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Waterford Ottawa Seniors Addition
2431 Bank Street

Development Servicing and Stormwater Management Report

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WATERFORD OTTAWA SENIORS RESIDENCE
PROPOSED RESIDENTIAL ADDITION
2431 BANK STREET

DEVELOPMENT SERVICING AND STORMWATER MANAGEMENT REPORT

Prepared by:

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April 30, 2020
July 31, 2020
Revised: October 30, 2020

Ref: R-2020-060
Novatech File No. 119247

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Engineers, Planners & Landscape Architects

October 30, 2020

Zlepnig Holdings Limited
P.O. Box 536
Metcalfe, Ontario
K0A 2P0

Attention: Mr. Fred Zlepnig, President

Dear Sir:

Re: Development Servicing and Stormwater Management Report
Proposed 14-Storey Residential Addition
2431 Bank Street, Ottawa, ON
Novatech File No.: 119247

Enclosed is a copy of the revised 'Development Servicing and Stormwater Management Report' for the proposed 14-storey residential addition to the existing Waterford Retirement Residence located at 2431 Bank Street, 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

M Savic

Miroslav Savic, P. Eng.
Senior Project Manager

cc: Adam Baker (City of Ottawa)
Sara-Jeanne Dagenais (Neuf Architects)

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

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1.0 INTRODUCTION

The new 14-storey residential addition is being proposed to the existing Waterford Retirement Residence by Zlepnig Holdings Limited 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 1.5 hectares in size and currently consists of an existing multi-unit retirement residence with site accesses off both Bank Street and the west-bound lanes of Hunt Club Road. The subject site is located on the northern corner of Bank Street and Hunt Club Road in the south end of Ottawa. Residential lots abut the property to the east and north, as well as commercial properties to the west and south of the site. The legal description of the subject site is designated as Part of Lot 5, Concession 3 (Rideau Front), Township of Gloucester, 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 on September 10th, 2019 at which time the client was advised of the general submission requirements.

Based on a review of **O. Reg. 525/98: Approval Exemptions**, a Ministry of the Environment, Conservation and Parks (MECP) Environmental Compliance Approval (ECA) will not be required since the on-site stormwater management facilities will service a single lot that is not an industrial site and the storm flows from this site are will discharge into a municipal storm sewer that is not a combined sewer.

The subject site is located within the jurisdiction of the Rideau Valley Conservation Authority (RVCA). An 'Enhanced' Level of Protection, equivalent to a long-term average removal of 80% of total suspended solids (TSS) is required as noted in the pre-consultation correspondence with the RVCA. Refer to **Appendix A** for a summary of the correspondence related to the proposed development.

1.4 Proposed Development

The proposed development will consist of a new 14-storey residential addition adjoining the existing residence. The proposed 14-storey residential addition will be serviced by extending new on-site service laterals to the existing sanitary and storm sewer systems which outlet to the municipal sewers in Bank Street. Two separate watermain connections are being proposed for redundancy due to the domestic demands of the new building with an isolation valve on the existing municipal watermain in Southgate Road. Barrier-free access to the proposed building will be provided at various points around the site to allow for ease of movement for all residents. The existing rear parking area on the north side of the building will be removed and converted into a landscaped amenity space for residents. The existing access to the rear parking area off Bank Street will be closed and pathway linkages with be connected to the existing municipal sidewalk along the east boulevard of Bank Street.

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 (Report No.: PG5163-1), prepared by Paterson Group dated January 15th, 2020.

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. 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 Waterford Retirement Residence site outlets to the existing 525mm dia. municipal sewer in Bank Street. The sanitary sewage outlet for the existing building is conveyed to the municipal sewer via. the existing 250mm dia. site service within the main entrance drive aisle off Bank Street. As per the pre-condition CCTV investigation, the existing 250mm service lateral is a PVC pipe and was found to be good condition to continue servicing the site. The proposed residential addition will not be serviced internally. Instead, a new site service with be extended from the existing monitoring manhole within the main entrance drive aisle to the eastern portion of the site for the new 14-storey residential addition.

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 Uses, Staff Uses and Infiltration Allowances

- Residential Units (Single Room / Studio): 1.0 person per unit
- Residential Units (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
- Number of Staff for the existing residence: 90 people
- Number of Staff for the proposed addition: 10 people
- Average Daily Staff Sewage Flow: 75 L/person/day
- Residential Peaking Factor calculated by the Harmon Equation
- Commercial Peaking Factor = 1.5
- Infiltration Allowance: 0.33 L/s/ha x 1.5 ha site = 0.50 L/s

The total calculated peak sanitary flow from the existing residence and the proposed addition, including infiltration, is approximately 4.76 L/s. Refer to **Appendix C** for detailed calculations.

A 250mm dia. sanitary gravity sewer at a minimum slope of 0.5% has a full flow conveyance capacity of 43.9 L/s and will have enough capacity to convey the theoretical sanitary flows for the proposed addition. Furthermore, the existing 250mm dia. sanitary gravity sewer is also at a minimum slope of 0.5% with the same full flow conveyance capacity of 43.9 L/s and the entire on-site system will have enough capacity to continue to convey the sanitary flows from the site.

2.2 Water

The existing Waterford Retirement Residence site is serviced from the existing 400mm dia. ductile iron municipal watermain that runs along the east boulevard of Bank Street. The proposed residential addition will be serviced by extending two new 150mm dia. water services connected to the existing 200mm dia. cast iron watermain in Southgate Road with a 200mm dia. isolation valve located between the new service laterals. The water services have been sized to provide the required domestic water demand and fire flow. Shut-off valves will be provided on the proposed water services at the limit of the north property line. 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 (Single Room or Studio Unit): 1.0 person per unit
- Residential Units (1 Bedroom Units): 1.4 people per unit
- Residential Units (2 Bedroom Units): 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 for Residents
- Peak Hour Demand Peaking Factor = 2.2 x Max. Day Demand for Residents
- Average Daily Employee Demand: 75 L/person/day
- Maximum Day Demand Peaking Factor = 1.5 x Avg. Day Demand for Employees
- Peak Hour Demand Peaking Factor = 1.8 x Max. Day Demand for Employees

The domestic water demands for the existing residence and the proposed addition, calculated as per the Ottawa Design Guidelines – Water Distribution are summarized in **Table 2.1** The detailed water demand calculations are provided in **Appendix C.**

Table 2.1: Theoretical Water Demands

Residential Use	Average Day Demand	Maximum Day Demand	Peak Hour Demand
Existing Residence	0.65 L/s	1.55 L/s	3.35 L/s
Proposed Addition	0.89 L/s	2.22 L/s	4.88 L/s

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:

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

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 at each connection point. **Table 2.2** and **Table 2.3** summarize 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 Conditions for Connection to Bank Street

Municipal Watermain Boundary Condition	Boundary Condition	Water Demand (L/s)	Min/Max Operating Pressure (psi)	Design Pressure (psi)*
Minimum HGL (Peak Hour Demand)	124.5 m	3.35	40 psi (min.)	49.1
Maximum HGL (Avg Day Demand)	131.5 m	0.65	80 psi (max.)	59.0
Max Day + Fire Flow HGL	126 m	150 + 1.55	20 psi (min.)	51.2

* Based on an average ground elevation of 90.0m. Design pressure = (HGL – watermain elevation) x 1.42197 PSI/m

Table 2.3 : Hydraulic Boundary Condition for Connection to Southgate Road

Municipal Watermain Boundary Condition	Boundary Condition	Water Demand (L/s)	Min/Max Operating Pressure (psi)	Design Pressure (psi)*
Minimum HGL (Peak Hour Demand)	124.5 m	4.88	40 psi (min.)	49.1
Maximum HGL (Avg Day Demand)	131.5 m	0.89	80 psi (max.)	59.0
Max Day + Fire Flow HGL	116 m	150 + 2.22	20 psi (min.)	37.0

*Based on an average ground elevation of 90.0m. Design pressure = (HGL – watermain elevation) x 1.42197 PSI/m

As indicated above, the existing municipal watermains 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 remote fire department (siamese) connection on a standpipe. The remote siamese connection will be located near the south-west corner of the proposed building addition, within 45m of the existing on-site private hydrant located south-west of the main entrance and drop-off area.

The Fire Underwriters Survey (FUS) was used to estimate fire flow requirements for the proposed building. The fire flow calculations have been based on the information provided by the architect. The existing building will have a 14-storey addition, a sprinkler system and will be constructed using fire resistive materials.

Table 2.4 summarizes the fire flow requirements for the proposed building, based on FUS calculations.

Table 2.4 : Fire Flow Requirements for the Proposed Development

Type of Uses	Fire Flow Demand USGPM (L/s)
Existing Residence + New Addition	9,000 L/min (150 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) engineer 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 two Class AA, blue bonnet municipal hydrants within 90m of the proposed development (one hydrant near the NE corner of Bank Street and Hunt Club Road approximately 48m from the proposed building; another along the west side of the existing residence building within the Bank Street boulevard approximately 12m from the existing building; and a third private hydrant near the front entrance of the existing retirement residence approximately 43m from the proposed fire department connection. 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 2.5**.

Table 2.5: Combined Hydrant Flow Summary

Municipal Fire Hydrants < 75m from Building	Private Fire Hydrants < 75m from Building	Combined Fire Flow
2 x 5,700 L/min	1 x 5,700 L/min*	17,100 L/min

* It is assumed that the private fire hydrant can provide similar flow rate as the rated municipal hydrants since it's connected to the same 406mm diameter watermain in Bank Street.

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

The existing Waterford Retirement Residence site outlets to the existing 525mm dia. municipal sewer in Bank Street. The sanitary sewage outlet for the existing building is conveyed to the municipal sewer via. the existing 375mm dia. site service within the main entrance drive aisle off Bank Street. As per the pre-condition CCTV investigation, the existing 375mm service lateral is a PVC pipe and was found to be good condition to continue servicing the site. The proposed residential addition will not be serviced internally. Instead, a new site service with be extended from the existing monitoring manhole within the main entrance drive aisle to the eastern portion of the site for the new 14-storey building addition.

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 parking lot surface and on the building roof to minimize the size of the underground SWM storage tank and pipes.
- Provide best measures to attempt to control the post-development flows from the site to a target 5-year release rate specified by the City of Ottawa. Control post-development flows from the site being developed up to and including the 100-year design event.

- Minimize the impact on the existing municipal sewer in Bank Street 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 entire site is approximately 1.5 ha in size, however the existing building cannot be retrofitted to accommodate stormwater controls to meet the current stormwater management criteria. The main parking areas on the south side of the building are controlled using inlet control devices (ICDs) on the outlet pipes of existing catchbasins within the paved parking area. The existing parking lot on the north side of the building is uncontrolled and has a separate outlet the municipal sewer in Bank Street due to the low elevation of the rear parking lot and lower level access doors from the rear of the existing building. The parking area is being removed and replaced with a landscaped amenity space and walking paths, however, due to the rear exit doors and shallow outlet sewers it will not be possible to control flow from this area. in portion of the site to be developed.

The uncontrolled pre-development flows from the 0.700 ha portion of the site to be developed were calculated using the Rational Method to be 150.6 L/s during the 1:5-year design event and 290.5 L/s during the 1:100-year design event. Refer to **Appendix D** for detailed calculations. There are currently no 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 using the Rational Method, to be approximately 101.4 L/s, based on a 10-min. rainfall intensity, using a 5-year return period (City of Ottawa IDF Curves) and a runoff coefficient of 0.50.

T_c = 10 min C =0.50
I_{5yr} = 104.2 mm/hr A = 0.700 ha

Q_{allow} = 2.78 CIA
= 2.78 x 0.50 x 104.2 x 0.700
= 101.4 L/s

2.3.3 Post-Development Conditions

The proposed site will be serviced by connecting to the existing 300mm dia. on-site storm sewer at the south-east corner of main entrance drive aisle for the existing Waterford Seniors Residence. As part of the stormwater management (SWM) strategy, stormwater runoff from portions of the proposed building roofs will be attenuated using control flow roof drains. In addition to this, stormwater runoff from the lower roof terraces and ground level amenity areas will be directing to an external stormwater storage tank system and controlled prior to being discharged into the on-site storm sewer system via. a mechanical pumping system. Refer to plan 119247-SWM for drainage areas and detail.

2.3.3.1 Area A-1: Uncontrolled Direct Runoff to Southgate Road

The combined uncontrolled post-development flow from this small sub-catchment area was calculated using the Rational Method to be approximately 1.6 L/s during the 5-year design event and 3.4 L/s during the 100-year design event. Refer to **Appendix D** for SWM calculations.

2.3.3.2 Area A-2: Uncontrolled Runoff to Bank Street

The uncontrolled post-development flow from this sub-catchment area was calculated using the Rational Method to be approximately 11.6 L/s during the 5-year design event and 23.4 L/s during the 100-year design event. As discussed above, it will not be possible to control flow from this area. in portion of the site to be developed due to the low elevation of the rear landscaped area and lower level access doors from the rear of the existing building. The existing parking lot on the north side of the building is uncontrolled and has a separate outlet the municipal sewer in Bank Street. The existing paved parking area is being completely removed and replaced with a landscaped amenity space and walking paths. The total post-development flows to the existing outlet sewer from this sub-catchment area will be significantly reduced (by approximately half) from the current conditions due to a reduction in the C-value from 0.88 to 0.42 under post-development conditions. The resulting reduction in flows to the existing outlet sewer represents a great flow reduction than controlling the flows to a C-value of 0.5 as specified under the allowable conditions. Refer to **Appendix D** for SWM calculations.

2.3.3.3 Area A-3: Uncontrolled Courtyard Flows

The uncontrolled post-development flow from this very small landscaped courtyard area was calculated using the Rational Method to be approximately 1.6 L/s during the 5-year design event and 3.2 L/s during the 100-year design event. The existing landscape drain in the small courtyard between the buildings is currently connected to the uncontrolled portion of the on-site storm sewer system. The landscape drain will be relocated to better drain the courtyard area, however, the portion of the on-site storm sewer system will be converted to internal mechanical plumbing as it will be below the new building addition and the tributary area will remain uncontrolled. Refer to **Appendix D** for SWM calculations.

2.3.3.4 Area A-4: Controlled Flow – Paved Parking Lot and Drive Aisle

Runoff from sub-catchment A-4 will be captured by the proposed on-site storm sewer system and attenuated by an ICD installed in the outlet pipe of CBMH 01.

Temporary storage is be provided within the oversized underground storm pipes and manhole structures as well as the surface of the paved parking lot area. The underground portion of the stormwater storage system will attenuate the runoff volumes for all storms up-to and including the 2-year storm event, while the surface of the paved parking lot and drive aisles will provide the remainder of the required storage for all storms greater than the 2-year storm event and up to the 100-year design event. The site has been designed to ensure that no stormwater will pond on the private paved surfaces (i.e. drive aisles or parking lots) during the 2-year storm event. Furthermore, the emergency overland flow route spill elevation from the controlled parking lot will provide protection for the building from the maximum ponding elevation during storm events larger than a 100-year design storm. As a result, no surface ponding will be able to reach the building envelope or building openings

Table 2.6 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 the 100-year design events.

Table 2.6: Stormwater Flows, ICD & Underground Storage System

Design Event	Controlled Site Flows from Area A-4					
	ICD Type	Peak Flow	Ponding Depth	Average Flow (50% Qpeak)	Storage Vol. Required	Max Storage Provided
2-Year	Tempest Vortex MHF (Type 'A')	25.2 L/s	0.0 m (89.77 m)	12.6 L/s	19.0 m³	107 m³
5-Year		25.4 L/s	0.08 m (89.88 m)	12.7 L/s	30.8 m³	
100-Year		26.2 L/s	0.21 m (90.01 m)	13.1 L/s	78.9 m³	
100-Year (+20%)		26.8 L/s	0.24 m (90.04 m)	13.4 L/s	100.6 m³	

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

2.3.3.5 Area R-1: Controlled Flow from Roof Terraces and Deck Drains

Stormwater runoff from this sub-catchment area will be captured by the lower terrace deck drains / outdoor amenity area drains and uncontrolled deck drains prior to being directed to an external stormwater storage tank. Stormwater collected within the storage tank will be pumped up to the proposed storm service and released into the existing on-site storm sewer system which in turn outlets to the municipal sewer in Bank Street. A pump (designed by the mechanical consultant) is required to control flow from the tank to a maximum rate of 37.8 L/s (600 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. Mechanical plumbing within the new building will be pressure pipe as required to protect the low mechanical storm piping and prevent water from entering the garage floor levels. An emergency overflow pipe from SWM tank to the on-site storm sewer system will be provided at an elevation of 88.15m (approximately 2.3m below the finished floor elevation of the new building). The emergency overflow pipe from the external SWM tank will drain by gravity into an uncontrolled section of the existing on-site storm sewer system.

Table 2.7 summarizes the post-development stormwater design flows and storage volumes for both the 5-year and 100-year design events.

Table 2.7: 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	37.8 L/s	0.0 m^3	>30.0 m^3
1:5 Year	37.8 L/s	4.1 m^3	
1:100 Year	37.8 L/s	20.8 m^3	
1:100 Year + 20% IDF increase	37.8 L/s	29.5 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.

2.3.3.6 Area R-2: Controlled Flow - New Tower Addition Building Roof

The post-development flow from this sub-catchment area will be attenuated by thirteen (13) individual Watts adjustable 'Accutrol' control flow roof drains (model number RD-100-A-ADJ) prior to being directed to the proposed storm service.

Table 2.8 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 2.8: 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 (0.014 ha)	1	RD-100-A-ADJ (Closed)	0.32	0.32	0.11	0.14	3.0	6.9	7.8
RD-1a (0.006 ha)	1	RD-100-A-ADJ (Closed)	0.32	0.32	0.09	0.13	0.9	2.2	3.1
RD-2 (0.015 ha)	1	RD-100-A-ADJ (Closed)	0.32	0.32	0.11	0.14	3.3	7.6	8.0
RD-2a (0.007 ha)	1	RD-100-A-ADJ (Closed)	0.32	0.32	0.10	0.13	1.1	2.8	3.5
RD-3 (0.013 ha)	1	RD-100-A-ADJ (Closed)	0.32	0.32	0.11	0.15	2.7	6.3	6.6
RD-3a (0.014 ha)	1	RD-100-A-ADJ (Closed)	0.32	0.32	0.11	0.15	2.9	6.8	6.8

RD-4 (0.004 ha)	1	RD-100-A-ADJ (Closed)	0.32	0.32	0.10	0.13	0.5	1.3	1.7
RD-5 (0.004 ha)	1	RD-100-A-ADJ (Closed)	0.32	0.32	0.10	0.13	0.5	1.3	1.8
RD-6 (0.012 ha)	1	RD-100-A-ADJ (1/4 Exposed)	0.79	0.87	0.10	0.13	1.6	4.0	5.2
RD-7 (0.014 ha)	1	RD-100-A-ADJ (Closed)	0.32	0.32	0.11	0.15	3.0	6.9	7.3
RD-8 (0.014 ha)	1	RD-100-A-ADJ (Closed)	0.32	0.32	0.11	0.15	3.0	6.9	7.3
RD-11 (0.008 ha)	1	RD-100-A-ADJ (Closed)	0.32	0.32	0.11	0.14	1.4	3.3	3.8
RD-12 (0.004 ha)	1	RD-100-A-ADJ (Closed)	0.32	0.32	0.09	0.12	0.5	1.3	2.3
Total Roof (0.129 ha)	**13**	**-**	**4.63**	**4.71**	**-**	**-**	**24.4**	**57.6**	**65.2**

Refer to **Appendix D** for detailed SWM calculations and to **Appendix E** 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.

2.3.3.7 Area R-3: Controlled Flow – Loading Expansion Building Roof

The post-development flow from this sub-catchment area will be attenuated by using two (2) Watts adjustable 'Accutrol' control flow roof drains (model number RD-100-A-ADJ) prior to being directed to the proposed storm service.

Table 2.9 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 2.9: 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-9 (0.015 ha)	1	RD-100-A-ADJ (1/4 Exposed)	0.79	0.87	0.10	0.13	2.2	5.4	7.6
RD-10 (0.008 ha)	1	RD-100-A-ADJ (Closed)	0.32	0.32	0.10	0.13	1.4	3.3	4.2
Total Roof (0.023 ha)	**2**	**-**	**1.11**	**1.19**	**-**	**-**	**3.6**	**8.7**	**11.8**

Refer to **Appendix D** for detailed SWM calculations and to **Appendix E** 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.

2.3.3.8 Stormwater Flow Summary

Table 3.0 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 3.0: Stormwater Flow Comparison Table

Design Event	Pre-Development Conditions		Post-Development Conditions					
	Uncontrolled Flow (L/s)	Allowable Flow (L/s)	A-1 Flow (L/s)	A-2 Flow (L/s)	A-3 Flow (L/s)	A-4 Flow (L/s)	R-1 to R-3	Total Flow (L/s)
5-Yr	150.6	101.4	1.6	11.6	1.6	25.4	43.5	83.7
100-Yr	290.5	101.4	3.4	23.1	3.2	26.2	43.7	99.6

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 allowable release rate specified by the City of Ottawa. This also represents a significant reduction in the flow rates, from the portion of the site affected by the proposed development, when compared to the respective uncontrolled pre-development flow conditions.

2.4 Stormwater Quality Control

The subject site is located within the jurisdiction of the Rideau Valley Conservation Authority (RVCA) and is tributary to the Rideau River. An 'Enhanced' Level of Protection, equivalent to a long-term average removal of 80% Total Suspended Solids (TSS), with at least 90% of the total rainfall being captured and treated, is required.

To achieve this level of quality control protection, a new oil-grit separator unit (CDS unit Model PMSU 20_20_5) will be installed downstream of CBMH 01. Stormwater runoff collected by the on-site storm sewer system (0.89 ha tributary area) will be directed through the proposed treatment unit. The contributing area includes the proposed residential tower building expansion, the proposed paved parking lot and drive aisles as well as small landscaped areas adjacent to the new building expansion.

As stated above, the proposed oil-grit separator has been sized to provide an 'Enhanced' Level of Protection for water quality treatment prior to discharging the stormwater into the municipal storm sewer in Capella Court. Echelon Environmental and Contech Stormwater Solutions Inc. have modeled and analyzed the tributary area to provide a CDS unit capable of meeting the TSS removal requirements. The model parameters for the TSS removal were based on historical rainfall data for Ottawa from the Ontario Climate Centre. It was determined that a **CDS Model PMSU 20_20_5** will exceed the target removal rate, providing a net annual **82.0% TSS removal**. The CDS unit has a treatment capacity of approximately 31 L/s, a sediment storage capacity of 1.67m^3; an oil storage capacity of 376 L; a total holding capacity of 3.15 m^3; and will treat a **net annual volume** of approximately **97.5%** for the tributary area.

Maintenance and Monitoring of the Storm Sewer and Stormwater Management Systems

It is recommended that the client implement a maintenance and monitoring program for both the on-site storm sewers and the stormwater management systems: The storm drainage system should be inspected routinely (at least annually); the ICD should be inspected to ensure it is fitted securely and free of debris; and the oil-grit separator should be inspected at regular intervals and maintained when necessary to ensure optimal performance. Refer to **Appendix G** for the CDS unit specifications, correspondence and summary of the annual TSS removal efficiency data.

3.0 SITE GRADING

The area of the site to be developed is primarily existing parking lots and the paved access roads/maintenance areas. Consequently, the existing site is relatively flat, with elevations varying from approximately 89.80m to 90.20m around the area of the existing east parking lot and main drive aisle down to approximately 89.20m to 89.50m for the rear parking lot adjacent to the north property line. The existing exit/entrance doors to the building along the rear parking lot and the north face of the building are at an elevation (89.25m to 89.65m at northwest corner) lower than the main floor building elevation of 90.42m. The low building grades along the north face require that we maintain a major system spill point to Southgate Road that is facilitated by a proposed swale and low landscape grading north of the proposed retaining wall that allows the grade to be raised to the existing loading area finished floor elevation of 90.13m.

Although the existing site does not slope too steeply, there is a low-lying landscaped area along the east property line where the existing servicing easement drops to drain the adjacent property grades. Existing stone retaining walls within this area will be retained and extended as required to properly grade the new parking lot.

The finished floor elevation (FFE) of the proposed residential building will be set at an elevation of 90.42m to match into the existing main floor elevation of the Waterford Retirement Residence being preserved on-site. The grades along the east, west and south property lines will be maintained and matched into where the new grading design requires on-site adjustments. The grades along the north property line will generally be matched as well, however, there will be a portion of the site that requires a structural retaining wall and or the use of the foundation wall of a portion of the new building to accommodate a slight grade change to the lower Southgate Road right-of-way. Refer to the enclosed Grading and Erosion & Sediment Control Plan (119247-GR) for details.

3.1 Emergency Overland Flow Route

In the case of a major rainfall event exceeding the design storms provided for, the stormwater located within the subject site will overflow towards the lower downstream sub-catchment areas and ultimately flow towards the Southgate Road right-of-way to the north. The floor elevation of the new building addition (90.42m) will be a minimum of 0.30m above the major system overflow points. The emergency overland flow route spill elevation from the controlled parking lot is 90.05m, as indicated on plan 119247-GR. This represents the maximum ponding elevation during storm events larger than a 100-year design storm. On-site ponding during the 100-year + 20% stress test (at approximately 90.04m), will not exceed this emergency spill elevation and is 0.37m below the finished floor elevation of the building. The lowest elevation against building envelope is approximately 90.25m, and as a result, no surface ponding will be able to reach the

building envelope or any of the proposed building openings. The emergency overland flow route is shown on the enclosed Grading and Erosion & Sediment Control Plan.

4.0 GEOTECHNICAL INVESTIGATIONS

A Geotechnical Investigation report has been prepared by Paterson Group 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.

In addition, the following measures will provide permanent erosion and sediment control on the portion of the **Waterford** site tributary to the south parking lot storm sewer system:

- A CDS type Oil/Grit Separator will be installed to provide water quality control prior to releasing stormwater from sub-catchment areas A-3, A-4, R-1, R-2 and R-3.

6.0 CONCLUSION

This report has been prepared in support of a site plan control application for the proposed residential development located at 2431 Bank Street.

The conclusions are as follows:

- The proposed 14-storey residential addition will be serviced by extending new laterals to the existing on-site sewer systems which ultimately outlets to the municipal sewers in Bank Street. The site is currently serviced by a watermain connection to the municipal main in Bank Street and the new addition will be serviced by two new connections to the municipal watermain in Southgate Gate in order to provide redundancy for the building.

- The building will be sprinklered and supplied with a remote fire department siamese connection. The new remote siamese connection will be located within 45m of the existing on-site private fire hydrant near the main entrance of the building.
- The site flows from sub-catchment area A-1 will continue to drain off-site uncontrolled to the municipal storm sewer system in Southbank Road, while flows from sub-catchment areas A-2 and A-3 will be conveyed uncontrolled to the on-site storm sewer system.
- The site flows from sub-catchment area A-4 will be attenuated by an ICD and controlled within the parking lot and drive aisle storm sewer system prior to being discharged from the site into the municipal storm sewer system in Bank Street.
- The site flows from sub-catchment area R-1 will be controlled by pumps and stored in an external SWM tank prior to being discharged into the on-site storm sewer system. Flows from area A-2 will be attenuated using control flow roof drains prior to being discharged to the municipal storm sewer system in Bank Street via the on-site storm sewer system.
- The total post-development site flow will be approximately 83.7 L/s during the 5-year design event and 99.6 L/s during the 100-year event, both of which are less than the allowable flow of 101.4 L/s as specified in the City of Ottawa criteria.
- An oil / grit separator unit (CDS Model PMSU 20_20_5) will provide an 'Enhanced' Level of protection for water quality control on the portion of the existing site being controlled and discharging to the 525mm dia. municipal storm sewer in Bank Street.
- Regular inspection and maintenance of the building services, roof drains, stormwater quality control treatment unit as well as the on-site SWM storage system including the structure sumps + ICDs 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:

Reviewed by:

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

Miroslav Savic, P. Eng.
Senior Project Manager

APPENDIX A

Correspondence

2431-2425 Bank Street

From: Moore, Sean (Sean.Moore@ottawa.ca)

To: fred@fkz.ca; hgagnon@neufarchitectes.com; adam@fkz.ca; steve@southway.com; sjdagenais@neufarchitectes.com; kzlepnig@yahoo.com

Cc: Cody.Oram@ottawa.ca; christopher.moise@ottawa.ca; Wally.Dubyk@ottawa.ca; Jeannette.Krabicka@ottawa.ca

Date: Friday, September 20, 2019, 11:00 AM EDT

Hi Fred,

Regarding our September 11, 2019 preconsultation meeting, please find below the submission requirements and comments for the proposed Site Plan Control and Lifting of Holding By-law applications for 2431-2425 Bank Street.

Zoning: MC[2286] S349 -h

Official Plan Designation: Arterial Mainstreet designation

Secondary Plan Designation: South Keys Mixed-Use Area designation (15 storey height limit)

List of required Plans/Reports with your applications:

Required Plans:

- Site Plan
- Landscape Plan
- Grading Plan
- Site Servicing Plan
- Survey Plan
- Elevation Plans
- Erosion and Sediment Control Plan
- Parking Garage Plans

Required Reports:

- Servicing Study
- Stormwater Management Report
- Transportation Impact Assessment
- Noise Feasibility Study
- Geotechnical Study
- Phase 1 ESA (5 copies) – to conformity with OReg 153/04
- Tree Conservation Report (if necessary)
- Urban Design Review Panel Submission
- Street level visualization of the proposed development in pdf of jpg format

All required plans & reports are to be provided in digital format (.pdf) at application submission in addition to 3 hard copies of all plans and reports.

Link to Site Plan Control application form:

https://app06.ottawa.ca/online_services/forms/ds/site_plan_control_en.pdf

Fee: $32,106.89

Complex Site Plan, Public Consultation

Link to Lifting of Holding By-law application form:

https://ottawa.ca/en/city-hall/planning-and-development/information-developers/development-application-review-process/development-application-submission/development-application-forms#lifting-holding-law

Fee: $6,385.99

Bank Street Secondary Plan

https://ottawa.ca/en/city-hall/planning-and-development/official-plan-and-master-plans/official-plan/volume-2a-secondary-plans/south-keys-blossom-park-bank-street-secondary-plan

Link to Urban Design Review Panel information:

http://ottawa.ca/en/city-hall/planning-and-development/how-develop-property/development-application-review-process-2-2

Link to Urban Design Guidelines for High-Rise Residential:

https://ottawa.ca/en/urban-design-guidelines-high-rise-buildings

Preliminary Staff Comments:

Planning:

-

- The South Keys Mixed Use Area Secondary Plan has several key policies as they relate to ‘tower’ development (floor plate size, tower separation) and built form that should be reviewed and incorporated into the proposal. ‘**Floor plate**’ is defined as the total area of a high-rise building floor measured from the exterior of the outside walls and includes the total floor area occupied by balconies’

- We appreciate the new residents garden in the north west corner (removing paved surfaces)
- Regarding Cash-in-Lieu of Parkland (CIL) requirements, credit for existing development will be allowed. The CIL rate calculated will be the net gain of number dwelling units, which is calculated at 1 ha owing (or cash equivalent) for every 500 dwelling units, up to a maximum of 10% of the site area. In this case the 10% will be defined as the 'construction area' only.
- The zoning by-law language (in exception 2286) is flawed in that it defines a tower as any portion of a building over a podium. This definition should relate to high-rise buildings (9 plus stories), and thus it requires a 23 metre separation between the existing 6 storey building and proposed 14 storey building. City staff have agreed to amend the exception zone through a City initiated zoning by-law amendment that would go to Planning Committee in November 2019. Therefoer, your project would not be effected by this language error in the exception zone. The intent will be restored to having a minimum 23 metre separation between two high-rise buildings (two buildings both over 9 stories in height).
- The 'h' associated with the zoning is a Holding Provision. This requires removal through a 'Lifting of Holding By-law' application. The applicant can be submitted concurrently with the Site Plan Control application, and will advance once City staff are in a position to issue site plan approval.
- Please ensure you reach out to Councillor Diane Deans (Ward 10 Councillor) regarding this project.

Design:

- This file will need to attend the UDRP for a formal review, and we recommend that due to its scale and potential impact to the surrounding neighbourhood and being located at such a prominent intersection, it can attend an informal session prior to application submission;
- If no changes to the current design are made, the proposal may need to attend a specialized design review session (charette style session) due to the following policies of the Secondary Plan:

4.1.3 Build Form

The future built form character of the MUA is demonstrated in the Community Design Plan and varies depending on location. Schedule C – Mixed Use Area Permitted Building Heights defines the various areas of permitted height for the Mixed-Use Area. Minor changes in configuration and/or size of the permitted building height areas identified on Schedule C will not require an amendment to this Secondary Plan.

1. *High-rise buildings will generally take a podium and tower form. A high-rise building that deviates from a podium and tower form with support from a specialized design review by the City's Urban Design Review Panel will be permitted subject to the applicable policies below.*

The secondary plan promotes the tower + podium built form with a small tower floor plate for high-rise development. The proposed new building does not represent the desirable built form (aka, 750 square metre floor plate). Therefore, it will be subject to the above high-lighted policy – a specialized design review.

- This is a complex site and requires a unique approach for large scale development to fit into this context. More analysis (3D modeling of the context) and review will be the best way forward.

Transportation:

- The TIA Screening Form has indicated that the TIA Triggers have been met. Please proceed with Step 2 – Scoping Report.
- Bank Street is designated as an Arterial road within the City's Official Plan with a ROW protection of 37.5 metres. The ROW limits are to be shown on all the drawings and the offset distance (18.75 metres) to be dimensioned from the existing centerline of pavement.
- Hunt Club Road is designated as an Arterial road within the City's Official Plan with a ROW protection of 44.5 metres. The ROW limits are to be shown on all the drawings and the offset distance (22.25 metres) to be dimensioned from the existing centerline of pavement.
- ROW interpretation – Land for a road widening will be taken equally from both sides of a road, measured from the centreline in existence at the time of the widening if required by the City. The centreline is a line running down the middle of a road surface, equidistant from both edges of the pavement. In determining the centreline, paved shoulders, bus lay-bys, auxiliary lanes, turning lanes and other special circumstances are not included in the road surface.
- A 5.0 metres x 5.0 metres sight triangle would be required at the intersection of Bank Street and Hunt Club Road and is to be shown on all drawings.

Regards,

Sean Moore MCIP, RPP

Planner III | Urbaniste III

Development Review (South Services) | Examen des projets d'aménagement (services sud)

Planning, Infrastructure and Economic Development | Services de planification, d'infrastructure et de développement économique

City of Ottawa | Ville d'Ottawa

☎ 613.580.2424 ext./poste 16481

ottawa.ca/planning / ottawa.ca/urbanisme

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Development Review – Pre-application consultation Checklist (Municipal Servicing)

Date: 2019-Sep-10

Site Location: 2425 Bank

Type of Development: ☐ **Residential (☐ townhomes, ☐ stacked, ☐ singles, ☐ apartments),**
☐ **Office Space, ☒ Commercial, ☐ Retail, ☐ Institutional, ☐ Industrial,**
Other: Enter text
Owner/Agent: Neuf Architects
Assigned Planner: Sean Moore
Attendees: Chris Moise, Wally Dubyk, Sara-Jeanne Dagenais (Neuf Architects), Sean Moore, Cody Oram

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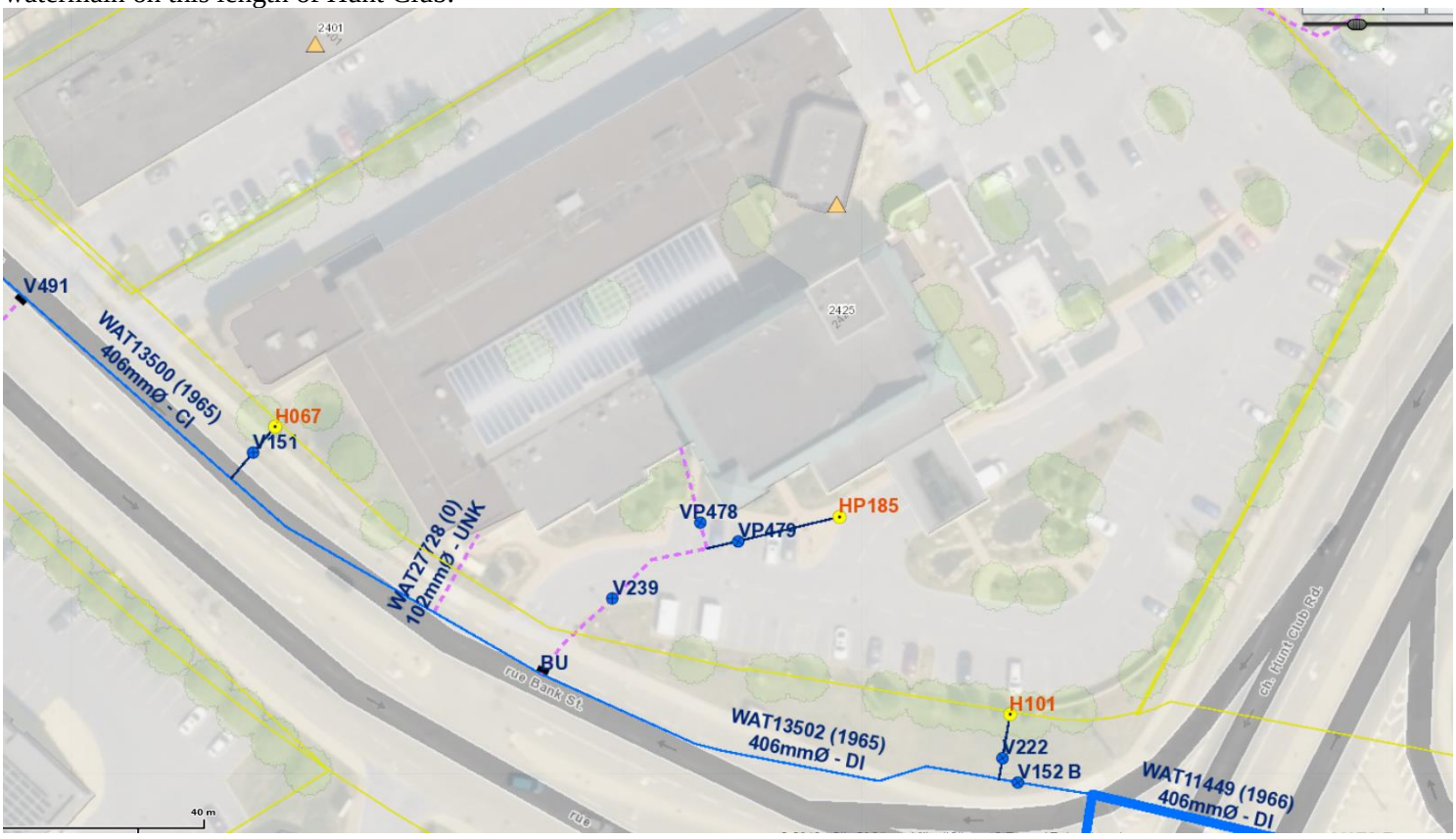
Infrastructure Information – advise applicant/owner that all existing and proposed utilities (municipal pipes) must be shown on the servicing plans

Water:

District Plan No. 2W2C

Frontage charges ($190.00 per metre of frontage if applicable) ☐ **Yes** ☒ **No**

Connection point (size & location of public watermain adjacent to site): 406mm DI watermain on Bank Street. There is no watermain on this length of Hunt Club.



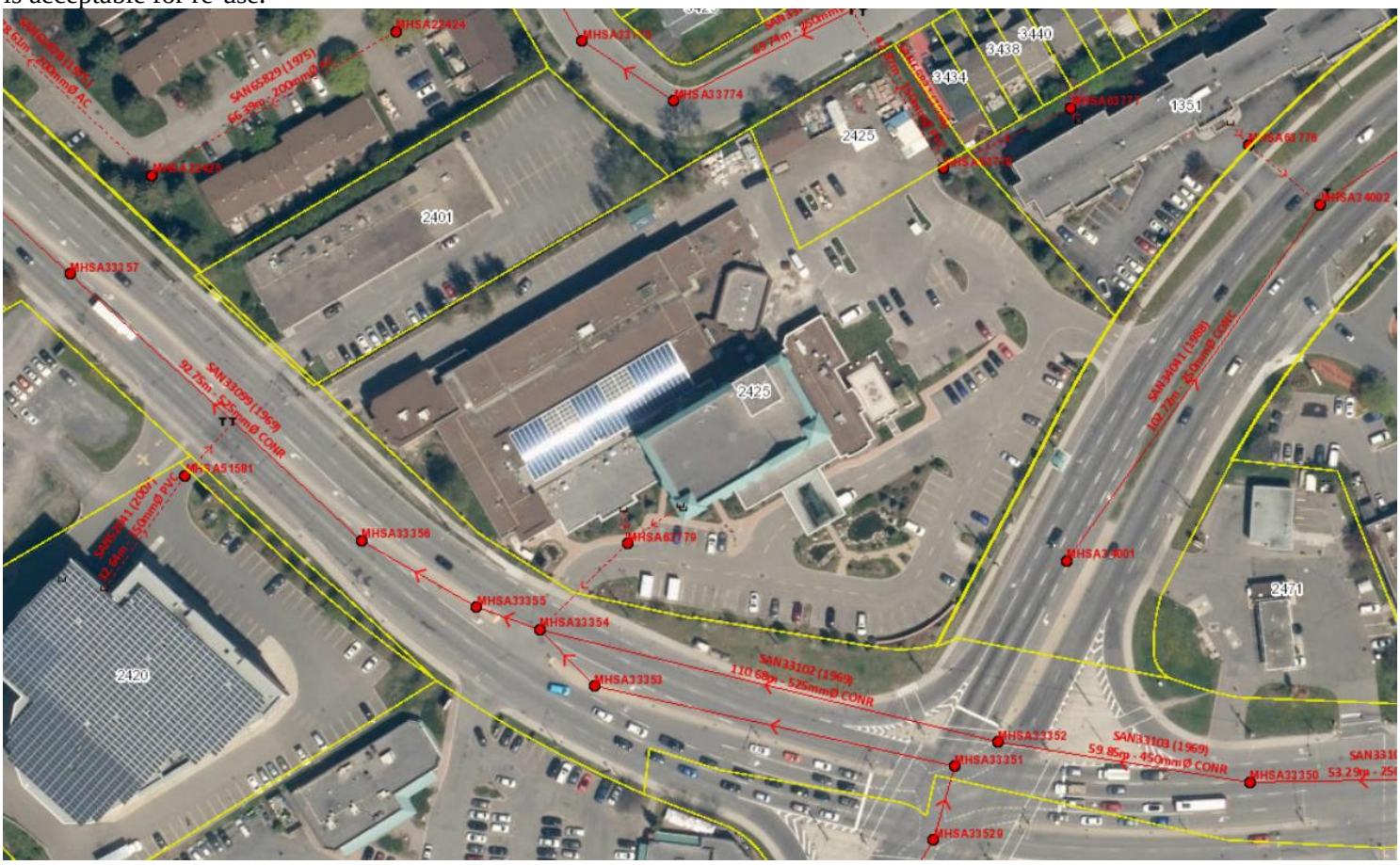
Submission documents must address/discuss:

- Boundary conditions (civil consultant must request boundary conditions from the City's assigned Project Manager, Development Review)
- Fire protection (Fire demand, Hydrant Locations)

Development Review – Pre-application consultation Checklist (Municipal Servicing)

- a water meter sizing questionnaire [water card] will have to be completed prior to receiving a water permit (water card will be provided post approval)
- a construction management plan is required if crossing 400mm Ø watermain during construction

Sanitary Sewers (size and location of public sanitary adjacent to site): 525mm concrete sanitary sewer on Bank Street. 250mm concrete sanitary sewer on Hunt Club. Proposed development is to utilize existing site sanitary service. CCTV inspection is required for the portion of site sanitary sewer service within Bank St Right-of-Way to confirm that the condition is acceptable for re-use.

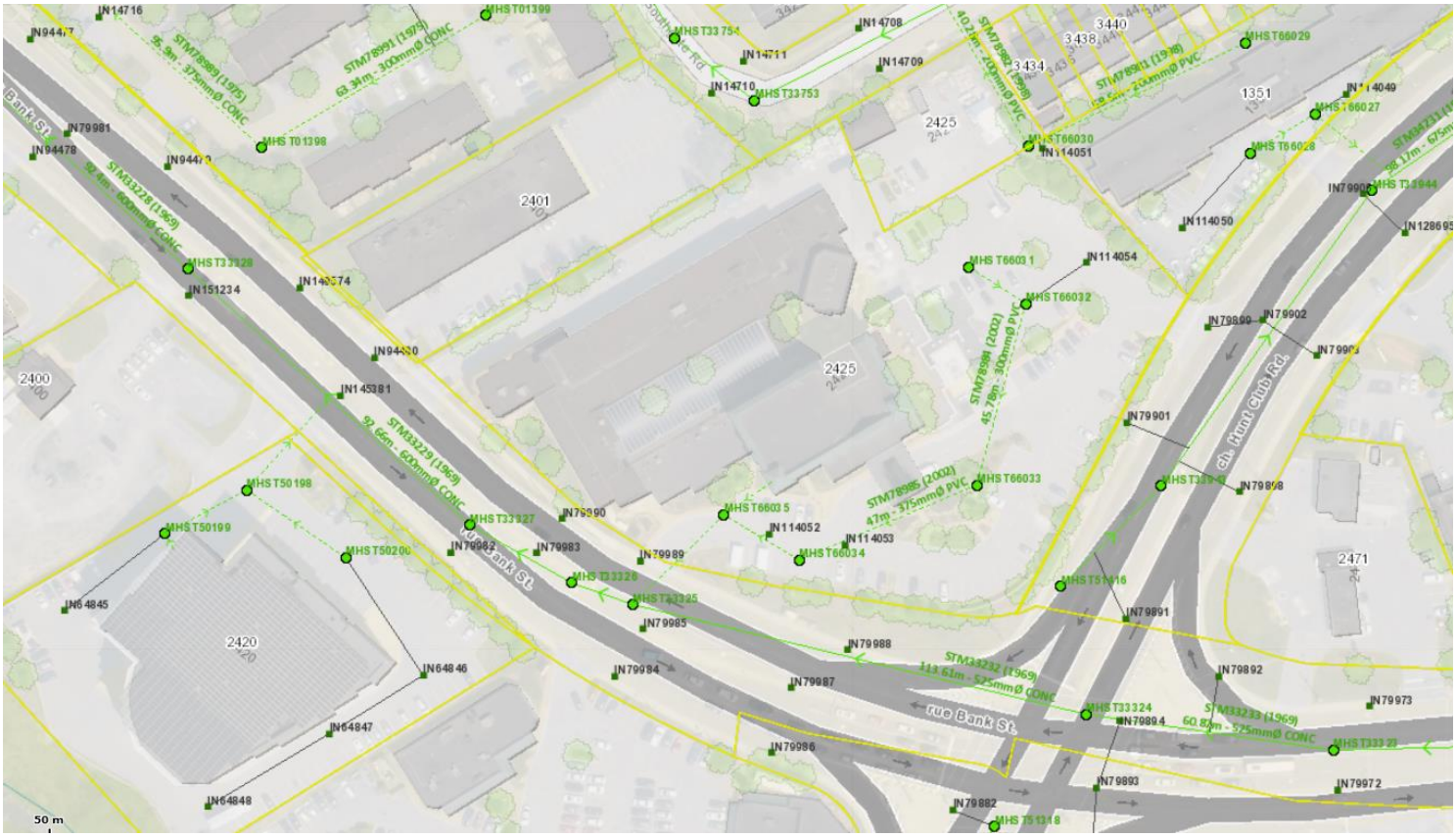


Monitoring manhole required on private property as per City Sewer Use Bylaw ☒ **Yes** ☐ **No**

The proposal increases the wastewater discharge from the property. In advance of the submission, consultant must coordinate the sanitary demand with the City's Project Manager, Development Review to confirm adequate capacity in the City's receiving sewer.

Development Review – Pre-application consultation Checklist (Municipal Servicing)

Storm Sewers (size and location of public storm sewer adjacent to site): 300mm concrete storm sewer on Hunt Club. 600mm concrete on Bank Street. The proposed development should utilize the existing site storm service. CCTV inspection is required for the portion of site storm sewer service within Bank St Right-of-Way to confirm that the condition is acceptable for re-use.



Storm Water Management:

a) Quality Control: (sub-watershed study, Conservation Authority, T.S.S. removal requirement, other quality issues)

Storm sewer on Bank St. outlets to Sawmill Creek, downstream approximately 1.3km from the property. Water Quality criteria to be confirmed by Rideau Valley Conservation Authority. Refer to Sawmill Creek Subwatershed Study for further details.

b) Quantity Control: (allowable runoff coefficient, receiving system constraints, MSS, legal outlet)

- MSS: Sawmill Creek Subwatershed Study
- Design storm for receiving sewer: 5-year design storm
- Runoff coefficient (C): C=0.5 or C=pre-development, whichever is less
- Time of concentration (Tc): To be calculated, min Tc=10mins
- Allowable flow rate: Control the 100-year event to 5-year event

Development Review – Pre-application consultation Checklist (Municipal Servicing)

Additional Notes:

Servicing

There are private sewers crossing the north east property line servicing 1351 Hunt Club. These sewers are to be protected during construction as per the easement agreements between the private property owners.

Ministry of Environment, Conservation and Parks (MECP)

All development applications should be considered for an Environmental Compliance Approval, under MECP regulations.

a. Consultant determines if an approval for sewage works under Section 53 of OWRA is required. Consultant determines what type of application is required and the City's project manager confirms. (If the consultant is not clear if an ECA is required, they will work with the City to determine what is required. If unclear or there is a difference of opinion the City Project Manager will coordinate requirements with MECP).
b. The project will be either transfer of review (standard), transfer of review (additional), direct submission, or exempt as per O. Reg. 525/98.
c. Pre-consultation is not required if applying for standard or additional works (schedule A of the Agreement) under Transfer Review.
d. Pre-consultation with local District office of MECP is recommended for direct submission.
e. Consultant completes an MECP request form for a pre-consultation. Sends request to moeccottawasewage@ontario.ca .

NOTE: Site Plan Approval, or Draft Approval, is required before any Ministry of the Environment, Conservation, and Parks (MECP) application is sent

Capital Works Projects that may impact the application? ☒ **Yes** ☐ **No** Refer to link

Hunt Club planned for resurfacing work within 2-3 years. Moratorium projected to begin on 12/21/2021.

Exterior Site Lighting: ☒ **Yes** ☐ **No**

If yes, require certification by a licensed professional engineer confirming the design complies with the following:
The location of the fixtures, fixture type (make, model, part number and the mounting height) must be shown on one of the approved plans.

1. Lighting must be designed only using fixtures that meet the criteria for Full Cut-off classification, as recognized by the Illuminating Engineering Society of North America (IESNA or IES), and
2. It must result in minimal light spillage onto adjacent properties. As a guideline, 0.5 foot-candle is normally the maximum allowable spillage.

Sensitive Marine Clay:

Sensitive Marine Clay (SMC) is widely found across Ottawa- geotechnical reports should include Atterberg Limits, consolidation testing, sensitivity values, and vane shear test results (at a minimum) with discussion for proposals in areas containing SMC.

Summary of Documentation to be Submitted should be forwarded to Planner within 5 business days

Refer to application tables for lists of required supporting plans and studies.

APPLICANT'S STUDY AND PLAN IDENTIFICATION LIST

– SITE PLAN APPLICATION – Municipal servicing

Legend:

The letter **S** indicates that the study or plan is required with application submission.
The letter **M** indicates that the study or plan may be required with application submission.

For information on preparing required studies and plans refer to:

http://ottawa.ca/en/development-application-review-process-0/guide-preparing-studies-and-plans

S/A	Number of copies	ENGINEERING		S/A	Number of copies
S	2	1. Site Servicing Plan	2. Assessment of Adequacy of Public Services / Site Servicing Study / Brief	S	2
S	2	3. Grade Control and Drainage Plan	4. Geotechnical Study	S	2
		5. Composite Utility Plan	6. Groundwater Impact Study		
		7. Servicing Options Report	8. Wellhead Protection Study		
		9. Community Transportation Study and/or Transportation Impact Study / Brief	10. Erosion and Sediment Control Plan / Brief	S	2
S	2	11. Storm water Management Report / Brief	12. Hydro-geological and Terrain Analysis		
		13. Water main Analysis	14. Noise Study	S	2
		15. Roadway Modification Design Plan	16. Confederation Line Proximity Study		

S/A	Number of copies	PLANNING / DESIGN / SURVEY		S/A	Number of copies
	50	17. Draft Plan of Subdivision	18. Plan Showing Layout of Parking Garage		2
	30	19. Draft Plan of Condominium	20. Planning Rationale		3
	35/55	21. Site Plan	22. Minimum Distance Separation (MDS)		3
	20	23. Concept Plan Showing Proposed Land Uses and Landscaping	24. Agrology and Soil Capability Study		5
	3	25. Concept Plan Showing Ultimate Use of Land	26. Cultural Heritage Impact Statement		3
	35/55	27. Landscape Plan	28. Archaeological Resource Assessment Requirements: **S** (site plan) **A** (subdivision, condo)		3
	2	29. Survey Plan	30. Shadow Analysis		3
	3	31. Architectural Building Elevation Drawings (dimensioned)	32. Design Brief (includes the Design Review Panel Submission Requirements)		Available Online
	6	33. Wind Analysis			

S/A	Number of copies	ENVIRONMENTAL		S/A	Number of copies
M	5	34. Phase 1 Environmental Site Assessment	35. Impact Assessment of adjacent Waste Disposal/Former Landfill Site		6
	5	36. Phase 2 Environmental Site Assessment (depends on the outcome of Phase 1)	37. Assessment of Landform Features		7
	4	38. Record of Site Condition	39. Mineral Resource Impact Assessment		4
	10	40. Tree Conservation Report	41. Environmental Impact Statement / Impact Assessment of Endangered Species		11
	4	42. Mine Hazard Study / Abandoned Pit or Quarry Study			

S/A	Number of copies	ADDITIONAL REQUIREMENTS		S/A	Number of copies
		43.	44.		

Meeting Date: ***Select a Date***

Application Type: ***Site Plan Control***

File Lead: ***Select File Lead***

Engineer/Project Manager: ***Select a Project Manager***

Site Address: Enter text

*Preliminary Assessment: **1**☐ **2**☐ **3**☐ **4**☐ **5**☐

*One (1) indicates that considerable revisions are required before a planning application is submitted, while five (5) suggest that proposal appears to meet the City's key land use policies and guidelines. This assessment is purely advisory and does not consider technical aspects of the proposal, or in any way guarantee application approval.

It is important to note that the need for additional studies and plans may result during application review. If following the submission of your application, it is determined that material that is not identified in this checklist is required to achieve complete application status, in accordance with the Planning Act and Official Plan requirements, City Planning will notify you of outstanding material required within the required 30 day period. Mandatory pre-application consultation will not shorten the City's standard processing timelines, or guarantee that an application will be approved. It is intended to help educate and inform the applicant about submission requirements as well as municipal processes, policies, and key issues in advance of submitting a formal development application. This list is valid for one year following the meeting date. If the application is not submitted within this timeframe the applicant must again pre-consult with the City.

Notes:

4. Geotechnical Study / Slope Stability Study – required as per Official Plan section 4.8.3. All site plan applications need to demonstrate the soils are suitable for development. A Slope Stability Study may be required with unique circumstances (Schedule K or topography may define slope stability concerns).

10. Erosion and Sediment Control Plan – required with all site plan applications as per Official Plan section 4.7.3.

11. Stormwater Management Report/Brief - required with all site plan applications as per Official Plan section 4.7.6.

14. Noise and Vibration Study – a Noise Study will be required if the noise sensitive development is proposed within 250 metres of an existing or proposed highway or a railway right-of-way, or 100 metres of an arterial or collector roadway or rapid-transit corridor. A Vibration Study will be required if the proposed development is within 75 metres of either an existing or proposed railway ROW. A Noise Study may also be required if the proposed development is adjacent to an existing or proposed stationary noise source..

35. An Impact Assessment of an Adjacent Waste Disposal/Former Landfill Site study is required for development proposals within 500 metres of a solid waste disposal site or other appropriate influence area or former landfill site. For contaminated sites a Record of Site Condition or letter of continued use is required.

39.A Mineral Resource Impact Assessment study is required, as per Official Plan section 3.7.4 adjacent to an unlicensed Limestone Resource or Sand and Gravel Resource Area (very limited uses considered within 500 metres of Limestone Resource Area or 300 metres of Sand and Gravel Resource Area). A study is required

- adjacent to, or within 300 metres of, a licensed pit
- adjacent to, or within 500 metres of, a licensed quarry

Steve Matthews

From: Jamie Batchelor <jamie.batchelor@rvca.ca>
Sent: Wednesday, April 8, 2020 1:19 PM
To: Miro Savic
Cc: Steve Matthews; Lee Sheets
Subject: RE: Waterford Retirements Residence - RVCA Pre-Consultation

Hi Miro,

I'll look into it. I'm not sure why our storm sewer layer differs. However, as long as the outlet is less than 2 km downstream, 80% TSS removal would still be required.

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: Miro Savic <m.savic@novatech-eng.com>
Sent: Wednesday, April 8, 2020 12:59 PM
To: Jamie Batchelor <jamie.batchelor@rvca.ca>
Cc: Steve Matthews <S.Matthews@novatech-eng.com>; Lee Sheets <l.sheets@novatech-eng.com>
Subject: RE: Waterford Retirements Residence - RVCA Pre-Consultation

Hello Jamie,

Thank you for quick response. According to the infrastructure mapping on GeoOttawa, the Bank Street storm sewer outlets to Sawmill Creek approximately 1.3km from the site. See the attached snapshot form GeoOttawa. Can you please review and get back to us.

Regards,

Miroslav Savic, P.Eng., Senior Project Manager | Land Development Engineering
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 x 265 | Fax: 613.254.5867

From: Jamie Batchelor <jamie.batchelor@rvca.ca>
Sent: Wednesday, April 8, 2020 11:29 AM
To: Miro Savic <m.savic@novatech-eng.com>
Cc: Steve Matthews <S.Matthews@novatech-eng.com>; Lee Sheets <l.sheets@novatech-eng.com>
Subject: RE: Waterford Retirements Residence - RVCA Pre-Consultation

Good Morning Miro,

Based on the downstream outlet to a watercourse being less than 400 metres downstream without any downstream facility, a water quality objective of 80% TSS removal would be required.

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: Miro Savic <m.savic@novatech-eng.com>
Sent: Tuesday, April 7, 2020 2:27 PM
To: Jamie Batchelor <jamie.batchelor@rvca.ca>
Cc: Steve Matthews <S.Matthews@novatech-eng.com>; Lee Sheets <l.sheets@novatech-eng.com>
Subject: Waterford Retirements Residence - RVCA Pre-Consultation

Hello Jamie,

We are working on a proposed development located at 2431 Bank Street in the City off Ottawa. The development proposal is a 14-storey addition to the existing Waterford Retirement Residence with 2 levels of underground parking.

The storm water from the site presently outlets to the existing 600mm diameter storm sewer in Banks Street via a 375mm diameter storm sewer. The storm drainage from the addition will be connected to the to the existing on-site storm sewer system. There will be no new storm sewer connection to the existing municipal infrastructure. Refer to the attached preliminary servicing plan for details.

The storm water quantity control will be provided in accordance with the City off Ottawa requirements. The post-development flows from the site will be controlled to the 1:5 year allowable flow calculated using a runoff coefficient of C=0.5. Post-development flow in excess of the allowable will be stored and controlled on site, for storms up to and including the 1:100 year design event.

Please confirm the storm water quality criteria for the proposed development. The existing site has no on-site storm water quality control.

Regards,

Miroslav Savic, P.Eng., Senior Project Manager | Land Development Engineering
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 x 265 | Fax: 613.254.5867

APPENDIX B

Development Servicing Study Checklist

Servicing study guidelines for development applications

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

- ☐ 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.
- ☐ 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.
- ☐ 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.
- ☐ 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.
- ☐ 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

☐ Confirm consistency with Master Servicing Study, if available
☒ 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.
☐ 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
☐ 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.
- ☐ 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).
- ☐ 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.
- ☒ Description of existing sanitary sewer available for discharge of wastewater from proposed development.
- ☐ 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)
- ☐ 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.
- ☐ 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).
- ☐ Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.
- ☐ Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.
- ☐ 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)
- ☒ 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.
- ☒ 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.
- ☐ Watercourse and hazard lands setbacks.
- ☐ Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.
- ☐ Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.
- ☒ Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).
- ☐ Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.
- ☒ 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.
- ☒ Any proposed diversion of drainage catchment areas from one outlet to another.
- ☒ Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.
- ☐ 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.
- ☒ Identification of potential impacts to receiving watercourses
- ☐ Identification of municipal drains and related approval requirements.
- ☒ Descriptions of how the conveyance and storage capacity will be achieved for the development.
- ☒ 100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.

- ☐ Inclusion of hydraulic analysis including hydraulic grade line elevations.
- ☒ Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.
- ☐ 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.
- ☐ 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:

- ☐ 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.
- ☐ Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.
- ☐ Changes to Municipal Drains.
- ☐ 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
- ☐ 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

2431 BANK STREET
SANITARY FLOWS

EXISTING RESIDENCE

Number of Single Room Units	81	
Persons per Single Room Unit	1.0	
Number of 1 Bedroom Units	43	
Persons per 1 Bedroom Unit	1.4	
Total Population Equivalent	141	
Average Daily Flow	280	L/c/day
Peak Factor (Harmon Formula)	3.6	
Peak Residential Flow	**1.65**	**L/s**
Number of Employees	90	
Average Daily Flow per Employee	75	L/c/day
Peak Factor	1.5	
Peak Commercial Flow	**0.12**	**L/s**
Total Sanitary Flow for Existing Residence	**1.77**	**L/s**

PROPOSED ADDITION

Number of 1 Bedroom Units	120	
Persons per 1 Bedroom Unit	1.4	
Number of 2 Bedroom Units	24	
Persons per 2 Bedroom Unit	2.1	
Total Population Equivalent	218	
Average Daily Flow	280	L/c/day
Peak Factor (Harmon Formula)	3.5	
Peak Residential Flow	**2.48**	**L/s**
Number of Employees	10	
Average Daily Flow per Employee	75	L/c/day
Peak Factor	1.5	
Peak Commercial Flow	**0.01**	**L/s**
Total Sanitary Flow for Proposed Addition	**2.49**	**L/s**

EXTRANEOUS FLOWS

Site Area (entire property included)	1.5	ha
Infiltration Allowance	0.33	L/s/ha
Peak Extraneous Flow	**0.50**	**L/s**
Total Peak Sanitary Flow	**4.76**	**L/s**

2431 BANK STREET
WATER ANALYSIS - DEMANDS OFF BANK STREET WATERMAIN

EXISTING BUILDING WATER DEMANDS

Number of Single Room Units	81	
Persons per Single Room Unit	1.0	
Number of 1 Bedroom Units	43	
Persons per 1 Bedroom Unit	1.4	
Total Population Equivalent	141	
Average Daily Demand per Person	350	L/c/day
Average Day Demand	0.57	L/s
Maximum Day Demand (2.5 x avg. day)	1.43	L/s
Peak Hour Demand (2.2 x max. day)	3.14	L/s
Number of Employees	90	
Average Daily Demand per Employee	75	L/c/day
Average Day Demand	0.08	L/s
Maximum Day Demand (1.5 x avg. day)	0.12	L/s
Peak Hour Demand (1.8 x max. day)	0.21	L/s
Total Average Day Demand	**0.65**	**L/s**
Total Maximum Day Demand	**1.55**	**L/s**
Total Peak Hour Demand	**3.35**	**L/s**

BOUNDARY CONDITIONS AT BANK STREET

Maximum HGL =	131.5	m
Minimum HGL =	124.5	m
Max Day + Fire Flow (150 L/s) =	126.0	m

PRESSURE CHECKS

Average Ground Elevation 90.0 m

High Pressure Test = Max HGL - Avg Ground Elev x 1.42197 psi/m < 80 psi

High Pressure = **59.0** psi

Low Pressure Test = Min HGL - Avg Ground Elev x 1.42197 psi/m > 40 psi

Low Pressure = **49.1** psi

Max Day + Fire Flow Test = Max Day + Fire - Avg Ground Elev x 1.42197 psi/m > 20 psi

Max Day + Fire Flow Pressure = **51.2** psi

2431 BANK STREET
WATER ANALYSIS - DEMANDS OFF SOUTHGATE ROAD WATERMAIN

PROPOSED ADDITION WATER DEMANDS

Number of 1 Bedroom Units	120	
Persons per 1 Bedroom Unit	1.4	
Number of 2 Bedroom Units	24	
Persons per 2 Bedroom Unit	2.1	
Total Population	218	
Average Daily Demand per Person	350	L/c/day
Average Day Demand	0.88	L/s
Maximum Day Demand (2.5 x avg. day)	2.21	L/s
Peak Hour Demand (2.2 x max. day)	4.86	L/s
Number of Employees	10	
Average Daily Demand per Employee	75	L/c/day
Average Day Demand	0.01	L/s
Maximum Day Demand (1.5 x avg. day)	0.01	L/s
Peak Hour Demand (1.8 x max. day)	0.02	L/s
Total Average Day Demand	**0.89**	**L/s**
Total Maximum Day Demand	**2.22**	**L/s**
Total Peak Hour Demand	**4.88**	**L/s**

BOUNDARY CONDITIONS AT SOUTHGATE ROAD

Maximum HGL =	131.5	m
Minimum HGL =	124.5	m
Max Day + Fire Flow (150 L/s) =	116.0	m

PRESSURE CHECKS

Average Ground Elevation 90.0 m

High Pressure Test = Max HGL - Avg Ground Elev x 1.42197 psi/m < 80 psi

High Pressure = **59.0** psi

Low Pressure Test = Min HGL - Avg Ground Elev x 1.42197 psi/m > 40 psi

Low Pressure = **49.1** psi

Max Day + Fire Flow Test = Max Day + Fire - Avg Ground Elev x 1.42197 psi/m > 20 psi

Max Day + Fire Flow Pressure = **37.0** psi

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 119247
Project Name: 2431 Bank Street
Date: 4/6/2020
Input By: S.Matthews
Reviewed By: M.Savic

Legend: Input by User; No Information or Input Required

Building Description: Existing Residence with 14 Storey Addition
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	Podium Level Footprint (m^2)	6929			
		Total Floors/Storeys (Podium)	1			
		Tower Footprint (m^2)	5366			
		Total Floors/Storeys (Tower)	14			
		Protected Openings (1 hr)	Yes			
		Area of structure considered (m^2)			**9,612**	
	F	**Base fire flow without reductions**				**13,000**
		$F = 220\ C\ (A)^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**11,050**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**			**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%	-30%	**-4,420**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	No	-10%		
				Cumulative Total	**-40%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	20.1 - 30 m		10%	**2,763**
		East Side	10.1 - 20 m		15%	
		South Side	> 45.1m		0%	
		West Side	> 45.1m		0%	
				Cumulative Total	**25%**	
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

Miro Savic

From: Baker, Adam <adam.baker@ottawa.ca>
Sent: Wednesday, April 22, 2020 2:33 PM
To: Miro Savic
Cc: Oram, Cody
Subject: RE: Waterford Retirement Residence - Boundary Conditions Request
Attachments: 2425 Bank April 2020.pdf

Hi Miro,

Please find below and attached the water boundary conditions 2431 Bank Street –

Please refer to tech bulletin for demands greater than 0.5L/s

The following are boundary conditions, HGL, for hydraulic analysis at 2425 Bank (zone 2W2C) assumed to be connected to the 203mm on Southgate and 406mm on Bank (see attached PDF for location).

Minimum HGL = 124.5m

Maximum HGL = 131.5m

MaxDay + FireFlow (150L/s) = 116.0m at the Southgate connection

MaxDay + FireFlow (150L/s) = 126.0m at the Bank St connection

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.

Thanks,
Adam

Adam Baker, EIT
Engineering Intern
Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique
Development Review - South Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 26552, Adam.Baker@ottawa.ca

From: Miro Savic <m.savic@novatech-eng.com>
Sent: April 13, 2020 8:31 AM
To: Oram, Cody <Cody.Oram@ottawa.ca>
Cc: Steve Matthews <S.Matthews@novatech-eng.com>; Lee Sheets <l.sheets@novatech-eng.com>
Subject: Waterford Retirement Residence - Boundary Conditions Request

Cody,

I'm writing to request watermain boundary conditions for the proposed development located at 2431 Bank Street in the City off Ottawa. The development proposal is a 14-storey addition to the existing Waterford Retirement Residence with 2 levels of underground parking.

The existing building is presently serviced with a 150mm watermain connected to 400mm watermain in Bank Street. The fire protection is provided from a private fire hydrant connected to the Bank Street watermain. The building addition is proposed to be serviced by a new connection to the existing 200mm watermain in Southgate Road. The mechanical plumbing for the addition is intended to be completely separated from the existing building plumbing. A new fire department connection will be provided near the southwest corner of the proposed addition within 45mm unobstructed path form the existing hydrant. Refer to the attached preliminary servicing plan for details.

Please provide the boundary conditions at the two connection locations (the existing connection to Bank Stree and the proposed connection to Southgate) based on the following water demands:

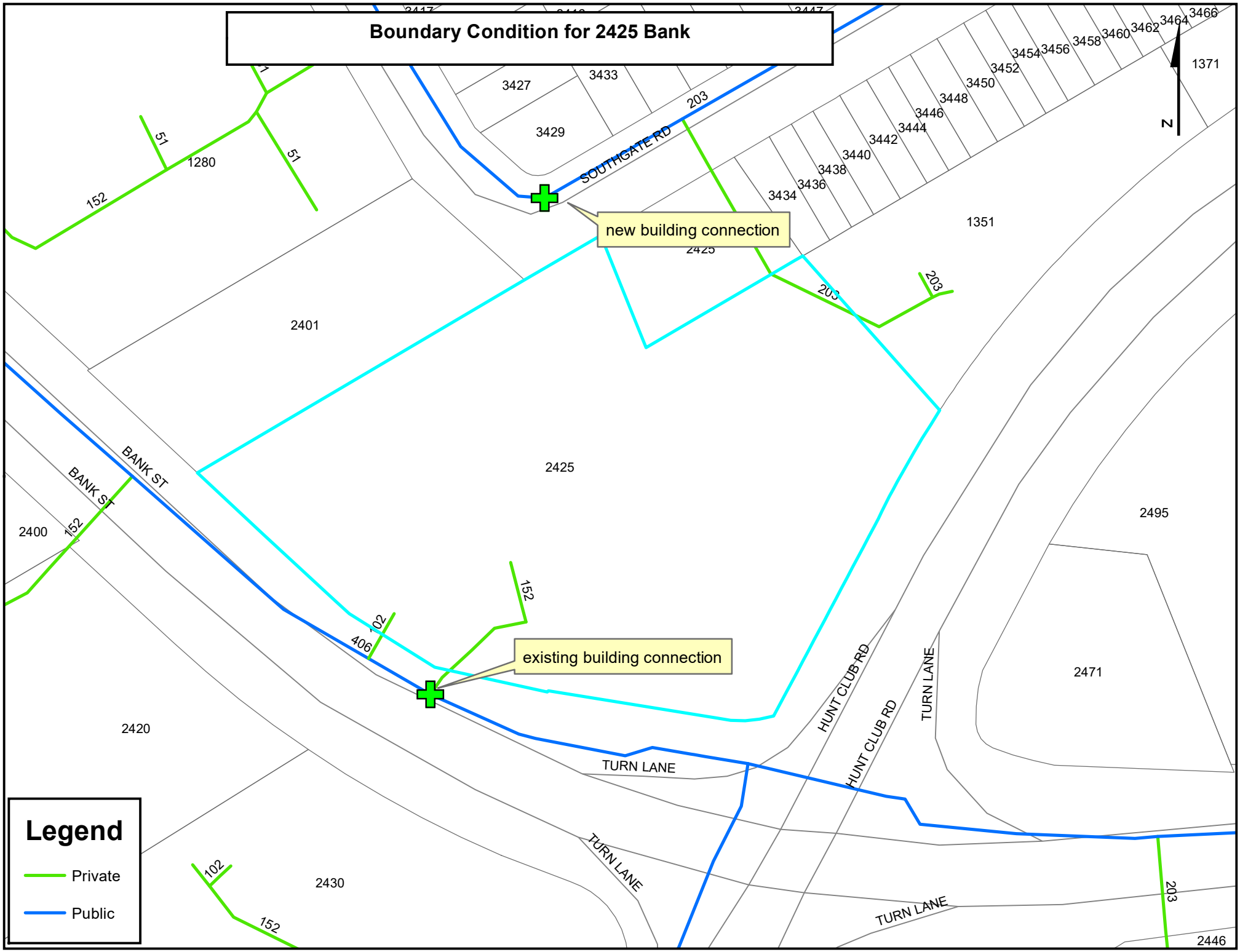
<u>New Service Connection to Southgate Road:</u>
Average Day Demand = 0.84 L/s
Maximum Day Demand = 2.09 L/s
Peak Hour Demand = 4.59 L/s
Fire Flow Demand = 150 L/s (9,000 L/min).

<u>Existing Service Connection to Bank Street:</u>
Average Day Demand = 0.65 L/s
Maximum Day Demand = 1.55 L/s
Peak Hour Demand = 3.35 L/s
Fire Flow Demand = 150 L/s (9,000 L/min).

The fire flow is calculate is using the FUS method for a fire resistive building with 2 hours fire rating. The area of structure considered in the calculations includes both, the existing building and the proposed addition. Refer to the attached calculations.

Regards,

Miroslav Savic, P.Eng., Senior Project Manager | Land Development Engineering
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 x 265 | Fax: 613.254.5867


Boundary Condition for 2425 Bank
new building connection
existing building connection
SOUTHGATE RD
BANK ST
BANK ST
HUNT CLUB RD
HUNT CLUB RD
TURN LANE
TURN LANE
TURN LANE
TURN LANE
2425
2401
2400
2420
2430
2471
2495
2446
1351
1371
1280
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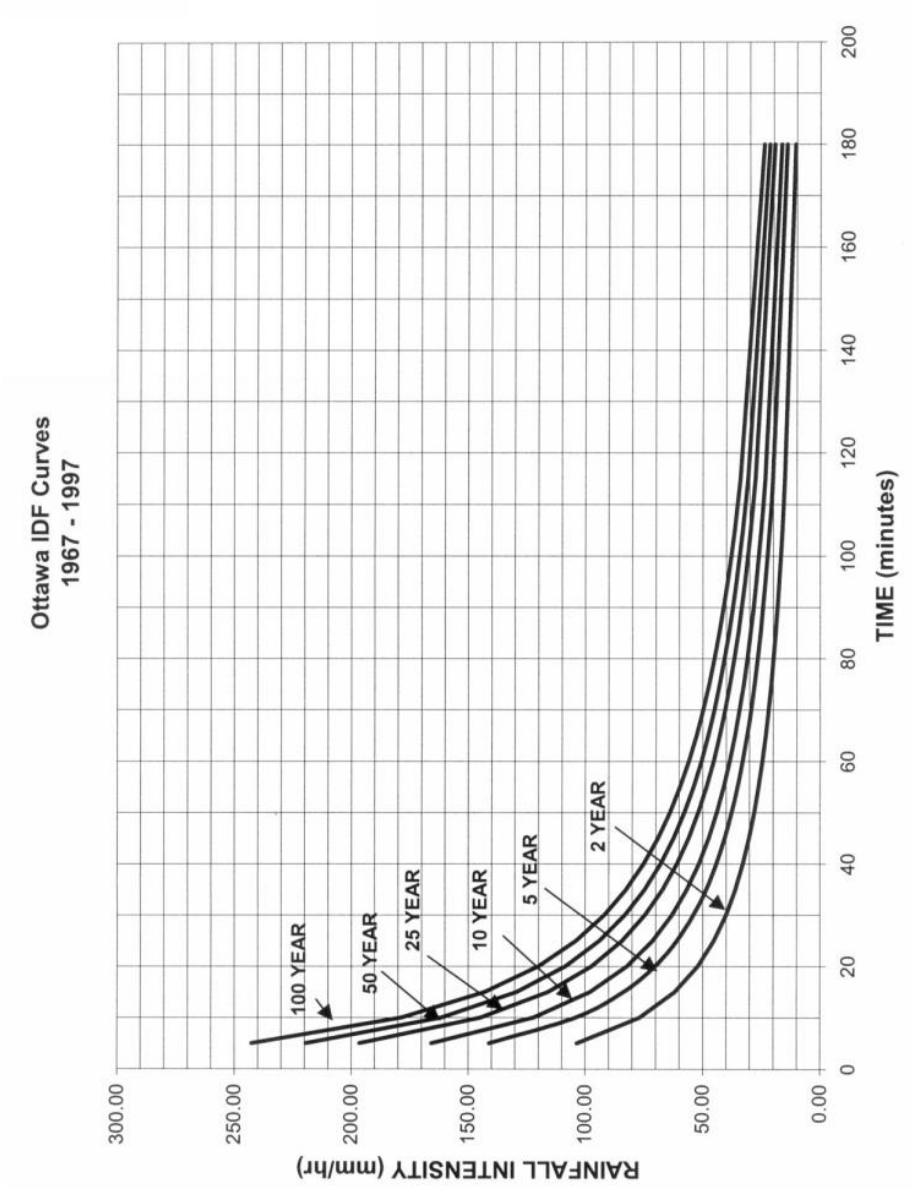
N
Legend
Private
Public

APPENDIX D

IDF Curves and SWM Calculations

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



Proposed 14-Storey Addition
2431 Bank Street - Waterford Retirement Residence

Pre - Development Site 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 5 year (L/s)
Portion of Site to be Developed	0.700	0.518	0.043	0.139	0.74	0.84	150.6	290.5	0.5	101.4

T_c = 10mins

Post - Development : Site 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) 5 year	Uncontrolled Flow (L/s) 100 year
A-1	Direct Runoff to Southgate Rd.	0.024	0.001	0.023	0.23	0.28	1.6	3.4
A-2	UnControlled Runoff to Bank St.	0.096	0.030	0.066	0.42	0.48	11.6	23.1
A-3	UnControlled Landscape Drain	0.014	0.004	0.010	0.40	0.46	1.6	3.2
A-4	Controlled Parking Lot	0.268	0.204	0.064	0.73	0.82	56.9	109.2
R-1	Controlled Internal SWM Tank	0.146	0.146	0.000	0.90	1.00	38.1	72.5
R-2	Controlled Flow RDs 1-8+11&12	0.129	0.129	0.000	0.90	1.00	33.6	64.0
R-3	Controlled Flow RDs 9 & 10	0.023	0.023	0.000	0.90	1.00	6.0	11.4
	Summed Area Check:	0.700					T_c = 10mins	T_c = 10mins

Post - Development : Total Flows for Controlled Site + Uncontrolled Runoff						
Area	Description	Peak Design Flow (L/s) 5 year	Peak Design Flow (L/s) 100 year	Storage Required (m^3) 5 year	Storage Required (m^3) 100 year	Provided (m^3)
A-1	Direct Runoff to Southgate Rd.	1.6	3.4	-	-	-
A-2	UnControlled Runoff to Bank St.	11.6	23.1	-	-	-
A-3	UnControlled Landscape Drain	1.6	3.2	-	-	-
A-4	Controlled Parking Lot	25.4	26.2	30.8	78.9	107.0
R-1	Controlled Internal SWM Tank	37.8	37.8	4.1	20.8	> 30
R-2	Controlled Flow RDs 1-8+11&12	4.6	4.7	24.4	57.6	65.2
R-3	Controlled Flow RDs 9 & 10	1.1	1.2	3.6	8.8	11.8
	Totals :	**83.7**	**99.6**	**63.0**	**166.0**	**214.0**
	Over Controlled:	17.7	1.8			

* Required storage volumes for A-4 have been calculated using 50% of the peak design flow rates

Proposed 14-Storey Residential Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA A-1 Direct Runoff to Southgate Road

OTTAWA IDF CURVE

Area =	0.024	ha	Qallow =	1.6	L/s
C =	0.23		Vol(max) =	0.0	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	2.16	0.57	0.17
10	104.19	1.59	0.00	0.00
15	83.56	1.28	-0.32	-0.28
20	70.25	1.07	-0.52	-0.62
25	60.90	0.93	-0.66	-0.99
30	53.93	0.82	-0.77	-1.38
35	48.52	0.74	-0.85	-1.79
40	44.18	0.68	-0.92	-2.20
45	40.63	0.62	-0.97	-2.62
50	37.65	0.58	-1.02	-3.05
55	35.12	0.54	-1.06	-3.49
60	32.94	0.50	-1.09	-3.92
65	31.04	0.47	-1.12	-4.36
70	29.37	0.45	-1.14	-4.80
75	27.89	0.43	-1.17	-5.25
80	26.56	0.41	-1.19	-5.70
85	25.37	0.39	-1.21	-6.15
90	24.29	0.37	-1.22	-6.60

Proposed 14-Storey Residential Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA A-1 Direct Runoff to Southgate Road

OTTAWA IDF CURVE

Area =	0.024	ha	Qallow =	3.4	L/s
C =	0.28		Vol(max) =	0.0	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	4.55	1.20	0.36
10	178.56	3.35	0.00	0.00
15	142.89	2.68	-0.67	-0.60
20	119.95	2.25	-1.10	-1.32
25	103.85	1.95	-1.40	-2.10
30	91.87	1.72	-1.63	-2.93
35	82.58	1.55	-1.80	-3.78
40	75.15	1.41	-1.94	-4.66
45	69.05	1.30	-2.05	-5.55
50	63.95	1.20	-2.15	-6.45
55	59.62	1.12	-2.23	-7.37
60	55.89	1.05	-2.30	-8.29
65	52.65	0.99	-2.36	-9.21
70	49.79	0.93	-2.42	-10.15
75	47.26	0.89	-2.46	-11.09
80	44.99	0.84	-2.51	-12.03
85	42.95	0.81	-2.54	-12.98
90	41.11	0.77	-2.58	-13.93

Proposed 14-Storey Residential Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA A-2 Uncontrolled Rearyard Runoff to Bank Street

OTTAWA IDF CURVE

Area =	0.096	ha	Qallow =	11.6	L/s
C =	0.42		Vol(max) =	0.0	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	15.78	4.13	1.24
10	104.19	11.64	0.00	0.00
15	83.56	9.34	-2.31	-2.08
20	70.25	7.85	-3.79	-4.55
25	60.90	6.81	-4.84	-7.26
30	53.93	6.03	-5.62	-10.11
35	48.52	5.42	-6.22	-13.07
40	44.18	4.94	-6.71	-16.10
45	40.63	4.54	-7.10	-19.18
50	37.65	4.21	-7.44	-22.31
55	35.12	3.93	-7.72	-25.47
60	32.94	3.68	-7.96	-28.67
65	31.04	3.47	-8.17	-31.88
70	29.37	3.28	-8.36	-35.12
75	27.89	3.12	-8.53	-38.37
80	26.56	2.97	-8.68	-41.64
85	25.37	2.84	-8.81	-44.93
90	24.29	2.71	-8.93	-48.22

Proposed 14-Storey Residential Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA A-2 Uncontrolled Rearyard Runoff to Bank Street

OTTAWA IDF CURVE

Area =	0.096	ha	Qallow =	23.1	L/s
C =	0.48		Vol(max) =	0.0	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	31.37	8.29	2.49
10	178.56	23.08	0.00	0.00
15	142.89	18.47	-4.61	-4.15
20	119.95	15.51	-7.58	-9.09
25	103.85	13.42	-9.66	-14.49
30	91.87	11.88	-11.21	-20.17
35	82.58	10.67	-12.41	-26.06
40	75.15	9.71	-13.37	-32.08
45	69.05	8.93	-14.16	-38.22
50	63.95	8.27	-14.81	-44.44
55	59.62	7.71	-15.37	-50.74
60	55.89	7.23	-15.86	-57.08
65	52.65	6.81	-16.28	-63.48
70	49.79	6.44	-16.65	-69.91
75	47.26	6.11	-16.97	-76.38
80	44.99	5.82	-17.27	-82.88
85	42.95	5.55	-17.53	-89.40
90	41.11	5.31	-17.77	-95.95

Proposed 14-Storey Residential Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA A-3 Uncontrolled Landscape Drain 1

OTTAWA IDF CURVE

Area =	0.014	ha	Qallow =	1.6	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	141.18	2.20	0.58	0.17
10	104.19	1.62	0.00	0.00
15	83.56	1.30	-0.32	-0.29
20	70.25	1.09	-0.53	-0.63
25	60.90	0.95	-0.67	-1.01
30	53.93	0.84	-0.78	-1.41
35	48.52	0.76	-0.87	-1.82
40	44.18	0.69	-0.93	-2.24
45	40.63	0.63	-0.99	-2.67
50	37.65	0.59	-1.04	-3.11
55	35.12	0.55	-1.08	-3.55
60	32.94	0.51	-1.11	-3.99
65	31.04	0.48	-1.14	-4.44
70	29.37	0.46	-1.16	-4.89
75	27.89	0.43	-1.19	-5.35
80	26.56	0.41	-1.21	-5.80
85	25.37	0.39	-1.23	-6.26
90	24.29	0.38	-1.24	-6.72

Proposed 14-Storey Residential Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA A-3 Uncontrolled Landscape Drain 1

OTTAWA IDF CURVE

Area =	0.014	ha	Qallow =	3.2	L/s
C =	0.46		Vol(max) =	0.0	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	4.39	1.16	0.35
10	178.56	3.23	0.00	0.00
15	142.89	2.58	-0.64	-0.58
20	119.95	2.17	-1.06	-1.27
25	103.85	1.88	-1.35	-2.03
30	91.87	1.66	-1.57	-2.82
35	82.58	1.49	-1.73	-3.64
40	75.15	1.36	-1.87	-4.48
45	69.05	1.25	-1.98	-5.34
50	63.95	1.16	-2.07	-6.21
55	59.62	1.08	-2.15	-7.09
60	55.89	1.01	-2.22	-7.98
65	52.65	0.95	-2.28	-8.87
70	49.79	0.90	-2.33	-9.77
75	47.26	0.85	-2.37	-10.68
80	44.99	0.81	-2.41	-11.59
85	42.95	0.78	-2.45	-12.50
90	41.11	0.74	-2.48	-13.41

Proposed Building Addition Storage Calculations Using Average
Novatech Project No. 119247 Release Rate Equal to 50% of the Qpeak
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA A-4 Controlled Flow-Parking Lot

OTTAWA IDF CURVE — Qpeak = 25.2 L/s
Area = 0.268 ha — Qavg = 12.6 L/s
C = 0.73 — Vol(max) = 19.0 m3
(Vol calculated for Qallow-avg)

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	56.55	43.95	13.18
10	76.81	41.93	29.33	17.60
15	61.77	33.72	21.12	19.01
20	52.03	28.41	15.81	18.97
25	45.17	24.66	12.06	18.09
30	40.04	21.86	9.26	16.67
35	36.06	19.69	7.09	14.88
40	32.86	17.94	5.34	12.82
45	30.24	16.51	3.91	10.56
50	28.04	15.31	2.71	8.13
55	26.17	14.29	1.69	5.57
60	24.56	13.41	0.81	2.91
65	23.15	12.64	0.04	0.16
70	21.91	11.96	-0.64	-2.67
75	20.81	11.36	-1.24	-5.56
90	18.14	9.91	-2.69	-14.55
105	16.13	8.81	-3.79	-23.88
120	14.56	7.95	-4.65	-33.47
135	13.30	7.26	-5.34	-43.26
150	12.25	6.69	-5.91	-53.20

Proposed Building Addition Storage Calculations Using Average
Novatech Project No. 119247 Release Rate Equal to 50% of the Qpeak
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA A-4 Controlled Flow-Parking Lot

OTTAWA IDF CURVE — Qpeak = 25.4 L/s
Area = 0.268 ha — Qavg = 12.7 L/s
C = 0.73 — Vol(max) = 30.8 m3
(Vol calculated for Qallow-avg)

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	77.08	64.38	19.31
10	104.19	56.89	44.19	26.51
15	83.56	45.62	32.92	29.63
20	70.25	38.36	25.66	30.79
25	60.90	33.25	20.55	30.82
30	53.93	29.44	16.74	30.14
35	48.52	26.49	13.79	28.96
40	44.18	24.12	11.42	27.42
45	40.63	22.18	9.48	25.60
50	37.65	20.56	7.86	23.58
55	35.12	19.18	6.48	21.37
60	32.94	17.99	5.29	19.03
65	31.04	16.95	4.25	16.57
70	29.37	16.04	3.34	14.01
75	27.89	15.23	2.53	11.37
90	24.29	13.26	0.56	3.03
105	21.58	11.78	-0.92	-5.77
120	19.47	10.63	-2.07	-14.91
135	17.76	9.70	-3.00	-24.30
150	16.36	8.93	-3.77	-33.90

Proposed Building Addition Storage Calculations Using Average
Novatech Project No. 119247 Release Rate Equal to 50% of the Qpeak
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA A-4 Controlled Flow-Parking Lot

OTTAWA IDF CURVE — Qpeak = 26.2 L/s
Area = 0.268 ha — Qavg = 13.1 L/s
C = 0.82 — Vol(max) = 78.9 m3
(Vol calculated for Qallow-avg)

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	148.44	135.34	40.60
10	178.56	109.21	96.11	57.66
15	142.89	87.39	74.29	66.86
20	119.95	73.36	60.26	72.31
25	103.85	63.51	50.41	75.62
30	91.87	56.19	43.09	77.56
35	82.58	50.51	37.41	78.55
40	75.15	45.96	32.86	78.86
45	69.05	42.23	29.13	78.65
50	63.95	39.11	26.01	78.04
55	59.62	36.47	23.37	77.11
60	55.89	34.19	21.09	75.91
65	52.65	32.20	19.10	74.48
70	49.79	30.45	17.35	72.88
75	47.26	28.90	15.80	71.11
90	41.11	25.14	12.04	65.03
105	36.50	22.32	9.22	58.10
120	32.89	20.12	7.02	50.53
135	30.00	18.35	5.25	42.49
150	27.61	16.89	3.79	34.08

Proposed Building Addition Storage Calculations Using Average
Novatech Project No. 119247 Release Rate Equal to 50% of the Qpeak
REQUIRED STORAGE - 1:100 YR + 20% IDF Increase
AREA A-4 Controlled Flow-Parking Lot

OTTAWA IDF CURVE — Qpeak = 26.8 L/s
Area = 0.268 ha — Qavg = 13.4 L/s
C = 0.82 — Vol(max) = 100.6 m3
(Vol calculated for Qallow-avg)

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	178.13	164.73	49.42
10	214.27	131.05	117.65	70.59
15	171.47	104.87	91.47	82.33
20	143.94	88.03	74.63	89.56
25	124.62	76.22	62.82	94.22
30	110.24	67.42	54.02	97.24
35	99.09	60.61	47.21	99.13
40	90.17	55.15	41.75	100.20
45	82.86	50.68	37.28	100.65
50	76.74	46.94	33.54	100.61
55	71.55	43.76	30.36	100.18
60	67.07	41.02	27.62	99.44
65	63.18	38.64	25.24	98.43
70	59.75	36.54	23.14	97.19
75	56.71	34.68	21.28	95.77
90	49.33	30.17	16.77	90.57
105	43.80	26.79	13.39	84.33
120	39.47	24.14	10.74	77.34
135	36.00	22.02	8.62	69.78
150	33.13	20.26	6.86	61.78

Structures	Size (mm)	Area (m^2)	T/G	Inv IN	Inv OUT
CBMH 01	1524	1.82	89.80	87.85	87.70
CBMH 02	1524	1.82	89.80	87.94	87.91
CBMH 03	1524	1.82	89.80	-	88.00

Area A-4: Storage Table

Elevation (m)	System Depth (m)	CBMH 01 Volume (m^3)	CBMH 02 Volume (m^3)	CBMH 03 Volume (m^3)	Underground Storage Combined Volume (m^3)	Surface Storage CBMH 01 Area (m^2)	CBMH 01 Volume (m^3)	CBMH 02 Area (m^2)	CBMH 02 Volume (m^3)	CBMH 03 Area (m^2)	CBMH 03 Volume (m^3)	Total Storage Ponding Volume (m^3)	**Total Volume (m^3)**	Design Head
87.70	0.00	-	-	-	-	-	-	-	-	-	-	-	**0**	-
87.85	0.15	0.27	-	-	0.27	-	-	-	-	-	-	-	**0.3**	0.02
88.27	0.57	1.04	0.66	0.49	7.90	-	-	-	-	-	-	-	**7.9**	0.44
88.53	0.83	1.51	1.13	0.97	15.24	-	-	-	-	-	-	-	**15.2**	0.70
89.15	1.45	2.65	2.26	2.10	16.37	-	-	-	-	-	-	-	**16.4**	1.32
89.50	1.80	3.28	2.90	2.74	17.01	-	-	-	-	-	-	-	**17.0**	1.67
89.75	2.05	3.74	3.36	3.19	17.46	0.00	0.00	0.00	0.00	0.00	0.00	0.0	**17.5**	1.92
89.78	2.08	3.79	3.41	3.25	24.17	0.00	0.00	0.00	0.00	0.00	0.00	0.0	**24.2**	1.95
89.80	2.10	3.83	3.45	3.28	24.28	0.00	0.00	0.00	0.00	0.00	0.00	0.0	**24.3**	1.97
89.85	2.15					16.50	0.41	27.17	0.68	37.71	0.94	2.0	**26.3**	2.02
89.90	2.20					42.61	1.89	78.00	3.31	83.96	3.98	9.2	**33.5**	2.07
89.95	2.25					77.96	4.90	154.46	9.12	142.93	9.66	23.7	**48.0**	2.12
90.00	2.30					123.80	9.95	244.01	19.08	219.25	18.71	47.7	**72.0**	2.17
90.05	2.35					179.16	17.52	332.45	33.49	301.58	31.73	82.7	**107.0**	2.22

PI = 3.141592654
pipe I.D.= 533 (pvc pipe)
U/G Pipe Volume
End Area 0.223 (m^2)
Total Length 61.5 (m)
Pipe Volume 13.7 (m^3)

U/G Pipe Size	525mm dia.	525mm dia.
Pipe Segment	CBMH 01 - CBMH 02	CBMH 02 - CBMH 03
Centre-Centre Length	33.2	31.3
Inside Structure	1.5	1.5
U/G Storage Length	31.7	29.8

IPEX Tempest HMF ICD - Type A

1:100 Yr
Flow (L/s) = 26.2
Head (m) = 2.18
Elevation (m) = **90.01**
Outlet Pipe Dia.(mm) = 254
Volume (m3) = 78.9

1:5 Yr
Flow (L/s) = 25.4
Head (m) = 2.05
Elevation (m) = **89.88**
Outlet Pipe Dia.(mm) = 254
Volume (m3) = 30.8

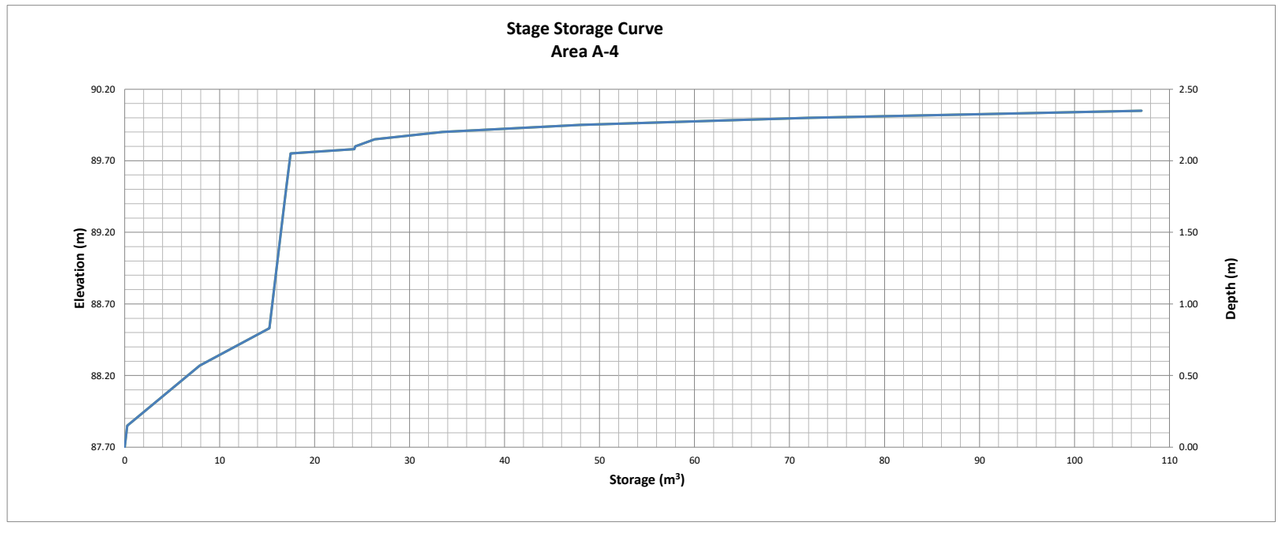
Maximum Ponding Depth (cm)	
1:100 Yr	**21**
1:5 Yr	**8**

Orifice Size - 1:100 yr Flow Check
Q=0.62xAx(2gh)^0.5

	1:100 yr	Flow Check
Q (m^3/s) =	0.0131	**0.0131**
g (m/s^2) =	9.81	9.81
h (m) =	**2.18**	2.18
A (m^2) =	**0.003228518**	**0.00322**
D (m) =	**0.064114562**	**0.06400**
D (mm) =	**64**	64.0

1:5 yr Flow Check

	1:5 yr
Q (m^3/s) =	0.0127
g (m/s^2) =	9.81
h (m) =	**2.05**
A (m^2) =	**0.00322**
D (m) =	**0.064**
D (mm) =	**64**



Proposed 14-Storey Residential Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA R-1 Controlled Internal SWM Tank

OTTAWA IDF CURVE

Area = 0.146 ha Qallow = 37.8 L/s
C = 0.90 Vol(max) = 0.0 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	37.83	0.03	0.01
10	76.81	28.06	-9.74	-5.85
15	61.77	22.56	-15.24	-13.71
20	52.03	19.01	-18.79	-22.55
25	45.17	16.50	-21.30	-31.95
30	40.04	14.63	-23.17	-41.71
35	36.06	13.17	-24.63	-51.72
40	32.86	12.01	-25.79	-61.91
45	30.24	11.05	-26.75	-72.24
50	28.04	10.24	-27.56	-82.67
55	26.17	9.56	-28.24	-93.19
60	24.56	8.97	-28.83	-103.79
65	23.15	8.46	-29.34	-114.44
70	21.91	8.00	-29.80	-125.14
75	20.81	7.60	-30.20	-135.89
90	18.14	6.63	-31.17	-168.33
105	16.13	5.89	-31.91	-201.01
120	14.56	5.32	-32.48	-233.86
135	13.30	4.86	-32.94	-266.84
150	12.25	4.48	-33.32	-299.92

Proposed 14-Storey Residential Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-1 Controlled Internal SWM Tank

OTTAWA IDF CURVE

Area = 0.146 ha Qallow = 37.8 L/s
C = 0.90 Vol(max) = 4.1 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	51.57	13.77	4.13
10	104.19	38.06	0.26	0.16
15	83.56	30.52	-7.28	-6.55
20	70.25	25.66	-12.14	-14.57
25	60.90	22.24	-15.56	-23.33
30	53.93	19.70	-18.10	-32.58
35	48.52	17.72	-20.08	-42.16
40	44.18	16.14	-21.66	-51.98
45	40.63	14.84	-22.96	-61.99
50	37.65	13.75	-24.05	-72.14
55	35.12	12.83	-24.97	-82.40
60	32.94	12.03	-25.77	-92.76
65	31.04	11.34	-26.46	-103.19
70	29.37	10.73	-27.07	-113.70
75	27.89	10.19	-27.61	-124.26
90	24.29	8.87	-28.93	-156.21
105	21.58	7.88	-29.92	-188.47
120	19.47	7.11	-30.69	-220.96
135	17.76	6.49	-31.31	-253.62
150	16.36	5.98	-31.82	-286.41

Proposed 14-Storey Residential Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-1 Controlled Internal SWM Tank

OTTAWA IDF CURVE

Area = 0.146 ha Qallow = 37.8 L/s
C = 1.00 Vol(max) = 20.8 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	98.51	60.71	18.21
10	178.56	72.47	34.67	20.80
15	142.89	58.00	20.20	18.18
20	119.95	48.69	10.89	13.06
25	103.85	42.15	4.35	6.52
30	91.87	37.29	-0.51	-0.92
35	82.58	33.52	-4.28	-8.99
40	75.15	30.50	-7.30	-17.52
45	69.05	28.03	-9.77	-26.39
50	63.95	25.96	-11.84	-35.53
55	59.62	24.20	-13.60	-44.88
60	55.89	22.69	-15.11	-54.41
65	52.65	21.37	-16.43	-64.08
70	49.79	20.21	-17.59	-73.88
75	47.26	19.18	-18.62	-83.79
90	41.11	16.69	-21.11	-114.02
105	36.50	14.81	-22.99	-144.81
120	32.89	13.35	-24.45	-176.03
135	30.00	12.18	-25.62	-207.56
150	27.61	11.21	-26.59	-239.34

Proposed 14-Storey Residential Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:100 YR + 20% IDF Increase
AREA R-1 Controlled Internal SWM Tank

OTTAWA IDF CURVE

Area = 0.146 ha Qallow = 37.8 L/s
C = 1.00 Vol(max) = 29.5 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	118.21	80.41	24.12
10	214.27	86.97	49.17	29.50
15	171.47	69.60	31.80	28.62
20	143.94	58.42	20.62	24.75
25	124.62	50.58	12.78	19.17
30	110.24	44.74	6.94	12.50
35	99.09	40.22	2.42	5.08
40	90.17	36.60	-1.20	-2.88
45	82.86	33.63	-4.17	-11.26
50	76.74	31.15	-6.65	-19.95
55	71.55	29.04	-8.76	-28.91
60	67.07	27.22	-10.58	-38.07
65	63.18	25.64	-12.16	-47.42
70	59.75	24.25	-13.55	-56.91
75	56.71	23.02	-14.78	-66.53
90	49.33	20.02	-17.78	-95.99
105	43.80	17.78	-20.02	-126.15
120	39.47	16.02	-21.78	-156.80
135	36.00	14.61	-23.19	-187.84
150	33.13	13.45	-24.35	-219.17

Proposed Building Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-2 Controlled Roof Drain #1

OTTAWA IDF CURVE

Area =	0.014	ha	Qallow =	0.32	L/s
C =	0.90		Vol(max) =	3.0	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	4.95	4.63	1.39
10	104.19	3.65	3.33	2.00
15	83.56	2.93	2.61	2.35
20	70.25	2.46	2.14	2.57
25	60.90	2.13	1.81	2.72
30	53.93	1.89	1.57	2.82
35	48.52	1.70	1.38	2.90
40	44.18	1.55	1.23	2.95
45	40.63	1.42	1.10	2.98
50	37.65	1.32	1.00	3.00
55	35.12	1.23	0.91	3.00
60	32.94	1.15	0.83	3.00
65	31.04	1.09	0.77	2.99
70	29.37	1.03	0.71	2.98
75	27.89	0.98	0.66	2.96
90	24.29	0.85	0.53	2.87
105	21.58	0.76	0.44	2.75
120	19.47	0.68	0.36	2.61

Proposed Building Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-2 Controlled Roof Drain #1

OTTAWA IDF CURVE

Area =	0.014	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	6.9	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	9.45	9.13	2.74
10	178.56	6.95	6.63	3.98
15	142.89	5.56	5.24	4.72
20	119.95	4.67	4.35	5.22
25	103.85	4.04	3.72	5.58
30	91.87	3.58	3.26	5.86
35	82.58	3.21	2.89	6.08
40	75.15	2.92	2.60	6.25
45	69.05	2.69	2.37	6.39
50	63.95	2.49	2.17	6.51
55	59.62	2.32	2.00	6.60
60	55.89	2.18	1.86	6.68
65	52.65	2.05	1.73	6.74
70	49.79	1.94	1.62	6.79
75	47.26	1.84	1.52	6.84
90	41.11	1.60	1.28	6.91
105	36.50	1.42	1.10	6.93
120	32.89	1.28	0.96	6.91

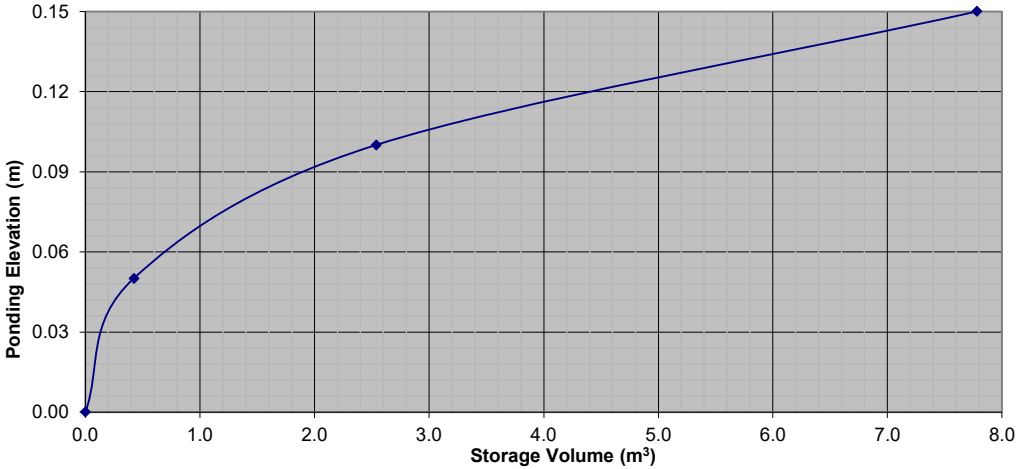
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to Closed

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	3.0	7.8
1:100 Year	0.32	0.32	14	6.9	7.8

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	16.91	0.4
0.10	67.63	2.5
0.15	142.04	7.8

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



Proposed Building Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-2 Controlled Roof Drain #1a

OTTAWA IDF CURVE

Area =	0.006	ha	Qallow =	0.32	L/s
C =	0.90		Vol(max) =	0.9	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	2.12	1.80	0.54
10	104.19	1.56	1.24	0.75
15	83.56	1.25	0.93	0.84
20	70.25	1.05	0.73	0.88
25	60.90	0.91	0.59	0.89
30	53.93	0.81	0.49	0.88
35	48.52	0.73	0.41	0.86
40	44.18	0.66	0.34	0.82
45	40.63	0.61	0.29	0.78
50	37.65	0.57	0.25	0.74
55	35.12	0.53	0.21	0.68
60	32.94	0.49	0.17	0.63
65	31.04	0.47	0.15	0.57
70	29.37	0.44	0.12	0.51
75	27.89	0.42	0.10	0.44
90	24.29	0.36	0.04	0.24
105	21.58	0.32	0.00	0.03
120	19.47	0.29	-0.03	-0.20

Proposed Building Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-2 Controlled Roof Drain #1a

OTTAWA IDF CURVE

Area =	0.006	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	2.2	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	4.05	3.73	1.12
10	178.56	2.98	2.66	1.60
15	142.89	2.38	2.06	1.86
20	119.95	2.00	1.68	2.02
25	103.85	1.73	1.41	2.12
30	91.87	1.53	1.21	2.18
35	82.58	1.38	1.06	2.22
40	75.15	1.25	0.93	2.24
45	69.05	1.15	0.83	2.25
50	63.95	1.07	0.75	2.24
55	59.62	0.99	0.67	2.23
60	55.89	0.93	0.61	2.20
65	52.65	0.88	0.56	2.18
70	49.79	0.83	0.51	2.14
75	47.26	0.79	0.47	2.11
90	41.11	0.69	0.37	1.97
105	36.50	0.61	0.29	1.82
120	32.89	0.55	0.23	1.65

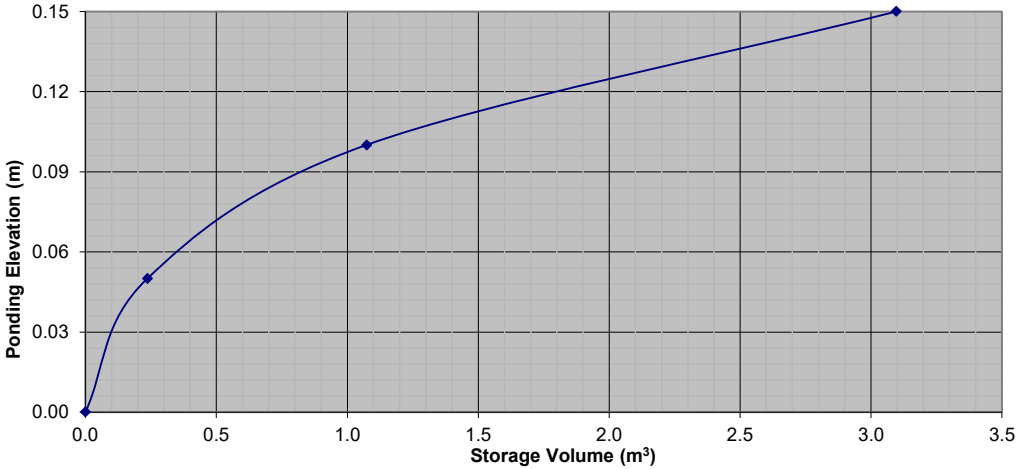
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to Closed

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	9	0.9	3.1
1:100 Year	0.32	0.32	13	2.2	3.1

Roof Drain Storage Table for Area RD 1a

Elevation	Area RD 1a	Total Volume
m	m^2	m^3
0.00	0	0
0.05	9.48	0.2
0.10	23.98	1.1
0.15	56.92	3.1

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



Proposed Building Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-2 **Controlled Roof Drain #2**

OTTAWA IDF CURVE

Area =	0.015	ha	Qallow =	0.32	L/s
C =	0.90		Vol(max) =	3.3	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	5.30	4.98	1.49
10	104.19	3.91	3.59	2.15
15	83.56	3.14	2.82	2.53
20	70.25	2.64	2.32	2.78
25	60.90	2.29	1.97	2.95
30	53.93	2.02	1.70	3.07
35	48.52	1.82	1.50	3.15
40	44.18	1.66	1.34	3.21
45	40.63	1.52	1.20	3.25
50	37.65	1.41	1.09	3.28
55	35.12	1.32	1.00	3.29
60	32.94	1.24	0.92	3.30
65	31.04	1.17	0.85	3.30
70	29.37	1.10	0.78	3.29
75	27.89	1.05	0.73	3.27
90	24.29	0.91	0.59	3.19
105	21.58	0.81	0.49	3.09
120	19.47	0.73	0.41	2.96

Proposed Building Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-2 **Controlled Roof Drain #2**

OTTAWA IDF CURVE

Area =	0.015	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	7.6	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	10.12	9.80	2.94
10	178.56	7.45	7.13	4.28
15	142.89	5.96	5.64	5.07
20	119.95	5.00	4.68	5.62
25	103.85	4.33	4.01	6.02
30	91.87	3.83	3.51	6.32
35	82.58	3.44	3.12	6.56
40	75.15	3.13	2.81	6.75
45	69.05	2.88	2.56	6.91
50	63.95	2.67	2.35	7.04
55	59.62	2.49	2.17	7.15
60	55.89	2.33	2.01	7.24
65	52.65	2.20	1.88	7.31
70	49.79	2.08	1.76	7.38
75	47.26	1.97	1.65	7.43
90	41.11	1.71	1.39	7.53
105	36.50	1.52	1.20	7.57
120	32.89	1.37	1.05	7.57

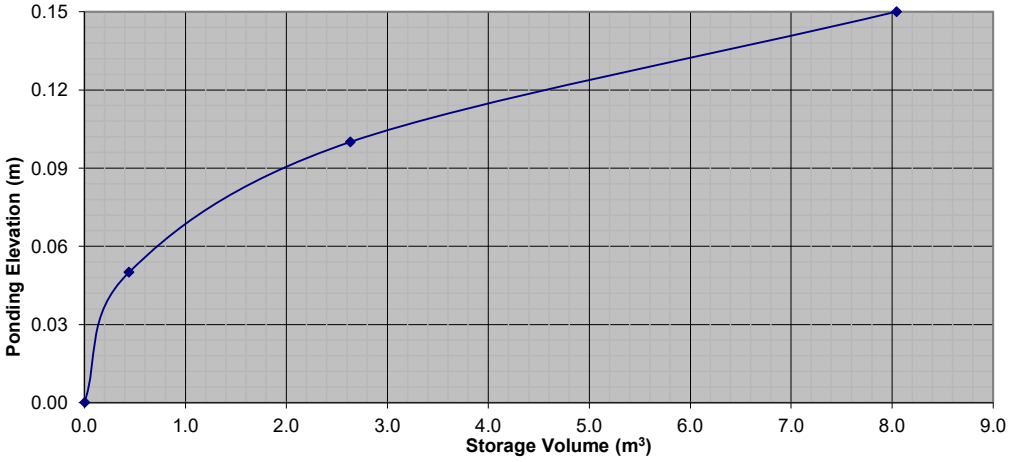
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to Closed

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	3.3	8.0
1:100 Year	0.32	0.32	14	7.6	8.0

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	17.56	0.4
0.10	70.22	2.6
0.15	146.11	8.0

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



Proposed Building Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-2 **Controlled Roof Drain #2a**

OTTAWA IDF CURVE

Area =	0.007	ha	Qallow =	0.32	L/s
C =	0.90		Vol(max) =	1.1	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	2.47	2.15	0.65
10	104.19	1.82	1.50	0.90
15	83.56	1.46	1.14	1.03
20	70.25	1.23	0.91	1.09
25	60.90	1.07	0.75	1.12
30	53.93	0.94	0.62	1.12
35	48.52	0.85	0.53	1.11
40	44.18	0.77	0.45	1.09
45	40.63	0.71	0.39	1.06
50	37.65	0.66	0.34	1.02
55	35.12	0.62	0.30	0.97
60	32.94	0.58	0.26	0.93
65	31.04	0.54	0.22	0.87
70	29.37	0.51	0.19	0.82
75	27.89	0.49	0.17	0.76
90	24.29	0.43	0.11	0.57
105	21.58	0.38	0.06	0.37
120	19.47	0.34	0.02	0.15

Proposed Building Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-2 **Controlled Roof Drain #2a**

OTTAWA IDF CURVE

Area =	0.007	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	2.8	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	4.72	4.40	1.32
10	178.56	3.47	3.15	1.89
15	142.89	2.78	2.46	2.21
20	119.95	2.33	2.01	2.42
25	103.85	2.02	1.70	2.55
30	91.87	1.79	1.47	2.64
35	82.58	1.61	1.29	2.70
40	75.15	1.46	1.14	2.74
45	69.05	1.34	1.02	2.76
50	63.95	1.24	0.92	2.77
55	59.62	1.16	0.84	2.77
60	55.89	1.09	0.77	2.76
65	52.65	1.02	0.70	2.75
70	49.79	0.97	0.65	2.73
75	47.26	0.92	0.60	2.70
90	41.11	0.80	0.48	2.59
105	36.50	0.71	0.39	2.46
120	32.89	0.64	0.32	2.30

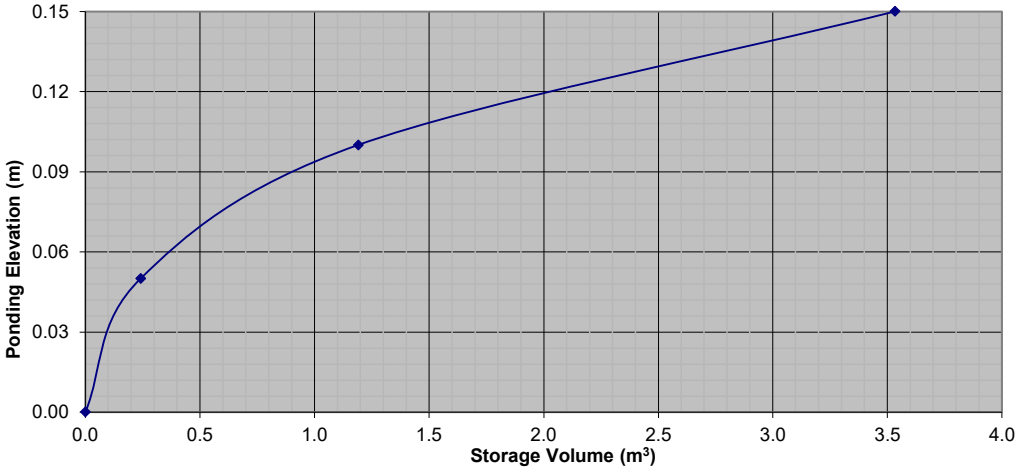
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to Closed

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	10	1.1	3.5
1:100 Year	0.32	0.32	13	2.8	3.5

Roof Drain Storage Table for Area RD 2a

Elevation	Area RD 2a	Total Volume
m	m^2	m^3
0.00	0	0
0.05	9.65	0.2
0.10	28.31	1.2
0.15	65.36	3.5

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



Proposed Building Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-2 Controlled Roof Drain #3

OTTAWA IDF CURVE

Area =	0.013	ha	Qallow =	0.32	L/s
C =	0.90		Vol(max) =	2.7	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	4.59	4.27	1.28
10	104.19	3.39	3.07	1.84
15	83.56	2.72	2.40	2.16
20	70.25	2.28	1.96	2.36
25	60.90	1.98	1.66	2.49
30	53.93	1.75	1.43	2.58
35	48.52	1.58	1.26	2.64
40	44.18	1.44	1.12	2.68
45	40.63	1.32	1.00	2.70
50	37.65	1.22	0.90	2.71
55	35.12	1.14	0.82	2.71
60	32.94	1.07	0.75	2.71
65	31.04	1.01	0.69	2.69
70	29.37	0.96	0.64	2.67
75	27.89	0.91	0.59	2.64
90	24.29	0.79	0.47	2.54
105	21.58	0.70	0.38	2.41
120	19.47	0.63	0.31	2.26

Proposed Building Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-2 Controlled Roof Drain #3

OTTAWA IDF CURVE

Area =	0.013	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	6.3	m3

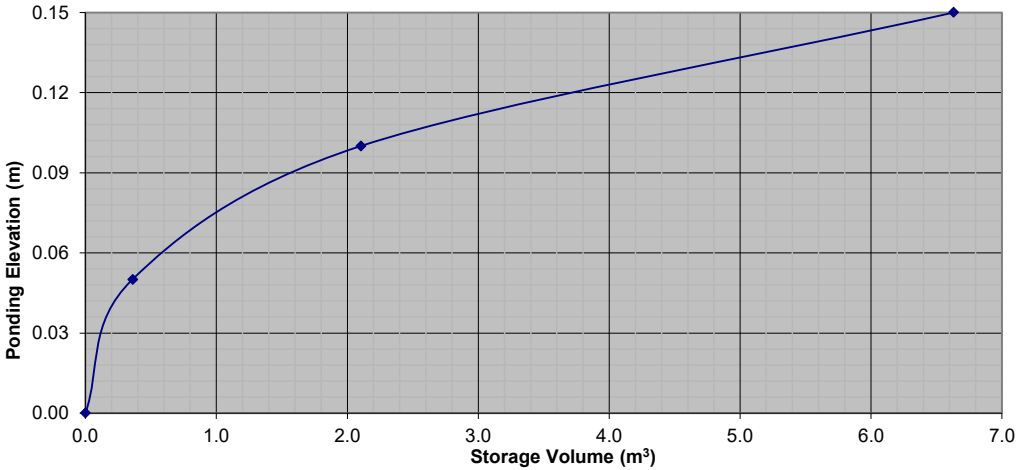
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	8.77	8.45	2.54
10	178.56	6.45	6.13	3.68
15	142.89	5.16	4.84	4.36
20	119.95	4.34	4.02	4.82
25	103.85	3.75	3.43	5.15
30	91.87	3.32	3.00	5.40
35	82.58	2.98	2.66	5.60
40	75.15	2.72	2.40	5.75
45	69.05	2.50	2.18	5.87
50	63.95	2.31	1.99	5.97
55	59.62	2.15	1.83	6.05
60	55.89	2.02	1.70	6.12
65	52.65	1.90	1.58	6.17
70	49.79	1.80	1.48	6.21
75	47.26	1.71	1.39	6.25
90	41.11	1.49	1.17	6.30
105	36.50	1.32	1.00	6.29
120	32.89	1.19	0.87	6.26

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	**Provided**
1:5 Year	0.32	0.32	11	2.7	6.6
1:100 Year	0.32	0.32	15	6.3	6.6

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	14.42	0.4
0.10	55.3	2.1
0.15	125.73	6.6

Stage Storage Curve: Area R-2
Controlled Roof Drain #3



Proposed Building Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-2 **Controlled Roof Drain #3a**

OTTAWA IDF CURVE

Area =	0.014	ha	Qallow =	0.32	L/s
C =	0.90		Vol(max) =	2.9	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	4.87	4.55	1.37
10	104.19	3.60	3.28	1.97
15	83.56	2.89	2.57	2.31
20	70.25	2.43	2.11	2.53
25	60.90	2.10	1.78	2.67
30	53.93	1.86	1.54	2.78
35	48.52	1.68	1.36	2.85
40	44.18	1.53	1.21	2.89
45	40.63	1.40	1.08	2.92
50	37.65	1.30	0.98	2.94
55	35.12	1.21	0.89	2.95
60	32.94	1.14	0.82	2.94
65	31.04	1.07	0.75	2.93
70	29.37	1.01	0.69	2.92
75	27.89	0.96	0.64	2.89
90	24.29	0.84	0.52	2.80
105	21.58	0.75	0.43	2.68
120	19.47	0.67	0.35	2.54

Proposed Building Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-2 **Controlled Roof Drain #3a**

OTTAWA IDF CURVE

Area =	0.014	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	6.8	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	9.31	8.99	2.70
10	178.56	6.85	6.53	3.92
15	142.89	5.48	5.16	4.65
20	119.95	4.60	4.28	5.14
25	103.85	3.98	3.66	5.50
30	91.87	3.52	3.20	5.77
35	82.58	3.17	2.85	5.98
40	75.15	2.88	2.56	6.15
45	69.05	2.65	2.33	6.29
50	63.95	2.45	2.13	6.40
55	59.62	2.29	1.97	6.49
60	55.89	2.14	1.82	6.57
65	52.65	2.02	1.70	6.63
70	49.79	1.91	1.59	6.68
75	47.26	1.81	1.49	6.72
90	41.11	1.58	1.26	6.79
105	36.50	1.40	1.08	6.81
120	32.89	1.26	0.94	6.78

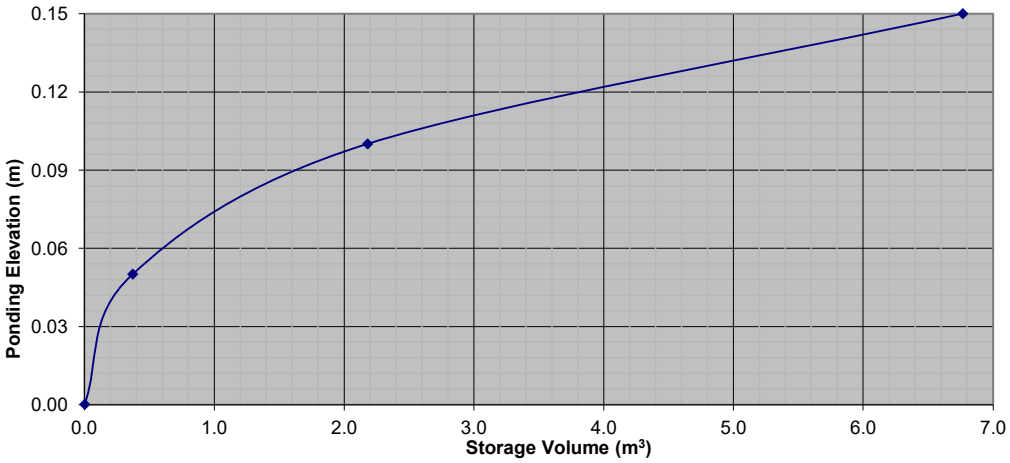
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to Closed

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	2.9	6.8
1:100 Year	0.32	0.32	15	6.8	6.8

Roof Drain Storage Table for Area RD 3a

Elevation	Area RD 3a	Total Volume
m	m^2	m^3
0.00	0	0
0.05	14.83	0.4
0.10	57.55	2.2
0.15	125.86	6.8

Stage Storage Curve: Area R-2
Controlled Roof Drain #3a



Proposed Building Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-2 **Controlled Roof Drain #4**

OTTAWA IDF CURVE

Area =	0.004	ha	Qallow =	0.32	L/s
C =	0.90		Vol(max) =	0.5	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	1.41	1.09	0.33
10	104.19	1.04	0.72	0.43
15	83.56	0.84	0.52	0.46
20	70.25	0.70	0.38	0.46
25	60.90	0.61	0.29	0.43
30	53.93	0.54	0.22	0.40
35	48.52	0.49	0.17	0.35
40	44.18	0.44	0.12	0.29
45	40.63	0.41	0.09	0.23
50	37.65	0.38	0.06	0.17
55	35.12	0.35	0.03	0.10
60	32.94	0.33	0.01	0.03
65	31.04	0.31	-0.01	-0.04
70	29.37	0.29	-0.03	-0.11
75	27.89	0.28	-0.04	-0.18
90	24.29	0.24	-0.08	-0.42
105	21.58	0.22	-0.10	-0.66
120	19.47	0.19	-0.13	-0.90

Proposed Building Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-2 **Controlled Roof Drain #4**

OTTAWA IDF CURVE

Area =	0.004	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	1.3	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	2.70	2.38	0.71
10	178.56	1.99	1.67	1.00
15	142.89	1.59	1.27	1.14
20	119.95	1.33	1.01	1.22
25	103.85	1.15	0.83	1.25
30	91.87	1.02	0.70	1.26
35	82.58	0.92	0.60	1.26
40	75.15	0.84	0.52	1.24
45	69.05	0.77	0.45	1.21
50	63.95	0.71	0.39	1.17
55	59.62	0.66	0.34	1.13
60	55.89	0.62	0.30	1.09
65	52.65	0.59	0.27	1.04
70	49.79	0.55	0.23	0.98
75	47.26	0.53	0.21	0.92
90	41.11	0.46	0.14	0.74
105	36.50	0.41	0.09	0.54
120	32.89	0.37	0.05	0.33

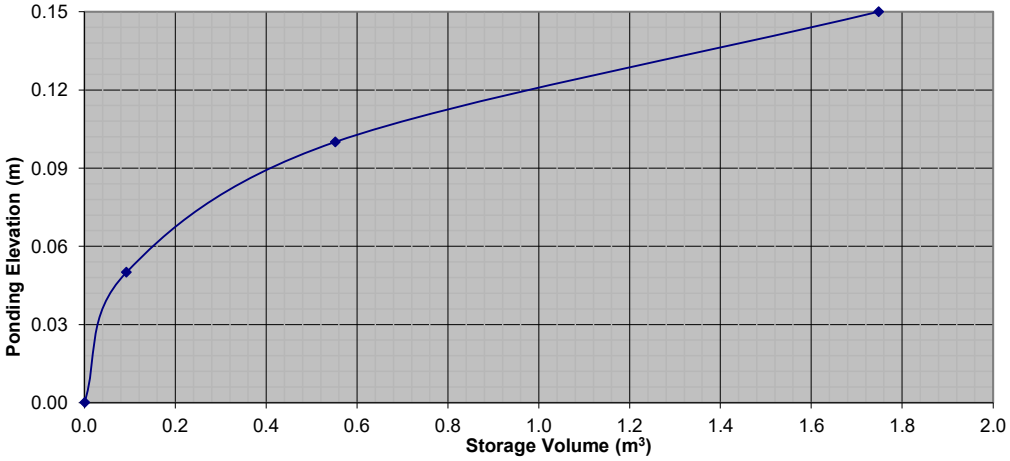
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to Closed

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	10	0.5	1.7
1:100 Year	0.32	0.32	13	1.3	1.7

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	3.68	0.1
0.10	14.72	0.6
0.15	33.12	1.7

Stage Storage Curve: Area R-2
Controlled Roof Drain #4



Proposed Building Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-2 **Controlled Roof Drain #5**

OTTAWA IDF CURVE

Area =	0.004	ha	Qallow =	0.32	L/s
C =	0.90		Vol(max) =	0.5	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	1.41	1.09	0.33
10	104.19	1.04	0.72	0.43
15	83.56	0.84	0.52	0.46
20	70.25	0.70	0.38	0.46
25	60.90	0.61	0.29	0.43
30	53.93	0.54	0.22	0.40
35	48.52	0.49	0.17	0.35
40	44.18	0.44	0.12	0.29
45	40.63	0.41	0.09	0.23
50	37.65	0.38	0.06	0.17
55	35.12	0.35	0.03	0.10
60	32.94	0.33	0.01	0.03
65	31.04	0.31	-0.01	-0.04
70	29.37	0.29	-0.03	-0.11
75	27.89	0.28	-0.04	-0.18
90	24.29	0.24	-0.08	-0.42
105	21.58	0.22	-0.10	-0.66
120	19.47	0.19	-0.13	-0.90

Proposed Building Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-2 **Controlled Roof Drain #5**

OTTAWA IDF CURVE

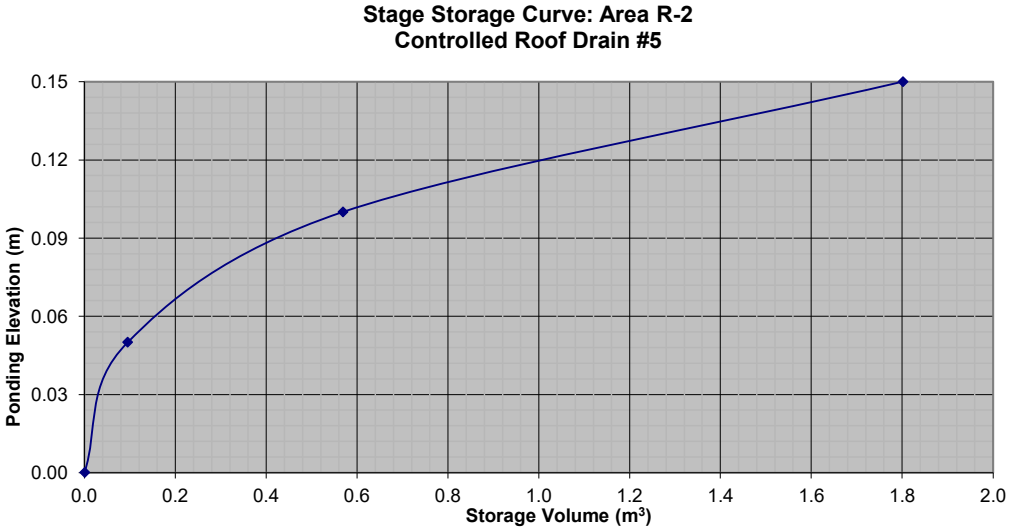
Area =	0.004	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	1.3	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	2.70	2.38	0.71
10	178.56	1.99	1.67	1.00
15	142.89	1.59	1.27	1.14
20	119.95	1.33	1.01	1.22
25	103.85	1.15	0.83	1.25
30	91.87	1.02	0.70	1.26
35	82.58	0.92	0.60	1.26
40	75.15	0.84	0.52	1.24
45	69.05	0.77	0.45	1.21
50	63.95	0.71	0.39	1.17
55	59.62	0.66	0.34	1.13
60	55.89	0.62	0.30	1.09
65	52.65	0.59	0.27	1.04
70	49.79	0.55	0.23	0.98
75	47.26	0.53	0.21	0.92
90	41.11	0.46	0.14	0.74
105	36.50	0.41	0.09	0.54
120	32.89	0.37	0.05	0.33

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**	**Provided**
1:5 Year	0.32	0.32	10	0.5	1.8
1:100 Year	0.32	0.32	13	1.3	1.8

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	3.79	0.1
0.10	15.17	0.6
0.15	34.13	1.8



Proposed Building Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-2 **Controlled Roof Drain #6**

OTTAWA IDF CURVE

Area =	0.012	ha	Qallow =	0.79	L/s
C =	0.90		Vol(max) =	1.6	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	4.24	3.45	1.03
10	104.19	3.13	2.34	1.40
15	83.56	2.51	1.72	1.55
20	70.25	2.11	1.32	1.58
25	60.90	1.83	1.04	1.56
30	53.93	1.62	0.83	1.49
35	48.52	1.46	0.67	1.40
40	44.18	1.33	0.54	1.29
45	40.63	1.22	0.43	1.16
50	37.65	1.13	0.34	1.02
55	35.12	1.05	0.26	0.87
60	32.94	0.99	0.20	0.72
65	31.04	0.93	0.14	0.55
70	29.37	0.88	0.09	0.39
75	27.89	0.84	0.05	0.21
90	24.29	0.73	-0.06	-0.33
105	21.58	0.65	-0.14	-0.89
120	19.47	0.58	-0.21	-1.48

Proposed Building Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-2 **Controlled Roof Drain #6**

OTTAWA IDF CURVE

Area =	0.012	ha	Qallow =	0.87	L/s
C =	1.00		Vol(max) =	4.0	m3

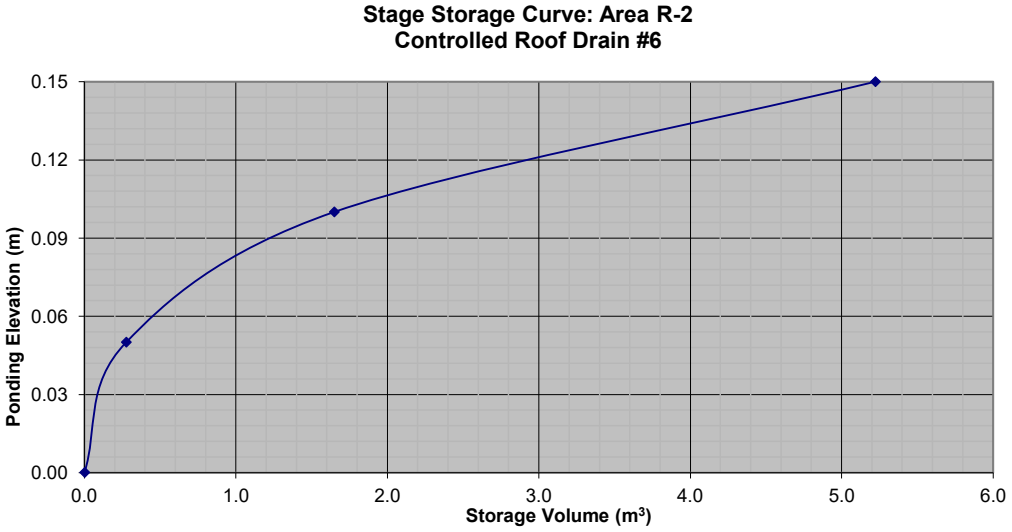
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	8.10	7.23	2.17
10	178.56	5.96	5.09	3.05
15	142.89	4.77	3.90	3.51
20	119.95	4.00	3.13	3.76
25	103.85	3.46	2.59	3.89
30	91.87	3.06	2.19	3.95
35	82.58	2.75	1.88	3.96
40	75.15	2.51	1.64	3.93
45	69.05	2.30	1.43	3.87
50	63.95	2.13	1.26	3.79
55	59.62	1.99	1.12	3.69
60	55.89	1.86	0.99	3.58
65	52.65	1.76	0.89	3.46
70	49.79	1.66	0.79	3.32
75	47.26	1.58	0.71	3.18
90	41.11	1.37	0.50	2.71
105	36.50	1.22	0.35	2.19
120	32.89	1.10	0.23	1.64

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	1.6	5.2
1:100 Year	0.87	0.87	13	4.0	5.2

Roof Drain Storage Table for Area RD 6

Elevation	Area RD 6	Total Volume
m	m^2	m^3
0.00	0	0
0.05	11	0.3
0.10	43.98	1.6
0.15	98.95	5.2



Proposed Building Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-2 **Controlled Roof Drain #7**

OTTAWA IDF CURVE

Area =	0.014	ha	Qallow =	0.32	L/s
C =	0.90		Vol(max) =	3.0	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	4.95	4.63	1.39
10	104.19	3.65	3.33	2.00
15	83.56	2.93	2.61	2.35
20	70.25	2.46	2.14	2.57
25	60.90	2.13	1.81	2.72
30	53.93	1.89	1.57	2.82
35	48.52	1.70	1.38	2.90
40	44.18	1.55	1.23	2.95
45	40.63	1.42	1.10	2.98
50	37.65	1.32	1.00	3.00
55	35.12	1.23	0.91	3.00
60	32.94	1.15	0.83	3.00
65	31.04	1.09	0.77	2.99
70	29.37	1.03	0.71	2.98
75	27.89	0.98	0.66	2.96
90	24.29	0.85	0.53	2.87
105	21.58	0.76	0.44	2.75
120	19.47	0.68	0.36	2.61

Proposed Building Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-2 **Controlled Roof Drain #7**

OTTAWA IDF CURVE

Area =	0.014	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	6.9	m3

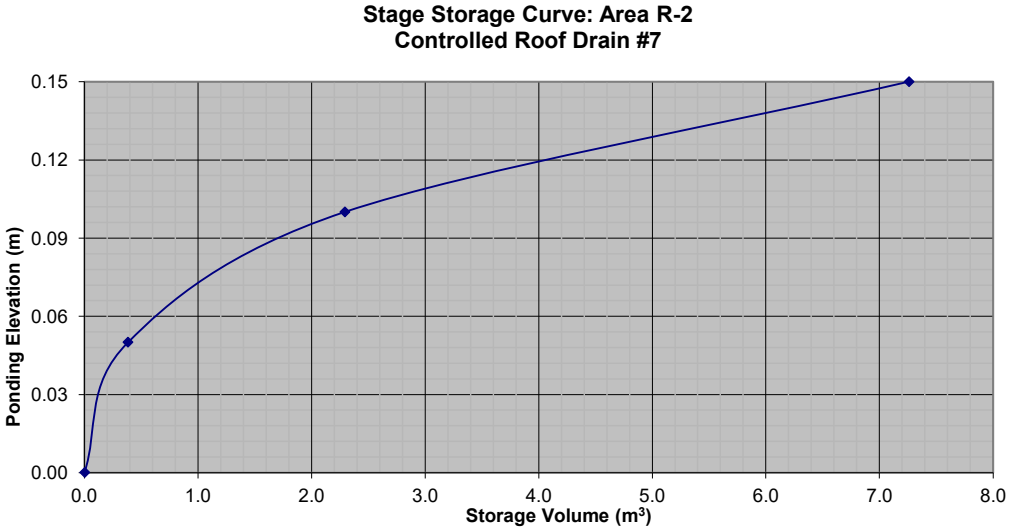
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	9.45	9.13	2.74
10	178.56	6.95	6.63	3.98
15	142.89	5.56	5.24	4.72
20	119.95	4.67	4.35	5.22
25	103.85	4.04	3.72	5.58
30	91.87	3.58	3.26	5.86
35	82.58	3.21	2.89	6.08
40	75.15	2.92	2.60	6.25
45	69.05	2.69	2.37	6.39
50	63.95	2.49	2.17	6.51
55	59.62	2.32	2.00	6.60
60	55.89	2.18	1.86	6.68
65	52.65	2.05	1.73	6.74
70	49.79	1.94	1.62	6.79
75	47.26	1.84	1.52	6.84
90	41.11	1.60	1.28	6.91
105	36.50	1.42	1.10	6.93
120	32.89	1.28	0.96	6.91

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	3.0	7.3
1:100 Year	0.32	0.32	15	6.9	7.3

Roof Drain Storage Table for Area RD 7

Elevation	Area RD 7	Total Volume
m	m^2	m^3
0.00	0	0
0.05	15.28	0.4
0.10	61.12	2.3
0.15	137.53	7.3



Proposed Building Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-2 **Controlled Roof Drain #8**

OTTAWA IDF CURVE

Area =	0.014	ha	Qallow =	0.32	L/s
C =	0.90		Vol(max) =	3.0	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	4.95	4.63	1.39
10	104.19	3.65	3.33	2.00
15	83.56	2.93	2.61	2.35
20	70.25	2.46	2.14	2.57
25	60.90	2.13	1.81	2.72
30	53.93	1.89	1.57	2.82
35	48.52	1.70	1.38	2.90
40	44.18	1.55	1.23	2.95
45	40.63	1.42	1.10	2.98
50	37.65	1.32	1.00	3.00
55	35.12	1.23	0.91	3.00
60	32.94	1.15	0.83	3.00
65	31.04	1.09	0.77	2.99
70	29.37	1.03	0.71	2.98
75	27.89	0.98	0.66	2.96
90	24.29	0.85	0.53	2.87
105	21.58	0.76	0.44	2.75
120	19.47	0.68	0.36	2.61

Proposed Building Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-2 **Controlled Roof Drain #8**

OTTAWA IDF CURVE

Area =	0.014	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	6.9	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	9.45	9.13	2.74
10	178.56	6.95	6.63	3.98
15	142.89	5.56	5.24	4.72
20	119.95	4.67	4.35	5.22
25	103.85	4.04	3.72	5.58
30	91.87	3.58	3.26	5.86
35	82.58	3.21	2.89	6.08
40	75.15	2.92	2.60	6.25
45	69.05	2.69	2.37	6.39
50	63.95	2.49	2.17	6.51
55	59.62	2.32	2.00	6.60
60	55.89	2.18	1.86	6.68
65	52.65	2.05	1.73	6.74
70	49.79	1.94	1.62	6.79
75	47.26	1.84	1.52	6.84
90	41.11	1.60	1.28	6.91
105	36.50	1.42	1.10	6.93
120	32.89	1.28	0.96	6.91

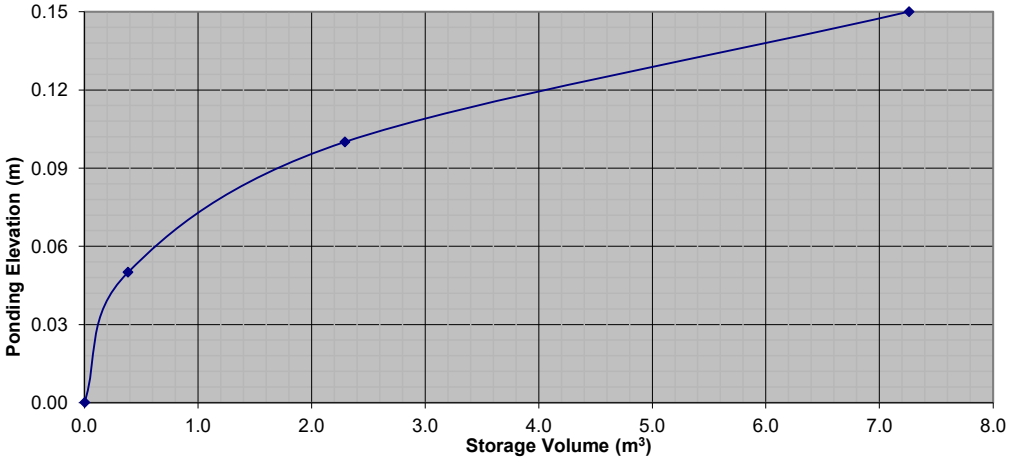
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to Closed

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	3.0	7.3
1:100 Year	0.32	0.32	15	6.9	7.3

Roof Drain Storage Table for Area RD 8

Elevation	Area RD 8	Total Volume
m	m^2	m^3
0.00	0	0
0.05	15.28	0.4
0.10	61.12	2.3
0.15	137.53	7.3

Stage Storage Curve: Area R-2
Controlled Roof Drain #8



Proposed Building Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-3 **Controlled Roof Drain #9**

OTTAWA IDF CURVE

Area =	0.015	ha	Qallow =	0.79	L/s
C =	0.90		Vol(max) =	2.2	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	5.30	4.51	1.35
10	104.19	3.91	3.12	1.87
15	83.56	3.14	2.35	2.11
20	70.25	2.64	1.85	2.22
25	60.90	2.29	1.50	2.24
30	53.93	2.02	1.23	2.22
35	48.52	1.82	1.03	2.16
40	44.18	1.66	0.87	2.08
45	40.63	1.52	0.73	1.98
50	37.65	1.41	0.62	1.87
55	35.12	1.32	0.53	1.74
60	32.94	1.24	0.45	1.61
65	31.04	1.17	0.38	1.46
70	29.37	1.10	0.31	1.31
75	27.89	1.05	0.26	1.15
90	24.29	0.91	0.12	0.66
105	21.58	0.81	0.02	0.13
120	19.47	0.73	-0.06	-0.43

Proposed Building Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-3 **Controlled Roof Drain #9**

OTTAWA IDF CURVE

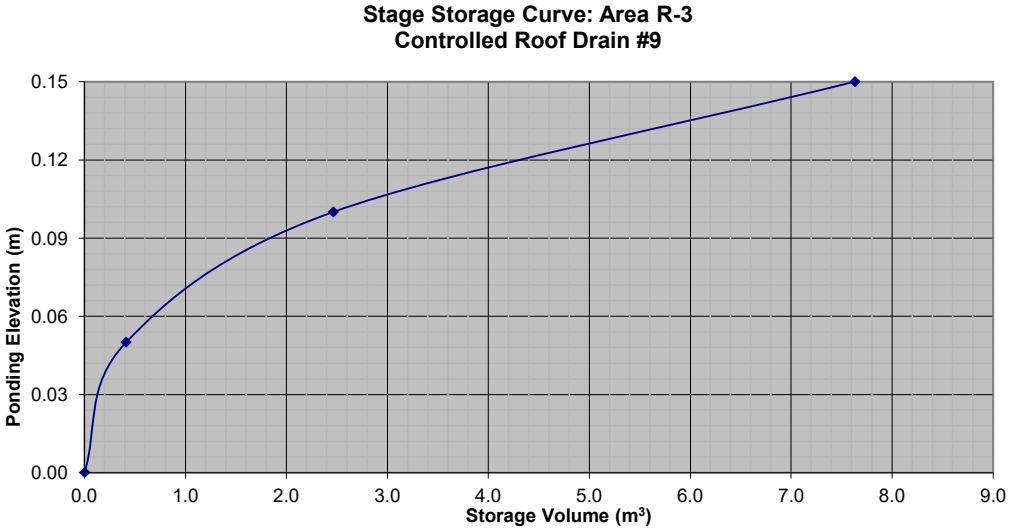
Area =	0.015	ha	Qallow =	0.87	L/s
C =	1.00		Vol(max) =	5.4	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	10.12	9.25	2.78
10	178.56	7.45	6.58	3.95
15	142.89	5.96	5.09	4.58
20	119.95	5.00	4.13	4.96
25	103.85	4.33	3.46	5.19
30	91.87	3.83	2.96	5.33
35	82.58	3.44	2.57	5.40
40	75.15	3.13	2.26	5.43
45	69.05	2.88	2.01	5.43
50	63.95	2.67	1.80	5.39
55	59.62	2.49	1.62	5.33
60	55.89	2.33	1.46	5.26
65	52.65	2.20	1.33	5.17
70	49.79	2.08	1.21	5.07
75	47.26	1.97	1.10	4.95
90	41.11	1.71	0.84	4.56
105	36.50	1.52	0.65	4.11
120	32.89	1.37	0.50	3.61

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	10	2.2	7.6
1:100 Year	0.87	0.87	13	5.4	7.6

Roof Drain Storage Table for Area RD 9

Elevation	Area RD 9	Total Volume
m	m^2	m^3
0.00	0	0
0.05	16.44	0.4
0.10	65.74	2.5
0.15	140.84	7.6



Proposed Building Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-3 **Controlled Roof Drain #10**

OTTAWA IDF CURVE

Area =	0.008	ha	Qallow =	0.32	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	2.83	2.51	0.75
10	104.19	2.09	1.77	1.06
15	83.56	1.67	1.35	1.22
20	70.25	1.41	1.09	1.30
25	60.90	1.22	0.90	1.35
30	53.93	1.08	0.76	1.37
35	48.52	0.97	0.65	1.37
40	44.18	0.88	0.56	1.35
45	40.63	0.81	0.49	1.33
50	37.65	0.75	0.43	1.30
55	35.12	0.70	0.38	1.26
60	32.94	0.66	0.34	1.22
65	31.04	0.62	0.30	1.18
70	29.37	0.59	0.27	1.13
75	27.89	0.56	0.24	1.07
90	24.29	0.49	0.17	0.90
105	21.58	0.43	0.11	0.71
120	19.47	0.39	0.07	0.50

Proposed Building Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-3 **Controlled Roof Drain #10**

OTTAWA IDF CURVE

Area =	0.008	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	3.3	m3

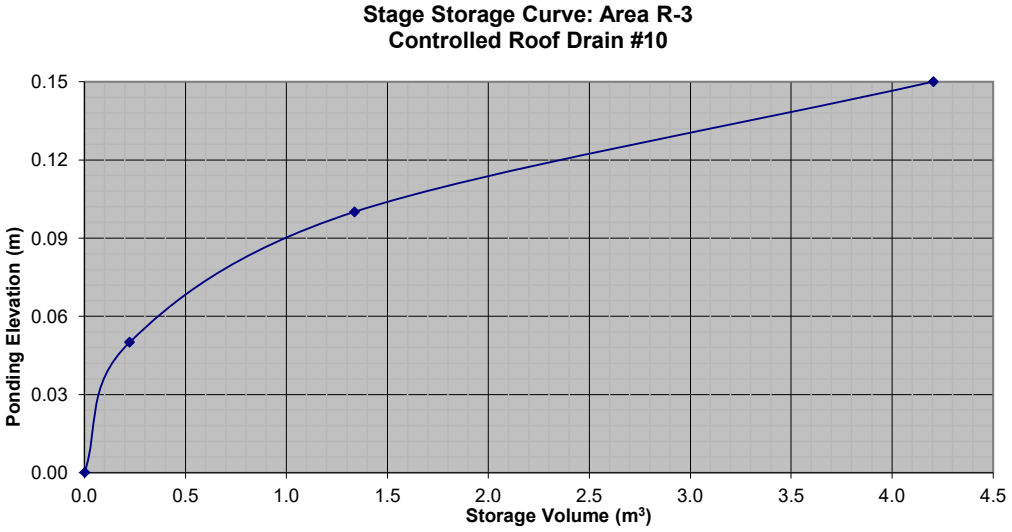
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	5.40	5.08	1.52
10	178.56	3.97	3.65	2.19
15	142.89	3.18	2.86	2.57
20	119.95	2.67	2.35	2.82
25	103.85	2.31	1.99	2.98
30	91.87	2.04	1.72	3.10
35	82.58	1.84	1.52	3.18
40	75.15	1.67	1.35	3.24
45	69.05	1.54	1.22	3.28
50	63.95	1.42	1.10	3.31
55	59.62	1.33	1.01	3.32
60	55.89	1.24	0.92	3.32
65	52.65	1.17	0.85	3.32
70	49.79	1.11	0.79	3.31
75	47.26	1.05	0.73	3.29
90	41.11	0.91	0.59	3.21
105	36.50	0.81	0.49	3.10
120	32.89	0.73	0.41	2.96

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	10	1.4	4.2
1:100 Year	0.32	0.32	13	3.3	4.2

Roof Drain Storage Table for Area RD 10

Elevation	Area RD 10	Total Volume
m	m^2	m^3
0.00	0	0
0.05	8.91	0.2
0.10	35.62	1.3
0.15	79.08	4.2



Proposed Building Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-2 **Controlled Roof Drain #11**

OTTAWA IDF CURVE

Area =	0.008	ha	Qallow =	0.32	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	2.83	2.51	0.75
10	104.19	2.09	1.77	1.06
15	83.56	1.67	1.35	1.22
20	70.25	1.41	1.09	1.30
25	60.90	1.22	0.90	1.35
30	53.93	1.08	0.76	1.37
35	48.52	0.97	0.65	1.37
40	44.18	0.88	0.56	1.35
45	40.63	0.81	0.49	1.33
50	37.65	0.75	0.43	1.30
55	35.12	0.70	0.38	1.26
60	32.94	0.66	0.34	1.22
65	31.04	0.62	0.30	1.18
70	29.37	0.59	0.27	1.13
75	27.89	0.56	0.24	1.07
90	24.29	0.49	0.17	0.90
105	21.58	0.43	0.11	0.71
120	19.47	0.39	0.07	0.50

Proposed Building Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-2 **Controlled Roof Drain #11**

OTTAWA IDF CURVE

Area =	0.008	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	3.3	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	5.40	5.08	1.52
10	178.56	3.97	3.65	2.19
15	142.89	3.18	2.86	2.57
20	119.95	2.67	2.35	2.82
25	103.85	2.31	1.99	2.98
30	91.87	2.04	1.72	3.10
35	82.58	1.84	1.52	3.18
40	75.15	1.67	1.35	3.24
45	69.05	1.54	1.22	3.28
50	63.95	1.42	1.10	3.31
55	59.62	1.33	1.01	3.32
60	55.89	1.24	0.92	3.32
65	52.65	1.17	0.85	3.32
70	49.79	1.11	0.79	3.31
75	47.26	1.05	0.73	3.29
90	41.11	0.91	0.59	3.21
105	36.50	0.81	0.49	3.10
120	32.89	0.73	0.41	2.96

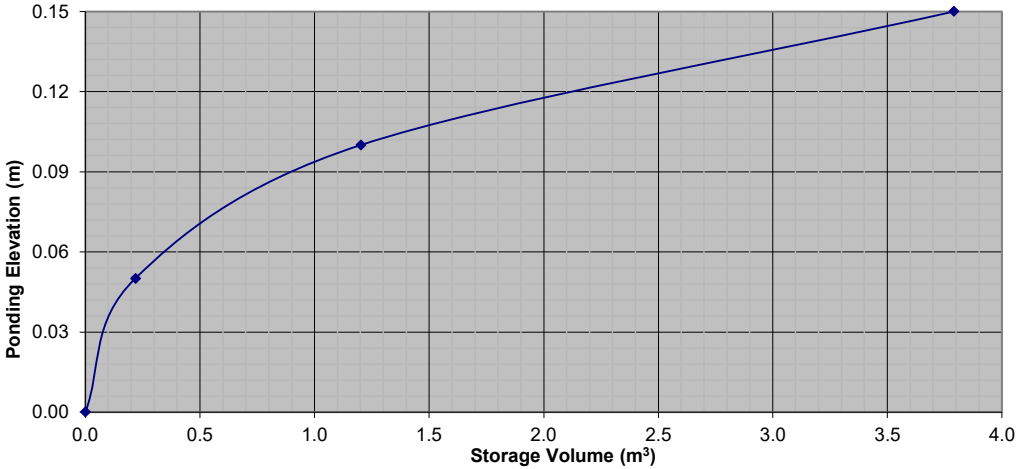
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to Closed

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	1.4	3.8
1:100 Year	0.32	0.32	14	3.3	3.8

Roof Drain Storage Table for Area RD 11

Elevation	Area RD 11	Total Volume
m	m^2	m^3
0.00	0	0
0.05	8.75	0.2
0.10	30.59	1.2
0.15	72.89	3.8

Stage Storage Curve: Area R-2
Controlled Roof Drain #11



Proposed Building Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-2 **Controlled Roof Drain #12**

OTTAWA IDF CURVE

Area =	0.004	ha	Qallow =	0.32	L/s
C =	0.90		Vol(max) =	0.5	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	1.41	1.09	0.33
10	104.19	1.04	0.72	0.43
15	83.56	0.84	0.52	0.46
20	70.25	0.70	0.38	0.46
25	60.90	0.61	0.29	0.43
30	53.93	0.54	0.22	0.40
35	48.52	0.49	0.17	0.35
40	44.18	0.44	0.12	0.29
45	40.63	0.41	0.09	0.23
50	37.65	0.38	0.06	0.17
55	35.12	0.35	0.03	0.10
60	32.94	0.33	0.01	0.03
65	31.04	0.31	-0.01	-0.04
70	29.37	0.29	-0.03	-0.11
75	27.89	0.28	-0.04	-0.18
90	24.29	0.24	-0.08	-0.42
105	21.58	0.22	-0.10	-0.66
120	19.47	0.19	-0.13	-0.90

Proposed Building Addition
Novatech Project No. 119247
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-2 **Controlled Roof Drain #12**

OTTAWA IDF CURVE

Area =	0.004	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	1.3	m3

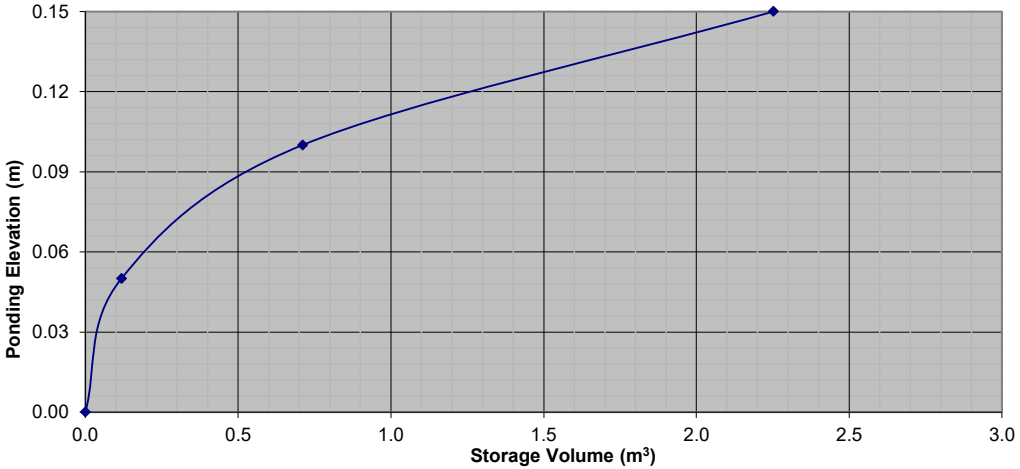
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	2.70	2.38	0.71
10	178.56	1.99	1.67	1.00
15	142.89	1.59	1.27	1.14
20	119.95	1.33	1.01	1.22
25	103.85	1.15	0.83	1.25
30	91.87	1.02	0.70	1.26
35	82.58	0.92	0.60	1.26
40	75.15	0.84	0.52	1.24
45	69.05	0.77	0.45	1.21
50	63.95	0.71	0.39	1.17
55	59.62	0.66	0.34	1.13
60	55.89	0.62	0.30	1.09
65	52.65	0.59	0.27	1.04
70	49.79	0.55	0.23	0.98
75	47.26	0.53	0.21	0.92
90	41.11	0.46	0.14	0.74
105	36.50	0.41	0.09	0.54
120	32.89	0.37	0.05	0.33

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**	**Provided**
1:5 Year	0.32	0.32	9	0.5	2.3
1:100 Year	0.32	0.32	12	1.3	2.3

Roof Drain Storage Table for Area RD 12

Elevation	Area RD 12	Total Volume
m	m^2	m^3
0.00	0	0
0.05	4.74	0.1
0.10	18.96	0.7
0.15	42.66	2.3

Stage Storage Curve: Area R-2
Controlled Roof Drain #12



APPENDIX E

Control Flow Rood Drain Information

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

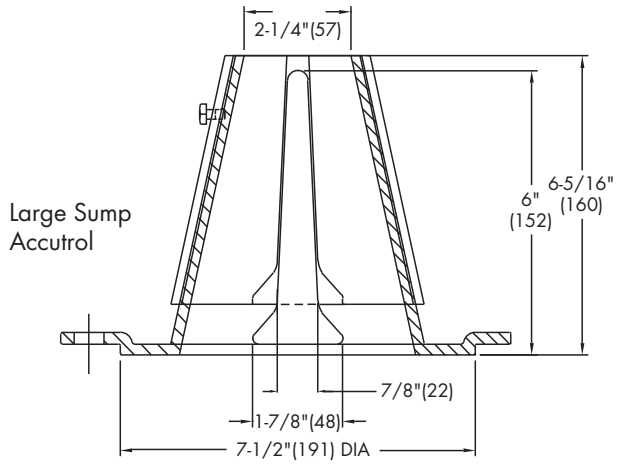
ADJUSTABLE ACCUTROL (for Large Sump Roof Drains only)

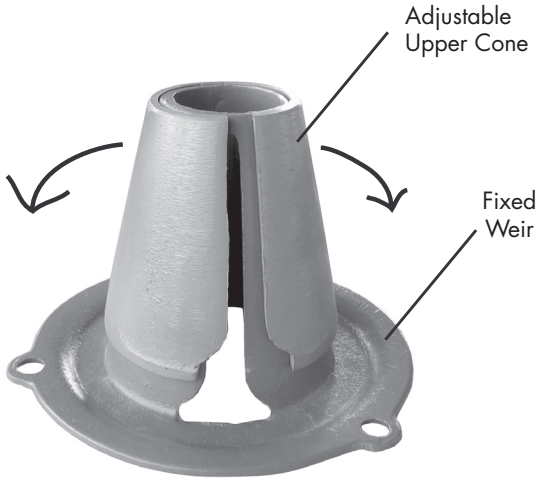
For more flexibility in controlling flow with heads deeper than 2", Watts Drainage offers the Adjustable Accutrol. The Adjustable Accutrol Weir is designed with a single parabolic opening that can be covered to restrict flow above 2" of head to less than 5 gpm per inch, up to 6" of head. To adjust the 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 _____

USA: Tel: (800) 338-2581 • Fax: (828) 248-3929 • Watts.com
Canada: Tel: (905) 332-4090 • Fax: (905) 332-7068 • Watts.ca
Latin America: Tel: (52) 81-1001-8600 • Fax: (52) 81-8000-7091 • Watts.com

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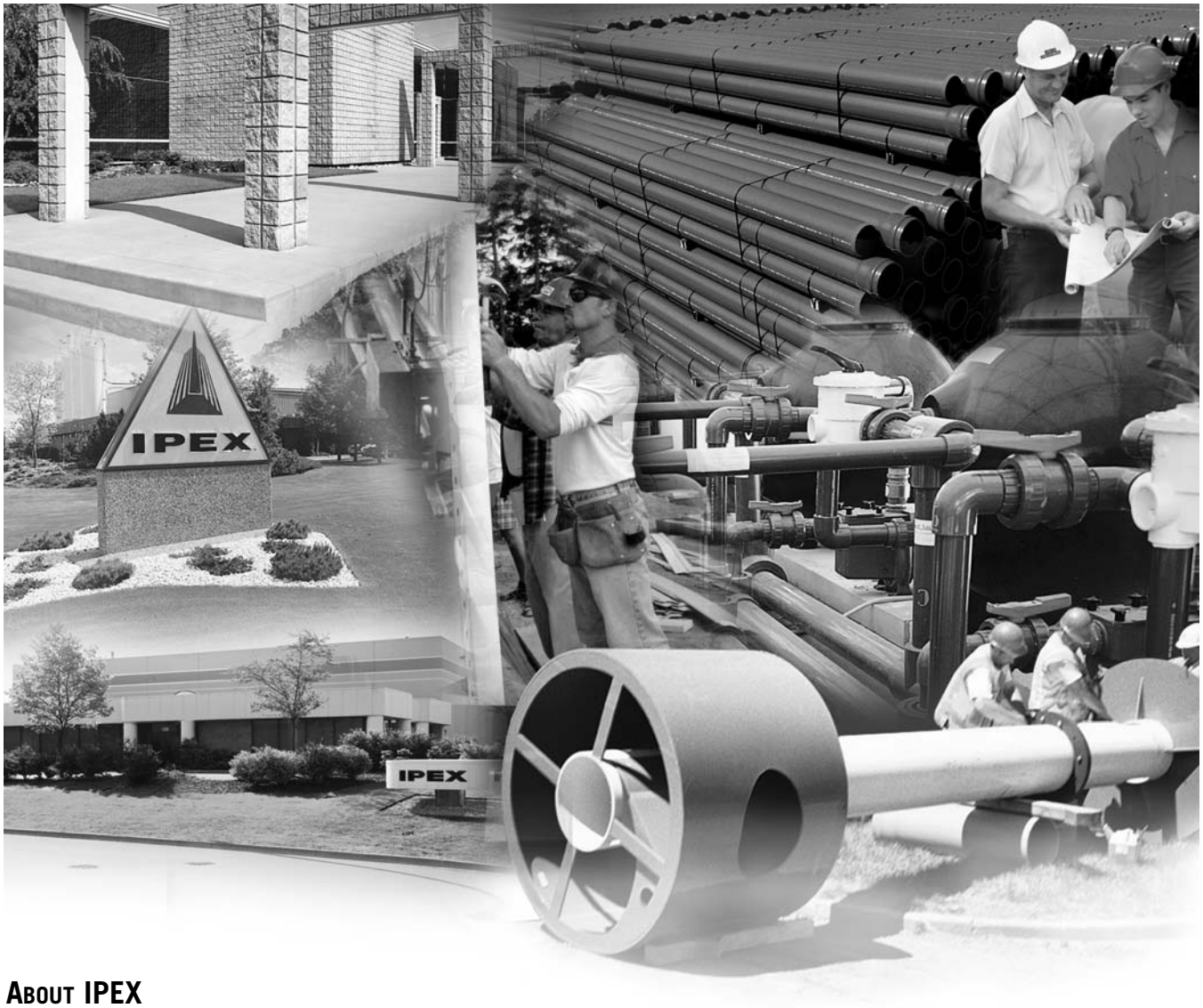
APPENDIX F

Inlet Control Device (ICD) Information

IPEX Tempest™ Inlet Control Devices

Municipal Technical Manual Series

Vol. I, 2nd Edition



About IPEX

At IPEX, we have been manufacturing non-metallic pipe and fittings since 1951. We formulate our own compounds and maintain strict quality control during production. Our products are made available for customers thanks to a network of regional stocking locations throughout North America. We offer a wide variety of systems including complete lines of piping, fittings, valves and custom-fabricated items.

More importantly, we are committed to meeting our customers' needs. As a leader in the plastic piping industry, IPEX continually develops new products, modernizes manufacturing facilities and acquires innovative process technology. In addition, our staff take pride in their work, making available to customers their extensive thermoplastic knowledge and field experience. IPEX personnel are committed to improving the safety, reliability and performance of thermoplastic materials. We are involved in several standards committees and are members of and/or comply with the organizations listed on this page.

For specific details about any IPEX product, contact our customer service department.

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TEMPEST INLET CONTROL DEVICES Technical Manual

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Product Installation

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Section Two: **Product Information: TEMPEST High Flow (HF) & Medium, High Flow (MHF) ICD**

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Product Installation

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PRODUCT TECHNICAL SPECIFICATION

General

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

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

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

ICD's shall have no moving parts.

Materials

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

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

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

All hardware will be made from 304 stainless steel.

Dimensioning

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

Installation

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

PRODUCT INFORMATION: TEMPEST HF & MHF ICD

Product Description

Our HF, HF Sump and MHF ICD's are designed to accommodate catch basins or manholes with sewer outlet pipes 6" in diameter or larger. Any storm sewer larger than 12" may require custom modification. However, IPEX can custom build a TEMPEST device to accommodate virtually any storm sewer size.

Available in 5 preset flow curves, these ICDs have the ability to provide constant flow rates: 9lps (143 gpm) and greater

Product Function

TEMPEST HF (High Flow): designed to manage moderate to higher flows 15 L/s (240 gpm) or greater and prevent the propagation of odour and floatables. With this device, the cross-sectional area of the device is larger than the orifice diameter and has been designed to limit head losses. The HF ICD can also be ordered without flow control when only odour and floatable control is required.

TEMPEST HF (High Flow) Sump: The height of a sewer outlet pipe in a catch basin is not always conveniently located. At times it may be located very close to the catch basin floor, not providing enough sump for one of the other TEMPEST ICDs with universal back plate to be installed. In these applications, the HF Sump is offered. The HF Sump offers the same features and benefits as the HF ICD; however, is designed to raise the outlet in a square or round catch basin structure. When installed, the HF sump is fixed in place and not easily removed. Any required service to the device is performed through a clean-out located in the top of the device which can be often accessed from ground level.

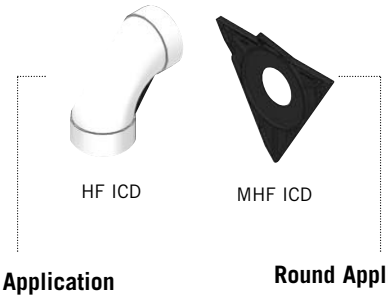
TEMPEST MHF (Medium to High Flow):
The MHF plate or plug is designed to control flow rates 9 L/s (143 gpm) or greater. It is not designed to prevent the propagation of odour and floatables.

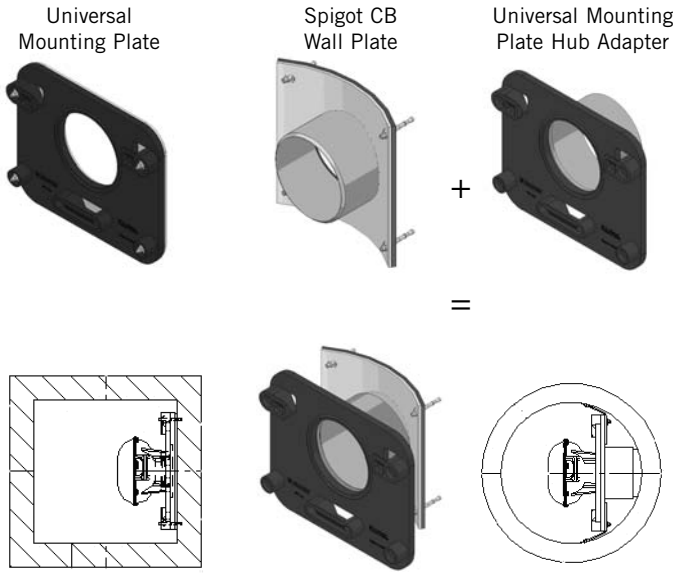
Product Construction

The HF, HF Sump and MHF ICDs are built to be light weight at a maximum weight of 6.8 Kg (14.6 lbs).

Product Applications

The HF and MHF ICD's are available to accommodate both square and round applications:





The HF Sump is available to accommodate low to no sump applications in both square and round catch basins:

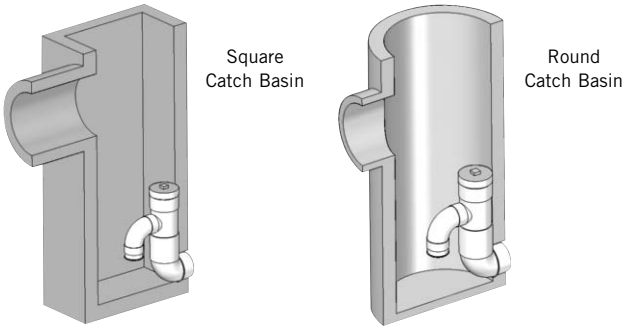
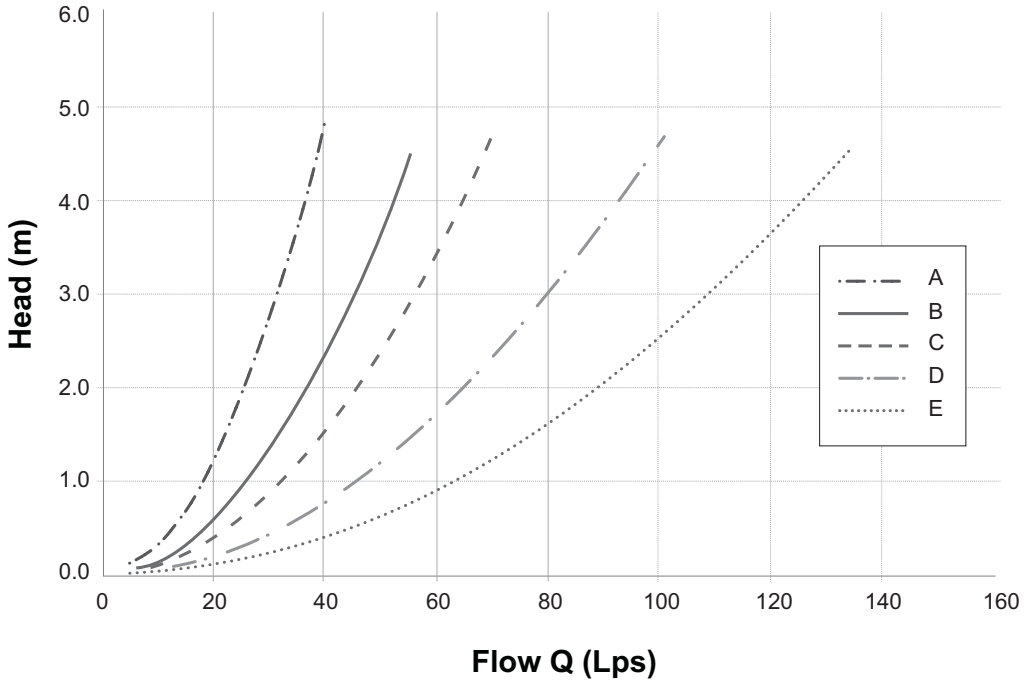


Chart 3: HF & MHF Preset Flow Curves



PRODUCT INSTALLATION

Instructions to assemble a TEMPEST HF or MHF ICD into a Square Catch Basin:

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

⚠ WARNING

- Verify that the outlet pipe doesn't protrude into the catch basin. If it does, cut down the pipe flush to the catch basin wall.
- Call your IPEX representative for more information or if you have any questions about our products.

Instructions to assemble a TEMPEST HF or MHF ICD into a Round Catch Basin:

STEPS:

1. Materials and tooling verification.
   - Tooling: impact drill, 3/8" concrete bit, torque wrench for 9/16" nut, hand hammer, level and marker.
   - Material: (4) concrete anchor 3/8 x 3-1/2, (4) washers and (4) nuts, spigot CB wall plate, universal mounting plate hub adapter, ICD device.
2. Use the round catch basin spigot adaptor to locate and mark the hole (4) pattern on the catch basin wall. You should use a level to ensure that the plate is at the horizontal.
3. Use an impact drill with a 3/8" concrete bit to make the four holes at a depth between 1-1/2" to 2-1/2". Clean the concrete dust from the holes.
4. Install the anchors (4) in the holes by using a hammer. Thread the nuts on the top of the anchors to protect the threads when you hit the anchors with the hammer. Remove the nuts from the ends of the anchors.
5. Install the spigot CB wall plate on the anchors and screw the 4 nuts in place with a maximum torque of 40 N.m (30 lbf-ft). There should be no gap between the spigot CB wall plate and the catch basin wall.
6. Put solvent cement on the hub of the universal mounting plate, hub adapter and the spigot of the CB wall plate, then slide the hub over the spigot. Make sure the universal mounting plate is at the horizontal and its hub is completely inserted onto the spigot. Normally, the corners of the hub adapter should touch the catch basin wall.
7. From ground above using a reach bar, lower the device by hooking the end of the reach bar to the handle of the ICD device. Align the triangular plate portion into the mounting wall plate. Push down the device to be sure it has centered in to the wall mounting plate and has created a seal.

⚠ WARNING

- Verify that the outlet pipe doesn't protrude into the catch basin. If it does, cut down the pipe flush to the catch basin wall.
- The solvent cement which is used in this installation is to be approved for PVC.
- The solvent cement should not be used below 0°C (32°F) or in a high humidity environment. Refer to the IPEX solvent cement guide to confirm the required curing time or visit the IPEX Online Solvent Cement Training Course available at www.ipexinc.com.
- Call your IPEX representative for more information or if you have any questions about our products.

Instructions to assemble a TEMPEST HF Sump into a Square or Round Catch Basin:

STEPS:

1. Materials and tooling verification:
   - Tooling: impact drill, 3/8" concrete bit, torque wrench for 9/16" nut, hand hammer, level, mastic tape and metal strapping
   - Material: (2) concrete anchor 3/8 x 3-1/2, (2) washers, (2) nuts, HF Sump pieces (2).
2. Apply solvent cement to the spigot end of the top half of the sump. Apply solvent cement to the hub of the bottom half of the sump. Insert the spigot of the top half of the sump into the hub of the bottom half of the sump.
3. Install the 8" spigot of the device into the outlet pipe. Use the mastic tape to seal the device spigot into the outlet pipe. You should use a level to be sure that the fitting is standing at the vertical.
4. Use an impact drill with a 3/8" concrete bit to make a series of 2 holes along each side of the body throat. The depth of the hole should be between 1-1/2" to 2-1/2". Clean the concrete dust from the 2 holes.
5. Install the anchors (2) in the holes by using a hammer. Put the nuts on the top of the anchors to protect the threads when you hit the anchors. Remove the nuts from the ends of the anchors.
6. Cut the metal strapping to length and connect each end of the strapping to the anchors. Screw the nuts in place with a maximum torque of 40 N.m (30 lbf-ft). The device should be completely flush with the catch basin wall.

⚠ WARNING

- Verify that the outlet pipe doesn't protrude into the catch basin. If it does, cut down the pipe flush to the catch basin wall.
- The solvent cement which is used in this installation is to be approved for PVC.
- The solvent cement should not be used below 0°C (32°F) or in a high humidity environment. Refer to the IPEX solvent cement guide to confirm the required curing time or visit the IPEX Online Solvent Cement Training Course available at www.ipexinc.com.
- Call your IPEX representative for more information or if you have any questions about our products.

PRODUCT TECHNICAL SPECIFICATION

General

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

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

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

ICD's shall have no moving parts.

Materials

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

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

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

All hardware will be made from 304 stainless steel.

Dimensioning

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

Installation

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

APPENDIX G

Stormwater Quality Control Treatment Unit Information

Steve Matthews

From: Patrick <patrick@echelonenvironmental.ca>
Sent: Monday, April 20, 2020 9:09 AM
To: Steve Matthews
Cc: Miro Savic
Subject: RE: CDS Sizing Request - 2431 Bank Street (The Waterford) in Ottawa
Attachments: CDS TSSR - 2431 Bank Street - PMSU 2020_5.pdf

Good morning Steve,

For this site we recommend a CDS PMSU 2020_5 which has a treatment flow rate of 31 L/s and an approximate budget price of $25,500. Treatment flow rate and volume treated are in the bottom right of the attached sheet. The rest of your required parameters are below.

- The sediment storage capacity in m3 = 1.668
- The oil storage capacity in L = 376
- The total unit storage capacity in L = 3.149

If you have any questions please let me know.

Best regards,

Patrick Graham
Project Manager
ECHELON ENVIRONMENTAL
505 Hood Road, Unit #26
Markham, ON.
L3R 5V6

Ph. 905-948-0000 ext. 223
Fax 905-948-0577
Email Patrick@echelonenvironmental.ca

From: Steve Matthews <S.Matthews@novatech-eng.com>
Sent: Thursday, April 9, 2020 4:09 PM
To: Patrick <patrick@echelonenvironmental.ca>
Cc: Miro Savic <m.savic@novatech-eng.com>
Subject: CDS Sizing Request - 2431 Bank Street (The Waterford) in Ottawa

Hi Patrick,

We are currently working on another project in Ottawa that requires a stormwater quality control unit for a parking lot area and for a portion of the upstream flows from the proposed building. The project is for the Waterford Retirement Residence located at 2431 Bank Street in the City of Ottawa. The project details for this stormwater quality control unit are as follows:

Tributary area = **0.89 ha** (combination of 0.02 ha un-controlled courtyard; 0.28 ha from controlled building flows; and 0.59 ha controlled parking lot flows)
Imperviousness = **77%**
Time of concentration = 10min
IDF Curve = City of Ottawa (104.2mm/hr Intensity for 5yr) (178.6mm/hr Intensity for 100yr)

We have a requirement to provide a level of quality control treatment to meet the **MOE 'Enhanced' Level of Protection** guidelines (i.e. **80% TSS removal** and **90% of annual runoff treated**). The proposed unit will be installed **on an existing 375mm dia. PVC pipe** with **180 degrees of separation** through the structure and approximately **2.5m cover** on the pipes. A standard particle distribution (**Fines**) is the minimum that is required for the design. Anticipated peak flow should be in the order of **70 L/s** based on the City's requirement to control the site to pre-development runoff levels. As a result, there will be some upstream attenuation due to ICDs within the paved parking area and CB structure as well as control flow drains on the proposed building roofs and pumped flows from the underground storage tank below the parking level of the new structure. See attached preliminary servicing plan for a sketch of the site and proposed water quality treatment unit location (highlighted in yellow).

Can you please **size a CDS unit** for us and provide the design details as well as an **approximate cost estimate.**

We will also need the following information on the unit for our SWM Report:

- % of net annual TSS removal
- % of net annual treatment volume for the tributary area
- The treatment capacity in L/s
- The sediment storage capacity in m^3
- The oil storage capacity in L
- The total unit storage capacity in L

Thank you for your time and consideration in this matter. there is any further information you require, please do not hesitate to send me an email as we are currently working from home.

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

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
BASED ON A FINE PARTICLE SIZE DISTRIBUTION

Project Name: 2431 Bank Street
Location: Ottawa, ON
OGS #: 1

Engineer: Novatech
Contact: Stephen Matthews, B.A.(Env)
Report Date: 20-Apr-20

Area	0.890	ha	**Rainfall Station #**	215	
Weighted C	0.75		**Particle Size Distribution**	FINE	
CDS Model	2020		**CDS Treatment Capacity**	31	l/s

Rainfall Intensity[1] (mm/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (l/s)	Treated Flowrate (l/s)	Operating Rate (%)	Removal Efficiency (%)	Incremental Removal (%)
1.0	10.6%	19.8%	1.9	1.9	6.0	97.1	10.3
1.5	9.9%	29.7%	2.8	2.8	8.9	96.3	9.5
2.0	8.4%	38.1%	3.7	3.7	11.9	95.4	8.0
2.5	7.7%	45.8%	4.6	4.6	14.9	94.6	7.3
3.0	5.9%	51.7%	5.6	5.6	17.9	93.7	5.6
3.5	4.4%	56.1%	6.5	6.5	20.8	92.9	4.0
4.0	4.7%	60.7%	7.4	7.4	23.8	92.0	4.3
4.5	3.3%	64.0%	8.4	8.4	26.8	91.2	3.0
5.0	3.0%	67.1%	9.3	9.3	29.8	90.3	2.7
6.0	5.4%	72.4%	11.1	11.1	35.7	88.6	4.8
7.0	4.4%	76.8%	13.0	13.0	41.7	86.9	3.8
8.0	3.5%	80.3%	14.8	14.8	47.7	85.2	3.0
9.0	2.8%	83.2%	16.7	16.7	53.6	83.5	2.4
10.0	2.2%	85.3%	18.6	18.6	59.6	81.8	1.8
15.0	7.0%	92.3%	27.8	27.8	89.4	73.2	5.1
20.0	4.5%	96.9%	37.1	31.2	100.0	58.9	2.7
25.0	1.4%	98.3%	46.4	31.2	100.0	47.1	0.7
30.0	0.7%	99.0%	55.7	31.2	100.0	39.3	0.3
35.0	0.5%	99.5%	64.9	31.2	100.0	33.7	0.2
40.0	0.5%	100.0%	74.2	31.2	100.0	29.5	0.2
45.0	0.0%	100.0%	83.5	31.2	100.0	26.2	0.0
50.0	0.0%	100.0%	92.8	31.2	100.0	23.6	0.0
							88.5

Removal Efficiency Adjustment[2] = 6.5%

Predicted Net Annual Load Removal Efficiency = 82.0%

Predicted Annual Rainfall Treated = 97.5%

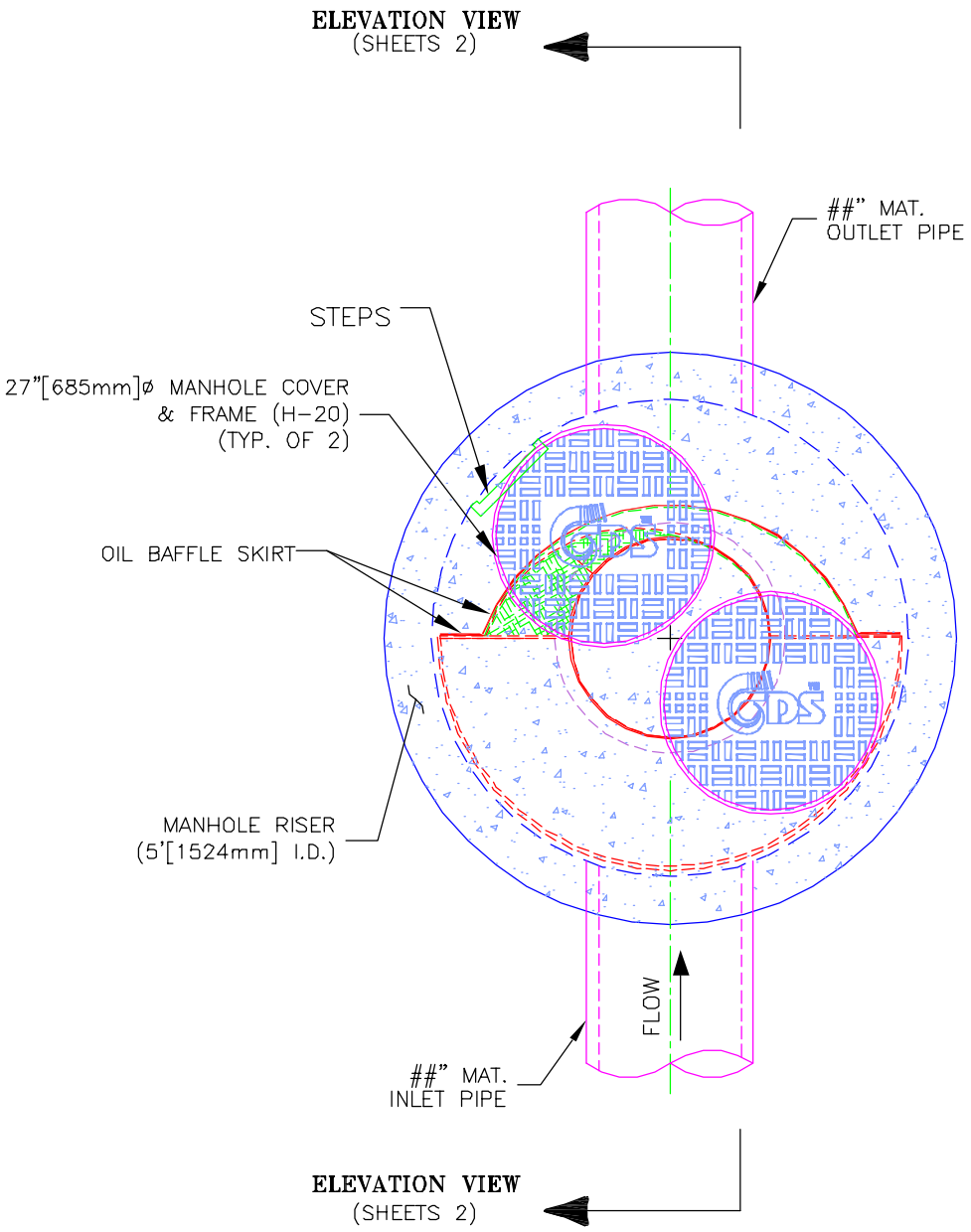
1 - Based on 42 years of hourly rainfall data from Canadian Station 6105976, Ottawa ON

2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

3 - CDS Efficiency based on testing conducted at the University of Central Florida

4 - CDS design flowrate and scaling based on standard manufacturer model & product specifications

PLAN VIEW

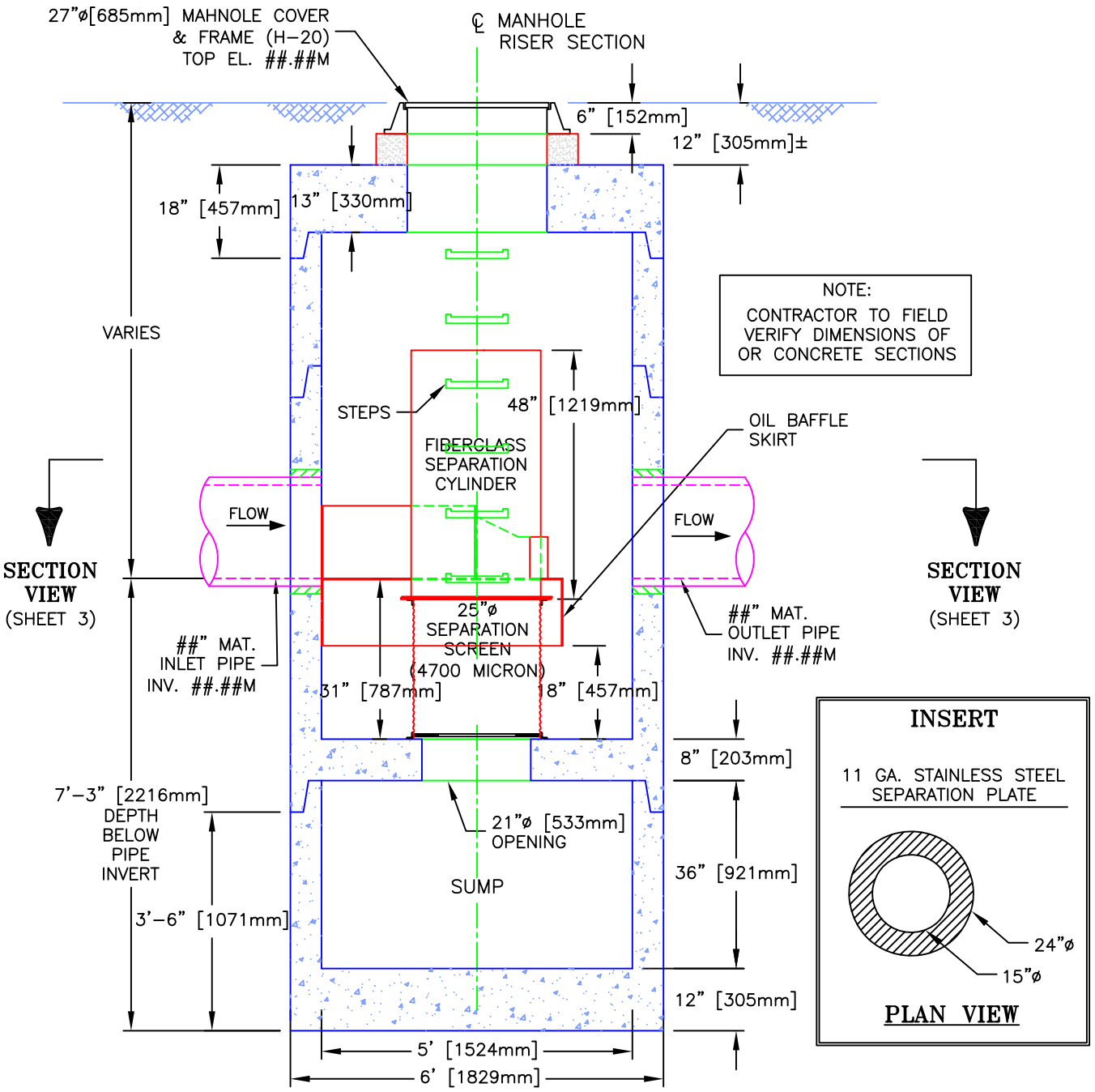


MODEL CDS20_20m, 31 L/s TREATMENT CAPACITY
STORM WATER TREATMENT UNIT

CONTECH STORMWATER SOLUTIONS	PROJECT NAME CITY, STATE	JOB# XX-##-###	SCALE 1" = 2'
		DATE ##/##/##	SHEET
		DRAWN INITIALS	1
		APPROV.	

Echelon Environmental 505 Hood Road, Unit 26, Markham, Ontario L3R 5V6 Tel: (905) 948-0000 Fax: (905) 948-0577

ELEVATION VIEW



MODEL CDS20_20m, 31 L/s TREATMENT CAPACITY STORM WATER TREATMENT UNIT

CONTECH STORMWATER SOLUTIONS	PROJECT NAME CITY, STATE	JOB# XX-##-###	SCALE 1" = 2.5'
		DATE ##/##/##	SHEET 2
		DRAWN INITIALS	
		APPROV.	

Echelon Environmental 505 Hood Road, Unit 26, Markham, Ontario L3R 5V6 Tel: (905) 948-0000 Fax: (905) 948-0577

CONTECH®
ENGINEERED SOLUTIONS

CDS® Inspection and Maintenance Guide

CDS TECHNOLOGIES

Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example, unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (e.g. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen. For deep units, a single manhole access point would allows both sump cleanout and access outside the screen.

The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine weather the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump.

Cleaning

Cleaning of a CDS systems should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be power washed to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the CDS system should be done in accordance with local regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins or deep sump manholes.

CDS Model	Diameter		Distance from Water Surface to Top of Sediment Pile		Sediment Storage Capacity	
	ft	m	ft	m	yd3	m3
CDS2015-4	4	1.2	3.0	0.9	0.9	0.7
CDS2015	5	1.5	3.0	0.9	1.3	1.0
CDS2020	5	1.5	3.5	1.1	1.3	1.0
CDS2025	5	1.5	4.0	1.2	1.3	1.0
CDS3020	6	1.8	4.0	1.2	2.1	1.6
CDS3030	6	1.8	4.6	1.4	2.1	1.6
CDS3035	6	1.8	5.0	1.5	2.1	1.6
CDS4030	8	2.4	4.6	1.4	5.6	4.3
CDS4040	8	2.4	5.7	1.7	5.6	4.3
CDS4045	8	2.4	6.2	1.9	5.6	4.3
CDS5640	10	3.0	6.3	1.9	8.7	6.7
CDS5653	10	3.0	7.7	2.3	8.7	6.7
CDS5668	10	3.0	9.3	2.8	8.7	6.7
CDS5678	10	3.0	10.3	3.1	8.7	6.7

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities

Support

- Drawings and specifications are available at www.contechstormwater.com.
- Site-specific design support is available from our engineers.

Contech Engineered Solutions LLC provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, stormwater, earth stabilization and wastewater treament products. For information, visit www.ContechES.com or call 800.338.1122

CONTECH ENGINEERED SOLUTIONS
800.925.5240
www.ContechES.com

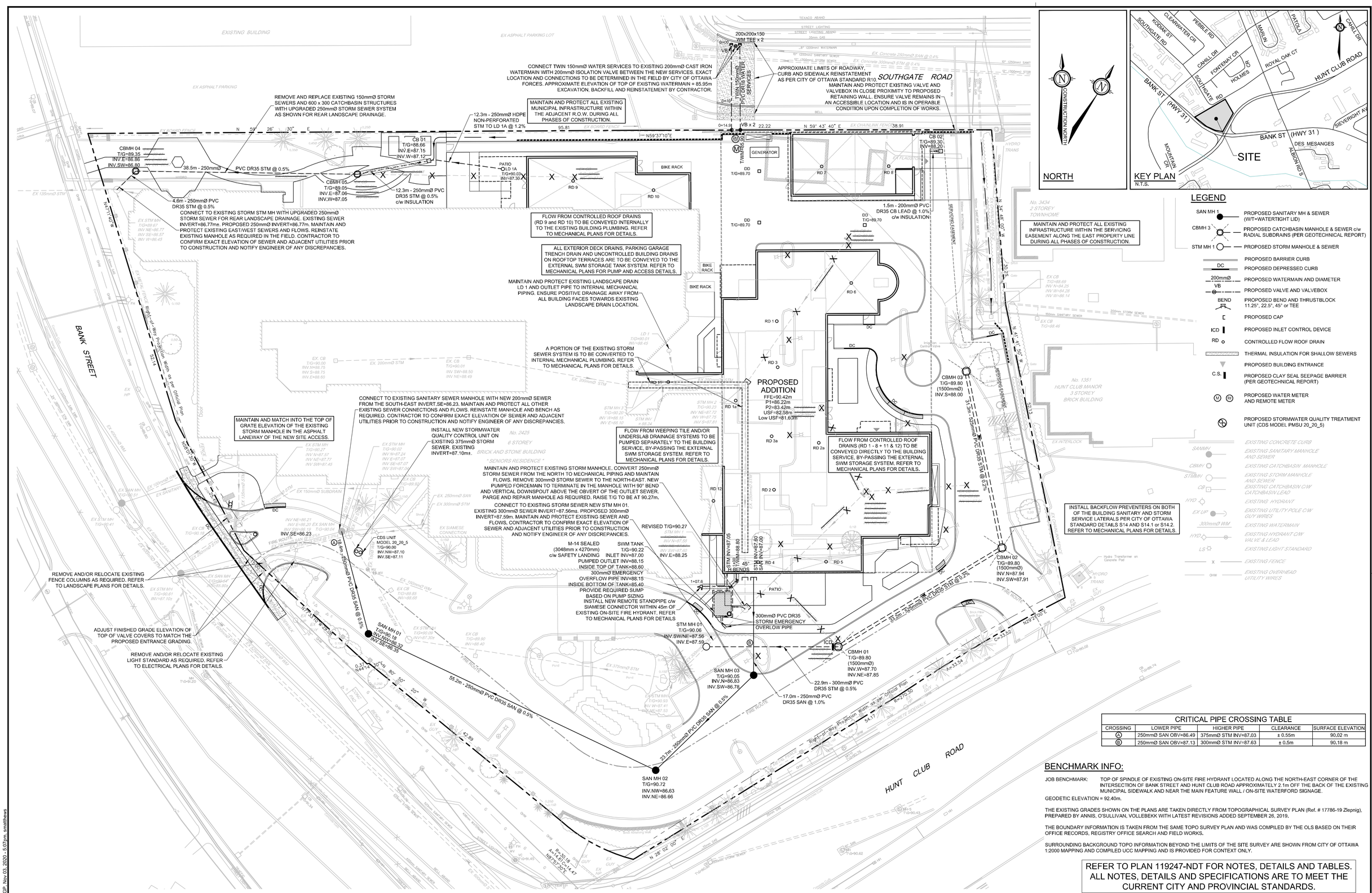
CDS Inspection & Maintenance Log

CDS Model: _____ Location: _____

Date	Water depth to sediment[1]	Floatable Layer Thickness[2]	Describe Maintenance Performed	Maintenance Personnel	Comments

1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than the values listed in table 1 the system should be cleaned out. **Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.**

2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.



LEGEND

- SAN MH 1 — PROPOSED SANITARY MH & SEWER (W/T=WATERTIGHT LID)
- CBMH 3 — PROPOSED CATCHBASIN MANHOLE & SEWER c/w RADIAL SUBDRAINS (PER GEOTECHNICAL REPORT)
- STM MH 1 — PROPOSED STORM MANHOLE & SEWER
- PROPOSED BARRIER CURB
- DC — PROPOSED DEPRESSED CURB
- 200mmØ — PROPOSED WATERMAIN AND DIAMETER
- VB — PROPOSED VALVE AND VALVEBOX
- BEND — PROPOSED BEND AND THRUSTBLOCK 11.25°, 22.5°, 45° or TEE
- PROPOSED CAP
- ICD — PROPOSED INLET CONTROL DEVICE
- RD — CONTROLLED FLOW ROOF DRAIN
- THERMAL INSULATION FOR SHALLOW SEWERS
- PROPOSED BUILDING ENTRANCE
- C.S. — PROPOSED CLAY SEAL SEEPAGE BARRIER (PER GEOTECHNICAL REPORT)
- M / R — PROPOSED WATER METER AND REMOTE METER
- PROPOSED STORMWATER QUALITY TREATMENT UNIT (CDS MODEL PMSU 20_20_5)
- EXISTING CONCRETE CURB
- EXISTING SANITARY MANHOLE AND SEWER
- EXISTING CATCHBASIN MANHOLE
- EXISTING STORM MANHOLE AND SEWER
- EXISTING CATCHBASIN C/W CATCHBASIN LEAD
- EXISTING HYDRANT
- EXISTING UTILITY POLE C/W GUY WIRES
- EXISTING WATERMAIN
- EXISTING HYDRANT C/W VALVE & LEAD
- EXISTING LIGHT STANDARD
- EXISTING FENCE
- EXISTING OVERHEAD UTILITY WIRES

CRITICAL PIPE CROSSING TABLE

CROSSING	LOWER PIPE	HIGHER PIPE	CLEARANCE	SURFACE ELEVATION
Ⓐ	250mmØ SAN OBV=86.49	375mmØ STM INV=87.03	± 0.55m	90.02 m
Ⓑ	250mmØ SAN OBV=87.13	300mmØ STM INV=87.63	± 0.5m	90.18 m

BENCHMARK INFO:

JOB BENCHMARK: TOP OF SPINDLE OF EXISTING ON-SITE FIRE HYDRANT LOCATED ALONG THE NORTH-EAST CORNER OF THE INTERSECTION OF BANK STREET AND HUNT CLUB ROAD APPROXIMATELY 2.1m OFF THE BACK OF THE EXISTING MUNICIPAL SIDEWALK AND NEAR THE MAIN FEATURE WALL / ON-SITE WATERFORD SIGNAGE.

GEODETIC ELEVATION = 92.40m.

THE EXISTING GRADES SHOWN ON THE PLANS ARE TAKEN DIRECTLY FROM TOPOGRAPHICAL SURVEY PLAN (Ref. # 17786-19 Zlepnig), PREPARED BY ANNIS, O'SULLIVAN, VOLLEBEKK WITH LATEST REVISIONS ADDED SEPTEMBER 26, 2019.

THE BOUNDARY INFORMATION IS TAKEN FROM THE SAME TOPO SURVEY PLAN AND WAS COMPILED BY THE OLS BASED ON THEIR OFFICE RECORDS, REGISTRY OFFICE SEARCH AND FIELD WORKS.

SURROUNDING BACKGROUND TOPO INFORMATION BEYOND THE LIMITS OF THE SITE SURVEY ARE SHOWN FROM CITY OF OTTAWA 1:2000 MAPPING AND COMPILED UCC MAPPING AND IS PROVIDED FOR CONTEXT ONLY.

REFER TO PLAN 119247-NDT FOR NOTES, DETAILS AND TABLES. ALL NOTES, DETAILS AND SPECIFICATIONS ARE TO MEET THE CURRENT CITY AND PROVINCIAL STANDARDS.

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
ZLEPNIG HOLDINGS LIMITED
P.O. Box 536
METCALFE, ONTARIO, K0A 2P0
Fred Zlepnig, President
PHONE: (613) 294-2016
fed@fkz.ca

No.	REVISION	DATE	BY
5	RE-SUBMITTED FOR SITE PLAN APPROVAL	OCT 30/20	MS
4	ISSUED FOR BUILDING PERMIT	OCT 6/20	MS
3	REVISED PER CITY COMMENTS	JULY 31/20	MS
2	ISSUED FOR COORDINATION	JULY 28/20	MS
1	ISSUED FOR SITE PLAN APPROVAL	APRIL 30/20	MS

SCALE 1:300 — 1:300 (0 3 6 9 12)

DESIGN MS / SM
CHECKED MS
DRAWN SM / LSC
CHECKED MS
APPROVED MS

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER — M. SAVIC 100102651 — Oct. 30, 2020 — PROVINCE OF ONTARIO

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
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Website www.novatech-eng.com

LOCATION
CITY OTTAWA
2425 BANK STREET

DRAWING NAME
WATERFORD OTTAWA SENIORS APARTMENTS

GENERAL PLAN OF SERVICES

PROJECT No. 119247
REV REV # 5
DRAWING No. 119247-GP

D07-12-20-0050

18152

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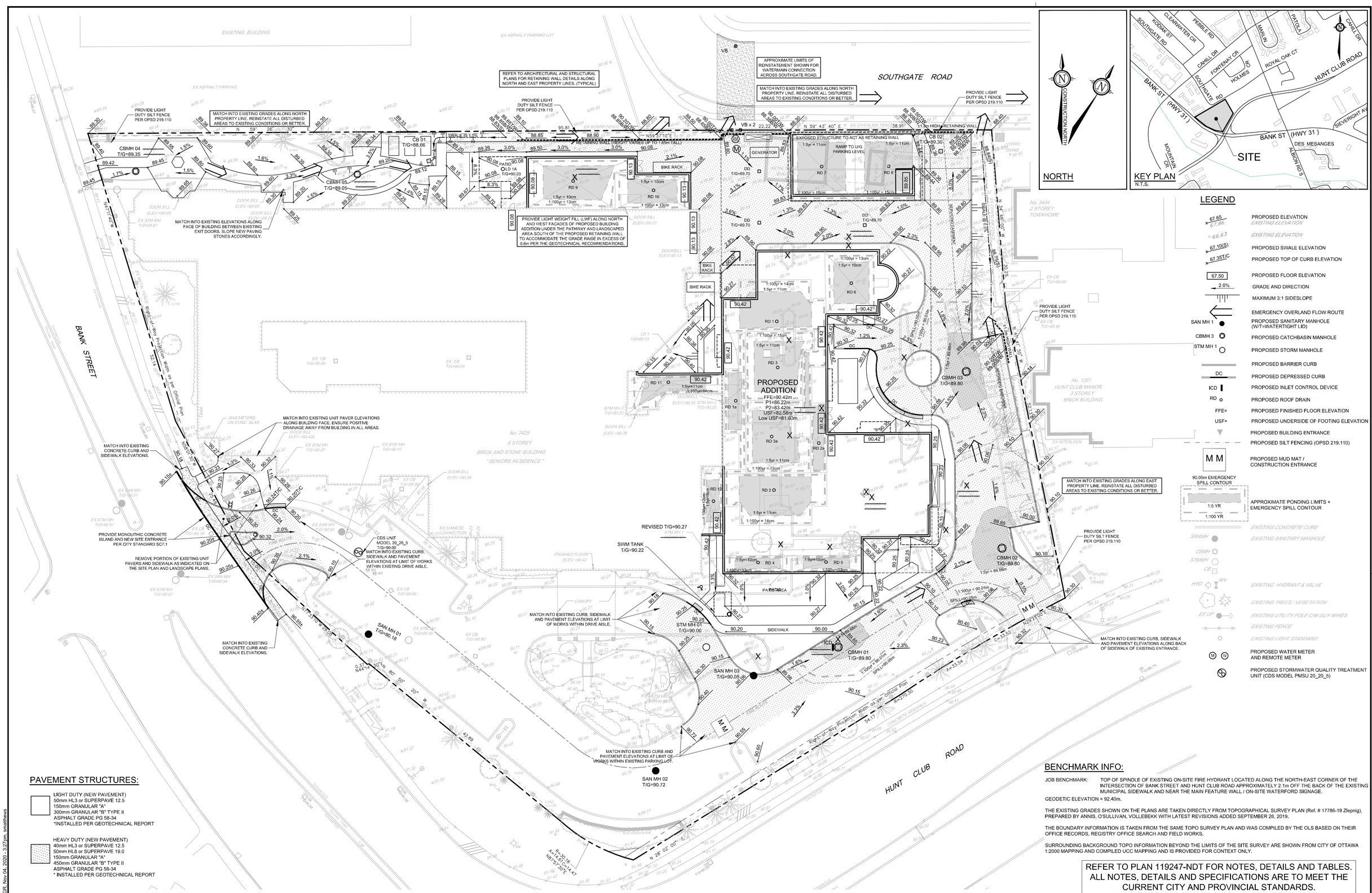

LEGEND

- PROPOSED ELEVATION / *EXISTING ELEVATION*
- PROPOSED SWALE ELEVATION
- PROPOSED TOP OF CURB ELEVATION
- PROPOSED FLOOR ELEVATION
- GRADE AND DIRECTION
- MAXIMUM 3:1 SIDESLOPE
- EMERGENCY OVERLAND FLOW ROUTE
- SAN MH 1 — PROPOSED SANITARY MANHOLE (W/T=WATERTIGHT LID)
- CBMH 3 — PROPOSED CATCHBASIN MANHOLE
- STM MH 1 — PROPOSED STORM MANHOLE
- PROPOSED BARRIER CURB
- DC — PROPOSED DEPRESSED CURB
- ICD — PROPOSED INLET CONTROL DEVICE
- RD — PROPOSED ROOF DRAIN
- FFE= PROPOSED FINISHED FLOOR ELEVATION
- USF= PROPOSED UNDERSIDE OF FOOTING ELEVATION
- PROPOSED BUILDING ENTRANCE
- PROPOSED SILT FENCING (OPSD 219.110)
- M M — PROPOSED MUD MAT / CONSTRUCTION ENTRANCE
- 90.05m EMERGENCY SPILL CONTOUR
- APPROXIMATE PONDING LIMITS + EMERGENCY SPILL CONTOUR (1:5 YR / 1:100 YR)
- *EXISTING CONCRETE CURB*
- *EXISTING SANITARY MANHOLE*
- *EXISTING HYDRANT & VALVE*
- *EXISTING TREES / VEGETATION*
- *EXISTING UTILITY POLE C/W GUY WIRES*
- *EXISTING FENCE*
- *EXISTING LIGHT STANDARD*
- PROPOSED WATER METER AND REMOTE METER
- PROPOSED STORMWATER QUALITY TREATMENT UNIT (CDS MODEL PMSU 20_20_5)

PAVEMENT STRUCTURES:

LIGHT DUTY (NEW PAVEMENT)
50mm HL3 or SUPERPAVE 12.5
150mm GRANULAR "A"
300mm GRANULAR "B" TYPE II
ASPHALT GRADE PG 58-34
*INSTALLED PER GEOTECHNICAL REPORT

HEAVY DUTY (NEW PAVEMENT)
40mm HL3 or SUPERPAVE 12.5
50mm HL8 or SUPERPAVE 19.0
150mm GRANULAR "A"
450mm GRANULAR "B" TYPE II
ASPHALT GRADE PG 58-34
* INSTALLED PER GEOTECHNICAL REPORT

BENCHMARK INFO:

JOB BENCHMARK: TOP OF SPINDLE OF EXISTING ON-SITE FIRE HYDRANT LOCATED ALONG THE NORTH-EAST CORNER OF THE INTERSECTION OF BANK STREET AND HUNT CLUB ROAD APPROXIMATELY 2.1m OFF THE BACK OF THE EXISTING MUNICIPAL SIDEWALK AND NEAR THE MAIN FEATURE WALL / ON-SITE WATERFORD SIGNAGE.

GEODETIC ELEVATION = 92.40m.

THE EXISTING GRADES SHOWN ON THE PLANS ARE TAKEN DIRECTLY FROM TOPOGRAPHICAL SURVEY PLAN (Ref. # 17786-19 Zlepnig), PREPARED BY ANNIS, O'SULLIVAN, VOLLEBEKK WITH LATEST REVISIONS ADDED SEPTEMBER 26, 2019.

THE BOUNDARY INFORMATION IS TAKEN FROM THE SAME TOPO SURVEY PLAN AND WAS COMPILED BY THE OLS BASED ON THEIR OFFICE RECORDS, REGISTRY OFFICE SEARCH AND FIELD WORKS.

SURROUNDING BACKGROUND TOPO INFORMATION BEYOND THE LIMITS OF THE SITE SURVEY ARE SHOWN FROM CITY OF OTTAWA 1:2000 MAPPING AND COMPILED UCC MAPPING AND IS PROVIDED FOR CONTEXT ONLY.

REFER TO PLAN 119247-NDT FOR NOTES, DETAILS AND TABLES. ALL NOTES, DETAILS AND SPECIFICATIONS ARE TO MEET THE CURRENT CITY AND PROVINCIAL STANDARDS.

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.

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LOCATION
CITY OTTAWA
2425 BANK STREET

DRAWING NAME
WATERFORD OTTAWA
SENIORS APARTMENTS

GRADING AND ESC PLAN

PROJECT No. 119247
REV # 5
DRAWING No. 119247-GR

D07-12-20-0050

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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. COMPLETE ALL WORKS IN ACCORDANCE WITH THE MOST CURRENT CITY OF OTTAWA STANDARDS AND SPECIFICATIONS USING THE CURRENT GUIDELINES, BYLAWS AND STANDARDS INCLUDING MATERIALS OF CONSTRUCTION, DISINFECTION AND ALL RELEVANT REFERENCES TO OPSS, OPSD & AWWA GUIDELINES - ALL CURRENT VERSIONS AND 'AS AMENDED'.
6. 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.
7. 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.
8. ALL ELEVATIONS ARE GEODETIC.
9. REFER TO THE GEOTECHNICAL INVESTIGATION REPORT (NO. PG5163-1, DATED JANUARY 15, 2020) PREPARED BY PATERSON GROUP INC., 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.
10. REFER TO ARCHITECT'S AND LANDSCAPE ARCHITECT'S DRAWINGS FOR BUILDING AND HARD SURFACED AREAS AND DIMENSIONS.
11. REFER TO THE 'DEVELOPMENT SERVICING STUDY AND STORMWATER MANAGEMENT REPORT' (R-2020-060) PREPARED BY NOVATECH ENGINEERING CONSULTANTS LTD.
12. SAW CUT AND KEY GRIND ASPHALT AT ALL ROAD CUTS AND ASPHALT TIE IN POINTS AS PER CITY OF OTTAWA STANDARDS (R10).
13. PROVIDE LINE/PARKING PAINTING.
14. CONTRACTOR TO PROVIDE THE CONSULTANT WITH A SERVICING PLAN OF 119247-GP INDICATING ALL SERVICING AS-BUILT INFORMATION SHOWN ON THE SERVICING PLAN. AS-BUILT INFORMATION MUST INCLUDE: PIPE MATERIAL, SIZES, LENGTHS, SLOPES, INVERT AND T/G ELEVATIONS, STRUCTURE LOCATIONS, VALVE AND HYDRANT LOCATIONS, T/WM ELEVATIONS AND ANY ALIGNMENT CHANGES, ETC.

SEWER NOTES:

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

ITEM	SPEC. No.	REFERENCE
CATCHBASIN (600x600mm)	705.010	OPSD
STORM / SANITARY MANHOLE (1200mmØ)	701.010	OPSD
STORM MANHOLE (1500mmØ)	701.020	OPSD
CB, FRAME & COVER	400.020	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 / CB LEAD	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. TYPICAL 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. PROVIDE A COPY OF ALL CCTV INSPECTION REPORTS TO THE ENGINEER FOR REVIEW.

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 98% 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 PLAN 119247-GR.

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 Final Acceptance: Removal Responsibility	After Final Acceptance: Inspection/Maintenance Responsibility
Temporary Measures	Silt Fence (Heavy Duty)	—— ——	OPSD 219.130	Developer's Contractor	Developer's Contractor	Weekly (as a minimum)	Consultant	Developer's Contractor	N/A
	Filter Bags	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	M M	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

PAVEMENT STRUCTURES:

LIGHT DUTY (NEW PAVEMENT)
50mm SUPERPAVE 12.5
150mm GRANULAR "A"
300mm GRANULAR "B" TYPE II
ASPHALT GRADE PG 58-34 - TRAFFIC LEVEL 'B'
*INSTALLED PER GEOTECHNICAL REPORT

HEAVY DUTY (NEW PAVEMENT)
40mm SUPERPAVE 12.5
50mm SUPERPAVE 19.0
150mm GRANULAR "A"
450mm GRANULAR "B" TYPE II
ASPHALT GRADE PG 58-34 - TRAFFIC LEVEL 'B'
* INSTALLED PER GEOTECHNICAL REPORT

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

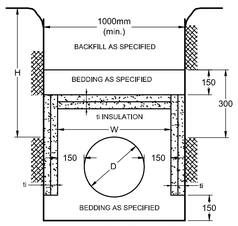
COVER (mm)	INSULATION THICKNESS (mm)
1500-1200	75
1200-900	100
900-600	125

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 BELOW)

EXTERNAL SWM STORAGE SYSTEM

DESIGN EVENT	STORAGE SYSTEM CONTROLLED FLOW	STORAGE VOLUMES REQUIRED	STORAGE VOLUMES PROVIDED
1:2 YR	37.8 L/s	0,0 m³	> 30.0 m³
1:5 YR	37.8 L/s	4.1 m³	
1:100 YR	37.8 L/s	20.8 m³	
1:100+20%	37.8 L/s	29.5 m³	

NOTES:
1. ALL DRAINAGE FROM AREA R-1 (PROPOSED AMENITY AREA DECK DRAINS, ALL UNCONTROLLED ROOF DRAINS AND PATIO DRAINS) 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.



INSULATION DETAIL FOR SHALLOW SEWERS
NOT TO SCALE

CRITICAL PIPE CROSSING TABLE

CROSSING	LOWER PIPE	HIGHER PIPE	CLEARANCE	SURFACE ELEVATION
A	250mmØ SAN OBV=86.49	375mmØ STM INV=87.03	± 0.55m	90.02 m
B	250mmØ SAN OBV=87.13	300mmØ STM INV=87.63	± 0.5m	90.18 m

* SEE 119247-GP PLAN FOR CROSSING LOCATIONS.

INLET CONTROL DEVICE DATA TABLE - CBMH 01

DESIGN EVENT	ICD TYPE (PLUG TYPE)	DIAMETER OF OUTLET PIPE (mm)	PEAK DESIGN FLOW (L/s)	½ PEAK DESIGN FLOW (L/s)	DESIGN HEAD (m)	WATER ELEVATION (m)	VOLUME (m³)	AVAILABLE STORAGE
1:2 YR	IPEX TEMPEST MHF TYPE 'A'	250mmØ PVC	25.2	12.6	1.94	89.77	19.0	107 m³
1:5 YR			25.4	12.7	2.05	89.88	30.8	
1:100 YR			26.2	13.1	2.18	90.01	78.9	

RESIDENTIAL TOWER ROOF DRAIN TABLE: AREA R-2 (ROOF DRAINS 1 to 8 + 11 & 12)

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-2	RD 1 (RD-100-A-ADJ)	CLOSED	0.32 L/s	11 cm	0.32 L/s	14 cm
R-2	RD 1a (RD-100-A-ADJ)	CLOSED	0.32 L/s	9 cm	0.32 L/s	13 cm
R-2	RD 2 (RD-100-A-ADJ)	CLOSED	0.32 L/s	11 cm	0.32 L/s	14 cm
R-2	RD 2a (RD-100-A-ADJ)	CLOSED	0.32 L/s	10 cm	0.32 L/s	13 cm
R-2	RD 3 (RD-100-A-ADJ)	CLOSED	0.32 L/s	11 cm	0.32 L/s	15 cm
R-2	RD 3a (RD-100-A-ADJ)	CLOSED	0.32 L/s	11 cm	0.32 L/s	15 cm
R-2	RD 4 (RD-100-A-ADJ)	CLOSED	0.32 L/s	10 cm	0.32 L/s	13 cm
R-2	RD 5 (RD-100-A-ADJ)	CLOSED	0.32 L/s	10 cm	0.32 L/s	13 cm
R-2	RD 6 (RD-100-A-ADJ)	1/4 EXPOSED	0.79 L/s	10 cm	0.87 L/s	13 cm
R-2	RD 7 (RD-100-A-ADJ)	CLOSED	0.32 L/s	11 cm	0.32 L/s	15 cm
R-2	RD 8 (RD-100-A-ADJ)	CLOSED	0.32 L/s	11 cm	0.32 L/s	15 cm
R-2	RD 11 (RD-100-A-ADJ)	CLOSED	0.32 L/s	11 cm	0.32 L/s	14 cm
R-2	RD 12 (RD-100-A-ADJ)	CLOSED	0.32 L/s	9 cm	0.32 L/s	12 cm

LOADING EXPANSION ROOF DRAIN TABLE: AREA R-3 (ROOF DRAINS 9 and 10)

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-3	RD 9 (RD-100-A-ADJ)	1/4 EXPOSED	0.79 L/s	10 cm	0.87 L/s	13 cm
R-3	RD 10 (RD-100-A-ADJ)	CLOSED	0.32 L/s	10 cm	0.32 L/s	13 cm

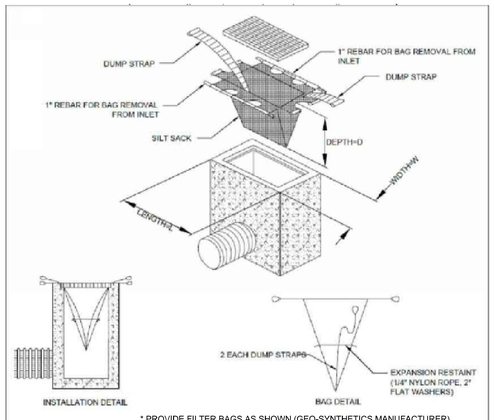
* REFER TO THE 'DEVELOPMENT SERVICING STUDY AND STORMWATER MANAGEMENT REPORT' (R-2020-060) PREPARED BY NOVATECH FOR DRAINAGE AREA IDENTIFIERS AND STORMWATER MANAGEMENT DETAILS.

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

EROSION AND SEDIMENT CONTROL NOTES :

THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES, TO PROVIDE FOR PROTECTION OF THE AREA DRAINAGE SYSTEM AND THE RECEIVING WATERCOURSE, DURING CONSTRUCTION ACTIVITIES. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.

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. EROSION AND SEDIMENT CONTROL MEASURES WILL BE IMPLEMENTED DURING CONSTRUCTION IN ACCORDANCE WITH THE "GUIDELINES ON EROSION AND SEDIMENT CONTROL FOR URBAN CONSTRUCTION SITES" (GOVERNMENT OF ONTARIO, MAY 1987), THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR MEETING ALL REGULATORY AGENCY REQUIREMENTS.
3. TO PREVENT SURFACE EROSION FROM ENTERING ANY STORM SEWER SYSTEM DURING CONSTRUCTION, FILTER BAGS WILL BE PLACED UNDER GRATES OF NEARBY CATCHBASINS AND STRUCTURES PER THE INLET SEDIMENT CONTROL DEVICE DETAIL. 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.
4. TO LIMIT EROSION: MINIMIZE THE AMOUNT OF EXPOSED SOILS AT ANY GIVEN TIME, RE-VEGETATE EXPOSED AREAS AND SLOPES AS SOON AS POSSIBLE AND PROTECT EXPOSED SLOPES WITH NATURAL OR SYNTHETIC MULCHES.
5. FOR MATERIAL STOCKPILING: MINIMIZE THE AMOUNT OF EXPOSED MATERIALS AT ANY GIVEN TIME; APPLY TEMPORARY SEEDING, TARPS, COMPACTION AND/OR SURFACE ROUGHENING AS REQUIRED TO STABILIZE STOCKPILED MATERIALS THAT WILL NOT BE USED WITHIN 14 DAYS.
6. 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.
7. 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.
8. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.
9. ROADWAYS ARE TO BE SWEPT AS REQUIRED OR AS DIRECTED BY THE ENGINEER AND/OR THE MUNICIPALITY.
10. THE CONTRACTOR SHALL ENSURE PROPER DUST CONTROL IS PROVIDED WITH THE APPLICATION OF WATER (AND IF REQUIRED, CALCIUM CHLORIDE) DURING DRY PERIODS. MONITOR DUST LEVELS DURING SITE PREPARATION/EXCAVATION, AND CONSTRUCTION ACTIVITIES, AND WHEN DUST LEVELS BECOME VISUALLY APPARENT SPRAY WATER TO MINIMIZE THE RELEASE OF DUST FROM GRAVEL, PAVED AREAS AND EXPOSED SOILS. USE CHEMICAL DUST SUPPRESSANTS ONLY WHERE NECESSARY ON PROBLEM AREAS.



* PROVIDE FILTER BAGS AS SHOWN (GEO-SYNTHETICS MANUFACTURER) OR APPROVED EQUIVALENT

INLET SEDIMENT CONTROL DEVICE
N.T.S. NOT TO SCALE

PROPOSED TWIN 150mmØ WATER SERVICES TABLE

STATION	SURFACE ELEVATION	T/WM ELEVATION	COMMENTS
0+00	88.25±	85.95± *	CONNECTIONS TO EX. 200mmØ WATERMAIN IN SOUTHGATE ROAD x 2
0+00.4	88.26±	85.95 **	CROSS ABOVE EX. 250Ø SAN x 2 (±2.1m CLEARANCE)
0+02.1	88.35±	85.95	CROSS ABOVE EX. 300mmØ STM x 2 (±1.5m CLEARANCE)
0+10	88.25±	85.95 **	- - -
0+11.9	88.40±	85.95	CROSS BELOW EX. BELL DUCT x 2 (±1.7m CLEARANCE)
0+14.6	88.41±	85.95	PROPERTY LINE / 150mmØ VALVE & VALVE BOX x 2
0+14.9	88.42	85.90	150mmØ CAP FOR BUILDING SERVICE AT FOUNDATION WALL x 2

* CONNECTION TO EXISTING 200mmØ WATERMAIN BY CITY FORCES. EXACT ELEVATION TO BE FIELD DETERMINED.
** PROVIDE THERMAL INSULATION AS PER CITY OF OTTAWA DETAILS W22 IN SHALLOW TRENCHES AND/OR W23 ADJACENT TO OPEN STRUCTURES.

PROPOSED 150mmØ WATERMAIN TABLE for REMOTE SIAMESE

STATION	SURFACE ELEVATION	T/WM ELEVATION	COMMENTS
1+00	90.32	88.00 **	150mmØ CAP FOR BUILDING SERVICE AT FOUNDATION WALL
1+01.2	90.31	88.00 **	45° HORIZONTAL BEND c/w INSULATION IN PROXIMITY TO SWM TANK
1+02.7	90.30	88.00 **	45° HORIZONTAL BEND c/w INSULATION IN PROXIMITY TO SWM TANK
1+03.3	90.30	88.00 **	CROSS ABOVE NEW 300mmØ STM (±0.5m CLEARANCE)
1+07.6	90.30	88.00 **	150mmØ RISER PIPE FOR REMOTE SIAMESE

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

WATERMAIN NOTES:

1. SUPPLY AND CONSTRUCT ALL WATERMAINS AND APPURTENANCES IN ACCORDANCE WITH THE CITY OF OTTAWA STANDARDS AND SPECIFICATIONS - ALL CURRENT VERSIONS AND 'AS AMENDED'. 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
VALVE BOX ASSEMBLY	W24	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.

BENCHMARK INFO:

JOB BENCHMARK: TOP OF SPINDLE OF EXISTING ON-SITE FIRE HYDRANT LOCATED ALONG THE NORTH-EAST CORNER OF THE INTERSECTION OF BANK STREET AND HUNT CLUB ROAD APPROXIMATELY 2.1m OFF THE BACK OF THE EXISTING MUNICIPAL SIDEWALK AND NEAR THE MAIN FEATURE WALL / ON-SITE WATERFORD SIGNAGE.

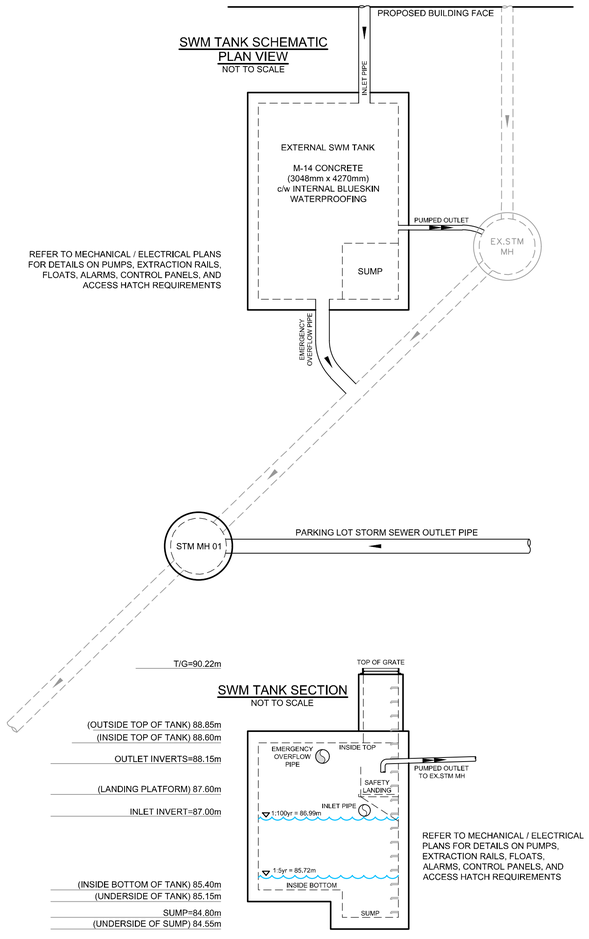
GEODETIC ELEVATION = 92.40m.

REFER TO PLANS 119247-GP AND 119247-GR FOR THE EXACT LOCATION OF THE JOB BENCHMARK.

THE EXISTING GRADES SHOWN ON THE PLANS ARE TAKEN DIRECTLY FROM TOPOGRAPHICAL SURVEY PLAN (Ref. # 17788-19 Zlepnig), PREPARED BY ANNIS, O'SULLIVAN, VOLLEBEKK WITH LATEST REVISIONS ADDED SEPTEMBER 26, 2019.

THE BOUNDARY INFORMATION IS TAKEN FROM THE SAME TOPO SURVEY PLAN AND WAS COMPILED BY THE OLS BASED ON THEIR OFFICE RECORDS, REGISTRY OFFICE SEARCH AND FIELD WORKS.

SURROUNDING BACKGROUND TOPO INFORMATION BEYOND THE LIMITS OF THE SITE SURVEY ARE SHOWN FROM CITY OF OTTAWA 1:2000 MAPPING AND COMPILED UCC MAPPING AND IS PROVIDED FOR CONTEXT ONLY.



THIS PLAN IS TO BE READ IN CONJUNCTION WITH PLANS 119247-GP AND 19247-GR

ALL PROJECT NOTES, DETAILS AND SPECIFICATIONS ARE TO MEET THE CURRENT CITY AND PROVINCIAL STANDARDS.

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
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Fred Zlepnig, President
PHONE: (613) 294-2016
fed@fkz.ca

No.	REVISION	DATE	BY
5	RE-SUBMITTED FOR SITE PLAN APPROVAL	OCT 30/20	MS
4	ISSUED FOR BUILDING PERMIT	OCT 6/20	MS
3	REVISED PER CITY COMMENTS	JULY 31/20	MS
2	ISSUED FOR COORDINATION	JULY 28/20	MS
1	ISSUED FOR SITE PLAN APPROVAL	APRIL 30/20	MS

SCALE: NOT TO SCALE

DESIGN: MS / SM
CHECKED: MS
DRAWN: SM
CHECKED: MS
APPROVED: MS

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER — M. SAVIC — 100102651 — Oct. 30, 2020 — PROVINCE OF ONTARIO

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LOCATION
CITY OF OTTAWA
2425 BANK STREET

DRAWING NAME
WATERFORD OTTAWA
SENIORS APARTMENTS

NOTES, DETAILS AND TABLES

PROJECT No. 119247
REV REV # 5
DRAWING No. 119247-NDT

D07-12-20-0050

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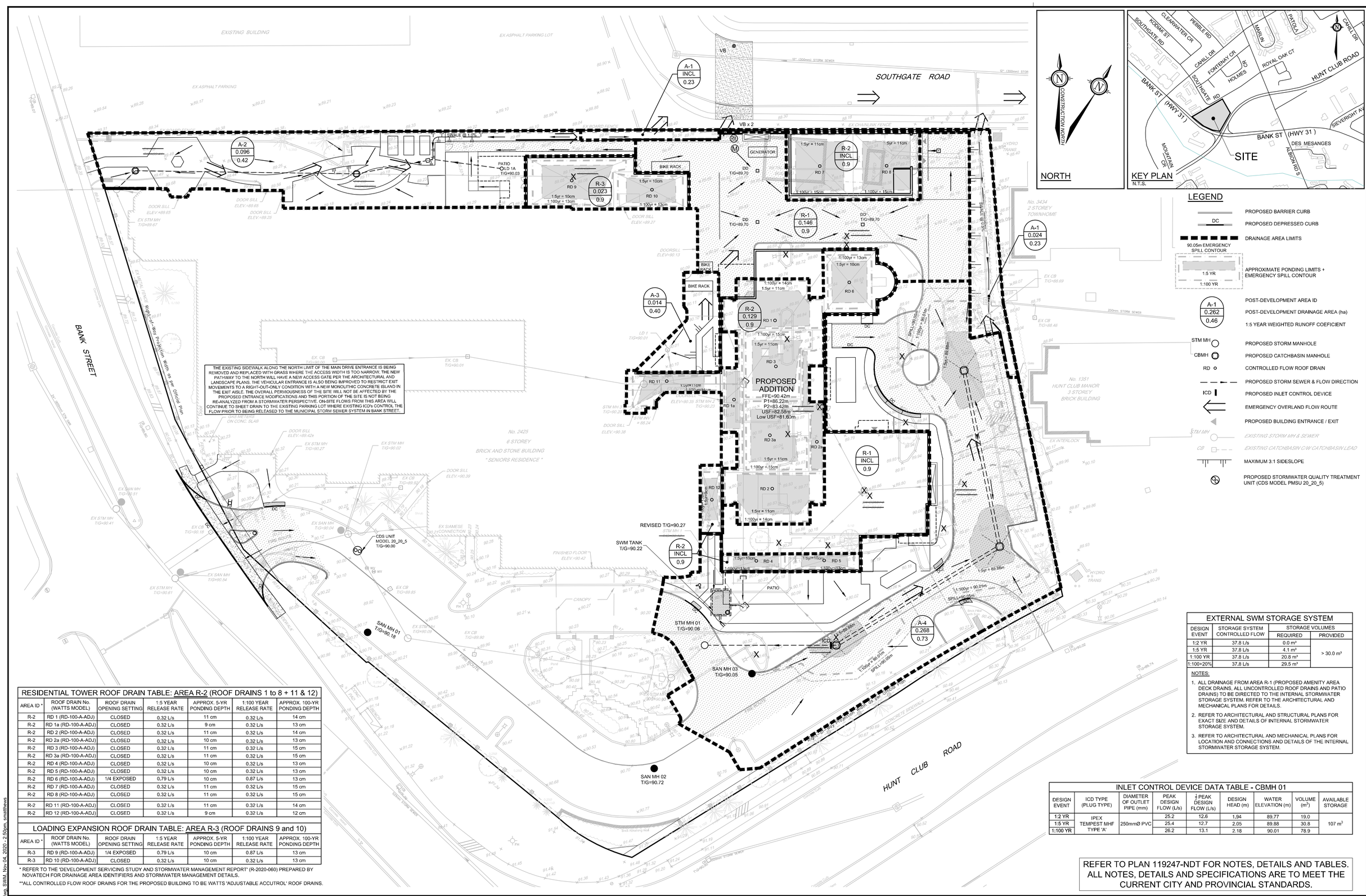

RESIDENTIAL TOWER ROOF DRAIN TABLE: AREA R-2 (ROOF DRAINS 1 to 8 + 11 & 12)

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-2	RD 1 (RD-100-A-ADJ)	CLOSED	0.32 L/s	11 cm	0.32 L/s	14 cm
R-2	RD 1a (RD-100-A-ADJ)	CLOSED	0.32 L/s	9 cm	0.32 L/s	13 cm
R-2	RD 2 (RD-100-A-ADJ)	CLOSED	0.32 L/s	11 cm	0.32 L/s	14 cm
R-2	RD 2a (RD-100-A-ADJ)	CLOSED	0.32 L/s	10 cm	0.32 L/s	13 cm
R-2	RD 3 (RD-100-A-ADJ)	CLOSED	0.32 L/s	11 cm	0.32 L/s	15 cm
R-2	RD 3a (RD-100-A-ADJ)	CLOSED	0.32 L/s	11 cm	0.32 L/s	15 cm
R-2	RD 4 (RD-100-A-ADJ)	CLOSED	0.32 L/s	10 cm	0.32 L/s	13 cm
R-2	RD 5 (RD-100-A-ADJ)	CLOSED	0.32 L/s	10 cm	0.32 L/s	13 cm
R-2	RD 6 (RD-100-A-ADJ)	1/4 EXPOSED	0.79 L/s	10 cm	0.87 L/s	13 cm
R-2	RD 7 (RD-100-A-ADJ)	CLOSED	0.32 L/s	11 cm	0.32 L/s	15 cm
R-2	RD 8 (RD-100-A-ADJ)	CLOSED	0.32 L/s	11 cm	0.32 L/s	15 cm
R-2	RD 11 (RD-100-A-ADJ)	CLOSED	0.32 L/s	11 cm	0.32 L/s	14 cm
R-2	RD 12 (RD-100-A-ADJ)	CLOSED	0.32 L/s	9 cm	0.32 L/s	12 cm

LOADING EXPANSION ROOF DRAIN TABLE: AREA R-3 (ROOF DRAINS 9 and 10)

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-3	RD 9 (RD-100-A-ADJ)	1/4 EXPOSED	0.79 L/s	10 cm	0.87 L/s	13 cm
R-3	RD 10 (RD-100-A-ADJ)	CLOSED	0.32 L/s	10 cm	0.32 L/s	13 cm

* REFER TO THE 'DEVELOPMENT SERVICING STUDY AND STORMWATER MANAGEMENT REPORT' (R-2020-060) 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.

EXTERNAL SWM STORAGE SYSTEM

DESIGN EVENT	STORAGE SYSTEM CONTROLLED FLOW	STORAGE VOLUMES REQUIRED	STORAGE VOLUMES PROVIDED
1:2 YR	37.8 L/s	0.0 m³	> 30.0 m³
1:5 YR	37.8 L/s	4.1 m³	
1:100 YR	37.8 L/s	20.8 m³	
1:100+20%	37.8 L/s	29.5 m³	

NOTES:

1. ALL DRAINAGE FROM AREA R-1 (PROPOSED AMENITY AREA DECK DRAINS, ALL UNCONTROLLED ROOF DRAINS AND PATIO DRAINS) 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.

INLET CONTROL DEVICE DATA TABLE - CBMH 01

DESIGN EVENT	ICD TYPE (PLUG TYPE)	DIAMETER OF OUTLET PIPE (mm)	PEAK DESIGN FLOW (L/s)	½ PEAK DESIGN FLOW (L/s)	DESIGN HEAD (m)	WATER ELEVATION (m)	VOLUME (m^3)	AVAILABLE STORAGE
1:2 YR	IPEX TEMPEST MHF TYPE 'A'	250mmØ PVC	25.2	12.6	1.94	89.77	19.0	107 m^3
1:5 YR			25.4	12.7	2.05	89.88	30.8	
1:100 YR			26.2	13.1	2.18	90.01	78.9	

REFER TO PLAN 119247-NDT FOR NOTES, DETAILS AND TABLES. ALL NOTES, DETAILS AND SPECIFICATIONS ARE TO MEET THE CURRENT CITY AND PROVINCIAL STANDARDS.

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Fred Zlepnig, President
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fed@fkz.ca

No.	REVISION	DATE	BY
3	RE-SUBMITTED FOR SITE PLAN APPROVAL	OCT 30/20	MS
2	REVISED PER CITY COMMENTS	JULY 31/20	MS
1	ISSUED FOR SITE PLAN APPROVAL	APRIL 30/20	MS

SCALE
1:300
1:300
0 3 6 9 12

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

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER
M. SAVIC
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Oct. 30, 2020
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LOCATION
CITY OTTAWA
2425 BANK STREET

DRAWING NAME
WATERFORD OTTAWA
SENIORS APARTMENTS

STORMWATER MANAGEMENT PLAN

PROJECT No. 119247
REV REV # 3
DRAWING No. 119247-SWM

D07-12-20-0050

18152

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