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39 Years

Fire Station 45

1070 March Road

Development Servicing Study and Stormwater Management Report

FIRE STATION 45
1075-A MARCH ROAD

DEVELOPMENT SERVICING STUDY AND STORMWATER MANAGEMENT REPORT

Prepared by:

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August 3, 2022
Revised December 9, 2022
Revised January 30, 2023

Ref: R-2022-090
Novatech File No. 122089

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Engineers, Planners & Landscape Architects

January 30, 2023

Morley Hoppner Inc.
1818 Bradley Side Road,
Ottawa, Ontario
K0A 1L0

Attention: Mr. Brian Morley

Re: Development Servicing Study and Stormwater Management Report
Fire Station 45
1075-A March Road
Novatech File No.: 122089

Enclosed is a copy of the revised 'Development Servicing Study and Stormwater Management Report' for the proposed Fire Station 45 located at 1070 March Road in the City of Ottawa. This report addresses the approach to site servicing and stormwater management, and it is being 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: Julie Candow (City of Ottawa)
Doug Brooks (Hobin Architecture)
Peter McClure (GWAL)

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1.0 INTRODUCTION

Novatech has been retained by *Morley Hoppner Group* to complete the site servicing, grading, and stormwater management design for the proposed Fire Station No. 45 in the City of Ottawa. This report is being submitted in support of a Site Plan Control application.

1.1 Location and Site Description

The 0.837 ha site is located at 1075-A March Road (temporary address), in Kanata North and is currently used as agricultural land, as depicted on Figure 1. The proposed fire station will be located within the larger Copperwood Estates subdivision and the legal description of the subject site is designated as Part 1 of Plan 4R-33375, PIN 04526-1649 City of Ottawa.

Figure 1: Aerial view of the site

1.2 Pre-Consultation Information

An initial pre-consultation meeting was held with the City of Ottawa on August 21, 2019. A subsequent meeting was held on April 22, 2022, at which time the client was advised of the general submission requirements. The Mississippi Valley Conservation Authority (MVCA) was also consulted regarding the proposed development as part of the larger Copperwood Estates subdivision. Based on a review of **O. Reg. 525/98: Approval Exemptions**, a Ministry of the Environment, Conservation and Parks (MECP) Environmental Compliance Approval (ECA) will not be required if the new municipal storm sewer in Buckbean Street and downstream stormwater management facility (SWMF), design as part of the CU Developments subdivision, are constructed and operational prior to the construction of the proposed fire station. However, if

the construction of the fire station precedes the completion of the necessary municipal storm sewer sections and downstream SWMF, an ECA will be required as part of the Interim Conditions. Refer to **Appendix A** for a summary of the correspondence related to the proposed development.

1.3 Proposed Development

The proposed development will consist of a 3-bay fire station building with associated paved parking, driveways, and landscaped areas. Due to the delay in the construction of the subdivision, the municipal infrastructure (i.e., watermain extension, sanitary sewer extension and new storm sewer) in Buckbean Street will not be in place prior to the construction of the Fire Station. Furthermore, the downstream municipal stormwater management facility (SWMF) will therefore not be operational. Consequently, interim servicing and stormwater management designs will be required. In the Final Condition, the proposed building will be serviced by the municipal sanitary sewer, storm sewer and watermain in Buckbean Street.

1.4 Reference Material

[1] Copperwood Estates (Formerly CU Development) - 1053, 1075 and 1145 March Road – Detailed Site Servicing and Stormwater Management Report (Ref.: R-2021-188), prepared by Novatech on May 4, 2022.

[2] Fire Station 45 - 1075 March Road - Water Age Analysis Memorandum, prepared by Novatech dated December 2, 2022.

[3] Geotechnical Investigation – Proposed Fire Station – 1075 March Road (Report No.: PG5321-1, Rev. 1), prepared by Paterson Group on January 20, 2021.

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 both in the Interim and Final Conditions. 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, as described in the Copperwood Estates – Site Servicing and SWM Report[2]. Refer to the enclosed General Plan of Services - Interim Conditions (C1.0), General Plan of Services - Final Conditions (C1.1) and to the subsequent sections of the report for further details.

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

2.1 Sanitary Sewage

The proposed fire station will be serviced by a new connection to the existing 375mm dia. municipal sanitary sewer in Buckbean Street, which flows into the 600mm dia. trunk sewer in March Road. This servicing configuration will be constructed in the Interim Condition phase and will remain unchanged in the Final Condition when the subdivision is constructed. A maintenance manhole will be provided near the property line for monitoring purposes. Design Criteria from the City of Ottawa Sewer Design Guidelines, Appendix 4-A and subsequent

Technical Bulletins were used to calculate the theoretical sewage flows for the proposed fire station. The sanitary sewage calculations are based on the following criteria:

- Average Daily Sewage Flows per Firefighter: 280 L/person/day (full-time staff ~ resident)
- Average Daily Sewage Flows per Firefighter: 75 L/person/day (trainee on training night)
- Average Daily Sewage Flows (Truck Wash): 400 L/vehicle/day (when applicable)
- Institutional Peaking Factor = 1.5
- Infiltration Allowance: 0.33 L/s/ha

The criteria above were compared to the values used in the Copperwood Estates – Site Servicing and SWM Report[2]. The criteria in the report are as follows:

- Average Daily Institutional Sanitary Sewage Flow: 28,000 L/ha/day
- Institutional Peaking Factor = 1.0
- Infiltration Allowance: 0.33 L/s/ha

Table 1 and **Table 1.1** identify the theoretical sanitary flows for the proposed fire station based on the above design criteria.

Table 1: **Theoretical Post-Development Sanitary Flows (Staff & Use Basis)**

Type of Use	Fire Station (Staff/Truck Washes)	Average Flow (L/s)	Peaking Factor	Peak Flow (L/s)
Staff	8 firefighters + 22 trainees	0.05	1.5	0.07
Truck Wash	3 vehicles	0.01		0.02
Infiltration	0.84 ha	0.28	-	0.28
Total	-	**0.34**	-	**0.37**

*Represents rounded values

Table 1.1: **Theoretical Post-Development Sanitary Flows (Typical Institutional Use Basis)**

Type of Use	Area	Average Flow (L/s)	Peaking Factor	Peak Flow (L/s)
Daily Average Institutional Sewage Flow (28,000 L/ha/day)	0.84 ha	0.27	1.0	0.27
Infiltration (ha)		0.28	-	0.28
Total	-	**0.55**	-	**0.55**

*Represents rounded values

As indicated in the tables above, the anticipated sanitary sewage flows from the proposed fire station are considered minimal and within the flows included for this parcel in the Copperwood Estates – Site Servicing and SWM Report[2]. Refer to **Appendix C** for detailed calculations and excerpts from the Copperwood Estates – Site Servicing and SWM Report[2].

A 150mm dia. sanitary sewer at a minimum slope of 3.0% has a full flow conveyance capacity of 26.4 L/s and will have enough capacity to convey the theoretical sanitary flows from the proposed fire station.

2.2 Water for Domestic Use and Fire Protection

The proposed fire station will be serviced by a new connection to the existing 300mm dia. municipal watermain in Buckbean Street. This servicing configuration will be constructed in the Interim Condition phase and will remain unchanged in the Final Condition when the subdivision is constructed. The proposed building will be non-sprinklered and the water meter will be located within the water entry room, with a remote meter on the exterior face of the building. An on-site fire hydrant is being proposed at the back of the fire station for training purposes but will also be required for fire protection during the Interim Condition.

2.2.1 Water Demands and Watermain Analysis

The theoretical water demands for the proposed development were based on the design criteria from the City of Ottawa Water Distribution Guidelines and subsequent Technical Bulletins. The Fire Underwriters Survey (FUS) method was used to calculate the fire flow based on general assumptions and information provided by the architect. The water demands are calculated based on the following criteria:

- Avg. Daily Water Demand per Firefighter: 280 L/person/day (full-time staff ~ residential)
- Average Daily Water Demand per Firefighter: 75 L/person/day (trainee on training night)
- Average Daily Water Demand (Truck Wash): 400 L/vehicle/day (when applicable)
- Maximum Day Demand = 1.5 x Avg. Day Demand (City Water Table 4.2)
- Peak Hour Demand = 1.8 x Max. Day Demand (City Water Table 4.2)

The criteria above were compared to the values used in the Copperwood Estates – Site Servicing and SWM Report[2]. The criteria in the report are as follows:

- Average Daily Institutional Water Demands: 28,000 L/ha/day
- Maximum Day Demand = 1.5 x Avg. Day Demand (City Water Table 4.2)
- Peak Hour Demand = 1.8 x Max. Day Demand (City Water Table 4.2)

Table 2 and **Table 2.1** identify the theoretical domestic water demands and fire flow requirements for the development based on the above design criteria.

Table 2: **Theoretical Post-Development Water Demands (Staff & Use Basis)**

Type of Use	Fire Station (Staff/Truck Washes)	Avg. Day Demand (L/s)	Max. Day Demand (L/s)	Peak Hour (L/s)	FUS Fire Flow (L/s)
Staff	8 firefighters + 22 trainees	0.05	0.07	0.12	100
Truck Wash	3 vehicles	0.01	0.02	0.04	
Total*	-	0.06	0.09	0.16	

*Represents rounded values, excluding the (unknown) flow from the on-site hydrant used for training purposes.

Table 2.1: **Theoretical Post-Development Water Demands (Typical Institutional Use Basis)**

Type of Use	Area (ha)	Avg. Day Demand (L/s)	Max. Day Demand (L/s)	Peak Hour (L/s)
Daily Average Institutional Sewage Flow (28,000 L/ha/day)	0.84	0.27	0.41	0.74

*Represents rounded values, excluding the (unknown) flow from the on-site hydrant used for training purposes

The fire flow requirements were calculated using the Fire Underwriters Survey (FUS). Based on information provided by the architect, the fire flow required for the fire station is expected to be in the order of 100 L/s. Refer to **Appendix D** for detailed calculations, correspondence from the City of Ottawa and excerpts from the Copperwood Estates – Site Servicing and SWM Report[2].

Interim Condition

In the Interim Condition, the on-site hydrant will be required for firefighting purposes, as the municipal hydrants along March Road are too far (>150m from the site) and the hydrants within the subdivision have yet to be installed. As discussed with the City of Ottawa, the hydraulic analysis included a fire flow of 95 L/s from the private on-site hydrant, which corresponds to the maximum value permitted per City of Ottawa Technical Bulletin ISTB-2018-02. This value is slightly less than the 100 L/s calculated per the FUS method, however this difference is deemed insignificant given the fact that the subject site is a fire station and the on-site fire trucks will be filled with water. Furthermore, fire flows calculated using the FUS method tend to be very conservative. Given these factors, we believe the on-site hydrant should be adequate during the Interim Conditions.

As part of the Interim Conditions, a Water Age Analysis Memo[2] was also prepared. The purpose of the memorandum was to provide the City of Ottawa with a water age analysis for the 1.1 km section of 406mm dia. watermain along March Road between Maxwell Bridge Road and the proposed Fire Station 45 site (off the future Buckbean Street). The City of Ottawa has identified concerns related to the quality of the drinking water within this stretch of dead-end watermain, given the fact that the subject site may be constructed prior to the larger Minto and CU Developments subdivisions on the east and west sides of March Road, north of Maxwell Bridge Road. Refer to **Appendix D** for a copy of the Water Age Analysis Memorandum.

Final Condition

In the Final Condition, the Copperwood Estates subdivision will be looped off the 400mm dia. feedermain in March Road and all municipal hydrants will be operational. As discussed with the City of Ottawa, a multi-hydrant approach to firefighting is anticipated to be required to achieve the maximum fire flow (100 L/s). There will be at least three (3) fire hydrants along Buckbean Street, within 150m of the site, two (2) of which are fronting the subject site. Although it is included in the hydraulic analysis, the private on-site hydrant (mainly used for training purposes) will not technically be required for firefighting purposes in the Final Condition as there will be sufficient municipal hydrants nearby. Based on the City of Ottawa Technical Bulletin ISTB-2018-02, Class AA (blue bonnet) hydrants within 75m have a maximum capacity 95 L/s while hydrants between 75m and 150m have a maximum capacity 63 L/s (at a pressure of 20 PSI). The combined maximum flow from the nearby hydrants exceeds the Max Day + Fire Flow requirement of the proposed development. This multi-hydrant approach to firefighting is in accordance with the City of Ottawa Technical Bulletin ISTB-2018-02. **Table 2.2** summarizes the

total theoretical combined fire flow available from the nearby fire hydrants and compares it to the fire flow demands based on FUS calculations.

Table 2.2: **Theoretical Fire Protection Summary Table**

Building	Fire Flow Demand (L/s)	Fire Hydrant(s) within 75m (~ 95 L/s each)*	Fire Hydrant(s) within 150m (~ 63 L/s each)	Theoretical Combined Available Fire Flow (L/s)
Fire Station 45	100	3	1	348

Preliminary domestic water demands, and fire flow requirements were provided to the City of Ottawa. **Table 2.3** summarizes preliminary hydraulic analysis results based on municipal watermain boundary conditions provided by the City of Ottawa.

Table 2.3: Hydraulic Boundary Conditions based on Copperwood Estates Report[2]

Municipal Watermain Boundary Condition	Boundary Condition	Normal Operating Pressure Range (psi)	Anticipated WM Pressure (psi)*
Minimum HGL (Peak Hour Demand)	126.2 m	40 psi (min.)	~ 62.1 psi
Maximum HGL (Max Day Demand)	131.0 m	50 - 70 psi	~ 68.9 psi
HGL (Max Day + Fire Flow)	124.6 m	20 psi (min.)	~ 59.8 psi

*Based on an approximate roadway elevation of 82.5m in Buckbean Street at the service connection. Design pressure = (HGL – watermain elevation) x 1.42197 PSI/m.

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.

The hydraulic model EPANET was used to analyzing the performance of the proposed watermain configuration for three (3) theoretical conditions:

- Peak Hour Demand
- Maximum HGL
- Maximum Day + Fire Flow Demand (100 L/s)

A schematic representation of the hydraulic network depicts the node and pipe numbers used in the model. The model indicates that adequate pressure will exist throughout the watermain system under the specified design conditions. **Table 2.4, Table 2.5,** and **Table 2.6** summarize the hydraulic model results. Refer to **Appendix D** for City of Ottawa boundary conditions, the hydraulic modeling schematic and modeling results.

Table 2.4: Peak Hour Demand

Operating Condition	Minimum System Pressure	Maximum System Pressure
Peak Hour demand of 0.16 L/s at Node J8 (Building)	A minimum system pressure of 413.9 kPa (60.0 psi) is available at Node J3 (Hyd)	A maximum on-site system pressure of 446.3 kPa (64.7 psi) is available at Nodes J1 and J13 (near connection to municipal WM)

Table 2.5: Maximum HGL

Operating Condition	Minimum System Pressure	Maximum System Pressure
Max Day demand of 0.1 L/s at Node J8 (Building)	A minimum system pressure of 461.1 kPa (66.8 psi) is available at Node J3 (Hyd)	A maximum on-site system pressure of 493.4 kPa (71.5 psi) is available at Nodes J1 and J13 (near connection to municipal WM)

Table 2.6: Maximum Day + Fire Flow Demand

Operating Condition	Minimum System Pressure	Maximum System Pressure
Max Day demands of 0.1 L/s at Node J8 (Building) and 95 L/s at Node J3 (Hyd)*	A minimum system pressure of 340.1 kPa (49.3 psi) is available at Node J3 (Hyd)	A maximum on-site system pressure of 419.8 kPa (60.9 psi) is available at Node J13 (near connection to municipal WM)

*On-site Hydrant (Node J3) will be required for firefighting purposes during the Interim Conditions.

The model indicates that the municipal watermain in Buckbean Street and the proposed on-site watermain will provide adequate fire flow and system pressures for both 'Max Day + Fire Flow' and 'Peak Hour' conditions.

2.3 Storm Drainage and Stormwater Management

Due to the delay in the construction of the subdivision, an interim stormwater management design will need to be implemented until such time as the 1200mm dia. storm sewer in Buckbean Street and new downstream SWMF is constructed and operational.

Interim Condition

In the Interim Condition, stormwater flows from the site will need to be controlled and treated prior to being released into the roadside ditch along the west side of March Road. As part of the interim works, stormwater runoff from the adjacent property to the northwest (i.e., the future Park and Ride) will be diverted around the subject site towards March Road.

Final Condition

In the Final Condition, the proposed site will be serviced by a new connection to the 1200mm dia. storm sewer in Buckbean Street, which will flow into the municipal SWMF to the south. Based on a discussion with the Novatech (Subdivision design) Team, the municipal SWMF will be one of the first things to be constructed within the subdivision once construction begins. The SWMF will ultimately provide the necessary water quality treatment for the subdivision.

The approach for the stormwater management designs, both in the Interim and Final Conditions, are further discussed in the subsequent sections of the report.

2.3.1 Stormwater Management Criteria and Objectives

The stormwater management design criteria will need to be different during the Interim and Final Conditions, as flows are being directed to two (2) different outlets.

Interim Condition

The interim stormwater management (SWM) criteria have been provided during pre-consultation meetings with the City of Ottawa and the MVCA. The SWM criteria and objectives during the Interim Conditions are as follows:

- Maintain existing drainage patterns, where possible.
- Provide a dual drainage system (i.e., minor, and major system flows).
- Control post-development storm flows to the respective pre-development conditions (i.e., during the 2-year, 5-year and 100-year design storms).
- MVCA is supportive of interim stormwater measures that incorporate best management practices to achieve an appropriate level of water quality on site, until the ultimate conditions can be achieved (i.e., ideally providing an Enhanced Level of Protection [i.e., 80% TSS removal], prior to releasing flows into the roadside ditch along March Road).
- Ensure that no surface ponding will occur on the paved surfaces (parking stalls and drive aisles) during the 2-year storm event.
- Provide guidelines to ensure that site preparation and construction is in accordance with the current Best Management Practices for Erosion a Sediment Control.

Final Condition

The final stormwater management (SWM) criteria have been provided during pre-consultation meetings with the City of Ottawa and the MVCA, based on the information contained in the Copperwood Estates – Site Servicing and SWM Report[2]. The SWM criteria and objectives are as follows:

- Maintain existing drainage patterns, where possible.
- Provide a dual drainage system (i.e., minor, and major system flows).
- Control post-development storm flows, up to an including the 100-year design event, to a maximum allowable release rate described in the Copperwood Estates – Site Servicing and SWM Report[2]. This is essentially based on an allowable 5-year design and a runoff coefficient C=0.85.
- Stormwater quality control measures will be provided by the downstream municipal SWMF.
- Ensure that no surface ponding will occur on the paved surfaces (parking stalls and drive aisles) during the 2-year storm event.
- Provide guidelines to ensure that site preparation and construction is in accordance with the current Best Management Practices for Erosion a Sediment Control.

Refer to **Appendix A** for correspondence from the City of Ottawa and to **Appendix E** for excerpts from the Copperwood Estates – Site Servicing and SWM Report[2].

2.3.2 Pre-Development Flows and Maximum Allowable Release Rates

The stormwater management design criteria and thus the allowable release rates will be different during the Interim and Final Conditions.

Interim Condition

The pre-development flows from the site have been calculated to be 35.7 L/s during the 2-year event, 48.5 L/s during the 5-year event and 103.9 L/s during the 100-year event, accounting for the roadway widening parcel along March Road. These flows represent the allowable release rate from the site during the Interim Conditions. As such, the allowable flows to the March Road ditch will be equivalent to the respective pre-development flows less any uncontrolled direct runoff from landscape areas around the perimeter of the site.

Final Condition

As specified in the Copperwood Estates – Site Servicing and SWM Report[2], the allowable release rate for the fire station site, accounting for the roadway widening parcel along March Road is approximately 236 L/s. Using a pro-rated area basis, the allowable release rate for the subject site (0.837 ha of a total 0.89 ha) is approximately **221.9 L/s**. The stormwater design of the fire station site in the Final Condition has been based on this pro-rated value. Refer to **Appendix E** for detailed calculations and excerpts from the Copperwood Estates – Site Servicing and SWM Report[2].

2.3.3 Post-Development Conditions

To minimize costs and throw-away construction, most of the site (i.e., laneways, paved parking lots, landscaped areas, and storm sewer infrastructure) will be constructed to function during both the Interim and Final Conditions. However, some elements of the design will be specific to the Interim Conditions phase (i.e., temporary access roads, modified CBMHs, temporary dry pond and level spreader berm, etc.) and will need to be modified upon completion of the Final Condition.

Interim Condition

In the Interim Condition, the proposed development will be serviced by the on-site storm sewer system with a temporary overland overflow outlet to the March Road roadside ditch. The on-site storm sewer will be constructed up to the south property line and capped downstream of CBMH 4. To mitigate the stormwater related impacts due to the increase in imperviousness of the site, stormwater runoff will be attenuated using control flow roof drains as well as a temporary (grass) dry pond, level spreader berm and vegetated filter strip, prior to releasing flows to the roadside ditch. The storm sewer (site outlet) pipe will only be extended as part of the Final Condition once the municipal storm sewer in Buckbean Street and downstream SWMF are constructed and operational.

2.3.3.1 Area R-1 – Controlled Flow from Building Roof

The post-development flow from this sub-catchment area will be attenuated using Watts adjustable 'Accutrol' control flow roof drains (RD 1 and RD 2) prior to being directed to the proposed on-site storm sewer system. The small canopy roof on the north side of the building (RD3) is too small to require a controlled flow roof drain. The control flow roof drains will be constructed in the Interim Condition phase and will remain unchanged in the Final Condition.

Table 3 summarizes the post-development design flows from this sub-catchment area as well as the type of roof drains, the maximum anticipated ponding depths, storage volumes required and storage volumes provided for both the 5-year and the 100-year design events.

Table 3: Controlled Flow Roof Drains

Roof Drain ID & Drainage Area (ha)	Number of Roof Drains	Watts Roof Drain Model ID (Weir Opening)	Total Controlled Flow (L/s)		Approximate Ponding Depth Above Drains (m)		Storage Volume Required (m^3)		Max. Storage Available (m^3)
			1:5 Year	1:100 Year	1:5 Year	1:100 Year	1:5 Year	1:100 Year	
RD 1+2 (0.049 ha)	2	RD-100-A-ADJ (Fully Exposed)	2.14	2.78	0.09	0.12	8.0	17.9	29.3
RD 3 (0.001 ha)	1	-	0.26*	0.50*	-	-	-	-	-
Total Roof (0.050 ha)	**3**	**-**	**2.40**	**3.30**	**-**	**-**	**8.0**	**17.9**	**29.3**

Table represents rounded values. * RD3 does not require controlled roof drain as the area is too small.

Refer to **Appendix E** for detailed SWM calculations and to **Appendix F** for detailed control flow 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.

In the Interim Conditions, the controlled building roof flows will subsequently be controlled by the perforated pipes located below the level spreader as the flows from the roof will be directed to the surface via CBMH 101.

2.3.3.2 Areas IA-0 to IA-6 (incl. Flow from R-1) - Controlled Flow from Site

Stormwater runoff from these sub-catchment areas will be captured by various catchbasins, CBMHs, and grassed drainage swales and directed to the low-lying area (dry pond) on the east side of the fire station building. The slope and configuration of the temporary dry pond and length of the level spreader were based on site specific conditions (i.e., topography, outlet location and drainage area berm configuration). The level spreader was designed as a 14.45m long berm, with a spill elevation of 82.88m, to provide sufficient storage for storms up to and including the 100-year design event. Since the downstream (outlet) pipe will be capped at the property line, stormwater will back-up within the storm sewer system and spill to the surface at an elevation of 82.70m, via the (lowered) lid of CBMH 101. The intent is for stormwater to be controlled within the dry pond (contained by the level spreader berm) and infiltrate into the ground and/or flow through the two (2) x 3.85m length - 100mm dia. perforated pipes located within the sand layer below the berm and flow overland to the roadside along March Road via the vegetated filter strip. The post-development flow from this sub-catchment area through the perforated pipes was calculated using the Rational Method to be approximately 22.4 L/s during the 2-year design event, 25.5 L/s during the 5-year design event, and 34.5 L/s during the 100-year design event, excluding any infiltration into the ground. Refer to **Appendix E** for detailed SWM calculations.

In larger storm events, exceeding the 100-year design storm, stormwater will also flow over the level spreader berm. The width of the level spreader will ensure a minimal flow depth over the

berm in extreme storm events, thus maximizing the contact area with the vegetation on the level spreader and within the downstream vegetated filter strip prior to sheet draining into the roadside ditch. This design approach is consistent with the MOE Stormwater Management Design Guidelines. The spill elevation of the level spreader is set at 82.88m, providing a maximum of 152.6m^3 of storage within the low-lying grassed area upstream of the level spreader berm, excluding minimal storage within the storm sewer system itself, which will be often full of water during the warmer months. During colder months, it is recommended that the on-site storm sewer system be emptied by pumping water to the surface within the low-lying area upstream of the level spreader. This will prevent the water from freezing within the storm sewer system in the Interim Conditions.

2.3.3.3 Area IA-7 - Uncontrolled Direct Runoff

The uncontrolled post-development flow from this sub-catchment area was calculated using the Rational Method to be approximately 7.9 L/s during the 2-year design event, 10.8 L/s during the 5-year design event, and 21.9 L/s during the 100-year design event. Refer to **Appendix E** for detailed SWM calculations.

2.3.3.4 Summary of Post-Development Flows – Interim Conditions

Table 3.1 compares the 5-year and 100-year design event post-development site flows from the proposed development to the respective pre-development flows, which represent the maximum allowable release rates.

Table 3.1: Stormwater Flow Comparison Table – Interim Conditions

Design Event	Drainage Areas IA-0 to IA-7 and R-1			
	Pre-Dev. Conditions	Post-Development Conditions		
	Max Release Rate (L/s)	IA-0 to IA-6 + R-1 Controlled Flow (L/s)	IA-7 Uncontrolled Direct Runoff (L/s)	Total Flow (L/s)
2-Yr	35.7	22.4	7.9	30.3
5-Yr	48.5	25.5	10.8	36.3
100-Yr	103.9	34.5	21.9	56.4

As indicated in the table above, the 2-year, 5-year and 100-year post-development flows will be less than the maximum allowable release rate for the site. Refer to **Appendix E** for detailed SWM calculations.

Final Condition

In the Final Condition, the on-site storm sewer system will be extended to outlet into the new 1200mm dia. storm sewer in Buckbean Street, which discharges into the new municipal SWMF immediately to the south. Stormwater runoff from the subject site will continue to be directed to various catchbasins, CBMHs and grassed drainage swales. Stormwater runoff will only be attenuated using the control flow drains installed in the Interim Conditions. Roof flows will be controlled for storms up to and including the 100-year design event. The need for the temporary dry pond and level spreader berm will no longer be required. As a result, the reminder of the site flows will be uncontrolled.

2.3.3.5 Areas A-0 to A-6 - Uncontrolled Flow from Site

The uncontrolled post-development flow from these sub-catchment areas was calculated using the Rational Method to be approximately 99.7 L/s during the 5-year design event and 195.2 L/s during the 100-year design event. These values were taken directly from the Storm Sewer Design Sheets prepared for the proposed development. Refer to **Appendix E** for detailed calculations and a copy of the 5-year Storm Sewer Design Sheet.

As indicated in the Storm Sewer Design Sheets, the pipe capacity of the on-site storm sewer system will exceed the 5-year design flows, therefore there will be no surface ponding during the 2-year or the 5-year design storms. During the 100-year design storm the pipe capacity will restrict the site flows slightly, however there will be no surface ponding as minor surcharging will be contained within the on-site storm sewer system.

2.3.3.6 Area A-7 - Uncontrolled Direct Runoff to March Road

The uncontrolled post-development flow from this sub-catchment area was calculated using the Rational Method to be approximately 10.2 L/s during the 5-year design event and 20.7 L/s during the 100-year design event. Refer to **Appendix E** for detailed SWM calculations.

2.3.3.7 Area R-1 – Controlled Flow from Building Roof

As described in Section 2.3.3.3, the post-development flow from this sub-catchment area will be attenuated using Watts adjustable 'Accutrol' control flow roof drains (RD 1 and RD 2) prior to being directed to the proposed on-site storm sewer system. The small canopy roof on the north side of the building (RD 3) is too small to require a controlled flow roof drain.

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. These values remain unchanged from the Interim Conditions.

Table 3.2: Controlled Flow Roof Drains

Roof Drain ID & Drainage Area (ha)	Number of Roof Drains	Watts Roof Drain Model ID (Weir Opening)	Total Controlled Flow (L/s)		Approximate Ponding Depth Above Drains (m)		Storage Volume Required (m^3)		Max. Storage Available (m^3)
			1:5 Year	1:100 Year	1:5 Year	1:100 Year	1:5 Year	1:100 Year	
RD 1+2 (0.049 ha)	2	RD-100-A-ADJ (Fully Exposed)	2.14	2.78	0.09	0.12	8.0	17.9	29.3
RD 3 (0.001 ha)	1	-	0.26*	0.50*	-	-	-	-	-
Total Roof (0.050 ha)	**3**	**-**	**2.40**	**3.30**	**-**	**-**	**8.0**	**17.9**	**29.3**

Table represents rounded values. * RD3 does not require controlled roof drain as the area is too small.

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

2.3.3.8 Summary of Post-Development Flows – Final Conditions

Table 3.3 compares the 5-year and 100-year design event post-development site flows from the proposed development to the maximum allowable release rate specified in the Copperwood Estates – Site Servicing and SWM Report[2].

Table 3.3: Stormwater Flow Comparison Table – Final Conditions

Design Event	Drainage Areas A-0 to A-7 and R-1				
	Pre-Dev. Conditions	Post-Development Conditions			
	Max Release Rate (L/s)	A-0 to A-6 Uncontrolled Flow (L/s)	A-7 Direct Runoff to March Road (L/s)	R-1 Controlled Flow (L/s)	Total Flow (L/s)
5-Yr	**221.9**	99.7	10.2	2.4	112.3
100-Yr		195.2	20.7	3.3	219.2

As indicated in the table above, the 5-year and 100-year post-development flows will be less than the maximum allowable release rate for the site. Refer to **Appendix E** for detailed SWM calculations.

2.3.3.9 Stormwater Quality Control

The subject site is located within the jurisdiction of the Mississippi Valley Conservation Authority (MVCA). As discussed with the MVCA, the stormwater quality control requirements for the Interim and Final Conditions will need to be different due to the different outlets.

Interim Condition

In the Interim Conditions, site flows will ultimately be directed to the roadside ditch along March Road. Based on correspondence from the MVCA, they are supportive of interim stormwater measures that incorporate best management practices to achieve an appropriate level of water quality for the portion of the site discharging into the roadside ditch, until such time as the downstream municipal storm sewer and SWMF are constructed and operational. To achieve the desired level of treatment, the following water quality control measures were considered:

- The use of a mechanical treatment unit (i.e., Oil-Grit Separator).
- A treatment train approach using natural Low Impact Development (LID) techniques.

Given the size of the drainage area (<2 ha), the fact that only the paved parking lot and access roads (~0.25 ha) require treatment and the temporary nature of the Interim Condition, a treatment train approach, using natural LID techniques including grass swales, a shallow dry pond, level spreader berm with a sand infiltration layer and vegetated filter strip was deemed more appropriate when compared to the costly and wasteful alternative of using a throw-away OGS treatment unit.

Based on a review of the MOE Stormwater Management Design Guidelines, *vegetated filter strips are engineered stormwater conveyance systems which treat small drainage areas (<2ha). Generally, a vegetated filter strip consists of a level spreader and planted vegetation. The level spreader ensures uniform flow over the vegetation which filters out pollutants and promotes*

infiltration of the stormwater. Furthermore, *vegetated filter strips should be located in flat areas (< 10%) to promote sheet flow and maximize the filtration potential. The ideal slope in a vegetated filter strip is < 5% (1% - 5%). The vegetated filter strip should be 10 m - 20 m wide in the direction of flow to provide sufficient stormwater quality enhancement.*

The proposed interim SWM design will include a treatment train approach, including shallow sloped grass swales, a relatively flat-bottom dry pond, a level spreader berm (complete with two (2) x 3.85m length perforated subdrains and infiltration sand layer) and a vegetated filter strip to provide the required level of water quality treatment. The design of the SWM elements is consistent with the parameters outlined in the MOE Stormwater Management Design Guidelines. Furthermore, the interim configuration of the storm sewer system (with a capped outlet) will promote settlement of suspended solids within the pipes and structure sumps, as the water will have to fill the system prior to spill to the surface via the (lowered) lid of CBMH 101.

Once the municipal storm sewer and downstream SWMF are constructed and operational, the need for the dry pond, level spreader berm and vegetated filter strip will no longer be required, as water quality treatment will be provided by the municipal SWM facility.

Final Condition

In the Final Condition, site flows will be directed to the municipal storm sewer in Buckbean Street. Based on a review of the Copperwood Estates – Site Servicing and SWM Report[2], the municipal stormwater management facility (SWMF) across the street will provide the required 'Enhanced' Level of Protection (i.e.: 80% TSS removal) for the subject site. Consequently, on-site stormwater quality control measures will not be required.

3.0 SITE GRADING

The existing site slopes approximately 2m from west to east. The finished floor elevation (FFE) of the fire station has been set at 83.50m, based on practical site entrance slopes off the future Buckbean Street. The surrounding elevation of the future 'Park and Ride' block (to the north and west) has not been designed yet, however the existing grades are generally higher than the proposed site. As such temporary diversion swales (by others) are being proposed along the north and west property lines (on the neighboring property) to prevent off-site flows from draining onto the subject site.

To minimize costs and throw-away construction, most of the site (i.e., laneways, paved parking lots, landscaped areas, and storm sewer infrastructure) will be constructed to function during both the Interim and Final Conditions. However, some elements of the design will be specific to the Interim Conditions phase (i.e., temporary access roads, culverts, etc.) and will need to be modified upon completion of the Final Condition.

Interim Condition

The main elements impacting the interim grading design will be the requirements for the temporary access roads and culverts. Refer to the enclosed Grading and ESC Plan – Interim Conditions (C2.0) for details.

Final Condition

In the Final Condition, the temporary access road, culverts will be removed and reinstated to match the final grading and landscape designs. Some of the interim SWM elements on the east side of the building (i.e., level spreader berm) may remain unchanged in the final condition depending on the owner's needs. CB 3 will be added in the Final Condition to ensure stormwater runoff is directed towards the on-site storm sewer system as opposed to continue to sheet drain towards the March Road ditch. Refer to the enclosed Grading and ESC Plan – Final Conditions (C2.1) for details.

3.1 Emergency Overland Flow Route

In the case of a major rainfall event exceeding the design storms provided for, the stormwater located within the proposed site will overflow towards the lower downstream sub-catchment areas and ultimately overflow towards Buckbean Street and/or March Road. Furthermore, the emergency spill point elevations within the site have been set 0.4m below the lowest building openings in the Interim Condition and Final Condition. The respective emergency overland flow routes are shown on the enclosed Grading and ESC Plan – Interim Conditions (C2.0) and Grading and ESC Plan – Final Conditions (C2.1) plans.

4.0 GEOTECHNICAL INVESTIGATIONS

Paterson Group prepared a Geotechnical Investigation Report for the proposed development. Refer to the Geotechnical Report[1] for subsurface conditions, construction recommendations and geotechnical inspection requirements.

5.0 EROSION AND SEDIMENT CONTROL

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

- Catch basin inserts (sediments sacks) will be placed within nearby catch basins and manholes and they 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 where appropriate, 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.
- Any stockpiled material will be properly managed to prevent those materials from entering the sewer system and/or the downstream ditch or watercourse.
- The proposed development will use the following stormwater best management practices (BMPs) and low impact development (LID) techniques to achieve water quality control until

such time as the downstream municipal storm sewer and SWMF are constructed and operational: grass swales, a shallow dry pond, level spreader berm and vegetated filter strip.

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

6.0 CONCLUSION

This report has been prepared in support of Site Plan Control application for the proposed Fire Station 45 in the City of Ottawa. The conclusions are as follows:

Interim Condition

- The proposed development will be serviced by the existing municipal watermain and sanitary sewer in Buckbean Street.
- The building will be non-sprinklered. The private on-site fire hydrant will provide fire protection in the Interim Condition.
- Stormwater management design for the fire station will include both on-site quantity control and quality control measures prior to releasing flows into the March Road roadside ditch. The stormwater management design will meet the requirements of the City of Ottawa and the MVCA. Post-development flows will be controlled to the equivalent pre-development conditions, while stormwater quality control measures will be provided by the natural treatment train approach using LIDs to provide the targeted Enhanced Level of Protection (i.e., 80% TSS Removal) until such time as the downstream municipal storm sewer and SWMF are constructed and operational.
    - Post-development flow from the main building roof (area R-1) will be attenuated using control flow roof drains. The control flow roof drains will be installed in the Interim Condition and will remain unchanged in the Final Condition.
    - The total post-development flow to the site will be approximately 36.3 L/s during the 5-year event and 56.4 L/s during the 100-year event, all less than the equivalent pre-development flow for the respective return period.
    - A treatment train approach, using LID techniques including grass swales, a shallow dry pond, level spreader berm, sand infiltration layer and vegetated filter strip was deemed more appropriate when compared to the alternative of using a costly throw-away OGS treatment unit.
    - Erosion and sediment controls are to be provided during construction.
- Regular inspection and maintenance of the storm sewer system and control flow roof drains is recommended to ensure that the storm drainage system is clean and operational. During colder months, it is recommended that the on-site storm sewer system be emptied by pumping water to the surface within the low-lying area upstream of the level spreader. This will prevent the water from freezing within the storm sewer system in the Interim Conditions.

Final Condition

- The proposed water and sanitary servicing will remain unchanged as constructed during the Interim Condition.

- The nearby proposed municipal fire hydrants along future Buckbean Street will provide the necessary fire protection.
- The on-site storm sewer system will be extended to outlet into the new storm sewer in Buckbean Street, which discharges into the new municipal SWMF immediately to the south. The stormwater quantity control measures will meet the requirements of the City of Ottawa, as described in the Copperwood Estates – Site Servicing and SWM Report[2].
- Stormwater quality control measures will be provided by the municipal SWMF across the street, and therefore no longer required on site.
    - Post-development flow from the main building roof (area R-1) will continue to be attenuated using control flow roof drains, installed in the Interim Condition.
    - The total post-development flow to the site will be approximately 112.3 L/s during the 5-year event and 219.2 L/s during the 100-year event, all less than the maximum allowable release rate of 221.9 L/s described in the Copperwood Estates – Site Servicing and SWM Report[2].
- Regular inspection and maintenance of the storm sewer system and control flow roof drains is recommended to ensure that the storm drainage system is clean and operational.

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

NOVATECH

Prepared by:

François Thauvette, P. Eng.
Senior Project Manager

APPENDIX A

Correspondence

1075 March Road
Pre-Consultation Meeting Minutes

Location: Room 4102E, City Hall
Date: August 21, 11am – 12pm

Attendee	Role
Stream Shen	Planner
Julie Candow	Project Manager (Engineer)
Rosanna Baggs	Project Manager (Transportation)
Matthew Hayley	Environmental Planner
Samantha Gatchene	Planning Assistant
Christine Hogan	Analyst (Asset Management)
Michael Lewis	Senior Engineer (Asset Management)
Peter Dodsworth	Program Manager (Design & Construction)
Shawn Lynch	Project Manager (Design & Construction)
Nathan Adams	Program Manager (Fire Services)

Comments from Applicant

1. The applicant is proposing a 3-bay fire station (Station 45) within the CU Development subdivision located at 1075 March Road (Block 309).
2. A location area study completed in 2015 identified the station location.
3. The proposed station will be a composite station and will host 7 career fire fighters (per shift) and up to 25 volunteers.
4. Two access are proposed onto Street 1; an access for returning fire trucks and regular vehicles on the eastern edge of the site and an access for fire trucks exiting onto Street 1 further west.
5. Finance: 2 million dollars will be allocated for 2020 and the remaining money will be allocated for 2021. The plan is to break grounds in 2021.

Planning Comments

1. This is a pre-consultation for a Site Plan Control Application, Standard, Staff Approval. Application form, timeline and fees can be found here.
2. Draft approval for the CU subdivision is expected in Fall 2019 and Spring 2020 for the Servicing and subsequently Registering of Phase 1. The fire station will be

available for purchase as part of phase 1 registration. For further questions on the timing of purchase and infrastructure availability, please contact Greg Winters at g.winters@novatech-eng.com or by telephone at 613-254-9643 Ext. 241.

3. Once, the subdivision receives draft approval, the block will be zoned Minor Institutional Zone (I1A) to permit the fire station. Please confirm whether any deviation from this proposed zoning is required so that we may create any necessary exception at the zoning by-law amendment stage.
4. Please ensure that all the proposed light fixture contain sharp cut-off and no light spillage on adjacent lands.
5. Please consult the Ward Councillors prior to application submission. Please consult both Councillor Jenna Sudds and Councillor El-Chantiry as the site is currently located in Ward 5, but Councillor Sudds is leading the coordination given it is an urban subdivision.

Engineering Comments

1. The Stormwater Management Criteria for the subject site is to be based on the following:
   i. The 100-yr post development allowable storm release rate shall be controlled to 219 L/s, as per Novatech's *1053, 1075 and 1145 March Road Site Servicing and Stormwater Management Report* (allowable storm release rate to be confirmed at Site Plan Control with the latest revision of Novatech's report).
   ii. Onsite storm runoff, in excess of the allowable release rate, and up to the 100-yr storm event must be detained on site.
   iii. Quantity control to be provide by the adjacent SWM Pond 1, to be constructed as part of the Claridge / Uniform subdivision. Onsite quality control will not be required (provided that the adjacent SWM Pond 1 is fully operational at the time of Site Plan Approval).
2. The proposed sanitary, storm and water service shall outlet to Street 1. The applicant is encouraged to coordinate with Novatech (engineering consultant for Claridge/Uniform subdivision) to discuss the timing of Phase 1 construction (inclusive of Street 1 and SWM Pond 1) as well as the installation of service stubs for the subject property, to avoid unnecessary road cuts in the future.
3. The existing borehole onsite estimates a bedrock depth of approximately 4.2m. Additional boreholes will be required within the subject property to better predict

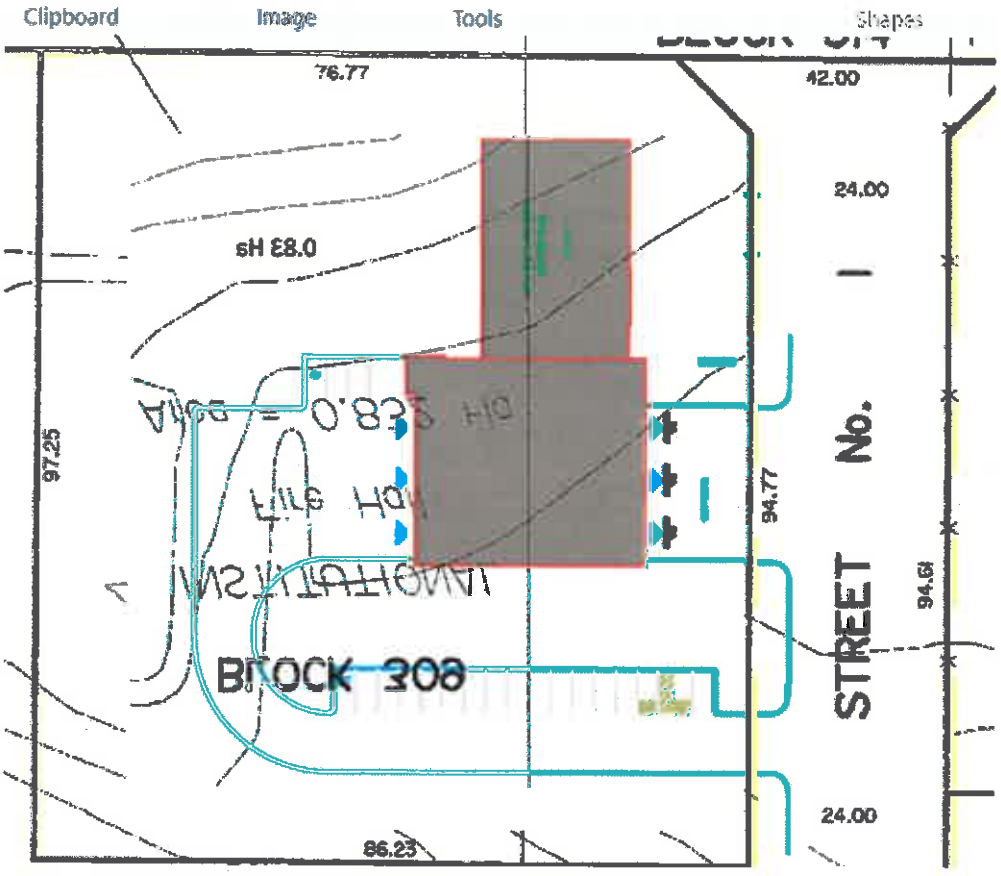
the bedrock elevations throughout the site. The bedrock elevation may dictate the preferred location of the service laterals.

4. The subject property has an elevation difference of approximately 2m. The proposed grading onsite may require the use of retaining walls or landscape terracing (maximum 3:1) to tie in with existing grades at the property limits.
5. Water Boundary condition requests must include the location of the service and the expected loads required by the proposed development. Please provide the following information:
   i. Location of service (Street 1)
   ii. Type of development and the amount of fire flow required (as per FUS, 1999).
   iii. Average daily demand: ___ l/s.
   iv. Maximum daily demand: ___l/s.
   v. Maximum hourly daily demand: ___ l/s.
6. An MECP Environmental Compliance Approval in not anticipated to be required for the subject site.

Should you have any questions or require additional information, please contact me directly at (613) 580-2424, x13850 or by email at Julie.Candow@ottawa.ca.

Transportation Comments

1. Follow Traffic Impact Assessment Guidelines
   - Traffic Impact Assessment will be required.
   - Start this process asap.
   - Applicant advised that their application will not be deemed complete until the submission of the draft step 1-4, including the functional draft RMA package (if applicable) and/or monitoring report (if applicable).
2. ROW protection on March Rd between Urban Limit and Terry Fox is 44.5m even (Note: Subject to unequal widenings outlined in March Road ESR). Corner triangles as per OP Annex 1 - Road Classification and Rights-of-Way at the following locations on the final plan will be required (measure on the property line/ROW protected line; no structure above or below this triangle):
   - Collector Road to Arterial Road: 5 metre x 5 metres
3. Sight triangle as per Zoning by-law is 6 metre x6 metre measure on the curb line.
4. Noise Impact Studies required for the following:
   - Road
5. Recommended to have the general access as far from the intersection as possible; flip the building and parking. TAC requires 55m between intersection and access.



6. AODA standards required; see attached checklist for guidance.
7. On site plan:
    - Show all details of the roads abutting the site up to and including the opposite curb; include such items as pavement markings, accesses and/or sidewalks.
    - Turning templates will be required for all accesses showing the largest vehicle to access the site; required for internal movements and at all access (entering and exiting and going in both directions). Show on separate drawing
    - Show all curb radii measurements; ensure that all curb radii are reduced as much as possible
    - Show lane/aisle widths.
    - Sidewalk is to be continuous across access as per City Specification 7.1.
    - Grey out any area that will not be impacted by this application.

Environment Comments

1. Please plant native species.

2. The site currently contains category 3 turtle habitat. The Kanata North land owner's group is currently pursuing an overall benefit permit. If the fire station is developed following the acceptance of the permit, no further action or study is required.

Forestry Comments

1. Depending on whether there are existing trees on-site, a Tree Conservation Report (TCR) may be required to review along with the suite of other plans/reports required by the City; an approved TCR is a requirement of Site Plan or Plan of Subdivision approval
2. Any removal of privately-owned trees 10cm or larger in diameter require a tree permit issued under the Urban Tree Conservation Bylaw; the permit is based on the approved TCR
3. In this case, the TCR may be combined with the LP
4. The TCR must list all trees on site by species, diameter and health condition.
5. The TCR must address all trees with a critical root zone that extends into the developable area.
6. If trees are to be removed, the TCR must clearly show where they are and document the reason they can not be retained
7. All retained trees must also be shown and all retained trees within the area impacted by the development process must be protected as per the City guidelines listed on Ottawa.ca
8. 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
9. The City does encourage the retention of healthy trees wherever possible; please ask your design/planning team to find opportunities for retention wherever possible if the trees are healthy and will contribute to the design/function of the site. For more information on the process or help with tree retention options, contact Mark Richardson mark.richardson@ottawa.ca
10. The removal of City-owned trees will require the permission of Forestry Services who will also review the submitted TCR; note that Forestry Services may ask for compensation for any City-owned tree that has to be removed.

Please refer to the links to "Guide to preparing studies and plans" and fees for general information. Additional information is available related to building permits, development

charges, and the Accessibility Design Standards. Be aware that other fees and permits may be required, outside of the development review process. You may obtain background drawings by contacting informationcentre@ottawa.ca.

These pre-con comments are valid for one year. If you submit a development application(s) after this time, you may be required to meet for another pre-consultation meeting and/or the submission requirements may change. You are as well encouraged to contact us for a follow-up meeting if the plan/concept will be further refined.

Please contact me at stream.shen@ottawa.ca or at 613-580-2424 extension 24488 if you have any questions.

Sincerely,

Stream Shen MCIP RPP
Planner II
Development Review - West

Devang Maratha

From: Mercedes Liedtke <mliedtke@mvc.on.ca>
Sent: Tuesday, October 25, 2022 8:35 AM
To: Francois Thauvette; Jane Cho
Subject: RE: Fire Station 45 - 1075 March Road - MVCA Pre-Consultation

Good Morning Francois,

It is understood that a proposed stormwater management pond as part of the CU developments subdivision will not be constructed prior to the fire station development.

The required water quality treatment for the subject site is an enhanced level of water quality protection (80% TSS removal). On-site water quality treatment measures (i.e., OGS or equivalent) are required to achieve 80% TSS removal for the interim conditions.

Shirley's brook is considered a cool-warm watercourse, and MVCA recommends thermal mitigation, as outlined in the Kanata North Urban Expansion Area CDP and EMP.

The Shirley's Brook and Watts Creek Subwatershed Study provides further information regarding Shirley's Brook. MVCA completed a Catchment Report for Shirley's Brook in 2016 as a part of the City Stream Watch program which may also provide some relevant background materials.

Please let me know if you have any questions.

Thank you,

Mercedes Liedtke, MSc.| Environmental Planner | Mississippi Valley Conservation Authority
10970 Highway 7, Carleton Place, ON K7C 3P1
www.mvc.on.ca | t. 613 253 0006 ext. 267 | f. 613 253 0122 | mliedtke@mvc.on.ca

Mississippi Valley Conservation Authority

From: Francois Thauvette <f.thauvette@novatech-eng.com>
Sent: October 24, 2022 9:51 AM
To: Mercedes Liedtke <mliedtke@mvc.on.ca>; Jane Cho <jcho@mvc.on.ca>
Subject: Fire Station 45 - 1075 March Road - MVCA Pre-Consultation

Hi Mercedes and Jane,

As discussed during our Teams call this morning, the construction of the CU Developments subdivision is being delayed. This will have a direct impact on the construction and approvals of Fire Station No. 45 (FS45). As a result, we need to design an interim access, servicing and SWM solution until such time as the Buckbean Street storm sewer (FS45 outlet) and downstream SWMF are constructed and operational. The intent is to construct the FS45 site with temporary access off March Road and provide temporary on-site storage (likely within a dry pond) and control the 5-yr and 100-yr post-development flows to their respective pre-development release rates (using a weir or stormwater control

structure) prior to releasing flows into the roadside ditch along March Road. Please review and confirm the stormwater quality control requirements for this interim scenario.

Once the downstream infrastructure and SWMF is constructed and operational, FS45 site flows will be re-directed to the proper outlet and the interim elements (i.e., temporary access, dry pond, etc.) will be removed and reinstated to the match the final grading and drainage design.

Regards,

François Thauvette, P. Eng., Senior Project Manager | Land Development & Public Sector Engineering
NOVATECH Engineers, Planners & Landscape Architects
Please note that I am working from home. Email or MS Teams are the best ways to contact me.
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext: 219 | Cell: 613.276.0310 | Fax: 613.254.5867

Devang Maratha

From: Mercedes Liedtke <mliedtke@mvc.on.ca>
Sent: Thursday, January 19, 2023 3:42 PM
To: Francois Thauvette; Jane Cho
Cc: Lynch, Shawn (Design & Construction); Brian Morley; Melissa Good
Subject: RE: FS45 - MVCA Comment Review Discussion

Good afternoon Francois,

I apologize for the delayed response in regard to your meeting invite. Given the recent changes under Bill 23, our main focus of review is now related to water quantity and the control of flooding and erosion.

The majority of our previous comments surround water quality, and achieving 80% TSS removal on-site. We understand that these are interim stormwater management conditions, and we understand given the cost of an OGS, it may not be a reasonable alternative to what was previously proposed in the latest submission. MVCA is supportive of interim stormwater measures that incorporate best management practices to achieve an appropriate level of water quality on site, until the ultimate conditions can be achieved.

If you would still like to meet to discuss our comments related to water quantity, and the control of flooding and erosion we are available Friday Jan 20. between 2:00-2:30pm.

Please let me know if you have any questions.

Thank you,

Mercedes Liedtke, MSc.| Environmental Planner | Mississippi Valley Conservation Authority
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Mississippi Valley Conservation Authority

From: Francois Thauvette <f.thauvette@novatech-eng.com>
Sent: January 17, 2023 12:55 PM
To: Mercedes Liedtke <mliedtke@mvc.on.ca>; Jane Cho <jcho@mvc.on.ca>
Cc: Lynch, Shawn (Design & Construction) <Shawn.Lynch@ottawa.ca>; Brian Morley <bdmorley@morleyhoppner.com>; Melissa Good <mgood@morleyhoppner.com>
Subject: FS45 - MVCA Comment Review Discussion

Hi Mercedes/Jane,

Would you be available for a brief Teams call to discuss the latest (attached) MVCA review comments? We are currently available the following dates/times:

- Wednesday (Jan. 18) between 9:30-10:30am

APPENDIX B

Development Servicing Study Checklist

Servicing study guidelines for development applications

4. Development Servicing Study Checklist

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

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

4.1 General Content

- ☐ Executive Summary (for larger reports only).
- ☒ Date and revision number of the report.
- ☒ Location map and plan showing municipal address, boundary, and layout of proposed development.
- ☒ Plan showing the site and location of all existing services.
- ☒ Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.
- ☒ Summary of Pre-consultation Meetings with City and other approval agencies.
- ☒ Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria.
- ☒ Statement of objectives and servicing criteria.
- ☒ Identification of existing and proposed infrastructure available in the immediate area.
- ☐ Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).
- ☒ Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.
- ☐ Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.
- ☐ Proposed phasing of the development, if applicable.

☒ Reference to geotechnical studies and recommendations concerning servicing.

☒ All preliminary and formal site plan submissions should have the following information:
- Metric scale
- North arrow (including construction North)
- Key plan
- Name and contact information of applicant and property owner
- Property limits including bearings and dimensions
- Existing and proposed structures and parking areas
- Easements, road widening and rights-of-way
- Adjacent street names

4.2 Development Servicing Report: Water

☒ Confirm consistency with Master Servicing Study, if available
☒ Availability of public infrastructure to service proposed development
☒ Identification of system constraints
☒ Identify boundary conditions
☒ Confirmation of adequate domestic supply and pressure
☒ Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development.
☒ Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.
☐ Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design
☒ Address reliability requirements such as appropriate location of shut-off valves
☐ Check on the necessity of a pressure zone boundary modification.
☒ Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range

- ☒ Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.
- ☐ Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.
- ☒ Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.
- ☒ Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.

4.3 Development Servicing Report: Wastewater

- ☒ Summary of proposed design criteria (Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).
- ☒ Confirm consistency with Master Servicing Study and/or justifications for deviations.
- ☒ Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers.
- ☒ Description of existing sanitary sewer available for discharge of wastewater from proposed development.
- ☐ Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable)
- ☐ Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix ‘C’) format.
- ☒ Description of proposed sewer network including sewers, pumping stations, and forcemains.
- ☐ Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).
- ☐ Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.
- ☐ Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.
- ☐ Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.
- ☒ Special considerations such as contamination, corrosive environment etc.

4.4 Development Servicing Report: Stormwater Checklist

- ☒ Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)
- ☒ Analysis of available capacity in existing public infrastructure.
- ☒ A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.
- ☒ Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.
- ☒ Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.
- ☒ Description of the stormwater management concept with facility locations and descriptions with references and supporting information.
- ☐ Set-back from private sewage disposal systems.
- ☐ Watercourse and hazard lands setbacks.
- ☒ Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.
- ☒ Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.
- ☒ Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).
- ☐ Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.
- ☒ Calculate pre and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.
- ☒ Any proposed diversion of drainage catchment areas from one outlet to another.
- ☒ Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.
- ☐ If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100 year return period storm event.
- ☒ Identification of potential impacts to receiving watercourses
- ☐ Identification of municipal drains and related approval requirements.
- ☒ Descriptions of how the conveyance and storage capacity will be achieved for the development.
- ☒ 100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.

- ☐ Inclusion of hydraulic analysis including hydraulic grade line elevations.
- ☒ Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.
- ☐ Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.
- ☐ Identification of fill constraints related to floodplain and geotechnical investigation.

4.5 Approval and Permit Requirements: Checklist

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

- ☐ Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in the Act.
- ☐ Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.
- ☐ Changes to Municipal Drains.
- ☐ Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)

4.6 Conclusion Checklist

- ☒ Clearly stated conclusions and recommendations
- ☐ Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.
- ☒ All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario

APPENDIX C

Sanitary Sewage Calculations, Excerpts from the Copperwood Estates – Site Servicing and SWM Report[2]

FIRE STATION 45
Sanitary Flows(Staff and Use)

Site Area	0.84		ha
Average Sanitary Flow - *Staff* (280 L/person/day)	8	0.03	
Average Sanitary Flow - *Trainee* (75 L/person/day)	22	0.02	
Truck Washing (400 L/truck/wash)	3	0.01	
Average Daily Flow		0.06	L/s
Peaking Factor - *Commercial*		1.5	
Peak Sanitary Flow		0.09	L/s
Infiltration Allowance		0.33	L/s/ha
Peak Extraneous Flows		0.28	L/s
Total Peak Sanitary Flow		**0.37**	**L/s**

FIRE STATION 45
Sanitary Flows (Typical Institutional Use Basis)

Site Area	0.84	ha
Average Sanitary Flow - *Commercial*	28,000	L/ha/day
Average Daily Flow	0.27	L/s
Peaking Factor - *Commercial*	1.0	
Peak Sanitary Flow	0.27	L/s
Infiltration Allowance	0.33	L/s/ha
Peak Extraneous Flows	0.28	L/s
Total Peak Sanitary Flow	**0.55**	**L/s**

SANITARY SEWER DESIGN SHEET
1053, 1075 and 1145 March Road
Copperwood Estate- Phase 1

NOVATECH
Engineers, Planners & Landscape Architects

PROJECT # : 116132
DESIGNED BY : MM/SAZ
CHECKED BY : DDB
DATE PREPARED : 6-Jun-18
DATE REVISED : 8-May-19
DATE REVISED : 20-Apr-20
DATE REVISED : 23-Dec-21
DATE REVISED : 4-May-22

LOCATION					RESIDENTIAL										COMMERCIAL / INSTITUTIONAL / PARK							INFILTRATION			FLOW	PROPOSED SEWER									
					INDIVIDUAL						CUMULATIVE				COMM		INST		PARK																
STREET	FROM MH	TO MH	Area ID	Total Area (ha.)	Single Units	Semi/ Town Units	Mult-Unit Towns	Multi-Unit Apartment	Population (in 1000's)	AREA (ha.)	Population (in 1000's)	AREA (ha.)	PEAK FACTOR M	PEAK POPULATION FLOW Qr(p) (L/s)	AREA (ha.)	Accu. AREA (ha.)	AREA (ha.)	Accu. AREA (ha.)	AREA (ha.)	Accu. AREA (ha.)	PEAK COMM/INST/PARK FLOW Qc(p) (L/s)	Total Area (ha.)	Accu. Total AREA (ha.)	PEAK EXTRAN. FLOW Q(i) (L/s)	PEAK DESIGN FLOW Q(d) (L/s)	LENGTH (m)	PIPE SIZE (mm)	PIPE ID (mm)	TYPE OF PIPE	GRADE %	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	Qpeak/ Qcap	d/ D_{full}	Actual Velocity
Outlet 1 - Street 1 and March Road																																			
Future Phase 2	FUT	405									0.078	1.29	3.6	0.92						1.17			2.46	0.81	1.78										
Street 6	405	607	B10	0.25	3				0.010	0.25	0.252	4.31	3.5	2.84		0.00		0.00		1.17	0.05	0.25	5.48	1.81	4.70	79.8	250	254.00	DR 35	0.66	50.4	0.99	9.3%	0.19	0.60
Street 7	603	605	B13	0.15		3			0.008	0.15	0.008	0.15	3.7	0.10		0.00		0.00		0.00	0.00	0.15	0.15	0.05	0.15	14.0	200	203.20	DR 35	0.95	33.4	1.03	0.4%		
Street 7	605	607	B14	0.70		25			0.068	0.70	0.076	0.85	3.6	0.89		0.00		0.00		0.00	0.00	0.70	0.85	0.28	1.17	92.6	200	203.20	DR 35	0.97	33.7	1.04	3.5%		
Street 7	607	609	B15	0.62		21			0.057	0.62	0.384	5.78	3.4	4.26		0.00		0.00		1.17	0.05	0.62	6.95	2.29	6.60	79.5	250	254.00	DR 35	0.55	46.0	0.91	14.4%	0.25	0.64
Street 7	609	611							0.000	0.00	0.384	5.78	3.4	4.26		0.00		0.00		1.17	0.05	0.00	6.95	2.29	6.60	7.4	250	254.00	DR 35	0.68	51.2	1.01	12.9%	0.23	0.68
Street 7	611	613	B16	0.11					0.000	0.11	0.384	5.89	3.4	4.26		0.00		0.00		1.17	0.05	0.11	7.06	2.33	6.64	51.0	250	254.00	DR 35	0.55	46.0	0.91	14.4%	0.25	0.64
	613	615							0.000	0.00	0.384	5.89	3.4	4.26		0.00		0.00		1.17	0.05	0.00	7.06	2.33	6.64	11.3	250	254.00	DR 35	0.71	52.3	1.03	12.7%	0.23	0.69
Street 7	615	617	B17	0.44		14			0.038	0.44	0.422	6.33	3.4	4.66		0.00		0.00		1.17	0.05	0.44	7.50	2.48	7.18	47.7	250	254.00	DR 35	0.55	46.0	0.91	15.6%	0.27	0.66
Street 8 / Park / Street 7	601	703	B18	2.06		30			0.081	1.01	0.081	1.01	3.6	0.95		0.00		0.00	1.05	1.05	0.04	2.06	2.06	0.68	1.67	108.0	200	203.20	DR 35	0.85	31.5	0.97	5.3%		
Street 8	703	705	B19	0.39		11			0.030	0.39	0.111	1.40	3.6	1.29		0.00		0.00		1.05	0.04	0.39	2.45	0.81	2.14	39.2	200	203.20	DR 35	1.30	39.0	1.20	5.5%		
Street 8	705	617							0.000	0.00	0.111	1.40	3.6	1.29		0.00		0.00		1.05	0.04	0.00	2.45	0.81	2.14	41.8	200	203.20	DR 35	2.82	57.5	1.77	3.7%		
Street 7	617	619	B20	0.49		16			0.043	0.49	0.576	8.22	3.4	6.26		0.00		0.00		2.22	0.10	0.49	10.44	3.45	9.80	70.1	250	254.00	DR 35	0.57	46.8	0.92	20.9%	0.30	0.72
Street 9	901	801	B27b	0.36	5				0.017	0.36	0.017	0.36	3.7	0.20		0.00		0.00		0.00	0.00	0.36	0.36	0.12	0.32	73.4	200	203.20	DR 35	1.20	37.5	1.16	0.9%		
Street 9	801	803	B27a	0.08	1				0.003	0.08	0.020	0.44	3.7	0.24		0.00		0.00		0.00	0.00	0.08	0.44	0.15	0.39	12.1	200	203.20	DR 35	1.07	35.4	1.09	1.1%		
Street 9	803	805	B21	0.31	5				0.017	0.31	0.037	0.75	3.7	0.44		0.00		0.00		0.00	0.00	0.31	0.75	0.25	0.69	61.2	200	203.20	DR 35	1.69	44.5	1.37	1.6%		
Street 9	805	807	B23	0.68	14				0.048	0.68	0.085	1.43	3.6	0.99		0.00		0.00		0.00	0.00	0.68	1.43	0.47	1.47	83.0	200	203.20	DR 35	1.51	42.0	1.30	3.5%		
Street 9	807	809	B24	0.49	10				0.034	0.49	0.119	1.92	3.6	1.38		0.00		0.00		0.00	0.00	0.49	1.92	0.63	2.01	70.9	200	203.20	DR 35	1.40	40.5	1.25	5.0%		
Street 9	809	619							0.000	0.00	0.119	1.92	3.6	1.38		0.00		0.00		0.00	0.00	0.00	1.92	0.63	2.01	9.8	200	203.20	DR 35	1.95	47.8	1.47	4.2%		
Street 7	619	621	B25	0.16		4			0.011	0.16	0.705	10.30	3.3	7.58		0.00		0.00		2.22	0.10	0.16	12.52	4.13	11.80	39.2	250	254.00	DR 35	0.61	48.5	0.96	24.4%	0.34	0.79
Street 7	621	907	B26	0.06					0.000	0.06	0.705	10.36	3.3	7.58		0.00		0.00		2.22	0.10	0.06	12.58	4.15	11.82	41.2	250	254.00	DR 35	0.61	48.5	0.96	24.4%	0.34	0.79
Street 10	901	903	B28	0.59	10				0.034	0.59	0.034	0.59	3.7	0.41		0.00		0.00		0.00	0.00	0.59	0.59	0.19	0.60	75.0	250	254.00	DR 35	1.97	87.1	1.72	0.7%	0.00	0.00
Street 10	903	905	B29	0.61	10				0.034	0.61	0.068	1.20	3.6	0.80		0.00		0.00		0.00	0.00	0.61	1.20	0.40	1.20	75.0	250	254.00	DR 35	2.27	93.5	1.84	1.3%	0.08	0.61
Street 10	905	907	B30	0.57	10				0.034	0.57	0.102	1.77	3.6	1.19		0.00		0.00		0.00	0.00	0.57	1.77	0.58	1.77	70.9	250	254.00	DR 35	2.17	91.4	1.80	1.9%	0.08	0.60
Street 9	901	1001	B31	0.40	5				0.017	0.40	0.017	0.40	3.7	0.20		0.00		0.00		0.00	0.00	0.40	0.40	0.13	0.34	72.1	200	203.20	DR 35	0.65	27.6	0.85	1.2%		
Street 9	1001	1003	B32	0.12	1				0.003	0.12	0.020	0.52	3.7	0.24		0.00		0.00		0.00	0.00	0.12	0.52	0.17	0.42	13.4	200	203.20	DR 35	0.45	23.0	0.71	1.8%		
Street 9	1003	1005	B33	0.97	18				0.061	0.97	0.082	1.49	3.6	0.96		0.00		0.00		0.00	0.00	0.97	1.49	0.49	1.45	114.4	200	203.20	DR 35	1.60	43.3	1.33	3.3%		
Street 9	1005	1101	B34	0.72	14				0.048	0.72	0.129	2.21	3.6	1.49		0.00		0.00		0.00	0.00	0.72	2.21	0.73	2.22	97.6	200	203.20	DR 35	2.29	51.8	1.60	4.3%		
Street 11	1103	1101	B35	0.34		7			0.019	0.34	0.019	0.34	3.7	0.23		0.00		0.00		0.00	0.00	0.34	0.34	0.11	0.34	53.0	200	203.20	DR 35	0.66	27.8	0.86	1.2%		
Street 11	1101	907	B36	0.25		6			0.016	0.25	0.164	2.80	3.5	1.89		0.00		0.00		0.00	0.00	0.25	2.80	0.92	2.81	82.0	200	203.20	DR 35	0.40	21.6	0.67	13.0%		
Street 10	907	1311	B37	0.56	10				0.034	0.56	1.006	15.49	3.2	10.56		0.00		0.00		2.22	0.10	0.56	17.71	5.84	16.50	82.8	375	381.00	DR 35	0.53	133.2	1.17	12.4%	0.23	0.78
Street 12	1315	1313	B38	0.44		8			0.022	0.44	0.022	0.44	3.7	0.26		0.00		0.00		0.00	0.00	0.44	0.44	0.15	0.40	57.8	200	203.20	DR 35	0.80	30.6	0.94	1.3%		
Street 12	1313	1311	B39	0.25		5			0.014	0.25	0.035	0.69	3.7	0.42		0.00		0.00		0.00	0.00	0.25	0.69	0.23	0.65	73.6	200	203.20	DR 35	1.13	36.4	1.12	1.8%		
Street 12	1311	1309	B40	0.25					0.000	0.25	1.041	16.43	3.2	10.90		0.00		0.00		2.22	0.10	0.25	18.65	6.15	17.15	24.1	375	381.00	DR 35	0.58	139.3	1.22	12.3%	0.23	0.82
Street 12	1309	1307				4			0.011	0.00	1.052	16.43	3.2	11.00		0.00		0.00		2.22	0.10	0.00	18.65	6.15	17.25	33.9	375	381.00	DR 35	0.53	133.2	1.17	13.0%	0.23	0.78
Street 12	1307	1305	B41	0.23		6			0.016	0.23	1.068	16.66	3.2	11.16		0.00		0.00		2.22	0.10	0.23	18.88	6.23	17.49	44.3	375	381.00	DR 35	0.54	134.4	1.18	13.0%	0.25	0.83
Street 12	1305	1303	B42	0.29		7			0.019	0.29	1.087	16.95	3.2	11.34		0.00		0.00		2.22	0.10	0.29	19.17	6.33	17.77	44.5	375	381.00	DR 35	0.54	134.4	1.18	13.2%	0.25	0.83
Street 12	1303	1301	B43	0.20					0.000	0.20	1.087	17.15	3.2	11.34		0.00		0.00		2.22	0.10	0.20	19.37	6.39	17.83	84.8	375	381.00	DR 35	0.53	133.2	1.17	13.4%	0.25	0.82
Street 12	1301	1215	B44	1.71			46	46	0.207	1.71	1.294	18.86	3.2	13.33		0.00		0.00		2.22	0.10	1.71	21.08	6.96	20.38	93.4	375	381.00	DR 35	0.54	134.4	1.18	15.2%	0.27	0.86
Future Phase 3	FUT	1205									0.251	3.75	3.5	2.84									3.75	1.24	4.07										
Future Phase 3	FUT	307									0.251	3.52	3.5	2.84									3.52	1.16	4.00										
Street 4	307	1205	B58	0.17					0.000	0.17	0.251	3.69	3.5	2.84		0.00		0.00		0.00	0.00	0.17	3.69	1.22	4.05	81.5	200	203.20	DR 35	0.68	28.2	0.87	14.4%		
Street 1	1205	1207	B59	0.59		15			0.041	0.59	0.542	8.03	3.4	5.91		0.00		0.00		0.00	0.00	0.59	8.03	2.65	8.56	111.2	200	203.20	DR 35	0.58	26.1	0.80	32.9%		
Street 1	1207	1209	B60	0.26		7			0.019	0.26	0.561	8.29	3.4	6.11		0.00		0.00		0.00	0.00	0.26	8.29	2.74	8.84	48.1	200	203.20	DR 35	0.65	27.6	0.85	32.1%		
Street 1	1209	1211	B61	0.12		3			0.008	0.12	0.569	8.41	3.4	6.19		0.00		0.00		0.00	0.00	0.12	8.41	2.78	8.96	25.0	200	203.20	DR 35	0.72	29.0	0.90	30.9%		
Street 3	309	311	B62	0.95		35			0.095	0.95	0.095	0.95	3.6	1.10		0.00		0.00		0.00	0.00	0.95	0.95	0.31	1.42	112.2	200	203.20	DR 35	0.45	23.0	0.71	6.2%		
Street 3	311	313	B63	0.31		11			0.030	0.31	0.124	1.26	3.6	1.44		0.00		0.00		0.00	0.00	0.31	1.26	0.42	1.85	44.5	200	203.20	DR 35	0.45	23.0	0.71	8.1%		
Street 3	313	315	B64	0.48		16			0.043	0.48	0.167	1.74	3.5	1.92		0.00		0.00		0.00	0.00	0.48	1.74	0.57	2.49	54.3	200	203.20	DR 35	0.45	23.0	0.71	10.9%		
Street 3	315	317	B65	0.11		2			0.005	0.11	0.173	1.85	3.5	1.98		0.00		0.00		0.00	0.00	0.11	1.85	0.61	2.59	15.5	200	203.20	DR 35	0.45	23.0	0.71	11.3%		
Street 3	317	1211	B66	0.11					0.000	0.11	0.173	1.96	3.5	1.98		0.00		0.00		0.00	0.00	0.11	1.96	0.65	2.63	73.0	200	203.20	DR 35	1.01	34.4	1.06	7.6%		
Street 1	1211	1213	B67	0.22					0.000	0.22	0.742	10.59	3.3	7.94		0.00		0.00		0.00	0.00	0.22	10.59	3.49	11.44	18.6	200	203.20	DR 35	0.59	26.3	0.81	43.5%		
Street 1	1213	1215							0.000	0.00	0.742	10.59	3.3	7.94		0.00		0.00		0.00	0.00	0.00	10.59	3.49	11.44	75.4	200	203.20	DR 35	0.70	28.6	0.88	40.0%		

SANITARY SEWER DESIGN SHEET
1053, 1075 and 1145 March Road
Copperwood Estate- Phase 1

NOVATECH
Engineers, Planners & Landscape Architects

PROJECT # : 116132
DESIGNED BY : MM/SAZ
CHECKED BY : DDB
DATE PREPARED : 6-Jun-18
DATE REVISED : 8-May-19
DATE REVISED : 20-Apr-20
DATE REVISED : 23-Dec-21
DATE REVISED : 4-May-22

LOCATION					RESIDENTIAL										COMMERCIAL / INSTITUTIONAL / PARK							INFILTRATION			FLOW	PROPOSED SEWER									
					INDIVIDUAL						CUMULATIVE				COMM		INST		PARK																
STREET	FROM MH	TO MH	Area ID	Total Area (ha.)	Single Units	Semi/ Town Units	Mult-Unit Towns	Multi-Unit Apartment	Population (in 1000's)	AREA (ha.)	Population (in 1000's)	AREA (ha.)	PEAK FACTOR M	PEAK POPULATION FLOW Qr(p) (L/s)	AREA (ha.)	Accu. AREA (ha.)	AREA (ha.)	Accu. AREA (ha.)	AREA (ha.)	Accu. AREA (ha.)	PEAK COMM/INST/PARK FLOW Qc(p) (L/s)	Total Area (ha.)	Accu. Total AREA (ha.)	PEAK EXTRAN. FLOW Q(i) (L/s)	PEAK DESIGN FLOW Q(d) (L/s)	LENGTH (m)	PIPE SIZE (mm)	PIPE ID (mm)	TYPE OF PIPE	GRADE %	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	Qpeak/ Qcap	d/ D_{full}	Actual Velocity
FUTURE BLOCK / EXISTING LANDS ACCOUNTED FOR INCLUDING BLOCK 315	FUT / EX	1407		0.00					0.000		0.280	5.69	3.5	3.15		0.00		4.34		0.00	1.41	0.00	10.03	3.31	7.86	69.2	200	203.20	DR 35	0.45	23.0	0.71	34.3%		
Easement - Park&Ride	1407	1409	B77	3.33			25	25	0.113	3.33	0.392	9.02	3.4	4.35		0.00		4.34		0.00	1.41	3.33	13.36	4.41	10.16	103.3	200	203.20	DR 35	0.44	22.7	0.70	44.8%		
Easement - Park&Ride	1409	1215		0.00					0.000		0.392	9.02	3.4	4.35		0.00		4.34		0.00	1.41	0.00	13.36	4.41	10.16	97.2	200	203.20	DR 35	0.44	22.7	0.70	44.8%		
Street 1	1215	1217	B68	0.13					0.000	0.13	2.428	38.60	3.0	23.72		0.00		4.34		2.22	1.50	0.13	45.16	14.90	40.13	69.9	375	381.00	DR 35	0.75	158.4	1.39	25.3%	0.34	1.15
Street 1	1217	1219	B69	0.14					0.000	0.14	2.428	38.74	3.0	23.72		0.00		4.34		2.22	1.50	0.14	45.30	14.95	40.17	27.1	375	381.00	DR 35	0.75	158.4	1.39	25.4%	0.34	1.15
Street 1	1219	1221							0.000	0.00	2.428	38.74	3.0	23.72		0.00		4.34		2.22	1.50	0.00	45.30	14.95	40.17	28.2	375	381.00	DR 35	0.76	159.5	1.40	25.2%	0.34	1.16
																																			0.00
Street 1	1221	1223	B78	1.10					0.000	0.27	2.428	39.01	3.0	23.72		0.00	0.83	5.17		2.22	1.77	1.10	46.40	15.31	40.80	99.1	375	381.00	DR 35	0.75	158.4	1.39	25.8%	0.34	1.15
Total Flows - Outlet 1														**23.72**							**1.77**		**46.40**	**15.31**	**40.80**									
Outlet 2 - Street 10 and March Road																																			
Street 10	909	911	A1	1.05				42	0.076	1.05	0.076	1.05	3.6	0.89		0.00		0.00		0.00	0.00	1.05	1.05	0.35	1.23	82.0	250	254.00	DR 35	1.94	86.4	1.71	1.4%		
Street 10	911	913	A2	3.57				28	0.050	0.50	0.126	1.55	3.6	1.46		0.00	3.07	3.07		0.00	0.99	3.57	4.62	1.52	3.98	45.3	250	254.00	DR 35	1.94	86.4	1.71	4.6%		
Street 10	913	915	A3	0.00					0.000	0.00	0.126	1.55	3.6	1.46		0.00		3.07		0.00	0.99	0.00	4.62	1.52	3.98	47.4	250	254.00	DR 35	1.71	81.1	1.60	4.9%		
Street 10	915	917	A4	0.25					0.000	0.00	0.126	1.55	3.6	1.46	0.25	0.25		3.07		0.00	1.08	0.25	4.87	1.61	4.14	75.7	250	254.00	DR 35	1.98	87.3	1.72	4.7%		
Street 10	917	919	A5	2.36					0.000	0.00	0.126	1.55	3.6	1.46	2.36	2.61		3.07		0.00	1.84	2.36	7.23	2.39	5.69	74.9	250	254.00	DR 35	2.15	91.0	1.80	6.2%		
Total Flows - Outlet 2														**1.46**							**1.84**			**2.39**	**5.69**									

Notes:
1. Q(d) = Qr(p) + Q(i) + Qc(p)
2. Q(i) = 0.33 L/sec/ha
3. Qr(p) = (PxqxM/86,400)
3. Qc(p) = (A*q*Pf)/86,400

Definitions:
Q(d) = Design Flow (L/sec)
Qr(p) = Population Flow (L/sec), Residential
Q(i) = Extraneous Flow (L/sec)
Qc(p) = Population Flow (L/sec), Commercial/Institutional/Park

P = Population (3.4 persons per single unit, 2.7 persons per townhouse unit, 2.7 persons per multi-unit townhouse unit, 1.8 persons per multi-unit apartment)
q = Average per capita flow = 280 L/cap/day - Residential
q = Average per gross ha. flow = 35000 L/gross ha/day - Light industrial
q = Average per gross ha. flow = 28000 L/gross ha/day - Commercial/Institutional
q = Average per gross ha. flow = 3700 L/gross ha/day - Park (20L/day/person, 185 persons/ha - as per Appendix 4-A of the City of Ottawa Sewer Design Guidelines)
M = Harmon Formula (maximum of 4.0), K = Correction Factor = 0.8
Min pipe size 200mm @ min. slope 0.32%
Mannings n = 0.013
Pf = Peak factor (Commercial/Institional/Park) = 1.0 (less than 20% of total contributing areas), 1.5 (if area is 20% or greater of total contributing area)

*Assumes existing single lot along roadway will ultimately become 2 single units.
**Assumes north half of property is 50% towns and 50% singles at same density as CU lands (25 singles/ha, 47 towns/ha), south half of property assumed to be multi unit residential at same density as CU lands (62.8units/ha).

MARCH ROAD

MURPHY CRESCENT

BLOCK 311, FIRE HALL, PARK AND RIDE, BLOCK 310, FUTURE CLARIDGE LANDS, ST.ISIDORE SCHOOL AND ST.ISIDORE CHURCH ARE SUBJECT TO SEPARATE SITE PLAN OR PLAN OF SUBDIVISION APPLICATIONS. DETAILS AND FINAL LAYOUT TO BE DETERMINED AT THE SITE PLAN OR PLAN OF SUBDIVISION STAGE. FOR ALTERNATE SERVICING SCENARIOS FOR THESE LANDS, WHICH ARE DEPENDENT ON THE DEVELOPMENT OF THESE LANDS, REFER TO SITE SERVICING REPORT APPENDIX

EXISTING ST.ISIDORE ROMAN CATHOLIC PARISH

EXISTING CEMETERY

EXISTING ST.ISIDORE SCHOOL

EXISTING RESIDENTIAL 1055 MARCH RD

EXISTING RESIDENTIAL 1015 MARCH RD

FUTURE COMMERCIAL, FUTURE SCHOOL AND BLOCK 305 ARE SUBJECT TO A SEPARATE SITE PLAN OR PLAN OF SUBDIVISION APPLICATION.

FUTURE COMMERCIAL BLOCK

FUTURE PHASE

FUTURE SCHOOL BLOCK

FUTURE CLARIDGE

Fire Hall

Park and Ride

SWM BLOCK

SWM BLOCK

PHASE 1

PHASE 2

PHASE 3

BLOCK 272

BLOCK 284

BLOCK 285

BLOCK 295

BLOCK 296

BLOCK 297

BLOCK 303

BLOCK 305

BLOCK 306

BLOCK 307

BLOCK 308

BLOCK 309

BLOCK 310

BLOCK 311

BLOCK 313

BLOCK 314

STREET 1

STREET 2

STREET 3

STREET 4

STREET 5

STREET 6

STREET 7

STREET 8

STREET 9

STREET 10

STREET 11

STREET 12

C.E.P.E.O.

7x7m SHELTER

PLAY GROUND

18x30m HOCKEY RINK

NADIA LANE

NORTH

SITE

KEY PLAN
N.T.S.

WEST LANDS

ELK FARM

SITE BENCHMARK
REFERENCED TO LOCAL GEODETIC DATUM
001196U0001
N: 5023713
E: 349701
ELEV: 78.639

LEGEND

- SITE BOUNDARY
- SANITARY DRAINAGE AREA BOUNDARY
- PHASING LIMITS
- PROPOSED SANITARY SEWER AND MANHOLE
- EXISTING SANITARY SEWER AND MANHOLE
- EXISTING SANITARY SEWER WITH DIRECTION OF FLOW
- AREA ID
- MANHOLE TO MANHOLE
- POPULATION EQUIVALENT *PLUS ADDITIONAL NON-RESIDENTIAL FLOW
- AREA IN HECTARES

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.

PRELIMINARY NOT FOR CONSTRUCTION

No.	REVISION	DATE	BY
6.	REVISED AS PER CITY OF OTTAWA COMMENTS	MAY 4/22	SAZ
5.	ISSUED FOR CITY OF OTTAWA REVIEW	DEC 23/21	MSP
4.	REVISED AS PER CITY OF OTTAWA COMMENTS	NOV 13/20	MSP
3.	REVISED AS PER CITY OF OTTAWA COMMENTS	MAY 8/20	MSP
2.	REVISED AS PER CITY OF OTTAWA COMMENTS	MAY 13/19	MSP
1.	ISSUED FOR DRAFT PLAN OF SUBDIVISION APPLICATION	JULY 23/18	MSP

SCALE
1:1500
1:1500
0 15 30 45 60

DESIGN TJM
CHECKED SAZ
DRAWN MTM
CHECKED SAZ
APPROVED MSP

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER
S.A.N. ZORGEL
100191467
May 4/22
PROVINCE OF ONTARIO

REFER TO 116132-NL FOR ADDITIONAL NOTES

CITY OF OTTAWA
COPPERWOOD ESTATE
1053, 1075 AND 1145 MARCH ROAD

DRAWING NAME
SANITARY DRAINAGE AREA PLAN
PHASE 1

PROJECT No. 116132-00
REV REV # 6
DRAWING No. 116132-SAN

D07-16-18-0023

#17801

APPENDIX D

Water Demands, Boundary Conditions, Schematic of the Hydraulic Model, Hydraulic Modeling Results, FUS Calculations and Water Age Analysis Memo

Francois Thauvette

From: Candow, Julie <julie.candow@ottawa.ca>
Sent: Friday, May 27, 2022 3:43 PM
To: Francois Thauvette
Subject: RE: Ottawa Fire Station 45 - Request for WM boundary conditions
Attachments: 1075 March Road_27May2022.docx

Hello,

Please see attached the boundary conditions for 1075 March Road.

Have a great weekend!

Julie Candow, P.Eng
Project Manager
Planning, Real Estate and Economic Development Department - West Branch
City of Ottawa
110 Laurier Avenue West Ottawa, ON
613.580.2424 ext. 13850

Please take note that due to the current COVID situation, I am working remotely and phone communication may not be reliable at this time. The best way to reach me is by email.

From: Francois Thauvette <f.thauvette@novatech-eng.com>
Sent: May 17, 2022 3:30 PM
To: Candow, Julie <julie.candow@ottawa.ca>
Subject: RE: Ottawa Fire Station 45 - Request for WM boundary conditions

Hi Julie,

It is understood that if we submit without the latest boundary conditions information, that this will be a comment in the 1st submission comment letter.

Regards,

François Thauvette, P. Eng., Senior Project Manager | Land Development & Public Sector Engineering
NOVATECH Engineers, Planners & Landscape Architects
Please note that I am working from home. Email or MS Teams are the best ways to contact me.
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: Candow, Julie <julie.candow@ottawa.ca>
Sent: Tuesday, May 17, 2022 3:27 PM
To: Francois Thauvette <f.thauvette@novatech-eng.com>
Subject: RE: Ottawa Fire Station 45 - Request for WM boundary conditions

Hi Francois,

I have not received the boundary conditions yet for this site. As stated in my email below, BC requests are taking up to 3 weeks to process. If you would like to submit with out the updated boundary conditions, it will be noted as a comment in the 1st submission comment letter that updated BC's will be required and to revise the watermain calculations accordingly.

Julie Candow, P.Eng
Project Manager
Planning, Real Estate and Economic Development Department - West Branch
City of Ottawa
110 Laurier Avenue West Ottawa, ON
613.580.2424 ext. 13850

Please take note that due to the current COVID situation, I am working remotely and phone communication may not be reliable at this time. The best way to reach me is by email.

From: Francois Thauvette <f.thauvette@novatech-eng.com>
Sent: May 17, 2022 1:07 PM
To: Candow, Julie <julie.candow@ottawa.ca>
Subject: RE: Ottawa Fire Station 45 - Request for WM boundary conditions

Hi Julie,

I am just following-up on the e-mail below to see if you had heard anything from the City's Water Department (re: the watermain boundary conditions request). Our client is eager to submit for SPC this week, so if we don't receive any updated boundary condition information, we will assume the information provided in the master servicing and SWM plan prepared for the larger subdivision is 'good enough' for our initial submission. Please review and advise.

Regards,

François Thauvette, P. Eng., Senior Project Manager | Land Development & Public Sector Engineering
NOVATECH Engineers, Planners & Landscape Architects
Please note that I am working from home. Email or MS Teams are the best ways to contact me.
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: Candow, Julie <julie.candow@ottawa.ca>
Sent: Friday, May 6, 2022 9:08 AM

To: Francois Thauvette <f.thauvette@novatech-eng.com>
Subject: RE: Ottawa Fire Station 45 - Request for WM boundary conditions

Thank you Francois, I have submitted your boundary condition request. Please note that Asset Management has advised us that boundary conditions can take up to 3 weeks due to backlog on their end.

Thanks,

Julie Candow, P.Eng
Project Manager
Planning, Real Estate and Economic Development Department - West Branch
City of Ottawa
110 Laurier Avenue West Ottawa, ON
613.580.2424 ext. 13850

Please take note that due to the current COVID situation, I am working remotely and phone communication may not be reliable at this time. The best way to reach me is by email.

From: Francois Thauvette <f.thauvette@novatech-eng.com>
Sent: May 05, 2022 3:35 PM
To: Candow, Julie <julie.candow@ottawa.ca>
Subject: Ottawa Fire Station 45 - Request for WM boundary conditions

Hi Julie,

I am sending this e-mail to request WM boundary conditions for the proposed Fire Station #45 in Kanata North. The subject site is located at the intersection of March Road and Street 1. The building will be serviced off the new 300mm dia. WM in Street 1. The architect has confirmed that the building will be non-sprinklered and constructed of non-combustible materials. The anticipated water demands are as follows:

- Average Day Demand = 0.27 L/s
- Maximum Day Demand = 0.41 L/s
- Peak Hour Demand = 0.74 L/s
- Maximum Fire Flow Demand = 100 L/s (FUS)

See the attached PDFs of the **preliminary** architectural Site Plan and the preliminary calculation sheets for details. A multi-hydrant approach to firefighting is anticipated to be required. Based on a review of the subdivision plans, there will be three (3) municipal fire hydrants within 150m of the site, along Street 1, two of which will be within 75m of the site.

Regards,

François Thauvette, P. Eng., Senior Project Manager | Land Development & Public Sector Engineering
NOVATECH Engineers, Planners & Landscape Architects
Please note that I am working from home. Email or MS Teams are the best ways to contact me.
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext: 219 | Cell: 613.276.0310 | Fax: 613.254.5867

Boundary Conditions
1075 March Road

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	16	0.27
Maximum Daily Demand	25	0.41
Peak Hour	44	0.74
Fire Flow Demand #1	6,000	100.00
Fire Flow Demand #2	10,000	166.67

Location

Results

Connection 1 – March Rd.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	131.0	69.5
Peak Hour	126.2	62.7
Max Day plus Fire 1	124.6	60.4
Max Day plus Fire 2	120.2	54.1

Ground Elevation = 82.13 m

Disclaimer

The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.

FIRE STATION 45
Domestic Water Demands (Staff and Use)

Avg. Daily Domestic Demand - *Staff* (280 L/person/day)	8	0.03	
Avg. Daily Domestic Demand - *Trainee* (75 L/person/day)	22	0.02	
Truck Washing (400 L/truck/wash)	3	0.01	
Average Daily Demand		0.06	L/s
Max Day Demand = 1.5 x Avg. Daily Demand		0.09	
Peak Hour Demand = 1.8 x Max Day Demand		0.16	L/s

***Excludes use of training hydrant on-site.**

FIRE STATION 45
Domesic Water Demands (Typical Institutional Use Basis)

Site Area	0.84	ha
Average Daily Water Demands - *Institutional*	28,000	L/ha/day
Average Daily Water Demand	0.27	L/s
Max Day Demand = 1.5 x Avg. Daily Demand	0.41	
Peak Hour Demand = 1.8 x Max Day Demand	0.74	L/s

***Excludes use of training hydrant on-site.**

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

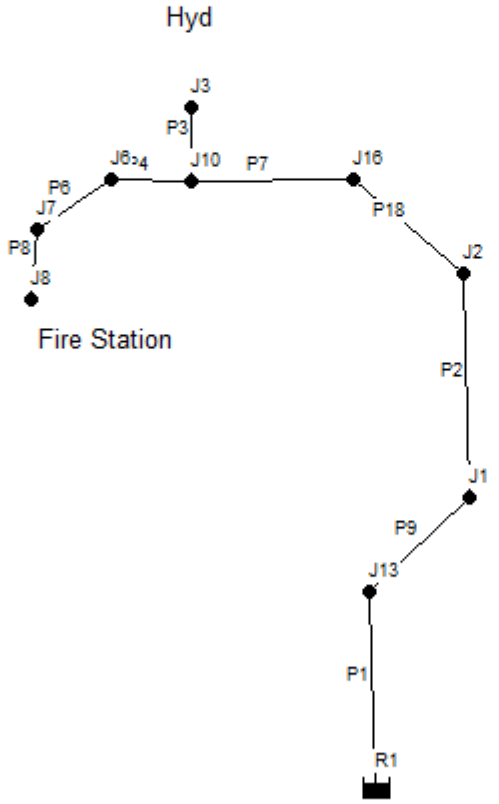
Novatech Project #: 122089
Project Name: Ottawa Fire Station 45
Date: 5/5/2022
Input By: S.Matthews
Reviewed By: F.Thauvette

Legend: Input by User; No Information or Input Required

Building Description: 1-Storey Fire Station incl. Partial Mezzanine
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)	1344			
		Number of Floors/Storeys	1			
		Area of structure considered (m^2)			**1,344**	
	F	**Base fire flow without reductions**				**6,000**
		F = 220 **C** (**A**)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**5,100**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**			**Reduction**		
	(2)	Adequately Designed System (NFPA 13)		-30%		**0**
		Standard Water Supply		-10%		
		Fully Supervised System		-10%		
				Cumulative Total	**0%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	> 45.1m		0%	**765**
		East Side	> 45.1m		0%	
		South Side	20.1 - 30 m		10%	
		West Side	30.1- 45 m		5%	
				Cumulative Total	**15%**	
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

Fire Station #45



Street 1

Fire Station 45 - Watermain Analysis

Peak Hour Demand
Network Table - Nodes

Node ID	Elevation m	Demand L/s	Head m	Pressure m	Pressure kPa	Pressure psi
Junc J1	80.7	0	126.2	45.5	446.36	64.74
Junc J2	80.8	0	126.2	45.4	445.37	64.60
Junc J13	80.7	0	126.2	45.5	446.36	64.74
Junc J16	81	0	126.2	45.2	443.41	64.31
Junc J10	81	0	126.2	45.2	443.41	64.31
Junc J3	84	0	126.2	42.2	413.98	60.04
Junc J6	81	0	126.2	45.2	443.41	64.31
Junc J7	81	0	126.2	45.2	443.41	64.31
Junc J8	83.5	0.16	126.2	42.7	418.89	60.75
Resvr R1	126.2	-0.16	126.2	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 P2	29.5	200	110	0.16	0.01	0
Pipe P1	19.1	200	110	0.16	0.01	0
Pipe P9	15.1	200	110	0.16	0.01	0
Pipe P18	5.9	200	110	0.16	0.01	0
Pipe P7	18.6	200	110	-0.16	0.01	0
Pipe P3	3.1	150	100	0	0	0
Pipe P4	1.2	200	110	0.16	0.01	0
Pipe P6	2.2	150	100	0.16	0.01	0
Pipe P8	3.9	150	100	0.16	0.01	0

Fire Station 45 - Watermain Analysis

Max HGL check
Network Table - Nodes

Node ID	Elevation m	Demand L/s	Head m	Pressure m	Pressure kPa	Pressure psi
Junc J1	80.7	0	131	50.3	493.44	71.57
Junc J2	80.8	0	131	50.2	492.46	71.43
Junc J13	80.7	0	131	50.3	493.44	71.57
Junc J16	81	0	131	50	490.50	71.14
Junc J10	81	0	131	50	490.50	71.14
Junc J3	84	0	131	47	461.07	66.87
Junc J6	81	0	131	50	490.50	71.14
Junc J7	81	0	131	50	490.50	71.14
Junc J8	83.5	0.1	131	47.5	465.98	67.58
Resvr R1	131	-0.1	131	0	0.00	0.00

Max HGL check
Network Table - Links

Link ID	Length m	Diameter mm	Roughness	Flow L/s	Velocity m/s	Unit Headloss m/km
Pipe P2	29.5	200	110	0.1	0	0
Pipe P1	19.1	200	110	0.1	0	0
Pipe P9	15.1	200	110	0.1	0	0
Pipe P18	5.9	200	110	0.1	0	0
Pipe P7	18.6	200	110	-0.1	0	0
Pipe P3	3.1	150	100	0	0	0
Pipe P4	1.2	200	110	0.1	0	0
Pipe P6	2.2	150	100	0.1	0.01	0
Pipe P8	3.9	150	100	0.1	0.01	0

Fire Station 45 - Watermain Analysis

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	80.7	0	122.63	41.93	411.33	59.66
Junc J2	80.8	0	120.94	40.14	393.77	57.11
Junc J13	80.7	0	123.5	42.8	419.87	60.90
Junc J16	81	0	120.6	39.6	388.48	56.34
Junc J10	81	0	119.53	38.53	377.98	54.82
Junc J3	84	95	118.67	34.67	340.11	49.33
Junc J6	81	0	119.53	38.53	377.98	54.82
Junc J7	81	0	119.53	38.53	377.98	54.82
Junc J8	83.5	0.1	119.53	36.03	353.45	51.26
Resvr R1	124.6	-95.1	124.6	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 P2	29.5	200	110	95.1	3.03	57.5
Pipe P1	19.1	200	110	95.1	3.03	57.5
Pipe P9	15.1	200	110	95.1	3.03	57.5
Pipe P18	5.9	200	110	95.1	3.03	57.5
Pipe P7	18.6	200	110	-95.1	3.03	57.5
Pipe P3	3.1	150	100	95	5.38	277.99
Pipe P4	1.2	200	110	0.1	0	0
Pipe P6	2.2	150	100	0.1	0.01	0
Pipe P8	3.9	150	100	0.1	0.01	0

NOVATECH
Engineers, Planners & Landscape Architects

M E M O R A N D U M

DATE: DECEMBER 2, 2022

TO: JULIE CANDOW (CITY OF OTTAWA)

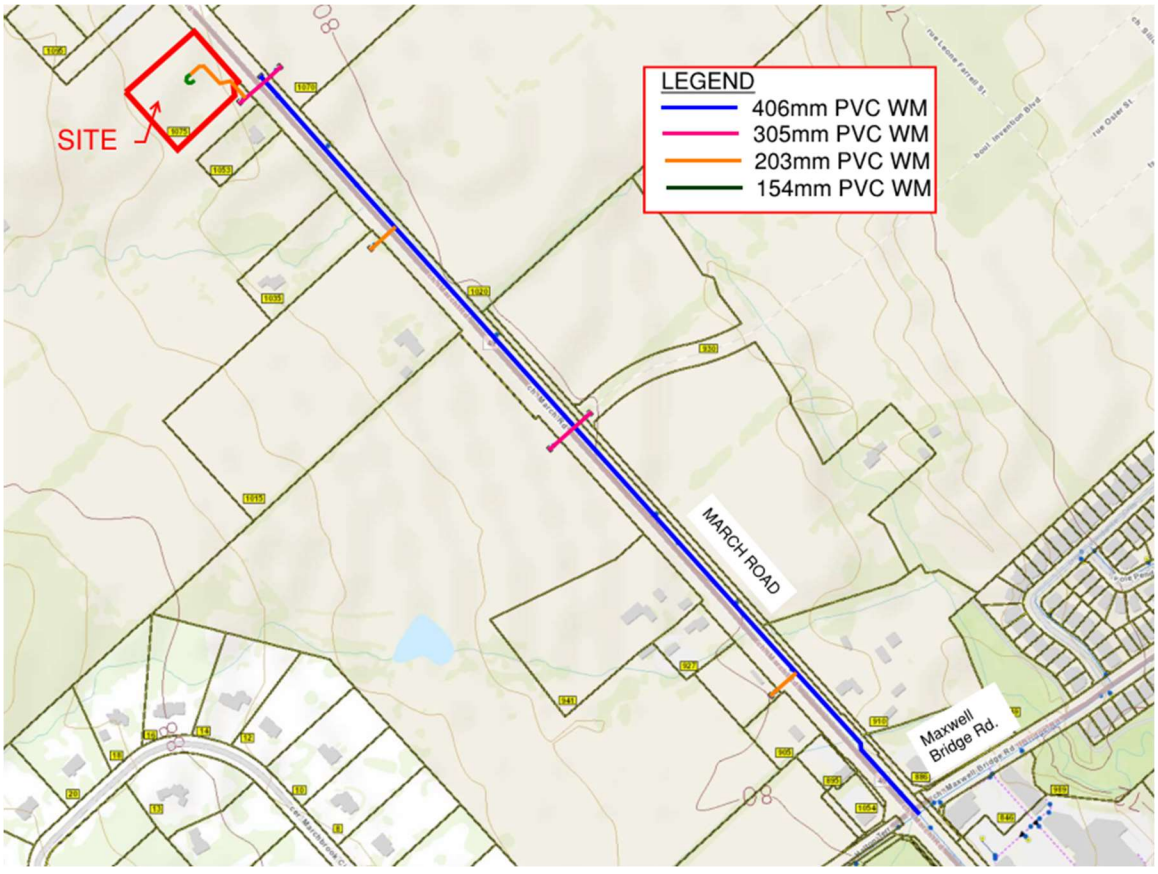
FROM: FRANÇOIS THAUVETTE

RE: FIRE STATION 45 - 1975A MARCH ROAD
INTERIM SERVICING - WATER AGE ANALYSIS
CITY FILE: D-07-12-22-0090
NOVATECH PROJECT: 122089

CC: B. MORLEY (MHI), S. LYNCH (CITY/FS45), P. MCCLURE (GWAL)

The purpose of this memorandum is to provide the City of Ottawa with a water age analysis for the 1.1 km section of 406mm dia. watermain along March Road between Maxwell Bridge Road and the proposed Fire Station 45 site (off the future Buckbean Street). The City of Ottawa has identified concerns related to the quality of the drinking water within this stretch of dead-end watermain, given the fact that the subject site may be constructed prior to the larger Minto and CU Developments subdivisions on the east and west sides of March Road, north of Maxwell Bridge Road.

Figure 1: Existing Watermain Network and Proposed FS45 Site



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Water Volume Calculations

The length of the 406mm dia. watermain along March Road, including hydrant leads and stubs (for future connections) are summarized in **Table 1**. The resulting volume of water within the dead-end watermain from Maxwell Bridge Road to the Fire Station building is also summarized.

Table 1: Water Volume Calculations

Pipe Size / Material	Length of Pipe (m)	Volume of Water*
406mm dia. / PVC	1,134m	137,489 L
305mm dia. / PVC	108m	7,482 L
203mm dia. / PVC	163m	5,327 L
154mm dia. / PVC	13m	245 L
TOTAL	**-**	**150,543 L (or 150.5m^3)**

*Volumes based on actual ID of pipes

Based on correspondence from the City of Ottawa, a water model simulation was completed by Asset Management to determine an accurate water age analysis for the watermain network at the intersection of March Road and Maxwell Bridge Road. The results indicate the age of the water to be approximately 2.3 days. As such, the City of Ottawa requires a 5-day turnover rate for the Fire Station as a theoretical starting point to determine the flushing rate, which is consistent with the requirement for an 8-day turn around as indicated in Section 4.1.2 of the City of Ottawa Water Design Guidelines.

Based on a review of 5 years of annual water consumption data provided by the City of Ottawa for similar Fire Stations (FS46 and FS47) it was calculated that the fire station utilizes on average approximately 1,400 L of (metered) water per day. In addition, it is estimated that on average 1,100 L of (unmetered) water is utilized daily for fire hydrant training purposes, as well as filling and washing of fire trucks on-site. The average water consumption for Fire Station 45 is therefore expected to be in the order of 2,500 L/day.

As expected, the water used by the Fire Station alone will not be adequate to turn over the volume of water within the dead-end section of watermain to prevent stagnation. As a result, Fire Station will need to flush the dead-end watermain along March Road to ensure the residual chlorine levels within the network are adequate. The water will be tested periodically by City staff, and the actual flushing rate will be adjusted, as required to achieve the desired residual chlorine levels. It is anticipated that the flush rate will decrease over time as the nearby Minto and CU Developments subdivisions are constructed and occupied.

Based on the current conditions, the estimated flush rate (volume of water to be turned over in a 5-day period) was calculated as follows:

- Estimated Volume of Water within the dead-end watermain: 150.5m^3
- Estimated Volume of Water used by FS45: 12.5m^3 (5 x 2.5m^3)
- Estimated Flush Rate Volume: 138m^3 (150.5m^3 – 12.5m^3)
- Estimated Daily Flush Rate Volume per day: **27.6m^3** or **27,600 L** (138m^3 / 5)

The cost of flushing this water into the municipal sanitary sewer system has not been included in this analysis. Despite the costs, there are benefits to flushing this water into the 600mm dia. sanitary sewer along March Road, as the sanitary flows from the Fire Station 45 alone would not be sufficient to keep the sewer system clean.

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As part of the interim water servicing strategy, the following options were considered:

- The installation of an external automatic flushing chamber (per Standard Detail Drawing W3.2), or
- The installation of an equivalent internal (metered) flushing device, given the fact the Fire Station will be a municipally owned and operated facility.

Based on recent correspondence from the City of Ottawa, it appears that an internal (metered) flushing device will be acceptable. The selected auto flushing device and configuration will be determined by the mechanical consultant at the detailed design stage and incorporated onto the interim servicing design.

Conclusion

Based on the water age analysis, automatic flushing of the dead-end watermain along March Road north of Maxwell Bridge Road, will be required and is anticipated to be approximately **27,600 L/day**, until such time as the nearby Minto and CU Developments subdivisions are constructed and occupied. The water will be tested periodically by City staff, and the actual flushing rate will be adjusted, as required to achieve the desired residual chlorine levels.

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Prepared by:

François Thauvette, P. Eng.

Senior Project Manager

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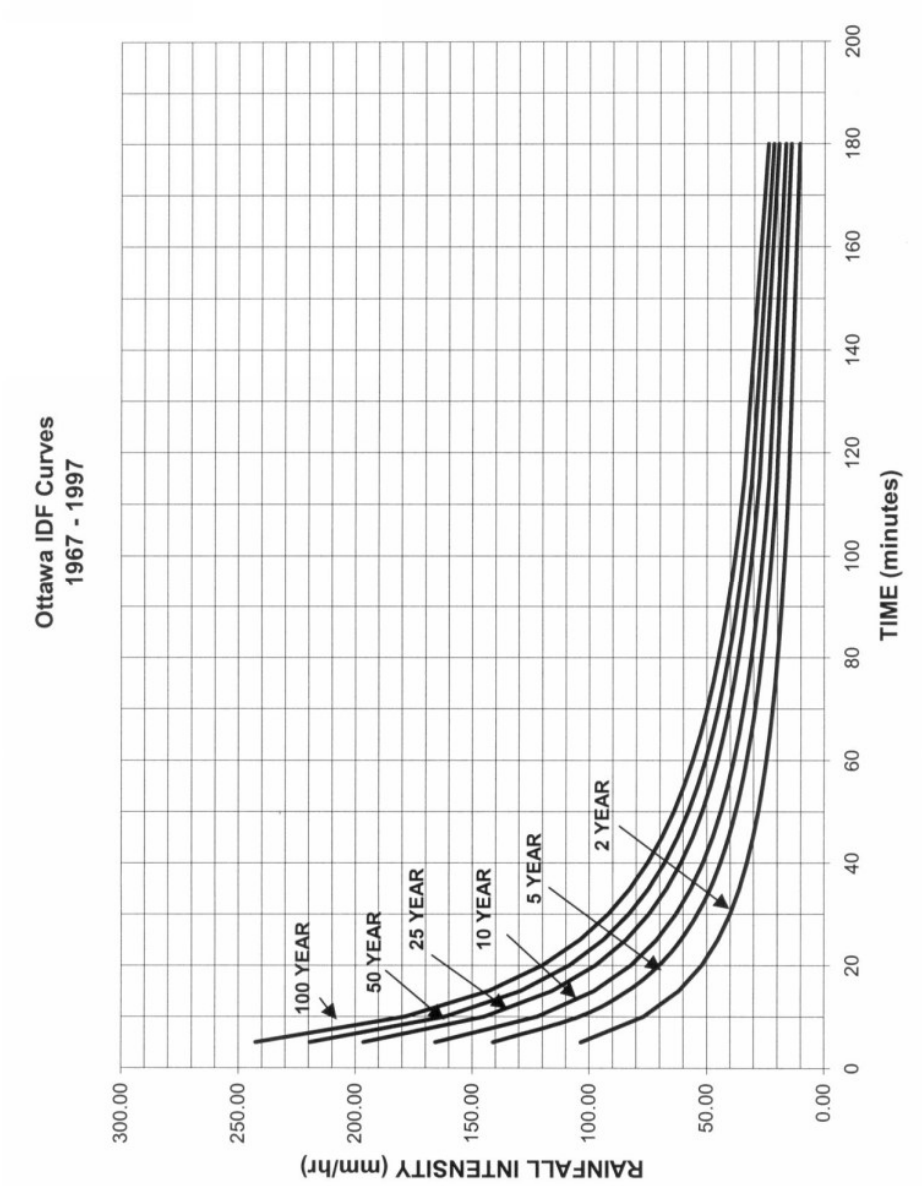
APPENDIX E

IDF Curves and SWM Calculations, Storm Sewer Design Sheets, Excerpts from the Copperwood Estates – Site Servicing and SWM Report[2]

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



Proposed Fire Station 45
1075-A March Road

Pre - Development : Site Flows - Interim Conditions									
Description	Area (ha)	$A_{impervious}$ (ha) C=0.9	A_{gravel} (ha) C=0.6	$A_{pervious}$ (ha) C=0.2	Weighted C_{W5}	Weighted C_{W100}	Pre-Development Flow		
							Allowable Flow (L/s) 2-yr*	Allowable Flow (L/s) 5-yr*	Allowable Flow (L/s) 100-yr*
Total Site Area	0.837	0.000	0.000	0.837	0.20	0.25	35.7	48.5	103.9

Post - Development : Site Flows - Interim Conditions																
Area	Description	Area (ha)	A_{imp} (ha) C=0.9	Agrav (ha) C=0.6	A_{perv} (ha) C=0.2	C_{W5}	C_{W100}	Uncontrolled Flow (L/s)*			Controlled Flow (L/s)			Storage Required (m^3)			Provided
								2-year	5-year	100-year	2-year	5-year	100-year	2-year	5-year	100-year	(m^3)
IA-0	Controlled Area (South Driveway)	0.025	0.025	0.000	0.000	0.90	1.00	-	-	-							
IA-1	Uncontrolled Area (West Parking)	0.135	0.071	0.000	0.064	0.57	0.64	-	-	-							
IA-2	Uncontrolled Area (Rear Parking)	0.073	0.042	0.000	0.031	0.60	0.68	-	-	-							
IA-3	Uncontrolled Area (Rear Parking)	0.091	0.029	0.000	0.062	0.42	0.49	-	-	-	22.4	25.5	34.5	42.5	63.2	147.7	152.6
IA-4	Uncontrolled Area (Rear)	0.046	0.044	0.000	0.002	0.87	0.97	-	-	-							
IA-5	Uncontrolled Roof and Landscape	0.205	0.072	0.015	0.118	0.48	0.55	-	-	-							
IA-6	Uncontrolled Landscape (Front)	0.084	0.012	0.026	0.046	0.42	0.51	-	-	-							
IA-7	Direct Runoff	0.128	0.018	0.006	0.104	0.29	0.34	7.9	10.8	21.9	-	-	-	-	-	-	-
R-1	Controlled Flow Roof Drains	0.050	0.050	0.000	0.000	0.90	1.00	-	-	-	-	-	-	5.7	8.0	17.9	29.3
	Area Check:	0.837	0.363	0.047	0.427	T_c = 10mins	Totals:	7.9	10.8	21.9	22.4	25.5	34.5	48.2	71.2	165.6	181.9
										Total Flows:	30.3	36.3	56.4				

* Represents approximate flows. Refer to Storm Sewer Design Sheet for detailed calculations.

Site - Controlled flow	Area (ha)	Aimp (ha)	Agrav (ha)	Aper (ha)	C_{W5}	C_{W100}
IA-0 TO IA-6 + R1	0.709	0.345	0.041	0.323	**0.56**	**0.64**

Proposed Fire Station 45
Novatech Project No. 122089
REQUIRED STORAGE - 1:2 YEAR EVENT
AREAS IA-0 to IA-6 + Roof Controlled Flow - Interim Condition

OTTAWA IDF CURVE Qpeak = 22.4 L/s
Area = 0.709 ha Qavg = 22.4 L/s
C = 0.56 Vol(max) = 42.5 m3
(Vol calculated for Qallow-avg)

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	115.06	92.65	27.79
10	76.81	85.33	62.91	37.75
15	61.77	68.62	46.21	41.59
20	52.03	57.81	35.39	42.47
25	45.17	50.18	27.76	41.65
30	40.04	44.49	22.07	39.73
35	36.06	40.06	17.65	37.06
40	32.86	36.51	14.10	33.83
45	30.24	33.60	11.18	30.19
50	28.04	31.15	8.74	26.21
55	26.17	29.07	6.66	21.98
60	24.56	27.28	4.87	17.52
75	20.81	23.12	0.71	3.18
90	18.14	20.16	-2.26	-12.20
120	14.56	16.18	-6.24	-44.91
150	12.25	13.61	-8.80	-79.24
180	10.63	11.81	-10.61	-114.58
210	9.42	10.46	-11.95	-150.63
240	8.47	9.42	-13.00	-187.20
270	7.72	8.58	-13.84	-224.16

Proposed Fire Station 45
Novatech Project No. 122089
REQUIRED STORAGE - 1:5 YEAR EVENT
AREAS IA-0 to IA-6 + Roof Controlled Flow - Interim Condition

OTTAWA IDF CURVE Qpeak = 25.5 L/s
Area = 0.709 ha Qavg = 25.5 L/s
C = 0.56 Vol(max) = 63.2 m3
(Vol calculated for Qallow-avg)

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	156.85	131.32	39.40
10	104.19	115.76	90.23	54.14
15	83.56	92.83	67.31	60.58
20	70.25	78.05	52.53	63.03
25	60.90	67.65	42.13	63.20
30	53.93	59.91	34.39	61.90
35	48.52	53.90	28.38	59.60
40	44.18	49.09	23.57	56.56
45	40.63	45.14	19.62	52.96
50	37.65	41.83	16.31	48.93
55	35.12	39.02	13.50	44.55
60	32.94	36.60	11.08	39.88
75	27.89	30.98	5.46	24.58
90	24.29	26.98	1.46	7.90
120	19.47	21.63	-3.89	-28.03
150	16.36	18.18	-7.34	-66.09
180	14.18	15.75	-9.77	-105.49
210	12.56	13.95	-11.57	-145.81
240	11.29	12.55	-12.97	-186.81
270	10.28	11.43	-14.09	-228.34

Grassed Dry Pond - Stage Storage

Elevation (m)	System Depth (m)	**Total Volume (m^3)**
82.24	0.00	**0**
82.30	0.06	**3.4**
82.35	0.11	**10.5**
82.40	0.16	**20.1**
82.45	0.21	**30.7**
82.50	0.26	**41.8**
82.55	0.31	**53.6**
82.60	0.36	**65.9**
82.65	0.41	**78.8**
82.70	0.46	**92.4**
82.75	0.51	**106.5**
82.80	0.56	**121.3**
82.85	0.61	**136.6**
82.90	0.66	**152.6**

Proposed Fire Station 45
Novatech Project No. 122089
REQUIRED STORAGE - 1:100 YEAR EVENT
AREAS IA-0 to IA-6 + Roof Controlled Flow - Interim Condition

OTTAWA IDF CURVE Qpeak = 34.5 L/s
Area = 0.709 ha Qavg = 34.5 L/s
C = 0.64 Vol(max) = 147.7 m3
(Vol calculated for Qallow-avg)

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	307.96	273.45	82.03
10	178.56	226.57	192.06	115.23
15	142.89	181.31	146.80	132.12
20	119.95	152.20	117.69	141.23
25	103.85	131.77	97.26	145.89
30	91.87	116.57	82.06	147.70
35	82.58	104.78	70.27	147.57
40	75.15	95.35	60.84	146.01
45	69.05	87.62	53.10	143.38
50	63.95	81.15	46.64	139.92
55	59.62	75.65	41.14	135.77
60	55.89	70.92	36.41	131.08
75	47.26	59.96	25.45	114.53
90	41.11	52.16	17.65	95.33
120	32.89	41.74	7.23	52.05
150	27.61	35.03	0.52	4.71
180	23.90	30.33	-4.18	-45.16
210	21.14	26.83	-7.68	-96.78
240	19.01	24.12	-10.39	-149.69
270	17.29	21.94	-12.57	-203.57

Proposed Fire Station 45
Novatech Project No. 122089
REQUIRED STORAGE - 1:100 YR + 20% IDF Increase
AREAS IA-0 to IA-6 + Roof Controlled Flow - Interim Condition

OTTAWA IDF CURVE Qpeak = 34.5 L/s
Area = 0.709 ha Qavg = 34.5 L/s
C = 0.64 Vol(max) = 191.8 m3
(Vol calculated for Qallow-avg)

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	369.55	335.04	100.51
10	214.27	271.88	237.37	142.42
15	171.47	217.58	183.07	164.76
20	143.94	182.64	148.13	177.76
25	124.62	158.12	123.61	185.42
30	110.24	139.88	105.37	189.67
35	99.09	125.74	91.23	191.58
40	90.17	114.42	79.91	191.78
45	82.86	105.14	70.63	190.70
50	76.74	97.38	62.87	188.60
55	71.55	90.79	56.27	185.71
60	67.07	85.11	50.60	182.15
75	56.71	71.95	37.44	168.49
90	49.33	62.60	28.09	151.67
120	39.47	50.09	15.58	112.15
150	33.13	42.04	7.53	67.77
180	28.68	36.39	1.88	20.35
210	25.37	32.20	-2.32	-29.17
240	22.81	28.94	-5.57	-80.23
270	20.75	26.33	-8.18	-132.47

Orifice Size - 1:100 yr Flow

Q=0.62xAx(2gh)^0.5

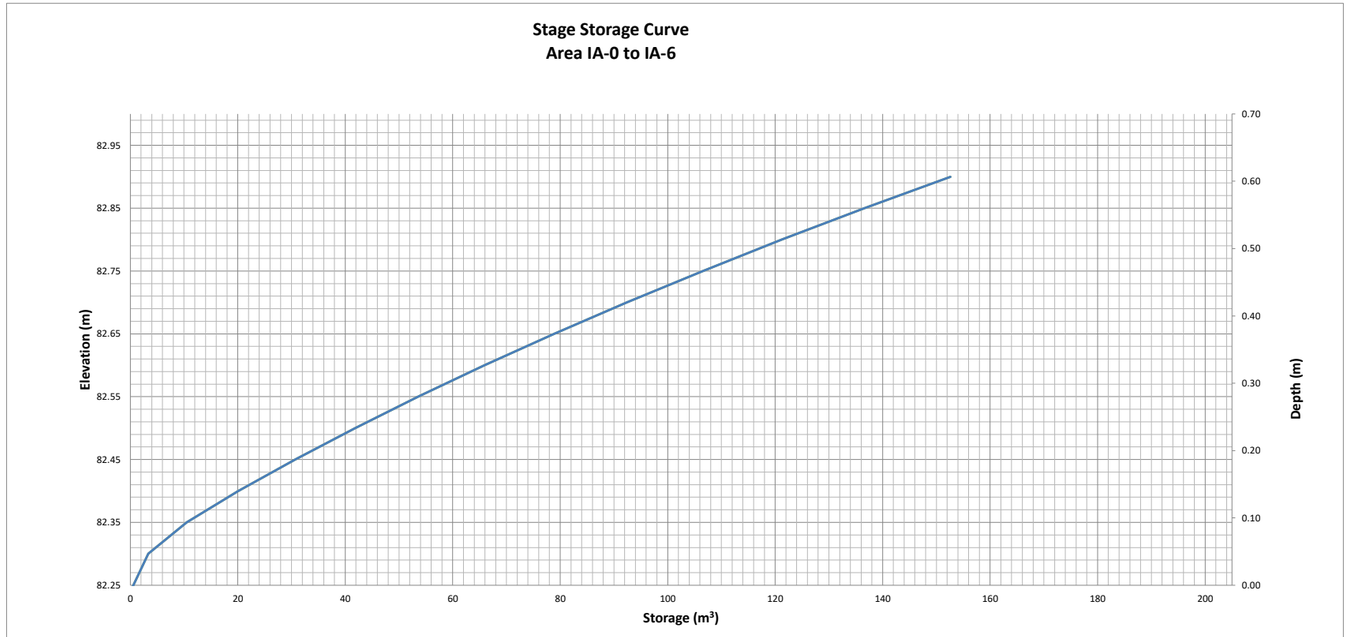
	Flow
Q (m^3/s) =	**0.0173**
g (m/s^2) =	9.81
h (m) =	**0.64**
A (m^2) =	**0.00785**
D (m) =	**0.10000**
D (mm) =	**100.0**

1:5 yr Flow

	1:5 yr
Q (m^3/s) =	0.0128
g (m/s^2) =	9.81
h (m) =	**0.35**
A (m^2) =	**0.00785**
D (m) =	**0.1**
D (mm) =	**100**

1:2 yr Flow

	1:2 yr
Q (m^3/s) =	0.0112
g (m/s^2) =	9.81
h (m) =	**0.27**
A (m^2) =	**0.00785**
D (m) =	**0.1**
D (mm) =	**100**



Proposed Fire Station 45
Novatech Project No. 122089
REQUIRED STORAGE - 1:2 YEAR EVENT
AREAS R-1 **Controlled Roof Drains 1+2**

OTTAWA IDF CURVE

Area =	0.049	ha	Qallow =	1.76	L/s
C =	0.90		Vol(max) =	5.7	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	12.70	10.94	3.28
10	76.81	9.42	7.66	4.59
15	61.77	7.57	5.81	5.23
20	52.03	6.38	4.62	5.54
25	45.17	5.54	3.78	5.67
30	40.04	4.91	3.15	5.67
35	36.06	4.42	2.66	5.59
40	32.86	4.03	2.27	5.45
45	30.24	3.71	1.95	5.26
50	28.04	3.44	1.68	5.03
55	26.17	3.21	1.45	4.78
60	24.56	3.01	1.25	4.50
65	23.15	2.84	1.08	4.21
70	21.91	2.69	0.93	3.89
75	20.81	2.55	0.79	3.56
90	18.14	2.22	0.46	2.51
105	16.13	1.98	0.22	1.37
120	14.56	1.79	0.03	0.18

Proposed Fire Station 45
Novatech Project No. 122089
REQUIRED STORAGE - 1:5 YEAR EVENT
AREAS R-1 **Controlled Roof Drains 1+2**

OTTAWA IDF CURVE

Area =	0.049	ha	Qallow =	2.14	L/s
C =	0.90		Vol(max) =	8.0	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	17.31	15.17	4.55
10	104.19	12.77	10.63	6.38
15	83.56	10.24	8.10	7.29
20	70.25	8.61	6.47	7.77
25	60.90	7.47	5.33	7.99
30	53.93	6.61	4.47	8.05
35	48.52	5.95	3.81	8.00
40	44.18	5.42	3.28	7.86
45	40.63	4.98	2.84	7.67
50	37.65	4.62	2.48	7.43
55	35.12	4.31	2.17	7.15
60	32.94	4.04	1.90	6.84
65	31.04	3.81	1.67	6.50
70	29.37	3.60	1.46	6.14
75	27.89	3.42	1.28	5.76
90	24.29	2.98	0.84	4.52
105	21.58	2.65	0.51	3.19
120	19.47	2.39	0.25	1.78

Proposed Fire Station 45
Novatech Project No. 122089
REQUIRED STORAGE - 1:100 YEAR EVENT
AREAS R-1 **Controlled Roof Drains 1+2**

OTTAWA IDF CURVE

Area =	0.049	ha	Qallow =	2.78	L/s
C =	1.00		Vol(max) =	17.9	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	33.06	30.28	9.08
10	178.56	24.32	21.54	12.93
15	142.89	19.47	16.69	15.02
20	119.95	16.34	13.56	16.27
25	103.85	14.15	11.37	17.05
30	91.87	12.51	9.73	17.52
35	82.58	11.25	8.47	17.78
40	75.15	10.24	7.46	17.90
45	69.05	9.41	6.63	17.89
50	63.95	8.71	5.93	17.80
55	59.62	8.12	5.34	17.63
60	55.89	7.61	4.83	17.40
65	52.65	7.17	4.39	17.13
70	49.79	6.78	4.00	16.81
75	47.26	6.44	3.66	16.46
90	41.11	5.60	2.82	15.23
105	36.50	4.97	2.19	13.81
120	32.89	4.48	1.70	12.25

Proposed Fire Station 45
Novatech Project No. 122089
REQUIRED STORAGE - 1:100 YEAR + 20%
AREAS R-1 **Controlled Roof Drains 1+2**

OTTAWA IDF CURVE

Area =	0.049	ha	Qallow =	3.14	L/s
C =	1.00		Vol(max) =	22.0	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	39.67	36.53	10.96
10	214.27	29.19	26.05	15.63
15	171.47	23.36	20.22	18.20
20	143.94	19.61	16.47	19.76
25	124.62	16.98	13.84	20.75
30	110.24	15.02	11.88	21.38
35	99.09	13.50	10.36	21.75
40	90.17	12.28	9.14	21.94
45	82.86	11.29	8.15	22.00
50	76.74	10.45	7.31	21.94
55	71.55	9.75	6.61	21.80
60	67.07	9.14	6.00	21.59
65	63.18	8.61	5.47	21.32
70	59.75	8.14	5.00	21.00
75	56.71	7.72	4.58	20.63
90	49.33	6.72	3.58	19.33
105	43.80	5.97	2.83	17.80
120	39.47	5.38	2.24	16.11

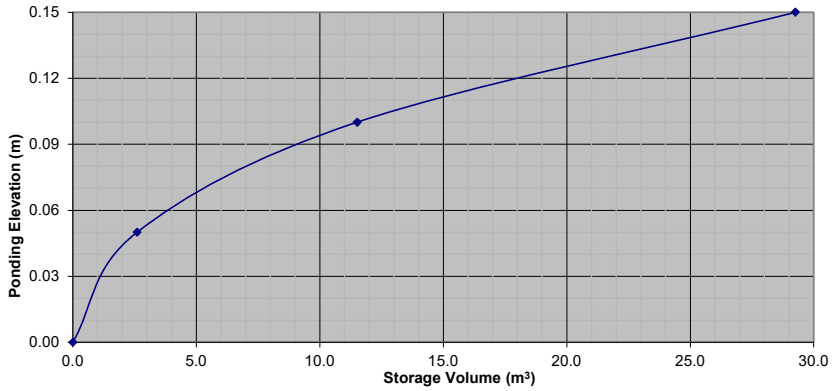
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ weir set to Fully-Exposed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:2 Year	0.88	1.76	7	5.7	
1:5 Year	1.07	2.14	9	8.0	29.3
1:100 Year	1.39	2.78	12	17.9	

Roof Drain Storage Table for Area RD 1+2

Elevation	Area RD 1+2	Total Volume
m	m^2	m^3
0.00	0	0
0.05	104.18	2.6
0.10	252.26	11.5
0.15	457.5	29.3

Stage Storage Curve: Areas R-1
Controlled Roof Drains 1+2



NOVATECH
Engineers, Planners & Landscape Architects

Proposed Fire Station 45
1075-A March Road

Pre - Development : Site Flows - Final Condition							
Description	Area (ha)	$A_{impervious}$ (ha) C=0.9	A_{gravel} (ha) C=0.6	$A_{pervious}$ (ha) C=0.2	Weighted C_{W5}	Weighted C_{W100}	Allowable Release Rate Per Copperwood Estates Detailed Site Servicing & SWM Report
Total Site Area	0.837	0.000	0.000	0.837	0.20	0.25	221.9

Post - Development : Site Flows - Final Condition														
Area	Description	Area (ha)	A_{imp} (ha) C=0.9	A_{perv} (ha) C=0.2	C_{W5}	C_{W100}	Uncontrolled Flow (L/s)*			Controlled Flow (L/s)		Storage Required (m^3)		Provided
							2-year	5-year	100-year	5-year	100-year	5-year	100-year	(m^3)
A-0	Uncontrolled Area (Front Driveway)	0.025	0.025	0.000	0.90	1.00	-	6.5	12.4	-	-	-	-	-
A-1	Uncontrolled Area (West Parking)	0.135	0.071	0.064	0.57	0.64	-	22.2	43.2	-	-	-	-	-
A-2	Uncontrolled Area (Rear Parking)	0.073	0.042	0.031	0.60	0.68	-	12.7	24.6	-	-	-	-	-
A-3	Uncontrolled Area (Rear Parking)	0.091	0.029	0.062	0.42	0.49	-	11.2	22.1	-	-	-	-	-
A-4	Uncontrolled Area (Rear)	0.046	0.044	0.002	0.87	0.97	-	11.6	22.2	-	-	-	-	-
A-5	Uncontrolled Roof and Landscape	0.204	0.073	0.131	0.45	0.52	-	26.6	52.5	-	-	-	-	-
A-6	Uncontrolled Landscape (Front)	0.098	0.015	0.087	0.31	0.37	-	8.9	18.2	-	-	-	-	-
A-7	Direct Runoff	0.115	0.017	0.098	0.30	0.36	-	10.2	20.7	-	-	-	-	-
R-1	Controlled Flow Roof Drains	0.050	0.050	0.000	0.90	1.00	-	-	-	2.4	3.3	8.0	17.9	29.3
	Area Check:	0.837						T_c = 10mins	Totals:	2.4	3.3	8.0	17.9	29.3

NOVATECH
Engineers, Planners & Landscape Architects

FIRE STATION 45 - 5 Year Storm Sewer Design Sheet

LOCATION			AREA (Ha)		FLOW					PROPOSED SEWER							
AREA ID	FROM	TO	AREA	R	INDIV 2.78 AR	ACCUM 2.78 AR	TIME OF CONC.	RAINFALL INTENSITY I	PEAK FLOW Q (l/s)	PIPE SIZE (mm)	PIPE SLOPE (%)	LENGTH (m)	CAPACITY (l/s)	FULL FLOW VELOCITY (m/s)	TIME OF FLOW (min.)	EXCESS CAPACITY (l/s)	Q/Qfull
A-1	CB 1	CBMH 1	0.135	0.57	0.21	0.21	10.00	104.19	22.29	250.0	0.35	28.3	35.22	0.72	0.66	12.93	0.63
A-2	CB 2	PIPE	0.073	0.60	0.12	0.12	10.00	104.19	12.69	200.0	1.00	0.8	32.83	1.04	0.01	20.14	0.39
A-3	CBMH 1	CBMH 2	0.091	0.42	0.11	0.44	10.66	100.84	44.57	300.0	0.35	43.7	57.27	0.81	0.90	12.70	0.78
A-4	CBMH 2	CBMH 101	0.046	0.87	0.11	0.55	11.56	96.63	53.45	375.0	0.35	20.1	103.83	0.94	0.36	50.38	0.51
A-5	CBMH 101	STMMH 01	0.204	0.45	0.26	0.81	11.91	95.06	76.85	375.0	0.45	35.5	117.73	1.06	0.56	40.89	0.65
	STMMH 01	CBMH 4	0.000	0.00	0.00	0.81	12.47	92.73	74.97	375.0	0.40	11.5	111.00	1.00	0.19	36.03	0.68
R-1	BLDG	CBMH 3	0.050	0.90	0.13	0.13	10.00	104.19	13.03	200.0	1.00	9.0	32.83	1.04	0.14	19.80	0.40
	BLDG	CBMH 3	CONTROL FLOW ROOF DRAINS						2.40								0.07
A-6	CBMH 3	CBMH 4	0.098	0.31	0.08	0.21	10.14	103.44	11.14	250.0	1.00	34.2	59.53	1.21	0.47	48.39	0.19
A-0	CBMH 4	EX	0.025	0.90	0.06	1.08	12.66	91.96	91.85	375.0	0.50	24.0	124.10	1.12	0.36	32.25	0.74

Definitions
Q = 2.78 AIR
Q = Peak Flow, in Litres per second (L/s)
A = Area in hectares (ha)
I = 2 Year Rainfall Intensity (mm/h)
R = Runoff Coefficient

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min Velocity = 0.8 m/sec.
3) 5 Year intensity = $998.071 / (time + 6.053)^{0.814}$
10 Year intensity = $1174.184 / (time + 6.014)^{0.816}$
100 Year intensity = $1735.688 / (time + 6.014)^{0.820}$

PROJECT #: 122089
PROJECT NAME: FIRE STATION 45
LOCATION: OTTAWA, ONTARIO

NOVATECH
Engineers, Planners & Landscape Architects

DATE PREPARED: MAY 2022
REVISED: JAN 2023

FIRE STATION 45 - 100 Year Storm Sewer Design Sheet

LOCATION			AREA (Ha)		FLOW					PROPOSED SEWER							
AREA ID	FROM	TO	AREA	R	INDIV 2.78 AR	ACCUM 2.78 AR	TIME OF CONC.	RAINFALL INTENSITY I	PEAK FLOW Q (l/s)	PIPE SIZE (mm)	PIPE SLOPE (%)	LENGTH (m)	CAPACITY (l/s)	FULL FLOW VELOCITY (m/s)	TIME OF FLOW (min.)	EXCESS CAPACITY (l/s)	Q/Qfull
A-1	CB 1	CBMH 1	0.135	0.64	0.24	0.24	10.00	178.56	42.89	250.0	0.35	28.3	35.22	0.72	0.66	-7.67	1.22
A-2	CB 2	PIPE	0.073	0.68	0.14	0.14	10.00	178.56	24.64	200.0	1.00	0.8	32.83	1.04	0.01	8.19	0.75
A-3	CBMH 1	CBMH 2	0.091	0.49	0.12	0.50	10.66	172.76	86.75	300.0	0.35	43.7	57.27	0.81	0.90	-29.48	1.51
A-4	CBMH 2	CBMH 101	0.046	0.97	0.12	0.63	11.56	165.47	103.62	375.0	0.35	20.1	103.83	0.94	0.36	0.22	1.00
A-5	CBMH 101	STMMH 01	0.204	0.45	0.26	0.88	11.91	162.77	143.46	375.0	0.45	35.5	117.73	1.06	0.56	-25.73	1.22
	STMMH 01	CBMH 4	0.000	0.00	0.00	0.88	12.47	158.74	139.92	375.0	0.40	11.5	111.00	1.00	0.19	-28.91	1.26
R-1	BLDG	CBMH 3	0.050	1.00	0.14	0.14	10.00	178.56	24.82	200.0	1.00	9.0	32.83	1.04	0.14	8.01	0.76
	BLDG	CBMH 3	CONTROL FLOW ROOF DRAINS						3.30								0.10
A-6	CBMH 3	CBMH 4	0.098	0.37	0.10	0.24	10.14	177.26	21.17	250.0	1.00	34.2	59.53	1.21	0.47	38.36	0.36
A-0	CBMH 4	EX	0.025	1.00	0.07	1.19	12.66	157.41	172.02	375.0	0.50	24.0	124.10	1.12	0.36	-47.92	1.39

Definitions
Q = 2.78 AIR
Q = Peak Flow, in Litres per second (L/s)
A = Area in hectares (ha)
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R = Runoff Coefficient

Notes:
1) Ottawa Rainfall-Intensity Curve
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3) 5 Year intensity = $998.071 / (time + 6.053)^{0.814}$
10 Year intensity = $1174.184 / (time + 6.014)^{0.816}$
100 Year intensity = $1735.688 / (time + 6.014)^{0.820}$

REFER TO 116132-NL FOR ADDITIONAL NOTES

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.

PRELIMINARY NOT FOR CONSTRUCTION

No.	REVISION	DATE	BY
7.	REVISED AS PER CITY OF OTTAWA COMMENTS	MAY 4/22	SAZ
6.	ISSUED FOR CITY OF OTTAWA REVIEW	DEC 23/21	MSP
5.	ISSUED TO MISSISSIPPI VALLEY CONSERVATION AUTHORITY FOR REVIEW	DEC 22/21	SAZ
4.	REVISED AS PER CITY OF OTTAWA COMMENTS	NOV 13/20	MSP
3.	REVISED AS PER CITY OF OTTAWA COMMENTS	MAY 8/20	MSP
2.	REVISED AS PER CITY OF OTTAWA COMMENTS	MAY 13/19	MSP
1.	ISSUED FOR DRAFT PLAN OF SUBDIVISION APPLICATION	JULY 23/18	MSP

SCALE 1:1500

DESIGN SAZ
CHECKED DDB
DRAWN RBG
CHECKED SAZ
APPROVED MSP

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER S.A.N. ZORGEL 100191487 May 4/22 PROVINCE OF ONTARIO

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Website www.novatech-eng.com

CITY OF OTTAWA
COPPERWOOD ESTATE
1053, 1075 AND 1145 MARCH ROAD

DRAWING NAME
STORM DRAINAGE AREA PLAN
PHASE 1

PROJECT No. 116132-00
REV REV # 7
DRAWING No. 116132-STM

D07-16-18-0023

#17801

APPENDIX F

Control Flow Roof Drain Information

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

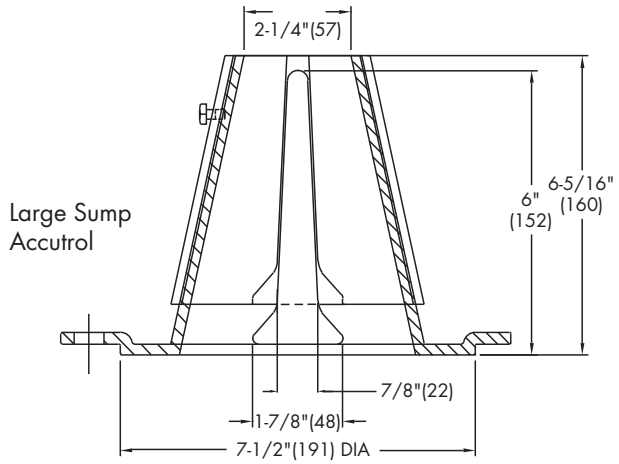
ADJUSTABLE ACCUTROL (for Large Sump Roof Drains only)

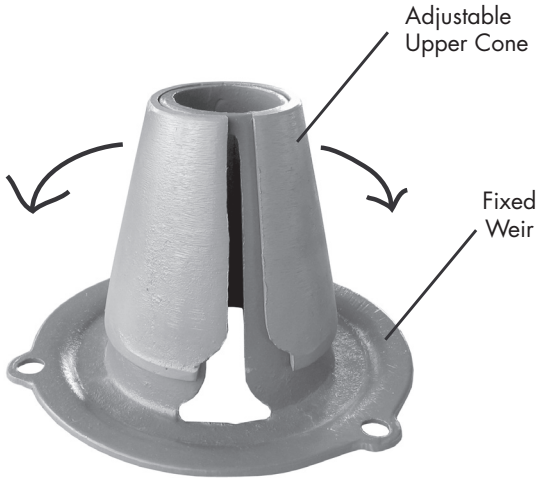
For more flexibility in controlling flow with heads deeper than 2", Watts Drainage offers the Adjustable Accutrol. The Adjustable Accutrol Weir is designed with a single parabolic opening that can be covered to restrict flow above 2" of head to less than 5 gpm per inch, up to 6" of head. To adjust the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

EXAMPLE:

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

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





1/2 Weir Opening Exposed Shown Above

TABLE 1. Adjustable Accutrol Flow Rate Settings

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

Job Name _____ Contractor _____

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

Engineer _____ Representative _____

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

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