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

35 Years

Mattino Developments Inc.
Block 21, Mattino Way

Servicing Design Brief

Engineering excellence. Planning precision. Inspired landscapes.

SERVICING DESIGN BRIEF
MATTINO DEVELOPMENTS INC.
BLOCK 21, MATTINO WAY

Prepared By:

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

November 1, 2019

Novatech File: 112021-10
Ref: R-2019-189

NOVATECH
Engineers, Planners & Landscape Architects

November 1, 2019

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

Attention: Mr. Kelby Lodoen Unseth, Planner II

Dear Mr. Lodoen Unseth:

Reference: Mattino Developments Inc.
Block 21, Mattino Way
Servicing Design Brief
Our File No.: 112021-10

Enclosed for your review and approval are three (3) copies of the Servicing Design Brief for the proposed Block 21 development.

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

Sincerely,

NOVATECH

Lucas Wilson, P.Eng.
Project Coordinator

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

Table of Contents

LIST OF TABLES

LIST OF FIGURES

APPENDICES

1.0 INTRODUCTION

The subject site is located within the Longfields community and is municipally known as 591 Via Mattino Way. The site is approximately 1.04 hectares and is bounded by a Transitway and Rail Corridor to the north and west, existing residential to the east, and the existing Longfields Central subdivision to the south. A key plan of the area is presented below in **Figure 1**.

Figure 1: Key Plan

The site is currently vacant. The proposed development will consist of 88 units in five three-storey apartment buildings (three 16-unit, two 20-unit apartments). The proposed site plan is shown in **Figure 2**.

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

This report should be read in conjunction with the following:

- Geotechnical Investigation, 'Proposed Residential Development, Mountshannon Drive, Ottawa, Ontario' prepared by Paterson dated January 31, 2013.

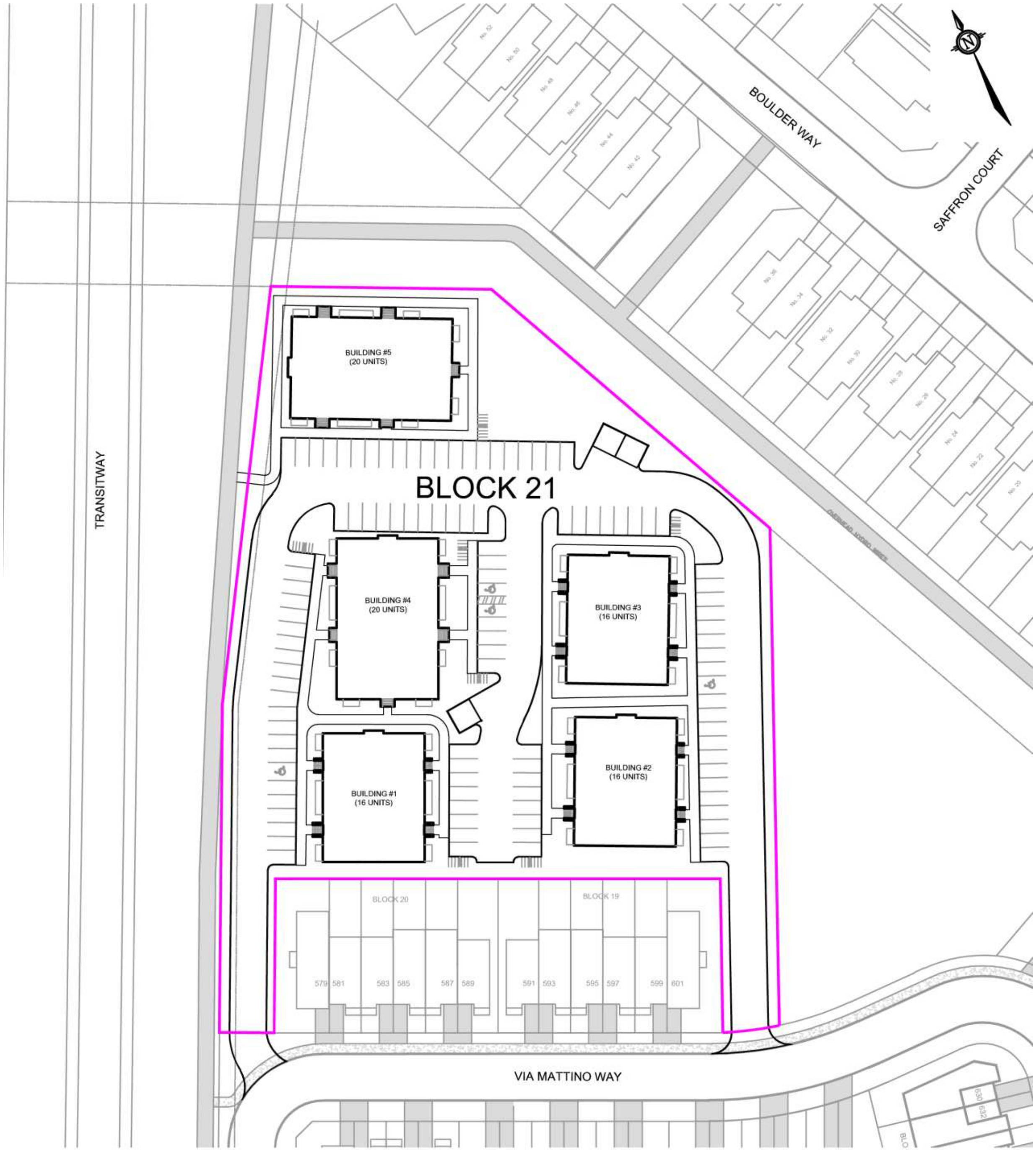


Figure 2: Site Plan

2.0 ROADWAYS

2.1 Existing Conditions

Currently there is access to the site through Via Mattino Way (Local Road).

2.2 Proposed Conditions

The development will be accessed from two entrances along Via Mattino Way.

All roads within the development are 6.7m private roads with at-grade parking.

2.3 Roadway Design

Paterson has prepared a Geotechnical Investigation report for the development (January 2013) that provides recommendations for roadway structure, servicing and foundations. The site consists of private roads and at-grade parking; the recommended roadway structure is as follows:

Table 2-1: Roadway Structure

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

3.0 GRADING

3.1 Existing Conditions

The site has a high point along the centre (north to south) and slopes approximately 1.0% easterly and westerly.

A Geotechnical investigation was carried out by Paterson which included 10 test pits within the Longfields Central subdivision (4 within the subject site). Test pits were dug at depths ranging from 6.10m to 6.70m below existing grade with no bedrock encountered. Each test pit was dry upon completion; therefore, groundwater levels were estimated based on moisture levels and colour of the recovered soil samples and expected to be between 2m to 3m below existing ground.

3.2 Proposed Conditions

The design grades will tie into existing elevations along the Transitway to the west, Parkland to the north and east and the adjacent residential lands to the south. For detailed grading refer to drawing 112021-10-GR.

The proposed grading will fall within these ranges:

- Landscaped Area: Minimum 1% - Maximum 7%
- Roadway and Parking: Minimum 1.0%
- Maximum Terracing Grade of 3H:1V

4.0 EROSION AND SEDIMENT CONTROL

The following 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).

- A qualified inspector should conduct regular visits to ensure the contractor is working in accord with the drawings and that mitigation measures are implemented as specified;
- Filter socks are to be placed under all new and existing catchbasins and storm manhole covers;
- Mud mats are to be placed at the construction entrances;
- Silt fences around the area under construction to be placed per OPSS 577 and OPSD 219.110;
- Application of topsoil and sod to disturbed areas; and,
- After complete build-out, all sewers are to be inspected and cleaned and all sediment and construction fencing is to be removed.

The proposed erosion and sediment control measures will be implemented prior to construction and will remain in place during construction until vegetation is established. There will be regular inspection and maintenance of the sediment control measures. It is important that precautions be taken during construction to prevent sediment from entering the proposed stormwater management systems. The erosion and sediment control plan is provided in **Appendix C**.

5.0 SANITARY SEWERS

5.1 Existing Conditions

An existing 200mm diameter sanitary stub is located at the eastern access to the site (MH119). There is also an existing 400mm diameter trunk sewer located north of the site.

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 (October 2012) and Technical bulletin ISTB-2018-01.

Sanitary flow from Block 21 is proposed to connect into the existing 200mm diameter sanitary stub that was provided during the construction of Longfields Central. The sanitary sewer layout is shown on 112021-10-GP (**Appendix C**), and the design sheet is attached in **Appendix A**. The site (approx. 1.04ha) will outlet at MH 119 (east entrance) with a peak design flow of 2.5 L/s. The wastewater flow is routed through the Longfields Central Subdivsion, directing flow to the East Barrhaven Trunk (EBHT) sanitary sewer. The EBHT drains into the West Rideau Collector Sewer (WRCS) on Merivale Road and eventually makes its way to the Robert O. Pickard Environmental Centre to be treated before being released to the Ottawa River.

Table 5-1: Sanitary Sewer Design Parameters

Parameter	Design Parameter
Apartment (2 bedroom) Unit Population	2.1 people/unit
Apartment Unit Density	88 Units (per Site Plan)
Residential Flow Rate, Average Daily	280 L/cap/day
Residential Peaking Factor	Harmon Equation (min=2.0, max=4.0)
Total Infiltration Rate	0.33 L/s/ha
Minimum Pipe Size	200 mm
Minimum Velocity	0.6 m/s
Maximum Velocity	3.0 m/s

5.3 Offsite Requirements

For the design of Longfields Central, a peak design flow of 4.0 L/s was calculated from MH 119 to MH 117, accounting for future flows from Block 21. With the detailed design of Block 21 being complete, the peak design flow calculated from MH 119 to MH 117 is now 3.2 L/s. Since the proposed flows are lower than previously accounted for in the Longfields Central Site Servicing and Stormwater Management Study, there will be sufficient capacity offsite to service the proposed development.

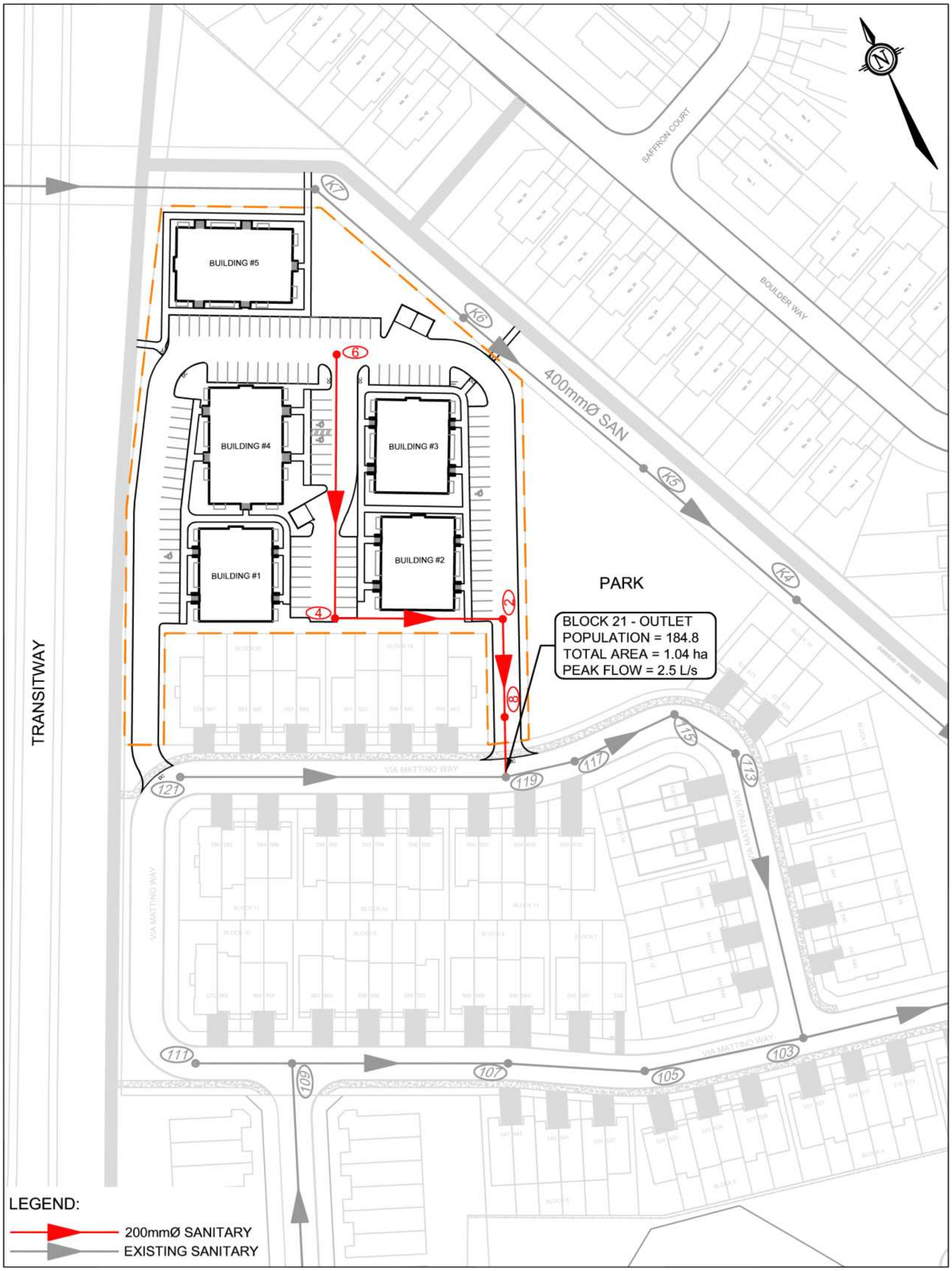


Figure 3: Sanitary Sewer Network

6.0 WATER

6.1 Existing Conditions

The proposed development is located inside the 2W Pressure Zone. Reconfiguration of the existing pressure zone from 2W to 3C is anticipated in 2020. Existing 200mm diameter stubs are located at both entrances to the site off Via Mattino Way. An existing 200mm diameter watermain run along Boulder Way north of the site.

6.2 Proposed Conditions

Block 21 will be connected to the existing watermain network by way of two separate feed points. The two connections are proposed to the existing 200mm diameter stubs located at the entrances off Via Mattino Way.

The development will be serviced by 200mm diameter watermains and will provide sufficient capacity to maintain appropriate pressures and fire flows throughout the development. **Figure 4** provides a high-level schematic of the proposed water distribution system.

The watermain boundary conditions below were obtained from the City of Ottawa and have been included in **Appendix A**:

Boundary Condition #1 – Located at Mountshannon Drive Existing 200mm x 400mm diameter watermain connection (Shown in **Appendix A**)

	Existing Zone 2W	Future Zone 3C
Demand Scenario	**Head (m)**	**Head (m)**
Maximum HGL	133.0	147.8
Peak Hour	126.0	146.3
Max Day + FF of 200 L/s	124.3	145.9
Max Day + FF of 250 L/s	123.2	145.4

Boundary Condition #2 – Located at Campanale Avenue (Shown in **Appendix A**)

	Existing Zone 2W	Future Zone 3C
Demand Scenario	**Head (m)**	**Head (m)**
Maximum HGL	133.0	147.8
Peak Hour	125.9	146.6
Max Day + FF of 200 L/s	119.4	141.6
Max Day + FF of 250 L/s	115.8	138.9

Construction of the first building within Block 21 is anticipated to be completed within 2021, later than what is anticipated for the reconfiguration to the future Zone 3C pressure zone. As such, the future Zone 3C boundary conditions will be used in the modelling for Block 21.

City of Ottawa watermain design Parameters are outlined in **Table 6-1**.

Figure 4: Watermain Layout

Table 6-1: Watermain Design Criteria

Design Parameter	Design Criteria
Apartment (2 bedroom) Unit Population	2.1 people/unit
Density	88 units
Residential Demand	280 L/c/d
Maximum Day Demand	2.5 x Average Day
Peak Hour Demand	2.2 x Maximum Day
Fire Demand	200 L/s (Building 5) 217 L/s (Building 2 and 3) 233 L/s (Building 1) 250 L/s (Building 4)
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 6-2: Water Flow Summary

Unit Type	Units	Population	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Hour Demand (L/s)
Apartments	88	185	0.599	1.497	3.294
Total	**88**	**185**	**0.599**	**1.497**	**3.294**

Based on the fire underwriters survey, the fire flows were calculated as 200 L/s (Building 5), 217 L/s (Building 2 and 3), 233 L/s (Building 1) and 250 L/s (Building 4). Fire flow calculations are provided in **Appendix A**.

The proposed watermain was modeled using EPANET 2 (See 112021-10-GP for detailed watermain layout).

A summary of the model results are shown below in **Table 6-3**, **Table 6-4** and **Table 6-5**. Full model results are included in **Appendix A**.

Table 6-3: Summary of Hydraulic Model Results - Maximum Day + Fire Flow

Operating Condition	Minimum Pressure
Building #1 (233 L/s)	279.00 kPa (HYD2)
Building #2 (217 L/s)	301.76 kPa (HYD2)
Building #3 (217 L/s)	297.64 kPa (HYD2)
Building #4 (250 L/s)	237.89 kPa (HYD2)
Building #5 (200 L/s)	327.95 kPa (HYD2)

Table 6-4: Summary of Hydraulic Model Results - Peak Hour Demand

Operating Condition	Maximum Pressure	Minimum Pressure
3.294 L/s through system	523.76 kPa (HYD1)	520.22 kPa (NODE1)

The hydraulic modeling summarized above highlights the maximum and minimum system pressures during Peak Hour/Maximum Pressure Check conditions, and the minimum system pressures during the Maximum Day + Fire conditions. 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 6-5: Summary of Hydraulic Model Results – Maximum Pressure Check

Operating Condition	Maximum Pressure	Minimum Pressure
0.599 L/s through system	559.07 kPa (HYD3)	532.09 kPa (CAP1)

Average day pressures at HYD3 are slightly above 552 kPa at 559.07 kPa. Since the average day pressures are modelled within the watermain and not the service to the units, lower pressures will be encountered at the upper levels. Pressures at the first floor were modelled at Building 1, nearest HYD3. The average day pressures within the units are below 552 kPa. We conclude that pressure reducing valves are not necessary to reduce the modelled pressure below 552 kPa within the watermain as the modelled average day pressures within the services to the units are within the required range.

7.0 STORMWATER MANAGEMENT

7.1 Stormwater Management Criteria

The following stormwater management criteria for the proposed development was prepared in accordance with the City of Ottawa Sewer Design Guidelines (October 2012) and the Longfields Central Site Servicing and Stormwater Management Study (Novatech, 2014). This report was prepared in accordance with the Longfields Davidson Heights Serviceability Study Update Report (1998).

- Provide a dual drainage system (i.e. minor and major system flows);
- Maximize the use of surface storage available on site;
- Control the runoff to MH122 to the allowable release rates Specified in **Section 7.1.1** using on-site storage;
- Ensure that no surface ponding will occur on the paved surfaces (i.e., private drive aisles or parking lots) 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; and,
- Provide guidelines to ensure that site preparation and construction is in accordance with the current Best Management Practices for Erosion and Sediment Control.

For the approval of the Longfields Central Subdivision, the following assumptions were made for the future development of Block 21 (see **Appendix B** for Longfields Central report excerpts):

- Restricted minor system flow of 37.5 L/s/ha;
- On-Site storage of 270 m^3 (270 m^3/ha);
  - 100 m^3 of surface storage;
  - 170 m^3 of underground storage (superpipe and/or storage chambers).

7.1.1 Allowable Release Rate

The allowable release rate for Block 21 (1.04 ha) was established based on the restricted minor system flow of 37.5 L/s/ha (37.6 L/s) for all storms up-to and including the 100-year storm event.

7.2 Existing Conditions

Existing 525mm and 675mm diameter storm sewers run along Via Mattino Way adjacent to the proposed development. Stubs were provided at both entrances to the site (MH122 and MH124), a 250mm diameter storm sewer at the west entrance (MH124) and a 525mm diameter storm sewer at the east entrance (MH122). An existing 1350mm diameter trunk storm sewer runs along the adjacent parkland to the north.

7.3 Proposed Conditions

Runoff from Block 21 will be routed to the existing storm sewer system in Via Mattino Way through the existing 525mm diameter stub located at the private entrance to the east (MH122). The storm system within Longfields Central is directed to the 1350mm diameter trunk storm sewer within Mountshannon Drive and ultimately outlets to the Longfields Davidson Heights Stormwater Management Facility located southwest of the Leikin Drive and Bill Leathem Drive intersection. This existing facility provides water quality control prior to discharging to the Rideau River via Barrhaven Creek. As such, on-site stormwater quality controls are not required.

7.3.1 Quality Control

As previously discussed, the Lonfields Davidson Heights SWM Facility provides the Quality Control for the site. The proposed site has a drainage area of approximately 1.04 ha and a runoff coefficient of 0.71. The site was previously referred to as areas 2A & 2B in the Longfields Central Design, which had a drainage area of 1.00 ha and runoff coefficient of 0.80 ha (refer to excerpt provided in **Appendix B**). When comparing the area x runoff coefficient values the proposed site has the same area, but a lower runoff coefficient han what was previously allocated, as shown below:

Parameter	*Longfields Central Design*	*Current Design*
Drainage Area	1.00 ha	1.00 ha
Runoff Coefficient	0.80	0.71
Area x Runoff Coefficient	0.80	0.71

7.3.2 Minor System Design

Storm Sewers

The storm sewers comprising the minor system have been designed based on the criteria outlined in the Ottawa Sewer Design Guidelines using the principals of dual drainage. The design criteria used in sizing the storm sewers are summarized in **Table 6.1**.

The proposed storm sewers have been designed using the rational method to convey peak flows associated with a 2-year rainfall event. The storm sewer design sheets are provided in **Appendix A**. The corresponding Storm Drainage Area Plan (Drawing 112021-10-STM) is provided in **Appendix C**.

Table 7-1: Storm Sewer Design Parameters

Parameter	Design Criteria
Private Roads	2 Year Return Period
Storm Sewer Design	Rational Method
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

Underground Storage

The allowable release rate is quite restrictive, as such underground storage will be required to attenuate runoff from the site. Underground storage will be provided using Stormtech SC-740 arch-type chambers (or approved equivalent), which are covered in 50mm dia. (D_{50}) clearstone. The chambers will be installed under the parking areas immediately upstream the ICDs. A total of 56 storage chambers will provide 137 m^3 of storage. Refer to **Appendix C** for further details.

The Stormtech SC-740 storage chambers are represented in the PCSWMM model as rectangular conduits. The height represents the exact height of the underground storage system (i.e. chambers + clearstone base / cover). The length and width parameters have been adjusted to represent the total storage provided. The proposed layout of underground storage chambers is shown on the General Plan of Services (drawing 112021-10-GP).

7.3.3 Major System Design

The site has been designed to convey runoff from storms that exceed the minor system capacity to Via Mattino Way. 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 300mm.

The site has been graded to provide an emergency overland flow route that spills along the roadway and outlets to Via Mattino Way at the eastern entrance to the site.

Surface Storage

The stage-storage curves for each inlet were calculated based on the proposed Grading Plan (drawing 112021-10-GR). The total surface storage shown in the stage-storage curves at each inlet is provided in **Appendix D**. Approximately 211 m^3 of total surface storage is available within the low-points of the parking areas and amenity space.

The total storage provided underground and on the surface is as follows:

Underground Storage	137 m^3
Surface Storage	211 m^3
Total Storage	348 m^3

7.4 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 Block 21 was evaluated using the *PCSWMM* 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 (October 2012).

3-Hour Chicago Storms:

- 25mm 3-hr Chicago storm
- 2-year 3-hr Chicago storm
- 5-year 3-hr Chicago storm
- 100-year 3-hr Chicago storm
- 100-year (+20%) 3-hr Chicago storm

12-Hour SCS Storms:

- 2-year 12-hr SCS storm
- 5-year 12-hr Chicago storm
- 100-year 12-hr Chicago storm
- 100-year (+20%) 12-hour SCS storm

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

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

Model Development

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

- Ensure no ponding in the paved areas following a 2-year event;
- Calculate the storm sewer hydraulic grade line for the 100-year storm event;
- Evaluate overland flow depths and ponding volumes in the paved areas during the 100-year event; and
- Determine the total major and minor system runoff from the site to Via Mattino Way.

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 Block 21 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 **112021-10-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 7-2**.

Table 7-2: Subcatchment Model Parameters

Area ID	Catchment Area (ha)	Runoff Coefficient (C)	Percent Impervious (%)	Zero Imperv. (%)	Flow Length (m)	Equivalent Width (m)	Average Slope (%)
1	0.08	0.79	84%	25%	25	32	1%
2	0.13	0.81	87%	30%	25	52	1%
3	0.09	0.74	77%	40%	20	45	1%
4	0.12	0.76	80%	45%	20	60	1%
5	0.08	0.74	77%	30%	20	40	1%
6	0.11	0.72	74%	25%	20	55	1%
7	0.15	0.71	73%	40%	20	75	1%
8	0.13	0.69	70%	30%	20	65	1%
9	0.07	0.31	16%	25%	15	47	1%
10	0.04	0.70	71%	10%	15	27	1%
TOTAL	**1.00 ha**	**0.71**	**73%**	**-**	**-**	**-**	**-**

Infiltration

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

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

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

Depression Storage

The default values for depression storage in the Sewer Design Guidelines were used for all catchments. Rooftops were assumed to provide no depression storage (Zero Imperv. Parameter).

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

Equivalent Width

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

Impervious Values

Impervious values for each subcatchment area were calculated based on the proposed Site Plan (**Figure 2**) and correspond to the Runoff Coefficients using the following equation:

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

7.5 Results of Hydrologic / Hydraulic Analysis

The model was used to evaluate the performance of the proposed storm drainage system for Block 21.

7.5.1 Minor System

Inflows to the storm sewer were modeled based on the characteristics of each inlet. All the catchbasins in the 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. Details are outlined as follows in **Table 6.4**. ICDs information is indicated on the General Plan of Services (drawing 112021-10-GP).

Table 7-3: 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)
CBMH1	Tempest LMF (Vortex 99)	92.95	90.45	2.62	10.1	11.5	13.8
CBMH3	Tempest LFM (Vortex 78)	92.62	90.48	2.35	6.5	7.7	8.0
CB7	Tempest LMF (Vortex 78)	92.95	91.35	1.86	5.6	6.8	7.2
MH7	Tempest LMF (Vortex 77)	93.30	90.60	2.48	6.0	6.8	8.2

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

7.5.2 Major System

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

Table 7-4: Overland Flow Results (100-year, 3-hour Chicago storm event)

Structure	T/G	Max. Static Ponding		100-yr Event			
	(m)	Elev. (m)	Spill Depth (m)	Elev. (m)	Depth (m)	Cascading Flow?	Cascade Depth (m)
CBMH1	92.95	93.17	0.22	93.07	0.12	N	0.00
CBMH2	92.95	93.20	0.25	93.08	0.13	N	0.00
CBMH3	92.62	92.85	0.23	92.84	0.22	N	0.00
CB2	92.62	92.92	0.30	92.84	0.22	N	0.00
CB3	92.90	93.07	0.17	93.07	0.17	N	0.00
CB5	92.95	93.25	0.30	93.08	0.13	N	0.00
CB6	92.95	93.10	0.15	93.08	0.13	N	0.00
CB7	92.95	93.25	0.30	93.21	0.26	N	0.00
RYCB1	92.95	93.19	0.24	93.08	0.13	N	0.00

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

7.5.3 Hydraulic Grade Line

The results of the analysis were used to determine if there would be any surcharging from the storm sewer system during the 100-year storm event. **Appendix B** provides a summary of the 100-year HGL elevation at each storm manhole within the proposed development, as well as a summary of the HGL elevations for a 20% increase (rainfall intensity and total precipitation) in the 100-year design event. The results of the HGL analysis and the stress testing indicates that the storm sewer does not surcharge during the 100-year event and 100-year+20% storm event

The results of the HGL analysis were used to ensure that a minimum freeboard of 0.30m is provided between the 100-year HGL and the designed underside of footing elevations. The 100-year HGL elevations at each storm manhole with respect to the lowest adjacent underside of footing elevation are provided in **Table 7-5**.

Table 7-5: 100-year HGL Elevations

Manhole ID	MH Invert Elevation (m)	T/G Elevation (m)	HGL Elevation (100yr) (m)	Design USF (m)	Clearance (100yr) (m)
HGL - Block 21					
MH01	90.01	92.75	90.68	91.51	0.83
MH03	90.19	93.40	90.69	91.51	0.82
MH05	90.32	93.23	90.70	91.53	0.83
MH07	90.60	93.30	90.70	91.70	1.00
CBMH1	90.45	92.95	90.70	91.53	0.83
EX MH122*	89.77	92.85	90.68	91.03	0.35

**Downstream 'fixed' outfall condition set at 100-year HGL within EX MH122 (90.68m)*

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

7.5.4 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 7-6** 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 7-6: Summary of Peak Flows

Design Event	Allowable Release Rate (L/s)	Controlled Minor System Release Rate (L/s)	Major System Release Rate (L/s)
2-year	37.6	28.2	0
5-year		32.7	0
100-year		**37.2**	0
100-year (+20%)	-	37.6	45.3

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

8.0 TEMPORARY FLOW CONTROLS DURING CONSTRUCTION

As specified in the City of Ottawa Sewer Design Guidelines (October, 2012), temporary flow controls are required during construction. This is to prevent the possibility of new incomplete sewer infrastructure from causing excessive flows within the existing / operational downstream sewer system.

8.1 Temporary Sanitary Flow Controls During Construction

During construction the incomplete sanitary sewer system will require a temporary flow control within the most downstream maintenance hole from the site (SAN MH-8). As the total sanitary flows from the proposed development are estimated to be 2.5 L/s a Tempest LMF ICD (Vortex – 45) will be required.

The design head for the Tempest LMF ICD (Vortex – 45) is 2.0m, as per the Ottawa Sewer Design Guidelines, as the depth in SAN MH-8 is 3.8m. Supporting correspondence and documentation for the Tempest LMF ICD is provided in **Appendix B**.

9.0 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 37.5 L/s/ha. All runoff volume from the 100-year storm event is stored on site using underground and above ground storage. Underground storage will be provided using Stormtech SC-740 (or approved equivalent) arch-type storage chambers. The Longfields Davidson Heights Stormwater Management Facility provides 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 outletting to the existing Mattino Way sanitary sewers.

3) Connection to the existing watermains in Mattino Way 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.

10.0 CLOSURE

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

Reviewed By:

Conrad Stang, M.A.Sc., P.Eng.
Project Manager, Water Resources

APPENDIX A: Design Sheets

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

Block 21, Mattino Way: 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	5yr	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.)	(%)
Block 21																										
			0.15	0.05					0.20	0.73	0.41	0.41	10.00	76.81			31.3									
3, 6	7	5							0.00		0.00	0.00	10.00				0.0	**31.3**	PVC	300	0.30	42.4	55.3	0.76	0.93	56.6%
									0.00		0.00	0.00	10.00				0.0									
			0.19	0.09					0.28	0.68	0.53	0.53	10.00	76.81			40.8									
1, 2, 9	CBMH1	5							0.00		0.00	0.00	10.00				0.0	**40.8**	PVC	375	0.25	23.6	91.5	0.80	0.49	44.6%
									0.00		0.00	0.00	10.00				0.0									
			0.11	0.04					0.15	0.71	0.30	1.24	10.93	73.40			90.7									
7	5	3							0.00		0.00	0.00	10.93				0.0	**90.7**	CONC	450	0.25	27.8	148.7	0.91	0.51	61.0%
									0.00		0.00	0.00	10.93				0.0									
									0.00		0.00	1.24	11.44	71.67			88.6									
	3	1							0.00		0.00	0.00	11.44				0.0	**88.6**	CONC	450	0.25	43.4	148.7	0.91	0.80	59.6%
									0.00		0.00	0.00	11.44				0.0									
			0.15	0.06					0.21	0.71	0.41	1.65	12.24	69.15			114.0									
5, 8	1	EX122							0.00		0.00	0.00	12.24				0.0	**114.0**	CONC	525	0.25	37.8	224.3	1.00	0.63	50.8%
									0.00		0.00	0.00	12.24				0.0									
Longfields Central																										
									0.00		0.00	0.00	10.00				0.0									
17, 27	EX126	EX124			0.22	0.62	0.05	0.54	0.27	0.61	0.45	0.45	10.00		104.19		47.3	**47.3**	PVC	300	0.40	45.0	63.8	0.87	0.86	74.2%
									0.00		0.00	0.00	10.00				0.0									
									0.00		0.00	0.00	10.86				0.0									
4, 5, 6	EX124	EX122			0.36	0.66	0.12	0.62	0.48	0.65	0.87	1.32	10.86		99.9		132.0	**132.0**	CONC	525	0.25	92.3	224.3	1.00	1.53	58.8%
									0.00		0.00	0.00	10.86				0.0									
									0.00		0.00	1.65	12.87	67.30			110.9									
	EX122	EX120							0.00		0.00	1.32	12.87		91.13		120.4	**231.4**	CONC	675	0.30	18.6	480.3	1.30	0.24	48.2%
									0.00		0.00	0.00	12.87				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: Block 21 (112021-10)
Designed: LRW
Checked: MAB
Date: November 1, 2019

NOVATECH
Engineers, Planners & Landscape Architects

M:\2012\112021\Block 21\DATA\Calculations\Sewer Calcs\STM\20191101-Storm Design Sheet (Rational Method).xlsx

Block 21, Mattino Way - Sanitary Sewer Design Sheet

AREA			RESIDENTIAL								INFILTRATION				PIPE							
			Towns		Apartments																	
ID	From	To	Units	Pop.	Units	Pop.	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
Block 21																						
	6	**4**	0	0.0	88	184.8	184.8	184.8	3.5	2.1	0.86	0.86	0.3	2.4	200	0.65	68.1	27.6	0.85	0.43	8.7%	0.216
	4	**2**	0	0.0	0	0.0	0.0	184.8	3.5	2.1	0.02	0.88	0.3	2.4	200	0.65	43.4	27.6	0.85	0.43	8.7%	0.077
	2	**EX119**	0	0.0	0	0.0	0.0	184.8	3.5	2.1	0.15	1.03	0.3	2.5	200	0.65	40.8	27.6	0.85	0.43	8.9%	0.077
Via Mattino Way																						
	EX121	**EX119**	24	64.8	0	0.0	64.8	64.8	3.6	0.8	0.70	0.70	0.2	1.0	200	1.00	84.1	34.2	1.06	0.40	2.9%	0.108
	EX119	**EX117**	4	10.8	0	0.0	10.8	260.4	3.5	2.9	0.10	0.80	0.3	3.2	200	0.35	18.2	20.2	0.62	0.38	15.8%	0.297

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 (2 Bedroom)	2.10	90
Singles	3.40	
Towns	2.70	60

Project: Block 21 (112021-10)
Designed: LRW
Checked: MAB
Date: November 1, 2019

M:\2012\112021\Block 21\DATA\Calculations\Sewer Calcs\SAN\20191101 - SAN Design Sheet.xlsx

NOVATECH
Engineers, Planners & Landscape Architects

Boundary Conditions for Longfields Block 21

Information Provided:

Date provided: Oct 2019

Scenario	Demand	
	L/min	L/s
Average Daily Demand	36	0.6
Maximum Daily Demand	90	1.5
Peak Hour	198	3.3
Fire Flow Demand #1	12000	200
Fire Flow Demand #2	15000	250

Location:

Results

Connection 1 - Boulder Way

Demand Scenario	Existing Zone 2W		Future Zone 3C	
	Head (m)	Pressure[1] (psi)	Head (m)	Pressure[1] (psi)
Maximum HGL	133.0	57.8	147.8	78.8
Peak Hour	125.9	47.9	146.2	76.6
Max Day plus Fire #1	117.4	35.7	138.6	65.9
Max Day plus Fire #2	112.7	29.1	134.5	60.0

[1] Ground Elevation = 92.3 m

Connection 2 - Mountshannon

Demand Scenario	Existing Zone 2W		Future Zone 3C	
	Head (m)	Pressure[1] (psi)	Head (m)	Pressure[1] (psi)
Maximum HGL	133.0	58.2	147.8	79.3
Peak Hour	126.0	48.2	146.3	77.1
Max Day plus Fire #1	124.3	45.9	145.9	76.6
Max Day plus Fire #2	123.2	44.3	145.4	75.9

[1] Ground Elevation = 92 m

Connection 3 - Campanale

Demand Scenario	Existing Zone 2W		Future Zone 3C	
	Head (m)	Pressure[1] (psi)	Head (m)	Pressure[1] (psi)
Maximum HGL	133.0	56.0	147.8	77.0
Peak Hour	125.9	46.0	146.6	75.4
Max Day plus Fire #1	119.4	36.7	141.6	68.2
Max Day plus Fire #2	115.8	31.6	138.9	64.4

[1] Ground Elevation = 93.6 m

Notes:

1) Confirm pressure reducing valves are not required once the pressure zone is reconfigured in 2020.
2) A 203 mm watermain was inserted in the model as shown on page 1.
3) Use the HGLs provided above to interpolate results for fires ranging from 200 l/s to 250 l/s, respectively.

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.*

Block 21 Water Demand						
	Area (ha)	Units	Population	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Hour Demand (L/s)
Apartments	N/A	88	185	0.599	1.497	3.294
Total	**0.00**	**88**	**185**	**0.599**	**1.497**	**3.294**

Water Demand Parameters

Apartments (2 Bedroom)	2.1	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	200, 217, 233, 250	L/s

Block 21 - Watermain Demand

Node	Apartments	Total Population	Average Day Residential Demand (L/s)	Maximum Day Residential Demand (L/s)	Peak Hour Residential Demand (L/s)	Fire Flow (L/s)
HYD1		0	0.000	0.000	0.000	233
HYD2	20	42	0.136	0.340	0.749	250
HYD3		0	0.000	0.000	0.000	250
T1	68	143	0.463	1.157	2.545	N/A
Total	**88**	**185**	**0.599**	**1.497**	**3.294**	

Water Demand Parameters

Singles	3.4	ppl/unit	Residential Max Day	2.5	x Avg Day
Apartments	2.1	ppl/unit	Residential Peak Hour	2.2	x Max Day
Residential Demand	280	L/c/day	Residential Fire Flow	200 - 250	L/s

NOVATECH
Engineers, Planners & Landscape Architects

Block 21 - Watermain Analysis

Network Table - Nodes - (Peak Hour)

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc HYD1	92.91	0	146.3	53.39	523.76	75.96
Junc HYD2	93.21	0.75	146.3	53.09	520.81	75.54
Junc HYD3	93.04	0	146.31	53.27	522.58	75.79
Junc NODE1	93.27	2.55	146.3	53.03	520.22	75.45
Resvr RES1	146.3	-0.37	146.3	0	0.00	0.00
Resvr RES2	146.6	-18.23	146.6	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	39	204	110	2.96	0.09	0.08	0.041
Pipe P2	74	204	110	2.96	0.09	0.08	0.041
Pipe P3	64	204	110	0.34	0.01	0.00	0.060
Pipe P4	72	204	110	-0.34	0.01	0.00	0.054
Pipe P5	57	204	110	0.41	0.01	0.00	0.057

Block 21 - Watermain Analysis

Network Table - Nodes - (Max Pressure Check - Future Zone C3)

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc HYD1	92.91	0	147.8	54.89	538.47	78.10
Junc HYD2	93.21	0.14	147.8	54.59	535.53	77.67
Junc HYD3	93.04	0	147.8	54.76	559.07	81.09
Junc CAP1	93.56	0.11	147.8	54.24	532.09	77.17
Junc NODE1	93.27	0.35	147.8	54.53	534.94	77.59
Resvr RES1	147.8	-0.96	147.8	0	0.00	0.00
Resvr RES2	147.8	-0.87	147.8	0	0.00	0.00

Network Table - Links - (Max Pressure Check - Future Zone 3C)

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	39	204	110	0.34	0.01	0.00	0.062
Pipe P2	74	204	110	0.34	0.01	0.00	0.051
Pipe P3	64	204	110	0.26	0.01	0.00	0.056
Pipe P4	72	204	110	-0.26	0.01	0.00	0.058
Pipe P5	57	204	110	-0.12	0.00	0.00	0.094
Pipe P6	11	155	100	-0.11	0.01	0.00	0.080

Block 21 - Watermain Analysis

Network Table - Nodes - (Fire Flow Summary)

Fire Flow		Minimum Pressure		
Node	Flow (L/s)	Pressure (kPa)	Pressure (PSI)	Node
BLDG #1	233	279.00	40.46	HYD2
BLDG #2	217	301.76	43.77	HYD2
BLDG #3	217	297.64	43.17	HYD2
BLDG #4	250	237.89	34.50	HYD2
BLDG #5	200	327.95	47.56	HYD2

Block 21 - 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	92.91	95	121.71	28.8	282.53	40.98
Junc HYD2	93.21	43.34	121.65	28.44	279.00	40.46
Junc HYD3	93.04	95	122.65	29.61	290.47	42.13
Junc NODE1	93.27	1.16	122.07	28.8	282.53	40.98
Resvr RES1	145.6	-143.65	145.6	0	0.00	0.00
Resvr RES2	139.8	-94.38	139.8	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	39	204	110	129.11	3.95	91.98	0.024
Pipe P2	74	204	110	34.11	1.04	7.82	0.029
Pipe P3	64	204	110	10.38	0.32	0.86	0.034
Pipe P4	72	204	110	-105.38	3.22	63.15	0.024
Pipe P5	57	204	110	32.96	1.01	7.33	0.029

Block 21 - 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	92.91	95	124.04	31.13	305.39	44.29
Junc HYD2	93.21	61.34	123.97	30.76	301.76	43.77
Junc HYD3	93.04	61	126.03	32.99	323.63	46.94
Junc NODE1	93.27	1.16	124.84	31.57	309.70	44.92
Resvr RES1	145.7	-133.63	145.7	0	0.00	0.00
Resvr RES2	140.7	-88.4	140.7	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	39	204	110	111.26	3.40	69.83	0.024
Pipe P2	74	204	110	50.26	1.54	16.03	0.027
Pipe P3	64	204	110	12.23	0.37	1.17	0.033
Pipe P4	72	204	110	-107.23	3.28	65.21	0.024
Pipe P5	57	204	110	49.11	1.50	15.35	0.027

Block 21 - 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	92.91	61	124.32	31.41	308.13	44.69
Junc HYD2	93.21	95.34	123.55	30.34	297.64	43.17
Junc HYD3	93.04	61	125.88	32.84	322.16	46.73
Junc NODE1	93.27	1.16	124.54	31.27	306.76	44.49
Resvr RES1	145.7	-133.62	145.7	0	0.00	0.00
Resvr RES2	140.7	-88.4	140.7	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	39	204	110	114.61	3.51	73.76	0.024
Pipe P2	74	204	110	53.61	1.64	18.06	0.027
Pipe P3	64	204	110	42.89	1.31	11.95	0.028
Pipe P4	72	204	110	-103.89	3.18	61.49	0.024
Pipe P5	57	204	110	52.45	1.60	17.35	0.027

Block 21 - 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	92.91	60	118.5	25.59	251.04	36.41
Junc HYD2	93.21	95.34	117.46	24.25	237.89	34.50
Junc HYD3	93.04	95	119.2	26.16	256.63	37.22
Junc NODE1	93.27	1.16	118.2	24.93	244.56	35.47
Resvr RES1	145.4	-153.56	145.4	0	0.00	0.00
Resvr RES2	138.9	-101.46	138.9	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	39	204	110	140.95	4.31	108.20	0.023
Pipe P2	74	204	110	45.95	1.41	13.57	0.028
Pipe P3	64	204	110	50.55	1.55	16.20	0.027
Pipe P4	72	204	110	-110.55	3.38	69.00	0.024
Pipe P5	57	204	110	44.79	1.37	12.95	0.028

Block 21 - Watermain Analysis

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

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc HYD1	92.91	53	127.43	34.52	338.64	49.12
Junc HYD2	93.21	94.34	126.64	33.43	327.95	47.56
Junc HYD3	93.04	53	128.85	35.81	351.30	50.95
Junc NODE1	93.27	1.16	127.58	34.31	336.58	48.82
Resvr RES1	145.9	-123.34	145.9	0	0.00	0.00
Resvr RES2	141.6	-81.68	141.6	0	0.00	0.00

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

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	39	204	110	105.06	3.21	62.78	0.024
Pipe P2	74	204	110	52.06	1.59	17.10	0.027
Pipe P3	64	204	110	43.44	1.33	12.23	0.028
Pipe P4	72	204	110	-96.44	2.95	53.58	0.025
Pipe P5	57	204	110	50.90	1.56	16.41	0.027

Block 21 - Watermain Analysis

Network Table - Nodes (Max Day + FF '20 psi')

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc H1	92.91	100	108.47	15.56	152.64	22.14
Junc H2	93.21	100.34	107.79	14.58	143.03	20.74
Junc H3	93.04	100	110.78	17.74	174.03	25.24
Junc NODE1	93.27	1.16	109.06	15.79	154.90	22.47
Resvr RES1	145.4	-175.83	145.4	0	0.00	0.00
Resvr RES2	138.9	-129.19	138.9	0	0.00	0.00

Network Table - Links (Max Day + FF '20 psi')

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	39	204	110	161.30	4.94	138.91	0.023
Pipe P2	74	204	110	61.30	1.88	23.15	0.026
Pipe P3	64	204	110	40.19	1.23	10.59	0.028
Pipe P4	72	204	110	-140.19	4.29	107.13	0.023
Pipe P5	57	204	110	60.15	1.84	22.35	0.026

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 112021-10
Project Name: Block 21
Date: 11/1/2019
Input By: Lucas Wilson
Reviewed By: Mark Bissett

Legend: No Information or Input Required

Building Description: Bldg 1, 16 Unit Apartment
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)	460			
		Number of Floors/Storeys	3			
		Area of structure considered (m^2)			**1,380**	
	F	**Base fire flow without reductions**				**12,000**
		$F = 220\ C\ (A)^{0.5}$				
	Reductions or Surcharges					
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible	Yes	-25%	-25%	**9,000**
		Limited combustible		-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**			**Reduction**		
	(2)	Adequately Designed System (NFPA 13)		-30%		**0**
		Standard Water Supply		-10%		
		Fully Supervised System		-10%		
				Cumulative Total	**0%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	3.1 - 10 m		20%	**4,500**
		East Side	20.1 - 30 m		10%	
		South Side	3.1 - 10 m		20%	
		West Side	> 45.1m		0%	
				Cumulative Total	**50%**	
	Results					
6	**(1) + (2) + (3)**	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**14,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**233**
				or	USGPM	3,699
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	3
		Required Volume of Fire Flow (m^3)			m^3	2520

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

Engineers, Planners & Landscape Architects

Novatech Project #: 112021-10
Project Name: Block 21
Date: 11/1/2019
Input By: Lucas Wilson
Reviewed By: Mark Bissett

Legend: No Information or Input Required

Building Description: Bldg 2, 16 Unit Apartment
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)	460			
		Number of Floors/Storeys	3			
		Area of structure considered (m^2)			**1,380**	
	F	**Base fire flow without reductions**				**12,000**
		$F = 220\ C\ (A)^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible	Yes	-25%	-25%	**9,000**
		Limited combustible		-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**			**Reduction**		
	(2)	Adequately Designed System (NFPA 13)		-30%		**0**
		Standard Water Supply		-10%		
		Fully Supervised System		-10%		
				Cumulative Total	**0%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	3.1 - 10 m		20%	**4,050**
		East Side	> 45.1m		0%	
		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**	**13,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**217**
				or	USGPM	3,435
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	2.5
		Required Volume of Fire Flow (m^3)			m^3	1950

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 112021-10
Project Name: Block 21
Date: 11/1/2019
Input By: Lucas Wilson
Reviewed By: Mark Bissett

Legend: No Information or Input Required

Building Description: Bldg 3, 16 Unit Apartment
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)	460			
		Number of Floors/Storeys	3			
		Area of structure considered (m^2)			**1,380**	
	F	**Base fire flow without reductions**				**12,000**
		$F = 220\,C\,(A)^{0.5}$				
	Reductions or Surcharges					
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible	Yes	-25%	-25%	**9,000**
		Limited combustible		-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	30.1- 45 m		5%	**3,600**
		East Side	30.1- 45 m		5%	
		South Side	3.1 - 10 m		20%	
		West Side	20.1 - 30 m		10%	
				Cumulative Total	**40%**	
	Results					
6	(1) + (2) + (3)	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**13,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**217**
				or	USGPM	3,435
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	2.5
		Required Volume of Fire Flow (m^3)			m^3	1950

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 112021-10
Project Name: Block 21
Date: 11/1/2019
Input By: Lucas Wilson
Reviewed By: Mark Bissett

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

Building Description: Building 4, 20 Unit Apartment
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)	570			
		Number of Floors/Storeys	3			
		Area of structure considered (m^2)			**1,710**	
	F	**Base fire flow without reductions** $F = 220\ C\ (A)^{0.5}$				**14,000**
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible	Yes	-25%	-25%	**10,500**
		Limited combustible		-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**			**Reduction**		
	(2)	Adequately Designed System (NFPA 13)		-30%		**0**
		Standard Water Supply		-10%		
		Fully Supervised System		-10%		
				Cumulative Total	**0%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	20.1 - 30 m		10%	**4,200**
		East Side	20.1 - 30 m		10%	
		South Side	3.1 - 10 m		20%	
		West Side	> 45.1m		0%	
				Cumulative Total	**40%**	
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 #: 112021-10
Project Name: Block 21
Date: 11/1/2019
Input By: Lucas Wilson
Reviewed By: Mark Bissett

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

Building Description: Building 5, 20 Unit Apartment
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)	570			
		Number of Floors/Storeys	3			
		Area of structure considered (m^2)			**1,710**	
	F	**Base fire flow without reductions**				**14,000**
		$F = 220\,C\,(A)^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible	Yes	-25%	-25%	**10,500**
		Limited combustible		-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	30.1- 45 m		5%	**1,575**
		East Side	> 45.1m		0%	
		South Side	20.1 - 30 m		10%	
		West Side	> 45.1m		0%	
				Cumulative Total	**15%**	
Results						
6	(1) + (2) + (3)	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**12,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**200**
				or	USGPM	3,170
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	2.5
		Required Volume of Fire Flow (m^3)			m^3	1800

APPENDIX B

Excerpts from Longfields Central Site Servicing Report

StormTech SC-740 Documentation
Tempest LMF Correspondence & Documentation

PCSWMM Storage Node Curves

PCSWMM Model Results (Ponding)
PCSWMM Model Results (HGL)

PCSWMM Model Schematics
PCSWMM Model Results (100-year output data)

CATCH BASIN TABLE			
CB ID	T/G ELEV (m)	INVERT (m)	I.C.D.
1	92.19	S=90.59 E=90.57	HYDROVEX 75 VHV-1
2	92.20	N=90.67	-
3	92.43	N=91.03	HYDROVEX 75 VHV-1
4	92.44	W=90.94 W=90.92	HYDROVEX 75 VHV-1
5	92.44	E=91.04	-
6	92.55	SW=91.15	-
7	92.55	NE=91.06 NE=91.05	HYDROVEX 125 VHV-2
8	92.42	W=90.92 W=90.94	HYDROVEX 125 VHV-2
9	92.42	E=91.02	-
10	92.49	S=91.01 S=90.99	HYDROVEX 125 VHV-2
11	92.49	N=91.09	-
12	92.63	SW=91.14 S=91.13	HYDROVEX 75 VHV-1
13	92.63	NE=91.23	-
14	92.83	NW=91.43	-
15	92.80	SE=91.34 E=91.33	HYDROVEX 75 VHV-1
16	92.88	NW=91.48	-
17	92.83	SE=91.38 E=91.37	94mm

* ALL SETS OF CATCHBASINS ARE TO BE INTERCONNECTED WITH A SINGLE ICD, UNLESS STATED OTHERWISE

STM MANHOLE TABLE	
MANHOLE ID	OBVERT
100	SE=89.07 SW=89.07 NW=89.07
102	NE=89.15 SW=89.15
104	NE=89.27 W=89.66
106	E=89.91 N=89.91 W=89.91
108	E=90.16 NW=90.16
110	SE=90.38 NW=90.38
112	SE=90.72 SW=90.72 NW=90.72
114	SE=91.03
116	S=90.18 NW=90.18
118	SE=90.25 W=90.28
120	E=90.39 W=90.39
122	E=90.44 NE=90.44 NW=90.44
124	SW=90.67 SE=90.67 NE=90.67
126	NE=90.85
KT208	S=89.51 NW=89.51
KT209	SE=89.15 N=89.15
KT539	S=89.32 N=89.32
MS2	W=90.26 N=90.34
MS4	S=90.23 N=89.42

LEGEND

- 0.35 / 1 / 0.70 — DRAINAGE AREA (hectares); AREA ID; RUN-OFF COEFFICIENT
- PROPOSED STORM MANHOLE & SEWER WITH DIRECTION OF FLOW
- PROPOSED ROAD CATCHBASIN
- MAJOR SYSTEM FLOW ROUTE
- STATIC PONDING - MAX. EXTENT OF STATIC PONDING VOLUME
- DYNAMIC PONDING - MAX. EXTENT OF DYNAMIC PONDING VOLUME
- EXISTING STORM MANHOLE & SEWER WITH DIRECTION OF FLOW
- CB — EXISTING ROAD CATCHBASIN

NORTH

KEY PLAN
N.T.S.

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.

Mattino DEVELOPMENTS INC.
171 CLARIDGE DRIVE
OTTAWA, ON
K2J 5V8

No.	REVISION	DATE	BY
6.	REVISED PER CITY COMMENTS	JUL 25/14	MAB
5.	ISSUED WITH MOE APPLICATION	JUN 12/14	MAB
4.	REVISED PER CITY COMMENTS	MAY 16/14	MAB
3.	REVISED PER CITY COMMENTS	APR 03/14	MAB
2.	REVISED PLAN OF SUBDIVISION	FEB 14/14	MAB
1.	ISSUED FOR APPROVAL	JUN 07/13	KJM

SCALE 1:500

DESIGN	LRW
CHECKED	MAB
DRAWN	DTD
CHECKED	MAB
APPROVED	JGR

FOR REVIEW ONLY

REGISTERED PROFESSIONAL ENGINEER J.G. RIDDELL PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER M.A. BISSETT 2014-07-25 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
LONGFIELDS CENTRAL
591 LONGFIELDS DRIVE

STORM DRAINAGE AREA PLAN

PROJECT No. 112021
REV: REV # 6
DRAWING No. 112021-STM

PLANB1.DWG - 1000mmx707mm

Longfields Central
Site Servicing and Stormwater Management Study

Prepared for:

Mattino
DEVELOPMENTS INC.

171 Claridge Drive
Ottawa, ON
K2J 5V8

Prepared by:

NOVATECH ENGINEERING CONSULTANTS LTD.
Suite 200, 240 Michael Cowpland Drive
Kanata, Ontario
K2M 1P6

Issued: June 7, 2013
Revised: February 14, 2014
Revised: April 3, 2014
Revised: May 16, 2014
Revised: June 12, 2014
Revised: July 25, 2014

Ref: R-2014-073
Novatech File No. 112021

<u>November 22, 2013</u>

- Longfields Development (by Campanale)
  - Revised Rearyard Areas: 0.34 ha + 0.29ha = 0.63 ha @ C = 0.54
  - Right-Of-Way Areas: 0.28 ha+ 0.09 ha = 0.37 ha @ C = 0.69

It is therefore noted that the revised areas contributing from the Campanale Development total to 1.0 ha and may cause an increase in major system flow contributing to SWM Park 959.

5.4.5 Future Development Blocks

During detailed design of the Longfields Development, it was determined that the medium density residential area is unable to provide the 64 L/s/ha and 100 m^3/ha through surface storage within the roadway and rearyard areas as requested in the *Longfields Davidson Heights Serviceability Study Update Report (1998)*. To achieve the guidelines set out in the Longfields Davidson Heights Serviceability Study Update Report (1998) throughout the development, the following high unit residential blocks will be restricted to the design criteria provided below:

<u>Block 1 (0.21 ha)</u>

- Restricted minor system flow of 6.0 L/s (28.8 L/s/ha)
- On-Site storage of 20.8 m^3 (100 m^3/ha)

<u>Block 2 (0.15 ha)</u>

- Restricted minor system flow of 9.6 L/s (64 L/s/ha)
- On-Site storage of 25 m^3 (167 m^3/ha)

<u>Block 21 (1.0 ha)</u>

- Restricted minor system flow of 37.6 L/s (37.5 L/s/ha)
- On-Site storage of 270 m^3 (270 m^3/ha)
  - 100 m^3 of surface storage
  - 170 m^3 of underground storage using either:
    - Superpipe storage
    - Underground storage chambers

It has been determined that the storage suggested above for each future residential block is sufficient for each block and can be accommodated through both surface and subsurface storage. Conditions must be placed within the subdivision agreement and registered on title for the site plan for all future blocks for the on-site storage criteria and restrictive release rates provided above.

Conceptual calculations have been completed for Block 21 to ensure sufficient storage is available within the future block. Through conceptual grading, it was determined that 100 m^3 of surface storage can be provided within storage sags throughout the parking lot areas. The additional 170 m^3 of necessary storage will be provided beneath the parking lot areas throughout the block using underground storage chambers. The chambers will be installed to provide temporary subsurface storage of runoff from storms up to 1:100 year event. The chambers conceptually designed for this report are provided by Stormtech (or approved equivalent) and have been designed with the following system requirements:

StormTech SC-740 Chamber

Designed to meet the most stringent industry performance standards for superior structural integrity while providing designers with a cost-effective method to save valuable land and protect water resources. The StormTech system is designed primarily to be used under parking lots thus maximizing land usage for commercial and municipal applications.

StormTech®
Detention • Retention • Recharge
Subsurface Stormwater Management℠

StormTech SC-740 Chamber
(not to scale)

Nominal Chamber Specifications

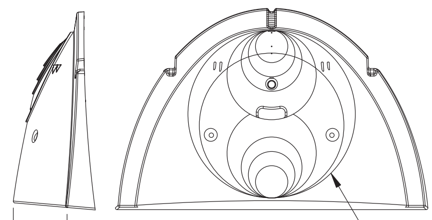
Size (L x W x H)
85.4" x 51.0" x 30.0"
(2170 x 1295 x 762 mm)

Chamber Storage
45.9 ft³ (1.30 m³)

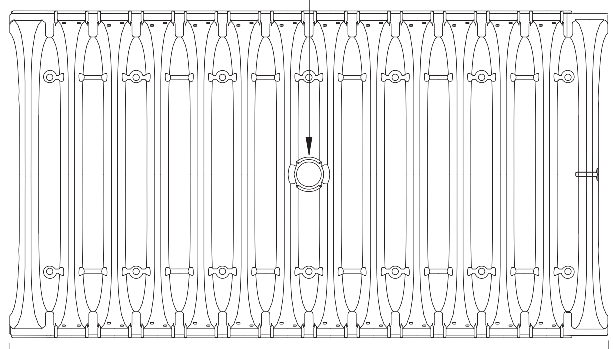
Minimum Installed Storage*
74.9 ft³ (2.12 m³)

Weight
74.0 lbs (33.6 kg)

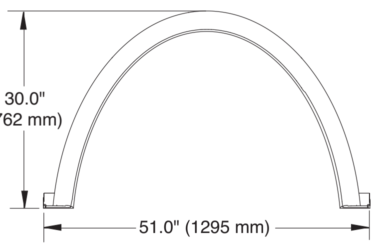
Shipping
30 chambers/pallet
60 end caps/pallet
12 pallets/truck

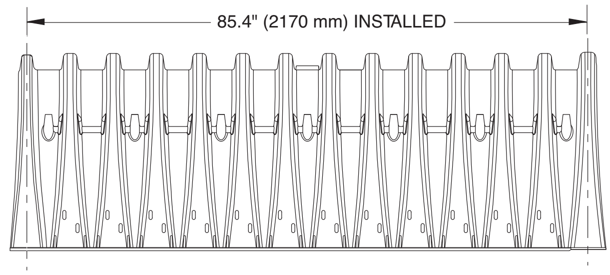


SC-740 End Cap

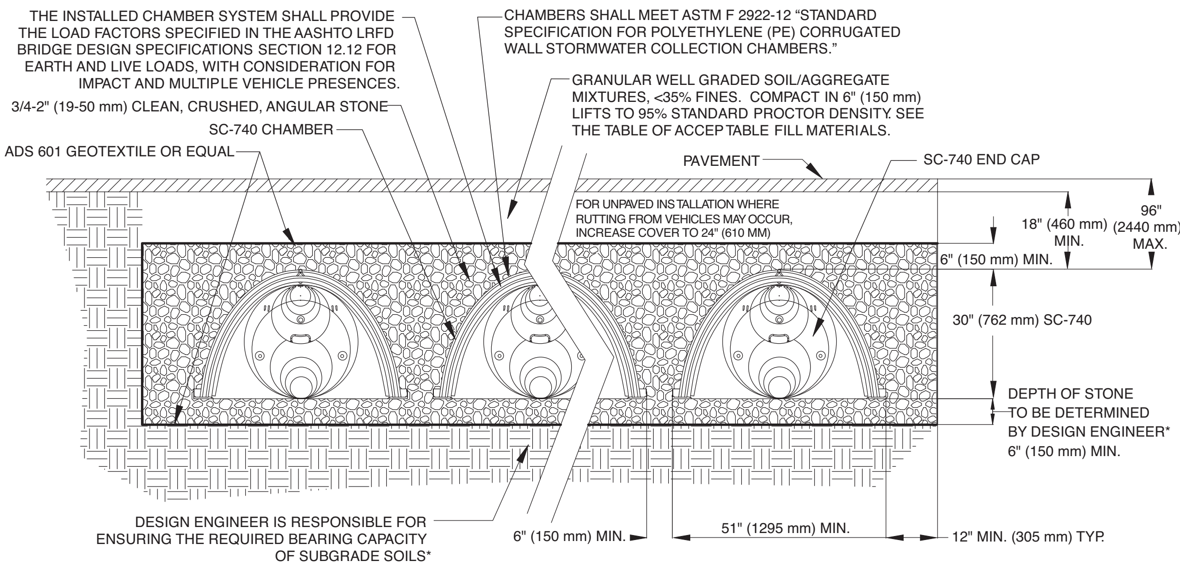


SC-740 Chamber





Typical Cross Section Detail
(not to scale)



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

MADE IN THE U.S.A.

SC-740 Cumulative Storage Volumes Per Chamber

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

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

Note: Add 1.13 cu. ft. (0.032 m^3) of storage for each additional inch (25 mm) of stone foundation.

Storage Volume Per Chamber

	Bare Chamber Storage	Chamber and Stone Stone Foundation Depth in. (mm)		
	ft^3 (m^3)	6 (150)	12 (305)	18 (460)
StormTech SC-740	45.9 (1.3)	74.9 (2.1)	81.7 (2.3)	88.4 (2.5)

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

Amount of Stone Per Chamber

	Stone Foundation Depth		
ENGLISH TONS (CUBIC YARDS)	**6"**	**12"**	**18"**
StormTech SC-740	3.8 (2.8 yd^3)	4.6 (3.3 yd^3)	5.5 (3.9 yd^3)
METRIC KILOGRAMS (METER^3)	**150 mm**	**305 mm**	**460 mm**
StormTech SC-740	3450 (2.1 m^3)	4170 (2.5 m^3)	4490 (3.0 m^3)

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

Volume of Excavation Per Chamber

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

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

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

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

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

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

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

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

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

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

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

TEMPEST Product Submittal Package

Date: October 31, 2019

Customer: Novatech

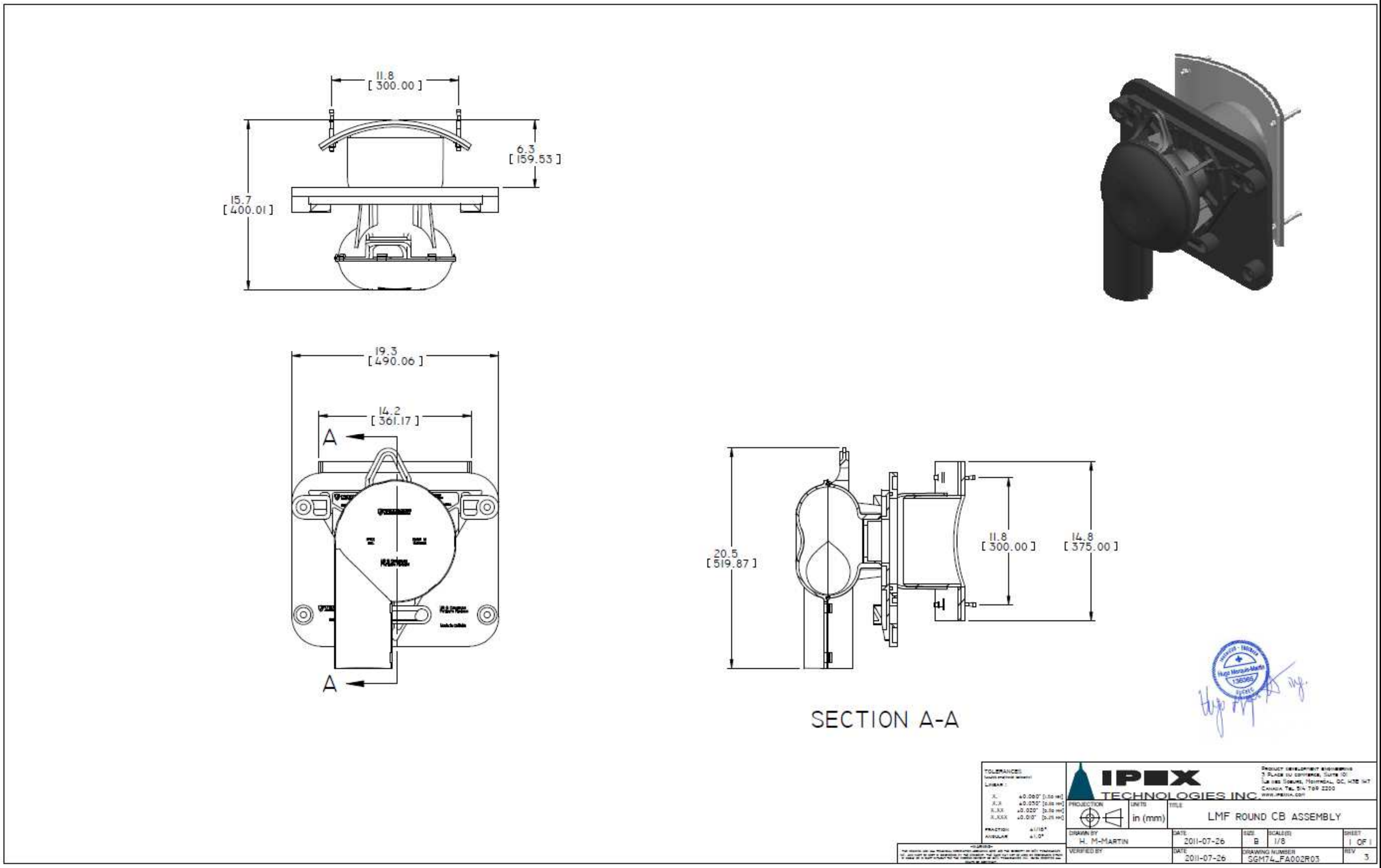
Contact: Lucas Wilson

Location: Ottawa

Project Name: Mattino Way

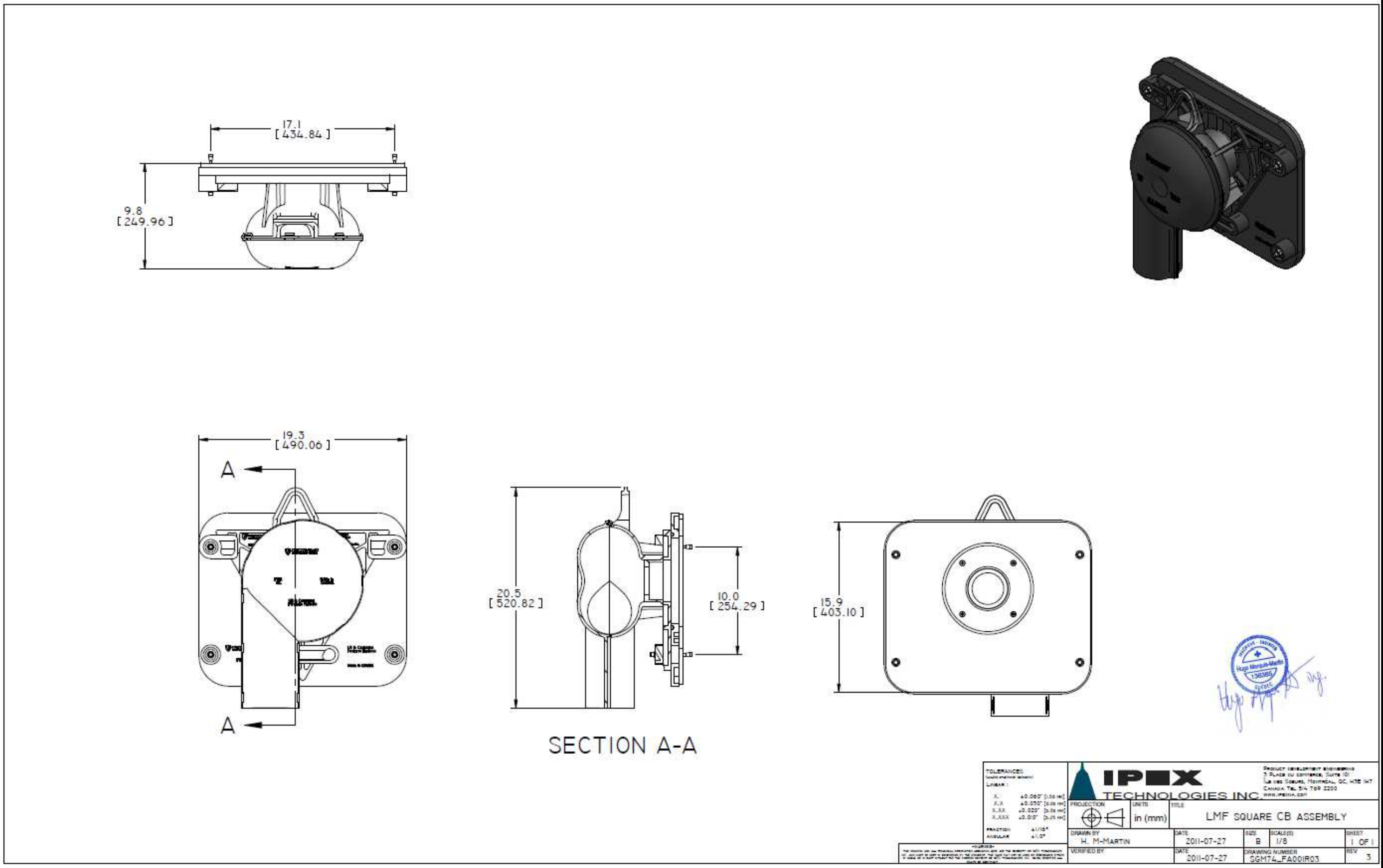
IPEX

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



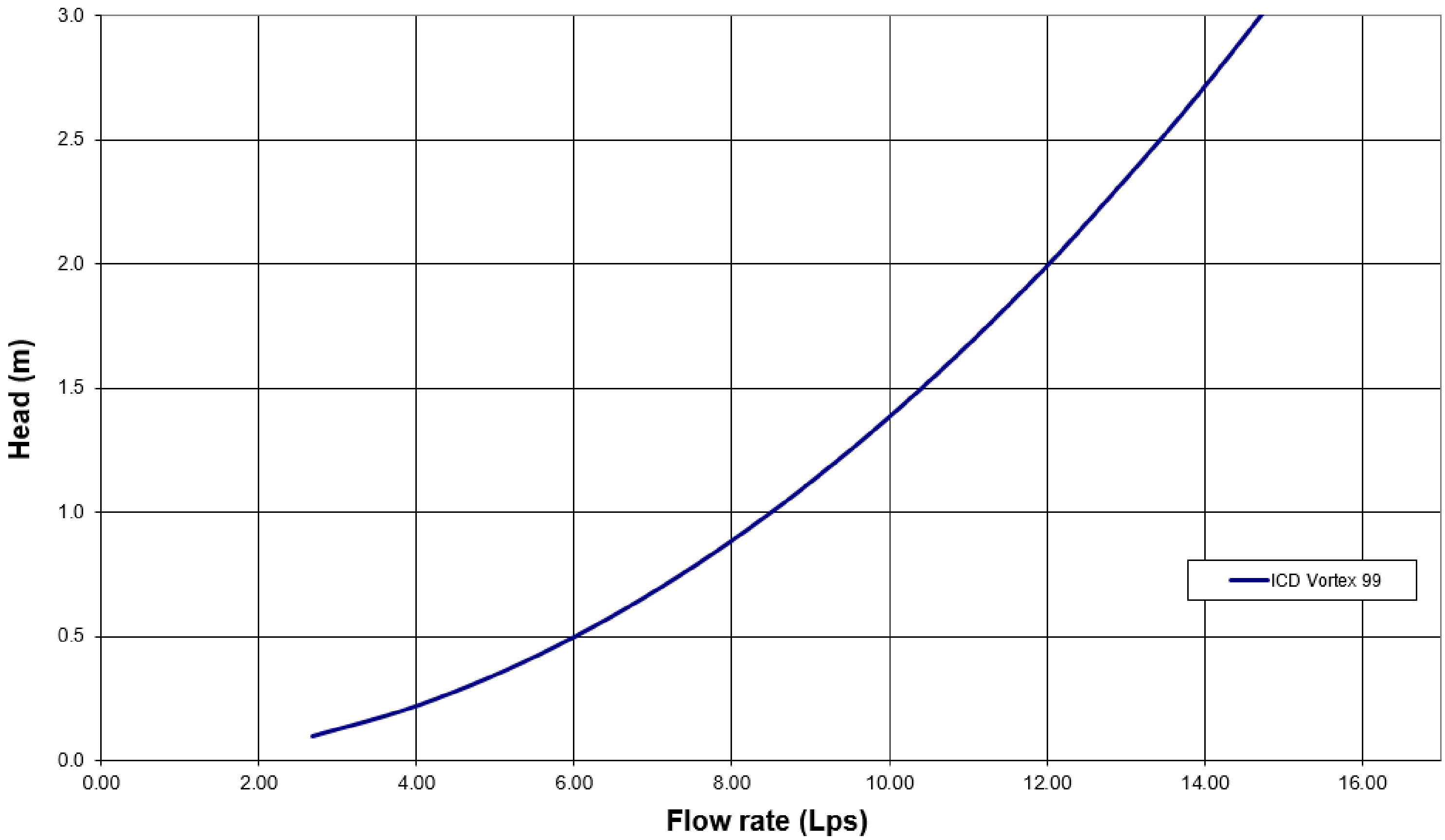
IPEX

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



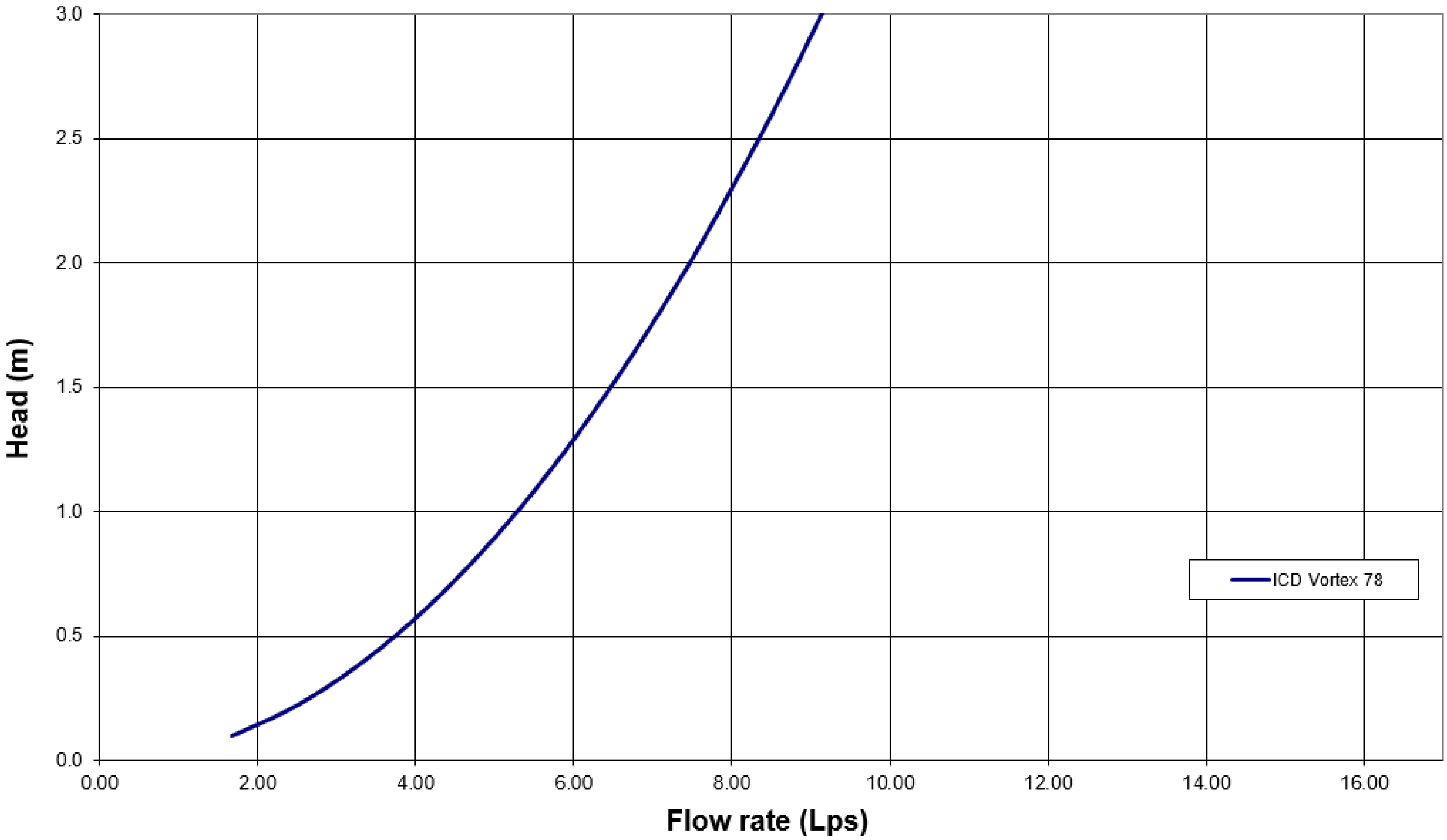
Tempest LMF ICD Flow Curve

Flow: 13.8 L/s
Head: 2.62 m
CBMH1



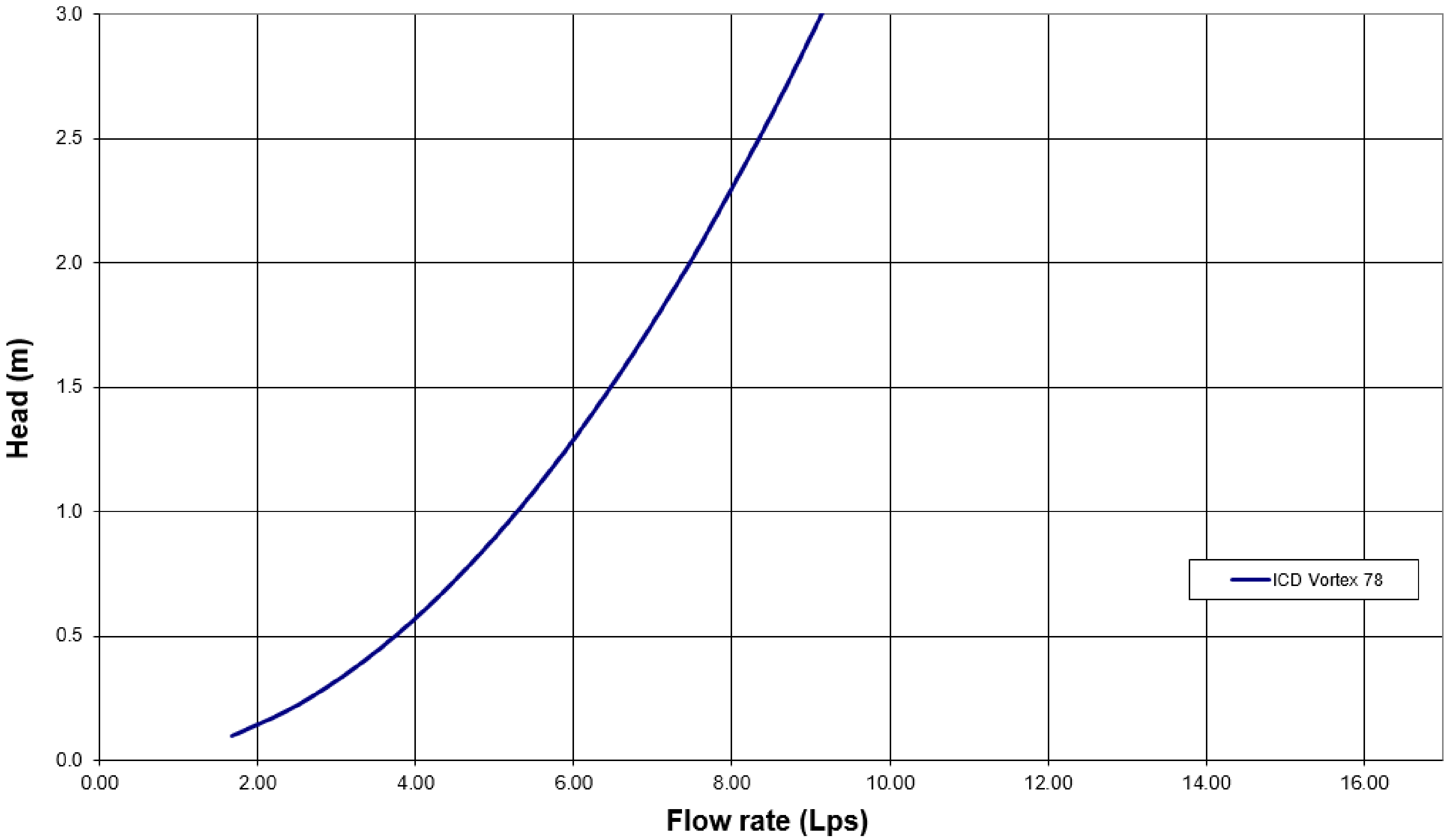
Tempest LMF ICD Flow Curve

Flow: 8 L/s
Head: 2.35 m
CBMH3



Tempest LMF ICD Flow Curve

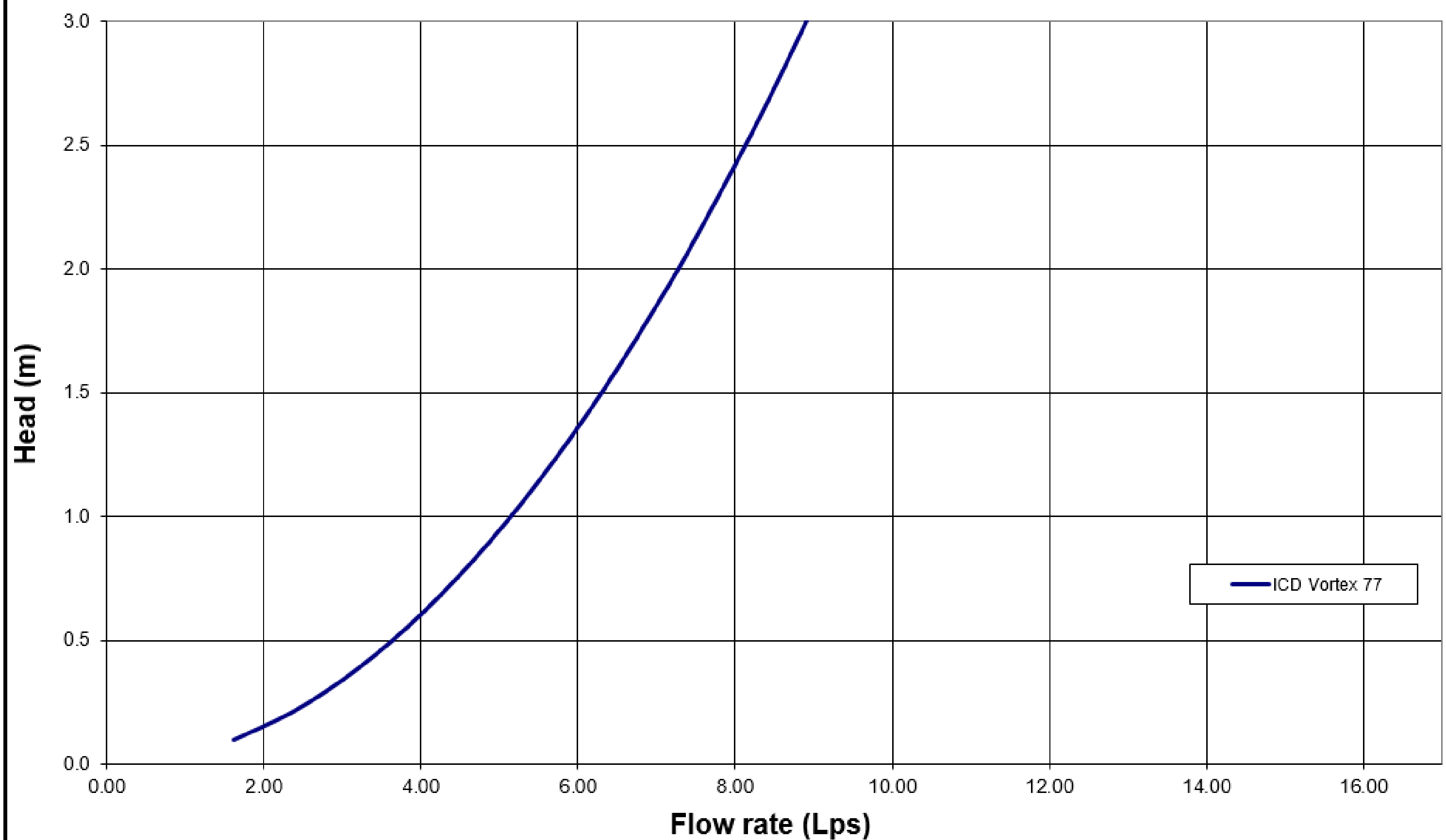
Flow: 7.2 L/s
Head: 1.86 m
CB7



IPEX

Tempest LMF ICD Flow Curve

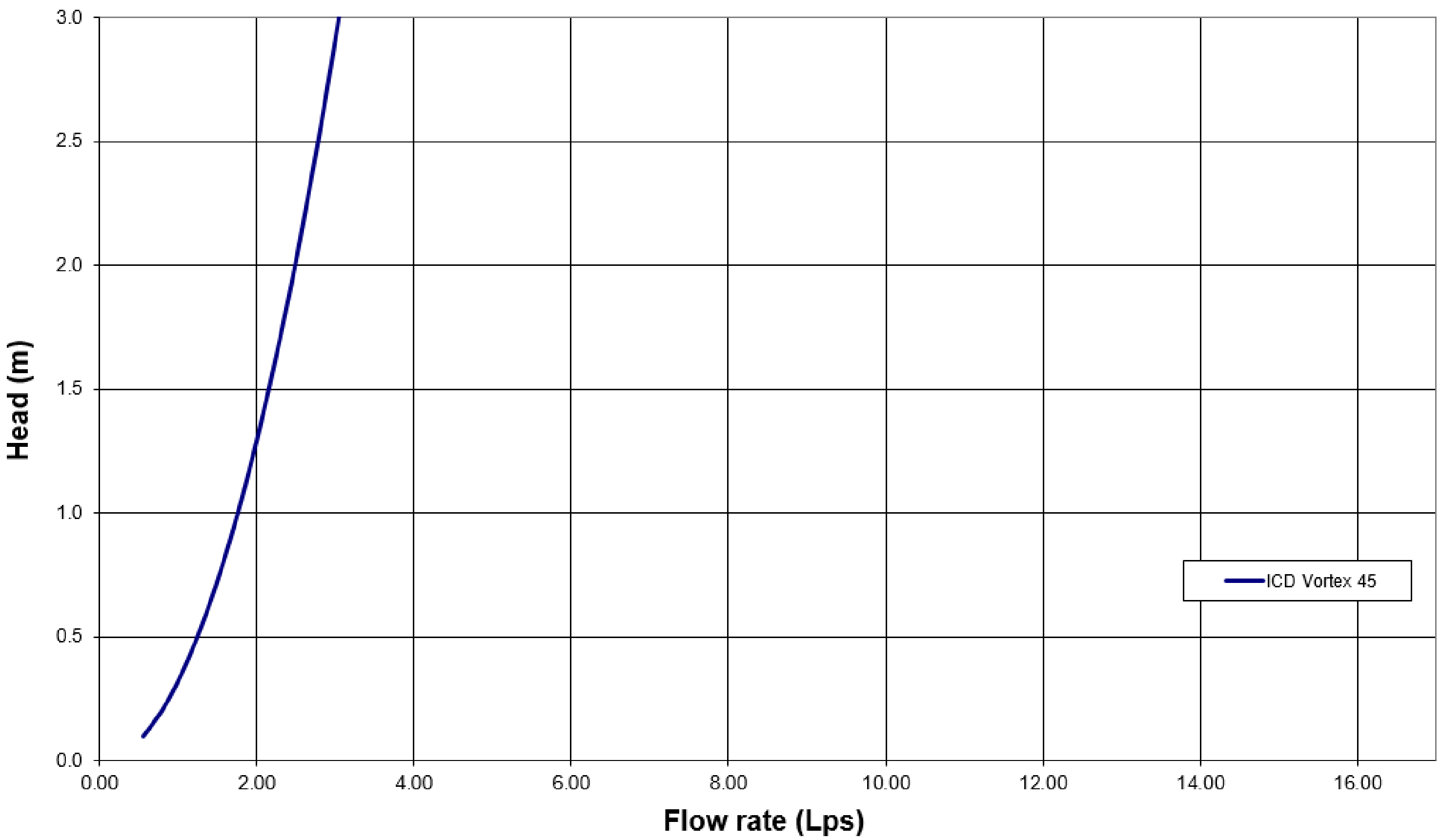
Flow: 8.2 L/s
Head: 2.48 m
MH7



IPEX

Tempest LMF ICD Flow Curve

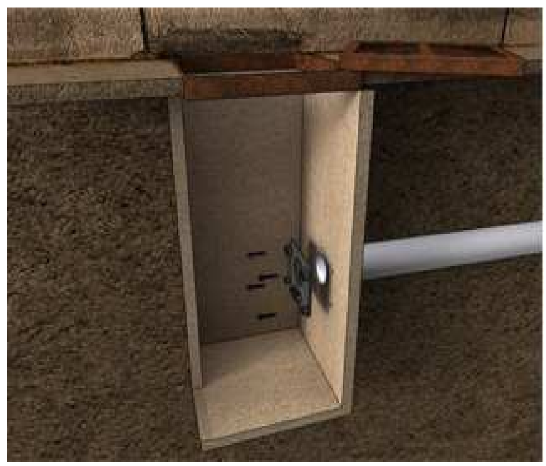
Flow: 2.5 L/s
Head: 2 m
SAN MH8

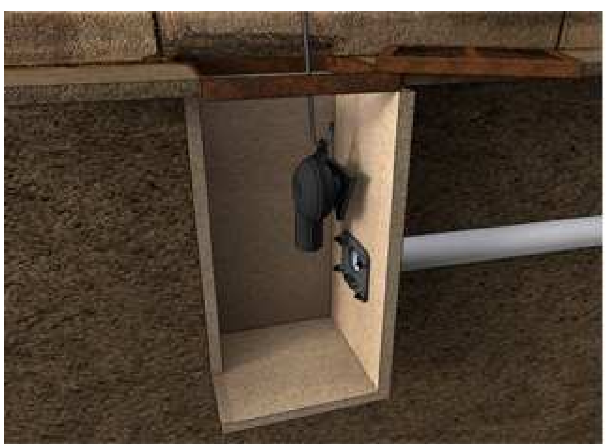


IPEX

Square CB Installation Notes:

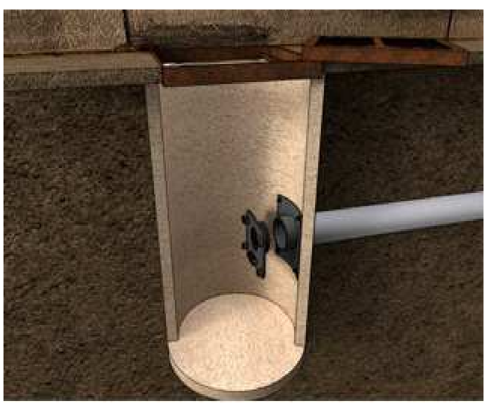
1. Materials and tooling verification:
   - Tooling: impact drill, 3/8'' concrete bit, torque wrench for 9/16''nut, hand hammer, level, and marker.
   - Material: (4) concrete anchor 3/8x3-1/2, (4) washers, (4) nuts
2. Use the mounting wall plate to locate and mark the hole (4) pattern on the catch basin 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 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.

Block 21 - Mattino Way (112021-10)
PCSWMM Storage Curves (surface storage)

NOVATECH
Engineers, Planners & Landscape Architects

CB2-Storage		
Depth (m)	Area (m^2)	Volume (m^3)
0.00	0.36	0.00
1.50	0.36	0.54
1.55	9.81	0.79
1.60	38.50	2.00
1.65	86.00	5.11
1.70	152.34	11.07
1.75	236.50	20.79
1.80	315.61	34.60
1.81	0.00	36.17
2.50	0.00	36.17

CB3-Storage		
Depth (m)	Area (m^2)	Volume (m^3)
0.00	0.36	0.00
1.85	0.36	0.67
1.90	37.32	1.61
1.95	133.00	5.87
2.00	253.76	15.54
2.02	314.52	21.22
2.03	0.00	22.79
2.85	0.00	22.79

CB5-Storage		
Depth (m)	Area (m^2)	Volume (m^3)
0.00	0.36	0.00
1.60	0.36	0.58
1.65	7.29	0.77
1.70	27.95	1.65
1.75	61.82	3.89
1.80	109.23	8.17
1.85	169.96	15.15
1.90	255.55	25.79
1.91	0.00	27.06
2.60	0.00	27.06

CB6-Storage		
Depth (m)	Area (m^2)	Volume (m^3)
0.00	0.36	0.00
1.60	0.36	0.58
1.65	40.63	1.60
1.70	149.65	6.36
1.75	262.14	16.65
1.76	0.00	17.96
2.60	0.00	17.96

CB7-Storage		
Depth (m)	Area (m^2)	Volume (m^3)
0.00	0.36	0.00
1.60	0.36	0.58
1.65	12.16	0.89
1.70	48.59	2.41
1.75	108.89	6.34
1.80	193.72	13.91
1.85	297.64	26.19
1.90	417.45	44.07
1.91	0.00	46.16
2.60	0.00	46.16

CBMH1-Storage		
Depth (m)	Area (m^2)	Volume (m^3)
0.00	0.36	0.00
2.50	0.36	0.90
2.55	15.65	1.30
2.60	61.42	3.23
2.65	129.90	8.01
2.70	211.27	16.54
2.72	242.77	21.08
2.73	0.00	22.29
3.50	0.00	22.29

CBMH2-Storage		
Depth (m)	Area (m^2)	Volume (m^3)
0.00	0.36	0.00
2.05	0.36	0.74
2.10	14.89	1.12
2.15	58.74	2.96
2.20	131.40	7.71
2.25	233.07	16.83
2.30	360.25	31.66
2.31	0.00	33.46
3.15	0.00	33.46

CBMH3-Storage		
Depth (m)	Area (m^2)	Volume (m^3)
0.00	0.36	0.00
2.15	0.36	0.77
2.20	23.86	1.38
2.25	95.02	4.35
2.30	214.52	12.09
2.35	384.77	27.07
2.38	414.11	39.06
2.39	0.00	41.13
3.15	0.00	41.13

RYCB1-Storage		
Depth (m)	Area (m^2)	Volume (m^3)
0.00	0.36	0.00
1.85	0.36	0.67
1.90	7.10	0.85
1.95	28.40	1.74
2.00	63.90	4.05
2.04	102.50	7.38
2.05	0.00	7.89
2.85	0.00	7.89

Date: 11/1/2019
M:\2012\112021\Block 21\DATA\Calculations\Sewer Calcs\SWM\112021-Blk21-Storage Curves_Rev1.xlsx

Block 21 - Mattino Way (112021-10)
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%)
CB2	91.12	92.62	92.92	0.30	92.04	92.63	92.84	92.87	0.00	0.01	0.22	0.25	0.00	0.00	0.00	0.00
CB3	91.05	92.90	93.07	0.17	91.89	92.28	93.07	93.08	0.00	0.00	0.17	0.18	0.00	0.00	0.00	0.01
CB5	91.35	92.95	93.25	0.30	91.94	92.33	93.08	93.20	0.00	0.00	0.13	0.25	0.00	0.00	0.00	0.00
CB6	91.35	92.95	93.35	0.40	91.94	92.33	93.08	93.20	0.00	0.00	0.13	0.25	0.00	0.00	0.00	0.00
CB7	91.35	92.95	93.25	0.30	92.51	93.04	93.21	93.25	0.00	0.09	0.26	0.30	0.00	0.00	0.00	0.00
CBMH1	90.45	92.95	93.17	0.22	91.89	92.28	93.07	93.10	0.00	0.00	0.12	0.15	0.00	0.00	0.00	0.00
CBMH2	90.88	92.95	93.20	0.25	91.89	92.28	93.08	93.12	0.00	0.00	0.13	0.17	0.00	0.00	0.00	0.00
CBMH3	90.48	92.62	92.85	0.23	92.04	92.63	92.84	92.87	0.00	0.01	0.22	0.25	0.00	0.00	0.00	0.02
RYCB1	91.15	93.00	93.19	0.19	91.89	92.29	93.08	93.12	0.00	0.00	0.08	0.12	0.00	0.00	0.00	0.00

[1] *3-hour Chicago Storm.*

Date: 11/1/2019
M:\2012\112021\Block 21\DATA\Calculations\Sewer Calcs\SWM\112021-Blk21-Model Results.xlsx

Block 21 - Mattino Way (112021-10)
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)
MH1	90.54	92.75	90.68	0.14	2.07	90.71
MH3	90.64	93.40	90.69	0.05	2.71	90.74
MH5	90.77	93.23	90.70	0.00	2.53	90.74
MH7 (D/S ICD)	90.90	93.95	90.70	0.00	3.25	90.70

[1] *3-hour Chicago Storm.*

Date: 11/1/2019
M:\2012\112021\Block 21\DATA\Calculations\Sewer Calcs\SWM\112021-Blk21-Model Results.xlsx

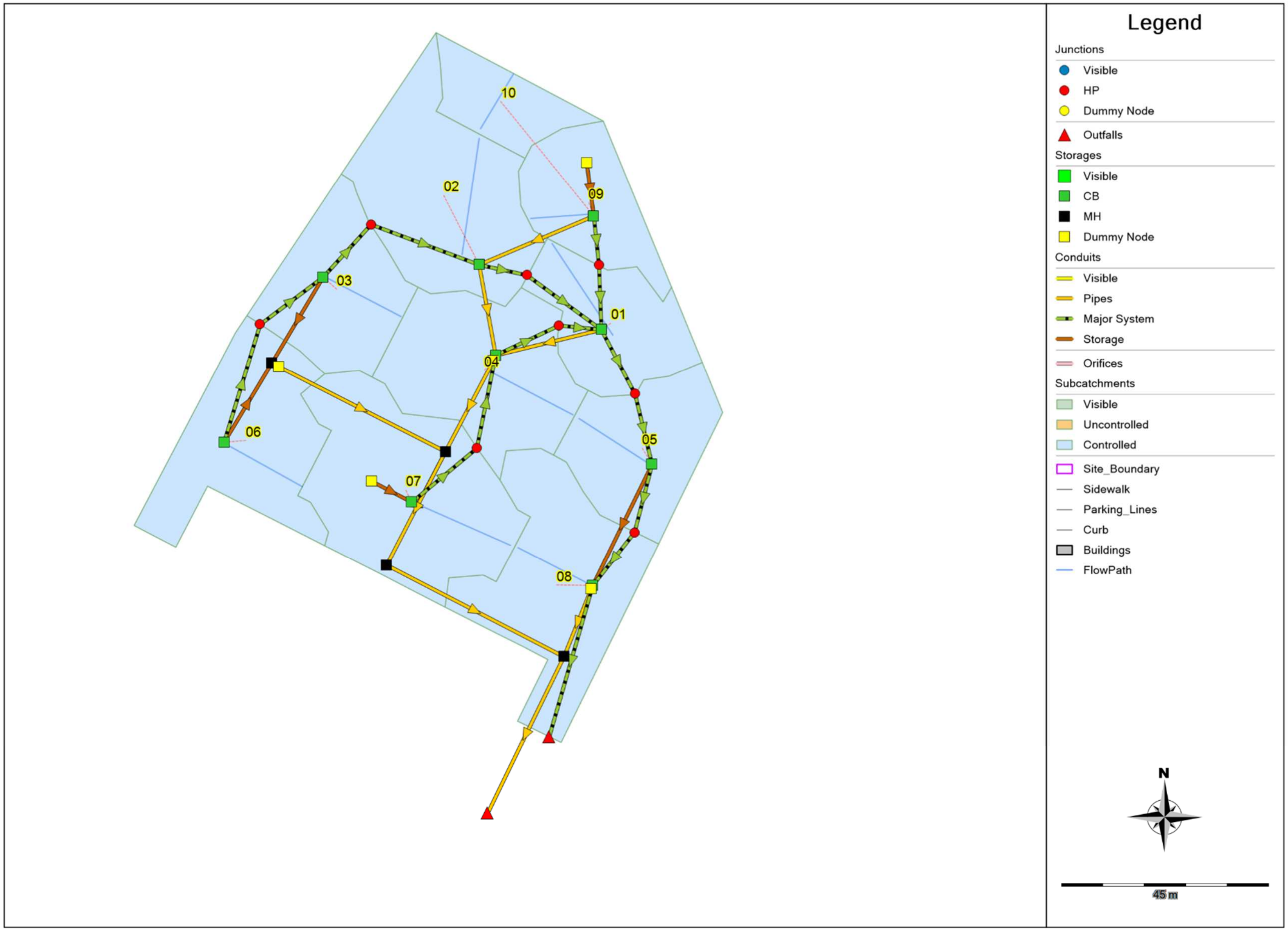
Block 21 - Mattino Way (112021-10)
PCSWMM Model Schematic

Overall Model Schematic

Date: 2019-11-01
M:\2012\112021\Block 21\DATA\Calculations\Sewer Calcs\SWM\PCSWMM\Model Schematic-Output\PCSWMM Model Schematic.docx

Block 21 - Mattino Way (112021-10)
PCSWMM Model Schematic

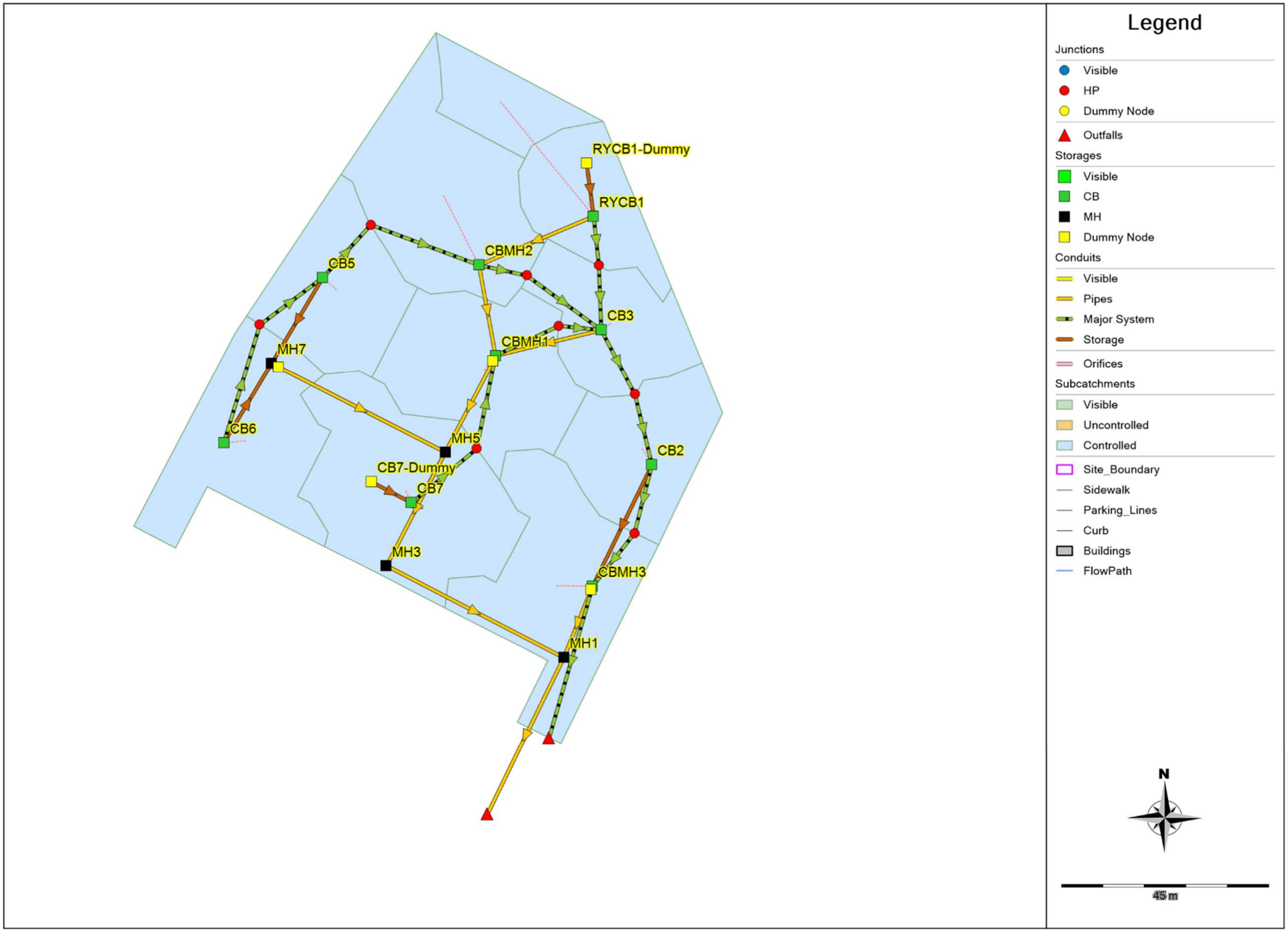
Subcatchment ID's (with flow paths)



Date: 2019-11-01
M:\2012\112021\Block 21\DATA\Calculations\Sewer Calcs\SWM\PCSWMM\Model Schematic-Output\PCSWMM Model Schematic.docx

Block 21 - Mattino Way (112021-10)
PCSWMM Model Schematic

Node ID's



Date: 2019-11-01
M:\2012\112021\Block 21\DATA\Calculations\Sewer Calcs\SWM\PCSWMM\Model Schematic-Output\PCSWMM Model Schematic.docx

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

M:\2012\112021\Block 21\CAD\Design\112021-10-STM.dwg

****
Element Count
****

Number of rain gages 1
Number of subcatchments ... 10
Number of nodes 28
Number of links 35
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
Raingage1	C3hr-100yr	INTENSITY	10 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
01	0.08	32.00	84.30	1.0000	Raingage1	CB3
02	0.13	52.00	87.10	1.0000	Raingage1	CBMH2
03	0.09	45.00	77.10	1.0000	Raingage1	CB5
04	0.12	60.00	80.00	1.0000	Raingage1	CBMH1
05	0.08	40.00	77.10	1.0000	Raingage1	CB2
06	0.11	55.00	74.30	1.0000	Raingage1	CB6
07	0.15	75.00	72.90	1.0000	Raingage1	CB7
08	0.13	65.00	70.00	1.0000	Raingage1	CBMH3
09	0.07	46.67	15.70	1.0000	Raingage1	RYCB1
10	0.04	26.67	71.40	1.0000	Raingage1	RYCB1

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
HP-CB2	JUNCTION	92.92	1.00	0.0	
HP-CB3	JUNCTION	93.07	1.00	0.0	
HP-CB5	JUNCTION	93.25	1.00	0.0	
HP-CB6	JUNCTION	93.35	1.00	0.0	
HP-CB7	JUNCTION	93.25	1.00	0.0	
HP-CBMH1	JUNCTION	93.17	1.00	0.0	
HP-CBMH2	JUNCTION	93.20	1.00	0.0	
HP-RYCB1	JUNCTION	93.19	1.00	0.0	
HP-CBMH3	OUTFALL	92.85	1.00	0.0	
MH122	OUTFALL	89.92	0.53	0.0	
CB2	STORAGE	91.12	2.50	0.0	
CB3	STORAGE	91.05	2.85	0.0	
CB5	STORAGE	91.35	2.60	0.0	
CB6	STORAGE	91.35	2.60	0.0	
CB7	STORAGE	91.35	2.60	0.0	
CB7-Dummy	STORAGE	91.36	2.64	0.0	
CBMH1	STORAGE	90.45	3.50	0.0	
CBMH2	STORAGE	90.88	3.07	0.0	
CBMH3	STORAGE	90.48	3.14	0.0	
CBMH3-ICD	STORAGE	90.48	2.14	0.0	
CBMH-ICD	STORAGE	90.45	2.50	0.0	
MH1	STORAGE	90.01	2.74	0.0	
MH3	STORAGE	90.19	3.21	0.0	
MH5	STORAGE	90.32	2.91	0.0	
MH7	STORAGE	90.60	3.35	0.0	
MH7-ICD	STORAGE	90.60	2.70	0.0	
RYCB1	STORAGE	91.15	2.85	0.0	
RYCB1-Dummy	STORAGE	91.20	2.85	0.0	

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
1	CB7-Dummy	CB7	CONDUIT	13.3	0.0752	0.0130
10	RYCB1	HP-RYCB1	CONDUIT	2.0	-9.5432	0.0150
11	HP-RYCB1	CB3	CONDUIT	2.0	14.6549	0.0150
12	CBMH1	HP-CBMH1	CONDUIT	2.0	-11.0672	0.0150
13	HP-CBMH1	CB3	CONDUIT	2.0	13.6247	0.0150
14	CB3	HP-CB3	CONDUIT	2.0	-8.5309	0.0150
15	HP-CB3	CB2	CONDUIT	2.0	23.0921	0.0150

16	CB2	HP-CB2	CONDUIT	2.0	-15.1717	0.0150
17	HP-CB2	CBMH3	CONDUIT	2.0	15.1717	0.0150
18	CBMH3	HP-CBMH3	CONDUIT	2.0	-11.5768	0.0150
19	RYCB1-Dummy	RYCB1	CONDUIT	17.4	0.1149	0.0130
2	CB6	HP-CB6	CONDUIT	2.0	-20.4124	0.0150
3	HP-CB6	CB5	CONDUIT	2.0	20.4124	0.0150
4	CB5	HP-CB5	CONDUIT	2.0	-15.1717	0.0150
5	HP-CB5	CBMH2	CONDUIT	2.0	15.1717	0.0150
6	CB7	HP-CB7	CONDUIT	2.0	-15.1717	0.0150
7	HP-CB7	CBMH1	CONDUIT	2.0	15.1717	0.0150
8	CBMH2	HP-CBMH2	CONDUIT	2.0	-12.5988	0.0150
9	HP-CBMH2	CB3	CONDUIT	2.0	15.1717	0.0150
CB2-CBMH3	CB2	CBMH3	CONDUIT	22.5	0.4441	0.0130
CB3-CBMH1	CB3	CBMH1	CONDUIT	23.6	1.0170	0.0130
CB5-MH7	CB5	MH7	CONDUIT	17.4	0.2299	0.0130
CB6-MH7	CB6	MH7	CONDUIT	17.4	0.2299	0.0130
CBMH1-MH5	CBMH-ICD	MH5	CONDUIT	23.6	0.2115	0.0130
CBMH2-CBMH1	CBMH2	CBMH1	CONDUIT	20.1	0.9951	0.0130
CBMH3-MH1	CBMH3-ICD	MH1	CONDUIT	16.7	0.4785	0.0130
MH1-STUB	MH1	MH122	CONDUIT	37.8	0.2381	0.0130
MH3-MH1	MH3	MH1	CONDUIT	43.4	0.2534	0.0130
MH5-MH3	MH5	MH3	CONDUIT	27.9	0.2513	0.0130
MH9-MH5	MH7-ICD	MH5	CONDUIT	42.4	0.3063	0.0130
RYCB1-CBMH2	RYCB1	CBMH2	CONDUIT	27.4	0.9854	0.0130
CB7	CB7	MH5	ORIFICE			
Orifice-1	CBMH3	CBMH3-ICD	ORIFICE			
Orifice-2	MH7	MH7-ICD	ORIFICE			
Orifice-3	CBMH1	CBMH-ICD	ORIFICE			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
1	RECT_CLOSED	1.06	0.98	0.25	0.92	1	810.19
10	RECT_OPEN	1.00	3.00	0.75	3.00	1	51004.65
11	RECT_OPEN	1.00	3.00	0.75	3.00	1	63205.48
12	RECT_OPEN	1.00	3.00	0.75	3.00	1	54926.48
13	RECT_OPEN	1.00	3.00	0.75	3.00	1	60943.52
14	RECT_OPEN	1.00	3.00	0.75	3.00	1	48223.69
15	RECT_OPEN	1.00	3.00	0.75	3.00	1	79340.60
16	RECT_OPEN	1.00	3.00	0.75	3.00	1	64310.23
17	RECT_OPEN	1.00	3.00	0.75	3.00	1	64310.23
18	RECT_OPEN	1.00	3.00	0.75	3.00	1	56176.93
19	RECT_CLOSED	1.06	0.98	0.25	0.92	4	1001.74
2	RECT_OPEN	1.00	3.00	0.75	3.00	1	74595.19
3	RECT_OPEN	1.00	3.00	0.75	3.00	1	74595.19
4	RECT_OPEN	1.00	3.00	0.75	3.00	1	64310.23
5	RECT_OPEN	1.00	3.00	0.75	3.00	1	64310.23
6	RECT_OPEN	1.00	3.00	0.75	3.00	1	64310.23
7	RECT_OPEN	1.00	3.00	0.75	3.00	1	64310.23
8	RECT_OPEN	1.00	3.00	0.75	3.00	1	58604.17
9	RECT_OPEN	1.00	3.00	0.75	3.00	1	64310.23
CB2-CBMH3	RECT_CLOSED	1.06	0.98	0.25	0.92	1	1968.94
CB3-CBMH1	CIRCULAR	0.30	0.07	0.07	0.30	1	97.53
CB5-MH7	RECT_CLOSED	1.06	0.98	0.25	0.92	1	1416.67
CB6-MH7	RECT_CLOSED	1.06	0.98	0.25	0.92	1	1416.67
CBMH1-MH5	CIRCULAR	0.38	0.11	0.09	0.38	1	80.64
CBMH2-CBMH1	CIRCULAR	0.30	0.07	0.07	0.30	1	96.47
CBMH3-MH1	CIRCULAR	0.30	0.07	0.07	0.30	1	66.89
MH1-STUB	CIRCULAR	0.53	0.22	0.13	0.53	1	209.86
MH3-MH1	CIRCULAR	0.45	0.16	0.11	0.45	1	143.53
MH5-MH3	CIRCULAR	0.45	0.16	0.11	0.45	1	142.95
MH9-MH5	CIRCULAR	0.30	0.07	0.07	0.30	1	53.52
RYCB1-CBMH2	CIRCULAR	0.30	0.07	0.07	0.30	1	96.00

```
*********************************************************
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 ........ YES
  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 10/10/2019 00:00:00
```

```
Ending Date .............. 10/17/2019 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:05:00
Wet Time Step ............ 00:05:00
Dry Time Step ............ 01:00:00
Routing Time Step ........ 2.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 4
Head Tolerance ........... 0.001500 m


*********************
Control Actions Taken
*********************


**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......         0.072        71.667
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         0.012        12.072
Surface Runoff ...........         0.060        59.523
Final Storage ............         0.001         0.772
Continuity Error (%) .....        -0.977


**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.060         0.595
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.004         0.040
External Outflow .........         0.061         0.611
Flooding Loss ............         0.000         0.000
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.000         0.004
Final Stored Volume ......         0.003         0.026
Continuity Error (%) .....         0.370


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

```
Highest Continuity Errors
*************************
Node MH1 (1.47%)
Node MH3 (1.13%)


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


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


*************************
Routing Time Step Summary
*************************
Minimum Time Step           :     0.07 sec
Average Time Step           :     2.00 sec
Maximum Time Step           :     2.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     2.00
Percent Not Converging      :     0.00


***************************
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
01	71.67	0.00	0.00	6.95	59.73	4.67	64.40	0.05	38.40	0.899
02	71.67	0.00	0.00	5.70	61.80	3.88	65.68	0.09	62.93	0.916
03	71.67	0.00	0.00	10.16	54.74	6.73	61.47	0.06	42.32	0.858
04	71.67	0.00	0.00	8.85	56.87	5.94	62.80	0.08	57.04	0.876
05	71.67	0.00	0.00	10.16	54.62	6.73	61.35	0.05	37.62	0.856
06	71.67	0.00	0.00	11.42	52.57	7.50	60.07	0.07	51.12	0.838
07	71.67	0.00	0.00	12.05	51.74	7.88	59.62	0.09	69.27	0.832
08	71.67	0.00	0.00	13.36	49.57	8.66	58.23	0.08	59.18	0.813

09	71.67	0.00	0.00	38.28	11.08	23.00	34.08	0.02	21.28	0.475
10	71.67	0.00	0.00	12.67	50.29	8.45	58.74	0.02	18.61	0.820

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days	Time of Max Occurrence hr:min	Reported Max Depth Meters
HP-CB2	JUNCTION	0.00	0.00	92.92	0	00:00	0.00
HP-CB3	JUNCTION	0.00	0.00	93.07	0	01:42	0.00
HP-CB5	JUNCTION	0.00	0.00	93.25	0	00:00	0.00
HP-CB6	JUNCTION	0.00	0.00	93.35	0	00:00	0.00
HP-CB7	JUNCTION	0.00	0.00	93.25	0	00:00	0.00
HP-CBMH1	JUNCTION	0.00	0.00	93.17	0	00:00	0.00
HP-CBMH2	JUNCTION	0.00	0.00	93.20	0	00:00	0.00
HP-RYCB1	JUNCTION	0.00	0.00	93.19	0	00:00	0.00
HP-CBMH3	OUTFALL	0.00	0.00	92.85	0	00:00	0.00
MH122	OUTFALL	0.76	0.76	90.68	0	00:00	0.76
CB2	STORAGE	0.04	1.71	92.83	0	01:51	1.71
CB3	STORAGE	0.05	2.02	93.07	0	01:42	2.02
CB5	STORAGE	0.03	1.73	93.08	0	01:40	1.73
CB6	STORAGE	0.03	1.73	93.08	0	01:41	1.73
CB7	STORAGE	0.03	1.86	93.21	0	01:34	1.86
CB7-Dummy	STORAGE	0.03	1.85	93.21	0	01:34	1.85
CBMH1	STORAGE	0.29	2.62	93.07	0	01:41	2.62
CBMH2	STORAGE	0.06	2.19	93.07	0	01:41	2.19
CBMH3	STORAGE	0.25	2.35	92.83	0	01:50	2.35
CBMH3-ICD	STORAGE	0.20	0.25	90.73	0	00:01	0.23
CBMH-ICD	STORAGE	0.23	0.30	90.75	0	00:02	0.25
MH1	STORAGE	0.67	0.70	90.71	0	00:03	0.68
MH3	STORAGE	0.49	0.55	90.74	0	00:03	0.50
MH5	STORAGE	0.36	0.42	90.74	0	00:03	0.38
MH7	STORAGE	0.13	2.48	93.08	0	01:40	2.48
MH7-ICD	STORAGE	0.08	0.14	90.74	0	00:04	0.11
RYCB1	STORAGE	0.05	1.93	93.08	0	01:41	1.93
RYCB1-Dummy	STORAGE	0.19	1.88	93.08	0	01:41	1.88

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days	Time of Max Occurrence hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
HP-CB2	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-CB3	JUNCTION	0.00	3.94	0	01:42	0	0.00271	0.007
HP-CB5	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-CB7	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-CBMH1	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-CBMH2	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-RYCB1	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-CBMH3	OUTFALL	0.00	0.00	0	00:00	0	0	0.000 ltr
MH122	OUTFALL	0.00	289.66	0	00:00	0	0.65	0.000
CB2	STORAGE	37.62	49.39	0	01:06	0.0491	0.0543	0.162
CB3	STORAGE	38.40	38.40	0	01:10	0.0515	0.0592	-0.008
CB5	STORAGE	42.32	42.32	0	01:10	0.0553	0.0553	0.175
CB6	STORAGE	51.12	51.12	0	01:10	0.0661	0.0662	0.165
CB7	STORAGE	69.27	69.27	0	01:10	0.0894	0.103	-0.001
CB7-Dummy	STORAGE	0.00	29.66	0	01:06	0	0.0132	0.102
CBMH1	STORAGE	57.04	86.80	0	01:07	0.0754	0.308	0.062
CBMH2	STORAGE	62.93	127.23	0	01:07	0.0854	0.261	0.008
CBMH3	STORAGE	59.18	66.96	0	01:10	0.0757	0.131	0.069
CBMH3-ICD	STORAGE	0.00	36.30	0	00:01	0	0.132	0.351
CBMH-ICD	STORAGE	0.00	41.98	0	00:02	0	0.263	0.361
MH1	STORAGE	0.00	289.66	0	00:00	0	0.652	1.493
MH3	STORAGE	0.00	145.36	0	00:01	0	0.506	1.145
MH5	STORAGE	0.00	90.58	0	00:01	0	0.495	0.813
MH7	STORAGE	0.00	51.25	0	01:10	0	0.122	-0.125
MH7-ICD	STORAGE	0.00	15.85	0	00:03	0	0.127	0.329
RYCB1	STORAGE	39.88	153.67	0	01:08	0.0473	0.19	0.204
RYCB1-Dummy	STORAGE	0.00	77.73	0	01:08	0	0.057	-0.377

****
Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary

****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
CB2	0.000	0	0	0	0.013	37	0 01:51	7.83
CB3	0.000	1	0	0	0.022	96	0 01:42	32.13
CB5	0.000	0	0	0	0.003	11	0 01:40	21.22
CB6	0.000	0	0	0	0.013	70	0 01:41	30.03
CB7	0.000	1	0	0	0.029	63	0 01:34	36.31
CB7-Dummy	0.000	1	0	0	0.002	70	0 01:34	4.09
CBMH1	0.000	1	0	0	0.005	22	0 01:41	78.83
CBMH2	0.000	0	0	0	0.007	21	0 01:41	119.19
CBMH3	0.000	1	0	0	0.029	70	0 01:50	21.39
CBMH3-ICD	0.000	9	0	0	0.000	12	0 00:01	27.57
CBMH-ICD	0.000	9	0	0	0.000	12	0 00:02	19.11
MH1	0.001	24	0	0	0.001	25	0 00:03	179.11
MH3	0.000	15	0	0	0.001	17	0 00:03	90.58
MH5	0.000	12	0	0	0.000	14	0 00:03	46.05
MH7	0.000	4	0	0	0.002	74	0 01:40	10.46
MH7-ICD	0.000	3	0	0	0.000	5	0 00:04	9.00
RYCB1	0.000	0	0	0	0.001	15	0 01:41	77.73
RYCB1-Dummy	0.000	7	0	0	0.002	66	0 01:41	6.42

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
HP-CBMH3	0.00	0.00	0.00	0.000
MH122	53.34	2.02	289.66	0.650
System	26.67	2.02	289.66	0.650

****
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
1	CONDUIT	29.66	0 01:06	0.03	0.04	1.00
10	CONDUIT	0.00	0 00:00	0.00	0.00	0.04
11	CONDUIT	0.00	0 00:00	0.00	0.00	0.09
12	CONDUIT	0.00	0 00:00	0.00	0.00	0.06
13	CONDUIT	0.00	0 00:00	0.00	0.00	0.09
14	CONDUIT	3.94	0 01:42	0.02	0.00	0.09
15	CONDUIT	3.94	0 01:42	0.01	0.00	0.11
16	CONDUIT	0.00	0 00:00	0.00	0.00	0.11
17	CONDUIT	0.00	0 00:00	0.00	0.00	0.11
18	CONDUIT	0.00	0 00:00	0.00	0.00	0.11
19	CONDUIT	77.73	0 01:08	0.11	0.02	1.00
2	CONDUIT	0.00	0 00:00	0.00	0.00	0.07
3	CONDUIT	0.00	0 00:00	0.00	0.00	0.07
4	CONDUIT	0.00	0 00:00	0.00	0.00	0.07
5	CONDUIT	0.00	0 00:00	0.00	0.00	0.06
6	CONDUIT	0.00	0 00:00	0.00	0.00	0.13
7	CONDUIT	0.00	0 00:00	0.00	0.00	0.06
8	CONDUIT	0.00	0 00:00	0.00	0.00	0.06
9	CONDUIT	0.00	0 00:00	0.00	0.00	0.09
CB2-CBMH3	CONDUIT	14.36	0 01:06	0.22	0.01	1.00
CB3-CBMH1	CONDUIT	32.13	0 01:07	0.45	0.33	1.00
CB5-MH7	CONDUIT	21.22	0 01:10	0.22	0.01	1.00
CB6-MH7	CONDUIT	30.03	0 01:10	0.24	0.02	1.00
CBMH1-MH5	CONDUIT	41.98	0 00:02	0.66	0.52	0.80
CBMH2-CBMH1	CONDUIT	65.96	0 01:07	0.93	0.68	1.00
CBMH3-MH1	CONDUIT	36.30	0 00:01	0.73	0.54	0.91
MH1-STUB	CONDUIT	289.66	0 00:00	1.51	1.38	1.00
MH3-MH1	CONDUIT	145.36	0 00:01	1.09	1.01	1.00
MH5-MH3	CONDUIT	90.58	0 00:01	0.81	0.63	0.96
MH9-MH5	CONDUIT	15.85	0 00:03	0.38	0.30	0.65
RYCB1-CBMH2	CONDUIT	119.19	0 01:07	1.69	1.24	1.00
CB7	ORIFICE	7.19	0 01:34			1.00
Orifice-1	ORIFICE	7.78	0 01:50			1.00
Orifice-2	ORIFICE	8.19	0 01:40			1.00

Orifice-3	ORIFICE	13.40	0 01:41	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
1	1.00	0.78	0.18	0.00	0.04	0.00	0.00	0.00	0.97	0.00
10	1.00	0.99	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	1.00	0.99	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	1.00	0.99	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	1.00	0.99	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	1.00	0.99	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00
15	1.00	0.98	0.02	0.00	0.00	0.00	0.00	0.00	0.99	0.00
16	1.00	0.98	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	1.00	0.98	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	1.00	0.98	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	1.00	0.94	0.00	0.00	0.04	0.00	0.00	0.03	0.00	0.00
2	1.00	0.99	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	1.00	0.99	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	1.00	0.99	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	1.00	0.99	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	1.00	0.99	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	1.00	0.99	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	1.00	0.99	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	1.00	0.99	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CB2-CBMH3	1.00	0.94	0.00	0.00	0.03	0.00	0.00	0.03	0.00	0.00
CB3-CBMH1	1.00	0.00	0.00	0.00	0.04	0.00	0.00	0.96	0.00	0.00
CB5-MH7	1.00	0.93	0.00	0.00	0.03	0.00	0.00	0.04	0.00	0.00
CB6-MH7	1.00	0.93	0.00	0.00	0.03	0.00	0.00	0.04	0.00	0.00
CBMH1-MH5	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
CBMH2-CBMH1	1.00	0.00	0.00	0.00	0.31	0.00	0.00	0.69	0.00	0.00
CBMH3-MH1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
MH1-STUB	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
MH3-MH1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
MH5-MH3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
MH9-MH5	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
RYCB1-CBMH2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.96	0.00

****

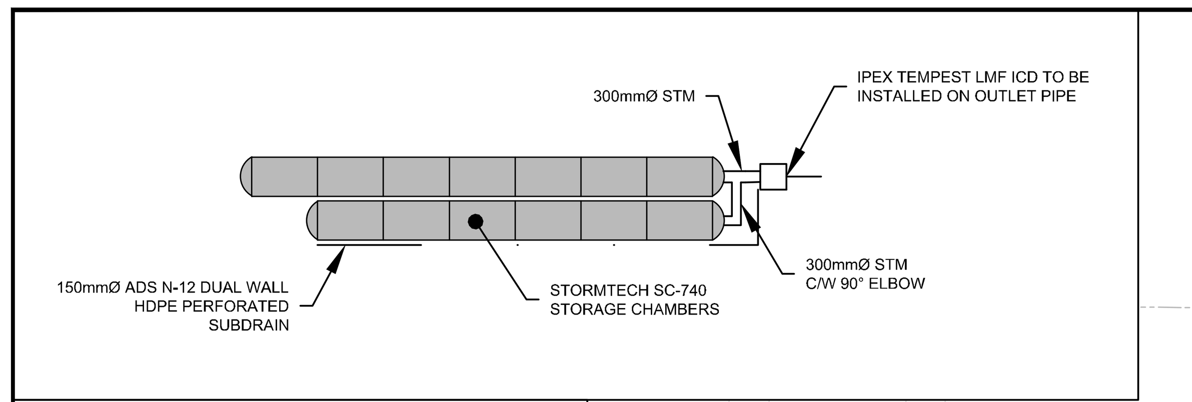
Conduit Surcharge Summary
****

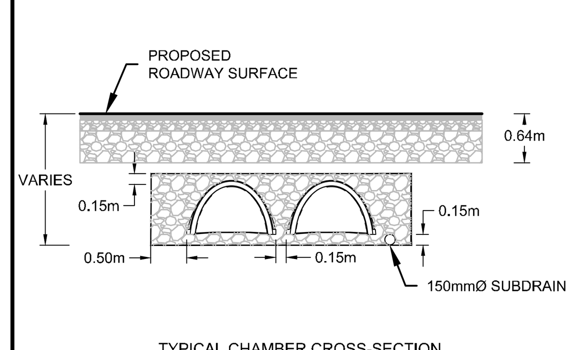
Conduit	Hours Full Both Ends	Hours Full Upstream	Hours Full Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
1	2.79	2.79	2.80	0.01	0.01
19	3.23	3.23	3.27	0.01	0.01
CB2-CBMH3	3.45	3.45	3.55	0.01	0.01
CB3-CBMH1	5.92	5.92	6.22	0.01	0.01
CB5-MH7	2.59	2.59	2.64	0.01	0.01
CB6-MH7	2.59	2.59	2.64	0.01	0.01
CBMH2-CBMH1	6.14	6.14	6.41	0.01	0.01
CBMH3-MH1	0.01	0.01	0.01	0.01	0.01
MH1-STUB	167.99	167.99	168.00	0.01	0.01
MH3-MH1	167.96	167.96	167.99	0.01	0.01
MH5-MH3	0.01	0.01	0.02	0.01	0.01
RYCB1-CBMH2	5.53	5.53	6.14	0.10	0.01

Analysis begun on: Fri Nov 1 12:34:42 2019
Analysis ended on: Fri Nov 1 12:34:52 2019
Total elapsed time: 00:00:10

APPENDIX C: Drawings

112021-10-GP
112021-10-GR
112021-10-STM
112021-10-ESC





TYPICAL CHAMBER CROSS-SECTION
SCALE 1:75

WATERMAIN TABLE				
Station	F/G ELEVATION	TOP OF WATERMAIN	COVER	DESCRIPTION
1+000.00	93.11	90.71	2.40	CONNECT TO EXISTING
1+019.34	93.04	90.64	2.40	HYD3 CONNECTION
1+020.34	93.03	90.63	2.40	45° HORIZONTAL BEND
1+023.19	93.17	90.77	2.40	45° HORIZONTAL BEND
1+025.00	93.20	90.80	2.40	-
1+050.00	93.57	91.17	2.40	-
1+060.80	93.42	91.02	2.40	45° H. BEND
1+063.64	93.24	90.84	2.40	45° HORIZONTAL BEND
1+065.99	93.19	90.79	2.40	SP1 CONNECTION
1+068.14	93.15	90.75	2.40	SP2 CONNECTION
1+075.00	93.01	90.61	2.40	-
1+091.53	93.26	90.86	2.40	VB1
1+097.95	93.41	91.01	2.40	SP4 CONNECTION
1+100.00	93.23	90.83	2.40	-
1+100.28	93.22	90.82	2.40	SP4 CONNECTION
1+125.00	93.43	91.03	2.40	-
1+132.86	93.20	90.80	2.40	45° HORIZONTAL BEND
1+135.03	93.22	90.82	2.40	SP5 CONNECTION
1+136.10	93.21	90.81	2.40	45° H. BEND
1+150.00	93.06	90.66	2.40	-
1+150.39	93.06	90.66	2.40	HYD2 CONNECTION
1+168.64	93.06	90.66	2.40	45° H. BEND
1+175.00	93.10	90.70	2.40	-
1+184.11	92.96	90.56	2.40	45° H. BEND
1+200.00	92.72	90.32	2.40	-
1+213.38	92.90	90.50	2.40	HYD1 CONNECTION
1+225.00	92.75	90.35	2.40	-
1+228.32	92.71	90.31	2.40	11.25° H. BEND
1+242.16	92.77	90.37	2.40	11.25° H. BEND
1+250.00	92.81	90.41	2.40	-
1+270.47	92.80	90.40	2.40	CONNECT TO EXISTING

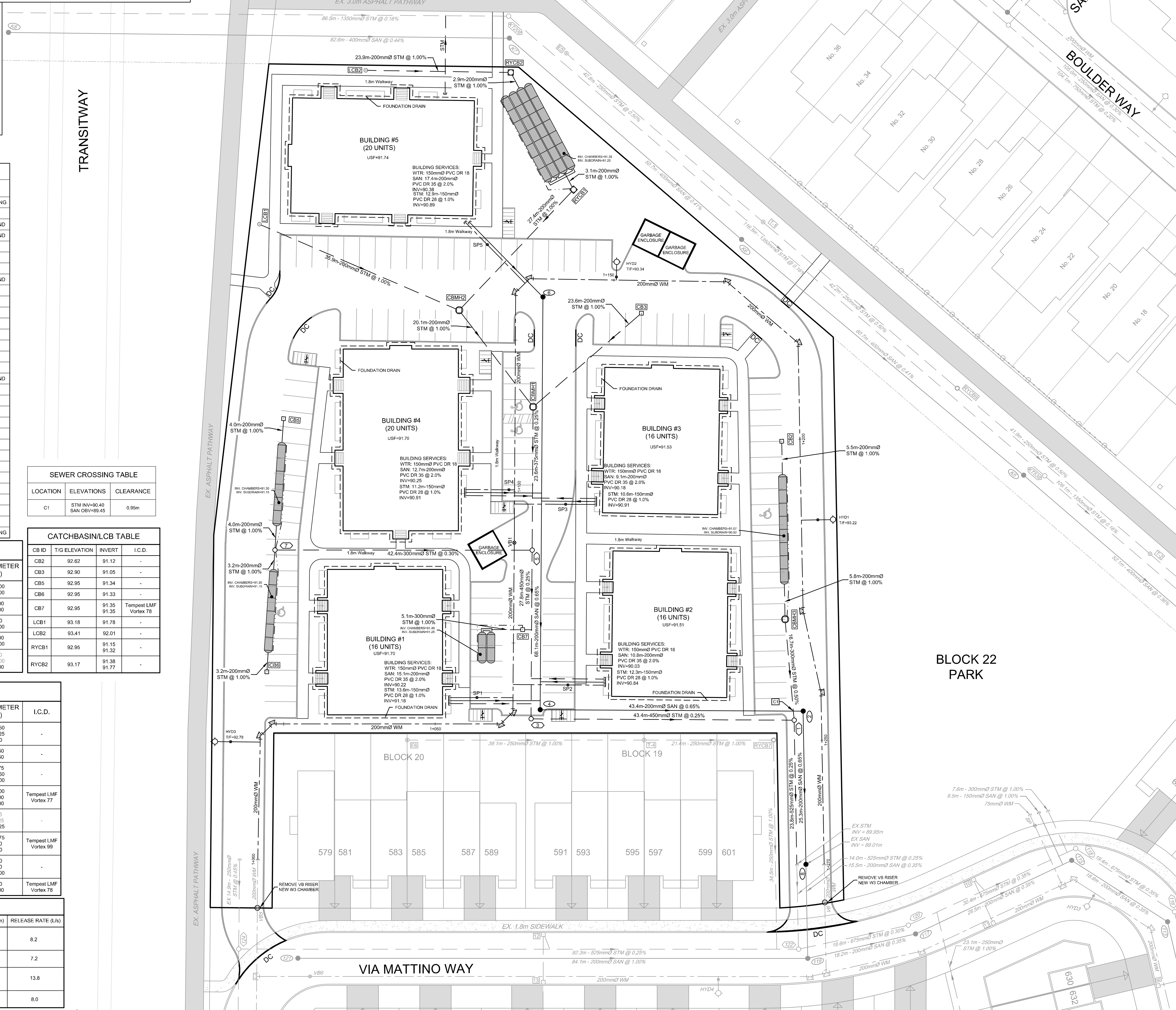
SEWER CROSSING TABLE		
LOCATION	ELEVATIONS	CLEARANCE
C1	STM INV=90.40 SAN OBV=89.45	0.95m

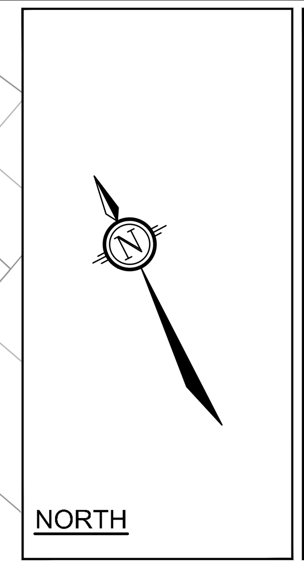
CATCHBASIN/LCB TABLE			
CB ID	T/G ELEVATION	INVERT	I.C.D.
CB2	92.62	91.12	-
CB3	92.90	91.05	-
CB5	92.95	91.34	-
CB6	92.95	91.33	-
CB7	92.95	91.35 91.35	Tempest LMF Vortex 78
LCB1	93.18	91.78	-
LCB2	93.41	92.01	-
RYCB1	92.95	91.15 91.32	-
RYCB2	93.17	91.38 91.77	-

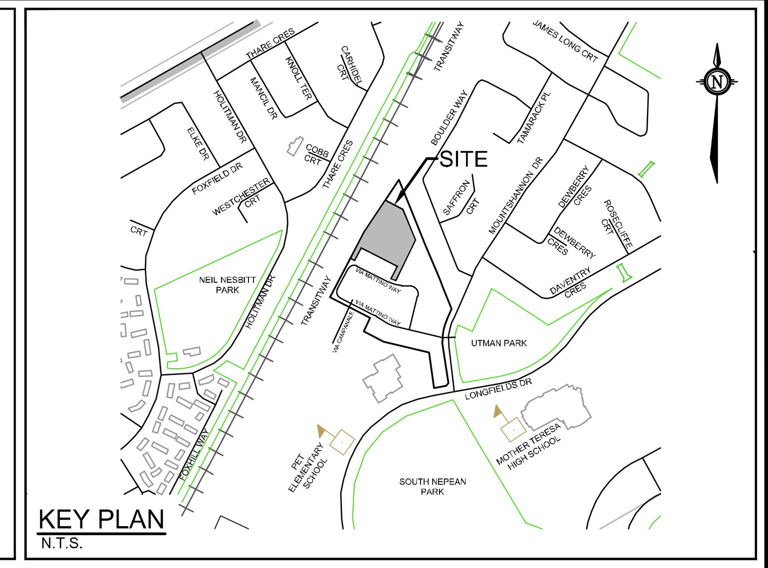
SANITARY MANHOLE TABLE				
MANHOLE ID	SIZE(mm)	T/G ELEV (m)	INVERT (m)	PIPE DIAMETER (mm)
2	1200Ø	92.76	NW=89.24 SW=89.18	NW=200 SW=200
4	1200Ø	93.23	NE=89.58 SE=89.52	NE=200 SE=200
6	1200Ø	93.15	N=90.03 SW=90.02	N=200 SW=200
8	1200Ø	90.73	NE=89.02 SW=89.01	NE=200 SW=200
119	1200Ø	92.87	E=88.90 NW=88.97 NE=88.96	E=200 NW=200 NE=200

STORM MANHOLE TABLE					
MANHOLE ID	SIZE(mm)	T/G ELEV (m)	INVERT (m)	PIPE DIAMETER (mm)	I.C.D.
1	1200Ø	92.75	NW=90.08 SW=90.01 N=90.40	NW=450 SW=525 N=300	-
3	1200Ø	93.40	NE=90.25 SE=90.19	NE=450 SE=450	-
5	1200Ø	93.23	NE=90.40 SW=90.32 NW=90.47	NE=375 SW=450 NW=300	-
7	1200Ø	93.30	SW=91.27 SE=90.60 NE=91.26	SW=200 SE=300 NE=200	Tempest LMF Vortex 77
122	1800Ø	92.85	E=89.77 NE=89.92 NW=89.92	E=675 NE=525 NW=525	-
CBMH1	1200Ø	92.95	SW=90.45 E=90.81 N=90.68	SW=375 E=200 N=200	Tempest LMF Vortex 99
CBMH2	1200Ø	92.95	S=90.88 E=90.88 NW=91.42	S=200 E=200 NW=200	-
CBMH3	1200Ø	92.62	S=90.48 NE=91.01	S=300 NE=200	Tempest LMF Vortex 78

ICD TABLE					
STRUCTURE ID	T/G ELEVATION	INVERT	I.C.D.	HEAD (m)	RELEASE RATE (L/s)
STM MH7	93.30	SW=91.27 SE=90.60 NE=91.26	Tempest LMF Vortex 77	2.48	8.2
CB7	92.95	SE=91.35 NW=91.35	Tempest LMF Vortex 78	1.86	7.2
CBMH1	92.95	SW=90.45 E=90.81 N=90.68	Tempest LMF Vortex 99	2.62	13.8
CBMH3	92.62	S=90.48 NE=91.01	Tempest LMF Vortex 78	2.35	8.0







LEGEND

- SANITARY MANHOLE, SEWER & DIRECTION OF FLOW
- STORM MANHOLE, SEWER & DIRECTION OF FLOW
- 300mmØ — WATERMAIN AND DIAMETER
- VALVE & VALVE BOX
- GATE VALVE CHAMBER PER W3
- 95 — ROAD CATCHBASIN
- SITE LEGAL BOUNDARY
- EXISTING PROPERTY & ROW LINES
- HYD T/F=100.00 — HYDRANT C/W VALVE & LEAD TF= TOP OF FLANGE ELEVATION
- THRUST BLOCK AND BEND
- LCB30 — LANDSCAPE TYPE CATCHBASIN
- RYCB1 — REAR YARD CATCH BASIN
- CBMH1 — CATCH BASIN MANHOLE

GENERAL NOTES:

1. DIMENSIONS AND LAYOUT INFORMATION SHALL BE CONFIRMED PRIOR TO COMMENCEMENT OF CONSTRUCTION.
2. THE ORIGINAL TOPOGRAPHY AND GROUND ELEVATIONS, SERVICING AND SURVEY INFORMATION SHOWN ON THIS PLAN ARE SUPPLIED FOR INFORMATION PURPOSES ONLY. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE ACCURACY OF ALL INFORMATION OBTAINED FROM THIS PLAN.
3. CO-ORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
4. BEFORE COMMENCING CONSTRUCTION, PROVIDE PROOF OF COMPREHENSIVE ALL RISK AND OPERATIONAL LIABILITY INSURANCE INCLUDING BLASTING. INSURANCE POLICY TO NAME THE OWNER, ENGINEER AND THE CITY AS CO-INSURED.
5. CONNECT TO EXISTING SYSTEMS AS DETAILED, INCLUDING ALL RESTORATION WORK NECESSARY TO REINSTATE SURFACES TO EXISTING CONDITIONS OR BETTER.
6. DETERMINE THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION. PROTECT AND ASSUME RESPONSIBILITY FOR ALL EXISTING UTILITIES WHETHER OR NOT SHOWN ON THESE DRAWINGS.
7. OBTAIN AND PAY FOR ALL NECESSARY PERMITS AND APPROVALS BEFORE COMMENCING CONSTRUCTION.
8. RESTORE ALL TRENCHES AND SURFACE FEATURES TO EXISTING CONDITIONS OR BETTER AND TO THE SATISFACTION OF MUNICIPAL AUTHORITIES.
9. REMOVE FROM SITE ALL EXCESS EXCAVATED MATERIAL UNLESS OTHERWISE INSTRUCTED BY THE ENGINEER. EXCAVATE AND REMOVE FROM SITE ALL ORGANIC MATERIAL AND DEBRIS UNLESS OTHERWISE INSTRUCTED BY THE ENGINEER.
10. ALL ELEVATIONS ARE GEODETIC AND UTILIZE METRIC UNITS.
11. REFER TO GEOTECHNICAL INVESTIGATION PROJECT: PG2306-1 (JANUARY 31, 2013), PREPARED BY PATERSON GROUP FOR SUBSURFACE CONDITIONS AND CONSTRUCTION RECOMMENDATIONS.
12. PERFORATED PIPE SUB-DRAINS TO BE PROVIDED AT SUBGRADE LEVEL EXTENDING FROM THE ROADSIDE CATCHBASIN FOR A DISTANCE OF 3.0m, PARALLEL TO THE CURB IN TWO DIRECTIONS.

SEWER NOTES:

1. SPECIFICATIONS:

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

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

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
THRUST BLOCK	W25.3	CITY OF OTTAWA

2. THE WATERMAIN SHALL BE PVC DR 18 IN ACCORDANCE WITH MATERIAL SPECIFICATION MW-18.1, UNLESS OTHERWISE INDICATED, COMPLETE WITH TRACING WIRE AND CATHODIC PROTECTION.
3. SUPPLY AND CONSTRUCT ALL WATERMAINS AND APPURTENANCES IN ACCORDANCE WITH THE CITY OF OTTAWA STANDARDS AND SPECIFICATIONS. EXCAVATION, INSTALLATION, BACKFILL AND RESTORATION OF ALL WATERMAINS BY THE CONTRACTOR. CONNECTIONS AND SHUT-OFFS AT THE MAIN AND CHLORINATION OF THE WATER SYSTEM SHALL BE PERFORMED BY CITY OFFICIALS.
4. WATERMAIN SHALL BE MINIMUM 2.4m DEPTH BELOW GRADE UNLESS OTHERWISE INDICATED.
5. PROVIDE MINIMUM 0.25m CLEARANCE BETWEEN OUTSIDE OF PIPES AT ALL CROSSINGS.
6. HORIZONTAL CLEARANCE BETWEEN WATERMAIN AND SEWERS IS 2.5m (MIN.).
7. CONNECTION TO EXISTING WATERMAIN BY CITY FORCES. CIVIL CONTRACTOR TO EXCAVATE TRENCH, PLACE BEDDING, BACKFILL AND REINSTATE SURFACE TO EXISTING CONDITIONS OR BETTER.
8. FIRE HYDRANT INSTALLATION PER CITY DETAIL W19.

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.

Mattino DEVELOPMENTS INC.
515 VIA MATTINO WAY
OTTAWA, ON
K2J 6B7

No.	REVISION	DATE	BY
1.	ISSUED FOR APPROVAL	NOV 1/19	MAB

SCALE 1:300

DESIGN LRW
CHECKED MAB
DRAWN DTD
CHECKED MAB
APPROVED JGR

FOR REVIEW ONLY

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

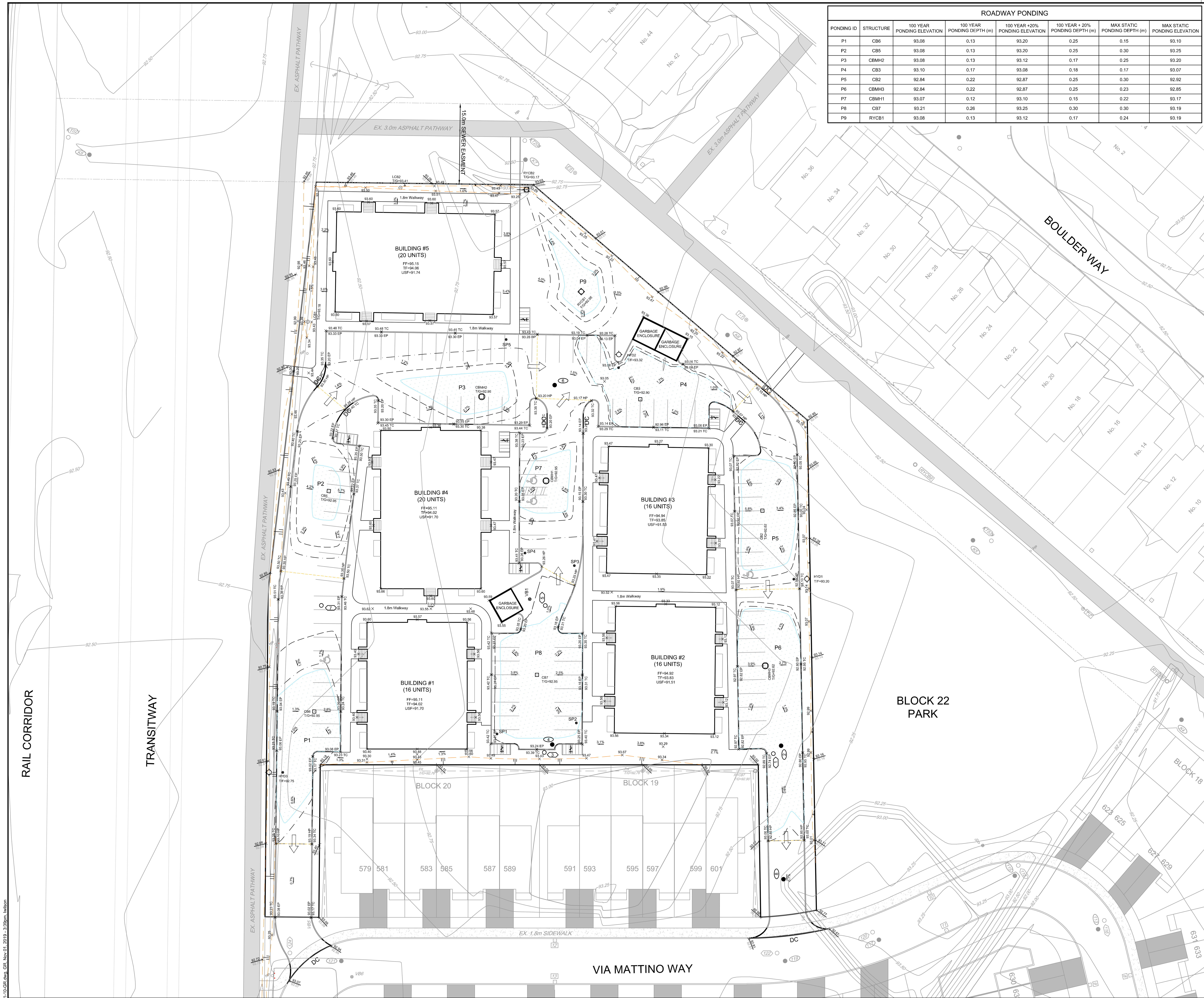
LICENSED PROFESSIONAL ENGINEER M.A. BISSETT NOV. 1/19 PROVINCE OF ONTARIO

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

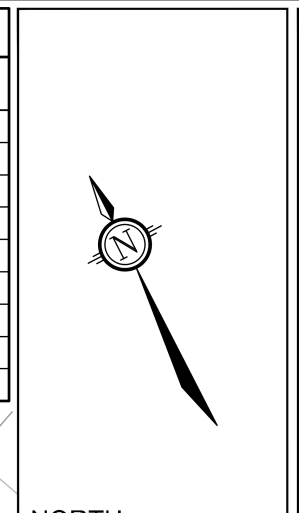
CITY of OTTAWA
LONGFIELDS CENTRAL
BLOCK 21

GENERAL PLAN OF SERVICES

PROJECT No. 112021-10
REV REV # 1
DRAWING No. 112021-10-GP



ROADWAY 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 DEPTH (m)	MAX STATIC PONDING ELEVATION
P1	CB6	93.08	0.13	93.20	0.25	0.15	93.10
P2	CB5	93.08	0.13	93.20	0.25	0.30	93.25
P3	CBMH2	93.08	0.13	93.12	0.17	0.25	93.20
P4	CB3	93.10	0.17	93.08	0.18	0.17	93.07
P5	CB2	92.84	0.22	92.87	0.25	0.30	92.92
P6	CBMH3	92.84	0.22	92.87	0.25	0.23	92.85
P7	CBMH1	93.07	0.12	93.10	0.15	0.22	93.17
P8	CB7	93.21	0.26	93.25	0.30	0.30	93.19
P9	RYCB1	93.08	0.13	93.12	0.17	0.24	93.19



NORTH

KEY PLAN
N.T.S.

LEGEND

2.6%	PROPOSED SLOPE AND DIRECTION
72.55 / 72.45	PROPOSED ELEVATION / EXISTING ELEVATION
×103.41	PROPOSED ELEVATION
×103.41 EP	PROPOSED ELEVATION AT EDGE OF PAVEMENT
×103.41 HP	PROPOSED ELEVATION AT HIGH POINT
×103.41 TC	PROPOSED ELEVATION AT TOP OF CURB
FF=	FINISHED FLOOR ELEVATION
TF=	TOP OF FOUNDATION
USF=	UNDERSIDE OF FOOTING
	DRAINAGE SPLIT
	TERRACING AND BREAKLINE (MAX 3:1 TERRACE SLOPE)
HYD1 TF=102.84	PROPOSED HYDRANT AND TOP OF FLANGE ELEVATION
VB1	PROPOSED VALVE & VALVE BOX LOCATION
SP	PROPOSED SERVICE POST
101	PROPOSED SANITARY MANHOLE
100	PROPOSED STORM MANHOLE
95	PROPOSED CATCHBASIN
	MAJOR OVERLAND FLOW DIRECTION
	100 yr PONDING AREA
	100 yr + 20% PONDING AREA
	MAX. STATIC PONDING AREA

GENERAL NOTES:

1. DIMENSIONS AND LAYOUT INFORMATION SHALL BE CONFIRMED PRIOR TO COMMENCEMENT OF CONSTRUCTION.
2. THE ORIGINAL TOPOGRAPHY AND GROUND ELEVATIONS, SERVICING AND SURVEY INFORMATION SHOWN ON THIS PLAN ARE SUPPLIED FOR INFORMATION PURPOSES ONLY. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE ACCURACY OF ALL INFORMATION OBTAINED FROM THIS PLAN.
3. CO-ORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
4. BEFORE COMMENCING CONSTRUCTION, PROVIDE PROOF OF COMPREHENSIVE ALL RISK AND OPERATIONAL LIABILITY INSURANCE INCLUDING BLASTING. INSURANCE POLICY TO NAME THE OWNER, ENGINEER AND THE CITY AS CO-INSURED. AMOUNT OF INSURANCE TO BE SPECIFIED BY OWNER'S AGENT.
5. CONNECT TO EXISTING SYSTEMS AS DETAILED, INCLUDING ALL RESTORATION WORK NECESSARY TO REINSTATE SURFACES TO EXISTING CONDITIONS OR BETTER.
6. DETERMINE THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION. PROTECT AND ASSUME ALL RESPONSIBILITY FOR ALL EXISTING UTILITIES WHETHER OR NOT SHOWN ON THESE DRAWINGS.
7. OBTAIN AND PAY FOR ALL NECESSARY PERMITS AND APPROVALS BEFORE COMMENCING CONSTRUCTION.
8. RESTORE ALL TRENCHES AND SURFACE FEATURES TO EXISTING CONDITIONS OR BETTER AND TO THE SATISFACTION OF CITY OF OTTAWA AUTHORITIES.
- ASPHALT RESTORATION SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA DETAIL R-10.
- THICKNESS OF GRANULAR MATERIAL AND ASPHALT LAYERS TO MATCH EXISTING.
- BOULEVARDS SHALL BE REINSTATED WITH 100mm OF TOPSOIL AND SOD.

9. REMOVE FROM SITE ALL EXCESS EXCAVATED MATERIAL UNLESS OTHERWISE INSTRUCTED BY ENGINEER.
10. ALL ELEVATIONS ARE GEODETIC AND UTILIZE METRIC UNITS.
12. CONCRETE SIDEWALK TO BE CONSTRUCTED AS PER CITY STANDARD.
13. REFER TO GEOTECHNICAL REPORT (PG2306-1, DATED JANUARY 31, 2013), PREPARED BY PATERSON GROUP FOR SUBSURFACE CONDITIONS AND CONSTRUCTION RECOMMENDATIONS.
14. PERFORATED PIPE SUB-DRAINS TO BE PROVIDED ALONG THE ROADWAY WITH INVERTS 300mm BELOW SUBGRADE PER CITY OF OTTAWA DETAIL R1.

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. ASPHALTIC CONCRETE TO BE COMPACTED TO AT LEAST 97% OF MARSHALL DENSITY.
6. ALL ROADWAYS TO HAVE 3% CROSSFALL INCLUDING SUBGRADE AND GRANULAR BASE.
7. 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'
8. PRIOR TO PLACEMENT OF TOPLIFT, THE CONTRACTOR SHALL ADJUST ALL STRUCTURES TO FINAL GRADE PER CITY OF OTTAWA STANDARDS.
9. MINIMUM OF 2% GRADE FOR ALL GRASS AREAS UNLESS OTHERWISE NOTED.
10. MAXIMUM TERRACING GRADE TO BE 3:1 UNLESS OTHERWISE NOTED.
11. ALL GRADES BY CURBS ARE EDGE OF PAVEMENT GRADES UNLESS OTHERWISE INDICATED.
12. CURBS SHALL BE BARRIER CURB AS SPECIFIED AND CONSTRUCTED PER CITY OF OTTAWA STANDARD (SC1.2).
13. REFER TO LANDSCAPE PLAN FOR PLANTING AND OTHER LANDSCAPE FEATURE DETAILS.

PAVEMENT STRUCTURE:

40mm	ASPHALT SP-12.5
50mm	ASPHALT SP-19.0
150mm	GRAN "A"
400mm	GRAN "B" TYPE II
640mm	TOTAL DEPTH

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.

Mattino DEVELOPMENTS INC.

171 CLARIDGE DRIVE
OTTAWA, ON
K2J 5V8

No.	REVISION	DATE	BY
1.	ISSUED FOR APPROVAL	NOV 1/19	MAB

SCALE 1:300

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 NOV. 1/19 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
LONGFIELDS CENTRAL
BLOCK 21

GRADING PLAN

PROJECT No. 112021-10
REV REV # 1
DRAWING No. 112021-10-GR

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 DEPTH (m)	MAX STATIC PONDING ELEVATION
P1	CB6	93.08	0.13	93.20	0.25	0.15	93.10
P2	CB5	93.08	0.13	93.20	0.25	0.30	93.25
P3	CBMH2	93.08	0.13	93.12	0.17	0.25	93.20
P4	CB3	93.10	0.17	93.08	0.18	0.17	93.07
P5	CB2	92.84	0.22	92.87	0.25	0.30	92.92
P6	CBMH3	92.84	0.22	92.87	0.25	0.23	92.85
P7	CBMH1	93.07	0.12	93.10	0.15	0.22	93.17
P8	CB7	93.21	0.26	93.25	0.30	0.30	93.19
P9	RYCB1	93.08	0.13	93.12	0.17	0.24	93.19

M:\2012\112021\Block 21\CAD\Design\112021-10-STM.dwg, STM, Nov 04, 2019 - 9:06am, 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.

Mattino DEVELOPMENTS INC.

515 VIA MATTINO WAY
OTTAWA, ON
K2J 6B7

No.	REVISION	DATE	BY
1.	ISSUED FOR APPROVAL	NOV 1/19	MAB

SCALE 1:300

DESIGN	LRW
CHECKED	MAB
DRAWN	DTD
CHECKED	MAB
APPROVED	JGR

FOR REVIEW ONLY

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

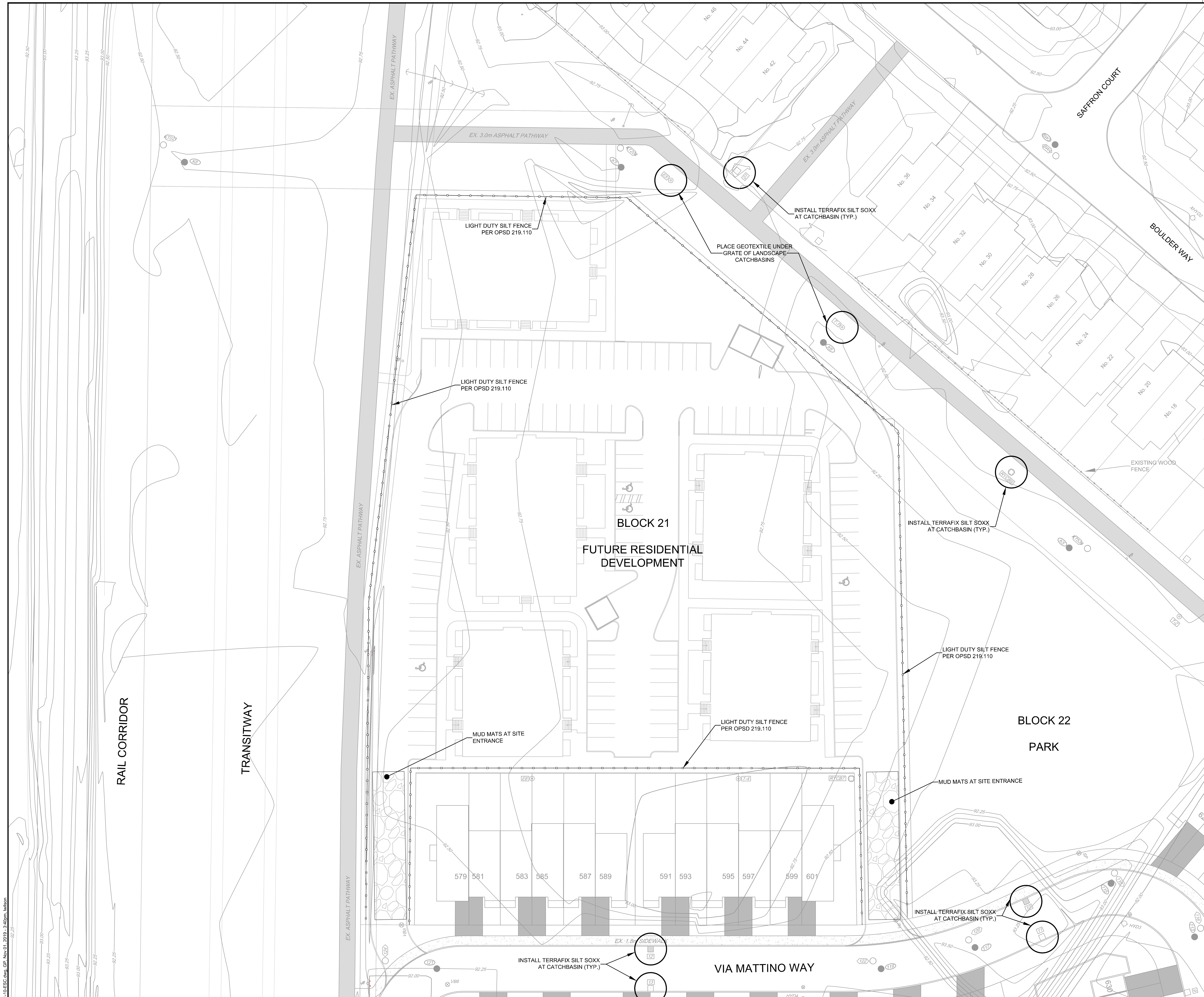
LICENSED PROFESSIONAL ENGINEER M.A. BISSETT NOV. 1/19 PROVINCE OF ONTARIO

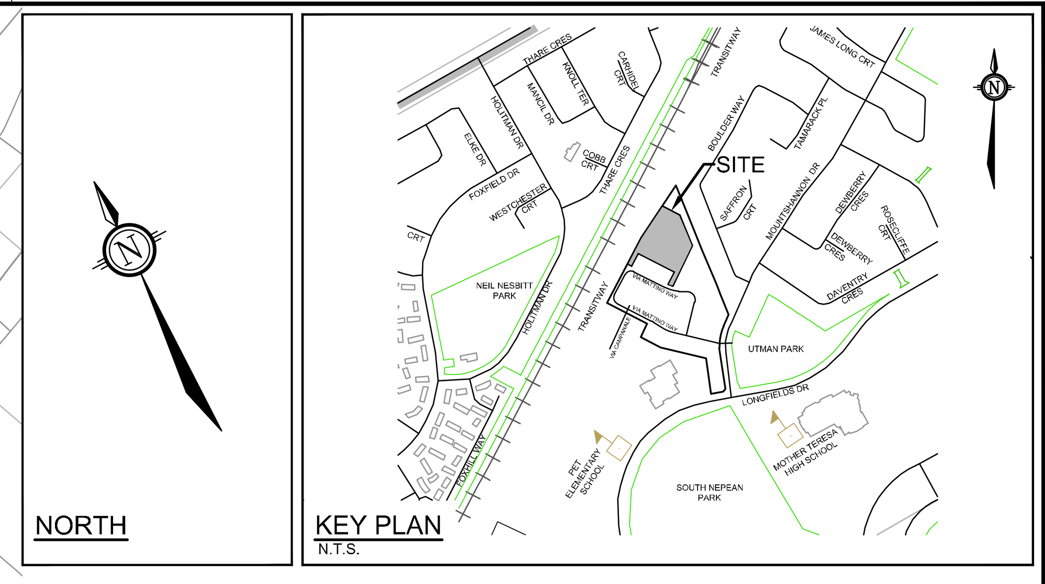
NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

CITY of OTTAWA
LONGFIELDS CENTRAL
BLOCK 21

POST-DEVELOPMENT STORM DRAINAGE AREA PLAN

PROJECT No. 112021-10
REV # 1
DRAWING No. 112021-10-STM





LEGEND

SILT FENCE PER OPSD 219.110	
MUD MATS (50mm - 100mm GRANULAR B, TYPE II)	
EXISITING GROUND CONTOUR AND ELEVATION	
VB	VALVE & VALVE BOX
LCB30	LANDSCAPE TYPE CATCHBASIN
RYCB9	REAR YARD CATCH BASIN
CBMH15	CATCH BASIN MANHOLE
96	CATCHBASIN

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 DITCH OR STORM SYSTEM DURING CONSTRUCTION, FILTER SOCKS (TERRAFIX SILT SOXX OR APPROVED EQUIVALENT) WILL BE PLACED AROUND 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. 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. CONTRACTOR SHALL INSTALL MUD MATS AT THE CONSTRUCTION ENTRANCE.
8. ALL TOPSOIL AND ANY SOFT, WET OR DELETERIOUS MATERIAL SHALL BE REMOVED FROM IMPROVED AREAS UNLESS OTHERWISE DIRECTED BY ENGINEER.

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

Mattino DEVELOPMENTS INC.

515 VIA MATTINO WAY
OTTAWA, ON
K2J 6B7

No.	REVISION	DATE	BY
1.	ISSUED FOR APPROVAL	NOV 1/19	MAB

SCALE: 1:300

1:300 — 0 3 6 9 12

DESIGN	LRW
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 — NOV. 1/19 — 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
LONGFIELDS CENTRAL
BLOCK 21

EROSION AND SEDIMENT CONTROL PLAN

PROJECT No. 112021-10
REV: REV # 1
DRAWING No. 112021-10-ESC

PLANB1.DWG - 1000mmx707mm