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Proposed Residential Development
593 Laurier Avenue

Development Servicing and Stormwater Management Report

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PROPOSED RESIDENTIAL DEVELOPMENT
593 LAURIER AVENUE

DEVELOPMENT SERVICING AND STORMWATER MANAGEMENT REPORT

Prepared by:

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December 9, 2019
Revised: July 31, 2020

Ref: R-2019-193
Novatech File No. 119019

NOVATECH
Engineers, Planners & Landscape Architects

July 31, 2020

Alexander Fleck House Inc.
250 Ste Anne Avenue
Ottawa, Ontario
K1L 7C4

Attention: Mr. Denis Michaud

Dear Sir:

Re: Development Servicing and Stormwater Management Report
Proposed 9-Storey Residential Development
593 Laurier Avenue, Ottawa, ON
Novatech File No.: 119019

Enclosed is a copy of the revised 'Development Servicing and Stormwater Management Report' for the proposed 9-storey residential development located at 593 Laurier Avenue, in the City of Ottawa. This report addresses the approach to site servicing and stormwater management and is submitted in support of a site plan control application.

Please contact the undersigned, should you have any questions or require additional information.

Yours truly,

NOVATECH

MSavic

Miroslav Savic, P. Eng.
Senior Project Manager

cc: Shawn Wessel (City of Ottawa)
Ryan Koolwine (Project1 Studio)

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1.0 INTRODUCTION

The new 16-storey residential building is being proposed by 11258770 Canada Inc. and Novatech has been retained to complete the site servicing and stormwater management design for this project.

1.1 Purpose

This report addresses the approach to site servicing and stormwater management and is being submitted in support of a site plan control application.

1.2 Site Description and Location

The subject site is approximately 0.123 hectares in size and currently consists of single multi-unit residential building with accessible site access off Laurier Avenue West. The subject site is located on the northwest corner of Laurier Avenue West and Bronson Avenue. Residential lots abut the property to the north and west. The legal description of the subject site is designated as Part of Lot 40, Concession A (Ottawa Front), Geographic Township of Nepean, City of Ottawa.

Figure 1 – **Aerial Plan** provides an aerial view of the site.

1.3 Pre-Consultation Information

A pre-consultation meeting was held with the City of Ottawa in 2018 at which time the client was advised of the general submission requirements. Subsequent meetings were held with the City on April 26th and on June 26th, 2019. Refer to **Appendix A** for a summary of the correspondence related to the proposed development.

Based on a review of **O. Reg. 525/98: Approval Exemptions**, a Ministry of the Environment, Conservation and Parks (MECP) Environmental Compliance Approval (ECA) is anticipated to be required because the storm flows from this site are ultimately being directed into a combined sewer in Bronson Avenue.

1.4 Proposed Development

The proposed development will consist of a new 9-storey residential building adjoining the existing Heritage House facing Laurier Avenue. The proposed 9-storey residential building will be serviced by extending new laterals to an extension of the combined municipal sewer system in Laurier Avenue West and to the municipal watermain in Laurier Avenue West. Barrier-free access to the proposed building will be provided off Laurier Avenue West. The Heritage House will be incorporated into the overall design of the site and will be serviced internally by the new building.

1.5 Reference Material

The following reports and studies were prepared and/or reviewed as part of the design process:

[1] The Geotechnical Investigation report (LRL File No.: 190227), prepared by LRL Engineering in June of 2019.

2.0 SITE SERVICING

The objective of the site servicing design is to provide proper sewage outlets, a suitable domestic water supply and to ensure that appropriate fire protection is provided for the proposed development. As discussed with the City of Ottawa, the total allowable flow from the subject site being directed to the combined sewer in Cambridge Street North is to include:

- Peak sanitary sewage flows
- Ground water flows
- Peak stormwater flows

The total flow from the site (summarized in **Section 2.6.2** of the Report) is being provided to the City of Ottawa for their review in confirming that the municipal combined sewer system has adequate capacity to accommodate the proposed development.

The servicing criteria, the expected sewage flows, and the water demands are to conform to the City of Ottawa municipal design guidelines for sewer and water distribution systems. Refer to the subsequent sections of the report for further details.

The City of Ottawa Servicing Study Guidelines for Development Applications requires that a Development Servicing Study Checklist be included to confirm that each applicable item is deemed complete and ready for review by City of Ottawa Infrastructure Approvals. A completed checklist is enclosed in **Appendix B** of the report.

2.1 Sanitary Sewage

The existing site does not have any municipal sewers along Laurier Avenue or Bronson Avenue. The sanitary sewage outlet for the existing building is to the north through the 140 Bronson Avenue building outletting to the existing sanitary sewer at the south-west corner of the intersection of Slater Street and Bronson Avenue. As per the pre-condition CCTV investigation, the existing 100mm service lateral is “Transite” pipe in good condition.

The following four options were considered for servicing the proposed development:

- Option 1 - Maintain the existing 100mm lateral if it is determined the slope is sufficient to carry the peak design flow from the proposed site.
- Option 2 - Replace the lateral with the required size generally in the same location as existing lateral within the 140 Bronson building.
- Option 3 - Relocate the lateral outside the 140 Bronson building but within the site.
- Option 4 - Install a new lateral within the Laurier Avenue north boulevard, extend the existing combined sewer within the boulevard and outlet to the Cambridge Street sewer.

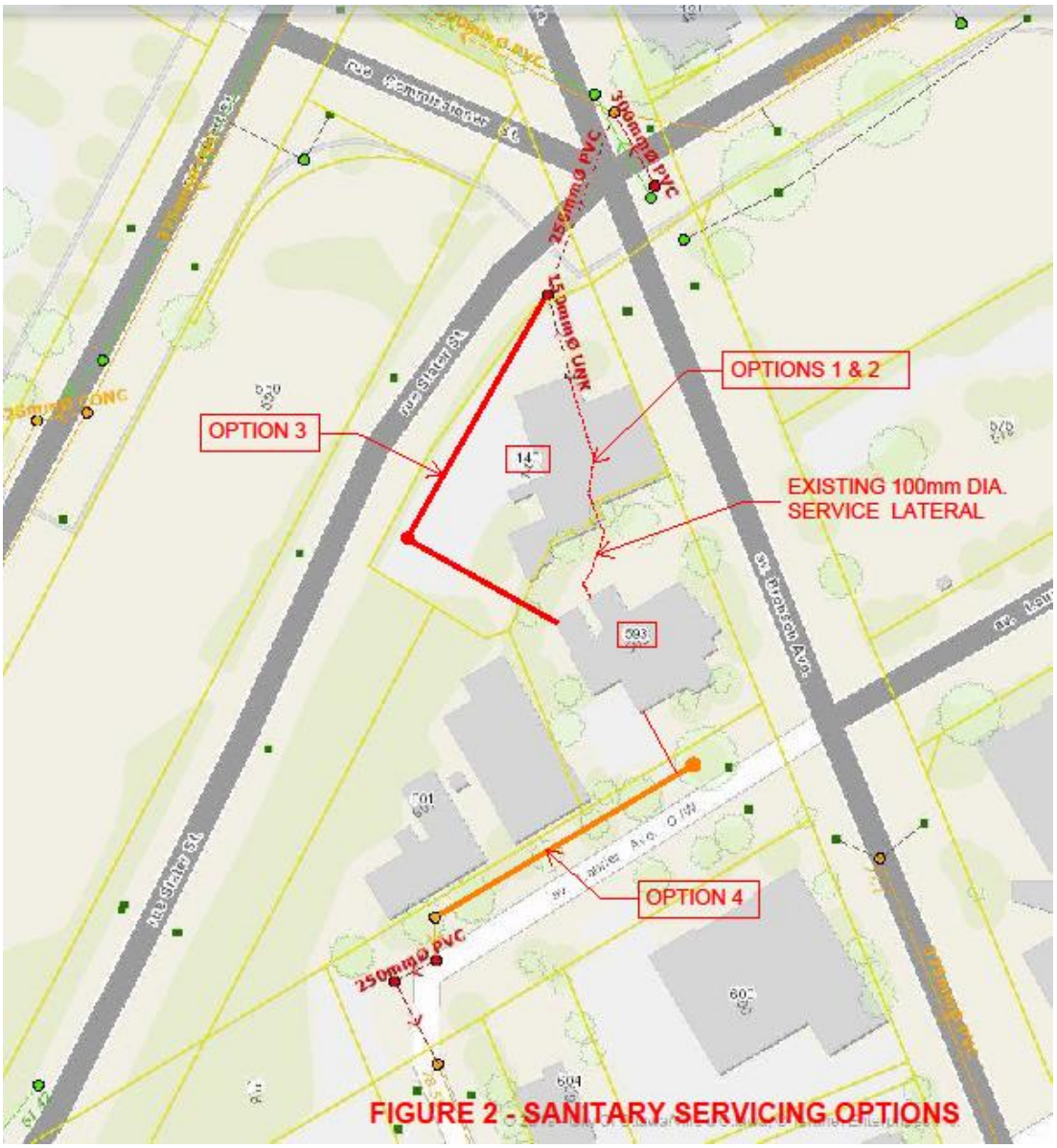

FIGURE 2 - SANITARY SERVICING OPTIONS

The Option 3 was initially chosen however, drainage agreements with the neighbouring property owner at 140 Bronson Avenue proved challenging and the determination was made to no longer pursue this option with the revised site plan submission.

The Option 4 was determined to be the preferred outlet through subsequent discussions with the City of Ottawa. Therefore, the proposed residential development will be serviced by a new 250mm dia. combined sewer that will be extended in the north boulevard of Laurier Avenue West and connected to the existing combined maintenance hole in the boulevard near the north-east corner of Cambridge Street North and Laurier Avenue West.

The City of Ottawa design criteria were used to calculate the theoretical sanitary flows for the proposed development. The following design criteria were taken from Section 4 – 'Sanitary Sewer Systems' and Appendix 4-A - 'Daily Sewage Flow for Various Types of Establishments' of the City of Ottawa Sewer Design Guidelines:

Residential and Commercial Uses

- Residential Units (Studio or 1-Bedroom): 1.4 people per unit
- Residential Units (2-Bedroom): 2.1 people per unit
- Average Daily Residential Sewage Flow: 280 L/person/day
- Residential Peaking Factor = 3.6 (Harmon Equation)
- Infiltration Allowance: 0.33 L/s/ha x 0.123 ha site = 0.04 L/s

Table 1 identifies the theoretical sanitary flows for the proposed residential development based on the above design criteria.

Table 1: Theoretical Post-Development Sanitary Flows

Residential Use	Unit Count	Design Population	Average Flow (L/s)	Peaking Factor	Peak Flow (L/s)	Total Flow (L/s)
New Building						
Studio / 1-Bedroom	45	63	0.20	3.6	0.74	0.74
2-Bedroom	12	26	0.08	3.6	0.30	0.30
Heritage House						
1-Bedroom	4	6	0.02	3.6	0.07	0.07
2-Bedroom	3	5	0.02	3.6	0.06	0.06
Infiltration Allowance	-	-	-	-	-	0.04
Total	**64**	**100**	**0.32**	**3.6**	**1.17**	**1.21**

A 200mm dia. sanitary gravity sewer at a minimum slope of 1.0% has a full flow conveyance capacity of 34.2 L/s and will have enough capacity to convey the theoretical sanitary flows for the proposed development. Refer to **Appendix E** for a copy of the sanitary sewer design sheet for the outlet sewer.

2.2 Water

The proposed residential development will be serviced by a new 150mm dia. water service connected to the existing 200mm dia. watermain in Laurier Avenue. The water service has been sized to provide the required domestic water demand and fire flow. A shut-off valve will be provided on the proposed water service. The water meter will be located within the water entry room, with a remote meter on the exterior face of the building.

2.2.1 Domestic Water Demands and Watermain Analysis

The City of Ottawa design criteria were used to calculate the theoretical water demands for the proposed development. The following design criteria were taken from Section 4 – 'Water Distribution Systems' of the Ottawa Design Guidelines – Water Distribution:

- Residential Units (Studio or 1 Bedroom): 1.4 people per unit
- Residential Units (2 Bedroom): 2.1 people per unit
- Average Daily Residential Water Demand: 350 L/person/day
- Maximum Day Demand Peaking Factor = 2.5 x Avg. Day Demand
- Peak Hour Demand Peaking Factor = 2.2 x Max. Day Demand

Table 2 identifies the theoretical domestic water demands for the development based on the above design criteria.

Table 2: Theoretical Water Demand for the Proposed Development

Residential Use	Unit Count	Design Population	Average Day Demand (L/s)	Max. Day Demand (L/s)	Peak Hour Demand (L/s)
New Building					
Studio / 1-Bedroom	45	63	0.26	0.64	1.40
2-Bedroom	12	26	0.11	0.26	0.58
Heritage House					
1-Bedroom	4	6	0.02	0.06	0.13
2-Bedroom	3	5	0.02	0.05	0.11
Total	**64**	**100**	**0.41**	**1.01**	**2.23**

The following design criteria were taken from Section 4.2.2 – 'Watermain Pressure and Demand Objectives' of the City of Ottawa Design Guidelines for Water Distribution:

- Minimum system pressures are not to be less than 276 kPa (40 psi) under Peak Hour demands
- Minimum system pressures are to be 140 kPa (20 psi) under Max Day + Fire Flow demands
- Maximum system pressure is not to exceed 552 kPa (80 psi)

Preliminary domestic water demands, and fire flow requirements were provided to the City of Ottawa. These values were used to generate the municipal watermain network boundary conditions. **Table 2.1** summarizes the watermain boundary conditions and the results of the hydraulic analysis. It is anticipated that a booster pump will be required to increase pressure to the upper floors of the building.

Table 2.2 : Hydraulic Boundary Condition Provided by the City

Municipal Watermain Boundary Condition	Boundary Condition	Water Demand (L/s)	Min/Max Operating Pressure (psi)	Design Pressure (psi)*
Minimum HGL (Peak Hour Demand)	106.8 m	2.23	40 psi (min.)	41.3
Maximum HGL (Avg Day Demand)	115.3 m	0.41	80 psi (max.)	53.4
Max Day + Fire Flow HGL	105 m	150 + 1.01	20 psi (min.)	38.8

*Based on the watermain elevation of 77.7m. Design pressure = (HGL – watermain elevation) x 1.42197 PSI/m

As indicated above, the existing municipal watermain should provide adequate system pressures to the proposed development.

2.2.2 Water Supply for Fire-Fighting

The proposed building will be fully sprinklered and supplied with a fire department (siamese) connection. The siamese connection will be located on the south side of the building, within 45m of the existing municipal fire hydrant on the SW corner of Laurier Ave. West and Bronson Ave.

The Fire Underwriters Survey (FUS) was used to estimate fire flow requirements for the proposed building. Based on information provided by the architect, a 16-storey, sprinklered building, constructed using fire resistive materials was used in the calculations. The existing Heritage House was considered as a four-storey building with wood frame construction and sprinkler system.

Table 2.2 summarizes the fire flow requirements for the proposed building, based on FUS calculations.

Table 2.2: Fire Flow Requirements for the Proposed Development

Type of Uses	Fire Flow Demand USGPM (L/s)
Existing Heritage Building	9,000 L/min (150 L/s)
Proposed Residential Building	3,000 L/min (50 L/s)

Refer to **Appendix C** for a copy of the preliminary FUS fire flow calculations and correspondence from the City of Ottawa.

The fire flow requirements include both sprinkler system and hose allowances in accordance with the OBC and NFPA 13. The sprinkler systems will be designed by the fire protection (sprinkler) contractor as this process involves detailed hydraulic calculations based on building layout, pipe runs, head losses, fire pump requirements, etc. Fire flow requirements calculated using the FUS method tend to generate higher values when compared to flows being calculated using the OBC and NFPA.

A multi-hydrant approach to fire-fighting is anticipated to be required. There are 3 Class AA (blue bonnet) hydrants within 90m of the proposed development (one hydrant on the SW corner of Laurier Avenue West and Bronson Avenue approximately 16m from the proposed building; another near the SW corner of Cambridge Street North and Laurier Avenue West approximately 60m from the proposed building; and a third hydrant across in front of 570 Laurier Avenue the south side of the roadway approximately 86m from the existing Heritage House. Based on *Table 1 Maximum flow to be considered from a given hydrant* in *Appendix I* of *Technical Bulletin ISTB-2018-02*, the combined flows from the three hydrants are summarized in **Table 2.3**.

Table 2.3: Combined Hydrant Flow Summary

Fire Hydrants < 75m from Building	Fire Hydrants > 75m < 150m from Building	Combined Fire Flow
2 x 5,700 L/min	1 x 3,800 L/min	15,200 L/min

The combined maximum flow from these hydrants will exceed the Max Day + Fire Flow requirement (9,000 L/min) of the proposed development. The existing municipal watermain network should therefore have adequate fire water supply for the proposed development.

2.3 Storm Drainage and Stormwater Management

There is currently no storm sewer/storm lateral serving the 593 Laurier site. Under existing conditions, surface drainage sheet flows in three directions; overland to Laurier Avenue, overland to Bronson Avenue and overland to the 140 Bronson site. The following two options were considered for servicing the proposed development:

- Option A – Similar to Option 3 for the sanitary lateral, a new storm connection would be constructed outletting to a new storm sewer which would be connected to the existing combined sewer at the north-east corner of the intersection of Slater Street and Bronson Avenue.
- Option B – Similar to Option 4 for the sanitary lateral and new storm lateral would outlet to a new combined sewer extension and eventually to the existing combined sewer within the Laurier Avenue northern boulevard and outlet to Cambridge Street North.

FIGURE 3 - STORM SERVICING OPTIONS

A modified Option A was originally chosen, however, as stated previously drainage agreements with the neighbouring property owner at 140 Bronson Avenue proved challenging and the determination was made to no longer pursue this option with the revised site plan submission.

The Option B was determined to be the preferred outlet through subsequent discussions with the City of Ottawa. The proposed sewer outlet for the site to be developed is the existing combined sewer in Cambridge Street North. Since the post-development storm flows are ultimately being directed to a combined sewer, they will need to be controlled prior to being released from the site. The total site allowable flow will be a combination of the peak sanitary flows, anticipated groundwater flows and the allocated stormwater flow components, as specified by the City of Ottawa. The proposed storm drainage and stormwater management design for the site is discussed in the following sections of the report.

2.3.1 Stormwater Management Criteria and Objectives

The stormwater management criteria and objectives for the site are as follows:

- Maximize the use of on-site storage on the building roof to minimize the size of the underground SWM storage pipes.
- Provide best measures to attempt to control the post-development flows from the site to a target 2-year release rate specified by the City of Ottawa (i.e. allowable 2-year release rate minus the peak sanitary and ground water flow components). Control post-development flows from the site being developed up to and including the 100-year design event.
- Minimize the impact on the existing combined sewer in Cambridge Street North by reducing the post-development storm flows from the site, when compared to current conditions.
- Provide guidelines to ensure that site preparation and construction is in accordance with the current Best Management Practices for Erosion and Sediment Control.

2.3.2 Pre-Development Conditions and Allowable Release Rate

The uncontrolled pre-development flows from the 0.123 ha site were calculated using the Rational Method to be 17.7 L/s during the 1:5-year design event and 34.6 L/s during the 1:100-year design event. Refer to **Appendix D** for detailed calculations. There are currently no water quantity or water quality control measures being provided on site.

As specified by the City of Ottawa, the target allowable release rate from the site was calculated to be approximately 10.5 L/s. This value was estimated using the Rational Method for a 2-year return period (City of Ottawa IDF Curves), 10-minute Time-of-Concentration (Tc), and a runoff coefficient of 0.40.

T_c = 10 min C =0.40
I_{2yr} = 76.81 mm/hr A = 0.123 ha

Q_{allow} = 2.78 CIA
= 2.78 x 0.40 x 76.81 x 0.123
= 10.5 L/s

As stated above, the total site allowable flow to the combined sewer system in Cambridge Street North will be a combination of the peak sanitary flow, anticipated groundwater flow and the allocated stormwater flow components.

- The peak sanitary flow from **Table 1** above was calculated to be 1.21 L/s.
- The anticipated groundwater corresponds to a maximum flow rate of 0.1 L/s.
- The remaining site flow allocated for stormwater management is therefore targeted to be 9.2 L/s [10.5 L/s – (1.2 L/s peak sanitary flow + 0.1 L/s groundwater flow)]

2.4 Post-Development Conditions

The proposed site will be serviced by connecting to the existing combined maintenance hole in the north boulevard of Laurier Avenue West (City structure ID: MHCH10723). As part of the stormwater management (SWM) strategy, stormwater runoff from the building roof will be attenuated using control flow roof drains. In addition to this, stormwater runoff from the lower mechanical drains and groundwater drainage systems will be controlled by pumps and an internal SWM storage tank.

Surface runoff from the perimeter amenity areas will be controlled with an ICD prior to being discharged into the proposed extension of the combined municipal outlet sewer. The ICD will be installed within CBMH 01 and upstream storage will be provided via an oversized stormwater storage pipe system. Refer to plan 119019-SWM for drainage areas and detail. Refer to **Appendix E** for a copy of the storm sewer design sheet for the outlet sewer. The post-development conditions will operate as described below:

- Stormwater runoff will be attenuated using control flow roof drains on the new building, a pumped SWM system by the mechanical engineer and an inlet control device (ICD) installed within the on-site gravity storm sewer system.
    - Peak flows from the new building will be controlled using 5 Watts Accutrol RD-100-A-ADJ flow control roof drains. Refer to documentation provided in **Appendix F** for details.
    - Flows from the mechanical drains around the low perimeter walkways of the new building and groundwater drainage systems for both buildings will be controlled by a set of duplex pumps complete with back-up power, high level alarms, and an internal SWM storage tank.
    - Peak flows from the amenity areas will be controlled to a maximum of 3.5 L/s using a Hydrovex Vortex ICD unit (Model 75 VHV-1) installed within the outlet pipe of CBMH 01. Refer to documentation provided in **Appendix G** for details.
    - A total of 19.1 m^3 of underground storage within the oversized storm sewers and MH structures will be provided to attenuate peak flows and runoff volumes for all storms up-to and including the 100-year storm event. Refer to supporting documentation provided in **Appendix G**.
    - Maximum ponding depths on the building addition (rooftop) will be 0.15m, while stormwater within the amenity areas could only pond to a max. depth of 0.10m. No surface ponding will occur within the amenity areas based on the design of the on-site stormwater system. The emergency overland flow route for the amenity area is Laurier Avenue West and the spill point from the system is the rim elevation of CBMH 01 set at 80.05m.

Runoff from the small perimeter areas of the site that cannot be captured (i.e. existing landscaped areas acting as direct runoff to Slater and Laurier) will continue to flow uncontrolled off the property.

2.5 Stormwater Management Modeling

The proposed storm drainage and stormwater management strategy was modelled using the PCSWMM hydrologic / hydraulic model. The PCSWMM model schematic and 100-year output data is provided in **Appendix D**. The PCSWMM Model files are provided on the enclosed CD.

2.5.1 Design Storms

The hydrologic / hydraulic analysis was completed using the 3-hour Chicago synthetic design storm for the 2, 5, and 100-year return periods. The IDF parameters used to generate the design storms were taken from the City of Ottawa Sewer Design Guidelines. The 3-hour Chicago storm distribution is applicable for urban storm drainage systems.

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.

2.5.2 Storm Drainage Areas

The site has been subdivided into sub-catchment areas representing post-development conditions, based on the proposed grading design and building addition roof; refer to **Table 3** for details. The runoff coefficients for each catchment were calculated for the proposed conditions. Refer to the Stormwater Management Plan (119019-SWM) for details.

Table 3: Post-Development Sub-catchment Area Parameters

Area ID	Drainage Area (ha)	Runoff Coefficient	Percent Imperviousness (%)	Zero Imperv. (m)	Equivalent Width (m)	Slope (%)
Uncontrolled Sub-catchments						
A-1	0.001	0.38	25.7%	0%	-	-
A-2	0.001	0.34	20.0%	0%	-	-
Controlled Sub-catchments						
A-3*	0.062	0.66	65.7%	40%	24.8	2.0%
B-1	0.013	0.90	100.0%	0%	-	-
R-1	0.046	0.90	100.0%	100%	-	-
TOTAL	**0.123**	**0.77**	**81.5%**	**-**	**-**	**-**

**Only Area A-3 is included in PCSWMM model.*

2.6 Model Results

The PCSWMM model results are discussed in the following sections of the report.

2.6.1.1 Area A-1: Uncontrolled Direct Runoff to Laurier Avenue

The uncontrolled post-development flow from this very small sub-catchment area was calculated using the Rational Method to be approximately 0.1 L/s during the 5-year design event and 0.2 L/s during the 100-year design event. Refer to **Appendix D** for SWM calculations.

2.6.1.2 Area A-2: Uncontrolled Runoff to Slater Street

The uncontrolled post-development flow from this very small sub-catchment area was calculated using the Rational Method to be approximately 0.1 L/s during the 5-year design event and 0.2 L/s during the 100-year design event. Refer to **Appendix D** for SWM calculations.

2.6.1.3 Area A-3: Controlled Flow - Heritage House Roof and Amenity Areas

Runoff from sub-catchment A-3 will be captured by the proposed on-site storm sewer system and controlled to 3.5 L/s via an ICD installed in the outlet pipe of CBMH 01. Storage is be provided within the oversized underground storm pipes and manhole structures. The provided 19.1 m^3 of underground storage will attenuate the runoff volumes for all storms up-to and including the 100-year storm event.

Table 3.1 summarizes the post-development design flow from this sub-catchment area as well as the type of ICD, the anticipated ponding elevations, storage volumes required and storage volume provided for the 2-year, 5-year, and 100-year design events.

Table 3.1: Stormwater Flows, ICD & Underground Storage System

Design Event	Controlled Site Flows from Area A-3				
	ICD Type	Design Flow	System Depth	Storage Vol. Required	Max Storage Provided
2-Year	Hydrovex (Vortex Model 75 VHV-1)	2.1 L/s	0.34 m (79.49 m)	6.0 m^3	19.1 m^3
5-Year		2.5 L/s	0.46 m (79.61 m)	9.9 m^3	
100-Year		3.5 L/s	0.89 m (80.04 m)	19.1 m^3	

Refer to **Appendix G** for ICD information and to **Appendix D** for detailed SWM calculations.

2.6.1.4 Area B-1: Controlled Flow from Mechanical Drains and Sub-Surface Systems

Stormwater runoff from this sub-catchment area will be captured by the lower mechanical deck drains and the sub-surface weeping tile directed to an internal stormwater storage tank. Stormwater collected within the storage tank will be pumped up to the proposed storm service and released into the combined sewer system Laurier Avenue West via the proposed building service. A pump (designed by the mechanical consultant) is required to control flow from the tank to a maximum rate of 1.26 L/s (20 USGPM), which corresponds to the maximum flow allocated for this catchment area. A “stand-by” pump will be provided for emergency and/or maintenance purposes. An emergency back-up power supply will also be provided. The storm service will be equipped with a backflow prevention device to protect the building from any potential sewer back-ups.

Table 3.2 summarizes the post-development stormwater design flows and storage volumes for both the 5-year and 100-year design events.

Table 3.2: Internal Stormwater Storage Tank and Pumped Flow

Design Event	Post-Development Conditions		
	Pumped Design Flow (L/s)	Volume Required (m^3)	Volume Provided (m^3)
1:2 Year	1.3 L/s	0.7 m^3	> 5.0 m^3
1:5 Year	1.3 L/s	1.3 m^3	
1:100 Year	1.3 L/s	3.7 m^3	
1:100 Year + 20% IDF increase	1.3 L/s	4.9 m^3	

As indicated in the table above, the internal stormwater storage tank will provide adequate storage for both the 5-year and 100-year design events, including an increased volume due to a 20% increase in rainfall intensity. Refer to **Appendix D** for detailed calculations.

2.6.1.5 Area R-1: Controlled Flow - New Building Roof

The post-development flow from this sub-catchment area will be attenuated using five (5) Watts adjustable 'Accutrol' control flow roof drains (model number RD-100-A-ADJ) prior to being directed to the proposed storm service.

Table 3.3 summarizes the post-development design flows from this sub-catchment area as well as the type of roof drains, the maximum anticipated ponding depths, storage volumes required, and storage volumes provided for both the 5-year and the 100-year design events.

Table 3.3: Design Flow and Roof Drain Table

Roof Drain ID & Drainage Area (ha)	Number of Roof Drains	Watts Roof Drain Model ID (Weir Opening)	Controlled Flow per Drain (L/s)		Approximate Ponding Depth Above Drains (m)		Storage Volume Required (m^3)		Max. Storage Available (m^3)
			5-Yr	100-Yr	5-Yr	100-Yr	5-Yr	100-Yr	
RD-1 (0.012 ha)	1	RD-100-A-ADJ (3/4 Exposed)	0.95	1.58	0.11	0.15	1.4	2.9	2.9
RD-2 (0.002 ha)	1	RD-100-A-ADJ (Closed)	0.32	0.32	0.07	0.12	0.1	0.4	0.7
RD-3 (0.016 ha)	1	RD-100-A-ADJ (1/4 Exposed)	0.79	0.95	0.11	0.15	2.4	5.5	5.5
RD-4 (0.012 ha)	1	RD-100-A-ADJ (Closed)	0.32	0.32	0.11	0.15	2.3	5.5	5.5
RD-5 (0.004 ha)	1	RD-100-A-ADJ (1/4 Exposed)	0.79	0.87	0.10	0.14	0.2	0.6	0.7
Total Roof (0.046 ha)	**5**	**-**	**3.17**	**4.04**	**-**	**-**	**6.4**	**14.9**	**15.3**

Refer to **Appendix D** for detailed SWM calculations and to **Appendix F** for roof drain information. As indicated in the table above, the building roof will provide sufficient storage for both the 5-year and 100-year design events.

2.6.1.6 Stormwater Flow Summary

Table 3.4 provides a summary of the total post-development flows from the site and compares them to the uncontrolled pre-development flows and target release rate specified by the City of Ottawa.

Table 3.4: Stormwater Flow Comparison Table

Design Event	Pre-Development Conditions		Post-Development Conditions						
	Uncontrolled Flow (L/s)	Target Release Rate (L/s)	R-1 Flow (L/s)	B-1 Flow (L/s)	A-1 Flow (L/s)	A-2 Flow (L/s)	A-3 Flow (L/s)	Total Flow (L/s)	Reduction in Flow (L/s or %)*
5-Yr	17.7	9.2	3.2	1.3	0.1	0.1	2.5	7.2	10.5 or 59%
100-Yr	34.6	9.2	4.0	1.3	0.2	0.2	3.5	9.2	25.4 or 73%

*Reduced flow compared to uncontrolled pre-development conditions.

As indicated in the table above, both the 5-year and the 100-year post-development flows from the site will be less than the target stormwater allowable release rate of 9.2 L/s, allotted to meet the total allowable flows by the City of Ottawa to the combined sewer system.

2.6.2 Summary of Total Flow to Municipal Combined Sewer

As stated above, the total site allowable flow to the combined sewer system in Cambridge Street North will be a combination of the peak sanitary flow, anticipated groundwater flow and the allocated stormwater flow components.

Table 3.5 provides a summary of the total post-development flows from the site to be developed and compares them to the uncontrolled pre-development flows and allowable release rate specified by the City of Ottawa.

Table 3.5: Combined Site Flows Summary and Comparison Table

Design Event	Pre-Development Conditions		Post-Development Conditions				
	Uncontrolled Storm Flow (L/s)	Allowable Release Rate (L/s)	Sanitary Flow (L/s)	Ground Water Flow (L/s)	Storm Flow (L/s)	Total Flow (L/s)	Reduction in Flow (L/s or %)*
5-Yr	17.7	10.5	1.21	0.1	7.2	8.5	9.2 or 52%
100-Yr	34.6	10.5			9.2	10.5	24.1 or 70%

*Reduced flow compared to uncontrolled pre-development stormwater runoff conditions (excl. pre-development sanitary and ground water flow components).

Although the target stormwater release rate of 10.5 L/s is only just achieved during the 100-year event, this still represents significant reductions in total site flow rate when compared to the respective pre-development conditions.

The total flow from the site to be developed is being provided to the City of Ottawa for their review in confirming that the municipal combined sewer system has adequate capacity to accommodate the proposed development.

2.6.3 Stormwater Quality Control

The subject site is located within the jurisdiction of the Rideau Valley Conservation Authority (RVCA). Based on email correspondence with the RVCA, stormwater quality control will not be required for this development as the site will outlet into a combined sewer in Cambridge Street North. Refer to **Appendix A** for a copy of the correspondence received from the RVCA.

3.0 SITE GRADING

The existing site is relatively flat, with elevations varying from approximately 81.0m near the southwest property corner down to approximately 80.1m near the northeast property corner adjacent to Bronson Avenue. Although the existing site does not slope too steeply, the site is perched above the surrounding properties on the north, east and south sides. The adjacent property to the west is at a similar elevation, while Laurier Avenue West drops to an elevation of approximately 79.0 at the intersection of Bronson Avenue. The grade continues to drop off significantly from south to north along Bronson Avenue. The road elevation at the intersection of Bronson and Slater is approximately 70.4m (nearly 11m below the on-site grades). There is a significant retaining wall along the east property line to accommodate the grade change along Bronson Avenue. The existing building along the north property line on the adjacent property at 140 Bronson Avenue is bunkered into the escarpment along the shared property line. The western portion of that property has a tiered landscaped area with a stone retaining wall along the shared property line and an additional concrete retaining wall in the middle of the property to accommodate the grade change down to the north.

The finished floor elevation (FFE) of the proposed residential building will be set at an elevation of 82.45m to match into the existing main floor elevation of the Heritage House being preserved on-site. The grades along the north, east and west property lines will be maintained. The grades along the south property line will be lowered slightly to accommodate access off the lower Laurier Avenue West roadway. Refer to the enclosed Grading and Erosion & Sediment Control Plan (119019-GR) for details.

4.0 GEOTECHNICAL INVESTIGATIONS

A Geotechnical Investigation report has been prepared by LRL Engineering for the proposed project. Refer to the Geotechnical Report[1] for subsurface conditions, construction recommendations and geotechnical inspection requirements.

5.0 EROSION AND SEDIMENT CONTROL

To mitigate erosion and to prevent sediment from entering the storm sewer system, temporary erosion and sediment control measures will be implemented on-site during construction in accordance with the Best Management Practices for Erosion and Sediment Control. This includes the following temporary measures:

- Filter bags will be placed under the grates of nearby catchbasins, manholes and will remain in place until vegetation has been established and construction is completed.
- Silt fencing will be placed per OPSS 577 and OPSD 219.110 along the surrounding construction limits.
- A mud mat will be installed at the construction entrance for the site.
- Street sweeping and cleaning will be performed, as required, to suppress dust and to provide safe and clean roadways adjacent to the construction site.
- On-site dewatering is to be directed to a sediment trap and/or gravel splash pad and discharged safely to an approved outlet as directed by the engineer.

The temporary erosion and sediment control measures will be implemented prior to construction and will remain in place during all phases of construction. Regular inspection and maintenance of the erosion control measures will be undertaken.

6.0 CONCLUSION

This report has been prepared in support of a site plan control application for the proposed residential development located at 593 Laurier Avenue.

The conclusions are as follows:

- The proposed 9-storey residential building will be serviced by extending new laterals to the combined municipal sewer system in Cambridge Street North and the municipal watermain in Laurier Avenue West.
- The municipal combined sewer will need to be extended in the north boulevard of Laurier Avenue West to service the site.
- The building will be sprinklered and supplied with a fire department siamese connection. The siamese connection will be located within 45m of the municipal fire hydrant near the south-west corner of the intersection of Laurier Avenue and Bronson Avenue.
- The site flows from sub-catchment area R-1 will be attenuated using control flow roof drains, while flows from area A-3 will be controlled by an ICD and controlled prior to being discharged into the municipal sewer system.
- The total post-development site flow will be approximately 8.5 L/s during the 5-year design event and 10.5 L/s during the 100-year event. Post-development flows will be reduced by approximately 9.2 L/s (or 52%) during the 5-year event and by as much as 24.1 L/s (or 70%) during the 100-year design event, compared to current conditions.
- Regular inspection and maintenance of the building services, roof drains, on-site SWM storage system and the sumps / ICD is recommended to ensure that the storm drainage system is clean and operational.
- Temporary erosion and sediment control measures are to be provided during construction.

It is recommended that the proposed site servicing and stormwater management design be approved for implementation.

NOVATECH

Prepared by:

Stephen Matthews, B.A. (Env.)
Senior Design Technologist

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

Reviewed by:

Miroslav Savic, P. Eng.
Senior Project Manager

APPENDIX A

Correspondence

Miro Savic

From: McCreight, Andrew <Andrew.McCreight@ottawa.ca>
Sent: Monday, July 8, 2019 10:31 AM
To: Danna SeeHar; Murray Chown
Cc: 'denis@henryinvestments.ca'; 'koolwine@project1studio.ca'; 'rmartin@robertsonmartin.com'; 'Eric Darwin'; POWELL MICHAEL; Wessel, Shawn; Moise, Christopher; Maloney, David; Lee Sheets; Gordon, Mark
Subject: 593 Laurier - 3rd pre-consult - confidential
Attachments: 593 Laurier Ave - 3rd Meeting Minutes.pdf

Hello,

Please find attached the minutes from the 3rd pre-consult meeting held on June 26, 2019. Please let me know if any comments were recorded incorrectly, of if anyone has additional comments.

From a planning perspective, it is important that I reiterate the comment about the current proposal triggering an Official Plan Amendment, as well as the concern relative to high-rise policies /guidelines.

The Department remains very concerned about the proposed height in it's current form. This is challenging site with competing interests between heritage, planning and engineering, but one that must find balance while achieving the review framework of all.

If the addition were to remain low-rise/mid-rise, urban design solutions will be workable. If the addition remains as a high-rise, then the rules of high-rise, such as tower separation, apply and will be instrumental to the Planning Rationale and review of the application(s). Locating height on the property cannot deny abutting property owners the same "right". As noted in the first two meetings, transition remains as a concern, and now with a high-rise in the mix, the setbacks and property relationship cause for further concern. The current proposal requires more analysis to accommodate the idea of a high-rise at this location, and potentially even land acquisition to the west. Otherwise, it is difficult to see how the proposal conforms with the Official Plan.

If anyone has further comments or questions, please do not hesitate to contact me.

Regards,
Andrew

Andrew McCreight MCIP RPP
Planner/Urbaniste
Development Review Central/Examen des demandes d'aménagement secteur centre
PLANNING, INFRASTRUCTURE AND ECONOMIC DEVELOPMENT
SERVICES DE PLANIFICATION, D'INFRASTRUCTURE ET DE DÉVELOPPEMENT ÉCONOMIQUE
110 Laurier Ave West | 4th Floor | Ottawa, ON | K1P 1J1
City of Ottawa | Ville d'Ottawa
613.580.2424 ext./poste 22568
ottawa.ca/planning / ottawa.ca/urbanisme

VACATION ALERT: I will be away July 19 - Aug 6.

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Pre-application Consultation Meeting Minutes
Address: 593 Laurier Ave.
Formal Pre-consultation File No.: PC2019-0069
Date: Wednesday June 26, 2019, 1:30pm – 3:00pm
Location: Room Billings Room, City Hall, 110 Laurier Ave W
City Contact: Andrew McCreight

City of Ottawa Staff Present:
Andrew McCreight – File Lead, Planner, Development Review Central
Christopher Moise – Architect/Urban Designer
David Maloney – Heritage Planner
Shawn Wessel – Infrastructure Project Manager
Mark Gordon – Planning Co-op Student

Invitees Present:
Denis Michaud -Owner (c/o)
Danna Seehar – Planner, Novatech
Murray Chown – Planner, Novatech
Ryan Koolwine – Architect, Studio1
Robert Martin – Roberson Martin Architects
Lee Sheets, Engineer, Novatech
Miro Savic, Engineer, Novatech

Eric Darwin, Dalhousie Community Association
Michael Powell, Dalhousie Community Association

Introductions and Acknowledgements
- Round table introductions

Overview of Proposal (Applicant Team)
- Took feedback from previous meeting and made a big push on heritage. The new proposal has improved the visibility of the heritage building – particularly the turret.
- The previous proposal was an “L” shape, the new proposal is a “hockey stick” shape which gives more buffer to the building.
- Building anything at ground level would obstruct the view of the turret due to grade change. Change in configuration of the addition of results in a smaller floorplate resulting in a taller building.
- This will be an iconic structure on the skyline. Submission will review long views and different perspectives.
- Animated streetscape along the lane and narrow profile along Laurier Street are improvements from previous design and lightens the building mass.
- The skew of the addition opens up the views from Slater Street and other important views.

- Glazed recessed area references the turret. This was brought down from the previous proposal to make the new building subordinate to the heritage structure.
- Precedent – St. Charles Market on Beechwood Street with the “wrap” approach.
- Single-loaded corridor with five units per floor.
- Glazed room near turret could be amenity space but there is already a large amount of space at grade. The ultimate use of the space is TBD.
- The stone retaining wall may need to be demolished – could reuse the stone on foundations.
- Current plans have the front door of the original home serving the entire development.
- No parking garage is planned. Two visitor parking spaces are proposed at grade.
- Preliminary idea is to clad the base of the building in rough stone, then transition to a more polished cladding above.
- The intent is to build as soon as possible. Will start with modifying the existing building once we have taken possession.

Preliminary Comments from the City

Planning Comments (Andrew McCreight)

- Obvious that many of the changes made to the proposal are to do with the heritage, and less about general planning.
- Undecided on the appropriate height due to the complex layering of policy.
- At junction of the General Urban Area, Traditional Mainstreet, Central Area and a variety of accompanying zoning.
- With the General Urban Area designation, the current proposal would trigger an official plan amendment
- Anything beyond the a mid-rise is likely to trigger an OPA.
- Our comfort with the height will come down to the context.
- The new building is as close as 1 metre to the back lot line. What happens when the abutting sites develops? There appears to be no conformity with the high-rise policies / guidelines concerning tower separation, and property compatibility/relationship. This remains a significant concern.
- The taller the proposed buildings goes, the more challenging conversations become. The City is reactionary on height and cannot tell you a height to go to, but the concerns have been flagged to date.
- The façade may need to be quieted so that it doesn’t compete with the detailing on the house.

Heritage (David Maloney)

- There have been lots of good heritage moves with this version, but it is a lot of height.
- The stone wall is a heritage attribute and is protected with the home.
- The height proposed could work with the heritage homes as an urban frame, but we are not sure about supportability from a policy perspective.
- Could look at reducing the wrapping of the building.

- Quieting the expression of the new building would improve its relation to the heritage home.
- The balconies at the front of the new building could be moved or removed.
- We appreciate the additional breathing room provided to the historic home.

Urban Design (Christopher Moise)

- The current proposal has ramp users having to roll up the drive aisle before they can access the wheelchair ramp. The ramp also appears too short for the grade change and is already at 8% slope which is steep.
- Given the challenge of making up the grade change to enter through the door of the old home it may not be possible to make it barrier free. Why not set the new building at a lower height and animate the front of the new building.
- Analysis has focused on the heritage asset – show some further analysis for building height.
- Would rather see a high quality tall building than a mediocre mid-rise building.
- Consider what it would look like if your neighbours build the same thing.
- Walk people through your analyses to show people how you landed on your proposal.

Infrastructure Comments (Shawn Wessel)

- The site poses challenges for both storm and sanitary sewers.
- The current sewer runs through the neighbouring rear building. This will have to be removed.
- All possible new sewer configurations will involve easements across a neighbouring property.
- We suggest that your team firm up the proposal before having a meeting with City staff from various infrastructure departments. We can work together to find a solution for the sewers.
- Please arrange this meeting with Shawn Wessel at x33017 or shawn.wessel@ottawa.ca

Community Association

- We are happy with the view planes that will be protected.
- Could cut into the escarpment and build useable space underground and put fenestrations in the back wall along Bronson. A skylight could also provide light to this space.
- It would be better to have car shares rather than two visitor parking spaces.
- Looking for short layout spot for Ubers, pizza delivery etc. don’t want these blocking the road and bike lanes.
- Not sure about the height but it is an odd site.
- Slater Street is going to be realigned – consider how this changes the development potential of parcels along Slater Street.
- The challenge with height is that you end up with a high-rise building intruding onto Laurier Street, which is a low-rise residential streetscape.

Next Steps

- Set up a meeting with City staff to go over infrastructure challenges.
- Discuss Planning Rationale and determine application requirements and next steps.
- It is recommended that the applicant team seek input from the Ward Councillor and neighbouring property owners.

Steve Matthews

From: Jamie Batchelor <jamie.batchelor@rvca.ca>
Sent: Friday, July 31, 2020 8:54 AM
To: Steve Matthews
Cc: Miro Savic; Eric Lalande
Subject: RE: 593 Laurier Avenue west - RVCA Pre-Consultation

Good Morning Steve,

Based on the stormwater being directed to a combined sewer which ends up in a downstream facility, the RVCA would not require any additional onsite water quality measures save and except best management practices.

Jamie Batchelor, MCIP, RPP
Planner, ext. 1191
Jamie.batchelor@rvca.ca

Rideau Valley Conservation Authority
3889 Rideau Valley Drive
PO Box 599, Manotick ON K4M 1A5
T 613-692-3571 | 1-800-267-3504 F 613-692-0831 | www.rvca.ca

From: Steve Matthews <S.Matthews@novatech-eng.com>
Sent: Thursday, July 30, 2020 10:29 AM
To: Jamie Batchelor <jamie.batchelor@rvca.ca>
Cc: Miro Savic <m.savic@novatech-eng.com>
Subject: 593 Laurier Avenue west - RVCA Pre-Consultation

Hello Jamie,

We are working on a proposed development located at 593 Laurier Avenue West in the City of Ottawa. The development proposal is a 9-storey residential apartment building that will be constructed on the site adjacent to an existing Heritage House that will remain and be upgraded to accommodate new residential units as well.

The storm water from the site presently sheet drains to neighbouring property to the north at 140 Bronson Avenue and/or runs off-site to the Laurier Avenue West roadway. The storm drainage from the new building and the perimeter of the site will be captured on-site and outlet to the to the existing combined sewer system in Cambridge Street North. There will be an extension of the Cambridge Street combined sewer along the north boulevard of Laurier Avenue West to accommodate the proposed development. Refer to the attached servicing and stormwater management plans for details.

The necessary **stormwater quantity** control measures will be provided in accordance with the City of Ottawa requirements. The all post-development flows (sanitary + storm + subsurface drainage) from the site will be controlled to the 1:2 year allowable flow calculated using a runoff coefficient of C=0.4. In order to accommodate the highly restrictive post-development flow criteria, stormwater be stored and controlled on site, for storms up to and including the 1:100 year design event in a combination of rooftop storage, internal SWM tank storage and external pipe/structure storage.

Please confirm if the RVCA has any **stormwater quality requirements** for the proposed development. The existing site has no on-site storm water quality control.

Regards,
Steve

Stephen Matthews, B.A.(Env), Senior Design Technologist
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 x 223 | Fax: 613.254.5867

APPENDIX B

Development Servicing Study Checklist

4. Development Servicing Study Checklist

The following section describes the checklist of the required content of servicing studies. It is expected that the proponent will address each one of the following items for the study to be deemed complete and ready for review by City of Ottawa Infrastructure Approvals staff.

The level of required detail in the Servicing Study will increase depending on the type of application. For example, for Official Plan amendments and re-zoning applications, the main issues will be to determine the capacity requirements for the proposed change in land use and confirm this against the existing capacity constraint, and to define the solutions, phasing of works and the financing of works to address the capacity constraint. For subdivisions and site plans, the above will be required with additional detailed information supporting the servicing within the development boundary.

4.1 General Content

N/A ☐ Executive Summary (for larger reports only).

☑ Date and revision number of the report.

☑ Location map and plan showing municipal address, boundary, and layout of proposed development.

☑ Plan showing the site and location of all existing services.

☑ Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.

☑ Summary of Pre-consultation Meetings with City and other approval agencies.

N/A ☐ Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria.

☑ Statement of objectives and servicing criteria.

☑ Identification of existing and proposed infrastructure available in the immediate area.

N/A ☐ Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).

☑ Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.

N/A ☐ Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.

N/A ☐ Proposed phasing of the development, if applicable.

☑ Reference to geotechnical studies and recommendations concerning servicing.

☑ All preliminary and formal site plan submissions should have the following information:

- Metric scale
- North arrow (including construction North)
- Key plan
- Name and contact information of applicant and property owner
- Property limits including bearings and dimensions
- Existing and proposed structures and parking areas
- Easements, road widening and rights-of-way
- Adjacent street names

4.2 Development Servicing Report: Water

N/A ☐ Confirm consistency with Master Servicing Study, if available

N/A ☐ Availability of public infrastructure to service proposed development

☑ Identification of system constraints

☑ Identify boundary conditions

☑ Confirmation of adequate domestic supply and pressure

☑ Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development.

☑ Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.

N/A ☐ Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design

☑ Address reliability requirements such as appropriate location of shut-off valves

N/A ☐ Check on the necessity of a pressure zone boundary modification.

☑ Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range

☑ Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.

N/A ☐ Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.

☑ Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.

☑ Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.

4.3 Development Servicing Report: Wastewater

☑ Summary of proposed design criteria (Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).

N/A ☐ Confirm consistency with Master Servicing Study and/or justifications for deviations.

☑ Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers.

N/A ☐ Description of existing sanitary sewer available for discharge of wastewater from proposed development.

N/A ☐ Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable)

N/A ☐ Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.

☑ Description of proposed sewer network including sewers, pumping stations, and forcemains.

N/A ☐ Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).

N/A ☐ Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.

N/A ☐ Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.

N/A ☐ Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.

☑ Special considerations such as contamination, corrosive environment etc.

4.4 Development Servicing Report: Stormwater Checklist

☑ Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)

N/A ☐ Analysis of available capacity in existing public infrastructure.

☑ A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.

☑ Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.

N/A ☐ Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.

☑ Description of the stormwater management concept with facility locations and descriptions with references and supporting information.

☑ Set-back from private sewage disposal systems.

N/A ☐ Watercourse and hazard lands setbacks.

N/A ☐ Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.

N/A ☐ Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.

- [x] Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).
- [ ] N/A Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.
- [x] Calculate pre and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.
- [ ] N/A Any proposed diversion of drainage catchment areas from one outlet to another.
- [x] Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.
- [ ] N/A If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100-year return period storm event.
- [ ] N/A Identification of potential impacts to receiving watercourses
- [ ] N/A Identification of municipal drains and related approval requirements.
- [x] Descriptions of how the conveyance and storage capacity will be achieved for the development.
- [x] 100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.
- [ ] N/A Inclusion of hydraulic analysis including hydraulic grade line elevations.
- [x] Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.
- [ ] N/A Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.
- [ ] N/A Identification of fill constraints related to floodplain and geotechnical investigation.

4.5 Approval and Permit Requirements: Checklist

The Servicing Study shall provide a list of applicable permits and regulatory approvals necessary for the proposed development as well as the relevant issues affecting each approval. The approval and permitting shall include but not be limited to the following:

NOTED ☐ Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in the Act.

NOTED ☐ Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.

N/A ☐ Changes to Municipal Drains.

N/A ☐ Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)

4.6 Conclusion Checklist

☑ Clearly stated conclusions and recommendations

TBD ☐ Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.

☑ All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario

APPENDIX C

Water Demands, FUS Calculations and City of Ottawa Boundary Conditions

Miro Savic

From: Wessel, Shawn <shawn.wessel@ottawa.ca>
Sent: Friday, October 11, 2019 2:27 PM
To: Miro Savic
Subject: 593 Laurier Avenue - Boundary Condition
Attachments: 593 Laurier Oct 2019.pdf

Good afternoon Mr. Savic.

Please find boundary conditions, as requested, below and attached:

The following are boundary conditions, HGL, for hydraulic analysis at 593 Laurier (zone 1W) assumed to be connected to the 203mm on Laurier (see attached PDF for location).

Minimum HGL = 106.8m

Maximum HGL = 115.3m

MaxDay + FireFlow (150 L/s) = 105.0m

MaxDay + FireFlow (50 L/s) = 108.0m

These are for current conditions and are based on computer model simulation.

Disclaimer: The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation.

If you require additional information or clarification, please do not hesitate to contact me anytime.

Thank you

Regards,

Shawn Wessel, A.Sc.T.,rcji
Project Manager - Infrastructure Approvals
Gestionnaire de projet – Approbation des demandes d'infrastructures

Development Review Central Branch | Direction de l'examen des projets d'aménagement, Centrale
Planning, Infrastructure and Economic Development Department | Direction générale de la planification de l'infrastructure et du développement économique
City of Ottawa | Ville d'Ottawa
110 Laurier Ave. W. | 110, avenue Laurier Ouest, Ottawa ON K1P 1J1
(613) 580 2424 Ext. | Poste 33017
Int. Mail Code | Code de Courrier Interne 01-14
shawn.wessel@ottawa.ca

Please consider the environment before printing this email

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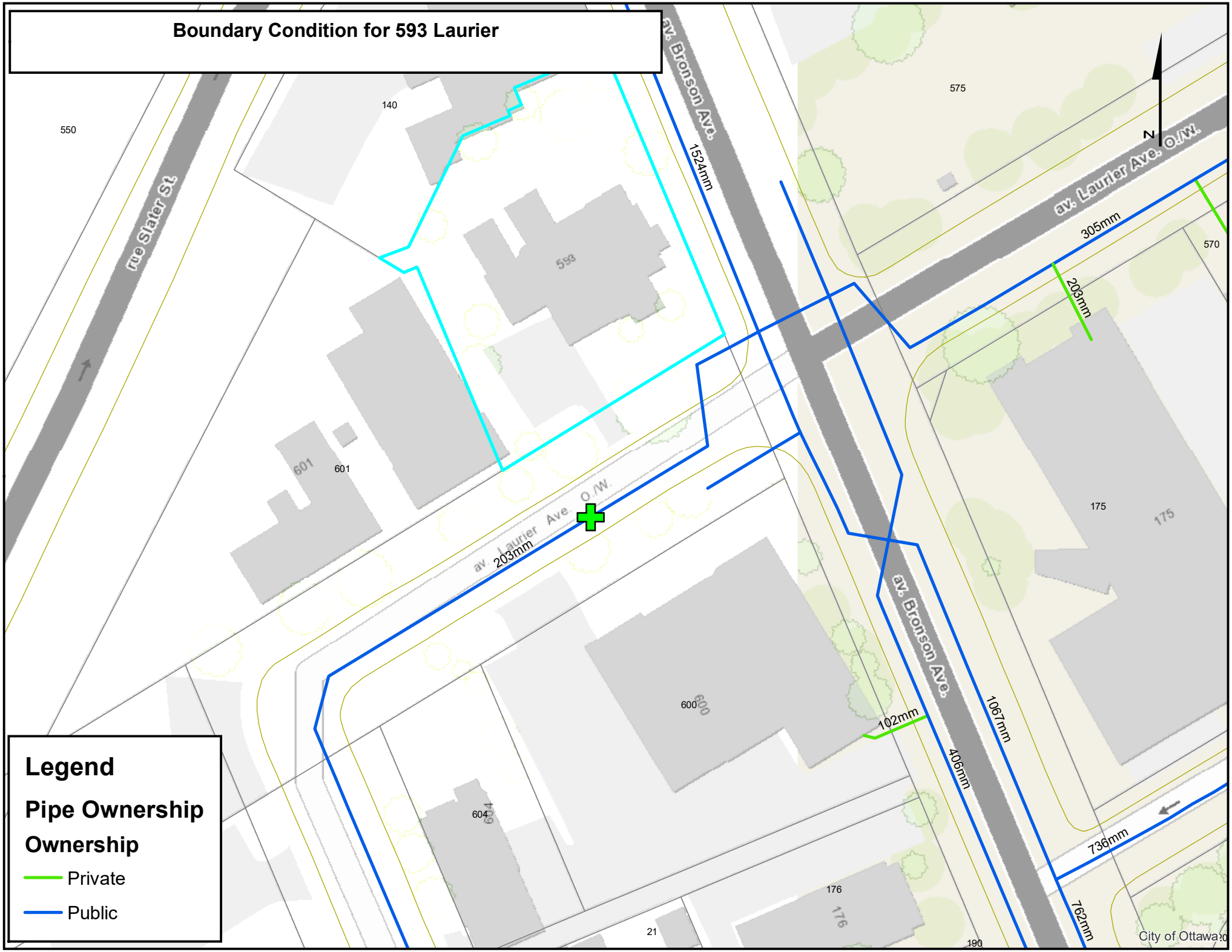

Boundary Condition for 593 Laurier
rue Slater St.
av. Bronson Ave.
av. Laurier Ave. O./W.
av. Laurier Ave. O./W.
av. Bronson Ave.
1524mm
305mm
203mm
203mm
102mm
406mm
1067mm
736mm
762mm
550
140
575
570
593
601
601
600
600
604
604
175
175
176
176
21
190
N
Legend
Pipe Ownership
Ownership
Private
Public
City of Ottawa

593 LAURIER AVENUE
WATER ANALYSIS

WATER DEMANDS

Number of 1 Bedroom Units	49	
Persons per 1 Bedroom Unit	1.4	
Number of 2 Bedroom Units	15	
Persons per 2 Bedroom Unit	2.1	
Total Population	100	
Average Day Demand	350	L/c/day
Average Day Demand	0.41	L/s
Maximum Day Demand (2.5 x avg. day)	1.01	L/s
Peak Hour Demand (2.2 x max. day)	2.23	L/s

BOUNDARY CONDITIONS

Maximum HGL =	115.3	m
Minimum HGL =	106.8	m
Max Day + Fire Flow (150 L/s) =	105	m

PRESSURE TESTS

AVERAGE GROUND ELEVATION 77.7 m

HIGH PRESSURE TEST = MAX HGL - AVG GROUND ELEV x 1.42197 PSI/m < 80 PSI

HIGH PRESSURE = **53.4** PSI

LOW PRESSURE TEST = MIN HGL - AVG GROUND ELEV x 1.42197 PSI/m > 40 PSI

LOW PRESSURE = **41.3** PSI

MAX DAY + FIRE FLOW TEST = MAX DAY + FIRE - AVG GROUND ELEV x 1.42197 PSI/m > 20 PSI

MAX DAY + FIRE PRESSURE = **38.8** PSI

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 119019
Project Name: 593 Laurier
Date: 7/30/2020
Input By: S.Matthews
Reviewed By: M.Savic

Legend: Input by User; No Information or Input Required

Building Description: 4 Storey Heritage Home
Wood frame

Step			Input		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction C	Wood frame	Yes	1.5	1.5	
		Ordinary construction		1		
		Non-combustible construction		0.8		
		Modified Fire resistive construction (2 hrs)		0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	182			
		Number of Floors/Storeys	4			
		Area of structure considered (m^2)			**728**	
	F	**Base fire flow without reductions**				**9,000**
		F = 220 C (A)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**7,650**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**			**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%	-30%	**-3,060**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	No	-10%		
				Cumulative Total	**-40%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	0 - 3 m		25%	**4,208**
		East Side	> 45.1m		0%	
		South Side	30.1- 45 m		5%	
		West Side	0 - 3 m		25%	
				Cumulative Total	**55%**	
Results						
6	(1) + (2) + (3)	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**9,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**150**
				or	USGPM	2,378
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	2
		Required Volume of Fire Flow (m^3)			m^3	1080

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 119019
Project Name: 593 Laurier
Date: 7/30/2020
Input By: S.Matthews
Reviewed By: M.Savic

Legend: Input by User; No Information or Input Required

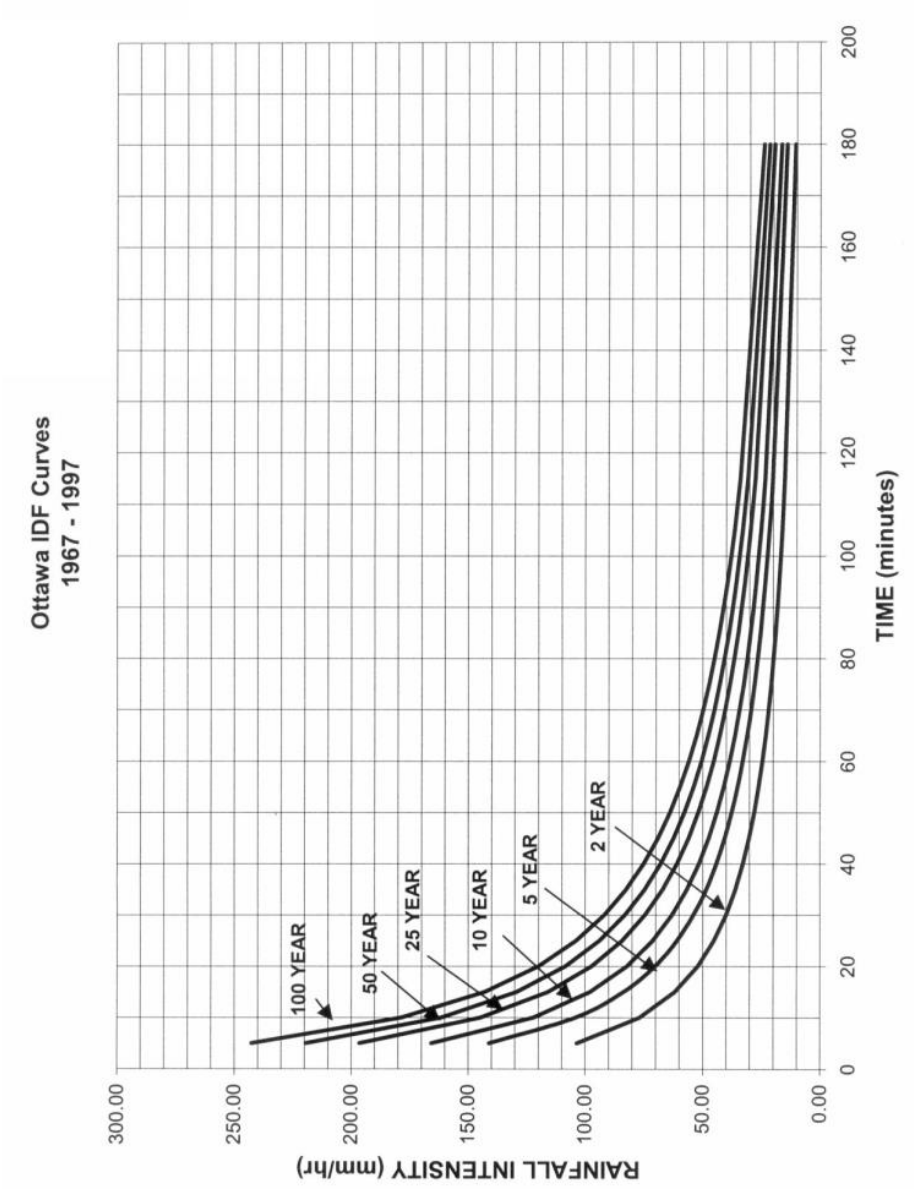
Building Description: 9-Storey Residential Tower
Fire Resistive Construction

Step			Choose		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction C	Wood frame		1.5	0.6	
		Ordinary construction		1		
		Non-combustible construction		0.8		
		Modified Fire resistive construction (2 hrs)	Yes	0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	438			
		Number of Floors/Storeys	9			
		Protected Openings (1 hr)	Yes			
		Area of structure considered (m^2)			**657**	
	F	**Base fire flow without reductions**				**3,000**
		F = 220 C $(A)^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**2,550**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**			**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%	-30%	**-1,020**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	No	-10%		
				Cumulative Total	**-40%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	0 - 3 m		25%	**1,913**
		East Side	0 - 3 m		25%	
		South Side	20.1 - 30 m		10%	
		West Side	3.1 - 10 m		20%	
				Cumulative Total	**75%**	
Results						
6	(1) + (2) + (3)	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**3,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**50**
				or	USGPM	793
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	1.25
		Required Volume of Fire Flow (m^3)			m^3	225

APPENDIX D

IDF Curves and SWM Calculations

APPENDIX 5-A OTTAWA INTENSITY DURATION FREQUENCY (IDF) CURVE



Proposed 9-Storey Residential Development
593 Laurier Avenue

Pre - Development Site Stormwater Flows										
Description	Area (ha)	$A_{impervious}$ (ha) C=0.9	A_{gravel} (ha) C=0.6	$A_{pervious}$ (ha) C=0.2	Weighted C_{w5}	Weighted C_{w100}	1:5 Year Flow (L/s)	1:100 Year Flow (L/s)	Allowable C_{value}	Allowable Flow 2-year (L/s)
Total Site Area	0.123	0.052	0.000	0.071	0.50	0.57	17.7	34.6	0.4	10.5

T_c = 10mins

Post - Development : Site Stormwater Flows if the areas were left Uncontrolled									
Area	Description	Area (ha)	A_{imp} (ha) C=0.9	A_{perv} (ha) C=0.2	C_5	C_{100}	Uncontrolled Flow (L/s) 2 year	5 year	100 year
A-1	Direct Runoff to Laurier Ave.	0.001	0.000	0.001	0.38	0.44	0.1	0.1	0.2
A-2	UnControlled Runoff to Slater St.	0.001	0.000	0.001	0.34	0.40	0.1	0.1	0.2
A-3	Controlled Underground Storage	0.062	0.041	0.021	0.66	0.75	8.8	11.9	23.0
B-1	Controlled Internal SWM Tank	0.013	0.013	0.000	0.90	1.00	2.5	3.4	6.5
R-1	Controlled Flow Roof Drains	0.046	0.046	0.000	0.90	1.00	8.8	12.0	22.8
	Summed Area Check:	0.123					T_c = 10mins	T_c = 10mins	

Post - Development : Total Stormwater Flows for Controlled Site + Uncontrolled Runoff								
Area	Description	Peak Design Flow (L/s) 2 year	5 year	100 year	Storage Required (m^3) 2 year	5 year	100 year	Provided (m^3)
A-1	Direct Runoff to Laurier Ave.	0.1	0.1	0.2	-	-	-	-
A-2	UnControlled Runoff to Slater St.	0.1	0.1	0.2	-	-	-	-
A-3	Controlled Underground Storage	2.8	3.0	3.5	6.0	9.9	16.8	19.1
B-1	Controlled Internal SWM Tank	1.3	1.3	1.3	0.7	1.3	3.7	> 5
R-1	Controlled Flow Roof Drains	3.2	3.2	4.0	6.4	6.4	14.9	15.3
	Totals :	**7.3**	**7.6**	**9.2**	**13.1**	**17.6**	**35.4**	**39.4**
	Over Controlled:	3.2	2.9	1.3				

Proposed 9-Storey Residential Development
Novatech Project No. 119019
REQUIRED STORAGE - 1:2 YEAR EVENT
Allowable Flow to Laurier Avenue

OTTAWA IDF CURVE

Area =	0.123	ha	Qallow =	10.5	L/s
C =	0.40		Vol(max) =	0.0	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	103.57	14.17	3.66	1.10
10	76.81	10.51	0.00	0.00
15	61.77	8.45	-2.06	-1.85
20	52.03	7.12	-3.39	-4.07
25	45.17	6.18	-4.33	-6.49
30	40.04	5.48	-5.03	-9.05
35	36.06	4.93	-5.57	-11.70
40	32.86	4.50	-6.01	-14.42
45	30.24	4.14	-6.37	-17.20
50	28.04	3.84	-6.67	-20.01
55	26.17	3.58	-6.93	-22.85
60	24.56	3.36	-7.15	-25.73
65	23.15	3.17	-7.34	-28.62
70	21.91	3.00	-7.51	-31.53
75	20.81	2.85	-7.66	-34.46
80	19.83	2.71	-7.79	-37.41
85	18.94	2.59	-7.91	-40.36
90	18.14	2.48	-8.02	-43.33

Proposed 9-Storey Residential Development
Novatech Project No. 119019
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA A-1 Direct Runoff to Laurier Avenue

OTTAWA IDF CURVE

Area =	0.001	ha	Qallow =	0.1	L/s
C =	0.38		Vol(max) =	0.0	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	0.15	0.04	0.01
10	104.19	0.11	0.00	0.00
15	83.56	0.09	-0.02	-0.02
20	70.25	0.07	-0.04	-0.04
25	60.90	0.06	-0.05	-0.07
30	53.93	0.06	-0.05	-0.09
35	48.52	0.05	-0.06	-0.12
40	44.18	0.05	-0.06	-0.15
45	40.63	0.04	-0.07	-0.18
50	37.65	0.04	-0.07	-0.21
55	35.12	0.04	-0.07	-0.24
60	32.94	0.03	-0.07	-0.27
65	31.04	0.03	-0.08	-0.30
70	29.37	0.03	-0.08	-0.33
75	27.89	0.03	-0.08	-0.36
80	26.56	0.03	-0.08	-0.39
85	25.37	0.03	-0.08	-0.42
90	24.29	0.03	-0.08	-0.45

Proposed 9-Storey Residential Development
Novatech Project No. 119019
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA A-1 Direct Runoff to Laurier Avenue

OTTAWA IDF CURVE

Area =	0.001	ha	Qallow =	0.2	L/s
C =	0.44		Vol(max) =	0.0	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	0.30	0.08	0.02
10	178.56	0.22	0.00	0.00
15	142.89	0.17	-0.04	-0.04
20	119.95	0.15	-0.07	-0.09
25	103.85	0.13	-0.09	-0.14
30	91.87	0.11	-0.11	-0.19
35	82.58	0.10	-0.12	-0.25
40	75.15	0.09	-0.13	-0.30
45	69.05	0.08	-0.13	-0.36
50	63.95	0.08	-0.14	-0.42
55	59.62	0.07	-0.14	-0.48
60	55.89	0.07	-0.15	-0.54
65	52.65	0.06	-0.15	-0.60
70	49.79	0.06	-0.16	-0.66
75	47.26	0.06	-0.16	-0.72
80	44.99	0.05	-0.16	-0.78
85	42.95	0.05	-0.16	-0.84
90	41.11	0.05	-0.17	-0.90

Proposed 9-Storey Residential Development
Novatech Project No. 119019
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA A-2 Uncontrolled Rearyard Runoff to Slater Street

OTTAWA IDF CURVE

Area =	0.001	ha	Qallow =	0.1	L/s
C =	0.34		Vol(max) =	0.0	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	0.13	0.03	0.01
10	104.19	0.10	0.00	0.00
15	83.56	0.08	-0.02	-0.02
20	70.25	0.07	-0.03	-0.04
25	60.90	0.06	-0.04	-0.06
30	53.93	0.05	-0.05	-0.09
35	48.52	0.05	-0.05	-0.11
40	44.18	0.04	-0.06	-0.14
45	40.63	0.04	-0.06	-0.16
50	37.65	0.04	-0.06	-0.19
55	35.12	0.03	-0.07	-0.22
60	32.94	0.03	-0.07	-0.24
65	31.04	0.03	-0.07	-0.27
70	29.37	0.03	-0.07	-0.30
75	27.89	0.03	-0.07	-0.32
80	26.56	0.03	-0.07	-0.35
85	25.37	0.02	-0.07	-0.38
90	24.29	0.02	-0.08	-0.41

Proposed 9-Storey Residential Development
Novatech Project No. 119019
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA A-2 Uncontrolled Rearyard Runoff to Slater Street

OTTAWA IDF CURVE

Area =	0.001	ha	Qallow =	0.2	L/s
C =	0.40		Vol(max) =	0.0	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	0.27	0.07	0.02
10	178.56	0.20	0.00	0.00
15	142.89	0.16	-0.04	-0.04
20	119.95	0.13	-0.07	-0.08
25	103.85	0.12	-0.08	-0.12
30	91.87	0.10	-0.10	-0.17
35	82.58	0.09	-0.11	-0.22
40	75.15	0.08	-0.11	-0.28
45	69.05	0.08	-0.12	-0.33
50	63.95	0.07	-0.13	-0.38
55	59.62	0.07	-0.13	-0.44
60	55.89	0.06	-0.14	-0.49
65	52.65	0.06	-0.14	-0.55
70	49.79	0.06	-0.14	-0.60
75	47.26	0.05	-0.15	-0.66
80	44.99	0.05	-0.15	-0.71
85	42.95	0.05	-0.15	-0.77
90	41.11	0.05	-0.15	-0.83

593 Laurier Avenue
PCSWMM Model Schematics

NOVATECH
Engineers, Planners & Landscape Architects

Overall Model Schematic

Date: 2020-07-29
M:\2019\119019\DATA\Calculations\SWM\PCSWMM\Model Schematic-Output\PCSWMM Model Schematics.docx

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


*************
Element Count
*************
Number of rain gages ...... 1
Number of subcatchments ... 1
Number of nodes ........... 6
Number of links ........... 5
Number of pollutants ...... 0
Number of land uses ....... 0


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


********************
Subcatchment Summary
********************
Name                        Area     Width   %Imperv    %Slope Rain Gage            Outlet
------------------------------------------------------------------------------------------
A-3                         0.06     24.80     65.70    2.0000 Raingage             CBMH04


************
Node Summary
************
                                      Invert      Max.    Ponded    External
Name                 Type               Elev.     Depth      Area    Inflow
----------------------------------------------------------------------------
MH02                 OUTFALL           79.02      0.00       0.0
CBMH01               STORAGE           79.15      0.90       0.0
CBMH02               STORAGE           79.21      1.09       0.0
CBMH03               STORAGE           79.28      1.92       0.0
CBMH04               STORAGE           79.30      2.00       0.0
MH01                 STORAGE           79.26      1.59       0.0


************
Link Summary
************
Name             From Node        To Node          Type            Length    %Slope Roughness
---------------------------------------------------------------------------------------------
CBMH02-CBMH01    CBMH02           CBMH01           CONDUIT           11.8    0.5085    0.0130
CBMH03-MH01      CBMH03           MH01             CONDUIT            8.0    0.1250    0.0130
CBMH04-CBMH03    CBMH04           CBMH03           CONDUIT           14.0    0.0714    0.0130
MH01-CBMH02      MH01             CBMH02           CONDUIT           10.5    0.3810    0.0130
OR1              CBMH01           MH02             ORIFICE


********************
Cross Section Summary
********************
                                    Full     Full     Hyd.     Max.   No. of     Full
Conduit          Shape             Depth     Area     Rad.    Width  Barrels     Flow
-----------------------------------------------------------------------------------
CBMH02-CBMH01    CIRCULAR           0.25     0.05     0.06     0.25        1    44.24
CBMH03-MH01      CIRCULAR           0.61     0.29     0.15     0.61        1   226.88
CBMH04-CBMH03    CIRCULAR           0.91     0.66     0.23     0.91        1   504.19
MH01-CBMH02      CIRCULAR           0.30     0.07     0.08     0.30        1    62.38


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

****************
Analysis Options
****************
Flow Units ............... LPS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
```

```
Surcharge Method ......... EXTRAN
Starting Date ............ 07/23/2020 00:00:00
Ending Date .............. 07/25/2020 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:05:00
Dry Time Step ............ 00:05:00
Routing Time Step ........ 5.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 1
Head Tolerance ........... 0.001500 m
```

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	0.004	71.667
Evaporation Loss	0.000	0.000
Infiltration Loss	0.001	15.279
Surface Runoff	0.004	56.491
Final Storage	0.000	0.619
Continuity Error (%)	-1.009	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.004	0.035
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.004	0.035
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	-0.161	

```
*************************
Highest Continuity Errors
*************************
Node CBMH03 (-1.06%)
```

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

```
*******************************
Highest Flow Instability Indexes
*******************************
Link CBMH03-MH01 (3)
Link MH01-CBMH02 (3)
Link CBMH04-CBMH03 (3)
Link CBMH02-CBMH01 (1)
```

```
************************
Routing Time Step Summary
************************
Minimum Time Step           :     0.93 sec
Average Time Step           :     4.98 sec
Maximum Time Step           :     5.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     2.03
Percent Not Converging      :     0.00
```

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

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
A-3	71.67	0.00	0.00	15.28	46.60	9.90	56.49	0.04	27.84	0.788

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

	Average	Maximum	Maximum	Time of Max	Reported

Node	Type	Depth Meters	Depth Meters	HGL Meters	Occurrence days hr:min	Max Depth Meters
MH02	OUTFALL	0.00	0.00	79.02	0 00:00	0.00
CBMH01	STORAGE	0.04	0.89	80.04	0 01:32	0.88
CBMH02	STORAGE	0.04	0.83	80.04	0 01:32	0.82
CBMH03	STORAGE	0.03	0.76	80.04	0 01:33	0.76
CBMH04	STORAGE	0.03	0.74	80.04	0 01:33	0.74
MH01	STORAGE	0.03	0.78	80.04	0 01:32	0.78

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
MH02	OUTFALL	0.00	3.48	0 01:32	0	0.0351	0.000
CBMH01	STORAGE	0.00	4.64	0 01:17	0	0.0351	0.028
CBMH02	STORAGE	0.00	7.06	0 01:10	0	0.0349	-0.529
CBMH03	STORAGE	0.00	20.03	0 01:09	0	0.0348	-1.048
CBMH04	STORAGE	27.84	27.84	0 01:10	0.035	0.035	0.676
MH01	STORAGE	0.00	10.39	0 01:10	0	0.0352	0.724

****
Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
CBMH01	0.000	5	0	0	0.001	98	0 01:32	3.48
CBMH02	0.000	3	0	0	0.002	76	0 01:32	4.64
CBMH03	0.000	2	0	0	0.002	39	0 01:33	10.39
CBMH04	0.000	1	0	0	0.002	37	0 01:33	20.03
MH01	0.000	2	0	0	0.001	49	0 01:32	7.06

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
MH02	9.46	2.24	3.48	0.035
System	9.46	2.24	3.48	0.035

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
CBMH02-CBMH01	CONDUIT	4.64	0 01:17	0.30	0.10	1.00
CBMH03-MH01	CONDUIT	10.39	0 01:10	0.36	0.05	1.00
CBMH04-CBMH03	CONDUIT	20.03	0 01:09	0.30	0.04	0.81
MH01-CBMH02	CONDUIT	7.06	0 01:10	0.37	0.11	1.00
OR1	ORIFICE	3.48	0 01:32			1.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
CBMH02-CBMH01	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.27	0.00
CBMH03-MH01	1.00	0.00	0.00	0.00	0.09	0.00	0.00	0.91	0.00	0.00
CBMH04-CBMH03	1.00	0.00	0.00	0.00	0.09	0.00	0.00	0.91	0.00	0.00
MH01-CBMH02	1.00	0.01	0.00	0.00	0.08	0.00	0.00	0.91	0.00	0.00

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Upstream	Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
CBMH02-CBMH01	2.66	2.66	2.93	0.01	0.01
CBMH03-MH01	0.95	0.95	0.98	0.01	0.01
MH01-CBMH02	2.26	2.26	2.42	0.01	0.01

Analysis begun on: Wed Jul 29 14:57:32 2020
Analysis ended on: Wed Jul 29 14:57:32 2020
Total elapsed time: < 1 sec

Structures	Size (mm)	Area (m^2)	T/G	Inv IN	Inv OUT
CBMH 01	1219	1.17	80.05	79.15	79.15
CBMH 02	1524	1.82	80.30	79.22	79.21
STM MH 01	1219	1.17	80.85	79.27	79.26
CBMH 03	1829	2.63	81.20	79.29	79.28
CBMH 04	1829	2.63	81.30	79.68	79.30

PI = 3.141592654
pipe I.D.= 251 (250 nominal pvc)
U/G Pipe Volume

End Area	0.050	(m^2)
Total Length	10.5	(m)
Pipe Volume	0.5	(m^3)

PI = 3.1415927
pipe I.D.= 299 (300 nominal pvc)
U/G Pipe Volume

End Area	0.070	(m^2)
Total Length	9.2	(m)
Pipe Volume	0.7	(m^3)

PI = 3.14159265
pipe I.D.= 598 (600 nominal pvc)
U/G Pipe Volume

End Area	0.281	(m^2)
Total Length	7.9	(m)
Pipe Volume	2.2	(m^3)

PI = 3.141593
pipe I.D.= 914 (900 nominal conc)
U/G Pipe Volume

End Area	0.657	(m^2)
Total Length	13.8	(m)
Pipe Volume	9.1	(m^3)

Area A-3: Storage Table

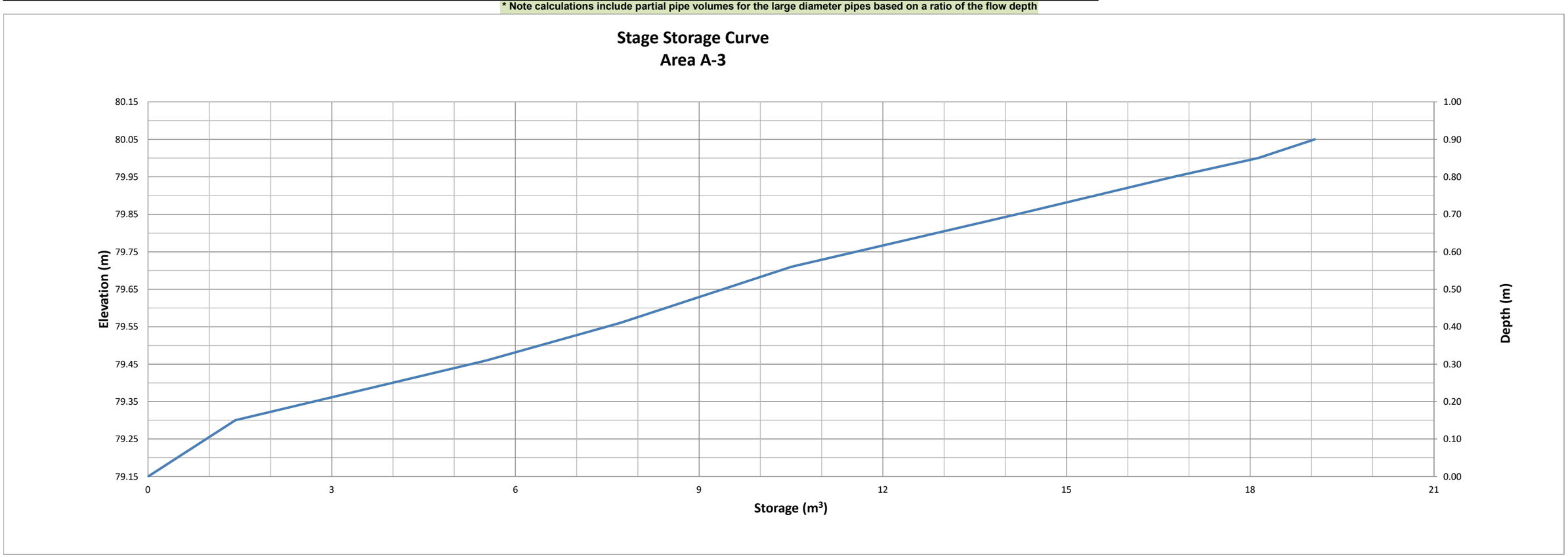
Elevation (m)	System Depth (m)	CBMH 01 Volume (m^3)	CBMH 02 Volume (m^3)	STM MH 01 Volume (m^3)	CBMH 03 Volume (m^3)	CBMH 04 Volume (m^3)	Underground Storage Combined Volume (m^3)	Surface Storage CBMH 01 Area (m^2)	CBMH 01 Volume (m^3)	CBMH 03 Area (m^2)	CBMH 03 Volume (m^3)	CBMH 04 Area (m^2)	CBMH 04 Volume (m^3)	Total Storage Ponding Volume (m^3)	**Total Volume (m^3)**	Design Head
79.15	0.00	0.00	-	-	-	-	-	-	-	-	-	-	-	-	**0**	-
79.30	0.15	0.18	0.16	0.05	0.05	0.00	1.42	-	-	-	-	-	-	-	**1.4**	0.15
79.46	0.31	0.36	0.46	0.23	0.47	0.42	5.53	-	-	-	-	-	-	-	**5.5**	0.31
79.56	0.41	0.48	0.64	0.35	0.74	0.68	7.71	-	-	-	-	-	-	-	**7.7**	0.41
79.71	0.56	0.65	0.91	0.53	1.13	1.08	10.51	-	-	-	-	-	-	-	**10.5**	0.56
79.85	0.70	0.82	1.17	0.69	1.50	1.45	14.18	-	-	-	-	-	-	-	**14.2**	0.70
79.95	0.80	0.93	1.35	0.81	1.76	1.71	16.75	0.00	0.00	0.00	0.00	0.00	0.00	0.0	**16.8**	0.80
80.00	0.85	0.99	1.44	0.86	1.89	1.84	18.13	0.00	0.00	0.00	0.00	0.00	0.00	0.0	**18.1**	0.85
80.05	0.90	1.05	1.53	0.92	2.02	1.97	19.05	0.00	0.00	0.00	0.00	0.00	0.00	0.0	**19.1**	0.90

*** Note calculations include partial pipe volumes for the large diameter pipes based on a ratio of the flow depth**

U/G Pipe Size	250mm dia.	300mm dia.
Pipe Segment	CBMH 01 - CBMH 02	CBMH 02 - STM MH 01
Centre-Centre Length	11.8	10.5
Inside Structure	1.3	1.3
U/G Storage Length	10.5	9.2

U/G Pipe Size	600mm dia.	900mm dia.
Pipe Segment	STM MH 01 - CBMH 03	CBMH 03 - CBMH 04
Centre-Centre Length	9.4	15.6
Inside Structure	1.5	1.8
U/G Storage Length	7.9	13.8

Total available storage to the obvert of the 900 dia. pipe would exceed 22cu.m.



Proposed 9-Storey Residential Development
Novatech Project No. 119019
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA B-1 Controlled Internal SWM Tank

OTTAWA IDF CURVE

Area = 0.013 ha Qallow = 1.26 L/s
C = 0.90 Vol(max) = 0.7 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	3.37	2.11	0.63
10	76.81	2.50	1.24	0.74
15	61.77	2.01	0.75	0.67
20	52.03	1.69	0.43	0.52
25	45.17	1.47	0.21	0.31
30	40.04	1.30	0.04	0.08
35	36.06	1.17	-0.09	-0.18
40	32.86	1.07	-0.19	-0.46
45	30.24	0.98	-0.28	-0.75
50	28.04	0.91	-0.35	-1.04
55	26.17	0.85	-0.41	-1.35
60	24.56	0.80	-0.46	-1.66
65	23.15	0.75	-0.51	-1.98
70	21.91	0.71	-0.55	-2.30
75	20.81	0.68	-0.58	-2.62
90	18.14	0.59	-0.67	-3.62
105	16.13	0.52	-0.74	-4.63
120	14.56	0.47	-0.79	-5.66
135	13.30	0.43	-0.83	-6.70
150	12.25	0.40	-0.86	-7.75

Proposed 9-Storey Residential Development
Novatech Project No. 119019
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA B-1 Controlled Internal SWM Tank

OTTAWA IDF CURVE

Area = 0.013 ha Qallow = 1.26 L/s
C = 0.90 Vol(max) = 1.3 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	4.59	3.33	1.00
10	104.19	3.39	2.13	1.28
15	83.56	2.72	1.46	1.31
20	70.25	2.28	1.02	1.23
25	60.90	1.98	0.72	1.08
30	53.93	1.75	0.49	0.89
35	48.52	1.58	0.32	0.67
40	44.18	1.44	0.18	0.43
45	40.63	1.32	0.06	0.17
50	37.65	1.22	-0.04	-0.11
55	35.12	1.14	-0.12	-0.39
60	32.94	1.07	-0.19	-0.68
65	31.04	1.01	-0.25	-0.98
70	29.37	0.96	-0.30	-1.28
75	27.89	0.91	-0.35	-1.59
90	24.29	0.79	-0.47	-2.54
105	21.58	0.70	-0.56	-3.52
120	19.47	0.63	-0.63	-4.51
135	17.76	0.58	-0.68	-5.53
150	16.36	0.53	-0.73	-6.55

Proposed 9-Storey Residential Development
Novatech Project No. 119019
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA B-1 Controlled Internal SWM Tank

OTTAWA IDF CURVE

Area = 0.013 ha Qallow = 1.26 L/s
C = 1.00 Vol(max) = 3.7 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	8.77	7.51	2.25
10	178.56	6.45	5.19	3.12
15	142.89	5.16	3.90	3.51
20	119.95	4.34	3.08	3.69
25	103.85	3.75	2.49	3.74
30	91.87	3.32	2.06	3.71
35	82.58	2.98	1.72	3.62
40	75.15	2.72	1.46	3.49
45	69.05	2.50	1.24	3.34
50	63.95	2.31	1.05	3.15
55	59.62	2.15	0.89	2.95
60	55.89	2.02	0.76	2.74
65	52.65	1.90	0.64	2.51
70	49.79	1.80	0.54	2.27
75	47.26	1.71	0.45	2.02
90	41.11	1.49	0.23	1.22
105	36.50	1.32	0.06	0.37
120	32.89	1.19	-0.07	-0.51
135	30.00	1.08	-0.18	-1.42
150	27.61	1.00	-0.26	-2.36

Proposed 9-Storey Residential Development
Novatech Project No. 119019
REQUIRED STORAGE - 1:100 YR + 20% IDF Increase
AREA B-1 Controlled Internal SWM Tank

OTTAWA IDF CURVE

Area = 0.013 ha Qallow = 1.26 L/s
C = 1.00 Vol(max) = 4.9 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	10.53	9.27	2.78
10	214.27	7.74	6.48	3.89
15	171.47	6.20	4.94	4.44
20	143.94	5.20	3.94	4.73
25	124.62	4.50	3.24	4.87
30	110.24	3.98	2.72	4.90
35	99.09	3.58	2.32	4.87
40	90.17	3.26	2.00	4.80
45	82.86	2.99	1.73	4.68
50	76.74	2.77	1.51	4.54
55	71.55	2.59	1.33	4.38
60	67.07	2.42	1.16	4.19
65	63.18	2.28	1.02	3.99
70	59.75	2.16	0.90	3.78
75	56.71	2.05	0.79	3.55
90	49.33	1.78	0.52	2.82
105	43.80	1.58	0.32	2.03
120	39.47	1.43	0.17	1.20
135	36.00	1.30	0.04	0.33
150	33.13	1.20	-0.06	-0.56

Proposed 9-Storey Residential Development
Novatech Project No. 119019
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-1 **Controlled Roof Drain #1**

OTTAWA IDF CURVE

Area =	0.012	ha	Qallow =	0.95	L/s
C =	0.90		Vol(max) =	1.4	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	4.24	3.29	0.99
10	104.19	3.13	2.18	1.31
15	83.56	2.51	1.56	1.40
20	70.25	2.11	1.16	1.39
25	60.90	1.83	0.88	1.32
30	53.93	1.62	0.67	1.20
35	48.52	1.46	0.51	1.06
40	44.18	1.33	0.38	0.90
45	40.63	1.22	0.27	0.73
50	37.65	1.13	0.18	0.54
55	35.12	1.05	0.10	0.34
60	32.94	0.99	0.04	0.14
65	31.04	0.93	-0.02	-0.07
70	29.37	0.88	-0.07	-0.29
75	27.89	0.84	-0.11	-0.51
90	24.29	0.73	-0.22	-1.19
105	21.58	0.65	-0.30	-1.90
120	19.47	0.58	-0.37	-2.63

Proposed 9-Storey Residential Development
Novatech Project No. 119019
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-1 **Controlled Roof Drain #1**

OTTAWA IDF CURVE

Area =	0.012	ha	Qallow =	1.58	L/s
C =	1.00		Vol(max) =	2.9	m3

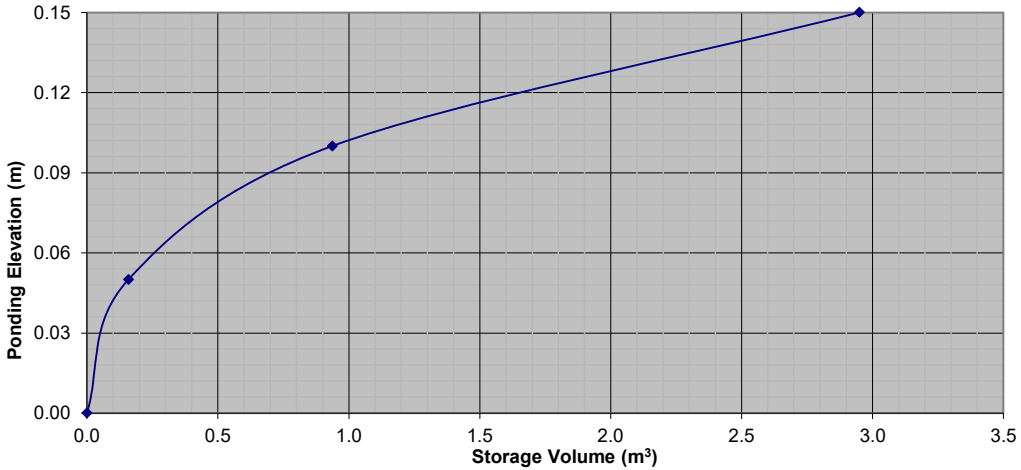
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	8.10	6.52	1.95
10	178.56	5.96	4.38	2.63
15	142.89	4.77	3.19	2.87
20	119.95	4.00	2.42	2.91
25	103.85	3.46	1.88	2.83
30	91.87	3.06	1.48	2.67
35	82.58	2.75	1.17	2.47
40	75.15	2.51	0.93	2.22
45	69.05	2.30	0.72	1.95
50	63.95	2.13	0.55	1.66
55	59.62	1.99	0.41	1.35
60	55.89	1.86	0.28	1.02
65	52.65	1.76	0.18	0.69
70	49.79	1.66	0.08	0.34
75	47.26	1.58	0.00	-0.02
90	41.11	1.37	-0.21	-1.13
105	36.50	1.22	-0.36	-2.28
120	32.89	1.10	-0.48	-3.47

Watts Accutrol Flow Control Roof Drains:		RD-100-A-ADJ set to 3/4 Exposed			
Design Event	**Flow/Drain (L/s)**	**Total Flow (L/s)**	**Ponding (cm)**	**Storage (m^3) Required**	**Provided**
1:5 Year	0.95	0.95	11	1.4	2.9
1:100 Year	1.58	1.58	15	2.9	2.9

Roof Drain Storage Table for Area RD 1

Elevation	Area RD 1	Total Volume
m	m^2	m^3
0.00	0	0
0.05	6.36	0.2
0.10	24.76	0.9
0.15	55.71	2.9

Stage Storage Curve: Area R-1
Controlled Roof Drain #1



Proposed 9-Storey Residential Development
Novatech Project No. 119019
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-1 **Controlled Roof Drain #2**

OTTAWA IDF CURVE

Area =	0.002	ha	Qallow =	0.32	L/s
C =	0.90		Vol(max) =	0.1	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	0.71	0.39	0.12
10	104.19	0.52	0.20	0.12
15	83.56	0.42	0.10	0.09
20	70.25	0.35	0.03	0.04
25	60.90	0.30	-0.02	-0.02
30	53.93	0.27	-0.05	-0.09
35	48.52	0.24	-0.08	-0.16
40	44.18	0.22	-0.10	-0.24
45	40.63	0.20	-0.12	-0.32
50	37.65	0.19	-0.13	-0.39
55	35.12	0.18	-0.14	-0.48
60	32.94	0.16	-0.16	-0.56
65	31.04	0.16	-0.16	-0.64
70	29.37	0.15	-0.17	-0.73
75	27.89	0.14	-0.18	-0.81
90	24.29	0.12	-0.20	-1.07
105	21.58	0.11	-0.21	-1.34
120	19.47	0.10	-0.22	-1.60

Proposed 9-Storey Residential Development
Novatech Project No. 119019
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-1 **Controlled Roof Drain #2**

OTTAWA IDF CURVE

Area =	0.002	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	0.4	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	1.35	1.03	0.31
10	178.56	0.99	0.67	0.40
15	142.89	0.79	0.47	0.43
20	119.95	0.67	0.35	0.42
25	103.85	0.58	0.26	0.39
30	91.87	0.51	0.19	0.34
35	82.58	0.46	0.14	0.29
40	75.15	0.42	0.10	0.23
45	69.05	0.38	0.06	0.17
50	63.95	0.36	0.04	0.11
55	59.62	0.33	0.01	0.04
60	55.89	0.31	-0.01	-0.03
65	52.65	0.29	-0.03	-0.11
70	49.79	0.28	-0.04	-0.18
75	47.26	0.26	-0.06	-0.26
90	41.11	0.23	-0.09	-0.49
105	36.50	0.20	-0.12	-0.74
120	32.89	0.18	-0.14	-0.99

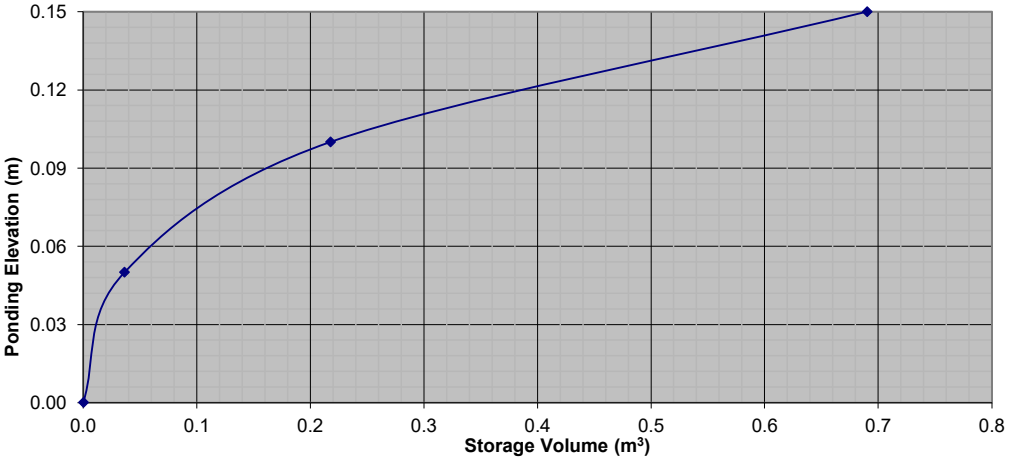
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to Closed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:5 Year	0.32	0.32	7	0.1	0.7
1:100 Year	0.32	0.32	12	0.4	0.7

Roof Drain Storage Table for Area RD 2

Elevation	Area RD 2	Total Volume
m	m^2	m^3
0.00	0	0
0.05	1.45	0.0
0.10	5.81	0.2
0.15	13.08	0.7

Stage Storage Curve: Area R-1
Controlled Roof Drain #2



Proposed 9-Storey Residential Development
Novatech Project No. 119019
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-1 **Controlled Roof Drain #3**

OTTAWA IDF CURVE

Area =	0.016	ha	Qallow =	0.79	L/s
C =	0.90		Vol(max) =	2.4	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	5.48	4.69	1.41
10	104.19	4.04	3.25	1.95
15	83.56	3.24	2.45	2.21
20	70.25	2.72	1.93	2.32
25	60.90	2.36	1.57	2.36
30	53.93	2.09	1.30	2.34
35	48.52	1.88	1.09	2.29
40	44.18	1.71	0.92	2.22
45	40.63	1.58	0.79	2.12
50	37.65	1.46	0.67	2.01
55	35.12	1.36	0.57	1.89
60	32.94	1.28	0.49	1.76
65	31.04	1.20	0.41	1.61
70	29.37	1.14	0.35	1.47
75	27.89	1.08	0.29	1.31
90	24.29	0.94	0.15	0.82
105	21.58	0.84	0.05	0.30
120	19.47	0.75	-0.04	-0.25

Proposed 9-Storey Residential Development
Novatech Project No. 119019
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-1 **Controlled Roof Drain #3**

OTTAWA IDF CURVE

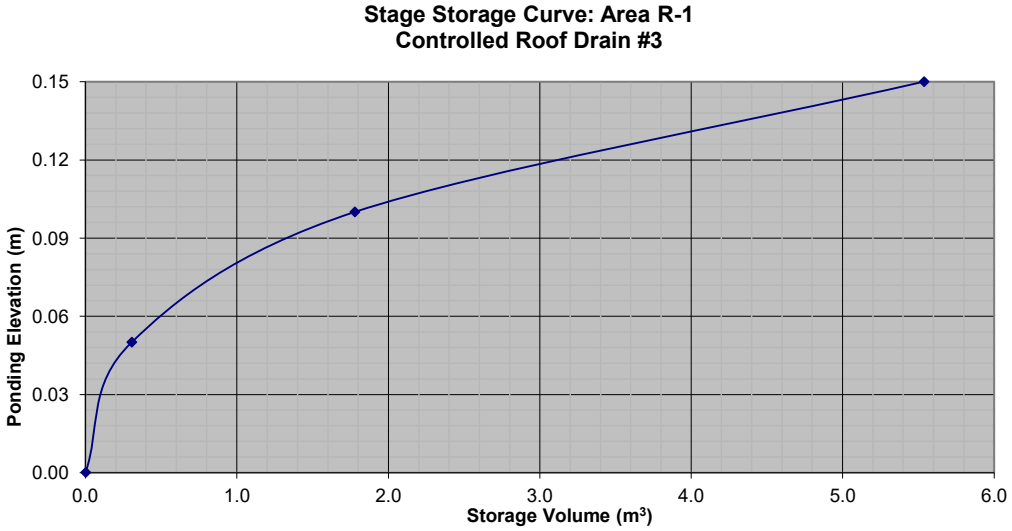
Area =	0.016	ha	Qallow =	0.95	L/s
C =	1.00		Vol(max) =	5.5	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	10.46	9.51	2.85
10	178.56	7.69	6.74	4.05
15	142.89	6.16	5.21	4.69
20	119.95	5.17	4.22	5.06
25	103.85	4.47	3.52	5.29
30	91.87	3.96	3.01	5.42
35	82.58	3.56	2.61	5.48
40	75.15	3.24	2.29	5.49
45	69.05	2.98	2.03	5.47
50	63.95	2.76	1.81	5.42
55	59.62	2.57	1.62	5.34
60	55.89	2.41	1.46	5.25
65	52.65	2.27	1.32	5.14
70	49.79	2.15	1.20	5.02
75	47.26	2.04	1.09	4.89
90	41.11	1.77	0.82	4.44
105	36.50	1.57	0.62	3.92
120	32.89	1.42	0.47	3.37

Watts Accutrol Flow Control Roof Drains:		RD-100-A-ADJ set to 1/4 Exposed			
Design Event	**Flow/Drain (L/s)**	**Total Flow (L/s)**	**Ponding (cm)**	**Storage (m^3)**	
				Required	**Provided**
1:5 Year	0.79	0.79	11	2.4	5.5
1:100 Year	0.95	0.95	15	5.5	5.5

Roof Drain Storage Table for Area RD 3

Elevation	Area RD 3	Total Volume
m	m^2	m^3
0.00	0	0
0.05	12.19	0.3
0.10	46.78	1.8
0.15	103.51	5.5



Proposed 9-Storey Residential Development
Novatech Project No. 119019
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-1 **Controlled Roof Drain #4**

OTTAWA IDF CURVE

Area =	0.012	ha	Qallow =	0.32	L/s
C =	0.90		Vol(max) =	2.3	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	4.13	3.81	1.14
10	104.19	3.05	2.73	1.64
15	83.56	2.45	2.13	1.91
20	70.25	2.06	1.74	2.08
25	60.90	1.78	1.46	2.19
30	53.93	1.58	1.26	2.27
35	48.52	1.42	1.10	2.31
40	44.18	1.29	0.97	2.34
45	40.63	1.19	0.87	2.35
50	37.65	1.10	0.78	2.35
55	35.12	1.03	0.71	2.34
60	32.94	0.96	0.64	2.32
65	31.04	0.91	0.59	2.30
70	29.37	0.86	0.54	2.27
75	27.89	0.82	0.50	2.23
90	24.29	0.71	0.39	2.11
105	21.58	0.63	0.31	1.96
120	19.47	0.57	0.25	1.80

Proposed 9-Storey Residential Development
Novatech Project No. 119019
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-1 **Controlled Roof Drain #4**

OTTAWA IDF CURVE

Area =	0.012	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	5.5	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	7.89	7.57	2.27
10	178.56	5.81	5.49	3.29
15	142.89	4.65	4.33	3.89
20	119.95	3.90	3.58	4.30
25	103.85	3.38	3.06	4.59
30	91.87	2.99	2.67	4.80
35	82.58	2.69	2.37	4.97
40	75.15	2.44	2.12	5.10
45	69.05	2.25	1.93	5.20
50	63.95	2.08	1.76	5.28
55	59.62	1.94	1.62	5.34
60	55.89	1.82	1.50	5.39
65	52.65	1.71	1.39	5.43
70	49.79	1.62	1.30	5.46
75	47.26	1.54	1.22	5.48
90	41.11	1.34	1.02	5.49
105	36.50	1.19	0.87	5.46
120	32.89	1.07	0.75	5.40

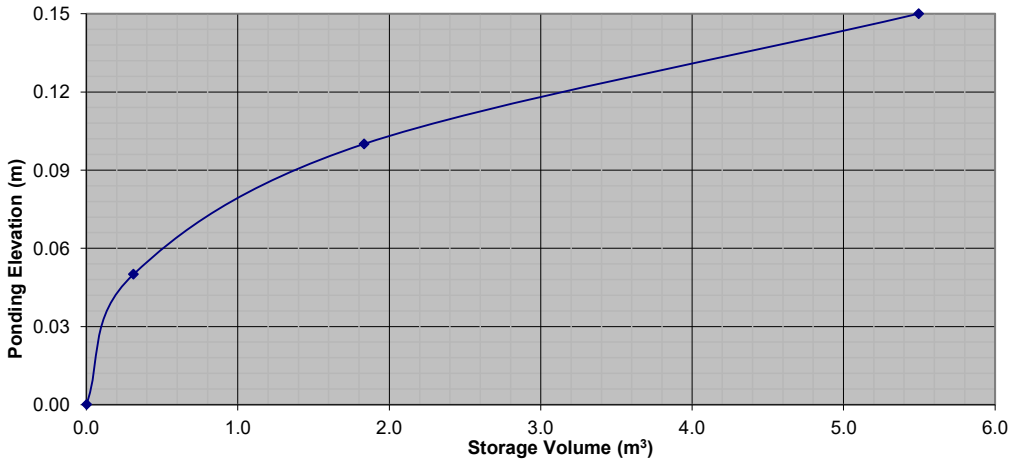
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to Closed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:5 Year	0.32	0.32	11	2.3	5.5
1:100 Year	0.32	0.32	15	5.5	5.5

Roof Drain Storage Table for Area RD 4

Elevation	Area RD 4	Total Volume
m	m^2	m^3
0.00	0	0
0.05	12.39	0.3
0.10	48.57	1.8
0.15	97.88	5.5

Stage Storage Curve: Area R-1
Controlled Roof Drain #4



Proposed 9-Storey Residential Development
Novatech Project No. 119019
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-1 **Controlled Roof Drain #5**

OTTAWA IDF CURVE

Area =	0.004	ha	Qallow =	0.79	L/s
C =	0.90		Vol(max) =	0.2	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	1.31	0.52	0.16
10	104.19	0.96	0.17	0.10
15	83.56	0.77	-0.02	-0.01
20	70.25	0.65	-0.14	-0.17
25	60.90	0.56	-0.23	-0.34
30	53.93	0.50	-0.29	-0.52
35	48.52	0.45	-0.34	-0.72
40	44.18	0.41	-0.38	-0.91
45	40.63	0.38	-0.41	-1.12
50	37.65	0.35	-0.44	-1.32
55	35.12	0.33	-0.46	-1.53
60	32.94	0.30	-0.49	-1.75
65	31.04	0.29	-0.50	-1.96
70	29.37	0.27	-0.52	-2.18
75	27.89	0.26	-0.53	-2.39
90	24.29	0.22	-0.57	-3.05
105	21.58	0.20	-0.59	-3.72
120	19.47	0.18	-0.61	-4.39

Proposed 9-Storey Residential Development
Novatech Project No. 119019
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-1 **Controlled Roof Drain #5**

OTTAWA IDF CURVE

Area =	0.004	ha	Qallow =	0.87	L/s
C =	1.00		Vol(max) =	0.6	m3

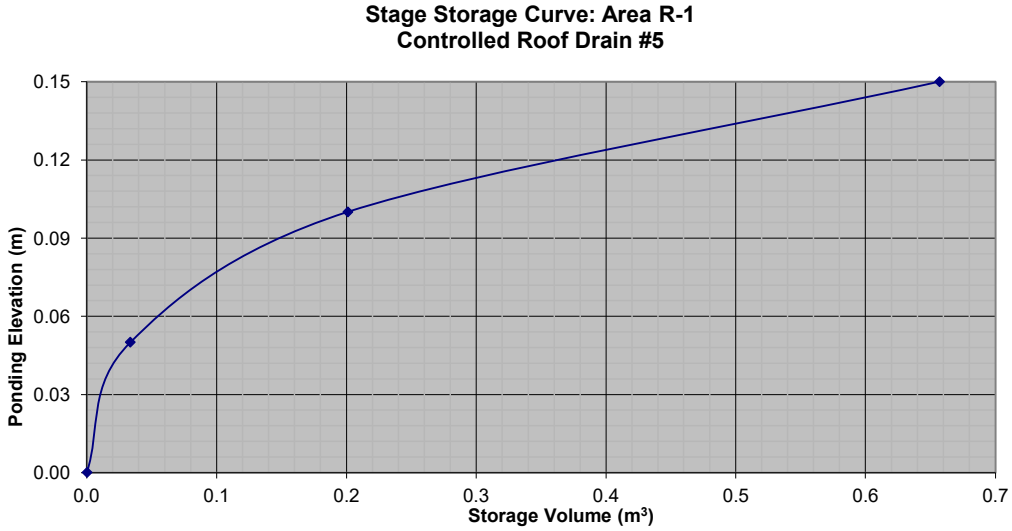
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	2.50	1.63	0.49
10	178.56	1.84	0.97	0.58
15	142.89	1.47	0.60	0.54
20	119.95	1.23	0.36	0.44
25	103.85	1.07	0.20	0.30
30	91.87	0.94	0.07	0.13
35	82.58	0.85	-0.02	-0.04
40	75.15	0.77	-0.10	-0.23
45	69.05	0.71	-0.16	-0.43
50	63.95	0.66	-0.21	-0.64
55	59.62	0.61	-0.26	-0.85
60	55.89	0.57	-0.30	-1.06
65	52.65	0.54	-0.33	-1.28
70	49.79	0.51	-0.36	-1.50
75	47.26	0.49	-0.38	-1.73
90	41.11	0.42	-0.45	-2.41
105	36.50	0.38	-0.49	-3.12
120	32.89	0.34	-0.53	-3.83

Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to 1/4 Exposed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:5 Year	0.79	0.79	10	0.2	0.7
1:100 Year	0.87	0.87	14	0.6	0.7

Roof Drain Storage Table for Area RD 5

Elevation	Area RD 5	Total Volume
m	m^2	m^3
0.00	0	0
0.05	1.34	0.0
0.10	5.36	0.2
0.15	12.87	0.7



APPENDIX E

Sanitary and Storm Sewer Design Sheets

593 Laurier Avenue - Residential Development
1:2 Year Storm Sewer Design Sheet

PROJECT : 119019
DESIGNED BY: SM
CHECKED BY: MS
DATE: July 31, 2020

NOVATECH
Engineers, Planners & Landscape Architects

AREA	FROM MH	TO MH	AREA (ha)			INDIV 2.78 AC	ACCUM 2.78 AC	TIME OF CONC. (min)	RAINFALL INTENSITY (mm/hr)	CONTROLLED FLOW* Q (L/s)	PEAK FLOW Q (L/s)	PROPOSED SEWER								
			C= 0.20	C = 0.60	C = 0.90							TYPE OF PIPE	PIPE SIZE (mm)	PIPE ID (mm)	GRADE (%)	LENGTH (m)	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	TIME OF FLOW (min)	PERCENTAGE OF CAPACITY
A-3 Controlled	CBMH 04	CBMH 03	0.007		0.005	0.02	0.02	10.00	76.81		1.3	CONC	900	914.0	0.10	14.0	**596.5**	0.91	0.26	0%
A-3 Controlled	CBMH 03	STM MH 01	0.006		0.014	0.04	0.05	10.26	75.83		5.4	PVC	600	594.0	0.10	8.0	**189.0**	0.68	0.20	3%
A-3 Controlled	STM MH 01	CBMH 02	0.005		0.009	0.03	0.04	10.26	75.83		8.6	PVC	300	299.4	0.35	10.5	**56.9**	0.81	0.22	15%
A-3 Controlled	CBMH 02	CBMH 01	0.003		0.013	0.03	0.09	10.45	75.11		15.3	PVC	250	251.5	0.50	11.8	**42.7**	0.86	0.23	36%
								10.68												
Controlled Flow From A-3			**A-3 is controlled to a maximum of 3.5 L/s by a Hydrovex ICD in the outlet pipe of CBMH 01**							**3.5**	**3.5**	PVC	250	251.5	0.50	11.3	**42.7**	0.86	0.22	**8%**
Storm Outlet to Municipal Sewer	CBMH 01	COMB MH 02	0.001		0.019	0.05	0.14	10.68	74.29		3.5	PVC	250	251.5	0.50	11.3	**42.7**	0.86	0.22	8%
								10.90												

NOTES:

1) Refer to Novatech DSS & SWM Report (R-2019-193) for storm drainage and stormwater details.

2) Refer to Novatech Drawing 119019-GP and 119019-PR for storm structure designations, storm pipe details and control structure tables.

3) Refer to Novatech Drawing 119019-SWM for the on-site tributary drainage areas and sketch STM-1 for specific sewer design sheet pipe segment breakdowns.

LEGEND

0.014 / CBMH 02 / 0.65 — DRAINAGE AREA (ha) / DOWNSTREAM STRUCTURE I.D. / 1:5 YEAR WEIGHTED RUNOFF COEFFICIENT

SANITARY SEWER, MH AND FLOW DIRECTION

DRAINAGE AREA BOUNDARY

593 LAURIER AVE
PROPOSED 9-STOREY
MID-RISE APARTMENT
GFE=82.45
BFE=79.50
SUB-BASEMENT=76.80
USF=77.70
LOW USF=75.30

AD 01 T/G=81.30
AD 02 T/G=81.30
CBMH 04 T/G=81.30
CBMH 03 T/G=81.20
STM MH 01 T/G=80.85
CBMH 02 T/G=80.30
CBMH 01 T/G=80.05
COMB MH 01 T/G=81.00
COMB MH 02 T/G=80.95

0.012 / CBMH 03 / 0.49
0.020 / STM MH 01 / 0.69
0.014 / CBMH 02 / 0.65
0.016 / CBMH 01 / 0.77

4.0m-250mmØ HDPE STM @ 1.0%
10.0m-250mmØ HDPE STM @ 1.0%
14.0m-900mmØ CONC/25-D STM @ 0.1%
40.0m-600mmØ PVC DR35 STM @ 1.1%
10.5m-300mmØ PVC DR35 STM @ 0.3% c/w INSULATION
11.8m-250mmØ PVC DR35 STM @ 0.5% c/w INSULATION
11.3m-250mmØ PVC DR35 STM @ 0.5% c/w INSULATION
16.5m-250mmØ PVC DR35 COMBINED SEWER @ 0.5%
18.0m-250mmØ PVC DR35 COMBINED SEWER @ 0.5%

PROVIDE PERFORATED SUBDRAIN FOR PERVIOUS PAVER SYSTEM PER MANUFACTURER'S RECOMMENDATIONS. OUTLET TO NORTH INLET OF CBMH 1.

ICD

INV.E=78.84 (NEW 250Ø COMBINED)

COMB MH 01
T/G=81.00
INV.W=78.92 (250Ø COMBINED)
INV.N=TBD (EX.BLDG SERVICE)
INV.E=78.93 (250Ø COMBINED)

COMB MH 02
T/G=80.95
INV.W=79.02 (250Ø COMBINED)
INV.N=79.08 (250Ø STM SERVICE)
INV.N=79.12 (200Ø SAN SERVICE)
INV.NE=79.09 (250Ø STORM)

Existing 225mmø Combined Sewer
Existing 250mmø Combined Sewer
Existing 250mmø Combined Sewer

MH-Comb T/G=80.81 Inv.NE=78.69 Inv.SE=78.66
MH-Comb T/G=80.78 Inv.N=78.78 Inv.SW=78.74
MH-Comb T/G=81.00 Inv.SW=78.83

RD 1 RD 2 RD 3 RD 4 RD 5

LAURIER AVENUE
BRONSON AVENUE

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

593 LAURIER AVENUE

STORM DRAINAGE AREA SKETCH

SCALE 1 : 250 (0 2 4 6 8 10)
DATE JULY 2020 | JOB 119019 | FIGURE STM-1

M:\2019\119019\CAD\Design\119019-STM.dwg, STM, Aug 03, 2020 - 11:41am, smatthews

SHT11X17.DWG - 279mmX432mm

593 LAURIER
SANITARY FLOW

Heritage Home

Number of 1 Bedroom Units	4	
Persons per 1 Bedroom Unit	1.4	
Number of 2 Bedroom Units	3	
Persons per 2 Bedroom Unit	2.1	

Proposed Tower

Number of 1 Bedroom Units	45	
Persons per 1 Bedroom Unit	1.4	
Number of 2 Bedroom Units	12	
Persons per 2 Bedroom Unit	2.1	
Total Number of Units	64	
Total Population Equivalent	100	
Average Daily Flow	280	L/c/day
Peak Factor (Harmon Formula)	3.60	
Peak Residential Flow	**1.17**	**L/s**
Site Area	0.123	ha
Infiltration Allowance	0.33	L/s/ha
Peak Extraneous Flows	**0.04**	**L/s**
Total Peak Sanitary Flow	**1.21**	**L/s**

593 Laurier Avenue West - Residential Development
Combined Sewer Design Sheet

NOVATECH
Engineers, Planners & Landscape Architects

PROJECT : 119019
DESIGNED BY: SM
CHECKED BY: MS
DATE: July 29, 2020

Location			Residential		Commercial / Institutional		Residential Cumulative		Peak Factor		Residential	Infiltration		Foundation Drains		PEAK DESIGN FLOW (l/s)	Pipe Data					
Street / Area	From	To	Population	Area (ha)	Area (ha)	Accu. Area (ha)	Pop.	Area (ha)	Res Peak Factor	Comm Peak Factor	Acc. Peak Flow (l/s)	Infilt. Flow (l/s)	Accu Infil. Flow	Found. Flow (l/s)	Accu Found. Flow		Size (mm)	Slope (%)	Length (m)	Capacity (l/s)	Full Flow Vel. (m/s)	Q/Q_{full} (%)
593 Laurier Avenue W	**CBMH 01**	**COMB MH 02**	0.0	0.000	0.00	0.00	0.0	0.00	3.8	1.5	3.50	0.00	0.00	0.00	0.00	**3.50**	250	0.5	11.3	42.0	0.86	8.3%
593 Laurier Avenue W	**Bldg STM Service**	**COMB MH 02**	0.0	0.000	0.00	0.00	0.0	0.00	3.8	1.5	1.26	0.00	0.00	0.00	0.00	**1.26**	250	1.0	3.0	59.4	1.21	2.1%
593 Laurier Avenue W	**Bldg SAN Service**	**COMB MH 02**	100.1	0.123	0.00	0.00	100.1	0.12	3.6	1.5	1.17	0.04	0.04	0.00	0.00	**1.21**	200	1.0	3.0	32.8	1.04	3.7%
601 Laurier Avenue W	**COMB MH 02**	**COMB MH 01**	25.2	0.056	0.00	0.00	125.3	0.18	3.6	1.5	6.21	0.02	0.06	0.28	0.28	**6.55**	250	0.5	18.0	42.0	0.86	15.6%
603 Laurier Avenue W	**COMB MH 01**	Ex. Comb. MH	10.8	0.052	0.00	0.00	136.1	0.23	3.6	1.5	6.33	0.02	0.08	0.26	0.54	**6.95**	250	0.5	16.5	42.0	0.86	16.5%

City of Ottawa Sewer Design Guidelines

Apartment Units - Studio / 1-Bedroom	1.4	persons/unit	
Average Apartment Unit	1.8	persons/unit	
Apartment Units - 2-Bedroom	2.1	persons/unit	
Single Family Lot	3.4	persons/unit	
Average Townhome or Semi-Detached Unit	2.7	persons/unit	
Average Domestic Flow	280	L/person/day	
Institutional / Commercial Flow	28000	L/ha/day	
Extraneous Flows	0.33	L/s/ha	
Foundation Drain Allowance	5.0	L/s/ha	(use 5.0 L/s/ha for tributary areas < 10 ha; 3.0 L/s/ha for tributary areas >10 ha < 100 ha; 2.0 L/s/ha for tributary areas >100 ha)
Residential Peaking Factor	Harmon Equation, Correction Factor = 0.8		
Institutional / Commercial Peaking Factor	1.5		

Notes:

1) The average apt./persons per unit value of **1.8** was used when determining the apartment population for the properties at **601** and **603 Laurier Avenue West**.
2) Maximum Peak Flows of **3.5 L/s** from the controlled amenity areas of 593 Laurier Avenue West have been input from the maximum **Hydrovex (Model 75 VHV-1)** flows allowable in the outlet pipe of **CBMH 01**.
3) Maximum Pumped Flows of **1.26 L/s (20 usgpm)** from the controlled SWM Tank within 593 Laurier Avenue West have been input from the **maximum pump rate** allowable by the **internal mechanical pump system**.
4) It is assumed that stormwater from the flat roof buildings on the properties at **601** and **603 Laurier Avenue West** discharge to the surface along the north property line and are **not tributary** to the combined sewer in Cambridge Street North.

LEGEND

0.26 / 32594 / ○○ — DRAINAGE AREA (ha)
DOWNSTREAM MAINTENANCE HOLE
# of RESIDENTIAL UNITS / PEAK FLOW

SANITARY SEWER, MH AND FLOW DIRECTION

DRAINAGE AREA BOUNDARY

FOUNDATION DRAIN ALLOWANCE BOUNDARY

0.053 / 10723 / 6 | 0.13

0.056 / COMB MH 01 / 14 | 0.3

0.123 / COMB MH 02 / 46 | 1.21

INCL / COMB MH 02 / incl | 1.26

INCL / COMB MH 01 / ○ | 3.5

AD 01 T/G=81.30

AD 02 T/G=81.30

CBMH 04 T/G=81.30

CBMH 03 T/G=81.20

CBMH 02 T/G=80.30

CBMH 01 T/G=80.05

STM MH 01 T/G=80.85

RD 1 RD 2 RD 3 RD 4 RD 5

4.0m-250mmØ HDPE STM @ 1.0%

10.0m-250mmØ HDPE STM @ 1.0%

14.0m-900mmØ CONC 65-D STM @ 0.1%

8.0m-600mmØ PVC DR35 STM @ 0.1%

10.5m-300mmØ PVC DR35 STM @ 0.3% c/w INSULATION

11.8m-250mmØ PVC DR35 STM @ 0.5% c/w INSULATION

11.3m-250mmØ PVC DR35 STM @ 0.5% c/w INSULATION

16.5m-250mmØ PVC DR35 COMBINED SEWER @ 0.5%

18.0m-250mmØ PVC DR35 COMBINED SEWER @ 0.5%

EXISTING SANITARY SERVICE FROM HERITAGE HOME TO BE INTERCEPTED AND RE-ROUTED TO NEW BUILDING PLUMBING. REFER TO MECHANICAL PLANS FOR DETAILS.

ALL SANITARY FLOWS FROM THE LOWER LEVELS WILL HAVE TO BE CAPTURED INTERNALLY AND PUMPED TO THE BUILDING SANITARY SERVICE. SANITARY FLOWS FROM THE UPPER FLOOR LEVELS ABOVE ARE TO BE CONVEYED TO THE SANITARY BUILDING SERVICE BY GRAVITY, REFER TO MECHANICAL PLANS FOR DETAILS.

PROVIDE PERFORATED SUBDRAIN FOR PERVIOUS PAVER SYSTEM PER MANUFACTURER'S RECOMMENDATIONS. OUTLET TO NORTH INLET OF CBMH 1.

593 LAURIER AVE
PROPOSED 9-STOREY MID-RISE APARTMENT
GFE=82.45
BFE=79.50
SUB-BASEMENT=76.80
USF=77.70
LOW USF=75.30

MH-Comb T/G=81.00 Inv.W=78.83 Inv.E=78.84 (NEW 250Ø COMBINED)

COMB MH 01 T/G=81.00
INV.W=78.92 (250Ø COMBINED)
INV.N=TBD (EX.BLDG SERVICE)
INV.E=78.93 (250Ø COMBINED)

COMB MH 02 T/G=80.95
INV.W=79.02 (250Ø COMBINED)
INV.N=79.08 (250Ø STM SERVICE)
INV.N=79.12 (200Ø SAN SERVICE)
INV.NE=79.09 (250Ø STORM)

MH-Comb T/G=80.81 Inv.NE=78.69 Inv.SE=78.66

Existing 250mmØ Combined Sewer

MH-Comb T/G=80.78 Inv.N=78.78 Inv.SW=78.74

Existing 225mmØ Combined Sewer

Existing 250mmØ Combined Sewer

LAURIER AVENUE

BRONSON AVENUE

Concrete Sidewalk
Concrete Curb
Asphalt

NOVATECH
Engineers, Planners & Landscape Architects
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Facsimile (613) 254-5867
Website www.novatech-eng.com

593 LAURIER AVENUE

SANITARY DRAINAGE AREA SKETCH

SCALE 1 : 250 (0 2 4 6 8 10)

DATE JULY 2020 | JOB 119019 | FIGURE SAN-1

SHT11X17 DWG - 279mmX432mm

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APPENDIX F

Control Flow Rood Drain Information

WATTS®	Adjustable Accutrol Weir Tag: RD-100-A-ADJ	Adjustable Flow Control for Roof Drains

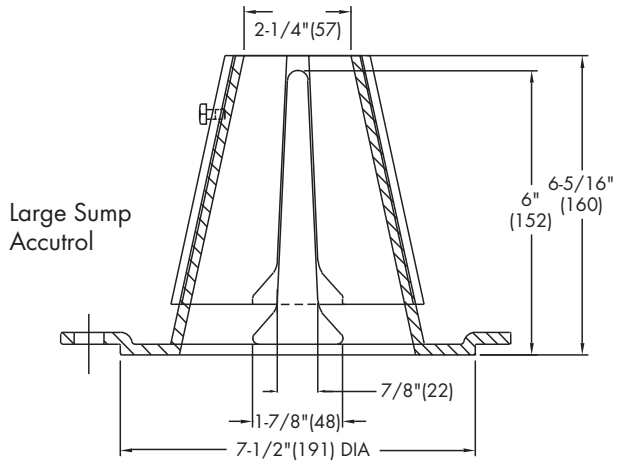
ADJUSTABLE ACCUTROL (for Large Sump Roof Drains only)

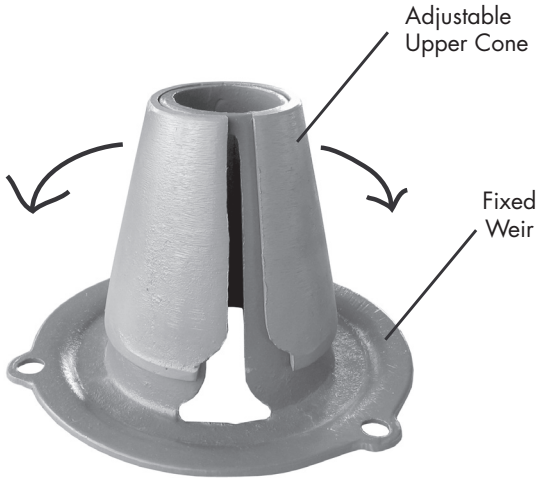
For more flexibility in controlling flow with heads deeper than 2", Watts Drainage offers the Adjustable Accutrol. The Adjustable Accutrol Weir is designed with a single parabolic opening that can be covered to restrict flow above 2" of head to less than 5 gpm per inch, up to 6" of head. To adjust the flow rate for depths over 2" of head, set the slot in the adjustable upper cone according to the flow rate required. Refer to Table 1 below.
Note: Flow rates are directly proportional to the amount of weir opening that is exposed.

EXAMPLE:

For example, if the adjustable upper cone is set to cover 1/2 of the weir opening, flow rates above 2"of head will be restricted to 2-1/2 gpm per inch of head.

Therefore, at 3"of head, the flow rate through the Accutrol Weir that has 1/2 the slot exposed will be:
[5 gpm (per inch of head) x 2 inches of head] + 2-1/2 gpm (for the third inch of head) = 12-1/2 gpm.





1/2 Weir Opening Exposed Shown Above

TABLE 1. Adjustable Accutrol Flow Rate Settings

Weir Opening Exposed	1"	2"	3"	4"	5"	6"
	Flow Rate (gallons per minute)					
Fully Exposed	5	10	15	20	25	30
3/4	5	10	13.75	17.5	21.25	25
1/2	5	10	12.5	15	17.5	20
1/4	5	10	11.25	12.5	13.75	15
Closed	5	5	5	5	5	5

Job Name _____ Contractor _____

Job Location _____ Contractor's P.O. No. _____

Engineer _____ Representative _____

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APPENDIX G

Inlet Control Device (ICD) Information

Steve Matthews

From: veronique.dufort@veolia.com on behalf of CSO, VWT Canada <cso@veolia.com>
Sent: Monday, July 27, 2020 1:10 PM
To: Steve Matthews
Cc: Miro Savic; Conrad Stang
Subject: Re: FW: 593 Laurier - Hydrovex Sizing Request
Attachments: NOVATECH_-_593_LAURIER_OTTAWA_ON.pdf

Hello,

Please find the flow rating curve documents.

Thank you,

Véronique Dufort

Le ven. 24 juill. 2020, à 17 h 04, Steve Matthews <S.Matthews@novatech-eng.com> a écrit :

> Hello,
>
> We have a small project in Ottawa that we are proposing to use a **Hydrovex ICD** and would like to request specific sizing and the flow rating curves to include in our stormwater management report.
>
> Can you please provide to appropriate information for us? The project is called **593 Laurier** and the unit is proposed to be installed in a **250mm dia. PVC DR35 outlet pipe** within **CBMH 01** (a 1200mm dia. maintenance hole with a 600mm sump).
>
> The peak flow rate we need the unit designed for is **3.5 L/s** at **0.9m of head** (measured from the upstream water elevation to the invert of the outlet pipe).
>
> We are hoping to submit the required documents for City approval before the end of next week and would appreciate if you were able to provide the necessary sizing and flow rating curve documents for our use.
>
> Regards,
>
> Steve
>
> **Stephen Matthews**, B.A.(Env), Senior Design Technologist

NOVATECH Engineers, Planners & Landscape Architects

240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 x 223 | Fax: 613.254.5867

--

VEOLIA WATER TECHNOLOGIES

Bureau/office: 514-334-7230 / télécopieur/fax:514-334-7519
4105 Sartelon, Saint-Laurent, QC H4S 2B3 Canada
www.veoliawatertechnologies.ca / www.veoliawatertech.com
ISO 9001:2015

Courriel / Email: cso@veolia.com
Visitez notre catalogue électronique: www.hydrovex.com
Utilisez notre outil de sélection: app.hydrovex.com

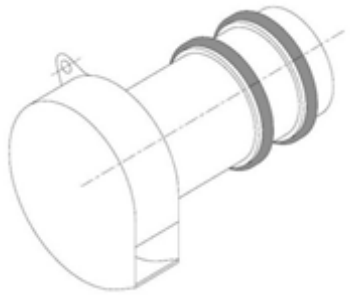
Veolia Water Technologies fournit des services et des solutions pour le traitement des eaux aux municipalités et industries à travers le Canada. **Nous continuons ainsi à vous servir pendant la pandémie de COVID-19.**

Veolia Water Technologies provides an array of water and wastewater services and solutions for municipalities and industries across Canada. **We therefore continue to serve you during the COVID-19 pandemic.**

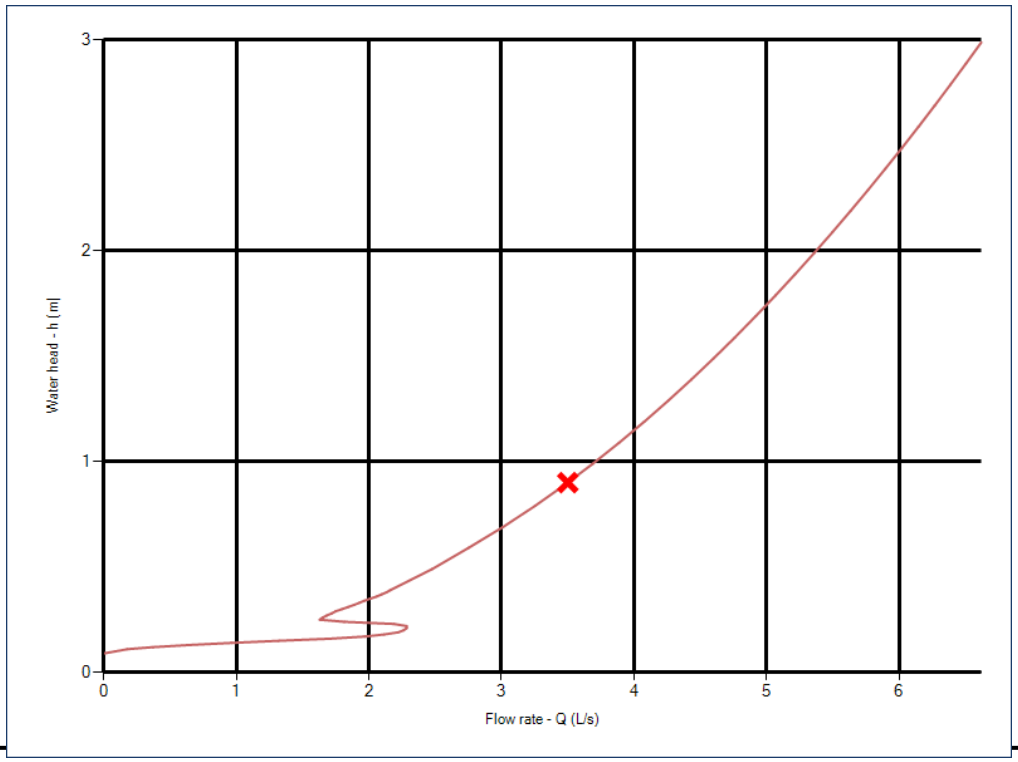
DATA SHEET
HYDROVEX® VHV
VORTEX REGULATOR

GENERAL INFORMATION

Application	Stormwater	
Project name	593 LAURIER, OTTAWA, ON	
Project number	NOVATECH	
Comment		
Regulator ID		
Design flow (Q)	3.5	L/s
Design head (h)	0.9	m
Outlet pipe diameter (C)	250	mm
Outlet pipe type	PVC	
Model	75 VHV-1,10,STD	
item #	PRIPHY200273	
Quantity	1	
Minimum clearance (H)	150	mm
Minimum manhole diameter (B)	600	mm



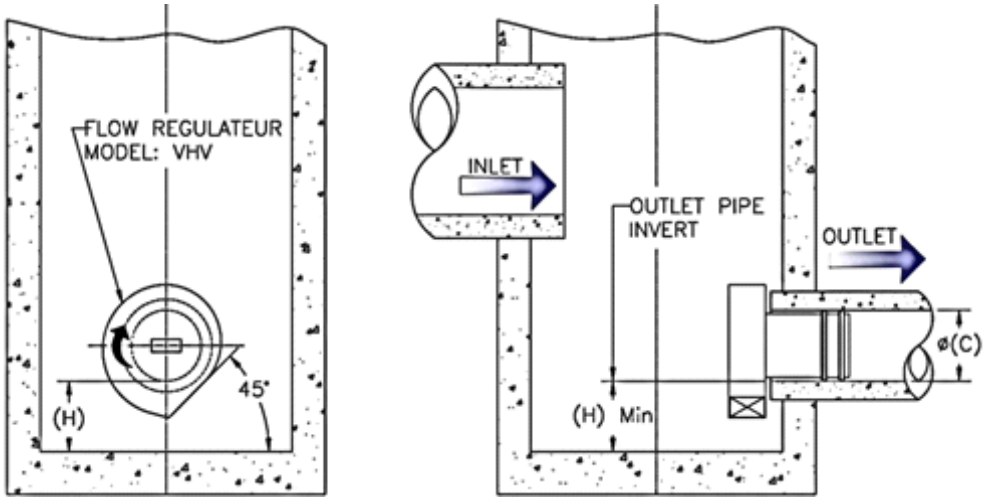
RATING CURVE



Q (L/s)	h (m)
0.000	0.089
0.962	0.139
2.219	0.189
1.814	0.239
1.749	0.289
1.964	0.339
2.160	0.389
3.477	0.889
4.432	1.389
5.215	1.889
5.895	2.389
6.505	2.889
9.522	6.089
12.292	10.089

2020-07-27

TYPICAL INSTALLATION



SPECIFICATIONS

The regulator shall be of the static type and shall operate using vortex principles with no moving parts. The flow will be regulated over the entire head range using only the hydraulic properties of the unit and the fluid flowing through it. The regulator shall be self-activating and shall not require instrumentation or external power.

Each regulator is comprised of a vortex chamber where flow control occurs. An outlet sleeve is welded to the vortex chamber to allow the regulator to be installed into a standard outlet pipe. Water tightness shall be obtained using two Neoprene o-rings located on the outlet sleeve and held in place using welded square bars.

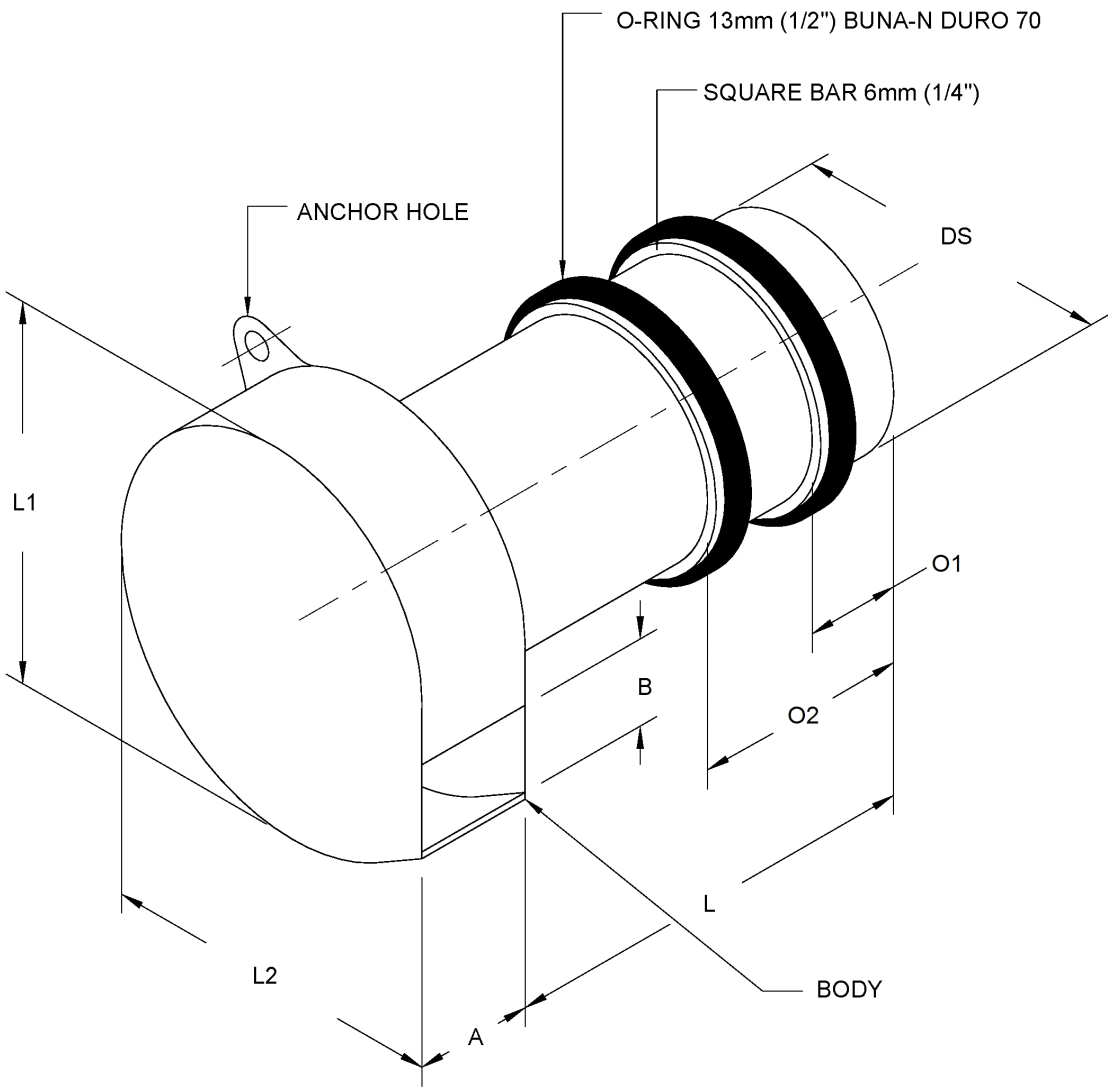
The regulator shall be fabricated entirely of stainless steel type 304 and continuously welded, as manufactured by Veolia Water Technologies Canada Inc. (John Meunier), 514-334-7230, cso@veolia.com.

VEOLIA

HYDROVEX®

Project name:	593 LAURIER, OTTA WA, ON
Project number:	NOVATECH
Regulator ID:	
Flow rate (Q):	3.5 L/s
Design head (h):	0.9 m
Model:	75 VHV-1,10,STD
Item #:	PRIPHY200273
Quantity:	1

Dimensions (mm)	
A	75
B	62
L1	272
L2	246
L	200
DS	225
O1	38
O2	100
Ø VENT	N/A



All dimensions in millimeters unless otherwise specified

2020-07-27

GENERAL NOTES:

1. COORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
2. 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 THIS DRAWING.
3. OBTAIN ALL NECESSARY PERMITS AND APPROVALS FROM THE CITY OF OTTAWA BEFORE COMMENCING CONSTRUCTION.
4. BEFORE COMMENCING CONSTRUCTION OBTAIN AND PROVIDE PROOF OF COMPREHENSIVE, ALL RISK AND OPERATIONAL LIABILITY INSURANCE FOR $5,000,000.00. INSURANCE POLICY TO NAME OWNERS, ENGINEERS AND ARCHITECTS AS CO-INSURED.
5. RESTORE ALL DISTURBED AREAS ON-SITE AND OFF-SITE, INCLUDING TRENCHES AND SURFACES ON PUBLIC ROAD ALLOWANCES TO EXISTING CONDITIONS OR BETTER TO THE SATISFACTION OF THE CITY OF OTTAWA AND ENGINEER.
6. REMOVE FROM SITE ALL EXCESS EXCAVATED MATERIAL, ORGANIC MATERIAL AND DEBRIS UNLESS OTHERWISE INSTRUCTED BY ENGINEER. EXCAVATE AND REMOVE FROM SITE ANY CONTAMINATED MATERIAL. ALL CONTAMINATED MATERIAL SHALL BE DISPOSED OF AT A LICENSED LANDFILL FACILITY.
7. ALL ELEVATIONS ARE GEODETIC.
8. REFER TO GEOTECHNICAL REPORT (No. 190227, DATED JUNE, 2019), PREPARED BY LRL ENGINEERING FOR SUBSURFACE CONDITIONS, CONSTRUCTION RECOMMENDATIONS, AND GEOTECHNICAL INSPECTION REQUIREMENTS. THE GEOTECHNICAL CONSULTANT IS TO REVIEW ON-SITE CONDITIONS AFTER EXCAVATION PRIOR TO PLACEMENT OF THE GRANULAR MATERIAL.
9. REFER TO ARCHITECT'S AND LANDSCAPE ARCHITECT'S DRAWINGS FOR BUILDING AND HARD SURFACE AREAS AND DIMENSIONS.
10. REFER TO DEVELOPMENT SERVICING & STORMWATER MANAGEMENT REPORT (R-2019-193) PREPARED BY NOVATECH.
11. SAW CUT AND KEY GRIND ASPHALT AT ALL ROAD CUTS AND ASPHALT TIE IN POINTS AS PER CITY OF OTTAWA STANDARDS (R10).

SEWER NOTES:

1. SUPPLY AND CONSTRUCT ALL SEWERS AND APPURTENANCES IN ACCORDANCE WITH THE MOST CURRENT CITY OF OTTAWA STANDARDS AND SPECIFICATIONS.
2. SPECIFICATIONS:

ITEM	SPEC. No.	REFERENCE
STORM & CBMH / SANITARY / COMB. MH (1200mmØ)	701.010	OPSD
STORM MANHOLE (1500mmØ)	701.020	OPSD
CBMH MANHOLE (1800mmØ)	701.030	OPSD
CIRCULAR SAN / COMB. MH FRAME & COVER	S25 & S24	CITY OF OTTAWA
CIRCULAR STORM & CBMH FRAME & COVER	S25 & S24.1	CITY OF OTTAWA
AREA DRAIN	S31	CITY OF OTTAWA
EXTERIOR MECHANICAL DRAIN (FD)	FD-490-F-4	WATTS CANADA
SEWER TRENCH	S6	CITY OF OTTAWA
SANITARY / STORM SEWER / CB LEAD	PVC DR 35 or CONC 65-D	

3. ALL STORM AND SANITARY SERVICE LATERALS SHALL BE EQUIPPED WITH BACKFLOW PREVENTION DEVICES AS PER THE CITY OF OTTAWA STANDARD DETAILS S14 AND S14.1 OR S14.2.
4. INSULATE ALL PIPES (SAN/STM) THAT HAVE LESS THAN 1.5m COVER WITH HI-40 INSULATION PER INSULATION DETAIL FOR SHALLOW SEWERS. PROVIDE 150mm CLEARANCE BETWEEN PIPE AND INSULATION.
5. SERVICES ARE TO BE CONSTRUCTED TO 1.0m FROM FACE OF BUILDING AT A MINIMUM SLOPE OF 1.0%.
6. 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.
7. FLEXIBLE CONNECTIONS ARE REQUIRED FOR CONNECTING PIPES TO MANHOLES (FOR EXAMPLE KOR-N-SEAL, PSX: POSITIVE SEAL AND DURASEAL). THE CONCRETE CRADLE FOR THE PIPE CAN BE ELIMINATED.
8. SUBDRAINS ARE TO BE INSTALLED WITH A RIGID PIPE EXTENDER AT ANY AND ALL CONNECTIONS TO CONCRETE STRUCTURES.
9. THE OWNER SHALL REQUIRE THAT THE SITE SERVICING CONTRACTOR PERFORM FIELD TESTS FOR QUALITY CONTROL OF ALL SANITARY SEWERS. LEAKAGE TESTING SHALL BE COMPLETED IN ACCORDANCE WITH OPSS 410.07.16, 410.07.16.04 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 A CERTIFIED PROFESSIONAL ENGINEER WHO SHALL SUBMIT A CERTIFIED COPY OF THE TEST RESULTS.
10. ALL STORM MANHOLES AND CATCHBASIN MANHOLES ARE TO HAVE 300mm SUMPS UNLESS OTHERWISE INDICATED. ALL CATCHBASINS ARE TO HAVE 600mm SUMPS UNLESS OTHERWISE INDICATED.
11. ALL CATCHBASINS, MANHOLES AND/OR CATCHBASIN MANHOLES THAT ARE TO HAVE ICD'S INSTALLED WITHIN THEM ARE TO HAVE 600mm SUMPS.
12. ALL WEEPING TILE CONNECTIONS TO BE MADE TO THE PROPOSED STORM SEWER SYSTEM DOWNSTREAM OF ANY INLET CONTROL DEVICES.
13. THE CONTRACTOR IS TO TELEVISE (CCTV) ALL PROPOSED SEWERS, 200mmØ OR GREATER PRIOR TO BASE COURSE ASPHALT. UPON COMPLETION OF CONTRACT, THE CONTRACTOR IS RESPONSIBLE TO FLUSH AND CLEAN ALL SEWERS & APPURTENANCES.
14. CONTRACTOR TO PROVIDE THE CONSULTANT WITH A GENERAL PLAN OF SERVICES INDICATING ALL APPLICABLE SERVICING AS-BUILT INFORMATION SHOWN ON THIS PLAN. AS-BUILT INFORMATION MUST INCLUDE: PIPE MATERIAL, SIZES, LENGTHS, SLOPES, INVERT AND T/G ELEVATIONS, STRUCTURE LOCATIONS AND ANY ALIGNMENT CHANGES, ETC.

WATERMAIN NOTES:

1. 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 BY CITY OF OTTAWA FORCES. CHLORINATION OF THE WATER SYSTEM SHALL BE PERFORMED BY THE CONTRACTOR IN THE PRESENCE CITY OF OTTAWA FORCES.
2. SPECIFICATIONS:

ITEM	SPEC. No.	REFERENCE
WATERMAIN TRENCHING	W17	CITY OF OTTAWA
THERMAL INSULATION IN SHALLOW TRENCHES	W22	CITY OF OTTAWA
THERMAL INSULATION AT OPEN STRUCTURES	W23	CITY OF OTTAWA
WATERMAIN CROSSING BELOW SEWER	W25	CITY OF OTTAWA
WATERMAIN	PVC DR 18	

3. WATERMAIN SHALL BE MINIMUM 2.4m DEPTH BELOW GRADE UNLESS OTHERWISE INDICATED.
4. PROVIDE MINIMUM 0.5m CLEARANCE BETWEEN OUTSIDE OF PIPES AT ALL CROSSINGS.
5. WATER SERVICE IS TO BE CONSTRUCTED TO WITHIN 1.0m OF FOUNDATION WALL AND CAPPED, UNLESS OTHERWISE INDICATED.

PROPOSED 150mmØ WATER SERVICE TABLE

STATION	SURFACE ELEVATION	T/WM ELEVATION	COMMENTS
0+00	79.85±	77.45 *	150mmØ WM CONNECTION TO EX. 200mmØ WM
0+05.3	79.77	77.37	CROSS BELOW EX. 50mmØ GAS LINE (1.4m± CLEAR)
0+10	80.15	77.65	- - -
0+11.8	80.24	77.74	PROPERTY LINE / 150mmØ V&VB
0+12.1	80.25	77.75	CAP 1.0m FROM FOUNDATION WALL

* CONNECTION TO EXISTING 200mmØ WATERMAIN. EXACT ELEVATIONS TO BE FIELD DETERMINED.

** PROVIDE THERMAL INSULATION AS PER CITY OF OTTAWA DETAIL W22 IN SHALLOW TRENCHES AND/OR CITY OF OTTAWA DETAIL W23 ADJACENT TO OPEN STRUCTURES.

ROOF DRAIN TABLE: AREA R-1 (ROOF DRAINS 1 to 5)

AREA ID *	ROOF DRAIN No. (WATTS MODEL)	ROOF DRAIN OPENING SETTING	1:5 YEAR RELEASE RATE	APPROX. 5-YR PONDING DEPTH	1:100 YEAR RELEASE RATE	APPROX. 100-YR PONDING DEPTH
R-1	RD 1 (RD-100-A-ADJ)	3/4 EXPOSED	0.95 L/s	11 cm	1.58 L/s	15 cm
R-1	RD 2 (RD-100-A-ADJ)	CLOSED	0.32 L/s	7 cm	0.32 L/s	12 cm
R-1	RD 3 (RD-100-A-ADJ)	1/4 EXPOSED	0.79 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 4 (RD-100-A-ADJ)	CLOSED	0.32 L/s	11 cm	0.32 L/s	15 cm
R-1	RD 5 (RD-100-A-ADJ)	1/4 EXPOSED	0.79 L/s	10 cm	0.87 L/s	14 cm

* REFER TO THE 'DEVELOPMENT SERVICING AND STORMWATER MANAGEMENT REPORT' (R-2019-193) PREPARED BY NOVATECH FOR DRAINAGE AREA IDENTIFIERS AND STORMWATER MANAGEMENT DETAILS.

**ALL CONTROLLED FLOW ROOF DRAINS FOR THE PROPOSED BUILDING TO BE WATTS 'ADJUSTABLE ACCUTROL' ROOF DRAINS.

INTERNAL SWM STORAGE SYSTEM

DESIGN EVENT	STORAGE SYSTEM CONTROLLED FLOW	STORAGE VOLUMES	
		REQUIRED	PROVIDED
1:2 YR	1.26 L/s	0.7 m³	> 5.0 m³
1:5 YR	1.26 L/s	1.3 m³	
1:100 YR	1.26 L/s	3.7 m³	
1:100+20%	1.26 L/s	4.9 m³	

NOTES:
1. ALL DRAINAGE FROM AREA B-1 (ALL PROPOSED EXTERIOR MECHANICAL DRAINS + WEEPING TILE DRAINAGE SYSTEM) TO BE DIRECTED TO THE INTERNAL STORMWATER STORAGE SYSTEM. REFER TO THE ARCHITECTURAL AND MECHANICAL PLANS FOR DETAILS.
2. REFER TO ARCHITECTURAL AND STRUCTURAL PLANS FOR EXACT SIZE AND DETAILS OF INTERNAL STORMWATER STORAGE SYSTEM.
3. REFER TO ARCHITECTURAL AND MECHANICAL PLANS FOR LOCATION AND CONNECTIONS AND DETAILS OF THE INTERNAL STORMWATER STORAGE SYSTEM.

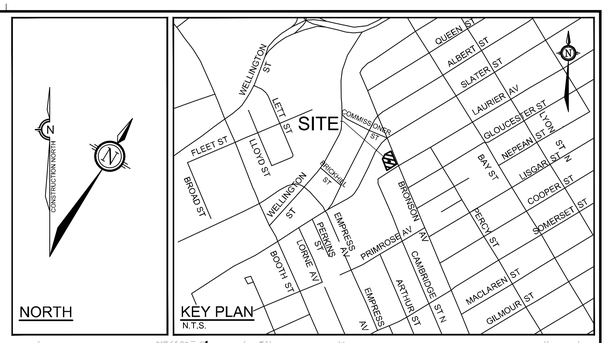
SITE FLOWS & STORMWATER MANAGEMENT TABLE

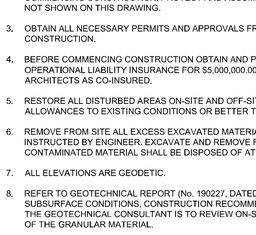
DESIGN EVENT	PRE-DEVELOPMENT CONDITIONS		POST-DEVELOPMENT CONDITIONS							
	UNCONTROLLED FLOW (L/s)	ALLOWABLE RELEASE RATE (L/s)	SAN FLOWS (L/s)	R-1 FLOW (L/s)	B-1 FLOW (L/s)	A-1 FLOW (L/s)	A-2 FLOW (L/s)	A-3 FLOW (L/s)	TOTAL FLOW (L/s)	REDUCTION IN FLOW (L/s OR %)*
1:5 YR	17.7	10.5	1.2	3.2	1.3	0.1	0.1	2.5	8.5	9.2 or 52%
1:100 YR	34.6	10.5		4.0	1.3	0.2	0.2	3.5	10.5	24.1 or 70%

* REDUCED FLOW COMPARED TO PRE-DEVELOPMENT UNCONTROLLED CONDITIONS

INLET CONTROL DEVICE DATA TABLE - CBMH 01

DESIGN EVENT	ICD TYPE (VORTEX MODEL)	DIAMETER OF OUTLET PIPE (mm)	DESIGN FLOW (L/s)	DESIGN HEAD (m)	WATER ELEVATION (m)	VOLUME (m³)	AVAILABLE STORAGE
1:2 YR	HYDROVEX (MODEL 75 VHV-1)	250mmØ PVC	2.1	0.34	79.49	6.0	19.1 m³
1:5 YR			2.5	0.46	79.61	9.9	
1:100 YR			3.5	0.89	80.04	19.1	



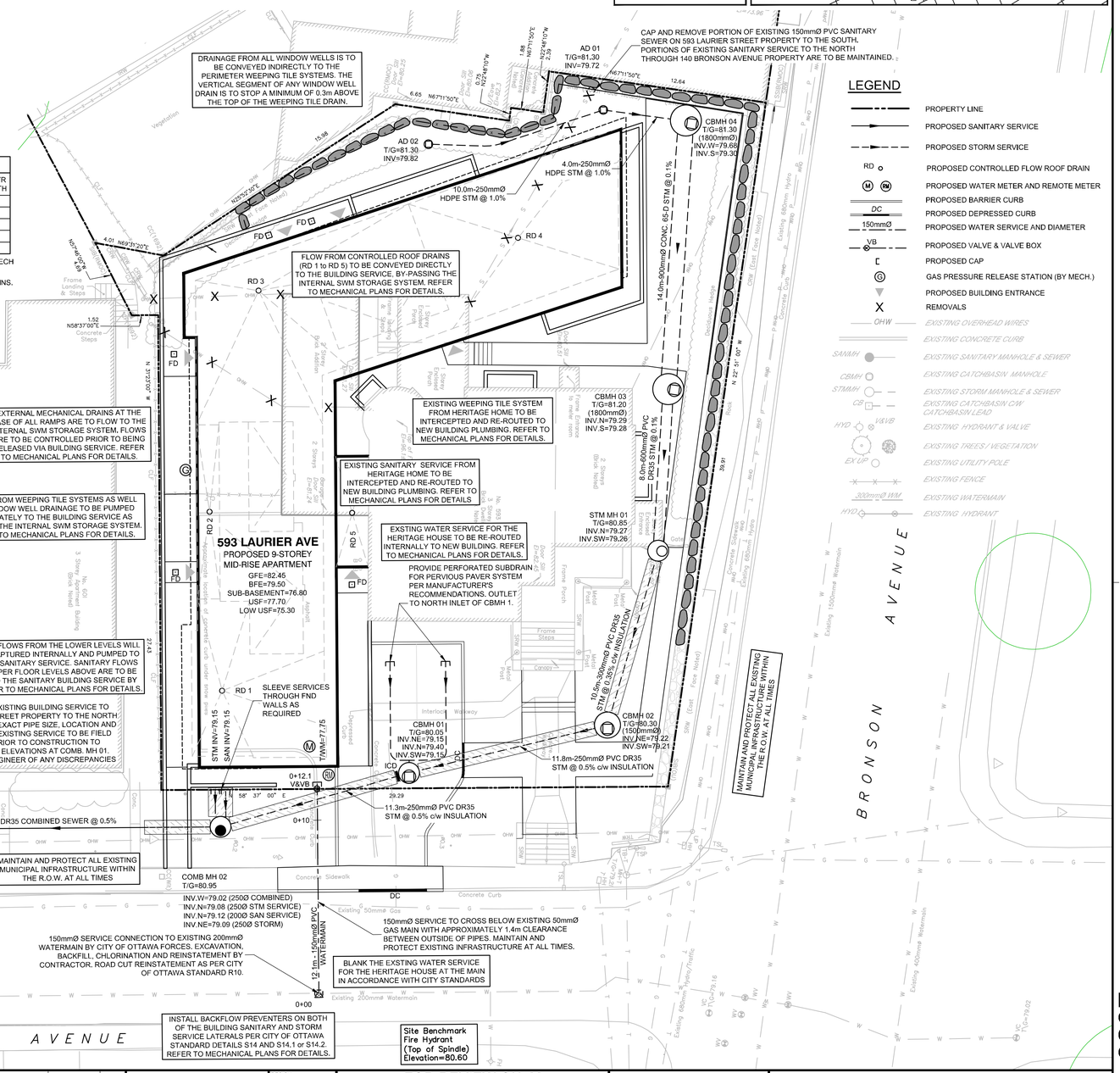


INSULATION DETAIL FOR SHALLOW SEWERS
NOT TO SCALE

ti = THICKNESS OF INSULATION (mm)
h = DEPTH OF COVER
W = D + 300 (1000 min)
W = WIDTH OF INSULATION (mm)
D = O.D OF PIPE (mm)

COVER (mm)	INSULATION THICKNESS (mm)
1500-1200	75
1200-900	100
900-600	125

INSULATION NOTES:
1. THE THICKNESS OF SEWER INSULATION SHALL BE THE EQUIVALENT OF 25mm FOR EVERY 300mm REDUCTION IN THE REQUIRED DEPTH OF COVER LESS THAN 1500mm (SEE TABLE ABOVE)



LEGEND

- PROPERTY LINE
- PROPOSED SANITARY SERVICE
- PROPOSED STORM SERVICE
- RD — PROPOSED CONTROLLED FLOW ROOF DRAIN
- M EM — PROPOSED WATER METER AND REMOTE METER
- PROPOSED BARRIER CURB
- DC — PROPOSED DEPRESSED CURB
- 150mmØ — PROPOSED WATER SERVICE AND DIAMETER
- VB — PROPOSED VALVE & VALVE BOX
- PROPOSED CAP
- G — GAS PRESSURE RELEASE STATION (BY MECH.)
- PROPOSED BUILDING ENTRANCE
- X — REMOVALS
- OHW — EXISTING OVERHEAD WIRES
- EXISTING CONCRETE CURB
- SANMH — EXISTING SANITARY MANHOLE & SEWER
- CBMH — EXISTING CATCHBASIN MANHOLE
- STMMH — EXISTING STORM MANHOLE & SEWER
- CB — EXISTING CATCHBASIN C/W CATCHBASIN LEAD
- HYD — VALVE — EXISTING HYDRANT & VALVE
- EXISTING TREES / VEGETATION
- EX UP — EXISTING UTILITY POLE
- EXISTING FENCE
- 300mmØ WM — EXISTING WATERMAIN
- HYD — EXISTING HYDRANT

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.

OWNER INFORMATION
ALEXANDER FLECK HOUSE INC.
250 STE ANNE AVENUE,
OTTAWA, ONTARIO, K1L 7C4
DENIS MICHAUD
PHONE: (613) 402-2855
denis@henryinvestments.ca

No.	REVISION	DATE	BY
2	REVISED SITE PLAN / ISSUED FOR SITE PLAN APPROVAL	JUL 31/20	MS
1	ISSUED FOR SITE PLAN APPROVAL	DEC 9/19	MS

SCALE 1:150
1:150 0 2 4 6
DESIGN SM / MS
CHECKED MS
DRAWN BF / SM
CHECKED JLS
APPROVED MS

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER M. SAVIC 100102651 July 31, 2020 PROVINCE OF ONTARIO

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

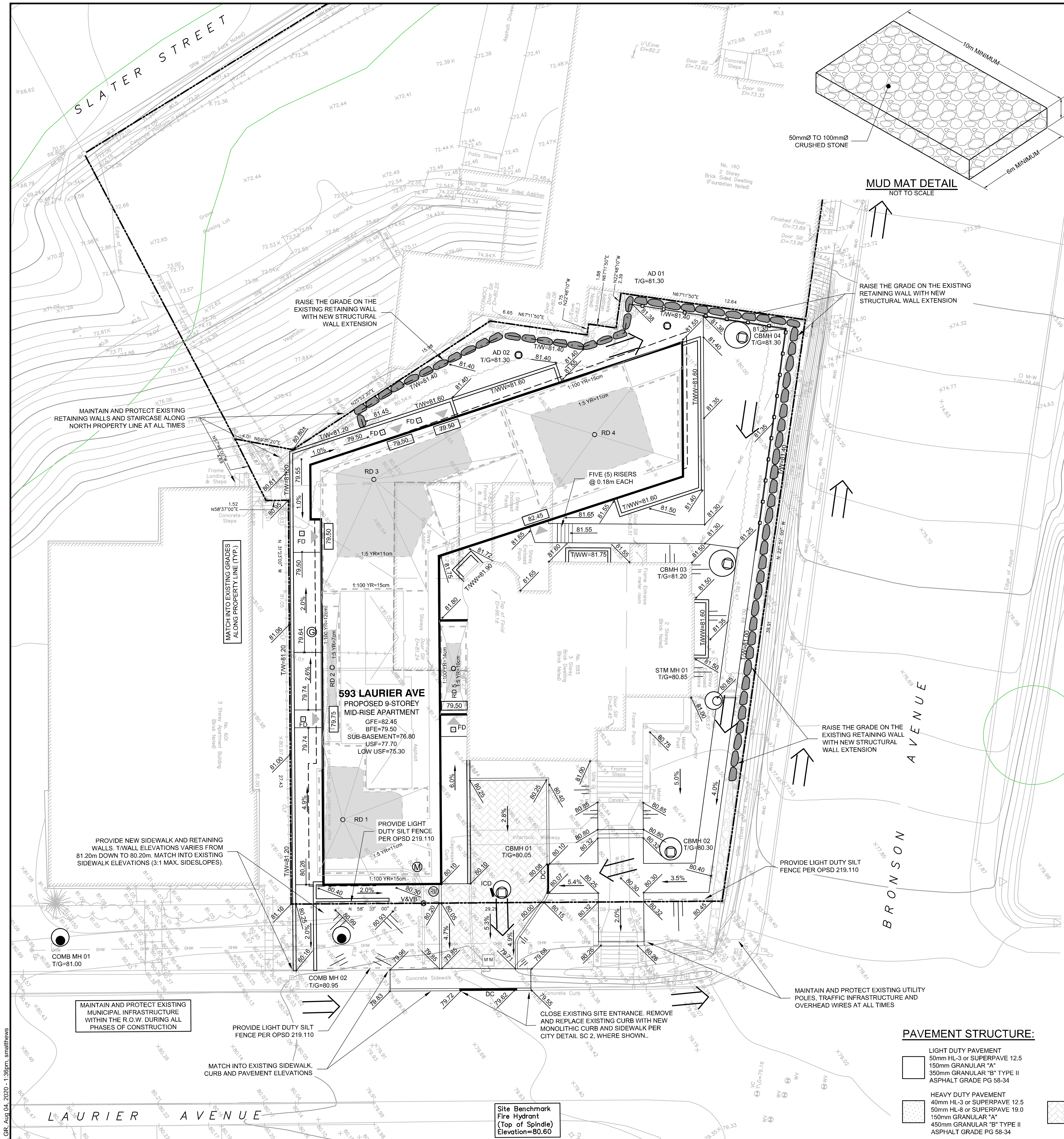
LOCATION
CITY OF OTTAWA
593 LAURIER AVENUE

DRAWING NAME
GENERAL PLAN OF SERVICES

PROJECT No. 119019
REV REV # 2
DRAWING No. 119019-GP

D07-12-19-0207

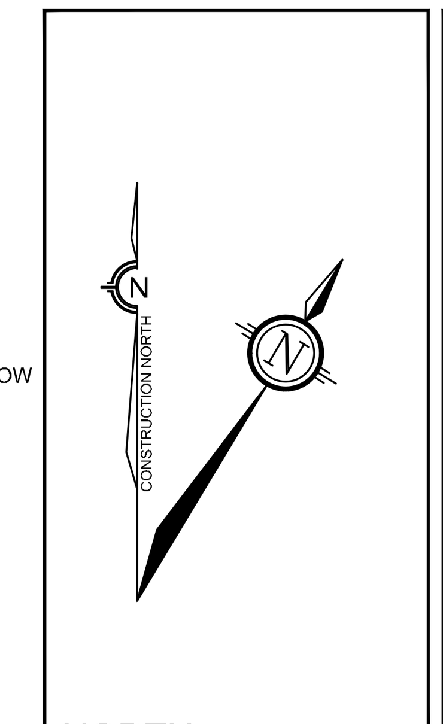
PLAN #18087



MUD MAT DETAIL
NOT TO SCALE

LEGEND

73.05	PROPOSED ELEVATION
73.03	EXISTING ELEVATION
2.0%	GRADE AND DIRECTION
	MAXIMUM 3:1 SIDESLOPE
	PROPOSED SILT FENCING (OPSD 219.110)
	DIRECTION OF MAJOR SYSTEM OVERLAND FLOW
FFE	FINISHED FLOOR ELEVATION
T/FND	TOP OF FOUNDATION WALL ELEVATION
USF	UNDERSIDE OF FOOTING ELEVATION
T/W	TOP OF RETAINING WALL ELEVATION
T/WW	TOP OF WINDOW WELL ELEVATION
RD	PROPOSED CONTROLLED FLOW ROOF DRAIN
	BUILDING ENTRANCE / EXIT
	PROPERTY LINE
	EXISTING EDGE OF PAVEMENT
V&VB	EXISTING VALVE & VALVE BOX
SP	EXISTING SERVICE POST
HYD	EXISTING HYDRANT
COMB MH	EXISTING COMBINED MH
CBMH	EXISTING CATCHBASIN
CB	EXISTING CATCHBASIN MH
EX UP	EXISTING UTILITY POLE C/W GUY WIRES
	EXISTING FENCE
O/H WIRES	EXISTING OVERHEAD WIRES
1:5 YR / 1:100 YR	APPROXIMATE PONDING LIMITS



NORTH

KEY PLAN
N.T.S.

Erosion and Sediment Control Responsibilities:

	ESC Measure	Symbol	Specification	During Construction: Installation Responsibility	During Construction: Inspection/Maintenance Responsibility	During Construction: Inspection Frequency	After Construction Prior to Final Acceptance: Approval to Remove	After Construction Prior to Final Acceptance: Removal Responsibility	After Final Acceptance: Inspection/Maintenance Responsibility
Temporary Measures	Silt Fence		OPSD 219.110	Developer's Contractor	Developer's Contractor	Weekly (as a minimum)	Consultant	Developer's Contractor	N/A
	Filter Fabric	Location as Indicated in ESC Note #3	Erosion and Sediment Control Notes	Developer's Contractor	Developer's Contractor	Weekly (as a minimum)	Consultant	Developer's Contractor	N/A
	Mud Mat	MM	Drawing Details	Developer's Contractor	Developer's Contractor	Weekly (as a minimum)	Developer's Contractor	Developer's Contractor	N/A
	Dust Control	Location as Required Around Site	Erosion and Sediment Control Notes	Developer's Contractor	Developer's Contractor	Weekly (as a minimum)	Consultant	Developer's Contractor	N/A
	Stabilized Material Stockpiling	Location as Required by Contractor	Erosion and Sediment Control Notes	Developer's Contractor	Developer's Contractor	Weekly (as a minimum)	Developer's Contractor	Developer's Contractor	N/A
	Sediment Basin (for flows being pumped out of excavations)	Location as Required by Contractor	- - -	Developer's Contractor	Developer's Contractor	After Every Rainstorm	Developer's Contractor	Developer's Contractor	N/A

GENERAL NOTES:

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2. 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 THIS DRAWING.
3. OBTAIN ALL NECESSARY PERMITS AND APPROVALS FROM THE CITY OF OTTAWA BEFORE COMMENCING CONSTRUCTION.
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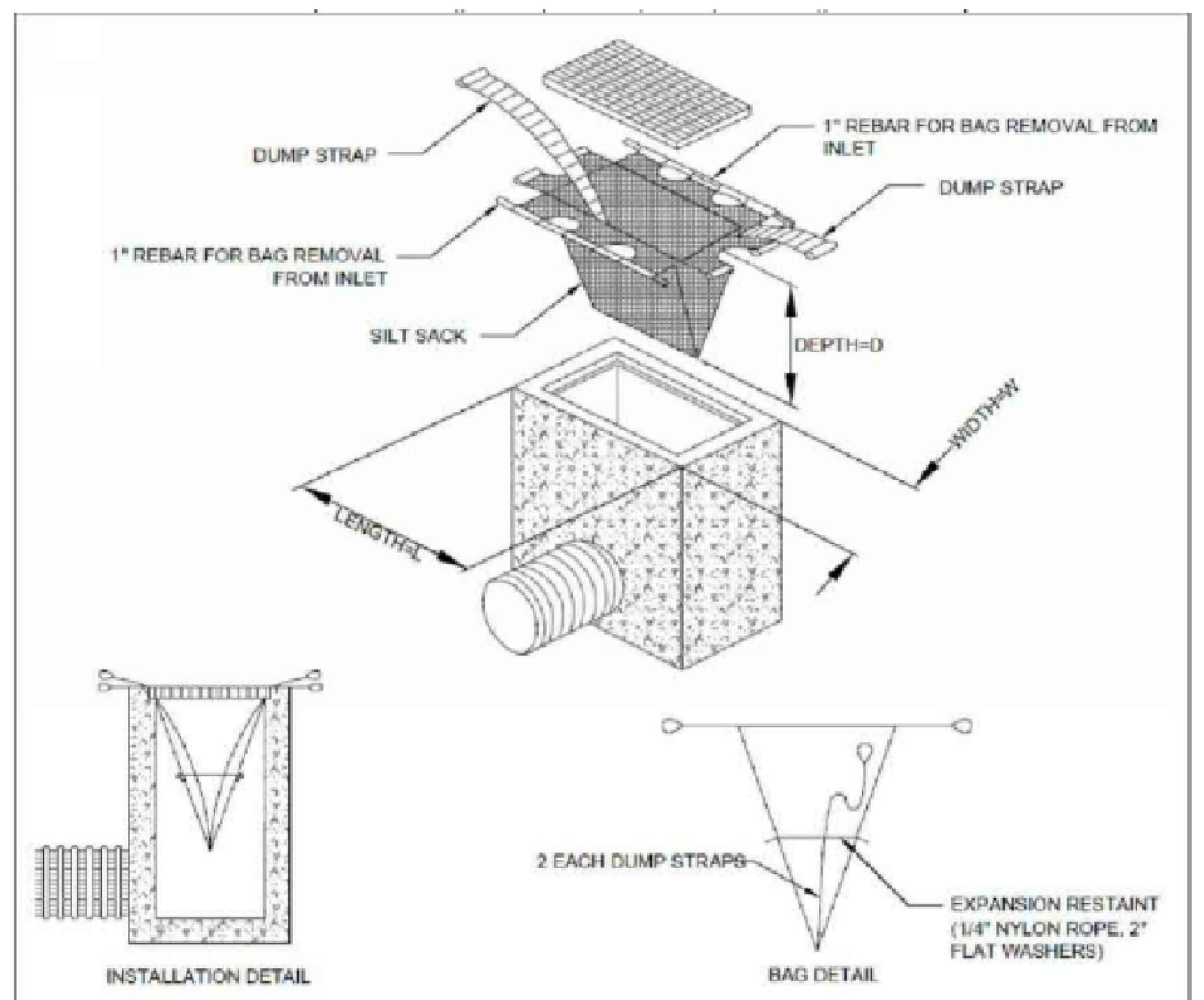
5. RESTORE ALL DISTURBED AREAS ON-SITE AND OFF-SITE, INCLUDING TRENCHES AND SURFACES ON PUBLIC ROAD ALLOWANCES TO EXISTING CONDITIONS OR BETTER TO THE SATISFACTION OF THE CITY OF OTTAWA AND ENGINEER.
6. REMOVE FROM SITE ALL EXCESS EXCAVATED MATERIAL, ORGANIC MATERIAL AND DEBRIS UNLESS OTHERWISE INSTRUCTED BY ENGINEER. EXCAVATE AND REMOVE FROM SITE ANY CONTAMINATED MATERIAL. ALL CONTAMINATED MATERIAL SHALL BE DISPOSED OF AT A LICENSED LANDFILL FACILITY.
7. ALL ELEVATIONS ARE GEODETIC.
8. REFER TO GEOTECHNICAL REPORT (No. 190227, DATED JUNE, 2019), PREPARED BY LRL ENGINEERING FOR SUBSURFACE CONDITIONS, CONSTRUCTION RECOMMENDATIONS, AND GEOTECHNICAL INSPECTION REQUIREMENTS. THE GEOTECHNICAL CONSULTANT IS TO REVIEW ON-SITE CONDITIONS AFTER EXCAVATION PRIOR TO PLACEMENT OF THE GRANULAR MATERIAL.
9. REFER TO ARCHITECT'S AND LANDSCAPE ARCHITECT'S DRAWINGS FOR BUILDING AND HARD SURFACE AREAS AND DIMENSIONS.
10. REFER TO DEVELOPMENT SERVICING & STORMWATER MANAGEMENT REPORT (R-2019-193) PREPARED BY NOVATECH.
11. SAW CUT AND KEY GRIND ASPHALT AT ALL ROAD CUTS AND ASPHALT TIE IN POINTS AS PER CITY OF OTTAWA STANDARDS (R10).

EROSION AND SEDIMENT CONTROL NOTES :

1. ALL EROSION AND SEDIMENT CONTROLS ARE TO BE INSTALLED TO THE SATISFACTION OF THE ENGINEER AND THE CITY OF OTTAWA. THEY ARE TO BE APPROPRIATE TO THE SITE CONDITIONS, PRIOR TO UNDERTAKING ANY SITE ALTERATIONS (FILLING, GRADING, REMOVAL OF VEGETATION, ETC.) AND DURING ALL PHASES OF SITE PREPARATION AND CONSTRUCTION. THESE PRACTICES ARE TO BE IMPLEMENTED IN ACCORDANCE WITH THE CURRENT BEST MANAGEMENT PRACTICES FOR EROSION AND SEDIMENT CONTROL AND SHOULD INCLUDE AS A MINIMUM THOSE MEASURES INDICATED ON THE PLAN.
2. TO PREVENT SURFACE EROSION FROM ENTERING ANY STORM SEWER SYSTEM DURING CONSTRUCTION, FILTER BAGS WILL BE PLACED UNDER GRATES OF NEARBY CATCHBASINS AND STRUCTURES. A LIGHT DUTY SILT FENCE BARRIER WILL ALSO BE INSTALLED AROUND THE CONSTRUCTION AREA (WHERE APPLICABLE). THESE CONTROL MEASURES WILL REMAIN IN PLACE UNTIL CONSTRUCTION IS 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 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. ROADWAYS ARE TO BE SWEPT AS REQUIRED OR AS DIRECTED BY THE ENGINEER AND/OR MUNICIPALITY.
7. THE CONTRACTOR SHALL ENSURE PROPER DUST CONTROL IS PROVIDED WITH THE APPLICATION OF WATER (AND IF REQUIRED, CALCIUM CHLORIDE) DURING DRY PERIODS.

GRADING NOTES:

1. ALL TOPSOIL, ORGANIC OR DELETERIOUS MATERIAL MUST BE ENTIRELY REMOVED FROM BENEATH THE PROPOSED PAVED AREAS AS DIRECTED BY THE SITE ENGINEER OR GEOTECHNICAL ENGINEER.
2. EXPOSED SUBGRADES IN PROPOSED PAVED AREAS SHOULD BE PROOF ROLLED WITH A LARGE STEEL DRUM ROLLER 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 COMPACTED TO AT LEAST 100% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY VALUE. ANY ADDITIONAL GRANULAR FILL USED BELOW THE PROPOSED PAVEMENT SHOULD BE COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY VALUE.
5. MINIMUM OF 2% GRADE FOR ALL GRASS AREAS UNLESS OTHERWISE NOTED.
6. MAXIMUM TERRACING GRADE TO BE 3:1 UNLESS OTHERWISE NOTED.
7. ALL GRADES BY CURBS ARE EDGE OF PAVEMENT GRADES UNLESS OTHERWISE INDICATED.
8. ALL CURBS SHALL BE BARRIER CURB (150mm) UNLESS OTHERWISE NOTED AND CONSTRUCTED AS PER CITY OF OTTAWA STANDARDS (SC1.1).
9. REFER TO LANDSCAPE PLAN FOR PLANTING AND OTHER LANDSCAPE FEATURE DETAILS.
10. CONTRACTOR TO PROVIDE THE CONSULTANT WITH A GRADING PLAN INDICATING AS-BUILT ELEVATIONS OF ALL DESIGN GRADES SHOWN ON THIS PLAN.



FILTER BAG DETAIL
INLET SEDIMENT CONTROL DEVICE
N.T.S.

PAVEMENT STRUCTURE:

LIGHT DUTY PAVEMENT
50mm HL-3 or SUPERPAVE 12.5
150mm GRANULAR "A"
350mm GRANULAR "B" TYPE II
ASPHALT GRADE PG 58-34

HEAVY DUTY PAVEMENT
40mm HL-3 or SUPERPAVE 12.5
50mm HL-8 or SUPERPAVE 19.0
150mm GRANULAR "A"
450mm GRANULAR "B" TYPE II
ASPHALT GRADE PG 58-34

HEAVY DUTY PERVIOUS PAVERS
PERVIOUS PAVERS (PER MANUFACTURER'S RECOMMENDATIONS)
150mm GRANULAR "A"
450mm GRANULAR "B" TYPE II
SUBDRAIN OUTLET TO CBMH 01

NOTE:
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DENIS MICHAUD
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No.	REVISION	DATE	BY
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1	ISSUED FOR SITE PLAN APPROVAL	DEC 9/19	MS

SCALE 1:150

DESIGN SM / MS
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LICENSED PROFESSIONAL ENGINEER
M. SAVIC
100102651
July 31, 2020
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LOCATION
CITY OF OTTAWA
593 LAURIER AVENUE

DRAWING NAME
GRADING AND EROSION & SEDIMENT CONTROL PLAN

PROJECT No. 119019
REV REV # 2
DRAWING No. 119019-GR

PLANA1.DWG - 841mmx594mm
PLAN #18087

D07-12-19-0207

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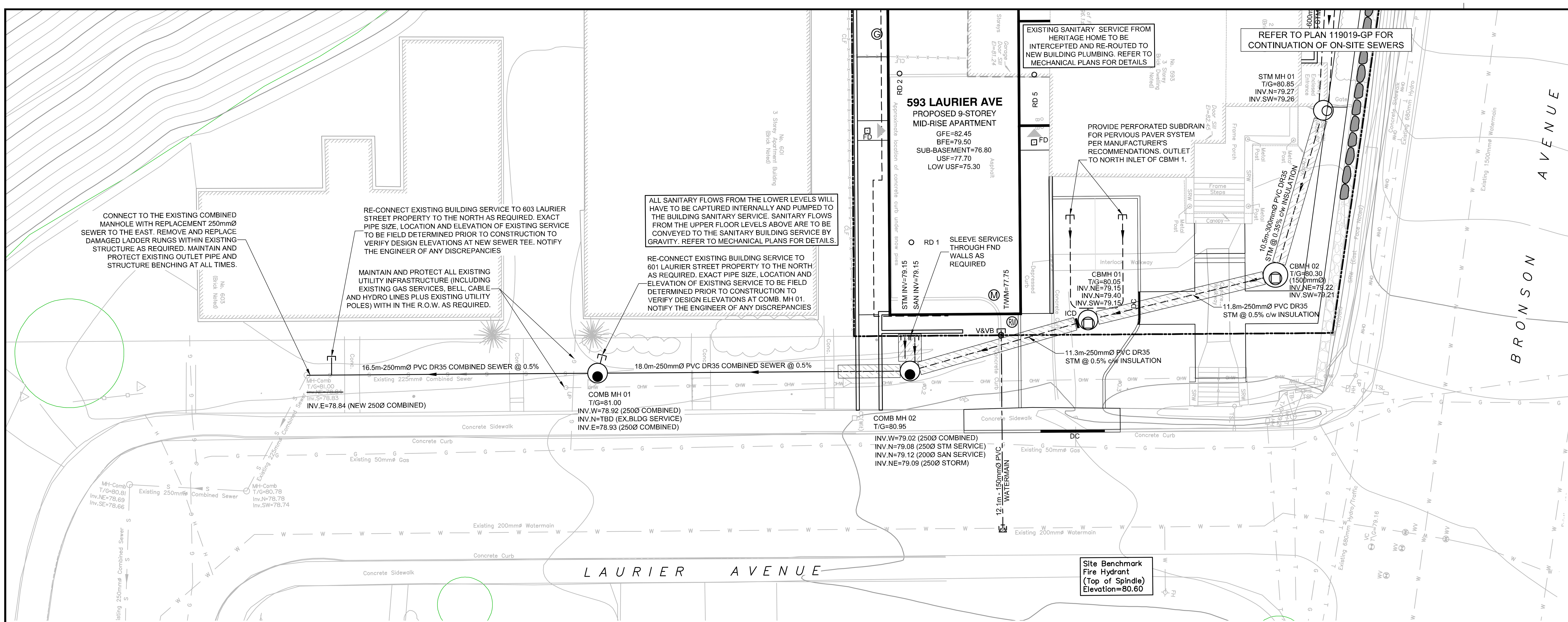

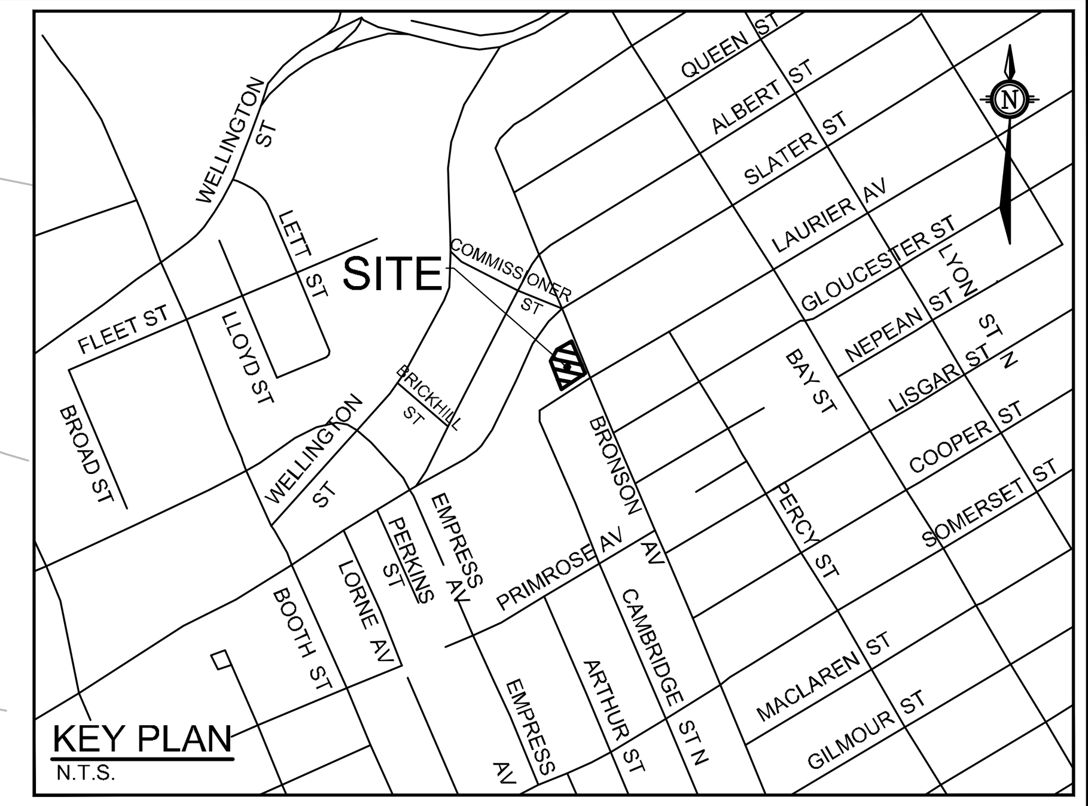

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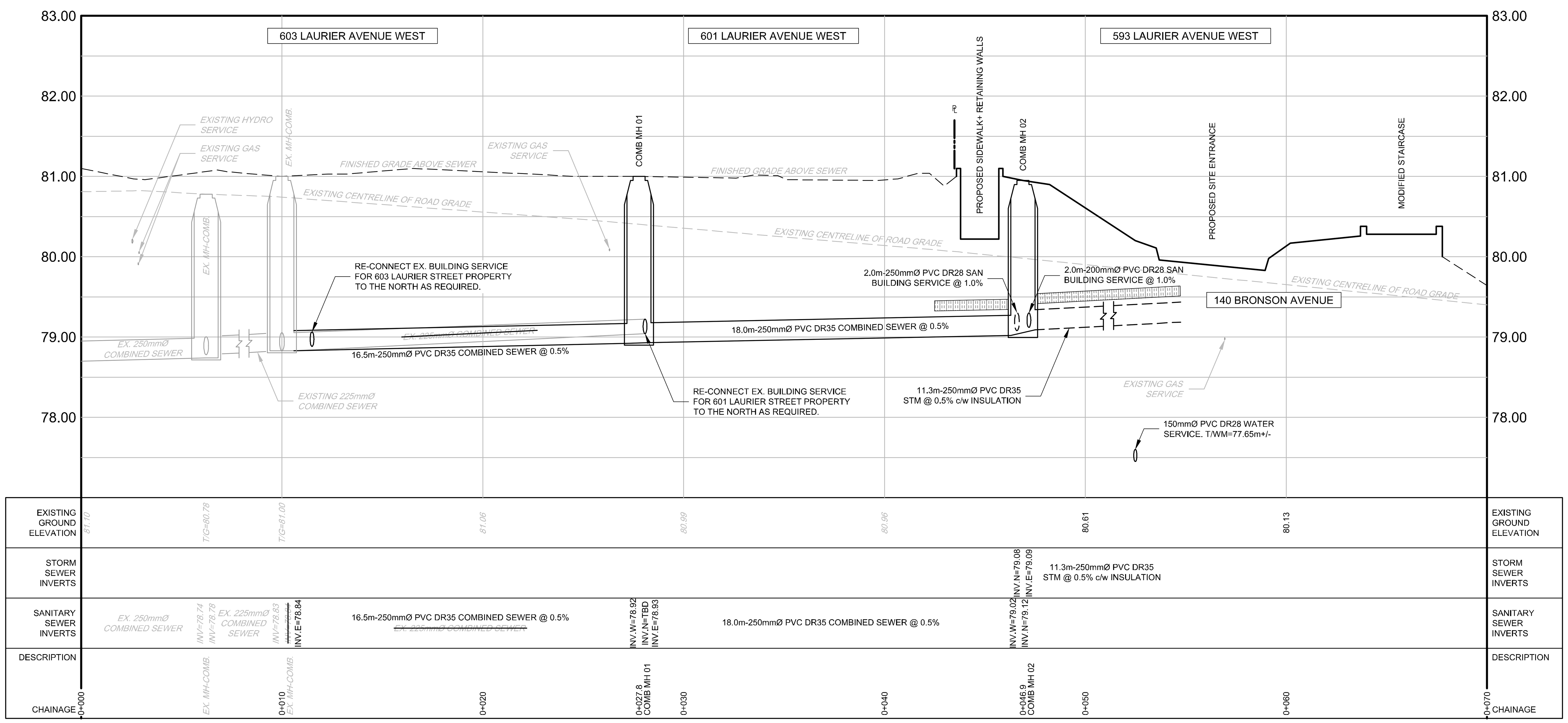
SEWER NOTES:

1. SUPPLY AND CONSTRUCT ALL SEWERS AND APPURTENANCES IN ACCORDANCE WITH THE MOST CURRENT CITY OF OTTAWA STANDARDS AND SPECIFICATIONS.
2. SPECIFICATIONS:

ITEM	SPEC. No.	REFERENCE
STORM / SANITARY MANHOLE (1200mmØ)	701.010	OPSD
STORM / SANITARY MH FRAME & COVER	401.010	OPSD
WATERTIGHT MH FRAME AND COVER	401.030	OPSD
SEWER TRENCH	S6	CITY OF OTTAWA
SANITARY / STORM SEWER	PVC DR 35	

3. ALL STORM AND SANITARY SERVICE LATERALS SHALL BE EQUIPPED WITH BACKFLOW PREVENTION DEVICES AS PER THE CITY OF OTTAWA STANDARD DETAILS S14 AND S14.1 OR S14.2.
4. INSULATE ALL PIPES (SAN/STM) THAT HAVE LESS THAN 1.5m COVER WITH HI-40 INSULATION PER INSULATION DETAIL FOR SHALLOW SEWERS. PROVIDE 150mm CLEARANCE BETWEEN PIPE AND INSULATION.
5. SERVICES ARE TO BE CONSTRUCTED TO 1.0m FROM FACE OF BUILDING AT A MINIMUM SLOPE OF 1.0%.
6. 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.
7. FLEXIBLE CONNECTIONS ARE REQUIRED FOR CONNECTING PIPES TO MANHOLES (FOR EXAMPLE KOR-N-SEAL, PSX: POSITIVE SEAL AND DURASEAL). THE CONCRETE CRADLE FOR THE PIPE CAN BE ELIMINATED.
8. THE OWNER SHALL REQUIRE THAT THE SITE SERVICING CONTRACTOR PERFORM FIELD TESTS FOR QUALITY CONTROL OF ALL SANITARY SEWERS. LEAKAGE TESTING SHALL BE COMPLETED IN ACCORDANCE WITH OPSS 410.07.16, 410.07.16.04 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 A CERTIFIED PROFESSIONAL ENGINEER WHO SHALL SUBMIT A CERTIFIED COPY OF THE TEST RESULTS.
9. ALL STORM MANHOLES AND CATCHBASIN MANHOLES ARE TO HAVE 300mm SUMPS UNLESS OTHERWISE INDICATED. ALL CATCHBASINS ARE TO HAVE 600mm SUMPS UNLESS OTHERWISE INDICATED.
10. ALL CATCHBASINS, MANHOLES AND/OR CATCHBASIN MANHOLES THAT ARE TO HAVE ICD's INSTALLED WITHIN THEM ARE TO HAVE 600mm SUMPS.
11. ALL WEEPING TILE CONNECTIONS TO BE MADE TO THE PROPOSED STORM SEWER SYSTEM DOWNSTREAM OF ANY INLET CONTROL DEVICES.
12. THE CONTRACTOR IS TO TELEVISE (CCTV) ALL PROPOSED SEWERS, 200mmØ OR GREATER PRIOR TO BASE COURSE ASPHALT. UPON COMPLETION OF CONTRACT, THE CONTRACTOR IS RESPONSIBLE TO FLUSH AND CLEAN ALL SEWERS & APPURTENANCES.
13. CONTRACTOR TO PROVIDE THE CONSULTANT WITH A PLAN AND PROFILE DRAWING INDICATING ALL APPLICABLE SERVICING AS-BUILT INFORMATION SHOWN ON THIS PLAN. AS-BUILT INFORMATION MUST INCLUDE: PIPE MATERIAL, SIZES, LENGTHS, SLOPES, INVERT AND T/G ELEVATIONS, STRUCTURE LOCATIONS AND ANY ALIGNMENT CHANGES, ETC.



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250 STE ANNE AVENUE,
OTTAWA, ONTARIO, K1L 7C4
DENIS MICHAUD
PHONE: (613) 402-2855
denis@henryinvestments.ca

No.	REVISION	DATE	BY
1	REVISED SITE PLAN / ISSUED FOR SITE PLAN APPROVAL	JUL 31/20	MS

SCALE 1:150, 1:75

DESIGN SM / MS
CHECKED MS
DRAWN SM
CHECKED JLS
APPROVED MS

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER
M. SAVIC
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PROVINCE OF ONTARIO

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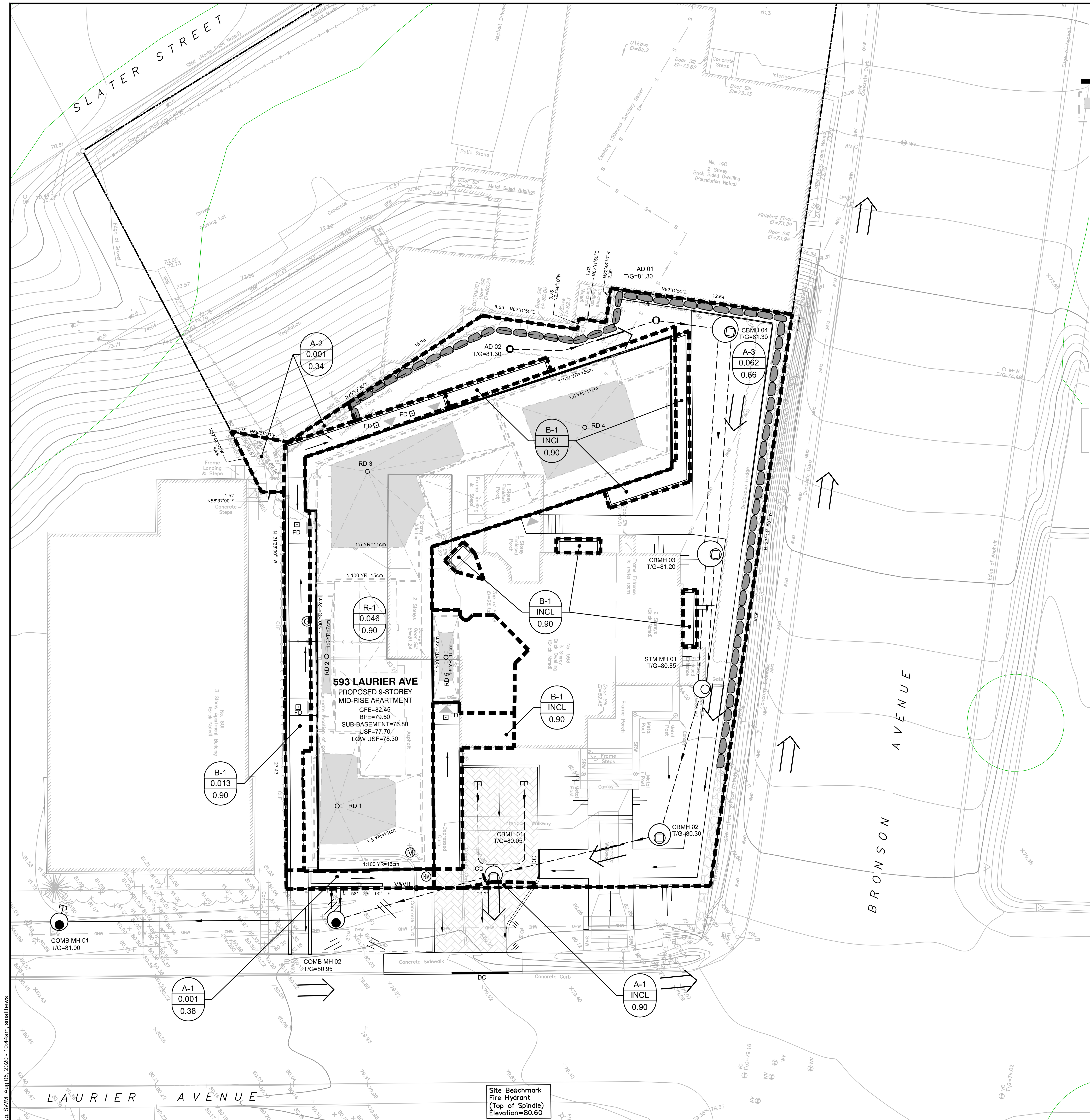
LOCATION
CITY OF OTTAWA
593 LAURIER AVENUE

DRAWING NAME
OUTLET SEWER
PLAN AND PROFILE

PROJECT No. 119019
REV # 1
DRAWING No. 119019-PR

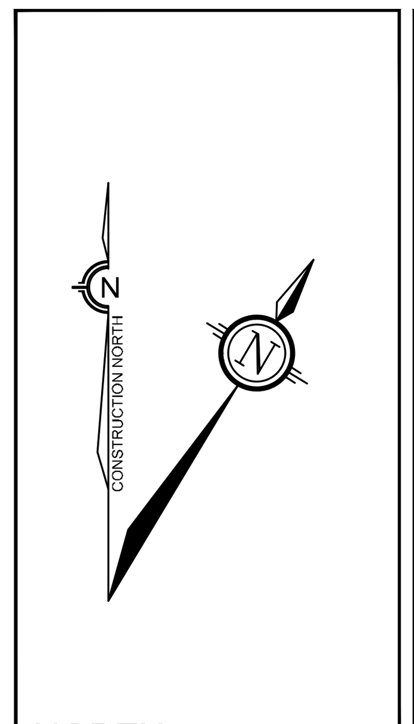
D07-12-19-0207

PLAN #18087

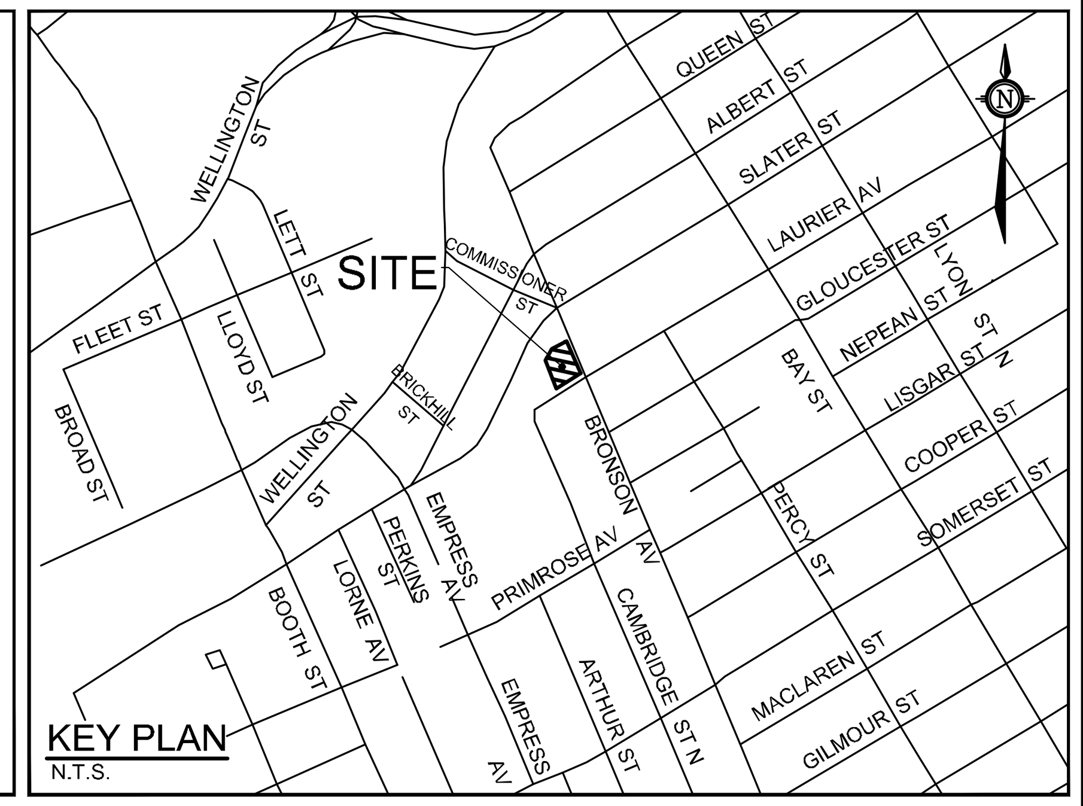


LEGEND

- PROPOSED BARRIER CURB
- DC — PROPOSED DEPRESSED CURB
- DRAINAGE AREA LIMITS
- 1:5 YR / 1:100 YR — APPROXIMATE PONDING LIMITS
- A-3 — POST-DEVELOPMENT AREA ID
- 0.078 — POST-DEVELOPMENT DRAINAGE AREA (ha)
- 0.57 — 1:5 YEAR WEIGHTED RUNOFF COEFICIENT
- FFE — FINISHED FLOOR ELEVATION
- T/FND — TOP OF FOUNDATION WALL ELEVATION
- USF — UNDERSIDE OF FOOTING ELEVATION
- RD — PROPOSED CONTROLLED FLOW ROOF DRAIN
- PROPOSED STORM SEWER AND FLOW DIRECTION
- EMERGENCY OVERLAND FLOW ROUTE
- PROPOSED BUILDING ENTRANCE / EXIT
- STM MH — EXISTING STORM MH & SEWER
- CB — EXISTING CATCHBASIN C/W CATCHBASIN LEAD



NORTH



KEY PLAN
N.T.S.

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INTERNAL SWM STORAGE SYSTEM

DESIGN EVENT	STORAGE SYSTEM CONTROLLED FLOW	STORAGE VOLUMES	
		REQUIRED	PROVIDED
1:2 YR	1.26 L/s	0.7 m³	> 5.0 m³
1:5 YR	1.26 L/s	1.3 m³	
1:100 YR	1.26 L/s	3.7 m³	
1:100+20%	1.26 L/s	4.9 m³	

NOTES:

1. ALL DRAINAGE FROM AREA B-1 (ALL PROPOSED EXTERIOR MECHANICAL DRAINS + WEEPING TILE DRAINAGE SYSTEM) TO BE DIRECTED TO THE INTERNAL STORMWATER STORAGE SYSTEM. REFER TO THE ARCHITECTURAL AND MECHANICAL PLANS FOR DETAILS.
2. REFER TO ARCHITECTURAL AND STRUCTURAL PLANS FOR EXACT SIZE AND DETAILS OF INTERNAL STORMWATER STORAGE SYSTEM.
3. REFER TO ARCHITECTURAL AND MECHANICAL PLANS FOR LOCATION AND CONNECTIONS AND DETAILS OF THE INTERNAL STORMWATER STORAGE SYSTEM.

SITE FLOWS & STORMWATER MANAGEMENT TABLE

DESIGN EVENT	PRE-DEVELOPMENT CONDITIONS		POST-DEVELOPMENT CONDITIONS							
	UNCONTROLLED FLOW (L/s)	ALLOWABLE RELEASE RATE (L/s)	SAN FLOWS (L/s)	R-1 FLOW (L/s)	B-1 FLOW (L/s)	A-1 FLOW (L/s)	A-2 FLOW (L/s)	A-3 FLOW (L/s)	TOTAL FLOW (L/s)	REDUCTION IN FLOW (L/s OR %)*
1:5 YR	17.7	10.5	1.2	3.2	1.3	0.1	0.1	2.5	8.5	9.2 or 52%
1:100 YR	34.6	10.5		4.0	1.3	0.2	0.2	3.5	10.5	24.1 or 70%

* REDUCED FLOW COMPARED TO PRE-DEVELOPMENT UNCONTROLLED CONDITIONS

INLET CONTROL DEVICE DATA TABLE - CBMH 01

DESIGN EVENT	ICD TYPE (VORTEX MODEL)	DIAMETER OF OUTLET PIPE (mm)	DESIGN FLOW (L/s)	DESIGN HEAD (m)	WATER ELEVATION (m)	VOLUME (m^3)	AVAILABLE STORAGE
1:2 YR	HYDROVEX (MODEL 75 VHV-1)	250mmØ PVC	2.1	0.34	79.49	6.0	19.1 m^3
1:5 YR			2.5	0.46	79.61	9.9	
1:100 YR			3.5	0.89	80.04	19.1	

ROOF DRAIN TABLE: AREA R-1 (ROOF DRAINS 1 to 5)

AREA ID *	ROOF DRAIN No. (WATTS MODEL)	ROOF DRAIN OPENING SETTING	1:5 YEAR RELEASE RATE	APPROX. 5-YR PONDING DEPTH	1:100 YEAR RELEASE RATE	APPROX. 100-YR PONDING DEPTH
R-1	RD 1 (RD-100-A-ADJ)	3/4 EXPOSED	0.95 L/s	11 cm	1.58 L/s	15 cm
R-1	RD 2 (RD-100-A-ADJ)	CLOSED	0.32 L/s	7 cm	0.32 L/s	12 cm
R-1	RD 3 (RD-100-A-ADJ)	1/4 EXPOSED	0.79 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 4 (RD-100-A-ADJ)	CLOSED	0.32 L/s	11 cm	0.32 L/s	15 cm
R-1	RD 5 (RD-100-A-ADJ)	1/4 EXPOSED	0.79 L/s	10 cm	0.87 L/s	14 cm

* REFER TO THE 'DEVELOPMENT SERVICING AND STORMWATER MANAGEMENT REPORT' (R-2019-193) PREPARED BY NOVATECH FOR DRAINAGE AREA IDENTIFIERS AND STORMWATER MANAGEMENT DETAILS.

**ALL CONTROLLED FLOW ROOF DRAINS FOR THE PROPOSED BUILDING TO BE WATTS 'ADJUSTABLE ACCUTROL' ROOF DRAINS.

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SCALE
1:150

DESIGN	SM / MS
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DRAWN	BF / SM
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APPROVED	MS

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER
C. M. STANG
100125708
July 31/20
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DRAWING NAME
STORMWATER MANAGEMENT PLAN

PROJECT No. 119019
REV: REV # 2
DRAWING No. 119019-SWM

PLANA1.DWG - 841mmx594mm
PLAN #18087

D07-12-19-0207