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British High Commission
140 Sussex Drive

Development Servicing Study and Stormwater Management Report

Engineering excellence. Planning precision. Inspired landscapes.

BRITISH HIGH COMMISSION
140 SUSSEX DRIVE

DEVELOPMENT SERVICING STUDY AND STORMWATER MANAGEMENT REPORT

Prepared by:

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

November 8, 2019

Ref: R-2019-143
Novatech File No. 119116

November 8, 2019

Mace
155 Moorgate, London,
EC2M 6XB,
United Kingdom

Attention: Mr. Nicholas Farmer

Dear Sir:

Re: Development Servicing Study and Stormwater Management Report
British High Commission
140 Sussex Drive, Ottawa, ON
Novatech File No.: 119116

Enclosed is a copy of the 'Development Servicing Study and Stormwater Management Report' for the proposed British High Commission located at 140 Sussex Drive, 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

François Thauvette, P. Eng.
Senior Project Manager

cc: Shawn Wessel (City of Ottawa)
Chris Knight (HOK)
Elaine Guenette (Smith + Andersen)

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

Novatech has been retained to complete the site servicing and stormwater management design for the new British High Commission (BHC) Embassy in Ottawa.

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. The objective of this report is to confirm that the proposed servicing and stormwater management design meets the applicable City of Ottawa Guidelines.

1.2 Site Description and Location

The subject site is home to the Earnscliffe National Historic Site of Canada, which currently serves as the official residence of the British High Commissioner to Canada. The expansive grounds also include a former Carriage House, a garage, as well as large gardens. The subject site is located at 140 Sussex Drive, north of the inter-provincial MacDonald-Cartier Bridge, overlooking the scenic Ottawa River. All visitors to the subject site must enter through a security gate. Retaining walls and security fencing run along the perimeter of the property. The National Research Council (NRC) building to the northeast shares an access off Sussex Drive. The legal description of the subject site is designated as Part of Lot 'O', Concession C (Rideau Front), Geographic Township of Nepean, Lots 17, 18, 19 (West Dalhousie Street), Lot 13 (South Earnscliffe Avenue Formerly McKay Street), Registered Plan 3 and Part of the UnNumbered Water Lot in the Ottawa River on the South Side of McKay Street (Now Earnscliffe Avenue) Produced, as shown on Registered Plan 3, 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 April 3, 2019, at which time the client was advised of the general submission requirements. The Rideau Valley Conservation Authority (RVCA) was also consulted regarding the proposed development. 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 3-storey Embassy building, new Guard House, gardener's building and indoor parking garage. The proposed BHC building will replace the old Carriage House and garage buildings, currently located on the southern portion of the property. To minimize the impact on the Historic Earnscliffe Residence and grounds, the proposed work will be limited to the southern portion of the property. The embassy has a security requirement for a secondary means of egress from the site. Given the site constraints, the only feasible location for the secondary access is through the NRC parking lot. The intent is to minimize impacts on the historic Earnscliffe grounds.

The majority of the existing on-site utilities and infrastructure will have to be removed, replaced and realigned to accommodate the proposed development, as much of it is either in poor condition, undersized and/or located below the proposed BHC building footprint.

Given the complexity of the proposed works, we anticipate that service to the Earnscliffe Residence will be temporarily interrupted during construction. Proper coordination and phasing of the work will be critical to minimize the disruptions during construction.

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 (Ref. No. 18109580), prepared by Golder and Associates Ltd., dated January 2019.

2.0 SITE SERVICING

The objective of the site servicing design is to provide proper sewage outlets, a suitable domestic water supply and to ensure that appropriate fire protection is provided for the proposed development. The servicing criteria, the expected sewage flows, and the water demands are to conform to the requirements of the City of Ottawa municipal design guidelines for sewer and water distribution systems. Refer to the subsequent sections of the report and to the enclosed plans C-000 and C-100 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 subject site, including both the Earnscliffe Residence and Carriage House, is currently being serviced by a <u>combined</u> sewer system (i.e. comprising of both sanitary sewage and stormwater runoff). The combined sewage flows are currently being conveyed to the 375mm

dia. sanitary sewer in Sussex Drive. The aging infrastructure on site is comprised of pipes of varying sizes and materials. Based on a recent site investigation, it was confirmed that sanitary sewage from the Earnscliffe Residence is currently being directed into a sanitary wet well (located near the southwest building corner), prior to being pump to the combined sewer system on site.

As part of the proposed development, the combined sewer system will be removed and replaced with new separate sanitary and storm sewer systems. Separating the stormwater runoff from the system will result in decreased flows to the municipal sanitary sewer.

The new 200mm dia. sanitary sewer system will be extended from the existing manhole (**City ID MHSA21997**) located just beyond the main entrance security gate. Based on the recent CCTV investigation, the existing 300mm dia. clay (outlet) pipe has been recently lined and appears to be in good condition. The new private sanitary sewer system will service the Earnscliffe Residence, the new BHC, Guard House and gardener's buildings. The sewage flows from the Earnscliffe sanitary wet well will be intercepted and re-directed to the new on-site sanitary sewer system. The intent is to minimize the disruptions to the Earnscliffe Residence during construction.

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:

Office and Commercial Uses

- Design Population: 50-70 Employees (use 70 in the calculations)
- Average Daily Sewage Flows (Employees/Staff): 75 L/person/day
- Maximum number of cars washed per day: 6
- Average Daily Sewage Flows (Car Hand Wash): 200 L/car/day
- Design Population for Special Events: 100-200 guests (use 200 in the calculations)
- Average Daily Sewage Flow (per guest): 30 L/seat/day (similar to banquet halls)
- Average Daily Sewage Flows (Event Staff): 75 L/person/day
- Commercial Peaking Factor = 1.5

- Average Daily Sewage Flow (per resident): 280 L/person/day
- Average Daily Sewage Flows (Employees/Staff): 75 L/person/day
- Residential Peaking Factor = 3.8

- Infiltration Allowance: 0.33 L/s/ha x 0.49 ha site = 0.16 L/s (subject site area only)

Table 1 identifies the theoretical sanitary flows for the site based on the above design criteria.

Table 1: Theoretical Post-Development Sanitary Flows

Type of Use	Design Population / Unit Count	Average Flow (L/s)	Peaking Factor	Peak Flow (L/s)	Total Flow (L/s)
British High Commission					
BHC Staff	70	0.06	1.5	0.09	0.09
Car Hand Wash	6	0.01	1.5	0.02	0.02
Special Event (Guests)	200	0.07	1.5	0.11	0.11
Special Event (Staff)	20	0.02	1.5	0.03	0.03
Sub-Total	**-**	**0.16**	**1.5**	**0.25**	**0.25**
Earnscliffe Residence					
Residents	2	< 0.01	3.8	0.04	0.04
Staff	5	< 0.01	3.8	0.04	0.04
Sub-Total	**-**	**0.02**	**3.8**	**0.08**	**0.08**
Infiltration Allowance	**-**	**-**	**-**	**-**	**0.16**
Total	**-**	**0.18**	**-**	**0.33**	**0.49**

Due to the shallow outlet and shallow bedrock on site, the proposed sanitary sewer will be installed at minimal grade. A 200mm dia. sanitary gravity sewer at a minimum slope of 0.35% has a full flow conveyance capacity of 20.2 L/s and will have enough capacity to convey the theoretical sanitary flows. Regular inspection and maintenance of the sanitary sewer system, including periodic flushing, is recommended to ensure that the sanitary sewer system is clean and operational.

2.2 Domestic Water

Water for domestic use and for fire-fighting is currently being provided by the 300mm dia. municipal watermain along Sussex Drive. Similar to the on-site combined sewer system, the aging watermain network on site is comprised of pipes of varying sizes and materials.

As part of the proposed development, portions of the existing private watermain, including the private fire hydrants, will be removed, realigned and upsized to accommodate the proposed development. The Earnscliffe Residence, the new BHC, Guard House and gardener's buildings will be serviced by connecting into this new private watermain. A new bulk water meter chamber is also being proposed on the new private watermain to account for all water use on-site. The connection to the existing water service will be made just behind the existing valve, adjacent to the Sussex Drive sidewalk. The new private watermain has been sized to provide the required domestic water demand and fire flows for the proposed development. Isolation valves will be provided on the proposed watermain and services.

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:

- Design Population: 50-70 Employees (use 70 in the calculations)
- Average Daily Water Demand (Employees/Staff): 75 L/person/day
- Maximum number of cars washed per day: 6
- Average Daily Water Demand (Car Hand Wash): 200 L/car/day
- Design Population for Special Events: 100-200 guests (use 200 in the calculations)
- Average Daily Water Demand (per guest): 30 L/seat/day (similar to a banquet halls)
- Average Daily Water Demand (Event Staff): 75 L/person/day
- Commercial Peaking Factors (City Water Table 4.2):
    - Maximum Day Demand Peaking Factor = 1.5 x Avg. Day Demand
    - Peak Hour Demand Peaking Factor = 1.8 x Max. Day

- Average Daily Water Demand (Residential): 350 L/person/day
- Average Daily Water Demand (Employees/Staff): 75 L/person/day
- Residential Peaking Factors (City Water Table 4.2):
    - Maximum Day Demand Peaking Factor = 2.5 x Avg. Day Demand
    - Peak Hour Demand Peaking Factor = 2.2 x Max. Day

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:

- Normal operating pressures are to range between 345 kPa (50 psi) and 483 kPa (70 psi) under Max Day demands
- 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

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

Table 2: **Theoretical Water Demands**

Type of Use	Design Population / Unit Count	Average Day Demand (L/s)	Max. Day Demand (L/s)	Peak Hour Demand (L/s)
British High Commission				
BHC Staff	70	0.06	0.09	0.16
Car Hand Wash	6	0.01	0.02	0.04
Special Event (Guests)	200	0.07	0.11	0.20
Special Event (Staff)	20	0.02	0.03	0.05
Sub-Total	**-**	**0.16**	**0.25**	**0.45**

Earnscliffe Residence				
Residents	2	< 0.01	0.02	0.04
Staff	5	< 0.01	0.02	0.04
Sub-Total	**-**	**0.02**	**0.04**	**0.08**
Total	**-**	**0.18**	**0.29**	**0.53**

2.2.2 Water Supply for Fire-Fighting

The proposed BHC will be fully sprinklered and supplied with a fire department (siamese) connection. The siamese connection will be located on the north side of the BHC building, adjacent to the parking garage entrance, within 45m of the relocated private on-site fire hydrant.

The Fire Underwriters Survey (FUS) was used to estimate fire flow requirements for the proposed BHC and Earnscliffe Residence, based on information provided by the architect. **Table 2.1** summarizes the fire flow requirements for the site.

Table 2.1: Fire Flow Requirements

Building (Type of Use)	Fire Flow Demand USGPM (L/s)
Proposed BHC (Office Building)	2,642 USGPM (167 L/s)
Existing Earnscliffe (Residence)	1,585 USGPM (100 L/s)

Refer to **Appendix C** for a copy of the preliminary FUS fire flow calculations.

A multi-hydrant approach to fire-fighting (as shown in the hydraulic modeling results) will likely be required to supply the fire flow calculated above. This approach is in accordance with the City of Ottawa Technical Bulletin ISTB-2018-02.

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

2.2.2.1 Watermain Network Analysis

The anticipated domestic water demands, and fire flow requirements were provided to the City of Ottawa to generate the municipal watermain network boundary conditions. **Table 2.2** summarizes the City's hydraulic analysis results and watermain boundary conditions.

Table 2.2: Municipal Watermain Boundary Conditions

Municipal Watermain Boundary Condition	Boundary Condition	Domestic Demand (L/s)	Normal Operating Pressure Range (psi)	Municipal WM Pressure (psi)*
Minimum HGL (Peak Hour Demand)	106.3m	0.53	40 psi (min.)	69.3
Maximum HGL (Max Day Demand)	115.0m	0.29	50-70 psi	81.6
HGL (Max Day + Fire Flow)	105.0m	167	20 psi (min.)	67.4

*Based on a roadway elevation of approx. 57.5m at the service connection to the 300mm dia. WM in Sussex Drive

The municipal watermain boundary conditions were then used to analyze the proposed on-site watermain network. The hydraulic model EPANET was used to analyzing the two theoretical conditions:

1) Maximum Day + Fire Flow Demand
2) Peak Hour Demand

A schematic representation of the hydraulic network depicts the node and pipe numbers used in the model. The model indicates that adequate water and system pressures will exist throughout the watermain system under the specified design conditions. **Table 2.3** and **Table 2.4** summarize the hydraulic model results for the on-site network.

Table 2.3: Maximum Day + Fire Flow Demand Condition

Operating Condition	Minimum System Pressure	Maximum System Pressure
Max Day Demands: 0.25 L/s at BHC (J15) 0.01 L/s at Guard House (J8) 0.04 L/s at Earnscliffe Res. (J13) **Fire Flow Demands:** 67 L/s at Hyd. 1 (J3) 100 L/s at Hyd. 2 (J10)	Minimum system pressure of 218.08 kPa (31.6 psi) is available at Hyd. 2 (J10)	Maximum system pressure 335.3 kPa (48.6 psi) is available at the connection to the existing watermain, where the private watermain is increased from a 150mm dia. to a 200mm dia. pipe (J1)

Table 2.4: Peak Hour Demand Condition

Operating Condition	Minimum System Pressure	Maximum System Pressure
Peak Hour Demands: 0.45 L/s at BHC (J15) 0.01 L/s at Guard House (J8) 0.08 L/s at Earnscliffe Res. (J13)	Minimum system pressure of 473.8 kPa (68.7 psi) is available at Hyd. 1 (J3)	Maximum system pressure 513.1 kPa (74.4 psi) is available within the private watermain (J9 & J12)

Refer to **Appendix C** for City of Ottawa boundary conditions, the hydraulic modeling schematic and hydraulic modelling results.

As indicated above, the existing municipal watermain network should have adequate water supply for the proposed site and will provide adequate system pressures for both 'Max Day +

Fire Flow' and 'Peak Hour' conditions, within the normal operating pressure ranges. However, based on a review of the Maximum HGL condition, it is anticipated that pressure reducing valves (PRV) will likely be required given the high system pressures (> 80 PSI).

3.0 Storm Drainage and Stormwater Management

Stormwater runoff from the subject site is currently being directed to two separate outlets. A portion of the site currently drains towards the on-site combined sewer system, while runoff from most of the site flows uncontrolled towards the Ottawa River. There are currently no on-site stormwater management control measures in place.

As part of the proposed development, the combined sewer system will be removed and replaced with new separate sanitary and storm sewer systems. Although this will decrease flows to the municipal sanitary sewer, it will result in increased flows to the municipal storm sewer in Sussex Drive. The new storm sewer system will be extended from the existing manhole (**City ID MHST75143**) located within the NCC bike path, near the Sussex Drive sidewalk. This structure has a 300mm dia. PVC outlet that flows into the 450mm dia. storm sewer in Sussex Drive. The 450mm dia. storm sewer conveys flow approximately 110m along Sussex before discharging into the existing 1950mm dia. trunk sewer (outlet) to the Ottawa River.

Stormwater runoff from the new BHC building roof, the Guard House roof and main access road on site will be captured and directed to the new storm sewer system. All flows from the new private storm sewer system will be directed through a new Oil/Grit Separator to achieve an Enhanced Level of Protect (i.e. 80% TSS removal) as per the RVCA requirements. Stormwater runoff from the remainder of the site will continue to infiltrate into the ground and/or flow uncontrolled towards the Ottawa River. The proposed storm drainage and stormwater management design for the site is discussed in the following sections of the report. Refer to enclosed plans C-100 and C-300 for further details.

3.1.1 Stormwater Management Criteria and Objectives

The stormwater management criteria were established during the pre-consultation process. **The criteria only apply to the portion of the site affected by the proposed BHC development, where storm flows are being directed to the new storm sewer system**. Stormwater management is not required, nor being proposed, in the areas north of the hoarding limit or for areas that currently sheet drain directly to the Ottawa River. The intent is for the Earnscliffe National Historic Site of Canada to remain unchanged as much as possible. The stormwater management criteria and objectives are as follows:

- Remove the existing on-site combined sewer system and replace it with separate sanitary and storm sewers to reduce the total flow being directed to the municipal sanitary sewer in Sussex Drive.
- Provide a dual drainage system (i.e. minor system and emergency overland flow route, for events exceeding the 100-year design storm).
- Control on-site the 100-year post-development flow to a maximum allowable release rate specified by the City of Ottawa, prior to releasing flows to the municipal storm sewer along Sussex Drive.
- Maintain existing drainage patterns, by allowing the remainder of the site to continue to drain as it does under current conditions.

- Maximize surface storage on site, both within the on-site paved drive aisle and on the proposed building roofs.
- Ensure that no surface ponding will occur on the paved surfaces (i.e. private drive aisles or parking lots) during the 2-year storm event.
- Ensure the maximum 100-year ponding depths within the paved areas do not exceed 350mm and that there is no major system flow offsite during the 100-year storm event.
- Provide water quality control equivalent to an 'Enhanced' Level of Protection (i.e., minimum 80% TSS removal) for on-site flows being directed to the municipal storm sewer in Sussex Drive.
- Provide guidelines to ensure that site preparation and construction is in accordance with the current Best Management Practices for Erosion and Sediment Control.

3.1.2 Pre-Development Conditions and Allowable Release Rate

Under pre-development conditions, stormwater runoff from the subject site is being directed to two (2) separate outlets. A small portion of the site currently directs stormwater to the on-site combined sewer system, that discharges into the municipal sanitary sewer in Sussex Drive, while most of the site runoff is being directed towards the Ottawa River.

As specified by the City of Ottawa, the allowable release rate that can be directed to the municipal storm sewer in Sussex Drive has been calculated using the Rational Method, based on a 10-minute rainfall intensity, using a 2-year return period (City of Ottawa IDF Curves) and the existing site weighted runoff coefficient (no greater than C=0.50). The allowable release rate was calculated as follows:

T_c = 10 min C =0.49
I_{5yr} = 76.81 mm/hr A = 0.924 ha

Q_{allow} = 2.78 CIA
= 2.78 (0.49) (76.81) (0.924)
= 96.7 L/s

In addition to the allowable release rate calculated above, a portion of the adjacent NCC lands and main site entrance currently flow onto the subject site. The pre-development flow rates from the off-site areas were calculated as follows:

T_c = 10 min A =0.172 ha
I_{5yr} = 104.2 mm/hr C_{5yr} = 0.40
I_{100yr} = 178.6 mm/hr C_{100yr} = 0.46

Q_{5yr} = 2.78 CIA
= 2.78 (0.40) (104.2) (0.172)
= 19.9 L/s

Q_{100yr} = 2.78 CIA
= 2.78 (0.46) (178.6) (0.172)
= 39.3 L/s

The off-site flows will be added to the overall allowable release rate for the respective 5-year and 100-year design storms.

3.1.3 Post-Development Conditions

The approach for the stormwater management design is to meet the requirements of the City of Ottawa and the Rideau Valley Conservation Authority (RVCA). On-site stormwater management will include both water quantity and water quality control measures (for flow being directed to the 450mm dia. municipal storm sewer along Sussex Drive).

Stormwater runoff from the proposed development will be attenuated by the use of control flow roof drains and the use of an inlet control device (ICD) within the on-site storm sewer system. Stormwater quality control will be provided by installing an oil/grit separator type treatment unit on the new storm sewer system to provide the required Enhanced Level of Protection (i.e. 80% TSS removal). Stormwater runoff from the remainder of the Earnscliffe National Historic Site of Canada will continue to sheet drain towards the Ottawa River. Refer to enclosed plans (C-000, C-100, C-200 and C-300) for further details.

3.1.3.1 Area OS-1: Uncontrolled Off-Site Runoff

The runoff from this off-site sub-catchment area will flow overland towards CBMH 1, located within the main site entrance. The uncontrolled post-development flows from this sub-catchment area were calculated using the Rational Method to be approximately 14.5 L/s during the 5-year design event and 28.7 L/s during the 100-year design event. Refer to **Appendix D** for detailed calculations.

3.1.3.2 Area OS-2: Uncontrolled Off-Site Runoff

The runoff from this off-site sub-catchment area will flow overland towards CB 1 and CB 2, located behind the smaller BHC garage and gardener's building. The uncontrolled post-development flows from this sub-catchment area were calculated using the Rational Method to be approximately 3.5 L/s during the 5-year design event and 7.6 L/s during the 100-year design event. Refer to **Appendix D** for detailed calculations.

3.1.3.3 Area A-1: Uncontrolled Site Runoff

The runoff from the on-site sub-catchment area A-1, as well as the off-site tributary sub-catchment area OS-2, will flow overland towards CB1 and CB2. The total uncontrolled post-development flows from these sub-catchment areas were calculated using the Rational Method to be approximately 7.9 L/s (3.5 L/s + 4.4 L/s) during the 5-year design event and 16.0 L/s (7.6 L/s + 8.4 L/s) during the 100-year design event. Refer to **Appendix D** for detailed calculations.

3.1.3.4 Area A-2: Controlled Site Runoff

The post-development flow from this sub-catchment area will be attenuated using an inlet control device (ICD) installed in the outlet pipe of CBMH 2. The release rate of the ICD has been set based on the limited storage available. Given the elevation of the outlet sewer and the site topography (i.e. the site being lower than Sussex Drive) the proposed on-site storm sewer system will be shallow. Consequently, there will be very little opportunity to up-size pipes and/or provide much underground storage. Stormwater runoff from this sub-catchment area will be temporarily stored on the paved drive aisle prior to being discharged into the on-site storm

sewer system. The site has however 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.

Table 3 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 3: Design Flow and ICD Table

Design Event	Sub-Catchment Area A-2				
	ICD Type	Design Flow (L/s)	Ponding Elevation (m)	Storage Vol. Required (m^3)	Max Storage Available (m^3)
2-Year	Hydrovex Vortex Model 200 VHV-2	20.7 L/s	55.62 m	4.8 m^3	14.8 m^3
5-Year		21.3 L/s	55.69 m	6.1 m^3	
100-Year		35.2 L/s	56.47 m	14.4 m^3	

Refer to **Appendix D** for SWM calculations and to **Appendix E** for ICD information. As indicated in the table above, this sub-catchment area will provide sufficient storage for the 2-year, 5-year and 100-year design events. Furthermore, no stormwater will pond on the private paved surfaces (i.e. drive aisles or parking lots) during the 2-year storm event.

3.1.3.5 Area R-1: Controlled Flow from Guard House Roof

The post-development flow from this sub-catchment area will be attenuated using a Watts adjustable 'Accutrol' control flow roof drain (model number RD-100-A-ADJ) prior to being directed to the proposed on-site storm sewer system.

Table 3.1 summarizes the post-development design flows from this sub-catchment area as well as the type of roof drain, the maximum anticipated ponding depths, storage volumes required, and storage volumes provided for both the 5-year and the 100-year design events.

Table 3.1: Design Flow and Roof Drain Table

Roof Drain ID & Drainage Area (ha)	Number of Roof Drains	Watts Roof Drain Model ID (Weir Opening)	Controlled Flow per Drain (L/s)		Approximate Ponding Depth Above Drains (m)		Storage Volume Required (m^3)		Max. Storage Available (m^3)
			5-Yr	100-Yr	5-Yr	100-Yr	5-Yr	100-Yr	
RD-1 (0.012 ha)	1	RD-100-A-ADJ (1/4 Exposed)	0.79	0.87	0.10	0.14	1.6	4.0	4.8

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

3.1.3.6 Area R-2: Controlled Flow from BHC Roof

The post-development flow from this sub-catchment area will be attenuated by using eleven (11) Watts adjustable 'Accutrol' control flow roof drains (model number RD-100-A-ADJ) prior to being directed to the proposed on-site storm sewer system. A small portion of the building roof

(i.e. the roof top terrace area) will however flow uncontrolled to the building storm service, via six (6) uncontrolled deck drains. **Table 3.2** summarizes the post-development design flows from this sub-catchment area as well as the type of roof drains, the maximum anticipated ponding depths, storage volumes required, and storage volumes provided for both the 5-year and the 100-year design events.

Table 3.2: 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-2 (0.007 ha)	1	RD-100-A-ADJ (1/4 Exposed)	0.79	0.87	0.10	0.14	0.7	1.9	2.3
RD-3 (0.020 ha)	1	RD-100-A-ADJ (1/4 Exposed)	0.79	0.87	0.10	0.14	3.5	8.3	9.7
RD-4 (0.019 ha)	1	RD-100-A-ADJ (1/4 Exposed)	0.79	0.87	0.10	0.14	3.2	7.5	9.4
RD-5 (0.020 ha)	1	RD-100-A-ADJ (1/4 Exposed)	0.79	0.87	0.10	0.14	3.4	7.9	9.7
RD-6 (0.006 ha)	1	RD-100-A-ADJ (Closed)	0.32	0.32	0.10	0.13	0.9	2.2	3.0
RD-7 (0.008 ha)	1	RD-100-A-ADJ (Closed)	0.32	0.32	0.10	0.14	1.5	3.5	4.1
RD-8 (0.005 ha)	1	RD-100-A-ADJ (Closed)	0.32	0.32	0.09	0.13	0.6	1.7	2.6
RD-9 (0.014 ha)	1	RD-100-A-ADJ (Closed)	0.32	0.32	0.11	0.14	2.9	6.7	7.2
RD-10 (0.014 ha)	1	RD-100-A-ADJ (Closed)	0.32	0.32	0.11	0.14	3.0	6.9	7.4
RD-11 (0.010 ha)	1	RD-100-A-ADJ (Closed)	0.32	0.32	0.10	0.14	1.9	4.4	5.0
RD-12 (0.019 ha)	1	RD-100-A-ADJ (1/4 Exposed)	0.79	0.87	0.10	0.14	3.3	7.7	9.3
Uncontrolled Portion of BHC Roof									
Deck Drains (0.016 ha)	6	-	4.2	7.9	-	-	-	-	-
Total Roof (0.158 ha)	**17**	**-**	**10.1**	**14.2**	**-**	**-**	**24.9**	**58.7**	**69.7**

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

3.1.3.7 Stormwater Flow Summary

Table 3.3 provides a summary of the total post-development flows and compares them to the allowable release rate specified by the City + the uncontrolled pre-development flows from the contributing off-site areas.

Table 3.3: Stormwater Flows Comparison Table

Design Event	Pre-Development Conditions	Post-Development Conditions						
	Allowable Release Rate + Off-Site Flows (L/s)	OS-1 Flow (L/s)	OS-2 Flow (L/s)	A-1 Flow (L/s)	A-2 Flow (L/s)	R-1 & R-2 Flow (L/s)	Total Flow (L/s)	Flow Rate Below Allowable (L/s or %)*
5-Yr	116.6 L/s (96.7 + 19.9)	14.5	3.5	4.4	21.3	10.9 (0.8+10.1)	54.6	62.0 or 53%
100-Yr	136.0 L/s (96.7 + 39.3)	28.7	7.6	8.4	35.2	15.1 (0.9+14.2)	95.0	41.0 or 30%

*Reduced flow compared to allowable release rate + uncontrolled off-site flows.

As indicated in the table above, both the 5-year and 100-year post-development flows will be slightly less than the allowable release rate + the uncontrolled pre-development flows from the contributing off-site areas.

3.1.4 Stormwater Quality Control

The subject site is located within the jurisdiction of the Rideau Valley Conservation Authority (RVCA) and is tributary to the Ottawa 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 for flow being directed to the proposed on-site storm sewer system.

To achieve this level of quality control protection, a new oil-grit separator unit (CDS Model PMSU 20_15_4) will be installed downstream of STM MH 1 and CBMH 2, on the storm sewer outlet pipe from the site. Stormwater runoff collected by the on-site storm sewer system (0.40ha tributary area) will be directed through the proposed treatment unit. The contributing area includes the proposed paved parking areas, walkways, landscaped areas as well as the building roofs.

As stated above, the proposed oil-grit separator has been sized to provide an Enhanced Level of water quality treatment prior to discharging the stormwater into the municipal storm sewer in Sussex Drive and ultimately into the Ottawa River. 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_15_4 will exceed the target removal rate, providing a net annual 85.4% TSS removal. The CDS unit has a treatment capacity of approximately 20 L/s, a sediment storage capacity of 838 m^3; an oil storage capacity of 232 L and will treat a net annual volume of approximately 98.8% for the tributary area.

The CB and CBMH structures will be equipped with sumps to promote additional settling of sediment. It is expected that the proposed treatment train approach will be used to provide the requisite level of water quality control.

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 they are free of debris; and the oil-grit separator should be inspected at regular intervals and maintained when necessary to ensure optimum performance. Refer to **Appendix G** for the CDS unit design parameters, sizing analysis, operation, design, performance and maintenance summary parameters as well as the annual TSS removal efficiency data.

4.0 SITE GRADING

The topography of the existing site drops gradually to the west from the NRC entrance off Sussex Drive (approximate elevation of 57.0m) down to the top of the embankment to the Ottawa River (approximate elevation of 56.3m). The existing Earnscliffe Residence and Carriage House are located near the top of the escarpment which then drops sharply down to the water's edge, nearly 15m below, at an elevation of approximately 41.3m. The existing finished floor elevation (FFE) of the existing Earnscliffe Residence is at an elevation of 57.24, while the existing rear parking pad and Earnscliffe driveway elevation is at approximately 54.3m.

The FFE of the proposed British High Commission building will be set at an elevation of 56.75m to match into the existing site and NCC parkland elevations, while the FFE of the proposed Guard House will be set at an elevation of 56.90m to better match into the access road elevations. The grades along the property lines will be maintained, where possible, however a portion of the forested NCC lands will continue to drain towards the site and be captured and treated before being conveyed to the municipal storm sewer in Sussex Drive. Refer to enclosed plan C-200 for details.

5.0 GEOTECHNICAL INVESTIGATIONS

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

6.0 EROSION AND SEDIMENT CONTROL

To mitigate erosion and to prevent sediment from entering the storm sewer system and/or Ottawa River, 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.

- Mud mats will be installed at the site entrances.
- 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:

- A new CDS Model PMSU 20_15_4 treatment unit will provide water quality control prior to releasing stormwater from the site towards the storm sewer in Sussex Drive.

7.0 CONCLUSION

This report has been prepared in support of a Site Plan Control application for the proposed British High Commission development located at 140 Sussex Drive.

The conclusions are as follows:

- On-site stormwater management, including both stormwater quantity and water quality control measures, will be provided in accordance with the requirements of the City of Ottawa and the RVCA.
- The existing on-site combined sewer system will be removed and replaced with separate on-site sanitary and storm sewer systems. The proposed development will also include the upgrading of the private watermain from Sussex Drive to the site. The proposed buildings will be serviced by the new servicing infrastructure. The existing Earnscliffe Residence services will be maintained and protected on the north portion of the site and be re-connected to the upgraded services on the south portion of the site being developed.
- The new BHC building will be sprinklered. A new bulk water meter chamber is also being proposed on the new private watermain to account for all water use on-site.
- The site flows from sub-catchment areas R-1 and R-2 (building roofs) will be attenuated using control flow roof drains, while flows from the paved drive aisles and driveways will be controlled by an ICD installed within the on-site storm sewer system.
- The total post-development site flow (from Areas R-1, R-1, OS-1, OS-2, A-1 and A-2) will be approximately 54.6 L/s during the 5-year design event and 95.0 L/s during the 100-year event, both of which are less than the respective allowable release rates.
- The new CDS Model PMSU 20_15_4 treatment unit will provide an ‘Enhanced’ Level of water quality control for the portion of the site discharging to the municipal storm sewer in Sussex Drive.

- Regular inspection and maintenance of the storm sewer system, including the ICD and water quality treatment unit is recommended to ensure that the storm drainage system is clean and operational.
- Erosion and sediment controls are to be provided both during construction and on a permanent basis.

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

NOVATECH

Prepared by:

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

Reviewed by:

François Thauvette, P. Eng.
Senior Project Manager

APPENDIX A

Correspondence

Francois Thauvette

From: Renaud, Jean-Charles <Jean-Charles.Renaud@ottawa.ca>
Sent: Monday, April 15, 2019 2:54 PM
To: Christopher Knight
Cc: Andrew Butler; Ashley.Whittal@fco.gov.uk; David.reed@fco.gov.uk; Moise, Christopher; Coutts, Sally; Wessel, Shawn; Hayley, Matthew; Dubyk, Wally; Lunney, John; Richardson, Mark
Subject: 140 Sussex Drive - Preconsultation Follow-up
Attachments: 2019-04-15_PlansStudiesList_140Sussex.pdf

Categories: Filed by Newforma

Good afternoon Christopher,

Further to our meeting on April 3rd, 2019, regarding the construction of a new embassy building for the British High Commission at 140 Sussex Drive, please find below an overview of the topics discussed. The required studies and plans list is also attached.

Planning

- The O1L[342] zoning on the property establishes a 7.5m minimum setback distance from all property line, an 11m height limit, as well as other performance standards. Any relief sought in order to facilitate the development process will need to be addressed through a Committee of Adjustment Application for Minor Variance. Please contact John Lunney, Committee of Adjustment Planner, in order to discuss the proposal prior to making any application.

Heritage

- At the meeting, the applicant indicated that the NCC has confirmed that they do not have jurisdiction.
- The existing structure on the property was converted from a stable to an office in 1930 when the High Commission moved in.
- The City will not require a heritage application.
- The new building will need to address the Earnscliffe building with respect and agacency.
- Consider exploring a taller building with a smaller footprint and less sprawl.

Urban Design

- Although an application to the Urban Design Review Panel is not required, it may be a useful tool in helping the proposal evolve.

Engineering

- Infrastructure
    - A 305 mm dia. PVC Watermain (c. 2014) is available on Sussex Ave.
    - A 102 mm dia. PVC Private Water Service (c. 2001) is available on this property fed from an intermediate 152 mm dia. CI private water service connected to the watermain.
    - A 375 mm dia. PVC Sanitary Sewer (c. unknown) on Sussex Ave., which drains to Somewhere Ave. Trunk/Collector and Interceptor Sewer.
    - A 300 mm dia. Clay Private Sanitary Service (c. 1907) is available on this property that connects to MHSA21998 within the ROW.

    - A 300 mm dia. Conc. Storm Sewer (c. 1967) on Sussex Ave., which drains to the Ottawa River at 100 Sussex adjacent King Edward Ave.
    - A 250 mm dia. Private Storm Service (unknown material type and vintage) is upstream and joined to a 300 mm dia. Private Storm Service (unknown material type and vintage) that connects to the 300 mm pipe in the ROW.
- **Please note**: Applicant to contact Rideau Valley Conservation Authority (RVCA) for possible restrictions due to quality control. Provide correspondence in Report.
- The following apply to this site and any development within a separated sewer area:
    - Total (~~San &~~ Stm) allowable release rate will be 2 year pre-development rate (due to vintage of infrastructure being installed pre c. 1970)
    - Coefficient (C) of runoff will need to be determined as per existing conditions but in no case more than 0.5
    - TC = 20 minutes or can be calculated
    - TC should be not be less than 10 minutes, since IDF curves become unrealistic at less than 10 min.
    - Any storm events greater than 5 year, up to 100 year, and including 100 year storm event must be detained on site.
    - Two separate sewer laterals (one for sanitary and other for storm) will be required.
- **Please note**: Foundation drains are to be independently connected to sewermain (separated or combined) unless being pumped with appropriate back up power, sufficient sized pump and back flow prevention.
- **Please note**: Roof drains are to be connected downstream of any incorporated ICD within the SWM system.
- An Environmental Noise Study is required due to proximity of Sussex & King Edward Avenues and the McDonald Cartier Bridge.
- Stationary Noise Study – consultant to speak to this in their report as per City NCG and NPC 300 Guidelines.
- Water Supply Redundancy – Fire Flow: Applicant to ensure that a second service with an inline valve chamber be provided where the average daily demand exceeds 50 m^3 / day (0.5787 l/s per day)
- Where underground storage (UG) and surface ponding are being considered:
    - Show all ponding for 5 and 100 year events
    - Note - There must be at least 15cm of vertical clearance between the spill elevation and the ground elevation at the building envelope that is in proximity of the flow route or ponding area. The exception in this case would be at reverse sloped loading dock locations. At these locations, a minimum of 15cm of vertical clearance must be provided below loading dock openings. Ensure to provide discussion in report and ensure grading plan matches if applicable.
    - Provide information on type of underground storage system including product name and model, number of chambers, chamber configuration, confirm invert of chamber system, top of chamber system, required cover over system and details, interior bottom slope (for self-cleansing), chart of storage values, length, width and height, capacity, entry ports (maintenance) etc.
    - Provide a cross section of underground chamber system showing invert and obvert/top, major and minor HWLs, top of ground, system volume provided during major and minor events. UG storage to provide actual 2 and 100 year event storage requirements.
    - In regards to all proposed UG storage, ground water levels (and in particular HGW levels) will need to be reviewed to ensure that the proposed system does not become surcharged and thereby ineffective.

- Modeling can be provided to ensure capacity for both storm and sanitary sewers for the proposed development by City's Water Distribution Dept. – Modeling Group, upon request.
- Waste: The Owner acknowledges the need to prepare a waste reduction workplan summary for the construction project as required by O.Reg. 102/94, being "Waste Audits and Waste Reduction Work Plans" made under the Environmental Protection Act, RSO 1990, c E.19, as amended and provide a copy of the said waste reduction workplan summary to the File Lead (PIED).
- A Source Protection policy screening was undertaken, and is shared with you for your information:
    - The address lies within the Mississippi-Rideau Source Protection Region and is subject to the policies of the Mississippi-Rideau Source Protection Plan.
    - The area is not located within a Surface Water Intake Protection Zone (IPZ) where significant threat policies apply.
    - The area is not located within a Wellhead Protection Area (WHPA).
    - The area is not within a Significant Groundwater Recharge Area.
    - The property is partially located within a Highly Vulnerable Aquifer. There are no legally-binding source protection policies under the Mississippi-Rideau Source Protection Plan for activities within Highly Vulnerable Aquifers.

Transportation

- Please fill out and submit the TIA Screening Form, which can be found in Appendix B of the TIA Guidelines.
- Please provide information regarding vehicles per hour. More studies may be required.

Environmental

- The property is adjacent to two natural environment features that could trigger an Environmental Impact Assessment, the Ottawa River and the escarpment to the adjacent south of the property is part of the natural heritage system. The Ottawa River contains habitat for endangered and threatened species and requires a minimum 30 m setback (plus any hazard associated with the watercourse or slope) or 15 m from top of slope.
- The project will likely trigger an EIS if it is coming closer to these two features than the current disturbed area (which for the purpose of this discussion will be defined as the impervious area on the site currently developed with laneways, parking and/or structures). In addition, any development or site alteration to support the development in or within the 30 m setback to the Ottawa River or the Natural Heritage System will require an EIS. This includes any services required to support the new building.
- The requirement for an EIS will be confirmed when a final site plan is available.

Planning Forestry

- A Tree Conservation Report (TCR) must be supplied for review along with the suite of other plans/reports required by the City; an approved TCR is a requirement of Site Plan or Plan approval
- Any removal of privately-owned trees 10cm or larger in diameter requires a tree permit issued under the Urban Tree Conservation Bylaw; the permit is based on the approved TCR
- The removal of City-owned trees will require the permission of Forestry Services who will also review the submitted TCR
- In this case, the TCR may be combined with the Landscape Plan
- The TCR must list all trees on site by species, diameter and health condition

- The TCR must address all trees with a critical root zone that extends into the developable area – all trees that could be impacted by the construction that are outside the developable area need to be addressed.
- Trees with a trunk that crosses/touches a property line are considered co-owned by both property owners; permission from the adjoining property owner must be obtained prior to the removal of co-owned trees
- If trees are to be removed, the TCR must clearly show where they are, and document the reason they cannot be retained – please provide a plan showing retained and removed treed areas
- All retained trees must be shown and all retained trees within the area impacted by the development process must be protected as per City guidelines listed on Ottawa.ca.
- the City encourages the retention of healthy trees; if possible, please seek opportunities for retention of trees that will contribute to the design/function of the site.
- Ensure there is an adequate availability of good quality soil for all newly planted trees
- Trees along Somerset will be planted under existing hydro lines – please ensure they are of an appropriate species
- For more information on the process or help with tree retention options, contact Mark Richardson mark.richardson@ottawa.ca.

Applications Required / Next Steps

- A Site Plan Control application, manager approval, with public consultation will be required.
- A Committee of Adjustment application for Minor Variance will be required. Please contact John Lunney in advance of submitting an application in order to discuss the proposal.
- A list of required studies and plans is attached.
- Please note that these pre-consultation comments are valid for one year. If you submit a development application after this time, you may be required to meet for another pre-consultation meeting and/or the submission requirements may change.
- Prior to making a complete submission, I also encourage you to discuss the proposal with the area Councillor, Mathieu Fleury, local community associations as well as immediate neighbours.

Please don't hesitate to communicate with me should you have additional questions.

JC

Jean-Charles Renaud, MCIP/*MICU*, RPP/*UPC*
Planner II | *Urbaniste II*
Development Review, Central | *Examen des projets d'aménagement, Central*
Planning, Infrastructure and Economic Development Department | *Services de la planification, de l'infrastructure et du développement économique*
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 27629
ottawa.ca/planning / ottawa.ca/urbanisme

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APPLICANT'S STUDY AND PLAN IDENTIFICATION LIST

Legend: **S** indicates that the study or plan is required with application submission.
A indicates that the study or plan may be required to satisfy a condition of approval/draft approval.

For information and guidance 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	10	1. Site Servicing Plan	2. Assessment of Adequacy of Public Services / Site Servicing Study / Brief	S	6
S	10	3. Grade Control and Drainage Plan	4. Geotechnical Study / Slope Stability Study	S	4
	2	5. Composite Utility Plan	6. Groundwater Impact Study		6
	5	7. Servicing Options Report	8. Wellhead Protection Study		6
A	9	9. Transportation Impact Study (dependent on screening form)	10.Erosion and Sediment Control Plan / Brief	S	6
S	6	11.Storm water Management Report / Brief	12.Hydro geological and Terrain Analysis		8
	3	13.Hydraulic Water main Analysis	14.Noise / Vibration Study	S	3
	10	15.Roadway Modification Design Plan	16.Confederation Line Proximity Study		9

S/A	Number of copies	PLANNING / DESIGN / SURVEY		S/A	Number of copies
	10	17.Draft Plan of Subdivision	18.Plan Showing Layout of Parking Garage	S	2
	10	19.Draft Plan of Condominium	20.Planning Rationale and Design Brief	S	3
S	10	21.Site Plan	22.Minimum Distance Separation (MDS)		3
	10	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	S	3
S	10	27.Landscape Plan	28.Archaeological Resource Assessment Requirements: **S** (site plan) **A** (subdivision, condo)	S	3
S	2	29.Survey Plan	30.Shadow Analysis		3
S	3	31.Architectural Building Elevation Drawings (dimensioned)	32.Design Brief (includes the Design Review Panel Submission Requirements)		3
	6	33.Wind Analysis			

S/A	Number of copies	ENVIRONMENTAL		S/A	Number of copies
S	2	34.Phase 1 Environmental Site Assessment	35.Impact Assessment of Adjacent Waste Disposal/Former Landfill Site		6
A	2	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
S	3	40.Tree Conservation Report	41.Scoped Environmental Impact Statement	A	3
	4	42.Mine Hazard Study / Abandoned Pit or Quarry Study	43.Integrated Environmental Review (Draft, as part of Planning Rationale)		3

S/A	Number of copies	ADDITIONAL REQUIREMENTS		S/A	Number of copies
		44.	45.		

Meeting Date: April 3, 2019 Application Type: *Site Plan Control*

File Lead (Assigned Planner): Jean-Charles Renaud Infrastructure Approvals Project Manager: Shawn Wessel

Site Address (Municipal Address): 140 Sussex Drive

***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, the* Planning, Infrastructure and Economic Development Department *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* Planning, Infrastructure and Economic Development Department.

Francois Thauvette

From: Eric Lalande <eric.lalande@rvca.ca>
Sent: Friday, July 26, 2019 3:14 PM
To: Francois Thauvette
Cc: Steve Matthews
Subject: RE: 140 Sussex Drive - BHC Embassy - RVCA Pre-Consultation

Hi Francois,

From a water quality protection perspective, enhanced quality control (Min. 80% TSS) will be required. What portion of the project is sheet draining? Parking area should be directed to sheet drain towards the quality control device.

Thanks,

Eric Lalande, MCIP, RPP
Planner, Rideau Valley Conservation Authority
613-692-3571 x1137

From: Francois Thauvette <f.thauvette@novatech-eng.com>
Sent: Friday, July 26, 2019 10:58 AM
To: Eric Lalande <eric.lalande@rvca.ca>
Cc: Steve Matthews <S.Matthews@novatech-eng.com>
Subject: 140 Sussex Drive - BHC Embassy - RVCA Pre-Consultation

Hi Eric,

We are working on the new British High Commission Embassy located at 140 Sussex Drive. The subject site is located north of the inter-provincial MacDonald-Cartier Bridge along the Ottawa River. The existing building will be demolished and replaced with a new 3-storey building. Parking will be provided (at-grade) within the building. Please advise what type of on-site water quality control measures are required. Please note that a portion of the site currently sheet drains directly (down the embankment) towards the Ottawa River. Water quality control measures for this portion of the site will not be possible. Please review and advise.

Regards,

François Thauvette, P. Eng., Senior Project Manager | Land Development & Public Sector Engineering
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext: 219 | Cell: 613.276.0310 | Fax: 613.254.5867

APPENDIX B

Development Servicing Study Checklist

4. Development Servicing Study Checklist

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

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

4.1 General Content

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

☑ Date and revision number of the report.

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

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

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

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

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

☑ Statement of objectives and servicing criteria.

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

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

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

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

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

☑ Reference to geotechnical studies and recommendations concerning servicing.

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

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

4.2 Development Servicing Report: Water

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

☑ 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.

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

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

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

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

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

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

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

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

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

4.3 Development Servicing Report: Wastewater

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

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

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

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

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

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

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

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

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

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

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

N/A ☐ 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.

N/A ☐ Set-back from private sewage disposal systems.

N/A ☐ 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.

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

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

4.5 Approval and Permit Requirements: Checklist

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

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

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

N/A ☐ Changes to Municipal Drains.

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

4.6 Conclusion Checklist

☑ Clearly stated conclusions and recommendations

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

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

APPENDIX C

Water Demands, FUS Calculations, City of Ottawa Boundary Conditions and Hydraulic Modelling Results

Francois Thauvette

From: Francois Thauvette
Sent: Thursday, October 3, 2019 11:48 AM
To: Wessel, Shawn
Cc: Steve Matthews
Subject: FW: 140 Sussex Drive - W Boundary Condition Request
Attachments: FUSv2-0-BHC.pdf; FUSv2-0-Earnscliffe.pdf

Hi Shawn,

We are working on the proposed 3-storey British High Commission (BHC) development at 140 Sussex Drive. The new BHC building will replace the old Carriage House and garage (currently located on the southern portion of the property). The Earnscliffe National Historic Site of Canada (Victorian style Manor, located on the northern portion of the property) will remain unchanged. Portions of the existing water service to the site (of varying sizes) will have to be removed, replaced and realigned to accommodate the proposed development.

We are sending you this e-mail to request watermain boundary conditions for the existing water service connection to the 300mm dia. WM in Sussex Drive (as shown on geoOttawa). The anticipated water demands for the proposed site (including both the new BHC and Earnscliffe Residence) are as follows:

- Average Day Demand = 0.18 L/s
- Maximum Day Demand = 0.29 L/s
- Peak Hour Demand = 0.53 L/s
- Maximum Fire Flow Demand = 167 L/s (BHC Building governs) – see attached FUS calculations for details

Please note that we anticipate requiring a multi-hydrant approach to fire fighting. There are currently two (2) private hydrants that will have to be relocated (or removed and replaced) as part of the proposed development. A hydraulic analysis will be completed, once the WM boundary conditions are provided by the City.

Regards,

François Thauvette, P. Eng., Senior Project Manager | Land Development & Public Sector Engineering
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext: 219 | Cell: 613.276.0310 | Fax: 613.254.5867

From: Steve Matthews <S.Matthews@novatech-eng.com>
Sent: Thursday, October 3, 2019 11:10 AM
To: Francois Thauvette <f.thauvette@novatech-eng.com>
Subject: BHC - Water Demands and FUS Calculations

François,

As requested, the water demands for the proposed BHC project (including both the proposed BHC building and the existing Earnscliffe Residence) are as follows:

- Average Day Demand = 0.18 L/s
- Maximum Day Demand = 0.29 L/s
- Peak Hour Demand = 0.53 L/s

- Maximum Fire Flow Demand = 167 L/s (BHC Building governs) – see attached FUS calculations

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

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 119116
Project Name: British High Commission
Date: 9/10/2019
Input By: S.Matthews
Reviewed By: F.Thauvette

Legend: Input by User; No Information or Input Required

Building Description: 3-Storey Building
Non-combustible construction

Step			Input		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction **C**	Wood frame		1.5	0.8	
		Ordinary construction		1		
		Non-combustible construction	Yes	0.8		
		Modified Fire resistive construction (2 hrs)		0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	1200			
		Number of Floors/Storeys	3			
		Area of structure considered (m^2)			**3,600**	
	F	**Base fire flow without reductions**				**11,000**
		F = 220 **C** (**A**)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	0%	**11,000**
		Limited combustible		-15%		
		Combustible	Yes	0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**			**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%	-30%	**-4,400**
		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%	**3,300**
		East Side	3.1 - 10 m		20%	
		South Side	> 45.1m		0%	
		West Side	> 45.1m		0%	
				Cumulative Total	**30%**	
Results						
6	**(1) + (2) + (3)**	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**10,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**167**
				or	USGPM	2,642
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	2
		Required Volume of Fire Flow (m^3)			m^3	1200

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

Engineers, Planners & Landscape Architects

Novatech Project #: 119116
Project Name: British High Commission
Date: 9/10/2019
Input By: S.Matthews
Reviewed By: F.Thauvette

Legend: Input by User; No Information or Input Required

Building Description: Existing Earnscliffe Residence
Ordinary construction

Step			Input		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction **C**	Wood frame		1.5	1	
		Ordinary construction	Yes	1		
		Non-combustible construction		0.8		
		Modified Fire resistive construction (2 hrs)		0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	420			
		Number of Floors/Storeys	2.5			
		Area of structure considered (m^2)			**1,050**	
	F	**Base fire flow without reductions**				**7,000**
		F = 220 **C** (**A**)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible	Yes	-25%	-25%	**5,250**
		Limited combustible		-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**			**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	No	-30%		**0**
		Standard Water Supply	No	-10%		
		Fully Supervised System	No	-10%		
				Cumulative Total	**0%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	> 45.1m		0%	**525**
		East Side	> 45.1m		0%	
		South Side	20.1 - 30 m		10%	
		West Side	> 45.1m		0%	
				Cumulative Total	**10%**	
Results						
6	**(1) + (2) + (3)**	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**6,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**100**
				or	USGPM	1,585
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	2
		Required Volume of Fire Flow (m^3)			m^3	720

Francois Thauvette

From: Wessel, Shawn <shawn.wessel@ottawa.ca>
Sent: Wednesday, October 9, 2019 9:43 AM
To: Francois Thauvette
Subject: 140 Sussex Drive - W Boundary Condition Request
Attachments: 140 Sussex Oct 2019.pdf

Good morning Mr. Thauvette.

Please find boundary condition for this site, as requested:

The following are boundary conditions, HGL, for hydraulic analysis at 140 Sussex (zone 1W) assumed to be connected to the 305mm on Sussex (see attached PDF for location).

Minimum HGL = 106.3m

Maximum HGL = 115.0m, the maximum pressure is estimated to be above 80 psi. A pressure check at completion of construction is recommended to determine if pressure control is required.

MaxDay + FireFlow (167L/s) = 105.0m

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

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

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

Thank you

Regards,

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

Development Review Central Branch | Direction de l'examen des projets d'aménagement, Centrale
Planning, Infrastructure and Economic Development Department | Direction générale de la planification de l'infrastructure et du développement économique

City of Ottawa | Ville d'Ottawa
110 Laurier Ave. W. | 110, avenue Laurier Ouest, Ottawa ON K1P 1J1
(613) 580 2424 Ext. | Poste 33017
Int. Mail Code | Code de Courrier Interne 01-14
shawn.wessel@ottawa.ca

Please consider the environment before printing this email

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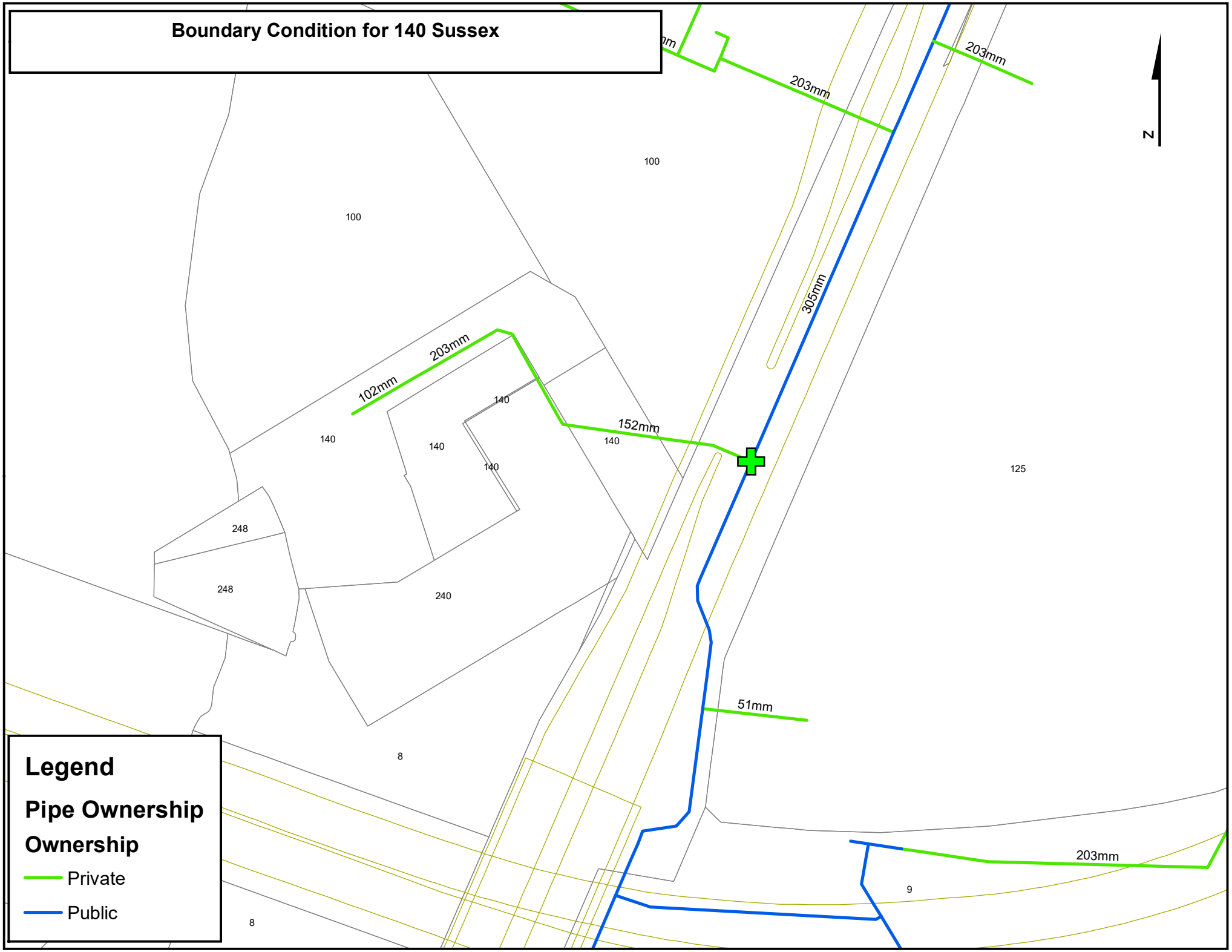
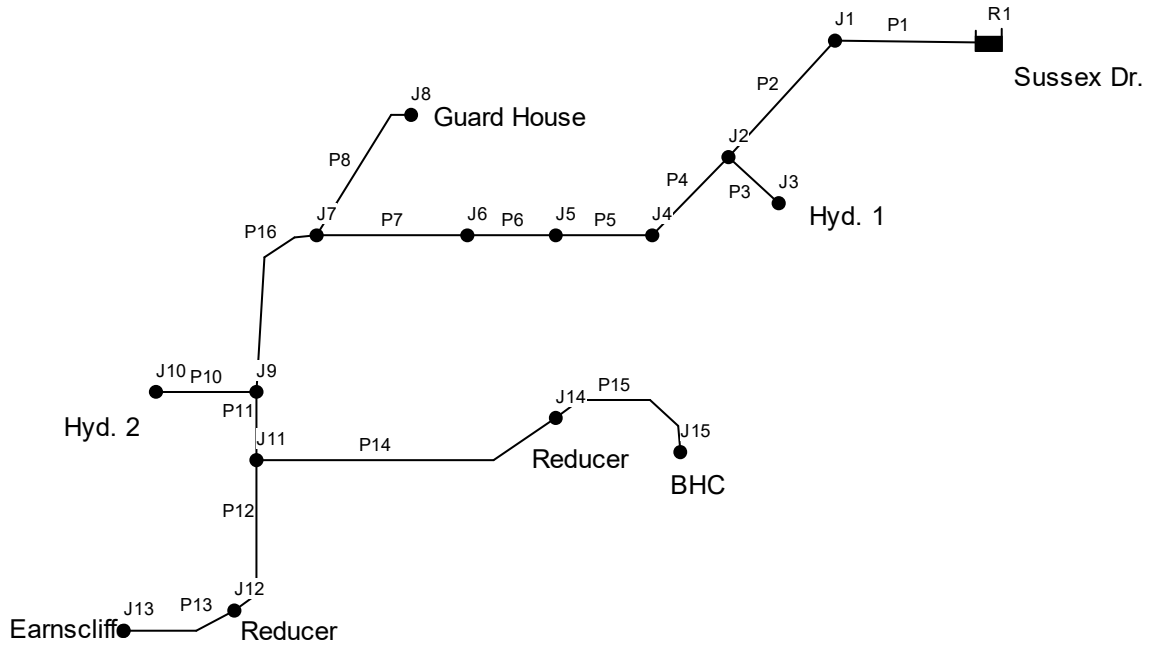

Boundary Condition for 140 Sussex
203mm
203mm
N
100
100
305mm
203mm
102mm
140
140
140
140
152mm
125
248
248
240
51mm
8
Legend
Pipe Ownership
Ownership
Private
Public
203mm
9
8

BRITISH HIGH COMMISSION -119116

140 SUSSEX DRIVE

PRIVATE WATERMAIN NETWORK SCHEMATIC



BHC & Earnscliffe - 140 Sussex Drive

Max Day + Fire Flow Demand
Network Table - Nodes

Node ID	Elevation m	Demand L/s	Head m	Pressure m	Pressure kPa	Pressure psi
Junc J1	55.2	0	89.38	34.18	335.31	48.63
Junc J2	54.8	0	84.91	30.11	295.38	42.84
Junc J3	58	67	84.34	26.34	258.40	37.48
Junc J4	54.8	0	84.47	29.67	291.06	42.22
Junc J5	54.5	0	83.83	29.33	287.73	41.73
Junc J6	54.3	0	83.47	29.17	286.16	41.50
Junc J7	54.2	0	83.22	29.02	284.69	41.29
Junc J8	56.9	0.01	83.22	26.32	258.20	37.45
Junc J9	54	0	81.72	27.72	271.93	39.44
Junc J10	57.5	100	79.73	22.23	218.08	31.63
Junc J11	54.1	0	81.72	27.62	270.95	39.30
Junc J12	54	0	81.72	27.72	271.93	39.44
Junc J13	57.24	0.04	81.72	24.48	240.15	34.83
Junc J14	54.3	0	81.72	27.42	268.99	39.01
Junc J15	56.75	0.25	81.72	24.97	244.96	35.53
Resvr R1	105	-167.3	105	0	0.00	0.00

Max Day + Fire Flow Demand
Network Table - Links

Link ID	Length m	Diameter mm	Roughness	Flow L/s	Velocity m/s	Unit Headloss m/km
Pipe P1	19.7	150	100	167.3	9.47	792.88
Pipe P3	3.9	150	100	67	3.79	145.61
Pipe P2	27.3	200	110	167.3	5.33	163.67
Pipe P4	6.9	200	110	100.3	3.19	63.45
Pipe P5	10.2	200	110	100.3	3.19	63.45
Pipe P6	5.6	200	110	100.3	3.19	63.46
Pipe P7	4	200	110	100.3	3.19	63.45
Pipe P8	11.7	25	100	0.01	0.02	0.07
Pipe P10	6.5	150	100	100	5.66	305.7
Pipe P11	13	200	110	0.29	0.01	0
Pipe P12	14.7	200	110	0.04	0	0
Pipe P13	30.8	100	100	0.04	0.01	0
Pipe P14	38	200	110	0.25	0.01	0
Pipe P15	2.7	150	100	0.25	0.01	0
Pipe P16	23.6	200	110	100.29	3.19	63.44

BHC & Earnscliffe - 140 Sussex Drive

Peak Hour Demand
Network Table - Nodes

Node ID	Elevation m	Demand L/s	Head m	Pressure m	Pressure kPa	Pressure psi
Junc J1	55.2	0	106.3	51.1	501.29	72.71
Junc J2	54.8	0	106.3	51.5	505.22	73.28
Junc J3	58	0	106.3	48.3	473.82	68.72
Junc J4	54.8	0	106.3	51.5	505.22	73.28
Junc J5	54.5	0	106.3	51.8	508.16	73.70
Junc J6	54.3	0	106.3	52	510.12	73.99
Junc J7	54.2	0	106.3	52.1	511.10	74.13
Junc J8	56.9	0.01	106.3	49.4	484.61	70.29
Junc J9	54	0	106.3	52.3	513.06	74.41
Junc J10	57.5	0	106.3	48.8	478.73	69.43
Junc J11	54.1	0	106.3	52.2	512.08	74.27
Junc J12	54	0	106.3	52.3	513.06	74.41
Junc J13	57.24	0.08	106.3	49.06	481.28	69.80
Junc J14	54.3	0	106.3	52	510.12	73.99
Junc J15	56.75	0.45	106.3	49.55	486.09	70.50
Resvr R1	106.3	-0.54	106.3	0	0.00	0.00

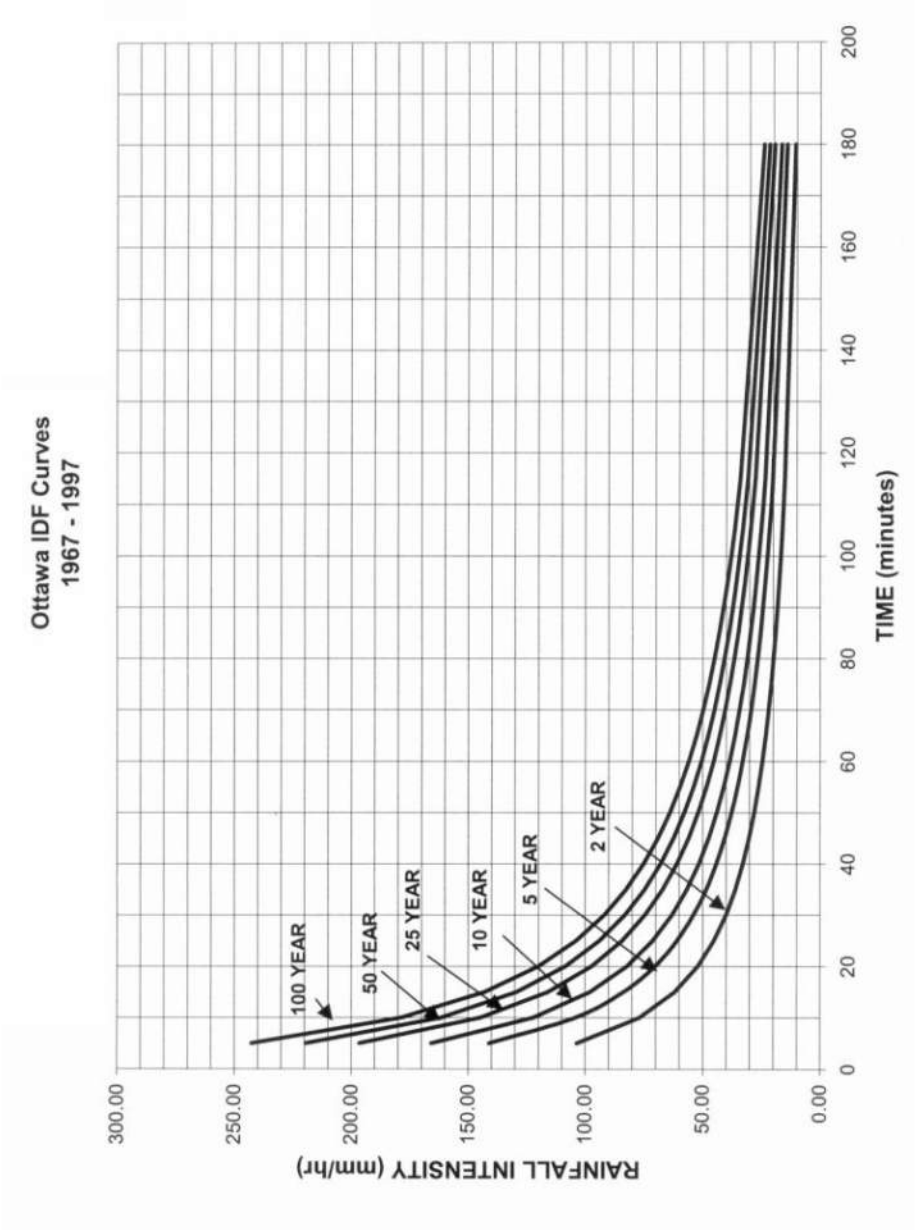
Peak Hour Demand
Network Table - Links

Link ID	Length m	Diameter mm	Roughness	Flow L/s	Velocity m/s	Unit Headloss m/km
Pipe P1	19.7	150	100	0.54	0.03	0.02
Pipe P3	3.9	150	100	0	0	0
Pipe P2	27.3	200	110	0.54	0.02	0
Pipe P4	6.9	200	110	0.54	0.02	0
Pipe P5	10.2	200	110	0.54	0.02	0
Pipe P6	5.6	200	110	0.54	0.02	0
Pipe P7	4	200	110	0.54	0.02	0
Pipe P8	11.7	25	100	0.01	0.02	0.07
Pipe P10	6.5	150	100	0	0	0
Pipe P11	13	200	110	0.53	0.02	0
Pipe P12	14.7	200	110	0.08	0	0
Pipe P13	30.8	100	100	0.08	0.01	0
Pipe P14	38	200	110	0.45	0.01	0
Pipe P15	2.7	150	100	0.45	0.03	0.01
Pipe P16	23.6	200	110	0.53	0.02	0

APPENDIX D

IDF Curves and SWM Calculations

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



Proposed Development - British High Commission
140 Sussex Drive

Pre - Development : Uncontrolled Site									
Description	Area (ha)	$A_{impervious}$ (ha) C=0.9	A_{gravel} (ha) C=0.7	$A_{pervious}$ (ha) C=0.2	Weighted C_{w5}	Weighted C_{w100}	1:5 Year Flow (L/s)	1:100 Year Flow (L/s)	Allowable Flow 2 year (L/s)
Total Site Area	0.924	0.373	0.005	0.546	0.49	0.56	129.9	255.1	96.7
Off-Site Tributary Area (NCC Lands)	0.172	0.049	0.000	0.123	0.40	0.46	19.9	39.3	39.3*
Allowable for Area Affected by Development									**136.0**

* Off-Site tributary flows will be conveyed un-controlled through the system at their existing runoff rates

Post - Development : Uncontrolled Site								
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
OS-1	Un-Controlled Off-Site Flow	0.111	0.040	0.071	0.45	0.52	14.5	28.7
OS-2	Un-Controlled Off-Site Flow	0.061	0.000	0.061	0.20	0.25	3.5	7.6
A-1	Un-Controlled Runoff to CB 1 & 2	0.023	0.015	0.008	0.66	0.74	4.4	8.4
A-2	Controlled Flow to CBMH 1	0.147	0.110	0.037	0.72	0.81	30.8	59.2
R-1	Controlled Roof - Guard House	0.012	0.012	0.000	0.90	1.00	3.1	6.0
R-2	Controlled Roof - BHC Building	0.158	0.158	0.000	0.90	1.00	41.2	78.4
							T_c = 10mins	T_c = 10mins

Post - Development : Total Flows for Controlled Site + Uncontrolled Runoff						
Area	Description	Flow (L/s) 5 year	Flow (L/s) 100 year	Storage Required (m^3) 5 year	Storage Required (m^3) 100 year	Provided (m^3)
OS-1	Un-Controlled Off-Site Flow	14.5	28.7	-	-	-
OS-2	Un-Controlled Off-Site Flow	3.5	7.6	-	-	-
A-1	Un-Controlled Runoff to CB 1 & 2	4.4	8.4	-	-	-
A-2	Controlled Flow to CBMH 1	21.3	35.2	6.1	14.4	14.8
R-1	Controlled Roof - Guard House	0.8	0.9	1.6	4.0	4.8
R-2	Controlled Roof - BHC Building	5.9	6.3	24.9	58.7	69.7
R-2	Un-Controlled Deck Drains - BHC Roof	4.2	7.9	-	-	-
	Totals :	**54.6**	**95.0**	**32.6**	**77.1**	**89.2**
	Over Controlled:	81.4	41.0			

Proposed BHC Development
Novatech Project No. 119116
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA OS-1 Uncontrolled Off-Site Flows

OTTAWA IDF CURVE

Area =	0.111	ha	Qallow =	14.5	L/s
C =	0.45		Vol(max) =	0.0	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	19.70	5.16	1.55
10	104.19	14.54	0.00	0.00
15	83.56	11.66	-2.88	-2.59
20	70.25	9.80	-4.74	-5.68
25	60.90	8.50	-6.04	-9.06
30	53.93	7.53	-7.01	-12.63
35	48.52	6.77	-7.77	-16.32
40	44.18	6.17	-8.37	-20.10
45	40.63	5.67	-8.87	-23.95
50	37.65	5.25	-9.29	-27.86
55	35.12	4.90	-9.64	-31.81
60	32.94	4.60	-9.94	-35.80
65	31.04	4.33	-10.21	-39.81
70	29.37	4.10	-10.44	-43.86
75	27.89	3.89	-10.65	-47.92
80	26.56	3.71	-10.83	-52.00
85	25.37	3.54	-11.00	-56.10
90	24.29	3.39	-11.15	-60.22

Proposed BHC Development
Novatech Project No. 119116
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA OS-1 Uncontrolled Off-Site Flows

OTTAWA IDF CURVE

Area =	0.111	ha	Qallow =	28.7	L/s
C =	0.52		Vol(max) =	0.0	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	38.96	10.30	3.09
10	178.56	28.67	0.00	0.00
15	142.89	22.94	-5.73	-5.15
20	119.95	19.26	-9.41	-11.29
25	103.85	16.67	-11.99	-17.99
30	91.87	14.75	-13.92	-25.05
35	82.58	13.26	-15.41	-32.36
40	75.15	12.06	-16.60	-39.85
45	69.05	11.09	-17.58	-47.47
50	63.95	10.27	-18.40	-55.20
55	59.62	9.57	-19.09	-63.01
60	55.89	8.97	-19.69	-70.90
65	52.65	8.45	-20.21	-78.84
70	49.79	7.99	-20.67	-86.83
75	47.26	7.59	-21.08	-94.86
80	44.99	7.22	-21.44	-102.93
85	42.95	6.90	-21.77	-111.03
90	41.11	6.60	-22.07	-119.16

Proposed BHC Development
Novatech Project No. 119116
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA OS-2 Uncontrolled Off-Site Flows

OTTAWA IDF CURVE

Area =	0.061	ha	Qallow =	3.5	L/s
C =	0.20		Vol(max) =	0.0	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	4.79	1.25	0.38
10	104.19	3.53	0.00	0.00
15	83.56	2.83	-0.70	-0.63
20	70.25	2.38	-1.15	-1.38
25	60.90	2.07	-1.47	-2.20
30	53.93	1.83	-1.70	-3.07
35	48.52	1.65	-1.89	-3.97
40	44.18	1.50	-2.04	-4.88
45	40.63	1.38	-2.16	-5.82
50	37.65	1.28	-2.26	-6.77
55	35.12	1.19	-2.34	-7.73
60	32.94	1.12	-2.42	-8.70
65	31.04	1.05	-2.48	-9.68
70	29.37	1.00	-2.54	-10.66
75	27.89	0.95	-2.59	-11.65
80	26.56	0.90	-2.63	-12.64
85	25.37	0.86	-2.67	-13.63
90	24.29	0.82	-2.71	-14.63

Proposed BHC Development
Novatech Project No. 119116
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA OS-2 Uncontrolled Off-Site Flows

OTTAWA IDF CURVE

Area =	0.061	ha	Qallow =	7.6	L/s
C =	0.25		Vol(max) =	0.0	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	10.29	2.72	0.82
10	178.56	7.57	0.00	0.00
15	142.89	6.06	-1.51	-1.36
20	119.95	5.09	-2.48	-2.98
25	103.85	4.40	-3.17	-4.75
30	91.87	3.89	-3.68	-6.62
35	82.58	3.50	-4.07	-8.55
40	75.15	3.19	-4.38	-10.52
45	69.05	2.93	-4.64	-12.54
50	63.95	2.71	-4.86	-14.58
55	59.62	2.53	-5.04	-16.64
60	55.89	2.37	-5.20	-18.72
65	52.65	2.23	-5.34	-20.82
70	49.79	2.11	-5.46	-22.93
75	47.26	2.00	-5.57	-25.05
80	44.99	1.91	-5.66	-27.18
85	42.95	1.82	-5.75	-29.32
90	41.11	1.74	-5.83	-31.47

Proposed BHC Development
Novatech Project No. 119116
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA A-1 Uncontrolled Runoff to CB 1 & 2

OTTAWA IDF CURVE

Area =	0.023	ha	Qallow =	4.4	L/s
C =	0.66		Vol(max) =	0.0	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	5.93	1.55	0.47
10	104.19	4.37	0.00	0.00
15	83.56	3.51	-0.87	-0.78
20	70.25	2.95	-1.42	-1.71
25	60.90	2.56	-1.82	-2.73
30	53.93	2.26	-2.11	-3.80
35	48.52	2.04	-2.34	-4.91
40	44.18	1.85	-2.52	-6.05
45	40.63	1.71	-2.67	-7.20
50	37.65	1.58	-2.79	-8.38
55	35.12	1.47	-2.90	-9.57
60	32.94	1.38	-2.99	-10.77
65	31.04	1.30	-3.07	-11.98
70	29.37	1.23	-3.14	-13.19
75	27.89	1.17	-3.20	-14.41
80	26.56	1.12	-3.26	-15.64
85	25.37	1.06	-3.31	-16.88
90	24.29	1.02	-3.35	-18.11

Proposed BHC Development
Novatech Project No. 119116
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA A-1 Uncontrolled Runoff to CB 1 & 2

OTTAWA IDF CURVE

Area =	0.023	ha	Qallow =	8.4	L/s
C =	0.74		Vol(max) =	0.0	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	11.47	3.03	0.91
10	178.56	8.44	0.00	0.00
15	142.89	6.75	-1.69	-1.52
20	119.95	5.67	-2.77	-3.32
25	103.85	4.91	-3.53	-5.30
30	91.87	4.34	-4.10	-7.37
35	82.58	3.90	-4.54	-9.53
40	75.15	3.55	-4.89	-11.73
45	69.05	3.26	-5.18	-13.97
50	63.95	3.02	-5.42	-16.25
55	59.62	2.82	-5.62	-18.55
60	55.89	2.64	-5.80	-20.87
65	52.65	2.49	-5.95	-23.21
70	49.79	2.35	-6.09	-25.56
75	47.26	2.23	-6.21	-27.92
80	44.99	2.13	-6.31	-30.30
85	42.95	2.03	-6.41	-32.68
90	41.11	1.94	-6.50	-35.08

Proposed BHC Development
Novatech Project No. 119116
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA A-2 Controlled Flow to CBMH 1

OTTAWA IDF CURVE

Area = 0.147 ha Qallow = 21.3 L/s
C = 0.72 Vol(max) = 6.1 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	41.76	20.46	6.14
10	104.19	30.82	9.52	5.71
15	83.56	24.72	3.42	3.07
20	70.25	20.78	-0.52	-0.62
25	60.90	18.01	-3.29	-4.93
30	53.93	15.95	-5.35	-9.63
35	48.52	14.35	-6.95	-14.59
40	44.18	13.07	-8.23	-19.75
45	40.63	12.02	-9.28	-25.06
50	37.65	11.14	-10.16	-30.49
55	35.12	10.39	-10.91	-36.01
60	32.94	9.74	-11.56	-41.60
65	31.04	9.18	-12.12	-47.26
70	29.37	8.69	-12.61	-52.97
75	27.89	8.25	-13.05	-58.73
90	24.29	7.18	-14.12	-76.22
105	21.58	6.38	-14.92	-93.97
120	19.47	5.76	-15.54	-111.90
135	17.76	5.25	-16.05	-129.97
150	16.36	4.84	-16.46	-148.14

Proposed BHC Development
Novatech Project No. 119116
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA A-2 Controlled Flow to CBMH 1

OTTAWA IDF CURVE

Area = 0.147 ha Qallow = 35.2 L/s
C = 0.81 Vol(max) = 14.4 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	80.46	45.26	13.58
10	178.56	59.19	23.99	14.40
15	142.89	47.37	12.17	10.95
20	119.95	39.77	4.57	5.48
25	103.85	34.43	-0.77	-1.16
30	91.87	30.46	-4.74	-8.54
35	82.58	27.38	-7.82	-16.43
40	75.15	24.91	-10.29	-24.69
45	69.05	22.89	-12.31	-33.23
50	63.95	21.20	-14.00	-41.99
55	59.62	19.77	-15.43	-50.93
60	55.89	18.53	-16.67	-60.01
65	52.65	17.45	-17.75	-69.21
70	49.79	16.51	-18.69	-78.51
75	47.26	15.67	-19.53	-87.90
90	41.11	13.63	-21.57	-116.48
105	36.50	12.10	-23.10	-145.53
120	32.89	10.91	-24.29	-174.92
135	30.00	9.94	-25.26	-204.57
150	27.61	9.15	-26.05	-234.42

Structures	Size (mm)	Area (m^2)	T/G	Inv IN	Inv OUT
CBMH 1	1219	1.17	56.40	55.25	55.24
CBMH 2	1219	1.17	56.40	55.30	55.29
CBMH 3	1219	1.17	56.35	-	55.34

Area A-2: Storage Table

Elevation (m)	System Depth (m)	CBMH 1 Volume (m^3)	CBMH 2 Volume (m^3)	CBMH 3 Volume (m^3)	Underground Storage Total Volume (m^3)	Surface Storage Areas Ponding CBMH 1 (m^2)	Ponding CBMH 2 (m^2)	Ponding CBMH 3 (m^2)	Total Storage Volumes Ponding CBMH 1 (m^3)	Ponding CBMH 2 (m^3)	Ponding CBMH 3 (m^3)	**Total Volume (m^3)**	Design Head
55.24	0.00	-	-	-	-	-	-	-	-	-	-	**0**	-
55.58	0.34	0.40	0.34	0.28	4.05	-	-	-	-	-	-	**4.1**	0.34
55.80	0.56	0.65	0.60	0.54	7.86	-	-	-	-	-	-	**7.9**	0.56
56.10	0.86	1.00	0.95	0.89	8.92	-	-	-	-	-	-	**8.9**	0.86
56.30	1.06	1.24	1.18	1.12	9.62	-	-	-	-	-	-	**9.6**	1.06
56.35	1.11	1.30	1.24		9.73	-	-	0.0	-	-	0.0	**9.7**	1.11
56.40	1.16	1.35	1.30		9.85	0.00	0.00	15.86	0.0	0.0	0.4	**10.2**	1.16
56.45	1.21				9.85	12.38	15.24	52.07	0.3	0.4	2.1	**12.6**	1.21
56.47	1.23				9.85	24.80	33.70	74.50	0.7	0.9	3.4	**14.8**	1.23

ICD - HydroVex Vortex 200 VHV-2

1:100 Yr
Flow (L/s) = 35.2
Head (m) = 1.23
Elevation (m) = **56.47**
Outlet Pipe Dia.(mm) = 305
Volume (m3) = 14.4

1:5 Yr
Flow (L/s) = 21.3
Head (m) = 0.45
Elevation (m) = **55.69**
Outlet Pipe Dia.(mm) = 305
Volume (m3) = 6.1

Maximum Ponding Depth	(cm)
1:100 Yr	**12**
1:5 Yr	**-**

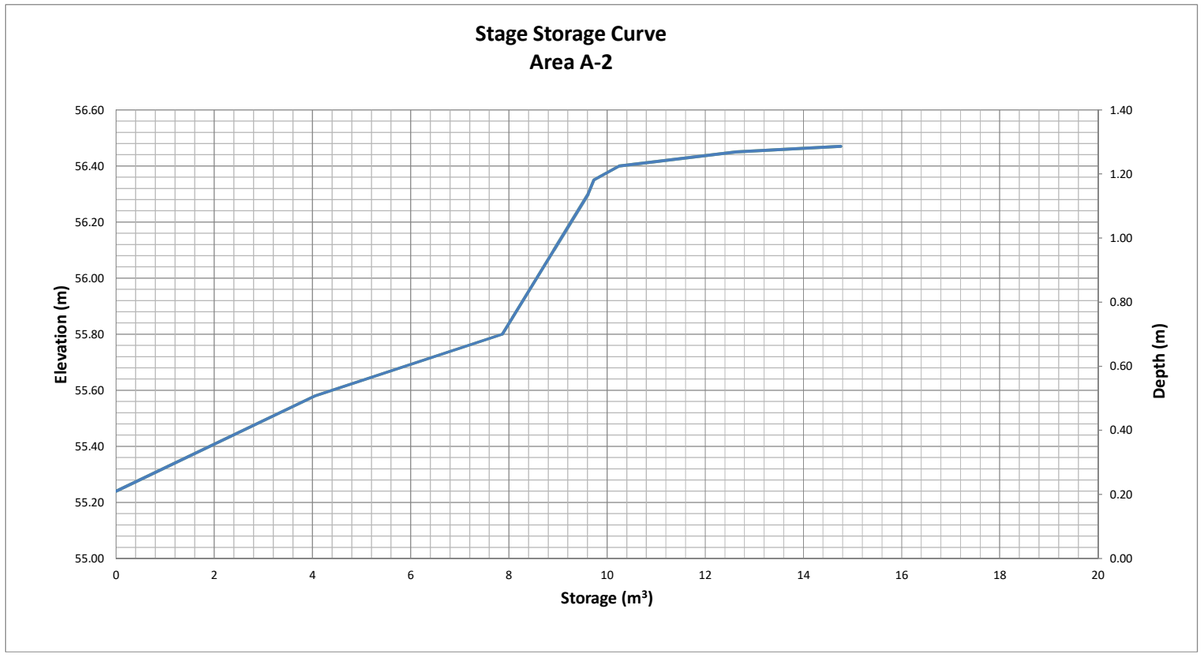
Orifice Size - 1:100 yr Flow Check

Q=0.62xAx(2gh)^0.5

	1:100 yr	Flow Check
Q (m^3/s) =	0.0352	**0.0350**
g (m/s^2) =	9.81	9.81
h (m) =	**1.23**	1.23
A (m^2) =	**0.011557101**	**0.01150**
D (m) =	**0.121305228**	**0.12100**
D (mm) =	**121**	121.0

1:5 yr Flow Check

	1:5 yr
Q (m^3/s) =	0.0213
g (m/s^2) =	9.81
h (m) =	**0.45**
A (m^2) =	**0.01150**
D (m) =	**0.121**
D (mm) =	**121**



PI = 3.141592654
pipe I.D.= 457 (pvc pipe)
U/G Pipe Volume
End Area 0.164 (m^2)
Total Length 37.1 (m)
Pipe Volume 6.1 (m^3)

U/G Pipe Size	450mm dia.	450mm dia.
Pipe Segment	CBMH 1 - CBMH 2	CBMH 2 - CBMH 3
Centre-Centre Length	21.0	18.5
Inside Structure	1.2	1.2
U/G Storage Length	19.8	17.3

Proposed BHC Development
Novatech Project No. 119116
REQUIRED STORAGE - 1:2 YR
AREA A-2 Controlled Flow to CBMH 1

OTTAWA IDF CURVE

Area = 0.147 ha Qallow = 20.7 L/s
C = 0.81 Vol(max) = 4.1 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	34.34	13.64	4.09
10	76.81	25.46	4.76	2.86
15	61.77	20.48	-0.22	-0.20
20	52.03	17.25	-3.45	-4.14
25	45.17	14.97	-5.73	-8.59
30	40.04	13.27	-7.43	-13.37
35	36.06	11.95	-8.75	-18.37
40	32.86	10.89	-9.81	-23.53
45	30.24	10.02	-10.68	-28.82
50	28.04	9.30	-11.40	-34.21
55	26.17	8.68	-12.02	-39.68
60	24.56	8.14	-12.56	-45.21
65	23.15	7.67	-13.03	-50.80
70	21.91	7.26	-13.44	-56.43
75	20.81	6.90	-13.80	-62.10
90	18.14	6.01	-14.69	-79.30
105	16.13	5.35	-15.35	-96.71
120	14.56	4.83	-15.87	-114.28
135	13.30	4.41	-16.29	-131.97
150	12.25	4.06	-16.64	-149.75

Proposed BHC Development
Novatech Project No. 119116
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-1 **Controlled Roof Drain #1**

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 BHC Development
Novatech Project No. 119116
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-1 **Controlled Roof Drain #1**

OTTAWA IDF CURVE

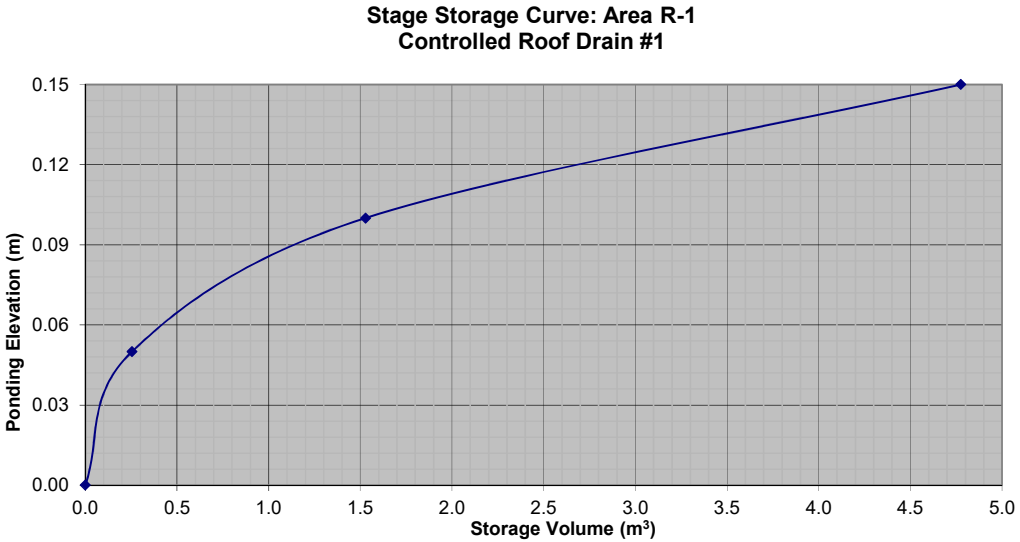
Area =	0.012	ha	Qallow =	0.87	L/s
C =	1.00		Vol(max) =	4.0	m3

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**	**Provided**
1:5 Year	0.79	0.79	10	1.6	4.8
1:100 Year	0.87	0.87	14	4.0	4.8

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	10.19	0.3
0.10	40.77	1.5
0.15	89.1	4.8



Proposed BHC Development
Novatech Project No. 119116
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-2 **Controlled Roof Drain #2**

OTTAWA IDF CURVE

Area =	0.007	ha	Qallow =	0.79	L/s
C =	0.90		Vol(max) =	0.7	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	2.64	1.85	0.55
10	104.19	1.95	1.16	0.69
15	83.56	1.56	0.77	0.69
20	70.25	1.31	0.52	0.63
25	60.90	1.14	0.35	0.52
30	53.93	1.01	0.22	0.39
35	48.52	0.91	0.12	0.25
40	44.18	0.83	0.04	0.09
45	40.63	0.76	-0.03	-0.08
50	37.65	0.70	-0.09	-0.26
55	35.12	0.66	-0.13	-0.44
60	32.94	0.62	-0.17	-0.63
65	31.04	0.58	-0.21	-0.82
70	29.37	0.55	-0.24	-1.01
75	27.89	0.52	-0.27	-1.21
90	24.29	0.45	-0.34	-1.81
105	21.58	0.40	-0.39	-2.44
120	19.47	0.36	-0.43	-3.07

Proposed BHC Development
Novatech Project No. 119116
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-2 **Controlled Roof Drain #2**

OTTAWA IDF CURVE

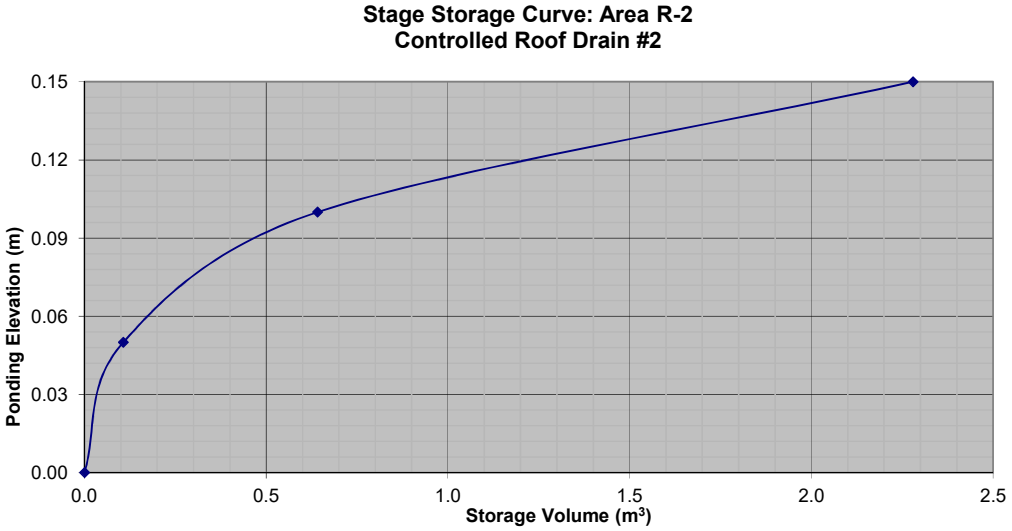
Area =	0.007	ha	Qallow =	0.87	L/s
C =	1.00		Vol(max) =	1.9	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	5.04	4.17	1.25
10	178.56	3.71	2.84	1.70
15	142.89	2.97	2.10	1.89
20	119.95	2.49	1.62	1.95
25	103.85	2.16	1.29	1.93
30	91.87	1.91	1.04	1.87
35	82.58	1.71	0.84	1.77
40	75.15	1.56	0.69	1.66
45	69.05	1.43	0.56	1.52
50	63.95	1.33	0.46	1.37
55	59.62	1.24	0.37	1.22
60	55.89	1.16	0.29	1.05
65	52.65	1.09	0.22	0.87
70	49.79	1.03	0.16	0.69
75	47.26	0.98	0.11	0.50
90	41.11	0.85	-0.02	-0.09
105	36.50	0.76	-0.11	-0.71
120	32.89	0.68	-0.19	-1.35

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	0.7	2.3
1:100 Year	0.87	0.87	14	1.9	2.3

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	4.28	0.1
0.10	17.1	0.6
0.15	48.44	2.3



Proposed BHC Development
Novatech Project No. 119116
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-2 **Controlled Roof Drain #3**

OTTAWA IDF CURVE

Area =	0.020	ha	Qallow =	0.79	L/s
C =	0.90		Vol(max) =	3.5	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	7.21	6.42	1.92
10	104.19	5.32	4.53	2.72
15	83.56	4.26	3.47	3.13
20	70.25	3.59	2.80	3.35
25	60.90	3.11	2.32	3.48
30	53.93	2.75	1.96	3.53
35	48.52	2.48	1.69	3.54
40	44.18	2.26	1.47	3.52
45	40.63	2.07	1.28	3.47
50	37.65	1.92	1.13	3.40
55	35.12	1.79	1.00	3.31
60	32.94	1.68	0.89	3.21
65	31.04	1.58	0.79	3.10
70	29.37	1.50	0.71	2.98
75	27.89	1.42	0.63	2.85
90	24.29	1.24	0.45	2.43
105	21.58	1.10	0.31	1.96
120	19.47	0.99	0.20	1.47

Proposed BHC Development
Novatech Project No. 119116
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-2 **Controlled Roof Drain #3**

OTTAWA IDF CURVE

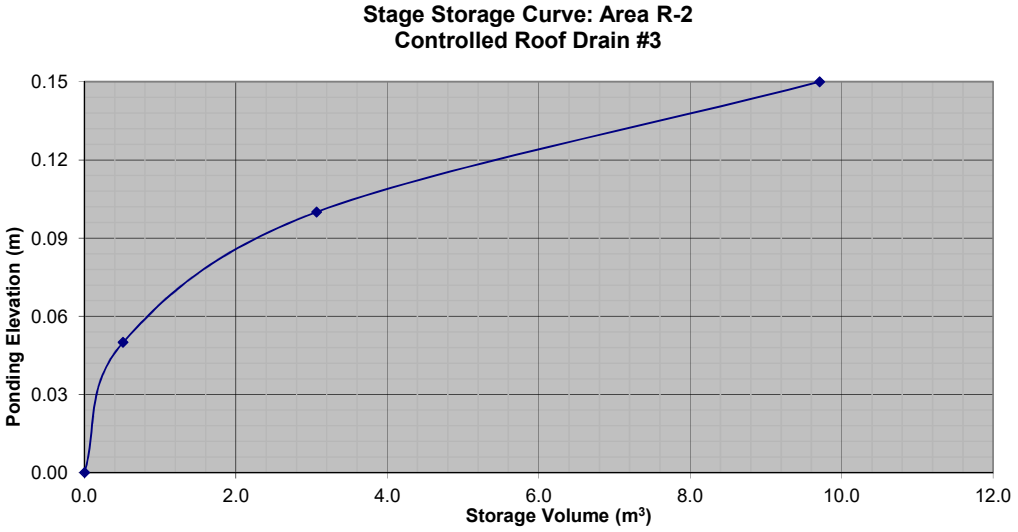
Area =	0.020	ha	Qallow =	0.87	L/s
C =	1.00		Vol(max) =	8.3	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	13.76	12.89	3.87
10	178.56	10.13	9.26	5.55
15	142.89	8.10	7.23	6.51
20	119.95	6.80	5.93	7.12
25	103.85	5.89	5.02	7.53
30	91.87	5.21	4.34	7.81
35	82.58	4.68	3.81	8.01
40	75.15	4.26	3.39	8.14
45	69.05	3.92	3.05	8.22
50	63.95	3.63	2.76	8.27
55	59.62	3.38	2.51	8.29
60	55.89	3.17	2.30	8.28
65	52.65	2.99	2.12	8.25
70	49.79	2.82	1.95	8.21
75	47.26	2.68	1.81	8.14
90	41.11	2.33	1.46	7.89
105	36.50	2.07	1.20	7.56
120	32.89	1.87	1.00	7.17

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	3.5	9.7
1:100 Year	0.87	0.87	14	8.3	9.7

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	20.44	0.5
0.10	81.76	3.1
0.15	183.97	9.7



Proposed BHC Development
Novatech Project No. 119116
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-2 **Controlled Roof Drain #4**

OTTAWA IDF CURVE

Area =	0.019	ha	Qallow =	0.79	L/s
C =	0.90		Vol(max) =	3.2	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	6.71	5.92	1.78
10	104.19	4.95	4.16	2.50
15	83.56	3.97	3.18	2.86
20	70.25	3.34	2.55	3.06
25	60.90	2.89	2.10	3.16
30	53.93	2.56	1.77	3.19
35	48.52	2.31	1.52	3.18
40	44.18	2.10	1.31	3.15
45	40.63	1.93	1.14	3.08
50	37.65	1.79	1.00	3.00
55	35.12	1.67	0.88	2.90
60	32.94	1.57	0.78	2.79
65	31.04	1.48	0.69	2.67
70	29.37	1.40	0.61	2.55
75	27.89	1.33	0.54	2.41
90	24.29	1.15	0.36	1.97
105	21.58	1.03	0.24	1.49
120	19.47	0.93	0.14	0.98

Proposed BHC Development
Novatech Project No. 119116
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-2 **Controlled Roof Drain #4**

OTTAWA IDF CURVE

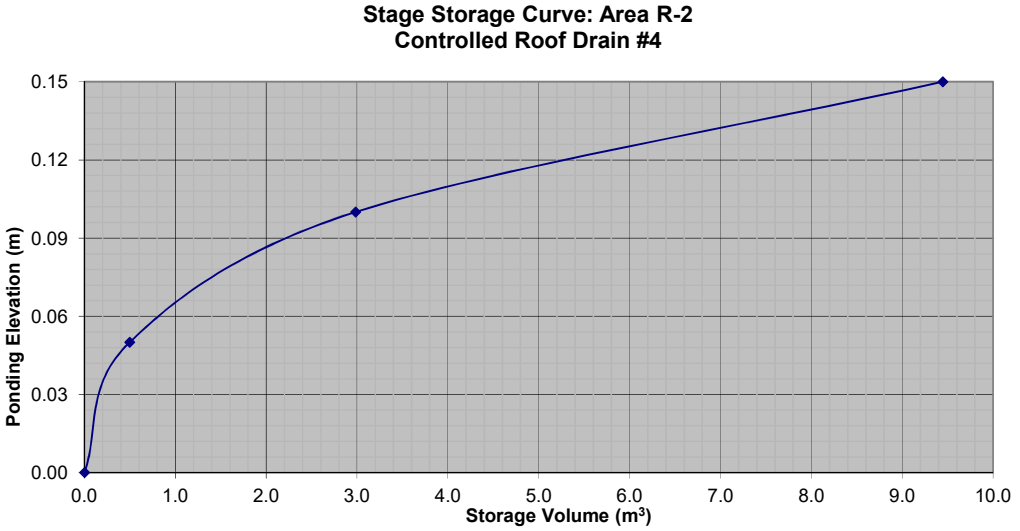
Area =	0.019	ha	Qallow =	0.87	L/s
C =	1.00		Vol(max) =	7.5	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	12.82	11.95	3.58
10	178.56	9.43	8.56	5.14
15	142.89	7.55	6.68	6.01
20	119.95	6.34	5.47	6.56
25	103.85	5.49	4.62	6.92
30	91.87	4.85	3.98	7.17
35	82.58	4.36	3.49	7.33
40	75.15	3.97	3.10	7.44
45	69.05	3.65	2.78	7.50
50	63.95	3.38	2.51	7.52
55	59.62	3.15	2.28	7.52
60	55.89	2.95	2.08	7.50
65	52.65	2.78	1.91	7.45
70	49.79	2.63	1.76	7.39
75	47.26	2.50	1.63	7.32
90	41.11	2.17	1.30	7.03
105	36.50	1.93	1.06	6.66
120	32.89	1.74	0.87	6.25

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	3.2	9.4
1:100 Year	0.87	0.87	14	7.5	9.4

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	19.89	0.5
0.10	79.54	3.0
0.15	178.96	9.4



Proposed BHC Development
Novatech Project No. 119116
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-2 **Controlled Roof Drain #5**

OTTAWA IDF CURVE

Area =	0.020	ha	Qallow =	0.79	L/s
C =	0.90		Vol(max) =	3.4	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	6.96	6.17	1.85
10	104.19	5.14	4.35	2.61
15	83.56	4.12	3.33	3.00
20	70.25	3.46	2.67	3.21
25	60.90	3.00	2.21	3.32
30	53.93	2.66	1.87	3.36
35	48.52	2.39	1.60	3.36
40	44.18	2.18	1.39	3.33
45	40.63	2.00	1.21	3.27
50	37.65	1.86	1.07	3.20
55	35.12	1.73	0.94	3.11
60	32.94	1.62	0.83	3.00
65	31.04	1.53	0.74	2.89
70	29.37	1.45	0.66	2.76
75	27.89	1.37	0.58	2.63
90	24.29	1.20	0.41	2.20
105	21.58	1.06	0.27	1.72
120	19.47	0.96	0.17	1.22

Proposed BHC Development
Novatech Project No. 119116
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-2 **Controlled Roof Drain #5**

OTTAWA IDF CURVE

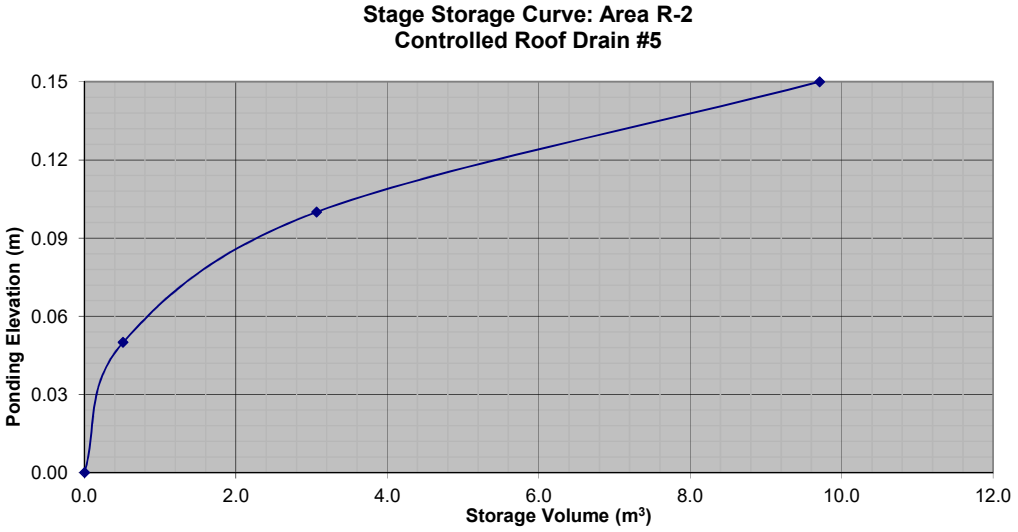
Area =	0.020	ha	Qallow =	0.87	L/s
C =	1.00		Vol(max) =	7.9	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	13.29	12.42	3.73
10	178.56	9.78	8.91	5.35
15	142.89	7.83	6.96	6.26
20	119.95	6.57	5.70	6.84
25	103.85	5.69	4.82	7.23
30	91.87	5.03	4.16	7.49
35	82.58	4.52	3.65	7.67
40	75.15	4.12	3.25	7.79
45	69.05	3.78	2.91	7.86
50	63.95	3.50	2.63	7.90
55	59.62	3.27	2.40	7.90
60	55.89	3.06	2.19	7.89
65	52.65	2.88	2.01	7.85
70	49.79	2.73	1.86	7.80
75	47.26	2.59	1.72	7.73
90	41.11	2.25	1.38	7.46
105	36.50	2.00	1.13	7.11
120	32.89	1.80	0.93	6.71

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	3.4	9.7
1:100 Year	0.87	0.87	14	7.9	9.7

Roof Drain Storage Table for Area RD 5

Elevation	Area RD 5	Total Volume
m	m^2	m^3
0.00	0	0
0.05	20.44	0.5
0.10	81.75	3.1
0.15	183.94	9.7



Proposed BHC Development
Novatech Project No. 119116
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-2 **Controlled Roof Drain #6**

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 BHC Development
Novatech Project No. 119116
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-2 **Controlled Roof Drain #6**

OTTAWA IDF CURVE

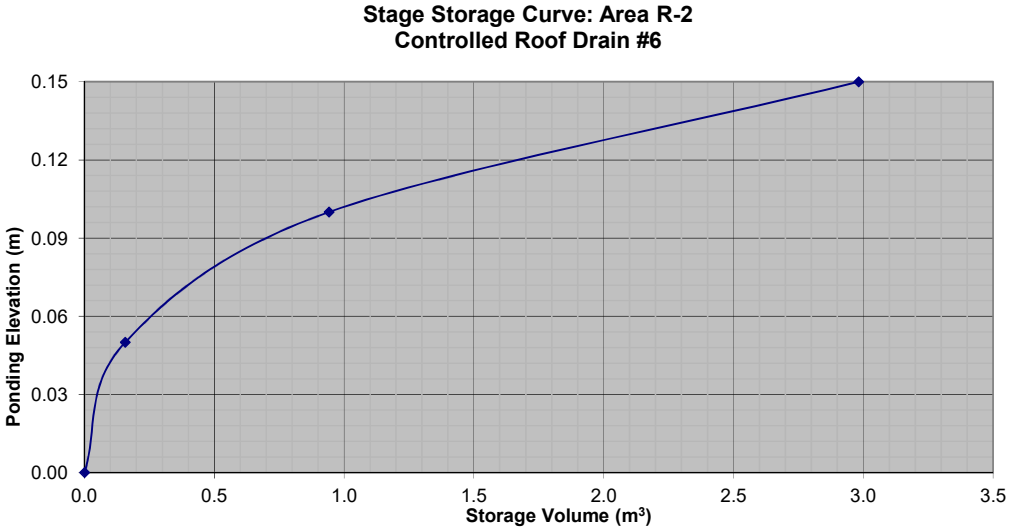
Area =	0.006	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	2.2	m3

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**	**Provided**
1:5 Year	0.32	0.32	10	0.9	3.0
1:100 Year	0.32	0.32	13	2.2	3.0

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	6.28	0.2
0.10	25.12	0.9
0.15	56.51	3.0



Proposed BHC Development
Novatech Project No. 119116
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-2 **Controlled Roof Drain #7**

OTTAWA IDF CURVE

Area =	0.008	ha	Qallow =	0.32	L/s
C =	0.90		Vol(max) =	1.5	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	2.97	2.65	0.79
10	104.19	2.19	1.87	1.12
15	83.56	1.76	1.44	1.29
20	70.25	1.48	1.16	1.39
25	60.90	1.28	0.96	1.44
30	53.93	1.13	0.81	1.46
35	48.52	1.02	0.70	1.47
40	44.18	0.93	0.61	1.46
45	40.63	0.85	0.53	1.44
50	37.65	0.79	0.47	1.41
55	35.12	0.74	0.42	1.38
60	32.94	0.69	0.37	1.34
65	31.04	0.65	0.33	1.30
70	29.37	0.62	0.30	1.25
75	27.89	0.59	0.27	1.20
90	24.29	0.51	0.19	1.03
105	21.58	0.45	0.13	0.84
120	19.47	0.41	0.09	0.64

Proposed BHC Development
Novatech Project No. 119116
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-2 **Controlled Roof Drain #7**

OTTAWA IDF CURVE

Area =	0.008	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	3.5	m3

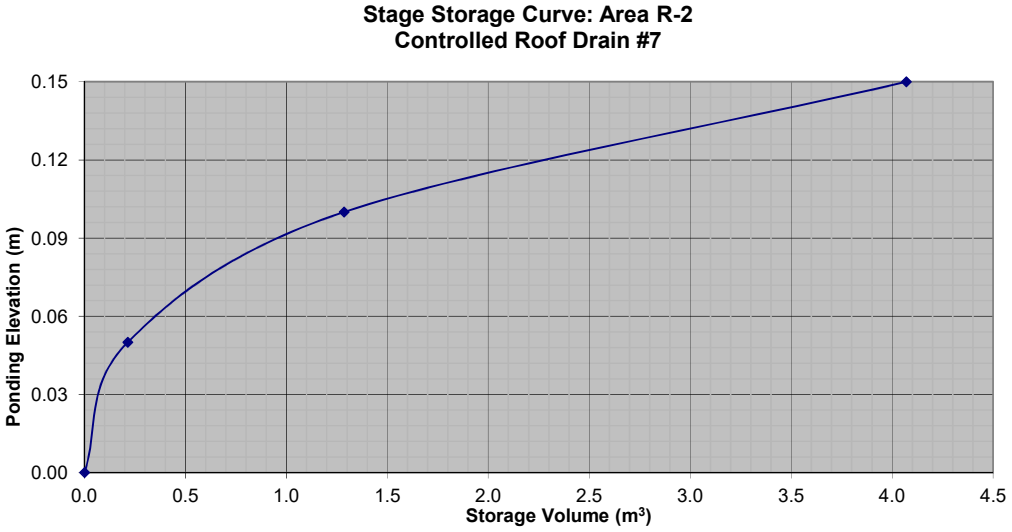
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	5.67	5.35	1.60
10	178.56	4.17	3.85	2.31
15	142.89	3.34	3.02	2.72
20	119.95	2.80	2.48	2.98
25	103.85	2.43	2.11	3.16
30	91.87	2.15	1.83	3.29
35	82.58	1.93	1.61	3.38
40	75.15	1.75	1.43	3.44
45	69.05	1.61	1.29	3.49
50	63.95	1.49	1.17	3.52
55	59.62	1.39	1.07	3.54
60	55.89	1.31	0.99	3.55
65	52.65	1.23	0.91	3.55
70	49.79	1.16	0.84	3.54
75	47.26	1.10	0.78	3.53
90	41.11	0.96	0.64	3.46
105	36.50	0.85	0.53	3.35
120	32.89	0.77	0.45	3.23

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	1.5	4.1
1:100 Year	0.32	0.32	14	3.5	4.1

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	8.57	0.2
0.10	34.28	1.3
0.15	77.14	4.1



Proposed BHC Development
Novatech Project No. 119116
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-2 **Controlled Roof Drain #8**

OTTAWA IDF CURVE

Area =	0.005	ha	Qallow =	0.32	L/s
C =	0.90		Vol(max) =	0.6	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	1.73	1.41	0.42
10	104.19	1.28	0.96	0.57
15	83.56	1.02	0.70	0.63
20	70.25	0.86	0.54	0.65
25	60.90	0.75	0.43	0.64
30	53.93	0.66	0.34	0.61
35	48.52	0.59	0.27	0.58
40	44.18	0.54	0.22	0.53
45	40.63	0.50	0.18	0.48
50	37.65	0.46	0.14	0.42
55	35.12	0.43	0.11	0.36
60	32.94	0.40	0.08	0.30
65	31.04	0.38	0.06	0.24
70	29.37	0.36	0.04	0.17
75	27.89	0.34	0.02	0.10
90	24.29	0.30	-0.02	-0.12
105	21.58	0.26	-0.06	-0.35
120	19.47	0.24	-0.08	-0.59

Proposed BHC Development
Novatech Project No. 119116
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-2 **Controlled Roof Drain #8**

OTTAWA IDF CURVE

Area =	0.005	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	1.7	m3

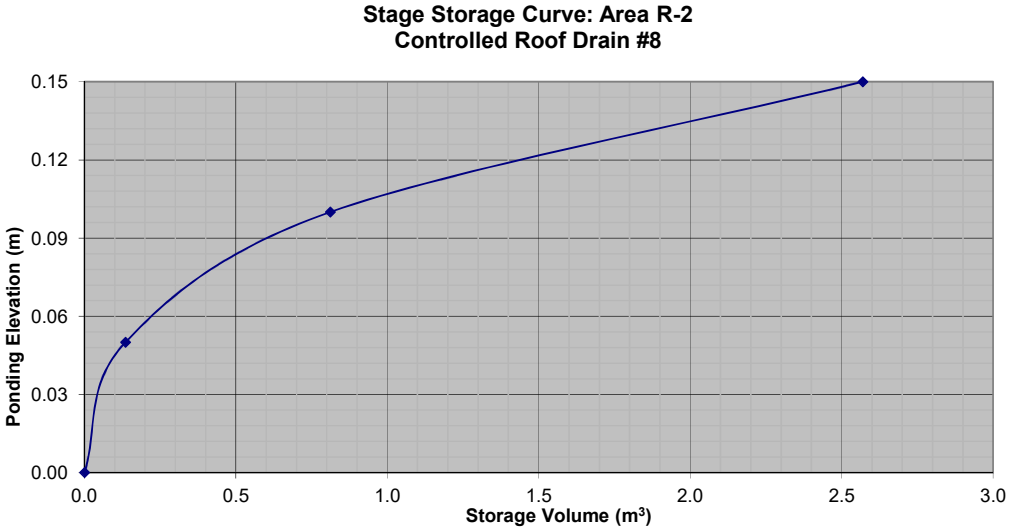
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	3.31	2.99	0.90
10	178.56	2.43	2.11	1.27
15	142.89	1.95	1.63	1.46
20	119.95	1.63	1.31	1.58
25	103.85	1.41	1.09	1.64
30	91.87	1.25	0.93	1.68
35	82.58	1.12	0.80	1.69
40	75.15	1.02	0.70	1.69
45	69.05	0.94	0.62	1.68
50	63.95	0.87	0.55	1.65
55	59.62	0.81	0.49	1.62
60	55.89	0.76	0.44	1.59
65	52.65	0.72	0.40	1.55
70	49.79	0.68	0.36	1.50
75	47.26	0.64	0.32	1.46
90	41.11	0.56	0.24	1.30
105	36.50	0.50	0.18	1.12
120	32.89	0.45	0.13	0.92

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	0.6	2.6
1:100 Year	0.32	0.32	13	1.7	2.6

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	5.41	0.1
0.10	21.64	0.8
0.15	48.69	2.6



Proposed BHC Development
Novatech Project No. 119116
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-2 **Controlled Roof Drain #9**

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	4.80	4.48	1.35
10	104.19	3.55	3.23	1.94
15	83.56	2.84	2.52	2.27
20	70.25	2.39	2.07	2.48
25	60.90	2.07	1.75	2.63
30	53.93	1.84	1.52	2.73
35	48.52	1.65	1.33	2.79
40	44.18	1.50	1.18	2.84
45	40.63	1.38	1.06	2.87
50	37.65	1.28	0.96	2.88
55	35.12	1.20	0.88	2.89
60	32.94	1.12	0.80	2.88
65	31.04	1.06	0.74	2.87
70	29.37	1.00	0.68	2.85
75	27.89	0.95	0.63	2.83
90	24.29	0.83	0.51	2.73
105	21.58	0.73	0.41	2.61
120	19.47	0.66	0.34	2.47

Proposed BHC Development
Novatech Project No. 119116
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-2 **Controlled Roof Drain #9**

OTTAWA IDF CURVE

Area =	0.014	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	6.7	m3

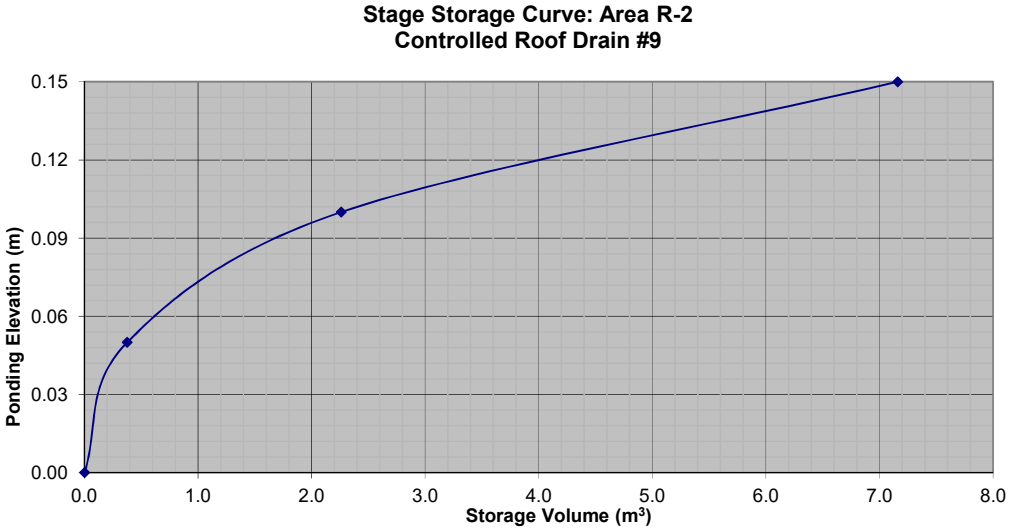
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	9.18	8.86	2.66
10	178.56	6.75	6.43	3.86
15	142.89	5.40	5.08	4.57
20	119.95	4.54	4.22	5.06
25	103.85	3.93	3.61	5.41
30	91.87	3.47	3.15	5.68
35	82.58	3.12	2.80	5.88
40	75.15	2.84	2.52	6.05
45	69.05	2.61	2.29	6.18
50	63.95	2.42	2.10	6.29
55	59.62	2.25	1.93	6.38
60	55.89	2.11	1.79	6.46
65	52.65	1.99	1.67	6.51
70	49.79	1.88	1.56	6.56
75	47.26	1.79	1.47	6.60
90	41.11	1.55	1.23	6.67
105	36.50	1.38	1.06	6.68
120	32.89	1.24	0.92	6.65

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	11	2.9	7.2
1:100 Year	0.32	0.32	14	6.7	7.2

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	15.07	0.4
0.10	60.29	2.3
0.15	135.66	7.2



Proposed BHC Development
Novatech Project No. 119116
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-2 **Controlled Roof Drain #10**

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 BHC Development
Novatech Project No. 119116
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-2 **Controlled Roof Drain #10**

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

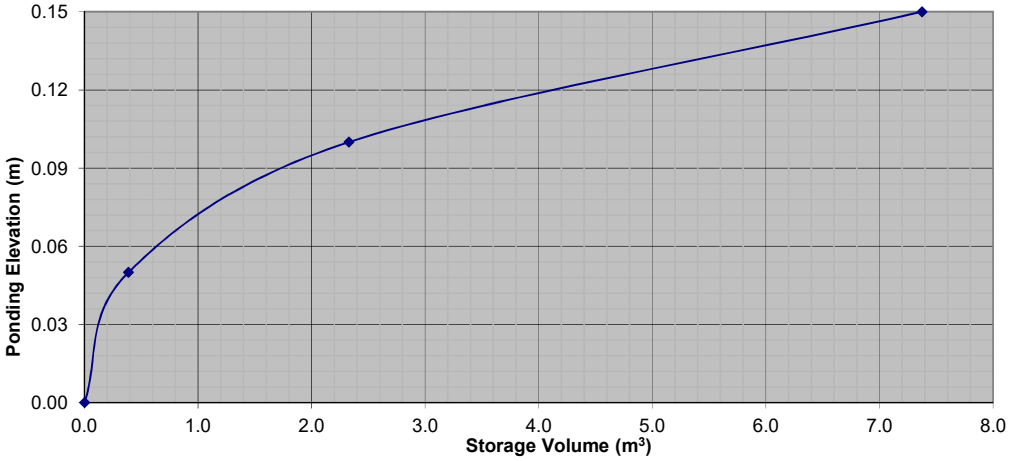
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to Closed

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	7.4
1:100 Year	0.32	0.32	14	6.9	7.4

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	15.53	0.4
0.10	62.1	2.3
0.15	139.73	7.4

Stage Storage Curve: Area R-2
Controlled Roof Drain #10



Proposed BHC Development
Novatech Project No. 119116
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-2 **Controlled Roof Drain #11**

OTTAWA IDF CURVE

Area =	0.010	ha	Qallow =	0.32	L/s
C =	0.90		Vol(max) =	1.9	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	3.50	3.18	0.95
10	104.19	2.58	2.26	1.36
15	83.56	2.07	1.75	1.57
20	70.25	1.74	1.42	1.70
25	60.90	1.51	1.19	1.78
30	53.93	1.34	1.02	1.83
35	48.52	1.20	0.88	1.85
40	44.18	1.09	0.77	1.86
45	40.63	1.01	0.69	1.85
50	37.65	0.93	0.61	1.84
55	35.12	0.87	0.55	1.81
60	32.94	0.82	0.50	1.79
65	31.04	0.77	0.45	1.75
70	29.37	0.73	0.41	1.71
75	27.89	0.69	0.37	1.67
90	24.29	0.60	0.28	1.52
105	21.58	0.53	0.21	1.35
120	19.47	0.48	0.16	1.17

Proposed BHC Development
Novatech Project No. 119116
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-2 **Controlled Roof Drain #11**

OTTAWA IDF CURVE

Area =	0.010	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	4.4	m3

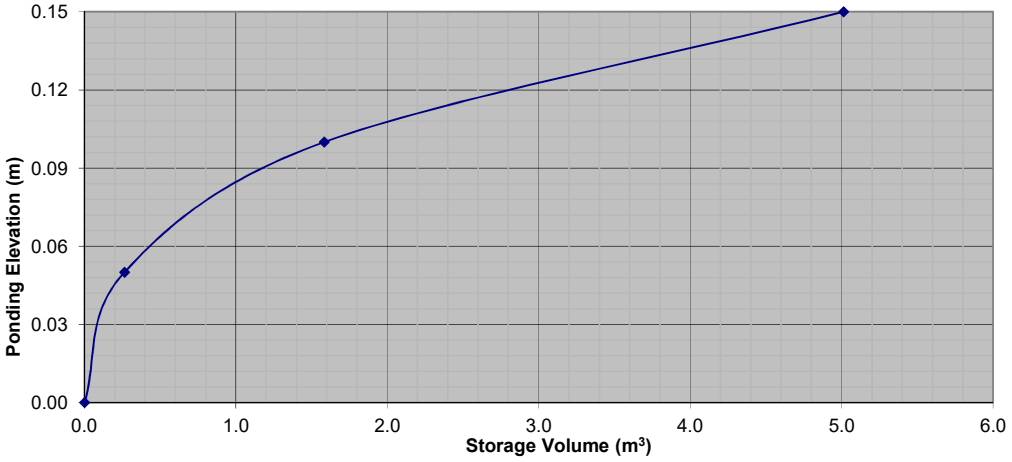
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	6.68	6.36	1.91
10	178.56	4.91	4.59	2.76
15	142.89	3.93	3.61	3.25
20	119.95	3.30	2.98	3.58
25	103.85	2.86	2.54	3.81
30	91.87	2.53	2.21	3.98
35	82.58	2.27	1.95	4.10
40	75.15	2.07	1.75	4.20
45	69.05	1.90	1.58	4.27
50	63.95	1.76	1.44	4.32
55	59.62	1.64	1.32	4.36
60	55.89	1.54	1.22	4.39
65	52.65	1.45	1.13	4.40
70	49.79	1.37	1.05	4.41
75	47.26	1.30	0.98	4.41
90	41.11	1.13	0.81	4.38
105	36.50	1.00	0.68	4.31
120	32.89	0.91	0.59	4.21

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	1.9	5.0
1:100 Year	0.32	0.32	14	4.4	5.0

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	10.56	0.3
0.10	42.22	1.6
0.15	95	5.0

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



Proposed BHC Development
Novatech Project No. 119116
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-2 **Controlled Roof Drain #12**

OTTAWA IDF CURVE

Area =	0.019	ha	Qallow =	0.79	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	6.85	6.06	1.82
10	104.19	5.06	4.27	2.56
15	83.56	4.06	3.27	2.94
20	70.25	3.41	2.62	3.14
25	60.90	2.96	2.17	3.25
30	53.93	2.62	1.83	3.29
35	48.52	2.35	1.56	3.29
40	44.18	2.14	1.35	3.25
45	40.63	1.97	1.18	3.19
50	37.65	1.83	1.04	3.11
55	35.12	1.70	0.91	3.02
60	32.94	1.60	0.81	2.91
65	31.04	1.51	0.72	2.80
70	29.37	1.43	0.64	2.67
75	27.89	1.35	0.56	2.54
90	24.29	1.18	0.39	2.10
105	21.58	1.05	0.26	1.62
120	19.47	0.94	0.15	1.12

Proposed BHC Development
Novatech Project No. 119116
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-2 **Controlled Roof Drain #12**

OTTAWA IDF CURVE

Area =	0.019	ha	Qallow =	0.87	L/s
C =	1.00		Vol(max) =	7.7	m3

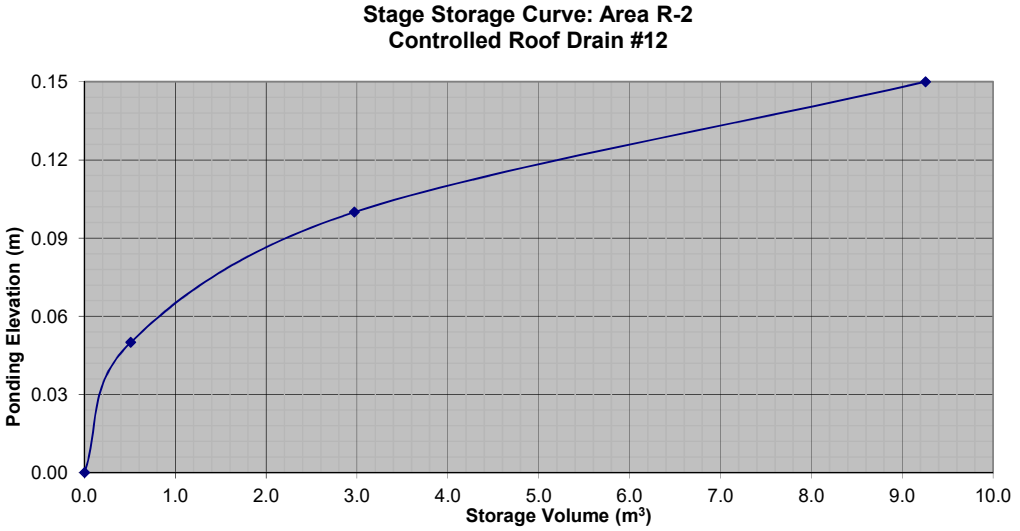
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	13.09	12.22	3.67
10	178.56	9.63	8.76	5.26
15	142.89	7.71	6.84	6.15
20	119.95	6.47	5.60	6.72
25	103.85	5.60	4.73	7.10
30	91.87	4.95	4.08	7.35
35	82.58	4.45	3.58	7.53
40	75.15	4.05	3.18	7.64
45	69.05	3.72	2.85	7.71
50	63.95	3.45	2.58	7.74
55	59.62	3.22	2.35	7.74
60	55.89	3.01	2.14	7.72
65	52.65	2.84	1.97	7.68
70	49.79	2.69	1.82	7.62
75	47.26	2.55	1.68	7.55
90	41.11	2.22	1.35	7.27
105	36.50	1.97	1.10	6.92
120	32.89	1.77	0.90	6.51

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	3.3	9.3
1:100 Year	0.87	0.87	14	7.7	9.3

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	20.37	0.5
0.10	78.14	3.0
0.15	173.23	9.3



Proposed BHC Development
Novatech Project No. 119116
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-2 Uncontrolled Terrace Deck Drains

OTTAWA IDF CURVE

Area =	0.016	ha	Qallow =	4.2	L/s
C =	0.90		Vol(max) =	0.0	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	5.65	1.48	0.44
10	104.19	4.17	0.00	0.00
15	83.56	3.34	-0.83	-0.74
20	70.25	2.81	-1.36	-1.63
25	60.90	2.44	-1.73	-2.60
30	53.93	2.16	-2.01	-3.62
35	48.52	1.94	-2.23	-4.68
40	44.18	1.77	-2.40	-5.77
45	40.63	1.63	-2.54	-6.87
50	37.65	1.51	-2.66	-7.99
55	35.12	1.41	-2.76	-9.12
60	32.94	1.32	-2.85	-10.27
65	31.04	1.24	-2.93	-11.42
70	29.37	1.18	-3.00	-12.58
75	27.89	1.12	-3.05	-13.75
80	26.56	1.06	-3.11	-14.92
85	25.37	1.02	-3.16	-16.09
90	24.29	0.97	-3.20	-17.27

Proposed BHC Development
Novatech Project No. 119116
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-2 Uncontrolled Terrace Deck Drains

OTTAWA IDF CURVE

Area =	0.016	ha	Qallow =	7.9	L/s
C =	1.00		Vol(max) =	0.0	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	10.80	2.85	0.86
10	178.56	7.94	0.00	0.00
15	142.89	6.36	-1.59	-1.43
20	119.95	5.34	-2.61	-3.13
25	103.85	4.62	-3.32	-4.98
30	91.87	4.09	-3.86	-6.94
35	82.58	3.67	-4.27	-8.97
40	75.15	3.34	-4.60	-11.04
45	69.05	3.07	-4.87	-13.15
50	63.95	2.84	-5.10	-15.29
55	59.62	2.65	-5.29	-17.46
60	55.89	2.49	-5.46	-19.64
65	52.65	2.34	-5.60	-21.84
70	49.79	2.21	-5.73	-24.06
75	47.26	2.10	-5.84	-26.28
80	44.99	2.00	-5.94	-28.52
85	42.95	1.91	-6.03	-30.76
90	41.11	1.83	-6.11	-33.01

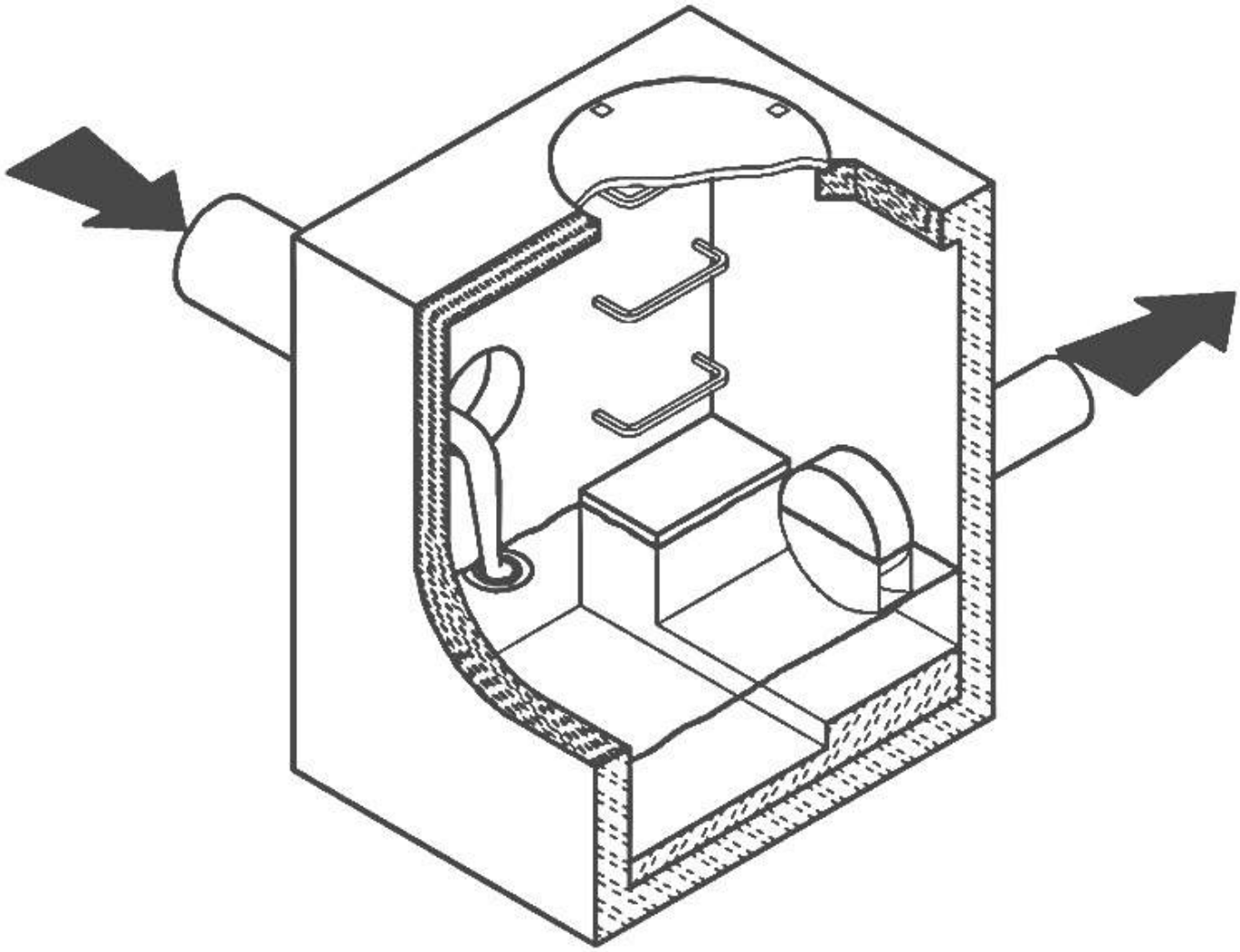
APPENDIX E

Inlet Control Device (ICD) Information

CSO/STORMWATER MANAGEMENT

HYDROVEX® VHV / SVHV

Vertical Vortex Flow Regulator



JOHN MEUNIER

APPLICATIONS

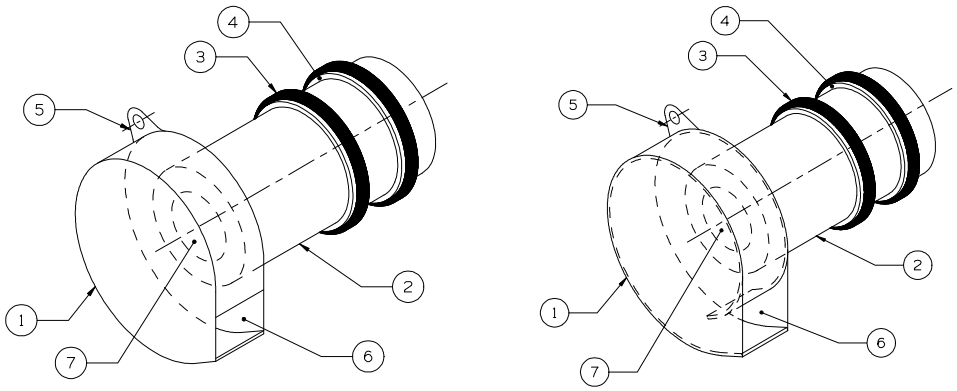
One of the major problems of urban wet weather flow management is the runoff generated after a heavy rainfall. During a storm event, uncontrolled flows may overload the drainage system and cause flooding. Sewer pipe wear and network deterioration are increased dramatically as a result of increased flow velocities. In a combined sewer system, the wastewater treatment plant will experience a significant increase in flows during storms, thereby losing its treatment efficiency.

A simple means of managing excessive water runoff is to control excessive flows at their point of origin, the manhole. **John Meunier Inc.** manufactures the **HYDROVEX® VHV / SVHV** line of vortex flow regulators for point source control of stormwater flows in sewer networks, as well as manholes, catch basins and other retention structures.

The **HYDROVEX® VHV / SVHV** design is based on the fluid mechanics principle of the forced vortex. The discharge is controlled by an air-filled vortex which reduces the effective water passage area without physically reducing orifice size. This effect grants precise flow regulation without the use of moving parts or electricity, thus minimizing maintenance. Although the concept is quite simple, over 12 years of research and testing have been invested in our vortex technology design in order to optimize its performance.

The **HYDROVEX® VHV / SVHV** Vertical Vortex Flow Regulators **(refer to Figure 1)** are manufactured entirely of stainless steel, and consist of a hollow body (**1**) (in which flow control takes place) and an outlet orifice (**7**). Two rubber "O" rings (**3**) seal and retain the unit inside the outlet pipe. Two stainless steel retaining rings (**4**) are welded on the outlet sleeve to ensure that there is no shifting of the "O" rings during installation and operation.

1. **BODY**
2. **SLEEVE**
3. **O-RING**
4. **RETAINING RINGS (SQUARE BAR)**
5. **ANCHOR PLATE**
6. **INLET**
7. **OUTLET ORIFICE**



VHV ***SVHV***

FIGURE 1: HYDROVEX® VHV-SVHV VERTICAL VORTREX FLOW REGULATORS

ADVANTAGES

- As a result of the air-filled vortex, a **HYDROVEX® VHV / SVHV** flow regulator will typically have an opening 4 to 6 times larger than an orifice plate. Larger opening sizes decrease the chance of blockage caused by sediments and debris found in stormwater flows. **Figure 2** shows the discharge curve of a vortex regulator compared to an equally sized orifice plate. One can see that for the same height of water and same opening size, the vortex regulator controls a flow approximately four times smaller than the orifice plate.
- Having no moving parts, they require minimal maintenance.
- Submerged inlet for floatables control.
- The **HYDROVEX® VHV / SVHV** line of flow regulators are manufactured entirely of stainless steel, making them durable and corrosion resistant.
- Installation of the **HYDROVEX® VHV / SVHV** flow regulators is quick and straightforward and is performed after all civil works are completed.
- Installation requires no assembly, special tools or equipment and may be carried out by any contractor.

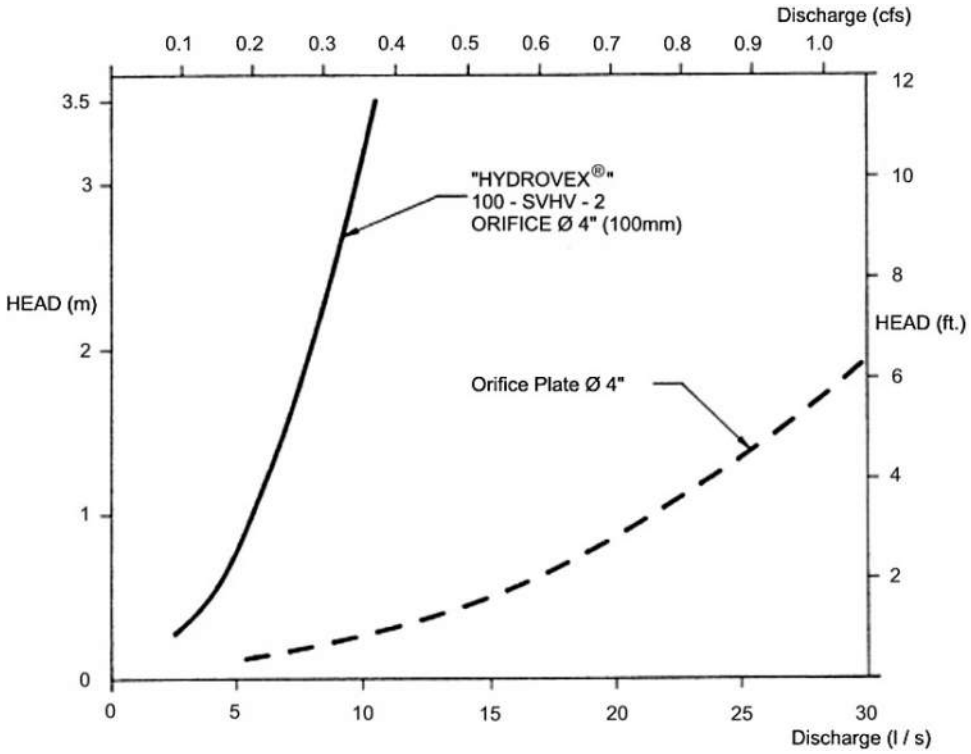


FIGURE 2: DISCHARGE CURVE SHOWING A HYDROVEX® FLOW REGULATOR VS AN ORIFICE PLATE

SELECTION

Selecting a **VHV or SVHV** regulator is easily achieved using the selection chart found at the end of this brochure (refer to **Figure 3)**. Each selection is made using the maximum allowable discharge rate and the maximum allowable water pressure (head) retained upstream from the regulator. The area in which the design point falls will designate the required VHV/SVHV model. The maximum design head is calculated as the difference between the maximum upstream water level and the invert of the outlet pipe. All selections should be verified by a John Meunier Inc. representative prior to fabrication.

Example:

- ✓ Maximum discharge 6 L/s (0.2 cfs)**
- ✓ Maximum design head 2m (6.56 ft.)
- ✓ Using **Figure 3** model required is a **75 VHV-1**

** It is important to verify the capacity of the manhole/catch basin outlet pipe. Should the outlet pipe be >80% full at design flow, the use of an air vent is required.

INSTALLATION REQUIREMENTS

HYDROVEX® VHV / SVHV flow regulators can be installed in circular or square manholes. **Figure 4** lists the minimum dimensions required for each regulator model. ***It is imperative to respect the minimum clearances shown to ensure ease of installation and proper functioning of the regulator.***

SPECIFICATIONS

In order to specify a **HYDROVEX® VHV/SVHV** flow regulator, the following parameters must be clearly indicated:

- The model number (ex: 75-VHV-1)
- The diameter and type of outlet pipe (ex: ø 6", SDR 35)
- The maximum discharge rate (ex: 6.0 L/s [0.21 CFS])
- The maximum upstream head (ex: 2.0 m [6.56 ft]) *
- The manhole diameter (ex: ø 900 mm [ø 36"])
- The minimum clearance "H" (ex: 150 mm [6 in]) as indicated in **Figure 4**
- The material type (ex: 304 stainless steel, standard)

* ***Upstream head is defined as the difference in elevation between the maximum upstream water level and the invert of the outlet pipe where the HYDROVEX® flow regulator is to be installed.***

PLEASE NOTE THAT WHEN REQUESTING A PROPOSAL, WE SIMPLY REQUIRE THAT YOU PROVIDE US WITH THE FOLLOWING INFORMATION:

- ***project design flow rate***
- ***pressure head***
- ***chamber's outlet pipe diameter and type***

Typical HYDROVEX® VHV model

OPTIONS

VHV-1-O
(extended inlet for odor control)

FV–VHV
(mounted on sliding plate for emergency bypass)

VHV with Gooseneck assembly
(manhole without clearance below regulator)

FV–VHV-O
(sliding plate with extended inlet)

VHV with upstream air vent
(applications where outlet pipe is > 80% full at peak flow)

® HYDROVEX®

VHV/SVHV Vortex Flow Regulator

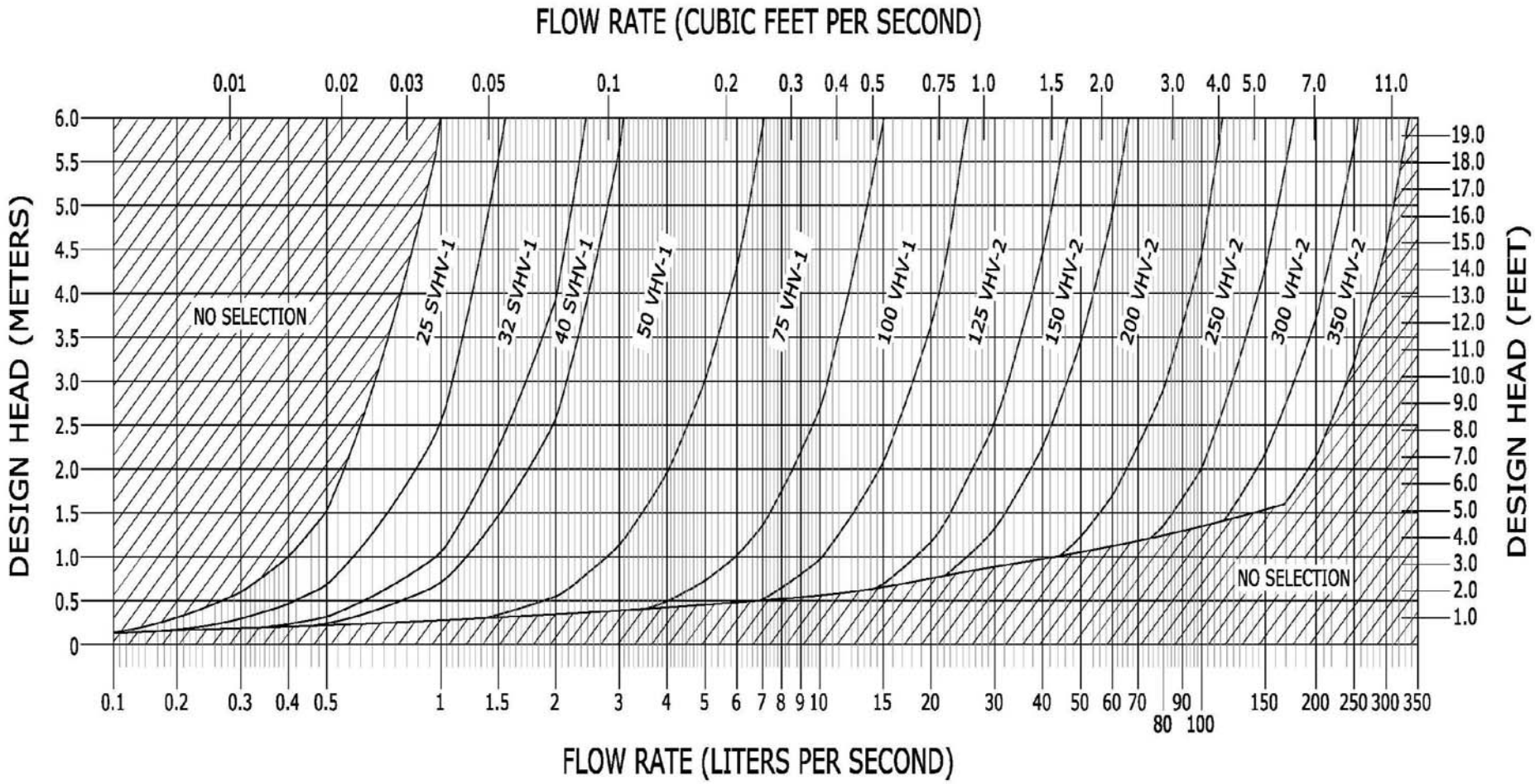


FIGURE 3

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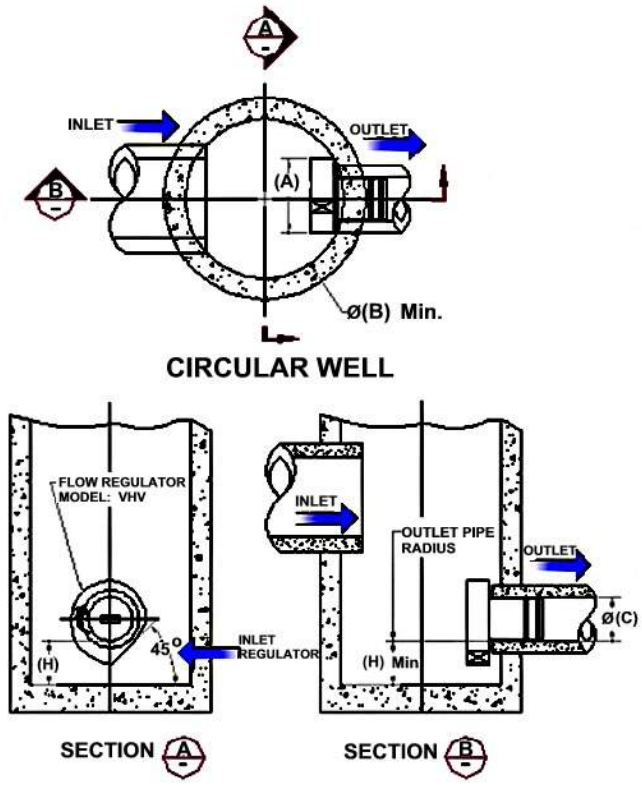
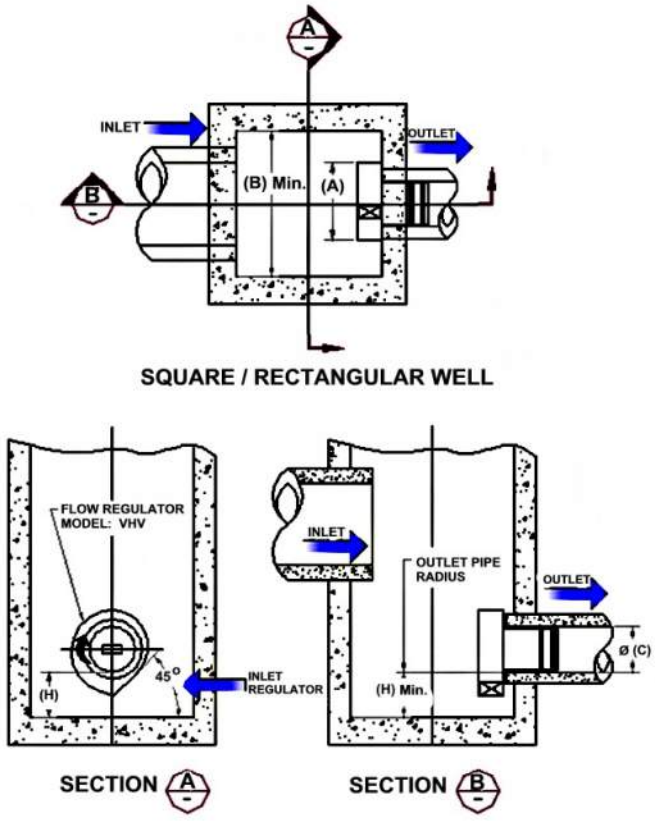
TYPICAL INSTALLATION OF A VORTEX FLOW REGULATOR IN A CIRCULAR OR SQUARE/RECTANGULAR MANHOLE
FIGURE 4

Model	Regulator Diameter **A** (mm) [in]	**CIRCULAR** Minimum Manhole Diameter **B** (mm) [in]	**SQUARE** Minimum Chamber Width **B** (mm) [in]	Minimum Outlet Pipe Diameter **C** (mm) [in]	Minimum Clearance **H** (mm) [in]
25 SVHV-1	125 [5]	600 [24]	600 [24]	150 [6]	150 [6]
32 SVHV-1	150 [6]	600 [24]	600 [24]	150 [6]	150 [6]
40 SVHV-1	200 [8]	600 [24]	600 [24]	150 [6]	150 [6]
50 VHV-1	150 [6]	600 [24]	600 [24]	150 [6]	150 [6]
75 VHV-1	250 [10]	600 [24]	600 [24]	150 [6]	150 [6]
100 VHV-1	325 [13]	900 [36]	600 [24]	150 [6]	200 [8]
125 VHV-2	275 [11]	900 [36]	600 [24]	150 [6]	200 [8]
150 VHV-2	350 [14]	900 [36]	600 [24]	150 [6]	225 [9]
200 VHV-2	450 [18]	1200 [48]	900 [36]	200 [8]	300 [12]
250 VHV-2	575 [23]	1200 [48]	900 [36]	250 [10]	350 [14]
300VHV-2	675 [27]	1600 [64]	1200 [48]	250 [10]	400 [16]
350VHV-2	800 [32]	1800 [72]	1200 [48]	300 [12]	500 [20]

Circular Manhole



Square / Rectangular Manhole



NOTE: ***In the case of a square manhole, the outlet pipe must be centered on the wall to ensure that there is enough clearance for installation of the regulator.***

INSTALLATION

The installation of a **HYDROVEX®** regulator may begin once the manhole and piping are in place. Installation consists of simply sliding the regulator into the outlet pipe of the manhole and securing it to the wall with an anchor (supplied). **John Meunier Inc.** recommends applying a lubricant on the inner surface of the outlet pipe, in order to facilitate the insertion and the manipulation of the flow controller.

MAINTENANCE

HYDROVEX® regulators are designed and manufactured to minimize maintenance requirements. We recommend a periodic visual inspection every 3-6 months (depending on local flow and sediment conditions) in order to ensure that neither the inlet nor the outlet has become blocked with debris. The manhole housing the vortex regulator should be inspected and cleaned with a vacuum truck periodically, especially after major storm events.

GUARANTY

The **HYDROVEX®** line of **VHV / SVHV** regulators are guaranteed against both design and manufacturing defects for a period of 5 years after sale. Should a flow regulator be found to be defective within the guarantee period, **John Meunier Inc.** will modify or replace the defective unit.

John Meunier Inc.
ISO 9001 : 2008

Head Office
4105 Sartelon
Saint-Laurent (Quebec) Canada H4S 2B3
Tel.: 514-334-7230 www.johnmeunier.com
Fax: 514-334-5070 cso@johnmeunier.com

Ontario Office
2000 Argentia Road, Plaza 4, Unit 430
Mississauga (Ontario) Canada L5N 1W1
Tel.: 905-286-4846 www.johnmeunier.com
Fax: 905-286-0488 ontario@johnmeunier.com

USA Office
2209 Menlo Avenue
Glenside, PA USA 19038
Tel.: 412- 417-6614 www.johnmeunier.com
Fax: 215-885-4741 asteele@johnmeunier.com

Revised: 2012-07-23

APPENDIX F

Control Flow Rood Drain Information

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

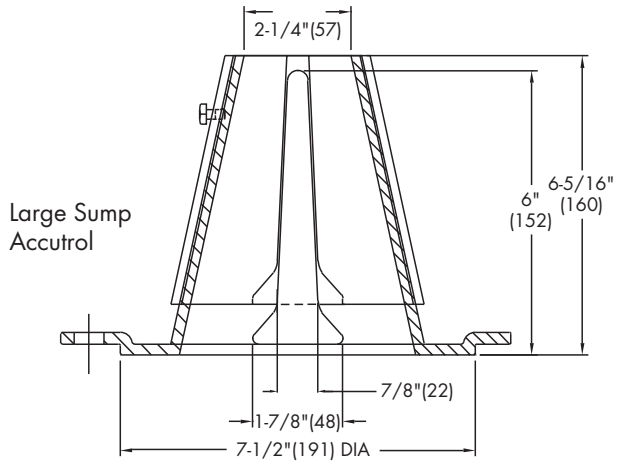
ADJUSTABLE ACCUTROL (for Large Sump Roof Drains only)

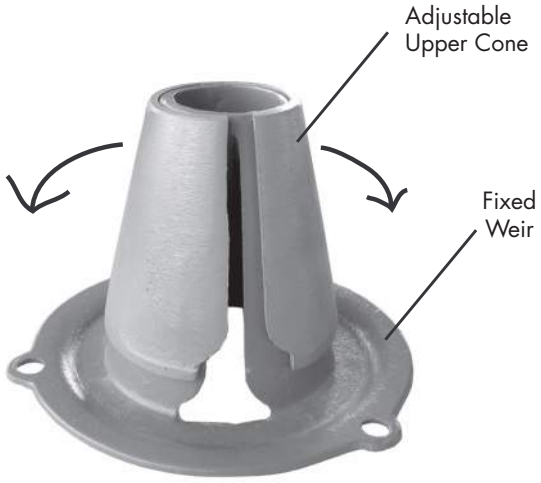
For more flexibility in controlling flow with heads deeper than 2", Watts Drainage offers the Adjustable Accutrol. The Adjustable Accutrol Weir is designed with a single parabolic opening that can be covered to restrict flow above 2" of head to less than 5 gpm per inch, up to 6" of head. To adjust the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

EXAMPLE:

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

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





1/2 Weir Opening Exposed Shown Above

TABLE 1. Adjustable Accutrol Flow Rate Settings

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

Job Name _____ Contractor _____

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

Engineer _____ Representative _____

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

WATTS®
A Watts Water Technologies Company

APPENDIX G

Water Quality Treatment Unit Information

Steve Matthews

From: Patrick Graham <patrick@echelonenvironmental.ca>
Sent: Monday, November 4, 2019 11:26 AM
To: Steve Matthews
Subject: RE: CDS Sizing Request - British High Commission in Ottawa
Attachments: CDS PMSU 2015-4 British High Commission Ottawa.pdf

Good morning Stephen,

Thanks for taking the time to speak with me this morning. As we discussed, please find attached our CDS sizing for the British High Commission in Ottawa, ON. For this site we recommend a CDS PMSU 2015_4 which has a budget price of $17,500. Below is all the information you requested about the CDS unit.

- % of net annual TSS removal – 85.4% (MOE Enhanced Level)
- % of net annual treatment volume for the tributary area – 98.8% (MOE Enhanced Level)
- The treatment capacity in L/s – 20 L/s
- The sediment storage capacity in m3 – 838 L
- The oil storage capacity in L – 232 L
- The total unit storage capacity in L – 1596 L

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 [mailto:S.Matthews@novatech-eng.com]
Sent: Sunday, November 03, 2019 12:13 PM
To: Evelyn Krolicka
Cc: Francois Thauvette
Subject: CDS Sizing Request - British High Commission in Ottawa

Hi Evelyn,

We are currently working on a project that requires a stormwater quality control unit.
The project is for the British High Commission (BHC) located in the City of Ottawa.
The project details are as follows:

Tributary area = **0.40 ha**
Imperviousness = **74%**

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 a new 300mm dia. PVC pipe with 180 degrees of separation through the structure, a second input from a new 250mm dia. PVC pipe at 90 degrees to the outlet pipe and approximately 1.2m to 1.3m of cover on all the pipes. A standard particle distribution (**Fines**) should be adequate for the design. Anticipated peak flow should be in the order of 51 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 drive aisle and CBMH structures as well as control flow drains on a portion of the proposed building roofs. See attached excerpt from the proposed stormwater management plan for a sketch of the area 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. If there is any further information you require, please do not hesitate to call.

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: British High Commission
Location: Ottawa
OGS #:

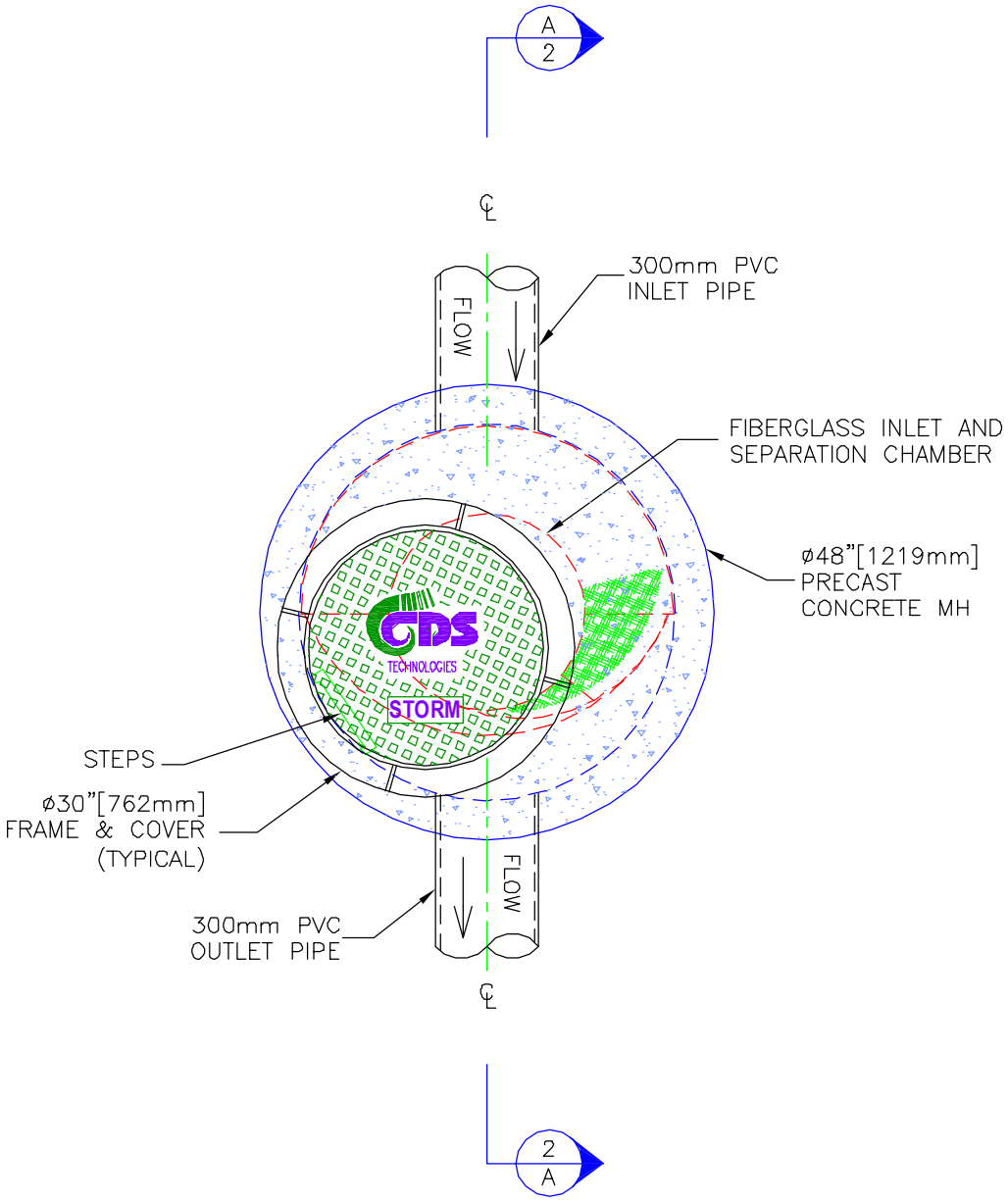
Engineer: **Novatech**
Contact: Stephen Matthews
Report Date: 4-Nov-19

Area	0.400	ha	**Rainfall Station #**	215	
Weighted C	0.73		**Particle Size Distribution**	Fine	
CDS Model	2015-4		**CDS Treatment Capacity**	20	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%	0.8	0.8	4.1	97.7	10.4
1.5	9.9%	29.7%	1.2	1.2	6.2	97.1	9.6
2.0	8.4%	38.1%	1.6	1.6	8.2	96.5	8.1
2.5	7.7%	45.8%	2.0	2.0	10.3	95.9	7.4
3.0	5.9%	51.7%	2.4	2.4	12.3	95.3	5.7
3.5	4.4%	56.1%	2.8	2.8	14.4	94.7	4.1
4.0	4.7%	60.7%	3.3	3.3	16.4	94.2	4.4
4.5	3.3%	64.0%	3.7	3.7	18.5	93.6	3.1
5.0	3.0%	67.1%	4.1	4.1	20.5	93.0	2.8
6.0	5.4%	72.4%	4.9	4.9	24.6	91.8	4.9
7.0	4.4%	76.8%	5.7	5.7	28.7	90.6	3.9
8.0	3.5%	80.3%	6.5	6.5	32.8	89.5	3.2
9.0	2.8%	83.2%	7.3	7.3	36.9	88.3	2.5
10.0	2.2%	85.3%	8.1	8.1	41.0	87.1	1.9
15.0	7.0%	92.3%	12.2	12.2	61.5	81.2	5.7
20.0	4.5%	96.9%	16.3	16.3	82.0	75.3	3.4
25.0	1.4%	98.3%	20.3	19.8	100.0	68.5	1.0
30.0	0.7%	99.0%	24.4	19.8	100.0	57.1	0.4
35.0	0.5%	99.5%	28.5	19.8	100.0	48.9	0.2
40.0	0.5%	100.0%	32.5	19.8	100.0	42.8	0.2
45.0	0.0%	100.0%	36.6	19.8	100.0	38.0	0.0
50.0	0.0%	100.0%	40.6	19.8	100.0	34.2	0.0
							91.9
						Removal Efficiency Adjustment[2] =	6.5%
						Predicted Net Annual Load Removal Efficiency =	**85.4%**
						Predicted Annual Rainfall Treated =	**98.8%**

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

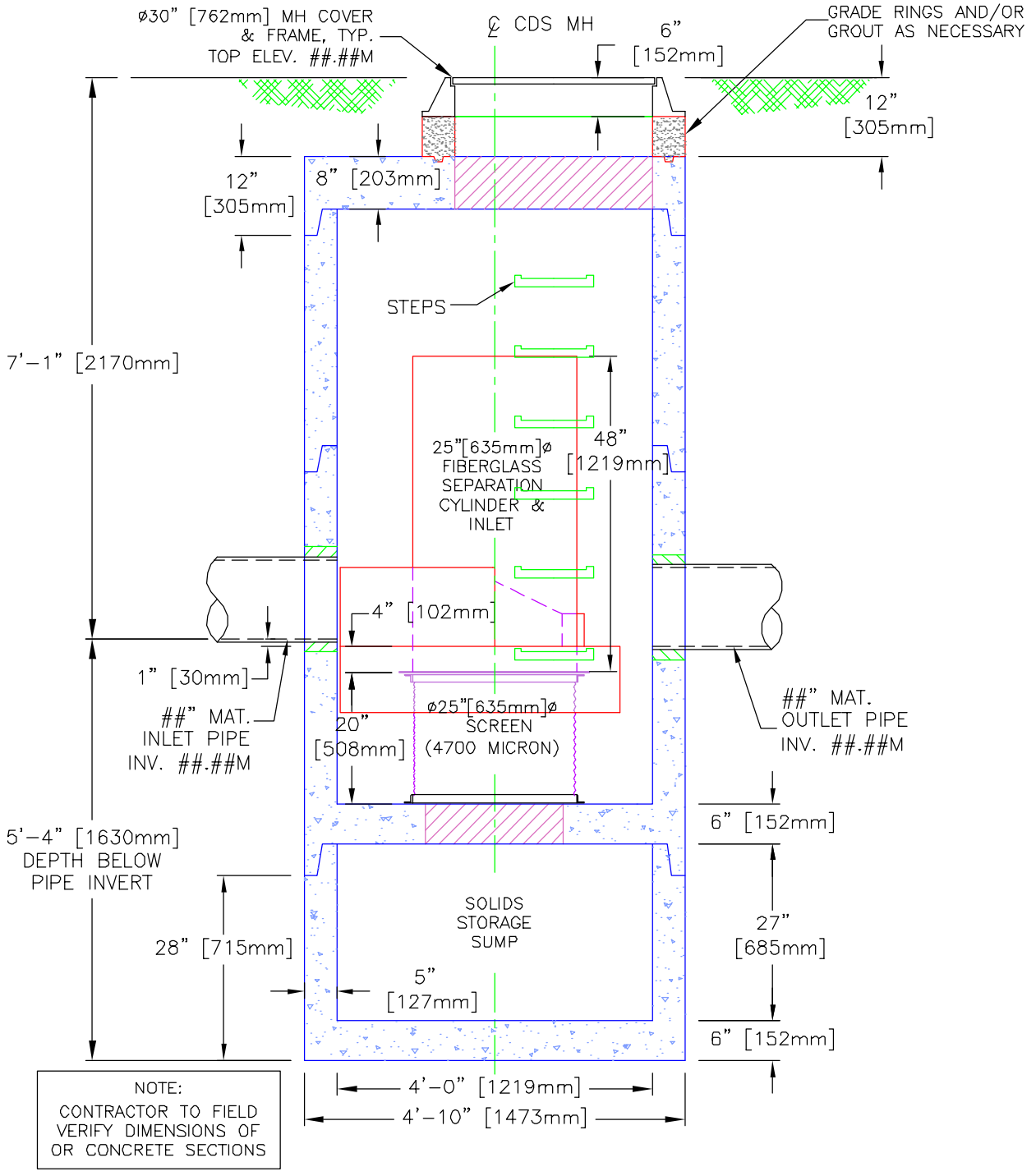


CDS MODEL PMSU20_15_4m
STORMWATER TREATMENT UNIT

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

Echelon Environmental 505 Hood Road, Unit 26, Markham, Ontario L3R 5V6 Tel: (905) 948-0000 Fax: (905) 948-0577
CONTECH Stormwater Solutions Inc. 930 Woodcock Road, Suite 101, Orlando, Florida 32803 Tel: (800) 848-9955

SECTION A–A
ELEVATION VIEW



NOTE:
CONTRACTOR TO FIELD VERIFY DIMENSIONS OF OR CONCRETE SECTIONS

CDS MODEL PMSU20_15_4m
STORMWATER TREATMENT UNIT

CONTECH STORMWATER SOLUTIONS	PROJECT NAME CITY, STATE	JOB# XX–##–###	SCALE 1" = 2'
		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 Stormwater Solutions Inc. 930 Woodcock Road, Suite 101, Orlando, Florida 32803 Tel: (800) 848-9955

GENERAL NOTES:

1. COORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
2. DETERMINE THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION. PROTECT AND ASSUME RESPONSIBILITY FOR ALL EXISTING UTILITIES WHETHER OR NOT SHOWN ON THIS DRAWING.
3. OBTAIN ALL NECESSARY PERMITS AND APPROVALS FROM THE CITY OF OTTAWA BEFORE COMMENCING CONSTRUCTION.
4. BEFORE COMMENCING CONSTRUCTION OBTAIN AND PROVIDE PROOF OF COMPREHENSIVE, ALL RISK AND OPERATIONAL LIABILITY INSURANCE FOR $5,000,000.00, INSURANCE POLICY TO NAME OWNERS, ENGINEERS AND ARCHITECTS AS CO-INSURED.
5. RESTORE ALL DISTURBED AREAS ON-SITE AND OFF-SITE, INCLUDING TRENCHES AND SURFACES ON PUBLIC ROAD ALLOWANCES TO EXISTING CONDITIONS OR BETTER TO THE SATISFACTION OF THE CITY OF OTTAWA AND ENGINEER.
6. REMOVE FROM SITE ALL EXCESS EXCAVATED MATERIAL, ORGANIC MATERIAL AND DEBRIS UNLESS OTHERWISE INSTRUCTED BY ENGINEER, EXCAVATE AND REMOVE FROM SITE ANY CONTAMINATED MATERIAL. ALL CONTAMINATED MATERIAL SHALL BE DISPOSED OF AT A LICENSED LANDFILL FACILITY.
7. ALL ELEVATIONS ARE GEODETIC.
8. REFER TO THE GEOTECHNICAL INVESTIGATION REPORT (NO. 18109580, DATED JANUARY, 2019) PREPARED BY GOLDER ASSOCIATES LTD., FOR SUBSURFACE CONDITIONS, CONSTRUCTION RECOMMENDATIONS, AND GEOTECHNICAL INSPECTION REQUIREMENTS. THE GEOTECHNICAL CONSULTANT IS TO REVIEW ON-SITE CONDITIONS AFTER EXCAVATION PRIOR TO PLACEMENT OF THE GRANULAR MATERIAL.
9. REFER TO ARCHITECT'S AND LANDSCAPE ARCHITECT'S DRAWINGS FOR BUILDING AND HARD SURFACED AREAS AND DIMENSIONS.
10. REFER TO THE 'DEVELOPMENT SERVICING STUDY AND STORMWATER MANAGEMENT REPORT' (R-2019-143) PREPARED BY NOVATECH ENGINEERING CONSULTANTS LTD.
11. SAW CUT AND KEY GRIND ASPHALT AT ALL ROAD CUTS AND ASPHALT TIE IN POINTS AS PER CITY OF OTTAWA STANDARDS (R10).
12. PROVIDE LINE/PARKING PAINTING.
13. CONTRACTOR TO PROVIDE THE CONSULTANT WITH A SERVICING PLAN OF C-100 INDICATING ALL SERVICING AS-BUILT INFORMATION SHOWN ON THIS PLAN. AS-BUILT INFORMATION MUST INCLUDE: PIPE MATERIAL, SIZES, LENGTHS, SLOPES, INVERT AND T/G ELEVATIONS, STRUCTURE LOCATIONS, 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.
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 C-200.

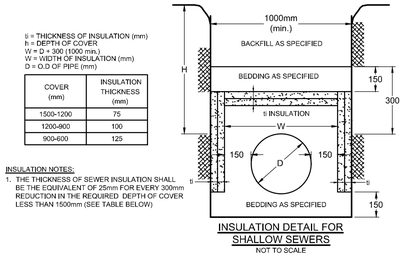
Erosion and Sediment Control Responsibilities:

				During Construction			After Construction Prior to Final Acceptance		After Final Acceptance
	ESC Measure	Symbol	Specification	Installation Responsibility	Inspection/Maintenance Responsibility	Inspection Frequency	Approval to Remove	Removal Responsibility	Inspection/Maintenance Responsibility
Temporary Measures	Silt Fence		OPSD 219.110	Developer's Contractor	Developer's Contractor	Weekly (as a minimum)	Consultant	Developer's Contractor	N/A
	Filter 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		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



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

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

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

INSULATION DETAIL FOR SHALLOW SEWERS
NOT TO SCALE

INLET CONTROL DEVICE DATA TABLE - CBMH 1

DESIGN EVENT	ICD TYPE (PLUG TYPE)	DIAMETER OF OUTLET PIPE (mm)	DESIGN FLOW (L/s)	DESIGN HEAD (m)	WATER ELEVATION (m)	VOLUME (m^3)	AVAILABLE STORAGE
1:2 YR	HYDROVEX VORTEX MODEL 200 VHV-2	300mmØ PVC	20.7	0.38	55.62	4.8	14.8 m^3
1:5 YR			21.3	0.45	55.69	6.1	
1:100 YR			35.2	1.23	56.47	14.4	

GUARD HOUSE ROOF DRAIN TABLE: AREA R-1 (ROOF DRAIN 1)

AREA ID *	ROOF DRAIN No. (WATTS MODEL)	ROOF DRAIN OPENING SETTING	1:5 YEAR RELEASE RATE	APPROX. 5-YR PONDING DEPTH	1:100 YEAR RELEASE RATE	APPROX. 100-YR PONDING DEPTH
R-1	RD 1 (RD-100-A-ADJ)	1/4 EXPOSED	0.79 L/s	10 cm	0.87 L/s	14 cm

BHC ROOF DRAIN TABLE: AREA R-2 (ROOF DRAINS 2 to 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 2 (RD-100-A-ADJ)	1/4 EXPOSED	0.79 L/s	10 cm	0.87 L/s	14 cm
R-2	RD 3 (RD-100-A-ADJ)	1/4 EXPOSED	0.79 L/s	10 cm	0.87 L/s	14 cm
R-2	RD 4 (RD-100-A-ADJ)	1/4 EXPOSED	0.79 L/s	10 cm	0.87 L/s	14 cm
R-2	RD 5 (RD-100-A-ADJ)	1/4 EXPOSED	0.79 L/s	10 cm	0.87 L/s	14 cm
R-2	RD 6 (RD-100-A-ADJ)	CLOSED	0.32 L/s	10 cm	0.32 L/s	13 cm
R-2	RD 7 (RD-100-A-ADJ)	CLOSED	0.32 L/s	10 cm	0.32 L/s	14 cm
R-2	RD 8 (RD-100-A-ADJ)	CLOSED	0.32 L/s	9 cm	0.32 L/s	13 cm
R-2	RD 9 (RD-100-A-ADJ)	CLOSED	0.32 L/s	11 cm	0.32 L/s	14 cm
R-2	RD 10 (RD-100-A-ADJ)	CLOSED	0.32 L/s	11 cm	0.32 L/s	14 cm
R-2	RD 11 (RD-100-A-ADJ)	CLOSED	0.32 L/s	10 cm	0.32 L/s	14 cm
R-2	RD 12 (RD-100-A-ADJ)	1/4 EXPOSED	0.79 L/s	10 cm	0.87 L/s	14 cm
R-2	TERRACE DECK DRAINS	UN-CONTROLLED	4.2 L/s	---	7.9 L/s	---

* REFER TO THE 'DEVELOPMENT SERVICING STUDY AND STORMWATER MANAGEMENT REPORT' (R-2019-143) 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 :

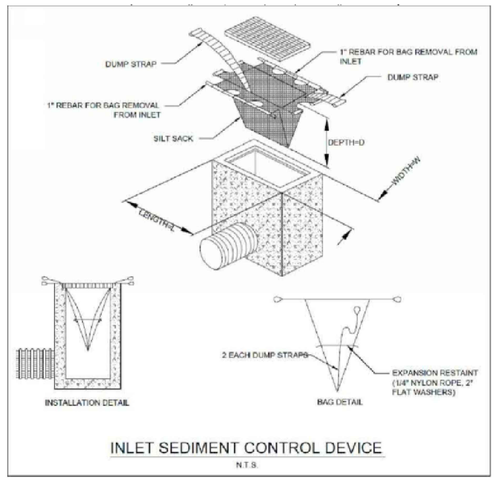
THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES, TO PROVIDE FOR PROTECTION OF THE AREA DRAINAGE SYSTEM AND THE RECEIVING WATERCOURSE, DURING CONSTRUCTION ACTIVITIES. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES 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 CLOTH WILL BE PLACED UNDER GRATES OF NEARBY CATCHBASINS AND STRUCTURES. A LIGHT DUTY SILT FENCE BARRIER WILL ALSO BE INSTALLED AROUND THE CONSTRUCTION AREA (WHERE APPLICABLE). THESE CONTROL MEASURES WILL REMAIN IN PLACE UNTIL CONSTRUCTION IS COMPLETE.
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.

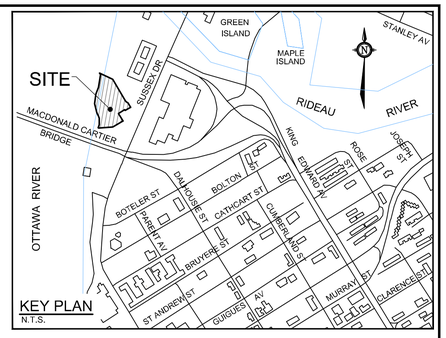
PROPOSED 200mmØ WATERMAIN TABLE

STATION	SURFACE ELEVATION	T/WM ELEVATION	COMMENTS
0+00	57.60±	55.20± *	CONNECTION TO EX. 150mmØ WM
0+00.3	57.58	55.18	200 x 150 REDUCER
0+00.6	57.55	55.15	22.5° VERTICAL BEND
0+01,8	57,35	54.65	22,5° VERTICAL BEND
0+03.4	57.05	54.65	CROSS NEW HA-HA DITCH (2.4m COVER BELOW DITCH)
0+07.5	57.65	54.60	11.25° HORIZONTAL BEND
0+18.5-0+22.7	56.83-57.00	54.55	BULK WATER METER IN R4 CHAMBER
0+27.3	56.75	54.75 **	150mmØ HYDRANT TEE
0+28,2	56,75	54,80 **	22.5° HORIZONTAL BEND
0+32.5	56.73	55.00 **	CROSS ABOVE EX. 300Ø SAN (±0.5m CLEARANCE)
0+34,2	56.74	54.80 **	22.5° HORIZONTAL BEND
0+36.1	56.75	54.60 **	PROPERTY LINE / 200mmØ VALVE & VALVE BOX
0+41.1	56.72	54.32	CROSS BELOW 250mmØ STM (±0.9m CLEARANCE)
0+54,0	56,64	54,24	25mmØ SERVICE TEE (1+00)
0+54.9	56.64	54.24	45° HORIZONTAL BEND
0+58,5	56,64	54,24	45° HORIZONTAL BEND
0+75.0	56.55	54.05	CROSS BELOW 200Ø SAN (±0.5m CLEARANCE)
0+77.6	56.55	54.05	150mmØ HYDRANT TEE
0+90,6	56,47	54,07	200 x 200 x 200 SERVICE TEE (2+00)
0+92.1	56.47	54.07	200mmØ VALVE & VALVE BOX
0+100.5	56.67	54.07	CROSS BELOW 200Ø SAN (±0.6m CLEARANCE)
0+102.8	56.67	54.07	45° HORIZONTAL BEND
0+105.3	56.60	54.07	200 x 100 REDUCER
0+105.8	56,60	54,06	CROSS BELOW RETAINING WALL
0+107.6	56.45±	54.05± *	CONNECTION TO EX. 100mmØ WM
1+00	56,64	54.24	25mmØ SERVICE TEE (0+54.0) - ROLL CONNECTION TO CROSS SAN
1+02.5	56,64	53.85	CROSS BELOW 200mmØ SAN (±0.5m CLEARANCE)
1+04.0	56.64	53.95	CROSS BELOW 300mmØ STM (±1.3m CLEARANCE)
1+05,0	56,65	54.15	25mmØ STAND POST
1+09.6	56.75	54.25	45° HORIZONTAL BEND
1+10,3	56,80	54.25	45° HORIZONTAL BEND
1+10,7	56,80	54.25	25mmØ CAP FOR BUILDING SERVICE
2+00	56.47	54.07	200 x 200 x 200 SERVICE TEE (0+90.6)
2+01.0	56,49	54.09	200mmØ VALVE & VALVE BOX
2+15.1	56,68	54.28	22.5° HORIZONTAL BEND
2+16.3	56,70	54.30	CROSS BELOW 250mmØ STM (±1.1m CLEARANCE)
2+25.7	56,75	54.30	22.5° HORIZONTAL BEND
2+38.0	57.20	54.35	200 x 150 REDUCER
2+38.6	57.22	54.35	45° HORIZONTAL BEND
2+39.4	57,25	54.35	45° HORIZONTAL BEND
2+39.7	57,25	54,35	150mmØ CAP FOR BUILDING SERVICE

* CONNECTIONS TO EXISTING 150mmØ and 100mmØ WATERMAINS. EXACT ELEVATIONS TO BE FIELD DETERMINED.
** PROVIDE THERMAL INSULATION AS PER CITY OF OTTAWA DETAIL W23 ADJACENT TO OPEN STRUCTURES.



INLET SEDIMENT CONTROL DEVICE
N.T.S.



BENCHMARK INFO:

JOB BENCHMARK: TOP OF SPINDLE OF EXISTING ON-SITE FIRE HYDRANT LOCATED ALONG THE SOUTH SIDE OF THE EXISTING SITE ACCESS ROAD.

GEODETIC ELEVATION = 57.41m.

REFER TO PLANS C-100 AND C-200 FOR LOCATION OF JOB BENCHMARKS.

THE EXISTING GRADES SHOWN ON THE PLANS ARE TAKEN DIRECTLY FROM TOPOGRAPHICAL SURVEY PLAN (Ref. # 18151-18 BHC), PREPARED BY ANNIS, O'SULLIVAN, VOLLEBEKK SIGNED AND DATED DECEMBER 7, 2018.

THE BOUNDARY INFORMATION IS TAKEN FROM THE SAME TOPO SURVEY PLAN AND WAS COMPILED BY THE OLS BASED ON PLANS 4R-14198 AND 4R-16305.

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

WATERMAIN NOTES:

1. SUPPLY AND CONSTRUCT ALL WATERMAINS AND APPURTENANCES IN ACCORDANCE WITH THE CITY OF OTTAWA STANDARDS AND SPECIFICATIONS. EXCAVATION, INSTALLATION, BACKFILL AND RESTORATION OF ALL WATERMAINS BY THE CONTRACTOR. CONNECTIONS AND SHUT-OFFS AT THE MAIN BY CITY OF OTTAWA FORCES. CHLORINATION OF THE WATER SYSTEM SHALL BE PERFORMED BY THE CONTRACTOR IN THE PRESENCE CITY OF OTTAWA FORCES.
2. SPECIFICATIONS:

ITEM	SPEC. No.	REFERENCE
WATERMAIN TRENCHING	W17	CITY OF OTTAWA
HYDRANT INSTALLATION	W19	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
BULK WATER METER CHAMBER	W32.1	CITY OF OTTAWA
WATERMAIN	PVC DR 18 or TYPE 'K' SOFT COPPER	

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.

THIS PLAN IS TO BE READ IN CONJUNCTIN WITH PLANS C-100 AND C-200

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

No.	REVISION	DATE	BY
2	ISSUED FOR SITE PLAN APPROVAL	NOV 8/19	FST
1	ISSUED FOR NCC REVIEW	NOV 1/19	FST

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

DESIGN SM / FST
CHECKED FST
DRAWN SM
CHECKED FST
APPROVED FST

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER
F.S. THAUVETTE
100041399
NOV. 8, 2019
PROVINCE OF ONTARIO

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

LOCATION
CITY of OTTAWA
BRITISH HIGH COMMISSION - EARNSCLIFFE

DRAWING NAME
NOTES, DETAILS & TABLES

PROJECT No. 119116
REV REV # 2
DRAWING No. C-000

CITY PLAN #_____-NDT

D07-12-19-

M:\2019\119116\CAD\Design\119116-NDT.dwg, NDT, Nov 08, 2019 - 2:44pm, smatthews

NOT FOR CONSTRUCTION

NRC PARKING LOT

CONNECT TO EXISTING STORM MANHOLE WITH NEW 300mmØ SEWER AND SUBDRAIN FROM HA-HA DITCH. PROPOSED 300mmØ TO HAVE 45° LONG RADIUS BEND INTO MANHOLE. PROPOSED 300mmØ INVERT AT CONNECTION=54.86±. PROPOSED 250mmØ INVERT AT CONNECTION=55.10±. MAINTAIN AND PROTECT EXISTING STRUCTURE AND INLET / OUTLET SEWERS. CONTRACTOR TO CONFIRM EXACT ELEVATION OF SEWER PRIOR TO CONSTRUCTION AND NOTIFY ENGINEER OF ANY DISCREPANCIES.

MAINTAIN AND PROTECT EXISTING STORM SEWERS, CATCHBASIN AND STORM MANHOLE. ADJUST TOP OF GRATES TO SUIT FINISHED GRADES AS SHOWN

PLUG AND ABANDON PORTION EXISTING STORM SEWER TO ENTRANCE CATCHBASIN.

CONNECT TO EXISTING STORM SEWER WITH 250x250x200 TEE. MAINTAIN AND PROTECT EXISTING OUTLET SEWER. CONTRACTOR TO CONFIRM EXACT ELEVATION OF SEWER PRIOR TO CONSTRUCTION AND NOTIFY ENGINEER OF ANY DISCREPANCIES.

200x200 SAN TEE (INV=54.30)
3.6m-200mmØ PVC DR35 SAN @ 3.0%

300x200 STM TEE (INV=55.19)
2.1m-200mmØ PVC DR35 STM @ 3.0%

CB 3
T/G=56.60
INV=55.40

CDS UNIT
MODEL 2D_15_4
T/G=56.69
INV.N=55.17
INV.W=55.18
INV.SE=55.16

LD 1
T/G=56.80
INV=55.20

250Ø

NEW HA-HA DITCH (REFER TO LANDSCAPE PLANS FOR DETAILS)

REDUCER

0+00

200mmØ PVC DR18 WATERMAIN

CONNECTION TO EXISTING 150mmØ PVC WATERMAIN BY CITY OF OTTAWA FORCES. REMOVE PORTION OF EXISTING WATERMAIN AND REPLACE WITH NEW UPSIZED WATERMAIN, AS SHOWN, TO SERVICE THE SUBJECT SITE. EXCAVATION, BACKFILL, CHLORINATION AND REINSTATEMENT BY CONTRACTOR.

GUARD HOUSE

25mmØ TYPE 'K' SOFT COPPER WATER

T/WM=RD 1 =54.20
1+10.7

FFE=56.90

STM INV=55.25

SAN INV=54.40

250Ø STM

200Ø SAN

CBMH 1
T/G=56.65
INV.NW=55.08
INV.SE=55.05

26.6m-300mmØ PVC DR35 STM @ 0.7%

20mmØ PVC DR18 WATERMAIN

SUSSEX DRIVE

CBMH 2
T/G=56.40
INV.W=55.25
INV.S=55.24

ICD

SP

20.8m-300mmØ PVC DR35 STM @ 0.35%

23.0m-200mmØ PVC DR35 SAN @ 0.35%

0+50

1+00

VB

RELOCATED HYD T/FL=57.20

PROVIDE NEW BULK WATER METER IN R4 CHAMBER PER CITY STANDARD DETAIL W32.1

JOB BENCHMARK No.2
TOP OF SPINDLE
Elev.=57.91

10.9m-300mmØ PVC DR35 STM @ 0.7%

SAN MH 1
T/G=56.45
(WATERTIGHT)
INV.W=54.42
INV.S=54.36

GAS METER

RD 2

RELOCATE EXISTING FIRE HYDRANT TO BACK OF NEW SIDEWALK AS REQUIRED.

21.0m-450mmØ PVC DR35 STM @ 0.2%

BUILDING ABOVE

CB 1
T/G=56.50
INV=55.35

CONNECT TO EXISTING SANITARY MANHOLE WITH NEW 200mmØ SEWER. PROPOSED INVERT AT CONNECTION=54.28±. REMOVE PORTIONS OF EXISTING ON-SITE COMBINED SEWERS AS INDICATED. MAINTAIN AND PROTECT EXISTING STRUCTURE AND OUTLET SEWER. CONTRACTOR TO CONFIRM EXACT ELEVATION OF SEWER PRIOR TO CONSTRUCTION AND NOTIFY ENGINEER OF ANY DISCREPANCIES.

34.2m-200mmØ PVC DR35 SAN @ 0.35%

200mmØ PVC DR18 WATERMAIN

7.7m-200mmØ PVC DR35 SAN @ 1.2%

CBMH 3
T/G=56.40
INV.E=55.29
INV.W=55.30
HYD
T/FL=56.75

0+75

TEE
INV=54.51

INV=54.60

RD 3

CB 2
T/G=56.50
INV=55.35

1.2m-200mmØ PVC DR35 STM @ 2.0%

RE-CONNECT EXISTING TWIN FORCEMAINS (SANITARY SERVICE) FROM EXISTING EARNSCLIFFE PUMP STATION. CONTRACTOR TO CONFIRM EXACT LOCATION, ELEVATION AND ALIGNMENT OF EXISTING FORCEMAINS PRIOR TO CONSTRUCTION AND NOTIFY ENGINEER OF ANY DISCREPANCIES.

18.5m-450mmØ PVC DR35 STM @ 0.2%

JOB BENCHMARK
TOP OF SPINDLE
Elev.=57.41

PROPOSED 2-STOREY BUILDING
FFE=56.75

STM INV=55.42

STM MH 1
T/G=56.68
INV.E=55.33
INV.N=55.39
INV.W=55.34

REDUCER

200mmØ PVC DR18 WM

2+39.7

2+30.7

SAN MH 2
T/G=56.45
(WATERTIGHT)
INV.E=54.54
INV.NW=T.B.D.
INV.W=54.55

CBMH 4
T/G=56.35
INV.E=55.34

2+00

VB

RD 4

200mmØ PVC DR18 WATERMAIN

SIAMESE

RD 11

TWM=54.35
150mmØ PVC
DR18 WM

RD 10

12.8m-200mmØ PVC DR35 SAN @ 0.35%

0+100

11.9m-250mmØ PVC DR35 STM @ 1.0%

PROPOSED 3-STOREY BUILDING
FFE=56.75

SAN INV=54.75

STM INV=55.46

RD 6

RD 5

RD 12

RED

SAN MH 3
T/G=56.48
(WATERTIGHT)
INV.E=54.60
INV.S=54.66

0+107.6

7.6m-200mmØ PVC DR35 SAN @ 1.1%

RD 7

RD 9

RD 8

ROOFTOP TERRACE

RE-CONNECT PORTION OF EXISTING ON-SITE WATER SERVICE TO EARNSCLIFFE RESIDENCE AS SHOWN. EXACT LOCATION AND ELEVATION TO BE DETERMINED IN THE FIELD. EXCAVATION, BACKFILL, CHLORINATION AND REINSTATEMENT BY CONTRACTOR.

OTTAWA RIVER

NEW HA-HA DITCH (REFER TO LANDSCAPE PLANS FOR DETAILS)

NEW HA-HA DITCH (REFER TO LANDSCAPE PLANS FOR DETAILS)

KEY PLAN
N.T.S.

SITE

GREEN ISLAND
MAPLE ISLAND
STANLEY AV
SUSSEX DR
RIDEAU RIVER
MACDONALD CARTIER BRIDGE
OTTAWA RIVER
KING EDWARD AV
ROSE ST
JOSEPH ST
BOLTON ST
CATHCART ST
DALHOUSIE ST
CHAMBERLAIN AV
BRUYERE ST
MURRAY ST
CLARENCE ST
ST ANDREW ST
GUIGUES AV
BOTELER ST
RIDEAU HALL

LEGEND

- SAN MH 1 — PROPOSED SANITARY MH & SEWER
- CBMH 3 — PROPOSED CATCHBASIN MH & SEWER
- STM MH 1 — PROPOSED STORM MH & SEWER
- CB 2 — PROPOSED CATCHBASIN & LEAD
- LD 1 — PROPOSED LANDSCAPE DRAIN PER S29 & S31
- HYD — VB — PROPOSED HYDRANT c/w VALVE & VALVE BOX
- PROPOSED BARRIER CURB
- DC — PROPOSED DEPRESSED CURB
- 200mmØ — PROPOSED WATERMAIN AND DIAMETER
- VC — PROPOSED VALVE & VALVE CHAMBER (PER CITY STD W3)
- SP — PROPOSED STANDPOST
- 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
- FFE — FINISHED FLOOR ELEVATION
- STORMWATER QUALITY CONTROL UNIT
- X—X — EXISTING INFRASTRUCTURE TO BE REMOVED OR ABANDONED
- DD — MECHANICAL DECK DRAIN (UNCONTROLLED ROOFTOP TERRACE)
- PROPOSED O/H GARAGE DOOR

REFER TO PLAN C-000 FOR NOTES, DETAILS AND TABLES

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

No.	REVISION	DATE	BY
2	ISSUED FOR SITE PLAN APPROVAL	NOV 8/19	FST
1	ISSUED FOR NCC REVIEW	NOV 1/19	FST

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

DESIGN SM / FST
CHECKED FST
DRAWN SM
CHECKED FST
APPROVED FST

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER
F.S. THAUVETTE
100041389
NOV. 8, 2019
PROVINCE OF ONTARIO

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

LOCATION
CITY of OTTAWA
BRITISH HIGH COMMISSION - EARNSCLIFFE

DRAWING NAME
SERVICING PLAN

PROJECT No. 119116
REV REV # 2
DRAWING No. C-100

CITY PLAN # D07-12-19-

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PLANNING - PRINTING

NOT FOR CONSTRUCTION

REMOVE SECTION OF EXISTING CURB AS REQUIRED. MATCH INTO EXISTING NRC PARKING LOT ASPHALT AND CURBS PER CITY OF OTTAWA STANDARDS. REINSTATE ALL DISTURBED AREAS TO EXISTING CONDITIONS OR BETTER.

NRC PARKING LOT

MATCH INTO EXISTING GRADES OF NRC PARKING LOT. MINIMIZE DISTURBANCE TO EXISTING VEGETATION. PROVIDE POSITIVE DRAINAGE ALONG NEW EGRESS ROUTE.

INSTALL LIGHT DUTY SILT FENCE PER OPSD 219.110 IN ACCORDANCE WITH ESC NOTE No. 3 (TYPICAL)

INSTALL FILTER BAG PER ESC NOTE No. 3 (TYPICAL)

MATCH INTO EXISTING SITE ENTRANCE WITH NEW CURB, SIDEWALK AND ASPHALT ROADWAY PER CITY OF OTTAWA STANDARDS.

MATCH INTO EXISTING ASPHALT ROADWAY ELEVATIONS. SAW CUT AND KEY-GRIND PER CITY OF OTTAWA STANDARD R-10.

EXACT ALIGNMENT OF PROPOSED SECONDARY EGRESS (LIGHT DUTY ASPHALT) TO BE DETERMINED IN FIELD.

CONCRETE PAVING (SEE LANDSCAPE PLANS FOR DETAILS)

MAINTAIN AND PROTECT EXISTING ON-SITE VEGETATION AND EARNSCLIFFE GROUNDS. MAINTAIN EXISTING DRAINAGE PATTERNS.

INSTALL LIGHT DUTY SILT FENCE ALONG FACE OF HOARDING PER OPSD 219.110 IN ACCORDANCE WITH ESC NOTE No. 3 (TYPICAL)

MATCH INTO EXISTING DRIVEWAY ELEVATIONS. MAINTAIN AND PROTECT EXISTING INTERLOCK PAVERS.

MATCH INTO EXISTING ASPHALT ROADWAY ELEVATIONS. SAW CUT AND KEY-GRIND PER CITY OF OTTAWA STANDARD R-10.

JOB BENCHMARK TOP OF SPINDLE Elev.=57.41

MAINTAIN AND PROTECT EXISTING ON-SITE VEGETATION AND EARNSCLIFFE GROUNDS. MATCH INTO EXISTING GRADES AT PERIMETER OF SITE. MAINTAIN EXISTING DRAINAGE PATTERNS.

INSTALL LIGHT DUTY SILT FENCE ALONG FACE OF HOARDING PER OPSD 219.110 IN ACCORDANCE WITH ESC NOTE No. 3 (TYPICAL)

INSTALL FILTER BAG PER ESC NOTE No. 3 (TYPICAL)

CDS UNIT MODEL 2D_15_4 T/G=56.69

CB 3 T/G=56.60

GUARD HOUSE FFE=56.90

CBMH 1 T/G=56.65

CBMH 2 T/G=56.40

CONCRETE SALLY PORT

RELOCATED HYD T/FL=57.20

JOB BENCHMARK No.2 TOP OF SPINDLE Elev.=57.91

INSTALL LIGHT DUTY SILT FENCE ALONG CONSTRUCTION FENCE PER OPSD 219.110 IN ACCORDANCE WITH ESC NOTE No. 3 (TYPICAL)

SAN MH 1 T/G=56.45 (WATERTIGHT)

CBMH 3 T/G=56.40

HYD T/FL=56.75

GAS METER

INSTALL FILTER BAG PER ESC NOTE No. 3 (TYPICAL)

CB 1 T/G=56.50

MAINTAIN AND PROTECT EXISTING VEGETATION ON NCC LANDS. MATCH INTO EXISTING GRADES AT PERIMETER OF SITE. MAINTAIN ALL EXISTING DRAINAGE PATTERNS.

CB 2 T/G=56.50

INSTALL LIGHT DUTY SILT FENCE ALONG EXISTING FENCELINE PER OPSD 219.110 IN ACCORDANCE WITH ESC NOTE No. 3 (TYPICAL)

STM MH 1 T/G=56.68

PROPOSED 2-STOREY BUILDING FFE=56.75

PROPOSED 3-STOREY BUILDING FFE=56.75

SAN MH 2 T/G=56.45 (WATERTIGHT)

CBMH 4 T/G=56.35

SAN MH 3 T/G=56.48 (WATERTIGHT)

INSTALL FILTER BAG PER ESC NOTE No. 3 (TYPICAL)

INSTALL LIGHT DUTY SILT FENCE ALONG EXISTING FENCELINE PER OPSD 219.110 IN ACCORDANCE WITH ESC NOTE No. 3 (TYPICAL)

INSTALL LIGHT DUTY SILT FENCE ALONG EXISTING FENCELINE PER OPSD 219.110 IN ACCORDANCE WITH ESC NOTE No. 3 (TYPICAL)

MAINTAIN AND PROTECT EXISTING ON-SITE VEGETATION AND EARNSCLIFFE GROUNDS. MATCH INTO EXISTING GRADES AT PERIMETER OF SITE. MAINTAIN EXISTING DRAINAGE PATTERNS.

PROVIDE 8 RISERS @ 0.16m EACH

ROOFTOP TERRACE

MAINTAIN AND PROTECT EXISTING VEGETATION ON NCC LANDS. MATCH INTO EXISTING GRADES AT PERIMETER OF SITE. PROVIDE POSITIVE DRAINAGE TOWARDS THE RIVER.

INSTALL LIGHT DUTY SILT FENCE ALONG CONSTRUCTION FENCE PER OPSD 219.110 IN ACCORDANCE WITH ESC NOTE No. 3 (TYPICAL)

INSTALL LIGHT DUTY SILT FENCE ALONG CONSTRUCTION FENCE PER OPSD 219.110 IN ACCORDANCE WITH ESC NOTE No. 3 (TYPICAL)

MATCH INTO EXISTING GRADES ALONG PERIMETER OF NEW HAHA DITCH. PROVIDE POSITIVE DRAINAGE FROM THE BOTTOM OF THE DITCH TO EXISTING GRADES AS SHOWN.

MATCH INTO EXISTING GRADES ALONG PERIMETER OF NEW HAHA DITCH. PROVIDE POSITIVE DRAINAGE FROM THE BOTTOM OF THE DITCH TO EXISTING GRADES AS SHOWN.

SUSSEX DRIVE

OTTAWA RIVER

LD 1 T/G=56.80

EXISTING 1 1/2 STOREY STONE DWELLING

KEY PLAN N.T.S.

SITE

MACDONALD CARTIER BRIDGE

GREEN ISLAND

MAPLE ISLAND

STANLEY AV

SUSSEX DR

RIDEAU RIVER

KING EDWARD AV

ROSE

JOSEPH ST

OTTAWA RIVER

BOTELER ST

DALHOUSIE ST

BOLTON ST

CATHCART ST

PARENT AV

CUMBERLAND ST

BRUYERE ST

ST ANDREW ST

GUIGUES AV

MURRAY ST

CLARENCE ST

LEGEND

56.65 / 56.86	PROPOSED ELEVATION / *EXISTING ELEVATION*
× 56.44	EXISTING ELEVATION
56.10(S)	PROPOSED SWALE ELEVATION
56.85T/C	PROPOSED TOP OF CURB ELEVATION
56.75	PROPOSED TERRACE ELEVATION
2.0%	GRADE AND DIRECTION
	MAXIMUM 3:1 SIDESLOPE
	EMERGENCY OVERLAND FLOW ROUTE
SAN MH 1	PROPOSED SANITARY MANHOLE
CBMH 3	PROPOSED CATCHBASIN MANHOLE
STM MH 1	PROPOSED STORM MANHOLE
CB	PROPOSED CATCHBASIN
HYD / VVB	PROPOSED HYDRANT AND VALVE
	PROPOSED BARRIER CURB
DC	PROPOSED DEPRESSED CURB
ICD	PROPOSED INLET CONTROL DEVICE
RD	PROPOSED ROOF DRAIN
FFE	PROPOSED FINISHED FLOOR ELEVATION

NOTE:
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2	ISSUED FOR SITE PLAN APPROVAL	NOV 8/19	FST
1	ISSUED FOR NCC REVIEW	NOV 1/19	FST

SCALE 1:250

1:250
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DESIGN SM / FST
CHECKED FST
DRAWN SM
CHECKED FST
APPROVED FST

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER F.S. THAUVETTE 100041399 NOV 8, 2019 PROVINCE OF ONTARIO

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

LOCATION
CITY of OTTAWA
BRITISH HIGH COMMISSION - EARNSCLIFFE

DRAWING NAME
GRADING AND EROSION & SEDIMENT CONTROL PLAN

PROJECT No. 119116
REV REV # 2
DRAWING No. C-200

D07-12-19-

CITY PLAN #_____-GR

REFER TO PLAN C-000 FOR NOTES, DETAILS AND TABLES

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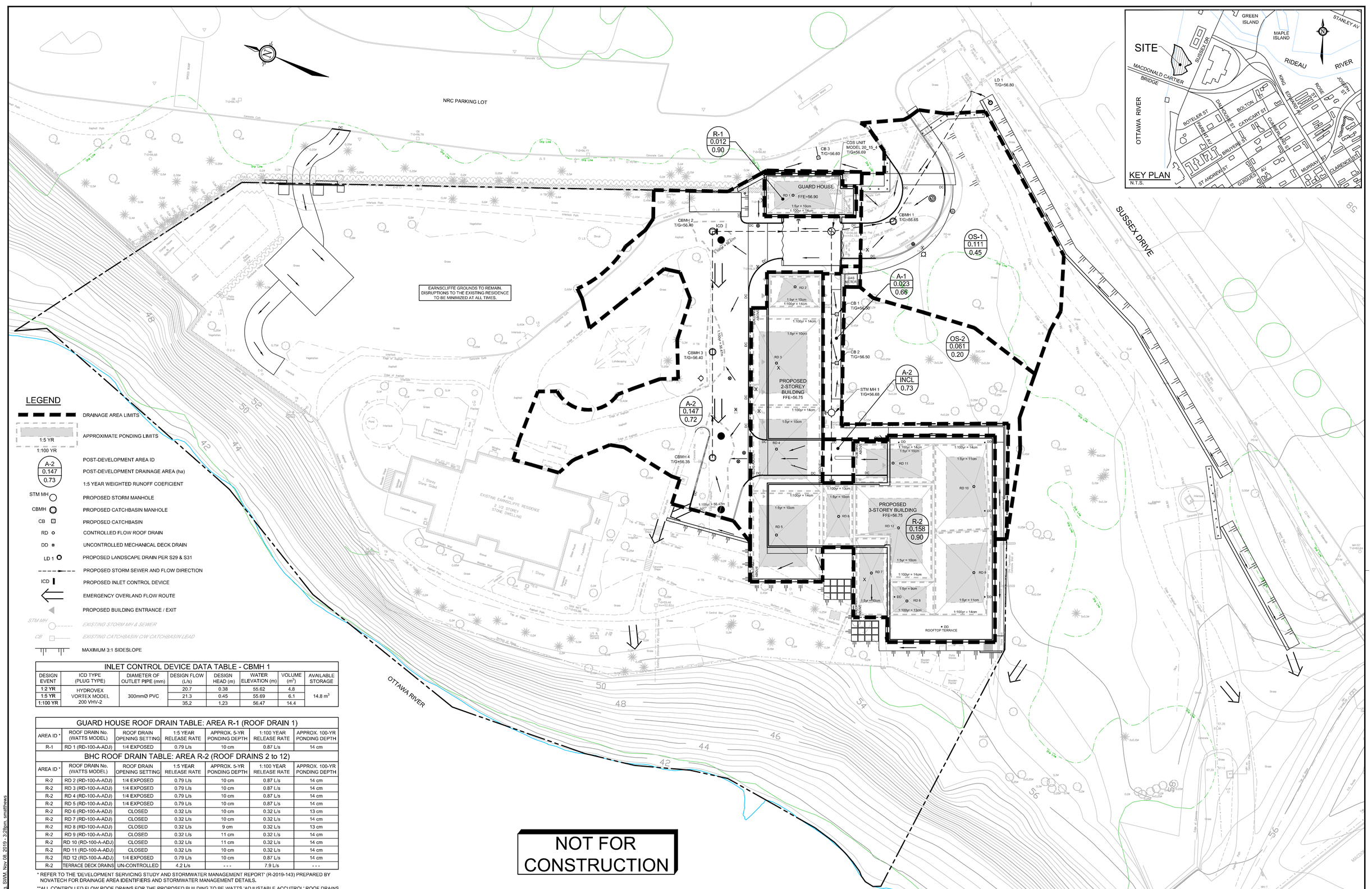

LEGEND

- DRAINAGE AREA LIMITS
- 1:5 YR / 1:100 YR — APPROXIMATE PONDING LIMITS
- A-2 / 0.147 / 0.73 — POST-DEVELOPMENT AREA ID / POST-DEVELOPMENT DRAINAGE AREA (ha) / 1:5 YEAR WEIGHTED RUNOFF COEFICIENT
- STM MH — PROPOSED STORM MANHOLE
- CBMH — PROPOSED CATCHBASIN MANHOLE
- CB — PROPOSED CATCHBASIN
- RD — CONTROLLED FLOW ROOF DRAIN
- DD — UNCONTROLLED MECHANICAL DECK DRAIN
- LD 1 — PROPOSED LANDSCAPE DRAIN PER S29 & S31
- PROPOSED STORM SEWER AND FLOW DIRECTION
- ICD — PROPOSED INLET CONTROL DEVICE
- EMERGENCY OVERLAND FLOW ROUTE
- PROPOSED BUILDING ENTRANCE / EXIT
- *STM MH — EXISTING STORM MH & SEWER*
- *CB — EXISTING CATCHBASIN C/W CATCHBASIN LEAD*
- MAXIMUM 3:1 SIDESLOPE

INLET CONTROL DEVICE DATA TABLE - CBMH 1

DESIGN EVENT	ICD TYPE (PLUG TYPE)	DIAMETER OF OUTLET PIPE (mm)	DESIGN FLOW (L/s)	DESIGN HEAD (m)	WATER ELEVATION (m)	VOLUME (m^3)	AVAILABLE STORAGE
1:2 YR	HYDROVEX VORTEX MODEL 200 VHV-2	300mmØ PVC	20.7	0.38	55.62	4.8	14.8 m^3
1:5 YR			21.3	0.45	55.69	6.1	
1:100 YR			35.2	1.23	56.47	14.4	

GUARD HOUSE ROOF DRAIN TABLE: AREA R-1 (ROOF DRAIN 1)

AREA ID *	ROOF DRAIN No. (WATTS MODEL)	ROOF DRAIN OPENING SETTING	1:5 YEAR RELEASE RATE	APPROX. 5-YR PONDING DEPTH	1:100 YEAR RELEASE RATE	APPROX. 100-YR PONDING DEPTH
R-1	RD 1 (RD-100-A-ADJ)	1/4 EXPOSED	0.79 L/s	10 cm	0.87 L/s	14 cm

BHC ROOF DRAIN TABLE: AREA R-2 (ROOF DRAINS 2 to 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 2 (RD-100-A-ADJ)	1/4 EXPOSED	0.79 L/s	10 cm	0.87 L/s	14 cm
R-2	RD 3 (RD-100-A-ADJ)	1/4 EXPOSED	0.79 L/s	10 cm	0.87 L/s	14 cm
R-2	RD 4 (RD-100-A-ADJ)	1/4 EXPOSED	0.79 L/s	10 cm	0.87 L/s	14 cm
R-2	RD 5 (RD-100-A-ADJ)	1/4 EXPOSED	0.79 L/s	10 cm	0.87 L/s	14 cm
R-2	RD 6 (RD-100-A-ADJ)	CLOSED	0.32 L/s	10 cm	0.32 L/s	13 cm
R-2	RD 7 (RD-100-A-ADJ)	CLOSED	0.32 L/s	10 cm	0.32 L/s	14 cm
R-2	RD 8 (RD-100-A-ADJ)	CLOSED	0.32 L/s	9 cm	0.32 L/s	13 cm
R-2	RD 9 (RD-100-A-ADJ)	CLOSED	0.32 L/s	11 cm	0.32 L/s	14 cm
R-2	RD 10 (RD-100-A-ADJ)	CLOSED	0.32 L/s	11 cm	0.32 L/s	14 cm
R-2	RD 11 (RD-100-A-ADJ)	CLOSED	0.32 L/s	10 cm	0.32 L/s	14 cm
R-2	RD 12 (RD-100-A-ADJ)	1/4 EXPOSED	0.79 L/s	10 cm	0.87 L/s	14 cm
R-2	TERRACE DECK DRAINS	UN-CONTROLLED	4.2 L/s	- - -	7.9 L/s	- - -

* REFER TO THE 'DEVELOPMENT SERVICING STUDY AND STORMWATER MANAGEMENT REPORT' (R-2019-143) 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.

NOT FOR CONSTRUCTION

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F.S. THAUVETTE
100041399
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NOVATECH
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Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
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LOCATION
CITY of OTTAWA
BRITISH HIGH COMMISSION - EARNSCLIFFE

DRAWING NAME
STORMWATER MANAGEMENT PLAN

PROJECT No. 119116
REV # 2
DRAWING No. C-300

D07-12-19-

CITY PLAN #_____-SWM

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