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Mattino Developments Inc.
Block 2 – 255 Mountshannon Dr.

Servicing Design Brief

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SERVICING DESIGN BRIEF
MATTINO DEVELOPMENTS INC.
BLOCK 2 – 255 MOUNTSHANNON DR.

Prepared By:

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Suite 200, 240 Michael Cowpland Drive
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February 24, 2023

Novatech File: 112021-05
Ref: R-2023-022

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February 24, 2023

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

Attention: **Mr. Derek Unrau, Project Manager**

Dear Mr. Derek Unrau:

Reference: **Mattino Developments Inc.**
Block 2 – 255 Mountshannon Drive
Servicing Design Brief
Our File No.: 112021-05

Enclosed for your review and approval is the Servicing Design Brief for the proposed Block 2 development at 255 Mountshannon Drive.

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

Sincerely,

NOVATECH

Lucas Wilson, P.Eng.
Project Manager

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1.0 INTRODUCTION

The subject site is located within the Longfields community and is municipally known as 255 Mountshannon Drive. The site is approximately 0.19 hectares and is bounded by existing residential to the north, the existing Longfields Central subdivision to the west and south, and Mountshannon Drive to the east. A key plan of the area is presented below in **Figure 1-1**.

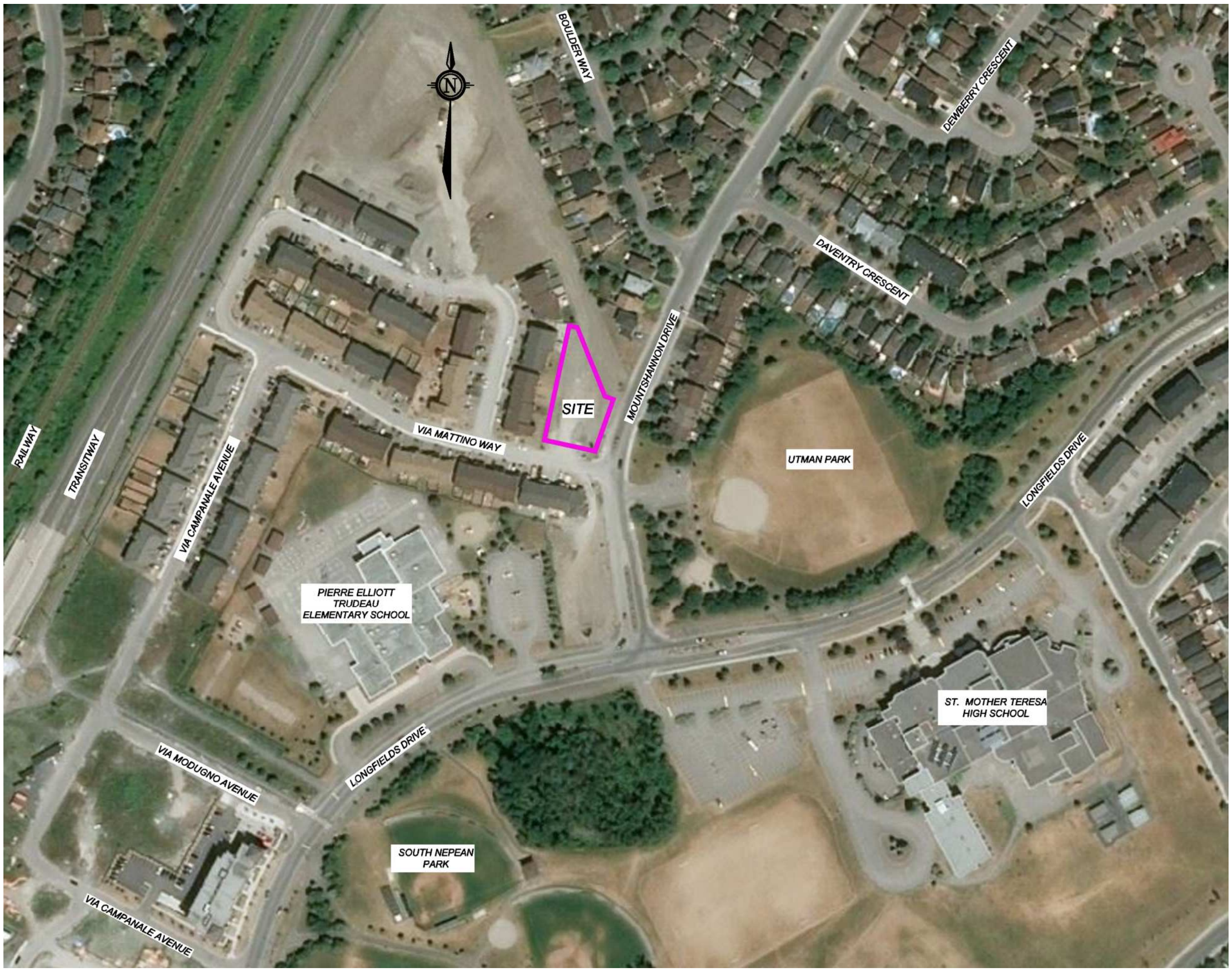

Figure 1-1: Key Plan

The site is currently vacant. The proposed development will consist of 16 units in a three-storey apartment building. The proposed site plan is shown in **Figure 1-2**.

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.
- Geotechnical Memorandum, prepared by Paterson dated September 6, 2019 (PG2306-MEMO.07).

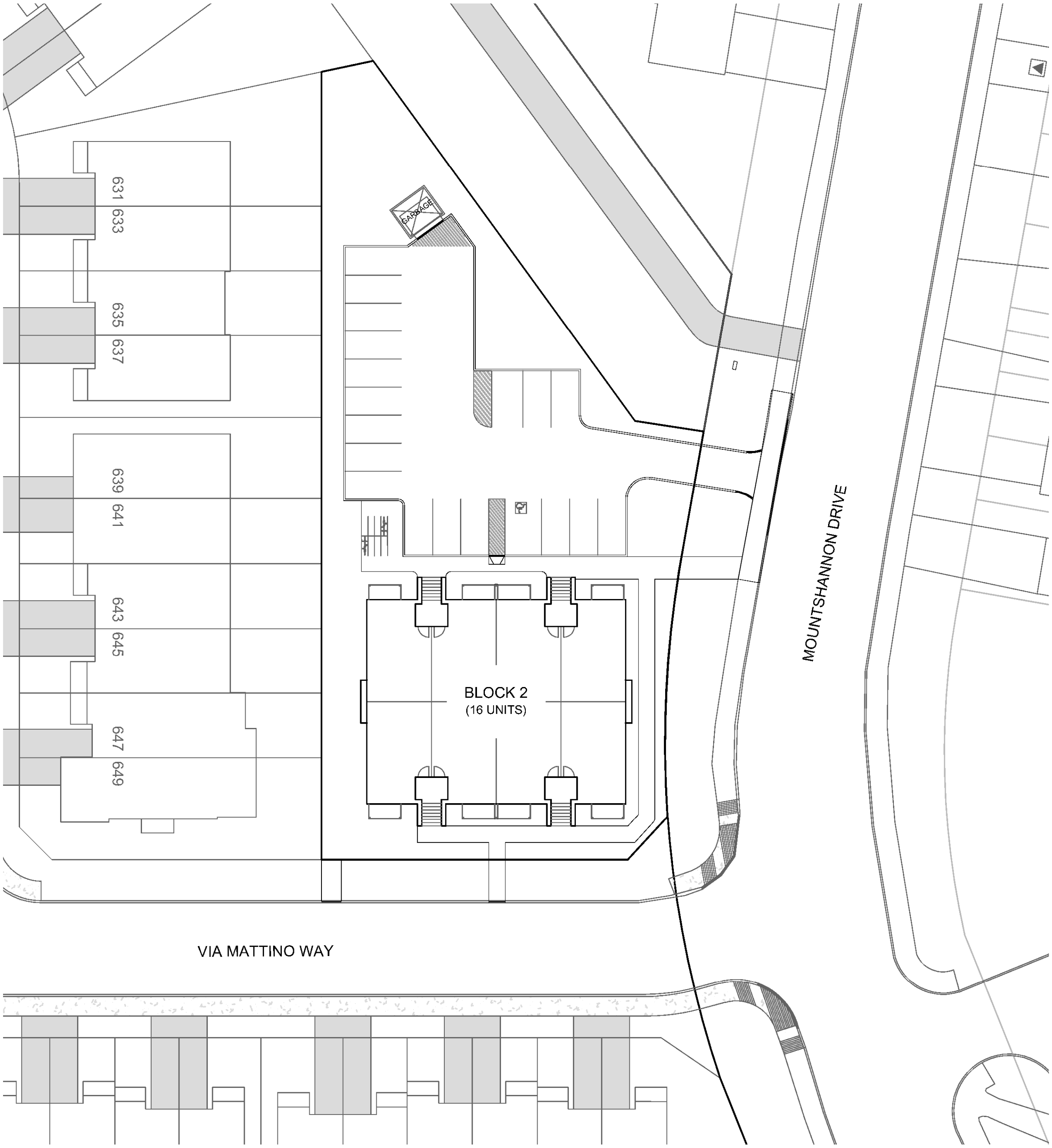

Figure 1-2: Site Plan

2.0 ROADWAYS

2.1 Existing Conditions

Currently there is access to the site through Via Mattino Way.

2.2 Proposed Conditions

The development will be accessed from a single entrance along Mountshannon Drive.

Entrance into the development is a 3.6m private road 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 is relatively flat, sloping slightly south towards Mountshannon Drive and Via Mattino Way.

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 existing townhomes to the west, existing pathway easement to the north, existing back of sidewalk along Mountshannon Drive and existing top of curb along Via Mattino Way. For detailed grading refer to drawing 112021-05-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;

- 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 250mm diameter sanitary sewer (SANMH MS5) is located within Mountshannon Drive and an existing 200mm diameter sanitary sewer is located south within Via Mattino Way. There is also an existing 400mm diameter trunk sewer located north of the site within the pathway easement.

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 2 is proposed to connect into the existing 200mm diameter sanitary sewer in Via Mattino Way. The sanitary sewer layout is shown on 112021-05-GP (**Appendix C**), and the design sheet is attached in **Appendix A**. The site (approx. 0.19ha) will outlet upstream of existing sanitary maintenance hole 101 with a peak design flow of 0.46 L/s. The wastewater flow is routed through the Mountshannon Drive sanitary sewer, 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	20 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 0.49 L/s was calculated for Block 2 connecting between MH 103 to MH 101 within Via Mattino Way (Longfields Central sanitary design sheet excerpt included in **Appendix A**). 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.

6.0 WATER

6.1 Existing Conditions

The proposed development is located inside the 2W2C Pressure Zone. An existing 400mm diameter watermain runs along Mountshannon Drive and an existing 200mm diameter watermain runs along Via Mattino Way.

6.2 Proposed Conditions

Block 2 will be connected to the existing 200mm watermain within Via Mattino Way.

The development will be serviced by a single 100mm diameter water service and will provide sufficient capacity to maintain appropriate pressures. The proposed building is located within 75m of two existing class AA (blue top) hydrants on Mountshannon Drive and Via Mattino Way and within 75m to 150m of an existing class AA (blue top) hydrants located near the intersection of Longfields Drive and Mountshannon Drive. These three hydrants provide a maximum fire flow capacity of 253 L/s (15,200 L/min).

The watermain boundary condition below was obtained from the City of Ottawa and has been included in **Appendix A**:

Boundary Condition #1 – Located at Via Mattino Way Existing 100mm x 200mm diameter watermain connection (Shown in **Appendix A**)

	Existing Zone 2W2C		**Future Zone SUC**	
Demand Scenario	**Head (m)**	**Pressure (psi)**	**Head (m)**	**Pressure (psi)**
Maximum HGL	133.1	58.2	146.9	77.9
Peak Hour	125.0	46.7	144.4	74.3
Max Day + FF of 200 L/s	124.3	45.7	142.1	71.1

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

Table 6-1: Watermain Design Criteria

Design Parameter	Design Criteria
Apartment (2 bedroom) Unit Population	2.1 people/unit
Density	20 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
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	16	34	0.109	0.272	0.599
Total	**16**	**34**	**0.109**	**0.272**	**0.599**

Based on the fire underwriters survey, the fire flow was calculated as 183 L/s. Hydrant spacing and locations per City of Ottawa guidelines are illustrated on the Fire Hydrant Coverage Plan in **Appendix A**. Fire flow calculations are provided in **Appendix A**.

The boundary conditions above highlight the maximum and minimum system pressures, for both existing and future pressure zones, during Peak Hour/Maximum Pressure conditions, and the minimum system pressures during the Maximum Day + Fire conditions. Since the Maximum Day + Fire Flow pressures are above the minimum 20 psi and the Peak Hour/Maximum Pressures fall within the normal operating pressure range (40 psi to 80 psi) we conclude the proposed development will be adequately serviced for both domestic and firefighting conditions.

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 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 2 (see **Appendix B** for Longfields Central report excerpts):

- Restricted minor system flow of 63.9 L/s/ha;
- On-Site storage of 25.0 m^3 (166.7 m^3/ha);
- Major System flow of 10.3 L/s.
- Total area of 0.04 ha (uncontrolled) with a runoff coefficient of 0.80 directed to Via Mattino Way (total area directed to 1350mm diameter trunk storm sewer of 0.15 ha).

7.1.1 Allowable Release Rate

The allowable release rate for Block 2 (0.15 ha) to 1350mm diameter trunk storm sewer was established based on the restricted minor system flow of 63.9 L/s/ha (9.6 L/s) for all storms up-to and including the 100-year storm event.

7.2 Existing Conditions

An existing 1350mm diameter trunk storm sewer runs along the existing pathway easement north of the proposed development.

7.3 Proposed Conditions

Most of the runoff from Block 2 will be routed to the existing 1350mm diameter trunk storm sewer in the adjacent pathway easement to the north. The remaining area (0.04 ha) will be directed uncontrolled to Via Mattino Way and captured by the local storm sewer system as per the design of Longfields Central subdivision. The existing 1350mm diameter trunk storm sewer 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 Longfields Davidson Heights SWM Facility provides the Quality Control for the site. The proposed site has a drainage area of approximately 0.19 ha and a runoff coefficient of 0.65. The site was previously referred to as area 30 and part of area 23 in the Longfields Central Design, which had a drainage area of 0.19 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 than what was previously allocated, as shown below:

Parameter	*Longfields Central Design*	*Current Design*
Drainage Area	0.19 ha	0.19 ha
Runoff Coefficient	0.80	0.65
Area x Runoff Coefficient	0.15	0.12

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 112021-05-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 64.8m of 250mm diameter storm sewers and a 1200mm diameter structure providing approximately 5.4 m^3 of storage. Refer to the proposed General Plan of Services (112021-05-GP) for storage pipe layout.

7.3.3 Major System Design

The site has been designed to convey runoff from storms that exceed the minor system capacity to Mountshannon Drive. The roadway and parking areas have been graded to ensure that the 100-year peak overland flows are limited to 10.3 L/s.

The site has been graded to provide overland flow routes that spills along the roadway and outlets to Mountshannon Drive at the entrance to the site (CBMH1).

Surface Storage

The stage-storage curves for each inlet were calculated based on the proposed Grading Plan (drawing 112021-05-GR). The total surface storage shown in the stage-storage curves at each inlet is provided in **Appendix B**. Approximately 40 m^3 of total surface storage is available within the low-points of the parking and landscape areas below the major system spill elevation of 92.40m.

The total storage provided underground and on the surface is as follows (provided surface storage refers to maximum available surface storage below the major system spill elevation of 92.40m):

Structure ID	Underground Storage (m^3)		Surface Storage (m^3)		Total Storage (m^3)	
	Required (2-YR)	Provided	Required (100-YR)	Provided	Required	Provided
CBMH01*	4.8	5.4	25.0	26.8	29.8	32.2
CB01	-	-		11.1		11.1
L02	-	-		1.6		1.6
TOTAL	**4.8**	**5.4**	**25.0**	**39.5**	**29.8**	**44.9**

*Structure with ICD.

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 2 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;
- 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 Mountshannon Drive.

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 2 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 **112021-05-STM** in **Appendix C**.

The hydrologic parameters for each subcatchment were developed based on the Site Plan (**Figure 1-2**) 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 (%)
Areas Directed to Mountshannon Dr.							
A-01	0.043	0.51	44%	0%	20	22	2%
A-02	0.096	0.72	74%	32%	24	41	2%
A-03	0.004	0.20	0%	0%	3	13	2%
A-04	0.009	0.43	33%	0%	3	30	2%
Areas Directed to Via Mattino Way (2014 MSS)							
A-05	0.039	0.69	70%	83%	15	26	2%
TOTAL	**0.21 ha**	**0.64**	**63%**	**-**	**-**	**-**	**-**

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.

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 2.

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 112021-05-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 69)	92.15	90.28	2.08	5.3	6.2	5.9

**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.

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)
CB1	92.20	92.42	0.22	92.36	0.16	N	0.00
CBMH1	92.15	92.40	0.25	92.36	0.21	N	0.00
L1	92.70	92.75	0.05	92.36	-	-	-
L2	92.25	92.48	0.23	92.36	0.11	N	0.00
RY1	92.63	92.72	0.09	92.36	-	-	-

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 storm service is proposed to connect to the existing 825mm storm sewer in Via Mattino Way. The HGL results from the 2014 MSS (Excerpts in **Appendix B**) 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 results of the HGL analysis and the stress testing indicates that the required freeboard has been achieved and the water level during the stress test event does not touch the underside of footing elevation.

7.5.4 Peak Flows

The overall release rate from the ICD and the uncontrolled flow draining to Mountshannon Drive (Area A-04) were used 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 7-5: Summary of Peak Flows

Design Event	**Allowable Release Rate**		**Minor System Release Rate**			**Major System Release Rate**		
	Minor (L/s)	**Major (L/s)**	**Controlled**	**Uncontrolled**	**Total**	**Spill**	**Uncontrolled**	**Total**
			(L/s)	**(L/s)**	**(L/s)**	**(L/s)**	**(L/s)**	**(L/s)**
2-year	**9.6**	**0.0**	5.3	1.4	**6.7**	-	-	**-**
5-year		**0.0**	6.2	3.3	**9.5**	-	-	**-**
100-year		**10.3**	5.9	-	**5.9**	-	7.2	**7.2**
100-year (+20%)	-	-	5.9	-	5.9	-	8.9	8.9

During the 100yr and 100yr+20% storm events, the uncontrolled flow from subcatchment A-04 was included as part of the major system flow being directed to Mountshannon Drive. During the 2yr and 5yr storm events, the uncontrolled flow was included as part of the minor system release rate.

8.0 CONCLUSIONS AND RECOMMENDATIONS

The report conclusions are as follows:

1) The proposed storm system will control post-development flow to the allowable release rate of 63.9 L/s/ha. Runoff volume from the 100-year storm event is within the allowable release rate. Underground storage will be provided using 250mm diameter storm sewers and 1200mm diameter structure. 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 Via Mattino Way sanitary sewers.

3) Connection to the existing watermain in Via 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.

9.0 CLOSURE

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

Sincerely,

NOVATECH

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2023.02.24
PROVINCE OF ONTARIO

Mark Bissett, P.Eng.
Senior Project Manager

APPENDIX A: Design Sheets

Storm Sewer Design Sheet (Rational Method)
Sanitary Sewer Design Sheets
Excerpt from Longfields Central Site Servicing Report (Sanitary Design Sheet)
Watermain Boundary Conditions
Water Demand
Fire Flow Calculations
Figure 2: Hydrant Location Plan

Block 2, 255 Mountshannon Drive: Storm Sewer Design Sheet (Rational Method)

LOCATION			AREA				FLOW							Total Peak Flow (Q)	PROPOSED SEWER							
Location	From Node	To Node	Hard Surface	Soft Surface	Total Area	Weighted Runoff Coefficient	Indivi 2.78 AR	Accum 2.78 AR	Time of Concentration	Rain Intensity (mm/hr)			Peak Flow		Pipe	Size	Grade	Length	Capacity	Full Flow Velocity	Time of Flow	Q/Qfull
										2yr	5yr	10yr										
			0.90	0.20	(ha)								(L/s)	(L/s)	Type	(mm)	(%)	(m)	(l/s)	(m/s)	(min.)	(%)
Block 2																						
A-03	RY1	CBMH1	0.000	0.004	0.004	0.20	0.002	0.002	10.00	76.81			0.2	**0.2**	PVC	250	1.00	19.8	62.0	1.22	0.27	0.3%
					0.000		0.000	0.000	10.00				0.0									
					0.000		0.000	0.000	10.00				0.0									
A-01	CB1	CBMH1	0.019	0.024	0.043	0.51	0.061	0.061	10.00	76.81			4.7	**4.7**	PVC	200	1.00	18.6	34.2	1.06	0.29	13.7%
					0.000		0.000	0.000	10.00				0.0									
					0.000		0.000	0.000	10.00				0.0									
A-02	CBMH1	EX1350	0.069	0.019	0.088	0.75	0.183	0.246	10.29	75.69			18.6	**18.6**	PVC	250	1.00	18.2	62.0	1.22	0.25	30.1%
					0.000		0.000	0.000	10.29				0.0									
					0.000		0.000	0.000	10.29				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 2 (112021-05)
Designed: LRW
Checked: MAB
Date: February 17, 2023

LICENSED PROFESSIONAL ENGINEER
L. R. WILSON
100160065
2023.02.24
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Engineers, Planners & Landscape Architects

M:\2012\112021\Block 2\DATA\Calculations\Sewer Calcs\STM\20230217-Storm Design Sheet (Rational Method).xlsx

Block 2, 255 Mountshannon Drive - 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
Longfields Central																						
A5	**EX121**	**EX119**	25	67.5		0.0	67.5	67.5	3.6	0.8	0.70	0.70	0.2	1.0	200	1.00	84.1	34.2	1.06	0.40	3.0%	0.108
A6, Block 21	**EX119**	**EX117**	2	5.4	88	184.8	190.2	257.7	3.5	2.9	0.92	1.62	0.5	3.4	200	0.35	18.2	20.2	0.62	0.38	17.0%	0.077
A11, A21	**EX117**	**EX115**	1	2.7	0	0.0	2.7	260.4	3.5	2.9	0.28	1.90	0.6	3.6	200	0.35	28.5	20.2	0.62	0.39	17.6%	0.077
A12	**EX115**	**EX113**	3	8.1	0	0.0	8.1	268.5	3.5	3.0	0.09	1.99	0.7	3.7	200	0.35	18.8	20.2	0.62	0.39	18.2%	0.077
A4	**EX113**	**EX103**	21	56.7	0	0.0	56.7	325.2	3.5	3.6	0.57	2.56	0.8	4.5	200	0.35	75.5	20.2	0.62	0.42	22.1%	0.077
A20	**EX111**	**EX109**	4	10.8	0	0.0	10.8	10.8	3.7	0.1	0.72	0.72	0.2	0.4	200	2.00	24.9	48.4	1.49	0.36	0.8%	0.000
C1, A1	**EX109**	**EX107**	26	70.2	0	0.0	70.2	81.0	3.6	0.9	0.29	1.01	0.3	1.3	200	0.50	55.8	24.2	0.75	0.33	5.3%	0.171
A20	**EX107**	**EX105**	10	27.0	0	0.0	27.0	108.0	3.6	1.3	0.27	1.28	0.4	1.7	200	0.55	35.4	25.4	0.78	0.37	6.6%	0.187
A3	**EX105**	**EX103**	6	16.2	0	0.0	16.2	124.2	3.6	1.4	0.17	1.45	0.5	1.9	200	1.75	41.8	45.3	1.40	0.57	4.2%	0.153
A13, **Block 2**	**EX103**	**EX101**	11	29.7	16	33.6	63.3	512.7	3.4	5.6	0.52	4.53	1.5	7.1	200	0.35	67.9	20.2	0.62	0.48	35.1%	0.463
	EX101	**MS3**		0.0	0	0.0	0.0	512.7	3.4	5.6	0.00	4.53	1.5	7.1	200	0.35	13.8	20.2	0.62	0.48	35.1%	0.463

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 2 (112021-05)
Designed: LRW
Checked: MAB
Date: February 17, 2023

LICENSED PROFESSIONAL ENGINEER
L. R. WILSON
100160065
2023.02.24
PROVINCE OF ONTARIO

M:\2012\112021\Block 2\DATA\Calculations\Sewer Calcs\SAN\20230217 - SAN Design Sheet.xlsx

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Longfields Central
SANITARY SEWER DESIGN SHEET

AREA			RESIDENTIAL							ICI		INFILTRATION				PIPE							
AREA ID	From	To	Towns	Stacked Towns	Java	Pop.	Accum. Pop.	Peak Factor	Peak Flow (l/s)	C/I Area (Ha)	Peak Flow (l/s)	Total Area (ha)	Accum. Area (ha)	Infilt. Flow (l/s)	**Total Flow (l/s)**	Size (mm)	Slope (%)	Length (m)	Capacity (l/s)	Full Flow Vel. (m/s)	Q/Q_{full} (%)	d/D_{full}	v/V_{full} (%)
645 Longfields Drive																							
C1	C32	109	16			43.2	43.2	4.00	0.70			0.52	0.52	0.15	0.85	200	2.60	65.2	55.17	1.70	1.5%	0.08	33.0%
A20	111	109	4			10.8	10.8	4.00	0.18			0.20	0.20	0.06	0.23	200	2.00	24.9	48.39	1.49	0.5%	0.00	0.0%
A1	109	107	10			27.0	81.0	4.00	1.31			0.29	1.01	0.28	1.60	200	0.50	55.8	24.19	0.75	6.6%	0.16	54.0%
A2	107	105	10			27.0	108.0	4.00	1.75			0.27	1.28	0.36	2.11	200	0.55	35.4	25.38	0.78	8.3%	0.19	60.0%
A3	105	103	6			16.2	124.2	4.00	2.01			0.17	1.45	0.41	2.42	200	1.75	41.8	45.26	1.40	5.3%	0.16	54.0%
A5	121	119	25			67.5	67.5	4.00	1.09			0.70	0.70	0.20	1.29	200	1.00	84.1	34.22	1.06	3.8%	0.12	45.0%
A6,A7	119	117	2		80	149.4	216.9	4.00	3.51			1.10	1.80	0.50	4.02	200	0.35	18.2	20.24	0.62	19.9%	0.30	78.0%
A11,A21	117	115	1			2.7	219.6	4.00	3.56	0.20	0.17	0.28	2.08	0.58	4.31	200	0.35	28.5	20.24	0.62	21.3%	0.30	78.0%
A12	115	113	3			8.1	227.7	4.00	3.69			0.09	2.17	0.61	4.30	200	0.35	18.8	20.24	0.62	21.2%	0.30	78.0%
A4	113	103	21			56.7	284.4	4.00	4.61			0.57	2.74	0.77	5.38	200	0.35	75.5	20.24	0.62	26.6%	0.34	83.0%
A13,A14	103	101	11	10		56.7	465.3	3.99	7.52			0.52	4.71	1.32	8.84	200	0.35	67.9	20.24	0.62	43.7%	0.44	96.0%
	101	MS3				0.0	465.3	3.99	7.52			0.00	4.71	1.32	8.84	200	0.35	13.8	20.24	0.62	43.7%	0.44	96.0%
Existing in Mountshannon Drive																							
A15	MS1	MS3		16		43.2	43.2	4.00	0.70			0.38	0.38	0.11	0.81	250	0.30	75.8	33.98	0.67	2.4%	0.08	33.0%
Connection to EBHT																							
A19	MS3	K2				0.0	508.5	3.97	8.18			0.08	5.17	1.45	9.63	300	0.32	15.5	57.07	0.78	16.9%	0.27	73.0%

Design Parameters:

Avg Flow/Person =	350	l/day
Infiltration =	0.28	l/s/ha
Residential Peaking Factor = Harmon Equation (max 4, min 2)		
Pipe Friction n =	0.013	
Comm./Inst. Flow =	50000	l/ha/day
Peaking Factor Comm./Inst. =	1.5	

Population Density:

Towns	2.7	ppl/unit
Stacked Towns	2.7	ppl/unit
Java	1.8	ppl/unit

Project: 112021
Designed: LRW
Checked: MAB
Date: May 16, 2014

M. A. BISSETT
2014-05-16

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Boundary Conditions
255 and 285 Mountshannon Drive

Provided Information

Block 1 - 285 Mountshannon Drive

Scenario	Demand	
	L/min	L/s
Average Daily Demand	8	0.14
Maximum Daily Demand	20	0.34
Peak Hour	45	0.75
Fire Flow Demand #1	12,000	200.00

Block 2 - 255 Mountshannon Drive

Scenario	Demand	
	L/min	L/s
Average Daily Demand	7	0.11
Maximum Daily Demand	16	0.27
Peak Hour	36	0.60
Fire Flow Demand #1	10,980	183.00

Location

Results

Existing Conditions (Pressure Zone 2W2C)

Block 1 Connection - Mountshannon Drive to 400 mm WM

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	133.1	57.9
Peak Hour	125.0	46.4
Max Day plus Fire Flow	126.4	48.5

[1] Ground Elevation = 92.3 m

Block 2 Connection - Mattino Way to 200 mm WM

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	133.1	58.2
Peak Hour	125.0	46.7
Max Day plus Fire Flow	124.3	45.7

[1] Ground Elevation = 92.1 m

Future Conditions (Pressure Zone SUC)

Block 1 Connection - Mountshannon Drive to 400 mm WM

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	146.9	77.6
Peak Hour	144.4	74.0
Max Day plus Fire Flow	144.4	74.0

[1] Ground Elevation = 92.3 m

Block 2 Connection - Mattino Way to 200 mm WM

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	146.9	77.9
Peak Hour	144.4	74.3
Max Day plus Fire Flow	142.1	71.1

[1] Ground Elevation = 92.1 m

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 2
Water Demand

	Area (ha)	Units	Population	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Hour Demand (L/s)
Apartments	N/A	16	34	0.109	0.272	0.599
Total	**0.00**	**16**	**34**	**0.109**	**0.272**	**0.599**

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	183	L/s

FUS - Fire Flow Calculations

As per 2020 Fire Underwriter's Survey Guidelines

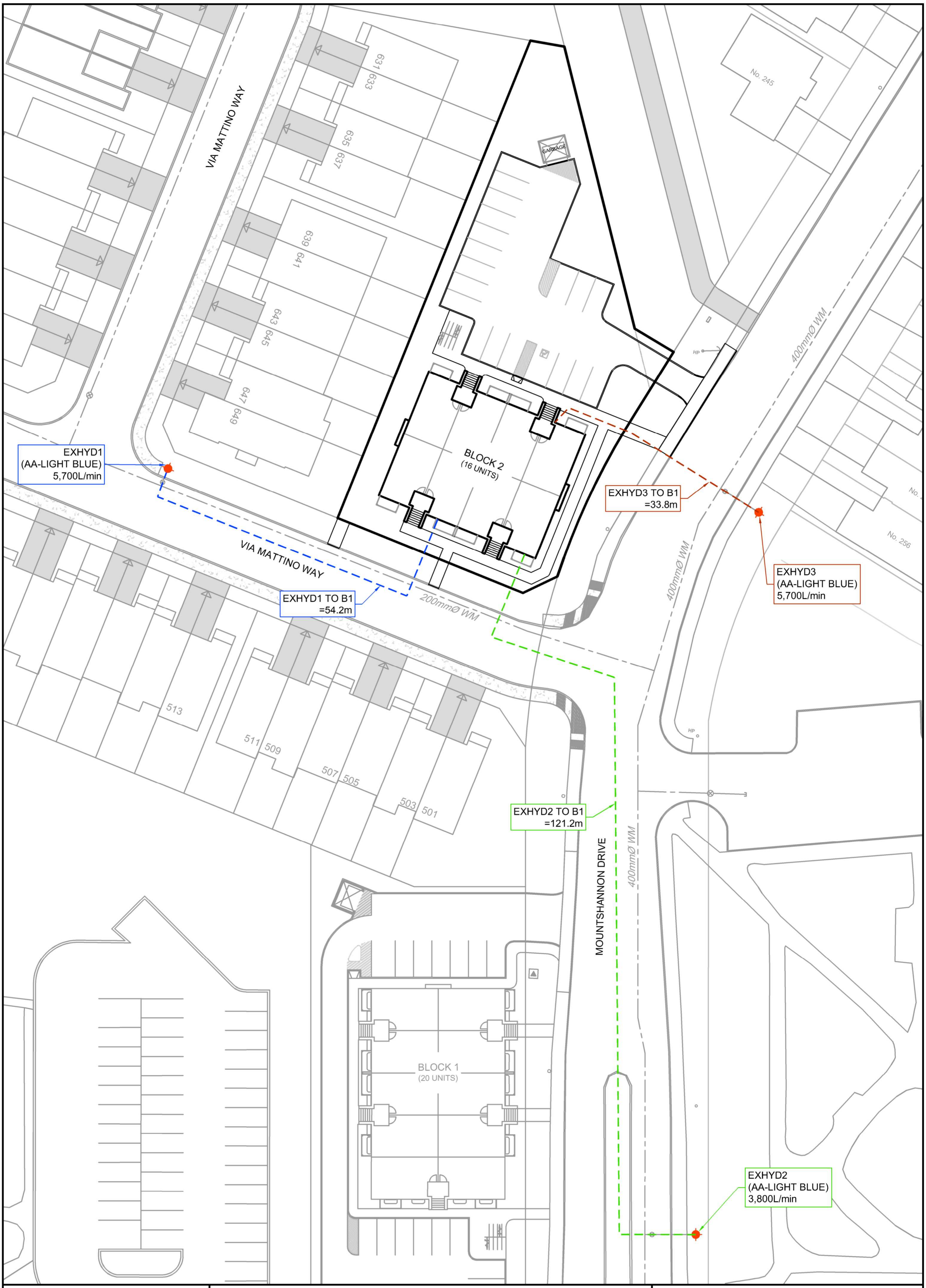
Novatech
Engineers, Planners & Landscape Architects

Novatech Project #: 112021-05
Project Name: Block 2
Date: 1/19/2023
Input By: Lucas Wilson
Reviewed By: Mark Bissett

Legend 🟨 ▨

Building Description: 16 Unit Apartment
Type V - Wood frame

Step			**Input**		**Value Used**	**Total Fire Flow (L/min)**
			Base Fire Flow			
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction C	Type V - Wood frame	Yes	1.5	1.5	
		Type IV - Mass Timber		Varies		
		Type III - Ordinary construction		1		
		Type II - Non-combustible construction		0.8		
		Type I - Fire resistive construction (2 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	456			
		Number of Floors/Storeys	3			
		Area of structure considered (m^2)			**1,368**	
	F	**Base fire flow without reductions** $F = 220\ C\ (A)^{0.5}$				**12,000**
			Reductions or Surcharges			
3	**Occupancy hazard reduction or surcharge**		**FUS Table 3**	**Reduction/Surcharge**		
	(1)	Non-combustible	Yes	-25%	-25%	**9,000**
		Limited combustible		-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**		**FUS Table 4**	**Reduction**		
	(2)	Adequately Designed System (NFPA 13)		-30%		**0**
		Standard Water Supply		-10%		
		Fully Supervised System		-10%		
				Cumulative Sub-Total	**0%**	
		Area of Sprinklered Coverage (m²)	0	0%		
				Cumulative Total	**0%**	
5	**Exposure Surcharge**		**FUS Table 5**		**Surcharge**	
	(3)	North Side	>30m		0%	**2,250**
		East Side	>30m		0%	
		South Side	20.1 - 30 m		10%	
		West Side	10.1 - 20 m		15%	
				Cumulative Total	**25%**	
			Results			
6	(1) + (2) + (3)	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**11,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**183**
				or	USGPM	2,906



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BLOCK 2 - 255 MOUNTSHANNON DRIVE

HYDRANT LOCATION PLAN

SCALE 1 : 500 0 5m 10m 20m

DATE FEB 24, 2023

JOB 112021-05

FIGURE FIGURE 2

M:\2012\112021\Block 2\CAD\Design\Figures\Design Brief\Hyd Location Plan_Blk 2.dwg, 11x17 portrait, Feb 23, 2023 - 12:34pm, lwilson

SHT11X17.DWG - 279mmX432mm

APPENDIX B

Excerpts from Longfields Central Site Servicing Report
Stantec 2002 Update – HGL Excerpts
PCSWMM Storage Node Curves
PCSWMM Model Results (Ponding)
PCSWMM Model Schematics
PCSWMM Model Results (100-year output data)
Tempest LMF Correspondence & Documentation

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

system will not experience any severe flooding even with a 20% increase during the 100-year event.

It was determined that overland flow within the rearyard swales will convey to a max depth of 0.37m under dynamic conditions during the 100 year event. This is due to maximizing the amount of storage area within the rearyards to meet the criteria set out for the development (40 m^3 /ha of storage within rearyard areas). A check of the clearance from the 100 year ponding elevation within the rearyards to the rear building terrace elevations indicate that there is sufficient space between the two elevations for the dynamic flows to not encroach the units. It has been determined that no rearyard ponding is occurring during the 5 year storm event, as all conveyance of flow is being maintained within the RYCB pipe interconnections. All dynamic ponding depths for both the 5 and 100 year storm events at each inlet have been added to the tables within drawing 112021-DET in **Appendix E**.

5.4.3 SWM Results

The constraints to the site were to restrict flows leaving the storm system to 64 L/s/ha and maintain an overall site storage of 100 m^3/ha. Major system flow beyond the 64 L/s/ha entering the storm sewers are to be conveyed along Mountshannon Drive and into the existing SWM Park 959 as stated in the *Longfields Davidson Heights Serviceability Study Update Report (1998).*

The external Campanale Homes development to the South of the site is to be controlled to the design provided in the Longfields Subdivision Report (Stantec – 2013) prior to entering the Longfields Central Development.

As stated in Section 5.3.5, portions of the Campanale Homes adjacent areas are conveying uncontrolled (A-17, A-18) as well as the major system overland flow from a large amount of rearyard area (A-33) onto the Longfields road network as per the design for the Campanale Homes – Longfields Subdivision (Stantec Engineering, 2013). The Longfields Central Development will provide strictly conveyance for the flows contributed from the Campanale Homes adjacent areas as described in the following tables. **Table 5.4 and Table 5.5** provided below outline the SSA hydrologic model results for the Longfields Central Development and contributing flows from the adjacent Campanale Development.

Table 5-4: Longfields Central Development SWM Breakdown (100-year storm event)

Description	**Area**	**Minor System Flow**		**Total Static Ponding**		**Major System Flow**
	(ha)	**(L/s)**	**(L/s/ha)**	**(m^3)**	**(m^3/ha)**	**(L/s)**
High Density Residential						
Block 1 (A-29)	0.21	6.0	28.8	20.8	100.0	94.3
Block 2 (A-30)	0.15	9.6	63.9	25.0	166.7	10.3
Block 21(A-2a/b)	1.00	37.6	37.5	270.0	269.4	38.8
Medium Density Residential						
Medium-Density	3.63	255.5	70.4	185.6	51.2	246.7
Total	**4.99**	**308.6**	**61.9**	**501.4**	**100.5**	**390.2**

November 22, 2013

- 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:

Block 1 (0.21 ha)

- 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)

Block 2 (0.15 ha)

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

Block 21 (1.0 ha)

- 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 Isolator Chambers used to prevent infiltration into the soils;
- Minimum stone *(50mm dia. Clearstone)* base foundation depth of 300mm;
- Minimum stone *(50mm dia. Clearstone)* cover above chamber of 305mm;
- Stone Porosity of 40%;

To determine the amount of chambers required to temporarily store the 1:100 year inflow volume, the Stormtech site calculator was used. Design results for the conceptual chambers for Block 21 are provided as follows:

Chamber

- Type: Stormtech MC-3500
- Bottom Surface Area: 167 m^2
- Total Storage Volume: 170 m^3
- Trench Length: 19 meters
- Trench Width: 9 meters

Additional chamber details and calculations are provided in **Appendix C**. Additional details of the on-site storage design will be developed as part of the Site Plan submission for Blocks 1, 2 and 21.

5.4.6 Hydraulic Grade Line

The model was used to calculate the hydraulic grade line (HGL) in the storm sewer for the 100-year 4-hour Chicago storm distribution. The downstream boundary condition for all 100-year storm distributions was set at the 100-year HGL elevation of the 1350mm trunk sewer at the connection (HGL = 90.54m).

The results of this 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 is indicated on the Plan and Profile Drawings (submitted separately) and included in the SSA Profiles in **Appendix C**. The 100-year HGL elevations at each storm manhole with the respected range of underside of footing elevations and obvert of pipes are provided below in **Table 5.6.** The sensitivity analysis results for the 100+20% design storm is also provided below.

Table 5-6: HGL Summary

Structure	HGL (m)		USF	Clearance (m)	
	100yr	100yr +20%	(m)	100yr	100yr + 20%
MH128	90.71	90.71	-	-	-
MH126	90.67	90.67	-	-	-
MH124	90.67	90.67	91.13	0.46	0.46
MH122	90.68	90.68	91.03	0.35	0.35
MH120	90.67	90.68	91.08	0.41	0.40
MH118	90.66	90.67	90.98	0.32	0.31
MH116	90.65	90.67	90.98	0.33	0.31
MH106	90.65	90.65	90.96	0.31	0.31
MH114	90.78	90.78	91.14	0.36	0.36
MH112	90.70	90.71	91.12	0.42	0.41
MH110	90.70	90.71	91.02	0.32	0.31

Structure	HGL (m)		USF	Clearance (m)	
	100yr	100yr +20%	(m)	100yr	100yr + 20%
MH108	90.68	90.68	90.99	0.31	0.31
MH104	90.59	90.59	90.93	0.34	0.34
MH102	90.58	90.58	-	-	-
EXIST.	90.55		-	-	-

As shown in the table above, there is very little change in the hydraulic grade line between the 100yr and 100yr + 20% conditions. This is due to the use of Hydrovex control devices which significantly restrict the amount of flow into the system.

LEGEND

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

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

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
1:500
0 5 10 15 20

DESIGN LRW
CHECKED MAB
DRAWN DTD
CHECKED MAB
APPROVED JGR

FOR REVIEW ONLY

J.G. RIDDELL
M.A. BISSETT
2014-07-25

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

M:\2012\112021\CAD\Design\112021-STM.dwg, STM, Jul 25, 2014 - 10:36am, lwilson

PLANB1.DWG - 1000mmx707mm

August 12th , 2002

File: 634 00365

Jean Lachance, P.Eng.
Program Manager, Infrastructure Approvals (South Ottawa)
Development Services Department
City of Ottawa
2 Constellation Drive, 5th floor
Nepean, On, K2G 5J9

Dear Mr. Lachance

Reference: ***Update to Longfields / Davidson-Heights model***

Further to our July 19th, 2002 memo to Larry Erion (DSD) and Chris Rogers (TUPW) regarding changes to the above noted model, please find herein a summary of the modifications that were undertaken as well as a revised drainage area map, SWM pond summary and HGL summary.

Changes to DDSWMM Model:
The latest DDSWMM version (LDJLY-15.dat) was obtained from the Infrastructure Branch of TUPW. The model was modified to reflect to following changes:

- The major flow from Area 85 now drains to Area 51 and eventually to pond 998 (along Beatrice Dr.) as opposed to draining to pond 198, which is also the culvert on Woodroffe Avenue .
- Area 78 now drains to Area 77 and eventually to pond 998 on Beatrice Drive. This area also used to drain to pond 198 on Woodroffe Avenue.
- It was noted that in the current DDSWMM version, pond 997 (at Beatrice and Claridge) was removed and all areas draining to it were re-routed to pond 998 (on Beatrice, north of Claridge). This change was confirmed by Larry Erion.
- The overland areas draining to pond 198 (Woodroffe culvert) consist of areas 50 and 87 for a total drainage area of 11.14 ha.
- Areas 943 and 944, that consists of Woodroffe avenue between Claridge Drive and Fallowfield Road, were halved since half of Woodroffe avenue will drain to roadside ditches (and eventually into a ravine). The area of Woodroffe that

drains to the minor system was modified to reflect the actual number of Catchbasins (as per the McCormick Ranking Drawings) and the catchbasins were modified to simulate actual CBs with a maximum capture of 50 L/s (as opposed to 19.8 L/s from regular CBs with ICDs).

All changes are documented in the model. The model has been saved as version 16 (LDJLY-16.txt). The revised drainage area map that was produced by TUPW has been revised to reflect the above noted changes. The map is appended herein.

Impact on Woodroffe Avenue Culvert:

The proposed 600 mm dia concrete culvert on Woodroffe Avenue (between Claride Drive and Longfields Drive) was reviewed base on the revised analysis. The original DDSWMM analysis estimated the peak flow at this location to be approximately 3.34 cms. The modifications to the major system have reduced this peak flow to 1.55 cms.

Using the profile information provided by McCormick Ranking, the 600 mm dia culvert will have the following specifications:

- Culvert Dia = 600 mm
- Culvert length = 45 m
- Inlet at 90.48, outlet at 90.35 , slope of 0.29%

The analysis was undertaken using the Environment Canada culvert program. In order to pass the 1.55 cms flow without overtopping the roadway, **twin 600 mm diameter concrete culverts will be required**. The maximum upstream WL will be 92.45 m.

Impact on Pond 998 (Beatrice Drive):

Since more flow is now being diverted to the Beatrice Drive Pond, we have reviewed the required volume for this pond. The total area draining to Pond 998 now consists of 46.05 ha as opposed to 29.73 ha outlined in Appendix J of the 1998 study. The new required volume for this facility is 3656 m3 with a corresponding area of 0.55 ha (assuming a depth of 0.7 m).

We have revised appendix J and have appended it to this letter for your information.

Impact on Minor System (Changes to XP-SWMM model):

The latest XP-SWMM version (LDHNOV15.XP) was obtained from the Infrastructure Branch of TUPW. The revised output from the modified DDSMMM model was interfaced with the XP-SWMM model and a new run was done to obtain new results.

The analysis shows that the HGL has not increased due to the changes to Woodroffe Avenue. Actually, the results show a slight decrease in HGL attributable most likely to the timing of the uncontrolled flow from Woodroffe Avenue.

A new 100 year HGL table has been prepared and is appended to this letter. Please note that most of the changes to the HGL from the original table are due to changes in pipe inverts, lenghts and locations. **It is therefore critical that inverts (or obverts) or proposed or as-built drawings be checked against the model to ensure that HGL are realistic. It may be necessary to revise the model again to reflect what is being proposed.**

We have also included for your information a revised drainage area map that shows the latest drainage area boundaries.

If you have any questions regarding the above, please do not hesitate to contact the undersigned at 724-4085.

Yours very truly,

STANTEC CONSULTING LTD.

Eric M. Tousignant, P.Eng.
Senior Environmental Engineer

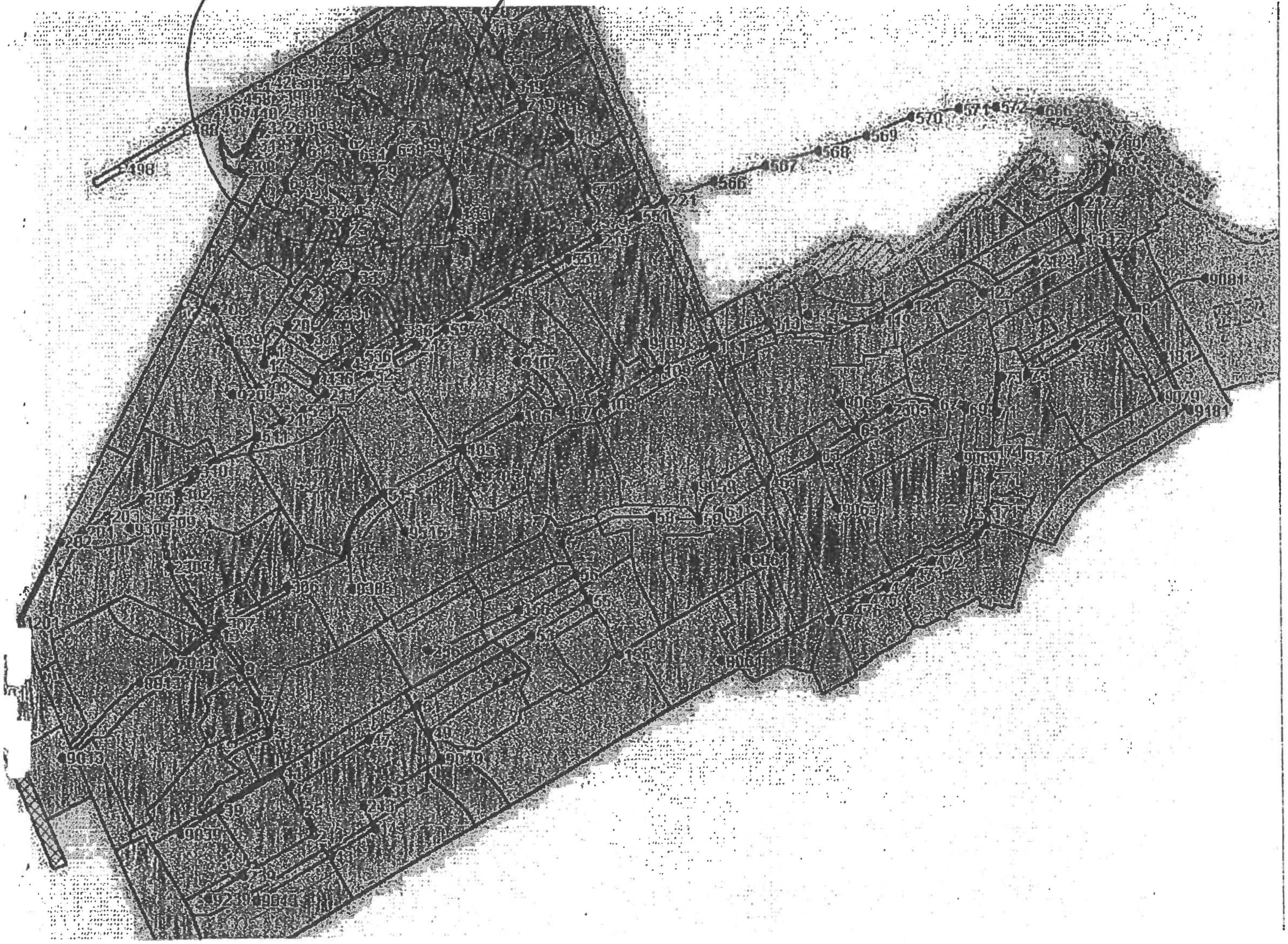
Revised HGL Table (Aug 2002)

Longfields Davidson Heights

Junction Name	Ground Elevation meters	Obvert Elevation meters	Nov 01 version 100 yr. HGL meters	Aug-02 version 100 yr. HGL meters
638	92.14	88.631	90.1231	90.0813
419	92.06	89.63	89.4739	89.391
559	91.98	89.47	89.4165	89.3237
319	91.88	89.13	89.3557	89.2663
719	91.96	88.989	89.2727	89.1854
541	92.38	88.4	90.0002	89.9579
31	91.56	88.299	89.9187	89.8761
533	92.9	88.169	89.8934	89.8506
33	91.8	87.972	89.8414	89.7986
35	92.19	87.802	89.7716	89.7286
217	92.1	88.276	89.5137	89.4701
819	91.8	88.652	88.9684	88.8981
919	92.4	88.304	88.6794	88.6211
579	92.3	88.164	88.5978	88.5399
111	92.75	87.803	88.3425	88.3329
463	92.5	88.761	89.5013	89.5398
525	92.65	88.696	89.9692	89.934
215	92.2	88.486	89.6761	89.6356
210	92.5	89.273	90.2822	90.254
209	92.69	89.12	90.6863	90.6571
539	92.959	89.24	90.9224	90.8932
208	92.8	89.42	91.1697	91.1406
211	92.89	88.906	90.1189	90.0869
17	92.6	89.533	90.2589	90.2236
19	92.5	89.445	90.2427	90.2074
435	92.65	89.247	90.1453	90.1102
436	92.65	88.987	90.1156	90.0804
437	92.65	88.779	90.0693	90.0342
23	92.6	89.962	90.2522	90.2172
335	92.65	89.129	90.1832	90.1481
336	92.5	88.874	90.1045	90.0693
536	92.96	88.719	90.0515	90.0162
331	92.65	89.498	90.231	90.196
20	92.6	90.111	90.2916	90.2564
21	92.8	90.152	90.283	90.2481
2331	92.6	89.361	90.2155	90.1805
25	92	89.567	90.3021	90.2671
27	92.2	89.732	90.3505	90.3156
2579	92.3	87.904	88.5004	88.442
219	92.8	87.756	88.4566	88.3976
550	92.5	87.966	88.8387	88.7857
549	92.45	88.176	89.2262	89.1788
221	91.1	87.503	87.7226	87.6697

NODE 25

Site


498
566
567
568
569
570
571
572
221
550
9084
9079
9181
9065
2305
9069
9049
9039
9043

Block 2 - 255 Mountshannon Drive (112021-05)
PCSWMM Storage Curves (underground/surface storage)

CB1-Storage		
Depth (m)	Area (m^2)	Volume (m^3)
0.00	0.37	0.00
1.40	0.37	0.52
1.62	138.70	15.82
1.621	0.00	15.89
2.40	0.00	15.89

CBMH1-Storage		
Depth (m)	Area (m^2)	Volume (m^3)
0.00	1.17	0.00
1.87	1.17	2.19
2.12	213.20	28.98
2.121	0.00	29.09
2.87	0.00	29.09

L02-Storage		
Depth (m)	Area (m2)	Volume (m3)
0.00	0.00	0.00
1.29	0.00	0.00
1.52	47.00	5.41
1.521	0.00	5.43
2.29	0.00	5.43

Date: 2/22/2023
M:\2012\112021\Block 2\DATA\Calculations\Sewer Calcs\SWM\112021-Blk2-Storage Curves.xlsx

Block 2 - 255 Mountshannon Drive (112021-05)
PCSWMM Model Results (Ponding)

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%)
CB01	90.76	92.20	92.42	0.22	91.68	92.22	92.36	92.40	0.00	0.02	0.16	0.20	0.00	0.00	0.00	0.00
CBMH01	90.28	92.15	92.40	0.25	91.68	92.21	92.36	92.40	0.00	0.06	0.21	0.25	0.00	0.00	0.00	0.00
L01	91.16	92.70	92.75	0.05	91.68	92.22	92.36	92.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
L02	90.92	92.25	92.48	0.23	91.68	92.22	92.36	92.40	0.00	0.00	0.11	0.15	0.00	0.00	0.00	0.00
RY01	90.48	92.63	92.72	0.09	91.68	92.22	92.36	92.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

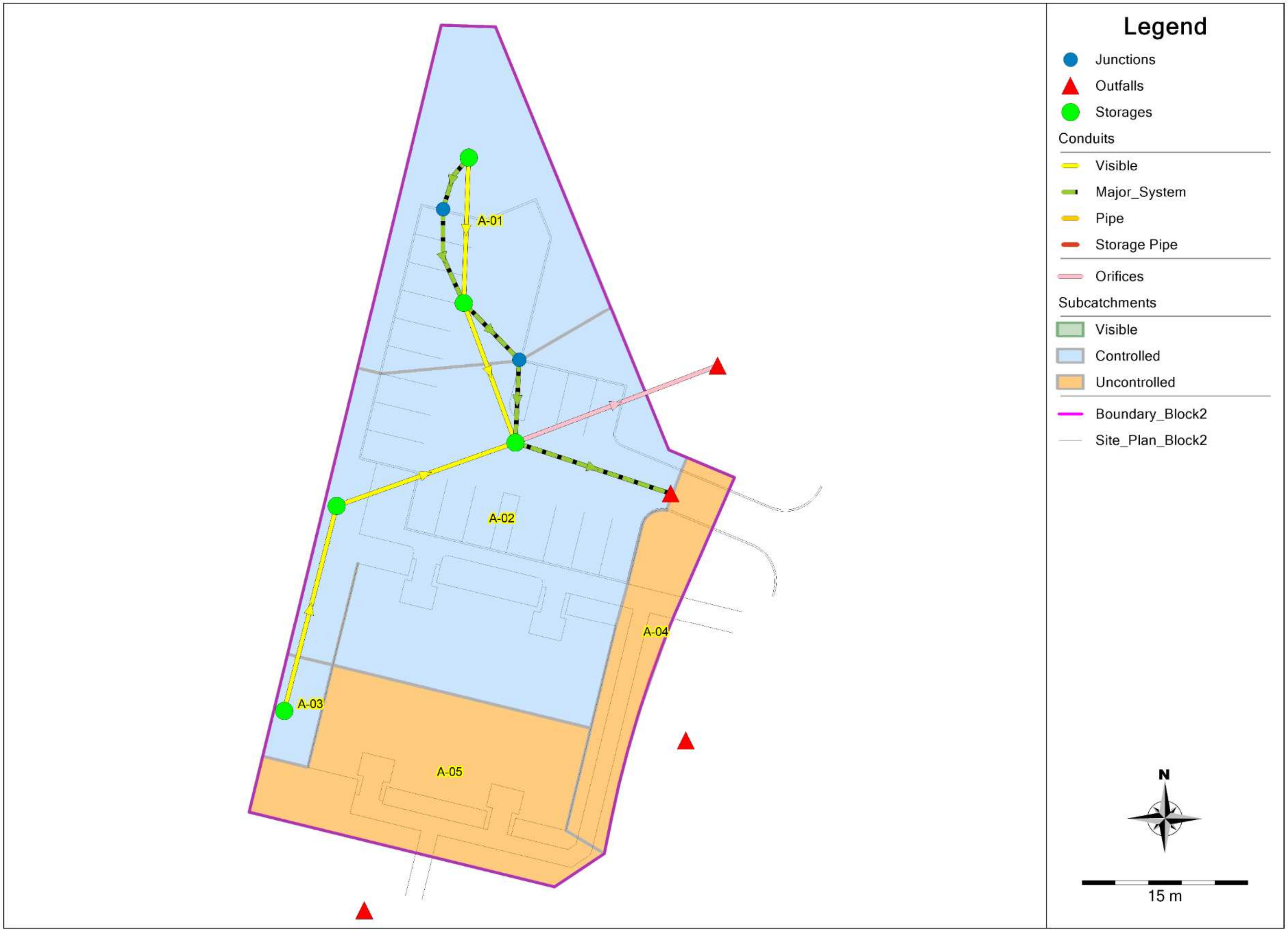
[1] *3-hour Chicago Storm.*

Date: 2/16/2023
M:\2012\112021\Block 2\DATA\Calculations\Sewer Calcs\SWM\112021-Blk2-Model Results.xlsx

Block 2 – 255 Mountshannon Drive (112021-05)
PCSWMM Model Schematic

NOVATECH
Engineers, Planners & Landscape Architects

Subcatchment ID's



Date: 2023-02-15
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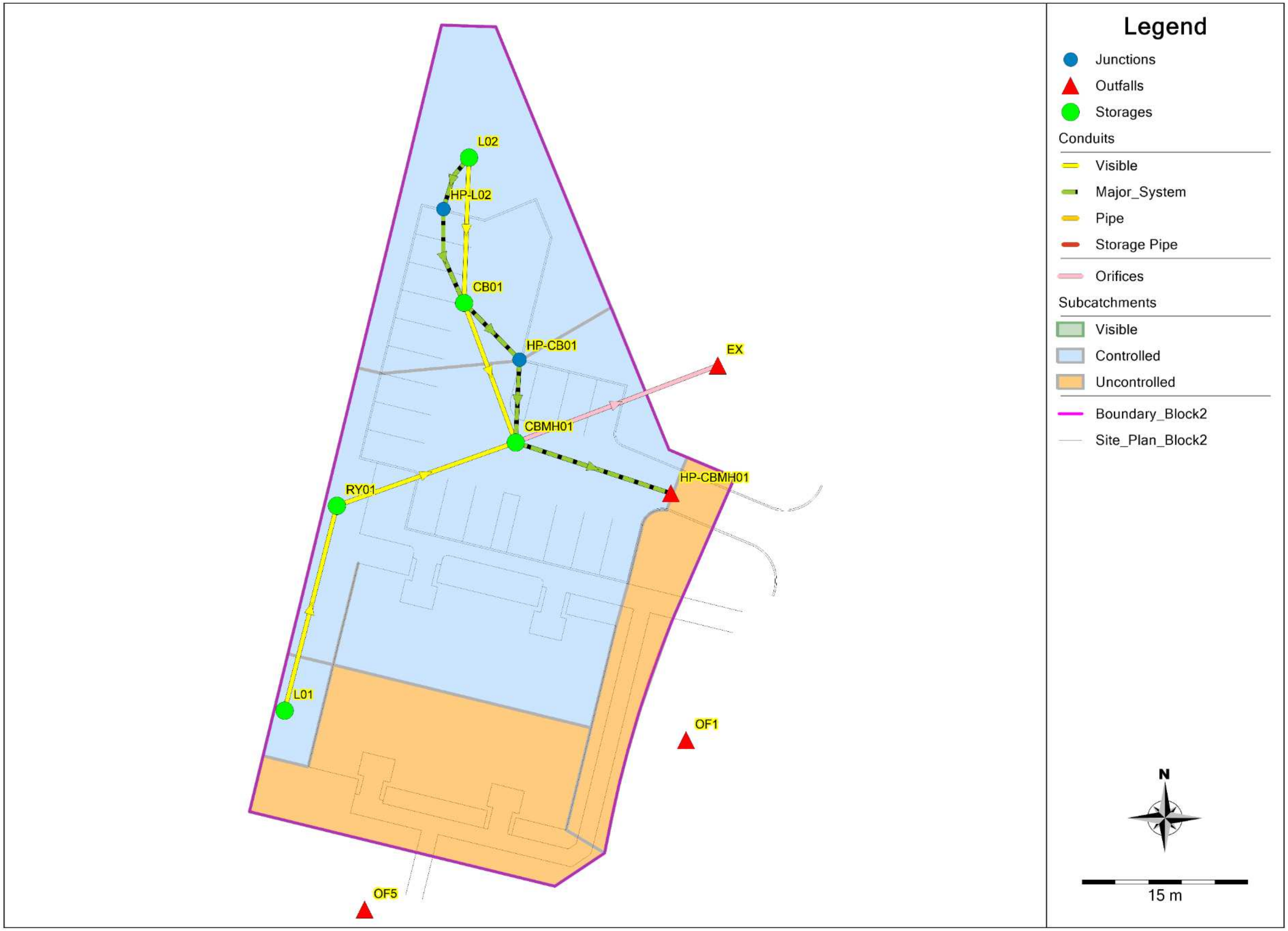
Block 2 – 255 Mountshannon Drive (112021-05)
PCSWMM Model Schematic

Node ID's



Date: 2023-02-15
M:\2012\112021\Block 2\DATA\Calculations\Sewer Calcs\SWM\PCSWMM\PCSWMM Model Schematic.docx

Block 2 – 255 Mountshannon Drive (112021-05)
PCSWMM Model Output
100yr 3-hour Chicago Storm

```
  EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)
  --------------------------------------------------------------


*************
Element Count
*************
Number of rain gages ...... 1
Number of subcatchments ... 5
Number of nodes ........... 11
Number of links ........... 10
Number of pollutants ...... 0
Number of land uses ....... 0


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


********************
Subcatchment Summary
********************
Name                       Area     Width   %Imperv    %Slope Rain Gage            Outlet
---------------------------------------------------------------------------------------------------------
---
A-01                       0.04     21.50     44.20    2.0000 RG-1                 CB01
A-02                       0.09     37.24     78.00    2.0000 RG-1                 CBMH01
A-03                       0.00     13.33      0.00    2.0000 RG-1                 L01
A-04                       0.02     32.00     37.50    2.0000 RG-1                 OF1
A-05                       0.04     26.00     70.50    2.0000 RG-1                 OF5


************
Node Summary
************
                                         Invert      Max.    Ponded    External
Name                 Type                 Elev.     Depth      Area    Inflow
-------------------------------------------------------------------------------
HP-CB01              JUNCTION             92.42      1.00       0.0
HP-L02               JUNCTION             92.48      1.00       0.0
EX                   OUTFALL              90.10      0.00       0.0
HP-CBMH01            OUTFALL              92.40      1.00       0.0
OF1                  OUTFALL              92.40      0.00       0.0
OF5                  OUTFALL              92.61      0.00       0.0
CB01                 STORAGE              90.80      2.40       0.0
CBMH01               STORAGE              90.28      2.87       0.0
L01                  STORAGE              91.16      1.54       0.0
L02                  STORAGE              90.96      2.29       0.0
RY01                 STORAGE              90.48      2.15       0.0


************
Link Summary
************
Name             From Node        To Node          Type            Length    %Slope Roughness
---------------------------------------------------------------------------------------------
CB01-CBMH01      CB01             CBMH01           CONDUIT           14.8    1.0136    0.0130
L01-RY01         L01              RY01             CONDUIT           14.6    1.0275    0.0130
L02-CB01         L02              CB01             CONDUIT           15.6    1.0257    0.0130
MS-CB01(1)       CB01             HP-CB01          CONDUIT            1.0  -22.5525    0.0150
MS-CB01(2)       HP-CB01          CBMH01           CONDUIT            1.0   28.0415    0.0150
MS-CBMH01        CBMH01           HP-CBMH01        CONDUIT            3.0   -8.3624    0.0150
MS-L02(1)        L02              HP-L02           CONDUIT            3.0   -7.6893    0.0150
MS-L02(2)        HP-L02           CB01             CONDUIT            3.0    9.3743    0.0150
RY01-CBMH01      RY01             CBMH01           CONDUIT           19.8    1.0102    0.0130
O-CBMH1          CBMH01           EX               ORIFICE


*********************
Cross Section Summary
*********************
                                        Full     Full     Hyd.     Max.   No. of     Full
Conduit          Shape                 Depth     Area     Rad.    Width  Barrels     Flow
---------------------------------------------------------------------------------------
CB01-CBMH01      CIRCULAR               0.25     0.05     0.06     0.25        1    59.87
L01-RY01         CIRCULAR               0.25     0.05     0.06     0.25        1    60.28
L02-CB01         CIRCULAR               0.25     0.05     0.06     0.25        1    60.23
MS-CB01(1)       RECT_OPEN              1.00     3.00     0.60     3.00        1 67570.12
MS-CB01(2)       RECT_OPEN              1.00     3.00     0.60     3.00        1 75345.48
MS-CBMH01        RECT_OPEN              1.00     3.00     0.60     3.00        1 41145.56
MS-L02(1)        RECT_OPEN              1.00     3.00     0.60     3.00        1 39454.84
MS-L02(2)        RECT_OPEN              1.00     3.00     0.60     3.00        1 43563.76
RY01-CBMH01      CIRCULAR               0.25     0.05     0.06     0.25        1    59.77


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

****************
Analysis Options
****************
Flow Units ............... LPS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 12/05/2022 00:00:00
Ending Date .............. 12/13/2022 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:01:00
Dry Time Step ............ 00:01:00
Routing Time Step ........ 1.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 1
Head Tolerance ........... 0.001500 m


**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Initial LID Storage ......         0.000         0.625
Total Precipitation ......         0.014        71.667
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         0.003        16.019
Surface Runoff ...........         0.011        55.737
Final Storage ............         0.000         0.625
Continuity Error (%) .....        -0.125


**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.011         0.106
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........         0.011         0.106
Flooding Loss ............         0.000         0.000
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.000         0.001
Final Stored Volume ......         0.000         0.001
Continuity Error (%) .....         0.000


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


********************************
Highest Flow Instability Indexes
```

```
  ********************************
  All links are stable.


  *************************
  Routing Time Step Summary
  *************************
  Minimum Time Step           :     0.50 sec
  Average Time Step           :     1.00 sec
  Maximum Time Step           :     1.00 sec
  Percent in Steady State     :     0.00
  Average Iterations per Step :     2.00
  Percent Not Converging      :     0.00
  Time Step Frequencies       :
     1.000 -  0.871 sec       :   100.00 %
     0.871 -  0.758 sec       :     0.00 %
     0.758 -  0.660 sec       :     0.00 %
     0.660 -  0.574 sec       :     0.00 %
     0.574 -  0.500 sec       :     0.00 %


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

  ---------------------------------------------------------------------------------------------------------
----------------------
                            Total      Total      Total      Total     Imperv       Perv      Total
Total     Peak  Runoff
                           Precip      Runon       Evap      Infil     Runoff     Runoff     Runoff
Runoff   Runoff   Coeff
  Subcatchment                 mm         mm         mm         mm         mm         mm         mm
10^6 ltr      LPS
  ---------------------------------------------------------------------------------------------------------
----------------------
  A-01                      71.67       0.00       0.00      24.90      31.73      15.11      46.84
0.02    17.41   0.654
  A-02                      71.67       0.00       0.00       9.69      55.97       6.09      62.06
0.05    41.80   0.866
  A-03                      71.67       0.00       0.00      43.84       0.00      27.94      27.94
0.00     1.68   0.390
  A-04                      71.67       0.00       0.00      27.41      26.90      17.45      44.35
0.01     7.17   0.619
  A-05                      71.67       0.00       0.00      12.97      50.60       8.19      58.80
0.02    18.34   0.820


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

  ---------------------------------------------------------------------------------
                                 Average  Maximum  Maximum  Time of Max    Reported
                                   Depth    Depth      HGL   Occurrence   Max Depth
  Node                 Type       Meters   Meters   Meters  days hr:min      Meters
  ---------------------------------------------------------------------------------
  HP-CB01              JUNCTION     0.00     0.00    92.42     0  00:00        0.00
  HP-L02               JUNCTION     0.00     0.00    92.48     0  00:00        0.00
  EX                   OUTFALL      0.56     0.56    90.66     0  00:00        0.56
  HP-CBMH01            OUTFALL      0.00     0.00    92.40     0  00:00        0.00
  OF1                  OUTFALL      0.00     0.00    92.40     0  00:00        0.00
  OF5                  OUTFALL      0.00     0.00    92.61     0  00:00        0.00
  CB01                 STORAGE      0.02     1.56    92.36     0  01:33        1.56
  CBMH01               STORAGE      0.41     2.08    92.36     0  01:35        2.08
  L01                  STORAGE      0.02     1.20    92.36     0  01:30        1.20
  L02                  STORAGE      0.02     1.40    92.36     0  01:34        1.40
  RY01                 STORAGE      0.21     1.88    92.36     0  01:33        1.88


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

  -------------------------------------------------------------------------------------------------
                                  Maximum  Maximum                  Lateral       Total        Flow
                                  Lateral    Total  Time of Max      Inflow      Inflow     Balance
                                   Inflow   Inflow   Occurrence      Volume      Volume       Error
  Node                 Type           LPS      LPS  days hr:min    10^6 ltr    10^6 ltr     Percent
  -------------------------------------------------------------------------------------------------
  HP-CB01              JUNCTION      0.00     0.00     0  00:00           0           0       0.000 ltr
  HP-L02               JUNCTION      0.00     0.00     0  00:00           0           0       0.000 ltr
  EX                   OUTFALL       0.00     5.86     0  01:35           0       0.076       0.000
  HP-CBMH01            OUTFALL       0.00     0.00     0  00:00           0           0       0.000 ltr
  OF1                  OUTFALL       7.17     7.17     0  01:10      0.0071      0.0071       0.000
  OF5                  OUTFALL      18.34    18.34     0  01:10      0.0229      0.0229       0.000
  CB01                 STORAGE      17.41    21.74     0  01:10      0.0201      0.0256      -0.030
  CBMH01               STORAGE      41.80    56.53     0  01:04      0.0546      0.0867       0.000
  L01                  STORAGE       1.68     5.53     0  01:04     0.00112     0.00284       0.028
  L02                  STORAGE       0.00     5.65     0  01:04           0     0.00356      -0.048
  RY01                 STORAGE       0.00    14.29     0  01:03           0      0.0113      -0.010


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

  No nodes were surcharged.


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

  No nodes were flooded.


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

  --------------------------------------------------------------------------------------------------
                         Average     Avg  Evap Exfil       Maximum     Max    Time of Max    Maximum
                          Volume    Pcnt  Pcnt  Pcnt        Volume    Pcnt     Occurrence    Outflow
  Storage Unit           1000 m3    Full  Loss  Loss       1000 m3    Full    days hr:min        LPS
  --------------------------------------------------------------------------------------------------
  CB01                     0.000       0     0     0         0.009      54       0  01:33      14.46
  CBMH01                   0.001       2     0     0         0.021      72       0  01:35      23.12
  L01                      0.000       1     0     0         0.000      78       0  01:30       3.75
  L02                      0.000       0     0     0         0.001      23       0  01:34       3.73
  RY01                     0.000      10     0     0         0.001      88       0  01:33       5.92


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

  -----------------------------------------------------------
                         Flow       Avg       Max       Total
                         Freq      Flow      Flow      Volume
  Outfall Node           Pcnt       LPS       LPS    10^6 ltr
  -----------------------------------------------------------
  EX                     2.51      4.36      5.86       0.076
  HP-CBMH01              0.00      0.00      0.00       0.000
  OF1                    1.57      0.65      7.17       0.007
  OF5                    1.65      2.01     18.34       0.023
  -----------------------------------------------------------
  System                 1.43      7.03     31.28       0.106


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

  -----------------------------------------------------------------------------
                                 Maximum  Time of Max   Maximum    Max/    Max/
                                  |Flow|   Occurrence   |Veloc|    Full    Full
  Link                 Type          LPS  days hr:min    m/sec     Flow   Depth
  -----------------------------------------------------------------------------
  CB01-CBMH01          CONDUIT     13.59     0  01:04     0.28     0.23    1.00
  L01-RY01             CONDUIT      5.07     0  01:02     0.10     0.08    1.00
  L02-CB01             CONDUIT      5.65     0  01:04     0.12     0.09    1.00
  MS-CB01(1)           CONDUIT      0.00     0  00:00     0.00     0.00    0.08
  MS-CB01(2)           CONDUIT      0.00     0  00:00     0.00     0.00    0.10
  MS-CBMH01            CONDUIT      0.00     0  00:00     0.00     0.00    0.10
  MS-L02(1)            CONDUIT      0.00     0  00:00     0.00     0.00    0.05
  MS-L02(2)            CONDUIT      0.00     0  00:00     0.00     0.00    0.08
  RY01-CBMH01          CONDUIT     14.29     0  01:03     0.29     0.24    1.00
  O-CBMH1              ORIFICE      5.86     0  01:35                      1.00


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

```
  -------------------------------------------------------------------------------------
                      Adjusted    ---------- Fraction of Time in Flow Class ----------
                       /Actual         Up    Down  Sub   Sup   Up    Down  Norm  Inlet
  Conduit               Length    Dry  Dry   Dry   Crit  Crit  Crit  Crit  Ltd   Ctrl
  -------------------------------------------------------------------------------------
  CB01-CBMH01             1.00   0.00  0.95  0.00  0.05  0.00  0.00  0.00  0.98  0.00
  L01-RY01                1.00   0.00  0.00  0.00  0.02  0.00  0.00  0.98  0.00  0.00
  L02-CB01                1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.98  0.00
  MS-CB01(1)              1.00   0.99  0.01  0.00  0.00  0.00  0.00  0.00  0.00  0.00
  MS-CB01(2)              1.00   0.99  0.01  0.00  0.00  0.00  0.00  0.00  0.00  0.00
  MS-CBMH01               1.00   0.99  0.01  0.00  0.00  0.00  0.00  0.00  0.00  0.00
  MS-L02(1)               1.00   0.99  0.01  0.00  0.00  0.00  0.00  0.00  0.00  0.00
  MS-L02(2)               1.00   0.99  0.01  0.00  0.00  0.00  0.00  0.00  0.00  0.00
  RY01-CBMH01             1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00


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

  ----------------------------------------------------------------------------
                                                           Hours        Hours
                         --------- Hours Full --------   Above Full   Capacity
  Conduit                 Both Ends  Upstream  Dnstream  Normal Flow   Limited
  ----------------------------------------------------------------------------
  CB01-CBMH01                  3.59      3.59      3.86       0.01         0.01
  L01-RY01                     3.17      3.17      3.32       0.01         0.01
  L02-CB01                     3.38      3.38      3.59       0.01         0.01
  RY01-CBMH01                  4.41      4.41    192.00       0.01         0.01


  Analysis begun on:  Wed Feb 22 20:26:08 2023
  Analysis ended on:  Wed Feb 22 20:26:10 2023
  Total elapsed time: 00:00:02
```

TEMPEST Product Submittal Package

Date: February 22, 2023

Customer: Novatech

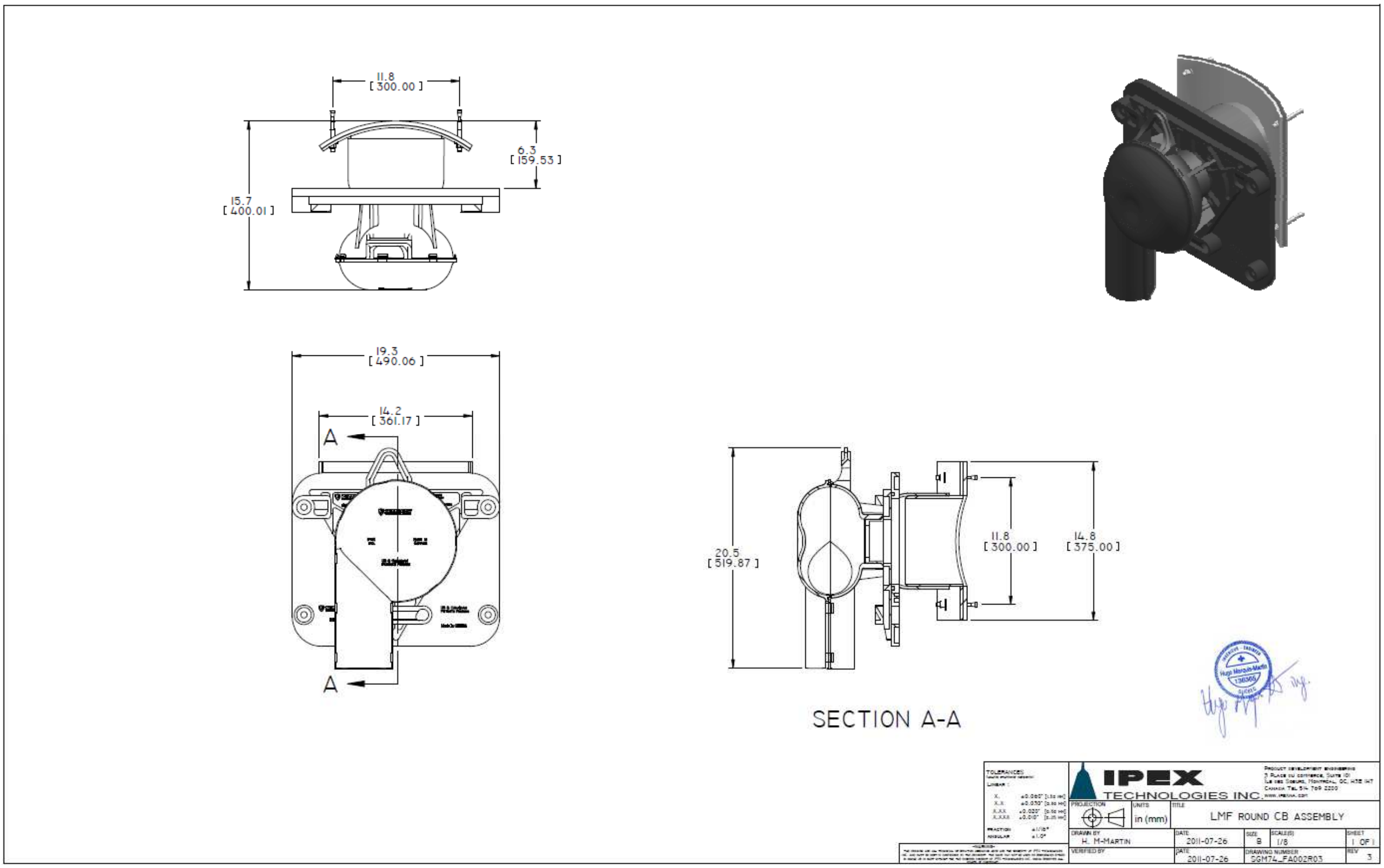
Contact: Lucas Wilson

Location: - -

Project Name: 255 & 285 Mountshannon Dr

IPEX

Tempest LMF ICD Rd Shop Drawing



Hugo Marquis-Martin 136365

TOLERANCES

LINEAR :

X. ±0.060"
X.X ±0.030"
X.XX ±0.020"
X.XXX ±0.010"
FRACTION ±1/16"
ANGULAR ±1.0°

PRODUCT DEVELOPMENT ENGINEERING
3 PLACE DU COMMERCE, SUITE 101
ILE DES SOEURS, MONTREAL, QC, H3E 1H7
CANADA TEL 514 769 2200

PROJECTION

UNITS: in (mm)

TITLE: LMF ROUND CB ASSEMBLY

DRAWN BY: H. M-MARTIN

DATE: 2011-07-26

SIZE: B

SCALE(S): 1/8

SHEET: 1 OF 1

VERIFIED BY:

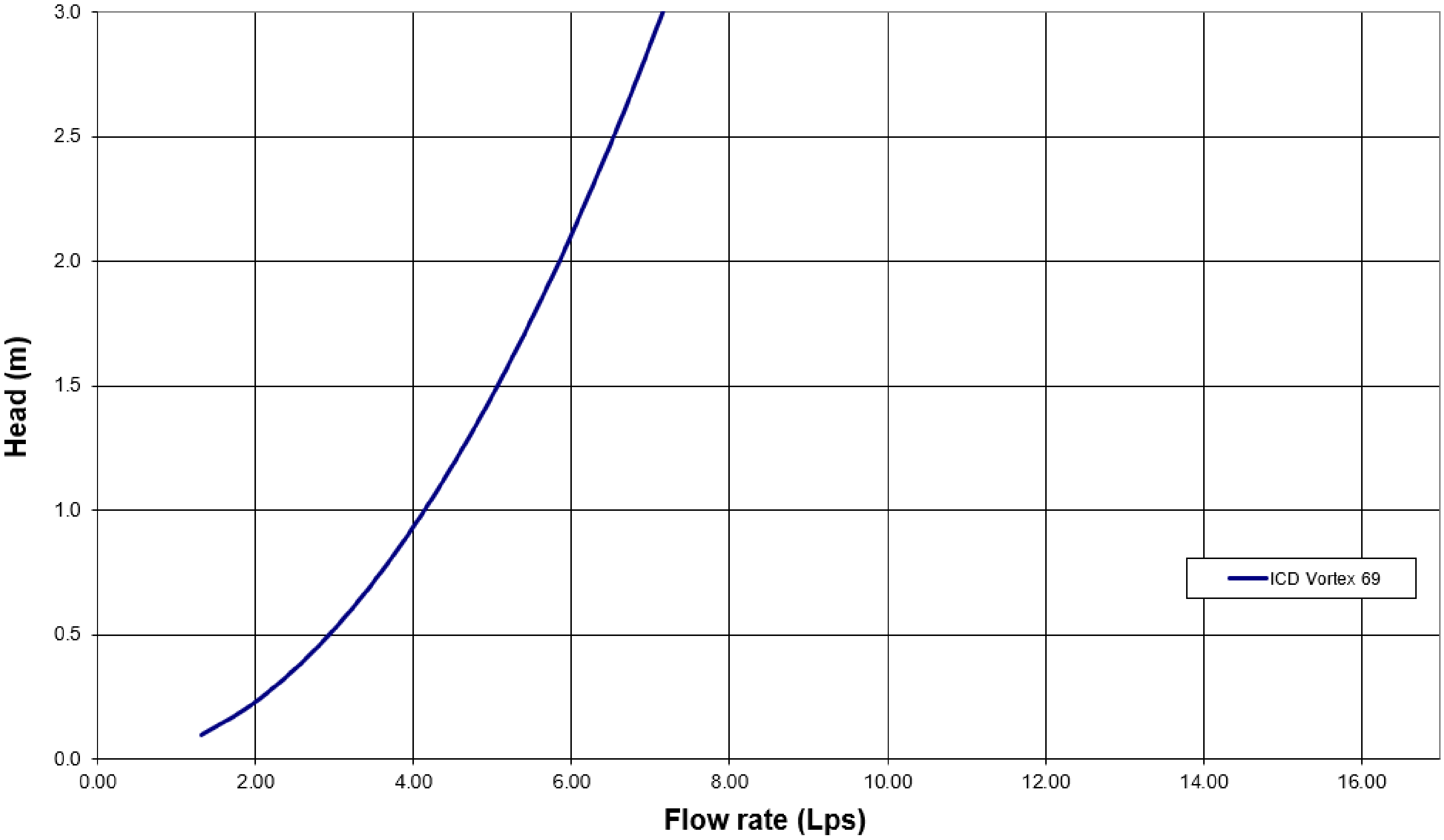
DATE: 2011-07-26

DRAWING NUMBER: SGM74_FA002R03

REV: 3

Tempest LMF ICD Flow Curve

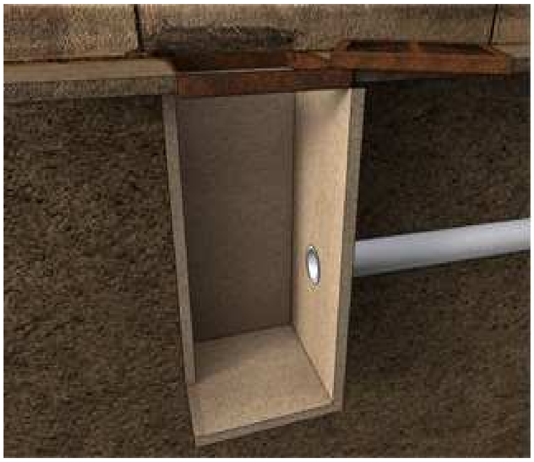
Flow: 5.9 L/s
Head: 2.08 m
CBMH1 (Block 2)

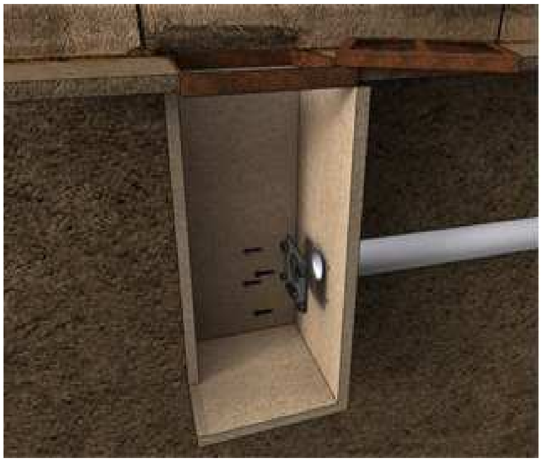


IPEX

Square CB Installation Notes:

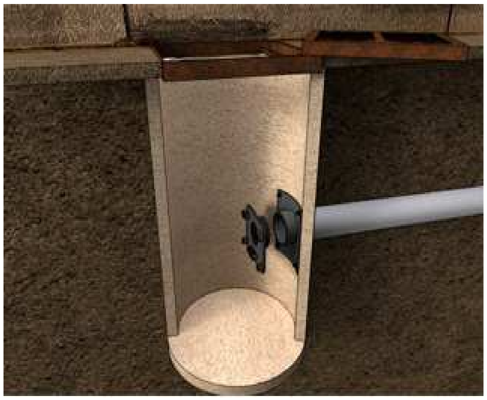
1. Materials and tooling verification:
   - Tooling: impact drill, 3/8'' concrete bit, torque wrench for 9/16''nut, hand hammer, level, and marker.
   - Material: (4) concrete anchor 3/8x3-1/2, (4) washers, (4) nuts
2. Use the mounting wall plate to locate and mark the hole (4) pattern on the catch basin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

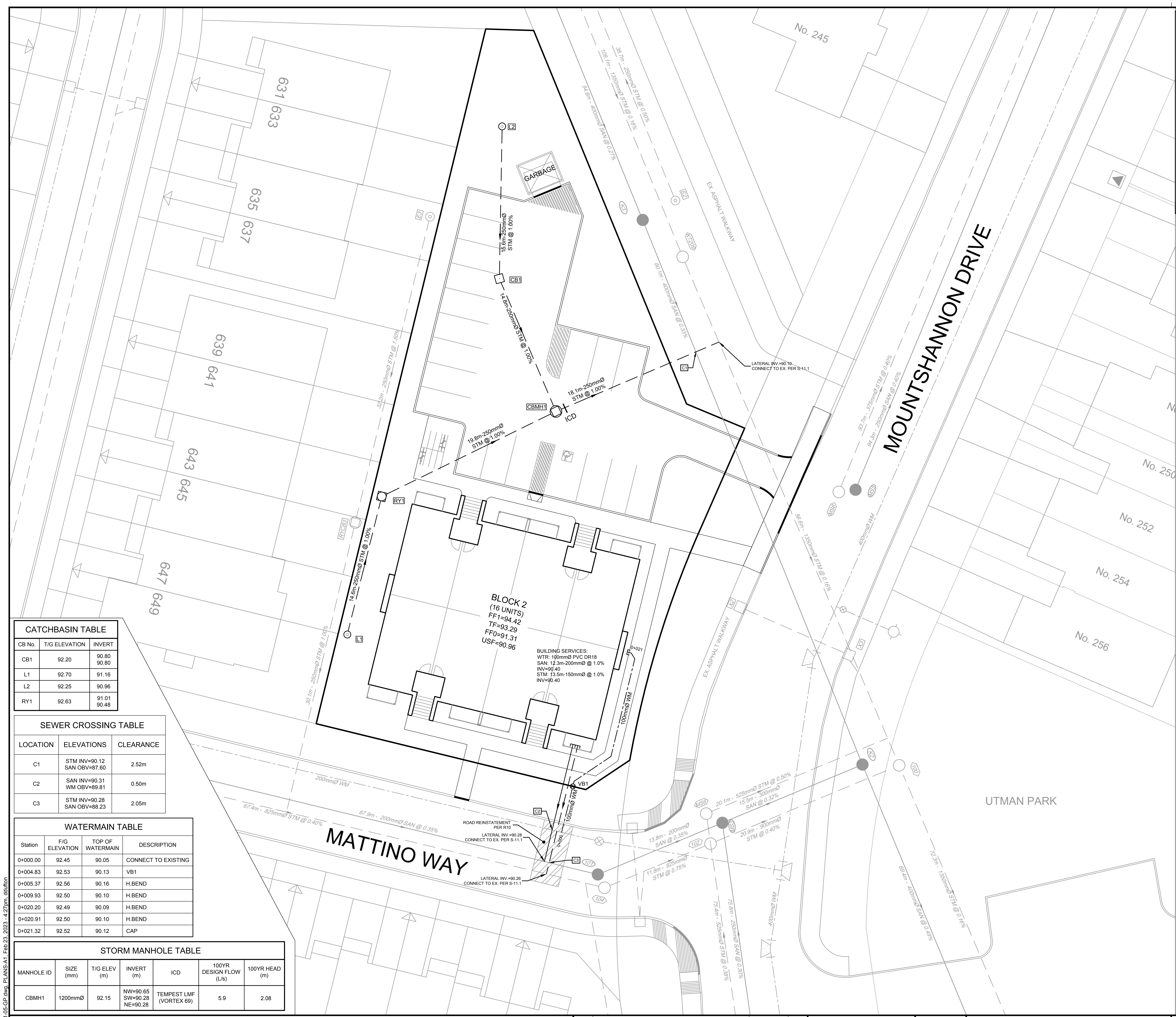
The Low Medium Flow (LMF), High Flow (HF) and the High Flow (HF) Sump shall allow for a minimum outlet pipe diameter of 200mm with a 600mm deep Catch Basin sump.

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.

APPENDIX C: Drawings

112021-05-GP
112021-05-GR
112021-05-STM
112021-05-ESC



CATCHBASIN TABLE

CB No.	T/G ELEVATION	INVERT
CB1	92.20	90.80 90.80
L1	92.70	91.16
L2	92.25	90.96
RY1	92.63	91.01 90.48

SEWER CROSSING TABLE

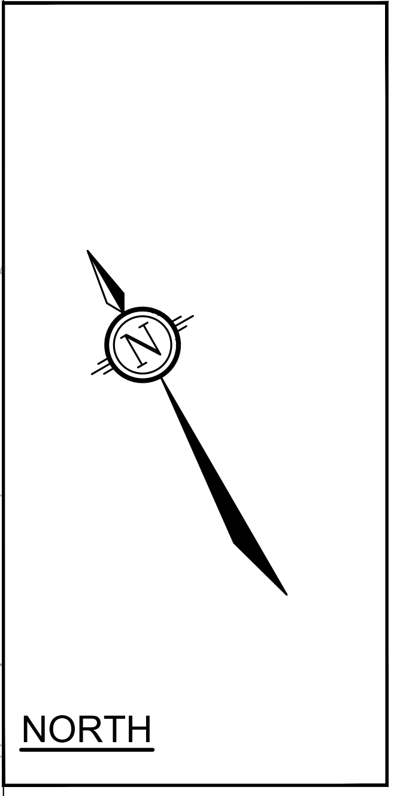
LOCATION	ELEVATIONS	CLEARANCE
C1	STM INV=90.12 SAN OBV=87.60	2.52m
C2	SAN INV=90.31 WM OBV=89.81	0.50m
C3	STM INV=90.28 SAN OBV=88.23	2.05m

WATERMAIN TABLE

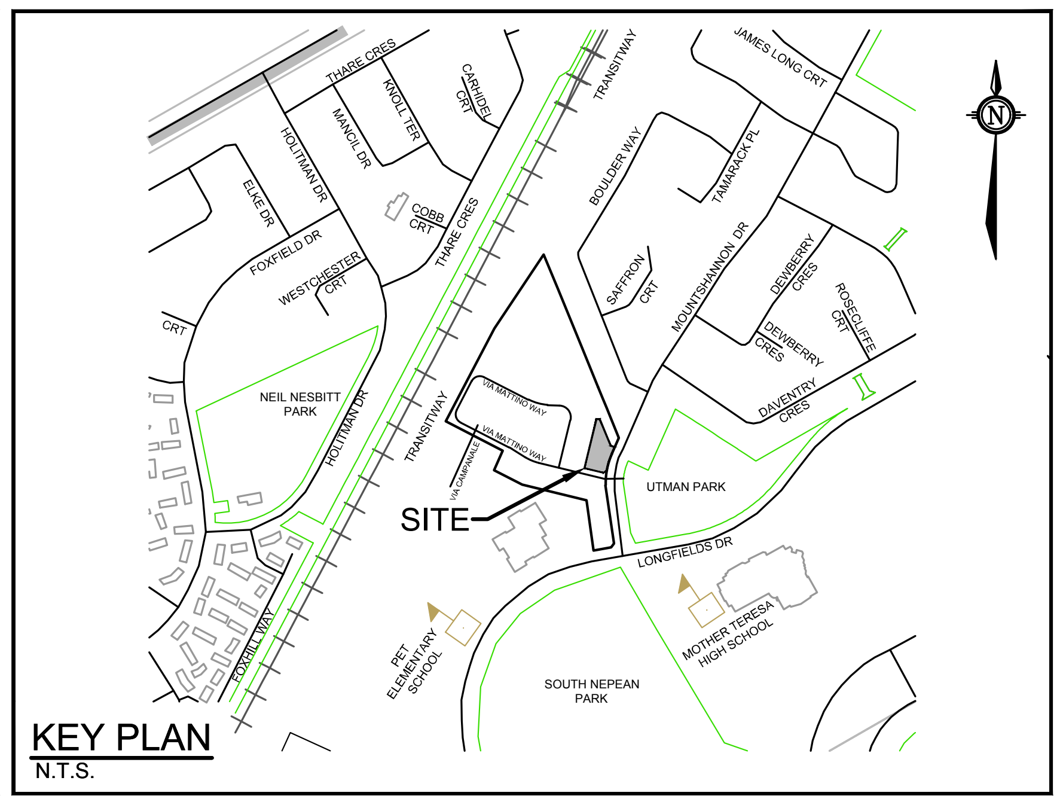
Station	F/G ELEVATION	TOP OF WATERMAIN	DESCRIPTION
0+000.00	92.45	90.05	CONNECT TO EXISTING
0+004.83	92.53	90.13	VB1
0+005.37	92.56	90.16	H.BEND
0+009.93	92.50	90.10	H.BEND
0+020.20	92.49	90.09	H.BEND
0+020.91	92.50	90.10	H.BEND
0+021.32	92.52	90.12	CAP

STORM MANHOLE TABLE

MANHOLE ID	SIZE (mm)	T/G ELEV (m)	INVERT (m)	ICD	100YR DESIGN FLOW (L/s)	100YR HEAD (m)
CBMH1	1200mmØ	92.15	NW=90.65 SW=90.28 NE=90.28	TEMPEST LMF (VORTEX 69)	5.9	2.08



NORTH



KEY PLAN
N.T.S.

LEGEND

④ ●	SANITARY MANHOLE, SEWER & DIRECTION OF FLOW
③ ○	STORM MANHOLE, SEWER & DIRECTION OF FLOW
300mmØ	WATERMAIN AND DIAMETER
⊗	VALVE & VALVE BOX
▬	SITE LEGAL BOUNDARY
—	EXISTING PROPERTY & ROW LINES
○ ⊗	EXISTING HYDRANT C/W VALVE & LEAD
	THRUST BLOCK AND BEND
L1 ◎	LANDSCAPE CATCHBASIN
RY1	REARYARD CATCHBASIN
CBMH1	CATCH BASIN MANHOLE
CB1 ☐	ROAD CATCHBASIN

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	(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. BACKWATER VALVES ARE TO BE INSTALLED ON SERVICES AS PER CITY STANDARDS (S14, S14.1, S14.2).
7. 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.
8. STORM MANHOLES AND CBMHS SHALL HAVE 300mm SUMPS UNLESS OTHERWISE INDICATED.
9. 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.
10. ALL CATCH BASIN LEADS SHALL BE 200mmØ @ 1.0% (MIN.) UNLESS SHOWN OTHERWISE.
11. ALL CATCH BASINS SHALL HAVE 600mm SUMPS UNLESS INDICATED 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 0.30m 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.

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

No.	REVISION	DATE	BY
1.	CITY SUBMISSION	FEB 24/23	MAB

SCALE
1:200

DESIGN	LRW
CHECKED	MAB
DRAWN	DTD
CHECKED	LRW
APPROVED	MAB

FOR REVIEW ONLY

L. R. WILSON
100160065

M.A. BISSETT
2023.02.24

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
255 MOUNTSHANNON DRIVE - BLOCK 2

SERVICING PLAN

PROJECT No. 112021-05
REV REV # 1
DRAWING No. 112021-05-GP

PLANA1.DWG - 841mmx594mm

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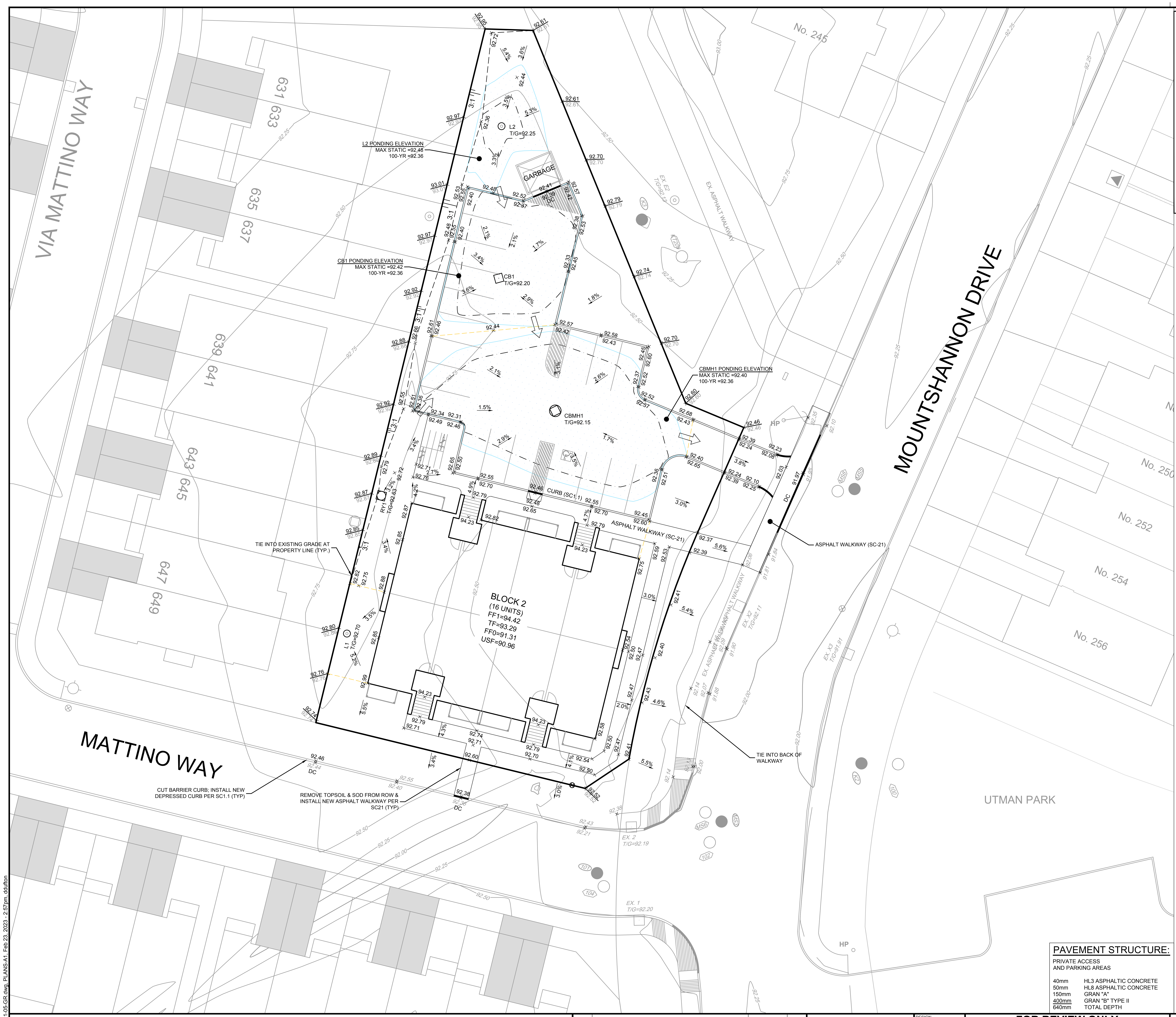
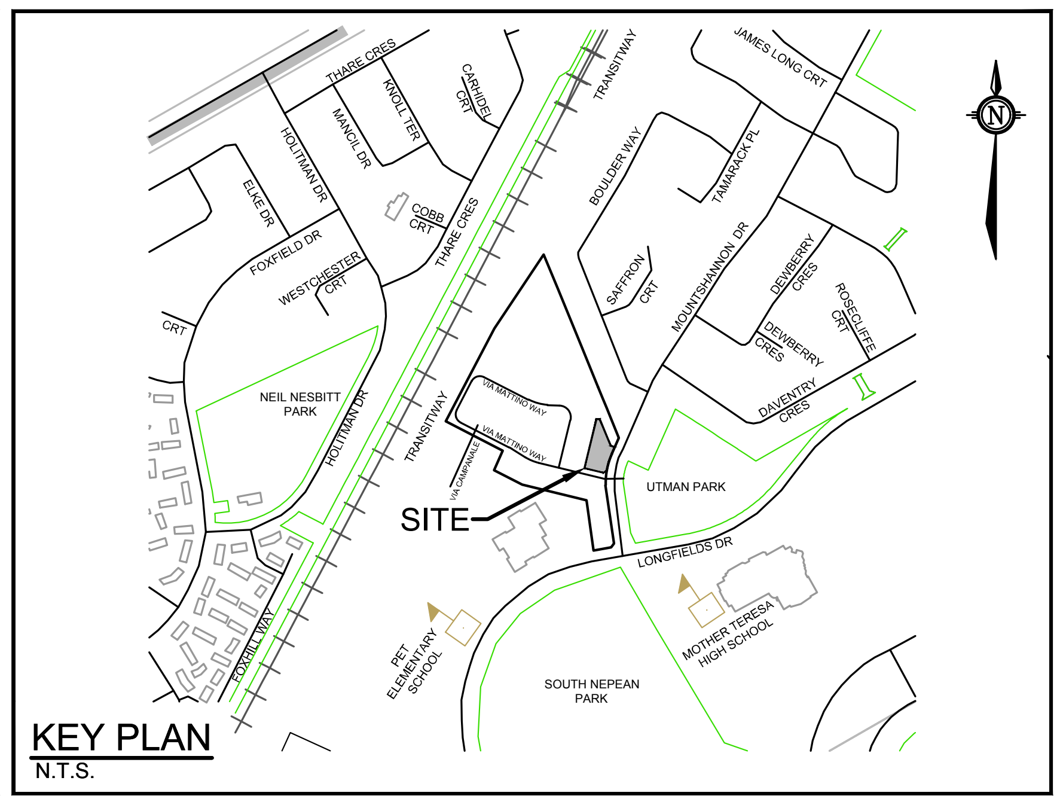


PAVEMENT STRUCTURE:

PRIVATE ACCESS
AND PARKING AREAS

40mm	HL3 ASPHALTIC CONCRETE
50mm	HL8 ASPHALTIC CONCRETE
150mm	GRAN "A"
400mm	GRAN "B" TYPE II
640mm	TOTAL DEPTH

NORTH



KEY PLAN

N.T.S.

LEGEND

2.5% →	PROPOSED GRADE AND DIRECTION OF FLOW	TF	TOP OF FOUNDATION
76.90 ×	PROPOSED ELEVATION	FF	FINISHED FLOOR ELEVATION
× 105.53 / 105.53	PROPOSED ELEVATION EXISTING ELEVATION	USF	UNDERSIDE OF FOUNDATION
× 77.50	EXISTING ELEVATION	DC	DEPRESSED CURB
3:1	TERRACING (3:1 MAX)	▭	MAX STATIC PONDING LIMITS
▨	PROPOSED RETAINING WALL	⌐ ⌐	100-YR PONDING LIMITS
⇨	MAJOR OVERLAND FLOW DIRECTION	- - -	DRAINAGE BOUNDARY
101.00	EXISTING CONTOUR AND ELEVATION		

GENERAL NOTES:

1. DIMENSIONS AND LAYOUT INFORMATION SHALL BE CONFIRMED PRIOR TO COMMENCEMENT OF CONSTRUCTION.

2. THE ORIGINAL TOPOGRAPHY AND GROUND ELEVATIONS, SERVICING AND SURVEY INFORMATION SHOWN ON THIS PLAN ARE SUPPLIED FOR INFORMATION PURPOSES ONLY. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE ACCURACY OF ALL INFORMATION OBTAINED FROM THIS PLAN.

3. CO-ORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.

4. BEFORE COMMENCING CONSTRUCTION, PROVIDE PROOF OF COMPREHENSIVE ALL RISK AND OPERATIONAL LIABILITY INSURANCE INCLUDING BLASTING. INSURANCE POLICY TO NAME THE OWNER, ENGINEER AND THE CITY AS CO-INSURED. AMOUNT OF INSURANCE TO BE SPECIFIED BY OWNER'S AGENT.

5. CONNECT TO EXISTING SYSTEMS AS DETAILED, INCLUDING ALL RESTORATION WORK NECESSARY TO REINSTATE SURFACES TO EXISTING CONDITIONS OR BETTER.

6. DETERMINE THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION. PROTECT AND ASSUME ALL RESPONSIBILITY FOR ALL EXISTING UTILITIES WHETHER OR NOT SHOWN ON THESE DRAWINGS.

7. OBTAIN AND PAY FOR ALL NECESSARY PERMITS AND APPROVALS BEFORE COMMENCING CONSTRUCTION.

8. RESTORE ALL TRENCHES AND SURFACE FEATURES TO EXISTING CONDITIONS OR BETTER AND TO THE SATISFACTION OF CITY OF OTTAWA AUTHORITIES.

- ASPHALT RESTORATION SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA DETAIL R-10.
- THICKNESS OF GRANULAR MATERIAL AND ASPHALT LAYERS TO MATCH EXISTING.
- BOULEVARDS SHALL BE REINSTATED WITH 100mm OF TOPSOIL, SEED AND MULCH.

9. REMOVE FROM SITE ALL EXCESS EXCAVATED MATERIAL UNLESS OTHERWISE INSTRUCTED BY ENGINEER.

10. ALL ELEVATIONS ARE GEODETIC AND UTILIZE METRIC UNITS.

11. ASPHALT WALKWAY TO BE CONSTRUCTED PER CITY STANDARD SC.20

12. REFER TO GEOTECHNICAL INVESTIGATION PG2306-1 (DATED JANUARY 31, 2013), PREPARED BY PATERSON GROUP FOR SUBSURFACE CONDITIONS AND CONSTRUCTION RECOMMENDATIONS.

13. PERFORATED PIPE SUB-DRAINS TO BE PROVIDED AT SUBGRADE LEVEL EXTENDING FROM THE ROADSIDE CATCHBASIN FOR A DISTANCE OF 3.0m, PARALLEL TO THE CURB IN TWO DIRECTIONS.

GRADING AND PAVEMENT NOTES:

1. ALL TOPSOIL, ORGANIC OR DELETERIOUS MATERIAL MUST BE ENTIRELY REMOVED FROM BENEATH THE PROPOSED HARD SURFACE (ie. PAVEMENT, CURB, SIDEWALK, ETC.) AREAS AS DIRECTED BY THE SITE ENGINEER OR GEOTECHNICAL ENGINEER.

2. EXPOSED SUBGRADES IN PROPOSED PAVED AREAS SHOULD BE HEAVILY PROOF ROLLED WITH A LARGE (10 TON) VIBRATORY STEEL DRUM ROLLER UNDER DRY CONDITIONS AND INSPECTED BY THE GEOTECHNICAL ENGINEER PRIOR TO THE PLACEMENT OF GRANULARS.

3. ANY SOFT AREAS EVIDENT FROM THE PROOF ROLLING SHOULD BE SUB-EXCAVATED AND REPLACED WITH SUITABLE MATERIAL THAT IS FROST COMPATIBLE WITH THE EXISTING SOILS AS RECOMMENDED BY THE GEOTECHNICAL ENGINEER.

4. THE GRANULAR BASE SHOULD BE PLACED IN MAXIMUM 300mm LIFTS AND COMPACTED TO AT LEAST 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. ROADWAY SUBGRADE TO BE INSPECTED BY THE GEOTECHNICAL ENGINEER AT THE TIME OF CONSTRUCTION TO REVIEW IF A WOVEN GEOTEXTILE IS REQUIRED BELOW THE GRANULAR MATERIALS; AND TO CONFIRM THE DEPTH AND COMPACTION OF GRANULAR 'B'

6. PRIOR TO PLACEMENT OF TOPLIFT, THE CONTRACTOR SHALL ADJUST ALL STRUCTURES TO FINAL GRADE PER CITY OF OTTAWA STANDARDS.

7. MINIMUM OF 2% GRADE FOR ALL GRASS AREAS UNLESS OTHERWISE NOTED.

8. MAXIMUM TERRACING GRADE TO BE 3:1 UNLESS OTHERWISE NOTED.

9. ALL GRADES BY CURBS ARE EDGE OF PAVEMENT GRADES UNLESS OTHERWISE INDICATED.

10. ALL CURBS SHALL BE BARRIER CURB UNLESS OTHERWISE NOTED AND CONSTRUCTED PER CITY OF OTTAWA STANDARD (SC1.1).

11. REFER TO LANDSCAPE PLAN FOR PLANTING AND OTHER LANDSCAPE FEATURE DETAILS.

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NOTE:
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No.	REVISION	DATE	BY
1.	CITY SUBMISSION	FEB 24/23	MAB

SCALE

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CHECKED	MAB
DRAWN	DTD
CHECKED	LRW
APPROVED	MAB

FOR REVIEW ONLY

L. R. WILSON
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M.A. BISSETT
2023.02.24

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Ottawa, Ontario, Canada K2M 1P6

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

CITY OF OTTAWA
255 MOUNTSHANNON DRIVE - BLOCK 2

GRADING PLAN

PROJECT No.	112021-05
REV	REV # 1
DRAWING No.	112021-05-GR

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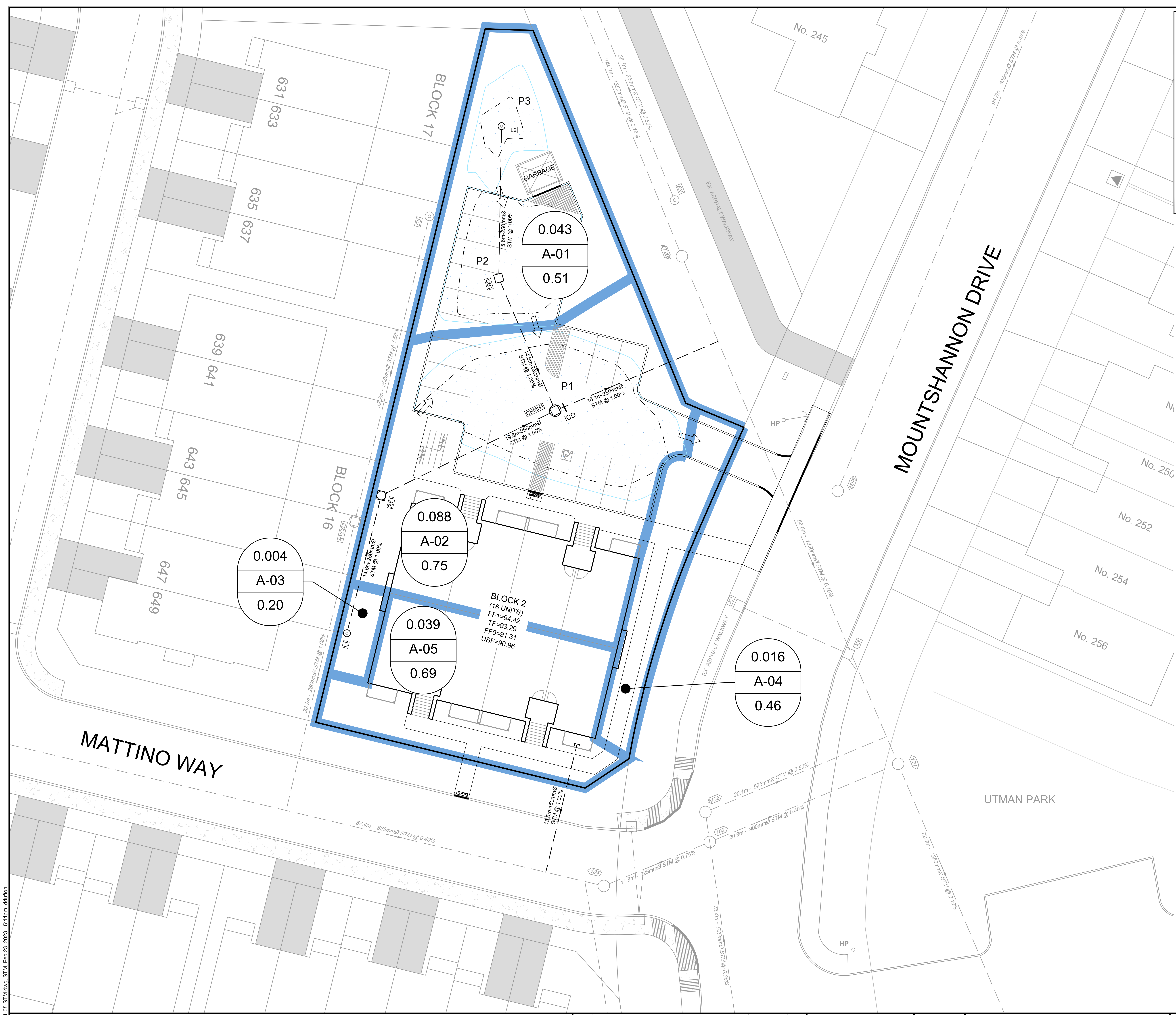

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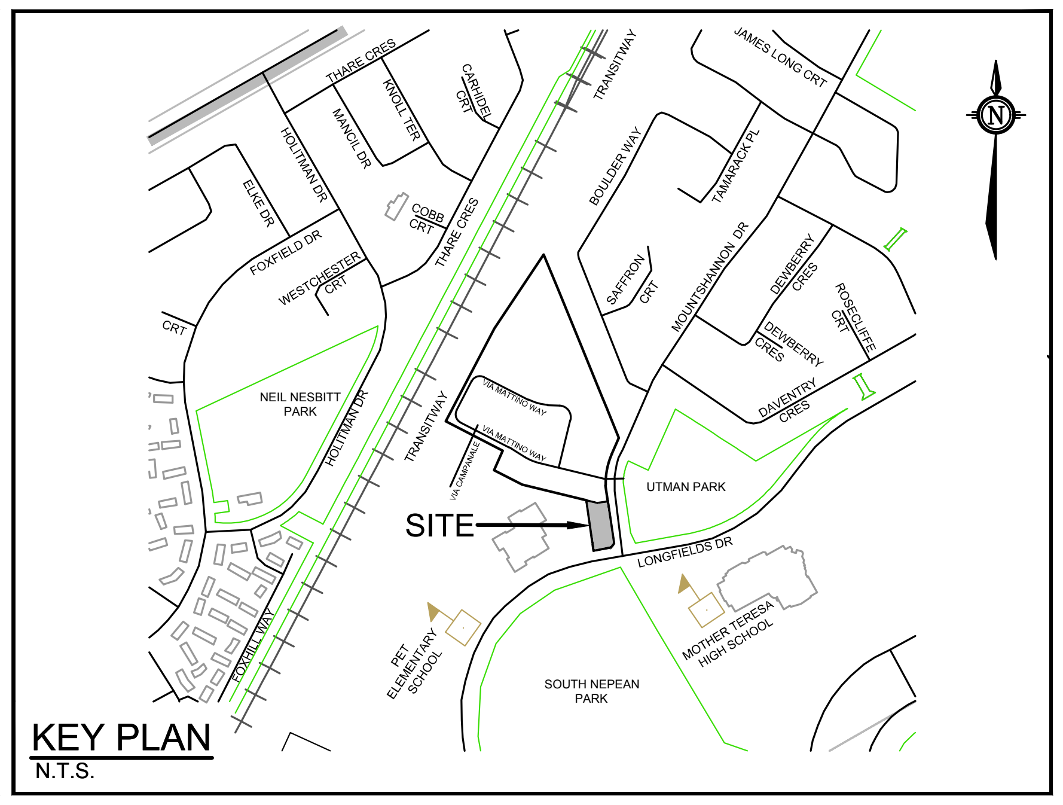

KEY PLAN
N.T.S.

LEGEND

0.24 ha	AREA (hectares)
A-01	AREA ID
0.65	RUN-OFF COEFFICIENT
▬	PROPOSED STORM DRAINAGE AREA BOUNDARY
100 ○◄—	PROPOSED STORM MANHOLE / SEWER AND FLOW DIRECTION
CB1 □	PROPOSED ROAD CATCHBASIN
RY1 □	REAR YARD CATCH BASIN
CBMH1 ●	CATCH BASIN MANHOLE
⇨	MAJOR SYSTEM FLOW ROUTE
▭	MAX STATIC PONDING LIMITS
▭	100-YR PONDING LIMITS

STORM MANHOLE TABLE

MANHOLE ID	SIZE (mm)	T/G ELEV (m)	INVERT (m)	ICD	100YR DESIGN FLOW (L/s)	100YR HEAD (m)
CBMH1	1200mmØ	92.15	NW=90.65 SW=90.28 NE=90.28	TEMPEST LMF (VORTEX 69)	5.9	2.08

PONDING

PONDING ID	STRUCTURE	100 YEAR PONDING ELEVATION	100 YEAR PONDING DEPTH (m)	100 YEAR +20% PONDING ELEVATION	100 YEAR + 20% PONDING DEPTH (m)	MAX STATIC PONDING ELEVATION	MAX STATIC PONDING DEPTH (m)
P1	CBMH1	92.36	0.21	92.40	0.25	92.40	0.25
P2	CB1	92.36	0.16	92.40	0.20	92.42	0.22
P3	L2	92.36	0.11	92.40	0.15	92.48	0.23

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DESIGN	LRW
CHECKED	MAB
DRAWN	DTD
CHECKED	LRW
APPROVED	MAB

FOR REVIEW ONLY

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

LICENSED PROFESSIONAL ENGINEER
M.A. BISSETT
2023.02.24
PROVINCE OF ONTARIO

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Website www.novatech-eng.com

CITY OF OTTAWA
255 MOUNTSHANNON DRIVE - BLOCK 2

STORM DRAINAGE AREA PLAN

PROJECT No. 112021-05
REV REV # 1
DRAWING No. 112021-05-STM

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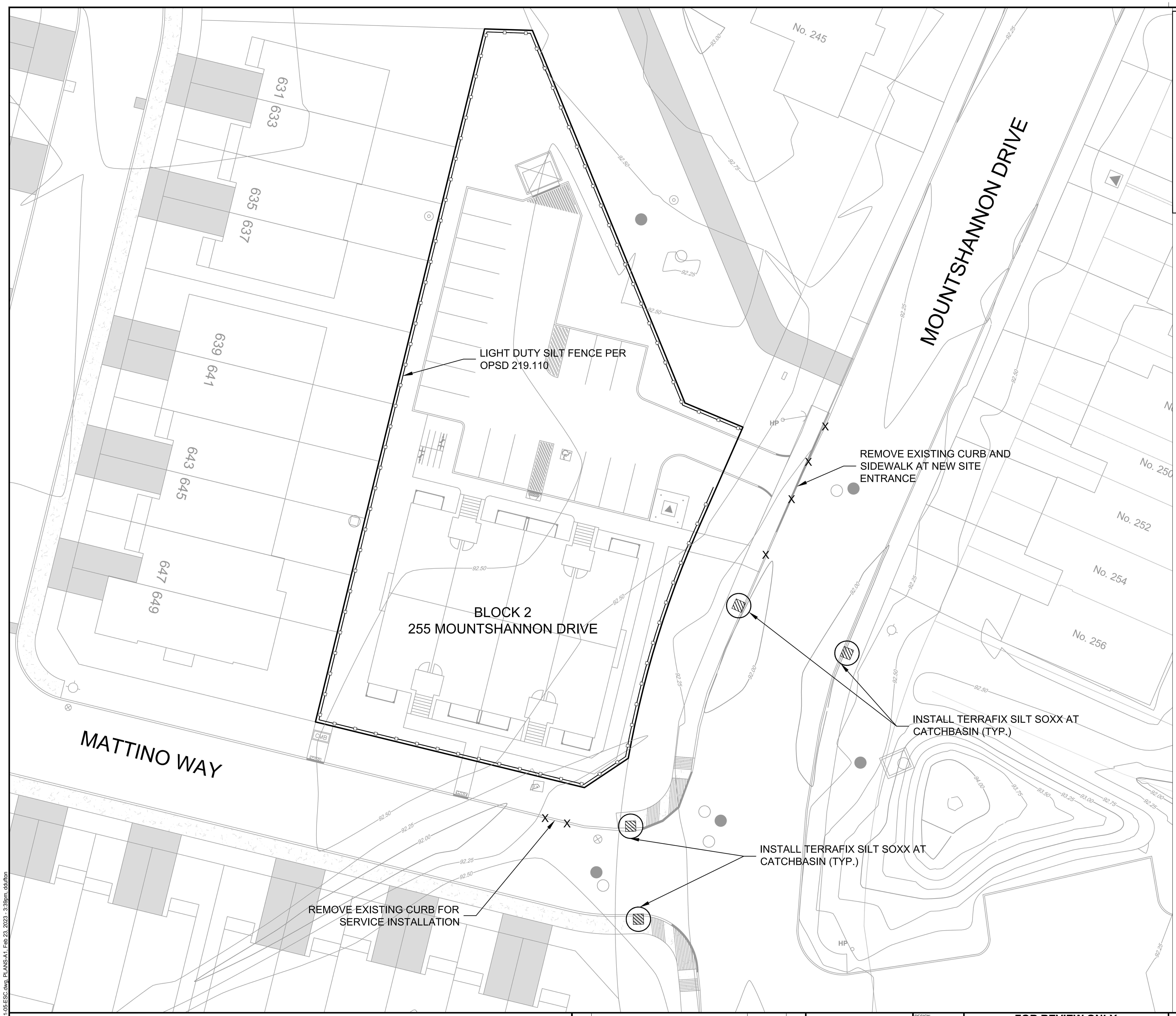

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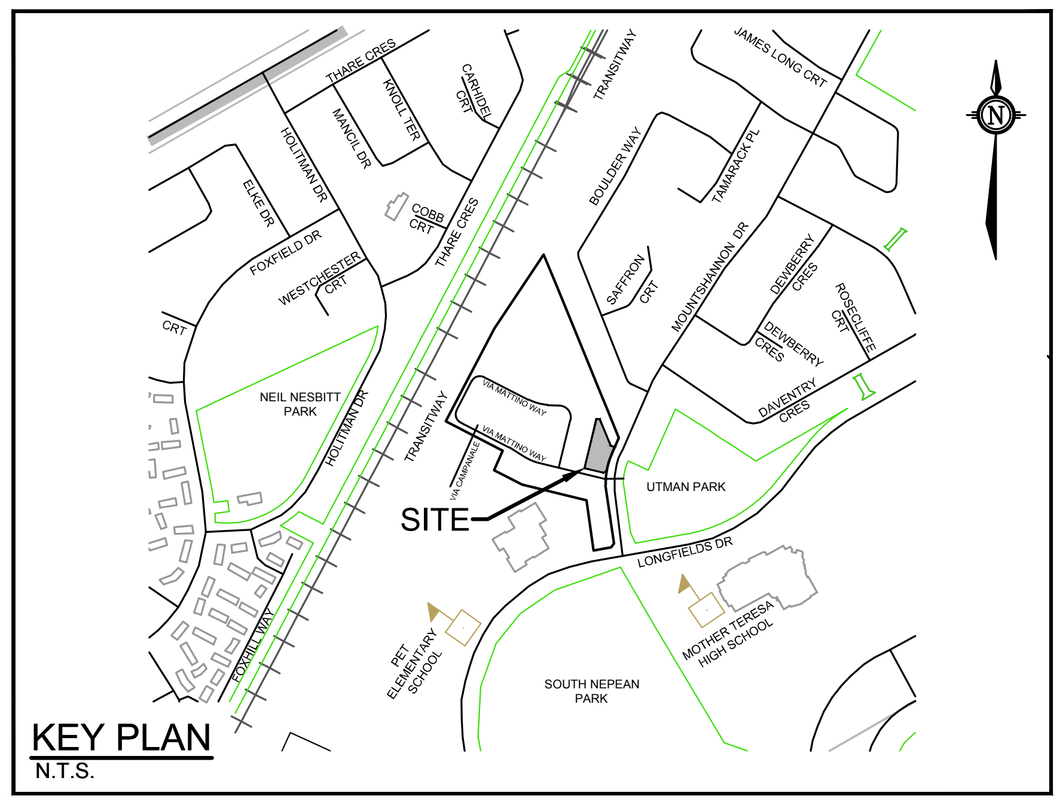

KEY PLAN
N.T.S.

LEGEND

—o—o—o—	SILT FENCE PER OPSD 219.110
101.00	EXISTING CONTOUR AND ELEVATION
X	REMOVALS

EROSION AND SEDIMENT CONTROL NOTES :

1. ALL EROSION AND SEDIMENT CONTROLS SHALL BE INSTALLED TO THE SATISFACTION OF THE ENGINEER, THE MUNICIPALITY AND THE CONSERVATION AUTHORITY. THEY SHALL 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 SHALL 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, A LIGHT DUTY SILT FENCE BARRIER WILL ALSO BE INSTALLED IN SELECTED LOCATIONS SHOWN ON THIS PLAN. TERRAFIX SILT SOXX ARE TO BE INSTALLED ON ALL PROPOSED CATCHBASINS. 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 PROVIDE DUST CONTROL WITH THE APPLICATION OF WATER AND/OR CALCIUM CHLORIDE AS REQUIRED.

7. THE CONTRACTOR SHALL PROTECT ALL SURVEY MONUMENTS.

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SCALE
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CITY OF OTTAWA
255 MOUNTSHANNON DRIVE - BLOCK 2

EROSION AND
SEDIMENT CONTROL PLAN

PROJECT No. 112021-05
REV REV # 1
DRAWING No. 112021-05-ESC

PLANA1.DWG - 841mmx594mm

APPENDIX D: Geotechnical Memorandums

Geotechnical Investigation – Longfields Central (Jan. 31/13)
Geotechnical Response to City Comments – Block 1 & 2 (Sep. 6/19)

patersongroup

Geotechnical Engineering

Environmental Engineering

Hydrogeology

Geological Engineering

Materials Testing

Building Science

Archaeological Studies

Geotechnical Investigation

Proposed Residential Development
Mountshannon Drive
Ottawa, Ontario

Prepared For

Mattino Developments

January 31, 2013

Report: PG2306-1

Paterson Group Inc.
Consulting Engineers
154 Colonnade Road South
Ottawa (Nepean), Ontario
Canada K2E 7J5

Tel: (613) 226-7381
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www.patersongroup.ca

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 3.2 Field Survey. 2
 3.3 Laboratory Testing. 3
 3.4 Analytical Testing. 3

4.0 OBSERVATIONS
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APPENDICES

Appendix 1 Soil Profile and Test Data Sheets
Symbols and Terms
Analytical Test Results

Appendix 2 Figure 1 - Key Plan
Drawing PG2306-1 - Test Hole Location Plan

1.0 INTRODUCTION

Paterson Group (Paterson) was commissioned by Mattino Developments to conduct a geotechnical investigation for the proposed residential development to be located at 591 Longfields Drive, west of Mountshannon Drive, in the City of Ottawa, Ontario (refer to Figure 1 - Key Plan in Appendix 2 of this report). The objectives of the current investigation were:

- ☐ Determine the subsoil and groundwater conditions at this site by means of test pits.
- ☐ Provide geotechnical recommendations pertaining to design of the proposed development including construction considerations which may affect the design.

The following report has been prepared specifically and solely for the aforementioned project which is described herein. It contains our findings and includes geotechnical recommendations pertaining to the design and construction of the subject development as they are understood at the time of writing this report.

Investigating the presence or potential presence of contamination on the subject property was not part of the scope of work of this present investigation.

2.0 PROPOSED DEVELOPMENT

It is understood that the proposed development will consist of several blocks of townhouse style and multi-unit residential buildings along with associated at grade parking areas and access lanes. It is further understood that this development will be municipally serviced.

3.0 METHOD OF INVESTIGATION

3.1 Field Investigation

The field program for the investigation was carried out on December 7, 2012. At that time, ten (10) test pits were advanced to a maximum depth of 6.7 m. The test pits locations were distributed in a manner to provide general coverage of the proposed development. The locations of the test pits are shown on Drawing PG2306-1 - Test Hole Location Plan included in Appendix 2.

The test pits were put down using a track mounted hydraulic shovel. All fieldwork was conducted under the full-time supervision of Paterson personnel under the direction of a senior engineer. The test pitting procedure consisted of excavating to the required depths at the selected locations, sampling and testing the overburden.

Groundwater

Water infiltration levels observed at the time of investigation were noted and are provided on the Soil Profile and Test Data sheets presented in Appendix 1.

Sampling

Soil samples were recovered from the sidewalls of the excavation, classified on site and placed in sealed plastic bags. All samples were transported to our laboratory. The depths at which the grab samples were recovered from the test pits are shown as G on the Soil Profile and Test Data sheets in Appendix 1.

Undrained shear strength testing was carried out in cohesive soils using a field vane apparatus.

All samples will be stored in the laboratory for a period of one month after issuance of this report. They will then be discarded unless we are otherwise directed.

3.2 Field Survey

The test pit locations were selected by Paterson in a manner to provide general coverage of the subject site. The test pits were located in the field and surveyed by Stantec Geomatics. The locations and ground surface elevations at the test pits are presented in Drawing PG2306-1 - Test Hole Location Plan in Appendix 2.

3.3 Laboratory Testing

The soil samples recovered from the subject site were examined in our laboratory to review the results of the field logging.

3.4 Analytical Testing

One (1) soil sample was submitted for analytical testing to assess the corrosion potential for exposed ferrous metals and the potential of sulphate attacks against subsurface concrete structures. The sample was submitted to determine the concentration of sulphate and chloride, the resistivity and the pH of the soil. The analytical test results are presented in Appendix 1 and discussed in Subsection 6.7 of this report.

4.0 OBSERVATIONS

4.1 Surface Conditions

At the time of the field program, the site was covered in snow. A large fill pile was noted at the northern portion of the site. A patch of dense trees were noted in the southern portion of the site, with a fill pile directly north of the patch of dense trees.

4.2 Subsurface Profile

The subsurface profile at the test hole locations consists of topsoil or fill overlying a very stiff to stiff silty clay crust overlying a firm grey silty clay. Compact glacial till or clayey silt were encountered below the silty clay. Practical refusal to excavation was encountered at depths of 5.6 and 5.8 m, in TP 7 and TP 9, respectively. Specific details of the soil profile at each test pit location are presented in the Soil Profile and Test Data sheets in Appendix 1.

Based on geological mapping, the bedrock underlying the subject site consists of interbedded sandstone and dolomite of the March formation, and the bedrock surface is expected to be between 5 and 10 m depth.

4.3 Groundwater

All test pits were noted to by dry upon completion. However, the groundwater level can also be estimated based on moisture levels and colour of the recovered soil samples. Based on these observations at the test pit locations, the groundwater table is expected between a 2 to 3 m depth. It should be noted that groundwater levels are subject to seasonal fluctuations. Therefore, the groundwater level could vary at the time of construction.

5.0 DISCUSSION

5.1 Geotechnical Assessment

From a geotechnical perspective, the subject site is adequate for the proposed residential development.

The above and other considerations are discussed in the following sections.

5.2 Site Grading and Preparation

Stripping Depth

Topsoil and deleterious fill, such as those containing organic materials, should be stripped from under any buildings and other settlement sensitive structures.

Fill Placement

Fill used for grading beneath the proposed buildings, unless otherwise specified, should consist of clean imported granular fill, such as Ontario Provincial Standard Specifications (OPSS) Granular A or Granular B Type II. The fill should be tested and approved prior to delivery to the site. It should be placed in lifts no greater than 300 mm thick and compacted using suitable compaction equipment for the lift thickness. Fill placed beneath the building areas should be compacted to at least 98% of its standard Proctor maximum dry density (SPMDD).

Non-specified existing fill along with site-excavated soil can be used as general landscaping fill where settlement of the ground surface is of minor concern. These materials should be spread in thin lifts and at least compacted by the tracks of the spreading equipment to minimize voids. If these materials are to be used to build up the subgrade level for areas to be paved, they should be compacted in thin lifts to a minimum density of 95% of their respective SPMDD. Non-specified existing fill and site-excavated soils are not suitable for use as backfill against foundation walls unless used in conjunction with a geocomposite drainage membrane, such as Miradrain G100N or Delta Drain 6000.

5.3 Foundation Design

Strip footings, up to 3 m wide, and pad footings, up to 4 m wide, can be designed using a bearing resistance value at serviceability limit states (SLS) of **150 kPa** and a factored bearing resistance value at ultimate limit states (ULS) of **225 kPa** placed on an undisturbed stiff silty clay. A geotechnical resistance factor of 0.5 was applied to the above noted bearing resistance value at ULS.

An undisturbed soil bearing surface consists of a surface from which all topsoil and deleterious materials, such as loose, frozen or disturbed soil, whether in situ or not, have been removed, in the dry, prior to the placement of concrete for footings.

The bearing resistance value at SLS will be subjected to potential post-construction total and differential settlements of 25 and 15 mm, respectively.

The bearing medium under footing-supported structures is required to be provided with adequate lateral support with respect to excavations and different foundation levels. Adequate lateral support is provided to the native soils above the groundwater table when a plane extending down and out from the bottom edge of the footing at a minimum of 1.5H:1V passes only through in situ soil of the same or higher capacity as the bearing medium soil.

Permissible Grade Raise Recommendations

Based on the silty clay layer depth and stiffness of the deposit, the following permissible grade raises are recommended for the subject site:

☐ A **permissible grade raise restriction of 1.2 m** is recommended for the **proposed buildings** across the subject site.

☐ A **permissible grade raise restriction of 2 m** is recommended for **parking areas and access roadways**.

Generally, the potential long term settlement is evaluated based on the compressibility characteristics of the silty clay. These characteristics have been conservatively estimated based on the shear strength of the clay and the subsoil conditions observed at the test pit locations.

5.4 Design for Earthquakes

Foundations constructed at the subject site can be designed using a seismic site response **Class D** as defined in the Ontario Building Code 2006 (OBC 2006; Table 4.1.8.4.A). The soils underlying the site are not susceptible to liquefaction.

5.5 Basement Slab

With the removal of all topsoil and deleterious fill, such as those containing organic matter, within the footprints of the proposed buildings, the native soil surface will be considered to be an acceptable subgrade surface on which to commence backfilling for floor slab construction. Any soft areas should be removed and backfilled with appropriate backfill material. OPSS Granular B Type II is recommended for backfilling below the floor slab. It is recommended that the upper 200 mm of sub-slab fill consist of 19 mm clear crushed stone. All backfill materials within the footprint of the proposed buildings should be placed in maximum 300 mm thick loose layers and compacted to at least 98% of its SPMDD.

5.6 Pavement Design

Residential driveways and local roadways are anticipated for the proposed development. The proposed pavement structures are shown in Tables 1 and 2 below.

Table 1 - Recommended Pavement Structure - Residential Driveways

Thickness mm	Material Description
50	**Wear Course -** HL-3 or Superpave 12.5 Asphaltic Concrete
150	**BASE** - OPSS Granular A Crushed Stone
300	**SUBBASE** - OPSS Granular B Type II
	SUBGRADE - Either fill, in situ soil or OPSS Granular B Type I or II material placed over in situ soil or fill

Table 2 - Recommended Pavement Structure - Local Roadways

Thickness mm	Material Description
40	**Wear Course -** HL-3 or Superpave 12.5 Asphaltic Concrete
50	**Binder Course -** HL-8 or Superpave 19.0 Asphaltic Concrete
150	**BASE** - OPSS Granular A Crushed Stone
400	**SUBBASE** - OPSS Granular B Type II
	SUBGRADE - Either fill, in situ soil or OPSS Granular B Type I or II material placed over in situ soil or fill

Minimum Performance Graded (PG) 58-34 asphalt cement should be used for this project.

If soft spots develop in the subgrade during compaction or due to construction traffic, the affected areas should be excavated and replaced with OPSS Granular B Type II material.

The pavement granular base and subbase should be placed in maximum 300 mm thick lifts and compacted to a minimum of 98% of the material's SPMDD using suitable vibratory equipment.

Pavement Structure Drainage

Satisfactory performance of the pavement structure is largely dependent on keeping the contact zone between the subgrade material and the base stone in a dry condition. Failure to provide adequate drainage under conditions of heavy wheel loading can result in the fine subgrade soil being pumped into the voids in the stone subbase, thereby reducing the load bearing capacity.

Due to the impervious nature of the subgrade materials consideration should be given to installing subdrains during the pavement construction as per City of Ottawa standards. The subdrain inverts should be approximately 300 mm below subgrade level. The subgrade surface should be shaped to promote water flow to the drainage lines.

6.0 DESIGN AND CONSTRUCTION PRECAUTIONS

6.1 Foundation Drainage and Backfill

It is recommended that a perimeter foundation drainage system be provided for the proposed structures. The system should consist of a 100 to 150 mm diameter perforated corrugated plastic pipe, surrounded on all sides by 150 mm of 10 mm clear crushed stone, placed at the footing level around the exterior perimeter of the structure. The pipe should have a positive outlet, such as a gravity connection to the storm sewer.

Backfill against the exterior sides of the foundation walls should consist of free-draining non frost susceptible granular materials. The greater part of the site excavated materials will be frost susceptible and, as such, are not recommended for re-use as backfill against the foundation walls, unless used in conjunction with a drainage geocomposite, such as Miradrain G100N or Delta Drain 6000, connected to the perimeter foundation drainage system. Imported granular materials, such as clean sand or OPSS Granular B Type I granular material, should otherwise be used for this purpose.

6.2 Protection of Footings Against Frost Action

Perimeter footings of heated structures are required to be insulated against the deleterious effect of frost action. A minimum of 1.5 m thick soil cover (or equivalent) should be provided in this regard.

A minimum of 2.1 m thick soil cover (or equivalent) should be provided for exterior unheated footings, not thermally connected to a heated space, such as exterior columns and/or wing walls.

6.3 Excavation Side Slopes

The side slopes of excavations in the soil and fill overburden materials should either be cut back at acceptable slopes or should be retained by shoring systems from the start of the excavation until the structure is backfilled. It is assumed that sufficient room will be available for the greater part of the excavation to be undertaken by open-cut methods (i.e. unsupported excavations).

The excavation side slopes above the groundwater level extending to a maximum depth of 3 m should be cut back at 1H:1V or flatter. The flatter slope is required for excavation below groundwater level. The subsoil at this site is considered to be mainly a Type 2 and 3 soil according to the Occupational Health and Safety Act and Regulations for Construction Projects.

Excavated soil should not be stockpiled directly at the top of excavations and heavy equipment should be kept away from the excavation sides.

Slopes in excess of 3 m in height should be periodically inspected by the geotechnical consultant in order to detect if the slopes are exhibiting signs of distress.

It is recommended that a trench box be used at all times to protect personnel working in trenches with steep or vertical sides. It is expected that services will be installed by “cut and cover” methods and excavations will not be left open for extended periods of time.

6.4 Pipe Bedding and Backfill

At least 150 mm of OPSS Granular A should be used for pipe bedding for sewer and water pipes. The bedding should extend to the spring line of the pipe. Cover material, from the spring line to at least 300 mm above the obvert of the pipe should consist of OPSS Granular A. The bedding and cover materials should be placed in maximum 300 mm thick lifts compacted to a minimum of 95% of the material’s SPMDD.

Generally, it should be possible to re-use the silty clay above the cover material if the excavation and filling operations are carried out in dry weather conditions.

Where hard surface areas are considered above the trench backfill, the trench backfill material within the frost zone (about 1.8 m below finished grade) should match the soils exposed at the trench walls to minimize differential frost heaving. The trench backfill should be placed in maximum 300 mm thick loose lifts and compacted to a minimum of 95% of the material’s SPMDD.

6.5 Groundwater Control

The contractor should be prepared to direct water away from all bearing surfaces and subgrades, regardless of the source, to prevent disturbance to the founding medium.

It is anticipated that pumping from open sumps will be sufficient to control the groundwater influx through the sides of the excavations.

A temporary MOE permit to take water (PTTW) will be required for this project if more than 50,000 L/day are to be pumped during the construction phase. At least 4 months should be allowed for completion of the application and issuance of the permit by the MOE.

6.6 Winter Construction

Precautions must be taken if winter construction is considered for this project. The subsoil conditions at this site consist of frost susceptible materials. In the presence of water and freezing conditions, ice could form within the soil mass. Heaving and settlement upon thawing could occur.

In the event of construction during below zero temperatures, the founding stratum should be protected from freezing temperatures by the use of straw, propane heaters and tarpaulins or other suitable means. In this regard, the base of the excavations should be insulated from sub-zero temperatures immediately upon exposure and until such time as heat is adequately supplied to the building and the footings are protected with sufficient soil cover to prevent freezing at founding level.

Trench excavations and pavement construction are also difficult activities to complete during freezing conditions without introducing frost in the subgrade or in the excavation walls and bottoms. Precautions should be taken if such activities are to be carried out during freezing conditions.

6.7 Corrosion Potential and Sulphate

The results of analytical testing show that the sulphate content is less than 0.1%. This result is indicative that Type 10 Portland cement (normal cement) would be appropriate for this site. The chloride content and the pH of the sample indicate that they are not significant factors in creating a corrosive environment for exposed ferrous metals at this site, whereas the resistivity is indicative of a non-aggressive to slightly aggressive corrosive environment.

6.8 Landscaping Considerations

Tree Planting Restrictions

The proposed residential dwellings are located in a low sensitivity area with respect to tree plantings over a silty clay deposit. It is recommended that trees placed within 4 m of the foundation wall shall consist of low water demanding trees with shallow roots systems that extend less than 1.5 m below ground surface. Trees placed greater than 4 m from the foundation wall may consist of typical street trees, which are typically moderate water demand species with roots extending to a maximum depth of 2 m below ground surface.

It is well documented in the literature, and is our experience, that fast-growing trees located near buildings founded on cohesive soils that shrink on drying can result in long-term differential settlements of the structures. Tree varieties that have the most pronounced effect on foundations are seen to consist of poplars, willows and some maples (i.e. Manitoba Maples) and, as such, they should not be considered in the landscaping design.

Swimming Pools

The in-situ soils are considered to be acceptable for in-ground swimming pools. Above ground swimming pools must be placed at least 3 m away from the residence foundation and neighbouring foundations. Otherwise, pool construction is considered routine, and can be constructed in accordance with the manufacturer`s requirements.

7.0 RECOMMENDATIONS

It is a requirement for the foundation design data provided herein to be applicable that a materials testing and observation services program including the following aspects be performed by the geotechnical consultant.

- Review of the grading plan.
- Observation of all bearing surfaces prior to the placement of concrete.
- Sampling and testing of the concrete and fill materials used.
- Periodic observation of the condition of unsupported excavation side slopes in excess of 3 m in height, if applicable.
- Observation of all subgrades prior to backfilling.
- Field density tests to determine the level of compaction achieved.
- Sampling and testing of the bituminous concrete including mix design reviews.

A report confirming that these works have been conducted in general accordance with our recommendations could be issued, upon request, following the completion of a satisfactory materials testing and observation program by the geotechnical consultant.

8.0 STATEMENT OF LIMITATIONS

The recommendations made in this report are in accordance with our present understanding of the project. The client should be aware that any information pertaining to soils and all test hole logs are furnished as a matter of general information only and test hole descriptions or logs are not to be interpreted as descriptive of conditions at locations other than those of the test holes.

The present report applies only to the project described in this document. Use of this report for purposes other than those described herein or by person(s) other than Mattino Developments or their agent(s) is not authorized without review by this firm for the applicability of our recommendations to the altered use of the report.

Paterson Group Inc.

Stephanie Boisvenue, B.Eng.

David J. Gilbert, P.Eng.

LICENSED PROFESSIONAL ENGINEER
D. J. GILBERT
100116130
PROVINCE OF ONTARIO

Report Distribution:

- ☐ Mattino Developments (3 copies)
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APPENDIX 1

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

ANALYTICAL TEST RESULTS

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Residential Development - Mountshannon Drive
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Limited.

REMARKS

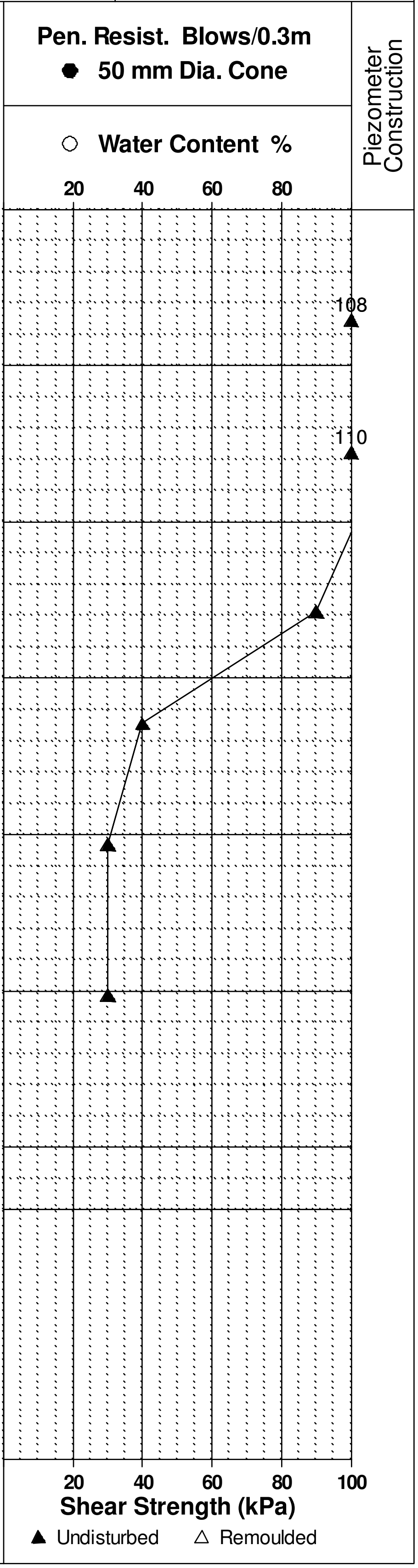
BORINGS BY Hydraulic Shovel

DATE December 7, 2012

FILE NO. PG2306

HOLE NO. TP 1

SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE					0	92.23
TOPSOIL 0.36	G	1				
	G	2				
					1	91.23
	G	3				
Very stiff to stiff, brown **SILTY CLAY**					2	90.23
	G	4				
					3	89.23
- firm and grey by 3.2m depth	G	5				
	G	6			4	88.23
	G	7			5	87.23
5.79						
GLACIAL TILL: Grey silty clay with sand, gravel, cobbles, boulders	G	8			6	86.23
6.40						
End of Test Pit (TP dry upon completion)						



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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Residential Development - Mountshannon Drive
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Limited.

REMARKS

BORINGS BY Hydraulic Shovel

DATE December 7, 2012

FILE NO. PG2306

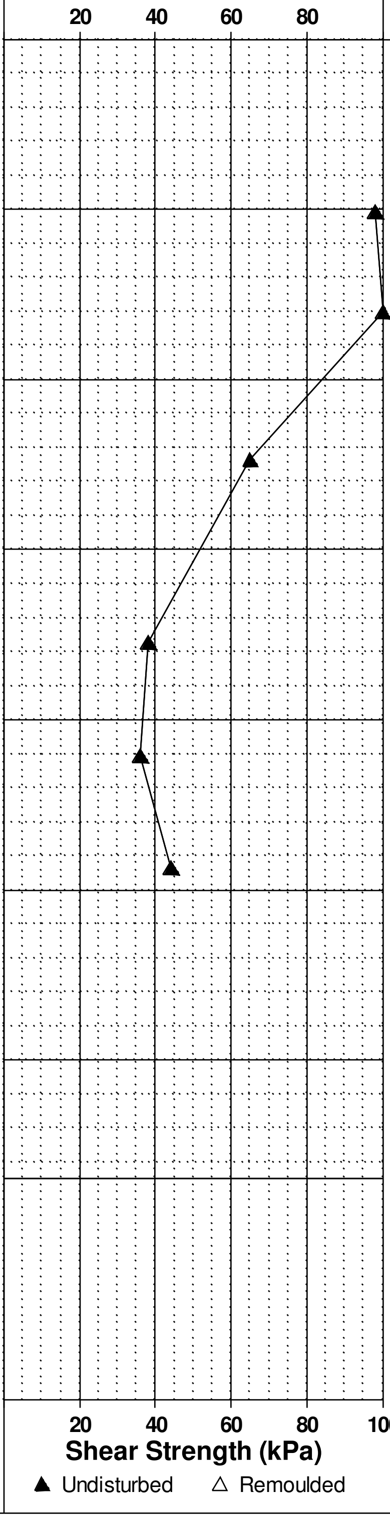
HOLE NO. TP 2

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	92.04
TOPSOIL 0.38							
Very stiff to stiff, brown **SILTY CLAY**		G	1			1	91.04
		G	2			2	90.04
		G	3			3	89.04
- firm and grey by 3.4m depth		G	4			4	88.04
		G	5				
		G	6			5	87.04
6.00						6	86.04
Grey **CLAYEY SILT** with sand 6.70		G	7				
End of Test Pit (TP dry upon completion)							

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone

○ Water Content %

Piezometer Construction



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Residential Development - Mountshannon Drive
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Limited.

REMARKS

BORINGS BY Hydraulic Shovel

DATE December 7, 2012

FILE NO. PG2306

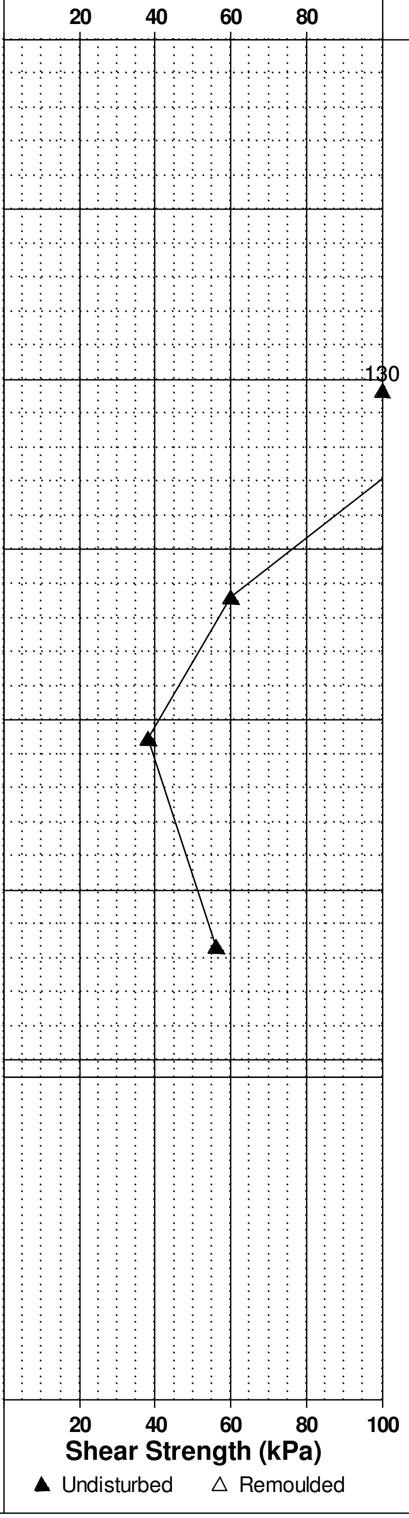
HOLE NO. TP 3

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	% RECOVERY	N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	92.30
TOPSOIL 0.20							
FILL: Brown silty clay with gravel, cobbles, boulders 1.14		G	1			1	91.30
Very stiff to stiff, brown **SILTY CLAY**		G	2			2	90.30
		G	3			3	89.30
- firm and grey by 3.8m depth		G	4			4	88.30
5.80		G	5			5	87.30
Grey **CLAYEY SILT** 6.10						6	86.30
End of Test Pit (TP dry upon completion)							

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone

○ Water Content %

Piezometer Construction



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Residential Development - Mountshannon Drive
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Limited.

FILE NO. **PG2306**

REMARKS

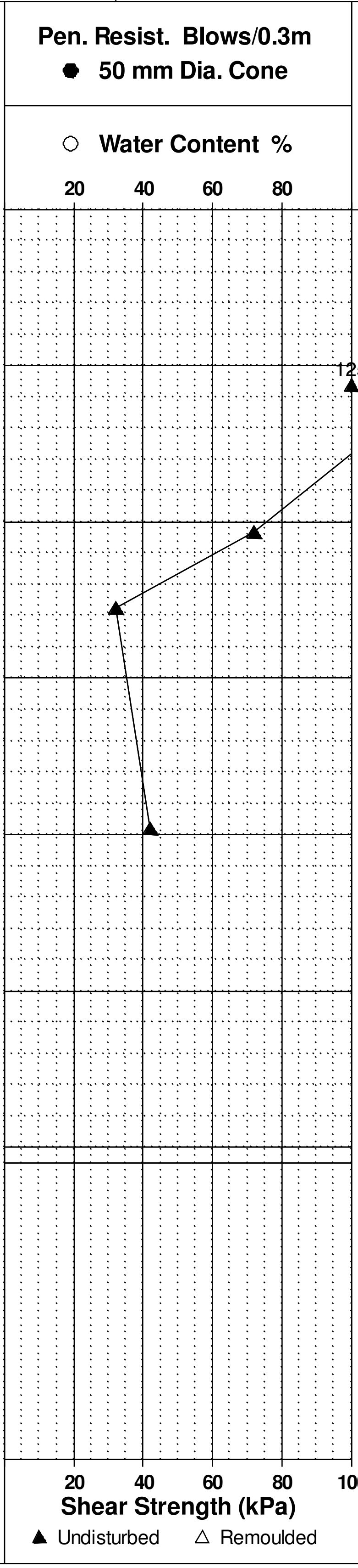
HOLE NO. **TP 4**

BORINGS BY Hydraulic Shovel

DATE December 7, 2012

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	92.15
TOPSOIL 0.15							
Very stiff to stiff, brown **SILTY CLAY**		G	1				
- rootlets noted to 1.2m depth						1	91.15
		G	2			2	90.15
- firm and grey by 2.7m depth		G	3				
						3	89.15
		G	4			4	88.15
5.20						5	87.15
Grey **CLAYEY SILT**		G	5				
6.10						6	86.15
End of Test Pit (TP dry upon completion)							

Piezometer Construction



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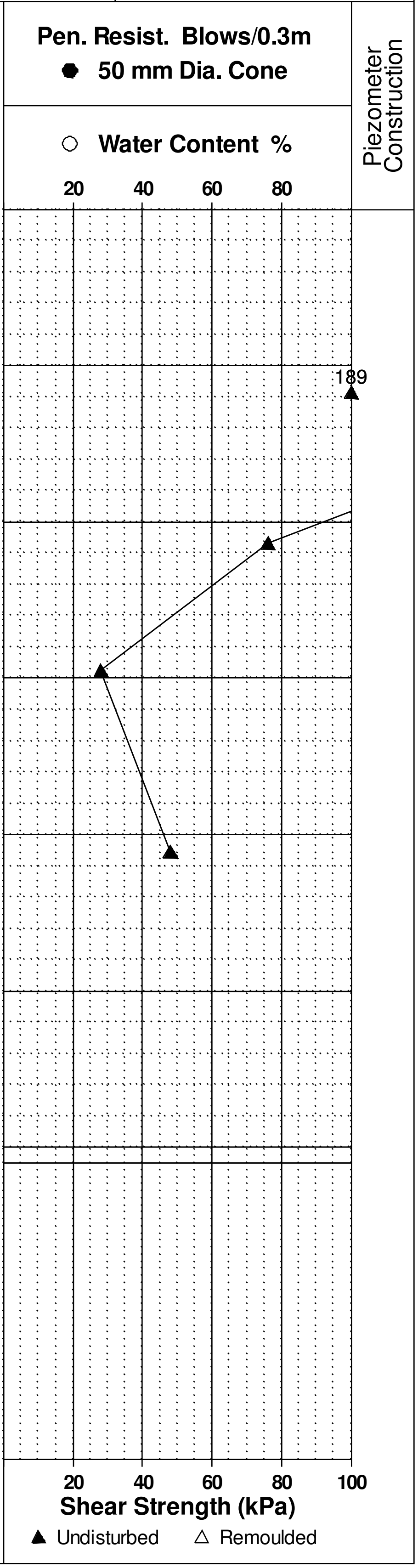
154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Residential Development - Mountshannon Drive
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Limited.
REMARKS
BORINGS BY Hydraulic Shovel
DATE December 7, 2012
FILE NO. PG2306
HOLE NO. TP 5

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	91.89
TOPSOIL 0.25	■						
Very stiff to stiff, brown **SILTY CLAY** - roots noted to 1.3m depth - firm and grey by 2.8m depth 4.30	▨	G G G	1 2 3			1 2 3 4	90.89 89.89 88.89 87.89
Grey **CLAYEY SILT** with sand 6.10	▨	G G	4 5			5 6	86.89 85.89
End of Test Pit (TP dry upon completion)							



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Residential Development - Mountshannon Drive
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Limited.

FILE NO. PG2306

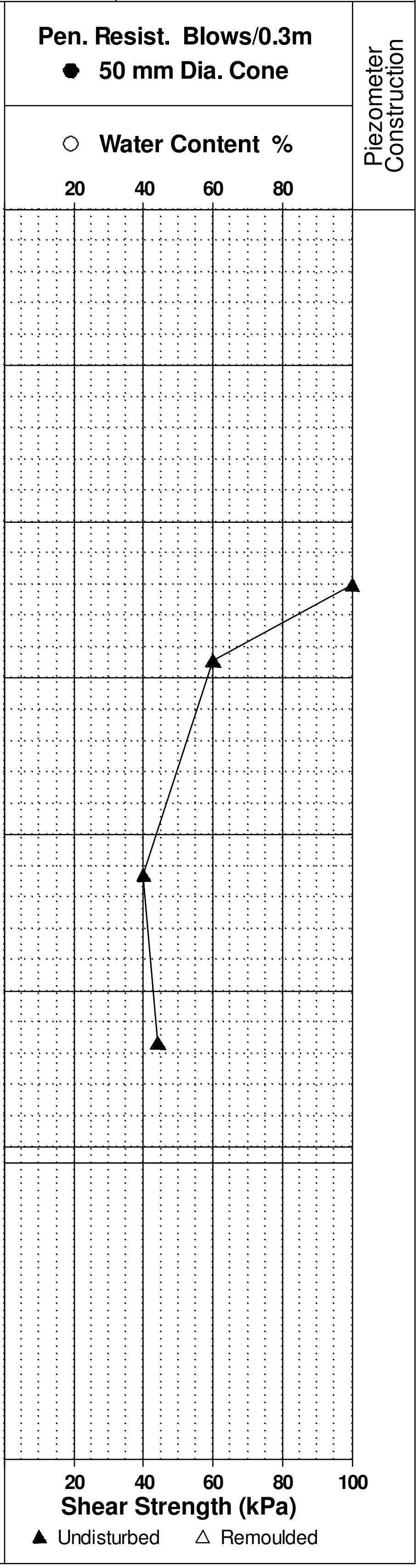
REMARKS

HOLE NO. TP 6

BORINGS BY Hydraulic Shovel

DATE December 7, 2012

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	93.31
TOPSOIL 0.20							
FILL: Brown silty clay, trace sand, gravel, cobbles, brick 1.52		G	1			1	92.31
		G	2			2	91.31
Very stiff to stiff, brown **SILTY CLAY** - firm and grey by 3.8m depth		G	3			3	90.31
		G	4			4	89.31
		G	5			5	88.31
6.10						6	87.31
End of Test Pit (TP dry upon completion)							



SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Residential Development - Mountshannon Drive
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Limited.

REMARKS

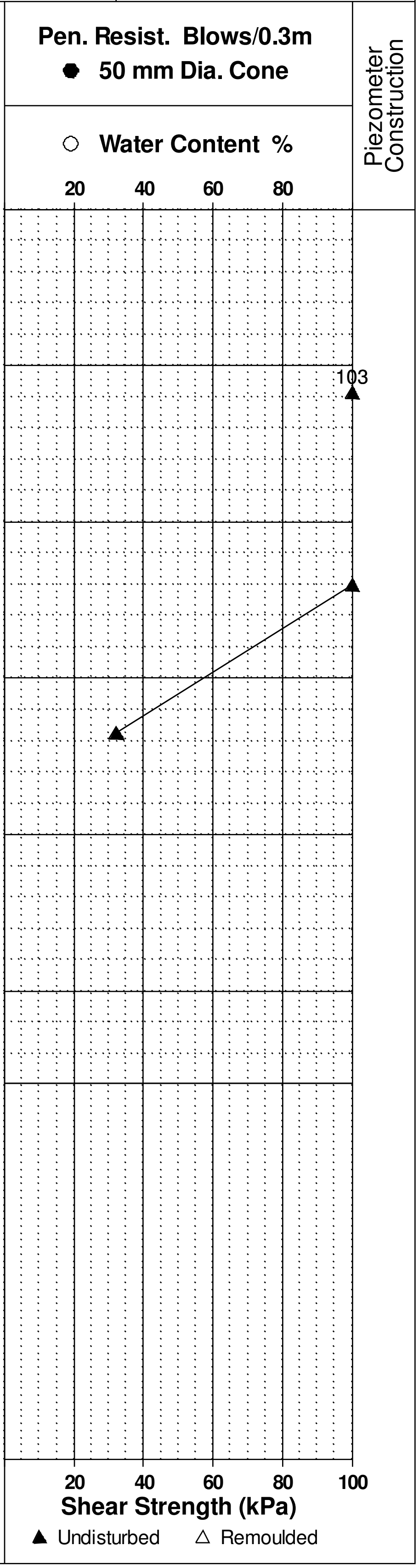
BORINGS BY Hydraulic Shovel

DATE December 7, 2012

FILE NO. PG2306

HOLE NO. TP 7

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	92.14
TOPSOIL 0.36							
Very stiff to stiff, brown **SILTY CLAY**		G	1			1	91.14
- rootlets noted to 1.2m depth		G	2			2	90.14
						3	89.14
- firm and grey by 3.2m depth		G	3				
		G	4			4	88.14
4.30							
GLACIAL TILL: Grey silty clay with sand, gravel, cobbles, boulders		G	5			5	87.14
5.59							
End of Test Pit Practical refusal to excavation at 5.59m depth. (TP dry upon completion)							



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Residential Development - Mountshannon Drive
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Limited.

REMARKS

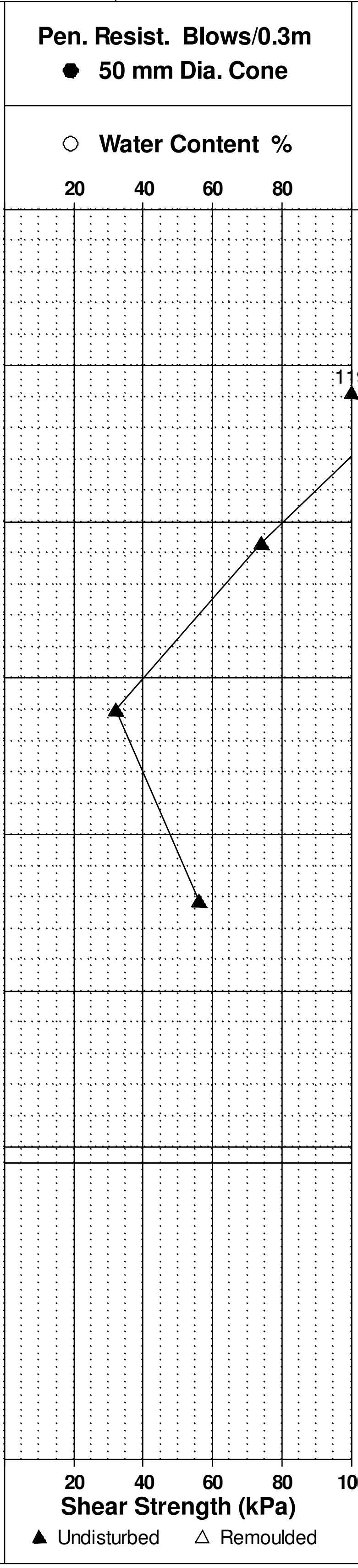
BORINGS BY Hydraulic Shovel

DATE December 7, 2012

FILE NO. PG2306

HOLE NO. TP 8

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Piezometer Construction
GROUND SURFACE						0	92.20	
TOPSOIL 0.18								
		G	1					
						1	91.20	
Very stiff to stiff, brown **SILTY CLAY**		G	2			2	90.20	
- firm and grey by 2.9m depth								
						3	89.20	
						4	88.20	
4.90								
Grey **CLAYEY SILT**		G	3			5	87.20	
						6	86.20	
6.10								
End of Test Pit (TP dry upon completion)								



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Residential Development - Mountshannon Drive
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Limited.

REMARKS

BORINGS BY Hydraulic Shovel

DATE December 7, 2012

FILE NO. PG2306

HOLE NO. TP 9

SOIL DESCRIPTION

GROUND SURFACE

TOPSOIL 0.23

Very stiff to stiff, brown **SILTY CLAY**

- rootlets noted to 1.2m depth

- firm and grey by 3.2m depth

5.00

GLACIAL TILL: Grey silty clay with sand, gravel, cobbles, boulders

5.79

End of Test Pit

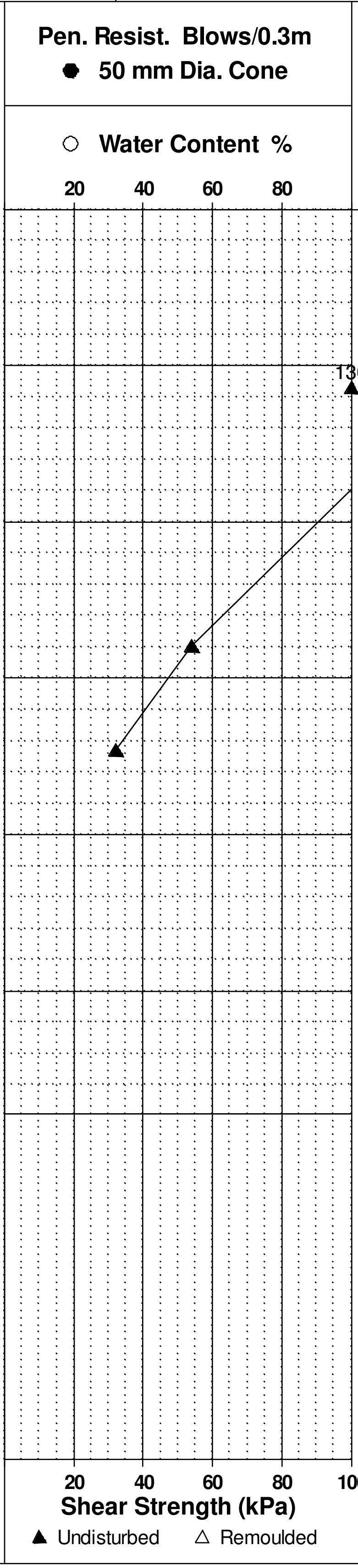
Practical refusal to excavation at 5.79m depth

(TP dry upon completion)

SAMPLE

TYPE	NUMBER	% RECOVERY	N VALUE or RQD
G	1		
G	2		
G	3		
G	4		
G	5		
G	6		

DEPTH (m)	ELEV. (m)
0	92.15
1	91.15
2	90.15
3	89.15
4	88.15
5	87.15



Piezometer Construction

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Residential Development - Mountshannon Drive
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Limited.

REMARKS

BORINGS BY Hydraulic Shovel

DATE December 7, 2012

FILE NO. PG2306

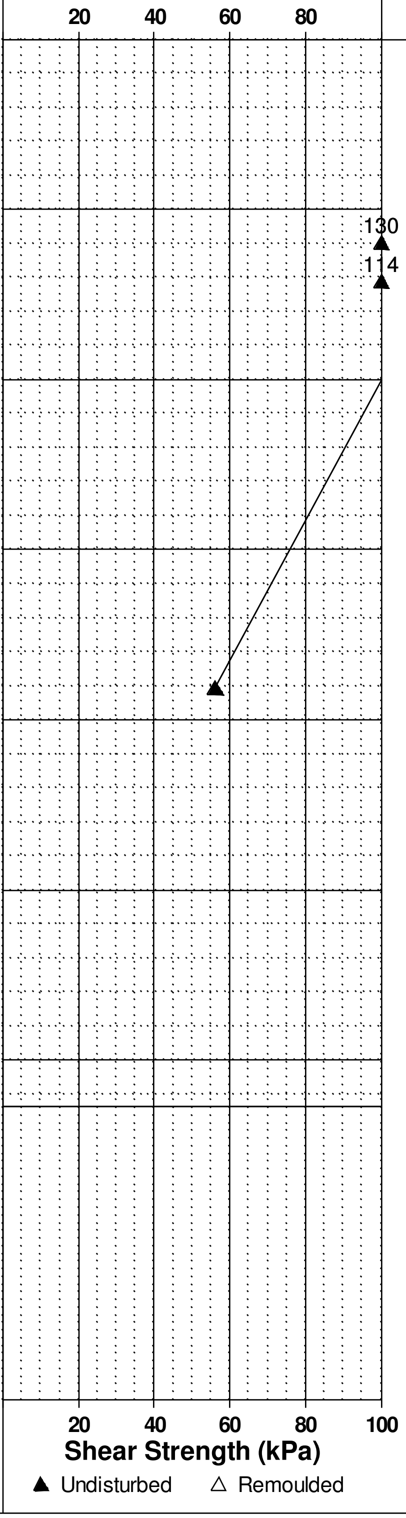
HOLE NO. TP10

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	92.45
TOPSOIL 0.20							
FILL: Brown silty clay 0.70		G	1				
		G	2			1	91.45
Very stiff to stiff, brown **SILTY CLAY**		G	3			2	90.45
						3	89.45
						4	88.45
- firm and grey by 4.3m depth		G	4			5	87.45
5.50		G	5				
GLACIAL TILL: Grey silty clay with sand, gravel, cobbles, boulders 6.27						6	86.45
End of Test Pit (TP dry upon completion)							

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone

○ Water Content %

Piezometer Construction



Shear Strength (kPa)

▲ Undisturbed △ Remoulded

SYMBOLS AND TERMS

SOIL DESCRIPTION

Behavioural properties, such as structure and strength, take precedence over particle gradation in describing soils. Terminology describing soil structure are as follows:

Desiccated	-	having visible signs of weathering by oxidation of clay minerals, shrinkage cracks, etc.
Fissured	-	having cracks, and hence a blocky structure.
Varved	-	composed of regular alternating layers of silt and clay.
Stratified	-	composed of alternating layers of different soil types, e.g. silt and sand or silt and clay.
Well-Graded	-	Having wide range in grain sizes and substantial amounts of all intermediate particle sizes (see Grain Size Distribution).
Uniformly-Graded	-	Predominantly of one grain size (see Grain Size Distribution).

The standard terminology to describe the strength of cohesionless soils is the relative density, usually inferred from the results of the Standard Penetration Test (SPT) ‘N’ value. The SPT N value is the number of blows of a 63.5 kg hammer, falling 760 mm, required to drive a 51 mm O.D. split spoon sampler 300 mm into the soil after an initial penetration of 150 mm.

Relative Density	‘N’ Value	Relative Density %
Very Loose	<4	<15
Loose	4-10	15-35
Compact	10-30	35-65
Dense	30-50	65-85
Very Dense	>50	>85

The standard terminology to describe the strength of cohesive soils is the consistency, which is based on the undisturbed undrained shear strength as measured by the in situ or laboratory vane tests, penetrometer tests, unconfined compression tests, or occasionally by Standard Penetration Tests.

Consistency	Undrained Shear Strength (kPa)	‘N’ Value
Very Soft	<12	<2
Soft	12-25	2-4
Firm	25-50	4-8
Stiff	50-100	8-15
Very Stiff	100-200	15-30
Hard	>200	>30

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

Cohesive soils can also be classified according to their “sensitivity”. The sensitivity is the ratio between the undisturbed undrained shear strength and the remoulded undrained shear strength of the soil.

Terminology used for describing soil strata based upon texture, or the proportion of individual particle sizes present is provided on the Textural Soil Classification Chart at the end of this information package.

ROCK DESCRIPTION

The structural description of the bedrock mass is based on the Rock Quality Designation (RQD).

The RQD classification is based on a modified core recovery percentage in which all pieces of sound core over 100 mm long are counted as recovery. The smaller pieces are considered to be a result of closely-spaced discontinuities (resulting from shearing, jointing, faulting, or weathering) in the rock mass and are not counted. RQD is ideally determined from NXL size core. However, it can be used on smaller core sizes, such as BX, if the bulk of the fractures caused by drilling stresses (called “mechanical breaks”) are easily distinguishable from the normal in situ fractures.

RQD %	**ROCK QUALITY**
90-100	Excellent, intact, very sound
75-90	Good, massive, moderately jointed or sound
50-75	Fair, blocky and seamy, fractured
25-50	Poor, shattered and very seamy or blocky, severely fractured
0-25	Very poor, crushed, very severely fractured

SAMPLE TYPES

SS	-	Split spoon sample (obtained in conjunction with the performing of the Standard Penetration Test (SPT))
TW	-	Thin wall tube or Shelby tube
PS	-	Piston sample
AU	-	Auger sample or bulk sample
WS	-	Wash sample
RC	-	Rock core sample (Core bit size AXT, BXL, etc.). Rock core samples are obtained with the use of standard diamond drilling bits.

SYMBOLS AND TERMS (continued)

GRAIN SIZE DISTRIBUTION

MC% - Natural moisture content or water content of sample, %
LL - Liquid Limit, % (water content above which soil behaves as a liquid)
PL - Plastic limit, % (water content above which soil behaves plastically)
PI - Plasticity index, % (difference between LL and PL)

Dxx - Grain size which xx% of the soil, by weight, is of finer grain sizes
These grain size descriptions are not used below 0.075 mm grain size
D10 - Grain size at which 10% of the soil is finer (effective grain size)
D60 - Grain size at which 60% of the soil is finer

Cc - Concavity coefficient = $(D30)^2$ / (D10 x D60)
Cu - Uniformity coefficient = D60 / D10

Cc and Cu are used to assess the grading of sands and gravels:
Well-graded gravels have: $1 < Cc < 3$ and $Cu > 4$
Well-graded sands have: $1 < Cc < 3$ and $Cu > 6$
Sands and gravels not meeting the above requirements are poorly-graded or uniformly-graded.
Cc and Cu are not applicable for the description of soils with more than 10% silt and clay
(more than 10% finer than 0.075 mm or the #200 sieve)

CONSOLIDATION TEST

p'_o - Present effective overburden pressure at sample depth
p'_c - Preconsolidation pressure of (maximum past pressure on) sample
Ccr - Recompression index (in effect at pressures below p'_c)
Cc - Compression index (in effect at pressures above p'_c)

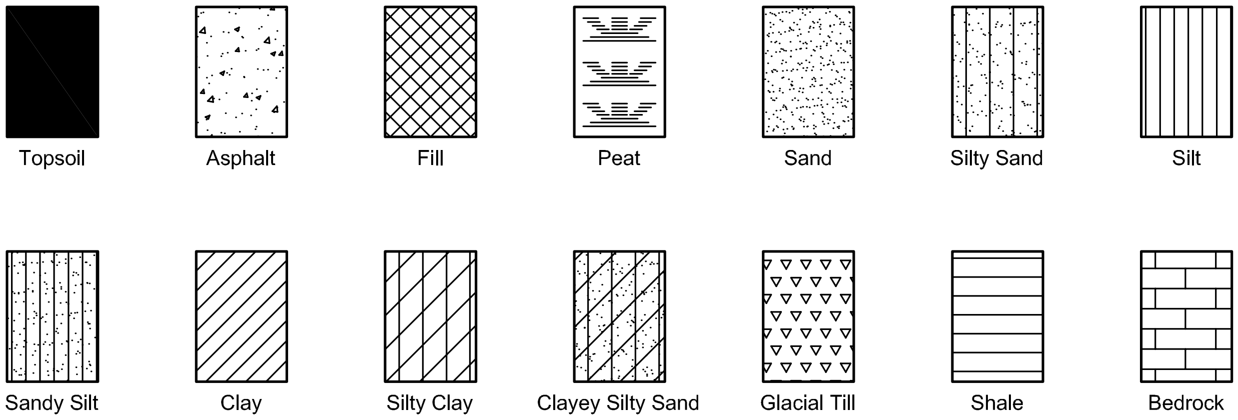
OC Ratio Overconsolidaton ratio = p'_c / p'_o
Void Ratio Initial sample void ratio = volume of voids / volume of solids
Wo - Initial water content (at start of consolidation test)

PERMEABILITY TEST

k - Coefficient of permeability or hydraulic conductivity is a measure of the ability of water to flow through the sample. The value of k is measured at a specified unit weight for (remoulded) cohesionless soil samples, because its value will vary with the unit weight or density of the sample during the test.

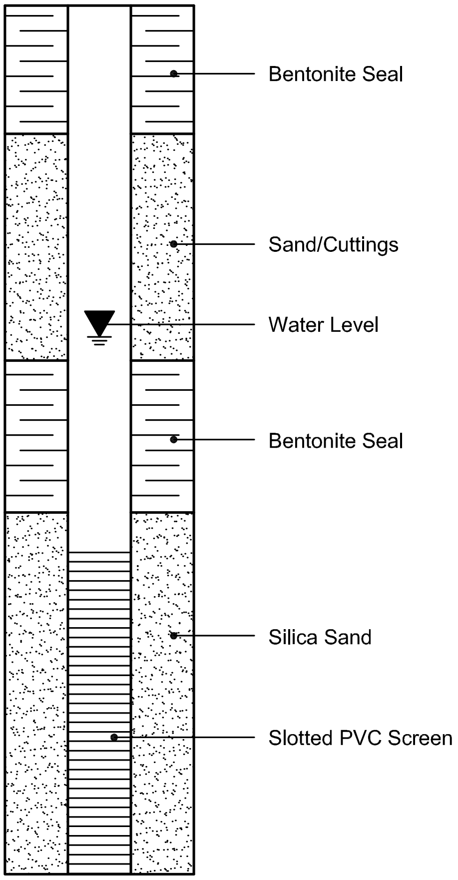
SYMBOLS AND TERMS (continued)

STRATA PLOT

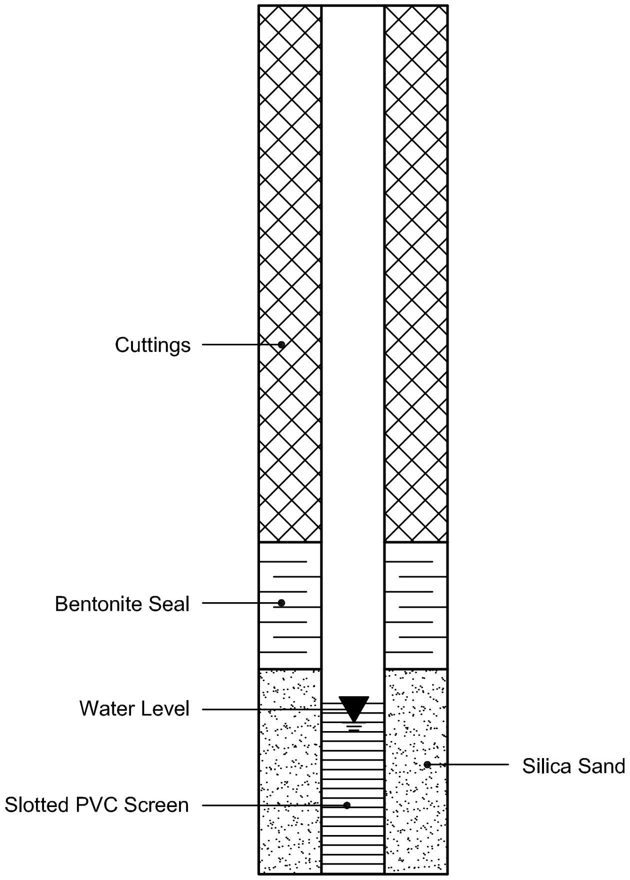


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



Certificate of Analysis

Report Date: 24-Jan-2013
Order Date:21-Jan-2013

Client: **Paterson Group Consulting Engineers**

Client PO: 13707

Project Description: PG2306

	Client ID:	BH1-G4	-	-	-
	Sample Date:	07-Dec-12	-	-	-
	Sample ID:	1304050-01	-	-	-
	MDL/Units	Soil	-	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	63.2	-	-	-
General Inorganics					
pH	0.05 pH Units	7.14 [1]	-	-	-
Resistivity	0.10 Ohm.m	40.7	-	-	-
Anions					
Chloride	5 ug/g dry	<5 [1]	-	-	-
Sulphate	5 ug/g dry	53 [1]	-	-	-

APPENDIX 2

FIGURE 1 - KEY PLAN

DRAWING PG2306-1 - TEST HOLE LOCATION PLAN

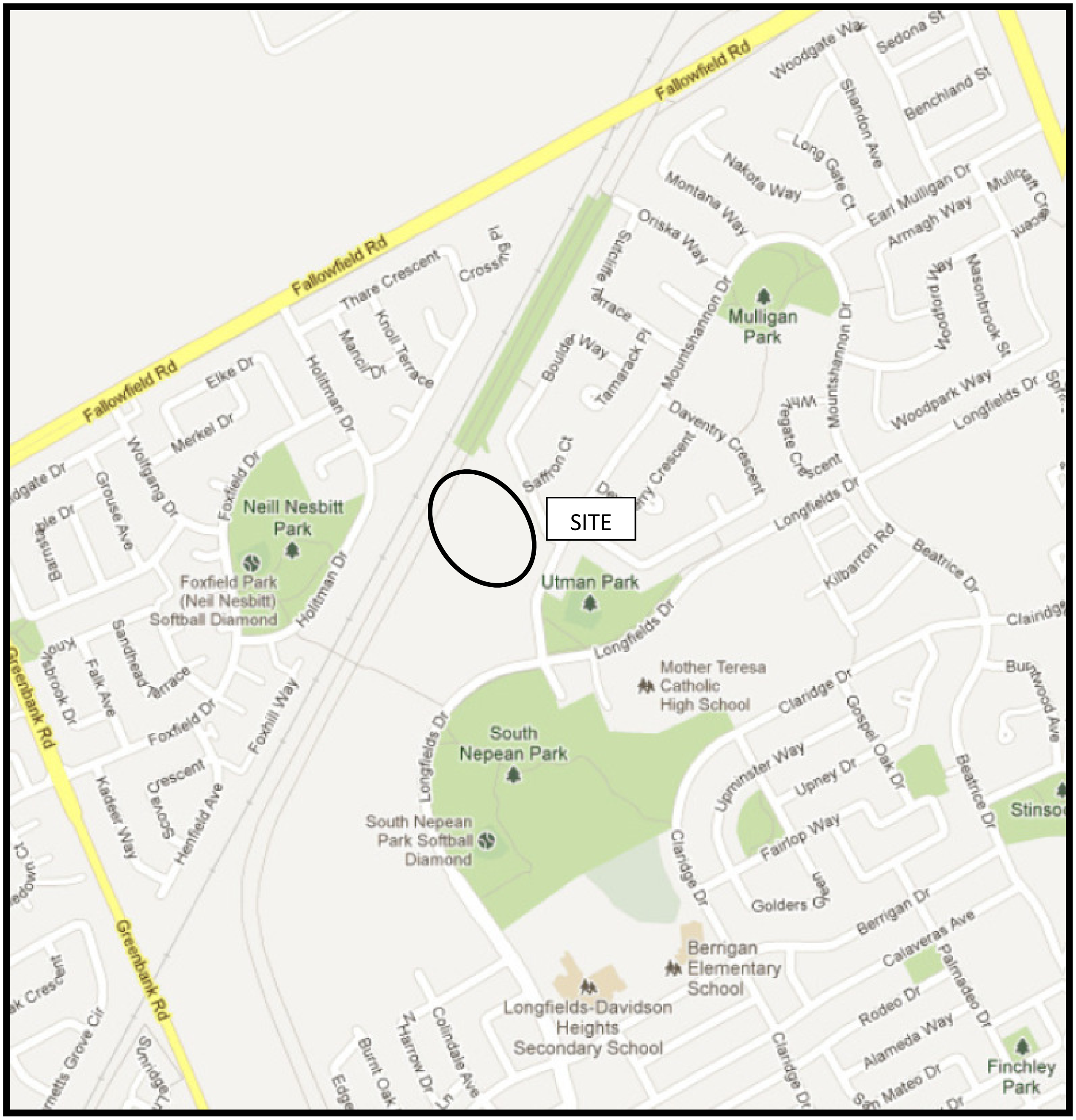
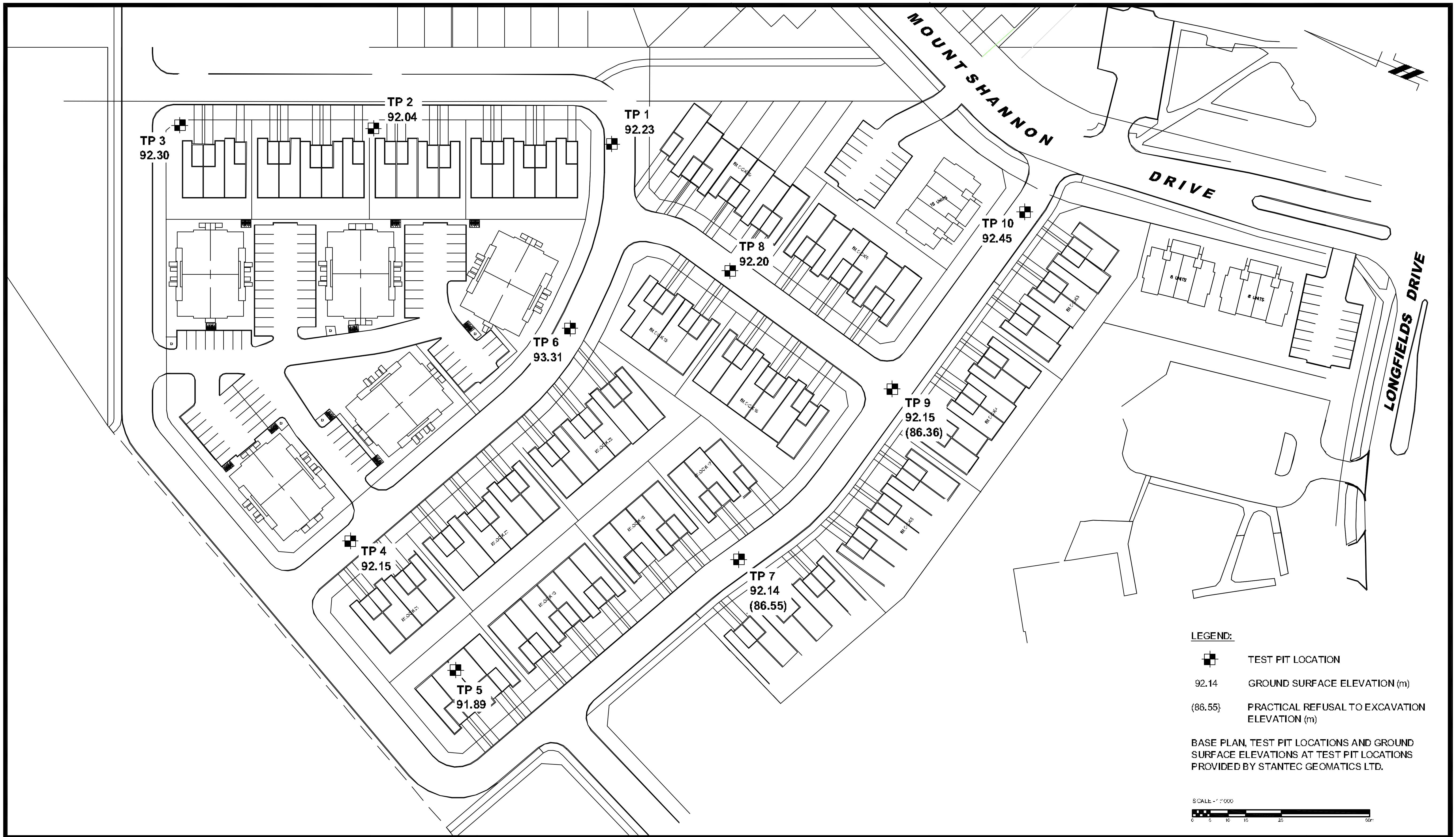


FIGURE 1

KEY PLAN



LEGEND:

▣	TEST PIT LOCATION
92.14	GROUND SURFACE ELEVATION (m)
(86.55)	PRACTICAL REFUSAL TO EXCAVATION ELEVATION (m)

BASE PLAN, TEST PIT LOCATIONS AND GROUND
SURFACE ELEVATIONS AT TEST PIT LOCATIONS
PROVIDED BY STANTEC GEOMATICS LTD.

SCALE - 1:1000

0 5 10 15 25 50m

paterson group
consulting engineers
154 Colonnade Road South, Ottawa, Ontario K2E 7J5

Scale:	1:1000
Des.:	SB
Dwn:	MPG
Chkd:	DG

MATTINO DEVELOPMENTS
GEOTECHNICAL INVESTIGATION
PROP. RESIDENTIAL DEVELOPMENT - MOUNTSHANNON DR.
OTTAWA, ONTARIO

TEST HOLE LOCATION PLAN

Dwg. No. PG2306-1
Report No.: PG2306-1
Date: 01/2013

11x17

patersongroup
consulting engineers

memorandum

re: **Geotechnical Responses to City Comments**
Proposed Residential Development
Blocks 1 and 2 - 255 and 285 Mountshannon Drive - Ottawa

to: Mattino Homes - **Mr. Pino Mattino** - mattino.ca@gmail.com
date: September 6, 2019
file: PG2306-MEMO.07

Further to the request of the City of Ottawa, Paterson Group (Paterson) can provide the following respond to the comments provided by the City for the proposed blocks at the aforementioned site.

City Comments

The Geotechnical Report identifies Sensitive Marine Clay soil. Show distance between trees and foundations and please provide the information required as per the Tree Planting in Sensitive Marine Clay Soils - 2017 Guidelines; link.

These guidelines have 6 conditions that need to be met to permit a 4.5 m separation distance from trees to foundations. I received confirmation from Forestry Services that the following conditions of the above guidelines are respected: Condition 1 - low sensitivity (plasticity), Condition 3 - soil volumes, Condition 4 - tree species and Condition 6 - grading to trees. There are still two more conditions that need to be respected:

Condition 2 - Foundation Depth (the underside of footing must be 2.1m or greater below the lowest finished grade); and

Condition 5 - Reinforced Foundations (the foundation walls are to be reinforced at least nominally to provide ductility, with a minimum of two upper and two lower 15M bars in the foundation wall).

Paterson Response

Regarding Condition 2, the subject site has subsoil conditions that consist of a very stiff to stiff silty clay deposit (weathered clay crust) extending to a depth of 4 to 5 m below the existing grade. Below the clay crust is a firm silty clay deposit. For this type of residential construction with partial basement units, the foundation will have a minimum frost cover of 1.5 m. Since there will be between 2.5 to 3.5 m of weathered clay crust below the founding depth, in our opinion, any tree planting with a separation of 4.5 m will not affect the foundations at this proposed founding elevation. Therefore, extending the foundations to 2.1 m is not required in this case.

Regarding Condition 5, the foundation walls will be reinforced using two upper and two lower 15M bars.

We trust that this information satisfies your requirements.

Best Regards,

Paterson Group Inc.

Carlos P. Da Silva, P.Eng., ing., QP$_{ESA}$

LICENSED PROFESSIONAL ENGINEER
C. P. DA SILVA
PROVINCE OF ONTARIO