NOVATECH
Engineers, Planners & Landscape Architects

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

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

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

37 Years

Provence Orleans
2128 Trim Road (Block 126)
Ottawa, Ontario

Servicing Design Brief

Engineering excellence. Planning precision. Inspired landscapes.

PROVENCE ORLEANS
2128 TRIM ROAD (BLOCK 126)
OTTAWA, ONTARIO

SERVICING DESIGN BRIEF
IN SUPPORT OF AN APPLICATION FOR
SITE PLAN CONTROL

Prepared For:

Provence Orleans Realty Investments Inc. (c/o Regional Group of Companies)

Prepared By:

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

June 29, 2020
Revised: September 24, 2020
Revised: March 24, 2021
Revised: April 6, 2021
Revised: May 3, 2021
Revised: May 14, 2021

Novatech File: 120057
Ref: R-2020-088

NOVATECH
Engineers, Planners & Landscape Architects

May 14, 2021

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

Attention: Will Curry, Project Manager – Infrastructure Approvals

Reference: Provence Orleans
2128 Trim Road (Block 126)
Servicing Design Brief
Our File No.: 120057

Enclosed for your review and approval is a digital copy of the Servicing Design Brief for the proposed Block 126 development in the Provence Orleans Subdivision at 2128 Trim Road in support of the application for site plan control.

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

Sincerely,

NOVATECH

Lucas Wilson, P.Eng.
Project Coordinator

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

Table of Contents

List of Tables

List of Figures

Appendices

1.0 INTRODUCTION

1.1 Background

Novatech has been retained to prepare a Servicing Design Brief for the Provence Orleans Subdivision – Block 126 Development, located at 2128 Trim Road, in the City of Ottawa. The site will be developed by Provence Orleans Realty Investments Inc. c/o Regional Group.

The development is located in the east end of Ottawa, south of Innes Road between Provence Avenue and Trim Road. **Figure 1** shows the location of the Provence Orleans Subdivision Lands and the Block 126 development.

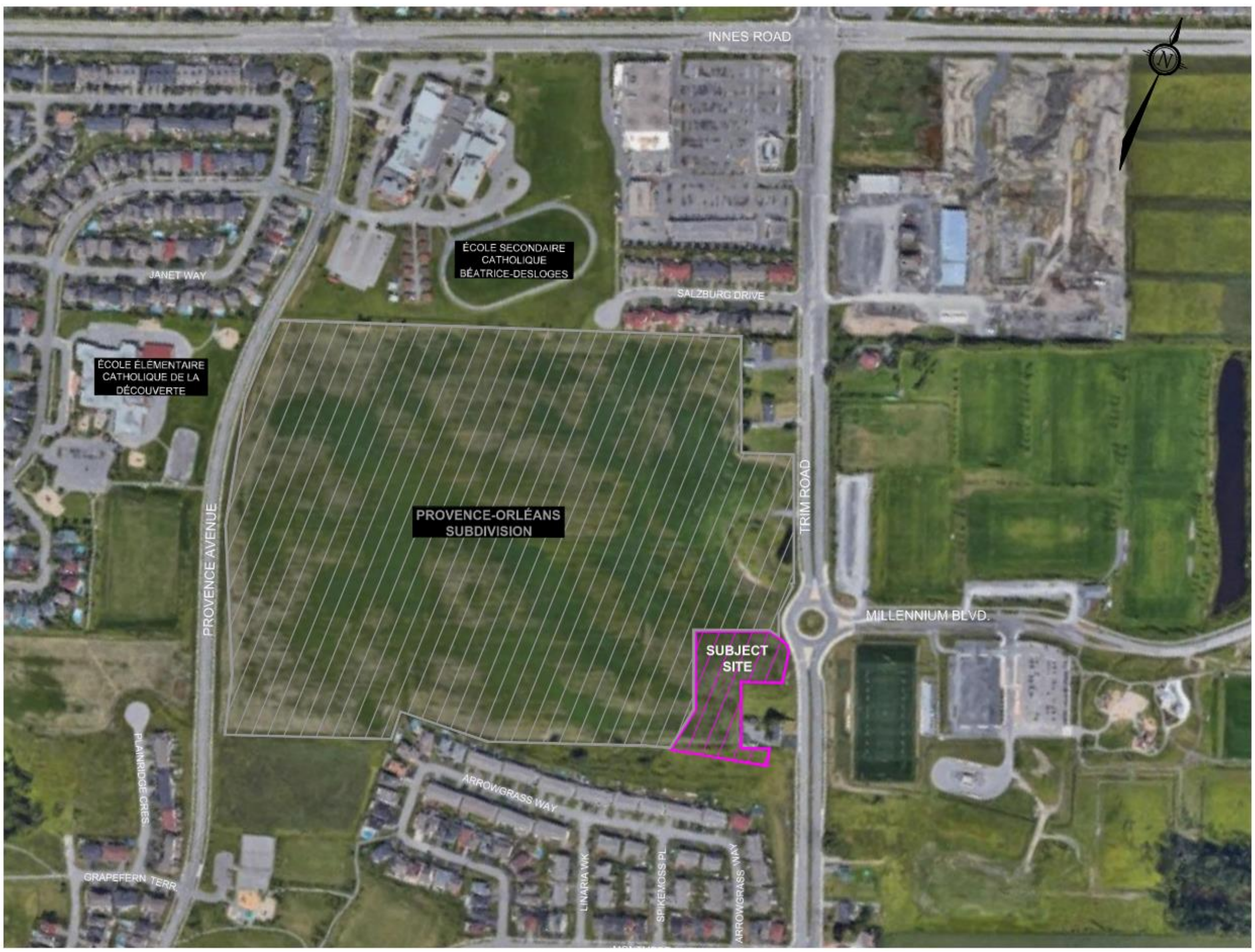


Figure 1: Key Plan

The proposed site is approximately 0.98ha and will be bordered by the future Phase 2 of Provence Orleans Subdivision, Ventoux Avenue to the north, Trim Road to the east and existing residential as well as a potential future Transitway to the south.

This Servicing Design Brief provides information on the considerations and approach by which Novatech has analyzed the existing site information for the Block 126 development, and details how the development lands will be serviced while meeting the City requirements and all other relevant regulations. This brief builds upon the Phase 2 and 3 Provence Orleans Subdivision

Site Servicing and Stormwater Management Design Brief prepared by Novatech **[1]**, the Master Servicing Study, Gloucester and Cumberland East Urban Community Expansion Area **[2]** prepared by Stantec, and the Site Servicing and Stormwater Management Design Brief, Provence Orleans Subdivision prepared by Novatech in support of Draft Approval **[3]**.

This report should be read in conjunction with the following:

- Geotechnical Investigation, Proposed Provence City Towns Block, Trim Road - Ottawa, Ontario prepared by Paterson Group, dated March 30, 2021 (Project:PG4278-3). **[4]**

1.2 Land Use

The site will consist of four back-to-back townhome buildings with 10 units each (40 units total). The proposed Site Plan is shown below in **Figure 2**.

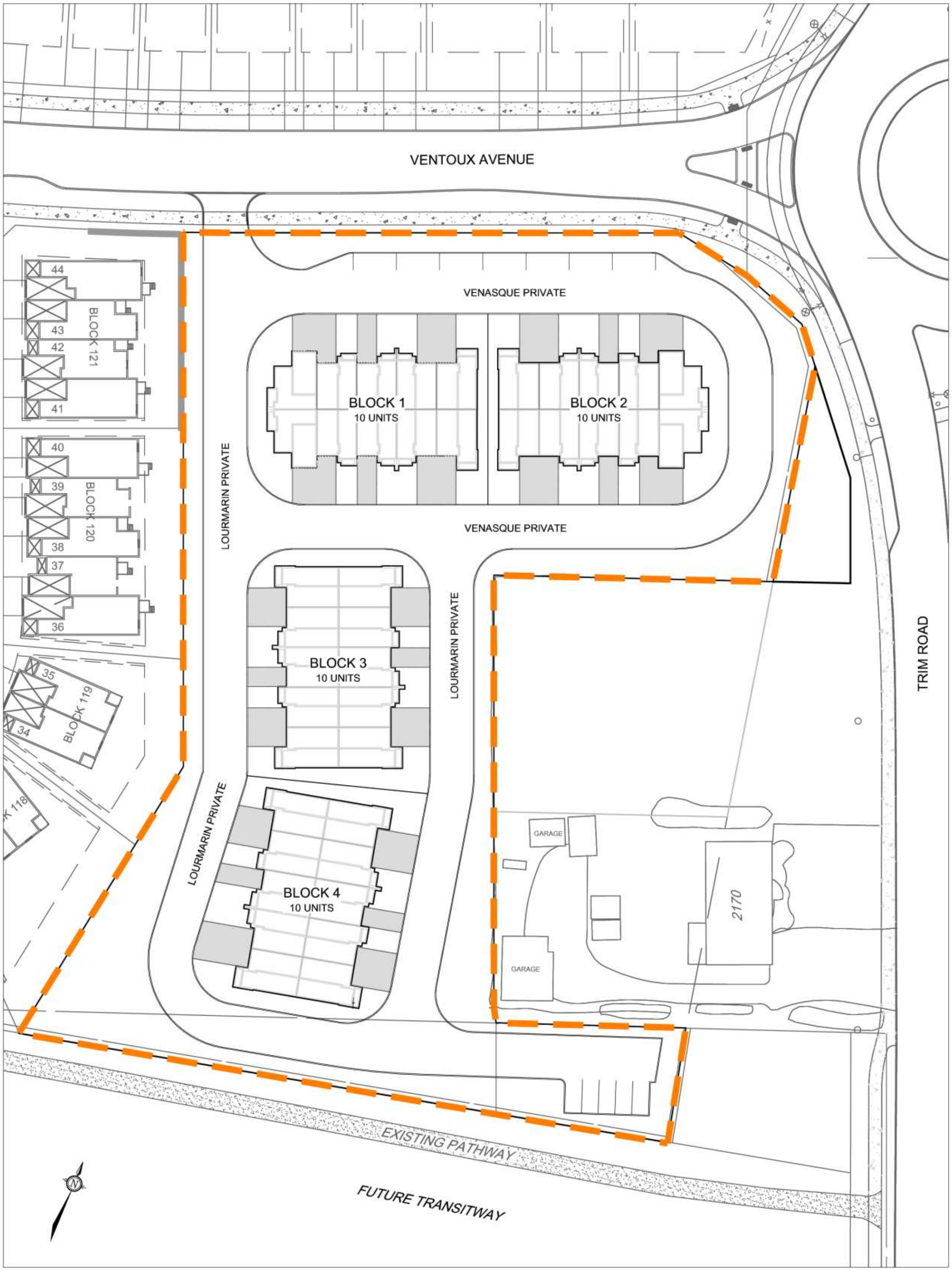


Figure 2: Site Plan

2.0 ROADWAYS

2.1 Existing Conditions

Currently the site can only be accessed from Trim Road, classified as an arterial roadway in the 2013 City of Ottawa Transportation Master Plan (TMP) **[5]**. Once constructed, Ventoux avenue (collector) will provide access to the site.

2.2 Proposed Conditions

The development will be accessed from a single entrance off Ventoux Avenue. The site contains a series of 6.7m private roads.

2.3 Roadway Design

Paterson Group has prepared a Geotechnical Investigation report for the development (March 30th, 2021) 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	450
Total	**690**

3.0 GRADING

3.1 Existing Conditions

The existing site generally slopes to the northeast at approximately 0.5%. The maximum grade of approximately 89.05 metres in the southwest corner and a minimum elevation of approximately 88.32 metres in the northeast corner give a total elevation differential of approximately 0.73 metres across the site.

Geotechnical investigations were carried out by Paterson Group **[4]**, with no bedrock encountered in the borehole at a depth of 30.5m. Groundwater was recorded at 84.79m, 3.65m below the ground surface, on December 1st, 2017.

3.2 Proposed Conditions

The design grades will tie into existing elevations along Ventoux Avenue, Trim Road, Future Transitway lands and the adjacent residential lands in Phase 2. A grade raise constraint of 1.1m for Blocks 1 and 2, and 1.6m for Blocks 3 and 4 is required. For detailed grading refer to drawing 120057-GR.

The proposed grading will fall within these ranges:

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

4.0 EROSION AND SEDIMENT CONTROL

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

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

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

- A qualified inspector should conduct daily visits during construction to ensure that the contractor is working in accordance with the design drawings and that mitigation measures are being implemented as specified.

  - A light duty silt fence barrier is to be installed in the locations shown on the Erosion and Sediment Control & Removals Plan (**120057-ESC).**

  - Straw bale barriers or rock flow check dams are to be installed in drainage ditches.

  - Terrafix Siltsoxx are to be placed under all new catchbasins and storm manhole covers.

  - After complete build-out, all sewers are to be inspected and cleaned and all sediment and construction fencing is to 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 200mm diameter sanitary sewer and maintenance hole is provided off Ventoux Avenue, at the site entrance, which outlets to a 250mm diameter sanitary sewer running along Ventoux.

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 **[6]**.

Sanitary flow from the site is proposed to connect into the 250mm diameter sanitary sewer in Ventoux Avenue. The sanitary sewer layout is shown on 120057-GP (**Appendix C**), and the design sheet is attached in **Appendix A**. The site (approx. 0.96ha) will outlet at MH 117 (site entrance) with a peak design flow of 1.6 L/s. The wastewater flow is routed through the sanitary sewer system in Ventoux Avenue to the 525mm diameter trunk sanitary sewer in Trim Road.

Table 5-1: Sanitary Sewer Design Parameters

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

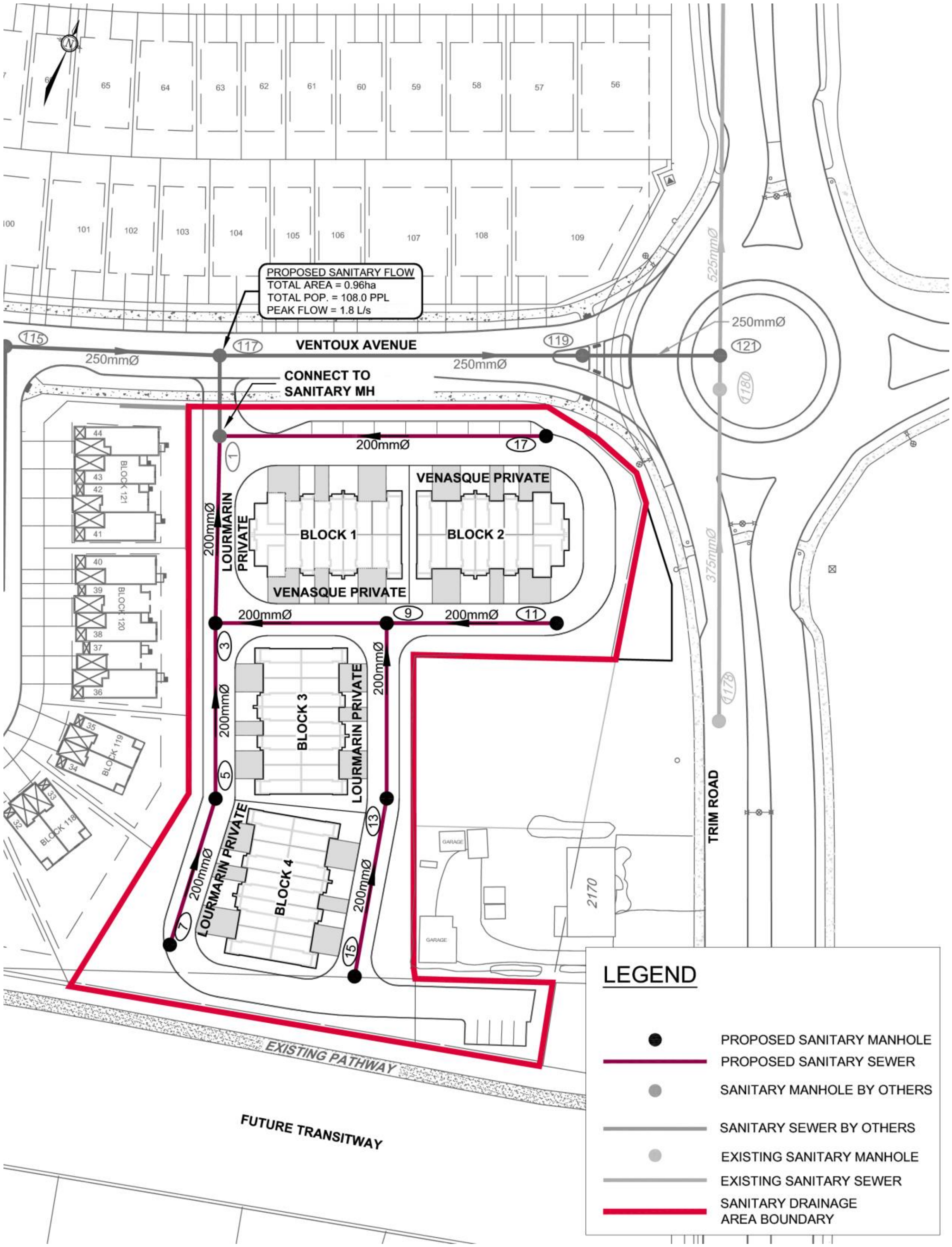


Figure 3: Sanitary Sewer Network

5.3 Offsite Requirements

For the design of Phase 2 of the Provence Orleans Subdivision, a peak design flow of 24.89 L/s was calculated from MH 117 to MH 119 in Ventoux Avenue, which is higher than the calculated peak design flow of 24.60 L/s incorporating the proposed site plan. Therefore, there will be sufficient capacity offsite to service the proposed development.

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), the Master Servicing Study prepared by Stantec which references the applicable portions of *Update to Master Drainage Plan East Urban Community Expansion Area* (Cumming Cockburn Ltd., September 11, 2000) and the Phase 2 & 3: Provence Orleans Subdivision Servicing and Stormwater Design Brief prepared by Novatech.

- Provide a dual drainage system (i.e. minor and major system flows);
- Control the runoff to MH116 in Ventoux Avenue to the allowable release rates Specified in **Section 6.1.1** using on-site storage;
- Ensure that no surface ponding will occur on the paved surfaces (i.e. private roadways or parking areas) during the 2-year storm event;
- Ensure that ponding is confined within the parking areas at a maximum depth of 0.35 m for both static ponding and dynamic flow;
- Minimum on-site detention storage provided by the major system is 150 m^3/ha;
- 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 (1.29 ha for the site and external areas) was established based on the restricted minor system flow of 70 L/s/ha (90.3 L/s) for all storms up-to and including the 100-year storm event. The site has been designed to ensure the release rate from the inlets capturing the external area of 2170 Trim Road (0.41 ha) is at least 70 L/s/ha (28.7 L/s).

6.2 Existing Conditions

The Provence Orleans subdivision lands are located within the Rideau Valley Conservation Authority jurisdiction. An existing 525mm diameter storm sewer and maintenance hole is provided at the site entrance on Ventoux Avenue. The 525mm diameter sewer will outlet to a 675mm diameter storm sewer within Ventoux Avenue.

6.3 Proposed Conditions

Runoff from the site will be routed to the storm sewer system in Ventoux Avenue through the existing 525mm diameter storm sewer and maintenance hole located at the private entrance along Ventoux Avenue. The storm system within the Provence Orleans Subdivision is directed to the existing Cardinal Creek stormwater management facility which provides water quality control. As such, on-site stormwater quality controls are not required. **Figure 5** outlines the proposed storm sewer system layout, and how it will connect to the existing network along Ventoux Avenue.

The existing 2170 Trim Road Lands will be captured by a series of RYCBs with controlled flows directed to the storm sewer system within the Block 126 lands.

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 **[6]** 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 sized 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 120057-STM) is provided in **Appendix C**.

Foundation drains are not provided for the slab-on-grade structures, the Geotechnical Report dated March 30th, 2021 does not include recommendations in regards to the installation of perimeter foundation drains.

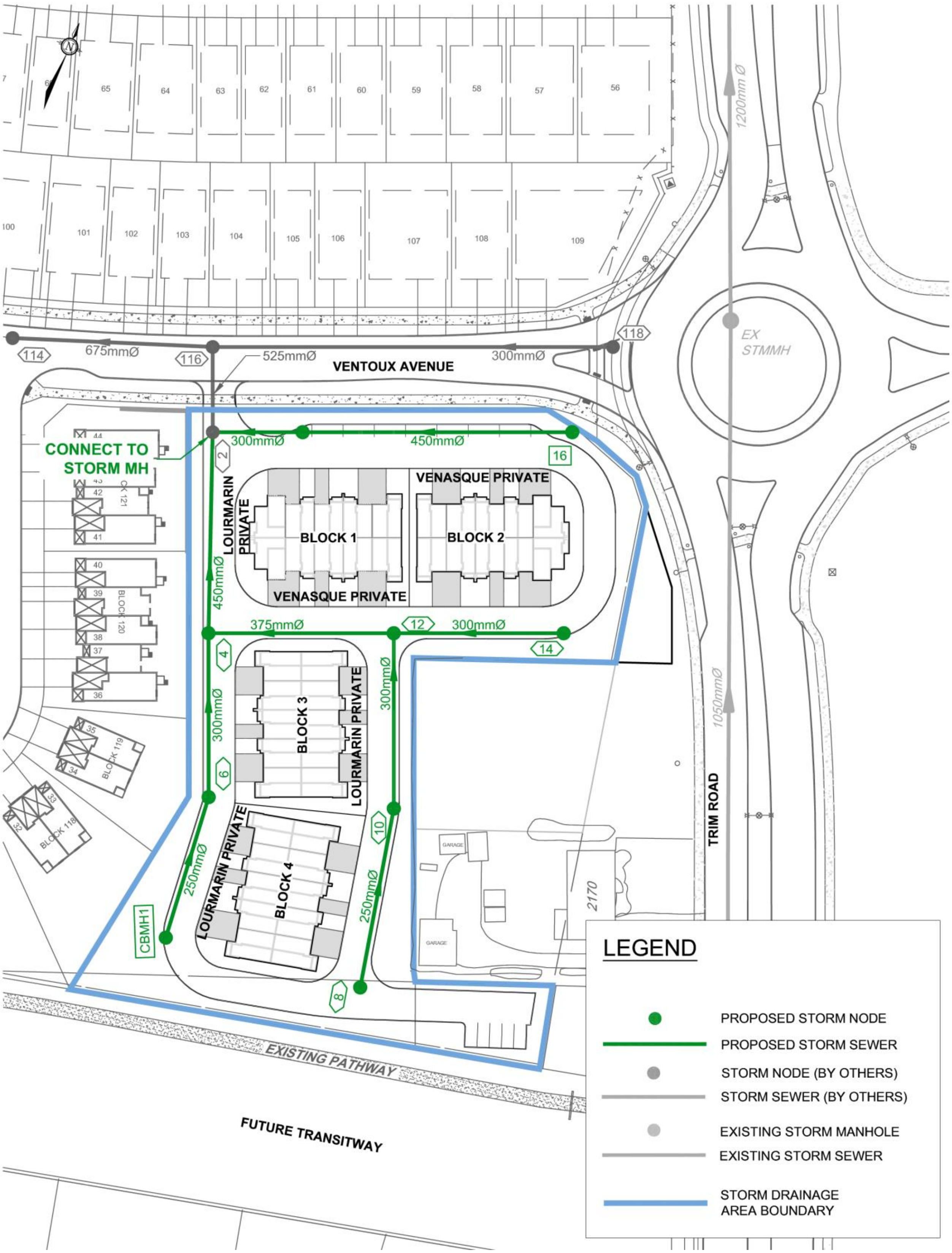


Figure 4: Storm Sewer Network

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 Ventoux Avenue. The roadway and parking areas have been graded to ensure that the 100-year peak overland flows are confined within the parking area 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 site has been graded to provide an emergency overland flow route that spills along the roadway and outlets to Ventoux Avenue at the entrance to the site. An additional emergency overland flow route has been provided for the swale system capturing the existing 2170 Trim Road lands that spills along the swale and outlets to the existing DICB located within the Trim Road ROW.

6.4 Hydrologic & Hydraulic Modeling

The *City of Ottawa Sewer Design Guidelines* (October 2012) require hydrologic modeling 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 **[6]**.

4 Hour Chicago Storms:
25mm 4-hr Chicago storm
2-year 4hr Chicago storm
5-year 4hr Chicago storm
100-year 4hr Chicago storm

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

The 4-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 4-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 gradeline for the 100-year storm event; and
- Ensure no surface 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 parking areas, including the overland flow across all high points and capture/bypass curves for inlets on continuous grade. 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 **120057-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 (%)
Controlled Areas (Block 126)							
A1	0.08	0.64	63	9	15	53	0.5
A2	0.12	0.71	73	43	20	60	0.5
A3	0.07	0.77	81	29	20	35	0.5
A4	0.04	0.2	0	0	10	40	0.5
A5	0.07	0.71	73	7	30	23	0.5
A6	0.1	0.73	76	44	20	50	0.5
A7	0.15	0.77	81	43	20	75	0.5
A8	0.08	0.73	76	25	20	40	0.5
A9	0.17	0.73	76	37	20	85	0.5
TOTAL	**0.88 ha**	**0.70**	**71%**	**-**	**-**	**-**	**-**

Area ID	Catchment Area (ha)	Runoff Coefficient (C)	Percent Impervious (%)	Zero Imperv. (%)	Flow Length (m)	Equivalent Width (m)	Average Slope (%)
Controlled Areas (External Areas & Portion of Block 126)							
A10	0.16	0.22	3	95	35	46	0.5
A11	0.12	0.26	8	95	50	24	0.5
A12	0.13	0.46	37	35	45	29	0.5
TOTAL	**0.41 ha**	**0.31**	**16%**	**-**	**-**	**-**	**-**
Uncontrolled Areas							
B1	0.01	0.20	0	0	2	50	33.33
B2	0.003	0.20	0	0	2	15	0.5
TOTAL	**0.013 ha**	**0.20**	**0%**	**-**	**-**	**-**	**-**

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 **[8]** 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 **[8]** 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 **[8]**, Section 5.4.5.6. The flow paths used to calculate the equivalent widths are shown on the PCSWMM schematics provided in **Appendix B**.

Impervious Values

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

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

6.5 Results of Hydrologic / Hydraulic Analysis

The model was used to evaluate the performance of the proposed storm drainage system for Block 126

6.5.1 Minor System

Inflows to the storm sewer were modeled based on the characteristics of each inlet. All the catchbasins in the roadways and parking areas 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 70 L/s/ha. Details are outlined as follows in **Table 6.4**. ICDs information is indicated on the General Plan of Services (drawing 120057-GP).

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 6-4: 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)
CB1	Tempest LMF (Vortex 89)	89.00	87.30	1.90	8.9	9.2	9.4
CB5	Tempest MHF (98mm)	89.13	87.43	1.91	25.1	26.0	26.7
CBMH2	Tempest LMF (Vortex 64)	89.08	86.20	3.12	4.6	5.9	6.2
MH10	Tempest LMF (Vortex 64)	89.37	86.38	2.99	4.7	5.7	6.1
MH18	Tempest LMF (Vortex 63)	89.32	86.11	3.13	4.5	5.8	6.0
RYCB1	Tempest MHF (70mm)	88.18	86.78	1.53	0.2	3.2	12.0
RYCB3	Tempest MHF (82mm)	88.55	86.87	1.80	3.4	9.2	18.0

**PCSWMM model results for a 4-hour Chicago storm distribution.*

6.5.2 Major System

The major system network was evaluated using the PCSWMM model to ensure that the overland flow depths and velocities conform to City standards. A summary of ponding depths at each inlet for the 2-year, 5-year, 100-year and 100-year (+20%) events are provided in **Appendix B**. The maximum static and dynamic ponding depths within the roadways are less than 0.35m during all events and the product of depth x velocity will be less than 0.60. In addition, there is no cascading flow over the highpoint during the 100-year storm event.

Table 6-5: Overland Flow Results (100-year Event)

Structure	T/G	Max. Static Ponding (Spill Depth)		100-yr Event (4hr)			
	(m)	Elev. (m)	Depth (m)	Elev. (m)	Depth (m)	Cascading Flow?	Cascade Depth (m)
CB1	89.00	89.31	0.31	89.20	0.20	N	0.00
CB3	89.18	89.48	0.30	89.37	0.19	N	0.00
CB4	89.18	89.43	0.25	89.37	0.19	N	0.00
CB5	89.13	89.38	0.25	89.34	0.21	N	0.00
CB6	89.02	89.32	0.30	89.24	0.22	N	0.00
CB7	88.97	89.26	0.29	89.25	0.28	N	0.00
CBMH1	89.15	89.45	0.30	89.32	0.17	N	0.00
CBMH2	89.08	89.38	0.30	89.32	0.24	N	0.00
RYCB1	88.18	88.78	0.60*	88.31	0.13	N	0.00
RYCB2	88.44	88.88	0.44*	88.68	0.24	N	0.00
RYCB3	88.55	88.73	0.18*	88.67	0.12	N	0.00
RYCB4	89.15	89.45	0.30	89.32	0.17	N	0.00

*RYCB located along ditch adjacent 2170 Trim Road

An expanded table of the ponding depths at low points in the roadway (including the stress-test event) is provided in **Appendix B** and confirms that no ponding occurs during the 2-year event. 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

The results of the analysis were used to determine if there would be any surcharging from the storm sewer system during the 100-year storm event. **Appendix B** provides a summary of the 100-year HGL elevation at each storm manhole within the proposed development, as well as a summary of the HGL elevations for a 20% increase (rainfall intensity and total precipitation) in the 100-year design event. The results of the HGL analysis and the stress testing indicates that the storm sewer surcharges at MH6, MH8, MH10, MH16, MH18, CBMH1 and CBMH2 but with no foundation drains connected to the storm sewer there are no clearance issues with respect to the designed USF elevations. The 100-year HGL elevations at each storm manhole are provided in **Table 6-6**.

Table 6-6: 100-year HGL Elevations

Manhole ID	MH Invert Elevation (m)	T/G Elevation (m)	HGL Elevation - 100yr4hr (m)
HGL - Block 126			
MH2	85.74	89.25	86.02
MH4	85.94	89.37	86.16
MH6	86.27	89.26	86.32
MH8	86.82	89.46	89.37
MH10	86.38	89.37	89.37
MH12	86.15	89.32	86.40
MH14	86.41	89.30	86.50
MH16	86.58	89.59	89.24
MH18	86.11	89.31	89.24

An expanded table showing the results of the stress test (100-year +20% event) and the HGL elevations is provided in **Appendix B**.

6.5.4 Peak Flows

The overall release rates from the ICDs were added to determine the overall release rate from the site. The results of this analysis indicate that the allowable release rates 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)	Major System Release Rate to Ventoux Ave. (L/s)
2-year	90.3	46.6	0
5-year		62.1	0.4
100-year		**84.0**	1.3
100-year (+20%)	-	85.4	23.9

**PCSWMM Model results for a 4-hr Chicago storm distribution; normal outfall condition.*

A small portion of the site, area B2 adjacent Ventoux Avenue, flows uncontrolled to the existing storm system. Area B2 is comprised completely of grass and is approximately 0.003 ha with a peak flow of 1.3 L/s during the 100-year storm event. With the inclusion of this uncontrolled area, the total release rate to the Ventoux Avenue storm sewer system is 85.3 L/s, meeting the allowable release rate. There is also a small portion of grassed land, area B1, that flows uncontrolled to the future transitway block with a peak flow of 4.3 L/s during the 100-year storm event.

The external areas of 2170 Trim Road and the small portion of Block 126 (0.41 ha) being directed to RYCB1 and RYCB3 have a combined release rate of 30 L/s (73 L/s/ha). All external areas are being controlled to 73 L/s/ha while ensuring the development as a whole is being controlled to the allowable release rate.

7.0 WATER

7.1 Existing Conditions

The proposed development is located inside the 2E Pressure Zone. As part of Phase 2 of the Provence Orleans Subdivision, a 300mm diameter watermain will be located within Ventoux Avenue connecting to an existing 400mm diameter trunk watermain in Trim Road. A 200mm diameter watermain cap will be provided at the entrance to the site off Ventoux Avenue.

7.2 Proposed Conditions

The site will be connected to the existing 300mm diameter waterman in Ventoux Avenue through the 200mm diameter cap provided at the site entrance.

A series of 200mm diameter watermains are proposed and will provide sufficient 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 (December 2019) provided as part of the detailed design for the Provence Orleans Subdivision and has been included in **Appendix A**:

Boundary Condition 1 – Provence Avenue
Max Day + FF of 167 L/s = 126.2m
Max Day + FF of 300 L/s = 122.9m
Peak Hour = 125.8m
Maximum HGL = 130.3m

Boundary Condition 2 – Trim Road
Max Day + FF of 167 L/s = 126.4m
Max Day + FF of 300 L/s = 123.3m
Peak Hour = 125.8m
Maximum HGL = 130.3m

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

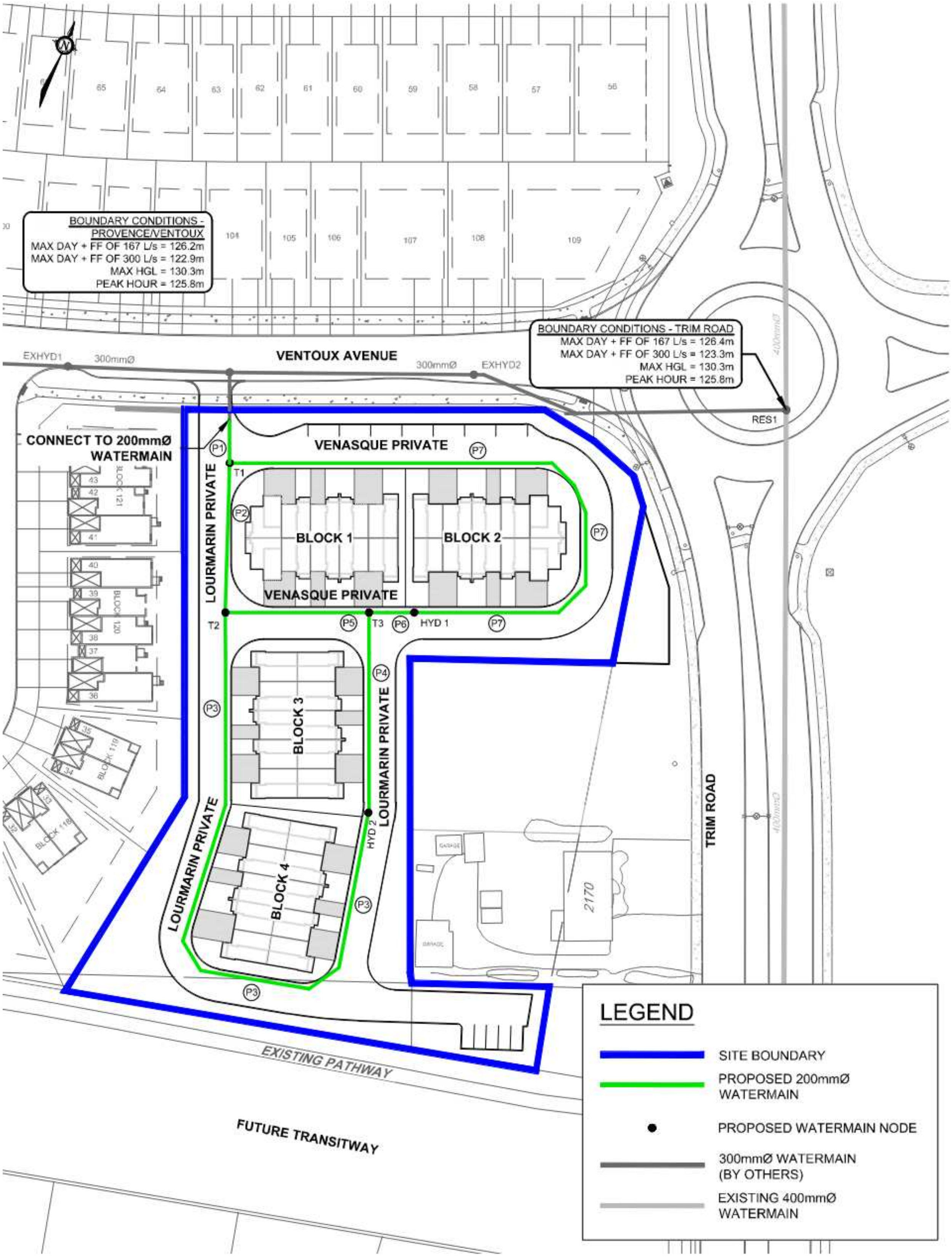


Figure 5: Watermain Layout

Table 7-1: Watermain Design Criteria

Design Parameter	Design Criteria
Town Population	2.7 people/unit
Residential Demand	280 L/c/d
Maximum Day Demand	2.5 x Average Day
Peak Hour Demand	2.2 x Maximum Day
Fire Demand	250, 267, 283 and 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)
Back-to-Back Towns	40	108	0.350	0.875	1.925
Total	**40**	**108**	**0.350**	**0.875**	**1.925**

Based on the fire underwriters survey, the fire flows were calculated as 250 L/s (Block 2), 267 L/s (Block 1), 283 L/s (Block 4) and 300 L/s (Block 3). 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 120057-GP for detailed watermain layout).

A summary of the model results are 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
267 L/s at Block 1	258.79 kPa (HYD3)
250 L/s at Block 2	277.82 kPa (HYD3)
300 L/s at Block 3	228.08 kPa (HYD3)
283 L/s at Block 4	234.16 kPa (HYD3)

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

Operating Condition	Maximum Pressure	Minimum Pressure
1.925 L/s through system	361.11 kPa (T3)	359.05 kPa (T2)

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

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

Operating Condition	Maximum Pressure	Minimum Pressure
0.350 L/s through system	405.55 kPa (T3)	403.49 kPa (T2)

The average day pressures throughout the system are below 552 kPa, therefore pressure reducing valves are not 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 70 L/s/ha. All runoff volume from the 100-year storm event is stored on site using surface storage. The existing Cardinal Creek stormwater management facility is the ultimate outlet for the site and provide water quality control.
2) The proposed sanitary sewer conforms to City design criteria and provides a gravity outlet for the development site. There is sufficient capacity in the downstream sanitary sewers to accommodate the flows that outlet to the Ventoux Avenue sanitary sewers.
3) Connection to the watermain in Ventoux Avenue will provide municipal water service to the development.
4) There is adequate fire protection to the proposed development, in accordance with the Fire Underwriter's Survey.
5) The proposed infrastructure (sanitary, storm and water) complies with City of Ottawa design standards.

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

Sincerely,

NOVATECH

Prepared By:

Lucas Wilson, P.Eng.
Project Coordinator

Reviewed By:

Mark Bissett, P.Eng.
Senior Project Manager

References

1. "Phase 2 and 3 Provence Orleans Subdivision Site Servicing and Stormwater Management Design Brief", Novatech [May 2020]

2. "Gloucester and Cumberland East Urban Community Expansion Area and Bilberry Creek Industrial Park Master Servicing Update", Stantec [July 2006]

3. "Site Servicing and Stormwater Management Design Brief (R-2018-095), Provence Orleans Subdivision, 2128 Trim Road, Ottawa, Ontario", Novatech [March 31, 2019]

4. "Geotechnical Investigation, Proposed Provence City Towns Block, Trim Road, Ottawa, Ontario (PG4278-3)", Paterson Group [March 30, 2021]

5. "Transportation Master Plan", City of Ottawa [November 2013]

6. "Sewer Design Guidelines", Department of Public Works and Services, City of Ottawa [October 2012]

APPENDIX A: Design Sheets

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

Provence Orleans - Block 126: Storm Sewer Design Sheet (Rational Method)

LOCATION			AREA								FLOW								PROPOSED SEWER							
Location	From Node	To Node	Hard Surface	Soft Surface	Towns Front Yard	Towns Front Yard	Towns Rear Yard	Towns Rear Yard	Total Area	Weighted Runoff Coefficient	Indivi 2.78 AR	Accum 2.78 AR	Time of Concentration	Rain Intensity (mm/hr) 2yr	Rain Intensity (mm/hr) 5yr	Rain Intensity (mm/hr) 10yr	Peak Flow	Total Peak Flow (Q)	Pipe	Size	Grade	Length	Capacity	Full Flow Velocity	Time of Flow	Q/Qfull
			0.90	0.20	Area	c	Area	c	(ha)								(L/s)	(L/s)	Type	(mm)	(%)	(m)	(l/s)	(m/s)	(min.)	(%)
			0.057	0.053					0.11	0.56	0.17	0.17	10.00	76.81			13.2									
A-3, A-4	CBMH1	6							0.00		0.00	0.00	10.00				0.0	13.2	CONC	525	1.00	31.5	448.7	2.01	0.26	2.9%
									0.00		0.00	0.00	10.00				0.0									
									0.00		0.00	0.17	10.26	75.82			13.0									
	6	CBMH2							0.00		0.00	0.00	10.26				0.0	13.0	CONC	525	0.50	12.4	317.2	1.42	0.15	4.1%
									0.00		0.00	0.00	10.26				0.0									
			0.087	0.033					0.12	0.71	0.24	0.41	10.41	75.28			30.7									
A-2	CBMH2	4							0.00		0.00	0.00	10.41				0.0	30.7	PVC	300	0.50	22.8	71.3	0.98	0.39	43.1%
									0.00		0.00	0.00	10.41				0.0									
			0.134	0.046					0.18	0.72	0.36	0.36	10.00	76.81			27.7									
A-5, A-6	8	10							0.00		0.00	0.00	10.00				0.0	27.7	PVC	375	1.00	39.0	182.9	1.60	0.41	15.2%
									0.00		0.00	0.00	10.00				0.0									
			0.038	0.202					0.24	0.31	0.21	0.57	10.41	75.28			42.8									
A-11, A-12	10	12							0.00		0.00	0.00	10.41				0.0	42.8	PVC	300	0.40	37.6	63.8	0.87	0.72	67.0%
									0.00		0.00	0.00	10.41				0.0									
				0.160					0.16	0.20	0.09	0.09	10.00	76.81			6.8									
A-10	14	12							0.00		0.00	0.00	10.00				0.0	6.8	PVC	300	0.50	36.4	71.3	0.98	0.62	9.6%
									0.00		0.00	0.00	10.00				0.0									
			0.122	0.028					0.15	0.77	0.32	0.98	11.12	72.75			71.2									
A-7	12	4							0.00		0.00	0.00	11.12				0.0	71.2	PVC	375	0.35	39.7	108.2	0.95	0.70	65.8%
									0.00		0.00	0.00	11.12				0.0									
			0.050	0.030					0.08	0.64	0.14	1.29	11.82	70.46			91.0									
A-1	4	2							0.00		0.00	0.00	11.82				0.0	91.0	CONC	450	0.30	43.1	162.9	0.99	0.72	55.9%
									0.00		0.00	0.00	11.82				0.0									
			0.188	0.062					0.25	0.73	0.50	0.50	10.00	76.81			38.8									
A-8, A-9	16	18							0.00		0.00	0.00	10.00				0.0	38.8	CONC	600	1.00	57.8	640.6	2.19	0.44	6.1%
									0.00		0.00	0.00	10.00				0.0									
									0.00		0.00	0.50	10.44	75.16			37.9									
	18	2							0.00		0.00	0.00	10.44				0.0	37.9	PVC	300	1.00	19.2	100.9	1.38	0.23	37.6%
									0.00		0.00	0.00	10.44				0.0									
									0.00		0.00	1.80	12.54	68.25			122.6									
	2	EX116							0.00		0.00	0.00	12.54				0.0	122.6	CONC	525	0.25	18.3	224.3	1.00	0.30	54.7%
									0.00		0.00	0.00	12.54				0.0									

Q = 2.78 AIR WHERE : Q = PEAK FLOW IN LITRES PER SECOND (L/s)
A = AREA IN HECTARES (ha)
I = RAINFALL INTENSITY IN MILLIMETERS PER HOUR (mm/hr)
R = WEIGHTED RUNOFF COEFFICIENT

Q = (1/n) A R^(2/3)So^(1/2) WHERE : Q = CAPACITY (L/s)
n = MANNING COEFFICIENT OF ROUGHNESS (0.013)
A = FLOW AREA (m^2)

Project: Provence Orleans - Block 126 (120057)
Designed: LRW
Checked: MAB
Date: May 14, 2021

NOVATECH
Engineers, Planners & Landscape Architects

Provence Orleans - Block 126: Sanitary Sewer Design Sheet

AREA			RESIDENTIAL							INFILTRATION				PIPE							
			SINGLES		Towns																
ID	From	To	Units	Pop.	Units	Pop.	Accum. Pop.	Peak Factor	Peak Flow (l/s)	Total Area (ha)	Accum. Area (ha)	Infilt. Flow (l/s)	**Total Flow (l/s)**	Size (mm)	Slope (%)	Length (m)	Capacity (l/s)	Full Flow Vel. (m/s)	Actual Vel. (m/s)	Q/Q_{full} (%)	d/D
Ventoux Avenue																					
	7	**5**	0	0.0	5	13.5	13.5	3.7	0.2	0.14	0.14	0.0	0.2	200	1.00	32.8	34.2	1.06	0.26	0.6%	0.000
	5	**3**	0	0.0	5	13.5	27.0	3.7	0.3	0.08	0.22	0.1	0.4	200	0.50	37.6	24.2	0.75	0.23	1.6%	0.077
	15	**13**	0	0.0	5	13.5	13.5	3.7	0.2	0.19	0.19	0.1	0.2	200	1.00	38.7	34.2	1.06	0.26	0.7%	0.000
	13	**9**	0	0.0	5	13.5	27.0	3.7	0.3	0.08	0.27	0.1	0.4	200	0.50	37.5	24.2	0.75	0.24	1.7%	0.077
	11	**9**	0	0.0	6	16.2	16.2	3.7	0.2	0.12	0.12	0.0	0.2	200	1.00	36.4	34.2	1.06	0.26	0.7%	0.000
	9	**3**	0	0.0	4	10.8	54.0	3.6	0.6	0.08	0.47	0.2	0.8	200	0.50	36.7	24.2	0.75	0.28	3.3%	0.077
	3	**1**	0	0.0	0	0.0	81.0	3.6	0.9	0.04	0.73	0.2	1.2	200	0.50	40.1	24.2	0.75	0.32	4.9%	0.077
	17	**1**	0	0.0	10	27.0	27.0	3.7	0.3	0.22	0.22	0.1	0.4	200	1.00	69.9	34.2	1.06	0.30	1.2%	0.077
	1	**EX117**	0	0.0	0	0.0	108.0	3.6	1.3	0.01	0.98	0.3	1.6	200	1.00	17.3	34.2	1.06	0.45	4.6%	0.153
	EX115	**EX117**	0	0.0	0	0.0	1327.0	3.7	15.9		20.43	6.7	22.7	250	0.35	46.0	36.7	0.72	0.66	61.7%	0.634
	EX117	**EX119**	5	17.0	0	0.0	1452.0	3.7	17.4	0.44	21.85	7.2	24.6	250	0.35	77.7	36.7	0.72	0.68	67.1%	0.672

Design Parameters:

Avg Flow/Person =	280	l/day
Comm./Inst. Flow =	35000	l/ha/day
Infiltration =	0.33	l/s/ha
Pipe Friction n =	0.013	

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

Population Density:

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

Project: Provence Orleans - Block 126 (120057)
Designed: LRW
Checked: MAB
Date: March 24, 2021

NOVATECH
Engineers, Planners & Landscape Architects

LICENSED PROFESSIONAL ENGINEER
Sept 21/20
M.E. RIDDELL
100040125
PROVINCE OF ONTARIO

PROJECT # : 117155
DESIGNED BY : TM/CH
CHECKED BY : MER
DATE PREPARED : 21-Sep-20

SANITARY SEWER DESIGN SHEET
Provence Orleans Subdivision - 2128 Trim Road
Developer: Provence Orleans Realty Investment Inc. c/o Regional Group of Companies

NOVATECH
Engineers, Planners & Landscape Architects

LOCATION				INDIVIDUAL						CUMULATIVE						PROPOSED SEWER								
STREET	FROM MH	TO MH	Area	Single Units	Townhouse Units	Condo Units	Retirement Home Units	Population (in 1000's)	AREA (ha.)	Population (in 1000's)	AREA (ha.)	PEAK FACTOR M	POPULATION FLOW Q(p) (L/s)	PEAK EXTRAN. FLOW Q(i) (L/s)	PEAK DESIGN FLOW Q(d) (L/s)	LENGTH (m)	PIPE SIZE (mm)	PIPE ID (mm)	TYPE OF PIPE	GRADE %	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	Qpeak/ Qcap	d/ D_{full}
Future Phase 5	FUT	109	500					0.3450	6.14	0.345	6.140	4.0	4.47	2.03	6.50									
Future Phase 4	FUT	111	400					0.4880	6.08	0.488	6.080	4.0	6.29	2.01	8.30									
Petanque Cres.	505	503	2		3			0.0081	0.17	0.008	0.170	4.0	0.11	0.06	0.16	12.4	200	203.20	DR 35	0.65	27.6	0.85	1%	
Petanque Cres.	503	501	3		16			0.0432	0.46	0.051	0.630	4.0	0.67	0.21	0.87	51.8	200	203.20	DR 35	0.35	20.2	0.62	4%	
Petanque Cres.	501	101	4		3			0.0081	0.13	0.059	0.760	4.0	0.77	0.25	1.02	26.2	200	203.20	DR 35	0.35	20.2	0.62	5%	
Petanque Cres.	505	507	9	7	1			0.0265	0.47	0.027	0.470	4.0	0.34	0.16	0.50	56.5	200	203.20	DR 35	0.65	27.6	0.85	2%	
Petanque Cres.	507	509	10	7				0.0238	0.42	0.050	0.890	4.0	0.65	0.29	0.95	56.0	200	203.20	DR 35	0.35	20.2	0.62	5%	
Petanque Cres.	509	511	11	10				0.0340	0.67	0.084	1.560	4.0	1.09	0.51	1.61	82.2	200	203.20	DR 35	0.35	20.2	0.62	8%	
Petanque Cres.	511	513	12	2				0.0068	0.21	0.091	1.770	4.0	1.18	0.58	1.77	14.2	200	203.20	DR 35	0.65	27.6	0.85	6%	
Petanque Cres.	513	109	13	8				0.0272	0.50	0.118	2.270	4.0	1.53	0.75	2.28	72.0	200	203.20	DR 35	0.50	24.2	0.75	9%	
Socca Cres.	403	405	41	7				0.0238	0.46	0.024	0.460	4.0	0.31	0.15	0.46	56.6	200	203.20	DR 35	0.65	27.6	0.85	2%	
Socca Cres.	403	401	42	1				0.0034	0.14	0.027	0.600	4.0	0.35	0.20	0.55	12.6	200	203.20	DR 35	0.48	23.7	0.73	2%	
Socca Cres.	401	111	43	10				0.0340	0.56	0.061	1.160	4.0	0.79	0.38	1.18	72.4	200	203.20	DR 35	0.35	20.2	0.62	6%	
Socca Cres.	405	407	46	6				0.0204	0.38	0.020	0.380	4.0	0.26	0.13	0.39	54.0	200	203.20	DR 35	0.66	27.8	0.86	1%	
Socca Cres.	407	409	47	1	2			0.0088	0.18	0.029	0.560	4.0	0.38	0.18	0.56	15.9	200	203.20	DR 35	0.52	24.7	0.76	2%	
Socca Cres.	409	115	48		19			0.0513	0.63	0.081	1.190	4.0	1.04	0.39	1.44	78.8	200	203.20	DR 35	0.36	20.5	0.63	7%	
Ventoux Ave.	99	101	1	4				0.0136	0.23	0.014	0.230	4.0	0.18	0.08	0.25	35.7	200	203.20	DR 35	0.65	27.6	0.85	1%	
Ventoux Ave.	101	103	5	3				0.0102	0.16	0.083	1.15	4.0	1.08	0.38	1.46	30.9	200	203.20	DR 35	0.35	20.2	0.62	7%	
Ventoux Ave.	103	105	6	7	7			0.0427	0.56	0.126	1.710	4.0	1.63	0.56	2.20	66.9	200	203.20	DR 35	0.35	20.2	0.62	11%	
Ventoux Ave.	105	107	7	13	1			0.0469	0.63	0.173	2.340	4.0	2.24	0.77	3.01	71.0	200	203.20	DR 35	0.35	20.2	0.62	15%	
Ventoux Ave.	107	109	8	6				0.0204	0.38	0.193	2.720	4.0	2.50	0.90	3.40	73.6	200	203.20	DR 35	0.35	20.2	0.62	17%	
Ventoux Ave.	109	111	26					0.0000	0.15	0.657	11.280	3.9	8.32	3.72	12.04	79.5	250	254.00	DR 35	0.35	36.7	0.72	33%	0.38
Ventoux Ave.	111	113	44	1				0.0034	0.12	1.209	18.64	3.7	14.68	6.15	20.83	52.5	250	254.00	DR 35	0.35	36.7	0.72	57%	0.53
Ventoux Ave.	113	115	45	7				0.0238	0.39	1.233	19.030	3.7	14.94	6.28	21.22	52.1	250	254.00	DR 35	0.35	36.7	0.72	58%	0.53
Ventoux Ave.	115	117	49	3				0.0102	0.20	1.324	20.420	3.7	15.95	6.74	22.69	46.0	250	254.00	DR 35	0.35	36.7	0.72	62%	0.56
Future Multi-Unit Block	1	117	50		48			0.1296	1.23	1.453	21.650	3.7	17.38	7.14	24.52	17.2	200	203.20	DR 35	1.00	34.2	1.06	72%	
Ventoux Ave.	117	119	51	6				0.0204	0.47	1.474	22.120	3.7	17.60	7.30	24.90	77.7	250	254.00	DR 35	0.35	36.7	0.72	68%	0.58
Ventoux Ave.	119	121	52					0.0000	0.05	1.474	22.170	3.7	17.60	7.32	24.91	29.5	250	254.00	DR 35	1.00	62.0	1.22	40%	0.41

Notes:
1. Q(d) = Q(p) + Q(i)
2. Q(i) = 0.33 L/sec/ha
3. Q(p) = (PxqxM/86,400)

Definitions:
Q(d) = Design Flow (L/sec)
Q(p) = Population Flow (L/sec)
Q(i) = Extraneous Flow (L/sec)

P = Population (3.4 persons/single unit, 2.7 persons/townhouse, 2.1 persons/apartment, 1.4 persons/retirement residence)
q = Average per capita flow = 280 L/cap/day - Residential
M = Harmon Formula (maximum of 4.0)
Min pipe size 200mm @ min. slope 0.32%

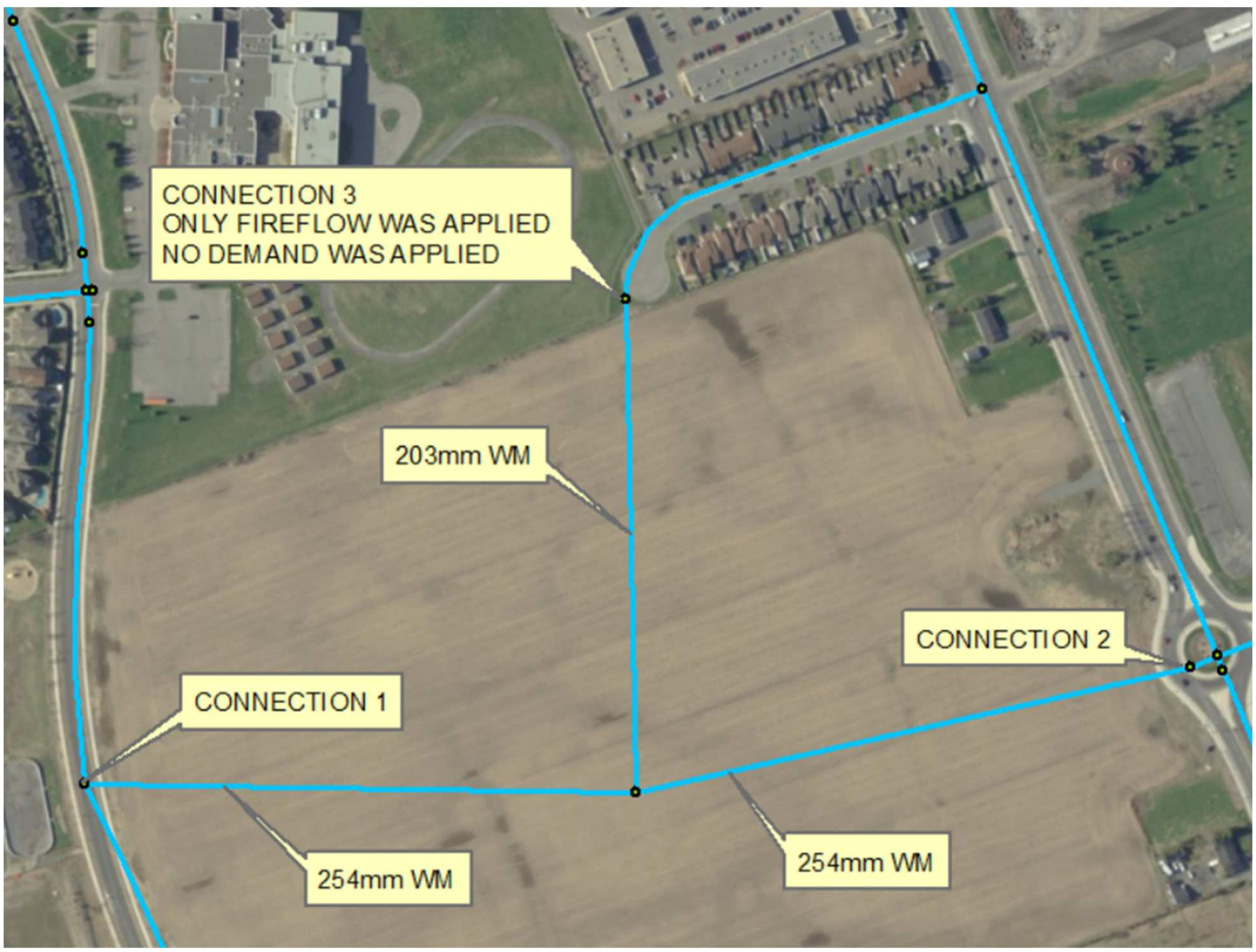
Boundary Conditions for Provence Orleans

Provided Information:

Date Provided December-19

Scenario	Demand	
	L/min	L/s
Average Daily Demand	119	1.99
Maximum Daily Demand	299	4.98
Peak Hour	658	10.96
Fire Flow Demand #1	10,020	167.00
Fire Flow Demand #2	18,000	300.00

Location:



Results:

Connection 1 - Provence Ave

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.3	59.2
Peak Hour	125.8	52.9
Max Day plus Fire 1	126.2	53.5
Max Day plus Fire 2	122.9	48.8

[1] Ground Elevation = 88.6m

Connection 2 - Trim Road

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.3	58.4
Peak Hour	125.8	52.1
Max Day plus Fire 1	126.4	52.9
Max Day plus Fire 2	123.3	48.5

[1] Ground Elevation = 89.2m

Connection 3 - Salzburg Dr

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.3	59.5
Peak Hour	125.8	53.1
Max Day plus Fire 1	123.0	49.0
Max Day plus Fire 2	113.2	35.1

[1] Ground Elevation = 88.5m

Notes:

1. Fire flow was applied on connection 3 but no demand was applied on connection 3. The City modeled additional internal looping within the three connections to meet the pressure requirement under fire flow condition at connection 3 as shown above.
2. Looping of the watermain is required to decrease vulnerability of the water system in case of breaks and to improve pressure under fire flow condition.
3. Interpolate the head elevation and the pressure for fire flow between 167L/s and 300L/s.
4. Ensure oversizing of the of local watermain does not require an excessive number of fire hydrants to accommodate the fire flow of 300L/s.

Disclaimer

The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.

Provence Orleans - Block 126 Water Demand						
	Area (ha)	Units	Population	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Hour Demand (L/s)
Towns	N/A	40	108	0.350	0.875	1.925
Total	**0.00**	**40**	**108**	**0.350**	**0.875**	**1.925**

Water Demand Parameters

Towns	2.7	ppl/unit
Residential Demand	280	L/c/day
Residential Max Day	2.5	x Avg Day
Residential Peak Hour	2.2	x Max Day
Residential Fire Flow	250 - 300	L/s

Provence Orleans - Block 126: Watermain Demand

Node	Towns	Total Population	Average Day Residential Demand (L/s)	Maximum Day Residential Demand (L/s)	Peak Hour Residential Demand (L/s)
HYD1	5	14	0.044	0.109	0.241
HYD2	10	27	0.088	0.219	0.481
EXHYD1	0	0	0.000	0.000	0.000
EXHYD2	0	0	0.000	0.000	0.000
T1	10	27	0.088	0.219	0.481
T2	5	14	0.044	0.109	0.241
T3	10	27	0.088	0.219	0.481
Total	**40**	**108**	**0.350**	**0.875**	**1.925**

Water Demand Parameters

Singles	3.4	ppl/unit	Residential Max Day	2.5	x Avg Day
Towns	2.7	ppl/unit	Residential Peak Hour	2.2	x Max Day
Residential Demand	280	L/c/day	Residential Fire Flow	250 - 300	L/s

M:\2020\120057\DATA\Calculations\Water\20210324 - Water Demand.xlsx

NOVATECH
Engineers, Planners & Landscape Architects

Provence Orleans - Block 126: Watermain Analysis

Network Table - Nodes - (Peak Hour)

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc HYD1	89	0.24	125.77	36.77	360.71	52.32
Junc HYD2	89.02	0.48	125.77	36.75	360.52	52.29
Junc T1	89.14	0.48	125.77	36.63	359.34	52.12
Junc T2	89.17	0.24	125.77	36.6	359.05	52.08
Junc T3	88.96	0.48	125.77	36.81	361.11	52.37
Resvr 1	125.8	-18.17	125.8	0	0.00	0.00
Resvr 2	125.8	-15.53	125.8	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	19	204	110	1.93	0.06	0.04	0.044
Pipe P2	32	204	110	0.96	0.03	0.01	0.048
Pipe P3	142	204	110	0.25	0.01	0.00	0.060
Pipe P4	45	204	110	-0.23	0.01	0.00	0.048
Pipe P5	31	204	110	0.47	0.01	0.00	0.059
Pipe P6	10	204	110	-0.25	0.01	0.00	0.065
Pipe P7	137	204	110	-0.49	0.01	0.00	0.054

NOVATECH
Engineers, Planners & Landscape Architects

Provence Orleans - Block 126: 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	89	0.04	130.3	41.3	405.15	58.76	15.22
Junc HYD2	89.02	0.09	130.3	41.28	404.96	58.73	25.73
Junc T1	89.14	0.09	130.3	41.16	403.78	58.56	1.33
Junc T2	89.17	0.04	130.3	41.13	403.49	58.52	2.99
Junc T3	88.96	0.09	130.3	41.34	405.55	58.82	10.07
Resvr 1	130.3	-3.3	130.3	0	0.00	0.00	0
Resvr 2	130.3	-2.83	130.3	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	19	204	110	0.35	0.01	0.00	0.068
Pipe P2	32	204	110	0.17	0.01	0.00	0.041
Pipe P3	142	204	110	0.05	0.00	0.00	0.137
Pipe P4	45	204	110	-0.04	0.00	0.00	0.000
Pipe P5	31	204	110	0.09	0.00	0.00	0.175
Pipe P6	10	204	110	-0.05	0.00	0.00	0.000
Pipe P7	137	204	110	-0.09	0.00	0.00	0.073

Provence Orleans - Block 126: Watermain Analysis

Network Table - Nodes - (Fire Flow Summary)

Fire Flow		Minimum Pressure		
LOCATION	Flow (L/s)	Pressure (kPa)	Pressure (PSI)	Node
B1	267	258.79	37.53	HYD2
B2	250	277.82	40.29	HYD2
B3	300	228.08	33.08	HYD2
B4	283	234.16	33.96	HYD2

Provence Orleans - Block 126: Watermain Analysis

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

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc HYD1	89	95.11	115.77	26.77	262.61	38.09
Junc HYD2	89.02	77.22	115.4	26.38	258.79	37.53
Junc EXHYD1	89.3	0	122.17	32.87	322.45	46.77
Junc EXHYD2	89.7	95.17	122.65	32.95	323.24	46.88
Junc T1	89.14	0.22	119.01	29.87	293.02	42.50
Junc T2	89.17	0.11	116.8	27.63	271.05	39.31
Junc T3	88.96	0.22	115.85	26.89	263.79	38.26
Resvr 1	123.7	-74.36	123.7	0	0.00	0.00
Resvr 2	124.1	-203.96	124.1	0	0.00	0.00

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

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	19	204	110	172.88	5.29	157.92	0.023
Pipe P2	32	204	110	110.60	3.38	69.06	0.024
Pipe P3	142	204	110	38.65	1.18	9.85	0.028
Pipe P4	45	204	110	-38.57	1.18	9.81	0.028
Pipe P5	31	204	110	71.85	2.20	31.06	0.026
Pipe P6	10	204	110	33.06	1.01	7.38	0.029
Pipe P7	137	204	110	-62.05	1.90	23.68	0.026

Provence Orleans - Block 126: Watermain Analysis

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

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc HYD1	89	95.11	117.47	28.47	279.29	40.51
Junc HYD2	89.02	60.22	117.34	28.32	277.82	40.29
Junc EXHYD1	89.3	0	122.8	33.5	328.64	47.66
Junc EXHYD2	89.7	95.17	123.19	33.49	328.54	47.65
Junc T1	89.14	0.22	120.19	31.05	304.60	44.18
Junc T2	89.17	0.11	118.38	29.21	286.55	41.56
Junc T3	88.96	0.22	117.57	28.61	280.66	40.71
Resvr 1	124.1	-68.4	124.1	0	0.00	0.00
Resvr 2	124.5	-192.91	124.5	0	0.00	0.00

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

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	19	204	110	155.88	4.77	130.37	0.023
Pipe P2	32	204	110	99.19	3.03	56.45	0.025
Pipe P3	142	204	110	33.07	1.01	7.38	0.029
Pipe P4	45	204	110	-27.14	0.83	5.12	0.030
Pipe P5	31	204	110	66.01	2.02	26.55	0.026
Pipe P6	10	204	110	38.64	1.18	9.85	0.028
Pipe P7	137	204	110	-56.47	1.73	19.88	0.027

Provence Orleans - Block 126: Watermain Analysis

Network Table - Nodes (Max Day + FF 'Bldg 3')

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc HYD1	89	95.11	112.95	23.95	234.95	34.08
Junc HYD2	89.02	95.22	112.27	23.25	228.08	33.08
Junc EXHYD1	89.3	55	120.47	31.17	305.78	44.35
Junc EXHYD2	89.7	55.17	121.67	31.97	313.63	45.49
Junc T1	89.14	0.22	116.78	27.64	271.15	39.33
Junc T2	89.17	0.11	114.1	24.93	244.56	35.47
Junc T3	88.96	0.22	113	24.04	235.83	34.20
Resvr 1	122.9	-94.47	122.9	0	0.00	0.00
Resvr 2	123.3	-216.84	123.3	0	0.00	0.00

Network Table - Links (Max Day + FF 'Bldg 3')

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	19	204	110	190.88	5.84	189.72	0.022
Pipe P2	32	204	110	122.67	3.75	83.65	0.024
Pipe P3	142	204	110	44.76	1.37	12.93	0.028
Pipe P4	45	204	110	-50.45	1.54	16.14	0.027
Pipe P5	31	204	110	77.79	2.38	35.99	0.025
Pipe P6	10	204	110	27.12	0.83	5.11	0.030
Pipe P7	137	204	110	-67.99	2.08	28.04	0.026

Provence Orleans - Block 126: Watermain Analysis

Network Table - Nodes (Max Day + FF 'Bldg 4')

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc HYD1	89	95.11	113.56	24.56	240.93	34.94
Junc HYD2	89.02	95.22	112.89	23.87	234.16	33.96
Junc EXHYD1	89.3	47	121.09	31.79	311.86	45.23
Junc EXHYD2	89.7	46.17	122.24	32.54	319.22	46.30
Junc T1	89.14	0.22	117.4	28.26	277.23	40.21
Junc T2	89.17	0.11	114.72	25.55	250.65	36.35
Junc T3	88.96	0.22	113.61	24.65	241.82	35.07
Resvr 1	123.3	-89.89	123.3	0	0.00	0.00
Resvr 2	123.7	-204.42	123.7	0	0.00	0.00

Network Table - Links (Max Day + FF 'Bldg 4')

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	19	204	110	190.88	5.84	189.72	0.022
Pipe P2	32	204	110	122.67	3.75	83.65	0.024
Pipe P3	142	204	110	44.76	1.37	12.93	0.028
Pipe P4	45	204	110	-50.45	1.54	16.14	0.027
Pipe P5	31	204	110	77.79	2.38	35.99	0.025
Pipe P6	10	204	110	27.12	0.83	5.11	0.030
Pipe P7	137	204	110	-67.99	2.08	28.04	0.026

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 120057
Project Name: Provence Orleans - Block 126
Date: 6/29/2020
Input By: Lucas Wilson
Reviewed By: Project Manager

Legend: (yellow) Input by User; (grey) No Information or Input Required

Building Description: Back-2-Back Towns (Block 1)
Wood frame

Step			Input		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction C	Wood frame	Yes	1.5	1.5	
		Ordinary construction		1		
		Non-combustible construction		0.8		
		Modified Fire resistive construction (2 hrs)		0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	516			
		Number of Floors/Storeys	3			
		Area of structure considered (m^2)			**1,548**	
	F	**Base fire flow without reductions** $F = 220\ C\ (A)^{0.5}$				**13,000**
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**11,050**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**			**Reduction**		
	(2)	Adequately Designed System (NFPA 13)		-30%		**0**
		Standard Water Supply		-10%		
		Fully Supervised System		-10%		
				Cumulative Total	**0%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	> 45.1m		0%	**4,973**
		East Side	3.1 - 10 m		20%	
		South Side	10.1 - 20 m		15%	
		West Side	20.1 - 30 m		10%	
				Cumulative Total	**45%**	
Results						
6	**(1) + (2) + (3)**	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**16,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**267**
				or	USGPM	4,227
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	3.5
		Required Volume of Fire Flow (m^3)			m^3	3360

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 120057
Project Name: Provence Orleans - Block 126
Date: 6/29/2020
Input By: Lucas Wilson
Reviewed By: Project Manager

Legend: (yellow) Input by User; (grey) No Information or Input Required

Building Description: Back-2-Back Towns (Block 2)
Wood frame

Step			Input		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction C	Wood frame	Yes	1.5	1.5	
		Ordinary construction		1		
		Non-combustible construction		0.8		
		Modified Fire resistive construction (2 hrs)		0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	516			
		Number of Floors/Storeys	3			
		Area of structure considered (m^2)			**1,548**	
	F	**Base fire flow without reductions**				**13,000**
		$F = 220\ C\ (A)^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**11,050**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**			**Reduction**		
	(2)	Adequately Designed System (NFPA 13)		-30%		**0**
		Standard Water Supply		-10%		
		Fully Supervised System		-10%		
				Cumulative Total	**0%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	> 45.1m		0%	**3,868**
		East Side	> 45.1m		0%	
		South Side	10.1 - 20 m		15%	
		West Side	3.1 - 10 m		20%	
				Cumulative Total	**35%**	
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
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	3
		Required Volume of Fire Flow (m^3)			m^3	2700

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #:	120057		
Project Name:	Provence Orleans - Block 126		
Date:	6/29/2020	Legend	
Input By:	Lucas Wilson		No Information or Input Required
Reviewed By:	Project Manager		

Building Description: Back-2-Back Towns (Block 3)
Wood frame

Step			Input		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction C	Wood frame	Yes	1.5	1.5	
		Ordinary construction		1		
		Non-combustible construction		0.8		
		Modified Fire resistive construction (2 hrs)		0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	553			
		Number of Floors/Storeys	3			
		Area of structure considered (m^2)			**1,659**	
	F	**Base fire flow without reductions**				**13,000**
		$F = 220\,C\,(A)^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**11,050**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**			**Reduction**		
	(2)	Adequately Designed System (NFPA 13)		-30%		**0**
		Standard Water Supply		-10%		
		Fully Supervised System		-10%		
				Cumulative Total	**0%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	10.1 - 20 m		15%	**7,183**
		East Side	10.1 - 20 m		15%	
		South Side	0 - 3 m		25%	
		West Side	20.1 - 30 m		10%	
				Cumulative Total	**65%**	
Results						
6	(1) + (2) + (3)	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**18,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**300**
				or	USGPM	4,756
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	4
		Required Volume of Fire Flow (m^3)			m^3	4320

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

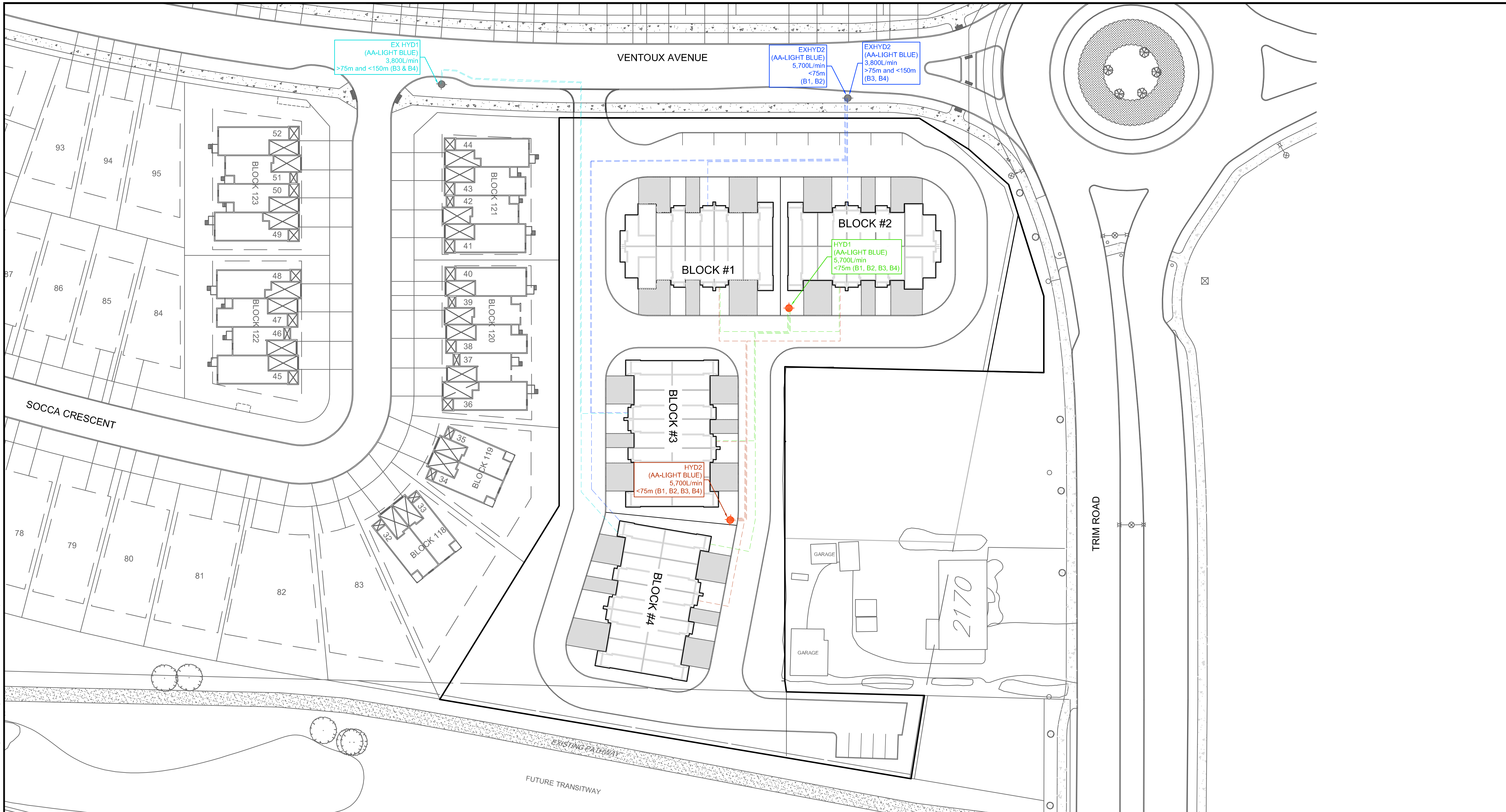
Engineers, Planners & Landscape Architects

Novatech Project #: 120057
Project Name: Provence Orleans - Block 126
Date: 6/29/2020
Input By: Lucas Wilson
Reviewed By: Project Manager

Legend: (yellow) Input by User; (grey) No Information or Input Required

Building Description: Back-2-Back Towns (Block 4)
Wood frame

Step			Input		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction C	Wood frame	Yes	1.5	1.5	
		Ordinary construction		1		
		Non-combustible construction		0.8		
		Modified Fire resistive construction (2 hrs)		0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	553			
		Number of Floors/Storeys	3			
		Area of structure considered (m^2)			1,659	
	F	**Base fire flow without reductions** $F = 220\ C\ (A)^{0.5}$				13,000
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	11,050
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**			**Reduction**		
	(2)	Adequately Designed System (NFPA 13)		-30%		0
		Standard Water Supply		-10%		
		Fully Supervised System		-10%		
				Cumulative Total	0%	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	0 - 3 m		25%	5,525
		East Side	10.1 - 20 m		15%	
		South Side	> 45.1m		0%	
		West Side	20.1 - 30 m		10%	
				Cumulative Total	50%	
Results						
6	(1) + (2) + (3)	**Total Required Fire Flow, rounded to nearest 1000L/min**			L/min	**17,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**283**
				or	USGPM	4,491
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	3.5
		Required Volume of Fire Flow (m^3)			m^3	3570



LEGEND

- ROUTE FROM PROPOSED BUILDING TO HYD1
- ROUTE FROM PROPOSED BUILDING TO HYD2
- ROUTE FROM PROPOSED BUILDING TO EXHYD1
- ROUTE FROM PROPOSED BUILDING TO EXHYD2
- FIRE HYDRANT

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

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

CITY OF OTTAWA

PROVENCE ORLEANS SUBDIVISION - CITY TOWNS

FIRE HYDRANT COVERAGE PLAN

SCALE	DATE	JOB	FIGURE
1:1250	MARCH 2021	120057	FIG-6

M:\2020\120057\CAD\Design\Figures\Design Brief\120057-HYD Coverage Plan.dwg, FIG6, Mar 24, 2021 - 9:12pm, lwilson

SHT11X17.DWG - 279mmX432mm

APPENDIX B

SWM Calculations

TEMPEST Product Submittal Package R1

Date: May 14, 2021

Customer: Novatech

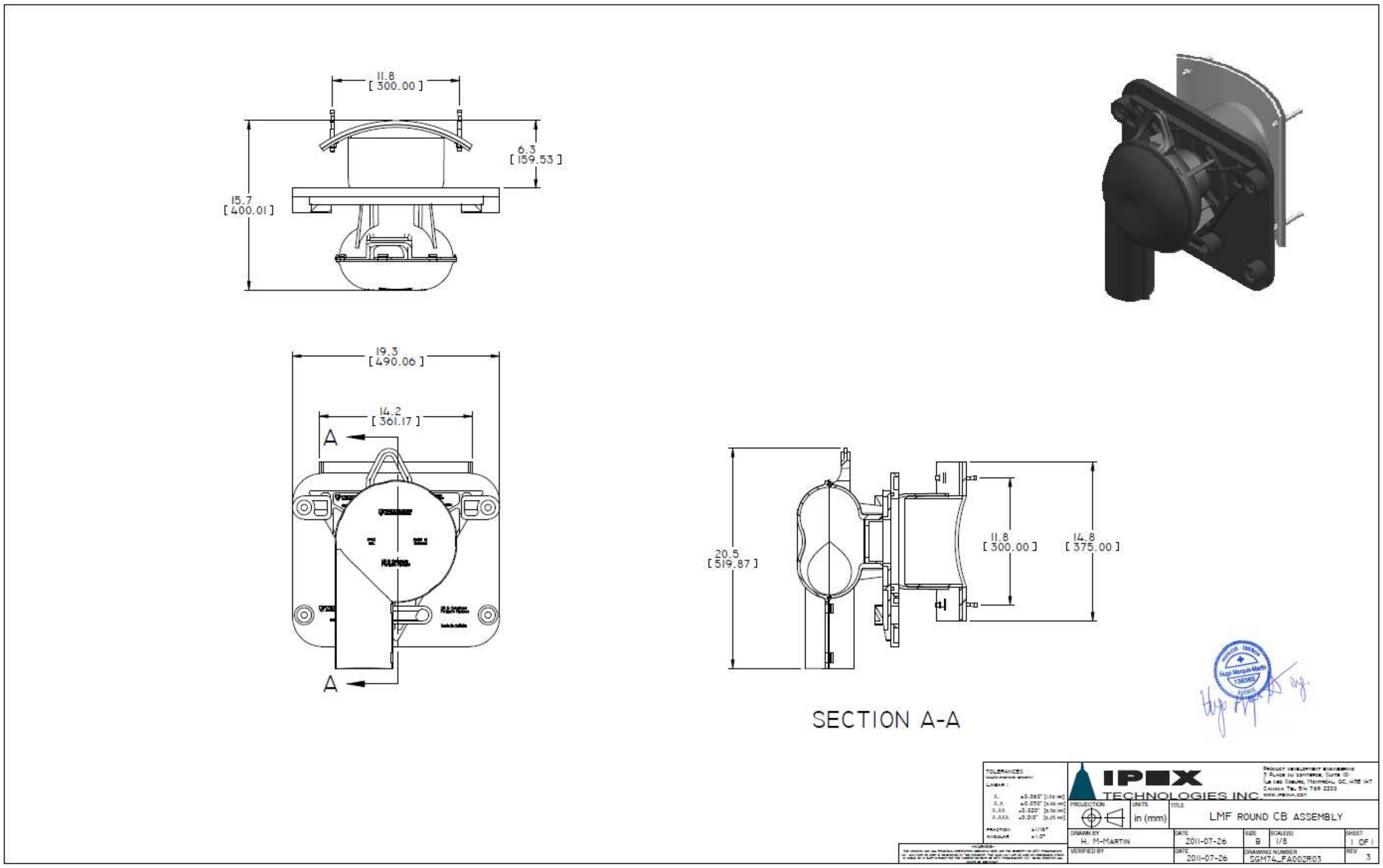
Contact: Lucas Wilson

Location: Provence

Project Name: Orleans Subdivision – City Towns

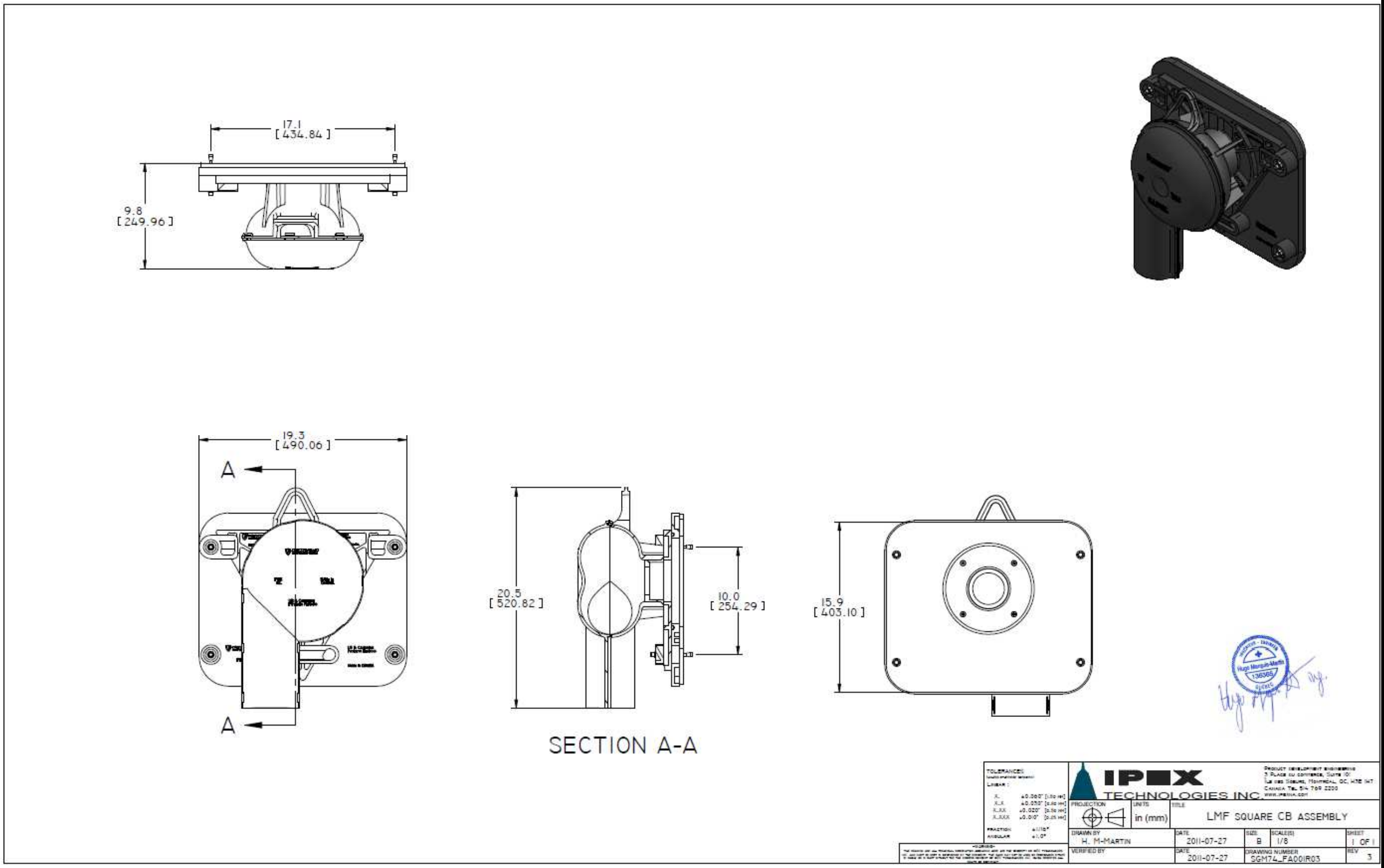
IPEX

Tempest LMF ICD Rd Shop Drawing

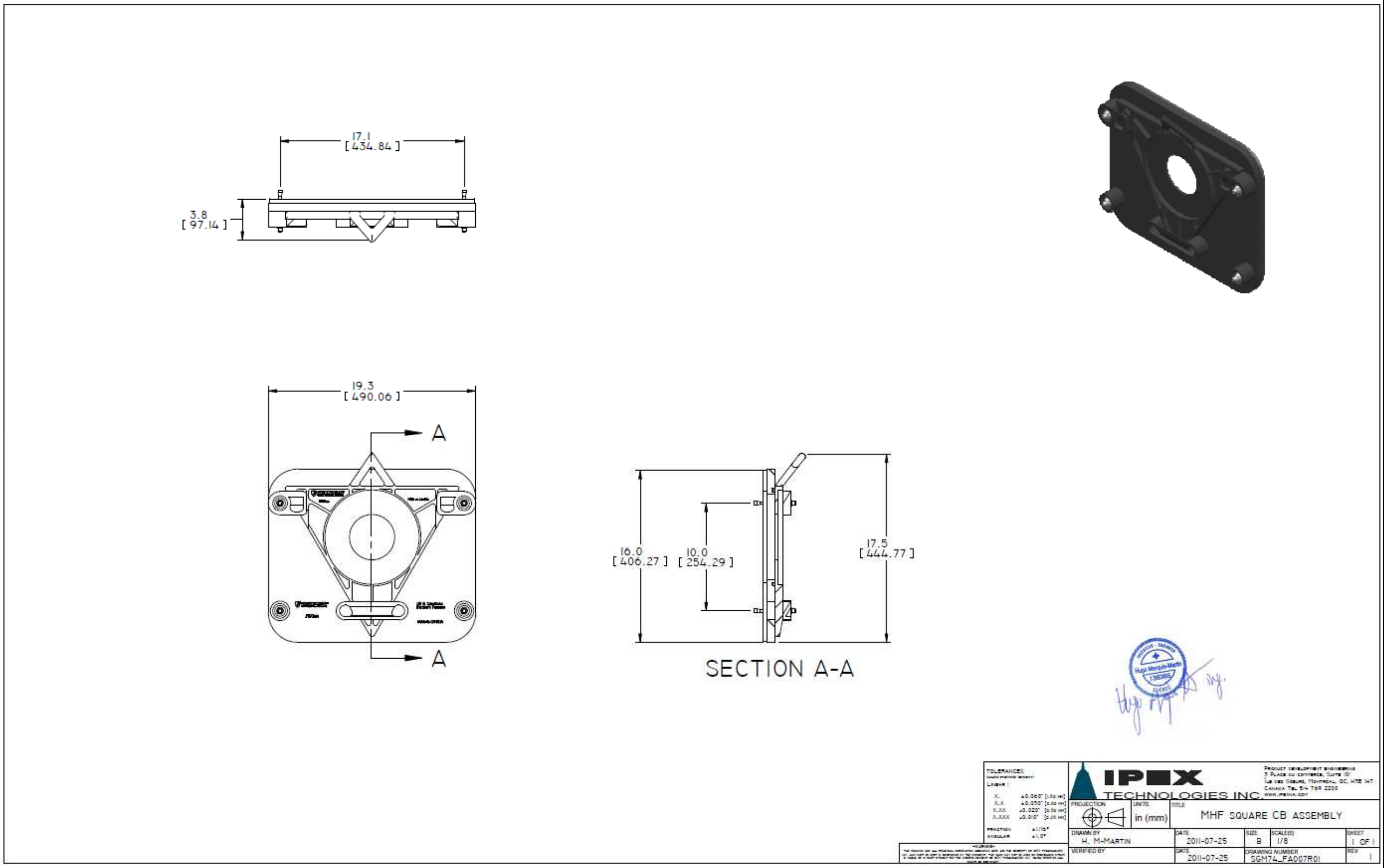


IPEX

<u>Tempest LMF ICD Sq</u> Shop Drawing

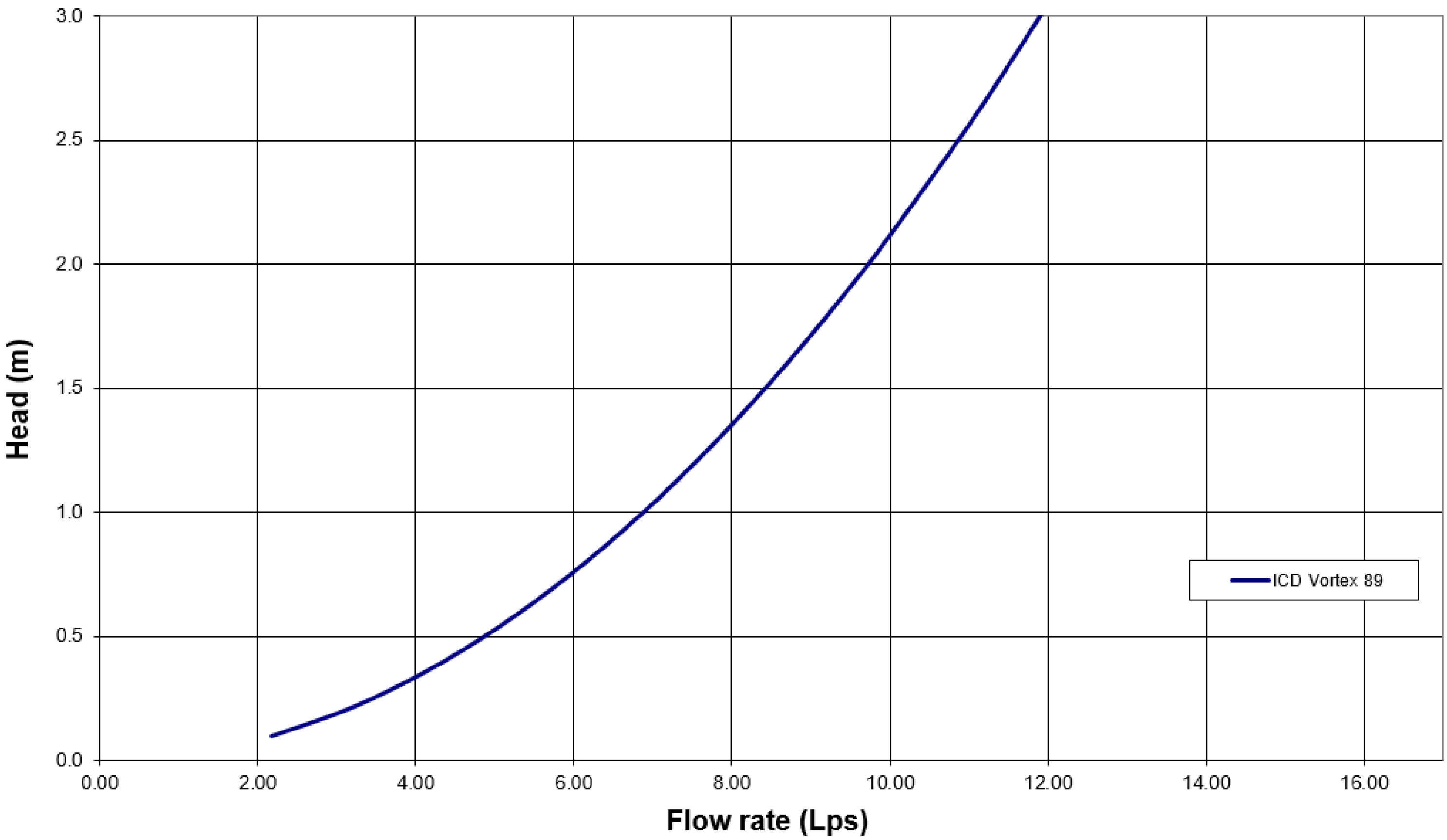


Tempest MHF ICD Sq Shop Drawing



Tempest LMF ICD Flow Curve

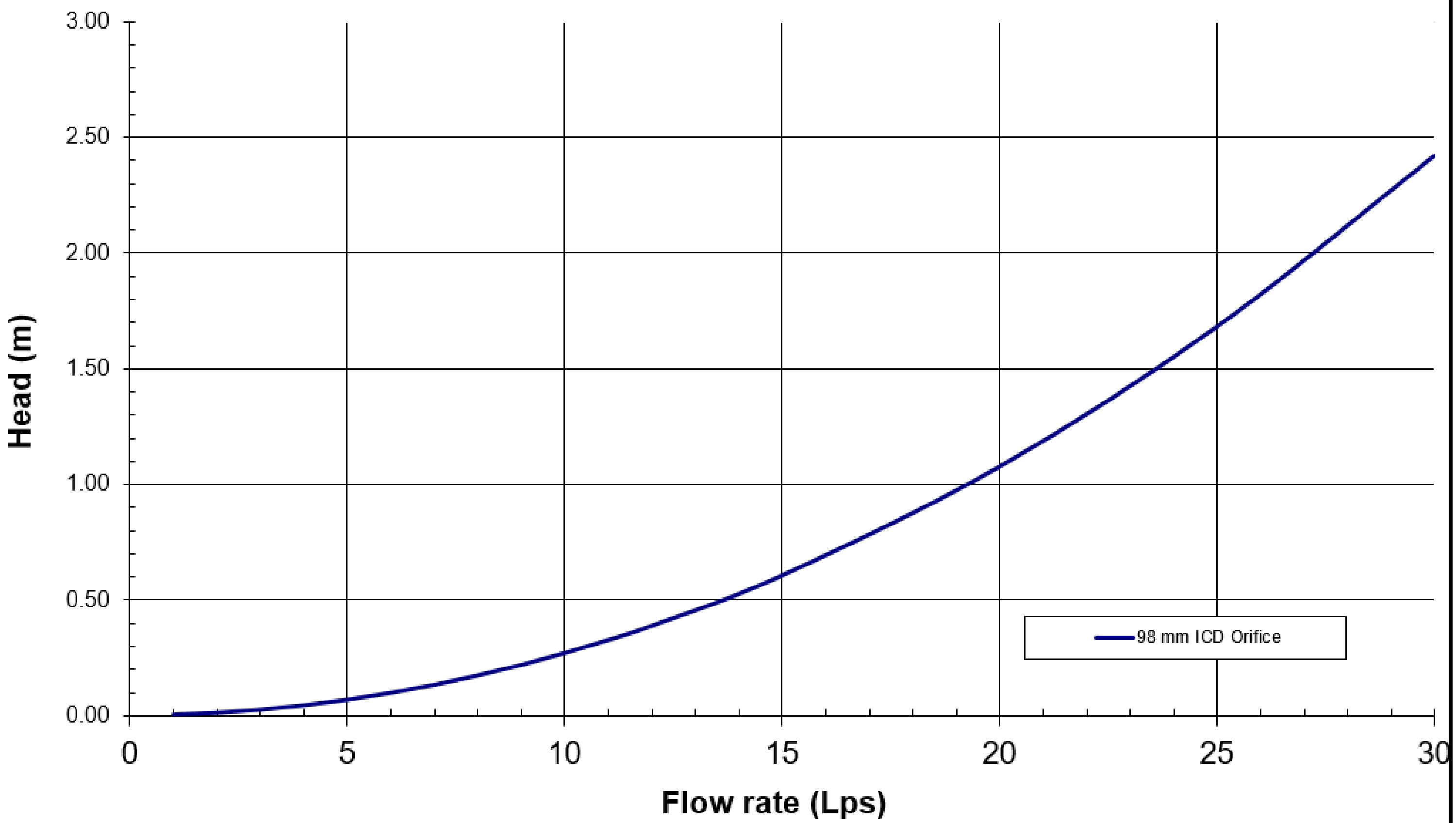
Flow: 9.4 L/s
Head: 1.90 m
CB1



IPEX

Tempest MHF ICD Flow Curve

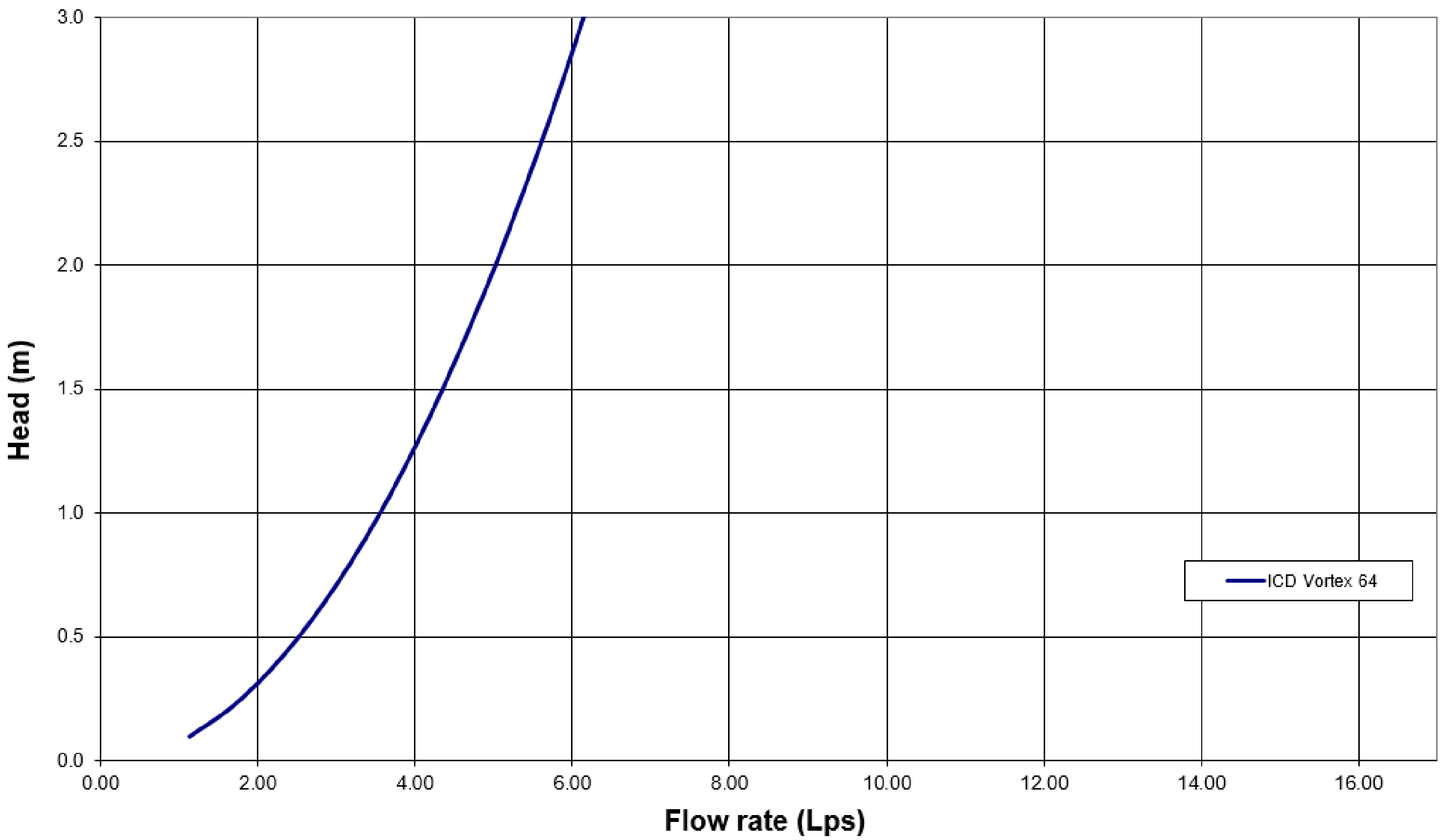
Flow: 26.7 L/s
Head: 1.91 m
CB5



IPEX

Tempest LMF ICD Flow Curve

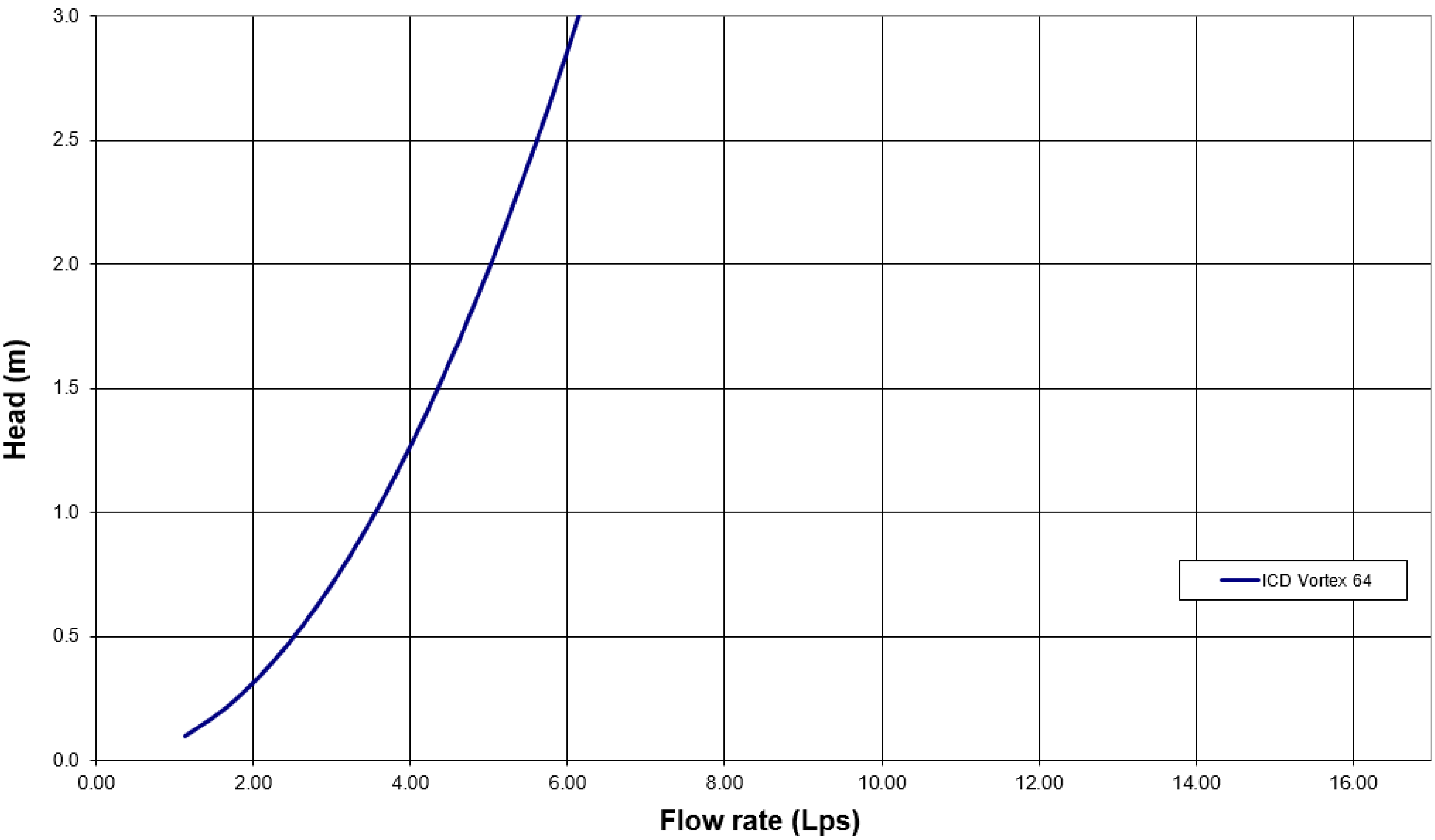
Flow: 6.2 L/s
Head: 3.12 m
CBMH02



IPEX

Tempest LMF ICD Flow Curve

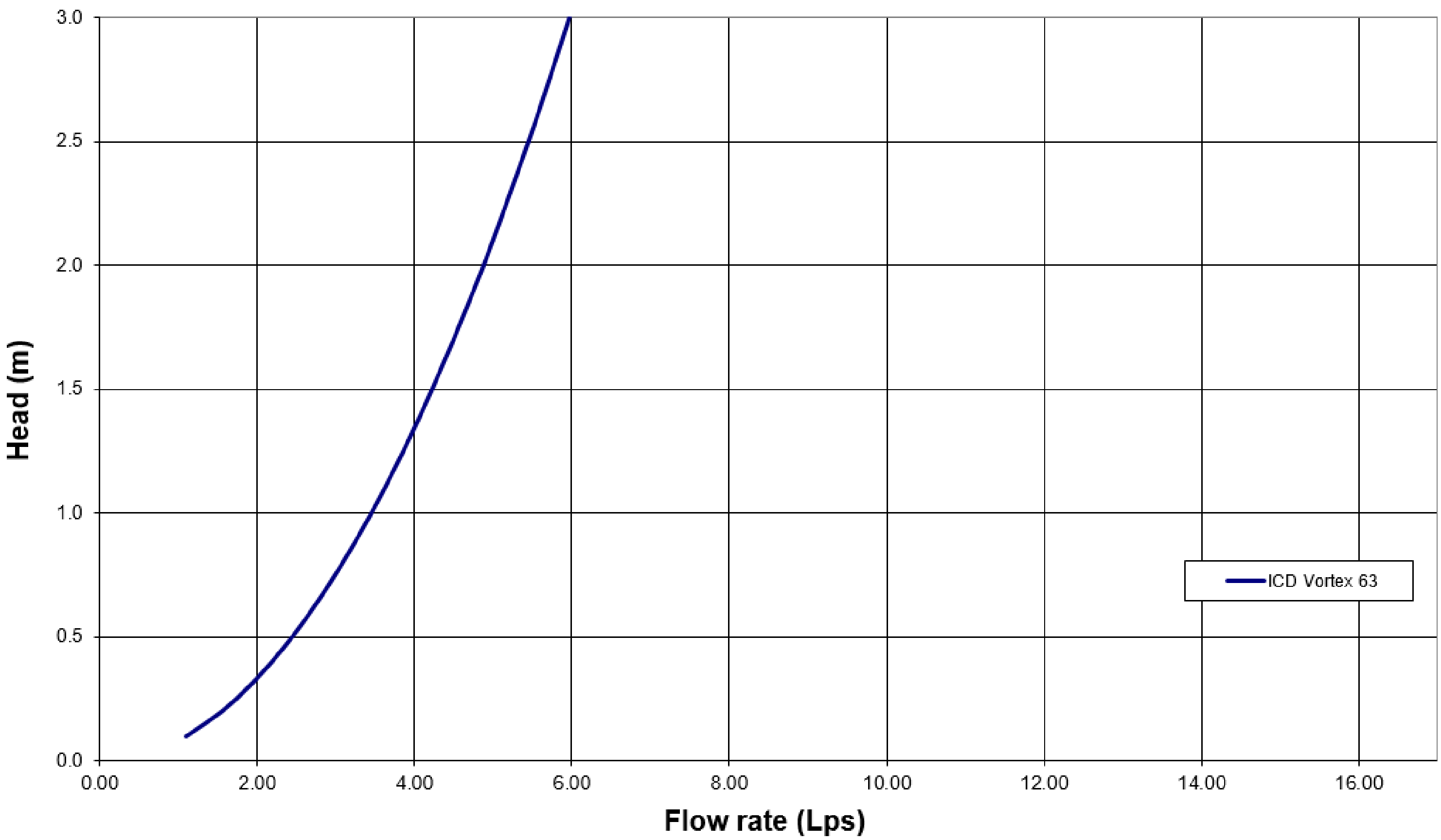
Flow: 6.1 L/s
Head: 2.99 m
MH10



IPEX

Tempest LMF ICD Flow Curve

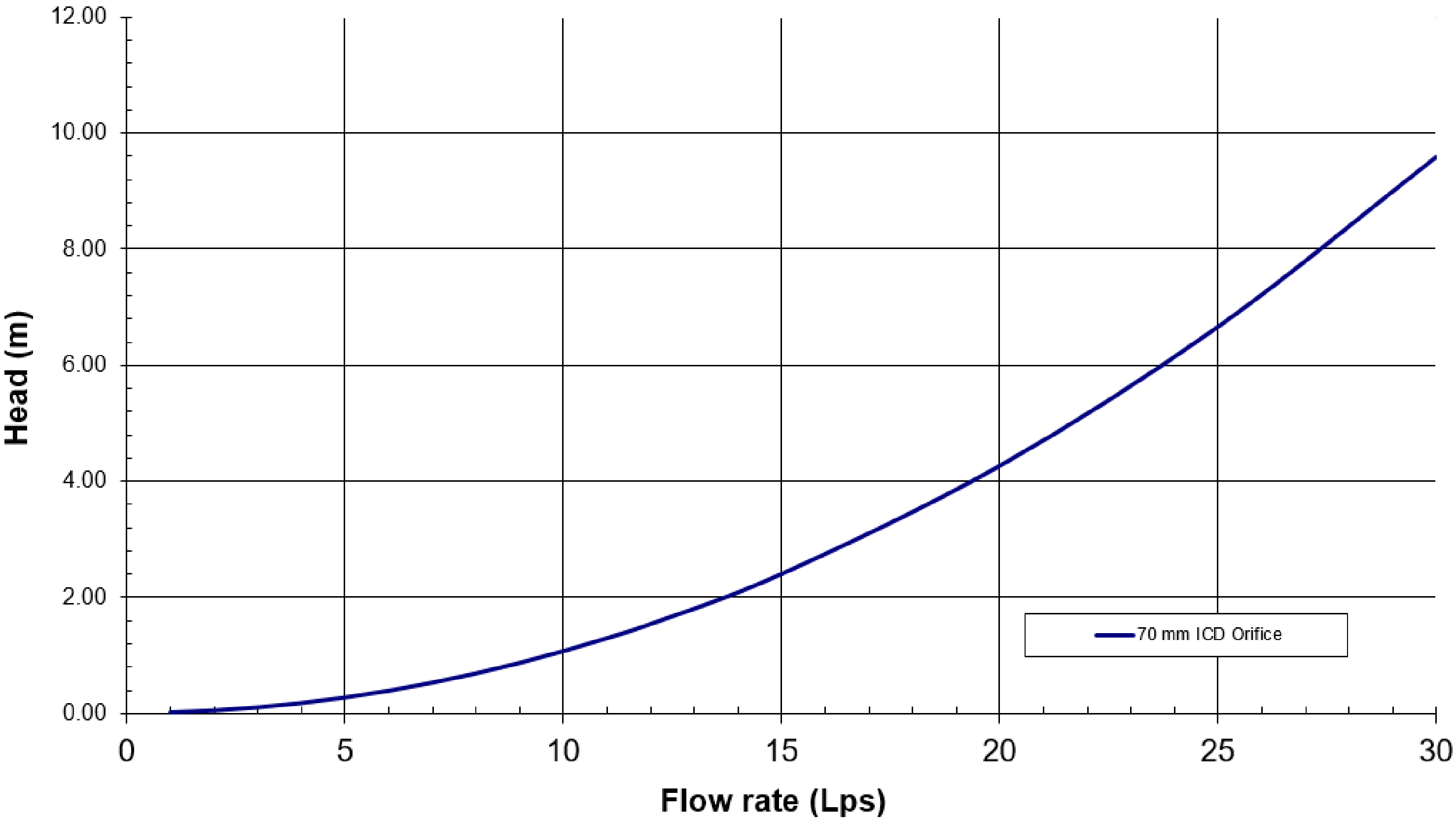
Flow: 6.0 L/s
Head: 3.13 m
MH18



IPEX

Tempest MHF ICD Flow Curve

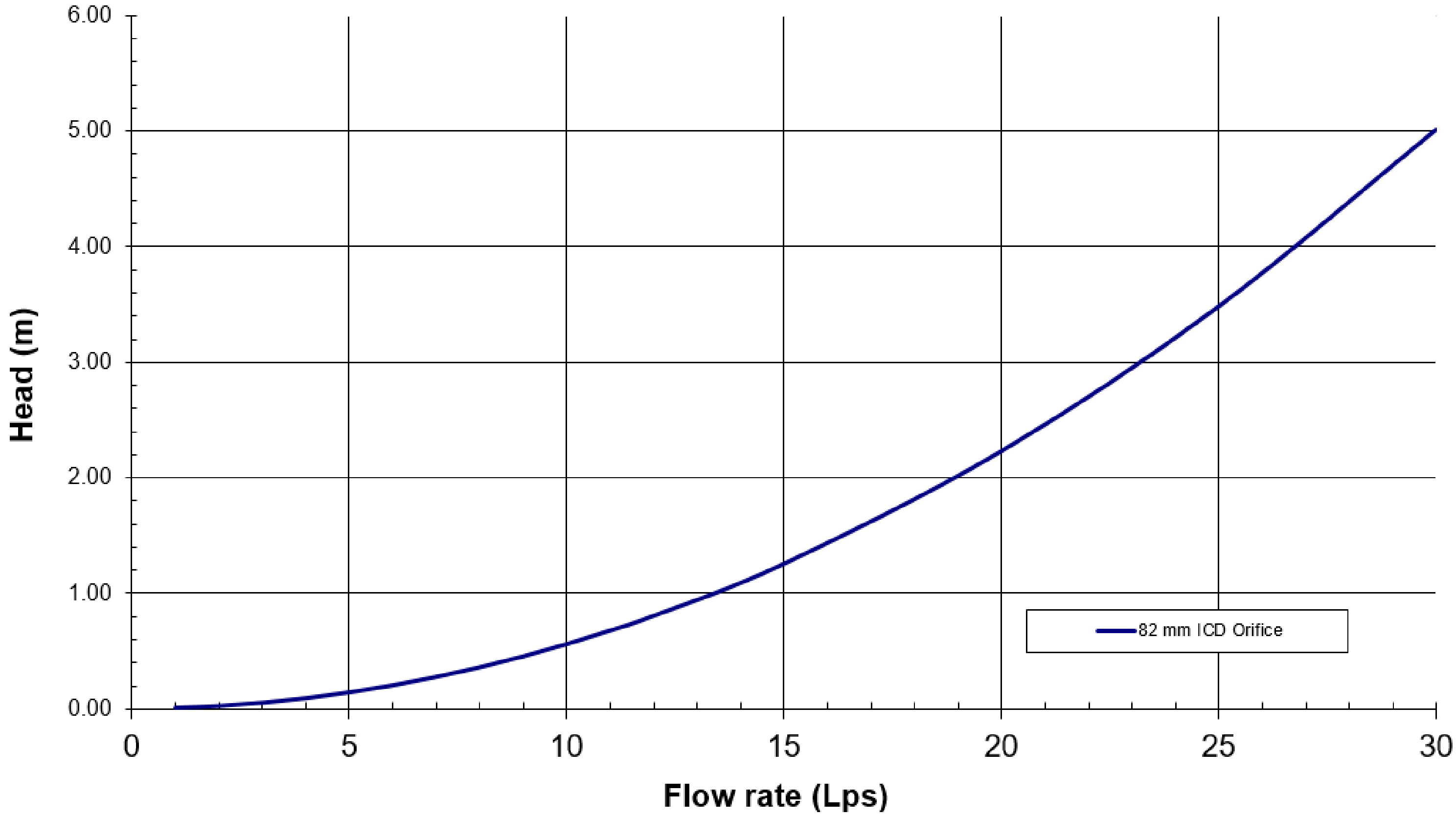
Flow: 12 L/s
Head: 1.53 m
RYCB1



IPEX

Tempest MHF ICD Flow Curve

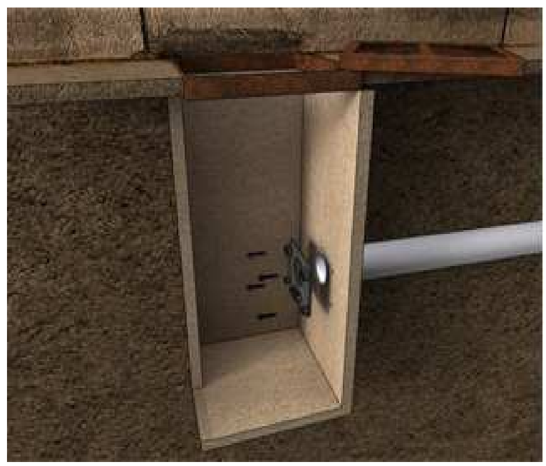
Flow: 18 L/s
Head: 1.80 m
RYCB3

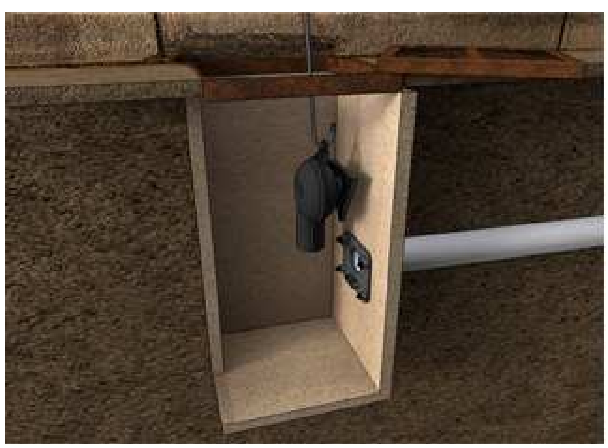


IPEX

Square CB Installation Notes:

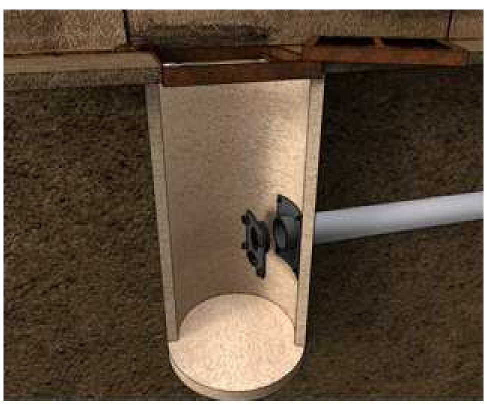
1. Materials and tooling verification:
   - Tooling: impact drill, 3/8’’ concrete bit, torque wrench for 9/16’’nut, hand hammer, level, and marker.
   - Material: (4) concrete anchor 3/8x3-1/2, (4) washers, (4) nuts
2. Use the mounting wall plate to locate and mark the hole (4) pattern on the catch basin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





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

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



CAUTION/WARNING/DISCLAIM:

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

IPEX

IPEX TEMPEST Inlet Control Devices Technical Specification

General

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

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

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

ICD's must have no moving parts.

Materials

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

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

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

All hardware will be made from 304 stainless steel.

Dimensioning

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

Installation

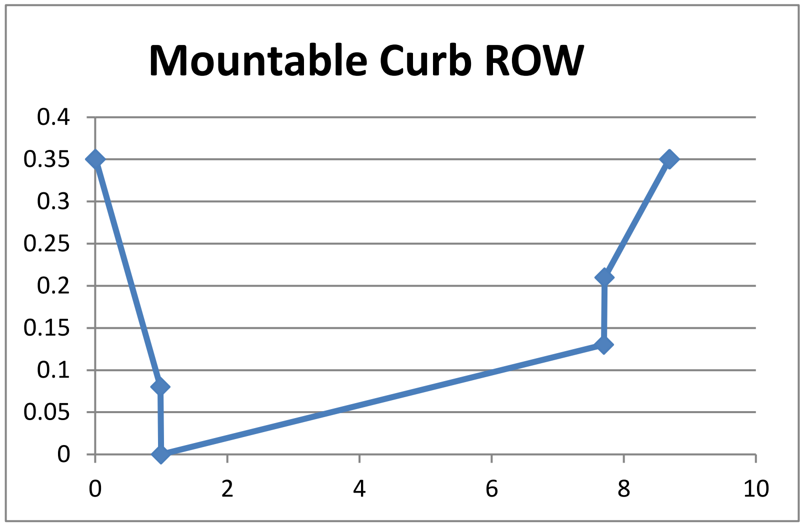
Contractor shall be responsible for securing, supporting and connecting the ICD's to the existing influent pipe and catchbasin/manhole structure as specified and designed by the Engineer.

IPEX

Provence Orleans - Block 126
Roadway Cross-Sections

Engineers, Planners & Landscape Architects

Mountable Curb and Gutter	
Distance	**Elevation**
0	0.35
0.01	0.35
0.99	0.08
1	0
7.7	0.13
7.71	0.21
8.69	0.35
8.7	0.35



Provence Orleans - Block 126 (120057)
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
1.70	0.36	0.61
1.75	7.00	0.80
1.80	28.50	1.68
1.85	70.00	4.15
1.90	130.00	9.15
1.95	202.00	17.45
2.00	285.00	29.62
2.01	305.00	32.57
2.02	0.00	34.10
2.70	0.00	34.10

CB2-Storage		
Depth (m)	Area (m^2)	Volume (m^3)
0.00	0.36	0.00
1.70	0.36	0.61
1.75	12.00	0.92
1.80	45.00	2.35
1.85	105.00	6.10
1.90	195.00	13.60
1.95	275.00	25.35
2.00	360.00	41.22
2.01	0.00	43.02
2.70	0.00	43.02

CBMH1-Storage		
Depth (m)	Area (m^2)	Volume (m^3)
0.00	1.13	0.00
2.52	1.13	2.85
2.57	12.00	3.18
2.62	42.00	4.53
2.67	78.00	7.53
2.72	122.00	12.53
2.77	178.00	20.03
2.82	230.00	30.23
2.83	0.00	31.38
3.52	0.00	31.38

CB3-Storage		
Depth (m)	Area (m^2)	Volume (m^3)
0.00	0.36	0.00
1.40	0.36	0.50
1.45	20.00	1.01
1.50	65.00	3.14
1.55	127.00	7.94
1.60	220.00	16.61
1.65	326.00	30.26
1.70	455.00	49.79
1.71	0.00	52.06
2.40	0.00	52.06

CB4-Storage		
Depth (m)	Area (m^2)	Volume (m^3)
0.00	0.36	0.00
1.40	0.36	0.50
1.45	12.00	0.81
1.50	45.00	2.24
1.55	105.00	5.99
1.60	195.00	13.49
1.65	306.00	26.01
1.66	0.00	27.54
2.40	0.00	27.54

CB5-Storage		
Depth (m)	Area (m^2)	Volume (m^3)
0.00	0.36	0.00
1.40	0.36	0.50
1.45	15.00	0.89
1.50	55.00	2.64
1.55	130.00	7.26
1.60	280.00	17.51
1.65	380.00	34.01
1.66	0.00	35.91
2.40	0.00	35.91

CB6-Storage		
Depth (m)	Area (m^2)	Volume (m^3)
0.00	0.36	0.00
1.40	0.36	0.50
1.45	8.00	0.71
1.50	30.00	1.66
1.55	70.00	4.16
1.60	120.00	8.91
1.65	182.00	16.46
1.70	245.00	27.14
1.71	0.00	28.36
2.40	0.00	28.36

CB7-Storage		
Depth (m)	Area (m^2)	Volume (m^3)
0.00	0.36	0.00
1.40	0.36	0.50
1.45	15.00	0.89
1.50	55.00	2.64
1.55	120.00	7.01
1.60	205.00	15.14
1.65	300.00	27.76
1.69	378.00	41.32
1.70	0.00	43.21
2.40	0.00	43.21

RYCB1-Storage		
Depth (m)	Area (m^2)	Volume (m^3)
0.00	0.36	0.00
1.40	0.36	0.50
1.45	10.00	0.76
1.50	35.00	1.89
1.55	66.00	4.41
1.60	105.00	8.69
1.65	150.00	15.06
1.70	190.00	23.56
1.75	236.00	34.21
1.80	290.00	47.36
1.85	364.00	63.71
1.90	452.00	84.11
1.95	550.00	109.16
2.00	656.00	139.31
2.01	0.00	142.59
2.40	0.00	142.59

Date: 5/14/2021
M:\2020\120057\DATA\Calculations\Sewer\SWM\120057-Storage Curves.xlsx

Provence Orleans - Block 126 (120057)
PCSWMM Storage Curves (surface storage)

NOVATECH
Engineers, Planners & Landscape Architects

RYCB2-Storage		
Depth (m)	Area (m^2)	Volume (m^3)
0.00	0.36	0.00
1.00	0.36	0.36
1.05	6.50	0.53
1.10	41.00	1.72
1.15	65.00	4.37
1.20	86.00	8.14
1.25	110.00	13.04
1.30	135.00	19.17
1.35	160.00	26.54
1.40	195.00	35.42
1.44	230.00	43.92
1.45	0.00	45.07
2.00	0.00	45.07

RYCB3-Storage		
Depth (m)	Area (m2)	Volume (m3)
0.00	0.36	0.00
1.68	0.36	0.60
1.73	3.00	0.69
1.78	10.00	1.01
1.83	20.00	1.76
1.86	35.00	2.59
1.87	0.00	2.76
2.68	0.00	2.76

RYCB4-Storage		
Depth (m)	Area (m2)	Volume (m3)
0.00	0.36	0.00
1.40	0.36	0.50
1.45	18.00	0.96
1.50	63.00	2.99
1.55	117.00	7.49
1.60	183.00	14.99
1.65	267.00	26.24
1.70	345.00	41.54
1.71	0.00	43.26
2.40	0.00	43.26

Provence Orleans - Block 126 (120057)
PCSWMM Model Results (Ponding)

NOVATECH
Engineers, Planners & Landscape Architects

CB / CBMH 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%)
CB1	87.30	89.00	89.31	0.31	88.99	89.09	89.20	89.23	0.00	0.09	0.20	0.23	0.00	0.00	0.00	0.00
CB3	87.78	89.18	89.48	0.30	88.21	89.00	89.37	89.41	0.00	0.00	0.19	0.23	0.00	0.00	0.00	0.00
CB4	87.78	89.18	89.43	0.25	88.21	89.01	89.37	89.41	0.00	0.00	0.19	0.23	0.00	0.00	0.00	0.00
CB5	87.43	89.13	89.38	0.25	89.12	89.24	89.34	89.37	0.00	0.11	0.21	0.24	0.00	0.00	0.00	0.00
CB6	87.62	89.02	89.32	0.30	87.94	89.05	89.24	89.29	0.00	0.03	0.22	0.27	0.00	0.00	0.00	0.00
CB7	87.57	88.97	89.26	0.29	87.94	89.05	89.25	89.29	0.00	0.08	0.28	0.32	0.00	0.00	0.00	0.03
CBMH01	86.63	89.15	89.45	0.30	87.94	88.97	89.32	89.36	0.00	0.00	0.17	0.21	0.00	0.00	0.00	0.00
CBMH02	86.20	89.08	89.38	0.30	87.94	88.97	89.32	89.36	0.00	0.00	0.24	0.28	0.00	0.00	0.00	0.00
RYCB1	86.78	88.18	88.78	0.60	86.79	86.92	88.31	88.44	0.00	0.00	0.13	0.26	0.00	0.00	0.00	0.00
RYCB2	87.44	88.44	88.88	0.44	87.48	87.50	88.68	88.78	0.00	0.00	0.24	0.34	0.00	0.00	0.00	0.00
RYCB3	86.87	88.55	88.73	0.18	86.97	87.37	88.67	88.75	0.00	0.00	0.12	0.20	0.00	0.00	0.00	0.02
RYCB4	87.75	89.15	89.45	0.30	87.94	88.97	89.32	89.36	0.00	0.00	0.17	0.21	0.00	0.00	0.00	0.00

[1] *4-hour Chicago Storm.*

Date: 5/14/2021
M:\2020\120057\DATA\Calculations\Sewer\SWM\120057-Model Results.xlsx

Provence Orleans - Block 126 (120057)
Summary of Hydraulic Grade Line (HGL) Elevations

NOVATECH
Engineers, Planners & Landscape Architects

MH ID	Obvert Elevation (m)	T/G Elevation (m)	HGL Elevation[1] (m)	Surcharge (m)	Clearance from T/G (m)	HGL in Stress Test[1] (m)
MH2	86.27	89.25	86.02	0.00	3.23	86.02
MH4	86.39	89.37	86.16	0.00	3.21	86.17
MH6	86.80	89.26	89.32	2.52	0.00	89.36
MH8	87.20	89.46	89.37	2.18	0.09	89.41
MH10	86.68	89.37	89.37	2.69	0.00	89.41
MH12	86.53	89.32	86.40	0.00	2.92	86.40
MH14	86.71	89.30	86.50	0.00	2.80	86.50
MH16	87.30	89.59	89.24	1.94	0.35	89.29
MH18	86.41	89.31	89.24	2.83	0.07	89.29
CBMH01	87.16	89.15	89.32	2.16	0.00	89.36
CBMH02	86.50	89.08	89.32	2.82	0.00	89.36

[1] *4-hour Chicago Storm; Normal outfall (100yr HGL in MH116 = 85.73).*

Provence Orleans – Block 126 (120057)
PCSWMM Model Schematic

Overall Model Schematic

Date: 2021-05-03
M:\2020\120057\DATA\Calculations\Sewer\SWM\PCSWMM Model Schematic.docx

Provence Orleans – Block 126 (120057)
PCSWMM Model Schematic

Subcatchment ID's

Date: 2021-05-03
M:\2020\120057\DATA\Calculations\Sewer\SWM\PCSWMM Model Schematic.docx

Provence Orleans – Block 126 (120057)
PCSWMM Model Schematic

Node ID's

Date: 2021-05-03
M:\2020\120057\DATA\Calculations\Sewer\SWM\PCSWMM Model Schematic.docx

Provence Orleans – Block 126
PCSWMM Model Output
100yr 4-hour Chicago Storm

NOVATECH
Engineers, Planners & Landscape Architects

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

****
Element Count
****

Number of rain gages 1
Number of subcatchments ... 14
Number of nodes 40
Number of links 48
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
RG1	C4hr-100yr	INTENSITY	10 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
A1	0.08	53.33	62.90	0.5000	RG1	CB1
A-10	0.16	45.71	2.90	0.5000	RG1	RYCB1
A11	0.12	24.00	8.30	0.5000	RG1	RYCB3
A12	0.13	28.89	37.40	0.5000	RG1	RYCB2
A2	0.12	60.00	72.90	0.5000	RG1	CBMH02
A3	0.07	35.00	81.40	0.5000	RG1	CBMH01
A4	0.04	40.00	0.00	0.5000	RG1	RYCB4
A5	0.07	23.33	72.90	0.5000	RG1	CB3
A6	0.10	50.00	75.70	0.5000	RG1	CB4
A7	0.15	75.00	81.40	0.5000	RG1	CB5
A8	0.08	40.00	75.70	0.5000	RG1	CB6
A9	0.17	85.00	75.70	0.5000	RG1	CB7
B1	0.01	50.00	0.00	33.3300	RG1	OF2
B2	0.00	15.00	0.00	0.5000	RG1	OF4

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
CB07-Dummy	JUNCTION	86.34	3.63	0.0	
CBMH02-Dummy	JUNCTION	86.20	2.88	0.0	
HP-CB13	JUNCTION	89.38	1.00	0.0	
HP-CB2	JUNCTION	89.38	1.00	0.0	
HP-CB20	JUNCTION	89.31	1.00	0.0	
HP-CB3	JUNCTION	89.45	1.00	0.0	
HP-CB6	JUNCTION	89.48	1.00	0.0	
HP-CB8	JUNCTION	89.43	1.00	0.0	
HP-CB9	JUNCTION	89.32	1.00	0.0	
HP-RYCB2	JUNCTION	88.88	1.00	0.0	
HP-RYCB3	JUNCTION	88.73	1.00	0.0	
HP-RYCB4	JUNCTION	89.23	1.00	0.0	
MH10_Dummy	JUNCTION	86.38	2.99	0.0	
MH18_Dummy	JUNCTION	86.11	3.21	0.0	
HP-CB7	OUTFALL	89.26	1.00	0.0	
MH116	OUTFALL	85.69	0.53	0.0	
OF1	OUTFALL	88.78	1.00	0.0	
OF2	OUTFALL	89.00	0.00	0.0	
OF4	OUTFALL	89.24	0.00	0.0	
CB1	STORAGE	87.30	2.70	0.0	
CB3	STORAGE	87.78	2.40	0.0	
CB4	STORAGE	87.78	2.40	0.0	
CB5	STORAGE	87.43	2.70	0.0	
CB6	STORAGE	87.62	2.40	0.0	
CB7	STORAGE	87.57	2.40	0.0	
CBMH01	STORAGE	86.63	3.52	0.0	
CBMH02	STORAGE	86.20	3.88	0.0	
MH10	STORAGE	86.38	3.99	0.0	
MH12	STORAGE	86.15	3.17	0.0	
MH14	STORAGE	86.41	2.89	0.0	
MH16	STORAGE	86.70	2.89	0.0	
MH18	STORAGE	86.11	3.20	0.0	
MH2	STORAGE	85.74	3.51	0.0	
MH4	STORAGE	85.94	3.43	0.0	
MH6	STORAGE	86.27	3.99	0.0	
MH8	STORAGE	86.82	2.64	0.0	
RYCB1	STORAGE	86.78	2.40	0.0	
RYCB2	STORAGE	87.44	2.00	0.0	
RYCB3	STORAGE	86.87	2.68	0.0	
RYCB4	STORAGE	87.75	2.40	0.0	

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	CBMH01	HP-CB3	CONDUIT	3.0	-10.0504	0.2500
C10	CB4	HP-CB8	CONDUIT	3.0	-8.6994	0.2500
C11	CB5	HP-CB13	CONDUIT	3.0	-8.3624	0.2500
C12	HP-CB13	CB1	CONDUIT	3.0	12.7695	0.2500
C13	CB6	HP-CB9	CONDUIT	3.0	-10.0504	0.2500
C14	HP-CB9	CB7	CONDUIT	3.0	11.7469	0.2500
C15	HP-CB8	CB5	CONDUIT	3.0	10.0504	0.2500
C16	RYCB2	HP-RYCB2	CONDUIT	3.0	-14.8270	0.0350
C17	HP-RYCB2	RYCB3	CONDUIT	23.5	1.4044	0.0350
C18	RYCB3	HP-RYCB3	CONDUIT	3.0	-6.0108	0.0350
C19	HP-RYCB3	RYCB1	CONDUIT	3.0	18.6494	0.0350
C2	HP-CB3	CBMH02	CONDUIT	3.0	10.3889	0.2500
C20	RYCB1	OF1	CONDUIT	3.0	-20.4124	0.0350
C21_1	RYCB4	HP-RYCB4	CONDUIT	3.0	-2.6676	0.0350
C21_2	HP-RYCB4	CBMH01	CONDUIT	3.0	2.6676	0.0350
C22	MH10	HP-CB8	CONDUIT	3.0	-2.0004	0.2500
C3	CBMH02	HP-CB2	CONDUIT	3.0	-10.0504	0.2500
C4	HP-CB2	CB1	CONDUIT	3.0	12.7695	0.2500
C5	CB7	HP-CB7	CONDUIT	3.0	-9.7122	0.2500
C6	HP-CB20	CB7	CONDUIT	3.0	11.4068	0.2500
C7	CB1	HP-CB20	CONDUIT	3.0	-10.3889	0.2500
C8	CB3	HP-CB6	CONDUIT	3.0	-10.0504	0.2500
C9	HP-CB6	CB4	CONDUIT	3.0	10.3889	0.2500
CB3-MH8	CB3	MH8	CONDUIT	27.1	0.9964	0.0130
CB4-MH10	CB4	MH10	CONDUIT	5.5	0.9091	0.0130
CB6-MH16	CB6	MH16	CONDUIT	29.2	0.9932	0.0130
CB7-MH18	CB7	CB07-Dummy	CONDUIT	2.5	0.8000	0.0130
CBMH01-MH6	CBMH01	MH6	CONDUIT	31.5	0.9842	0.0130
CBMH02-MH4	CBMH02-Dummy	MH4	CONDUIT	22.8	0.4825	0.0130
Dummy-MH18	CB07-Dummy	MH18	CONDUIT	22.1	0.9955	0.0130
MH10-MH12	MH10_Dummy	MH12	CONDUIT	37.6	0.3989	0.0130
MH12-MH4	MH12	MH4	CONDUIT	39.7	0.3276	0.0130
MH14-MH12	MH14	MH12	CONDUIT	36.4	0.4945	0.0130
MH16-Dummy	MH16	CB07-Dummy	CONDUIT	35.7	1.0085	0.0130
MH18-MH2	MH18_Dummy	MH2	CONDUIT	19.2	0.9896	0.0130
MH2-MH116	MH2	MH116	CONDUIT	20.3	0.2507	0.0130
MH4-MH2	MH4	MH2	CONDUIT	41.0	0.2929	0.0130
MH6-CBMH02	MH6	CBMH02	CONDUIT	12.4	0.5645	0.0130
MH8-MH10	MH8	MH10	CONDUIT	39.0	1.0001	0.0130
RYCB2-ICD	RYCB2	RYCB3	CONDUIT	50.8	1.0040	0.0130
RYCB4-CBMH01	RYCB4	CBMH01	CONDUIT	9.4	0.9575	0.0130
CB1-ICD	CB1	MH4	ORIFICE			
CB5-ICD	CB5	MH12	ORIFICE			
CBMH02-ICD	CBMH02	CBMH02-Dummy	ORIFICE			
MH10-ICD	MH10	MH10_Dummy	ORIFICE			
MH18-ICD	MH18	MH18_Dummy	ORIFICE			
RYCB1-ICD	RYCB1	MH14	ORIFICE			
RYCB3-ICD	RYCB3	MH10_Dummy	ORIFICE			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	Road_Transect	1.00	7.76	2.15	8.70	1	16404.35
C10	Road_Transect	1.00	7.76	2.15	8.70	1	15262.04
C11	Road_Transect	1.00	7.76	2.15	8.70	1	14963.52
C12	Road_Transect	1.00	7.76	2.15	8.70	1	18490.78
C13	Road_Transect	1.00	7.76	2.15	8.70	1	16404.35
C14	Road_Transect	1.00	7.76	2.15	8.70	1	17734.92
C15	Road_Transect	1.00	7.76	2.15	8.70	1	16404.35
C16	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	21438.57
C17	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	6598.02

C18	TRAPEZOIDAL	1.00	3.15	0.49	6.15	1	13650.11
C19	TRAPEZOIDAL	1.00	4.50	0.58	7.50	1	38400.65
C2	Road_Transect	1.00	7.76	2.15	8.70	1	16678.37
C20	TRAPEZOIDAL	1.00	4.50	0.58	7.50	1	40174.74
C21_1	RECT_OPEN	1.00	3.00	0.60	3.00	1	9959.60
C21_2	RECT_OPEN	1.00	3.00	0.60	3.00	1	9959.60
C22	Road_Transect	1.00	7.76	2.15	8.70	1	7318.57
C3	Road_Transect	1.00	7.76	2.15	8.70	1	16404.35
C4	Road_Transect	1.00	7.76	2.15	8.70	1	18490.78
C5	Road_Transect	1.00	7.76	2.15	8.70	1	16125.96
C6	Road_Transect	1.00	7.76	2.15	8.70	1	17476.33
C7	Road_Transect	1.00	7.76	2.15	8.70	1	16678.37
C8	Road_Transect	1.00	7.76	2.15	8.70	1	16404.35
C9	Road_Transect	1.00	7.76	2.15	8.70	1	16678.37
CB3-MH8	CIRCULAR	0.38	0.11	0.09	0.38	1	175.02
CB4-MH10	CIRCULAR	0.20	0.03	0.05	0.20	1	31.27
CB6-MH16	CIRCULAR	0.30	0.07	0.07	0.30	1	96.38
CB7-MH18	CIRCULAR	0.20	0.03	0.05	0.20	1	29.34
CBMH01-MH6	CIRCULAR	0.53	0.22	0.13	0.53	1	426.67
CBMH02-MH4	CIRCULAR	0.30	0.07	0.07	0.30	1	67.17
Dummy-MH18	CIRCULAR	0.60	0.28	0.15	0.60	1	612.67
MH10-MH12	CIRCULAR	0.30	0.07	0.07	0.30	1	61.08
MH12-MH4	CIRCULAR	0.38	0.11	0.09	0.38	1	100.36
MH14-MH12	CIRCULAR	0.30	0.07	0.07	0.30	1	68.01
MH16-Dummy	CIRCULAR	0.60	0.28	0.15	0.60	1	616.64
MH18-MH2	CIRCULAR	0.30	0.07	0.07	0.30	1	96.20
MH2-MH116	CIRCULAR	0.53	0.22	0.13	0.53	1	215.32
MH4-MH2	CIRCULAR	0.45	0.16	0.11	0.45	1	154.31
MH6-CBMH02	CIRCULAR	0.53	0.22	0.13	0.53	1	323.15
MH8-MH10	CIRCULAR	0.38	0.11	0.09	0.38	1	175.35
RYCB2-ICD	CIRCULAR	0.25	0.05	0.06	0.25	1	59.59
RYCB4-CBMH01	CIRCULAR	0.25	0.05	0.06	0.25	1	58.19

```
****************
Transect Summary
****************

Transect Road_Transect
Area:
          0.0013    0.0053    0.0120    0.0213    0.0334
          0.0483    0.0657    0.0836    0.1018    0.1201
          0.1387    0.1578    0.1774    0.1976    0.2183
          0.2395    0.2613    0.2836    0.3060    0.3284
          0.3507    0.3731    0.3955    0.4178    0.4402
          0.4626    0.4850    0.5073    0.5297    0.5521
          0.5745    0.5968    0.6192    0.6416    0.6640
          0.6864    0.7088    0.7312    0.7536    0.7760
          0.7984    0.8208    0.8432    0.8656    0.8880
          0.9104    0.9328    0.9552    0.9776    1.0000
Hrad:
          0.0046    0.0091    0.0137    0.0182    0.0226
          0.0270    0.0337    0.0423    0.0508    0.0591
          0.0675    0.0765    0.0868    0.0988    0.1127
          0.1286    0.1466    0.1691    0.1953    0.2226
          0.2506    0.2792    0.3079    0.3369    0.3658
          0.3946    0.4234    0.4519    0.4801    0.5082
          0.5359    0.5633    0.5904    0.6171    0.6435
          0.6696    0.6953    0.7207    0.7458    0.7705
          0.7948    0.8189    0.8426    0.8660    0.8891
          0.9119    0.9343    0.9565    0.9784    1.0000
Width:
          0.1188    0.2375    0.3563    0.4751    0.6019
          0.7287    0.7964    0.8051    0.8137    0.8223
          0.8389    0.8633    0.8877    0.9122    0.9366
          0.9610    0.9855    0.9977    0.9978    0.9979
          0.9979    0.9980    0.9981    0.9982    0.9982
          0.9983    0.9984    0.9984    0.9985    0.9986
          0.9987    0.9987    0.9988    0.9989    0.9989
          0.9990    0.9991    0.9992    0.9992    0.9993
          0.9994    0.9994    0.9995    0.9996    0.9996
          0.9997    0.9998    0.9999    0.9999    1.0000


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

****************
Analysis Options
****************
Flow Units ............... LPS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 06/02/2020 00:00:00
Ending Date .............. 06/03/2020 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:00:30
Wet Time Step ............ 00:05:00
Dry Time Step ............ 00:05:00
Routing Time Step ........ 1.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 100
Number of Threads ........ 2
Head Tolerance ........... 0.000500 m


**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......         0.099        76.002
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         0.032        24.251
Surface Runoff ...........         0.068        51.833
Final Storage ............         0.001         0.549
Continuity Error (%) .....        -0.831


**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.068         0.675
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........         0.068         0.676
Flooding Loss ............         0.000         0.000
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.000         0.000
Continuity Error (%) .....        -0.077


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


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


*************************
Routing Time Step Summary
*************************
Minimum Time Step           :     0.50 sec
Average Time Step           :     1.00 sec
Maximum Time Step           :     1.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     2.02
Percent Not Converging      :     0.01


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

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
A1	76.00	0.00	0.00	17.84	47.04	10.91	57.95	0.05	35.04	0.762
A-10	76.00	0.00	0.00	51.29	2.20	25.06	25.06	0.04	18.26	0.330
A11	76.00	0.00	0.00	50.58	6.31	25.70	25.70	0.03	12.10	0.338
A12	76.00	0.00	0.00	37.02	28.19	39.18	39.18	0.05	26.78	0.515
A2	76.00	0.00	0.00	13.02	55.01	7.98	62.99	0.08	54.54	0.829
A3	76.00	0.00	0.00	8.88	61.27	5.62	66.89	0.05	33.22	0.880
A4	76.00	0.00	0.00	48.89	0.00	28.08	28.08	0.01	10.48	0.370
A5	76.00	0.00	0.00	13.16	54.69	7.75	62.44	0.04	30.81	0.822
A6	76.00	0.00	0.00	11.65	57.14	7.21	64.35	0.06	46.17	0.847
A7	76.00	0.00	0.00	8.88	61.44	5.62	67.07	0.10	71.18	0.882
A8	76.00	0.00	0.00	11.65	56.92	7.21	64.13	0.05	36.94	0.844
A9	76.00	0.00	0.00	11.65	57.05	7.21	64.27	0.11	78.49	0.846
B1	76.00	0.00	0.00	47.02	0.00	33.43	33.43	0.00	4.28	0.440
B2	76.00	0.00	0.00	47.40	0.00	31.46	31.46	0.00	1.25	0.414

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days	hr:min	Reported Max Depth Meters
CB07-Dummy	JUNCTION	0.74	2.90	89.24	0	02:20	2.90
CBMH02-Dummy	JUNCTION	0.02	0.06	86.26	0	02:11	0.06
HP-CB13	JUNCTION	0.00	0.00	89.38	0	00:00	0.00
HP-CB2	JUNCTION	0.00	0.00	89.38	0	00:00	0.00
HP-CB20	JUNCTION	0.00	0.00	89.31	0	00:00	0.00
HP-CB3	JUNCTION	0.00	0.00	89.45	0	00:00	0.00
HP-CB6	JUNCTION	0.00	0.00	89.48	0	00:00	0.00
HP-CB8	JUNCTION	0.00	0.00	89.43	0	00:00	0.00
HP-CB9	JUNCTION	0.00	0.00	89.32	0	00:00	0.00
HP-RYCB2	JUNCTION	0.00	0.00	88.88	0	00:00	0.00
HP-RYCB3	JUNCTION	0.00	0.00	88.73	0	00:00	0.00
HP-RYCB4	JUNCTION	0.01	0.09	89.32	0	02:08	0.09
MH10_Dummy	JUNCTION	0.02	0.15	86.53	0	02:07	0.15
MH18_Dummy	JUNCTION	0.02	0.05	86.16	0	02:20	0.05
HP-CB7	OUTFALL	0.00	0.00	89.26	0	00:00	0.00
MH116	OUTFALL	0.04	0.23	85.92	0	01:49	0.23
OF1	OUTFALL	0.00	0.00	88.78	0	00:00	0.00
OF2	OUTFALL	0.00	0.00	89.00	0	00:00	0.00
OF4	OUTFALL	0.00	0.00	89.24	0	00:00	0.00
CB1	STORAGE	0.09	1.90	89.20	0	01:41	1.90
CB3	STORAGE	0.23	1.59	89.37	0	02:04	1.59
CB4	STORAGE	0.23	1.59	89.37	0	02:04	1.59
CB5	STORAGE	0.07	1.91	89.34	0	01:34	1.91
CB6	STORAGE	0.35	1.62	89.24	0	02:20	1.62
CB7	STORAGE	0.37	1.68	89.25	0	02:20	1.68
CBMH01	STORAGE	0.53	2.69	89.32	0	02:09	2.69
CBMH02	STORAGE	0.66	3.12	89.32	0	02:11	3.12
MH10	STORAGE	0.54	2.99	89.37	0	02:04	2.99
MH12	STORAGE	0.03	0.25	86.40	0	01:48	0.25
MH14	STORAGE	0.00	0.09	86.50	0	01:50	0.09
MH16	STORAGE	0.61	2.54	89.24	0	02:20	2.54
MH18	STORAGE	0.84	3.13	89.24	0	02:20	3.13
MH2	STORAGE	0.05	0.28	86.02	0	01:49	0.28
MH4	STORAGE	0.03	0.22	86.16	0	01:48	0.22
MH6	STORAGE	0.64	3.05	89.32	0	02:10	3.05
MH8	STORAGE	0.42	2.55	89.37	0	02:04	2.55
RYCB1	STORAGE	0.05	1.53	88.31	0	01:50	1.53
RYCB2	STORAGE	0.05	1.24	88.68	0	01:56	1.24
RYCB3	STORAGE	0.08	1.80	88.67	0	01:55	1.80
RYCB4	STORAGE	0.27	1.57	89.32	0	02:09	1.57

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
CB07-Dummy	JUNCTION	0.00	68.62	0	01:24	0	0.171	-0.315
CBMH02-Dummy	JUNCTION	0.00	6.24	0	02:11	0	0.134	-0.002
HP-CB13	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-CB2	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-CB20	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-CB3	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-CB6	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-CB8	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-CB9	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-RYCB2	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-RYCB3	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-RYCB4	JUNCTION	0.00	8.39	0	01:31	0	0.0109	0.019
MH10_Dummy	JUNCTION	0.00	24.03	0	01:55	0	0.19	-0.246
MH18_Dummy	JUNCTION	0.00	5.96	0	02:06	0	0.161	-0.002
HP-CB7	OUTFALL	0.00	0.00	0	00:00	0	0	0.000 ltr
MH116	OUTFALL	0.00	84.04	0	01:49	0	0.672	0.000
OF1	OUTFALL	0.00	0.00	0	00:00	0	0	0.000 ltr
OF2	OUTFALL	4.28	4.28	0	01:30	0.00334	0.00334	0.000
OF4	OUTFALL	1.25	1.25	0	01:30	0.000944	0.000944	0.000
CB1	STORAGE	35.04	35.04	0	01:30	0.0464	0.0464	0.032
CB3	STORAGE	30.81	32.00	0	01:29	0.0437	0.0445	0.257
CB4	STORAGE	46.17	46.17	0	01:30	0.0644	0.0644	0.055
CB5	STORAGE	71.18	71.18	0	01:30	0.101	0.101	0.021
CB6	STORAGE	36.94	44.44	0	01:25	0.0513	0.0514	0.529
CB7	STORAGE	78.49	83.77	0	01:30	0.109	0.11	0.059
CBMH01	STORAGE	33.22	40.66	0	01:25	0.0468	0.0645	-0.095
CBMH02	STORAGE	54.54	74.69	0	01:29	0.0756	0.149	0.021
MH10	STORAGE	0.00	38.28	0	01:27	0	0.115	-0.035
MH12	STORAGE	0.00	62.46	0	01:47	0	0.331	0.109
MH14	STORAGE	0.00	11.99	0	01:50	0	0.0401	-0.012
MH16	STORAGE	0.00	66.85	0	01:25	0	0.059	-0.468
MH18	STORAGE	0.00	45.23	0	01:26	0	0.163	0.036
MH2	STORAGE	0.00	84.04	0	01:48	0	0.672	-0.017
MH4	STORAGE	0.00	78.09	0	01:48	0	0.511	0.034
MH6	STORAGE	0.00	36.44	0	01:27	0	0.074	0.041
MH8	STORAGE	0.00	35.57	0	01:25	0	0.0509	-0.308
RYCB1	STORAGE	18.26	18.26	0	01:30	0.0401	0.0401	-0.003
RYCB2	STORAGE	26.78	26.78	0	01:35	0.0509	0.0509	0.056
RYCB3	STORAGE	12.10	27.08	0	01:28	0.0308	0.0817	-0.088
RYCB4	STORAGE	10.48	23.41	0	01:30	0.0112	0.0156	0.153

****
Node Surcharge Summary
****

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

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
CB07-Dummy	JUNCTION	5.90	1.494	0.726

****
Node Flooding Summary
****

No nodes were flooded.

****

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

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
CB1	0.000	1	0	0	0.009	25	0 01:41	9.42
CB3	0.001	2	0	0	0.015	29	0 02:04	22.66
CB4	0.001	4	0	0	0.012	45	0 02:04	38.28
CB5	0.000	1	0	0	0.019	54	0 01:34	26.67
CB6	0.001	5	0	0	0.012	43	0 02:20	36.80
CB7	0.005	11	0	0	0.036	83	0 02:20	65.89
CBMH01	0.001	4	0	0	0.009	29	0 02:09	27.52
CBMH02	0.003	6	0	0	0.025	54	0 02:11	39.50
MH10	0.001	13	0	0	0.003	75	0 02:04	27.61
MH12	0.000	1	0	0	0.000	8	0 01:48	62.45
MH14	0.000	0	0	0	0.000	3	0 01:50	11.99
MH16	0.001	21	0	0	0.003	88	0 02:20	11.46
MH18	0.001	26	0	0	0.004	98	0 02:20	14.01
MH2	0.000	1	0	0	0.000	8	0 01:49	84.04
MH4	0.000	1	0	0	0.000	7	0 01:48	78.09
MH6	0.001	16	0	0	0.003	76	0 02:10	21.49
MH8	0.000	16	0	0	0.003	97	0 02:04	5.27
RYCB1	0.000	0	0	0	0.003	2	0 01:50	11.99
RYCB2	0.000	1	0	0	0.012	28	0 01:56	18.00
RYCB3	0.000	1	0	0	0.001	43	0 01:55	18.00
RYCB4	0.001	2	0	0	0.010	22	0 02:09	6.75

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

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
HP-CB7	0.00	0.00	0.00	0.000
MH116	43.93	17.81	84.04	0.672
OF1	0.00	0.00	0.00	0.000
OF2	3.23	1.33	4.28	0.003
OF4	3.18	0.37	1.25	0.001
System	10.07	19.50	1.25	0.676

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

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C1	CHANNEL	0.00	0 00:00	0.00	0.00	0.08
C10	CHANNEL	0.00	0 00:00	0.00	0.00	0.10
C11	CHANNEL	0.00	0 00:00	0.00	0.00	0.10
C12	CHANNEL	0.00	0 00:00	0.00	0.00	0.10
C13	CHANNEL	0.00	0 00:00	0.00	0.00	0.11
C14	CHANNEL	0.00	0 00:00	0.00	0.00	0.14
C15	CHANNEL	0.00	0 00:00	0.00	0.00	0.10
C16	CONDUIT	0.00	0 00:00	0.00	0.00	0.12
C17	CONDUIT	0.00	0 00:00	0.00	0.00	0.06
C18	CONDUIT	0.00	0 00:00	0.00	0.00	0.06
C19	CONDUIT	0.00	0 00:00	0.00	0.00	0.06
C2	CHANNEL	0.00	0 00:00	0.00	0.00	0.09
C20	CONDUIT	0.00	0 00:00	0.00	0.00	0.06
C21_1	CONDUIT	3.57	0 01:32	0.02	0.00	0.13
C21_2	CONDUIT	7.70	0 01:31	0.06	0.00	0.13
C22	CHANNEL	0.00	0 00:00	0.00	0.00	0.00
C3	CHANNEL	0.00	0 00:00	0.00	0.00	0.12
C4	CHANNEL	0.00	0 00:00	0.00	0.00	0.10
C5	CHANNEL	0.00	0 00:00	0.00	0.00	0.14
C6	CHANNEL	0.00	0 00:00	0.00	0.00	0.14
C7	CHANNEL	0.00	0 00:00	0.00	0.00	0.10
C8	CHANNEL	0.00	0 00:00	0.00	0.00	0.10
C9	CHANNEL	0.00	0 00:00	0.00	0.00	0.10
CB3-MH8	CONDUIT	22.66	0 01:25	0.85	0.13	1.00
CB4-MH10	CONDUIT	38.28	0 01:27	1.22	1.22	1.00
CB6-MH16	CONDUIT	36.80	0 01:25	1.07	0.38	1.00
CB7-MH18	CONDUIT	65.89	0 01:24	2.10	2.25	1.00
CBMH01-MH6	CONDUIT	27.52	0 01:28	0.40	0.06	1.00
CBMH02-MH4	CONDUIT	6.24	0 02:11	0.61	0.09	0.23
Dummy-MH18	CONDUIT	45.23	0 01:26	0.35	0.07	1.00
MH10-MH12	CONDUIT	24.03	0 01:55	0.80	0.39	0.51
MH12-MH4	CONDUIT	62.45	0 01:48	0.95	0.62	0.58
MH14-MH12	CONDUIT	11.99	0 01:50	0.59	0.18	0.43
MH16-Dummy	CONDUIT	46.31	0 01:26	0.27	0.08	1.00
MH18-MH2	CONDUIT	5.96	0 02:06	0.73	0.06	0.24
MH2-MH116	CONDUIT	84.04	0 01:49	0.82	0.39	0.48
MH4-MH2	CONDUIT	78.09	0 01:48	1.08	0.51	0.47
MH6-CBMH02	CONDUIT	33.57	0 01:28	0.16	0.10	1.00
MH8-MH10	CONDUIT	23.17	0 01:24	0.27	0.13	1.00
RYCB2-ICD	CONDUIT	18.00	0 01:28	0.62	0.30	1.00
RYCB4-CBMH01	CONDUIT	14.45	0 01:24	0.59	0.25	1.00
CB1-ICD	ORIFICE	9.42	0 01:41			1.00
CB5-ICD	ORIFICE	26.67	0 01:34			1.00
CBMH02-ICD	ORIFICE	6.24	0 02:11			1.00
MH10-ICD	ORIFICE	6.07	0 02:57			1.00
MH18-ICD	ORIFICE	5.96	0 02:06			1.00
RYCB1-ICD	ORIFICE	11.99	0 01:50			1.00
RYCB3-ICD	ORIFICE	18.00	0 01:55			1.00

```
**************************
Flow Classification Summary
**************************
```

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 ----------								
C1	1.69	0.84	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C10	1.64	0.87	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C11	1.63	0.97	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C12	1.78	0.96	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C13	1.69	0.80	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C14	1.75	0.80	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C15	1.69	0.97	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C16	3.02	0.96	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C17	1.00	0.97	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C18	2.19	0.97	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C19	3.65	0.97	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2	1.70	0.84	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C20	3.78	0.97	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C21_1	2.15	0.84	0.01	0.00	0.14	0.00	0.00	0.00	0.80	0.00
C21_2	2.15	0.84	0.01	0.00	0.14	0.00	0.00	0.00	0.81	0.00
C22	1.30	0.98	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C3	1.69	0.84	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4	1.78	0.96	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C5	1.68	0.80	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C6	1.74	0.80	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C7	1.70	0.96	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C8	1.69	0.87	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C9	1.70	0.87	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CB3-MH8	1.00	0.01	0.00	0.00	0.19	0.00	0.00	0.80	0.01	0.00
CB4-MH10	1.00	0.01	0.00	0.00	0.18	0.00	0.00	0.81	0.00	0.00
CB6-MH16	1.00	0.01	0.00	0.00	0.27	0.00	0.00	0.72	0.02	0.00
CB7-MH18	1.00	0.01	0.00	0.00	0.26	0.00	0.00	0.73	0.00	0.00
CBMH01-MH6	1.00	0.01	0.00	0.00	0.33	0.00	0.00	0.67	0.06	0.00
CBMH02-MH4	1.00	0.01	0.00	0.00	0.02	0.00	0.00	0.97	0.02	0.00
Dummy-MH18	1.00	0.01	0.00	0.00	0.43	0.00	0.00	0.56	0.05	0.00
MH10-MH12	1.00	0.01	0.00	0.00	0.03	0.00	0.00	0.96	0.00	0.00
MH12-MH4	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
MH14-MH12	1.00	0.05	0.01	0.00	0.07	0.00	0.00	0.88	0.07	0.00
MH16-Dummy	1.00	0.01	0.26	0.00	0.73	0.00	0.00	0.00	0.66	0.00
MH18-MH2	1.00	0.01	0.00	0.00	0.03	0.00	0.00	0.96	0.03	0.00
MH2-MH116	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.56	0.00
MH4-MH2	1.00	0.01	0.00	0.00	0.02	0.00	0.00	0.97	0.00	0.00
MH6-CBMH02	1.00	0.01	0.43	0.00	0.56	0.00	0.00	0.00	0.66	0.00
MH8-MH10	1.00	0.01	0.00	0.00	0.27	0.00	0.00	0.72	0.05	0.00
RYCB2-ICD	1.00	0.06	0.00	0.00	0.06	0.00	0.00	0.88	0.01	0.00
RYCB4-CBMH01	1.00	0.06	0.00	0.00	0.21	0.00	0.00	0.74	0.00	0.00

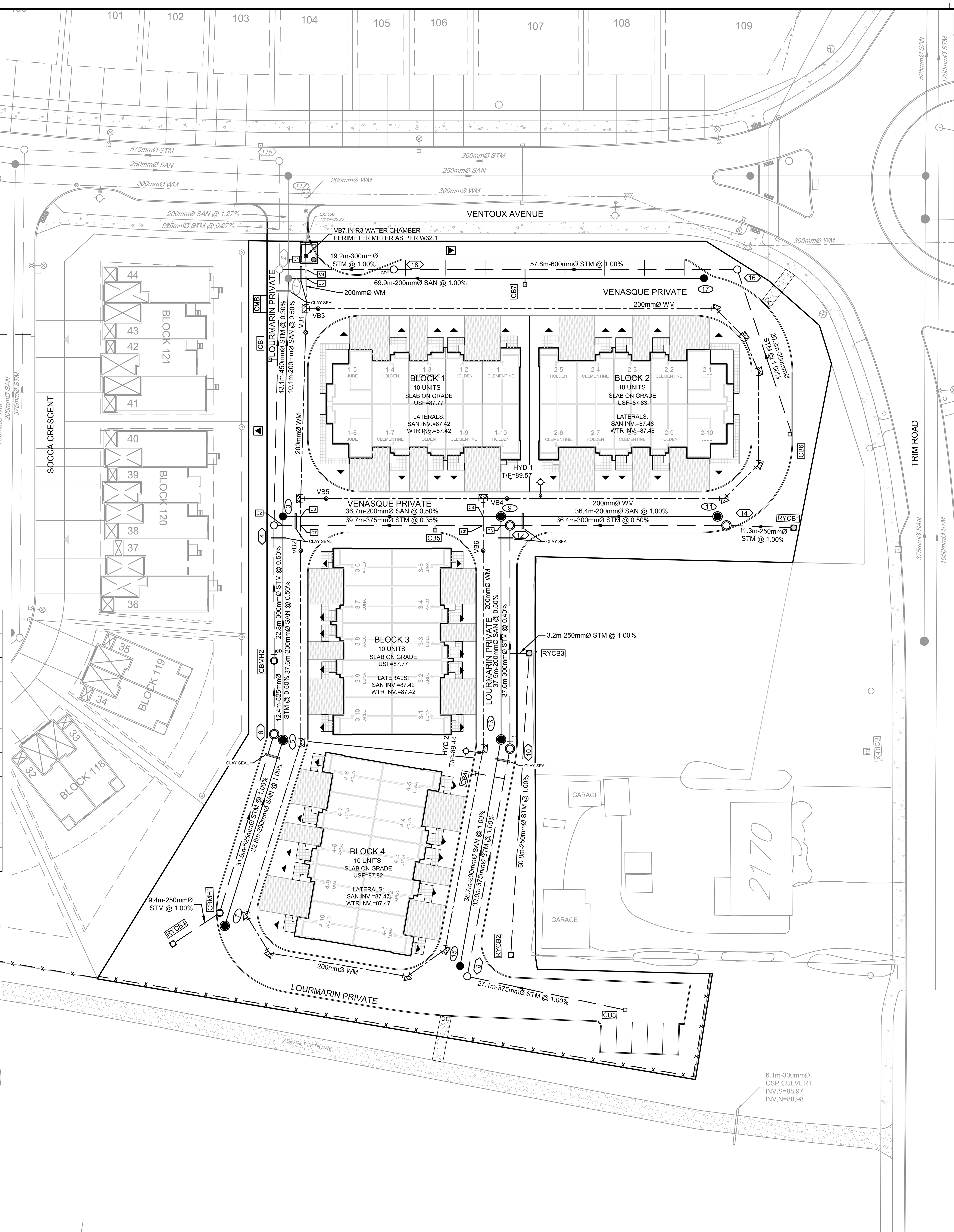
```
*************************
Conduit Surcharge Summary
*************************
```

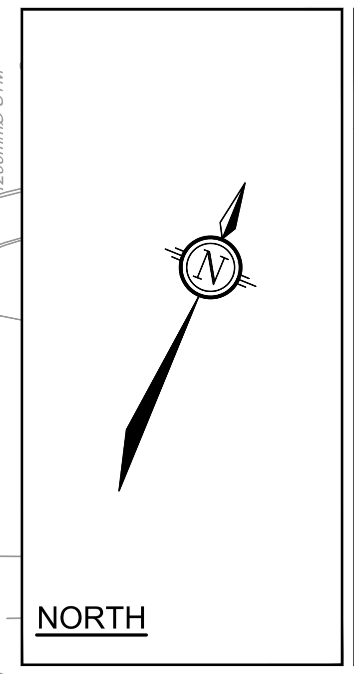
Conduit	Hours Full Both Ends	Hours Full Upstream	Hours Full Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
CB3-MH8	3.88	3.88	4.19	0.01	0.01
CB4-MH10	4.07	4.09	4.13	0.07	0.08
CB6-MH16	5.70	5.70	6.10	0.01	0.01
CB7-MH18	5.88	5.94	5.91	0.11	0.06
CBMH01-MH6	5.48	5.48	6.01	0.01	0.01
Dummy-MH18	7.27	7.27	7.99	0.01	0.01
MH16-Dummy	6.58	6.58	7.27	0.01	0.01
MH6-CBMH02	6.13	6.13	6.33	0.01	0.01
MH8-MH10	4.83	4.83	5.52	0.01	0.01
RYCB2-ICD	1.12	1.12	1.31	0.01	0.01
RYCB4-CBMH01	4.67	4.67	4.75	0.01	0.01

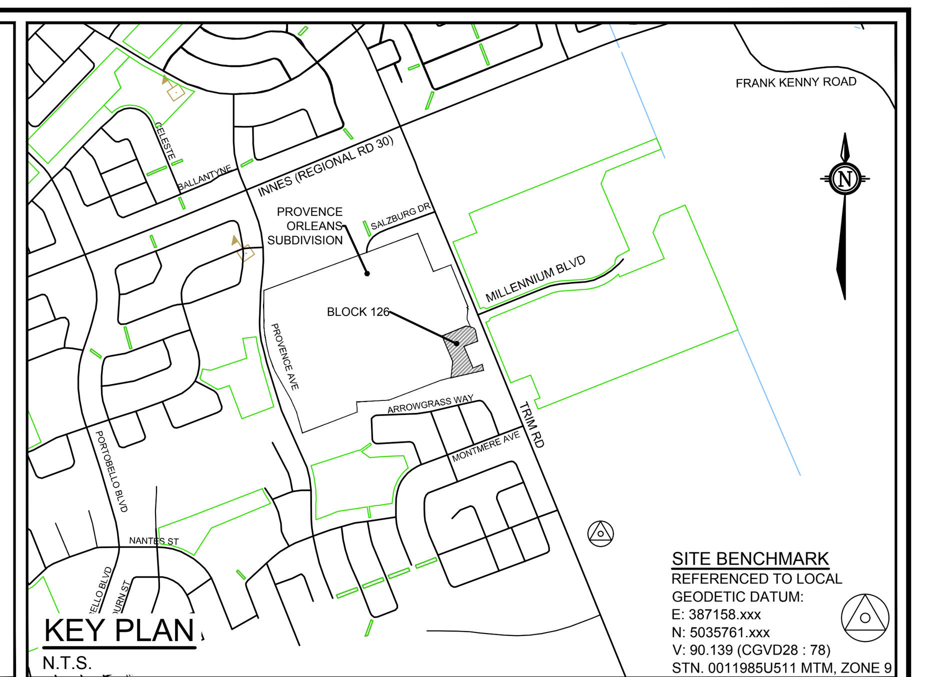
Analysis begun on: Fri May 14 10:58:34 2021
Analysis ended on: Fri May 14 10:58:38 2021
Total elapsed time: 00:00:04

APPENDIX C: Drawings

120057-GP
120057-GR
120057-STM
120057-ESC







WATERMAIN TABLE

Station	F/G ELEVATION	TOP OF WATERMAIN	DESCRIPTION
1+027.11	89.22	86.82	200x200 TEE
1+031.11	89.16	89.16	VB1
1+059.07	89.41	87.01	200x200 TEE
1+067.82	89.38	86.98	VB2
1+099.76	89.27	86.87	22.5° H. BEND
1+130.64	89.33	86.93	45° H.BEND
1+139.71	89.37	86.97	45° H.BEND
1+164.18	89.59	87.19	45° H.BEND
2+011.65	89.22	86.82	VB3
2+079.11	89.36	86.96	45° H.BEND
2+087.29	89.36	86.96	45° H.BEND
2+111.55	89.25	86.85	45° H.BEND
2+121.07	89.35	86.95	45° H.BEND
2+152.60	89.32	86.92	HYD1 CONNECTION
2+158.24	89.30	86.90	VB4
2+162.24	89.27	86.87	200x200 TEE
2+188.65	89.41	87.01	VB5
3+009.85	89.27	86.87	VB6
3+043.37	89.25	86.85	11° H.BEND
3+044.16	89.24	86.84	HYD2 CONNECTION
3+077.95	89.48	87.08	45° H.BEND

CATCHBASIN TABLE

CB ID	T/G ELEVATION	INVERT	I.C.D.	RELEASE RATE
CB1	89.00	87.30	Tempest LMF Vortex 89	9.4
CB3	89.18	87.78	-	-
CB4	89.18	87.78	-	-
CB5	89.13	87.43	Tempest MHF 98mm	26.7
CB6	89.02	87.62	-	-
CB7	88.97	87.57	-	-

REAR YARD CATCHBASIN TABLE

RYCB No.	T/G ELEVATION	INVERT	I.C.D.	RELEASE RATE
RYCB1	88.18	86.78	Tempest MHF 70mm	12.0
RYCB2	88.44	87.44	-	-
RYCB3	88.55	86.87	Tempest MHF 82mm	18.0
RYCB4	89.15	87.75	-	-

SANITARY MANHOLE TABLE

MANHOLE ID	SIZE(mm)	T/G ELEV (m)	INVERT (m)	PIPE DIAMETER (mm)
1	1200Ø	89.32	N=84.73 S=85.23 E=85.29	N=200 S=200 E=200
3	1200Ø	89.40	S=85.44 E=85.44 N=85.43	S=200 E=200 N=200
5	1200Ø	89.27	S=85.66 N=85.63	S=200 N=200
7	1200Ø	89.20	N=85.99	N=200
9	1200Ø	89.31	W=85.62 S=85.68 E=85.63	W=200 S=200 E=200
11	1200Ø	89.33	W=85.99	W=200
13	1200Ø	89.34	S=85.90 N=85.87	S=200 N=200
15	1200Ø	89.47	N=86.29	N=200
17	1200Ø	89.35	W=85.99	W=200
117	1200Ø	89.36	W=83.92 E=83.91 S=84.51	W=250 E=250 S=200

SEWER CROSSING TABLE

LOCATION	ELEVATIONS	CLEARANCE
C1	STM INV=85.94 SAN OBV=84.91	1.03m
C2	STM INV=86.02 SAN OBV=85.65	0.37m
C3	STM INV=86.15 SAN OBV=85.89	0.26m
C4	WM INV=86.72 STM OBV=86.30	0.42m
C5	WM INV=86.70 SAN OBV=85.52	1.18m
C6	WM OBV=86.83 SAN INV=85.66	1.17m
C7	WM INV=86.81 STM OBV=86.41	0.40m
C8	WM INV=86.66 SAN OBV=85.81	0.85m
C9	WM INV=86.66 STM OBV=86.51	0.15m

STORM MANHOLE TABLE

MANHOLE ID	SIZE(mm)	T/G ELEV (m)	INVERT (m)	PIPE DIAMETER (mm)	I.C.D.	RELEASE RATE
2	1200Ø	89.34	N=85.70 E=85.92 S=85.81	N=525 E=300 S=450	-	-
4	1200Ø	89.37	N=85.94 S=86.09 E=86.02	N=450 S=300 E=375	-	-
6	1200Ø	89.26	N=86.27 S=86.32	N=525 S=525	-	-
8	1200Ø	89.47	N=86.82 E=87.51	N=375 E=375	-	-
10	1200Ø	89.37	N=86.38 S=86.43	N=300 S=375	Tempest LMF Vortex 64	6.1
12	1200Ø	89.32	S=86.23 E=86.23 W=86.15	S=300 E=300 W=375	-	-
14	1200Ø	89.29	W=86.41 E=86.67	W=300 E=250	-	-
16	1200Ø	89.59	SE=87.33 W=86.70	SE=300 W=600	-	-
18	1200Ø	89.31	E=86.12 W=86.11	E=600 W=300	Tempest LMF Vortex 63	6.0
116	1500Ø	89.34	W=85.54 S=85.68 E=85.91	W=675 S=525 E=300	-	-
CBMH1	1200Ø	89.15	SW=87.66 N=86.63	SW=250 N=525	-	-
CBMH2	1200Ø	89.08	N=86.20 S=86.20	N=300 S=525	Tempest LMF Vortex 64	6.2

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.

LEGEND

SANITARY MANHOLE, SEWER & DIRECTION OF FLOW WITH COVER PER S28.1	ROAD CATCHBASIN
SANITARY MANHOLE WITH COMPRESSION ASSEMBLY TOP	ROAD CATCHBASIN WITH ICD
STORM MANHOLE, SEWER & DIRECTION OF FLOW WITH COVER PER S28.1	REAR YARD CATCH BASIN
STORM MANHOLE WITH COMPRESSION ASSEMBLY TOP	REAR YARD CATCH BASIN WITH ICD
WATERMAIN AND DIAMETER	HYDRANT C/W VALVE & LEAD TF= TOP OF FLANGE ELEVATION
VALVE & VALVE BOX	CAP
VALVE & VALVE CHAMBER	HYDRO TRANSFORMER
BEND AND THRUST BLOCK	COMMUNITY MAIL BOX

GENERAL NOTES:

1. DIMENSIONS AND LAYOUT INFORMATION SHALL BE CONFIRMED PRIOR TO START 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 PG4278-3 (DATED MARCH 30, 2021), 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 1.8m 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 AND COVER ARE TO BE COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY. WHERE THE BEDDING IS LOCATED WITHIN FIRM TO SOFT GREY SILTY CLAY, THE THICKNESS OF THE BEDDING MATERIAL SHOULD BE INCREASED TO A MINIMUM OF 300m. THE COVER MATERIAL SHALL CONSIST OF OPSS GRANULAR 'A' AND SHOULD EXTEND FROM THE SPRING LINE OF THE PIPE TO AT LEAST 300mm ABOVE THE OBVERT OF THE PIPE.
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.
9. SAN & STM COMPRESSION ASSEMBLY TOP BY EJ GROUP INC. PRODUCT NUMBERS: SAN-41420049W01 & STM-41420050W01

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 CLEARANCE BETWEEN OUTSIDE OF PIPES AT ALL CROSSINGS PER W25 (0.50m) AND W25.2 (0.25m).
6. WATER LATERAL AND SERVICE POST ARE TO BE CONSTRUCTED 2.0m FROM BACK OF CURB USING 19mmØ PEX.

No.	REVISION	DATE	BY
8.	CITY SUBMISSION	MAY 14/21	MAB
7.	CITY SUBMISSION	MAY 3/21	MAB
6.	CITY SUBMISSION	APR 06/21	MAB
5.	CITY SUBMISSION	MAR 24/21	MAB
4.	CITY COMMENTS	NOV 24/20	MAB
3.	CITY COMMENTS	OCT 16/20	MAB
2.	CITY COMMENTS	SEP 24/20	MAB
1.	ISSUED FOR APPROVAL	JUN 29/20	MAB

SCALE 1:400

DESIGN DTD | CHECKED MAB | DRAWN DTD | CHECKED MAB | APPROVED JGR

FOR REVIEW ONLY

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

LICENSED PROFESSIONAL ENGINEER — M.A. BISSETT 2021.05.14 — PROVINCE OF ONTARIO

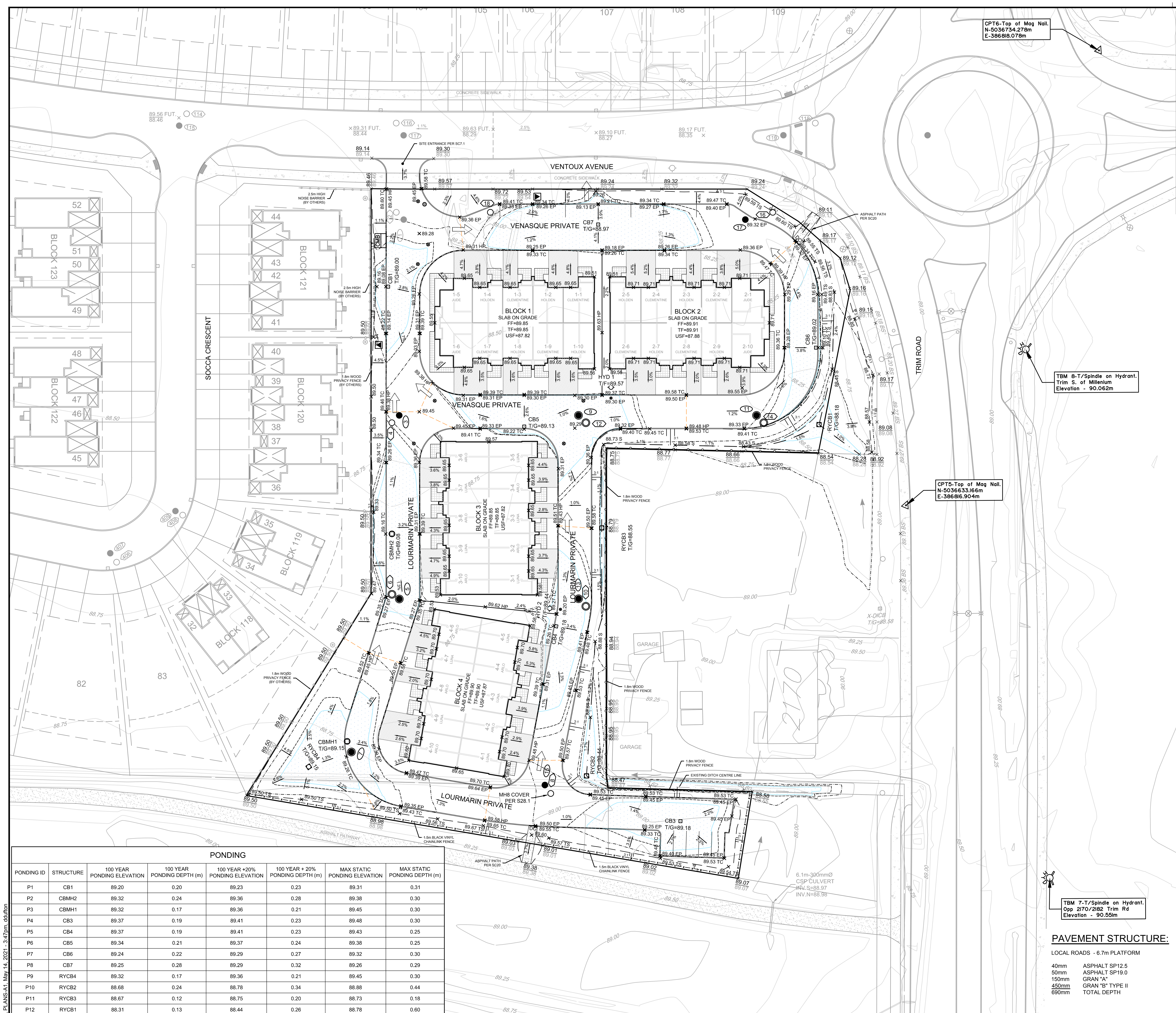
NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

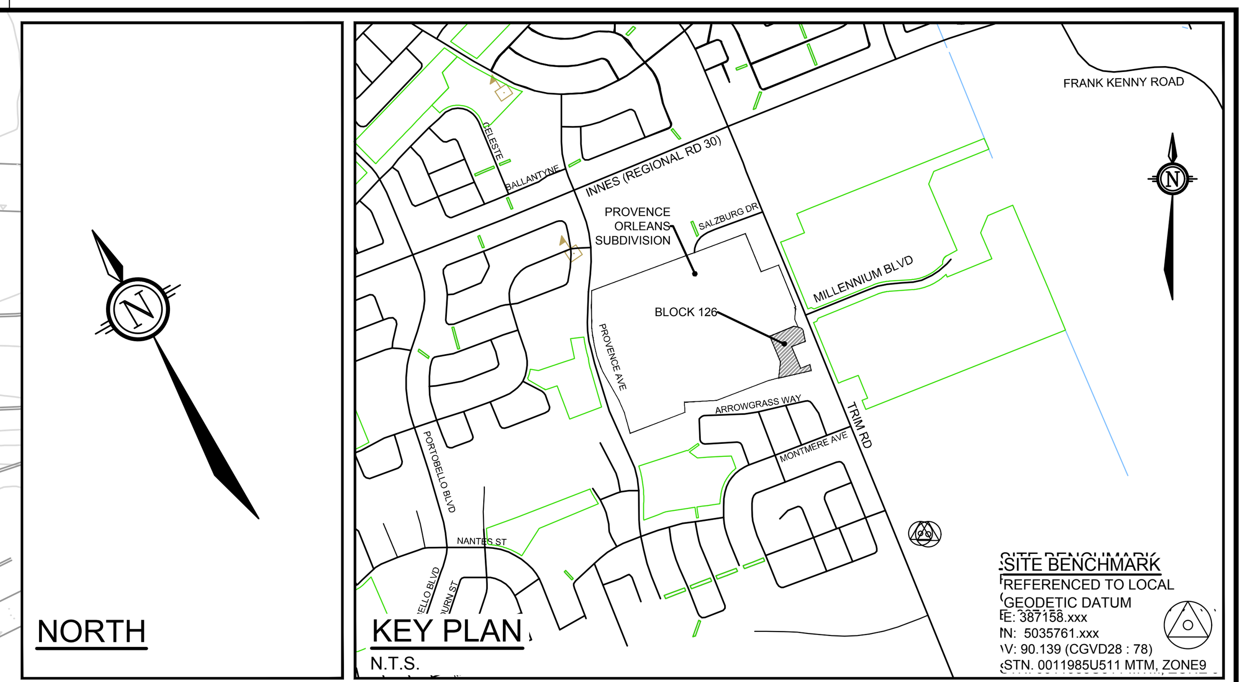
CITY OF OTTAWA
PROVENCE ORLEANS - 2128 TRIM ROAD (BLOCK 126)

GENERAL PLAN OF SERVICE

PROJECT No. 120057
REV: REV # 8
DRAWING No. 120057-GP

D07-12-20-0095
PLAN #18172





LEGEND

- PROPOSED GRADE AND DIRECTION
- PROPOSED ELEVATION AT HIGH POINT
- PROPOSED ELEVATION / EXISTING ELEVATION
- EXISTING ELEVATION
- EXISTING ELEVATION AT BACK OF SIDEWALK
- EXISTING CONTOUR AND ELEVATION
- SWALE AND TERRACE
- 100 yr PONDING AREA
- 100 yr + 20% PONDING AREA
- MAX. STATIC PONDING AREA
- HYDRO TRANSFORMER
- CMB COMMUNITY MAILBOX
- PROPOSED SANITARY MANHOLE
- SANITARY MANHOLE WITH COMPRESSION ASSEMBLY TOP
- PROPOSED STORM MANHOLE
- STORM MANHOLE WITH COMPRESSION ASSEMBLY TOP
- RYCB1 PROPOSED CATCHBASIN WITH ICD
- PROPOSED REAR YARD CATCHBASIN WITH ICD
- VB PROPOSED VALVE & VALVE BOX LOCATION
- HYD PROPOSED HYDRANT WITH TOP OF FLANGE ELEVATION
- 1.8m WOOD PRIVACY FENCE
- 1.5m BLACK VINYL CHAINLINK FENCE
- 2.5m HIGH NOISE BARRIER

GENERAL NOTES:

1. ALL DIMENSIONS AND LAYOUT INFORMATION SHALL BE CONFIRMED PRIOR TO COMMENCEMENT OF CONSTRUCTION.
2. THE ORIGINAL TOPOGRAPHY AND GROUND ELEVATIONS, SERVICING AND SURVEY INFORMATION SHOWN ON THIS PLAN ARE SUPPLIED FOR INFORMATION PURPOSES ONLY. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE ACCURACY OF ALL INFORMATION OBTAINED FROM THIS PLAN.
3. CO-ORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
4. BEFORE COMMENCING CONSTRUCTION, PROVIDE PROOF OF COMPREHENSIVE ALL RISK AND OPERATIONAL LIABILITY INSURANCE INCLUDING BLASTING. INSURANCE POLICY TO NAME THE OWNER, ENGINEER AND THE CITY AS CO-INSURED. AMOUNT OF INSURANCE TO BE SPECIFIED BY OWNER'S AGENT.
5. CONNECT TO EXISTING SYSTEMS AS DETAILED, INCLUDING ALL RESTORATION WORK NECESSARY TO REINSTATE SURFACES TO EXISTING CONDITIONS OR BETTER.
6. DETERMINE THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION. PROTECT AND ASSUME ALL RESPONSIBILITY FOR ALL EXISTING UTILITIES WHETHER OR NOT SHOWN ON THESE DRAWINGS.
7. OBTAIN AND PAY FOR ALL NECESSARY PERMITS AND APPROVALS BEFORE COMMENCING CONSTRUCTION.
8. RESTORE ALL TRENCHES AND SURFACE FEATURES TO EXISTING CONDITIONS OR BETTER AND TO THE SATISFACTION OF CITY OF OTTAWA AUTHORITIES.
   - ASPHALT RESTORATION SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA DETAIL R-10.
   - THICKNESS OF GRANULAR MATERIAL AND ASPHALT LAYERS TO MATCH EXISTING.
   - BOULEVARDS SHALL BE REINSTATED WITH 100mm OF TOPSOIL, SEED AND MULCH.
9. REMOVE FROM SITE ALL EXCESS EXCAVATED MATERIAL UNLESS OTHERWISE INSTRUCTED BY ENGINEER.
10. ALL ELEVATIONS ARE GEODETIC AND UTILIZE METRIC UNITS.
11. ALL FENCING TO BE LOCATED 0.15m INSIDE PROPERTY LINE. REFER TO LANDSCAPING PLAN FOR DETAILS.
12. REFER TO GEOTECHNICAL INVESTIGATION REPORT PG4278-3 (DATED MARCH 30, 2021), PREPARED BY PATERSON GROUP FOR SUBSURFACE CONDITIONS AND CONSTRUCTION RECOMMENDATIONS.
13. ALL BLOCKS ARE SLAB-ON-GRADE WITH NO FOUNDATION DRAINS BEING PROPOSED.
14. 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.
15. GRADE RAISE RESTRICTIONS ON SITE AS PER GEOTECHNICAL INVESTIGATION (DATED 10/2019) PREPARED BY PATERSON GROUP.

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 98% 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. BUILD ROADWAYS WITH 2% CROSSFALL INCLUDING SUBGRADE AND GRANULAR BASE.
6. 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'.
7. PRIOR TO PLACEMENT OF TOPLIFT, THE CONTRACTOR SHALL ADJUST ALL STRUCTURES TO FINAL GRADE PER CITY OF OTTAWA STANDARDS.
8. MINIMUM OF 2% GRADE FOR ALL GRASS AREAS UNLESS OTHERWISE NOTED.
9. MAXIMUM TERRACING GRADE TO BE 3:1 UNLESS OTHERWISE NOTED.
10. ALL GRADES BY CURBS ARE EDGE OF PAVEMENT GRADES UNLESS OTHERWISE INDICATED.
11. ALL CURBS SHALL BE MOUNTABLE CURB UNLESS OTHERWISE NOTED AND CONSTRUCTED PER CITY OF OTTAWA STANDARD (SC1.3).
12. REFER TO LANDSCAPE PLAN FOR PLANTING AND OTHER LANDSCAPE FEATURE DETAILS.

PAVEMENT STRUCTURE:

LOCAL ROADS - 6.7m PLATFORM

40mm	ASPHALT SP12.5
50mm	ASPHALT SP19.0
150mm	GRAN "A"
450mm	GRAN "B" TYPE II
690mm	TOTAL DEPTH

PONDING

PONDING ID	STRUCTURE	100 YEAR PONDING ELEVATION	100 YEAR PONDING DEPTH (m)	100 YEAR +20% PONDING ELEVATION	100 YEAR + 20% PONDING DEPTH (m)	MAX STATIC PONDING ELEVATION	MAX STATIC PONDING DEPTH (m)
P1	CB1	89.20	0.20	89.23	0.23	89.31	0.31
P2	CBMH2	89.32	0.24	89.36	0.28	89.38	0.30
P3	CBMH1	89.32	0.17	89.36	0.21	89.45	0.30
P4	CB3	89.37	0.19	89.41	0.23	89.48	0.30
P5	CB4	89.37	0.19	89.41	0.23	89.43	0.25
P6	CB5	89.34	0.21	89.37	0.24	89.38	0.25
P7	CB6	89.24	0.22	89.29	0.27	89.32	0.30
P8	CB7	89.25	0.28	89.29	0.32	89.26	0.29
P9	RYCB4	89.32	0.17	89.36	0.21	89.45	0.30
P10	RYCB2	88.68	0.24	88.78	0.34	88.88	0.44
P11	RYCB3	88.67	0.12	88.75	0.20	88.73	0.18
P12	RYCB1	88.31	0.13	88.44	0.26	88.78	0.60

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

No.	REVISION	DATE	BY
8.	CITY SUBMISSION	MAY 14/21	MAB
7.	CITY SUBMISSION	MAY 3/21	MAB
6.	CITY SUBMISSION	APR 6/21	MAB
5.	CITY SUBMISSION	MAR 24/21	MAB
4.	CITY COMMENTS	NOV 24/20	MAB
3.	CITY COMMENTS	OCT 16/20	MAB
2.	CITY COMMENTS	SEP 24/20	MAB
1.	ISSUED FOR APPROVAL	JUN 29/20	MAB

SCALE 1:400

DESIGN DTD · CHECKED MAB · DRAWN DTD · CHECKED MAB · APPROVED JGR

FOR REVIEW ONLY

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

LICENSED PROFESSIONAL ENGINEER — M.A. BISSETT — 2021.05.14 — PROVINCE OF ONTARIO

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

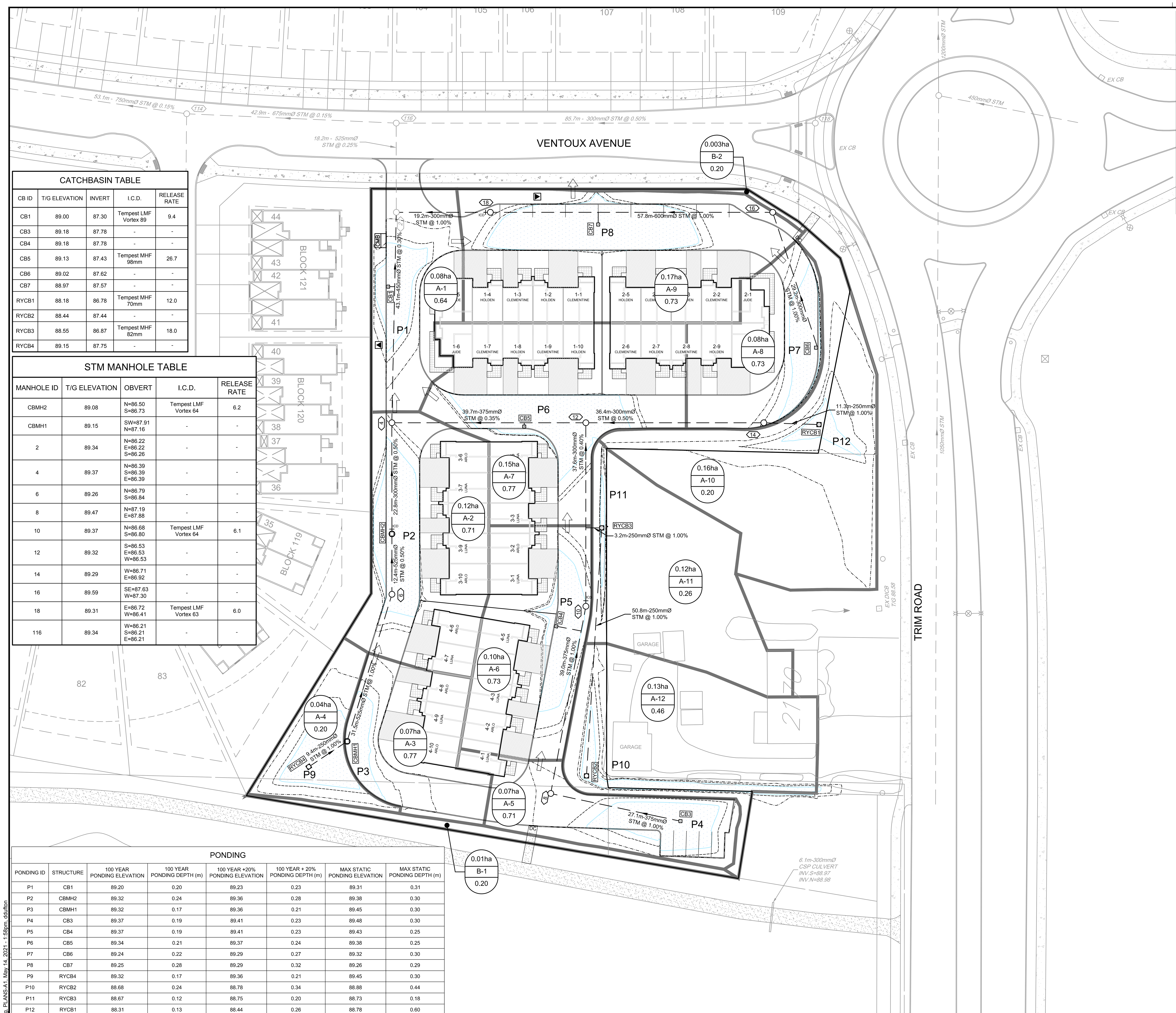
CITY OF OTTAWA
PROVENCE ORLEANS - 2128 TRIM ROAD (BLOCK 126)

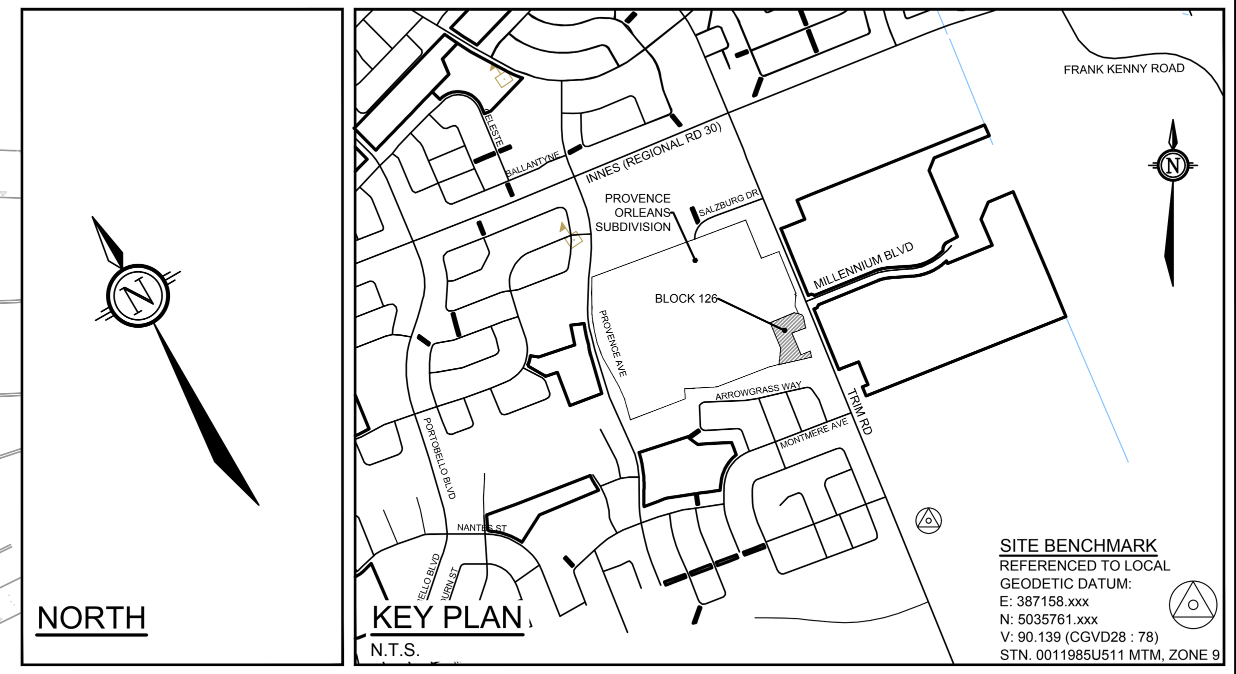
GRADING PLAN

PROJECT No. 120057
REV # 8
DRAWING No. 120057-GR

D07-12-20-0095
PLAN #18172

M:\2020\120057\CAD\Design\120057-GR.dwg, PLANS-A1, May 14, 2021 - 3:47pm, ddufton





LEGEND

- DRAINAGE AREA (hectares) — 0.24 ha
- AREA ID — 1
- RUN-OFF COEFFICIENT — 0.65
- DRAINAGE BOUNDARY AREA
- PROPOSED STORM MANHOLE & SEWER WITH DIRECTION OF FLOW
- EXISTING STORM MANHOLE & SEWER WITH DIRECTION OF FLOW
- CBMH — PROPOSED CATCHBASIN MANHOLE
- CBMH — EXISTING CATCHBASIN MANHOLE
- 95 — PROPOSED ROAD CATCHBASIN
- 95 — EXISTING ROAD CATCHBASIN
- RYCB — PROPOSED REAR YARD CATCHBASIN
- RYCB — EXISTING REAR YARD CATCHBASIN
- MAJOR SYSTEM FLOW ROUTE
- 100 yr PONDING AREA
- 100 yr + 20% PONDING AREA
- MAX. STATIC PONDING AREA
- HYDRO TRANSFORMER
- CMB — COMMUNITY MAILBOX

CATCHBASIN TABLE

CB ID	T/G ELEVATION	INVERT	I.C.D.	RELEASE RATE
CB1	89.00	87.30	Tempest LMF Vortex 89	9.4
CB3	89.18	87.78	-	-
CB4	89.18	87.78	-	-
CB5	89.13	87.43	Tempest MHF 98mm	26.7
CB6	89.02	87.62	-	-
CB7	88.97	87.57	-	-
RYCB1	88.18	86.78	Tempest MHF 70mm	12.0
RYCB2	88.44	87.44	-	-
RYCB3	88.55	86.87	Tempest MHF 82mm	18.0
RYCB4	89.15	87.75	-	-

STM MANHOLE TABLE

MANHOLE ID	T/G ELEVATION	OBVERT	I.C.D.	RELEASE RATE
CBMH2	89.08	N=86.50 S=86.73	Tempest LMF Vortex 64	6.2
CBMH1	89.15	SW=87.91 N=87.16	-	-
2	89.34	N=86.22 E=86.22 S=86.26	-	-
4	89.37	N=86.39 S=86.39 E=86.39	-	-
6	89.26	N=86.79 S=86.84	-	-
8	89.47	N=87.19 E=87.88	-	-
10	89.37	N=86.68 S=86.80	Tempest LMF Vortex 64	6.1
12	89.32	S=86.53 E=86.53 W=86.53	-	-
14	89.29	W=86.71 E=86.92	-	-
16	89.59	SE=87.63 W=87.30	-	-
18	89.31	E=86.72 W=86.41	Tempest LMF Vortex 63	6.0
116	89.34	W=86.21 S=86.21 E=86.21	-	-

PONDING

PONDING ID	STRUCTURE	100 YEAR PONDING ELEVATION	100 YEAR PONDING DEPTH (m)	100 YEAR +20% PONDING ELEVATION	100 YEAR + 20% PONDING DEPTH (m)	MAX STATIC PONDING ELEVATION	MAX STATIC PONDING DEPTH (m)
P1	CB1	89.20	0.20	89.23	0.23	89.31	0.31
P2	CBMH2	89.32	0.24	89.36	0.28	89.38	0.30
P3	CBMH1	89.32	0.17	89.36	0.21	89.45	0.30
P4	CB3	89.37	0.19	89.41	0.23	89.48	0.30
P5	CB4	89.37	0.19	89.41	0.23	89.43	0.25
P6	CB5	89.34	0.21	89.37	0.24	89.38	0.25
P7	CB6	89.24	0.22	89.29	0.27	89.32	0.30
P8	CB7	89.25	0.28	89.29	0.32	89.26	0.29
P9	RYCB4	89.32	0.17	89.36	0.21	89.45	0.30
P10	RYCB2	88.68	0.24	88.78	0.34	88.88	0.44
P11	RYCB3	88.67	0.12	88.75	0.20	88.73	0.18
P12	RYCB1	88.31	0.13	88.44	0.26	88.78	0.60

M:\2020\120057\CAD\Design\120057-STM.dwg, PLANS-A1, May 14, 2021 - 1:58pm, ddufton

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

No.	REVISION	DATE	BY
7.	CITY SUBMISSION	MAY 14/21	MAB
6.	CITY SUBMISSION	MAY 3/21	MAB
5.	CITY SUBMISSION	APR 6/21	MAB
4.	CITY SUBMISSION	MAR 24/21	MAB
3.	CITY COMMENTS	NOV 24/20	MAB
2.	CITY COMMENTS	SEP 24/20	MAB
1.	ISSUED FOR APPROVAL	JUN 29/20	MAB

SCALE
1:400
1:400
0 4 8 12 16

DESIGN DTD
CHECKED MAB
DRAWN DTD
CHECKED MAB
APPROVED JGR

FOR REVIEW ONLY

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

LICENSED PROFESSIONAL ENGINEER
M.A. BISSETT
2021.05.14
PROVINCE OF ONTARIO

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

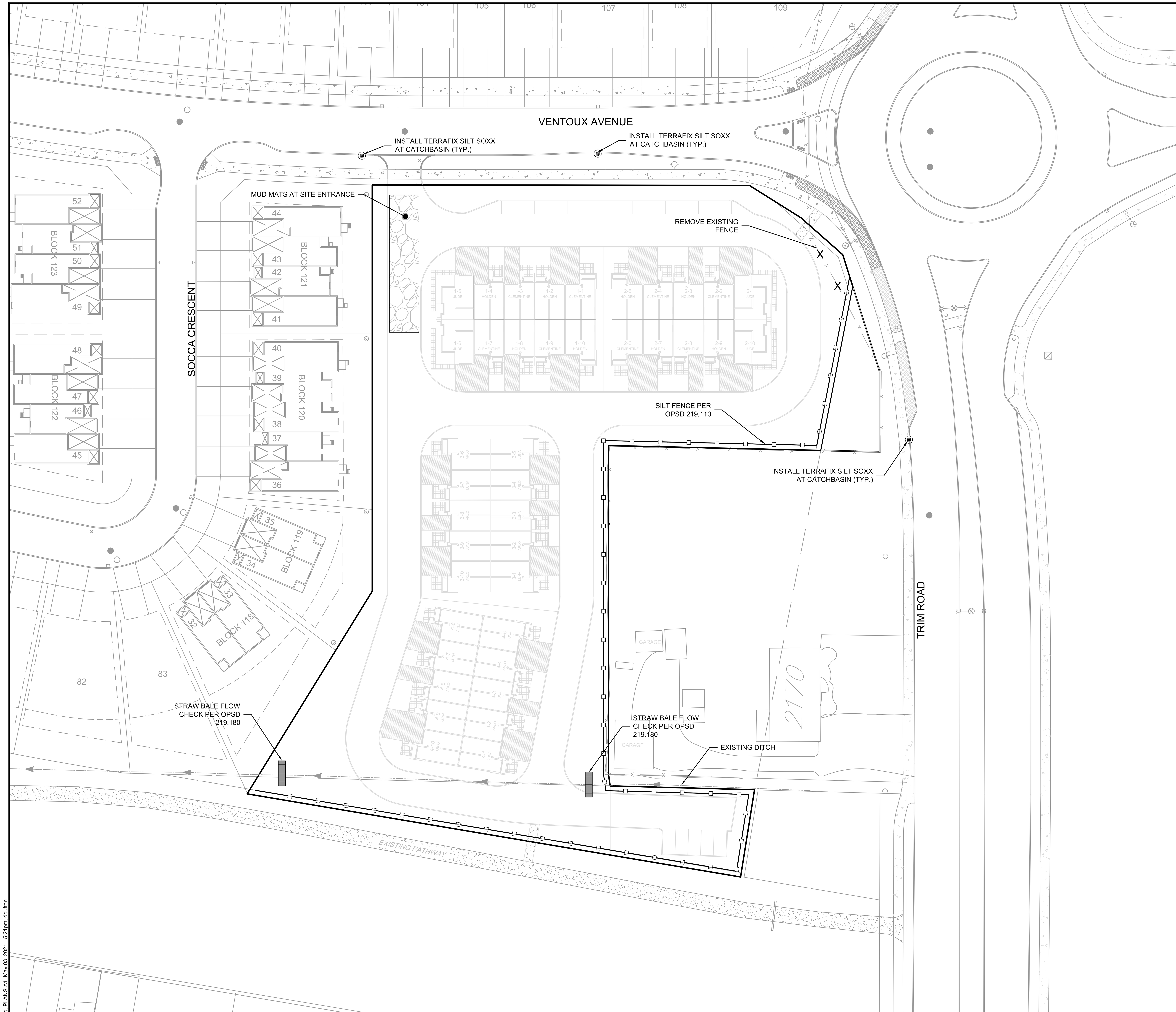
CITY OF OTTAWA
PROVENCE ORLEANS - 2128 TRIM ROAD (BLOCK 126)

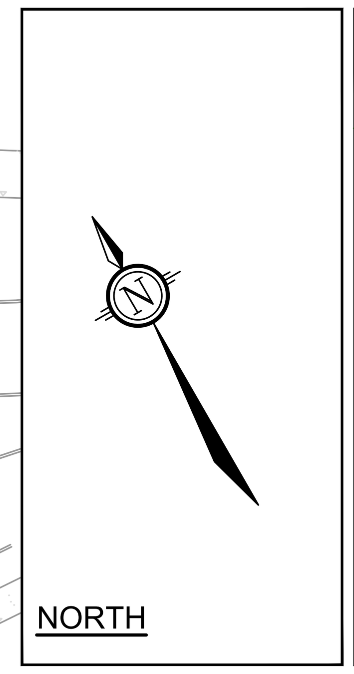
STORM DRAINAGE AREA PLAN

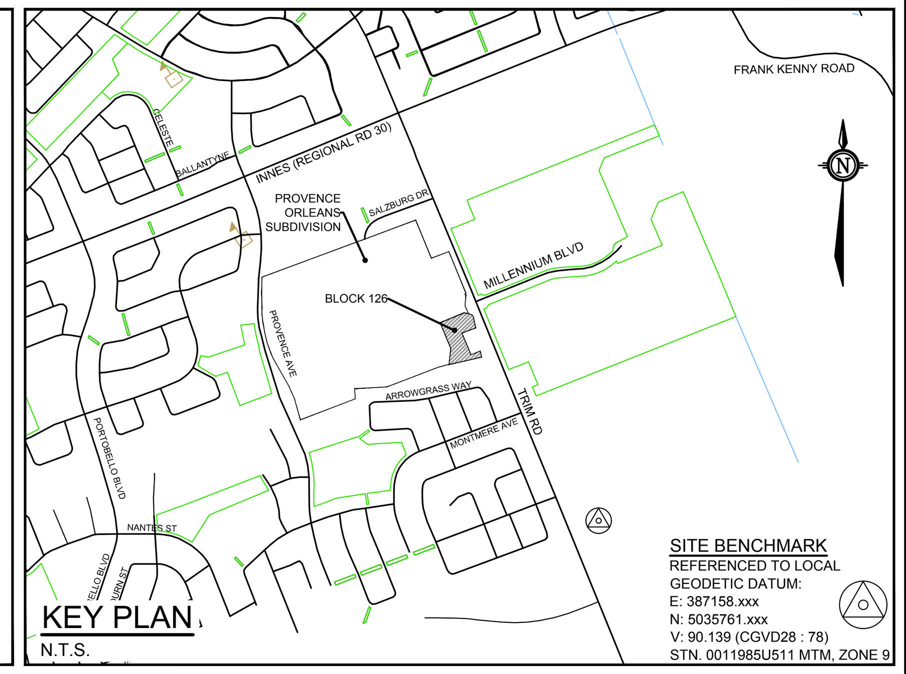
PROJECT No. 120057
REV REV # 7
DRAWING No. 120057-STM

PLANA1.DWG - 841mmx594mm

PLAN #18172 D07-12-20-0095







LEGEND

(hatched box)	MUD MATS (200mm GRANULAR B, TYPE II)	101.00	EXISITING GROUND CONTOUR AND LABEL
X	REMOVALS	(line with squares)	SILT FENCE PER OPSD 219.110
(circled square)	TERRAFIX SILT SOXX INSTALLED AT CATCH BASIN	(grey bar)	STRAW BALE FLOW CHECK PER OPSD 219.180

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. A LIGHT DUTY SILT FENCE BARRIER WILL ALSO BE INSTALLED IN SELECTED LOCATIONS SHOWN ON THIS PLAN, AND STRAW BALE BARRIERS WILL BE INSTALLED WITHIN THE OUTLET DITCHES. THESE CONTROL MEASURES WILL REMAIN IN PLACE UNTIL VEGETATION HAS BEEN ESTABLISHED AND CONSTRUCTION COMPLETE.

3. 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.

4. 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.

5. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.

6. THE CONTRACTOR SHALL ENSURE PROPER DUST CONTROL IS PROVIDED WITH THE APPLICATION OF WATER (AND IF REQUIRED, CALCIUM CHLORIDE) DURING DRY PERIODS.

7. THE CONTRACTOR SHALL PROTECT ALL SURVEY MONUMENTS.

8. ALL TOPSOIL AND ANY SOFT, WET OR DELETERIOUS MATERIAL SHALL BE REMOVED FROM IMPROVED AREAS UNLESS OTHERWISE DIRECTED BY ENGINEER.

M:\2020\120057\CAD\Design\120057-ESC.dwg, PLANS-A1, May 03, 2021 - 5:21pm, ddufton

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

No.	REVISION	DATE	BY
7.	CITY SUBMISSION	MAY 14/21	MAB
6.	CITY SUBMISSION	MAY 3/21	MAB
5.	CITY SUBMISSION	APR 6/21	MAB
4.	CITY SUBMISSION	MAR 24/21	MAB
3.	CITY COMMENTS	NOV 24/20	MAB
2.	CITY COMMENTS	SEP 24/20	MAB
1.	ISSUED FOR APPROVAL	JUN 29/20	MAB

SCALE
1:400
1:400
0 4 8 12 16

DESIGN	DTD
CHECKED	MAB
DRAWN	DTD
CHECKED	MAB
APPROVED	JGR

FOR REVIEW ONLY

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

LICENSED PROFESSIONAL ENGINEER
M.A. BISSETT
2021.05.14
PROVINCE OF ONTARIO

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

CITY OF OTTAWA
PROVENCE ORLEANS - 2128 TRIM ROAD (BLOCK 126)

REMOVALS &
EROSION AND SEDIMENT
CONTROL PLAN

PROJECT No. 120057
REV: REV # 7
DRAWING No. 120057-ESC

PLAN #8172 D07-12-20-0095

PLANA1.DWG - 841mmx594mm

Appendix D:

DSS Checklist

PROVENCE ORLEANS BLOCK 126, 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

PROVENCE ORLEANS BLOCK 126, 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	

PROVENCE ORLEANS BLOCK 126, OTTAWA
DEVELOPMENT SERVICING STUDY CHECKLIST

4.2 Water	Addressed (Y/N/NA)	Comments
Confirm consistency with Master Servicing Study, if available.	Y	
Availability of public infrastructure to service proposed development.	Y	Refer to Sections: 5.0 Sanitary Sewers, 6.0 Stormwater Management, 7.0 Water
Identification of system constraints.	N/A	
Identify boundary conditions.	Y	Provided by City of Ottawa
Confirmation of adequate domestic supply and pressure.	Y	Refer to Appendix A
Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development.	Y	Refer to Appendix A
Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.	Y	Refer to Appendix A
Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design.	N/A	
Address reliability requirements such as appropriate location of shut-off valves.	Y	
Check on the necessity of a pressure zone boundary modification.	N/A	
Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range.	Y	Refer to Section 7.0 Water
Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.	Y	Refer to Section 7.0 Water
Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.	N/A	
Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Y	Refer to Section 7.0 Water
Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	N/A	

PROVENCE ORLEANS BLOCK 126, OTTAWA
DEVELOPMENT SERVICING STUDY CHECKLIST

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 (120057-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	

PROVENCE ORLEANS BLOCK 126, OTTAWA
DEVELOPMENT SERVICING STUDY CHECKLIST

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	