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200 Baribeau Street
Ottawa, Ontario

Servicing Design Brief

Engineering excellence. Planning progress. Liveable landscapes.

200 BARIBEAU STREET
OTTAWA, ONTARIO

SERVICING DESIGN BRIEF

Prepared For:

Parkriver Properties

Prepared By:

NOVATECH
Suite 200, 240 Michael Cowpland Drive
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June 27, 2024

Novatech File: 119068
Ref: R-2020-104

NOVATECH
Engineers, Planners & Landscape Architects

June 27, 2024

City of Ottawa
Infrastructure Services and Community Sustainability
110 Laurier Avenue West, 4^{th} 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 Engineer

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1.0 INTRODUCTION

1.1 Background

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

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

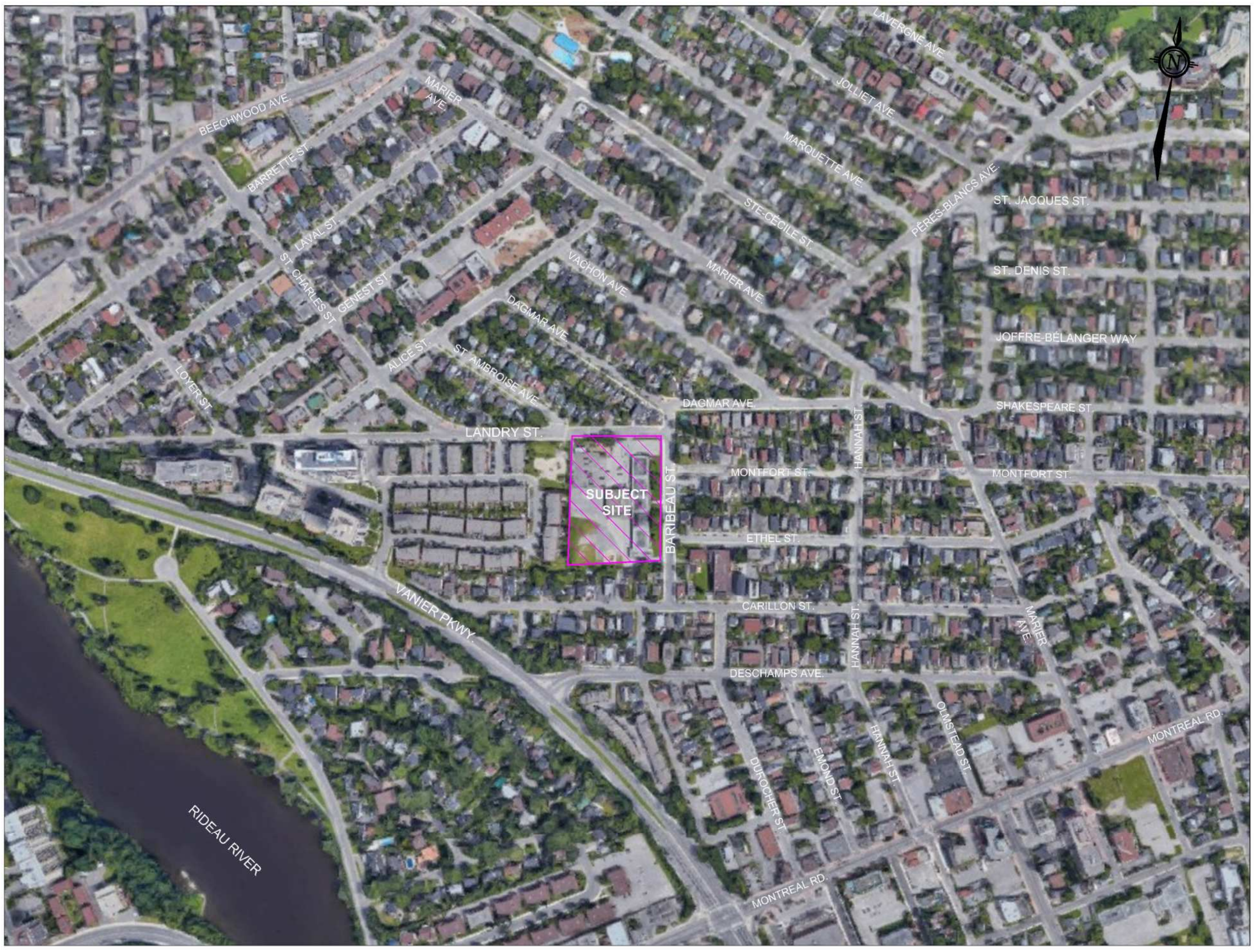

Figure 1: Key Plan

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 94 townhouses, each with two additional dwelling units, for a total of 282 units. The proposed Site Plan is shown below in **Figure 2**.

Figure 2: Site Plan

2.0 ROADWAYS

2.1 Existing Conditions

The former school site could be accessed from Landry Street and Baribeau Street, all classified as local roadways in the 2013 City of Ottawa Transportation Master Plan (TMP).

2.2 Proposed Conditions

The development will be accessed from Baribeau Street. The site contains a 6.0m private road.

2.3 Roadway Design

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

Table 2-1: Roadway Structure

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

3.0 GRADING

3.1 Existing Conditions

The lands along the north and east property lines at 200 Baribeau Street slope towards the adjacent public roadways (Landry Street and Baribeau Street). The remaining portion of the subject lands are directed to an existing catchbasin located within the playing field.

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

3.2 Proposed Conditions

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

- Underside of slab must have a minimum of 0.30m clearance above the 100-year flood level of 56.44m;

- All building openings 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 landscaped areas located along Landry Street and Baribeau Street will tie into the back of curb and existing back of sidewalk. The landscaped areas adjacent to the west and south property lines, including the park lands, will tie into the existing grades along the south and west property lines maintaining the existing emergency overland flow routes from Landry Street and Baribeau Street. For detailed grading refer to drawing 119068-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 around 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 at two separate connection points. 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 to the 250mm sanitary sewer (Baribeau Street) with a peak design flow of 2.5 L/s at existing sanitary maintenance hole 6 and 3.4 L/s at the proposed maintenance hole 7 (5.9 L/s total).

Table 5-1: Proposed Sanitary Sewer Design Parameters

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

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

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

With the inclusion of infiltration, the total design flow from the existing school is calculated 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 5.9 L/s represents an increase of 5.2 L/s being directed to the existing 250mm diameter sanitary sewer in Baribeau Street. The attached sanitary design sheet in Appendix A shows the available capacity in the 250mm diameter sanitary sewer in Baribeau Street. 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 34%.

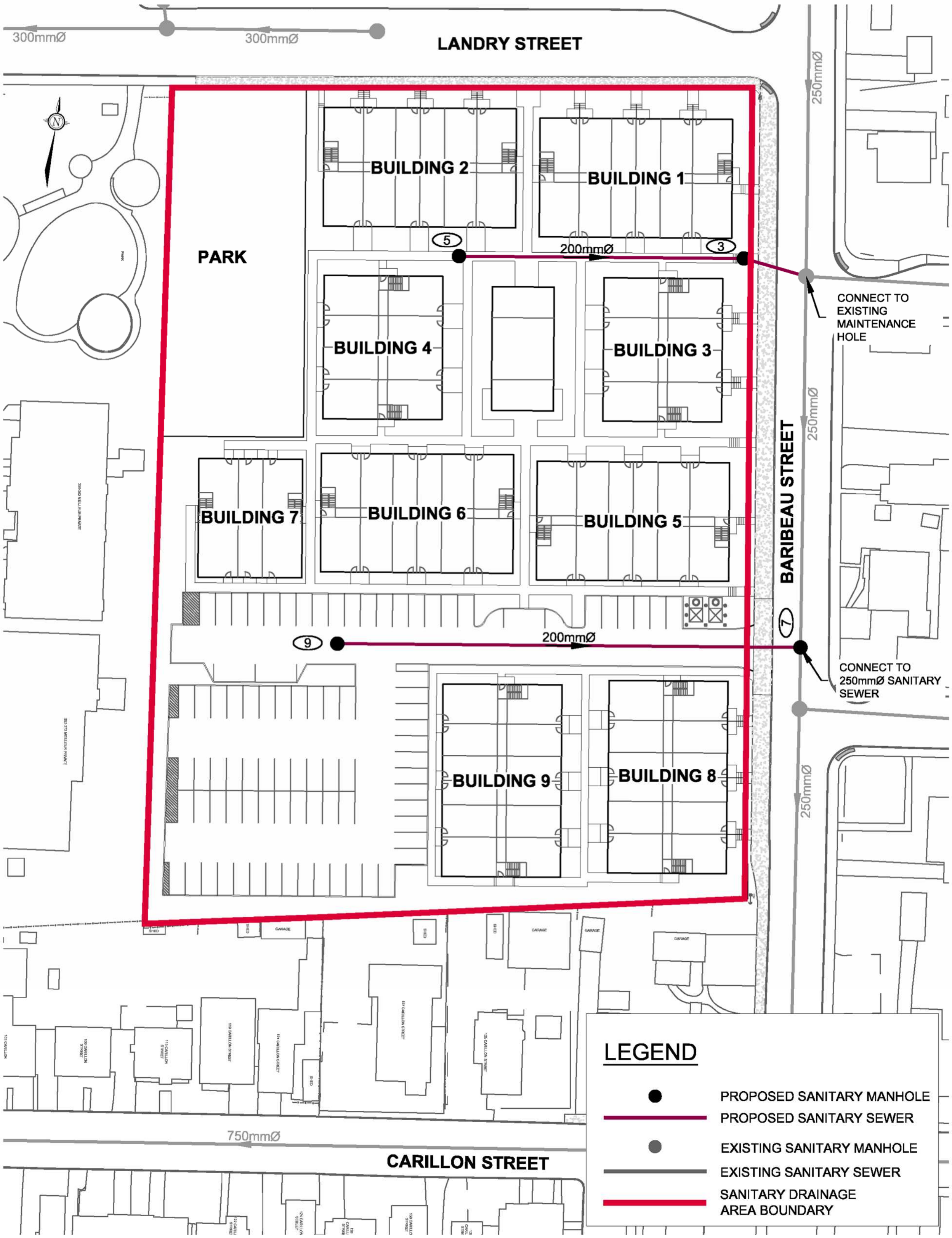

Figure 3: Sanitary Sewer Network

6.0 STORMWATER MANAGEMENT

6.1 Stormwater Management Criteria

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

- Provide a dual drainage system (i.e. minor and major system flows);
- Control the runoff to the existing storm system in Carillon Street to the allowable release rates Specified in **Section 6.1.1** using on-site storage;
- Ensure that ponding is confined within the parking areas at a maximum depth of 0.35 m for both static ponding and dynamic flow;
- Ensure no surface ponding occurs during the 2-year storm event;
- 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
  - o 1.27 ha (site boundary)
- Runoff Coefficient
  - o 0.50 (based on City of Ottawa criteria)
- Rainfall Intensity
  - o 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, storm sewers ranging from 600mm to 900mm are located within Baribeau Street and 1050mm diameter storm sewers are located within Carillon Street.

6.3 Proposed Conditions

Catch basins located within the private roadway and landscaped areas will be controlled with inlet control devices (ICDs). Runoff from the site will be routed to the 1050mm diameter storm sewer in Carillon Street through the property at 127 Carillon Street. A 6.0m easement will be provided through the property to access the existing 1050mm storm sewer. Catch basins located within the private roadway and landscaped areas will be controlled with inlet control devices (ICDs) in order to meet the allowable release rate in **Section 6.1.1**. As there will be no foundation drain connections for the slab-on-grade buildings, the entire storm sewer network will act as underground storage during both the 2-year and 5-year storm events.

The underside of slab elevation for each building has been set at least 300mm above the 100-year floodplain level of 56.44m. In addition, all building opening have been set a minimum of 300mm above the 100-year floodplain level.

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

6.3.1 Minor System Design

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

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

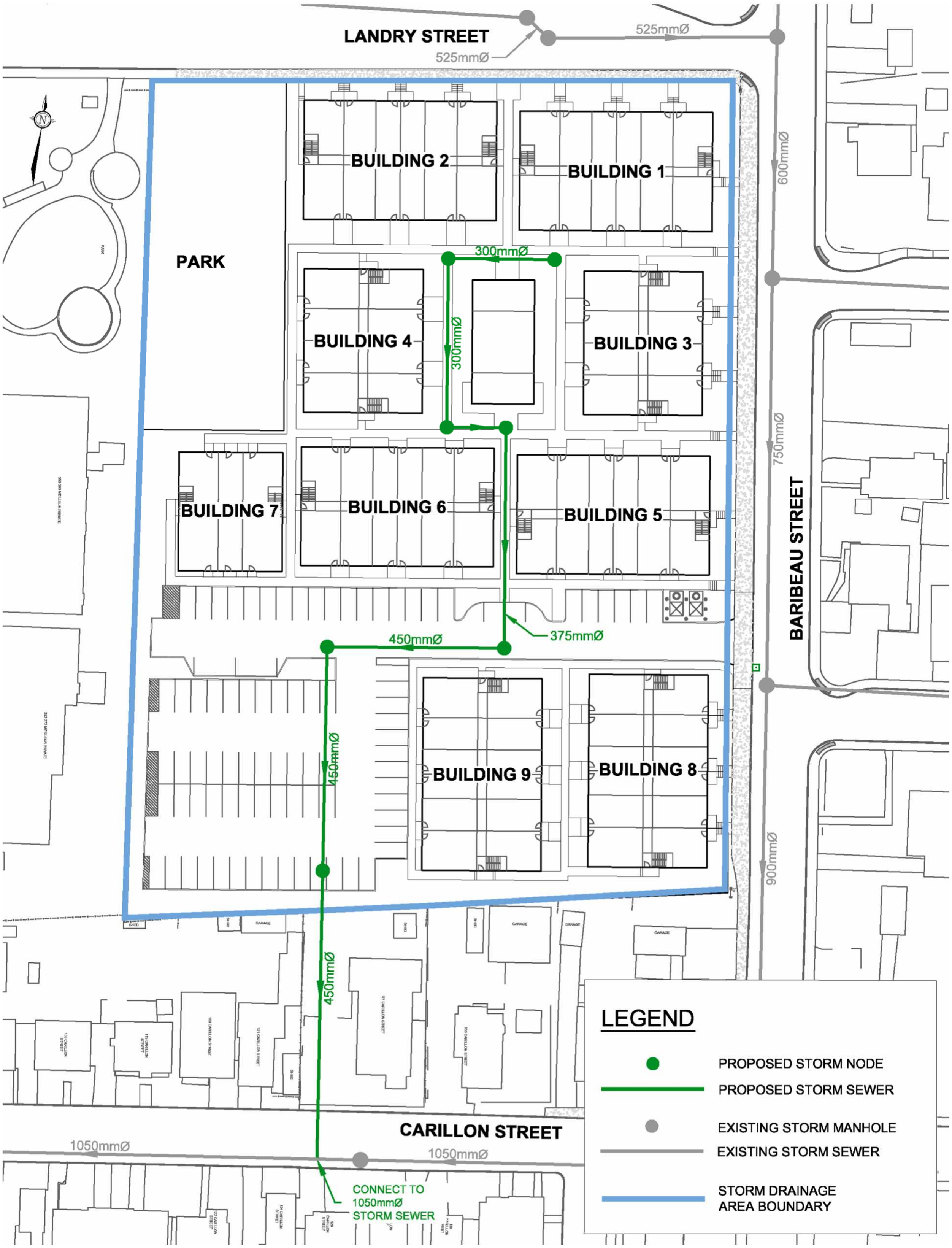

Figure 4: Storm Sewer Network

Table 6-1: Storm Sewer Design Parameters

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

Table 6-2: Runoff Coefficients

Land Use	Runoff Coefficient
Hard Surface	0.90
Soft Surface	0.20

6.3.2 Major System Design

The site has been designed to convey runoff from storms that exceed the minor system capacity to the approved major system outlet within the existing pathway easement in the southwest corner of the site leading to Kipp Street. The roadway area has been graded to ensure that the 100-year peak overland flows are confined within the site at a maximum flow depth of 350mm. 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 along the south and west property lines. 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 occurs during the 2-year storm event.

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

Storm Drainage Area Plan & Subcatchment Parameters

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

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

Table 6-3: Subcatchment Model Parameters

Area ID	Catchment Area (ha)	Runoff Coefficient (C)	Percent Impervious (%)	Zero Imperv. (%)	Flow Length (m)	Equivalent Width (m)	Average Slope (%)
A-01	0.064	0.24	6.1	0	25	26	4
A-02	0.092	0.30	14.7	60	25	37	4
A-03	0.097	0.80	86	90	25	39	1.5
A-04	0.091	0.83	89.3	93	25	36	1.5
A-05	0.073	0.76	80.4	80	15	49	1.5
A-06	0.06	0.80	85.5	89	15	40	1.5
A-07	0.125	0.83	89.4	66	15	83	1.5
A-08	0.158	0.82	88.5	33	25	63	1
A-09	0.024	0.48	39.6	84	10	24	2
A-10	0.009	0.24	5.6	0	5	18	2
A-11	0.007	0.20	0	0	5	14	2
A-12	0.07	0.73	75.8	85	15	47	2

Area ID	Catchment Area (ha)	Runoff Coefficient (C)	Percent Impervious (%)	Zero Imperv. (%)	Flow Length (m)	Equivalent Width (m)	Average Slope (%)
A-13	0.076	0.87	96.1	0	15	51	1.5
A-14	0.005	0.20	0	0	5	10	2
A-15	0.110	0.87	96.2	28	20	55	1.5
A-16	0.011	0.20	0	0	5	22	2
A-17	0.01	0.40	29	0	15	7	2
A-18	0.021	0.68	69	72	10	21	1.5
A-19	0.048	0.66	66	68	15	32	1.5
A-20	0.027	0.60	57.8	67	10	27	1.5
B-01	0.036	0.47	38.1	0	5	72	2
B-02	0.054	0.44	34.3	0	5	108	2
A-01	0.064	0.24	6.1	0	25	26	4
TOTAL	**1.27 ha**	**0.69**	**70%**	**-**	**-**	**-**	**-**

Infiltration

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

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

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

Depression Storage

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

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

Equivalent Width

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

Impervious Values

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

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

Boundary Conditions (Carillon Street Connection)

The Hydraulic Grade Line (HGL) elevations for the existing 1050mm storm sewer in Carillon Street was provided by the City of Ottawa (refer to existing HGL profile in Appendix B). The 2-year, 5-year and 100-year HGL elevations in the existing storm sewer at the proposed connection are 52.50m, 52.60m and 55.05m respectively.

6.4.1 Stormwater Storage

Surface storage is represented in the PCSWMM model using storage nodes and storage curves. Refer to **Appendix B** for additional details.

Underground Storage

Underground storage will be provided using the proposed storm sewer system to ensure no 2-year ponding occurs.

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)		
			Underground	Surface	TOTAL
Surface Storage					
CB01	A-07	0.19	-	9	9
CB02	A-15	0.33	-	79	79
CB03	A-12	0.34	-	69	69
CB04	A-13	0.31	-	80	80
Underground Storage (250mm to 450mm Pipes, 1200mm Structures)					
MH04	-	-	35	-	35

Inlet Control Devices (ICDs)

ICDs will be located at maintenance hole MH04, controlling flows from the private roadway. RY01 and RY03 will also include an ICD, controlled flows from the swales located along the west and south property lines. ICDs are specified 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. 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)
MH04	146 mm	56.32	52.52	3.88	75.1	83.4	51.3
RY01	127 mm	55.39	53.59	1.97	6.3	18.7	22.7
RY03	108 mm	55.75	54.03	1.79	12.0	17.3	20.7

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

6.5.2 Major System

The major system network was evaluated using the PCSWMM model to ensure that the ponding depths conform to City standards. A summary of ponding depths at each inlet for the 2-year, 5-year, 100-year and 100-year (+20%) events are provided in **Appendix B**. The maximum static and dynamic ponding depths within the roadways are less than or equal to 0.35m during all events up to and including the 100-year event.

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

Structure	T/G	Max. Static Ponding (Spill Depth)		100-yr Event (3hr)			
	(m)	Elev. (m)	Depth (m)	Elev. (m)	Depth (m)	Cascading Flow?	Cascade Depth (m)
CB01	56.26	56.45	0.19	56.47	0.21	Y	0.02
CB02	56.06	56.39	0.33	56.40	0.34	Y	0.01
CB03	56.07	56.41	0.34	56.42	0.35	Y	0.01
CB04	56.06	56.37	0.31	56.36	0.30	N	0.00
CBMH01	56.64	56.71	0.07	56.73	0.09	Y	0.02
LC01	56.57	56.66	0.09	56.78	0.21	Y	0.12
LC02	56.58	56.69	0.11	56.78	0.20	Y	0.09
LC03	56.64	56.73	0.09	56.85	0.21	Y	0.12

Structure	T/G	Max. Static Ponding (Spill Depth)		100-yr Event (3hr)			
	(m)	Elev. (m)	Depth (m)	Elev. (m)	Depth (m)	Cascading Flow?	Cascade Depth (m)
LC04	55.69	55.76	0.07	55.88	0.19	Y	0.12
LC05	55.79	55.89	0.10	55.92	0.13	Y	0.03
LC06	56.72	56.81	0.09	56.90	0.18	Y	0.09
LC07	56.67	56.76	0.09	56.87	0.20	Y	0.11
LC08	56.65	56.74	0.09	56.86	0.21	Y	0.12
LC09	56.62	56.73	0.11	56.85	0.23	Y	0.12
LC10	56.65	56.75	0.10	56.84	0.19	Y	0.09
LC11	56.63	56.71	0.08	56.79	0.16	Y	0.08
LC12	56.65	56.74	0.09	56.85	0.20	Y	0.11
LC13	56.65	56.71	0.06	56.84	0.19	Y	0.13
LC14	56.67	56.76	0.09	56.86	0.19	Y	0.10
RY01	55.39	55.65	0.26	55.56	0.17	N	0.00
RY02	55.50	55.70	0.20	55.77	0.27	Y	0.07
RY03	55.59	55.75	0.16	55.82	0.23	Y	0.07
RY04	55.25	55.50	0.25	55.58	0.33	Y	0.08
RY05	55.45	55.65	0.20	55.68	0.23	Y	0.03
RY06	55.55	55.75	0.20	55.84	0.29	Y	0.09
RY07	55.66	55.85	0.19	55.87	0.21	Y	0.02

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.

6.5.3 Hydraulic Grade Line

Surcharging is occurring throughout the storm sewer system as the sewers are providing the required underground storage to ensure no 2-year ponding is occurring. Since there are no foundation drains being connected to the system for the slab-on-grade buildings, a hydraulic grade line analysis has not been provided.

6.5.4 Peak Flows

The overall release rates from the controlled and uncontrolled areas 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 6-7** 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 6-7: Summary of Peak Flows

Design Event	Allowable Release Rate (L/s)	Controlled Minor System Release Rate (L/s)	Uncontrolled Minor System Release Rate (L/s)	Total Minor System Release Rate (L/s)
2-year	135.6	90.7	9.0	99.7
5-year		117.5	18.0	135.5
100-year		93.7	40.0	133.7
100-year (+20%)	-	96.4	49.5	145.9

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

As mentioned above in **Section 6.3.2**, the existing site provides an emergency overland flow route for Landry Street and Baribeau Street, outletting to the pathway block connecting to Kipp Street. Through coordination with the City of Ottawa (**Appendix D**) Novatech has assumed potential 100-year overland flows of 190 L/s from Landry Street and 1,000 L/s from Baribeau Street. Most of the major system from the 100-year storm event is contained on-site. During the 100-year storm event 26.4 L/s of major system flow from the swale system is directed to Kipp Street at RY04. The overland flow at RY04 is the result of maintaining the grade of the existing overland flow route as we are unable to raise the existing grade enough to provide additional storage. The additional 26.4 L/s from the site is insignificant compared to the assumed flows from Landry Street and Baribeau Street.

7.0 WATER

7.1 Existing Conditions

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

7.2 Proposed Conditions

The site will have two connection points to the existing watermain on Baribeau Street. One at the site entrance and the other connection located between building 1 and 4.

A 200mm diameter watermain is 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**:

<u>Boundary Condition 1</u> – 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

<u>Boundary Condition 2</u> – 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**.

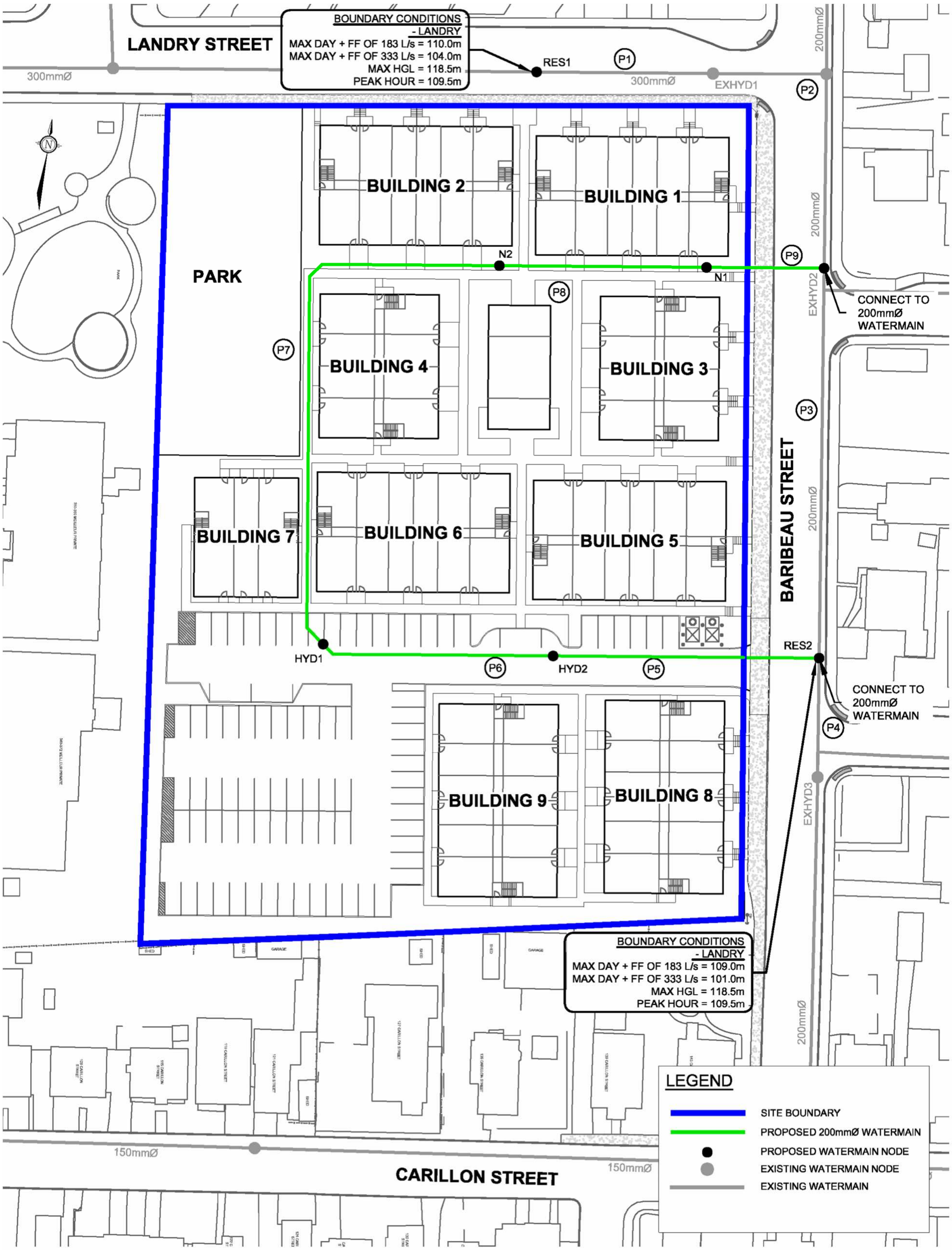

Figure 5: Watermain Layout

Table 7-1: Watermain Design Criteria

Design Parameter	Design Criteria
Apartment Population	1.8 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 300 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)
Apartments	282	508	1.645	4.113	9.048
Total	**282**	**508**	**1.645**	**4.113**	**9.048**

Based on the fire underwriters survey, the fire flows were calculated as 183 L/s (Building 7), 233 L/s (Building 3), 250 L/s (Building 4), 267 L/s (Buildings 2 and 8), 283 L/s (Buildings 1, 5 and 9) and 300 L/s (Building 6). 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
300 L/s (95 L/s @ HYD 1 & 2, 55 L/s @ EXHYD 2 & 3)	414.86 kPa (HYD2)

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

Operating Condition	Maximum Pressure	Minimum Pressure
9.048 L/s through system	527.58 kPa (EXHYD3)	513.95 kPa (N2)

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
1.645 L/s through system	615.87 kPa (EXHYD3)	602.33 kPa (N2)

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.

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 watermain in Baribeau Street will provide municipal water service to the development.

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

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

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

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

Sincerely,

NOVATECH

Prepared By:

Lucas Wilson, P.Eng.
Project Manager

Reviewed By:

Mark Bissett, P.Eng.
Senior Project Manager

APPENDIX A: Design Sheets

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

200 Baribeau Street

Project No.: 119068

STORM SEWER DESIGN SHEET

FLOW RATES BASED ON RATIONAL METHOD

NOVATECH
Engineers, Planners & Landscape Architects

LOCATION				AREA (ha)			FLOW							TOTAL FLOW	SEWER DATA								
Street	Catchment ID	From Manhole	To Manhole	Area (ha)	C	AC (ha)	Indiv 2.78 AC	Accum 2.78 AC	Time of Concentration	Rainfall Intensity 2 Year (mm/hr)	Rainfall Intensity 5 Year (mm/hr)	Rainfall Intensity 10 Year (mm/hr)	Peak Flow (L/s)	Total Peak Flow, Q (L/s)	Dia. (m) Actual	Dia. (mm)	Type	Slope (%)	Length (m)	Capacity (L/s)	Velocity (m/s)	Flow Time (min)	Ratio Q/Q full
				0.139	0.77	0.11	0.298	0.298	10.00	76.81			22.9										
	A-04, A-19	MH14	MH12			0.00	0.000	0.000	10.00					22.9	0.305	300	PVC	0.50	17.2	71.3	0.98	0.29	32%
						0.00	0.000	0.000	10.00														
				0.145	0.75	0.11	0.302	0.600	10.29	75.70			45.4										
	A-03, A-18, A-20	MH12	MH10			0.00	0.000	0.000	10.29					45.4	0.305	300	PVC	0.50	27.2	71.3	0.98	0.46	64%
						0.00	0.000	0.000	10.29														
				0.060	0.80	0.05	0.133	0.733	10.76	74.01			54.3										
	A-06	MH10	CBMH01			0.00	0.000	0.000	10.76					54.3	0.305	300	PVC	0.50	9.6	71.3	0.98	0.16	76%
						0.00	0.000	0.000	10.76														
				0.073	0.76	0.06	0.154	0.888	10.92	73.44			65.2										
	A-05	CBMH01	MH08			0.00	0.000	0.000	10.92					65.2	0.381	375	PVC	0.50	35.6	129.2	1.13	0.52	50%
						0.00	0.000	0.000	10.92														
				0.125	0.83	0.10	0.288	1.176	11.44	71.67			84.3										
	A-07	MH08	MH06			0.00	0.000	0.000	11.44					84.3	0.457	450	Conc	0.50	28.6	210.2	1.28	0.37	40%
						0.00	0.000	0.000	11.44														
				0.344	0.84	0.29	0.803	1.979	11.82	70.47			139.5										
	A-08, A-13, A-15	MH06	MH04			0.00	0.000	0.000	11.82					139.5	0.457	450	Conc	1.00	36.2	297.2	1.81	0.33	47%
						0.00	0.000	0.000	11.82														
				0.292	0.40	0.12	0.325	2.304	12.15	69.43			160.0										
	A-01, A-02, A-09 to A-12, A-14, A-16 to A-17	MH04	EX. 1050			0.00	0.000	0.000	12.15					160.0	0.457	450	Conc	2.00	46.6	420.3	2.56	0.30	38%
						0.00	0.000	0.000	12.15														

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:	June 27, 2024
Design By:	Lucas Wilson
Client:	Parkriver Properties
Dwg. Reference:	119068-STM
Checked By:	MAB

200 Baribeau Street - Sanitary Sewer Design Sheet

AREA			RESIDENTIAL					INFILTRATION				PIPE							
			Apartments																
ID	From	To	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																			
	9	**7**	162	291.6	291.6	3.5	3.3	0.31	0.31	0.1	3.4	200	0.35	74.8	20.2	0.62	0.38	16.7%	0.307
	5	**3**	120	216.0	216.0	3.5	2.5	0.24	0.24	0.1	2.5	200	0.65	46.0	27.6	0.85	0.44	9.2%	0.229
	3	6	0	0.0	216.0	3.5	2.5	0.00	0.24	0.1	2.5	200	0.35	10.5	20.2	0.62	0.36	12.5%	0.265
TOTAL			282	507.6	507.6	3.4	5.6	0.00	0.55	0.2	**5.9**								

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

Project: 200 Baribeau Street (119068)
Designed: LRW
Checked: MAB
Date: June 27, 2024

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 Sanitary Sewer																									
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	282	507.6	784.6	3.3	8.4	0.00	0.00	0.00	0.0	1.01	4.33	1.4	9.8	250	0.37	70.4	37.7	0.74	0.52	26.0%	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
Baribeau St.	**EXSANMH9**	**EXSANMH12**	0	0.0		0.0	853.4	3.3	9.1	0.00	0.00	0.28	0.1	1.37	6.82	2.3	11.4	250	0.30	71.8	34.0	0.67	0.51	33.7%	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: June 27, 2024

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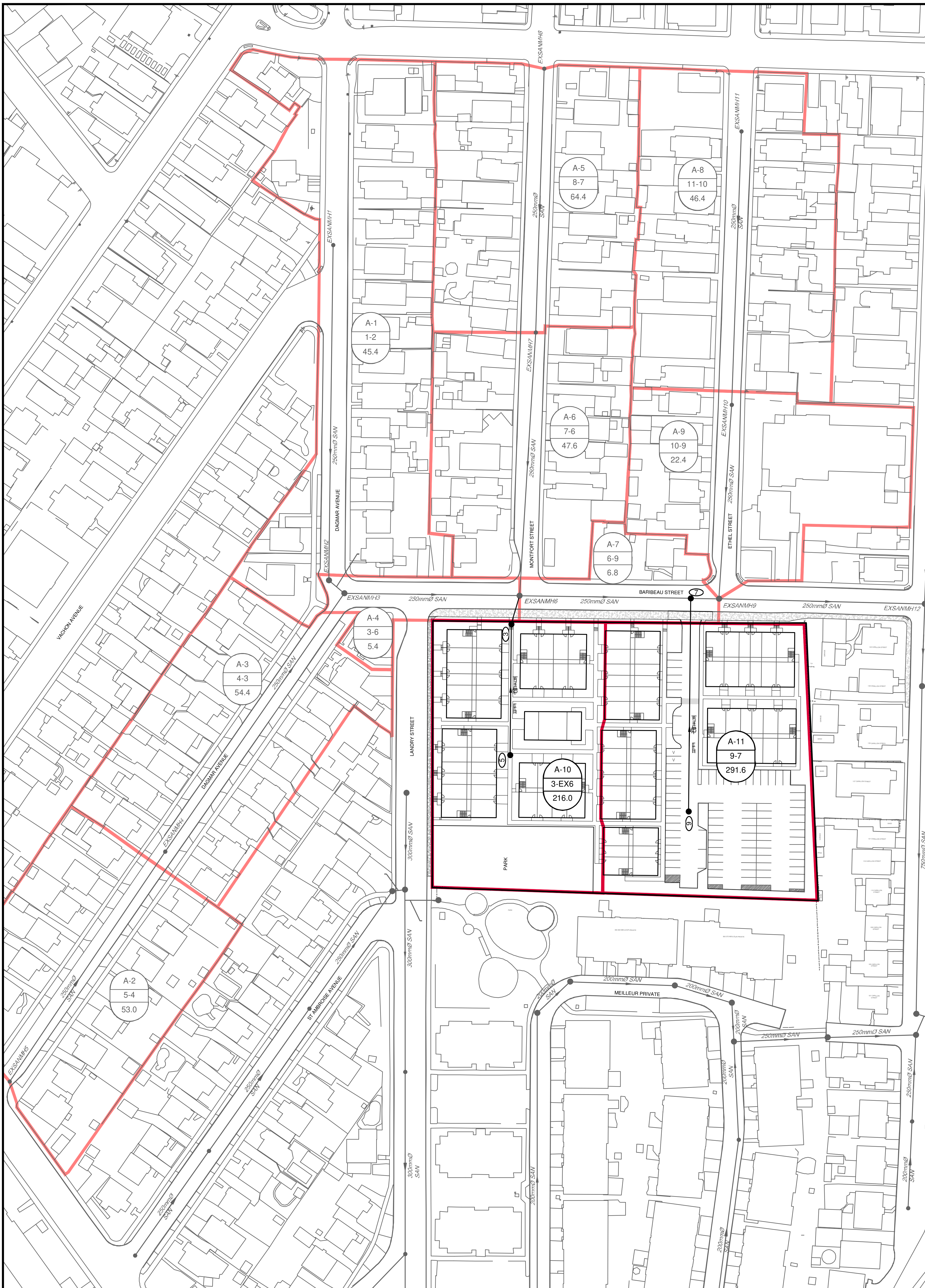

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NOVATECH

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Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
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LEGEND

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

CITY OF OTTAWA

200 BARIBEAU STREET

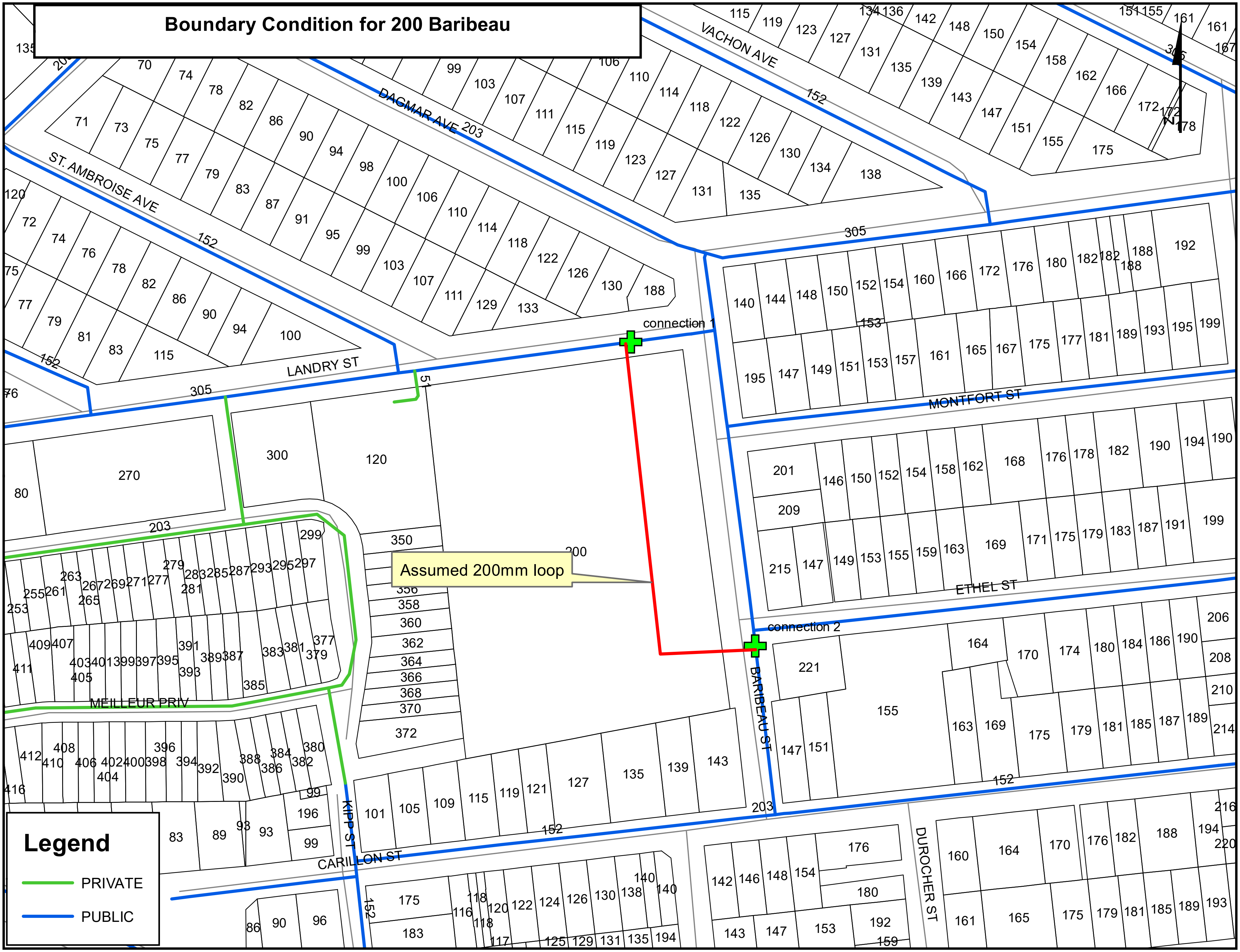
OFF-SITE SANITARY NETWORK

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

DATE	JOB	FIGURE
JUNE 27, 2024	119068	SAN

SHT11X17.DWG - 279mmX432mm

Boundary Condition for 200 Baribeau



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

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'

200 Baribeau Street Water Demand						
	Area (ha)	Units	Population	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Hour Demand (L/s)
Towns	N/A	282	508	1.645	4.113	9.048
Total	**0.00**	**282**	**508**	**1.645**	**4.113**	**9.048**

Water Demand Parameters

Apartment	1.8	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 - 300	L/s

200 Baribeau Street - Watermain Demand

Node	Apartments	Total Population	Average Day Residential Demand (L/s)	Maximum Day Residential Demand (L/s)	Peak Hour Residential Demand (L/s)
HYD1	18	32	0.105	0.263	0.578
HYD2	144	259	0.840	2.100	4.620
EXHYD1	0	0	0.000	0.000	0.000
EXHYD2	0	0	0.000	0.000	0.000
EXHY3	0	0	0.000	0.000	0.000
N1	60	108	0.350	0.875	1.925
N2	60	108	0.350	0.875	1.925
Total	**282**	**508**	**1.645**	**4.113**	**9.048**

Water Demand Parameters

		ppl/unit	Residential Max Day	2.5	x Avg Day
Towns	1.8	ppl/unit	Residential Peak Hour	2.2	x Max Day
Residential Demand	280	L/c/day	Residential Fire Flow	183 - 300	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	56.45	0.58	109.49	53.04	520.32	75.47
Junc HYD2	56.72	4.62	109.49	52.77	517.67	75.08
Junc EXHYD1	56.43	0	109.5	53.07	520.62	75.51
Junc EXHYD2	56.05	0	109.5	53.45	524.34	76.05
Junc EXHYD3	55.72	0	109.5	53.78	527.58	76.52
Junc N1	57.06	1.92	109.49	52.43	514.34	74.60
Junc N2	57.1	1.92	109.49	52.39	513.95	74.54
Resvr RES1	109.5	-2.54	109.5	0	0.00	0.00
Resvr RES2	109.5	-6.51	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	25	300	120	2.54	0.04	0.01	0.039
Pipe P2	49	204	110	2.54	0.08	0.06	0.042
Pipe P3	83	204	110	-1.76	0.05	0.03	0.045
Pipe P4	19	204	110	-1.76	0.05	0.03	0.045
Pipe P5	42	204	110	4.75	0.15	0.20	0.038
Pipe P6	39	204	110	0.13	0.00	0.00	0.063
Pipe P7	92	204	110	0.45	0.01	0.00	0.053
Pipe P8	33	204	110	-2.38	0.07	0.06	0.043
Pipe P9	18	204	110	-4.30	0.13	0.17	0.039

200 Baribeau Street - Watermain Analysis

Network Table - Nodes - (Max Pressure Check)

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi	Age Hours
Junc HYD1	56.45	0.1	118.5	62.05	608.71	88.29	13.98
Junc HYD2	56.72	0.84	118.5	61.78	606.06	87.90	0.44
Junc EXHYD1	56.43	0	118.5	62.07	608.91	88.31	1.07
Junc EXHYD2	56.05	0	118.5	62.45	612.63	88.86	2.39
Junc EXHYD3	55.72	0	118.5	62.78	615.87	89.32	0.54
Junc N1	57.06	0.35	118.5	61.44	602.73	87.42	2.59
Junc N2	57.1	0.35	118.5	61.4	602.33	87.36	3.3
Resvr RES1	118.5	-0.46	118.5	0	0.00	0.00	0
Resvr RES2	118.5	-1.18	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	25	300	120	0.46	0.01	0.00	0.051
Pipe P2	49	204	110	0.46	0.01	0.00	0.058
Pipe P3	83	204	110	-0.32	0.01	0.00	0.061
Pipe P4	19	204	110	-0.32	0.01	0.00	0.061
Pipe P5	42	204	110	0.86	0.03	0.01	0.050
Pipe P6	39	204	110	0.02	0.00	0.00	0.000
Pipe P7	92	204	110	0.08	0.00	0.00	0.064
Pipe P8	33	204	110	-0.43	0.01	0.00	0.057
Pipe P9	18	204	110	-0.78	0.02	0.01	0.047

200 Baribeau Street - Watermain Analysis

Network Table - Nodes (Max Day + FF '300 L/s')

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc HYD1	56.45	95.26	98.75	42.3	414.96	60.19
Junc HYD2	56.72	97.1	99.01	42.29	414.86	60.17
Junc EXHYD1	56.43	0	105.1	48.67	477.45	69.25
Junc EXHYD2	56.05	55	102.06	46.01	451.36	65.46
Junc EXHYD3	55.72	55	102.22	46.5	456.17	66.16
Junc N1	57.06	0.88	101.58	44.52	436.74	63.34
Junc N2	57.1	0.88	100.72	43.62	427.91	62.06
Resvr RES1	105.3	-104.83	105.3	0	0.00	0.00
Resvr RES2	102.8	-199.28	102.8	0	0.00	0.00

Network Table - Links (Max Day + FF '300 L/s')

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	25	300	120	104.83	1.48	8.13	0.022
Pipe P2	49	204	110	104.83	3.21	62.54	0.024
Pipe P3	83	204	110	-16.02	0.49	1.93	0.032
Pipe P4	19	204	110	-71.02	2.17	30.40	0.026
Pipe P5	42	204	110	128.26	3.92	90.85	0.024
Pipe P6	39	204	110	31.16	0.95	6.61	0.029
Pipe P7	92	204	120	64.10	1.96	21.41	0.022
Pipe P8	33	204	110	-64.98	1.99	25.79	0.026
Pipe P9	18	204	110	-65.85	2.01	26.44	0.026

FUS - Fire Flow Calculations

As per 2020 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 119068
Project Name: 200 Baribeau
Date: 6/27/2024
Input By: Lucas Wilson
Reviewed By: Mark Bissett

Legend

Building Description: Building #1 (36 Units)
Type V - 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	Type V - Wood frame	Yes	1.5	1.5	
		Type IV - Mass Timber		Varies		
		Type III - Ordinary construction		1		
		Type II - Non-combustible construction		0.8		
		Type I - Fire resistive construction (2 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	597			
		Number of Floors/Storeys	3			
		Area of structure considered (m^2)			**1,791**	
	F	**Base fire flow without reductions**				**14,000**
		$F = 220\ C\ (A)^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**		**FUS Table 3**	**Reduction/Surcharge**		
	(1)	Non-combustible	Yes	-25%	-25%	**10,500**
		Limited combustible		-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**		**FUS Table 4**	**Reduction**		
	(2)	Adequately Designed System (NFPA 13)		-30%		**0**
		Standard Water Supply		-10%		
		Fully Supervised System		-10%		
		Cumulative Sub-Total			**0%**	
		Area of Sprinklered Coverage (m²)	0	0%		
		Cumulative Total			**0%**	
5	**Exposure Surcharge**		**FUS Table 5**		**Surcharge**	
	(3)	North Side	20.1 - 30 m		10%	**6,300**
		East Side	20.1 - 30 m		10%	
		South Side	3.1 - 10 m		20%	
		West Side	3.1 - 10 m		20%	
		Cumulative Total			**60%**	
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

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FUS - Fire Flow Calculations

As per 2020 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 119068
Project Name: 200 Baribeau
Date: 6/27/2024
Input By: Lucas Wilson
Reviewed By: Mark Bissett

Legend

Building Description: Building #2 (36 Units)
Type V - 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	Type V - Wood frame	Yes	1.5	1.5	
		Type IV - Mass Timber		Varies		
		Type III - Ordinary construction		1		
		Type II - Non-combustible construction		0.8		
		Type I - Fire resistive construction (2 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	597			
		Number of Floors/Storeys	3			
		Area of structure considered (m^2)			**1,791**	
	F	**Base fire flow without reductions** $F = 220\ C\ (A)^{0.5}$				**14,000**
	Reductions or Surcharges					
3	**Occupancy hazard reduction or surcharge**		**FUS Table 3**	**Reduction/Surcharge**		
	(1)	Non-combustible	Yes	-25%	-25%	**10,500**
		Limited combustible		-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**		**FUS Table 4**	**Reduction**		
	(2)	Adequately Designed System (NFPA 13)		-30%		**0**
		Standard Water Supply		-10%		
		Fully Supervised System		-10%		
				Cumulative Sub-Total	**0%**	
		Area of Sprinklered Coverage (m²)	0	0%		
				Cumulative Total	**0%**	
5	**Exposure Surcharge**		**FUS Table 5**		**Surcharge**	
	(3)	North Side	20.1 - 30 m		10%	**5,250**
		East Side	3.1 - 10 m		20%	
		South Side	3.1 - 10 m		20%	
		West Side	>30m		0%	
				Cumulative Total	**50%**	
	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

FUS - Fire Flow Calculations

As per 2020 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 119068
Project Name: 200 Baribeau
Date: 6/27/2024
Input By: Lucas Wilson
Reviewed By: Mark Bissett

Legend

Building Description: Building #3 (24 Units)
Type V - 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	Type V - Wood frame	Yes	1.5	1.5	
		Type IV - Mass Timber		Varies		
		Type III - Ordinary construction		1		
		Type II - Non-combustible construction		0.8		
		Type I - Fire resistive construction (2 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	445			
		Number of Floors/Storeys	3			
		Area of structure considered (m^2)			**1,335**	
	F	**Base fire flow without reductions**				**12,000**
		$F = 220\ C\ (A)^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**		**FUS Table 3**	**Reduction/Surcharge**		
	(1)	Non-combustible	Yes	-25%	-25%	**9,000**
		Limited combustible		-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**		**FUS Table 4**	**Reduction**		
	(2)	Adequately Designed System (NFPA 13)		-30%		**0**
		Standard Water Supply		-10%		
		Fully Supervised System		-10%		
				Cumulative Sub-Total	**0%**	
		Area of Sprinklered Coverage (m²)	0	0%		
				Cumulative Total	**0%**	
5	**Exposure Surcharge**		**FUS Table 5**		**Surcharge**	
	(3)	North Side	3.1 - 10 m		20%	**6,300**
		East Side	20.1 - 30 m		10%	
		South Side	3.1 - 10 m		20%	
		West Side	3.1 - 10 m		20%	
				Cumulative Total	**70%**	
Results						
6	(1) + (2) + (3)	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**15,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**250**
				or	USGPM	3,963

FUS - Fire Flow Calculations

As per 2020 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 119068
Project Name: 200 Baribeau
Date: 6/27/2024
Input By: Lucas Wilson
Reviewed By: Mark Bissett

Legend

Building Description: Building #4 (24 Units)
Type V - 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	Type V - Wood frame	Yes	1.5	1.5	
		Type IV - Mass Timber		Varies		
		Type III - Ordinary construction		1		
		Type II - Non-combustible construction		0.8		
		Type I - Fire resistive construction (2 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	445			
		Number of Floors/Storeys	3			
		Area of structure considered (m^2)			**1,335**	
	F	**Base fire flow without reductions**				**12,000**
		$F = 220\ C\ (A)^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**		**FUS Table 3**	**Reduction/Surcharge**		
	(1)	Non-combustible	Yes	-25%	-25%	**9,000**
		Limited combustible		-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**		**FUS Table 4**	**Reduction**		
	(2)	Adequately Designed System (NFPA 13)		-30%		**0**
		Standard Water Supply		-10%		
		Fully Supervised System		-10%		
				Cumulative Sub-Total	**0%**	
		Area of Sprinklered Coverage (m²)	0	0%		
				Cumulative Total	**0%**	
5	**Exposure Surcharge**		**FUS Table 5**		**Surcharge**	
	(3)	North Side	3.1 - 10 m		20%	**5,400**
		East Side	3.1 - 10 m		20%	
		South Side	3.1 - 10 m		20%	
		West Side	>30m		0%	
				Cumulative Total	**60%**	
Results						
6	(1) + (2) + (3)	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**14,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**233**
				or	USGPM	3,699

FUS - Fire Flow Calculations

As per 2020 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 119068
Project Name: 200 Baribeau
Date: 6/27/2024
Input By: Lucas Wilson
Reviewed By: Mark Bissett

Legend

Building Description: Building #5 (36 Units)
Type V - 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	Type V - Wood frame	Yes	1.5	1.5	
		Type IV - Mass Timber		Varies		
		Type III - Ordinary construction		1		
		Type II - Non-combustible construction		0.8		
		Type I - Fire resistive construction (2 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	597			
		Number of Floors/Storeys	3			
		Area of structure considered (m^2)			**1,791**	
	F	**Base fire flow without reductions**				**14,000**
		$F = 220\ C\ (A)^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**		**FUS Table 3**	**Reduction/Surcharge**		
	(1)	Non-combustible	Yes	-25%	-25%	**10,500**
		Limited combustible		-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**		**FUS Table 4**	**Reduction**		
	(2)	Adequately Designed System (NFPA 13)		-30%		**0**
		Standard Water Supply		-10%		
		Fully Supervised System		-10%		
				Cumulative Sub-Total	**0%**	
		Area of Sprinklered Coverage (m²)	0	0%		
				Cumulative Total	**0%**	
5	**Exposure Surcharge**		**FUS Table 5**		**Surcharge**	
	(3)	North Side	3.1 - 10 m		20%	**6,825**
		East Side	20.1 - 30 m		10%	
		South Side	10.1 - 20 m		15%	
		West Side	3.1 - 10 m		20%	
				Cumulative Total	**65%**	
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

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FUS - Fire Flow Calculations

As per 2020 Fire Underwriter's Survey Guidelines

Novatech Project #: 119068
Project Name: 200 Baribeau
Date: 6/27/2024
Input By: Lucas Wilson
Reviewed By: Mark Bissett

Legend

Building Description: Building #6 (36 Units)
Type V - 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	Type V - Wood frame	Yes	1.5	1.5	
		Type IV - Mass Timber		Varies		
		Type III - Ordinary construction		1		
		Type II - Non-combustible construction		0.8		
		Type I - Fire resistive construction (2 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	597			
		Number of Floors/Storeys	3			
		Area of structure considered (m^2)			**1,791**	
	F	**Base fire flow without reductions**				**14,000**
		$F = 220\ C\ (A)^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**		**FUS Table 3**	**Reduction/Surcharge**		
	(1)	Non-combustible	Yes	-25%	-25%	**10,500**
		Limited combustible		-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**		**FUS Table 4**	**Reduction**		
	(2)	Adequately Designed System (NFPA 13)		-30%		**0**
		Standard Water Supply		-10%		
		Fully Supervised System		-10%		
				Cumulative Sub-Total	**0%**	
		Area of Sprinklered Coverage (m²)	0	0%		
				Cumulative Total	**0%**	
5	**Exposure Surcharge**		**FUS Table 5**		**Surcharge**	
	(3)	North Side	3.1 - 10 m		20%	**7,875**
		East Side	3.1 - 10 m		20%	
		South Side	10.1 - 20 m		15%	
		West Side	0 - 3 m		25%	
				Cumulative Total	**75%**	
Results						
6	(1) + (2) + (3)	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**18,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**300**
				or	USGPM	4,756

FUS - Fire Flow Calculations

As per 2020 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 119068
Project Name: 200 Baribeau
Date: 6/27/2024
Input By: Lucas Wilson
Reviewed By: Mark Bissett

Legend

Building Description: Building #7 (18 Units)
Type V - 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	Type V - Wood frame	Yes	1.5	1.5	
		Type IV - Mass Timber		Varies		
		Type III - Ordinary construction		1		
		Type II - Non-combustible construction		0.8		
		Type I - Fire resistive construction (2 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	322			
		Number of Floors/Storeys	3			
		Area of structure considered (m^2)			**966**	
	F	**Base fire flow without reductions**				**10,000**
		$F = 220\ C\ (A)^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**		**FUS Table 3**	**Reduction/Surcharge**		
	(1)	Non-combustible	Yes	-25%	-25%	**7,500**
		Limited combustible		-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**		**FUS Table 4**	**Reduction**		
	(2)	Adequately Designed System (NFPA 13)		-30%		**0**
		Standard Water Supply		-10%		
		Fully Supervised System		-10%		
				Cumulative Sub-Total	**0%**	
		Area of Sprinklered Coverage (m²)	0	0%		
				Cumulative Total	**0%**	
5	**Exposure Surcharge**		**FUS Table 5**		**Surcharge**	
	(3)	North Side	>30m		0%	**3,000**
		East Side	0 - 3 m		25%	
		South Side	>30m		0%	
		West Side	10.1 - 20 m		15%	
				Cumulative Total	**40%**	
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

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FUS - Fire Flow Calculations

As per 2020 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 119068
Project Name: 200 Baribeau
Date: 6/27/2024
Input By: Lucas Wilson
Reviewed By: Mark Bissett

Legend

Building Description: Building #8 (36 Units)
Type V - 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	Type V - Wood frame	Yes	1.5	1.5	
		Type IV - Mass Timber		Varies		
		Type III - Ordinary construction		1		
		Type II - Non-combustible construction		0.8		
		Type I - Fire resistive construction (2 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	597			
		Number of Floors/Storeys	3			
		Area of structure considered (m^2)			**1,791**	
	F	**Base fire flow without reductions**				**14,000**
		$F = 220\ C\ (A)^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**		**FUS Table 3**	**Reduction/Surcharge**		
	(1)	Non-combustible	Yes	-25%	-25%	**10,500**
		Limited combustible		-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**		**FUS Table 4**	**Reduction**		
	(2)	Adequately Designed System (NFPA 13)		-30%		**0**
		Standard Water Supply		-10%		
		Fully Supervised System		-10%		
				Cumulative Sub-Total	**0%**	
		Area of Sprinklered Coverage (m^2)	0	0%		
				Cumulative Total	**0%**	
5	**Exposure Surcharge**		**FUS Table 5**		**Surcharge**	
	(3)	North Side	10.1 - 20 m		15%	**6,300**
		East Side	20.1 - 30 m		10%	
		South Side	10.1 - 20 m		15%	
		West Side	3.1 - 10 m		20%	
				Cumulative Total	**60%**	
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

FUS - Fire Flow Calculations

As per 2020 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 119068
Project Name: 200 Baribeau
Date: 6/27/2024
Input By: Lucas Wilson
Reviewed By: Mark Bissett

Legend

Building Description: Building #9 (36 Units)
Type V - 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	Type V - Wood frame	Yes	1.5	1.5	
		Type IV - Mass Timber		Varies		
		Type III - Ordinary construction		1		
		Type II - Non-combustible construction		0.8		
		Type I - Fire resistive construction (2 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	597			
		Number of Floors/Storeys	3			
		Area of structure considered (m^2)			**1,791**	
	F	**Base fire flow without reductions**				**14,000**
		$F = 220\, C\, (A)^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**		**FUS Table 3**	**Reduction/Surcharge**		
	(1)	Non-combustible	Yes	-25%	-25%	**10,500**
		Limited combustible		-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**		**FUS Table 4**	**Reduction**		
	(2)	Adequately Designed System (NFPA 13)		-30%		**0**
		Standard Water Supply		-10%		
		Fully Supervised System		-10%		
				Cumulative Sub-Total	**0%**	
		Area of Sprinklered Coverage (m²)	0	0%		
				Cumulative Total	**0%**	
5	**Exposure Surcharge**		**FUS Table 5**		**Surcharge**	
	(3)	North Side	10.1 - 20 m		15%	**5,250**
		East Side	3.1 - 10 m		20%	
		South Side	10.1 - 20 m		15%	
		West Side	>30m		0%	
				Cumulative Total	**50%**	
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

M:\2019\119068\CAD\Design\Figures\Design Brief\119068-HYDCoverage.dwg, FIG6, Jun 25, 2024 - 4:13pm, lwilson

NOVATECH
Engineers, Planners & Landscape Architects

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Ottawa, Ontario, Canada K2M 1P6

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

LEGEND

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

CITY OF OTTAWA
200 BARIBEAU STREET

FIRE HYDRANT
COVERAGE PLAN

SCALE 1 : 500 (0 5 10 15 20)

DATE JUNE 27, 2024 | JOB 119068 | FIGURE FIG-6

SHT11X17.DWG - 279mmX432mm

APPENDIX B

SWM Calculations

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

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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)
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
1.59	94.40	9.51
1.59	0.00	9.55
2.40	0.00	9.55

CB2-Storage		
Depth (m)	Area (m^2)	Volume (m^3)
0.00	0.36	0.00
1.40	0.36	0.50
1.73	476.00	79.10
1.73	0.00	79.34
2.40	0.00	79.34

CB3-Storage		
Depth (m)	Area (m^2)	Volume (m^3)
0.00	0.36	0.00
1.40	0.36	0.50
1.74	407.90	69.91
1.74	0.00	70.11
2.40	0.00	70.11

CB4-Storage		
Depth (m)	Area (m^2)	Volume (m^3)
0.00	0.36	0.00
1.40	0.36	0.50
1.71	517.10	80.71
1.71	0.00	80.97
2.40	0.00	80.97

Date: 6/27/2024
M:\2019\119068\DATA\Calculations\Sewer Calcs\SWM\119068-Storage Curves.xlsx

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	54.86	56.26	56.45	0.19	55.46	56.17	56.47	56.48	0.00	0.00	0.21	0.22	0.00	0.00	0.02	0.03
CB02	54.66	56.06	56.39	0.33	55.42	56.09	56.40	56.43	0.00	0.03	0.34	0.37	0.00	0.00	0.01	0.04
CB03	54.67	56.07	56.41	0.34	55.46	56.13	56.42	56.44	0.00	0.06	0.35	0.37	0.00	0.00	0.01	0.03
CB04	54.66	56.06	56.37	0.31	55.42	56.09	56.36	56.40	0.00	0.03	0.30	0.34	0.00	0.00	0.00	0.03
CBMH01	54.36	56.64	56.71	0.07	55.46	56.16	56.73	56.82	0.00	0.00	0.09	0.18	0.00	0.00	0.02	0.11
LC01	55.57	56.57	56.66	0.09	55.64	56.19	56.78	56.83	0.00	0.00	0.21	0.26	0.00	0.00	0.12	0.17
LC02	55.44	56.58	56.69	0.11	55.51	56.18	56.78	56.83	0.00	0.00	0.20	0.25	0.00	0.00	0.09	0.14
LC03	55.55	56.64	56.73	0.09	55.66	56.17	56.85	56.89	0.00	0.00	0.21	0.25	0.00	0.00	0.12	0.16
LC04	54.80	55.69	55.76	0.07	54.84	54.88	55.88	55.97	0.00	0.00	0.19	0.28	0.00	0.00	0.12	0.21
LC05	55.10	55.79	55.89	0.10	55.12	55.15	55.92	56.01	0.00	0.00	0.13	0.22	0.00	0.00	0.03	0.12
LC06	55.72	56.72	56.81	0.09	55.81	56.22	56.90	56.93	0.00	0.00	0.18	0.21	0.00	0.00	0.09	0.12
LC07	55.60	56.67	56.76	0.09	55.69	56.22	56.87	56.91	0.00	0.00	0.20	0.24	0.00	0.00	0.11	0.15
LC08	55.47	56.65	56.74	0.09	55.49	56.21	56.86	56.90	0.00	0.00	0.21	0.25	0.00	0.00	0.12	0.16
LC09	55.62	56.62	56.73	0.11	55.69	56.17	56.85	56.89	0.00	0.00	0.23	0.27	0.00	0.00	0.12	0.16
LC10	55.65	56.65	56.75	0.10	55.71	56.21	56.84	56.87	0.00	0.00	0.19	0.22	0.00	0.00	0.09	0.12
LC11	55.63	56.63	56.71	0.08	55.68	56.18	56.79	56.84	0.00	0.00	0.16	0.21	0.00	0.00	0.08	0.13
LC12	55.49	56.65	56.74	0.09	55.61	56.22	56.85	56.88	0.00	0.00	0.20	0.23	0.00	0.00	0.11	0.14
LC13	55.65	56.65	56.71	0.06	55.65	56.22	56.84	56.86	0.00	0.00	0.19	0.21	0.00	0.00	0.13	0.15
LC14	55.67	56.67	56.76	0.09	55.75	56.17	56.86	56.90	0.00	0.00	0.19	0.23	0.00	0.00	0.10	0.14
RY01	53.59	55.39	55.65	0.26	53.69	53.95	55.56	55.67	0.00	0.00	0.17	0.28	0.00	0.00	0.00	0.02
RY02	54.32	55.50	55.70	0.20	54.37	54.41	55.77	55.87	0.00	0.00	0.27	0.37	0.00	0.00	0.07	0.17
RY03	54.03	55.59	55.75	0.16	54.32	54.57	55.82	55.85	0.00	0.00	0.23	0.26	0.00	0.00	0.07	0.10
RY04	53.84	55.25	55.50	0.25	53.89	53.96	55.58	55.70	0.00	0.00	0.33	0.45	0.00	0.00	0.08	0.20
RY05	54.07	55.45	55.65	0.20	54.12	54.17	55.68	55.86	0.00	0.00	0.23	0.41	0.00	0.00	0.03	0.21
RY06	54.55	55.55	55.75	0.20	54.60	54.64	55.84	55.93	0.00	0.00	0.29	0.38	0.00	0.00	0.09	0.18
RY07	54.26	55.66	55.85	0.19	54.33	54.59	55.87	55.91	0.00	0.00	0.21	0.25	0.00	0.00	0.02	0.06

[1] *3-hour Chicago Storm.*

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

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.4)

****
Element Count
****

Number of rain gages 1
Number of subcatchments ... 22
Number of nodes 64
Number of links 88
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
RG-1	C3hr-100yr	INTENSITY	10 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
A-01	0.06	25.60	6.10	4.0000	RG-1	LC05
A-02	0.09	36.80	14.70	4.0000	RG-1	LC04
A-03	0.10	38.80	86.00	1.5000	RG-1	LC12
A-04	0.09	36.40	89.30	1.5000	RG-1	LC06
A-05	0.07	48.67	80.40	1.5000	RG-1	LC14
A-06	0.06	40.00	85.50	1.5000	RG-1	LC01
A-07	0.12	83.33	89.40	1.5000	RG-1	CB01
A-08	0.16	63.20	88.50	1.0000	RG-1	CB03
A-09	0.02	24.00	39.60	2.0000	RG-1	RY06
A-10	0.01	18.00	5.60	2.0000	RG-1	RY02
A-11	0.01	14.00	0.00	2.0000	RG-1	RY05
A-12	0.07	46.67	75.80	2.0000	RG-1	RY07
A-13	0.08	50.67	96.10	1.5000	RG-1	CB04
A-14	0.01	10.00	0.00	2.0000	RG-1	RY04
A-15	0.11	55.00	96.20	1.5000	RG-1	CB02
A-16	0.01	22.00	0.00	2.0000	RG-1	RY01
A-17	0.01	6.67	29.00	2.0000	RG-1	RY03
A-18	0.02	21.00	69.00	1.5000	RG-1	LC11
A-19	0.05	32.00	66.00	1.5000	RG-1	LC09
A-20	0.03	27.00	57.80	1.5000	RG-1	LC10
B-01	0.04	72.00	38.10	2.0000	RG-1	OF1
B-02	0.05	108.00	34.30	2.0000	RG-1	OF1

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
HP-CB01	JUNCTION	56.45	1.00	0.0	
HP-CB02	JUNCTION	56.39	1.00	0.0	
HP-CB03	JUNCTION	56.41	1.00	0.0	
HP-CB04	JUNCTION	56.37	1.00	0.0	
HP-LC01	JUNCTION	56.66	1.00	0.0	
HP-LC02	JUNCTION	56.69	1.00	0.0	
HP-LC04	JUNCTION	55.76	1.00	0.0	
HP-LC05(1)	JUNCTION	55.92	1.00	0.0	
HP-LC05(2)	JUNCTION	55.89	1.00	0.0	
HP-LC06(1)	JUNCTION	56.96	1.00	0.0	
HP-LC06(2)	JUNCTION	56.81	1.00	0.0	
HP-LC07	JUNCTION	56.76	1.00	0.0	
HP-LC08	JUNCTION	56.74	1.00	0.0	
HP-LC09/LC03	JUNCTION	56.73	1.00	0.0	
HP-LC10(1)	JUNCTION	56.76	1.00	0.0	
HP-LC10(2)	JUNCTION	56.75	1.00	0.0	
HP-LC11/CBMH01	JUNCTION	56.71	1.00	0.0	
HP-LC12	JUNCTION	56.74	1.00	0.0	
HP-LC13	JUNCTION	56.71	1.00	0.0	
HP-LC14(1)	JUNCTION	56.91	1.00	0.0	
HP-LC14(2)	JUNCTION	56.76	1.00	0.0	
HP-RY01	JUNCTION	55.65	1.00	0.0	
HP-RY02	JUNCTION	55.70	1.00	0.0	
HP-RY03	JUNCTION	55.75	1.00	0.0	
HP-RY05	JUNCTION	55.65	1.00	0.0	
HP-RY06	JUNCTION	55.75	1.00	0.0	
HP-RY07(1)	JUNCTION	55.98	1.00	0.0	
HP-RY07(2)	JUNCTION	55.85	1.00	0.0	
Ex.1050	OUTFALL	51.05	0.99	0.0	
HP-RY04	OUTFALL	55.50	1.00	0.0	
OF1	OUTFALL	56.00	0.00	0.0	
CB01	STORAGE	54.86	2.40	0.0	
CB02	STORAGE	54.66	2.40	0.0	
CB03	STORAGE	54.67	2.40	0.0	
CB04	STORAGE	54.66	2.40	0.0	
CBMH01	STORAGE	54.36	3.28	0.0	
Dummy-MH04	STORAGE	52.52	3.79	0.0	
LC01	STORAGE	55.57	2.00	0.0	
LC02	STORAGE	55.44	2.14	0.0	
LC03	STORAGE	55.55	2.09	0.0	
LC04	STORAGE	54.80	1.89	0.0	
LC05	STORAGE	55.10	1.69	0.0	
LC06	STORAGE	55.72	2.00	0.0	
LC07	STORAGE	55.60	2.07	0.0	
LC08	STORAGE	55.47	2.18	0.0	
LC09	STORAGE	55.62	2.00	0.0	
LC10	STORAGE	55.65	2.00	0.0	
LC11	STORAGE	55.63	2.00	0.0	
LC12	STORAGE	55.49	2.16	0.0	
LC13	STORAGE	55.65	2.00	0.0	
LC14	STORAGE	55.67	2.00	0.0	
MH04	STORAGE	52.52	4.76	0.0	
MH06	STORAGE	53.30	3.89	0.0	
MH08	STORAGE	53.58	3.85	0.0	
MH10	STORAGE	54.48	3.20	0.0	
MH12	STORAGE	54.62	3.13	0.0	
MH14	STORAGE	54.70	3.06	0.0	
RY01	STORAGE	53.59	2.80	0.0	
RY02	STORAGE	54.32	2.18	0.0	
RY03	STORAGE	54.03	2.56	0.0	
RY04	STORAGE	53.84	2.41	0.0	
RY05	STORAGE	54.07	2.38	0.0	
RY06	STORAGE	54.55	2.00	0.0	
RY07	STORAGE	54.26	2.40	0.0	

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
CB01-Lead	CB01	MH08	CONDUIT	17.8	1.0113	0.0130
CB02-Lead	CB02	MH04	CONDUIT	3.1	0.9678	0.0130
CB03-Lead	CB03	MH06	CONDUIT	9.9	1.1112	0.0130
CB04-Lead	CB04	MH04	CONDUIT	17.7	1.0170	0.0130
CBMH01-MH08	CBMH01	MH08	CONDUIT	35.6	0.5056	0.0130
LC01-LC02	LC01	LC02	CONDUIT	13.3	0.9775	0.0130
LC01-MH10	LC02	MH10	CONDUIT	5.2	0.9616	0.0130
LC03-CBMH01	LC03	CBMH01	CONDUIT	15.5	0.9678	0.0130
LC04-RY06	LC04	RY06	CONDUIT	25.4	0.9843	0.0130
LC05-LC04	LC05	LC04	CONDUIT	29.5	1.0170	0.0130
LC06-LC07	LC06	LC07	CONDUIT	11.8	1.0170	0.0130
LC07-MH14	LC07	MH14	CONDUIT	7.7	1.0390	0.0130
LC08-MH14	LC08	MH14	CONDUIT	6.9	1.0145	0.0130
LC09-LC03	LC09	LC03	CONDUIT	5.4	0.9260	0.0130
LC10-Lead	LC10	MH12	CONDUIT	1.2	0.8334	0.0130
LC11-Lead	LC11	MH10	CONDUIT	1.2	0.8334	0.0130
LC12-MH12	LC12	MH12	CONDUIT	5.2	0.9616	0.0130
LC13-LC12	LC13	LC12	CONDUIT	16.1	0.9938	0.0130
LC14-LC03	LC14	LC03	CONDUIT	12.0	1.0001	0.0130
MH04-Ex1050	Dummy-MH04	Ex.1050	CONDUIT	46.6	1.9961	0.0130
MH06-MH04	MH06	MH04	CONDUIT	36.2	0.9945	0.0130
MH08-MH06	MH08	MH06	CONDUIT	28.6	0.4895	0.0130
MH10-CBMH01	MH10	CBMH01	CONDUIT	9.6	0.5208	0.0130
MH12-MH10	MH12	MH10	CONDUIT	27.2	0.5147	0.0130
MH14-MH12	MH14	MH12	CONDUIT	17.2	0.4651	0.0130
MS-CB01(1)	CB01	HP-CB01	CONDUIT	3.0	-6.3461	0.0150
MS-CB01(2)	HP-CB01	CB03	CONDUIT	3.0	12.7695	0.0150
MS-CB02(1)	CB02	HP-CB02	CONDUIT	3.0	-11.0672	0.0150
MS-CB02(2)	HP-CB02	CB04	CONDUIT	3.0	11.0672	0.0150
MS-CB03(1)	CB03	HP-CB03	CONDUIT	3.0	-11.4068	0.0150
MS-CB03(2)	HP-CB03	CB02	CONDUIT	3.0	11.7469	0.0150
MS-CB04(1)	CB04	HP-CB04	CONDUIT	3.0	-10.3889	0.0150

MS-CB04(2)	HP-CB04	RY05	CONDUIT	3.0	32.2191	0.0150
MS-CBMH01(1)	CBMH01	HP-LC11/CBMH01	CONDUIT	7.3	-0.9589	0.0350
MS-CBMH01(2)	HP-LC11/CBMH01	LC02	CONDUIT	7.4	1.7570	0.0350
MS-LC01(1)	LC01	HP-LC01	CONDUIT	5.8	-1.5519	0.0350
MS-LC01(2)	HP-LC01	LC04	CONDUIT	26.2	3.7048	0.0350
MS-LC02(1)	LC02	HP-LC02	CONDUIT	6.5	-1.6926	0.0350
MS-LC02(2)	HP-LC02	LC01	CONDUIT	6.9	1.7394	0.0350
MS-LC03(1)	LC03	HP-LC09/LC03	CONDUIT	6.0	-1.5002	0.0350
MS-LC03(2)	HP-LC09/LC03	CBMH01	CONDUIT	9.4	0.9575	0.0350
MS-LC04(1)	LC04	HP-LC04	CONDUIT	4.4	-1.5911	0.0350
MS-LC04(2)	HP-LC04	RY06	CONDUIT	21.0	1.0001	0.0350
MS-LC05(1)	HP-LC05(1)	LC05	CONDUIT	13.6	0.9559	0.0350
MS-LC05(2)	LC05	HP-LC05(2)	CONDUIT	10.1	-0.9901	0.0350
MS-LC05(3)	HP-LC05(2)	LC04	CONDUIT	19.4	1.0310	0.0350
MS-LC06(1)	HP-LC06(1)	LC06	CONDUIT	5.9	4.0712	0.0350
MS-LC06(2)	LC06	HP-LC06(2)	CONDUIT	3.8	-2.3691	0.0350
MS-LC06(3)	HP-LC06(2)	LC07	CONDUIT	8.1	1.7287	0.0350
MS-LC07(1)	LC07	HP-LC07	CONDUIT	5.9	-1.5256	0.0350
MS-LC07(2)	HP-LC07	LC08	CONDUIT	6.9	1.5944	0.0350
MS-LC08(1)	LC08	HP-LC08	CONDUIT	7.0	-1.2858	0.0350
MS-LC08(2)	HP-LC08	LC09	CONDUIT	7.8	1.5386	0.0350
MS-LC09	LC09	HP-LC09/LC03	CONDUIT	5.4	-2.0375	0.0350
MS-LC10(1)	HP-LC10(1)	LC10	CONDUIT	7.0	1.5716	0.0350
MS-LC10(2)	LC10	HP-LC10(2)	CONDUIT	7.0	-1.4287	0.0350
MS-LC10(3)	HP-LC10(2)	LC11	CONDUIT	7.8	1.5386	0.0350
MS-LC11	LC11	HP-LC11/CBMH01	CONDUIT	5.4	-1.4816	0.0350
MS-LC12(1)	HP-LC10(1)	LC12	CONDUIT	7.4	1.4867	0.0350
MS-LC12(2)	LC12	HP-LC12	CONDUIT	7.4	-1.2163	0.0350
MS-LC12(3)	HP-LC12	LC13	CONDUIT	8.8	1.0228	0.0350
MS-LC13(1)	LC13	HP-LC13	CONDUIT	4.3	-1.3955	0.0350
MS-LC13(2)	HP-LC13	LC05	CONDUIT	25.8	3.5682	0.0350
MS-LC14(1)	HP-LC14(1)	LC14	CONDUIT	5.5	4.3678	0.0350
MS-LC14(2)	LC14	HP-LC14(2)	CONDUIT	4.1	-2.1957	0.0350
MS-LC14(3)	HP-LC14(2)	LC03	CONDUIT	7.9	1.5192	0.0350
MS-RY01(1)	RY01	HP-RY01	CONDUIT	13.5	-1.9263	0.0350
MS-RY01(2)	HP-RY01	RY04	CONDUIT	8.3	4.8249	0.0350
MS-RY02(1)	RY02	HP-RY02	CONDUIT	10.0	-2.0004	0.0350
MS-RY02(2)	HP-RY02	RY05	CONDUIT	15.0	1.6669	0.0350
MS-RY03(1)	RY03	HP-RY03	CONDUIT	11.6	-1.3794	0.0350
MS-RY03(2)	HP-RY03	RY01	CONDUIT	22.3	1.6146	0.0350
MS-RY04(1)	RY04	HP-RY04	CONDUIT	3.0	-8.3624	0.0350
MS-RY05(1)	RY05	HP-RY05	CONDUIT	10.0	-2.0004	0.0350
MS-RY05(2)	HP-RY05	RY04	CONDUIT	7.3	5.4877	0.0350
MS-RY06(1)	RY06	HP-RY06	CONDUIT	8.5	-2.3536	0.0350
MS-RY06(2)	HP-RY06	RY02	CONDUIT	15.2	1.6450	0.0350
MS-RY07(1)	HP-RY07(1)	RY07	CONDUIT	17.5	1.8289	0.0350
MS-RY07(2)	RY07	HP-RY07(2)	CONDUIT	12.4	-1.5324	0.0350
MS-RY07(3)	HP-RY07(2)	RY03	CONDUIT	10.7	2.4306	0.0350
RY02-RY05	RY02	RY05	CONDUIT	25.1	0.9961	0.0130
RY04-RY01	RY04	RY01	CONDUIT	20.0	1.0001	0.0130
RY05-RY04	RY05	RY04	CONDUIT	17.3	0.9827	0.0130
RY06-RY02	RY06	RY02	CONDUIT	23.4	0.9830	0.0130
RY07-RY03	RY07	RY03	CONDUIT	22.5	0.9778	0.0130
O-MH04	MH04	Dummy-MH04	ORIFICE			
O-RY01	RY01	Dummy-MH04	ORIFICE			
O-RY03	RY03	Dummy-MH04	ORIFICE			

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Cross Section Summary
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Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
CB01-Lead	CIRCULAR	0.20	0.03	0.05	0.20	1	32.99
CB02-Lead	CIRCULAR	0.20	0.03	0.05	0.20	1	32.27
CB03-Lead	CIRCULAR	0.20	0.03	0.05	0.20	1	34.58
CB04-Lead	CIRCULAR	0.20	0.03	0.05	0.20	1	33.08
CBMH01-MH08	CIRCULAR	0.38	0.11	0.09	0.38	1	124.68
LC01-LC02	CIRCULAR	0.25	0.05	0.06	0.25	1	58.80
LC01-MH10	CIRCULAR	0.25	0.05	0.06	0.25	1	58.32
LC03-CBMH01	CIRCULAR	0.25	0.05	0.06	0.25	1	58.51
LC04-RY06	CIRCULAR	0.25	0.05	0.06	0.25	1	59.00
LC05-LC04	CIRCULAR	0.25	0.05	0.06	0.25	1	59.97
LC06-LC07	CIRCULAR	0.25	0.05	0.06	0.25	1	59.97
LC07-MH14	CIRCULAR	0.25	0.05	0.06	0.25	1	60.62
LC08-MH14	CIRCULAR	0.25	0.05	0.06	0.25	1	59.90
LC09-LC03	CIRCULAR	0.25	0.05	0.06	0.25	1	57.23
LC10-Lead	CIRCULAR	0.25	0.05	0.06	0.25	1	54.29
LC11-Lead	CIRCULAR	0.25	0.05	0.06	0.25	1	54.29
LC12-MH12	CIRCULAR	0.25	0.05	0.06	0.25	1	58.32
LC13-LC12	CIRCULAR	0.25	0.05	0.06	0.25	1	59.29
LC14-LC03	CIRCULAR	0.25	0.05	0.06	0.25	1	59.47
MH04-Ex1050	CIRCULAR	0.45	0.16	0.11	0.45	1	402.83
MH06-MH04	CIRCULAR	0.45	0.16	0.11	0.45	1	284.34
MH08-MH06	CIRCULAR	0.45	0.16	0.11	0.45	1	199.49
MH10-CBMH01	CIRCULAR	0.30	0.07	0.07	0.30	1	69.79
MH12-MH10	CIRCULAR	0.30	0.07	0.07	0.30	1	69.38
MH14-MH12	CIRCULAR	0.30	0.07	0.07	0.30	1	65.95
MS-CB01(1)	RECT_OPEN	1.00	3.00	0.60	3.00	1	35843.43
MS-CB01(2)	RECT_OPEN	1.00	3.00	0.60	3.00	1	50844.53
MS-CB02(1)	RECT_OPEN	1.00	3.00	0.60	3.00	1	47334.20
MS-CB02(2)	RECT_OPEN	1.00	3.00	0.60	3.00	1	47334.20
MS-CB03(1)	RECT_OPEN	1.00	6.00	0.75	6.00	1	111525.99
MS-CB03(2)	RECT_OPEN	1.00	6.00	0.75	6.00	1	113176.17
MS-CB04(1)	RECT_OPEN	1.00	3.00	0.60	3.00	1	45860.92
MS-CB04(2)	RECT_OPEN	1.00	3.00	0.60	3.00	1	80763.20
MS-CBMH01(1)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	5452.14
MS-CBMH01(2)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	7380.03
MS-LC01(1)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	6935.89
MS-LC01(2)	RECT_OPEN	1.00	3.00	0.60	3.00	1	11737.20
MS-LC02(1)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	7243.36
MS-LC02(2)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	7342.91
MS-LC03(1)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	6819.29
MS-LC03(2)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	5447.99
MS-LC04(1)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	7022.94
MS-LC04(2)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	5567.75
MS-LC05(1)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	5443.54
MS-LC05(2)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	5540.12
MS-LC05(3)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	5653.21
MS-LC06(1)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	11233.85
MS-LC06(2)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	8569.58
MS-LC06(3)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	7320.20
MS-LC07(1)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	6876.85
MS-LC07(2)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	7030.21
MS-LC08(1)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	6313.34
MS-LC08(2)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	6906.18
MS-LC09	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	7947.19
MS-LC10(1)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	6979.80
MS-LC10(2)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	6654.91
MS-LC10(3)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	6906.18
MS-LC11	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	6777.06
MS-LC12(1)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	6788.50
MS-LC12(2)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	6140.31
MS-LC12(3)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	5630.67
MS-LC13(1)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	6577.06
MS-LC13(2)	RECT_OPEN	1.00	3.00	0.60	3.00	1	11518.67
MS-LC14(1)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	11635.91
MS-LC14(2)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	8249.94
MS-LC14(3)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	6862.32
MS-RY01(1)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	7727.32
MS-RY01(2)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	12229.61
MS-RY02(1)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	7874.58
MS-RY02(2)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	7188.26
MS-RY03(1)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	6539.14
MS-RY03(2)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	7074.51
MS-RY04(1)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	16100.34
MS-RY05(1)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	7874.58
MS-RY05(2)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	13042.60
MS-RY06(1)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	8541.51
MS-RY06(2)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	7140.80
MS-RY07(1)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	7529.42
MS-RY07(2)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	6892.24
MS-RY07(3)	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	8680.16
RY02-RY05	CIRCULAR	0.25	0.05	0.06	0.25	1	59.35
RY04-RY01	CIRCULAR	0.25	0.05	0.06	0.25	1	59.47
RY05-RY04	CIRCULAR	0.25	0.05	0.06	0.25	1	58.95
RY06-RY02	CIRCULAR	0.25	0.05	0.06	0.25	1	58.96
RY07-RY03	CIRCULAR	0.25	0.05	0.06	0.25	1	58.81

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****************
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
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Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 04/29/2024 00:00:00
Ending Date .............. 04/30/2024 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 ........ 1.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 4
Head Tolerance ........... 0.001500 m
```

************************** Runoff Quantity Continuity **************************	Volume hectare-m	Depth mm
Total Precipitation	0.091	71.667
Evaporation Loss	0.000	0.000
Infiltration Loss	0.017	13.529
Surface Runoff	0.074	58.514
Final Storage	0.001	0.478
Continuity Error (%)	-1.193	

************************** Flow Routing Continuity **************************	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.074	0.742
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.002
External Outflow	0.074	0.744
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.005	0.046
Final Stored Volume	0.005	0.046
Continuity Error (%)	0.004	

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*************************
Highest Continuity Errors
*************************
Node LC05 (-2.16%)


***************************
Time-Step Critical Elements
***************************
None


********************************
Highest Flow Instability Indexes
********************************
Link O-RY01 (98)
Link O-RY03 (90)
Link O-MH04 (79)


*********************************
Most Frequent Nonconverging Nodes
*********************************
Convergence obtained at all time steps.


*************************
Routing Time Step Summary
*************************
Minimum Time Step           :     0.50 sec
Average Time Step           :     1.00 sec
Maximum Time Step           :     1.00 sec
% of Time in Steady State   :     0.00
Average Iterations per Step :     2.00
% of Steps Not Converging   :     0.00
Time Step Frequencies       :
    1.000 -  0.871 sec      :    99.43 %
    0.871 -  0.758 sec      :     0.14 %
    0.758 -  0.660 sec      :     0.12 %
    0.660 -  0.574 sec      :     0.11 %
    0.574 -  0.500 sec      :     0.20 %


***************************
Subcatchment Runoff Summary
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Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
A-01	71.67	0.00	0.00	42.53	4.29	25.78	30.07	0.02	18.67	0.420
A-02	71.67	0.00	0.00	38.52	10.45	23.61	34.06	0.03	29.59	0.475
A-03	71.67	0.00	0.00	6.18	61.76	4.25	66.01	0.06	46.93	0.921
A-04	71.67	0.00	0.00	4.71	64.18	3.31	67.49	0.06	44.36	0.942
A-05	71.67	0.00	0.00	8.63	57.50	6.02	63.51	0.05	35.04	0.886
A-06	71.67	0.00	0.00	6.37	61.27	4.54	65.81	0.04	29.09	0.918
A-07	71.67	0.00	0.00	4.65	63.75	3.38	67.13	0.08	61.02	0.937
A-08	71.67	0.00	0.00	5.07	62.83	3.49	66.32	0.10	76.78	0.925
A-09	71.67	0.00	0.00	26.76	28.30	17.85	46.15	0.01	10.35	0.644
A-10	71.67	0.00	0.00	41.70	3.95	28.36	32.31	0.00	3.67	0.451
A-11	71.67	0.00	0.00	44.20	0.00	29.92	29.92	0.00	2.80	0.418
A-12	71.67	0.00	0.00	10.66	54.24	7.40	61.64	0.04	33.30	0.860
A-13	71.67	0.00	0.00	1.71	67.56	1.27	68.83	0.05	37.48	0.960
A-14	71.67	0.00	0.00	44.20	0.00	29.92	29.92	0.00	2.00	0.418
A-15	71.67	0.00	0.00	1.66	68.12	1.24	69.36	0.08	54.25	0.968
A-16	71.67	0.00	0.00	44.20	0.00	29.92	29.92	0.00	4.40	0.418
A-17	71.67	0.00	0.00	31.77	20.35	20.17	40.52	0.00	3.82	0.565
A-18	71.67	0.00	0.00	13.66	49.21	9.49	58.70	0.01	9.87	0.819
A-19	71.67	0.00	0.00	15.06	47.05	10.06	57.12	0.03	22.08	0.797
A-20	71.67	0.00	0.00	18.65	41.17	12.65	53.82	0.01	12.31	0.751
B-01	71.67	0.00	0.00	27.24	26.75	19.12	45.87	0.02	16.08	0.640
B-02	71.67	0.00	0.00	28.93	24.08	20.22	44.30	0.02	23.91	0.618

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Node Depth Summary
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Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days	Time of Max Occurrence hr:min	Reported Max Depth Meters
HP-CB01	JUNCTION	0.00	0.01	56.46	0	01:10	0.01
HP-CB02	JUNCTION	0.00	0.01	56.40	0	01:23	0.01
HP-CB03	JUNCTION	0.00	0.01	56.42	0	01:14	0.01
HP-CB04	JUNCTION	0.00	0.00	56.37	0	00:00	0.00
HP-LC01	JUNCTION	0.00	0.02	56.68	0	01:11	0.02
HP-LC02	JUNCTION	0.00	0.09	56.78	0	01:11	0.09
HP-LC04	JUNCTION	0.00	0.11	55.87	0	01:15	0.11
HP-LC05(1)	JUNCTION	0.00	0.00	55.92	0	01:15	0.00
HP-LC05(2)	JUNCTION	0.00	0.03	55.92	0	01:15	0.03

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HP-LC06(1)	JUNCTION	0.00	0.00	56.96	0	00:00	0.00
HP-LC06(2)	JUNCTION	0.00	0.08	56.89	0	01:10	0.08
HP-LC07	JUNCTION	0.00	0.11	56.87	0	01:10	0.11
HP-LC08	JUNCTION	0.00	0.12	56.86	0	01:11	0.12
HP-LC09/LC03	JUNCTION	0.00	0.12	56.85	0	01:11	0.12
HP-LC10(1)	JUNCTION	0.00	0.08	56.84	0	01:10	0.08
HP-LC10(2)	JUNCTION	0.00	0.08	56.83	0	01:11	0.08
HP-LC11/CBMH01	JUNCTION	0.00	0.07	56.78	0	01:11	0.07
HP-LC12	JUNCTION	0.00	0.10	56.84	0	01:10	0.10
HP-LC13	JUNCTION	0.00	0.02	56.73	0	01:11	0.02
HP-LC14(1)	JUNCTION	0.00	0.00	56.91	0	00:00	0.00
HP-LC14(2)	JUNCTION	0.00	0.09	56.85	0	01:11	0.09
HP-RY01	JUNCTION	0.00	0.00	55.65	0	00:00	0.00
HP-RY02	JUNCTION	0.00	0.07	55.77	0	01:18	0.07
HP-RY03	JUNCTION	0.00	0.07	55.82	0	01:11	0.07
HP-RY05	JUNCTION	0.00	0.03	55.68	0	01:19	0.03
HP-RY06	JUNCTION	0.00	0.08	55.83	0	01:17	0.08
HP-RY07(1)	JUNCTION	0.00	0.00	55.98	0	00:00	0.00
HP-RY07(2)	JUNCTION	0.00	0.02	55.87	0	01:11	0.02
Ex.1050	OUTFALL	4.00	4.00	55.05	0	00:00	4.00
HP-RY04	OUTFALL	0.00	0.07	55.57	0	01:19	0.07
OF1	OUTFALL	0.00	0.00	56.00	0	00:00	0.00
CB01	STORAGE	0.34	1.61	56.47	0	01:07	1.61
CB02	STORAGE	0.54	1.74	56.40	0	01:22	1.74
CB03	STORAGE	0.53	1.75	56.42	0	01:14	1.75
CB04	STORAGE	0.54	1.70	56.36	0	01:47	1.70
CBMH01	STORAGE	0.84	2.37	56.73	0	01:11	2.37
Dummy-MH04	STORAGE	2.53	2.60	55.12	0	01:13	2.60
LC01	STORAGE	0.09	1.21	56.78	0	01:11	1.21
LC02	STORAGE	0.10	1.34	56.78	0	01:11	1.34
LC03	STORAGE	0.09	1.30	56.85	0	01:11	1.30
LC04	STORAGE	0.27	1.08	55.88	0	01:15	1.08
LC05	STORAGE	0.02	0.82	55.92	0	01:15	0.82
LC06	STORAGE	0.07	1.18	56.90	0	01:10	1.18
LC07	STORAGE	0.09	1.27	56.87	0	01:10	1.27
LC08	STORAGE	0.10	1.39	56.86	0	01:10	1.39
LC09	STORAGE	0.08	1.23	56.85	0	01:11	1.23
LC10	STORAGE	0.08	1.19	56.84	0	01:10	1.19
LC11	STORAGE	0.08	1.16	56.79	0	01:11	1.16
LC12	STORAGE	0.10	1.36	56.85	0	01:10	1.36
LC13	STORAGE	0.08	1.19	56.84	0	01:10	1.19
LC14	STORAGE	0.07	1.19	56.86	0	01:11	1.19
MH04	STORAGE	2.68	3.88	56.40	0	01:22	3.88
MH06	STORAGE	1.90	3.12	56.42	0	01:15	3.12
MH08	STORAGE	1.62	2.90	56.48	0	01:12	2.90
MH10	STORAGE	0.73	2.30	56.78	0	01:11	2.30
MH12	STORAGE	0.59	2.22	56.84	0	01:10	2.22
MH14	STORAGE	0.51	2.16	56.86	0	01:11	2.16
RY01	STORAGE	1.48	1.97	55.56	0	01:13	1.97
RY02	STORAGE	0.75	1.45	55.77	0	01:18	1.45
RY03	STORAGE	1.03	1.79	55.82	0	01:11	1.79
RY04	STORAGE	1.23	1.74	55.58	0	01:19	1.74
RY05	STORAGE	1.00	1.61	55.68	0	01:19	1.61
RY06	STORAGE	0.52	1.29	55.84	0	01:16	1.29
RY07	STORAGE	0.80	1.61	55.87	0	01:11	1.61

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Node Inflow Summary
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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
HP-CB01	JUNCTION	0.00	56.09	0	01:10	0	0.0288	-0.001
HP-CB02	JUNCTION	0.00	28.23	0	01:22	0	0.004	0.003
HP-CB03	JUNCTION	0.00	81.42	0	01:14	0	0.0228	0.001
HP-CB04	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-LC01	JUNCTION	0.00	25.33	0	01:11	0	0.00991	2.792
HP-LC02	JUNCTION	0.00	3.56	0	01:07	0	0.00101	0.455
HP-LC04	JUNCTION	0.00	22.87	0	01:14	0	0.0138	-0.273
HP-LC05(1)	JUNCTION	0.00	0.10	0	01:15	0	2.46e-06	0.583 ltr
HP-LC05(2)	JUNCTION	0.00	2.18	0	01:14	0	0.000406	2.377
HP-LC06(1)	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-LC06(2)	JUNCTION	0.00	14.19	0	01:10	0	0.00441	-0.141
HP-LC07	JUNCTION	0.00	16.71	0	01:10	0	0.00619	0.094
HP-LC08	JUNCTION	0.00	16.50	0	01:08	0	0.0068	0.008
HP-LC09/LC03	JUNCTION	0.00	23.03	0	01:11	0	0.00737	0.845
HP-LC10(1)	JUNCTION	0.00	8.12	0	01:10	0	0.00299	0.142
HP-LC10(2)	JUNCTION	0.00	14.15	0	01:10	0	0.00496	-0.027
HP-LC11/CBMH01	JUNCTION	0.00	9.62	0	01:11	0	0.00255	1.047
HP-LC12	JUNCTION	0.00	11.17	0	01:10	0	0.00394	0.204
HP-LC13	JUNCTION	0.00	24.68	0	01:10	0	0.0113	5.893
HP-LC14(1)	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-LC14(2)	JUNCTION	0.00	13.21	0	01:10	0	0.00372	0.042
HP-RY01	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-RY02	JUNCTION	0.00	10.71	0	01:17	0	0.00518	-0.007
HP-RY03	JUNCTION	0.00	10.31	0	01:11	0	0.00342	-2.242
HP-RY05	JUNCTION	0.00	2.93	0	01:18	0	0.000964	0.197
HP-RY06	JUNCTION	0.00	16.11	0	01:16	0	0.00858	-0.198
HP-RY07(1)	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-RY07(2)	JUNCTION	0.00	2.14	0	01:09	0	0.000224	2.711
Ex.1050	OUTFALL	0.00	93.69	0	01:13	0	0.676	0.000
HP-RY04	OUTFALL	0.00	26.42	0	01:19	0	0.0302	0.000
OF1	OUTFALL	39.99	39.99	0	01:10	0.0404	0.0404	0.000
CB01	STORAGE	61.02	61.02	0	01:10	0.0839	0.0876	0.007
CB02	STORAGE	54.25	123.52	0	01:14	0.0763	0.123	0.009
CB03	STORAGE	76.78	149.86	0	01:10	0.105	0.144	0.010
CB04	STORAGE	37.48	59.72	0	01:10	0.0523	0.0957	-0.012
CBMH01	STORAGE	0.00	122.06	0	01:10	0	0.247	-0.037
Dummy-MH04	STORAGE	0.00	93.68	0	01:13	0	0.681	0.007
LC01	STORAGE	29.09	29.09	0	01:10	0.0395	0.0401	-0.039
LC02	STORAGE	0.00	24.33	0	01:04	0	0.0306	0.068
LC03	STORAGE	0.00	50.34	0	01:08	0	0.0746	0.081
LC04	STORAGE	29.59	72.21	0	01:10	0.0313	0.0722	-0.378
LC05	STORAGE	18.67	41.79	0	01:10	0.0192	0.03	-2.115
LC06	STORAGE	44.36	44.36	0	01:10	0.0614	0.0614	-0.016
LC07	STORAGE	0.00	43.37	0	01:10	0	0.0614	0.072
LC08	STORAGE	0.00	18.34	0	01:09	0	0.00927	-0.075
LC09	STORAGE	22.08	36.56	0	01:10	0.0274	0.0342	-0.018
LC10	STORAGE	12.31	19.65	0	01:10	0.0145	0.0175	-0.020
LC11	STORAGE	9.87	23.01	0	01:10	0.0123	0.0173	0.012
LC12	STORAGE	46.93	46.93	0	01:10	0.064	0.0656	0.015
LC13	STORAGE	0.00	24.86	0	01:10	0	0.0128	-0.034
LC14	STORAGE	35.04	35.04	0	01:10	0.0464	0.0464	-0.030
MH04	STORAGE	0.00	101.33	0	01:10	0	0.631	-0.000
MH06	STORAGE	0.00	121.68	0	01:08	0	0.424	-0.000
MH08	STORAGE	0.00	125.01	0	01:07	0	0.307	-0.000
MH10	STORAGE	0.00	73.74	0	01:05	0	0.164	-0.009
MH12	STORAGE	0.00	58.41	0	01:04	0	0.119	-0.019
MH14	STORAGE	0.00	33.36	0	01:04	0	0.0586	-0.062
RY01	STORAGE	4.40	29.87	0	01:10	0.00329	0.0707	0.062
RY02	STORAGE	3.67	50.32	0	01:15	0.00291	0.0874	0.020
RY03	STORAGE	3.82	32.44	0	01:10	0.00405	0.05	-0.035
RY04	STORAGE	2.00	47.94	0	01:19	0.0015	0.0919	0.016
RY05	STORAGE	2.80	48.43	0	01:17	0.00209	0.0895	0.002
RY06	STORAGE	10.35	54.91	0	01:13	0.0111	0.0844	0.049
RY07	STORAGE	33.30	33.30	0	01:10	0.0431	0.0441	-0.012

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Node Surcharge Summary
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No nodes were surcharged.

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Node Flooding Summary
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No nodes were flooded.

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Storage Volume Summary
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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	0.000	4.0	0.0	0.0	0.010	100.0	0	01:07	70.04
CB02	0.005	6.1	0.0	0.0	0.079	100.0	0	01:22	31.17
CB03	0.004	6.3	0.0	0.0	0.070	100.0	0	01:14	81.42
CB04	0.005	6.5	0.0	0.0	0.075	92.7	0	01:47	24.20
CBMH01	0.001	25.8	0.0	0.0	0.003	72.2	0	01:11	120.92
Dummy-MH04	0.000	0.0	0.0	0.0	0.000	0.0	0	00:00	93.69
LC01	0.000	4.3	0.0	0.0	0.000	60.6	0	01:11	27.23
LC02	0.000	4.8	0.0	0.0	0.000	62.8	0	01:11	21.25

LC03	0.000	4.3	0.0	0.0	0.000	62.0	0	01:11	44.87
LC04	0.000	14.4	0.0	0.0	0.000	57.3	0	01:15	51.57
LC05	0.000	1.2	0.0	0.0	0.000	48.6	0	01:15	28.59
LC06	0.000	3.5	0.0	0.0	0.000	59.0	0	01:10	43.77
LC07	0.000	4.1	0.0	0.0	0.000	61.5	0	01:10	41.96
LC08	0.000	4.6	0.0	0.0	0.000	63.9	0	01:10	16.50
LC09	0.000	4.1	0.0	0.0	0.000	61.7	0	01:11	34.58
LC10	0.000	3.9	0.0	0.0	0.000	59.7	0	01:10	18.62
LC11	0.000	4.0	0.0	0.0	0.000	58.0	0	01:11	22.35
LC12	0.000	4.6	0.0	0.0	0.000	62.8	0	01:10	45.82
LC13	0.000	3.9	0.0	0.0	0.000	59.4	0	01:10	24.68
LC14	0.000	3.7	0.0	0.0	0.000	59.3	0	01:11	33.65
MH04	0.003	56.3	0.0	0.0	0.004	81.5	0	01:22	100.19
MH06	0.002	48.9	0.0	0.0	0.004	80.2	0	01:15	118.89
MH08	0.002	42.1	0.0	0.0	0.003	75.3	0	01:12	121.68
MH10	0.001	22.7	0.0	0.0	0.003	72.0	0	01:11	67.37
MH12	0.001	18.8	0.0	0.0	0.003	71.0	0	01:10	47.40
MH14	0.001	16.6	0.0	0.0	0.002	70.7	0	01:11	27.65
RY01	0.001	52.7	0.0	0.0	0.001	70.4	0	01:13	22.68
RY02	0.000	34.4	0.0	0.0	0.001	66.6	0	01:18	48.02
RY03	0.000	40.4	0.0	0.0	0.001	70.1	0	01:11	31.03
RY04	0.000	50.9	0.0	0.0	0.001	72.2	0	01:19	47.83
RY05	0.000	41.9	0.0	0.0	0.001	67.5	0	01:19	47.45
RY06	0.000	26.1	0.0	0.0	0.000	64.4	0	01:16	49.97
RY07	0.000	33.5	0.0	0.0	0.001	67.1	0	01:11	29.80

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Outfall Loading Summary
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Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
Ex.1050	67.36	11.71	93.69	0.676
HP-RY04	2.08	16.12	26.42	0.030
OF1	12.14	3.88	39.99	0.040
System	27.20	31.71	136.86	0.746

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Link Flow Summary
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Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	Time of Max Occurrence hr:min	Maximum |Veloc| m/sec	Max/Full Flow	Max/Full Depth
CB01-Lead	CONDUIT	30.54	0	01:02	0.97	0.93	1.00
CB02-Lead	CONDUIT	27.70	0	01:10	0.88	0.86	1.00
CB03-Lead	CONDUIT	26.76	0	01:01	0.85	0.77	1.00
CB04-Lead	CONDUIT	24.20	0	03:39	0.77	0.73	1.00
CBMH01-MH08	CONDUIT	120.92	0	01:11	1.09	0.97	1.00
LC01-LC02	CONDUIT	24.33	0	01:04	0.72	0.41	1.00
LC01-MH10	CONDUIT	21.25	0	01:05	0.67	0.36	1.00
LC03-CBMH01	CONDUIT	44.87	0	01:08	0.91	0.77	1.00
LC04-RY06	CONDUIT	35.79	0	01:07	0.73	0.61	1.00
LC05-LC04	CONDUIT	28.59	0	01:08	0.58	0.48	1.00
LC06-LC07	CONDUIT	39.09	0	01:05	0.88	0.65	1.00
LC07-MH14	CONDUIT	33.36	0	01:04	0.87	0.55	1.00
LC08-MH14	CONDUIT	7.16	0	01:06	0.21	0.12	1.00
LC09-LC03	CONDUIT	18.65	0	01:07	0.53	0.33	1.00
LC10-Lead	CONDUIT	7.64	0	01:07	0.42	0.14	1.00
LC11-Lead	CONDUIT	14.57	0	01:10	0.41	0.27	1.00
LC12-MH12	CONDUIT	34.11	0	01:04	0.71	0.58	1.00
LC13-LC12	CONDUIT	14.21	0	01:10	0.29	0.24	1.00
LC14-LC03	CONDUIT	31.06	0	01:05	0.68	0.52	1.00
MH04-Ex1050	CONDUIT	93.69	0	01:13	0.59	0.23	1.00
MH06-MH04	CONDUIT	101.33	0	01:10	0.64	0.36	1.00
MH08-MH06	CONDUIT	121.68	0	01:08	0.77	0.61	1.00
MH10-CBMH01	CONDUIT	67.37	0	01:06	0.95	0.97	1.00
MH12-MH10	CONDUIT	47.40	0	01:05	0.67	0.68	1.00
MH14-MH12	CONDUIT	24.61	0	01:11	0.35	0.37	1.00
MS-CB01(1)	CONDUIT	56.09	0	01:10	0.17	0.00	0.11
MS-CB01(2)	CONDUIT	56.09	0	01:10	0.17	0.00	0.18
MS-CB02(1)	CONDUIT	28.23	0	01:22	0.05	0.00	0.17
MS-CB02(2)	CONDUIT	27.32	0	01:23	0.07	0.00	0.15
MS-CB03(1)	CONDUIT	81.42	0	01:14	0.08	0.00	0.18
MS-CB03(2)	CONDUIT	75.69	0	01:14	0.10	0.00	0.17
MS-CB04(1)	CONDUIT	0.00	0	00:00	0.00	0.00	0.15
MS-CB04(2)	CONDUIT	0.00	0	00:00	0.00	0.00	0.11
MS-CBMH01(1)	CONDUIT	9.39	0	01:11	0.30	0.00	0.08
MS-CBMH01(2)	CONDUIT	1.89	0	01:10	0.05	0.00	0.14
MS-LC01(1)	CONDUIT	25.33	0	01:11	0.44	0.00	0.12
MS-LC01(2)	CONDUIT	25.14	0	01:11	0.21	0.00	0.10
MS-LC02(1)	CONDUIT	2.90	0	01:11	0.06	0.00	0.15
MS-LC02(2)	CONDUIT	3.56	0	01:07	0.08	0.00	0.15
MS-LC03(1)	CONDUIT	6.63	0	01:14	0.15	0.00	0.16
MS-LC03(2)	CONDUIT	22.95	0	01:11	0.50	0.00	0.10
MS-LC04(1)	CONDUIT	22.87	0	01:14	0.26	0.00	0.15
MS-LC04(2)	CONDUIT	22.63	0	01:15	0.16	0.00	0.20
MS-LC05(1)	CONDUIT	0.10	0	01:15	0.00	0.00	0.07
MS-LC05(2)	CONDUIT	2.18	0	01:14	0.09	0.00	0.08
MS-LC05(3)	CONDUIT	1.45	0	01:15	0.03	0.00	0.11
MS-LC06(1)	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
MS-LC06(2)	CONDUIT	14.19	0	01:10	0.21	0.00	0.13
MS-LC06(3)	CONDUIT	14.00	0	01:10	0.18	0.00	0.14
MS-LC07(1)	CONDUIT	16.71	0	01:10	0.19	0.00	0.15
MS-LC07(2)	CONDUIT	16.03	0	01:10	0.17	0.00	0.16
MS-LC08(1)	CONDUIT	16.50	0	01:08	0.21	0.00	0.16
MS-LC08(2)	CONDUIT	15.54	0	01:10	0.21	0.00	0.18
MS-LC09	CONDUIT	20.62	0	01:10	0.19	0.00	0.18
MS-LC10(1)	CONDUIT	7.43	0	01:10	0.11	0.00	0.14
MS-LC10(2)	CONDUIT	14.15	0	01:10	0.19	0.00	0.14
MS-LC10(3)	CONDUIT	14.09	0	01:11	0.23	0.00	0.12
MS-LC11	CONDUIT	7.90	0	01:11	0.14	0.00	0.12
MS-LC12(1)	CONDUIT	8.12	0	01:10	0.13	0.00	0.14
MS-LC12(2)	CONDUIT	11.17	0	01:10	0.13	0.00	0.15
MS-LC12(3)	CONDUIT	10.76	0	01:10	0.13	0.00	0.15
MS-LC13(1)	CONDUIT	24.68	0	01:10	0.51	0.00	0.10
MS-LC13(2)	CONDUIT	24.53	0	01:11	0.36	0.00	0.07
MS-LC14(1)	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
MS-LC14(2)	CONDUIT	13.21	0	01:10	0.19	0.00	0.14
MS-LC14(3)	CONDUIT	12.33	0	01:10	0.15	0.00	0.15
MS-RY01(1)	CONDUIT	0.00	0	00:00	0.00	0.00	0.09
MS-RY01(2)	CONDUIT	0.00	0	00:00	0.00	0.00	0.17
MS-RY02(1)	CONDUIT	10.71	0	01:17	0.10	0.00	0.17
MS-RY02(2)	CONDUIT	10.58	0	01:18	0.12	0.00	0.15
MS-RY03(1)	CONDUIT	10.31	0	01:11	0.12	0.00	0.15
MS-RY03(2)	CONDUIT	9.97	0	01:11	0.26	0.00	0.12
MS-RY04(1)	CONDUIT	26.42	0	01:19	0.17	0.00	0.20
MS-RY05(1)	CONDUIT	2.93	0	01:18	0.04	0.00	0.13
MS-RY05(2)	CONDUIT	2.88	0	01:19	0.02	0.00	0.18
MS-RY06(1)	CONDUIT	16.11	0	01:16	0.12	0.00	0.19
MS-RY06(2)	CONDUIT	15.99	0	01:17	0.13	0.00	0.18
MS-RY07(1)	CONDUIT	0.00	0	00:00	0.00	0.00	0.10
MS-RY07(2)	CONDUIT	2.14	0	01:09	0.05	0.00	0.11
MS-RY07(3)	CONDUIT	1.14	0	01:11	0.02	0.00	0.13
RY02-RY05	CONDUIT	37.91	0	01:15	0.77	0.64	1.00
RY04-RY01	CONDUIT	21.45	0	01:19	0.44	0.36	1.00
RY05-RY04	CONDUIT	44.52	0	01:19	0.91	0.76	1.00
RY06-RY02	CONDUIT	37.07	0	01:13	0.76	0.63	1.00
RY07-RY03	CONDUIT	27.89	0	01:10	0.57	0.47	1.00
O-MH04	ORIFICE	51.33	0	01:22			1.00
O-RY01	ORIFICE	22.68	0	01:24			1.00
O-RY03	ORIFICE	20.73	0	01:11			1.00

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Flow Classification Summary
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Conduit	Adjusted /Actual Length	Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
		---------- Fraction of Time in Flow Class ----------								
CB01-Lead	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CB02-Lead	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CB03-Lead	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CB04-Lead	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CBMH01-MH08	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
LC01-LC02	1.00	0.01	0.01	0.00	0.95	0.03	0.00	0.00	0.85	0.00
LC01-MH10	1.00	0.01	0.00	0.00	0.13	0.00	0.00	0.87	0.00	0.00
LC03-CBMH01	1.00	0.01	0.00	0.00	0.13	0.00	0.00	0.87	0.00	0.00
LC04-RY06	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
LC05-LC04	1.00	0.00	0.81	0.00	0.19	0.00	0.00	0.00	0.95	0.00
LC06-LC07	1.00	0.01	0.00	0.00	0.96	0.03	0.00	0.00	0.84	0.00
LC07-MH14	1.00	0.01	0.00	0.00	0.12	0.00	0.00	0.87	0.00	0.00
LC08-MH14	1.00	0.04	0.00	0.00	0.13	0.00	0.00	0.84	0.00	0.00

LC09-LC03	1.00	0.01	0.00	0.00	0.12	0.00	0.00	0.87	0.00	0.00
LC10-Lead	1.00	0.01	0.00	0.00	0.12	0.00	0.00	0.87	0.00	0.00
LC11-Lead	1.00	0.01	0.00	0.00	0.12	0.00	0.00	0.87	0.00	0.00
LC12-MH12	1.00	0.01	0.00	0.00	0.12	0.00	0.00	0.87	0.00	0.00
LC13-LC12	1.00	0.01	0.84	0.00	0.15	0.00	0.00	0.00	0.84	0.00
LC14-LC03	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.87	0.00
MH04-Ex1050	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
MH06-MH04	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
MH08-MH06	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
MH10-CBMH01	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
MH12-MH10	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
MH14-MH12	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
MS-CB01(1)	1.00	0.93	0.06	0.00	0.01	0.00	0.00	0.00	0.94	0.00
MS-CB01(2)	1.00	0.89	0.09	0.00	0.01	0.00	0.00	0.00	0.95	0.00
MS-CB02(1)	1.00	0.89	0.10	0.00	0.01	0.00	0.00	0.00	0.94	0.00
MS-CB02(2)	1.00	0.89	0.10	0.00	0.01	0.00	0.00	0.00	0.94	0.00
MS-CB03(1)	1.00	0.89	0.09	0.00	0.01	0.00	0.00	0.00	0.94	0.00
MS-CB03(2)	1.00	0.89	0.09	0.00	0.01	0.00	0.00	0.00	0.95	0.00
MS-CB04(1)	1.00	0.89	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MS-CB04(2)	1.00	0.98	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MS-CBMH01(1)	1.00	0.05	0.00	0.00	0.00	0.00	0.00	0.95	0.00	0.00
MS-CBMH01(2)	1.00	0.05	0.00	0.00	0.01	0.00	0.00	0.94	0.00	0.00
MS-LC01(1)	1.00	0.89	0.00	0.00	0.01	0.00	0.00	0.10	0.00	0.00
MS-LC01(2)	1.00	0.89	0.00	0.00	0.02	0.00	0.00	0.09	0.02	0.00
MS-LC02(1)	1.00	0.05	0.00	0.00	0.01	0.00	0.00	0.94	0.00	0.00
MS-LC02(2)	1.00	0.05	0.00	0.00	0.01	0.00	0.00	0.94	0.00	0.00
MS-LC03(1)	1.00	0.05	0.00	0.00	0.01	0.00	0.00	0.95	0.00	0.00
MS-LC03(2)	1.00	0.05	0.00	0.00	0.00	0.00	0.00	0.95	0.00	0.00
MS-LC04(1)	1.00	0.05	0.00	0.00	0.02	0.00	0.00	0.93	0.00	0.00
MS-LC04(2)	1.00	0.05	0.00	0.00	0.02	0.00	0.00	0.93	0.02	0.00
MS-LC05(1)	1.00	0.05	0.00	0.00	0.01	0.00	0.00	0.94	0.01	0.00
MS-LC05(2)	1.00	0.05	0.00	0.00	0.01	0.00	0.00	0.94	0.01	0.00
MS-LC05(3)	1.00	0.05	0.00	0.00	0.02	0.00	0.00	0.93	0.02	0.00
MS-LC06(1)	1.00	0.99	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MS-LC06(2)	1.00	0.05	0.00	0.00	0.01	0.00	0.00	0.95	0.00	0.00
MS-LC06(3)	1.00	0.05	0.00	0.00	0.01	0.00	0.00	0.94	0.01	0.00
MS-LC07(1)	1.00	0.05	0.00	0.00	0.01	0.00	0.00	0.94	0.00	0.00
MS-LC07(2)	1.00	0.05	0.00	0.00	0.01	0.00	0.00	0.94	0.01	0.00
MS-LC08(1)	1.00	0.05	0.00	0.00	0.01	0.00	0.00	0.94	0.00	0.00
MS-LC08(2)	1.00	0.05	0.00	0.00	0.01	0.00	0.00	0.95	0.00	0.00
MS-LC09	1.00	0.05	0.00	0.00	0.01	0.00	0.00	0.95	0.00	0.00
MS-LC10(1)	1.00	0.05	0.00	0.00	0.01	0.00	0.00	0.94	0.01	0.00
MS-LC10(2)	1.00	0.05	0.00	0.00	0.01	0.00	0.00	0.94	0.00	0.00
MS-LC10(3)	1.00	0.05	0.00	0.00	0.01	0.00	0.00	0.95	0.01	0.00
MS-LC11	1.00	0.05	0.00	0.00	0.01	0.00	0.00	0.95	0.00	0.00
MS-LC12(1)	1.00	0.04	0.00	0.00	0.01	0.00	0.00	0.94	0.00	0.00
MS-LC12(2)	1.00	0.04	0.00	0.00	0.01	0.00	0.00	0.94	0.00	0.00
MS-LC12(3)	1.00	0.04	0.00	0.00	0.01	0.00	0.00	0.94	0.00	0.00
MS-LC13(1)	1.00	0.88	0.00	0.00	0.01	0.00	0.00	0.11	0.00	0.00
MS-LC13(2)	1.00	0.88	0.00	0.00	0.02	0.00	0.00	0.10	0.01	0.00
MS-LC14(1)	1.00	0.99	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MS-LC14(2)	1.00	0.05	0.00	0.00	0.01	0.00	0.00	0.95	0.00	0.00
MS-LC14(3)	1.00	0.05	0.00	0.00	0.01	0.00	0.00	0.95	0.00	0.00
MS-RY01(1)	1.00	0.97	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MS-RY01(2)	1.00	0.97	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MS-RY02(1)	1.00	0.05	0.00	0.00	0.02	0.00	0.00	0.93	0.01	0.00
MS-RY02(2)	1.00	0.05	0.00	0.00	0.02	0.00	0.00	0.93	0.02	0.00
MS-RY03(1)	1.00	0.04	0.00	0.00	0.01	0.00	0.00	0.94	0.00	0.00
MS-RY03(2)	1.00	0.05	0.00	0.00	0.03	0.00	0.00	0.93	0.02	0.00
MS-RY04(1)	1.00	0.05	0.00	0.00	0.03	0.00	0.00	0.92	0.01	0.00
MS-RY05(1)	1.00	0.05	0.01	0.00	0.02	0.00	0.00	0.93	0.01	0.00
MS-RY05(2)	1.00	0.05	0.01	0.00	0.02	0.00	0.00	0.92	0.02	0.00
MS-RY06(1)	1.00	0.05	0.00	0.00	0.02	0.00	0.00	0.93	0.01	0.00
MS-RY06(2)	1.00	0.05	0.00	0.00	0.02	0.00	0.00	0.93	0.02	0.00
MS-RY07(1)	1.00	0.99	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MS-RY07(2)	1.00	0.04	0.00	0.00	0.01	0.00	0.00	0.94	0.01	0.00
MS-RY07(3)	1.00	0.04	0.00	0.00	0.01	0.00	0.00	0.94	0.01	0.00
RY02-RY05	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
RY04-RY01	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
RY05-RY04	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
RY06-RY02	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
RY07-RY03	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00

****
Conduit Surcharge Summary
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Conduit	Hours Full Both Ends	Hours Full Upstream	Hours Full Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
CB01-Lead	3.84	3.84	24.00	0.01	0.01
CB02-Lead	24.00	24.00	24.00	0.01	0.02
CB03-Lead	24.00	24.00	24.00	0.01	0.01
CB04-Lead	24.00	24.00	24.00	0.01	0.01
CBMH01-MH08	24.00	24.00	24.00	0.01	0.16
LC01-LC02	2.73	2.73	2.83	0.01	0.01
LC01-MH10	2.83	2.83	2.87	0.01	0.01
LC03-CBMH01	2.75	2.75	2.86	0.01	0.01
LC04-RY06	13.99	13.99	24.00	0.01	0.01
LC05-LC04	0.67	0.67	13.90	0.01	0.01
LC06-LC07	2.64	2.64	2.71	0.01	0.01
LC07-MH14	2.71	2.71	2.78	0.01	0.01
LC08-MH14	2.81	2.81	2.87	0.01	0.01
LC09-LC03	2.69	2.69	2.73	0.01	0.01
LC10-Lead	2.69	2.69	2.69	0.01	0.01
LC11-Lead	2.69	2.69	2.70	0.01	0.01
LC12-MH12	2.80	2.80	2.84	0.01	0.01
LC13-LC12	2.69	2.69	2.80	0.01	0.01
LC14-LC03	2.68	2.68	2.75	0.01	0.01
MH04-Ex1050	24.00	24.00	24.00	0.01	0.01
MH06-MH04	24.00	24.00	24.00	0.01	0.01
MH08-MH06	24.00	24.00	24.00	0.01	0.01
MH10-CBMH01	24.00	24.00	24.00	0.01	0.31
MH12-MH10	24.00	24.00	24.00	0.01	0.01
MH14-MH12	24.00	24.00	24.00	0.01	0.01
RY02-RY05	24.00	24.00	24.00	0.01	0.01
RY04-RY01	24.00	24.00	24.00	0.01	0.01
RY05-RY04	24.00	24.00	24.00	0.01	0.01
RY06-RY02	24.00	24.00	24.00	0.01	0.01
RY07-RY03	24.00	24.00	24.00	0.01	0.01

Analysis begun on: Thu Jun 27 14:50:01 2024
Analysis ended on: Thu Jun 27 14:50:04 2024
Total elapsed time: 00:00:03

200 Baribeau Street (119068)
PCSWMM Model Schematic

Overall Model Schematic

Date: 2024-06-27
M:\2019\119068\DATA\Calculations\Sewer Calcs\SWM\PCSWMM Model Schematic.docx

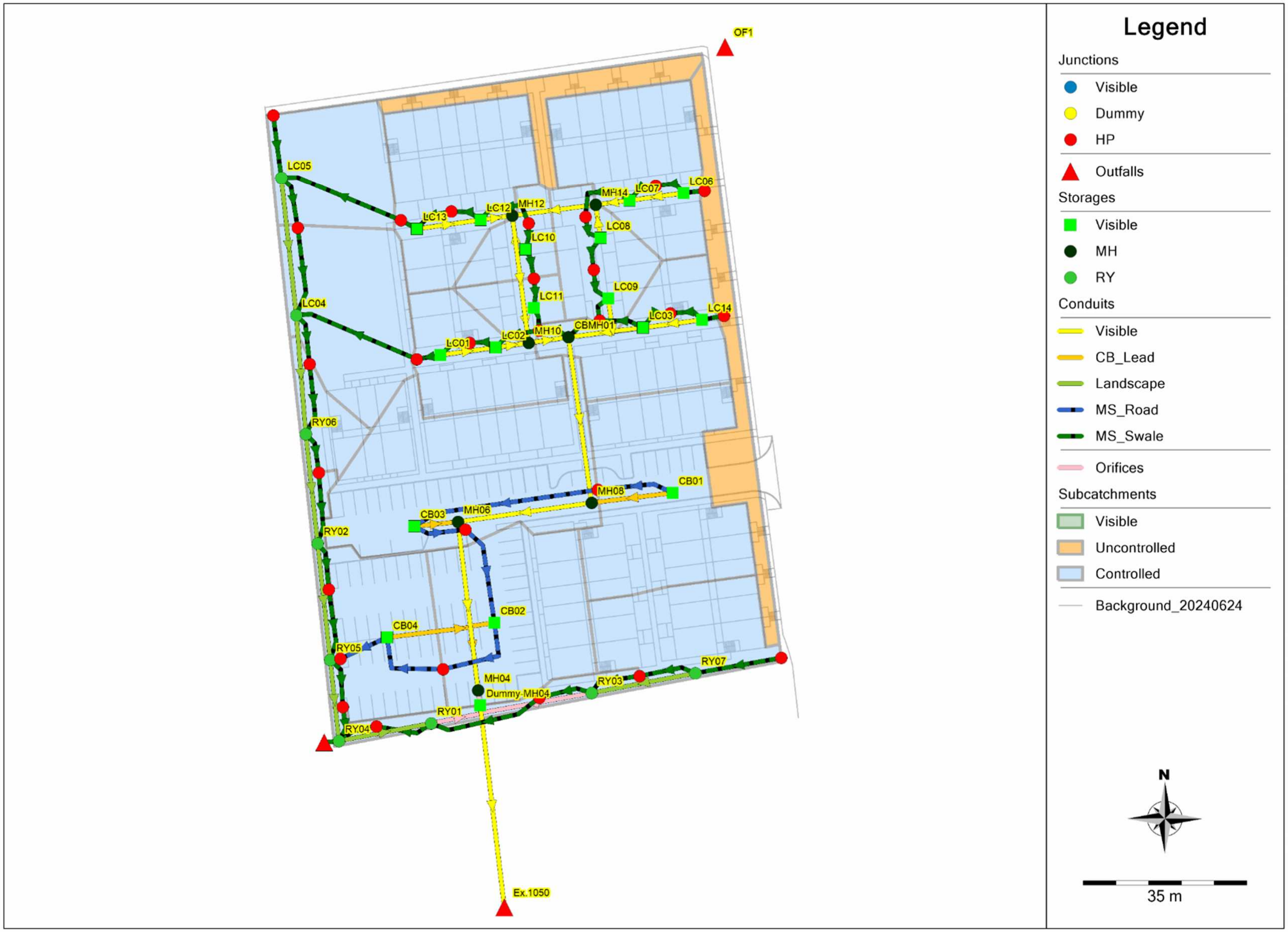
200 Baribeau Street (119068)
PCSWMM Model Schematic

Subcatchment ID's

Date: 2024-06-27
M:\2019\119068\DATA\Calculations\Sewer Calcs\SWM\PCSWMM Model Schematic.docx

200 Baribeau Street (119068)
PCSWMM Model Schematic

Node ID's



Date: 2024-06-27
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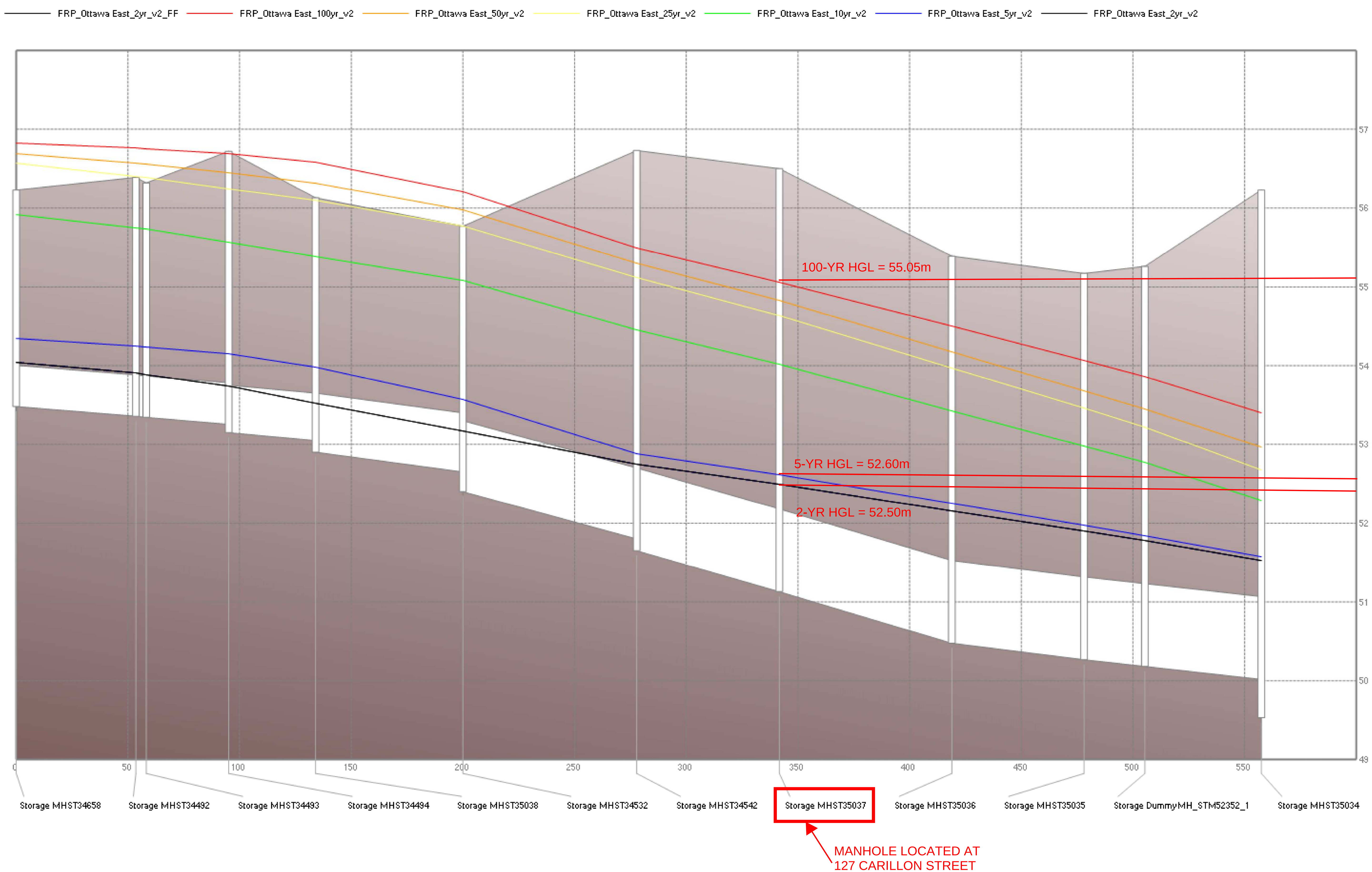
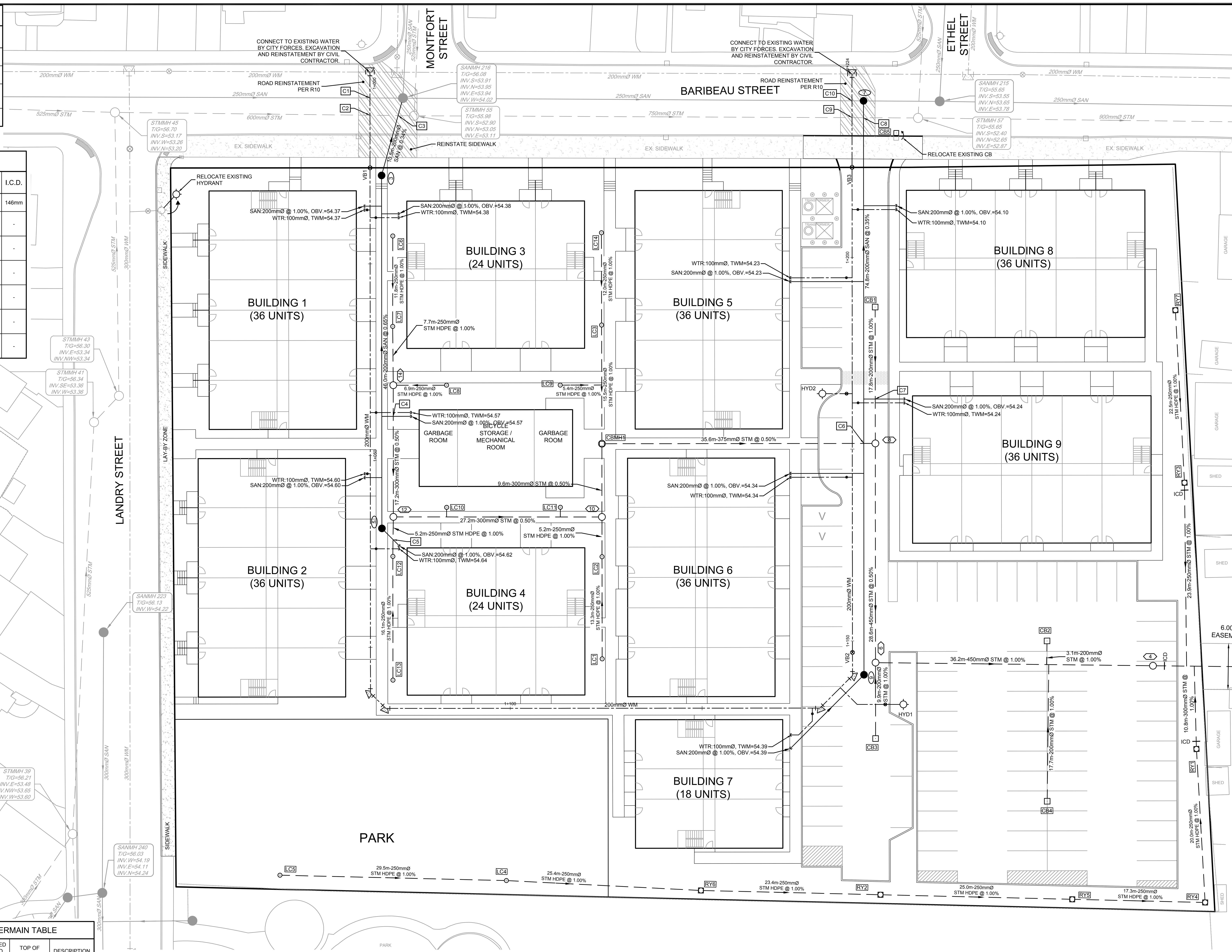
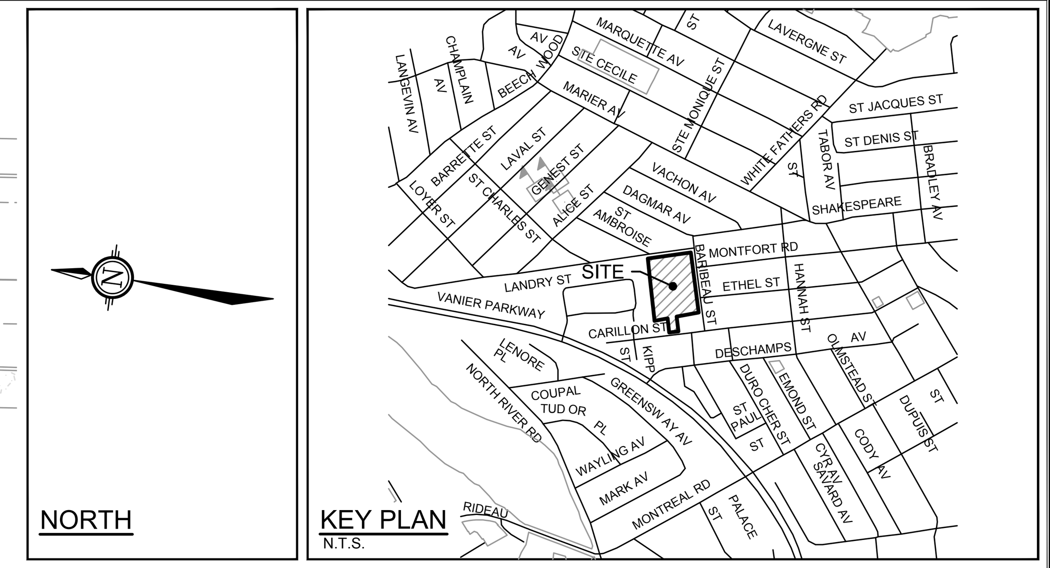


FRP_Ottawa East_2yr_v2_FF
FRP_Ottawa East_100yr_v2
FRP_Ottawa East_50yr_v2
FRP_Ottawa East_25yr_v2
FRP_Ottawa East_10yr_v2
FRP_Ottawa East_5yr_v2
FRP_Ottawa East_2yr_v2
100-YR HGL = 55.05m
5-YR HGL = 52.60m
2-YR HGL = 52.50m
57
56
55
54
53
52
51
50
49
0
50
100
150
200
250
300
350
400
450
500
550
Storage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

APPENDIX C: Drawings

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





SANITARY MANHOLE TABLE				
MANHOLE ID	SIZE(mm)	T/G ELEV (m)	INVERT (m)	PIPE DIAMETER (mm)
3	1200Ø	56.17	E=54.06 W=54.07	E=200 W=200
5	1200Ø	56.73	E=54.37 SW=54.39	E=200 SW=200
7	1200Ø	55.61	W=53.76 N=53.69 S=53.69	W=200 N=250 S=250
9	1200Ø	56.15	NW=54.05 E=54.02	NW=200 E=200

STORM MANHOLE TABLE					
MANHOLE ID	SIZE(mm)	T/G ELEV (m)	INVERT (m)	PIPE DIAMETER (mm)	I.C.D.
4	1200Ø	56.33	N=52.94 S=52.52	N=450 S=450	146mm
6	1200Ø	56.20	W=54.57 S=53.30 E=53.44	W=200 S=450 E=450	-
8	1200Ø	56.43	N=54.18 W=53.58 E=54.68	N=375 W=450 E=200	-
10	1200Ø	56.68	N=54.48 E=54.48 W=55.39	N=300 E=300 W=250	-
12	1200Ø	56.75	E=54.62 S=54.62 W=55.44	E=300 S=300 W=250	-
14	1200Ø	56.76	W=54.71 E=55.52 S=55.40	W=300 E=250 S=250	-
CBMH1	1200Ø	56.64	W=54.43 S=54.36 E=55.40	W=300 S=375 E=250	-

CATCHBASIN TABLE			
CB ID	T/G ELEVATION	INVERT	I.C.D.
CB1	56.26	54.86	-
CB2	56.06	54.66	-
CB3	56.07	54.67	-
CB4	56.06	54.66	-

REAR YARD CATCHBASIN TABLE			
RYCB No.	T/G ELEVATION	INVERT	I.C.D.
LC1	56.57	55.57	-
LC2	56.58	55.44	-
LC3	56.64	55.55	-
LC4	55.69	54.29	-
LC5	55.79	53.99	-
LC6	56.72	55.72	-
LC7	56.67	55.60	-
LC8	56.65	55.47	-
LC9	56.62	55.62	-
LC10	56.65	55.65	-
LC11	56.63	55.63	-
LC12	56.65	55.49	-
LC13	56.65	55.65	-
LC14	56.67	55.67	-
RY1	55.39	53.59	127mm
RY2	55.50	54.32	-
RY3	55.59	54.03	108mm
RY4	55.25	53.84	-
RY5	55.45	54.07	-
RY6	55.55	54.55	-
RY7	55.66	54.26	-

SEWER CROSSING TABLE		
LOCATION	ELEVATIONS	CLEARANCE
C1	SAN INV=53.96 WM OBV=53.72	0.24m
C2	WM INV=53.97 STM OBV=53.67	0.30m
C3	SAN INV=54.03 STM OBV=53.66	0.37m
C4	STM INV=54.67 SAN OBV=54.54	0.13m
C5	STM INV=55.65 SAN OBV=54.61	1.04m
C6	STM INV=54.19 SAN OBV=54.11	0.08m
C7	STM INV=55.09 SAN OBV=54.20	0.89m
C8	SAN INV=53.76 STM OBV=53.43	0.33m
C9	WM INV=53.73 STM OBV=53.43	0.30m
C10	SAN INV=53.69 WM OBV=53.22	0.47m
C11	WM INV=53.90 STM OBV=52.16	1.74m
C12	SAN INV=52.63 STM OBV=52.11	0.52m

WATERMAIN TABLE			
Station	PROPOSED GROUND ELEVATION	TOP OF WATERMAIN	DESCRIPTION
1+000.00	56.04	53.64	200 x 200 TEE
1+012.48	56.16	53.76	VB1
1+017.98	56.87	54.47	WTR SERVICE
1+018.98	56.88	54.48	WTR SERVICE
1+044.38	56.88	54.58	WTR SERVICE
1+052.37	56.91	54.60	WTR SERVICE
1+062.15	56.80	54.64	WTR SERVICE
1+080.96	56.74	54.34	H. BEND
1+083.79	56.70	54.30	H. BEND
1+139.23	56.34	54.40	WTR SERVICE
1+139.93	56.31	53.91	H. BEND
1+143.69	56.26	53.86	HYD1 TEE
1+145.93	56.19	53.79	H. BEND
1+148.49	56.20	53.80	VB2
1+171.34	56.38	54.34	WTR SERVICE
1+181.03	56.53	54.24	WTR SERVICE
1+182.23	56.53	54.13	HYD2 TEE
1+197.34	56.40	54.24	WTR SERVICE
1+206.23	56.24	53.84	WTR SERVICE
1+211.73	56.05	53.65	VB3
1+223.91	55.66	53.26	200 x 200 TEE

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.

LEGEND

- SANITARY MANHOLE, SEWER & FLOW DIRECTION
- STORM MANHOLE, SEWER & FLOW DIRECTION
- WATERMAIN AND DIAMETER (300mmØ)
- VALVE & VALVE BOX (VB)
- BEND AND THRUST BLOCK
- HYDRANT C/W VALVE & LEAD (HYD)
- CAP
- ROAD CATCHBASIN (95)
- LANDSCAPE TYPE CATCHBASIN (LC30)
- REAR YARD CATCH BASIN (RY9)
- SERVICE POST LOCATION (SP)

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

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND 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
15.	CONCEPT UPDATE	JUN 27/24	MAB
14.	MINOR UPDATES TO BLOCKS 1-4, 9	NOV 16/22	MAB
13.	USF LOWERED BLOCKS 1, 2, 3, 4 & 9	JUL 20/22	MAB
12.	SITE PLAN UPDATE	JUL 15/22	MAB
11.	ISSUED FOR ECA	MAR 24/22	MAB
10.	ISSUED FOR BUILDING PERMIT	MAR 2/22	MAB
9.	CITY SUBMISSION - PARK UPDATE	FEB 15/22	MAB
8.	CITY SUBMISSION	OCT 21/21	MAB
7.	CITY SUBMISSION	AUG 3/21	MAB
6.	CITY SUBMISSION	JUN 8/21	MAB
5.	CITY SUBMISSION	FEB 5/21	MAB
4.	STORM OUTLET VIA 127 CARILLION	OCT 23/20	MAB
3.	SITE PLAN APPLICATION	AUG 24/20	MAB
2.	RVCA APPROVAL IN PRINCIPAL APPLICATION	MAY 28/20	MAB
1.	ISSUED FOR RVCA REVIEW	MAR 26/20	MAB

SCALE 1:250

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

FOR REVIEW ONLY

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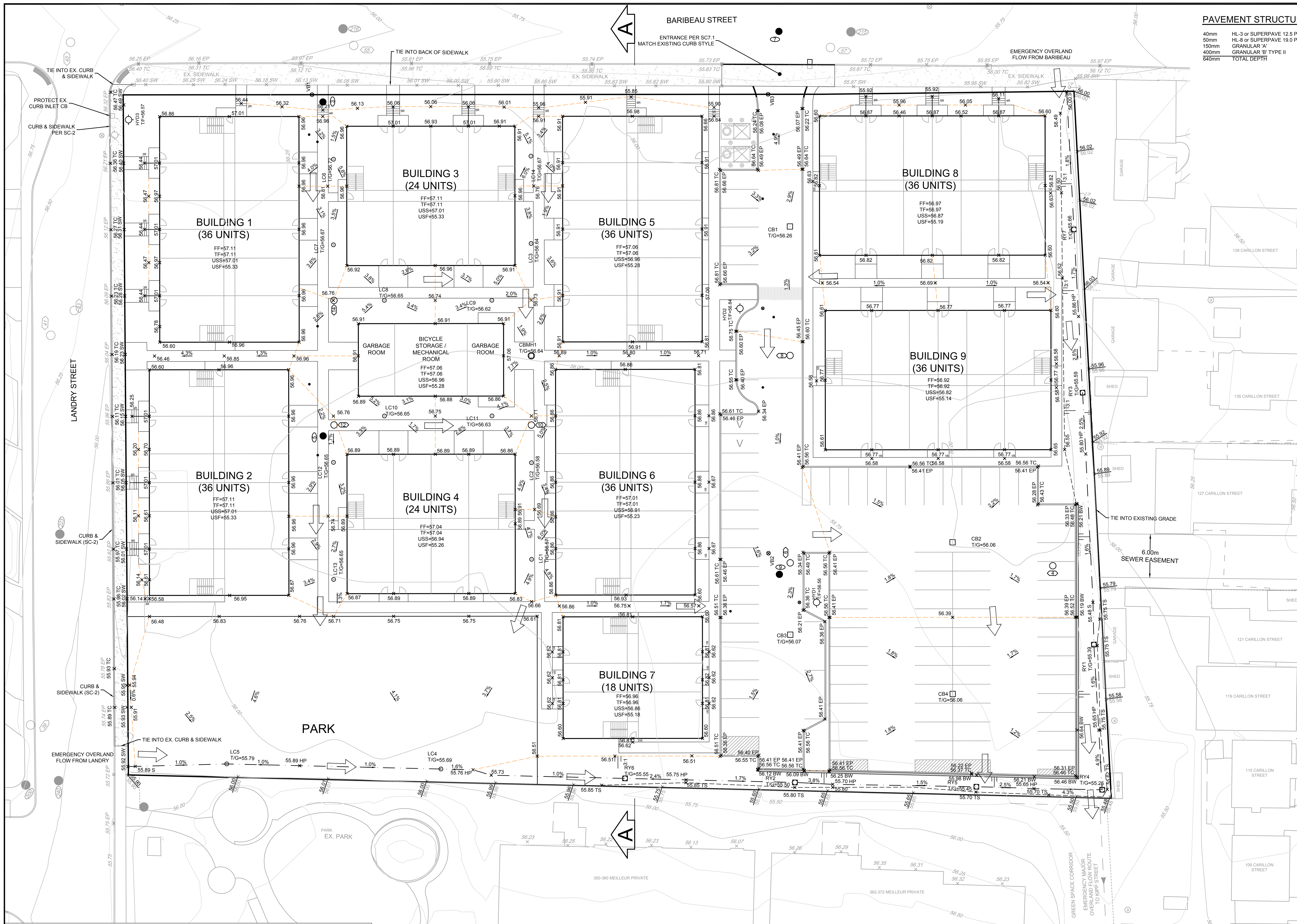
CITY OF OTTAWA
DOMINION VILLAGE - 200 BARIBEAU STREET

SERVICING PLAN

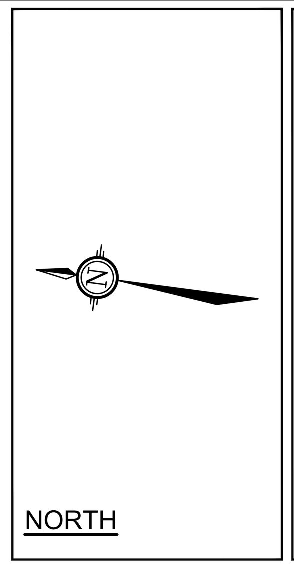
PROJECT No. 119068
REV #15
DRAWING No. 119068-GP

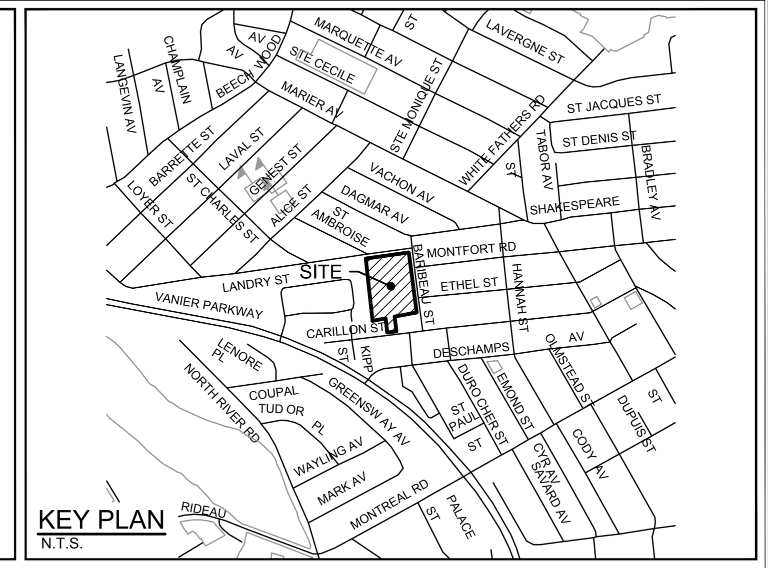
M:\2019\119068\CAD\Design\119068-GP.dwg, GP (2), Jun 27, 2024 - 4:17pm, ddufton
PLANB1.DWG - 1000mmx707mm



PAVEMENT STRUCTURE:

40mm	HL-3 or SUPERPAVE 12.5 PG 58-34
50mm	HL-8 or SUPERPAVE 19.0 PG 58-34
150mm	GRANULAR 'A'
400mm	GRANULAR 'B' TYPE II
640mm	TOTAL DEPTH





LEGEND

56.60	PROPOSED ELEVATION	HYD T/F=56.84	HYDRANT WITH TOP OF FLANGE ELEVATION
2.5%	PROPOSED GRADE AND DIRECTION OF FLOW	101	SANITARY MANHOLE
105.59 HP	PROPOSED ELEVATION AT HIGH POINT	100	STORM MANHOLE
105.53 / 105.53	PROPOSED ELEVATION / EXISTING ELEVATION	CB6 T/G=56.48	CATCHBASIN WITH TOP OF GRATE ELEVATION CB WITH ICD
55.98	EXISTING SPOT ELEVATION	LCB1 T/G=56.48	LANDSCAPE TYPE CATCHBASIN WITH TOP OF GRATE ELEVATION
56.13 BS	EXISTING ELEVATION AT BACK OF SIDEWALK	VB	VALVE & VALVE BOX LOCATION
55.00	EXISTING CONTOUR ELEVATION	FF=	FINISHED FLOOR
UP	EXISTING UTILITY POLE AND GUY WIRE	TF=	TOP OF FOUNDATION
	MAJOR OVERLAND FLOW DIRECTION	USS=	UNDERSIDE OF SLAB
3:1	TERRACE GRADE (3:1 MAX)	USF=	UNDERSIDE OF FOOTING
	SWALE AND TERRACE	EP	EDGE OF PAVEMENT
	MAX STATIC PONDING LIMITS	TC	TOP OF CURB
	100-YR PONDING LIMITS	SW	SIDEWALK
	100-YR +20% PONDING LIMITS		GARDEN WALL
	DRAINAGE BOUNDARY		EXISTING PRIVACY FENCE

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

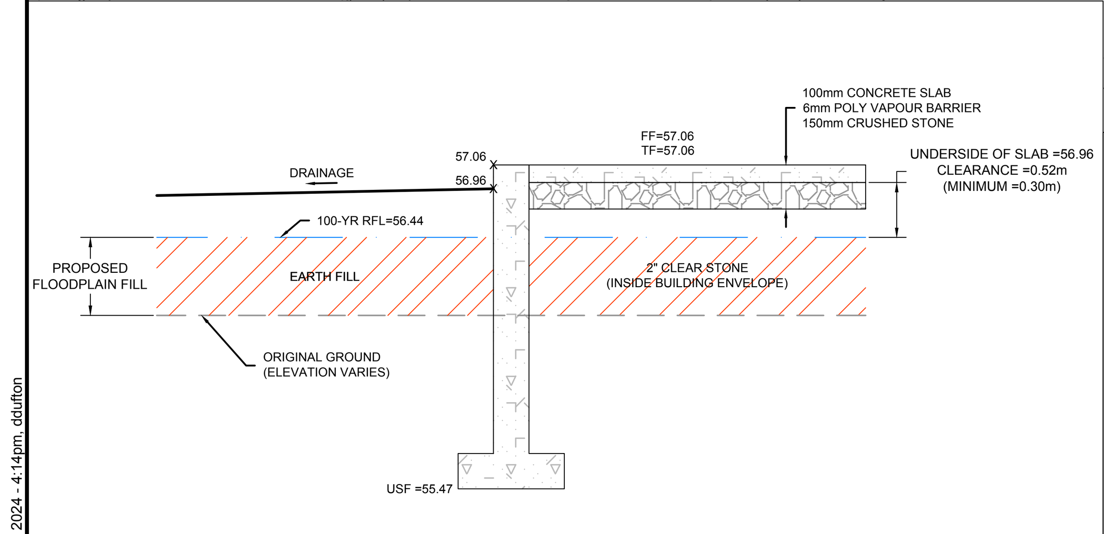
GENERAL NOTES:

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, AND SOD.
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:

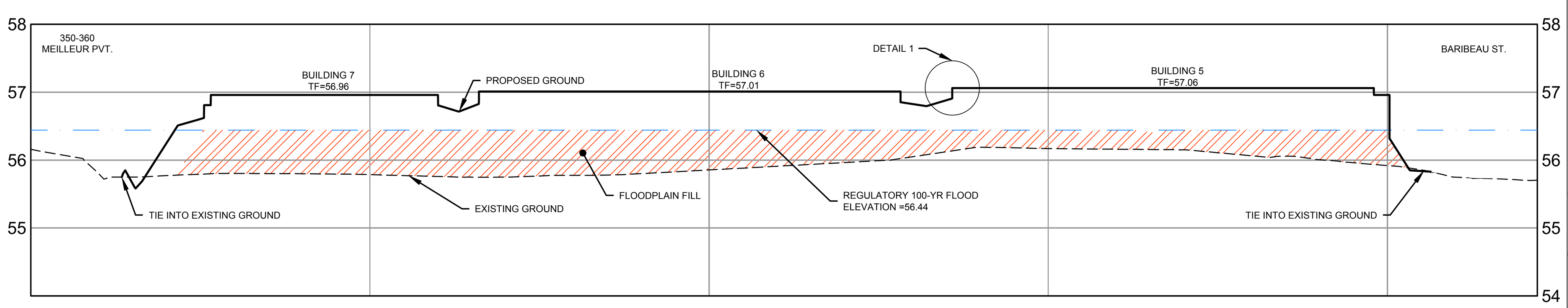
1. ALL TOPSOIL, ORGANIC OR DELETERIOUS MATERIAL MUST BE ENTIRELY REMOVED FROM BENEATH THE PROPOSED HARD SURFACE (ie. PAVEMENT, CURB, SIDEWALK, ETC.) AREAS AS DIRECTED BY THE SITE ENGINEER OR GEOTECHNICAL ENGINEER.
2. EXPOSED SUBGRADES IN PROPOSED PAVED AREAS SHOULD BE HEAVILY PROOF ROLLED WITH A LARGE (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 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	CB01	56.47	0.21	56.48	0.22	56.45	0.19
P2	CB02	56.40	0.34	56.43	0.37	56.39	0.33
P3	CB03	56.42	0.35	56.44	0.37	56.41	0.34
P4	CB04	56.36	0.30	56.40	0.34	56.37	0.31
P5	CBMH01	56.73	0.09	56.82	0.18	56.71	0.07
P6	LC01	56.78	0.21	56.83	0.26	56.66	0.09
P7	LC02	56.78	0.20	56.83	0.25	56.69	0.11
P8	LC03	56.85	0.21	56.89	0.25	56.73	0.09
P9	LC04	55.88	0.19	55.97	0.28	55.76	0.07
P10	LC05	55.92	0.13	56.01	0.22	55.89	0.10
P11	LC06	56.90	0.18	56.93	0.21	56.81	0.09
P12	LC07	56.87	0.20	56.91	0.24	56.76	0.09
P13	LC08	56.86	0.21	56.90	0.25	56.74	0.09
P14	LC09	56.85	0.23	56.89	0.27	56.73	0.11
P15	LC10	56.84	0.19	56.87	0.22	56.75	0.10
P16	LC11	56.79	0.16	56.84	0.21	56.71	0.08
P17	LC12	56.85	0.20	56.88	0.23	56.74	0.09
P18	LC13	56.84	0.19	56.86	0.21	56.71	0.06
P19	LC14	56.86	0.19	56.90	0.23	56.76	0.09
P20	RY01	55.56	0.17	55.67	0.28	55.65	0.26
P21	RY02	55.77	0.27	55.87	0.37	55.70	0.20
P22	RY03	55.82	0.23	55.85	0.26	55.75	0.16
P23	RY04	55.58	0.33	55.70	0.45	55.50	0.25
P24	RY05	55.68	0.23	55.86	0.41	55.65	0.20
P25	RY06	55.84	0.29	55.93	0.38	55.75	0.20
P26	RY07	55.87	0.21	55.91	0.25	55.85	0.19



DETAIL 1 - BUILDING 5: FLOOD PROOFING
N.T.S.

SITE CROSS SECTION



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

NOTE:
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parkriver PROPERTIES

No.	REVISION	DATE	BY
17.	CONCEPT UPDATE	JUN 27/24	MAB
16.	MEILLEUR PVT REAR LOT GRADES ADDED	NOV 30/22	MAB
15.	MINOR UPDATES TO BLOCKS 1-4, 9	NOV 16/22	MAB
14.	USF LOWERED BLOCK 1, 2, 3, 4 & 9	JUL 20/22	MAB
13.	SITE PLAN UPDATE	JUL 15/22	MAB
12.	ISSUED FOR ECA	MAR 24/22	MAB
11.	ISSUED FOR BUILDING PERMIT	MAR 2/22	MAB
10.	CITY SUBMISSION - PARK UPDATE	FEB 15/22	MAB
9.	CITY SUBMISSION	OCT 21/21	MAB
8.	FILL ADJUSTMENT PER RVCA	SEPT 27/21	MAB
7.	CITY SUBMISSION	AUG 3/21	MAB
6.	CITY SUBMISSION	JUN 8/21	MAB
5.	CITY SUBMISSION	FEB 5/21	MAB
4.	STORM OUTLET VIA 127 CARILLION	OCT 23/20	MAB
3.	SITE PLAN APPLICATION	AUG 24/20	MAB
2.	RVCA APPROVAL IN PRINCIPAL APPLICATION	MAY 28/20	MAB
1.	ISSUED FOR RVCA REVIEW	MAR 26/20	MAB

SCALE 1:250

DESIGN DTD
CHECKED LRW
DRAWN DTD
CHECKED LRW
APPROVED MAB

FOR REVIEW ONLY

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CITY OF OTTAWA
DOMINION VILLAGE - 200 BARIBEAU STREET

GRADING PLAN

PROJECT No. 119068
REV REV # 17
DRAWING No. 119068-GR

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)
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P9	LC04	55.88	0.19	55.97	0.28	55.76	0.07
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P11	LC06	56.90	0.18	56.93	0.21	56.81	0.09
P12	LC07	56.87	0.20	56.91	0.24	56.76	0.09
P13	LC08	56.86	0.21	56.90	0.25	56.74	0.09
P14	LC09	56.85	0.23	56.89	0.27	56.73	0.11
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P16	LC11	56.79	0.16	56.84	0.21	56.71	0.08
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P18	LC13	56.84	0.19	56.86	0.21	56.71	0.06
P19	LC14	56.86	0.19	56.90	0.23	56.76	0.09
P20	RY01	55.56	0.17	55.67	0.28	55.65	0.26
P21	RY02	55.77	0.27	55.87	0.37	55.70	0.20
P22	RY03	55.82	0.23	55.85	0.26	55.75	0.16
P23	RY04	55.58	0.33	55.70	0.45	55.50	0.25
P24	RY05	55.68	0.23	55.86	0.41	55.65	0.20
P25	RY06	55.84	0.29	55.93	0.38	55.75	0.20
P26	RY07	55.87	0.21	55.91	0.25	55.85	0.19

CATCHBASIN TABLE

CB ID	T/G ELEVATION	INVERT	I.C.D.
CB1	56.26	54.56	-
CB2	56.06	54.36	-
CB3	56.07	54.37	-
CB4	56.06	54.36	-
LC1	56.57	55.57	-
LC2	56.58	55.44	-
LC3	56.64	55.55	-
LC4	55.69	54.29	-
LC5	55.79	53.99	-
LC6	56.72	55.72	-
LC7	56.67	55.60	-
LC8	56.65	55.47	-
LC9	56.62	55.62	-
LC10	56.65	55.65	-
LC11	56.63	55.63	-
LC12	56.65	55.49	-
LC13	56.65	55.65	-
LC14	56.67	55.67	-
RY1	55.39	53.59	127mm
RY2	55.50	54.32	-
RY3	55.59	54.03	108mm
RY4	55.25	53.84	-
RY5	55.45	54.07	-
RY6	55.55	54.55	-
RY7	55.66	54.26	-

STORM MANHOLE TABLE

MANHOLE ID	SIZE(mm)	T/G ELEV (m)	INVERT (m)	PIPE DIAMETER (mm)	I.C.D.
4	[illegible]	56.33	N=52.94 S=52.52	N=450 S=450	146mm
6	[illegible]	56.20	W=54.57 S=53.30 E=53.44	W=200 S=450 E=450	-
8	[illegible]	56.43	N=54.18 W=53.58 E=54.68	N=375 W=450 E=200	-
10	[illegible]	56.68	N=54.48 E=54.48 W=55.39	N=300 E=300 W=250	-
12	[illegible]	56.75	E=54.62 S=54.62 W=55.44	E=300 S=300 W=250	-
14	[illegible]	56.76	W=54.71 E=55.52 S=55.40	W=300 E=250 S=250	-
CBMH1	[illegible]	56.64	W=54.43 S=54.36 E=55.40	W=300 S=375 E=250	-

NOTE:
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No.	REVISION	DATE	BY
10.	CONCEPT UPDATE	JUN 27/24	MAB
9.	SITE PLAN UPDATE	JUL 15/22	MAB
8.	ISSUED FOR ECA	MAR 24/22	MAB
7.	CITY SUBMISSION - PARK UPDATE	FEB 15/22	MAB
6.	CITY SUBMISSION	JUN 8/21	MAB
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4.	STORM OUTLET VIA 127 CARILLION	OCT 23/20	MAB
3.	SITE PLAN APPLICATION	AUG 24/20	MAB
2.	RVCA APPROVAL IN PRINCIPAL APPLICATION	MAY 28/20	MAB
1.	ISSUED FOR RVCA REVIEW	MAR 26/20	MAB

SCALE 1:250

DESIGN LRW
CHECKED MAB
DRAWN BRF
CHECKED LRW
APPROVED MAB

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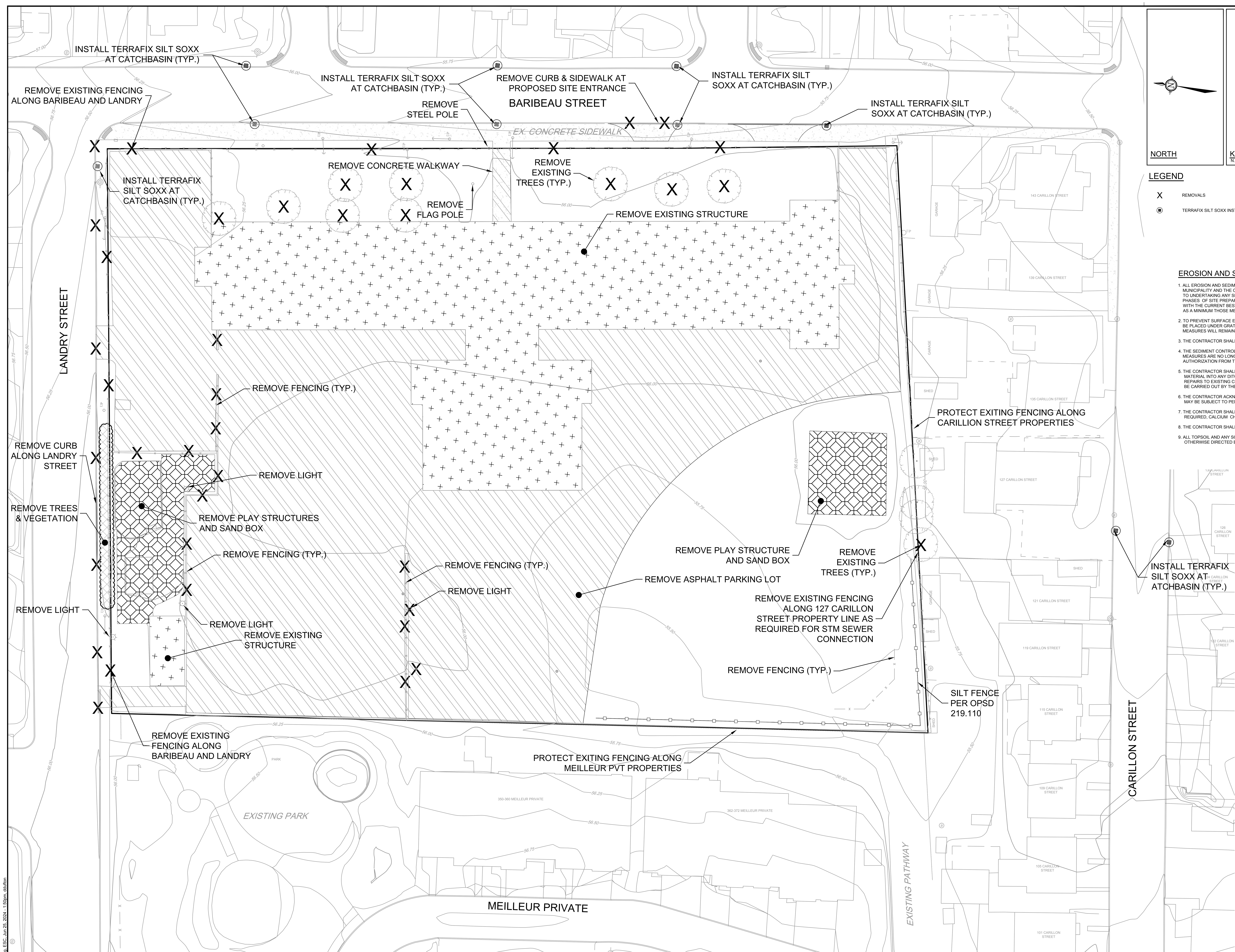
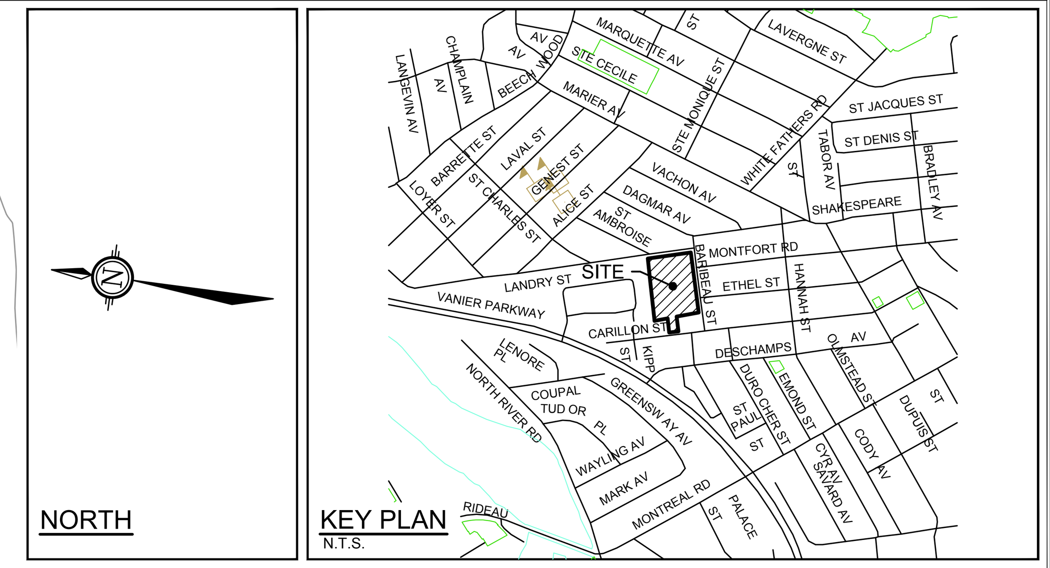
CITY OF OTTAWA
200 BARIBEAU STREET

DRAWING NAME
STORM DRAINAGE AREA PLAN

PROJECT No. 119068
REV REV # 10
DRAWING No. 119068-STM





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
10.	CONCEPT UPDATE	JUN 27/24	MAB
9.	SITE PLAN UPDATE	JUL 15/22	MAB
8.	ISSUED FOR ECA	MAR 24/22	MAB
7.	CITY SUBMISSION - PARK UPDATE	FEB 15/21	MAB
6.	CITY SUBMISSION	OCT 21/21	MAB
5.	CITY SUBMISSION	AUG 3/21	MAB
4.	CITY SUBMISSION	JUN 8/21	MAB
3.	CITY SUBMISSION	FEB 5/21	MAB
2.	STORM OUTLET VIA 127 CARILLION	OCT 23/20	MAB
1.	SITE PLAN APPLICATION	AUG 24/20	MAB

SCALE 1:250

DESIGN DTD
CHECKED LRW
DRAWN DTD
CHECKED LRW
APPROVED MAB

FOR REVIEW ONLY

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

LICENSED PROFESSIONAL ENGINEER M.A. BISSETT 2024.06.27 PROVINCE OF ONTARIO

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Ottawa, Ontario, Canada K2M 1P6
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Facsimile (613) 254-5867
Website www.novatech-eng.com

CITY OF OTTAWA
DOMINION VILLAGE - 200 BARIBEAU STREET

REMOVALS & EROSION AND SEDIMENT CONTROL PLAN

PROJECT No. 119068
REV #10
DRAWING No. 119068-ESC

M:\2019\119068\CAD\Design\119068-ESC.dwg, ESC, Jun 25, 2024 - 1:50pm

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	

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.

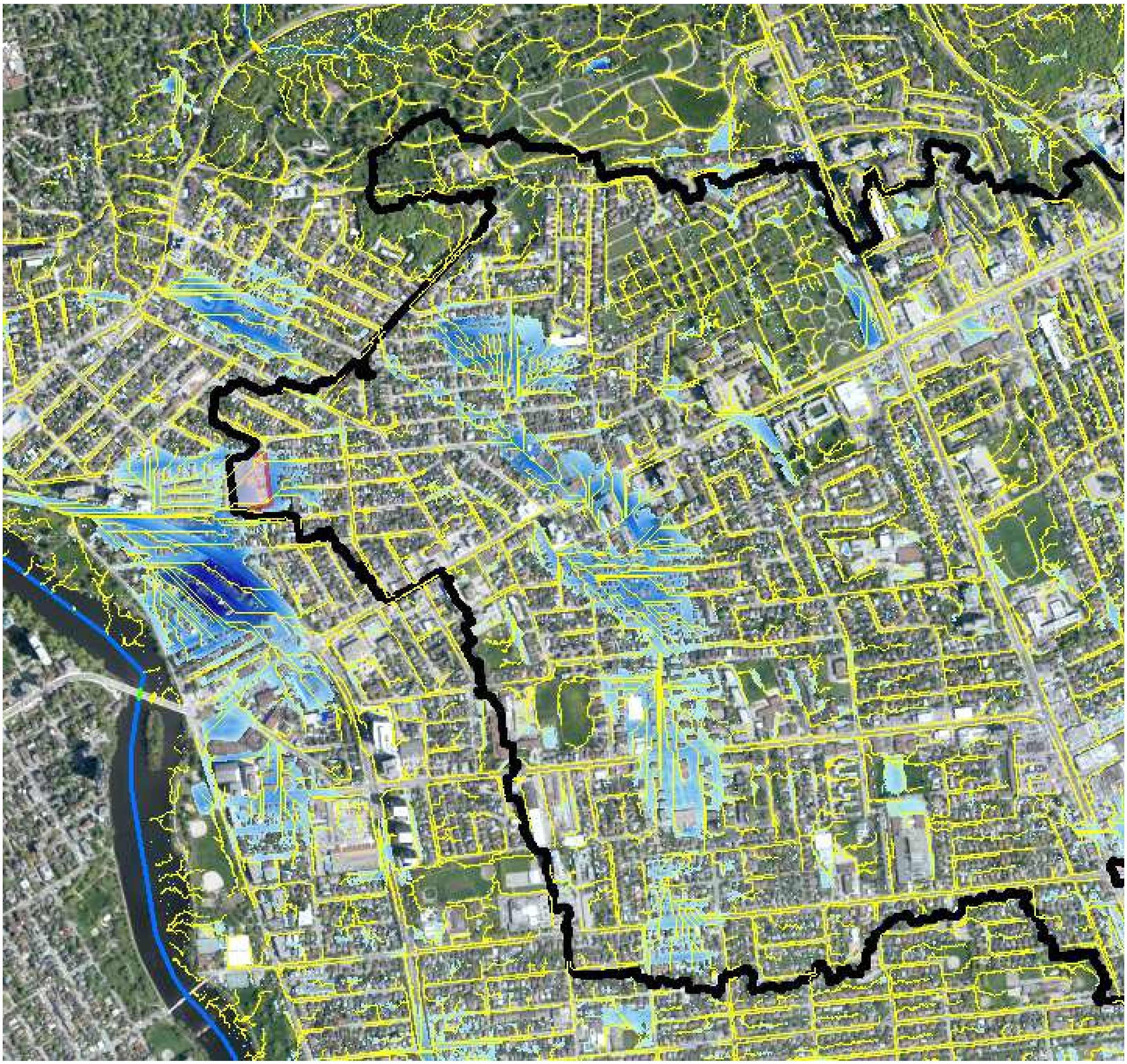
Eric

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

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

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

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

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