NOVATECH

Engineers, Planners & Landscape Architects

Engineering

Land/Site Development

Municipal Infrastructure

Environmental/ Water Resources

Traffic/ Transportation

Recreational

Planning

Land/Site Development

Planning Application Management

Municipal Planning

Urban Design

Expert Witness (LPAT)

Wireless Industry

Landscape Architecture

Streetscapes & Public Amenities

Open Space, Parks & Recreation

Community & Residential

Commercial & Institutional

Environmental Restoration

PROPOSED WAREHOUSE DEVELOPMENT 405 HUNTMAR DRIVE

Site Servicing and Stormwater Management Report

39 Years

Prepared for: ROSEFELLOW

Engineering excellence. Planning progress. Liveable landscapes.

PROPOSED WAREHOUSE DEVELOPMENT

405 HUNTMAR DRIVE

OTTAWA ONTARIO

SITE SERVICING AND STORMWATER MANAGEMENT REPORT

Prepared By:

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

Issued: December 16, 2022
Revised: March 30, 2023

Novatech File: 122151
Ref: R-2022-209

March 30, 2023

City of Ottawa
Planning Infrastructure and Economic Development Department
110 Laurier Avenue West, 4th Floor
Ottawa, ON
K1P 1J1

Attention: **Kelly Livingstone**

Reference: **Proposed Warehouse Development**
405 Huntmar Drive, Ottawa
Site Servicing and Stormwater Management Report
Our File No.: 122151

Please find enclosed the revised 'Site Servicing and Stormwater Management Report' for the above noted project. This report is prepared in support of the Site Plan Application and is hereby submitted for review and approval.

Should you have any questions or comments, please do not hesitate to contact us.

Yours truly,

NOVATECH

Drew Blair, P. Eng
Senior Project Manager

cc: Julian Nini, Rosefellow

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

Table of Contents

TABLES

FIGURES

APPENDICES

DRAWINGS

1.0 INTRODUCTION

Novatech has been retained to prepare a Site Servicing and Stormwater Management Report for the proposed development located at 405 Huntmar Drive within Ottawa, Ontario. This report will support a Site Plan Application for the proposed development.

Figure 1 – Key Plan shows the site location in respect to Kanata West.

This report outlines the site sanitary and water servicing along with the proposed storm drainage and stormwater management strategy for the proposed development.

1.1 Existing Conditions

The total site area is approximately 8.67 hectares in size and is located within the Kanata West Business Park (KWBP) Development north of the Highway 417 and Palladium Drive interchange. The KWBP is located in and follows the design criteria outlined in the Kanata West Master Servicing Study (KWMSS). Within the KWPB development, the proposed site is northwest of the Huntmar Drive and Campeau Drive roundabout. The site is described as Part of Lot 4, Concession 1, Geographic Township of Huntley (PIN 045080173) and has a municipal address of 405 Huntmar Drive. The site is bounded by Huntmar Drive to the east, Campeau Drive to the south, Journeyman Street to the west, and private agricultural/residential lands to the north. The topography of the site slopes north-easterly towards Huntmar Drive.

Figure 2 – Existing Conditions Plan highlights the site's existing conditions.

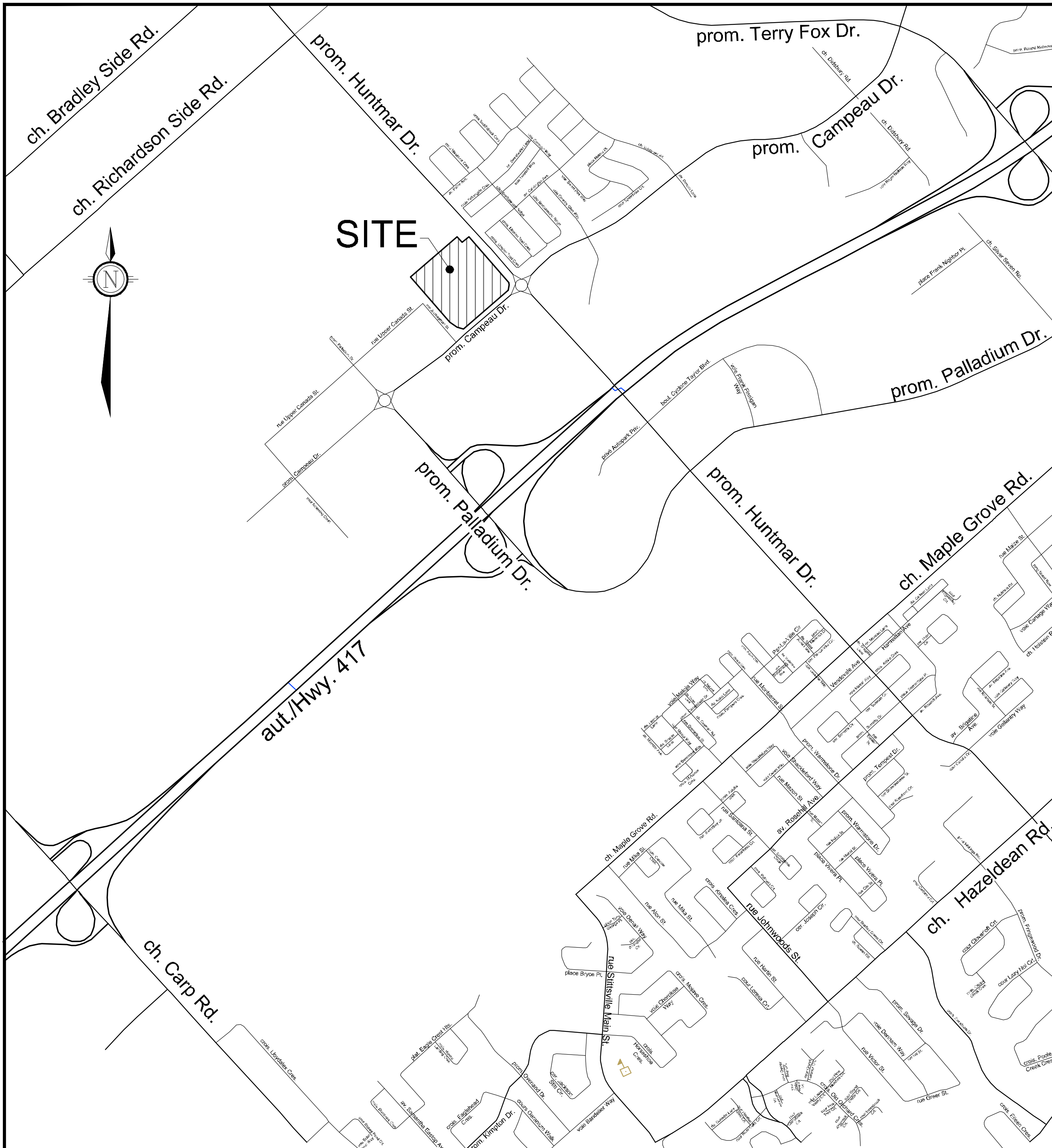
It should be noted that the Kanata West Business Park Development has been designed, approved, and constructed to provide sanitary, storm and water servicing including stormwater management for the subject site.

1.2 Proposed Development

The proposed development consists of two (2) large warehouses (Building A and Building B), associated truck loading docks and surface parking lots. The proposed warehouse buildings will cover approximately 4.47 hectares of the 8.67 hectare site. Access to the site will be provided by two (2) entrances from Journeyman Street, a right in/right out entrance on Huntmar Drive and a full entrance on Huntmar Drive. The full movement entrance on Huntmar Drive requires some median removal and line painting and is included in a Road Modification Approval (RMA) application. **Figure 3** – Concept Plan presents the proposed warehouse development.

This report should be read in conjunction with the following engineering drawing set which can be found in **Appendix F**:

122151-NLD1	Notes, Legends, and Details
122151-NLD2	Notes, Legends, and Details
122151-ESC	Erosion and Sediment Control Plan
122151-GP1	General Plan of Services
122151-GP2	General Plan of Services
122151-PR1	Plan and Profile Off-Site Watermain Extension Station 5+000 to 5+100
122151-GR1	Grading Plan
122151-GR2	Grading Plan
122151-SWM	Post-Development Stormwater Management Plan



M:\2022\122151\CAD\Civil\Figures\122151-FIG.dwg, FIG 1-KP, Mar 30, 2023 - 1:14pm, smatthews

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

405 HUNTMAR DRIVE

KEY PLAN

SCALE: NOT TO SCALE

DATE	JOB	FIGURE
MAR 2023	122151	FIGURE 1

SHT8X11.DWG - 216mmx279mm

M:\2022\122151\CAD\Civil\Figures\122151-FIG.dwg, FIG 2-ECDN, Mar 30, 2023 - 1:16pm, smatthews

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

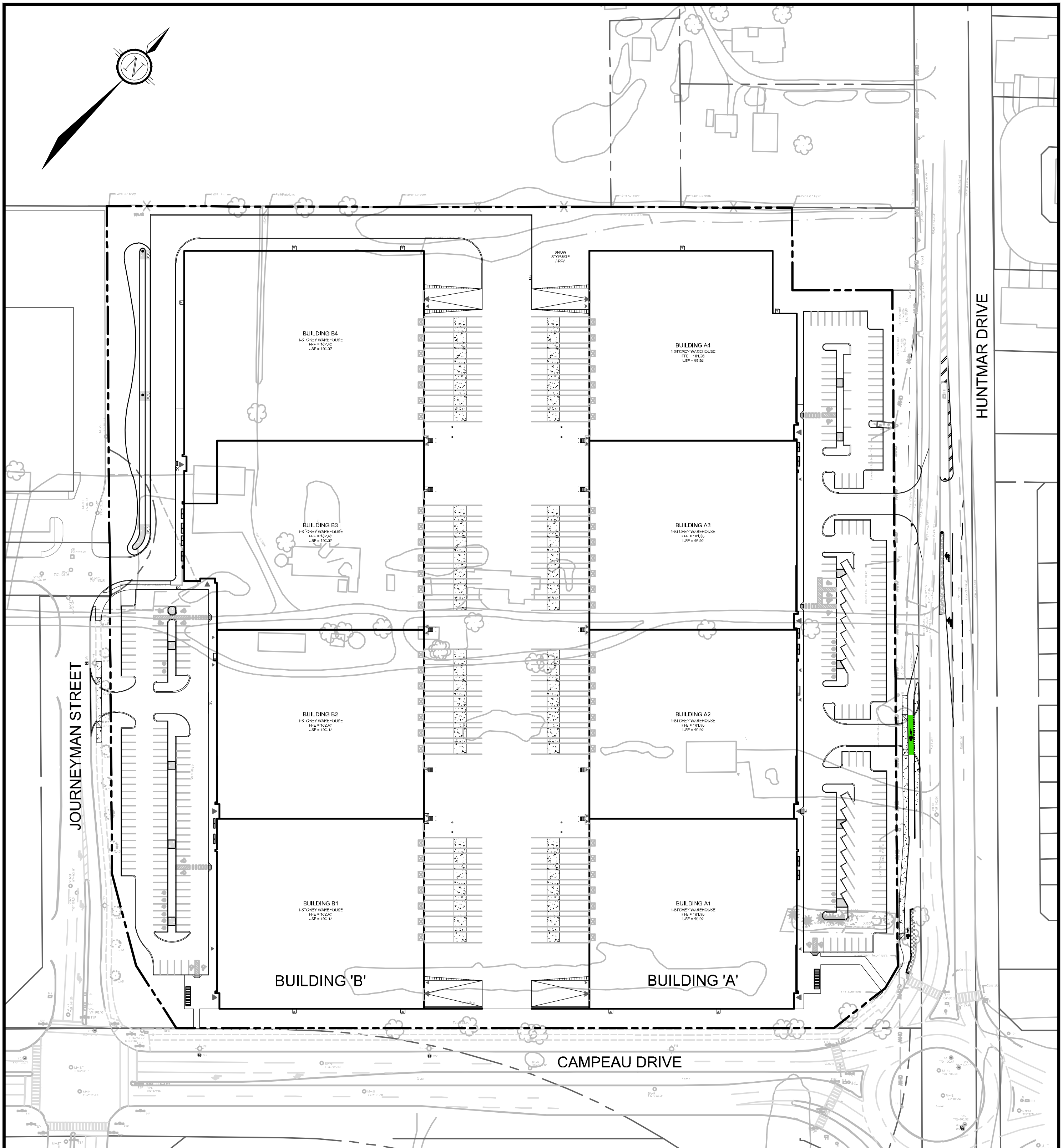
405 HUNTMAR DRIVE

EXISTING CONDITIONS PLAN

SCALE 1 : 2000 (0 20 40 60 80)

DATE	JOB	FIGURE
MAR 2023	122151	FIGURE 2

SHT8X11.DWG - 216mmx279mm



M:\2022\122151\CAD\Civil\Figures\122151-FIG.dwg, FIG 3-Concept, Mar 30, 2023 - 1:22pm, smatthews

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

405 HUNTMAR DRIVE

CONCEPT PLAN

SCALE 1 : 2000 (0, 20, 40, 60, 80)		
DATE MAR 2023	JOB 122151	FIGURE FIGURE 3

SHT8X11.DWG - 216mmx279mm

1.3 Site Design and Constraints

As indicated previously, the subject site is part of the Kanata West Business Park (KWBP). Design criteria and information for the KWBP is provided in the report *'Kanata West Business Park Design Brief – Phase 5'* prepared by IBI Group dated October, 2019. The KWBP report follows recommendations and design constraints from the Kanata West Master Servicing Study (KWMSS) dated June 2006. This site servicing report conforms to design criteria and constraints based on the KWBP Design Brief for each sewer and watermain system. Design criteria and constraints for each system are discussed in more detail in the appropriate sections of this report.

1.4 Geotechnical Investigation

The report titled *'Geotechnical Investigation Proposed Warehouse Buildings'* prepared by Paterson Group Rev.#2 dated March 21, 2023, provides geotechnical recommendations for the proposed development. A summary of the geotechnical investigation's findings are as follows:

- The ground surface across the site is generally flat and at grade with neighboring roads and properties.
- The site consists of a topsoil and/or fill underlain by a thick silty clay deposit. The thickness of the fill layer ranges between 0.5m to 1.8m. The silty clay deposit consists of an upper layer of very stiff to stiff brown crust followed by a stiff to firm grey silty clay.
- Bedrock information is based on available geological mapping of the site's location. The bedrock consists of interbedded limestone and shale of the Verulam formation with overburden drift thickness of 15m to 25m.
- Long-term groundwater levels are estimated to be at depths of 3m to 4m below existing grade.
- A permissible grade raise restriction of 2.0m is recommended for the site.
- Two tree planting setback areas were identified. Area 1 has high sensitivity clay soils and Area 2 has low/medium sensitivity clay soils. For each area, the tree planting recommendations and a plan showing the two areas is included in the geotechnical investigation.

The report provides engineering guidelines based on Paterson Group's interpretation of the geotechnical information and project requirements. Refer to the Geotechnical Investigation for complete details.

1.5 Consultations and Approvals

The proposed site plan was presented at a pre-consultation meeting with the City of Ottawa on September 27, 2022. Notes from the meeting were received and incorporated into the site plan submission. The pre-consultation notes are included in **Appendix A**.

As part of the site plan approval process, the Mississippi Valley Conservation Authority (MVCA) will be included in the circulation by the City of Ottawa for review and comments. Clearance from the MVCA will be required as part of the site plan approval process.

Following site plan approval, an Environmental Compliance Approval (ECA) application may be submitted for approval (if required) to the Ministry of the Environment, Conservation and Parks (MECP). An ECA may be required as the subject site is zoned as an industrial development and may not qualify for an ECA exemption. The ECA requirement to be reviewed with the City.

1.6 Background Reports

This report provides information on the considerations and approach by which Novatech has designed and evaluated the proposed servicing and stormwater management strategies. This report should be read in conjunction with the following:

- Kanata West Master Servicing Study, Ottawa ON, prepared by Stantec Consulting and CCL/IBI Group, June, 2006.
- Design Brief, Kanata West Business Park – Phase 5, 425 Huntmar Drive, Ottawa, ON, prepared by IBI Group dated October, 2019.
- Geotechnical Investigation, Proposed Warehouse Buildings, Campeau Drive and Huntmar Drive, Ottawa, ON, prepared by Paterson Group Rev. #2 dated March 21, 2023.

2.0 WATER SERVICING

2.1 Introduction

The municipal watermain network for the general area surrounding this site was designed as part of the Kanata West Business Park (KWBP) development. As part of that design, the KWBP and the Kanata West Master Servicing Study (KWMSS) recommended that a 600mm watermain be extended across Highway 417 to provide adequate water supply for the KWBP. This 600mm watermain has been installed.

As part of the KWBP, the watermain network has been constructed to service the entire business park with two connections to the existing 600mm Huntmar Drive watermain. The first connection is a 300mm watermain within the Huntmar and Campeau Drive roundabout. The second connection is a 200mm watermain directly servicing the Tanger Site.

The original KWBP plans indicates a 300mm watermain extended north on Huntmar Drive and a 200mm watermain west on Upper Canada Street connecting to Journeyman Street. The current design will not be providing the municipal Upper Canada ROW connection from Journeyman Street to Huntmar Drive. A watermain connection from Journeyman Street to Huntmar Drive is required by the City of Ottawa to provide a looped system to the KWBP that does not operate through the private Tanger Outlets site. Following discussions with the City of Ottawa, a looped watermain connection will be provided through the proposed site and north on Huntmar Drive to Fallengale Crescent.

A copy of the Kanata West Business Park (KWBP) Proposed Water Distribution Plan is included in **Appendix B.**

2.2 Proposed Watermain System

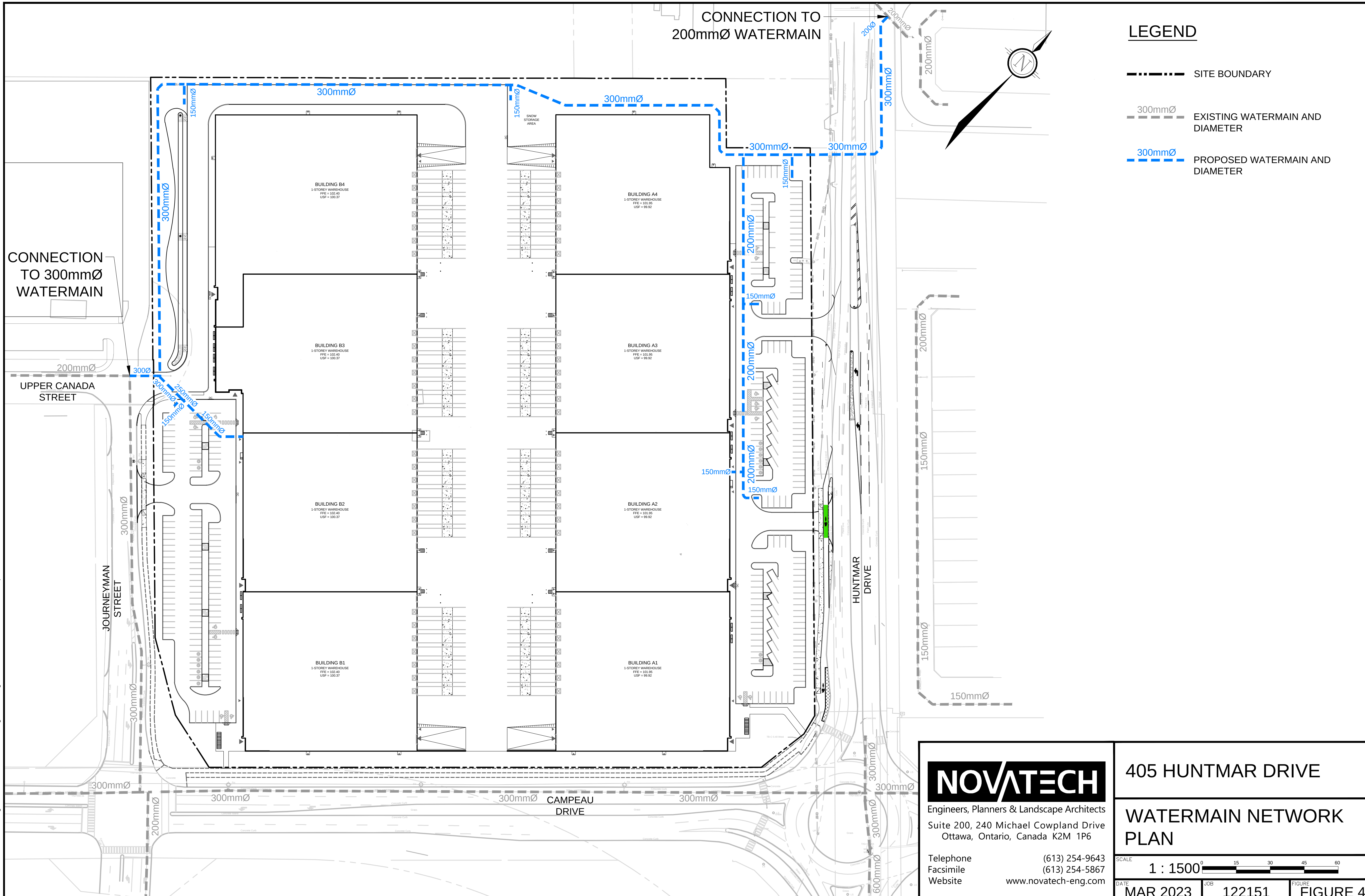
Water servicing for the proposed development includes both onsite and offsite watermain works. A 300mm watermain will be provided on-site from Journeyman Street, along the north edge of the site to Huntmar Drive. The 300mm watermain will proceed off-site and cross Huntmar Drive and be extended northwards to connect to the existing 200mm watermain at the end of Fallengale Crescent. The 300mm watermain will be located in a 6m wide easement on-site. The easement will be in favour of the City of Ottawa and will allow for any future maintenance and/or repairs. Individual 200mm and 250mm watermains will be extended on-site from the 300mm watermain to supply each building as well as private fire hydrants.

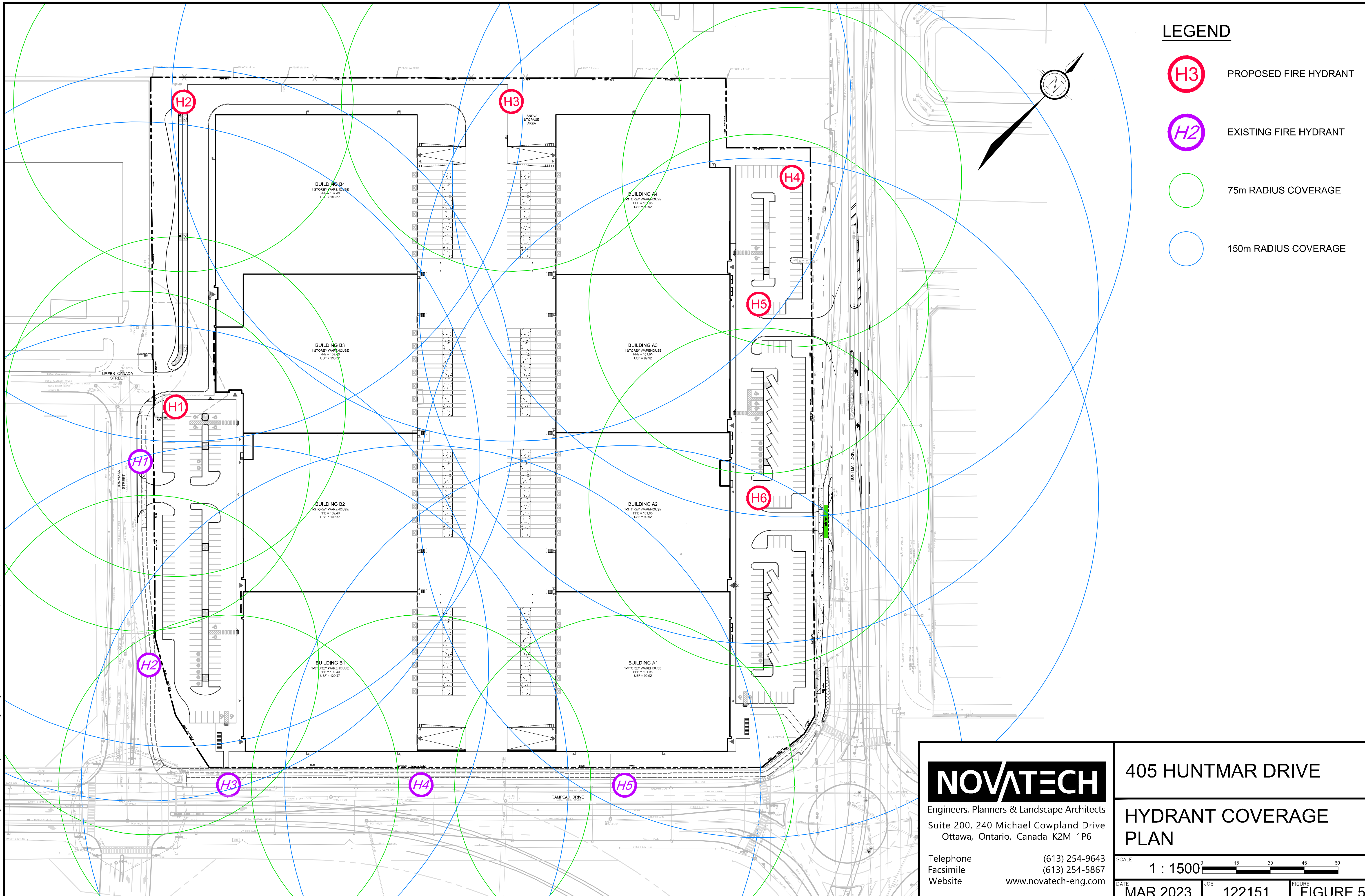
Refer to **Figure 4** – Watermain Network Plan for details.

There are six (6) on-site fire hydrants to service the proposed development. Additionally, there are five (5) existing hydrants that surround the proposed site with two (2) on Journeyman Street and three (3) on Campeau Drive. The location and details of the proposed hydrants are illustrated on the drawings **122151-GP1** and **122151-GP2** in **Appendix F**. The combination of the proposed and existing hydrants will be sufficient to service the entire site based on a 150m radius from each hydrant as shown on **Figure 5** – Hydrant Coverage Plan. Each building will be provided with sprinklers and supplied with fire department (siamese) connections.

2.2.1 Proposed Domestic Water Demands

Design criteria from the City of Ottawa Water Distribution Guidelines and Section 8 of the Ontario Building Code (OBC) were used to calculate the theoretical water demands for the proposed development. The demand calculations are based on flow requirements from the proposed uses on site.


CONNECTION TO
200mmØ WATERMAIN
CONNECTION
TO 300mmØ
WATERMAIN
LEGEND
SITE BOUNDARY
300mmØ
EXISTING WATERMAIN AND
DIAMETER
300mmØ
PROPOSED WATERMAIN AND
DIAMETER
300mmØ
150mmØ
200mmØ
250mmØ
UPPER CANADA
STREET
JOURNEYMAN
STREET
HUNTMAR
DRIVE
CAMPEAU
DRIVE
BUILDING B4
BUILDING B3
BUILDING B2
BUILDING B1
BUILDING A4
BUILDING A3
BUILDING A2
BUILDING A1
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
405 HUNTMAR DRIVE
WATERMAIN NETWORK
PLAN
SCALE
1 : 1500
DATE
MAR 2023
JOB
122151
FIGURE
FIGURE 4
M:\2022\122151\CAD\Civil\Figures\122151-WatermainAlignment.dwg, FIG 4-WM, Mar 30, 2023 - 2:39pm, smatthews
SHT11X17.DWG - 279mmX432mm



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

405 HUNTMAR DRIVE

HYDRANT COVERAGE PLAN

SCALE 1 : 1500 (0 15 30 45 60)

DATE MAR 2023 | JOB 122151 | FIGURE 5

M:\2022\122151\CAD\Civil\Figures\122151-HydrantCoverage.dwg, FIG 5, Mar 30, 2023 - 1:48pm, smatthews

SHT11X17.DWG - 279mmX432mm

The water demand calculations for the proposed development are based on the following criteria:

- Industrial Water Demand
  - Per each water closet = 950L/day
  - Per each loading bay = 150L/day (each)
- Commercial Office Water Demand
  - Per each 9.3m^2 floor space = 75L/day
- Peaking Factor
  - Max Day = 1.5
  - Peak Hour = 1.8

Fireflow demands for the proposed development have been calculated using the Fire Underwriters Survey (FUS). Based on information provided by the Building and Fire Flow Consultant, the fire flow requirements for Buildings A and B may be considered as 233 L/s (assuming 1-storey buildings) with a possible further 25% reduction for sprinklers to 183 L/s. Details of the FUS fireflow calculations can be found in **Appendix B**.

A fire flow assessment report has been completed by Civelec Consultants Inc. for the site. This report concludes that the flowrate required for the fire sprinklers within both buildings is 183 L/s. Thus, conducting the fireflow analysis using an FUS fireflow of 233 L/s results in a conservative approach. The fire flow assessment report is included in **Appendix B**.

The domestic water demands and fire flow for the proposed development are summarized in **Table 2.1** below.

Table 2.1: Domestic Water Demand Summary

Proposed Use	Ave. Daily Demand (L/s)	Max. Daily Demand (L/s)	Peak Hour Demand (L/s)	FUS Fireflow (L/s)
Building A				
Industrial Flows	0.27	0.40	0.72	233
Commercial Flows	0.10	0.15	0.28	
Sub-Total	0.37	0.55	1.00	
Building B				
Industrial Flows	0.27	0.40	0.72	233
Commercial Flows	0.11	0.17	0.30	
Sub-Total	0.38	0.57	1.02	
Total Domestic Demands	**0.75**	**1.12**	**2.02**	**233 (Max)**

2.3 Boundary Conditions and Hydraulic Analysis

The boundary conditions provided by the City of Ottawa are specific to two connection points. The first connection point is the existing 200mm dia. watermain north on Huntmar Drive and West of Fallengale Crescent. The second connection point is the existing 300mm watermain at the Journeyman Street and Upper Canada Street intersection. These boundary conditions are based on the proposed domestic water demands as shown in **Table 2.1**. Municipal watermain boundary conditions provided by the City of Ottawa can be found in **Appendix B**.

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

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

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

- Maximum HGL
- Peak Hour
- Maximum Day + Fireflow Demand (233 L/s)

A schematic representation of the hydraulic network depicts the node and pipe numbers used in the model. The model is based on hydraulic boundary conditions provided by the City of Ottawa.

The model indicates that adequate pressure will exist throughout the watermain system under the specified design conditions. Refer to **Appendix B** for the hydraulic modeling schematic and modeling results.

The hydraulic requirements and hydraulic model results are summarized in **Table 2.2** below.

Table 2.2: Hydraulic Model Summary

Operating Conditions	Demand (L/s)	Fire Flow (L/s)	Min/Max Allowable Pressure (kPa/psi)	Max/Min Pressure (kPa/psi)
High Pressure (Max HGL)	0.75	N/A	690/80 (Max)	598.4 / 86.8 (Max)
Peak Hour	2.02	N/A	276/40 (Min)	555.2 / 80.5 (Min)
Max Daily + Fire Flow Demand (Building A)	1.12	383	138/20 (Min)	212.3 / 30.8 (Min)
Max Daily + Fire Flow Demand (Building B)	1.12	383	138/20 (Min)	439.5 / 63.7 (Min)

The proposed water distribution system was checked for high pressures during average daily demand using a hydraulic boundary condition provided by the City of Ottawa. The model indicated that pressures above 550 kPa (80 psi) exist within the site, up to a maximum of 598.4 kPa (86.8 psi). Therefore, pressure reducing valves will be required for each building. A note has been added to the drawings located in **Appendix F** to indicate pressure reducing valves are required.

The model indicates that the municipal watermain on Huntmar Drive and Journeyman Street along with the on-site watermain will provide adequate fireflows and system pressures to service the site under each operating condition.

3.0 SANITARY SERVICING

3.1 Introduction

The subject site is within the KWBP that designed the sanitary wastewater outlet for the area. The sanitary flows ultimately outlet to the Signature Ridge Pump Station (SRPS). The KWMSS created a wastewater master plan for the entire KWBP along with a sanitary sewer design sheet. The KWBP outlined allowable release rates for the subject site within its design. Sanitary drainage plans and design sheets from the KWBP and KWMSS are included in **Appendix C**.

For the purposes of this report, sanitary flow analysis will focus on the subject site and the contributing flows to the overall KWBP development.

The 405 Huntmar Drive development will be serviced by 250mm dia. gravity on-site sanitary sewers. Buildings A and B will have separate service connections with different outlets.

- Building A sanitary service will outlet to the proposed on-site monitoring manhole (SAN MH02) and connect to the existing 250mm dia. stub installed from the 375mm dia. sanitary sewer within Campeau Drive.
- Building B sanitary service will connect to an on-site monitoring manhole (SAN MH01) then outlet to the existing KWBP sanitary maintenance hole MH140A. This maintenance hole is located at the Upper Canada Street and Journeyman Street intersection.

Refer to **Figure 6** – Sanitary Sewer Alignment for details.

3.2 Proposed On-Site Sanitary Servicing

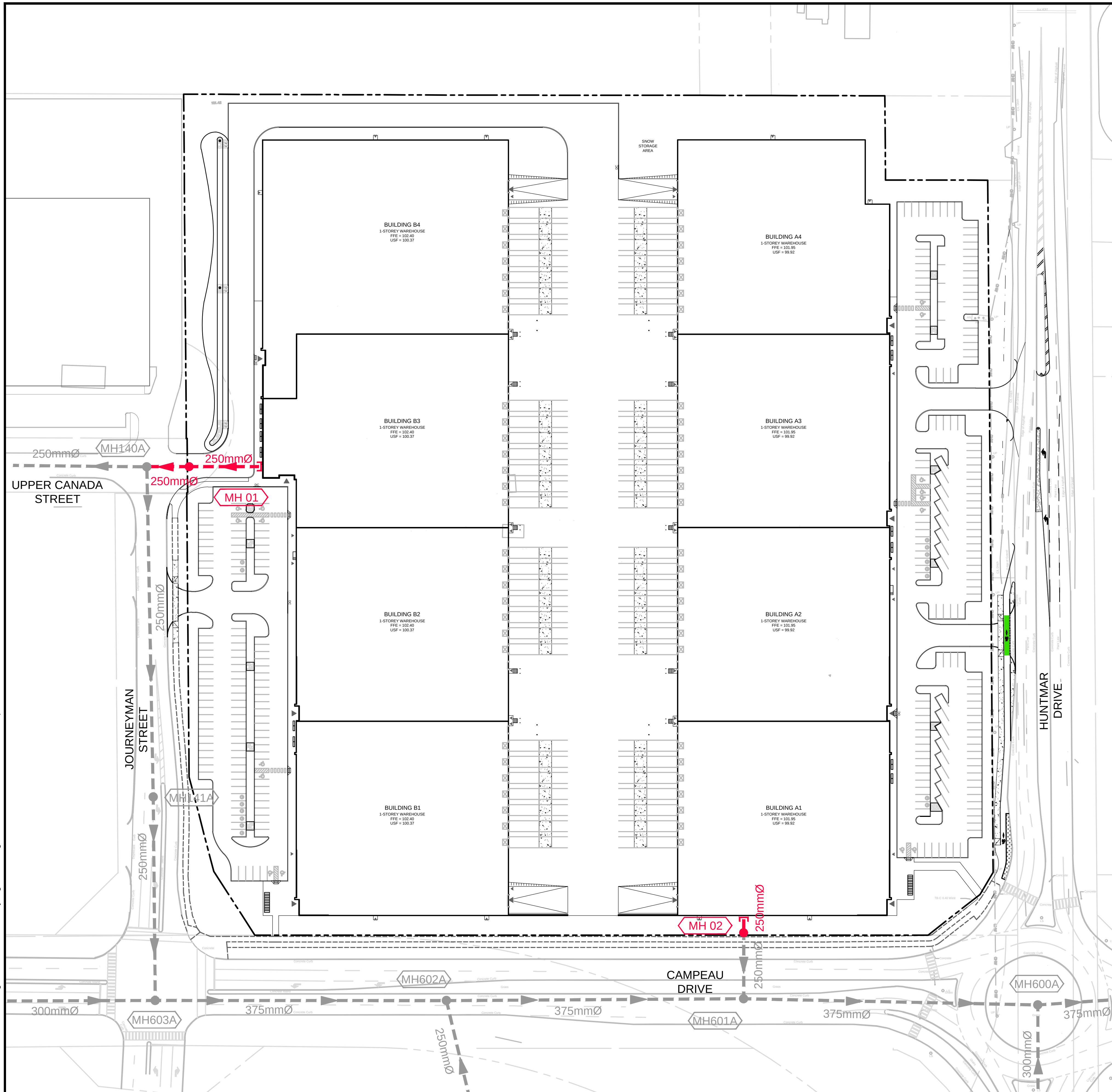
The proposed sanitary servicing for 405 Huntmar Drive follows the sanitary servicing design provided in the *Kanata West Business Park – Phase 5 Design Brief* prepared by IBI Group, and conforms to the recommendations from the KNMSS, the *Ottawa Sewer Design Guidelines (October 2012)* and technical bulletin *ISTB-2018-01* (March 2018).

3.2.1 Proposed Peak Sanitary Flows

Design Criteria

The total theoretical peak sanitary flow from the proposed development was calculated based on the following criteria from Section 4 of the City of Ottawa Sewer Design Guidelines and Section 8 of the Ontario Building Code:

- Site Area = 8.67 ha
- Industrial Sanitary Flow
  - Per each water closet = 950L/day
  - Per each loading bay = 150L/day (each)
- Commercial Office Water Demand
  - Per each water closet = 950L/day
- Commercial Peaking Factor = 1.5
- Industrial Peak Factor = per MOE/City of Ottawa graph (included in **Appendix C**)
- Infiltration Rate = 0.33 L/s/ha
- Minimum Velocity = 0.6 m/s
- Manning's n = 0.013



LEGEND

- SITE BOUNDARY
- 300mmØ — EXISTING SANITARY SEWER, DIAMETER AND DIRECTION
- 300mmØ — PROPOSED SANITARY SEWER, DIAMETER AND DIRECTION
- MH601A — EXISTING SANITARY MANHOLE
- MH 01 — PROPOSED SANITARY MANHOLE

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

405 HUNTMAR DRIVE

SANITARY SEWER ALIGNMENT

SCALE	DATE	JOB	FIGURE
1 : 1500	MAR 2023	122151	FIGURE 6

SHT11X17.DWG - 279mmX432mm

M:\2022\122151\CAD\Civil\Figures\122151-SanitaryAlignment.dwg, FIG 6-SAN, Mar 30, 2023 - 1:53pm, smatthews

Sanitary Flows

The proposed sanitary peak flows are provided in **Table 3.1** below.

Table 3.1: Proposed Sanitary Peak Flow Summary

Proposed Use	Unit Count	Peaking Factor (1)	Peak Design Flow (L/s)
Building A			
No. Loading Docks/Washrooms	28 / 20	4.3	1.15
Office Space (m^2)	1080	1.5	0.15
Infiltration (ha)	4.27	-	1.41
Building A Total	-	-	**2.71**
Building B			
No. Loading Docks/Washrooms	28 / 20	4.3	1.15
Office Space (m^2)	1160	1.5	0.16
Infiltration (ha)	4.40	-	1.45
Building B Total	-	-	**2.77**

(1) *Peaking Factor for industrial and commercial areas as per Section 3.2.1*

As shown above in Table 3.1, Building A will produce a peak design flow of 2.71 L/s outletting to maintenance hole MH603A on Campeau Drive. Building B will generate a peak design flow of 2.77 L/s outletting to maintenance hole MH140A on Upper Canada Street. The light industrial peaking factor has been calculated to be 4.3 based on a total site area of 8.67 ha using the MOE/City of Ottawa Appendix 4-B.1 graph included in **Appendix C**. The sanitary sewer design sheet for the proposed development is also included in **Appendix C**.

The Kanata West Business Park Design Brief sets an allowable sanitary release rate for the proposed development. Previously, the KWBP had the proposed site split up from north to south with two separate sanitary outlets. It was designed that the north portion would outlet to Upper Canada Street at maintenance hole MH140A with an allowable release rate of 9.31 L/s. The south portion would outlet to Campeau Drive at maintenance hole MH603A with an allowable release rate of 3.71 L/s. Sanitary sewage flows calculated in the KWBP are based on release rates of 35,000 L/ha/day and 28,000 L/ha/day. A copy of the KWBP sanitary sewer design sheet and sanitary drainage area plan are included in **Appendix C**.

The proposed sanitary peak flows in comparison to the allowable sanitary peak flows from the KWBP are shown in **Table 3.3** below.

Table 3.3: Allowable and Proposed Peak Flow Summary

Sanitary Outlet	Service	KWBP Allowable Peak Flow	Proposed Sanitary Peak Flows
Campeau Drive MH603A	Building A	3.71 L/s	2.71 L/s
Upper Canada Street MH140A	Building B	9.31 L/s	2.77 L/s

As indicated in the table above, the calculated proposed sanitary peak flows are significantly less than the KWBP allowable peak flows. As a result, a 250mm dia. sanitary sewer at a minimum slope of 0.4% has a full flow conveyance capacity of 21.6 L/s and will be able to service the proposed development.

4.0 STORM SERVICING AND STORMWATER MANAGEMENT

The 405 Huntmar Drive development will be serviced by on-site gravity storm sewers system with pipe sizes ranging from 200mm dia. catchbasin leads up to 1200mm dia. storage pipes. Buildings A and B will have separate services with different outlets. The Building A storm service will outlet to the existing 1200mm dia. storm service stub at the mid-point of the south property line which in turn outlets to the existing KWBP storm maintenance hole MH601 within Campeau Drive. The storm service for Building B will outlet to the existing KWBP storm maintenance hole MH164 in Journeyman Street located at the intersection with Upper Canada Street. The KWBP storm sewer system flows south along Journeyman Street, then along Campeau Drive and discharges into the existing KWBP SWM Pond 6 (providing both water quantity and quality control measures for the business park) approximately 200m southeast of the subject site. The approach for the stormwater management design for the site is discussed in the subsequent sections of the report.

Refer to **Figure 7** – Storm Sewer Alignment for details.

4.1 Stormwater Management Criteria and Objectives

The proposed storm servicing and stormwater management for 405 Huntmar Drive builds on the designs provided in the *Kanata West Business Park – Phase 5 Design Brief* prepared by IBI Group, and conforms to the recommendations from the KNMSS, the *Ottawa Sewer Design Guidelines (October 2012)* and technical bulletin *ISTB-2018-01* (March 2018).

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

- Maintain existing drainage patterns.
- Provide a dual drainage system (i.e., minor, and major system flows).
- Control post-development storm flows, up to and including the 100-year design event, to the maximum allowable release rate for the subject site as defined in the KWBP report, using an allowable flow to the Journeyman Street storm sewer system of 737 L/s and an allowable flow to the Campeau Drive storm sewer system of 712 L/s for a total allowable of 1449 L/s.
- Ensure that no surface ponding will occur on the paved surfaces (parking stalls and drive aisles) during the 2-year storm event, excluding the depressed loading dock areas.
- Provide guidelines to ensure that site preparation and construction is in accordance with the current Best Management Practices for Erosion a Sediment Control.

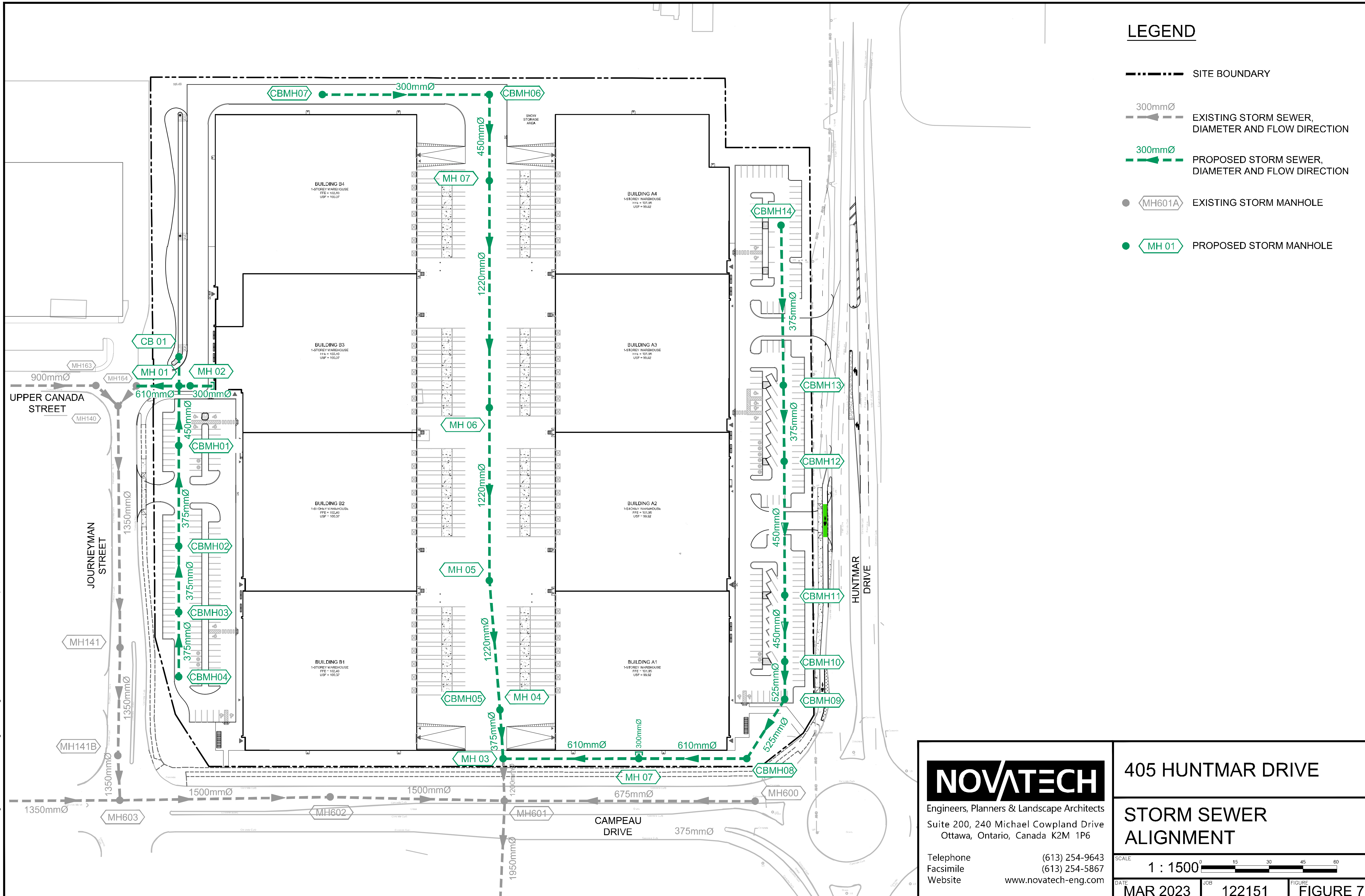
Refer to **Appendix A** for correspondence from the City of Ottawa.

4.2 Pre-Development Conditions and Allowable Release Rate

It is assumed that there are currently no on-site stormwater quantity or stormwater quality control measures in place. The uncontrolled pre-development flows from the 8.67 ha site have been calculated using the Rational Method to be approximately 411.7 L/s during the 2-year design event, 558.4 L/s during the 5-year design event and 1190.4 L/s during the 100-year design event. The allowable release rate for the 8.67 ha site, as specified in the KWBP Design Brief, was calculated to be 737 L/s to the storm sewer located in Journeyman Street, and 712 L/s to the storm sewer located in Campeau Drive. These allowable release rates sum to an allowable release rate of 1449 L/s. Refer to **Appendix D** for detailed calculations.

4.3 Post-Development Conditions

The proposed development will be serviced by a new on-site storm sewer system and extending a new 610mm dia. outlet pipe to the existing 1350mm dia. concrete storm sewer in Journeyman



M:\2022\122151\CAD\Civil\Figures\122151-StormAlignment.dwg, FIG 7-STM, Mar 30, 2023 - 2:22pm, smatthews

SHT11X17.DWG - 279mmX432mm

Street, as well as connecting to the existing on-site 1200mm dia. concrete service stub off Campeau Drive. Stormwater runoff from the site will be directed to various catchbasins and trench drains located within the paved drive aisles and depressed loading docks. To mitigate the stormwater related impacts due to the increase in imperviousness of the site, stormwater runoff will be attenuated using control flow drains on the proposed building roof as well as an inlet control device (ICD) within the on-site storm sewer system servicing the loading dock areas. Flows will be controlled for storms up to and including the 100-year design event. Due to the existing grades, runoff from a minor portion of the perimeter of the site will sheet drain uncontrolled off site.

4.3.1 Area DR-1: Uncontrolled Direct Runoff to Huntmar Roadside Ditch

The uncontrolled post-development flow from this sub-catchment area was calculated using the Rational Method to be approximately 7.6 L/s during the 2-year design event, 10.3 L/s during the 5-year design event and 20.5 L/s during the 100-year design event. Refer to **Appendix D** for detailed SWM calculations.

4.3.2 Area DR-2: Uncontrolled Direct Runoff to Huntmar Storm Sewer System

The uncontrolled post-development flow from this sub-catchment area was calculated using the Rational Method to be approximately 8.6 L/s during the 2-year design event, 11.7 L/s during the 5-year design event and 23.2 L/s during the 100-year design event. Refer to **Appendix D** for detailed SWM calculations.

4.3.3 Area DR-3: Uncontrolled Direct Runoff to Campeau

The uncontrolled post-development flow from this sub-catchment area was calculated using the Rational Method to be approximately 6.9 L/s during the 2-year design event, 9.3 L/s during the 5-year design event and 19.7 L/s during the 100-year design event. Refer to **Appendix D** for detailed SWM calculations.

4.3.4 Area DR-4: Uncontrolled Direct Runoff to Journeyman

The uncontrolled post-development flow from this sub-catchment area was calculated using the Rational Method to be approximately 1.2 L/s during the 2-year design event, 1.6 L/s during the 5-year design event and 3.2 L/s during the 100-year design event. Refer to **Appendix D** for detailed SWM calculations.

4.3.5 Area DR-5: Uncontrolled Direct Runoff to the North and West

The uncontrolled post-development flow from this sub-catchment area was calculated using the Rational Method to be approximately 7.7 L/s during the 2-year design event, 10.4 L/s during the 5-year design event and 22.3 L/s during the 100-year design event. Refer to **Appendix D** for detailed SWM calculations.

4.3.6 Area A-1: Rain Garden Infiltration Area

The post-development flow from this sub-catchment area will be directed into an underground granular infiltration trench installed in the open area at the north-west corner of the site. Stormwater runoff from this sub-catchment area will be temporarily stored underground within the voids of the granular trench and on the surface within the vegetated rain garden system to encourage as much uptake of water by the plantings while infiltrating as much as possible into the groundwater system. The rain gardens have been designed to contain and retain a significant amount of runoff, however, a system of landscape drains and an outlet catchbasin will be installed with an ICD to allow excess water to overflow into the on-site storm sewer system at a controlled rate during large events. In the case of a major rainfall event exceeding the design storms provided for, the stormwater located within the subject site will spill towards the lower downstream sub-catchment areas and ultimately flow towards Journeyman Street ROW.

Table 4.1 summarizes the post-development design conditions for the rain garden area as well as the anticipated infiltration rate, approximate ponding elevations and the storage volumes provided for the 2-year, 5-year, 100-year and the 100-year +20% design events.

Table 4.1: Stormwater Storage, Ponding Elevations & Infiltration Rate

Design Event	On-Site Infiltration Gardens Draining Area A-1			
	Stormwater Storage System	Infiltration Rate	Rain Garden Ponding Depth (Elevation)	Storage Volume Provided
2-Year	Surface Storage / Plant Material Uptake / Groundwater Infiltration (40% Voids)	0.1725 L/s	0.07 m (101.55 m)	(46 + 8.9) 54.9 m³
5-Year			0.12 m (101.60 m)	(46 + 17.5) 63.5 m³
100-Year			0.21 m (101.69 m)	(46 + 55.7) 101.7 m³
100-Year (+20%)			0.25 m (101.73 m)	(46 + 72) 118.0 m³

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

The excess flows that will not be infiltrated from this sub-catchment area will be attenuated by an ICD installed in the outlet pipe of CB 01. Stormwater runoff from this sub-catchment area will be temporarily stored on the surface of the proposed rain gardens prior to being discharged into the downstream on-site storm sewer system.

Table 4.2 summarizes the post-development design flow from this sub-catchment area as well as the ICD specifications, the anticipated ponding elevations, storage volumes required and storage volume provided for the 2-year, 5-year and the 100-year design events. Refer to **Appendix D** for detailed SWM calculations.

Table 4.2: Stormwater Flows, ICD & Surface Storage

Design Event	Controlled Site Flows from Area A-1					
	ICD Type	Peak Flow	Ponding Depth/Elev.	Average Flow (50% Q_{peak})	Storage Vol. Required	Storage Provided*
2-Year	171mm dia. circular orifice plug	61.2 L/s	0.07 m (101.55 m)	30.6 L/s	8.9 m³	123.8 m³
5-Year		62.8 L/s	0.12 m (101.60 m)	31.4 L/s	17.5 m³	
100-Year		65.6 L/s	0.21 m (101.69 m)	32.8 L/s	55.7 m³	
100-Year (+20%)		70 L/s	0.25 m (101.73m)	35 L/s	72.0 m³	

As indicated above, in **Table 4.1** and **Table 4.2**, this sub-catchment area will provide sufficient storage for the 2-year, 5-year and 100-year design events. The site has been designed to ensure that no stormwater will pond on the paved drive aisles and/or parking stalls during the 2-year storm event. Furthermore, the site grading design will ensure that surface ponding depths will not touch the building envelope or lowest building openings during the 100-year+20% stress test. Emergency overflow from the raingarden will be to the Journeyman ROW.

4.3.7 Area A-2: Un-Controlled Flow from East Parking Area

Stormwater runoff from this sub-catchment area will be conveyed by the on-site storm sewer system to the existing outlet sewer in Campeau Drive. The uncontrolled post-development flow from this sub-catchment area was calculated using the Rational Method to be approximately

127.8 L/s during the 2-year design event, 173.4 L/s during the 5-year design event and 331.8 L/s during the 100-year design event. Refer to **Appendix D** for detailed SWM calculations.

The on-site parking lot areas have been designed to ensure that no stormwater will pond on the paved drive aisles and/or parking stalls during the 2-year storm event. Furthermore, the site grading design will ensure that surface ponding depths will not touch the building envelope or lowest building openings during the 100-year+20% stress test.

4.3.8 Area A-3: Un-Controlled Flow from West Parking Area

Stormwater runoff from this sub-catchment area will be conveyed by the on-site storm sewer system to the existing outlet sewer in Journeyman Street. The uncontrolled post-development flow from this sub-catchment area was calculated using the Rational Method to be approximately 90.7 L/s during the 2-year design event, 123.1 L/s during the 5-year design event and 235.8 L/s during the 100-year design event. Refer to **Appendix D** for detailed SWM calculations.

The on-site parking lot areas have been designed to ensure that no stormwater will pond on the paved drive aisles and/or parking stalls during the 2-year storm event. Furthermore, the site grading design will ensure that surface ponding depths will not touch the building envelope or lowest building openings during the 100-year+20% stress test.

4.3.9 Area A-4: Controlled Flow from Loading Dock Area

The post-development flow from this sub-catchment area will be attenuated by an ICD installed in the outlet pipe of STM MH 04. Stormwater runoff from this sub-catchment area will be temporarily stored underground within the on-site storm sewer system and on the surface of the depressed loading docks prior to being discharged into the downstream storm sewer system.

Table 4.3 summarizes the post-development design flow from this sub-catchment area as well as the ICD specifications, the anticipated ponding elevations, storage volumes required and storage volume provided for the 2-year, 5-year and the 100-year design events. Refer to **Appendix D** for detailed SWM calculations.

Table 4.3: Stormwater Flows, ICD & Surface Storage

Design Event	Controlled Site Flows from Area A-4					
	ICD Type	Peak Flow	Ponding Depth/Elev.	Average Flow (50% Q_{peak})	Storage Vol. Required	Storage Provided*
2-Year	219mm dia. circular orifice plug	116.7 L/s	0.00 m (99.10 m)	58.4 L/s	222.5 m³	808.8 m³
5-Year		146.4 L/s	0.00 m (99.83 m)	73.2 L/s	309.3 m³	
100-Year		182.2 L/s	0.25 m (100.93 m)	91.1 L/s	698.2 m³	
100-Year (+20%)		240 L/s	0.60 m (101.28 m)	120.0 L/s	808.8 m³	

* *Storage available to a depth of 0.30m within the loading docks, and 0.60m in the overall system*

As indicated in the table above, this sub-catchment area will provide sufficient storage for the 2-year, 5-year and 100-year design events. The site has been designed to ensure that maximum surface ponding depths will be approximately 0.73m below the (Warehouse A) lowest building openings and 1.18m below the (Warehouse B) lowest building openings during the 100-year+20% stress test.

4.3.10 Area R-1: Controlled Flow from Roof of Warehouse A

The post-development flow from this sub-catchment area will be attenuated using Watts adjustable 'Accutrol' control flow roof drains (model number RD-100-A-ADJ: individual roof drains are to be set either ¼ exposed, ½ exposed, or fully exposed as indicated in the tables below) prior to being directed to the proposed storm service.

Table 4.4 summarizes the post-development design flows from this sub-catchment area as well as the type of roof drains, the maximum anticipated ponding depths, storage volumes required and storage volumes provided for both the 5-year and the 100-year design events.

Table 4.4: Warehouse A - Controlled Flow Roof Drains

Roof Drain ID & Drainage Area (ha)	Number of Roof Drains	Watts Roof Drain Model ID (Weir Opening)	Controlled Flow per Drain (L/s)		Approximate Ponding Depth Above Drains (m)		Storage Volume Required (m^3)		Max. Storage Available (m^3)
			1:5 Year	1:100 Year	1:5 Year	1:100 Year	1:5 Year	1:100 Year	
RD A1-A24 (1.11 ha)	24	RD-100-A-ADJ (1/4 Exposed)	0.87	0.95	0.11	0.15	263	568	586
RD A25-A36 (0.68 ha)	12	RD-100-A-ADJ (1/2 Exposed)	1.10	1.26	0.11	0.15	161	336	356
RD A37 (0.01 ha)	1	RD-100-A-ADJ (Fully Exposed)	0.79	0.95	0.06	0.08	1.4	2.9	2.9
RD A38-A48 (0.35 ha)	11	RD-100-A-ADJ (1/4 Exposed)	0.87	0.95	0.11	0.15	71	157	179
Total Roof (2.15 ha)	**48**	**-**	**44.4**	**49.3**	**-**	**-**	**497**	**1063**	**1124**

* *Table represents rounded values*

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

4.3.11 Area R-2: Controlled Flow from Roof of Warehouse B

The post-development flow from this sub-catchment area will be attenuated using Watts adjustable 'Accutrol' control flow roof drains (model number RD-100-A-ADJ: individual roof drains are to be set either ¼ exposed, ½ exposed, or fully exposed as indicated in the tables below) prior to being directed to the proposed storm service.

Table 4.5 summarizes the post-development design flows from this sub-catchment area as well as the type of roof drains, the maximum anticipated ponding depths, storage volumes required and storage volumes provided for both the 5-year and the 100-year design events.

Table 4.5: Warehouse B - Controlled Flow Roof Drains

Roof Drain ID & Drainage Area (ha)	Number of Roof Drains	Watts Roof Drain Model ID (Weir Opening)	Controlled Flow per Drain (L/s)		Approximate Ponding Depth Above Drains (m)		Storage Volume Required (m^3)		Max. Storage Available (m^3)
			1:5 Year	1:100 Year	1:5 Year	1:100 Year	1:5 Year	1:100 Year	
RD B1-B5 (0.31 ha)	5	RD-100-A-ADJ (1/2 Exposed)	1.10	1.26	0.11	0.15	78	162	165
RD B6 (0.01 ha)	1	RD-100-A-ADJ (Fully Exposed)	0.79	0.95	0.06	0.08	0.9	2.1	2.2
RD B7-B49 (2.00 ha)	43	RD-100-A-ADJ (1/4 Exposed)	0.87	0.95	0.11	0.15	479	1031	1062
Total Roof (2.32 ha)	**49**	**-**	**43.7**	**48.1**	**-**	**-**	**558**	**1195**	**1229**

* *Table represents rounded values*

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

4.3.12 Summary of Post-Development Flows

Table 4.6 compares the post-development site flows from the proposed development to the uncontrolled pre-development flows and to the maximum allowable release rate specified by the KWBP Design Brief, for the 2-year, 5-year, and the 100-year design events.

Table 4.6: Stormwater Flow Comparison Table

Design Event	On-Site Drainage Areas									
	Pre-Development Conditions		Post-Development Conditions							
	Ex. Site Flows (L/s)	Max Release Rate (L/s)	DR Flow (L/s)	A-1 Flow (L/s)	A-2 Flow (L/s)	A-3 Flow (L/s)	A-4 Flow (L/s)	R-1 Flow (L/s)	R-2 Flow (L/s)	Total Flow (L/s)
2-Yr	411.7	**1449 (737+712)**	32.0	61.2	127.8	90.7	116.7	39.7	39.4	507.3
5-Yr	558.4		43.3	62.8	173.4	123.1	146.4	44.4	43.7	637.0
100-Yr	1190.4		88.9	65.6	331.8	235.8	182.2	49.3	48.1	1001.8

* *Total site flows exclude infiltration from rain gardens and infiltration gallery areas.*

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

4.4 Stormwater Infiltration (Rain Garden + Infiltration Gallery)

By implementing infiltration BMPs as part of the storm drainage design, the impacts of development on the hydrologic cycle can be considerably reduced. Infiltration of clean runoff will have additional benefits for stormwater management.

The proposed stormwater management strategy includes the installation of a bioretention raingarden and an infiltration gallery to meet the infiltration targets identified in the Kanata West Master Servicing Study (KWMSS 2010).

4.4.1 Infiltration Target

The KWMSS indicates that, based on existing soil conditions on the site, annual infiltration is anticipated at approximately 50mm to 70mm. The KWMSS further indicated that all proposed development should target a 25% increase in infiltration above the existing conditions (i.e., 62.5mm to 87.5mm). Based on the site area of 8.67 ha, this corresponds to an annual infiltration target volume of 5,420m^3 to 7,590m^3.

4.4.2 Rain Garden Design

To meet the infiltration target, one (1) bioretention raingarden will be constructed in the north-west corner of the site. The 115 m long bioretention area will consist of 1000 mm of planting soil (as recommended in the CVC LID SWM Planning and Design Manual, and the MOE SWM Planning and Design Manual) above a 2.0m wide x 0.5m high infiltration trench filled with 50mm dia. clear stone wrapped in geotextile. A 200mm diameter perforated pipe will be installed within the clear stone and installed catchbasins will be perched 0.2m above the swale bottom of the rain garden to provide overflow protection. The downstream catchbasin is controlled with an ICD and outlets to the storm sewer. Refer to **122151-NLD1, 122151-NLD2** in **Appendix F** for raingarden details.

Paterson Group analysed the in-situ soil samples and provided percolation rates to be used for this site in the infiltration analysis. The percolation rates provided are 35 – 50+ mins/cm. From Table C1 of the CVC LID SWM Manual, the corresponding infiltration rate for 50 mins/cm is 12 mm/hr. To determine the design infiltration rate, the safety correction factor has to be considered. The underlying soil horizon 1.5m below the bottom of the clear stone is assumed to be clay at an infiltration rate of 1.5mm/hr. The ratio then is 12/1.5 or 8. From Table C2 in the CVC LID SWM Manual, the safety correction factor for a ratio of 8 is 4.5. The design infiltration rate is 12mm/hr / 4.5 = 2.7mm/hr. Using a corrected infiltration rate of 2.7mm/hr determines the drawdown time of the proposed infiltration trench at approximately 74.1 hours. Refer to **Table 4.7** and calculations provided in **Appendix D.**

The rain gardens will have a tributary drainage area of 0.38 ha (catchment A-1) and a total storage capacity of 96 m^3 – refer to drawing **122151-SWM** in **Appendix F**. The available storage will be sufficient to retain and infiltrate the first 25.3 mm of runoff from the contributing drainage area.

Table 4.7: Infiltration Rate Through Soil and Retention Time (Rain Garden)

Bioretention Area	Infiltration Rate (Inc. Safety Correction Factor)	Storage Volume			Bottom Area of Trench	Infiltration Rate through Soil[1]	Retention Time[2]
		Surface	Clear Stone	Total			
Raingarden (Area A-1)	2.7 mm/hr	50 m^3	46 m^3	96 m^3	230 m^2	0.1725 L/s	74.1 hours

(1) *Infiltration rate = percolation rate/safety correction factor x bottom area of trench (assumes no infiltration through sides)*

(2) *Retention time = storage volume of clear stone trench / infiltration rate through soil*

4.4.3 Rain Garden Annual Rainfall and Volume Captured

Based on the thirty (30) years of climate data (1971-2000) from the Ottawa CDA Environment Canada Weather Station (STA ID: 6105976), the average annual precipitation in Ottawa is 914mm (rain + snow). The average annual rainfall is 733mm, and the annual rainfall between May and October is 515mm. Refer to Climate Normal provided in **Appendix D**.

The area draining to the raingardens (0.38 ha) represents 4.4% of the total site area (8.67ha). Total volume of stormwater infiltrated is calculated below in **Table 4.8**.

Table 4.8: Infiltrated Volume of Stormwater (Rain Garden)

Bioretention Area	Drainage Area	Total Storage Volume	Infiltration Depth[1]	Percent of Annual Rainfall (515 mm) Infiltrated	Amount of Rainfall Infiltrated[2]
Raingarden (Area A-1)	0.38 ha	96.0 m^3	25.3 mm	59.2%	1,158.5 m^3

(1) Infiltration depth = storage volume / drainage area
(2) Amount of rainfall infiltrated – total rainfall x drainage area

The rain gardens will infiltrate the first 25.3 mm of runoff from each storm event. Based on the average annual rainfall, the total amount of stormwater infiltrated will be approximately 1,158.5m^3/yr, which equates to 13.4 mm of annual infiltration over the 8.67 ha site area.

4.4.4 Infiltration Gallery Design

To meet the infiltration target, one (1) infiltration gallery will be constructed west of Building B within the parking area to infiltrate a portion of the stormwater released from the roof of Building B. A manhole installed in the storm outlet from Building B will intercept the low flows from the building roof and direct them to the 117m long by 6m wide infiltration gallery. The gallery consists of a 6.0m wide x 0.5m high infiltration trench filled with 50mm dia. clear stone wrapped in geotextile. Two (2) 200mm diameter pipes are installed within the clear stone and are connected to the manhole. Any flows in excess of the capacity of the infiltration gallery will outlet uncontrolled to the downstream storm sewer. Refer to **122151-NLD1** and **122151-NLD2** in **Appendix F** for infiltration gallery details.

Paterson Group analysed the in-situ soil samples and provided percolation rates to be used for this site in the infiltration analysis. The percolation rates provided are 35 – 50+ mins/cm. From Table C1 of the CVC LID SWM Manual, the corresponding infiltration rate for 50 mins/cm is 12 mm/hr. To determine the design infiltration rate, the safety correction factor has to be considered. The underlying soil horizon 1.5m below the bottom of the clear stone is assumed to be clay at an infiltration rate of 1.5mm/hr. The ratio then is 12/1.5 or 8. From Table C2 in the CVC LID SWM Manual, the safety correction factor for a ratio of 8 is 4.5. The design infiltration rate is 12mm/hr / 4.5 = 2.7mm/hr. Using a corrected infiltration rate of 2.7mm/hr determines the drawdown time of the proposed infiltration trench at approximately 74.1 hours. Refer to **Table 4.9** and calculations provided in **Appendix D.**

The infiltration gallery will have a tributary drainage area of 3.0 ha (Building B roof area) and a total storage capacity of 140.4 m^3 – refer to drawing **122151-SWM** in **Appendix F**. The available storage will be sufficient to retain and infiltrate the first 4.7 mm of runoff from the contributing drainage area.

Table 4.9: Infiltration Rate Through Soil and Retention Time (Infiltration Gallery)

Bioretention Area	Infiltration Rate (Inc. Safety Correction Factor)	Storage Volume			Bottom Area of Trench	Infiltration Rate through Soil[1]	Retention Time[2]
		Surface	Clearstone	Total			
Building B Roof	2.7 mm/hr	0 m^3	140.4 m^3	140.4 m^3	702 m^2	0.5265 L/s	74.1 hours

(1) Infiltration rate = percolation rate/safety correction factor x bottom area of trench (assumes no infiltration through sides)
(2) Retention time = storage volume of clear stone trench / infiltration rate through soil

4.4.5 Infiltration Gallery Annual Rainfall and Volume Captured

Based on the thirty (30) years of climate data (1971-2000) from the Ottawa CDA Environment Canada Weather Station (STA ID: 6105976), the average annual precipitation in Ottawa is 914mm (rain + snow). The average annual rainfall is 733mm, and the annual rainfall between May and October is 515mm. Refer to Climate Normal provided in **Appendix D**.

The area draining to the infiltration gallery (3.0ha) represents 34.6% of the total site area (8.67ha).

Total volume of stormwater infiltrated is calculated below in **Table 4.10**.

Table 4.10: Infiltrated Volume of Stormwater (Infiltration Gallery)

Bioretention Area	Drainage Area	Total Storage Volume	Infiltration Depth[1]	Percent of Annual Rainfall (515 mm) Infiltrated	Amount of Rainfall Infiltrated[2]
Building B Roof	3.0 ha	140.4 m^3	4.7 mm	32.0%	4,944 m^3

(1) Infiltration depth = storage volume / drainage area
(2) Amount of rainfall infiltrated – total rainfall x drainage area

The infiltration gallery will infiltrate the first 4.7 mm of runoff from each storm event. Based on the average annual rainfall, the total amount of stormwater infiltrated will be approximately 4,944m^3/yr, which equates to 57.0 mm of annual infiltration over the 8.67 ha site area.

4.4.6 Overall Infiltration Results

The raingarden will provide infiltration for 13.4mm or 1,158.5m^3 and the infiltration gallery will provide 57.0mm or 4,944m^3 for a yearly total infiltration of stormwater for the site of **70.4mm** or **6,102.5m^3**. The infiltration targets identified in the Kanata West Master Servicing Study (KWMSS 2010) will be achieved.

5.0 EROSION AND SEDIMENT CONTROL

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 socks (catchbasin inserts) will be placed in existing and proposed catchbasins and catchbasin manholes, and will remain in place until vegetation has been established and construction is completed;
- Silt fencing will be placed along the surrounding construction limits;
- Mud mats will be installed at the site entrances;
- Strawbale or rock check dams will be installed in swales and ditches;
- The contractor will be required to perform regular street sweeping and cleaning as required, to suppress dust and to provide safe and clean roadways adjacent to the construction site;

Erosion and sediment control measures should be inspected daily and after every rain event to determine maintenance, repair, or replacement requirements. Sediments or granulars that enter site sewers shall be removed immediately by the contractor. These measures will be implemented prior to the commencement of construction and maintained in good order until vegetation has been established. Refer to the Erosion and Sediment Control Plan (**122151-ESC**) for additional information.

6.0 CONCLUSIONS AND RECOMMENDATIONS

This revised Site Servicing and Stormwater Management Report has evaluated the servicing (water, sanitary and storm servicing) and stormwater management for the proposed warehouse development at 405 Huntmar Drive within the north quadrant of the Kanata West Business Park.

The principal findings and conclusions of this report are as follows:

- The proposed warehouse development will be serviced by municipal watermain, sanitary and storm sewers located in Huntmar Drive, Campeau Drive and Journeyman Street.
- Buildings A and B will be sprinklered and supplied with fire department (Siamese) connections. The Siamese connections will be located within 45m of a nearby fire hydrant.
- A 300mm dia. watermain connecting Journeyman Street to Huntmar Drive will be constructed on-site within a 6m easement in favour of the City of Ottawa. Buildings A and B will be serviced separately off the 300mm dia. watermain by 200mm and 250mm watermain respectively.
- The sanitary sewer design servicing the proposed warehouse buildings conforms to the allowable release rates outlined in the Kanata West Business Park sanitary design. Building A and Building B will discharge to the existing sanitary sewers on Campeau Drive and Journeyman Street, respectfully.
- The proposed development includes various methods of controlled and uncontrolled conveyance of stormwater.
  - Storm sewers (minor system) in the parking lots for the two (2) warehouses have been designed to convey the uncontrolled 5-year peak flow using the rational method.
  - The loading bay between the warehouses will include controlled oversized storm sewers to prevent ponding within the loading bay.
  - Flows from the warehouse roofs will be attenuated by controlled flow roof drains outletting into the minor storm sewer system.
  - Release rates from the proposed development conform to the allowable release rates outlined in the Kanata West Business Park storm design.
  - The site will include a raingarden and infiltration gallery to provide infiltration as recommended by the Kanata West Master Servicing Study.
- Temporary erosion and sediment control measures will be implemented onsite during construction.

7.0 CLOSURE

The preceding report is respectfully submitted for review and approval. Please contact the undersigned should you have questions or require additional information.

NOVATECH

Prepared by:

Billy McEwen, E.I.T.

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

Reviewed by:

Drew Blair, P. Eng.
Senior Project Manager

Appendix A
Correspondence

Ottawa

APPLICANT'S STUDY AND PLAN IDENTIFICATION LIST

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

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

S/A	ENGINEERING		S/A
S	1. Site Servicing Plan	2. Site Servicing Study / Assessment of Adequacy of Public Services	**S**
S	3. Grade Control and Drainage Plan	4. Geotechnical Study / Slope Stability Study	**S**
	5. Composite Utility Plan	6. Groundwater Impact Study	
S	7. Servicing Options Report	8. Wellhead Protection Study	
S	9. Transportation Impact Assessment (TIA)	10.Erosion and Sediment Control Plan / Brief	**S**
S	11.Storm water Management Report / Brief	12.Hydro geological and Terrain Analysis	
S	13.Hydraulic Water main Analysis	14.Noise / Vibration Study	**S**
	15.Roadway Modification Functional Design	16.MECP Environmental Compliance Approval	**A**

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

S/A	ENVIRONMENTAL		S/A
S	34.Phase 1 Environmental Site Assessment	35.Impact Assessment of Adjacent Waste Disposal/Former Landfill Site	
A	36.Phase 2 Environmental Site Assessment (depends on the outcome of Phase 1)	37.Assessment of Landform Features	
A	38.Record of Site Condition	39.Mineral Resource Impact Assessment	
	40.Tree Conservation Report	41.Environmental Impact Statement / Impact Assessment of Endangered Species	**S**
	42.Mine Hazard Study / Abandoned Pit or Quarry Study	43.Integrated Environmental Review (Draft, as part of Planning Rationale)	

S/A	ADDITIONAL REQUIREMENTS		S/A
S	44. Applicant's Public Consultation Strategy (may be provided as part of the Planning Rationale)	45.Site Lighting Plan	**A**
A	46. Site Lighting Certification Letter	47.	

Meeting Date: September 27, 2022

Application Type: *Site Plan Control*

File Lead (Assigned Planner): Kelly Livingstone

Infrastructure Approvals Project Manager: Julie Candow

Site Address (Municipal Address): 405 Huntmar Dr

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

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

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

Pre-Application Consultation Follow-up Comments

Property Address: 405 Huntmar Drive
File Number: PC2022-0227
Description: Application for Site Plan Control to construct two industrial buildings with a total of 43,600 sq.m. of gross floor area.

Meeting Location: Virtual – Microsoft Teams
Meeting Date: September 27, 2022
Attendees: Drew Blair – Applicant Team
Nathanael Niedermann – Applicant Team
Sam Tsoumas – Applicant Team
Murray Chown – Applicant Team
Jennifer Luong – Applicant Team
Julian Nini – Applicant Team
Frank Di Paolo – Applicant Team
John Papagiannis – Applicant Team
Fernando Lozano – Applicant Team
Kelly Livingstone – Planner 2
Patrick McMahon - Transportation
Steven Payne – File Lead, Planning Coop
Julie Candow – Project Manager

Regrets: Matthew Ippersiel – Urban Design Planner
Jeff Goettling – Parks Planner
Mark Richardson - Forestry

Submission Requirements

Documents required in support of this application are highlighted in the attached Study and Plan Identification List.

When checking for Application Completeness the City refers to the requirements provided in Ottawa's Guide to preparing studies and plans. Additional information is also available related to building permits, development charges, and the Accessibility Design Standards. Be aware that other fees and permits may be required, outside of the development review process. You may obtain background drawings by contacting informationcentre@ottawa.ca.

These pre-application consultation comments are valid for one year. If you submit a development application(s) after this time, you may be required to meet for another pre-consultation meeting and/or the submission requirements may change.

Application Type and Fees

The application fees (2022 rates) for the proposed applications are as follows. Application fees may vary from now to time of submission:

Application Type	Planning / Legal Fee	Initial Engineering Design Review and Inspection Fee	Conservation Authority Fee (Initial)	Total (HST may apply to part or all)
Site Plan Control - Complex	$49,964.88	$10,000.00	1,065.00	$61,029.88

Planning

Planning Policy

- The New Official Plan designates the site as Mixed Industrial, within the Suburban Transect. Many different uses are permitted in the mixed industrial zone, intending to provide a transition from heavier industrial uses to neighbourhood areas. Accordingly low-impact industrial uses are permitted, such as warehousing, light manufacturing, and distribution and storage. It appears that the proposed uses would comply with the Official Plan
- The area is also subject to the Kanata West Secondary Plan and Community Design Plans. I do not think they are too heavily applicable to this site – for example they establish maximum heights in other locations - but please review those and have regard for them with your submission.

Zoning

- Site is zoned IP13, mostly, there is a small corner zoned Development Reserve (DR)
- Purpose of the IP13 zone is consistent with the Planning Policy, which is to:
    - "(1) accommodate mixed office, office-type uses and low impact, light industrial uses in a business park setting, in accordance with the Enterprise Area designations of the Official Plan or, the Employment Area or the General Urban Area designation where applicable;"…
    - "(4) prohibit uses which are likely to generate noise, fumes, odours, or other similar obnoxious impacts, or are hazardous;"
    - "(5) provide development standards that would ensure compatibility between uses and would minimize the negative impact of the uses on adjacent non-industrial areas."
- Permitted uses include warehousing and light industrial
- Zoning provisions are standard, the main note I will raise is that the maximum height is 11m within 20m of a residential zone. Otherwise the max height is 22m. There is residential on the other side of Huntmar drive, so provide confirmation that you are further than 20m from nearby residential and that the 11m height doesn't apply..
- Additionally, referring to IP13 subzone provisions, item 13(d) states the minimum interior side yard setback is 4 metres. The setback to Journeymann Street should be 4m.

Additional Comments

- I encourage you to reach out to the local ward Councillor before making a submission. Since you are at a Ward boundary, the adjacent Councillor will also be circulated on a submission, and so it is recommended you reach out to them as well, as a courtesy.
- Staff will provide a full subdivision approval package for D07-16-14-0003 upon receipt from our Legal department. Unfortunately, there have been some delays in receiving this. Alternatively, you may reach out to the Subdivision owner to receive that information.
- All dimensions should be in metric for your full submission. Ottawa's reference materials for preparing studies and plans are available online at: https://ottawa.ca/en/planning-development-and-construction/residential-property-regulations/development-application-review-process/development-application-submission/guide-preparing-studies-and-plans
- The High-Performance Development Standard has been approved by Council and will apply once the New Official Plan is officially in effect. Site Plan metrics include such things as Building Energy Efficiency, Accessibility, Tree Planting and Species requirements. You can view them all by searching it up on the City's website.
    - The current Tier 1 High Performance Development Standard Requirements are provided on the linked page: https://engage.ottawa.ca/ottawa-high-performance-development-standard1/news_feed/hpds-requirements-site-plan
        - These will be design standards required to be shown on plans and met through Site Plan review and approval.
- The City will soon be changing its Site Plan and Zoning By-law Amendment processes in response to Bill 109. A follow up pre-application consultation, and integration into this new planning process will be required if your application is submitted on or after January 1, 2023. More details can be shared at a future date.

Transportation

- Please follow Traffic Impact Assessment Guidelines
    - Please proceed with scoping.
    - Applicant advised that their application will not be deemed complete until the submission of the draft step 1-4. Submission of the strategy report prior to official application is encouraged.
- Noise Impact Studies may be required for the following:
    - Stationary
- As the proposed site is commercial/institutional/industrial and for general public use, AODA legislation applies. While this is a site plan issue, consider how pedestrians will move within the site.
- Ensure that the development protects the 37.5m right of way on Huntmar Drive.
- Sidewalks and/or cycle tracks along may be requested to be constructed through development charges should funding become available.

- Incorporate the access on the north leg of the Journeyman access that was recently approved (1300 Upper Canada) on the concept plans.
- A reduction of the minimum parking could be supported.
- The elimination of Upper Canada Street should be discussed in the TIA when reviewing access for the site.

Urban Design

- Please explore the feasibility of breaking up the proposed buildings into smaller buildings, in particular Building B (closer to Huntmar). As proposed, these are extremely large building floorplates, which will result in very long facades and likely unanimated facades along the public realm.
- A generous landscaping treatment along the perimeter of the site will be key to minimizing the proposal's impact on the context. Minimize the visual impacts of the very long facades and parking and loading areas on the public realm, particularly towards the adjacent residential neighbourhood across Huntmar.
    - In general, the green bands surrounding the site need to be greatly increased in size to incorporate a very generous landscaping treatment.
    - Please be mindful of the power lines along Huntmar and the impacts this may have on tree species selection, growth and pruning. Large tree species are needed along this edge. Depending on how far back the power lines are from the property line, a greater setback and wider green band will be needed.
    - Kanata has a long tradition of incorporating conifer species into the urban landscape through site design. Integrating conifers visible to the public realm is strongly encouraged.
- Public sidewalks are needed along all frontages.
- Ensure that the central loading area is screened from the public realm as much as possible (with landscaping and potentially other means).
- Avoid blank walls fronting onto the public realm. Windows must be provided and where not possible, facades must be articulated as much as possible to provide visual interest.
- As the floorplans of the buildings are refined, please locate offices, breakrooms or any other potentially active use to front towards the public realm. Incorporate glazing for the office spaces to add visual interest and transparency to the front facades.
- As the building elevations are developed, please ensure that main entrances are prominently expressed and facing towards the public realm. Ample glazing, and enhanced materiality and architectural treatment should serve to animate facades and make the entrances of the buildings more legible and welcoming.
- Please carefully consider pedestrian connections on the site as well as connections to public sidewalks and transit stops.

- Look for opportunities for outdoor seating areas (such as picnic tables) for employee use on the property. Accompany these areas with trees for shade where possible.
- Please reference the Kanata West Concept Plan for any relevant urban design guidance.
- As with all site plan control applications, a Design Brief will be required as a part of your submission. A Terms of Reference attached which lists the requirements for the Design Brief will be provided with the written comments.
- Review by the Urban Design Review Panel is not required as a part of this application.

Engineering

- The Servicing Study Guidelines for Development Applications are available at the following address: https://ottawa.ca/en/planning-development-and-construction/development-information-residents/development-application-20#section-servicing-study-guidelines-for-development-applications

- 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)

- Record drawings and utility plans are also available for purchase from the City (Contact the City’s Information Centre by email at geoinformation@ottawa.ca or by phone at (613) 580-2424 x.44455).

- The water, sanitary, storm servicing and stormwater management criteria for the subject site are to be in accordance with the Kanata West Business Park Design Brief, prepared by IBI Group (latest revision) and the Kanata West Master Servicing Study (2006).

  WATER

  Under final build-out, two City-owned watermains must supply the KWBP. Under current conditions, the only City-owned main supplying the KWBP is the 305mm watermain in Campeau. The KWBP Design Brief identified the second City-owned feed to be via Upper Canada Street. The proposal to forgo the Upper Canada Street extension between Journeyman Street and Huntmar Drive will eliminate the possibility of a second City-owned watermain supplying the KWBP via Upper Canada as was intended in the Draft Approved KWBP. Note that providing a watermain connection from Huntmar Drive to Journeyman Street through the site with an easement in favour of the City is not desirable due to impedances this could cause should the City require immediate access to the watermain for maintenance or repair. The continuation of Upper Canada Street as a City-owned ROW between Journeyman and Huntmar is considered essential from a water servicing and infrastructure perspective for the KWBP and should be constructed as originally designed.

  SANITARY & STORM

  The existing storm and sanitary infrastructure within Journeyman Street and Campeau Drive, as well as the receiving storm pond, were designed to accommodate this site as per the KWBP Design Brief. The capacity of pipes receiving flows from the subject site should be reviewed and confirmed with any formal submission.

- 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:

  a. Location of service
  b. Type of development and the amount of fire flow required (as per FUS).
  c. Average daily demand: ___ l/s.
  d. Maximum daily demand: ___l/s.

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

- An MECP Environmental Compliance Approval is not anticipated to be required for this application unless the proposed development does not meet the following exemption criteria:

  a. Is designed to service one lot or parcel of land;

  b. Discharges into a storm sewer that is not a combined sewer;

  c. Does not service industrial land or a structure located on industrial land; and

  d. Is not located on industrial land. O.Reg. 525/98, s. 3; O.Reg. 40/15, s. 4.

  In which “industrial land” means land used for the production, processing, repair, maintenance or storage of goods or materials, or the processing, storage, transfer or disposal of waste, but does not include land used primarily for the purpose of buying or selling;

  a) Goods or materials other than fuel, or

  b) Services other than vehicle repair services.

- Phase 1 ESAs and Phase 2 ESAs must conform to clause 4.8.4 of the Official Plan that requires that development applications conform to Ontario Regulation 153/04.

<u>Parks Planning</u>

- Cash-in-lieu of parkland and associated appraisal fee will be required as a condition of approval per the current Parkland Dedication Bylaw. Value of noted lands to be appraised through a Real Estate Valuation Advisor within the Planning, Real Estate & Eco Development Department.

- For Commercial purposes, the parkland requirement is calculated at 2% of the gross site land area.

- Has there been any past Parkland Dedication credited to the subject property parcel(s)? If so, please provide the associated documentation for Parks and Facilities Planning (PFP) review/ consideration. The conveyance of land for purposes or the payment of money in-lieu of accepting the conveyance is not required for development, redevelopment, subdivisions or consents, where it is known, or can be demonstrated that the required parkland conveyance or money in-lieu thereof has been previously satisfied. Please provide/ identify this in the Planning Rationale or by other means when the initial development application is submitted.

Forestry

- If there are impacts on trees, please reach out to the planning forester for TCR submission information.

Environmental Planning

- An EIS was prepared for the subdivision (prepared by Muncaster Environmental (2014) which identified some tree retention along the northern property line. This tree retention area is also where a small watercourse is identified in GeoOttawa and the New OP (Schedule C11-A), a setback will be required to this feature. To confirm, an up-dated EIS to reflect the proposed setback to the watercourse, and species at risk at north portion of property. The EIS can contain the headwater drainage features assessment which will assist in understanding what setback, if any, is needed. More information about how to address this feature and how it will require a setback as per the New Official Plan Section 4.9.3 Policy 1 and 2, the minimum setbacks in this area will need to be determined. This feature may be considered under New OP Section 4.9.3 policy 5.
- Headwater Drainage Feature policies in the New OP Section 4.9.3 will need to be addressed and changes to the plan may be required.

    5) Where development or site alteration is proposed within or adjacent to headwater drainage features, and the proponent is requesting an exception to the minimum setback identified in Policy 2), the proposal and supporting studies must address the following to the satisfaction of the City:
    a) Evaluation and description of the project site, sensitivity of the headwater drainage features and sampling methods;
    b) Assessment and classification of hydrological function, riparian conditions, fish and fish habitat and terrestrial habitat; and
    c) Management recommendations regarding the need to protect, conserve, mitigate, maintain recharge or maintain/replicate terrestrial linkages of the headwater drainage features and a corresponding recommendation for an appropriate minimum setback.

    definition of HDFs from the OP: *Non-permanently flowing drainage features that may not have defined bed or banks, first-order and zero-order intermittent and ephemeral channels, swales and connected headwater wetlands, not including rills or furrows.*

    Please confirm the findings of the report with the MVCA.

- Urban Heat - incorporate heat mitigation measures into design
    - Please add features that reduce the urban heat island effect (see OP 10.3.3) produced by the parking lot and a building footprint. For example, this impact can be reduced by adding large canopy trees, green roofs or vegetation walls, or constructing the parking lot or building differently.
- Bird safe design
    - Given the type of the proposal (commercial/industrial) the proposal will need to 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://ottawa.ca/en/planning-development-and-construction/developing-property/development-application-review-process/development-application-submission/guide-preparing-studies-and-plans .

APPENDIX B
Water Servicing

Boundary Conditions
405 Huntmar

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	45	0.75
Maximum Daily Demand	67.2	1.12
Peak Hour	121.2	2.02
Fire Flow Demand # 1	14000	233
Fire Flow Demand # 2	23000	383

Option 1 – Huntmar Drive and Upper Canada Street

Location

Results

Connection 1 - Huntmar Drive

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	160.8	86.5
Peak Hour	156.5	80.4
Max Day plus Fire #1	151.6	73.5
Max Day plus Fire #2	147.1	67.1

[1] Ground Elevation = 99.9 m

Connection 2 - Upper Canada Street

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	160.8	84.0
Peak Hour	156.5	77.9
Max Day plus Fire #1	147.5	65.2
Max Day plus Fire #2	136.9	50.1

[1] Ground Elevation = 101.7 m

Option 2 – Fallengale and Upper Canada Street

Results

Connection 1 - Fallengale Crescent

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	160.8	87.5
Peak Hour	156.4	81.4
Max Day plus Fire #1	144.8	64.7
Max Day plus Fire #2	130.1	43.9

[1] Ground Elevation = 99.2 m

Connection 2 - Upper Canada Street

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	160.8	84.0
Peak Hour	156.4	77.8
Max Day plus Fire #1	145.3	62.0
Max Day plus Fire #2	131.4	42.2

[1] Ground Elevation = 101.7 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:
   a. 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.
   b. 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.
2. A future 305 mm watermain linking the two connection locations was included for modelling purposes.

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.

Domestic Water Demands

Daily Demands from OBC Table 8.2.1.3

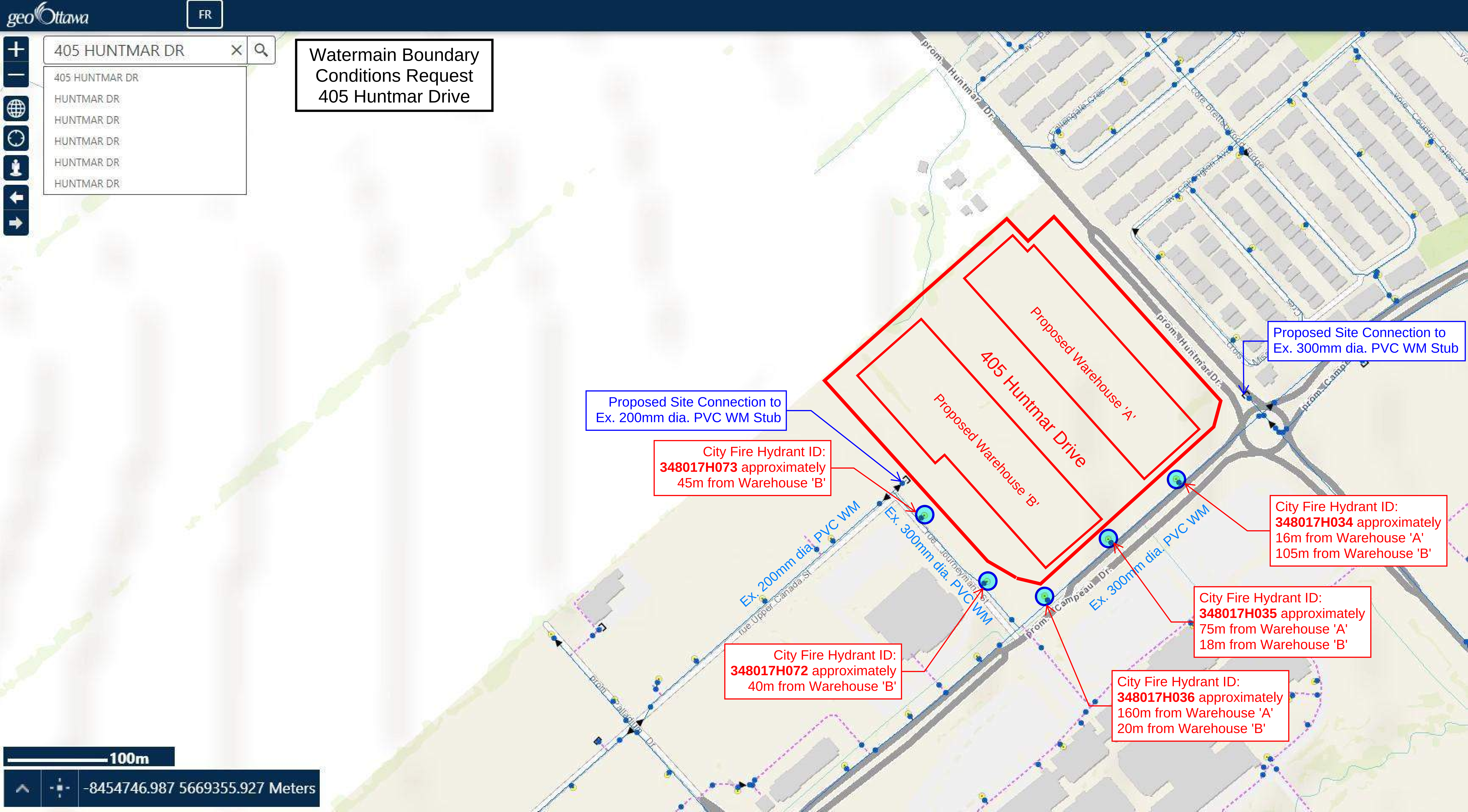
Establishment	Daily Demand Volume	
Industrial :	150	L/day/loading bay
	950	L/day/washroom
Office Space	75	L/day/9.3sq.m.

Industrial Peaking Factors City of Ottawa Water Distrubution Guidelines

Conditions	Peaking Factor	
Maximum Day	1.5	x Avg. Day
Peak Hour	1.8	x Max Day

Proposed Development Conditions

	Warehouse 1	Warehouse 2	Totals
No. Loading Bays	28	28	56
No. Washrooms	20	20	40
Office Space ~sq. m.	1080	1160	2240
Total Daily Volume (Liters)	31,910	32,555	64,465
Avg Day Demand (L/s)	0.37	0.38	0.75
Max Day Demand (L/s)	0.55	0.57	1.12
Peak Hour Demand (L/s)	1.00	1.02	2.02


geoOttawa
FR
405 HUNTMAR DR
405 HUNTMAR DR
HUNTMAR DR
HUNTMAR DR
HUNTMAR DR
HUNTMAR DR
HUNTMAR DR
Watermain Boundary Conditions Request 405 Huntmar Drive
Proposed Warehouse 'A'
405 Huntmar Drive
Proposed Warehouse 'B'
Proposed Site Connection to Ex. 300mm dia. PVC WM Stub
Proposed Site Connection to Ex. 200mm dia. PVC WM Stub
City Fire Hydrant ID: 348017H073 approximately 45m from Warehouse 'B'
City Fire Hydrant ID: 348017H034 approximately 16m from Warehouse 'A' 105m from Warehouse 'B'
City Fire Hydrant ID: 348017H035 approximately 75m from Warehouse 'A' 18m from Warehouse 'B'
City Fire Hydrant ID: 348017H072 approximately 40m from Warehouse 'B'
City Fire Hydrant ID: 348017H036 approximately 160m from Warehouse 'A' 20m from Warehouse 'B'
Ex. 200mm dia. PVC WM
Ex. 300mm dia. PVC WM
Ex. 300mm dia. PVC WM
prom. Huntmar Dr.
prom. Campeau Dr.
100m
-8454746.987 5669355.927 Meters

FUS - Fire Flow Calculations

As per 2020 Fire Underwriter's Survey Guidelines

Novatech Project #: 122151
Project Name: 405 Huntmar Drive
Date: 11/10/2022
Input By: S. Matthews
Reviewed By: D. Blair

Legend: Input by User; No Information or Input Required

Building Description: 1-Storey Warehouse - Building 'A'
Type II - Non-combustible construction

Step			Input		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction C	Type V - Wood frame		1.5	0.8	
		Type IV - Mass Timber		Varies		
		Type III - Ordinary construction		1		
		Type II - Non-combustible construction	Yes	0.8		
		Type I - Fire resistive construction (2 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	21,435			
		Number of Floors/Storeys	1			
		Area of structure considered (m^2)			**21,435**	
	F	**Base fire flow without reductions**				**26,000**
		$F = 220\ C\ (A)^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	0%	**26,000**
		Limited combustible		-15%		
		Combustible	Yes	0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction (100% sprinkler coverage of building used)**			**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%	-30%	**-13,000**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	Yes	-10%	-10%	
				Cumulative Total	**-50%**	
5	**Exposure Surcharge (cumulative %, Maximum Exposure Adjsutement Charge Used)**				**Surcharge**	
	(3)	North Side	30.1- 45 m		0%	**0**
		East Side	> 45.1m		0%	
		South Side	> 45.1m		0%	
		West Side	> 45.1m		0%	
				Cumulative Total	**0%**	
Results						
6	**(1) + (2) + (3)**	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**13,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**217**
				or	USGPM	3,435
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	2.5
		Required Volume of Fire Flow (m^3)			m^3	1950

FUS - Fire Flow Calculations

As per 2020 Fire Underwriter's Survey Guidelines

Novatech Project #: 122151
Project Name: 405 Huntmar Drive
Date: 11/10/2022
Input By: S. Matthews
Reviewed By: D. Blair

Legend: Input by User; No Information or Input Required

Building Description: 1-Storey Warehouse - Building 'B'
Type II - Non-combustible construction

Step			Input		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction C	Type V - Wood frame		1.5	0.8	
		Type IV - Mass Timber		Varies		
		Type III - Ordinary construction		1		
		Type II - Non-combustible construction	Yes	0.8		
		Type I - Fire resistive construction (2 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	23,121			
		Number of Floors/Storeys	1			
		Area of structure considered (m^2)			**23,121**	
	F	**Base fire flow without reductions**				**27,000**
		$F = 220\ C\ (A)^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	0%	**27,000**
		Limited combustible		-15%		
		Combustible	Yes	0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction (100% sprinkler coverage of building used)**			**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%	-30%	**-13,500**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	Yes	-10%	-10%	
				Cumulative Total	**-50%**	
5	**Exposure Surcharge (cumulative %, Maximum Exposure Adjsutement Charge Used)**				**Surcharge**	
	(3)	North Side	> 45.1m		0%	**0**
		East Side	> 45.1m		0%	
		South Side	> 45.1m		0%	
		West Side	30.1- 45 m		0%	
				Cumulative Total	**0%**	
Results						
6	**(1) + (2) + (3)**	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**14,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**233**
				or	USGPM	3,699
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	3
		Required Volume of Fire Flow (m^3)			m^3	2520

FUS - Fire Flow Calculations

As per 2020 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #:	122151		
Project Name:	405 Huntmar Drive		
Date:	11/10/2022	Legend	Input by User
Input By:	S. Matthews		No Information or Input Required
Reviewed By:	D. Blair		

Building Description: 3-Storey Warehouse - Building 'A'
Type II - Non-combustible construction

Step			Input		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction C	Type V - Wood frame		1.5	0.8	
		Type IV - Mass Timber		Varies		
		Type III - Ordinary construction		1		
		Type II - Non-combustible construction	Yes	0.8		
		Type I - Fire resistive construction (2 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	21,435			
		Number of Floors/Storeys	3			
		Area of structure considered (m^2)			**64,305**	
	F	**Base fire flow without reductions**				**45,000**
		$F = 220\ C\ (A)^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	0%	**45,000**
		Limited combustible		-15%		
		Combustible	Yes	0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction (100% sprinkler coverage of building used)**			**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%	-30%	**-22,500**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	Yes	-10%	-10%	
				Cumulative Total	**-50%**	
5	**Exposure Surcharge (cumulative %, Maximum Exposure Adjsutement Charge Used)**				**Surcharge**	
	(3)	North Side	30.1- 45 m		0%	**0**
		East Side	> 45.1m		0%	
		South Side	> 45.1m		0%	
		West Side	> 45.1m		0%	
				Cumulative Total	**0%**	
Results						
6	(1) + (2) + (3)	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**23,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**383**
				or	USGPM	6,077
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	5
		Required Volume of Fire Flow (m^3)			m^3	6900

FUS - Fire Flow Calculations

As per 2020 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

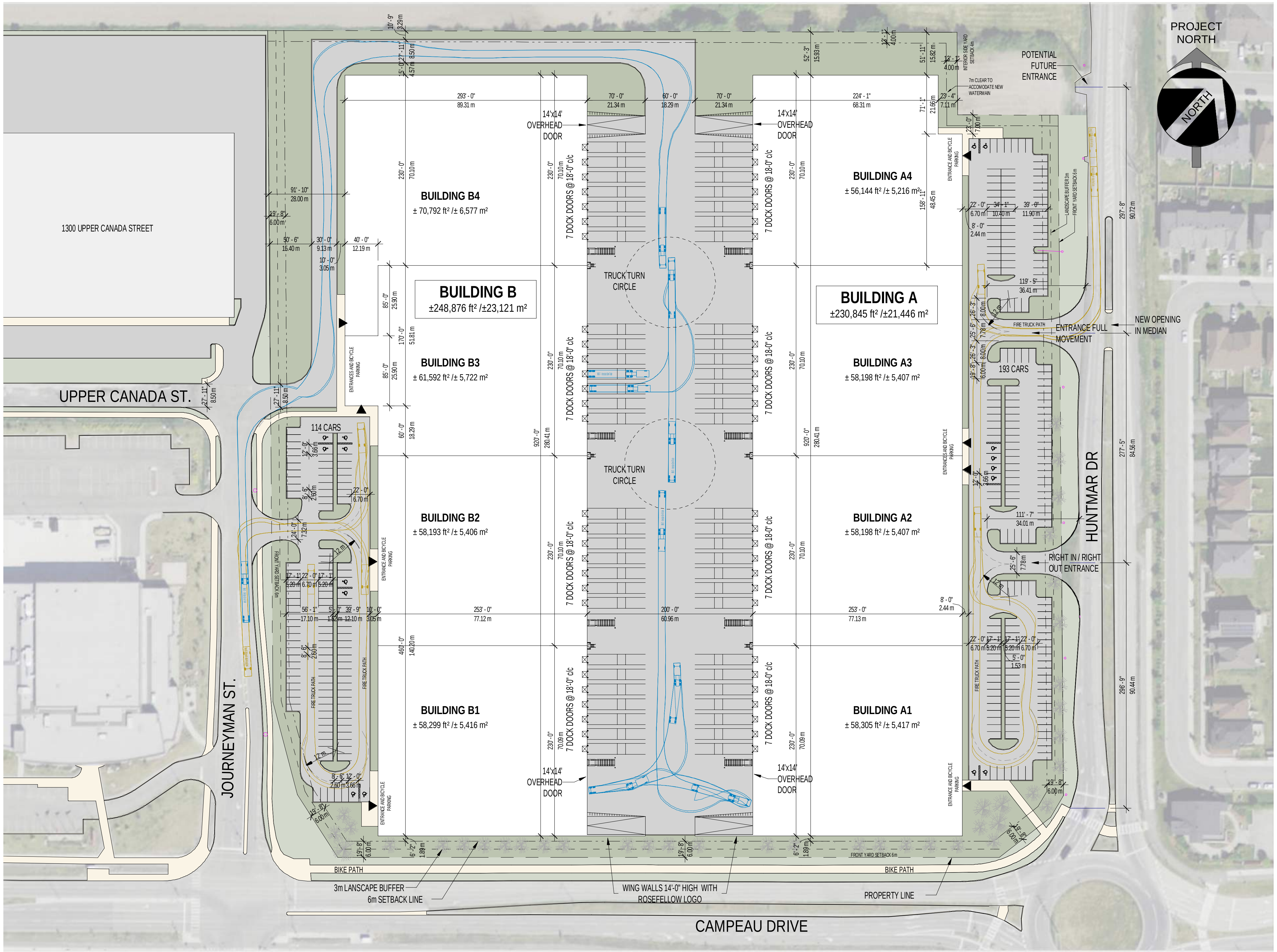
Novatech Project #:	122151
Project Name:	405 Huntmar Drive
Date:	11/10/2022
Input By:	S. Matthews
Reviewed By:	D. Blair

Legend: Input by User; No Information or Input Required

Building Description: 3-Storey Warehouse - Building 'B'
Type II - Non-combustible construction

Step			Input		Value Used	Total Fire Flow (L/min)
	Base Fire Flow					
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction C	Type V - Wood frame		1.5	0.8	
		Type IV - Mass Timber		Varies		
		Type III - Ordinary construction		1		
		Type II - Non-combustible construction	Yes	0.8		
		Type I - Fire resistive construction (2 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	23,121			
		Number of Floors/Storeys	3			
		Area of structure considered (m^2)			**69,363**	
	F	**Base fire flow without reductions** $F = 220\ C\ (A)^{0.5}$				**46,000**
	Reductions or Surcharges					
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	0%	46,000
		Limited combustible		-15%		
		Combustible	Yes	0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction (100% sprinkler coverage of building used)**			**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%	-30%	**-23,000**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	Yes	-10%	-10%	
				Cumulative Total	**-50%**	
5	**Exposure Surcharge (cumulative %, Maximum Exposure Adjsutement Charge Used)**				**Surcharge**	
	(3)	North Side	> 45.1m		0%	**0**
		East Side	> 45.1m		0%	
		South Side	> 45.1m		0%	
		West Side	30.1- 45 m		0%	
				Cumulative Total	**0%**	
	Results					
6	(1) + (2) + (3)	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**23,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**383**
				or	USGPM	6,077
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	5
		Required Volume of Fire Flow (m^3)			m^3	6900

MS
I:\22081 Rosefellow Kanata\01 Preliminary\Option 12.1 2022.10.31\22081 Kanata MSP Option 12.1.rvt



PROJECT STATISTICS

• PROPERTY

PARCEL: 405 HUNTMAR DR			
LOT AREA	±21.4 ac	±933,036 ft²	±86,681.9 m^2

• ZONING (IP13) LIGHT INDUSTRIAL

SETBACKS	MIN.	MAX.
- FRONT YARD	6m	-
- SIDE YARD	6m	-
- INTERIOR SIDE YARD	4m	-
- REAR YARD	6m	-
- MAX. FSI	-	2
- MAX G.F.A		±173,427 m^2
- COVERAGE	-	55%

• CITY PARKING REQUIREMENTS

- LIGHT INDUSTRIAL	0.8 /100 m^2 FOR THE FIRST 5,000 m^2 AND 0.4/100 m^2 ABOVE 5,000 m^2
- HC RESERVED	100-199 CARS MIN. 2 HC RESERVED
- MIN. AISLE WIDTH 6.7m	6.7m (2 WAY)
- LANDSCAPED BUFFER TO STREET	MIN, 3m
- STANDARD STALL DIMENSIONS	MIN. 2.6m X 5.2m
- HC STALL DIMENSIONS	MAX. 3.66m X 5.2m
- BICYCLE PARKING	1/1,000m^2

• PROPOSED BUILDING AREAS

- BUILDING A	±230,845 pi^2	±21,446 m^2
- BUILDING B	±248,876 pi^2	±23,121 m^2
- TOTAL GROSS FLOOR AREA (G.F.A.)	**±479,721 pi^2**	**±44,568 m^2**
- TOTAL COVERAGE		51.4%
- TOTAL LANDSCAPING	±138,512 pi^2	15%
INCLUDES CURBS AND SIDEWALKS		

• PROPOSED PARKING

BUILDING A	
- PARKING REQUIRED BY THE CITY	106 STALLS
- PARKING PROVIDED	193 STALLS
- BICYCLE PARKING	21 STALLS
BUILDING B	
- PARKING REQUIRED BY THE CITY	113 STALLS
- PARKING PROVIDED	114 STALLS
- BICYCLE PARKING	23 STALLS

• BUILDING A AREA SUMMARY

TENANT BUILDING A1		
- WAREHOUSE	±55,390 pi^2	±5,146 m^2
- OFFICE (5%)	±2,915 pi^2	±271 m^2
- A1 TENANT AREA	**±58,305 pi^2**	**±5,417 m^2**
TENANT BUILDING A2		
- WAREHOUSE	±55,288 pi^2	±5,136 m^2
- OFFICE (5%)	±2,910 pi^2	±270 m^2
- A2 TENANT AREA	**±58,198 pi^2**	**±5,407 m^2**
TENANT BUILDING A3		
- WAREHOUSE	±55,288 pi^2	±5,136 m^2
- OFFICE (5%)	±2,910 pi^2	±270 m^2
- A3 TENANT AREA	**±58,198 pi^2**	**±5,407 m^2**
TENANT BUILDING A4		
- WAREHOUSE	±53,337 pi^2	±4,955 m^2
- OFFICE (5%)	±2,807 pi^2	±261 m^2
- A4 TENANT AREA	**±56,144 pi^2**	**±5,216 m^2**
TOTAL AREA BUILDING A	**±230,845 pi^2**	**21446.20**

• BUILDING B AREA SUMMARY

TENANT BUILDING B1		
- WAREHOUSE	±55,384 pi^2	±5,145 m^2
- OFFICE (5%)	±2,915 pi^2	±271 m^2
- B1 TENANT AREA	**±58,299 pi^2**	**±5,416 m^2**
TENANT BUILDING B2		
- WAREHOUSE	±55,283 pi^2	±5,136 m^2
- OFFICE (5%)	±2,910 pi^2	±270 m^2
- B2 TENANT AREA	**±58,193 pi^2**	**±5,406 m^2**
TENANT BUILDING B3		
- WAREHOUSE	±58,512 pi^2	±5,436 m^2
- OFFICE (5%)	±3,080 pi^2	±286 m^2
- B3 TENANT AREA	**±61,592 pi^2**	**±5,722 m^2**
TENANT BUILDING B4		
- WAREHOUSE	±67,252 pi^2	±6,248 m^2
- OFFICE (5%)	±3,540 pi^2	±329 m^2
- B4 TENANT AREA	**±70,792 pi^2**	**±6,577 m^2**
TOTAL AREA BUILDING B	**±248,876 pi^2**	**23121.34**

ISSUED FOR DISCUSSION

ROSEFELLOW.

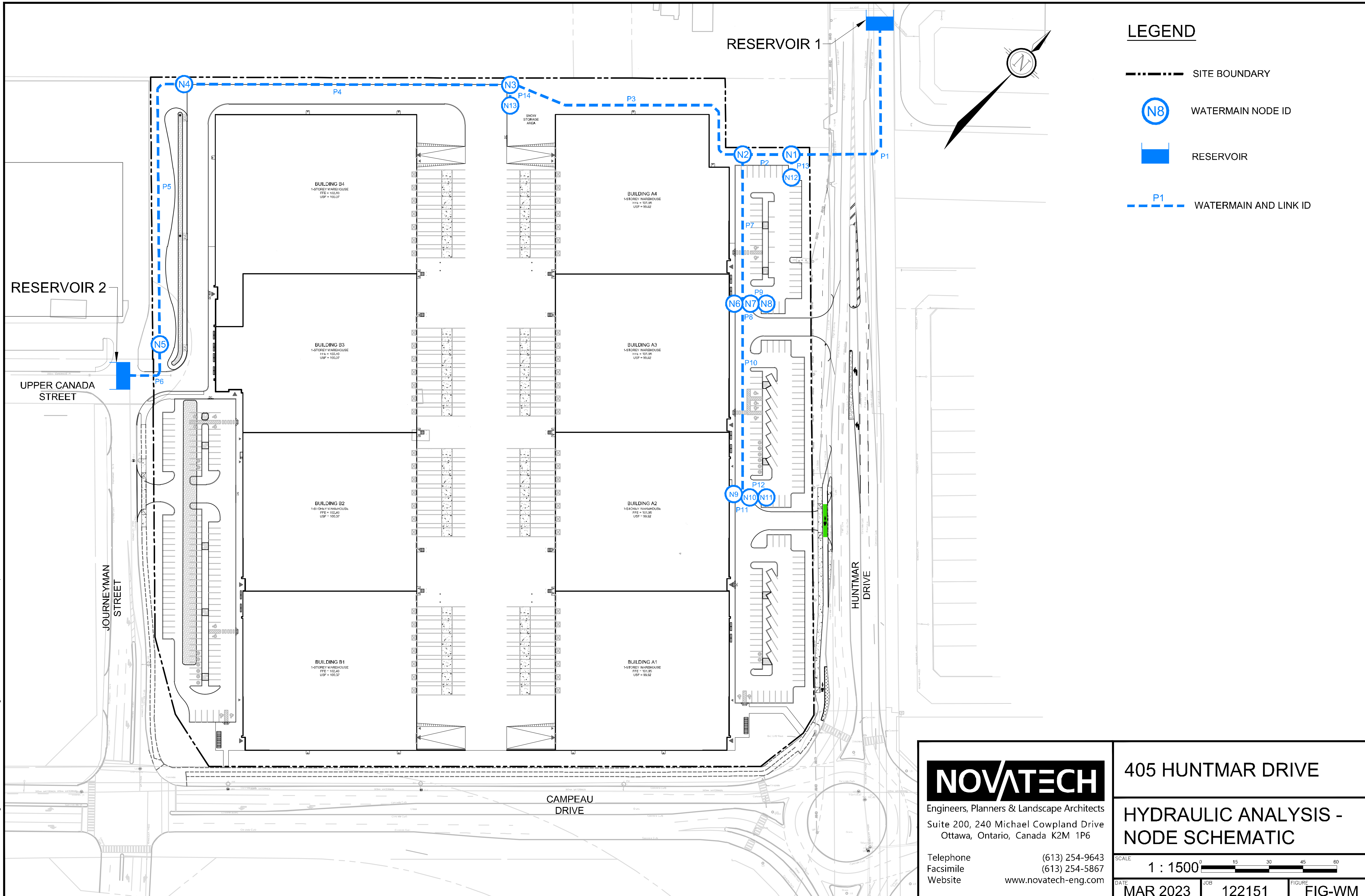
Industrial Project

405 Huntmar Drive, Kanata, Ont.

P100 Master Site Plan - Option 12.1   1" = 120'-0"

FOLIO 22081   2022.10.31

GKC
ARCHITECTURE & DESIGN
MONTREAL - TORONTO



M:\2022\122151\CAD\Civil\Figures\122151-NodeSchematic.dwg, WM-Schematic, Mar 30, 2023 - 1:40pm, smatthews

SHT11X17.DWG - 279mmX432mm

WATERMAIN DESIGN SHEET

Population and Consumption Rate Calculations

Node	Light Industrial			Commercial		Consumption Rates (L/s)		
	No. Loading Bays	No. Washrooms	Light Industrial Daily Demand (L/d)	Office Space (m2)	Commercial Daily Demand (L/d)	Average Daily	Maximum Daily	Maximum Hourly
R1								
R2								
N1	0	0	0	0	0.00	0.00	0.00	0.00
N2	0	0	0	0	0.00	0.00	0.00	0.00
N3	0	0	0	0	0.00	0.00	0.00	0.00
N4	0	0	0	0	0.00	0.00	0.00	0.00
N5	28	20	23200	1160	9354.84	0.38	0.57	1.02
N6	0	0	0	0	0.00	0.00	0.00	0.00
N7	0	0	0	0	0.00	0.00	0.00	0.00
N8	0	0	0	0	0.00	0.00	0.00	0.00
N9	28	20	23200	1080	8709.68	0.37	0.55	1.00
N10	0	0	0	0	0.00	0.00	0.00	0.00
N11	0	0	0	0	0.00	0.00	0.00	0.00
N12	0	0	0	0	0.00	0.00	0.00	0.00
N13	0	0	0	0	0.00	0.00	0.00	0.00
Total	**56**	**40**	**46400**	**2240.00**	**18065**	**0.75**	**1.12**	**2.02**

Water Demand Parameters (Local Demand as per City of Ottawa Guidelines - Water Distribution Systems)

Light Industrial Demand (Loading Bays)	150	L / day / loading bay
Light Industrial Demand (Washrooms)	950	L / day / washroom
Commercial Demand (Office Space)	75	L / day / 9.3sq.m.
Commerical/Industrial Max Day	1.5	x Avg Day
Commerical/Industrial Peak Hour	1.8	x Max Day

AVERAGE DAY DEMAND / HIGH PRESSURE CHECK

Junction Report

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
R1	160.8	-0.27	160.80	0.00	0.00	0.00
R2	160.8	-0.48	160.80	0.00	0.00	0.00
N1	99.2	0.00	160.80	61.60	604.30	87.65
N2	99.3	0.00	160.80	61.50	603.32	87.50
N3	99.0	0.00	160.80	61.80	606.26	87.93
N4	99.6	0.00	160.80	61.20	600.37	87.08
N5	99.8	0.38	160.80	61.00	598.41	86.79
N6	99.3	0.00	160.80	61.50	603.32	87.50
N7	99.2	0.00	160.80	61.60	604.30	87.65
N8	99.1	0.00	160.80	61.70	605.28	87.79
N9	99.2	0.37	160.80	61.60	604.30	87.65
N10	99.1	0.00	160.80	61.70	605.28	87.79
N11	99.1	0.00	160.80	61.70	605.28	87.79
N12	99.2	0.00	160.80	61.60	604.30	87.65
N13	99.0	0.00	160.80	61.80	606.26	87.93

Maximum Pressure

AVERAGE DAY DEMAND / HIGH PRESSURE CHECK

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
P1	99.7	300	120	-0.27	0.000	0.00	0.073
P2	21.5	300	120	-0.27	0.000	0.00	0.000
P3	136.3	300	120	0.10	0.000	0.00	0.000
P4	156.5	300	120	0.10	0.000	0.00	0.000
P5	117.8	300	120	0.10	0.000	0.00	0.510
P6	22.9	300	120	0.48	0.010	0.00	0.000
P7	71.0	200	110	0.37	0.010	0.00	0.052
P8	19.1	200	110	0.00	0.000	0.00	0.000
P9	6.0	150	100	0.00	0.000	0.00	0.000
P10	69.2	200	110	0.37	0.010	0.00	0.061
P11	31.5	200	110	0.00	0.000	0.00	0.000
P12	6.0	150	100	0.00	0.000	0.00	0.000
P13	10.1	150	100	0.00	0.000	0.00	0.000
P14	9.0	150	100	0.00	0.000	0.00	0.000

PEAK HOUR DEMAND

Junction Report

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
R1	156.4	-0.74	156.40	0.00	0.00	0.00
R2	156.4	-1.28	156.40	0.00	0.00	0.00
N1	99.2	0.00	156.40	57.20	561.13	81.39
N2	99.3	0.00	156.40	57.10	560.15	81.24
N3	99.0	0.00	156.40	57.40	563.09	81.67
N4	99.6	0.00	156.40	56.80	557.21	80.82
N5	99.8	1.02	156.40	56.60	555.25	80.53
N6	99.3	0.00	156.40	57.10	560.15	81.24
N7	99.2	0.00	156.40	57.20	561.13	81.39
N8	99.1	0.00	156.40	57.30	562.11	81.53
N9	99.2	1.00	156.40	57.20	561.13	81.39
N10	99.1	0.00	156.40	57.30	562.11	81.53
N11	99.1	0.00	156.40	57.30	562.11	81.53
N12	99.2	0.00	156.40	57.20	561.13	81.39
N13	99.0	0.00	156.40	57.40	563.09	81.67

Minimum Pressure

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
P1	99.7	300	120	-0.74	0.01	0.00	0.050
P2	21.5	300	120	-0.74	0.01	0.00	0.046
P3	136.3	300	120	0.26	0.00	0.00	0.060
P4	156.5	300	120	0.26	0.00	0.00	0.052
P5	117.8	300	120	0.26	0.00	0.00	0.069
P6	22.9	300	120	1.28	0.02	0.00	0.044
P7	71.0	200	110	1.00	0.03	0.01	0.048
P8	19.1	200	110	0.00	0.00	0.00	0.000
P9	6.0	150	100	0.00	0.00	0.00	0.000
P10	69.2	200	110	1.00	0.03	0.01	0.049
P11	31.5	200	110	0.00	0.00	0.00	0.000
P12	6.0	150	100	0.00	0.00	0.00	0.000
P13	10.1	150	100	0.00	0.00	0.00	0.000
P14	9.0	150	100	0.00	0.00	0.00	0.000

MAXIMUM DAY + FIREFLOW DEMAND AT BUILDING A

Junction Report

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
R1	144.8	-150.85	144.80	0.00	0.00	0.00
R2	145.3	-83.27	145.30	0.00	0.00	0.00
N1	99.2	0.00	143.21	44.01	431.74	62.62
N2	99.3	0.00	143.02	43.72	428.89	62.21
N3	99	0.00	143.74	44.74	438.90	63.66
N4	99.6	0.00	144.56	44.96	441.06	63.97
N5	99.8	0.55	145.18	45.38	445.18	64.57
N6	99.3	0.00	128.23	28.93	283.80	41.16
N7	99.2	0.00	127.14	27.94	274.09	39.75
N8	99.1	95	125.47	26.37	258.69	37.52
N9	99.2	0.57	124.22	25.02	245.45	35.60
N10	99.1	0.00	122.41	23.31	228.67	33.17
N11	99.1	95	120.74	21.64	212.29	30.79
N12	99.2	43	142.56	43.36	425.36	61.69
N13	99	0	143.74	44.74	438.90	63.66

(orange)	Minimum Pressure
(blue)	Applied Fire Flow

MAXIMUM DAY + FIREFLOW DEMAND AT BUILDING A

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
P1	99.7	300	120	-150.85	2.13	15.96	0.021
P2	21.5	300	120	-107.85	1.53	8.57	0.022
P3	136.3	300	120	82.72	1.17	5.25	0.023
P4	156.5	300	120	82.72	1.17	5.25	0.023
P5	117.8	300	120	82.72	1.17	5.25	0.023
P6	22.9	300	120	83.27	1.18	5.31	0.023
P7	71.0	200	110	190.57	6.07	208.31	0.022
P8	19.1	200	110	95.00	3.02	57.39	0.025
P9	6.0	150	100	95.00	5.38	277.99	0.028
P10	69.2	200	110	95.57	3.04	58.02	0.025
P11	31.5	200	110	95.00	3.02	57.39	0.025
P12	6.0	150	100	95.00	5.38	277.99	0.028
P13	10.1	150	100	-43.00	2.43	64.04	0.032
P14	9.0	150	100	0.00	0	0.00	0

MAXIMUM DAY + FIFREFLOW DEMAND AT BUILDING B

Junction Report

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
R1	144.8	-20.25	144.80	0.00	0.00	0.00
R2	145.3	-213.87	145.30	0.00	0.00	0.00
N1	99.2	0.00	144.76	45.56	446.94	64.82
N2	99.3	0.00	144.75	45.45	445.86	64.67
N3	99	0.00	144.70	45.70	448.32	65.02
N4	99.6	0.00	144.65	45.05	441.94	64.10
N5	99.8	233.55	144.60	44.80	439.49	63.74
N6	99.3	0.00	144.75	45.45	445.86	64.67
N7	99.2	0.00	144.75	45.55	446.85	64.81
N8	99.1	0.00	144.75	45.65	447.83	64.95
N9	99.2	0.57	144.75	45.55	446.85	64.81
N10	99.1	0.00	144.75	45.65	447.83	64.95
N11	99.1	0.00	144.75	45.65	447.83	64.95
N12	99.2	0.00	144.76	45.56	446.94	64.82
N13	99	0.00	144.70	45.70	448.32	65.02

(orange)	Minimum Pressure
(blue)	Applied Fire Flow

MAXIMUM DAY + FIFREFLOW DEMAND AT BUILDING B

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
P1	99.7	300	120	-20.25	0.29	0.39	0.028
P2	21.5	300	120	-20.25	0.29	0.39	0.028
P3	136.3	300	120	-19.68	0.28	0.37	0.028
P4	156.5	300	120	-19.68	0.28	0.37	0.028
P5	117.8	300	120	-19.68	0.28	0.37	0.028
P6	22.9	300	120	213.87	3.03	30.46	0.020
P7	71.0	200	110	0.57	0.02	0.00	0.053
P8	19.1	200	110	0.00	0.00	0.00	0.000
P9	6.0	150	100	0.00	0.00	0.00	0.000
P10	69.2	200	110	0.57	0.02	0.00	0.053
P11	31.5	200	110	0.00	0.00	0.00	0.000
P12	6.0	150	100	0.00	0.00	0.00	0.000
P13	10.1	150	100	0.00	0.00	0.00	0.000
P14	9.0	150	100	0.00	0.00	0.00	0.000

MAXIMUM DAY + FIREFLOW DEMAND SUMMARY

Maximum day plus fire flow demand was modeled for node N1.
The following is a summary of the minimum pressures that occurred for this operating condition.

	Demand (L/s)						
Fire at Junction	Maximum Daily	Fire Flow	Max Day + Fire	Minimum Pressure (m)	kPa	psi	Node
N11	1.12	233.00	234.12	21.64	212.29	30.79	N11
N5	1.12	233.00	234.12	44.80	439.49	63.74	N5

Drew Blair

From: Candow, Julie <julie.candow@ottawa.ca>
Sent: Wednesday, November 30, 2022 9:34 AM
To: Drew Blair
Cc: Nathanael Niedermann; Julian Nini; Murray Chown; Adam Thompson; Jennifer Luong
Subject: RE: Watermain Loop - 405 Huntmar Drive (PC2022-0227)

Hi Drew,

I apologize for the delay on this. I had a meeting with our Asset Management team – see below for their responses in red.

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

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

From: Drew Blair <D.Blair@novatech-eng.com>
Sent: November 22, 2022 3:26 PM
To: Candow, Julie <julie.candow@ottawa.ca>
Cc: Nathanael Niedermann <nathanaeln@rosefellow.com>; Julian Nini <juliann@rosefellow.com>; Murray Chown <m.chown@novatech-eng.com>; Adam Thompson <a.thompson@novatech-eng.com>; Jennifer Luong <j.luong@novatech-eng.com>
Subject: RE: Watermain Loop - 405 Huntmar Drive (PC2022-0227)

CAUTION: This email originated from an External Sender. Please do not click links or open attachments unless you recognize the source.

ATTENTION : Ce courriel provient d’un expéditeur externe. Ne cliquez sur aucun lien et n’ouvrez pas de pièce jointe, excepté si vous connaissez l’expéditeur.

Hi Julie,

Will the City require us to install hydrants on either of these watermains along Huntmar (yellow option or orange option)? It is assumed the hydrants would be installed within the City ROW and be municipally owned and maintained. No – municipal hydrants will not be required within the ROW for either option (yellow or orange).

If the City doesn’t require hydrants and we proceed with the option to install the 300mm watermain southwards in the City’s west boulevard of Huntmar and ultimately connect at Campeau; could we have multiple connections off this 300mm watermain in Huntmar to private hydrants within our site? No, multiple connections to the 300mm watermain in Huntmar would not be supported. It is expected that private hydrants would be fed from a private watermain within your site.

Thanks,

Drew

Drew Blair, P.Eng., Senior Project Manager | Land Development Engineering
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 x 236 | Fax: 613.254.5867
The information contained in this email message is confidential and is for exclusive use of the addressee.

From: Candow, Julie <julie.candow@ottawa.ca>
Sent: Wednesday, November 16, 2022 12:46 PM
To: Drew Blair <D.Blair@novatech-eng.com>
Cc: Nathanael Niedermann <nathanaeln@rosefellow.com>; Julian Nini <juliann@rosefellow.com>; Murray Chown <m.Chown@novatech-eng.com>; Adam Thompson <a.thompson@novatech-eng.com>; Jennifer Luong <j.luong@novatech-eng.com>
Subject: RE: Watermain Loop - 405 Huntmar Drive (PC2022-0227)

Hi Drew,

Sorry for the confusion. We would like to see one **or** the other, not both.

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

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

From: Drew Blair <D.Blair@novatech-eng.com>
Sent: November 16, 2022 12:03 PM
To: Candow, Julie <julie.candow@ottawa.ca>
Cc: Nathanael Niedermann <nathanaeln@rosefellow.com>; Julian Nini <juliann@rosefellow.com>; Murray Chown <m.chown@novatech-eng.com>; Adam Thompson <a.thompson@novatech-eng.com>; Jennifer Luong <j.luong@novatech-eng.com>
Subject: RE: Watermain Loop - 405 Huntmar Drive (PC2022-0227)

CAUTION: This email originated from an External Sender. Please do not click links or open attachments unless you recognize the source.

ATTENTION : Ce courriel provient d’un expéditeur externe. Ne cliquez sur aucun lien et n’ouvrez pas de pièce jointe, excepté si vous connaissez l’expéditeur.

Hi Julie,

Thanks for this.

I just wanted to confirm if the City is requesting we install **both** the 300mm watermain (shown in yellow) southwards on Huntmar Dr to connect in to the existing 300mm watermain stub at Campeau Dr **and** install the 300mm watermain (shown in orange) northwards to connect into the existing 200mm watermain at Fallengale Crescent? Or is the City requesting that we install one or the other but we don’t have to do both?

Thanks,

Drew

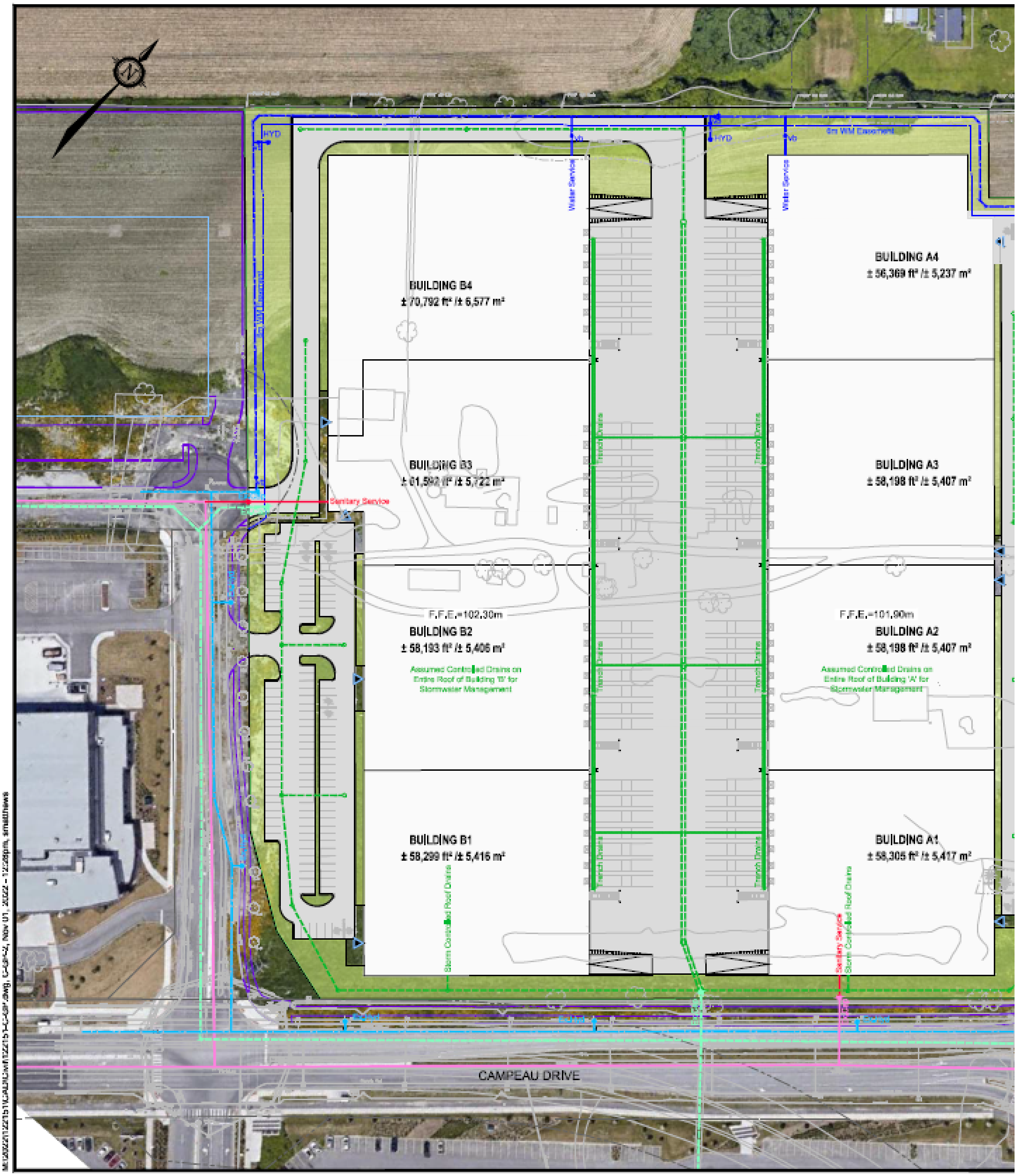
Drew Blair, P.Eng., Senior Project Manager | Land Development Engineering
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 x 236 | Fax: 613.254.5867
The information contained in this email message is confidential and is for exclusive use of the addressee.

From: Candow, Julie <julie.candow@ottawa.ca>
Sent: Wednesday, November 16, 2022 11:24 AM
To: Drew Blair <D.Blair@novatech-eng.com>
Cc: Nathanael Niedermann <nathanaeln@rosefellow.com>; Julian Nini <juliann@rosefellow.com>; Murray Chown <m.Chown@novatech-eng.com>; Adam Thompson <a.thompson@novatech-eng.com>; Jennifer Luong <j.luong@novatech-eng.com>
Subject: RE: Watermain Loop - 405 Huntmar Drive (PC2022-0227)

Hi Drew,

In response to Novatech's Memo re: 405 Huntmar Drive, the City has reviewed the water servicing approach and offers the following comments:

1. Eliminating the draft approved extension of the Upper Canada ROW through the subject parcel, 405 Huntmar Street, is acceptable
2. The alternative watermain loop should be 300mm diameter, as opposed to 200mm diameter. The proposed watermain should connect to the 300mm diameter watermain in Upper Canada Street (existing 200mm stub and reducer to be removed).
3. The City would like to minimize the amount of public watermain within private property as much as possible. For that reason, can we please ask that Novatech explore the following watermain configurations.
    - the northern extension of watermain within Huntmar Drive to be located within the boulevard on the west side of the Huntmar Drive ROW (yellow highlight below)
    - a connection to the existing 200mm dia. watermain within Huntmar Drive, adjacent to Fallengale Crescent. The proposed 300mm diameter tee connection and extension within Huntmar Drive could be within the east boulevard to minimize reinstatement costs (see orange highlight below)



Please let me know if you have any questions.

Thanks,

Julie Candow, P.Eng

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

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

From: Drew Blair <D.Blair@novatech-eng.com>
Sent: November 03, 2022 9:22 AM
To: Candow, Julie <julie.candow@ottawa.ca>
Cc: Nathanael Niedermann <nathanaeln@rosefellow.com>; Julian Nini <juliann@rosefellow.com>; Murray Chown <m.chown@novatech-eng.com>; Adam Thompson <a.thompson@novatech-eng.com>; Jennifer Luong <j.luong@novatech-eng.com>
Subject: Watermain Loop - 405 Huntmar Drive (PC2022-0227)

CAUTION: This email originated from an External Sender. Please do not click links or open attachments unless you recognize the source.

ATTENTION : Ce courriel provient d’un expéditeur externe. Ne cliquez sur aucun lien et n’ouvrez pas de pièce jointe, excepté si vous connaissez l’expéditeur.

Hello Julie,

As part of the pre-consultation meeting with the City for the proposed development at 405 Huntmar, there were some comments in regards to a watermain loop requirement across this site.

Please find attached a memo (including a figure 122151-C-GP_v4) that describes and illustrates the preferred watermain looping for the site and the reasoning behind the proposed location.

We request your review and confirmation if the approach provided in the attached memo for a watermain loop for 405 Huntmar Drive is acceptable.

Please let us know if you have any questions.

Thanks,

Drew

Drew Blair, P.Eng., Senior Project Manager | Land Development Engineering
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 x 236 | Fax: 613.254.5867
The information contained in this email message is confidential and is for exclusive use of the addressee.

'

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.

CIVELEC CONSULTANTS INC.
3900 COTE VERTU SUITE 200
ST-LAURENT (QUÉBEC) H4R 1V4

TEL. : (514) 337-2600
FAX : (514) 337-2610

March 24, 2023

Planning, Real Estate and Economic Development Department - West Branch
City of Ottawa
110 Laurier Avenue West Ottawa, ON
julie.candow@ottawa.ca

Attention: Julie Candow, P.Eng, Project Manager

Subject: 22081-Rosefellow Kanata – Required Fire Flow Proposal – R.2
O/Ref.: 2301-01A

Julie,

To determine the water demand for fire protection based on the Fire Underwriters Survey, a document has been prepared by the Opta Information Intelligence Corp (formerly Insurance Advisory Organization). Part 2 of the document, contains a guide ("Guide for Determination of Required Fire Flows for Public Fire Protection in Canada), from here on referred to as the "Guide".

The subsection entitled "Risk Quantification with Required Fire Flows" states the following:

"*The Guide to calculate required fire flows is made available to municipal officials, consulting engineers and other interested stakeholders as an aid in estimating water supply requirements for public fire protection. This document is a guide and requires specialized knowledge and experience in public fire protection engineering for its effective application*."

The guide provides the following formula for estimating the fire flow required for a given area:

$RFF=220\ CA^{0.5}$

where RFF = Required Fire Flow
C = coefficient related to the type of construction
A is the total floor area of the building in m^2

This formula only takes into consideration the building construction and the building area. The use of this formula provides a reasonable estimation for a building that does not have an adequate sprinkler system or that has a control mode density-area sprinkler system. The firefighting is based on a fire involving a majority of the building and the main objective is to limit the fire from spreading to other buildings and if possible extinguish the fire.

The modern-day sprinkler systems are designed to limit the fire to a relatively small area (by using Quick response sprinklers) and some are actually designed to extinguish the fire by using "Early Suppression Fast Response" sprinkler technology, as is the case in our situation. Since the proposed sprinkler design is based on the specific combustible loading of the building's occupancy content, the actual storage configuration, the actual height of the building and the clearances of the sprinklers with respect to the combustibles, it would be almost impossible to create a simple equation to estimate the fire flow that could be applied to all buildings of the same size given that most important criteria in determining the required water supplies in sprinklered buildings is based on commodity classifications for situations involving warehouses. As a number of sprinkler systems for speculative buildings are not designed for the actual combustible contents nor do they necessarily use ESFR sprinkler technology, the Guide uses a very conservative credit for sprinklered buildings.

The following examples will demonstrate the typical exceptions where the Guide would provide unreasonable flows (at times under-estimated and at times over-estimated) and where fire protection knowledge is required to determine the reasonable fire flows.

Example 1

We have a 1000 m^2 building of non-combustible construction. The building is used for storage of Class 1B flammable liquids in relieving-type metal drums 25 ft high on racks. The building is fully sprinklered. There is no required exposure protection.

In this example, the estimated fire flow would be:

220 x 0.8 x 10000.5 = 5,565 L/min

If we increase the flow by 25% for rapid burning fire, we get 6,957 L/min.

Assuming that we have a fully supervised sprinkler system, we can reduce the flow up to 50% yielding thus a RFF of 3,478 L/min or 920 usgpm.

The sprinkler system design for such an occupancy would require a density of 0.60 gpm/sq ft over an area of 3000 sq ft (flow of 1,800 gpm) plus in-rack sprinklers flowing 18 sprinklers at 30 gpm (flow of 540 gpm) and 500 gpm for hose streams yielding a total demand flow of 2840 usgpm or 10,750 L/min.

As we can see in this example, the real fire flow required to control the fire is approximately 3 times the flow calculated as per the Guide.

Example 2

We have a 150,000 m^2 building of non-combustible construction. The building is used for storage of car parts. The building is fully sprinklered. There is no required exposure protection.
In this case the required flow is:

220 x 0.8 x 150,0000.5 = 68,164 L/min

We did not increase the flow for medium hazard.

Assuming that we have a fully supervised sprinkler system, we can reduce the flow up to 50% and we obtain 34,082 L/min or 9,005 usgpm.

Giving a 50% credit for sprinklers is not reasonable. The sprinkler system is typically designed to control the fire within an area of 140 m^2. If the fire is not extinguished or controlled within the sprinkler design area, the fire will probably spread to the entire building and the credit for 50% would not work as the fire would behave as if the sprinkler system would not be present.

To protect this warehouse, there is almost no municipal water system that can provide these flows based on the Guide's estimation equation. These large warehouses are installed in industrial parks and the typical fire flows required to extinguish the fire are in the range of 5,000 L/min to 12,000 L/min (1320 gpm – 3170 gpm).

In this case, the calculations based on the guide require over 4 times more the water flow that is actually required to extinguish the fire.

These examples show why the experience in fire protection engineering is required to correctly determine the actual fire flows required to extinguish a fire.

Other Methods

Other than the FUS, several other organizations have developed simplified methods to determine the required water flow for fire protection purposes. The results vary over 150% depending on the organization.

NRC has developed a method that is based largely on building volume. The method determines the total water required for firefighting and then determines the required flow rate according to the water supply value obtained. It also limits the flow rate to a maximum of 9,000 L/min (2,378 gpm). For sprinklered buildings, the NRC method defers to NFPA 13 as the appropriate design standard for the water demand based on the sprinkler flow plus the hose stream demand. This method was included in the annex of the Ontario Building Code 2006 version.

Another method used to calculate water supplies can be found in NFPA 1142 which also uses building volume as its premise but utilizes a different formula. As was the case for the NRC method, the NFPA 1142 method first determines the total water required for firefighting and then derives the required flow rate. It limits the maximum flow rate to 3,900 L/min (1,030 gpm). When applying this method to fully sprinklered buildings with no exposure hazard, the water demand is the same as the water demand required for the sprinkler flow plus the hose stream flow as per the requirements of NFPA 13.

From these examples, we can see that the use of any of these methods without a detailed fire protection engineering analysis, can provide inconsistent results that can lead to inadequate water supplies or over exaggerated water supplies.

By code, large buildings require mandatory sprinkler protection. Consequently, when using the aforementioned methods, the volume of water calculations are replaced by the water supplies derived from the actual sprinkler flow rate (determined from NFPA 13 or other acceptable source), the number of hose streams expected to be used by the fire department, and the expected duration of the fire.

Flow Analysis

There are two reference standards (NFPA and FM) in the fire protection industry when it comes to sprinkler system design. NFPA 13 is the universal standard adopted in the United States and across Canada. The other is FM Global which has its own research centre and test labs. Both of these standards align when it comes to the specific sprinkler design criteria for the subject building. Both organizations also agree that a sprinkler design based on ESFR sprinklers, reduces the amount of water required for hose streams from 500 gpm (for conventional sprinklers) to 250 gpm and reduces the fire duration requirement from 120 minutes (for conventional sprinklers) to 60 minutes. This is due to the fact the ESFR sprinklers are designed to suppress the fire rather than simply “control” the fire.

The FUS method has a slightly different approach from the two methods discussed above. Unlike the NRC method or the NFPA 1142 method, the FUS first determines the flow rate (based on the building area and other site specific features) and then calculates the total volume of water required based on the derived flow rate and the projected fire duration. Furthermore, it does not differentiate between sprinkler flow and hose stream flow. Sprinkler flow is not dependent on building size but rather on the building’s occupancy. It is calculated on a finite number of sprinklers operating regardless of the building size. As the FUS does not take into consideration the actual sprinkler flow but instead reduces the calculated flow by a “one size fits all” percentage, the calculated results in the FUS usually leads to flows that are unrealistic for large buildings and inadequate for small buildings.

Based on the FUS, the total required fire flow calculations for the subject building yielded a flow rate of 10,000 L/min (2,642 gpm) (see calculations attached with this report).

The NFPA 13 based design criteria for the subject building are summarized as follows:

Actual sprinkler flow rate using ESFR sprinklers = 5610 L/min (1482 gpm)
Hose stream allowance required when using ESFR sprinklers = 946 L/min (250 gpm)
Fire Duration when using ESFR sprinklers = 60 min

Because standard spray sprinkler systems require a hose stream allowance of 1892 L/min (500 gpm) for storage occupancies, there is a possibility that the fire department may draw 1892 L/min (500 gpm) instead of the 946 L/min (250 gpm) (required for ESFR sprinklers) during firefighting operations. We have therefore increased the hose stream demand by 250 gpm as part of our proposed analysis.

As per our analysis, the actual required water flow rate would be 7500 L/min (1982 us gpm).

To represent the required flow for adequate water supplies, the FUS calculated flow of 14,000 L/min (3698 gpm) was reduced to 1100 L/min (2906 gpm). This is represented in the FUS form under STEP I by providing a supplementary line whereby an additional reduction of 25% was applied due to the use of ESFR sprinklers in the building.

This 25% reduction still provides water supplies that are approximately 1000 gpm larger than the sprinkler flow and hoses (500 gpm).

As per the information available the city can supply over 11,000 L/min.

If you require any additional information, please do not hesitate to contact us.

Sincerely Yours,

Civelec Consultants Inc.

Paul Lhotsky, PhD, P. Eng., P. E.

LICENSED PROFESSIONAL ENGINEER
P. LHOTSKY
PROVINCE OF ONTARIO

Civelec Consultant Inc.

Project: KANATA BUILDINGS
O/Ref.: 2301-01A
Client: Rosefellow

FIRE FLOW ASSESSMENT

Applicable design guidelines:

1. Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection, 2020
2. Ottawa Design Guidelines - Water Distribution (2010) ISTB-2018-02
3. Technical Bulletin ISTB-2021-03

STEP A - Determine the type of construction

Type of construction	Coefficient (C)	Value selected (C)
Fire-resistive construction (> 3 hours)	0.6	**1.0**
Non-combustible construction	0.8	
Ordinary construction	1.0	
Wood frame construction	1.5	

STEP B - Determine the floor area

Floor / Level	Floor area per level (sq. ft.)	Floor area per level (m^2)
Gross floor area (GFA) ground level	248,581	23094
Total floor area (A)	**248,581**	**23094**

STEP C - Determine the height in storeys

Floor / Level	Number of storeys	Percent of floor area considered
Ground level	3	100%
Height in storeys	**3**	

STEP D - Determine base fire flow *(round to nearest 1,000 L/min)*

$$F = 220C\sqrt{A}$$

Where:

F is the required fire flow in L/min

C is the coefficient related to the type of construction, and;

A is the total floor area of the building in m^2

Coefficient related to type of construction (C) = **1.0**

Floor area considered (A) = **69282** m2

REQUIRED (BASE) FIRE FLOW (F) = **58,000** **L/min** (*rounded to nearest 1,000 L/min)*

Civelec Consultant Inc.

Project: KANATA BUILDINGS
O/Ref.: 2301-01A
Client: Rosefellow

FIRE FLOW ASSESSMENT

STEP E = Determine the increase or decrease for occupancy and apply to Step D *(Step D x Step E, do not round)*

Occupancy Class	Occupancy factor	Value selected (C)
Non-combustible	0.75	
Limited combustible	0.85	
Combustible	1.00	**1.0**
Free burning	1.15	
Rapid burning	1.25	

REQUIRED (BASE) FIRE FLOW (F) = **57,907** **L/min** *(not rounded)*

STEP F - Determine the decrease, if any, for automatic sprinkler protection and apply to value in Step D above *(do not round)*

Sprinkler system design	Sprinkler design charge	Value selected (C)	Total charge
Automatic sprinkler system conforming to NFPA standards	-30%	Yes	-30%
Standard water supply	-10%	Yes	-10%
Fully supervised system	-10%	Yes	-10%
Additional reduction - adjacent buildings sprinklerd	-25%	Yes	-25%
Total charge for sprinkler system			**-75%**

DECREASE FOR SPRINKLER PROTECTION = **14,477** **L/min** *(not rounded)*

STEP G - Determine the total increase for exposures and apply to value in Step D above *(do not round)*

Façade	Separation distance (m)	Length-height factor of exposed wall (m-storeys)	Assumed construction of exposed wall of adjacent	Total change (%)
North façade	> 30	N/A	N/A	0%
East façade (fire/party wall)	> 30	N/A	N/A	0%
South façade	> 30	N/A	N/A	0%
West façade	> 30	N/A	N/A	0%
Total charge for exposures				**0%**

INCREASE FOR EXPOSURES = **0** **L/min** *(not rounded)*

STEP H - Determine fire flow including all increases and reductions (Step E + Step F + Step G, *round to nearest 1,000 L/min*)

TOTAL REQUIRED FIRE FLOW (RFF) =	**14,000**	**L/min *(rounded to nearest 1,000 L/min)***
	233	**L/s**
	3698	**USGPM**

Civelec Consultant Inc.

Project:	KANATA BUILDINGS
O/Ref.:	2301-01A
Client:	Rosefellow

FIRE FLOW ASSESSMENT

STEP I - Additional adjustemnt for engineering judgement. Justification: Reduction for ESFR sprinkler: 25%

TOTAL REQUIRED FIRE FLOW (RFF) =	**11,000**	**L/min** ***(rounded to nearest 1,000 L/min)***
	183	**L/s**
	2906	**USGPM**

Prepared by: Paul Lhotsky Date: March 24 2023

LICENSED PROFESSIONAL ENGINEER
P. LHOTSKY
PROVINCE OF ONTARIO

APPENDIX C
Sanitary Servicing

Project No. 122151
Project Name: 405 Huntmar Dr
Project Location: Ottawa, ON

Date: December 2022

Proposed Peak Sanitary Flows

Daily Demands from OBC Table 8.2.1.3

Type of Use	Daily Demand Volume	
Industrial (warehouse)	150	L/day/loading bay
	950	L/day/washroom
Commercial (office Space)	75	L/ day/ 9.3 m of Office Space

Industrial & Commercial Sanitary Peaking Factors

Conditions	Peaking Factor
Office Space/Commercial	1.5
Light Industrial (warehouse)	4.3

Proposed Development Conditions

	Building A	Building B
No. Loading Bays	28	28
No. Washrooms	20	20
Peak Industrial Flows (L/s)	**1.15**	**1.15**
Office Space ~sq. m.	1080	1160
Peak Commercial Flows (L/s)	**0.15**	**0.16**
Site Area (ha)	4.27	4.40
Extraneuos Flows (0.33 L/s/ha)	**1.41**	**1.45**
Total Peak Sanitary Flows (L/s)	**2.71**	**2.77**

SANITARY SEWER DESIGN SHEET
405 Huntmar Drive

NOVATECH
Engineers, Planners & Landscape Architects

PROJECT # : 122151
DESIGNED BY : BM
CHECKED BY : DDB
DATE PREPARED : 9-Dec-22

LOCATION					LIGHT INDUSTRIAL					COMMERCIAL			INFILTRATION		FLOW	PROPOSED SEWER								
STREET	FROM MH	TO MH	Area ID	Total Area (ha.)	Loading Bays L	Washrooms W	AREA (ha.)	PEAK FACTOR Mi	PEAK LIGHT INDUSTRIAL FLOW Qind (L/s)	OFFFICE AREA (m2) Ao	PEAK FACTOR Mc	PEAK COMM/INST/PARK FLOW Qcom (L/s)	Total Area (ha.)	PEAK EXTRAN. FLOW Qinf (L/s)	PEAK DESIGN FLOW Q(d) (L/s)	LENGTH (m)	PIPE SIZE (mm)	PIPE ID (mm)	TYPE OF PIPE	GRADE %	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	Qpeak/ Qcap	d/ D_{full}
	Building A																							
Campeau Dr	Building A	MH 02		4.27	28	20	2.03	4.3	**1.15**	1080	1.5	**0.15**	4.27	**1.41**	**2.71**	5.2	250	254.00	DR 35	2.00	87.7	1.73	3.1%	
	Building B																							
Upper Canada St	Building B	MH 01		4.39	28	20	2.19	4.3	**1.15**	1160	1.5	**0.16**	4.39	**1.45**	**2.77**	25.6	250	254.00	DR 35	1.00	62.0	1.22	4.5%	
	MH 01	MH 140A		0.01	0	0	0.00	4.3	**1.15**	0	1.5	**0.16**	0.01	**1.45**	**2.77**	14.7	250	254.00	DR 35	1.00	62.0	1.22	4.5%	
	Total Flows																							

Notes:
1. Q(d) = Qind + Qcom + Qinf
2. Qind = (L*150 + W*950) * Mi / 86,400
3. Qcom = (Ao / 9.3) * 75 * Mc / 86,400
2. Qinf = 0.33 L/sec/ha

Min pipe size 200mm @ min. slope 0.32%
Mannings n = 0.013

Definitions:
Q(d) = Design Flow (L/sec)
Qind = Light Industrial Flow (L/sec)
Qcom = Commercial Flow (L/sec)
Qinf = Extraneous Flow (L/sec)

L = No. Loading Bay
W = No. Washroom
Mi = Light Industrial Peak Factor (as per Appendix 4-B.1 of the City of Ottawa Sewer Design Guidelines)
Qind = [(150 L / d / Loading Bay) + (950 L / d / Washroom)] * Mi

Ao = Office Area (m2)
Mc = Commercial Peak Factor = 1.5 (as per City of Ottawa Sewer Design Guidelines)
Qcom = (75 L / d) * (Ao / 9.3m2) * Mc

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	TOTAL	PROPOSED SEWER DESIGN							
				UNIT TYPES				AREA	POPULATION		PEAK	PEAK	AREA (Ha)							PEAK	AREA (Ha)		FLOW	FLOW	FLOW	CAPACITY	LENGTH	DIA	SLOPE	VELOCITY	VELOCITY	AVAILABLE CAPACITY	
											FACTOR	FLOW	PRESTIGE BUISNESS PK		COMMERCIAL		INDUSTRIAL			FLOW										(full)	(actual)		
STREET	AREA ID	FROM MH	TO MH	SF	SD	TH	APT	(Ha)	IND	CUM		(L/s)	IND	CUM	IND	CUM	IND	CUM	PF	(L/s)	IND	CUM	(L/s)	(L/s)	(L/s)	(L/s)	(m)	(mm)	(%)	(m/s)	(m/s)	L/s	(%)
KANATA WEST BUSINESS PARK - Block number based on overall concept plan of subdivision																																	
Upper Canada Street	Blocks 31	MH154A	MH153A										0.70	0.70				0.00	1.50	0.34	0.92	0.92	0.30	0.00	0.64	43.87	110.00	250	0.50	0.866	0.301	43.22	98.53
	Blocks 35, 53, 54												1.84	2.54				0.00	1.50	1.23	2.06	2.98		0.00	1.23								
	Blocks 33, 34	MH153A	MH152A														1.89	1.89	5.90	4.52	1.89	4.87	1.61	0.00	7.36	39.24	114.86	250	0.40	0.774	0.543	31.88	81.24
		MH152A	MH151A											2.54				1.89	5.90	5.75	0.03	4.90	1.62	0.00	7.37	36.70	10.84	250	0.35	0.724	0.562	29.33	79.92
	Blocks 37, 38, 39	MH151A	MH150A											2.54			7.04	8.93	4.50	17.51	7.24	12.14	4.01	0.00	21.52	36.70	102.56	250	0.35	0.724	0.753	15.18	41.37
		MH150A	MH101A											2.54				8.93	4.50	17.51	0.11	12.25	4.04	0.00	21.56	36.70	63.86	250	0.35	0.724	0.753	15.15	41.27
Campeau Drive	Blocks 3	MH99A	MH100A										4.18	4.18						2.03	4.68	4.68	1.54	0.00	3.58	50.02	112.75	250	0.65	0.987	0.570	46.44	92.85
		MH100A	MH101A											4.18						2.03	0.25	4.93	1.63	0.00	3.66	51.91	101.44	250	0.70	1.024	0.571	48.25	92.95
Nipissing Court	Blocks 1, 7	MH123A	MH122A														2.23	2.23	6.25	5.65	2.59	2.59	0.85	0.00	6.50	50.02	65.18	250	0.65	0.987	0.607	43.52	87.00
		MH122A	MH121A															2.23	6.25	5.65	0.20	2.79	0.92	0.00	6.57	50.02	100.00	250	0.65	0.987	0.607	43.45	86.87
	Blocks 4, 5	MH121A	MH101A										2.37	2.37				2.23	6.25	6.80	2.61	5.40	1.78	0.00	8.58	85.51	97.00	250	1.90	1.688	1.038	76.93	89.97
Campeau Drive	Block 36	MH101A	MH103A										0.33	9.42				11.16	4.75	26.05	0.56	23.14	7.64	0.00	33.69	43.87	93.00	250	0.50	0.866	0.952	10.18	23.20
	Block 32, 54	MH103A	MH104A										1.00	10.42				11.16	4.75	26.54	1.31	24.45	8.07	0.00	34.61	43.87	120.00	250	0.50	0.866	0.952	9.26	21.11
Campeau Drive	Block 29, 32	MH104A	MH105A										0.85	11.27				11.16	4.75	26.95	0.99	25.44	8.40	0.00	35.35	43.87	53.11	250	0.50	0.866	0.952	8.52	19.42
KWRC	Blocks 6, 8, 9, 10		MH 105A												11.78	11.78				5.73	11.78	11.78	3.89	0.00	9.61	39.24	12.01	250	0.40	0.774	0.601	29.62	75.50
Campeau Drive		MH105A	MH106A											11.27		11.78		11.16	4.75	32.68	0.28	37.50	12.38	0.00	45.05	59.68	87.77	300	0.35	0.818	0.877	14.63	24.51
	Block 24	MH106A	MH107A										0.75	12.02		11.78		11.16	4.75	33.04	1.10	38.60	12.74	0.00	45.78	59.68	90.92	300	0.35	0.818	0.900	13.90	23.29
Upper Canada Street	Blocks 26, 27, 30	MH154A	MH156A														3.19	3.19	5.50	7.11	3.40	3.40	1.12	0.00	8.23	50.02	107.00	250	0.65	0.987	0.692	41.79	83.55
		MH156A	MH131A															3.19	5.50	7.11	0.19	3.59	1.18	0.00	8.29	50.02	101.71	250	0.65	0.987	0.692	41.73	83.42
Palladium Drive	Blocks 17	MH130A	MH131A											0.00			0.71	0.71	5.50	1.58	1.18	1.18	0.39	0.00	1.97	50.02	106.00	250	0.65	0.987	0.467	48.05	96.06
Palladium Drive		MH131A	MH132A											0.00				3.90	5.25	8.29	0.23	5.00	1.65	0.00	9.94	43.87	67.35	250	0.50	0.866	0.672	33.92	77.33
	Block 23, 24, 25, 28	MH132A	MH133A										3.30	3.30				3.90	5.25	9.90	3.56	8.56	2.82	0.00	12.72	43.87	71.26	250	0.50	0.866	0.730	31.14	71.00
		MH133A	MH107A											3.30				3.90	5.25	9.90	0.17	8.73	2.88	0.00	12.78	107.45	42.79	250	3.00	2.121	1.304	94.67	88.11
Campeau Drive	Block 49	MH107A	MH108A											15.32	0.42	12.20		15.06	4.40	40.22	0.97	48.30	15.94	0.00	56.16	59.68	120.00	300	0.35	0.818	0.900	3.52	5.90
		MH108A	EX604A											15.32		12.20		15.06	4.40	40.22	0.49	48.79	16.10	0.00	56.32	59.68	120.00	300	0.35	0.818	0.900	3.36	5.63
	Block 22	MH 604A	MH 603A										2.63	17.95		12.20		15.06	4.40	41.50	3.03	51.82	17.10	0.00	58.60	62.51	102.12	300	0.38	0.857	0.942	3.91	6.26
Upper Canada Street	Blocks 18, 19, 20, 21	MH160A	MH161A											0.00			2.25	2.25	5.75	5.24	2.48	2.48	0.82	0.00	6.06	58.86	83.00	250	0.90	1.162	0.714	52.80	89.70
	Block 14- 16	MH161A	MH162A										2.23	2.23				2.25	5.75	6.32	2.45	4.93	1.63	0.00	7.95	50.02	112.00	250	0.65	0.987	0.692	42.07	84.10
		MH162A	MH140A											2.23				2.25	5.75	6.32	0.22	5.15	1.70	0.00	8.02	63.57	110.98	250	1.05	1.255	0.772	55.55	87.38
Upper Canada Street	Blocks 40, 41	MH167A	MH166A											0.00			1.45	1.45	6.25	3.67	1.66	1.66	0.55	0.00	4.22	51.91	72.00	250	0.70	1.024	0.611	47.69	91.87
	Block 42	MH166A	MH165A											0.00			0.74	2.19	5.70	5.06	0.94	2.60	0.86	0.00	5.91	50.02	100.00	250	0.65	0.987	0.607	44.10	88.17
	Blocks 12, 13	MH165A	MH140A											0.00			1.49	3.68	5.30	7.90	1.68	4.28	1.41	0.00	9.31	39.24	99.02	250	0.40	0.774	0.601	29.92	76.26
Journeyman Street		MH140A	MH141A											2.23				5.93	5.00	13.10	0.30	9.73	3.21	0.00	16.31	31.02	120.00	250	0.25	0.612	0.612	14.71	47.43
		MH141A	MH (84)											2.23				5.93	5.00	13.10	0.22	9.95	3.28	0.00	16.38	31.02	40.30	250	0.25	0.612	0.612	14.64	47.20
		Stub	MH 603A											2.23				5.93	5.00	13.10	0.00	9.95	3.28	0.00	16.38	31.63	32.98	250	0.26	0.624	0.624	15.26	48.22
Campeau Drive	Block 11	MH 603A	MH 602A										2.40	22.58		12.20		20.99	3.80	49.22	2.83	64.60	21.32	0.00	70.54	103.47	105.24	375	0.32	0.908	0.973	32.93	31.83
	Tanger Outlet Centres	MH 602A	MH 601A											22.58	16.40	28.60		20.99	3.80	57.19	16.84	81.44	26.88	0.00	84.07	109.75	107.73	375	0.36	0.963	1.059	25.68	23.40
	Block 52	MH 601A	MH 600A										2.16	24.74		28.60		20.99	3.80	58.24	2.54	83.98	27.71	0.00	85.95	109.75	106.95	375	0.36	0.963	1.059	23.79	21.68

Campeau Drive	Block XX	MH XXX	MH XXX	Light Grey = Constructed Sewer

Design Parameters:

Residential			ICI Areas			
						Peak Factor (PF)
SF	3.4	p/p/u	P.B.P.	28,000	L/Ha/day	1.5
TH/SD	2.7	p/p/u	COM	28,000	L/Ha/day	1.5
APT	1.8	p/p/u	IND	35,000	L/Ha/day	MOE Chart
Other	60	p/p/Ha				

Notes:
1. Manning's coefficient (n) = 0.013
2. Demand (per capita): 280 L/day 300 L/day
3. Infiltration allowance: 0.33 L/s/Ha 0.4 L/s/Ha
4. Residential Peaking Factor:
   Harmon Formula = 1+(14/(4+P^0.5)) K=0.8
   where P = population in thousands

Designed: LME

Checked:

Dwg. Reference: 14289-501

No.	Revision	Date
1.	City submission No. 1	2014-11-25
2.	City submission No. 2	2015-04-08
3.	City submission No. 3	2015-06-18
4.	City submission No. 4	2015-10-15
5.	Revised for Phase 2 Registration	2018-04-19
6.	Revised for Phase 3 Registration	2018-09-14
7.	Revised per City Comments (Phase 3)	2018-12-14
8.	Revised for Phase 4 Registration	2019-04-26
9.	Revised for Phase 4 Registration Comments	2019-06-24
10.	Revised for Phase 5 Registration	2019-09-11
11.	Revised per City comments for Phase 5 Registration	2019-10-25

File Reference:	Date:	Sheet No:
14289.5.7.1	2018-04-19	1 of 1

IBI GROUP

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

SANITARY SEWER DESIGN SHEET

PROJECT: TANGER OUTLET CENTRES
LOCATION: CITY OF OTTAWA
CLIENT: RIO-CAN MANAGEMENT INC

LOCATION				RESIDENTIAL									ICI AREAS							INFILTRATION ALLOWANCE			TOTAL FLOW	PROPOSED SEWER DESIGN						
				UNIT TYPES				AREA	POPULATION		PEAK FACTOR	PEAK FLOW	AREA (Ha)						PEAK FLOW	AREA (Ha)		FLOW		CAPACITY	LENGTH	DIA	SLOPE	VELOCITY (full)	AVAILABLE CAPACITY	
													INSTITUTIONAL		HIGH PROFILE EMPLOY		PRESTIGE BUSINESS PK													
STREET	AREA ID	FROM MH	TO MH	SF	SD	TH	APT	(Ha)	IND	CUM		(L/s)	IND	CUM	IND	CUM	IND	CUM	(L/s)	IND	CUM	(L/s)	(L/s)	(L/s)	(m)	(mm)	(%)	(m/s)	L/s	(%)
Tanger Site		1A	2A						0.0		4.00	0.00			2.21	2.21			1.92	2.21	2.21	0.62	2.54	37.22	50.16	250	0.36	0.735	34.69	93.18
Tanger Site		2A	3A						0.0		4.00	0.00			0.92	3.13			2.72	0.92	3.13	0.88	3.59	38.24	52.42	250	0.38	0.755	34.65	90.60
Tanger Site		3A	7A						0.0		4.00	0.00			1.03	4.16			3.61	1.03	4.16	1.16	4.78	39.72	91.80	250	0.41	0.784	34.95	87.98
Tanger Site		7A	8A						0.0		4.00	0.00			1.03	5.19			4.51	1.03	5.19	1.45	5.96	38.24	57.25	250	0.38	0.755	32.28	84.42
Tanger Site		8A	8Anew						0.0		4.00	0.00			0.00	5.19			4.51	0.00	5.19	1.45	5.96	36.70	10.00	250	0.35	0.724	30.74	83.77
Tanger Site		9A	8Anew						0.0		4.00	0.00			0.64	0.64			0.56	0.64	0.64	0.18	0.73	87.96	42.20	250	2.01	1.736	87.22	99.16
Tanger Site		8Anew	23B						0.0		4.00	0.00			0.00	5.83			5.06	0.00	5.83	1.63	6.69	35.64	53.46	250	0.33	0.703	28.95	81.22
Tanger Site		23B	602A						0.0		4.00	0.00			0.00	5.83			5.06	0.00	5.83	1.63	6.69	39.24	36.60	250	0.40	0.774	32.54	82.94
Tanger Site		BLKHD	22A						0.0		4.00	0.00			0.77	0.77			0.67	0.77	0.77	0.22	0.88	34.54	32.00	250	0.31	0.682	33.66	97.44
Tanger Site		22A	21A						0.0		4.00	0.00			0.82	1.59			1.38	0.82	1.59	0.45	1.83	38.74	81.66	250	0.39	0.765	36.92	95.29
Tanger Site		21A	20A						0.0		4.00	0.00			2.32	3.91			3.39	2.32	3.91	1.09	4.49	35.64	99.28	250	0.33	0.703	31.15	87.40
Tanger Site		20A	19A						0.0		4.00	0.00			0.00	3.91			3.39	0.00	3.91	1.09	4.49	34.54	35.14	250	0.31	0.682	30.05	87.00
Tanger Site		19A	18A						0.0		4.00	0.00			1.52	5.43			4.71	1.52	5.43	1.52	6.23	36.17	93.44	250	0.34	0.714	29.94	82.77
Tanger Site		18A	17A						0.0		4.00	0.00			0.00	5.43			4.71	0.00	5.43	1.52	6.23	31.63	19.26	250	0.26	0.624	25.40	80.29
Hotel Site		103A	102A						0.0		4.00	0.00			0.66	0.66			0.57	0.66	0.66	0.18	0.76	NOT CONSTRUCTED						
Hotel Site		102A	101A						0.0		4.00	0.00			1.42	2.08			1.81	1.42	2.08	0.58	2.39							
Hotel Site		101A	100A						0.0		4.00	0.00			0.06	2.14			1.86	0.06	2.14	0.60	2.46							
Feedmill Creek Crossing		100A	17A						0.0		4.00	0.00			0.17	2.31			2.01	0.17	2.31	0.65	2.65	45.12	98.75	300	0.20	0.618	42.46	94.12
Tanger Site		17A	16A						0.0		4.00	0.00			0.29	8.03			6.97	0.29	8.03	2.25	9.22	43.97	67.35	300	0.19	0.603	34.75	79.04
Tanger Site		16A	15A						0.0		4.00	0.00			0.18	8.21			7.13	0.18	8.21	2.30	9.43	46.23	33.06	300	0.21	0.634	36.80	79.61
Tanger Site		15A	14A						0.0		4.00	0.00			0.00	8.21			7.13	0.00	8.21	2.30	9.43	48.38	25.97	300	0.23	0.663	38.96	80.52
Tanger Site		13A	14A						0.0		4.00	0.00			0.55	0.55			0.48	0.55	0.55	0.15	0.63	62.04	69.00	250	1.00	1.224	61.41	98.98
Tanger Site		14A	12A						0.0		4.00	0.00			0.13	8.89			7.72	0.13	8.89	2.49	10.21	47.32	59.08	300	0.22	0.648	37.11	78.43
Tanger Site		12A	11A						0.0		4.00	0.00			1.68	10.57			9.18	1.68	10.57	2.96	12.13	54.33	93.58	300	0.29	0.745	42.19	77.66
Huntmar Drive		11A	302A						0.0		4.00	0.00			0.00	10.57			9.18	0.00	10.57	2.96	12.13	50.44	12.11	300	0.25	0.691	38.31	75.94
Huntmar Drive		302A	301A						0.0		4.00	0.00			0.29	10.86			9.43	0.29	10.86	3.04	12.47	37.75	36.63	300	0.14	0.517	25.28	66.97
Huntmar Drive		301A	600A						0.0		4.00	0.00			0.37	11.23			9.75	0.37	11.23	3.14	12.89	45.12	118.25	300	0.20	0.618	32.22	71.42
External (West)			604A						0.0		4.00	0.00					52.66	52.66	32.00	52.66	52.66	14.74	46.74							
External (North)		BULKHEAD	604A						0.0		4.00	0.00					4.76	4.76	2.89	4.76	4.76	1.33	4.23	46.43	23.97	250	0.56	0.916	42.20	90.90
Campeau Drive		604A	603A						0.0		4.00	0.00					0.44	57.86	35.16	0.44	57.86	16.20	51.36	62.19	102.12	300	0.38	0.852	10.83	17.41
External (North)		BULKHEAD	603A						0.0		4.00	0.00					5.14	5.14	3.12	5.14	5.14	1.44	4.56	31.63	22.98	250	0.26	0.624	27.07	85.58
Campeau Drive		603A	602A						0.0		4.00	0.00					0.50	63.50	38.59	0.50	63.50	17.78	56.37	103.47	105.24	375	0.32	0.908	47.11	45.53
Campeau Drive		602A	601A						0.0		4.00	0.00			0.00	5.83	0.50	64.00	43.95	0.50	69.83	19.55	63.50	109.75	107.73	375	0.36	0.963	46.24	42.14
External (North)		BULKHEAD	601A						0.0		4.00	0.00					5.00	5.00	3.04	5.00	5.00	1.40	4.44	31.63	29.00	250	0.26	0.624	27.20	85.97
Campeau Drive		601A	600A						0.0		4.00	0.00			0.00	5.83	0.39	69.39	47.22	0.39	75.22	21.06	68.29	109.75	106.95	375	0.36	0.963	41.46	37.78
Campeau Drive		600A	Ex.						0.0		4.00	0.00			0.00	17.06	0.00	69.39	56.97	0.00	86.45	24.21	81.18	68.44	21.40	375	0.14	0.600	-12.74	-18.62

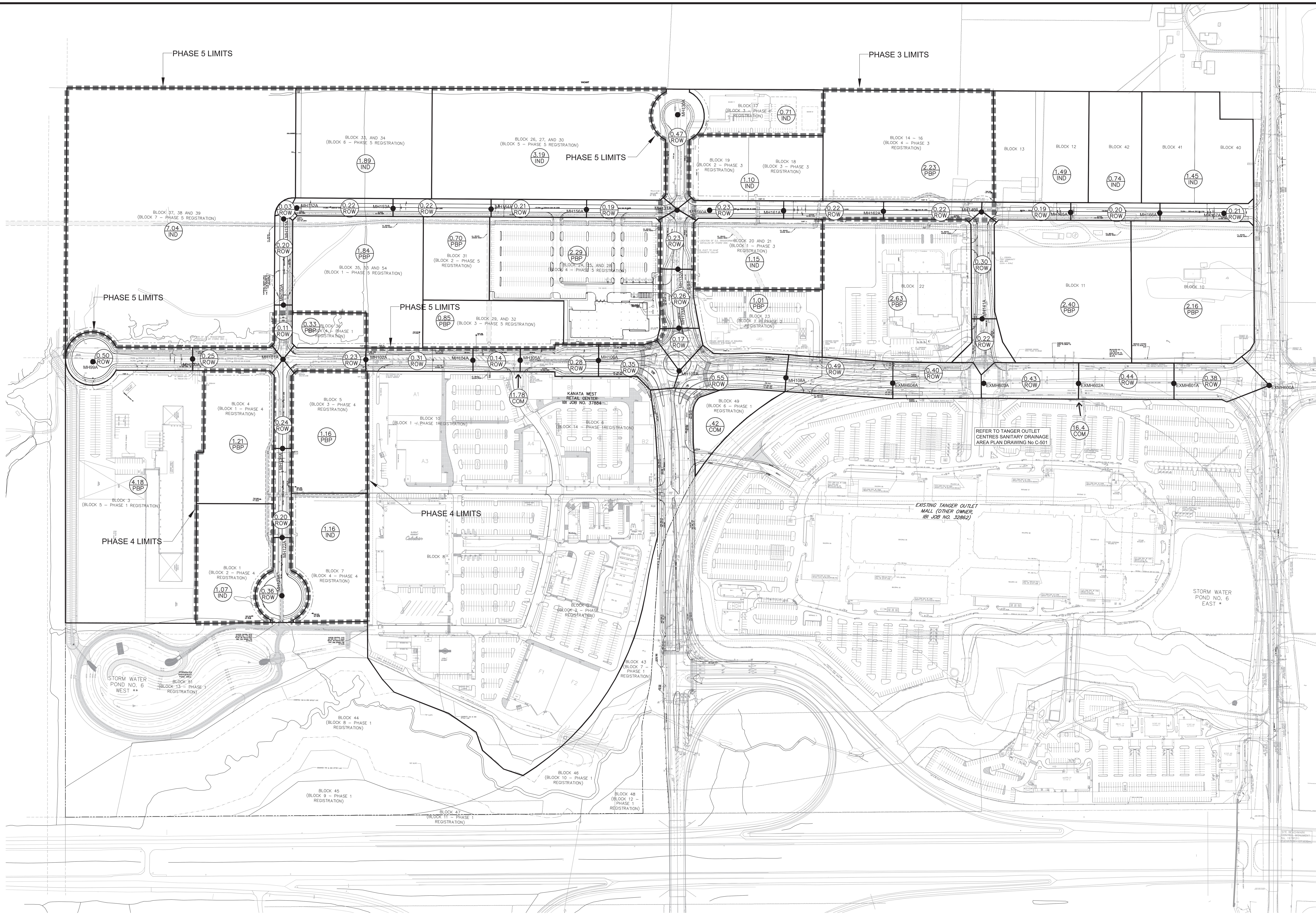
Design Parameters:

Residential			ICI Areas			Peak Factor
SF	3.4	p/p/u	INST	50,000	L/Ha/day	1.5
TH/SD	2.7	p/p/u	EMP	50,000	L/Ha/day	1.5
APT	2.3	p/p/u	BUSS	35,000	L/Ha/day	1.5
Other	60	p/p/Ha				

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

Designed: J.I.M.
Checked: P.K.
Dwg. Reference: 32862 C-501/C-501A

No.	Revision	Date
1.	1st Submission for Site Plan Application	30/01/2013
2.	2nd Submission for Site Plan Application	20/05/2013
3.	Submitted For MOE Application	25/06/2013
4.	Revised external pipe lengths	17/09/2013
5.	Revised Per New Building 7/12 Site Plan	2/7/2014
6.	Revised pipe data	11/8/2014
7.	As-built	2/2/2015
File Reference: 32862.5.7.1	Date: 25/01/2013	Sheet No: 1 of 1



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
20			
19			
18			
17			
16			
15	ISSUED FOR PHASE 5 REGISTRATION	LME	19:09:10
14	REVISED AS PER PHASE 4 COMMENTS	LME	19:07:25
13	REVISED AS PER PHASE 4 COMMENTS	LME	19:07:22
12	REVISED AS PER PHASE 4 COMMENTS	LME	19:06:24
11	ISSUED FOR PHASE 4 REGISTRATION	LME	19:04:25
10	REVISED AS PER PHASE 3 COMMENTS	LME	19:03:08
9	ISSUED FOR PHASE 3 TENDER	LME	19:01:11
8	REVISED AS PER PHASE 3 COMMENTS	LME	18:12:14
7	REVISED FOR PHASE 3 REGISTRATION	LME	18:09:14
6	REVISED FOR PHASE 2 REGISTRATION	LME	18:04:20
5	REVISED AS PER CITY COMMENTS	LME	15:11:05
4	REVISED AS PER CITY COMMENTS	LME	15:10:15
3	REVISED AS PER NEW SITE PLAN AND CITY COMMENTS	LME	15:06:19
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
tel 613 225 1311 fax 613 225 9868
ibigroup.com

Project Title

KANATA WEST BUSINESS PARK PHASE 5

LICENSED PROFESSIONAL ENGINEER
L. M. ERION
13379508
2019/09/10
PROVINCE OF ONTARIO

Drawing Title

SANITARY DRAINAGE AREA PLAN

Scale 1:2000

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

D07-16-14-0003_P5

#17661

TAGGART KANATA WEST
BUSINESS PARK

SANITARY SEWER DESIGN SHEET
PROJECT : Kanata West Servicibility Study
LOCATION : CITY OF OTTAWA

PAGE 1 OF 1
PROJECT: 3598-LD-03
DATE: April 2005
DESIGN: JIM
FILE: 3598LD sewers XLS

MODEL 1 ULTIMATE (population based criteria JCI simultaneous peaking)

LOCATION				TOTAL AREA	RESIDENTIAL							EMPLOYMENT/RETAIL/BUSINESS PARK/OPEN SPACES							INFILTRATION				TOTAL FLOW	PROPOSED SEWER									
STREET	FROM MH	TO MH			APPLIC AREA	UNIT/Ha	TOTAL UNITS	POPULATION INDIV	POPULATION ACCUM	PEAK FACTOR	PEAK FLOW	APPLIC AREA	ACCUM AREA	TOTAL AREA	FLOW RATE	PEAK FLOW INDIV	PEAK FLOW ACCUM	TOTAL	AREA (Ha) INDIV	AREA (Ha) CUMUL	TOTAL CUMUL	PEAK FLOW		CAPACITY	VELOCITY (full)	LGTH.	PIPE	GRADE	AVAIL. CAP.	HARMON PF	ACTUAL q/Q	va/Vf	ACTUAL VELOCITY
				(Ha)	(Ha)						(l/s)	(Ha)	(Ha)	(Ha)	(l/Ha/d)	(l/s)	(l/s)	(l/s)				(l/s)	(l/s)	l/s	m/s	(m)	(mm)	%	(%)				(m/s)
Campeau Drive Trunk Sewer	1	2	Area 1 (PBP)	38.11								38.11	38.11		35000	23.16	23.16		38.11	38.11													
			Area 2 (PBP)	27.29								27.29	65.40		35000	16.58	39.74		27.29	65.40													
			Area 3 Ext Employment	14.05								14.05	79.45		50000	12.20	51.94		14.05	79.45													
			Area 4 HP Employment	10.93								10.93	90.38	90.38	50000	9.49	61.42	61.42	10.93	90.38	90.38	25.31	86.73	283.79	1.27	525.0	525	0.40	69.44%		0.306	0.730	0.927
	2	3	Area 5 Residential	29.19	29.19	19	553	1664	1664	3.65	24.58			90.38				61.42	29.19	29.19										365			
			Area 9 Ext Employment	8.45							24.58	8.45	8.45	98.83	50000	7.34	7.34	68.76	8.45	128.02	128.02	35.85	129.18	286.61	0.98	700.0	600	0.20	54.93%		0.451	0.830	0.815
	14	3	Area 6/8 Ext Employment	16.65								16.65	16.65		50000	14.45	14.45		16.65	16.65													
			Area 7 HP Employment	5.48								5.48	22.13	22.13	50000	4.76	19.21	19.21	5.48	22.13	22.13	6.20	25.41	148.74	0.91	910.0	450	0.25	82.92%		0.171	0.830	0.571
	3	4							1664	3.65	24.58	0.00	0.00	120.96		0.00	0.00	87.97	0.00	0.00	150.15	42.04	134.59	392.29	1.06	300.0	675	0.20	60.59%	365	0.394	0.790	0.839
	4A	4	Area 10 Residential	27.86	27.86	19	529	1588	1588	3.66	23.55								27.86	27.86	27.86	7.80	31.36	148.74	0.91	750.0	450	0.25	78.92%	366	0.211	0.660	0.598
	4	5	14 Mixed Use	4.13	1.76	50	88	263	3515	3.38	48.17	2.37	2.37	123.33	35000	1.44	1.44	89.41	4.13	4.13	182.14	51.00	188.58	392.29	1.06	450.0	675	0.20	51.93%	338	0.481	0.840	0.892
	Queensway	5	Area 13 Community Retail	6.35								6.35	6.35	6.35	35000	3.86	3.86	3.86	6.35														
			Area 11/12 Mixed Use	11.80	5.02	50	251	752	752	3.88	11.81	6.79	13.14	13.14	35000	4.12	7.98	7.98	11.80	18.15	18.15	5.08	24.88	43.88	0.87	420.0	250	0.50	43.31%	368	0.567	0.880	0.762
	5	5A	Area 15 Community Retail	3.88				0	4267	3.31	57.19	3.88			35000	2.36			3.88											331			
First Line Road Sewer			Area 44	25.54							57.19	25.54	29.42	165.89	35000	15.52	17.88	115.27	25.54	29.42	229.71	64.32	236.77	519.43	1.14	300.0	750	0.20	54.42%		0.456	0.830	0.945
				229.71							57.19							115.27				64.32	236.77										
Signature Ridge		5A	Area 100 Residential	90.20	90.20	19	1714	5141	5141	3.23	67.35	0.00																		323			
Signature Ridge		5A	Area 100 Non-Residential	4.88							67.35	4.88	4.88	4.88	50000	4.24	4.24	4.24	95.08	95.08	95.08	26.62	98.21										
Intersticial Lands & Broughton/Richardson		5A																					65.00										
Total To SRPS	**5A**	**SRPS**		**324.79**	**154.02**		**3136**		**9409**		**124.54**	**170.77**						**119.51**			**324.79**	**90.94**	**399.98**	**580.53**	**1.27**	**30.0**	**750**	**0.25**	**31.10%**	298	0.689	0.940	1.197
Palladium Drive Trunk Sewer	6	7	Area 32 (PBP)	57.03								57.03	57.03		50000	49.51	49.51		57.03	57.03													
			Area 32A Park	8.34								8.34	65.37		0	0.00	49.51		8.34	65.37													
			Area 33/34 Ext Employment	54.85								54.85	120.22	120.22	50000	47.61	97.12	97.12	54.85	120.22	120.22												
	7	8	Area 37 Mixed Use	36.70	15.60	50	780	2340	2340	3.53	33.47	21.10	21.10	141.32	50000	18.32	18.32	115.44	36.70	36.70	156.92	43.94	192.85	455.83	1.23	925.0	675	0.27	57.69%	353	0.423	0.810	1.000
				156.92	15.60		780		2340		33.47	141.32						115.44	156.92		156.92	43.94	192.85							353			
Corel Centre Etc. (Existing Sewer)		16	Area 35 HP Employment	6.05								6.05	6.05		30000	3.15	3.15		6.05														
		16	Area 36 (Corel Centre)																			30.00											
		16	Area 38 Exten Employment	20.15								20.15	26.20	26.20	14400	5.04	8.19	8.19	20.15	26.20	26.20	7.34	45.52				*Existing*						
First Line Road Sewer	15	16	Area 40 Employment	14.59								14.59	14.59		35000	8.87	8.87		14.59	14.59													
			Area 41 Employment	11.97								11.97	26.56		35000	7.27	16.14		11.97	26.56													
			Area 42 Employment	20.66								20.66	47.22		35000	12.55	28.69		20.66	47.22													
			Area 43 Employment	28.89								28.89	76.11	76.11	35000	17.55	46.25	46.25	28.89	76.11	76.11	21.31	67.56	224.35	1.00	525.0	525	0.25	69.89%		0.301	0.730	0.733
Carp River Trunk	16	8	Nothing To Add	102.31	15.60		780		2340	3.53	33.47	102.31	102.31	102.31	0	0.00	54.44	54.44	0.00	102.31	102.31	28.65	113.08	286.61	0.98	400.0	600	0.20	60.54%	353	0.395	0.790	0.776
Carp River Trunk	8	10A	Nothing To Add	259.23	15.60		780		2340		33.47	0.00	0.00	243.63		0.00	0.00	169.87	0.00	139.01	259.23	109.92	305.93	579.95	1.05	550.0	825	0.15	47.25%	353	0.528	0.860	0.904
Marle Grove Road Trunk Sewer	9	10	Area 18/19 Exist. Residential	23.34	23.34	19	443	1330	1330										23.34	23.34										372			
			Area 22/26/27 Residential	79.32	79.32	30	2380	7139	8469	3.03	103.82								79.32	102.66	102.66	28.74	132.56	405.11	1.39	775.0	600	0.40	67.28%	303	0.327	0.740	1.027
Hazeldean/Huntmar Trunk Sewer	11	12	Area 16/20 Residential	99.01	99.01	19	1881	5644	5644	3.20	73.06								99.01	99.01										320			
			Area 16/20 Commercial	33.50								33.50	33.50	33.50	50000	29.08	29.08	29.08	33.50	132.51													
			Area 16/20 Open Space	14.13								14.13							14.13	146.64													
			Area 17 Ex. Commercial	3.44							73.06	3.44	36.94	36.94	35000	2.09	31.17	31.17	3.44	150.08	150.08	42.02	146.26	554.82	1.50	775.0	675	0.40	73.64%		0.264	0.700	1.051
	12	10	Area 21 Exist. Employment	10.89								10.89	10.89	10.89	50000	9.45	9.45		10.89	10.89													
			Area 19A Exist Residential	6.63	6.63	19	126	378									9.45		6.63	17.52													
			Area 23/24 Community Retail	17.61								17.61	28.50	28.50	35000	10.70	20.15	51.32	17.61	35.13													
			Area 28/30 Residential	27.10	27.10	30	813	2439	8460	3.03	103.72	0.00	0.00	65.44				51.32	27.10	62.23	212.31	59.45	214.49	519.43	1.14	950.0	750	0.20	58.71%	303	0.413	0.800	0.911
Marle Grove Road Trunk Sewer	10	10A	Area 39 Mixed Use	21.13	8.98	50	449	1347				12.15	12.15	77.59	35000	7.38	7.38	58.71	21.13														
			Area 29 Residential	15.00	15.00	30	450	1350	19627	2.66	211.54							58.71	15.00	36.13	351.10	98.31	368.56	669.89	1.21	1000.0	825	0.20	44.98%	266	0.550	0.870	1.056
Carp River Trunk Sewer	13	10A	Area 25 Community Retail	20.24								20.24	20.24	20.24	35000	12.30	12.30	12.30	20.24														
			Area 31 residential	38.72	38.72	30	1162	3485	3485	3.39	47.80							12.30	38.72	58.96	58.96	16.51	76.61	320.17	1.10	1000.0	600	0.25	76.07%	339	0.239	0.680	0.746
		10A	Area 31A (PBP)	0.75								0.75	0.75	0.75	50000	0.65	0.65	0.65	0.75	0.75	0.75	0.21	0.86	36.69	0.72	100.0	250	0.35	97.63%		0.023	0.340	0.246
Pumping Station 2 to KWPS	**10A**	**KWPS**		**670.04**	**313.70**		**8484**		**25451**		**292.82**	**356.34**						**241.53**			**670.04**	**224.95**	**759.29**	**1273.71**	**1.43**	**30.0**	**1050**	**0.20**	**40.39%**	255	0.596	0.900	1.283
STUDY TOTALS				994.83	467.72		11620		34860			527.11																		241			

Average Daily Per capita Flow Rate =	350 l/cap/d
Infiltration Allowance Flow Rate =	0.28 l/sec/Ha

Residential Peaking Factor = 1+(14/(4+(P^0.5))), P=Pop. in 1000's, Max of 4

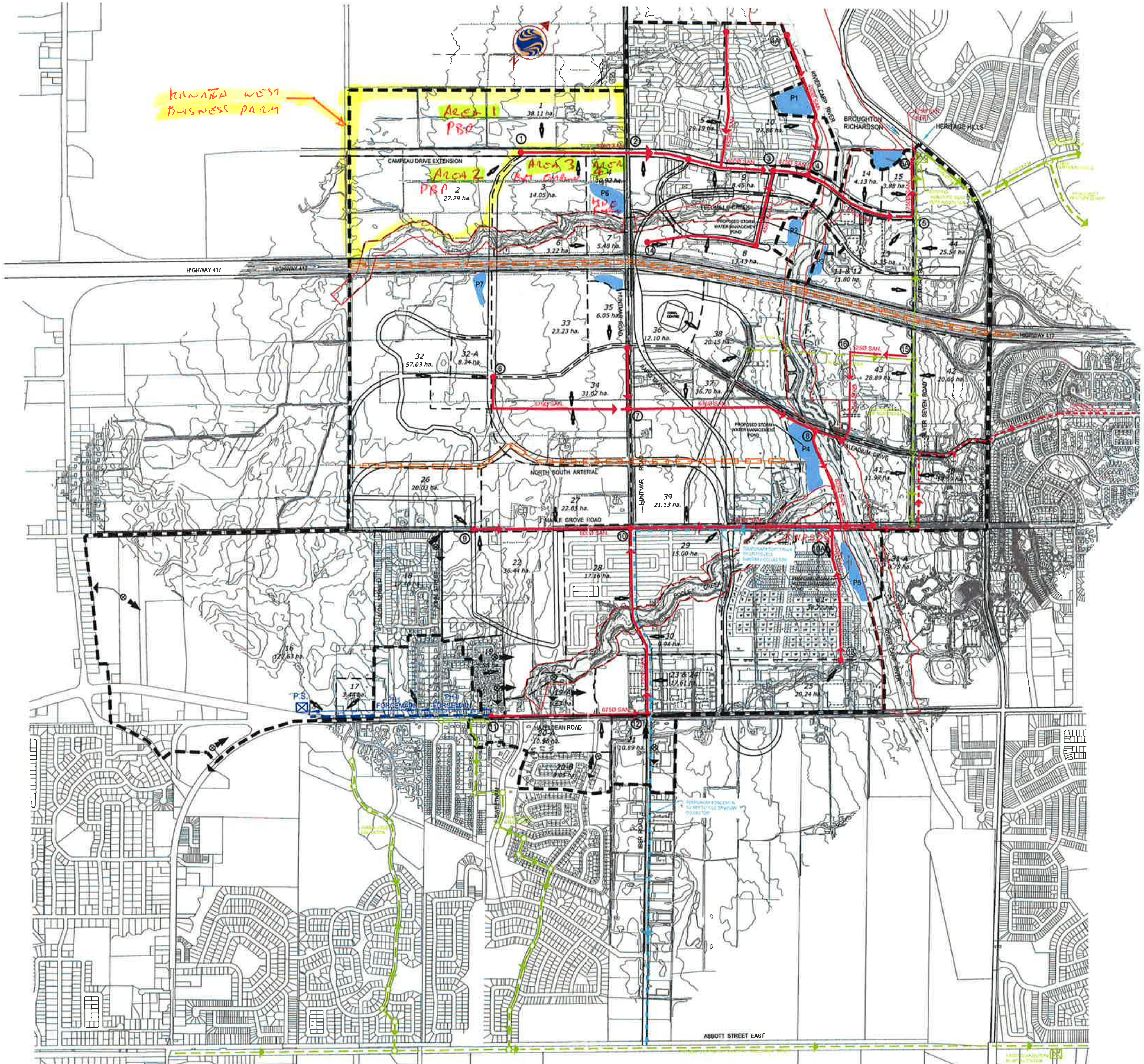
Population density per unit =	3.00
P. F. For Employment/Retail/Business Park =	1.50

Mixed Uses Assumes: 15% Community Retail, 42.5% Business Park and 42.5% Residential

Revision No. 1: April 01, 2005
Revision No. 2: April 11, 2005
Revision No. 3: April 21, 2005
Revision No. 4: June 07, 2005
Revision No. 5: August 10, 2005
Revision No. 6: Oct. 14, 2005
Revision No. 7: Nov. 10, 2005
Revision No. 8: Nov. 11, 2005
Revision No. 9: Apr. 19, 2006

Stantec CCL/IBI

FIG. 4.2-1



Stantec Consulting Ltd.
1505 Laperriere Avenue
Ottawa ON Canada
K1Z 7T1
Tel. 613.722.4420
Fax. 613.722.2799
www.stantec.com

Copyright Reserved

The Contractor shall verify and be responsible for all dimensions. DO NOT scale the drawing - any errors or omissions shall be reported to Stantec Consulting Ltd. without delay.
The Copyrights to all designs and drawings are the property of Stantec Consulting Ltd. Reproduction or use for other than that authorized by Stantec Consulting Ltd. is forbidden.

CCL/IBI

Legend

— — — (heavy dashed)	ULTIMATE MAJOR DRAINAGE LIMIT
— — — (light dashed)	SUBCATCHMENT AREAS
red line	PROPOSED TRUNK SEWER
red dashed	PROPOSED FORCEMAIN
blue dash-dot	TEMPORARY FORCEMAIN
blue dashed	PROPOSED STITTSVILLE PUMPING STATION AND FORCEMAIN
green dashed	EXISTING TRUNK SEWER
orange	MAJOR DRAINAGE SPLIT
①	NODES
⊗⟶	EXISTING PUMPING STATION AND FORCEMAIN (TO BE DECOMMISSIONED)
44 25.54 ha.	INPUT POINT AND AREA IN HECTARES
◀	EXISTING PUMPING STATION GRAVITY OUTLET

Revision		By	Appd.	Date
5	REVISED FOR DEC.21/05 SUBMISSION	G.B.U.	S.J.P.	05:12:21
4	REVISED TRUNK SEWER FROM 18 TO KWPS	R.W.W.	R.W.W.	05:10:05
3	ARROWS FOR EXIST. PUMP STATIONS ADDED	R.W.W.	R.W.W.	05:08:09
2	REPORT JUNE 2005	R.W.W.	R.W.W.	05:06:07
1	REPORT APR. 2005	R.W.W.	R.W.W.	05:04:20

File Name: Dwn. Chkd. Dsgn. Date

Seals

Client/Project

Kanata West Concept Plan
Master Servicing Study

Ottawa, Ontario

Title

Preferred Waste-Water Option

Project No. 60400406

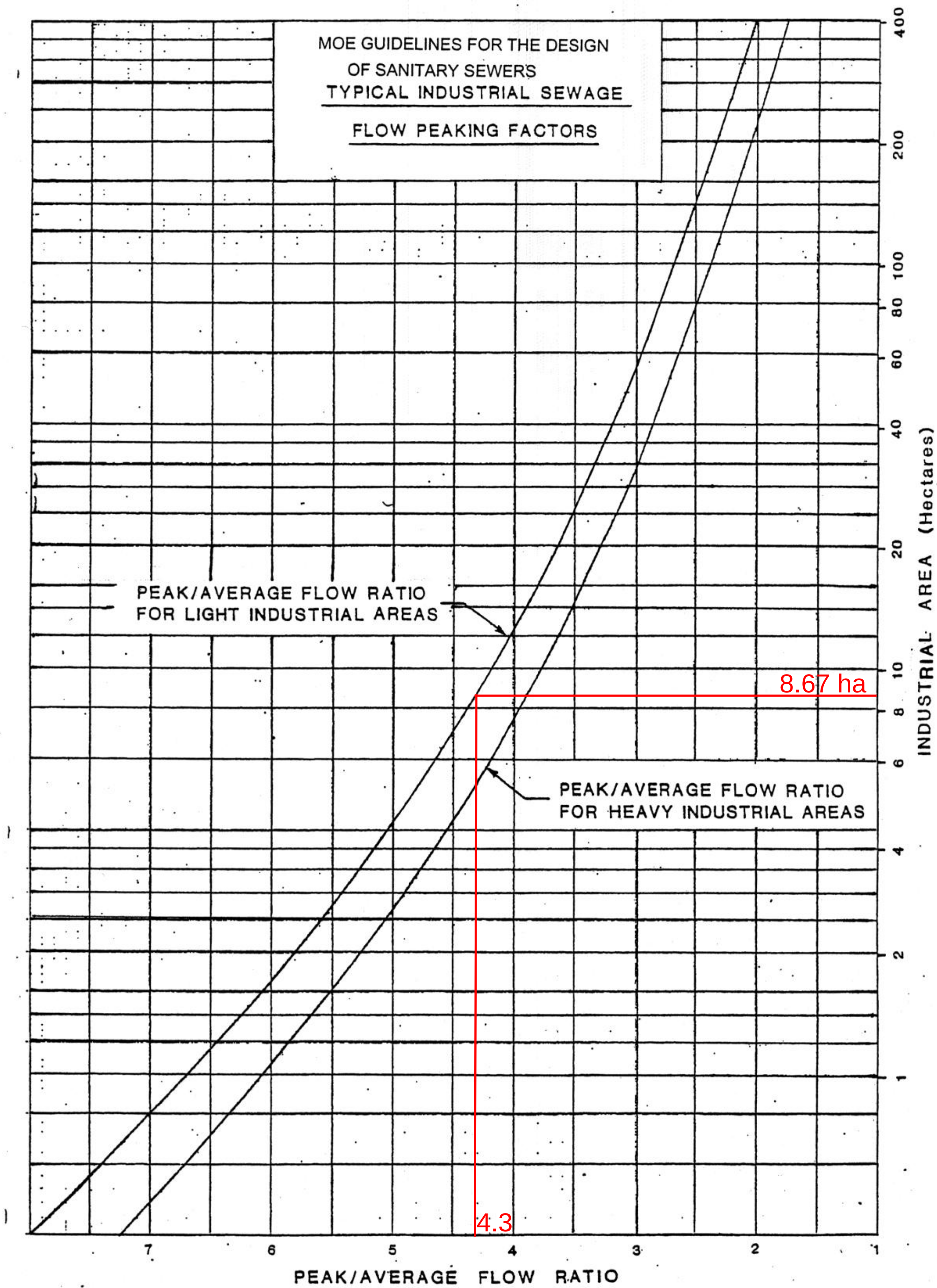
Scale 1:7500 (0 75 225 375m)

Drawing No. S-I

Sheet 7 of 7

Revision 5

APPENDIX 4-B PEAKING FACTOR FOR INDUSTRIAL AREAS



APPENDIX D
Storm Servicing and Stormwater Management

405 Huntmar Drive

Project No.: 122151

STORM SEWER DESIGN SHEET
405 Huntmar Drive Servicing Strategy
FLOW RATES BASED ON RATIONAL METHOD

LICENSED PROFESSIONAL ENGINEER
D. D. BLAIR
100122737
Mar. 30 2023
PROVINCE OF ONTARIO

NOVATECH
Engineers, Planners & Landscape Architects

LOCATION			AREA (ha)			FLOW								TOTAL FLOW	SEWER DATA								
Catchment ID	From Manhole	To Manhole	Area (ha)	C	AC (ha)	Indiv 2.78 AC	Accum 2.78 AC	Time of Concentration	Rainfall Intensity 2 Year (mm/hr)	Rainfall Intensity 5 Year (mm/hr)	Rainfall Intensity 10 Year (mm/hr)	Rainfall Intensity 100 Year (mm/hr)	Peak Flow (L/s)	Total Peak Flow, Q (L/s)	Dia. (m) Actual	Dia. (mm)	Type	Slope (%)	Length (m)	Capacity (L/s)	Velocity (m/s)	Flow Time (min)	Ratio Q/Q full
BUILDING A, BUILDING A PARKING LOT AND LOADING BAY STORM SEWER SYSTEM OUTLETTING TO CAMPEAU DRIVE STORM SEWER																							
					0.00	0.000	0.000	10.00															
AREA A-2-1	CBMH 14	CBMH 13	0.22	0.77	0.17	0.471	0.471	10.00		104.19			49	49	0.381	375	PVC	0.50	70.7	129.2	1.13	1.04	38%
					0.00	0.000	0.000	10.00															
					0.00	0.000	0.000	10.00															
					0.00	0.000	0.000	11.04															
AREA A-2-2	CBMH 13	CBMH 12	0.12	0.83	0.10	0.277	0.748	11.04		99.01			74	74	0.381	375	PVC	0.50	33.7	129.2	1.13	0.50	57%
					0.00	0.000	0.000	11.04															
					0.00	0.000	0.000	11.04															
					0.00	0.000	0.000	11.53															
AREA A-2-3	CBMH 12	CBMH 11	0.12	0.84	0.10	0.280	1.028	11.53		96.73			99	99	0.457	450	PVC	0.60	59.2	230.2	1.40	0.70	43%
					0.00	0.000	0.000	11.53															
					0.00	0.000	0.000	11.53															
					0.00	0.000	0.000	12.24															
AREA A-2-4	CBMH 11	CBMH 10	0.15	0.82	0.12	0.342	1.370	12.24		93.69			128	128	0.457	450	PVC	1.00	29.3	297.2	1.81	0.27	43%
					0.00	0.000	0.000	12.24															
					0.00	0.000	0.000	12.24															
					0.00	0.000	0.000	12.51															
AREA A-2-5	CBMH 10	CBMH 09	0.06	0.85	0.05	0.142	1.512	12.51		92.58			140	140	0.533	525	Conc	0.50	16.6	317.0	1.42	0.20	44%
					0.00	0.000	0.000	12.51															
					0.00	0.000	0.000	12.51															
					0.00	0.000	0.000	12.70															
AREA A-2-6	CBMH 09	CBMH 08	0.04	0.86	0.03	0.096	1.607	12.70		91.80			148	148	0.533	525	Conc	0.60	31.2	347.3	1.55	0.33	42%
					0.00	0.000	0.000	12.70															
					0.00	0.000	0.000	12.70															
					0.00	0.000	0.000	13.04															
AREA A-2-7	CBMH 08	MH 08	0.04	0.47	0.02	0.052	1.660	13.04		90.48			150	150	0.610	600	Conc	0.40	47.7	404.9	1.39	0.57	37%
					0.00	0.000	0.000	13.04															
					0.00	0.000	0.000	13.04															
								13.61															
					0.00	0.000	0.000	10.00															
**** AREA R-A ****	BLDG A	MH 08	2.15	1.00	2.15	5.977	5.977	10.00		104.19			622.8	44	0.305	300	PVC	2.00	2.6	142.5	1.95	0.02	31%
					0.00	0.000	0.000	10.00															
					0.00	0.000	0.000	10.00															
								10.02															
					0.00	0.000	0.000	13.61															
AREA A-0	MH 08	MH 03	0.00	0.00	0.00	0.000	1.660	13.61		88.33			147	191	0.610	600	Conc	0.40	59.3	404.9	1.39	0.71	47%
					0.00	0.000	0.000	13.61															
					0.00	0.000	0.000	13.61															
								14.32															

405 Huntmar Drive

Project No.: 122151

STORM SEWER DESIGN SHEET
405 Huntmar Drive Servicing Strategy
FLOW RATES BASED ON RATIONAL METHOD

NOVATECH
Engineers, Planners & Landscape Architects

LOCATION			AREA (ha)			FLOW								TOTAL FLOW	SEWER DATA								
Catchment ID	From Manhole	To Manhole	Area (ha)	C	AC (ha)	Indiv 2.78 AC	Accum 2.78 AC	Time of Concentration	Rainfall Intensity 2 Year (mm/hr)	Rainfall Intensity 5 Year (mm/hr)	Rainfall Intensity 10 Year (mm/hr)	Rainfall Intensity 100 Year (mm/hr)	Peak Flow (L/s)	Total Peak Flow, Q (L/s)	Dia. (m) Actual	Dia. (mm)	Type	Slope (%)	Length (m)	Capacity (L/s)	Velocity (m/s)	Flow Time (min)	Ratio Q/Q full
					0.00	0.000	0.000	10.00															
AREA A-4-1	CBMH 07	CBMH 06	0.07	0.70	0.05	0.136	0.136	10.00		104.19			14	14	0.305	300	PVC	1.00	73.4	100.8	1.38	0.89	14%
					0.00	0.000	0.000	10.00															
					0.00	0.000	0.000	10.00															
					0.00	0.000	0.000	10.89															
AREA A-4-2	CBMH 06	MH 07	0.24	0.44	0.11	0.294	0.430	10.89		99.74			43	43	0.457	450	PVC	0.50	36.9	210.2	1.28	0.48	20%
					0.00	0.000	0.000	10.89															
					0.00	0.000	0.000	10.89															
					0.00	0.000	0.000	11.37															
AREA A-4-3	MH 07	MH 06	0.38	0.90	0.34	0.951	1.381	11.37		97.49			135	135	1.219	1200	Conc	0.20	98.4	1,818.2	1.56	1.05	7%
					0.00	0.000	0.000	11.37															
					0.00	0.000	0.000	11.37															
					0.00	0.000	0.000	12.42															
AREA A-4-4	MH 06	MH 05	0.41	0.90	0.37	1.026	2.406	12.42		92.94			224	224	1.219	1200	Conc	0.20	74.4	1,818.2	1.56	0.80	12%
					0.00	0.000	0.000	12.42															
					0.00	0.000	0.000	12.42															
					0.00	0.000	0.000	13.22															
AREA A-4-5	MH 05	MH 04	0.43	0.90	0.39	1.076	3.482	13.22		89.81			313	313	1.219	1200	Conc	0.20	55.4	1,818.2	1.56	0.59	17%
					0.00	0.000	0.000	13.22															
					0.00	0.000	0.000	13.22															
					0.00	0.000	0.000	13.81															
AREA A-4-6	MH 04	MH 03	0.45	0.88	0.40	1.101	4.583	13.81		87.62			402	402	0.381	375	PVC	1.00	19.5	182.8	1.60	0.20	220%
					0.00	0.000	0.000	13.81															
					0.00	0.000	0.000	13.81															
					0.00	0.000	0.000	13.81															
** AREA A-4-6 **	MH 04	MH 03	0.45	0.88	0.40	1.101	4.583	13.81		87.62			402	146	0.381	375	PVC	1.00	19.5	182.8	1.60	0.20	80%
					0.00	0.000	0.000	13.81															
					0.00	0.000	0.000	13.81															
								14.01															
					0.00	0.000	0.000	14.32															
Campeau Drive	MH 03	EX STM MH Campeau Dr	0.00	0.00	0.00	0.000	1.660	14.32		85.81			142	333	1.219	1200	Conc	0.24	16.7	1,991.8	1.71	0.16	17%
					0.00	0.000	0.000	14.32															
					0.00	0.000	0.000	14.32															
								14.49															

405 Huntmar Drive

Project No.: 122151

STORM SEWER DESIGN SHEET
405 Huntmar Drive Servicing Strategy
FLOW RATES BASED ON RATIONAL METHOD

NOVATECH
Engineers, Planners & Landscape Architects

LOCATION			AREA (ha)			FLOW								TOTAL FLOW	SEWER DATA								
Catchment ID	From Manhole	To Manhole	Area (ha)	C	AC (ha)	Indiv 2.78 AC	Accum 2.78 AC	Time of Concentration	Rainfall Intensity 2 Year (mm/hr)	Rainfall Intensity 5 Year (mm/hr)	Rainfall Intensity 10 Year (mm/hr)	Rainfall Intensity 100 Year (mm/hr)	Peak Flow (L/s)	Total Peak Flow, Q (L/s)	Dia. (m) Actual	Dia. (mm)	Type	Slope (%)	Length (m)	Capacity (L/s)	Velocity (m/s)	Flow Time (min)	Ratio Q/Q full
BUILDING B AND BUILDING B PARKING LOT STORM SEWER SYSTEMS OUTLETTING TO JOURNEYMAN STREET STORM SEWER																							
					0.00	0.000	0.000	10.00															
AREA A-3-1	CBMH 04	CBMH 03	0.14	0.72	0.10	0.280	0.280	10.00		104.19			29	29	0.381	375	PVC	1.00	28.6	182.8	1.60	0.30	16%
					0.00	0.000	0.000	10.00															
					0.00	0.000	0.000	10.00															
					0.00	0.000	0.000	10.30															
AREA A-3-2	CBMH 03	CBMH 02	0.11	0.77	0.08	0.235	0.516	10.30		102.65			53	53	0.381	375	PVC	0.50	29.2	129.2	1.13	0.43	41%
					0.00	0.000	0.000	10.30															
					0.00	0.000	0.000	10.30															
					0.00	0.000	0.000	10.73															
AREA A-3-3	CBMH 02	CBMH 01	0.15	0.77	0.12	0.321	0.837	10.73		100.51			84	84	0.381	375	PVC	1.00	44.5	182.8	1.60	0.46	46%
					0.00	0.000	0.000	10.73															
					0.00	0.000	0.000	10.73															
					0.00	0.000	0.000	11.19															
AREA A-3-4	CBMH 01	MH 01	0.15	0.83	0.12	0.346	1.183	11.19		98.30			116	116	0.457	450	PVC	0.60	26.3	230.2	1.40	0.31	51%
					0.00	0.000	0.000	11.19															
					0.00	0.000	0.000	11.19															
								11.50															
					0.00	0.000	0.000	10.00															
** AREA R-B **	BLDG B	MH 02	2.32	0.90	2.09	5.805	5.805	10.00		104.19			604.8	44	0.305	300	PVC	1.00	10.1	100.8	1.38	0.12	43%
					0.00	0.000	0.000	10.00															
					0.00	0.000	0.000	10.00															
					0.00	0.000	0.000	10.12															
AREA R-B	MH 02	MH 01	0.00	0.00	0.00	0.000	0.000	10.12						44	0.305	300	PVC	1.00	5.0	100.8	1.38	0.06	43%
					0.00	0.000	0.000	10.12															
					0.00	0.000	0.000	10.12															
								10.18															
					0.00	0.000	0.000	11.50															
AREA A-1	Rain Garden CB	MH 01	0.38	0.55	0.21	0.581	0.581	11.50		96.88			56.3	56	0.254	250	PVC	4.00	12.6	124.0	2.45	0.09	45%
					0.00	0.000	0.000	11.50															
					0.00	0.000	0.000	11.50															
								11.59															
					0.00	0.000	0.000	11.50															
AREA A-1	MH 01	EX STM MH Journeyman St	0.00	0.00	0.00	0.000	1.764	11.50		96.88			170.9	215	0.610	600	Conc	0.30	17.6	350.6	1.20	0.24	61%
					0.00	0.000	0.000	11.50															
					0.00	0.000	0.000	11.50															
								11.75															

Project No.: 122151

STORM SEWER DESIGN SHEET
405 Huntmar Drive Servicing Strategy
FLOW RATES BASED ON RATIONAL METHOD

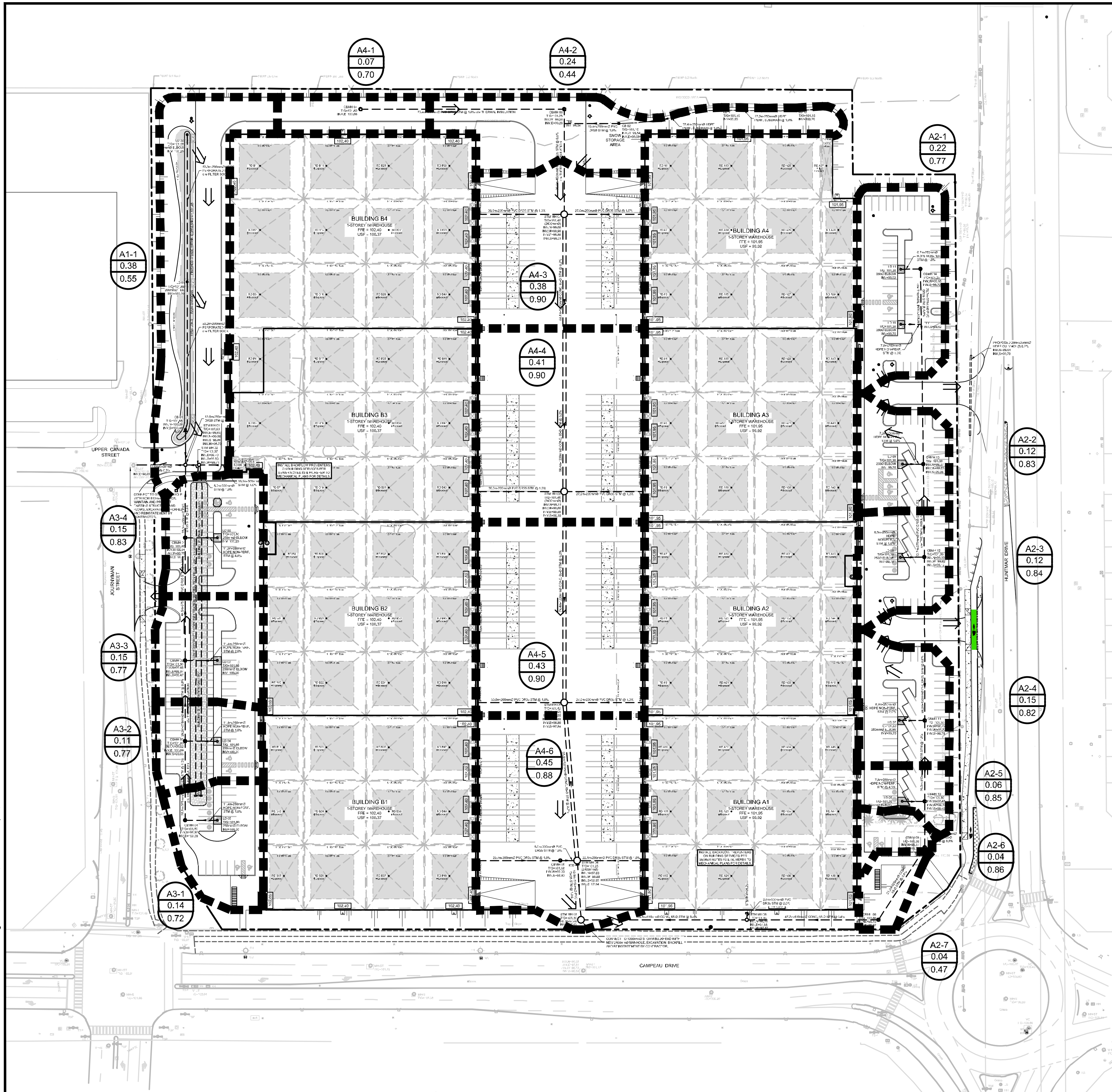
NOVATECH
Engineers, Planners & Landscape Architects

LOCATION			AREA (ha)			FLOW								TOTAL FLOW	SEWER DATA								
Catchment ID	From Manhole	To Manhole	Area (ha)	C	AC (ha)	Indiv 2.78 AC	Accum 2.78 AC	Time of Concentration	Rainfall Intensity 2 Year (mm/hr)	Rainfall Intensity 5 Year (mm/hr)	Rainfall Intensity 10 Year (mm/hr)	Rainfall Intensity 100 Year (mm/hr)	Peak Flow (L/s)	Total Peak Flow, Q (L/s)	Dia. (m) Actual	Dia. (mm)	Type	Slope (%)	Length (m)	Capacity (L/s)	Velocity (m/s)	Flow Time (min)	Ratio Q/Q full

Q = 2.78 AIC, where	**Consultant:**	**Novatech**	
Q = Peak Flow in Litres per Second (L/s)	**Issued Date:**	December 16, 2022	
A = Area in hectares (ha)	**Review Date:**	March 30, 2023	
I = Rainfall Intensity (mm/hr), 5 year storm	**Design By:**	BM	
C = Runoff Coefficient	**Client:**	**Dwg. Reference:**	**Checked By:**
** AREA R-A ** = Controlled Flow Release Rate	ROSEFELLOW	122151-STM-1	DDB

Legend:

10.00	Storm sewers designed to the 2 year event (without ponding) for local roads
10.00	Storm sewers designed to the 5 year event (without ponding) for collector roads
10.00	Storm sewers designed to the 10 year event (without ponding) for arterial roads
10.00	Storm sewers designed to the 100 year event (without ponding)



LEGEND

A4-3	DRAINAGE AREA I.D.
0.38	TRIBUTARY DRAINAGE AREA (ha)
0.90	1:5 YEAR WEIGHTED RUNOFF COEFFICIENT
	STORM SEWER & FLOW DIRECTION
	STORM DRAINAGE AREA BOUNDARY

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

405 HUNTMAR

ON-SITE STORM DRAINAGE AREAS

SCALE 1 : 1500 (0, 15, 30, 45, 60)

DATE MAR 2023 | JOB 122151 | FIGURE STM-1

M:\2022\122151\CAD\Civil\122151-SWM.dwg, STM, Mar 29, 2023 - 6:41pm, smatthews

SHT11X17.DWG - 279mmX432mm

IBI GROUP

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

STORM SEWER DESIGN SHEET

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

LOCATION				AREA (Ha)											RATIONAL DESIGN FLOW													SEWER DATA								
STREET	AREA ID	FROM MH	TO MH	C= 0.20	C= 0.57	C= 0.57	C= 0.61	C= 0.68	C= 0.68	C= 0.70	C= 0.85	C= 0.85	C= 0.90	C= 0.90	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	5yr PEAK FLOW (L/s)	10yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm) DIA	W	H	SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (5yr) (L/s)	(%)
KANATA WEST BUSINESS PARK - Block numbers based on overall concept plan of subdivision																																				
Campeau Drive		MH105	MH106												0.00	0.00	11.25			98.02	114.88	167.89	0.00													
							0.22								0.37	0.37	11.25	1.04	12.29	98.02	114.88	167.89			62.63		62.6	317.2	89.00	525			0.50	1.420	254.61	80.26%
		MH106	MH107												0.00	0.00	12.29			93.46	109.50	159.99	0.00													
												0.32			0.76	1.13	12.29	1.18	13.47	93.46	109.50	159.99			180.67		180.7	620.1	118.60	675			0.50	1.679	439.42	70.86%
Upper Canada St.	Blocks 26, 27, 30	MH155	MH156								3.19				7.54	7.54	14.55			85.04	99.60	145.45	641.03													
						0.29									0.46	0.46	14.55	0.80	15.35	85.04	99.60	145.45			66.84		707.9	1,004.6	87.00	825			0.45	1.820	296.69	29.53%
		MH156	MH131												0.00	7.54	15.35			82.45	96.55	140.99	621.54													
						0.11						0.14			0.51	0.96	15.35	0.97	16.32	82.45	96.55	140.99			136.01		757.5	1,004.6	106.29	825			0.45	1.820	247.01	24.59%
Palladium Drive	Blocks 17	MH130	MH131								0.71				1.68	1.68	10.00			104.19	122.14	178.56	174.81													
												0.39			0.92	0.92	10.00	1.29	11.29	104.19	122.14	178.56			164.55		339.4	844.6	99.64	900			0.20	1.286	505.24	59.82%
Palladium Drive		MH131	MH132												0.00	9.22	16.32			79.52	93.11	135.93	732.86													
															0.00	1.89	16.32	0.61	16.93	79.52	93.11	135.93			256.40		989.3	1,478.7	70.00	975			0.40	1.919	489.39	33.10%
	Block 24, 25, 28, 23	MH132	MH133								3.30				7.80	17.01	16.93			77.81	91.09	132.97	1,323.76													
												0.30			0.71	2.60	16.93	0.56	17.49	77.81	91.09	132.97			345.08		1668.8	1,911.0	72.07	1050			0.45	2.138	242.19	12.67%
		MH133	MH107												0.00	17.01	17.49			76.29	89.31	130.36	1,297.99													
												0.31			0.73	3.33	17.49	0.34	17.83	76.29	89.31	130.36			433.79		1731.8	1,911.0	43.99	1050			0.45	2.138	179.25	9.38%
Palladium Drive		MH137	MH136												0.00	0.00	10.00			104.19	122.14	178.56	0.00													
												0.49			1.16	1.16	10.00	0.96	10.96	104.19	122.14	178.56			206.75		206.7	238.5	120.00	375			1.70	2.092	31.74	13.31%
		MH136	MH135												0.00	0.00	10.96			99.40	116.50	170.27	0.00													
												0.25			0.59	1.75	10.96	0.44	11.40	99.40	116.50	170.27			297.73		297.7	399.0	64.15	450			1.80	2.431	101.32	25.39%
Tanger entrance		MH170	MH135								0.28				0.66	0.66	10.00			104.19	122.14	178.56	68.94													
												0.12			0.28	0.28	10.00	0.67	10.67	104.19	122.14	178.56			50.63		119.6	182.9	64.40	375			1.00	1.604	63.34	34.63%
Palladium Drive	Block 49	MH135	MH134								0.34				0.80	1.47	11.40			97.36	114.09	166.73	142.63													
												0.54			1.28	3.31	11.40	0.67	12.07	97.36	114.09	166.73			551.58		694.2	899.6	79.72	750			0.60	1.973	205.41	22.83%
		MH134	MH107												0.00	1.47	12.07			94.40	110.61	161.62	138.30													
															0.00	3.31	12.07	0.33	12.40	94.40	110.61	161.62			534.68		673.0	899.6	38.58	750			0.60	1.973	226.65	25.19%
Campeau Drive		MH107	MH108								0.50				1.18	19.66	17.83			75.40	88.26	128.82	1,482.34													
												0.65			1.54	9.30	17.83	0.63	18.46	75.40	88.26	128.82			1,198.16		2,680.5	4,658.7	119.50	1350			0.70	3.153	1978.17	42.46%
	Block 23	MH108	MH604								1.01				2.39	22.05	18.46			73.81	86.40	126.09	1,627.34													
												0.33			0.78	10.08	18.46	0.48	18.95	73.81	86.40	126.09			1,271.07		2,898.4	4,658.7	91.51	1350			0.70	3.153	1760.26	37.78%
Campeau Drive	Block 22	MH 604	MH 603								2.63				6.21	28.26	18.95			72.65	85.03	124.08	2,053.15													
												0.59			1.39	11.48	18.95	0.75	19.70	72.65	85.03	124.08			1,423.83		3,477.0	3,340.9	101.49	1350			0.36	2.261	-136.1	-4.07%
Upper Canada St.	Blocks 18,19,20,21	MH160	MH161								2.25				5.32	5.32	11.05			98.96	115.97	169.50	526.12													
						0.12						0.15			0.54	0.54	11.05	0.75	11.80	98.96	115.97	169.50			92.31		618.4	733.69	89.00	675			0.70	1.986	115.26	15.71%
		MH161	MH162												0.00	5.32	11.80			95.57	111.99	163.65	508.13													
						0.24									0.38	0.92	11.80	0.96	12.75	95.57	111.99	163.65			151.36		659.5	1,058.9	110.00	825			0.50	1.919	399.40	37.72%
	Blocks 14- 16	MH162	MH163								2.39				5.65	10.96	12.75			91.60	107.32	156.78	1,004.34													
						0.16									0.25	1.18	12.75	0.76	13.52	91.60	107.32	156.78			184.76		1,189.1	1,400.6	97.85	900			0.55	2.133	211.51	15.10%
		MH163	MH140												0.00	10.96	13.52			88.68	103.87	151.73	972.28													
															0.00	1.18	13.52	0.12	13.64	88.68	103.87	151.73			178.81		1,151.1	1,400.6	15.23	900			0.55	2.133	249.52	17.82%
Upper Canada St.	Blocks 40, 41	MH167	MH166								1.45				3.43	3.43	11.70			96.00	112.49	164.38	328.92													
						0.33									0.52	0.52	12.50	1.08	13.58	92.61	108.51	158.53			82.90		411.8	1,286.2	71.56	1200			0.10	1.102	874.38	67.98%
	Blocks 12, 42	MH166	MH165								1.49				3.52	6.95	13.58			88.43	103.59	151.32	614.38													
						0.14									0.22	0.74	13.58	1.51	15.10	88.43	103.59	151.32			112.69		727.1	1,286.2	100.00	1200			0.10	1.102	559.12	43.47%
	Block 13	MH165	MH164								0.58				1.37	8.32	15.10			83.25	97.49	142.36	692.46													
															0.00	0.74	15.10	1.23	16.32	83.25	97.49	142.36			106.03		798.5	1,762.2	87.86	1350			0.10	1.193	963.76	54.69%
		MH164	MH140												0.00	8.32	16.32			79.51	93.10	135.92	661.37													
						0.13									0.21	0.95	16.32	0.21	16.53	79.51	93.10	135.92			129.22		790.6	1,760.8	15.00	1350			0.10	1.192	970.22	55.10%

Definitions:
Q = 2.78CiA, where:
Q = Peak Flow in Litres per Second (L/s)
A = Area in Hectares (Ha)
i = Rainfall intensity in millimeters per hour (mm/hr)
[i = 998.071 / (TC+6.053)^0.814] 5 YEAR
[i = 1174.184 / (TC+6.014)^0.816] 10 YEAR
[i = 1735.688 / (TC+6.014)^0.820] 100 YEAR

Notes:
1. Mannings coefficient (n) = 0.013

2. The Storm Sewer Design Sheet is for the rational method storm sewer design only, release rates for the individual blocks are included in Table 4.1 of the Design Brief, Kanata West Business Park, 333 Huntmar Drive, by IBI Group November 2015

Designed: LME

Checked:

Dwg. Reference: 14289-500

No.	Revision	Date
1.	City submission No. 1	2014-11-25
2.	City submission No. 2	2015-04-08
3.	City submission No. 3	2015-06-18
4.	City submission No. 4	2015-10-15
5.	City submission No. 5	2015-11-04
6.	Revised for Phase 2 Registration	2018-04-19
7.	Revised for Phase 3 Registration	2018-09-14
8.	Revised per City comments	2018-12-14
9.	Revised per City comments	2019-03-08
10.	Revised for Phase 4 Registration	2019-04-25
11.	Revised per comments for Phase 4 Registration	2019-06-24
12.	Revised per Phase 5 Registration	2019-09-10
13.	Revised per City Comments for Phase 5 Registration	2019-10-24
14.	Revised per City Comments for Phase 5 Registration	2019-11-06

File Reference:	Date:	Sheet No:
14289.5.7.1	2019-11-06	1 of 2

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

STORM SEWER DESIGN SHEET

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

LOCATION				AREA (Ha)											RATIONAL DESIGN FLOW													SEWER DATA								
STREET	AREA ID	FROM MH	TO MH	C= 0.20	C= 0.57	C= 0.57	C= 0.61	C= 0.68	C= 0.68	C= 0.70	C= 0.85	C= 0.85	C= 0.90	C= 0.90	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	5yr PEAK FLOW (L/s)	10yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm) DIA	W	H	SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (5yr) (L/s)	(%)
KANATA WEST BUSINESS PARK - Block numbers based on overall concept plan of subdivision																																				
Journeyman St.		MH140	MH141												0.00	19.28	16.32			79.51	93.10	135.92	1,533.17													
						0.13				0.32					0.83	2.96	16.32	0.95	17.27	79.51	93.10	135.92			402.03		1,935.2	2,784.1	107.00	1350			0.25	1.884	848.9	30.5%
		MH141	MH141B												0.00	19.28	17.27			76.88	90.00	131.37	1,482.33													
										0.13					0.25	3.21	17.27	0.54	17.81	76.88	90.00	131.37			421.81		1,904.1	2,156.5	47.35	1350			0.15	1.460	252.4	11.7%
Journeyman St.		Stub	MH 603												0.00	19.28	17.81			75.46	88.33	128.92	1,454.94													
															0.00	3.21	17.81	0.33	18.14	75.46	88.33	128.92			413.95		1,868.9	1,363.9	18.02	1350			0.06	0.923	-505.0	-37.0%
Campeau Drive		603	602												0.00	47.54	19.70			70.93	83.00	121.11	3,372.06													
												0.26			0.61	15.30	19.70	0.71	20.41	70.93	83.00	121.11			1,853.06		5,225.1	3,971.3	92.77	1500			0.29	2.177	-1253.8	-31.6%
		602	601												0.00	47.54	20.41			69.37	81.18	118.44	3,298.20													
												0.32			0.76	16.06	20.41	0.53	20.94	69.37	81.18	118.44			1,901.67		5,199.9	4,362.8	76.05	1500			0.35	2.392	-837.0	-19.2%
Tanger	Blocks 10, 11	601	9								4.56				10.78	58.32	20.94			68.26	79.87	116.52	3,980.92													
												0.78			1.84	17.90	20.94	0.87	21.80	68.26	79.87	116.52			2,085.72		6,066.6	5,730.3	96.86	1950			0.15	1.859	-336.4	-5.9%
Tanger		9	12										3.24		8.11	66.43	21.80			66.52	77.83	113.53	4,418.87													
															0.00	17.90	21.80	0.81	22.62	66.52	77.83	113.53			2,032.17	18.00	6,469.0	5,749.5	90.76	1950			0.15	1.865	-719.6	-12.5%
Tanger		12	13										1.81		4.53	70.95	22.62			64.99	76.03	110.89	4,611.14													
															0.00	17.90	22.62	0.22	22.83	64.99	76.03	110.89			1,984.84	18.00	6,614.0	5,749.5	24.54	1950			0.15	1.865	-864.5	-15.0%
Tanger		13	Pond 6E										4.11		10.28	81.24	22.83			64.59	75.56	110.20	5,246.78													
														0.84	2.10	20.00	22.83	0.08	22.92	64.59	75.56	110.20			2,204.06	153.00	7,603.8	7,005.7	9.99	2100			0.15	1.959	-598.1	-8.5%
KANATA WEST BUSINESS PARK																																				
Upper Canada St.	Block31,33,34	MH154	MH153								2.59				6.12	6.12	12.70			91.81	107.56	157.14	561.88													
						0.32									0.51	0.51	12.70	1.70	14.40	91.81	107.56	157.14			79.68		641.6	905.5	120.00	975			0.15	1.175	263.92	29.15%
Upper Canada St.	Blocks 35, 53, 54	MH153	MH152B								1.82				4.30	10.42	14.40			85.54	100.18	146.32	891.39													
						0.16									0.25	0.76	14.40	1.10	15.51	85.54	100.18	146.32			111.29		1002.7	1,103.3	81.80	1050			0.15	1.234	100.65	9.12%
	External Drainage	DI200	MH152B	14.53											8.08	8.08	30.00	2.48	32.48	53.93	63.05	91.87	435.66				435.7	473.6	127.45	825			0.10	0.858	37.89	8.00%
Upper Canada St.		MH152B	MH152												0.00	18.50	14.40			85.54	100.18	146.32	1,582.43													
															0.00	0.76	14.40	1.07	15.47	85.54	100.18	146.32			111.29		1693.7	2,332.0	81.80	1500			0.10	1.278	638.30	27.37%
	Blocks 39	MH152	MH151												0.00	18.50	15.47			82.07	96.11	140.33	1,518.31													
															0.00	0.76	15.47	0.18	15.65	82.07	96.11	140.33			106.74		1625.0	2,332.0	13.91	1500			0.10	1.278	706.98	30.32%
		MH151	MH150												0.00	18.50	15.65			81.51	95.45	139.37	1,507.97													
						0.17									0.27	1.03	15.65	1.35	17.00	81.51	95.45	139.37			143.55		1651.5	2,332.0	103.40	1500			0.10	1.278	680.50	29.18%
		MH150	MH120												0.00	18.50	17.00			77.61	90.86	132.64	1,435.79													
						0.20									0.32	1.35	17.00	0.89	17.89	77.61	90.86	132.64			178.65		1614.4	3,006.9	72.86	1650			0.10	1.362	1392.42	46.31%
Campeau Drive	Block 3	MH99	MH100								4.18				9.88	9.88	11.70			96.00	112.49	164.38	948.19													
									0.36						0.68	0.68	11.70	1.13	12.83	96.00	112.49	164.38			111.87		1060.1	1,560.3	118.50	1050			0.30	1.746	500.29	32.06%
		MH100	MH101												0.00	9.88	12.83			91.29	106.95	156.24	901.68													
							0.27								0.46	1.14	12.83	0.76	13.59	91.29	106.95	156.24			177.87		1079.6	2,073.9	80.84	1200			0.26	1.776	994.37	47.95%
	Block 37, 38, 39	MH101	MH120								7.03				16.61	26.49	15.50			81.98	95.99	140.17	2,171.48													
															0.00	1.14	15.50	0.14	15.64	81.98	95.99	140.17			159.57		2331.0	2,961.0	20.89	1200			0.53	2.536	630.00	21.28%
Campeau Drive	Block 32, 29	MH104	MH103								0.85				2.01	2.01	11.25			98.02	114.88	167.89	196.89													
							0.66								1.12	1.12	11.25	2.33	13.58	98.02	114.88	167.89			187.90		384.8	473.6	120.00	825			0.10	0.858	88.76	18.74%
	Block 36	MH103	MH102								0.33				0.78	2.79	13.58			88.44	103.60	151.33	246.61													
															0.00	1.12	13.58	1.52	15.10	88.44	103.60	151.33			169.37		416.0	597.2	82.99	900			0.10	0.909	181.24	30.35%
		MH102	MH120												0.00	2.79	15.10			83.23	97.47	142.33	232.08													
															0.00	1.12	15.10	0.37	15.47	83.23	97.47	142.33			159.30		391.4	597.2	20.01	900			0.10	0.909	205.85	34.47%
Nipissing Court	Blocks 4, 5	MH120	MH121								2.37				5.60	53.38	17.89			75.25	88.09	128.57	4,016.75													
						0.26									0.41	4.02	17.89	0.74	18.63	75.25	88.09	128.57			516.40		4533.2	6,120.8	88.44	1950			0.17	1.985	1587.62	25.94%
		MH121	MH122		0.21										0.33	53.71	18.63			73.40	85.92	125.38	3,942.57													
															0.00	4.02	18.63	0.73	19.36	73.40	85.92	125.38			503.61		4446.2	7,119.4	100.84	1950			0.23	2.309	2673.27	37.55%
	Blocks 1, 7	MH122	MH123					0.35			2.23				5.93	59.64	19.36			71.69	83.90	122.43	4,275.61													
															0.00	4.02	19.36	0.77	20.13	71.69	83.90	122.43			491.73		4767.3	6,638.9	99.19	1950			0.20	2.154	1871.57	28.19%
Future	Blocks 8, 9	MH (215)	MH123								11.78				27.84	27.84	20.70	0.24	20.94	68.75	80.45	117.37	1,913.77				1,913.8	3,006.9	20.00	1650			0.10	1.362	1093.09	36.35%
West Pond Outlet		MH123	Outlet												0.00	87.48	20.13			69.97	81.88	119.47	6,121.06													
															0.00	4.02	20.13	0.87	21.00	69.97	81.88	119.47			479.86		6600.9	10,648.2	119.64	2400			0.17	2.280	4047.31	38.01%
Future	Blocks X,X	MH XX	MHXX	Grey = Constructed																																

Definitions:
Q = 2.78CiA, where:
Q = Peak Flow in Litres per Second (L/s)
A = Area in Hectares (Ha)
i = Rainfall intensity in millimeters per hour (mm/hr)
[i = 998.071 / (TC+6.053)^0.814] 5 YEAR
[i = 1174.184 / (TC+6.014)^0.816] 10 YEAR
[i = 1735.688 / (TC+6.014)^0.820] 100 YEAR

Notes:
1. Mannings coefficient (n) = 0.013

2. The Storm Sewer Design Sheet is for the rational method storm sewer design only, release rates for the individual blocks are included in Table 4.1 of the Design Brief, Kanata West Business Park, 333 Huntmar Drive, by IBI Group November 2015

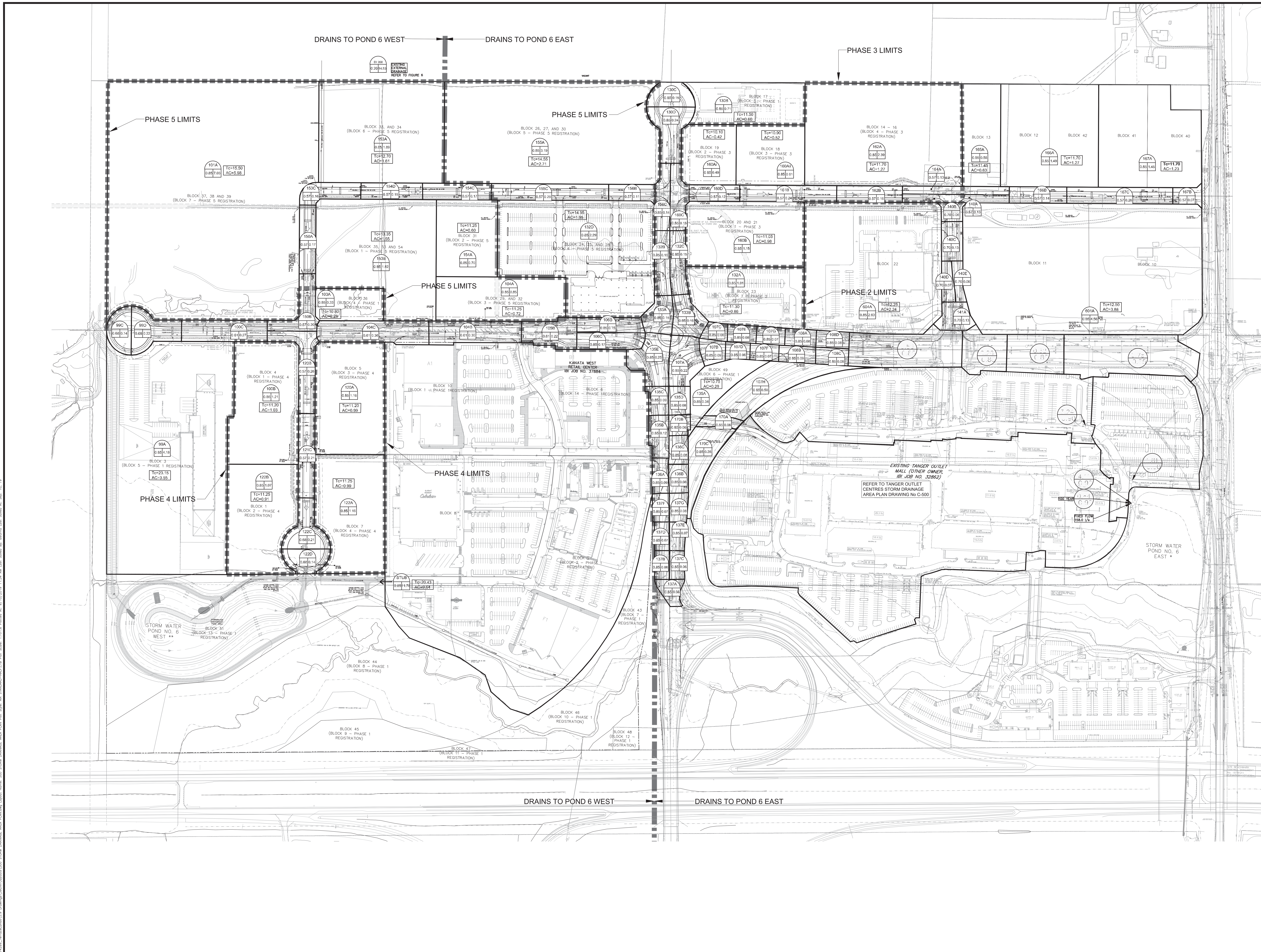
Designed: LME

Checked:

Dwg. Reference: 14289-500

No.	Revision	Date
1.	City submission No. 1	2014-11-25
2.	City submission No. 2	2015-04-08
3.	City submission No. 3	2015-06-18
4.	City submission No. 4	2015-10-15
5.	City submission No. 5	2015-11-04
6.	Revised for Phase 2 Registration	2018-04-19
7.	Revised for Phase 3 Registration	2018-09-14
8.	Revised per City comments	2018-12-14
9.	Revised per City comments	2019-03-08
10.	Revised for Phase 4 Registration	2019-04-25
11.	Revised per comments for Phase 4 Registration	2019-06-24
12.	Revised for Phase 5 Registration	2019-09-10
13.	Revised per City comments for Phase 5 Registration	2019-10-24
14.	Revised per City comments for Phase 5 Registration	2019-11-06

File Reference:	Date:	Sheet No:
14289.5.7.1	2019-11-06	2 of 2



LEGEND:

- DRAINAGE AREA LIMITS
- MH601 — STORM MANHOLE & NUMBER
- STORM SEWER & FLOW DIRECTION
- 604A / 0.85 / 2.63 — AREA ID; AREA IN HECTARES; RUNOFF COEFFICIENT
- EMERGENCY OVERLAND FLOW ROUTE
- Tc=11.70 AC=1.23 — ESTIMATED TIME OF CONCENTRATION IN MINUTES; PRODUCT OF AREA AND RUNOFF COEFFICIENT

EXISTING TANGER OUTLET CENTRE

- 0.56 / 0.85 — AREA IN HECTARES; RUNOFF COEFFICIENT

No.	REVISIONS	By	Date
20			
19			
18			
17			
16			
15	ISSUED FOR PHASE 5 REGISTRATION	LME	19:09:10
14	REVISED AS PER PHASE 4 COMMENTS	LME	19:07:25
13	REVISED AS PER PHASE 4 COMMENTS	LME	19:07:22
12	REVISED AS PER PHASE 4 COMMENTS	LME	19:06:24
11	ISSUED FOR PHASE 4 REGISTRATION	LME	19:04:25
10	REVISED AS PER PHASE 3 COMMENTS	LME	19:03:08
9	ISSUED FOR PHASE 3 TENDER	LME	19:01:11
8	REVISED AS PER PHASE 3 COMMENTS	LME	18:12:14
7	REVISED FOR PHASE 3 REGISTRATION	LME	18:09:14
6	REVISED FOR PHASE 2 REGISTRATION	LME	18:04:20
5	REVISED AS PER CITY COMMENTS	LME	15:11:05
4	REVISED AS PER CITY COMMENTS	LME	15:10:15
3	REVISED AS PER NEW SITE PLAN AND CITY COMMENTS	LME	15:06:19
2	REVISED AS PER CITY COMMENTS	LME	15:04:08
1	ISSUED TO CITY FOR APPOVAL	LME	14:11:27

TAGGART REALTY MANAGEMENT

IBI GROUP
400 – 333 Preston Street
Ottawa ON K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

Project Title

KANATA WEST BUSINESS PARK PHASE 5

LICENSED PROFESSIONAL ENGINEER
L. M. ERSON
13379508
2019/09/10
PROVINCE OF ONTARIO

Drawing Title

STORM DRAINAGE AREA PLAN

Scale 1:2000

Design	Date
LME	NOV. 2014
Drawn	**Checked**
DPS	TRB
Project No.	**Drawing No.**
14289	500

D07-16-14-0003_P5

#17661

Area ID	Area (ha)	IMP (%)		LGI (m)	AVAILABLE/REQUIRED STORAGE (cu-m)	MINOR SYSTEM CAPTURE (l/s)
		TIMP	XIMP			
101A	**7.03**	**0.93**	**0.93**	**327**	**780**	**1230**
150A	**0.17**	**0.53**	**0.53**	**83**	**n/a**	**31**
150B	**0.2**	**0.53**	**0.53**	**75**	**7**	**37**
UPS Site modelled as per approved report “Design Brief UPS Canada Inc. 8825 Campeau Drive (IBI Group, January 2017)						
99C	0.14	0.69	0.69	30	44	33
99D	0.22	0.69	0.69	60	21	45
100C	0.27	0.59	0.59	103	13	49
100B	1.21	0.93	0.93	155	117	259
120A	1.16	0.93	0.93	214	75	191
120B	0.26	0.53	0.53	100	7	45
103A	0.33	0.93	0.93	56	20	104
104C	0.36	0.59	0.59	135	17	62
Kanata West Retail Centre modelled as per approved report “Design Brief Kanata West Retail Centre 3015, 3075 and 3095 Palladium Drive” (IBI Group, July 2017)						
121C	0.21	0.53	0.53	101	49	37
122B	1.07	0.93	0.93	149	103	231
122A	1.16	0.93	0.93	216	73	185
122C	0.21	0.69	0.69	60	21	46
122D	0.14	0.69	0.69	30	24	31
153A	**1.89**	**0.93**	**0.93**	**119**	**190**	**430**
153B	**1.82**	**0.93**	**0.93**	**129**	**180**	**408**
153C	**0.16**	**0.53**	**0.53**	**79**	**n/a**	**29**
154D	**0.15**	**0.53**	**0.53**	**76**	**n/a**	**29**
154A	**0.70**	**0.93**	**0.93**	**81**	**70**	**171**
154C	**0.17**	**0.57**	**0.57**	**82**	**48**	**33**
155C	**0.29**	**0.57**	**0.57**	**141**	**60**	**50**
155A	**3.19**	**0.93**	**0.93**	**160**	**480**	**525**
132D	**2.29**	**0.93**	**0.93**	**157**	**360**	**377**
156B	**0.11**	**0.57**	**0.57**	**56**	**5**	**22**
156C	0.14	0.93	0.93	82	7	40
132B	0.15	0.93	0.93	80	9	43
130C	0.15	0.93	0.93	30	15	41
130B	0.71	0.93	0.93	101	120	111
130D	0.24	0.93	0.93	67	15	62
160C	0.15	0.93	0.93	81	n/a	43
132A	1.01	0.93	0.93	117	132	187
132C	0.15	0.93	0.93	77	4	43
104A	**0.85**	**0.93**	**0.93**	**95**	**90**	**204**
104B	0.3	0.71	0.71	111	65	75
105B	0.22	0.93	0.93	65	n/a	57
106C	0.17	0.93	0.93	82	1	110
135E	0.25	0.93	0.93	50	11	80
106B	0.15	0.93	0.93	82	1	58
133A	0.15	0.93	0.93	57	19	48
133B	0.16	0.93	0.93	57	n/a	74
137A	0.08	0.93	0.93	33	n/a	38
137B/C	0.12	0.93	0.93	36	n/a	57

Area ID	Area (ha)	IMP (%) TIMP	IMP (%) XIMP	LGI (m)	AVAILABLE/REQUIRED STORAGE (cu-m)	MINOR SYSTEM CAPTURE (l/s)
137D/E	0.14	0.93	0.93	35	n/a	67
137F/G	0.15	0.93	0.93	35	n/a	72
136A/B/C	0.25	0.93	0.93	69	n/a	116
170A	0.06	0.93	0.93	54	n/a	29
170B	0.06	0.93	0.93	25	n/a	29
135B	0.12	0.93	0.93	64	n/a	56
135A	1.12	0.93	0.93	117	111	257
135C/D	0.17	0.93	0.93	35	n/a	81
107A	0.22	0.93	0.93	64	n/a	101
107C/B	0.15	0.93	0.93	35	n/a	72
107E/D	0.14	0.93	0.93	35	n/a	67
107G/F	0.14	0.93	0.93	35	n/a	67
108A/B	0.17	0.93	0.93	36	n/a	81
108D/C	0.16	0.93	0.93	40	n/a	76
604A	2.63	0.93	0.93	166	266	556
604B	0.59	0.93	0.93	137	n/a	170
166A	1.49	0.93	0.93	112	247	233
166B	0.14	0.53	0.53	70	5	42
167A	1.45	0.93	0.93	112	240	227
167C	0.26	0.53	0.53	127	14	59
167B	0.07	0.53	0.53	35	n/a	30
160B	1.01	0.93	0.93	80	245	144
160A – 160A(i)ϕ 0.49ha	1.1	0.93	0.93	79	184 – TBD	172 – 76ϕ
160A – 160A(ii)θ 0.61ha					TBD	96θ
160D	0.12	0.53	0.53	61	n/a	23
161B	0.24	0.53	0.53	117	47	36
162A	2.39	0.93	0.93	188	355	233
162B	0.16	0.53	0.53	79	n/a	30
165A	0.58	0.93	0.93	92	160	116
164A	0.13	0.53	0.53	76	4	30
140AB	0.19	0.61	0.61	76	32	53
140C	0.13	0.71	0.71	48	11	32
140D/E	0.13	0.71	0.71	49	7	39
141A	0.13	0.71	0.71	34	15	30
603	0.26	0.93	0.93	54	n/a	75
602	0.32	0.93	0.93	70	n/a	92
601A	4.56	0.93	0.93	212	642	712
600	0.78	0.93	0.93	164	n/a	225

Bold font indicates Phase 5 areas

* required to store the 100 year storm event

ϕ Block 2 – Phase 3 Registration

θ Block 3 – Phase 3 Registration

TBD – To Be Determined at Site Plan Application

Project #: 122151
Project Name: 405 Huntmar
Location: Ottawa

NOVATECH
Engineers, Planners & Landscape Architects

Date Prepared: 3/30/2023

Proposed Industrial Development
405 Huntmar Drive - Warehouses 'A' and 'B'

Pre - Development Site Flows										Allowable Site Flows (L/s)*
Description	*Area (ha)*	*$A_{impervious}$ (ha) C=0.9*	*A_{gravel} (ha) C=0.6*	*$A_{pervious}$ (ha) C=0.2*	Weighted C_{w5}	Weighted C_{w100}	1:2 Year Flow (L/s)	1:5 Year Flow (L/s)	1:100 Year Flow (L/s)	
Total Site Area to be Developed	8.67	0.10	0.31	8.26	0.22	0.28	411.7	558.4	1190.4	
Site Allowable to Journeyman										**737**
Site Allowable to Campeau										**712**

* Allowable flows are based on the STM Plan information provided in the 2019 KWBP Design Brief

Post - Development Site Flows																
Area	Description	*Area (ha)*	*A_{imp} (ha) C=0.9*	*A_{perv} (ha) C=0.2*	C_5	C_{100}	Uncontrolled Flow (L/s)			Controlled Flow (L/s)			Storage Required (m^3)			Storage Provided (m^3)
							2-year	5-year	100-year	2-year	5-year	100-year	2-year	5-year	100-year	
DR-1	Direct Runoff to Huntmar Ditch	0.09	0.025	0.07	0.39	0.46	7.6	10.3	20.5	-	-	-	-	-	-	-
DR-2	Direct Runoff to Huntmar Sewers	0.10	0.029	0.07	0.40	0.47	8.6	11.7	23.2	-	-	-	-	-	-	-
DR-3	Direct Runoff to Campeau	0.15	0.003	0.15	0.21	0.27	6.9	9.3	19.7	-	-	-	-	-	-	-
DR-4	Direct Runoff to Journeyman	0.02	0.002	0.02	0.27	0.33	1.2	1.6	3.2	-	-	-	-	-	-	-
DR-5	Direct Runoff to North and West	0.18	0.000	0.18	0.20	0.25	7.7	10.4	22.3	-	-	-	-	-	-	-
A-1	Rain Garden Infiltration Area	0.38	0.19	0.19	0.55	0.63	On-Site Infiltration ~ 0.1 L/s			61.2	62.8	65.6	9	17	56	124
A-2	Un-Controlled Bldg 'A' Parking Lot	0.76	0.64	0.12	0.79	0.88	127.8	173.4	331.8	-	-	-	-	-	-	-
A-3	Un-Controlled Bldg 'B' Parking Lot	0.55	0.45	0.10	0.77	0.86	90.7	123.1	235.8	-	-	-	-	-	-	-
A-4	Controlled Loading Dock Area	1.97	1.77	0.20	0.83	0.92	-	-	-	116.7	146.4	182.2	222	309	698	809
R-1	Controlled Flow Roof - Building 'A'	2.15	2.15	0.00	0.90	1.00	-	-	-	39.7	44.4	49.3	334	497	1063	1124
R-2	Controlled Flow Roof - Building 'B'	2.32	2.32	0.00	0.90	1.00	-	-	-	39.4	43.7	48.1	376	558	1195	1229
	Totals :	8.67	-	-	-	-	**250.4**	**339.7**	**656.6**	**256.9**	**297.3**	**345.2**	**942**	**1382**	**3012**	**3285**
							Total Stormwater Flows :			**507.3**	**637.0**	**1001.8**	1449 L/s (Total Post-Development Site Allowable)			

T_c = 10mins

Post-Development sewer flows to Journeyman Storm Sewer System 349.5 L/s

Post-Development sewer flows to Campeau Storm Sewer System 563.4 L/s 912.8 L/s (Total Site Flow to Sewers)

Prepared By: Novatech

M:\2022\122151\DATA\Calculations\SWM\122151-SWM-Calcs_v2.xlsx

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA DR-1 Direct Runoff to Huntmar Ditch.

OTTAWA IDF CURVE
Area = 0.090 ha Qallow = 7.6 L/s
C = 0.39 Vol(max) = 0.0 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	10.22	2.64	0.79
10	76.81	7.58	0.00	0.00
15	61.77	6.10	-1.48	-1.34
20	52.03	5.13	-2.44	-2.93
25	45.17	4.46	-3.12	-4.68
30	40.04	3.95	-3.63	-6.53
35	36.06	3.56	-4.02	-8.44
40	32.86	3.24	-4.34	-10.41
45	30.24	2.98	-4.60	-12.41
50	28.04	2.77	-4.81	-14.44
55	26.17	2.58	-5.00	-16.49
60	24.56	2.42	-5.16	-18.56
75	20.81	2.05	-5.53	-24.87
90	18.14	1.79	-5.79	-31.26
120	14.56	1.44	-6.14	-44.23
150	12.25	1.21	-6.37	-57.34
180	10.63	1.05	-6.53	-70.54
210	9.42	0.93	-6.65	-83.80

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA DR-1 Direct Runoff to Huntmar Ditch.

OTTAWA IDF CURVE
Area = 0.090 ha Qallow = 10.3 L/s
C = 0.39 Vol(max) = 0.0 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	13.93	3.65	1.10
10	104.19	10.28	0.00	0.00
15	83.56	8.25	-2.04	-1.83
20	70.25	6.93	-3.35	-4.02
25	60.90	6.01	-4.27	-6.41
30	53.93	5.32	-4.96	-8.93
35	48.52	4.79	-5.49	-11.54
40	44.18	4.36	-5.92	-14.21
45	40.63	4.01	-6.27	-16.94
50	37.65	3.72	-6.57	-19.70
55	35.12	3.47	-6.82	-22.49
60	32.94	3.25	-7.03	-25.31
75	27.89	2.75	-7.53	-33.89
90	24.29	2.40	-7.89	-42.58
120	19.47	1.92	-8.36	-60.20
150	16.36	1.61	-8.67	-78.01
180	14.18	1.40	-8.88	-95.94
210	12.56	1.24	-9.04	-113.95

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA DR-1 Direct Runoff to Huntmar Ditch.

OTTAWA IDF CURVE
Area = 0.090 ha Qallow = 20.5 L/s
C = 0.46 Vol(max) = 0.0 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	27.83	7.36	2.21
10	178.56	20.48	0.00	0.00
15	142.89	16.39	-4.09	-3.68
20	119.95	13.76	-6.72	-8.07
25	103.85	11.91	-8.57	-12.85
30	91.87	10.53	-9.94	-17.89
35	82.58	9.47	-11.01	-23.11
40	75.15	8.62	-11.86	-28.46
45	69.05	7.92	-12.56	-33.91
50	63.95	7.33	-13.14	-39.43
55	59.62	6.84	-13.64	-45.01
60	55.89	6.41	-14.07	-50.64
75	47.26	5.42	-15.06	-67.76
90	41.11	4.71	-15.76	-85.11
120	32.89	3.77	-16.70	-120.27
150	27.61	3.17	-17.31	-155.79
180	23.90	2.74	-17.74	-191.54
210	21.14	2.42	-18.05	-227.45

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:100 YEAR + 20%
AREA DR-1 Direct Runoff to Huntmar Ditch.

OTTAWA IDF CURVE
Area = 0.090 ha Qallow = 24.6 L/s
C = 0.46 Vol(max) = 0.0 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	33.40	8.83	2.65
10	214.27	24.57	0.00	0.00
15	171.47	19.66	-4.91	-4.42
20	143.94	16.51	-8.07	-9.68
25	124.62	14.29	-10.28	-15.42
30	110.24	12.64	-11.93	-21.47
35	99.09	11.36	-13.21	-27.74
40	90.17	10.34	-14.23	-34.15
45	82.86	9.50	-15.07	-40.69
50	76.74	8.80	-15.77	-47.31
55	71.55	8.20	-16.37	-54.01
60	67.07	7.69	-16.88	-60.77
75	56.71	6.50	-18.07	-81.31
90	49.33	5.66	-18.91	-102.14
120	39.47	4.53	-20.04	-144.32
150	33.13	3.80	-20.77	-186.95
180	28.68	3.29	-21.28	-229.85
210	25.37	2.91	-21.66	-272.94

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA DR-2 Direct Runoff to Huntmar Sewers

OTTAWA IDF CURVE

Area = 0.100 ha Qallow = 8.6 L/s
C = 0.40 Vol(max) = 0.0 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	11.60	3.00	0.90
10	76.81	8.60	0.00	0.00
15	61.77	6.92	-1.68	-1.52
20	52.03	5.83	-2.78	-3.33
25	45.17	5.06	-3.54	-5.32
30	40.04	4.49	-4.12	-7.41
35	36.06	4.04	-4.56	-9.59
40	32.86	3.68	-4.92	-11.81
45	30.24	3.39	-5.22	-14.09
50	28.04	3.14	-5.46	-16.39
55	26.17	2.93	-5.67	-18.72
60	24.56	2.75	-5.85	-21.07
75	20.81	2.33	-6.27	-28.23
90	18.14	2.03	-6.57	-35.49
120	14.56	1.63	-6.97	-50.21
150	12.25	1.37	-7.23	-65.09
180	10.63	1.19	-7.41	-80.07
210	9.42	1.05	-7.55	-95.13

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA DR-2 Direct Runoff to Huntmar Sewers

OTTAWA IDF CURVE

Area = 0.100 ha Qallow = 11.7 L/s
C = 0.40 Vol(max) = 0.0 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	15.82	4.14	1.24
10	104.19	11.67	0.00	0.00
15	83.56	9.36	-2.31	-2.08
20	70.25	7.87	-3.80	-4.56
25	60.90	6.82	-4.85	-7.28
30	53.93	6.04	-5.63	-10.14
35	48.52	5.44	-6.24	-13.10
40	44.18	4.95	-6.72	-16.14
45	40.63	4.55	-7.12	-19.23
50	37.65	4.22	-7.45	-22.36
55	35.12	3.94	-7.74	-25.54
60	32.94	3.69	-7.98	-28.74
75	27.89	3.12	-8.55	-38.47
90	24.29	2.72	-8.95	-48.34
120	19.47	2.18	-9.49	-68.34
150	16.36	1.83	-9.84	-88.56
180	14.18	1.59	-10.08	-108.91
210	12.56	1.41	-10.27	-129.36

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA DR-2 Direct Runoff to Huntmar Sewers

OTTAWA IDF CURVE

Area = 0.100 ha Qallow = 23.2 L/s
C = 0.47 Vol(max) = 0.0 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	31.54	8.34	2.50
10	178.56	23.21	0.00	0.00
15	142.89	18.57	-4.64	-4.17
20	119.95	15.59	-7.62	-9.14
25	103.85	13.50	-9.71	-14.56
30	91.87	11.94	-11.27	-20.28
35	82.58	10.73	-12.47	-26.20
40	75.15	9.77	-13.44	-32.26
45	69.05	8.97	-14.23	-38.43
50	63.95	8.31	-14.89	-44.68
55	59.62	7.75	-15.46	-51.01
60	55.89	7.26	-15.94	-57.39
75	47.26	6.14	-17.06	-76.79
90	41.11	5.34	-17.86	-96.46
120	32.89	4.28	-18.93	-136.30
150	27.61	3.59	-19.62	-176.56
180	23.90	3.11	-20.10	-217.08
210	21.14	2.75	-20.46	-257.78

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:100 YEAR + 20%
AREA DR-2 Direct Runoff to Huntmar Sewers

OTTAWA IDF CURVE

Area = 0.100 ha Qallow = 27.8 L/s
C = 0.47 Vol(max) = 0.0 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	37.85	10.00	3.00
10	214.27	27.85	0.00	0.00
15	171.47	22.29	-5.56	-5.01
20	143.94	18.71	-9.14	-10.97
25	124.62	16.20	-11.65	-17.48
30	110.24	14.33	-13.52	-24.34
35	99.09	12.88	-14.97	-31.43
40	90.17	11.72	-16.13	-38.71
45	82.86	10.77	-17.08	-46.11
50	76.74	9.97	-17.87	-53.62
55	71.55	9.30	-18.55	-61.21
60	67.07	8.72	-19.13	-68.87
75	56.71	7.37	-20.48	-92.15
90	49.33	6.41	-21.44	-115.76
120	39.47	5.13	-22.72	-163.57
150	33.13	4.31	-23.54	-211.87
180	28.68	3.73	-24.12	-260.50
210	25.37	3.30	-24.55	-309.33

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA DR-3 Direct Runoff to Campeau

OTTAWA IDF CURVE
Area = 0.150 ha Qallow = 6.9 L/s
C = 0.21 Vol(max) = 0.0 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	9.24	2.39	0.72
10	76.81	6.85	0.00	0.00
15	61.77	5.51	-1.34	-1.21
20	52.03	4.64	-2.21	-2.65
25	45.17	4.03	-2.82	-4.23
30	40.04	3.57	-3.28	-5.90
35	36.06	3.22	-3.64	-7.64
40	32.86	2.93	-3.92	-9.41
45	30.24	2.70	-4.16	-11.22
50	28.04	2.50	-4.35	-13.05
55	26.17	2.34	-4.52	-14.91
60	24.56	2.19	-4.66	-16.78
75	20.81	1.86	-5.00	-22.48
90	18.14	1.62	-5.23	-28.27
120	14.56	1.30	-5.55	-39.99
150	12.25	1.09	-5.76	-51.85
180	10.63	0.95	-5.91	-63.78
210	9.42	0.84	-6.01	-75.77

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA DR-3 Direct Runoff to Campeau

OTTAWA IDF CURVE
Area = 0.150 ha Qallow = 9.3 L/s
C = 0.21 Vol(max) = 0.0 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	12.60	3.30	0.99
10	104.19	9.30	0.00	0.00
15	83.56	7.46	-1.84	-1.66
20	70.25	6.27	-3.03	-3.63
25	60.90	5.43	-3.86	-5.80
30	53.93	4.81	-4.49	-8.07
35	48.52	4.33	-4.97	-10.43
40	44.18	3.94	-5.36	-12.85
45	40.63	3.63	-5.67	-15.32
50	37.65	3.36	-5.94	-17.81
55	35.12	3.13	-6.16	-20.34
60	32.94	2.94	-6.36	-22.89
75	27.89	2.49	-6.81	-30.64
90	24.29	2.17	-7.13	-38.50
120	19.47	1.74	-7.56	-54.44
150	16.36	1.46	-7.84	-70.54
180	14.18	1.27	-8.03	-86.75
210	12.56	1.12	-8.18	-103.04

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA DR-3 Direct Runoff to Campeau

OTTAWA IDF CURVE
Area = 0.150 ha Qallow = 19.7 L/s
C = 0.27 Vol(max) = 0.0 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	26.82	7.09	2.13
10	178.56	19.73	0.00	0.00
15	142.89	15.79	-3.94	-3.55
20	119.95	13.26	-6.48	-7.77
25	103.85	11.48	-8.26	-12.38
30	91.87	10.15	-9.58	-17.24
35	82.58	9.13	-10.61	-22.27
40	75.15	8.30	-11.43	-27.43
45	69.05	7.63	-12.10	-32.67
50	63.95	7.07	-12.66	-37.99
55	59.62	6.59	-13.14	-43.37
60	55.89	6.18	-13.56	-48.80
75	47.26	5.22	-14.51	-65.29
90	41.11	4.54	-15.19	-82.02
120	32.89	3.64	-16.10	-115.90
150	27.61	3.05	-16.68	-150.12
180	23.90	2.64	-17.09	-184.58
210	21.14	2.34	-17.40	-219.18

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:100 YEAR + 20%
AREA DR-3 Direct Runoff to Campeau

OTTAWA IDF CURVE
Area = 0.150 ha Qallow = 23.7 L/s
C = 0.27 Vol(max) = 0.0 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	32.18	8.51	2.55
10	214.27	23.68	0.00	0.00
15	171.47	18.95	-4.73	-4.26
20	143.94	15.91	-7.77	-9.33
25	124.62	13.77	-9.91	-14.86
30	110.24	12.18	-11.50	-20.69
35	99.09	10.95	-12.73	-26.73
40	90.17	9.96	-13.71	-32.91
45	82.86	9.16	-14.52	-39.21
50	76.74	8.48	-15.20	-45.59
55	71.55	7.91	-15.77	-52.05
60	67.07	7.41	-16.27	-58.56
75	56.71	6.27	-17.41	-78.35
90	49.33	5.45	-18.23	-98.42
120	39.47	4.36	-19.32	-139.07
150	33.13	3.66	-20.02	-180.15
180	28.68	3.17	-20.51	-221.49
210	25.37	2.80	-20.87	-263.01

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA DR-4 Direct Runoff to Journeyman

OTTAWA IDF CURVE
Area = 0.020 ha Qallow = 1.2 L/s
C = 0.27 Vol(max) = 0.0 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	1.55	0.40	0.12
10	76.81	1.15	0.00	0.00
15	61.77	0.93	-0.23	-0.20
20	52.03	0.78	-0.37	-0.45
25	45.17	0.68	-0.47	-0.71
30	40.04	0.60	-0.55	-0.99
35	36.06	0.54	-0.61	-1.28
40	32.86	0.49	-0.66	-1.58
45	30.24	0.45	-0.70	-1.89
50	28.04	0.42	-0.73	-2.20
55	26.17	0.39	-0.76	-2.51
60	24.56	0.37	-0.78	-2.82
75	20.81	0.31	-0.84	-3.78
90	18.14	0.27	-0.88	-4.76
120	14.56	0.22	-0.93	-6.73
150	12.25	0.18	-0.97	-8.72
180	10.63	0.16	-0.99	-10.73
210	9.42	0.14	-1.01	-12.75

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA DR-4 Direct Runoff to Journeyman

OTTAWA IDF CURVE
Area = 0.020 ha Qallow = 1.6 L/s
C = 0.27 Vol(max) = 0.0 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	2.12	0.56	0.17
10	104.19	1.56	0.00	0.00
15	83.56	1.25	-0.31	-0.28
20	70.25	1.05	-0.51	-0.61
25	60.90	0.91	-0.65	-0.97
30	53.93	0.81	-0.75	-1.36
35	48.52	0.73	-0.84	-1.76
40	44.18	0.66	-0.90	-2.16
45	40.63	0.61	-0.95	-2.58
50	37.65	0.57	-1.00	-3.00
55	35.12	0.53	-1.04	-3.42
60	32.94	0.49	-1.07	-3.85
75	27.89	0.42	-1.15	-5.15
90	24.29	0.36	-1.20	-6.48
120	19.47	0.29	-1.27	-9.16
150	16.36	0.25	-1.32	-11.87
180	14.18	0.21	-1.35	-14.59
210	12.56	0.19	-1.38	-17.33

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA DR-4 Direct Runoff to Journeyman

OTTAWA IDF CURVE
Area = 0.020 ha Qallow = 3.2 L/s
C = 0.33 Vol(max) = 0.0 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	4.39	1.16	0.35
10	178.56	3.23	0.00	0.00
15	142.89	2.58	-0.64	-0.58
20	119.95	2.17	-1.06	-1.27
25	103.85	1.88	-1.35	-2.03
30	91.87	1.66	-1.57	-2.82
35	82.58	1.49	-1.73	-3.64
40	75.15	1.36	-1.87	-4.48
45	69.05	1.25	-1.98	-5.34
50	63.95	1.16	-2.07	-6.21
55	59.62	1.08	-2.15	-7.09
60	55.89	1.01	-2.22	-7.98
75	47.26	0.85	-2.37	-10.68
90	41.11	0.74	-2.48	-13.41
120	32.89	0.59	-2.63	-18.95
150	27.61	0.50	-2.73	-24.55
180	23.90	0.43	-2.79	-30.18
210	21.14	0.38	-2.84	-35.84

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:100 YEAR + 20%
AREA DR-4 Direct Runoff to Journeyman

OTTAWA IDF CURVE
Area = 0.020 ha Qallow = 3.9 L/s
C = 0.33 Vol(max) = 0.0 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	5.26	1.39	0.42
10	214.27	3.87	0.00	0.00
15	171.47	3.10	-0.77	-0.70
20	143.94	2.60	-1.27	-1.53
25	124.62	2.25	-1.62	-2.43
30	110.24	1.99	-1.88	-3.38
35	99.09	1.79	-2.08	-4.37
40	90.17	1.63	-2.24	-5.38
45	82.86	1.50	-2.37	-6.41
50	76.74	1.39	-2.49	-7.46
55	71.55	1.29	-2.58	-8.51
60	67.07	1.21	-2.66	-9.58
75	56.71	1.02	-2.85	-12.81
90	49.33	0.89	-2.98	-16.09
120	39.47	0.71	-3.16	-22.74
150	33.13	0.60	-3.27	-29.46
180	28.68	0.52	-3.35	-36.22
210	25.37	0.46	-3.41	-43.01

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA DR-5 Direct Runoff to North and West

OTTAWA IDF CURVE

Area =	0.180	ha	Qallow =	7.7	L/s
C =	0.20		Vol(max) =	0.0	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	10.37	2.68	0.80
10	76.81	7.69	0.00	0.00
15	61.77	6.18	-1.50	-1.35
20	52.03	5.21	-2.48	-2.98
25	45.17	4.52	-3.17	-4.75
30	40.04	4.01	-3.68	-6.62
35	36.06	3.61	-4.08	-8.56
40	32.86	3.29	-4.40	-10.55
45	30.24	3.03	-4.66	-12.58
50	28.04	2.81	-4.88	-14.64
55	26.17	2.62	-5.07	-16.72
60	24.56	2.46	-5.23	-18.82
75	20.81	2.08	-5.60	-25.22
90	18.14	1.82	-5.87	-31.70
120	14.56	1.46	-6.23	-44.85
150	12.25	1.23	-6.46	-58.14
180	10.63	1.06	-6.62	-71.53
210	9.42	0.94	-6.74	-84.98

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA DR-5 Direct Runoff to North and West

OTTAWA IDF CURVE

Area =	0.180	ha	Qallow =	10.4	L/s
C =	0.20		Vol(max) =	0.0	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	14.13	3.70	1.11
10	104.19	10.43	0.00	0.00
15	83.56	8.36	-2.07	-1.86
20	70.25	7.03	-3.40	-4.08
25	60.90	6.09	-4.33	-6.50
30	53.93	5.40	-5.03	-9.06
35	48.52	4.86	-5.57	-11.70
40	44.18	4.42	-6.01	-14.41
45	40.63	4.07	-6.36	-17.18
50	37.65	3.77	-6.66	-19.98
55	35.12	3.52	-6.91	-22.81
60	32.94	3.30	-7.13	-25.67
75	27.89	2.79	-7.64	-34.36
90	24.29	2.43	-8.00	-43.18
120	19.47	1.95	-8.48	-61.05
150	16.36	1.64	-8.79	-79.11
180	14.18	1.42	-9.01	-97.29
210	12.56	1.26	-9.17	-115.56

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA DR-5 Direct Runoff to North and West

OTTAWA IDF CURVE

Area =	0.180	ha	Qallow =	22.3	L/s
C =	0.25		Vol(max) =	0.0	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	30.36	8.02	2.41
10	178.56	22.34	0.00	0.00
15	142.89	17.88	-4.46	-4.02
20	119.95	15.01	-7.33	-8.80
25	103.85	12.99	-9.35	-14.02
30	91.87	11.49	-10.85	-19.52
35	82.58	10.33	-12.01	-25.22
40	75.15	9.40	-12.94	-31.05
45	69.05	8.64	-13.70	-36.99
50	63.95	8.00	-14.34	-43.01
55	59.62	7.46	-14.88	-49.10
60	55.89	6.99	-15.35	-55.24
75	47.26	5.91	-16.43	-73.92
90	41.11	5.14	-17.19	-92.85
120	32.89	4.12	-18.22	-131.20
150	27.61	3.45	-18.88	-169.95
180	23.90	2.99	-19.35	-208.95
210	21.14	2.65	-19.69	-248.13

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:100 YEAR + 20%
AREA DR-5 Direct Runoff to North and West

OTTAWA IDF CURVE

Area =	0.180	ha	Qallow =	26.8	L/s
C =	0.25		Vol(max) =	0.0	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	36.43	9.63	2.89
10	214.27	26.81	0.00	0.00
15	171.47	21.45	-5.35	-4.82
20	143.94	18.01	-8.80	-10.56
25	124.62	15.59	-11.22	-16.82
30	110.24	13.79	-13.01	-23.43
35	99.09	12.40	-14.41	-30.26
40	90.17	11.28	-15.52	-37.26
45	82.86	10.37	-16.44	-44.39
50	76.74	9.60	-17.20	-51.61
55	71.55	8.95	-17.85	-58.92
60	67.07	8.39	-18.41	-66.29
75	56.71	7.09	-19.71	-88.70
90	49.33	6.17	-20.63	-111.42
120	39.47	4.94	-21.87	-157.44
150	33.13	4.14	-22.66	-203.94
180	28.68	3.59	-23.22	-250.74
210	25.37	3.17	-23.63	-297.75

Proposed Industrial Development			Storage Calculations Using Average	
Novatech Project No. 122151			Release Rate Equal to 50% of the Qpeak	
REQUIRED STORAGE - 1:2 YEAR EVENT				
AREA A-1 Rain Gardens Infiltration Trench Overflow				
OTTAWA IDF CURVE		Qpeak =	61.2	L/s
Area = 0.38 ha		Qavg =	30.6	L/s
C = 0.55		Vol(max) =	8.9	m3
		(Vol calculated for Qallow-avg)		
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	60.18	29.58	8.87
10	76.81	44.63	14.03	8.42
15	61.77	35.89	5.29	4.76
20	52.03	30.23	-0.37	-0.44
25	45.17	26.24	-4.36	-6.54
30	40.04	23.27	-7.33	-13.20
35	36.06	20.95	-9.65	-20.26
40	32.86	19.09	-11.51	-27.61
45	30.24	17.57	-13.03	-35.18
50	28.04	16.29	-14.31	-42.92
55	26.17	15.21	-15.39	-50.80
60	24.56	14.27	-16.33	-58.79
65	23.15	13.45	-17.15	-66.88
70	21.91	12.73	-17.87	-75.05
75	20.81	12.09	-18.51	-83.28
80	19.83	11.52	-19.08	-91.58
85	18.94	11.01	-19.59	-99.92
90	18.14	10.54	-20.06	-108.32
95	17.41	10.12	-20.48	-116.75
100	16.75	9.73	-20.87	-125.22

Proposed Industrial Development			Storage Calculations Using Average	
Novatech Project No. 122151			Release Rate Equal to 50% of the Qpeak	
REQUIRED STORAGE - 1:5 YEAR EVENT				
AREA A-1 Rain Gardens Infiltration Trench Overflow				
OTTAWA IDF CURVE		Qpeak =	62.8	L/s
Area = 0.38 ha		Qavg =	31.4	L/s
C = 0.55		Vol(max) =	17.5	m3
		(Vol calculated for Qallow-avg)		
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	82.03	50.63	15.19
10	104.19	60.54	29.14	17.48
15	83.56	48.55	17.15	15.43
20	70.25	40.82	9.42	11.30
25	60.90	35.38	3.98	5.97
30	53.93	31.33	-0.07	-0.12
35	48.52	28.19	-3.21	-6.74
40	44.18	25.67	-5.73	-13.75
45	40.63	23.61	-7.79	-21.04
50	37.65	21.88	-9.52	-28.57
55	35.12	20.41	-10.99	-36.28
60	32.94	19.14	-12.26	-44.13
65	31.04	18.04	-13.36	-52.12
70	29.37	17.07	-14.33	-60.20
75	27.89	16.20	-15.20	-68.38
80	26.56	15.43	-15.97	-76.64
85	25.37	14.74	-16.66	-84.97
90	24.29	14.11	-17.29	-93.36
95	23.31	13.54	-17.86	-101.80
100	22.41	13.02	-18.38	-110.29

Proposed Industrial Development			Storage Calculations Using Average	
Novatech Project No. 122151			Release Rate Equal to 50% of the Qpeak	
REQUIRED STORAGE - 1:100 YEAR EVENT				
AREA A-1 Rain Gardens Infiltration Trench Overflow				
OTTAWA IDF CURVE		Qpeak =	65.6	L/s
Area = 0.38 ha		Qavg =	32.8	L/s
C = 0.63		Vol(max) =	55.7	m3
		(Vol calculated for Qallow-avg)		
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	160.25	127.45	38.23
10	178.56	117.89	85.09	51.06
15	142.89	94.35	61.55	55.39
20	119.95	79.20	46.40	55.68
25	103.85	68.57	35.77	53.65
30	91.87	60.66	27.86	50.14
35	82.58	54.52	21.72	45.62
40	75.15	49.61	16.81	40.36
45	69.05	45.59	12.79	34.53
50	63.95	42.23	9.43	28.28
55	59.62	39.37	6.57	21.67
60	55.89	36.90	4.10	14.78
65	52.65	34.76	1.96	7.64
70	49.79	32.87	0.07	0.31
75	47.26	31.20	-1.60	-7.20
80	44.99	29.71	-3.09	-14.85
85	42.95	28.36	-4.44	-22.64
90	41.11	27.14	-5.66	-30.55
95	39.43	26.04	-6.76	-38.55
100	37.90	25.03	-7.77	-46.65

Proposed Industrial Development			Storage Calculations Using Average	
Novatech Project No. 122151			Release Rate Equal to 50% of the Qpeak	
REQUIRED STORAGE - 1:100 YR + 20% IDF Increase				
AREA A-1 Rain Gardens Infiltration Trench Overflow				
OTTAWA IDF CURVE		Qpeak =	70.0	L/s
Area = 0.38 ha		Qavg =	35.0	L/s
C = 0.63		Vol(max) =	72.0	m3
		(Vol calculated for Qallow-avg)		
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	192.29	157.29	47.19
10	214.27	141.47	106.47	63.88
15	171.47	113.22	78.22	70.39
20	143.94	95.04	60.04	72.04
25	124.62	82.28	47.28	70.92
30	110.24	72.79	37.79	68.02
35	99.09	65.43	30.43	63.90
40	90.17	59.54	24.54	58.89
45	82.86	54.71	19.71	53.21
50	76.74	50.67	15.67	47.01
55	71.55	47.24	12.24	40.39
60	67.07	44.29	9.29	33.43
65	63.18	41.71	6.71	26.18
70	59.75	39.45	4.45	18.68
75	56.71	37.44	2.44	10.98
80	53.99	35.65	0.65	3.10
85	51.54	34.03	-0.97	-4.93
90	49.33	32.57	-2.43	-13.11
95	47.32	31.24	-3.76	-21.41
100	45.48	30.03	-4.97	-29.82

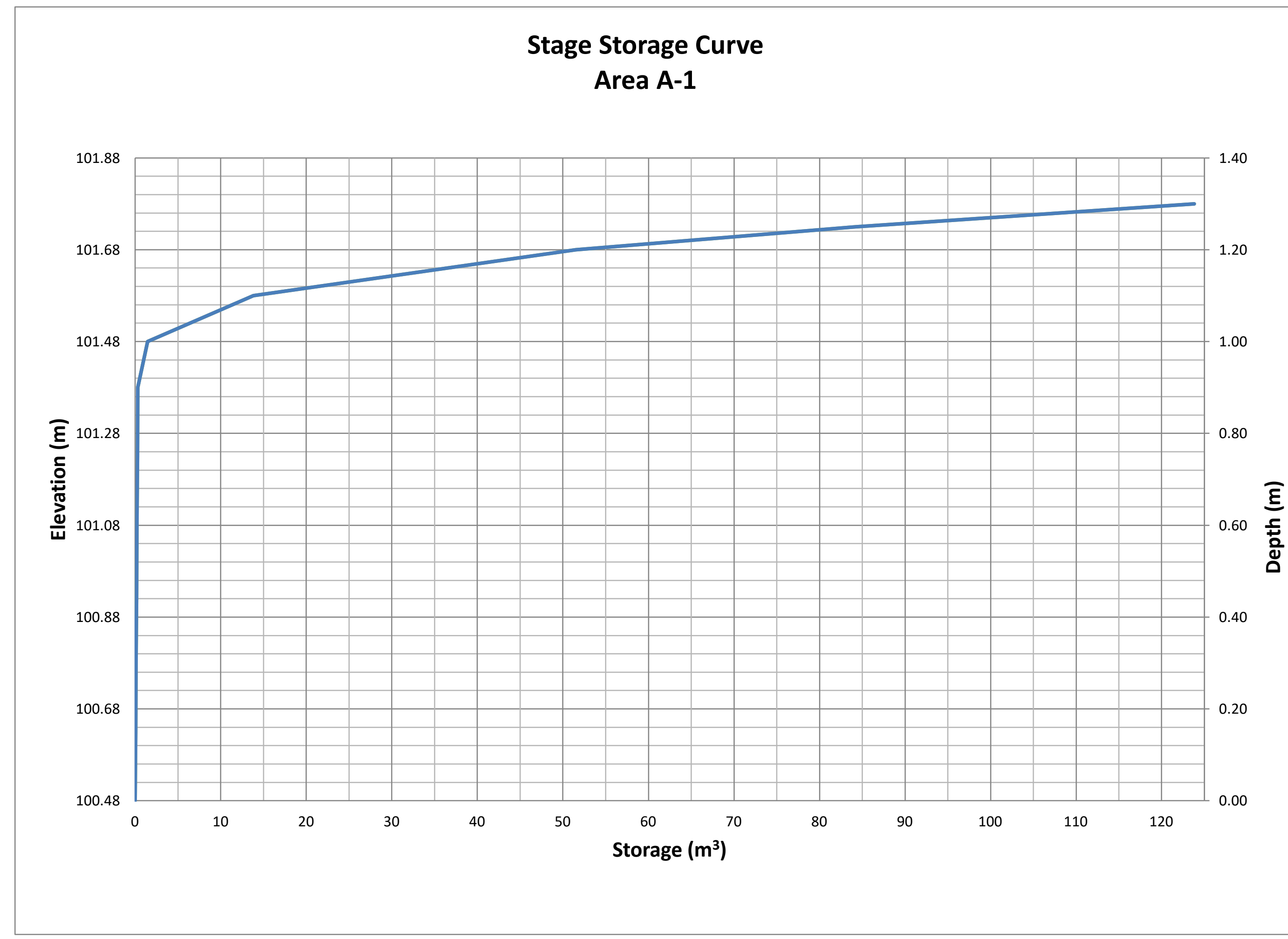
171mm Circular Plug Type ICD	
1:100 Yr	
Flow (L/s) =	65.6
Head (m) =	1.08
Elevation (m) =	**101.69**
Outlet Pipe Dia.(mm) =	254
Volume (m3) =	55.7
1:5 Yr	
Flow (L/s) =	62.8
Head (m) =	0.99
Elevation (m) =	**101.60**
Outlet Pipe Dia.(mm) =	254
Volume (m3) =	17.5
1:2 Yr	
Flow (L/s) =	61.2
Head (m) =	0.94
Elevation (m) =	**101.55**
Outlet Pipe Dia.(mm) =	254
Volume (m3) =	8.9

Orifice Size - 1:100 yr Flow Check		
Q=0.62xAx(2gh)^0.5		
	1:100 yr	Flow Check
Q (m^3/s) =	0.0656	**0.0656**
g (m/s^2) =	9.81	9.81
h (m) =	**1.08**	1.08
A (m^2) =	**0.022953474**	**0.02297**
D (m) =	**0.170954001**	**0.17100**
D (mm) =	**171**	171.0

1:5 yr Flow Check	
	1:5 yr
Q (m^3/s) =	0.0628
g (m/s^2) =	9.81
h (m) =	**0.99**
A (m^2) =	**0.02297**
D (m) =	**0.171**
D (mm) =	**171**

1:2 yr Flow Check	
	1:2 yr
Q (m^3/s) =	0.0612
g (m/s^2) =	9.81
h (m) =	**0.94**
A (m^2) =	**0.02297**
D (m) =	**0.171**
D (mm) =	**171**

Area A-1: Storage Table			Underground Storage	Surface Storage				Total Storage	
	System	Structure Storage	Combined	Above Infiltration Trench		In Drive Aisle		Ponding	**Total**
Elevation (m)	Depth (m)	CB 01 (m^3)	Volume (m^3)	Area (m^2)	Volume (m^3)	Area (m^2)	Volume (m^3)	Volume (m^3)	**Volume (m^3)**
100.48	1.00	-	-	-	-	-	-	-	**0**
100.63	0.15	0.1	0.1	-	-	-	-	-	**0.1**
100.78	0.30	0.1	0.1	-	-	-	-	-	**0.1**
100.93	0.45	0.2	0.2	-	-	-	-	-	**0.2**
101.08	0.60	0.2	0.2	-	-	-	-	-	**0.2**
101.23	0.75	0.3	0.3	-	-	-	-	-	**0.3**
101.38	0.90	0.3	0.3	0.0	0.0	-	-	0.0	**0.3**
101.48	1.00	0.4	0.4	22.2	1.1	-	-	1.1	**1.5**
101.58	1.10	0.4	0.4	224.4	13.4	-	-	13.4	**13.8**
101.68	1.20	0.4	0.4	528.3	51.1	-	-	51.1	**51.5**
101.73	1.25		0.4	780.5	83.8	-	-	83.8	**84.2**
101.78	1.30		0.4	802.4	123.4	-	-	123.4	**123.8**



Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA A-2 Un-Controlled East Parking Lot

OTTAWA IDF CURVE
Area = 0.760 ha Qallow = 127.8 L/s
C = 0.79 Vol(max) = 0.0 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	172.35	44.54	13.36
10	76.81	127.81	0.00	0.00
15	61.77	102.79	-25.02	-22.52
20	52.03	86.59	-41.23	-49.47
25	45.17	75.16	-52.65	-78.97
30	40.04	66.64	-61.18	-110.12
35	36.06	60.01	-67.81	-142.39
40	32.86	54.69	-73.12	-175.49
45	30.24	50.32	-77.49	-209.22
50	28.04	46.66	-81.15	-243.45
55	26.17	43.55	-84.26	-278.06
60	24.56	40.87	-86.95	-313.00
75	20.81	34.64	-93.18	-419.29
90	18.14	30.19	-97.62	-527.15
120	14.56	24.23	-103.58	-745.77
150	12.25	20.39	-107.42	-966.81
180	10.63	17.68	-110.13	-1189.38
210	9.42	15.67	-112.14	-1413.01

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA A-2 Un-Controlled East Parking Lot

OTTAWA IDF CURVE
Area = 0.760 ha Qallow = 173.4 L/s
C = 0.79 Vol(max) = 0.0 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	234.94	61.55	18.46
10	104.19	173.39	0.00	0.00
15	83.56	139.05	-34.34	-30.91
20	70.25	116.91	-56.48	-67.78
25	60.90	101.34	-72.05	-108.08
30	53.93	89.74	-83.65	-150.56
35	48.52	80.74	-92.65	-194.57
40	44.18	73.53	-99.86	-239.67
45	40.63	67.61	-105.78	-285.60
50	37.65	62.66	-110.73	-332.19
55	35.12	58.45	-114.94	-379.30
60	32.94	54.82	-118.57	-426.84
75	27.89	46.41	-126.98	-571.41
90	24.29	40.42	-132.97	-718.04
120	19.47	32.40	-140.99	-1015.15
150	16.36	27.23	-146.16	-1315.44
180	14.18	23.60	-149.79	-1617.75
210	12.56	20.89	-152.49	-1921.44

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA A-2 Un-Controlled East Parking Lot

OTTAWA IDF CURVE
Area = 0.760 ha Qallow = 331.8 L/s
C = 0.88 Vol(max) = 0.0 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	451.05	119.21	35.76
10	178.56	331.84	0.00	0.00
15	142.89	265.56	-66.28	-59.65
20	119.95	222.92	-108.92	-130.70
25	103.85	192.99	-138.85	-208.27
30	91.87	170.73	-161.11	-290.00
35	82.58	153.47	-178.37	-374.58
40	75.15	139.65	-192.19	-461.25
45	69.05	128.33	-203.51	-549.49
50	63.95	118.85	-212.99	-638.96
55	59.62	110.81	-221.03	-729.41
60	55.89	103.88	-227.96	-820.67
75	47.26	87.82	-244.02	-1098.08
90	41.11	76.40	-255.44	-1379.36
120	32.89	61.13	-270.71	-1949.09
150	27.61	51.31	-280.53	-2524.74
180	23.90	44.42	-287.42	-3104.12
210	21.14	39.30	-292.54	-3686.05

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:100 YEAR + 20%
AREA A-2 Un-Controlled East Parking Lot

OTTAWA IDF CURVE
Area = 0.760 ha Qallow = 398.2 L/s
C = 0.88 Vol(max) = 0.0 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	541.26	143.05	42.92
10	214.27	398.21	0.00	0.00
15	171.47	318.67	-79.54	-71.58
20	143.94	267.50	-130.70	-156.84
25	124.62	231.59	-166.62	-249.92
30	110.24	204.88	-193.33	-348.00
35	99.09	184.16	-214.05	-449.50
40	90.17	167.58	-230.62	-553.50
45	82.86	153.99	-244.22	-659.39
50	76.74	142.63	-255.58	-766.75
55	71.55	132.97	-265.24	-875.29
60	67.07	124.65	-273.56	-984.80
75	56.71	105.39	-292.82	-1317.70
90	49.33	91.68	-306.53	-1655.24
120	39.47	73.36	-324.85	-2338.91
150	33.13	61.58	-336.63	-3029.69
180	28.68	53.31	-344.90	-3724.94
210	25.37	47.15	-351.05	-4423.26

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA A-2 Un-Controlled East Parking Lot

OTTAWA IDF CURVE
Area = 0.550 ha Qallow = 90.7 L/s
C = 0.77 Vol(max) = 0.0 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	122.37	31.62	9.49
10	76.81	90.75	0.00	0.00
15	61.77	72.98	-17.77	-15.99
20	52.03	61.47	-29.27	-35.12
25	45.17	53.36	-37.38	-56.07
30	40.04	47.31	-43.43	-78.18
35	36.06	42.60	-48.14	-101.10
40	32.86	38.83	-51.92	-124.60
45	30.24	35.73	-55.02	-148.55
50	28.04	33.13	-57.61	-172.84
55	26.17	30.92	-59.82	-197.42
60	24.56	29.01	-61.73	-222.23
75	20.81	24.59	-66.15	-297.69
90	18.14	21.44	-69.31	-374.27
120	14.56	17.20	-73.54	-529.49
150	12.25	14.48	-76.27	-686.43
180	10.63	12.56	-78.19	-844.45
210	9.42	11.12	-79.62	-1003.22

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA A-2 Un-Controlled East Parking Lot

OTTAWA IDF CURVE
Area = 0.550 ha Qallow = 123.1 L/s
C = 0.77 Vol(max) = 0.0 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	166.80	43.70	13.11
10	104.19	123.10	0.00	0.00
15	83.56	98.72	-24.38	-21.94
20	70.25	83.00	-40.10	-48.12
25	60.90	71.95	-51.16	-76.73
30	53.93	63.72	-59.39	-106.90
35	48.52	57.32	-65.78	-138.14
40	44.18	52.20	-70.90	-170.16
45	40.63	48.00	-75.10	-202.77
50	37.65	44.49	-78.62	-235.85
55	35.12	41.50	-81.61	-269.30
60	32.94	38.92	-84.18	-303.05
75	27.89	32.95	-90.15	-405.69
90	24.29	28.70	-94.41	-509.80
120	19.47	23.00	-100.10	-720.74
150	16.36	19.33	-103.77	-933.95
180	14.18	16.75	-106.35	-1148.58
210	12.56	14.83	-108.27	-1364.20

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA A-2 Un-Controlled East Parking Lot

OTTAWA IDF CURVE
Area = 0.550 ha Qallow = 235.8 L/s
C = 0.86 Vol(max) = 0.0 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	320.49	84.70	25.41
10	178.56	235.79	0.00	0.00
15	142.89	188.69	-47.10	-42.39
20	119.95	158.39	-77.39	-92.87
25	103.85	137.13	-98.66	-147.99
30	91.87	121.31	-114.48	-206.06
35	82.58	109.04	-126.74	-266.16
40	75.15	99.23	-136.56	-327.74
45	69.05	91.18	-144.61	-390.44
50	63.95	84.45	-151.34	-454.01
55	59.62	78.73	-157.05	-518.28
60	55.89	73.81	-161.98	-583.12
75	47.26	62.40	-173.39	-780.24
90	41.11	54.29	-181.50	-980.10
120	32.89	43.44	-192.35	-1384.92
150	27.61	36.46	-199.33	-1793.95
180	23.90	31.56	-204.22	-2205.62
210	21.14	27.92	-207.87	-2619.11

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:100 YEAR + 20%
AREA A-2 Un-Controlled East Parking Lot

OTTAWA IDF CURVE
Area = 0.550 ha Qallow = 282.9 L/s
C = 0.86 Vol(max) = 0.0 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	384.59	101.64	30.49
10	214.27	282.94	0.00	0.00
15	171.47	226.43	-56.51	-50.86
20	143.94	190.07	-92.87	-111.45
25	124.62	164.56	-118.39	-177.58
30	110.24	145.57	-137.37	-247.27
35	99.09	130.85	-152.09	-319.39
40	90.17	119.08	-163.87	-393.29
45	82.86	109.42	-173.53	-468.52
50	76.74	101.34	-181.60	-544.81
55	71.55	94.48	-188.46	-621.93
60	67.07	88.57	-194.37	-699.75
75	56.71	74.88	-208.06	-936.29
90	49.33	65.14	-217.80	-1176.12
120	39.47	52.13	-230.82	-1661.90
150	33.13	43.75	-239.19	-2152.73
180	28.68	37.88	-245.07	-2646.74
210	25.37	33.51	-249.44	-3142.93

Proposed Industrial Development Storage Calculations Using Average
Novatech Project No. 122151 Release Rate Equal to 50% of the Qpeak
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA A-1 Controlled Site Flows + Underground Storage

OTTAWA IDF CURVE
Area = 1.97 ha
C = 0.83
Qpeak = 116.7 L/s
Qavg = 58.4 L/s
Vol(max) = 222.5 m3
(Vol calculated for Qallow-avg)

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	470.59	412.24	123.67
10	76.81	348.97	290.62	174.37
15	61.77	280.65	222.30	200.07
20	52.03	236.41	178.06	213.67
25	45.17	205.22	146.87	220.31
30	40.04	181.94	123.59	222.47
35	36.06	163.84	105.49	221.53
40	32.86	149.32	90.97	218.33
45	30.24	137.40	79.05	213.43
50	28.04	127.41	69.06	207.18
55	26.17	118.91	60.56	199.85
60	24.56	111.58	53.23	191.63
65	23.15	105.19	46.84	182.68
70	21.91	99.56	41.21	173.10
75	20.81	94.57	36.22	162.98
90	18.14	82.43	24.08	130.06
105	16.13	73.31	14.96	94.22
120	14.56	66.16	7.81	56.26
135	13.30	60.41	2.06	16.69
150	12.25	55.67	-2.68	-24.15

Proposed Industrial Development Storage Calculations Using Average
Novatech Project No. 122151 Release Rate Equal to 50% of the Qpeak
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA A-1 Controlled Site Flows + Underground Storage

OTTAWA IDF CURVE
Area = 1.97 ha
C = 0.83
Qpeak = 146.4 L/s
Qavg = 73.2 L/s
Vol(max) = 309.3 m3
(Vol calculated for Qallow-avg)

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	641.46	568.26	170.48
10	104.19	473.41	400.21	240.13
15	83.56	379.65	306.45	275.81
20	70.25	319.20	246.00	295.19
25	60.90	276.69	203.49	305.23
30	53.93	245.03	171.83	309.29
35	48.52	220.45	147.25	309.22
40	44.18	200.76	127.56	306.14
45	40.63	184.60	111.40	300.78
50	37.65	171.08	97.88	293.65
55	35.12	159.59	86.39	285.08
60	32.94	149.68	76.48	275.34
65	31.04	141.05	67.85	264.62
70	29.37	133.46	60.26	253.07
75	27.89	126.71	53.51	240.82
90	24.29	110.36	37.16	200.65
105	21.58	98.06	24.86	156.63
120	19.47	88.45	15.25	109.82
135	17.76	80.72	7.52	60.89
150	16.36	74.34	1.14	10.29

Proposed Industrial Development Storage Calculations Using Average
Novatech Project No. 122151 Release Rate Equal to 50% of the Qpeak
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA A-1 Controlled Site Flows + Underground Storage

OTTAWA IDF CURVE
Area = 1.97 ha
C = 0.92
Qpeak = 182.2 L/s
Qavg = 91.1 L/s
Vol(max) = 698.2 m3
(Vol calculated for Qallow-avg)

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	1229.00	1137.90	341.37
10	178.56	904.18	813.08	487.85
15	142.89	723.58	632.48	569.23
20	119.95	607.40	516.30	619.56
25	103.85	525.86	434.76	652.14
30	91.87	465.20	374.10	673.38
35	82.58	418.16	327.06	686.82
40	75.15	380.52	289.42	694.60
45	69.05	349.66	258.56	698.10
50	63.95	323.85	232.75	698.25
55	59.62	301.92	210.82	695.71
60	55.89	283.04	191.94	690.98
65	52.65	266.59	175.49	684.41
70	49.79	252.12	161.02	676.30
75	47.26	239.29	148.19	666.86
90	41.11	208.18	117.08	632.21
105	36.50	184.81	93.71	590.40
120	32.89	166.57	75.47	543.40
135	30.00	151.90	60.80	492.46
150	27.61	139.81	48.71	438.43

Proposed Industrial Development Storage Calculations Using Average
Novatech Project No. 122151 Release Rate Equal to 50% of the Qpeak
REQUIRED STORAGE - 1:100 YR + 20% IDF Increase
AREA A-1 Controlled Site Flows + Underground Storage

OTTAWA IDF CURVE
Area = 1.97 ha
C = 0.92
Qpeak = 240.0 L/s
Qavg = 120.0 L/s
Vol(max) = 808.8 m3
(Vol calculated for Qallow-avg)

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	1474.80	1354.78	406.43
10	214.27	1085.02	965.00	579.00
15	171.47	868.30	748.28	673.45
20	143.94	728.88	608.86	730.63
25	124.62	631.03	511.01	766.51
30	110.24	558.24	438.22	788.79
35	99.09	501.79	381.77	801.72
40	90.17	456.62	336.60	807.85
45	82.86	419.59	299.57	808.83
50	76.74	388.62	268.60	805.80
55	71.55	362.31	242.29	799.54
60	67.07	339.65	219.63	790.65
65	63.18	319.91	199.89	779.56
70	59.75	302.55	182.53	766.62
75	56.71	287.15	167.13	752.08
90	49.33	249.81	129.79	700.87
105	43.80	221.78	101.76	641.07
120	39.47	199.89	79.87	575.04
135	36.00	182.28	62.26	504.28
150	33.13	167.78	47.76	429.81

Structures	Size (mm)	Area (m^2)	T/G	Inv IN	Inv OUT
STM MH 04	2438	4.67	101.25	97.83	97.64
CBMH 05	1220	1.17	101.08	99.00	98.90
STM MH 05	2438	4.67	101.42	97.95	97.94
STM MH 06	2438	4.67	101.45	98.11	98.10
STM MH 07	2438	4.67	101.48	99.08	98.31
CBMH 06	1220	1.17	101.25	99.34	99.26
CBMH 07	1220	1.17	101.60	-	100.08

	PI = 3.141592654		
pipe I.D.=	1220	(conc pipe)	
U/G Storage Pipe Volume			
End Area	1.169	(m^2)	
Total Length	228.2	(m)	
Pipe Volume	266.8	(m^3)	

	PI = 3.141592654		
pipe I.D.=	457	(pvc pipe)	
U/G Storage Pipe Volume			
End Area	0.164	(m^2)	
Total Length	36.3	(m)	
Pipe Volume	6.0	(m^3)	

Area A-4: Storage Table

Elevation (m)	System Depth (m)	STM MH 04 Volume (m^3)	CBMH 05 Volume (m^3)	STM MH 05 Volume (m^3)	STM MH 06 Volume (m^3)	STM MH 07 Volume (m^3)	CBMH 06 Volume (m^3)	CBMH 07 Volume (m^3)	Underground Storage: Combined Volume (m^3)	Surface Storage: CBMH 05 Area (m^2)	Surface Storage: CBMH 05 Volume (m^3)	Surface Storage: Building 'A' Loading Dock Area (m^2)	Surface Storage: Building 'A' Loading Dock Volume (m^3)	Total Storage: Ponding Volume (m^3)	Total Storage: **Total Volume (m^3)**	Design Head
97.64	0.00	-	-	-	-	-	-	-	-	-	-	-	-	-	**0**	-
97.83	0.19	0.89	-	-	-	-	-	-	0.89	-	-	-	-	-	**0.9**	0.00
98.44	0.80	3.73	-	2.33	1.59	0.61	-	-	104.03	-	-	-	-	-	**104.0**	0.61
99.05	1.41	6.58	0.18	5.18	4.43	3.45	-	-	211.36	-	-	-	-	-	**211.4**	1.22
99.35	1.71	7.98	0.53	6.58	5.84	4.86	0.11	-	265.81	-	-	-	-	-	**265.8**	1.52
99.53	1.89	8.82	0.74	7.42	6.68	5.70	0.32	-	298.89	-	-	-	-	-	**298.9**	1.70
99.72	2.08	9.71	0.96	8.31	7.56	6.58	0.54	-	306.38	-	-	-	-	-	**306.4**	1.89
100.68	3.04	14.19	2.08	12.79	12.04	11.06	1.66	0.70	327.25	-	-	0.0	0.0	0.0	**327.2**	2.85
100.78	3.14	14.66	2.20	13.26	12.51	11.53	1.78	0.82	329.47	-	-	953.36	47.67	47.7	**377.1**	2.95
100.83	3.19	14.89	2.26	13.49	12.74	11.76	1.84	0.88	330.58	-	-	1535.28	109.88	109.9	**440.5**	3.00
100.98	3.34	15.59	2.43	14.19	13.44	12.46	2.01	1.05	333.90	-	-	3070.56	455.32	455.3	**789.2**	3.15
101.08	3.44	16.06	2.55	14.66	13.91	12.93	2.13	1.17	336.12	0.00	0.00	-	-	455.3	**791.4**	3.25
101.13	3.49			14.89	14.14	13.16		1.23	336.88	14.76	0.37	-	-	455.7	**792.6**	3.30
101.18	3.54					13.40		1.29	337.17	59.03	2.21	-	-	457.5	**794.7**	3.35
101.23	3.59							1.34	337.23	132.81	7.01	-	-	462.3	**799.6**	3.40
101.28	3.64							1.40	337.29	232.59	16.14	-	-	471.5	**808.8**	3.45

Maximum Ponding Depths	**(cm)**
1:100 Yr	**25**
1:5 Yr	**-85**
1:2 Yr	**-158**

219mm Circular Plug Type ICD

1:100 Yr
Flow (L/s) = 182.2
Head (m) = 3.10
Elevation (m) = **100.93**
Outlet Pipe Dia.(mm) = 375
Volume (m3) = 698.2

1:5 Yr
Flow (L/s) = 146.4
Head (m) = 2.00
Elevation (m) = **99.83**
Outlet Pipe Dia.(mm) = 375
Volume (m3) = 309.3

1:2 Yr
Flow (L/s) = 116.7
Head (m) = 1.27
Elevation (m) = **99.10**
Outlet Pipe Dia.(mm) = 375
Volume (m3) = 222.5

Orifice Size - 1:100 yr Flow Check

Q=0.62xAx(2gh)^0.5

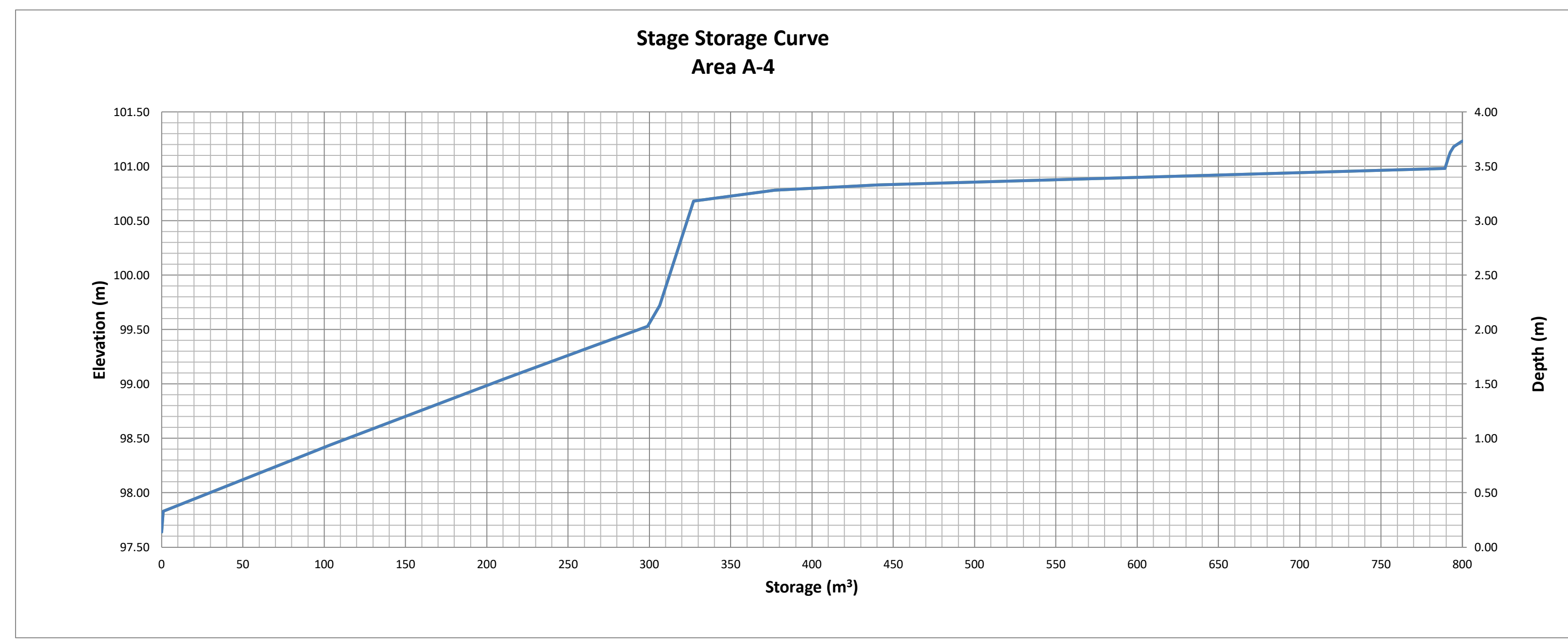
	1:100 yr	Flow Check
Q (m^3/s) =	0.1822	**0.1822**
g (m/s^2) =	9.81	9.81
h (m) =	**3.10**	3.10
A (m^2) =	**0.037666155**	**0.03767**
D (m) =	**0.218993237**	**0.21900**
D (mm) =	**219**	219.0

1:5 yr Flow Check

	1:5 yr
Q (m^3/s) =	0.1464
g (m/s^2) =	9.81
h (m) =	**2.00**
A (m^2) =	**0.03767**
D (m) =	**0.219**
D (mm) =	**219**

1:2 yr Flow Check

	1:2 yr
Q (m^3/s) =	0.1167
g (m/s^2) =	9.81
h (m) =	**1.27**
A (m^2) =	**0.03767**
D (m) =	**0.219**
D (mm) =	**219**



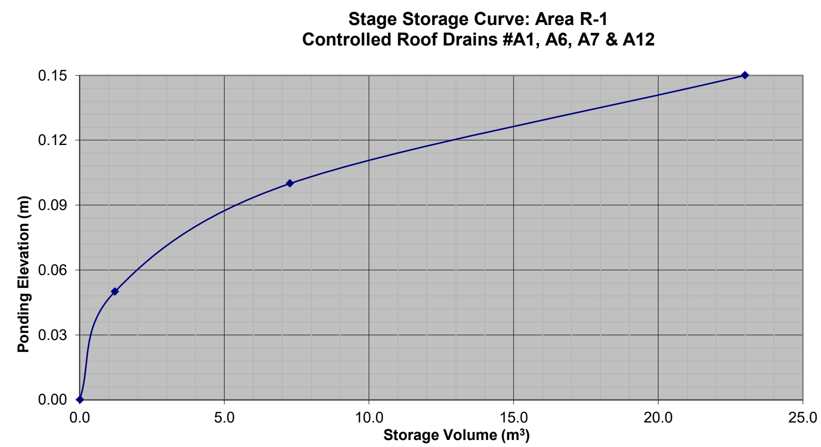
Proposed Industrial Development				
Novatech Project No. 122151				
REQUIRED STORAGE - 1:2 YEAR EVENT				
AREA R-1: Building A Roof Drains A1, A6, A7 & A12				
OTTAWA IDF CURVE				
Area = 0.044 ha			Qallow = 0.79 L/s	
C = 0.90			Vol(max) = 6.9 m3	
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	11.40	10.61	3.18
10	76.81	8.46	7.67	4.60
15	61.77	6.80	6.01	5.41
20	52.03	5.73	4.94	5.93
25	45.17	4.97	4.18	6.27
30	40.04	4.41	3.62	6.51
35	36.06	3.97	3.18	6.68
40	32.86	3.62	2.83	6.79
45	30.24	3.33	2.54	6.86
50	28.04	3.09	2.30	6.89
55	26.17	2.88	2.09	6.90
60	24.56	2.70	1.91	6.89
75	20.81	2.29	1.50	6.76
90	18.14	2.00	1.21	6.52
120	14.56	1.60	0.81	5.85
150	12.25	1.35	0.56	5.03
180	10.63	1.17	0.38	4.10
210	9.42	1.04	0.25	3.11

Proposed Industrial Development				
Novatech Project No. 122151				
REQUIRED STORAGE - 1:5 YEAR EVENT				
AREA R-1: Building A Roof Drains A1, A6, A7 & A12				
OTTAWA IDF CURVE				
Area = 0.044 ha			Qallow = 0.87 L/s	
C = 0.90			Vol(max) = 10.3 m3	
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	15.54	14.75	4.43
10	104.19	11.47	10.68	6.41
15	83.56	9.20	8.41	7.57
20	70.25	7.73	6.94	8.33
25	60.90	6.70	5.91	8.87
30	53.93	5.94	5.15	9.26
35	48.52	5.34	4.55	9.56
40	44.18	4.86	4.07	9.78
45	40.63	4.47	3.68	9.94
50	37.65	4.15	3.36	10.07
55	35.12	3.87	3.08	10.15
60	32.94	3.63	2.84	10.21
75	27.89	3.07	2.28	10.26
90	24.29	2.67	1.88	10.17
120	19.47	2.14	1.35	9.74
150	16.36	1.80	1.01	9.10
180	14.18	1.56	0.77	8.33
210	12.56	1.38	0.59	7.46

Watts Accutrol Flow Control Roof Drains:		RD-100-A-ADJ set to 1/4 Exposed			
Design Event	**Flow/Drain (L/s)**	**Total Flow (L/s)**	**Ponding (cm)**	**Storage (m³) Required**	**Provided**
1:2 Year	0.79	0.79	10	6.9	23.0
1:5 Year	0.87	0.87	11	10.3	23.0
1:100 Year	0.95	0.95	15	22.1	23.0

Roof Drain Storage Table for Area RDs

Elevation	Area Roof Drains	Total Volume
m	m²	m³
0.00	0	0
0.05	48.41	1.2
0.10	193.62	7.3
0.15	435.64	23.0



Proposed Industrial Development				
Novatech Project No. 122151				
REQUIRED STORAGE - 1:100 YEAR EVENT				
AREA R-1: Building A Roof Drains A1, A6, A7 & A12				
OTTAWA IDF CURVE				
Area = 0.044 ha			Qallow = 0.95 L/s	
C = 1.00			Vol(max) = 22.1 m3	
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	29.69	28.74	8.62
10	178.56	21.84	20.89	12.53
15	142.89	17.48	16.53	14.88
20	119.95	14.67	13.72	16.47
25	103.85	12.70	11.75	17.63
30	91.87	11.24	10.29	18.52
35	82.58	10.10	9.15	19.22
40	75.15	9.19	8.24	19.78
45	69.05	8.45	7.50	20.24
50	63.95	7.82	6.87	20.62
55	59.62	7.29	6.34	20.93
60	55.89	6.84	5.89	21.19
75	47.26	5.78	4.83	21.74
90	41.11	5.03	4.08	22.02
120	32.89	4.02	3.07	22.13
150	27.61	3.38	2.43	21.85
180	23.90	2.92	1.97	21.32
210	21.14	2.59	1.64	20.62

Proposed Industrial Development				
Novatech Project No. 122151				
REQUIRED STORAGE - 1:100 YEAR + 20%				
AREA R-1: Building A Roof Drains A1, A6, A7 & A12				
OTTAWA IDF CURVE				
Area = 0.044 ha			Qallow = 0.95 L/s	
C = 1.00			Vol(max) = 27.9 m3	
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	35.63	34.68	10.40
10	214.27	26.21	25.26	15.16
15	171.47	20.97	20.02	18.02
20	143.94	17.61	16.66	19.99
25	124.62	15.24	14.29	21.44
30	110.24	13.48	12.53	22.56
35	99.09	12.12	11.17	23.46
40	90.17	11.03	10.08	24.19
45	82.86	10.14	9.19	24.80
50	76.74	9.39	8.44	25.31
55	71.55	8.75	7.80	25.75
60	67.07	8.20	7.25	26.12
75	56.71	6.94	5.99	26.94
90	49.33	6.03	5.08	27.46
120	39.47	4.83	3.88	27.92
150	33.13	4.05	3.10	27.93
180	28.68	3.51	2.56	27.63
210	25.37	3.10	2.15	27.14

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA R-1: Building A Roof Drains A2-A5 & A8-A11

OTTAWA IDF CURVE

Area = 0.043 ha; Qallow = 0.79 L/s
C = 0.90; Vol(max) = 6.7 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	11.14	10.35	3.11
10	76.81	8.26	7.47	4.48
15	61.77	6.65	5.86	5.27
20	52.03	5.60	4.81	5.77
25	45.17	4.86	4.07	6.10
30	40.04	4.31	3.52	6.33
35	36.06	3.88	3.09	6.49
40	32.86	3.54	2.75	6.59
45	30.24	3.25	2.46	6.65
50	28.04	3.02	2.23	6.68
55	26.17	2.82	2.03	6.68
60	24.56	2.64	1.85	6.67
75	20.81	2.24	1.45	6.52
90	18.14	1.95	1.16	6.27
120	14.56	1.57	0.78	5.59
150	12.25	1.32	0.53	4.75
180	10.63	1.14	0.35	3.82
210	9.42	1.01	0.22	2.81

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-1: Building A Roof Drains A2-A5 & A8-A11

OTTAWA IDF CURVE

Area = 0.043 ha; Qallow = 0.87 L/s
C = 0.90; Vol(max) = 9.9 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	15.19	14.40	4.32
10	104.19	11.21	10.42	6.25
15	83.56	8.99	8.20	7.38
20	70.25	7.56	6.77	8.12
25	60.90	6.55	5.76	8.64
30	53.93	5.80	5.01	9.02
35	48.52	5.22	4.43	9.30
40	44.18	4.75	3.96	9.51
45	40.63	4.37	3.58	9.67
50	37.65	4.05	3.26	9.78
55	35.12	3.78	2.99	9.86
60	32.94	3.54	2.75	9.92
75	27.89	3.00	2.21	9.95
90	24.29	2.61	1.82	9.84
120	19.47	2.09	1.30	9.39
150	16.36	1.76	0.97	8.73
180	14.18	1.53	0.74	7.94
210	12.56	1.35	0.56	7.07

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-1: Building A Roof Drains A2-A5 & A8-A11

OTTAWA IDF CURVE

Area = 0.043 ha; Qallow = 0.95 L/s
C = 1.00; Vol(max) = 21.5 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	29.01	28.06	8.42
10	178.56	21.34	20.39	12.24
15	142.89	17.08	16.13	14.52
20	119.95	14.34	13.39	16.07
25	103.85	12.41	11.46	17.20
30	91.87	10.98	10.03	18.06
35	82.58	9.87	8.92	18.74
40	75.15	8.98	8.03	19.28
45	69.05	8.25	7.30	19.72
50	63.95	7.65	6.70	20.09
55	59.62	7.13	6.18	20.39
60	55.89	6.68	5.73	20.63
75	47.26	5.65	4.70	21.15
90	41.11	4.91	3.96	21.41
120	32.89	3.93	2.98	21.47
150	27.61	3.30	2.35	21.16
180	23.90	2.86	1.91	20.60
210	21.14	2.53	1.58	19.88

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:100 YEAR + 20%
AREA R-1: Building A Roof Drains A2-A5 & A8-A11

OTTAWA IDF CURVE

Area = 0.043 ha; Qallow = 0.95 L/s
C = 1.00; Vol(max) = 27.1 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	34.82	33.87	10.16
10	214.27	25.61	24.66	14.80
15	171.47	20.50	19.55	17.59
20	143.94	17.21	16.26	19.51
25	124.62	14.90	13.95	20.92
30	110.24	13.18	12.23	22.01
35	99.09	11.85	10.90	22.88
40	90.17	10.78	9.83	23.59
45	82.86	9.91	8.96	24.18
50	76.74	9.17	8.22	24.67
55	71.55	8.55	7.60	25.09
60	67.07	8.02	7.07	25.44
75	56.71	6.78	5.83	26.23
90	49.33	5.90	4.95	26.72
120	39.47	4.72	3.77	27.13
150	33.13	3.96	3.01	27.10
180	28.68	3.43	2.48	26.77
210	25.37	3.03	2.08	26.25

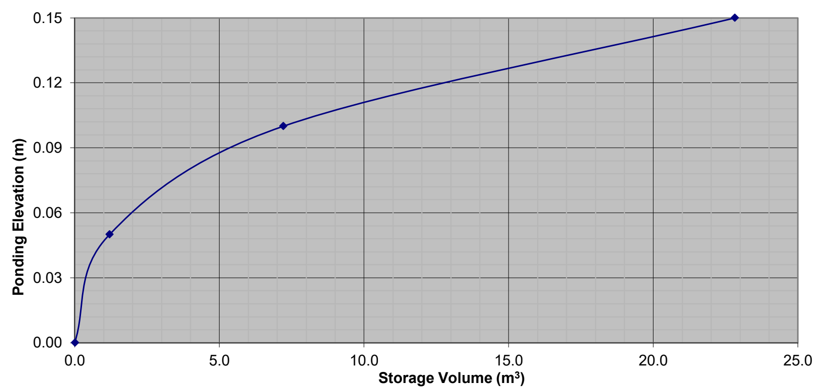
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to 1/4 Exposed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:2 Year	0.79	0.79	10	6.7	22.8
1:5 Year	0.87	0.87	11	9.9	22.8
1:100 Year	0.95	0.95	15	21.5	22.8

Roof Drain Storage Table for Area RDs

Elevation	Area Roof Drains	Total Volume
m	m^2	m^3
0.00	0	0
0.05	48	1.2
0.10	192.2	7.2
0.15	432.3	22.8

Stage Storage Curve: Area R-1
Controlled Roof Drains #A2-A5 & A8-A11



Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA R-1: Building A Roof Drains A13, A18, A19 & A24

OTTAWA IDF CURVE

Area =	0.050	ha	Qallow =	0.79	L/s
C =	0.90		Vol(max) =	8.2	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	12.96	12.17	3.65
10	76.81	9.61	8.82	5.29
15	61.77	7.73	6.94	6.24
20	52.03	6.51	5.72	6.86
25	45.17	5.65	4.86	7.29
30	40.04	5.01	4.22	7.59
35	36.06	4.51	3.72	7.81
40	32.86	4.11	3.32	7.97
45	30.24	3.78	2.99	8.08
50	28.04	3.51	2.72	8.15
55	26.17	3.27	2.48	8.20
60	24.56	3.07	2.28	8.22
75	20.81	2.60	1.81	8.16
90	18.14	2.27	1.48	7.99
120	14.56	1.82	1.03	7.43
150	12.25	1.53	0.74	6.68
180	10.63	1.33	0.54	5.83
210	9.42	1.18	0.39	4.89

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-1: Building A Roof Drains A13, A18, A19 & A24

OTTAWA IDF CURVE

Area =	0.050	ha	Qallow =	0.87	L/s
C =	0.90		Vol(max) =	12.1	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	17.66	16.87	5.06
10	104.19	13.03	12.24	7.35
15	83.56	10.45	9.66	8.70
20	70.25	8.79	8.00	9.60
25	60.90	7.62	6.83	10.24
30	53.93	6.75	5.96	10.72
35	48.52	6.07	5.28	11.09
40	44.18	5.53	4.74	11.37
45	40.63	5.08	4.29	11.59
50	37.65	4.71	3.92	11.76
55	35.12	4.39	3.60	11.89
60	32.94	4.12	3.33	11.99
75	27.89	3.49	2.70	12.14
90	24.29	3.04	2.25	12.14
120	19.47	2.44	1.65	11.85
150	16.36	2.05	1.26	11.31
180	14.18	1.77	0.98	10.63
210	12.56	1.57	0.78	9.84

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-1: Building A Roof Drains A13, A18, A19 & A24

OTTAWA IDF CURVE

Area =	0.050	ha	Qallow =	0.95	L/s
C =	1.00		Vol(max) =	26.1	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	33.74	32.79	9.84
10	178.56	24.82	23.87	14.32
15	142.89	19.86	18.91	17.02
20	119.95	16.67	15.72	18.87
25	103.85	14.43	13.48	20.23
30	91.87	12.77	11.82	21.28
35	82.58	11.48	10.53	22.11
40	75.15	10.45	9.50	22.79
45	69.05	9.60	8.65	23.35
50	63.95	8.89	7.94	23.82
55	59.62	8.29	7.34	24.21
60	55.89	7.77	6.82	24.55
75	47.26	6.57	5.62	25.28
90	41.11	5.71	4.76	25.73
120	32.89	4.57	3.62	26.08
150	27.61	3.84	2.89	25.99
180	23.90	3.32	2.37	25.62
210	21.14	2.94	1.99	25.06

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:100 YEAR + 20%
AREA R-1: Building A Roof Drains A13, A18, A19 & A24

OTTAWA IDF CURVE

Area =	0.050	ha	Qallow =	0.95	L/s
C =	1.00		Vol(max) =	32.9	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	40.48	39.53	11.86
10	214.27	29.78	28.83	17.30
15	171.47	23.83	22.88	20.60
20	143.94	20.01	19.06	22.87
25	124.62	17.32	16.37	24.56
30	110.24	15.32	14.37	25.87
35	99.09	13.77	12.82	26.93
40	90.17	12.53	11.58	27.80
45	82.86	11.52	10.57	28.53
50	76.74	10.67	9.72	29.15
55	71.55	9.95	9.00	29.68
60	67.07	9.32	8.37	30.14
75	56.71	7.88	6.93	31.19
90	49.33	6.86	5.91	31.90
120	39.47	5.49	4.54	32.67
150	33.13	4.61	3.66	32.90
180	28.68	3.99	3.04	32.80
210	25.37	3.53	2.58	32.47

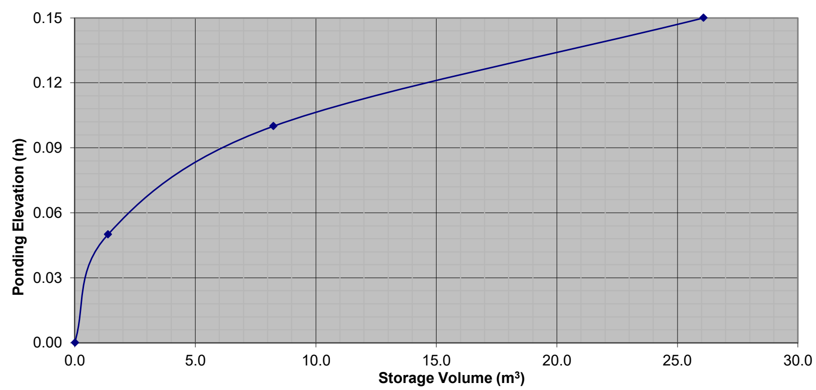
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to 1/4 Exposed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:2 Year	0.79	0.79	10	8.2	26.1
1:5 Year	0.87	0.87	11	12.1	26.1
1:100 Year	0.95	0.95	15	26.1	26.1

Roof Drain Storage Table for Area RDs

Elevation	Area Roof Drains	Total Volume
m	m^2	m^3
0.00	0	0
0.05	54.9	1.4
0.10	219.61	8.2
0.15	494.13	26.1

Stage Storage Curve: Area R-1
Controlled Roof Drains #A13, A18, A19 & A24



Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA R-1: Building A Roof Drains A14-A17 & A20-A23

OTTAWA IDF CURVE
Area = 0.049 ha   Qallow = 0.79 L/s
C = 0.90   Vol(max) = 8.0 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	12.70	11.91	3.57
10	76.81	9.42	8.63	5.18
15	61.77	7.57	6.78	6.10
20	52.03	6.38	5.59	6.71
25	45.17	5.54	4.75	7.12
30	40.04	4.91	4.12	7.41
35	36.06	4.42	3.63	7.62
40	32.86	4.03	3.24	7.77
45	30.24	3.71	2.92	7.88
50	28.04	3.44	2.65	7.94
55	26.17	3.21	2.42	7.98
60	24.56	3.01	2.22	7.99
75	20.81	2.55	1.76	7.93
90	18.14	2.22	1.43	7.75
120	14.56	1.79	1.00	7.17
150	12.25	1.50	0.71	6.41
180	10.63	1.30	0.51	5.54
210	9.42	1.15	0.36	4.59

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-1: Building A Roof Drains A14-A17 & A20-A23

OTTAWA IDF CURVE
Area = 0.049 ha   Qallow = 0.87 L/s
C = 0.90   Vol(max) = 11.8 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	17.31	16.52	4.96
10	104.19	12.77	11.98	7.19
15	83.56	10.24	9.45	8.51
20	70.25	8.61	7.82	9.39
25	60.90	7.47	6.68	10.01
30	53.93	6.61	5.82	10.48
35	48.52	5.95	5.16	10.83
40	44.18	5.42	4.63	11.10
45	40.63	4.98	4.19	11.32
50	37.65	4.62	3.83	11.48
55	35.12	4.31	3.52	11.60
60	32.94	4.04	3.25	11.70
75	27.89	3.42	2.63	11.83
90	24.29	2.98	2.19	11.81
120	19.47	2.39	1.60	11.50
150	16.36	2.01	1.22	10.94
180	14.18	1.74	0.95	10.24
210	12.56	1.54	0.75	9.44

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-1: Building A Roof Drains A14-A17 & A20-A23

OTTAWA IDF CURVE
Area = 0.049 ha   Qallow = 0.95 L/s
C = 1.00   Vol(max) = 25.4 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	33.06	32.11	9.63
10	178.56	24.32	23.37	14.02
15	142.89	19.47	18.52	16.66
20	119.95	16.34	15.39	18.47
25	103.85	14.15	13.20	19.79
30	91.87	12.51	11.56	20.82
35	82.58	11.25	10.30	21.63
40	75.15	10.24	9.29	22.29
45	69.05	9.41	8.46	22.83
50	63.95	8.71	7.76	23.29
55	59.62	8.12	7.17	23.67
60	55.89	7.61	6.66	23.99
75	47.26	6.44	5.49	24.69
90	41.11	5.60	4.65	25.11
120	32.89	4.48	3.53	25.42
150	27.61	3.76	2.81	25.30
180	23.90	3.26	2.31	24.90
210	21.14	2.88	1.93	24.32

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:100 YEAR + 20%
AREA R-1: Building A Roof Drains A14-A17 & A20-A23

OTTAWA IDF CURVE
Area = 0.049 ha   Qallow = 0.95 L/s
C = 1.00   Vol(max) = 32.1 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	39.67	38.72	11.62
10	214.27	29.19	28.24	16.94
15	171.47	23.36	22.41	20.17
20	143.94	19.61	18.66	22.39
25	124.62	16.98	16.03	24.04
30	110.24	15.02	14.07	25.32
35	99.09	13.50	12.55	26.35
40	90.17	12.28	11.33	27.20
45	82.86	11.29	10.34	27.91
50	76.74	10.45	9.50	28.51
55	71.55	9.75	8.80	29.03
60	67.07	9.14	8.19	29.47
75	56.71	7.72	6.77	30.49
90	49.33	6.72	5.77	31.16
120	39.47	5.38	4.43	31.88
150	33.13	4.51	3.56	32.07
180	28.68	3.91	2.96	31.94
210	25.37	3.46	2.51	31.58

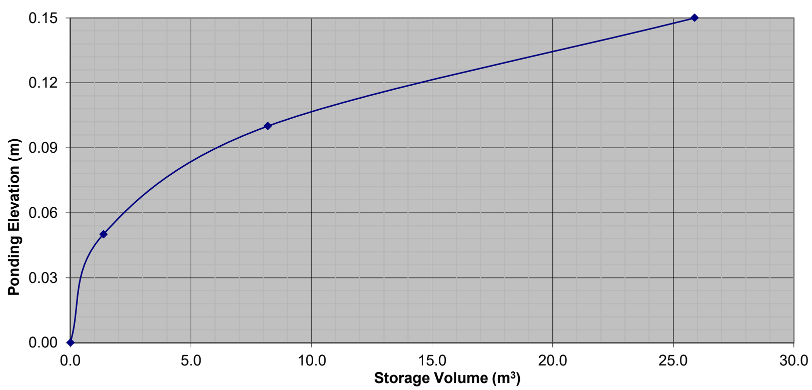
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to 1/4 Exposed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:2 Year	0.79	0.79	10	8.0	25.9
1:5 Year	0.87	0.87	11	11.8	25.9
1:100 Year	0.95	0.95	15	25.4	25.9

Roof Drain Storage Table for Area RDs

Elevation	Area Roof Drains	Total Volume
m	m^2	m^3
0.00	0	0
0.05	54.49	1.4
0.10	217.95	8.2
0.15	490.38	25.9

Stage Storage Curve: Area R-1
Controlled Roof Drains #A14-A17 & A20-A23



Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA R-1: Building A Roof Drains A25, A30, A31 & A36

OTTAWA IDF CURVE

Area = 0.057 ha   Qallow = 0.95 L/s
C = 0.90   Vol(max) = 9.2 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	14.77	13.82	4.15
10	76.81	10.95	10.00	6.00
15	61.77	8.81	7.86	7.07
20	52.03	7.42	6.47	7.76
25	45.17	6.44	5.49	8.24
30	40.04	5.71	4.76	8.57
35	36.06	5.14	4.19	8.80
40	32.86	4.69	3.74	8.97
45	30.24	4.31	3.36	9.08
50	28.04	4.00	3.05	9.15
55	26.17	3.73	2.78	9.18
60	24.56	3.50	2.55	9.19
75	20.81	2.97	2.02	9.08
90	18.14	2.59	1.64	8.84
120	14.56	2.08	1.13	8.11
150	12.25	1.75	0.80	7.18
180	10.63	1.52	0.57	6.11
210	9.42	1.34	0.39	4.95

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-1: Building A Roof Drains A25, A30, A31 & A36

OTTAWA IDF CURVE

Area = 0.057 ha   Qallow = 1.10 L/s
C = 0.90   Vol(max) = 13.6 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	20.13	19.18	5.76
10	104.19	14.86	13.91	8.35
15	83.56	11.92	10.97	9.87
20	70.25	10.02	9.07	10.88
25	60.90	8.68	7.73	11.60
30	53.93	7.69	6.74	12.13
35	48.52	6.92	5.97	12.54
40	44.18	6.30	5.35	12.84
45	40.63	5.79	4.84	13.08
50	37.65	5.37	4.42	13.26
55	35.12	5.01	4.06	13.39
60	32.94	4.70	3.75	13.49
75	27.89	3.98	3.03	13.62
90	24.29	3.46	2.51	13.57
120	19.47	2.78	1.83	13.15
150	16.36	2.33	1.38	12.45
180	14.18	2.02	1.07	11.58
210	12.56	1.79	0.84	10.59

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-1: Building A Roof Drains A25, A30, A31 & A36

OTTAWA IDF CURVE

Area = 0.057 ha   Qallow = 1.26 L/s
C = 1.00   Vol(max) = 28.5 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	38.46	37.20	11.16
10	178.56	28.29	27.03	16.22
15	142.89	22.64	21.38	19.24
20	119.95	19.01	17.75	21.30
25	103.85	16.46	15.20	22.79
30	91.87	14.56	13.30	23.94
35	82.58	13.09	11.83	24.83
40	75.15	11.91	10.65	25.55
45	69.05	10.94	9.68	26.14
50	63.95	10.13	8.87	26.62
55	59.62	9.45	8.19	27.02
60	55.89	8.86	7.60	27.35
75	47.26	7.49	6.23	28.03
90	41.11	6.51	5.25	28.37
120	32.89	5.21	3.95	28.46
150	27.61	4.38	3.12	28.04
180	23.90	3.79	2.53	27.30
210	21.14	3.35	2.09	26.34

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:100 YEAR + 20%
AREA R-1: Building A Roof Drains A25, A30, A31 & A36

OTTAWA IDF CURVE

Area = 0.057 ha   Qallow = 1.26 L/s
C = 1.00   Vol(max) = 36.0 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	46.15	44.89	13.47
10	214.27	33.95	32.69	19.62
15	171.47	27.17	25.91	23.32
20	143.94	22.81	21.55	25.86
25	124.62	19.75	18.49	27.73
30	110.24	17.47	16.21	29.18
35	99.09	15.70	14.44	30.33
40	90.17	14.29	13.03	31.27
45	82.86	13.13	11.87	32.05
50	76.74	12.16	10.90	32.70
55	71.55	11.34	10.08	33.26
60	67.07	10.63	9.37	33.73
75	56.71	8.99	7.73	34.77
90	49.33	7.82	6.56	35.41
120	39.47	6.26	5.00	35.96
150	33.13	5.25	3.99	35.91
180	28.68	4.55	3.29	35.48
210	25.37	4.02	2.76	34.78

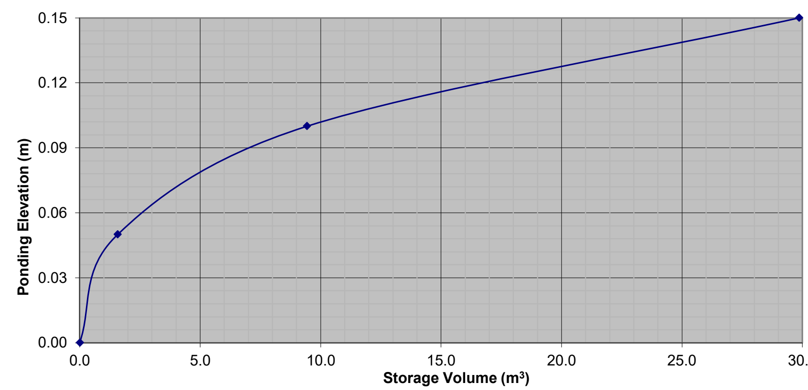
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to 1/2 Exposed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:2 Year	0.95	0.95	10	9.2	29.9
1:5 Year	1.10	1.10	11	13.6	29.9
1:100 Year	1.26	1.26	15	28.5	29.9

Roof Drain Storage Table for Area RDs

Elevation	Area Roof Drains	Total Volume
m	m^2	m^3
0.00	0	0
0.05	62.86	1.6
0.10	251.44	9.4
0.15	565.74	29.9

Stage Storage Curve: Area R-1
Controlled Roof Drains #A25, A30, A31 & A36



Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA R-1: Building A Roof Drains A26-A29 & A32-A35

OTTAWA IDF CURVE
Area = 0.056 ha; Qallow = 0.95 L/s
C = 0.90; Vol(max) = 9.0 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	14.51	13.56	4.07
10	76.81	10.76	9.81	5.89
15	61.77	8.65	7.70	6.93
20	52.03	7.29	6.34	7.61
25	45.17	6.33	5.38	8.07
30	40.04	5.61	4.66	8.39
35	36.06	5.05	4.10	8.61
40	32.86	4.60	3.65	8.77
45	30.24	4.24	3.29	8.87
50	28.04	3.93	2.98	8.94
55	26.17	3.67	2.72	8.97
60	24.56	3.44	2.49	8.97
75	20.81	2.92	1.97	8.85
90	18.14	2.54	1.59	8.60
120	14.56	2.04	1.09	7.85
150	12.25	1.72	0.77	6.90
180	10.63	1.49	0.54	5.82
210	9.42	1.32	0.37	4.65

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-1: Building A Roof Drains A26-A29 & A32-A35

OTTAWA IDF CURVE
Area = 0.056 ha; Qallow = 1.10 L/s
C = 0.90; Vol(max) = 13.3 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	19.78	18.83	5.65
10	104.19	14.60	13.65	8.19
15	83.56	11.71	10.76	9.68
20	70.25	9.84	8.89	10.67
25	60.90	8.53	7.58	11.37
30	53.93	7.56	6.61	11.89
35	48.52	6.80	5.85	12.28
40	44.18	6.19	5.24	12.58
45	40.63	5.69	4.74	12.80
50	37.65	5.28	4.33	12.98
55	35.12	4.92	3.97	13.10
60	32.94	4.62	3.67	13.20
75	27.89	3.91	2.96	13.31
90	24.29	3.40	2.45	13.25
120	19.47	2.73	1.78	12.80
150	16.36	2.29	1.34	12.08
180	14.18	1.99	1.04	11.20
210	12.56	1.76	0.81	10.20

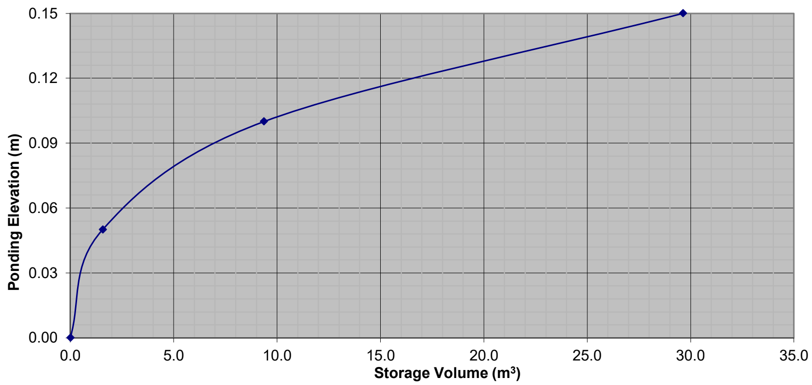
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to 1/2 Exposed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:2 Year	0.95	0.95	10	9.0	29.6
1:5 Year	1.10	1.10	11	13.3	29.6
1:100 Year	1.26	1.26	15	27.8	29.6

Roof Drain Storage Table for Area RDs

Elevation	Area Roof Drains	Total Volume
m	m^2	m^3
0.00	0	0
0.05	62.38	1.6
0.10	249.54	9.4
0.15	561.46	29.6

Stage Storage Curve: Area R-1
Controlled Roof Drains #A26-A29 & A32-A35



Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-1: Building A Roof Drains A26-A29 & A32-A35

OTTAWA IDF CURVE
Area = 0.056 ha; Qallow = 1.26 L/s
C = 1.00; Vol(max) = 27.8 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	37.78	36.52	10.96
10	178.56	27.80	26.54	15.92
15	142.89	22.25	20.99	18.89
20	119.95	18.67	17.41	20.90
25	103.85	16.17	14.91	22.36
30	91.87	14.30	13.04	23.48
35	82.58	12.86	11.60	24.35
40	75.15	11.70	10.44	25.05
45	69.05	10.75	9.49	25.62
50	63.95	9.96	8.70	26.09
55	59.62	9.28	8.02	26.47
60	55.89	8.70	7.44	26.79
75	47.26	7.36	6.10	27.44
90	41.11	6.40	5.14	27.76
120	32.89	5.12	3.86	27.80
150	27.61	4.30	3.04	27.35
180	23.90	3.72	2.46	26.58
210	21.14	3.29	2.03	25.60

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:100 YEAR + 20%
AREA R-1: Building A Roof Drains A26-A29 & A32-A35

OTTAWA IDF CURVE
Area = 0.056 ha; Qallow = 1.26 L/s
C = 1.00; Vol(max) = 35.2 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	45.34	44.08	13.22
10	214.27	33.36	32.10	19.26
15	171.47	26.69	25.43	22.89
20	143.94	22.41	21.15	25.38
25	124.62	19.40	18.14	27.21
30	110.24	17.16	15.90	28.62
35	99.09	15.43	14.17	29.75
40	90.17	14.04	12.78	30.67
45	82.86	12.90	11.64	31.43
50	76.74	11.95	10.69	32.06
55	71.55	11.14	9.88	32.60
60	67.07	10.44	9.18	33.06
75	56.71	8.83	7.57	34.06
90	49.33	7.68	6.42	34.67
120	39.47	6.15	4.89	35.17
150	33.13	5.16	3.90	35.08
180	28.68	4.47	3.21	34.62
210	25.37	3.95	2.69	33.90

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA R-1: Building A Controlled Roof Drain A37

OTTAWA IDF CURVE
Area = 0.010 ha   Qallow = 0.63 L/s
C = 0.90   Vol(max) = 0.8 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	2.59	1.96	0.59
10	76.81	1.92	1.29	0.77
15	61.77	1.55	0.92	0.82
20	52.03	1.30	0.67	0.81
25	45.17	1.13	0.50	0.75
30	40.04	1.00	0.37	0.67
35	36.06	0.90	0.27	0.57
40	32.86	0.82	0.19	0.46
45	30.24	0.76	0.13	0.34
50	28.04	0.70	0.07	0.21
55	26.17	0.65	0.02	0.08
60	24.56	0.61	-0.02	-0.06
75	20.81	0.52	-0.11	-0.49
90	18.14	0.45	-0.18	-0.95
120	14.56	0.36	-0.27	-1.91
150	12.25	0.31	-0.32	-2.91
180	10.63	0.27	-0.36	-3.93
210	9.42	0.24	-0.39	-4.97

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-1: Building A Controlled Roof Drain A37

OTTAWA IDF CURVE
Area = 0.010 ha   Qallow = 0.79 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	3.53	2.90	0.87
10	104.19	2.61	1.98	1.19
15	83.56	2.09	1.46	1.31
20	70.25	1.76	1.13	1.35
25	60.90	1.52	0.89	1.34
30	53.93	1.35	0.72	1.29
35	48.52	1.21	0.58	1.23
40	44.18	1.11	0.48	1.14
45	40.63	1.02	0.39	1.04
50	37.65	0.94	0.31	0.94
55	35.12	0.88	0.25	0.82
60	32.94	0.82	0.19	0.70
75	27.89	0.70	0.07	0.30
90	24.29	0.61	-0.02	-0.12
120	19.47	0.49	-0.14	-1.03
150	16.36	0.41	-0.22	-1.99
180	14.18	0.35	-0.28	-2.97
210	12.56	0.31	-0.32	-3.98

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-1: Building A Controlled Roof Drain A37

OTTAWA IDF CURVE
Area = 0.010 ha   Qallow = 0.95 L/s
C = 1.00   Vol(max) = 2.9 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	6.75	5.80	1.74
10	178.56	4.96	4.01	2.41
15	142.89	3.97	3.02	2.72
20	119.95	3.33	2.38	2.86
25	103.85	2.89	1.94	2.91
30	91.87	2.55	1.60	2.89
35	82.58	2.30	1.35	2.83
40	75.15	2.09	1.14	2.73
45	69.05	1.92	0.97	2.62
50	63.95	1.78	0.83	2.48
55	59.62	1.66	0.71	2.33
60	55.89	1.55	0.60	2.17
75	47.26	1.31	0.36	1.64
90	41.11	1.14	0.19	1.04
120	32.89	0.91	-0.04	-0.26
150	27.61	0.77	-0.18	-1.64
180	23.90	0.66	-0.29	-3.08
210	21.14	0.59	-0.36	-4.56

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:100 YEAR + 20%
AREA R-1: Building A Controlled Roof Drain A37

OTTAWA IDF CURVE
Area = 0.010 ha   Qallow = 0.95 L/s
C = 1.00   Vol(max) = 3.8 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	8.10	7.15	2.14
10	214.27	5.96	5.01	3.00
15	171.47	4.77	3.82	3.44
20	143.94	4.00	3.05	3.66
25	124.62	3.46	2.51	3.77
30	110.24	3.06	2.11	3.81
35	99.09	2.75	1.80	3.79
40	90.17	2.51	1.56	3.74
45	82.86	2.30	1.35	3.65
50	76.74	2.13	1.18	3.55
55	71.55	1.99	1.04	3.43
60	67.07	1.86	0.91	3.29
75	56.71	1.58	0.63	2.82
90	49.33	1.37	0.42	2.28
120	39.47	1.10	0.15	1.06
150	33.13	0.92	-0.03	-0.26
180	28.68	0.80	-0.15	-1.65
210	25.37	0.71	-0.24	-3.08

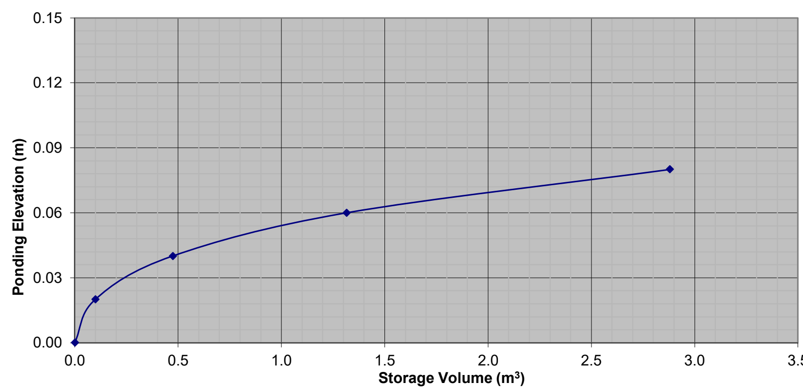
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to Fully Exposed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:2 Year	0.63	0.63	5	0.8	2.9
1:5 Year	0.79	0.79	6	1.4	2.9
1:100 Year	0.95	0.95	8	2.9	2.9

Roof Drain Storage Table for Area RD A37

Elevation	Area RD A37	Total Volume
m	m^2	m^3
0.00	0	0
0.02	9.92	0.1
0.04	27.56	0.5
0.06	56.61	1.3
0.08	99.76	2.9

Stage Storage Curve: Area R-1
Controlled Roof Drain # A37



Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA R-1: Building A Roof Drains A38-A41 & A44-A47

OTTAWA IDF CURVE
Area = 0.031 ha   Qallow = 0.79 L/s
C = 0.90   Vol(max) = 4.2 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	8.03	7.24	2.17
10	76.81	5.96	5.17	3.10
15	61.77	4.79	4.00	3.60
20	52.03	4.04	3.25	3.89
25	45.17	3.50	2.71	4.07
30	40.04	3.11	2.32	4.17
35	36.06	2.80	2.01	4.21
40	32.86	2.55	1.76	4.22
45	30.24	2.35	1.56	4.20
50	28.04	2.17	1.38	4.15
55	26.17	2.03	1.24	4.09
60	24.56	1.90	1.11	4.01
75	20.81	1.61	0.82	3.71
90	18.14	1.41	0.62	3.33
120	14.56	1.13	0.34	2.44
150	12.25	0.95	0.16	1.44
180	10.63	0.82	0.03	0.37
210	9.42	0.73	-0.06	-0.75

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-1: Building A Roof Drains A38-A41 & A44-A47

OTTAWA IDF CURVE
Area = 0.031 ha   Qallow = 0.87 L/s
C = 0.90   Vol(max) = 6.4 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	10.95	10.16	3.05
10	104.19	8.08	7.29	4.37
15	83.56	6.48	5.69	5.12
20	70.25	5.45	4.66	5.59
25	60.90	4.72	3.93	5.90
30	53.93	4.18	3.39	6.11
35	48.52	3.76	2.97	6.24
40	44.18	3.43	2.64	6.33
45	40.63	3.15	2.36	6.38
50	37.65	2.92	2.13	6.39
55	35.12	2.72	1.93	6.38
60	32.94	2.56	1.77	6.35
75	27.89	2.16	1.37	6.18
90	24.29	1.88	1.09	5.91
120	19.47	1.51	0.72	5.18
150	16.36	1.27	0.48	4.31
180	14.18	1.10	0.31	3.35
210	12.56	0.97	0.18	2.32

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-1: Building A Roof Drains A38-A41 & A44-A47

OTTAWA IDF CURVE
Area = 0.031 ha   Qallow = 0.95 L/s
C = 1.00   Vol(max) = 14.1 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	20.92	19.97	5.99
10	178.56	15.39	14.44	8.66
15	142.89	12.31	11.36	10.23
20	119.95	10.34	9.39	11.26
25	103.85	8.95	8.00	12.00
30	91.87	7.92	6.97	12.54
35	82.58	7.12	6.17	12.95
40	75.15	6.48	5.53	13.26
45	69.05	5.95	5.00	13.50
50	63.95	5.51	4.56	13.68
55	59.62	5.14	4.19	13.82
60	55.89	4.82	3.87	13.92
75	47.26	4.07	3.12	14.05
90	41.11	3.54	2.59	14.00
120	32.89	2.83	1.88	13.57
150	27.61	2.38	1.43	12.87
180	23.90	2.06	1.11	11.99
210	21.14	1.82	0.87	10.99

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:100 YEAR + 20%
AREA R-1: Building A Roof Drains A38-A41 & A44-A47

OTTAWA IDF CURVE
Area = 0.031 ha   Qallow = 0.95 L/s
C = 1.00   Vol(max) = 17.8 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	25.10	24.15	7.24
10	214.27	18.47	17.52	10.51
15	171.47	14.78	13.83	12.44
20	143.94	12.40	11.45	13.75
25	124.62	10.74	9.79	14.68
30	110.24	9.50	8.55	15.39
35	99.09	8.54	7.59	15.94
40	90.17	7.77	6.82	16.37
45	82.86	7.14	6.19	16.72
50	76.74	6.61	5.66	16.99
55	71.55	6.17	5.22	17.21
60	67.07	5.78	4.83	17.39
75	56.71	4.89	3.94	17.72
90	49.33	4.25	3.30	17.83
120	39.47	3.40	2.45	17.65
150	33.13	2.86	1.91	17.15
180	28.68	2.47	1.52	16.44
210	25.37	2.19	1.24	15.58

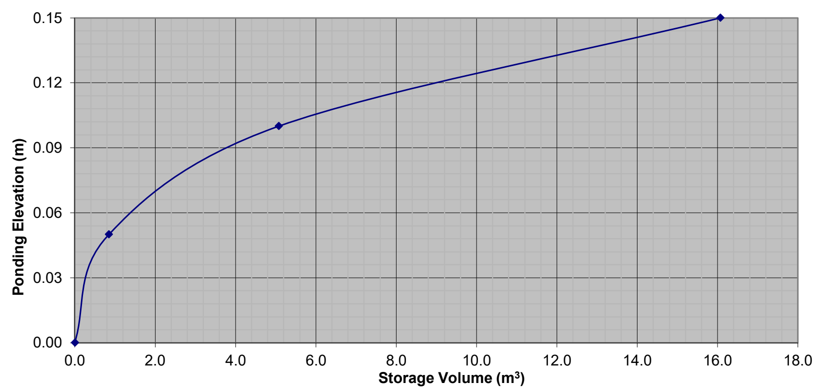
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to 1/4 Exposed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:2 Year	0.79	0.79	9	4.2	16.1
1:5 Year	0.87	0.87	11	6.4	16.1
1:100 Year	0.95	0.95	14	14.1	16.1

Roof Drain Storage Table for Area RDs

Elevation	Area Roof Drains	Total Volume
m	m^2	m^3
0.00	0	0
0.05	33.82	0.8
0.10	135.3	5.1
0.15	304.42	16.1

Stage Storage Curve: Area R-1
Controlled Roof Drains #A38-A41 & A44-A47



Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA R-1: Building A Roof Drains A42, A43 & A48

OTTAWA IDF CURVE

Area =	0.032	ha	Qallow =	0.79	L/s
C =	0.90		Vol(max) =	4.4	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	8.29	7.50	2.25
10	76.81	6.15	5.36	3.22
15	61.77	4.95	4.16	3.74
20	52.03	4.17	3.38	4.05
25	45.17	3.62	2.83	4.24
30	40.04	3.21	2.42	4.35
35	36.06	2.89	2.10	4.40
40	32.86	2.63	1.84	4.42
45	30.24	2.42	1.63	4.40
50	28.04	2.25	1.46	4.37
55	26.17	2.10	1.31	4.31
60	24.56	1.97	1.18	4.23
75	20.81	1.67	0.88	3.94
90	18.14	1.45	0.66	3.58
120	14.56	1.17	0.38	2.71
150	12.25	0.98	0.19	1.72
180	10.63	0.85	0.06	0.66
210	9.42	0.75	-0.04	-0.46

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-1: Building A Roof Drains A42, A43 & A48

OTTAWA IDF CURVE

Area =	0.032	ha	Qallow =	0.87	L/s
C =	0.90		Vol(max) =	6.7	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	11.30	10.51	3.15
10	104.19	8.34	7.55	4.53
15	83.56	6.69	5.90	5.31
20	70.25	5.62	4.83	5.80
25	60.90	4.88	4.09	6.13
30	53.93	4.32	3.53	6.35
35	48.52	3.88	3.09	6.50
40	44.18	3.54	2.75	6.59
45	40.63	3.25	2.46	6.65
50	37.65	3.01	2.22	6.67
55	35.12	2.81	2.02	6.67
60	32.94	2.64	1.85	6.65
75	27.89	2.23	1.44	6.49
90	24.29	1.94	1.15	6.23
120	19.47	1.56	0.77	5.53
150	16.36	1.31	0.52	4.68
180	14.18	1.14	0.35	3.73
210	12.56	1.01	0.22	2.71

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-1: Building A Roof Drains A42, A43 & A48

OTTAWA IDF CURVE

Area =	0.032	ha	Qallow =	0.95	L/s
C =	1.00		Vol(max) =	14.6	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	21.59	20.64	6.19
10	178.56	15.88	14.93	8.96
15	142.89	12.71	11.76	10.59
20	119.95	10.67	9.72	11.66
25	103.85	9.24	8.29	12.43
30	91.87	8.17	7.22	13.00
35	82.58	7.35	6.40	13.43
40	75.15	6.68	5.73	13.76
45	69.05	6.14	5.19	14.02
50	63.95	5.69	4.74	14.22
55	59.62	5.30	4.35	14.37
60	55.89	4.97	4.02	14.48
75	47.26	4.20	3.25	14.64
90	41.11	3.66	2.71	14.62
120	32.89	2.93	1.98	14.23
150	27.61	2.46	1.51	13.56
180	23.90	2.13	1.18	12.70
210	21.14	1.88	0.93	11.73

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:100 YEAR + 20%
AREA R-1: Building A Roof Drains A42, A43 & A48

OTTAWA IDF CURVE

Area =	0.032	ha	Qallow =	0.95	L/s
C =	1.00		Vol(max) =	18.6	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	25.91	24.96	7.49
10	214.27	19.06	18.11	10.87
15	171.47	15.25	14.30	12.87
20	143.94	12.80	11.85	14.23
25	124.62	11.09	10.14	15.20
30	110.24	9.81	8.86	15.94
35	99.09	8.82	7.87	16.52
40	90.17	8.02	7.07	16.97
45	82.86	7.37	6.42	17.34
50	76.74	6.83	5.88	17.63
55	71.55	6.36	5.41	17.87
60	67.07	5.97	5.02	18.06
75	56.71	5.04	4.09	18.43
90	49.33	4.39	3.44	18.57
120	39.47	3.51	2.56	18.44
150	33.13	2.95	2.00	17.98
180	28.68	2.55	1.60	17.30
210	25.37	2.26	1.31	16.47

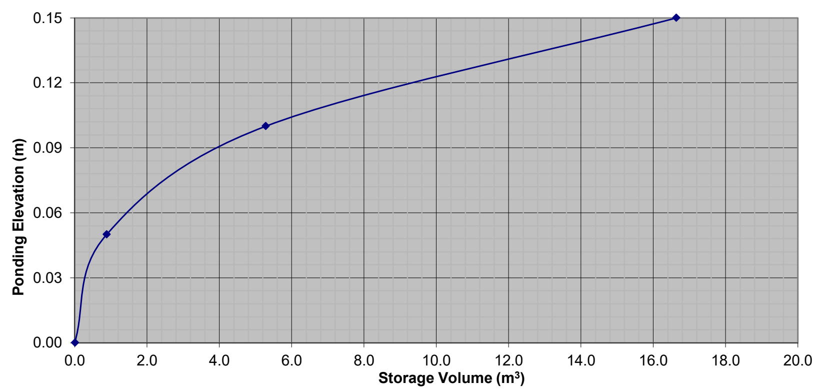
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to 1/4 Exposed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:2 Year	0.79	0.79	9	4.4	16.6
1:5 Year	0.87	0.87	11	6.7	16.6
1:100 Year	0.95	0.95	14	14.6	16.6

Roof Drain Storage Table for Area RDs

Elevation	Area Roof Drains	Total Volume
m	m^2	m^3
0.00	0	0
0.05	35.18	0.9
0.10	140.74	5.3
0.15	313.55	16.6

Stage Storage Curve: Area R-1
Controlled Roof Drains #A42, A43 & A48



Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA R-2: Building B Roof Drains B1 - B5

OTTAWA IDF CURVE
Area = 0.063 ha   Qallow = 0.95 L/s
C = 0.90   Vol(max) = 10.5 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	16.33	15.38	4.61
10	76.81	12.11	11.16	6.69
15	61.77	9.74	8.79	7.91
20	52.03	8.20	7.25	8.70
25	45.17	7.12	6.17	9.25
30	40.04	6.31	5.36	9.65
35	36.06	5.68	4.73	9.94
40	32.86	5.18	4.23	10.15
45	30.24	4.77	3.82	10.30
50	28.04	4.42	3.47	10.41
55	26.17	4.13	3.18	10.48
60	24.56	3.87	2.92	10.52
75	20.81	3.28	2.33	10.49
90	18.14	2.86	1.91	10.31
120	14.56	2.30	1.35	9.69
150	12.25	1.93	0.98	8.83
180	10.63	1.68	0.73	7.83
210	9.42	1.48	0.53	6.73

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-2: Building B Roof Drains B1 - B5

OTTAWA IDF CURVE
Area = 0.063 ha   Qallow = 1.10 L/s
C = 0.90   Vol(max) = 15.5 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	22.25	21.30	6.39
10	104.19	16.42	15.47	9.28
15	83.56	13.17	12.22	11.00
20	70.25	11.07	10.12	12.15
25	60.90	9.60	8.65	12.97
30	53.93	8.50	7.55	13.59
35	48.52	7.65	6.70	14.07
40	44.18	6.96	6.01	14.44
45	40.63	6.40	5.45	14.73
50	37.65	5.94	4.99	14.96
55	35.12	5.54	4.59	15.13
60	32.94	5.19	4.24	15.27
75	27.89	4.40	3.45	15.51
90	24.29	3.83	2.88	15.54
120	19.47	3.07	2.12	15.25
150	16.36	2.58	1.63	14.66
180	14.18	2.24	1.29	13.88
210	12.56	1.98	1.03	12.97

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-2: Building B Roof Drains B1 - B5

OTTAWA IDF CURVE
Area = 0.063 ha   Qallow = 1.26 L/s
C = 1.00   Vol(max) = 32.4 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	42.51	41.25	12.37
10	178.56	31.27	30.01	18.01
15	142.89	25.03	23.77	21.39
20	119.95	21.01	19.75	23.70
25	103.85	18.19	16.93	25.39
30	91.87	16.09	14.83	26.69
35	82.58	14.46	13.20	27.73
40	75.15	13.16	11.90	28.56
45	69.05	12.09	10.83	29.25
50	63.95	11.20	9.94	29.82
55	59.62	10.44	9.18	30.30
60	55.89	9.79	8.53	30.71
75	47.26	8.28	7.02	31.57
90	41.11	7.20	5.94	32.08
120	32.89	5.76	4.50	32.41
150	27.61	4.84	3.58	32.18
180	23.90	4.19	2.93	31.60
210	21.14	3.70	2.44	30.78

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:100 YEAR + 20%
AREA R-2: Building B Roof Drains B1 - B5

OTTAWA IDF CURVE
Area = 0.063 ha   Qallow = 1.26 L/s
C = 1.00   Vol(max) = 40.9 m3

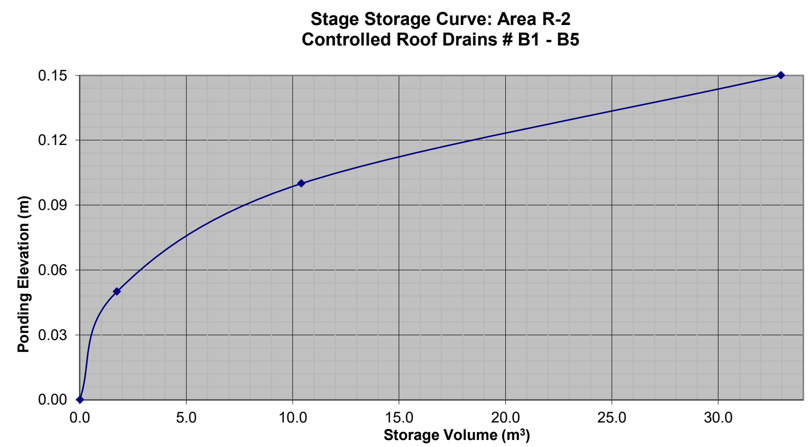
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	51.01	49.75	14.92
10	214.27	37.53	36.27	21.76
15	171.47	30.03	28.77	25.89
20	143.94	25.21	23.95	28.74
25	124.62	21.83	20.57	30.85
30	110.24	19.31	18.05	32.49
35	99.09	17.36	16.10	33.80
40	90.17	15.79	14.53	34.88
45	82.86	14.51	13.25	35.78
50	76.74	13.44	12.18	36.54
55	71.55	12.53	11.27	37.19
60	67.07	11.75	10.49	37.75
75	56.71	9.93	8.67	39.02
90	49.33	8.64	7.38	39.85
120	39.47	6.91	5.65	40.70
150	33.13	5.80	4.54	40.89
180	28.68	5.02	3.76	40.65
210	25.37	4.44	3.18	40.12

Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to 1/2 Exposed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:2 Year	0.95	0.95	10	10.5	32.9
1:5 Year	1.10	1.10	11	15.5	32.9
1:100 Year	1.26	1.26	15	32.4	32.9

Roof Drain Storage Table for Area RDs

Elevation	Area Roof Drains	Total Volume
m	m^2	m^3
0.00	0	0
0.05	69.36	1.7
0.10	277.44	10.4
0.15	624.24	32.9



Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA R-2: Building B Controlled Roof Drain B6

OTTAWA IDF CURVE
Area = 0.008 ha   Qallow = 0.63 L/s
C = 0.90   Vol(max) = 0.5 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	2.07	1.44	0.43
10	76.81	1.54	0.91	0.54
15	61.77	1.24	0.61	0.55
20	52.03	1.04	0.41	0.49
25	45.17	0.90	0.27	0.41
30	40.04	0.80	0.17	0.31
35	36.06	0.72	0.09	0.19
40	32.86	0.66	0.03	0.07
45	30.24	0.61	-0.02	-0.07
50	28.04	0.56	-0.07	-0.21
55	26.17	0.52	-0.11	-0.35
60	24.56	0.49	-0.14	-0.50
75	20.81	0.42	-0.21	-0.96
90	18.14	0.36	-0.27	-1.44
120	14.56	0.29	-0.34	-2.44
150	12.25	0.25	-0.38	-3.46
180	10.63	0.21	-0.42	-4.51
210	9.42	0.19	-0.44	-5.56

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-2: Building B Controlled Roof Drain B6

OTTAWA IDF CURVE
Area = 0.008 ha   Qallow = 0.79 L/s
C = 0.90   Vol(max) = 0.9 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	2.83	2.20	0.66
10	104.19	2.09	1.46	0.87
15	83.56	1.67	1.04	0.94
20	70.25	1.41	0.78	0.93
25	60.90	1.22	0.59	0.88
30	53.93	1.08	0.45	0.81
35	48.52	0.97	0.34	0.72
40	44.18	0.88	0.25	0.61
45	40.63	0.81	0.18	0.49
50	37.65	0.75	0.12	0.37
55	35.12	0.70	0.07	0.24
60	32.94	0.66	0.03	0.11
75	27.89	0.56	-0.07	-0.32
90	24.29	0.49	-0.14	-0.78
120	19.47	0.39	-0.24	-1.73
150	16.36	0.33	-0.30	-2.72
180	14.18	0.28	-0.35	-3.74
210	12.56	0.25	-0.38	-4.77

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-2: Building B Controlled Roof Drain B6

OTTAWA IDF CURVE
Area = 0.008 ha   Qallow = 0.95 L/s
C = 1.00   Vol(max) = 2.1 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	5.40	4.45	1.33
10	178.56	3.97	3.02	1.81
15	142.89	3.18	2.23	2.01
20	119.95	2.67	1.72	2.06
25	103.85	2.31	1.36	2.04
30	91.87	2.04	1.09	1.97
35	82.58	1.84	0.89	1.86
40	75.15	1.67	0.72	1.73
45	69.05	1.54	0.59	1.58
50	63.95	1.42	0.47	1.42
55	59.62	1.33	0.38	1.24
60	55.89	1.24	0.29	1.06
75	47.26	1.05	0.10	0.45
90	41.11	0.91	-0.04	-0.19
120	32.89	0.73	-0.22	-1.57
150	27.61	0.61	-0.34	-3.02
180	23.90	0.53	-0.42	-4.52
210	21.14	0.47	-0.48	-6.04

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:100 YEAR + 20%
AREA R-2: Building B Controlled Roof Drain B6

OTTAWA IDF CURVE
Area = 0.008 ha   Qallow = 0.95 L/s
C = 1.00   Vol(max) = 2.7 m3

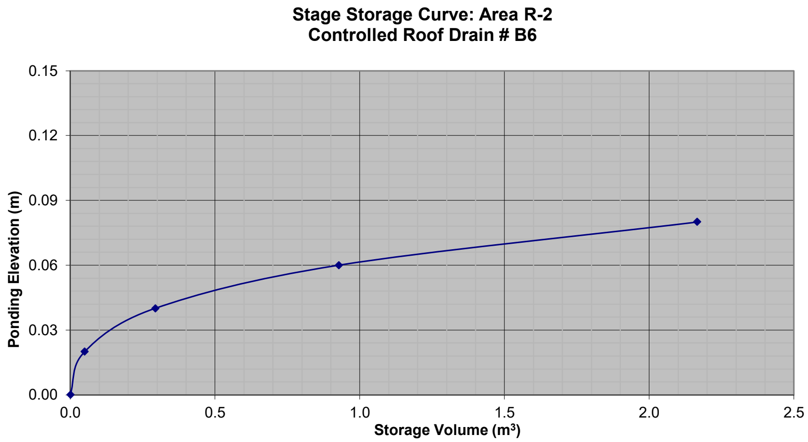
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	6.48	5.53	1.66
10	214.27	4.77	3.82	2.29
15	171.47	3.81	2.86	2.58
20	143.94	3.20	2.25	2.70
25	124.62	2.77	1.82	2.73
30	110.24	2.45	1.50	2.70
35	99.09	2.20	1.25	2.63
40	90.17	2.01	1.06	2.53
45	82.86	1.84	0.89	2.41
50	76.74	1.71	0.76	2.27
55	71.55	1.59	0.64	2.12
60	67.07	1.49	0.54	1.95
75	56.71	1.26	0.31	1.40
90	49.33	1.10	0.15	0.79
120	39.47	0.88	-0.07	-0.52
150	33.13	0.74	-0.21	-1.92
180	28.68	0.64	-0.31	-3.37
210	25.37	0.56	-0.39	-4.86

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

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:2 Year	0.63	0.63	5	0.5	2.2
1:5 Year	0.79	0.79	6	0.9	2.2
1:100 Year	0.95	0.95	8	2.1	2.2

Roof Drain Storage Table for Area RD B6

Elevation	Area RD B6	Total Volume
m	m^2	m^3
0.00	0	0
0.02	4.88	0.0
0.04	19.52	0.3
0.06	43.92	0.9
0.08	79.91	2.2



Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA R-2: Building B Roof Drains B7 - B13

OTTAWA IDF CURVE
Area = 0.035 ha   Qallow = 0.79 L/s
C = 0.90   Vol(max) = 5.0 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	9.07	8.28	2.48
10	76.81	6.73	5.94	3.56
15	61.77	5.41	4.62	4.16
20	52.03	4.56	3.77	4.52
25	45.17	3.96	3.17	4.75
30	40.04	3.51	2.72	4.89
35	36.06	3.16	2.37	4.97
40	32.86	2.88	2.09	5.01
45	30.24	2.65	1.86	5.02
50	28.04	2.46	1.67	5.00
55	26.17	2.29	1.50	4.96
60	24.56	2.15	1.36	4.90
75	20.81	1.82	1.03	4.65
90	18.14	1.59	0.80	4.31
120	14.56	1.28	0.49	3.49
150	12.25	1.07	0.28	2.55
180	10.63	0.93	0.14	1.52
210	9.42	0.82	0.03	0.43

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-2: Building B Roof Drains B7 - B13

OTTAWA IDF CURVE
Area = 0.035 ha   Qallow = 0.87 L/s
C = 0.90   Vol(max) = 7.5 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	12.36	11.57	3.47
10	104.19	9.12	8.33	5.00
15	83.56	7.32	6.53	5.87
20	70.25	6.15	5.36	6.43
25	60.90	5.33	4.54	6.81
30	53.93	4.72	3.93	7.08
35	48.52	4.25	3.46	7.26
40	44.18	3.87	3.08	7.39
45	40.63	3.56	2.77	7.47
50	37.65	3.30	2.51	7.52
55	35.12	3.08	2.29	7.54
60	32.94	2.88	2.09	7.54
75	27.89	2.44	1.65	7.43
90	24.29	2.13	1.34	7.22
120	19.47	1.70	0.91	6.59
150	16.36	1.43	0.64	5.79
180	14.18	1.24	0.45	4.88
210	12.56	1.10	0.31	3.90

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-2: Building B Roof Drains B7 - B13

OTTAWA IDF CURVE
Area = 0.035 ha   Qallow = 0.95 L/s
C = 1.00   Vol(max) = 16.5 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	23.62	22.67	6.80
10	178.56	17.37	16.42	9.85
15	142.89	13.90	12.95	11.66
20	119.95	11.67	10.72	12.87
25	103.85	10.10	9.15	13.73
30	91.87	8.94	7.99	14.38
35	82.58	8.03	7.08	14.88
40	75.15	7.31	6.36	15.27
45	69.05	6.72	5.77	15.58
50	63.95	6.22	5.27	15.82
55	59.62	5.80	4.85	16.01
60	55.89	5.44	4.49	16.16
75	47.26	4.60	3.65	16.42
90	41.11	4.00	3.05	16.47
120	32.89	3.20	2.25	16.20
150	27.61	2.69	1.74	15.63
180	23.90	2.33	1.38	14.86
210	21.14	2.06	1.11	13.95

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:100 YEAR + 20%
AREA R-2: Building B Roof Drains B7 - B13

OTTAWA IDF CURVE
Area = 0.035 ha   Qallow = 0.95 L/s
C = 1.00   Vol(max) = 20.8 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	28.34	27.39	8.22
10	214.27	20.85	19.90	11.94
15	171.47	16.68	15.73	14.16
20	143.94	14.01	13.06	15.67
25	124.62	12.13	11.18	16.76
30	110.24	10.73	9.78	17.60
35	99.09	9.64	8.69	18.25
40	90.17	8.77	7.82	18.78
45	82.86	8.06	7.11	19.20
50	76.74	7.47	6.52	19.55
55	71.55	6.96	6.01	19.84
60	67.07	6.53	5.58	20.07
75	56.71	5.52	4.57	20.55
90	49.33	4.80	3.85	20.79
120	39.47	3.84	2.89	20.81
150	33.13	3.22	2.27	20.46
180	28.68	2.79	1.84	19.88
210	25.37	2.47	1.52	19.14

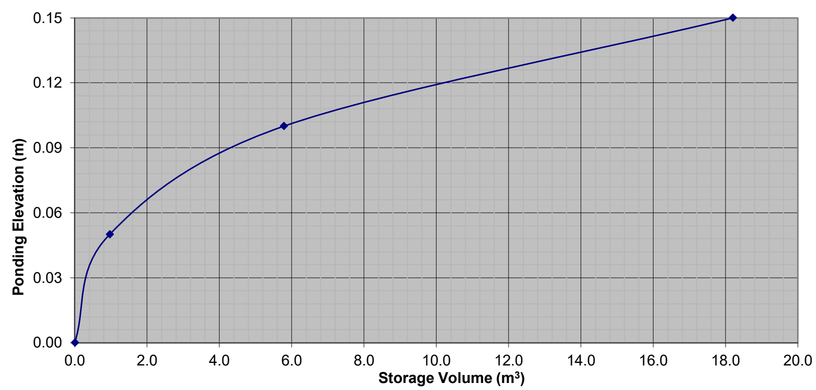
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to 1/4 Exposed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:2 Year	0.79	0.79	10	5.0	18.2
1:5 Year	0.87	0.87	11	7.5	18.2
1:100 Year	0.95	0.95	15	16.5	18.2

Roof Drain Storage Table for Area RDs

Elevation	Area Roof Drains	Total Volume
m	m^2	m^3
0.00	0	0
0.05	38.53	1.0
0.10	154.12	5.8
0.15	342.66	18.2

Stage Storage Curve: Area R-2
Controlled Roof Drains # B7 - B13



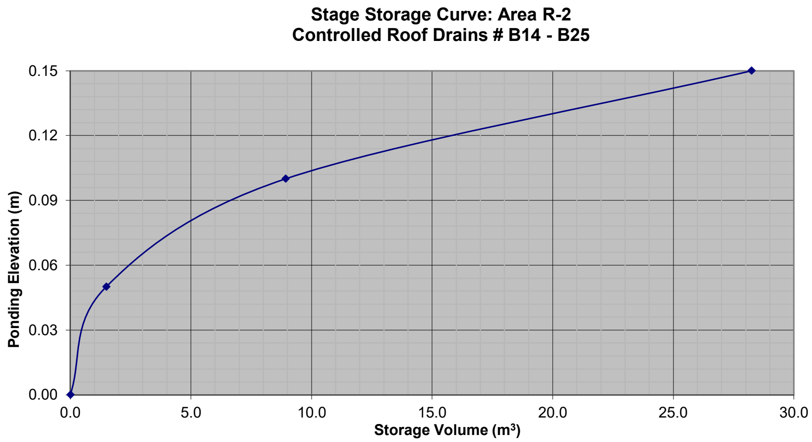
Proposed Industrial Development					
Novatech Project No. 122151					
REQUIRED STORAGE - 1:2 YEAR EVENT					
AREA R-2: Building B Roof Drains B14 - B25					
OTTAWA IDF CURVE					
Area =	0.053	ha	Qallow =	0.79	L/s
C =	0.90		Vol(max) =	8.9	m3
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)	
5	103.57	13.73	12.94	3.88	
10	76.81	10.18	9.39	5.64	
15	61.77	8.19	7.40	6.66	
20	52.03	6.90	6.11	7.33	
25	45.17	5.99	5.20	7.80	
30	40.04	5.31	4.52	8.14	
35	36.06	4.78	3.99	8.38	
40	32.86	4.36	3.57	8.56	
45	30.24	4.01	3.22	8.69	
50	28.04	3.72	2.93	8.79	
55	26.17	3.47	2.68	8.85	
60	24.56	3.26	2.47	8.88	
75	20.81	2.76	1.97	8.86	
90	18.14	2.41	1.62	8.73	
120	14.56	1.93	1.14	8.22	
150	12.25	1.62	0.83	7.51	
180	10.63	1.41	0.62	6.69	
210	9.42	1.25	0.46	5.78	

Proposed Industrial Development					
Novatech Project No. 122151					
REQUIRED STORAGE - 1:5 YEAR EVENT					
AREA R-2: Building B Roof Drains B14 - B25					
OTTAWA IDF CURVE					
Area =	0.053	ha	Qallow =	0.87	L/s
C =	0.90		Vol(max) =	13.1	m3
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)	
5	141.18	18.72	17.93	5.38	
10	104.19	13.82	13.03	7.82	
15	83.56	11.08	10.29	9.26	
20	70.25	9.32	8.53	10.23	
25	60.90	8.08	7.29	10.93	
30	53.93	7.15	6.36	11.45	
35	48.52	6.43	5.64	11.85	
40	44.18	5.86	5.07	12.17	
45	40.63	5.39	4.60	12.41	
50	37.65	4.99	4.20	12.61	
55	35.12	4.66	3.87	12.76	
60	32.94	4.37	3.58	12.88	
75	27.89	3.70	2.91	13.09	
90	24.29	3.22	2.43	13.13	
120	19.47	2.58	1.79	12.90	
150	16.36	2.17	1.38	12.42	
180	14.18	1.88	1.09	11.78	
210	12.56	1.66	0.87	11.02	

Watts Accutrol Flow Control Roof Drains:		RD-100-A-ADJ set to 1/4 Exposed			
Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Provided
1:2 Year	0.79	0.79	10	8.9	28.2
1:5 Year	0.87	0.87	11	13.1	28.2
1:100 Year	0.95	0.95	15	28.1	28.2

Roof Drain Storage Table for Area RDs

Elevation	Area Roof Drains	Total Volume
m	m^2	m^3
0.00	0	0
0.05	59.46	1.5
0.10	237.82	8.9
0.15	535.09	28.2



Proposed Industrial Development					
Novatech Project No. 122151					
REQUIRED STORAGE - 1:100 YEAR EVENT					
AREA R-2: Building B Roof Drains B14 - B25					
OTTAWA IDF CURVE					
Area =	0.053	ha	Qallow =	0.95	L/s
C =	1.00		Vol(max) =	28.1	m3
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)	
5	242.70	35.76	34.81	10.44	
10	178.56	26.31	25.36	15.22	
15	142.89	21.05	20.10	18.09	
20	119.95	17.67	16.72	20.07	
25	103.85	15.30	14.35	21.53	
30	91.87	13.54	12.59	22.65	
35	82.58	12.17	11.22	23.56	
40	75.15	11.07	10.12	24.29	
45	69.05	10.17	9.22	24.90	
50	63.95	9.42	8.47	25.42	
55	59.62	8.78	7.83	25.86	
60	55.89	8.24	7.29	26.23	
75	47.26	6.96	6.01	27.06	
90	41.11	6.06	5.11	27.58	
120	32.89	4.85	3.90	28.06	
150	27.61	4.07	3.12	28.06	
180	23.90	3.52	2.57	27.78	
210	21.14	3.12	2.17	27.28	

Proposed Industrial Development					
Novatech Project No. 122151					
REQUIRED STORAGE - 1:100 YEAR + 20%					
AREA R-2: Building B Roof Drains B14 - B25					
OTTAWA IDF CURVE					
Area =	0.053	ha	Qallow =	0.95	L/s
C =	1.00		Vol(max) =	35.4	m3
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)	
5	291.24	42.91	41.96	12.59	
10	214.27	31.57	30.62	18.37	
15	171.47	25.26	24.31	21.88	
20	143.94	21.21	20.26	24.31	
25	124.62	18.36	17.41	26.12	
30	110.24	16.24	15.29	27.53	
35	99.09	14.60	13.65	28.67	
40	90.17	13.29	12.34	29.61	
45	82.86	12.21	11.26	30.40	
50	76.74	11.31	10.36	31.07	
55	71.55	10.54	9.59	31.65	
60	67.07	9.88	8.93	32.16	
75	56.71	8.36	7.41	33.32	
90	49.33	7.27	6.32	34.12	
120	39.47	5.82	4.87	35.04	
150	33.13	4.88	3.93	35.39	
180	28.68	4.23	3.28	35.38	
210	25.37	3.74	2.79	35.14	

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA R-2: Building B Roof Drains B26 - B37

OTTAWA IDF CURVE

Area = 0.050 ha | Qallow = 0.79 L/s
C = 0.90 | Vol(max) = 8.2 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	12.96	12.17	3.65
10	76.81	9.61	8.82	5.29
15	61.77	7.73	6.94	6.24
20	52.03	6.51	5.72	6.86
25	45.17	5.65	4.86	7.29
30	40.04	5.01	4.22	7.59
35	36.06	4.51	3.72	7.81
40	32.86	4.11	3.32	7.97
45	30.24	3.78	2.99	8.08
50	28.04	3.51	2.72	8.15
55	26.17	3.27	2.48	8.20
60	24.56	3.07	2.28	8.22
75	20.81	2.60	1.81	8.16
90	18.14	2.27	1.48	7.99
120	14.56	1.82	1.03	7.43
150	12.25	1.53	0.74	6.68
180	10.63	1.33	0.54	5.83
210	9.42	1.18	0.39	4.89

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-2: Building B Roof Drains B26 - B37

OTTAWA IDF CURVE

Area = 0.050 ha | Qallow = 0.87 L/s
C = 0.90 | Vol(max) = 12.1 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	17.66	16.87	5.06
10	104.19	13.03	12.24	7.35
15	83.56	10.45	9.66	8.70
20	70.25	8.79	8.00	9.60
25	60.90	7.62	6.83	10.24
30	53.93	6.75	5.96	10.72
35	48.52	6.07	5.28	11.09
40	44.18	5.53	4.74	11.37
45	40.63	5.08	4.29	11.59
50	37.65	4.71	3.92	11.76
55	35.12	4.39	3.60	11.89
60	32.94	4.12	3.33	11.99
75	27.89	3.49	2.70	12.14
90	24.29	3.04	2.25	12.14
120	19.47	2.44	1.65	11.85
150	16.36	2.05	1.26	11.31
180	14.18	1.77	0.98	10.63
210	12.56	1.57	0.78	9.84

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-2: Building B Roof Drains B26 - B37

OTTAWA IDF CURVE

Area = 0.050 ha | Qallow = 0.95 L/s
C = 1.00 | Vol(max) = 26.1 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	33.74	32.79	9.84
10	178.56	24.82	23.87	14.32
15	142.89	19.86	18.91	17.02
20	119.95	16.67	15.72	18.87
25	103.85	14.43	13.48	20.23
30	91.87	12.77	11.82	21.28
35	82.58	11.48	10.53	22.11
40	75.15	10.45	9.50	22.79
45	69.05	9.60	8.65	23.35
50	63.95	8.89	7.94	23.82
55	59.62	8.29	7.34	24.21
60	55.89	7.77	6.82	24.55
75	47.26	6.57	5.62	25.28
90	41.11	5.71	4.76	25.73
120	32.89	4.57	3.62	26.08
150	27.61	3.84	2.89	25.99
180	23.90	3.32	2.37	25.62
210	21.14	2.94	1.99	25.06

Proposed Industrial Development
Novatech Project No. 122151
REQUIRED STORAGE - 1:100 YEAR + 20%
AREA R-2: Building B Roof Drains B26 - B37

OTTAWA IDF CURVE

Area = 0.050 ha | Qallow = 0.95 L/s
C = 1.00 | Vol(max) = 32.9 m3

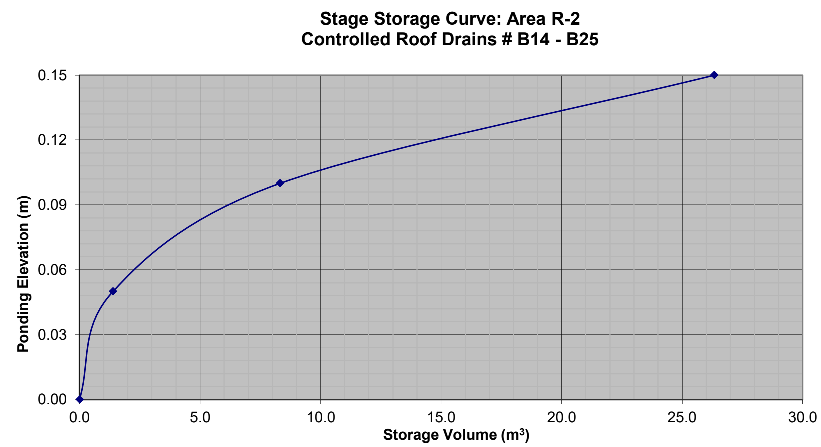
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	40.48	39.53	11.86
10	214.27	29.78	28.83	17.30
15	171.47	23.83	22.88	20.60
20	143.94	20.01	19.06	22.87
25	124.62	17.32	16.37	24.56
30	110.24	15.32	14.37	25.87
35	99.09	13.77	12.82	26.93
40	90.17	12.53	11.58	27.80
45	82.86	11.52	10.57	28.53
50	76.74	10.67	9.72	29.15
55	71.55	9.95	9.00	29.68
60	67.07	9.32	8.37	30.14
75	56.71	7.88	6.93	31.19
90	49.33	6.86	5.91	31.90
120	39.47	5.49	4.54	32.67
150	33.13	4.61	3.66	32.90
180	28.68	3.99	3.04	32.80
210	25.37	3.53	2.58	32.47

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

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:2 Year	0.79	0.79	10	8.2	26.3
1:5 Year	0.87	0.87	11	12.1	26.3
1:100 Year	0.95	0.95	15	26.1	26.3

Roof Drain Storage Table for Area RDs

Elevation	Area Roof Drains	Total Volume
m	m^2	m^3
0.00	0	0
0.05	55.44	1.4
0.10	221.75	8.3
0.15	498.94	26.3



Proposed Industrial Development				
Novatech Project No. 122151				
REQUIRED STORAGE - 1:2 YEAR EVENT				
AREA R-2: Building B Roof Drains B38 - B49				
OTTAWA IDF CURVE				
Area = 0.044 ha			Qallow = 0.79 L/s	
C = 0.90			Vol(max) = 6.9 m3	
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	11.40	10.61	3.18
10	76.81	8.46	7.67	4.60
15	61.77	6.80	6.01	5.41
20	52.03	5.73	4.94	5.93
25	45.17	4.97	4.18	6.27
30	40.04	4.41	3.62	6.51
35	36.06	3.97	3.18	6.68
40	32.86	3.62	2.83	6.79
45	30.24	3.33	2.54	6.86
50	28.04	3.09	2.30	6.89
55	26.17	2.88	2.09	6.90
60	24.56	2.70	1.91	6.89
75	20.81	2.29	1.50	6.76
90	18.14	2.00	1.21	6.52
120	14.56	1.60	0.81	5.85
150	12.25	1.35	0.56	5.03
180	10.63	1.17	0.38	4.10
210	9.42	1.04	0.25	3.11

Proposed Industrial Development				
Novatech Project No. 122151				
REQUIRED STORAGE - 1:5 YEAR EVENT				
AREA R-2: Building B Roof Drains B38 - B49				
OTTAWA IDF CURVE				
Area = 0.044 ha			Qallow = 0.87 L/s	
C = 0.90			Vol(max) = 10.3 m3	
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	15.54	14.75	4.43
10	104.19	11.47	10.68	6.41
15	83.56	9.20	8.41	7.57
20	70.25	7.73	6.94	8.33
25	60.90	6.70	5.91	8.87
30	53.93	5.94	5.15	9.26
35	48.52	5.34	4.55	9.56
40	44.18	4.86	4.07	9.78
45	40.63	4.47	3.68	9.94
50	37.65	4.15	3.36	10.07
55	35.12	3.87	3.08	10.15
60	32.94	3.63	2.84	10.21
75	27.89	3.07	2.28	10.26
90	24.29	2.67	1.88	10.17
120	19.47	2.14	1.35	9.74
150	16.36	1.80	1.01	9.10
180	14.18	1.56	0.77	8.33
210	12.56	1.38	0.59	7.46

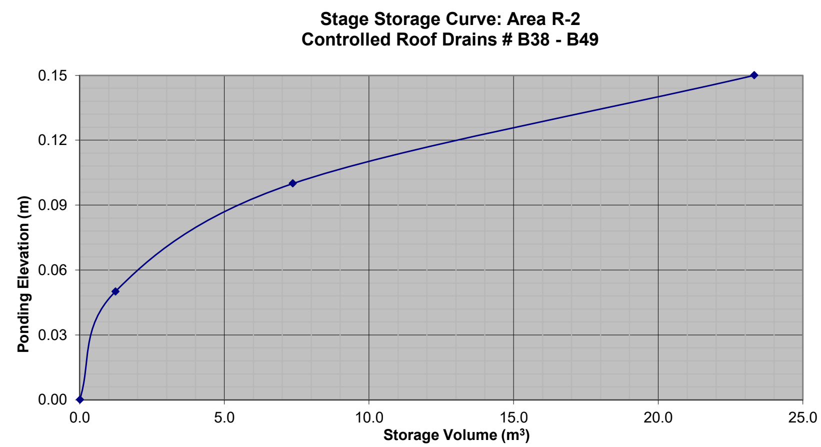
Proposed Industrial Development				
Novatech Project No. 122151				
REQUIRED STORAGE - 1:100 YEAR EVENT				
AREA R-2: Building B Roof Drains B38 - B49				
OTTAWA IDF CURVE				
Area = 0.044 ha			Qallow = 0.95 L/s	
C = 1.00			Vol(max) = 22.1 m3	
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	29.69	28.74	8.62
10	178.56	21.84	20.89	12.53
15	142.89	17.48	16.53	14.88
20	119.95	14.67	13.72	16.47
25	103.85	12.70	11.75	17.63
30	91.87	11.24	10.29	18.52
35	82.58	10.10	9.15	19.22
40	75.15	9.19	8.24	19.78
45	69.05	8.45	7.50	20.24
50	63.95	7.82	6.87	20.62
55	59.62	7.29	6.34	20.93
60	55.89	6.84	5.89	21.19
75	47.26	5.78	4.83	21.74
90	41.11	5.03	4.08	22.02
120	32.89	4.02	3.07	22.13
150	27.61	3.38	2.43	21.85
180	23.90	2.92	1.97	21.32
210	21.14	2.59	1.64	20.62

Proposed Industrial Development				
Novatech Project No. 122151				
REQUIRED STORAGE - 1:100 YEAR + 20%				
AREA R-2: Building B Roof Drains B38 - B49				
OTTAWA IDF CURVE				
Area = 0.044 ha			Qallow = 0.95 L/s	
C = 1.00			Vol(max) = 27.9 m3	
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	291.24	35.63	34.68	10.40
10	214.27	26.21	25.26	15.16
15	171.47	20.97	20.02	18.02
20	143.94	17.61	16.66	19.99
25	124.62	15.24	14.29	21.44
30	110.24	13.48	12.53	22.56
35	99.09	12.12	11.17	23.46
40	90.17	11.03	10.08	24.19
45	82.86	10.14	9.19	24.80
50	76.74	9.39	8.44	25.31
55	71.55	8.75	7.80	25.75
60	67.07	8.20	7.25	26.12
75	56.71	6.94	5.99	26.94
90	49.33	6.03	5.08	27.46
120	39.47	4.83	3.88	27.92
150	33.13	4.05	3.10	27.93
180	28.68	3.51	2.56	27.63
210	25.37	3.10	2.15	27.14

Watts Accutrol Flow Control Roof Drains:			RD-100-A-ADJ set to 1/4 Exposed		
Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Provided
1:2 Year	0.79	0.79	10	6.9	23.3
1:5 Year	0.87	0.87	11	10.3	23.3
1:100 Year	0.95	0.95	15	22.1	23.3

Roof Drain Storage Table for Area RDs

Elevation	Area Roof Drains	Total Volume
m	m^2	m^3
0.00	0	0
0.05	49.08	1.2
0.10	196.31	7.4
0.15	441.69	23.3



<u>Design Infiltration Rate:</u>
Hydraulic Conductivity of In-Situ Soil (provided by Geotechnical Consultant): 3 x 10^{-6} to 1 x 10^{-10}
Percolation Time (provided by Geotechnical Consultant): 35 to 50 mins/cm

Assumptions:
- Hydraulic Conductivity = 1 x 10^{-6}
- Percolation Time = 50 mins/cm
- Approximate Infiltration Rate = 12 mm/hr (From Ontario Ministry of Municipal Affairs and Housing and CVC LID SWM Manual)
- Least Permeable Infiltration Rate 1.5m Below Bottom of Clear stone Trench = 1.5 mm/hr

Infiltration Rate / Least Permeable Infiltration Rate Ratio = 8.0 (12 mm/hr / 1.5 mm/hr)

Safety Correction Factor for Ratio between 4.1 to 8.0 (from Safety Correction Factor Table) = 4.5

Design Infiltration Rate = Infiltration Rate / Safety Correction Factor
= 12 mm/hr / 4.5
= 2.7 mm/hr

NOVATECH
Engineers, Planners & Landscape Architects

Maximum Stone Reservoir Depth	
$d_{r\,max} = i * t_s / V_r$	**Value**
Where:	
$d_{r\,max}$ = Maximum stone reservoir depth (mm)	500
i = Infiltration rate for native soils (mm/hr)	2.7
V_r = Void space ratio for filter bed and gravel layer (assumed 0.4)	0.4
t_s = Time to drain (design for 48 hour time to drain is recommended)	71.4
Stone Reservoir Depth Provided for Water Quality (mm)	*500*
Total Stone Reservoir Depth Provided (mm)	*500*

Footprint Surface Area (Stone Reservoir)	
$A_f = WQV / (d_r * V_r)$	**Value**
Where:	
A_f = Footprint surface area (m^2)	230.0
WQV = Water quality volume (m^3)	46.0
d_r = Stone reservoir depth (m)	0.5
V_r = Void space ratio for filter bed and gravel layer (assumed 0.4)	0.4
Min. Length (m)	115.0
Min. Width (m)	2.0
Provided Length (m)	*115.0*
Provided Width (m)	*2.0*
Provided Footprint Surface Area (m^2)	*230.0*

"For Designs that include an underdrain, the filter media bed should be 1 to 1.25 metres in depth."
CVC LID SWM Planning and Design Guide (2010)

Calculation for Table 4.6: Infiltration Rate through Soil and Retention Time

Bioretention Area: Area A-1
Design Infiltration Rate: 2.7 mm/hr
Bottom Area of Clear stone Trench: 230.0 m^2 *(115.0m length x 2.0m width)*

Storage Volume:
Surface: 50.0 m^3 *(calculated by Autodesk Civil 3D surface from the grading plan)*
Clear stone: 46.0 m^3 *(115.0 m length x 2.0 m width x 0.5 m height x 0.4 void ratio)*
Total: 96.0 m^3

Infiltration Rate through Soil:
Infiltration Rate = percolation rate x bottom area of trench
= 2.7 mm/hr x 230.0 m^2 x [(1 m / 1000 mm) x (1 hr / 3600 sec) x (1000 L / 1 m^3)]
= 0.1725 L/s (assumes no infiltration through the sides)

Retention Time:
Retention time = storage volume of clear stone trench / infiltration rate through soil
= 96.0 m^3 / [0.1725 L/s x (1 m^3 / 1000 L) x (3600 sec / 1 hr)]
= 74.1 hours (3.1 days)

Calculation for Table 4.7: Infiltrated Volume of Stormwater

Bioretention Area: Area A-1
Drainage Area: 0.38 ha
Total Storage Volume: 96.0 m^3

Infiltration Depth:
Infiltration depth = storage volume / drainage area
= 46.0 m^3 / 0.38 ha x [(10000 m^2 / 1 ha) x (1 m / 1000 mm)]
= 25.3 mm

Percent of Average Annual Rainfall Infiltrated:
**Based on daily rainfall depths the amount of annual rainfall for events with 25 mm or less will be captured for infiltration.*

Average Annual Rainfall (May – October) = 515mm
Average Annual Number of Days with Rainfall of 0.2 mm – 5 mm = 48
Average Annual Number of Days with Rainfall of 5 mm – 10 mm = 15
Average Annual Number of Days with Rainfall of 10 mm – 25 mm = 12
Average Annual Number of Days with Minimum Rainfall of 25mm = 4

Annual Rainfall Infiltrated = number of days x minimum rainfall
= (48 x 0.2mm) + (15 x 5mm) + (12 x 10mm) + (4 x 25mm)
= 305 mm (59.2% of average annual rainfall)

Amount of Rainfall Infiltrated:
Amount of rainfall infiltrated = total rainfall infiltrated x drainage area
= (515 mm x 59.2%) x 0.38 ha x [(10000 m^2 / 1 ha) x (1 m / 1000mm)]
= 1158.5 m^3

Maximum Stone Reservoir Depth	
$d_{r\,max} = i * t_s / V_r$	**Value**
Where:	
$d_{r\,max}$ = Maximum stone reserovir depth (mm)	500.0
i = Infiltration rate for native soils (mm/hr)	2.7
V_r = Void space ratio for filter bed and gravel layer (assumed 0.4)	0.4
t_s = Time to drain (design for 48 hour time to drain is recommended)	74.1
Stone Reservoir Depth Provided for Water Quality (mm)	*500*
Total Stone Reservoir Depth Provided (mm)	*500*

Footprint Surface Area (Stone Reservoir)	
$A_f = WQV / (d_r * V_r)$	**Value**
Where:	
A_f = Footprint surface area (m^2)	702.0
WQV = Water quality volume (m^3)	140.4
d_r = Stone reservoir depth (m)	0.5
V_r = Void space ratio for filter bed and gravel layer (assumed 0.4)	0.4
Min. Length (m)	117.0
Min. Width (m)	6.0
Provided Length (m)	*117.0*
Provided Width (m)	*6.0*
Provided Footprint Surface Area (m^2)	*702.0*

"For Designs that include an underdrain, the filter media bed should be 1 to 1.25 metres in depth."
CVC LID SWM Planning and Design Guide (2010)

Calculation for Table 4.8: Infiltration Rate through Soil and Retention Time

Bioretention Area: Infiltration Gallery
Design Infiltration Rate: 2.7 mm/hr
Bottom Area of Clear stone Trench: 702 m^2 *(117.0m length x 6.0m width)*

Storage Volume:
Surface: 0.0 m^3
Clear stone: 140.4 m^3 *(117.0m length x 6.0m width x 0.5m height incl. perf. pipe x 0.4 void ratio)*
Total: 140.4 m^3

Infiltration Rate through Soil:
Infiltration Rate = percolation rate x bottom area of trench
= 2.7 mm/hr x 702 m^2 x [(1 m / 1000 mm) x (1 hr / 3600 sec) x (1000 L / 1 m^3)]
= 0.5265 L/s (assumes no infiltration through the sides)

Retention Time:
Retention time = storage volume of clear stone trench / infiltration rate through soil
= 140.4 m^3 / [0.5265 L/s x (1 m^3 / 1000 L) x (3600 sec / 1 hr)]
= 74.1 hours (3.1 days)

Calculation for Table 4.9: Infiltrated Volume of Stormwater

Bioretention Area: Infiltration Gallery
Drainage Area: 3.0 ha
Total Storage Volume: 84.0 m^3

Infiltration Depth:
Infiltration depth = storage volume / drainage area
= 140.4 m^3 / 3.0 ha x [(10000 m^2 / 1 ha) x (1 m / 1000 mm)]
= 4.7 mm

Percent of Average Annual Rainfall Infiltrated:
**Based on daily rainfall depths the amount of annual rainfall for events with 5 mm or less will be captured for infiltration.*

Average Annual Rainfall (May – October) = 515mm
Average Annual Number of Days with Rainfall of 0.2 mm – 5 mm = 48
Average Annual Number of Days with Minimum Rainfall of 5 mm = 31

Annual Rainfall Infiltrated = number of days x minimum rainfall
= (48 x 0.2mm) + (31 x 5mm)
= 165 mm (32% of average annual rainfall)

Amount of Rainfall Infiltrated:
Amount of rainfall infiltrated = total rainfall infiltrated x drainage area
= (515 mm x 32%) x 3.0 ha x [(10000 m^2 / 1 ha) x (1 m / 1000mm)]
= 4,944 m^3

Pavement Structure Drainage

Satisfactory performance of the pavement structure is largely dependent on keeping the contact zone between the subgrade material and the base stone in a dry condition. Failure to provide adequate drainage under conditions of heavy wheel loading can result in the fine subgrade soil being pumped into the voids in the stone subbase, thereby reducing its load carrying capacity.

For areas where silty clay is encountered at subgrade level, it is recommended that subdrains be installed during the pavement construction as per City of Ottawa standards. The subdrain inverts should be approximately 300 mm below subgrade level. The subgrade surface should be crowned to promote water flow to the drainage lines.

5.7 Percolation Rates

Infiltration galleries are anticipated to be located the within the subject site. It is anticipated that a silty clay will be encountered at the base of the infiltration galleries during the installation and will affect the rate of stormwater infiltration into the underlying material. The percolation rate was interpreted from the hydraulic conductivity which was estimated based on previous investigations within the area and on experience. Based on these values, the average percolation rate (T-Time) was estimated to be within the ranges in Table 6.

Table 6 - Estimated Percolation Rates

Material	Hydraulic Conductivity - k (m/sec)	Percolation (T-time) - (mins/cm)
Silty Clay [1]	**$3x10^{-6}$ to $1x10^{-10}$**	**35 to 50+**

[1] - Values are based upon site-specific testing carried out at a nearby phase of the development

Minnesota Pollution Control Agency

Design infiltration rates

Design infiltration rates, in inches per hour, for A, B, C, and D soil groups. Corresponding USDA soil classification and Unified soil Classifications are included. Note that A soils have two infiltration rates that are a function of soil texture.*

Link to this **table**

Hydrologic soil group	Infiltration rate (inches/hour)	Infiltration rate (centimeters/hour)	Soil textures	Corresponding Unified Soil Classification
A	1.63[a]	4.14	gravel sandy gravel silty gravels	GW - well-graded gravels, sandy gravels GP - gap-graded or uniform gravels, sandy gravels GM - silty gravels, silty sandy gravels SW - well-graded gravelly sands
	0.8	2.03	sand loamy sand sandy loam	SP - gap-graded or uniform sands, gravelly sands
B	0.45	1.14		SM - silty sands, silty gravelly sands
	0.3	0.76	loam, silt loam	MH - micaceous silts, diatomaceous silts, volcanic ash
C	0.2	0.51	Sandy clay loam	ML - silts, very fine sands, silty or clayey fine sands
D	0.06	0.15	clay loam silty clay loam sandy clay silty clay clay	GC - clayey gravels, clayey sandy gravels SC - clayey sands, clayey gravelly sands CL - low plasticity clays, sandy or silty clays OL - organic silts and clays of low plasticity CH - highly plastic clays and sandy clays OH - organic silts and clays of

OH - organic silts and clays of high plasticity

*NOTE that this table has been updated from Version 2.X of the Minnesota Stormwater Manual. There are no longer two different infiltration rates for B soils and a value of 0.06 is used for D soils (instead of < 0.2 in/hr).

Source: Thirty guidance manuals and many other stormwater references were reviewed to compile recommended infiltration rates. All of these sources use the following studies as the basis for their recommended infiltration rates: (1) Rawls, Brakensiek and Saxton (1982); (2) Rawls, Gimenez and Grossman (1998); (3) Bouwer and Rice (1984); and (4) Urban Hydrology for Small Watersheds (NRCS). SWWD, 2005, provides field documented data that supports the proposed infiltration rates. (view reference list)

[a]This rate is consistent with the infiltration rate provided for the lower end of the Hydrologic Soil Group A soils in the Wisconsin Department of Natural Resources Conservation Practice Standard: Site Evaluation for Stormwater Infiltration.

Retrieved from "http://stormwater.pca.state.mn.us/index.php?title=Design_infiltration_rates&oldid=28118"

Categories: Soil properties | Table

Search

This page was last modified on 22 August 2016, at 07:31.

Minnesota Pollution Control Agency | 651-296-6300, 800-657-3864 | Assistance | Web site policy

© 2016 by Minnesota Pollution Control Agency • Powered by MediaWiki

Natural Environment (NE) 20%

All three alternatives will have essentially the same impact on the natural environment. Alternative I has a minor increased impact due to the number of ponds (8) and there location within the KWCP.

5.5.2 Selection of Stormwater Management Alternatives

Based on the above evaluation, Alternative III is selected as the preferred stormwater management alternative. This option offers the greatest amount of flexibility for phasing opportunities while providing an economical servicing solution that meets the objectives of the Carp River Watershed/Subwatershed Study.

5.6 Best Management Practices

The Carp River Watershed/Subwatershed Study (Robinson Consultants, November 2004) proposes target infiltration rates of 104 mm/yr and 73 mm/yr for areas of moderate and low recharge, respectively, within the KWCP. To meet the identified infiltration targets suggested the following best management practices (BMP's) were recommended and are shown on Figures 7.3.3 through 7.3.7 in Appendix 3.4.

- Subsurface Infiltration;
- Biofilters;
- Wet ponds; and
- Dry ponds.

A water balance and subsurface hydrogeological investigation at the detailed design stage will dictate which of the proposed BMPs will be selected for specific developments.

Given the establishment of the dominant soil associations that exist in the Study area **(see Figure 5.4)**, and considering the extent of the poorly draining soils within the nearly flat topography, it is apparent that drainage in the Study area is primarily governed by the characteristics of the poorly draining silty clay to clay soils underlying all but a small percentage of the Study area. As a result, the establishment of the infiltration rates of the soils can be simplified to reflect the silty clay to clay soils and the till material over bedrock. Table 5.6 below summarizes the anticipated infiltration rates of these two principal soil groups, based on soil characteristics and borehole data regarding degree of compaction.

Table 5.6 -Summary of Infiltration Rates of Principal Soil Groups

Soil Groups	**Estimated Infiltration Rates [1] (mm/yr)**	**Percent of Annual Rainfall Infiltrated**
Castor, Dalhousie, North Gower (silty clay to clay)	50-70 mm/yr	5-7
Anstruther, Farmington, Nepean (sandy loams to till)	70-100 mm/yr	7-11

1. Infiltration rates presented in this table are consistent with the average hydraulic conductivities of the individual soils comprising the principal soil group.

As the infiltration rates provided in Table 5.6 reflect estimated hydraulic conductivities only, further in-situ analysis of soils under saturated loading conditions is necessary at each site in order to provide site-specific values. The above rates are based on borehole logs completed to date appended to this report in Appendix 3.5.

Post development infiltration rates are to be increased by 25 percent above the pre-development rate. This rate of infiltration has been established to compensate for those areas (ie. Roadway corridors) that can not provide infiltration.

5.7 Stormwater Management Design

Preliminary site plans of each of the proposed ponds have been prepared and are provided in Appendix 3.1. These ponds have been sized to meet the requirements established in Section 5.2. It is noted that the pond site plans are included to demonstrate the land area required to accommodate an appropriate SWM facility and are not intended for construction purposes. A detailed design of the specific facilities will be required at the subsequent design stage. Stage-storage curves for the proposed ponds are presented in Appendix 3.3.1.

At the detailed design stage for Ponds 6 and 7, consideration shall be made for erosion control volumes in order to comply with any erosion control criteria established for Feedmill Creek.

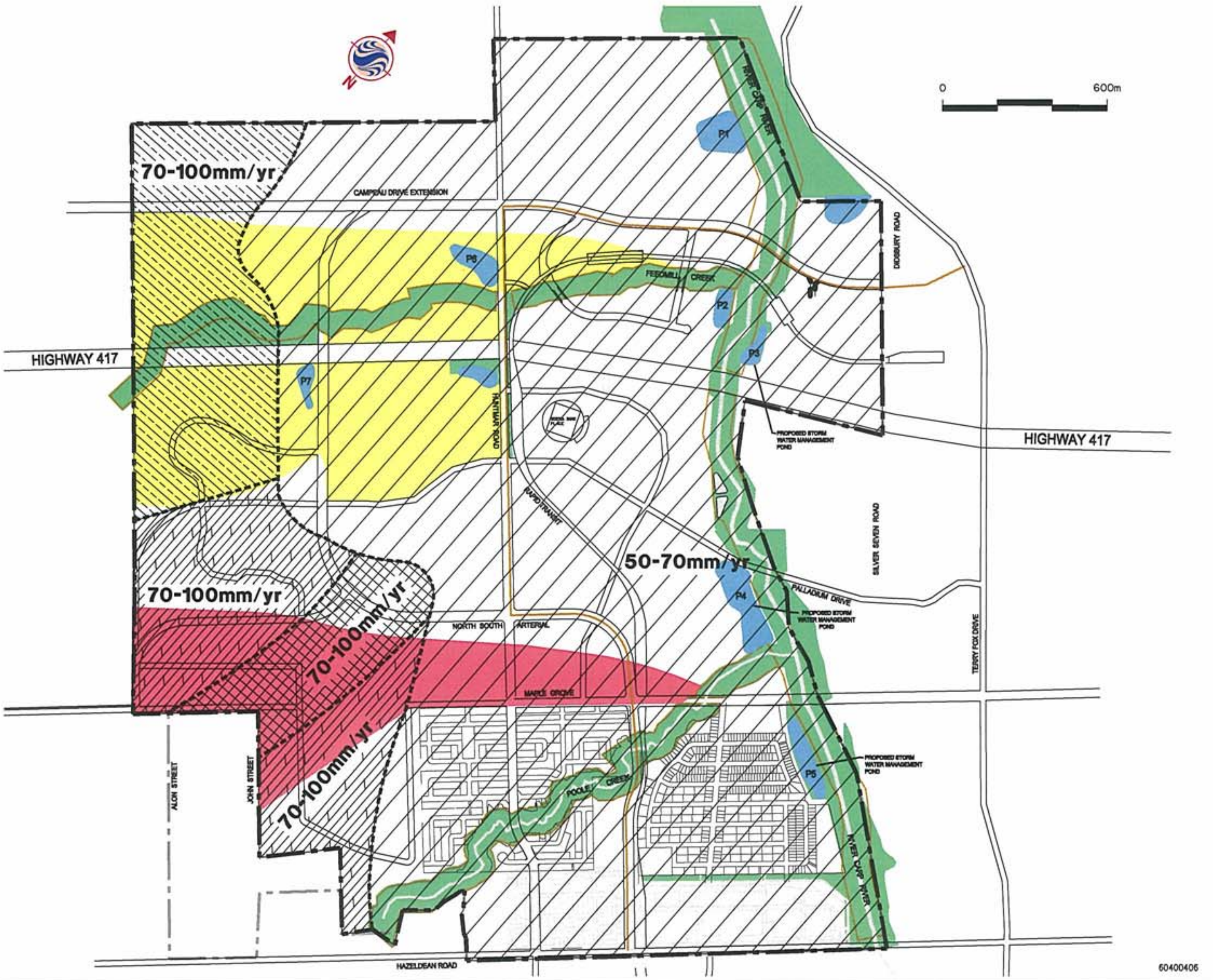
Low flow velocities for existing and future conditions were modeled for the 2, 5 and 10 year events to assess erosion potential. Pond banks are clay and loam and the calculated velocities do not approach levels that would create erosion for these banks.

The post development analysis addresses the potential changes in the Regulatory 1:100 year flood plain and the potential impact on erosion throughout the reach. The hydrologic and hydraulic analysis, which has been reviewed and supported by the Mississippi Valley Conservation Authority, indicates that there will be no significant impact. A further assessment of the potential for erosion has been conducted in the Flow Characterization and Flood Level Analysis, prepared by CH2MHill and dated June 2006. Pond sizing is provided in **Tables 5.7.1 and 5.7.2** below.

Table 5.7.1 – Stormwater Management Pond Elevations Constraining the Minor System

Pond	*Carp/Poole/Feedmill 100 year Water Level (m)**	*Carp/Poole/Feedmill Normal Water Level (m)*	*100 year Pond Level* (m)*
1	93.65	92.00	93.96
2	93.80	92.25	94.23
3	93.85	92.25	94.20
4	94.20	92.50	94.74
5	94.60	92.70	94.94
6	97.20	96.50	98.94
7	101.80	100.50	102.92

- 100 yr water levels from Mississippi Valley Conservation Authority Regulatory Floodplain Mapping



INFILTRATION TARGETS

SOIL TYPE	RECHARGE
FINE SAND	MODERATE
PALEOZOIC BEDROCK	MODERATE
TILL	MODERATE
CLAY	LOW

Kanata-West Concept Plan Boundary

Area Tributary To Feedmill Creek (Existing Conditions)

Area Tributary To Maple Grove Ditch System and Poole Creek (Existing Conditions)

OPEN SPACE

NOTE:
SOIL TYPES AND RECHARGE POTENTIAL FROM CARP RIVER WATERSHED/SUBWATERSHED STUDY BY ROBINSON CONSULTANTS INC. 2004.
TARGET INFILTRATION RATES OBTAINED FROM ENVIRONMENTAL FACT SHEETS FROM 2004 REPORT.

Stantec

CCL Cumming Cockburn Limited / IBI

MAY 2006

FIG. 5.4

Canadian Climate Normals 1971-2000 Station Data

The minimum number of years used to calculate these Normals is indicated by a code for each element. A "+" beside an extreme date indicates that this date is the first occurrence of the extreme value. Values and dates in bold indicate all-time extremes for the location.

Data used in the calculation of these Normals may be subject to further quality assurance checks. This may result in minor changes to some values presented here.

OTTAWA CDA * ONTARIO					
Latitude:	45°23'00.000" N	**Longitude**:	75°43'00.000" W	**Elevation**:	79.20 m
Climate ID:	6105976	**WMO ID**:		**TC ID**:	WCG

* This station meets WMO standards for temperature and precipitation.

▼ Temperature

Temperature	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
Daily Average (°C)	-10.5	-8.6	-2.4	6.0	13.6	18.4	21.0	19.7	14.7	8.2	1.5	-6.6	6.3	A
Standard Deviation	2.9	2.7	2.5	1.9	1.8	1.3	1.1	1.1	1.2	1.6	1.7	3.3	0.8	A
Daily Maximum (°C)	-6.1	-3.9	2.1	10.9	19.1	23.8	26.4	25.0	19.7	12.6	4.9	-2.9	11.0	A
Daily Minimum (°C)	-14.8	-13.2	-7.0	1.1	8.0	13.0	15.5	14.3	9.7	3.7	-1.9	-10.3	1.5	A
Extreme Maximum (°C)	11.7	12.2	25.6	31.2	35.0	36.7	37.8	**37.8**	36.7	29.4	23.3	16.1		
Date (yyyy/dd)	1932/14	1953/21	1945/28	1990/27	1921/21	1921/22	1913/04	**1917/01**	1931/11	1891/03	1961/03	1951/07		
Extreme Minimum (°C)	-37.8	-38.3	-36.7	-20.6	-7.2	0.0	3.3	1.7	-4.4	-12.8	-23.9	**-38.9**		
Date (yyyy/dd)	1925/19	1934/17	1938/04	1923/01	1902/10	1910/04	1942/10	1934/30	1947/28	1933/26	1925/30	**1933/29**		

▼ Precipitation

Precipitation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
Rainfall (mm)	22.9	16.1	33.6	59.7	80.9	91.2	88.9	87.6	86.8	76.2	60.5	28.8	733.2	A
Snowfall (cm)	49	41	32	7	0	0	0	0	0	3	18	52	203	A

Precipitation (mm)	64.2	51.6	64.9	67.7	81.0	91.2	88.9	87.6	86.8	79.1	77.0	74.1	914.2	A
Average Snow Depth (cm)	21	25	20	2	0	0	0	0	0	0	1	11	7	A
Median Snow Depth (cm)	21	25	20	1	0	0	0	0	0	0	1	10	7	A
Snow Depth at Month-end (cm)	23	26	9	0	0	0	0	0	0	0	4	16	7	A
Extreme Daily Rainfall (mm)	40.1	38.4	41.8	48.3	75.9	77.5	74.2	90.4	**93.2**	58.4	49.0	73.2		
Date (yyyy/dd)	1995/ 15	1997/ 21	1980/ 21	1956/ 15	1916/ 17	1946/ 17	1899/ 11	1943/ 23	**1942/ 09**	1995/ 05	1907/ 07	1933/ 31		
Extreme Daily Snowfall (cm)	**56**	46	48	33	19	0	0	0	0	22	53	38		
Date (yyyy/dd)	**1894/ 29**	1895/ 08	1947/ 02	1970/ 02	1907/ 04	1890/ 01	1890/ 01	1890/ 01	1890/ 01	1933/ 24	1912/ 25	1973/ 20		
Extreme Daily Precipitation (mm)	55.9	45.7	48.8	48.3	75.9	77.5	74.2	90.4	**93.2**	58.4	53.3	73.2		
Date (yyyy/dd)	1894/ 29	1895/ 08	1962/ 12	1956/ 15	1916/ 17	1946/ 17	1899/ 11	1943/ 23	**1942/ 09**	1995/ 05	1912/ 25	1933/ 31		
Extreme Snow Depth (cm)	53	**97**	89	66	8	0	0	0	0	18	30	51		
Date (yyyy/dd)	1971/ 30	**1971/ 24**	1971/ 12	1971/ 01	1963/ 11	1961/ 01	1961/ 01	1961/ 01	1961/ 01	1997/ 27	1995/ 28	1970/ 25		

▼ Days with Maximum Temperature

Days with Maximum Temperature

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
<= 0 °C	23.3	19.8	10.9	0.9	0.0	0.0	0.0	0.0	0.0	0.0	5.8	19.1	79.7	A
> 0 °C	7.7	8.5	20.1	29.1	31.0	30.0	31.0	31.0	30.0	31.0	24.2	11.9	285.5	A
> 10 °C	0.0	0.1	3.0	15.3	29.5	30.0	31.0	31.0	29.5	20.5	5.4	0.4	195.6	A
> 20 °C	0.0	0.0	0.1	2.6	12.8	24.1	29.8	27.4	13.6	2.6	0.1	0.0	113.2	A
> 30 °C	0.0	0.0	0.0	0.0	0.7	2.3	4.3	2.5	0.5	0.0	0.0	0.0	10.3	A
> 35 °C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	A

▼ Days with Minimum Temperature

Days with Minimum Temperature

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
> 0 °C	1.0	1.1	4.5	17.5	30.3	30.0	31.0	31.0	29.5	23.6	10.5	1.8	211.9	A

<= 2 °C	30.9	27.9	29.5	18.5	2.5	0.1	0.0	0.0	1.5	12.3	24.3	30.4	177.9	A
<= 0 °C	30.0	27.2	26.5	12.5	0.7	0.0	0.0	0.0	0.5	7.4	19.5	29.2	153.4	A
< -2 °C	29.0	25.6	21.9	7.0	0.2	0.0	0.0	0.0	0.0	2.7	13.1	26.2	125.7	A
< -10 °C	21.8	18.7	10.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	1.9	15.2	67.9	A
< -20 °C	8.6	5.9	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.4	18.9	A
< - 30 °C	0.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.7	A

▼ Days with Rainfall

Days with Rainfall

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
>= 0.2 mm	3.9	3.3	6.3	10.8	13.4	12.9	12.4	12	14.1	13.7	10.7	5.1	118.5	A
>= 5 mm	1.5	1.1	2.1	4	5.3	5.2	5.1	4.9	5.3	4.7	3.7	2.1	45	A
>= 10 mm	0.73	0.47	1	1.9	2.7	3.1	3.1	2.6	2.8	2.3	1.9	1.1	23.9	A
>= 25 mm	0.23	0.07	0.20	0.30	0.37	0.80	0.70	0.83	0.63	0.47	0.40	0	5	A

▼ Days With Snowfall

Days With Snowfall

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
>= 0.2 cm	14.8	10.6	8.2	2.7	0.17	0	0	0	0	1.1	5.5	13.4	56.6	A
>= 5 cm	3.4	2.7	2.6	0.37	0	0	0	0	0	0.10	1.2	3.6	13.9	A
>= 10 cm	0.80	0.93	0.83	0.17	0	0	0	0	0	0.07	0.40	1.4	4.6	A
>= 25 cm	0	0.13	0	0	0	0	0	0	0	0	0.03	0.07	0.23	A

▼ Days with Precipitation

Days with Precipitation

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
>= 0.2 mm	16.6	12.2	12.4	12.4	13.4	12.9	12.4	12.0	14.1	14.2	14.7	16.1	163.4	A
>= 5 mm	4.3	3.0	4.3	4.6	5.3	5.2	5.1	4.9	5.3	4.9	4.7	5.2	57.0	A
>= 10 mm	1.4	1.5	1.9	2.2	2.7	3.1	3.1	2.6	2.8	2.4	2.4	2.3	28.5	A
>= 25 mm	0.2	0.2	0.2	0.3	0.4	0.8	0.7	0.8	0.6	0.5	0.4	0.1	5.3	A

▼ Days with Snow Depth

Days with Snow Depth

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
>= 1 cm	30.3	28	25.7	5.4	0.04	0	0	0	0	0.40	5.9	23.8	119.5	A
>= 5 cm	28.2	27.6	23.5	3.6	0	0	0	0	0	0.13	3.7	20.3	107.1	A
>= 10 cm	24.2	24.3	20.5	2.6	0	0	0	0	0	0.03	1.6	13.8	87	A
>= 20 cm	15.6	16.4	12.8	1.5	0	0	0	0	0	0	0.17	5.3	51.7	A

▼ Degree Days

Degree Days

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
Above 24 °C	0	0	0	0	0.2	2.7	6.9	3.2	0.5	0	0	0	13.4	A

Above 18 °C	0	0	0	0.9	13	51	99.8	71.6	16.4	0.5	0	0	253	A
Above 15 °C	0	0	0	3.8	37.3	114.2	186.1	147.7	46.2	3.4	0	0	538.6	A
Above 10 °C	0	0	0.6	19.8	125.9	253.7	340.6	299.7	148.4	31.6	2.7	0	1222.8	A
Above 5 °C	0.1	0.3	8	76	266.3	403.2	495.6	454.7	291.1	115.3	21.1	0.8	2132.4	A
Above 0 °C	4.7	6.9	43.7	188.6	420.7	553.2	650.6	609.7	441	254.2	85.7	12.1	3270.9	A
Below 0 °C	329.8	249.1	118.9	8.5	0	0	0	0	0	0.3	39.8	217.5	963.9	A
Below 5 °C	480.2	383.8	238.2	46	0.7	0	0	0	0.1	16.5	125.2	361.2	1651.7	A
Below 10 °C	635.1	524.9	385.8	139.7	15.2	0.5	0	0	7.4	87.7	256.8	515.4	2568.5	A
Below 15 °C	790.1	666.2	540.2	273.7	81.6	11	0.5	3	55.3	214.5	404.1	670.4	3710.6	A
Below 18 °C	883.1	751	633.2	360.8	150.3	37.8	7.2	20	115.4	304.6	494.1	763.4	4520.8	A

▼ Soil Temperature

Soil Temperature

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
at 5 cm depth (AM obs) (°C)	-0.2	-0.7	-0.2	3.0	11.1	16.6	19.1	18.2	14.2	8.3	3.5	0.5	7.8	A
at 5 cm depth (PM obs) (°C)	-0.2	-0.6	-0.0	5.2	14.4	20.2	23.0	21.8	17.0	10.3	4.1	0.5	9.6	A
at 10 cm depth (AM obs) (°C)	0.0	-0.5	-0.1	3.2	11.2	16.7	19.2	18.4	14.6	8.8	3.8	0.8	8.0	A
at 10 cm depth (PM obs) (°C)	0.0	-0.4	0.0	4.7	13.6	19.4	22.1	21.1	16.6	10.2	4.2	0.8	9.4	A
at 20 cm depth (AM obs) (°C)	0.5	-0.1	0.3	3.4	11.5	17.0	19.6	19.0	15.3	9.7	4.6	1.4	8.5	A
at 20 cm depth (PM obs) (°C)	0.5	-0.0	0.3	4.1	12.6	18.3	21.0	20.2	16.2	10.2	4.8	1.4	9.1	A
at 50 cm depth (AM obs) (°C)	1.1	0.3	0.3	2.5	9.8	15.0	17.8	17.8	15.2	10.4	5.6	2.2	8.2	A
at 100 cm depth (AM obs) (°C)	2.9	2.0	1.6	2.5	7.6	12.3	15.2	16.2	15.0	11.7	7.8	4.5	8.3	A
at 150 cm depth (AM obs) (°C)	5.0	3.9	3.3	3.5	6.8	10.7	13.6	15.0	14.8	12.7	9.7	6.7	8.8	C
at 300 cm depth (AM obs) (°C)	7.0	5.9	5.1	4.6	5.7	8.1	10.4	12.1	12.9	12.3	10.7	8.7	8.6	A

▼ Evaporation

Evaporation

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
Lake Evaporation (mm)	0	0	0	0	3.6	4.3	4.5	3.7	2.4	1.4	0	0	0	C

▼ Bright Sunshine

Bright Sunshine

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
Total Hours	101.2	129.8	159.8	189.4	230.3	253.3	276.8	246.7	171.5	136.7	83.6	82.0	2061.1	C
Days with measureable	21.6	22.3	24.7	25.5	27.9	28.6	30.2	29.7	26.5	25.8	20.9	19.7	303.4	C

% of possible daylight hours	35.7	44.3	43.3	46.8	50.0	54.1	58.4	56.5	45.5	40.2	29.1	30.1	44.5	C
Extreme Daily	8.9	10.4	11.6	13.5	14.9	**15.2**	15.0	14.0	12.7	10.6	9.6	8.1		A
Date (yyyy/dd)	1981/31	1974/26	1987/24	1974/26	1997/27	**1979/25**	1978/01	1978/05	1991/01	1976/01	1985/01	1979/30		

▼ Radiation

Radiation

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
Extreme Global - RF1 (MJ/m2)	11.4	16.7	22.6	27.9	31.3	32.5	30.8	28.8	23.6	17.2	11.7	8.7		
Date (yyyy/dd)	1994/31	1994/27	1994/30	1986/23	1990/30	1987/20	1996/01	1987/01	1991/01	1992/01	1985/01	1989/01		
Extreme Net - RF4 (MJ/m2)	2.6	1.8	11.8	15.3	17.7	19.3	19.3	15.7	12.5	7.8	3.7	1.7		
Date (yyyy/dd)	1988/31	1986/28	1996/31	1993/14	1987/15	1987/17	1997/16	1995/07	1996/01	1995/01	1988/03	1987/10		

Legend

- A = WMO "3 and 5 rule" (i.e. no more than 3 consecutive and no more than 5 total missing for **either** temperature **or** precipitation)
- B = At least 25 years
- C = At least 20 years
- D = At least 15 years

Date modified: 2014-07-09

For the purpose of designing the infiltration BMP, hydraulic conductivity values (typically in centimetres per second) generated from permeameter or infiltrometer tests must be converted into infiltration rates (typically in millimetres per hour). **It is critical to note that hydraulic conductivity and infiltration rate are two different concepts and that conversion from one parameter to another cannot be done through unit conversion**. Particularly for fine grained soils, there is no consistent relationship due to the many factors involved. Table C1 and Figure C1 describes approximate relationships between hydraulic conductivity, percolation time and infiltration rate. Measured hydraulic conductivity values can be converted to infiltration rates using the approximate relationship described in Figure C1.

Table C1: Approximate relationships between hydraulic conductivity, percolation time and infiltration rate

Hydraulic Conductivity, K_{fs} (centimetres/second)	Percolation Time, T (minutes/centimetre)	Infiltration Rate, 1/T (millimetres/hour)
0.1	2	300
0.01	4	150
0.001	8	75
0.0001	12	50
0.00001	20	30
0.000001	50	12

Source: Ontario Ministry of Municipal Affairs and Housing (OMMAH). 1997. Supplementary Guidelines to the Ontario Building Code 1997. SG-6 Percolation Time and Soil Descriptions. Toronto, Ontario.

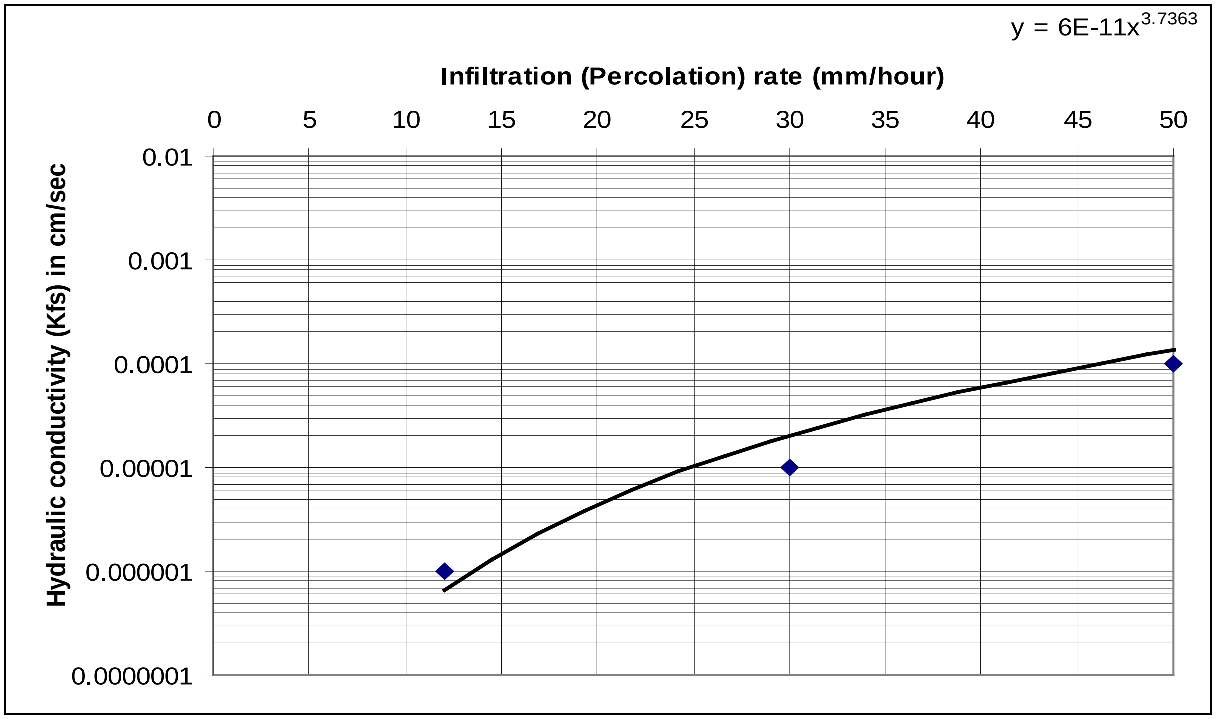
Following testing, the test pits should be refilled with the original soil and the surface replaced with the original topsoil.

The results and locations of all test pits, soil borings and infiltration tests should be included in documents submitted to commenting and approval agencies in support of the development proposal.

C2.4 Step 4. Design Considerations

The infiltration rate used to design an infiltration BMP must incorporate a safety correction factor that compensates for potential reductions in soil permeability due to compaction or smearing during construction, gradual accumulation of fine sediments over the lifespan of the BMP and uncertainty in measured values when less permeable soil horizons exist within 1.5 metres below the proposed bottom elevation of the BMP.

Figure C1: Approximate relationship between infiltration rate and hydraulic conductivity



Source: Ontario Ministry of Municipal Affairs and Housing (OMMAH). 1997. Supplementary Guidelines to the Ontario Building Code 1997. SG-6 Percolation Time and Soil Descriptions. Toronto, Ontario.

The measured infiltration rate (in millimetres per hour) at the proposed bottom elevation of the BMP must be divided by a safety correction factor selected from Table C2 to calculate the design infiltration rate. To select a safety correction factor from Table C2, calculate the ratio of the mean (geometric) measured infiltration rate at the proposed bottom elevation of the BMP to the rate in the least permeable soil horizon within 1.5 metres below the bottom of the BMP. Based on this ratio, a safety correction factor is selected from Table C2. For example, where the mean infiltration rate measured at the proposed bottom elevation of the BMP is 30 mm/h, and the mean infiltration rate measured in an underlying soil horizon within 1.5 metres of the bottom is 12 mm/h, the ratio would be 2.5, the safety correction factor would be 3.5, and the design infiltration rate would be 8.6 mm/h. Where the soil horizon is continuous within 1.5 metres below the proposed bottom of the BMP, the mean infiltration rate measured at the bottom elevation of the BMP should be divided by a safety correction factor of 2.5 to calculate the design infiltration rate.

Table C2: Safety correction factors for calculating design infiltration rates

Ratio of Mean Measured Infiltration Rates[1]	Safety Correction Factor[2]
≤ 1	2.5
1.1 to 4.0	3.5
4.1 to 8.0	4.5
8.1 to 16.0	6.5
16.1 or greater	8.5

Source: Wisconsin Department of Natural Resources. 2004. Conservation Practice Standards. Site Evaluation for Stormwater Infiltration (1002). Madison, WI.

Notes:

1. Ratio is determined by dividing the geometric mean measured infiltration rate at the proposed bottom elevation of the BMP by the geometric mean measured infiltration rate of the least permeable soil horizon within 1.5 metres below the proposed bottom elevation of the BMP.
2. The design infiltration rate is calculated by dividing the geometric mean measured infiltration rate at the proposed bottom elevation of the BMP by the safety correction factor.

The design infiltration rate should be used to determine the maximum depth of the water storage component of the BMP, based on the desired drawdown period (typically 48 hours to fully drain the BMP; see Chapter 4 for guidance regarding the design of specific infiltration BMP types). Based on the calculated design infiltration rate, assumptions regarding the bottom elevation of the BMP may need to be reconsidered and further infiltration testing may be warranted.

APPENDIX E
Development Servicing Study Checklist

NOVATECH
Engineers, Planners & Landscape Architects

Project Name: 405 Huntmar Drive
Project Number: 122151
Date: December 16, 2022
Revised: March 30, 2023

Development Servicing Study Checklist

4.1 General Content	Addressed (Y/N/NA)	Section	Comments
Executive Summary (for larger reports only).	NA		
Date and revision number of the report.	Y	Cover	
Location map and plan showing municipal address, boundary, and layout of proposed development.	Y	1	Fig 1, Fig 2
Plan showing the site and location of all existing services.	Y	1	Fig 2, Engineering Drawings
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.	N		
Summary of Pre-consultation Meetings with City and other approval agencies.	Y	1.0	Appendix A
Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria.	Y	1.0	
Statement of objectives and servicing criteria.	Y	1.0	
Identification of existing and proposed infrastructure available in the immediate area.	Y		Engineering Drawings
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).	Y	4.0	
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 neighboring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.	Y		Engineering Drawings

NOVATECH
Engineers, Planners & Landscape Architects

Development Servicing Study Checklist

4.1 General Content	Addressed (Y/N/NA)	Section	Comments
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.	Y	1.0	Geotechnical Report submitted under separate cover
All preliminary and formal site plan submissions should have the following information:			
Metric scale	Y		Engineering Drawings
North arrow (including construction North)	Y		Engineering Drawings
Key plan	Y		Engineering Drawings, Fig 1
Name and contact information of applicant and property owner	Y		Engineering Drawings
Property limits including bearings and dimensions	Y		Engineering Drawings
Existing and proposed structures and parking areas	Y		Engineering Drawings
Easements, road widening and rights-of-way	Y		Engineering Drawings
Adjacent street names	Y		Engineering Drawings

Development Servicing Study Checklist

4.2 Water	Addressed (Y/N/NA)	Section	Comments
Confirm consistency with Master Servicing Study, if available.	Y	2.0	
Availability of public infrastructure to service proposed development.	Y	2.0	
Identification of system constraints.	Y	2.0	
Identify boundary conditions.	Y	2.0	Appendix B
Confirmation of adequate domestic supply and pressure.	Y	2.0	
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.	Y	2.0	Appendix B
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.	Y	2.0	
Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design.	Y	2.0	
Address reliability requirements such as appropriate location of shut-off valves.	Y	2.0	
Check on the necessity of a pressure zone boundary modification.	NA		
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.	Y	2.0	Appendix B
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.	Y	2.0	Fig 4, Fig 5
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.	Y	2.0	
Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Y	2.0	Appendix B
Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	Y	2.0	Appendix B

NOVATECH
Engineers, Planners & Landscape Architects

Project Name: 405 Huntmar Drive
Project Number: 122151
Date: December 16, 2022
Revised: March 30, 2023

Development Servicing Study Checklist

4.3 Wastewater	Addressed (Y/N/NA)	Section	Comments
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).	Y	3.0	
Confirm consistency with Master Servicing Study and/or justifications for deviations.	Y	3.0	
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.	NA		
Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Y	3.0	
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)	Y	3.0	
Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	Y	3.0	Appendix C
Description of proposed sewer network including sewers, pumping stations, and forcemains.	Y	3.0	Appendix C
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).	NA		
Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	NA		
Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	NA		
Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	NA		
Special considerations such as contamination, corrosive environment etc.	NA		

Development Servicing Study Checklist

4.4 Stormwater	Addressed (Y/N/NA)	Section	Comments
Description of drainage outlets and downstream constraints including legality of outlet (i.e. municipal drain, right-of-way, watercourse, or private property).	Y	4.0	
Analysis of the available capacity in existing public infrastructure.	Y	4.0	Appendix D
A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns and proposed drainage patterns.	Y		Fig 1, Fig 2 Engineering Drawings
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.	Y	4.0	
Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	Y	4.0	
Description of stormwater management concept with facility locations and descriptions with references and supporting information.	Y	4.0	
Set-back from private sewage disposal systems.	N/A		
Watercourse and hazard lands setbacks.	N/A		
Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	Y	1.0	Appendix A
Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	N/A		
Storage requirements (complete with calcs) and conveyance capacity for 5 yr and 100 yr events.	Y	4.0	Appendix D
Identification of watercourse within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	N/A		
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.	Y	4.0	Appendix D
Any proposed diversion of drainage catchment areas from one outlet to another.	Y	4.0	
Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and SWM facilities.	Y	4.0	Fig 7 Engineering Drawings
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.	NA		

Development Servicing Study Checklist

4.4 Stormwater	**Addressed (Y/N/NA)**	**Section**	**Comments**
Identification of municipal drains and related approval requirements.	N/A		
Description of how the conveyance and storage capacity will be achieved for the development.	Y	4.0	
100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	Y		
Inclusion of hydraulic analysis including HGL elevations.	N		
Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Y	5.0	Engineering Drawings
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 constrains related to floodplain and geotechnical investigation.	NA		

Development Servicing Study Checklist

4.5 Approval and Permit Requirements	Addressed (Y/N/NA)	Section	Comments
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.	Y	1.0	Appendix A
Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.	NA		
Changes to Municipal Drains.	NA		
Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)	NA		

4.6 Conclusion	Addressed (Y/N/NA)	Section	Comments
Clearly stated conclusions and recommendations.	Y	6.0	
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.	N		
All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario.	Y	7.0	Appendices

APPENDIX F

Drawings

GENERAL NOTES:

1. COORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
2. DETERMINE THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION. PROTECT AND ASSUME RESPONSIBILITY FOR ALL EXISTING UTILITIES WHETHER OR NOT SHOWN ON THIS DRAWING.
3. OBTAIN ALL NECESSARY PERMITS AND APPROVALS FROM THE CITY OF OTTAWA BEFORE COMMENCING CONSTRUCTION.
4. BEFORE COMMENCING CONSTRUCTION OBTAIN AND PROVIDE PROOF OF COMPREHENSIVE, ALL RISK AND OPERATIONAL LIABILITY INSURANCE FOR $5,000,000.00. INSURANCE POLICY TO NAME OWNERS, ENGINEERS AND ARCHITECTS AS CO-INSURED.
5. COMPLETE ALL WORKS IN ACCORDANCE WITH THE MOST CURRENT CITY OF OTTAWA STANDARDS AND SPECIFICATIONS USING THE CURRENT GUIDELINES, BYLAWS AND STANDARDS INCLUDING MATERIALS OF CONSTRUCTION, DISINFECTION AND ALL RELEVANT REFERENCES TO OPSS, OPSD & AWWA GUIDELINES - ALL CURRENT VERSIONS AND 'AS AMENDED'.
6. RESTORE ALL DISTURBED AREAS ON-SITE AND OFF-SITE, INCLUDING TRENCHES AND SURFACES ON PUBLIC ROAD ALLOWANCES TO EXISTING CONDITIONS OR BETTER TO THE SATISFACTION OF THE CITY OF OTTAWA AND ENGINEER.
7. REMOVE FROM SITE ALL EXCESS EXCAVATED MATERIAL, ORGANIC MATERIAL AND DEBRIS UNLESS OTHERWISE INSTRUCTED BY ENGINEER. EXCAVATE AND REMOVE FROM SITE ANY CONTAMINATED MATERIAL, ALL CONTAMINATED MATERIAL SHALL BE DISPOSED OF AT A LICENSED LANDFILL FACILITY.
8. ALL ELEVATIONS ARE GEODETIC.
9. REFER TO THE GEOTECHNICAL INVESTIGATION REPORT (NO. PG6394-1, REV. 1, DATED SEPTEMBER 1, 2022) PREPARED BY PATERSON GROUP INC., FOR SUBSURFACE CONDITIONS, CONSTRUCTION RECOMMENDATIONS, AND GEOTECHNICAL INSPECTION REQUIREMENTS. THE GEOTECHNICAL CONSULTANT IS TO REVIEW ON-SITE CONDITIONS AFTER EXCAVATION PRIOR TO PLACEMENT OF THE GRANULAR MATERIAL.
10. REFER TO ARCHITECT'S AND LANDSCAPE ARCHITECT'S DRAWINGS FOR BUILDING AND HARD SURFACED AREAS AND DIMENSIONS.
11. REFER TO THE 'SITE SERVICING AND STORMWATER MANAGEMENT REPORT' (R-2022-209) 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 LOT PAINTING AS REQUIRED BY ARCHITECT.
14. CONTRACTOR TO PROVIDE THE CONSULTANT WITH A SERVICING PLAN OF 122151-GP1 AND 122151-GP2 INDICATING ALL SERVICING AS-BUILT INFORMATION SHOWN ON THE SERVICING PLANS. AS-BUILT INFORMATION MUST INCLUDE: PIPE MATERIAL, SIZES, LENGTHS, SLOPES, INVERT AND T/G ELEVATIONS, STRUCTURE LOCATIONS, VALVE AND HYDRANT LOCATIONS, T/WM ELEVATIONS AND ANY ALIGNMENT CHANGES, ETC.

SEWER NOTES:

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

ITEM	SPEC. No.	REFERENCE
CATCHBASIN (600x600mm)	705.010	OPSD
STORM / SANITARY MANHOLE (1200mmØ)	701.010	OPSD
STORM / CATCHBASIN MANHOLE (2400mmØ)	701.013	OPSD
CB, FRAME & COVER	400.020	OPSD
STORM / SANITARY MH FRAME & COVER	401.010	OPSD
WATERTIGHT MH FRAME AND COVER	401.030	OPSD
SEWER TRENCH	S6	CITY OF OTTAWA
SANITARY / STORM SEWER / CB LEAD	PVC DR 35	
STORM SUPER-PIPE (600mm DIAMETER AND OVER)	CONCRETE 65-D	

3. THE WEEPING TILE SERVICE SHALL BE EQUIPPED WITH A BACKFLOW PREVENTION DEVICE AS PER THE CITY OF OTTAWA STANDARD DETAIL S18.
4. INSULATE ALL PIPES (SAN/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.
5. SERVICES ARE TO BE CONSTRUCTED TO 1.0m FROM FACE OF BUILDING AT A MINIMUM SLOPE OF 1.0%.
6. PIPE BEDDING, COVER AND BACKFILL ARE TO BE COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY. THE USE OF CLEAR CRUSHED STONE AS A BEDDING LAYER SHALL NOT BE PERMITTED.
7. FLEXIBLE CONNECTIONS ARE REQUIRED FOR CONNECTING PIPES TO MANHOLES (FOR EXAMPLE KOR-N-SEAL, PSX: POSITIVE SEAL AND DURASEAL). THE CONCRETE CRADLE FOR THE PIPE CAN BE ELIMINATED.
8. THE OWNER SHALL REQUIRE THAT THE SITE SERVICING CONTRACTOR PERFORM FIELD TESTS FOR QUALITY CONTROL OF ALL SANITARY SEWERS. LEAKAGE TESTING SHALL BE COMPLETED IN ACCORDANCE WITH OPSS 410.07.16, 410.07.16.04 AND 407.07.24. DYE TESTING IS TO BE COMPLETED ON ALL SANITARY SERVICES TO CONFIRM PROPER CONNECTION TO THE SANITARY SEWER MAIN. THE FIELD TESTS SHALL BE PERFORMED IN THE PRESENCE OF A CERTIFIED PROFESSIONAL ENGINEER WHO SHALL SUBMIT A CERTIFIED COPY OF THE TEST RESULTS.
9. TYPICAL STORM MANHOLES AND CATCHBASIN MANHOLES ARE TO HAVE 300mm SUMPS UNLESS OTHERWISE INDICATED. ALL CATCHBASINS ARE TO HAVE 600mm SUMPS UNLESS OTHERWISE INDICATED.
10. ALL CATCHBASINS, MANHOLES AND/OR CATCHBASIN MANHOLES THAT ARE TO HAVE ICD'S INSTALLED WITHIN THEM ARE TO HAVE 600mm SUMPS.
11. ALL WEEPING TILE CONNECTIONS TO BE MADE TO THE PROPOSED STORM SEWER SYSTEM DOWNSTREAM OF ANY INLET CONTROL DEVICES.
12. THE CONTRACTOR IS TO TELEVISE (CCTV) ALL PROPOSED SEWERS, 200mmØ OR GREATER PRIOR TO BASE COURSE ASPHALT. UPON COMPLETION OF CONTRACT, THE CONTRACTOR IS RESPONSIBLE TO FLUSH AND CLEAN ALL SEWERS & APPURTENANCES. PROVIDE A COPY OF ALL CCTV INSPECTION REPORTS TO THE ENGINEER FOR REVIEW.

GRADING NOTES:

1. ALL TOPSOIL, ORGANIC OR DELETERIOUS MATERIAL MUST BE ENTIRELY REMOVED FROM BENEATH THE PROPOSED PAVED AREAS AS DIRECTED BY THE SITE ENGINEER OR GEOTECHNICAL ENGINEER.
2. EXPOSED SUBGRADES IN PROPOSED PAVED AREAS SHOULD BE PROOF ROLLED WITH A LARGE STEEL DRUM ROLLER AND INSPECTED BY THE GEOTECHNICAL ENGINEER PRIOR TO THE PLACEMENT OF GRANULARS.
3. ANY SOFT AREAS EVIDENT FROM THE PROOF ROLLING SHOULD BE SUB-EXCAVATED AND REPLACED WITH SUITABLE MATERIAL THAT IS FROST COMPATIBLE WITH THE EXISTING SOILS AS RECOMMENDED BY THE GEOTECHNICAL ENGINEER.
4. THE GRANULAR BASE SHOULD BE COMPACTED TO AT LEAST 98% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY VALUE. ANY ADDITIONAL GRANULAR FILL USED BELOW THE PROPOSED PAVEMENT SHOULD BE COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY VALUE.
5. MINIMUM OF 2% GRADE FOR ALL GRASS AREAS UNLESS OTHERWISE NOTED.
6. MAXIMUM TERRACING GRADE TO BE 3:1 UNLESS OTHERWISE NOTED.
7. ALL GRADES BY CURBS ARE EDGE OF PAVEMENT GRADES UNLESS OTHERWISE INDICATED.
8. ALL CURBS SHALL BE BARRIER CURB (150mm) UNLESS OTHERWISE NOTED AND CONSTRUCTED AS PER CITY OF OTTAWA STANDARDS (SC1.1).
9. REFER TO LANDSCAPE PLAN FOR PLANTING AND OTHER LANDSCAPE FEATURE DETAILS.
10. CONTRACTOR TO PROVIDE THE CONSULTANT WITH A GRADING PLAN INDICATING AS-BUILT ELEVATIONS OF ALL DESIGN GRADES SHOWN ON PLANS 122151-GR1 AND 122151-GR2.

PAVEMENT STRUCTURES:

LIGHT DUTY PAVEMENT
50mm HL-3 or SUPERPAVE 12.5
150mm GRANULAR "A"
300mm GRANULAR "B" TYPE II
ASPHALT GRADE PG 58-34 - TRAFFIC LEVEL 'B'
*INSTALLED PER GEOTECHNICAL REPORT

HEAVY DUTY PAVEMENT
40mm HL-3 or SUPERPAVE 12.5
50mm HL-8 or SUPERPAVE 19.0
150mm GRANULAR "A"
400mm GRANULAR "B" TYPE II
ASPHALT GRADE PG 58-34 - TRAFFIC LEVEL 'B'
*INSTALLED PER GEOTECHNICAL REPORT

HEAVY DUTY CONCRETE ROADWAY
CONCRETE AND HEAVY DUTY GRANULAR
BASE INSTALLED PER GEOTECHNICAL REPORT

HEAVY DUTY PAVEMENT - ROADWAY RE-INSTATEMENT
MATCH EXISTING GRANULAR STRUCTURE OF ROADWAY IN TRENCHES
MATCH EXISTING ASPHALT THICKNESSES IN TRENCHES
NEW ASPHALT GRADE: PG 58-34
PROVIDE MUNICIPAL ROADWAY ASPHALT OVERLAY AS SHOWN, PER CITY STANDARD DETAIL R10. REFER TO AMENDED ROAD ACTIVITY BY-LAW 2003-445.

EROSION AND SEDIMENT CONTROL NOTES :

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

1. ALL EROSION AND SEDIMENT CONTROLS ARE TO BE INSTALLED TO THE SATISFACTION OF THE ENGINEER AND THE CITY OF OTTAWA, THEY ARE TO BE APPROPRIATE TO THE SITE CONDITIONS, PRIOR TO UNDERTAKING ANY SITE ALTERATIONS (FILLING, GRADING, REMOVAL OF VEGETATION, ETC.) AND DURING ALL PHASES OF SITE PREPARATION AND CONSTRUCTION. THESE PRACTICES ARE TO BE IMPLEMENTED IN ACCORDANCE WITH THE CURRENT BEST MANAGEMENT PRACTICES FOR EROSION AND SEDIMENT CONTROL AND SHOULD INCLUDE AS A MINIMUM THOSE MEASURES INDICATED ON THE PLAN.
2. EROSION AND SEDIMENT CONTROL MEASURES WILL BE IMPLEMENTED DURING CONSTRUCTION IN ACCORDANCE WITH THE "GUIDELINES ON EROSION AND SEDIMENT CONTROL FOR URBAN CONSTRUCTION SITES" (GOVERNMENT OF ONTARIO, MAY 1987). THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR MEETING ALL REGULATORY AGENCY REQUIREMENTS.
3. TO PREVENT SURFACE EROSION FROM ENTERING ANY STORM SEWER SYSTEM DURING CONSTRUCTION, FILTER BAGS WILL BE PLACED UNDER GRATES OF NEARBY CATCHBASINS AND STRUCTURES. 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 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.
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 HIGHER AREAS.

WATERMAIN NOTES:

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

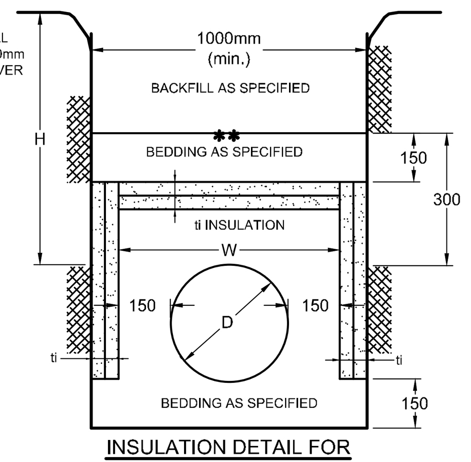
ITEM	SPEC. No.	REFERENCE
WATERMAIN TRENCHING	W17	CITY OF OTTAWA
HYDRANT INSTALLATION	W19	CITY OF OTTAWA
THERMAL INSULATION IN SHALLOW TRENCHES	W22	CITY OF OTTAWA
THERMAL INSULATION AT OPEN STRUCTURES	W23	CITY OF OTTAWA
VALVE BOX ASSEMBLY	W24	CITY OF OTTAWA
WATERMAIN CROSSING BELOW SEWER	W25	CITY OF OTTAWA
WATERMAIN CROSSING OVER SEWER	W25.2	CITY OF OTTAWA
CONCRETE THRUST BLOCKS	W25.3 & W25.4	CITY OF OTTAWA
CATHODIC PROTECTION	W40	CITY OF OTTAWA
ANODE INSTALLATION	W42	CITY OF OTTAWA
WATERMAIN MATERIAL	PVC DR 18	

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

INSULATION NOTES:
1. THE THICKNESS OF SEWER INSULATION SHALL BE THE EQUIVALENT OF 25mm FOR EVERY 300mm REDUCTION IN THE REQUIRED DEPTH OF COVER LESS THAN 1800mm (SEE TABLE BELOW)

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

COVER (mm)	INSULATION THICKNESS (mm)
1800-1500	50
1500-1200	75
1200-900	100
900-600	125



INSULATION DETAIL FOR SHALLOW SEWERS
NOT TO SCALE

PROPOSED 300mmØ WATERMAIN TABLE: OFF-SITE EXTENSION

STATION	SURFACE ELEVATION	T/WM ELEVATION	COMMENTS
5+000	100.26	97.86	300mmØ VALVE & VALVE BOX @ PROPERTY LINE (0+448.6)
5+009.6	99.62	97.82 **	INSULATE WATERMAIN AT CROSSING BELOW ROADSIDE DITCH
5+025	100.42	67.65	- - -
5+025.6	100.31	67.65 ***	CROSS BELOW EX. STREETLIGHT WIRING (±1.7m CLEARANCE)
5+026.7	100.09	67.64 ***	CROSS BELOW EX. 150mmØ GAS MAIN (±1.4m CLEARANCE)
5+028.5	100.00	97.60	45° HORIZONTAL BEND
5+032.8	99.98	97.58	45° HORIZONTAL BEND
5+050	99.96	97.50	- - -
5+075	100.17	97.58	- - -
5+087.3	99.99	97.60	45° HORIZONTAL BEND
5+088.2	99.99	97.60	300 x 200 REDUCER
5+090.2	99.99	97.55	200mmØ VALVE & VALVE BOX
5+091.7	99.98±	97.55 *	CONNECTION TO EXISTING WATERMAIN - NEW 200 x 200 x 200 TEE

* CONNECTIONS TO EXISTING 300mmØ and 200mmØ WATERMAINS. EXACT ELEVATIONS TO BE FIELD DETERMINED.
** PROVIDE THERMAL INSULATION AS PER CITY OF OTTAWA DETAILS W22 IN SHALLOW TRENCHES WHERE COVER IS LESS THAN 2.4m AND/OR W23 ADJACENT TO OPEN STRUCTURES.
*** PIPE CROSSINGS WITH WATERMAINS ARE TO BE IN ACCORDANCE WITH CITY STANDARDS W25 AND W25.2 TO AVOID CONFLICTS, WHERE POSSIBLE.

INLET CONTROL DEVICE DATA TABLE: AREA A-1 (OUTLET PIPE of CB 01)

DESIGN EVENT	ICD TYPE (PLUG TYPE)	DIAMETER OF OUTLET PIPE (mm)	PEAK DESIGN FLOW (L/s)	½ PEAK DESIGN FLOW (L/s)	DESIGN HEAD (m)	WATER ELEVATION (m)	VOLUME (m^3)	AVAILABLE STORAGE
1:2 YR	CIRCULAR 171mmØ ORIFICE PLUG	250mmØ PVC DR35	61.2	30.6	0.94	101.55	8.9	> 120 m^3
1:5 YR			62.8	31.4	0.99	101.60	17.5	
1:100 YR			65.6	32.8	1.08	101.69	55.7	

PROPOSED 300mmØ WATERMAIN TABLE: EAST / WEST ON-SITE LOOP

STATION	SURFACE ELEVATION	T/WM ELEVATION	COMMENTS
0+000	102.05±	99.65 *	CONNECTION TO EXISTING 300mmØ WATERMAIN TEE
0+009.5	102.10	99.70	300mmØ VALVE & VALVE BOX @ PROPERTY LINE
0+012.2	102.05	99.65	300 x 300 x 300 TEE (1+000)
0+013.0	102.05	99.65	300mmØ VALVE & VALVE BOX
0+025	102.03	99.63	- - -
0+050	102.46	100.06	- - -
0+075	102.26	99.86	- - -
0+100	102.33	99.93	- - -
0+125	102.24	99.84	- - -
0+139.0	102.10	99.70	45° HORIZONTAL BEND
0+141.9	102.10	99.70	45° HORIZONTAL BEND
0+150	102.10	99.70	- - -
0+151.6	102.09	99.69	300 x 150 x 300 TEE (HYDRANT No. 05)
0+175	102.21	99.81	- - -
0+200	101.95	99.55	- - -
0+225	101.87	99.47	- - -
0+250	101.84	99.44	- - -
0+275	101.56	99.16	- - -
0+295.8	101.43	99.03	300 x 150 x 300 TEE (HYDRANT No. 04)
0+297.4	101.40	99.00	300mmØ VALVE & VALVE BOX
0+298.4	101.38	98.98	22.5° HORIZONTAL BEND
0+320.6	101.25	98.85	CROSS BELOW 250mmØ STM [Inv=99.68m] (±0.8m CLEARANCE)
0+321.7	101.30	98.90	22.5° HORIZONTAL BEND
0+350	101.65	98.75	- - -
0+375	101.60	98.45	- - -
0+386.6	101.45	98.45	45° HORIZONTAL BEND
0+390.9	101.00	98.45	45° HORIZONTAL BEND
0+400	100.85	98.45	- - -
0+407.7	101.00	98.60	45° HORIZONTAL BEND
0+410.5	101.05	98.65	45° HORIZONTAL BEND
0+419.0	101.15	98.75	300 x 250 x 300 TEE (2+000)
0+425	101.15	98.75	- - -
0+440.6	101.15	98.75	300 x 150 x 300 TEE (HYDRANT No. 03)
0+442.0	101.15	98.75	22.5° VERTICAL BEND
0+444.2	100.90	97.90	22.5° VERTICAL BEND
0+448.6	100.28	97.88	300mmØ VALVE & VALVE BOX @ PROPERTY LINE (5+000)
1+000	102.05	99.65	300 x 300 x 300 TEE (0+012.2)
1+000.5	102.05	99.65	45° HORIZONTAL BEND
1+001.1	102.04	99.64	300 x 250 REDUCER
1+001.7	102.03	99.63	22.5° VERTICAL BEND
1+003.0	102.02	99.90 **	22.5° VERTICAL BEND
1+004.1	101.99	99.90 *** **	CROSS ABOVE 250mmØ SAN [Obv=98.01m] (±1.6m CLEARANCE)
1+006.4	101.98	99.90 *** **	CROSS ABOVE 610mmØ STM [Obv=99.29m] (±0.3m CLEARANCE)
1+010.0	101.96	99.90 **	- - -
1+012.5	102.17	99.90 ***	CROSS ABOVE 450mmØ STM [Obv=99.34m] (±0.3m CLEARANCE)
1+013.7	102.20	99.85	250 x 150 x 250 TEE (HYDRANT No. 06)
1+015.2	102.07	99.85 **	22.5° VERTICAL BEND
1+016.0	102.07	100.20 **	22.5° VERTICAL BEND
1+018.1	102.06	100.20 *** **	CROSS ABOVE 200mmØ STM [Obv=99.70m] (±0.25m CLEARANCE)
1+021.0	102.05	100.20 *** **	CROSS ABOVE 200mmØ STM [Obv=99.70m] (±0.25m CLEARANCE)
1+025	102.07	100.00 **	- - -
1+025.5	102.07	99.90 **	22.5° VERTICAL BEND
1+026.3	102.08	99.68	22.5° VERTICAL BEND
1+029.0	102.08	99.68	250 x 150 REDUCER
1+037.7	102.01	99.61	45° HORIZONTAL BEND
1+042.9	102.13	99.73	150mmØ VALVE & VALVE BOX
1+047.1	102.38	99.75	150mmØ BUILDING 'B' SERVICE CAP (1.0m FROM FOUNDATION WALL)
2+000	101.15	98.75	300 x 200 x 300 TEE (0+419.0)
2+012.0	101.57	99.17	200mmØ VALVE & VALVE BOX
2+025	101.55	99.15	- - -
2+050	101.85	99.45	- - -
2+066.0	101.63	99.20	200 x 150 x 200 TEE (3+000 @ FIRE HYDRANT No. 02)
2+068.0	101.63	99.20	200mmØ VALVE & VALVE BOX
2+075	101.60	99.20	- - -
2+100	101.64	99.24	- - -
2+125	101.75	99.35	- - -
2+140.2	101.63	99.23	200 x 150 x 200 BUILDING 'A' SERVICE TEE (4+000)
2+150	101.71	99.30	- - -
2+150.6	101.71	99.30	45° HORIZONTAL BEND
2+152.0	101.69	99.30	45° HORIZONTAL BEND
2+153.5	101.67	99.27	200mmØ VALVE & VALVE BOX
2+154.8	101.65	99.25	200 x 150 REDUCER
2+157.4	101.75	99.25	FIRE HYDRANT No. 01
3+000	101.63	99.20	200 x 150 x 200 TEE (2+066.0)
3+002.0	101.61	99.20	150mmØ VALVE & VALVE BOX
3+006.8	101.75	99.20	FIRE HYDRANT No. 02
4+000	101.63	99.23	250 x 150 x 250 BUILDING 'A' SERVICE TEE (2+140.2)
4+002.5	101.68	99.28	150mmØ VALVE & VALVE BOX
4+004.9	101.75	99.30	150mmØ BUILDING 'A' SERVICE CAP (1.0m FROM FOUNDATION WALL)

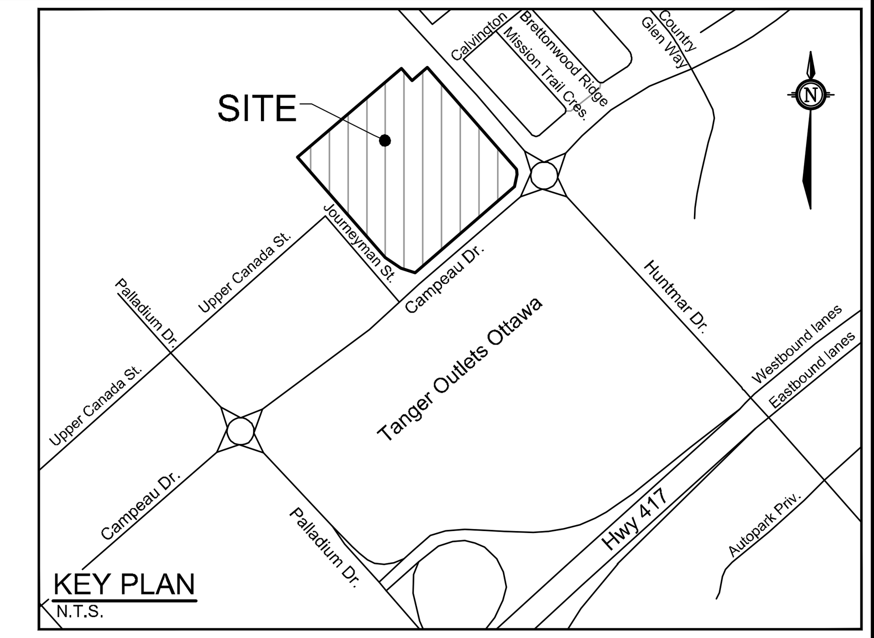
* CONNECTIONS TO EXISTING 300mmØ and 200mmØ WATERMAINS. EXACT ELEVATIONS TO BE FIELD DETERMINED.
** PROVIDE THERMAL INSULATION AS PER CITY OF OTTAWA DETAILS W22 IN SHALLOW TRENCHES WHERE COVER IS LESS THAN 2.4m AND/OR W23 ADJACENT TO OPEN STRUCTURES.
*** PIPE CROSSINGS WITH WATERMAINS ARE TO BE IN ACCORDANCE WITH CITY STANDARDS W25 AND W25.2 TO AVOID CONFLICTS, WHERE POSSIBLE.

INLET CONTROL DEVICE DATA TABLE: AREA A-4 (OUTLET PIPE of STM MH 04)

DESIGN EVENT	ICD TYPE (PLUG TYPE)	DIAMETER OF OUTLET PIPE (mm)	PEAK DESIGN FLOW (L/s)	½ PEAK DESIGN FLOW (L/s)	DESIGN HEAD (m)	WATER ELEVATION (m)	VOLUME (m^3)	AVAILABLE STORAGE
1:2 YR	CIRCULAR 219mmØ ORIFICE PLUG	375mmØ PVC DR35	116.7	58.4	1.27	99.10	222	> 810 m^3
1:5 YR			146.4	73.2	2.00	99.83	309	
1:100 YR			182.2	91.1	3.10	100.93	698	

LEGEND

SITE BOUNDARY
℄ SWALE AND DIRECTION OF FLOW
127.55 PROPOSED ELEVATION
127.45 EXISTING ELEVATION
127.55(S) PROPOSED SWALE ELEVATION
127.55 PROPOSED TERRACE ELEVATION
MAXIMUM 3: 1 SIDESLOPE
2.0% PARKING GRADE AND DIRECTION
FFE PROPOSED FINISHED FLOOR ELEVATION
USF PROPOSED UNDER SIDE OF FOOTING ELEVATION
PROPOSED BUILDING ENTRANCE
PROPOSED LIMIT OF BUILDING OVERHANG
T/G= TOP OF GRATE ELEVATION
MH100 PROPOSED STORM MANHOLE
CB1 PROPOSED CATCHBASIN
CB1 PROPOSED CATCHBASIN WITH TEMPORARY SILTSACK
CBT1 PROPOSED CATCHBASIN TEE
CBE1 PROPOSED CATCHBASIN ELBOW
PROPOSED STORM SEWER AND DIRECTION OF FLOW
PROPOSED CATCHBASIN LEAD AND DIRECTION OF FLOW
PROPOSED CATCHBASIN SUBDRAIN AND DIRECTION OF FLOW
MH101 PROPOSED SANITARY MANHOLE
PROPOSED SANITARY SEWER AND DIRECTION OF FLOW
PROPOSED WATERMAIN
BEND PROPOSED BEND AND THRUSTBLOCK 11.25°, 22.5°, 45° OR TEE
VVB PROPOSED VALVE AND VALVE BOX
HYD PROPOSED HYDRANT C/W VALVE & LEAD
PROPOSED CAP
(A) PIPE CROSSING LOCATION
PROPOSED ROOF DRAIN
PROPOSED BARRIER CURB
DC PROPOSED DEPRESSED CURB
TACTILE WALKING SURFACE INDICATOR (TWSI)
CURB CUTOUT
PROPOSED LIGHT STANDARD
PROPOSED SIAMESE CONNECTION
GM PROPOSED GAS METER LOCATION
HM PROPOSED HYDRO METER LOCATION
PROPOSED TRANSFORMER PAD C/W BOLLARDS
CLAY DIKE AS PER CITY OF OTTAWA DETAIL S8
SILT FENCE AS PER OPSD 219.110
MAJOR OVERLAND FLOW ROUTE
STRAW BALES AS PER OPSD 219.100
MM CONSTRUCTION ACCESS MUD MAT
ICD PROPOSED INLET CONTROL DEVICE
1:5 YR APPROXIMATE PONDING LIMITS
STORM DRAINAGE BOUNDARY
0.637 / A-1 / 0.36 AREA (ha) / SUB-CATCHMENT AREA ID / 1:5 YR POST-DEVELOPMENT RUNOFF COEFFICIENT
+102.52 EXISTING ELEVATION
EXISTING STORM MANHOLE AND SEWER
EXISTING SANITARY MANHOLE AND SEWER
EX. WMH EXISTING WATERMAIN
EXISTING WATER MANHOLE
VVB EXISTING VALVE AND VALE BOX
EXISTING FIRE HYDRANT
EX.CB EXISTING CATCHBASIN
T/G EXISTING TOP OF GRATE
EX UP EXISTING UTILITY POLE C/W GUY WIRES
LS EXISTING LIGHT STANDARD
TSL EXISTING TRAFFIC STREET LIGHT
EXISTING FENCE
EXISTING UNDERGROUND GASMAIN
UH EXISTING UNDERGROUND HYDRO
UB EXISTING UNDERGROUND BELL CABLE
B EXISTING BELL PEDESTAL
EXISTING TREES / SHRUBS
HEAVY DUTY ASPHALT/FIRE ROUTE
INTERLOCK PAVING STONES
ROADCUT REINSTATEMENT
WATERMAIN INSULATION AREA AS PER CITY OF OTTAWA DETAIL W22



KEY PLAN
N.T.S.

BENCHMARK INFO:

OLS JOB BENCHMARK No. 2 ON THE TOP OF SPINDLE OF THE EXISTING MUNICIPAL FIRE HYDRANT LOCATED NEAR THE NORTH-EAST CORNER OF THE INTERSECTION OF JOURNEYMAN STREET AND CAMPEAU DRIVE. GEODETIC ELEVATION = 102.98m. (JOB BENCHMARKS No.1 + No.3 & 4 ARE ALSO SHOWN ON THE SURVEYOR'S PLAN Ref. No. 23334-22 Rosefellow PtL 4 CI HU T DI)

ALL ELEVATIONS ARE REFERRED TO THE CGVD28 GEODETIC DATUM. BEARINGS ARE GRID, DERIVED FROM THE NORTHERLY LIMIT OF CAMPEAU DRIVE SHOWN TO BE N48°07'05"E ON PLAN 4R-28637 AND ARE REFERRED TO THE CENTRAL MERIDIAN OF MTM ZONE 9 (76°30' WEST LONGITUDE) NAD-83 (ORIGINAL)

THE EXISTING GRADES SHOWN ON THE PLANS ARE TAKEN DIRECTLY FROM TOPOGRAPHICAL SURVEY PLAN (Ref. No. 23334-22 Rosefellow PtL 4 CI HU T DI), PREPARED BY ANNIS, O'SULLIVAN, VOLLEBEKK SIGNED AND DATED SEPTEMBER 27, 2021.

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

CRITICAL SEWER PIPE CROSSING TABLE

CROSSING	LOWER PIPE	HIGHER PIPE	CLEARANCE	SURFACE ELEVATION
A	250mmØ SAN OBV=97.79	300mmØ U/S WM=99.36	± 1.6m	± 102.06 m
B	250mmØ SAN OBV=97.80	200mmØ STM INV=100.00	± 2.2m	± 102.06 m
C	250mmØ SAN OBV=98.01	250mmØ U/S WM=99.65	± 1.6m	101.99 m
D	610mmØ STM OBV=99.29	250mmØ U/S WM=99.65	± 0.3m	101.98 m
E1	450mmØ STM OBV=99.34	250mmØ U/S WM=99.65	± 0.3m	102.17 m
E2	450mmØ STM OBV=99.35	150mmØ U/S WM=99.75	± 0.4m	102.07 m
F1	200mmØ STM OBV=99.70	250mmØ U/S WM=99.95	± 0.25m	102.06 m
F2	200mmØ STM OBV=99.70	250mmØ U/S WM=99.95	± 0.25m	102.05 m
G	250mmØ SAN OBV=98.08	250mmØ STM INV=100.04	± 2.0m	101.92 m
H	250mmØ SAN OBV=96.70	610mmØ STM INV=97.82	± 1.1m	101.45 m
I	300mmØ T/WM=98.85	250mmØ STM INV=99.68	± 0.8m	101.30 m

* SEE 122151-GP1 AND GP2 PLANS FOR SEWER CROSSING LOCATIONS

ALL PROJECT NOTES, DETAILS AND SPECIFICATIONS ARE TO MEET THE MOST CURRENT AND AMENDED VERSIONS OF THE CITY OF OTTAWA AND PROVINCIAL STANDARDS

THIS PLAN IS TO BE READ IN CONJUNCTION WITH CIVIL PLANS 122151-GP1&2, 122151-GR1&2 AND 122151-PR1

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

No.	REVISION	DATE	BY
2	REVISED PER CITY COMMENTS	MAR 30/23	DDB
1	ISSUED FOR CITY OF OTTAWA REVIEW	DEC 16/22	DDB

SCALE: NOT TO SCALE
DESIGN: SM / BM / DDB
CHECKED: DDB
DRAWN: SM
CHECKED: BM / DDB
APPROVED: DDB

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER
D. D. BLAIR
100122737
Mar. 30 2023
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
405 HUNTMAR DRIVE - WAREHOUSE DEVELOPMENT

DRAWING NAME
NOTES, LEGEND AND DETAILS

PROJECT No. 122151
REV: REV # 2
DRAWING No. 122151-NLD1

D07-12-22-0186

#18906

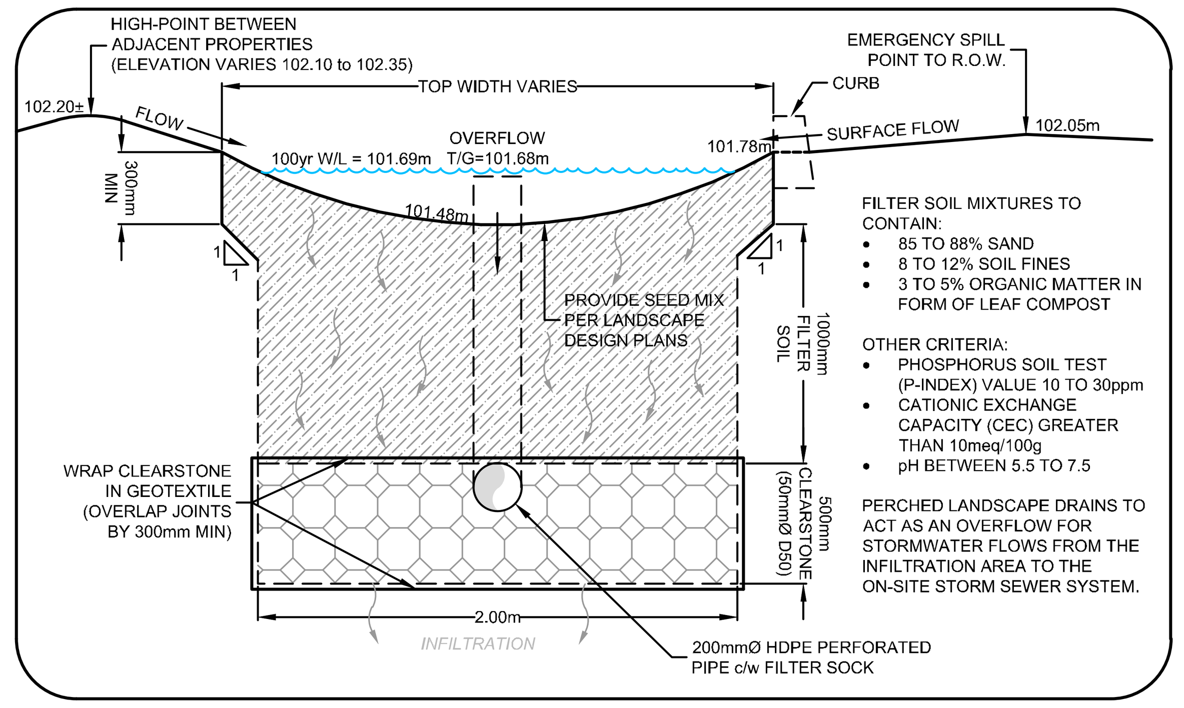
M:\2022\122151\CAD\Civil\122151-NLD.dwg, NLD1, Mar 29, 2023 - 5:43pm, smatthews

BUILDING 'A' ROOF DRAIN TABLE: AREA R-1 (ROOF DRAINS A1 to A48)						
AREA ID *	ROOF DRAIN No. (WATTS MODEL)	ROOF DRAIN OPENING SETTING	1:5 YEAR RELEASE RATE	APPROX. 5-YR PONDING DEPTH	1:100 YEAR RELEASE RATE	APPROX. 100-YR PONDING DEPTH
R-1	RD 1 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 2 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 3 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 4 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 5 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 6 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 7 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 8 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 9 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 10 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 11 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 12 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 13 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 14 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 15 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 16 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 17 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 18 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 19 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 20 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 21 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 22 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 23 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 24 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 25 (RD-100-A-ADJ)	1/2 EXPOSED	1.10 L/s	11 cm	1.26 L/s	15 cm
R-1	RD 26 (RD-100-A-ADJ)	1/2 EXPOSED	1.10 L/s	11 cm	1.26 L/s	15 cm
R-1	RD 27 (RD-100-A-ADJ)	1/2 EXPOSED	1.10 L/s	11 cm	1.26 L/s	15 cm
R-1	RD 28 (RD-100-A-ADJ)	1/2 EXPOSED	1.10 L/s	11 cm	1.26 L/s	15 cm
R-1	RD 29 (RD-100-A-ADJ)	1/2 EXPOSED	1.10 L/s	11 cm	1.26 L/s	15 cm
R-1	RD 30 (RD-100-A-ADJ)	1/2 EXPOSED	1.10 L/s	11 cm	1.26 L/s	15 cm
R-1	RD 31 (RD-100-A-ADJ)	1/2 EXPOSED	1.10 L/s	11 cm	1.26 L/s	15 cm
R-1	RD 32 (RD-100-A-ADJ)	1/2 EXPOSED	1.10 L/s	11 cm	1.26 L/s	15 cm
R-1	RD 33 (RD-100-A-ADJ)	1/2 EXPOSED	1.10 L/s	11 cm	1.26 L/s	15 cm
R-1	RD 34 (RD-100-A-ADJ)	1/2 EXPOSED	1.10 L/s	11 cm	1.26 L/s	15 cm
R-1	RD 35 (RD-100-A-ADJ)	1/2 EXPOSED	1.10 L/s	11 cm	1.26 L/s	15 cm
R-1	RD 36 (RD-100-A-ADJ)	1/2 EXPOSED	1.10 L/s	11 cm	1.26 L/s	15 cm
R-1	RD 37 (RD-100-A-ADJ)	FULLY EXPOSED	0.79 L/s	6 cm	0.95 L/s	8 cm
R-1	RD 38 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	14 cm
R-1	RD 39 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	14 cm
R-1	RD 40 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	14 cm
R-1	RD 41 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	14 cm
R-1	RD 42 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	14 cm
R-1	RD 43 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	14 cm
R-1	RD 44 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	14 cm
R-1	RD 45 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	14 cm
R-1	RD 46 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	14 cm
R-1	RD 47 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	14 cm
R-1	RD 48 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	14 cm

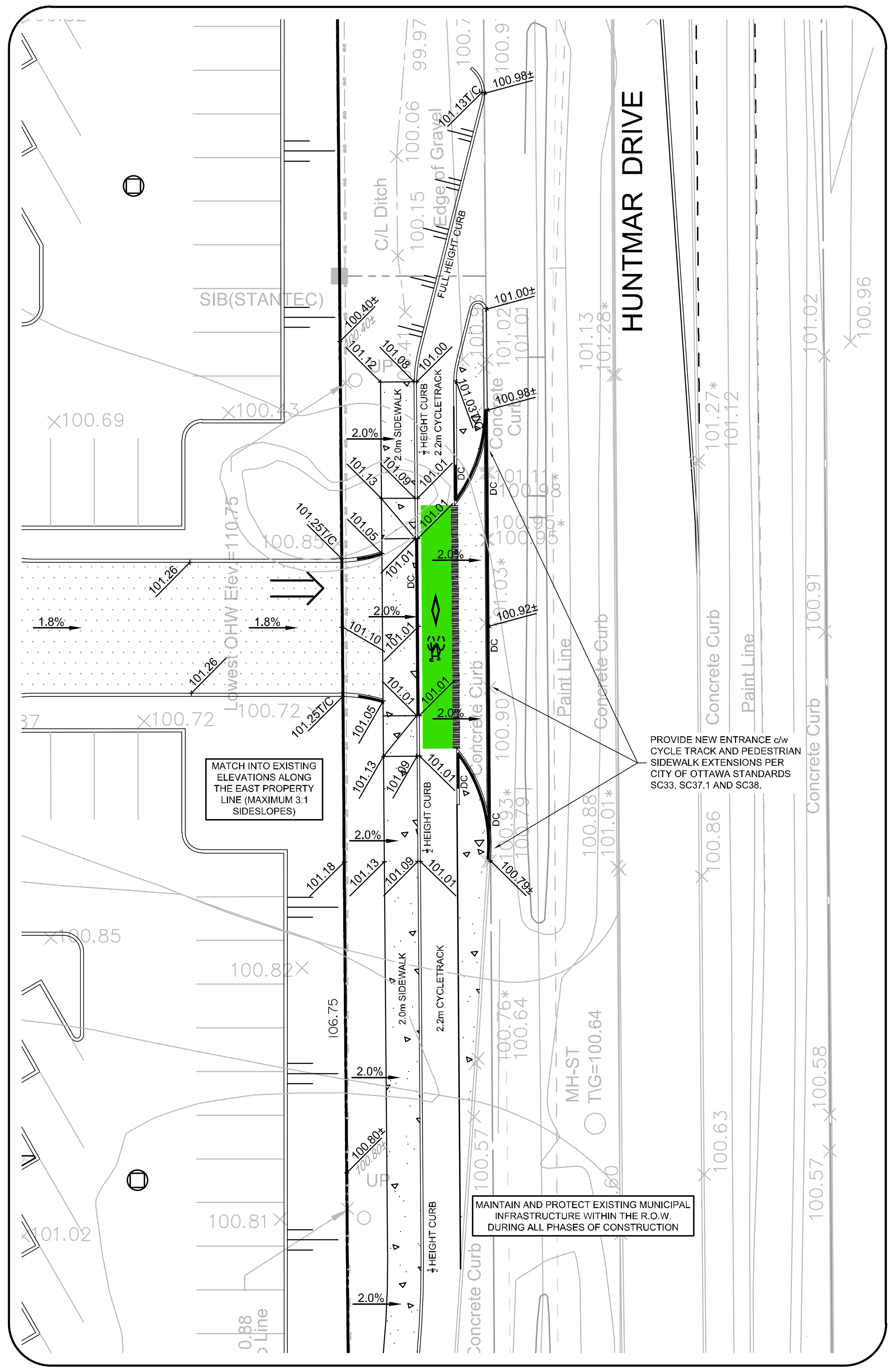
BUILDING 'B' ROOF DRAIN TABLE: AREA R-2 (ROOF DRAINS B1 to B49)						
AREA ID *	ROOF DRAIN No. (WATTS MODEL)	ROOF DRAIN OPENING SETTING	1:5 YEAR RELEASE RATE	APPROX. 5-YR PONDING DEPTH	1:100 YEAR RELEASE RATE	APPROX. 100-YR PONDING DEPTH
R-2	RD 1 (RD-100-A-ADJ)	1/2 EXPOSED	1.10 L/s	11 cm	1.26 L/s	15 cm
R-2	RD 2 (RD-100-A-ADJ)	1/2 EXPOSED	1.10 L/s	11 cm	1.26 L/s	15 cm
R-2	RD 3 (RD-100-A-ADJ)	1/2 EXPOSED	1.10 L/s	11 cm	1.26 L/s	15 cm
R-2	RD 4 (RD-100-A-ADJ)	1/2 EXPOSED	1.10 L/s	11 cm	1.26 L/s	15 cm
R-2	RD 5 (RD-100-A-ADJ)	1/2 EXPOSED	1.10 L/s	11 cm	1.26 L/s	15 cm
R-2	RD 6 (RD-100-A-ADJ)	FULLY EXPOSED	0.79 L/s	6 cm	0.95 L/s	8 cm
R-2	RD 7 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 8 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 9 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 10 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 11 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 12 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 13 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 14 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 15 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 16 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 17 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 18 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 19 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 20 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 21 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 22 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 23 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 24 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 25 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 26 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 27 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 28 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 29 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 30 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 31 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 32 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 33 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 34 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 35 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 36 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 37 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 38 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 39 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 40 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 41 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 42 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 43 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 44 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 45 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 46 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 47 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 48 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 49 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm

* REFER TO THE 'SITE SERVICING AND STORMWATER MANAGEMENT REPORT' (R-2022-209) PREPARED BY NOVATECH FOR DRAINAGE AREA IDENTIFIERS AND STORMWATER MANAGEMENT DETAILS.

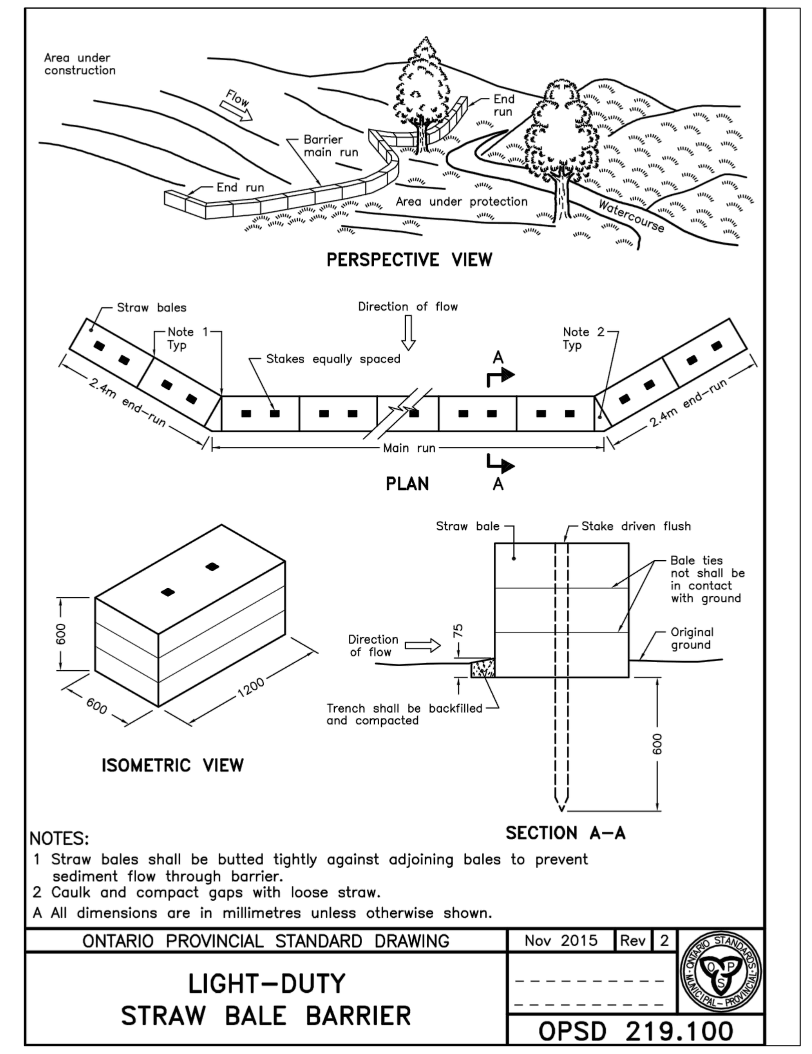
**ALL CONTROLLED FLOW ROOF DRAINS FOR THE PROPOSED BUILDINGS TO BE WATTS 'ADJUSTABLE ACCUTROL' ROOF DRAINS.

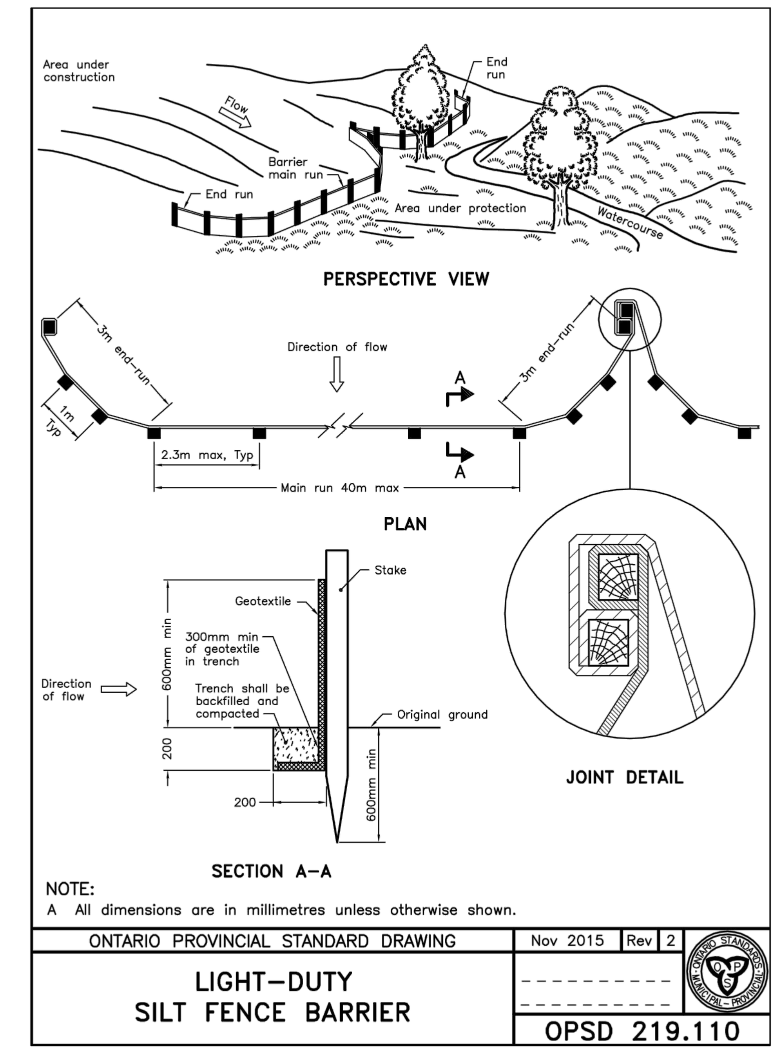


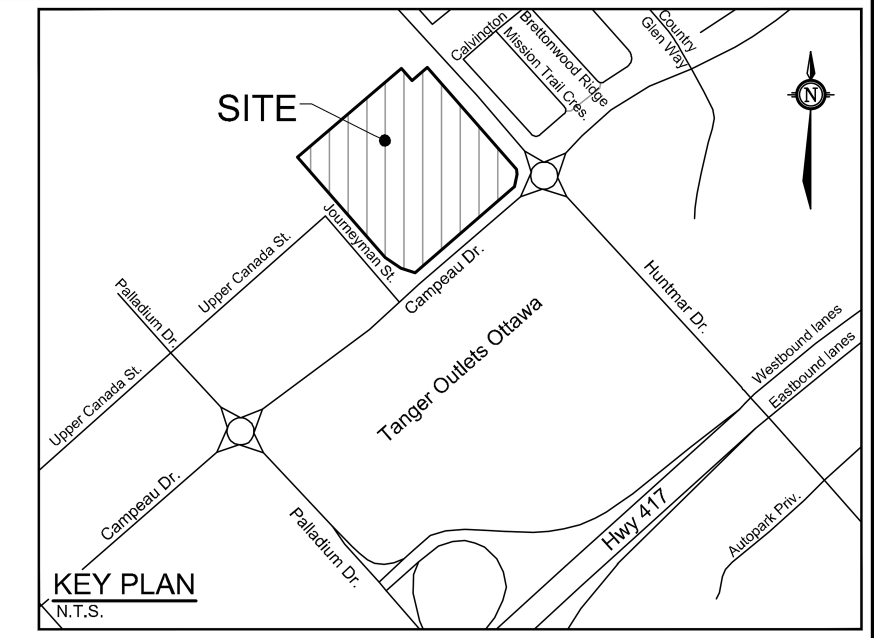
RAIN GARDENS INFILTRATION DETAIL WITH OVERFLOW DRAINS
SCALE 1:25

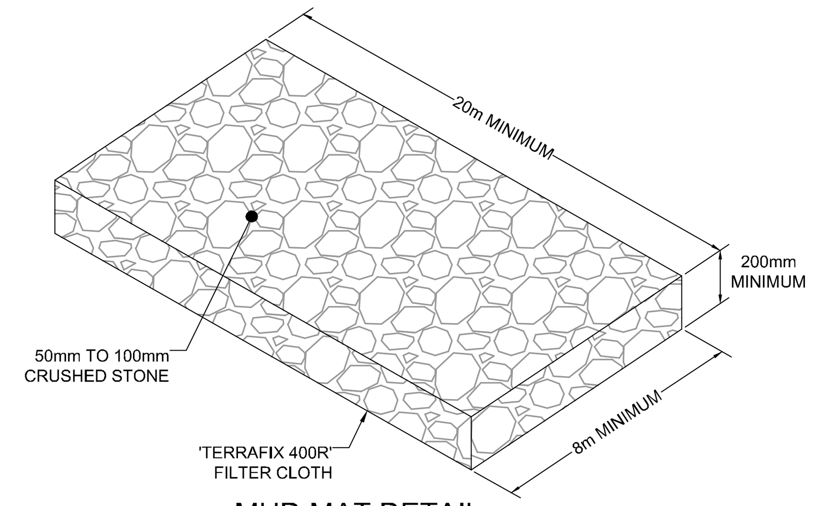


BUILDING 'A' HUNTMAR SOUTH ACCESS GRADING DETAIL
NOT TO SCALE

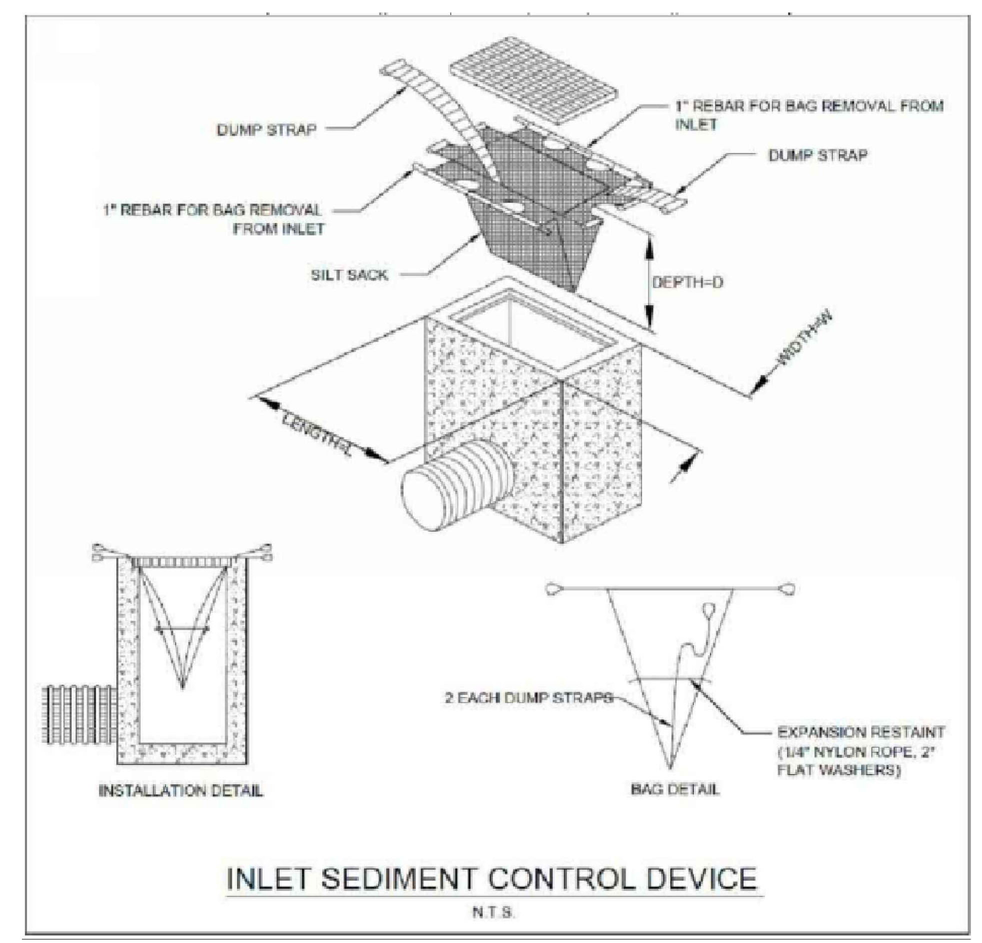




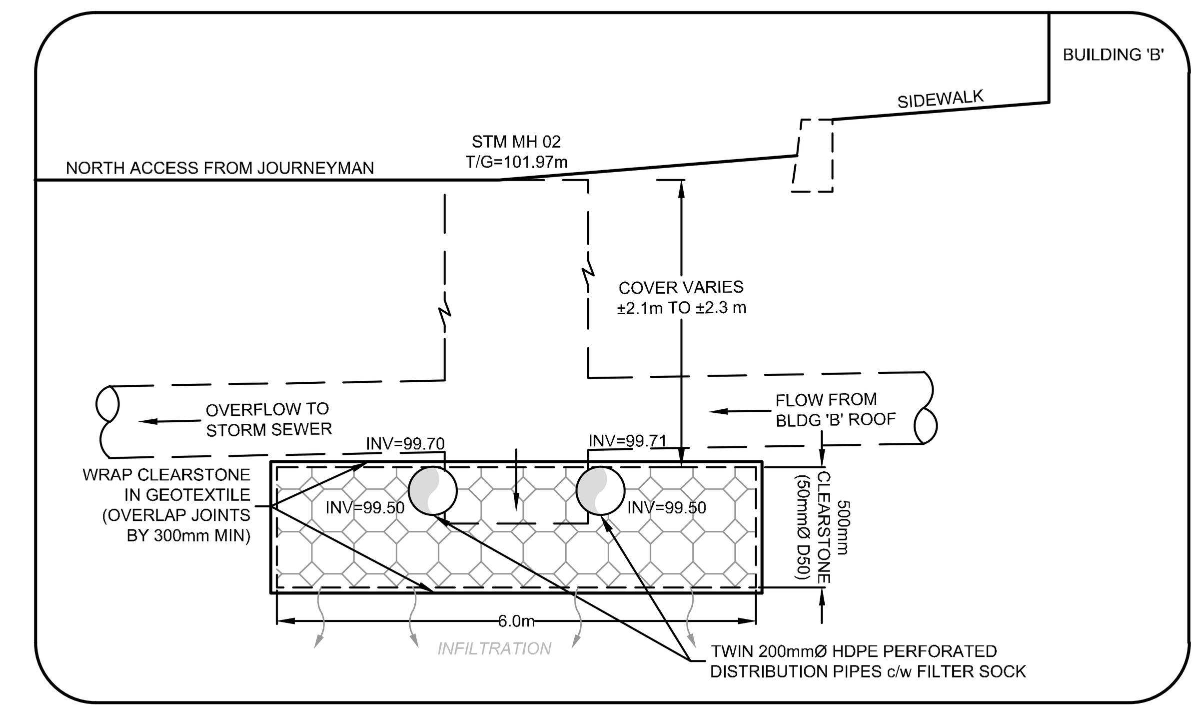




MUD MAT DETAIL
NTS



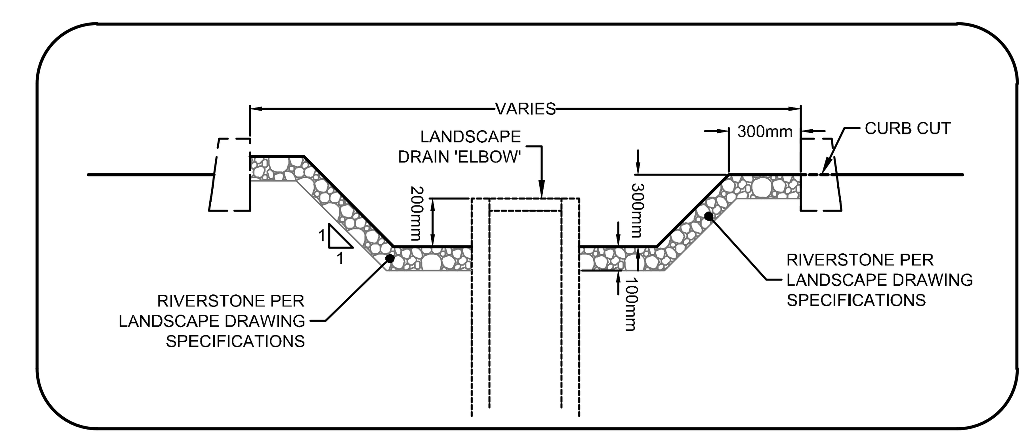
INLET SEDIMENT CONTROL DEVICE
N.T.S.



BUILDING 'B' RAINWATER INFILTRATION GALLERY DETAIL
NOT TO SCALE

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	Straw Bale Barrier (Light Duty)		OPSD 219.100	Developer's Contractor	Developer's Contractor	Weekly (as a minimum)	Consultant	Developer's Contractor	N/A
	Silt Fence (Light Duty)		OPSD 219.110	Developer's Contractor	Developer's Contractor	Weekly (as a minimum)	Consultant	Developer's Contractor	N/A
	Filter Bags	Location as Indicated in ESC Note #3	Erosion and Sediment Control Notes	Developer's Contractor	Developer's Contractor	Weekly (as a minimum)	Consultant	Developer's Contractor	N/A
	Mud Mat	MM	Drawing Details	Developer's Contractor	Developer's Contractor	Weekly (as a minimum)	Developer's Contractor	Developer's Contractor	N/A
	Dust Control	Location as Required Around Site	Erosion and Sediment Control Notes	Developer's Contractor	Developer's Contractor	Weekly (as a minimum)	Consultant	Developer's Contractor	N/A
	Stabilized Material Stockpiling	Location as Required by Contractor	Erosion and Sediment Control Notes	Developer's Contractor	Developer's Contractor	Weekly (as a minimum)	Developer's Contractor	Developer's Contractor	N/A
	Sediment Basin (for flows being pumped out of excavations)	Location as Required by Contractor	- - -	Developer's Contractor	Developer's Contractor	After Every Rainstorm	Developer's Contractor	Developer's Contractor	N/A



TYPICAL LANDSCAPE DRAINS IN CURBED PARKING ISLANDS
SCALE 1:25

ALL PROJECT NOTES, DETAILS AND SPECIFICATIONS ARE TO MEET THE MOST CURRENT AND AMENDED VERSIONS OF THE CITY OF OTTAWA AND PROVINCIAL STANDARDS

THIS PLAN IS TO BE READ IN CONJUNCTION WITH CIVIL PLANS 122151-GP1&2, 122151-GR1&2 AND 122151-PR1

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

No.	REVISION	DATE	BY
2	REVISED PER CITY COMMENTS	MAR 30/23	DDB
1	ISSUED FOR CITY OF OTTAWA REVIEW	DEC 16/22	DDB

SCALE: NOT TO SCALE
DESIGN: SM / BM / DDB
CHECKED: DDB
DRAWN: SM
CHECKED: BM / DDB
APPROVED: DDB

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER D. D. BLAIR 100122737 Mar. 30 2023 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
405 HUNTMAR DRIVE - WAREHOUSE DEVELOPMENT

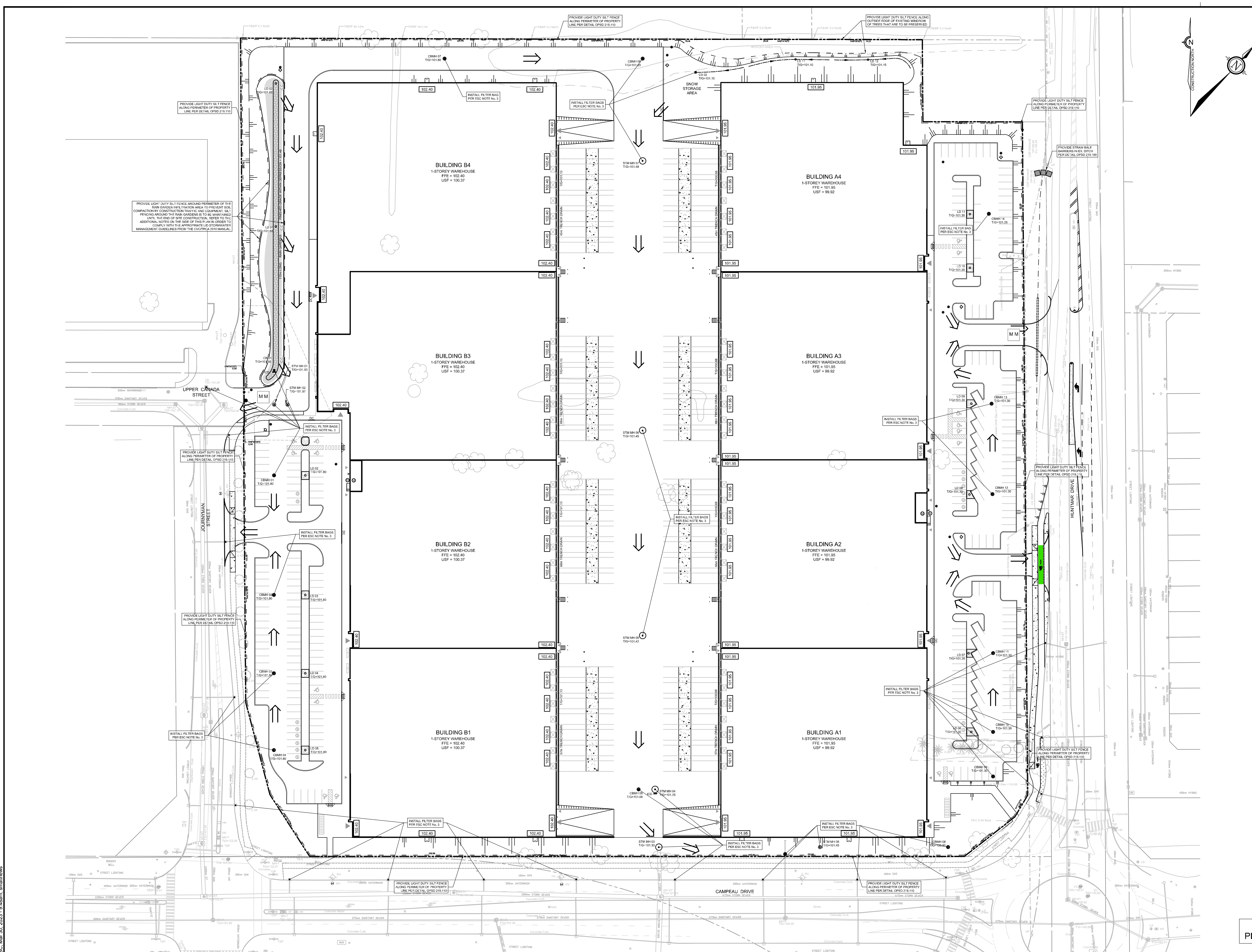
DRAWING NAME
NOTES, LEGEND AND DETAILS

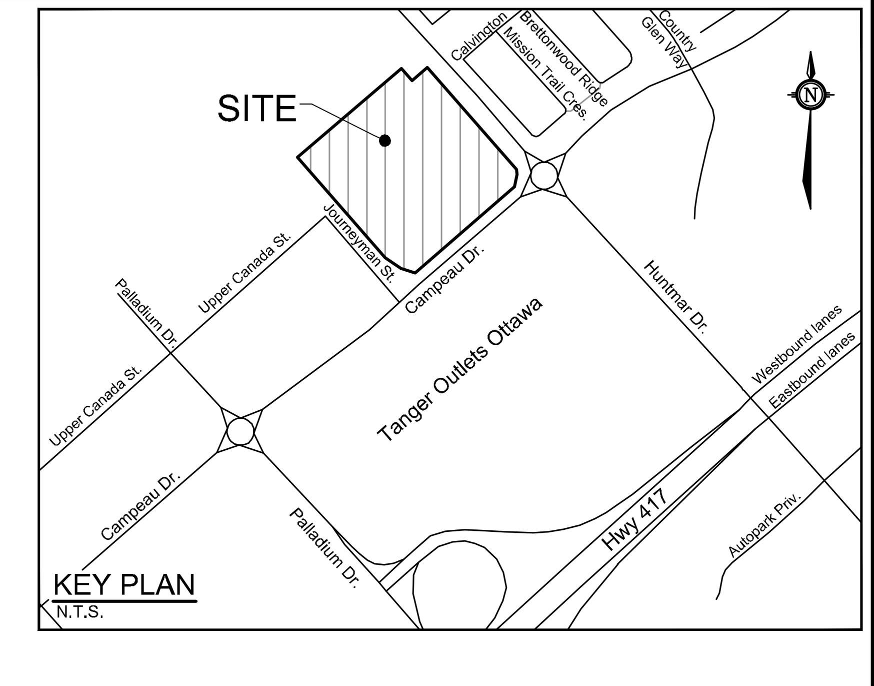
PROJECT No. 122151
REV: REV # 2
DRAWING No. 122151-NLD2

D07-12-22-0186

#18906

M:\2022\122151\CAD\Civil\122151-NLD.dwg, NLD2, Mar 29, 2023 - 3:19pm, smatthews





Low Impact Development Stormwater Management Planning and Design Guide

Construction Considerations
Ideally, bioretention sites should remain outside the limit of disturbance until construction of the bioretention begins to prevent soil compaction by heavy equipment. Bioretention locations should not be used as the site of sediment basins during construction, as the concentration of fines will prevent post-construction infiltration. They should also not be used for storing materials. To prevent sediment from clogging the surface of a bioretention cell, stormwater should be diverted away from the bioretention site until the drainage area is fully stabilized. Due to the locations of many bioretention practices in the road right-of-way or tight urban spaces, considerations of traffic control and utility conflicts must be part of the plans and inspections.

The following is a typical construction sequence to properly install a bioretention practice. The steps may be modified to reflect different bioretention applications or expected site conditions.

1. Bioretention areas should be fully protected by silt fence or construction fencing to prevent compaction by construction traffic and equipment.
2. Installation may only begin after entire contributing drainage area has been either stabilized or flows have been safely routed around the area. The designer should check the boundaries of the contributing drainage area to ensure it conforms to original design.
3. The pretreatment forebay should be excavated first and sealed until full construction is completed.
4. Excavators or backhoes working adjacent to the proposed bioretention area should excavate the cell to the appropriate design depth.
5. It may be necessary to rip the bottom soils to promote greater infiltration or excavate any sediment that may have built up during construction.
6. There are three options at this step depending on the design:
   a. No infiltration: Place an impermeable liner on the bed of the bioretention area with 150 mm overlap on sides. Lay the perforated underdrain pipe, Pack 50 mm diameter clear stone to 75 mm above top of underdrain, an optional 75 mm choking coarse of pea gravel, and then lay the non-woven geotextile drainage fabric over the stone and underdrain.
   b. Partial infiltration: Place desired depth of stone for the infiltration volume on bed and then lay the perforated underdrain pipe over it. Pack 50 mm diameter clear stone to 75 mm above the top of the underdrain, an optional 75 mm choking coarse of pea gravel and then lay the non-woven geotextile drainage fabric over the stone and underdrain.
   c. Full infiltration: Stone can be placed to provide added stormwater volume storage or the bioretention media can be added directly to the bottom of the excavation.
7. Bioretention filter media should be obtained premixed from a vendor. Apply in 300 mm lifts until desired top elevation of bioretention area is achieved. Thoroughly wet each lift before adding the next and wait until water has drained through the soil before adding the next lift. Wait a few days to check for settlement, and add additional media as needed.

4-90

Version 1.0

Low Impact Development Stormwater Management Planning and Design Guide

8. Prepare planting holes for any trees and shrubs, install vegetation, and water accordingly. Install any temporary irrigation.
9. Plant landscaping materials as shown in the landscaping plan, and water them weekly in the first two months.
10. Lay down surface cover in accordance with the design (mulch, riverstone, or turf).
11. Conduct final construction inspection, checking inlet, pretreatment cell, bioretention cell and outlet elevations.

Construction Inspection
Common construction pitfalls can be avoided by careful construction supervision that focuses on the following aspects:

Erosion and Sediment Control
- Bioretention locations should be blocked from construction traffic and should not be used for erosion and sediment control.
- Proper erosion and sediment controls should be in place for the drainage area.

Materials
- Gravel for the underdrain should be clean and washed; no fines should be present in the material.
- Underdrain pipe material should be perforated and of the correct size.
- A cap should be placed on the upstream (but not the downstream) end of the underdrain.
- Filter media should be tested to confirm that it meets specifications.
- Mulch composition should be correct.

Elevations
Elevations of the following items should be checked for accuracy:
- Depth of the gravel and invert of the underdrain
- Inverts for inflow and outflow points
- Filter depth after media is placed
- Ponding depth provided between the surface of the filter bed and the overflow structure
- Mulch depth

Landscaping and Stabilization
- Correct vegetation should be planted.
- Pretreatment area should be stabilized.
- Drainage area should be stabilized prior to directing water to the bioretention.

The following items should be checked after the first rainfall event, and adjustments should be made as necessary:
- Outfall protection/energy dissipation at concentrated inflow should be stable.
- Flow should not concentrate and should spread evenly over the filter bed.

4-91

Version 1.0

Low Impact Development Stormwater Management Planning and Design Guide

- Ponded water at the surface of the bioretenton facility should drain within 24 hours of the end of the storm event. The filter media bed should fully drain within a maximum period of 72 hours.
- Excessive sediment accumulation should not be present.

4-92

Version 1.0

THIS PLAN IS TO BE READ IN CONJUNCTION WITH CIVIL PLANS 122151-NLD1&2, 122151-GP1&2 AND 122151-GR1&GR2

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

No.	REVISION	DATE	BY
2	REVISED PER CITY COMMENTS	MAR 30/23	DDB
1	ISSUED FOR CITY OF OTTAWA REVIEW	DEC 16/22	DDB

SCALE 1:750

1:750 (0 10 20 30)

DESIGN SM / BM / DDB
CHECKED DDB
DRAWN SM
CHECKED BM / DDB
APPROVED DDB

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER
D. D. BLAIR
100122737
Mar. 30 2023
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
405 HUNTMAR DRIVE - WAREHOUSE DEVELOPMENT

DRAWING NAME
EROSION AND SEDIMENT CONTROL PLAN

PROJECT No. 122151
REV REV # 2
DRAWING No. 122151-ESC

PLAN24x36.DWG - 914.4mmx609.6mm

D07-12-22-0186

#18906

THIS PLAN IS TO BE READ IN CONJUNCTION WITH CIVIL PLANS 122151-NLD1&2, 122151-GR1&2 AND 122151-PR1

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

No.	REVISION	DATE	BY
2	REVISED PER CITY COMMENTS	MAR 30/23	DDB
1	ISSUED FOR CITY OF OTTAWA REVIEW	DEC 16/22	DDB

SCALE 1:400

DESIGN: SM / BM / DDB
CHECKED: DDB
DRAWN: SM
CHECKED: BM / DDB
APPROVED: DDB

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER
D. D. BLAIR
100122737
Mar. 30 2023
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
405 HUNTMAR DRIVE - WAREHOUSE DEVELOPMENT

DRAWING NAME
GENERAL PLAN OF SERVICES

PROJECT No. 122151
REV: REV # 2
DRAWING No. 122151-GP1

D07-12-22-0186

#18906

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

No.	REVISION	DATE	BY
2	REVISED PER CITY COMMENTS	MAR 30/23	DDB
1	ISSUED FOR CITY OF OTTAWA REVIEW	DEC 16/22	DDB

SCALE 1:400

DESIGN	SM / BM / DDB
CHECKED	DDB
DRAWN	SM
CHECKED	BM / DDB
APPROVED	DDB

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER
D. D. BLAIR
100122737
Mar. 30 2023
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
405 HUNTMAR DRIVE - WAREHOUSE DEVELOPMENT

DRAWING NAME
GENERAL PLAN OF SERVICES

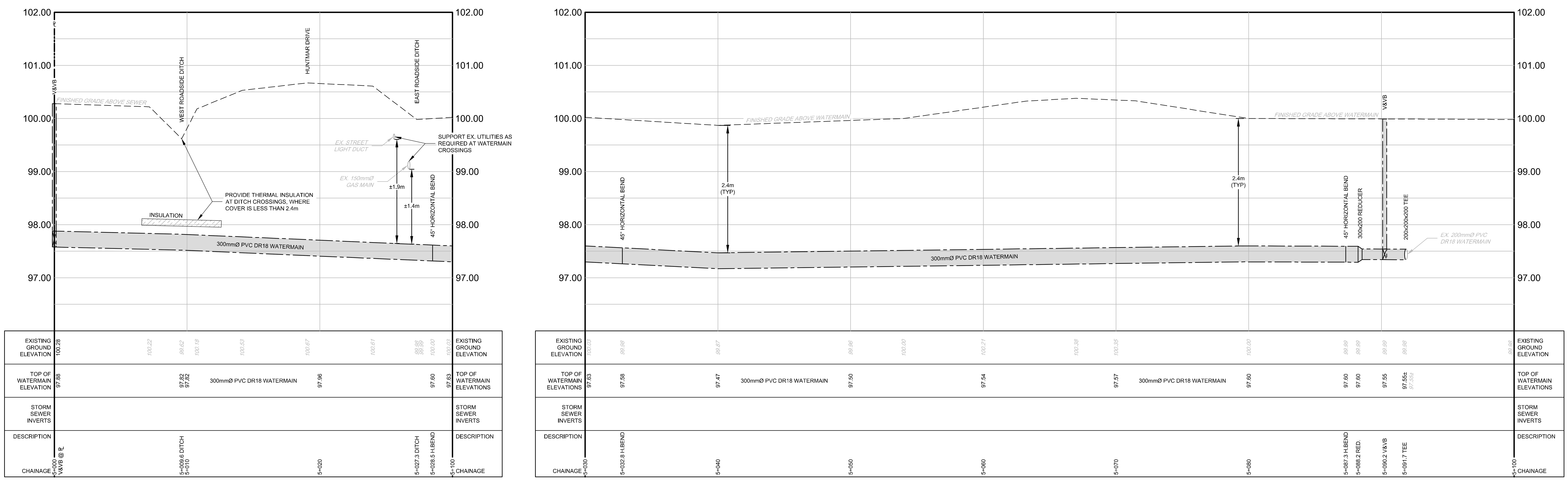
PROJECT No. 122151
REV # 2
DRAWING No. 122151-GP2

D07-12-22-0186

#18906

HUNTMAR DRIVE

THIS PLAN IS TO BE READ IN CONJUNCTION WITH CIVIL PLANS 122151-NLD1&2, 122151-GP1&2 AND 122151-GR1&GR2



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

No.	REVISION	DATE	BY
2	REVISED PER CITY COMMENTS	MAR 30/23	DDB
1	ISSUED FOR CITY OF OTTAWA REVIEW	DEC 16/22	DDB

SCALE 1:150 / 1:75

DESIGN: SM / BM / DDB
CHECKED: DDB
DRAWN: SM
CHECKED: BM / DDB
APPROVED: DDB

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER D. D. BLAIR 100122737 Mar. 30 2023 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
405 HUNTMAR DRIVE - WAREHOUSE DEVELOPMENT

DRAWING NAME
PLAN and PROFILE
OFF-SITE WATERMAIN EXTENSION
STATION 5+000 to 5+100

PROJECT No. 122151
REV # 2
DRAWING No. 122151-PR1

D07-12-22-0186

#18906

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

No.	REVISION	DATE	BY
2	REVISED PER CITY COMMENTS	MAR 30/23	DDB
1	ISSUED FOR CITY OF OTTAWA REVIEW	DEC 16/22	DDB

SCALE 1:400

DESIGN SM / BM / DDB
CHECKED DDB
DRAWN SM
CHECKED BM / DDB
APPROVED DDB

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER
D. D. BLAIR
100122737
Mar. 30 2023
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
405 HUNTMAR DRIVE - WAREHOUSE DEVELOPMENT

DRAWING NAME
GRADING PLAN

PROJECT No. 122151
REV # 2
DRAWING No. 122151-GR1

D07-12-22-0186

#18906

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

No.	REVISION	DATE	BY
2	REVISED PER CITY COMMENTS	MAR 30/23	DDB
1	ISSUED FOR CITY OF OTTAWA REVIEW	DEC 16/22	DDB

SCALE 1:400

DESIGN	SM / BM / DDB
CHECKED	DDB
DRAWN	SM
CHECKED	BM / DDB
APPROVED	DDB

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER
D. D. BLAIR
100122737
Mar. 30 2023
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
405 HUNTMAR DRIVE - WAREHOUSE DEVELOPMENT

DRAWING NAME
GRADING PLAN

PROJECT No. 122151
REV # 2
DRAWING No. 122151-GR2

D07-12-22-0186

#18906

BUILDING 'A' ROOF DRAIN TABLE: AREA R-1 (ROOF DRAINS A1 to A48)

AREA ID *	ROOF DRAIN No. (WATTS MODEL)	ROOF DRAIN OPENING SETTING	1:5 YEAR RELEASE RATE	APPROX. 5-YR PONDING DEPTH	1:100 YEAR RELEASE RATE	APPROX. 100-YR PONDING DEPTH
R-1	RD 1 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 2 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 3 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 4 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 5 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 6 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 7 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 8 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 9 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 10 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 11 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 12 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 13 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 14 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 15 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 16 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 17 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 18 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 19 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 20 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 21 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 22 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 23 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 24 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-1	RD 25 (RD-100-A-ADJ)	1/2 EXPOSED	1.10 L/s	11 cm	1.26 L/s	15 cm
R-1	RD 26 (RD-100-A-ADJ)	1/2 EXPOSED	1.10 L/s	11 cm	1.26 L/s	15 cm
R-1	RD 27 (RD-100-A-ADJ)	1/2 EXPOSED	1.10 L/s	11 cm	1.26 L/s	15 cm
R-1	RD 28 (RD-100-A-ADJ)	1/2 EXPOSED	1.10 L/s	11 cm	1.26 L/s	15 cm
R-1	RD 29 (RD-100-A-ADJ)	1/2 EXPOSED	1.10 L/s	11 cm	1.26 L/s	15 cm
R-1	RD 30 (RD-100-A-ADJ)	1/2 EXPOSED	1.10 L/s	11 cm	1.26 L/s	15 cm
R-1	RD 31 (RD-100-A-ADJ)	1/2 EXPOSED	1.10 L/s	11 cm	1.26 L/s	15 cm
R-1	RD 32 (RD-100-A-ADJ)	1/2 EXPOSED	1.10 L/s	11 cm	1.26 L/s	15 cm
R-1	RD 33 (RD-100-A-ADJ)	1/2 EXPOSED	1.10 L/s	11 cm	1.26 L/s	15 cm
R-1	RD 34 (RD-100-A-ADJ)	1/2 EXPOSED	1.10 L/s	11 cm	1.26 L/s	15 cm
R-1	RD 35 (RD-100-A-ADJ)	1/2 EXPOSED	1.10 L/s	11 cm	1.26 L/s	15 cm
R-1	RD 36 (RD-100-A-ADJ)	1/2 EXPOSED	1.10 L/s	11 cm	1.26 L/s	15 cm
R-1	RD 37 (RD-100-A-ADJ)	FULLY EXPOSED	0.79 L/s	6 cm	0.95 L/s	8 cm
R-1	RD 38 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	14 cm
R-1	RD 39 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	14 cm
R-1	RD 40 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	14 cm
R-1	RD 41 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	14 cm
R-1	RD 42 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	14 cm
R-1	RD 43 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	14 cm
R-1	RD 44 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	14 cm
R-1	RD 45 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	14 cm
R-1	RD 46 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	14 cm
R-1	RD 47 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	14 cm
R-1	RD 48 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	14 cm

INLET CONTROL DEVICE DATA TABLE: AREA A-1 (OUTLET PIPE of CB 01)

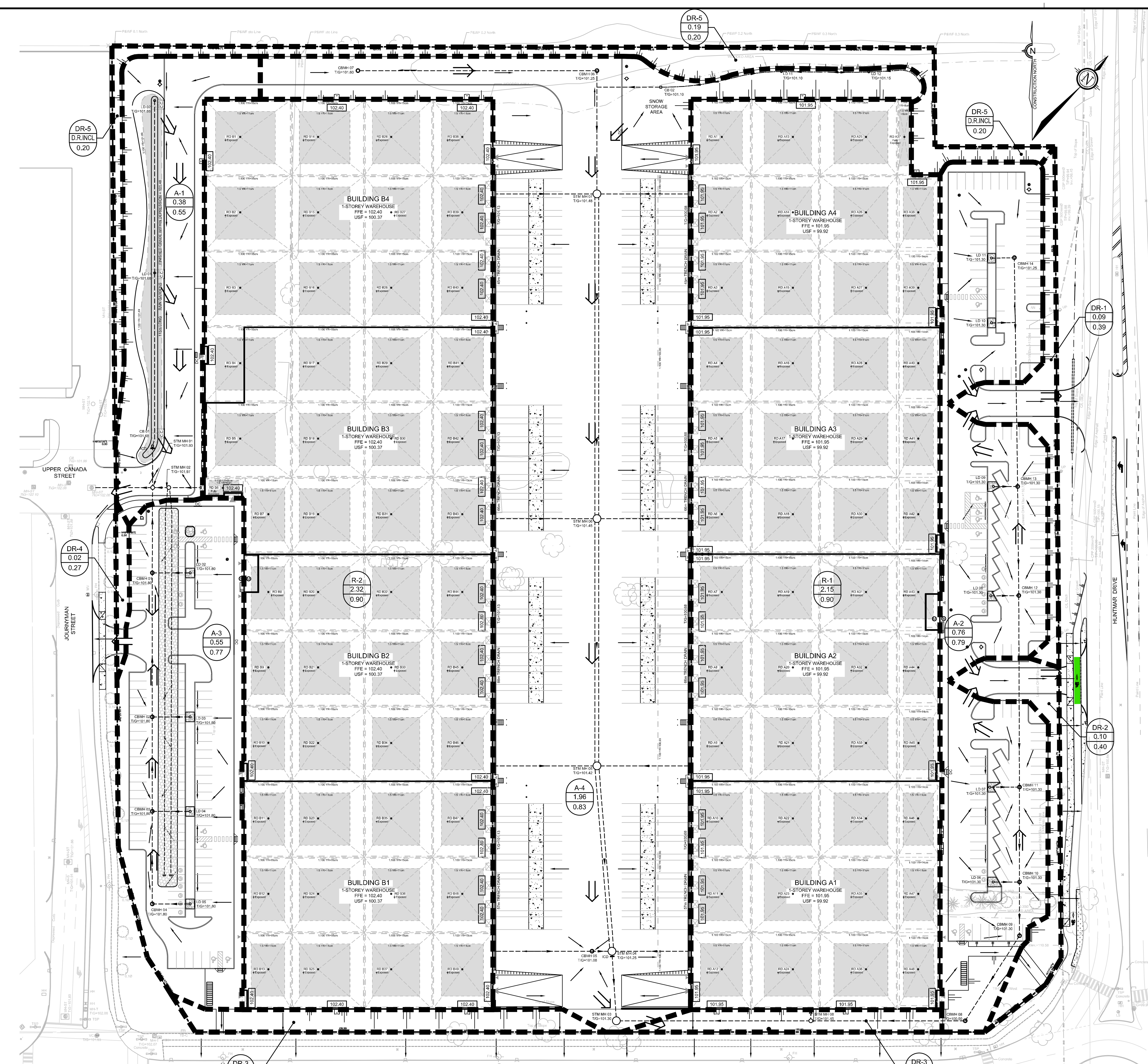
DESIGN EVENT	ICD TYPE (PLUG TYPE)	DIAMETER OF OUTLET PIPE (mm)	PEAK DESIGN FLOW (L/s)	½ PEAK DESIGN FLOW (L/s)	DESIGN HEAD (m)	WATER ELEVATION (m)	VOLUME (m^3)	AVAILABLE STORAGE
1:2 YR	CIRCULAR 171mmØ ORIFICE PLUG	250mmØ PVC DR35	61.2	30.6	0.94	101.55	8.9	> 120 m^3
1:5 YR			62.8	31.4	0.99	101.60	17.5	
1:100 YR			65.6	32.8	1.08	101.69	55.7	

BUILDING 'B' ROOF DRAIN TABLE: AREA R-2 (ROOF DRAINS B1 to B49)

AREA ID *	ROOF DRAIN No. (WATTS MODEL)	ROOF DRAIN OPENING SETTING	1:5 YEAR RELEASE RATE	APPROX. 5-YR PONDING DEPTH	1:100 YEAR RELEASE RATE	APPROX. 100-YR PONDING DEPTH
R-2	RD 1 (RD-100-A-ADJ)	1/2 EXPOSED	1.10 L/s	11 cm	1.26 L/s	15 cm
R-2	RD 2 (RD-100-A-ADJ)	1/2 EXPOSED	1.10 L/s	11 cm	1.26 L/s	15 cm
R-2	RD 3 (RD-100-A-ADJ)	1/2 EXPOSED	1.10 L/s	11 cm	1.26 L/s	15 cm
R-2	RD 4 (RD-100-A-ADJ)	1/2 EXPOSED	1.10 L/s	11 cm	1.26 L/s	15 cm
R-2	RD 5 (RD-100-A-ADJ)	1/2 EXPOSED	1.10 L/s	11 cm	1.26 L/s	15 cm
R-2	RD 6 (RD-100-A-ADJ)	FULLY EXPOSED	0.79 L/s	6 cm	0.95 L/s	8 cm
R-2	RD 7 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 8 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 9 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 10 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 11 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 12 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 13 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 14 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 15 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 16 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 17 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 18 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 19 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 20 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 21 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 22 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 23 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 24 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 25 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 26 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 27 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 28 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 29 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 30 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 31 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 32 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 33 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 34 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 35 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 36 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 37 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 38 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 39 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 40 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 41 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 42 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 43 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 44 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 45 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 46 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 47 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 48 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm
R-2	RD 49 (RD-100-A-ADJ)	1/4 EXPOSED	0.87 L/s	11 cm	0.95 L/s	15 cm

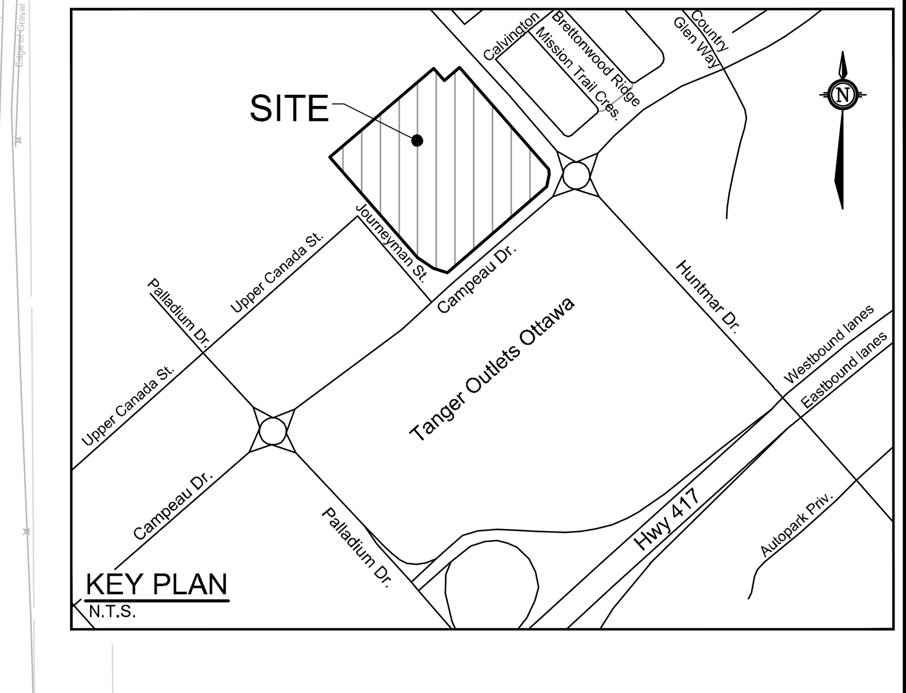
* REFER TO THE 'DEVELOPMENT SERVICING STUDY AND STORMWATER MANAGEMENT REPORT' (R-2022-___) PREPARED BY NOVATECH FOR DRAINAGE AREA IDENTIFIERS AND STORMWATER MANAGEMENT DETAILS.

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



INLET CONTROL DEVICE DATA TABLE: AREA A-4 (OUTLET PIPE of STM MH 04)

DESIGN EVENT	ICD TYPE (PLUG TYPE)	DIAMETER OF OUTLET PIPE (mm)	PEAK DESIGN FLOW (L/s)	½ PEAK DESIGN FLOW (L/s)	DESIGN HEAD (m)	WATER ELEVATION (m)	VOLUME (m^3)	AVAILABLE STORAGE
1:2 YR	CIRCULAR 219mmØ ORIFICE PLUG	375mmØ PVC DR35	116.7	58.4	1.27	99.10	222	> 810 m^3
1:5 YR			146.4	73.2	2.00	99.83	309	
1:100 YR			182.2	91.1	3.10	100.93	698	



THIS PLAN IS TO BE READ IN CONJUNCTION WITH CIVIL PLANS 122151-NLD1&2, 122151-GP1&2 AND 122151-GR1&GR2

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

No.	REVISION	DATE	BY
2	REVISED PER CITY COMMENTS	MAR 30/23	DDB
1	ISSUED FOR CITY OF OTTAWA REVIEW	DEC 16/22	DDB

SCALE 1:750

DESIGN SM / BM / DDB
CHECKED DDB
DRAWN SM
CHECKED BM / DDB
APPROVED DDB

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER D. D. BLAIR 100122737 Mar. 30 2023 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
405 HUNTMAR DRIVE - WAREHOUSE DEVELOPMENT

DRAWING NAME
POST-DEVELOPMENT STORMWATER MANAGEMENT PLAN

PROJECT No. 122151
REV REV # 2
DRAWING No. 122151-SWM

D07-12-22-0186

#18906

M:\2022\122151\CAD\Civil\122151-SWM.dwg, SWM, Mar 29, 2023 - 6:41pm, smatthews