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CARPENTERS UNION TRAINING CENTRE BUILDING ADDITION
8560 Campeau Drive

Development Servicing Study and
Stormwater Management Report

CARPENTERS UNION TRAINING CENTRE - BUILDING ADDITION
8560 Campeau Drive

DEVELOPMENT SERVICING STUDY AND STORMWATER MANAGEMENT REPORT

Prepared by:

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February 28, 2025

Ref: R-2023-142
Novatech File No. 123082

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Engineers, Planners & Landscape Architects

February 28, 2025

Carpenters Union
8560 Campeau Drive
Ottawa, Ontario
K2T 0N7

Attention: Jon Baron, Area Training Manager - Eastern Ontario

Re: Development Servicing Study and Stormwater Management Report
Proposed Building Addition – Carpenters Union Training Centre
8560 Campeau Drive, Ottawa, ON
Novatech File No.: 123082

Enclosed is a copy of the 'Development Servicing Study and Stormwater Management Report' for the proposed development at 8560 Campeau Drive 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 amendment application.

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

NOVATECH

François Thauvette, P. Eng.
Senior Project Manager | Land Development & Public-Sector Engineering

cc: Mohammed Fawzi (City of Ottawa)
Robert Matthews (n45)
Sylvain Chenier (McKee Engineering)

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1.0 INTRODUCTION

Novatech has been retained by N45 Architecture Inc. to complete the site servicing, grading, and stormwater management design associated with the proposed building addition of the Carpenters Union Training Centre. This report is being submitted in support of a Site Plan Control amendment application.

1.1 Location and Site Description

The subject site consists of the property at 8560 Campeau Drive. This property covers an approximate area of 2.631 hectares and is occupied by the Carpenters Union Training Centre and associated surface parking lots and outdoor amenity areas. The landscape area along the western property line is currently undeveloped. The subject site is surrounded by a commercial building to the north, undeveloped lands to the east, a hotel property to the west and Tanger Outlet Mall on the south side of Campeau Drive. The site is serviced by the municipal watermain, sanitary and storm sewers in Campeau Drive. The legal description of the subject site is designated as Part of Lot 4, Concession 1 (Ottawa Front), Geographic Township of Huntley, City of Ottawa.

Figure 1: Aerial view of the site

1.2 Pre-Consultation Information

A pre-consultation meeting was held with the City of Ottawa on December 13, 2024, at which time the client was advised of the general submission requirements. The Mississippi Valley Conservation Authority (MVCA) was consulted as part of the original development of the site. Based on a review of **O. Reg. 525/98: Approval Exemptions**, a Ministry of the Environment, Conservation and Parks (MECP) Environmental Compliance Approval (ECA) is not anticipated to be required. 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 large 1-storey addition on the north side of the existing building, replacing the concrete pad located within the fenced area. The proposed addition will be serviced by extending the internal plumbing (sanitary, storm and water) of the existing building. Storm drainage from the site will continue to be directed towards the 1350mm dia. municipal storm sewer Campeau Drive. Other site revisions include the relocation of the garbage bins to the west side of the north parking lot as well as 2 new gazebos adjacent to the proposed building addition to provide outdoor amenity areas for staff during their breaks.

1.4 Reference Material

The following design guidelines have been used to establish the servicing and stormwater management requirements for the proposed development:

- Ottawa Sewer Design Guidelines (2012) and Technical Bulletins (2010-present)
- Ottawa Design Guidelines for Water Distribution (2010) & Tech. Bulletins (2010-present)
- Ministry of the Environment Design Guidelines for Sewage Works (2008)
- Ministry of the Environment Stormwater Management Planning and Design Manual (2003)
- Ministry of the Environment Design Guidelines for Drinking Water Systems (2008)
- Fire Underwriters Survey (FUS) Water Supply for Public Fire protection
- Ontario Provincial Standards

The following report(s) were reviewed as part of the design process:

[1] Site Servicing Report Carpenters Union – 8560 Campeau Drive – prepared by Jp2g Consultants on July 15, 2015.

[2] Stormwater Management Report Carpenters Union – 8560 Campeau Drive – prepared by Jp2g Consultants on July 3, 2015.

The Jp2g SWM Report described above also references the following reports and studies:

[2.1] Kanata West Master Servicing Study - June 2006.

[2.2] Conceptual Site Servicing Plan - Taggart Kanata West Business Park –Dec.2013.

[2.3] Carp River Watershed Subwatershed Study - December 2004.

[2.4] Kanata West Business Park Design Brief - November 2014.

[2.5] Detailed Geotechnical Investigation Report - Proposed Development Campeau Drive & Palladium Drive, Block 22, Ottawa, ON – December 2014.

[3] Geotech Design Report – Proposed Addition at 8560 Campeau Drive, Ottawa, ON – prepared by Stantec in February 2025.

2.0 SITE SERVICING

The objective of the site servicing design is to provide proper sewage outlets, a suitable domestic water supply and to ensure that appropriate fire protection is provided for the proposed development. The servicing criteria, the expected sewage flows, and the water demands are to conform to the requirements of the City of Ottawa municipal design guidelines for sewer and water distribution systems. The City of Ottawa Servicing Study Guidelines for Development Applications requires that a Development Servicing Study Checklist be included in the report 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. Refer to the General Plan of Services (123082-GP) and the subsequent sections of the report for further details.

2.1 Sanitary Sewage

Under current conditions the building is serviced by a 250mm diameter PVC sewer connected to the 300mm diameter concrete municipal sanitary sewer in Campeau Drive. Based on a review of the Jp2g Site Servicing Report[1], the peak sanitary flows were calculated to be approximately 0.13 L/s based on a design population of 100 staff. The peak sanitary flows could increase to 0.81 L/s in the event of a large banquet type event. These flows are within the 1.6 L/s range that was accounted for in the Kanata West Business Park (KWBP) sanitary sewer design for the municipal sanitary sewer in Campeau Drive.

Under post-development conditions the proposed building addition (i.e., floor drains only) will be serviced by extending the internal plumbing from the stub installed as part of the original building construction. No additional washrooms or increase in staff are anticipated as part of the proposed building expansion. As a result, the peak sanitary flows are expected to remain unchanged as described in the previously approved Jp2g design documents. Refer to **Appendix F** for details.

2.2 Water for Domestic Use and Fire Protection

The subject site is located within the City of Ottawa 3W watermain pressure zone. Under current conditions the building is serviced by a 150mm diameter watermain fed off the 300mm dia. municipal watermain in Campeau Drive. Fire protection is currently being provided by the nearby municipal hydrants. Based on a review of the Jp2g Servicing Report[1], the average daily water demand was calculated to be approximately 0.09 L/s based on a design population of 100 staff. This would result in a maximum daily demand of 0.13 L/s (0.09 L/s x 1.5) and a Peak Hour Demand of 0.24 L/s (0.13 L/s x 1.8). The Fire Underwriters Survey (FUS) method was used to estimate the anticipated fire flow requirements for the original building at 167 L/s. Refer to **Appendix C** and **Appendix F** for details.

Under post-development conditions the proposed building addition (i.e., sprinkler system) will be serviced by extending the internal plumbing from the stub installed as part of the original building construction. No additional washrooms or increase in staff are anticipated as part of the proposed building expansion. As a result, the domestic water demands are expected to remain unchanged as generally described in the previously approved Jp2g design documents.

2.2.1 Water Demands and Watermain Analysis

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

- Average Daily Water Demand: 75 L/person/day
- Maximum Day Demand Peaking Factor = 1.5 x Avg. Day Demand (City Water Table 4.2)
- Peak Hour Demand Peaking Factor = 1.8 x Max. Day Demand (City Water Table 4.2)

Table 2 identifies the theoretical domestic water demands and fire flow requirements for the site, based on the above design criteria, information contained within the previously approved Jp2g Servicing Report[1] and information from the architect related to the proposed building addition.

Table 2: **Theoretical Water Demands**

Carpenters Union	Design Population	Avg. Day Demand (L/s)*	Max. Day Demand (L/s)*	Peak Hour Demand (L/s)*	Fire Flow (L/s)
Ex. Building	100	0.09	0.13	0.24	167
Ex. Building incl. Addition	**100**	**0.09**	**0.13**	**0.24**	**200**

*Represents rounded values

The FUS method was used to calculate the increased fire flow requirements, accounting for the proposed building addition, based on information provided by the architect. As indicated above, the FUS fire flow requirements have increased from 167 L/s to 200 L/s, including both sprinkler system and hose allowances in accordance with the OBC and NFPA 13. The sprinkler system will be designed by the fire protection (sprinkler) contractor as this process involves detailed hydraulic calculations based on building layout, pipe runs, head losses, fire pump requirements, etc. Refer to **Appendix C** for detailed calculations and correspondence from the City of Ottawa.

As discussed with the City of Ottawa, a multi-hydrant approach to firefighting is anticipated to be required to achieve the maximum fire flow requirements on-site. 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 various nearby fire hydrants will exceed 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 2.1 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 2.1: **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)
Ex. Building	167	4	2	>200
Ex. Building incl. Addition	200	4	2	

Preliminary domestic water demands, and fire flow requirements were provided to the City of Ottawa. **Table 2.2** summarizes preliminary hydraulic analysis results based on municipal watermain boundary conditions provided by the City of Ottawa.

Table 2.2: Hydraulic Boundary Conditions Provided by the City

Municipal Watermain Boundary Condition	Boundary Condition	Normal Operating Pressure Range (psi)	Anticipated WM Pressure (psi)*
Building Service Connection – 305mm dia. PVC WM in Campeau Drive			
Minimum HGL (Peak Hour Demand)	156.5 m	40 psi (min.)	~ 75 psi
Maximum HGL (Average Day Demand)	160.7 m	50 - 70 psi	~ 81 psi
HGL (Max Day + 200 L/s Fire Flow)	143.1 m	20 psi (min.)	~ 56 psi

*Based on an approximate roadway elevation of 101.8m in Campeau Drive. 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:

- Minimum system pressures are to be 276 kPa (40 psi) under Peak Hour demands.
- Normal operating pressures are to range between 345 kPa (50 psi) and 483 kPa (70 psi) under Average Day demands.
- Minimum system pressures are to be 140 kPa (20 psi) under Max Day + Fire Flow demands.

The hydraulic analysis indicates that the municipal watermain will provide adequate water and system pressures during 'Peak Hour' and 'Max Day + Fire Flow' conditions. Pressure reducing valves would be required as system pressures are expected to exceed 80 psi as indicated in the table above. Refer to **Appendix C** for detailed calculations and correspondence from the City of Ottawa.

2.3 Storm Drainage and Stormwater Management

The approach to stormwater management, both under existing and post-development conditions, is discussed in the subsequent sections of the report.

2.3.1 Stormwater Management Criteria and Objectives

The stormwater management (SWM) criteria described in the Jp2g SWM Report[2] were based on discussions with the City of Ottawa and the Mississippi Valley Conservation Authority (MVCA). The SWM criteria and objectives for the proposed development of the subject site are to meet the requirements of the original development and are summarized as follows:

- Ensure stormwater quantity measures are maintained, by:
    - Controlling post-development storm flows on-site to the maximum allowable release rate (570 L/s) allotted for the subject site, up to and including the 100-year design event without affecting adjacent lands.
- Ensure stormwater quality measures are maintained, by:
    - Providing an Enhanced Level of Protection (i.e., 80% TSS removal),
    - Minimizing temperature increases at the receiving water course, and
    - Providing a minimum annual infiltration of 91mm/year, as outlined in the Kanata West Master Servicing Study, which represents a 25% increase to the 73mm/year outlined in the Carp River Watershed/Subwatershed Study.

In addition to the technical requirements listed above the design should:

- Maintain existing drainage patterns and continue to direct site flows to the municipal storm sewer in Campeau Drive.
- Maintain a dual drainage system (i.e., minor system and emergency overland flow route for events exceeding the 100-year design storm).
- 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 F** for a copy of the previously approved Jp2g SWM Report[2].

2.3.1 Allowable Release Rate

Based on a review of the previously approved Jp2g SWM Report[2], the subject site (Block 22 within the Kanata West Business Park) was allotted a maximum 5-year allowable release rate of 570 L/s. Refer to **Appendix F** for details.

2.3.2 Existing Conditions

Based on a review of the Jp2g SWM Report[2], most of the stormwater flows from the 2.631 ha subject site are being controlled. Flows from the paved parking lots and landscape areas are being controlled by inlet control devices (ICD) while flows from a portion of the building roof are being attenuated by control flow roof drains. Site flows are being discharged into the 1350mm dia. municipal storm sewer in Campeau Drive, via the building service and on-site storm sewer system.

Stormwater quantity control measures

Table 3 summarizes the pre-development sub-catchment areas, runoff coefficients, and controlled flows comprising the site.

Table 3: **Pre-Development Release Rates Summary Table**

ID	Description	Total Area (ha)	Runoff Coeff.		Flow Control	Flow Rate (L/s)	
			$C_{w\ -5-yr}$	$C_{w-100-yr}$		5-yr	100-yr
A-1	Ex. Building Roof	0.490	0.90	1.00	Mix of controlled and non-controlled drains	100	100
A-2	West Parking Lot	0.682	0.60	0.67	315mm dia. plug Type ICD in STMH 1	292.4	370
A-3	North Parking Lot	0.848	0.52	0.59			
A-5	Rear Loading Area	0.363	0.65	0.74			
A-4	South Parking lot	0.248	0.47	0.54	Hydrovex 250 VHV-2 ICD in outlet of CB 1	49.4	80
Total	**---**	**2.631**	**-**	**-**	**-**	**441.8**	**550**

As indicated above, the 100-year peak flow is currently being controlled to a maximum release rate of 550 L/s, which is less than the allowable release rate of 570 L/s.

Stormwater quality control measures

The subject site is located within the jurisdiction of the Mississippi Valley Conservation Authority (MVCA). Based on the review of the Jp2g SWM Report[2], site flows are being discharged into the municipal storm sewer in Campeau Drive, which in turn conveys stormwater to SWM Pond 6 East, located approximately 500m downstream of the site. SWM Pond 6 East is one of the two stormwater management ponds designed to provide an 'Enhanced Level of Protect' (i.e., 80% TSS removal) for the Kanata West Business Park area, north of Feedmill Creek. As a result, no additional quality control measures are currently required or being provided on-site. Furthermore, building roofs and landscaped areas are generally considered clean for the purposes of stormwater quality and aquatic habitat protection. The building roofs and landscaped areas currently comprise approximately 59% of the total 2.631 ha site area.

In terms of mitigating temperature increases, on-site stormwater quantity control measures are currently being provided on 'light' coloured building roofs and within the underground storm sewer system (pipes and structures) during the 5-year event, thus minimizing the potential for stormwater management on the surface of paved parking lots which is prone to increasing the water temperatures. These thermal mitigation measures were implemented in the original SWM design for the site to meet the objectives of the Carp River Watershed/Subwatershed Study[2.3].

Infiltration of stormwater is currently being provided on site by a 296m long, 0.75m wide x 0.75 high, infiltration system installed within the parking lots and landscaped areas. As described in the Jp2g SWM Report[2], the existing infiltration provides an average infiltration of 148mm/year to the groundwater table, exceeding the minimum annual infiltration target of 91mm/year, as outlined in the Kanata West Master Servicing Study[2.4], which represents a 25% increase to the 73mm/year outlined in the Carp River Watershed/Subwatershed Study[2.3].

2.3.3 Post-Development Conditions

Under post-development conditions, the general approach to site drainage and stormwater management will remain the same. Refer to the enclosed Post-Development Storm Drainage Area Plan (123082-STM) for sub-catchment areas and to the following sections of the report for further details.

Stormwater quantity control measures

2.3.3.1 Area A-1 – Controlled Flow from Existing Building Roof

Under post-development conditions, sub-catchment area A-1 will remain unaltered. The partially controlled existing building roof flows will continue to discharge to the on-site storm sewer system, via the internal plumbing and existing 375mm dia. building service. Refer to **Appendix F** for a copy of the previously approved Jp2g SWM Report[2].

2.3.3.2 AreaA-1.1 – Controlled Flow from Building Addition

Flows from the proposed building addition roof will be attenuated using Watts adjustable 'Accutrol' control flow roof drains (model number RD-100-A-ADJ) prior to being discharged into the on-site storm sewer system, via the internal plumbing and existing building service. The 375mm dia. building service was designed to handle the building addition flows.

Table 3.1 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 the 5-year and 100-year design events.

Table 3.1: Building Addition - Controlled Flow Roof Drains

Roof Drain ID & Drainage Area per Drain (ha)	Number of Roof Drains	Watts Roof Drain Model ID (Weir Opening)	Controlled Flow per Drain (L/s)		Approximate Ponding Depth Above Drains (m)		Storage Volume Required (m^3)		Max. Storage Available (m^3)
			5 Yr	100 Yr	5 Yr	100 Yr	5 Yr	100 Yr	
RD1, (0.009 ha)	1	RD-100-A-ADJ (Closed)	0.32	0.32	0.08	0.11	1.4	3.3	7.0
RD2, (0.009 ha)	1	RD-100-A-ADJ (Closed)	0.32	0.32	0.08	0.11	1.4	3.5	7.2
RD3, (0.010 ha)	1	RD-100-A-ADJ (Closed)	0.32	0.32	0.08	0.11	1.8	4.3	8.6
RD4, (0.010 ha)	1	RD-100-A-ADJ (Closed)	0.32	0.32	0.08	0.11	1.8	4.4	8.7
RD5, (0.010 ha)	1	RD-100-A-ADJ (Closed)	0.32	0.32	0.08	0.11	1.8	4.4	8.7
RD6, (0.010 ha)	1	RD-100-A-ADJ (Closed)	0.32	0.32	0.08	0.11	1.8	4.2	8.5
RD7, (0.010 ha)	1	RD-100-A-ADJ (Closed)	0.32	0.32	0.08	0.11	1.8	4.2	8.6
RD8, (0.10 ha)	1	RD-100-A-ADJ (Closed)	0.32	0.32	0.08	0.11	1.8	4.2	8.5
RD9, (0.008 ha)	1	RD-100-A-ADJ (Closed)	0.32	0.32	0.08	0.11	1.4	3.4	7.1
RD10, (0.008 ha)	1	RD-100-A-ADJ (Closed)	0.32	0.32	0.08	0.11	1.3	3.3	6.9
RD11, (0.004 ha)	1	RD-100-A-ADJ (Closed)	0.32	0.32	0.07	0.10	0.3	1.0	3.1
RD12, (0.004 ha)	1	RD-100-A-ADJ (Closed)	0.32	0.32	0.07	0.10	0.3	1.0	3.1
RD13, (0.005 ha)	1	RD-100-A-ADJ (Closed)	0.32	0.32	0.07	0.10	0.5	1.4	3.9
RD14, (0.004 ha)	1	RD-100-A-ADJ (Closed)	0.32	0.32	0.07	0.10	0.5	1.4	3.9
RD15, (0.005 ha)	1	RD-100-A-ADJ (Closed)	0.32	0.32	0.07	0.10	0.5	1.4	3.9
RD16, (0.001 ha)	1	RD-100-A-ADJ (Closed)	0.32	0.32	0.00	0.07	0.0	0.1	1.0
Total Roof (0.118ha)*	**16**	**-**	**5.1***	**5.1***	**-**	**-**	**18.4***	**45.5***	**98.7***

*Table represents rounded values

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

2.3.3.1 Areas A-2.1 – Controlled flow from North and West Sides

For the purpose of this report, existing areas A-2, A-3 and a portion of area A-5 (minus the proposed building addition roof – area A-1.1) have been merged into a single catchment area, now identified as A-2.1. These areas have been combined as flows are being controlled by the existing inlet control device (i.e., 315mm dia. plug type ICD) installed in the outlet pipe of STMH 1. Like current conditions, stormwater runoff from this sub-catchment area will be temporarily stored within the underground storm sewer system and when necessary, on the surface of the parking lots, prior to being discharged into the downstream storm sewer system.

Table 3.2 summarizes the post-development design flow from these combined sub-catchment areas as well as the ICD specifications, the anticipated ponding elevations, storage volumes required and storage volume provided for the 2-year, 5-year and 100-year design events.

Table 3.2: Stormwater Flows, ICD & Storage

Design Event	Controlled Site Flows from Area A-2.1					
	ICD Type	Peak Flow	Ponding Depth/Elev.	~Average Flow (50% Qpeak)	Storage Vol. Required*	Max Storage Provided
5-Year	315mm dia. plug type ICD	287.1 L/s	0.00 m (100.90 m)	143.6 L/s	63.9 m³	**545 m³
100-Year		371.9 L/s	0.22 m (102.12 m)	186.0 L/s	188.7 m³	

*Storage volumes are based on the 50% Qpeak flow rates, which generally represents the average flow.
**Maximum storage volume at 0.30m surface ponding provided based on the JP2G SWM report[2]

Refer to **Appendix D** for detailed SWM calculations and **Appendix F** for a copy of the previously approved Jp2g SWM Report[2].

2.3.3.2 Area A-4 – Controlled Flow from South Side

Under post-development conditions, sub-catchment area A-4 will remain unaltered. The controlled post-development flows from this sub-catchment area will continue to be attenuated by the existing ICD (Hydrovex 250 VHV-2) installed in the outlet pipe of CB-1. Refer to **Appendix F** for a copy of the previously approved Jp2g SWM Report[2].

2.3.3.3 Summary of Post- Development Flows

Table 3.3 summarizes the post-development sub-catchment areas, runoff coefficients, and controlled flows comprising the site.

Table 3.3: Stormwater Flow Summary Table

ID	Description	Total Area (ha)	Runoff Coeff.		Flow Control	Flow Rate (L/s)	
			$C_{w\ -5-yr}$	$C_{w-100-yr}$		5-yr	100-yr
A-1	Ex. Building Roof	0.490	0.90	1.00	Mix of controlled and non-controlled drains	100.0	100.0
A-1.1	New Building Addition Roof	0.118	0.90	1.00	Controlled flow roof drains	5.1	5.1
A-2.1	North and West Parking Lots	1.660	0.52	0.60	315mm dia. plug Type ICD in STMH1	287.1	371.9
A-4	South Parking lot	0.363	0.47	0.54	Hydrovex 250 VHV-2 ICD in outlet of CB1	49.4	80.0
Total	**-**	**2.631**	**-**	**-**	**-**	**441.7**	**557.0**

As indicated above, the 100-year post-development peak flow will be controlled to a maximum release rate of 557.0 L/s, which is less than the allowable release rate of 570 L/s.

Stormwater quality control measures

Under post-development conditions, site flows will continue to be directed to SWM Pond 6 East, via the municipal storm sewer in Campeau Drive. SWM Pond 6 East will continue to provide an 'Enhanced Level of Protect' (i.e., 80% TSS removal) for the Kanata West Business Park area, north of Feedmill Creek, including the subject site. As a result, no additional quality control measures are required or being provided on-site. Furthermore, building roofs and landscaped areas are generally considered clean for the purposes of water quality and aquatic habitat protection. The building roofs and landscaped areas now comprise approximately 65% of the total 2.631 ha site area, an increase when compared to current conditions.

In terms of mitigating temperature increases, on-site stormwater quantity control measures will continue to be provided on 'light' coloured building roofs, including the proposed building addition, and within the underground storm sewer system (pipes and structures, during the 5-year event), thus minimizing the potential for stormwater management on the surface of paved parking lots which is prone to increasing the water temperatures. The thermal mitigation measures are consistent with those implemented in the original SWM design for the site to meet the objectives of the Carp River Watershed/Subwatershed Study[2.3].

As part of the proposed works, short segments of storm sewer below the proposed building addition need to be re-aligned to avoid conflicts with the proposed building slab and footings. As a result, the total length of the on-site infiltration system was reduced from 296m to 283.5m (representing approximately 95% of the original design length). Additionally, the area contributing flow to the on-site infiltration system has been reduced by the size of the building addition roof (0.118ha), as these flows are now being directed to the building service. Consequently, the site area contributing to the infiltration system has been reduced from 1.778ha to 1.660ha (representing 93% of the original area tributary to the infiltration system). The result is a reduction in the average annual infiltration from 148mm/year to approximately 131 mm/year (i.e., 148 mm/hr x 0.95 x 0.93), which still exceeds the minimum annual infiltration target of 91mm/year, as outlined in the Kanata West Master Servicing Study[2.4].

Maintenance and Monitoring of the Storm Sewer and Stormwater Management Systems

It is recommended that the client implement (or continue) the maintenance and monitoring program for both the on-site storm sewers and the stormwater management systems: The storm drainage system, roof drains and ICDs should be inspected routinely (at least annually) and maintained when necessary to ensure optimum performance.

3.0 SITE GRADING

The existing area to be developed consists of a relatively flat concrete slab. Stormwater runoff from this area currently drains towards existing CB-4. As part of the proposed development existing CB-4 will be removed and certain sewer segments re-aligned. Site grading adjacent to the proposed building addition will generally match existing grades, which slope north towards the existing parking lot. The finished floor elevation (FFE) of the proposed building will be set at 102.80m to match the existing building slab. Internal steps and a ramp (for larger truck deliveries) will be required to ensure the adjacent grades are maintained. As a result, the major overland flow route towards Journeyman Street will be maintained. The grades adjacent to the relocated garbage bin and gazebos will also generally match existing grades. Refer to the enclosed Grading and ESC Plan (123082-GR) for details.

4.0 GEOTECHNICAL INVESTIGATIONS

Stantec prepared a detailed Geotechnical Investigation Report[2.5] for the original development of the site, which was referenced in the Jp2g SWM Report[2]. Stantec has subsequently updated the Geotechnical Design Report[3]. Refer to these documents for subsurface conditions, construction recommendations and geotechnical inspection requirements.

5.0 EROSION AND SEDIMENT CONTROL

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

- Filter bags will be placed under the grates of nearby catchbasins, manholes and will remain in place until construction is completed.
- Silt fencing will be placed per OPSS 577 and OPSD 219.110 along the surrounding construction limits.
- Mud mats will be installed at the site entrance.
- 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 into the sewer system and/or the downstream ditch or watercourse.

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

6.0 CONCLUSION

This report has been prepared in support of a Site Plan Control amendment application for the proposed building addition at 8560 Campeau Drive. The conclusions are as follows:

- The proposed addition will be serviced by extending the internal plumbing (sanitary, storm and water) of the existing building, which is currently serviced by the municipal sewers and watermain in Campeau Drive.
- The building addition will be sprinklered like the remainder of the existing building.
- The nearby municipal fire hydrants will provide fire protection.
- The proposed stormwater design will continue to include both on-site stormwater quantity and downstream off-site stormwater quality control measures.
    - Post-development flows from sub-catchment areas A-1, A-1.1 will be attenuated by the use of control flow roof drains, while stormwater flows from sub-catchment areas A-2.1 and A-4 will continue to be controlled by the existing inlet control devices (ICD) installed within the on-site storm sewer system.
    - The total post-development flow from the subject site will be approximately 441.7L/s L/s during the 5-year event and 557.0 L/s during the 100-year event, all less than the maximum allowable release rate of 570 L/s for the site, as described in the previously approved Jp2g SWM Report[2].
    - On-site stormwater quality control measures will include measures to mitigate temperature increases in stormwater, such as the use of 'light' coloured building roofs. Infiltration of stormwater will continue to exceed the minimum annual infiltration target of 91mm/year, as outlined in the Kanata West Master Servicing Study[2.4].
    - Stormwater quality control measures equivalent to an 'Enhanced Level of Protect' (i.e., 80% TSS removal) will continue to be provided by SWM Pond 6 East, for the Kanata West Business Park area, north of Feedmill Creek, including the subject site.
- Regular inspection and maintenance of the storm sewer system, including the inlet control devices and control flow roof drains, is recommended to ensure that the storm drainage system is clean and operational.
- Erosion and sediment controls will be provided during construction.

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

NOVATECH

Prepared by:

Leonel Perez, C.E.T.
Design Technologist - Land Development

Reviewed by:

François Thauvette, P. Eng.
Senior Project Manager – Land Development

APPENDIX A

Project Correspondence

File No.: PC2024-0504

December 24, 2024

Robert Tran
Novatech
Via email: r.tran@novatech-eng.com

Subject: **Pre-Consultation: Meeting Feedback**
Proposed Site Plan Control Application – 8560 Campeau Drive

Please find below information regarding next steps as well as consolidated comments from the above-noted pre-consultation meeting held on Enter Date of Meeting.

Pre-Consultation Preliminary Assessment

1 ☐	**2** ☐	**3** ☐	**4** ☐	**5** ☒

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

Next Steps

1. A review of the proposal and materials submitted for the above-noted pre-consultation has been undertaken.

2. In your subsequent submission, please ensure that all comments or issues detailed herein are addressed. A detailed cover letter stating how each issue has been addressed must be included with the submission materials. Please coordinate the numbering of your responses within the cover letter with the comment number(s) herein.

3. Please note, if your development proposal changes significantly in scope, design, or density before the next submission, you may be requested to repeat the pre-consultation process before filing an Official application.

Supporting Information and Material Requirements

1. The attached **Study and Plan Identification List** outlines the information and material that has been identified, during this phase of pre-consultation, as either required (R) or advised (A) as part of a future complete application submission.

    a. The required plans and studies must meet the City's Terms of Reference (ToR) and/or Guidelines, as available on Ottawa.ca. These ToR and Guidelines outline

the specific requirements that must be met for each plan or study to be deemed adequate.

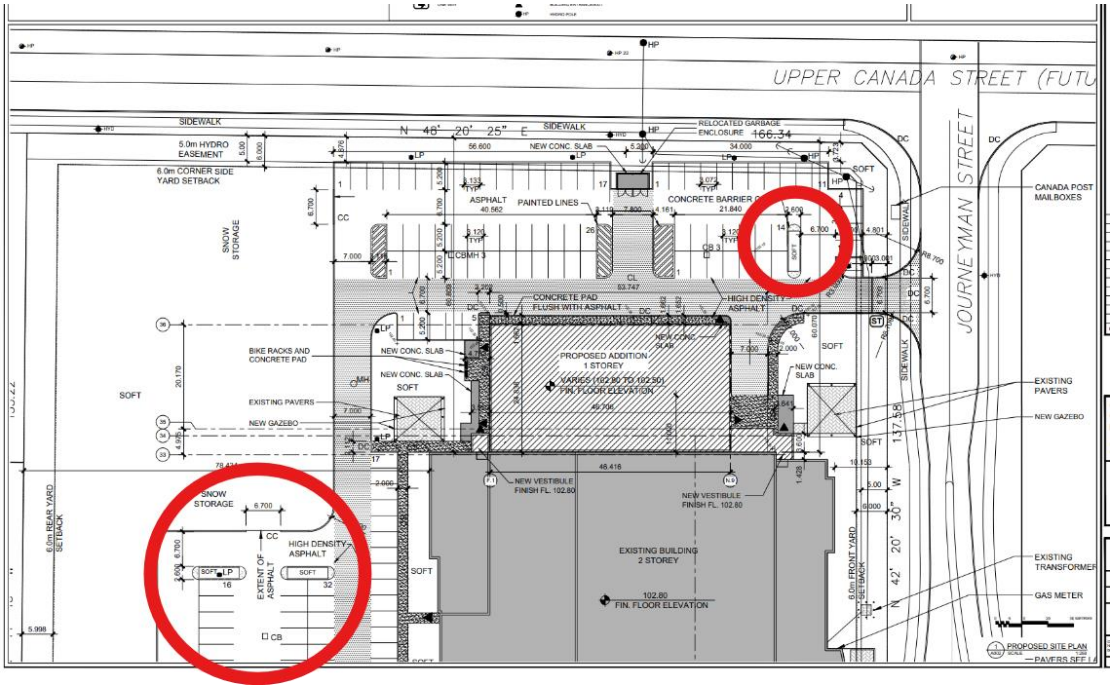
Consultation with Technical Agencies

1. You are encouraged to consult with technical agencies early in the development process and throughout the development of your project concept. A list of technical agencies and their contact information is enclosed.

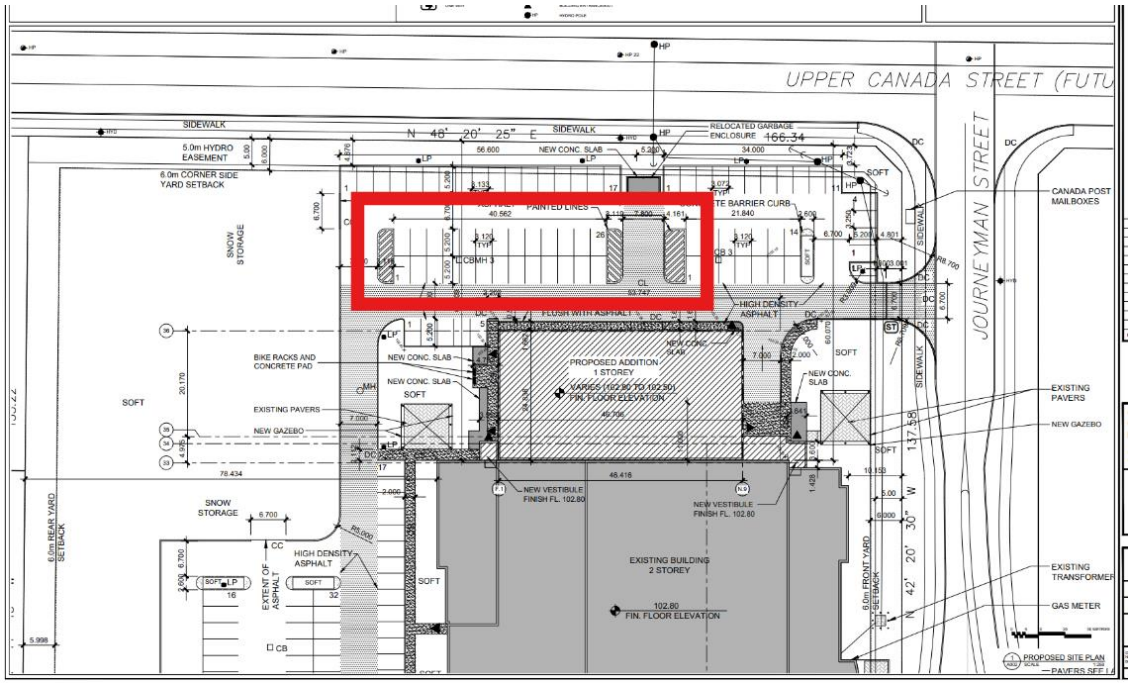
Planning

Comments:

1. Official Plan
    a. Staff note that the proposed development generally aligns with the Official Plan.
2. Zoning Deficiency
    a. Staff have concerns with the proposed location of the outdoor refuse collection, as it not zoning compliant. Please refer to Section 110, policy 3 of the Zoning By-law as it notes:
        i. All outdoor refuse collection and refuse loading areas contained within or accessed via a parking lot must be:
            1. located at least 9.0 metres from a lot line abutting a public street;
            2. located at least 3.0 metres from any other lot line; and
            3. screened from view by an opaque screen with a minimum height of 2.0 metres.
            4. where an in-ground refuse container is provied, the screening requirement of Section (3)(c) above may be achieved with soft landscaping. (By-law 2020-299
3. Site Plan
    a. Please consider opportunities for additional trees and landscaping throughout the subject site.
        i. Consider utilizing all existing medians in the parking lot and provide additional tree plantings. Please refer to image below:



ii. Consider converting the following demarcated medians into physical landscape medians. Please refer to image below:



4. Required Applications

    a. Site Plan Control (Standard) – more information on the process can be found here.

    b. If required, zoning relief can be sought through a Minor Variance or Minor Zoning By-law Amendment application.

        i. Minor Variance – more information on the process can be found here.

        ii. Zoning By-law Amendment (Minor) – more information on the process can be found here.

Feel free to contact Nishant Dave (nishant.dave@ottawa.ca), Planner I, for follow-up questions.

Urban Design

Comments:

5. Submission Requirements:

    a. Site Plan

    b. Elevations

6. Preliminary Design Comments:

    a. Please relocate the garbage away from the street. Maintaining the existing garbage and loading area would be preferred.

    b. Please provide landscaping and screening around the gazebos and garbage areas.

    c. Please look for opportunities for additional tree planting within the site and along the roadway frontages.

Feel free to contact Lisa Stern (lisa.stern@ottawa.ca), Urban Designer, for follow-up questions.

Engineering

Comments:

7. List of Plans and Studies Required:

    a. Geotechnical Report

b. Grading & Drainage Plan

c. Site Servicing Plan (Removals Plan can be combined)

d. Site Servicing Memorandum

8. Site Servicing Memorandum

The Site Servicing Memorandum shall include the following:

- The memo must compare pre-development conditions and post development conditions with respect to drainage and discuss where surface drainage is directed to.

- If rooftop storage is proposed, the memorandum must provide supporting calculations to support proposed release rates and storage volumes. A roof plan showing ponding limits is also required.

- Roof drains are to be connected downstream of any incorporated ICDs within the SWM system and not to foundation drain system.

- Boundary conditions must be requested and included in the memorandum to demonstrate that there is adequate fire protection with respect to the increase in the building footprint. Fire Underwriter Survey (FUS) calculations must also be included to demonstrate fire protection needs are being met or exceeded. Instructions for boundary conditions are below.

- If the addition will be serviced internally through the existing building, the memorandum must demonstrate that the existing services are adequately sized to service the addition.

9. Boundary Conditions Request

a. Water Boundary condition requests must include the location of the service (map or plan with connection location(s) indicated) and the expected loads required by the proposed development, including calculations. Please provide the following information:

i. Location of service

ii. Type of development

iii. The amount of fire flow required (per OBC or FUS).

iv. Average daily demand: ___ l/s.

v. Maximum daily demand: ___l/s.

vi. Maximum hourly daily demand: ___ l/s.

10. Please note that these comments are considered preliminary based on the information available to date and therefore maybe amended as additional details become available and presented to the city. It is the responsibility of the applicant to verify the above information. The applicant may contact me for follow-up questions related to engineering/infrastructure prior to submission of an application if necessary.

Feel free to contact Mohammed Fawzi (mohammed.fawzi@ottawa.ca), Senior Project Manager, for follow-up questions.

Noise

Comments:

11. Classrooms are considered noise sensitive. A road noise study is required if within 100m of a collector or arterial.

Feel free to contact Mike Giampa (mike.giampa@ottawa.ca), Transportation Project Manager, for follow-up questions.

Transportation

Comments:

12. Right-of-way protection (Campeau).

    a. See Schedule C16 of the Official Plan.

    b. Any requests for exceptions to ROW protection requirements must be discussed with Transportation Planning and concurrence provided by Transportation Planning management.

13. 3x3 corner sight triangle required at Uppercanada and Journeyman.

14. A TIA is not required.

Feel free to contact Mike Giampa (mike.giampa@ottawa.ca), Transportation Project Manager, for follow-up questions.

Environment

Comments:

15. Significant environmental features – there are no significant natural features to trigger an Environmental Impact Study adjacent to the site and proposed alterations.

16. Bird-Safe Design - Please review and incorporate bird safe design elements. Some of the risk factors include glass and related design traps such as corner glass and fly-through conditions, ventilation grates and open pipes, landscaping, light pollution. More guidance and solutions are available in the guidelines which can be found here: https://documents.ottawa.ca/sites/documents/files/birdsafedesign_guidelines_en.pdf

Feel free to contact Matthew Hayley (matthew.hayley@ottawa.ca), Environmental Planner, for follow-up questions.

Forestry

Comments:

17. The location of the proposed addition appears to be fully paved.

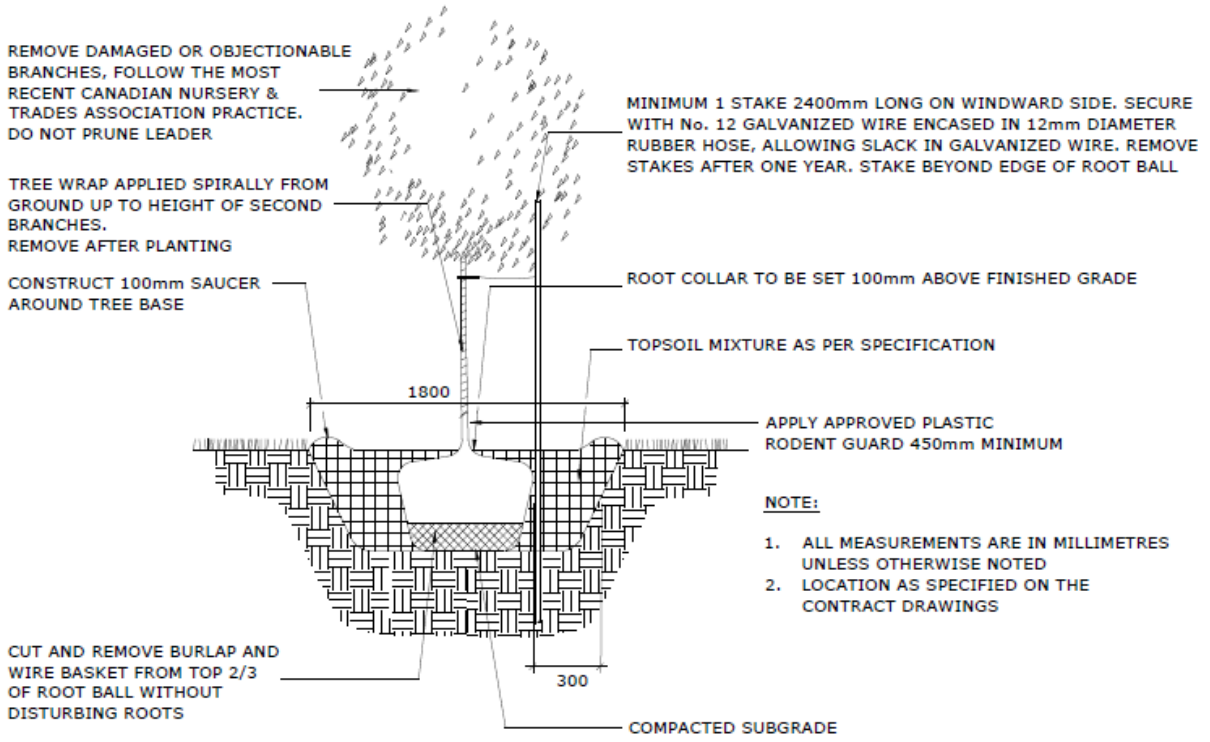
18. Please confirm that there are no impacts to existing trees planted through the original Site Plan application.

19. If no impacts to trees or changes to soft landscaped areas, no TCR will be required.

20. Consider adding trees within parking lot area/soft landscaped areas to increase the canopy cover and shade to address the urban heat island effect. If trees are to be planted a Landscape Plan should be provided, including all required information in the Landscape Plan Terms of Reference.

Side Note:

21. Separate from the Site Plan process, please ensure that future landscaping contracts correct and do not continue to use 'volcano mulching', which can cause the trees to rot where the mulch meets the stem. Mulch should be pulled back from the root collar as shown in the Tree Planting specification below. If the corrugated plastic tree guards and stakes are still in place on the trees planted through the previous site plan, they must be removed.



DECIDUOUS TREE PLANTING

Feel free to contact Nancy Young (nancy.young@ottawa.ca), Planning Forester, for follow-up questions.

Parkland

Comments:

a. The proposed development is required to provide parkland dedicaiton in accordance with the Parkland Dedication By-law No. 2022-280.

b. The applicable parkland dedication rate for Industrial and commercial uses is 2% of the gross land area. For Commercial and Industrial redevelopment, gross land area means the portion of the property that is impacted by the development.

c. The gross land area for this site appears to be 1,160 sq m. Parkland dedication required as CIL is required on the value of 23 sq m.

d. Parks & Facilities Planning is requesting payment of Cash-in-lieu-of-Parkland for this development. The value of the land, equivalent to the Parkland Dedication requirement, will be determined as of the day before planning approval is given for the development. The Applicant shall bear the cost of any appraisal costs incurred by the City.

e. The proposed development represents an increase in the gross floor area of a non-residential use. The proposal is not exempt from the requirement to provide parkland dedication.

Feel free to contact Anissa McAlpine (anissa.mcalpine@ottawa.ca), Parks Planner, for follow-up questions.

Other

22. The High Performance Development Standard (HPDS) is a collection of voluntary and required standards that raise the performance of new building projects to achieve sustainable and resilient design and will be applicable to Site Plan Control and Plan of Subdivision applications.

    a. The HPDS was passed by Council on April 13, 2022, but is not in effect at this time, as Council has referred the 2023 HPDS Update Report back to staff with the direction to bring forward an updated report to Committee at a later date. The timing of an updated report to Committee is unknown at this time, and updates will be shared when they are available.

    b. Please refer to the HPDS information at ottawa.ca/HPDS for more information.

23. Under the Affordable Housing Community Improvement Plan, a Tax Increment Equivalent Grant (TIEG) program was created to incentivize the development of affordable rental units. It provides a yearly fixed grant for 20 years. The grant

helps offset the revenue loss housing providers experience when incorporating affordable units in their developments.

a. To be eligible for the TIEG program you must meet the following criteria:

   i. the greater of five units OR 15 per cent of the total number of units within the development must be made affordable

   ii. provide a minimum of 15 per cent of each unit type in the development as affordable

   iii. enter into an agreement with the city to ensure the units maintain affordable for a minimum period of 20 years at or below the city-wide average market rent for the entire housing stock based on building form and unit type, as defined by the Canada Mortgage and Housing Corporation

   iv. must apply after a formal Site Plan Control submission, or Building Permit submission for projects not requiring Site Plan Control, and prior to Occupancy Permit issuance

b. Please refer to the TIEG information *at Affordable housing community improvement plan / Plan d'améliorations communautaires pour le logement abordable for more details or contact the TIEG coordinator via email at affordablehousingcip@ottawa.ca.*

Submission Requirements and Fees

1. Site Plan Control – Standard
   a. Additional information regarding fees related to planning applications can be found here.
2. The attached **Study and Plan Identification List** outlines the information and material that has been identified as either required (R) or advised (A) as part of a future complete application submission.
   a. The required plans and studies must meet the City's Terms of Reference (ToR) and/or Guidelines, as available on Ottawa.ca. These ToR and Guidelines outline the specific requirements that must be met for each plan or study to be deemed adequate.
3. All of the above comments or issues should be addressed to ensure the effectiveness of the application submission review.

Should there be any questions, please do not hesitate to contact myself or the contact identified for the above areas / disciplines.

Yours Truly,
Nishant Dave

Encl. SPIL, List of Technical Agencies, HPDS

c.c. Colette Gorni, Planner II
Lisa Stern, Urban Designer
Mohammad Fawzi, Senior Project Manager
Mike Giampa, Transportation Project Manager
Matthew Hayley, Environmental Planner
Nancy Young, Planning Forester
Anissa McAlpine, Parks Planner

APPLICANT'S STUDY AND PLAN IDENTIFICATION LIST

Proposed Site Plan Control (Standard) Application – 8560 Campeau Drive– PC2024-0504

Legend: **R** = Required, the study or plan is required with application submission
A = Advised, the study or plan is advised to evaluate the application or satisfy a condition of approval/draft approval
1 - OPA, **2** - ZBA, **3** - Plan of Subdivision, **4** - Plan of Condominium, **5** - SPC

Core studies required for certain applications all the time (Remaining studies are site specific)

For information and guidance on preparing required studies and plans refer here:

ENGINEERING										
R	**A**	**Study/ Plan Name**	**Description**	**When Required**					**Applicable Study Components & Other Comments**
				1	**2**	**3**	**4**	**5**	
☐	☐	1. Environmental Site Assessment (Phase 1 & Phase 2)	Ensures development only takes place on sites where the environmental conditions are suitable for the proposed use	☒	☒	☒	☒	☒	Record of Site Condition Yes ☐ No ☐
				Study Trigger Details: All cases					
☒	☐	2. Geotechnical Study	Geotechnical design requirements for the subsurface conditions	☒	☒	☒	☒	☒	
				Study Trigger Details: All cases					
☒	☐	3. Grading and Drainage Plan	Grading relationships between connecting (or abutting) properties and surface runoff control	☐	☐	☒	☐	☒	
				Study Trigger Details: All cases					
☐	☐	4. Hydrogeological and Terrain Analysis	A scientific study or evaluation that includes a description of the ground and surface hydrology, geology, terrain, affected landform and its susceptibility	☐	☐	☒	☒	☒	Reasonable Use Study Yes ☐ No ☐ Groundwater Impact Study Yes ☐ No ☐
				Study Trigger Details: When developing on private services or when urban development is in close proximity to existing private serviced development					
☐	☐	5. Noise Control Study	Potential impacts of noise on a development	☒	☒	☒	☒	☒	Vibration Study Yes ☐ No ☐
				Study Trigger Details: See Terms of Reference for full details.					

☐	☐	6. Rail Proximity Study	Development on land adjacent to all Protected Transportation Corridors and facilities shown on Schedule C2 of the Official Plan, to follow rail safety and risk mitigation best practices	☐	☒	☒	☒	☒	Rail Safety Report Yes ☐ No ☐ O-Train Network Proximity Study Yes ☐ No ☐
				Study Trigger Details: Within the Development Zone of Influence for existing and future rapid transit stations and corridors, as shown on Annex 2 of the OP OR on land adjacent to all Protected Transportation Corridors and facilities shown on Schedule C2 of the Official Plan					
☒	☐	7. Site Servicing Memorandum	Provides servicing details based on proposed scale of development with an engineering overview taking into consideration surrounding developments and connections. See feedback form for details.	☐	☒	☒	☒	☒	Fluvial Geomorphological Report Yes ☐ No ☐ Assessment of Adequacy of Public Services Yes ☐ No ☐ Servicing Options Report Yes ☐ No ☐ Erosion and Sediment Control Plan / Brief Yes ☐ No ☐ Hydraulic Water Main Analysis Yes ☐ No ☐ Stormwater Management Report and Detailed Design Brief Yes ☐ No ☐
				Study Trigger Details: All cases					
☐	☐	8. Slope Stability Study	Assessment of slope stability and measures to provide safe set-back.	☐	☒	☒	☒	☒	Retrogressive Landslide Analysis Yes ☐ No ☐
				Study Trigger Details: Where the potential for Hazard Lands exists on a site.					
☐	☐	9. Transportation Impact Assessment	Identify on and off-site measures to align a development with City transportation objectives.	☐	☒	☒	☒	☒	Roadway Modification Functional Design Yes ☐ No ☐
				Study Trigger Details: If the development generates 60 person-trips or more; or if the development is located in a Location Trigger; or if the development has a Safety Trigger.					

☐	☐	10. Water Budget Assessment	Identify impact of land use changes on the hydrologic cycle and post-development mitigation targets.	☐	☒	☒	☒	☒	
				Study Trigger Details: May be required for site plan control applications for sites with private servicing and / or proximity to hydrogeologically-sensitive areas. Draft plans of subdivision are required to integrate water budget assessments into supporting stormwater management plans and analysis for the study area.					
☐	☐	11. Wellhead Protection Study	Delineate a Wellhead Protection Area (WHPA) and characterize vulnerability for new communal residential drinking water well systems, in accordance with Technical Rules under *Clean Water Act.*	☐	☒	☒	☒	☒	
				Study Trigger Details: Required for all new communal residential drinking water well systems; including new municipal wells, new private communal wells (small water works) that require a Municipal Responsibility Agreement (MRA), expansions or increased water takings from an existing municipal well or existing private communal well and new private communal wells.					

PLANNING									
R	**A**	**Study/Plan Name**	**Description**	**When Required**					**Applicable Study Components & Other Comments**
				1	**2**	**3**	**4**	**5**	
☐	☐	12. Agrology and Soil Capability Study	Confirm or recommend alterations to mapping of agricultural lands in the City.	☒	☐	☐	☐	☐	
				Study Trigger Details: For the expansion of a settlement area or identification of a new settlement area through a comprehensive review; or where it is demonstrated that the land does not meet the requirements for an Agricultural Resource Area.					
☐	☐	13. Archaeological Assessment	Discover any archaeological resources on site, evaluate cultural heritage value and conservation strategies	☒	☒	☒	☒	☒	
				Study Trigger Details: When the land has either: a known archaeological site; or the potential to have archaeological sites; or where the City's Archaeological Resource Potential Mapping Study indicates archaeological potential, outside of the historic core; or upon discovery of any archaeological resource during construction in the City's historic core area.					
☒	☐	14. Building Elevations	Visual of proposed development to understand facing of building including direction of sunlight, height, doors, and windows.	☒	☒	☐	☐	☒	
				Study Trigger Details: Site Plan: for residential buildings with 25 or more residential units; or for residential buildings with less than 25 residential units, if the units are within the Urban area or the High-performance Development Standard threshold in the rural area. Official Plan or Zoning By-law: if staff deem it necessary to determine compliance with OP policies, the Zoning By-law or City of Ottawa Urban Design Guidelines.					

☐	☐	15. Heritage Impact Assessment	Determine impacts of proposed development on cultural heritage resources.	☒	☒	☒	☒	☒	Study Trigger Details: Where development or an application under the Ontario Heritage Act is proposed on, adjacent to, across the street from or within 30 metres of a protected heritage property; or for any development adjacent to the Rideau Canal UNESCO World Heritage Site and its landscaped buffer.	Conservation Plan Yes ☐ No ☐
☐	☐	16. Heritage Act Acknowledgement Report	A submission requirement to demonstrate that the *Ontario Heritage Act* requirements have been satisfied, to ensure that multiple applications are considered currently.	☐	☒	☒	☒	☒	Study Trigger Details: Where the subject property is listed on the Heritage Register and the applicant must submit a Heritage Permit Application (designated heritage property listed on the Heritage Register) or provide notice of intent to demolish or remove a building (non-designated property listed on the Heritage Register).	Heritage Permit Application Yes ☐ No ☐ Notice of Intent to Demolish Yes ☐ No ☐
☐	☐	17. Impact Assessment Study – Mineral Aggregate	Mineral aggregate extraction activities; and to protect known high quality mineral aggregate resources from development and activities that would preclude or hinder their existence (ability to be extracted) or expansion.	☒	☒	☒	☒	☒	Study Trigger Details: New Development within 500 metres of lands within the Bedrock Overlay , or within 300 metres of lands within the Sand and Gravel Resource Area Overlay.	
☐	☐	18. Impact Assessment Study – Mining Hazards	To identify or confirm known mineral deposits or petroleum resources and significant areas of mineral potential. To protect mineral and petroleum resources from development and activities which would preclude or hinder the establishment of new operations or access to the resources.	☒	☒	☒	☒	☒	Study Trigger Details: For all applications in proximity to mining operations.	

☐	☐	19. Impact Assessment Study – Waste Disposal Sites / Former Landfill Sites	To identify or confirm known proximity of existing or former waste disposal sites. To ensure issues of public health, public safety and environmental impact are addressed.	☒	☒	☒	☒	☒	Study Trigger Details: For the establishment of any new Solid Waste Disposal Site or for a footprint expansion of an operating Solid Waste Disposal Site; or development within three kilometers of an operating or non-operating Waste Disposal Site.	
☒	☐	20. Landscape Plan	A plan to demonstrate how the canopy cover, urban design, health, and climate change objectives of Official Plan will be met through tree planting and other site design elements. (If new trees are proposed).	☒	☒	☒	☒	☒	Study Trigger Details: Site Plan, Plan of Subdivision, and Plan of Condominium: always required, except where it is demonstrated that the landscape component of a project is not relevant to the review of the application. A high-level conceptual Landscape Plan may be required to support Zoning By-law and Official Plan Amendment applications.	
☐	☐	21. Mature Neighbourhood Streetscape Character Analysis	In the Mature Neighbourhoods a Streetscape Character Analysis is required to determine the applicable zoning requirements.	☐	☒	☐	☐	☐	Study Trigger Details: Zoning By-law amendment application in areas covered by the Mature Neighbourhoods zoning overlay for applications of residential development of four storeys or less located in a R1, R2, R3, or R4 zone.	
☐	☐	22. Minimum Distance Separation	Provincial land use planning tool that determines setback distances between livestock barns, manure storages or anaerobic digesters and surrounding land uses, with the objective of minimizing land use conflicts and nuisance complaints related to odour.	☒	☒	☒	☒	☒	Study Trigger Details: Applications in the Rural Area, outside of a village.	

☐	☐	23. Parking Plan	A tool to assess the sufficiency of on-street parking in plans of subdivision.	☐	☐	☒	☒	☐	
				Study Trigger Details: For new or revised plans of subdivision with public streets.					
☒	☐	24. Plan of Survey	A Plan of Survey depicts legal boundaries and is a specialized map of a parcel of land and it delineates boundary locations, building locations, physical features and other items of spatial importance.	☒	☒	☒	☒	☒	
				Study Trigger Details: Required for all *Planning Act* applications.					
☐	☐	25. Plan of Subdivision	Proposed subdivision layout to be used for application approval	☐	☒	☒	☐	☐	
				Study Trigger Details: Always required with the submission of plan of subdivision application. Only required with a Zoning By-law Amendment application, where such ZBLA is in response to enable a subdivision.					
☐	☐	26. Plan of Condominium	Proposed condominium layout to be used for application approval	☐	☐	☐	☒	☐	
				Study Trigger Details: With the submission of plan of condominium application.					
☐	☐	27. Planning Rationale	Provides the planning justification in support of the *Planning Act* application and to assist staff and the public in the review of the proposal.	☒	☒	☒	☐	☐	Integrated Environmental Review Summary Yes ☐ No ☐
				Study Trigger Details: For all Official Plan amendment, Zoning By-law amendment, or plan of subdivision applications.					
☒	☐	28. Preliminary Construction Management Plan	A checklist that shows a development proposal's anticipated impacts to all modes of transportation and all elements in the right of way during construction.	☐	☐	☒	☐	☒	
				Study Trigger Details: For all Site Plan and plan of subdivision applications.					

☐	☐	29. Public Consultation Strategy	Proposal to reach and collect public input as part of development application.	☒	☒	☒	☒	☒	Study Trigger Details: Official Plan Amendment, Zoning By-law Amendment and Subdivision: Always required. Condominium: Vacant Land only Site Plan: At the discretion of the City's file lead in consultation with the Business and Technical Support Services Manager.	
☐	☐	30. Shadow Analysis	A visual model of how the proposed development will cast its shadow.	☐	☒	☐	☐	☐	Study Trigger Details: When there is an increase in height or massing proposed for a residential, commercial or office use. Two triggers: 1. Inside the Greenbelt: proposed development is over 5 storeys in height (≤15 meters). If a development proposal is 5 storeys or less, but is proposing an increase in height and/or massing and is in close proximity to a shadow sensitive area, a shadow analysis may be requested. 2. Outside the Greenbelt: proposed development is over 3 storeys in height (≤9 meters) and is in close proximity to a shadow sensitive area. Where a proposed development is not in close proximity to a shadow sensitive area (e.g. industrial development) the trigger for a shadow analysis is over 5 storeys in height (≤15 meters).	
☒	☐	31. Site Plan	A Site Plan is a visual drawing that illustrates the proposed development of a site in two dimensions.	☒	☒	☒	☒	☒	Study Trigger Details: Site Plan: All Other applications: where a layout of the	Site Plan Yes ☒ No ☐ Concept Plan Yes ☐ No ☐

				public realm, building massing, heights, densities or massing of the proposal provides changes to the planned context; sites proposing multiple land uses; sites with multiple landowners; sites with two or more buildings, on-site park dedication, and/or a new public or private street(s); sites with proposed changes to connectivity (such as active transportation networks, vehicular circulation or access to transit); sites where the development potential on adjacent properties may be impacted by or could be integrated into the proposed site.	Facility Fit Plan Yes ☐ No ☐
☐	☐	32. Urban Design Brief	Illustrate how a development proposal represents high-quality and context sensitive design that implements policies of the Official Plan, relevant secondary plans, and Council approved plans and guidelines.	☒ ☒ ☒ ☐ ☒ Study Trigger Details: For all Official Plan amendment, Zoning By-law amendment, and plan of subdivision applications. For SPC applications: proposals for residential buildings with 25 or more residential units, or for proposals for residential buildings with less than 25 residential units, if the units are within the Urban area or the High-performance Development Standard threshold in the rural area where OP Policy 11.3 (3) is relevant; for non-residential and mixed-use proposals.	
☐	☐	33. Urban Design Review Panel Report	Demonstrates that a development proposal has attended an Urban Design Review Panel formal review meeting, received, and responded to the associated recommendations, if applicable	☒ ☒ ☒ ☒ ☒ Study Trigger Details: Required for all planning act applications subject to UDRP review, in accordance with the UDRP Panel Terms of Reference.	
☐	☐	34. Wind Analysis	A visual model and a written evaluation of how a proposed development will impact pedestrian-level wind conditions.	☐ ☒ ☐ ☐ ☒ Study Trigger Details: Applications seeking an increase in height and/or massing which is either: a tall building(s), 10 storeys or more or a proposed building that is more than twice the height of	

				adjacent existing buildings and is greater than five storeys in height and is adjacent to existing or planned low rise development, open spaces, water bodies and large public amenity areas.					
☒	☐	35. Zoning Confirmation Report	The purpose of the Zoning Confirmation Report (ZCR) is to identify all zoning compliance issues, if any, at the outset of a planning application.	☐	☒	☐	☐	☒	
				Study Trigger Details: Required for all SPC and ZBLA applications.					

ENVIRONMENTAL										
R	**A**	**Study / Plan Name**	**Description**	**When Required**					**Applicable Study Components & Other Comments**
				1	**2**	**3**	**4**	**5**	
☐	☐	36. Community Energy Plan	Includes a community energy analysis, alongside mitigation measures, and other associated information. The community energy analysis refers to the overall assessment process to identify on and off-site measures to align the design of the development with City climate objectives.	☐	☐	☐	☐	☐	
				NOT IMPLEMENTED & NOT REQUIRED					
☐	☐	37. Energy Modelling Report	The Energy Modeling Report is a Site Plan Control application submission requirement to show how climate change mitigation, and energy objectives will be met through exterior building design elements.	☐	☐	☐	☐	☐	
				NOT IMPLEMENTED & NOT REQUIRED					
☐	☐	38. Environmental Impact Study	Assessment of environmental impacts of a project and documents the existing natural features, identifies the potential environmental impacts,	☒	☒	☒	☐	☒	Assessment of Landform Features Yes ☐ No ☐ Integrated Environmental Review Yes ☐ No ☐
				Study Trigger Details: Is required when development or site alteration is proposed in or within a					

			recommends ways to avoid and reduce the negative impacts, and proposes ways to enhance natural features and functions.	specified distance of environmentally designated lands, natural heritage features, the City's Natural Heritage System, or hazardous forest types for wildland fire. The EIS Decision Tool (Appendix 2 of the Environmental Impact Study Guidelines) provides a checklist of the natural heritage features and adjacent areas within which an EIS is required to support development applications under the *Planning Act.*	Protocol for Wildlife Protection during Construction Yes ☐ No ☐ Significant Woodlands Guidelines for Identification, Evaluation, and Impact Assessment Yes ☐ No ☐
☐	☐	39. Environmental Management Plan	A comprehensive environmental planning document that identifies, evaluates, and mitigates the potential impacts of proposed development on the natural environment and its ecological functions at local planning stage.	☒ ☐ ☐ ☐ ☐ Study Trigger Details: Official Plan amendments for local plans (area-specific policy or secondary plan, where: there is significant change in the conditions upon which the original study was based; there are proposed changes to planned infrastructure needed to service a subdivision that would have a significant impact on the infrastructure needs of another subdivision within the EMP study area, or the applicable Class Environmental Assessment approval has expired.	
☐	☐	40. High-performance Development Standard	A collection of voluntary and required standards that raise performance of new building projects to achieve sustainable and resilient design	☐ ☐ ☐ ☐ ☐ NOT IMPLEMENTED & NOT REQUIRED	
☐	☐	41. Tree Conservation Report	Demonstrates how tree cover will be retained and protected on the site, including mature trees, stands of trees, and hedgerows.	☐ ☐ ☒ ☒ ☒ Study Trigger Details: Where there is a tree of 10 centimeters in diameter or greater on the site and/or if there is a tree on an adjacent site that has a Critical Root Zone (CRZ) extending onto the development site.	

SUPPLEMENTARY DEVELOPMENT INFORMATION

The following details have been compiled to provide additional information on matters for consideration throughout the application approval and development process. Please note, this document is updated from time to time and should be reviewed for each project proposed to be undertaken.

General

- Refer to Planning application submission information and materials and fees for further information on preparing for application submission. Be aware that other fees and permits may be required, outside of the development review process.
- Additional information is available related to building permits, development charges, and the Accessibility Design Standards.
- You may obtain background drawings by contacting geoinformation@ottawa.ca.
- Plans are to be standard A1 size (594 mm x 841 mm) or Arch D size (609.6 mm x 914.4 mm) sheets, dimensioned in metric and utilizing an appropriate Metric scale (1:200, 1:250, 1:300, 1:400 or 1:500).
- All PDF submitted documents are to be unlocked, flattened and not saved as a portfolio file.
- Where private roads are proposed:
    - Submit a Private Roadway Street Naming application to Building Code Services Branch for any internal private road network.
    - Applications are available at all Client Service Centres and the private roadway approval process takes three months.

Servicing and Site Works

Servicing and site works shall be in accordance with the following documents:

- Ottawa Sewer Design Guidelines (October 2012)
- Ottawa Design Guidelines – Water Distribution (2010)
- Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007)
- City of Ottawa Slope Stability Guidelines for Development Applications (revised 2012)
- City of Ottawa Environmental Noise Control Guidelines (January, 2016)
- City of Ottawa Park and Pathway Development Manual (2012)
- City of Ottawa Accessibility Design Standards (2012)
- Ottawa Standard Tender Documents (latest version)
- Ontario Provincial Standards for Roads & Public Works (2013)

Exterior Site Lighting

Where proposed, requires certification by an acceptable professional engineer, licensed in the Province of Ontario, which states that the exterior site lighting has been designed to meet the following criteria:

- It uses only fixtures that meet the criteria for Full Cut-Off (Sharp cut-off) classification, as recognized by the Illuminating Engineering Society of North America (IESNA or IES), and
- It results in minimal light spillage onto adjacent properties. As a guideline, 0.5 foot-candle is normally the maximum allowable spillage.

The location of the fixtures, fixture type (make, model, part number and the mounting height) must be shown on one of the approved plans.

City Surveyor Direction

- The determination of property boundaries, minimum setbacks and other regulatory constraints are a critical component of development. An Ontario Land Surveyor (O.L.S.) needs to be consulted at the outset of a project to ensure properties are properly defined and can be used as the geospatial framework for the development.
- Topographic details may also be required for a project and should be either carried out by the O.L.S. that has provided the Legal Survey or done in consultation with the O.L.S. to ensure that the project is integrated to the appropriate control network.

  Questions regarding the above requirements can be directed to the City's Surveyor, Andre Roy, at Andre.Roy1@ottawa.ca.

Waste Management

- New multi-unit residential development, defined as containing six (6) or more units, intending to receive City waste collection services will be required, as of June 1, 2022, to participate in the City's Green Bin program in accordance with Council's approval of the multi-residential waste diversion strategy. The development must include adequate facilities for the proper storage of allocated garbage, recycling, and green bin containers and such facilities built in accordance with the approved site design. Questions regarding this change and requirements can be directed to Andre.Laplante@ottawa.ca.

- For sites containing:
  - One or more buildings with a total GFA greater than 2000 square metres;
  - Retail shopping complexes with a total GFA greater than 10,000 square metres;
  - Sites containing office buildings with total GFA greater than 10,000 square metres;
  - Hotels and motels with more than 75 units;
  - Hospitals (human);
  - Educational institutions with more than 350 students; or
  - Manufacturing establishments working more than 16,000 person-hours in a month

  A Waste Reduction Workplan Summary is required for the construction project as required by O.Reg. 102/94, being "Waste Audits and Waste Reduction Work Plans" made under the Environmental Protection Act, RSO 1990, c E.19, as amended.

Fire Routes

- Fire routes are required to be designated by By-law for Fire Services to establish them as a legal fire route. Where a development proposes to establish a fire route, an Application for Fire Route

Designation is to be made. Questions regarding the designation of fire routes and required process can be directed to fireroutes@ottawa.ca.

Dewatering Activities

- Project contractors and/or your engineers are required to contact the Sewer Use Program to arrange for the proper agreements or approvals to allow for the discharge of water from construction dewatering activities to the City's sanitary or storm sewer system. Please contact the Sewer Use Duty Officer at 613-580-2424 ext. 23326 and/or suppue@ottawa.ca.

Backflow Prevention Devices for Premise Isolation

- Buildings or facilities installing a backflow preventer for premise isolation of the drinking water system must register with the City's Backflow Prevention Program where a moderate or severe hazard may be caused in accordance with CSA B64.10 "Selection and Installation of Backflow Preventers". Please contact the Backflow Prevention Program at 613-580-2424 ext. 22299 or backflow@ottawa.ca to submit a Premise Isolation Survey.

Energy Considerations

- Are you considering harvesting thermal energy from the wastewater infrastructure or harvesting geothermal energy?
    - Additional information can be found on the City website or by contacting Melissa Jort-Conway.

Flood Plain Mapping and Climate Change

- An interactive map, for informational purposes only, showing the results of on-going flood plain mapping work completed by the Conservation Authorities in partnership with the City is now available. This mapping may be used to identify known riverine flood hazards for a property or area. The map and additional related information can be found on Ottawa.ca.

Blasting

- Where blasting may take place:
    - Blasting activities will be required to conform to the City's Standard S.P. No. F-1201 entitled Use of Explosives, as amended.
    - To avoid future delays in process, including the Municipal Consent process for shoring, ensure communication with necessary entities, including utilities, is undertaken early.
- Blasting and pile driving activities in the vicinity of Enbridge Gas Distribution and Storage (GDS) facilities require prior approval by GDS. The Blasting and Pile Driving Form, referenced in Enbridge's Third Party Requirements in the Vicinity of Natural Gas Facilities Standard, must be provided to mark-ups@enbridge.com by the Owner of the proposed work for all blasting and pile driving operations. In addition, a licensed blasting consultant's stamped validation report must be submitted to GDS for review if blasting is to occur within thirty (30) metres of GDS facilities. The request must be submitted a minimum of four weeks prior to the beginning of work to allow sufficient time for review.

Archaeological

- Archaeological Resources
    - Should potential archaeological resources be encountered during excavation activities, all Work in the area must stop immediately and the Owner shall contact a provincially licensed archaeologist.
    - If during the process of development deeply buried/undetected archaeological remains are uncovered, the Owner shall immediately notify the Archaeology Section of the Ontario Ministry of Tourism, Culture and Sport.
    - In the event that human remains are encountered during construction, the Owner shall immediately contact the police, the Ministry of Tourism, Culture and Sport and the Registrar of Cemeteries, Cemeteries Regulation Unit, Ministry of Consumer and Business Services, Consumer Protection Branch.

Trees

- The City's Tree Protection Bylaw, being By-Law No. 2020-340, as amended, requires that any trees to be removed shall be removed in accordance with an approved Tree Permit and Tree Conservation Report and that all retained trees will be protected in accordance with an approved Tree Conservation Report.

Limiting Distance and Parks

- A Limiting Distance Agreement may be required by Building Code Services before building permit(s) can be issued with respect to the proximity of the building to a park block. The City will consider entering into a Limiting Distance Agreement with the Owner with such Agreement to be confirmed through the City's Reality Initiatives & Development Branch. A Limiting Distance Agreement is at the expense of the Owner.

Development Constructability

How a development is constructed, its constructability, is being looked at earlier in the development review process to raise awareness of potential impacts to the City's right of way and facilitate earlier issue resolution with stakeholders. Where a construction management plan is required as part of the site plan or subdivision application approval, conditions will be included that set out the specific parameters to be addressed for the specific project. However, please note the following construction and traffic management requirements and considerations in the development of your project.

- **Open Lane (includes all vehicular lanes, transit lanes and cycling lanes) Requirements**
    - Unless specified in the site-specific conditions to be provided by City of Ottawa Traffic Management at the time of approval, the following requirements must be adhered to and accommodated as part of any proposed encroachments and construction management plan. The standard requirements outlined in this section shall further apply to cycling facilities and Transit.
        - All lanes are to function uninterrupted at all times.
        - No interruption or blockage of traffic is permitted.
        - No loading or unloading from an open lane is permitted.
        - All vehicular travel lanes are to be a minimum of 3.5 metres in width.

        - All cycling lanes are to be a minimum of 1.5 metres.

- **Pedestrian Requirements**
    - Unless specified in the site-specific conditions provided by City of Ottawa Traffic Management at the time of approval, the contractor is required to maintain a minimum width of 1.5 metres for a pedestrian facility on one side of the corridor at all times; even in instances where a pedestrian facility was not present prior to construction.
    - The facility shall include a free and unobstructed hard surface acceptable for the use of all pedestrians including those with accessibility challenges and shall maintain access to all buildings and street crossings.
    - The facility must always be maintained in a clean condition and in a good state of repair to the satisfaction of the City.
    - Any change of level which is over 13 millimetres in height is to be provided with a smooth non-tripping transition.
    - Any temporary barriers or fencing shall include a cane detectable boundary protection with edge or barrier at least 75 millimetres high above the ground surface.
    - If works overhead are required, a 2.1 metre minimum clear headroom must be provided.
    - If overhead protection is required above the pedestrian facility, it is to be offset a minimum of 600 millimetres from any travel lane.
- **Transit Requirements**
    - Travel lanes accommodating OC Transpo must be a minimum of 3.5 metres in width and have a minimum 4.5 metre vertical clearance at all times.
    - Should access to a bus stop be impacted, the developer will be required to email TOPConstructionandDetours@ottawa.ca a minimum of 20 working days prior to work commencing to coordinate any site-specific conditions as part of the work. This includes temporary relocation of transit stops, removal of bus shelters or stops and transit detour routes.
    - The contractor may be required to relocate and provide a suitable alternative to OC Transpo's bus stop to the satisfaction of OC Transpo
    - The Contractor shall provide OC Transpo with a minimum of ten (10) working days' notice to coordinate temporary relocation of bus stops. When a bus stop and/or shelter must be temporarily relocated, the contractor may be required to provide stop infrastructure (i.e. bench, bus and/or shelter pads), to the satisfaction of OC Transpo.
    - All temporary stop locations including infrastructure are to be fully accessible in accordance with City of Ottawa Accessibility Design Standards and to the satisfaction of the OC Transpo.
    - Temporary bus stops are to be constructed and ready for use prior to the start of any works that would impact the regular bus stop location(s).
- **Public Consultation**
    - May include, but not be limited to, proponent lead public meeting(s), letter notification(s) and information dissemination via print, electronic means or social media, to impacted properties above and beyond the notification requirements specified in the Road Activity By-law.
- **General Considerations for all Applications**

- A comprehensive construction management plan should include and consider the following:
    - The proposed stages of construction and the anticipated durations of each stage and any impact to existing travel lanes, pedestrian facilities, cycling facilities and/or transit facilities. Any proposed encroachment should be identified and dimensioned on the site plan for review of feasibility.
    - The proposed constructability methods being used as part of the proposed development (ie: fly forming, Peri forming etc.) and any additional traffic impacts/interruptions anticipated with proposed methods. If a crane is being placed on site, the location should be identified, and show the overhead impacts of the crane.
    - Consideration that any tie-backs and/or shoring within the City of Ottawa Right of Way are subject to Municipal Consent in advance of commencement of the project. Approval for encroachments is not guaranteed if impacts to transportation facilities cannot be addressed to the City's satisfaction.
    - Identify any truck hauling routes to and from the proposed development site and any proposed accesses. Designated heavy truck routes are to be followed at all times, however, if a deviation is required from the existing heavy truck route network, then a structural review may be required as part of an Over-dimensional Vehicle Project Permit.
    - Identify the location of any site trailers and the location. Note, if placing a site trailer above any walk-through scaffolding or on the second floor (or above), an engineering drawing must be submitted to building code services for review. More information can be found on the Building Permit Approval process.
    - Identify equipment and/or materials storage locations as required. Storage is not permitted on the road or the roadway shoulders or boulevards, unless the storage areas are identified in the traffic control plan and appropriate traffic control devices protect the equipment or materials.
- Any work as part of the development that requires a road cut, road closure or encroachment will be subject to the Road Activity By-law and potential site-specific conditions identified at site plan or subdivision approval which will be noted on the subsequent Permit(s). Information about construction in the right-of-way including applying for permits and associated fees can be found on the City's website.

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

Correspondence from City, Watermain Boundary Conditions and Modelling Results, Hydrant Sketch ,FUS Calculations, FUS Letter from Architect

Leonel Perez

From: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Sent: Thursday, January 30, 2025 2:28 PM
To: Francois Thauvette
Cc: Leonel Perez
Subject: RE: 8560 Campeau Drive - Carpenters Union - WM Boundary Conditions Request (123082)
Attachments: 8560 Campeau Boundary Condition(30 Jan 2025).docx

Hi Francois,

Please see attached.

Thank you.

Best Regards,

Mohammed Fawzi, P.Eng.
Senior Project Manager (A), Infrastructure Approvals
Development Review – West Branch
Planning, Development and Building Services Department (PDBS)| Direction générale des services de la planification, de l'aménagement et du bâtiment (DGSPAB)
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West | 110 Avenue Laurier Ouest
Ottawa, ON K1P 1J1
613.580.2424 ext./poste 20120, Mohammed.Fawzi@ottawa.ca

From: Fawzi, Mohammed
Sent: January 30, 2025 10:08 AM
To: Francois Thauvette <f.thauvette@novatech-eng.com>
Cc: Leonel Perez <l.perez@novatech-eng.com>
Subject: RE: 8560 Campeau Drive - Carpenters Union - WM Boundary Conditions Request (123082)

Hi Francois,

Just sent them an email – they are usually pretty quick to give a response back.

Will keep you posted.

Best Regards,

Mohammed Fawzi, P.Eng.
Senior Project Manager (A), Infrastructure Approvals
Development Review – West Branch

Planning, Development and Building Services Department (PDBS)| Direction générale des services de la planification, de l'aménagement et du bâtiment (DGSPAB)
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West | 110 Avenue Laurier Ouest
Ottawa, ON K1P 1J1
613.580.2424 ext./poste 20120, Mohammed.Fawzi@ottawa.ca

From: Francois Thauvette <f.thauvette@novatech-eng.com>
Sent: January 30, 2025 9:10 AM
To: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Cc: Leonel Perez <l.perez@novatech-eng.com>
Subject: RE: 8560 Campeau Drive - Carpenters Union - WM Boundary Conditions Request (123082)

Hi Mohammed,

Just following up on the WM boundary condition request that was submitted approximately 3 weeks ago. Could you please check with the City Water Department to see if this information could be provided this week? We require this information to finalize our analysis and report.

Regards,

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

From: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Sent: Monday, January 13, 2025 7:39 AM
To: Francois Thauvette <f.thauvette@novatech-eng.com>
Cc: Leonel Perez <l.perez@novatech-eng.com>
Subject: RE: 8560 Campeau Drive - Carpenters Union - WM Boundary Conditions Request (123082)

Hi Francois,

Thank you. This is to confirm your request has been received.

Best Regards,

Mohammed Fawzi, P.Eng.
Senior Project Manager (A), Infrastructure Approvals

Development Review – West Branch
Planning, Development and Building Services Department (PDBS)| Direction générale des services de la planification, de l'aménagement et du bâtiment (DGSPAB)
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West | 110 Avenue Laurier Ouest
Ottawa, ON K1P 1J1
613.580.2424 ext./poste 20120, Mohammed.Fawzi@ottawa.ca

From: Francois Thauvette <f.thauvette@novatech-eng.com>
Sent: Friday, January 10, 2025 11:46 AM
To: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Cc: Leonel Perez <l.perez@novatech-eng.com>
Subject: FW: 8560 Campeau Drive - Carpenters Union - WM Boundary Conditions Request (123082)

Hi Mohammed,

We are sending this e-mail to request municipal watermain boundary conditions related to the proposed 1-storey Carpenters Union Learning Centre building addition at 8560 Campeau Drive. See e-mail below and attached documents for details.

Regards,

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

From: Leonel Perez <l.perez@novatech-eng.com>
Sent: Thursday, January 9, 2025 2:35 PM
To: Francois Thauvette <f.thauvette@novatech-eng.com>
Subject: 8560 Campeau Drive - Carpenters Union - WM Boundary Conditions Request (123082)

Hi François,

The purpose of this email is to request watermain boundary conditions for the 305mm dia. PVC watermain in Campeau Drive at the existing 150mm dia. building service connection (as shown on geoOttawa). We anticipate that the proposed building addition (i.e., sprinkler system only) will be serviced by extending the internal plumbing from the stub installed as part of the original building construction. Since no additional washrooms or increase in staff are anticipated as part of the proposed building expansion the water demand will remain unchanged (based on Average Day Demand described in the previously approved Site Servicing Report from JP2G Consultants - dated July 15, 2015 - attached).

The domestic water demands are as follows:

- Average Day Demand = 0.09 L/s
- Maximum Day Demand = 0.13 L/s (Avg. Day x 1.5)
- Peak Hour Demand = 0.24 L/s (Max Day x 1.8) – Note: value in JP2G report appears to be incorrect.

The anticipated FUS fire flow demand, including the building addition, was calculated as follows:

- NEW Fire Flow Demand = 200 L/s – Note: JP2G calculated the original FUS fire flow to be 167 L/s.

See attached **123082-FUS** calculation sheets and JP2G Site Servicing Report for details.

A multi-hydrant approach to firefighting is anticipated to be required. As indicated on the geoOttawa website, there are four (4) blue bonnet municipal hydrant within 75m of the subject as well as two (2) blue bonnet municipal hydrants within 150m of the subject site. See attached **123082 - Water Boundary Conditions Sketch** for details.

Please review and let me know if you require any additional information.

Thanks,

Leonel Perez, Design Technologist
NOVATECH
Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6
Tel: 613.254.9643

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'

This e-mail originates from the City of Ottawa e-mail system. Any distribution, use or copying of this e-mail or the information it contains by other than the intended recipient(s) is unauthorized. Thank you.

Le présent courriel a été expédié par le système de courriels de la Ville d'Ottawa. Toute distribution, utilisation ou reproduction du courriel ou des renseignements qui s'y trouvent par une personne autre que son destinataire prévu est interdite. Je vous remercie de votre collaboration.

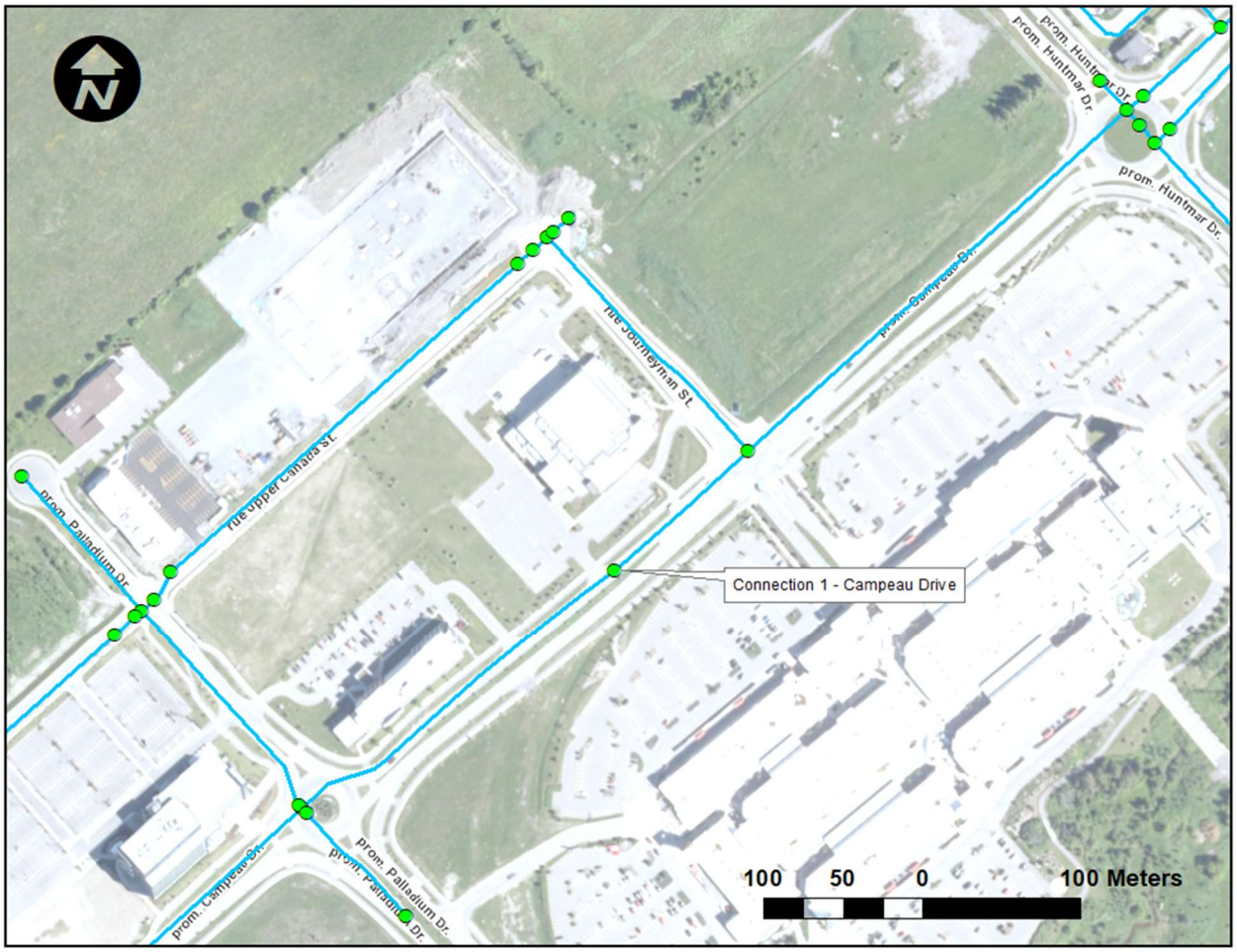
'

Boundary Conditions
8560 Campeau Drive

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	5	0.09
Maximum Daily Demand	8	0.13
Peak Hour	14	0.24
Fire Flow Demand	12,000	200.00

Location



Results

Connection 1 – Campeau Drive

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	160.7	83.8
Peak Hour	156.5	77.8
Max Day plus Fire Flow #1	143.1	58.7

[1] Ground Elevation = 101.8 m

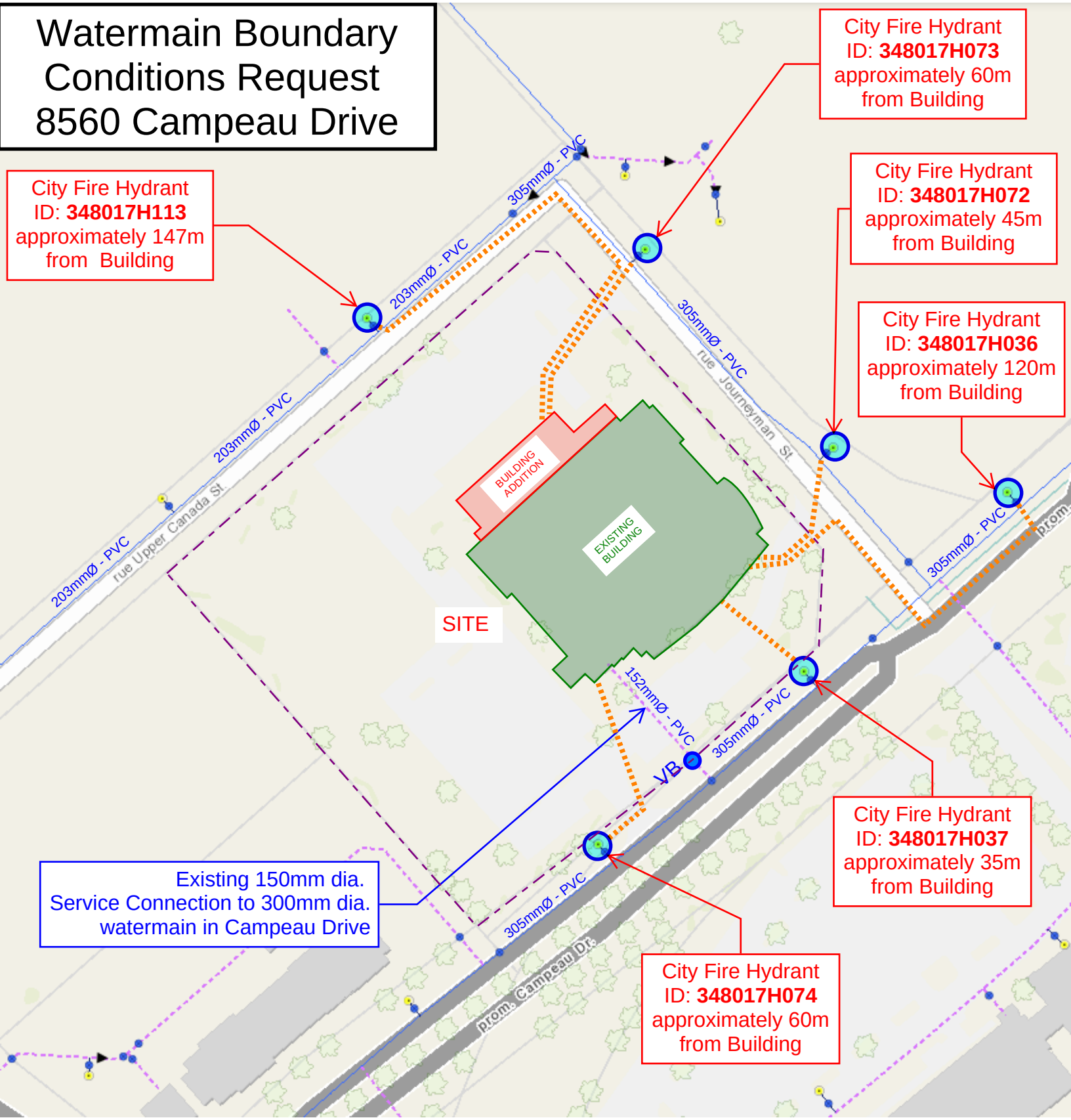
Notes

1. As per the Ontario Building Code in areas that may be occupied, the static pressure at any fixture shall not exceed 552 kPa (80 psi.) Pressure control measures to be considered are as follows, in order of preference:
    - If possible, systems to be designed to residual pressures of 345 to 552 kPa (50 to 80 psi) in all occupied areas outside of the public right-of-way without special pressure control equipment.
    - Pressure reducing valves to be installed immediately downstream of the isolation valve in the home/ building, located downstream of the meter so it is owner maintained.

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.

Watermain Boundary Conditions Request 8560 Campeau Drive



FUS - Fire Flow Calculations

Engineers, Planners & Landscape Architects

Novatech Project #: 123082
Project Name: 8560 Campeau Drive
Date: 1/9/2025
Input By: L. Perez
Reviewed By: F. Thauvette
Drawing Reference:

Legend: Input by User / No Input Required
Reference: Fire Underwriter's Survey Guideline (2020) Formula Method

Building Description: Mix of Non-Combustible & Timber
Type IV - Mass Timber

Step			Choose		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction **C**	Type V - Wood frame		1.5	1	
		Type IV - Mass Timber	Yes	Varies		
		Type III - Ordinary construction		1		
		Type II - Non-combustible construction		0.8		
		Type I - Fire resistive construction (2 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	7343			
		Number of Floors/Storeys	1			
		Protected Openings (1 hr) if C<1.0	No			
		Area of structure considered (m^2)			**7,343**	
	F	**Base fire flow without reductions**				**19,000**
		F = 220 **C** (**A**)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**		**FUS Table 3**	**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	25%	**23,750**
		Limited combustible		-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning	Yes	25%		
4	**Sprinkler Reduction**		**FUS Table 4**	**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%	-30%	**-11,875**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	Yes	-10%	-10%	
				Cumulative Sub-Total	**-50%**	
		Area of Sprinklered Coverage (m^2)	7343	100%		
				Cumulative Total	**-50%**	
5	**Exposure Surcharge**		**FUS Table 5**		**Surcharge**	
	(3)	North Side	>30m		0%	**0**
		East Side	>30m		0%	
		South Side	>30m		0%	
		West Side	>30m		0%	
				Cumulative Total	**0%**	
Results						
6	**(1) + (2) + (3)**	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**12,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**200**
				or	USGPM	3,170

The Sovereign Building
71 Bank St., 7th Floor
Ottawa ON, Canada
K1P 5N2

t. 613-224-0095
f. 613-224-9811
info@n45.ca
N45.CA

N45 ARCHITECTURE INC.

23-790

30 January 2024

Nishant Dave
Planner I
Development Review West
110 Laurier Ave. West
City of Ottawa, ON.
K1P 1J1

Re: Carpenters' Union Local 93 Expansion
8560 Campeau Drive
Kanata, ON.
K2T 0N7

On behalf of our client, we are writing this memo to support the City of Ottawa's Site Plan Control request. The development located 8560 Campeau Drive, Kanata is comprised of single storey addition to an existing training centre. Both the original building and the addition will be fully sprinklered and fully monitored. The original building construction is non-combustible, but the addition will be a combination of mass timber and CLT wood structural panels. The building is designed under 3.2.2.24 of the 2012 OBC. The heavy timber design is supported by the the findings in the Report authored by Stantec Code Consultancy Department. All structural members of the addition including floors, beams and columns are not required to have a fire rating per the above building classification. This design will provide the building with a FUS occupancy class as determined by Novatech Engineering and the type of construction will be "Non-combustible" as defined in the appendix of the Fire Underwriters Survey (2020). Additionally, all vertical openings will be protected in accordance with the Ontario Building Code or other applicable code having jurisdiction; all vertical enclosures will have walls of non-combustible construction with a fire-resistance rating of minimum one hour where required.

We trust that this is to your satisfaction. If you have any questions, please feel free to contact me at your convenience.

Regards,

N45 Architecture Inc.

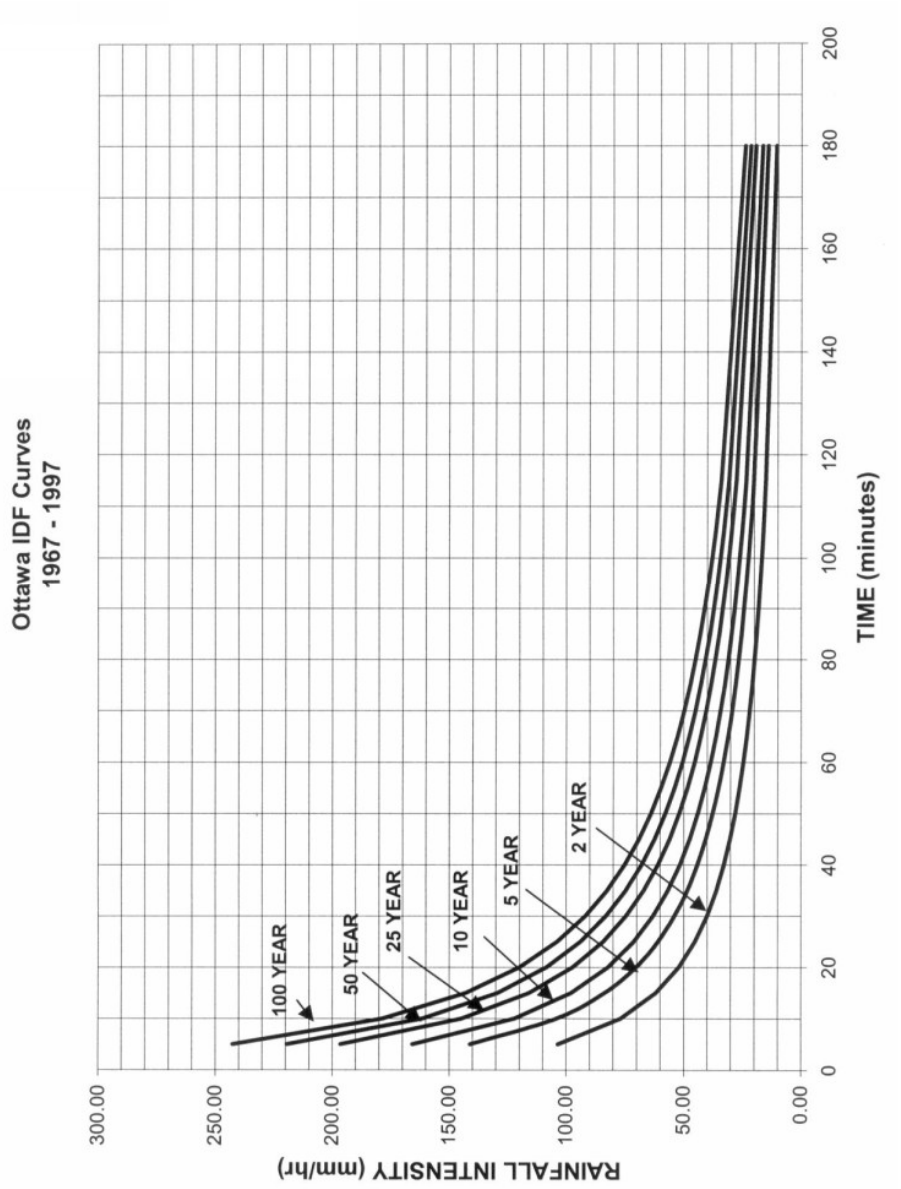
Robert Matthews

ONTARIO ASSOCIATION OF ARCHITECTS
ROBERT C. MATTHEWS
LICENCE
2966

APPENDIX D

IDF Curves, SWM Calculations

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



Carpenters Union - Building Addition
8560 Campeau Drive

Existing Conditions Site Flows												
Area	Description (Based on Jp2g SWM Report - 2015)	Area (ha)	Total Area (ha)	$A_{impervious}$ (ha) C=0.9	$A_{pervious}$ (ha) C=0.2	Weighted C_{w5}	Weighted C_{w100}	5-Year Flow (L/s)	100-Year Flow (L/s)	Allowable $C_{w(pre)}$	Approximate Storage Requirements (m^3)	
											5-year	100-year
A-1	Building roof	0.490	0.490	0.490	0.000	0.90	1.00	100.0	100.0	570.0	15.0	46.0
A-4	Front entrance, parking and landscaped areas	0.363	0.363	0.140	0.223	0.47	0.54	49.4	80.0		-	10.3
A-2	West Side parking, sidewalks, landscaped areas	0.682	1.778	0.934	0.844	0.57	0.64	292.4	370.0		-	119.0
A-3	Rear parking area, sidewalks, patios, concrete pad	0.848										
A-5	Loading Area and landscaped areas	0.248										
	Entire Site	2.631	2.631	1.564	1.067	0.62	0.70	441.8	550.0		**15.0**	**175.3**

Post - Development : Site Flows Flow to Existing STM sewer at Campeau Dr												
Area	Description	Area (ha)	Total Area (ha)	A_{imp} (ha) C=0.9	A_{perv} (ha) C=0.2	Weighted C_{w5}	Weighted C_{w100}	Controlled Flow (L/s)			Approximate Storage Requirements (m^3)	
								5-year Flow	100-year Flow	Allowable $C_{w(post)}$	5-year	100-year
A-1*	Existing Building roof	0.490	0.490	0.490	0.000	0.90	1.00	100.0	100.0	570.0	18.0	47.0
A1.1	New Building addition	0.118	0.118	0.118	0.000	0.90	1.00	5.1	5.1		18.4	45.5
A-2.1	North and West Parking Lots & Landscape areas	1.660	1.660	0.770	0.891	0.52	0.60	287.1	371.9		63.9	188.7
A-4*	South Parking lot & Landscape areas	0.363	0.363	0.140	0.223	0.47	0.54	49.4	80.0		-	10.3
	Flows to Existing STM Sewer in Campeau Dr.	**2.631**						**441.7**	**557.0**		**100.3**	**291.5**

*Values taken from previously approved JP2G SWM report

Carpenters Union - Building Addition
Novatech Project No. 123082
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA POST A-1*

OTTAWA IDF CURVE

Area =	0.490	ha	Qallow =	20.0	L/s
C =	0.90		Vol(max) =	53.1	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	103.57	126.98	106.98	32.09
10	76.81	94.16	74.16	44.50
15	61.77	75.73	55.73	50.15
20	52.03	63.79	43.79	52.55
25	45.17	55.37	35.37	53.06
30	40.04	49.09	29.09	52.37
35	36.06	0.03	-19.97	-41.93
40	32.86	40.29	20.29	48.70
45	30.24	0.56	-19.45	-52.50
50	28.04	34.38	14.38	43.13
55	26.17	32.08	12.08	39.88
60	24.56	30.11	10.11	36.39
65	23.15	28.38	8.38	32.69
70	21.91	26.86	6.86	28.83
75	20.81	25.52	5.52	24.82
80	19.83	24.31	4.31	20.69
85	18.94	23.23	3.23	16.45
90	18.14	22.24	2.24	12.11

Carpenters Union - Building Addition
Novatech Project No. 123082
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA POST A-1*

OTTAWA IDF CURVE

Area =	0.490	ha	Qallow =	20.0	L/s
C =	0.90		Vol(max) =	83.0	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	173.08	153.08	45.92
10	104.19	127.74	107.74	64.64
15	83.56	102.44	82.44	74.20
20	70.25	86.13	66.13	79.35
25	60.90	74.66	54.66	81.99
30	53.93	66.11	46.11	83.01
35	48.52	59.48	39.48	82.91
40	44.18	54.17	34.17	82.01
45	40.63	49.81	29.81	80.49
50	37.65	46.16	26.16	78.49
55	35.12	43.06	23.06	76.10
60	32.94	40.39	20.39	73.40
65	31.04	38.06	18.06	70.43
70	29.37	36.01	16.01	67.24
75	27.89	34.19	14.19	63.86
80	26.56	32.56	12.56	60.31
85	25.37	31.10	11.10	56.62
90	24.29	29.78	9.78	52.80

Carpenters Union - Building Addition
Novatech Project No. 123082
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA POST A-1*

OTTAWA IDF CURVE

Area =	0.490	ha	Qallow =	20.0	L/s
C =	1.00		Vol(max) =	202.1	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	330.61	310.61	93.18
10	178.56	243.23	223.23	133.94
15	142.89	194.65	174.65	157.19
20	119.95	163.40	143.40	172.08
25	103.85	141.46	121.46	182.19
30	91.87	125.14	105.14	189.26
35	82.58	112.49	92.49	194.23
40	75.15	102.36	82.36	197.67
45	69.05	94.06	74.06	199.96
50	63.95	87.12	67.12	201.35
55	59.62	81.22	61.22	202.02
60	55.89	76.14	56.14	202.10
65	52.65	71.72	51.72	201.69
70	49.79	67.82	47.82	200.86
75	47.26	64.37	44.37	199.67
80	44.99	61.29	41.29	198.18
85	42.95	58.51	38.51	196.41
90	41.11	56.00	36.00	194.41

Carpenters Union - Building Addition
Novatech Project No. 123082
REQUIRED STORAGE - 1:100 YR + 20% IDF Increase
AREA POST A-1*

OTTAWA IDF CURVE

Area =	0.490	ha	Qallow =	20.0	L/s
C =	1.00	0	Vol(max) =	257.8	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	291.24	396.73	376.73	113.02
10	214.27	291.88	271.88	163.13
15	171.47	233.58	213.58	192.22
20	143.94	196.08	176.08	211.29
25	124.62	169.75	149.75	224.63
30	110.24	150.17	130.17	234.31
35	99.09	134.99	114.99	241.47
40	90.17	122.84	102.84	246.81
45	82.86	112.87	92.87	250.76
50	76.74	104.54	84.54	253.63
55	71.55	97.46	77.46	255.63
60	67.07	91.37	71.37	256.92
65	63.18	86.06	66.06	257.63
70	59.75	81.39	61.39	257.83
75	56.71	77.25	57.25	257.61
80	53.99	73.54	53.54	257.01
85	51.54	70.21	50.21	256.09
90	49.33	67.20	47.20	254.89

Carpenters Union - Building Addition
Novatech Project No. 123082
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA POST A1.1

OTTAWA IDF CURVE

Area =	0.118	ha	Qallow =	5.1	L/s
C =	0.90		Vol(max) =	12.3	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	103.57	30.50	25.38	7.61
10	76.81	22.62	17.50	10.50
15	61.77	18.19	13.07	11.76
20	52.03	15.32	10.20	12.24
25	45.17	13.30	8.18	12.27
30	40.04	11.79	6.67	12.01
35	36.06	0.03	-5.09	-10.68
40	32.86	9.68	4.56	10.94
45	30.24	0.56	-4.57	-12.33
50	28.04	8.26	3.14	9.41
55	26.17	7.71	2.59	8.53
60	24.56	7.23	2.11	7.60
65	23.15	6.82	1.70	6.62
70	21.91	6.45	1.33	5.60
75	20.81	6.13	1.01	4.54
80	19.83	5.84	0.72	3.45
85	18.94	5.58	0.46	2.34
90	18.14	5.34	0.22	1.20

Carpenters Union - Building Addition
Novatech Project No. 123082
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA POST A1.1

OTTAWA IDF CURVE

Area =	0.118	ha	Qallow =	5.1	L/s
C =	0.90		Vol(max) =	19.4	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	41.57	36.45	10.93
10	104.19	30.68	25.56	15.34
15	83.56	24.60	19.48	17.54
20	70.25	20.69	15.57	18.68
25	60.90	17.93	12.81	19.22
30	53.93	15.88	10.76	19.37
35	48.52	14.29	9.17	19.25
40	44.18	13.01	7.89	18.94
45	40.63	11.96	6.84	18.48
50	37.65	11.09	5.97	17.90
55	35.12	10.34	5.22	17.23
60	32.94	9.70	4.58	16.49
65	31.04	9.14	4.02	15.68
70	29.37	8.65	3.53	14.82
75	27.89	8.21	3.09	13.91
80	26.56	7.82	2.70	12.97
85	25.37	7.47	2.35	11.98
90	24.29	7.15	2.03	10.97

Carpenters Union - Building Addition
Novatech Project No. 123082
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA POST A1.1

OTTAWA IDF CURVE

Area =	0.118	ha	Qallow =	5.1	L/s
C =	1.00		Vol(max) =	47.5	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	79.41	74.29	22.29
10	178.56	58.42	53.30	31.98
15	142.89	46.75	41.63	37.47
20	119.95	39.24	34.12	40.95
25	103.85	33.98	28.86	43.28
30	91.87	30.06	24.94	44.89
35	82.58	27.02	21.90	45.98
40	75.15	24.59	19.47	46.72
45	69.05	22.59	17.47	47.17
50	63.95	20.92	15.80	47.41
55	59.62	19.51	14.39	47.48
60	55.89	18.29	13.17	47.40
65	52.65	17.22	12.10	47.21
70	49.79	16.29	11.17	46.91
75	47.26	15.46	10.34	46.53
80	44.99	14.72	9.60	46.08
85	42.95	14.05	8.93	45.56
90	41.11	13.45	8.33	44.98

Carpenters Union - Building Addition
Novatech Project No. 123082
REQUIRED STORAGE - 1:100 YR + 20% IDF Increase
AREA POST A1.1

OTTAWA IDF CURVE

Area =	0.118	ha	Qallow =	5.1	L/s
C =	1.00	0	Vol(max) =	60.6	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	291.24	95.29	90.17	27.05
10	214.27	70.10	64.98	38.99
15	171.47	56.10	50.98	45.88
20	143.94	47.09	41.97	50.37
25	124.62	40.77	35.65	53.48
30	110.24	36.07	30.95	55.71
35	99.09	32.42	27.30	57.33
40	90.17	29.50	24.38	58.52
45	82.86	27.11	21.99	59.37
50	76.74	25.11	19.99	59.97
55	71.55	23.41	18.29	60.35
60	67.07	21.94	16.82	60.57
65	63.18	20.67	15.55	60.64
70	59.75	19.55	14.43	60.60
75	56.71	18.55	13.43	60.45
80	53.99	17.66	12.54	60.21
85	51.54	16.86	11.74	59.89
90	49.33	16.14	11.02	59.51

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Building Addition — Storage Calculations Using Average
Novatech Project No. 123082 — Release Rate Equal to 50% of the Qpeak
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA POST A-2.1

OTTAWA IDF CURVE
Area = 1.660 ha — Qallow = 184.3 L/s
C = 0.52 — Qavg= 92.2 L/s
Vol(max) = 55.3 m^3
(Vol calculated for Qallow-avg)

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	103.57	248.54	64.23	19.27
10	76.81	184.31	92.15	55.29
15	61.77	148.22	56.07	50.46
20	52.03	124.86	32.70	39.25
25	45.17	108.39	16.23	24.35
30	40.04	96.09	3.94	7.09
35	36.06	86.53	-5.62	-11.81
40	32.86	78.86	-13.29	-31.90
45	30.24	72.57	-19.59	-52.89
50	28.04	67.29	-24.86	-74.59
55	26.17	62.80	-29.35	-96.87
60	24.56	58.93	-33.22	-119.61
65	23.15	55.56	-36.60	-142.74
70	21.91	52.58	-39.57	-166.20
75	20.81	49.95	-42.21	-189.94
80	19.83	47.59	-44.57	-213.93
85	18.94	45.46	-46.69	-238.14
90	18.14	43.54	-48.62	-262.53

Building Addition — Storage Calculations Using Average
Novatech Project No. 123082 — Release Rate Equal to 50% of the Qpeak
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA POST A-2.1

OTTAWA IDF CURVE
Area = 1.660 ha — Qallow = 287.1 L/s
C = 0.52 — Qavg= 143.6 L/s
Vol(max) = 63.9 m^3
(Vol calculated for Qallow-avg)

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	338.79	154.48	46.34
10	104.19	250.03	106.46	63.88
15	83.56	200.51	56.94	51.25
20	70.25	168.58	25.01	30.02
25	60.90	146.13	2.56	3.85
30	53.93	129.41	-14.16	-25.49
35	48.52	116.43	-27.14	-57.00
40	44.18	106.03	-37.54	-90.09
45	40.63	97.50	-46.07	-124.39
50	37.65	90.36	-53.21	-159.64
55	35.12	84.29	-59.28	-195.63
60	32.94	79.05	-64.51	-232.25
65	31.04	74.50	-69.07	-269.38
70	29.37	70.48	-73.08	-306.95
75	27.89	66.92	-76.64	-344.90
80	26.56	63.74	-79.83	-383.17
85	25.37	60.88	-82.69	-421.73
90	24.29	58.28	-85.28	-460.53

Building Addition — Storage Calculations Using Average
Novatech Project No. 123082 — Release Rate Equal to 50% of the Qpeak
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA POST A-2.1

OTTAWA IDF CURVE
Area = 1.660 ha — Qallow = 371.9 L/s
C = 0.60 — Qavg= 186.0 L/s
Vol(max) = 188.7 m^3
(Vol calculated for Qallow-avg)

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	672.02	300.09	90.03
10	178.56	494.41	308.45	185.07
15	142.89	395.66	209.69	188.72
20	119.95	332.13	146.17	175.40
25	103.85	287.54	101.58	152.37
30	91.87	254.37	68.41	123.14
35	82.58	228.65	42.69	89.64
40	75.15	208.07	22.11	53.05
45	69.05	191.19	5.23	14.12
50	63.95	177.08	-8.88	-26.64
55	59.62	165.09	-20.87	-68.88
60	55.89	154.77	-31.20	-112.31
65	52.65	145.77	-40.19	-156.74
70	49.79	137.86	-48.10	-202.02
75	47.26	130.84	-55.12	-248.03
80	44.99	124.57	-61.39	-294.66
85	42.95	118.93	-67.03	-341.84
90	41.11	113.83	-72.13	-389.51

Building Addition — Storage Calculations Using Average
Novatech Project No. 123082 — Release Rate Equal to 50% of the Qpeak
REQUIRED STORAGE - 1:100 YR + 20% IDF Increase
AREA POST A-2.1

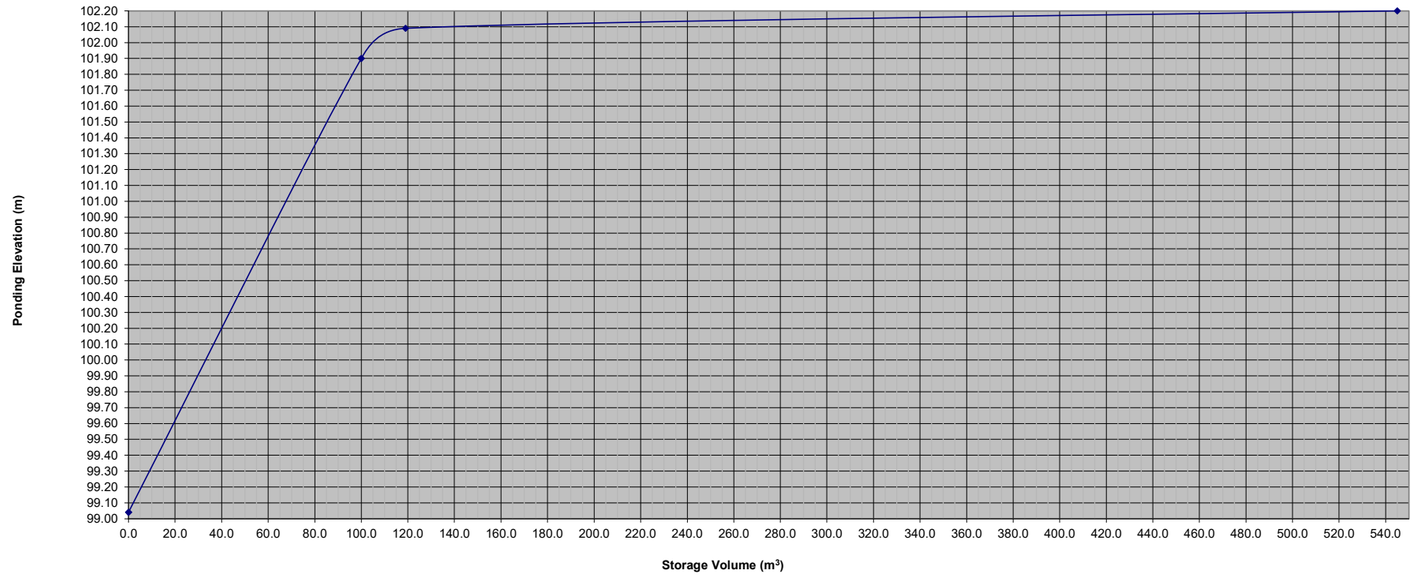
OTTAWA IDF CURVE
Area = 1.660 ha — Qallow = 373.0 L/s
C = 0.60 — Qavg= 186.5 L/s
0 Vol(max) = 259.5 m^3
(Vol calculated for Qallow-avg)

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	291.24	806.42	434.50	130.35
10	214.27	593.29	406.79	244.07
15	171.47	474.79	288.29	259.46
20	143.94	398.55	212.05	254.46
25	124.62	345.05	158.55	237.82
30	110.24	305.25	118.75	213.74
35	99.09	274.38	87.88	184.55
40	90.17	249.68	63.18	151.64
45	82.86	229.43	42.93	115.91
50	76.74	212.50	26.00	77.99
55	71.55	198.11	11.61	38.31
60	67.07	185.72	-0.78	-2.81
65	63.18	174.93	-11.57	-45.14
70	59.75	165.43	-21.07	-88.48
75	56.71	157.01	-29.49	-132.69
80	53.99	149.49	-37.01	-177.65
85	51.54	142.72	-43.78	-223.27
90	49.33	136.60	-49.90	-269.47

Storage Table for Area A-2.1

Elevation	Total Volume
m	m^3
99.04	0
101.90	100
102.09	119.0
102.20	545.0

Stage Storage Curve: Area A-2.1
ICD STMH-1



PROJECT #: 123082
PROJECT NAME: Carpenters Union Building Addition
LOCATION: OTTAWA

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Engineers, Planners & Landscape Architects

DATE PREPARED: JAN 2025

TABLE A2.1-A: Structure information

Structures	Size Dia.(mm)	Area (m^2)	T/G*	Inv IN*	Inv OUT*
STMMH-1	1800	2.54	102.45	99.11	99.04
CB-5	600	0.28	101.90	-	100.95
CB-6	600	0.28	101.90	-	100.95
STMH-7	1200	1.13	102.35	99.55	99.50
STMH-2	1200	1.13	102.25	99.93	99.85
STMH-5	1500	1.77	102.05	100.30	100.23
STMH-6	1500	1.77	102.05	100.80	100.80
CB-2	600	0.28	101.90	-	100.95
CB-3	600	0.28	101.90	-	100.95
LD-2	600	0.28	102.25	-	100.95

TABLE A2.1-B: Pipe / Stone Trench Information

Structures	Width (m)	Depth (m)	Length (m)	Void Ratio	Volume
Stone Trench	0.75	0.75	254.5	40%	55.46

Pipe	Dia(mm)*	Length (m)	Volume(m^3)	Slope	Inv UP	Inv DOWN
STM Pipe	450	89.00	14.15	0.91%	99.85	99.04
STM Pipe	375	30.50	3.37	0.98%	100.23	99.93
STM Pipe	300	49.30	3.48	1.01%	100.80	100.30
CB Lead	300	17.00	1.20	5.00%	100.95	100.10
CB Lead	250	36.80	1.81	0.12%	74.21	74.17
Subdrain Pipe	150	254.50	4.50	0.00%	100.80	100.80
		Total	28.51			

Trench storage calculation

Volume = (Width * Depth * Length * Void Ratio) - (Volume subdrain pipe * Void ratio)

TABLE A2.1-C: Storage Provided - A-2.1

Undersground Storage Table

Elevation* (m)	System Depth (m)	STMMH-1 Volume (m^3)	CB-5 Volume (m^3)	CB-6 Volume (m^3)	STMH-7 Volume (m^3)	STMH-2 Volume (m^3)	STMH-5 Volume (m^3)	STMH-6 Volume (m^3)	CB-2 Volume (m^3)	CB-3 Volume (m^3)	LD-2 Volume (m^3)	Trench Volume (m^3)	Pipes Volume (m^3)	Underground Volume (m^3)*
99.040	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00
100.950	1.84	4.86	-	-	1.64	1.24	1.27	0.27	0.00	0.00	0.00	-	28.51	37.80
101.900	2.79	7.28	0.27	0.27	2.71	2.32	2.95	1.94	0.27	0.27	0.27	55.46	28.51	102.53
101.950	2.84	7.41	0.28	0.28	2.77	2.38	3.04	2.03	0.28	0.28	0.28	-	28.51	-
102.000	2.89	7.53	0.30	0.30	2.83	2.43	3.13	2.12	0.30	0.30	0.30	-	28.51	-
102.050	2.94	7.66	0.31	0.31	2.88	2.49	3.22	2.21	0.31	0.31	0.31	-	28.51	-
102.100	2.99	7.79	0.33	0.33	2.94	2.54	3.30	2.30	0.33	0.33	0.33	-	28.51	-
102.150	3.04	7.91	0.34	0.34	3.00	2.60	3.39	2.39	0.34	0.34	0.34	-	28.51	-
102.200	3.09	8.04	0.35	0.35	3.05	2.66	3.48	2.47	0.35	0.35	0.35	-	28.51	-

TABLE A2.1-D: Orifice Sizing information - A-2.1

Control Device				**Centroid of ICD***			
Round Plate Orifice		315 mm		99.10			
Design Event	**Flow (L/S)**	**Head (m)**	**Elev (m)**	**Outlet dia. (mm)**	**Volume (m^3)**	**Area (m^2)**	**Dia. (mm)**
1:5 Year	287.1	1.80	100.90	525	63.88	0.0779	315.0
1:100 Year	371.9	3.02	102.12	525	188.72	0.0779	315.0

*Information taken directly from JP2G SWM Report.
**The design Head is calculated based on the centre of the outlet pipe

Orifice Control Sizing

Q = 0.62 x A x (2gh)^ 0.5
Q is the release rate in m^3/s
A is the orifice area in m^2
g is the acceleration due to gravity, 9.81 m/s^2
h is the head of water above the orifice centre in m
d is the diameter of the orifice in m

Orifice Flow Calculations

Q=0.62xAx(2gh)^0.5

	1:100 yr	1:5yr
Q (L/s) =	371.93	287.14
g (m/s^2) =	9.81	9.81
h (m) =	**3.02**	1.80
A (m^2) =	**0.0779**	**0.0779**
D (m) =	**0.315**	**0.315**
D (mm) =	**315**	**315**

Carpenters Union - Building Addition Storage Calculations Using Average
Novatech Project No. 123082 Release Rate Equal to 50% of the Qpeak
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA POST A-4*

OTTAWA IDF CURVE — Qallow = 36.4 L/s
Area = 0.363 ha — Qavg= 18.2 L/s
C = 0.47 — Vol(max) = 10.9 m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
10	76.81	36.45	18.22	10.93
15	61.77	29.31	11.09	9.98
20	52.03	24.69	6.47	7.76
25	45.17	21.43	3.21	4.81
30	40.04	19.00	0.78	1.40
35	36.06	0.03	-18.19	-38.20
40	32.86	15.59	-2.63	-6.31
45	30.24	0.56	-17.67	-47.70
50	28.04	13.31	-4.92	-14.75
55	26.17	12.42	-5.80	-19.15
60	24.56	11.65	-6.57	-23.65
65	23.15	10.99	-7.24	-28.22
70	21.91	10.40	-7.82	-32.86
75	20.81	9.88	-8.35	-37.56
80	19.83	9.41	-8.81	-42.30
85	18.94	8.99	-9.23	-47.09
90	18.14	8.61	-9.61	-51.91

Carpenters Union - Building Addition Storage Calculations Using Average
Novatech Project No. 123082 Release Rate Equal to 50% of the Qpeak
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA POST A-4*

OTTAWA IDF CURVE — Qallow = 49.4 L/s
Area = 0.363 ha — Qavg= 24.7 L/s
C = 0.47 — Vol(max) = 14.8 m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
10	104.19	49.44	24.72	14.83
15	83.56	39.65	14.93	13.44
20	70.25	33.34	8.61	10.34
25	60.90	28.90	4.18	6.26
30	53.93	25.59	0.87	1.56
35	48.52	23.02	-1.70	-3.57
40	44.18	20.97	-3.75	-9.01
45	40.63	19.28	-5.44	-14.69
50	37.65	17.87	-6.85	-20.56
55	35.12	16.67	-8.05	-26.58
60	32.94	15.63	-9.09	-32.72
65	31.04	14.73	-9.99	-38.96
70	29.37	13.94	-10.78	-45.29
75	27.89	13.23	-11.49	-51.69
80	26.56	12.60	-12.12	-58.16
85	25.37	12.04	-12.68	-64.68
90	24.29	11.53	-13.20	-71.26

Carpenters Union - Building Addition Storage Calculations Using Average
Novatech Project No. 123082 Release Rate Equal to 50% of the Qpeak
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA POST A-4*

OTTAWA IDF CURVE — Qallow = 80.0 L/s
Area = 0.363 ha — Qavg= 40.0 L/s
C = 0.54 — Vol(max) = 34.3 m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
10	178.56	97.22	57.22	34.33
15	142.89	77.80	37.80	34.02
20	119.95	65.31	25.31	30.37
25	103.85	56.54	16.54	24.81
30	91.87	50.02	10.02	18.03
35	82.58	44.96	4.96	10.42
40	75.15	40.91	0.91	2.19
45	69.05	37.60	-2.40	-6.49
50	63.95	34.82	-5.18	-15.54
55	59.62	32.46	-7.54	-24.87
60	55.89	30.43	-9.57	-34.44
65	52.65	28.66	-11.34	-44.21
70	49.79	27.11	-12.89	-54.14
75	47.26	25.73	-14.27	-64.22
80	44.99	24.50	-15.50	-74.42
85	42.95	23.39	-16.61	-84.73
90	41.11	22.38	-17.62	-95.13

Carpenters Union - Building Addition Storage Calculations Using Average
Novatech Project No. 123082 Release Rate Equal to 50% of the Qpeak
REQUIRED STORAGE - 1:100 YR + 20% IDF Increase
AREA POST A-4*

OTTAWA IDF CURVE — Qallow = 80.0 L/s
Area = 0.363 ha — Qavg= 40.0 L/s
C = 0.54 — 0 Vol(max) = 48.0 m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
10	214.27	116.66	76.66	46.00
15	171.47	93.36	53.36	48.02
20	143.94	78.37	38.37	46.04
25	124.62	67.85	27.85	41.77
30	110.24	60.02	20.02	36.04
35	99.09	53.95	13.95	29.30
40	90.17	49.10	9.10	21.83
45	82.86	45.11	5.11	13.81
50	76.74	41.78	1.78	5.35
55	71.55	38.96	-1.04	-3.45
60	67.07	36.52	-3.48	-12.53
65	63.18	34.40	-5.60	-21.85
70	59.75	32.53	-7.47	-31.37
75	56.71	30.87	-9.13	-41.06
80	53.99	29.40	-10.60	-50.90
85	51.54	28.06	-11.94	-60.87
90	49.33	26.86	-13.14	-70.96

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Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA A-1.1 Building Addition - RD #1

OTTAWA IDF CURVE

Area =	0.009	ha	Qallow =	0.32	L/s
C =	0.90		Vol(max) =	1.0	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	2.24	1.92	0.58
10	76.81	1.66	1.34	0.80
15	61.77	1.33	1.01	0.91
20	52.03	1.12	0.80	0.96
25	45.17	0.98	0.66	0.98
30	40.04	0.87	0.55	0.98
35	36.06	0.78	0.46	0.96
40	32.86	0.71	0.39	0.94
45	30.24	0.65	0.33	0.90
50	28.04	0.61	0.29	0.86
55	26.17	0.57	0.25	0.81
60	24.56	0.53	0.21	0.76
65	23.15	0.50	0.18	0.70
70	21.91	0.47	0.15	0.64
75	20.81	0.45	0.13	0.58
90	18.14	0.39	0.07	0.39
105	16.13	0.35	0.03	0.18
120	14.56	0.31	-0.01	-0.04

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA A-1.1 Building Addition - RD #1

OTTAWA IDF CURVE

Area =	0.009	ha	Qallow =	0.32	L/s
C =	0.90		Vol(max) =	1.5	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	3.05	2.73	0.82
10	104.19	2.25	1.93	1.16
15	83.56	1.81	1.49	1.34
20	70.25	1.52	1.20	1.44
25	60.90	1.32	1.00	1.49
30	53.93	1.17	0.85	1.52
35	48.52	1.05	0.73	1.53
40	44.18	0.95	0.63	1.52
45	40.63	0.88	0.56	1.51
50	37.65	0.81	0.49	1.48
55	35.12	0.76	0.44	1.45
60	32.94	0.71	0.39	1.41
65	31.04	0.67	0.35	1.37
70	29.37	0.63	0.31	1.32
75	27.89	0.60	0.28	1.27
90	24.29	0.52	0.20	1.11
105	21.58	0.47	0.15	0.92
120	19.47	0.42	0.10	0.72

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA A-1.1 Building Addition - RD #1

OTTAWA IDF CURVE

Area =	0.009	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	3.7	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	5.83	5.51	1.65
10	178.56	4.29	3.97	2.38
15	142.89	3.43	3.11	2.80
20	119.95	2.88	2.56	3.07
25	103.85	2.49	2.17	3.26
30	91.87	2.21	1.89	3.39
35	82.58	1.98	1.66	3.49
40	75.15	1.80	1.48	3.56
45	69.05	1.66	1.34	3.61
50	63.95	1.54	1.22	3.65
55	59.62	1.43	1.11	3.67
60	55.89	1.34	1.02	3.68
65	52.65	1.26	0.94	3.68
70	49.79	1.20	0.88	3.68
75	47.26	1.13	0.81	3.66
90	41.11	0.99	0.67	3.60
105	36.50	0.88	0.56	3.50
120	32.89	0.79	0.47	3.38

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:100 YEAR + 20%
AREA A-1.1 Building Addition - RD #1

OTTAWA IDF CURVE

Area =	0.009	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	4.7	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	6.99	6.67	2.00
10	214.27	5.14	4.82	2.89
15	171.47	4.12	3.80	3.42
20	143.94	3.46	3.14	3.76
25	124.62	2.99	2.67	4.01
30	110.24	2.65	2.33	4.19
35	99.09	2.38	2.06	4.32
40	90.17	2.16	1.84	4.43
45	82.86	1.99	1.67	4.51
50	76.74	1.84	1.52	4.57
55	71.55	1.72	1.40	4.61
60	67.07	1.61	1.29	4.64
65	63.18	1.52	1.20	4.67
70	59.75	1.43	1.11	4.68
75	56.71	1.36	1.04	4.69
90	49.33	1.18	0.86	4.67
105	43.80	1.05	0.73	4.61
120	39.47	0.95	0.63	4.52

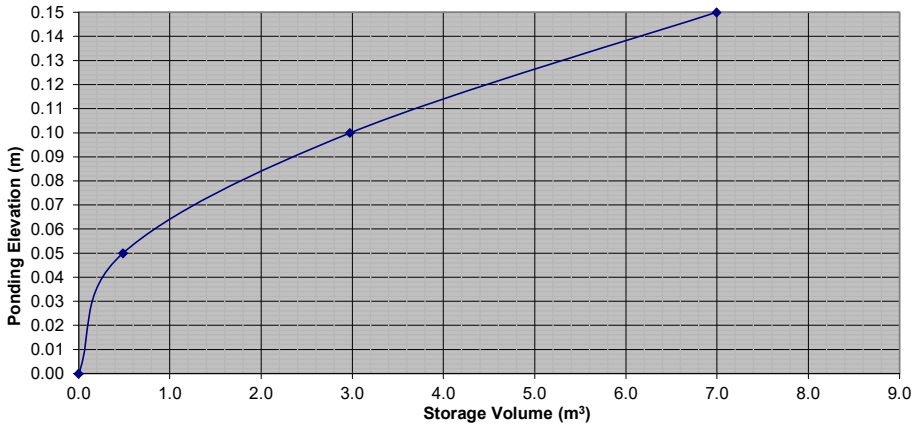
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to Closed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:2 Year	0.32	0.32	7	1.0	
1:5 Year	0.32	0.32	8	1.5	7.0
1:100 Year	0.32	0.32	11	3.7	

Roof Drain Storage Table for Area A-1.1 RD-1

Elevation	Area RD 1	Total Volume
m	m^2	m^3
0.00	0.4	0
0.05	19.1	0.5
0.10	80.4	3.0
0.15	80.4	7.0

Stage Storage Curve: Area A-1.1
Controlled Roof Drain RD-1



NOVATECH
Engineers, Planners & Landscape Architects

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA A-1.1 Building Addition - RD #2

OTTAWA IDF CURVE

Area =	0.009	ha	Qallow =	0.32	L/s
C =	0.90		Vol(max) =	1.0	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	2.21	1.89	0.57
10	76.81	1.64	1.32	0.79
15	61.77	1.32	1.00	0.90
20	52.03	1.11	0.79	0.95
25	45.17	0.96	0.64	0.97
30	40.04	0.85	0.53	0.96
35	36.06	0.77	0.45	0.94
40	32.86	0.70	0.38	0.91
45	30.24	0.65	0.33	0.88
50	28.04	0.60	0.28	0.83
55	26.17	0.56	0.24	0.79
60	24.56	0.52	0.20	0.73
65	23.15	0.49	0.17	0.68
70	21.91	0.47	0.15	0.62
75	20.81	0.44	0.12	0.56
90	18.14	0.39	0.07	0.36
105	16.13	0.34	0.02	0.15
120	14.56	0.31	-0.01	-0.07

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA A-1.1 Building Addition - RD #2

OTTAWA IDF CURVE

Area =	0.009	ha	Qallow =	0.32	L/s
C =	0.90		Vol(max) =	1.5	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	3.01	2.69	0.81
10	104.19	2.22	1.90	1.14
15	83.56	1.78	1.46	1.32
20	70.25	1.50	1.18	1.41
25	60.90	1.30	0.98	1.47
30	53.93	1.15	0.83	1.49
35	48.52	1.03	0.71	1.50
40	44.18	0.94	0.62	1.49
45	40.63	0.87	0.55	1.48
50	37.65	0.80	0.48	1.45
55	35.12	0.75	0.43	1.42
60	32.94	0.70	0.38	1.38
65	31.04	0.66	0.34	1.33
70	29.37	0.63	0.31	1.29
75	27.89	0.59	0.27	1.24
90	24.29	0.52	0.20	1.07
105	21.58	0.46	0.14	0.88
120	19.47	0.42	0.10	0.69

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA A-1.1 Building Addition - RD #2

OTTAWA IDF CURVE

Area =	0.009	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	3.6	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	5.75	5.43	1.63
10	178.56	4.23	3.91	2.35
15	142.89	3.39	3.07	2.76
20	119.95	2.84	2.52	3.03
25	103.85	2.46	2.14	3.21
30	91.87	2.18	1.86	3.34
35	82.58	1.96	1.64	3.44
40	75.15	1.78	1.46	3.51
45	69.05	1.64	1.32	3.55
50	63.95	1.52	1.20	3.59
55	59.62	1.41	1.09	3.61
60	55.89	1.32	1.00	3.62
65	52.65	1.25	0.93	3.62
70	49.79	1.18	0.86	3.61
75	47.26	1.12	0.80	3.60
90	41.11	0.97	0.65	3.53
105	36.50	0.87	0.55	3.43
120	32.89	0.78	0.46	3.31

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:100 YEAR + 20%
AREA A-1.1 Building Addition - RD #2

OTTAWA IDF CURVE

Area =	0.009	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	4.6	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	6.90	6.58	1.97
10	214.27	5.08	4.76	2.86
15	171.47	4.06	3.74	3.37
20	143.94	3.41	3.09	3.71
25	124.62	2.95	2.63	3.95
30	110.24	2.61	2.29	4.13
35	99.09	2.35	2.03	4.26
40	90.17	2.14	1.82	4.36
45	82.86	1.96	1.64	4.44
50	76.74	1.82	1.50	4.50
55	71.55	1.70	1.38	4.54
60	67.07	1.59	1.27	4.57
65	63.18	1.50	1.18	4.59
70	59.75	1.42	1.10	4.60
75	56.71	1.34	1.02	4.61
90	49.33	1.17	0.85	4.59
105	43.80	1.04	0.72	4.52
120	39.47	0.94	0.62	4.43

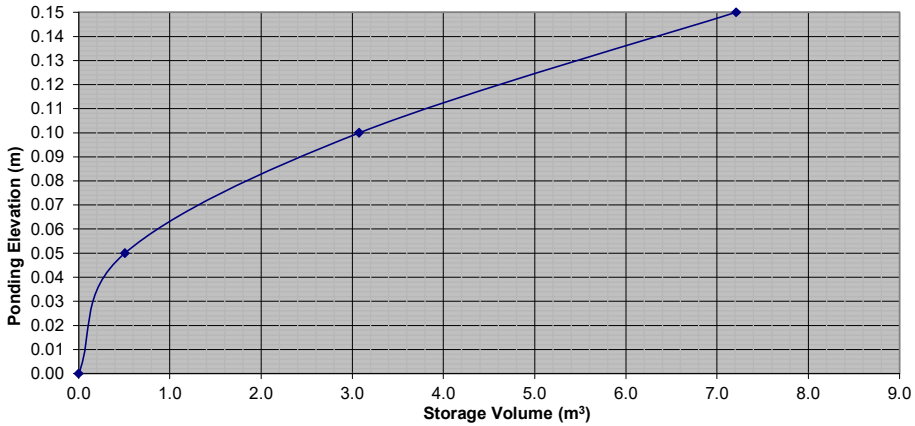
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to Closed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:2 Year	0.32	0.32	7	1.0	
1:5 Year	0.32	0.32	8	1.5	7.2
1:100 Year	0.32	0.32	11	3.6	

Roof Drain Storage Table for Area A-1.1 RD-2

Elevation	Area RD 2	Total Volume
m	m^2	m^3
0.00	0.4	0
0.05	20.0	0.5
0.10	82.7	3.1
0.15	82.7	7.2

Stage Storage Curve: Area A-1.1
Controlled Roof Drain RD-2



NOVATECH
Engineers, Planners & Landscape Architects

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA A-1.1 Building Addition - RD #3

OTTAWA IDF CURVE

Area =	0.010	ha	Qallow =	0.32	L/s
C =	0.90		Vol(max) =	1.3	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	2.65	2.33	0.70
10	76.81	1.96	1.64	0.99
15	61.77	1.58	1.26	1.13
20	52.03	1.33	1.01	1.21
25	45.17	1.16	0.84	1.25
30	40.04	1.02	0.70	1.27
35	36.06	0.92	0.60	1.27
40	32.86	0.84	0.52	1.25
45	30.24	0.77	0.45	1.22
50	28.04	0.72	0.40	1.19
55	26.17	0.67	0.35	1.15
60	24.56	0.63	0.31	1.11
65	23.15	0.59	0.27	1.06
70	21.91	0.56	0.24	1.01
75	20.81	0.53	0.21	0.96
90	18.14	0.46	0.14	0.78
105	16.13	0.41	0.09	0.58
120	14.56	0.37	0.05	0.38

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA A-1.1 Building Addition - RD #3

OTTAWA IDF CURVE

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

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	3.61	3.29	0.99
10	104.19	2.67	2.35	1.41
15	83.56	2.14	1.82	1.64
20	70.25	1.80	1.48	1.77
25	60.90	1.56	1.24	1.86
30	53.93	1.38	1.06	1.91
35	48.52	1.24	0.92	1.93
40	44.18	1.13	0.81	1.94
45	40.63	1.04	0.72	1.94
50	37.65	0.96	0.64	1.93
55	35.12	0.90	0.58	1.91
60	32.94	0.84	0.52	1.88
65	31.04	0.79	0.47	1.85
70	29.37	0.75	0.43	1.81
75	27.89	0.71	0.39	1.77
90	24.29	0.62	0.30	1.63
105	21.58	0.55	0.23	1.46
120	19.47	0.50	0.18	1.28

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA A-1.1 Building Addition - RD #3

OTTAWA IDF CURVE

Area =	0.010	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	4.6	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	6.90	6.58	1.97
10	178.56	5.08	4.76	2.85
15	142.89	4.06	3.74	3.37
20	119.95	3.41	3.09	3.71
25	103.85	2.95	2.63	3.95
30	91.87	2.61	2.29	4.12
35	82.58	2.35	2.03	4.26
40	75.15	2.14	1.82	4.36
45	69.05	1.96	1.64	4.44
50	63.95	1.82	1.50	4.49
55	59.62	1.69	1.37	4.54
60	55.89	1.59	1.27	4.57
65	52.65	1.50	1.18	4.59
70	49.79	1.42	1.10	4.60
75	47.26	1.34	1.02	4.60
90	41.11	1.17	0.85	4.58
105	36.50	1.04	0.72	4.52
120	32.89	0.94	0.62	4.43

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:100 YEAR + 20%
AREA A-1.1 Building Addition - RD #3

OTTAWA IDF CURVE

Area =	0.010	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	5.8	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	8.28	7.96	2.39
10	214.27	6.09	5.77	3.46
15	171.47	4.87	4.55	4.10
20	143.94	4.09	3.77	4.53
25	124.62	3.54	3.22	4.83
30	110.24	3.13	2.81	5.06
35	99.09	2.82	2.50	5.24
40	90.17	2.56	2.24	5.38
45	82.86	2.36	2.04	5.50
50	76.74	2.18	1.86	5.58
55	71.55	2.03	1.71	5.66
60	67.07	1.91	1.59	5.71
65	63.18	1.80	1.48	5.76
70	59.75	1.70	1.38	5.79
75	56.71	1.61	1.29	5.81
90	49.33	1.40	1.08	5.84
105	43.80	1.24	0.92	5.83
120	39.47	1.12	0.80	5.77

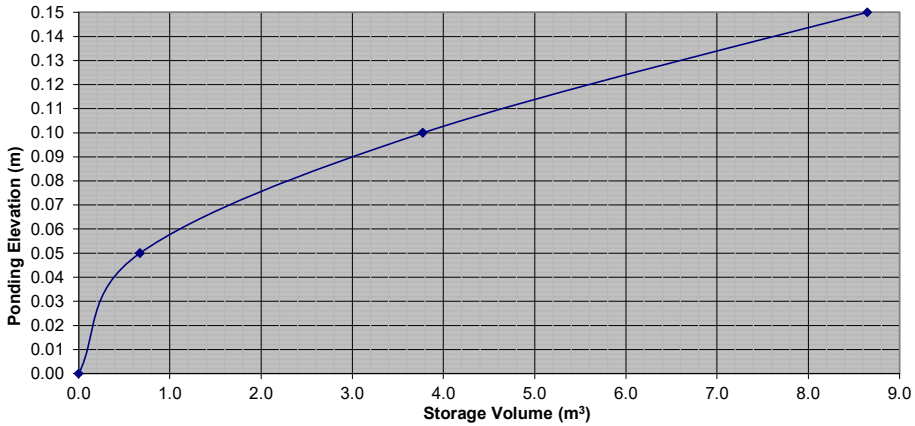
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to Closed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:2 Year	0.32	0.32	7	1.3	
1:5 Year	0.32	0.32	8	1.9	8.6
1:100 Year	0.32	0.32	11	4.6	

Roof Drain Storage Table for Area A-1.1 RD-3

Elevation	Area RD 3	Total Volume
m	m^2	m^3
0.00	0.4	0
0.05	26.5	0.7
0.10	97.5	3.8
0.15	97.5	8.6

Stage Storage Curve: Area A-1.1
Controlled Roof Drain RD-3



PROJECT #: 123082
PROJECT NAME: Carpenters Union Building Addition
LOCATION: OTTAWA

NOVATECH
Engineers, Planners & Landscape Architects

DATE PREPARED: 1/31/2025

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA A-1.1 Building Addition - RD #4

OTTAWA IDF CURVE

Area =	0.010	ha	Qallow =	0.32	L/s
C =	0.90		Vol(max) =	1.2	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	2.62	2.30	0.69
10	76.81	1.94	1.62	0.97
15	61.77	1.56	1.24	1.12
20	52.03	1.32	1.00	1.20
25	45.17	1.14	0.82	1.23
30	40.04	1.01	0.69	1.25
35	36.06	0.91	0.59	1.24
40	32.86	0.83	0.51	1.23
45	30.24	0.77	0.45	1.20
50	28.04	0.71	0.39	1.17
55	26.17	0.66	0.34	1.13
60	24.56	0.62	0.30	1.09
65	23.15	0.59	0.27	1.04
70	21.91	0.55	0.23	0.99
75	20.81	0.53	0.21	0.93
90	18.14	0.46	0.14	0.75
105	16.13	0.41	0.09	0.56
120	14.56	0.37	0.05	0.35

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA A-1.1 Building Addition - RD #4

OTTAWA IDF CURVE

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

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	3.57	3.25	0.98
10	104.19	2.64	2.32	1.39
15	83.56	2.11	1.79	1.62
20	70.25	1.78	1.46	1.75
25	60.90	1.54	1.22	1.83
30	53.93	1.36	1.04	1.88
35	48.52	1.23	0.91	1.91
40	44.18	1.12	0.80	1.92
45	40.63	1.03	0.71	1.91
50	37.65	0.95	0.63	1.90
55	35.12	0.89	0.57	1.88
60	32.94	0.83	0.51	1.85
65	31.04	0.79	0.47	1.82
70	29.37	0.74	0.42	1.78
75	27.89	0.71	0.39	1.74
90	24.29	0.61	0.29	1.59
105	21.58	0.55	0.23	1.43
120	19.47	0.49	0.17	1.24

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA A-1.1 Building Addition - RD #4

OTTAWA IDF CURVE

Area =	0.010	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	4.5	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	6.83	6.51	1.95
10	178.56	5.02	4.70	2.82
15	142.89	4.02	3.70	3.33
20	119.95	3.37	3.05	3.66
25	103.85	2.92	2.60	3.90
30	91.87	2.58	2.26	4.07
35	82.58	2.32	2.00	4.20
40	75.15	2.11	1.79	4.30
45	69.05	1.94	1.62	4.38
50	63.95	1.80	1.48	4.44
55	59.62	1.68	1.36	4.48
60	55.89	1.57	1.25	4.51
65	52.65	1.48	1.16	4.53
70	49.79	1.40	1.08	4.54
75	47.26	1.33	1.01	4.54
90	41.11	1.16	0.84	4.52
105	36.50	1.03	0.71	4.45
120	32.89	0.93	0.61	4.36

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:100 YEAR + 20%
AREA A-1.1 Building Addition - RD #4

OTTAWA IDF CURVE

Area =	0.010	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	5.8	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	8.19	7.87	2.36
10	214.27	6.03	5.71	3.42
15	171.47	4.82	4.50	4.05
20	143.94	4.05	3.73	4.47
25	124.62	3.50	3.18	4.78
30	110.24	3.10	2.78	5.00
35	99.09	2.79	2.47	5.18
40	90.17	2.54	2.22	5.32
45	82.86	2.33	2.01	5.43
50	76.74	2.16	1.84	5.51
55	71.55	2.01	1.69	5.58
60	67.07	1.89	1.57	5.64
65	63.18	1.78	1.46	5.68
70	59.75	1.68	1.36	5.71
75	56.71	1.59	1.27	5.74
90	49.33	1.39	1.07	5.76
105	43.80	1.23	0.91	5.74
120	39.47	1.11	0.79	5.69

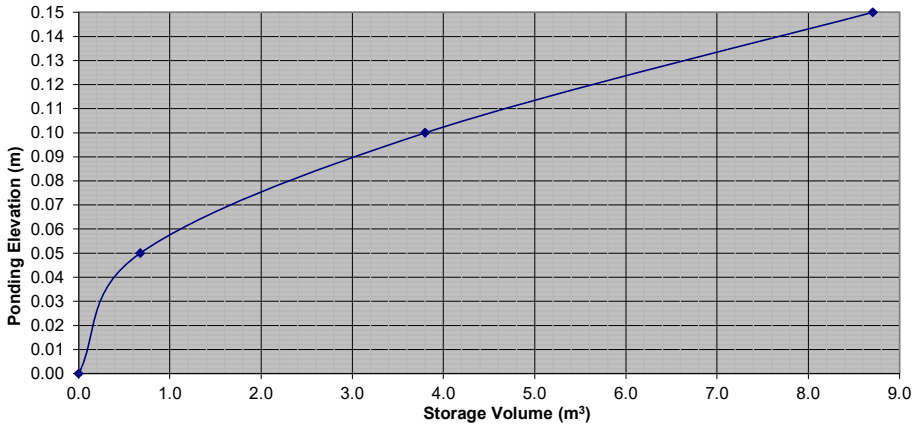
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to Closed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:2 Year	0.32	0.32	7	1.2	
1:5 Year	0.32	0.32	8	1.9	8.7
1:100 Year	0.32	0.32	11	4.5	

Roof Drain Storage Table for Area A-1.1 RD-4

Elevation	Area RD 4	Total Volume
m	m^2	m^3
0.00	0.4	0
0.05	26.7	0.7
0.10	98.2	3.8
0.15	98.2	8.7

Stage Storage Curve: Area A-1.1
Controlled Roof Drain RD-4



PROJECT #: 123082
PROJECT NAME: Carpenters Union Building Addition
LOCATION: OTTAWA

NOVATECH
Engineers, Planners & Landscape Architects

DATE PREPARED: 1/31/2025

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA A-1.1 Building Addition - RD #5

OTTAWA IDF CURVE

Area =	0.010	ha	Qallow =	0.32	L/s
C =	0.90		Vol(max) =	1.3	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	2.70	2.38	0.71
10	76.81	2.00	1.68	1.01
15	61.77	1.61	1.29	1.16
20	52.03	1.35	1.03	1.24
25	45.17	1.18	0.86	1.28
30	40.04	1.04	0.72	1.30
35	36.06	0.94	0.62	1.30
40	32.86	0.86	0.54	1.28
45	30.24	0.79	0.47	1.26
50	28.04	0.73	0.41	1.23
55	26.17	0.68	0.36	1.19
60	24.56	0.64	0.32	1.15
65	23.15	0.60	0.28	1.10
70	21.91	0.57	0.25	1.05
75	20.81	0.54	0.22	1.00
90	18.14	0.47	0.15	0.82
105	16.13	0.42	0.10	0.63
120	14.56	0.38	0.06	0.42

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA A-1.1 Building Addition - RD #5

OTTAWA IDF CURVE

Area =	0.010	ha	Qallow =	0.32	L/s
C =	0.90		Vol(max) =	2.0	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	3.67	3.35	1.01
10	104.19	2.71	2.39	1.44
15	83.56	2.17	1.85	1.67
20	70.25	1.83	1.51	1.81
25	60.90	1.59	1.27	1.90
30	53.93	1.40	1.08	1.95
35	48.52	1.26	0.94	1.98
40	44.18	1.15	0.83	1.99
45	40.63	1.06	0.74	1.99
50	37.65	0.98	0.66	1.98
55	35.12	0.91	0.59	1.96
60	32.94	0.86	0.54	1.93
65	31.04	0.81	0.49	1.90
70	29.37	0.76	0.44	1.87
75	27.89	0.73	0.41	1.83
90	24.29	0.63	0.31	1.69
105	21.58	0.56	0.24	1.52
120	19.47	0.51	0.19	1.34

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA A-1.1 Building Addition - RD #5

OTTAWA IDF CURVE

Area =	0.010	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	4.7	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	7.02	6.70	2.01
10	178.56	5.16	4.84	2.91
15	142.89	4.13	3.81	3.43
20	119.95	3.47	3.15	3.78
25	103.85	3.00	2.68	4.02
30	91.87	2.66	2.34	4.21
35	82.58	2.39	2.07	4.34
40	75.15	2.17	1.85	4.45
45	69.05	2.00	1.68	4.53
50	63.95	1.85	1.53	4.59
55	59.62	1.72	1.40	4.63
60	55.89	1.62	1.30	4.67
65	52.65	1.52	1.20	4.69
70	49.79	1.44	1.12	4.70
75	47.26	1.37	1.05	4.71
90	41.11	1.19	0.87	4.69
105	36.50	1.06	0.74	4.63
120	32.89	0.95	0.63	4.55

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:100 YEAR + 20%
AREA A-1.1 Building Addition - RD #5

OTTAWA IDF CURVE

Area =	0.010	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	6.0	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	8.42	8.10	2.43
10	214.27	6.20	5.88	3.53
15	171.47	4.96	4.64	4.18
20	143.94	4.16	3.84	4.61
25	124.62	3.60	3.28	4.93
30	110.24	3.19	2.87	5.16
35	99.09	2.87	2.55	5.35
40	90.17	2.61	2.29	5.49
45	82.86	2.40	2.08	5.61
50	76.74	2.22	1.90	5.70
55	71.55	2.07	1.75	5.77
60	67.07	1.94	1.62	5.83
65	63.18	1.83	1.51	5.88
70	59.75	1.73	1.41	5.91
75	56.71	1.64	1.32	5.94
90	49.33	1.43	1.11	5.98
105	43.80	1.27	0.95	5.96
120	39.47	1.14	0.82	5.92

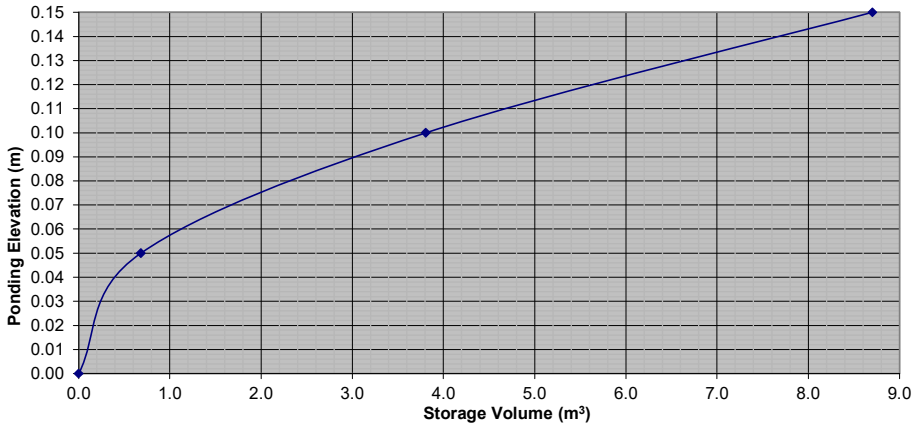
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to Closed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:2 Year	0.32	0.32	7	1.3	
1:5 Year	0.32	0.32	8	2.0	8.7
1:100 Year	0.32	0.32	11	4.7	

Roof Drain Storage Table for Area A-1.1 RD-5

Elevation	Area RD 5	Total Volume
m	m^2	m^3
0.00	0.4	0
0.05	26.9	0.7
0.10	98.0	3.8
0.15	98.0	8.7

Stage Storage Curve: Area A-1.1
Controlled Roof Drain RD-5



NOVATECH
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Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA A-1.1 Building Addition - RD #6

OTTAWA IDF CURVE
Area = 0.010 ha Qallow = 0.32 L/s
C = 0.90 Vol(max) = 1.2 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	2.61	2.29	0.69
10	76.81	1.93	1.61	0.97
15	61.77	1.56	1.24	1.11
20	52.03	1.31	0.99	1.19
25	45.17	1.14	0.82	1.23
30	40.04	1.01	0.69	1.24
35	36.06	0.91	0.59	1.24
40	32.86	0.83	0.51	1.22
45	30.24	0.76	0.44	1.19
50	28.04	0.71	0.39	1.16
55	26.17	0.66	0.34	1.12
60	24.56	0.62	0.30	1.07
65	23.15	0.58	0.26	1.03
70	21.91	0.55	0.23	0.97
75	20.81	0.52	0.20	0.92
90	18.14	0.46	0.14	0.74
105	16.13	0.41	0.09	0.54
120	14.56	0.37	0.05	0.34

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA A-1.1 Building Addition - RD #6

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

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	3.56	3.24	0.97
10	104.19	2.62	2.30	1.38
15	83.56	2.10	1.78	1.61
20	70.25	1.77	1.45	1.74
25	60.90	1.53	1.21	1.82
30	53.93	1.36	1.04	1.87
35	48.52	1.22	0.90	1.89
40	44.18	1.11	0.79	1.90
45	40.63	1.02	0.70	1.90
50	37.65	0.95	0.63	1.88
55	35.12	0.88	0.56	1.86
60	32.94	0.83	0.51	1.83
65	31.04	0.78	0.46	1.80
70	29.37	0.74	0.42	1.76
75	27.89	0.70	0.38	1.72
90	24.29	0.61	0.29	1.58
105	21.58	0.54	0.22	1.41
120	19.47	0.49	0.17	1.23

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA A-1.1 Building Addition - RD #6

OTTAWA IDF CURVE
Area = 0.010 ha Qallow = 0.32 L/s
C = 1.00 Vol(max) = 4.5 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	6.79	6.47	1.94
10	178.56	5.00	4.68	2.81
15	142.89	4.00	3.68	3.31
20	119.95	3.36	3.04	3.64
25	103.85	2.91	2.59	3.88
30	91.87	2.57	2.25	4.05
35	82.58	2.31	1.99	4.18
40	75.15	2.10	1.78	4.28
45	69.05	1.93	1.61	4.35
50	63.95	1.79	1.47	4.41
55	59.62	1.67	1.35	4.45
60	55.89	1.56	1.24	4.48
65	52.65	1.47	1.15	4.50
70	49.79	1.39	1.07	4.51
75	47.26	1.32	1.00	4.51
90	41.11	1.15	0.83	4.48
105	36.50	1.02	0.70	4.42
120	32.89	0.92	0.60	4.32

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:100 YEAR + 20%
AREA A-1.1 Building Addition - RD #6

OTTAWA IDF CURVE
Area = 0.010 ha Qallow = 0.32 L/s
C = 1.00 Vol(max) = 5.7 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	8.15	7.83	2.35
10	214.27	6.00	5.68	3.41
15	171.47	4.80	4.48	4.03
20	143.94	4.03	3.71	4.45
25	124.62	3.49	3.17	4.75
30	110.24	3.08	2.76	4.98
35	99.09	2.77	2.45	5.15
40	90.17	2.52	2.20	5.29
45	82.86	2.32	2.00	5.40
50	76.74	2.15	1.83	5.48
55	71.55	2.00	1.68	5.55
60	67.07	1.88	1.56	5.61
65	63.18	1.77	1.45	5.65
70	59.75	1.67	1.35	5.68
75	56.71	1.59	1.27	5.70
90	49.33	1.38	1.06	5.73
105	43.80	1.23	0.91	5.71
120	39.47	1.10	0.78	5.65

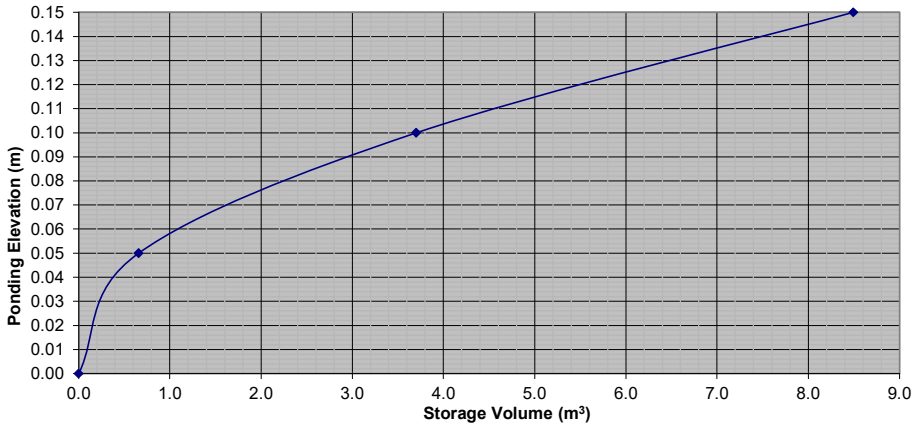
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to Closed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:2 Year	0.32	0.32	7	1.2	8.5
1:5 Year	0.32	0.32	8	1.9	
1:100 Year	0.32	0.32	11	4.5	

Roof Drain Storage Table for Area A-1.1 RD-6

Elevation	Area RD 6	Total Volume
m	m^2	m^3
0.00	0.4	0
0.05	25.9	0.7
0.10	95.9	3.7
0.15	95.9	8.5

Stage Storage Curve: Area A-1.1
Controlled Roof Drain RD-6



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Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA A-1.1 Building Addition - RD #7

OTTAWA IDF CURVE

Area =	0.010	ha	Qallow =	0.32	L/s
C =	0.90		Vol(max) =	1.2	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	2.54	2.22	0.67
10	76.81	1.88	1.56	0.94
15	61.77	1.51	1.19	1.07
20	52.03	1.27	0.95	1.15
25	45.17	1.11	0.79	1.18
30	40.04	0.98	0.66	1.19
35	36.06	0.88	0.56	1.18
40	32.86	0.80	0.48	1.16
45	30.24	0.74	0.42	1.14
50	28.04	0.69	0.37	1.10
55	26.17	0.64	0.32	1.06
60	24.56	0.60	0.28	1.01
65	23.15	0.57	0.25	0.96
70	21.91	0.54	0.22	0.91
75	20.81	0.51	0.19	0.85
90	18.14	0.44	0.12	0.67
105	16.13	0.40	0.08	0.47
120	14.56	0.36	0.04	0.26

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA A-1.1 Building Addition - RD #7

OTTAWA IDF CURVE

Area =	0.010	ha	Qallow =	0.32	L/s
C =	0.90		Vol(max) =	1.8	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	3.46	3.14	0.94
10	104.19	2.55	2.23	1.34
15	83.56	2.05	1.73	1.55
20	70.25	1.72	1.40	1.68
25	60.90	1.49	1.17	1.76
30	53.93	1.32	1.00	1.80
35	48.52	1.19	0.87	1.82
40	44.18	1.08	0.76	1.83
45	40.63	1.00	0.68	1.82
50	37.65	0.92	0.60	1.81
55	35.12	0.86	0.54	1.78
60	32.94	0.81	0.49	1.75
65	31.04	0.76	0.44	1.72
70	29.37	0.72	0.40	1.68
75	27.89	0.68	0.36	1.63
90	24.29	0.59	0.27	1.48
105	21.58	0.53	0.21	1.31
120	19.47	0.48	0.16	1.13

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA A-1.1 Building Addition - RD #7

OTTAWA IDF CURVE

Area =	0.010	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	4.3	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	6.61	6.29	1.89
10	178.56	4.86	4.54	2.72
15	142.89	3.89	3.57	3.21
20	119.95	3.26	2.94	3.53
25	103.85	2.83	2.51	3.76
30	91.87	2.50	2.18	3.92
35	82.58	2.25	1.93	4.05
40	75.15	2.05	1.73	4.14
45	69.05	1.88	1.56	4.21
50	63.95	1.74	1.42	4.26
55	59.62	1.62	1.30	4.30
60	55.89	1.52	1.20	4.32
65	52.65	1.43	1.11	4.34
70	49.79	1.36	1.04	4.35
75	47.26	1.29	0.97	4.35
90	41.11	1.12	0.80	4.31
105	36.50	0.99	0.67	4.24
120	32.89	0.90	0.58	4.14

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:100 YEAR + 20%
AREA A-1.1 Building Addition - RD #7

OTTAWA IDF CURVE

Area =	0.010	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	5.5	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	7.93	7.61	2.28
10	214.27	5.83	5.51	3.31
15	171.47	4.67	4.35	3.91
20	143.94	3.92	3.60	4.32
25	124.62	3.39	3.07	4.61
30	110.24	3.00	2.68	4.82
35	99.09	2.70	2.38	4.99
40	90.17	2.45	2.13	5.12
45	82.86	2.26	1.94	5.22
50	76.74	2.09	1.77	5.31
55	71.55	1.95	1.63	5.37
60	67.07	1.83	1.51	5.42
65	63.18	1.72	1.40	5.46
70	59.75	1.63	1.31	5.49
75	56.71	1.54	1.22	5.51
90	49.33	1.34	1.02	5.52
105	43.80	1.19	0.87	5.49
120	39.47	1.07	0.75	5.43

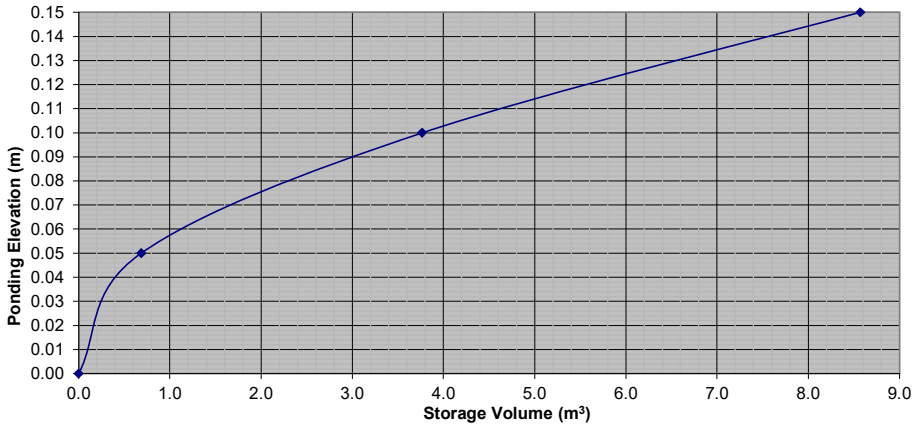
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to Closed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:2 Year	0.32	0.32	6	1.2	
1:5 Year	0.32	0.32	8	1.8	8.6
1:100 Year	0.32	0.32	11	4.3	

Roof Drain Storage Table for Area A-1.1 RD-7

Elevation	Area RD 7	Total Volume
m	m^2	m^3
0.00	0.4	0
0.05	27.1	0.7
0.10	96.1	3.8
0.15	96.1	8.6

Stage Storage Curve: Area A-1.1
Controlled Roof Drain RD-7



PROJECT #: 123082
PROJECT NAME: Carpenters Union Building Addition
LOCATION: OTTAWA

NOVATECH
Engineers, Planners & Landscape Architects

DATE PREPARED: 1/31/2025

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA A-1.1 Building Addition - RD #8

OTTAWA IDF CURVE
Area = 0.010 ha Qallow = 0.32 L/s
C = 0.90 Vol(max) = 1.2 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	2.56	2.24	0.67
10	76.81	1.90	1.58	0.95
15	61.77	1.53	1.21	1.09
20	52.03	1.29	0.97	1.16
25	45.17	1.12	0.80	1.20
30	40.04	0.99	0.67	1.21
35	36.06	0.89	0.57	1.20
40	32.86	0.81	0.49	1.18
45	30.24	0.75	0.43	1.16
50	28.04	0.69	0.37	1.12
55	26.17	0.65	0.33	1.08
60	24.56	0.61	0.29	1.04
65	23.15	0.57	0.25	0.99
70	21.91	0.54	0.22	0.93
75	20.81	0.52	0.20	0.88
90	18.14	0.45	0.13	0.70
105	16.13	0.40	0.08	0.50
120	14.56	0.36	0.04	0.29

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA A-1.1 Building Addition - RD #8

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

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

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA A-1.1 Building Addition - RD #8

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

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	6.68	6.36	1.91
10	178.56	4.91	4.59	2.76
15	142.89	3.93	3.61	3.25
20	119.95	3.30	2.98	3.58
25	103.85	2.86	2.54	3.81
30	91.87	2.53	2.21	3.97
35	82.58	2.27	1.95	4.10
40	75.15	2.07	1.75	4.19
45	69.05	1.90	1.58	4.27
50	63.95	1.76	1.44	4.32
55	59.62	1.64	1.32	4.36
60	55.89	1.54	1.22	4.38
65	52.65	1.45	1.13	4.40
70	49.79	1.37	1.05	4.41
75	47.26	1.30	0.98	4.41
90	41.11	1.13	0.81	4.38
105	36.50	1.00	0.68	4.31
120	32.89	0.90	0.58	4.21

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:100 YEAR + 20%
AREA A-1.1 Building Addition - RD #8

OTTAWA IDF CURVE
Area = 0.010 ha Qallow = 0.32 L/s
C = 1.00 Vol(max) = 5.6 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	8.01	7.69	2.31
10	214.27	5.89	5.57	3.34
15	171.47	4.72	4.40	3.96
20	143.94	3.96	3.64	4.37
25	124.62	3.43	3.11	4.66
30	110.24	3.03	2.71	4.88
35	99.09	2.73	2.41	5.05
40	90.17	2.48	2.16	5.19
45	82.86	2.28	1.96	5.29
50	76.74	2.11	1.79	5.37
55	71.55	1.97	1.65	5.44
60	67.07	1.85	1.53	5.49
65	63.18	1.74	1.42	5.53
70	59.75	1.64	1.32	5.56
75	56.71	1.56	1.24	5.58
90	49.33	1.36	1.04	5.60
105	43.80	1.20	0.88	5.57
120	39.47	1.09	0.77	5.51

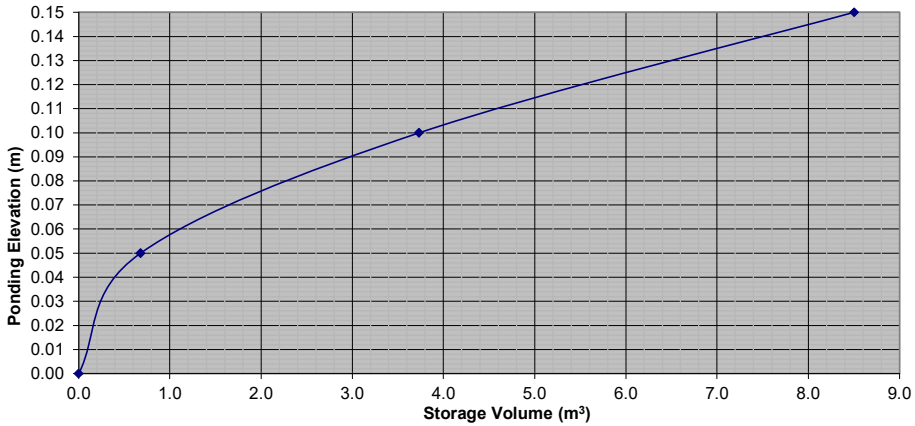
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to Closed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:2 Year	0.32	0.32	7	1.2	8.5
1:5 Year	0.32	0.32	8	1.9	
1:100 Year	0.32	0.32	11	4.4	

Roof Drain Storage Table for Area A-1.1 RD-8

Elevation	Area RD 8	Total Volume
m	m^2	m^3
0.00	0.4	0
0.05	26.7	0.7
0.10	95.4	3.7
0.15	95.4	8.5

Stage Storage Curve: Area A-1.1
Controlled Roof Drain RD-8



PROJECT #: 123082
PROJECT NAME: Carpenters Union Building Addition
LOCATION: OTTAWA

NOVATECH
Engineers, Planners & Landscape Architects

DATE PREPARED: 1/31/2025

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA A-1.1 Building Addition - RD #9

OTTAWA IDF CURVE
Area = 0.008 ha Qallow = 0.32 L/s
C = 0.90 Vol(max) = 0.9 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	2.14	1.82	0.55
10	76.81	1.59	1.27	0.76
15	61.77	1.28	0.96	0.86
20	52.03	1.07	0.75	0.90
25	45.17	0.93	0.61	0.92
30	40.04	0.83	0.51	0.91
35	36.06	0.74	0.42	0.89
40	32.86	0.68	0.36	0.86
45	30.24	0.62	0.30	0.82
50	28.04	0.58	0.26	0.78
55	26.17	0.54	0.22	0.73
60	24.56	0.51	0.19	0.67
65	23.15	0.48	0.16	0.62
70	21.91	0.45	0.13	0.56
75	20.81	0.43	0.11	0.49
90	18.14	0.37	0.05	0.29
105	16.13	0.33	0.01	0.08
120	14.56	0.30	-0.02	-0.14

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA A-1.1 Building Addition - RD #9

OTTAWA IDF CURVE
Area = 0.008 ha Qallow = 0.32 L/s
C = 0.90 Vol(max) = 1.4 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	2.91	2.59	0.78
10	104.19	2.15	1.83	1.10
15	83.56	1.72	1.40	1.26
20	70.25	1.45	1.13	1.36
25	60.90	1.26	0.94	1.41
30	53.93	1.11	0.79	1.43
35	48.52	1.00	0.68	1.43
40	44.18	0.91	0.59	1.42
45	40.63	0.84	0.52	1.40
50	37.65	0.78	0.46	1.37
55	35.12	0.73	0.41	1.34
60	32.94	0.68	0.36	1.30
65	31.04	0.64	0.32	1.25
70	29.37	0.61	0.29	1.20
75	27.89	0.58	0.26	1.15
90	24.29	0.50	0.18	0.98
105	21.58	0.45	0.13	0.79
120	19.47	0.40	0.08	0.59

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA A-1.1 Building Addition - RD #9

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

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	5.57	5.25	1.57
10	178.56	4.10	3.78	2.27
15	142.89	3.28	2.96	2.66
20	119.95	2.75	2.43	2.92
25	103.85	2.38	2.06	3.09
30	91.87	2.11	1.79	3.22
35	82.58	1.89	1.57	3.31
40	75.15	1.72	1.40	3.37
45	69.05	1.58	1.26	3.41
50	63.95	1.47	1.15	3.44
55	59.62	1.37	1.05	3.46
60	55.89	1.28	0.96	3.46
65	52.65	1.21	0.89	3.46
70	49.79	1.14	0.82	3.45
75	47.26	1.08	0.76	3.44
90	41.11	0.94	0.62	3.36
105	36.50	0.84	0.52	3.26
120	32.89	0.75	0.43	3.13

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:100 YEAR + 20%
AREA A-1.1 Building Addition - RD #9

OTTAWA IDF CURVE
Area = 0.008 ha Qallow = 0.32 L/s
C = 1.00 Vol(max) = 4.4 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	6.68	6.36	1.91
10	214.27	4.91	4.59	2.76
15	171.47	3.93	3.61	3.25
20	143.94	3.30	2.98	3.58
25	124.62	2.86	2.54	3.81
30	110.24	2.53	2.21	3.98
35	99.09	2.27	1.95	4.10
40	90.17	2.07	1.75	4.20
45	82.86	1.90	1.58	4.27
50	76.74	1.76	1.44	4.32
55	71.55	1.64	1.32	4.36
60	67.07	1.54	1.22	4.39
65	63.18	1.45	1.13	4.40
70	59.75	1.37	1.05	4.41
75	56.71	1.30	0.98	4.41
90	49.33	1.13	0.81	4.38
105	43.80	1.00	0.68	4.31
120	39.47	0.91	0.59	4.22

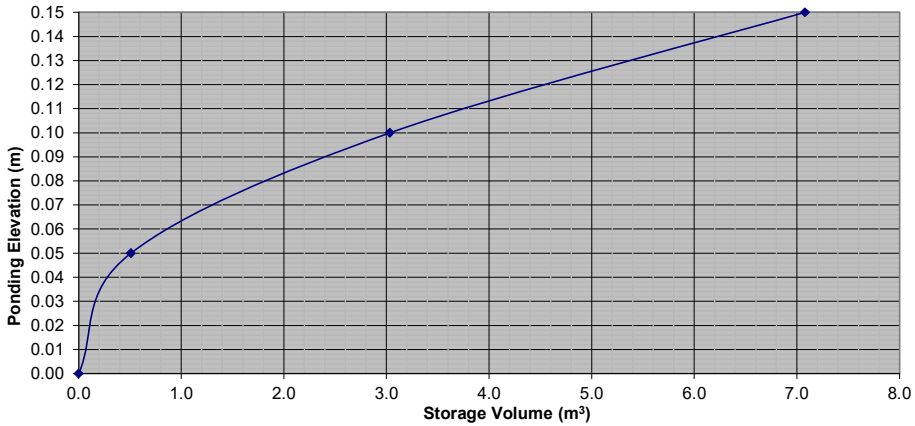
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to Closed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:2 Year	0.32	0.32	6	0.9	
1:5 Year	0.32	0.32	8	1.4	7.1
1:100 Year	0.32	0.32	11	3.5	

Roof Drain Storage Table for Area A-1.1 RD-9

Elevation	Area RD 9	Total Volume
m	m^2	m^3
0.00	0.4	0
0.05	20.0	0.5
0.10	81.0	3.0
0.15	81.0	7.1

Stage Storage Curve: Area A-1.1
Controlled Roof Drain RD-9



PROJECT #: 123082
PROJECT NAME: Carpenters Union Building Addition
LOCATION: OTTAWA

NOVATECH
Engineers, Planners & Landscape Architects

DATE PREPARED: 1/31/2025

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA A-1.1 Building Addition - RD #10

OTTAWA IDF CURVE
Area = 0.008 ha Qallow = 0.32 L/s
C = 0.90 Vol(max) = 0.9 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	2.17	1.85	0.55
10	76.81	1.61	1.29	0.77
15	61.77	1.29	0.97	0.87
20	52.03	1.09	0.77	0.92
25	45.17	0.94	0.62	0.94
30	40.04	0.84	0.52	0.93
35	36.06	0.75	0.43	0.91
40	32.86	0.69	0.37	0.88
45	30.24	0.63	0.31	0.84
50	28.04	0.59	0.27	0.80
55	26.17	0.55	0.23	0.75
60	24.56	0.51	0.19	0.70
65	23.15	0.48	0.16	0.64
70	21.91	0.46	0.14	0.58
75	20.81	0.44	0.12	0.52
90	18.14	0.38	0.06	0.32
105	16.13	0.34	0.02	0.11
120	14.56	0.30	-0.02	-0.11

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA A-1.1 Building Addition - RD #10

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

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	2.95	2.63	0.79
10	104.19	2.18	1.86	1.12
15	83.56	1.75	1.43	1.28
20	70.25	1.47	1.15	1.38
25	60.90	1.27	0.95	1.43
30	53.93	1.13	0.81	1.45
35	48.52	1.01	0.69	1.46
40	44.18	0.92	0.60	1.45
45	40.63	0.85	0.53	1.43
50	37.65	0.79	0.47	1.40
55	35.12	0.73	0.41	1.37
60	32.94	0.69	0.37	1.33
65	31.04	0.65	0.33	1.28
70	29.37	0.61	0.29	1.24
75	27.89	0.58	0.26	1.19
90	24.29	0.51	0.19	1.02
105	21.58	0.45	0.13	0.83
120	19.47	0.41	0.09	0.63

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA A-1.1 Building Addition - RD #10

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

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	5.64	5.32	1.60
10	178.56	4.15	3.83	2.30
15	142.89	3.32	3.00	2.70
20	119.95	2.79	2.47	2.96
25	103.85	2.41	2.09	3.14
30	91.87	2.14	1.82	3.27
35	82.58	1.92	1.60	3.36
40	75.15	1.75	1.43	3.42
45	69.05	1.60	1.28	3.47
50	63.95	1.49	1.17	3.50
55	59.62	1.39	1.07	3.52
60	55.89	1.30	0.98	3.52
65	52.65	1.22	0.90	3.52
70	49.79	1.16	0.84	3.52
75	47.26	1.10	0.78	3.50
90	41.11	0.96	0.64	3.43
105	36.50	0.85	0.53	3.33
120	32.89	0.76	0.44	3.20

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:100 YEAR + 20%
AREA A-1.1 Building Addition - RD #10

OTTAWA IDF CURVE
Area = 0.008 ha Qallow = 0.32 L/s
C = 1.00 Vol(max) = 4.5 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	6.77	6.45	1.93
10	214.27	4.98	4.66	2.80
15	171.47	3.99	3.67	3.30
20	143.94	3.35	3.03	3.63
25	124.62	2.90	2.58	3.86
30	110.24	2.56	2.24	4.04
35	99.09	2.30	1.98	4.16
40	90.17	2.10	1.78	4.26
45	82.86	1.93	1.61	4.34
50	76.74	1.78	1.46	4.39
55	71.55	1.66	1.34	4.43
60	67.07	1.56	1.24	4.46
65	63.18	1.47	1.15	4.48
70	59.75	1.39	1.07	4.49
75	56.71	1.32	1.00	4.49
90	49.33	1.15	0.83	4.46
105	43.80	1.02	0.70	4.40
120	39.47	0.92	0.60	4.30

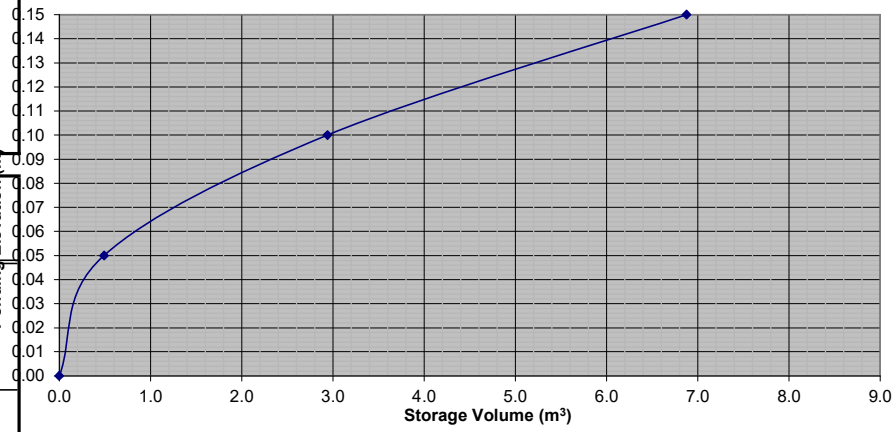
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to Closed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:2 Year	0.32	0.32	6	0.9	
1:5 Year	0.32	0.32	8	1.5	6.9
1:100 Year	0.32	0.32	11	3.5	

Roof Drain Storage Table for Area A-1.1 RD-10

Elevation	Area RD 10	Total Volume
m	m^2	m^3
0.00	0.4	0
0.05	19.2	0.5
0.10	78.7	2.9
0.15	78.7	6.9

Stage Storage Curve: Area A-1.1
Controlled Roof Drain RD-10



NOVATECH
Engineers, Planners & Landscape Architects

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA A-1.1 Building Addition - RD #11

OTTAWA IDF CURVE

Area =	0.004	ha	Qallow =	0.32	L/s
C =	0.90		Vol(max) =	0.3	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	1.00	0.68	0.20
10	76.81	0.74	0.42	0.25
15	61.77	0.60	0.28	0.25
20	52.03	0.50	0.18	0.22
25	45.17	0.44	0.12	0.17
30	40.04	0.39	0.07	0.12
35	36.06	0.35	0.03	0.06
40	32.86	0.32	0.00	-0.01
45	30.24	0.29	-0.03	-0.08
50	28.04	0.27	-0.05	-0.15
55	26.17	0.25	-0.07	-0.22
60	24.56	0.24	-0.08	-0.30
65	23.15	0.22	-0.10	-0.38
70	21.91	0.21	-0.11	-0.46
75	20.81	0.20	-0.12	-0.54
90	18.14	0.18	-0.14	-0.78
105	16.13	0.16	-0.16	-1.03
120	14.56	0.14	-0.18	-1.29

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA A-1.1 Building Addition - RD #11

OTTAWA IDF CURVE

Area =	0.004	ha	Qallow =	0.32	L/s
C =	0.90		Vol(max) =	0.4	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	1.36	1.04	0.31
10	104.19	1.01	0.69	0.41
15	83.56	0.81	0.49	0.44
20	70.25	0.68	0.36	0.43
25	60.90	0.59	0.27	0.40
30	53.93	0.52	0.20	0.36
35	48.52	0.47	0.15	0.31
40	44.18	0.43	0.11	0.26
45	40.63	0.39	0.07	0.20
50	37.65	0.36	0.04	0.13
55	35.12	0.34	0.02	0.06
60	32.94	0.32	0.00	-0.01
65	31.04	0.30	-0.02	-0.08
70	29.37	0.28	-0.04	-0.15
75	27.89	0.27	-0.05	-0.23
90	24.29	0.23	-0.09	-0.46
105	21.58	0.21	-0.11	-0.70
120	19.47	0.19	-0.13	-0.95

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA A-1.1 Building Addition - RD #11

OTTAWA IDF CURVE

Area =	0.004	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	1.2	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	2.60	2.28	0.69
10	178.56	1.92	1.60	0.96
15	142.89	1.53	1.21	1.09
20	119.95	1.29	0.97	1.16
25	103.85	1.11	0.79	1.19
30	91.87	0.99	0.67	1.20
35	82.58	0.89	0.57	1.19
40	75.15	0.81	0.49	1.17
45	69.05	0.74	0.42	1.14
50	63.95	0.69	0.37	1.10
55	59.62	0.64	0.32	1.06
60	55.89	0.60	0.28	1.01
65	52.65	0.56	0.24	0.96
70	49.79	0.53	0.21	0.90
75	47.26	0.51	0.19	0.84
90	41.11	0.44	0.12	0.65
105	36.50	0.39	0.07	0.45
120	32.89	0.35	0.03	0.24

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:100 YEAR + 20%
AREA A-1.1 Building Addition - RD #11

OTTAWA IDF CURVE

Area =	0.004	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	1.6	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	3.13	2.81	0.84
10	214.27	2.30	1.98	1.19
15	171.47	1.84	1.52	1.37
20	143.94	1.54	1.22	1.47
25	124.62	1.34	1.02	1.53
30	110.24	1.18	0.86	1.55
35	99.09	1.06	0.74	1.56
40	90.17	0.97	0.65	1.55
45	82.86	0.89	0.57	1.54
50	76.74	0.82	0.50	1.51
55	71.55	0.77	0.45	1.48
60	67.07	0.72	0.40	1.44
65	63.18	0.68	0.36	1.40
70	59.75	0.64	0.32	1.35
75	56.71	0.61	0.29	1.30
90	49.33	0.53	0.21	1.13
105	43.80	0.47	0.15	0.94
120	39.47	0.42	0.10	0.75

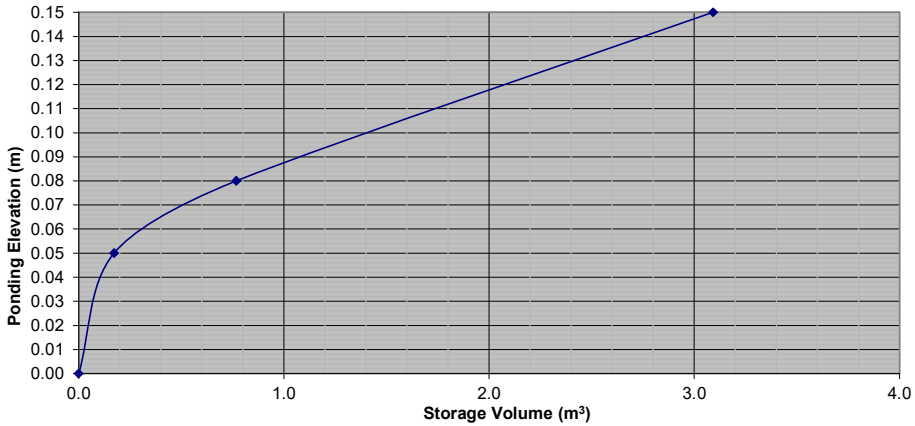
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to Closed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:2 Year	0.32	0.32	6	0.3	
1:5 Year	0.32	0.32	7	0.4	3.1
1:100 Year	0.32	0.32	10	1.2	

Roof Drain Storage Table for Area A-1.1 RD-11

Elevation	Area RD 11	Total Volume
m	m^2	m^3
0.00	0.4	0
0.05	6.5	0.2
0.08	33.2	0.8
0.15	33.2	3.1

Stage Storage Curve: Area A-1.1
Controlled Roof Drain RD-11



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Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA A-1.1 Building Addition - RD #12

OTTAWA IDF CURVE

Area =	0.004	ha	Qallow =	0.32	L/s
C =	0.90		Vol(max) =	0.2	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	0.99	0.67	0.20
10	76.81	0.73	0.41	0.25
15	61.77	0.59	0.27	0.24
20	52.03	0.50	0.18	0.21
25	45.17	0.43	0.11	0.17
30	40.04	0.38	0.06	0.11
35	36.06	0.34	0.02	0.05
40	32.86	0.31	-0.01	-0.02
45	30.24	0.29	-0.03	-0.09
50	28.04	0.27	-0.05	-0.16
55	26.17	0.25	-0.07	-0.23
60	24.56	0.23	-0.09	-0.31
65	23.15	0.22	-0.10	-0.39
70	21.91	0.21	-0.11	-0.47
75	20.81	0.20	-0.12	-0.55
90	18.14	0.17	-0.15	-0.79
105	16.13	0.15	-0.17	-1.05
120	14.56	0.14	-0.18	-1.31

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA A-1.1 Building Addition - RD #12

OTTAWA IDF CURVE

Area =	0.004	ha	Qallow =	0.32	L/s
C =	0.90		Vol(max) =	0.4	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	1.34	1.02	0.31
10	104.19	0.99	0.67	0.40
15	83.56	0.80	0.48	0.43
20	70.25	0.67	0.35	0.42
25	60.90	0.58	0.26	0.39
30	53.93	0.51	0.19	0.35
35	48.52	0.46	0.14	0.30
40	44.18	0.42	0.10	0.24
45	40.63	0.39	0.07	0.18
50	37.65	0.36	0.04	0.12
55	35.12	0.33	0.01	0.05
60	32.94	0.31	-0.01	-0.02
65	31.04	0.30	-0.02	-0.09
70	29.37	0.28	-0.04	-0.17
75	27.89	0.27	-0.05	-0.24
90	24.29	0.23	-0.09	-0.48
105	21.58	0.21	-0.11	-0.72
120	19.47	0.19	-0.13	-0.97

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA A-1.1 Building Addition - RD #12

OTTAWA IDF CURVE

Area =	0.004	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	1.2	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	2.57	2.25	0.67
10	178.56	1.89	1.57	0.94
15	142.89	1.51	1.19	1.07
20	119.95	1.27	0.95	1.14
25	103.85	1.10	0.78	1.17
30	91.87	0.97	0.65	1.17
35	82.58	0.87	0.55	1.16
40	75.15	0.80	0.48	1.14
45	69.05	0.73	0.41	1.11
50	63.95	0.68	0.36	1.07
55	59.62	0.63	0.31	1.03
60	55.89	0.59	0.27	0.98
65	52.65	0.56	0.24	0.93
70	49.79	0.53	0.21	0.87
75	47.26	0.50	0.18	0.81
90	41.11	0.44	0.12	0.62
105	36.50	0.39	0.07	0.42
120	32.89	0.35	0.03	0.20

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:100 YEAR + 20%
AREA A-1.1 Building Addition - RD #12

OTTAWA IDF CURVE

Area =	0.004	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	1.5	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	3.08	2.76	0.83
10	214.27	2.27	1.95	1.17
15	171.47	1.81	1.49	1.35
20	143.94	1.52	1.20	1.44
25	124.62	1.32	1.00	1.50
30	110.24	1.17	0.85	1.52
35	99.09	1.05	0.73	1.53
40	90.17	0.95	0.63	1.52
45	82.86	0.88	0.56	1.50
50	76.74	0.81	0.49	1.48
55	71.55	0.76	0.44	1.44
60	67.07	0.71	0.39	1.40
65	63.18	0.67	0.35	1.36
70	59.75	0.63	0.31	1.31
75	56.71	0.60	0.28	1.26
90	49.33	0.52	0.20	1.09
105	43.80	0.46	0.14	0.90
120	39.47	0.42	0.10	0.70

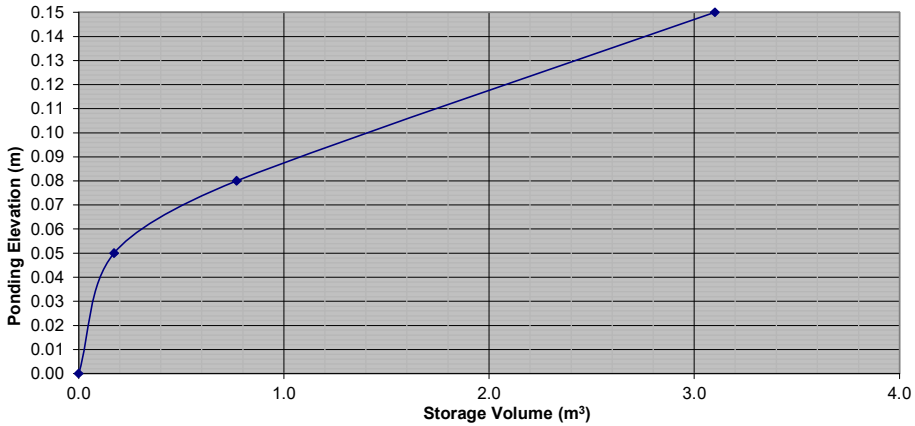
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to Closed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:2 Year	0.32	0.32	5	0.2	
1:5 Year	0.32	0.32	7	0.4	3.1
1:100 Year	0.32	0.32	10	1.2	

Roof Drain Storage Table for Area A-1.1 RD-12

Elevation	Area RD 12	Total Volume
m	m^2	m^3
0.00	0.4	0
0.05	6.5	0.2
0.08	33.3	0.8
0.15	33.3	3.1

Stage Storage Curve: Area A-1.1
Controlled Roof Drain RD-12



NOVATECH
Engineers, Planners & Landscape Architects

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA A-1.1 Building Addition - RD #13

OTTAWA IDF CURVE

Area =	0.005	ha	Qallow =	0.32	L/s
C =	0.90		Vol(max) =	0.3	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	1.18	0.86	0.26
10	76.81	0.88	0.56	0.33
15	61.77	0.71	0.39	0.35
20	52.03	0.59	0.27	0.33
25	45.17	0.52	0.20	0.29
30	40.04	0.46	0.14	0.25
35	36.06	0.41	0.09	0.19
40	32.86	0.38	0.06	0.13
45	30.24	0.35	0.03	0.07
50	28.04	0.32	0.00	0.00
55	26.17	0.30	-0.02	-0.07
60	24.56	0.28	-0.04	-0.14
65	23.15	0.26	-0.06	-0.22
70	21.91	0.25	-0.07	-0.29
75	20.81	0.24	-0.08	-0.37
90	18.14	0.21	-0.11	-0.61
105	16.13	0.18	-0.14	-0.85
120	14.56	0.17	-0.15	-1.11

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA A-1.1 Building Addition - RD #13

OTTAWA IDF CURVE

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

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	1.61	1.29	0.39
10	104.19	1.19	0.87	0.52
15	83.56	0.96	0.64	0.57
20	70.25	0.80	0.48	0.58
25	60.90	0.70	0.38	0.56
30	53.93	0.62	0.30	0.53
35	48.52	0.55	0.23	0.49
40	44.18	0.51	0.19	0.44
45	40.63	0.46	0.14	0.39
50	37.65	0.43	0.11	0.33
55	35.12	0.40	0.08	0.27
60	32.94	0.38	0.06	0.20
65	31.04	0.35	0.03	0.14
70	29.37	0.34	0.02	0.07
75	27.89	0.32	0.00	-0.01
90	24.29	0.28	-0.04	-0.23
105	21.58	0.25	-0.07	-0.46
120	19.47	0.22	-0.10	-0.70

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA A-1.1 Building Addition - RD #13

OTTAWA IDF CURVE

Area =	0.005	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	1.5	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	3.08	2.76	0.83
10	178.56	2.27	1.95	1.17
15	142.89	1.82	1.50	1.35
20	119.95	1.52	1.20	1.44
25	103.85	1.32	1.00	1.50
30	91.87	1.17	0.85	1.52
35	82.58	1.05	0.73	1.53
40	75.15	0.95	0.63	1.52
45	69.05	0.88	0.56	1.50
50	63.95	0.81	0.49	1.48
55	59.62	0.76	0.44	1.44
60	55.89	0.71	0.39	1.40
65	52.65	0.67	0.35	1.36
70	49.79	0.63	0.31	1.31
75	47.26	0.60	0.28	1.26
90	41.11	0.52	0.20	1.09
105	36.50	0.46	0.14	0.91
120	32.89	0.42	0.10	0.70

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:100 YEAR + 20%
AREA A-1.1 Building Addition - RD #13

OTTAWA IDF CURVE

Area =	0.005	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	2.0	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	3.70	3.38	1.01
10	214.27	2.72	2.40	1.44
15	171.47	2.18	1.86	1.67
20	143.94	1.83	1.51	1.81
25	124.62	1.58	1.26	1.89
30	110.24	1.40	1.08	1.95
35	99.09	1.26	0.94	1.97
40	90.17	1.15	0.83	1.98
45	82.86	1.05	0.73	1.98
50	76.74	0.98	0.66	1.97
55	71.55	0.91	0.59	1.94
60	67.07	0.85	0.53	1.92
65	63.18	0.80	0.48	1.88
70	59.75	0.76	0.44	1.84
75	56.71	0.72	0.40	1.80
90	49.33	0.63	0.31	1.66
105	43.80	0.56	0.24	1.49
120	39.47	0.50	0.18	1.31

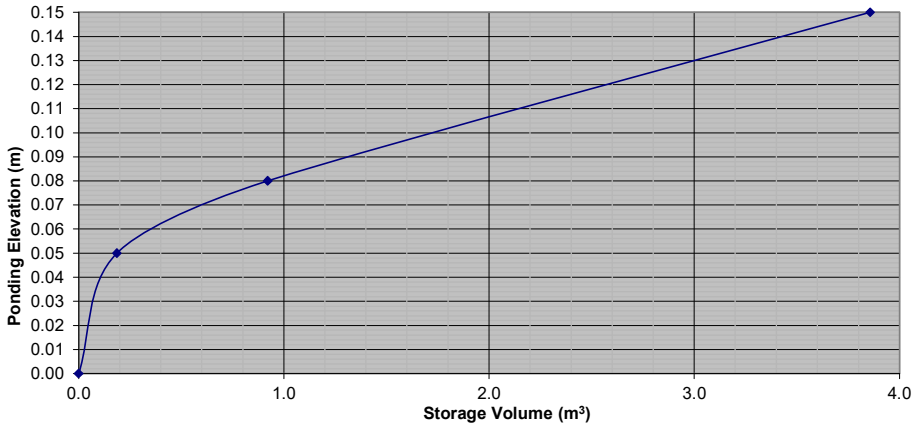
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to Closed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:2 Year	0.32	0.32	6	0.3	
1:5 Year	0.32	0.32	7	0.6	3.9
1:100 Year	0.32	0.32	10	1.5	

Roof Drain Storage Table for Area A-1.1 RD-13

Elevation	Area RD 13	Total Volume
m	m^2	m^3
0.00	0.4	0
0.05	7.1	0.2
0.08	41.9	0.9
0.15	41.9	3.9

Stage Storage Curve: Area A-1.1
Controlled Roof Drain RD-13



PROJECT #: 123082
PROJECT NAME: Carpenters Union Building Addition
LOCATION: OTTAWA

NOVATECH
Engineers, Planners & Landscape Architects

DATE PREPARED: 1/31/2025

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA A-1.1 Building Addition - RD #14

OTTAWA IDF CURVE

Area =	0.005	ha	Qallow =	0.32	L/s
C =	0.90		Vol(max) =	0.3	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	1.17	0.85	0.26
10	76.81	0.87	0.55	0.33
15	61.77	0.70	0.38	0.34
20	52.03	0.59	0.27	0.32
25	45.17	0.51	0.19	0.29
30	40.04	0.45	0.13	0.24
35	36.06	0.41	0.09	0.18
40	32.86	0.37	0.05	0.12
45	30.24	0.34	0.02	0.06
50	28.04	0.32	0.00	-0.01
55	26.17	0.30	-0.02	-0.08
60	24.56	0.28	-0.04	-0.15
65	23.15	0.26	-0.06	-0.23
70	21.91	0.25	-0.07	-0.30
75	20.81	0.24	-0.08	-0.38
90	18.14	0.21	-0.11	-0.62
105	16.13	0.18	-0.14	-0.87
120	14.56	0.16	-0.16	-1.12

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA A-1.1 Building Addition - RD #14

OTTAWA IDF CURVE

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

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	1.60	1.28	0.38
10	104.19	1.18	0.86	0.51
15	83.56	0.94	0.62	0.56
20	70.25	0.79	0.47	0.57
25	60.90	0.69	0.37	0.55
30	53.93	0.61	0.29	0.52
35	48.52	0.55	0.23	0.48
40	44.18	0.50	0.18	0.43
45	40.63	0.46	0.14	0.38
50	37.65	0.43	0.11	0.32
55	35.12	0.40	0.08	0.25
60	32.94	0.37	0.05	0.19
65	31.04	0.35	0.03	0.12
70	29.37	0.33	0.01	0.05
75	27.89	0.32	0.00	-0.02
90	24.29	0.27	-0.05	-0.24
105	21.58	0.24	-0.08	-0.48
120	19.47	0.22	-0.10	-0.72

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA A-1.1 Building Addition - RD #14

OTTAWA IDF CURVE

Area =	0.005	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	1.5	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	3.05	2.73	0.82
10	178.56	2.24	1.92	1.15
15	142.89	1.80	1.48	1.33
20	119.95	1.51	1.19	1.42
25	103.85	1.30	0.98	1.48
30	91.87	1.15	0.83	1.50
35	82.58	1.04	0.72	1.51
40	75.15	0.94	0.62	1.50
45	69.05	0.87	0.55	1.48
50	63.95	0.80	0.48	1.45
55	59.62	0.75	0.43	1.42
60	55.89	0.70	0.38	1.38
65	52.65	0.66	0.34	1.33
70	49.79	0.63	0.31	1.28
75	47.26	0.59	0.27	1.23
90	41.11	0.52	0.20	1.06
105	36.50	0.46	0.14	0.87
120	32.89	0.41	0.09	0.67

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:100 YEAR + 20%
AREA A-1.1 Building Addition - RD #14

OTTAWA IDF CURVE

Area =	0.005	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	2.0	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	3.66	3.34	1.00
10	214.27	2.69	2.37	1.42
15	171.47	2.15	1.83	1.65
20	143.94	1.81	1.49	1.79
25	124.62	1.57	1.25	1.87
30	110.24	1.39	1.07	1.92
35	99.09	1.25	0.93	1.94
40	90.17	1.13	0.81	1.95
45	82.86	1.04	0.72	1.95
50	76.74	0.96	0.64	1.93
55	71.55	0.90	0.58	1.91
60	67.07	0.84	0.52	1.88
65	63.18	0.79	0.47	1.85
70	59.75	0.75	0.43	1.81
75	56.71	0.71	0.39	1.77
90	49.33	0.62	0.30	1.62
105	43.80	0.55	0.23	1.45
120	39.47	0.50	0.18	1.27

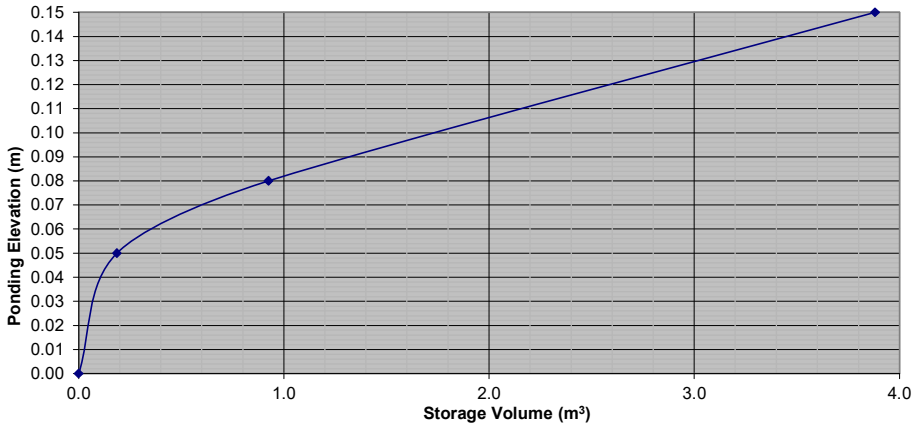
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to Closed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:2 Year	0.32	0.32	6	0.3	
1:5 Year	0.32	0.32	7	0.6	3.9
1:100 Year	0.32	0.32	10	1.5	

Roof Drain Storage Table for Area A-1.1 RD-14

Elevation	Area RD 14	Total Volume
m	m^2	m^3
0.00	0.4	0
0.05	7.1	0.2
0.08	42.2	0.9
0.15	42.2	3.9

Stage Storage Curve: Area A-1.1
Controlled Roof Drain RD-14



PROJECT #: 123082
PROJECT NAME: Carpenters Union Building Addition
LOCATION: OTTAWA

NOVATECH
Engineers, Planners & Landscape Architects

DATE PREPARED: 1/31/2025

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA A-1.1 Building Addition - RD #15

OTTAWA IDF CURVE

Area =	0.005	ha	Qallow =	0.32	L/s
C =	0.90		Vol(max) =	0.4	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	1.21	0.89	0.27
10	76.81	0.90	0.58	0.35
15	61.77	0.72	0.40	0.36
20	52.03	0.61	0.29	0.35
25	45.17	0.53	0.21	0.31
30	40.04	0.47	0.15	0.27
35	36.06	0.42	0.10	0.21
40	32.86	0.38	0.06	0.15
45	30.24	0.35	0.03	0.09
50	28.04	0.33	0.01	0.02
55	26.17	0.31	-0.01	-0.05
60	24.56	0.29	-0.03	-0.12
65	23.15	0.27	-0.05	-0.19
70	21.91	0.26	-0.06	-0.27
75	20.81	0.24	-0.08	-0.34
90	18.14	0.21	-0.11	-0.58
105	16.13	0.19	-0.13	-0.83
120	14.56	0.17	-0.15	-1.08

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA A-1.1 Building Addition - RD #15

OTTAWA IDF CURVE

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

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	1.65	1.33	0.40
10	104.19	1.22	0.90	0.54
15	83.56	0.98	0.66	0.59
20	70.25	0.82	0.50	0.60
25	60.90	0.71	0.39	0.59
30	53.93	0.63	0.31	0.56
35	48.52	0.57	0.25	0.52
40	44.18	0.52	0.20	0.47
45	40.63	0.48	0.16	0.42
50	37.65	0.44	0.12	0.36
55	35.12	0.41	0.09	0.30
60	32.94	0.39	0.07	0.24
65	31.04	0.36	0.04	0.17
70	29.37	0.34	0.02	0.10
75	27.89	0.33	0.01	0.03
90	24.29	0.28	-0.04	-0.19
105	21.58	0.25	-0.07	-0.43
120	19.47	0.23	-0.09	-0.66

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA A-1.1 Building Addition - RD #15

OTTAWA IDF CURVE

Area =	0.005	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	1.6	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	3.15	2.83	0.85
10	178.56	2.32	2.00	1.20
15	142.89	1.86	1.54	1.38
20	119.95	1.56	1.24	1.49
25	103.85	1.35	1.03	1.54
30	91.87	1.19	0.87	1.57
35	82.58	1.07	0.75	1.58
40	75.15	0.98	0.66	1.58
45	69.05	0.90	0.58	1.56
50	63.95	0.83	0.51	1.53
55	59.62	0.77	0.45	1.50
60	55.89	0.73	0.41	1.46
65	52.65	0.68	0.36	1.42
70	49.79	0.65	0.33	1.37
75	47.26	0.61	0.29	1.32
90	41.11	0.53	0.21	1.16
105	36.50	0.47	0.15	0.97
120	32.89	0.43	0.11	0.77

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:100 YEAR + 20%
AREA A-1.1 Building Addition - RD #15

OTTAWA IDF CURVE

Area =	0.005	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	2.0	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	3.79	3.47	1.04
10	214.27	2.78	2.46	1.48
15	171.47	2.23	1.91	1.72
20	143.94	1.87	1.55	1.86
25	124.62	1.62	1.30	1.95
30	110.24	1.43	1.11	2.00
35	99.09	1.29	0.97	2.03
40	90.17	1.17	0.85	2.04
45	82.86	1.08	0.76	2.04
50	76.74	1.00	0.68	2.03
55	71.55	0.93	0.61	2.01
60	67.07	0.87	0.55	1.99
65	63.18	0.82	0.50	1.95
70	59.75	0.78	0.46	1.92
75	56.71	0.74	0.42	1.88
90	49.33	0.64	0.32	1.73
105	43.80	0.57	0.25	1.57
120	39.47	0.51	0.19	1.39

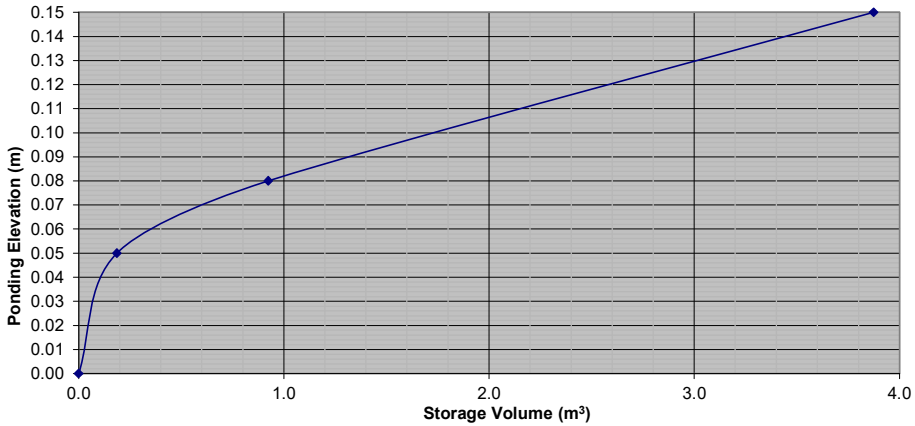
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to Closed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:2 Year	0.32	0.32	6	0.4	
1:5 Year	0.32	0.32	7	0.6	3.9
1:100 Year	0.32	0.32	10	1.6	

Roof Drain Storage Table for Area A-1.1 RD-15

Elevation	Area RD 15	Total Volume
m	m^2	m^3
0.00	0.4	0
0.05	7.1	0.2
0.08	42.1	0.9
0.15	42.1	3.9

Stage Storage Curve: Area A-1.1
Controlled Roof Drain RD-15



NOVATECH
Engineers, Planners & Landscape Architects

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA A-1.1 Building Addition - RD #16

OTTAWA IDF CURVE

Area =	0.001	ha	Qallow =	0.32	L/s
C =	0.90		Vol(max) =	0.0	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	0.33	0.01	0.00
10	76.81	0.25	-0.07	-0.04
15	61.77	0.20	-0.12	-0.11
20	52.03	0.17	-0.15	-0.18
25	45.17	0.14	-0.18	-0.26
30	40.04	0.13	-0.19	-0.35
35	36.06	0.12	-0.20	-0.43
40	32.86	0.11	-0.21	-0.52
45	30.24	0.10	-0.22	-0.60
50	28.04	0.09	-0.23	-0.69
55	26.17	0.08	-0.24	-0.78
60	24.56	0.08	-0.24	-0.87
65	23.15	0.07	-0.25	-0.96
70	21.91	0.07	-0.25	-1.05
75	20.81	0.07	-0.25	-1.14
90	18.14	0.06	-0.26	-1.41
105	16.13	0.05	-0.27	-1.69
120	14.56	0.05	-0.27	-1.97

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA A-1.1 Building Addition - RD #16

OTTAWA IDF CURVE

Area =	0.001	ha	Qallow =	0.32	L/s
C =	0.90		Vol(max) =	0.0	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	0.45	0.13	0.04
10	104.19	0.33	0.01	0.01
15	83.56	0.27	-0.05	-0.05
20	70.25	0.22	-0.10	-0.11
25	60.90	0.20	-0.12	-0.19
30	53.93	0.17	-0.15	-0.27
35	48.52	0.16	-0.16	-0.35
40	44.18	0.14	-0.18	-0.43
45	40.63	0.13	-0.19	-0.51
50	37.65	0.12	-0.20	-0.60
55	35.12	0.11	-0.21	-0.68
60	32.94	0.11	-0.21	-0.77
65	31.04	0.10	-0.22	-0.86
70	29.37	0.09	-0.23	-0.95
75	27.89	0.09	-0.23	-1.04
90	24.29	0.08	-0.24	-1.31
105	21.58	0.07	-0.25	-1.58
120	19.47	0.06	-0.26	-1.86

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA A-1.1 Building Addition - RD #16

OTTAWA IDF CURVE

Area =	0.001	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	0.2	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	0.86	0.54	0.16
10	178.56	0.64	0.32	0.19
15	142.89	0.51	0.19	0.17
20	119.95	0.43	0.11	0.13
25	103.85	0.37	0.05	0.07
30	91.87	0.33	0.01	0.01
35	82.58	0.29	-0.03	-0.05
40	75.15	0.27	-0.05	-0.13
45	69.05	0.25	-0.07	-0.20
50	63.95	0.23	-0.09	-0.28
55	59.62	0.21	-0.11	-0.36
60	55.89	0.20	-0.12	-0.44
65	52.65	0.19	-0.13	-0.52
70	49.79	0.18	-0.14	-0.60
75	47.26	0.17	-0.15	-0.68
90	41.11	0.15	-0.17	-0.94
105	36.50	0.13	-0.19	-1.20
120	32.89	0.12	-0.20	-1.46

Carpenters Union - Building Addition
#REF!
REQUIRED STORAGE - 1:100 YEAR + 20%
AREA A-1.1 Building Addition - RD #16

OTTAWA IDF CURVE

Area =	0.001	ha	Qallow =	0.32	L/s
C =	1.00		Vol(max) =	0.3	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	1.04	0.72	0.21
10	214.27	0.76	0.44	0.27
15	171.47	0.61	0.29	0.26
20	143.94	0.51	0.19	0.23
25	124.62	0.44	0.12	0.19
30	110.24	0.39	0.07	0.13
35	99.09	0.35	0.03	0.07
40	90.17	0.32	0.00	0.00
45	82.86	0.29	-0.03	-0.07
50	76.74	0.27	-0.05	-0.14
55	71.55	0.25	-0.07	-0.22
60	67.07	0.24	-0.08	-0.29
65	63.18	0.22	-0.10	-0.37
70	59.75	0.21	-0.11	-0.45
75	56.71	0.20	-0.12	-0.53
90	49.33	0.18	-0.14	-0.78
105	43.80	0.16	-0.16	-1.03
120	39.47	0.14	-0.18	-1.29

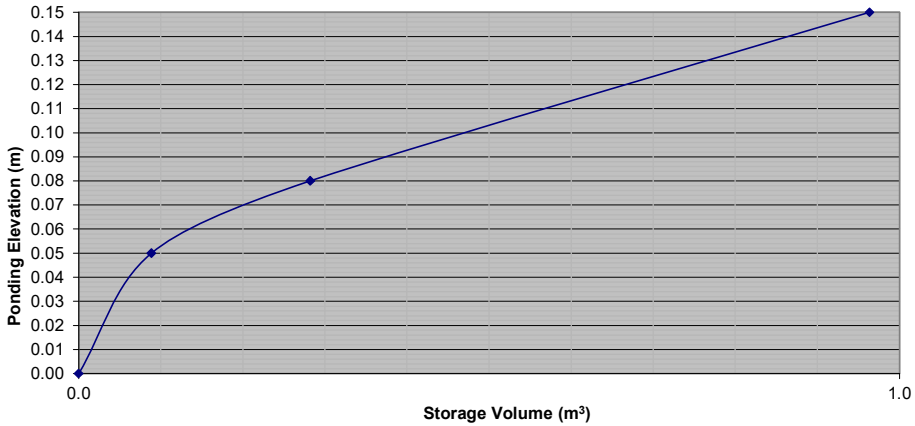
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to Closed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:2 Year	0.32	0.32	0	0.0	1.0
1:5 Year	0.32	0.32	0	0.0	
1:100 Year	0.32	0.32	7	0.2	

Roof Drain Storage Table for Area A-1.1 RD-16

Elevation	Area RD 16	Total Volume
m	m^2	m^3
0.00	0.4	0
0.05	3.2	0.1
0.08	9.7	0.3
0.15	9.7	1.0

Stage Storage Curve: Area A-1.1
Controlled Roof Drain RD-16



APPENDIX E

Control Flow Roof Drain Information (New Building Addition Roof)

WATTS®	Adjustable Accutrol Weir Tag: _____	Adjustable Flow Control for Roof Drains

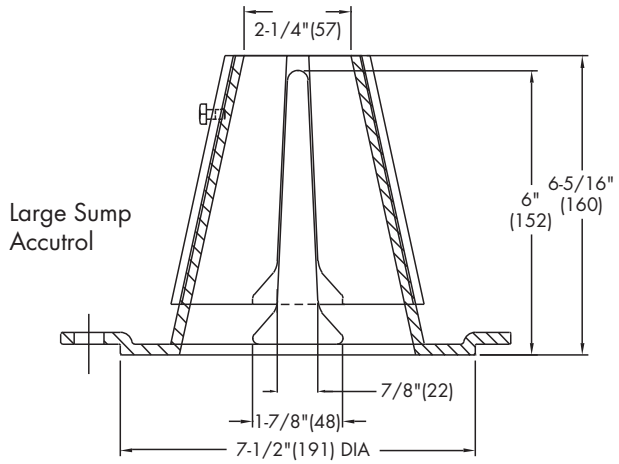
ADJUSTABLE ACCUTROL (for Large Sump Roof Drains only)

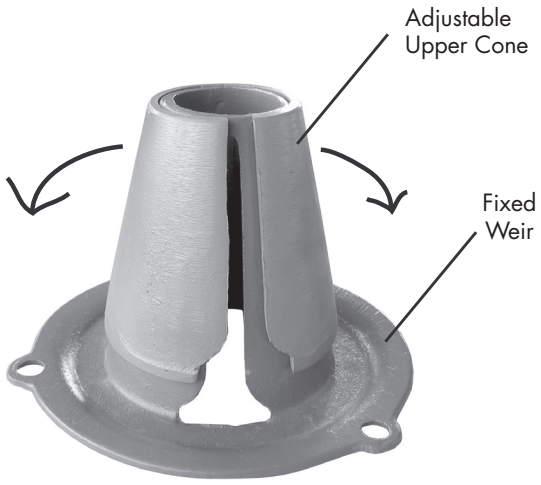
For more flexibility in controlling flow with heads deeper than 2", Watts Drainage offers the Adjustable Accutrol. The Adjustable Accutrol Weir is designed with a single parabolic opening that can be covered to restrict flow above 2" of head to less than 5 gpm per inch, up to 6" of head. To adjust the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

EXAMPLE:

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

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





1/2 Weir Opening Exposed Shown Above

TABLE 1. Adjustable Accutrol Flow Rate Settings

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

Job Name _____ Contractor _____

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

Engineer _____ Representative _____

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APPENDIX F

Previously approved Jp2g Site Servicing Report and Jp2g SWM Report

Jp2g Consultants Inc.
ENGINEERS ■ PLANNERS ■ PROJECT MANAGERS

J.M. Janota, M.Sc., P.Eng.
J.E. Hunton, MCIP, RPP

Jp2g Ref. No. 2141650A

July 15, 2015

City of Ottawa
Development Review - Urban Services Branch
Planning and Growth Management Department
110 Laurier Avenue West, 4th Floor
Ottawa, ON, K1P 1J1

Attention: Tracey Scaramozzino, Planner

Re **Carpenters Union, 8560 Campeau Drive, Kanata**
Site Servicing Report, Revision No. 4

Dear Tracey:

We provide the following Site Servicing Report in accordance with the City of Ottawa Site Plan Control Application requirements for the proposed Carpenters Union Building on the future extension of Campeau Drive, in the Kanata West Business Park (KWBP) of Ottawa. The purpose of the revised report is to confirm that existing municipal and site services, including water, storm and sanitary, can support the increased demand from the proposed new building.

Reference documents

- Site Servicing and Grading Plan by Jp2g Consultants Inc., July 15, 2015.
- Stormwater Management Report by Jp2g Consultants Inc., July 3, 2015.
- Topographical Survey by Stantec Geomatics Ltd, April 16, 2014, Ref No. 122411024-300.
- Conceptual Site Servicing Plan for the Taggart Kanata West Business Park by IBI Group, December 2013
- Design Brief, Tanger Outlet Centres, 333 Huntmar Drive by IBI Group, June 2013

Background

The proposed office and training facility development is to be located on an existing vacant property, at the intersection of Campeau Drive and Journeyman Street, in the KWBP development, just west of the intersection of Huntmar Drive and the Campeau Drive extension in Ottawa, Ontario. The total site area is approximately 2.63 ha. The proposed site development includes the construction of a two-storey building, parking areas and landscaped areas.

Servicing

1.1 Storm sewer and Stormwater Management

Recently constructed as part of the KWBP development, there is an existing 1350mm diameter concrete storm sewer, flowing easterly, along the north side of Campeau Drive, The outlet for the municipal storm sewer is the existing stormwater pond (Kanata West Pond 6 East) approximately 500 meters east of the site, adjacent to the Tanger Outlets site.

Proposed site storm drainage from rooftop, walkways, the asphalt driveways and parking areas, and landscaped areas will be collected by a storm sewer system. This system will provide groundwater infiltration in accordance with target rates set out by the Carp River Watershed/Subwatershed Study. During storm events where the volume of runoff exceeds the available capacity within the infiltration system, the stormwater will spill into the storm sewer main and will be directed offsite to the 1350mm diameter municipal storm sewer via an existing 1200mm diameter concrete storm sewer stub which currently terminates at the property line. Based on hydraulic load calculations by McKee Engineering (Refer to **Appendix A**), the proposed 375mm diameter storm service will have sufficient capacity for the roof flow from the building.

Stormwater quantity control will be achieved using flow restrictors in the new storm sewer system. Stormwater management calculations as well as details on the infiltration system are included in the Stormwater Management Report prepared by Jp2g, July 3, 2015.

1.2 Sanitary Sewer

Recently constructed as part of the KWBP development, there is an existing 300mm diameter sanitary sewer, flowing easterly, along the south side of Campeau Drive. The outlet for sanitary sewers in the KWBP is the Signature Ridge Pump Station. Currently, the existing 300mm diameter municipal sanitary sewer, which was constructed as part of the Tanger Outlets Centres development, terminates at manhole MH-604A in front of the Carpenters Union Site. Based on the approved servicing study, Conceptual Site Servicing Plan for the Taggart Kanata West Business Park (December 2013), the sanitary sewer will be extended further along Campeau Drive as development of the KWBP continues.

Sanitary flows from the proposed building will be collected by a new 250mm diameter sanitary sewer which will outlet the building at a slope of 2.0% and will be connected to the existing 250mm diameter sanitary sewer stub, approximately 5.85m deep, at the property line via a new monitoring manhole. The existing 250mm diameter sanitary sewer stub is connected to the 300mm diameter municipal sanitary sewer, in the right-of-way, approximately 5.45m deep.

Based on the City of Ottawa Sewer Design Guidelines' Appendix 4-A - Daily Sewage Flow for Various Establishments, the daily sewage flow in litres for office workers is 75 l/person/day. It is anticipated that the average daily usage will be 100 people per day and the resulting peak sewage flow is 0.13 l/s. However, the maximum occupancy capacity of the facility is 1300 people. In the event of a large banquet, the average daily sewage flow in litres for an assembly hall with a kitchenette facility is 36 l/person/day. The resulting peak sewage flow based on the maximum occupancy is 0.81 l/s. (Refer to **Appendix B**).

Sanitary hydraulic load calculations prepared by McKee Engineering based on peaked plumbing fixture units in accordance with the Building Code (Refer to **Appendix A**), were calculated to be 7.26 l/s. This value includes the provision for a 25% future expansion of the sanitary flow. Due to the method used to calculate this value, it cannot be used for estimating average flows connecting to sewers.

The calculated sanitary flows are within the range of 1.6 l/s that was accounted for in the sanitary sewer design for KWBP which included all external sanitary drainage areas contributing to the municipal sanitary sewer along Campeau Drive; refer to the KWBP Sanitary Sewer Design Sheet and Drainage Area Plan in **Appendix B**.

1.3 Water

Recently constructed as part of the KWBP development, there is an existing 300mm diameter watermain and fire hydrant located on the north side of Campeau Drive. Currently, the watermain, which was constructed as part of the Tanger Outlets Centres development, terminates approximately 100 meters west of the intersection of Campeau Drive and Journeyman Street, in front of the Carpenters Union Site. Based on the approved study, Conceptual Site Servicing Plan for the Taggart Kanata West Business Park (December 2013), the watermain will be extended further along Campeau Drive as development of the KWBP continues.

A proposed 150mm diameter watermain will service the proposed Carpenters Union building, and connect to the existing 300mm diameter municipal watermain in the right-of-way on Campeau Drive. The proposed 150mm diameter water service will include a service valve at the property line. The water meter will be located inside the building's mechanical room and a remote water meter will be installed along the building exterior. The proposed building will be equipped with sprinklers.

The average daily water demand for the proposed building is also based on City of Ottawa Sewer Design Guidelines' Appendix 4-A - Daily Sewage Flow for Various Establishments. The maximum daily and maximum hourly water demands were calculated according to Table 4.2 from the City of Ottawa Design Guidelines for Water Distribution. The calculations are based on the following criteria:

- Average daily sewage flow for office workers = 75 l/person/day
- Average occupancy for the building = 100 persons

Average Daily Demand: $\frac{75 \text{ l/person/day} \times 100 \text{ persons}}{24 \text{ hrs/day} \times 3600 \text{ s/hr}} = 0.087 \text{ l/s}$

Maximum Daily Demand: 0.087 l/s x 1.5 = 0.13 l/s

Maximum Hour Demand: 0.087 l/s x 1.8 = 0.16 l/s

There is an existing fire hydrant on Campeau Drive located 35 meters west of the intersection of Campeau Drive and Journeyman Street, which will not provide satisfactory fire protection to the site. Adequate fire flows will not be available for this site until the planned 610mm watermain link project between Campeau Drive and Cyclone Taylor Boulevard is completed. The proposed building will be equipped with sprinklers and a siamese connection located at the front of the building at the main (south) entrance. McKee Engineering has confirmed that the automatic sprinkler system will be monitored. Therefore, based on the Fire Underwriters Survey Method, the fire flow demand for the proposed school was calculated to be:

Fire Flow Demand: 166.7 l/s (Refer to **Appendix C**).

Previously submitted water demand values were provided to the City of Ottawa for the hydraulic analysis of the boundary conditions at the proposed Carpenters' Union location. The following Boundary Conditions, included in **Appendix C**, were returned:

Max. HGL = 166.2m/93.6 psi
PKHR = 154.7m/77.2 psi
MXDY+Fire (168.36L/s) = 154.3m/76.8 psi

We understand that these values are based on pre-development conditions of the Kanata West Business Park and therefore should be checked during construction. The Boundary Conditions received from the City were used to calculate the water pressure at the building connection during the maximum hour demand condition and the maximum day + fire flow condition. It is recommended that a pressure check be performed during construction to confirm the whether pressure control is required. According to the City of Ottawa Design Guidelines – Water Distribution, the installation of a pressure reducing valve is required inside the building at pressures exceeding 552 kPa (80 psi).

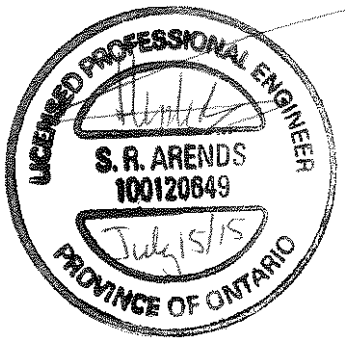
End of Site Servicing Report

Please contact the undersigned should you require any clarification.

Yours truly,

Jp2g Consultants Inc.
ENGINEERS · PLANNERS · PROJECT MANAGERS

Roxanne Tubb, P.Eng.
Civil Engineer



Stephen Arends, P. Eng.
Civil Engineer

Appendix A - Hydraulic Load Calculations

Roxanne Tubb

From: Joshua Bates <joshua.bates@mckeeottawa.ca>
Sent: Wednesday, April 29, 2015 11:48 AM
To: 'roxannet@jp2g.com'
Cc: MK Projects 2015; Scott Cooper; Ed Hope <edh@n45.ca> (edh@n45.ca); 'garyw@n45.ca'
Subject: RE: 14-004 Carpenters Union - Mech design required sizing of the interior storm, sanitary and water services (MK 14090)
Attachments: image001.png; image002.jpg

Hello Roxanne,

Please see the information added to the table in our Sept 23rd email below, which now includes flow rates.

Regards,

Josh.

From: Roxanne Tubb [mailto:roxannet@jp2g.com]
Sent: Monday, April 13, 2015 4:32 PM
To: Scott Cooper
Cc: 'Ed Hope'; Joshua Bates; garyw@n45.ca
Subject: RE: 14-004 Carpenters Union - Mech design required sizing of the interior storm, sanitary and water services

Hi Scott,

The City is asking for flow rates calculated by the Mechanical Engineer to compare the sizing of the sanitary and storm services. Would you please send those to me?

Thank you.

Roxanne Tubb, P.Eng.
Civil Engineer - ingénieur civil
Project Manager
T: 613-828-7800 x227, roxannet@jp2g.com
1150 Morrison Drive, Suite 410, Ottawa, Ontario, K2H 8S9
Jp2g Consultants Inc.
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From: Scott Cooper [mailto:scott.cooper@mckeeottawa.ca]
Sent: Tuesday, September 23, 2014 3:42 PM
To: 'garyw@n45.ca'
Cc: Guy-Olivier Mauzeroll; Roxanne Tubb; Ed Hope
Subject: RE: 14-004 Carpenters Union - Mech design required sizing of the interior storm, sanitary and water services

Gary,

The requirements for the water, storm, and sanitary services are as follows:

Service:	Pipe Diameter:	Slope:	Flow:
Domestic Water	150mmØ	N/A	
Storm	380mmØ	1:100	100l/s (controlled flow)
Sanitary	150mmØ	1:100	7.26l/s

If you have any questions please do not hesitate to call.

Regards,

Scott Cooper, P.Eng., LEED®AP
Senior Associate - Mechanical

Scott.Cooper@mckeeottawa.ca
1785 Woodward Drive
Ottawa, ON K2C 0P9
Tel: (613) 723-9585 Ext 129
Fax: (613) 723-9584

www.mckeeottawa.ca

McKEE ENGINEERING

From: Gary Wentzell [mailto:garyw@n45.ca]
Sent: September 15, 2014 4:20 PM
To: Scott Cooper
Cc: Guy-Olivier Mauzeroll; Roxanne Tubb; Ed Hope
Subject: 14-004 Carpenters Union - Mech design required sizing of the interior storm, sanitary and water services

Hi Scott

Could you provide the information requested from Roxanne so she can complete her design.
If you need to call to discuss with : 613- 828-7800 ext 227

We need this and your McKee dwgs coordinated for the Site Plan Application this month.
Thanks

Gary Wentzell
Partner

The Telephone Exchange Building
43 Eccles Street, 2nd Floor, Ottawa, Ontario, Canada, K1R 6S3
t. 613-224-0095 ext. 233
f. 613-224-9811
garyw@n45.ca

A merger of ema Architects Inc. and popovic routhier architects inc.

Appendix B - Sanitary Sewer Design Sheet

Carpenters Union, 8560 Campeau Drive, Kanata

Jp2g Consultants Inc.
ENGINEERS ▪ PLANNERS ▪ PROJECT MANAGERS

Appendix A - Sanitary Sewer Design Sheet, Rev. 3

A.1.1 - Peak Flow Design Based on Site Area

Definitions
Manning's Coefficient (n) = 0.013

Manning's Formula
$Q = A*R^{2/3}*S^{1/2}/n$ (l/s), where
A = Areas in Hectares (ha)
R = Hydraulic Radius (m)
S = Slope

Design Parameters*
1) Prestige Business Park Flow = 35,000 L/ha/day
2) Commercial/Institutional Peak Factor = 1.50
3) Extraneous Flow = 0.28L/s/ha
4) Minimum Velocity = 0.6 m/s

Designed RT
Checked DN
Dwg. Reference C1
Jp2g project No 2141650A

Location		Prestige Business Park Flow**			Infiltration Flow			Total Flow	Sewer Data					
		Area (ha)		Peak Flow	Area (ha)		Inf. Flow		Length	Dia.	Slope	Capacity	Velocity	Utilization
From	To	Individual	Cumulative	(l/s)	Individual	Cumulative	(l/s)	(l/s)	(m)	(mm)	(%)	(full) (l/s)	(full) (m/s)	(%)
CU Building	SAMH-1	2.631	2.631	1.60	2.631	2.631	0.74	2.34	38.5	200	2.0	46.4	1.5	5.0
SAMH-1	MH 604A	0.000	2.631	1.60	0.000	2.631	0.74	2.34	24.0	250	0.4	35.2	0.7	6.6
MH 604A	MH 603A	0.440	3.071	1.87	0.000	2.631	0.74	2.60	50.7	300	0.8	86.5	1.2	3.0

A.1.2 - Peak Flow Design Based on Daily Average Design Population

Design Parameters*
1) Average Daily Sewage Flow for office employees = 75 L/person/day; Average Daily Sewage Flow for Schools = 60 L/person/day; Therefore use 75L/person/day as a worst case
2) Commercial/Institutional Peak Factor = 1.50
3) Extraneous Flow = 0.28L/s/ha
4) Anticipated Aveage Daily Usage

Type of Establishment	Type of Useage	Prestige Business Park Flow**			Infiltration Flow			Total Flow	Sewer Data					
		Population	Daily Sewage Flow	Peak Flow	Area (ha)		Inf. Flow		Length	Dia.	Slope	Capacity	Velocity	Utilization
		(People)	(l/s)	(l/s)	Individual	Cumulative	(l/s)	(l/s)	(m)	(mm)	(%)	(full) (l/s)	(full) (m/s)	(%)
Institution	Average Daily	100	75	0.13	2.63	2.631	0.74	0.87	38.5	200	2.0	46.4	1.5	1.9

* City of Ottawa Sewer Design Guidelines, Section 4 - Sanitary Sewer Systems (including Appendix 4-A)
**Prestige Business Park flow data from Kanata West Business Park Sanitary Sewer Design Sheet by IBI Group, dated April 8, 2015.
***Calculated based on average daily occupancy
*** Total Wet Weather Flow for typical storm event

A.1.3 - Peak Flow Design Based on Maximum Capacity Design Population

Design Parameters*
1) Average Daily Sewage Flow for an assembly hall = 36 L/person/day
2) Commercial/Institutional Peak Factor = 1.50
3) Extraneous Flow = 0.28L/s/ha
4) Maximum Capacity of Building

Type of Establishment	Type of Useage	Prestige Business Park Flow**			Infiltration Flow			Total Flow	Sewer Data					
		Population	Daily Sewage Flow	Peak Flow	Area (ha)		Inf. Flow		Length	Dia.	Slope	Capacity	Velocity	Utilization
		(People)	(l/s)	(l/s)	Individual	Cumulative	(l/s)	(l/s)	(m)	(mm)	(%)	(full) (l/s)	(full) (m/s)	(%)
Institution	Maximum Capacity	1300	36	0.81	2.63	2.631	0.74	1.55	38.5	200	2.0	46.4	1.5	3.3

* City of Ottawa Sewer Design Guidelines, Section 4 - Sanitary Sewer Systems (including Appendix 4-A)
**Prestige Business Park flow data from Kanata West Business Park Sanitary Sewer Design Sheet by IBI Group, dated April 8, 2015.
***Calculated based on maximum occupancy
*** Total Wet Weather Flow for typical storm event

IBI GROUP
IBI Group
400-333 Preston Street
Ottawa, Ontario
K1S 5N4

SANITARY SEWER DESIGN SHEET

PROJECT: KANATA WEST BUSINESS PARK
LOCATION: 333 HUNTMAR DRIVE
CLIENT: TAGGART

LOCATION				RESIDENTIAL									ICI AREAS								INFILTRATION ALLOWANCE			FIXED FLOW	TOTAL FLOW	PROPOSED SEWER DESIGN							
				UNIT TYPES				AREA	POPULATION		PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)							PEAK FLOW (L/s)	AREA (Ha)		FLOW									AVAILABLE CAPACITY	
STREET	AREA ID	FROM MH	TO MH	SF	SD	TH	APT	(Ha)	IND	CUM			PRESTIGE BUISNESS PK		COMMERCIAL		INDUSTRIAL				IND	CUM	(L/s)	(L/s)	(L/s)	CAPACITY (L/s)	LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	VELOCITY (actual) (m/s)	L/s	(%)
													IND	CUM	IND	CUM	IND	CUM	PF														
KANATA WEST BUSINESS PARK - PHASE 2																																	
Street No. 3	Blocks 30, 31, 33	MH154A	MH153A														2.51	2.51	5.60	5.69	2.71	2.71	0.76	0.00	6.45	43.87	110.00	250	0.50	0.87	0.61	37.42	85.29
	Blocks 34, 35	MH153A	MH152A														1.59	4.10	5.00	8.30	1.78	4.49	1.26	0.00	9.56	39.24	107.92	250	0.40	0.77	0.60	29.68	75.63
	Blocks 39	MH152A	MH151A										4.50	4.50				4.10	4.40	10.04	4.56	9.05	2.53	0.00	12.58	36.70	19.32	250	0.35	0.72	0.65	24.13	65.73
		MH151A	MH150A											4.50				4.10	4.40	10.04	0.19	9.24	2.59	0.00	12.63	36.70	74.93	250	0.35	0.72	0.65	24.07	65.59
		MH150A	MH101A											4.50				4.10	4.40	10.04	0.20	9.44	2.64	0.00	12.69	36.70	82.50	250	0.35	0.72	0.65	24.02	65.44
Campeau Drive	Blocks 3, 4, 37, 38	MH100A	MH101A										1.47	1.47			3.35	3.35	5.20	7.95	5.28	5.28	1.48	0.00	9.43	75.98	101.44	250	1.50	1.50	0.92	66.55	87.59
Street No. 1	Blocks 1, 7	MH123A	MH122A										0.75	0.75			2.23	2.23	5.55	5.47	3.36	3.36	0.94	0.00	6.41	43.87	65.18	250	0.50	0.87	0.61	37.46	85.39
	Blocks 2, 6	MH122A	MH121A										0.76	1.51			2.11	4.34	5.00	9.71	3.13	6.49	1.82	0.00	11.53	43.87	100.00	250	0.50	0.87	0.67	32.34	73.73
	Block 5	MH121A	MH101A										0.75	2.26				4.34	5.00	10.16	0.99	7.48	2.09	0.00	12.26	87.74	100.00	250	2.00	1.73	1.21	75.48	86.03
Campeau Drive	Block 36	MH101A	MH103A										0.93	9.16				11.79	4.00	24.67	1.16	23.36	6.54	0.00	31.21	43.87	93.00	250	0.50	0.87	0.93	12.66	28.85
	Block 32	MH 103A	MH 104A										0.93	10.09				11.79	4.00	25.24	1.24	24.60	6.89	0.00	32.12	43.87	120.00	250	0.50	0.87	0.93	11.74	26.77
KANATA WEST BUSINESS PARK - PHASE 1																																	
Campeau Drive	Block 29	MH104A	MH105A										0.80	10.89				11.79	3.55	23.57	0.94	25.54	7.15	0.00	30.72	43.87	53.11	250	0.50	0.87	0.93	13.14	29.96
KWRC	Blocks 8, 9		MH 105A												11.78	11.78				10.23	11.78	11.78	3.30	0.00	13.52	39.24	15.00	250	0.40	0.77	0.70	25.71	65.53
Campeau Drive	Block 29	MH 105A	MH106A											10.89		11.78		11.79	3.55	33.80	0.28	37.60	10.53	0.00	44.33	59.68	87.77	300	0.35	0.82	0.88	15.36	25.73
	Block 24	MH106A	MH107A										0.75	11.64		11.78		11.79	3.55	34.25	1.10	38.70	10.84	0.00	45.09	59.68	91.24	300	0.35	0.82	0.88	14.59	24.45
Street No. 3	Blocks 27, 28	MH154A	MH156A														1.80	1.80	6.00	4.38	1.99	1.99	0.56	0.00	4.93	50.02	107.00	250	0.65	0.99	0.61	45.09	90.14
	Block 25	MH156A	MH131A														0.60	2.40	5.50	5.35	0.77	2.76	0.77	0.00	6.12	43.87	101.71	250	0.50	0.87	0.61	37.75	86.05
Founders Way	Blocks 17, 26	MH130A	MH131A														1.93	1.93	5.90	4.61	2.40	2.40	0.67	0.00	5.28	49.63	107.00	250	0.64	0.98	0.60	44.35	89.35
Founders Way		MH131A	MH132A															4.33	5.00	8.77	0.23	5.39	1.51	0.00	10.28	43.87	66.35	250	0.50	0.87	0.67	33.59	76.57
	Block 23	MH132A	MH133A										1.20	1.20				4.33	5.00	9.50	1.46	6.85	1.92	0.00	11.42	43.87	66.00	250	0.50	0.87	0.67	32.45	73.97
		MH133A	MH107A											1.20				4.33	5.00	9.50	0.17	7.02	1.97	0.00	11.47	107.45	48.02	250	3.00	2.12	1.30	95.99	89.33
Campeau Drive	Block 49	MH107A	MH108A										1.23	14.07		11.78		16.12	3.55	41.96	1.78	47.50	13.30	0.00	55.26	59.68	120.00	300	0.35	0.82	0.90	4.43	7.42
		MH108A	EX604A											14.07		11.78		16.12	3.55	41.96	0.49	47.99	13.44	0.00	55.39	59.68	120.00	300	0.35	0.82	0.90	4.29	7.19
	Block 22	*MH 604A*	*MH 603A*										2.63	16.70		11.78		16.12	3.55	43.56	3.03	51.02	14.29	0.00	57.84	62.51	*102.12*	*300*	*0.38*	0.86	0.94	4.67	7.48
Street No. 4	Blocks 19, 20	MH160A	MH161A														1.00	1.00	6.70	2.71	1.20	1.20	0.34	0.00	3.05	62.04	83.00	250	1.00	1.22	0.63	58.99	95.08
	Blocks 16, 18, 21	MH161A	MH162A														1.80	2.80	5.50	6.24	2.00	3.20	0.90	0.00	7.13	51.91	112.00	250	0.70	1.02	0.72	44.77	86.25
	Blocks 14, 15	MH162A	MH140A										1.51	1.51				2.80	5.50	7.16	1.70	4.90	1.37	0.00	8.53	67.96	110.00	250	1.20	1.34	0.82	59.43	87.45
Street No. 4	Blocks 40, 41	MH167A	MH166A														1.47	1.47	6.40	3.81	1.66	1.66	0.46	0.00	4.28	51.91	72.00	250	0.70	1.02	0.61	47.63	91.76
	Block 42	MH166A	MH165A														0.76	2.23	5.50	4.97	0.94	2.60	0.73	0.00	5.70	50.02	100.00	250	0.65	0.99	0.61	44.32	88.61
	Blocks 12, 13	MH165A	MH140A														1.51	3.74	5.20	7.88	1.68	4.28	1.20	0.00	9.08	39.24	100.00	250	0.40	0.77	0.60	30.16	76.87
Street No. 2		MH140A	MH141A											1.51				6.54	4.50	12.84	0.30	9.48	2.65	0.00	15.49	31.27	120.00	250	0.25	0.62	0.59	15.77	50.45
		MH141A	Stub											1.51				6.54	4.50	12.84	0.22	9.70	2.72	0.00	15.56	31.02	39.34	250	0.25	0.61	0.61	15.46	49.85
		Stub	*MH 603A*											1.51				6.54	4.50	12.84	0.00	9.70	2.72	0.00	15.56	31.63	*32.98*	*250*	*0.26*	0.62	0.60	16.08	50.83
Campeau Drive		*MH 603A*	*MH 602A*											18.21		11.78		22.66	3.50	53.42	0.43	61.15	17.12	0.00	70.54	103.47	*105.24*	*375*	*0.32*	0.91	0.97	32.93	31.83
	Tanger Outlet Centres	*MH 602A*	*MH 601A*											18.21	16.40	28.18		22.66	3.50	67.65	16.84	77.99	21.84	0.00	89.49	109.75	*107.73*	*375*	*0.36*	0.96	1.06	20.25	18.46
	Block 10 & 11	*MH 601A*	*MH 600A*										4.56	22.77		28.18		22.66	3.50	70.43	4.94	82.93	23.22	0.00	93.65	109.75	*106.95*	*375*	*0.36*	0.96	1.06	16.10	14.67

Design Parameters:

Residential			ICI Areas			
SF	3.4	p/p/u				Peak Factor (PF)
TH/SD	2.7	p/p/u	P.B.P.	35,000	L/Ha/day	1.5
APT	1.8	p/p/u	COM	50,000	L/Ha/day	1.5
Other	60	p/p/Ha	IND	35,000	L/Ha/day	MOE Chart

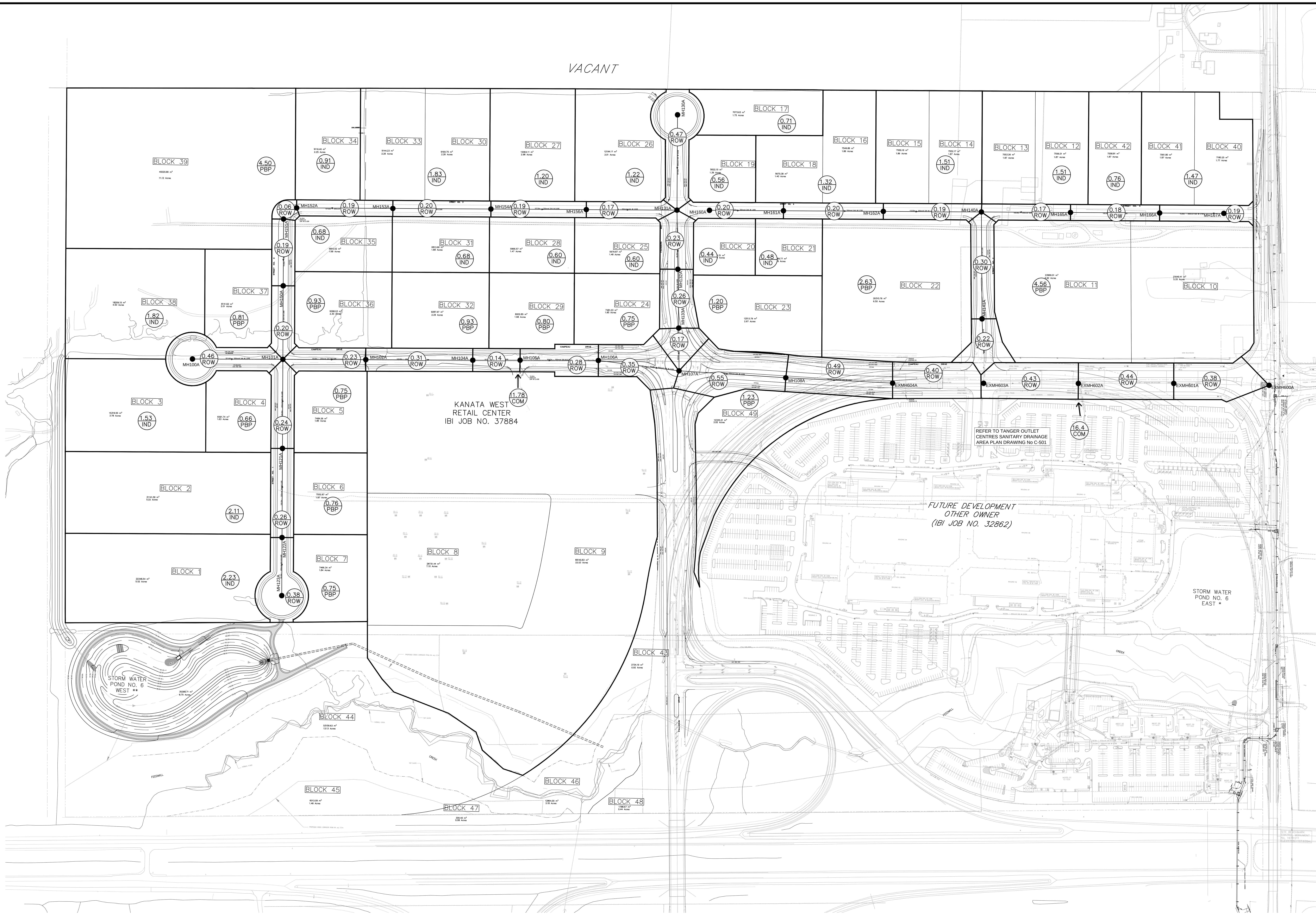
Notes:
1. Manning's coefficient (n) = 0.013
2. Demand (per capita): 350 L/day 300 L/day
3. Infiltration allowance: 0.28 L/s/Ha 0.4 L/s/Ha
4. Residential Peaking Factor:
   Harmon Formula = 1+(14/(4+P^0.5))
   where P = population in thousands

Designed: LME
Checked:
Dwg. Reference: 14289-501

No.	Revision	Date
1.	City submission No. 1	11/25/2014
2.	City submission No. 2	4/8/2015

File Reference: 14289.5.7.1
Date: 4/8/2015
Sheet No: 1 of 1

LICENSED PROFESSIONAL ENGINEER
L. M. ERION
2015-04-06
PROVINCE OF ONTARIO



LEGEND:

5.14 P.B.P.	AREA IN HECTARES / LAND USE TYPE
PBP	PRESTIGE BUSINESS PARK - 35 000 l/s/ha
IND	LIGHT INDUSTRIAL - 35 000 l/s/ha
COM	COMMERCIAL - 50 000 l/s/ha
ROW	RIGHT OF WAY (INFILTRATION FLOW ONLY)
	DRAINAGE AREA LIMITS
MH601A	SANITARY MANHOLE & NUMBER
	SANITARY SEWER & FLOW DIRECTION

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4			
3			
2	REVISED AS PER CITY COMMENTS	LME	15:04:08
1	ISSUED TO CITY FOR APPROVAL	LME	14:11:27

TAGGART
REALTY MANAGEMENT

IBI GROUP
400 – 333 Preston Street
Ottawa ON K1S 5N4 Canada
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ibigroup.com

Project Title

KANATA WEST BUSINESS PARK

LICENSED PROFESSIONAL ENGINEER
L. M. ERION
2015/04/08
PROVINCE OF ONTARIO

N

Drawing Title

SANITARY DRAINAGE AREA PLAN

Scale
1:2000

Design	Date
LME	NOV. 2014
Drawn DPS	Checked TRB
Project No. 14289	Drawing No. 501

REVIEWED BY
DEVELOPMENT REVIEW SERVICES BRANCH

Signed ______________________

Date ______________________ 2015

Plan Number ______________________

Appendix C - Water Demand and Fire Flow Calculations

Carpenters Union, 8560 Campeau Drive, Kanata, Ontario

Jp2g Consultants Inc.
ENGINEERS ▪ PLANNERS ▪ PROJECT MANAGERS

Appendix C - Water Demand and Fire Flow Calculations

C.1.1 - Fire Flow Demand Requirements (Fire Underwritters Survey (FUS Guidelines))

Design Parameters*

Estimated Fire Flow Formula: F=220*C*A-1/2(L/min)

F = Required fire flow (L/min)
C = Coefficient related to the type of construction
$C_{1.5}$ = 1.5 for wood frame construction (structure essentially all combustible)
$C_{1.0}$ = 1.0 for ordinary construction (brick or other masonry walls, combustible floor and interior)
$C_{0.8}$ = 0.8 for non-combustible construction (unprotected metal structural components, masonry or metal walls)
$C_{0.6}$ = 0.6 for fire-resistive construction (fully protected frame, floors, roof)
A = Total floor area in square metres

Adjustments to the calculated fire flow are based on: reduction low fire hazard occupancy (school), reduction for automatic sprinkler proection, and an increase for exposures for residences within 45 metres on two sides of the school.
The table below summarizes the adjustments made to the basic fire flow.

Building Construction	Floor Area	C	1	2		3		4		Final Adjusted Fire Flow	Final Adjusted Fire Flow
			Fire Flow (F)	Occupancy		Sprinkler		Exposure			
non-combustible construction	(m^2)		(L/min)	%	Adjusted Fire Flow(s) (L/min)	%	Adjusted Fire Flow(s) (L/min)		Adjusted Fire Flow(s) (L/min)	(L/min)	(L/s)
	6100	0.8	14000	25.0	17500	-50.0	-8750	5.0	875.0	10000	166.7

*Water Supply for Pubic Protection (Fire Underwriters Survey, 1999).

Roxanne Tubb

From: Joshua Bates <joshua.bates@mckeeottawa.ca>
Sent: Friday, April 10, 2015 11:48 AM
To: 'roxannet@jp2g.com'
Cc: MK Projects 2015; Scott Cooper
Subject: RE: 14-004 CU Site Plan Application City 2nd Comments 23 March 2015 (MK 14090)
Attachments: image001.jpg; image002.png; image003.jpg

Hi Roxanne,

Per our discussion we will be providing a complete automatic sprinkler protection system which will conform to NFPA 13 and will have full supervision including a water flow and control valve alarm service. Therefore the reductions of FUS for these items are applicable for this site.

Regards,

Joshua Bates, C.E.T.
Mechanical Designer

Joshua.Bates@mckeeottawa.ca
1785 Woodward Drive
Ottawa, ON K2C 0P9
Tel: (613) 723-9585 Ext 106
Fax: (613) 723-9584

www.mckeeottawa.ca

From: Roxanne Tubb [mailto:roxannet@jp2g.com]
Sent: Thursday, April 09, 2015 12:35 PM
To: Joshua Bates
Cc: 'Gary Wentzell'
Subject: RE: 14-004 CU Site Plan Application City 2nd Comments 23 March 2015

Hi Josh,

As discussed, here is the Fire Underwriters Survey document. No. 3 on page 17 is the paragraph the City reviewer is referring to. Please provide confirmation that they 50% reduction for sprinkler systems is applicable for this site.

Thank you.

Roxanne Tubb, P.Eng.
Civil Engineer - ingénieur civil
Project Manager
T: 613-828-7800 x227, roxannet@jp2g.com
1150 Morrison Drive, Suite 410, Ottawa, Ontario, K2H 8S9

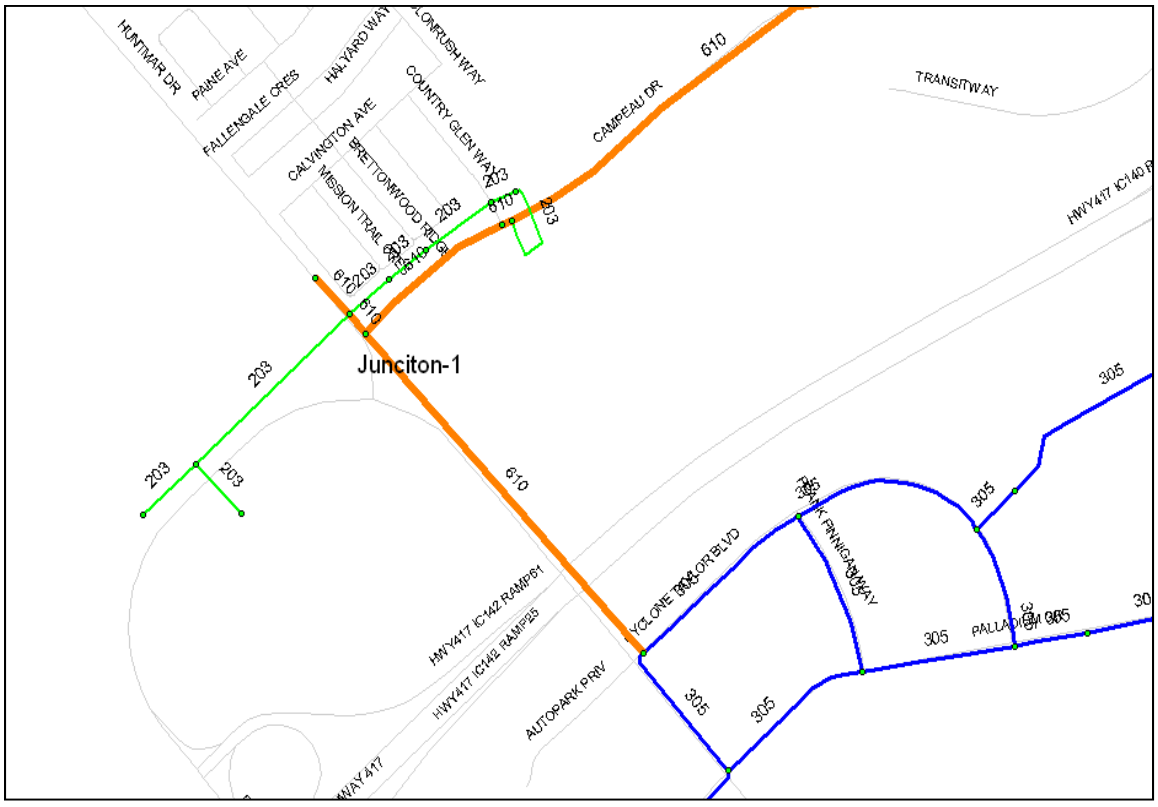
Boundary Conditions at 8560 Campeau Dr.

Boundary Conditions:
Max HGL = 166.2m/93.6 psi
PKHR = 154.7m/77.2 psi
MXDY+Fire (168.36 L/s) =154.3m /76.8 psi

To ensure adequate fire supple and system reliability, the development is subject to only after construction of 610mm pipe built between Junction-1 to Cyclone Taylor Blvd.

Note: The Connection requires Pressure Reducing Valve (PRV) as pressure exceeds the City's Standard Benchmark 80 psi.

Location of Connections:



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.

C.1.2 - Water Boundary Conditions

Water Demands

Average Daily Demand:	0.85	l/s
Maximum Daily Demand:	1.28	l/s
Maximum Hour Demand:	1.53	l/s
Fire Flow Demand:	94.50	l/s

Design Parameters

Pipe Diameter:	150	mm
Pipe Material:	PVC	
Pipe Length	50.0	m
Finished Floor Elevation:	102.80	
Pavement Elevation:	100.60	

Boundary Conditions

Max. HGL:	166.6	m
Min HGL:	155.2	m
Max. Day + Fire:	156.7	m

Boundary Condition Check

Check water pressure at municipal connection:

Min. HGL - Pavement elevation =	54.60	m	
=	77.64	psi*	*Normal operating pressure ranges between 345 kPa (50 psi) and 552 kPa (80 psi) under a condition of maximum daily
=	535.31	kPa*	flow as per City of Ottawa Design Guidelines - Water Distribution (Section 4.2.2)

Pressure at municipal connection OK

Check water pressure at building connection (at max. hour demand):

Min. HGL - Finished floor elevation - Friction Loss** =	52.40	m	**Friction loss calculated using the Hazen-Williams Equation
=	74.51	psi***	***Under maximum hourly demand conditions the pressures shall not be less than 276 kPa (40 psi) as per City of Ottawa
=	513.70	kPa***	Design Guidelines - Water Distribution (Section 4.2.2)

Pressure at building connection (at max. hour demand) OK

Check water pressure at building connection (at max. day + fire demand):

Min. HGL - Finished floor elevation - Friction Loss** =	46.34	m	**Friction loss calculated using the Hazen-Williams Equation
=	65.89	psi****	****Under maximum day and fire flow demand conditions the residual pressure at any point in the system shall not be less
=	454.32	kPa****	than 140 kPa (20 psi) as per City of Ottawa Design Guidelines - Water Distribution (Section 4.2.2)

Pressure at municipal connection (at max. day + fire demand) OK

Appendix D - Development Servicing Study Checklist

4. Development Servicing Study Checklist

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

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

4.1 General Content

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

☑ Date and revision number of the report.

SEE DWG C-1 ☑ Location map and plan showing municipal address, boundary, and layout of proposed development.

SEE DWG C-1 ☑ Plan showing the site and location of all existing services.

SEE SWM REPORT ☑ 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.

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

SEE SWM REPORT ☑ 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.

SEE SWM REPORT ☑ 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).

SEE DWG C-2 ☑ Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.

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

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

N/A ☐ Reference to geotechnical studies and recommendations concerning servicing.

SEE DWGS C-1 & C-2 ☑ 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

SEE SECTION 1.3 ☑ Confirm consistency with Master Servicing Study, if available

SEE SECTION 1.3 ☑ Availability of public infrastructure to service proposed development

SEE CONCEPTUAL SITE SERVICING STUDY FOR KWBP BY IBI GROUP, DEC. 2013

☑ Identification of system constraints

☑ Identify boundary conditions

☑ Confirmation of adequate domestic supply and pressure

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

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

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

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

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

SEE CONCEPTUAL SITE SERVICING STUDY FOR KWBP BY IBI GROUP, DEC. 2013 ☑ 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

SEE DWG C-1 ☑ Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.

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

SEE SECTION 1.3 ☑ Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.

SEE CONCEPTUAL SITE SERVICING STUDY FOR KWBP BY IBI GROUP, DEC. 2013 ☑ 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).

SEE SECTION 1.2

SEE SECTION 1.2 ☑ Confirm consistency with Master Servicing Study and/or justifications for deviations.

N/A ☐ 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.

SEE SECTION 1.2 ☑ Description of existing sanitary sewer available for discharge of wastewater from proposed development.

SEE CONCEPTUAL SITE SERVICING STUDY FOR KWBP BY IBI GROUP, DEC. 2013 ☑ 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.

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

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

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

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

N/A ☐ Special considerations such as contamination, corrosive environment etc.

4.4 Development Servicing Report: Stormwater Checklist

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

SEE SWM REPORT ☑ Analysis of available capacity in existing public infrastructure.

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

SEE SWM REPORT ☑ 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.

SEE SWM REPORT ☑ Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.

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

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

N/A ☐ Watercourse and hazard lands setbacks.

SEE SWM REPORT ☑ Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.

SEE SWM REPORT ☑ Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.

SEE SWM REPORT ☑	Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).
N/A ☐	Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.
SEE SWM REPORT ☑	Calculate pre and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.
N/A ☐	Any proposed diversion of drainage catchment areas from one outlet to another.
SEE SWM REPORT ☑	Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.
N/A ☐	If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100-year return period storm event.
SEE SWM REPORT ☑	Identification of potential impacts to receiving watercourses
N/A ☐	Identification of municipal drains and related approval requirements.
SEE SWM REPORT ☑	Descriptions of how the conveyance and storage capacity will be achieved for the development.
SEE DWG C-2 ☑	100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.
N/A ☐	Inclusion of hydraulic analysis including hydraulic grade line elevations.
SEE DWG C-2 ☑	Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.
N/A ☐	Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.
N/A ☐	Identification of fill constraints related to floodplain and geotechnical investigation.

4.5 Approval and Permit Requirements: Checklist

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

N/A ☐ 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.

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

N/A ☐ Changes to Municipal Drains.

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

4.6 Conclusion Checklist

☑ Clearly stated conclusions and recommendations

TBC ☐ 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

Jp2g Consultants Inc.
ENGINEERS ▪ PLANNERS ▪ PROJECT MANAGERS

1150 Morrison Drive, Suite 410
Ottawa, ON, K2H 8S9
T.613.828.7800 F.613.828.2600
Project No. 2141650A

Stormwater Management Report

Carpenters Union

8560 Campeau Drive, Kanata, Ontario

Prepared for

City of Ottawa
Infrastructure Services and Community Sustainability
110 Laurier Ave. West, 4th floor, Mail Code 01-14
Ottawa, Ontario, K1P 1J1

July 3, 2015

Table of Contents

1 Introduction

Jp2g Consultants Inc. was retained by N45 Architecture Inc. to complete a Stormwater Management Report suitable for City of Ottawa Site Plan Control Application, for the proposed Carpenters Union construction project located on the future extension of Campeau Drive, in the Kanata West Business Park, in the City of Ottawa. The total site area is approximately 2.631 ha and the proposed site development area includes the construction of a 4741 m^2 two-storey building, and associated parking areas and landscaped areas. A Pre-Consultation meeting was held with City of Ottawa staff, on June 5th, 2014, to determine the project constraints and requirements. See Record of Pre-Consultation in **Appendix A**. The following report details the stormwater management calculations used for water quantity and quality control.

Reference Drawings: Figure 1 – Stormwater Management Sub-Drainage Areas, C1 - Site Servicing Plan (July 3, 2015), C2 - Site Grading and Drainage Plan, Erosion and Sediment Control Plan (July 3, 2015), C5 – Ultimate Site Servicing Plan, and C6 – Ultimate Site Grading and Drainage Plan (July 3, 2015).

2 Objective

The objective of the stormwater management plan is to control post-development peak flows to pre-determined levels, and detain onsite, stormwater up to and including the 100-year storm event without affecting adjacent lands.

3 Design Parameters

Stormwater management criteria for this site, in terms of quality and quantity control, is based on the following approved studies and reports:

- Conceptual Site Servicing Plan for the Taggart Kanata West Business Park (December 2013) – Table 5 included in **Appendix B**,
- Email correspondence from IBI Group dated February 17, 2015, included in **Appendix B**,
- Kanata West Master Servicing Study (June 2006),
- Carp River Watershed Subwatershed Study (December 2004).

The maximum allowable release rate for this site shall not exceed the criteria set in the approved studies and reports. Flows in excess of the allowable release rate up to and including the 100-year event will be detained onsite.

The Modified Rational Method (Q = 2.78CiA) was chosen to calculate the post-development release rates, and onsite storage requirements for this development. Detailed stormwater management calculations are included in **Appendix C**. All proposed storm sewers were assigned a Manning's coefficient of roughness of 0.013 corresponding to smooth wall pipes. In accordance with City of Ottawa Sewer Design Guidelines (Section 5.4.5.2.1), the coefficients used for calculating the post-development release rate were C = 0.20 for grassed areas and C = 0.90 for hard surfaced areas including rooftops. In addition, 25% was added to the C value for the 100-year storm calculations. The rainfall intensities used in this analysis are based on the IDF Curves and Equations, as per City of Ottawa Sewer Design Guidelines (Section 5.4.2).

4 Water Quantity Controls

4.1 Pre-development Conditions

The existing site is an undeveloped parcel with a generally flat site topography that is sloped toward the east side of the property with an approximate elevation difference of 1 meter over a 160 meter length. Currently, services are being installed along Campeau Drive, as part of the development of the Kanata West Business Park, and Tanger Outlets Centre site which is located across Campeau Drive from the Carpenters Union site.

4.2 Allowable release rate

The stormwater management design criteria for this site is based on the recently submitted Kanata West Business Park Design Brief (November 2014) that is currently being reviewed by the City of Ottawa. With the modifications of the Pond 6 design, the Carpenters Union site, also known as Block 22, in the Kanata West Business Park, has been allocated an allowable release rate of **570.0 l/s**; see Email from IBI Group dated February 17, 2015 in **Appendix B**. Therefore, the 5-year allowable release rate is: **$Q_{allowable}$ = 570.0 l/s**.

4.3 Post-development Conditions

The proposed site development includes the construction of a new two-storey building, an associated parking lot, and landscaped areas. Proposed site grading and drainage was designed such that stormwater runoff will be collected by the roof and a new storm water collection system, which will be connected to the existing 1350 mm diameter municipal storm sewer on Campeau Drive.

The site development area is approximately **2.63 ha** and has a post-development average weighted runoff coefficient of **C=0.62**, and **C=0.70** for the 5-year and 100-year events, respectively. Stormwater management techniques are required to reduce peak flows from the area, given that post-development peak flows will exceed the 5-year allowable release rate of **570.0 l/s**. Overall onsite storage requirements were calculated to be **203m^3** for the 100-year rainfall event. No onsite storage is required during the 5-year rainfall event.

4.4 Pipe Design

Pipe diameter sizing was based on the **5-year** storm event, in accordance with City of Ottawa requirements. Under 5-year conditions, the storm sewers are not in surcharged conditions, i.e. flow/capacity <100%.

4.5 Onsite stormwater detention

Post-development peak flows will be controlled, at the allowable release rate by installing flow restrictors at the outlet of structures CB-1and STMH-1, limiting the outlet discharge to **80.0 l/s** and **370.0 l/s** at an estimated head of **1.29m** and **2.91m**, respectively.

At CB-1, the restricted flow will create parking lot ponding volumes of **0 m^3** and **10 m^3** for the 5-year and 100-year event, respectively. Based on a maximum ponding depth of 300 mm in parking areas, and the ponding area of the front laneway measuring approximately 600 m^2, the total available storage is approximately **60 m^3**. The **10 m^3** of required storage for the 100-year event will create ponding area of approximately 170 m^2 at a ponding depth of approximately 190 mm in the front laneway.

The flow restrictor at STMH-1 will create combined ponding volumes of **0 m^3** and **119 m^3** for the 5-year and 100-year event, respectively at CB-2, CB-3, CB-5 and CB-6. Based on a maximum ponding depth of 300 mm in the parking areas, and the combined ponding area of the parking areas measuring approximately 5450 m^2, the total available storage is approximately **545 m^3**. The **119 m^3** of required storage for the 100-year event will create ponding area of approximately 2020 m^2 with a ponding depth of 180 mm in the parking areas.

Table 1: Ponding Depths

Structure No.	5-yr Ponding Depth	100-yr Ponding Depth	100-yr Ponding Elevation	100-yr Ponding Volume
CB-1	N/A	0.19m	102.09m	10m^3
STMH-1	N/A	0.18m	102.08m	119m^3

Flow will also be detained on a section of the roof, over the workshop area, by installing parabolic weirs, (Watts Flow Control Roof Drain, or approved equivalent), at 6 of the 23 proposed roof drains limiting the total flow from the roof to **100.0 l/s**, see correspondence with McKee Engineering confirming the total flow to be released from the roof in **Appendix E**.The restricted flow will create rooftop storage of **15 m^3** and **46 m^3** for the 5-year and 100-year event, respectively on the workshop roof. Based on a maximum ponding depth of 150mm on roof tops, and the workshop roof area of 1750 m^2, the total available storage is approximately **87.5 m^3** using the volume of a pyramid equation, which is sufficient to accommodate the 100-year event. The **46 m^3** of required storage for the 100-year event will create ponding at a ponding depth of approximately 80mm. Rooftop runoff will be collected by the building's 375 mm diameter storm service which will flow unrestricted to the municipal storm sewer.

Hydrovex and Watts roof drain data sheets are included in **Appendix D** and **Appendix E** respectively, however approved equivalent products can also be used. Also included in **Appendix D** is the orifice calculation sheet for the plug style inlet control device.

The ponding limits for the 5-year and the 100-year event are indicated on **Figure 1**. In the event the capacity of this system is exceeded, emergency runoff will overflow towards Journeyman Street through the northeast private approach.

4.6 Proposed release rates

The proposed release rate for this site during the 100-year event was calculated to be **550.0 l/s (100.0 l/s + 80.0 l/s + 370.0 l/s)**. Therefore, proposed release rate is within the allowable release rate for this site, determined to be **570.0 l/s** in Section 4.2.

5 Water Quality Control

Based on correspondence with the Mississippi Valley Conservation Authority (MVCA), attached in **Appendix F**), stormwater quality control is required corresponding to an enhanced level of protection, consideration for minimizing temperature increases at the receiving watercourse as well as providing infiltration targets set out in the Carp River Watershed Watershed/Subwatershed Study (December 2004).

It is understood that the outlet for the 1350mm diameter storm sewer on Campeau Drive is located approximately 500m downstream at Pond 6 East, one of two stormwater management ponds designed to provide the required treatment of storm flows for the Kanata West Business Park area north of Feedmill Creek. The Conceptual Site Servicing Plan for the Taggart Kanata West Business Park (December 2013) confirms that the Pond 6 East facility, which discharges to Feedmill Creek, will provide the enhanced level of protection for the proposed Carpenters Union development site.

The Carp River Watershed/Subwatershed Study provided target infiltration rates for the subwatersheds based on soil classification. In general, the site soils are topsoil underlain by fat to lean clay overlying till over limestone bedrock, as identified within the Detailed Geotechnical Investigation Report Proposed Development Campeau Drive & Palladium Drive, Block 22, Ottawa, ON by Stantec dated December 2014. The site infiltration rate target for groundwater resources based on the Carp River Watershed Study with low recharge areas is 73 mm/yr. The Kanata West Master Servicing Study by Stantec/Cumming Cockburn Limited/IBI Group dated June 16, 2006 recommends that the post-development infiltration rates are to be increased by 25 percent above the pre-development rate. Therefore, the target infiltration rate of 91 mm/yr for this site was based on the Carp River Watershed Study. A water balance (as per the MOE Stormwater Management Planning and Design Manual March 2003) was completed to compare the total annual infiltration rate difference between the pre-development and post-development based on land use and soil type. The difference in pre and post-development site infiltration equates to a rate of **147.5 mm/yr**. To promote ground water recharge similar to the existing condition, the annual infiltration rate resulting from the difference of the pre-to post-development water balance was used to design the infiltration system. **Tables G-1** and **G-2** within **Appendix G** present the water balance and infiltration rate requirement calculations.

The Carp River Watershed/Subwatershed Study suggests that the infiltration may be carried out by constructing an infiltration trench; however several site specific factors should be considered prior to design including: space requirements, contributing drainage area, soils, safety, and existing aquatic resources. Based on the geotechnical report, the observed groundwater table at the time of drilling in the open boreholes reaches a maximum of **99.90 m** in elevation in the vicinity of the proposed infiltration trench. To be conservative and account for possible seasonal fluctuations, the groundwater table is assumed to be at **100.00 m**. The coefficient of permeability calculated for the existing site soils is too low to provide infiltration of the site soils between rainstorm events. Therefore, the proposed infiltration trench will require a sand layer with a minimum D_{10} (diameter of material at the 10^{th} percentile passing) of **0.25 mm** between the groundwater table and the infiltration trench. The rate of infiltration was determined by using the procedures laid out in "*A Design Manual for Sizing Infiltration Ponds*" by Joel W. Massmann of the Washington State Department of Transportation (Massmann, 2003). The methods outlined in this document related the rate of infiltration with properties of the soils in addition to the depth of ponding above ground level.

The **296 m** long infiltration system is designed as per the Section 4.5.8 of the MOE SWM Planning & Design Guideline. The system is design using a **0.75 x 0.75 m** (base x height) trench with clear stone (**50 mm** diameter) surrounding a **150 mm** diameter perforated pipe. The storage available within the clear stone void space at an elevation of **100.90 m** provides an average infiltration of **148 mm/year** to the ground water table, which meets the water balance requirements. The maximum average rain day infiltration within the system is **156 mm/year**. Refer to **Tables G-3** for the Infiltration Trench Design and **Table G-4** for Infiltration Trench Design Strategy as per MOE Recommendations within **Appendix G**. During storm events where the volume of runoff exceeds the available capacity within the infiltration stone trench, the stormwater will spill into the storm sewer main and will be directed offsite.

The infiltration trench is designed with pre-treatment CB's within the parking area and landscaping catchbasins within vegetated areas for inspection and maintenance. Routine inspection for sedimentation build-up, debris, or length of time for the trench to drain (maximum acceptable length is 72 hours) should be carried out at least annually and following every major storm event (>25 mm). Maintenance shall be provided as required based on the inspection results. If the time required to fully drain exceeds 72 hours, drain via pumping and clean out the perforated pipe. If slow drainage persists, the system may need removal and replacement of clear stone and/or geotextile fabric.

6 Erosion and Sediment Control

In accordance with City of Ottawa requirements, best management practices are to be implemented by the Contractor to provide protection of the area drainage system and the receiving water course, during construction activities. This includes limiting the amount of exposed soil, using filter bag inserts under the grates of catch basins and manholes, installing silt fences and other effective sediment traps, and installing and maintaining mud mats for outgoing construction traffic during construction activities.

Stormwater runoff should be directed away from the infiltration trench during construction. After the parking lots are paved and the landscaped areas are vegetated, erosion and sediment control structures can be removed to direct runoff to the infiltration trench.

7 Conclusion

The proposed site development includes a new two-storey building, associated parking areas and landscaped areas. Roof drainage and surface runoff will be collected by a new storm sewer system which will be connected to the existing 1350mm diameter municipal storm sewer located on Campeau Drive. Post-development peak flows will be detained on the roof and in asphalt parking areas in order to limit the post-development release rate to allowable levels. There is sufficient onsite storage to accommodate the 100-year event.

Summary of report

ID	Description	Value/result
01	Allowable release rate	$Q_{allowable}$ = 570.0 l/s
02	Proposed release rate	$Q_{100\text{-}yr\ post}$ = 550.0 l/s
03	Post-development runoff coefficient	$C_{5\text{-}yr\ post}$ = 0.62, $C_{100\text{-}yr\ post}$ = 0.70
04	Post-development onsite storage requirement	Roof: 46 m^3; Parking: 10 m^3 & 119 m^3
05	Proposed onsite storage	Roof: 47 m^3; Parking: 10 m^3 & 121 m^3
06	Discharge outlet location	1350mmϕ storm sewer Campeau Drive
07	Emergency runoff overflow location	Journeyman Street

END OF REPORT

Prepared by

Roxanne Tubb, P.Eng.
Civil Engineer

Stephen Arends, P.Eng.
Civil Engineer

STORMWATER SUB-DRAINAGE AREA

EXISTING SURFACE DRAINAGE

PROPOSED SURFACE DRAINAGE

OVERLAND FLOW ROUTE

A1 — DRAINAGE AREA IDENTIFICATION
0.13 ha — SUB-DRAINAGE AREA (IN HECTARES)
0.63 — POST-DEVELOPMENT RUNOFF COEFFICIENT
0.67 — PRE-DEVELOPMENT RUNOFF COEFFICIENT

FIGURE 1

CARPENTERS' UNION BUILDING
KANATA, ONTARIO
STORMWATER MANAGEMENT
SUB-DRAINAGE AREAS
SCALE: 1:750

PROPOSED BLOCK 21

UPPER CANADA STREET

LIMIT OF 100-YR PONDING
100-YR PONDING ELEVATION: 102.08
100-YR PONDING DEPTH: 0.18m
100-YR PONDING VOLUME: 34m3

JOURNEYMAN STREET

PROPOSED BLOCK 17

LIMIT OF 100-YR PONDING
100-YR PONDING ELEVATION: 102.08
100-YR PONDING DEPTH: 0.18m
100-YR PONDING VOLUME: 29m3

PROPOSED BLOCK 22
26310.76 m²
6.50 Acres

LIMIT OF 100-YR PONDING
100-YR PONDING DEPTH: 0.08m
100-YR PONDING VOLUME: 46m3

LIMIT OF 5-YR PONDING
5-YR PONDING DEPTH: 0.03m
5-YR PONDING VOLUME: 15m3

SCUPPER (TYP.)

RD (TYP.)

LIMIT OF 100-YR PONDING
100-YR PONDING ELEVATION: 102.08
100-YR PONDING DEPTH: 0.18m
100-YR PONDING VOLUME: 59m3

PROPOSED BLOCK 18

CAMPEAU DRIVE

LIMIT OF 100-YR PONDING
100-YR ELEVATION: 102.09
100-YR PONDING DEPTH: 0.19m
100-YR PONDING VOLUME: 10m3

SITE BENCHMARK
TOP OF SPINDLE
ELEV=103.47m

1350mm¢ CONC. CL100-D STORM SEWER @ 0.35%

PROPOSED STREET NO. 2

A1 0.49 ha 0.20 0.90
A2 0.68 ha 0.20 0.60
A3 0.85 ha 0.20 0.52
A4 0.36 ha 0.20 0.47
A5 0.25 ha 0.20 0.65

CB-1, CB-2, CB-3, CB-4, CB-5, CB-6
LD-1, LD-2, LD-3, LD-4, LD-5
STMH-1, STMH-2, STMH-3, STMH-4, STMH-5, STMH-6, STMH-7
SAMH-1
CB
MH-ST
SD
DC
PWF

BH1 102.61 N 5017806.798 E 348641.954
BH2 102.27 N 5017848.170 E 348653.586
BH3 102.41 N 5017807.693 E 348683.709
BH4 102.04 N 5017897.194 E 348645.905
BH5 101.89 N 5017900.350 E 348715.008
BH6 101.67 N 5017867.607 E 348746.724
BH7 101.97 N 5017857.562 E 348709.305

Appendix A - Record of Pre-Consultation

Roxanne Tubb

From: Robert Matthews <robertm@n45.ca>
Sent: Tuesday, July 22, 2014 10:51 AM
To: Roxanne Tubb (roxannet@jp2g.com); Marietta Ruhland (mruhland@drcla.ca); Gary Wentzell
Cc: edh@n45.ca
Subject: FW: Carpenters Union Site Plan Control Application
Attachments: image001.jpg

From: Moore, Sean [mailto:Sean.Moore@ottawa.ca]
Sent: Tuesday, July 22, 2014 10:24 AM
To: Robert Matthews
Subject: FW: Carpenters Union Site Plan Control Application

FYI

From: Moore, Sean
Sent: July 18, 2014 10:31 AM
To: 'Robert Matthews'
Cc: Ogilvie, Chris; Young, Mark; Bernier, John
Subject: Carpenters Union Site Plan Control Application

Hi Robert,

As per our preconsultation meeting on June 5th for the Carpenters Union building in the Taggart Plan of Subdivision please find the submission requirements for the Site Plan Control application below:

Application Type:

- Manager Approval, Public Consultation $19,903.78
- Conservation Authority Fee $880.00
- Design Review and Inspection Fee (depends on the amount of infrastructure/landscaping – please see application)

Site Plan Control application:
https://app06.ottawa.ca/online_services/forms/ds/Application_for_Site_Plan_Control_en.pdf

Required Plans:

- Site Plan (55 copies) – including illustration of proposed road modifications
- Landscape Plan (55 copies)
- Grading Plan (55 copies)
- Site Servicing Plan (55 copies), including how the site is to be serviced by utilities
- Architectural Elevations – full size b/w drawings (5 copies)
- Architectural Elevations - 11x17 colour (2 copies)
- Survey Plan (2 copies)
- Cd with all required plans and studies in pdf

Required Studies:

- Transportation Impact Study– an addendum letter to the existing report prepared by Delcan (9 copies)

- Site Servicing Brief & Stormwater Management Report (6 copies)
- Geotechnical Study (4 copies)
- Erosion and Sediment Control Plan (8 copies)

Design Comments:

- Please enhance the pedestrian access to the building (widen and consider seating)
- Limit parking at the front of the building to the greatest extent possible in accordance with Kanata West Concept Plan (see link attached to Concept Plan)
- Consider berming in addition to planting between r.o.w and parking to echo what is approved on the Tanger site (as per the Tanger Landscape Plan sent to you)
- Consider re-locating the rear patio area adjacent to the garbage enclosure
- Ensure screening of rear area is attractive – consider including some plantings to provide additional screening
- See Kanata West Concept Plan for overall design guidelines in the 'Prestige Business Park' designation

Kanata West Concept Plan (see Prestige Business Park Section 4.1.4(5):
See Chapter 4a in the link provided below
http://ottawa.ca/en/city-hall/planning-and-development/community-plans-and-design-guidelines/community-plans-and-studi-2

Please be aware that the Zoning by-law amendment for this site is scheduled for the August 21st Planning Committee and a report will be made available 10 days prior to the committee date. I will forward you the report once it is available for your review/knowledge.

Regards,

Sean Moore MCIP, RPP
Planner II
Development Review (Suburban Services)
Urbaniste II
Examen des demandes d'aménagement (Services suburbain)
PLANNING AND GROWTH MANAGEMENT URBANISME ET GESTION DE LA CROISSANCE
City of Ottawa | Ville d'Ottawa
☎ 613.580.2424 ext/poste. 16481
ottawa.ca/planning / ottawa.ca/urbanisme

Appendix B - IBI Group Correspondence

Roxanne Tubb

From: Terry Brule <tbrule@IBIGroup.com>
Sent: Tuesday, February 17, 2015 12:31 PM
To: Roxanne Tubb
Cc: Jim Moffatt; Peter Deir
Subject: RE: Carpenters Union Development
Attachments: image001.png; image002.png

Hi Roxanne,

The current servicing design for the KWBP has refined the storm drainage areas to correspond with the legal blocks. Block 22 (Carpenter's Union) has been allocated 570l/s release rate with major system flow contained on site.

Cheers!

Terry Brule P.Eng., ing.

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IBI Defining the cities of tomorrow

From: Roxanne Tubb [mailto:roxannet@jp2g.com]
Sent: Tuesday, February 17, 2015 10:42 AM
To: Terry Brule; Jim Moffatt
Subject: RE: Carpenters Union Development

Thank you Jim and Terry for all your help with this project.

The City has also noted that the allowable release rate for this site may have changed based on pond amendments. Can you please confirm whether the number we are using from the attached table is correct?

Thank you.

Roxanne Tubb, P.Eng.
Civil Engineer - ingénieur civil
Project Manager
T: 613-828-7800 x227, roxannet@jp2g.com
1150 Morrison Drive, Suite 410, Ottawa, Ontario, K2H 8S9

Jp2g Consultants Inc.
ENGINEERS · PLANNERS · PROJECT MANAGERS

Table 5: Post-Development Drainage Area Characteristics

AREA I.D.	DESCRIPTION	AREA (HA)	LENGTH (LGI) (M)	TIMP (%)	XIMP (%)	INLET CAPTURE RATE (L/S)	AVAILABLE STORAGE (M3)	UTILIZED STORAGE (M3)
Tributary to Pond 6 West SWM Facility								
100	North West	16.40	481	93	93	2647	1970*	1967*
200	South West	25.09	610	93	93	3672	n/a	n/a
SWMF WEST	SWM Block	3.96	tp=15min	CN=95		n/a	n/a	n/a
Tributary to Pond 6 East SWM Facility								
300	North East	23.34	577	93	93	3530	3555*	3555*
400R	Commercial Campeau Dr	4.02	322	95	95	759	n/a	n/a
401	North Parking Area	5.32	344	99	99	1245	126	126
402	Flat Roof Area	3.93	281	99	99	147.6	1971	1638
403	Promenade Pedestrian Area	0.83	108	99	99	n/a	n/a	n/a
404	South Parking Area	4.08	358	99	99	1071	121	121
405	Grassed Area	0.66	tp=15min	CN=75		n/a	n/a	n/a
SWMF EAST	SWM Block	1.54	tp=15min	CN=95		n/a	n/a	n/a
Hotel Site South of Feedmill Creek								
500	Parking Area	2.29	216	99	99	617	87	86
501	Flat Roof Area	0.27	41	99	99	16.2	136	92
500A	Grassed Area	1.55	tp=15min	CN=75		n/a	n/a	n/a

***Note: Storage values are conceptual, to be confirmed at detailed design stage**

It should be noted that Area 100 and 300 (northwest and northeast portions of the subject site, respectively) will be self-contained and will not generate major overflow during the 100 year storm event. The overall connectivity of the system is indicated within the post-development drainage area plan **Figure 8**. A SWMHYMO model schematic and model output is provided within **Appendix E**.

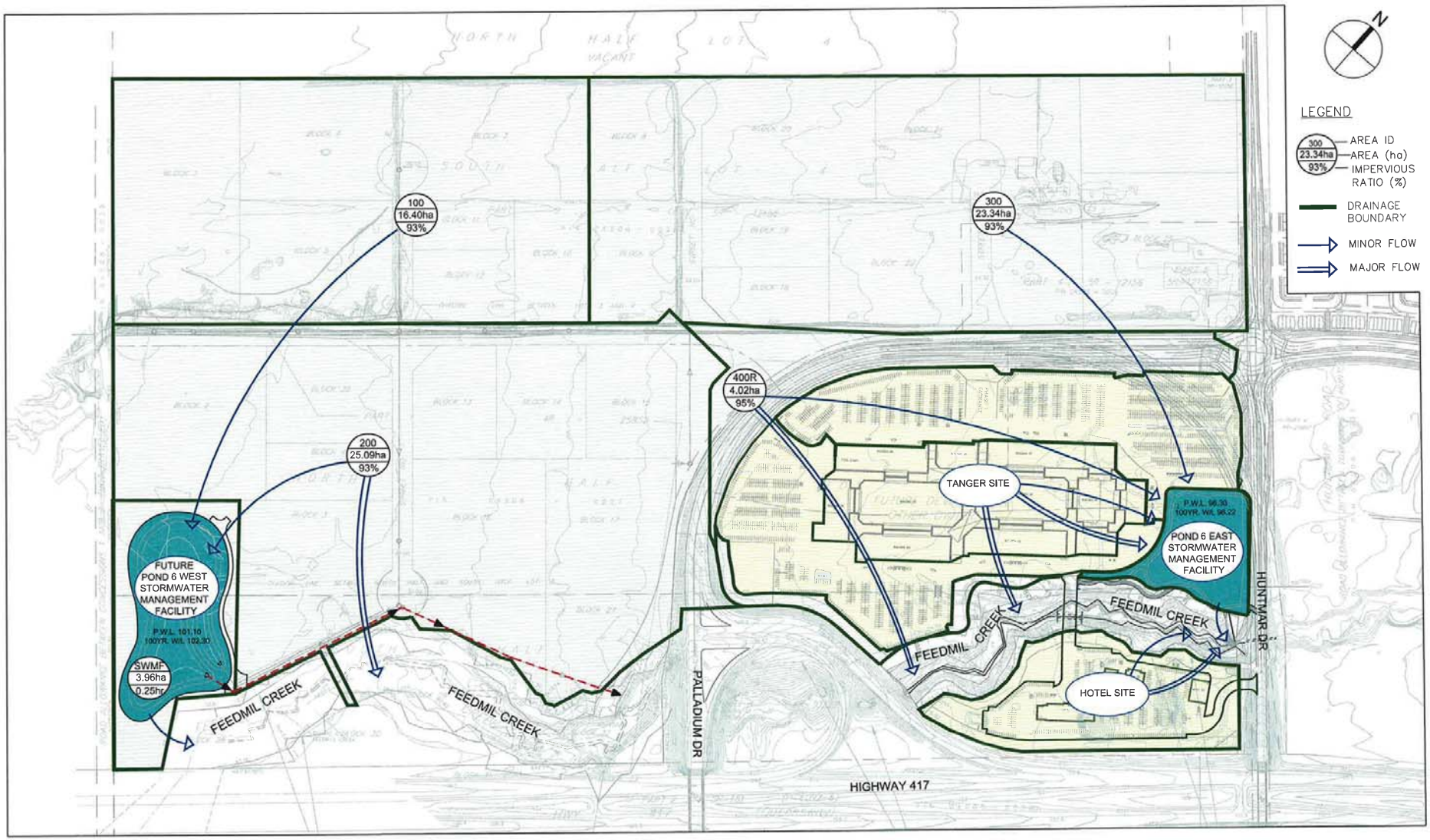
4.7.2.3 Future Campeau Dr. Extension

Drainage Area 400R is comprised of future Campeau Drive extension and commercial site. For hydrological modeling purposes, this area has been assumed with no on-site detention. The minor system capture for Campeau Dr. extension is based on 10 year rational method flow capture as per City of Ottawa Sewer design guidelines for arterial roadway design. The minor system capture for the future commercial area is based on 5 year rational method flow.

4.7.2.4 Tanger Outlet Centre

Flat Roof Areas

The buildings proposed for the Tanger Outlet Centre will be typical flat roof commercial buildings with covered walkways connecting some of the buildings. Turner Fleischer Architects have



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Plot Style: ---- Plot Scale: 1:1 Plotted At: Dec. 18, 13 2:00 PM Printed By: SLAVICA VUKIC Last Saved By: SVUKIC Last Saved At: Dec. 17, 13

IBI GROUP

Scale: N.T.S.

Project Title: CONCEPTUAL SITE SERVICING PLAN
TAGGART KANATA WEST BUSINESS PARK
333 HUNTMAR DRIVE

Drawing Title: POST-DEVELOPMENT SWM DRAINAGE BOUNDARIES

Sheet No.: FIGURE 8

Appendix C - Stormwater Management Calculations

C.1.1 - Allowable release rate

ID	Description	Type	Areas (m^2) $C_{0.90}$	$C_{0.40}$	Total (m^2)	$C_{pre\text{-}5\text{-}yr}$	$C_{pre\text{-}100\text{-}yr}$*
A	Property Area	uncontrolled	0	26310	26310	0.40	0.50

**including 25% increase as per City of Ottawa Sewer Design Guidelines*

Using the criteria for the site provided by IBI Group on February 17, 2015 from the Kanata West Business Park Design Brief (November 2014):

5-year flow rate per unit area, Q/ha = 151.2 l/s/ha
Total Area, A = 2.631 ha

$Q_{allowable}$ = *Q = Q/ha x A*
$Q_{allowable\ (5\text{-}year)}$ = 570.0 l/s ①

Using the Rational Method, the maximum allowable release rate is therefore:

Total Area, A = 2.631 ha
5-year Runoff coefficient, C = 0.85 **As per Conceptual Site Servicing Plan, Stormwater Management Plan and Erosion Sediment Control Plan Taggart Kanata West Business Park and Tanger Outlets Centre (September 2012)
Estimated time of concentration, t_c = 21.0 minutes
Based on Ottawa IDF curve, $i_{5\text{-}years}$ = $998.071/(t_c+6.053)^{0.814}$
68.1 mm/hr

$Q_{allowable}$ = *Q = 2.78 C x i x A*
$Q_{allowable\ (5\text{-}year)}$ = 423.6 l/s

C is the Runoff Coefficient
i is the intensity in mm/hr
A is the area in hectares (ha)

C.1.2 - Post-development release rate

ID	Description	Type	Areas (m^2) $C_{0.90}$	$C_{0.20}$	Total (m^2)	$C_{post\text{-}5\text{-}yr}$	$C_{post\text{-}100\text{-}yr}$*
A1	building roof	controlled	4900	0	4900	0.90	1.00
A2	side parking, sidewalks, landscaped areas	controlled	3859	2964	6823	0.60	0.67
A3	rear parking area, sidewalks, patios, concrete pa	controlled	3876	4601	8477	0.52	0.59
A4	front entrance, parking and landscaped areas	controlled	1400	2231	3631	0.47	0.54
A5	loading area and landscaped areas	controlled	1604	875	2479	0.65	0.74
			15639	10671	26310	0.62	0.70

**including 25% increase as per City of Ottawa Sewer Design Guidelines*

Calculations for post-development runoff coefficient

$C_{post\text{-}5\text{-}yr\ (col.\ D)}$ =(column A * 0.9 + column B * 0.2) / column C
$C_{post\text{-}100\text{-}yr\ (col.\ E)}$ =(column A * 1.0 + column B * 0.2*1.25) / column C
note: 0.90 x 1.25 = 1.125, use max. 1.0

Calculations for average weighted runoff coefficient

$C_{post\text{-}5\text{-}yr}$ =((15639*0.9)+(10671*0.2))/26310 0.62
$C_{post\text{-}100\text{-}yr}$ =((15639*1.0)+(10671*0.2*1.25))/26310 0.70

Estimated time of concentration, t_c = 10.0 minutes ***As per City of Ottawa Sewer Design Guidelines (Section 5.4.5.2)
Based on Ottawa IDF curve, $i_{5\text{-}years}$ = $998.071/(t_c+6.053)^{0.814}$
104.2 mm/hr
Based on Ottawa IDF curve, $i_{100\text{-}years}$ = $1735.688/(t_c+6.014)^{0.820}$
178.6 mm/hr
20% increase to 100-yr rainfall, $i_{stress\ test}$ = 214.3 mm/hr

A.1.2.1 - uncontrolled flow

Total uncontrolled area, A4 = ha
5-year Runoff coefficient, C = 0.47
100-year Runoff coefficient, C = 0.54
Estimated time of concentration, t_c = 10.0 minutes

$Q_{uncontrolled\ 5\text{-}year}$ = 0.0 l/s ②
$Q_{net\text{-}allowable\ 5\text{-}year}$ = 570.0 l/s ③ = ①-②
$Q_{uncontrolled\ 100\text{-}year}$ = 0.0 l/s ④
$Q_{net\text{-}allowable\ 100\text{-}year}$ = 570.0 l/s ⑤ = ①-④
$Q_{uncontrolled\ stress\ test}$ = 0.0 l/s ⑥

C.1.3 - Post-development onsite storage

C.1.3.1 - Overall onsite storage requirements

Total controlled area, A1 to A5	2.631	ha	
5-year Runoff coefficient, C	0.62		
100-year Runoff coefficient, C	0.70		
net-allowable 5-year release rate	570.0	l/s	⑤

Table 1.3.1a - 5-year onsite storage requirements

	Time (minutes)	$i_{5\text{-years}}$ (mm/hr)	Q_{actual} (l/s)	$Q_{allowable}$ (l/s)	Q_{stored} (l/s)	V_{stored} (m^3)
peak Vstored --->	10	104.2	469.5	570.0	-100.5	-60.3
	15	83.6	376.5	570.0	-193.5	-174.1
	20	70.3	316.6	570.0	-253.4	-304.1
	25	60.9	274.4	570.0	-295.6	-443.4
	30	53.9	243.0	570.0	-327.0	-588.6
	35	48.5	218.6	570.0	-351.4	-737.9
	40	44.2	199.1	570.0	-370.9	-890.2
	45	40.6	183.1	570.0	-386.9	-1044.7
	50	37.7	169.7	570.0	-400.3	-1201.0
	55	35.1	158.3	570.0	-411.7	-1358.7
	60	32.9	148.4	570.0	-421.6	-1517.6

Therefore -60 m^3 of onsite storage required during 5-year event

Table 1.3.1b - 100-year onsite storage requirements

	Time (min)	$i_{100\text{-years}}$ (mm/hr)	Q_{actual} (l/s)	$Q_{allowable}$ (l/s)	Q_{stored} (l/s)	V_{stored} (m^3)
peak V_{stored} --->	10	178.6	908.7	570.0	338.7	203.2
	15	142.9	727.2	570.0	157.2	141.5
	20	120.0	610.5	570.0	40.5	48.6
	25	103.8	528.5	570.0	-41.5	-62.2
	30	91.9	467.5	570.0	-102.5	-184.4
	35	82.6	420.3	570.0	-149.7	-314.4
	40	75.1	382.4	570.0	-187.6	-450.2
	45	69.1	351.4	570.0	-218.6	-590.2
	50	64.0	325.5	570.0	-244.5	-733.6
	55	59.6	303.4	570.0	-266.6	-879.6
	60	55.9	284.5	570.0	-285.5	-1027.9

Therefore 203 m^3 of onsite storage required during 100-year event

C.1.3.2 - Estimated detention created by installing roof weirs

Workshop roof area	0.175	ha	
5-year Runoff coefficient, C	0.90		
100-year Runoff coefficient, C	1.00		
Install 3.3 l/s weirs at 6 of the 23 roof drains	20.0	l/s	*Watts, Flow Control Roof Drain, or approved equivalent*

Table 1.3.2a - 5-year estimated detention on workshop roof

	Time	$i_{5\text{-years}}$	Q_{actual}	$Q_{allowable}$	Q_{stored}	V_{stored}
	(minutes)	(mm/hr)	(l/s)	(l/s)	(l/s)	(m^3)
peak V_{stored} --->	10	104.2	45.6	20.0	25.6	15.4
	15	83.6	36.6	20.0	16.6	14.9
	20	70.3	30.8	20.0	10.8	12.9
	25	60.9	26.7	20.0	6.7	10.0
	30	53.9	23.6	20.0	3.6	6.5
	35	48.5	21.2	20.0	1.2	2.6
	40	44.2	19.3	20.0	-0.7	-1.6
	45	40.6	17.8	20.0	-2.2	-6.0
	50	37.7	16.5	20.0	-3.5	-10.5
	55	35.1	15.4	20.0	-4.6	-15.3
	60	32.9	14.4	20.0	-5.6	-20.1
Therefore		15	m^3 estimated roof detention			

Table 1.3.2b - 100-year estimated detention on workshop roof

	Time	$i_{100\text{-years}}$	Q_{actual}	$Q_{allowable}$	Q_{stored}	V_{stored}
	(min)	(mm/hr)	(l/s)	(l/s)	(l/s)	(m^3)
peak V_{stored} --->	10	178.6	86.9	20.0	66.9	40.1
	15	142.9	69.5	20.0	49.5	44.6
	20	120.0	58.4	20.0	38.4	46.0
	25	103.8	50.5	20.0	30.5	45.8
	30	91.9	44.7	20.0	24.7	44.4
	35	82.6	40.2	20.0	20.2	42.4
	40	75.1	36.6	20.0	16.6	39.7
	45	69.1	33.6	20.0	13.6	36.7
	50	64.0	31.1	20.0	11.1	33.3
	55	59.6	29.0	20.0	9.0	29.7
	60	55.9	27.2	20.0	7.2	25.9
Therefore		46	m^3 estimated roof detention			

C.1.3.3 - Estimated detention created by installing flow restrictor at CB-1 outlet

Total controlled area, A4	0.363	ha	
5-year Runoff coefficient, C	0.47		
100-year Runoff coefficient, C	0.54		
Install flow control at CB-1 outlet	80.0	l/s	*Hydrovex 250 VHV-2, or approved equivalent, ~1.29m head*

Table 1.3.3a - 5-year estimated detention in front laneway

	Time	$i_{5\text{-years}}$	Q_{actual}	$Q_{allowable}$	Q_{stored}	V_{stored}
	(minutes)	(mm/hr)	(l/s)	(l/s)	(l/s)	(m^3)
peak V_{stored} --->	10	104.2	49.4	80.0	-30.6	-18.3
	15	83.6	39.6	80.0	-40.4	-36.3
	20	70.3	33.3	80.0	-46.7	-56.0
	25	60.9	28.9	80.0	-51.1	-76.7
	30	53.9	25.6	80.0	-54.4	-98.0
	35	48.5	23.0	80.0	-57.0	-119.7
	40	44.2	21.0	80.0	-59.0	-141.7
	45	40.6	19.3	80.0	-60.7	-164.0
	50	37.7	17.9	80.0	-62.1	-186.4
	55	35.1	16.7	80.0	-63.3	-209.0
	60	32.9	15.6	80.0	-64.4	-231.7
Therefore		-18	m^3 estimated laneway detention			

Table 1.3.3b - 100-year estimated detention in front laneway

	Time	$i_{100\text{-years}}$	Q_{actual}	$Q_{allowable}$	Q_{stored}	V_{stored}
	(min)	(mm/hr)	(l/s)	(l/s)	(l/s)	(m^3)
peak V_{stored} --->	10	178.6	97.2	80.0	17.2	10.3
	15	142.9	77.8	80.0	-2.2	-2.0
	20	120.0	65.3	80.0	-14.7	-17.7
	25	103.8	56.5	80.0	-23.5	-35.2
	30	91.9	50.0	80.0	-30.0	-54.0
	35	82.6	44.9	80.0	-35.1	-73.6
	40	75.1	40.9	80.0	-39.1	-93.8
	45	69.1	37.6	80.0	-42.4	-114.5
	50	64.0	34.8	80.0	-45.2	-135.6
	55	59.6	32.5	80.0	-47.5	-156.9
	60	55.9	30.4	80.0	-49.6	-178.5
Therefore		10	m^3 estimated laneway detention			

C.1.3.4 - Estimated detention created by installing flow restrictor at STMH-1 outlet

Total controlled area, A2, A3 & A5	1.778	ha	
5-year Runoff coefficient, C	0.57		
100-year Runoff coefficient, C	0.64		
Install flow control at STMH-1 outlet	370.0	l/s	*Plug style inlet control device, ~2.91m head*

Table 1.3.4a - 5-year estimated detention in parking areas

	Time	$i_{5\text{-years}}$	Q_{actual}	$Q_{allowable}$	Q_{stored}	V_{stored}
	(minutes)	(mm/hr)	(l/s)	(l/s)	(l/s)	(m^3)
peak V_{stored} --->	10	104.2	292.4	370.0	-77.6	-46.6
	15	83.6	234.5	370.0	-135.5	-122.0
	20	70.3	197.1	370.0	-172.9	-207.5
	25	60.9	170.9	370.0	-199.1	-298.7
	30	53.9	151.3	370.0	-218.7	-393.6
	35	48.5	136.1	370.0	-233.9	-491.1
	40	44.2	124.0	370.0	-246.0	-590.5
	45	40.6	114.0	370.0	-256.0	-691.2
	50	37.7	105.7	370.0	-264.3	-793.0
	55	35.1	98.6	370.0	-271.4	-895.8
	60	32.9	92.4	370.0	-277.6	-999.2
Therefore		-47	m^3 estimated parking lot detention			

Table 1.3.4b - 100-year estimated detention in parking areas

	Time	$i_{100\text{-years}}$	Q_{actual}	$Q_{allowable}$	Q_{stored}	V_{stored}
	(min)	(mm/hr)	(l/s)	(l/s)	(l/s)	(m^3)
peak V_{stored} --->	10	178.6	568.3	370.0	198.3	119.0
	15	142.9	454.8	370.0	84.8	76.3
	20	120.0	381.8	370.0	11.8	14.1
	25	103.8	330.5	370.0	-39.5	-59.2
	30	91.9	292.4	370.0	-77.6	-139.7
	35	82.6	262.8	370.0	-107.2	-225.1
	40	75.1	239.2	370.0	-130.8	-314.0
	45	69.1	219.8	370.0	-150.2	-405.6
	50	64.0	203.6	370.0	-166.4	-499.3
	55	59.6	189.8	370.0	-180.2	-594.8
	60	55.9	177.9	370.0	-192.1	-691.6
Therefore		119	m^3 estimated parking lot detention			

C.1.4 - Site storage

	5-year event	100-year event		
overall storage requirements	-60	203	m^3	*Table C.1.3.1*
estimated roof detention	15	46	m^3	*Table C.1.3.2*
roof ponding depth	0.03	0.08	m	*maximum allowable: 0.15m*
roof ponding area (workshop)	1750	1750	m^2	
estimated roof ponding volume (100-yr)	18	47	m^3	*pyramid equation (V=roof area*ponding depth/3)*
total available roof storage (at 150mm ponding)		88	m^3	*pyramid equation (V=roof area*ponding depth/3)*
estimated front laneway detention (CB-1)	0	10	m^3	*Table C.1.3.3*
front laneway ponding depth (CB-1)	0.00	0.19	m	*maximum allowable: 0.3m*
laneway available ponding area (CB-1)	600	600	m^2	
estimated front laneway ponding volume (CB-1)	0	10	m^3	*pyramid equation (V=area*ponding depth/3)*
estimated parking lot detention (STMH-1)	0	119	m^3	*Table C.1.3.4*
parking lot ponding depth (STMH-1)	0.00	0.18	m	*maximum allowable: 0.3m*
parking lot available ponding area (STMH-1)	5450	5450	m^2	
estimated parking ponding volume (STMH-1)	0	121	m^3	*pyramid equation (V=area*ponding depth/3)*
total available onsite storage (at 300mm ponding)		545	m^3	*pyramid equation (V=area*ponding depth/3)*
Total available onsite storage > overall storage requirements		OK		
Total available onsite storage > estimated detention		OK		

C.1.5 - Release rate for site

Release rate			
Allowable release rate (5-yr)	570.0		*Section C.1.1*
Controlled release rate at roof drains (100-yr)	20.0		*Section C.1.3.2*
Uncontrolled release rate at roof drains (100-yr)	80.0		
Controlled release rate at CB-1 (100-yr)	80.0		*Section C.1.3.3*
Controlled release rate at STMH-1 (100-yr)	370.0		*Section C.1.3.4*
Total release rate (100-yr)	550.0		*CRR*
Total release rate (100-yr) < Allowable release rate (5-yr)	OK		

C.1.6 - Storm Sewer Pipe Design

Jp2g Consultants Inc.
ENGINEERS · PLANNERS · PROJECT MANAGERS

Project Name: Carpenters Union Building – Campeau Drive, Ottawa

Definitions
Manning's Coefficient = 0.013
Return Frequency (yrs) = 5
1 acre = 0.4047 hectares

Rational Method
Q = 2.78 CIA (l/s), where
C= Runoff Coefficient
i = Rainfall Intensity (mm/hr)
A = Areas in Hectares (ha)

Notes
1) Used City of Ottawa IDF Curve
2) Min. velocity = 0.8 m/sec
3) Max. velocity = 6.0 m/sec

Designed RT
Checked DN
Dwg. Reference C1
Jp2g project No 2141650A

LOCATION		AREA (ha)		FLOW					SEWER DATA									CLEANSING VELOCITY	
From	To	C= 0.90	C= 0.20	Individual 2.78CA	Cum. 2.78CA	tc (min.)	$i_{5\ years}$ (mm/hr)	$i_{100\ years}$ (mm/hr)	$Flow_{5\ years}$ (l/s)	Dia. (mm)	Slope (%)	Length (m)	Capacity (full) (l/s)	Velocity (full) (m/s)	Sect.Time (minutes)	Tot. Time (minutes)	Utilization (%)	Actual velocity (l/s)	Min Cleansing Velocity? (YES/NO)
Roof	STMH-4	0.490	0.000	1.23	1.23	10.0	104.2	178.6	127.7	375	2.0	23.0	247.9	2.2	0.2	10.2	52	2.29	YES
CB-3	STMH-6	0.194	0.230	0.61	0.61	10.0	104.2	178.6	63.8	250	2.0	4.5	84.1	1.7	0.0	10.0	76	1.90	YES
STMH-6	STMH-5	0.000	0.000	0.00	0.61	11.0	99.2	169.9	60.8	300	1.0	49.3	96.7	1.4	0.6	11.6	63	1.48	YES
CB-4	STMH-5	0.160	0.088	0.45	0.45	10.0	104.2	178.6	46.9	250	1.0	39.6	59.5	1.2	0.5	10.5	79	1.34	YES
CB-2	STMH-5	0.194	0.230	0.61	0.61	11.0	99.2	169.9	60.8	250	2.0	4.5	84.1	1.7	0.0	11.0	72	1.92	YES
STMH-5	STMH-2	0.000	0.000	0.00	1.68	10.0	104.0	178.2	174.2	375	1.0	30.5	175.3	1.6	0.3	10.4	99	1.83	YES
STMH-2	STMH-7	0.000	0.000	0.00	1.68	10.4	102.3	175.3	171.4	375	1.0	50.0	175.3	1.6	0.5	10.9	98	1.83	YES
CB-6	STMH-7	0.386	0.296	1.13	1.13	10.0	104.2	178.6	117.8	300	2.0	17.0	136.7	1.9	0.1	10.1	86	2.19	YES
STMH-7	STMH-1	0.000	0.000	0.00	2.81	10.1	103.4	177.2	290.2	525	1.0	39.0	430.0	2.0	0.3	10.5	67	2.17	YES
CB-5	STMH-1	0.193	0.148	0.57	0.57	10.9	99.7	170.8	56.4	250	2.0	18.8	84.1	1.7	0.2	11.1	67	1.87	YES
STMH-1	STMH-4	0.000	0.000	0.00	3.37	10.0	104.2	178.6	351.2	525	1.0	13.8	430.0	2.0	0.1	10.1	82	2.24	YES
CB-1	STMH-4	0.140	0.223	0.47	0.47	11.0	99.2	169.9	47.0	250	2.0	52.5	84.1	1.7	0.5	11.5	56	1.80	YES
STMH-4	STMH-3	0.000	0.000	0.00	5.07	11.2	98.3	168.3	535.3	600	1.0	16.7	614.0	2.2	0.1	11.3	87	2.43	YES
STMH-3	Campeau Dr	0.000	0.000	0.00	5.07	11.3	97.7	167.3	535.3	1200	0.4	15.5	2465.7	2.2	0.1	11.4	22	1.81	YES

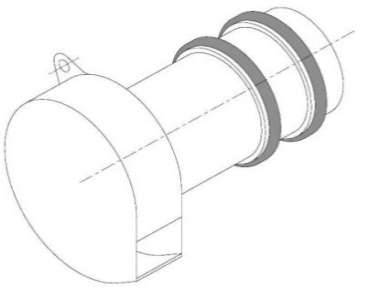
Flow control installed at outlet

Appendix D – Inlet Control Device - Data Sheets

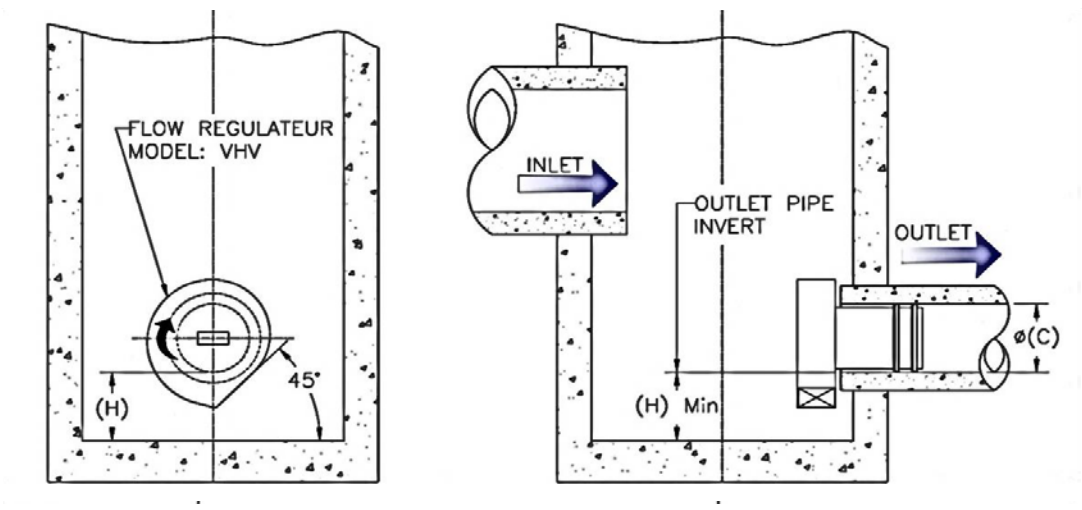
DATA SHEET
HYDROVEX® VHV
VORTEX REGULATOR

GENERAL INFORMATION

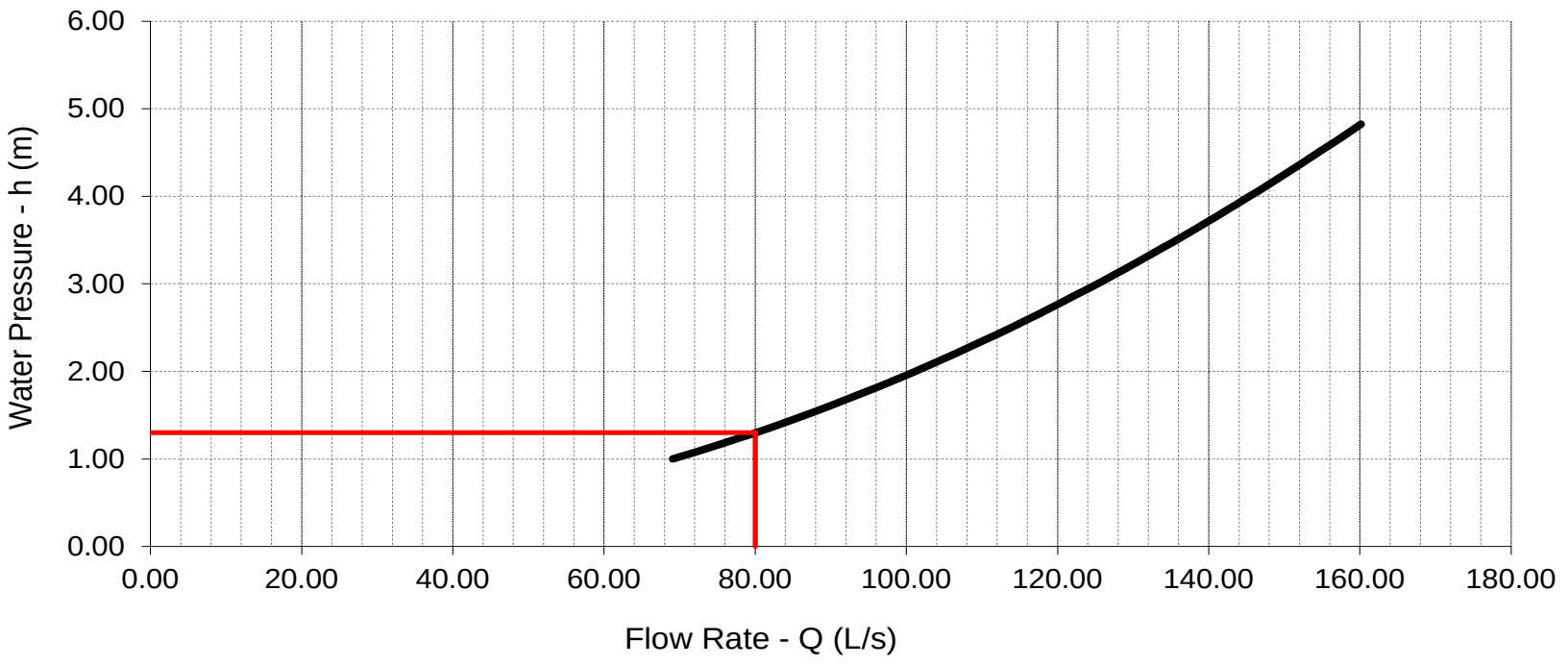
Application:	*Stormwater*	
Project Name:	*8560 CAMPEAU DRIVE, OTTAWA, QC*	
Project Number:	*HYX-4867*	
Identification:	*CB-1*	
Design flow rate (Q):	*80.00*	*L/s*
Design head (h):	*1.30*	*m*
Outlet pipe diameter (C):	*250*	*mm*
Model:	*250 VHV-2,10,SA*	
Item #:	*PRIPHY200313*	
Quantity:	*1*	
Minimum clearance (H)	*350*	*mm*
Minimum manhole diameter (B)	*1200*	*mm*



TYPICAL INSTALLATION



DISCHARGE CURVE VORTEX VALVE



Q (L/s)	72.00	80.07	87.40	94.16	100.47	106.40	112.02
h (m)	1.08	1.30	1.53	1.75	1.98	2.20	2.43

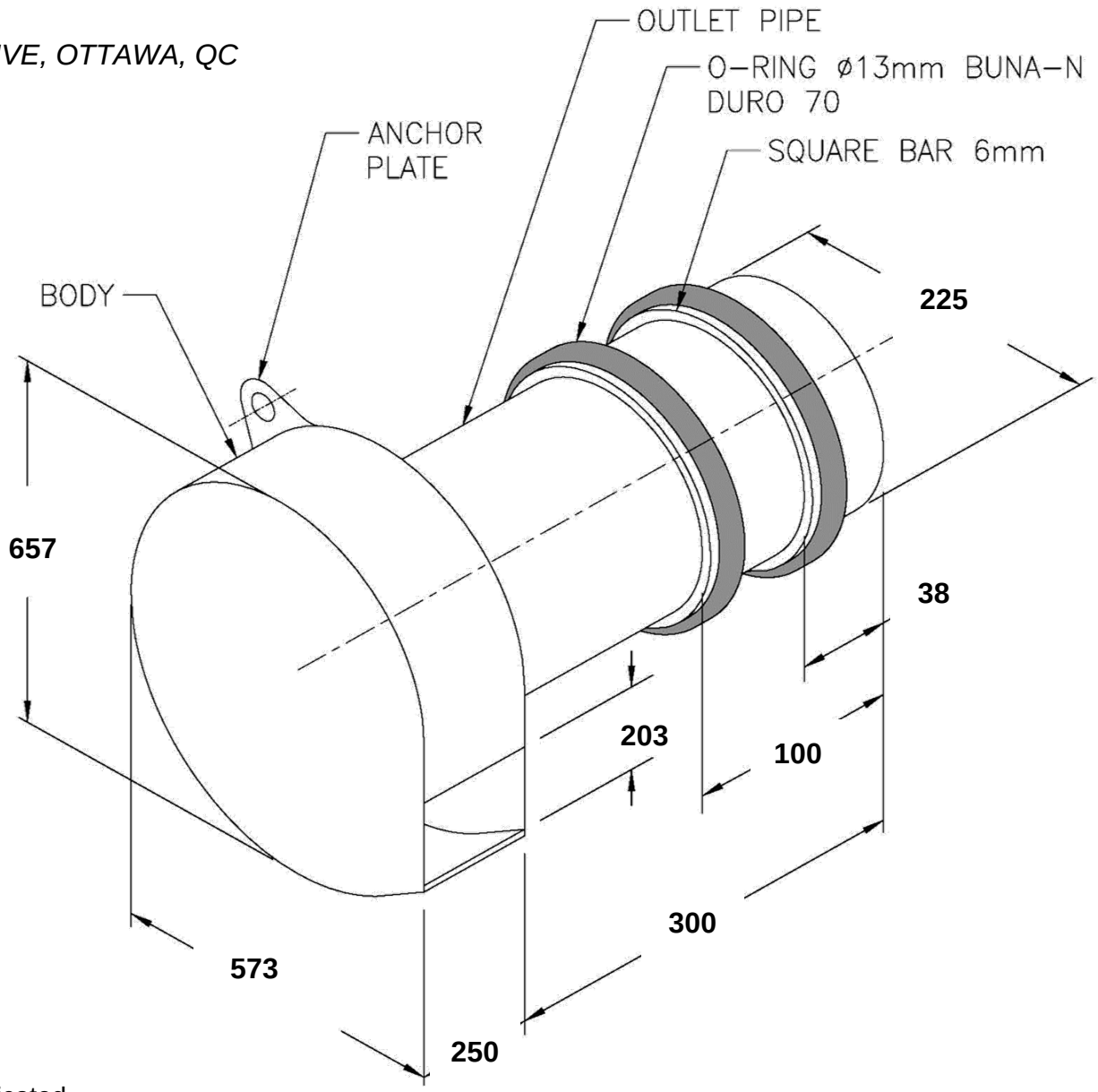
117.37	122.49	127.40	132.13	136.70	141.12	145.40
2.65	2.88	3.10	3.33	3.55	3.78	4.00

VEOLIA

HYDROVEX® VHV Vortex Flow Regulator

HYDROVEX®

Project Name: *8560 CAMPEAU DRIVE, OTTAWA, QC*
Project Number: *HYX-4867*
Identification: *CB-1*
Flow Rate: *80.00 L/s*
Design Head: *1.30 m*
Model: *250 VHV-2,10,SA*
Item #: *PRIPHY200313*
Weight: *36.0 Kg*
Quantity: *1*



All dimensions in mm unless otherwise indicated

2015-06-30

Jp2g Consultants Inc.
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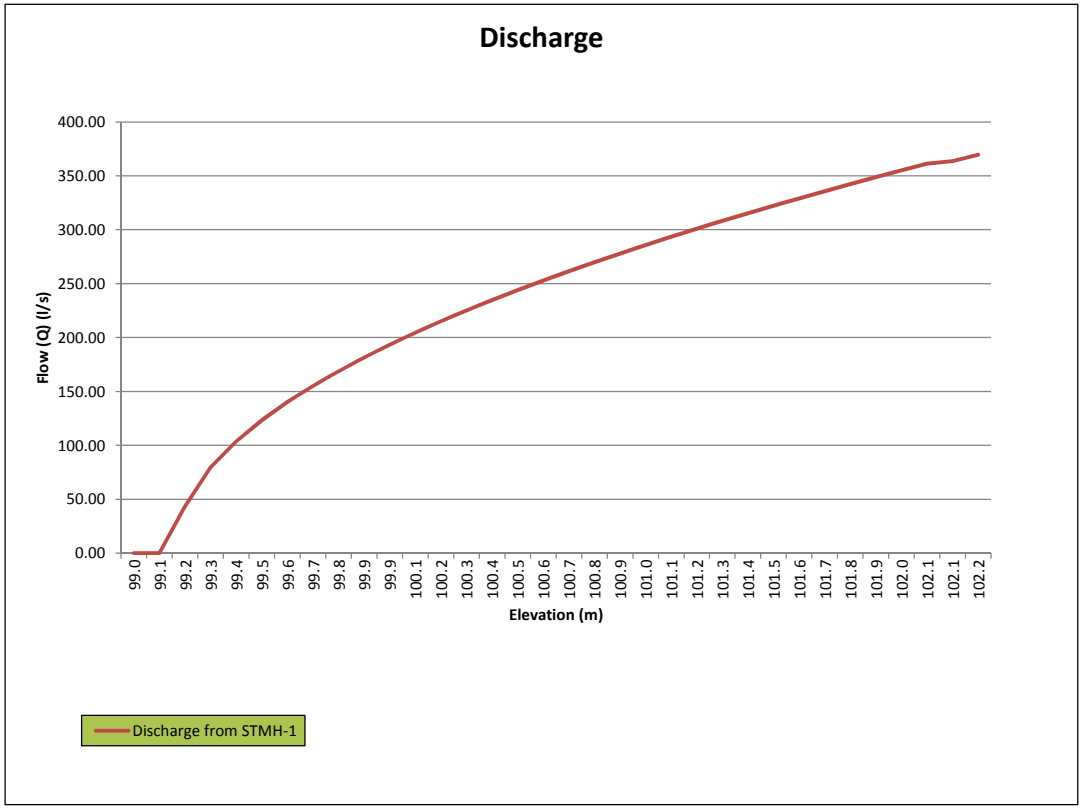
ELEVATION- DISCHARGE TABLE

	STMH-1
Outlet Structure Component	Orifice
Invert Elevation	98.95
Component Size Orifice Diameter (mm) Weir Width (m)	315
Orifice Centriod Elevation (m)	99.1075
Orifice Area (m^2)	0.078
Component Coefficient	0.61

Outlet Structure Elevation-Discharge Evaluation			
Elevation (m)	Head (m)	Q_2 (l/s)	Storm
98.95	0.00	0.000	
99.05	0.00	0.000	
99.15	0.04	43.410	
99.25	0.14	79.487	
99.35	0.24	103.692	
99.45	0.34	123.231	
99.55	0.44	140.071	
99.65	0.54	155.092	
99.75	0.64	168.782	
99.85	0.74	181.442	
99.95	0.84	193.275	
100.05	0.94	204.424	
100.15	1.04	214.995	
100.25	1.14	225.070	
100.35	1.24	234.714	
100.45	1.34	243.976	
100.55	1.44	252.900	
100.65	1.54	261.519	
100.75	1.64	269.863	
100.85	1.74	277.956	
100.95	1.84	285.821	
101.05	1.94	293.475	
101.15	2.04	300.934	
101.25	2.14	308.213	
101.35	2.24	315.324	
101.45	2.34	322.278	
101.55	2.44	329.085	
101.65	2.54	335.754	
101.75	2.64	342.293	
101.85	2.74	348.709	
101.95	2.84	355.010	
102.05	2.94	361.20	
102.09	2.98	363.647	100-year
102.2	3.08	369.694	



*Orifice Equation: $Q = cA(2gh)^{1/2}$ (m^3/s *1000 = l/s)*
*Weir Equation: $Q = CLH^{3/2}$ (m^3/s *1000 = l/s)*
H for orifice equations is depth of water above the centroide of the orifice.
H for weir equations is depth of water above the weir crest.

Appendix E – Watts Flow Control Roof Drain - Data Sheet

Roxanne Tubb

From: Scott Cooper <scott.cooper@mckeeottawa.ca>
Sent: June 30, 2015 8:36 AM
To: 'Roxanne Tubb'
Cc: MK Projects 2015; garyw@n45.ca; Joshua Bates
Subject: RE: 14-004 Carpenters Union - Mech design required sizing of the interior storm, sanitary and water services (MK 14090)
Attachments: image005.png; image006.jpg; image002.jpg

Roxanne,

We offer the following:

Storm Water Calculations

Based on the OBC calculation method for a 15min storm the maximum run-off rate from the roof is approximately 126L/s.
Using the same method for the shop roof the maximum run-off rate was calculated at 46L/s.

Therefore if we reduce the run-off rate from the shop roof to 20L/s, the run-off from the building will be 100L/s using the OBC. To achieve this flow rate 6 controlled flow roof drains have been proposed at a flow rate of roughly 3.4L/s

Sanitary Calculations

Based on the OBC and the number plumbing units in the building we have roughly 500 fixture units of drainage. Based on OBC Table 7.4.10.5(2) the "maximum probable drainage rate" is 7.26L/s.

If you have any further questions please do not hesitate to contact us.

Scott Cooper, P.Eng., LEED®AP
Senior Associate - Mechanical

Scott.Cooper@mckeeottawa.ca
1785 Woodward Drive
Ottawa, ON K2C 0P9
Tel: (613) 723-9585 Ext 129
Fax: (613) 723-9584

www.mckeeottawa.ca

From: Roxanne Tubb [mailto:roxannet@jp2g.com]
Sent: June 29, 2015 3:05 PM
To: Scott Cooper
Cc: MK Projects 2015; garyw@n45.ca; Joshua Bates
Subject: RE: 14-004 Carpenters Union - Mech design required sizing of the interior storm, sanitary and water services (MK 14090)

Scott,

Roxanne Tubb

From: Joshua Bates <joshua.bates@mckeeottawa.ca>
Sent: Monday, April 13, 2015 11:41 AM
To: 'roxannet@jp2g.com'
Cc: Scott Cooper; MK Projects 2015; 'garyw@n45.ca'
Subject: RE: Carpenters Union - Roof Drains (MK 14090)
Attachments: image001.png; image002.jpg; 14090 Roof Drain Coordination.pdf

Follow Up Flag: Follow up
Flag Status: Completed

Hello Roxanne,

Please see attached file illustrating the locations of the roof drains which require flow control, all other roof drains will be full flow. We have calculated and selected the flow for these drains based on the allowable release rate of 100L/S in accordance with the 2012 OBC.

Please advise if there is any other info you require for the Site Plan Control Application.

Regards,

Josh.

From: Roxanne Tubb [mailto:roxannet@jp2g.com]
Sent: Wednesday, April 08, 2015 9:55 AM
To: Joshua Bates
Cc: MK Projects 2015; Scott Cooper; garyw@n45.ca
Subject: RE: Carpenters Union - Roof Drains (MK 14090)

Hi Josh,

Has the roof drain design been completed? Could I please get a copy when it is? The City is asking for more detail than I can provide for the Site Plan Control Application.

Thank you.

Roxanne Tubb, P.Eng.
Civil Engineer - ingénieur civil
Project Manager
T: 613-828-7800 x227, roxannet@jp2g.com
1150 Morrison Drive, Suite 410, Ottawa, Ontario, K2H 8S9
Jp2g Consultants Inc.
ENGINEERS · PLANNERS · PROJECT MANAGERS

From: Joshua Bates [mailto:joshua.bates@mckeeottawa.ca]
Sent: Wednesday, April 01, 2015 10:59 AM

To: Roxanne Tubb
Cc: MK Projects 2015; Scott Cooper; 'garyw@n45.ca'
Subject: RE: Carpenters Union - Roof Drains (MK 14090)

Good morning Roxanne,

As per our discussion this morning, we will select the roof drains based on the allowable release rate of 100l/s. With this rate we only require a small amount of flow control, so we will coordinate with Gary's team to determine what area of the building they will allow for some ponding.

Thank you,

Josh.

From: Joshua Bates
Sent: Friday, March 13, 2015 1:51 PM
To: 'Roxanne Tubb'
Cc: MK Projects 2015; Scott Cooper; Gary Wentzell; MK Projects 2015
Subject: RE: Carpenters Union - Roof Drains (MK 14090)

Hi Roxanne,

We can specify a roof drain with a single slot weir which would allow for 15gpm at 3" of ponding. I'm assuming the roof scuppers will prevent any ponding greater than 3"?

23 drains x 15gpm per = 345gpm or 22 l/s which is less than the total allowable release rate of 100 l/s.

Regards,

Josh.

From: Roxanne Tubb [mailto:roxannet@jp2g.com]
Sent: Wednesday, March 11, 2015 11:16 AM
To: Joshua Bates
Cc: MK Projects 2015; Scott Cooper; Gary Wentzell
Subject: RE: Carpenters Union - Roof Drains (MK 14090)

Hi Josh,

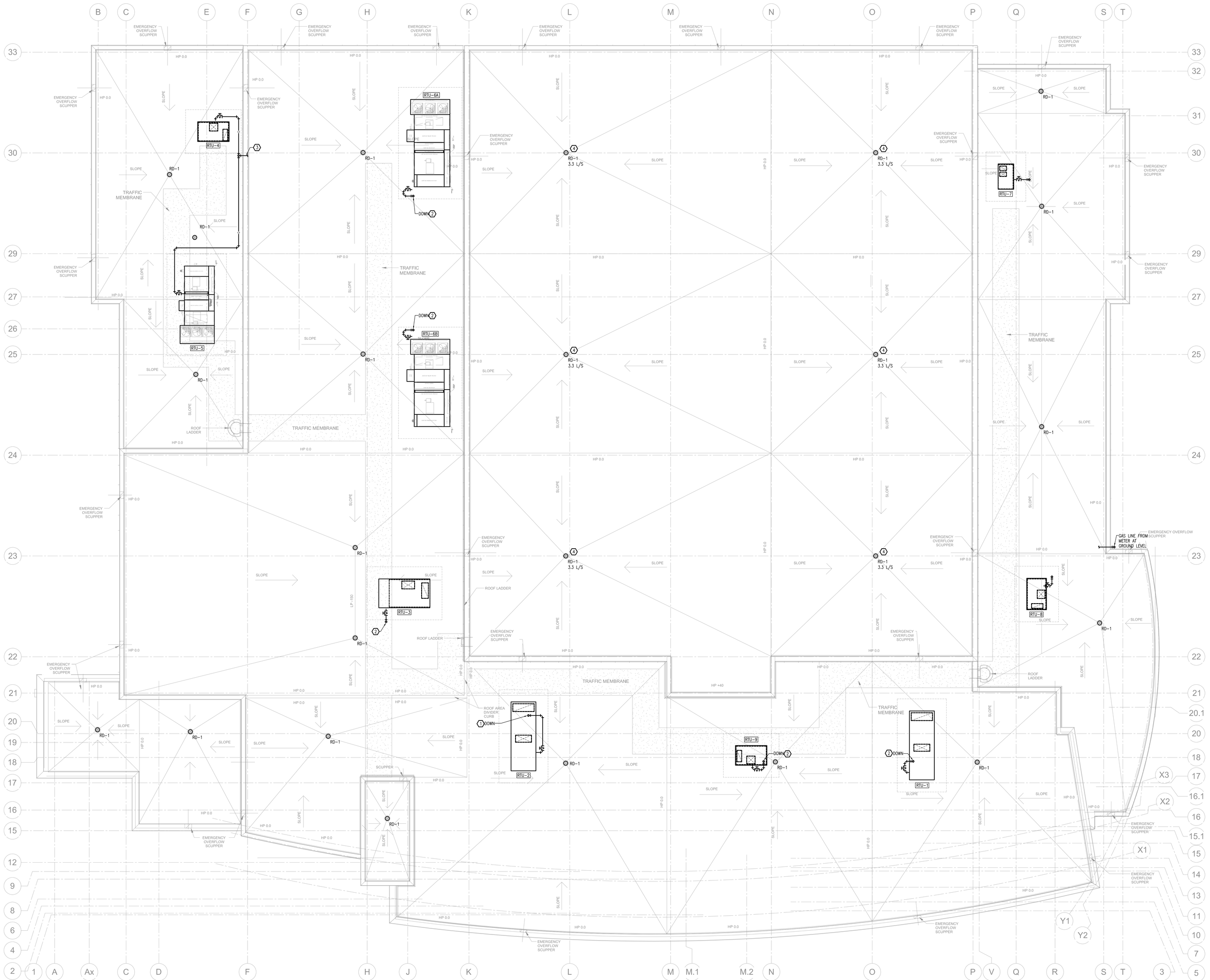
As I said my voicemail message, the number of roof drains has been reduced to 23 from 34.

Given that we cannot pond more than 3" on the roof, can you confirm what the individual release rate for the roof drains will be?

I should also specify, that the allowable release rate for the roof has increased to 100.0 l/s.

Thank you.

Roxanne Tubb, P.Eng.
Civil Engineer - ingénieur civil
Project Manager
T: 613-828-7800 x227, roxannet@jp2g.com
1150 Morrison Drive, Suite 410, Ottawa, Ontario, K2H 8S9



GENERAL NOTES

1. METAL TO METAL CONTACT SHOULD BE AVOIDED USING ISOLATORS IN BETWEEN BUILDING STRUCTURE, EQUIPMENT, AND MECHANICAL FASTENING DEVICES.

GENERAL NOTES

1. GAS PIPING TO PASS THROUGH WALL AND RUN WITHIN MECHANICAL CHASE. SEAL WATER TIGHT AT PENETRATION.
2. GAS PIPING TO PASS THROUGH ROOF CURB AND RUN AT HIGH LEVEL WITHIN BUILDING. SEAL WATER TIGHT AT PENETRATION.
3. GAS PIPING TO PASS THROUGH WALL AND RUN AT HIGH LEVEL WITHIN BUILDING. SEAL WATER TIGHT AT PENETRATION.
4. SUPPLY AND INSTALL ROOF DRAIN COMPLETE WITH ADJUSTABLE FLOW CONTROL WEIR. BALANCE ROOF DRAIN FLOW ACCORDINGLY.

RD-100-A

Tag: _____

Large Capacity Roof Drain

Components:

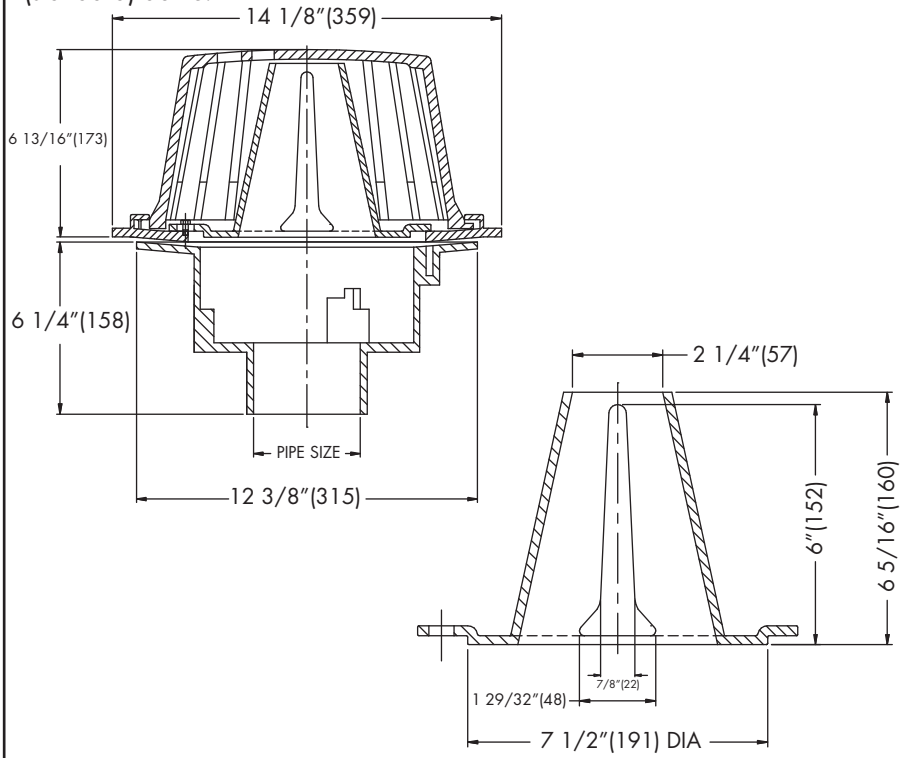

B2


B2-DM


B2-FLG


FC-2

SPECIFICATION: Watts Drainage Products RD-100 epoxy coated cast iron roof drain with deep sump, wide serrated flashing flange, flashing clamp device with integral gravel stop, accutrol weir and self-locking polyethylene (standard) dome.



Free Area Sq. In.
137

Deck opening 10" (254) with sump receiver 13-1/4" (337)

** Side Outlet (-SO) option only available in 2"(51), 3"(76), 4"(102) pipe sizes. Underdeck Clamp (-BED and -D options) are not available when -SO is selected.

Order Code: RD-10☐-A☐-☐-☐

Ex. RD-102P-K

Pipe Sizing (Select One)		
Suffix	Description	
2	2"(51) Pipe Size	☐
3	3"(76) Pipe Size	☐
4	4"(102) Pipe Size	☐
5	5"(127) Pipe Size	☐
6	6"(152) Pipe Size	☐
8	8"(203) Pipe Size	☐

Outlet Type (Select One)		
Suffix	Description	
NH	No Hub (MJ)	☐
P	Push On	☐
T	Threaded Outlet	☐
X	Inside Caulk	☐

Options (Select One or More)		
Suffix	Description	
-B	Sump Receiver Flange	☐
-BED	Sump Receiver, Adj Ext., Deck Clamp	☐
-C	Secondary Membrane Clamp	☐
-D	Underdeck Clamp	☐
-E	Adjustable Extension	☐
-GSS	Stainless Steel Ballast Guard	☐
-H	Adj. to 6" IRMA Ballast Guard	☐
-K	Ductile Iron Dome	☐
-K80	Aluminum Dome	☐
-L	Vandal Proof Dome	☐
-R	2" High External Water Dam	☐
-SO	Side Outlet**	☐
-V	Fixed Extension (1-1/2",2",3",4"	☐
-W	Adj. Water Level Regulator	☐
-W-1	Waterproofing Flange	☐
-Z	Extended Integral Wide Flange	☐
-5	Sediment Bucket	☐
-6	Vandal Proof Top	☐
-12	Galvanized Dome	☐
-13	All Galvanized	☐
-83	Mesh Covered Dome	☐
-113M	Special Epoxy from 3M Range	☐

Optional Body Material (NH Only)		
Suffix	Description	
-60	PVC Body w/Socket Outlet	☐
-61	ABS Body w/Socket Outlet	☐

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

A Watts Water Technologies Company

Accutrol Weirs

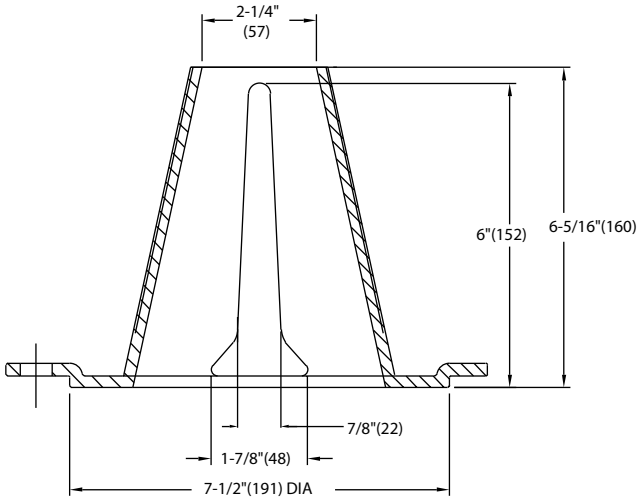
Tag: _____

Flow Control for Roof Drains

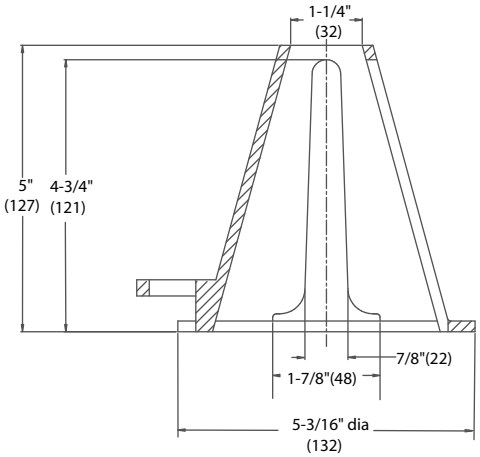
ACCUTROL WEIR FLOW CONTROL

SPECIFICATION: Watts Drainage Products epoxy coated cast iron Accutrol Weir is designed with parabolic openings which limit the flow of rain water off a roof. Each weir slot controls flow to 5 gpm per inch of head to a maximum of 30 gpm at 6" head(for large sump), 25 gpm at 5" head(for small sump) . The Accutrol Weir is secured to the flashing clamp of the roof drain. The Accutrol Weir is available with 1 to 4 slots for the large sump drain and up to 3 slots for the small sump drain.

For Large Sump Roof Drains Specify the "-A" option and number of slots required. (ie. "RD-100-A2" for two slot weir)
For Small Sump Roof Drains Specify the "-A" option and number of slots required. (ie. "RD-200-A1" for one slot weir)



LARGE SUMP ACCUTROL WEIR



SMALL SUMP ACCUTROL WEIR

Job Name _____ Contractor _____

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

Engineer _____ Representative _____

CANADA: 5435 North Service Road, Burlington, ON, L7L 5H7 TEL: 905-332-6718 TOLL-FREE: 1-888-208-8927 Website: www.wattsdrainage.ca

Appendix F - MVCA Correspondence

Mississippi Valley Conservation Authority

File: 14-KN-SP

June 19, 2015

Tracey Scaramozzino
City of Ottawa
Planning and Growth Management Department
110 Laurier Avenue West, 4th floor
Ottawa, ON K1P 1J1

Dear Ms. Scaramozzino:

Re: Site Plan Application
8560 Campeau Drive, Ottawa
City File No. D07-12-14-0162

Mississippi Valley Conservation Authority (MVCA) engineering staff have been circulated the site plan application for 8560 Campeau Drive. The following has been received in response to MVCA technical review comments dated May 12, 2015:

- "*Stormwater Management Report, Carpenters Union, 8560 Campeau Drive, Kanata, Ontario*" (Jp2g Consultants Inc., June 5, 2015); and
- Additional information received by email May 13, 2015.

The site is within the Kanata West Community and the *Kanata West Master Servicing Study* includes the target of increasing the post-development infiltration. As outlined in the report, an infiltration trench has been designed in accordance with the recommendations of the MOE Design Manual to address the infiltration target. MVCA if of the understanding that pre-treatment catchbasins will be provided in the non-rooftop impervious areas to prevent premature clogging of the infiltration system.

MVCA's comments regarding stormwater quantity and quality treatment have been addressed. Thank you for the opportunity to provide comments. Should any questions arise, please do not hesitate to contact the undersigned.

Regards,

Myra Van Die, P.Eng.
Water Resources Engineer
613-253-0006 ext. 259

Cc: Roxanne Tubb, P.Eng., Jp2g Consultants Inc.

Appendix G - Infiltration Trench Design

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TABLE G-1: WATER BALANCE

Water Balance Analysis Approach: MOE Stormwater Management Planning and Design Manual March 2003
Section 3.2 Water Balance

Pre-Development

*Land Use	Land Use**	Soil Type	HSG	Drainage Area (ha)	Infiltration (mm)	Site Infiltration (m^3)
Woodland	Shrubs	Clay	CD	0.18	197	355
Field	Shallow Rooted Crops	Clay	CD	2.45	164	4018
			Total	2.63		4373

Post-Development

*Land Use	Land Use**	Soil Type	HSG	Drainage Area (ha)	Infiltration (mm)	Site Infiltration (m^3)
Roof, Parking, Sidewalks, Concrete Pads	None	Clay	CD	2.33	0	0
Landscaped Areas	Urban Lawns	Clay	CD	0.30	164	492
			Total	2.63		492

Difference (m^3)	**3881**
Site Annual Infiltration Rate Difference (mm/yr)	**147.5**

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TABLE G-2: INFILTRATION REQUIREMENTS

(1a)	Total Site Area		2.631	ha	
(1b)			26310	m^2	[(1a) x 10,000]
(2a)	Infiltration quantity (Carp River Watershed/SubWatershed Study by Robinson Consultants, December 2004, Groundwater Resourse Target 73 mm/yr infiltration based on low recharge areas (pg 199)		91	mm/year	Silty Clay to Clay Soils with 25% increase above pre-development rates
(2b)			0.1	m/year	[(2b) / 1,000]
(3a)	Target Annual Infiltration Volume	Carp River Watershed Study	2401	m^3/year	[(1b) x (2b)]
(3b)		Water Balance	**3881**	m^3/year	Refer to Table C-1: Water Balance Sheet
(4)	Target Infiltration Time per Rainfall Day (Assume 2 hour Infiltration Time per Rain Storm)		782618	s/year	Refer to Table C-3: Infiltration Trench Design Sheet for Rain Days
(5)	Target Infiltration Rate		0.00496	m^3/s	[(3b) / (4)]

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TABLE G-3: INFILTRATION TRENCH DESIGN

Coefficient of Permeability $K_z = CD_{10}2$ **cm/s** (Soil Mechanics and Foundations by Muni Budhu)

Variable	Value	Remark
D_{10} =	0.0002	Extrapolated D_{10} of exisitng soil to the water table based on the Geotechnical Investigation Report Proposed Development Campeau Drive & Palladium Drive Block 22, Ottawa ON Dated December 2014
C =	1	C is a constant varying between 0.4 and 1.2; usually 1.0
K_z =	0.00000004	cm/s **Too low to infiltrate to the water table**
D_{10} =	0.25	Minimum D_{10} for sand layer between clean stone and water table
C =	1	C is a constant varying between 0.4 and 1.2; usually 1.0
K_z =	0.0625	cm/s

Darcy's Law q = AKi **m^3/s** Modified Based on Correction Factor: q = Akzi (CFsilt) m^3/s

Infiltration Design Approach: A DESIGN MANUAL FOR SIZING INFILTRATION PONDS By Joel W. Massmann, Washington State Department of Transportation October 2003

Variable	Value	Remark
Q =	**3,881**	(m^3) Refer to Table C-2: Infiltration Requirements Target Annual Infiltration Volume
q =	0.004958484	(m^3/s) Refer to Table C-2: Infiltration Requirements Target Infiltration Rate
K_z =	0.000625	m/s
i =	$\frac{\Delta H}{41.636(k^{0.05})}$	Total Head (Ponding Depth P_D + L) / Saturation Depth below Ground
P_D =	0.3	Assume Ponding in the Rock Material Below Perforated Pipe
L =	0.5	Depth between Rock Surface and Ground Water Table
ΔH	0.8	m
i =	0.03	Reduced Hydraulic Gradient to account for mounding in Shallow Groundwater Sites
Cfsilt =	0.6	Correction Factor for siltation build-up based on low monitoring and maintenance
A =	**476**	(m^2) Minimum Bottom Area for the Infiltration Trench

Proposed Infiltration Trench Design						
Base Elevation (m)	Infiltration Trench Length (m)	Infiltration Trench Width (m)	Total Bottom Area (m^2)	Total Area (m^2)	K_z (m/s)	CFSilt
100.5	296	0.75	222	222	0.000625	0.60

Infiltration Trench Flow Parameters								
Elevation (m)	P_D (m)	ΔH	i	Flow (m^3/s)	Voids Storage in Clean Stone (m^3) *	Time to Infiltrate Rock Storage to Maximum Water Table (h)	Maximum Yearly Infiltration (based on Rain Days) (m^3/year) **	Maximum Yearly Infiltration (based on Rain Days) (mm/ha/year)
100.50	0.00	0.50	0.02	0.0014	**0.0**	0.00	0	0
100.60	0.10	0.60	0.02	0.0017	**8.9**	1.42	965	37
100.70	0.20	0.70	0.02	0.0020	**17.8**	2.44	1,930	73
100.80	0.30	0.80	0.03	0.0023	**26.6**	3.20	2,896	110
100.90	0.40	0.90	0.03	0.0026	**35.7**	3.80	3,881	148
100.95	0.45	0.95	0.03	0.0027	**37.9**	3.83	4,116	156

Note: Assume Snow is plowed to Snow storage area and does not drain into Infiltration Trench

* Porisity of 0.4 based on MOE SWMPDM 2003 page 4-26

(1)	City of Ottawa Precipitation Days	162.6	days	http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/phys08a-eng.htm
(2)	Typical Year	365	days	
(3)	Precipitation Days/Year Ratio	0.445	days/year	[(1) / (2)]
(4)	Assume Dec - End March Frozen	121	days	
(5)	Therefore, remaining days per year not frozen	244	days	[(2) - (4)]
(6)	Rain Days per Year *	109	days	[(3) x (5)]
(7)	Yearly Precipitation	943.5	mm	http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/phys08a-eng.htm
(8)	Yearly Snow	235.7	cm	http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/phys08a-eng.htm
(9)	Equivalent Snow Precipitation (Assume 10mm snow = 1mm water)	235.7	mm	http://www.ec.gc.ca/meteo-weather/default.asp?lang=En&n=108C6C74-1#wsA0744309
(10)	Total Rain Precipitation	707.8	mm	[(7) - (9)]
(11)	Average Rain Precipitation per Rain Days per Year	6.51	mm/day	[(10) / (6)]
(12)	Impervious Parking Area Draining to Infiltration Trench	18589	m^2	From Sub-Drainage Areas Sheet
(13)	Total Average Rainfall Volume to Infiltration Trench per Rain Day	**121.0**	m^3	[(12) x (11)/1000]
(13)	Max Assumed Rock Volume (30% voids) in Infiltration Trench	**37.9**	m^3	**Therefore, Infiltration Trench Satisfies minimum infiltration criteria (100 mm/ha/year) as per Carp River Watershed Study**
(14)	Max Yearly Infiltration (Based on Rain Days)	**156.4**	mm/ha/year	

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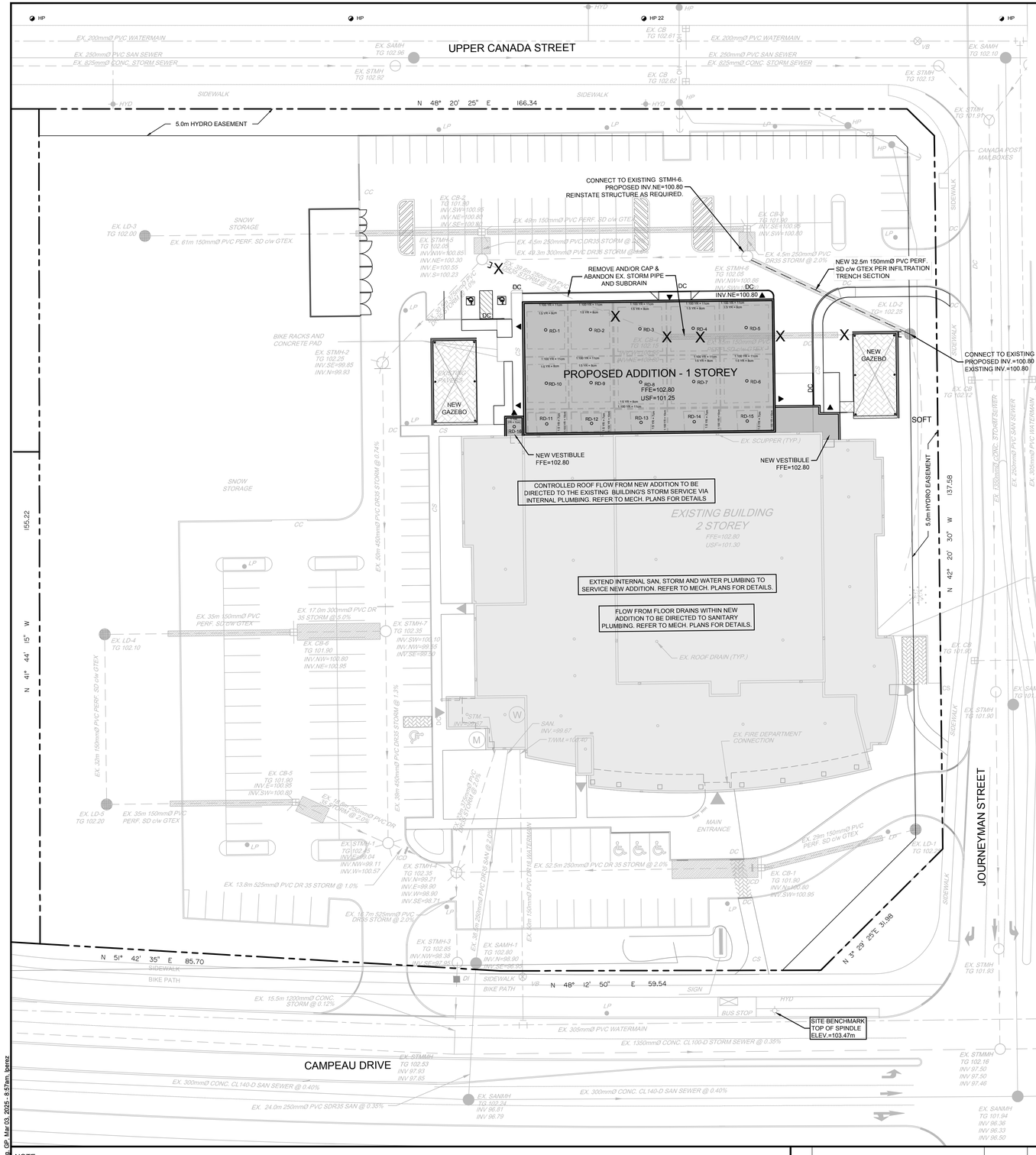
TABLE G-4: INFILTRATION TRENCH DESIGN STRATEGY AS PER MOE RECOMMENDATIONS

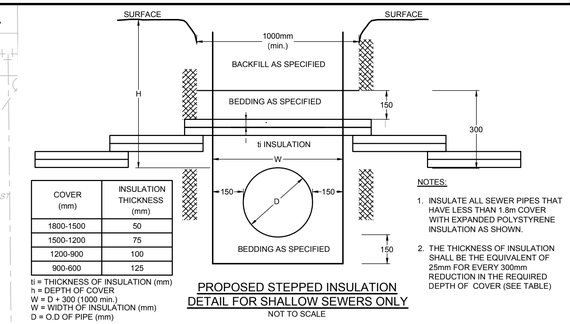
Parameter	MOE Recommendation*	Design Strategy
Drainage Area	Small Drainage Areas (< 2ha)	Drainage area directed to the infiltration trench is 1.86 ha.
Land Use	Infiltration trenches are best implemented for residential uses. Infiltration trenches are not suitable for industrial land uses since there is a high potential for groundwater contamination and/or dry weather spills.	The infiltration trench proposed for the commercial parking lot includes pre-treatment catchbasins and maintenance ports to minimize groundwater contamination.
Water Table	The seasonably high water table depth should be >1 m below the bottom of the infiltration trench.	The water table is an approximate maximum elevation of 99.90 m around the proposed infiltration trenches, which is 0.60 m below the infiltration trench. The infiltration trench cannot be raised to meet the 1.0 m separation due cover constraints and the by-pass sewer system.
Bed Rock	The depth to bedrock should be > 1 m below the bottom of the infiltration trench.	The maximum bedrock elevation recorded during the geotechnical investigation is 95.30 m, approximately 5.20 m below the bottom of the infiltration trench.
Soils	Infiltration trenches are not suitable if the native soil has a percolation rate less than 15 mm/hr.	The native soil is clay and not suitable for providing infiltration. Therefore, the clay directly above the water table will be removed and replaced with a sand layer, which has a percolation rate of 210 mm/hr as per Table 4.4 of the MOE SWMPDG.
Storage Configuration	The depth of the storage layer should be sized to ensure 24 hour drawdown of the stored water based on the percolation rate determine in field. It is recommended that the trench length be maximized compared to the trench width, which will encourage the uniform distribution of water in the storage layer.	The trench provides a drawdown of 3.8 hours at full capacity to maximize infiltration during consecutive storm events. The trench length was maximized for a uniform distribution of water within the storage layer.
Location/Setbacks	The setbacks from wells specified in the Building Code for leaching bed systems shall also be observed for infiltration trenches.	Not applicable. Municipal water provided.
Storage Media	It is recommended that 50 mm diameter clear stone be used. Non-woven filter fabric should be installed at the interface of the trench and the native material to ensure that the latter does not clog the trench. The filter fabric should extend to cover the top of the trench.	Storage media specified as 50 mm diameter clear stone with geotextile separating the native material and the proposed material.
Filter Layer	A filter layer is constructed underneath the storage layer to provide quality enhancement of the stormwater before it infiltrates the native soil. The most common filter medium used in infiltration is sand, which should be approximately 0.3 m thick.	0.5 m thick sand layer to promote infiltration to the water table.
Planting Strategy	The planting requirements for an infiltration trench are more aesthetic that functional. Planting with deep roots should be avoided since they can puncture the filter fabric at the top of the trench allowing native soil material to clog the gravel storage layer from above.	Deep rooted plants are not shown to be overtop of the infiltration trench.
Distribution Pipes	Water is conveyed into the storage layer by a series of perforated pipes.	Stormwater runoff is distributed/ conveyed through a series of perforated pipes.
Overflow/By-Pass Pipe	A by-pass pipe should be incorporated into the design of an underground infiltration trench to convey high flows around the trench.	Stormwater runoff greater than the capacity of the perforated pipe will by-pass the system through the on-site storm sewer.
Pre-Treatment	If the infiltration trench is being used to treat stormwater runoff from an entire site (including roads and parking lots), pre-treatment is necessary to minimize the potential for suspended sediments to clog the trench.	Pre-treatment catchbasins will reduce the potential for sedimentation and debris from clogging the trench

* Recommendations from Section 4.5.8 Infiltration Trenches of the MOE SWM Planning & Design Manual

APPENDIX G

Engineering Drawings





COVER (mm)	INSULATION THICKNESS (mm)
1800-1500	50
1500-1200	75
1200-900	100
900-600	125

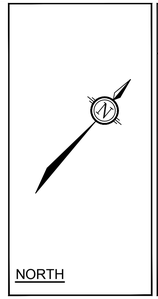
ti = THICKNESS OF INSULATION (mm)
h = DEPTH OF COVER
W = D + 300 (1000 min.)
W = WIDTH OF INSULATION (mm)
D = O.D OF PIPE (mm)

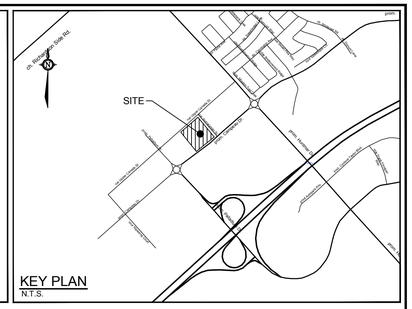
NOTES:

1. INSULATE ALL SEWER PIPES THAT HAVE LESS THAN 1.8m COVER WITH EXPANDED POLYSTYRENE INSULATION AS SHOWN.
2. THE THICKNESS OF INSULATION SHALL BE THE EQUIVALENT OF 25mm FOR EVERY 300mm REDUCTION IN THE REQUIRED DEPTH OF COVER (SEE TABLE)

PROPOSED STEPPED INSULATION DETAIL FOR SHALLOW SEWERS ONLY

NOT TO SCALE





LEGEND

- PROPERTY LINE
- PROPOSED STORM SEWER
- PROPOSED BARRIER CURB (15cm CURB HEIGHT)
- DC — DEPRESSED BARRIER CURB (0cm CURB HEIGHT)
- X — ABANDON/REMOVALS
- THERMAL INSULATION FOR SHALLOW SEWERS
- PROPOSED BUILDING ENTRANCE
- PROPOSED STORM CAP
- APPROXIMATE PONDING LIMITS
- RD-9 — PROPOSED ROOF DRAINS

- FFE — PROPOSED FINISHED FLOOR ELEVATION
- USF — UNDERSIDE OF FOOTING ELEVATION
- ICD — EXISTING INLET CONTROL DEVICE
- M W — EXISTING WATER METER AND REMOTE METER
- VB — EXISTING VALVE AND VALVEBOX
- EXISTING BUILDING ENTRANCE
- EX. SAMH-1 — EXISTING CONCRETE CURB
- EXISTING SANITARY MANHOLE AND SEWER
- EX. STMH-1 — EXISTING STORM MANHOLE AND SEWER
- EX.CB-Y — EXISTING CATCHBASIN C/W CATCHBASIN LEAD AND RADIAL SUBDRAIN
- 305mmØ WM — EXISTING WATERMAIN
- HYD — EXISTING HYDRANT
- EXISTING LANDSCAPE DRAIN

BENCHMARK NOTES:

1. ELEVATIONS ARE REFERENCED TO SITE BENCHMARK CONTROL POINT (SOUTH EAST CORNER HYDRANT TOP OF SPINDLE) HAVING A PUBLISHED ELEVATION OF 103.47m SHOWN ON THE JP2G SITE GRADING AND DRAINAGE, EROSION AND SEDIMENT CONTROL PLAN REV. 13 (IFC) DATED OCT19, 2015.
2. IT IS THE RESPONSIBILITY OF THE USER OF THIS INFORMATION TO VERIFY THAT THE SITE BENCHMARK HAS NOT BEEN ALTERED OR DISTURBED AND THAT ITS RELATIVE ELEVATION AND DESCRIPTION AGREES WITH THE INFORMATION SHOWN ON THIS DRAWING.
3. LEGAL INFORMATION WAS TAKEN FROM TOPOGRAPHIC PLAN OF SURVEY OF PART OF LOTS 3 AND 4 CONCESSION 1, IN THE TOWN OF HUNTLEY, CITY OF OTTAWA, SURVEYED BY STANTEC GEOMATICS LTD. (PLAN NO.: 4R-28323 DATED OCT 27, 2014).

GENERAL NOTES:

1. COORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
2. DETERMINE THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION. PROTECT AND ASSUME RESPONSIBILITY FOR ALL EXISTING UTILITIES WHETHER OR NOT SHOWN ON THIS DRAWING.
3. OBTAIN ALL NECESSARY PERMITS AND APPROVALS FROM THE CITY OF OTTAWA BEFORE COMMENCING CONSTRUCTION.
4. BEFORE COMMENCING CONSTRUCTION OBTAIN AND PROVIDE PROOF OF COMPREHENSIVE, ALL RISK AND OPERATIONAL LIABILITY INSURANCE FOR $5,000,000.00. INSURANCE POLICY TO NAME OWNERS, ENGINEERS AND ARCHITECTS AS CO-INSURED.
5. COMPLETE ALL WORKS IN ACCORDANCE WITH THE MOST CURRENT CITY OF OTTAWA STANDARDS AND SPECIFICATIONS USING THE CURRENT GUIDELINES, BYLAWS AND STANDARDS INCLUDING MATERIALS OF CONSTRUCTION, DISINFECTION AND ALL RELEVANT REFERENCES TO OPSS, OPSD & AWWA GUIDELINES - ALL CURRENT VERSIONS AND 'AS AMENDED'.
6. RESTORE ALL DISTURBED AREAS ON-SITE AND OFF-SITE, INCLUDING TRENCHES AND SURFACES ON PUBLIC ROAD ALLOWANCES TO EXISTING CONDITIONS OR BETTER TO THE SATISFACTION OF THE CITY OF OTTAWA AND ENGINEER.
7. REMOVE FROM SITE ALL EXCESS EXCAVATED MATERIAL, ORGANIC MATERIAL AND DEBRIS UNLESS OTHERWISE INSTRUCTED BY ENGINEER. EXCAVATE AND REMOVE FROM SITE ANY CONTAMINATED MATERIAL. ALL CONTAMINATED MATERIAL SHALL BE DISPOSED OF AT A LICENSED LANDFILL FACILITY.
8. ALL ELEVATIONS ARE GEODETIC.
9. REFER TO GEOTECHNICAL REPORT FOR PROPOSED DEVELOPMENT, CAMPEAU DRIVE AND PALLADIUM DRIVE, BLOCK 22, OTTAWA, ONTARIO, DATED FEBRUARY 2025, PREPARED BY STANTEC CONSULTING LTD., FOR SUBSURFACE CONDITIONS, CONSTRUCTION RECOMMENDATIONS, AND GEOTECHNICAL INSPECTION REQUIREMENTS. THE GEOTECHNICAL CONSULTANT IS TO REVIEW ON-SITE CONDITIONS AFTER EXCAVATION PRIOR TO PLACEMENT OF THE GRANULAR MATERIAL.
10. REFER TO ARCHITECT'S AND LANDSCAPE ARCHITECT'S DRAWINGS FOR BUILDING AND HARD SURFACE AREAS AND DIMENSIONS.
11. REFER TO THE DEVELOPMENT SERVICING STUDY & STORMWATER MANAGEMENT REPORT (R-2023-142) PREPARED BY NOVATECH.
12. SAW CUT AND KEY GRIND ASPHALT AT ALL ROAD CUTS AND ASPHALT TIE IN POINTS AS PER CITY OF OTTAWA STANDARDS (R10).
13. PROVIDE LINE / PARKING PAINTING AS REQUIRED PER THE ARCHITECTURAL SITE PLAN.

SEWER NOTES:

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

ITEM	SPEC. No.	REFERENCE
CATCHBASIN (600x600mm)	705.010	OPSD
STORM / SANITARY MANHOLE (1200mmØ)	701.010	OPSD
CB, FRAME & COVER	400.020	OPSD
STORM / CBMH MANHOLE FRAME AND COVER	401.010 - TYPE "B"	OPSD
WATERTIGHT MH FRAME AND COVER	401.030	OPSD
SEWER TRENCH	S6	CITY OF OTTAWA
STORM SEWER	CONC. 65-D (450mmØ or greater), PVC DR 35 (SMALLER THAN 450mmØ)	
CATCHBASIN LEAD	PVC DR 35	

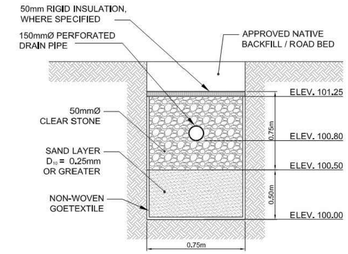
3. INSULATE ALL PIPES (STM) THAT HAVE LESS THAN 1.8m COVER WITH HI-40 INSULATION PER INSULATION DETAIL FOR SHALLOW SEWERS. PROVIDE 150mm CLEARANCE BETWEEN PIPE AND INSULATION.
4. PIPE BEDDING, COVER AND BACKFILL ARE TO BE COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY. THE USE OF CLEAR CRUSHED STONE AS A BEDDING LAYER SHALL NOT BE PERMITTED.
5. FLEXIBLE CONNECTIONS ARE REQUIRED FOR CONNECTING PIPES TO MANHOLES (FOR EXAMPLE KOR-N-SEAL, PSX: POSITIVE SEAL AND DURASEAL). THE CONCRETE CRADLE FOR THE PIPE CAN BE ELIMINATED.
6. THE OWNER SHALL REQUIRE THAT THE SITE SERVICING CONTRACTOR PERFORM FIELD TESTS FOR QUALITY CONTROL OF ALL SANITARY SEWERS. LEAKAGE TESTING SHALL BE COMPLETED IN ACCORDANCE WITH OPSS 410.07.16, 410.07.16.04 AND 407.07.24. DYE TESTING IS TO BE COMPLETED ON ALL SANITARY SERVICES TO CONFIRM PROPER CONNECTION TO THE SANITARY SEWER MAIN. THE FIELD TESTS SHALL BE PERFORMED IN THE PRESENCE OF A CERTIFIED PROFESSIONAL ENGINEER WHO SHALL SUBMIT A CERTIFIED COPY OF THE TEST RESULTS.
7. ALL STORM MANHOLES AND CATCHBASIN MANHOLES ARE TO HAVE 300mm SUMPS UNLESS OTHERWISE INDICATED. ALL CATCHBASINS ARE TO HAVE 600mm SUMPS.
8. ALL CATCHBASINS, MANHOLES AND/OR CATCHBASIN MANHOLES THAT ARE TO HAVE ICD'S INSTALLED WITHIN THEM ARE TO HAVE 600mm SUMPS.
9. PROPOSED BUILDING ADDITION WEEPING TILE TO BE CONNECTED TO EXISTING BUILDING WEEPING TILE.
10. CONTRACTOR TO TELEVISE (CCTV) ALL PROPOSED SEWERS, 200mmØ OR GREATER PRIOR TO BASE COURSE ASPHALT. UPON COMPLETION OF CONTRACT, THE CONTRACTOR IS RESPONSIBLE TO FLUSH AND CLEAN ALL SEWERS & APPURTENANCES.
11. CONTRACTOR TO PROVIDE THE CONSULTANT WITH A GENERAL PLAN OF SERVICES INDICATING ALL SERVICING AS-BUILT INFORMATION SHOWN ON THIS PLAN. AS-BUILT INFORMATION MUST INCLUDE: PIPE MATERIAL, SIZES, LENGTHS, SLOPES, INVERT AND T/G ELEVATIONS, STRUCTURE LOCATIONS, VALVE AND HYDRANT LOCATIONS, T/WM ELEVATIONS AND ANY ALIGNMENT CHANGES, ETC.

ROOF DRAIN TABLE

AREA ID *	ROOF DRAIN No. (WATTS MODEL)**	ROOF DRAIN OPENING SETTING	5-YEAR RELEASE RATE	APPROX. 5-YEAR PONDING DEPTH	100-YEAR RELEASE RATE	APPROX. 100-YR PONDING DEPTH
A-1.1	RD 1 (RD-100-A-ADJ)	CLOSED	0.32 L/s	8 cm	0.32 L/s	11 cm
	RD 2 (RD-100-A-ADJ)	**CLOSED**	**0.32 L/s**	8 cm	**0.32 L/s**	11 cm
	RD 3 (RD-100-A-ADJ)	CLOSED	0.32 L/s	8 cm	0.32 L/s	11 cm
	RD 4 (RD-100-A-ADJ)	CLOSED	0.32 L/s	8 cm	0.32 L/s	11 cm
	RD 5 (RD-100-A-ADJ)	CLOSED	0.32 L/s	8 cm	0.32 L/s	11 cm
	RD 6 (RD-100-A-ADJ)	CLOSED	0.32 L/s	8 cm	0.32 L/s	11 cm
	RD 7 (RD-100-A-ADJ)	CLOSED	0.32 L/s	8 cm	0.32 L/s	11 cm
	RD 8 (RD-100-A-ADJ)	CLOSED	0.32 L/s	8 cm	0.32 L/s	11 cm
	RD 9 (RD-100-A-ADJ)	**CLOSED**	**0.32 L/s**	8 cm	**0.32 L/s**	11 cm
	RD 10 (RD-100-A-ADJ)	CLOSED	0.32 L/s	8 cm	0.32 L/s	11 cm
	RD 11 (RD-100-A-ADJ)	CLOSED	0.32 L/s	7 cm	0.32 L/s	10 cm
	RD 12 (RD-100-A-ADJ)	CLOSED	0.32 L/s	7 cm	0.32 L/s	10 cm
	RD 13 (RD-100-A-ADJ)	**CLOSED**	**0.32 L/s**	7 cm	0.32 L/s	10 cm
	RD 14 (RD-100-A-ADJ)	CLOSED	0.32 L/s	7 cm	0.32 L/s	10 cm
	RD 15 (RD-100-A-ADJ)	CLOSED	0.32 L/s	7 cm	0.32 L/s	10 cm
	RD 16 (RD-100-A-ADJ)	CLOSED	0.32 L/s	0 cm	0.32 L/s	7 cm
	TOTAL CONTROLLED FLOW RATE		5.1 L/s		5.1 L/s	

* REFER TO THE 'DEVELOPMENT SERVICING STUDY AND STORMWATER MANAGEMENT REPORT' (R-2023-142) PREPARED BY NOVATECH FOR DRAINAGE AREA IDENTIFIERS AND STORMWATER MANAGEMENT DETAILS.

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



INFILTRATION TRENCH SECTION

NOT TO SCALE

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

OWNER INFORMATION
CARPENTERS UNION
8560 CAMPEAU DRIVE
KANATA, ONTARIO, K2T 0N7
JON BARON
PHONE: (613)-620-0213
E-MAIL: JBaron@ubcja.ca

No.	REVISION	DATE	BY
1	ISSUED FOR SITE PLAN CONTROL	FEB 28/25	FST

SCALE
1:400
1:400
0 4 8 12 16

DESIGN LP
CHECKED FST
DRAWN LP
CHECKED FST
APPROVED FST

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER
F.S. THAUVETTE
100041399
Feb 28, 2025
PROVINCE OF ONTARIO

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

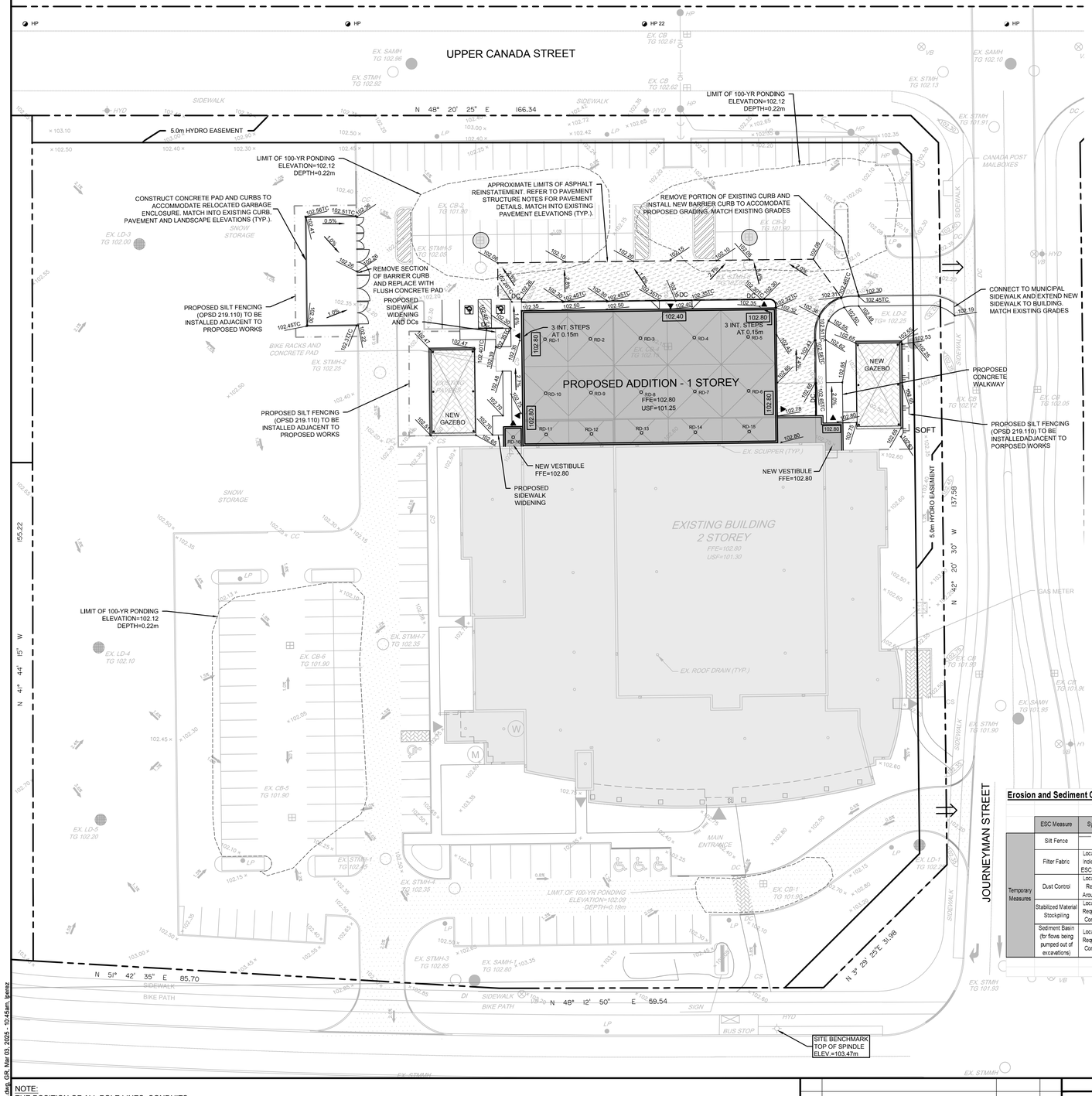
LOCATION
CITY OF OTTAWA
CARPENTERS UNION - 8560 CAMPEAU DRIVE

DRAWING NAME
GENERAL PLAN OF SERVICES

PROJECT No. 123082
REV REV # 1
DRAWING No. 123082-GP

M:\2023\123082\CAD\Civil\123082-GP.dwg, GP, Mar 03, 2025 - 8:57am, lperez

PLAN24x36LDWG - 914.4mmx609.6mm



LEGEND

- PROPERTY LINE
- 102.35 / 102.35 — PROPOSED ELEVATION / EXISTING ELEVATION
- 102.50TC — PROPOSED TOP OF CURB ELEVATION
- 102.80 — PROPOSED TERRACE ELEVATION
- 2.0% — GRADE AND DIRECTION
- EMERGENCY OVERLAND FLOW ROUTE
- PROPOSED BARRIER CURB
- DC — PROPOSED DEPRESSED CURB
- FFE — PROPOSED FINISHED FLOOR ELEVATION
- USF — UNDERSIDE OF FOOTING ELEVATION
- PROPOSED BUILDING ENTRANCE
- EXISTING GRADING PER JP2G DESIGN (BASED ON STREET No.3 PRELIMINARY GRADING PLAN BY IBI GROUP DATED JUNE 26, 2014)
- EXISTING ELEVATION PER JP2G DESIGN
- EXISTING SURFACE DRAINAGE PER JP2G DESIGN
- EXISTING BUILDING ENTRANCE
- HP — EXISTING HYDRO POLE AND ANCHOR
- OH — EXISTING HYDRO OVERHEAD WIRES
- LP — EXISTING LIGHT POLES(ONSITE)
- EXISTING CONCRETE CURB
- EX. SAMH-1 — EXISTING SANITARY MANHOLE
- EX. STMH-1 — EXISTING STORM MANHOLE
- EX. CB-3 — EXISTING CATCHBASIN
- HYD — EXISTING HYDRANT & VALVE
- EXISTING LANDSCAPE DRAIN
- FILTER BAG PER ESC NOTE #3
- PROPOSED SILT FENCING (OPSD 219.110)
- EXISTING ROOF DRAIN
- APPROXIMATE 'HEAVY DUTY' ASPHALT REINSTATEMENT LIMITS
- RD-6 — PROPOSED ROOF DRAINS
- APPROXIMATE SURFACE PONDING LIMITS

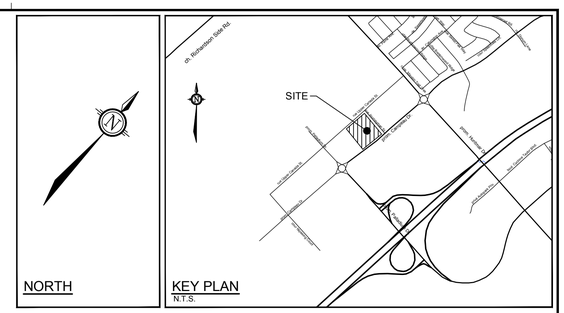
PAVEMENT STRUCTURES (PER PREVIOUS DESIGN):

LIGHT DUTY (PARKING STALLS)
50mm HL3 ASPHALTIC CONCRETE
150mm GRANULAR "A" BASE (CRUSHED LIMESTONE)
500mm GRANULAR "B" TYPE II SUB-BASE
*INSTALLED PER JP2G DESIGN

HEAVY DUTY (AISLES AND FIRE ROUTES)
40mm HL3 ASPHALTIC CONCRETE
50mm HL8 ASPHALTIC CONCRETE
150mm GRANULAR "A" BASE (CRUSHED LIMESTONE)
500mm GRANULAR "B" TYPE II SUB-BASE
*INSTALLED PER JP2G DESIGN

Erosion and Sediment Control Responsibilities:

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



GENERAL NOTES:

1. COORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
2. DETERMINE THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION. PROTECT AND ASSUME RESPONSIBILITY FOR ALL EXISTING UTILITIES WHETHER OR NOT SHOWN ON THIS DRAWING.
3. OBTAIN ALL NECESSARY PERMITS AND APPROVALS FROM THE CITY OF OTTAWA BEFORE COMMENCING CONSTRUCTION.
4. BEFORE COMMENCING CONSTRUCTION OBTAIN AND PROVIDE PROOF OF COMPREHENSIVE, ALL RISK AND OPERATIONAL LIABILITY INSURANCE FOR $5,000,000.00. INSURANCE POLICY TO NAME OWNERS, ENGINEERS AND ARCHITECTS AS CO-INSURED.
5. COMPLETE ALL WORKS IN ACCORDANCE WITH THE MOST CURRENT CITY OF OTTAWA STANDARDS AND SPECIFICATIONS USING THE CURRENT GUIDELINES, BYLAWS AND STANDARDS INCLUDING MATERIALS OF CONSTRUCTION, DISINFECTION AND ALL RELEVANT REFERENCES TO OPSS, OPSD & AWWA GUIDELINES - ALL CURRENT VERSIONS AND 'AS AMENDED'.
6. RESTORE ALL DISTURBED AREAS ON-SITE AND OFF-SITE, INCLUDING TRENCHES AND SURFACES ON PUBLIC ROAD ALLOWANCES TO EXISTING CONDITIONS OR BETTER TO THE SATISFACTION OF THE CITY OF OTTAWA AND ENGINEER.
7. REMOVE FROM SITE ALL EXCESS EXCAVATED MATERIAL, ORGANIC MATERIAL AND DEBRIS UNLESS OTHERWISE INSTRUCTED BY ENGINEER. EXCAVATE AND REMOVE FROM SITE ANY CONTAMINATED MATERIAL. ALL CONTAMINATED MATERIAL SHALL BE DISPOSED OF AT A LICENSED LANDFILL FACILITY.
8. ALL ELEVATIONS ARE GEODETIC.
9. REFER TO GEOTECHNICAL REPORT FOR PROPOSED DEVELOPMENT, CAMPEAU DRIVE AND PALLADIUM DRIVE, BLOCK 22, OTTAWA, ONTARIO, DATED FEBRUARY 2025, PREPARED BY STANTEC CONSULTING LTD., FOR SUBSURFACE CONDITIONS, CONSTRUCTION RECOMMENDATIONS, AND GEOTECHNICAL INSPECTION REQUIREMENTS. THE GEOTECHNICAL CONSULTANT IS TO REVIEW ON-SITE CONDITIONS AFTER EXCAVATION PRIOR TO PLACEMENT OF THE GRANULAR MATERIAL.
10. REFER TO ARCHITECT'S AND LANDSCAPE ARCHITECT'S DRAWINGS FOR BUILDING AND HARD SURFACE AREAS AND DIMENSIONS.
11. REFER TO THE DEVELOPMENT SERVICING STUDY & STORMWATER MANAGEMENT REPORT (R-2023-142) PREPARED BY NOVATECH.
12. SAW CUT AND KEY GRIND ASPHALT AT ALL ROAD CUTS AND ASPHALT TIE IN POINTS AS PER CITY OF OTTAWA STANDARDS (R10).
13. PROVIDE LINE / PARKING PAINTING AS REQUIRED PER THE ARCHITECTURAL SITE PLAN.

GRADING NOTES:

1. ALL TOPSOIL, ORGANIC OR DELETERIOUS MATERIAL MUST BE ENTIRELY REMOVED FROM BENEATH THE PROPOSED BUILDING PAVED AREAS AS DIRECTED BY THE SITE ENGINEER OR GEOTECHNICAL ENGINEER.
2. EXPOSED SUBGRADES IN PROPOSED PAVED AREAS SHOULD BE PROOF ROLLED WITH A LARGE STEEL DRUM ROLLER AND INSPECTED BY THE GEOTECHNICAL ENGINEER PRIOR TO THE PLACEMENT OF GRANULARS.
3. ANY SOFT AREAS EVIDENT FROM THE PROOF ROLLING SHOULD BE SUB-EXCAVATED AND REPLACED WITH SUITABLE MATERIAL THAT IS FROST COMPATIBLE WITH THE EXISTING SOILS AS RECOMMENDED BY THE GEOTECHNICAL ENGINEER.
4. THE GRANULAR BASE SHOULD BE COMPACTED TO AT LEAST 100% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY VALUE. ANY ADDITIONAL GRANULAR FILL USED BELOW THE PROPOSED PAVEMENT SHOULD BE COMPACTED TO AT LEAST 100% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY VALUE.
5. MINIMUM OF 2% GRADE FOR ALL GRASS AREAS UNLESS OTHERWISE NOTED.
6. MAXIMUM TERRACING GRADE TO BE 3:1 UNLESS OTHERWISE NOTED.
7. ALL GRADES BY CURBS ARE EDGE OF PAVEMENT GRADES UNLESS OTHERWISE INDICATED.
8. CONCRETE BARRIER CURBS ARE TO BE CONSTRUCTED PER CITY OF OTTAWA STANDARDS (SC1.1) AT A HEIGHT OF 150mm AND ALL DEPRESSIONS ARE TO BE CONSTRUCTED FLUSH.
9. REFER TO LANDSCAPE PLAN FOR PLANTING AND OTHER LANDSCAPE FEATURE DETAILS.
10. CONTRACTOR TO PROVIDE THE CONSULTANT WITH A GRADING PLAN INDICATING AS-BUILT ELEVATIONS OF ALL DESIGN GRADES SHOWN ON THIS PLAN.

EROSION AND SEDIMENT CONTROL NOTES :

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

1. ALL EROSION AND SEDIMENT CONTROLS ARE TO BE INSTALLED TO THE SATISFACTION OF THE ENGINEER AND THE CITY OF OTTAWA, THEY ARE TO BE APPROPRIATE TO THE SITE CONDITIONS, PRIOR TO UNDERTAKING ANY SITE ALTERATIONS (FILLING, GRADING, REMOVAL OF VEGETATION, ETC.) AND DURING ALL PHASES OF SITE PREPARATION AND CONSTRUCTION. THESE PRACTICES ARE TO BE IMPLEMENTED IN ACCORDANCE WITH THE CURRENT BEST MANAGEMENT PRACTICES FOR EROSION AND SEDIMENT CONTROL AND SHOULD INCLUDE AS A MINIMUM THOSE MEASURES INDICATED ON THE PLAN.
2. EROSION AND SEDIMENT CONTROL MEASURES WILL BE IMPLEMENTED DURING CONSTRUCTION IN ACCORDANCE WITH THE "GUIDELINES ON EROSION AND SEDIMENT CONTROL FOR URBAN CONSTRUCTION SITES" (GOVERNMENT OF ONTARIO, MAY 1987). THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR MEETING ALL REGULATORY AGENCY REQUIREMENTS.
3. TO PREVENT SURFACE EROSION FROM ENTERING ANY STORM SEWER SYSTEM DURING CONSTRUCTION, CATCHBASIN INSERTS (FILTER BAGS) WILL BE PLACED WITHIN SURFACE CATCHBASINS AND STRUCTURES. A LIGHT DUTY SILT FENCE BARRIER WILL ALSO BE INSTALLED AROUND THE CONSTRUCTION AREA (WHERE APPLICABLE). THESE CONTROL MEASURES WILL REMAIN IN PLACE UNTIL CONSTRUCTION IS COMPLETE.
4. TO LIMIT EROSION: MINIMIZE THE AMOUNT OF EXPOSED SOILS AT ANY GIVEN TIME, RE-VEGETATE EXPOSED AREAS AND SLOPES AS SOON AS POSSIBLE AND PROTECT EXPOSED SLOPES WITH NATURAL OR SYNTHETIC MULCHES.
5. FOR MATERIAL STOCKPILING: MINIMIZE THE AMOUNT OF EXPOSED MATERIALS AT ANY GIVEN TIME; APPLY TEMPORARY SEEDING, TARPS, COMPACTION AND/OR SURFACE ROUGHENING AS REQUIRED TO STABILIZE STOCKPILED MATERIALS THAT WILL NOT BE USED WITHIN 14 DAYS.
6. THE SEDIMENT CONTROL MEASURES SHALL ONLY BE REMOVED WHEN, IN THE OPINION OF THE ENGINEER, THE MEASURES ARE NO LONGER REQUIRED. NO CONTROL MEASURES MAY BE PERMANENTLY REMOVED WITHOUT PRIOR AUTHORIZATION FROM THE ENGINEER.
7. THE CONTRACTOR SHALL IMMEDIATELY REPORT TO THE ENGINEER ANY ACCIDENTAL DISCHARGES OF SEDIMENT MATERIAL INTO ANY STORM SEWER SYSTEM. APPROPRIATE RESPONSE MEASURES, INCLUDING ANY REPAIRS TO EXISTING CONTROL MEASURES OR THE IMPLEMENTATION OF ADDITIONAL CONTROL MEASURES, SHALL BE CARRIED OUT BY THE CONTRACTOR WITHOUT DELAY.
8. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.
9. ROADWAYS ARE TO BE SWEPT AS REQUIRED OR AS DIRECTED BY THE ENGINEER AND/OR THE MUNICIPALITY.
10. THE CONTRACTOR SHALL ENSURE PROPER DUST CONTROL IS PROVIDED WITH THE APPLICATION OF WATER (AND IF REQUIRED, CALCIUM CHLORIDE) DURING DRY PERIODS. MONITOR DUST LEVELS DURING SITE PREPARATION/EXCAVATION, AND CONSTRUCTION ACTIVITIES, AND WHEN DUST LEVELS BECOME VISUALLY APPARENT SPRAY WATER TO MINIMIZE THE RELEASE OF DUST FROM GRAVEL, PAVED AREAS AND EXPOSED SOILS. USE CHEMICAL DUST SUPPRESSANTS ONLY WHERE NECESSARY ON PROBLEM AREAS.

BENCHMARK NOTES:

1. ELEVATIONS ARE REFERENCED TO SITE BENCHMARK CONTROL POINT (SOUTH EAST CORNER HYDRANT TOP OF SPINDLE) HAVING A PUBLISHED ELEVATION OF 103.47m SHOWN ON THE JP2G SITE GRADING AND DRAINAGE, EROSION AND SEDIMENT CONTROL PLAN REV. 13 (IFC) DATED OCT19, 2015.
2. IT IS THE RESPONSIBILITY OF THE USER OF THIS INFORMATION TO VERIFY THAT THE SITE BENCHMARK HAS NOT BEEN ALTERED OR DISTURBED AND THAT ITS RELATIVE ELEVATION AND DESCRIPTION AGREES WITH THE INFORMATION SHOWN ON THIS DRAWING.
3. LEGAL INFORMATION WAS TAKEN FROM TOPOGRAPHIC PLAN OF SURVEY OF PART OF LOTS 3 AND 4 CONCESSION 1, IN THE TOWN OF HUNTLEY, CITY OF OTTAWA, SURVEYED BY STANTEC GEOMATICS LTD. (PLAN NO.: 4R-28323 DATED OCT 27, 2014).

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

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No.	REVISION	DATE	BY
1	ISSUED FOR SPC APPLICATION	FEB 28/25	FST

SCALE: 1:400 (1:400 0 4 8 12 16)

DESIGN: LP
CHECKED: FST
DRAWN: LP
CHECKED: FST
APPROVED: FST

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER — F.S. THAUVETTE — 100041590 — Feb 28, 2025 — PROVINCE OF ONTARIO

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LOCATION
CITY OF OTTAWA
CARPENTERS UNION - 8560 CAMPEAU DRIVE

DRAWING NAME
GRADING AND EROSION & SEDIMENT CONTROL PLAN

PROJECT No. 123082
REV REV # 1
DRAWING No. 123082-GR

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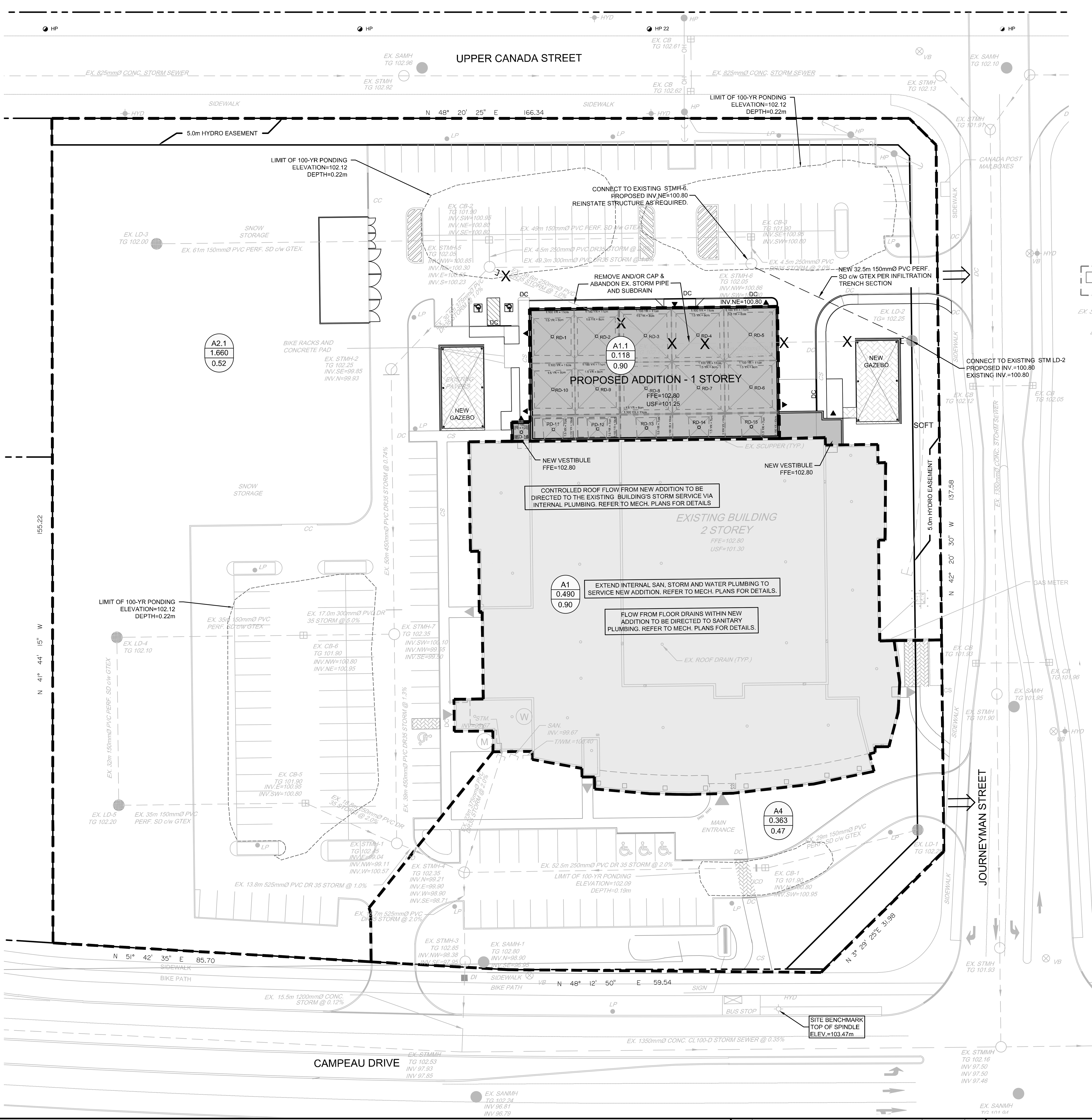
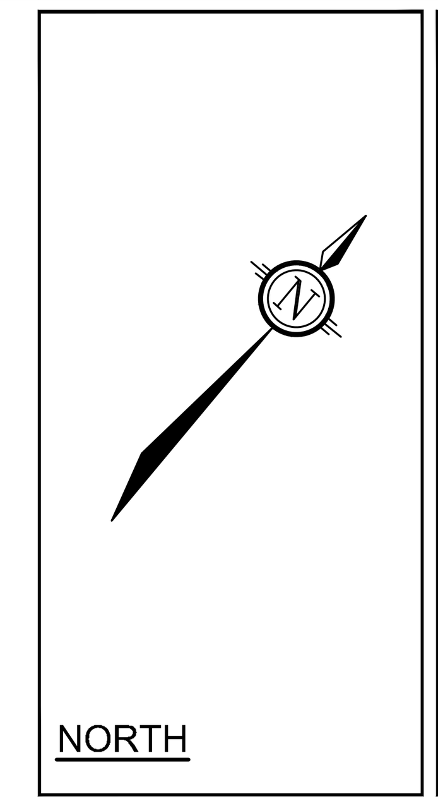
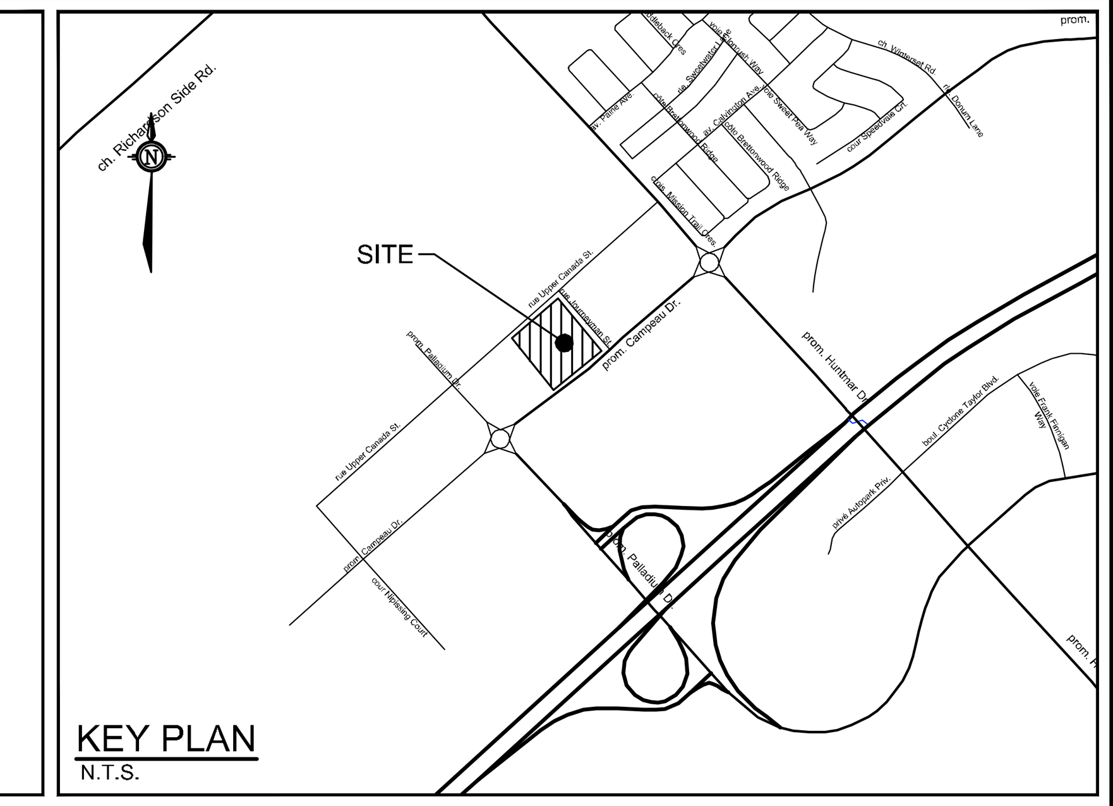
PLAN(ANSI_D).DWG - 3714.4mm x 609.6mm







LEGEND

- PROPERTY LINE
- POST / 1.000 / 0.50 — POST-DEVELOPMENT AREA ID; POST-DEVELOPMENT DRAINAGE AREA (ha); 1:5 YEAR WEIGHTED RUNOFF COEFICIENT
- DRAINAGE AREA LIMITS
- EMERGENCY OVERLAND FLOW ROUTE
- PROPOSED BUILDING ENTRANCE
- FFE — PROPOSED FINISHED FLOOR ELEVATION
- USF — PROPOSED UNDERSIDE OF FOOTING ELEVATION
- RD-6 — PROPOSED ROOF DRAINS
- APPROXIMATE SURFACE PONDING LIMITS
- APPROXIMATE PONDING LIMITS
- EX. STMH-1 — EXISTING STORM MANHOLE AND SEWER
- EX. CB-1 — EXISTING CATCHBASIN C/W CATCHBASIN LEAD
- EXISTING LANDSCAPE DRAIN
- X — ABANDON/REMOVALS
- PROPOSED STORM SEWER

GENERAL NOTES:

1. COORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
2. DETERMINE THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION. PROTECT AND ASSUME RESPONSIBILITY FOR ALL EXISTING UTILITIES WHETHER OR NOT SHOWN ON THIS DRAWING.
3. ALL ELEVATIONS ARE GEODETIC.
4. REFER TO THE DETAILED GEOTECHNICAL INVESTIGATION REPORT (PROJECT NO. 121626324, DATED FEBRUARY 2025), PREPARED BY STANTEC CONSULTING LTD., FOR SUBSURFACE CONDITIONS, CONSTRUCTION RECOMMENDATIONS, AND GEOTECHNICAL INSPECTION REQUIREMENTS. THE GEOTECHNICAL CONSULTANT IS TO REVIEW ON-SITE CONDITIONS AFTER EXCAVATION PRIOR TO PLACEMENT OF THE GRANULAR MATERIAL.
5. REFER TO THE DEVELOPMENT SERVICING STUDY & STORMWATER MANAGEMENT REPORT (R-2023-142) PREPARED BY NOVATECH.

BENCHMARK NOTES:

1. ELEVATIONS ARE REFERENCED TO SITE BENCHMARK CONTROL POINT (SOUTH EAST CORNER HYDRANT TOP OF SPINDLE) HAVING A PUBLISHED ELEVATION OF 103.47m SHOWN ON THE JP2G SITE GRADING AND DRAINAGE, EROSION AND SEDIMENT CONTROL PLAN REV. 13 (IFC) DATED OCT19, 2015.
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PROPOSED SITE FLOWS & STORMWATER MANAGEMENT TABLE

DESIGN EVENT	EXISTING CONDITIONS		POST-DEVELOPMENT CONDITIONS				
	CONTROLLED AND UNCONTROLLED FLOWS (L/s)	ALLOWABLE RELEASE RATE (L/s)	A1 FLOW (L/s)	A1.1 FLOW (L/s)	A2.1 FLOW (L/s)	A-4 FLOW (L/s)	TOTAL FLOW (L/s)
1:5 YR	469.5	570.0	100.0	5.1	321.7	49.4	476.3*
1:100 YR	550.0		100.0	5.1	371.9	80.0	557.0

*TABLE REPRESENTS ROUNDED VALUES.

ROOF DRAIN TABLE

AREA ID *	ROOF DRAIN No. (WATTS MODEL)**	ROOF DRAIN OPENING SETTING	5-YEAR RELEASE RATE	APPROX. 5-YEAR PONDING DEPTH	100-YEAR RELEASE RATE	APPROX. 100-YR PONDING DEPTH
A-1.1	RD 1 (RD-100-A-ADJ)	CLOSED	0.32 L/s	8 cm	0.32 L/s	11 cm
	RD 2 (RD-100-A-ADJ)	CLOSED	0.32 L/s	8 cm	0.32 L/s	11 cm
	RD 3 (RD-100-A-ADJ)	CLOSED	0.32 L/s	8 cm	0.32 L/s	11 cm
	RD 4 (RD-100-A-ADJ)	CLOSED	0.32 L/s	8 cm	0.32 L/s	11 cm
	RD 5 (RD-100-A-ADJ)	CLOSED	0.32 L/s	8 cm	0.32 L/s	11 cm
	RD 6 (RD-100-A-ADJ)	CLOSED	0.32 L/s	8 cm	0.32 L/s	11 cm
	RD 7 (RD-100-A-ADJ)	CLOSED	0.32 L/s	8 cm	0.32 L/s	11 cm
	RD 8 (RD-100-A-ADJ)	CLOSED	0.32 L/s	8 cm	0.32 L/s	11 cm
	RD 9 (RD-100-A-ADJ)	CLOSED	0.32 L/s	8 cm	0.32 L/s	11 cm
	RD 10 (RD-100-A-ADJ)	CLOSED	0.32 L/s	8 cm	0.32 L/s	11 cm
	RD 11 (RD-100-A-ADJ)	CLOSED	0.32 L/s	7 cm	0.32 L/s	10 cm
	RD 12 (RD-100-A-ADJ)	CLOSED	0.32 L/s	7 cm	0.32 L/s	10 cm
	RD 13 (RD-100-A-ADJ)	CLOSED	0.32 L/s	7 cm	0.32 L/s	10 cm
	RD 14 (RD-100-A-ADJ)	CLOSED	0.32 L/s	7 cm	0.32 L/s	10 cm
	RD 15 (RD-100-A-ADJ)	CLOSED	0.32 L/s	7 cm	0.32 L/s	10 cm
	RD 16 (RD-100-A-ADJ)	CLOSED	0.32 L/s	0 cm	0.32 L/s	7 cm
	TOTAL CONTROLLED FLOW RATE		5.1 L/s	-	5.1 L/s	-

* REFER TO THE 'DEVELOPMENT SERVICING STUDY AND STORMWATER MANAGEMENT REPORT' (R-2023-142) PREPARED BY NOVATECH FOR DRAINAGE AREA IDENTIFIERS AND STORMWATER MANAGEMENT DETAILS.

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

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No.	REVISION	DATE	BY
1	ISSUED FOR SITE PLAN CONTROL	FEB 28/25	FST

SCALE 1:400

DESIGN	LP
CHECKED	FST
DRAWN	LP
CHECKED	FST
APPROVED	FST

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER F.S. THAUVETTE 100041399 Feb 28, 2025 PROVINCE OF ONTARIO

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LOCATION
CITY OF OTTAWA
CARPENTER'S UNION

DRAWING NAME
POST-DEVELOPMENT STORMWATER MANAGEMENT PLAN

PROJECT No. 123082
REV: REV # 1
DRAWING No. 123082-SWM

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