NOVATECH

Engineers, Planners & Landscape Architects

Engineering

- Land / Site Development
- Municipal Infrastructure
- Environmental / Water Resources
- Traffic / Transportation
- Structural
- Recreational

Planning

- Land / Site Development
- Planning Application Management
- Municipal Planning Documents & Studies
- Expert Witness (OMB)
- Wireless Industry

Landscape Architecture

- Urban Design & Streetscapes
- Open Space, Parks & Recreation Planning
- Community & Residential Developments
- Commercial & Institutional Sites
- Environmental Restoration

37 Years

200 Baribeau Street
Ottawa, Ontario

Servicing Design Brief

Engineering excellence. Planning precision. Inspired landscapes.

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

Novatech File: 119068
Ref: R-2020-104

NOVATECH
Engineers, Planners & Landscape Architects

August 24, 2020

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

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

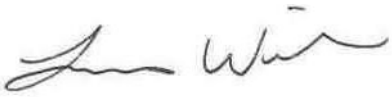
Reference: **200 Baribeau Street**
Servicing Design Brief
Our File No.: 119068

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

M:\2019\119068\DATA\REPORTS\SERVICING\2020.08.24 SITE SERVICING.DOCX

TABLE OF CONTENTS

List of Tables

List of Figures

Appendices

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. **Figure 1** shows the location of the development lands.

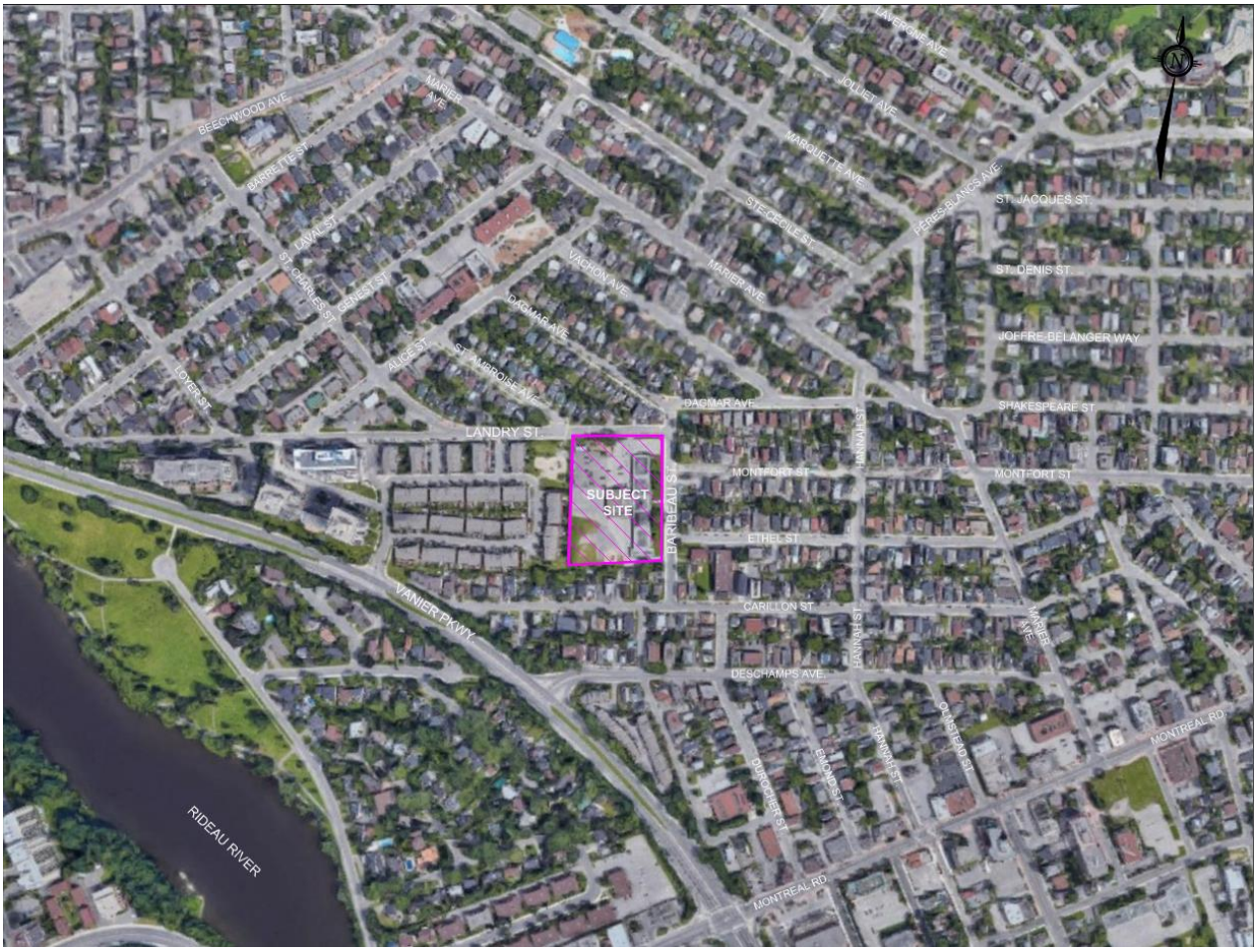


Figure 1: Key Plan

The proposed site is approximately 1.27ha 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 eleven townhome buildings with a total of 92 units. The proposed Site Plan is shown below in **Figure 2**.

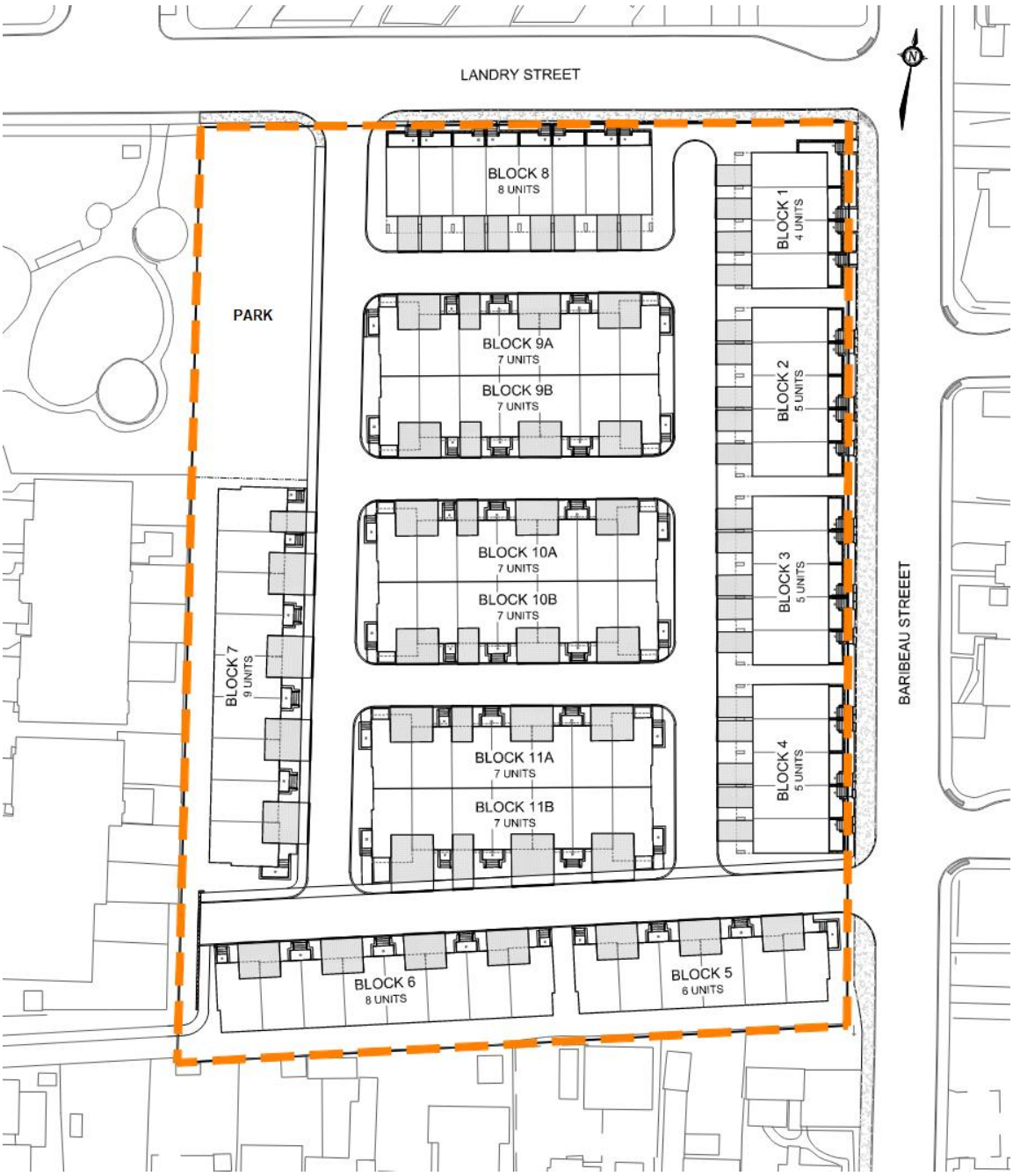


Figure 2: Site Plan

2.0 ROADWAYS

2.1 Existing Conditions

Currently the site can be accessed from Landry Street and Baribeau Street, both 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 and Baribeau 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 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.

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 96.44m;

- 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 and Baribeau Street will tie into the back of curb and existing back of sidewalk. The rear-yards of Blocks 5, 6 and 7 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 250mm diameter sanitary sewer in Baribeau Street. The sanitary sewer layout is shown on 119068-GP (**Appendix C**), and the design sheet is attached in **Appendix A**. The site (approx. 1.27ha) will outlet at MH 1 (Baribeau Street site entrance) with a peak design flow of 3.1 L/s. The wastewater flow is routed through the sanitary sewer system in Baribeau Street to the 750mm diameter trunk sanitary sewer in Carillon Street.

Table 5-1: Proposed Sanitary Sewer Design Parameters

Parameter	Design Parameter
Town Unit Population	2.7 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 proposed peak design flow of 3.1 L/s represents an increase of 2.4 L/s being directed to the existing sanitary sewer system in Baribeau Street. The attached sanitary design sheet in **Appendix A** shows the available capacity in the 250mm diameter sanitary sewer in Baribeau Street at the point of connection. With the additional flows from the site, there is still adequate capacity remaining in the existing sanitary sewer as the Q/Q_{FULL} is at 26%.

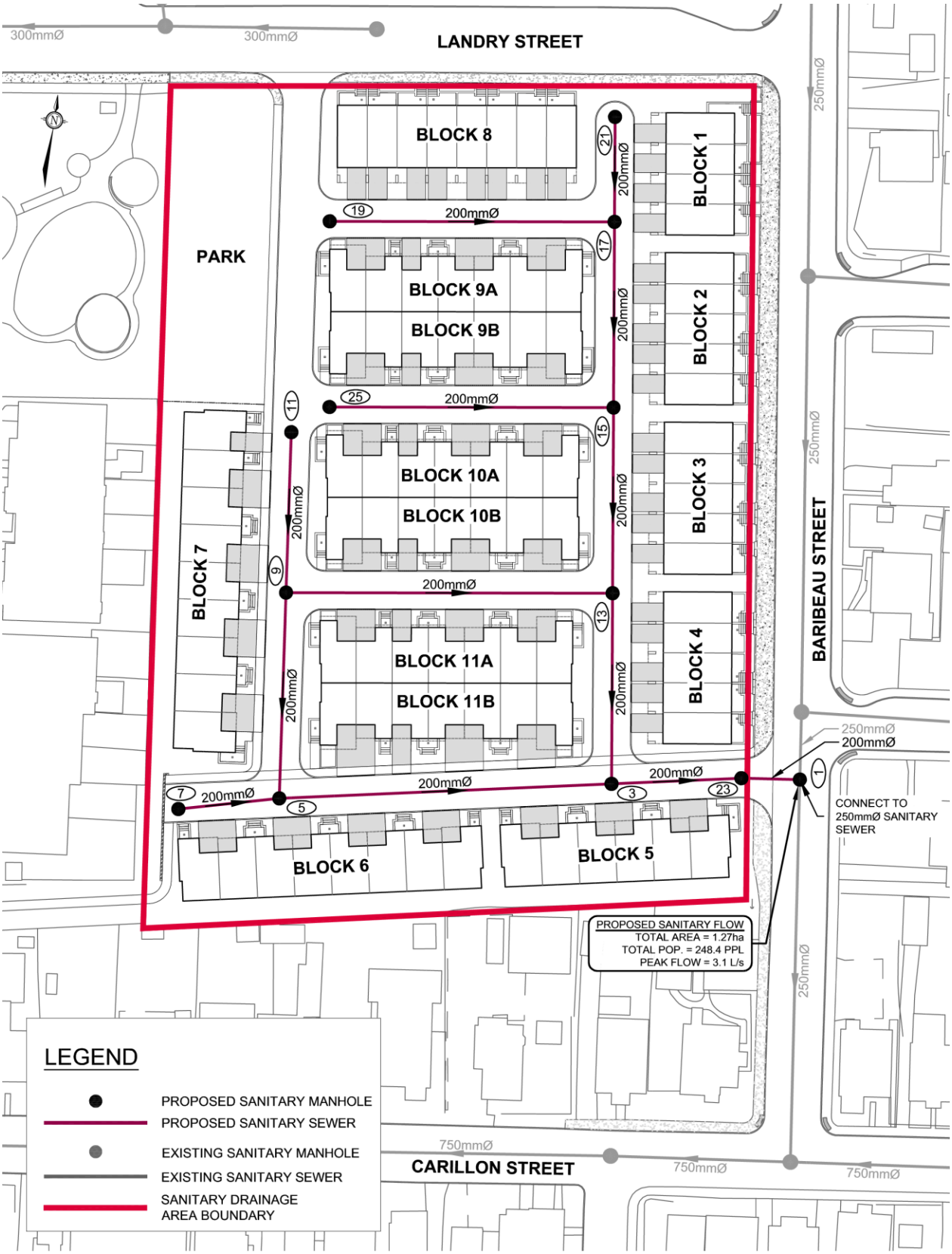


Figure 3: Sanitary Sewer Network

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 Baribeau 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
    - 1.27 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 135.6 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 and storm sewers ranging from 600mm to 900mm are located within Baribeau Street.

6.3 Proposed Conditions

Catch basins located within the private roadway and landscaped areas will be controlled with inlet control devises (ICDs). Runoff from the site will be routed to the 900mm diameter storm sewer in Baribeau Street near the intersection of Ethel 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-740 storage chambers to contain the 100-year storm on-site.

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 Baribeau 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 119063-STM) is provided in **Appendix C**.

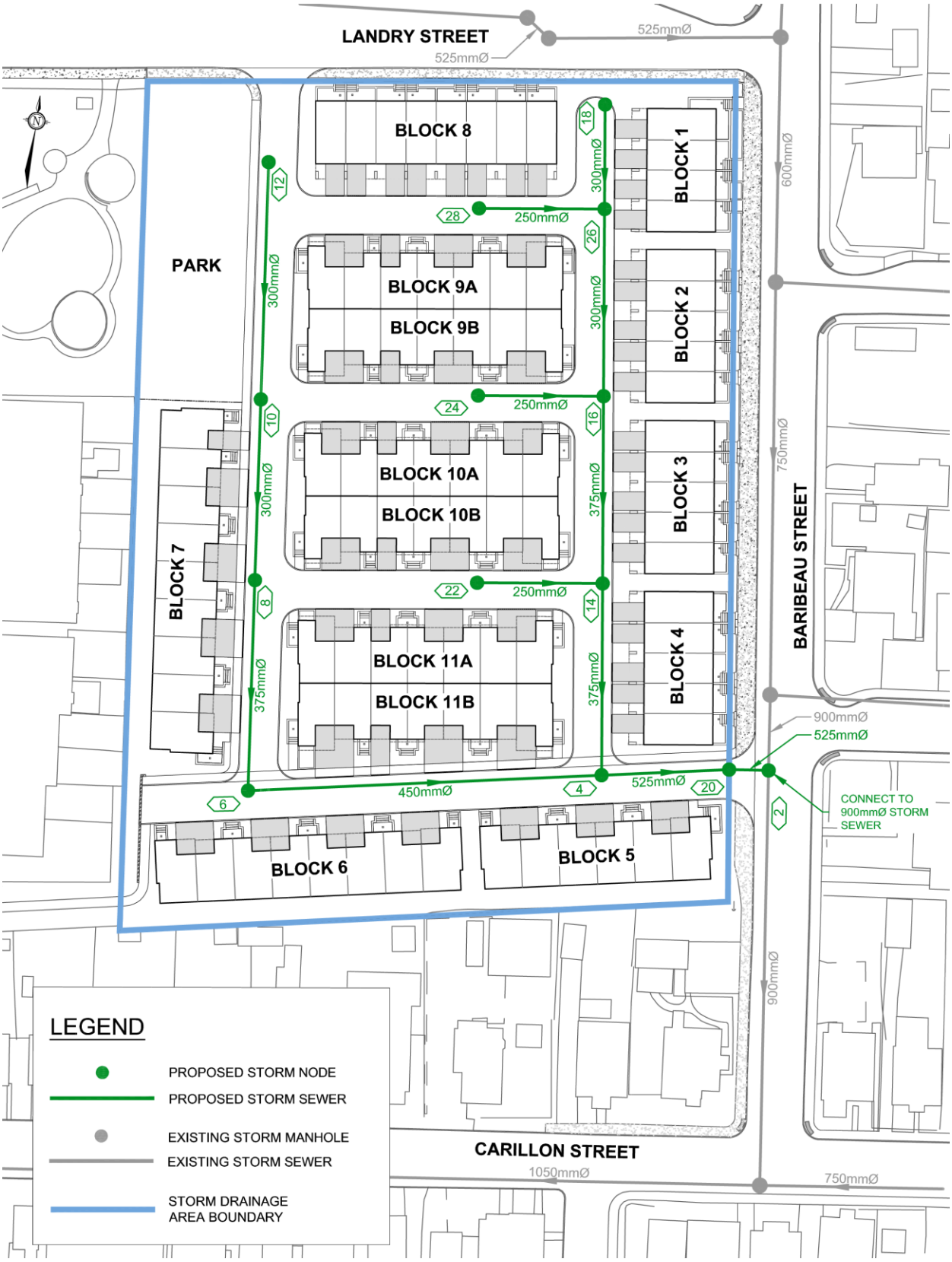


Figure 4: Storm Sewer Network

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 existing pathway easement in the southwest corner of the site leading to Kipp Street. The roadway and landscaped areas have 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 Block 7 for Landry Street and through the rear-yards of Block 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 (%)
A01	0.043	0.40	28	0	15	29	0.5
A02	0.045	0.83	90	30	15	30	0.5
A03	0.102	0.79	84	65	15	68	0.5
A04	0.079	0.71	73	50	10	79	0.5
A05	0.073	0.78	82	50	10	73	0.5
A06	0.093	0.80	86	60	10	93	0.5
A07	0.066	0.80	86	30	15	44	0.5
A08	0.042	0.40	29	0	15	28	0.5
A09	0.023	0.48	40	95	10	23	0.5
A10	0.028	0.53	46	95	10	28	0.5
A11	0.089	0.80	85	35	15	59	0.5
A12	0.091	0.82	88	60	15	61	0.5

Area ID	Catchment Area (ha)	Runoff Coefficient (C)	Percent Impervious (%)	Zero Imperv. (%)	Flow Length (m)	Equivalent Width (m)	Average Slope (%)
A13	0.086	0.74	77	55	10	86	0.5
A14	0.091	0.79	85	45	15	61	0.5
A15	0.082	0.80	85	40	10	82	0.5
A16	0.064	0.78	83	25	15	43	0.5
A17	0.008	0.36	23	35	10	8	0.5
A18	0.031	0.58	55	95	10	31	0.5
A19	0.019	0.53	47	95	10	19	0.5
A20	0.027	0.51	44	95	10	27	0.5
A21	0.005	0.36	23	35	10	5	0.5
B1	0.027	0.54	49	0	10	27	2
B2	0.052	0.43	33	0	10	52	2
TOTAL	**1.27 ha**	**0.75**	**79%**	**-**	**-**	**-**	**-**

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 surves. Refer to **Appendix B** for additional details.

Underground Storage

Underground storage will be provided using StormTech STC-740 (arch type) storage chambers connected to CBs 7, 9, 11 and 12. The underground storage chambers are required to prevent major system flow from being directed off-site.

The StormTech STC-740 chambers have the following dimensions:

- Stone foundation depth = 150mm (min)
- Stone cover = 150mm (min)
- Stone porosity = 40%
- Size (L x W x H) = 2170mm x 1295mm x 762mm
- Chamber / minimum installed storage = 1.30 m^3 / 2.12 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 STC-740 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-740 Storage Chambers
			Underground[1]	Surface[2]	TOTAL	
Catchbasins within Private Roadway						
CB01	A14	0.15	-	15.0	15.0	-
CB02	A25	0.15	-	10.9	10.9	-
CB03	A11	0.15	-	19.1	19.1	-
CB04	A07	0.15	-	13.3	13.3	-
CB05	A02	0.15	-	8.3	8.3	-
CB06	A13	0.15	-	13.5	13.5	-
CB07	A12	0.15	21.2	12.8	34.0	8

Structure ID	STM Area ID	Max Static Ponding Depth (m)	Storage Provided (m^3)			Number of StormTech STC-740 Storage Chambers
			Underground[1]	Surface[2]	TOTAL	
CB08	A05	0.15	-	11.3	11.3	-
CB09	A06	0.15	21.2	12.8	34.0	8
CB10	A04	0.15	-	14.3	14.3	-
CB11	A03	0.15	21.2	13.1	34.3	8
CB12	A16	0.12	32.7	9.0	41.7	12

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 135.6 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 86)	56.43	55.03	1.63	7.7	7.8	8.1
CB02	Tempest LMF (Vortex 86)	56.38	54.98	1.66	7.7	7.8	8.2
CB03	Tempest LMF (Vortex 86)	56.43	55.03	1.55	8.0	8.0	8.2

CB04	Tempest LMF (Vortex 78)	56.50	55.10	1.55	6.3	6.4	6.6
CB05	Tempest LMF (Vortex 78)	56.56	55.16	1.53	6.3	6.4	6.5
CB06	Tempest LMF (Vortex 78)	56.48	55.08	1.62	6.4	6.5	6.7
CB07	Tempest LMF (Vortex 71)	56.57	54.87	1.83	3.6	4.0	6.0
CB08	Tempest LMF (Vortex 78)	56.55	55.15	1.6	6.4	6.4	6.7
CB09	Tempest LFM (Vortex 71)	56.61	54.91	1.84	3.6	4.0	6.1
CB10	Tempest LMF (Vortex 78)	56.63	55.23	1.59	6.4	6.4	6.6
CB11	Tempest LMF (Vortex 71)	56.67	54.97	1.86	3.7	4.1	6.1
CB12	Tempest LMF (Vortex 71)	56.38	54.68	1.81	2.8	3.2	6.0
RYCB1	Tempest LMF (Vortex 78)	55.80	53.99	1.79	3.9	4.9	7.1
RYCB2	Tempest LMF (Vortex 78)	55.61	53.98	1.55	2.5	3.2	6.6
RYCB3	Tempest LMF (Vortex 70)	55.59	53.45	2.17	4.0	4.6	6.3

**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 135.6 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 20 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 33 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	56.64	0.26	Y	0.11
CB03	56.43	56.58	0.15	56.58	0.15	N	0.00
CB04	56.50	56.65	0.15	56.65	0.15	N	0.00
CB05	56.56	56.71	0.15	56.69	0.13	N	0.00
CB06	56.48	56.63	0.15	56.70	0.22	Y	0.07
CB07	56.57	56.72	0.15	56.70	0.13	N	0.00
CB08	56.55	56.70	0.15	56.75	0.20	Y	0.05
CB09	56.61	56.76	0.15	56.75	0.14	N	0.00
CB10	56.63	56.78	0.15	56.82	0.19	Y	0.04
CB11	56.67	56.82	0.15	56.83	0.16	Y	0.01
CB12	56.38	56.50	0.12	56.49	0.11	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	0:26	0:46	1:30
CB2	0:22	0:39	1:16
CB3	0:25	0:43	1:36
CB4	0:20	0:37	1:27
CB5	0:05	0:19	0:52
CB6	0:28	0:49	1:36
CB7	0:00	0:00	1:19
CB8	0:22	0:41	1:24
CB9	0:00	0:00	1:20
CB10	0:21	0:40	1:29
CB11	0:00	0:00	1:37
CB12	0:00	0:00	0:51

*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 not 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 0.30m is provided between the 100-year HGL and the designed underside of footing elevations. The 100-year HGL elevations at each storm manhole with respect to the lowest adjacent underside of footing 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 USF (m)	Clearance (100yr) (m)
MH02	52.68	55.72	53.21	55.03	1.82
MH04	52.74	56.51	53.24	55.03	1.79
MH06	52.92	56.44	53.25	54.98	1.73
MH08	53.08	56.45	53.28	55.13	1.85
MH10	53.25	56.54	53.37	55.13	1.76
MH12	53.38	56.75	53.45	55.20	1.75
MH14	52.96	56.50	53.26	55.05	1.79
MH16	53.04	56.59	53.26	55.10	1.84
MH18	53.27	56.79	53.31	55.20	1.89
MH20	52.70	56.02	53.23	55.03	1.80
MH22	53.29	56.64	53.34	55.00	1.66
MH24	53.36	56.66	53.41	55.11	1.70
MH26	53.21	56.66	53.31	55.20	1.89
MH28	53.46	56.73	53.51	55.20	1.69

**Downstream 'fixed' outfall condition set at obvert of existing 900mm storm sewer within MH2 (53.21m). Initial depths based on fixed outfall elevation of 53.21m.*

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 USF 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)	Major System Release Rate (L/s)
2-year	135.6	78.4	6.7	85.1	0
5-year		83.3	14.1	97.4	0
100-year		101.5	33.8	135.3	0
100-year (+20%)	-	103.2	42.6	145.8	114.8

**PCSWMM Model results for a 3-hr Chicago storm distribution; normal outfall condition.*

7.0 WATER

7.1 Existing Conditions

The proposed development is located inside the 1E Pressure Zone. An existing 300mm diameter watermain runs along Landry Street and an existing 200mm diameter watermain runs along Baribeau Street.

7.2 Proposed Conditions

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

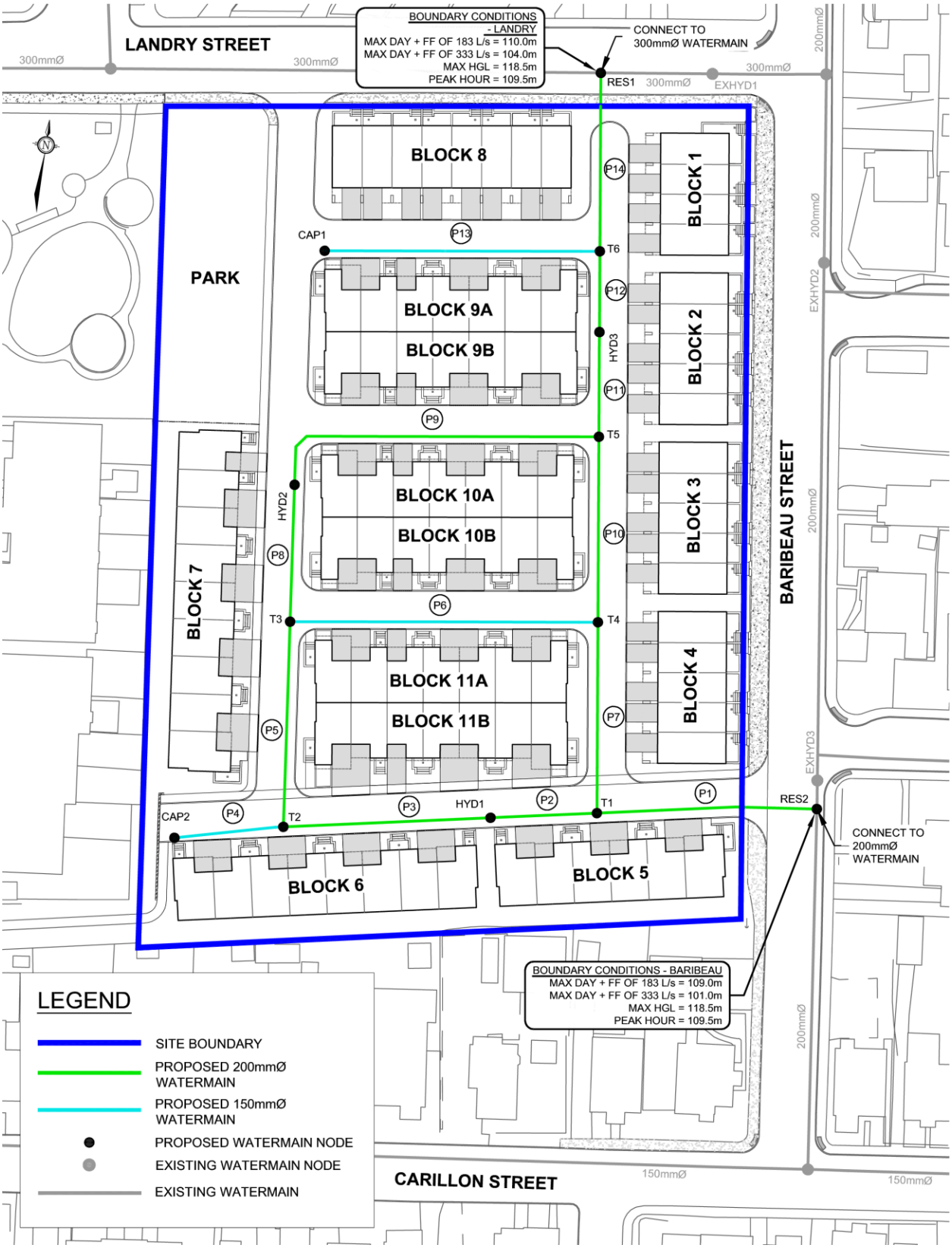


Figure 5: Watermain Layout

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	92	248	0.805	2.013	4.428
Total	**92**	**248**	**0.805**	**2.013**	**4.428**

Based on the fire underwriters survey, the fire flows were calculated as 183 L/s (Block 1), 217 L/s (Block 2, 3, 4 and 8), 233 L/s (Block 5), 267 L/s (Block 7), 283 L/s (Block 6) and 317 L/s (Block 9, 10 and 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
183 L/s at Block 1	511.79 kPa (HYD3)
217 L/s at Block 2	495.60 kPa (HYD3)
217 L/s at Block 3 & 4	480.10 kPa (HYD1)
233 L/s at Block 5	479.81 kPa (HYD1)
283 L/s at Block 6	437.33 kPa (HYD2)
267 L/s at Block 7	429.38 kPa (HYD2)
217 L/s at Block 8	492.56 kPa (HYD3)
317 L/s at Block 9	420.85 kPa (HYD2)
317 L/s at Block 20 & 11	401.82 kPa (HYD2)

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

Operating Condition	Maximum Pressure	Minimum Pressure
4.428 L/s through system	522.77 kPa (T3)	519.73 kPa (HYD3)

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
2.013 L/s through system	611.06 kPa (T3)	560.15 kPa (T5, 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 135.6 L/s. All runoff volume from the 100-year storm event is stored on-site using underground and surface storage.

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 Baribeau Street sanitary sewers.

3) Connection to the watermains in Baribeau Street and Landry 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.

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 Sheets
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	0.115	0.81	0.09	0.259	0.259	10.00	76.81			19.9	19.9	0.305	300	PVC	0.35	37.8	59.6	0.82	0.77	33%
						0.00	0.000	0.000	10.00													
						0.00	0.000	0.000	10.00													
	A1, A8, A9	MH10	MH8	0.109	0.42	0.05	0.127	0.386	10.77	73.97			28.6	28.6	0.305	300	PVC	0.35	28.8	59.6	0.82	0.59	48%
						0.00	0.000	0.000	10.77													
						0.00	0.000	0.000	10.77													
	A11	MH8	MH6	0.089	0.80	0.07	0.198	0.584	11.36	71.96			42.0	42.0	0.381	375	PVC	0.25	33.5	91.4	0.80	0.70	46%
						0.00	0.000	0.000	11.36													
						0.00	0.000	0.000	11.36													
	A10, A14, A15, A16, A17, A18, A19, A20, A21	MH6	MH4	0.358	0.71	0.25	0.707	1.291	12.05	69.72			90.0	90.0	0.457	450	Conc	0.20	56.4	132.9	0.81	1.16	68%
						0.00	0.000	0.000	12.05													
						0.00	0.000	0.000	12.05													
	A4	MH18	MH26	0.081	0.70	0.06	0.158	0.158	10.00	76.81			12.1	12.1	0.305	300	PVC	0.35	16.6	59.6	0.82	0.34	20%
						0.00	0.000	0.000	10.00													
						0.00	0.000	0.000	10.00													
	A3	MH26	MH16	0.102	0.79	0.08	0.224	0.382	10.34	75.53			28.8	28.8	0.305	300	PVC	0.35	29.8	59.6	0.82	0.61	48%
						0.00	0.000	0.000	10.34													
						0.00	0.000	0.000	10.34													
	A5, A6	MH16	MH14	0.168	0.78	0.13	0.364	0.746	10.95	73.35			54.7	54.7	0.381	375	PVC	0.25	29.8	91.4	0.80	0.62	60%
						0.00	0.000	0.000	10.95													
						0.00	0.000	0.000	10.95													
	A12, A13	MH14	MH4	0.180	0.76	0.14	0.380	1.126	11.57	71.27			80.3	80.3	0.381	375	PVC	0.25	30.5	91.4	0.80	0.63	88%
						0.00	0.000	0.000	11.57													
						0.00	0.000	0.000	11.57													
		MH4	MH2			0.00	0.000	2.417	13.22	66.33			160.3	160.3	0.533	525	Conc	0.20	26.6	200.5	0.90	0.49	80%
						0.00	0.000	0.000	13.22													
						0.00	0.000	0.000	13.22													

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

Consultant:	**Novatech**
Date:	August 24, 2020
Design By:	Lucas Wilson
Client:	**Dwg. Reference:** / **Checked By:**
Parkriver Properties	119068-STM / MAB

Legend:

*	Indicates 100 Year intensity for storm sewers
10.00	Storm sewers designed to the 2 year event (without ponding) for local roads
10.00	Storm sewers designed to the 5 year event (without ponding) for collector roads
10.00	Storm sewers designed to the 10 year event (without ponding) for arterial roads

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	15	40.5	40.5	3.7	0.5	0.15	0.15	0.0	0.5	200	0.65	45.7	27.6	0.85	0.28	1.9%	0.077
	21	**17**	0	0.0	4	10.8	10.8	3.7	0.1	0.05	0.05	0.0	0.1	200	0.65	16.8	27.6	0.85	0.19	0.5%	0.000
	17	**15**	0	0.0	5	13.5	64.8	3.6	0.8	0.07	0.27	0.1	0.9	200	0.35	29.8	20.2	0.62	0.26	4.2%	0.153
	25	**15**	0	0.0	14	37.8	37.8	3.7	0.4	0.13	0.13	0.0	0.5	200	0.65	45.6	27.6	0.85	0.28	1.8%	0.077
	15	**13**	0	0.0	5	13.5	116.1	3.6	1.3	0.07	0.47	0.2	1.5	200	0.35	29.8	20.2	0.62	0.30	7.4%	0.202
	9	**13**	0	0.0	14	37.8	37.8	3.7	0.4	0.13	0.13	0.0	0.5	200	0.65	52.5	27.6	0.85	0.28	1.8%	0.077
	13	**3**	0	0.0	5	13.5	167.4	3.5	1.9	0.07	0.67	0.2	2.1	200	0.35	30.6	20.2	0.62	0.33	10.6%	0.077
	11	**9**	0	0.0	4	10.8	10.8	3.7	0.1	0.05	0.05	0.0	0.1	200	0.65	25.8	27.6	0.85	0.19	0.5%	0.077
	9	**5**	0	0.0	5	13.5	24.3	3.7	0.3	0.05	0.10	0.0	0.3	200	0.35	33.1	20.2	0.62	0.19	1.6%	0.077
	7	**5**	0	0.0	3	8.1	8.1	3.7	0.1	0.03	0.03	0.0	0.1	200	1.00	16.3	34.2	1.06	0.20	0.3%	0.077
	5	**3**	0	0.0	15	40.5	72.9	3.6	0.9	0.13	0.26	0.1	0.9	200	0.35	53.4	20.2	0.62	0.27	4.7%	0.077
	3	**1**	0	0.0	3	8.1	248.4	3.5	2.8	0.03	0.96	0.3	3.1	200	0.35	30.3	20.2	0.62	0.38	15.4%	0.297

Design Parameters:

Avg Flow/Person =	280	l/day
Comm./Inst. Flow =	28000	l/ha/day
Infiltration =	0.33	l/s/ha
Pipe Friction n =	0.013	

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

Population Density:

	ppl/unit	units/net ha
Apartment	1.80	90
Singles	3.40	
Towns	2.70	60

Project: 200 Baribeau Street (119068)

Designed: LRW

Checked: MAB

Date: August 24, 2020

NOVATECH
Engineers, Planners & Landscape Architects

200 Baribeau Street - Sanitary Sewer Design Sheet

AREA			RESIDENTIAL							ICI				INFILTRATION				PIPE							
			SINGLES		Apartments																				
Street	From	To	Units	Pop.	Units	Pop.	Accum. Pop.	Peak Factor	Peak Flow (l/s)	Commercial Area (ha)	Institutional Area (ha)	Accum. Area (ha)	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
Existing																									
Dagmar Ave.	**EXSANMH1**	**EXSANMH2**	7	23.8	12	21.6	45.4	3.7	0.5	0.00	0.00	0.00	0.0	0.52	0.52	0.2	0.7	250	0.45	108.7	41.6	0.82	0.27	1.7%	0.077
Dagmar Ave.	**EXSANMH2**	**EXSANMH3**	0	0.0		0.0	45.4	3.7	0.5	0.00	0.00	0.00	0.0	0.00	0.52	0.2	0.7	250	0.28	7.1	32.8	0.65	0.22	2.2%	0.108
Dagmar Ave.	**EXSANMH5**	**EXSANMH4**	14	47.6	3	5.4	53.0	3.6	0.6	0.00	0.00	0.00	0.0	0.69	0.69	0.2	0.9	250	1.00	99.2	62.0	1.22	0.38	1.4%	0.077
Dagmar Ave.	**EXSANMH4**	**EXSANMH3**	16	54.4		0.0	107.4	3.6	1.2	0.00	0.00	0.00	0.0	0.77	1.46	0.5	1.7	250	0.81	110.5	55.8	1.10	0.42	3.1%	0.132
Baribeau St.	**EXSANMH3**	**EXSANMH6**	0	0.0	3	5.4	158.2	3.5	1.8	0.00	0.00	0.00	0.0	0.08	2.06	0.7	2.5	250	0.51	61.0	44.3	0.87	0.40	5.6%	0.171
Montfort St.	**EXSANMH8**	**EXSANMH7**	11	37.4	15	27.0	64.4	3.6	0.8	0.00	0.00	0.00	0.0	0.65	0.65	0.2	1.0	250	0.39	86.6	38.7	0.76	0.28	2.5%	0.108
Montfort St.	**EXSANMH7**	**EXSANMH6**	14	47.6		0.0	112.0	3.6	1.3	0.00	0.00	0.00	0.0	0.61	1.26	0.4	1.7	250	0.19	95.7	27.0	0.53	0.25	6.3%	0.077
Baribeau St.	**EXSANMH6**	**EXSANMH9**	2	6.8		0.0	277.0	3.5	3.1	0.00	0.00	0.00	0.0	0.14	3.46	1.1	4.3	250	0.37	70.4	37.7	0.74	0.41	11.3%	0.077
Ethel St.	**EXSANMH11**	**EXSANMH10**	11	37.4	5	9.0	46.4	3.7	0.5	0.00	0.00	0.00	0.0	0.58	0.58	0.2	0.7	250	0.40	84.7	39.2	0.77	0.25	1.9%	0.077
Ethel St.	**EXSANMH10**	**EXSANMH9**	5	17.0	3	5.4	68.8	3.6	0.8	0.00	0.28	0.28	0.1	0.54	1.12	0.4	1.3	250	0.41	68.8	39.7	0.78	0.30	3.3%	0.077
200 Baribeau Street							248.4	3.5	2.8	0.00	0.00	0.00	0.0	0.00	0.96	0.3	3.1								
Baribeau St.	**EXSANMH9**	**EXSANMH12**	0	0.0		0.0	594.2	3.3	6.4	0.00	0.00	0.28	0.1	1.37	6.91	2.3	8.9	250	0.30	71.8	34.0	0.67	0.47	26.1%	0.077

Design Parameters:

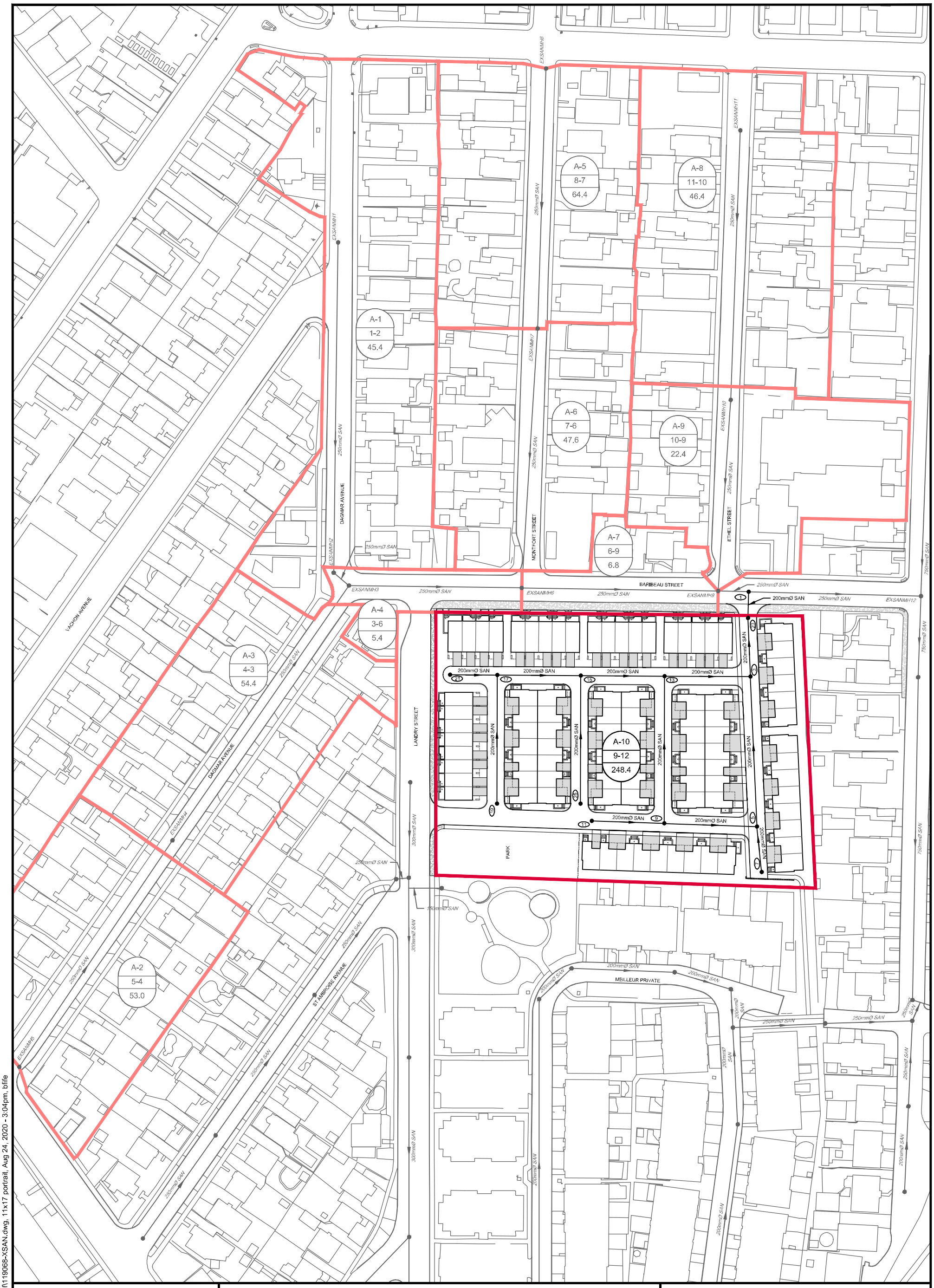
Avg Flow/Person =	280	l/day
Comm./Inst. Flow =	28000	l/ha/day
Infiltration =	0.33	l/s/ha
Pipe Friction n =	0.013	
Residential Peaking Factor = Harmon Equation (max 4, min 2)		
Institutional Peaking Factor	1.5	

Population Density:

	ppl/unit	units/net ha
Apartment	1.80	90
Singles	3.40	
Towns	2.70	60

Project: 200 Baribeau Street (119068)
Designed: LRW
Checked: MAB
Date: August 24, 2020

NOVATECH
Engineers, Planners & Landscape Architects



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

- A-2 / 5-4 / 53.0 — EXISTING AREA I.D.
- EXISTING MANHOLE RUN
- EXISTING POPULATION
- A-1 / 10-9 / 22.4 — PROPOSED AREA I.D.
- PROPOSED MANHOLE RUN
- PROPOSED POPULATION
- EXSANMH1 — EXISTING SANITARY NETWORK
- PROPOSED SANITARY NETWORK
- EXISTING SANITARY DRAINAGE AREA
- PROPOSED SANITARY DRAINAGE AREA

CITY OF OTTAWA

200 BARIBEAU STREET

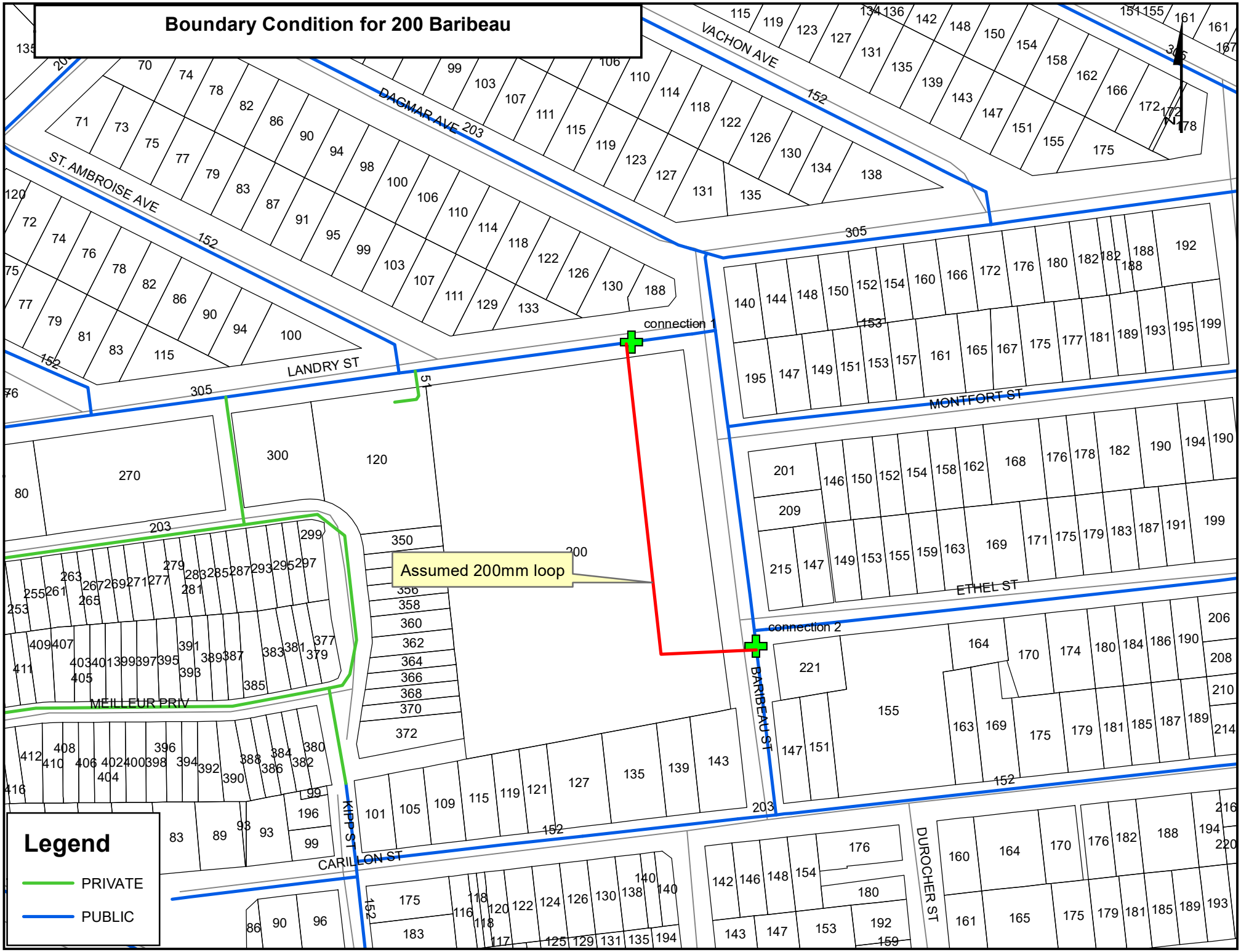
OFF-SITE SANITARY NETWORK

SCALE 1 : 1250 (0 10 20 30 40 50)

DATE AUG 2020 | JOB 119068 | FIGURE SAN

SHT11X17.DWG - 279mmX432mm

M:\2019\119068\CAD\Design\Figures\Design Brief\119068-XSAN.dwg, 11x17 portrait, Aug 24, 2020 - 3:04pm, bfife


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

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

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

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

'

'
'

This e-mail originates from the City of Ottawa e-mail system. Any distribution, use or copying of this e-mail or the information it contains by other than the intended recipient(s) is unauthorized. Thank you.

Le présent courriel a été expédié par le système de courriels de la Ville d'Ottawa. Toute distribution, utilisation ou reproduction du courriel ou des renseignements qui s'y trouvent par une personne autre que son destinataire prévu est interdite. Je vous remercie de votre collaboration.

'

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	92	248	0.805	2.013	4.428
Total	**0.00**	**92**	**248**	**0.805**	**2.013**	**4.428**

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	9	24	0.079	0.197	0.433
HYD2	9	24	0.079	0.197	0.433
HYD3	4	11	0.035	0.088	0.193
EXHYD1	0	0	0.000	0.000	0.000
EXHYD2	0	0	0.000	0.000	0.000
EXHYD3	0	0	0.000	0.000	0.000
CAP1	8	22	0.070	0.175	0.385
CAP2	3	8	0.026	0.066	0.144
T1	7	19	0.061	0.153	0.337
T2	5	14	0.044	0.109	0.241
T3	13	35	0.114	0.284	0.626
T4	11	30	0.096	0.241	0.529
T5	12	32	0.105	0.263	0.578
T6	11	30	0.096	0.241	0.529
Total	**92**	**248**	**0.805**	**2.013**	**4.428**

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

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	56.34	0.43	109.5	53.16	521.50	75.64
Junc HYD2	56.4	0.43	109.5	53.1	520.91	75.55
Junc HYD3	56.52	0.19	109.5	52.98	519.73	75.38
Junc T1	56.33	0.34	109.5	53.17	521.60	75.65
Junc T2	56.25	0.24	109.5	53.25	522.38	75.77
Junc T3	56.21	0.63	109.5	53.29	522.77	75.82
Junc T4	56.29	0.53	109.5	53.21	521.99	75.71
Junc T5	56.42	0.58	109.5	53.08	520.71	75.52
Junc T6	56.48	0.53	109.5	53.02	520.13	75.44
Junc CAP1	56.39	0.38	109.5	53.11	521.01	75.57
Junc CAP2	56.28	0.14	109.5	53.22	522.09	75.72
Resvr RES1	109.5	-2.25	109.5	0	0.00	0.00
Resvr RES2	109.5	-2.18	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	2.18	0.07	0.05	0.043
Pipe P2	17	204	110	1.08	0.03	0.01	0.048
Pipe P3	33	204	110	0.65	0.02	0.01	0.052
Pipe P4	18	155	100	0.14	0.01	0.00	0.082
Pipe P5	33	204	110	0.26	0.01	0.00	0.070
Pipe P6	50	155	100	-0.26	0.01	0.00	0.071
Pipe P7	31	204	110	0.77	0.02	0.01	0.050
Pipe P8	22	204	110	-0.11	0.00	0.00	0.158
Pipe P9	56	204	110	-0.54	0.02	0.00	0.054
Pipe P10	30	204	110	-0.02	0.00	0.00	0.000
Pipe P11	16	204	110	-1.14	0.03	0.01	0.047
Pipe P12	13	204	110	-1.33	0.04	0.02	0.047
Pipe P13	44	155	100	0.38	0.02	0.01	0.065
Pipe P14	28	204	110	2.24	0.07	0.05	0.043
Pipe P15	18	300	120	0.00	0.00	0.00	0.000
Pipe P16	48	204	110	0.00	0.00	0.00	0.000
Pipe P17	84	204	110	0.00	0.00	0.00	0.000
Pipe P18	5	204	110	0.00	0.00	0.00	0.000

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	56.34	0.08	118.5	62.16	609.79	88.44	1.6
Junc HYD2	56.4	0.08	118.5	62.1	609.20	88.36	6.98
Junc HYD3	56.52	0.04	118.5	61.98	608.02	88.19	1.13
Junc T1	56.33	0.06	118.5	62.17	609.89	88.46	0.81
Junc T2	56.25	0.04	118.5	62.25	610.67	88.57	4.17
Junc T3	56.21	0.11	118.5	62.29	611.06	88.63	11.53
Junc T4	56.29	0.1	118.5	62.21	610.28	88.51	4.7
Junc T5	56.42	0.1	118.5	62.08	560.15	81.24	1.85
Junc T6	56.48	0.1	118.5	62.02	560.15	81.24	0.63
Junc CAP1	56.39	0.07	118.5	62.11	609.30	88.37	3.94
Junc CAP2	56.28	0.03	118.5	62.22	610.38	88.53	7.74
Resvr RES1	118.5	-0.41	118.5	0	0.00	0.00	0
Resvr RES2	118.5	-0.4	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	0.40	0.01	0.00	0.057
Pipe P2	17	204	110	0.20	0.01	0.00	0.060
Pipe P3	33	204	110	0.12	0.00	0.00	0.087
Pipe P4	18	155	100	0.03	0.00	0.00	0.000
Pipe P5	33	204	110	0.05	0.00	0.00	0.000
Pipe P6	50	155	100	-0.05	0.00	0.00	0.093
Pipe P7	31	204	110	0.14	0.00	0.00	0.066
Pipe P8	22	204	110	-0.02	0.00	0.00	0.000
Pipe P9	56	204	110	-0.10	0.00	0.00	0.073
Pipe P10	30	204	110	0.00	0.00	0.00	0.000
Pipe P11	16	204	110	-0.21	0.01	0.00	0.057
Pipe P12	13	204	110	-0.24	0.01	0.00	0.051
Pipe P13	44	155	100	0.07	0.00	0.00	0.047
Pipe P14	28	204	110	0.41	0.01	0.00	0.059
Pipe P15	18	300	120	0.00	0.00	0.00	0.000
Pipe P16	48	204	110	0.00	0.00	0.00	0.000
Pipe P17	84	204	110	0.00	0.00	0.00	0.000
Pipe P18	5	204	110	0.00	0.00	0.00	0.000

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	183	511.79	74.23	HYD3
B2	217	495.60	71.88	HYD3
B3/B4	217	480.10	69.63	HYD1
B5	233	479.81	69.59	HYD1
B6	283	437.33	63.43	HYD2
B7	267	429.38	62.28	HYD2
B8	217	492.56	71.44	HYD3
B9	317	420.85	61.04	HYD2
B10/11	317	401.82	58.28	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	56.34	0.2	108.84	52.5	515.03	74.70
Junc HYD2	56.4	0.2	108.78	52.38	513.85	74.53
Junc HYD3	56.52	95.09	108.69	52.17	511.79	74.23
Junc EXHYD1	56.43	88	109.82	53.39	523.76	75.96
Junc EXHYD2	56.05	0	109.53	53.48	524.64	76.09
Junc EXHYD3	55.72	0	109.03	53.31	522.97	75.85
Junc T1	56.33	0.15	108.85	52.52	515.22	74.73
Junc T2	56.25	0.11	108.82	52.57	515.71	74.80
Junc T3	56.21	0.28	108.8	52.59	515.91	74.83
Junc T4	56.29	0.24	108.8	52.51	515.12	74.71
Junc T5	56.42	0.26	108.75	52.33	513.36	74.46
Junc T6	56.48	0.24	109.11	52.63	516.30	74.88
Junc CAP1	56.39	0.17	109.11	52.72	517.18	75.01
Junc CAP2	56.28	0.07	108.82	52.54	515.42	74.75
Resvr RES1	110	-190.16	110	0	0.00	0.00
Resvr RES2	109	5.15	109	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	24.42	0.75	4.21	0.030
Pipe P2	17	204	110	9.12	0.28	0.68	0.035
Pipe P3	33	204	110	8.93	0.27	0.65	0.035
Pipe P4	18	155	100	0.07	0.00	0.00	0.131
Pipe P5	33	204	110	8.75	0.27	0.63	0.035
Pipe P6	50	155	100	-0.34	0.02	0.01	0.064
Pipe P7	31	204	110	15.14	0.46	1.74	0.032
Pipe P8	22	204	110	8.81	0.27	0.64	0.035
Pipe P9	56	204	110	8.61	0.26	0.61	0.035
Pipe P10	30	204	110	14.56	0.45	1.62	0.033
Pipe P11	16	204	110	22.91	0.70	3.74	0.030
Pipe P12	13	204	110	-72.18	2.21	31.33	0.026
Pipe P13	44	155	100	0.17	0.01	0.00	0.067
Pipe P14	28	204	110	72.59	2.22	31.66	0.026
Pipe P15	18	300	120	117.57	1.66	10.06	0.021
Pipe P16	48	204	110	29.57	0.90	6.00	0.029
Pipe P17	84	204	110	29.57	0.90	6.00	0.029
Pipe P18	5	204	110	29.57	0.90	6.00	0.029

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	56.34	0.2	107.12	50.78	498.15	72.25
Junc HYD2	56.4	0.2	107.09	50.69	497.27	72.12
Junc HYD3	56.52	95.09	107.04	50.52	495.60	71.88
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 T1	56.33	0.15	107.12	50.79	498.25	72.27
Junc T2	56.25	0.11	107.1	50.85	498.84	72.35
Junc T3	56.21	0.28	107.09	50.88	499.13	72.39
Junc T4	56.29	0.24	107.09	50.8	498.35	72.28
Junc T5	56.42	0.26	107.07	50.65	496.88	72.07
Junc T6	56.48	0.24	107.54	51.06	500.90	72.65
Junc CAP1	56.39	0.17	107.54	51.15	501.78	72.78
Junc CAP2	56.28	0.07	107.1	50.82	498.54	72.31
Resvr RES1	108.6	-180.28	108.6	0	0.00	0.00
Resvr RES2	107.2	-38.73	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	17.29	0.53	2.22	0.032
Pipe P2	17	204	110	6.49	0.20	0.36	0.037
Pipe P3	33	204	110	6.29	0.19	0.34	0.037
Pipe P4	18	155	100	0.07	0.00	0.00	0.000
Pipe P5	33	204	110	6.12	0.19	0.32	0.037
Pipe P6	50	155	100	-0.30	0.02	0.01	0.068
Pipe P7	31	204	110	10.64	0.33	0.90	0.034
Pipe P8	22	204	110	6.14	0.19	0.33	0.037
Pipe P9	56	204	110	5.94	0.18	0.31	0.037
Pipe P10	30	204	110	10.10	0.31	0.82	0.034
Pipe P11	16	204	110	15.78	0.48	1.87	0.032
Pipe P12	13	204	110	-79.31	2.43	37.30	0.025
Pipe P13	44	155	100	0.17	0.01	0.00	0.074
Pipe P14	28	204	110	79.73	2.44	37.66	0.025
Pipe P15	18	300	120	100.56	1.42	7.53	0.022
Pipe P16	48	204	110	73.56	2.25	32.44	0.026
Pipe P17	84	204	110	-21.44	0.66	3.31	0.031
Pipe P18	5	204	110	-21.44	0.66	3.31	0.031

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	56.34	95.2	105.28	48.94	480.10	69.63
Junc HYD2	56.4	0.2	105.63	49.23	482.95	70.05
Junc HYD3	56.52	95.09	105.77	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 T1	56.33	0.15	105.79	49.46	485.20	70.37
Junc T2	56.25	0.11	105.44	49.19	482.55	69.99
Junc T3	56.21	0.28	105.59	49.38	484.42	70.26
Junc T4	56.29	0.24	105.75	49.46	485.20	70.37
Junc T5	56.42	0.26	105.75	49.33	483.93	70.19
Junc T6	56.48	0.24	106.68	50.2	492.46	71.43
Junc CAP1	56.39	0.17	106.68	50.29	493.34	71.55
Junc CAP2	56.28	0.07	105.44	49.16	482.26	69.95
Resvr RES1	108.6	-149.58	108.6	0	0.00	0.00
Resvr RES2	107.2	-69.43	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	82.25	2.52	39.90	0.025
Pipe P2	17	204	110	69.77	2.13	29.42	0.026
Pipe P3	33	204	110	-25.42	0.78	4.54	0.030
Pipe P4	18	155	100	0.07	0.00	0.00	0.131
Pipe P5	33	204	110	-25.60	0.78	4.59	0.030
Pipe P6	50	155	100	-9.40	0.50	3.27	0.040
Pipe P7	31	204	110	12.33	0.38	1.19	0.033
Pipe P8	22	204	110	-16.48	0.50	2.03	0.032
Pipe P9	56	204	110	-16.68	0.51	2.08	0.032
Pipe P10	30	204	110	2.68	0.08	0.07	0.042
Pipe P11	16	204	110	-14.26	0.44	1.55	0.033
Pipe P12	13	204	110	-109.35	3.35	67.61	0.024
Pipe P13	44	155	100	0.17	0.01	0.00	0.074
Pipe P14	28	204	110	109.76	3.36	68.09	0.024
Pipe P15	18	300	120	39.82	0.56	1.35	0.025
Pipe P16	48	204	110	39.82	1.22	10.41	0.028
Pipe P17	84	204	110	39.82	1.22	10.41	0.028
Pipe P18	5	204	110	12.82	0.39	1.28	0.033

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	56.34	95.2	105.25	48.91	479.81	69.59
Junc HYD2	56.4	0.2	105.7	49.3	483.63	70.15
Junc HYD3	56.52	43.09	106.1	49.58	486.38	70.54
Junc EXHYD1	56.43	0	107.97	51.54	505.61	73.33
Junc EXHYD2	56.05	0	107.33	51.28	503.06	72.96
Junc EXHYD3	55.72	95	106.22	50.5	495.41	71.85
Junc T1	56.33	0.15	105.71	49.38	484.42	70.26
Junc T2	56.25	0.11	105.44	49.19	482.55	69.99
Junc T3	56.21	0.28	105.63	49.42	484.81	70.32
Junc T4	56.29	0.24	105.76	49.47	485.30	70.39
Junc T5	56.42	0.26	105.88	49.46	485.20	70.37
Junc T6	56.48	0.24	106.71	50.23	492.76	71.47
Junc CAP1	56.39	0.17	106.71	50.32	493.64	71.60
Junc CAP2	56.28	0.07	105.44	49.16	482.26	69.95
Resvr RES1	108	-134.07	108	0	0.00	0.00
Resvr RES2	106.3	-100.94	106.3	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	51.36	1.57	16.68	0.027
Pipe P2	17	204	110	66.38	2.03	26.83	0.026
Pipe P3	33	204	110	-28.82	0.88	5.72	0.029
Pipe P4	18	155	100	0.07	0.00	0.00	0.131
Pipe P5	33	204	110	-28.99	0.89	5.79	0.029
Pipe P6	50	155	100	-8.33	0.44	2.61	0.041
Pipe P7	31	204	110	-15.17	0.46	1.74	0.032
Pipe P8	22	204	110	-20.95	0.64	3.17	0.031
Pipe P9	56	204	110	-21.15	0.65	3.23	0.031
Pipe P10	30	204	110	-23.74	0.73	3.99	0.030
Pipe P11	16	204	110	-45.15	1.38	13.14	0.028
Pipe P12	13	204	110	-88.24	2.70	45.45	0.025
Pipe P13	44	155	100	0.17	0.01	0.00	0.074
Pipe P14	28	204	110	88.65	2.71	45.85	0.025
Pipe P15	18	300	120	45.42	0.64	1.73	0.025
Pipe P16	48	204	110	45.42	1.39	13.29	0.028
Pipe P17	84	204	110	45.42	1.39	13.29	0.028
Pipe P18	5	204	110	-49.58	1.52	15.63	0.027

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	56.34	95.2	101.13	44.79	439.39	63.73
Junc HYD2	56.4	95.2	100.98	44.58	437.33	63.43
Junc HYD3	56.52	0.09	103.43	46.91	460.19	66.74
Junc EXHYD1	56.43	0	105.96	49.53	485.89	70.47
Junc EXHYD2	56.05	0	105.12	49.07	481.38	69.82
Junc EXHYD3	55.72	93	103.65	47.93	470.19	68.20
Junc T1	56.33	0.15	102.11	45.78	449.10	65.14
Junc T2	56.25	0.11	101.12	44.87	440.17	63.84
Junc T3	56.21	0.28	101.11	44.9	440.47	63.88
Junc T4	56.29	0.24	102.14	45.85	449.79	65.24
Junc T5	56.42	0.26	102.43	46.01	451.36	65.46
Junc T6	56.48	0.24	104.26	47.78	468.72	67.98
Junc CAP1	56.39	0.17	104.26	47.87	469.60	68.11
Junc CAP2	56.28	0.07	101.12	44.84	439.88	63.80
Resvr RES1	106	-157.03	106	0	0.00	0.00
Resvr RES2	103.7	-127.98	103.7	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	87.82	2.69	45.05	0.025
Pipe P2	17	204	110	100.01	3.06	57.31	0.025
Pipe P3	33	204	110	4.81	0.15	0.21	0.038
Pipe P4	18	155	100	0.07	0.00	0.00	0.000
Pipe P5	33	204	110	4.64	0.14	0.19	0.039
Pipe P6	50	155	100	-25.55	1.35	20.82	0.035
Pipe P7	31	204	110	-12.35	0.38	1.19	0.033
Pipe P8	22	204	110	29.90	0.91	6.13	0.029
Pipe P9	56	204	110	-65.29	2.00	26.02	0.026
Pipe P10	30	204	110	-38.14	1.17	9.61	0.028
Pipe P11	16	204	110	-103.69	3.17	61.28	0.024
Pipe P12	13	204	110	-103.78	3.18	61.38	0.024
Pipe P13	44	155	100	0.17	0.01	0.00	0.067
Pipe P14	28	204	110	104.20	3.19	61.83	0.024
Pipe P15	18	300	120	52.83	0.75	2.29	0.024
Pipe P16	48	204	110	52.83	1.62	17.58	0.027
Pipe P17	84	204	110	52.83	1.62	17.58	0.027
Pipe P18	5	204	110	-40.17	1.23	10.58	0.028

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	56.34	95.2	100.4	44.06	432.23	62.69
Junc HYD2	56.4	95.2	100.17	43.77	429.38	62.28
Junc HYD3	56.52	77.09	101.86	45.34	444.79	64.51
Junc EXHYD1	56.43	0	106.56	50.13	491.78	71.33
Junc EXHYD2	56.05	0	105.84	49.79	488.44	70.84
Junc EXHYD3	55.72	0	104.58	48.86	479.32	69.52
Junc T1	56.33	0.15	101.48	45.15	442.92	64.24
Junc T2	56.25	0.11	100.38	44.13	432.92	62.79
Junc T3	56.21	0.28	100.35	44.14	433.01	62.80
Junc T4	56.29	0.24	101.4	45.11	442.53	64.18
Junc T5	56.42	0.26	101.41	44.99	441.35	64.01
Junc T6	56.48	0.24	103.38	46.9	460.09	66.73
Junc CAP1	56.39	0.17	103.38	46.99	460.97	66.86
Junc CAP2	56.28	0.07	100.38	44.1	432.62	62.75
Resvr RES1	106.6	-193.71	106.6	0	0.00	0.00
Resvr RES2	104.5	-75.3	104.5	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	124.02	3.79	85.37	0.024
Pipe P2	17	204	110	105.11	3.22	62.84	0.024
Pipe P3	33	204	110	9.91	0.30	0.79	0.035
Pipe P4	18	155	100	0.07	0.00	0.00	0.000
Pipe P5	33	204	110	9.74	0.30	0.77	0.035
Pipe P6	50	155	100	-25.76	1.37	21.14	0.035
Pipe P7	31	204	110	18.76	0.57	2.58	0.031
Pipe P8	22	204	110	35.21	1.08	8.29	0.029
Pipe P9	56	204	110	-59.98	1.84	22.24	0.026
Pipe P10	30	204	110	-7.25	0.22	0.44	0.036
Pipe P11	16	204	110	-67.49	2.06	27.67	0.026
Pipe P12	13	204	110	-144.58	4.42	113.42	0.023
Pipe P13	44	155	100	0.17	0.01	0.00	0.074
Pipe P14	28	204	110	145.00	4.44	114.03	0.023
Pipe P15	18	300	120	48.71	0.69	1.97	0.024
Pipe P16	48	204	110	48.71	1.49	15.13	0.027
Pipe P17	84	204	110	48.71	1.49	15.13	0.027
Pipe P18	5	204	110	48.71	1.49	15.12	0.027

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	56.34	0.2	106.86	50.52	495.60	71.88
Junc HYD2	56.4	27.2	106.7	50.3	493.44	71.57
Junc HYD3	56.52	95.09	106.73	50.21	492.56	71.44
Junc EXHYD1	56.43	95	108.38	51.95	509.63	73.92
Junc EXHYD2	56.05	0	107.96	51.91	509.24	73.86
Junc EXHYD3	55.72	0	107.24	51.52	505.41	73.30
Junc T1	56.33	0.15	106.89	50.56	495.99	71.94
Junc T2	56.25	0.11	106.81	50.56	495.99	71.94
Junc T3	56.21	0.28	106.76	50.55	495.90	71.92
Junc T4	56.29	0.24	106.79	50.5	495.41	71.85
Junc T5	56.42	0.26	106.73	50.31	493.54	71.58
Junc T6	56.48	0.24	107.33	50.85	498.84	72.35
Junc CAP1	56.39	0.17	107.33	50.94	499.72	72.48
Junc CAP2	56.28	0.07	106.81	50.53	495.70	71.90
Resvr RES1	108.6	-218.94	108.6	0	0.00	0.00
Resvr RES2	107.2	-0.07	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	36.07	1.10	8.67	0.029
Pipe P2	17	204	110	14.92	0.46	1.69	0.032
Pipe P3	33	204	110	14.73	0.45	1.65	0.033
Pipe P4	18	155	100	0.07	0.00	0.00	0.131
Pipe P5	33	204	110	14.55	0.45	1.61	0.033
Pipe P6	50	155	100	-4.35	0.23	0.78	0.045
Pipe P7	31	204	110	20.99	0.64	3.18	0.031
Pipe P8	22	204	110	18.62	0.57	2.55	0.031
Pipe P9	56	204	110	-8.58	0.26	0.61	0.035
Pipe P10	30	204	110	16.40	0.50	2.01	0.032
Pipe P11	16	204	110	7.56	0.23	0.48	0.036
Pipe P12	13	204	110	-87.53	2.68	44.77	0.025
Pipe P13	44	155	100	0.17	0.01	0.00	0.074
Pipe P14	28	204	110	87.94	2.69	45.17	0.025
Pipe P15	18	300	120	130.99	1.85	12.29	0.021
Pipe P16	48	204	110	35.99	1.10	8.64	0.029
Pipe P17	84	204	110	35.99	1.10	8.64	0.029
Pipe P18	5	204	110	35.99	1.10	8.64	0.029

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	56.34	32.2	99.95	43.61	427.81	62.05
Junc HYD2	56.4	95.2	99.3	42.9	420.85	61.04
Junc HYD3	56.52	95.09	100.34	43.82	429.87	62.35
Junc EXHYD1	56.43	95	104.32	47.89	469.80	68.14
Junc EXHYD2	56.05	0	103.47	47.42	465.19	67.47
Junc EXHYD3	55.72	0	101.99	46.27	453.91	65.83
Junc T1	56.33	0.15	100.33	44	431.64	62.60
Junc T2	56.25	0.11	99.77	43.52	426.93	61.92
Junc T3	56.21	0.28	99.59	43.38	425.56	61.72
Junc T4	56.29	0.24	100.17	43.88	430.46	62.43
Junc T5	56.42	0.26	100.16	43.74	429.09	62.23
Junc T6	56.48	0.24	101.71	45.23	443.71	64.35
Junc CAP1	56.39	0.17	101.71	45.32	444.59	64.48
Junc CAP2	56.28	0.07	99.77	43.49	426.64	61.88
Resvr RES1	104.6	-285.04	104.6	0	0.00	0.00
Resvr RES2	101.9	-33.97	101.9	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	87.08	2.66	44.35	0.025
Pipe P2	17	204	110	59.99	1.84	22.24	0.026
Pipe P3	33	204	110	27.80	0.85	5.35	0.030
Pipe P4	18	155	100	0.07	0.00	0.00	0.000
Pipe P5	33	204	110	27.62	0.85	5.29	0.030
Pipe P6	50	155	100	-18.70	0.99	11.68	0.036
Pipe P7	31	204	110	26.93	0.82	5.05	0.030
Pipe P8	22	204	110	46.04	1.41	13.62	0.027
Pipe P9	56	204	110	-49.16	1.50	15.38	0.027
Pipe P10	30	204	110	7.99	0.24	0.53	0.036
Pipe P11	16	204	110	-41.43	1.27	11.21	0.028
Pipe P12	13	204	110	-136.52	4.18	101.99	0.023
Pipe P13	44	155	100	0.17	0.01	0.00	0.074
Pipe P14	28	204	110	136.94	4.19	102.56	0.023
Pipe P15	18	300	120	148.10	2.10	15.42	0.021
Pipe P16	48	204	110	53.10	1.62	17.75	0.027
Pipe P17	84	204	110	53.10	1.62	17.75	0.027
Pipe P18	5	204	110	53.10	1.62	17.75	0.027

200 Baribeau Street - Watermain Analysis

Network Table - Nodes (Max Day + FF 'Block 10 & 11')

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc HYD1	56.34	95.2	97.6	41.26	404.76	58.71
Junc HYD2	56.4	95.2	97.36	40.96	401.82	58.28
Junc HYD3	56.52	95.09	98.99	42.47	416.63	60.43
Junc EXHYD1	56.43	0	104.55	48.12	472.06	68.47
Junc EXHYD2	56.05	0	103.59	47.54	466.37	67.64
Junc EXHYD3	55.72	32	101.92	46.2	453.22	65.73
Junc T1	56.33	0.15	98.69	42.36	415.55	60.27
Junc T2	56.25	0.11	97.58	41.33	405.45	58.81
Junc T3	56.21	0.28	97.55	41.34	405.55	58.82
Junc T4	56.29	0.24	98.58	42.29	414.86	60.17
Junc T5	56.42	0.26	98.58	42.16	413.59	59.99
Junc T6	56.48	0.24	100.79	44.31	434.68	63.05
Junc CAP1	56.39	0.17	100.79	44.4	435.56	63.17
Junc CAP2	56.28	0.07	97.58	41.3	405.15	58.76
Resvr RES1	104.6	-215.57	104.6	0	0.00	0.00
Resvr RES2	101.9	-103.44	101.9	0	0.00	0.00

Network Table - Links (Max Day + FF 'Block 10 & 11')

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	35	204	110	128.11	3.92	90.66	0.024
Pipe P2	17	204	110	105.72	3.23	63.52	0.024
Pipe P3	33	204	110	10.52	0.32	0.89	0.034
Pipe P4	18	155	100	0.07	0.00	0.00	0.131
Pipe P5	33	204	110	10.35	0.32	0.86	0.034
Pipe P6	50	155	100	-25.60	1.36	20.89	0.035
Pipe P7	31	204	110	22.24	0.68	3.54	0.031
Pipe P8	22	204	110	35.67	1.09	8.49	0.029
Pipe P9	56	204	110	-59.53	1.82	21.93	0.026
Pipe P10	30	204	110	-3.61	0.11	0.12	0.040
Pipe P11	16	204	110	-63.40	1.94	24.64	0.026
Pipe P12	13	204	110	-158.49	4.85	134.45	0.023
Pipe P13	44	155	100	0.17	0.01	0.00	0.074
Pipe P14	28	204	110	158.90	4.86	135.10	0.023
Pipe P15	18	300	120	56.67	0.80	2.60	0.024
Pipe P16	48	204	110	56.67	1.73	20.01	0.027
Pipe P17	84	204	110	56.67	1.73	20.01	0.027
Pipe P18	5	204	110	24.67	0.75	4.29	0.030

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: 8/14/2020
Input By: Lucas Wilson
Reviewed By: Mark Bissett

Legend: No Information or Input Required

Building Description: Block 1
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)	216			
		Number of Floors/Storeys	3			
		Area of structure considered (m^2)			**648**	
	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	20.1 - 30 m		10%	**4,080**
		East Side	20.1 - 30 m		10%	
		South Side	0 - 3 m		25%	
		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**	**11,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**183**
				or	USGPM	2,906
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	2
		Required Volume of Fire Flow (m^3)			m^3	1320

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: 8/14/2020
Input By: Lucas Wilson
Reviewed By: Mark Bissett

Legend: Input by User; No Information or Input Required

Building Description: Block 2 & 3 - 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: 8/14/2020
Input By: Lucas Wilson
Reviewed By: Mark Bissett

Legend: Input by User; No Information or Input Required

Building Description: Block 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%	**4,973**
		East Side	20.1 - 30 m		10%	
		South Side	10.1 - 20 m		15%	
		West Side	10.1 - 20 m		15%	
				Cumulative Total	**65%**	
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: 8/14/2020
Input By: Lucas Wilson
Reviewed By: Mark Bissett

Legend: Input by User; No Information or Input Required

Building Description: Block 5 - 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)	320			
		Number of Floors/Storeys	3			
		Area of structure considered (m^2)			**960**	
	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	10.1 - 20 m		15%	**5,950**
		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**	**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: 8/14/2020
Input By: Lucas Wilson
Reviewed By: Mark Bissett

Legend: No Information or Input Required

Building Description: Block 6 - 8 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)	425			
		Number of Floors/Storeys	3			
		Area of structure considered (m^2)			**1,275**	
	F	**Base fire flow without reductions**				**12,000**
		F = 220 C (A)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**10,200**
		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%	**7,140**
		East Side	0 - 3 m		25%	
		South Side	10.1 - 20 m		15%	
		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**	**17,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**283**
				or	USGPM	4,491
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	3.5
		Required Volume of Fire Flow (m^3)			m^3	3570

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: 8/14/2020
Input By: Lucas Wilson
Reviewed By: Mark Bissett

Legend: No Information or Input Required

Building Description: Block 7 - 9 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)	476			
		Number of Floors/Storeys	3			
		Area of structure considered (m^2)			**1,428**	
	F	**Base fire flow without reductions**				**12,000**
		F = 220 C (A)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**10,200**
		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%	**6,120**
		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**	**16,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**267**
				or	USGPM	4,227
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	3.5
		Required Volume of Fire Flow (m^3)			m^3	3360

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: 8/14/2020
Input By: Lucas Wilson
Reviewed By: Mark Bissett

Legend: No Information or Input Required

Building Description: Block 8 - 8 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)	384			
		Number of Floors/Storeys	3			
		Area of structure considered (m^2)			**1,152**	
	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	20.1 - 30 m		10%	**3,740**
		East Side	10.1 - 20 m		15%	
		South Side	10.1 - 20 m		15%	
		West Side	> 45.1m		0%	
				Cumulative Total	**40%**	
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: 8/14/2020
Input By: Lucas Wilson
Reviewed By: Mark Bissett

Legend: Input by User; No Information or Input Required

Building Description: Block 9 - 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)	641			
		Number of Floors/Storeys	3			
		Area of structure considered (m^2)			**1,923**	
	F	**Base fire flow without reductions**				**14,000**
		$F = 220\ C\ (A)^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**11,900**
		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%	**7,140**
		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**	**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: 8/14/2020
Input By: Lucas Wilson
Reviewed By: Mark Bissett

Legend: Input by User; No Information or Input Required

Building Description: Block 10 & 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)	641			
		Number of Floors/Storeys	3			
		Area of structure considered (m^2)			**1,923**	
	F	**Base fire flow without reductions**				**14,000**
		$F = 220\ C\ (A)^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**11,900**
		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%	**7,140**
		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**	**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

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	1.270	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	135.6

[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)
Pre-Development Peak Flow Sample Calculations

NOVATECH
Engineers, Planners & Landscape Architects

Calculation of Peak Flows

$$Q_p = 2.78\ x\ C\ x\ I\ x\ A$$

**Rational Method Equation*

Where:

Q_p =	Peak Flow (L/s)
C =	Runoff Coefficient (increases by 25% for a 100-year event; max 1.0)
I =	Rainfall Intensity (mm)
	**Based on City of Ottawa IDF data using a 10-minute time-of-concentration (T_c)*
A =	Drainage Area (ha)

Sample Calculation for 100-year Storm Event:

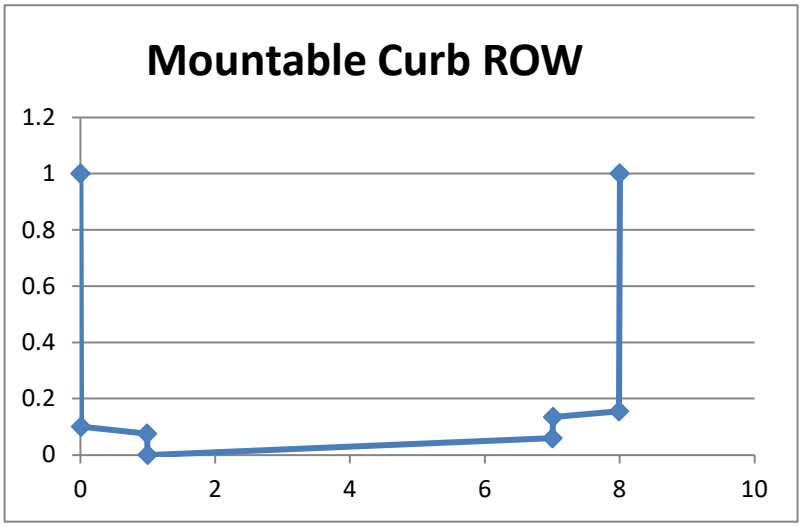
Drainage Area = 1.27 ha
Runoff Coefficient = 0.50 (2-year)
Rainfall Intensity = 76.81 mm/hr (based on 10-minute Tc; City of Ottawa IDF data)

$$Q_p = 2.78\ x\ 0.50\ x\ 76.81 mm/hr\ x\ 1.27 ha$$
$$Q_p = 135.6\ L/s$$

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	145.00	11.41
1.56	0.00	12.13
2.40	0.00	12.13

CB3-Storage		
Depth (m)	Area (m^2)	Volume (m^3)
0.00	0.36	0.00
1.40	0.36	0.50
1.55	254.00	19.58
1.56	0.00	20.85
2.40	0.00	20.85

CB4-Storage		
Depth (m)	Area (m^2)	Volume (m^3)
0.00	0.36	0.00
1.40	0.36	0.50
1.55	177.00	13.81
1.56	0.00	14.69
2.40	0.00	14.69

CB5-Storage		
Depth (m)	Area (m^2)	Volume (m^3)
0.00	0.36	0.00
1.40	0.36	0.50
1.55	110.00	8.78
1.56	0.00	9.33
2.40	0.00	9.33

CB6-Storage		
Depth (m)	Area (m^2)	Volume (m^3)
0.00	0.36	0.00
1.40	0.36	0.50
1.55	180.00	14.03
1.56	0.00	14.93
2.40	0.00	14.93

CB7-Storage		
Depth (m)	Area (m^2)	Volume (m^3)
0.00	0.00	0.00
0.92	46.10	21.21
0.93	0.36	21.44
1.70	0.36	21.72
1.85	170.00	34.49
1.86	0.00	35.34
2.70	0.00	35.34

CB8-Storage		
Depth (m)	Area (m^2)	Volume (m^3)
0.00	0.36	0.00
1.40	0.36	0.50
1.55	151.00	11.86
1.56	0.00	12.61
2.40	0.00	12.61

CB9-Storage		
Depth (m)	Area (m^2)	Volume (m^3)
0.00	0.00	0.00
0.92	46.10	21.21
0.93	0.36	21.44
1.70	0.36	21.72
1.85	170.00	34.49
1.86	0.00	35.34
2.70	0.00	35.34

CB10-Storage		
Depth (m)	Area (m2)	Volume (m3)
0.00	0.36	0.00
1.40	0.36	0.50
1.55	190.00	14.78
1.56	0.00	15.73
2.40	0.00	15.73

CB11-Storage		
Depth (m)	Area (m2)	Volume (m3)
0.00	0.00	0.00
0.92	46.10	21.21
0.93	0.36	21.44
1.70	0.36	21.72
1.85	175.00	34.87
1.86	0.00	35.74
2.70	0.00	35.74

CB12-Storage		
Depth (m)	Area (m2)	Volume (m3)
0.00	0.00	0.00
0.92	71.00	32.66
0.93	0.36	33.02
1.70	0.36	33.29
1.82	150.00	42.32
1.83	0.00	43.07
2.70	0.00	43.07

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	56.45	56.49	56.64	56.71	0.07	0.11	0.26	0.33	0.00	0.00	0.11	0.18
CB03	55.03	56.43	56.58	0.15	56.49	56.52	56.58	56.67	0.06	0.09	0.15	0.24	0.00	0.00	0.00	0.09
CB04	55.10	56.50	56.65	0.15	56.55	56.58	56.65	56.73	0.05	0.08	0.15	0.23	0.00	0.00	0.00	0.08
CB05	55.16	56.56	56.71	0.15	56.58	56.62	56.69	56.77	0.02	0.06	0.13	0.21	0.00	0.00	0.00	0.06
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	54.87	56.57	56.72	0.15	55.53	55.69	56.70	56.77	0.00	0.00	0.13	0.20	0.00	0.00	0.00	0.05
CB08	55.15	56.55	56.70	0.15	56.61	56.65	56.75	56.80	0.06	0.10	0.20	0.25	0.00	0.00	0.05	0.10
CB09	54.91	56.61	56.76	0.15	55.58	55.74	56.75	56.81	0.00	0.00	0.14	0.20	0.00	0.00	0.00	0.05
CB10	55.23	56.63	56.78	0.15	56.69	56.72	56.82	56.85	0.06	0.09	0.19	0.22	0.00	0.00	0.04	0.07
CB11	54.97	56.67	56.82	0.15	55.67	55.84	56.83	56.89	0.00	0.00	0.16	0.22	0.00	0.00	0.01	0.07
CB12	54.68	56.38	56.50	0.12	55.10	55.21	56.49	56.64	0.00	0.00	0.11	0.26	0.00	0.00	0.00	0.14
LCB1	54.65	55.65	55.90	0.25	54.69	54.88	55.80	55.86	0.00	0.00	0.15	0.21	0.00	0.00	0.00	0.00
LCB2	54.44	55.65	55.80	0.15	54.54	54.88	55.79	55.85	0.00	0.00	0.14	0.20	0.00	0.00	0.00	0.05
LCB3	54.22	55.55	55.70	0.15	54.55	54.88	55.78	55.82	0.00	0.00	0.23	0.27	0.00	0.00	0.08	0.12
LCB4	54.45	55.45	55.61	0.16	54.49	54.50	55.53	55.64	0.00	0.00	0.08	0.19	0.00	0.00	0.00	0.03
LCB5	54.45	55.45	55.60	0.15	54.46	54.60	55.62	55.79	0.00	0.00	0.17	0.34	0.00	0.00	0.02	0.19
LCB6	54.23	55.41	55.65	0.24	54.33	54.60	55.62	55.79	0.00	0.00	0.21	0.38	0.00	0.00	0.00	0.14
LCB7	54.26	55.66	55.85	0.19	54.33	54.60	55.62	55.79	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.00
LCB10	54.22	55.22	55.50	0.28	54.23	54.37	55.53	55.57	0.00	0.00	0.31	0.35	0.00	0.00	0.03	0.07
RYCB3	53.45	55.59	55.75	0.16	54.32	54.59	55.62	55.79	0.00	0.00	0.03	0.20	0.00	0.00	0.00	0.04

[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	53.21	55.72	53.21	0	2.51	53.21
MH04	53.27	56.51	53.24	0	3.27	53.24
MH06	53.37	56.44	53.25	0	3.19	53.25
MH08	53.46	56.45	53.28	0	3.17	53.28
MH10	53.55	56.54	53.37	0	3.17	53.37
MH12	53.68	56.75	53.45	0	3.30	53.45
MH14	53.34	56.50	53.26	0	3.24	53.26
MH16	53.42	56.59	53.26	0	3.33	53.27
MH18	53.57	56.79	53.31	0	3.48	53.31
MH20	53.23	56.02	53.23	0	2.79	53.23
MH22	53.54	56.64	53.34	0	3.30	53.34
MH24	53.61	56.66	53.41	0	3.25	53.41
MH26	53.51	56.66	53.31	0	3.35	53.31
MH28	53.71	56.73	53.51	0	3.22	53.51

[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 ... 23
  Number of nodes ........... 58
  Number of links ........... 77
  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
  ------------------------------------------------------------------------------------------
---
  A01                          0.04     28.67     28.40    0.5000 RG_1                LCB1
  A02                          0.04     30.00     89.80    0.5000 RG_1                CB05
  A03                          0.10     68.00     84.30    0.5000 RG_1                CB11
  A04                          0.08     79.00     73.40    0.5000 RG_1                CB10
  A05                          0.07     73.00     82.20    0.5000 RG_1                CB08
  A06                          0.09     93.00     86.00    0.5000 RG_1                CB09
  A07                          0.07     44.00     86.40    0.5000 RG_1                CB04
  A08                          0.04     28.00     28.60    0.5000 RG_1                LCB2
  A09                          0.02     23.00     39.80    0.5000 RG_1                LCB3
  A10                          0.03     28.00     46.40    0.5000 RG_1                LCB4
  A11                          0.09     59.33     85.40    0.5000 RG_1                CB03
  A12                          0.09     60.67     87.90    0.5000 RG_1                CB07
  A13                          0.09     86.00     76.70    0.5000 RG_1                CB06
  A14                          0.09     60.67     84.60    0.5000 RG_1                CB01
  A15                          0.08     82.00     85.40    0.5000 RG_1                CB02
  A16                          0.06     42.67     82.80    0.5000 RG_1                CB12
  A17                          0.01      8.00     23.10    0.5000 RG_1                LCB5
  A18                          0.03     31.00     54.80    0.5000 RG_1                LCB6
  A19                          0.02     19.00     47.40    0.5000 RG_1                RYCB3
  A20                          0.03     27.00     44.40    0.5000 RG_1                LCB7
  A21                          0.01      5.00     23.10    0.5000 RG_1                LCB10
  B01                          0.03     27.00     48.60    2.0000 RG_1                OF1
  B02                          0.05     52.00     32.70    2.0000 RG_1                OF1


  ************
  Node Summary
  ************
                                        Invert      Max.    Ponded    External
  Name                 Type              Elev.     Depth      Area    Inflow
  ------------------------------------------------------------------------
  Dummy-RYCB3          JUNCTION          52.85      3.70       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-CBMH1             JUNCTION          56.50      1.00       0.0
  HP-LCB1              JUNCTION          55.90      1.00       0.0
  HP-LCB3              JUNCTION          55.70      1.00       0.0
  HP-LCB6              JUNCTION          55.65      1.00       0.0
  HP-LCB7              JUNCTION          55.85      1.00       0.0
  HP-RYCB3             JUNCTION          55.75      1.00       0.0
  HP-LCB10             OUTFALL           55.50      1.00       0.0
  HP-LCB5              OUTFALL           55.60      1.00       0.0
  MH02                 OUTFALL           52.68      0.53       0.0
  OF1                  OUTFALL            0.00      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           54.87      2.70       0.0
  CB08                 STORAGE           55.15      2.40       0.0
  CB09                 STORAGE           54.91      2.70       0.0
  CB10                 STORAGE           55.23      2.40       0.0
  CB11                 STORAGE           54.97      2.70       0.0
  CB12                 STORAGE           54.68      2.70       0.0
  LCB1                 STORAGE           54.65      2.00       0.0
  LCB10                STORAGE           54.22      2.00       0.0
  LCB2                 STORAGE           54.44      2.21       0.0
  LCB3                 STORAGE           54.22      2.33       0.0
  LCB4                 STORAGE           54.45      2.00       0.0
  LCB5                 STORAGE           54.45      2.00       0.0
  LCB6                 STORAGE           54.23      2.18       0.0
  LCB7                 STORAGE           54.26      2.40       0.0
  MH04                 STORAGE           52.74      3.77       0.0
  MH06                 STORAGE           52.92      3.52       0.0
  MH08                 STORAGE           53.08      3.37       0.0
  MH10                 STORAGE           53.25      3.29       0.0
  MH12                 STORAGE           53.38      3.37       0.0
  MH14                 STORAGE           52.96      3.54       0.0
  MH16                 STORAGE           53.04      3.55       0.0
  MH18                 STORAGE           53.27      3.52       0.0
  MH20                 STORAGE           52.70      3.32       0.0
  MH22                 STORAGE           53.29      3.35       0.0
  MH24                 STORAGE           53.36      3.30       0.0
  MH26                 STORAGE           53.21      3.45       0.0
  MH28                 STORAGE           53.46      3.27       0.0
  RYCB1                STORAGE           53.99      2.81       0.0
  RYCB2                STORAGE           53.98      2.63       0.0
  RYCB3                STORAGE           53.45      3.14       0.0


  ************
  Link Summary
  ************
  Name                 From Node         To Node           Type            Length    %Slope Roughness
  ---------------------------------------------------------------------------------------------------
  C2                   LCB10             RYCB2             CONDUIT           19.5    0.9744    0.0130
  C7                   LCB10             HP-LCB10          CONDUIT            5.0   -5.6314    0.0350
  Dummy-MH4            Dummy-RYCB3       MH04              CONDUIT           21.9    0.1826    0.0130
  LCB1-LCB2            LCB1              LCB2              CONDUIT           21.2    0.9906    0.0130
  LCB2-RYCB1           LCB2              RYCB1             CONDUIT           10.4    0.9616    0.0130
  LCB3-RYCB1           LCB3              RYCB1             CONDUIT           18.4    0.9783    0.0130
  LCB4-RYCB2           LCB4              RYCB2             CONDUIT           18.2    0.9891    0.0130
  LCB5-RYCB2           LCB5              LCB6              CONDUIT           21.6    1.0186    0.0130
  LCB6-RYCB3           LCB6              RYCB3             CONDUIT           33.3    0.9910    0.0130
  LCB7-RYCB3           LCB7              RYCB3             CONDUIT           22.5    0.9778    0.0130
  MH10-MH8             MH10              MH08              CONDUIT           28.8    0.3472    0.0130
  MH12-MH10            MH12              MH10              CONDUIT           37.8    0.3439    0.0130
  MH14-MH4             MH14              MH04              CONDUIT           30.5    0.2623    0.0130
  MH16-MH14            MH16              MH14              CONDUIT           29.8    0.2685    0.0130
  MH18-MH26            MH18              MH26              CONDUIT           16.6    0.3614    0.0130
  MH20-MH2             MH20              MH02              CONDUIT            6.3    0.3175    0.0130
  MH22-MH14            MH22              MH14              CONDUIT           20.0    1.0001    0.0130
  MH24-MH16            MH24              MH16              CONDUIT           20.0    1.0001    0.0130
  MH26-MH16            MH26              MH16              CONDUIT           29.8    0.3356    0.0130
  MH28-MH26            MH28              MH26              CONDUIT           20.0    1.0001    0.0130
  MH4-MH20             MH04              MH20              CONDUIT           20.3    0.1970    0.0130
  MH6-Dummy            MH06              Dummy-RYCB3       CONDUIT           34.5    0.2029    0.0130
  MH8-MH6              MH08              MH06              CONDUIT           33.5    0.2388    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-CBMH1             CB12              HP-CBMH1          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-CBMH1	HP-CBMH1	LCB5	CONDUIT	3.0	37.3632	0.0350
MS-HP-LCB1	HP-LCB1	LCB2	CONDUIT	14.4	1.7396	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-LCB6	HP-LCB6	LCB5	CONDUIT	8.3	2.4132	0.0350
MS-HP-LCB7	HP-LCB7	RYCB3	CONDUIT	10.7	2.4254	0.0350
MS-HP-RYCB2	RYCB2	LCB10	CONDUIT	13.0	3.0014	0.0350
MS-HP-RYCB3	HP-RYCB3	LCB6	CONDUIT	22.3	1.5270	0.0350
MS-LCB1	LCB1	HP-LCB1	CONDUIT	7.4	-3.3662	0.0350
MS-LCB2	LCB2	RYCB1	CONDUIT	11.5	-1.3068	0.0350
MS-LCB3	LCB3	HP-LCB3	CONDUIT	8.5	-1.7664	0.0350
MS-LCB4	LCB4	RYCB2	CONDUIT	16.0	-1.0001	0.0350
MS-LCB5	LCB5	HP-LCB5	CONDUIT	3.0	-4.9370	0.0350
MS-LCB6	LCB6	HP-LCB6	CONDUIT	13.5	-1.7785	0.0350
MS-LCB7	LCB7	HP-LCB7	CONDUIT	12.4	-1.5354	0.0350
MS-RYCB3	RYCB3	HP-RYCB3	CONDUIT	11.6	-1.3779	0.0350
CB01-ICD	CB01	MH04	ORIFICE			
CB02-ICD	CB02	MH06	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			
RYCB2-ICD	RYCB2	MH06	ORIFICE			
RYCB3-ICD	RYCB3	Dummy-RYCB3	ORIFICE			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C2	CIRCULAR	0.25	0.05	0.06	0.25	1	58.71
C7	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	13212.26
Dummy-MH4	CIRCULAR	0.45	0.16	0.11	0.45	1	121.85
LCB1-LCB2	CIRCULAR	0.25	0.05	0.06	0.25	1	59.19
LCB2-RYCB1	CIRCULAR	0.25	0.05	0.06	0.25	1	58.32
LCB3-RYCB1	CIRCULAR	0.25	0.05	0.06	0.25	1	58.82
LCB4-RYCB2	CIRCULAR	0.25	0.05	0.06	0.25	1	59.14
LCB5-RYCB2	CIRCULAR	0.25	0.05	0.06	0.25	1	60.02
LCB6-RYCB3	CIRCULAR	0.25	0.05	0.06	0.25	1	59.20
LCB7-RYCB3	CIRCULAR	0.25	0.05	0.06	0.25	1	58.81
MH10-MH8	CIRCULAR	0.30	0.07	0.07	0.30	1	56.99
MH12-MH10	CIRCULAR	0.30	0.07	0.07	0.30	1	56.71
MH14-MH4	CIRCULAR	0.38	0.11	0.09	0.38	1	89.80
MH16-MH14	CIRCULAR	0.38	0.11	0.09	0.38	1	90.85
MH18-MH26	CIRCULAR	0.30	0.07	0.07	0.30	1	58.14
MH20-MH2	CIRCULAR	0.53	0.22	0.13	0.53	1	242.33
MH22-MH14	CIRCULAR	0.25	0.05	0.06	0.25	1	59.47
MH24-MH16	CIRCULAR	0.25	0.05	0.06	0.25	1	59.47
MH26-MH16	CIRCULAR	0.30	0.07	0.07	0.30	1	56.02
MH28-MH26	CIRCULAR	0.25	0.05	0.06	0.25	1	59.47
MH4-MH20	CIRCULAR	0.53	0.22	0.13	0.53	1	190.91
MH6-Dummy	CIRCULAR	0.45	0.16	0.11	0.45	1	128.43
MH8-MH6	CIRCULAR	0.38	0.11	0.09	0.38	1	85.69
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-CBMH1	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-CBMH1	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	7343.42
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-LCB6	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	8649.08
MS-HP-LCB7	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	8670.85
MS-HP-RYCB2	CIRCULAR	1.00	0.79	0.25	1.00	1	1542.88
MS-HP-RYCB3	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	6880.08
MS-LCB1	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	10215.00
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	7399.77
MS-LCB4	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	5567.75
MS-LCB5	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	12370.85
MS-LCB6	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	7424.90
MS-LCB7	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	6898.92
MS-RYCB3	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	6535.48

****
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 ......         0.091        71.667
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         0.015        12.156
Surface Runoff ...........         0.076        59.647
Final Storage ............         0.001         0.600
Continuity Error (%) .....        -1.028


**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------      ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.076         0.756
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.005
External Outflow .........         0.076         0.759
Flooding Loss ............         0.000         0.000
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.002         0.022
Final Stored Volume ......         0.002         0.022
Continuity Error (%) .....         0.235


*************************
Highest Continuity Errors
*************************
Node LCB10 (16.62%)
Node LCB5 (15.29%)


***************************
Time-Step Critical Elements
***************************
Link MH20-MH2 (46.21%)
Link MH4-MH20 (1.98%)
Link MS-CB02 (1.52%)


********************************
Highest Flow Instability Indexes
********************************
All links are stable.


*************************
Routing Time Step Summary
*************************
Minimum Time Step           :     0.47 sec
Average Time Step           :     3.01 sec
Maximum Time Step           :     5.00 sec
Percent in Steady State     :    -0.00
Average Iterations per Step :     2.00
Percent Not Converging      :     0.01


***************************
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
-----------------------------------------------------------------------------------------------------------
  A01                            71.67       0.00       0.00      32.74      19.94     19.21     39.15
0.02     13.53   0.546
  A02                            71.67       0.00       0.00       4.49      63.67      3.15     66.82
0.03     21.95   0.932
  A03                            71.67       0.00       0.00       6.93      60.22      4.72     64.93
0.07     49.10   0.906
  A04                            71.67       0.00       0.00      11.77      52.15      7.93     60.08
0.05     37.09   0.838
  A05                            71.67       0.00       0.00       7.84      58.43      5.45     63.87
0.05     35.13   0.891
  A06                            71.67       0.00       0.00       6.16      61.27      4.35     65.62
0.06     45.11   0.916
  A07                            71.67       0.00       0.00       6.00      61.25      4.13     65.38
0.04     31.95   0.912
  A08                            71.67       0.00       0.00      32.64      20.08     19.17     39.24
0.02     13.25   0.548
  A09                            71.67       0.00       0.00      27.01      28.53     16.95     45.48
0.01      8.98   0.635
  A10                            71.67       0.00       0.00      23.99      33.26     15.22     48.49
0.01     11.47   0.677
  A11                            71.67       0.00       0.00       6.44      60.60      4.41     65.01
0.06     42.97   0.907
  A12                            71.67       0.00       0.00       5.33      62.73      3.70     66.43
0.06     44.21   0.927
  A13                            71.67       0.00       0.00      10.29      54.56      7.01     61.57
0.05     40.80   0.859
  A14                            71.67       0.00       0.00       6.80      60.17      4.63     64.80
0.06     43.84   0.904
  A15                            71.67       0.00       0.00       6.42      60.57      4.53     65.10
0.05     39.73   0.908
  A16                            71.67       0.00       0.00       7.60      58.62      5.14     63.76
0.04     30.67   0.890
  A17                            71.67       0.00       0.00      34.75      16.33     21.25     37.58
0.00      2.69   0.524
  A18                            71.67       0.00       0.00      20.16      39.30     12.99     52.29
0.02     13.38   0.730
  A19                            71.67       0.00       0.00      23.53      33.98     14.96     48.94
0.01      7.84   0.683
  A20                            71.67       0.00       0.00      24.91      31.83     15.75     47.58
0.01     10.91   0.664
  A21                            71.67       0.00       0.00      34.75      16.33     21.25     37.58
0.00      1.68   0.524
  B01                            71.67       0.00       0.00      22.73      34.10     15.35     49.45
0.01     12.03   0.690
  B02                            71.67       0.00       0.00      29.86      22.95     19.74     42.69
0.02     21.75   0.596


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

-------------------------------------------------------------------------------------------
                                  Average    Maximum    Maximum  Time of Max      Reported
                                    Depth      Depth        HGL   Occurrence    Max Depth
Node                 Type          Meters     Meters     Meters  days hr:min        Meters
-------------------------------------------------------------------------------------------
Dummy-RYCB3          JUNCTION        0.36       0.39      53.24    0  01:20          0.39
HP-CB01              JUNCTION        0.00       0.07      56.65    0  01:14          0.07
HP-CB02              JUNCTION        0.00       0.11      56.64    0  01:14          0.11
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       0.00      56.71    0  00:00          0.00
HP-CB06              JUNCTION        0.00       0.06      56.69    0  01:14          0.06
HP-CB07              JUNCTION        0.00       0.00      56.72    0  00:00          0.00
HP-CB08              JUNCTION        0.00       0.05      56.75    0  01:14          0.05
HP-CB09              JUNCTION        0.00       0.00      56.76    0  00:00          0.00
```

HP-CB10	JUNCTION	0.00	0.04	56.82	0	01:14	0.04	
HP-CB11	JUNCTION	0.00	0.01	56.83	0	01:31	0.01	
HP-CBMH1	JUNCTION	0.00	0.00	56.50	0	00:00	0.00	
HP-LCB1	JUNCTION	0.00	0.00	55.90	0	00:00	0.00	
HP-LCB3	JUNCTION	0.00	0.07	55.77	0	01:15	0.07	
HP-LCB6	JUNCTION	0.00	0.00	55.65	0	00:00	0.00	
HP-LCB7	JUNCTION	0.00	0.00	55.85	0	00:00	0.00	
HP-RYCB3	JUNCTION	0.00	0.00	55.75	0	00:00	0.00	
HP-LCB10	OUTFALL	0.00	0.00	55.50	0	01:21	0.00	
HP-LCB5	OUTFALL	0.00	0.01	55.61	0	01:19	0.00	
MH02	OUTFALL	0.53	0.53	53.21	0	00:00	0.53	
OF1	OUTFALL	0.00	0.00	0.00	0	00:00	0.00	
CB01	STORAGE	0.32	1.63	56.66	0	01:14	1.63	
CB02	STORAGE	0.25	1.66	56.64	0	01:14	1.66	
CB03	STORAGE	0.34	1.55	56.58	0	01:23	1.55	
CB04	STORAGE	0.30	1.55	56.65	0	01:23	1.55	
CB05	STORAGE	0.13	1.53	56.69	0	01:20	1.53	
CB06	STORAGE	0.34	1.62	56.70	0	01:14	1.62	
CB07	STORAGE	0.46	1.83	56.70	0	01:31	1.83	
CB08	STORAGE	0.30	1.60	56.75	0	01:14	1.60	
CB09	STORAGE	0.47	1.84	56.75	0	01:31	1.84	
CB10	STORAGE	0.32	1.59	56.82	0	01:14	1.59	
CB11	STORAGE	0.53	1.86	56.83	0	01:31	1.86	
CB12	STORAGE	0.39	1.81	56.49	0	01:30	1.81	
LCB1	STORAGE	0.06	1.15	55.80	0	01:14	1.14	
LCB10	STORAGE	0.04	1.31	55.53	0	01:24	1.31	
LCB2	STORAGE	0.09	1.35	55.79	0	01:14	1.35	
LCB3	STORAGE	0.13	1.56	55.78	0	01:15	1.56	
LCB4	STORAGE	0.03	1.08	55.53	0	01:23	1.08	
LCB5	STORAGE	0.09	1.17	55.62	0	01:24	1.17	
LCB6	STORAGE	0.13	1.39	55.62	0	01:23	1.39	
LCB7	STORAGE	0.12	1.36	55.62	0	01:22	1.36	
MH04	STORAGE	0.47	0.50	53.24	0	01:22	0.50	
MH06	STORAGE	0.30	0.33	53.25	0	01:20	0.33	
MH08	STORAGE	0.14	0.20	53.28	0	01:21	0.20	
MH10	STORAGE	0.03	0.12	53.37	0	01:17	0.12	
MH12	STORAGE	0.01	0.07	53.45	0	01:20	0.07	
MH14	STORAGE	0.26	0.30	53.26	0	01:22	0.30	
MH16	STORAGE	0.18	0.22	53.26	0	01:22	0.22	
MH18	STORAGE	0.01	0.04	53.31	0	01:16	0.04	
MH20	STORAGE	0.51	0.53	53.23	0	01:22	0.53	
MH22	STORAGE	0.02	0.05	53.34	0	01:31	0.05	
MH24	STORAGE	0.02	0.05	53.41	0	01:31	0.05	
MH26	STORAGE	0.04	0.10	53.31	0	01:20	0.10	
MH28	STORAGE	0.02	0.05	53.51	0	01:31	0.05	
RYCB1	STORAGE	0.18	1.79	55.78	0	01:15	1.79	
RYCB2	STORAGE	0.07	1.55	55.53	0	01:24	1.55	
RYCB3	STORAGE	0.33	2.17	55.62	0	01:22	2.17	

****
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
Dummy-RYCB3	JUNCTION	0.00	55.29	0	01:22	0	0.347	0.030
HP-CB01	JUNCTION	0.00	31.68	0	01:14	0	0.0171	0.172
HP-CB02	JUNCTION	0.00	35.99	0	01:14	0	0.0221	1.866
HP-CB03	JUNCTION	0.00	0.30	0	01:19	0	3.3e-05	4.813 ltr
HP-CB04	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-CB05	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-CB06	JUNCTION	0.00	21.64	0	01:13	0	0.0123	0.132
HP-CB07	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-CB08	JUNCTION	0.00	11.90	0	01:14	0	0.00668	0.284
HP-CB09	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-CB10	JUNCTION	0.00	8.48	0	01:13	0	0.00311	0.678
HP-CB11	JUNCTION	0.00	0.74	0	01:29	0	0.000251	6.627
HP-CBMH1	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-LCB1	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-LCB3	JUNCTION	0.00	10.39	0	01:14	0	0.00808	1.601
HP-LCB6	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-LCB7	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-RYCB3	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-LCB10	OUTFALL	0.00	0.11	0	01:21	0	0.000339	0.000
HP-LCB5	OUTFALL	0.00	0.89	0	01:19	0	0.000244	0.000
MH02	OUTFALL	0.00	101.47	0	01:22	0	0.727	0.000
OF1	OUTFALL	33.79	33.79	0	01:10	0.0356	0.0356	0.000

CB01	STORAGE	43.84	43.84	0	01:10	0.059	0.0714	-0.009
CB02	STORAGE	39.73	48.01	0	01:13	0.0534	0.0705	-0.040
CB03	STORAGE	42.97	42.97	0	01:10	0.0579	0.0579	-0.012
CB04	STORAGE	31.95	31.95	0	01:10	0.0432	0.0432	-0.012
CB05	STORAGE	21.95	21.95	0	01:10	0.0301	0.0303	-0.019
CB06	STORAGE	40.80	40.80	0	01:10	0.053	0.0597	-0.064
CB07	STORAGE	44.21	44.21	0	01:10	0.0605	0.0605	0.017
CB08	STORAGE	35.13	35.13	0	01:10	0.0467	0.0498	-0.044
CB09	STORAGE	45.11	45.11	0	01:10	0.0611	0.0611	0.017
CB10	STORAGE	37.09	37.09	0	01:10	0.0475	0.0476	-0.002
CB11	STORAGE	49.10	49.10	0	01:10	0.0663	0.0664	0.026
CB12	STORAGE	30.67	45.03	0	01:14	0.0408	0.0625	-0.144
LCB1	STORAGE	13.53	13.53	0	01:10	0.0169	0.0169	-0.098
LCB10	STORAGE	1.68	6.17	0	01:16	0.00188	0.00537	19.937
LCB2	STORAGE	13.25	24.90	0	01:10	0.0165	0.0334	0.171
LCB3	STORAGE	8.98	18.17	0	01:10	0.0105	0.0157	-0.036
LCB4	STORAGE	11.47	14.66	0	01:14	0.0136	0.0215	-0.166
LCB5	STORAGE	2.69	11.68	0	01:06	0.00301	0.00529	18.047
LCB6	STORAGE	13.38	16.63	0	01:06	0.0162	0.0217	0.164
LCB7	STORAGE	10.91	10.91	0	01:10	0.0129	0.0129	0.201
MH04	STORAGE	0.00	101.44	0	01:22	0	0.728	-0.000
MH06	STORAGE	0.00	49.00	0	01:21	0	0.306	0.042
MH08	STORAGE	0.00	28.32	0	01:20	0	0.169	-0.103
MH10	STORAGE	0.00	20.11	0	01:17	0	0.109	0.008
MH12	STORAGE	0.00	6.52	0	01:20	0	0.0303	-0.032
MH14	STORAGE	0.00	38.12	0	01:23	0	0.327	-0.001
MH16	STORAGE	0.00	25.38	0	01:20	0	0.216	-0.105
MH18	STORAGE	0.00	0.37	0	01:09	0	0.000111	0.114
MH20	STORAGE	0.00	101.46	0	01:22	0	0.728	-0.000
MH22	STORAGE	0.00	6.04	0	01:31	0	0.0605	0.001
MH24	STORAGE	0.00	6.05	0	01:31	0	0.0611	0.003
MH26	STORAGE	0.00	12.72	0	01:14	0	0.111	0.003
MH28	STORAGE	0.00	6.09	0	01:31	0	0.0661	-0.003
RYCB1	STORAGE	0.00	19.56	0	01:10	0	0.0409	-0.099
RYCB2	STORAGE	0.00	13.66	0	01:15	0	0.026	-0.273
RYCB3	STORAGE	7.84	18.08	0	01:03	0.00931	0.0418	-0.148

****
Node Surcharge Summary
****

No nodes were surcharged.

****
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	8	0	0	0.017	100	0	01:11	39.81
CB02	0.001	6	0	0	0.012	100	0	01:10	44.19
CB03	0.002	8	0	0	0.020	97	0	01:23	8.51
CB04	0.001	7	0	0	0.014	93	0	01:23	6.55
CB05	0.000	3	0	0	0.007	76	0	01:20	6.52
CB06	0.001	9	0	0	0.015	100	0	01:11	28.33
CB07	0.007	20	0	0	0.032	90	0	01:31	6.04
CB08	0.001	7	0	0	0.013	100	0	01:11	18.56
CB09	0.007	21	0	0	0.033	92	0	01:31	6.05
CB10	0.001	8	0	0	0.016	100	0	01:13	15.08
CB11	0.009	24	0	0	0.036	100	0	01:29	6.83
CB12	0.010	23	0	0	0.040	94	0	01:30	6.00
LCB1	0.000	3	0	0	0.000	57	0	01:14	12.15
LCB10	0.000	2	0	0	0.000	65	0	01:24	3.78
LCB2	0.000	4	0	0	0.000	61	0	01:14	19.56
LCB3	0.000	5	0	0	0.001	67	0	01:15	10.39
LCB4	0.000	2	0	0	0.000	54	0	01:23	13.66
LCB5	0.000	4	0	0	0.000	59	0	01:24	1.90
LCB6	0.000	6	0	0	0.001	64	0	01:23	9.85
LCB7	0.000	5	0	0	0.000	57	0	01:22	8.71
MH04	0.001	13	0	0	0.001	13	0	01:22	101.46

MH06	0.000	8	0	0	0.000	9	0	01:20	49.00
MH08	0.000	4	0	0	0.000	6	0	01:21	28.42
MH10	0.000	1	0	0	0.000	4	0	01:17	20.11
MH12	0.000	0	0	0	0.000	2	0	01:20	6.52
MH14	0.000	7	0	0	0.000	8	0	01:22	38.11
MH16	0.000	5	0	0	0.000	6	0	01:22	25.42
MH18	0.000	0	0	0	0.000	1	0	01:16	0.14
MH20	0.001	15	0	0	0.001	16	0	01:22	101.47
MH22	0.000	1	0	0	0.000	2	0	01:31	6.04
MH24	0.000	1	0	0	0.000	2	0	01:31	6.05
MH26	0.000	1	0	0	0.000	3	0	01:20	12.71
MH28	0.000	1	0	0	0.000	2	0	01:31	6.09
RYCB1	0.000	6	0	0	0.002	64	0	01:15	16.20
RYCB2	0.000	3	0	0	0.001	59	0	01:24	11.52
RYCB3	0.000	11	0	0	0.001	69	0	01:22	12.90

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
HP-LCB10	0.61	0.03	0.11	0.000
HP-LCB5	0.95	0.03	0.89	0.000
MH02	94.05	24.77	101.47	0.727
OF1	36.08	3.83	33.79	0.036
System	32.92	28.66	33.79	0.763

****
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
C2	CONDUIT	5.40	0	01:16	0.25	0.09	1.00
C7	CONDUIT	0.11	0	01:21	0.01	0.00	0.18
Dummy-MH4	CONDUIT	55.27	0	01:21	0.36	0.45	0.91
LCB1-LCB2	CONDUIT	12.15	0	01:10	0.59	0.21	1.00
LCB2-RYCB1	CONDUIT	19.56	0	01:10	0.77	0.34	1.00
LCB3-RYCB1	CONDUIT	9.44	0	01:10	0.32	0.16	1.00
LCB4-RYCB2	CONDUIT	13.66	0	01:15	0.79	0.23	1.00
LCB5-RYCB2	CONDUIT	9.85	0	01:06	0.27	0.16	1.00
LCB6-RYCB3	CONDUIT	8.08	0	01:03	0.56	0.14	1.00
LCB7-RYCB3	CONDUIT	8.71	0	01:04	0.58	0.15	1.00
MH10-MH8	CONDUIT	20.11	0	01:18	0.74	0.35	0.42
MH12-MH10	CONDUIT	6.52	0	01:20	0.36	0.11	0.32
MH14-MH4	CONDUIT	38.11	0	01:23	0.37	0.42	0.87
MH16-MH14	CONDUIT	25.42	0	01:23	0.32	0.28	0.70
MH18-MH26	CONDUIT	0.37	0	01:09	0.03	0.01	0.22
MH20-MH2	CONDUIT	101.47	0	01:22	0.47	0.42	1.00
MH22-MH14	CONDUIT	6.04	0	01:31	0.31	0.10	0.44
MH24-MH16	CONDUIT	6.05	0	01:31	0.58	0.10	0.32
MH26-MH16	CONDUIT	12.70	0	01:20	0.50	0.23	0.42
MH28-MH26	CONDUIT	6.09	0	01:31	0.78	0.10	0.22
MH4-MH20	CONDUIT	101.46	0	01:22	0.47	0.53	0.97
MH6-Dummy	CONDUIT	49.00	0	01:22	0.36	0.38	0.81
MH8-MH6	CONDUIT	28.42	0	01:21	0.42	0.33	0.60
MS-CB01	CHANNEL	31.68	0	01:14	0.04	0.00	0.15
MS-CB02	CHANNEL	35.99	0	01:14	0.03	0.00	0.18
MS-CB03	CHANNEL	0.30	0	01:19	0.00	0.00	0.08
MS-CB04	CHANNEL	0.00	0	00:00	0.00	0.00	0.07
MS-CB05	CHANNEL	0.00	0	00:00	0.00	0.00	0.07
MS-CB06	CHANNEL	21.64	0	01:13	0.03	0.00	0.14
MS-CB07	CHANNEL	0.00	0	00:00	0.00	0.00	0.07
MS-CB08	CHANNEL	11.90	0	01:14	0.02	0.00	0.13
MS-CB09	CHANNEL	0.00	0	00:00	0.00	0.00	0.07
MS-CB10	CHANNEL	8.48	0	01:13	0.02	0.00	0.11
MS-CB11	CHANNEL	0.74	0	01:29	0.00	0.00	0.09
MS-CBMH1	CHANNEL	0.00	0	00:00	0.00	0.00	0.05
MS-HP-CB01	CHANNEL	31.25	0	01:14	0.03	0.00	0.17
MS-HP-CB02	CHANNEL	34.24	0	01:15	0.13	0.00	0.08
MS-HP-CB03	CHANNEL	0.01	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	0.00	0	00:00	0.00	0.00	0.07
MS-HP-CB06	CHANNEL	21.33	0	01:14	0.03	0.00	0.15
MS-HP-CB07	CHANNEL	0.00	0	00:00	0.00	0.00	0.08
MS-HP-CB08	CHANNEL	11.52	0	01:14	0.02	0.00	0.13
MS-HP-CB09	CHANNEL	0.00	0	00:00	0.00	0.00	0.07
MS-HP-CB10	CHANNEL	6.14	0	01:14	0.01	0.00	0.12
MS-HP-CB11	CHANNEL	0.40	0	01:31	0.01	0.00	0.07
MS-HP-CBMH1	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
MS-HP-LCB1	CONDUIT	0.00	0	00:00	0.00	0.00	0.07
MS-HP-LCB2	CONDUIT	0.00	0	00:00	0.00	0.00	0.11
MS-HP-LCB3	CONDUIT	10.19	0	01:15	0.47	0.00	0.07
MS-HP-LCB6	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
MS-HP-LCB7	CONDUIT	0.00	0	00:00	0.00	0.00	0.02
MS-HP-RYCB2	CONDUIT	0.00	0	00:00	0.00	0.00	0.15
MS-HP-RYCB3	CONDUIT	0.00	0	00:00	0.00	0.00	0.11
MS-LCB1	CONDUIT	0.00	0	00:00	0.00	0.00	0.07
MS-LCB2	CONDUIT	0.00	0	00:00	0.00	0.00	0.07
MS-LCB3	CONDUIT	10.39	0	01:14	0.12	0.00	0.15
MS-LCB4	CONDUIT	0.00	0	00:00	0.00	0.00	0.04
MS-LCB5	CONDUIT	0.89	0	01:19	0.03	0.00	0.11
MS-LCB6	CONDUIT	0.00	0	00:00	0.00	0.00	0.11
MS-LCB7	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
MS-RYCB3	CONDUIT	0.00	0	00:00	0.00	0.00	0.02
CB01-ICD	ORIFICE	8.12	0	01:14			1.00
CB02-ICD	ORIFICE	8.20	0	01:14			1.00
CB03-ICD	ORIFICE	8.22	0	01:23			1.00
CB04-ICD	ORIFICE	6.55	0	01:23			1.00
CB05-ICD	ORIFICE	6.52	0	01:20			1.00
CB06-ICD	ORIFICE	6.70	0	01:14			1.00
CB07-ICD	ORIFICE	6.04	0	01:31			1.00
CB08-ICD	ORIFICE	6.66	0	01:14			1.00
CB09-ICD	ORIFICE	6.05	0	01:31			1.00
CB10-ICD	ORIFICE	6.64	0	01:14			1.00
CB11-ICD	ORIFICE	6.09	0	01:31			1.00
CB12-ICD	ORIFICE	6.00	0	01:30			1.00
RYCB1-ICD	ORIFICE	7.05	0	01:15			1.00
RYCB2-ICD	ORIFICE	6.55	0	01:24			1.00
RYCB3-ICD	ORIFICE	6.30	0	01:22			1.00

****
Flow Classification Summary
****

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
C2	1.00	0.01	0.00	0.00	0.13	0.00	0.00	0.86	0.01	0.00
C7	1.00	0.13	0.01	0.00	0.01	0.00	0.00	0.85	0.01	0.00
Dummy-MH4	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
LCB1-LCB2	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.94	0.00
LCB2-RYCB1	1.00	0.01	0.00	0.00	0.17	0.00	0.00	0.82	0.00	0.00
LCB3-RYCB1	1.00	0.00	0.00	0.00	0.25	0.00	0.00	0.74	0.02	0.00
LCB4-RYCB2	1.00	0.00	0.00	0.00	0.06	0.00	0.00	0.93	0.01	0.00
LCB5-RYCB2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.93	0.00
LCB6-RYCB3	1.00	0.00	0.00	0.00	0.25	0.00	0.00	0.74	0.01	0.00
LCB7-RYCB3	1.00	0.00	0.00	0.00	0.23	0.00	0.00	0.76	0.01	0.00
MH10-MH8	1.00	0.00	0.10	0.00	0.90	0.00	0.00	0.00	0.98	0.00
MH12-MH10	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.40	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-MH26	1.00	0.00	0.55	0.00	0.45	0.00	0.00	0.00	0.88	0.00
MH20-MH2	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	0.14	0.00	0.86	0.00	0.00	0.00	0.99	0.00
MH24-MH16	1.00	0.00	0.20	0.00	0.80	0.00	0.00	0.00	0.99	0.00
MH26-MH16	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.97	0.00
MH28-MH26	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
MH4-MH20	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
MH6-Dummy	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
MH8-MH6	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
MS-CB01	1.00	0.09	0.04	0.00	0.14	0.00	0.00	0.73	0.04	0.00
MS-CB02	1.00	0.09	0.03	0.00	0.10	0.00	0.00	0.78	0.03	0.00
MS-CB03	1.00	0.09	0.05	0.00	0.15	0.00	0.00	0.72	0.05	0.00
MS-CB04	1.00	0.83	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MS-CB05	1.00	0.94	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MS-CB06	1.00	0.09	0.04	0.00	0.16	0.00	0.00	0.72	0.05	0.00
MS-CB07	1.00	0.86	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MS-CB08	1.00	0.09	0.04	0.00	0.13	0.00	0.00	0.75	0.04	0.00
MS-CB09	1.00	0.85	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MS-CB10	1.00	0.09	0.04	0.00	0.14	0.00	0.00	0.73	0.05	0.00

MS-CB11	1.00	0.12	0.02	0.00	0.17	0.00	0.00	0.69	0.05	0.00
MS-CBMH1	1.00	0.94	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MS-HP-CB01	1.00	0.09	0.04	0.00	0.09	0.00	0.00	0.78	0.05	0.00
MS-HP-CB02	1.00	0.12	0.00	0.00	0.06	0.00	0.00	0.82	0.03	0.00
MS-HP-CB03	1.00	0.13	0.00	0.00	0.06	0.00	0.00	0.81	0.04	0.00
MS-HP-CB04	1.00	0.80	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MS-HP-CB05	1.00	0.83	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MS-HP-CB06	1.00	0.09	0.04	0.00	0.14	0.00	0.00	0.73	0.06	0.00
MS-HP-CB07	1.00	0.80	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MS-HP-CB08	1.00	0.09	0.04	0.00	0.16	0.00	0.00	0.72	0.06	0.00
MS-HP-CB09	1.00	0.83	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MS-HP-CB10	1.00	0.09	0.04	0.00	0.13	0.00	0.00	0.75	0.05	0.00
MS-HP-CB11	1.00	0.09	0.04	0.00	0.02	0.00	0.00	0.85	0.02	0.00
MS-HP-CBMH1	1.00	0.97	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MS-HP-LCB1	1.00	0.97	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MS-HP-LCB2	1.00	0.97	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MS-HP-LCB3	1.00	0.12	0.00	0.00	0.01	0.00	0.00	0.87	0.01	0.00
MS-HP-LCB6	1.00	0.97	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MS-HP-LCB7	1.00	0.99	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MS-HP-RYCB2	1.00	0.98	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MS-HP-RYCB3	1.00	0.97	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MS-LCB1	1.00	0.97	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MS-LCB2	1.00	0.97	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MS-LCB3	1.00	0.12	0.00	0.00	0.03	0.00	0.00	0.85	0.01	0.00
MS-LCB4	1.00	0.99	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MS-LCB5	1.00	0.12	0.01	0.00	0.02	0.00	0.00	0.85	0.02	0.00
MS-LCB6	1.00	0.97	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MS-LCB7	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MS-RYCB3	1.00	0.99	0.01	0.00	0.00	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
C2	0.85	0.85	1.01	0.01	0.01
LCB1-LCB2	1.01	1.01	1.18	0.01	0.01
LCB2-RYCB1	1.18	1.18	1.25	0.01	0.01
LCB3-RYCB1	1.36	1.36	1.50	0.01	0.01
LCB4-RYCB2	0.69	0.69	0.81	0.01	0.01
LCB5-RYCB2	1.21	1.21	1.41	0.01	0.01
LCB6-RYCB3	1.41	1.41	1.78	0.01	0.01
LCB7-RYCB3	1.38	1.38	1.66	0.01	0.01
MH20-MH2	0.87	0.87	24.00	0.01	0.01
MH4-MH20	0.01	0.01	0.87	0.01	0.01

Analysis begun on: Thu Aug 20 16:47:05 2020
Analysis ended on: Thu Aug 20 16:47:07 2020
Total elapsed time: 00:00:02

200 Baribeau Street (109168)
PCSWMM Model Schematic

NOVATECH
Engineers, Planners & Landscape Architects

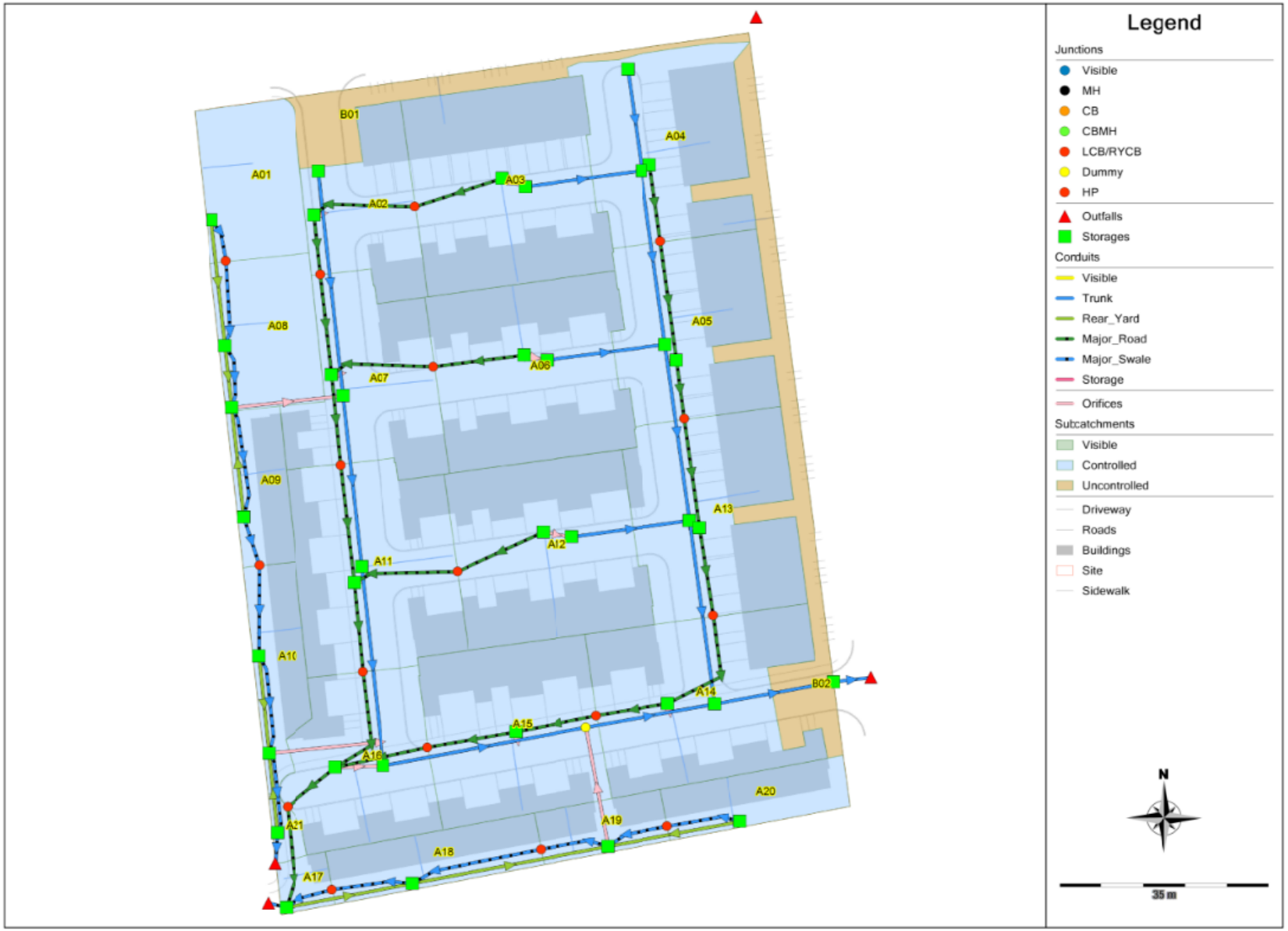
Overall Model Schematic

Date: 2020-08-21
M:\2019\119068\DATA\Calculations\Sewer Calcs\SWM\PCSWMM Model Schematic.docx

200 Baribeau Street (109168)
PCSWMM Model Schematic

NOVATECH
Engineers, Planners & Landscape Architects

Subcatchment ID's (with flow paths)

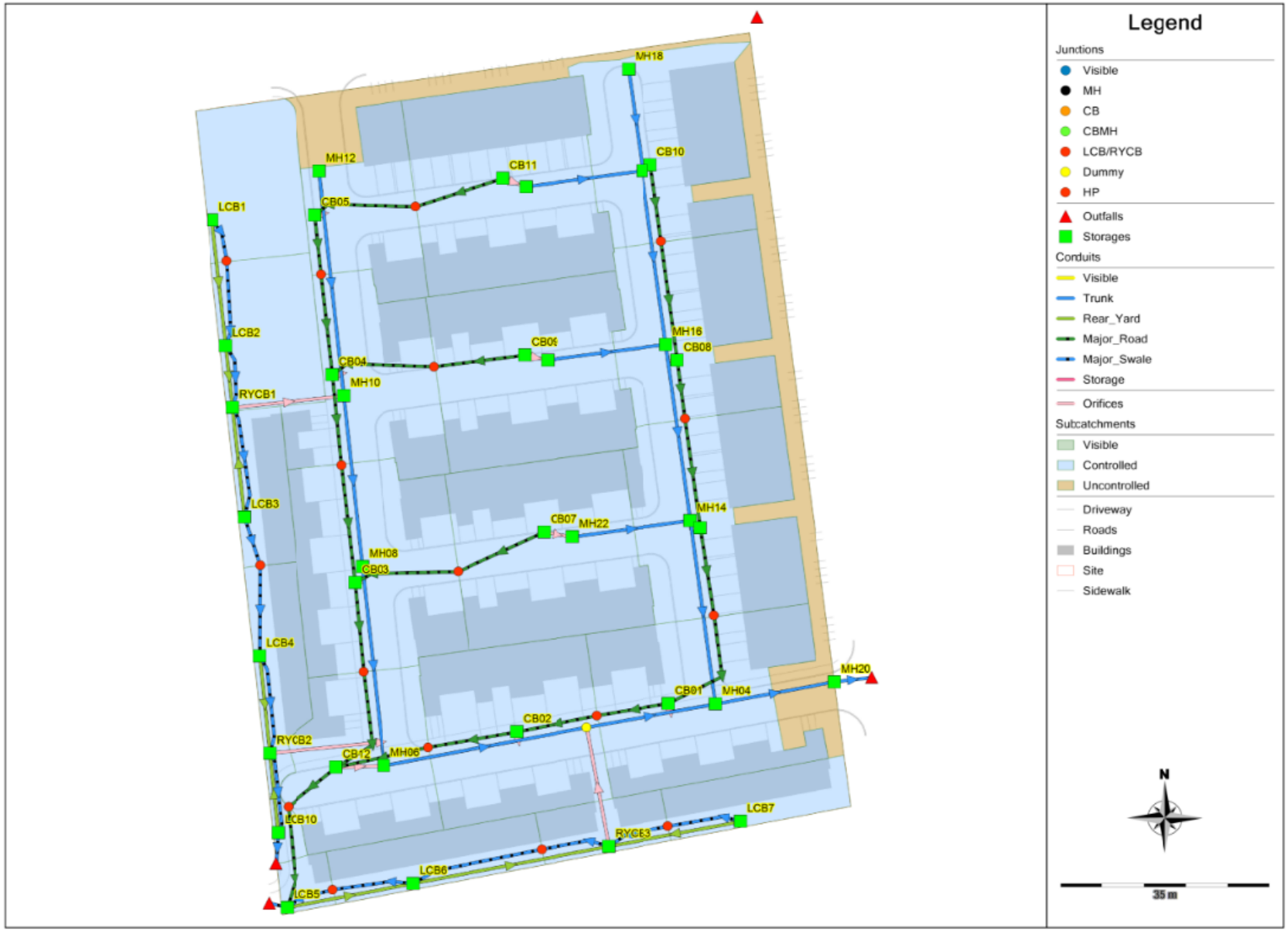


Date: 2020-08-21
M:\2019\119068\DATA\Calculations\Sewer Calcs\SWM\PCSWMM Model Schematic.docx

200 Baribeau Street (109168)
PCSWMM Model Schematic

NOVATECH
Engineers, Planners & Landscape Architects

Node ID's



Date: 2020-08-21
M:\2019\119068\DATA\Calculations\Sewer Calcs\SWM\PCSWMM Model Schematic.docx

StormTech SC-740 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 commercial and municipal applications.

StormTech®
Detention • Retention • Recharge

Subsurface Stormwater Management℠

StormTech SC-740 Chamber
(not to scale)

Nominal Chamber Specifications

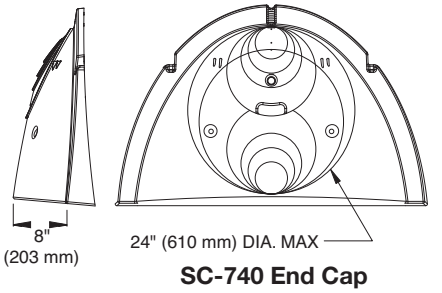
Size (L x W x H)
85.4" x 51.0" x 30.0"
(2170 x 1295 x 762 mm)

Chamber Storage
45.9 ft³ (1.30 m³)

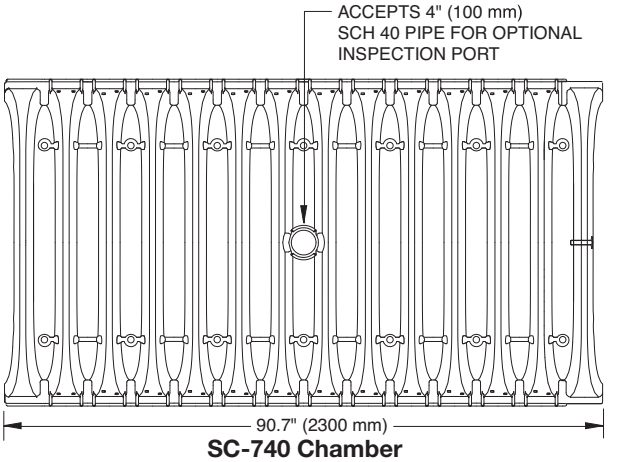
Minimum Installed Storage*
74.9 ft³ (2.12 m³)

Weight
74.0 lbs (33.6 kg)

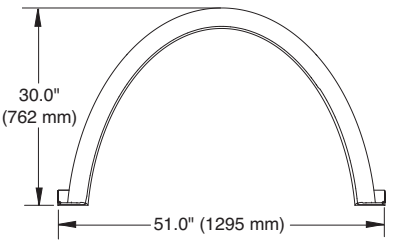
Shipping
30 chambers/pallet
60 end caps/pallet
12 pallets/truck

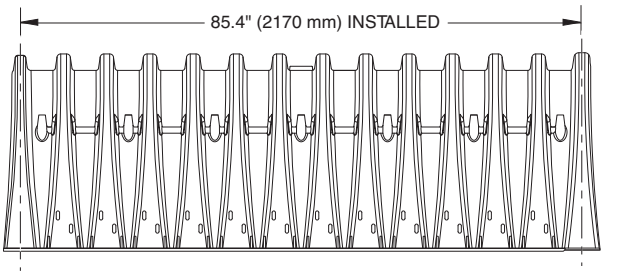


SC-740 End Cap

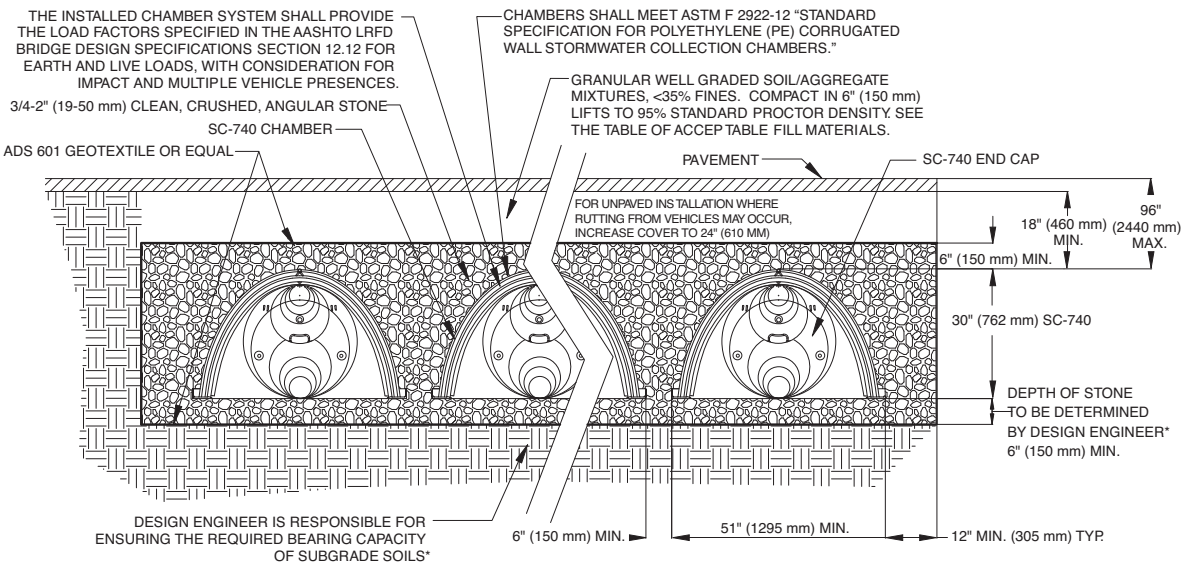


SC-740 Chamber





Typical Cross Section Detail
(not to scale)



THIS CROSS SECTION DETAILS THE REQUIREMENTS NECESSARY TO SATISFY THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 12.12 FOR EARTH AND LIVE LOADS USING STORMTECH CHAMBERS

MADE IN THE U.S.A.

SC-740 Cumulative Storage Volumes Per Chamber

Assumes 40% Stone Porosity. Calculations are Based Upon a 6" (152 mm) Stone Base Under the Chambers.

Depth of Water in System Inches (mm)	Cumulative Chamber Storage Ft³ (m³)	Total System Cumulative Storage Ft³ (m³)
42 (1067)	45.90 (1.300)	74.90 (2.121)
41 (1041)	45.90 (1.300)	73.77 (2.089)
40 (1016)	Stone 45.90 (1.300)	72.64 (2.057)
39 (991)	Cover 45.90 (1.300)	71.52 (2.025)
38 (965)	45.90 (1.300)	70.39 (1.993)
37 (948)	45.90 (1.300)	69.26 (1.961)
36 (914)	45.90 (1.300)	68.14 (1.929)
35 (889)	45.85 (1.298)	66.98 (1.897)
34 (864)	45.69 (1.294)	65.75 (1.862)
33 (838)	45.41 (1.286)	64.46 (1.825)
32 (813)	44.81 (1.269)	62.97 (1.783)
31 (787)	44.01 (1.246)	61.36 (1.737)
30 (762)	43.06 (1.219)	59.66 (1.689)
29 (737)	41.98 (1.189)	57.89 (1.639)
28 (711)	40.80 (1.155)	56.05 (1.587)
27 (686)	39.54 (1.120)	54.17 (1.534)
26 (660)	38.18 (1.081)	52.23 (1.479)
25 (635)	36.74 (1.040)	50.23 (1.422)
24 (610)	35.22 (0.977)	48.19 (1.365)
23 (584)	33.64 (0.953)	46.11 (1.306)
22 (559)	31.99 (0.906)	44.00 (1.246)
21 (533)	30.29 (0.858)	41.85 (1.185)
20 (508)	28.54 (0.808)	39.67 (1.123)
19 (483)	26.74 (0.757)	37.47 (1.061)
18 (457)	24.89 (0.705)	35.23 (0.997)
17 (432)	23.00 (0.651)	32.96 (0.939)
16 (406)	21.06 (0.596)	30.68 (0.869)
15 (381)	19.09 (0.541)	28.36 (0.803)
14 (356)	17.08 (0.484)	26.03 (0.737)
13 (330)	15.04 (0.426)	23.68 (0.670)
12 (305)	12.97 (0.367)	21.31 (0.608)
11 (279)	10.87 (0.309)	18.92 (0.535)
10 (254)	8.74 (0.247)	16.51 (0.468)
9 (229)	6.58 (0.186)	14.09 (0.399)
8 (203)	4.41 (0.125)	11.66 (0.330)
7 (178)	2.21 (0.063)	9.21 (0.264)
6 (152)	0	6.76 (0.191)
5 (127)	0	5.63 (0.160)
4 (102)	Stone Foundation 0	4.51 (0.125)
3 (76)	0	3.38 (0.095)
2 (51)	0	2.25 (0.064)
1 (25)	0	1.13 (0.032)

Note: Add 1.13 cu. ft. (0.032 m³) of storage for each additional inch (25 mm) of stone foundation.

Storage Volume Per Chamber

	Bare Chamber Storage	Chamber and Stone Stone Foundation Depth in. (mm)		
	ft³ (m³)	6 (150)	12 (305)	18 (460)
StormTech SC-740	45.9 (1.3)	74.9 (2.1)	81.7 (2.3)	88.4 (2.5)

Note: Storage volumes are in cubic feet per chamber. Assumes 40% porosity for the stone plus the chamber volume.

Amount of Stone Per Chamber

	Stone Foundation Depth		
ENGLISH TONS (CUBIC YARDS)	6"	12"	18"
StormTech SC-740	3.8 (2.8 yd³)	4.6 (3.3 yd³)	5.5 (3.9 yd³)
METRIC KILOGRAMS (METER³)	**150 mm**	**305 mm**	**460 mm**
StormTech SC-740	3450 (2.1 m³)	4170 (2.5 m³)	4490 (3.0 m³)

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

Volume of Excavation Per Chamber

	Stone Foundation Depth		
	6" (150 mm)	12" (305 mm)	18" (460 mm)
StormTech SC-740	5.5 (4.2)	6.2 (4.7)	6.8 (5.2)

Note: Volumes are in cubic yards (cubic meters) per chamber. Assumes 6" (150 mm) of separation between chamber rows and 18" (460 mm) of cover. The volume of excavation will vary as the depth of the cover increases.

STANDARD LIMITED WARRANTY OF STORMTECH LLC ("STORMTECH"): PRODUCTS

(A) This Limited Warranty applies solely to the StormTech chambers and endplates manufactured by StormTech and sold to the original purchaser (the "Purchaser"). The chambers and endplates are collectively referred to as the "Products."

(B) The structural integrity of the Products, when installed strictly in accordance with StormTech's written installation instructions at the time of installation, are warranted to the Purchaser against defective materials and workmanship for one (1) year from the date of purchase. Should a defect appear in the Limited Warranty period, the Purchaser shall provide StormTech with written notice of the alleged defect at StormTech's corporate headquarters within ten (10) days of the discovery of the defect. The notice shall describe the alleged defect in reasonable detail. StormTech agrees to supply replacements for those Products determined by StormTech to be defective and covered by this Limited Warranty. The supply of replacement products is the sole remedy of the Purchaser for breaches of this Limited Warranty. StormTech's liability specifically excludes the cost of removal and/or installation of the Products.

(C) **THIS LIMITED WARRANTY IS EXCLUSIVE. THERE ARE NO OTHER WARRANTIES WITH RESPECT TO THE PRODUCTS, INCLUDING NO IMPLIED WARRANTIES OF MERCHANT-ABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.**

(D) This Limited Warranty only applies to the Products when the Products are installed in a single layer. **UNDER NO CIRCUMSTANCES, SHALL THE PRODUCTS BE INSTALLED IN A MULTI-LAYER CONFIGURATION.**

(E) No representative of StormTech has the authority to change this Limited Warranty in any manner or to extend this Limited Warranty. This Limited Warranty does not apply to any person other than to the Purchaser.

(F) Under no circumstances shall StormTech be liable to the Purchaser or to any third party for product liability claims; claims arising from the design, shipment, or installation of the Products, or the cost of other goods or services related to the purchase and installation of the Products. For this Limited Warranty to apply, the Products must be installed in accordance with all site conditions required by state and local codes; all other applicable laws; and StormTech's written installation instructions.

(G) **THE LIMITED WARRANTY DOES NOT EXTEND TO INCIDENTAL, CONSEQUENTIAL, SPECIAL OR INDIRECT DAMAGES. STORMTECH SHALL NOT BE LIABLE FOR PENALTIES OR LIQUIDATED DAMAGES, INCLUDING LOSS OF PRODUCTION AND PROFITS; LABOR AND MATERIALS; OVERHEAD COSTS; OR OTHER LOSS OR EXPENSE INCURRED BY THE PURCHASER OR ANY THIRD PARTY. SPECIFICALLY EXCLUDED FROM LIMITED WARRANTY COVERAGE ARE DAMAGE TO THE PRODUCTS ARISING FROM ORDINARY WEAR AND TEAR; ALTERATION, ACCIDENT, MISUSE, ABUSE OR NEGLECT; THE PRODUCTS BEING SUBJECTED TO VEHICLE TRAFFIC OR OTHER CONDITIONS WHICH ARE NOT PERMITTED BY STORMTECH'S WRITTEN SPECIFICATIONS OR INSTALLATION INSTRUCTIONS; FAILURE TO MAINTAIN THE MINIMUM GROUND COVERS SET FORTH IN THE INSTALLATION INSTRUCTIONS; THE PLACEMENT OF IMPROPER MATERIALS INTO THE PRODUCTS; FAILURE OF THE PRODUCTS DUE TO IMPROPER SITING OR IMPROPER SIZING; OR ANY OTHER EVENT NOT CAUSED BY STORMTECH. THIS LIMITED WARRANTY REPRESENTS STORMTECH'S SOLE LIABILITY TO THE PURCHASER FOR CLAIMS RELATED TO THE PRODUCTS, WHETHER THE CLAIM IS BASED UPON CONTRACT, TORT, OR OTHER LEGAL THEORY.**

20 Beaver Road, Suite 104 | Wethersfield | Connecticut | 06109
860.529.8188 | 888.892.2694 | fax 866.328.8401 | fax 860-529-8040 | www.stormtech.com

Printed on recycled paper

User Inputs

Chamber Model:	SC-740
Outlet Control Structure:	Yes
Project Name:	200 Baribeau
Engineer:	Lucas Wilson
Project Location:	
Measurement Type:	Metric
Required Storage Volume:	21.20 cubic meters.
Stone Porosity:	40%
Stone Foundation Depth:	152 mm.
Stone Above Chambers:	152 mm.
Average Cover Over Chambers:	457 mm.
Design Constraint Dimensions:	(3.00 m. x 18.50 m.)

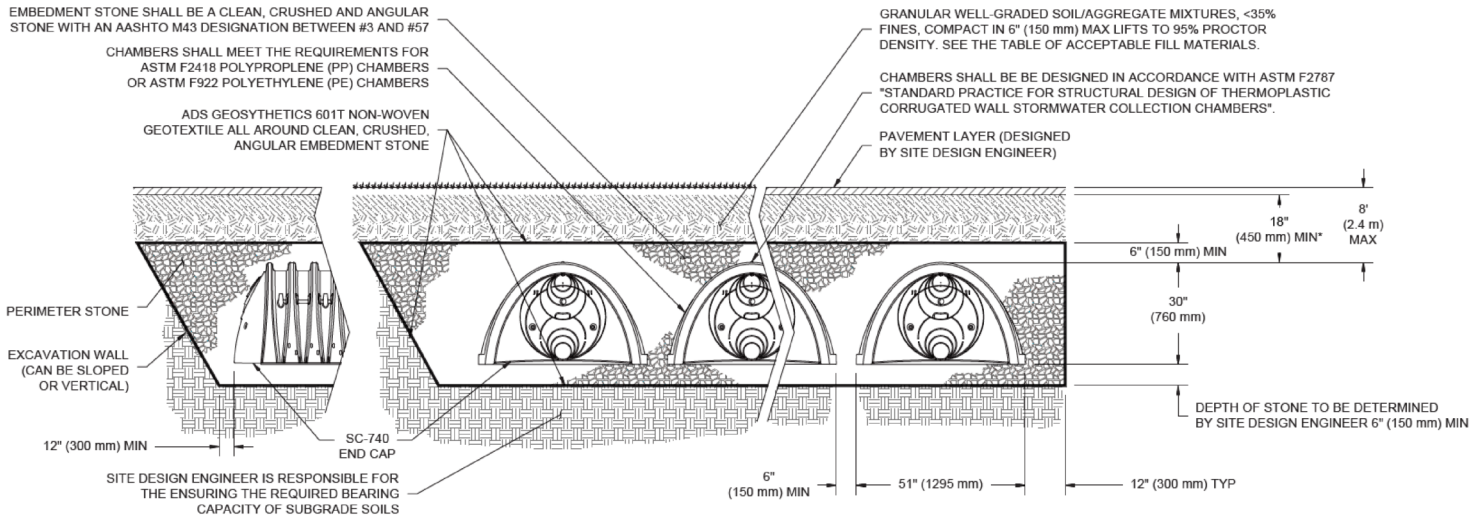
Results

System Volume and Bed Size

Installed Storage Volume:	21.24 cubic meters.
Storage Volume Per Chamber:	1.30 cubic meters.
Number Of Chambers Required:	8
Number Of End Caps Required:	2
Chamber Rows:	1
Maximum Length:	18.45 m.
Maximum Width:	1.91 m.
Approx. Bed Size Required:	35.15 square meters.

System Components

Amount Of Stone Required:	27.10 cubic meters
Volume Of Excavation (Not Including Fill):	37.49 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-740
Outlet Control Structure:	Yes
Project Name:	200 Baribeau
Engineer:	N/A
Project Location:	
Measurement Type:	Metric
Required Storage Volume:	32.60 cubic meters.
Stone Porosity:	40%
Stone Foundation Depth:	152 mm.
Stone Above Chambers:	152 mm.
Average Cover Over Chambers:	700 mm.
Design Constraint Dimensions:	(5.00 m. x 11.00 m.)

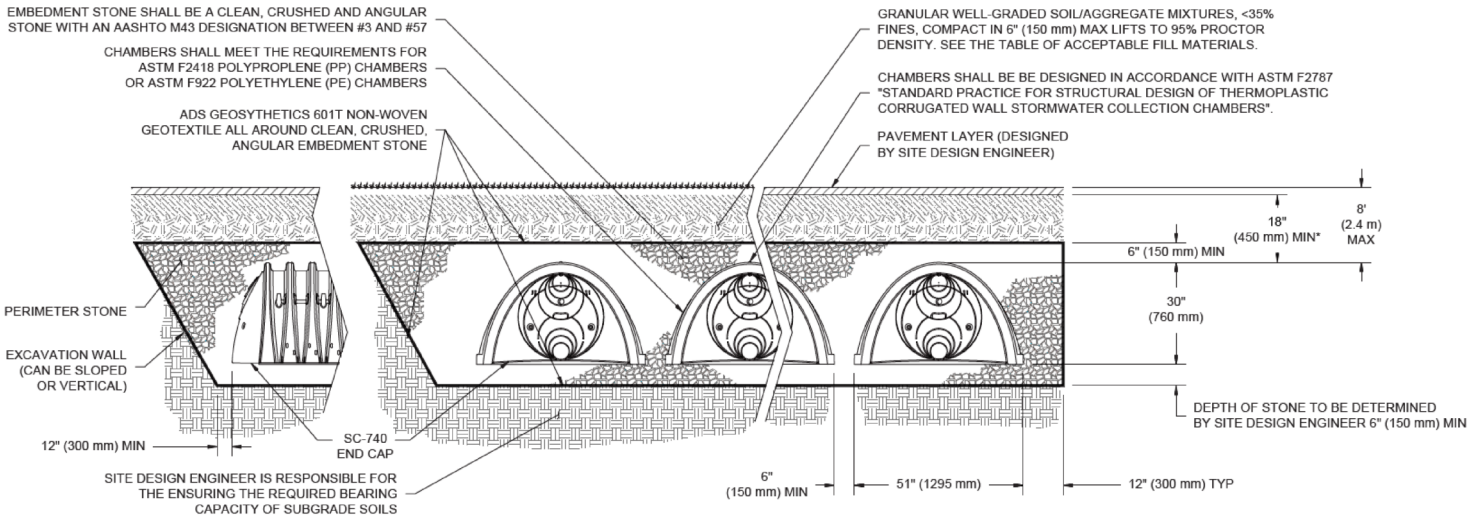
Results

System Volume and Bed Size

Installed Storage Volume:	32.69 cubic meters.
Storage Volume Per Chamber:	1.30 cubic meters.
Number Of Chambers Required:	12
Number Of End Caps Required:	6
Chamber Rows:	3
Maximum Length:	10.97 m.
Maximum Width:	4.98 m.
Approx. Bed Size Required:	54.68 square meters.

System Components

Amount Of Stone Required:	42.73 cubic meters
Volume Of Excavation (Not Including Fill):	58.33 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

SiteASSIST™ by StormTech
FOR STORMTECH INSTRUCTIONS, DOWNLOAD THE INSTALLATION APP

200 BARIBEAU
OTTAWA, ONTARIO

SC-740 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH SC-740.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBERS SHALL BE CERTIFIED TO CSA B184, "POLYMERIC SUB-SURFACE STORMWATER MANAGEMENT STRUCTURES", AND MEET THE REQUIREMENTS OF ASTM F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
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 F2418 SHALL BE GREATER THAN OR EQUAL TO 550 LBS/IN/IN. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 23° C / 73° F), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
   - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
   - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
   - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF THE SC-740 SYSTEM

1. STORMTECH SC-740 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH SC-740 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-740 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-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.

PROPOSED LAYOUT

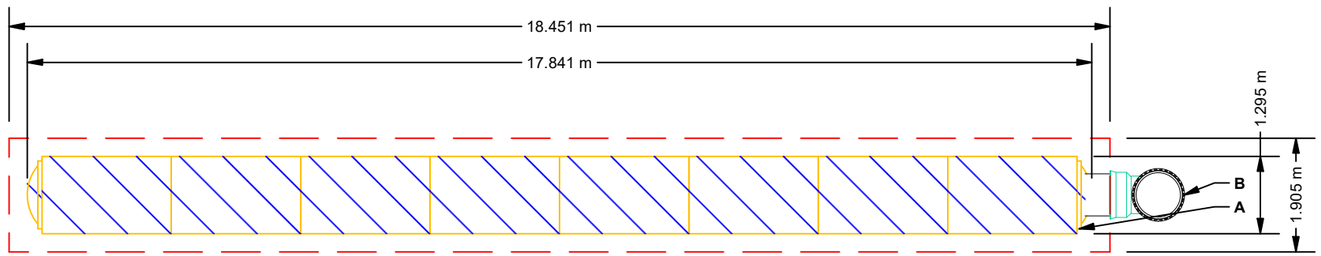
8	STORMTECH SC-740 CHAMBERS
2	STORMTECH SC-740 END CAPS
152	STONE ABOVE (mm)
152	STONE BELOW (mm)
40	STONE VOID
21.2	INSTALLED SYSTEM VOLUME (m³) (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)
35.1	SYSTEM AREA (m²)
40.7	SYSTEM PERIMETER (m)

CONCEPTUAL ELEVATIONS

MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	3.353
MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	1.524
MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	1.372
MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	1.372
MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	1.372
TOP OF STONE:	1.067
TOP OF SC-740 CHAMBER:	0.914
600 mm ISOLATOR ROW INVERT:	0.155
BOTTOM OF SC-740 CHAMBER:	0.152
BOTTOM OF STONE:	0.000

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
PREFABRICATED END CAP	A	600 mm BOTTOM PREFABRICATED END CAP/TYP OF ALL 600 mm BOTTOM CONNECTIONS AND ISOLATOR ROWS	3 mm	
NYLOPLAST (INLET W/ ISO ROW)	B	750 mm DIAMETER (610 mm SUMP MIN)		



ISOLATOR ROW (SEE DETAIL)

NO WOVEN GEOTEXTILE

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
OTTAWA, ONTARIO

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

REV	DRW	CHK	DESCRIPTION

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

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

SCALE = 1 : 100

SHEET
2 OF 6

PROPOSED LAYOUT

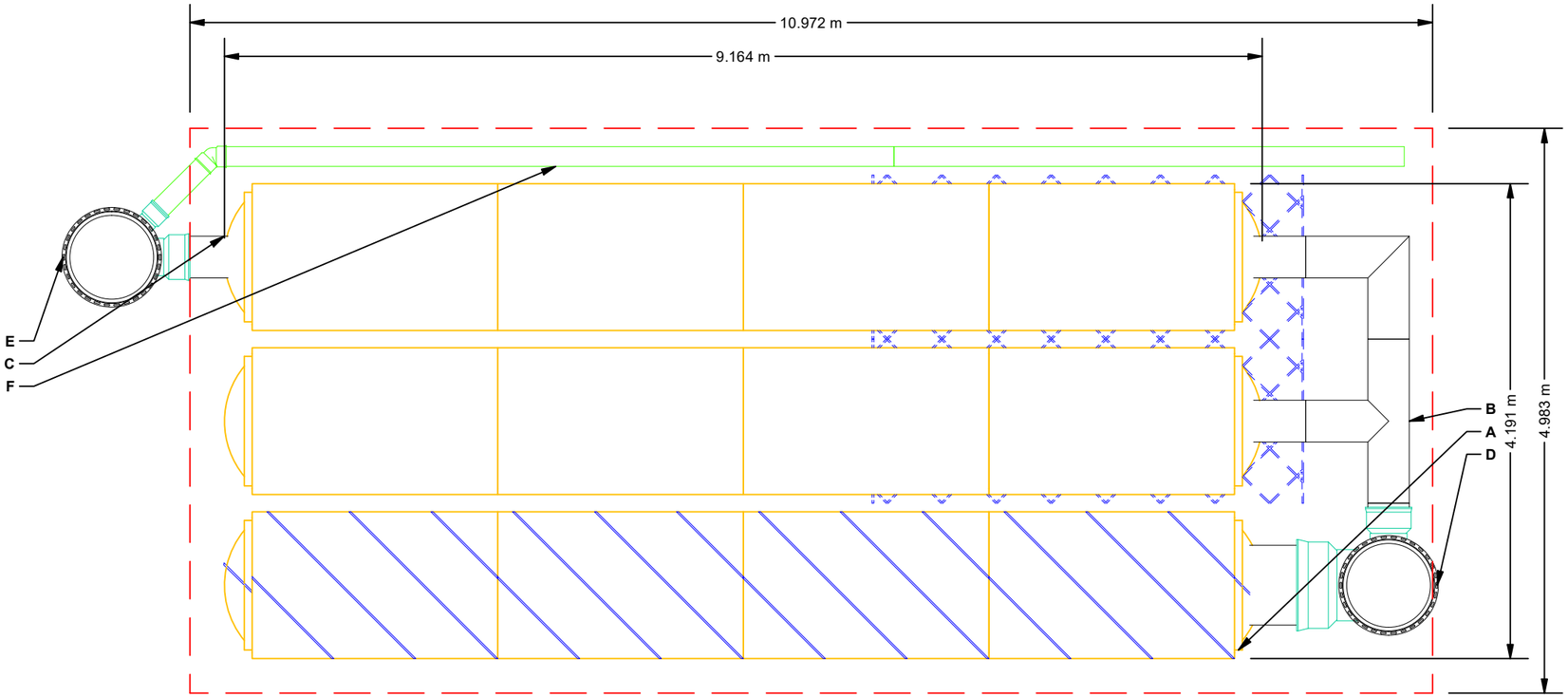
12	STORMTECH SC-740 CHAMBERS
6	STORMTECH SC-740 END CAPS
152	STONE ABOVE (mm)
152	STONE BELOW (mm)
40	STONE VOID
32.7	INSTALLED SYSTEM VOLUME (m^3) (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)
54.7	SYSTEM AREA (m^2)
31.9	SYSTEM PERIMETER (m)

CONCEPTUAL ELEVATIONS

MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	3.353
MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	1.524
MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	1.372
MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	1.372
MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	1.372
TOP OF STONE:	1.067
TOP OF SC-740 CHAMBER:	0.914
300 mm x 300 mm TOP MANIFOLD INVERT:	0.470
300 mm BOTTOM CONNECTION INVERT:	0.183
600 mm ISOLATOR ROW INVERT:	0.155
BOTTOM OF SC-740 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	600 mm BOTTOM PREFABRICATED END CAP/TYP OF ALL 600 mm BOTTOM CONNECTIONS AND ISOLATOR ROWS	3 mm	
MANIFOLD	B	300 mm x 300 mm TOP MANIFOLD, ADS N-12	318 mm	
PIPE CONNECTION	C	300 mm BOTTOM CONNECTION	30 mm	
NYLOPLAST (INLET W/ ISO ROW)	D	750 mm DIAMETER (610 mm SUMP MIN)		130 L/s IN
NYLOPLAST (OUTLET)	E	750 mm DIAMETER (DESIGN BY ENGINEER)		57 L/s OUT
UNDERDRAIN	F	150 mm ADS N-12 DUAL WALL PERFORATED HDPE UNDERDRAIN		



ISOLATOR ROW
(SEE DETAIL)

PLACE MINIMUM 3.810 m OF ADS GEOSYNTHETICS 315WTK 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 - 12 CHAMBERS
OTTAWA, ONTARIO

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

REV	DRW	CHK	DESCRIPTION

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

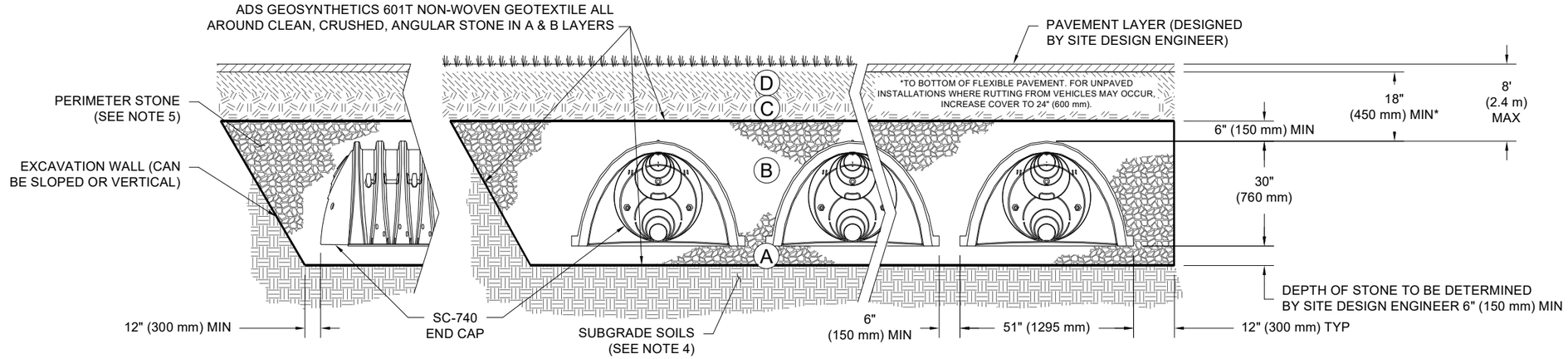
ADS Canada
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

SCALE = 1 : 50

ACCEPTABLE FILL MATERIALS: STORMTECH SC-740 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. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 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] 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] 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 F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-740 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 F2418 SHALL BE GREATER THAN OR EQUAL TO 550 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.

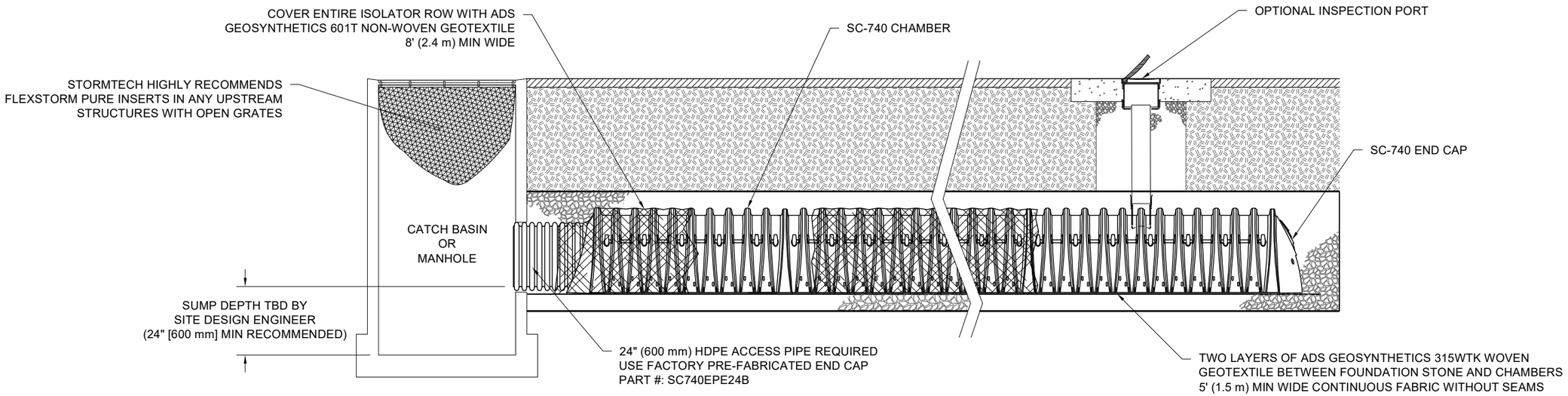
200 BARIBEAU
OTTAWA, ONTARIO

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



SC-740 ISOLATOR ROW DETAIL
NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

STEP 2) CLEAN OUT ISOLATOR ROW USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.

2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

200 BARIBEAU
OTTAWA, ONTARIO

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

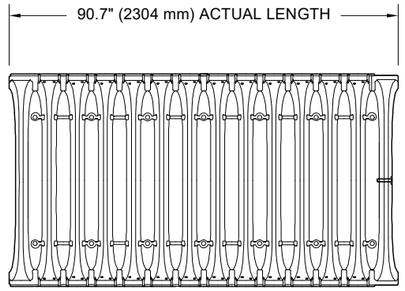
REV	DRW	CHK	DESCRIPTION

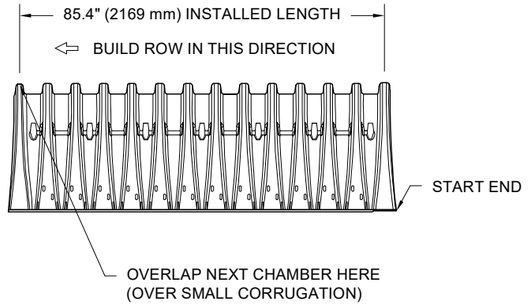
StormTech®
Detention · Retention · Water Quality
520 CROMWELL AVENUE | ROCKY HILL | CT | 06067
860-529-8188 | 888-892-2694 |
WWW.STORMTECH.COM

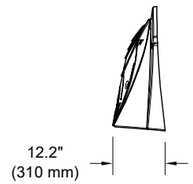
ADS Canada
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

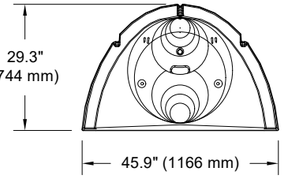
SC-740 TECHNICAL SPECIFICATION

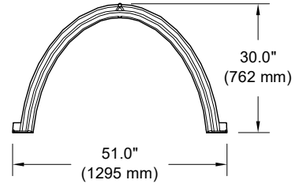
NTS







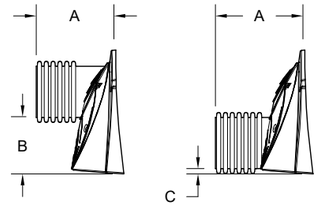




NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	51.0" X 30.0" X 85.4"	(1295 mm X 762 mm X 2169 mm)
CHAMBER STORAGE	45.9 CUBIC FEET	(1.30 m³)
MINIMUM INSTALLED STORAGE*	74.9 CUBIC FEET	(2.12 m³)
WEIGHT	75.0 lbs.	(33.6 kg)

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



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
SC740EPE06T / SC740EPE06TPC	6" (150 mm)	10.9" (277 mm)	18.5" (470 mm)	---
SC740EPE06B / SC740EPE06BPC			---	0.5" (13 mm)
SC740EPE08T /SC740EPE08TPC	8" (200 mm)	12.2" (310 mm)	16.5" (419 mm)	---
SC740EPE08B / SC740EPE08BPC			---	0.6" (15 mm)
SC740EPE10T / SC740EPE10TPC	10" (250 mm)	13.4" (340 mm)	14.5" (368 mm)	---
SC740EPE10B / SC740EPE10BPC			---	0.7" (18 mm)
SC740EPE12T / SC740EPE12TPC	12" (300 mm)	14.7" (373 mm)	12.5" (318 mm)	---
SC740EPE12B / SC740EPE12BPC			---	1.2" (30 mm)
SC740EPE15T / SC740EPE15TPC	15" (375 mm)	18.4" (467 mm)	9.0" (229 mm)	---
SC740EPE15B / SC740EPE15BPC			---	1.3" (33 mm)
SC740EPE18T / SC740EPE18TPC	18" (450 mm)	19.7" (500 mm)	5.0" (127 mm)	---
SC740EPE18B / SC740EPE18BPC			---	1.6" (41 mm)
SC740EPE24B*	24" (600 mm)	18.5" (470 mm)	---	0.1" (3 mm)

ALL STUBS, EXCEPT FOR THE SC740EPE24B 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 SC740EPE24B THE 24" (600 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 1.75" (44 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
OTTAWA, ONTARIO

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

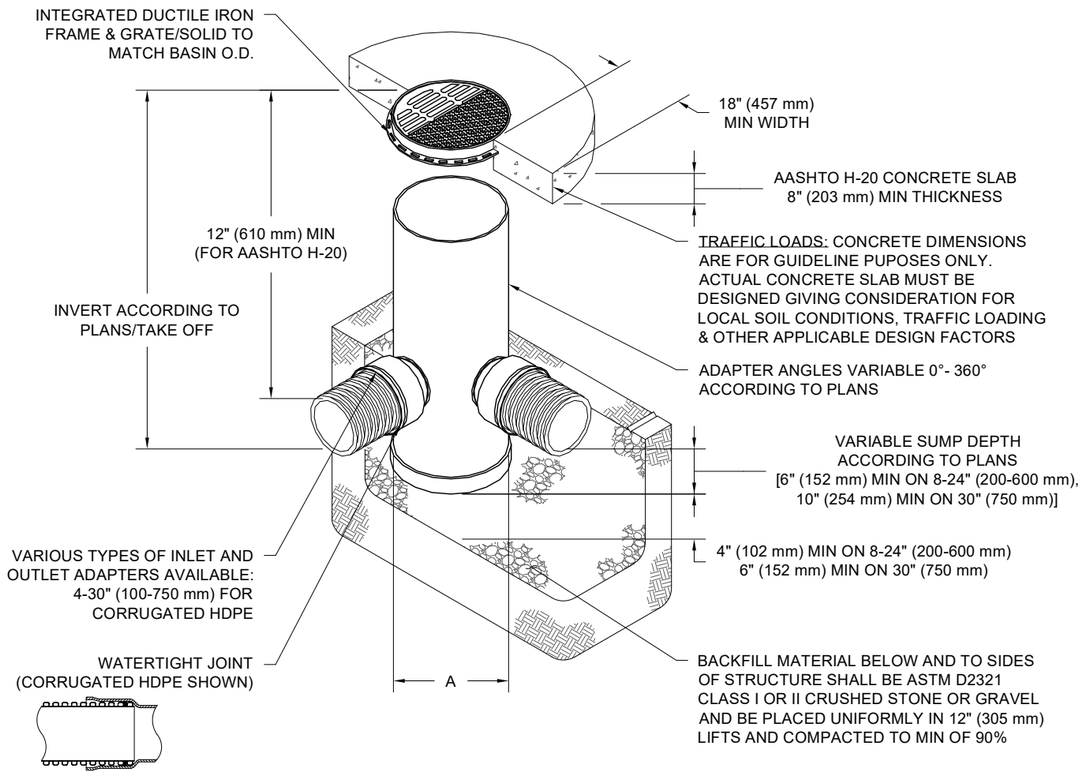
REV	DRW	CHK	DESCRIPTION

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

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

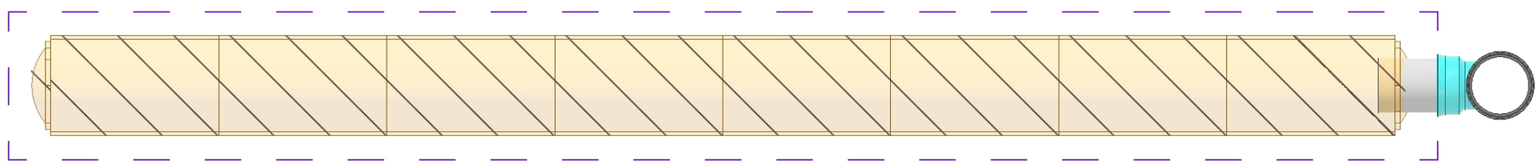
200 BARIBEAU
OTTAWA, ONTARIO

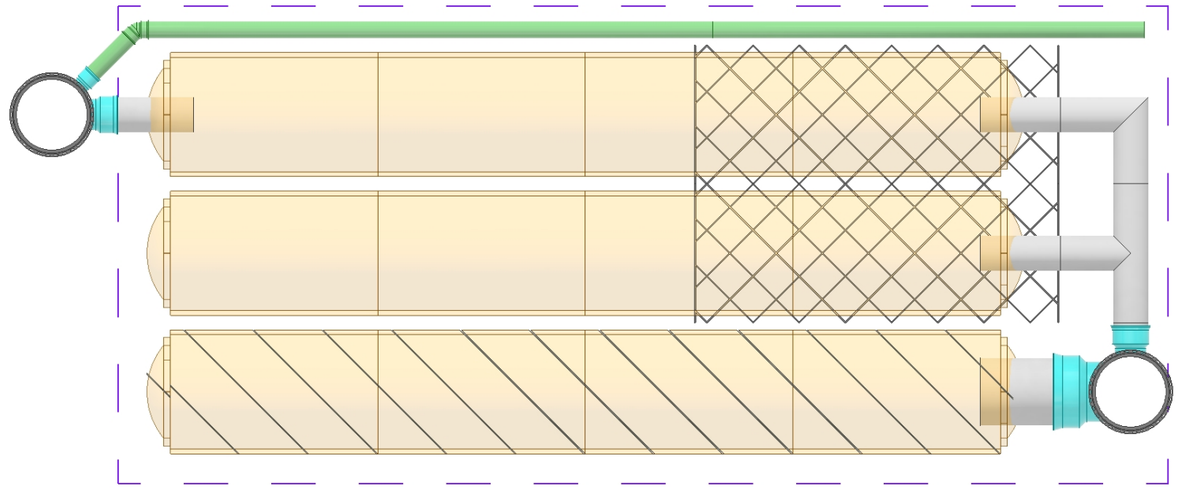
DATE:
DRAWN: LW
PROJECT #:
CHECKED: N/A

REV	DRW	CHK	DESCRIPTION

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

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


Z
X


Z
X

TEMPEST Product Submittal Package R1

Date: August 21, 2020

Customer: Novatech

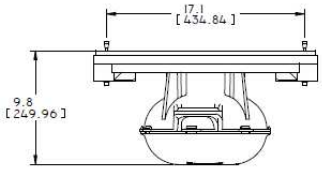
Contact: Lucas Wilson

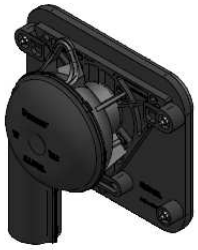
Location: Ottawa

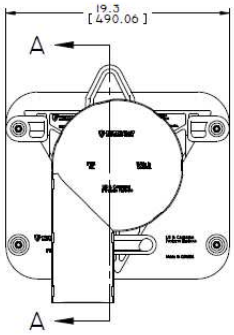
Project Name: 200 Baribeau St

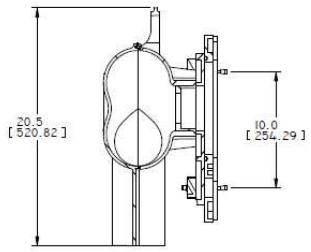
IPEX

Tempest LMF ICD Sq Shop Drawing

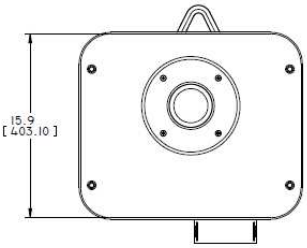








SECTION A-A

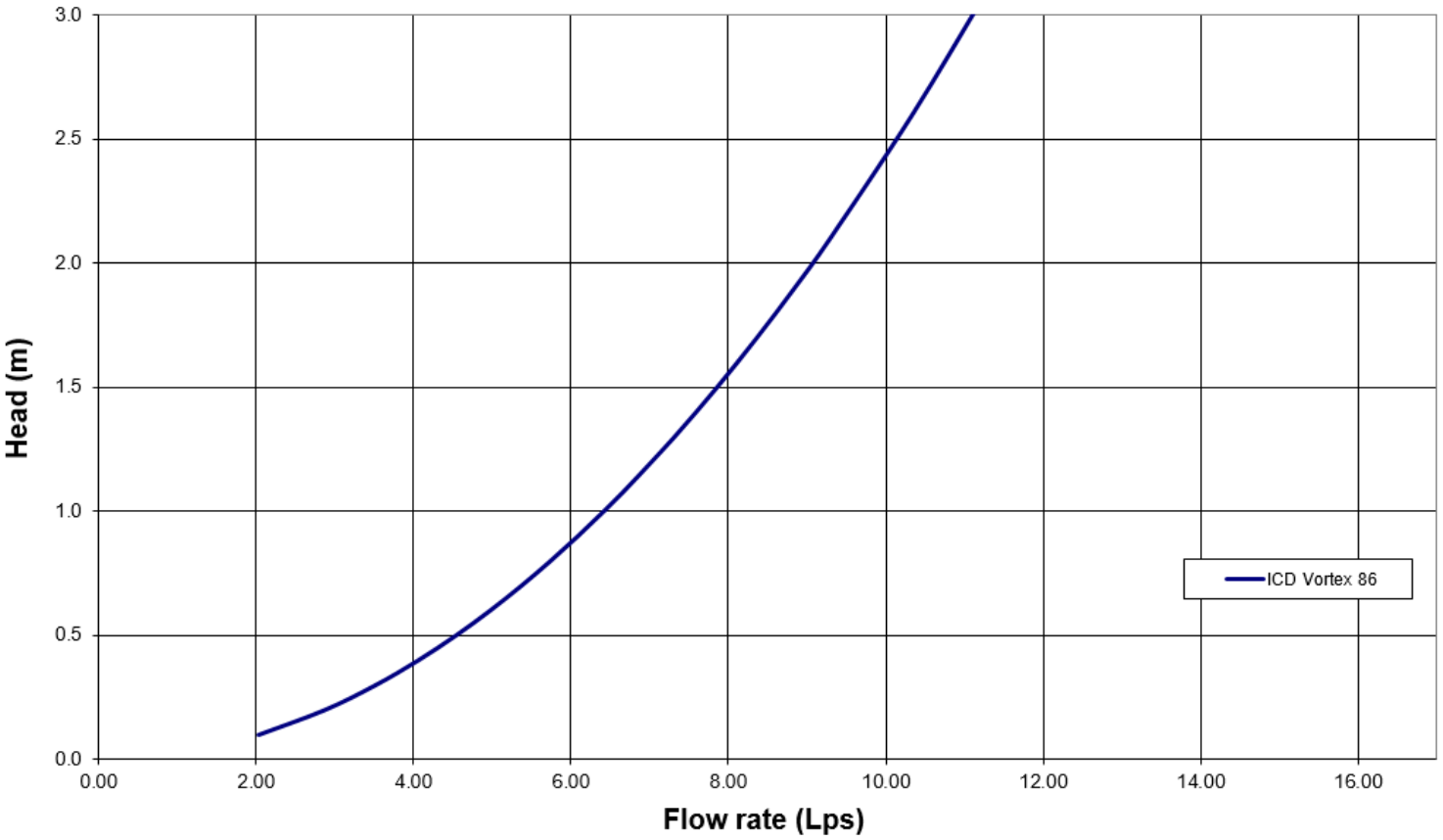


TOLERANCES:	IPEX TECHNOLOGIES INC.				
	PROJECTION	UNITS	TITLE	LMF SQUARE CB ASSEMBLY	
		in (mm)			
	DRAWN BY	DATE	SIZE	SCALE(S)	SHEET
	H. M-MARTIN	2011-07-27	B	1/8	1 OF 1
	VERIFIED BY	DATE	DRAWING NUMBER		REV
		2011-07-27	SQM74_FA001R03		3

IPEX

Tempest LMF ICD Flow Curve

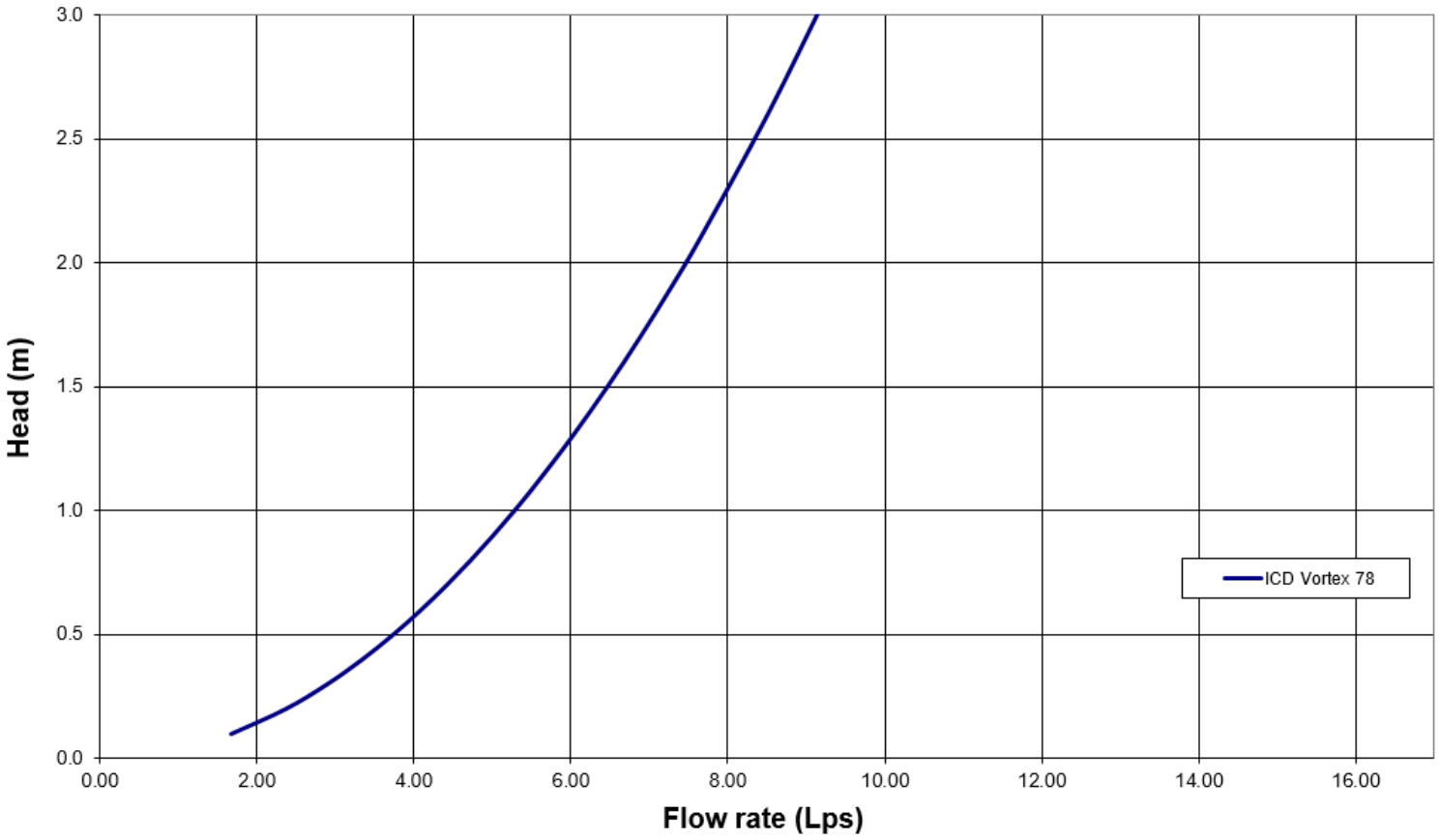
Flow: 8.2 L/s
Head: 1.61 m
CB



IPEX

Tempest LMF ICD Flow Curve

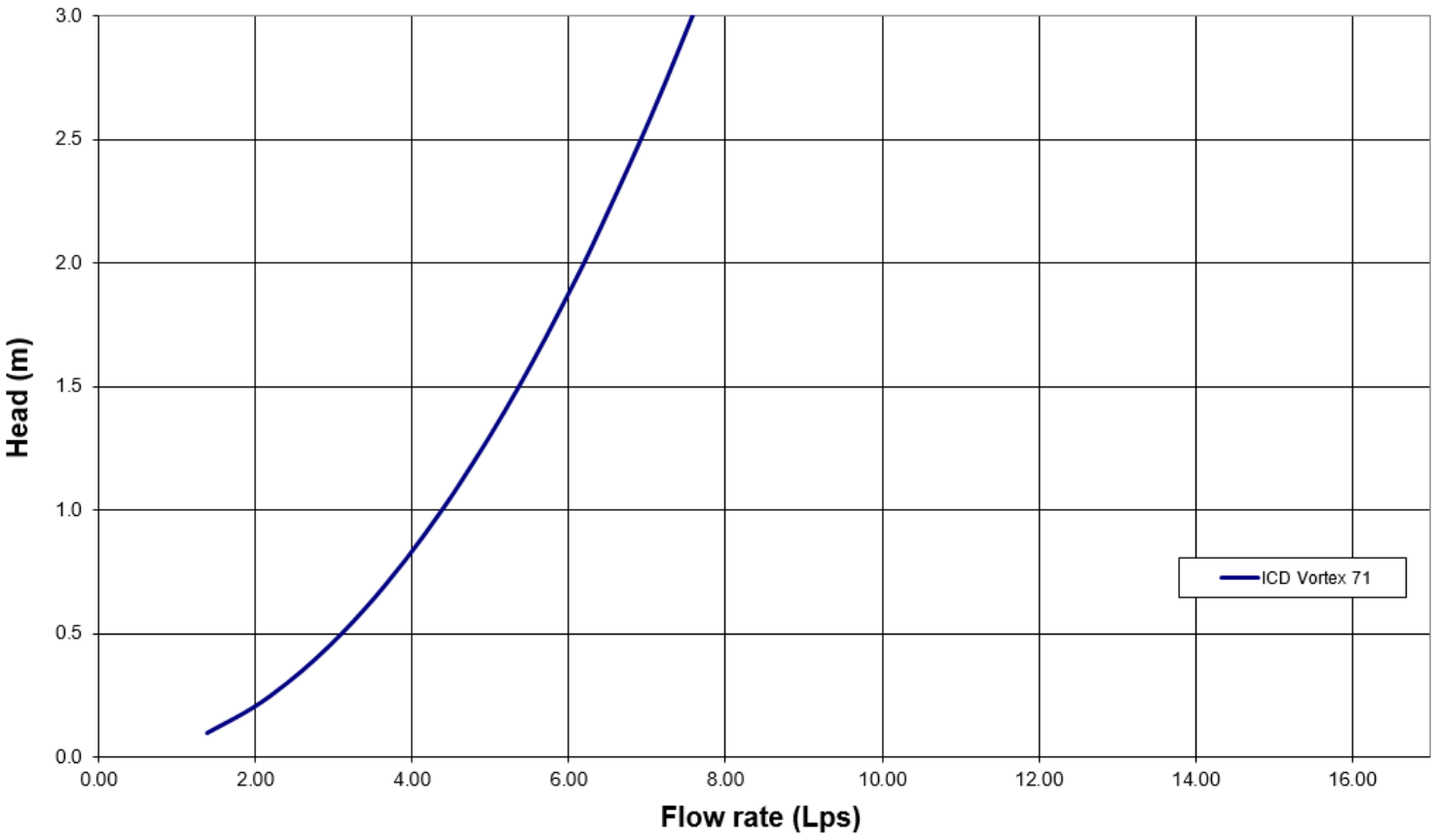
Flow: 6.6 L/s
Head: 1.57 m
CB



IPEX

Tempest LMF ICD Flow Curve

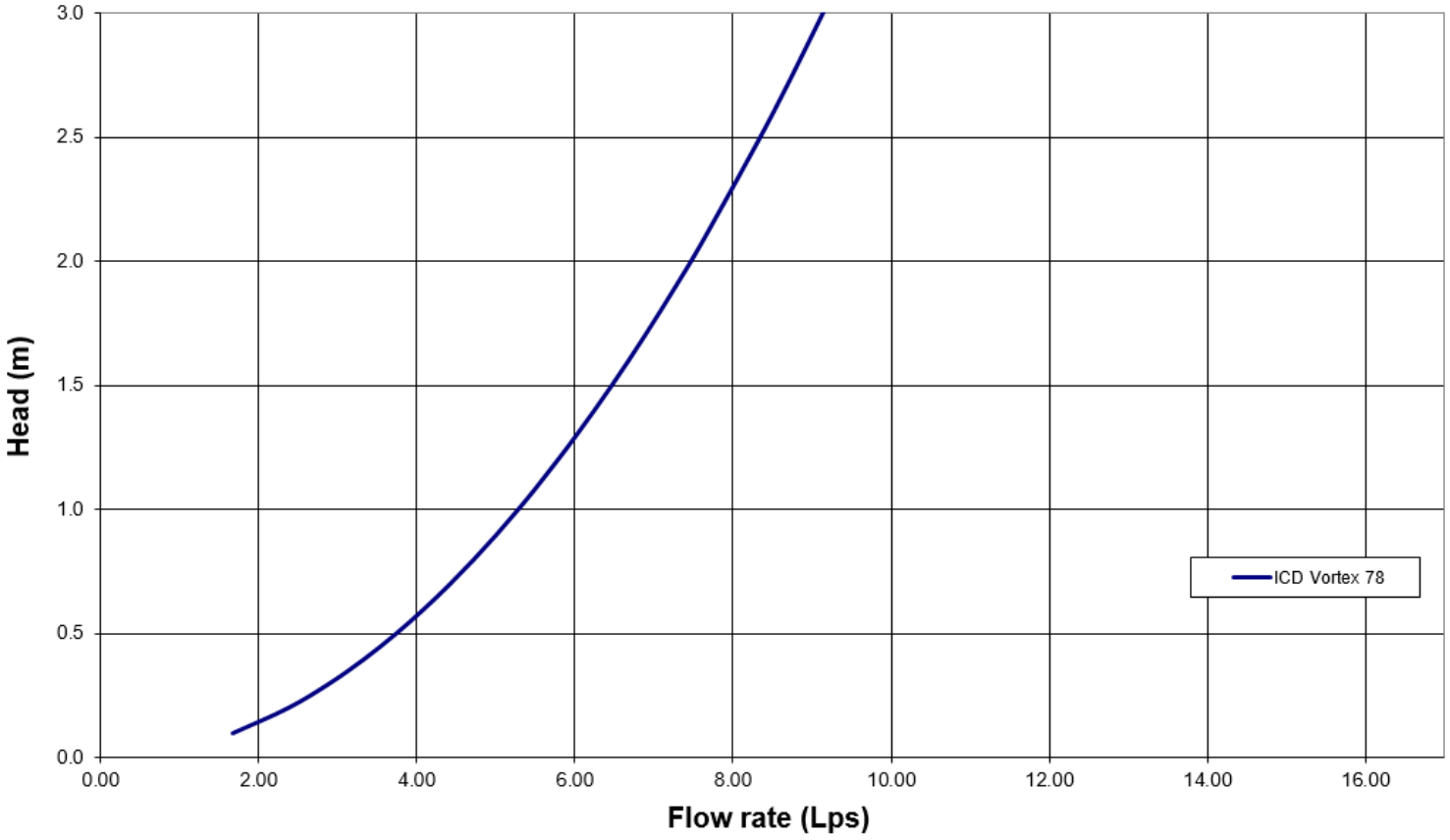
Flow: 6 L/s
Head: 1.84 m
CB



IPEX

Tempest LMF ICD Flow Curve

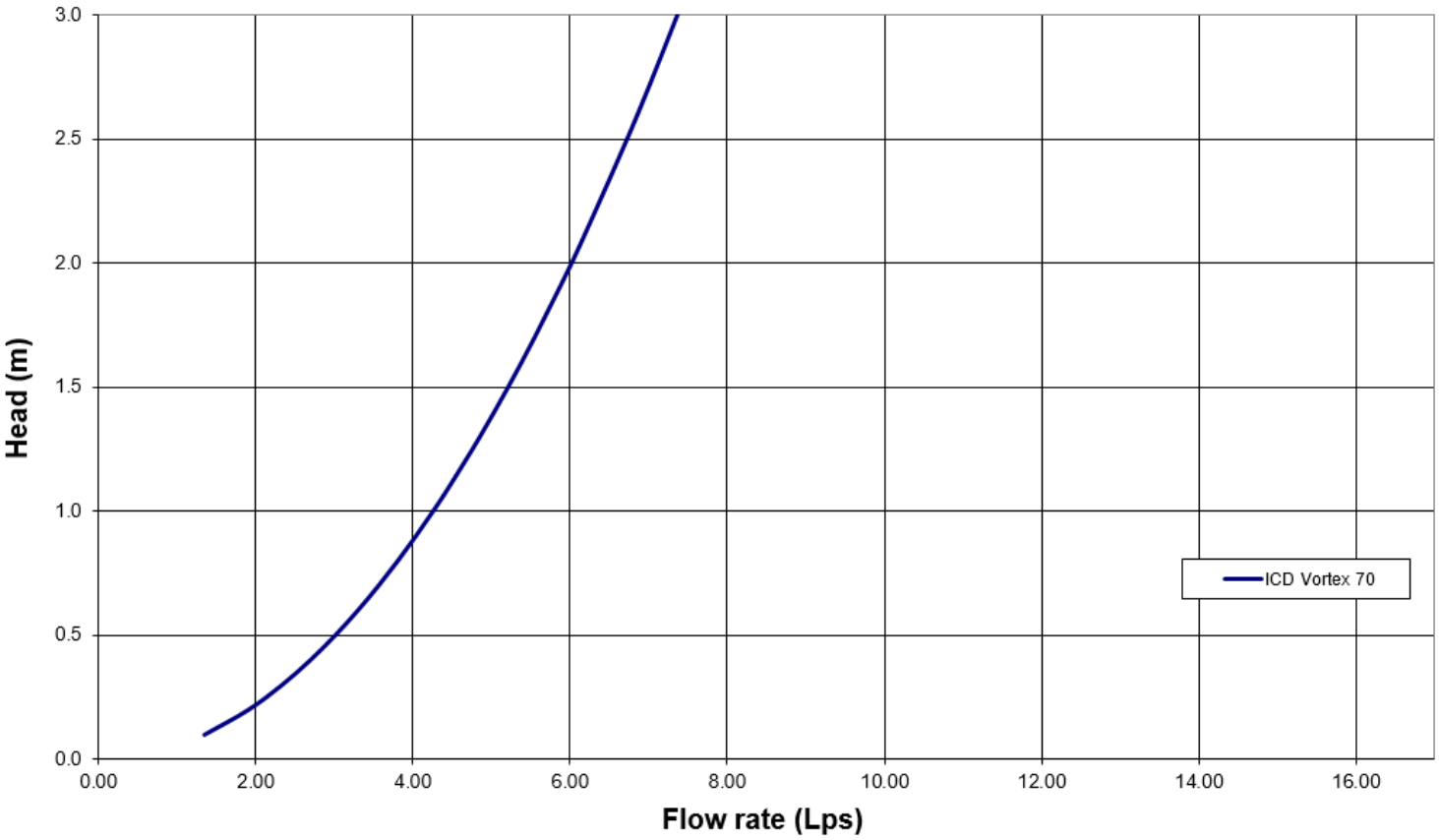
Flow: 7.1 L/s
Head: 1.79 m
RYCB1



IPEX

Tempest LMF ICD Flow Curve

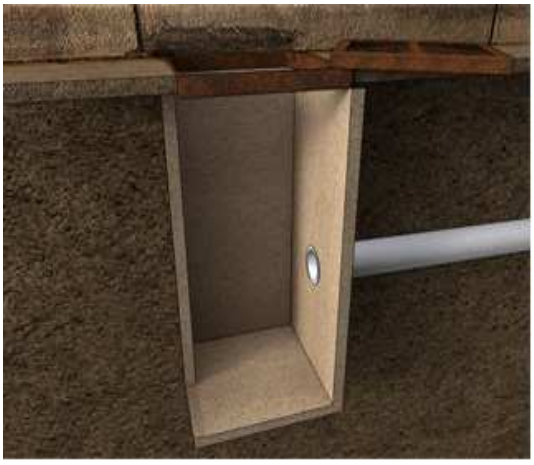
Flow: 6.3 L/s
Head: 2.17 m
RYCB3

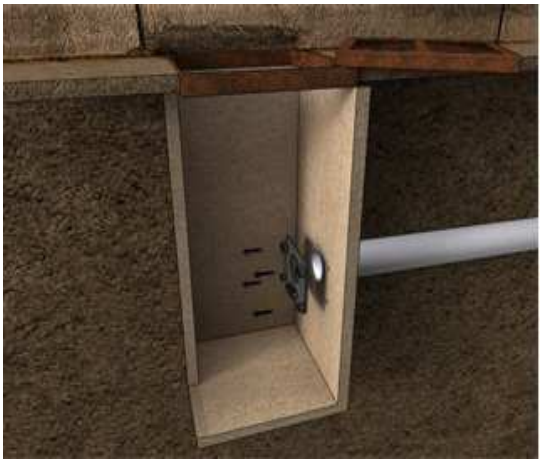


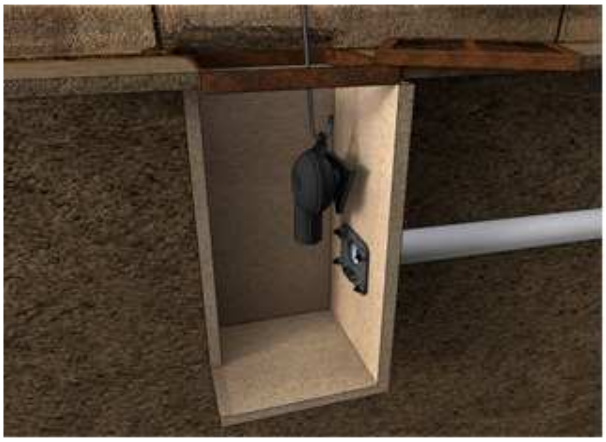
IPEX

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.





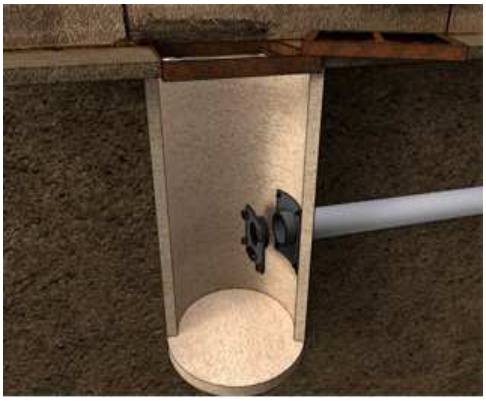


IPEX

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.

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)
1	1200Ø	55.74	N=53.52 S=53.51 W=53.57	N=250 S=250 W=200
3	1200Ø	56.52	E=53.69 W=53.70 N=53.75	E=200 W=200 N=200
5	1200Ø	56.45	E=53.89 N=53.95 W=53.90	E=200 N=200 W=200
7	1200Ø	56.48	E=54.06	E=200
9	1200Ø	56.44	S=54.07 N=54.08 E=54.26	S=200 N=200 E=200
11	1200Ø	56.58	S=54.25	S=200
13	1200Ø	56.52	N=53.87 S=53.86 W=53.92	N=200 S=200 W=200
15	1200Ø	56.61	N=53.98 S=53.97 W=54.03	N=200 S=200 W=200
17	1200Ø	56.70	N=54.09 S=54.08 W=54.14	N=200 S=200 W=200
19	1200Ø	56.72	E=54.44	E=200
21	1200Ø	56.78	S=54.20	S=200
23	1200Ø	56.05	W=53.61 E=53.60	W=200 E=200
25	1200Ø	56.65	E=54.33	E=200

STORM MANHOLE TABLE

MANHOLE ID	SIZE(mm)	T/G ELEV (m)	INVERT (m)	PIPE DIAMETER (mm)
2	1200Ø	55.72	N=52.31 S=52.31 W=52.68	N=900 S=900 W=525
4	1200Ø	56.51	E=52.74 W=52.81 N=52.88	E=525 W=450 N=375
6	1200Ø	56.44	E=52.92 W=54.64 N=53.00	E=450 W=300 N=375
8	1200Ø	56.45	N=53.15 S=53.08	N=300 S=375
10	1200Ø	56.54	N=53.25 S=53.25 W=53.80	N=300 S=300 W=300
12	1200Ø	56.75	E=54.41 S=53.38	E=200 S=300
14	1200Ø	56.50	N=52.96 S=52.96 W=53.09	N=375 S=375 W=250
16	1200Ø	56.59	N=53.11 S=53.04 E=54.39 W=53.16	N=300 S=375 E=200 W=250
18	1200Ø	56.79	W=55.14 S=53.27 E=55.12	W=250 S=300 E=250
20	1200Ø	56.01	W=52.70 E=52.70	W=525 E=525
22	1200Ø	56.64	E=53.29 W=54.82	E=250 W=200
24	1200Ø	56.66	E=53.36 W=54.87	E=250 W=200
26	1200Ø	56.66	N=53.21 S=53.21 W=53.26	N=300 S=300 W=250
28	1200Ø	56.73	E=53.46 W=54.93	E=250 W=200

REAR YARD CATCHBASIN TABLE

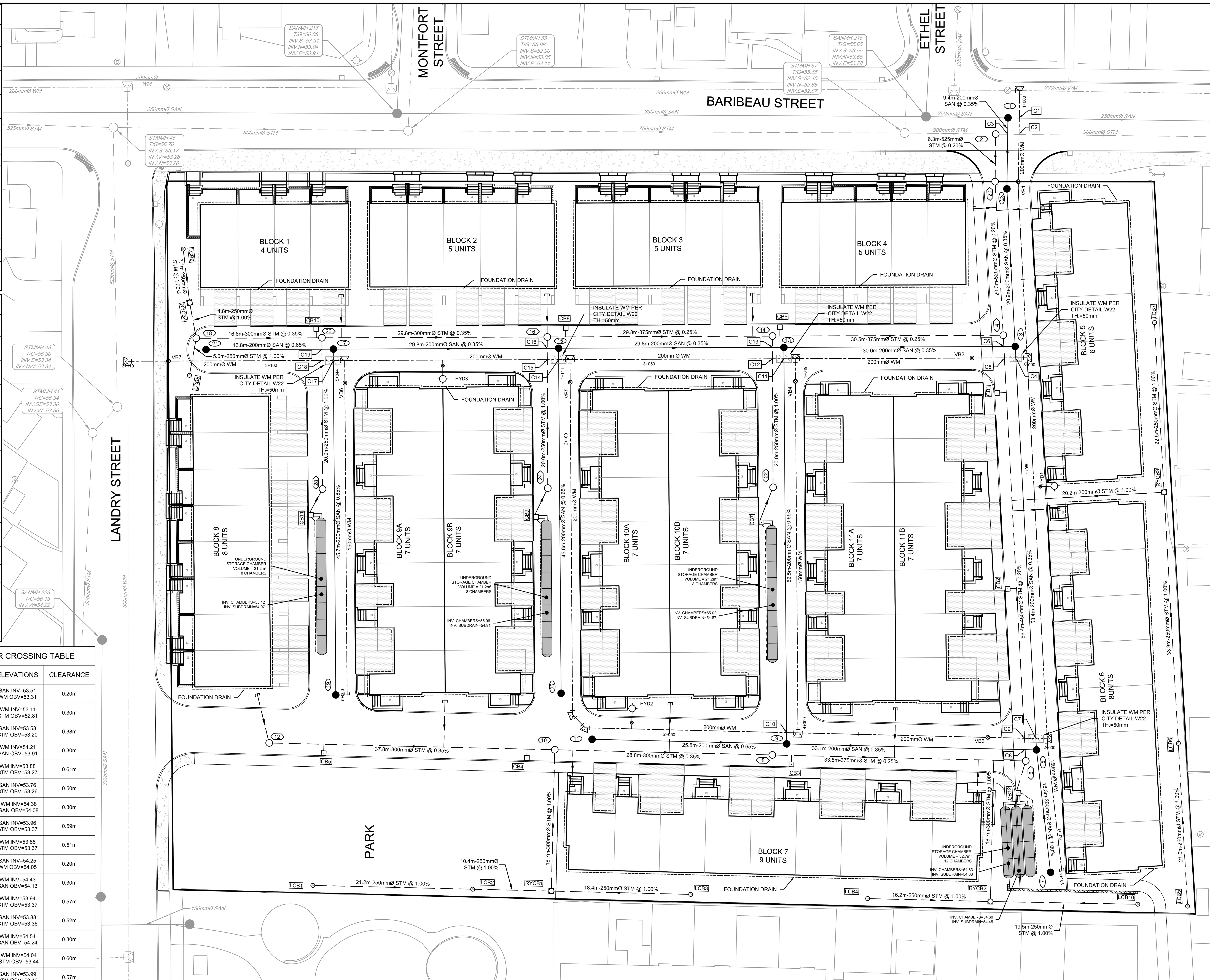
RYCB No.	T/G ELEVATION	INVERT	I.C.D.
LCB1	55.65	54.65	-
LCB2	55.65	54.44	-
LCB3	55.55	54.22	-
LCB4	55.45	54.45	-
LCB5	55.45	54.45	-
LCB6	55.41	54.23	-
LCB7	55.66	54.26	-
RYCB1	54.82	53.69	TEMPEST LMF (VORTEX 78)
RYCB2	55.61	53.68	TEMPEST LMF (VORTEX 78)
RYCB3	55.59	53.45	TEMPEST LMF (VORTEX 70)

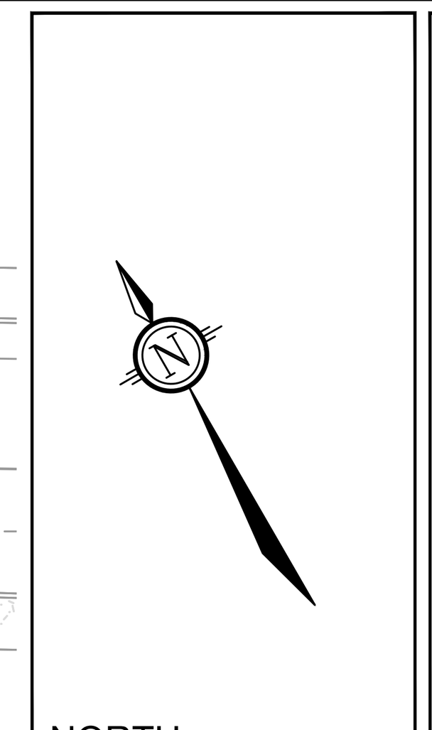
CATCHBASIN TABLE

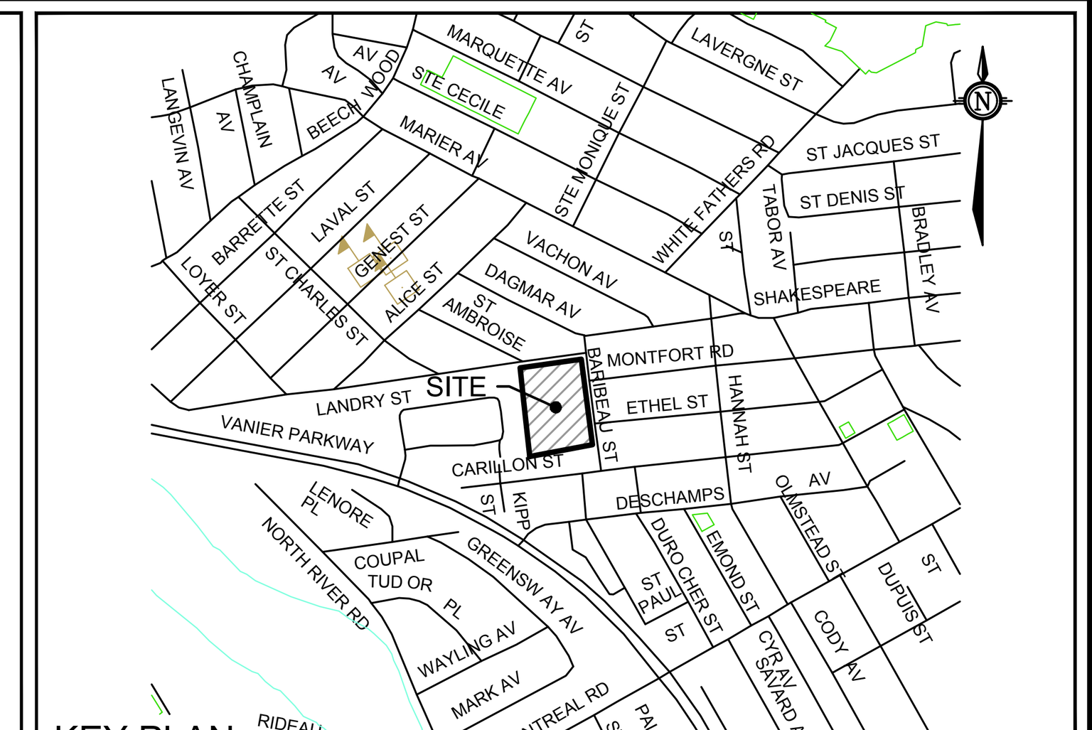
CB ID	T/G ELEVATION	INVERT	I.C.D.
CB1	56.43	55.03	TEMPEST LMF (VORTEX 86)
CB2	56.38	54.98	TEMPEST LMF (VORTEX 86)
CB3	56.43	55.03	TEMPEST LMF (VORTEX 86)
CB4	56.50	55.10	TEMPEST LMF (VORTEX 78)
CB5	56.56	55.16	TEMPEST LMF (VORTEX 78)
CB6	56.48	55.08	TEMPEST LMF (VORTEX 78)
CB7	56.57	54.87	TEMPEST LMF (VORTEX 71)
CB8	56.55	55.15	TEMPEST LMF (VORTEX 78)
CB9	56.61	54.91	TEMPEST LMF (VORTEX 71)
CB10	56.63	55.23	TEMPEST LMF (VORTEX 78)
CB11	56.67	54.97	TEMPEST LMF (VORTEX 71)
CB12	56.38	54.68	TEMPEST LMF (VORTEX 71)

SEWER CROSSING TABLE

LOCATION	ELEVATIONS	CLEARANCE
C1	SAN INV=53.51 WM OBV=53.31	0.20m
C2	WM INV=53.11 STM OBV=52.81	0.30m
C3	SAN INV=53.58 STM OBV=53.20	0.38m
C4	WM INV=54.21 SAN OBV=53.91	0.30m
C5	WM INV=53.88 STM OBV=53.27	0.61m
C6	SAN INV=53.76 STM OBV=53.26	0.50m
C7	WM INV=54.38 SAN OBV=54.08	0.30m
C8	SAN INV=53.96 STM OBV=53.37	0.59m
C9	WM INV=53.88 STM OBV=53.37	0.51m
C10	SAN INV=54.25 WM OBV=54.05	0.20m
C11	WM INV=54.43 SAN OBV=54.13	0.30m
C12	WM INV=53.94 STM OBV=53.37	0.57m
C13	SAN INV=53.88 STM OBV=53.36	0.52m
C14	WM INV=54.54 SAN OBV=54.24	0.30m
C15	WM INV=54.04 STM OBV=53.44	0.60m
C16	SAN INV=53.99 STM OBV=53.42	0.57m
C17	WM INV=54.65 SAN OBV=54.35	0.30m
C18	WM INV=54.13 STM OBV=53.54	0.59m
C19	SAN INV=54.10 STM OBV=53.52	0.58m




NORTH


KEY PLAN
N.T.S.

LEGEND

SANITARY MANHOLE, SEWER & DIRECTION OF FLOW		ROAD CATCHBASIN	
STORM MANHOLE, SEWER & DIRECTION OF FLOW		ROAD CATCHBASIN WITH ICD	
WATERMAIN AND DIAMETER		LANDSCAPE TYPE CATCHBASIN	
VALVE & VALVE BOX		REAR YARD CATCH BASIN	
VALVE & VALVE CHAMBER		UNDERGROUND STORAGE CHAMBERS WITH SUBDRAIN	
BEND AND THRUST BLOCK			
HYDRANT C/W VALVE & LEAD			
CAP			

NOTES:

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

ALL BUILDING ARE SLAB ON GRADE

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.

WATERMAIN TABLE

Station	F/G ELEVATION	TOP OF WATERMAIN	DESCRIPTION
1+000.00	55.75	53.35	CONNECT TO EXISTING
1+012.06	56.03	53.63	VB1
1+025.00	56.59	54.19	-
1+035.39	56.56	54.16	200 X 200 TEE
1+050.00	56.56	54.16	-
1+052.51	56.57	54.17	HYD1 TEE
1+075.00	56.50	54.10	-
1+085.85	56.49	54.09	200 X 150 TEE
1+100.00	56.47	54.07	-
1+103.45	56.47	54.07	CAP

WATERMAIN TABLE

Station	F/G ELEVATION	TOP OF WATERMAIN	DESCRIPTION
2+000.00	56.49	54.09	200 X 150 TEE
2+000.49	56.48	54.08	V. BEND
2+001.00	56.47	54.58	V. BEND
2+002.00	56.48	54.58	V. BEND
2+002.51	56.48	54.08	V. BEND
2+007.87	56.52	54.12	VB3
2+025.00	56.50	54.10	-
2+032.99	56.45	54.05	200 X 150 TEE
2+050.00	56.59	54.19	-
2+054.99	56.63	54.23	HYD2 TEE
2+061.12	56.58	54.18	45° HORIZONTAL BEND
2+063.53	56.60	54.20	45° HORIZONTAL BEND
2+075.00	56.76	54.36	-
2+100.00	56.74	54.34	-
2+110.52	56.63	54.23	200 X 200 TEE

WATERMAIN TABLE

Station	F/G ELEVATION	TOP OF WATERMAIN	DESCRIPTION
3+000.00	56.56	54.16	200 x 200 TEE
3+000.71	56.54	54.14	V. BEND
3+001.00	56.53	54.41	V. BEND
3+002.00	56.51	54.41	V. BEND
3+002.29	56.50	54.10	V. BEND
3+007.29	56.53	54.13	VB2
3+025.00	56.55	54.15	-
3+030.67	56.53	54.13	200 X 150 TEE
3+031.18	56.53	54.13	V. BEND
3+031.67	56.54	54.63	V. BEND
3+032.67	56.54	54.63	V. BEND
3+033.16	56.54	54.14	V. BEND
3+050.00	56.69	54.29	-
3+060.47	56.63	54.23	200 X 200 TEE
3+060.97	56.63	54.23	V. BEND

WATERMAIN TABLE

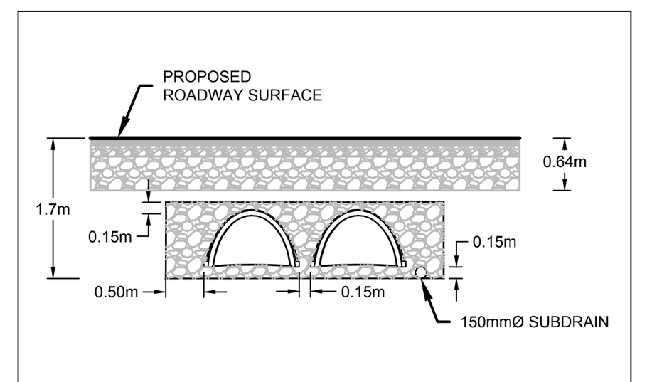
Station	F/G ELEVATION	TOP OF WATERMAIN	DESCRIPTION
3+061.47	56.63	54.74	V. BEND
3+062.47	56.64	54.74	V. BEND
3+062.97	56.64	54.24	V. BEND
3+075.00	56.71	54.31	-
3+077.30	56.74	54.34	HYD3 TEE
3+090.27	56.73	54.33	200 X 150 TEE
3+090.75	56.73	54.33	V. BEND
3+091.27	56.73	54.85	V. BEND
3+092.27	56.73	54.85	V. BEND
3+092.79	56.73	54.33	V. BEND
3+100.00	56.77	54.37	-
3+113.60	56.35	53.95	VB7
3+118.94	56.27	53.87	CONNECT TO EXISTING

WATERMAIN TABLE

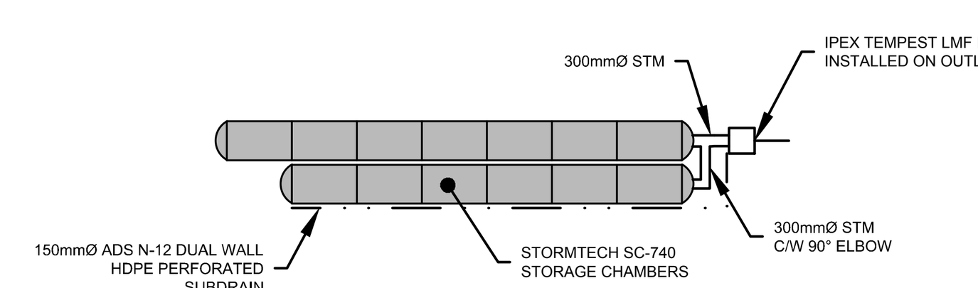
Station	F/G ELEVATION	TOP OF WATERMAIN	DESCRIPTION
4+000.00	56.45	54.05	200 X 150 TEE
4+025.00	56.64	54.24	-
4+046.49	56.67	54.27	VB4
4+049.49	56.53	54.13	200 X 150 TEE

WATERMAIN TABLE

Station	F/G ELEVATION	TOP OF WATERMAIN	DESCRIPTION
5+000.00	56.71	54.31	CAP
5+025.00	56.78	54.38	-
5+041.24	56.82	54.42	VB4
5+044.24	56.73	54.33	200 X 150 TEE



TYPICAL CHAMBER CROSS-SECTION
SCALE 1:75



NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND 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
3.	SITE PLAN APPLICATION	AUG 28/20	MAB
2.	RVCA APPROVAL IN PRINCIPAL APPLICATION	MAY 28/20	MAB
1.	ISSUED FOR RVCA REVIEW	MAR 26/20	MAB

SCALE 1:300

DESIGN DTD
CHECKED LRW
DRAWN DTD
CHECKED LRW
APPROVED MAB

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER L. R. WILSON 100160065 2020.08.24 PROVINCE OF ONTARIO

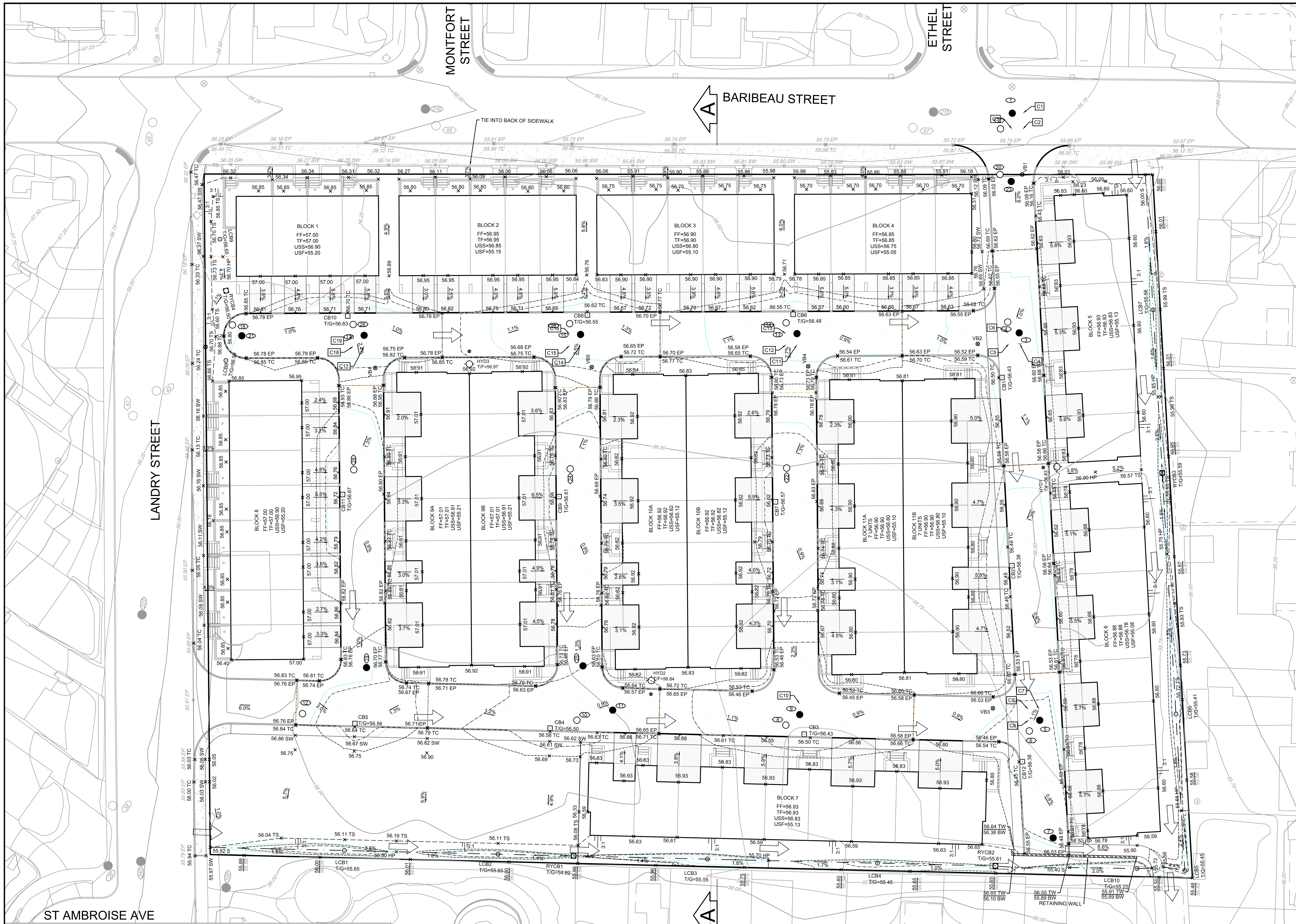
LICENSED PROFESSIONAL ENGINEER M.A. BISSETT 2020.08.24 PROVINCE OF ONTARIO

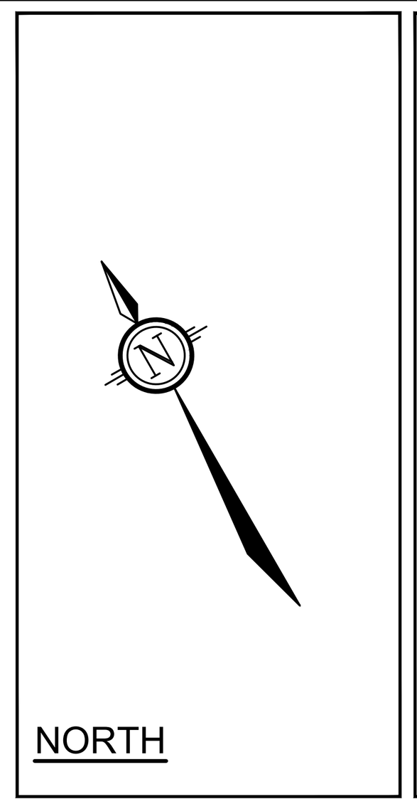
NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

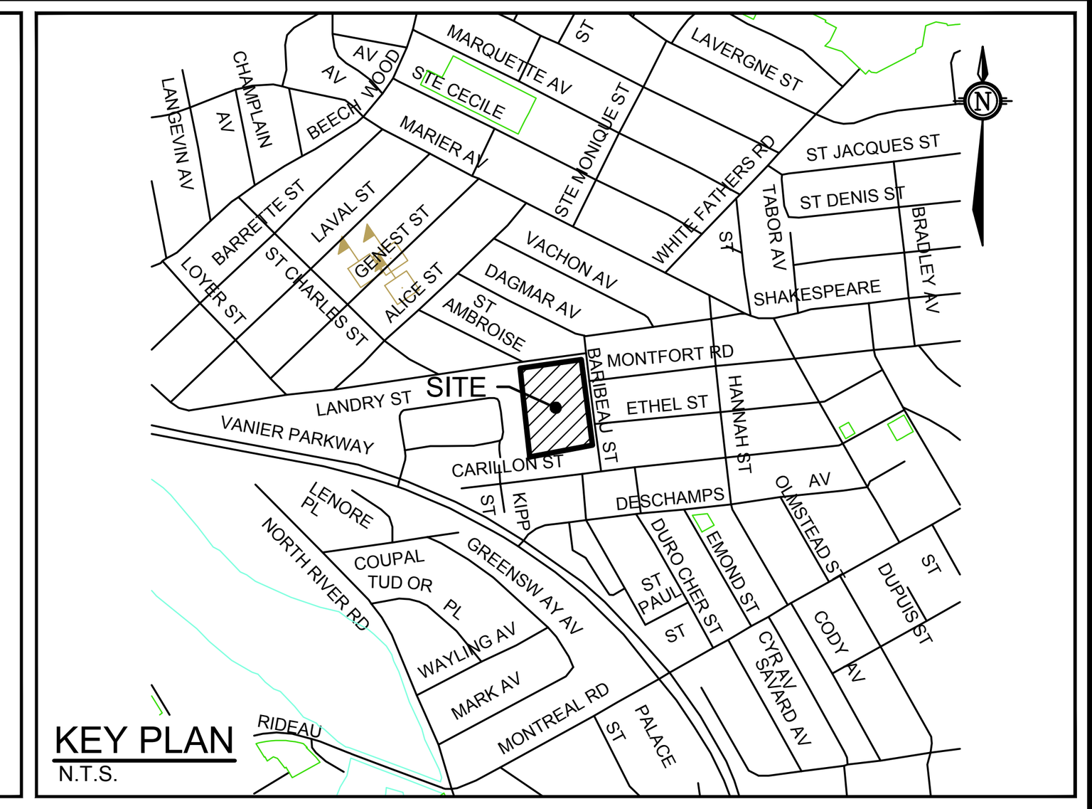
CITY OF OTTAWA
200 BARIBEAU STREET

SERVICING PLAN

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







LEGEND

2.5%	PROPOSED GRADE AND DIRECTION OF FLOW
105.59 HP	PROPOSED ELEVATION AT HIGH POINT
105.53 / 105.53	PROPOSED ELEVATION / EXISTING ELEVATION
55.98	EXISTING SPOT ELEVATION
56.13 BS	EXISTING ELEVATION AT BACK OF SIDEWALK
55.00	EXISTING CONTOUR ELEVATION
UP	UTILITY POLE AND GUY WIRE
	MAJOR OVERLAND FLOW DIRECTION
3:1	TERRACE GRADE (3:1 MAX)
	SWALE AND TERRACE
	MAX STATIC PONDING LIMITS
	100-YR PONDING LIMITS
	100-YR +20% PONDING LIMITS
HYD T/F=56.84	HYDRANT WITH TOP OF FLANGE ELEVATION
101	SANITARY MANHOLE
100	STORM MANHOLE
CB6 T/G=56.48	CATCHBASIN WITH TOP OF GRATE ELEVATION CB WITH ICD
LCB1 T/G=56.48	LANDSCAPE TYPE CATCHBASIN WITH TOP OF GRATE ELEVATION
VB	VALVE & VALVE BOX LOCATION
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:

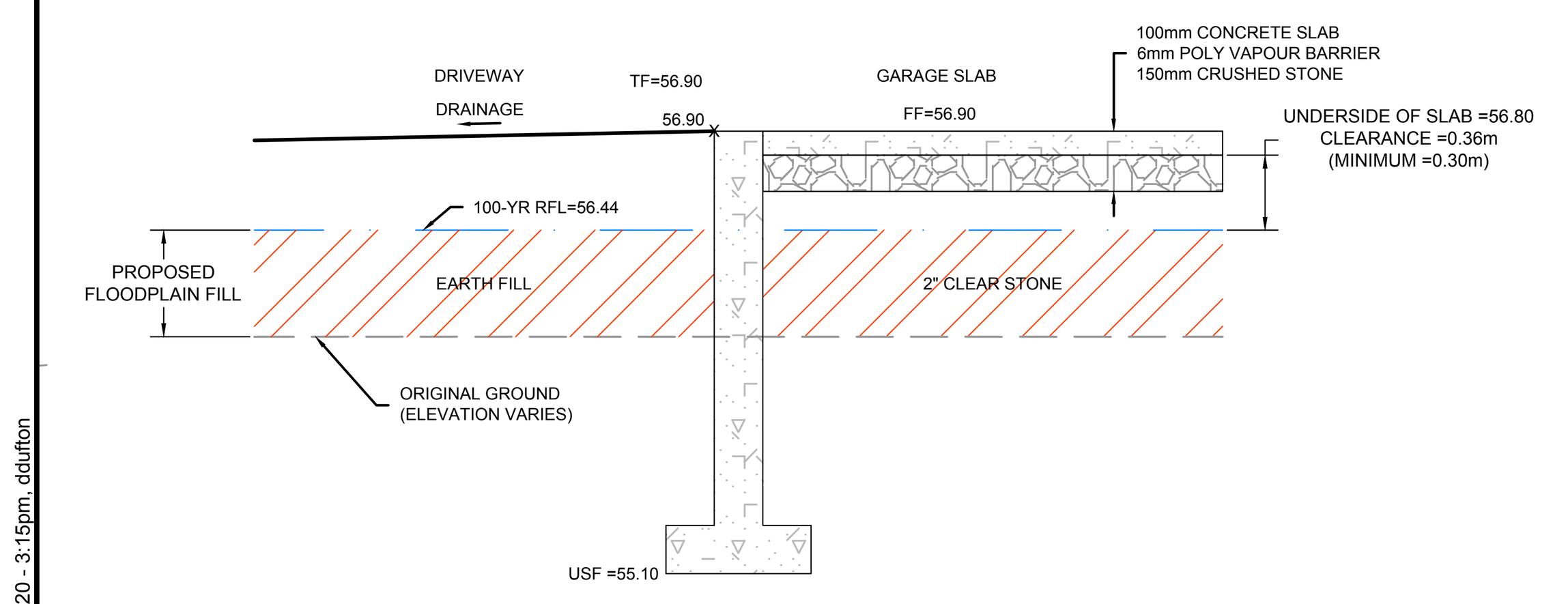
1. DIMENSIONS AND LAYOUT INFORMATION SHALL BE CONFIRMED PRIOR TO COMMENCEMENT OF CONSTRUCTION.
2. THE ORIGINAL TOPOGRAPHY AND GROUND ELEVATIONS, SERVICING AND SURVEY INFORMATION SHOWN ON THIS PLAN ARE SUPPLIED FOR INFORMATION PURPOSES ONLY. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE 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:

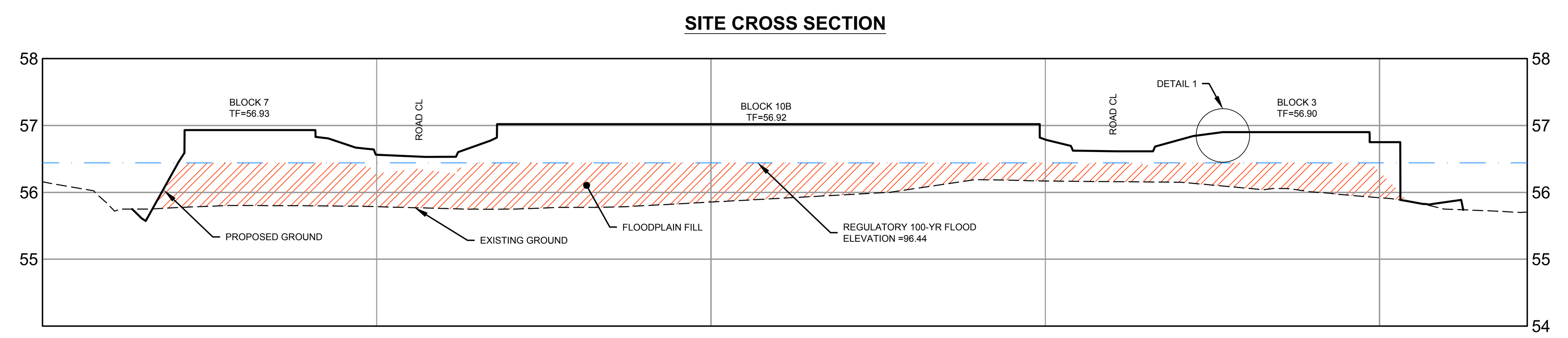
1. ALL TOPSOIL, ORGANIC OR DELETERIOUS MATERIAL MUST BE ENTIRELY REMOVED FROM BENEATH THE PROPOSED HARD SURFACE (ie. PAVEMENT, CURB, SIDEWALK, ETC.) AREAS AS DIRECTED BY THE SITE ENGINEER OR GEOTECHNICAL ENGINEER.
2. EXPOSED SUBGRADES IN PROPOSED PAVED AREAS SHOULD BE HEAVILY PROOF ROLLED WITH A LARGE (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	56.64	0.26	56.71	0.33	56.53	0.15
P3	CB3	56.58	0.15	56.67	0.24	56.58	0.15
P4	CB4	56.65	0.15	56.73	0.23	56.65	0.15
P5	CB5	56.69	0.13	56.77	0.21	56.71	0.15
P6	CB6	59.70	0.22	56.75	0.27	56.63	0.15
P7	CB7	56.70	0.13	56.77	0.20	56.72	0.15
P8	CB8	56.75	0.20	56.80	0.25	56.70	0.15
P9	CB9	56.75	0.14	56.81	0.20	56.76	0.15
P10	CB10	56.82	0.19	56.85	0.22	56.78	0.15
P11	CB11	56.83	0.16	56.89	0.22	56.82	0.15
P12	CB12	56.49	0.11	56.64	0.26	56.50	0.12
P13	LCB1	55.80	0.15	55.86	0.21	55.90	0.25
P14	LCB2	55.79	0.14	55.85	0.20	55.80	0.15
P15	LCB3	55.78	0.23	55.82	0.27	55.70	0.15
P16	LCB4	55.53	0.08	55.64	0.19	55.61	0.16
P17	LCB5	55.62	0.17	55.79	0.34	55.60	0.15
P18	LCB6	55.62	0.21	55.79	0.38	55.65	0.24
P19	LCB7	55.62	0.00	55.79	0.13	55.85	0.19
P20	LCB10	55.53	0.31	55.57	0.16	55.50	0.28
P21	RYCB3	55.75	0.16	55.75	0.35	55.75	0.16



DETAIL 1 - FLOOD PROOFING (BLOCK3)
N.T.S.



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

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND 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

PAVEMENT STRUCTURE:

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

No.	REVISION	DATE	BY
3.	SITE PLAN APPLICATION	AUG 28/20	MAB
2.	RVCA APPROVAL IN PRINCIPAL APPLICATION	MAY 28/20	MAB
1.	ISSUED FOR RVCA REVIEW	MAR 26/20	MAB

SCALE 1:300

DESIGN DTD | CHECKED LRW | DRAWN DTD | CHECKED LRW | APPROVED MAB

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER L. R. WILSON 100160065 2020.08.24 PROVINCE OF ONTARIO

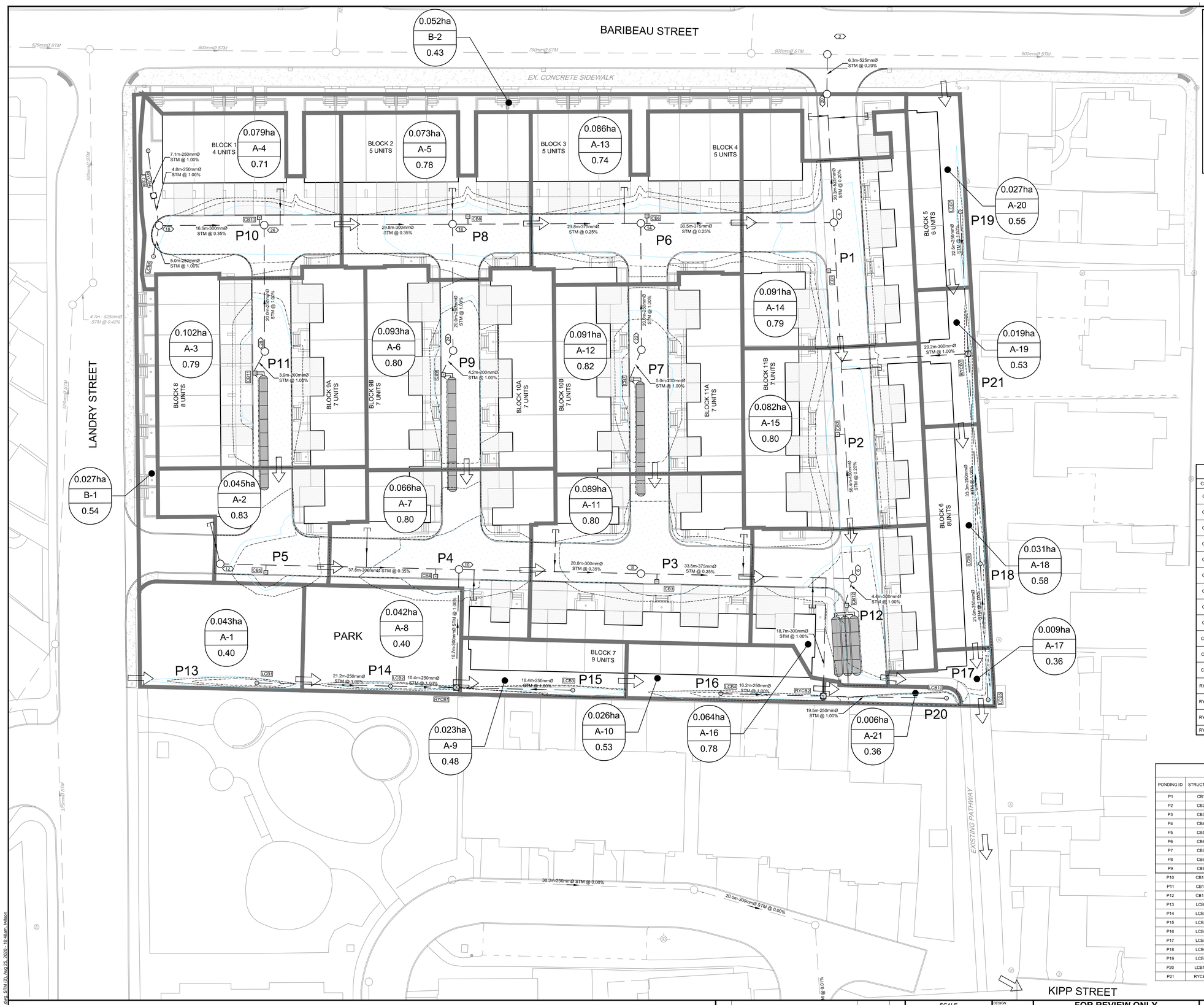
LICENSED PROFESSIONAL ENGINEER M.A. BISSETT 2020.08.24 PROVINCE OF ONTARIO

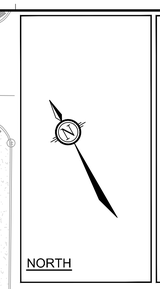
NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

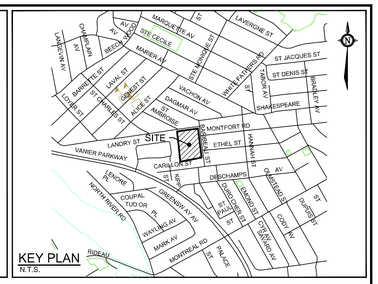
CITY OF OTTAWA
200 BARIBEAU STREET

GRADING PLAN

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







LEGEND

- 0.24 ha / A-1 / 0.65 — DRAINAGE AREA (hectares); AREA ID; RUN-OFF COEFFICIENT
- DRAINAGE BOUNDARY AREA
- MAX STATIC PONDING LIMITS
- 100-YR PONDING LIMITS
- 100-YR +20% PONDING LIMITS
- 100 — PROPOSED STORM MANHOLE & SEWER WITH DIRECTION OF FLOW
- 100 — EXISTING STORM MANHOLE & SEWER WITH DIRECTION OF FLOW
- CB1 — PROPOSED ROAD CATCHBASIN WITH ICD
- EXISTING ROAD CATCHBASIN
- RYCB — PROPOSED REAR YARD CATCHBASIN WITH ICD
- MAJOR SYSTEM FLOW ROUTE

CATCHBASIN TABLE

CB ID	T/G ELEVATION	INVERT	I.C.D.
CB1	56.43	54.73	TEMPEST LMF (VORTEX 86)
CB2	56.38	54.68	TEMPEST LMF (VORTEX 86)
CB3	56.43	54.73	TEMPEST LMF (VORTEX 86)
CB4	56.50	54.80	TEMPEST LMF (VORTEX 78)
CB5	56.56	54.86	TEMPEST LMF (VORTEX 78)
CB6	56.48	54.78	TEMPEST LMF (VORTEX 78)
CB7	56.57	54.57	TEMPEST LMF (VORTEX 71)
CB8	56.55	54.85	TEMPEST LMF (VORTEX 78)
CB9	56.61	54.61	TEMPEST LMF (VORTEX 71)
CB10	56.63	54.93	TEMPEST LMF (VORTEX 78)
CB11	56.67	54.67	TEMPEST LMF (VORTEX 71)
CB12	56.38	54.38	TEMPEST LMF (VORTEX 71)
RYCB1	54.82	53.69	TEMPEST LMF (VORTEX 78)
RYCB2	55.61	53.68	TEMPEST LMF (VORTEX 78)
RYCB3	55.59	53.45	TEMPEST LMF (VORTEX 70)
RYCB4	56.50	55.17	-

STORM MANHOLE TABLE

MANHOLE ID	SIZE(mm)	T/G ELEV (m)	INVERT (m)	PIPE DIAMETER (mm)
2	1200Ø	55.72	N=52.31 S=52.31 W=52.68	N=900 S=900 W=525
4	1200Ø	56.51	E=52.74 W=52.81 N=52.88	E=525 W=450 N=375
6	1200Ø	56.44	E=52.92 W=54.64 N=53.00	E=450 W=300 N=375
8	1200Ø	56.45	N=53.15 S=53.08	N=300 S=375
10	1200Ø	56.54	N=53.25 S=53.25 W=53.80	N=300 S=300 W=300
12	1200Ø	56.75	E=54.41 S=53.38	E=200 S=300
14	1200Ø	56.50	N=52.96 S=52.96 W=53.09	N=375 S=375 W=250
16	1200Ø	56.59	N=53.11 S=53.04 E=54.39 W=53.16	N=300 S=375 E=200 W=250
18	1200Ø	56.79	W=55.14 S=53.27 E=55.12	W=250 S=300 E=250
20	1200Ø	56.01	W=52.70 E=52.70	W=525 E=525
22	1200Ø	56.64	E=53.29 W=54.82	E=250 W=200
24	1200Ø	56.66	E=53.36 W=54.87	E=250 W=200
26	1200Ø	56.66	N=53.21 S=53.21 W=53.26	N=300 S=300 W=250
28	1200Ø	56.73	E=53.46 W=54.93	E=250 W=200

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	56.64	0.26	56.71	0.33	56.53	0.15
P3	CB3	56.58	0.15	56.67	0.24	56.58	0.15
P4	CB4	56.65	0.15	56.73	0.23	56.65	0.15
P5	CB5	56.69	0.13	56.77	0.21	56.71	0.15
P6	CB6	59.70	0.22	56.75	0.27	56.63	0.15
P7	CB7	56.70	0.13	56.77	0.20	56.72	0.15
P8	CB8	56.75	0.20	56.80	0.25	56.70	0.15
P9	CB9	56.75	0.14	56.81	0.20	56.76	0.15
P10	CB10	56.82	0.19	56.85	0.22	56.78	0.15
P11	CB11	56.83	0.16	56.89	0.22	56.82	0.15
P12	CB12	56.49	0.11	56.64	0.26	56.50	0.12
P13	LCB1	55.80	0.15	55.86	0.21	55.90	0.25
P14	LCB2	55.79	0.14	55.85	0.20	55.80	0.15
P15	LCB3	55.78	0.23	55.82	0.27	55.70	0.15
P16	LCB4	55.53	0.08	55.64	0.19	55.61	0.16
P17	LCB5	55.62	0.17	55.79	0.34	55.60	0.15
P18	LCB6	55.62	0.21	55.79	0.38	55.65	0.24
P19	LCB7	55.62	0.00	55.79	0.13	55.85	0.19
P20	LCB10	55.53	0.31	55.57	0.16	55.50	0.28
P21	RYCB3	55.75	0.16	55.75	0.35	55.75	0.16

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND 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.

No.	REVISION	DATE	BY
3.	SITE PLAN APPLICATION	AUG 28/20	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 LRW
CHECKED MAB
DRAWN BRF
CHECKED LRW
APPROVED MAB

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER L. R. WILSON 100160065 2020.08.24 PROVINCE OF ONTARIO

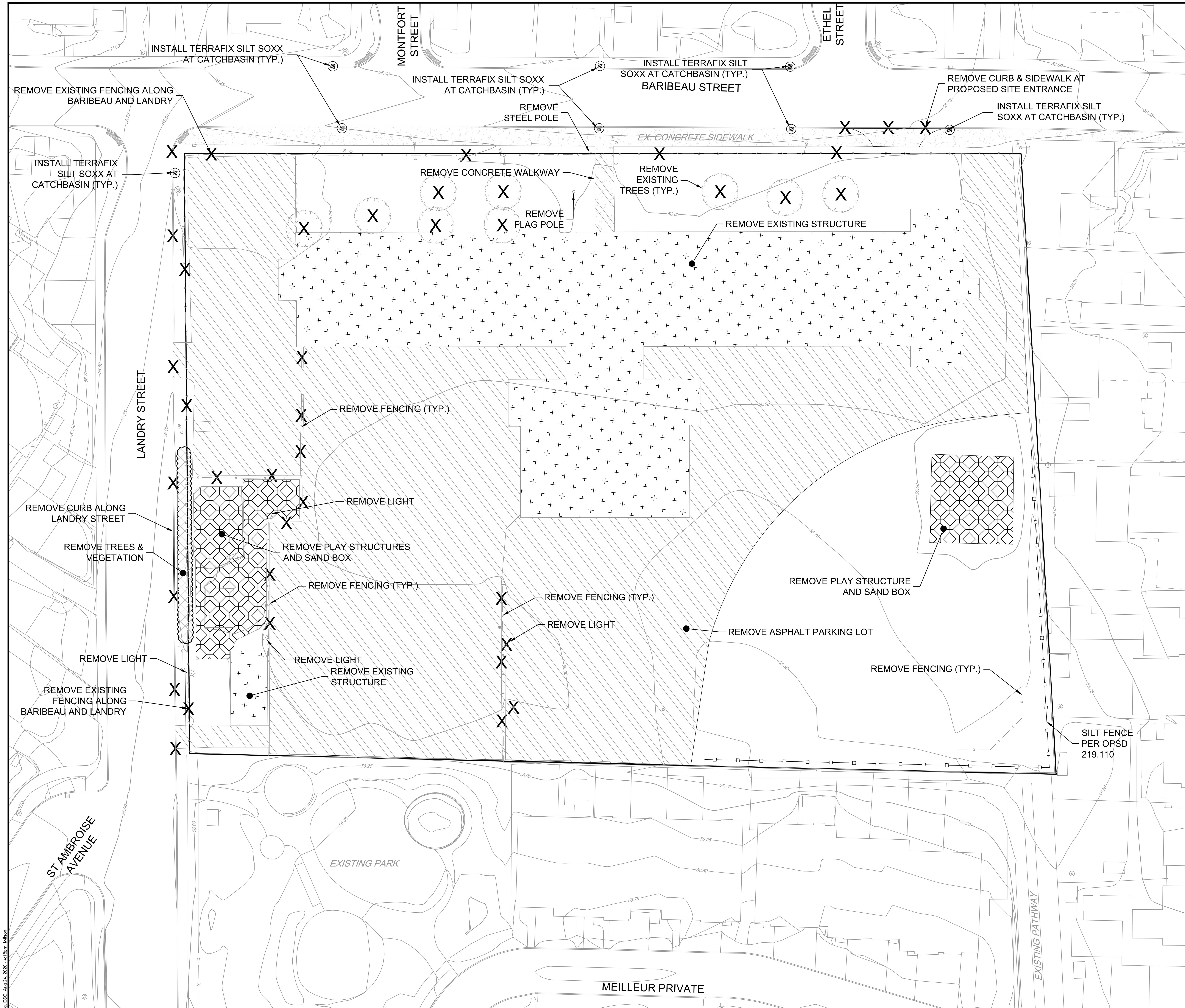
LICENSED PROFESSIONAL ENGINEER M.A. BISSETT 2020.08.24 PROVINCE OF ONTARIO

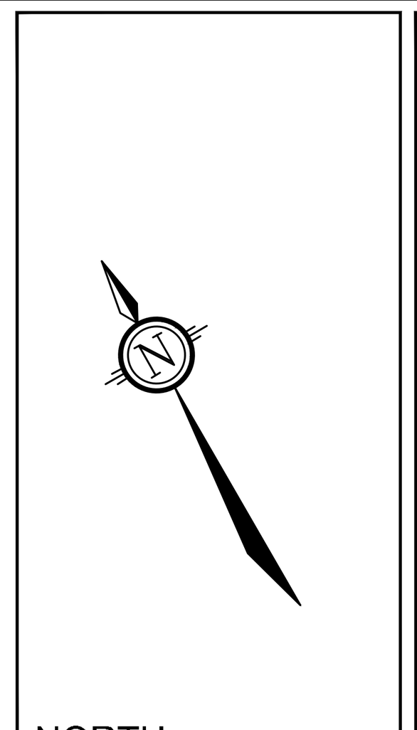
NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

CITY OF OTTAWA
200 BARIBEAU STREET

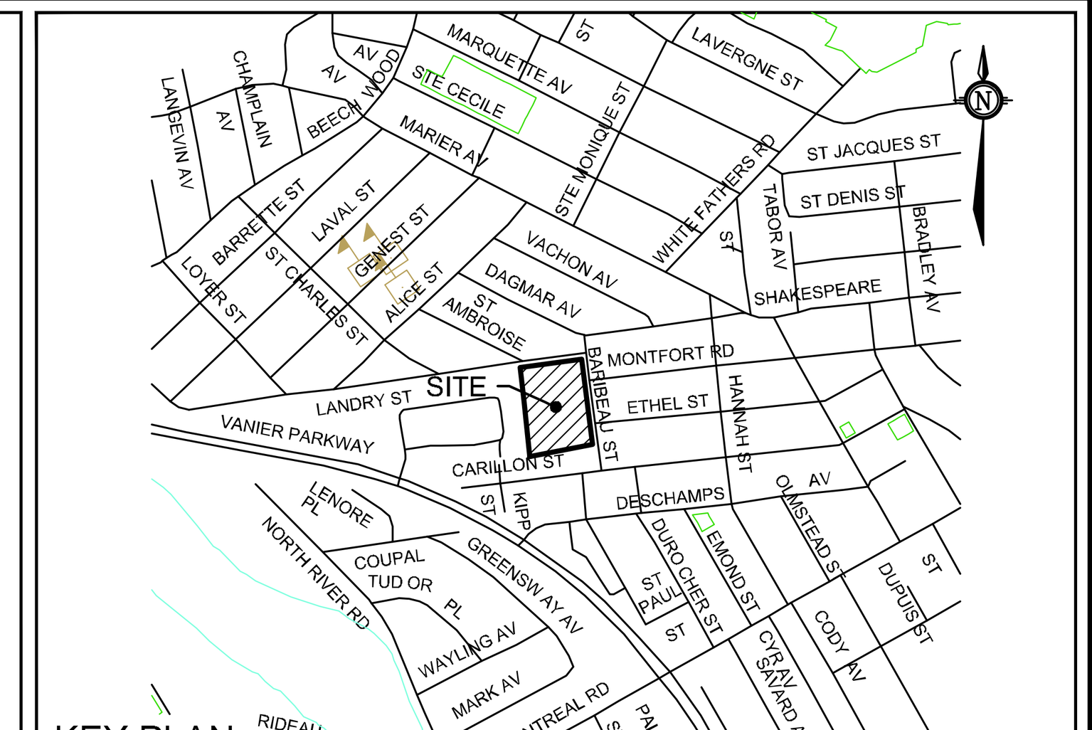
DRAWING NAME
STORM DRAINAGE AREA PLAN

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





NORTH



KEY PLAN
N.T.S.

LEGEND

X	REMOVALS		EXISITING GROUND CONTOUR AND LABEL
	TERRAFIX SILT SOXX INSTALLED AT CATCH BASIN		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.

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND 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
1.	SITE PLAN APPLICATION	AUG 28/20	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
100160065
2020.08.24
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
M.A. BISSETT
2020.08.24
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

REMOVALS &
EROSION AND SEDIMENT
CONTROL PLAN

PROJECT No. 119068
REV REV # 1
DRAWING No. 119068-ESC

PLANB1.DWG - 1000mmx707mm

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 125m^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

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

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

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

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.

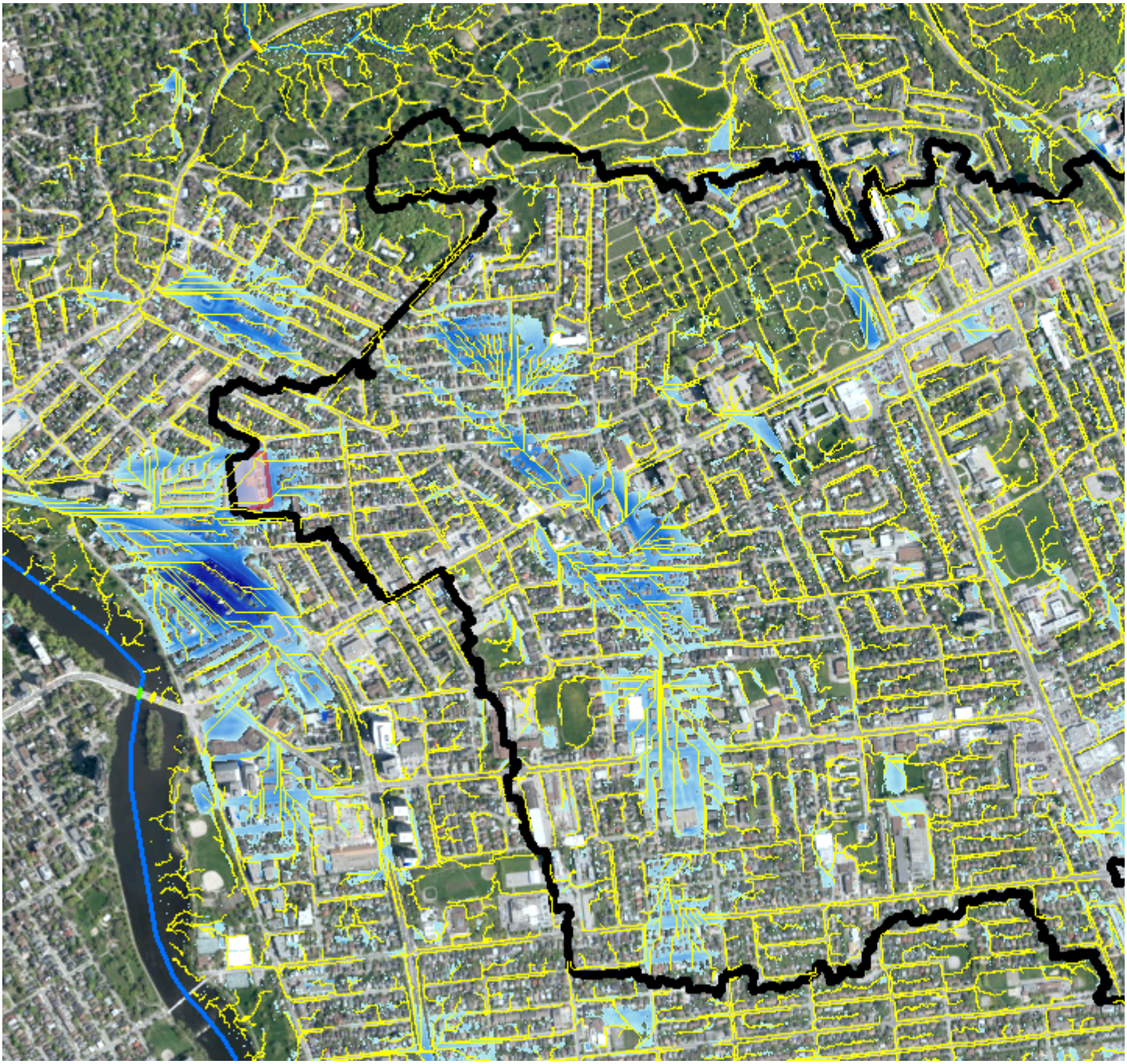
Eric

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

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
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext: 237 | Cell: 613.261.4792

'

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

NOVATECH
Engineers, Planners & Landscape Architects

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