59      30.79     16.14     46.93
0.01    11.19   0.655
  A-21                           71.67       0.00       0.00      12.59      51.10      7.95     59.05
0.02    14.37   0.824
  A-22                           71.67       0.00       0.00      24.08      33.12     15.28     48.40
0.01    10.64   0.675
  A-23                           71.67       0.00       0.00      33.86      17.91     20.77     38.68
0.00     2.75   0.540
  B-01                           71.67       0.00       0.00      22.98      34.12     14.64     48.76
0.02    14.55   0.680
  B-02                           71.67       0.00       0.00      30.01      23.37     18.64     42.01
0.02    18.89   0.586
  B-03                           71.67       0.00       0.00      25.34      30.10     16.73     46.83
0.00     3.00   0.653


  ******************
  Node Depth Summary
  ******************
```

| Node | Type | Average Depth Meters | Maximum Depth Meters | Maximum HGL Meters | Time of Max Occurrence days hr:min | Reported Max Depth Meters |
|---|---|---|---|---|---|---|
| CB02-Dummy | JUNCTION | 2.49 | 2.55 | 55.12 | 0 01:22 | 2.55 |
| HP-CB01 | JUNCTION | 0.00 | 0.07 | 56.65 | 0 01:15 | 0.07 |
| HP-CB02 | JUNCTION | 0.00 | 0.10 | 56.63 | 0 01:16 | 0.10 |
| HP-CB03 | JUNCTION | 0.00 | 0.00 | 56.58 | 0 01:23 | 0.00 |
| HP-CB04 | JUNCTION | 0.00 | 0.00 | 56.65 | 0 00:00 | 0.00 |
| HP-CB05 | JUNCTION | 0.00 | 0.01 | 56.72 | 0 01:25 | 0.01 |
| HP-CB06 | JUNCTION | 0.00 | 0.07 | 56.70 | 0 01:14 | 0.07 |
| HP-CB07 | JUNCTION | 0.00 | 0.00 | 56.72 | 0 01:09 | 0.00 |
| HP-CB08 | JUNCTION | 0.00 | 0.06 | 56.76 | 0 01:14 | 0.06 |
| HP-CB09 | JUNCTION | 0.00 | 0.00 | 56.76 | 0 00:00 | 0.00 |
| HP-CB10 | JUNCTION | 0.00 | 0.05 | 56.83 | 0 01:13 | 0.05 |
| HP-CB11 | JUNCTION | 0.00 | 0.04 | 56.86 | 0 01:21 | 0.04 |
| HP-CB12 | JUNCTION | 0.00 | 0.00 | 56.50 | 0 00:00 | 0.00 |
| HP-LCB1 | JUNCTION | 0.00 | 0.01 | 55.86 | 0 01:11 | 0.01 |
| HP-LCB3 | JUNCTION | 0.00 | 0.08 | 55.83 | 0 01:14 | 0.08 |
| HP-LCB4 | JUNCTION | 0.00 | 0.00 | 55.70 | 0 00:00 | 0.00 |
| HP-LCB5 | JUNCTION | 0.00 | 0.01 | 55.66 | 0 01:14 | 0.01 |
| HP-LCB6 | JUNCTION | 0.00 | 0.00 | 55.65 | 0 01:12 | 0.00 |
| HP-RYCB3 | JUNCTION | 0.00 | 0.09 | 55.84 | 0 01:11 | 0.09 |
| HP-RYCB4 | JUNCTION | 0.00 | 0.00 | 55.90 | 0 00:00 | 0.00 |
| HP-RYCB5 | OUTFALL | 0.00 | 0.10 | 55.60 | 0 01:13 | 0.10 |
| OF1 | OUTFALL | 0.00 | 0.00 | 56.00 | 0 00:00 | 0.00 |
| OF2 | OUTFALL | 4.00 | 4.00 | 55.05 | 0 00:00 | 4.00 |
| OF3 | OUTFALL | 0.00 | 0.00 | 56.50 | 0 00:00 | 0.00 |
| CB01 | STORAGE | 0.16 | 1.63 | 56.66 | 0 01:14 | 1.63 |
| CB02 | STORAGE | 0.17 | 1.65 | 56.63 | 0 01:16 | 1.65 |
| CB03 | STORAGE | 0.14 | 1.55 | 56.58 | 0 01:23 | 1.55 |
| CB04 | STORAGE | 0.13 | 1.53 | 56.63 | 0 01:23 | 1.53 |
| CB05 | STORAGE | 0.11 | 1.56 | 56.72 | 0 01:25 | 1.56 |
| CB06 | STORAGE | 0.15 | 1.62 | 56.70 | 0 01:14 | 1.62 |
| CB07 | STORAGE | 0.16 | 1.43 | 56.72 | 0 01:32 | 1.43 |
| CB08 | STORAGE | 0.13 | 1.61 | 56.76 | 0 01:14 | 1.61 |
| CB09 | STORAGE | 0.16 | 1.43 | 56.76 | 0 01:31 | 1.43 |
| CB10 | STORAGE | 0.13 | 1.60 | 56.83 | 0 01:13 | 1.60 |
| CB11 | STORAGE | 0.16 | 1.47 | 56.86 | 0 01:21 | 1.47 |
| CB12 | STORAGE | 0.13 | 1.38 | 56.48 | 0 01:29 | 1.38 |
| LCB1 | STORAGE | 0.82 | 1.60 | 55.86 | 0 01:10 | 1.60 |
| LCB2 | STORAGE | 0.66 | 1.45 | 55.89 | 0 01:32 | 1.45 |
| LCB3 | STORAGE | 0.88 | 1.62 | 55.84 | 0 01:13 | 1.62 |
| LCB4 | STORAGE | 0.58 | 1.19 | 55.69 | 0 01:14 | 1.19 |
| LCB5 | STORAGE | 0.83 | 1.41 | 55.66 | 0 01:14 | 1.41 |
| MH02 | STORAGE | 2.24 | 2.31 | 55.13 | 0 01:22 | 2.31 |
| MH04 | STORAGE | 2.08 | 2.16 | 55.14 | 0 01:22 | 2.16 |
| MH06 | STORAGE | 2.78 | 2.84 | 55.11 | 0 01:22 | 2.84 |
| MH08 | STORAGE | 2.32 | 2.39 | 55.12 | 0 01:19 | 2.39 |
| MH10 | STORAGE | 2.00 | 2.07 | 55.13 | 0 01:19 | 2.07 |
| MH12 | STORAGE | 1.68 | 1.75 | 55.13 | 0 01:19 | 1.75 |
| MH14 | STORAGE | 1.88 | 1.97 | 55.15 | 0 01:22 | 1.97 |
| MH16 | STORAGE | 1.72 | 1.82 | 55.16 | 0 01:21 | 1.82 |
| MH18 | STORAGE | 2.96 | 3.01 | 55.10 | 0 01:20 | 3.01 |
| MH20 | STORAGE | 3.06 | 3.10 | 55.09 | 0 01:18 | 3.10 |
| MH22 | STORAGE | 1.55 | 1.65 | 55.16 | 0 01:22 | 1.65 |
| MH24 | STORAGE | 1.40 | 1.50 | 55.16 | 0 01:21 | 1.50 |
| MH26 | STORAGE | 1.43 | 1.53 | 55.16 | 0 01:21 | 1.53 |
| MH28 | STORAGE | 1.18 | 1.29 | 55.17 | 0 01:21 | 1.29 |
| RYCB1 | STORAGE | 1.11 | 1.85 | 55.84 | 0 01:13 | 1.85 |
| RYCB3 | STORAGE | 1.05 | 1.82 | 55.85 | 0 01:11 | 1.82 |
| RYCB4 | STORAGE | 0.45 | 1.24 | 55.89 | 0 01:31 | 1.24 |
| RYCB5 | STORAGE | 1.06 | 1.59 | 55.61 | 0 01:09 | 1.59 |
| RYCB6 | STORAGE | 1.33 | 1.90 | 55.65 | 0 01:11 | 1.90 |

**********
Node Inflow Summary
**********

| Node | Type | Maximum Lateral Inflow LPS | Maximum Total Inflow LPS | Time of Max Occurrence days hr:min | Lateral Inflow Volume 10^6 ltr | Total Inflow Volume 10^6 ltr | Flow Balance Error Percent |
|---|---|---|---|---|---|---|---|
| CB02-Dummy | JUNCTION | 0.00 | 53.72 | 0 01:17 | 0 | 0.424 | -0.002 |
| HP-CB01 | JUNCTION | 0.00 | 31.61 | 0 01:14 | 0 | 0.0163 | 0.091 |
| HP-CB02 | JUNCTION | 0.00 | 27.93 | 0 01:16 | 0 | 0.0162 | 2.609 |
| HP-CB03 | JUNCTION | 0.00 | 0.19 | 0 01:21 | 0 | 8.55e-06 | 7.550 ltr |
| HP-CB04 | JUNCTION | 0.00 | 0.00 | 0 00:00 | 0 | 0 | 0.000 ltr |
| HP-CB05 | JUNCTION | 0.00 | 0.72 | 0 01:22 | 0 | 6.64e-05 | 21.613 |
| HP-CB06 | JUNCTION | 0.00 | 25.59 | 0 01:14 | 0 | 0.0123 | 0.115 |
| HP-CB07 | JUNCTION | 0.00 | 1.56 | 0 01:09 | 0 | 5.34e-06 | 3.913 ltr |
| HP-CB08 | JUNCTION | 0.00 | 18.20 | 0 01:13 | 0 | 0.00735 | 0.209 |
| HP-CB09 | JUNCTION | 0.00 | 0.00 | 0 00:00 | 0 | 0 | 0.000 ltr |
| HP-CB10 | JUNCTION | 0.00 | 11.89 | 0 01:12 | 0 | 0.00379 | 0.411 |
| HP-CB11 | JUNCTION | 0.00 | 6.80 | 0 01:20 | 0 | 0.00275 | 0.335 |
| HP-CB12 | JUNCTION | 0.00 | 0.00 | 0 00:00 | 0 | 0 | 0.000 ltr |
| HP-LCB1 | JUNCTION | 0.00 | 1.14 | 0 01:10 | 0 | 5.97e-05 | 6.120 |
| HP-LCB3 | JUNCTION | 0.00 | 16.03 | 0 01:13 | 0 | 0.0118 | 0.618 |
| HP-LCB4 | JUNCTION | 0.00 | 0.00 | 0 00:00 | 0 | 0 | 0.000 ltr |
| HP-LCB5 | JUNCTION | 0.00 | 1.11 | 0 01:12 | 0 | 0.000149 | 1.594 |
| HP-LCB6 | JUNCTION | 0.00 | 0.56 | 0 01:11 | 0 | 1.53e-05 | 1.591 ltr |
| HP-RYCB3 | JUNCTION | 0.00 | 17.90 | 0 01:10 | 0 | 0.00843 | -0.224 |
| HP-RYCB4 | JUNCTION | 0.00 | 0.00 | 0 00:00 | 0 | 0 | 0.000 ltr |
| HP-RYCB5 | OUTFALL | 0.00 | 50.04 | 0 01:13 | 0 | 0.0391 | 0.000 |
| OF1 | OUTFALL | 33.44 | 33.44 | 0 01:10 | 0.0384 | 0.0384 | 0.000 |
| OF2 | OUTFALL | 0.00 | 103.83 | 0 01:22 | 0 | 0.7 | 0.000 |
| OF3 | OUTFALL | 3.00 | 3.00 | 0 01:10 | 0.00327 | 0.00327 | 0.000 |
| CB01 | STORAGE | 42.84 | 42.84 | 0 01:10 | 0.0574 | 0.0707 | -0.032 |
| CB02 | STORAGE | 29.28 | 40.96 | 0 01:14 | 0.0402 | 0.0572 | -0.184 |
| CB03 | STORAGE | 39.47 | 39.47 | 0 01:10 | 0.0506 | 0.0515 | 0.156 |
| CB04 | STORAGE | 31.36 | 31.36 | 0 01:10 | 0.0413 | 0.0413 | -0.552 |
| CB05 | STORAGE | 22.91 | 22.91 | 0 01:10 | 0.0314 | 0.0341 | 0.119 |
| CB06 | STORAGE | 40.31 | 40.31 | 0 01:10 | 0.0531 | 0.0605 | -0.010 |
| CB07 | STORAGE | 45.67 | 45.68 | 0 01:10 | 0.0639 | 0.0639 | 0.420 |
| CB08 | STORAGE | 35.52 | 35.52 | 0 01:10 | 0.0468 | 0.0506 | 0.184 |
| CB09 | STORAGE | 45.19 | 45.19 | 0 01:10 | 0.0631 | 0.0631 | 0.187 |
| CB10 | STORAGE | 34.93 | 34.93 | 0 01:10 | 0.0471 | 0.0472 | 0.209 |
| CB11 | STORAGE | 48.98 | 48.98 | 0 01:10 | 0.0666 | 0.0667 | -1.929 |
| CB12 | STORAGE | 33.61 | 39.33 | 0 01:19 | 0.043 | 0.0587 | -0.171 |
| LCB1 | STORAGE | 11.19 | 11.19 | 0 01:10 | 0.0131 | 0.0141 | 0.012 |
| LCB2 | STORAGE | 12.95 | 62.82 | 0 01:30 | 0.0142 | 0.0927 | 0.020 |
| LCB3 | STORAGE | 10.07 | 21.30 | 0 01:49 | 0.0118 | 0.0221 | 0.066 |
| LCB4 | STORAGE | 10.35 | 21.77 | 0 01:13 | 0.0121 | 0.0243 | -0.214 |
| LCB5 | STORAGE | 10.64 | 26.24 | 0 01:13 | 0.0126 | 0.0376 | 0.015 |
| MH02 | STORAGE | 0.00 | 45.91 | 0 01:22 | 0 | 0.386 | -0.004 |
| MH04 | STORAGE | 0.00 | 38.02 | 0 01:22 | 0 | 0.331 | 0.000 |
| MH06 | STORAGE | 0.00 | 87.12 | 0 01:22 | 0 | 0.64 | -0.001 |
| MH08 | STORAGE | 0.00 | 27.37 | 0 01:19 | 0 | 0.16 | -0.003 |
| MH10 | STORAGE | 0.00 | 19.32 | 0 01:19 | 0 | 0.108 | -0.003 |
| MH12 | STORAGE | 0.00 | 6.56 | 0 01:25 | 0 | 0.0364 | -0.005 |
| MH14 | STORAGE | 0.00 | 38.02 | 0 01:22 | 0 | 0.331 | -0.000 |
| MH16 | STORAGE | 0.00 | 25.44 | 0 01:21 | 0 | 0.219 | 0.000 |
| MH18 | STORAGE | 0.00 | 87.13 | 0 01:23 | 0 | 0.639 | 0.011 |
| MH20 | STORAGE | 0.00 | 103.83 | 0 01:22 | 0 | 0.706 | -0.051 |
| MH22 | STORAGE | 0.00 | 6.04 | 0 01:32 | 0 | 0.0658 | -0.002 |
| MH24 | STORAGE | 0.00 | 6.03 | 0 01:31 | 0 | 0.065 | -0.001 |
| MH26 | STORAGE | 0.00 | 12.76 | 0 01:21 | 0 | 0.111 | -0.001 |
| MH28 | STORAGE | 0.00 | 6.13 | 0 01:21 | 0 | 0.067 | -0.001 |
| RYCB1 | STORAGE | 0.00 | 63.35 | 0 01:31 | 0 | 0.104 | 0.014 |
| RYCB3 | STORAGE | 19.28 | 28.82 | 0 01:10 | 0.023 | 0.0386 | 0.023 |
| RYCB4 | STORAGE | 12.62 | 12.62 | 0 01:10 | 0.0137 | 0.0145 | 0.024 |
| RYCB5 | STORAGE | 2.75 | 50.17 | 0 01:12 | 0.00309 | 0.0547 | 3.726 |
| RYCB6 | STORAGE | 22.17 | 37.87 | 0 01:10 | 0.0275 | 0.0517 | 0.677 |

**********
Node Surcharge Summary
**********

Surcharging occurs when water rises above the top of the highest conduit.

| Node | Type | Hours Surcharged | Max. Height Above Crown Meters | Min. Depth Below Rim Meters |
|---|---|---|---|---|
| CB02-Dummy | JUNCTION | 24.00 | 2.103 | 1.287 |

**********
Node Flooding Summary
**********

No nodes were flooded.

**********
Storage Volume Summary
**********

| Storage Unit | Average Volume 1000 m3 | Avg Pcnt Full | Evap Pcnt Loss | Exfil Pcnt Loss | Maximum Volume 1000 m3 | Max Pcnt Full | Time of Max Occurrence days hr:min | Maximum Outflow LPS |
|---|---|---|---|---|---|---|---|---|
| CB01 | 0.001 | 6 | 0 | 0 | 0.017 | 100 | 0 01:12 | 39.55 |
| CB02 | 0.000 | 5 | 0 | 0 | 0.009 | 100 | 0 01:12 | 35.81 |
| CB03 | 0.001 | 5 | 0 | 0 | 0.017 | 95 | 0 01:23 | 8.25 |
| CB04 | 0.001 | 4 | 0 | 0 | 0.014 | 69 | 0 01:23 | 6.50 |
| CB05 | 0.000 | 4 | 0 | 0 | 0.008 | 99 | 0 01:25 | 7.27 |
| CB06 | 0.001 | 6 | 0 | 0 | 0.016 | 100 | 0 01:11 | 32.20 |
| CB07 | 0.003 | 10 | 0 | 0 | 0.034 | 96 | 0 01:32 | 7.31 |
| CB08 | 0.001 | 6 | 0 | 0 | 0.013 | 100 | 0 01:11 | 24.88 |
| CB09 | 0.003 | 10 | 0 | 0 | 0.034 | 95 | 0 01:31 | 6.03 |
| CB10 | 0.001 | 6 | 0 | 0 | 0.014 | 100 | 0 01:11 | 18.54 |
| CB11 | 0.004 | 10 | 0 | 0 | 0.035 | 100 | 0 01:18 | 12.93 |
| CB12 | 0.003 | 8 | 0 | 0 | 0.037 | 86 | 0 01:29 | 6.17 |
| LCB1 | 0.000 | 34 | 0 | 0 | 0.001 | 67 | 0 01:10 | 10.64 |
| LCB2 | 0.000 | 30 | 0 | 0 | 0.001 | 65 | 0 01:32 | 59.96 |
| LCB3 | 0.000 | 38 | 0 | 0 | 0.001 | 69 | 0 01:13 | 16.22 |
| LCB4 | 0.000 | 29 | 0 | 0 | 0.000 | 60 | 0 01:14 | 20.98 |
| LCB5 | 0.000 | 38 | 0 | 0 | 0.001 | 64 | 0 01:14 | 26.06 |
| MH02 | 0.003 | 61 | 0 | 0 | 0.003 | 63 | 0 01:22 | 45.91 |
| MH04 | 0.002 | 59 | 0 | 0 | 0.002 | 61 | 0 01:22 | 38.12 |
| MH06 | 0.003 | 67 | 0 | 0 | 0.003 | 68 | 0 01:22 | 87.13 |
| MH08 | 0.003 | 62 | 0 | 0 | 0.003 | 64 | 0 01:19 | 27.38 |
| MH10 | 0.002 | 57 | 0 | 0 | 0.002 | 59 | 0 01:19 | 19.32 |
| MH12 | 0.002 | 50 | 0 | 0 | 0.002 | 52 | 0 01:19 | 6.66 |
| MH14 | 0.002 | 57 | 0 | 0 | 0.002 | 59 | 0 01:22 | 38.02 |
| MH16 | 0.002 | 53 | 0 | 0 | 0.002 | 56 | 0 01:21 | 25.44 |
| MH18 | 0.003 | 67 | 0 | 0 | 0.003 | 68 | 0 01:20 | 87.14 |
| MH20 | 0.003 | 87 | 0 | 0 | 0.004 | 88 | 0 01:18 | 103.83 |
| MH22 | 0.002 | 49 | 0 | 0 | 0.002 | 53 | 0 01:22 | 6.05 |
| MH24 | 0.002 | 47 | 0 | 0 | 0.002 | 50 | 0 01:21 | 6.05 |
| MH26 | 0.002 | 47 | 0 | 0 | 0.002 | 50 | 0 01:21 | 12.78 |
| MH28 | 0.001 | 41 | 0 | 0 | 0.001 | 45 | 0 01:21 | 6.14 |
| RYCB1 | 0.001 | 39 | 0 | 0 | 0.002 | 66 | 0 01:13 | 64.32 |
| RYCB3 | 0.000 | 41 | 0 | 0 | 0.001 | 71 | 0 01:11 | 26.98 |
| RYCB4 | 0.000 | 22 | 0 | 0 | 0.000 | 62 | 0 01:31 | 10.82 |
| RYCB5 | 0.000 | 48 | 0 | 0 | 0.001 | 72 | 0 01:09 | 50.04 |
| RYCB6 | 0.000 | 50 | 0 | 0 | 0.001 | 71 | 0 01:11 | 34.54 |

**********
Outfall Loading Summary
**********

| Outfall Node | Flow Freq Pcnt | Avg Flow LPS | Max Flow LPS | Total Volume 10^6 ltr |
|---|---|---|---|---|
| HP-RYCB5 | 3.93 | 25.09 | 50.04 | 0.039 |
| OF1 | 13.98 | 4.97 | 33.44 | 0.038 |
| OF2 | 72.87 | 13.55 | 103.83 | 0.700 |
| OF3 | 13.11 | 0.44 | 3.00 | 0.003 |
| System | 25.97 | 44.05 | 3.00 | 0.780 |

**********
Link Flow Summary
**********

| Link | Type | Maximum \|Flow\| LPS | Time of Max Occurrence days hr:min | Maximum \|Veloc\| m/sec | Max/ Full Flow | Max/ Full Depth |
|---|---|---|---|---|---|---|
| Dummy-MH06 | CONDUIT | 53.72 | 0 01:17 | 0.34 | 0.19 | 1.00 |
| LCB1-RYCB3 | CONDUIT | 9.68 | 0 01:11 | 0.20 | 0.16 | 1.00 |
| LCB2-RYCB1 | CONDUIT | 59.96 | 0 01:43 | 1.22 | 0.99 | 1.00 |
| LCB3-RYCB1 | CONDUIT | 20.73 | 0 01:49 | 0.42 | 0.35 | 1.00 |
| LCB4-LCB5 | CONDUIT | 20.98 | 0 01:14 | 0.43 | 0.35 | 1.00 |
| LCB5-RYCB5 | CONDUIT | 26.04 | 0 01:16 | 0.53 | 0.44 | 1.00 |
| MH02-CB02-Dummy | CONDUIT | 45.91 | 0 01:22 | 0.29 | 0.16 | 1.00 |
| MH02-OF2 | CONDUIT | 103.83 | 0 01:22 | 0.48 | 0.24 | 1.00 |
| MH04-MH02 | CONDUIT | 38.12 | 0 02:09 | 0.35 | 0.22 | 1.00 |
| MH06-MH18 | CONDUIT | 87.13 | 0 01:23 | 0.40 | 0.20 | 1.00 |
| MH08-MH06 | CONDUIT | 27.38 | 0 01:19 | 0.25 | 0.16 | 1.00 |
| MH10-MH8 | CONDUIT | 19.32 | 0 01:19 | 0.27 | 0.20 | 1.00 |
| MH12-MH10 | CONDUIT | 6.66 | 0 01:28 | 0.09 | 0.07 | 1.00 |
| MH14-MH4 | CONDUIT | 38.02 | 0 01:22 | 0.34 | 0.31 | 1.00 |
| MH16-MH14 | CONDUIT | 25.44 | 0 01:21 | 0.23 | 0.20 | 1.00 |
| MH18-MH20 | CONDUIT | 87.14 | 0 01:23 | 0.40 | 0.21 | 1.00 |
| MH22-MH14 | CONDUIT | 6.05 | 0 01:35 | 0.12 | 0.10 | 1.00 |
| MH24-MH16 | CONDUIT | 6.05 | 0 01:36 | 0.12 | 0.10 | 1.00 |
| MH26-MH16 | CONDUIT | 12.78 | 0 01:21 | 0.18 | 0.15 | 1.00 |
| MH28-MH26 | CONDUIT | 6.14 | 0 01:21 | 0.13 | 0.10 | 1.00 |
| MS-CB01 | CHANNEL | 31.61 | 0 01:14 | 0.04 | 0.00 | 0.15 |
| MS-CB02 | CHANNEL | 27.93 | 0 01:16 | 0.03 | 0.00 | 0.18 |
| MS-CB03 | CHANNEL | 0.19 | 0 01:21 | 0.00 | 0.00 | 0.08 |
| MS-CB04 | CHANNEL | 0.00 | 0 00:00 | 0.00 | 0.00 | 0.06 |
| MS-CB05 | CHANNEL | 0.72 | 0 01:22 | 0.00 | 0.00 | 0.08 |
| MS-CB06 | CHANNEL | 25.59 | 0 01:14 | 0.03 | 0.00 | 0.14 |
| MS-CB07 | CHANNEL | 1.56 | 0 01:09 | 1.64 | 0.00 | 0.07 |
| MS-CB08 | CHANNEL | 18.20 | 0 01:13 | 0.03 | 0.00 | 0.13 |
| MS-CB09 | CHANNEL | 0.00 | 0 00:00 | 0.00 | 0.00 | 0.07 |
| MS-CB10 | CHANNEL | 11.89 | 0 01:12 | 0.03 | 0.00 | 0.12 |
| MS-CB11 | CHANNEL | 6.80 | 0 01:20 | 0.01 | 0.00 | 0.11 |
| MS-CB12 | CHANNEL | 0.00 | 0 00:00 | 0.00 | 0.00 | 0.05 |
| MS-HP-CB01 | CHANNEL | 31.08 | 0 01:15 | 0.04 | 0.00 | 0.16 |
| MS-HP-CB02 | CHANNEL | 28.95 | 0 01:20 | 0.12 | 0.00 | 0.07 |
| MS-HP-CB03 | CHANNEL | 0.00 | 0 01:23 | 0.00 | 0.00 | 0.05 |
| MS-HP-CB04 | CHANNEL | 0.00 | 0 00:00 | 0.00 | 0.00 | 0.08 |
| MS-HP-CB05 | CHANNEL | 0.03 | 0 01:25 | 0.00 | 0.00 | 0.07 |
| MS-HP-CB06 | CHANNEL | 25.07 | 0 01:14 | 0.03 | 0.00 | 0.15 |
| MS-HP-CB07 | CHANNEL | 0.00 | 0 01:09 | 0.00 | 0.00 | 0.08 |
| MS-HP-CB08 | CHANNEL | 17.29 | 0 01:14 | 0.02 | 0.00 | 0.14 |
| MS-HP-CB09 | CHANNEL | 0.00 | 0 00:00 | 0.00 | 0.00 | 0.06 |
| MS-HP-CB10 | CHANNEL | 10.68 | 0 01:13 | 0.02 | 0.00 | 0.13 |
| MS-HP-CB11 | CHANNEL | 6.40 | 0 01:21 | 0.02 | 0.00 | 0.09 |
| MS-HP-CB12 | CONDUIT | 0.00 | 0 00:00 | 0.00 | 0.00 | 0.10 |
| MS-HP-LCB1 | CONDUIT | 0.23 | 0 01:11 | 0.00 | 0.00 | 0.13 |
| MS-HP-LCB2 | CONDUIT | 3.62 | 0 01:13 | 0.03 | 0.00 | 0.17 |
| MS-HP-LCB3 | CONDUIT | 15.94 | 0 01:14 | 0.30 | 0.00 | 0.14 |
| MS-HP-LCB4 | CONDUIT | 0.00 | 0 00:00 | 0.00 | 0.00 | 0.11 |
| MS-HP-LCB5 | CONDUIT | 0.73 | 0 01:14 | 0.01 | 0.00 | 0.19 |
| MS-HP-LCB6 | CONDUIT | 0.04 | 0 01:12 | 0.00 | 0.00 | 0.18 |
| MS-HP-RYCB3 | CONDUIT | 17.44 | 0 01:11 | 0.17 | 0.00 | 0.16 |
| MS-HP-RYCB4 | CONDUIT | 0.00 | 0 00:00 | 0.00 | 0.00 | 0.12 |
| MS-LCB1 | CONDUIT | 1.14 | 0 01:10 | 0.03 | 0.00 | 0.10 |
| MS-LCB2 | CONDUIT | 58.80 | 0 01:31 | 0.49 | 0.01 | 0.18 |
| MS-LCB3 | CONDUIT | 16.03 | 0 01:13 | 0.12 | 0.00 | 0.19 |
| MS-LCB4 | CONDUIT | 0.00 | 0 00:00 | 0.00 | 0.00 | 0.10 |
| MS-LCB5 | CONDUIT | 1.11 | 0 01:12 | 0.02 | 0.00 | 0.11 |
| MS-RYCB3 | CONDUIT | 17.90 | 0 01:10 | 0.16 | 0.00 | 0.17 |
| MS-RYCB4 | CONDUIT | 0.00 | 0 00:00 | 0.00 | 0.00 | 0.12 |
| MS-RYCB5 | CONDUIT | 50.04 | 0 01:13 | 0.26 | 0.00 | 0.25 |
| MS-RYCB6 | CONDUIT | 0.56 | 0 01:11 | 0.01 | 0.00 | 0.12 |
| RYCB4-LCB2 | CONDUIT | 10.82 | 0 01:10 | 0.22 | 0.18 | 1.00 |
| RYCB5-RYCB6 | CONDUIT | 25.25 | 0 01:11 | 0.51 | 0.42 | 1.00 |
| CB01-ICD | ORIFICE | 7.94 | 0 01:14 | | | 1.00 |
| CB02-ICD | ORIFICE | 7.89 | 0 01:16 | | | 1.00 |
| CB03-ICD | ORIFICE | 8.06 | 0 01:23 | | | 1.00 |
| CB04-ICD | ORIFICE | 6.50 | 0 01:23 | | | 1.00 |
| CB05-ICD | ORIFICE | 6.56 | 0 01:25 | | | 1.00 |
| CB06-ICD | ORIFICE | 6.61 | 0 01:14 | | | 1.00 |
| CB07-ICD | ORIFICE | 6.04 | 0 01:32 | | | 1.00 |
| CB08-ICD | ORIFICE | 6.68 | 0 01:14 | | | 1.00 |
| CB09-ICD | ORIFICE | 6.03 | 0 01:31 | | | 1.00 |
| CB10-ICD | ORIFICE | 6.66 | 0 01:13 | | | 1.00 |
| CB11-ICD | ORIFICE | 6.13 | 0 01:21 | | | 1.00 |
| CB12-ICD | ORIFICE | 6.17 | 0 01:29 | | | 1.00 |
| RYCB1-ICD | ORIFICE | 6.27 | 0 01:13 | | | 1.00 |
| RYCB3-ICD | ORIFICE | 9.08 | 0 01:10 | | | 1.00 |
| RYCB6-ICD | ORIFICE | 8.73 | 0 01:11 | | | 1.00 |

**********
Flow Classification Summary
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| Conduit | Adjusted /Actual Length | Fraction of Time in Flow Class: Dry | Up Dry | Down Dry | Sub Crit | Sup Crit | Up Crit | Down Crit | Norm Ltd | Inlet Ctrl |
|---|---|---|---|---|---|---|---|---|---|---|
| Dummy-MH06 | 1.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| LCB1-RYCB3 | 1.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| LCB2-RYCB1 | 1.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| LCB3-RYCB1 | 1.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| LCB4-LCB5 | 1.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| LCB5-RYCB5 | 1.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MH02-CB02-Dummy | 1.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| MH02-OF2 | 1.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MH04-MH02 | 1.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MH06-MH18 | 1.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MH08-MH06 | 1.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MH10-MH8 | 1.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MH12-MH10 | 1.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MH14-MH4 | 1.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MH16-MH14 | 1.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MH18-MH20 | 1.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MH22-MH14 | 1.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MH24-MH16 | 1.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MH26-MH16 | 1.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MH28-MH26 | 1.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MS-CB01 | 1.00 | 0.04 | 0.01 | 0.00 | 0.07 | 0.00 | 0.00 | 0.88 | 0.04 | 0.00 |
| MS-CB02 | 1.00 | 0.04 | 0.01 | 0.00 | 0.05 | 0.00 | 0.00 | 0.89 | 0.02 | 0.00 |
| MS-CB03 | 1.00 | 0.04 | 0.02 | 0.00 | 0.05 | 0.00 | 0.00 | 0.88 | 0.04 | 0.00 |
| MS-CB04 | 1.00 | 0.92 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MS-CB05 | 1.00 | 0.04 | 0.02 | 0.00 | 0.04 | 0.00 | 0.00 | 0.89 | 0.03 | 0.00 |
| MS-CB06 | 1.00 | 0.04 | 0.01 | 0.00 | 0.08 | 0.00 | 0.00 | 0.87 | 0.05 | 0.00 |
| MS-CB07 | 1.00 | 0.05 | 0.00 | 0.00 | 0.08 | 0.00 | 0.00 | 0.87 | 0.95 | 0.00 |
| MS-CB08 | 1.00 | 0.04 | 0.01 | 0.00 | 0.07 | 0.00 | 0.00 | 0.88 | 0.04 | 0.00 |
| MS-CB09 | 1.00 | 0.92 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MS-CB10 | 1.00 | 0.04 | 0.01 | 0.00 | 0.07 | 0.00 | 0.00 | 0.88 | 0.04 | 0.00 |
| MS-CB11 | 1.00 | 0.05 | 0.01 | 0.00 | 0.07 | 0.00 | 0.00 | 0.87 | 0.05 | 0.00 |
| MS-CB12 | 1.00 | 0.95 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MS-HP-CB01 | 1.00 | 0.04 | 0.01 | 0.00 | 0.05 | 0.00 | 0.00 | 0.89 | 0.04 | 0.00 |
| MS-HP-CB02 | 1.00 | 0.05 | 0.00 | 0.00 | 0.05 | 0.00 | 0.00 | 0.90 | 0.04 | 0.00 |
| MS-HP-CB03 | 1.00 | 0.06 | 0.01 | 0.00 | 0.05 | 0.00 | 0.00 | 0.89 | 0.04 | 0.00 |
| MS-HP-CB04 | 1.00 | 0.92 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MS-HP-CB05 | 1.00 | 0.04 | 0.03 | 0.00 | 0.05 | 0.00 | 0.00 | 0.88 | 0.04 | 0.00 |
| MS-HP-CB06 | 1.00 | 0.04 | 0.01 | 0.00 | 0.07 | 0.00 | 0.00 | 0.88 | 0.06 | 0.00 |
| MS-HP-CB07 | 1.00 | 0.04 | 0.01 | 0.00 | 0.07 | 0.00 | 0.00 | 0.88 | 0.05 | 0.00 |
| MS-HP-CB08 | 1.00 | 0.04 | 0.01 | 0.00 | 0.08 | 0.00 | 0.00 | 0.87 | 0.06 | 0.00 |
| MS-HP-CB09 | 1.00 | 0.92 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MS-HP-CB10 | 1.00 | 0.04 | 0.01 | 0.00 | 0.07 | 0.00 | 0.00 | 0.88 | 0.05 | 0.00 |
| MS-HP-CB11 | 1.00 | 0.04 | 0.02 | 0.00 | 0.05 | 0.00 | 0.00 | 0.89 | 0.03 | 0.00 |
| MS-HP-CB12 | 1.00 | 0.95 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MS-HP-LCB1 | 1.00 | 0.04 | 0.00 | 0.00 | 0.03 | 0.00 | 0.00 | 0.92 | 0.02 | 0.00 |
| MS-HP-LCB2 | 1.00 | 0.94 | 0.03 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 | 0.95 | 0.00 |
| MS-HP-LCB3 | 1.00 | 0.04 | 0.00 | 0.00 | 0.04 | 0.00 | 0.00 | 0.92 | 0.02 | 0.00 |
| MS-HP-LCB4 | 1.00 | 0.95 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MS-HP-LCB5 | 1.00 | 0.04 | 0.01 | 0.00 | 0.05 | 0.00 | 0.00 | 0.90 | 0.95 | 0.00 |
| MS-HP-LCB6 | 1.00 | 0.04 | 0.01 | 0.00 | 0.05 | 0.00 | 0.00 | 0.90 | 0.03 | 0.00 |
| MS-HP-RYCB3 | 1.00 | 0.04 | 0.00 | 0.00 | 0.05 | 0.00 | 0.00 | 0.91 | 0.03 | 0.00 |
| MS-HP-RYCB4 | 1.00 | 0.95 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MS-LCB1 | 1.00 | 0.04 | 0.00 | 0.00 | 0.03 | 0.00 | 0.00 | 0.92 | 0.01 | 0.00 |
| MS-LCB2 | 1.00 | 0.95 | 0.01 | 0.00 | 0.00 | 0.00 | 0.04 | 0.00 | 0.00 | 0.00 |
| MS-LCB3 | 1.00 | 0.04 | 0.00 | 0.00 | 0.06 | 0.00 | 0.00 | 0.90 | 0.02 | 0.00 |
| MS-LCB4 | 1.00 | 0.96 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MS-LCB5 | 1.00 | 0.04 | 0.01 | 0.00 | 0.04 | 0.00 | 0.00 | 0.91 | 0.02 | 0.00 |
| MS-RYCB3 | 1.00 | 0.04 | 0.00 | 0.00 | 0.04 | 0.00 | 0.00 | 0.92 | 0.01 | 0.00 |
| MS-RYCB4 | 1.00 | 0.95 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MS-RYCB5 | 1.00 | 0.04 | 0.00 | 0.00 | 0.05 | 0.00 | 0.00 | 0.90 | 0.02 | 0.00 |
| MS-RYCB6 | 1.00 | 0.04 | 0.01 | 0.00 | 0.04 | 0.00 | 0.00 | 0.91 | 0.03 | 0.00 |
| RYCB4-LCB2 | 1.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RYCB5-RYCB6 | 1.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**********
Conduit Surcharge Summary
**********

| Conduit | Hours Full: Both Ends | Hours Full: Upstream | Hours Full: Dnstream | Hours Above Full Normal Flow | Hours Capacity Limited |
|---|---|---|---|---|---|
| Dummy-MH06 | 24.00 | 24.00 | 24.00 | 0.01 | 0.01 |
| LCB1-RYCB3 | 24.00 | 24.00 | 24.00 | 0.01 | 0.01 |
| LCB2-RYCB1 | 24.00 | 24.00 | 24.00 | 0.01 | 0.30 |
| LCB3-RYCB1 | 24.00 | 24.00 | 24.00 | 0.01 | 0.01 |
| LCB4-LCB5 | 24.00 | 24.00 | 24.00 | 0.01 | 0.01 |
| LCB5-RYCB5 | 24.00 | 24.00 | 24.00 | 0.01 | 0.01 |
| MH02-CB02-Dummy | 24.00 | 24.00 | 24.00 | 0.01 | 0.01 |
| MH02-OF2 | 24.00 | 24.00 | 24.00 | 0.01 | 0.01 |
| MH04-MH02 | 24.00 | 24.00 | 24.00 | 0.01 | 0.01 |
| MH06-MH18 | 24.00 | 24.00 | 24.00 | 0.01 | 0.01 |
| MH08-MH06 | 24.00 | 24.00 | 24.00 | 0.01 | 0.01 |
| MH10-MH8 | 24.00 | 24.00 | 24.00 | 0.01 | 0.01 |
| MH12-MH10 | 24.00 | 24.00 | 24.00 | 0.01 | 0.01 |
| MH14-MH4 | 24.00 | 24.00 | 24.00 | 0.01 | 0.01 |
| MH16-MH14 | 24.00 | 24.00 | 24.00 | 0.01 | 0.01 |
| MH18-MH20 | 24.00 | 24.00 | 24.00 | 0.01 | 0.01 |
| MH22-MH14 | 24.00 | 24.00 | 24.00 | 0.01 | 0.01 |
| MH24-MH16 | 24.00 | 24.00 | 24.00 | 0.01 | 0.01 |
| MH26-MH16 | 24.00 | 24.00 | 24.00 | 0.01 | 0.01 |
| MH28-MH26 | 24.00 | 24.00 | 24.00 | 0.01 | 0.01 |
| RYCB4-LCB2 | 24.00 | 24.00 | 24.00 | 0.01 | 0.01 |
| RYCB5-RYCB6 | 24.00 | 24.00 | 24.00 | 0.01 | 0.01 |

Analysis begun on: Fri Jan 29 10:30:54 2021
Analysis ended on: Fri Jan 29 10:30:55 2021

**200 Baribeau Street (119068)**
**PCSWMM Model Schematic**

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## Overall Model Schematic

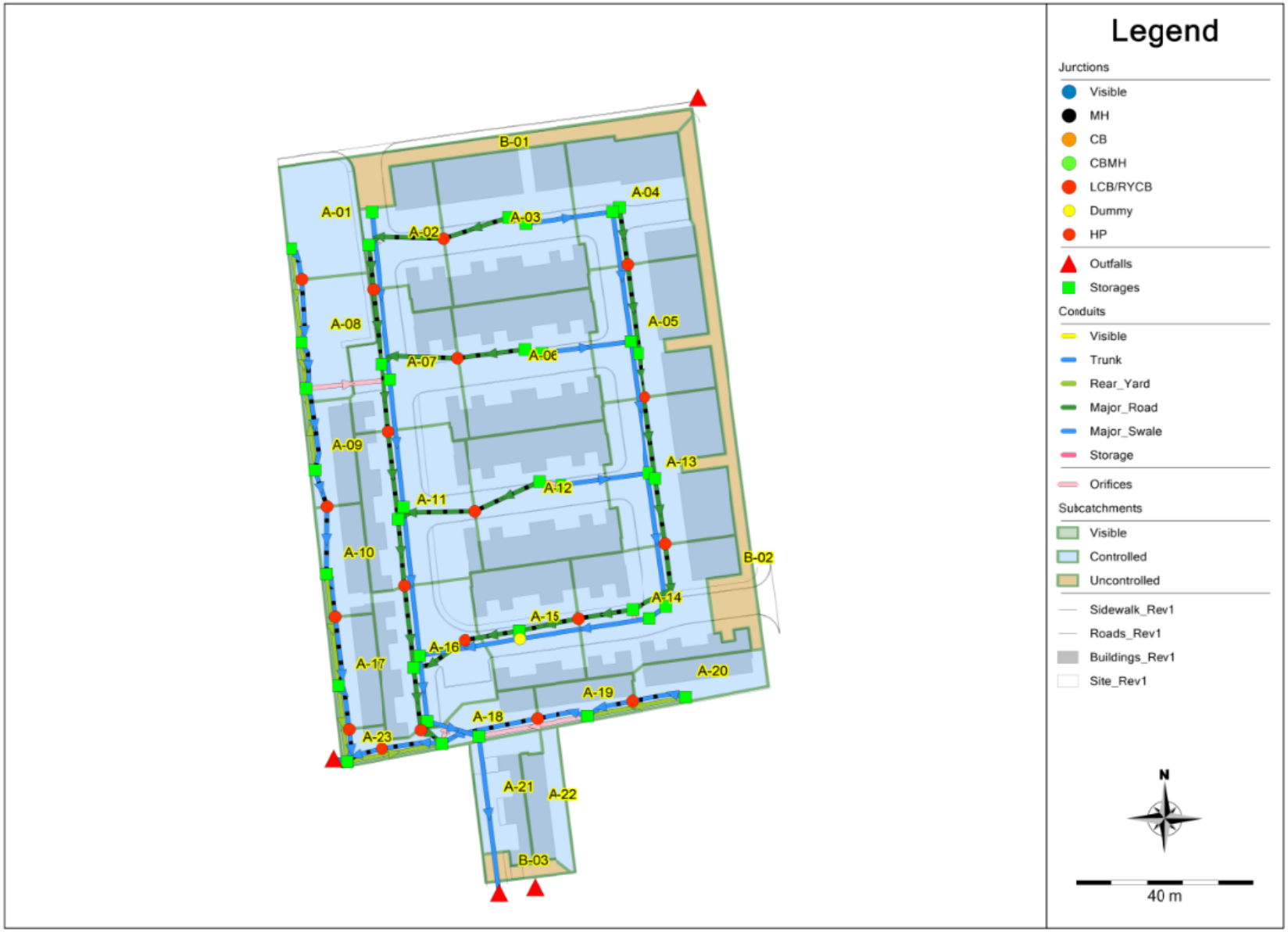



Date: 2020-08-21
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**200 Baribeau Street (119068)**
**PCSWMM Model Schematic**

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## Subcatchment ID's

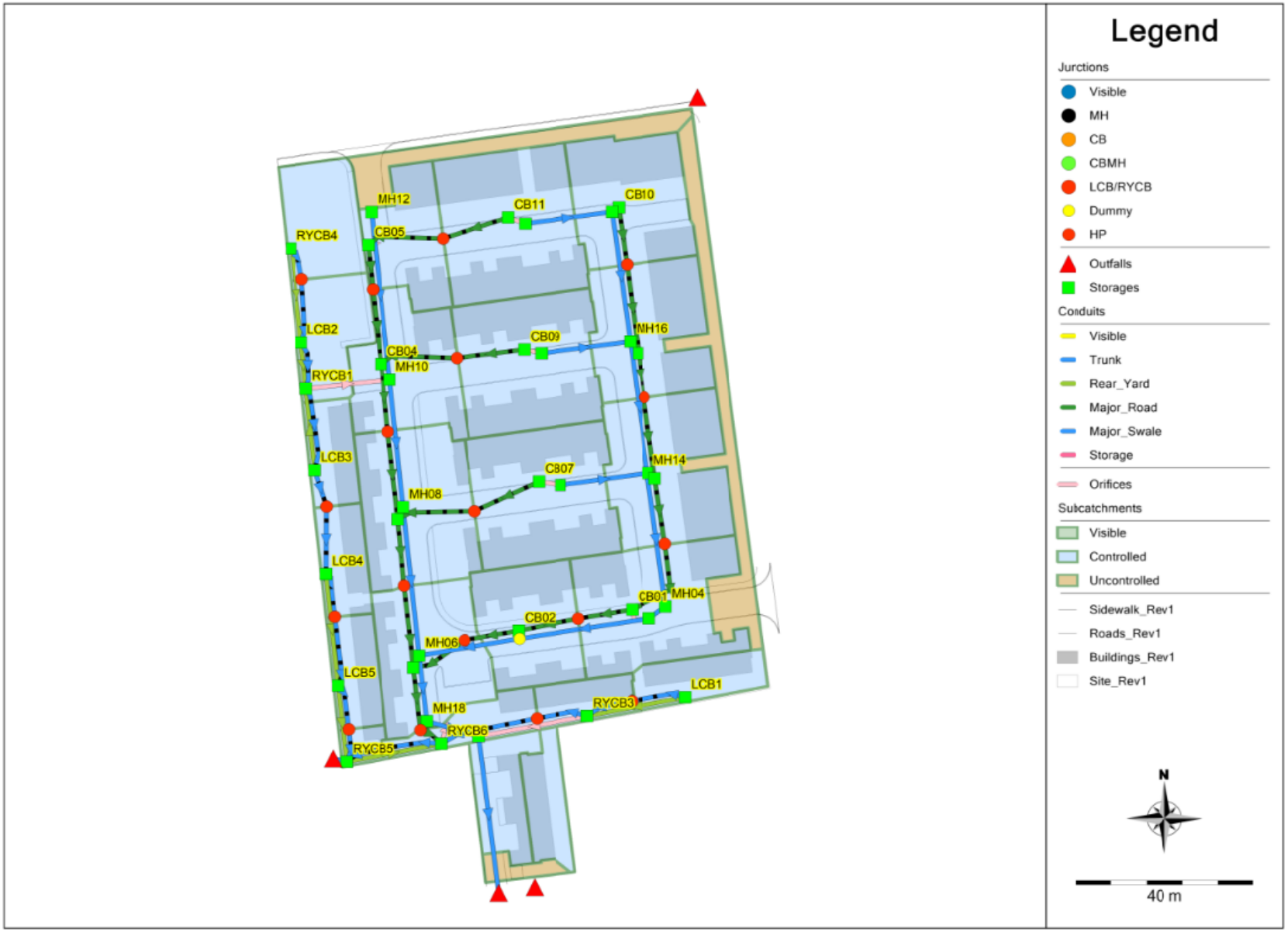



Date: 2020-08-21
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**200 Baribeau Street (119068)**
**PCSWMM Model Schematic**

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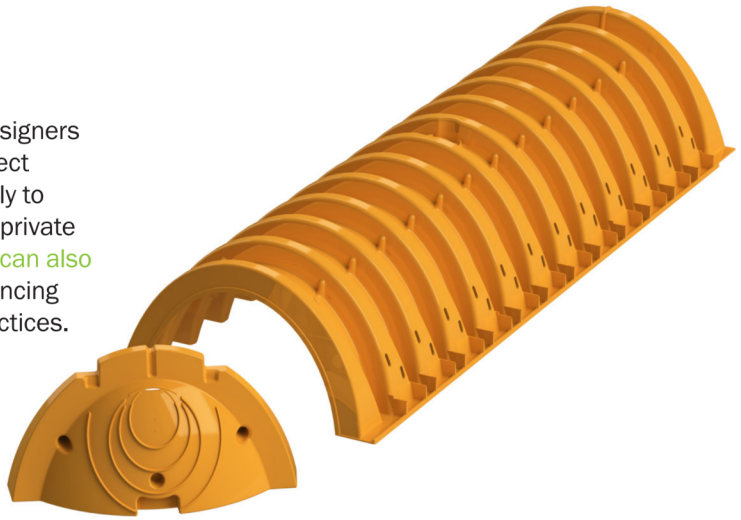
## Node ID's




Date: 2020-08-21
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# SC-310 CHAMBER

Designed to meet the most stringent industry performance standards for superior structural integrity while providing designers with a cost-effective method to save valuable land and protect water resources. The StormTech system is designed primarily to be used under parking lots, thus maximizing land usage for private (commercial) and public applications. StormTech chambers can also be used in conjunction with Green Infrastructure, thus enhancing the performance and extending the service life of these practices.



**STORMTECH SC-310 CHAMBER**
(not to scale)

**Nominal Chamber Specifications**

**Size (L x W x H)**
85.4" x 34.0" x 16.0"
2,170 mm x 864 mm x 406 mm

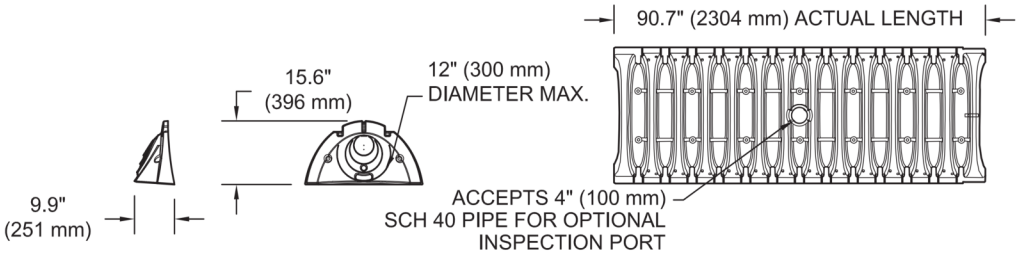
**Chamber Storage**
14.7 ft³ (0.42 m³)

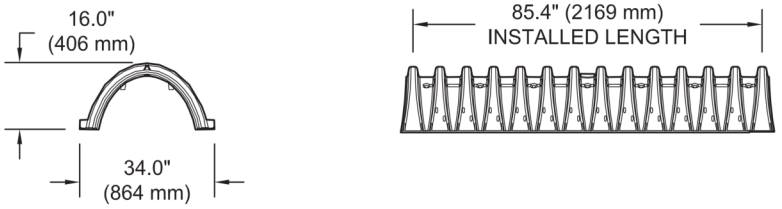
**Min. Installed Storage***
31.0 ft³ (0.88 m³)

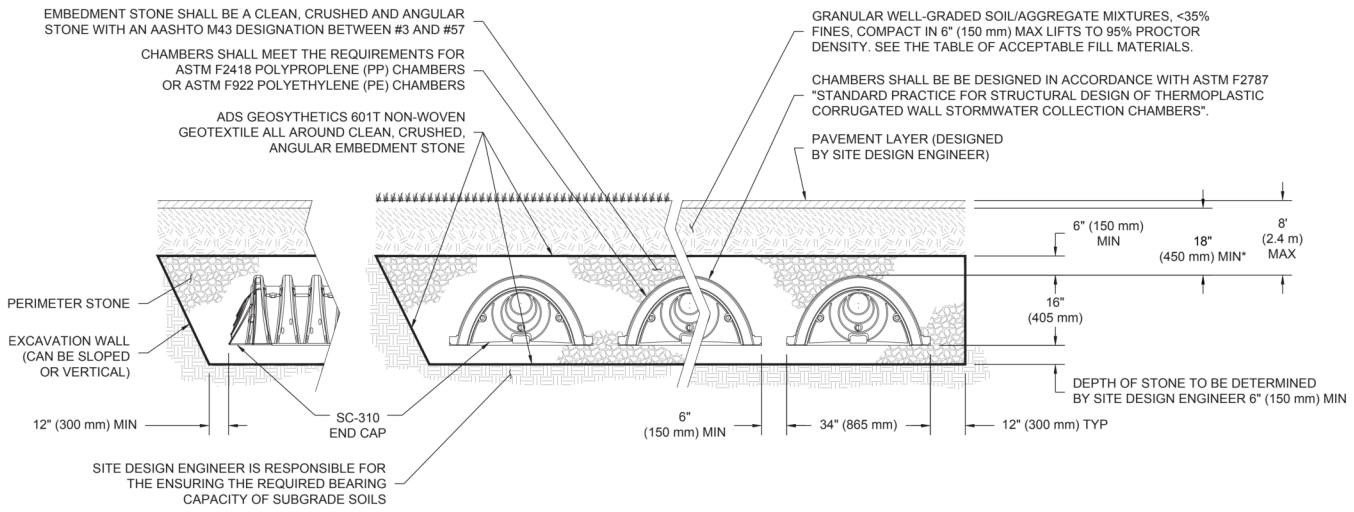
**Weight**
37.0 lbs (16.8 kg)

**Shipping**
41 chambers/pallet
108 end caps/pallet
18 pallets/truck

*Assumes 6" (150 mm) stone above and below chambers and 40% stone porosity.




*MINIMUM COVER TO BOTTOM OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING FROM VEHICLES MAY OCCUR, INCREASE COVER TO 24" (600 mm).

# SC-310 CUMULATIVE STORAGE VOLUMES PER CHAMBER

Assumes 40% Stone Porosity. Calculations are Based Upon a 6" (150 mm) Stone Base Under Chambers.

| Depth of Water in System Inches (mm) | | Cumulative Chamber Storage ft³ (m³) | Total System Cumulative Storage ft³ (m³) |
|---|---|---|---|
| 28 (711) | | 14.70 (0.416) | 31.00 (0.878) |
| 27 (686) | | 14.70 (0.416) | 30.21 (0.855) |
| 26 (680) | Stone | 14.70 (0.416) | 29.42 (0.833) |
| 25 (610) | Cover | 14.70 (0.416) | 28.63 (0.811) |
| 24 (609) | | 14.70 (0.416) | 27.84 (0.788) |
| 23 (584) | | 14.70 (0.416) | 27.05 (0.766) |
| 22 (559) | | 14.70 (0.416) | 26.26 (0.748) |
| 21 (533) | | 14.64 (0.415) | 25.43 (0.720) |
| 20 (508) | | 14.49 (0.410) | 24.54 (0.695) |
| 19 (483) | | 14.22 (0.403) | 23.58 (0.668) |
| 18 (457) | | 13.68 (0.387) | 22.47 (0.636) |
| 17 (432) | | 12.99 (0.368) | 21.25 (0.602) |
| 16 (406) | | 12.17 (0.345) | 19.97 (0.566) |
| 15 (381) | | 11.25 (0.319) | 18.62 (0.528) |
| 14 (356) | | 10.23 (0.290) | 17.22 (0.488) |
| 13 (330) | | 9.15 (0.260) | 15.78 (0.447) |
| 12 (305) | | 7.99 (0.227) | 14.29 (0.425) |
| 11 (279) | | 6.78 (0.192) | 12.77 (0.362) |
| 10 (254) | | 5.51 (0.156) | 11.22 (0.318) |
| 9 (229) | | 4.19 (0.119) | 9.64 (0.278) |
| 8 (203) | | 2.83 (0.081) | 8.03 (0.227) |
| 7 (178) | | 1.43 (0.041) | 6.40 (0.181) |
| 6 (152) | | 0 | 4.74 (0.134) |
| 5 (127) | | 0 | 3.95 (0.112) |
| 4(102) | Stone Foundation | 0 | 3.16 (0.090) |
| 3 (76) | | 0 | 2.37 (0.067) |
| 2 (51) | | 0 | 1.58 (0.046) |
| 1 (25) | | 0 | 0.79 (0.022) |

**Note:** Add 0.79 ft³ (0.022 m³) of storage for each additional inch. (25 mm) of stone foundation.

## STORAGE VOLUME PER CHAMBER FT³ (M³)

| | Bare Chamber Storage ft³ (m³) | Chamber and Stone Foundation Depth in. (mm) | | |
|---|---|---|---|---|
| | | 6 (150) | 12 (300) | 18 (450) |
| StormTech SC-310 | 14.7 (0.4) | 31.0 (0.9) | 35.7 (1.0) | 40.4 (1.1) |

**Note:** Assumes 6" (150 mm) of stone above chambers, 6" (150 mm) row spacing and 40% stone porosity.

## AMOUNT OF STONE PER CHAMBER

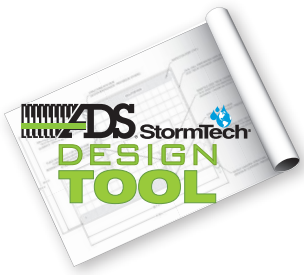
| ENGLISH TONS (yds³) | Stone Foundation Depth | | |
|---|---|---|---|
| | 6" | 12" | 18" |
| StormTech SC-310 | 2.1 (1.5 yd³) | 2.7 (1.9 yd³) | 3.4 (2.4 yd³) |
| **METRIC KILOGRAMS (m³)** | **150 mm** | **300 mm** | **450 mm** |
| StormTech SC-310 | 1830 (1.1 m³) | 2490 (1.5 m³) | 2990 (1.8 m³) |

**Note:** Assumes 6" (150 mm) of stone above, and between chambers.

## VOLUME EXCAVATION PER CHAMBER YD³ (M³)

| | Stone Foundation Depth | | |
|---|---|---|---|
| | 6" (150 mm) | 12" (300 mm) | 18" (450 mm) |
| StormTech SC-310 | 2.9 (2.2) | 3.4 (2.6) | 3.8 (2.9) |

**Note:** Assumes 6" (150 mm) of row separation and 18" (450 mm) of cover. The volume of excavation will vary as the depth of the cover increases.




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**and utilize the StormTech Design Tool**

**For more information on the StormTech SC-310 Chamber and other ADS products, please contact our Customer Service Representatives at 1-800-821-6710**

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## User Inputs

| | |
|---|---|
| **Chamber Model:** | SC-310 |
| **Outlet Control Structure:** | Yes |
| **Project Name:** | 200 Baribeau - 16 Chambers |
| **Engineer:** | Lucas Wilson |
| **Project Location:** | |
| **Measurement Type:** | Metric |
| **Required Storage Volume:** | 21.00 cubic meters. |
| **Stone Porosity:** | 40% |
| **Stone Foundation Depth:** | 152 mm. |
| **Stone Above Chambers:** | 230 mm. |
| **Average Cover Over Chambers:** | 457 mm. |
| **Design Constraint Dimensions:** | (3.00 m. x 20.00 m.) |

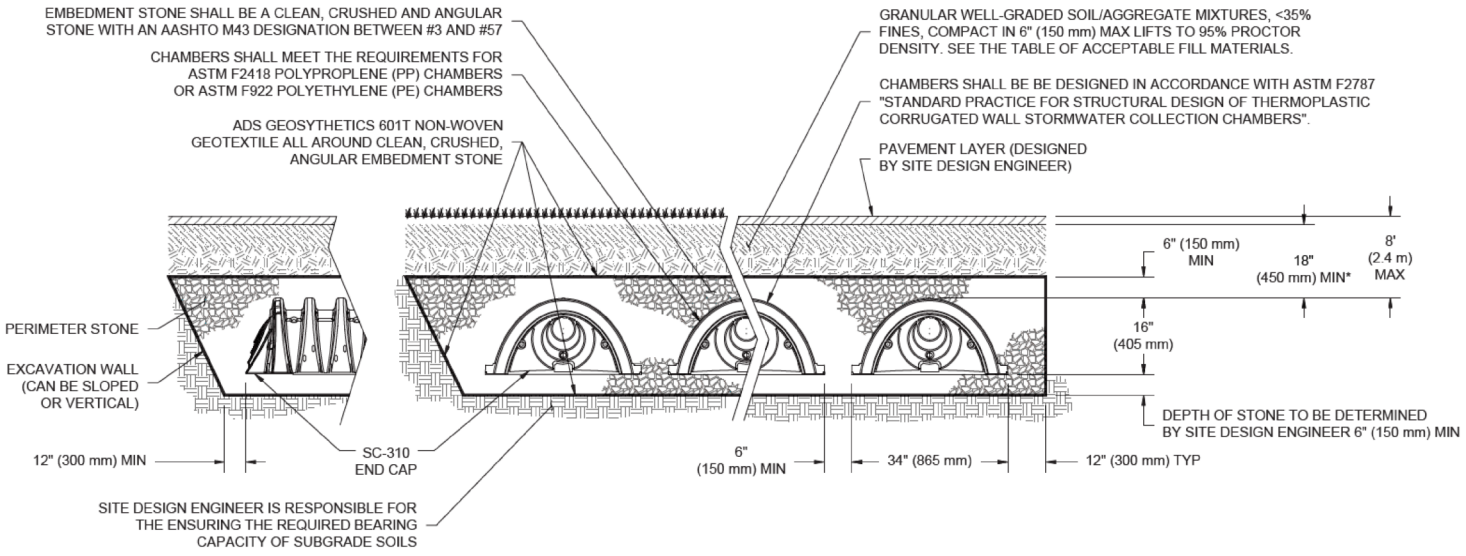
## Results

### System Volume and Bed Size

| | |
|---|---|
| **Installed Storage Volume:** | 21.75 cubic meters. |
| **Storage Volume Per Chamber:** | 0.42 cubic meters. |
| **Number Of Chambers Required:** | 16 |
| **Number Of End Caps Required:** | 4 |
| **Chamber Rows:** | 2 |
| **Maximum Length:** | 19.53 m. |
| **Maximum Width:** | 2.88 m. |
| **Approx. Bed Size Required:** | 56.26 square meters. |

### System Components

| | |
|---|---|
| **Amount Of Stone Required:** | 37.72 cubic meters |
| **Volume Of Excavation (Not Including Fill):** | 44.38 cubic meters |




*MINIMUM COVER TO BOTTOM OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING FROM VEHICLES MAY OCCUR, INCREASE COVER TO 24" (600 mm).

## User Inputs

| | |
|---|---|
| **Chamber Model:** | SC-310 |
| **Outlet Control Structure:** | Yes |
| **Project Name:** | 200 Baribeau - 20 Chambers |
| **Engineer:** | Lucas Wilson |
| **Project Location:** | |
| **Measurement Type:** | Metric |
| **Required Storage Volume:** | 25.00 cubic meters. |
| **Stone Porosity:** | 40% |
| **Stone Foundation Depth:** | 152 mm. |
| **Stone Above Chambers:** | 230 mm. |
| **Average Cover Over Chambers:** | 457 mm. |
| **Design Constraint Dimensions:** | (20.00 m. x 7.00 m.) |

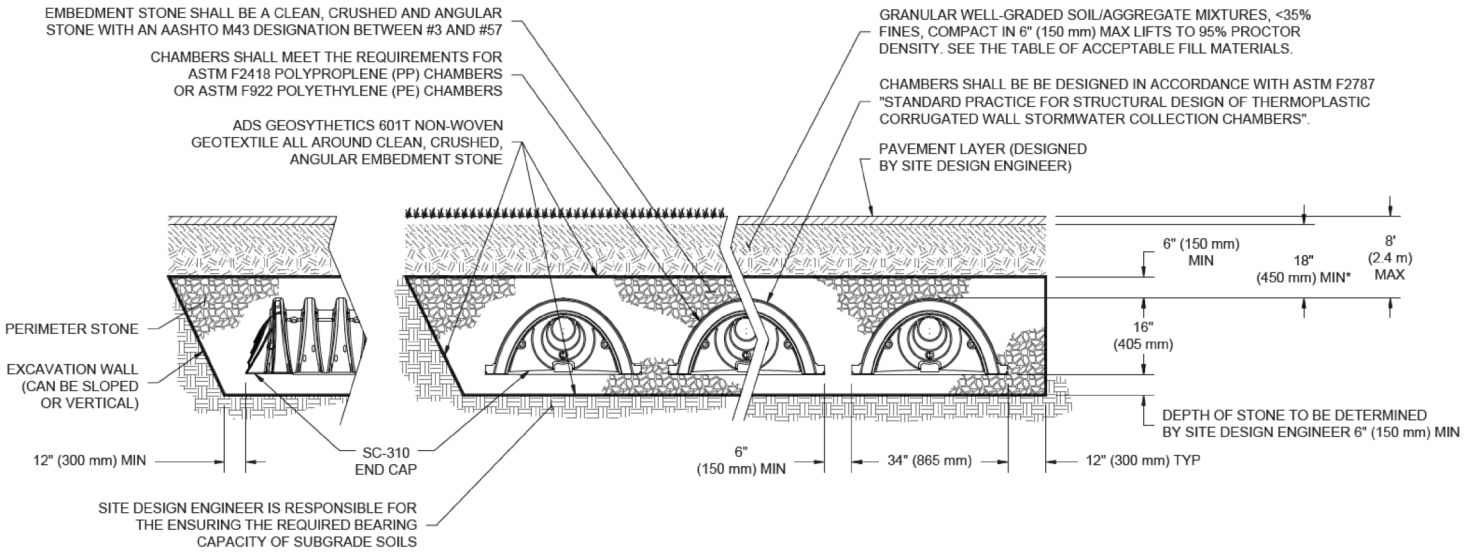
## Results

### System Volume and Bed Size

| | |
|---|---|
| **Installed Storage Volume:** | 26.44 cubic meters. |
| **Storage Volume Per Chamber:** | 0.42 cubic meters. |
| **Number Of Chambers Required:** | 20 |
| **Number Of End Caps Required:** | 20 |
| **Chamber Rows:** | 10 |
| **Maximum Length:** | 6.52 m. |
| **Maximum Width:** | 11.01 m. |
| **Approx. Bed Size Required:** | 67.96 square meters. |

### System Components

| | |
|---|---|
| **Amount Of Stone Required:** | 45.29 cubic meters |
| **Volume Of Excavation (Not Including Fill):** | 53.62 cubic meters |




*MINIMUM COVER TO BOTTOM OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING FROM VEHICLES MAY OCCUR, INCREASE COVER TO 24" (600 mm).

| PROJECT INFORMATION | |
|---|---|
| ENGINEERED PRODUCT MANAGER | |
| ADS SALES REP | |
| PROJECT NO. | |

ADS Canada

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# 200 BARIBEAU
## OTTAWA, ONTARIO

## SC-310 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH SC-310.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE OR POLYETHYLENE COPOLYMERS.
3. CHAMBERS SHALL BE CERTIFIED TO CSA B184, "POLYMERIC SUB-SURFACE STORMWATER MANAGEMENT STRUCTURES", AND MEET THE REQUIREMENTS OF ASTM F2922 (POLETHYLENE) OR ASTM F2418-16a (POLYPROPYLENE), "STANDARD SPECIFICATION FOR CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
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 50 mm (2").
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2922 SHALL BE GREATER THAN OR EQUAL TO 400 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 F2922 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 THE SC-310 SYSTEM

1. STORMTECH SC-310 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH SC-310 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN 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 - 150 mm (6") SPACING BETWEEN THE CHAMBER ROWS.
7. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE 20-50 mm (3/4-2").
8. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
9. 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 SC-310 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
2. THE USE OF CONSTRUCTION EQUIPMENT OVER SC-310 & SC-740 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADERS, DUMP TRUCKS, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH SC-310/SC-740/DC-780 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 THE CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY 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

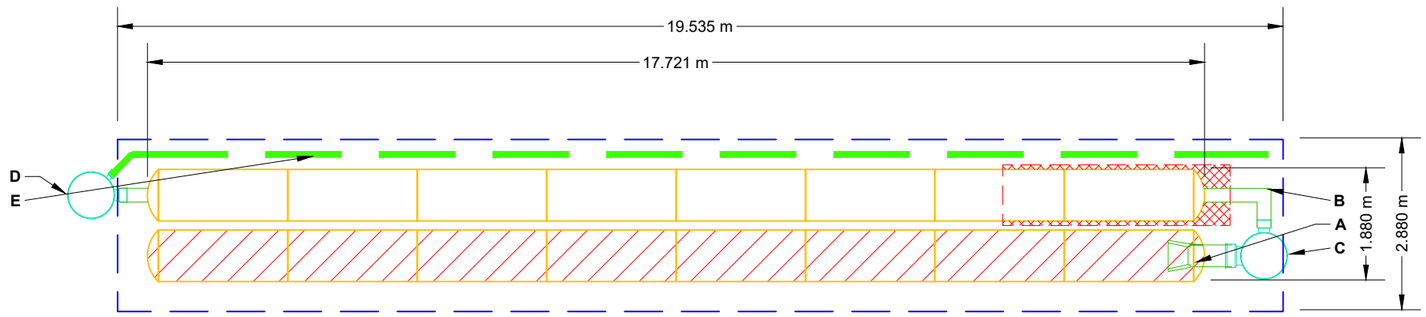
| | |
|---|---|
| 16 | STORMTECH SC-310 CHAMBERS |
| 4 | STORMTECH SC-310 END CAPS |
| 230 | STONE ABOVE (mm) |
| 152 | STONE BELOW (mm) |
| 40 | STONE VOID |
| 21.7 | INSTALLED SYSTEM VOLUME ($m^3$) (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED) |
| 56.3 | SYSTEM AREA ($m^2$) |
| 44.8 | SYSTEM PERIMETER (m) |

## CONCEPTUAL ELEVATIONS

| | |
|---|---|
| MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED): | 2.997 |
| MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC): | 1.168 |
| MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC): | 1.016 |
| MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT): | 1.016 |
| MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT): | 1.016 |
| TOP OF STONE: | 0.789 |
| TOP OF SC-310 CHAMBER: | 0.559 |
| 200 mm x 200 mm TOP MANIFOLD INVERT: | 0.241 |
| 300 mm ISOLATOR ROW PLUS INVERT: | 0.175 |
| 200 mm BOTTOM CONNECTION INVERT: | 0.168 |
| BOTTOM OF SC-310 CHAMBER: | 0.152 |
| 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 | 300 mm BOTTOM PREFABRICATED END CAP, PART#: SC310EPE12BR / TYP OF ALL 300 mm ISOLATOR ROW PLUS CONNECTIONS | 23 mm | |
| MANIFOLD | B | 200 mm x 200 mm TOP MANIFOLD, MOLDED FITTINGS | 89 mm | |
| NYLOPLAST (INLET W/ ISO PLUS ROW) | C | 750 mm DIAMETER (610 mm SUMP MIN) | | 25 L/s IN |
| NYLOPLAST (OUTLET) | D | 750 mm DIAMETER (DESIGN BY ENGINEER) | | 20 L/s OUT |
| UNDERDRAIN | E | 100 mm ADS N-12 DUAL WALL PERFORATED HDPE UNDERDRAIN | | |




ISOLATOR ROW PLUS
(SEE DETAIL)

PLACE MINIMUM 3.810 m OF ADSPLUS125 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.
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200 BARIBEAU - 16 CHAMBERS
OTTAWA, ONTARIO

DRAWN: LW
CHECKED: N/A
DATE:
PROJECT #:

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


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## PROPOSED LAYOUT

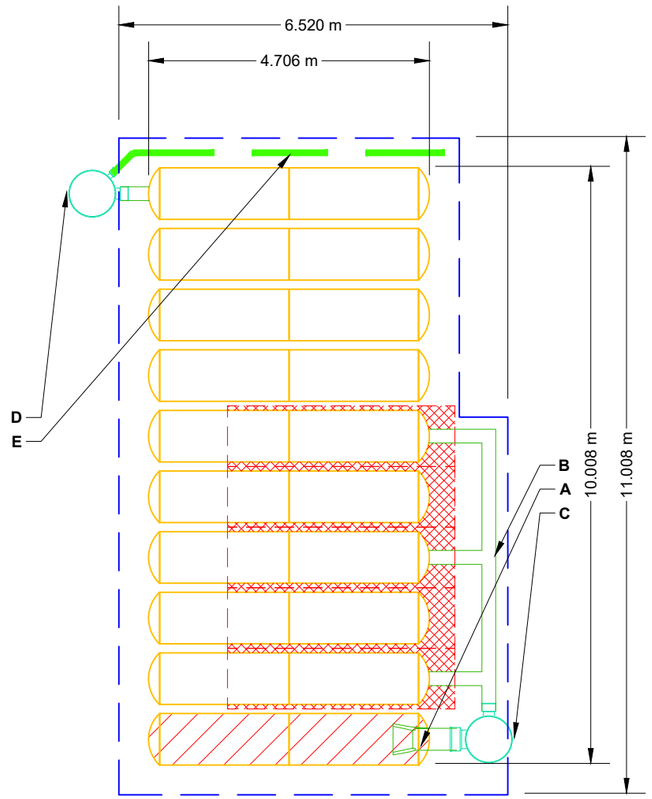
| | | |
|---|---|---|
| 20 | STORMTECH SC-310 CHAMBERS | |
| 20 | STORMTECH SC-310 END CAPS | |
| 230 | STONE ABOVE (mm) | |
| 152 | STONE BELOW (mm) | |
| 40 | STONE VOID | |
| 26.4 | INSTALLED SYSTEM VOLUME ($m^3$) (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED) | |
| 68.0 | SYSTEM AREA ($m^2$) | |
| 35.1 | SYSTEM PERIMETER (m) | |

## CONCEPTUAL ELEVATIONS

| | |
|---|---|
| MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED): | 2.997 |
| MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC): | 1.168 |
| MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC): | 1.016 |
| MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT): | 1.016 |
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| 200 mm BOTTOM CONNECTION INVERT: | 0.168 |
| BOTTOM OF SC-310 CHAMBER: | 0.152 |
| UNDERDRAIN INVERT: | 0.000 |
| BOTTOM OF STONE: | 0.000 |

*INVERT ABOVE BASE OF CHAMBER

| PART TYPE | ITEM ON LAYOUT | DESCRIPTION | INVERT* | MAX FLOW |
|---|---|---|---|---|
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| NYLOPLAST (OUTLET) | D | 750 mm DIAMETER (DESIGN BY ENGINEER) | | 20 L/s OUT |
| UNDERDRAIN | E | 100 mm ADS N-12 DUAL WALL PERFORATED HDPE UNDERDRAIN | | |




ISOLATOR ROW PLUS
(SEE DETAIL)

PLACE MINIMUM 3.810 m OF ADSPLUS125 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.

200 BARIBEAU - 20 CHAMBERS
OTTAWA, ONTARIO

DATE: 12/7/2020 | DRAWN: LW | CHECKED: N/A | PROJECT #:

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


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SCALE = 1 : 100

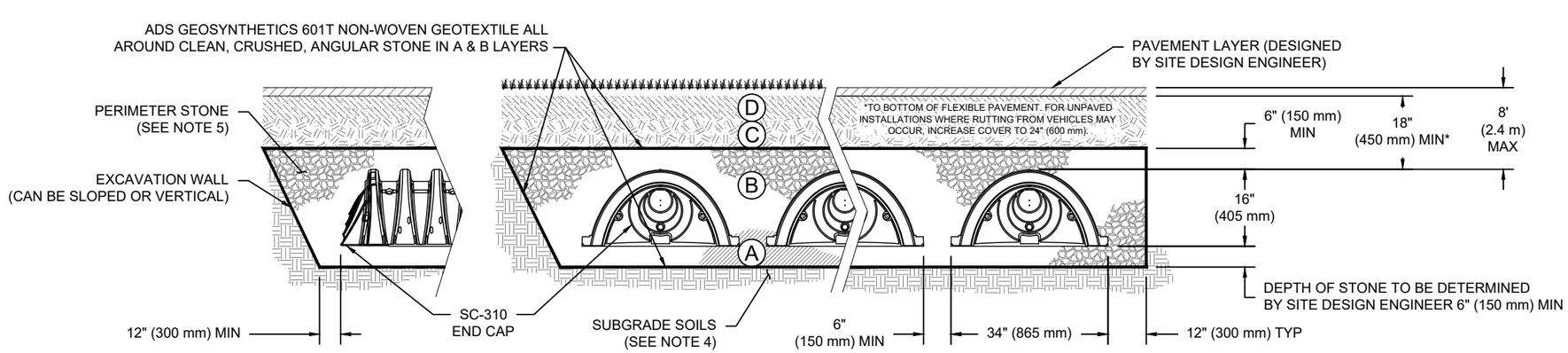
SHEET
2 OF 6


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# ACCEPTABLE FILL MATERIALS: STORMTECH SC-310 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 18" (450 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 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN). |
| 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, 357, 4, 467, 5, 56, 57 | 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, 357, 4, 467, 5, 56, 57 | 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 6" (150 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 F2922 (POLETHYLENE) OR ASTM F2418-16a (POLYPROPYLENE), "STANDARD SPECIFICATION FOR CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-310 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 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2922 SHALL BE GREATER THAN OR EQUAL TO 400 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.

200 BARIBEAU - 16 CHAMBERS
OTTAWA, ONTARIO
DRAWN: LW
CHECKED: N/A
DATE:
PROJECT #:

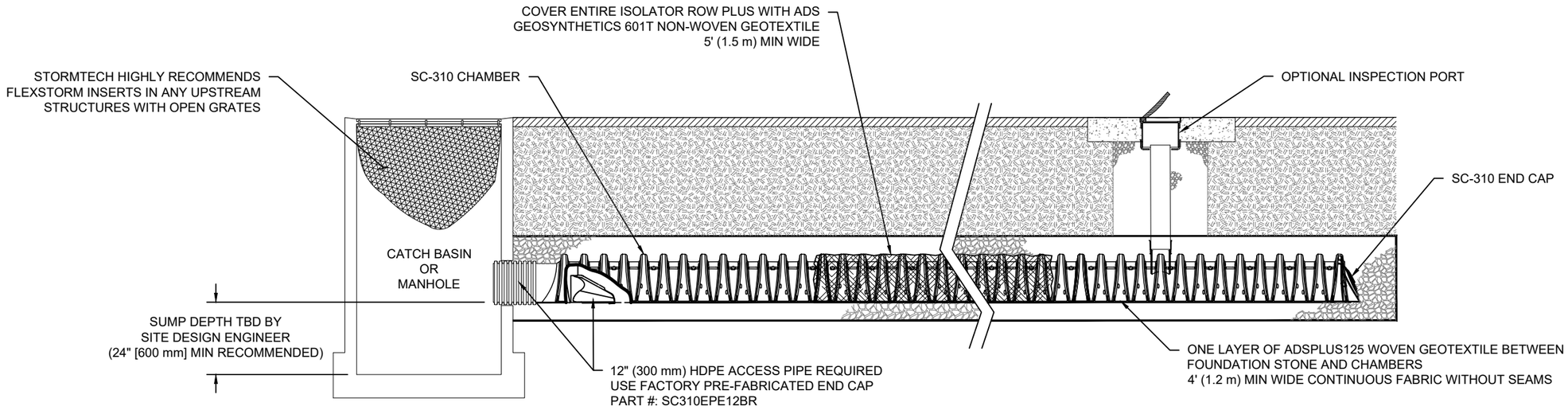
| REV | DRW | CHK | DESCRIPTION |
|---|---|---|---|


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**SC-310 ISOLATOR ROW PLUS DETAIL**
NTS

## INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS 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 PLUS 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 PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS 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 PLUS 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.

200 BARIBEAU - 16 CHAMBERS
OTTAWA, ONTARIO
DATE:
DRAWN: LW
PROJECT #:
CHECKED: N/A

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

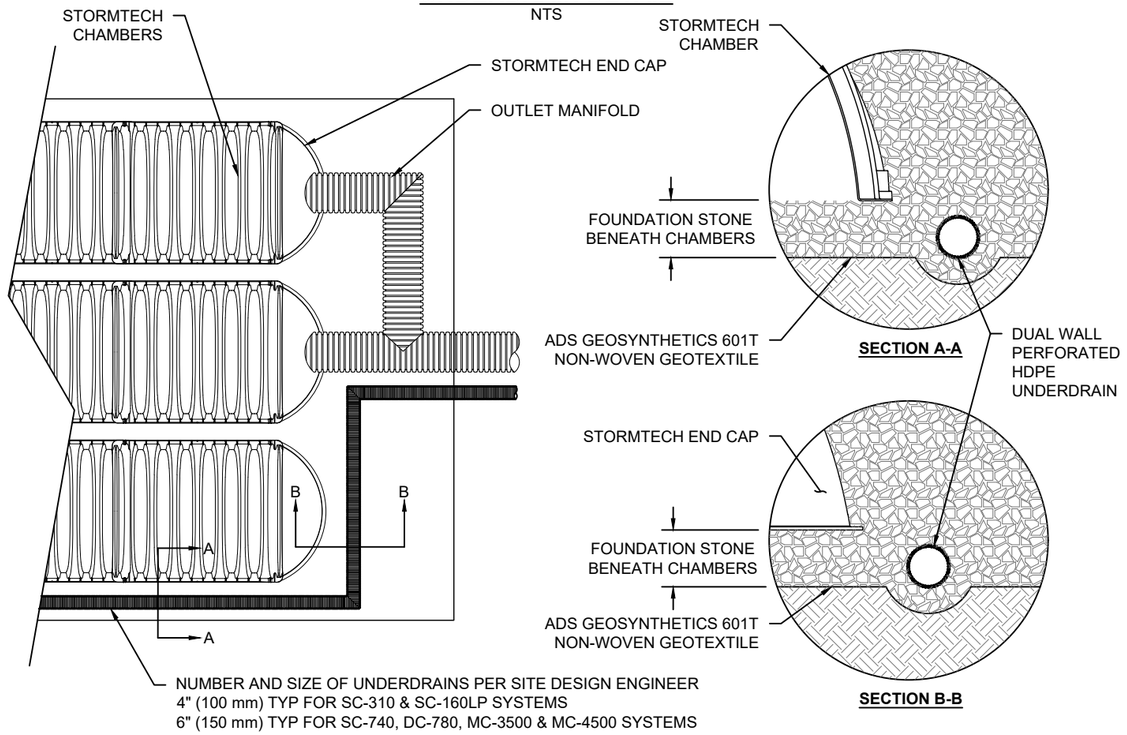
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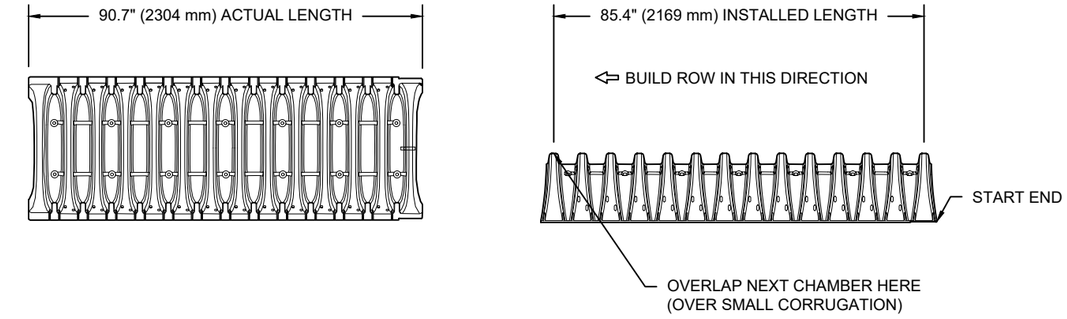
## UNDERDRAIN DETAIL

NTS




## SC-310 TECHNICAL SPECIFICATION

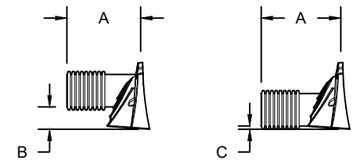
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**NOMINAL CHAMBER SPECIFICATIONS**

| | | |
|---|---|---|
| SIZE (W X H X INSTALLED LENGTH) | 34.0" X 16.0" X 85.4" | (864 mm X 406 mm X 2169 mm) |
| CHAMBER STORAGE | 14.7 CUBIC FEET | (0.42 m³) |
| MINIMUM INSTALLED STORAGE* | 31.0 CUBIC FEET | (0.88 m³) |
| WEIGHT | 35.0 lbs. | (16.8 kg) |

*ASSUMES 6" (152 mm) ABOVE, BELOW, AND BETWEEN CHAMBERS




PRE-FAB STUB AT BOTTOM OF END CAP WITH FLAMP END WITH "BR"
PRE-FAB STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PRE-FAB STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
PRE CORED END CAPS END WITH "PC"

| PART # | STUB | A | B | C |
|---|---|---|---|---|
| SC310EPE06T / SC310EPE06TPC | 6" (150 mm) | 9.6" (244 mm) | 5.8" (147 mm) | --- |
| SC310EPE06B / SC310EPE06BPC | | | --- | 0.5" (13 mm) |
| SC310EPE08T / SC310EPE08TPC | 8" (200 mm) | 11.9" (302 mm) | 3.5" (89 mm) | --- |
| SC310EPE08B / SC310EPE08BPC | | | --- | 0.6" (15 mm) |
| SC310EPE10T / SC310EPE10TPC | 10" (250 mm) | 12.7" (323 mm) | 1.4" (36 mm) | --- |
| SC310EPE10B / SC310EPE10BPC | | | --- | 0.7" (18 mm) |
| SC310EPE12B | 12" (300 mm) | 13.5" (343 mm) | --- | 0.9" (23 mm) |
| SC310EPE12BR | 12" (300 mm) | 13.5" (343 mm) | --- | 0.9" (23 mm) |

ALL STUBS, EXCEPT FOR THE SC310EPE12B ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

* FOR THE SC310EPE12B THE 12" (300 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 0.25" (6 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

NOTE: ALL DIMENSIONS ARE NOMINAL

200 BARIBEAU - 16 CHAMBERS
OTTAWA, ONTARIO

DATE:
DRAWN: LW
PROJECT #:
CHECKED: N/A

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

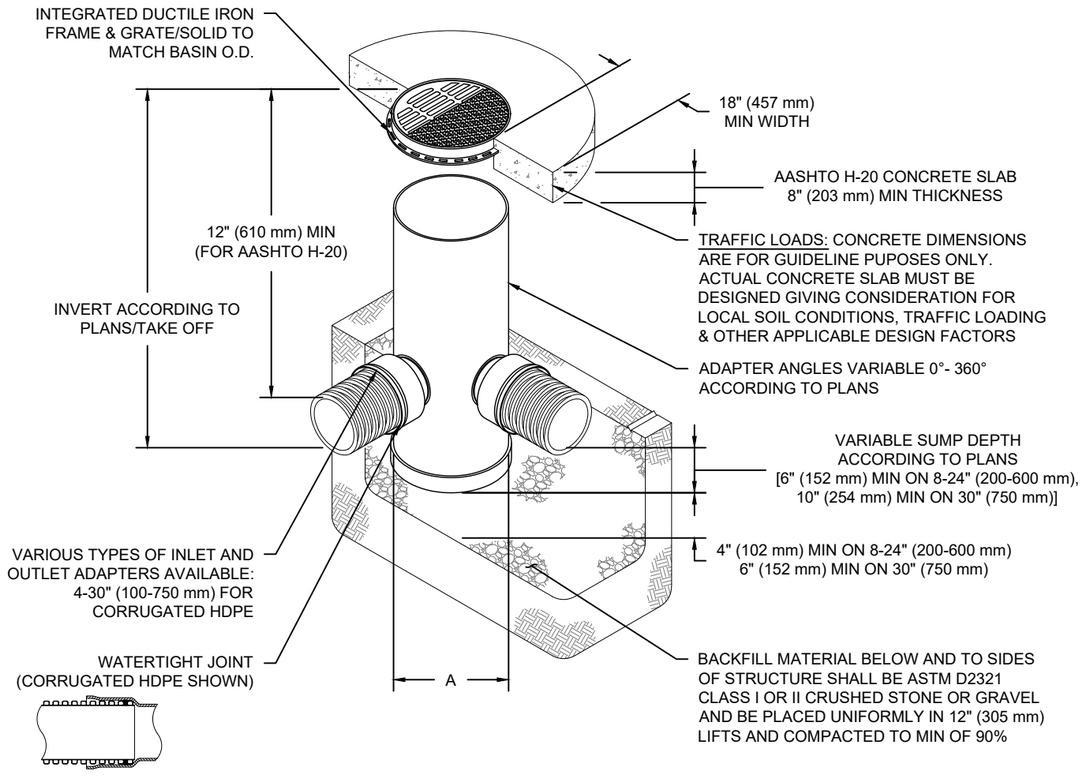
ADS Canada
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473



THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER 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.

# NYLOPLAST DRAIN BASIN

NTS




## NOTES

1. 8-30" (200-750 mm) GRATES/SOLID COVERS SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
2. 12-30" (300-750 mm) FRAMES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
3. DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS
4. DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS & HANCOR DUAL WALL) & SDR 35 PVC
5. FOR COMPLETE DESIGN AND PRODUCT INFORMATION: **WWW.NYLOPLAST-US.COM**
6. TO ORDER CALL: **800-821-6710**

| A | PART # | GRATE/SOLID COVER OPTIONS | | |
|---|---|---|---|---|
| 8" (200 mm) | 2808AG | PEDESTRIAN LIGHT DUTY | STANDARD LIGHT DUTY | SOLID LIGHT DUTY |
| 10" (250 mm) | 2810AG | PEDESTRIAN LIGHT DUTY | STANDARD LIGHT DUTY | SOLID LIGHT DUTY |
| 12" (300 mm) | 2812AG | PEDESTRIAN AASHTO H-10 | STANDARD AASHTO H-20 | SOLID AASHTO H-20 |
| 15" (375 mm) | 2815AG | PEDESTRIAN AASHTO H-10 | STANDARD AASHTO H-20 | SOLID AASHTO H-20 |
| 18" (450 mm) | 2818AG | PEDESTRIAN AASHTO H-10 | STANDARD AASHTO H-20 | SOLID AASHTO H-20 |
| 24" (600 mm) | 2824AG | PEDESTRIAN AASHTO H-10 | STANDARD AASHTO H-20 | SOLID AASHTO H-20 |
| 30" (750 mm) | 2830AG | PEDESTRIAN AASHTO H-20 | STANDARD AASHTO H-20 | SOLID AASHTO H-20 |

200 BARIBEAU - 16 CHAMBERS
OTTAWA, ONTARIO

DATE:
DRAWN: LW
PROJECT #:
CHECKED: N/A

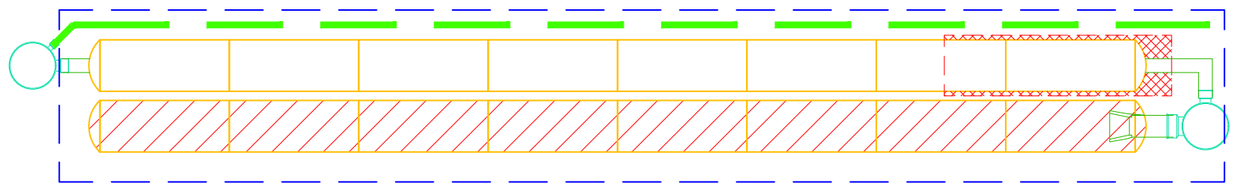
| REV | DRW | CHK | DESCRIPTION |
|---|---|---|---|
| | | | |

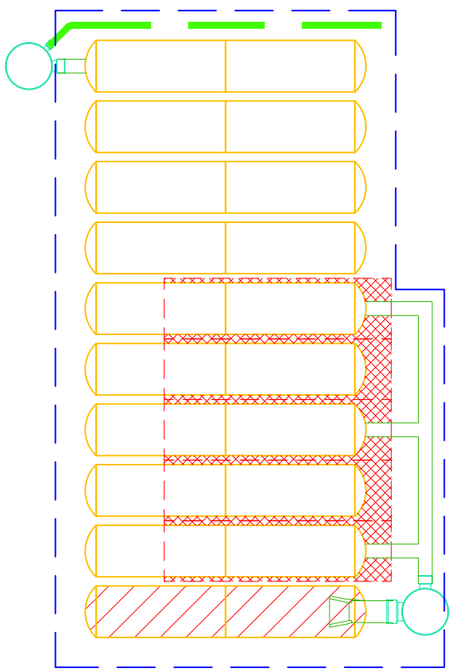

3130 VERONA AVE
BUFORD, GA 30518
PHN (770) 932-2443
FAX (770) 932-2490
www.nyloplast-us.com

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HILLIARD, OH 43026
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# TEMPEST Product Submittal Package R1




**Date: February 2, 2021**

**Customer: Novatech**

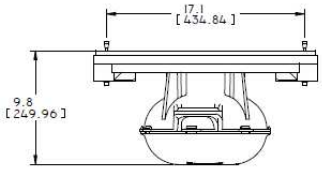
**Contact: Lucas Wilson**

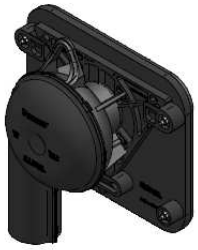
**Location: Ottawa**

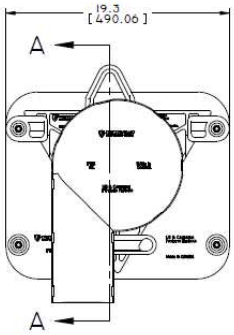
**Project Name: 200 Baribeau St**

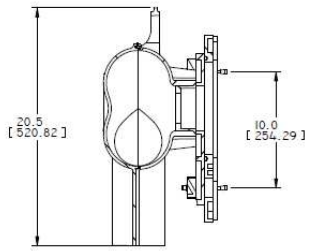
IPEX

# Tempest LMF ICD Sq Shop Drawing

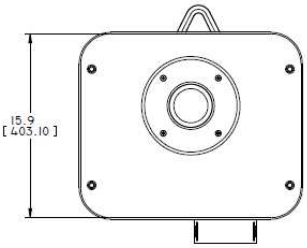





SECTION A-A



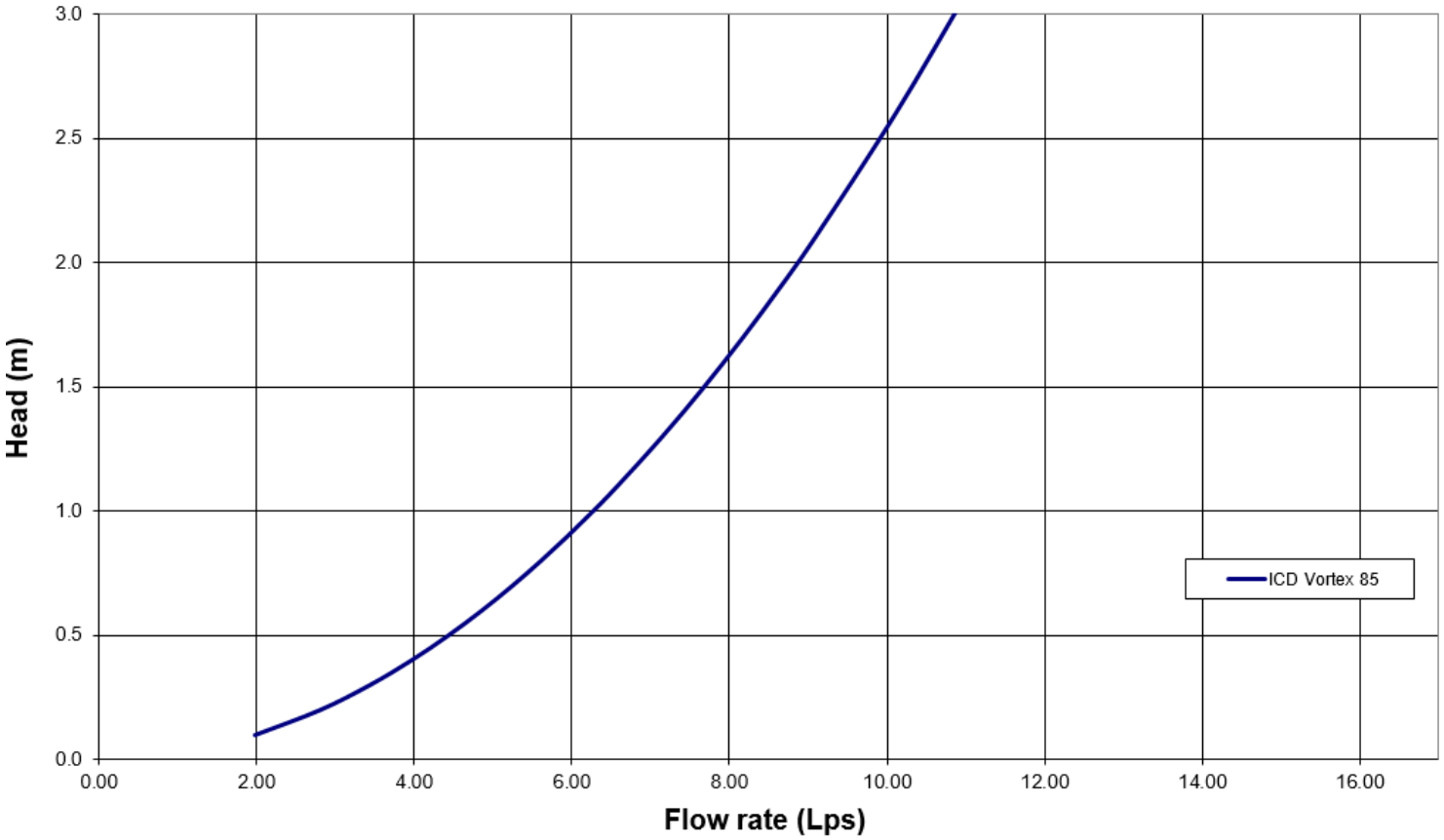



| | | | | | |
|---|---|---|---|---|---|
| TOLERANCES: | IPEX TECHNOLOGIES INC. | | | | |
| | PROJECTION | UNITS | TITLE | LMF SQUARE CB ASSEMBLY | |
| | | in (mm) | | | |
| | DRAWN BY | DATE | SIZE | SCALE(S) | SHEET |
| | H. M-MARTIN | 2011-07-27 | B | 1/8 | 1 OF 1 |
| | VERIFIED BY | DATE | DRAWING NUMBER | | REV |
| | | 2011-07-27 | SQM74_FA001R03 | | 3 |

IPEX

## Tempest LMF ICD Flow Curve

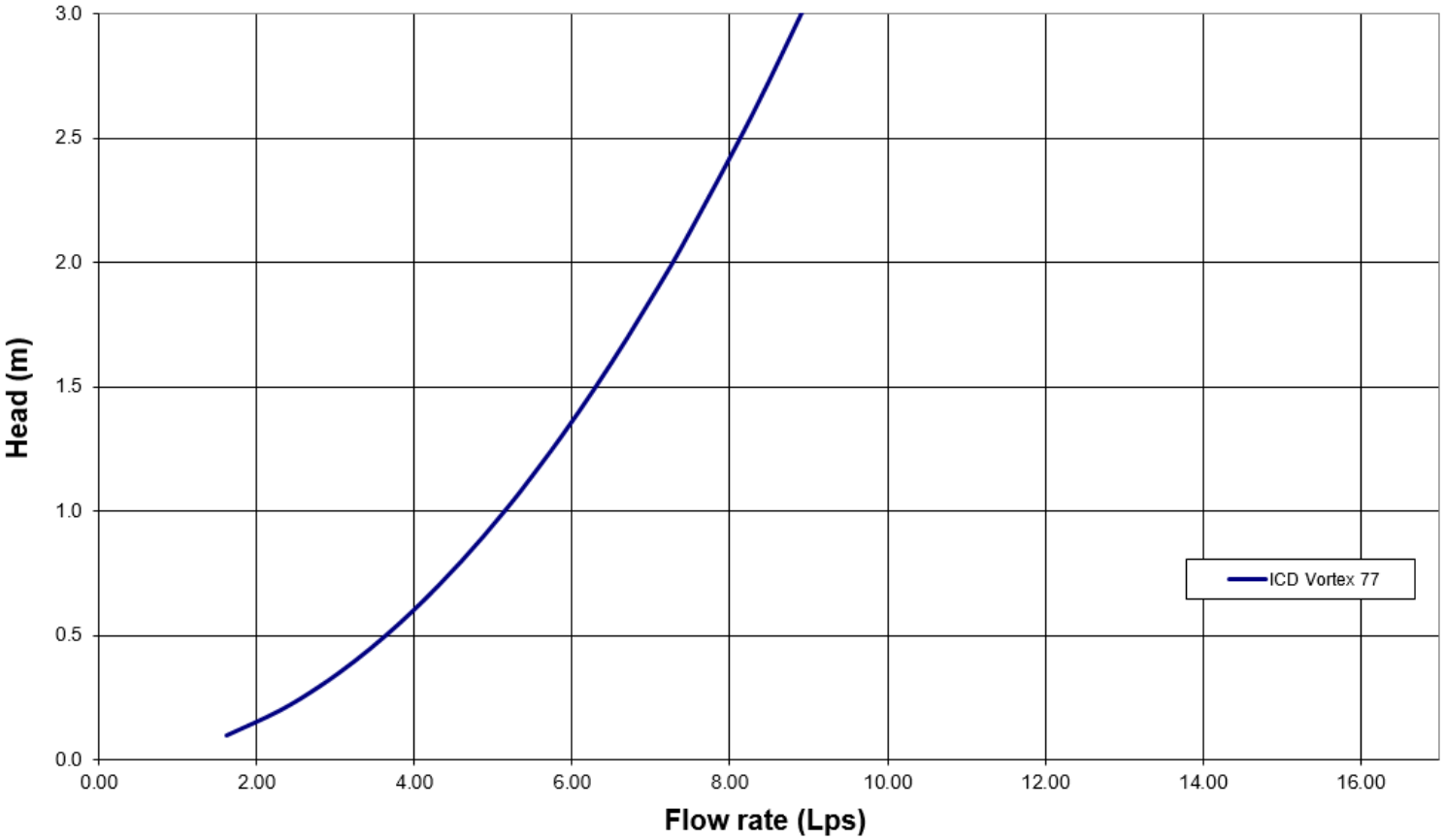
**Flow: 8 L/s**
**Head: 1.61 m**
**CB**




IPEX

## Tempest LMF ICD Flow Curve

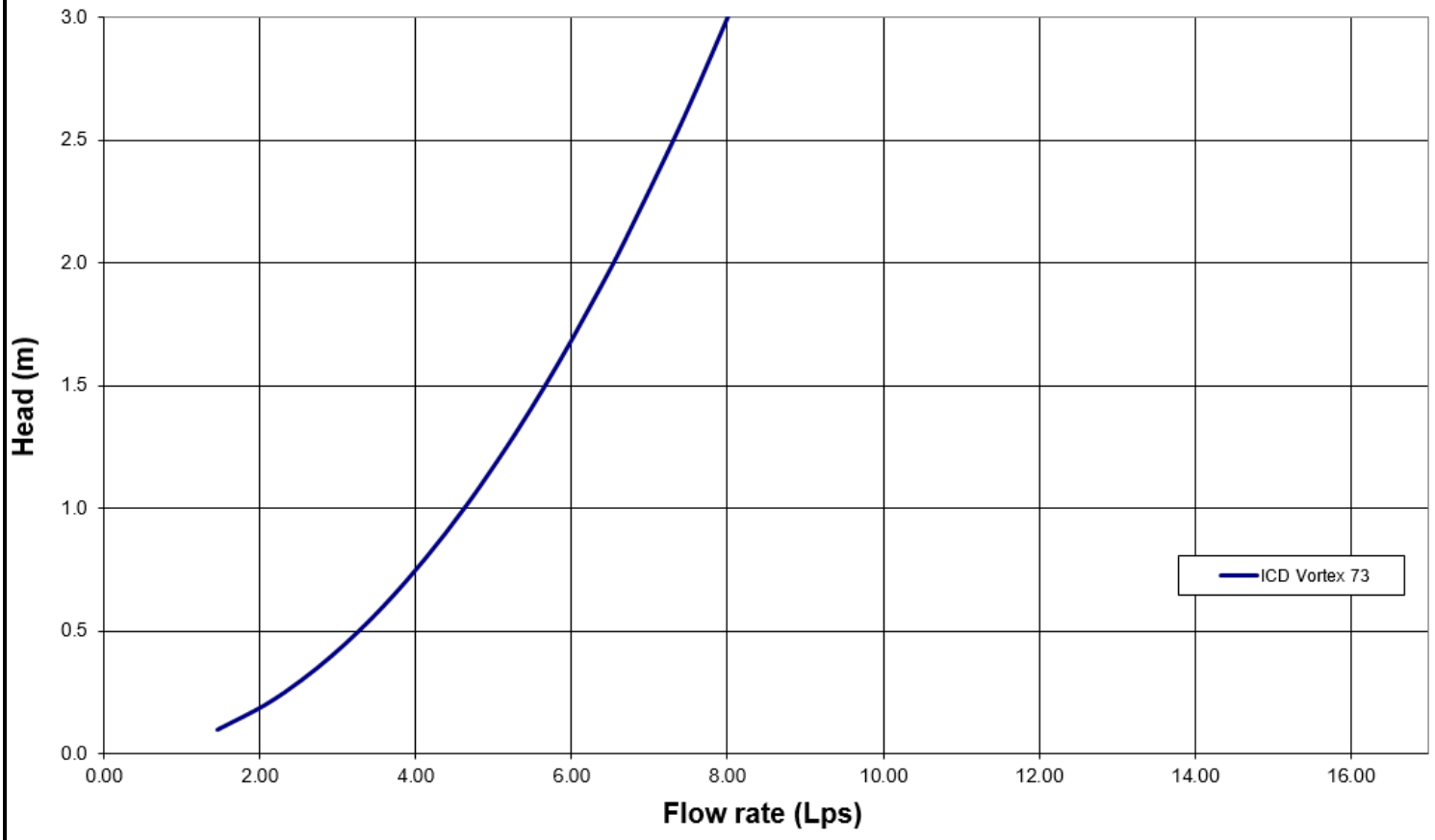
**Flow: 6.4 L/s**
**Head: 1.58 m**
**CB**




IPEX

## Tempest LMF ICD Flow Curve

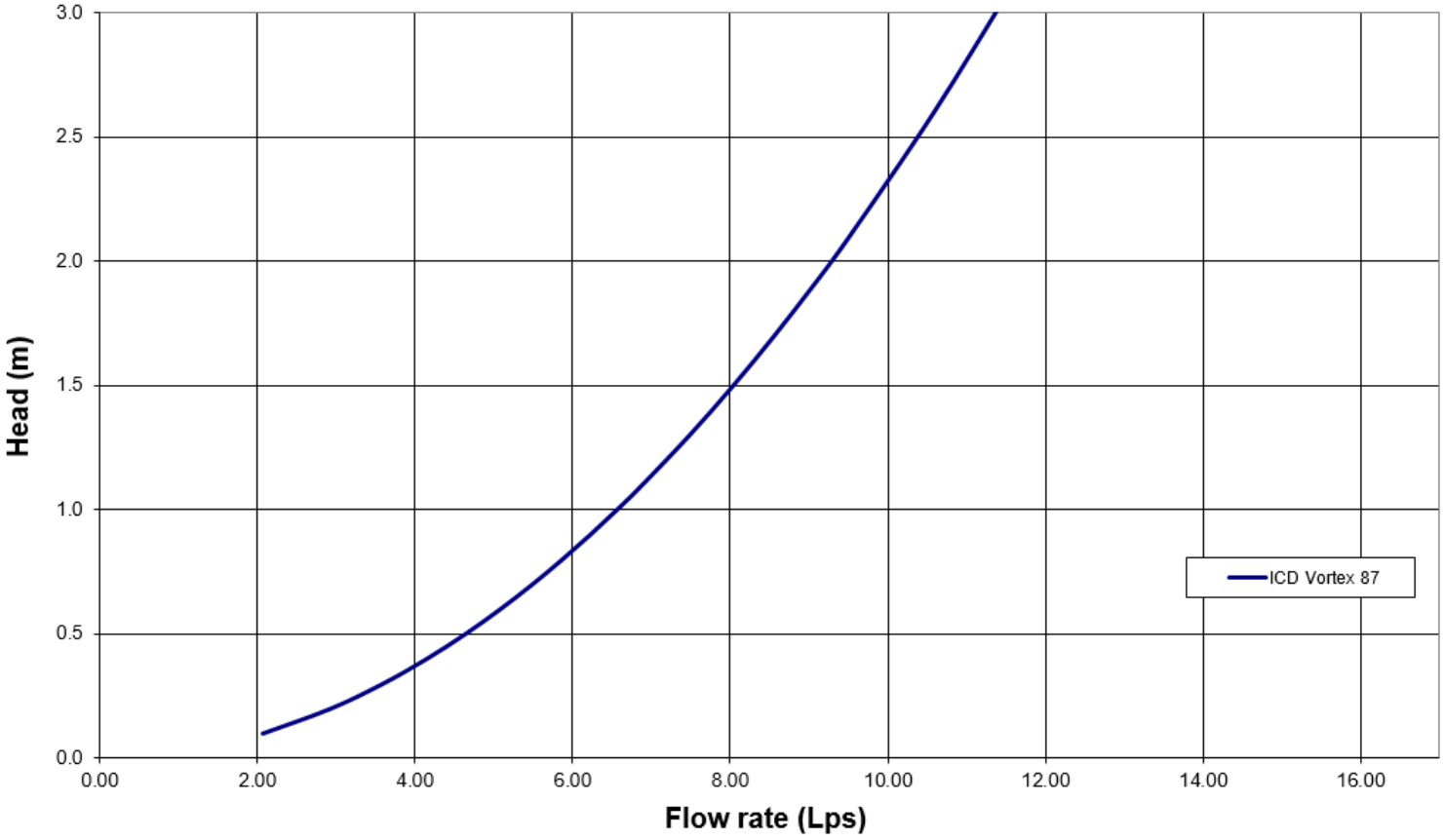
**Flow: 6.3 L/s**
**Head: 1.85 m**
**CB**




IPEX

## Tempest LMF ICD Flow Curve

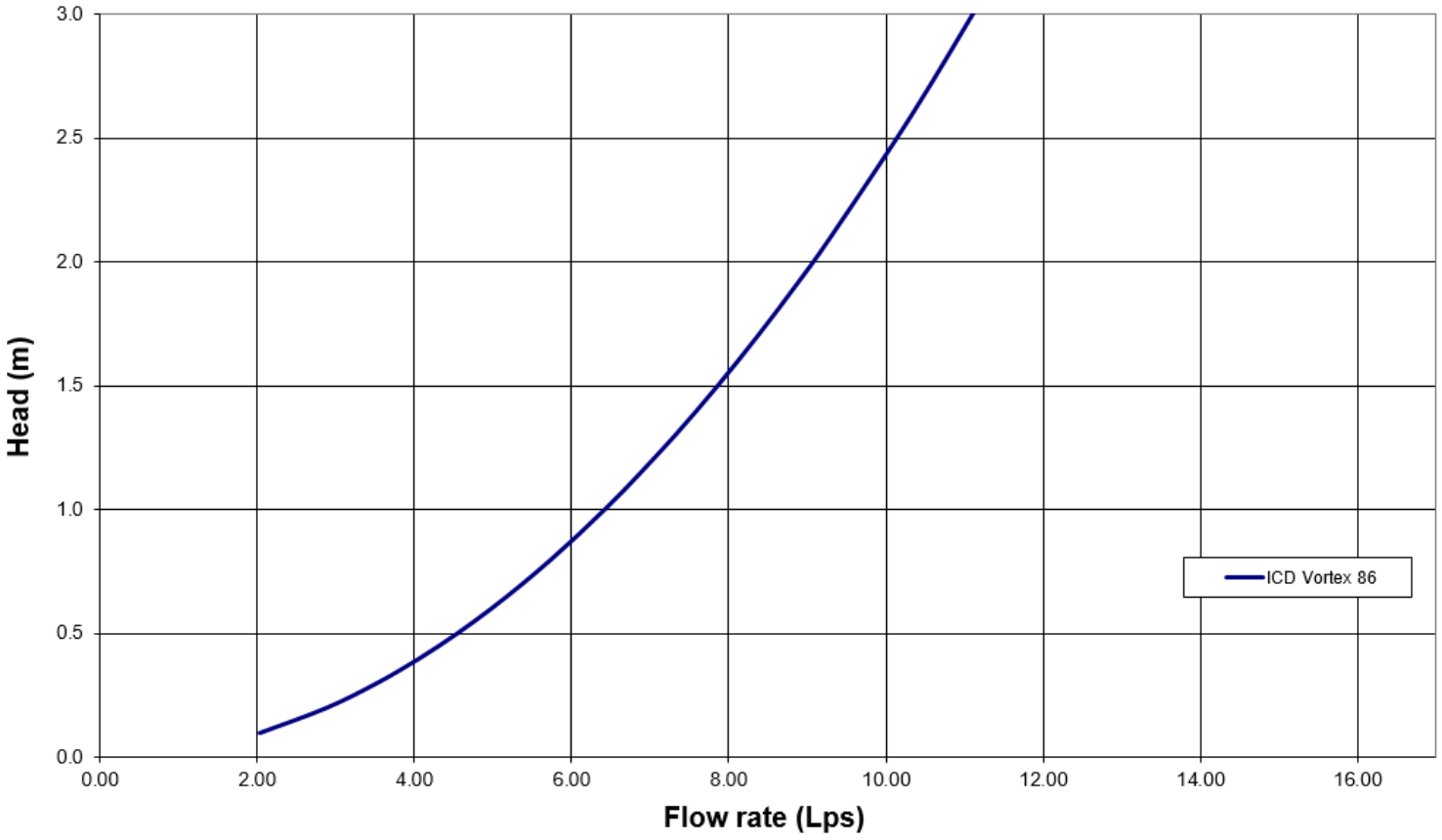
**Flow: 8.9 L/s**
**Head: 1.88 m**
**RYCB1**




IPEX

## Tempest LMF ICD Flow Curve

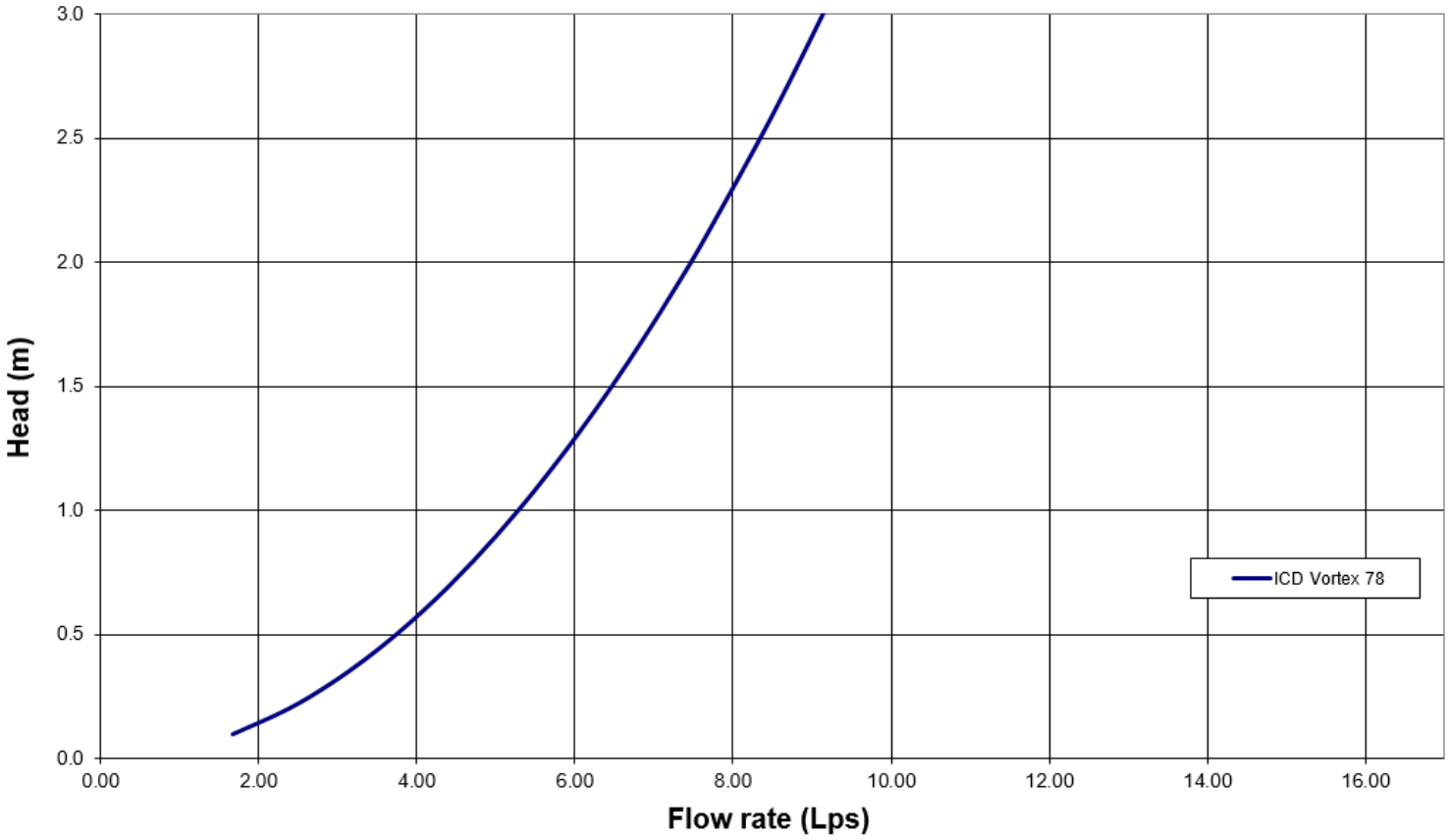
**Flow: 6.9 L/s**
**Head: 1.17 m**
**RYCB2**




IPEX

## Tempest LMF ICD Flow Curve

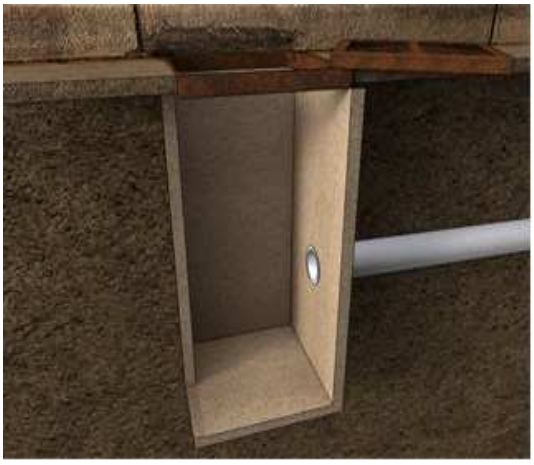
**Flow: 7.7 L/s**
**Head: 2.13 m**
**RYCB3**

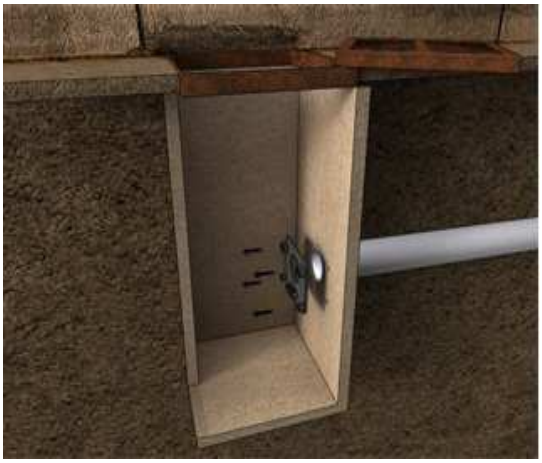


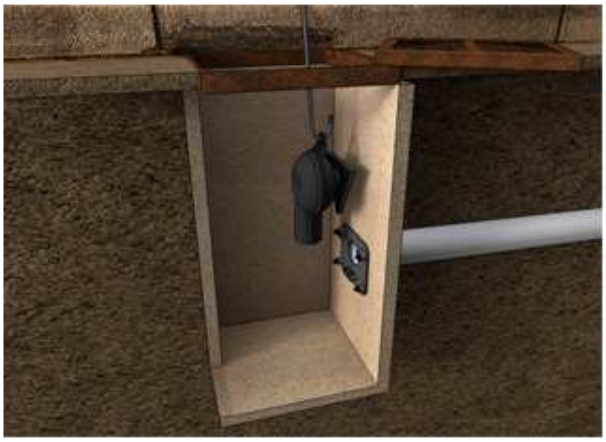

IPEX

## Square CB Installation Notes:

1. Materials and tooling verification:
   - Tooling: impact drill, 3/8'' concrete bit, torque wrench for 9/16''nut, hand hammer, level, and marker.
   - Material: (4) concrete anchor 3/8x3-1/2, (4) washers, (4) nuts
2. Use the mounting wall plate to locate and mark the hole (4) pattern on the catch basin wall. You should use a level to ensure that the plate is at the horizontal.
3. Use an impact drill with a 3/8'' concrete bit to make the four holes at a minimum of 1-1/2'' depth up to 2-1/2''. Clean the concrete dust from the holes.
4. Install the anchors (4) in the holes by using a hammer. Put the nuts on the top of the anchors to protect the threads when you will hit the anchors with the hammer. Remove the nuts on the ends of the anchors
5. Install the wall mounting plate on the anchors and screw the nut in place with a maximum torque of 40 N.m (30 lbf-ft). There should be no gap between the wall mounting plate and the catch basin wall.
6. From ground above using a reach bar, lower the device by hooking the end of the reach bar to the handle of the LMF device. Align the triangular plate portion into the mounting wall plate. Push down the device to be sure it has centered in to the wall mounting plate and has created a seal.





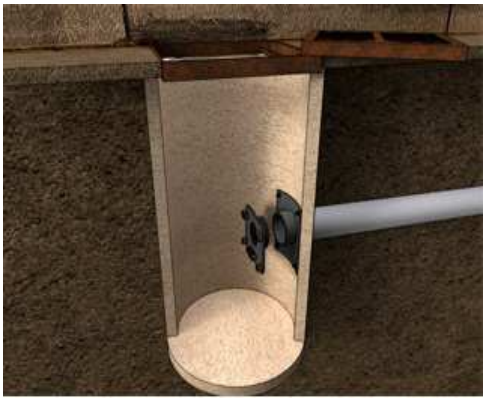


IPEX

## Round CB Installation Notes: (Refer to square install notes above for steps 1 , 3, & 4)

2. Use spigot catch basin wall plate to locate and mark the hole (4) pattern on the catch basin wall. You should use a level to ensure that the plate is at the horizontal.
5. Install the CB spigot wall plate on the anchors and screw the 4 nuts in place with a maximum torque of 40 N.m (30 lb-ft). There should be no gap between the CB spigot wall plate and the catch basin wall.
6. Apply solvent cement on the hub of the universal mounting plate and the spigot of the spigot CB wall plate. Slide the hub over the spigot. Make sure the universal mounting plate is at the horizontal and its hub is completely inserted onto the spigot. Normally, the corners of the universal mounting plate hub adapter should touch the catch basin wall.
7. From ground above using a reach bar, lower the ICD device by hooking the end of the reach bar to the handle of the ICD device. Align the triangular plate portion into the mounting wall plate. Push down the device to be sure it has centered into the mounting plate and has created a seal.






**CAUTION/WARNING/DISCLAIM:**

- Verify that the inlet(s) pipe(s) is not protruding into the catch basin. If it is, cut it back so that the inlet pipe is flush with the catch basin wall.
- Any required cement in the installation must be approved for PVC.
- The solvent cement should not be used below 0°C (32°F) or in a high humidity environment. Please refer to the IPEX solvent cement guide to confirm required curing times or attend the IPEX **Online Solvent Cement Training Course**.
- Call your IPEX representative for more information or if you have any questions about our products.

IPEX

# IPEX TEMPEST Inlet Control Devices Technical Specification

## General

Inlet control devices (ICD's) are designed to provide flow control at a specified rate for a given water head level and also provide odour and floatable control where specified. All ICD's will be IPEX Tempest or approved equal.

All devices shall be removable from a universal mounting plate. An operator from street level using only a T-bar with a hook will be able to retrieve the device while leaving the universal mounting plate secured to the catch basin wall face. The removal of the TEMPEST devices listed above must not require any unbolting or special manipulation or any special tools.

High Flow (HF) Sump devices will consist of a removable threaded cap which can be accessible from street level with out entry into the catchbasin (CB). The removal of the threaded cap shall not require any special tools other than the operator's hand.

ICD's must have no moving parts.

## Materials

ICD's are to be manufactured from Polyvinyl Chloride (PVC) or Polyurethane material, designed to be durable enough to withstand multiple freeze-thaw cycles and exposure to harsh elements.

The inner ring seal will be manufactured using a Buna or Nitrile material with hardness between Duro 50 and Duro 70.

The wall seal is to be comprised of a 3/8" thick Neoprene Closed Cell Sponge gasket which is attached to the back of the wall plate.

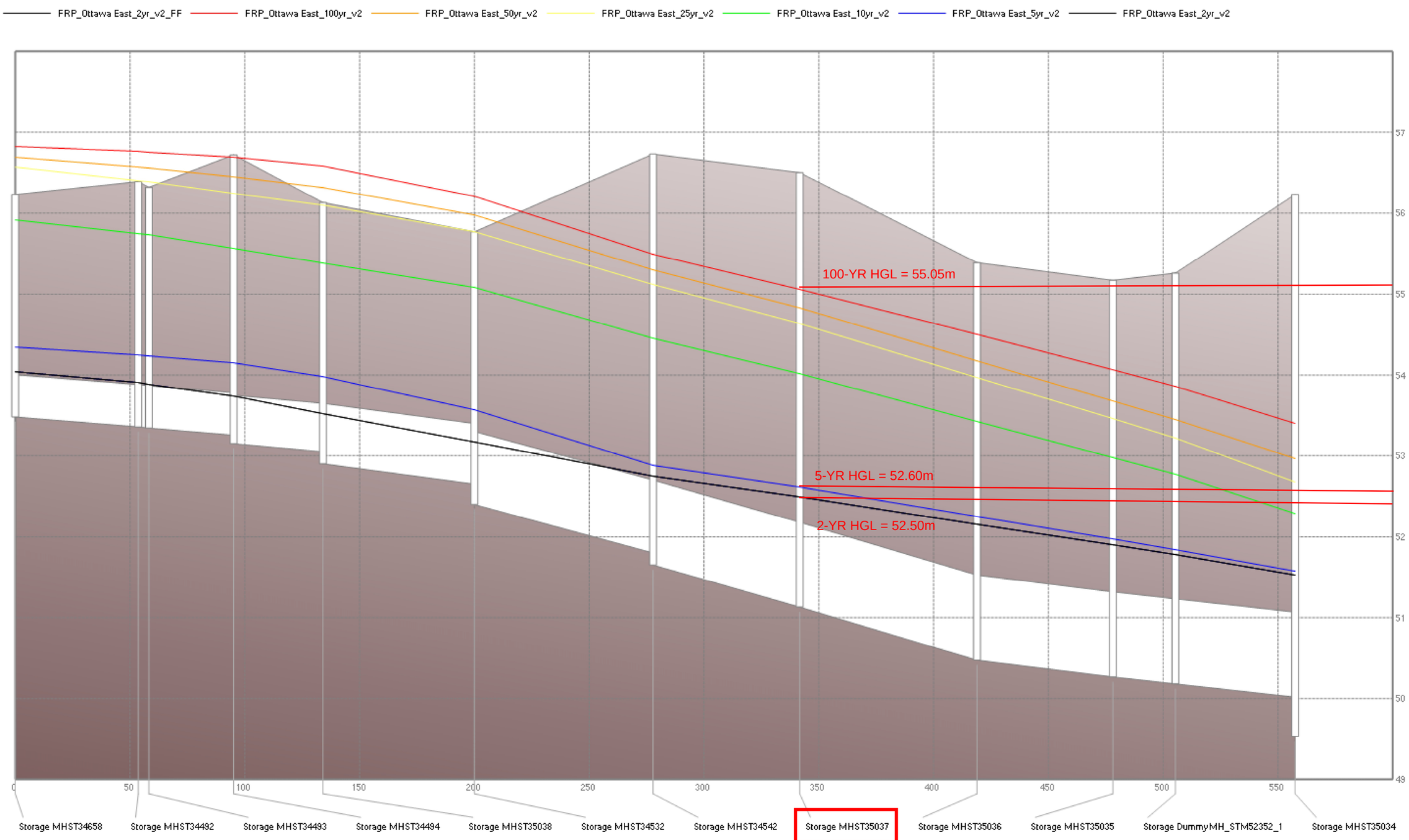
All hardware will be made from 304 stainless steel.

## Dimensioning

The Low Medium Flow (LMF), High Flow (HF) and the High Flow (HF) Sump shall allow for a minimum outlet pipe diameter of 200mm with a 600mm deep Catch Basin sump.

## Installation

Contractor shall be responsible for securing, supporting and connecting the ICD's to the existing influent pipe and catchbasin/manhole structure as specified and designed by the Engineer.


FRP_Ottawa East_2yr_v2_FF
FRP_Ottawa East_100yr_v2
FRP_Ottawa East_50yr_v2
FRP_Ottawa East_25yr_v2
FRP_Ottawa East_10yr_v2
FRP_Ottawa East_5yr_v2
FRP_Ottawa East_2yr_v2
100-YR HGL = 55.05m
5-YR HGL = 52.60m
2-YR HGL = 52.50m
57
56
55
54
53
52
51
50
49
0
50
100
150
200
250
300
350
400
450
500
550
Storage MHST34658
Storage MHST34492
Storage MHST34493
Storage MHST34494
Storage MHST35038
Storage MHST34532
Storage MHST34542
Storage MHST35037
Storage MHST35036
Storage MHST35035
Storage DummyMH_STM52352_1
Storage MHST35034
MANHOLE LOCATED AT
127 CARILLON STREET

## APPENDIX C: Drawings

119068-GP
119068-GR
119068-STM
119068-ESC

## SANITARY MANHOLE TABLE

| MANHOLE ID | SIZE(mm) | T/G ELEV (m) | INVERT (m) | PIPE DIAMETER (mm) |
|---|---|---|---|---|
| 3 | 1200Ø | 56.52 | E=53.82<br>W=53.79<br>N=53.85 | E=200<br>W=200<br>N=200 |
| 5 | 1200Ø | 56.40 | E=53.58<br>N=53.53<br>S=53.52 | E=200<br>N=200<br>S=200 |
| 7 | 1200Ø | 56.51 | N=53.47<br>E=53.41 | N=200<br>E=200 |
| 9 | 1200Ø | 56.46 | S=53.64<br>N=53.65<br>E=53.70 | S=200<br>N=200<br>E=200 |
| 11 | 1200Ø | 56.54 | S=53.75<br>E=53.81 | S=200<br>E=200 |
| 13 | 1200Ø | 56.52 | N=53.96<br>S=53.95<br>W=54.04 | N=200<br>S=200<br>W=200 |
| 15 | 1200Ø | 56.64 | N=54.05<br>S=54.15<br>W=53.99 | N=200<br>S=200<br>W=200 |
| 17 | 1200Ø | 56.72 | E=54.21<br>S=54.15<br>W=54.21 | E=200<br>S=200<br>W=200 |
| 19 | 1200Ø | 56.73 | E=54.51 | E=200 |
| 21 | 1200Ø | 56.77 | W=54.33 | W=200 |
| 23 | 1200Ø | 56.06 | W=53.96 | W=200 |
| 25 | 1200Ø | 54.80 | W=53.74<br>E=53.77 | W=200<br>E=200 |
| 27 | 1200Ø | 55.09 | S=53.31<br>W=53.37 | S=200<br>W=200 |
| 29 | 1200Ø | 56.56 | N=53.20<br>S=53.19 | N=200<br>S=200 |

## STORM MANHOLE TABLE

| MANHOLE ID | SIZE(mm) | T/G ELEV (m) | INVERT (m) | PIPE DIAMETER (mm) |
|---|---|---|---|---|
| 2 | 1200Ø | 56.47 | E=52.90<br>W=52.82<br>N=55.02 | E=375<br>W=450<br>N=200 |
| 4 | 1200Ø | 56.52 | W=52.98<br>N=53.04 | W=375<br>N=375 |
| 6 | 1200Ø | 56.42 | S=52.27<br>E=52.34<br>N=52.42 | S=525<br>E=450<br>N=375 |
| 8 | 1200Ø | 56.46 | N=52.80<br>S=52.73 | N=300<br>S=375 |
| 10 | 1200Ø | 56.58 | N=53.06<br>S=53.06<br>W=53.80 | N=300<br>S=300<br>W=300 |
| 12 | 1200Ø | 56.73 | E=54.41<br>S=53.47 | E=200<br>S=300 |
| 14 | 1200Ø | 56.50 | N=53.19<br>S=53.18<br>W=53.31 | N=375<br>S=375<br>W=250 |
| 16 | 1200Ø | 56.62 | N=53.41<br>S=53.34<br>W=53.46 | N=300<br>S=375<br>W=250 |
| 18 | 1500Ø | 56.50 | N=52.10<br>W=54.27<br>E=52.09 | N=525<br>W=200<br>E=525 |
| 20 | 1200Ø | 55.52 | S=51.99<br>W=51.99<br>E=53.77 | S=525<br>W=525<br>E=250 |
| 22 | 1200Ø | 56.63 | E=53.51<br>W=55.09 | E=250<br>W=200 |
| 24 | 1200Ø | 56.66 | E=53.66<br>W=55.14 | E=250<br>W=200 |
| 26 | 1200Ø | 56.69 | NE=55.22<br>S=53.63<br>W=53.68 | NE=200<br>S=300<br>W=250 |
| 28 | 1200Ø | 56.73 | E=53.88<br>W=55.20 | E=250<br>W=200 |

## REAR YARD CATCHBASIN TABLE

| RYCB No. | T/G ELEVATION | INVERT | I.C.D. |
|---|---|---|---|
| LCB1 | 55.66 | 54.26 | - |
| LCB2 | 55.65 | 54.44 | - |
| LCB3 | 55.55 | 54.22 | - |
| LCB4 | 55.50 | 54.50 | - |
| LCB5 | 55.45 | 54.25 | - |
| RYCB1 | 54.79 | 53.69 | TEMPEST LMF (VORTEX 73) |
| RYCB3 | 55.59 | 54.03 | TEMPEST LMF (VORTEX 87) |
| RYCB4 | 55.65 | 54.65 | - |
| RYCB5 | 55.25 | 54.02 | - |
| RYCB6 | 55.41 | 53.75 | TEMPEST LMF (VORTEX 87) |

## SEWER CROSSING TABLE

| LOCATION | ELEVATIONS | CLEARANCE |
|---|---|---|
| C1 | SAN INV=53.51<br>WM OBV=53.35 | 0.16m |
| C2 | WM INV=53.48<br>STM OBV=53.18 | 0.30m |
| C3 | WM INV=54.29<br>SAN OBV=53.99 | 0.30m |
| C4 | SAN INV=53.86<br>STM OBV=53.34 | 0.52m |
| C5 | WM INV=53.89<br>STM OBV=53.33 | 0.56m |
| C6 | WM INV=53.82<br>STM OBV=52.82 | 1.00m |
| C7 | SAN INV=53.54<br>STM OBV=52.81 | 0.73m |
| C8 | WM INV=54.09<br>SAN OBV=53.79 | 0.30m |
| C9 | STM INV=53.79<br>SAN OBV=53.51 | 0.28m |
| C10 | WM INV=53.95<br>STM OBV=52.16 | 1.80m |
| C11 | WM INV=53.95<br>SAN OBV=53.38 | 0.57m |
| C12 | SAN INV=52.61<br>STM OBV=52.13 | 0.48m |
| C13 | WM INV=54.21<br>SAN OBV=53.91 | 0.30m |
| C14 | WM INV=54.32<br>SAN OBV=54.02 | 0.30m |
| C15 | WM INV=54.53<br>SAN OBV=54.23 | 0.30m |
| C16 | WM INV=93.94<br>STM OBV=53.59 | 0.25m |
| C17 | SAN INV=53.97<br>STM OBV=53.58 | 0.39m |
| C18 | WM INV=54.29<br>SAN OBV=53.99 | 0.30m |
| C19 | WM INV=54.06<br>STM OBV=53.74 | 0.32m |
| C20 | SAN INV=54.06<br>STM OBV=53.73 | 0.33m |
| C21 | WM INV=54.16<br>STM OBV=53.91 | 0.25m |
| C22 | WM INV=54.65<br>SAN OBV=54.35 | 0.30m |
| C23 | SAN INV=54.22<br>STM OBV=53.92 | 0.71m |

## CATCHBASIN TABLE

| CB ID | T/G ELEVATION | INVERT | I.C.D. |
|---|---|---|---|
| CB1 | 56.43 | 55.03 | TEMPEST LMF (VORTEX 85) |
| CB2 | 56.38 | 54.98 | TEMPEST LMF (VORTEX 85) |
| CB3 | 56.43 | 55.03 | TEMPEST LMF (VORTEX 85) |
| CB4 | 56.50 | 55.10 | TEMPEST LMF (VORTEX 77) |
| CB5 | 56.56 | 55.16 | TEMPEST LMF (VORTEX 77) |
| CB6 | 56.48 | 55.08 | TEMPEST LMF (VORTEX 77) |
| CB7 | 56.57 | 55.14 | TEMPEST LMF (VORTEX 77) |
| CB8 | 56.55 | 55.15 | TEMPEST LMF (VORTEX 77) |
| CB9 | 56.61 | 55.18 | TEMPEST LMF (VORTEX 77) |
| CB10 | 56.63 | 55.23 | TEMPEST LMF (VORTEX 77) |
| CB11 | 56.67 | 55.24 | TEMPEST LMF (VORTEX 77) |
| CB12 | 56.38 | 54.95 | TEMPEST LMF (VORTEX 77) |

## WATERMAIN TABLE

| Station | F/G ELEVATION | TOP OF WATERMAIN | DESCRIPTION |
|---|---|---|---|
| 1+000.00 | 55.75 | 53.35 | CONNECT TO EXISTING |
| 1+011.86 | 56.02 | 53.62 | VB1 |
| 1+025.00 | 56.61 | 54.21 | - |
| 1+033.73 | 56.54 | 54.14 | H. BEND |
| 1+035.09 | 56.54 | 54.14 | 200 X 200 TEE |
| 1+040.25 | 56.54 | 54.14 | H. BEND |
| 1+050.00 | 56.55 | 54.15 | - |
| 1+060.50 | 56.52 | 54.12 | HYD1 TEE |
| 1+075.00 | 56.48 | 54.08 | - |
| 1+085.94 | 56.43 | 54.03 | 200 X 150 TEE |

## WATERMAIN TABLE

| Station | F/G ELEVATION | TOP OF WATERMAIN | DESCRIPTION |
|---|---|---|---|
| 1+085.94 | 56.43 | 54.03 | 200 X 150 TEE |
| 2+000.00 | 56.54 | 54.14 | CAP |
| 2+013.26 | 56.43 | 54.03 | 200 X 150 TEE |
| 2+019.19 | 56.44 | 54.04 | VB3 |
| 2+025.00 | 56.51 | 54.11 | - |
| 2+044.03 | 56.47 | 54.07 | 200 X 150 TEE |
| 2+050.00 | 56.49 | 54.09 | - |
| 2+066.31 | 56.63 | 54.23 | HYD2 TEE |
| 2+073.84 | 56.57 | 54.17 | 200 x 150 TEE |
| 2+075.00 | 56.57 | 54.17 | - |
| 2+100.00 | 56.66 | 54.26 | - |
| 2+103.66 | 56.65 | 54.25 | 200 x 150 TEE |
| 2+125.00 | 56.11 | 53.71 | - |
| 2+127.08 | 56.00 | 53.60 | VB7 |
| 2+132.93 | 55.97 | 53.57 | 200 x 300 TEE |

## WATERMAIN TABLE

| Station | F/G ELEVATION | TOP OF WATERMAIN | DESCRIPTION |
|---|---|---|---|
| 3+000.00 | 56.54 | 54.14 | 200 x 200 TEE |
| 3+001.50 | 56.51 | 56.51 | H. BEND |
| 3+006.63 | 56.53 | 54.13 | VB2 |
| 3+025.00 | 56.55 | 54.15 | - |
| 3+029.76 | 56.53 | 54.13 | 200 X 150 TEE |
| 3+050.00 | 56.70 | 54.30 | - |
| 3+059.56 | 56.65 | 54.25 | 200 X 200 TEE |
| 3+075.00 | 56.73 | 54.33 | - |
| 3+076.64 | 56.74 | 54.34 | HYD3 TEE |
| 3+089.36 | 56.75 | 54.35 | 200 X 150 TEE |

## WATERMAIN TABLE

| Station | F/G ELEVATION | TOP OF WATERMAIN | DESCRIPTION |
|---|---|---|---|
| 4+000.00 | 56.47 | 54.07 | 200 X 150 TEE |
| 4+025.00 | 56.64 | 54.24 | - |
| 4+046.54 | 56.67 | 54.27 | VB4 |
| 4+049.49 | 56.53 | 54.13 | 200 X 150 TEE |

## WATERMAIN TABLE

| Station | F/G ELEVATION | TOP OF WATERMAIN | DESCRIPTION |
|---|---|---|---|
| 5+000.00 | 56.57 | 54.17 | 200 x 150 TEE |
| 5+025.00 | 56.68 | 54.28 | - |
| 5+045.72 | 56.74 | 54.34 | VB5 |
| 5+048.67 | 56.65 | 54.25 | 200 X 200 TEE |

## WATERMAIN TABLE

| Station | F/G ELEVATION | TOP OF WATERMAIN | DESCRIPTION |
|---|---|---|---|
| 6+000.00 | 56.65 | 54.25 | 200 x 150 TEE |
| 6+025.00 | 56.77 | 54.37 | - |
| 6+045.70 | 56.82 | 54.42 | VB6 |
| 6+048.65 | 56.75 | 54.35 | 200 X 150 TEE |
| 6+050.00 | 56.73 | 54.33 | - |
| 6+068.56 | 56.78 | 54.38 | CONNECT TO EXISTING |

## LEGEND

- SANITARY MANHOLE, SEWER & DIRECTION OF FLOW
- STORM MANHOLE, SEWER & DIRECTION OF FLOW
- 300mmØ — WATERMAIN AND DIAMETER
- VB — VALVE & VALVE BOX
- VC — VALVE & VALVE CHAMBER
- BEND AND THRUST BLOCK
- HYD — HYDRANT C/W VALVE & LEAD
- CAP
- 95 — ROAD CATCHBASIN
- 96 — ROAD CATCHBASIN WITH ICD
- LCB30 — LANDSCAPE TYPE CATCHBASIN
- RYCB9 — REAR YARD CATCH BASIN
- UNDERGROUND STORAGE CHAMBERS WITH SUBDRAIN

**NOTES:**
RIDEAU RIVER REGULATORY FLOOD LEVEL (REDUCED FLOOD RISK) = 56.44
ALL BUILDINGS ARE SLAB-ON-GRADE

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

parkriver PROPERTIES

| No. | REVISION | DATE | BY |
|---|---|---|---|
| 5. | CITY SUBMISSION | FEB 5/21 | MAB |
| 4. | STORM OUTLET VIA 127 CARILLION | OCT 23/20 | MAB |
| 3. | SITE PLAN APPLICATION | AUG 24/20 | MAB |
| 2. | RVCA APPROVAL IN PRINCIPAL APPLICATION | MAY 28/20 | MAB |
| 1. | ISSUED FOR RVCA REVIEW | MAR 26/20 | MAB |

SCALE 1:250 (1:250 0 2 4 6 8 10)

DESIGN DTD
CHECKED LRW
DRAWN DTD
CHECKED LRW
APPROVED MAB

**FOR REVIEW ONLY**

LICENSED PROFESSIONAL ENGINEER L.R. WILSON 100160365 PROVINCE OF ONTARIO

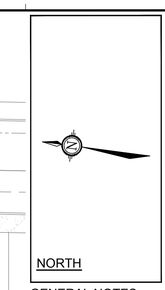
LICENSED PROFESSIONAL ENGINEER M.A. BISSETT 2021.02.05 PROVINCE OF ONTARIO

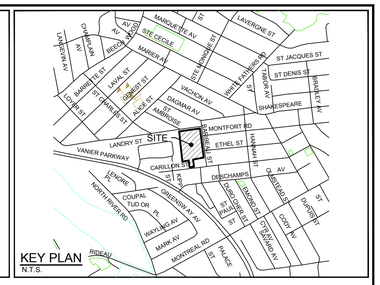

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com


CITY OF OTTAWA
200 BARIBEAU STREET

SERVICING PLAN

PROJECT No. 119068
REV REV #5
DRAWING No. 119068-GP




## GENERAL NOTES:

1. DIMENSIONS AND LAYOUT INFORMATION SHALL BE CONFIRMED PRIOR TO COMMENCEMENT OF CONSTRUCTION.
2. THE ORIGINAL TOPOGRAPHY AND GROUND ELEVATIONS, SERVICING AND SURVEY INFORMATION SHOWN ON THIS PLAN ARE SUPPLIED FOR INFORMATION PURPOSES ONLY. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE ACCURACY OF ALL INFORMATION OBTAINED FROM THIS PLAN.
3. CO-ORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
4. BEFORE COMMENCING CONSTRUCTION, PROVIDE PROOF OF COMPREHENSIVE ALL RISK AND OPERATIONAL LIABILITY INSURANCE INCLUDING BLASTING. INSURANCE POLICY TO NAME THE OWNER, ENGINEER AND THE CITY AS CO-INSURED.
5. CONNECT TO EXISTING SYSTEMS AS DETAILED, INCLUDING ALL RESTORATION WORK NECESSARY TO REINSTATE SURFACES TO EXISTING CONDITIONS OR BETTER.
6. DETERMINE THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION. PROTECT AND ASSUME RESPONSIBILITY FOR ALL EXISTING UTILITIES WHETHER OR NOT SHOWN ON THESE DRAWINGS.
7. OBTAIN AND PAY FOR ALL NECESSARY PERMITS AND APPROVALS BEFORE COMMENCING CONSTRUCTION.
8. RESTORE ALL TRENCHES AND SURFACE FEATURES TO EXISTING CONDITIONS OR BETTER AND TO THE SATISFACTION OF MUNICIPAL AUTHORITIES.
9. REMOVE FROM SITE ALL DEBRIS AND EXCESS EXCAVATED MATERIAL UNLESS OTHERWISE INSTRUCTED BY THE ENGINEER.
10. ALL ELEVATIONS ARE GEODETIC AND UTILIZE METRIC UNITS.
11. REFER TO GEOTECHNICAL INVESTIGATION PG4278-1 (DATED JULY 5, 2018), PREPARED BY PATERSON GROUP INC. FOR SUBSURFACE CONDITIONS AND CONSTRUCTION RECOMMENDATIONS.
12. PERFORATED PIPE SUB-DRAINS TO BE PROVIDED AT SUBGRADE LEVEL EXTENDING FROM THE ROADSIDE CATCHBASIN FOR A DISTANCE OF 3.0m, PARALLEL TO THE CURB IN TWO DIRECTIONS.

## SEWER NOTES:

1. SPECIFICATIONS:

| ITEM | SPEC. No. | REFERENCE |
|---|---|---|
| CATCHBASIN (600x600mm) | 705.010 | OPSD |
| CATCHBASIN MANHOLE (1200Ø) | 701.010 | OPSD |
| STORM / SANITARY MANHOLE (1200Ø) | 701.010 | OPSD |
| ROADSIDE CB FRAME & COVER | S2 & S19 | CITY of OTTAWA |
| CBMH FRAME & COVER | S25 & S28.1 | CITY of OTTAWA |
| STORM / SANITARY MH FRAME & COVER | S24.1 / S24 & S25 | CITY of OTTAWA |
| STORM SEWER | PVC DR 35 OR CONC. | (CLASS SPECIFIED ON PROFILE DRAWINGS) |
| SANITARY SEWER | PVC DR 35 | |
| CATCHBASIN LEAD | PVC DR 35 | |

2. INSULATE ALL PIPES (SAN/STM) THAT HAVE LESS THAN 1.5m COVER WITH 50mmX1200mm HI-40 INSULATION. PROVIDE 150mm CLEARANCE BETWEEN PIPE AND INSULATION.
3. SERVICES ARE TO BE CONSTRUCTED TO PROPERTY LINE AT MINIMUM SLOPE OF 1.0% (2.0% IS PREFERRED).
4. PIPE BEDDING, COVER AND BACKFILL ARE TO BE COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY. THE USE OF CLEAR CRUSHED STONE AS A BEDDING LAYER SHALL NOT BE PERMITTED.
5. SEWER SERVICE CONNECTIONS PER CITY OF OTTAWA DETAILS S11 AND S11.1.
6. THE SITE SERVICING CONTRACTOR SHALL PERFORM FIELD TESTS FOR QUALITY CONTROL OF ALL SANITARY SEWERS. LEAKAGE TESTING SHALL BE COMPLETED IN ACCORDANCE WITH OPSS 410.07.16 AND 407.07.24. DYE TESTING IS TO BE COMPLETED ON ALL SANITARY SERVICES TO CONFIRM PROPER CONNECTION TO THE SANITARY SEWER MAIN. THE FIELD TESTS SHALL BE PERFORMED IN THE PRESENCE OF THE ENGINEER.
7. STORM MANHOLES AND CBMHS SHALL HAVE 300mm SUMPS UNLESS OTHERWISE INDICATED.
8. CONTRACTOR TO TELEVISE (CCTV) ALL PROPOSED SEWERS, 200mmØ OR GREATER PRIOR TO BASE COURSE ASPHALT. UPON COMPLETION OF CONTRACT, THE CONTRACTOR IS RESPONSIBLE TO FLUSH AND CLEAN ALL SEWERS & APPURTENANCES.

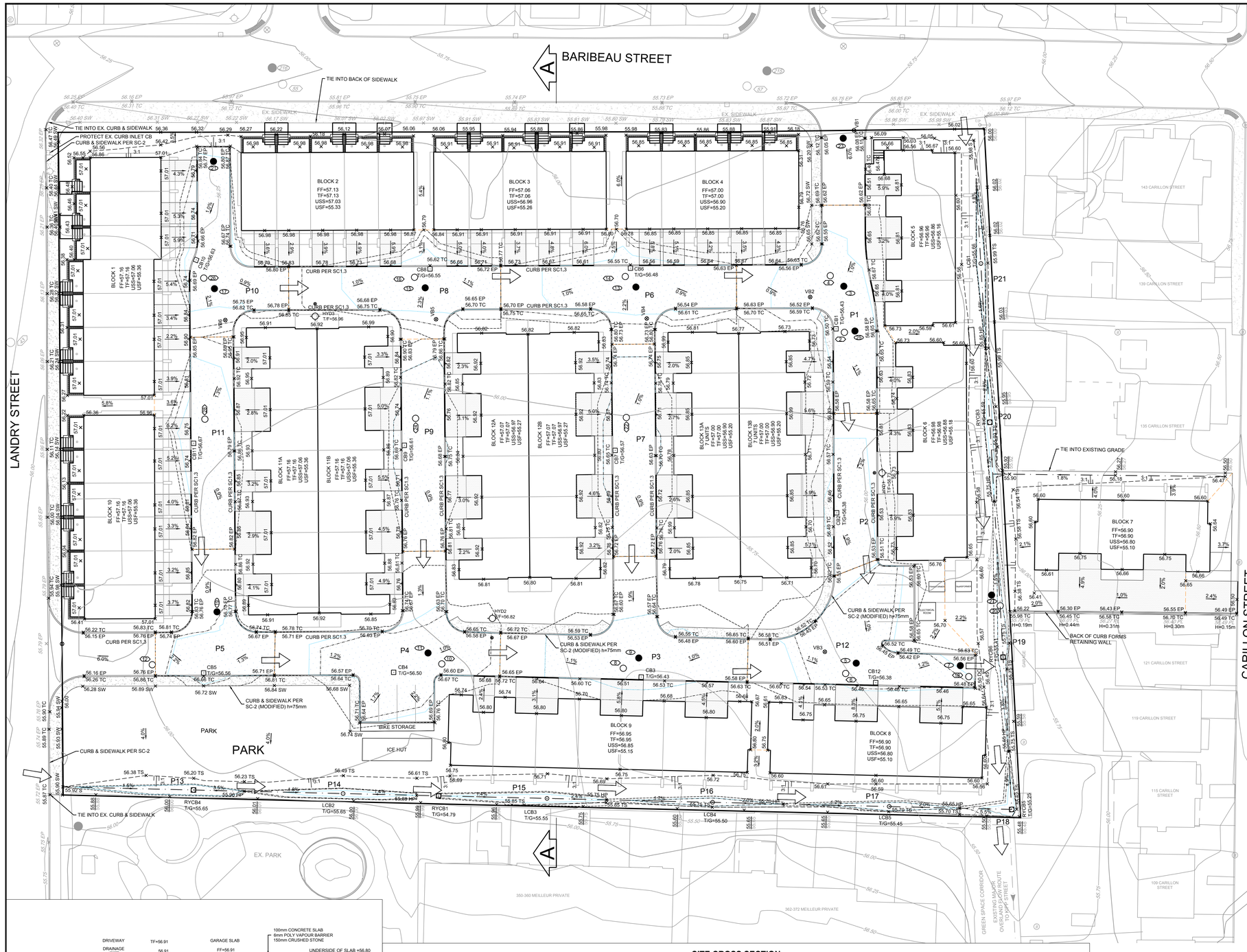
## WATERMAIN NOTES:

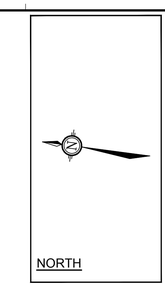
1. GENERAL:

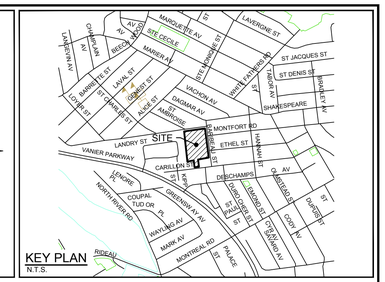
| ITEM | DETAIL No. | REFERENCE |
|---|---|---|
| WATERMAIN TRENCHING | W17 | CITY OF OTTAWA |
| THERMAL INSULATION IN SHALLOW TRENCHES | W22 | CITY OF OTTAWA |
| WATERMAIN CROSSING BELOW SEWER / OVER SEWER | W25 / W25.2 | CITY OF OTTAWA |

2. THE WATERMAIN SHALL BE PVC DR 18 IN ACCORDANCE WITH MATERIAL SPECIFICATION MW-18.1, UNLESS OTHERWISE INDICATED.
3. SUPPLY AND CONSTRUCT ALL WATERMAINS AND APPURTENANCES IN ACCORDANCE WITH THE CITY OF OTTAWA STANDARDS AND SPECIFICATIONS. EXCAVATION, INSTALLATION, BACKFILL AND RESTORATION OF ALL WATERMAINS BY THE CONTRACTOR. CONNECTIONS AND SHUT-OFFS AT THE MAIN AND CHLORINATION OF THE WATER SYSTEM SHALL BE PERFORMED BY CITY OFFICIALS.
4. WATERMAIN SHALL BE MINIMUM 2.4m DEPTH BELOW GRADE UNLESS OTHERWISE INDICATED.
5. PROVIDE MINIMUM 0.50m CLEARANCE BETWEEN OUTSIDE OF PIPES AT ALL CROSSINGS.
6. WATER SERVICE SHALL BE CONSTRUCTED TO SERVICE POST AT PROPERTY LINE, UNLESS OTHERWISE INDICATED.
7. PRESSURE REDUCING VALVES SHALL BE INSTALLED AT ALL UNITS.


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## LEGEND

- PROPOSED GRADE AND DIRECTION OF FLOW (2.5%)
- PROPOSED ELEVATION AT HIGH POINT (105.59 HP)
- PROPOSED ELEVATION (100.53)
- EXISTING ELEVATION
- EXISTING SPOT ELEVATION (×55.88)
- EXISTING ELEVATION AT BACK OF SIDEWALK (56.13 BS)
- EXISTING CONTOUR ELEVATION (55.00)
- UTILITY POLE AND GUY WIRE (UP)
- MAJOR OVERLAND FLOW DIRECTION
- TERRACE GRADE (3:1 MAX) (3:1)
- SWALE AND TERRACE
- MAX STATIC PONDING LIMITS
- 100-YR PONDING LIMITS
- 100-YR +20% PONDING LIMITS
- HYDRANT WITH TOP OF FLANGE ELEVATION (HYD T/F=55.84)
- SANITARY MANHOLE (101)
- STORM MANHOLE (100)
- CATCHBASIN WITH TOP OF GRATE ELEVATION CB WITH ICD (CB6 T/G=56.48)
- LANDSCAPE TYPE CATCHBASIN WITH TOP OF GRATE ELEVATION (LCB1 T/G=56.48)
- VALVE & VALVE BOX LOCATION (VB)
- FF= FINISHED FLOOR
- TF= TOP OF FOUNDATION
- USS= UNDERSIDE OF SLAB
- USF= UNDERSIDE OF FOOTING
- EP EDGE OF PAVEMENT
- TC TOP OF CURB

**RIDEAU RIVER REGULATORY FLOOD LEVEL (REDUCED FLOOD RISK) = 56.44**

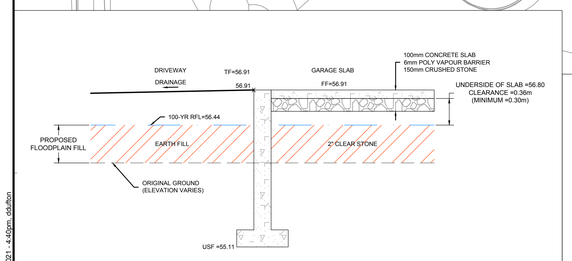
## GENERAL NOTES:

1. DIMENSIONS AND LAYOUT INFORMATION SHALL BE CONFIRMED PRIOR TO COMMENCEMENT OF CONSTRUCTION.
2. THE ORIGINAL TOPOGRAPHY AND GROUND ELEVATIONS, SERVICING AND SURVEY INFORMATION SHOWN ON THIS PLAN ARE SUPPLIED FOR INFORMATION PURPOSES ONLY. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE ACCURACY OF ALL INFORMATION OBTAINED FROM THIS PLAN.
3. CO-ORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
4. BEFORE COMMENCING CONSTRUCTION, PROVIDE PROOF OF COMPREHENSIVE ALL RISK AND OPERATIONAL LIABILITY INSURANCE INCLUDING BLASTING. INSURANCE POLICY TO NAME THE OWNER, ENGINEER AND THE CITY AS CO-INSURED. AMOUNT OF INSURANCE TO BE SPECIFIED BY OWNER'S AGENT.
5. CONNECT TO EXISTING SYSTEMS AS DETAILED, INCLUDING ALL RESTORATION WORK NECESSARY TO REINSTATE SURFACES TO EXISTING CONDITIONS OR BETTER.
6. DETERMINE THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION. PROTECT AND ASSUME ALL RESPONSIBILITY FOR ALL EXISTING UTILITIES WHETHER OR NOT SHOWN ON THESE DRAWINGS.
7. OBTAIN AND PAY FOR ALL NECESSARY PERMITS AND APPROVALS BEFORE COMMENCING CONSTRUCTION.
8. RESTORE ALL TRENCHES AND SURFACE FEATURES TO EXISTING CONDITIONS OR BETTER AND TO THE SATISFACTION OF CITY OF OTTAWA AUTHORITIES.
   - ASPHALT RESTORATION SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA DETAIL R-10.
   - THICKNESS OF GRANULAR MATERIAL AND ASPHALT LAYERS TO MATCH EXISTING.
   - BOULEVARDS SHALL BE REINSTATED WITH 100mm OF TOPSOIL, SEED AND MULCH.
9. REMOVE FROM SITE ALL EXCESS EXCAVATED MATERIAL UNLESS OTHERWISE INSTRUCTED BY ENGINEER.
10. ALL ELEVATIONS ARE GEODETIC AND UTILIZE METRIC UNITS.
11. REFER TO GEOTECHNICAL INVESTIGATION PG4951-1 (DATED JULY 15, 2019), PREPARED BY PATERSON GROUP FOR SUBSURFACE CONDITIONS AND CONSTRUCTION RECOMMENDATIONS.
12. PERFORATED PIPE SUB-DRAINS TO BE PROVIDED AT SUBGRADE LEVEL EXTENDING FROM THE ROADSIDE CATCHBASIN FOR A DISTANCE OF 3.0m, PARALLEL TO THE CURB IN TWO DIRECTIONS.

## GRADING AND PAVEMENT NOTES:

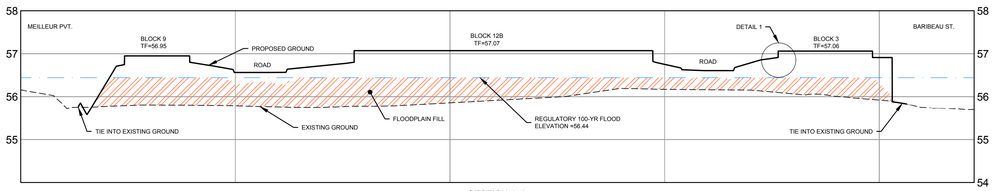
1. ALL TOPSOIL, ORGANIC OR DELETERIOUS MATERIAL MUST BE ENTIRELY REMOVED FROM BENEATH THE PROPOSED HARD SURFACE (ie. PAVEMENT, CURB, SIDEWALK, ETC.) AREAS AS DIRECTED BY THE SITE ENGINEER OR GEOTECHNICAL ENGINEER.
2. EXPOSED SUBGRADES IN PROPOSED PAVED AREAS SHOULD BE HEAVILY PROOF ROLLED WITH A LARGE (10 TON) VIBRATORY STEEL DRUM ROLLER UNDER DRY CONDITIONS AND INSPECTED BY THE GEOTECHNICAL ENGINEER PRIOR TO THE PLACEMENT OF GRANULARS.
3. ANY SOFT AREAS EVIDENT FROM THE PROOF ROLLING SHOULD BE SUB-EXCAVATED AND REPLACED WITH SUITABLE MATERIAL THAT IS FROST COMPATIBLE WITH THE EXISTING SOILS AS RECOMMENDED BY THE GEOTECHNICAL ENGINEER.
4. THE GRANULAR BASE SHOULD BE PLACED IN MAXIMUM 300mm LIFTS AND COMPACTED TO AT LEAST 100% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY VALUE. ANY ADDITIONAL GRANULAR FILL USED BELOW THE PROPOSED PAVEMENT SHOULD BE PLACED IN MAXIMUM 300mm LIFTS AND COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY VALUE.
5. ROADWAY SUBGRADE TO BE INSPECTED BY THE GEOTECHNICAL ENGINEER AT THE TIME OF CONSTRUCTION TO REVIEW IF A WOVEN GEOTEXTILE IS REQUIRED BELOW THE GRANULAR MATERIALS; AND TO CONFIRM THE DEPTH AND COMPACTION OF GRANULAR 'B'
6. PRIOR TO PLACEMENT OF TOPLIFT, THE CONTRACTOR SHALL ADJUST ALL STRUCTURES TO FINAL GRADE PER CITY OF OTTAWA STANDARDS.
7. MINIMUM OF 2% GRADE FOR ALL GRASS AREAS UNLESS OTHERWISE NOTED.
8. MAXIMUM TERRACING GRADE TO BE 3:1 UNLESS OTHERWISE NOTED.
9. ALL GRADES BY CURBS ARE EDGE OF PAVEMENT GRADES UNLESS OTHERWISE INDICATED.
10. ALL CURBS SHALL BE MOUNTABLE CURB UNLESS OTHERWISE NOTED AND CONSTRUCTED PER CITY OF OTTAWA STANDARD (SC1.3).
11. REFER TO LANDSCAPE PLAN FOR PLANTING AND OTHER LANDSCAPE FEATURE DETAILS.

| PONDING | | | | | | | |
|---|---|---|---|---|---|---|---|
| PONDING ID | STRUCTURE | 100 YEAR PONDING ELEVATION | 100 YEAR PONDING DEPTH (m) | 100 YEAR +20% PONDING ELEVATION | 100 YEAR + 20% PONDING DEPTH (m) | MAX STATIC PONDING ELEVATION | MAX STATIC PONDING DEPTH (m) |
| P1 | CB1 | 56.66 | 0.23 | 56.72 | 0.29 | 56.58 | 0.15 |
| P2 | CB2 | 56.63 | 0.25 | 56.70 | 0.32 | 56.53 | 0.15 |
| P3 | CB3 | 56.58 | 0.15 | 56.67 | 0.24 | 56.58 | 0.15 |
| P4 | CB4 | 56.63 | 0.13 | 56.73 | 0.23 | 56.65 | 0.15 |
| P5 | CB5 | 56.72 | 0.16 | 56.78 | 0.22 | 56.71 | 0.15 |
| P6 | CB6 | 59.70 | 0.22 | 56.75 | 0.27 | 56.63 | 0.15 |
| P7 | CB7 | 56.72 | 0.15 | 56.77 | 0.20 | 56.72 | 0.15 |
| P8 | CB8 | 56.76 | 0.21 | 56.80 | 0.25 | 56.70 | 0.15 |
| P9 | CB9 | 56.76 | 0.15 | 56.81 | 0.20 | 56.76 | 0.15 |
| P10 | CB10 | 56.83 | 0.20 | 56.86 | 0.23 | 56.78 | 0.15 |
| P11 | CB11 | 56.86 | 0.19 | 56.89 | 0.22 | 56.82 | 0.15 |
| P12 | CB12 | 56.48 | 0.10 | 56.64 | 0.26 | 56.50 | 0.12 |
| P13 | RYCB4 | 55.89 | 0.24 | 55.93 | 0.28 | 55.90 | 0.25 |
| P14 | LCB2 | 55.89 | 0.24 | 55.91 | 0.26 | 55.80 | 0.15 |
| P15 | LCB3 | 55.84 | 0.29 | 55.88 | 0.33 | 55.75 | 0.20 |
| P16 | LCB4 | 55.69 | 0.19 | 55.78 | 0.28 | 55.70 | 0.20 |
| P17 | LCB5 | 55.66 | 0.21 | 55.73 | 0.28 | 55.65 | 0.20 |
| P18 | RYCB5 | 55.61 | 0.36 | 55.71 | 0.46 | 55.50 | 0.25 |
| P19 | RYCB6 | 55.65 | 0.24 | 55.82 | 0.41 | 55.65 | 0.24 |
| P20 | RYCB3 | 55.85 | 0.26 | 55.87 | 0.28 | 55.75 | 0.16 |
| P21 | LCB1 | 55.86 | 0.20 | 55.88 | 0.22 | 55.85 | 0.19 |




**DETAIL 1 - FLOOD PROOFING (BLOCK 3)**
N.T.S.

**SITE CROSS SECTION**




**SECTION A-A**
HORIZONTAL SCALE 1:300
VERTICAL SCALE 1:60

## PAVEMENT STRUCTURE:

| | |
|---|---|
| 40mm | ASPHALT SP12.5 |
| 50mm | ASPHALT SP19.0 |
| 150mm | GRAN "A" |
| 400mm | GRAN "B" TYPE II |
| 640mm | TOTAL DEPTH |

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parkriver PROPERTIES

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| 1. | ISSUED FOR RVCA REVIEW | MAR 26/20 | MAB |

SCALE 1:250
1:250
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DESIGN DTD
CHECKED LRW
DRAWN DTD
CHECKED LRW
APPROVED MAB

**FOR REVIEW ONLY**

LICENSED PROFESSIONAL ENGINEER L. R. WILSON 100160065 PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER M.A. BISSETT 2021.02.05 PROVINCE OF ONTARIO

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
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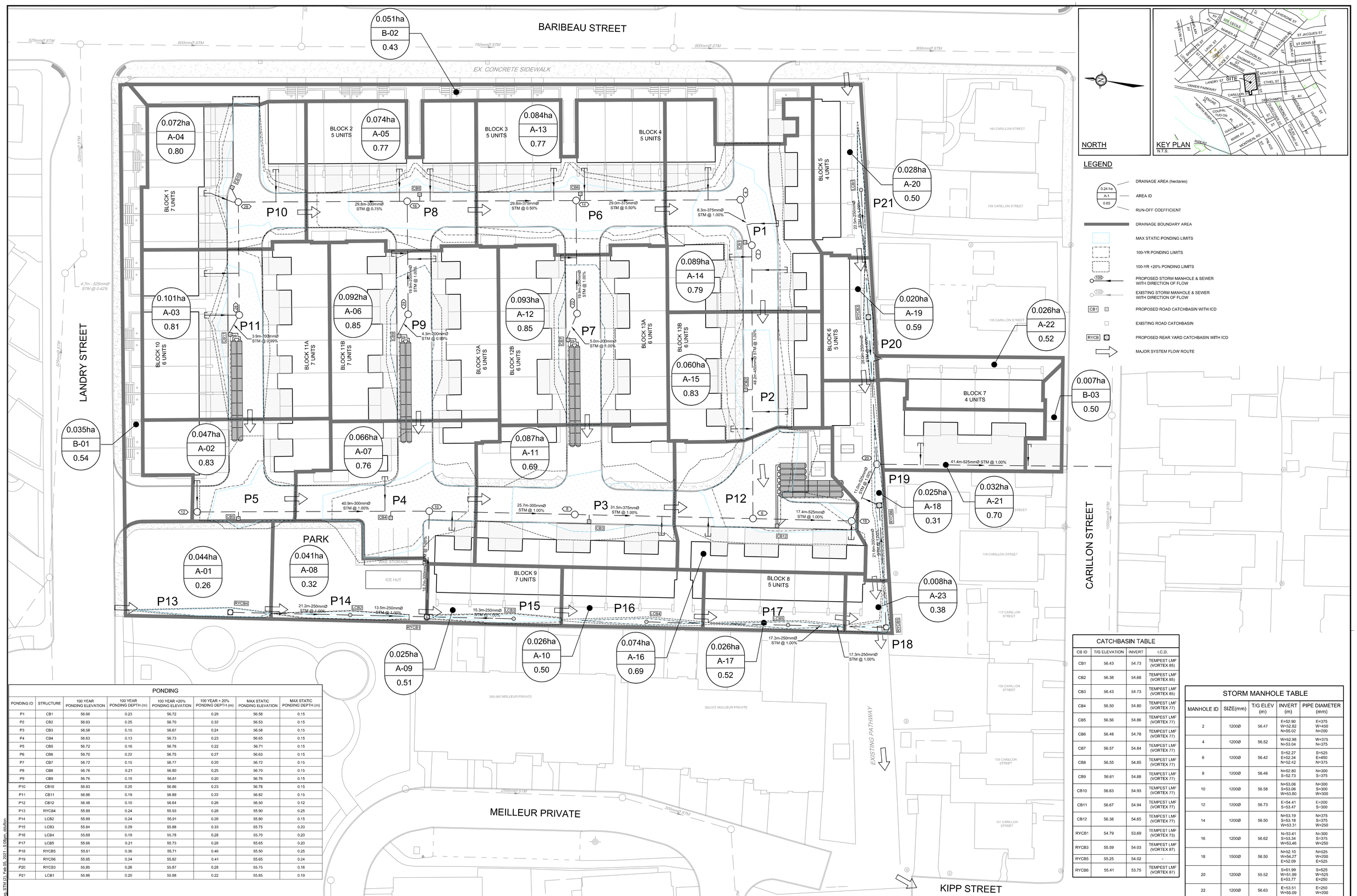
CITY OF OTTAWA
200 BARIBEAU STREET

GRADING PLAN

PROJECT No. 119068
REV REV # 5
DRAWING No. 119068-GR

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PLANEX Online Validation Service




| PONDING | | | | | | | |
|---|---|---|---|---|---|---|---|
| PONDING ID | STRUCTURE | 100 YEAR PONDING ELEVATION | 100 YEAR PONDING DEPTH (m) | 100 YEAR +20% PONDING ELEVATION | 100 YEAR + 20% PONDING DEPTH (m) | MAX STATIC PONDING ELEVATION | MAX STATIC PONDING DEPTH (m) |
| P1 | CB1 | 56.66 | 0.23 | 56.72 | 0.29 | 56.58 | 0.15 |
| P2 | CB2 | 56.63 | 0.25 | 56.70 | 0.32 | 56.53 | 0.15 |
| P3 | CB3 | 56.58 | 0.15 | 56.67 | 0.24 | 56.58 | 0.15 |
| P4 | CB4 | 56.63 | 0.13 | 56.73 | 0.23 | 56.65 | 0.15 |
| P5 | CB5 | 56.72 | 0.16 | 56.78 | 0.22 | 56.71 | 0.15 |
| P6 | CB6 | 59.70 | 0.22 | 56.75 | 0.27 | 56.63 | 0.15 |
| P7 | CB7 | 56.72 | 0.15 | 56.77 | 0.20 | 56.72 | 0.15 |
| P8 | CB8 | 56.76 | 0.21 | 56.80 | 0.25 | 56.70 | 0.15 |
| P9 | CB9 | 56.76 | 0.15 | 56.81 | 0.20 | 56.76 | 0.15 |
| P10 | CB10 | 56.83 | 0.20 | 56.86 | 0.23 | 56.78 | 0.15 |
| P11 | CB11 | 56.86 | 0.19 | 56.89 | 0.22 | 56.82 | 0.15 |
| P12 | CB12 | 56.48 | 0.10 | 56.64 | 0.26 | 56.50 | 0.12 |
| P13 | RYCB4 | 55.89 | 0.24 | 55.93 | 0.28 | 55.90 | 0.25 |
| P14 | LCB2 | 55.89 | 0.24 | 55.91 | 0.26 | 55.80 | 0.15 |
| P15 | LCB3 | 55.84 | 0.29 | 55.88 | 0.33 | 55.75 | 0.20 |
| P16 | LCB4 | 55.69 | 0.19 | 55.78 | 0.28 | 55.70 | 0.20 |
| P17 | LCB5 | 55.66 | 0.21 | 55.73 | 0.28 | 55.65 | 0.20 |
| P18 | RYCB5 | 55.61 | 0.36 | 55.71 | 0.46 | 55.50 | 0.25 |
| P19 | RYCB6 | 55.65 | 0.24 | 55.82 | 0.41 | 55.65 | 0.24 |
| P20 | RYCB3 | 55.85 | 0.26 | 55.87 | 0.28 | 55.75 | 0.16 |
| P21 | LCB1 | 55.86 | 0.20 | 55.88 | 0.22 | 55.85 | 0.19 |

| CATCHBASIN TABLE | | | |
|---|---|---|---|
| CB ID | T/G ELEVATION | INVERT | I.C.D. |
| CB1 | 56.43 | 54.73 | TEMPEST LMF (VORTEX 85) |
| CB2 | 56.38 | 54.68 | TEMPEST LMF (VORTEX 85) |
| CB3 | 56.43 | 54.73 | TEMPEST LMF (VORTEX 85) |
| CB4 | 56.50 | 54.80 | TEMPEST LMF (VORTEX 77) |
| CB5 | 56.56 | 54.86 | TEMPEST LMF (VORTEX 77) |
| CB6 | 56.48 | 54.78 | TEMPEST LMF (VORTEX 77) |
| CB7 | 56.57 | 54.84 | TEMPEST LMF (VORTEX 77) |
| CB8 | 56.55 | 54.85 | TEMPEST LMF (VORTEX 77) |
| CB9 | 56.61 | 54.88 | TEMPEST LMF (VORTEX 77) |
| CB10 | 56.63 | 54.93 | TEMPEST LMF (VORTEX 77) |
| CB11 | 56.67 | 54.94 | TEMPEST LMF (VORTEX 77) |
| CB12 | 56.38 | 54.65 | TEMPEST LMF (VORTEX 77) |
| RYCB1 | 54.79 | 53.69 | TEMPEST LMF (VORTEX 73) |
| RYCB3 | 55.59 | 54.03 | TEMPEST LMF (VORTEX 87) |
| RYCB5 | 55.25 | 54.02 | - |
| RYCB6 | 55.41 | 53.75 | TEMPEST LMF (VORTEX 87) |

| STORM MANHOLE TABLE | | | | |
|---|---|---|---|---|
| MANHOLE ID | SIZE(mm) | T/G ELEV (m) | INVERT (m) | PIPE DIAMETER (mm) |
| 2 | 1200Ø | 56.47 | E=52.90<br>W=52.82<br>N=55.02 | E=375<br>W=450<br>N=200 |
| 4 | 1200Ø | 56.52 | W=52.98<br>N=53.04 | W=375<br>N=375 |
| 6 | 1200Ø | 56.42 | S=52.27<br>E=52.34<br>N=52.42 | S=525<br>E=450<br>N=375 |
| 8 | 1200Ø | 56.46 | N=52.80<br>S=52.73 | N=300<br>S=375 |
| 10 | 1200Ø | 56.58 | N=53.06<br>S=53.06<br>W=53.80 | N=300<br>S=300<br>W=300 |
| 12 | 1200Ø | 56.73 | E=54.41<br>S=53.47 | E=200<br>S=300 |
| 14 | 1200Ø | 56.50 | N=53.19<br>S=53.18<br>W=53.31 | N=375<br>S=375<br>W=250 |
| 16 | 1200Ø | 56.62 | N=53.41<br>S=53.34<br>W=53.46 | N=300<br>S=375<br>W=250 |
| 18 | 1500Ø | 56.50 | N=52.10<br>W=54.27<br>E=52.09 | N=525<br>W=200<br>E=525 |
| 20 | 1200Ø | 55.52 | S=51.99<br>W=51.99<br>E=53.77 | S=525<br>W=525<br>E=250 |
| 22 | 1200Ø | 56.63 | E=53.51<br>W=55.09 | E=250<br>W=200 |

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SCALE 1:250

1:250
0 2 4 6 8 10

DESIGN LRW
CHECKED MAB
DRAWN BRF
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APPROVED MAB

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CITY OF OTTAWA
200 BARIBEAU STREET

DRAWING NAME
STORM DRAINAGE AREA PLAN

PROJECT No. 119068
REV REV # 5
DRAWING No. 119068-STM

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INSTALL TERRAFIX SILT SOXX AT CATCHBASIN (TYP.)

INSTALL TERRAFIX SILT SOXX AT CATCHBASIN (TYP.)

INSTALL TERRAFIX SILT SOXX AT CATCHBASIN (TYP.)

REMOVE CURB & SIDEWALK AT PROPOSED SITE ENTRANCE

INSTALL TERRAFIX SILT SOXX AT CATCHBASIN (TYP.)

REMOVE EXISTING FENCING ALONG BARIBEAU AND LANDRY

REMOVE STEEL POLE

BARIBEAU STREET

EX. CONCRETE SIDEWALK

INSTALL TERRAFIX SILT SOXX AT CATCHBASIN (TYP.)

REMOVE CONCRETE WALKWAY

REMOVE EXISTING TREES (TYP.)

REMOVE FLAG POLE

REMOVE EXISTING STRUCTURE

LANDRY STREET

REMOVE FENCING (TYP.)

REMOVE EXISTING FENCING ALONG 127 CARILLON STREET PROPERTY LINE

REMOVE EXISTING STRUCTURE

REMOVE CURB ALONG LANDRY STREET

REMOVE LIGHT

REMOVE TREES & VEGETATION

REMOVE PLAY STRUCTURES AND SAND BOX

REMOVE FENCING (TYP.)

REMOVE FENCING (TYP.)

REMOVE LIGHT

REMOVE PLAY STRUCTURE AND SAND BOX

REMOVE EXISTING TREES (TYP.)

REMOVE ASPHALT PARKING LOT

REMOVE ASPHALT PARKING LOT

INSTALL TERRAFIX SILT SOXX AT ATCHBASIN (TYP.)

REMOVE LIGHT

REMOVE EXISTING STRUCTURE

REMOVE FENCING (TYP.)

REMOVE CURB AT PROPOSED SITE ENTRANCE

SILT FENCE PER OPSD 219.110

REMOVE EXISTING FENCING ALONG BARIBEAU AND LANDRY

CARILLON STREET

EXISTING PARK

MEILLEUR PRIVATE

EXISTING PATHWAY

143 CARILLON STREET
139 CARILLON STREET
135 CARILLON STREET
121 CARILLON STREET
119 CARILLON STREET
115 CARILLON STREET
109 CARILLON STREET
105 CARILLON STREET
101 CARILLON STREET
350-360 MEILLEUR PRIVATE
362-372 MEILLEUR PRIVATE

NORTH

KEY PLAN
N.T.S.

SITE

LEGEND

- X — REMOVALS
- TERRAFIX SILT SOXX INSTALLED AT CATCH BASIN
- EXISITING GROUND CONTOUR AND LABEL
- SILT FENCE PER OPSD 219.110

## EROSION AND SEDIMENT CONTROL NOTES :

1. ALL EROSION AND SEDIMENT CONTROLS ARE TO BE INSTALLED TO THE SATISFACTION OF THE ENGINEER, THE MUNICIPALITY AND THE CONSERVATION AUTHORITY. THEY ARE TO BE APPROPRIATE TO THE SITE CONDITIONS, PRIOR TO UNDERTAKING ANY SITE ALTERATIONS (FILLING, GRADING, REMOVAL OF VEGETATION, ETC.) AND DURING ALL PHASES OF SITE PREPARATION AND CONSTRUCTION. THESE PRACTICES ARE TO BE IMPLEMENTED IN ACCORDANCE WITH THE CURRENT BEST MANAGEMENT PRACTICES FOR EROSION AND SEDIMENT CONTROL AND SHOULD INCLUDE AS A MINIMUM THOSE MEASURES INDICATED ON THE PLAN.
2. TO PREVENT SURFACE EROSION FROM ENTERING THE STORM SYSTEM DURING CONSTRUCTION, FILTER SOCKS WILL BE PLACED UNDER GRATES OF ALL PROPOSED AND EXISTING CATCHBASINS AND STRUCTURES. THESE CONTROL MEASURES WILL REMAIN IN PLACE UNTIL VEGETATION HAS BEEN ESTABLISHED AND CONSTRUCTION COMPLETE.
3. THE CONTRACTOR SHALL INSTALL MUD MATS AT ALL SITE ENTRANCES (100mm GRANULAR 'B', TYPE II).
4. THE SEDIMENT CONTROL MEASURES SHALL ONLY BE REMOVED WHEN, IN THE OPINION OF THE ENGINEER, THE MEASURES ARE NO LONGER REQUIRED. NO CONTROL MEASURES MAY BE PERMANENTLY REMOVED WITHOUT PRIOR AUTHORIZATION FROM THE ENGINEER.
5. THE CONTRACTOR SHALL IMMEDIATELY REPORT TO THE ENGINEER ANY ACCIDENTAL DISCHARGES OF SEDIMENT MATERIAL INTO ANY DITCH OR STORM SEWER SYSTEM. APPROPRIATE RESPONSE MEASURES, INCLUDING ANY REPAIRS TO EXISTING CONTROL MEASURES OR THE IMPLEMENTATION OF ADDITIONAL CONTROL MEASURES, SHALL BE CARRIED OUT BY THE CONTRACTOR WITHOUT DELAY.
6. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.
7. THE CONTRACTOR SHALL ENSURE PROPER DUST CONTROL IS PROVIDED WITH THE APPLICATION OF WATER (AND IF REQUIRED, CALCIUM CHLORIDE) DURING DRY PERIODS.
8. THE CONTRACTOR SHALL PROTECT ALL SURVEY MONUMENTS.
9. ALL TOPSOIL AND ANY SOFT, WET OR DELETERIOUS MATERIAL SHALL BE REMOVED FROM IMPROVED AREAS UNLESS OTHERWISE DIRECTED BY ENGINEER.

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parkriver PROPERTIES

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SCALE 1:250

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DESIGN DTD
CHECKED LRW
DRAWN DTD
CHECKED LRW
APPROVED MAB

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LICENSED PROFESSIONAL ENGINEER
L. R. WILSON
100160065
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
M.A. BISSETT
2021.02.05
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CITY OF OTTAWA
200 BARIBEAU STREET

REMOVALS &
EROSION AND SEDIMENT
CONTROL PLAN

PROJECT No. 119068
REV REV # 3
DRAWING No. 119068-ESC

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**Appendix D:**

DSS Checklist
Emergency Overland Flow Route Documentation

**200 BARIBEAU STREET, OTTAWA**
**DEVELOPMENT SERVICING STUDY CHECKLIST**

| **4.1 General Content** | **Addressed (Y/N/NA)** | **Comments** |
|---|---|---|
| Executive Summary (for larger reports only). | N/A | |
| Date and revision number of the report. | Y | |
| Location map and plan showing municipal address, boundary, and layout of proposed development. | Y | Refer to Report Figures |
| Plan showing the site and location of all existing services. | Y | Refer to Grading and Servicing Plans |
| Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere. | Y | Refer to Site Plan |
| Summary of Pre-consultation Meetings with City and other approval agencies. | Y | |
| 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. | Y | |
| Statement of objectives and servicing criteria. | Y | Refer to Sections: 5.0 Sanitary Sewers, 6.0 Stormwater Management, 7.0 Water |
| Identification of existing and proposed infrastructure available in the immediate area. | Y | |
| Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available). | N/A | |
| Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighboring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths. | Y | Refer to Grading Plan and Stormwater Management Plan |

**200 BARIBEAU STREET, OTTAWA**
**DEVELOPMENT SERVICING STUDY CHECKLIST**

| **4.1 General Content** | **Addressed (Y/N/NA)** | **Comments** |
|---|---|---|
| Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts. | N/A | |
| Proposed phasing of the development, if applicable. | N/A | |
| Reference to geotechnical studies and recommendations concerning servicing. | Y | Refer to Section 3.0 Grading |
| All preliminary and formal site plan submissions should have the following information: | | |
| Metric scale | Y | |
| North arrow (including construction North) | Y | |
| Key plan | Y | |
| Name and contact information of applicant and property owner | Y | |
| Property limits including bearings and dimensions | Y | |
| Existing and proposed structures and parking areas | Y | |
| Easements, road widening and rights-of-way | Y | |
| Adjacent street names | Y | |

**200 BARIBEAU STREET, OTTAWA**
**DEVELOPMENT SERVICING STUDY CHECKLIST**

| 4.2 Water | Addressed (Y/N/NA) | Comments |
|---|---|---|
| Confirm consistency with Master Servicing Study, if available. | Y | |
| Availability of public infrastructure to service proposed development. | Y | Refer to Sections: 5.0 Sanitary Sewers, 6.0 Stormwater Management, 7.0 Water |
| Identification of system constraints. | N/A | |
| Identify boundary conditions. | Y | Provided by City of Ottawa |
| Confirmation of adequate domestic supply and pressure. | Y | Refer to Appendix A |
| 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. | Y | Refer to Appendix A |
| 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. | Y | Refer to Appendix 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. | Y | |
| 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. | Y | Refer to Section 7.0 Water |
| 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. | Y | Refer to Section 7.0 Water |
| 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. | Y | Refer to Section 7.0 Water |
| Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference. | N/A | |

| **4.3 Wastewater** | Addressed (Y/N/NA) | **Comments** |
|---|---|---|
| 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). | Y | Refer to Section 5.0 Sanitary Sewers |
| Confirm consistency with Master Servicing Study and/or justifications for deviations. | N/A | |
| Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers. | N/A | |
| Description of existing sanitary sewer available for discharge of wastewater from proposed development. | Y | Refer to Section 5.0 Sanitary Sewers |
| 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) | y | Refer to Appendix A |
| Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format. | N/A | |
| Description of proposed sewer network including sewers, pumping stations, and forcemains. | Y | Refer to Section 5.0 Sanitary Sewers |
| 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 | |
| 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 Stormwater** | **Addressed (Y/N/NA)** | **Comments** |
|---|---|---|
| Description of drainage outlets and downstream constraints including legality of outlet (i.e. municipal drain, right-of-way, watercourse, or private property). | Y | Refer to Section 6.0 Stormwater Management |
| Analysis of the available capacity in existing public infrastructure. | Y | Refer to Appendix A |
| A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns and proposed drainage patterns. | Y | Refer to Storm Drainage Area Plan (119068-STM) |
| 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. | Y | Refer to Section 6.0 Stormwater Management |
| Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements. | Y | Refer to Section 6.0 Stormwater Management |
| Description of stormwater management concept with facility locations and descriptions with references and supporting information. | Y | Refer to Section 6.0 Stormwater Management |
| 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 calcs) and conveyance capacity for 5 yr and 100 yr events. | Y | Refer to Appendix B |
| Identification of watercourse 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. | Y | Refer to Appendix B |
| 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 SWM 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 | |

| **4.4 Stormwater** | **Addressed (Y/N/NA)** | **Comments** |
|---|---|---|
| Identification of potential impacts to receiving watercourses. | N/A | |
| Identification of municipal drains and related approval requirements. | N/A | |
| Description of how the conveyance and storage capacity will be achieved for the development. | Y | Refer to Section 6.0 Stormwater Management |
| 100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading. | Y | Refer to Grading Plan and Storm Drainage Area Plan |
| Inclusion of hydraulic analysis including HGL elevations. | N/A | |
| Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors. | Y | Refer to Section 4.0 Erosion Sediment Control |
| 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 constrains related to floodplain and geotechnical investigation. | N/A | |

| **4.5 Approval and Permit Requirements** | **Addressed (Y/N/NA)** | **Comments** |
|---|---|---|
| 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 Act. 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. | N/A | |
| 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** | **Addressed (Y/N/NA)** | **Comments** |
|---|---|---|
| Clearly stated conclusions and recommendations. | Y | Refer to Section 8.0 Conclusions and Recommendations |
| 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. | Y | |
| All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario. | Y | |

# M E M O R A N D U M

**DATE:** **MAY 4, 2020** **PROJECT: 119068**

**TO:** **ERIC TOUSIGNANT, HIRAN SANDANAYAKE**

**FROM:** **MARK BISSETT, LUCAS WILSON, CONRAD STANG**

**RE:** **200 BARIBEAU STREET – SWM MODELLING**

**CC:** **KEVIN MCMAHON, PIERRE BOULET, JOHN RIDDELL**

Novatech has updated our drainage model to quantify major overland flow routed through the planned development at 200 Baribeau Street. Before we finalize the Concept Plan and expend significant design effort, we request a staff review of the model so we might find consensus on the overland flow accommodation. The magnitude of conveyance informs how we design the site.

Using City 1:1000 topographic mapping we have delineated the drainage boundaries (shown on Figures DSK-2A and 2B) with excellent correlation to the DRAPE 2014 Lidar mapping. There are two overland flow parcels that need consideration and are described below:

Area 1: East of Baribeau Street

There is a large 616ha drainage catchment to the east. Our analysis shows the majority of this parcel is located in a bowl and does not produce overland flow towards 200 Baribeau under any reasonable design storm (we assessed up to the 100-year+20% rainfall event). As such, the effective drainage area contributing overland flow from the east is 29.0ha.

Using the City-suggested criteria a minor system capture rate of 85L/s/ha and surface storage of 100m$^3$/ha we calculate overland flow of $Q_{100}$=1,650L/s at Baribeau Street. Interestingly, only minor adjustments to either parameter lower the overland flow at Baribeau Street to $Q_{100}$=0L/s. We tested model sensitivity by adjusting the inlet capture rate to 100L/s/ha and the surface storage to 125m$^3$/ha. In our opinion, these values are more representative of actual conditions as we understand there is no ICD control, and the topographic modelling supports the increased surface storage.

In all likelihood, we think there will be no overland flow from this upstream area during a 100-year rainfall event due to the probable inlet capture rate and available surface storage. Regardless, we see value in an emergency overland flow route as protection against extreme weather events and/or inlet capture obstruction.

Area 2: Northwest of Landry Street

There is a 6.6ha drainage catchment northwest of the development site with overland flow routed to a parkette on Landry Street (part of a recent development by Claridge Homes). Using a minor system capture rate of 85L/s/ha and surface storage of 100m$^3$/ha we calculate overland flow of $Q_{100}$=190L/s. Civil design plans indicate the major system flow from Landry Street is routed through the parkette and residential rear yards toward Kipp Street. Novatech will obtain

the as-built design plans and servicing report to confirm the intended conveyance along this corridor.

Similar to Area 1, the modelled overland flow drops to $Q_{100}$=0L/s if either of the SWM parameters are modified to reflect the anticipated real-world conditions (i.e. inlet capture of 100L/s/ha, or surface storage of 125$m^3$/ha). Our conclusion is that Area 2 will not likely experience overland flow from the upstream drainage area during a 100-year design storm. Regardless, a prudent design will provide an emergency overland flow route as protection against extreme events.

Next Steps

In closing, we respectfully ask staff to review our SWM model so we might find a mutually acceptable overland conveyance rate through the development for both Area 1 and Area 2. This value is required to finalize the development concept, design the flow route, and make our submission to the City and RVCA.

Hoping the above is agreeable. Please call with any question or concerns.
Respectfully submitted.

## Lucas Wilson

**From:** Tousignant, Eric <Eric.Tousignant@ottawa.ca>
**Sent:** Tuesday, June 2, 2020 1:47 PM
**To:** Mark Bissett
**Cc:** Sandanayake, Hiran; Lucas Wilson; Conrad Stang
**Subject:** RE: 200 Baribeau - Community Model

Hi Mark

Given that this is an emergency route and not part of the 100 year design, and not even part of the 20% stress test, I would not be concerned about including it in your final report if you fear it could be an issue. This was more as a check on our part to make sure that should any flow spill onto the property that it could be conveyed to the channel at the rear. This was important because the only way flow will get to the channel is through the property as it cannot spill around it. You have shown that the property can convey 900 L/s should there be some kind of major system spill (i.e. blockage or even less than anticipated storage in the upstream sewershed). It is not our intent to designate this property as an overland flow route, but it is good to know that should it be required, flow can safely make it to the channel.

In short, I am fine with the approach you have taken.

Eric

*Eric Tousignant, P.Eng.*
Senior Water Resources Engineer
Infrastructure Services
613-580-2424 ext 25129

---

**From:** Mark Bissett <m.bissett@novatech-eng.com>
**Sent:** May 29, 2020 2:28 PM
**To:** Tousignant, Eric <Eric.Tousignant@ottawa.ca>
**Cc:** Sandanayake, Hiran <Hiran.Sandanayake@ottawa.ca>; Lucas Wilson <l.wilson@novatech-eng.com>; Conrad Stang <c.stang@novatech-eng.com>
**Subject:** 200 Baribeau - Community Model

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**Eric**- I think we've developed a reasonable solution, but want to bounce this off your team one last time. Here's our approach:

1) **Existing Conditions**: overland flow from Baribeau Street is routed through the existing school site. We suspect this does not occur during any design storm up to the 100-year+20% event (based on previous modelling), but

agree allowance should be made for safety. The spill point is an access road at elevation 56.00m between the school and garage at 143 Carillon Street. Using the broad-crested weir equation, we calculated flow for various water levels (see PDF-Existing). The trick of course is choosing an appropriate max. spill elevation. We think 56.15m is a reasonable peak water level, as higher elevations suggest extensive community flooding…to our knowledge this is not occurring. At 56.15m there is an emergency overland flow of Q=908L/s through the existing school block and pathway to Kipp Street (same discharge point as the 100 Landry development).

2) **Proposed Conditions**: provide an equivalent emergency overland flow (Q>908L/s) through the proposed development with a maximum water level of 56.15m on Baribeau. It appears this can be achieved…we would prepare a detailed model as part of the submission, but for now using a broad-crested weir at the Baribeau spill point and Manning's open channel through the rear yards suggest about 1,000L/s can be conveyed (see PDF-Proposed).

Hoping your team can advise if you generally agree with this approach. My risk here is that we complete a detail design, submit to RVCA for a Fill Permit (has to go to Executive Committee), and then it all blows up because of the off-site overland flow conveyance. Totally respect that your not giving approval…just guidance.
Thanking you in advance, have a great weekend, and my apologies for the long email. Best,

**Mark Bissett**, P.Eng., Senior Project Manager | Land Development & Municipal
**NOVATECH** Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext: 237 | Cell: 613.261.4792
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**From:** Tousignant, Eric <Eric.Tousignant@ottawa.ca>
**Sent:** Tuesday, May 5, 2020 10:59 AM
**To:** Mark Bissett <m.bissett@novatech-eng.com>
**Cc:** Sandanayake, Hiran <Hiran.Sandanayake@ottawa.ca>; Conrad Stang <c.stang@novatech-eng.com>; Lucas Wilson <l.wilson@novatech-eng.com>; Pierre Boulet (Boulet) <pierreb@bouletconstruction.com>; Kevin McMahon <kevin@ulra.ca>; John Riddell <J.Riddell@novatech-eng.com>
**Subject:** RE: 200 Baribeau - Community Model

Hi Mark

Your analysis appears to be reasonable and in line with previous assessments done in this area. What I would require though, is for you to show that should there be excess external major system flow (i.e due to CB blockages for example), that this flow could be routed through the property to the ditch that was create for the 100 Landry street Development (i.e. emergency overflow route).

Eric

*Eric Tousignant, P.Eng.*
Senior Water Resources Engineer
Infrastructure Services
613-580-2424 ext 25129

**From:** Mark Bissett <m.bissett@novatech-eng.com>
**Sent:** May 04, 2020 12:52 PM
**To:** Tousignant, Eric <Eric.Tousignant@ottawa.ca>
**Cc:** Sandanayake, Hiran <Hiran.Sandanayake@ottawa.ca>; Conrad Stang <c.stang@novatech-eng.com>; Lucas Wilson <l.wilson@novatech-eng.com>; Pierre Boulet (Boulet) <pierreb@bouletconstruction.com>; Kevin McMahon <kevin@ulra.ca>; John Riddell <J.Riddell@novatech-eng.com>
**Subject:** 200 Baribeau - Community Model

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**Eric**- kindly refer to the attached memo and SWM model for the 200 Baribeau development site.
We're hoping to establish consensus on a reasonable overland conveyance from two upstream parcels that are routed through this site.
We appreciate staff input and assistance with this matter. Sincerely,

**Mark Bissett**, P.Eng., Senior Project Manager | Land Development & Municipal
**NOVATECH** Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext: 237 | Cell: 613.261.4792
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**From:** Tousignant, Eric <Eric.Tousignant@ottawa.ca>
**Sent:** Monday, April 6, 2020 10:48 AM
**To:** Mark Bissett <m.bissett@novatech-eng.com>
**Subject:** FW: 200 Baribeau - Community Model

Hi Mark

Below is a rough idea of the entire overland drainage system that goes through the Property. As you can see, it is very large. Back in 2006-2007, I did a high level estimate of the flow reaching the property just to the west (100 Landry). I have attached some old emails about this. The 100 year estimate was quite high but IBI created a ditch on the property to take the upstream flow. I'm sure that if a more detailed model was created that we would have a lower peak flow, but that would be a huge undertaking at this time.

Now if you only want to account for the 2.2 ha area area, I would do a lumped rational method computation for the 100 year and subtract the 2 year. This should give you a good idea of the overland flow from the 2.2 ha area.

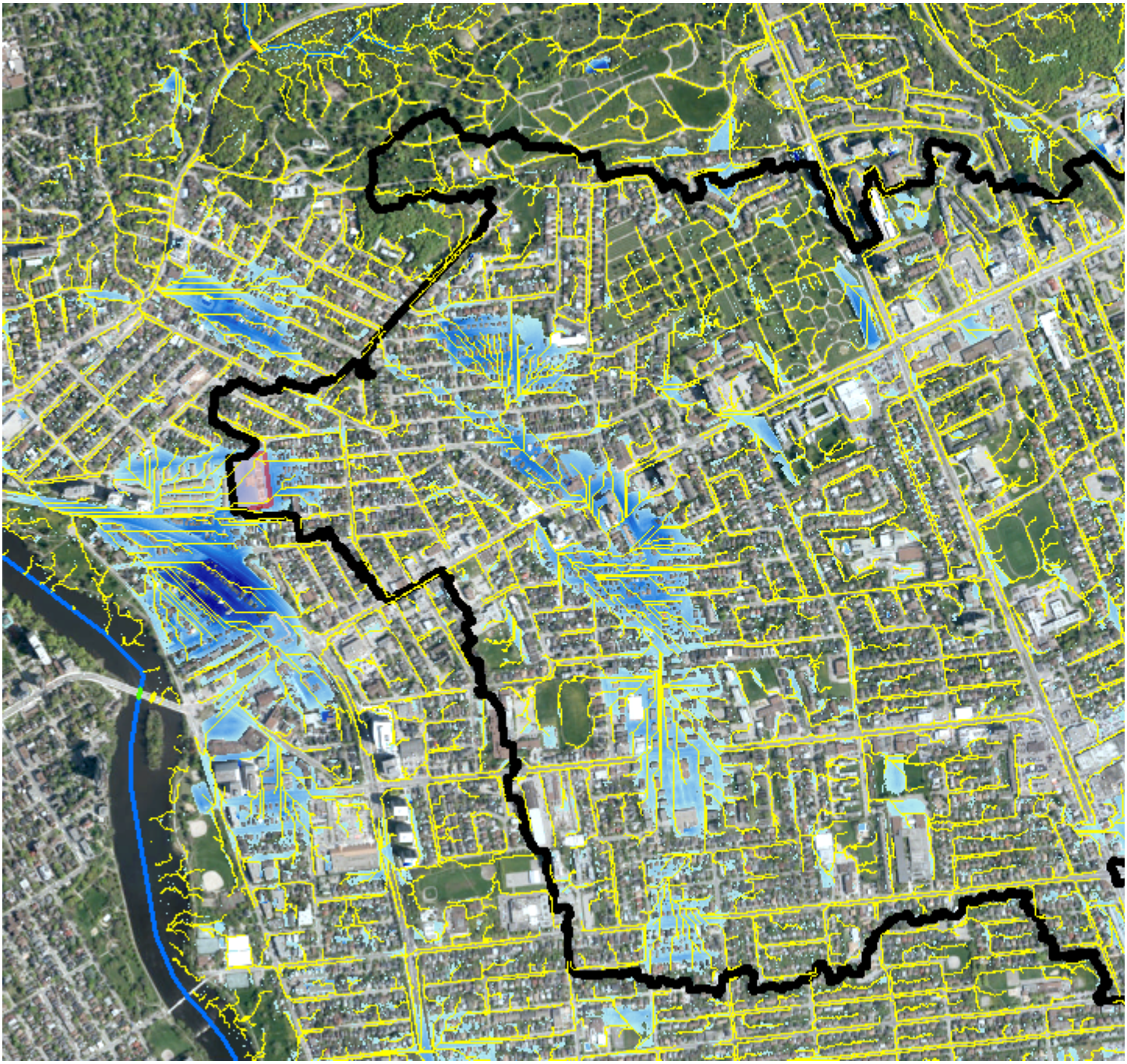
Eric

*Eric Tousignant, P.Eng.*
Senior Water Resources Engineer
Infrastructure Services
613-580-2424 ext 25129

**From:** Cooke, Ryan <ryan.cooke@ottawa.ca>
**Sent:** April 03, 2020 5:48 PM
**To:** Tousignant, Eric <Eric.Tousignant@ottawa.ca>
**Cc:** Sandanayake, Hiran <Hiran.Sandanayake@ottawa.ca>
**Subject:** RE: 200 Baribeau - Community Model

Hi Eric,

Our DEM/streams show that the upstream area is very large, as shown below ('major' upstream drainage area shown, drainage area to low point would be larger).



Although not all this drainage area would make its way to the site, the stream lines are also not accurate in this location because it's in a low point.



Unfortunately we don't have a major system model that can provide hydrographs.

Maybe we can discuss further next week?

Thanks,

Ryan

---

**From:** Tousignant, Eric <Eric.Tousignant@ottawa.ca>
**Sent:** April 02, 2020 1:27 PM
**To:** Sandanayake, Hiran <Hiran.Sandanayake@ottawa.ca>; Cooke, Ryan <ryan.cooke@ottawa.ca>
**Subject:** FW: 200 Baribeau - Community Model

Gentlemen

Mark Bisette at Novatech is looking at a redevelopment project at 200 Baribeau in Vanier. The attached figure shows a drainage area of approximately 2.2 ha that goes through the site, but I wonder if this was not determined with a high Level DEM. What does our more detailed DEM show? Does it go through the site or does it follow Baribeau Street. If it does go thought the site, do we have major system flow/hydrograph and this location from the Major system model?

Thanks
Eric

---

**From:** Mark Bissett <m.bissett@novatech-eng.com>
**Sent:** March 30, 2020 10:39 AM
**To:** Tousignant, Eric <Eric.Tousignant@ottawa.ca>

**Cc:** Conrad Stang <c.stang@novatech-eng.com>
**Subject:** 200 Baribeau - Community Model

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**Eric**- I'm working on a preliminary design for a site at 200 Baribeau Street in Vanier. The site is currently a private school, which the developer intends to convert to residential units. As part of our preliminary design, it appears that external major system roadway flow is routed through the private site from both the north (10ha parcel near Landry Street & St. Ambroise Avenue) and from the east (25ha parcel near Baribeau Street & Ethel Street). The drainage areas are depicted on the attached Figure DSK-2, generated using the DRAPE 2014 elevation model.

Does the City have modelling information that can be shared to help quantify overland flow conveyed via each upstream parcel? We'd need the catchbasin info and ICD controls (if any), and roadway depression storage. Not sure if this is available…we'd really appreciate any modelling staff might be able to share, or guidance on your experience in this community.

Hope you are keeping well. Stay safe, all the best.

**Mark Bissett**, P.Eng., Senior Project Manager | Land Development & Municipal
**NOVATECH** Engineers, Planners & Landscape Architects
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NOVATECH
Engineers, Planners & Landscape Architects

JOB NO. 119068

# 200 BARIBEAU
# EXISTING CONDITIONS
# BROAD CRESTED WEIR

**Broad Crested Weir**

$Q\ (m^3/s) = C \times L \times H^{(3/2)}$

| | |
|---|---|
| **Weir Coefficeint** | 1.84 |
| **Bottom Width (m)** | 8.5 |
| **Bottom of Weir Elevation (m)** | 56.00 |

| Water Level Elevation | Flow Rate Over Weir | | Surface Storage |
|---|---|---|---|
| (m) | ($m^3/s$) | (L/s) | ($m^3$) |
| 56.00 | 0.000 | 0.0 | 1015 |
| 56.05 | 0.175 | 174.9 | 1340 |
| 56.10 | 0.495 | 494.6 | 1700 |
| 56.15 | 0.909 | 908.6 | 2075 |
| 56.20 | 1.399 | 1398.9 | 2500 |
| 56.25 | 1.955 | 1955.0 | 2950 |
| 56.30 | 2.570 | 2569.9 | 3500 |

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JOB NO. 119068

## 200 BARIBEAU
## PROPOSED CONDITIONS
## BROAD CRESTED WEIR

**Broad Crested Weir**

**$Q\ (m^3/s) = C \times L \times H^{(3/2)}$**

| | |
|---|---|
| **Weir Coefficeint** | 1.84 |
| **Bottom Width (m)** | 10.3 |
| **Bottom of Weir Elevation (m)** | 56.00 |

| **Water Level Elevation** | **Flow Rate Over Weir** | |
|---|---|---|
| **(m)** | **($m^3/s$)** | **(L/s)** |
| 56.00 | 0.000 | 0.0 |
| 56.05 | 0.212 | 211.9 |
| 56.10 | 0.599 | 599.3 |
| 56.15 | 1.101 | 1101.0 |
| 56.20 | 1.695 | 1695.1 |
| 56.25 | 2.369 | 2369.0 |
| 56.30 | 3.114 | 3114.1 |

## 200 BARIBEAU
## PROPOSED CONDITIONS
## BLOCK 5 & 6 REARYARD
## CONVEYANCE -
## MANNINGS EQUATION

Flat bottom ditch

| | | |
|---|---|---|
| Depth | m | 0.31 |
| Bottom Width | m | 4.00 |
| Side slopes | 1 to X | 1 |
| Top Width | m | 4.62 |
| Area | $m^2$ | 1.336 |
| Perimeter | m | 4.88 |
| R=A/P | m | 0.27 |
| n | | 0.040 |
| Slope | m/m | 0.005 |
| $Q_{max}$ | $m^3/s$ | 0.996 |
| $V_{max}$ | m/s | 0.746 |

Prepared By:
NOVATECH
Date: 5/28/2020