Site Servicing Brief

Greystone Village Phase 3 Condos

375 Deschâtelets Avenue

Greystone Village Phase 3 Condos
375 Deschâtelets Avenue
Site Servicing Brief

Prepared For:

Greystone Village Inc.

Prepared By:

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

Prepared: June 3, 2022
Revised: August 19, 2022
Revised: December 2, 2022
Revised: January 20, 2023
Revised: February 10, 2023

Novatech File: 114025
Ref: R-2022-020

NOVATECH
Engineers, Planners & Landscape Architects

February 10, 2023

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

Attention: **Nishant Jhamb**

Reference: **Greystone Village Phase 3 Condos – 375 Deschâtelets Avenue**
Site Servicing Brief
Novatech File No.: 114025

Please find enclosed a copy of the revised Site Servicing Brief for the Greystone Village Phase 3 Condos, located at 375 Deschâtelets Avenue in Old Ottawa East, east of Main Street/Deschâtelets Avenue, south of des Oblate Avenue, west of Scholastic Drive and north of Deschâtelets Avenue within the City of Ottawa. The report demonstrates how the proposed site will be serviced with storm, sanitary, watermain, utilities, and stormwater management and is submitted for your review and approval.

This report is supplementary to the following reports to provide specifics related to the Greystone Village Phase 3 Condo Buildings which is part of the overall Greystone Village subdivision development:

- *"Greystone Village, 175 Main Street – Site Servicing, Stormwater Management, Noise, Erosion and Sediment Control Brief" dated February 24, 2016*
- "*Greystone Village - 175 Main Street: Site Servicing, Stormwater Management, Noise, Erosion and Sediment Control Brief (Phase 2 and 3), R-2017-089", dated May 26, 2017*

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

Sincerely,

NOVATECH

Steve Zorgel, P. Eng.
Project Coordinator | Land Development Engineering

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

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICIES

LIST OF DRAWINGS

This report should be read in conjunction with the engineering drawing set which includes the following drawings, dated January 20, 2023:

- 114025-GP (PH3) - General Plans of Services
- 114025-GR (PH3) - Grading, Erosion and Sediment Control Plan
- 114025-STM (PH3) - Storm Drainage Area Plan
- 114025-SAN1-2 – Sanitary Drainage Area Plan
- 114025-SAN1-B – Sanitary Drainage Area Plan

This report should be read in conjunction with the engineering drawing set which includes the following drawings, dated February 10, 2023:

- 114025-STM1-2 – Storm Drainage Area Plan
- 114025-STM1-B – Storm Drainage Area Plan

CD

- Hydraulic Model – Phase 3

1.0 INTRODUCTION

Novatech has been retained by Greystone Village Inc. to prepare this Site Servicing Brief in support of the site plan application of the Greystone Village Phase 3 Condos at 375 Deschâtelets Avenue in Old Ottawa East. The key plan (**Figure 1**) highlights the Greystone Village and Phase 3 Condo site location. The existing property is currently vacant. The proposed re-development of this portion of the site will consist of two (2) 7-storey buildings that will contain 153 and 118 units respectively. A total of approximately 169 underground parking spaces will be provided within underground parking. This Site Servicing Brief will confirm how the proposed Greystone Village Phase 3 Condos will be serviced with sanitary, water, stormwater management, and utilities. Refer to **Figure 2 –** Concept Plan – Phase 3 Condos for proposed site layout.

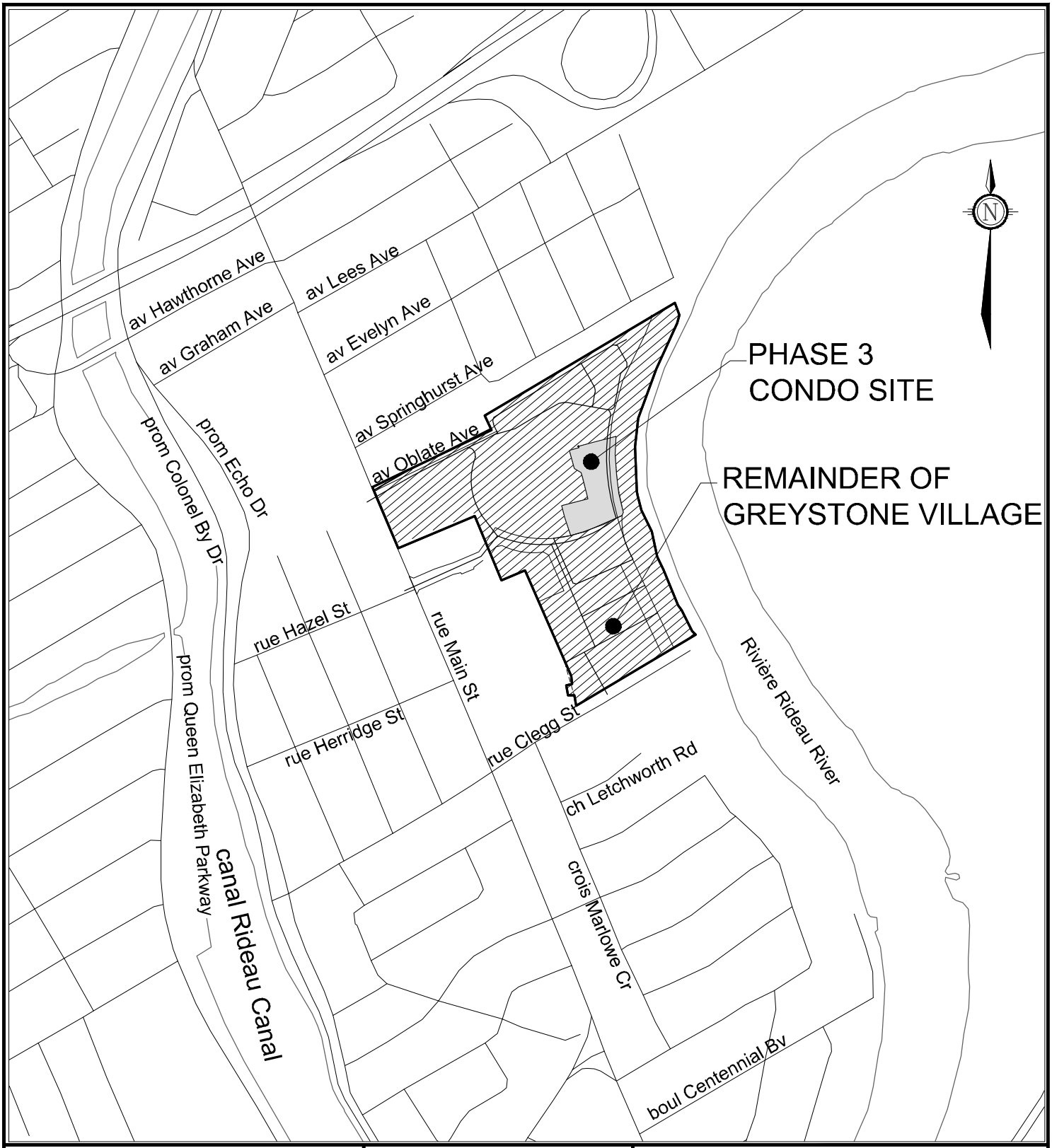
1.1 Geotechnical Investigation

Refer to Paterson's geotechnical report (*Geotechnical Investigation – Proposed Multi-Storey Buildings – Greystone Village - Phase 3 – Scholastic Drive – Ottawa, Ontario*; PG5383-1; dated March 9, 2022) for geotechnical considerations.

1.2 Additional Reports

This report provides information on the considerations and approach by which Novatech has designed and evaluated the proposed servicing for the Greystone Village Phase 3 Condos. This report should be read in conjunction with the following:

- *Proposed Retaining Wall – Proposed Development, Greystone Phase 3, PG5383, Rev. 1, completed by Paterson Group, dated November 4, 2022;*
- *Greystone Village, Phase 3, Scholastic Drive – Grading Plan Review Memorandum, dated June 6, 2022, PG5383.MEMO.02 Revision 1;*
- *Greystone Village, Phase 3, Scholastic Drive – Site Servicing Plan Review Memorandum, dated June 6, 2022, PG5383.MEMO.03 Revision 1;*
- *Greystone Village, 175 Main Street – Site Servicing, Stormwater Management, Noise, Erosion and Sediment Control Brief, dated February 24, 2016 (Referred to as Master Servicing Study 2016);*
- *Greystone Village, 175 Main Street – Site Servicing, Stormwater Management, Noise, Erosion and Sediment Control Brief – Phase 2 and 3, dated May 26, 2017 (Referred to as Master Servicing Study 2017);*
- *10 Des Oblate Avenue – Greystone Village 2A / 2B Mixed Use Building: Site Servicing And Stormwater Management Memorandum, dated March 11 2020;*
- *360 Deschâtelets Ave – The Spencer (Greystone Village 1c Building): Site Servicing And Stormwater Management Memorandum, dated August 6, 2020;*
- *225 Scholastic Drive – Greystone Village Deschâtelets Building: Site Servicing And Stormwater Management Memorandum, dated May 15, 2020;*
- *225 Scholastic Drive – Greystone Village Retirement Residence: Site Servicing And Stormwater Management Memorandum, dated March 23, 2018.*
- *Greystone Village – 175 Main Street – Potential Low Impact Development Opportunities, Prepared by Novatech, dated November 25, 2015, Ref. R-2015-182.*



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

CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

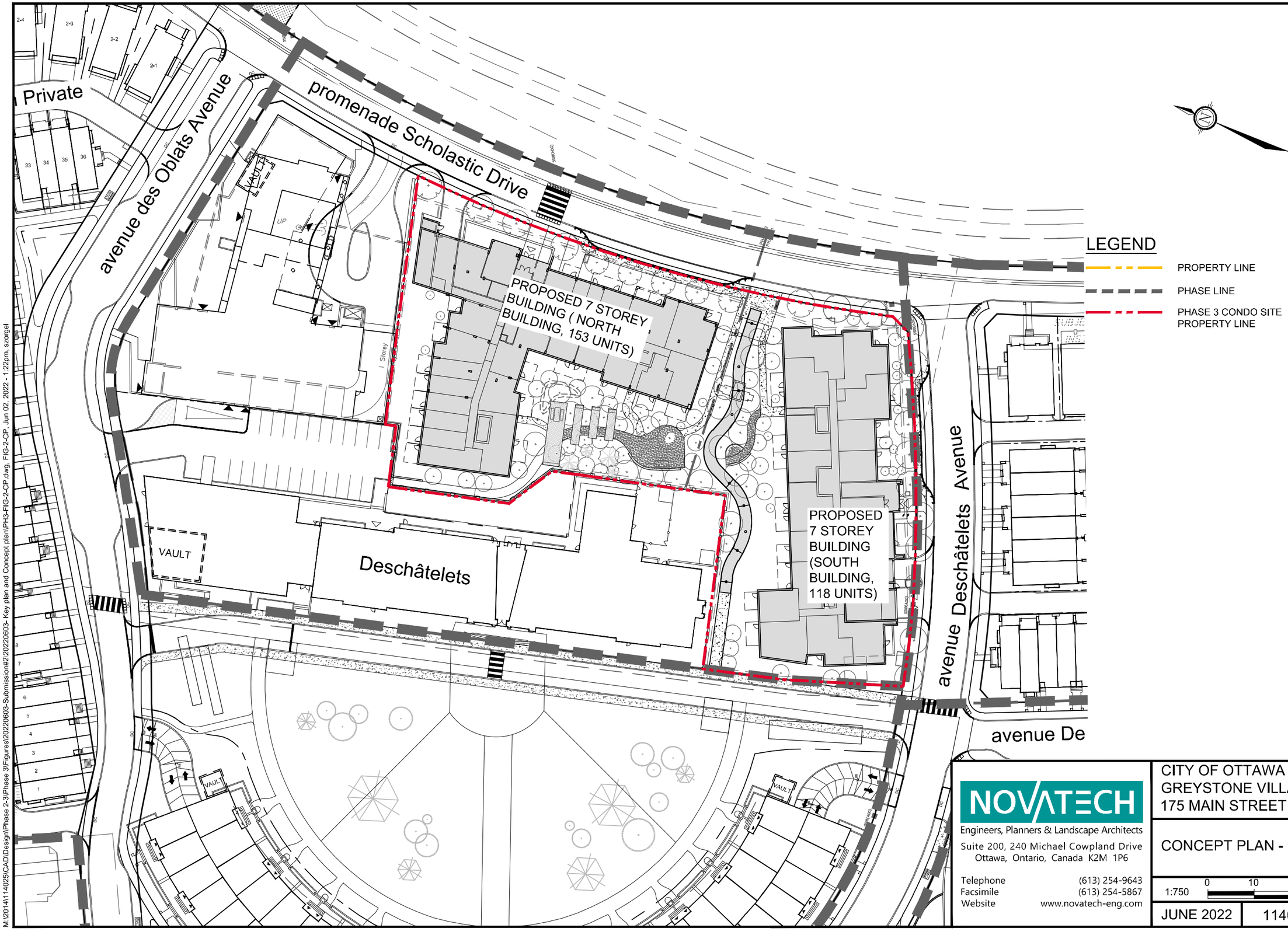
KEY PLAN

N.T.S.

JUNE 2022	114025	FIGURE 1

SHT8X11.DWG - 216mmx279mm

M:\2014\114025\CAD\Design\Phase 2-3\Phase 3\Figures\20220603-Submission#2\20220603- Key plan and Concept plan\PH3-FIG-1-KP.dwg, KP, Jun 02, 2022 - 1:19pm, szorgel



M:\2014\114025\CAD\Design\Phase 2-3\Phase 3\Figures\20220603-Submission#2\20220603- Key plan and Concept plan\PH3-FIG-2-CP.dwg, FIG-2-CP, Jun 02, 2022 - 1:22pm, szorgel

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

CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

CONCEPT PLAN - PHASE 3 CONDOS

1:750 0 10 20 30

JUNE 2022 | 114025 | FIGURE 2

SHT11X17.DWG - 279mmX432mm

1.3 Approvals

There have been several approvals by the Rideau Valley Conservation Authority and the Ministry of the Environment, Conservation and Parks and the City of Ottawa, which includes the phase 3 condo site. Relevant approvals are as follows. Refer to **Appendix D** for details.

MOECP

- ECA Number 0292-AP6PWR – Storm and Sanitary Sewers within Phase 2 & 3;
- ECA Number 3454-APEHFQ – Stormwater Outfall and Oil / Grit Separator within Phase 2 & 3;
- ECA Number 4082-AAZQ6P – Storm and Sanitary Sewers within Phase 1;
- ECA Number 8946-ACUP7W – Stormwater Outfall and Oil / Grit Separator within Phase 1;

RVCA

- File Number RV3-08/17 – Stormwater Outlet and Soil Remediation
- File Number RV3-56/15 –Soil Remediation Amended

The RVCA has confirmed they have no further comments and additional approvals are required for the phase 3 condo site. Refer to **Appendix D** for correspondence.

2.0 SANITARY SERVICING

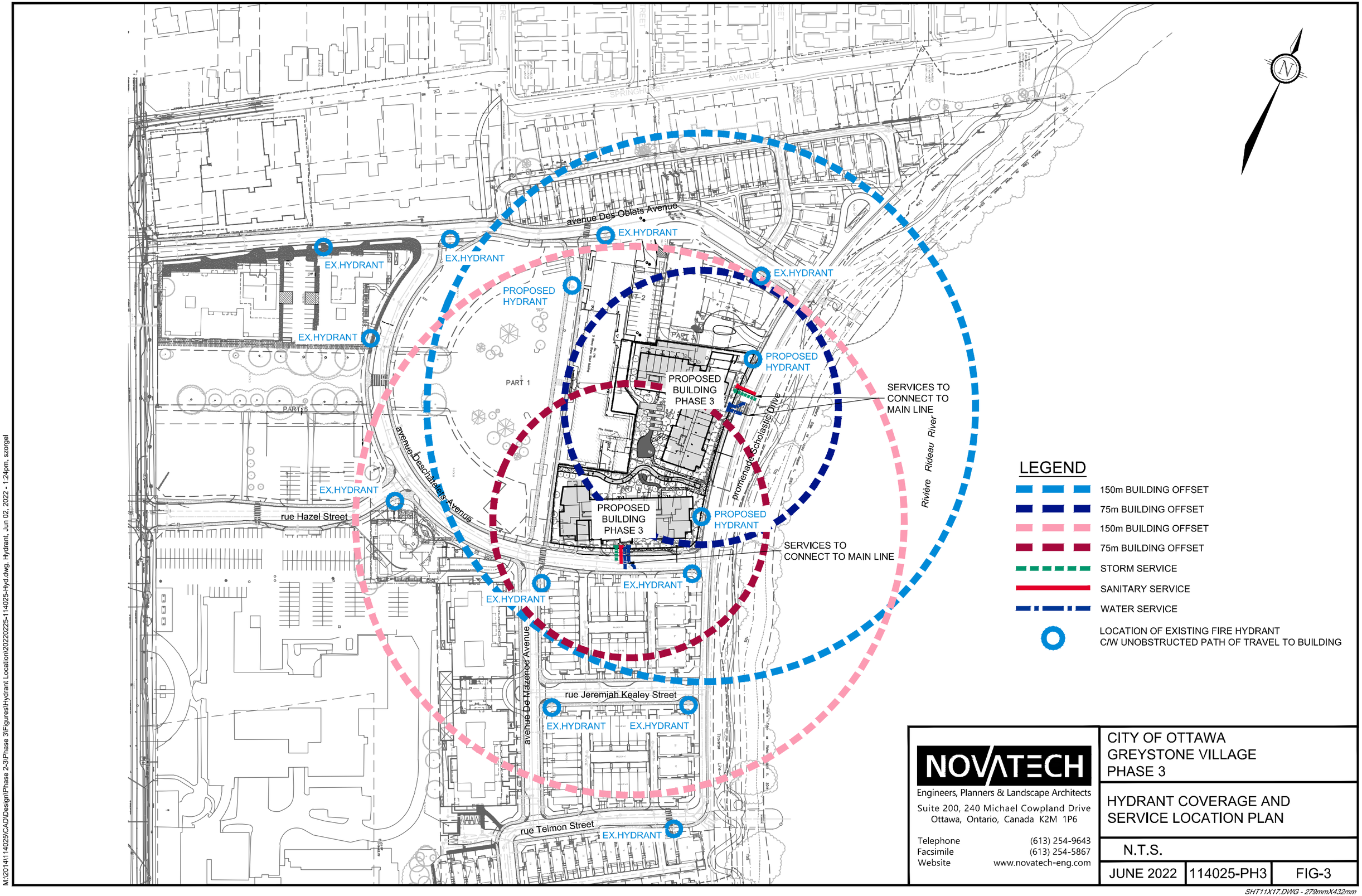
The two (2) proposed 7-storey buildings at the corner of Scholastic **Avenue**/Deschâtelets Avenue will each be serviced by two 200mm dia. sanitary services that connects to the existing 250mm diameter sanitary sewers on Scholastic **Avenue** and Deschâtelets Avenue respectively complete with backwater flow valves. Refer to **Figure 3** – Hydrant Coverage and Service Location Plan for locations.

2.1 Design Criteria

2.1.1 Existing System

The master Site Servicing, Stormwater Management, Noise, Erosion and Sediment Control Briefs (2016 & 2017) as listed above were completed prior to the City of Ottawa issuing Technical Bulletin ISTB 2018-01. Therefore, the master servicing studies for Greystone Village were based on the following City of Ottawa design criteria:

- Residential Average Sewage Flow = 350 L/capita/day
- Residential Peaking Factor = Harmon Equation
- Max Peaking Factor = 4.0
- ICI Peaking factor = 1.5
- Infiltration Allowance = 0.28 L/s/ha
- Population Density:
    - 3.4/unit (Singles)
    - 2.7/unit (Towns)
    - 2.1/unit (Two Bedroom Apartment)
    - 3.1/unit (Three Bedroom Apartment)
    - 2.0/unit (School Residence)
    - 1.4/unit (Retirement Residence or Studio Apartment)



LEGEND

- 150m BUILDING OFFSET
- 75m BUILDING OFFSET
- 150m BUILDING OFFSET
- 75m BUILDING OFFSET
- STORM SERVICE
- SANITARY SERVICE
- WATER SERVICE
- LOCATION OF EXISTING FIRE HYDRANT C/W UNOBSTRUCTED PATH OF TRAVEL TO BUILDING

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

CITY OF OTTAWA
GREYSTONE VILLAGE
PHASE 3

HYDRANT COVERAGE AND SERVICE LOCATION PLAN

N.T.S.

JUNE 2022 | 114025-PH3 | FIG-3

- Minimum Pipe Slope (200mm) = 0.32%
- Minimum Full Flow Velocity = 0.6m/s
- Maximum Full Flow Velocity = 3.0m/s

2.1.2 Proposed System

The current sanitary design is based on design criteria outlined in the City of Ottawa's Technical Bulletin ISTB 2018-01 and are as follows:

- Residential Average Sewage Flow = 280 L/capita/day
- Residential Peaking Factor = Harmon Equation
- Max Peaking Factor = 4.0
- ICI Peaking factor = 1.5 if ICI >20%, 1.0 <20%
- Infiltration Allowance = 0.33 L/s/ha
- Population Density:
    - 3.4/unit (Singles)
    - 2.7/unit (Towns)
    - 2.1/unit (Two Bedroom Apartment)
    - 3.1/unit (Three Bedroom Apartment)
    - 2.0/unit (School Residence)
    - 1.4/unit (Retirement Residence or Studio Apartment)
- Minimum Pipe Slope (200mm) = 0.32%
- Minimum Full Flow Velocity = 0.6m/s
- Maximum Full Flow Velocity = 3.0m/s

2.2 Proposed Sanitary Design – Phase 3 Condos

2.2.1 Master Servicing Study Flows

Based on the criteria listed in Section 2.1.1 the calculated peak sanitary design flows for Greystone Village Phase 3 Condo Area as per the Master Servicing Studies (MSS) was determined to be:

- Phase 1A/1B (Outlet 1) = 1.83 L/s
- Phase 2/3 (Outlet 2) = 1.15 L/s

The peak sanitary flows are summarized below in **Table 2.1**. Refer to **Appendix A** for approved Sanitary Design Sheets and to the Sanitary Drainage Areas Plans (Drawings **114025-SAN1, SAN2** and **SAN1-B**) for additional information. Note that Area B13 for phase 2/3 outlet includes the existing Deschâtelets building outletting to Scholastic Drive in the MSS. This value has been netted out of the calculations for peak sanitary flow from the phase 3 site.

Table 2.1: Phase 3 Condo Site - Sanitary Flow Summary As per Master Servicing Studies **

Development Condition	Population	Peak Res. Flow (L/s)	Peak Ext. Flow (L/s)	Peak Design Flow (L/s)
Total Flow Outlet 1	107	1.73	0.10	1.83*
Total Flow Outlet 2	63	1.02	0.13	1.15

* Peak Design Flow includes extraneous flows, population flows as well as forecourt flows (not listed in above table, refer to design sheets and Sanitary Drainage Areas Plans for further details).
**Refer to *Greystone Village, 175 Main Street – Site Servicing, Stormwater Management, Noise, Erosion and Sediment Control Brief – Phase 2 and 3 for further details* for further details.

2.2.2 Proposed System

Based on the new criteria listed in Section 2.1.2 the calculated peak sanitary design flow for the proposed Greystone Village Phase 3 Condo site was determined to be:

- Phase 1A/1B (Outlet 1) = 2.38 L/s
- Phase 2/3 (Outlet 2) = 3.08 L/s

The peak sanitary flows are summarized below in **Table 2.2**. Refer to **Appendix A** for proposed Sanitary Design Sheets and to the revised Sanitary Drainage Areas Plans (Drawings **114025-SAN1**, **SAN2** and **SAN1-B**) for additional information.

Table 2.2: Phase 3 Condos Site - Proposed Sanitary Flow Summary

Development Condition	Population	Peak Res. Flow (L/s)	Peak Ext. Flow (L/s)	Peak Design Flow (L/s) *
Total Flow Outlet 1**	198	2.26	0.13	2.38
Total Flow Outlet 2***	256	2.89	0.20	3.08

* Peak Design Flow include extraneous flows, population flows as well as forecourt flows (not listed in above table, refer to design sheets and Sanitary Drainage Areas Plans for further details).
**Refer to Sanitary Sewer Design Sheet Greystone Village, 175 Main Street 3 dated June 3, 2022
***Refer to Current Sanitary Sewer Design Sheet Greystone Village, 175 Main-Phase 2 and 3 (Outlet 2) dated June 3, 2022

The proposed sanitary design flows for Greystone Village Phase 3 site are higher than the flows accounted for in the previous master servicing studies. Therefore, a review of the overall Greystone downstream sanitary system is required and has been completed below.

2.3 Overall Downstream Sanitary System – Greystone Village

2.3.1 Existing System

Based on the criteria listed in Section 2.1.1 the calculated peak sanitary design flows for Greystone Village as per the Master Servicing Studies was determined to be:

- Phase 1A/1B (Outlet 1) = 24.03 L/s
- Phase 2/3 (Outlet 2) = 10.72 L/s

The peak sanitary flows are summarized below in **Table 2.3**. Refer to **Appendix A** for approved Sanitary Design Sheets and to the Sanitary Drainage Areas Plans (Drawings **114025-SAN1**, **SAN2 and SAN1-B**) for additional information.

Table 2.3: Overall Greystone Sanitary Flow Summary As per Master Servicing Studies**

Development Condition	Population	Peak Res. Flow (L/s)	Peak Ext. Flow (L/s)	Peak Design Flow (L/s)
Total Flow Outlet 1	1491	22.23	1.52	24.03*
Total Flow Outlet 2	624	9.91	0.81	10.72

* Peak Design Flow includes extraneous flows, population flows as well as forecourt flows (not listed in above table, refer to design sheets and Sanitary Drainage Areas Plans for further details).
**Refer to *Greystone Village, 175 Main Street – Site Servicing, Stormwater Management, Noise, Erosion and Sediment Control Brief – Phase 2 and 3 for further details.*

2.3.1 Proposed System

Based on the new criteria listed in Section 2.1.2 the calculated peak sanitary design flow for the proposed Greystone Village Phase 3 Condos was determined to be:

- Phase 1A/1B (Outlet 1) = 18.05 L/s
- Phase 2/3 (Outlet 2) = 10.56 L/s

The peak sanitary flows are summarized below in **Table 2.4**. Refer to **Appendix A** for proposed Sanitary Design Sheets and to the revised Sanitary Drainage Areas Plans (Drawings **114025-SAN1**, **SAN2 and SAN1-B**) for additional information.

Table 2.4: Overall Greystone Proposed Sanitary Flow Summary

Development Condition	Population	Peak Res. Flow (L/s)	Peak Ext. Flow (L/s)	Peak Design Flow (L/s)
Total Flow Outlet 1**	1567	15.91	1.83	18.05*
Total Flow Outlet 2***	909	9.61	0.95	10.56

* Peak Design Flow include extraneous flows, population flows as well as forecourt flows (not listed in above table, refer to design sheets and Sanitary Drainage Areas Plans for further details).
**Refer to Sanitary Sewer Design Sheet Greystone Village, 175 Main Street 3 dated June 3, 2022
***Refer to Current Sanitary Sewer Design Sheet Greystone Village, 175 Main-Phase 2 and 3 (Outlet 2) dated June 3, 2022

2.4 Sanitary Conclusion

For the proposed Phase 3 Condo site there is a 0.55 L/s increase of peak sanitary flow into the existing Outlet 1 and an increase of 2.01 L/s of peak sanitary flow into the existing Outlet 2 compared to the sanitary flows accounted for in the master servicing studies. An analysis of the downstream system was completed.

An analysis of the overall Greystone Village downstream system showed that there is a 5.98 L/s reduction of peak sanitary flow into the existing Outlet 1 and a reduction of 0.16 L/s for Outlet 2. Sanitary flows have been updated for the entire development including as-built information for past site plans to reflect current unit counts and design criteria as per Technical Bulletin ISTB 2018-01. The flows have decreased in comparison to the previously accounted flows in the master servicing reports (2016, 2017). Therefore, the existing sanitary sewers adequate capacity to

accommodate the peak sanitary flow from the Greystone Village Phase 3 Condos. Refer to **Appendix A** for proposed Sanitary Sewer Design sheet for details.

3.0 WATERMAIN

The two (2) proposed 7-storey buildings at the corner of Scholastic Drive /Deschâtelets Avenue will each be serviced by two 150mm diameter water services that will be interconnected for redundancy that connects to the existing 250mm diameter watermain on Scholastic Drive and Deschâtelets Avenue respectively. Each building will be sprinklered using modern fire fighting equipment. Refer to **Figure 3** – Hydrant Coverage and Service location Plan for locations.

3.1 Previous Studies

The master Site Servicing, Stormwater Management, Noise, Erosion and Sediment Control Briefs (2016 & 2017) as listed above were completed prior to the City of Ottawa issuing Technical Bulletin ISTB 2018-01 & ISTB-2021-03. Therefore, the master servicing studies for Greystone Village were based on the following City of Ottawa design criteria:

Demands:

- Average Daily Demand = 350L/capita/day
- Maximum Daily Demand = 2.5 x Average Daily Demand
- Peak Hour Demand = 2.2 x Maximum Daily Demand
- Fire Flow = Fire Underwriter's Survey

Residential

- School Residence Average Flow = 70 L/student/day
- Population Density:
    - 3.4/unit (Singles)
    - 2.7/unit (Towns)
    - 2.1/unit (Apartment)
    - 2.0/unit (School Residence)
    - 1.4/unit (Retirement Residence)

System Requirements

- Maximum Allowable Pressure = 100psi (690 kPa)
- Minimum Allowable Pressure (excluding fire flow conditions) = 40psi (276 kPa)
- Minimum Allowable Pressure during fire flow conditions = 20psi (138 kPa)
- Maximum Allowable Age = 5 days (residence time = 8 days, 192 hours)

Fire Flow (maximum):

- 141.40L/s (Singles)
- 259.36L/s (Row Towns)
- 219.97L/s (Back to Back Row Towns)
- 230.67L/s (4 Storey Combustible Construction Condo)
- 251.52L/s (6 Storey Non-Combustible Construction Condo)
- 286.45L/s (9 Storey Non-Combustible Construction Condo)
- 300.24L/s (Retirement Residence) **(Fronting Phase 3 Scholastic Drive)**
- 229.03L/s (4 Storey Condo) **(Fronting Phase 3 Deschâtelets Avenue)**
- 249.76L/s (School Residence)

- 133.33 (Domicile Building - offsite)
- 173.37 (Sister's Building – offsite)

Friction Factors:

Watermain Size:	C-Factor:
300mm diameter	120
200mm and 250mm diameter	110
150mm to 50mm diameter	100

The water distribution network could provide adequate system pressures under the maximum day plus fireflow and under peak hour conditions within the development.

3.2 Proposed Watermain Design

The current sanitary design is based on design criteria outlined in the City of Ottawa's Technical Bulletin ISTB 2018-01 & ISTB 2021-03 and are as follows. Fireflows are based on the FUS 2020:

Demands:

- Average Daily Demand = 280L/capita/day
- Maximum Daily Demand = 2.5 x Average Daily Demand
- Peak Hour Demand = 2.2 x Maximum Daily Demand
- Fire Flow = Fire Underwriter's Survey 2020

Residential

- School Residence Average Flow = 70 L/student/day
- Population Density:
    - 3.4/unit (Singles)
    - 2.7/unit (Towns)
    - 2.1/unit (Apartment)
    - 2.0/unit (School Residence)
    - 1.4/unit (Retirement Residence)

System Requirements:

- Maximum Pressure (System) = 690kPa (100psi)
- Maximum Pressure (Service) = 552kPa (80psi)
- Minimum Pressure (w/o fire flow) = 275kPa (40psi)
- Minimum Pressure (w/ fire flow) = 140kPa (20psi)
- Maximum Age Onsite (Quality) = 192 hours
- Friction Factor: 200mm/300mm = 110/120

Fire Flow (FUS 2020)

- Phase 3 Condos (maximum):
    - 233 L/s (7 Storey building Fronting Scholastic Drive)
    - 200 L/s (7 Storey building Fronting Deschâtelets Avenue)

It should be noted that both services will need to be interconnected for redundancy at the entry into the building.

There is adequate hydrant coverage to provide 233 L/s under the fireflow operating conditions, refer to **Figure 3** – Hydrant Coverage and Service Location plan for coverage areas.

Boundary Conditions

Boundary conditions were requested based on current demand and fireflows for the phase 3 condo site. The results indicate an increase in the boundary conditions under all operating conditions. It should be noted that the maximum fireflows for the phase 3 buildings (north and south) have decreased from the fireflows accounted for in the master servicing studies fronting the phase 3 site on Scholastic Drive (N21) and Deschâtelets Avenue (N22). The increase in population demand would have a negligible effect on the peak hour condition. Therefore, it can be concluded that the existing watermain system has adequate capacity to service the proposed phase 3 condo site.

A copy of the City of Ottawa provided boundary conditions, boundary condition request and information from the master servicing studies are included in **Appendix B**.

As per correspondence from the City of Ottawa, no further analysis is required for the phase 3 condo site.

4.0 STORMWATER MANAGEMENT

The two (2) proposed 7-storey buildings at the corner of Scholastic Drive /Deschâtelets Avenue will each be serviced by a 200mm diameter storm service connecting to the existing 375mm diameter storm sewer on Scholastic Drive and the 375mm diameter storm sewer on Deschâtelets Avenue, respectively, complete with backwater flow valves. Refer to **Figure 3** – Hydrant Coverage and Service location Plan for locations.

4.1 Stormwater Management Criteria

The stormwater management criteria used in the design of the Greystone Village Phase 3 Condos have been based on the following:

- Greystone Village, 175 Main Street – Site Servicing, Stormwater Management, Noise, Erosion and Sediment Control Brief – Phase 2 and 3 dated May 26, 2017, (Novatech, May 2017/Ref. # R-2017-089)
    - This report outlines the design criteria for all future development within Greystone Village, including the Phase 3 Condos,
- City of Ottawa Sewer Design Guidelines (October 2012).

4.1.1 Minor System (Storm Sewers)

- The receiving storm sewers on Scholastic Drive and Deschâtelets Avenue have been designed using the Rational Method for a 1:5-year return period;
- Provide additional storage (if necessary) to control the total site runoff to the allowable minor system release rate (5-year storm) for all storms up to the 100-year event.
- Ensure 100-year controlled flow rates do not exceed or have adverse effects on the existing storm system.

4.1.2 Major System (Emergency Overland Flow)

- Runoff that exceeds the 100-year storm event is to be conveyed overland to Scholastic Drive and Deschâtelets Avenue.

4.1.3 Water Quality Control

- Water quality control will be provided via two existing Vortechnic hydrodynamic separators at the storm outlets to the Rideau River. These Vortechnics units have been designed to provide an Enhanced level of water quality treatment for the entire Greystone Village development, including the Phase 3 condominiums. Refer to Section 1.2 for approved master servicing reports (2016 & 2017). No additional water quality treatment measures are proposed.

4.1.4 Erosion and Sediment Control

- A qualified inspector should conduct daily visits during construction to ensure that the contractor is working in accord with the design drawings and that mitigation measures are being implemented as specified;
- Inserts and filter fabric are to be placed under all proposed and existing catchbasins and storm manhole covers;
- After complete build-out, all sewers are to be inspected and cleaned and all sediment and construction fencing is to be removed.

4.2 Stormwater Management Modeling

The City of Ottawa Sewer Design Guidelines (October 2012) requires hydrologic / hydraulic modeling for all dual drainage systems. The performance of the proposed storm drainage system was originally evaluated using the PCSWMM model as part of the 2017 Master Servicing Study. For this submission, the MSS PCSWMM model has been updated using available as-built information for the storm drainage infrastructure in Greystone Village. The results of the analysis were used to:

- Calculate the total post-development runoff from Phase 3 Condominium site.
- Calculate the storm sewer hydraulic grade line for 100-year event.

Two PCSWMM model versions (100-year and stress test) are submitted. Schematics and output files are provided in **Appendix C**.

4.2.1 Design Storms

The hydrologic / hydraulic analysis was completed using the following synthetic design storms and historical storms. The IDF parameters used to generate the design storms were taken from the City of Ottawa Sewer Design Guidelines (October 2012).

3 Hour Chicago Storms:	*24 Hour Chicago Storms*:
5-year 3hr Chicago storm	100-year 24hr Chicago storm
100-year 3hr Chicago storm	
100-year+20% 3hr Chicago storm	

12 Hour SCS Type II Storms:	*Historical Storms*:
5-year 24 hour SCS Type II storm	July 1, 1979 storm
100-year 24 hour SCS Type II storm	August 4, 1988 storm
	August 8, 1996 storm

The 3-hour Chicago distribution generates the highest peak flows for both the minor and major systems and was determined to be the critical storm distribution for the design of the storm drainage system.

The proposed drainage system has also been stress tested using a 3-hour Chicago design storm that has a 20% higher intensity and total volume compared to the 100-year event.

4.2.2 Modelling Parameters

The hydrologic parameters for each subcatchment were developed based on the proposed land use and grading. Subcatchments were modeled using the standard SWMM5 runoff module with Horton's Equation for infiltration.

Areas Above Underground Parking

The modelling parameters and approach for the areas above the underground parking garage are further supported by a supplemental technical memorandum "*Runoff Coefficient Calculation of Areas Above Underground Parking Roof Slab, dated December 2, 2022".* The memo also contains an email from a geotechnical consultant that supports the parameters used in the hydrologic analysis. See **Appendix C** for details.

Infiltration

Infiltration losses for all subcatchments were modeled using Horton's infiltration equation, which defines the infiltration capacity of soil over the duration of a precipitation event using a decay function that ranges from an initial maximum infiltration rate to a minimum rate as the storm progresses. The default values for the City of Ottawa were used for all catchments.

Horton's Equation:
$f(t) = f_c + (f_o - f_c)e^{-k(t)}$

Initial infiltration rate: f_o = 76.2 mm/hr
Final infiltration rate: f_c = 13.2 mm/hr
Decay Coefficient: k = 4.14/hr

Depression Storage

The default values for depression storage in the City of Ottawa were used for all catchments. Rooftops were assumed to provide no depression storage (zero-impervious parameter).

- Depression Storage (pervious areas): 4.67 mm
- Depression Storage (impervious areas): 1.57 mm

Equivalent Width

'Equivalent Width' refers to the width of the subcatchment flow path. This parameter is calculated as described in Section 5.4.5.6 of the *City of Ottawa Sewer Design Guidelines* (October 2012).

Impervious Values

Runoff coefficients for each subcatchment were determined based on the proposed site plan. Percent impervious values were calculated using the following equation:

$$\%imp = (C - 0.20) / 0.70$$

Boundary Condition

The 100yr flood elevation in the Rideau River (57.85m) is used as boundary condition for both outlets. Outlet 1 is fronting Oblate Ave. and outlet 2 is located in front of Telmon St. Refer to **Appendix C** for model schematics and outlets location.

4.3 Proposed Stormwater System

4.3.1 Previous Studies (2017 MSS)

The existing sewers on Scholastic Drive and Deschâtelets Avenue were sized using the Rational Method based on a 5-year level of service, using the drainage areas and runoff coefficients from the *Greystone Village Master Servicing Study* (2017). Stormwater flows within the Phase 3 boundary were allocated to discharge to the Rideau River via the following outlets.

- Outlet 1 - Located within Phase 1 of the Greystone Village development.
    - Phase 3 catchment areas fronting Deschâtelets Avenue (southern building)
- Outlet 2 - Located within Phase 2-3 of the Greystone Village development.
    - Phase 3 catchment areas fronting Scholastic Drive (northern building)

Updates to MSS

The drainage patterns and outlets for the Phase 3 site are generally consistent with the drainage patterns considered in the 2017 master servicing study, but there have been minor changes to drainage patterns and release rates from some of the newly developed areas. The overall storm drainage model from the MSS has been updated to reflect the proposed storm drainage system for the Phase 3 site and all available as-built information for existing development. An addendum to the MSS has been prepared and submitted to reflect the updated model results.

4.3.2 Proposed Storm System

Runoff from the site will be captured by a combination of area drains in the courtyard or along the building, controlled roof drains, trench drains, or will directly drain overland to Scholastic Drive and Deschâtelets Avenue. Storm drainage will be consistent with the Stormwater Drainage Area Plan, 114025-STM(PH3).

Surface Drainage

Area drains throughout the site will be directed to the following outlets:

- Area drains 1-6 within the courtyard will outlet to the existing 375mm storm sewer on Scholastic Drive.
- Area drains 7-9 within the courtyard are proposed to outlet to the existing 375mm storm sewer on Deschâtelets Avenue.

The area drains have been designed to capture the 100-year runoff from the contributing catchments within Phase 3. The area drains will be routed into the underground parking structure where they will be gravity fed to a mechanical room before being pumped to the storm service laterals for the Phase 3 buildings.

Foundation Drainage

Foundation drains will be routed to the underground parking sump and pumped (with appropriate back up power, sufficient sized pump and back flow prevention) to the service laterals for the Phase 3 Condominiums. Flow will be pumped at the same rate as the incoming flow.

Underground Parking

All drainage from covered levels of underground parking will be captured and conveyed to the sanitary sewer pit in the mechanical room before outletting to the sanitary sewer lateral. Flow will be pumped at the same rate as the incoming flow.

A trench drain will be required at the bottom the underground parking ramp along Deschâtelets Avenue to capture any flows entering the parking structure. This drain will not be controlled and will be pumped to the internal storm system at the same rate as the incoming flow.

Underground Parking Roof Slab

Storm runoff from the landscaped areas above the parking garage will be captured by the area drains, as described above in the 'Surface Drainage' section. These areas have been modeled based on the % impervious area at the surface and a portion of the rainfall will infiltrate into the soils above the parking garage roof slab.

The parking garage will have a perforated pipe drainage system just above the roof slab to collect any infiltrated water that exceeds the available water holding capacity of the overlying soils. It was determined that the depth of soil above the roof slab will provide sufficient water holding capacity to retain all infiltrated water for storms up to the 100-year, with essentially no surface water reaching the roof slab drainage system – refer to memo "*Runoff Coefficient Calculation of Areas Above Underground Parking Roof Slab, dated December 2, 2022"* in **Appendix C**.

For the stress-test event, it is assumed that the soils above the parking garage are fully saturated and that infiltrated water will be collected by the perforated pipe drains above the roof slab. The inflow rate to the perforated pipes was estimated based on the minimum Horton's infiltration rate of 13.2 mm/hr. Based on the area of the roof slab (~0.42 ha), this corresponds to a flow rate of 15.5 L/s. This flow rate has been added as a steady base flow in the PCSWMM model at the connection points to the sewers on Scholastic Drive and Deschâtelets Avenue.

Flat Roof Buildings

The Phase 3 Condos will have flat roofs with controlled flow roof drains to attenuate runoff from storms up to the 100-year event prior to discharging to the storm sewers on Scholastic Drive and Deschâtelets Avenue.

- The northern building will outlet to Scholastic Drive and the southern building will outlet to Deschâtelets Avenue.
- The design of the roof drainage system has been coordinated with the architect and mechanical engineer.
- Runoff from storms greater than the 100-year event that exceeds the available rooftop storage will outlet to the courtyard via scuppers on the roof.

Interim Condition & External Drainage Area

During interim conditions, the roof drain outlets from the existing Deschâtelets building (subcatchment B19) are collected by a 300mm perforated pipe drain and conveyed to MH306. Under interim conditions, the landscaped area behind the Deschâtelets building (subcatchment

B20) has been considered to flow overland into subcatchment A02 of Phase 3 due to the existing topography.

No external storm flows from neighbouring properties will be considered under ultimate buildout conditions of adjacent properties, see **Appendix D** for correspondence. Under future conditions, a storage tank will be installed in the Deschâtelets building to control stormwater from the building roof before outletting to MH306 and this will substantially reduce the outflow rate. Runoff from landscaped area B20 will be diverted towards Oblate Ave and will no longer impact Phase 3.

Since the interim conditions introduce external flows into Phase 3 and generates higher peak flows from the existing building roof, the interim conditions scenario has been used for the design of Phase 3.

4.4 Results

As some of the drainage areas and building designs have changed in the time period between the completion of the 2016/2017 MSS and the Phase 3 design, it is difficult to compare storm flows in the receiving sewers using the Rational Method and design sheets. Therefore, the PCSWMM model has been updated to include as-built information within the overall Greystone Village development. The updated model has been used to determine if there are any adverse effects on the stormwater system resulting from the as-built data or from the proposed Phase 3 development.

4.4.1 Storm Flows – Phase 3 Development

Storm flows from the Phase 3 site will be captured by a combination of area drains in the courtyard or along the building, controlled roof drains, trench drains, or will directly drain overland to Scholastic Drive and Deschâtelets Avenue. A summary of the flows are as follows in **Table 4.1**:

Table 4.1: Storm Flows – Phase 3 Condo Site*

Subcatchment ID	Outlet	System	Uncontrolled Runoff (L/s)			100-Year Controlled Release Rate (L/s)
			5-Year	100-Year	100-year + 20%**	
North Building	Scholastic Dr. – PH.2-3	Directly to Minor System	40.48	73.97	90.27	10.29
A01	Scholastic Dr. – PH.2-3	Overland to Scholastic Dr.	2.26	6.55	9.21	N/A
A02***	Scholastic Dr. – PH.2-3	Directly to Minor System	9.03	63.91	85.02	N/A
A03	Scholastic Dr. – PH.2-3	Overland to Scholastic Dr.	12.29	29.14	37.69	N/A
South Building	Deschâtelets Ave. – PH.1	Directly to Minor System	37.06	66.23	80.29	8.84
A04	Deschâtelets Ave. – PH.1	Overland to Deschâtelets Ave.	6.30	12.70	16.01	N/A
A05	Deschâtelets Ave. – PH.1	Overland to Deschâtelets Ave.	6.48	15.52	20.16	N/A
A06	Deschâtelets Ave. – PH.1	Directly to Minor System	9.75	21.27	27.6	N/A

*Table represents flows leaving the Phase 3 site, whether they are controlled after leaving the site or not. Flows are based on the 3hr Chicago Storm Distribution.

**Stress test includes infiltrated flow through fully saturated soil during stress test. Infiltrated flow rate is 36.66 L/s/ha.

*** Overland runoff from area B20 is added to A02 under interim conditions.

Note that a portion of the uncontrolled flow (A01, A03, A04, & A05) will flow overland to either Scholastic Drive or Deschâtelets Avenue and will be captured by the existing roadside catchbasins which are fitted with Inlet Control Devices (ICDs). As the total inflow to these catchbasins includes runoff from both the Phase 3 lands and the right-rights of way, the minor system inflows to these catchbasins from Phase 3 cannot be reported independently and will be controlled prior to entering the minor system.

4.4.2 Overall Storm Flows – Greystone Village Outlets

As described above, drainage patterns, catchment areas, and storm sewer data were updated in the overall Greystone Village PCSWMM model. Refer to **Appendix C** for model schematics. Changes in drainage patterns include the existing Deschâtelets building outletting to Oblate Avenue instead of Scholastic Drive as per the MSS. Therefore, the design flows and corresponding HGL elevations were checked for all 3 roadways: Oblate Avenue; Scholastic Drive; and Deschâtelets Avenue.

The overall storm flows were compared at each outlet to the Rideau River. The model results (**Table 4.2**) show that there are minor increases in flows compared to the master servicing studies:

Table 4.2 – 100-Year Storm Flow Summary in Minor System at Outlets

Outlet	Proposed Phase 3 Condo Site Plan Application (2023)	Master Servicing Study (2017)
Outlet 1 – Phase 1	853 L/s	798 L/s
Outlet 2 – Phase 2-3	1629 L/s	1,578 L/s

The results indicate an increase in flow in the minor system. There is an approximate 8% increase in flow to Outlet 1 and an approximate 4% increase in flow to Outlet 2. It should be noted that the majority of differences between the updated model and the approved MSS model are the result of changes to reflect as-built conditions for previous phases and not as a result of Phase 3. The uncontrolled runoff from the Deschâtelets building has a considerable impact on flow rate and once storage tank is installed in the building, flow rate will be substantially lower than the interim conditions.

It should be noted there is a very small difference in area and imperviousness to each outlet, refer to figure 5 (addendum to MSS) in Appendix C. The existing vortechnic units are still sized appropriately to handle the increase in peak flow to each outlet. See correspondence from the manufacturer in the appendix for details.

4.4.3 HGL Check

The master servicing studies included a storm sewer hydraulic grade line (HGL) analysis based on controlled flows to the minor system during the 100-year and stress test design storm events. Therefore, an additional check was completed to ensure there will be no adverse effects on HGLs and/or the level of service for the Phase 3 stormwater management design, this analysis includes a review of the HGL levels downstream of Phase 3 within the pipes along Deschâtelets Avenue, Scholastic Drive and Oblate Avenue.

Three scenarios were considered to compare the effects of the Phase 3 development on the existing system.

1) The approved PCSWMM model from the 2016/2017 Master Servicing Studies;
2) The updated model of the as-built condition of the entire Greystone village, including the latest design for the Phase 3 condo site;
3) To conservatively compare HGL impacts from Phase 3 development, the updated model was also run without any flow contribution from the Phase 3 lands.

Model results are provided in **Appendix C**. A summary and comparison of the downstream HGL elevations are provided in **Table 4.3.**

Table 4.3 – HGL Levels (Downstream of Phase 3) – 3hr Chicago 100-year Storm

Street	MH Number	Approved MSS Model (m)	Updated Model W/ Phase 3 (m)	Updated Model Excluding Phase 3 (m)*	MSS Model and Updated Model Difference(m)**	Difference of Updated Model with and without Phase 3(m)***
Oblate Avenue	304	61.07	61.02	61.02	-0.05	0.00
	306	59.58	59.64	59.64	+0.01	0.00
	308	58.85	59.27	59.25	+0.42	+0.02
	310	58.69	58.85	58.73	+0.18	+0.12
	334	58.61	58.73	58.61	+0.12	+0.12
Scholastic Drive	324	60.75	60.73	60.73	-0.02	0.00
	326	59.31	59.31	59.26	0.00	+0.05
	328	58.78	59.34	58.96	+0.44	+0.38
Deschâtelets Avenue	128	61.42	61.49	61.49	+0.07	+0.00
	126	61.55	61.59	61.52	+0.04	+0.07
	124	60.86	60.88	60.83	+0.02	+0.05
	114	60.01	60.05	60.02	+0.04	+0.03
	118	59.51	59.52	59.52	+0.01	+0.00

* No runoff from Phase 3 flows to the sewer system

** Difference between the updated model with Phase 3 and MSS model

*** Difference between the updated model with Phase 3 and the updated model excluding Phase 3

The results indicate the following:

- HGLs have slightly increased upstream and downstream at the connection point along Oblate Avenue due to the existing Deschâtelets building connection being uncontrolled:
    - 100-year HGLs are below the obvert of the pipe or fronting units with waterproof basements (no connection to storm sewer).

- HGLs have slightly increased upstream and downstream at the connection point along Scholastic Drive.
    - There are no other connections to the storm sewer along Scholastic Drive, therefore there is no concerns.
- HGLs have slightly increased upstream and downstream at the connection point along Deschâtelets Avenue (south building – Phase 3).
    - 100-year HGLs are below the obvert of the pipe and there are no concerns with USF or slab elevations.

Even though the HGLs have increased slightly at the connection points, there is no risk of basement flooding under the 100-year storm and stress test events. Increases in HGL levels are mainly due to as built or current conditions. Refer to Refer to **Appendix C** for an Addendum to the Master Servicing Study for detailed information, which includes the following:

- Detailed HGLs through the subdivision.
- As-Built Underside of Footings.
- As-built Storm Drainage Area Plans.

4.5 Major System Flows

Since a portion of the uncontrolled flows from Phase 3 will flow overland to either Scholastic Drive or Deschâtelets Avenue, overland flow depths within the rights-of-way were checked using the updated model to ensure depths of flow within the roadway have not increased.

Results indicated the depths of flow within the roadway were at or below the previously calculated flow depths in the master servicing studies. Therefore, the Phase 3 condo site will have adverse effects on the major system flows under the 100-year storm event. Major system results (provided in **Appendix C**) are based on the scenarios described in Section 4.4.2.

4.5.1 Major System (Emergency Overland Flow) – Phase 3

The on-site major system has been designed to convey all uncontrolled overland flows and/or any runoff that exceeds the capacity of the Phase 3 storm sewers to either Scholastic Drive or Deschâtelets Avenue. The northern building perimeter and courtyard will be conveyed to Scholastic Avenue and the southern building (south and west) will be conveyed to Deschâtelets Avenue. This approach is generally consistent with the previous master servicing studies.

Worst-case channel depth calculations were completed using the stress test (100-year + 20%) near pinch points of the building and verified that the theoretical flow depth was less than the difference between the building envelope grade and the spill point. Therefore, it can be concluded that the overland flow will not touch any part of the building envelope while conveying the calculated flow during the stress test (100-year + 20%). Supporting calculations can be found in **Appendix C.**

Emergency Overland flow from Scholastic Drive and Deschâtelets Avenue ultimately outlet to the Rideau River.

Storm drainage will be consistent with the Stormwater Drainage Area Plan, 114025-STM(PH3). Under interim conditions, storm runoff is considered for the landscaped area between the Phase 3 development and the existing Deschatelets building (Area B20-INT) due the existing topography

is sloped towards the Phase 3 development. No external storm flows from neighbouring properties will be considered under ultimate buildout conditions of adjacent properties, see **Appendix D** for correspondence.

4.5.2 Major System (Emergency Overland Flow) – Deschâtelets Avenue

The highpoint on the ramp to the underground parking garage has an elevation of 63.73m. At CB34 the total of the static and dynamic depth during the stress test (100yr + 20%) event is 0.06m based on the as-built model for the Phase 3 development. The edge of pavement elevation in front of the underground parking ramp is 63.52m, giving a flow depth of 63.58m in the roadway. There is a 0.15m freeboard between the depth of flow on Deschâtelets Avenue and the highpoint on the parking garage ramp. Therefore, there will be no spillage from the road into the underground parking ramp.

4.6 LID Features

No specific LID features were considered for the site and were previously considered not feasible. Refer to the report, *Greystone Village – 175 Main Street – Potential Low Impact Development Opportunities, Prepared by Novatech, dated November 25, 2015, Ref. R-2015-182.*

4.7 Groundwater Infiltration

Since the building foundation will be waterproof and an infiltration control system and tank and being implemented for the phase 3 development, it is expected that groundwater flows post-construction will be low to negligible (2,000L/day). The infiltration control system/tank will be approved by the geotechnical consultant at the time of construction.

5.0 NOISE

An analysis of the roadway traffic along Mainstreet to the West and Highway 417 to the North indicates that the indoor sound levels for all condo buildings north of the existing Deschâtelets building will not exceed the maximum allowable limits outlined in the City of Ottawa's Environmental Noise Control Guidelines and therefore noise attenuation measures for the buildings will not be necessary for the Greystone Village Phase 3 Condos.

All condo buildings and site plans south of the existing Deschâtelets building are outside the 500m limit and are not subject to noise analysis.

The detailed results are included in the Noise Impact Assessment Report. Refer to "*Greystone Village, 175 Main Street – Site Servicing, Stormwater Management, Noise, Erosion and Sediment Control Brief – Phase 2 and 3*" dated May 26, 2017 by Novatech Engineering.

6.0 UTILITIES

The phase 3 condo site will be serviced with hydro, gas, bell and rogers with connections to Scholastic Drive (north building) and Deschâtelets Avenue (south building).Canada Post will service the site with community mailboxes, as well as lobby mailboxes (condos). Site lighting will be provided along roadways, sidewalks and walkways as per City standards. OC Transpo will have a temporary turnaround at the end of Hazel Street until such time as the phase 2 is completed, which will provide a loop back to Main Street using Hazel Street, Deschâtelets Avenue as well as Oblate Avenue.

For additional information existing utility servicing, refer to the Phase 1A/1B utility plans (Drawings **114025-U1** to **U7**) as well as the Phase 2/3 utility plan (Drawing **114025-U-B**) which has been circulated to all the utilities (included as part of the drawings).

7.0 EROSION AND SEDIMENT CONTROL

Temporary 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). Details will be provided on the Erosion and Sediment Control Plan. Erosion and sediment control measures may include:

- Placement of insert in catchbasins and filter fabric under all maintenance holes;
- Silt fences around the area under construction placed as per OPSS 577 and OPSD 219.110;
- Light duty straw bale check dam per OPSD 219.180; and
- Application of topsoil and sod to disturbed areas.

The erosion and sediment control measures are to be installed to the satisfaction of the engineer, the City, and conservation authority prior to construction and will remain in place during construction until vegetation is established. The erosion and sediment control measures will also be subject to regular inspection to ensure the measures are operational.

8.0 CONCLUSIONS

This report confirms the proposed Greystone Village Phase 3 Condo development can be adequately serviced with storm and sanitary sewers and watermain. The report is summarized below:

<u>Sanitary Servicing</u>

- The sanitary flows have increased for the phase 3 condo site compared to the calculated flows in the master servicing studies, therefore an analysis of the overall Greystone system was completed.
- Sanitary flows have been updated to reflect current unit counts and design criteria as per Technical Bulletin ISTB 2018-01. The sanitary flows for outlet 1 and outlet 2 have decreased in comparison to the previously accounted flows in the master servicing reports (2016, 2017). Therefore, the existing sanitary sewers with Greystone and downstream of Greystone have adequate capacity to accommodate the peak sanitary flow from the Greystone Village Phase 3 Condo site.

<u>Watermain</u>

- The existing 250mm dia. watermain on Deschâtelets Avenue and Scholastic Drive are looped from the existing 200mm dia. watermain on Clegg Street to the new 400mm dia. watermain on Main Street.
- The existing onsite watermain can adequately service the site under all operating conditions including fireflow. There are sufficient existing hydrants to provide the required fireflow for the phase 3 condo buildings.

<u>Stormwater Management</u>

- The two (2) proposed 7-storey buildings at the corner of Scholastic Drive /Deschâtelets Avenue will each be serviced by a 200mm diameter storm service that connects to the existing 375mm diameter storm sewer on Scholastic Drive and 375mm diameter storm sewer and Deschâtelets Avenue respectively complete with backwater flow valves.
- Runoff from the site will be captured by a combination of area drains in the courtyard or along the building, controlled roof drains, trench drains or will drain overland to Scholastic Drive or Deschâtelets Avenue.
- The depth of soil above the parking garage slab will provide sufficient storage to retain the modelled infiltration volume within the soil for storms up to and including the 100-year event. Water stored in the soil will gradually be dispersed through evapotranspiration.
    - For the stress-test event, it is assumed that the soils above the parking garage slab are fully saturated and any infiltrated water from the surface will percolate through the soil to a perforated pipe system above the underground parking garage roof slab. The flow rate into the perforated pipes has been estimated at approximately 15.5 L/s.
- The results indicate an increase in flow in the minor system. There is an approximate 3% increase in flow to Outlet 1 and approximately 7% increase in flow to Outlet 2. It should be noted that majority of differences between the updated model and the approved MSS model are the result of changes to reflect as-built conditions for previous phases and interim condition of Deschâtelets building , and not as a result of Phase 3. The increases in flow are considered minor.
- The HGLs have increased slightly in the vicinity of the connection points and slightly upstream and downstream of the connection points. Generally, the HGLs that have increased are below the obvert of the pipe or are fronting units with waterproof basements, therefore there are no concerns with basement flooding.
- Depth of flow within Oblate Avenue, Scholastic Drive and Deschâtelets Avenue are at or below depths of flows calculated in the master servicing studies with the exception of CB75, which increase by 0.01m.
- Emergency Overland flow from Scholastic Drive and Deschâtelets Avenue ultimately outlet to the Rideau River. Overland flow will not touch any part of the building envelope while conveying the calculated flow during the stress test (100-year +20%).

<u>Noise</u>

- The indoor noise levels will be mitigated to achieve the required sound levels. The outdoor amenity areas are below the required noise level threshold. Further conclusions are provided in the Noise Impact Assessment Report dated dated May 26, 2017 by Novatech Engineering.

<u>Utilities</u>

- The development will be serviced by hydro, phone, gas, and cable from the existing services Deschâtelets Avenue and Scholastic Drive.

<u>Erosion and Sediment Control</u>

- Erosion and sediment control measures will be implemented prior to construction and remain in place until vegetation is established.

This report is respectfully submitted for site plan approval. Please contact the undersigned should you have questions or require additional information.

NOVATECH

Prepared by:

Vahid Mehdipour

Vahid Mehdipour, M.Sc.
Engineering Intern | Water Resources

Reviewed by:

Steve Zorgel, P. Eng.
Project Manager | Land Development Engineering

Appendix A
Sanitary Design

Approved Material as per Master Servicing Studies

SANITARY SEWER DESIGN SHEET
Greystone Village - 175 Main Street
Developer: Greystone Village Inc.
Additional Condo Units

NOVATECH
Engineers, Planners & Landscape Architects

PROJECT # : 114025
DESIGNED BY : SZ
CHECKED BY : JAG
DATE PREPARED : 15-Dec-15
DATE REVISED : 04-Apr-16
DATE REVISED : 21-Jun-16
DATE REVISED : 15-Mar-17
DATE REVISED : 26-May-17

LOCATION				INDIVIDUAL							CUMULATIVE		PEAK FACTOR M	POPULATION FLOW Q(p) (L/s)	PEAK EXTRAN. FLOW Q(i) (L/s)	PEAK DESIGN FLOW Q(d) (L/s)	PROPOSED SEWER							
STREET	FROM MH	TO MH	Area	Single Units	Townhouse Units	Condo Units	Future School Residence	Retirement Home Units	Population (in 1000's)	AREA (ha.)	Population (in 1000's)	AREA (ha.)					LENGTH (m)	PIPE SIZE (mm)	PIPE ID (mm)	TYPE OF PIPE	GRADE %	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	Qpeak/ Qcap
*DESCHATELETS AVENUE	151	149	1&2		21	80			0.225	0.64	0.225	0.640	4.0	3.64	0.18	3.82	30.6	200	203.20	DR 35	0.65	27.6	0.85	14%
*DESCHATELETS AVENUE	149	147	3							0.05	0.225	0.690	4.0	3.64	0.19	3.83	27.8	200	203.20	DR 35	0.40	21.6	0.67	18%
*DESCHATELETS AVENUE	147	145	4							0.31	0.225	1.000	4.0	3.64	0.28	3.92	33.6	200	203.20	DR 35	0.40	21.6	0.67	18%
*DESCHATELETS AVENUE	145	193	5		21		112		0.281	0.74	0.505	1.740	4.0	8.13	0.49	8.62	20.2	200	203.20	DR 35	0.40	21.6	0.67	40%
*DESCHATELETS AVENUE	193	143									0.505	1.74	4.0	8.13	0.49	8.62	20.2	200	203.20	DR 35	0.40	21.6	0.67	40%
DESCHATELETS AVENUE	143	141	6			75			0.158	0.21	0.663	1.95	3.9	10.49	0.55	11.04	31.1	200	203.20	DR 35	0.40	21.6	0.67	51%
DESCHATELETS AVENUE	141	139	7							0.08	0.663	2.030	3.9	10.49	0.57	11.06	27.0	200	203.20	DR 35	0.40	21.6	0.67	51%
DESCHATELETS AVENUE	139	133	8							0.09	0.663	2.120	3.9	10.49	0.59	11.09	21.8	200	203.20	DR 35	0.40	21.6	0.67	51%
**FORECOURT	133	131	9						0.149	0.80			1.5	0.05	0.22	0.28	75.3	200	203.20	DR 35	0.40	21.6	0.67	68%
DE MAZENOD AVENUE			10		12	102			0.247	0.47	0.910	2.590	3.8	14.10	0.73	14.82								
DE MAZENOD AVENUE	105	131	11		12	102			0.247	0.48	0.247	0.480	4.0	4.00	0.13	4.13	73.6	200	203.20	DR 35	0.40	21.6	0.67	19%
JEREMIAH KEALEY STREET	131	129	12		6				0.016	0.19	1.172	3.260	3.8	17.83	0.91	19.02	47.7	250	254.00	DR 35	0.40	39.2	0.77	48%
JEREMIAH KEALEY STREET	129	127	13		6				0.016	0.19	1.189	3.450	3.8	18.06	0.97	19.30	48.7	250	254.00	DR 35	0.40	39.2	0.77	49%
DESCHATELETS AVENUE	133	135	14		3	47			0.107	0.34	0.107	0.340	4.0	1.73	0.10	1.83	51.2	200	203.20	DR 35	0.65	27.6	0.85	7%
DESCHATELETS AVENUE	135	137	15		3	20			0.050	0.13	0.157	0.470	4.0	2.54	0.13	2.67	49.3	200	203.20	DR 35	0.40	21.6	0.67	12%
SCHOLASTIC DRIVE	137	127	16	4					0.014	0.19	0.171	0.660	4.0	2.76	0.18	2.95	69.9	200	203.20	DR 35	0.40	21.6	0.67	14%
SCHOLASTIC DRIVE	127	125	17	4					0.014	0.17	1.373	4.280	3.7	20.61	1.20	22.09	59.6	250	254.00	DR 35	0.40	39.2	0.77	56%
SCHOLASTIC DRIVE	125	109									1.373	4.280	3.7	20.61	1.20	22.09	13.6	250	254.00	DR 35	0.40	39.2	0.77	56%
PHILOSOPHER PRIVATE	101	111	18	4					0.014	0.17	0.014	0.170	4.0	0.22	0.05	0.27	24.8	200	203.20	DR 35	0.65	27.6	0.85	1%
TELMON STREET	111	103	19							0.07	0.014	0.240	4.0	0.22	0.07	0.29	17.1	200	203.20	DR 35	0.40	21.6	0.67	1%
TELMON STREET	103	105	20	1					0.003	0.03	0.017	0.270	4.0	0.28	0.08	0.35	8.4	200	203.20	DR 35	0.40	21.6	0.67	2%
TELMON STREET	105	107	21	7	3				0.032	0.26	0.049	0.530	4.0	0.79	0.15	0.94	46.3	200	203.20	DR 35	0.40	21.6	0.67	4%
TELMON STREET	107	109	22	4	3				0.022	0.21	0.071	0.740	4.0	1.14	0.21	1.35	39.7	200	203.20	DR 35	0.40	21.6	0.67	6%
OUTLET	109	113									1.443	5.020	3.7	21.58	1.41	23.26	11.9	250	254.00	DR 35	0.40	39.2	0.77	59%
OUTLET	113	115	23							0.04	1.443	5.060	3.7	21.58	1.42	23.27	43.3	250	254.00	DR 35	5.13	140.5	2.77	17%
CLEGG	123	121	24	6					0.020	0.19	0.020	0.190	4.0	0.33	0.05	0.38	72.5	200	203.20	DR 35	3.16	60.8	1.88	1%
CLEGG	121	117	25	8					0.027	0.18	0.048	0.370	4.0	0.77	0.10	0.87	77.0	200	203.20	DR 35	0.40	21.6	0.67	4%
CLEGG	117	115									0.048	0.370	4.0	0.77	0.10	0.87	9.5	200	203.20	DR 35	0.42	22.2	0.68	4%
OUTLET	115	119									1.491	5.430	3.7	22.23	1.52	24.03	10.6	250	254.00	DR 35	0.41	39.7	0.78	60%

SANITARY SEWER DESIGN SHEET
Greystone Village - 175 Main Street
Developer: Greystone Village Inc.
Additional Condo Units

NOVATECH
Engineers, Planners & Landscape Architects

PROJECT # :	114025
DESIGNED BY :	SZ
CHECKED BY :	JAG
DATE PREPARED :	15-Dec-15
DATE REVISED :	04-Apr-16
DATE REVISED :	21-Jun-16
DATE REVISED :	15-Mar-17
DATE REVISED :	26-May-17

LOCATION				INDIVIDUAL							CUMULATIVE		PEAK FACTOR M	POPULATION FLOW Q(p) (L/s)	PEAK EXTRAN. FLOW Q(i) (L/s)	PEAK DESIGN FLOW Q(d) (L/s)	PROPOSED SEWER							
STREET	FROM MH	TO MH	Area	Single Units	Townhouse Units	Condo Units	Future School Residence	Retirement Home Units	Population (in 1000's)	AREA (ha.)	Population (in 1000's)	AREA (ha.)					LENGTH (m)	PIPE SIZE (mm)	PIPE ID (mm)	TYPE OF PIPE	GRADE %	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	Qpeak/ Qcap

*Part of future phase 2 outletting through phase 1A at outlet 1.

Notes:

1. Q(d) = Q(p) + Q(i)
2. Q(i) = 0.28 L/sec/ha
3. Q(p) = (PxqxM/86,400)

Definitions:

Q(d) = Design Flow (L/sec)
Q(p) = Population Flow (L/sec)
Q(i) = Extraneous Flow (L/sec)

P = Population (3.4 persons/single unit, 2.7 persons/townhouse, 2.1 persons/apartment, 2.0 persons/ school residence, 1.4 persons/retirement residence)
q = Average per capita flow = 350 L/cap/day - Residential
q = Average per gross ha. flow = 35000 L/gross ha/day - Light industrial
q = Average per gross ha. flow = 50000 L/gross ha/day - Commercial/Mixed use
M = Harmon Formula (maximum of 4.0)
Min pipe size 200mm @ min. slope 0.32%

** Parkland: Area = 0.91 ha, Flow Rate for parks with flush toilets = 20L/Day/Person, peak design flow from parkland to be added to peak design flow of subsequent pipes.

Population = 75 Persons/acre Details from Appendix 4-A OSDG
Institutional Peaking factor = 1.5

SANITARY SEWER DESIGN SHEET
Greystone Village - 175 Main Street - Phase 2 and 3 (Outlet 2)
Developer: Greystone Village Inc.

NOVATECH
Engineers, Planners & Landscape Architects

PROJECT # : 114025
DESIGNED BY : SZ
CHECKED BY : JAG
DATE PREPARED : 18-Nov-16
DATE REVISED: 15-Mar-17
DATE REVISED: 26-May-17

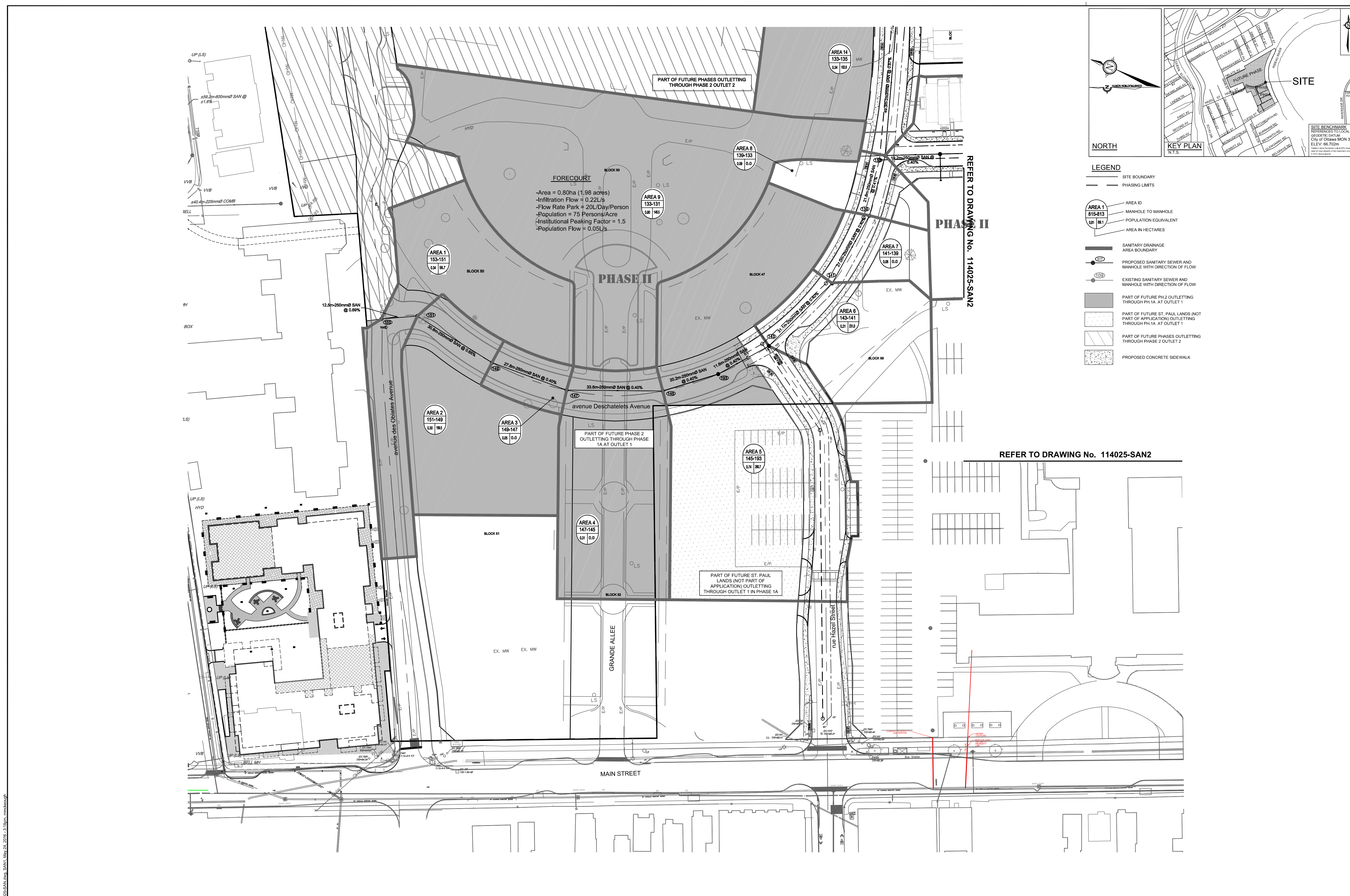
LOCATION				INDIVIDUAL						CUMULATIVE		PEAK FACTOR M	POPULATION FLOW Q(p) (L/s)	PEAK EXTRAN. FLOW Q(i) (L/s)	PEAK DESIGN FLOW Q(d) (L/s)	PROPOSED SEWER							
STREET	FROM MH	TO MH	Area	Single Units	Townhouse Units	Condo Units	Retirement Home Units	Population (in 1000's)	AREA (ha.)	Population (in 1000's)	AREA (ha.)					LENGTH (m)	PIPE SIZE (mm)	PIPE ID (mm)	TYPE OF PIPE	GRADE %	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	Qpeak/ Qcap
OBLATS AVENUE	301A	301	B1					0.000	0.04	0.000	0.040	4.0	0.00	0.01	0.01	18.5	250	254.00	DR 35	5.25	142.1	2.81	0%
OBLATS AVENUE	301	303	B2		3			0.008	0.12	0.008	0.160	4.0	0.13	0.04	0.18	27.9	250	254.00	DR 35	2.30	94.1	1.86	0%
OBLATS AVENUE	303	305	B3		7			0.019	0.15	0.027	0.310	4.0	0.44	0.09	0.52	32.4	250	254.00	DR 35	3.33	113.2	2.23	0%
OBLATS AVENUE	305	307	B4		10	19		0.067	0.33	0.094	0.640	4.0	1.52	0.18	1.70	44.9	250	254.00	DR 35	3.34	113.4	2.24	2%
OBLATS AVENUE	307	309	B5					0.000	0.03	0.094	0.670	4.0	1.52	0.19	1.71	14.8	250	254.00	DR 35	4.99	138.6	2.73	1%
OBLATS AVENUE	309	311	B6					0.000	0.09	0.094	0.760	4.0	1.52	0.21	1.73	36.7	250	254.00	DR 35	3.81	121.1	2.39	1%
PARISH PRIVATE	313	315	B7		12			0.032	0.14	0.032	0.140	4.0	0.53	0.04	0.56	56.5	250	254.00	DR 35	3.24	111.7	2.20	1%
SANCTUARY PRIVATE	317	315	B8	9				0.031	0.33	0.031	0.330	4.0	0.50	0.09	0.59	61.3	250	254.00	DR 35	0.65	50.0	0.99	1%
SANCTUARY PRIVATE	315	319	B9	1	2			0.009	0.15	0.072	0.620	4.0	1.16	0.17	1.34	36.3	250	254.00	DR 35	0.41	39.7	0.78	3%
SANCTUARY PRIVATE	319	321	B10	1	2			0.009	0.06	0.081	0.680	4.0	1.31	0.19	1.50	8.1	250	254.00	DR 35	0.50	43.9	0.87	3%
SANCTUARY PRIVATE	321	311	B11	2				0.007	0.09	0.087	0.770	4.0	1.42	0.22	1.63	22.4	250	254.00	DR 35	0.40	39.2	0.77	4%
OBLATS AVENUE	311	329	B12				141	0.197	0.41	0.379	1.940	4.0	6.14	0.54	6.68	32.9	250	254.00	DR 35	0.42	40.2	0.79	17%
SCHOLASTIC DRIVE	323	325	B13			30	85	0.182	0.84	0.182	0.840	4.0	2.95	0.24	3.18	37.8	250	254.00	DR 35	3.87	122.0	2.41	3%
SCHOLASTIC DRIVE	325	327	B14			30		0.063	0.05	0.245	0.890	4.0	3.97	0.25	4.22	35.3	250	254.00	DR 35	3.32	113.0	2.23	4%
SCHOLASTIC DRIVE	327	329	B15					0.000	0.04	0.245	0.930	4.0	3.97	0.26	4.23	36.7	250	254.00	DR 35	3.88	122.2	2.41	3%
OUTLET	329	331								0.624	2.870	3.9	9.91	0.80	10.72	41.0	250	254.00	DR 35	0.41	39.7	0.78	27%
OUTLET	331	EXMH								0.624	2.870	3.9	9.91	0.80	10.72	5.3	250	254.00	DR 35	0.38	38.2	0.75	28%

Notes:
1. **Q(d) = Q(p) + Q(i)**
2. **Q(i) = 0.28 L/sec/ha**
3. **Q(p) = (PxqxM/86,400)**

Definitions:
Q(d) = Design Flow (L/sec)
Q(p) = Population Flow (L/sec)
Q(i) = Extraneous Flow (L/sec)

Population = 75 Persons/acre
Institutional Peaking factor = 1.5

P = Population (3.4 persons/single unit, 2.7 persons/townhouse, 2.1 persons/apartment, 1.4 persons/retirement residence)
q = Average per capita flow = 350 L/cap/day - Residential
q = Average per gross ha. flow = 35000 L/gross ha/day - Light industrial
q = Average per gross ha. flow = 50000 L/gross ha/day - Commercial/Mixed use
M = Harmon Formula (maximum of 4.0)
Min pipe size 250mm @ min. slope 0.24%



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
4.	REVISED AS PER CITY COMMENTS & ISSUED FOR E.C.A.	MAY 24/16	JAG
3.	ISSUED FOR TENDER	APR 20/16	JAG
2.	REVISED AS PER CITY COMMENTS	APR 13/16	JAG
1.	ISSUED FOR CITY OF OTTAWA REVIEW	DEC 18/15	JAG

SCALE 1:500

DESIGN JAG
CHECKED MSP
DRAWN MTM
CHECKED JAG
APPROVED JGR

FOR REVIEW ONLY

REGISTERED PROFESSIONAL ENGINEER J.G. RIDDELL 24/5/16 PROVINCE OF ONTARIO

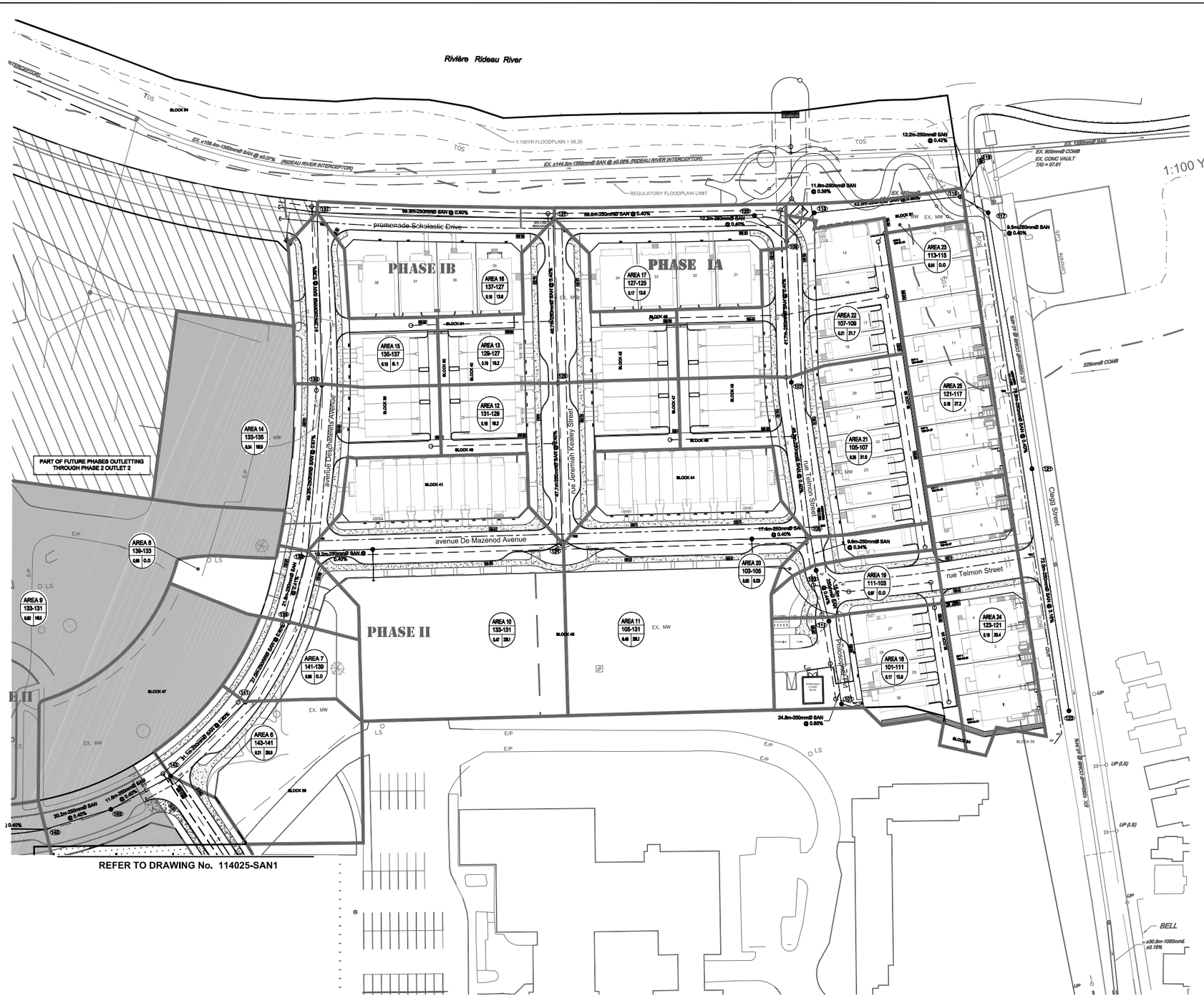
NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

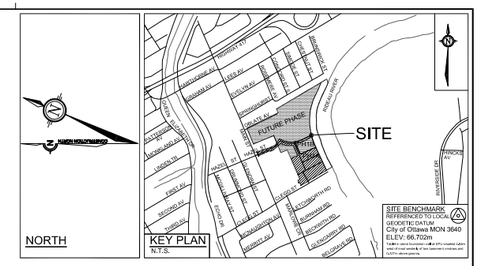
CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

DRAWING NAME
SANITARY DRAINAGE AREAS PLAN
PHASE 1A AND 1B

PROJECT No. 114025-00
REV REV # 4
DRAWING No. 114025-SAN1

PLANB1.DWG - 1000mmx707mm





LEGEND

- SITE BOUNDARY
- PHASING LIMITS
- PROPOSED BARRIER CURB
- AREA ID
- MANHOLE TO MANHOLE
- POPULATION EQUIVALENT
- AREA IN HECTARES
- SANITARY DRAINAGE AREA BOUNDARY
- PROPOSED SANITARY SEWER AND MANHOLE
- POPOSED SANITARY SEWER WITH DIRECTION OF FLOW
- EXISTING SANITARY SEWER AND MANHOLE
- EXISTING SANITARY SEWER WITH DIRECTION OF FLOW
- PART OF FUTURE PH.2 OUTLETTING THROUGH PH.1A AT OUTLET 1
- PART OF FUTURE ST. PAUL LANDS (NOT PART OF APPLICATION) OUTLETTING THROUGH PH.1A AT OUTLET 1
- PART OF FUTURE PHASES OUTLETTING THROUGH PHASE 2 OUTLET 2
- PROPOSED CONCRETE SIDEWALK

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
4.	REVISED AS PER CITY COMMENTS & ISSUED FOR E.C.A.	MAY 24/16	JAG
3.	ISSUED FOR TENDER	APR 20/16	JAG
2.	REVISED AS PER CITY COMMENTS	APR 13/16	JAG
1.	ISSUED FOR CITY OF OTTAWA REVIEW	DEC 18/15	JAG

SCALE 1:500 (1:500, 0 5 10 15 20)

DESIGN JAG
CHECKED MSP
DRAWN MTM
CHECKED JAG
APPROVED JGR

FOR REVIEW ONLY

PROFESSIONAL ENGINEERS PROVINCE OF ONTARIO J.G. RIDDELL 2015/12/09

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

CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

DRAWING NAME
SANITARY DRAINAGE AREAS PLAN
PHASE 1A AND 1B

PROJECT No. 114025-00
REV REV # 4
DRAWING No. 114025-SAN2

rue Brunswick Street

rue Chestnut Street

rue Simcoe Street

rue Concord Street

avenue Rosemere Avenue

avenue Springhurst Avenue

prive Sanctuary Private

prive Parish Private

Rivière Rideau River

promenade Scholastic Drive

avenue Des Oblats Avenue

avenue De Mazenod Avenue

Avenue Deschatelets Avenue

GAS EASEMENT

REGULATORY 1:100YR FLOODPLAIN LIMIT

1:100YR FLOODPLAIN = 58.35

PHASE III

PHASE II

PHASE IB

PHASE IC

PART OF PHASE 2 OUTLETTING THROUGH PHASE 1A AT OUTLET 1

REFER TO DRAWING No. 114025-SAN1

REFER TO DRAWING No. 114025-SAN2

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.

NORTH

KEY PLAN
N.T.S.

SITE

SITE BENCHMARK
REFERENCED TO LOCAL GEODETIC DATUM
City of Ottawa MON 3640
ELEV: 66.702m

LEGEND

- SITE BOUNDARY
- PHASING LIMITS
- PROPOSED BARRIER CURB
- AREA ID
- MANHOLE TO MANHOLE
- POPULATION EQUIVALENT
- AREA IN HECTARES
- SANITARY DRAINAGE AREA BOUNDARY
- PROPOSED SANITARY SEWER AND MANHOLE
- POPOSED SANITARY SEWER WITH DIRECTION OF FLOW
- EXISTING SANITARY SEWER AND MANHOLE
- EXISTING SANITARY SEWER WITH DIRECTION OF FLOW
- PART OF PH.2 OUTLETTING THROUGH PH.1A AT OUTLET 1
- PHASE 1A AND 1B OUTLETTING THOUGH PH.1A AT OUTLET 1
- PROPOSED CONCRETE SIDEWALK

REFER TO 114025-SAN1 & SAN2 FOR ADDITIONAL DRAINAGE DETAILS OUTLETTING TO PHASE 1A OUTLET 1

No.	REVISION	DATE	BY
3.	REVISED AS PER CITY COMMENTS AND ISSUED FOR E,C,A.	MAY 26/17	JAG
2.	RE-ISSUED AS PER CITY COMMENTS	MAR 8/17	JAG
1.	ISSUED FOR CITY OF OTTAWA REVIEW	NOV 21/16	JAG

SCALE 1:500 (1:500 0 5 10 15 20)

DESIGN SAZ
CHECKED JAG
DRAWN SAZ
CHECKED JAG
APPROVED MSP

FOR REVIEW ONLY

J.G. RIDDELL 26/5/17

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

CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

DRAWING NAME
SANITARY DRAINAGE AREAS PLAN
PHASE 2 AND 3
(OUTLETTING THROUGH SANITARY OUTLET 2)

PROJECT No. 114025-00
REV REV # 3
DRAWING No. 114025-SAN1-B

D07-16-15-0001 PHASE 2 AND 3

Proposed Material for Phase 3 Condo Site

SANITARY SEWER DESIGN SHEET
Greystone Village - 175 Main Street - Phase 2 and 3 (Outlet 2)
Developer: Greystone Village Inc.

NOVATECH
Engineers, Planners & Landscape Architects

PROJECT # : 114025
DESIGNED BY : SZ
CHECKED BY : JAG
DATE PREPARED : 18-Nov-16 **DATE REVISED :** 3-Jun-22
DATE REVISED: 15-Mar-17
DATE REVISED: 26-May-17
ASBLT - DATE REVISED: 15-Sep-17

LOCATION				INDIVIDUAL							CUMULATIVE		PEAK FACTOR M	POPULATION FLOW Q(p) (L/s)	PEAK EXTRAN. FLOW Q(i) (L/s)	PEAK DESIGN FLOW Q(d) (L/s)	PROPOSED SEWER							
STREET	FROM MH	TO MH	Area	Single Units	Townhouse Units	3 Bedroom Condo Units	2 Bedroom Condo Units	Retirement Home Units or Studio Apartment	Population (in 1000's)	AREA (ha.)	Population (in 1000's)	AREA (ha.)					LENGTH (m)	PIPE SIZE (mm)	PIPE ID (mm)	TYPE OF PIPE	GRADE %	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	Qpeak/ Qcap
OBLATS AVENUE	301A	301	B1						0.000	0.04	0.000	0.040	3.8	0.00	0.01	0.01	***18.8***	250	254.00	DR 35	***1.81***	83.5	1.65	0%
OBLATS AVENUE	301	303	B2		3				0.008	0.12	0.008	0.160	3.7	0.10	0.05	0.15	***27.2***	250	254.00	DR 35	***2.43***	96.7	1.91	0%
OBLATS AVENUE	303	305	B3		7				0.019	0.15	0.027	0.310	3.7	0.32	0.10	0.43	***33.0***	250	254.00	DR 35	***3.40***	114.4	2.26	0%
OBLATS AVENUE*	305	307	B4		10			220	0.335	0.67	0.362	0.980	3.4	4.03	0.32	4.35	***45.4***	250	254.00	DR 35	***3.11***	109.4	2.16	4%
OBLATS AVENUE	307	309	B5						0.000	0.03	0.362	1.010	3.4	4.03	0.33	4.36	***14.9***	250	254.00	DR 35	***4.70***	134.5	2.65	3%
OBLATS AVENUE	309	311	B6						0.000	0.09	0.362	1.100	3.4	4.03	0.36	4.39	***36.8***	250	254.00	DR 35	***3.76***	120.3	2.37	4%
PARISH PRIVATE	313	315	B7		12				0.032	0.14	0.032	0.140	3.7	0.39	0.05	0.43	***57.6***	250	254.00	DR 35	***3.11***	109.4	2.16	0%
SANCTUARY PRIVATE	317	315	B8	9					0.031	0.33	0.031	0.330	3.7	0.37	0.11	0.47	***61.2***	250	254.00	DR 35	***0.61***	48.5	0.96	1%
SANCTUARY PRIVATE	315	319	B9	1	2				0.009	0.15	0.072	0.620	3.6	0.84	0.20	1.05	***36.5***	250	254.00	DR 35	***0.41***	39.7	0.78	3%
SANCTUARY PRIVATE	319	321	B10	1	2				0.009	0.06	0.081	0.680	3.6	0.94	0.22	1.17	***7.7***	250	254.00	DR 35	***0.52***	44.7	0.88	3%
SANCTUARY PRIVATE	321	321b	B11	2					0.007	0.09	0.087	0.770	3.6	1.02	0.25	1.28	***11.1***	250	254.00	DR 35	***0.45***	41.6	0.82	3%
SANCTUARY PRIVATE	321b	311									0.087	0.770	3.6	1.02	0.25	1.28	***11.6***	250	254.00	DR 35	***0.60***	48.1	0.95	3%
OBLATS AVENUE	311	329	B12					146	0.204	0.36	0.654	2.230	3.3	7.05	0.74	7.79	***32.9***	250	254.00	DR 35	***0.39***	38.7	0.76	20%
SCHOLASTIC DRIVE	323	325	B13						0.000	0.08	0.000	0.080	3.8	0.00	0.03	0.03	***37.4***	250	254.00	DR 35	***3.82***	121.3	2.39	0%
SCHOLASTIC DRIVE	325	327	B14				59	94	0.256	0.52	0.256	0.600	3.5	2.89	0.20	3.08	***35.0***	250	254.00	DR 35	***3.46***	115.4	2.28	3%
SCHOLASTIC DRIVE	327	329	B15						0.000	0.04	0.256	0.640	3.5	2.89	0.21	3.10	***37.6***	250	254.00	DR 35	***3.78***	120.6	2.38	3%
OUTLET	329	331									0.909	2.870	3.3	9.61	0.95	10.56	***40.8***	250	254.00	DR 35	***0.37***	37.7	0.74	28%
OUTLET	331	EXMH									0.909	2.870	3.3	9.61	0.95	10.56	***5.2***	250	254.00	DR 35	***0.77***	54.4	1.07	19%

Phase 3 Condo

Notes:
1. Q(d) = Q(p) + Q(i)
2. Q(i) = 0.33 L/sec/ha
3. Q(p) = (PxqxM/86,400)

Definitions:
Q(d) = Design Flow (L/sec)
Q(p) = Population Flow (L/sec)
Q(i) = Extraneous Flow (L/sec)

Institutional Peaking factor = 1.5 if ICI >20%, 1.0 <20%

P = Population (3.4 persons/single unit, 2.7 persons/townhouse, 3.1 persons/3-bed apartment, 2.1 persons/2-bed apartment, 2.0 persons/ school residence, 1.4 persons/retirement residence or studio apartment)
q = Average per capita flow = 280 L/cap/day - Residential
q = Average per gross ha. flow = 35000 L/gross ha/day - Light industrial
q = Average per gross ha. flow =28000 L/gross ha/day - Commercial/Mixed use/Institutional
M = Harmon Formula (maximum of 4.0)
Min pipe size 200mm @ min. slope 0.32%

*Refer to technical memo 225 Deschatelets Avenue - Greystone Village, Site Servicing and Stormwater Management Memorandum for details. Population of 195 retirement residence equivelant to flow demand from:
- 401 Student @ 90L/cap/day
- 40 Staff, 45 Daycare, 155 Community Centre @ 75L/cap/day
- 38 apartment units at 1.8 persons/unit @ 280L/cap/day
- 363 Gym @ 36L/cap/day

SANITARY SEWER DESIGN SHEET
Greystone Village - 175 Main Street
Developer: Greystone Village Inc.
Additional Condo Units

NOVATECH
Engineers, Planners & Landscape Architects

PROJECT # : 114025
DESIGNED BY : SZ
CHECKED BY : MSP
DATE PREPARED : 15-Dec-15
DATE REVISED : 4-Apr-16
DATE REVISED : ~~21-Jun-16~~ ~~17-Oct-16~~ ~~5-Jan-17~~ ~~27-Apr-17~~ As-Built
DATE REVISED : 3-Jun-22

LOCATION				INDIVIDUAL								CUMULATIVE		PEAK FACTOR M	POPULATION FLOW Q(p) (L/s)	PEAK EXTRAN. FLOW Q(i) (L/s)	PEAK DESIGN FLOW Q(d) (L/s)	PROPOSED SEWER							
STREET	FROM MH	TO MH	Area	Single Units	Townhouse Units	3 Bedroom Condo Units	2 Bedroom Condo Units	Future School Residence	Retirement Home Units or Studio Apartment	Population (in 1000's)	AREA (ha.)	Population (in 1000's)	AREA (ha.)					LENGTH (m)	PIPE SIZE (mm)	PIPE ID (mm)	TYPE OF PIPE	GRADE %	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	Qpeak/ Qcap
*DESCHATELETS AVENUE	153	151		Not Installed																					
*DESCHATELETS AVENUE	151	149	1							0.000	0.21	0.000	0.210	3.8	0.00	0.07	0.07	***30.4***	200	203.20	DR 35	***0.72***	29.0	0.90	0%
*DESCHATELETS AVENUE	149	147	2		21		119			0.307	0.48	0.307	0.690	3.5	3.44	0.23	3.67	***28.0***	200	203.20	DR 35	***0.29***	18.4	0.57	20%
**FORECOURT	147	145	9							0.000	0.80			1.5	0.05	0.26	0.32	***33.8***	200	203.20	DR 35	***0.30***	18.7	0.58	22%
*DESCHATELETS AVENUE			3							0.000	0.31	0.307	1.000	3.5	3.44	0.33	4.08								
*DESCHATELETS AVENUE	145	193	4		21			112		0.281	0.68	0.587	1.680	3.3	6.38	0.55	7.25	***20.1***	200	203.20	DR 35	***0.40***	21.6	0.67	33%
*DESCHATELETS AVENUE	193	143	5							0.000	0.06	0.587	1.74	3.3	6.38	0.57	7.27	***21.2***	200	203.20	DR 35	***0.19***	14.9	0.46	49%
DESCHATELETS AVENUE	143	141	6							0.000	0.05	0.587	1.79	3.3	6.38	0.59	7.28	***30.9***	200	203.20	DR 35	***0.46***	23.2	0.72	31%
DESCHATELETS AVENUE	141	139	7				43		42	0.149	0.23	0.736	2.020	3.3	7.89	0.67	8.87	***26.3***	200	203.20	DR 35	***0.38***	21.1	0.65	42%
DESCHATELETS AVENUE	139	133	8							0.000	0.09	0.736	2.110	3.3	7.89	0.70	8.90	***21.6***	200	203.20	DR 35	***0.55***	25.4	0.78	35%
					N																				
DE MAZENOD AVENUE	133	195	10A		1					0.003	0.04	0.739	2.150	3.3	7.92	0.71	8.94	***17.9***	200	203.20	DR 35	***0.67***	28.0	0.86	32%
DE MAZENOD AVENUE	195	131	10B		11		61		45	0.221	0.44	0.960	2.590	3.2	10.11	0.85	11.28	***56.6***	200	203.20	DR 35	***0.42***	22.2	0.68	51%
DE MAZENOD AVENUE	105	197	11A		1					0.003	0.04	0.003	0.040	3.8	0.03	0.01	0.05	***17.5***	200	203.20	DR 35	***0.57***	25.8	0.80	0%
DE MAZENOD AVENUE	197	131	11B		11		61		45	0.221	0.44	0.224	0.480	3.5	2.54	0.16	2.70	***56.5***	200	203.20	DR 35	***0.42***	22.2	0.68	12%
JEREMIAH KEALEY STREET	131	129	12		6					0.016	0.19	1.200	3.260	3.2	12.43	1.08	13.82	***47.5***	250	254.00	DR 35	***0.23***	29.8	0.59	46%
JEREMIAH KEALEY STREET	129	127	13		6					0.016	0.19	1.216	3.450	3.2	12.59	1.14	14.04	***49.1***	250	254.00	DR 35	***0.35***	36.7	0.72	38%
DESCHATELETS AVENUE	133	135	14		3		35		83	0.198	0.39	0.198	0.390	3.5	2.26	0.13	2.38	***49.6***	200	203.20	DR 35	***0.71***	28.8	0.89	8%
DESCHATELETS AVENUE	135	137	15		3					0.008	0.13	0.206	0.520	3.5	2.35	0.17	2.52	***51.5***	200	203.20	DR 35	***0.39***	21.4	0.66	12%
SCHOLASTIC DRIVE	137	127	16	4						0.014	0.23	0.220	0.750	3.5	2.49	0.25	2.74	***70.4***	200	203.20	DR 35	***0.41***	21.9	0.68	13%
SCHOLASTIC DRIVE	127	125	17	4						0.014	0.18	1.449	4.380	3.2	14.80	1.45	16.56	***59.1***	250	254.00	DR 35	***0.59***	47.7	0.94	35%
SCHOLASTIC DRIVE	125	109								0.000		1.449	4.380	3.2	14.80	1.45	16.56	***12.5***	250	254.00	DR 35	***0.48***	43.0	0.85	39%
PHILOSOPHER PRIVATE	101	111	18	4						0.014	0.16	0.014	0.160	3.7	0.16	0.05	0.22	***24.6***	200	203.20	DR 35	***0.81***	30.8	0.95	1%
TELMON STREET	111	103	19							0.000	0.08	0.014	0.240	3.7	0.16	0.08	0.24	***15.5***	200	203.20	DR 35	***0.45***	23.0	0.71	1%
TELMON STREET	103	105	20	1						0.003	0.04	0.017	0.280	3.7	0.20	0.09	0.30	***10.0***	200	203.20	DR 35	***0.40***	21.6	0.67	1%
TELMON STREET	105	107	21	6	3					0.029	0.25	0.046	0.530	3.7	0.54	0.17	0.71	***45.7***	200	203.20	DR 35	***0.39***	21.4	0.66	3%
TELMON STREET	107	109	22	5	3					0.025	0.23	0.071	0.760	3.6	0.83	0.25	1.08	***42.3***	200	203.20	DR 35	***0.57***	25.8	0.80	4%
OUTLET	109	113								0.000		1.520	5.140	3.1	15.46	1.70	17.48	***11.6***	250	254.00	DR 35	***0.52***	44.7	0.88	39%
OUTLET	113	115	23							0.000	0.04	1.520	5.180	3.1	15.46	1.71	17.49	***43.6***	250	254.00	DR 35	***3.81***	121.1	2.39	14%
CLEGG	123	121	24	6						0.020	0.18	0.020	0.180	3.7	0.24	0.06	0.30	***74.8***	200	203.20	DR 35	***3.09***	60.1	1.85	1%
CLEGG	121	117	25	8						0.027	0.18	0.048	0.360	3.7	0.56	0.12	0.68	***78.6***	200	203.20	DR 35	***0.38***	21.1	0.65	3%
CLEGG	117	115								0.000		0.048	0.360	3.7	0.56	0.12	0.68	***6.6***	200	203.20	DR 35	***1.20***	37.5	1.16	2%
OUTLET	115	119								0.000		1.567	5.540	3.1	15.91	1.83	18.05	***11.2***	250	254.00	DR 35	***0.36***	37.2	0.73	48%

SANITARY SEWER DESIGN SHEET
Greystone Village - 175 Main Street
Developer: Greystone Village Inc.
Additional Condo Units

NOVATECH
Engineers, Planners & Landscape Architects

PROJECT # : 114025
DESIGNED BY : SZ
CHECKED BY : MSP
DATE PREPARED : 15-Dec-15
DATE REVISED : 4-Apr-16
DATE REVISED : ~~21-Jun-16~~ ~~17-Oct-16~~ ~~5-Jan-17~~ ~~27-Apr-17~~ As-Built
DATE REVISED : 3-Jun-22

LOCATION				INDIVIDUAL								CUMULATIVE						PROPOSED SEWER							
STREET	FROM MH	TO MH	Area	Single Units	Townhouse Units	3 Bedroom Condo Units	2 Bedroom Condo Units	Future School Residence	Retirement Home Units or Studio Apartment	Population (in 1000's)	AREA (ha.)	Population (in 1000's)	AREA (ha.)	PEAK FACTOR M	POPULATION FLOW Q(p) (L/s)	PEAK EXTRAN. FLOW Q(i) (L/s)	PEAK DESIGN FLOW Q(d) (L/s)	LENGTH (m)	PIPE SIZE (mm)	PIPE ID (mm)	TYPE OF PIPE	GRADE %	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	Qpeak/ Qcap

*Part of future phase 2 outletting through phase 1A at outlet 1.

Phase 3 Condo

Notes:

1. Q(d) = Q(p) + Q(i)
2. Q(i) = 0.33 L/sec/ha
3. Q(p) = (PxqxM/86,400)

Definitions:

Q(d) = Design Flow (L/sec)
Q(p) = Population Flow (L/sec)
Q(i) = Extraneous Flow (L/sec)

P = Population (3.4 persons/single unit, 2.7 persons/townhouse, 3.1 persons/3-bed apartment, 2.1 persons/2-bed apartment, 2.0 persons/ school residence, 1.4 persons/retirement residence or studio apartment)
q = Average per capita flow = 280 L/cap/day - Residential
q = Average per gross ha. flow = 35000 L/gross ha/day - Light industrial
q = Average per gross ha. flow =28000 L/gross ha/day - Commercial/Mixed use/Institutional
M = Harmon Formula (maximum of 4.0)
Min pipe size 200mm @ min. slope 0.32%

** Parkland: Area = 0.80 ha, Flow Rate for parks with flush toilets = 20L/Day/Person, peak design flow from parkland to be added to peak design flow of subsequent pipes.

Population = 75 Persons/acre Details from Appendix 4-A OSDG
Institutional Peaking factor = 1.5 if ICI >20%, 1.0 <20%

Appendix B
Boundary Conditions, Fire Flow Calculations, and Hydraulic Analysis Results

Steve Zorgel

From: Jhamb, Nishant <nishant.jhamb@ottawa.ca>
Sent: Thursday, August 4, 2022 9:49 AM
To: Steve Zorgel
Cc: Marc St.Pierre
Subject: FW: 375 Deschatelets - Greystone Phase 3
Attachments: 375 Deschatelets Avenue July 2022.pdf

Hello Steve

The following are boundary conditions, HGL, for hydraulic analysis at 375 Deschatelets Avenue (zone 1W) assumed to be connected to the 254 mm watermain on Deschatelets OR the 254 mm on Scholastic Drive (see attached PDF for location).

Both Connections:

Minimum HGL: 105.6 m

Maximum HGL: 115.1 m

Max Day + Fire Flow (233 L/s): 99.3 m (Connection 1)

Max Day + Fire Flow (200 L/s): 103.6 m (Connection 2)

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

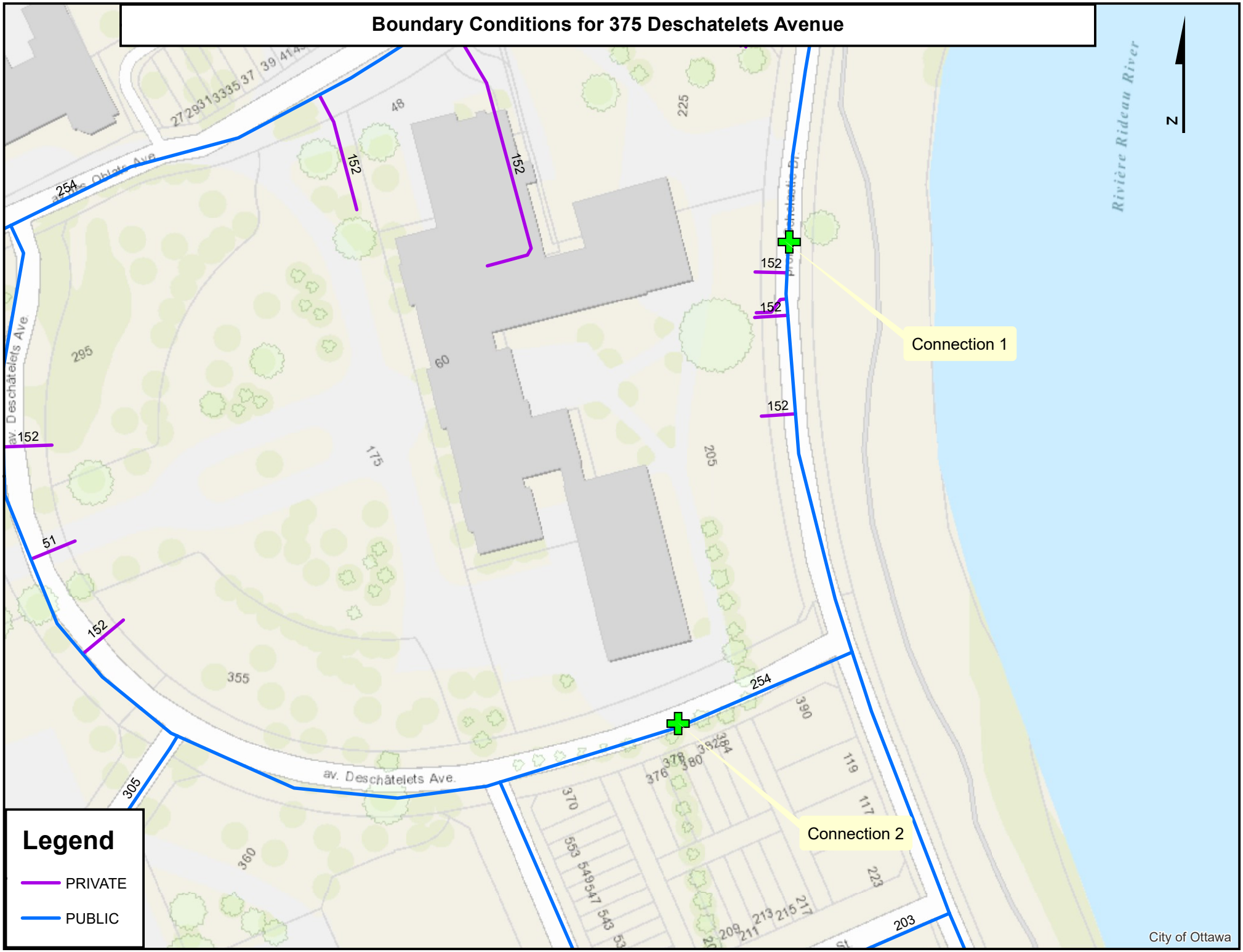
Disclaimer: The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation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

Nishant Jhamb, P.Eng
Project Manager |Gestionnaire de projet
Planning, Real Estate and Economic Development Department
Development Review - Central Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 23112, nishant.jhamb@ottawa.ca

'

'

Boundary Conditions for 375 Deschatelets Avenue



Legend

- PRIVATE
- PUBLIC

Greystone Phase 3 Condos
Water Demand

	Units	Population	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Hour Demand (L/s)
North Tower					
2 Bedroom	59	123.9	0.402	1.004	2.208
1 Bedroom or Studio	94	131.6	0.426	1.066	2.346
South Tower					
2 Bedroom	35	73.5	0.238	0.595	1.310
1 Bedroom or Studio	83	116.2	0.377	0.941	2.071
Total	271.0	445.2	1.44	3.61	7.94

Water Demand Parameters

Apartment Units (2 bedroom)	2.1	persons/unit
Apartment Units (studio)	1.4	persons/unit
Residential Demand	280	L/c/day
Residential Max Day	2.5	x Avg Day
Residential Peak Hour	2.2	x Max Day
North Condo Fireflow (#16)	233	L/s
South Condo Fireflow (#15)	200	L/s

21-Jul-22

FUS - Fire Flow Calculations

As per 2020 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 114025 - Phase 3 Site Plan
Project Name: Greystone Village - Phase 3 Site Plan
Date: 7/21/2022
Input By: Steve Zorgel
Reviewed By: Marc St. Pierre

Legend: Input by User; No Information or Input Required

Building Description: 7 Storey Building Fronting Scholastic Avenue
Non-Combustible Construction - 2020 FUS

Step			Choose		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction C	Wood frame		1.5	0.8	
		Ordinary construction		1		
		Non-combustible construction	Yes	0.8		
		Modified Fire resistive construction (2 hrs)		0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	1800			
		Number of Floors/Storeys	7			
		Protected Openings (1 hr)				
		Area of structure considered (m^2)			**8,100**	
	F	**Base fire flow without reductions**				**16,000**
		F = 220 C $(A)^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**13,600**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**			**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%	-30%	**-5,440**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	No	-10%		
				Cumulative Total	**-40%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	10.1 - 20 m		15%	**6,120**
		East Side	> 45.1m		0%	
		South Side	10.1 - 20 m		15%	
		West Side	10.1 - 20 m		15%	
				Cumulative Total	**45%**	
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

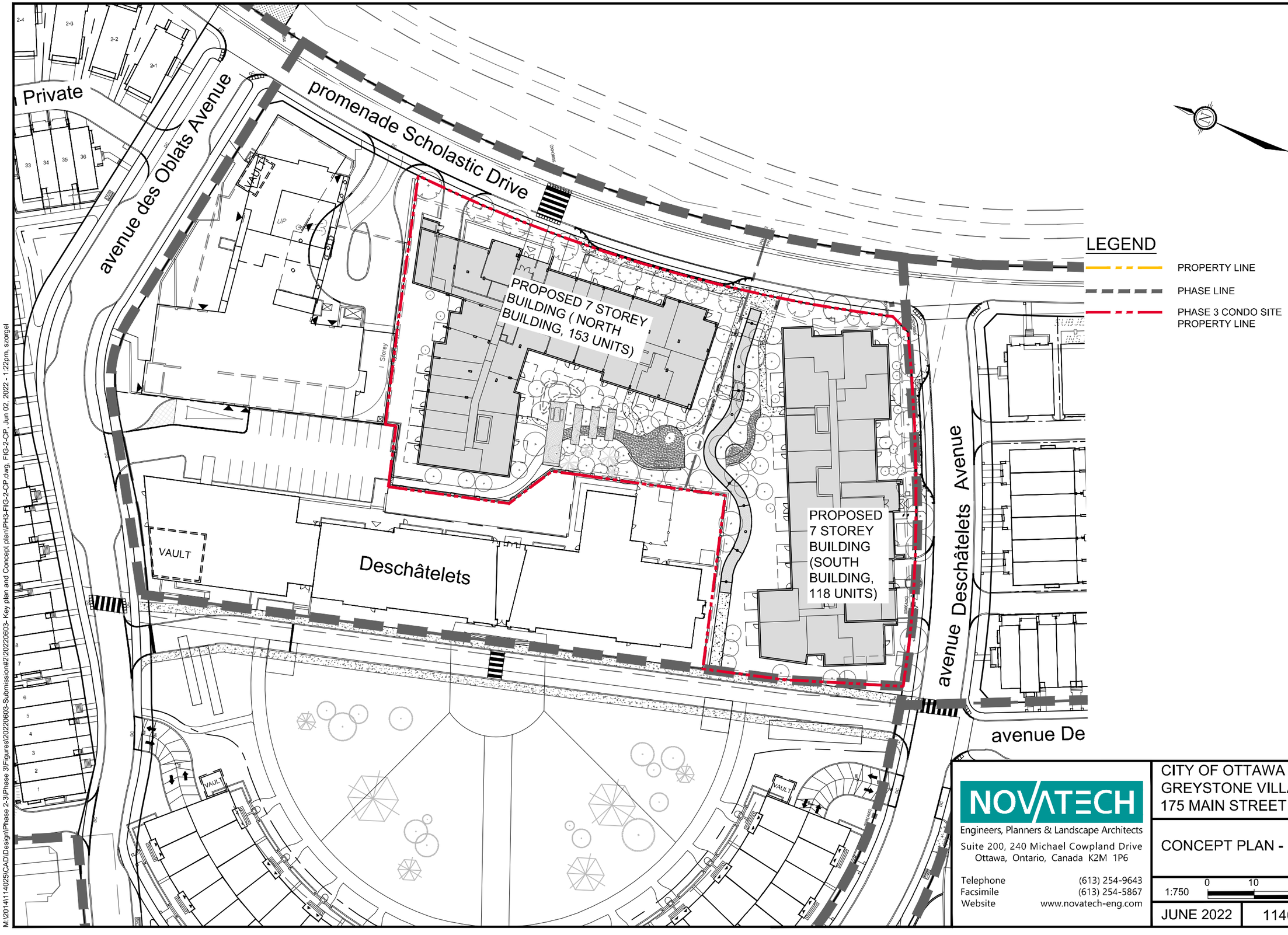
NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 114025 - Phase 3 Site Plan
Project Name: Greystone Village - Phase 3 Site Plan
Date: 7/21/2022
Input By: Steve Zorgel
Reviewed By: Marc St. Pierre

Legend: Input by User; No Information or Input Required

Building Description: 7 Storey Building Fronting Deschatelets Avenue
Non-Combustible Construction - 2020 FUS

Step			Choose		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction C	Wood frame		1.5	0.8	
		Ordinary construction		1		
		Non-combustible construction	Yes	0.8		
		Modified Fire resistive construction (2 hrs)		0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	1680			
		Number of Floors/Storeys	7			
		Protected Openings (1 hr)				
		Area of structure considered (m^2)			**7,560**	
	F	**Base fire flow without reductions**				**15,000**
		F = 220 C (A)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**12,750**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**			**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%	-30%	**-5,100**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System		-10%		
				Cumulative Total	**-40%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	10.1 - 20 m		15%	**4,463**
		East Side	> 45.1m		0%	
		South Side	20.1 - 30 m		10%	
		West Side	20.1 - 30 m		10%	
				Cumulative Total	**35%**	
Results						
6	(1) + (2) + (3)	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**12,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**200**
				or	USGPM	3,170
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	2.5
		Required Volume of Fire Flow (m^3)			m^3	1800



M:\2014\114025\CAD\Design\Phase 2-3\Phase 3\Figures\20220603-Submission#2\20220603- Key plan and Concept plan\PH3-FIG-2-CP.dwg, FIG-2-CP, Jun 02, 2022 - 1:22pm, szorgel

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

CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

CONCEPT PLAN - PHASE 3 CONDOS

1:750 0 10 20 30

JUNE 2022 | 114025 | FIGURE 2

SHT11X17.DWG - 279mmX432mm

Steve Zorgel

From: Chris Ilg <cilg@neufarchitectes.com>
Sent: Wednesday, January 26, 2022 12:44 PM
To: Steve Zorgel
Cc: Marc St.Pierre
Subject: RE: Greystone Phase 3 Buildings

Follow Up Flag: Follow up
Flag Status: Flagged

Hey Steve,

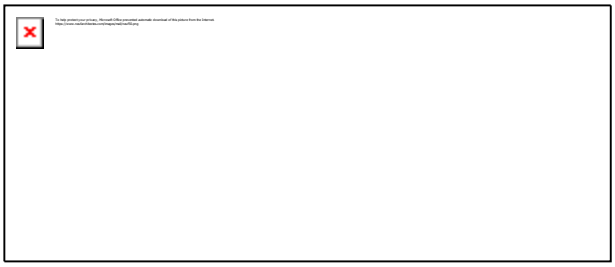
I'll describe the construction system and maybe you can confirm the class based on this.

Structure = concrete frame – floor assembly and columns to be 2hr rated
Exterior walls –
Masonry veneer finishes (90mm standard) and metal panels/siding – both non-combustible materials.
Steel stud assembly
Exterior gypsum and exterior gypsum. We likely will only require certain walls to be classified 1hr due to limiting distances with other buildings, but otherwise we are not specifying 1hr even though they could be considered 1hr.

Roof will be inverted roof with plastic XPS insulation above a rubberized membrane.

Let me know if this helps clarify the construction. I'm not sure the implications on the fire protection system if we qualify between classes, so let me know if there is a benefit to push either way in terms of cost or system complexity.

Thanks,



CHRIS ILG, OAQ, OAA, MRAIC, LEED AP
Architecte associé, Partner Architect
T 514 847 1117 #226 F 514 847 2287 C 514.512.1647
630, boul. René-Lévesque O. 32e étage, Montréal (QC) H3B 1S6
NEUF ARCHITECTES SENCRL Confidentialité + Transmission
Montréal. Ottawa. Toronto

50 ANS ET TOUJOURS NEUF . 50 YEARS AND STILL NEUF

From: Steve Zorgel <s.zorgel@novatech-eng.com>
Sent: Monday, January 24, 2022 7:51 AM
To: Chris Ilg <cilg@neufarchitectes.com>
Cc: Marc St.Pierre <m.stpierre@novatech-eng.com>
Subject: Greystone Phase 3 Buildings

Hi Chris,

I am working on calculating estimated fireflows for the two 7-storey buildings in phase 3 of Greystone. I wanted to confirm the following for the two buildings. Do you anticipate

- Building class 3, 4, 5 or 6? The building class definitions are attached;
    - The fire rating of the floors, exterior walls and roof. 1-hr minimum fire rating to be classified as Modified Fire Resistive, otherwise Non-Combustible construction (example assemblies for Modified Fire Resistive attached but not necessary as long as rating is >1-hr);
- Sprinklered system will be a fully supervised/monitored system and utilize standard firefighting equipment (hoses, nozzles, etc.).

Please let us know if you have this information available (or if unknown) so we can make the appropriate assumptions for fireflows. Thank you.

Steve Zorgel, **P.Eng.,** Project Coordinator | Engineering

NOVATECH Engineers, Planners & Landscape Architects

240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 x298 | Fax: 613.254.5867

Fireflows at Node Locations (if applicable)

Date: May 10, 2017

Node ID	Fireflows Applied	Governing Fireflow
N1	Single Unit 1 - 141.40L/s	141.40L/s
	Single Unit 2 - 120.44L/s	
	Single Unit 3 - 104.77L/s	
N2	n/a 50mm lead	
N3	Condo 9a - full area = 399.88L/s	286.45L/s
	Condo 9b - Firebreak at Phase Line = 286.45L/s	
	Townhouse 4a - 1 firebreak = 219.53L/s	
	Townhouse 4b - 2 firebreaks = 176.85L/s	
	Townhouse 4c - 3 firebreaks = 154.12L/s	
	Single Unit 1 - 141.40L/s	
	Single Unit 3 - 104.77L/s	
	Townhouse 5 - (268.88) capped at 167L/s	
N4	Townhouse 5 - (268.88) capped at 167L/s	167L/s
	Single Unit 23 - 137.65L/s	
	Single Unit 1 - 141.40L/s	
	Single Unit 2 - 120.44L/s	
	Single Unit 3 - 104.77L/s	
N5	Townhouse 5 - (268.88) capped at 167L/s	167L/s
	Single Unit 23 - 137.65L/s	
N6	Condo 9a - full area = 399.88L/s	286.45L/s
	Condo 9b - Firebreak at Phase Line = 286.45L/s	
	Townhouse 4a - 1 firebreak = 219.53L/s	
	Townhouse 4b - 2 firebreaks = 176.85L/s	
	Townhouse 4c - 3 firebreaks = 154.12L/s	
	Townhouse 5 - (268.88) capped at 167L/s	
N7	Townhouse 5 - (268.88) capped at 167L/s	167L/s
	Condo 6 - 145.15 L/s	
	Single Unit 23 - 137.65L/s	
N8	Townhouse 4a - 1 firebreak = 219.53L/s	399.88L/s or 286.45L/s
	Townhouse 4b - 2 firebreaks = 176.85L/s	
	Townhouse 4c - 3 firebreaks = 154.12L/s	
	Townhouse 5 - (268.88) capped at 167L/s	
	Townhouse 7a - 219.97L/s	
	Townhouse 7b - 202.94L/s	
	Condo 9a - full area = 399.88L/s	
	Condo 9b - Firebreak at Phase Line = 286.45L/s	
	Condo 13a - 229.03L/s	
	Condo 13b - 229.03L/s	
N9	Townhouse 7a - 219.97L/s	219.97L/s
	Townhouse 7b - 202.94L/s	
N10	School 12 - 249.76L/s	249.76L/s

Fireflows at Node Locations (if applicable)

Date: May 10, 2017

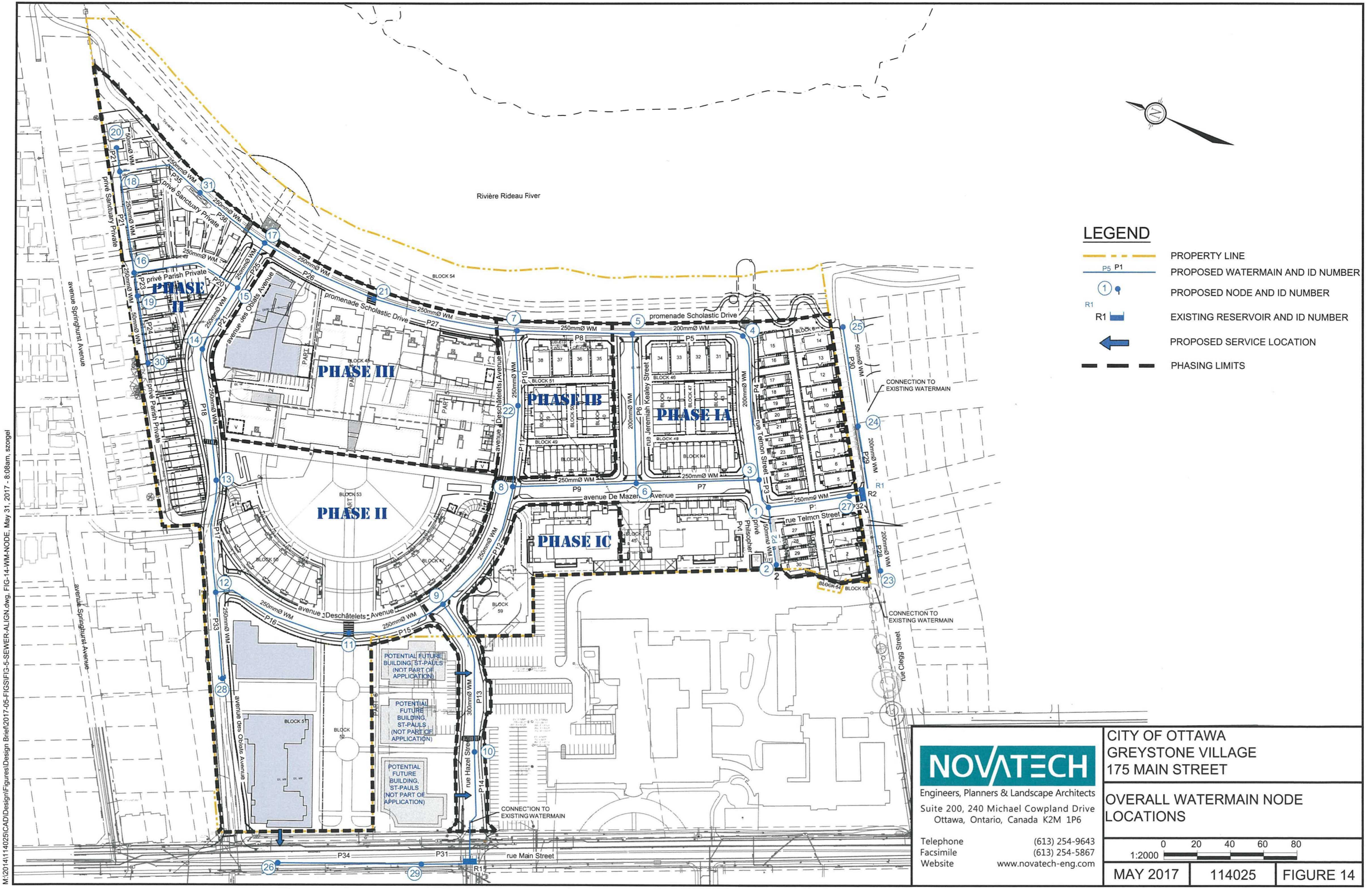
Node ID	Fireflows Applied	Governing Fireflow
N11	Townhouse 7a - 219.97L/s	249.76L/s
	Townhouse 7b - 202.94L/s	
	School 12 - 249.76L/s	
	Condo 10 - 181.08L/s	
N12	Townhouse 7a - 219.97L/s	219.97L/s
	Townhouse 7b - 202.94L/s	
	Condo 10 - 181.08L/s	
N13	Townhouse 7a - 219.97L/s	230.67L/s
	Townhouse 7b - 202.94L/s	
	Townhouse 18 (259.36) - capped at 167L/s	
	Condo Building 16 - 230.67L/s	
N14	Condo Building 16 - 230.67L/s	300.24L/s
	Retirement Residence Unit 17 - 300.24L/s	
	Townhouse 18 (259.36) - capped at 167L/s	
	Townhouse 19 - 259.36L/s	
N15	Retirement Residence Unit 17 - 300.24L/s	300.24L/s
	Townhouse 19 - 259.36L/s	
	Single Unit 21 - 103.75L/s	
N16*	Townhouse 19 - 259.36L/s	259.36L/s
	Single Unit 20 - 103.49L/s	
	Single Unit 21 - 103.75L/s	
N17	Retirement Residence Unit 17 - 300.24L/s	300.24L/s
	Single Unit 21 - 103.75L/s	
N18*	Townhouse 19 - 259.36L/s	259.36L/s
	Single Unit 20 - 103.49L/s	
	Single Unit 22 - 121.25L/s	
N19*	Townhouse 19 - 259.36L/s	259.36L/s
	Single Unit 20 - 103.49L/s	
N20	n/a 50mm lead	
N21	Deschatelets Building 14 - 248.24L/s	300.24L/s
	Condo 15a - 139.73L/s	
	Condo 15b 145.26L/s	
	Retirement Residence Unit 17 - 300.24L/s	
N22	Townhouse 5 - (268.88) capped at 167L/s	229.03L/s
	Condo 13a - 229.03L/s	
	Condo 13b - 229.03L/s	
	Townhouse 4a - 1 firebreak = 219.53L/s	
	Townhouse 4b - 2 firebreaks = 176.85L/s	
	Townhouse 4c - 3 firebreaks = 154.12L/s	
N23	Single Unit 1 - 141.40L/s	141.40L/s
	Single Unit 2 - 120.44L/s	
	Single Unit 3 - 104.77L/s	
N24*	Single Unit 1 - 141.40L/s	141.40L/s
	Single Unit 2 - 120.44L/s	
	Single Unit 3 - 104.77L/s	
N25	n/a 50mm lead	

Fireflows at Node Locations (if applicable)

Date: May 10, 2017

Node ID	Fireflows Applied	Governing Fireflow
N26	Condo 11 - 251.52L/s	251.52L/s
N27*	Single Unit 1 - 141.40L/s	141.40L/s
	Single Unit 2 - 120.44L/s	
	Single Unit 3 - 104.77L/s	
N28	Condo 10 - 181.08L/s	181.08L/s
	Domicile Building	133.33L/s
	Sister's Building	173.37L/s
N29	School 12 - 249.76L/s	249.76L/s
N30	n/a 50mm lead	
N31	Single Unit 20 - 103.49L/s	121.25L/s
	Single Unit 21 - 103.75L/s	
	Single Unit 22 - 121.25L/s	

Notes: *No fire hydrant near location, therefore not subject to fireflow analysis



LEGEND

- PROPERTY LINE
- P5 P1 — PROPOSED WATERMAIN AND ID NUMBER
- 1 — PROPOSED NODE AND ID NUMBER
- R1 — EXISTING RESERVOIR AND ID NUMBER
- PROPOSED SERVICE LOCATION
- PHASING LIMITS

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

CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

OVERALL WATERMAIN NODE LOCATIONS

0 20 40 60 80
1:2000

MAY 2017 | 114025 | FIGURE 14

SHT11X17 DWG - 279mmX432mm

M:\2014\114025\CAD\Design\Figures\Design Brief\2017-05-FIGS\FI3-5-SEWER-ALIGN.dwg, FIG-14-WM-NODE, May 31, 2017 - 8:08am, szorgel

Appendix C
Stormwater Management

NOVATECH
Engineers, Planners & Landscape Architects

M E M O R A N D U M

DATE: **DECEMBER 2, 2022**

TO: **NISHANT JHAMB (CITY OF OTTAWA)**

FROM: **MICHAEL PETEPIECE**
VAHID MEHDIPOUR

RE: **375 DESCHÂTELETS AVENUE - SITE PLAN CONTROL**
RUNOFF COEFFICIENT CALCULATION OF AREAS ABOVE UNDERGROUND PARKING ROOF SLAB
NOVATECH PROJECT #: 114025

CC: **STEVE ZORGEL**

BACKGROUND

This memo was originally submitted on November 24, 2022 and has been revised to include additional information and input from the geotechnical engineer in support of the assumptions and parameters used in the hydrologic analysis for Greystone Phase 3. This updated memo is provided in response to the following comment provided by the City's Storm Water Modelling team on September 29, 2022, regarding the runoff coefficient, model parameters and release rate calculations for the landscaped areas above the underground parking roof slab:

> *"Area A01, A02, A03, A04, A05, and A06 are above the underground parking roof slab. Storm water collected in this area during a major event will eventually drain to the City System. Runoff Coefficient and release rate calculations provided for this area are incorrect.*
>
> *The soil above the underground parking will act as storage layer above the impermeable Roof Slab with 100-year C value of 1. Please revise the calculations. Provide discussions on what will be the available storage volume and release rate from this layer. Please include discussions from geotechnical engineer about the available storage volume and release rates"*

The PCSWMM model currently represents these subcatchments as pervious areas using standard City of Ottawa runoff coefficients and infiltration parameters, in which a portion of the rainfall is infiltrated into the the soil above the parking garage roof slab, any excess storm runoff is conveyed overland to storm inlets to the storm sewer system in Scholastic Drive and Deschâtelets Avenue. Based on the proposed grading and architectural plans, there is a significant depth of soil above the top of the roof slabs. Water percolating through the soil column will eventually reach the roof slab where it will be collected by perforated pipes, or flow laterally to the outer edge of the slab where it will continue to perolcate downwards.

Upon further review of the hydrology for these catchments and discussions with the Geotechnical engineer for the project, we have determined that the modeling approach used is appropriate. This memo has been prepared in support of the hydrologic analysis and provides additional information on soil storage volumes and release rates.

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

DRAINAGE AREAS AND INFILTRATION MODELING (PCSWMM)

The storm drainage subcatchments within Phase III of Greystone Village are shown in the Storm Drainage Area Plan (**114025-STM(PH3))** attached to this memo. The post-development subcatchments of Phase III include two buildings (South Building and North Building) and areas A01-06 above the underground parking roof slab.

PCSWMM is used to model the proposed stormwater management for the Phase III site application. **Figure 1** illustrates the subcatchment areas used in the PCSWMM model. The hydrologic parameters for each subcatchment were developed based on the proposed land use and grading.

Figure 1. Phase III PCSWMM Model Subcatchments

Soil Type & Porosity

The soils on site generally consist of an upper layer of silty sand overtop of silty clay. The soils placed in the landscaped areas over the parking garage will either be the native silty sand, or imported soil suitable for landscaping. The porosity (space available for water storage) of this soil was reviewed with the geotechnical engineer and it was determined that 10% porosity is a reasonable value to use in the hydrologic analysis. The soil above the parking garage slab will be above the groundwater table, so the voids within the soil will be available for stormwater storage.

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

Infiltration Rate

Infiltration has been modelled using Horton's equation, which defines the infiltration capacity of soil over the duration of a precipitation event using a decay function that ranges from an initial maximum infiltration rate to a minimum rate as the storm progresses. Through consultation with the geotechnical engineer, it was determined that the default Horton's infiltration values for the City of Ottawa are suitable for the soils that will be used in the landscaped areas.

Horton's Equation:
$f(t) = f_c + (f_o - f_c)e^{-k(t)}$

Initial infiltration rate: f_o = 76.2 mm/hr
Final infiltration rate: f_c = 13.2 mm/hr
Decay Coefficient: k = 4.14/hr

Over the course of a storm event, the soil will become saturated and the infiltration rate will decrease over time in accordance with the above-noted function. The water will percolate down towards the roof slab of the parking garage where it will be intercepted by a drainage layer. The drainage layer will either collect the water in perforated pipes or direct it laterally to the edges of the parking structure where it will continue to percolate downwards to the foundation drains. The drainage layer will have a much higher hydraulic conductivity than the overlying soil, so the overlying soil will always permit the vertical movement of water and will never become saturated to the point where it would act as an impermeable surface.

Back-to-Back Storms

In the event of back-to-back storms, the infiltration rate will not have recovered back to the initial rate (76.2 mm/hr). Depending on the inter-event time, the initial infiltration rate for the second storm will be somewhere between the minimum and maximum rates. This would be the same whether the soils are over the parking structure or not.

MODEL RESULTS

Table 1 shows the 100-year model results for peak runoff, runoff depth, infiltration depth, and infiltration volume for areas A01-06.

Table 1. Infiltration Depth, Runoff Depth and Peak Runoff for Areas A01-06

Subcatchment Parameters			Model Results (100yr-4hr Chicago Storm Event)			
Name	Area (ha)	% Impervious	Peak Runoff (L/s)	Runoff Depth (mm)	Infiltration Depth (mm)	Infiltration Volume (m^3)
A01	0.04	21	6.61	37.76	33.92	14
A02	0.12	31	25.63	41.81	29.87	36
A03*	0.09	53	29.14	151.07	63.96	58
A04*	0.04	43	12.70	100.68	42.69	17
A05	0.05	57	15.52	51.60	20.08	10
A06	0.09	28	21.27	42.69	28.99	26

* Sum of all sub-areas

Table *2* lists the elevation of the parking garage roof slab under each subcatchment, the average ground elevation, the average depth of soil above the roof slab, and the average available soil volume in each of areas A01-06. A detailed grading plan (**114025-GR(PH3)** and a plan showing the top of underground parking slab elevations (Slab Elevation Plan, 12272-001) are attached to this memo.

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

Table 2. Average Finished Grading Top of Roof Slabs, Soil Volume and Water Capacity for Areas A01-06

Subcatchment Name	Average Finished Grade (m)	Elevation of Roof Slab (m)	Average Soil Depth (m)	Average Soil Volume[(1)] (m^3)	Water Holding Capacity[(2)] (m^3)	100yr Infiltration Volume[(3)] (m^3)
A01	61.89	61.21	0.68	272	27.2	14
A02	62.15	61.41	0.74	888	88.8	36
A03	63.20	61.95	1.25	1125	112.5	58
A04	63.56	61.87	1.69	676	67.6	17
A05	64.28	63.47	0.81	405	40.5	10
A06	63.29	62.28	1.01	909	90.9	26

(1) Is equal to [Finished Grading – Roof Slab Elevation] × Area

(2) Soil volume x 10% Void Ratio

(3) Volume of infiltrated water based on Horton's Equation - From Table 1

In comparing the 100-year infiltration volumes in **Table 1** to the water storage capacity in **Table 2**, this analysis demonstrates that the soils above the parking garage slab will have sufficient water storage capacity to accommodate the 100yr infiltration volume without becoming fully saturated. The available water storage capacity of the soils is between 2 and 4 times the 100yr infiltration volume.

CONCLUSION

Based on the above information, this analysis demonstrates that the soils above the parking garage slab will have the same infiltration characteristics as they would if the roof slab was not present. Even in the event of back-to-back storms and/or failure of the underlying drainage layer, the soil volume will have the sufficient water-holding capacity to accommodate the infiltrated surface water without becoming fully saturated and behaving like an impermeable surface. Therefore, there is no need to revise the PCSWMM modelling approach for these areas.

ATTACHMENTS

1) Email Correspondence with Geotechnical Engineer (November 30, 2022)
2) 114025-STM (PH3) Stormwater Management Plan (Rev 5, Nov. 24, 2022)
3) 114025-GR(PH3) Grading, Erosion & Sediment Control Plan (Rev 13, Nov. 24, 2022)
4) 12272-001 Slab Elevation Plan (Neuf Architects)

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

From: Scott Dennis <SDennis@patersongroup.ca>
Sent: Wednesday, November 30, 2022 4:35 PM
To: Mike Petepiece; Steve Zorgel
Cc: Evan Garfinkel; Vahid Mehdipour
Subject: RE: Infiltration Rate - Void Ratio Assumptions

Thanks Mike,

I have reviewed your assumptions and information provided below, and I am in agreement, from a geotechnical perspective. If you need more information from me on this, please let me know.

Regards,

PATERSON GROUP
SOLUTION ORIENTED ENGINEERING

SCOTT DENNIS, P.Eng., ing.
Senior Project Manager – Geotechnical
TEL: (613) 226-7381 ext. 332

9 AURIGA DRIVE
OTTAWA ON K2E 7T9
patersongroup.ca

From: Mike Petepiece <m.petepiece@novatech-eng.com>
Sent: November 30, 2022 3:35 PM
To: Steve Zorgel <s.zorgel@novatech-eng.com>; Scott Dennis <SDennis@patersongroup.ca>
Cc: Evan Garfinkel <egarfinkel@regionalgroup.com>; Vahid Mehdipour <v.mehdipour@novatech-eng.com>
Subject: RE: Infiltration Rate - Void Ratio Assumptions

Hi Scott,
Thank you for meeting with us this morning to review the stormwater modeling approach for the soils over the parking garage for Greystone Phase 3. As discussed, the City has indicated that our analysis requires input from a geotechnical engineer and we would appreciate your feedback on the following assumptions and information used in our stormwater management analysis as documented in the memo titled *"375 Deschatelets Avenue – Site Plan Control. Runoff Coefficient Calculation of Areas Above Underground Parking Garage Roof Slab"* (Novatech, November 24, 2022).

- The soils on site generally consist of an upper layer of silty sand overtop of silty clay. For the purposes of stormwater modeling, it is assumed that the soils that will be used for the landscaped areas over the parking garage will either be the native silty sand, or imported soil suitable for landscaping.
- The porosity (space available for water storage) of this soil is assumed to be approximately 10% of the total soil volume.

- The hydrologic parameters used to simulate infiltration in the stormwater model (Horton's Infiltration methodology) are the default values from the Ottawa Sewer Design Guidelines and are suitable for the soils that will be placed above the parking garage roof.

  Initial Infiltration Rate= 76.2 mm/hr
  Final Infiltration Rate= 13.2 mm/hr
  Decay Coefficient = 4.14 hr^{-1}

- As a storm progresses, the upper layers of the soil will become saturated and the infiltration rate will decrease over time in accordance with the above-noted function. The water will percolate down towards the roof slab of the parking garage where it will be intercepted by a drainage layer. The drainage layer will either collect the water in perforated pipes, or direct it laterally to the edges of the parking structure where it will continue to percolate downwards to the foundation drains. The drainage layer will have a much higher hydraulic conductivity than the overlying soil, so the surface infiltration rate will not be affected by any accumulation of water above the slab.
- In the event of back-to-back storms, the infiltration rate will not have recovered back to the initial rate (76.2mm/hr). Depending on the inter-event time, the initial infiltration rate for the second storm will be somewhere between the minimum and maximum rates. This would be the same whether the soils are over the parking structure or not.
- The soils will always have some vertical movement of water and will never become saturated to the point where the soils would act as an impermeable surface.
- Due to this, for the purposes of stormwater modeling, the soils above the parking structure will have essentially the same infiltration characteristics as if the parking structure was not there, even in back-to-back storms, and there is no required change to the modeling approach for these areas.

Please let us know if you agree with the assumptions and information provided above. Based on your reply, the memo and the stormwater management report will be updated to include the above noted information and any additional input you may have.

Thank you,

Michael Petepiece, P.Eng., Senior Project Manager | Water Resources
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext: 235 | Cell: 613.299.4677 | Fax: 613.254.5867

From: Steve Zorgel <s.zorgel@novatech-eng.com>
Sent: Tuesday, November 29, 2022 3:28 PM
To: Scott Dennis <SDennis@patersongroup.ca>
Cc: Mike Petepiece <m.petepiece@novatech-eng.com>; Evan Garfinkel <egarfinkel@regionalgroup.com>
Subject: Infiltration Rate - Void Ratio Assumptions

Hi Scott,

We recently submitted a package to the city for Greystone Phase 3 condo site. The City has provided the following comment and we provided a memo to address this comment:

2. *Area A01, A02, A03, A04, A05, A06 are above the underground parking roof slab. Storm water collected in this area during a major event will eventually drain to the City System. Runoff Coefficient and release rate calculations provided for this area are incorrect.*

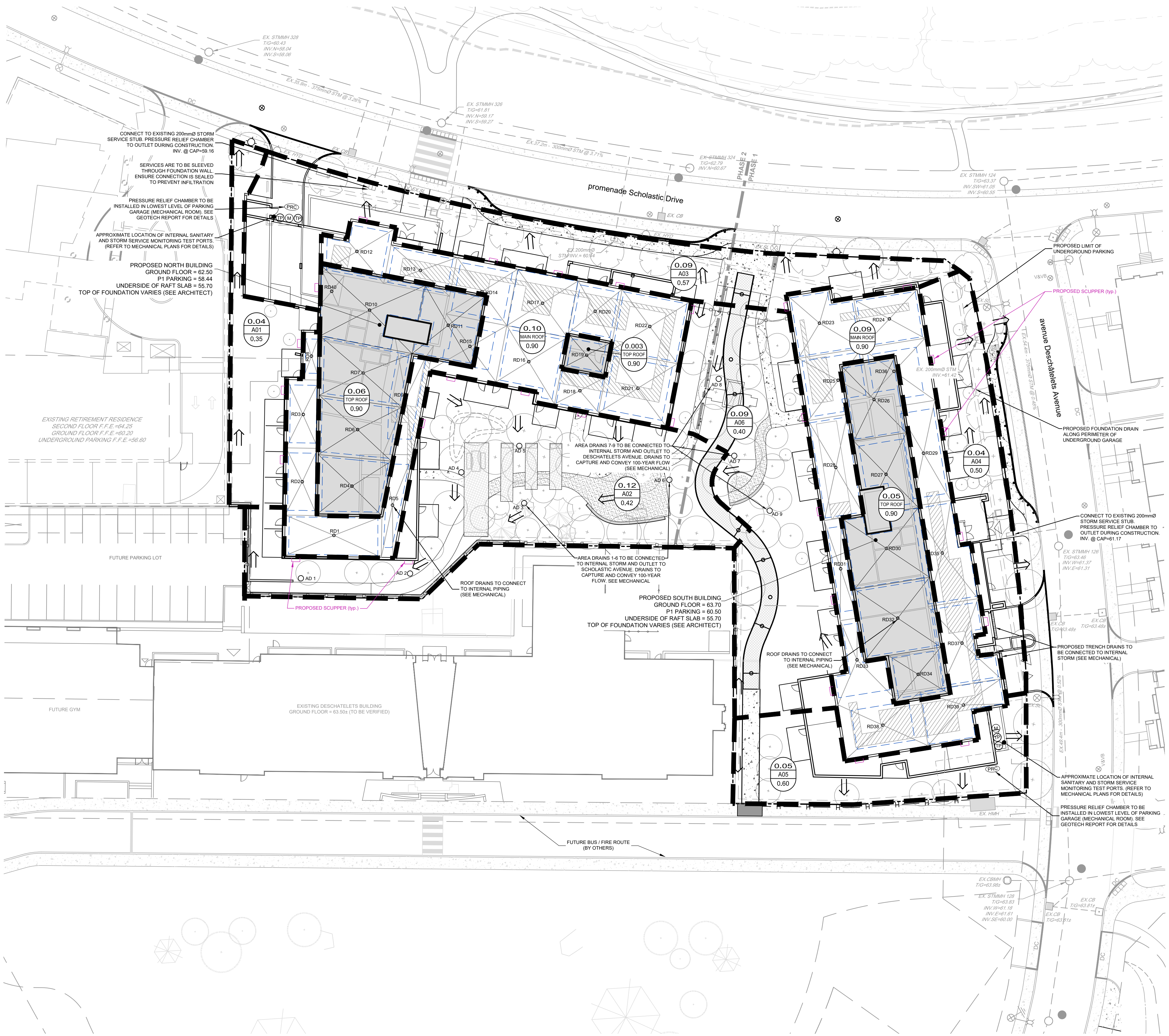
   The soil above the underground parking will act as storage layer above the impermeable Roof Slab with 100-year C value of 1. Please revise the calculations. Provide discussions on what will be the available storage volume and release rate from this layer. Please include discussions from geotechnical engineer about the available storage volume and release rates.

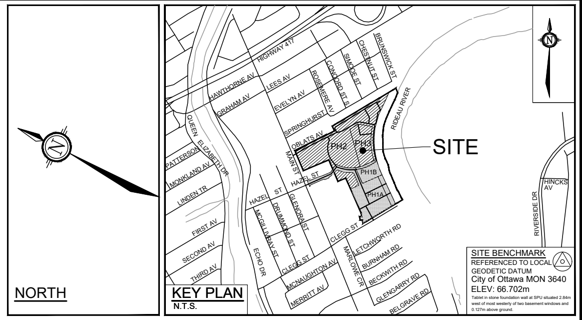
Novatech: Refer to Technical Memorandum, Runoff Coefficient Calculation of Areas Above Underground Parking Roof Slab, dated November 24, 2022.

We wanted to confirm the infiltration/exfiltration rate, void ratio was reasonable that was considered as part of the memo. The City is also concerned with back-to-back storms and we wouldn't mind a quick discussion on this.

Are you available for a quick meeting tomorrow to discuss?

Steve Zorgel, **P.Eng.,** Project Manager | Engineering
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 x298 | Fax: 613.254.5867





LEGEND

- SITE BOUNDARY
- STORM DRAINAGE AREA
- MAJOR OVERLAND FLOW ROUTE
- 0.07 DRAINAGE AREA (HECTARES)
- A01 DRAINAGE AREA I.D.
- 0.71 RUNOFF COEFFICIENT
- PROPOSED STORM SEWER AND DIRECTION OF FLOW
- AD1 PROPOSED AREA DRAIN
- RD1 PROPOSED ROOF DRAIN
- RD1 PROPOSED ROOF DRAIN WITH 100YR PONDING CONTOUR
- PROPOSED ROOF SCUPPER LOCATION
- PROPOSED LIMITS OF UNDERGROUND PARKING
- PROPOSED RETAINING WALL
- PROPOSED RETAINING WALL AND ACOUSTIC FENCE
- PROPOSED ACOUSTIC FENCE
- PROPOSED TREES / SHRUBS
- M PROPOSED WATER METER LOCATION
- TP PROPOSED SANITARY / STORM MONITORING TEST PORT
- PRC PROPOSED PRESSURE RELIEF CHAMBER
- STM MH EXISTING STORM MANHOLE AND SEWER
- SAN MH EXISTING SANITARY MANHOLE
- VVB EXISTING VALVE AND VALE BOX
- EX.HYD EXISTING FIRE HYDRANT
- EX.CB EXISTING CATCHBASIN
- TG EXISTING TOP OF GRATE
- EX UP EXISTING UTILITY POLE C/W GUY WIRES
- LS EXISTING LIGHT STANDARD
- EXISTING LIMITS OF CONCRETE
- PROPOSED LIMITS OF CONCRETE
- PROPOSED LIMITS OF STONEDUST PAVING
- PROPOSED METAL GRATE / FOOTBRIDGE
- PROPOSED LIMITS OF GREEN ROOF

PHASE 3 CONDOS - ROOF DRAIN TABLE

AREA ID	ZURN SPECIFICATION	NOTCHES	POST DEVELOPMENT ZURN ROOFDRAIN CONTROL PARAMETERS					
			1:5 - YEAR EVENT			1:100 - YEAR EVENT		
			HEAD(m)	Q(l/s)	VOL(m³)	HEAD(m)	Q(l/s)	VOL(m³)
NORTH BUILDING								
RD1	ZCF121-1W-X4-Z-105-10-77	1	0.105	0.39	1.41	0.138	0.51	3.13
RD2	ZCF121-1W-X4-Z-105-10-77	1	0.095	0.36	0.57	0.127	0.47	1.35
RD3	ZCF121-1W-X4-Z-105-10-77	1	0.096	0.36	0.58	0.128	0.48	1.37
RD4	ZCF121-1W-X4-Z-105-10-77	1	0.107	0.40	1.53	0.139	0.52	3.39
RD5	ZCF121-1W-X4-Z-105-10-77	1	0.096	0.36	0.48	0.122	0.46	1.17
RD6	ZCF121-1W-X4-Z-105-10-77	1	0.107	0.40	1.76	0.139	0.52	3.87
RD7	ZCF121-1W-X4-Z-105-10-77	1	0.108	0.40	2.07	0.141	0.52	4.52
RD8	ZCF121-1W-X4-Z-105-10-77	1	0.077	0.29	0.10	0.108	0.40	0.27
RD9	ZCF121-1W-X4-Z-105-10-77	1	0.082	0.30	0.52	0.108	0.40	1.21
RD10	ZCF121-1W-X4-Z-105-10-77	1	0.115	0.43	3.06	0.149	0.56	6.60
RD11	ZCF121-1W-X4-Z-105-10-77	1	0.112	0.42	1.77	0.146	0.54	3.92
RD12	ZCF121-1W-X4-Z-105-10-77	1	0.101	0.38	0.87	0.133	0.50	2.00
RD13	ZCF121-1W-X4-Z-105-10-77	1	0.096	0.36	0.58	0.134	0.50	1.36
RD14	ZCF121-1W-X4-Z-105-10-77	1	0.096	0.36	0.81	0.127	0.47	1.87
RD15	ZCF121-1W-X4-Z-105-10-77	1	0.079	0.29	0.58	0.103	0.39	1.32
RD16	ZCF121-1W-X4-Z-105-10-77	1	0.104	0.39	1.34	0.135	0.51	2.99
RD17	ZCF121-1W-X4-Z-105-10-77	1	0.113	0.42	1.19	0.148	0.55	2.69
RD18	ZCF121-1W-X4-Z-105-10-77	1	0.103	0.39	0.34	0.140	0.52	0.85
RD19	ZCF121-1W-X4-Z-105-10-77	1	0.094	0.35	0.35	0.126	0.47	0.85
RD20	ZCF121-1W-X4-Z-105-10-77	2	0.096	0.71	0.41	0.131	0.97	1.05
RD21	ZCF121-1W-X4-Z-105-10-77	2	0.106	0.79	1.16	0.131	0.97	2.72
RD22	ZCF121-1W-X4-Z-105-10-77	2	0.104	0.78	1.16	0.141	1.05	2.74
RD40	ZCF121-1W-X4-Z-105-10-77	1	0.000	0.00	0.00	0.000	0.00	0.00
SUBTOTAL				9.31	22.65		12.29	51.25
SOUTH BUILDING								
RD23	ZCF121-1W-X4-Z-105-10-77	1	0.108	0.40	1.40	0.141	0.53	3.11
RD24	ZCF121-1W-X4-Z-105-10-77	1	0.107	0.40	1.09	0.140	0.52	2.47
RD25	ZCF121-1W-X4-Z-105-10-77	1	0.100	0.37	0.91	0.132	0.49	2.06
RD26	ZCF121-1W-X4-Z-105-10-77	1	0.108	0.40	1.63	0.141	0.52	3.62
RD27	ZCF121-1W-X4-Z-105-10-77	1	0.111	0.41	1.50	0.127	0.47	3.33
RD28	ZCF121-1W-X4-Z-105-10-77	1	0.108	0.40	1.51	0.141	0.53	3.35
RD29	ZCF121-1W-X4-Z-105-10-77	1	0.097	0.36	1.13	0.127	0.47	2.54
RD30	ZCF121-1W-X4-Z-105-10-77	1	0.114	0.42	2.34	0.148	0.55	5.09
RD31	ZCF121-1W-X4-Z-105-10-77	1	0.095	0.35	0.47	0.126	0.47	1.11
RD32	ZCF121-1W-X4-Z-105-10-77	1	0.110	0.41	2.31	0.143	0.53	5.06
RD33	ZCF121-1W-X4-Z-105-10-77	1	0.101	0.38	0.90	0.132	0.49	2.06
RD34	ZCF121-1W-X4-Z-105-10-77	1	0.101	0.38	0.83	0.133	0.50	1.89
RD35	ZCF121-1W-X4-Z-105-10-77	2	0.108	0.81	1.18	0.144	1.07	2.78
RD36	ZCF121-1W-X4-Z-105-10-77	1	0.085	0.32	0.77	0.112	0.42	1.75
RD37	ZCF121-1W-X4-Z-105-10-77	2	0.103	0.77	0.58	0.138	1.03	2.62
RD38	ZCF121-1W-X4-Z-105-10-77	2	0.114	0.85	1.19	0.108	0.80	1.00
RD39	ZCF121-1W-X4-Z-105-10-77	2	0.109	0.81	0.83	0.146	1.09	2.00
SUBTOTAL				8.25	20.58		10.49	45.85
	TOTAL			17.56	43.23		22.79	97.10

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

PRELIMINARY NOT FOR CONSTRUCTION

No.	REVISION	DATE	BY
5.	REVISED AS PER CITY OF OTTAWA COMMENTS	NOV 24/22	SAZ
4.	REVISED AS PER CITY OF OTTAWA COMMENTS	AUG 19/22	SAZ
3.	ISSUED FOR COORDINATION	AUG 10/22	SAZ
2.	REVISED AS PER CITY OF OTTAWA COMMENTS	JUN 3/22	SAZ
1.	ISSUED WITH SITE PLAN APPLICATION	JUL 22/21	JAG

SCALE 1:250

DESIGN SAZ
CHECKED MSP
DRAWN MTM
CHECKED SAZ
APPROVED MSP

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER S.A.N. ZORGEL 100191487 Nov. 24/22 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

CITY OF OTTAWA
225 SCHOLASTIC DRIVE
GREYSTONE VILLAGE PHASE 3

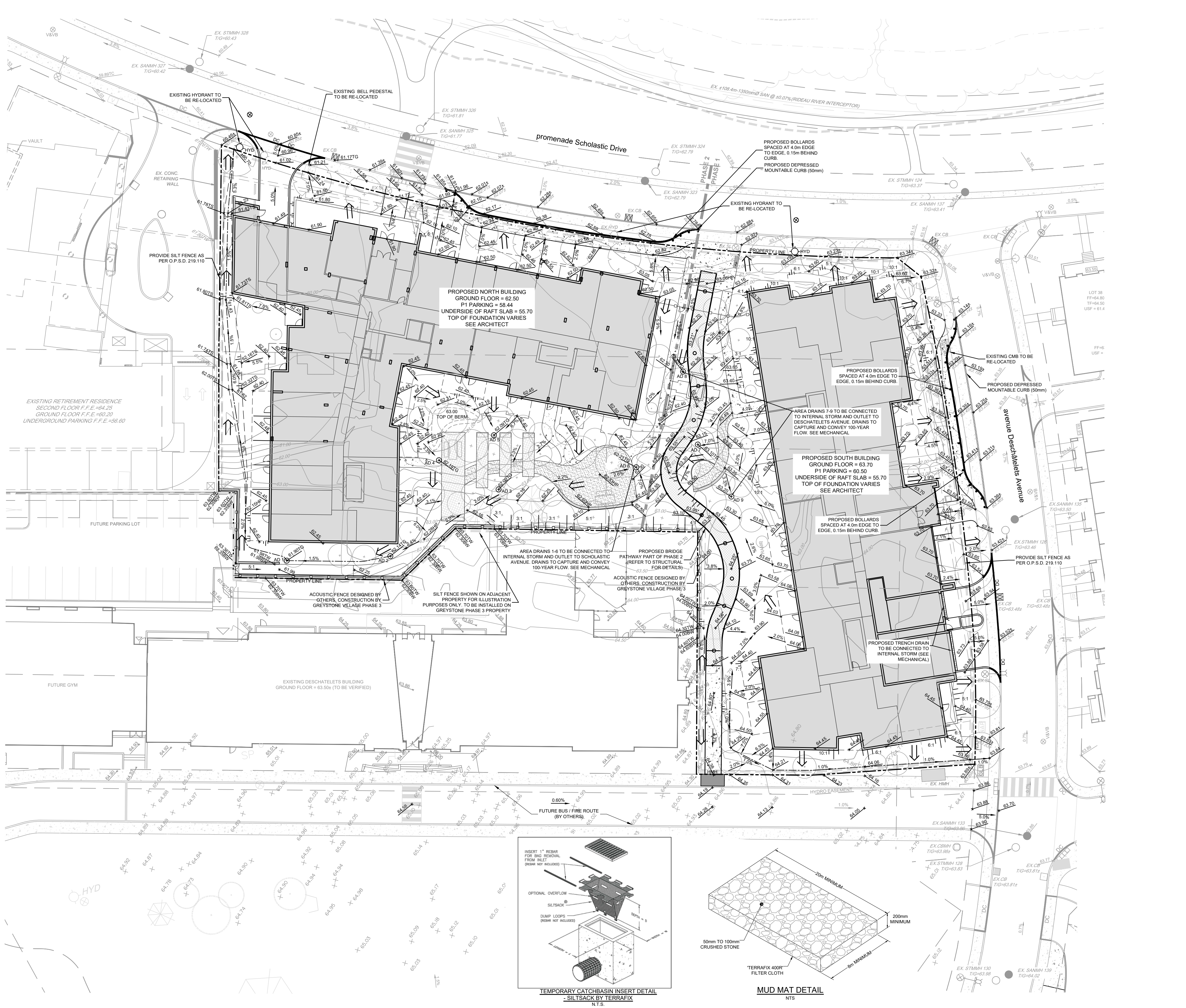
DRAWING NAME
STORMWATER MANAGEMENT PLAN

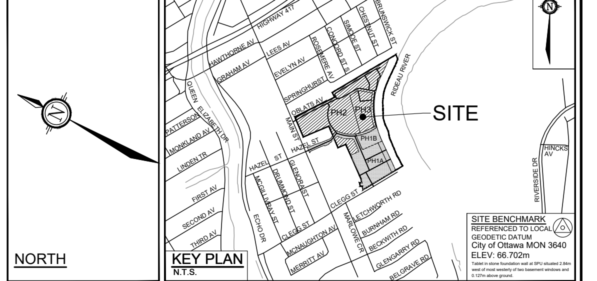
PROJECT No. 114025-PH3
REV REV # 5
DRAWING No. 114025-STM(PH3)

D07-12-21-0111

#17640

PLANB1.DWG - 1000mmx707mm





LEGEND

- SITE BOUNDARY
- PROPOSED ELEVATION / EXISTING ELEVATION (62.50 / 63.66)
- PROPOSED TOP OF WALL ELEVATION / PROPOSED BOTTOM OF WALL ELEVATION (63.70TW / 62.30BW)
- PROPOSED TOP OF GRATE ELEVATION (62.96TG)
- PROPOSED ELEVATED PATHWAY ELEVATION (64.50*)
- HOBIN ARCHITECT PROPOSED ELEVATION (CECCE SCHOOL) (63.70)
- SUBDIVISION DESIGN ELEVATION (64.42TC)
- AOV ORIGINAL TOPO ELEVATION (x64.83)
- PROPOSED GRADE AND DIRECTION (2.0%)
- PROPOSED TERRACING (MAX 3:1)
- PROPOSED SWALE WITH GRADE AND DIRECTION (2.0%)
- MAJOR OVERLAND FLOW ROUTE
- PROPOSED BARRIER CURB
- PROPOSED DEPRESSED CURB (DC)
- PROPOSED DEPRESSED MOUNTABLE CURB (50mm)
- PROPOSED AREA DRAIN (AD1)
- PROPOSED SIAMESE CONNECTION
- PROPOSED BUILDING ENTRANCE
- PROPOSED LIMITS OF UNDERGROUND PARKING
- PROPOSED RETAINING WALL
- PROPOSED RETAINING WALL AND ACOUSTIC FENCE
- PROPOSED TREES / SHRUBS
- PROPOSED SILT SACK IN EXISTING CATCHBASIN (EX.CB)
- PROPOSED SILT FENCE (AS PER O.P.S.D. 219.110)
- 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
- EXISTING STREETLIGHT
- EXISTING HYDRANT
- DC — EXISTING DEPRESSED CURB
- CMB — EXISTING COMMUNITY MAILBOX
- EX.HMH — EXISTING HYDRO MANHOLE
- HMH — PROPOSED HYDRO MANHOLE
- EXISTING LIMITS OF CONCRETE
- PROPOSED LIMITS OF CONCRETE
- PROPOSED LIMITS OF STONEDUST PAVING
- PROPOSED METAL GRATE / FOOTBRIDGE

GENERAL NOTES:

1) COORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
2) DETERMINE THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION. PROTECT AND ASSUME RESPONSIBILITY FOR ALL EXISTING UTILITIES WHETHER OR NOT SHOWN ON THIS DRAWING.
3) OBTAIN ALL NECESSARY PERMITS AND APPROVALS FROM THE CITY OF OTTAWA BEFORE COMMENCING CONSTRUCTION.
4) BEFORE COMMENCING CONSTRUCTION OBTAIN AND PROVIDE PROOF OF COMPREHENSIVE, ALL RISK AND OPERATIONAL LIABILITY INSURANCE FOR $5,000,000.00. INSURANCE POLICY TO NAME OWNERS, ENGINEERS AND ARCHITECTS AS CO-INSURED.
5) RESTORE ALL DISTURBED AREAS ON-SITE AND OFF-SITE, INCLUDING TRENCHES AND SURFACES ON PUBLIC ROAD ALLOWANCES TO EXISTING CONDITIONS OR BETTER TO THE SATISFACTION OF THE CITY OF OTTAWA AND ENGINEER.
6) REMOVE FROM SITE ALL EXCESS EXCAVATED MATERIAL, ORGANIC MATERIAL AND DEBRIS UNLESS OTHERWISE INSTRUCTED BY ENGINEER. EXCAVATE AND REMOVE FROM SITE ANY CONTAMINATED MATERIAL. ALL CONTAMINATED MATERIAL SHALL BE DISPOSED OF AT A LICENSED LANDFILL FACILITY.
7) ALL ELEVATIONS ARE GEODETIC.
8) REFER TO ARCHITECT'S AND LANDSCAPE ARCHITECT'S DRAWINGS FOR BUILDING AND HARDSURFACE AREAS AND DIMENSIONS.
9) REFER TO SERVICING DESIGN BRIEF PREPARED BY NOVATECH ENGINEERING CONSULTANTS LTD.
10) SAW CUT AND KEY GRIND ASPHALT AT ALL ROAD CUTS AND ASPHALT TIE IN POINTS AS PER CITY OF OTTAWA STANDARDS (R10).
11) PROVIDE LINE/PARKING PAINTING.
12) CONTRACTOR TO PROVIDE THE CONSULTANT WITH A GRADING PLAN INDICATING THE AS-BUILT ELEVATION OF EVERY DESIGN GRADE SHOWN ON THIS PLAN.
13) REFER TO GEOTECHNICAL REPORT PREPARED BY PATERSON GROUP 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.
14) ALL MATERIALS AND CONSTRUCTION METHODS SHALL BE IN ACCORDANCE WITH THE CITY OF OTTAWA STANDARDS AND SPECIFICATIONS AND ONTARIO PROVINCIAL STANDARDS AND SPECIFICATIONS. ONTARIO PROVINCIAL STANDARDS AND SPECIFICATIONS WILL APPLY WHERE NO CITY STANDARDS ARE AVAILABLE.
15) ALL PRIVATE APPROACHES MUST BE CONSTRUCTED AS PER CITY SPECIFICATION SC13.

GRADING NOTES:

1) ALL TOPSOIL, ORGANIC OR DELETERIOUS MATERIAL MUST BE ENTIRELY REMOVED FROM BENEATH THE PROPOSED PAVED AREAS.
2) EXPOSED SUBGRADES IN PROPOSED PAVED AREAS SHOULD BE PROOF ROLLED WITH A LARGE STEEL DRUM ROLLER AND INSPECTED BY THE GEOTECHNICAL CONSULTANT.
3) ANY SOFT AREAS EVIDENT FROM THE PROOF ROLLING SHOULD BE SUBEXCAVATED AND REPLACED WITH SUITABLE MATERIAL THAT IS FROST COMPATIBLE WITH THE EXISTING SOILS.
4) THE GRANULAR BASE SHOULD BE COMPACTED TO AT LEAST 100% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY VALUE. ANY ADDITIONAL GRANULAR FILL USED BELOW THE PROPOSED PAVEMENT SHOULD BE COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY VALUE.
5) GRADE AND/OR FILL BEHIND PROPOSED CURB AND BETWEEN BUILDINGS AND CURBS, WHERE REQUIRED TO PROVIDE POSITIVE DRAINAGE.
6) MINIMUM OF 2% GRADE FOR ALL GRASS AREAS 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.

EROSION AND SEDIMENT CONTROL NOTES :

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) TO PREVENT SURFACE EROSION FROM ENTERING THE DITCH OR STORM SYSTEM DURING CONSTRUCTION, CATCHBASIN INSERTS WILL BE PLACED UNDER GRATES OF CATCHBASINS AND STRUCTURES. A LIGHT DUTY SILT FENCE BARRIER WILL ALSO BE INSTALLED ALONG THE PROPERTY LINES. THESE CONTROL MEASURES WILL REMAIN IN PLACE UNTIL VEGETATION HAS BEEN ESTABLISHED AND CONSTRUCTION IS COMPLETE.
3) 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.
4) THE CONTRACTOR SHALL IMMEDIATELY REPORT TO THE ENGINEER ANY ACCIDENTAL DISCHARGES OF SEDIMENT MATERIAL INTO ANY DITCH OR 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.
5) THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.
6) ROADWAYS ARE TO BE SWEPT AS REQUIRED OR AS DIRECTED BY THE ENGINEER AND/OR MUNICIPALITY.
7) THE CONTRACTOR SHALL ENSURE PROPER DUST CONTROL IS PROVIDED WITH THE APPLICATION OF WATER (AND IF REQUIRED, CALCIUM CHLORIDE) DURING DRY PERIODS.

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

PRELIMINARY NOT FOR CONSTRUCTION

No.	REVISION	DATE	BY
13.	REVISED AS PER CITY OF OTTAWA COMMENTS	NOV 24/22	SAZ
12.	REVISED AS PER CITY OF OTTAWA COMMENTS	AUG 19/22	SAZ
11.	ISSUED FOR COORDINATION	AUG 10/22	SAZ
10.	REVISED AS PER CITY OF OTTAWA COMMENTS	JUN 3/22	SAZ
9.	ISSUED FOR COORDINATION	MAY 24/22	SAZ
8.	ISSUED FOR COORDINATION	MAR 4/22	SAZ
7.	ISSUED FOR COORDINATION	MAR 2/22	MSP
6.	ISSUED FOR COORDINATION	FEB 23/22	MSP
5.	ISSUED WITH SITE PLAN APPLICATION	JUL 22/21	JAG
4.	ISSUED FOR INFORMATION	MAR 19/21	JAG
3.	RE-ISSUED FOR COORDINATION	FEB 17/21	JAG
2.	ISSUED FOR COORDINATION	DEC 4/20	JAG
1.	ISSUED FOR DISCUSSION PURPOSES	DEC 2/20	JAG

SCALE 1:250

DESIGN MTM · CHECKED SAZ · DRAWN MTM · CHECKED SAZ · APPROVED MSP

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER S.A.N. ZORGEL 100191487 NOV 24/22 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

CITY OF OTTAWA
225 SCHOLASTIC DRIVE
GREYSTONE VILLAGE PHASE 3

DRAWING NAME
GRADING, EROSION & SEDIMENT CONTROL PLAN

PROJECT No. 114025-PH3
REV # 13
DRAWING No. 114025-GR(PH3)

D07-12-21-0111

#17640

PARKING SLAB STUDY (1 001)
1 : 200

NOTES GÉNÉRALES General Notes

1. Ces documents d'architecture sont la propriété exclusive de NEUF architect(e)s et ne pourront être utilisés, reproduits ou copiés sans autorisation écrite préalable. / These architectural documents are the exclusive property of NEUF architect(e)s and cannot be used, copied or reproduced without written pre-authorisation
2. Les dimensions apparaissant aux documents devront être vérifiées par l'entrepreneur avant le début des travaux. / All dimensions which appear on the documents must be verify by the contractor before to start the work.
3. Veuillez aviser l'architecte de toute dimension erreur et/ou divergences entre ces documents et ceux des autres professionnels. / The architect must be notified of all errors, omissions and discrepancies between these documents and those of the others professionnals.
4. Les dimensions sur ces documents doivent être lues et non mesurées. / The dimensions on these documents must be read and not measured.

CIVIL + PLANNING
NOVATECH
240 Michael Cowland Drive, Suite 200
Ottawa, Ontario, K2M 1P6
P : (613) 254-9643

LANDSCAPE ARCHITECTURE
CSW Landscape Architects Limited
319 McRae Avenue, Suite 502
Ottawa, Ontario K1Z 0B9
P : (613-729-4536

MECHANICAL / ELECTRICAL
GOODKEY, WEEDMARK AND ASSOCIATES LTD.
1688 Woodward drive, Suite 200
Ottawa, Ontario, K2C 3R8
P : (613) 727-5111

STRUCTURAL
CUNLIFFE & ASSOCIATES
200-1550 Carling
Ave., Ottawa, ON. K1Z 8S8
P : (613)-729-7242

ARCHITECTES Architect
NEUF architect(e)s SENCRL
630, boul. René-Lévesque O. 32e étages, Montréal QC H3B 1S6
T 514 847 1117 NEUFarchitectes.com

SCEAU / Seal

NEUF ARCHITECT(E)S
NEUF ARCHITECTES SENCRL

CLIENT Client
REGIONAL GROUP

OUVRAGE Project
GREYSTONE VILLAGE PHASE 3

EMPLACEMENT Location
OTTAWA

NO PROJET No.
12272

NO	RÉVISION	DATE (aa-mm-jj)

DESSINÉ PAR Drawn by
Author

VÉRIFIÉ PAR Checked
Checker

DATE (aa.mm.jj)
10/17/22

ÉCHELLE Scale
1 : 200

TITRE DU DESSIN Drawing Title
SLAB ELEVATION PLAN

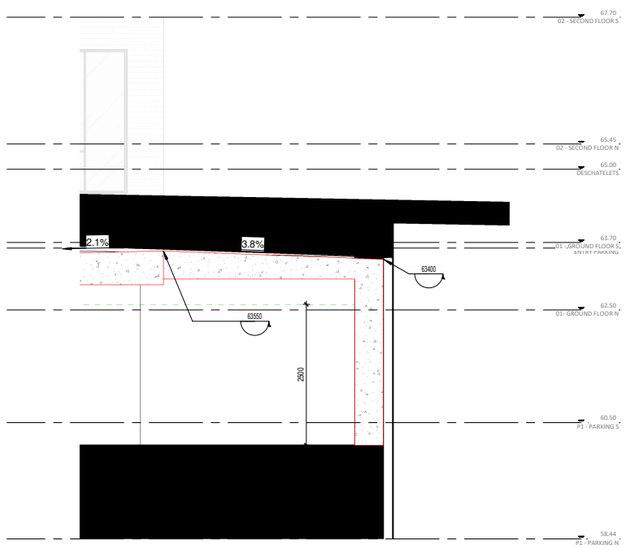
RÉVISION Revision

NO. DESSIN Dwg Number
001

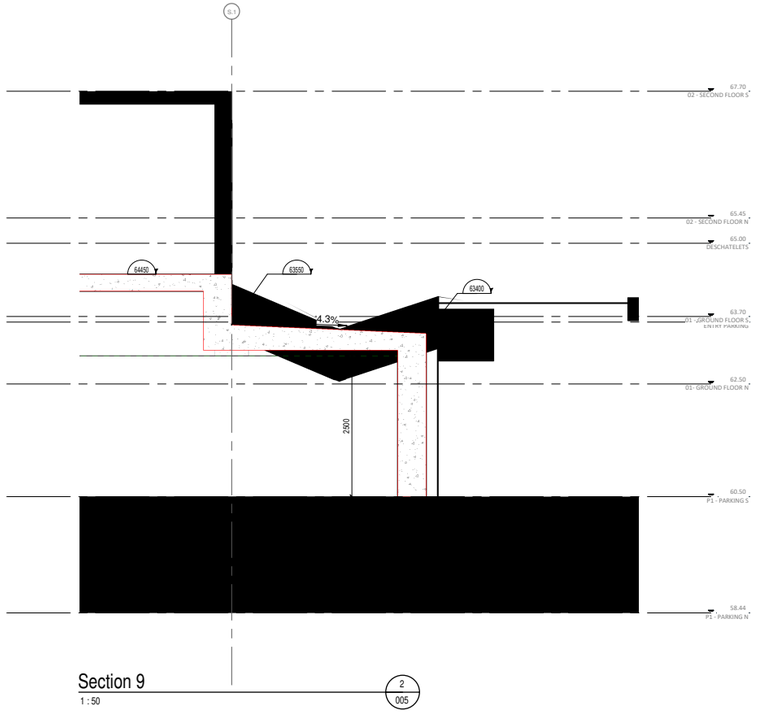
#17640

D07-12-21-0111

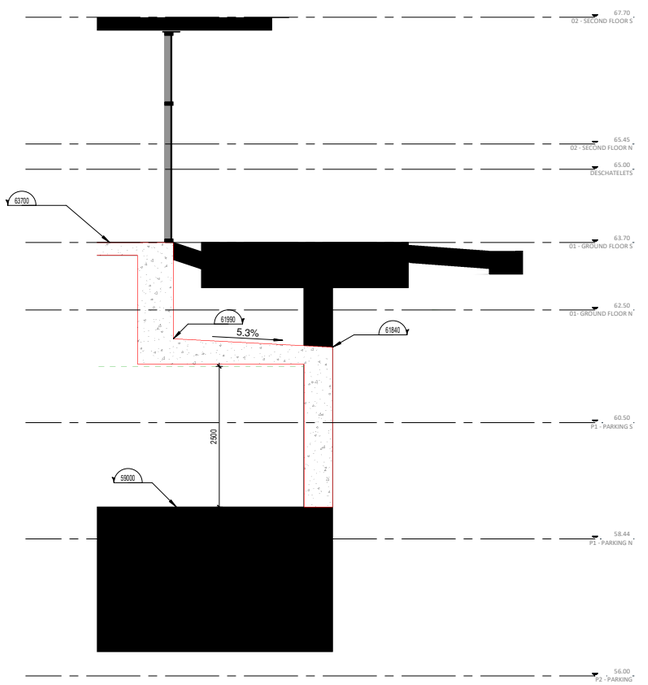
Autodesk Docs://12272_GREYSTONE/GV-PH3_12272_ARC_R22.rvt



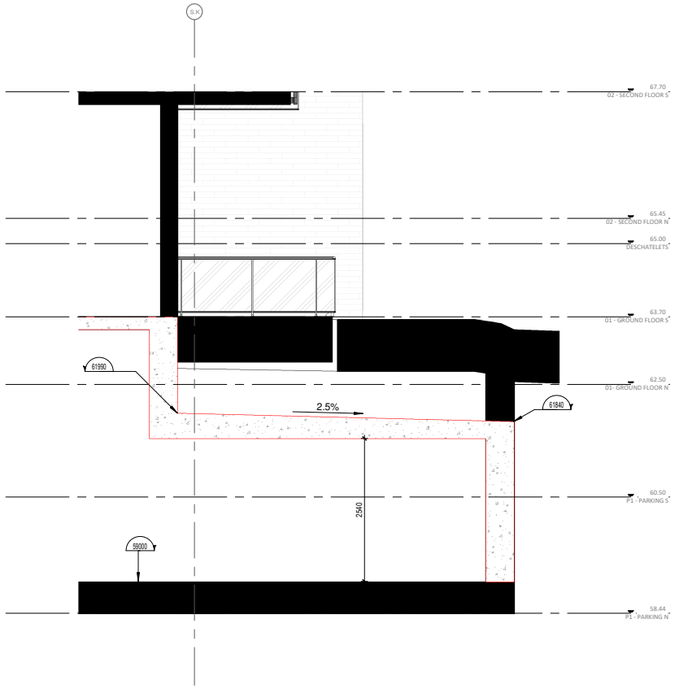
Section 26
1 : 50
1 / 005



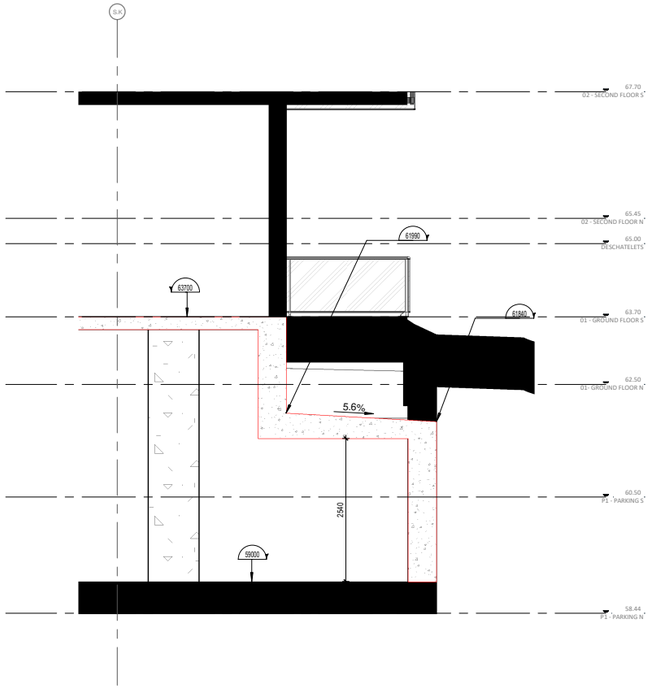
Section 9
1 : 50
2 / 005



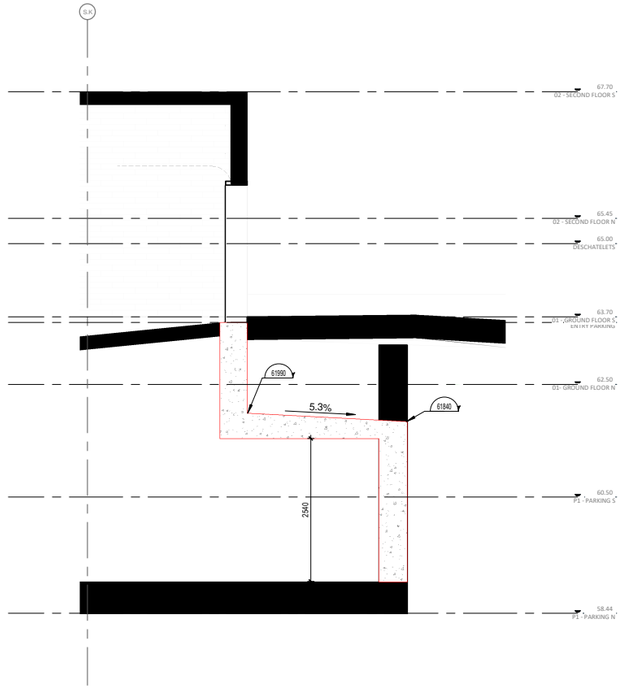
Section 28
1 : 50
5 / 005



Section 11
1 : 50
4 / 005



Section 1
1 : 50
3 / 005



Section 29
1 : 50
6 / 005

NOTES GÉNÉRALES General Notes

1. Ces documents d'architecture sont la propriété exclusive de NEUF architect(e)s et ne pourront être utilisés, reproduits ou copiés sans autorisation écrite préalable. / These architectural documents are the exclusive property of NEUF architect(e)s and cannot be used, copied or reproduced without written pre-authorisation
2. Les dimensions apparaissant aux documents devront être vérifiées par l'entrepreneur avant le début des travaux. / All dimensions which appear on the documents must be verify by the contractor before to start the work.
3. Veuillez aviser l'architecte de toute dimension erreur et/ou divergences entre ces documents et ceux des autres professionnels. / The architect must be notified of all errors, omissions and discrepancies between these documents and those of the others professionnals.
4. Les dimensions sur ces documents doivent être lues et non mesurées. / The dimensions on these documents must be read and not measured.

CIVIL + PLANNING
NOVATECH
240 Michael Cowland Drive, Suite 200
Ottawa, Ontario, K2M 1P6
P : (613) 254-9643

LANDSCAPE ARCHITECTURE
CSW Landscape Architects Limited
319 McRae Avenue, Suite 502
Ottawa, Ontario K1Z 0B9
P : (613-729-4536

MECHANICAL / ELECTRICAL
GOODKEY, WEEDMARK AND ASSOCIATES LTD.
1688 Woodward drive, Suite 200
Ottawa, Ontario, K2C 3R8
P : (613) 727-5111

STRUCTURAL
CUNLIFFE & ASSOCIATES
200-1550 Carling
Ave., Ottawa, ON, K1Z 8S8
P : (613)-729-7242

ARCHITECTES Architect
NEUF architect(e)s SENCRL
630, boul. René-Lévesque O. 32e étages, Montréal QC H3B 1S6
T 514 847 1117 NEUFarchitectes.com

SCEAU / Seal

NEUF
ARCHITECT(E)S
NEUF ARCHITECTES SENCRL

CLIENT Client
REGIONAL GROUP

OUVRAGE Project
GREYSTONE VILLAGE PHASE 3

EMPLACEMENT Location
OTTAWA

NO PROJET No.
12272

NO	RÉVISION	DATE (aa-mm-jj)

DESSINÉ PAR Drawn by
Author

VÉRIFIÉ PAR Checked
Checker

DATE (aa.mm.jj)
10/20/22

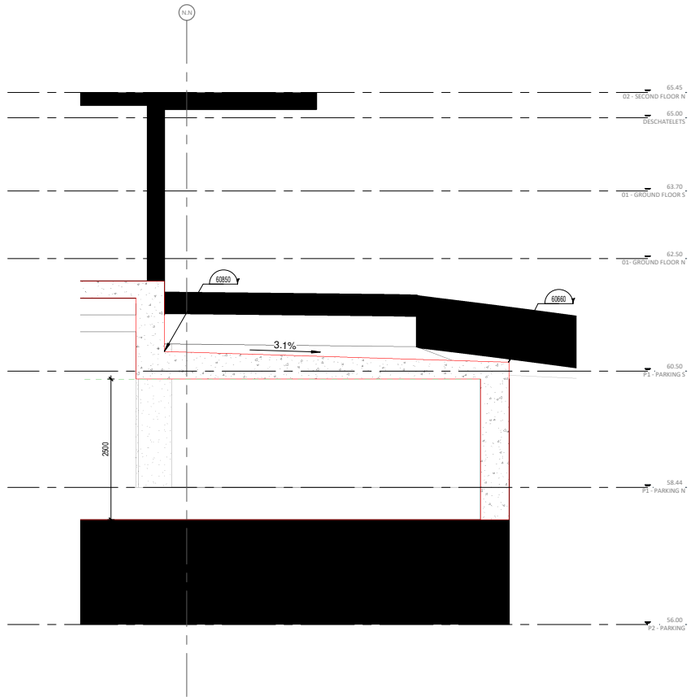
ÉCHELLE Scale
1 : 50

TITRE DU DESSIN Drawing Title
Unnamed

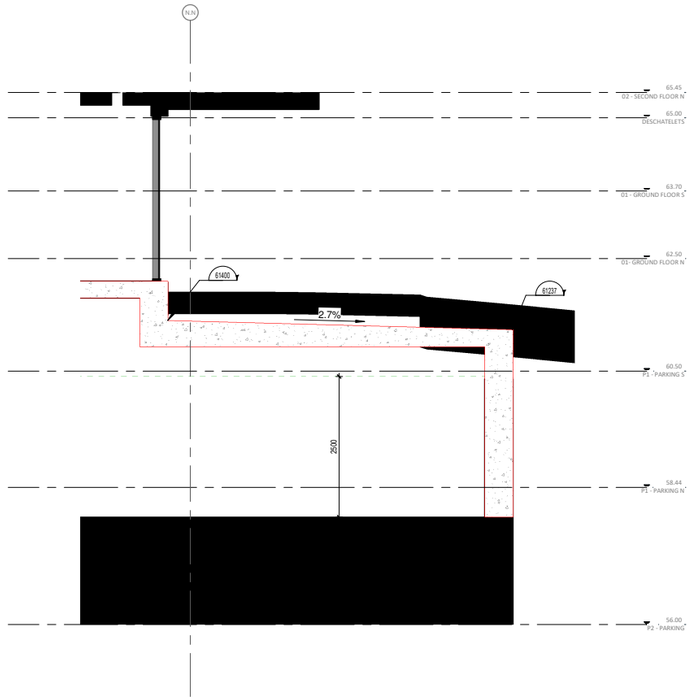
RÉVISION Revision

NO. DESSIN Dwg Number
005

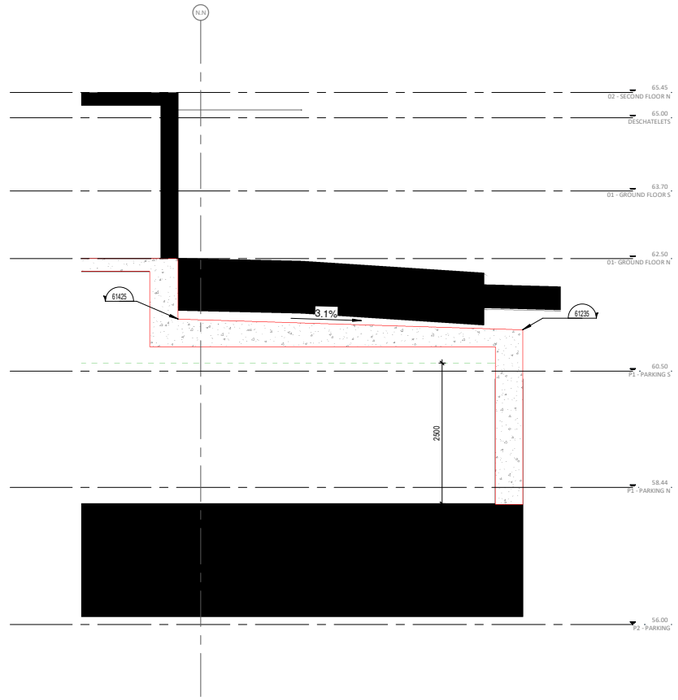
D07-12-21-0111
#17640



Section 18
1 : 50
1 / 006



Section 19
1 : 50
2 / 006



Section 20
1 : 50
3 / 006

NOTES GÉNÉRALES General Notes

1. Ces documents d'architecture sont la propriété exclusive de NEUF architect(e)s et ne pourront être utilisés, reproduits ou copiés sans autorisation écrite préalable. / These architectural documents are the exclusive property of NEUF architect(e)s and cannot be used, copied or reproduced without written pre-authorisation
2. Les dimensions apparaissant aux documents devront être vérifiées par l'entrepreneur avant le début des travaux. / All dimensions which appear on the documents must be verify by the contractor before to start the work.
3. Veuillez aviser l'architecte de toute dimension erreur et/ou divergences entre ces documents et ceux des autres professionnels. / The architect must be notified of all errors, omissions and discrepancies between these documents and those of the others professionnals.
4. Les dimensions sur ces documents doivent être lues et non mesurées. / The dimensions on these documents must be read and not measured.

CIVIL + PLANNING
NOVATECH
240 Michael Cowland Drive, Suite 200
Ottawa, Ontario, K2M 1P6
P : (613) 254-9643

LANDSCAPE ARCHITECTURE
CSW Landscape Architects Limited
319 McRae Avenue, Suite 502
Ottawa, Ontario K1Z 0B9
P : (613-729-4536

MECHANICAL / ELECTRICAL
GOODKEY, WEEDMARK AND ASSOCIATES LTD.
1688 Woodward drive, Suite 200
Ottawa, Ontario, K2C 3R8
P : (613) 727-5111

STRUCTURAL
CUNLIFFE & ASSOCIATES
200-1550 Carling
Ave., Ottawa, ON, K1Z 8S8
P : (613)-729-7242

ARCHITECTES Architect
NEUF architect(e)s SENCRL
630, boul. René-Lévesque O. 32e étages, Montréal QC H3B 1S6
T 514 847 1117 NEUFarchitectes.com

SCEAU / Seal

NEUF
ARCHITECT(E)S
NEUF ARCHITECTES SENCRL

CLIENT Client
REGIONAL GROUP

OUVRAGE Project
GREYSTONE VILLAGE PHASE 3

EMPLACEMENT Location
OTTAWA

NO PROJET No.
12272

NO	RÉVISION	DATE (aa-mm-jj)

DESSINÉ PAR Drawn by
Author

VÉRIFIÉ PAR Checked
Checker

DATE (aa.mm.jj)
10/20/22

ÉCHELLE Scale
1 : 50

TITRE DU DESSIN Drawing Title
Unnamed

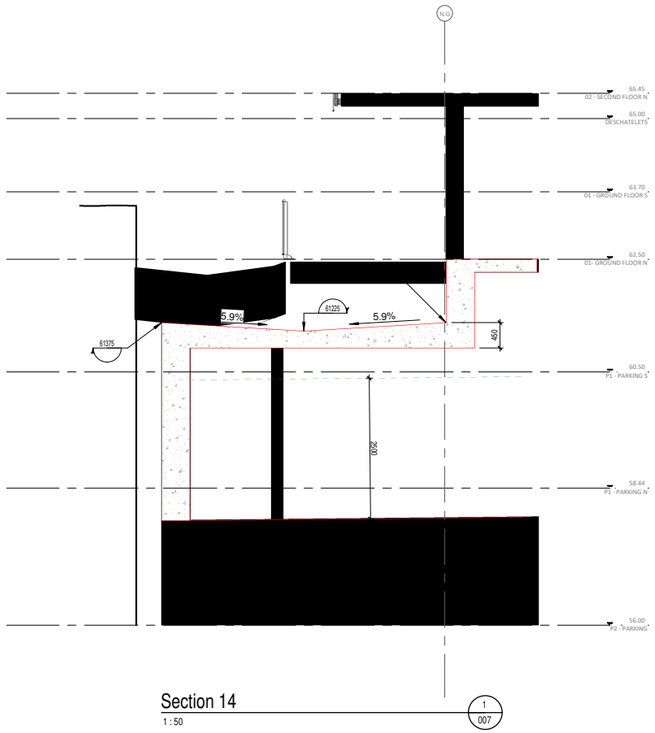
RÉVISION Revision

NO. DESSIN Dwg Number
006

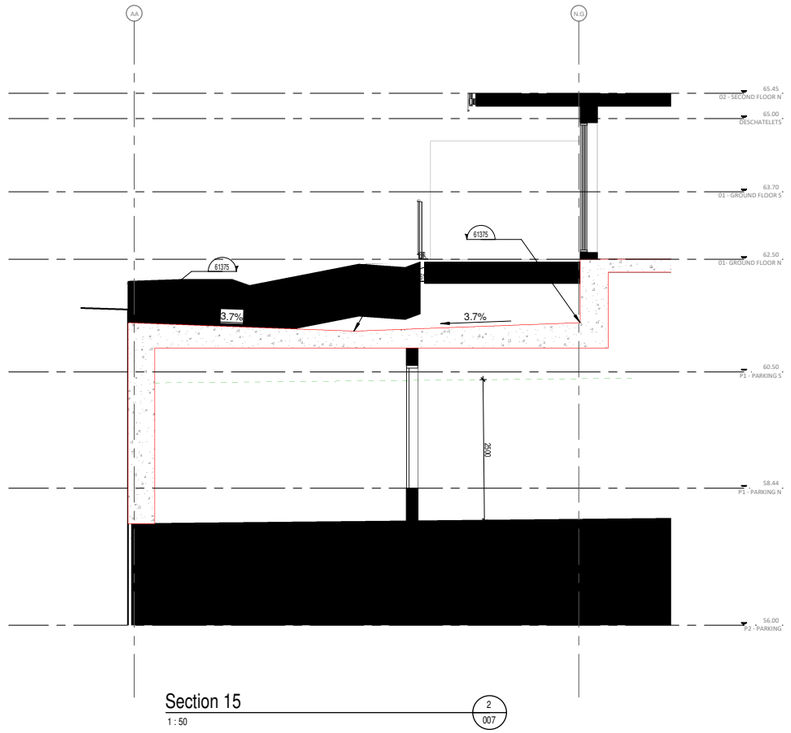
#17640

D07-12-21-0111

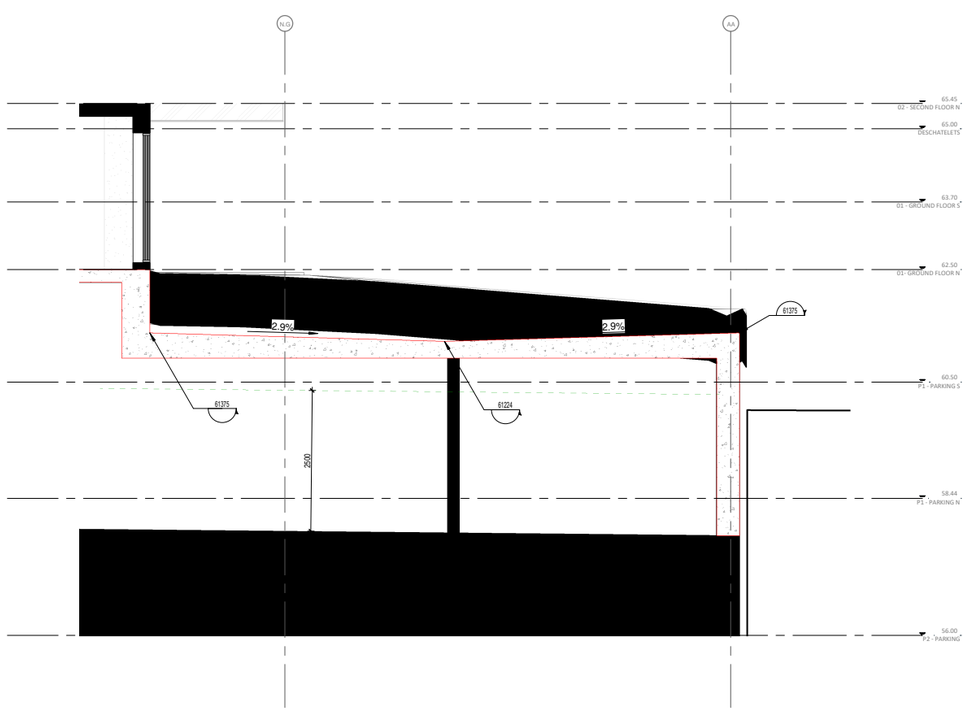
Autodesk Docs://12272_GREYSTONE/GV PH3_12272_ARC_R22.rvt



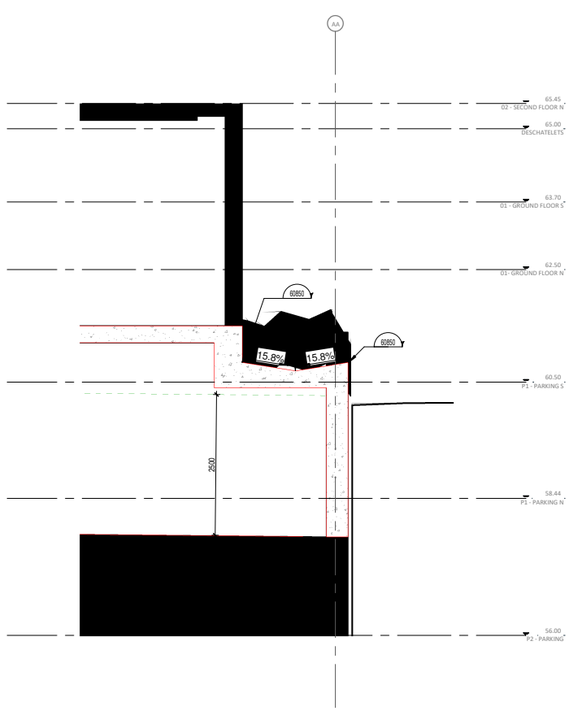
Section 14
1 : 50
1 / 007



Section 15
1 : 50
2 / 007



Section 16
1 : 50
3 / 007



Section 17
1 : 50
4 / 007

NOTES GÉNÉRALES General Notes

1. Ces documents d'architecture sont la propriété exclusive de NEUF architect(e)s et ne pourront être utilisés, reproduits ou copiés sans autorisation écrite préalable. / These architectural documents are the exclusive property of NEUF architect(e)s and cannot be used, copied or reproduced without written pre-authorisation
2. Les dimensions apparaissant aux documents devront être vérifiées par l'entrepreneur avant le début des travaux. / All dimensions which appear on the documents must be verify by the contractor before to start the work.
3. Veuillez aviser l'architecte de toute dimension erreur et/ou divergences entre ces documents et ceux des autres professionnels. / The architect must be notified of all errors, omissions and discrepancies between these documents and those of the others professionnals.
4. Les dimensions sur ces documents doivent être lues et non mesurées. / The dimensions on these documents must be read and not measured.

CIVIL + PLANNING
NOVATECH
240 Michael Cowland Drive, Suite 200
Ottawa, Ontario, K2M 1P6
P : (613) 254-9643

LANDSCAPE ARCHITECTURE
CSW Landscape Architects Limited
319 McRae Avenue, Suite 502
Ottawa, Ontario K1Z 0B9
P : (613-729-4536

MECHANICAL / ELECTRICAL
GOODKEY, WEEDMARK AND ASSOCIATES LTD.
1688 Woodward drive, Suite 200
Ottawa, Ontario, K2C 3R8
P : (613) 727-5111

STRUCTURAL
CUNLIFFE & ASSOCIATES
200-1550 Carling
Ave., Ottawa, ON. K1Z 8S8
P : (613)-729-7242

ARCHITECTES Architect
NEUF architect(e)s SENCRL
630, boul. René-Lévesque O. 32e étages, Montréal QC H3B 1S6
T 514 847 1117 NEUFarchitectes.com

SCEAU / Seal

NEUF
ARCHITECT(E)S
NEUF ARCHITECTES SENCRL

CLIENT Client
REGIONAL GROUP

OUVRAGE Project
GREYSTONE VILLAGE PHASE 3

EMPLACEMENT Location
OTTAWA

NO PROJET No.
12272

NO	RÉVISION	DATE (aa-mm-jj)

DESSINÉ PAR Drawn by
Author

VÉRIFIÉ PAR Checked
Checker

DATE (aa.mm.jj)
10/20/22

ÉCHELLE Scale
1 : 50

TITRE DU DESSIN Drawing Title
Unnamed

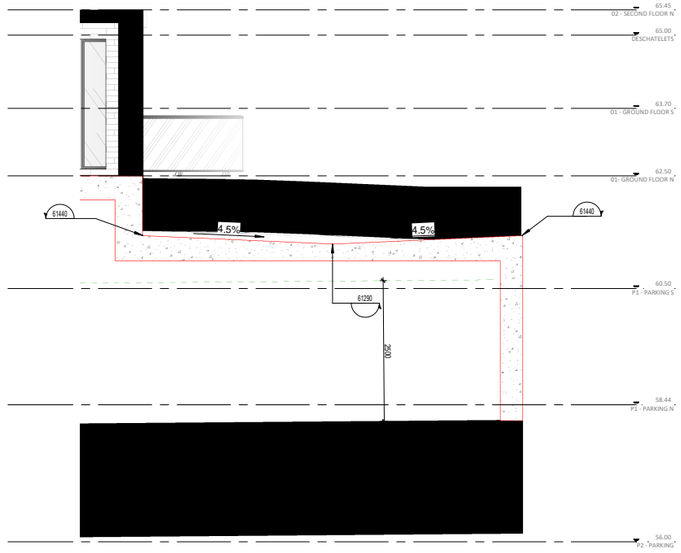
RÉVISION Revision

NO. DESSIN Dwg Number
007

D07-12-21-0111

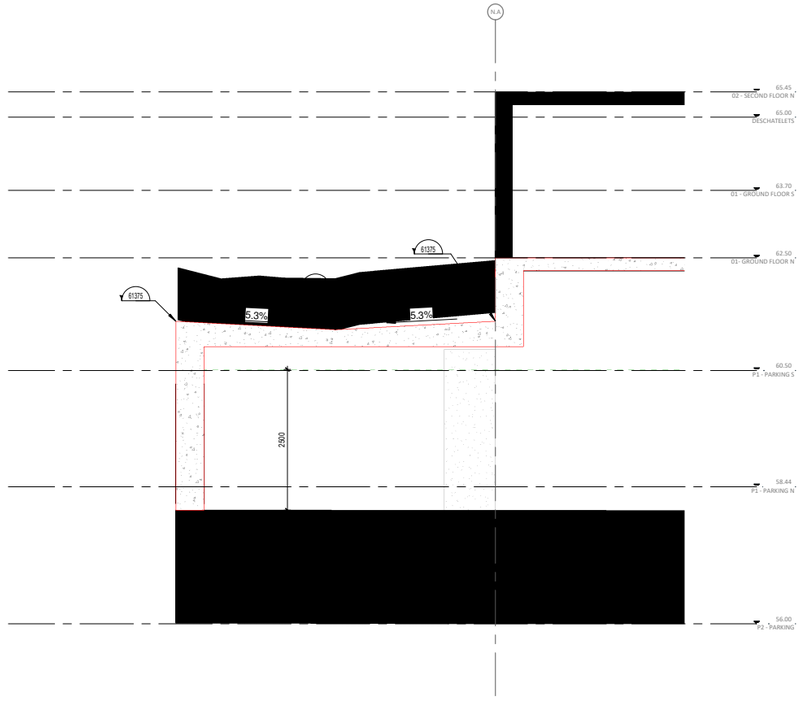
#17640

Autodesk Docs://12272_GREYSTONE/GV-PH3_12272_ARC_R22.rvt



Section 27
1 : 50

1
008



Section 13
1 : 50

2
008

NOTES GÉNÉRALES General Notes

1. Ces documents d'architecture sont la propriété exclusive de NEUF architect(e)s et ne pourront être utilisés, reproduits ou copiés sans autorisation écrite préalable. / These architectural documents are the exclusive property of NEUF architect(e)s and cannot be used, copied or reproduced without written pre-authorisation
2. Les dimensions apparaissant aux documents devront être vérifiées par l'entrepreneur avant le début des travaux. / All dimensions which appear on the documents must be verify by the contractor before to start the work.
3. Veuillez aviser l'architecte de toute dimension erreur et/ou divergences entre ces documents et ceux des autres professionnels. / The architect must be notified of all errors, omissions and discrepancies between these documents and those of the others professionnals.
4. Les dimensions sur ces documents doivent être lues et non mesurées. / The dimensions on these documents must be read and not measured.

CIVIL + PLANNING
NOVATECH
240 Michael Cowland Drive, Suite 200
Ottawa, Ontario, K2M 1P6
P : (613) 254-9643

LANDSCAPE ARCHITECTURE
CSW Landscape Architects Limited
319 McRae Avenue, Suite 502
Ottawa, Ontario K1Z 0B9
P : (613-729-4536

MECHANICAL / ELECTRICAL
GOODKEY, WEEDMARK AND ASSOCIATES LTD.
1688 Woodward drive, Suite 200
Ottawa, Ontario, K2C 3R8
P : (613) 727-5111

STRUCTURAL
CUNLIFFE & ASSOCIATES
200-1550 Carling
Ave., Ottawa, ON, K1Z 8S8
P : (613)-729-7242

ARCHITECTES Architect
NEUF architect(e)s SENCRL
630, boul. René-Lévesque O. 32e étages, Montréal QC H3B 1S6
T 514 847 1117 NEUFarchitectes.com

SCEAU / Seal

NEUF
ARCHITECT(E)S
NEUF ARCHITECTES SENCRL

CLIENT Client
REGIONAL GROUP

OUVRAGE Project
GREYSTONE VILLAGE PHASE 3

EMPLACEMENT Location
OTTAWA

NO PROJET No.
12272

NO	RÉVISION	DATE (aa-mm-jj)

DESSINÉ PAR Drawn by
Author

VÉRIFIÉ PAR Checked
Checker

DATE (aa.mm.jj)
10/20/22

ÉCHELLE Scale
1 : 50

TITRE DU DESSIN Drawing Title
Unnamed

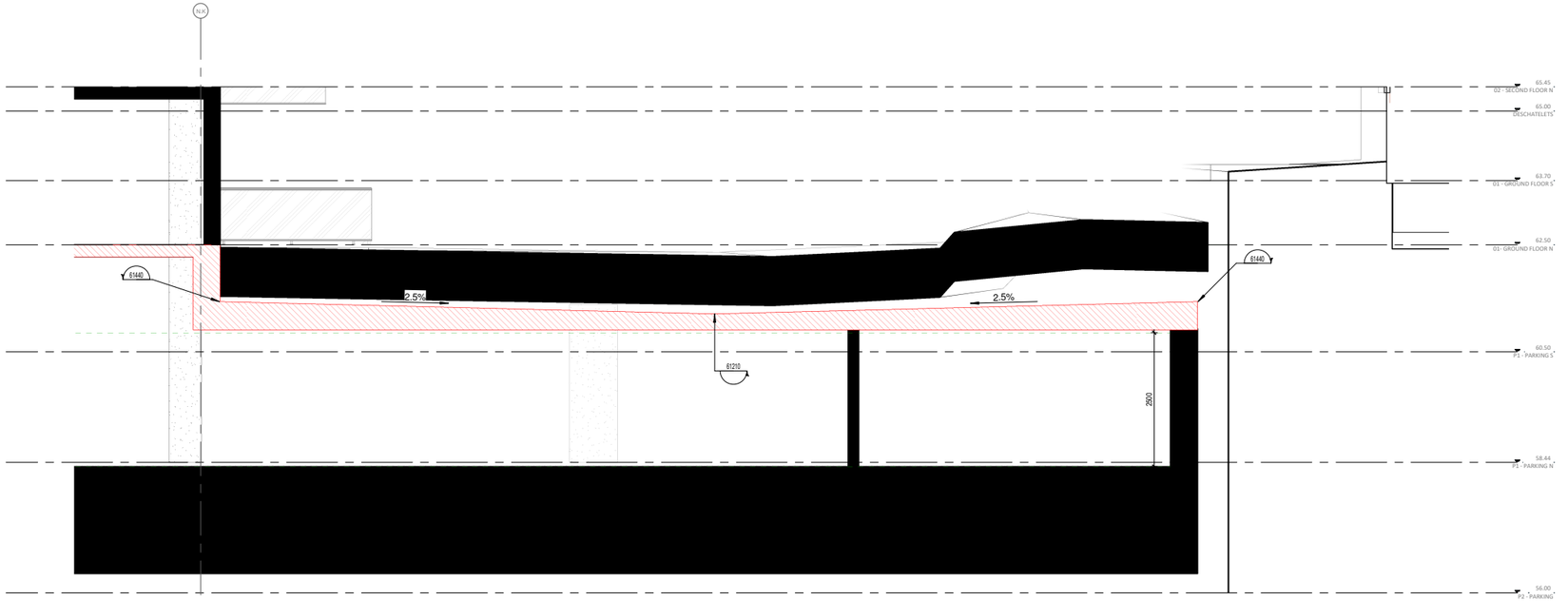
RÉVISION Revision

NO. DESSIN Dwg Number
008

#17640

D07-12-21-0111

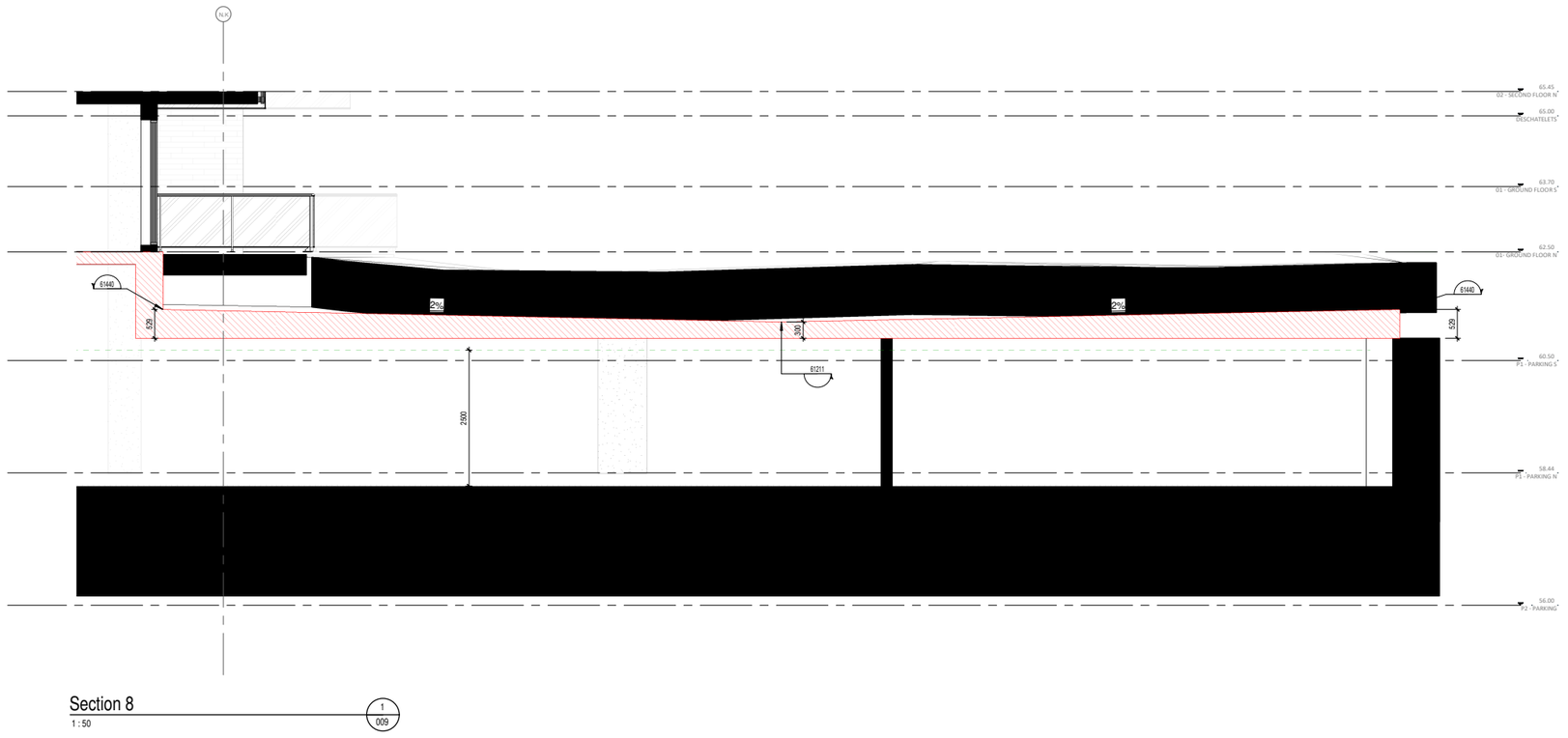
Autodesk Docs://12272_GREYSTONE/GV PH3_12272_ARC_R22.rvt



Section 7

1 : 50

2 / 009



Section 8

1 : 50

1 / 009

CIVIL + PLANNING
NOVATECH
240 Michael Cowland Drive, Suite 200
Ottawa, Ontario, K2M 1P6
P : (613) 254-9643

LANDSCAPE ARCHITECTURE
CSW Landscape Architects Limited
319 McRae Avenue, Suite 502
Ottawa, Ontario K1Z 0B9
P : (613-729-4536

MECHANICAL / ELECTRICAL
GOODKEY, WEEDMARK AND ASSOCIATES LTD.
1688 Woodward drive, Suite 200
Ottawa, Ontario, K2C 3R8
P : (613) 727-5111

STRUCTURAL
CUNLIFFE & ASSOCIATES
200-1550 Carling
Ave., Ottawa, ON, K1Z 8S8
P : (613)-729-7242

ARCHITECTES Architect
NEUF architect(e)s SENCRL
630, boul. René-Lévesque O. 32e étages, Montréal QC H3B 1S6
T 514 847 1117 NEUFarchitectes.com

SCEAU / Seal

NEUF
ARCHITECT(E)S
NEUF ARCHITECTES SENCRL

CLIENT Client
REGIONAL GROUP

OUVRAGE Project
GREYSTONE VILLAGE PHASE 3

EMPLACEMENT Location
OTTAWA

NO PROJET No.
12272

NO	RÉVISION	DATE (aa-mm-jj)

DESSINÉ PAR Drawn by
Author

VÉRIFIÉ PAR Checked
Checker

DATE (aa.mm.jj)
10/20/22

ÉCHELLE Scale
1 : 50

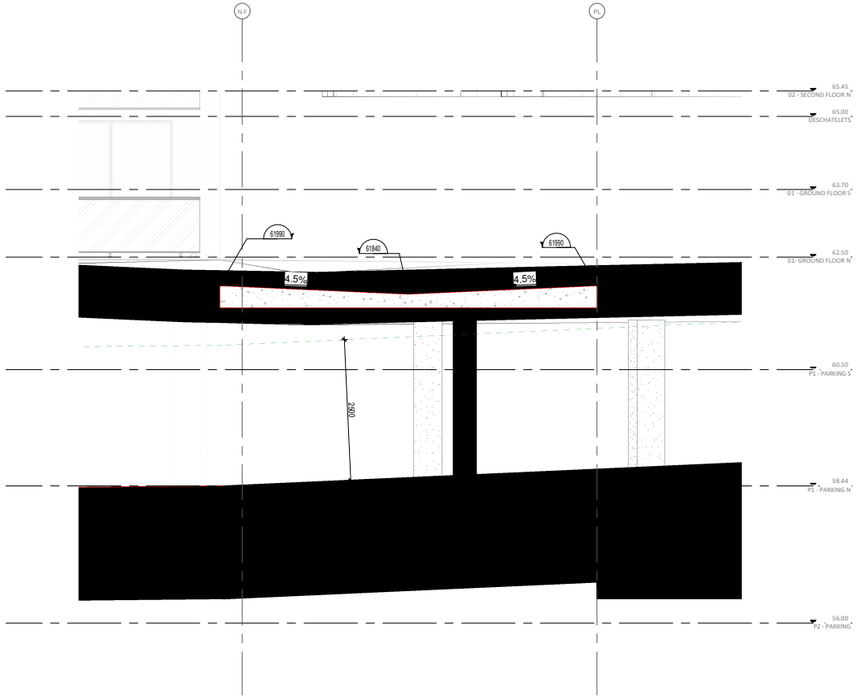
TITRE DU DESSIN Drawing Title
Unnamed

RÉVISION Revision

NO. DESSIN Dwg Number
009

#17640

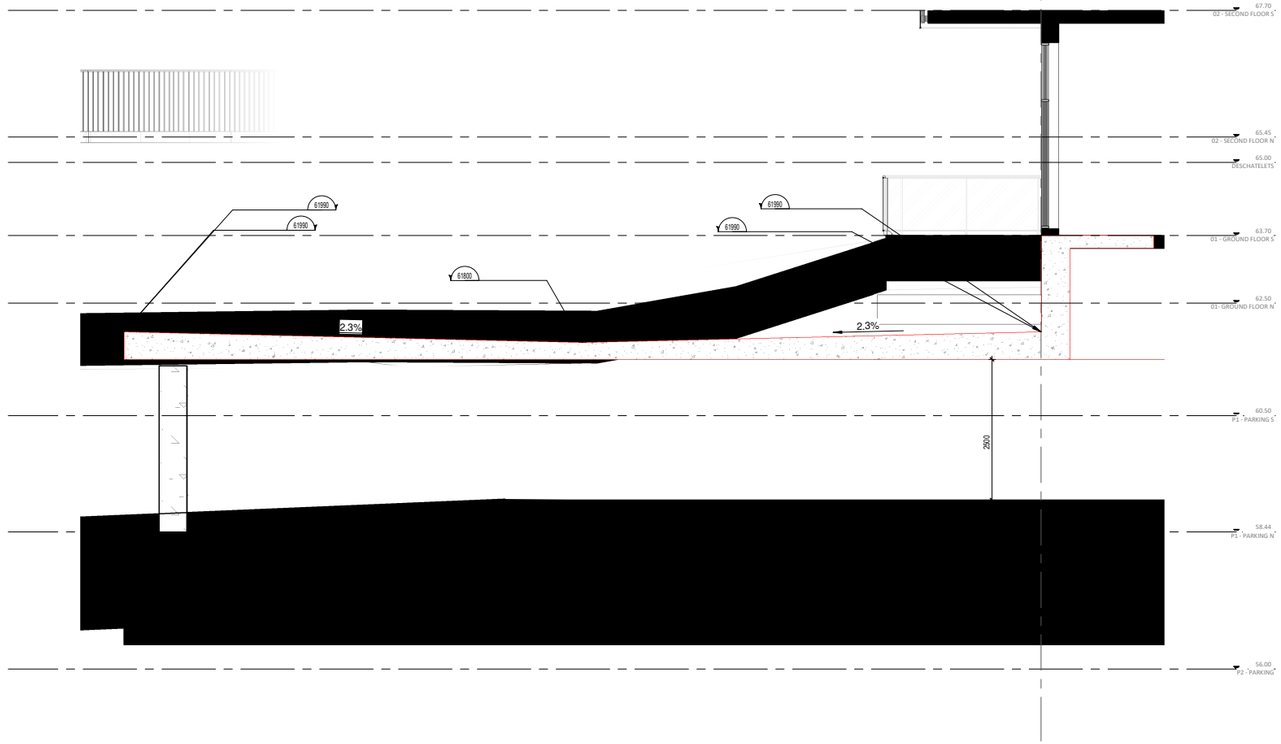
D07-12-21-0111



Section 23

1 : 50

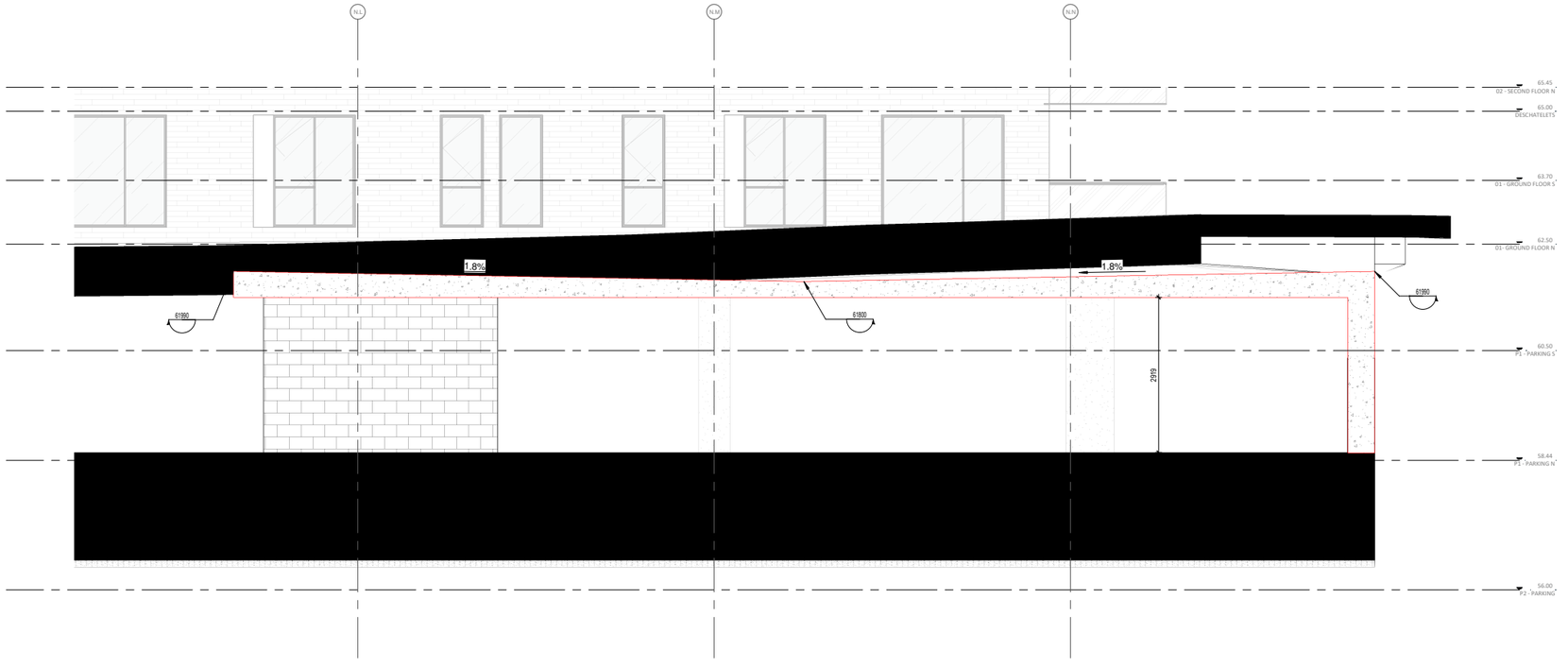
2
010



Section 24

1 : 50

3
010



Section 22

1 : 50

1
010

NOTES GÉNÉRALES General Notes

1. Ces documents d'architecture sont la propriété exclusive de NEUF architect(e)s et ne pourront être utilisés, reproduits ou copiés sans autorisation écrite préalable. / These architectural documents are the exclusive property of NEUF architect(e)s and cannot be used, copied or reproduced without written pre-authorisation
2. Les dimensions apparaissant aux documents devront être vérifiées par l'entrepreneur avant le début des travaux. / All dimensions which appear on the documents must be verify by the contractor before to start the work.
3. Veuillez aviser l'architecte de toute dimension erreur et/ou divergences entre ces documents et ceux des autres professionnels. / The architect must be notified of all errors, omissions and discrepancies between these documents and those of the others professionnals.
4. Les dimensions sur ces documents doivent être lues et non mesurées. / The dimensions on these documents must be read and not measured.

CIVIL + PLANNING
NOVATECH
240 Michael Cowland Drive, Suite 200
Ottawa, Ontario, K2M 1P6
P : (613) 254-9643

LANDSCAPE ARCHITECTURE
CSW Landscape Architects Limited
319 McRae Avenue, Suite 502
Ottawa, Ontario K1Z 0B9
P : (613-729-4536

MECHANICAL / ELECTRICAL
GOODKEY, WEEDMARK AND ASSOCIATES LTD.
1688 Woodward drive, Suite 200
Ottawa, Ontario, K2C 3R8
P : (613) 727-5111

STRUCTURAL
CUNLIFFE & ASSOCIATES
200-1550 Carling
Ave., Ottawa, ON, K1Z 8S8
P : (613)-729-7242

ARCHITECTES Architect
NEUF architect(e)s SENCRL
630, boul. René-Lévesque O. 32e étages, Montréal QC H3B 1S6
T 514 847 1117 NEUFarchitectes.com

SCEAU / Seal

NEUF
ARCHITECT(E)S
NEUF ARCHITECTES SENCRL

CLIENT Client
REGIONAL GROUP

OUVRAGE Project
GREYSTONE VILLAGE PHASE 3

EMPLACEMENT Location
OTTAWA

NO PROJET No.
12272

NO	RÉVISION	DATE (aa-mm-jj)

DESSINÉ PAR Drawn by
Author

VÉRIFIÉ PAR Checked
Checker

DATE (aa.mm.jj)
10/21/22

ÉCHELLE Scale
1 : 50

TITRE DU DESSIN Drawing Title
Unnamed

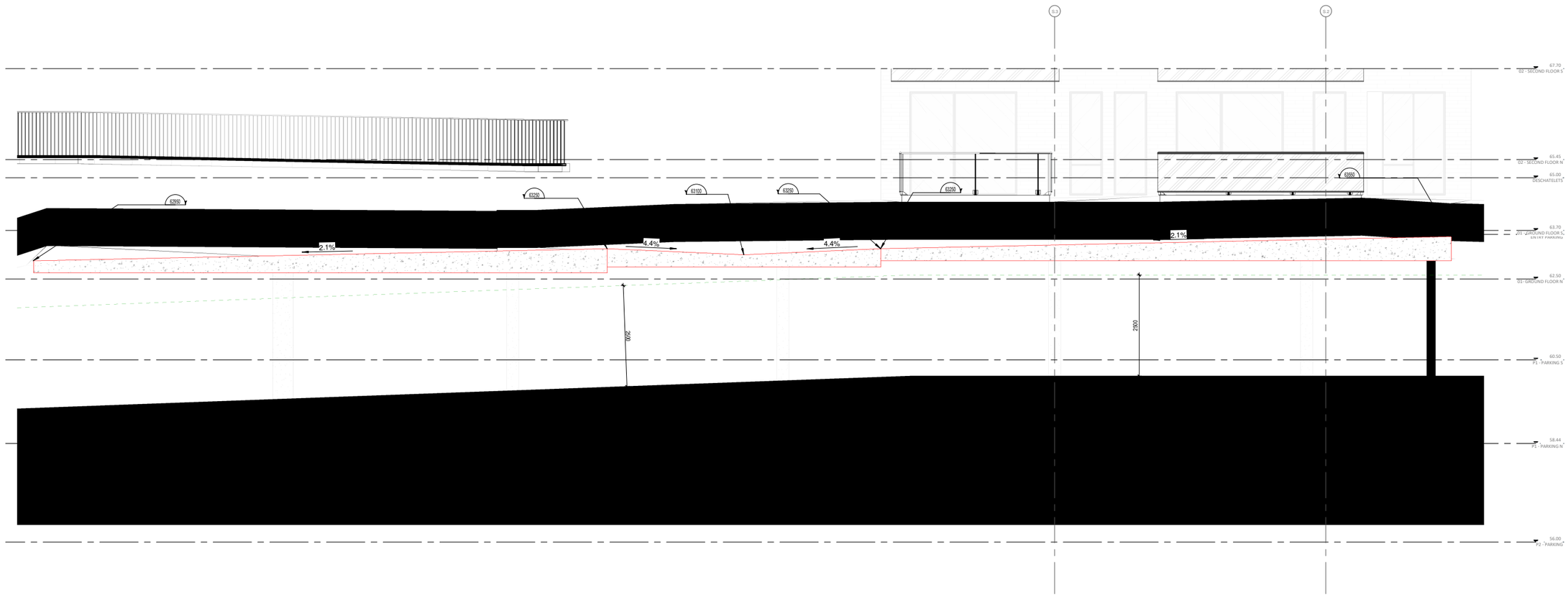
RÉVISION Revision

NO. DESSIN Dwg Number
010

#17640

D07-12-21-0111

Autodesk Docs://12272_GREYSTONE/GV-PH3_12272_ARC_R22.rvt



Section 25

1 : 50

1
011

NOTES GÉNÉRALES General Notes

1. Ces documents d'architecture sont la propriété exclusive de NEUF architect(e)s et ne pourront être utilisés, reproduits ou copiés sans autorisation écrite préalable. / These architectural documents are the exclusive property of NEUF architect(e)s and cannot be used, copied or reproduced without written pre-authorisation
2. Les dimensions apparaissant aux documents devront être vérifiées par l'entrepreneur avant le début des travaux. / All dimensions which appear on the documents must be verify by the contractor before to start the work.
3. Veuillez aviser l'architecte de toute dimension erreur et/ou divergences entre ces documents et ceux des autres professionnels. / The architect must be notified of all errors, omissions and discrepancies between these documents and those of the others professionnals.
4. Les dimensions sur ces documents doivent être lues et non mesurées. / The dimensions on these documents must be read and not measured.

CIVIL + PLANNING
NOVATECH
240 Michael Cowland Drive, Suite 200
Ottawa, Ontario, K2M 1P6
P : (613) 254-9643

LANDSCAPE ARCHITECTURE
CSW Landscape Architects Limited
319 McRae Avenue, Suite 502
Ottawa, Ontario K1Z 0B9
P : (613-729-4536

MECHANICAL / ELECTRICAL
GOODKEY, WEEDMARK AND ASSOCIATES LTD.
1688 Woodward drive, Suite 200
Ottawa, Ontario, K2C 3R8
P : (613) 727-5111

STRUCTURAL
CUNLIFFE & ASSOCIATES
200-1550 Carling
Ave., Ottawa, ON, K1Z 8S8
P : (613)-729-7242

ARCHITECTES Architect
NEUF architect(e)s SENCRL
630, boul. René-Lévesque O. 32e étages, Montréal QC H3B 1S6
T 514 847 1117 NEUFarchitectes.com

SCEAU / Seal

NEUF
ARCHITECT(E)S
NEUF ARCHITECTES SENCRL

CLIENT Client
REGIONAL GROUP

OUVRAGE Project
GREYSTONE VILLAGE PHASE 3

EMPLACEMENT Location
OTTAWA

NO PROJET No.
12272

NO	RÉVISION	DATE (aa-mm-jj)

DESSINÉ PAR Drawn by
Author

VÉRIFIÉ PAR Checked
Checker

DATE (aa.mm.jj)
10/21/22

ÉCHELLE Scale
1 : 50

TITRE DU DESSIN Drawing Title
Unnamed

RÉVISION Revision

NO. DESSIN Dwg Number
011

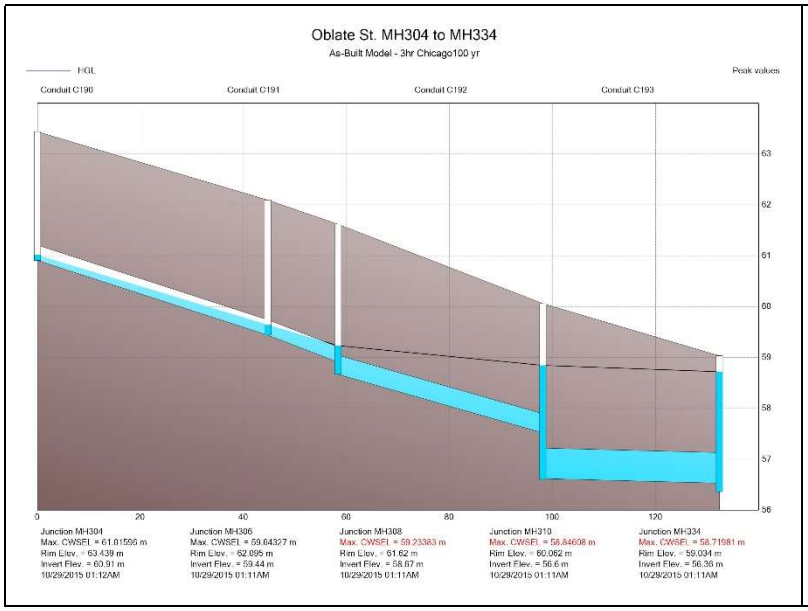
D07-12-21-0111

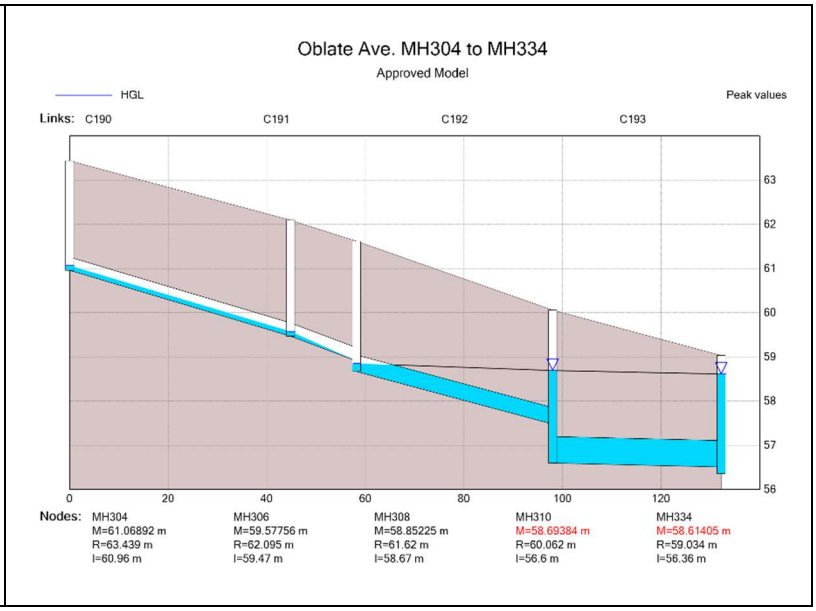
#17640

Autodesk Docs://12272_GREYSTONE/GV-PH3_12272_ARC_R22.rvt

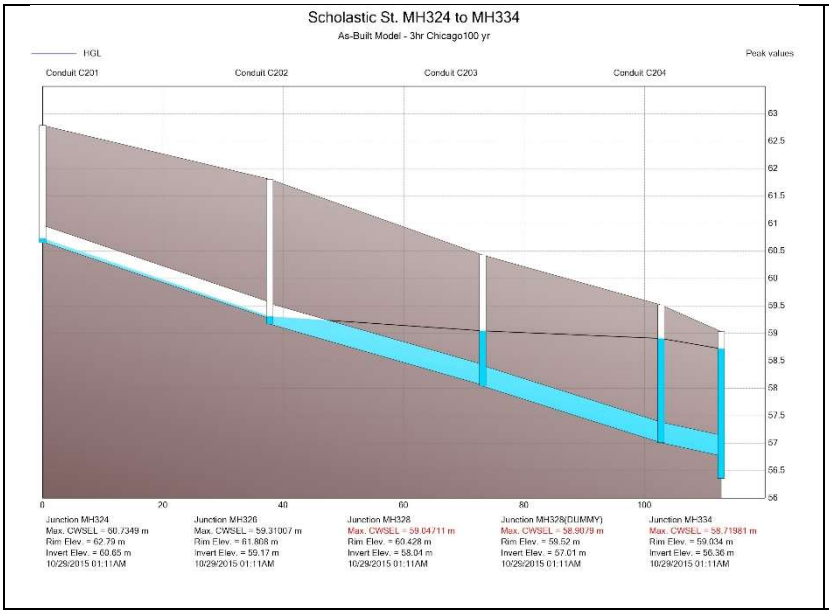
100-yr Profiles Minor System:

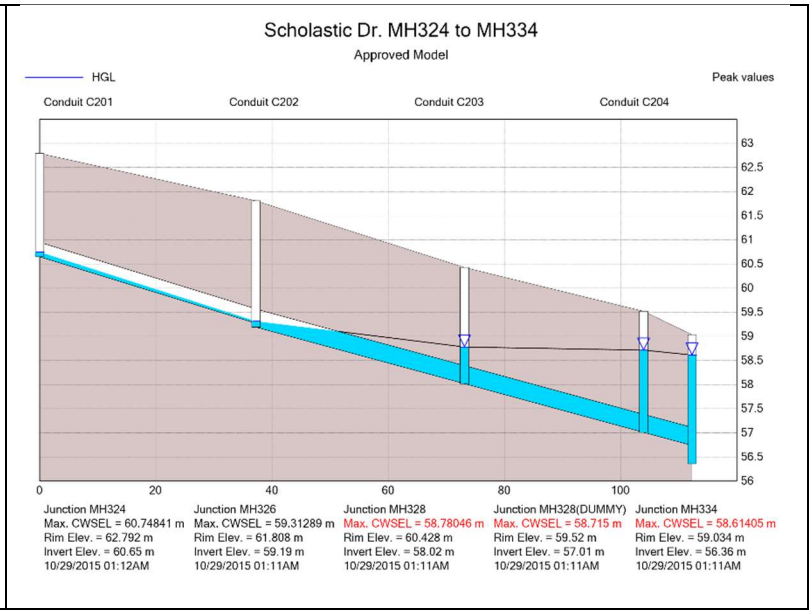
MH304 to MH334 (Oblate Avenue):



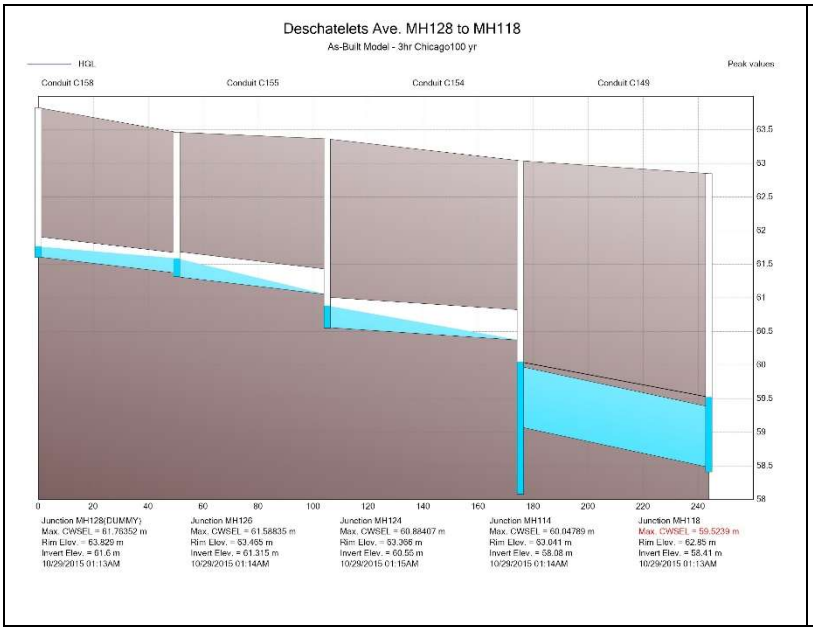


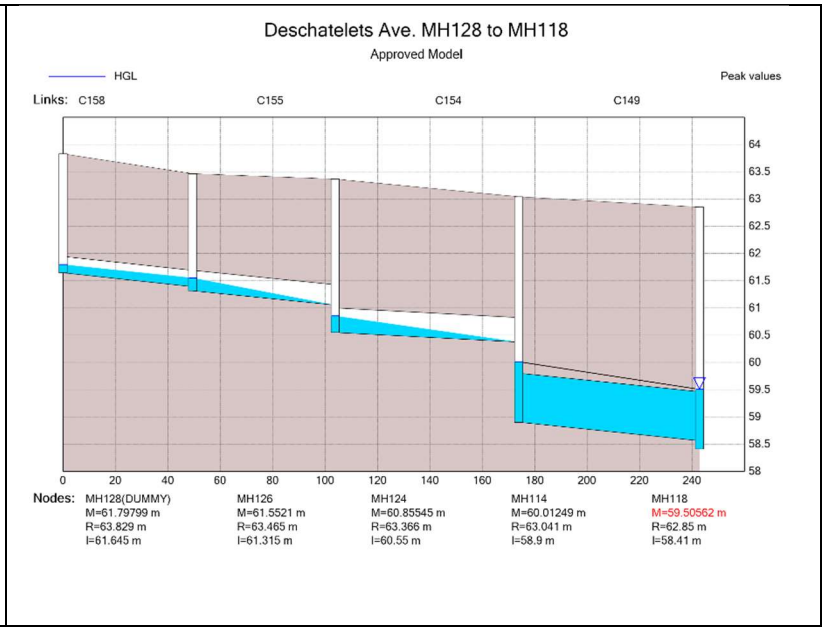
MH324 to MH334 (Scholastic Drive):





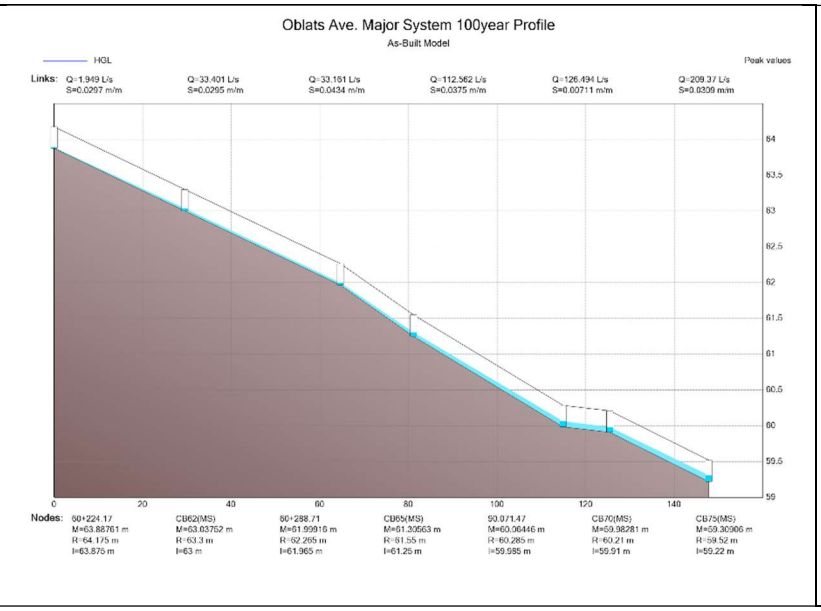
MH128 to MH118 (Deschâtelets Avenue):

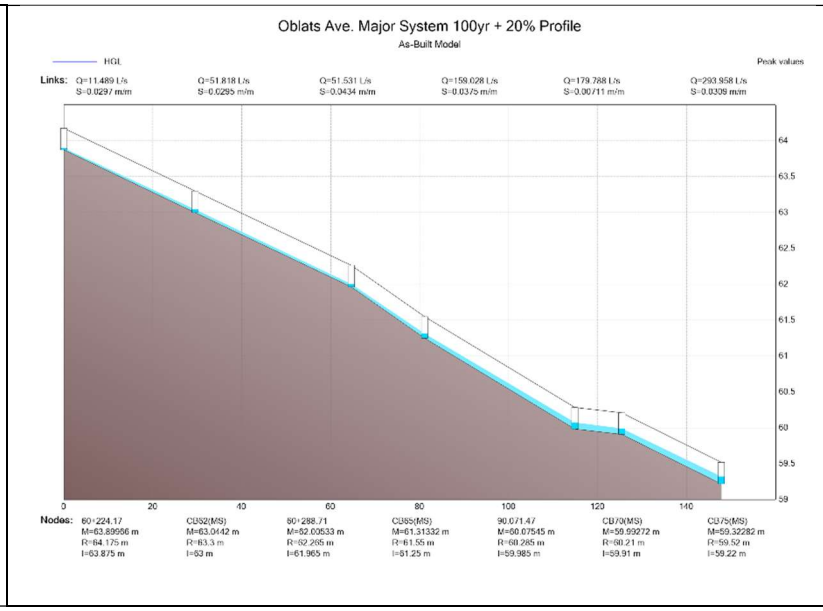




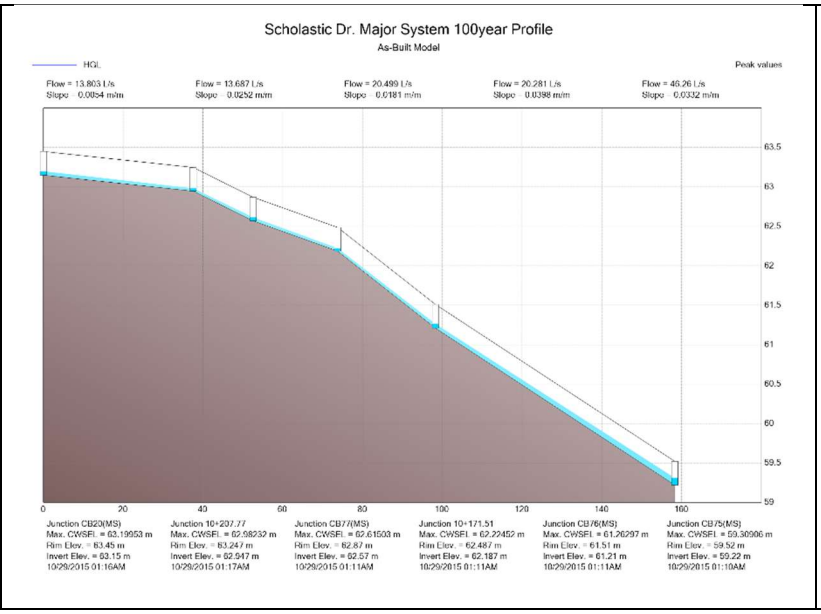
100-yr & Stress Test Profiles of Major System:

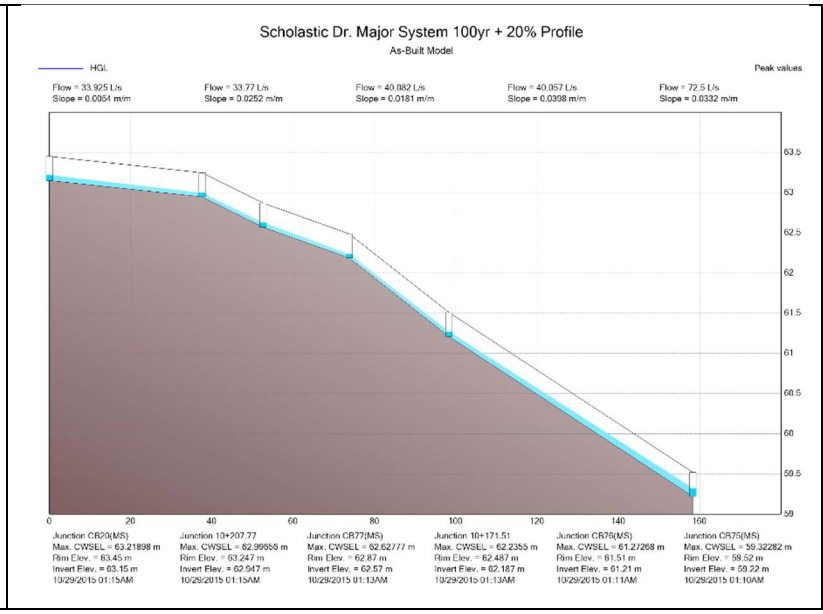
Oblate Avenue:



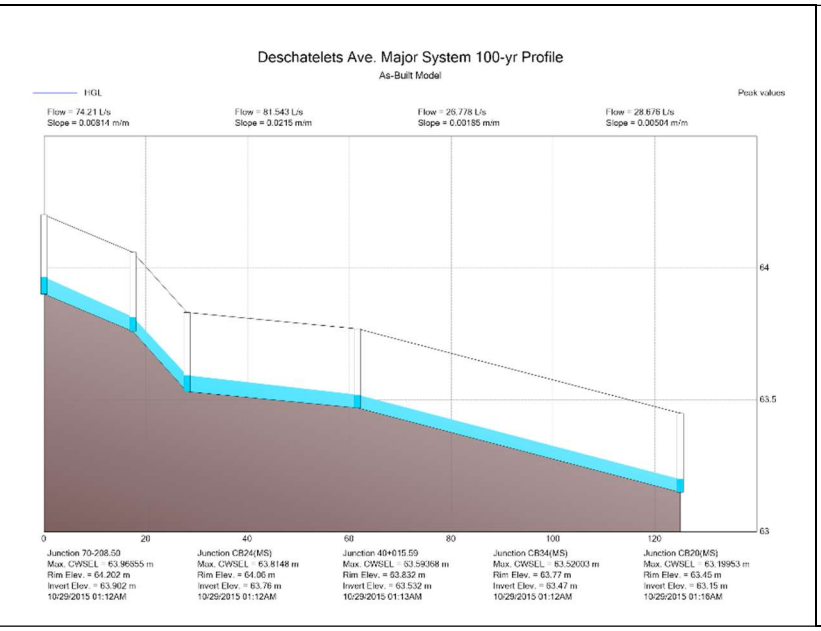


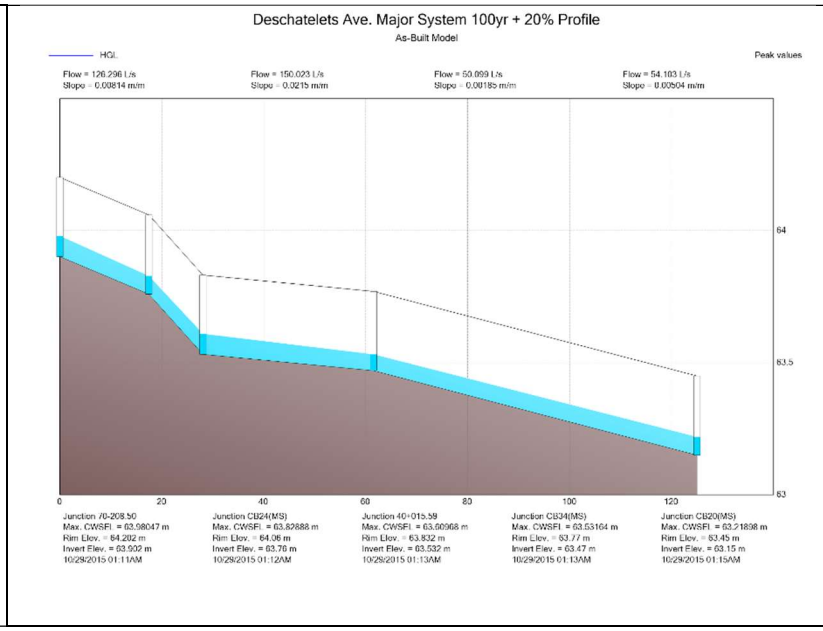
Scholastic Drive:



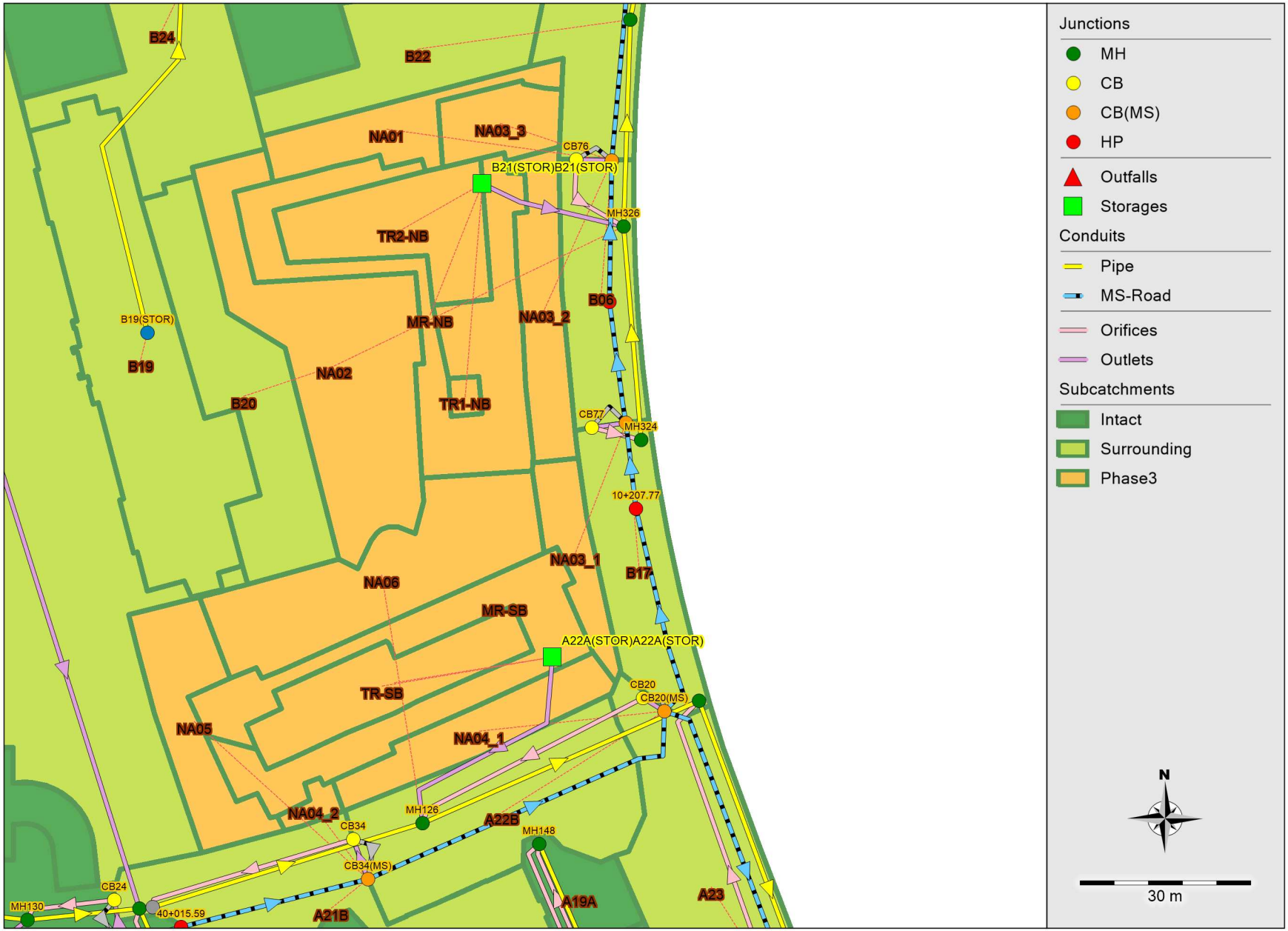


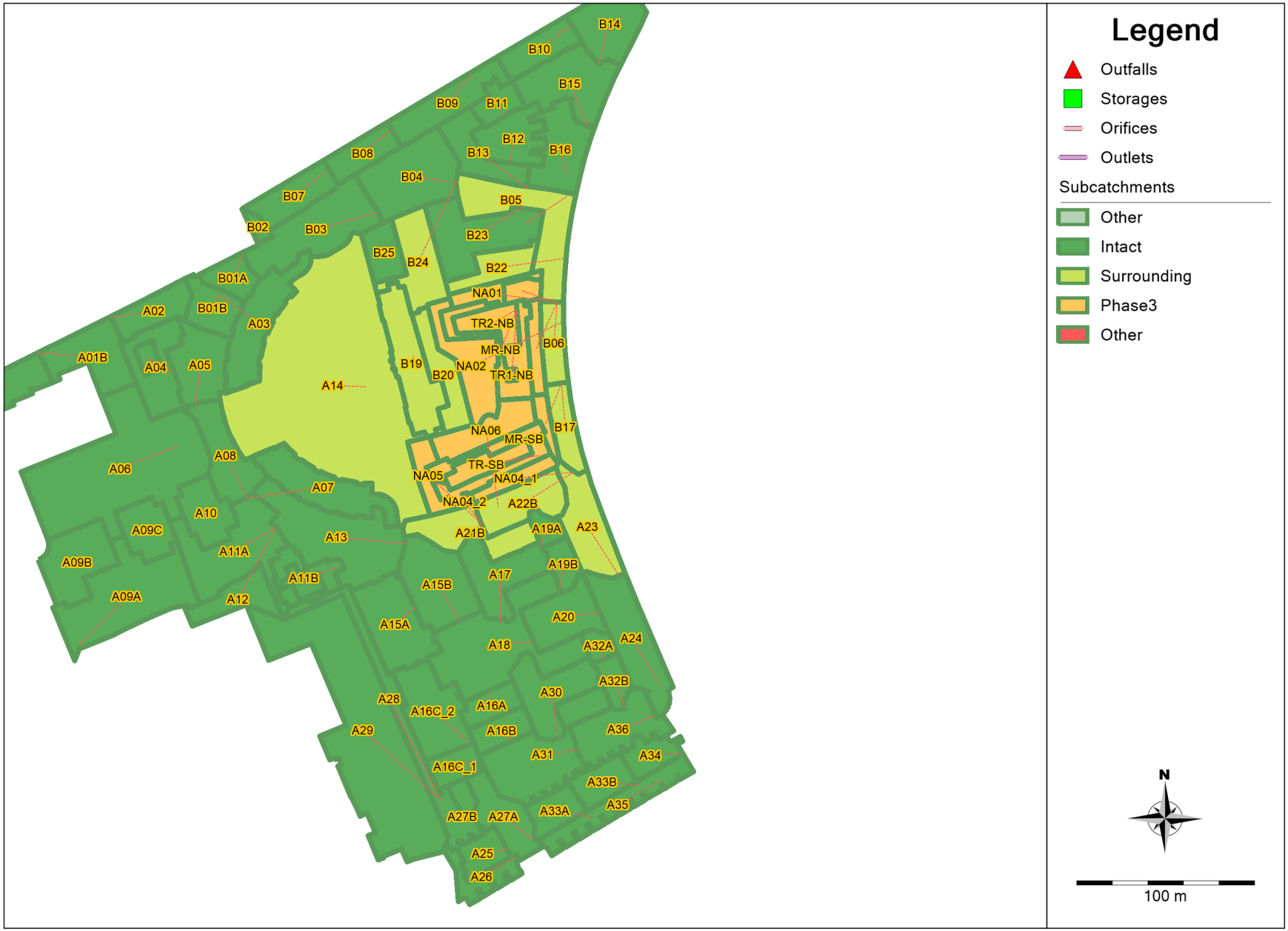
Deschâtelets Avenue:

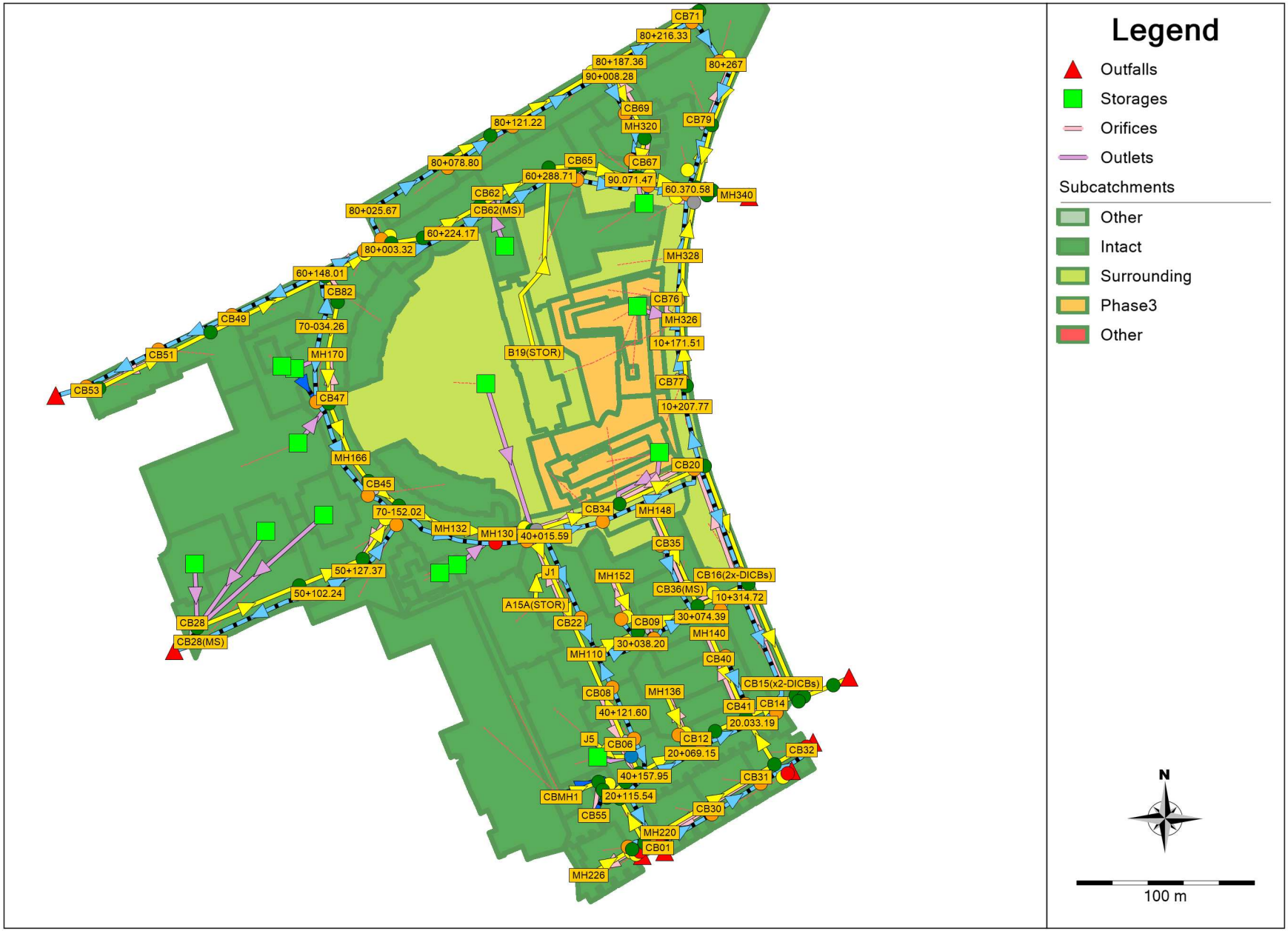




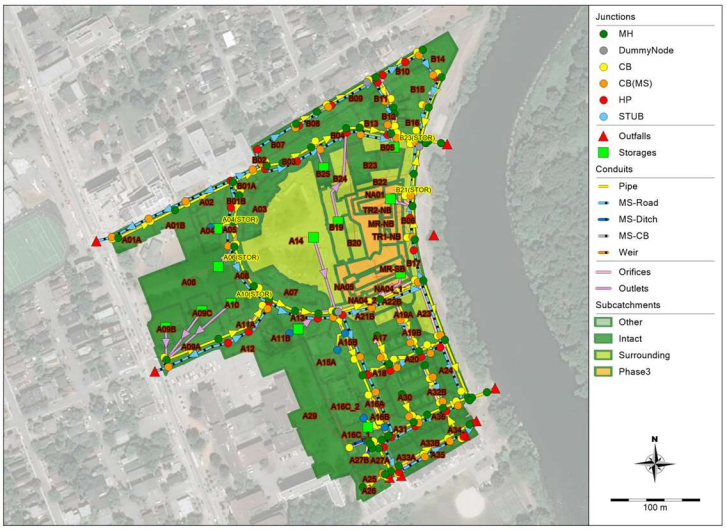

Junctions
MH
CB
CB(MS)
HP
STUB
Outfalls
Storages
Conduits
Pipe
MS-Road
MS-Ditch
MS-CB
Weir
Orifices
Outlets
Subcatchments
Intact
Surrounding
Phase3
N
100 m

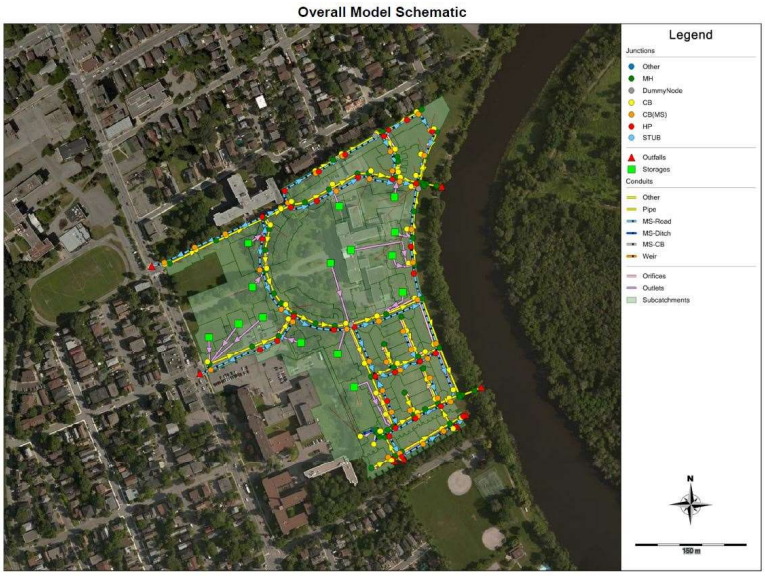

B24
B22
NA01
NA03_3
CB76
B21(STOR)B21(STOR)
MH326
TR2-NB
B06
B19(STOR)
MR-NB
NA03_2
B19
NA02
B20
TR1-NB
CB77
MH324
10+207.77
NA03_1
B17
NA06
MR-SB
A22A(STOR)A22A(STOR)
CB20
CB20(MS)
TR-SB
NA05
NA04_1
NA04_2
MH126
CB34
A22B
MH148
CB34(MS)
CB24
MH130
40+015.59
A21B
A19A
A23
Junctions
MH
CB
CB(MS)
HP
Outfalls
Storages
Conduits
Pipe
MS-Road
Orifices
Outlets
Subcatchments
Intact
Surrounding
Phase3
N
30 m

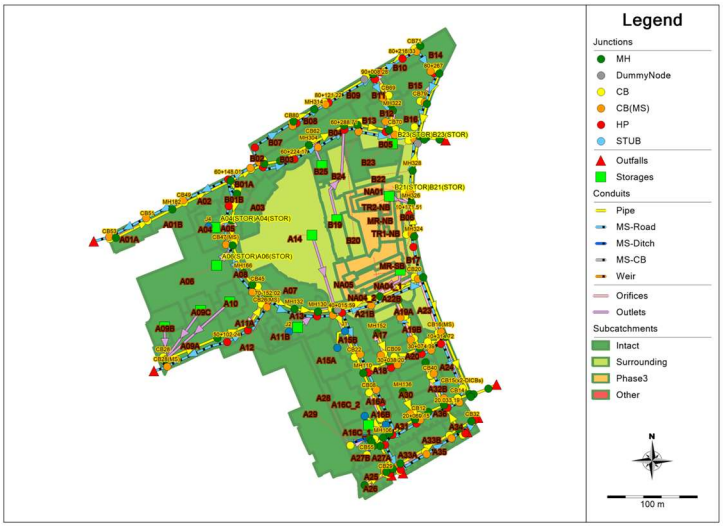

B14
B10
B15
B09
B11
B12
B08
B13
B16
B04
B07
B05
B02
B03
B23
B25
B24
B22
B01A
NA01
A02
B01B
TR2-NB
A03
B06
MR-NB
A01B
A04
A05
B19
NA02
B20
TR1-NB
A14
B17
NA06
MR-SB
A08
A06
TR-SB
NA05
NA04_1
A07
NA04_2
A22B
A10
A09C
A21B
A19A
A23
A13
A11A
A09B
A19B
A17
A11B
A15B
A09A
A12
A20
A15A
A18
A32A
A24
A32B
A28
A30
A16C_2
A16A
A29
A16B
A36
A31
A34
A16C_1
A33B
A35
A27B
A27A
A33A
A25
A26
Legend
Outfalls
Storages
Orifices
Outlets
Subcatchments
Other
Intact
Surrounding
Phase3
Other
N
100 m

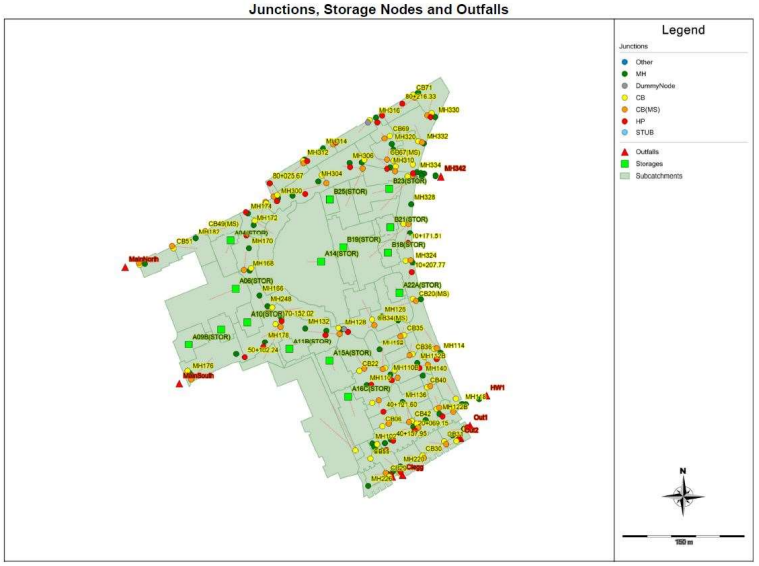

CB71
80+216.33
80+187.36
80+267
90+008.28
CB69
MH320
CB79
80+121.22
80+078.80
CB65
CB67
60+288.71
90.071.47
60.370.58
MH340
CB62
CB62(MS)
80+025.67
60+224.17
80+003.32
MH328
60+148.01
CB82
CB76
CB49
MH326
70-034.26
10+171.51
CB51
MH170
B19(STOR)
CB53
CB77
CB47
10+207.77
MH166
CB20
CB45
CB34
MH148
70-152.02
MH132
MH130
40+015.59
CB35
50+127.37
J1
MH152
CB16(2x-DICBs)
CB36(MS)
50+102.24
10+314.72
A15A(STOR)
CB22
CB09
30+074.39
CB28
MH140
CB28(MS)
30+038.20
MH110
CB40
CB15(x2-DICBs)
CB08
MH136
CB41
CB14
40+121.60
20.033.19
J5
CB06
CB12
CB32
20+069.15
40+157.95
CB31
CBMH1
20+115.54
CB30
CB55
MH220
CB01
MH226
Legend
Outfalls
Storages
Orifices
Outlets
Subcatchments
Other
Intact
Surrounding
Phase3
Other
N
100 m

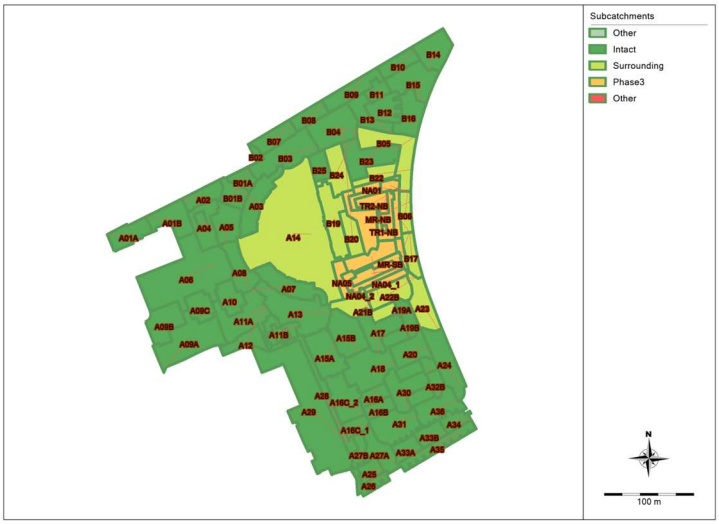
Updated vs. Approved MSS Model Schematics:



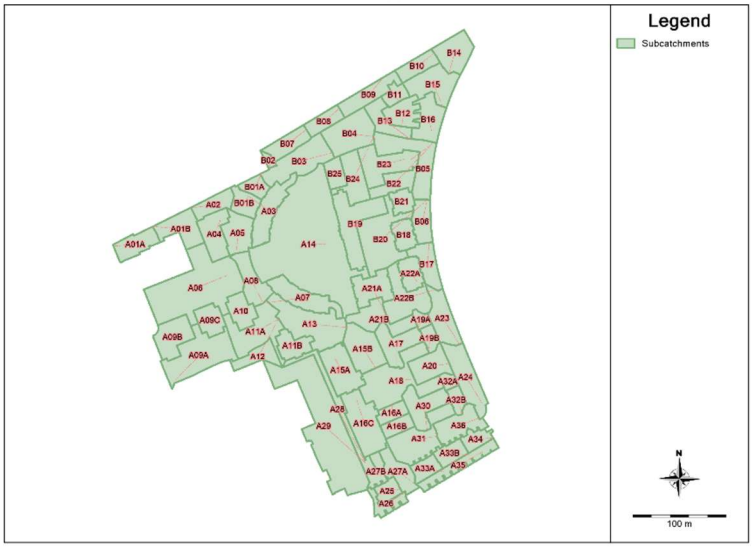








Subcatchments - Approved Model



NOVATECH
Engineers, Planners & Landscape Architects

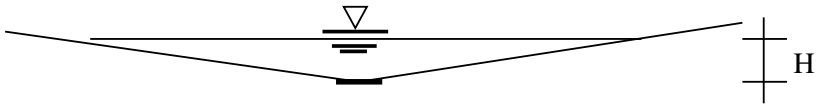
Runoff Coefficients

Drainage Area	Total Area (m^2)	Ponding Area (m^2)	Hard Surface Area		Gravel Area		Grass Area		5-Year Runoff Coefficient	100-Year Runoff Coefficient
			Area (m^2)	C	Area (m^2)	C	Area (m^2)	C		
North Building/Outlet 2										
RD1	86.9	80.9	86.9	0.90	0.0	0.70	0.0	0.20	0.90	1.00
RD2	47.4	44.4	47.4	0.90	0.0	0.70	0.0	0.20	0.90	1.00
RD3	48.1	44.4	48.1	0.90	0.0	0.70	0.0	0.20	0.90	1.00
RD4	92.5	84.5	92.5	0.90	0.0	0.70	0.0	0.20	0.90	1.00
RD5	43.0	43.0	43.0	0.90	0.0	0.70	0.0	0.20	0.90	1.00
RD6	101.8	96.7	101.8	0.90	0.0	0.70	0.0	0.20	0.90	1.00
RD7	114.1	109.1	114.1	0.90	0.0	0.70	0.0	0.20	0.90	1.00
RD8	17.3	14.5	17.3	0.90	0.0	0.70	0.0	0.20	0.90	1.00
RD9	41.8	64.0	41.8	0.90	0.0	0.70	0.0	0.20	0.90	1.00
RD10	153.6	134.9	153.6	0.90	0.0	0.70	0.0	0.20	0.90	1.00
RD11	104.0	84.6	104.0	0.90	0.0	0.70	0.0	0.20	0.90	1.00
RD12	63.0	57.4	63.0	0.90	0.0	0.70	0.0	0.20	0.90	1.00
RD13	48.7	38.2	48.7	0.90	0.0	0.70	0.0	0.20	0.90	1.00
RD14	59.0	60.8	59.0	0.90	0.0	0.70	0.0	0.20	0.90	1.00
RD15	44.0	80.4	44.0	0.90	0.0	0.70	0.0	0.20	0.90	1.00
RD16	84.1	80.9	84.1	0.90	0.0	0.70	0.0	0.20	0.90	1.00
RD17	79.8	56.1	79.8	0.90	0.0	0.70	0.0	0.20	0.90	1.00
RD18	37.0	20.9	37.0	0.90	0.0	0.70	0.0	0.20	0.90	1.00
RD19	35.3	28.5	35.3	0.90	0.0	0.70	0.0	0.20	0.90	1.00
RD20	53.7	31.8	53.7	0.90	0.0	0.70	0.0	0.20	0.90	1.00
RD21	99.3	65.4	99.3	0.90	0.0	0.70	0.0	0.20	0.90	1.00
RD22	99.0	69.1	99.0	0.90	0.0	0.70	0.0	0.20	0.90	1.00
RD40	No Contributing Area	Roof Drain for Any Unintended Rain Entering near Edge of Building								
A01	345.0	-	65.0	0.90	0.0	0.70	280	0.20	0.33	0.39
A02	1188.0	-	272.0	0.90	141.0	0.70	775	0.20	0.42	0.50
A03	888.0	-	475.0	0.90	0.0	0.70	413	0.20	0.57	0.65
South Building/Outlet 1										
RD23	87.2	75.0	87.2	0.90	0.0	0.70	0.0	0.20	0.90	1.00
RD24	73.9	60.2	73.9	0.90	0.0	0.70	0.0	0.20	0.90	1.00
RD25	63.9	60.3	63.9	0.90	0.0	0.70	0.0	0.20	0.90	1.00
RD26	97.0	87.7	97.0	0.90	0.0	0.70	0.0	0.20	0.90	1.00
RD27	92.3	74.4	92.3	0.90	0.0	0.70	0.0	0.20	0.90	1.00
RD28	91.9	80.6	91.9	0.90	0.0	0.70	0.0	0.20	0.90	1.00
RD29	73.2	83.6	73.2	0.90	0.0	0.70	0.0	0.20	0.90	1.00
RD30	126.3	106.6	126.3	0.90	0.0	0.70	0.0	0.20	0.90	1.00
RD31	41.9	37.4	41.9	0.90	0.0	0.70	0.0	0.20	0.90	1.00
RD32	124.2	116.7	124.2	0.90	0.0	0.70	0.0	0.20	0.90	1.00
RD33	64.0	59.7	64.0	0.90	0.0	0.70	0.0	0.20	0.90	1.00
RD34	60.8	54.2	60.8	0.90	0.0	0.70	0.0	0.20	0.90	1.00
RD35	101.3	62.4	101.3	0.90	0.0	0.70	0.0	0.20	0.90	1.00
RD36	54.5	83.5	54.5	0.90	0.0	0.70	0.0	0.20	0.90	1.00
RD37	95.9	67.7	95.9	0.90	0.0	0.70	0.0	0.20	0.90	1.00
RD38	104.2	53.6	104.2	0.90	0.0	0.70	0.0	0.20	0.90	1.00
RD39	82.7	42.9	82.7	0.90	0.0	0.70	0.0	0.20	0.90	1.00
A04	441.0	-	189.0	0.90	0.0	0.70	252	0.20	0.50	0.57
A05	459.0	-	261.0	0.90	0.0	0.70	198	0.20	0.60	0.68
A06	924.0	-	247.0	0.90	30.0	0.70	647	0.20	0.40	0.47
Total	**7233.60**		**4250.6**		**141.0**		**1918.0**			

NOVATECH
Engineers, Planners & Landscape Architects

Zurn Roof Drains

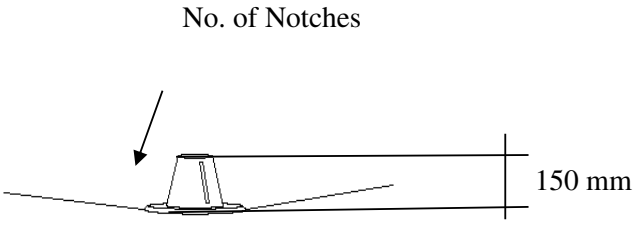
Opening	G.P.M. Per Inch of Head	L.P.M. Per Inch (25 mm) of Head	L/s Per Metre of Head	L/s Per 0.15 m of Head
Standard - X1	5.00	22.730	14.915	2.237
Reduced - X2	3.75	17.048	11.186	1.678
Reduced - X3	2.50	11.365	7.458	1.119
Max Reduced - X4	1.25	5.683	3.729	0.559



SAMPLE CALCULATION:

AREA R-01

Number of notches (N) = 1
Head (H) = 0.105 m for 5-year event
Head (H) = 0.138 m for 100-year event



$Q_{5\ all}$ = 3.729 L/s/m/notch x H x N
$Q_{5\ all}$ = 3.729 L/s/m/notch x .105 m x 1 notch
$Q_{5\ all}$ = 0.39 L/s

$Q_{100\ all}$ = 3.729 L/s/m/notch x H x N
$Q_{100\ all}$ = 3.729 L/s/m/notch x .138 m x 1 notch
$Q_{100\ all}$ = 0.51 L/s

NOVATECH
Engineers, Planners & Landscape Architects

Controlled Flow

5 YR

Area No.	Area (ha)	C_{5yr}	Time (min)	intensity mm/hr	Uncontrolled runoff L/s	Control System	Zurn Model Number	Release Rate (L/s/m of head)	Notches	Depth (m)	Controlled Flow (L/s)	Storage available (m^3)	Storage used (m^3)
North Building/Outlet 2													
Roof Drains													
RD1	0.0087	0.90	10.00	104.19	2.26	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.105	0.39	4.043	1.41
RD2	0.0047	0.90	10.00	104.19	1.24	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.095	0.36	2.220	0.57
RD3	0.0048	0.90	10.00	104.19	1.25	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.096	0.36	2.219	0.58
RD4	0.0093	0.90	10.00	104.19	2.41	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.107	0.40	4.223	1.53
RD5	0.0043	0.90	10.00	104.19	1.12	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.096	0.36	2.151	0.48
RD6	0.0102	0.90	10.00	104.19	2.65	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.107	0.40	4.837	1.76
RD7	0.0114	0.90	10.00	104.19	2.98	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.108	0.40	5.457	2.07
RD8	0.0017	0.90	10.00	104.19	0.45	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.077	0.29	0.727	0.10
RD9	0.0042	0.90	10.00	104.19	1.09	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.082	0.30	3.200	0.52
RD10	0.0154	0.90	10.00	104.19	4.00	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.115	0.43	6.746	3.06
RD11	0.0104	0.90	10.00	104.19	2.71	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.112	0.42	4.230	1.77
RD12	0.0063	0.90	10.00	104.19	1.64	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.101	0.38	2.868	0.87
RD13	0.0049	0.90	10.00	104.19	1.27	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.096	0.36	1.911	0.58
RD14	0.0059	0.90	10.00	104.19	1.54	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.096	0.36	3.039	0.81
RD15	0.0044	0.90	10.00	104.19	1.15	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.079	0.29	4.019	0.58
RD16	0.0084	0.90	10.00	104.19	2.19	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.104	0.39	4.046	1.34
RD17	0.0080	0.90	10.00	104.19	2.08	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.113	0.42	2.805	1.19
RD18	0.0037	0.90	10.00	104.19	0.96	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.103	0.39	1.044	0.34
RD19	0.0035	0.90	10.00	104.19	0.92	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.094	0.35	1.425	0.35
RD20	0.0054	0.90	10.00	104.19	1.40	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	2	0.096	0.71	1.590	0.41
RD21	0.0099	0.90	10.00	104.19	2.59	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	2	0.106	0.79	3.270	1.16
RD22	0.0099	0.90	10.00	104.19	2.58	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	2	0.104	0.78	3.453	1.16
RD40	No Contributing Area		Roof Drain for Any Unintended Rain			Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.000	0.00	0.000	0.00
Roof Subtotal:	**0.16**				**40.50**						**9.31**	**69.52**	**22.65**
Courtyard													
A01	0.0345	0.33	10.00	104.19	3.32								
A02	0.1188	0.42	10.00	104.19	14.44								
A03	0.0888	0.57	10.00	104.19	14.78								
Courtyard Subtotal	**0.24**				**32.53**								
Total Outlet 2 (Roof+Courtyard):	**0.40**				**73.03**								
South Building/Outlet 1													
Roof Drains													
RD23	0.0087	0.90	10.00	104.19	2.27	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.108	0.40	3.752	1.40
RD24	0.0074	0.90	10.00	104.19	1.93	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.107	0.40	3.008	1.09
RD25	0.0064	0.90	10.00	104.19	1.67	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.100	0.37	3.013	0.91
RD26	0.0097	0.90	10.00	104.19	2.53	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.108	0.40	4.386	1.63
RD27	0.0092	0.90	10.00	104.19	2.41	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.111	0.41	3.721	1.50
RD28	0.0092	0.90	10.00	104.19	2.40	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.108	0.40	4.031	1.51
RD29	0.0073	0.90	10.00	104.19	1.91	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.097	0.36	4.181	1.13
RD30	0.0126	0.90	10.00	104.19	3.29	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.114	0.42	5.330	2.34
RD31	0.0042	0.90	10.00	104.19	1.09	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.095	0.35	1.871	0.47
RD32	0.0124	0.90	10.00	104.19	3.24	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.110	0.41	5.833	2.31
RD33	0.0064	0.90	10.00	104.19	1.67	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.101	0.38	2.985	0.90
RD34	0.0061	0.90	10.00	104.19	1.58	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.101	0.38	2.709	0.83
RD35	0.0101	0.90	10.00	104.19	2.64	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	2	0.108	0.81	3.122	1.18
RD36	0.0055	0.90	10.00	104.19	1.42	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.085	0.32	4.175	0.77
RD37	0.0096	0.90	10.00	104.19	2.50	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	2	0.103	0.77	3.383	0.58
RD38	0.0104	0.90	10.00	104.19	2.72	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	2	0.114	0.85	2.681	1.19
RD39	0.0083	0.90	10.00	104.19	2.16	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	2	0.109	0.81	2.146	0.83
Roof Subtotal:	**0.14**				**37.41**						**8.25**	**60.32**	**20.58**
Courtyard													
A04	0.0441	0.50	10.00	104.19	6.39								
A05	0.0459	0.60	10.00	104.19	7.95								
A06	0.0924	0.40	10.00	104.19	10.80								
Courtyard Subtotal:	**0.18**				**25.13**								
Total Outlet 1 (Roof + Courtyard):	**0.33**				**62.55**								
Total 5 Year (Outlet 1 + Outlet 2):	**0.72**				**135.57**						**17.56**	**129.84**	**43.23**

100 YR

Area ID	Area (ha)	C_{100yr}	Time (min)	intensity mm/hr	Uncontrolled runoff L/s	Control System	Zurn Model Number	Release Rate (L/s/m of head)	Notches	Depth (m)	Controlled Flow (L/s)	Storage available (m^3)	Storage used (m^3)
North Building/Outlet 2													
Roof Drains													
RD1	0.0087	1.00	10.00	178.56	4.31	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.138	0.51	4.043	3.13
RD2	0.0047	1.00	10.00	178.56	2.35	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.127	0.47	2.220	1.35
RD3	0.0048	1.00	10.00	178.56	2.39	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.128	0.48	2.219	1.37
RD4	0.0093	1.00	10.00	178.56	4.59	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.139	0.52	4.223	3.39
RD5	0.0043	1.00	10.00	178.56	2.13	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.122	0.46	2.151	1.17
RD6	0.0102	1.00	10.00	178.56	5.05	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.139	0.52	4.837	3.87
RD7	0.0114	1.00	10.00	178.56	5.67	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.141	0.52	5.457	4.52
RD8	0.0017	1.00	10.00	178.56	0.86	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.108	0.40	0.727	0.27
RD9	0.0042	1.00	10.00	178.56	2.07	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.108	0.40	3.200	1.21
RD10	0.0154	1.00	10.00	178.56	7.63	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.149	0.56	6.746	6.60
RD11	0.0104	1.00	10.00	178.56	5.16	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.146	0.54	4.230	3.92
RD12	0.0063	1.00	10.00	178.56	3.13	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.133	0.50	2.868	2.00
RD13	0.0049	1.00	10.00	178.56	2.42	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.134	0.50	1.911	1.36
RD14	0.0059	1.00	10.00	178.56	2.93	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.127	0.47	3.039	1.87
RD15	0.0044	1.00	10.00	178.56	2.18	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.103	0.39	4.019	1.32
RD16	0.0084	1.00	10.00	178.56	4.18	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.135	0.51	4.046	2.99
RD17	0.0080	1.00	10.00	178.56	3.96	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.148	0.55	2.805	2.69
RD18	0.0037	1.00	10.00	178.56	1.83	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.140	0.52	1.044	0.85
RD19	0.0035	1.00	10.00	178.56	1.75	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.126	0.47	1.425	0.85
RD20	0.0054	1.00	10.00	178.56	2.67	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	2	0.131	0.97	1.590	1.05
RD21	0.0099	1.00	10.00	178.56	4.93	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	2	0.131	0.97	3.270	2.72
RD22	0.0099	1.00	10.00	178.56	4.91	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	2	0.141	1.05	3.453	2.74
RD40	No Contributing Area		Roof Drain for Any Unintended Rain Entering near Edge of Building			Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.000	0.00	0.000	0.00
Roof Subtotal:	**0.16**				**77.11**						**12.29**	**69.52**	**51.25**
Courtyard													
A01	0.0345	0.39	10.00	178.56	6.70								
A02	0.1188	0.50	10.00	178.56	29.24								
A03	0.0888	0.65	10.00	178.56	28.70								
Courtyard Subtotal:	**0.24**				**64.65**								
Total Outlet 2 (Roof+ Courtyard):	**0.40**				**141.76**								
South Building/Outlet 1													
Roof Drains													
RD23	0.0087	1.00	10.00	178.56	4.33	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.141	0.53	3.752	3.11
RD24	0.0074	1.00	10.00	178.56	3.67	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.140	0.52	3.008	2.47
RD25	0.0064	1.00	10.00	178.56	3.17	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.132	0.49	3.013	2.06
RD26	0.0097	1.00	10.00	178.56	4.81	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.141	0.52	4.386	3.62
RD27	0.0092	1.00	10.00	178.56	4.58	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.127	0.47	3.721	3.33
RD28	0.0092	1.00	10.00	178.56	4.56	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.141	0.53	4.031	3.35
RD29	0.0073	1.00	10.00	178.56	3.64	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.127	0.47	4.181	2.54
RD30	0.0126	1.00	10.00	178.56	6.27	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.148	0.55	5.330	5.09
RD31	0.0042	1.00	10.00	178.56	2.08	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.126	0.47	1.871	1.11
RD32	0.0124	1.00	10.00	178.56	6.16	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.143	0.53	5.833	5.06
RD33	0.0064	1.00	10.00	178.56	3.18	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.132	0.49	2.985	2.06
RD34	0.0061	1.00	10.00	178.56	3.02	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.133	0.50	2.709	1.89
RD35	0.0101	1.00	10.00	178.56	5.03	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	2	0.144	1.07	3.122	2.78
RD36	0.0055	1.00	10.00	178.56	2.71	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	1	0.112	0.42	4.175	1.75
RD37	0.0096	1.00	10.00	178.56	4.76	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	2	0.138	1.03	3.383	2.62
RD38	0.0104	1.00	10.00	178.56	5.17	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	2	0.108	0.80	2.681	1.00
RD39	0.0083	1.00	10.00	178.56	4.10	Zurn Roof Drain	ZCF121-1W-X4-Z-105-10-77	3.73	2	0.146	1.09	2.146	2.00
Roof Subtotal	**0.14**				**71.24**						**10.49**	**60.32**	45.85
Courtyard													
A04	0.0441	0.57	10.00	178.56	12.51								
A05	0.0459	0.68	10.00	178.56	15.41								
A06	0.0924	0.47	10.00	178.56	21.59								
Courtyard Subtotal	**0.18**				**49.52**								
Total Outlet 1 (Roof + Courtyard)	**0.33**				**120.76**								
Total 100 Year (Outlet 1 + Outlet 2):	**0.72**				**262.52**						**22.79**	**129.84**	**97.10**

Outlet 1 Summary Table (Runoff to Deschatelets Avenue)

Area ID	Area	Runoff		Storage available	Storage used	
		5 year event	100 year		5 year event	100 year event
	(ha)	L/s	L/s	(m^3)	(m^3)	(m^3)
Controlled						
Roof	0.144	8.25	10.49	60.32	20.58	45.85
Uncontrolled						
A04	0.04	6.39	12.51	-	-	-
A05	0.05	7.95	15.41	-	-	-
A06	0.09	10.80	21.59			
Total	0.33	33.39	60.01	60.32	20.58	45.85

Outlet 2 Summary Table (Runoff to Scholastic Avenue)

Area ID	Area	Runoff		Storage available	Storage used	
		5 year event	100 year event		5 year event	100 year event
	(ha)	L/s	L/s	(m^3)	(m^3)	(m^3)
Controlled						
Roof	0.1553	9.31	12.29	69.52	22.65	51.25
Uncontrolled						
A01	0.035	3.32	6.70	-	-	-
A02	0.119	14.44	29.24	-	-	-
A03	0.089	14.78	28.70	-	-	-
Total	0.40	41.84	76.94	69.52	22.65	51.25

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-1 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.009	ha	Qallow =	0.39
C =	0.90		Vol(max) =	1.41
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	3.07	2.68	0.80
10	104.19	2.26	1.87	1.12
15	83.56	1.82	1.43	1.28
20	70.25	1.53	1.14	1.36
25	60.90	1.32	0.93	1.40
30	53.93	1.17	0.78	1.41
35	48.52	1.05	0.66	1.40
40	44.18	0.96	0.57	1.37
45	40.63	0.88	0.49	1.33
50	37.65	0.82	0.43	1.29
55	35.12	0.76	0.37	1.23
60	32.94	0.72	0.33	1.17
65	31.04	0.67	0.28	1.11
70	29.37	0.64	0.25	1.04
75	27.89	0.61	0.22	0.97
80	26.56	0.58	0.19	0.90
85	25.37	0.55	0.16	0.82
90	24.29	0.53	0.14	0.74

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
3	0.03	0.03
6	0.08	0.04
9	0.15	0.05
13	0.26	0.06
18	0.41	0.07
23	0.61	0.08
29	0.87	0.09
36	1.20	0.10
43	1.59	0.11
52	2.07	0.12
61	2.63	0.13
70	3.29	0.14
81	**4.04**	**0.15**

Linear Interpolation

0.11	H	0.10		H =	0.105 m
1.59	1.41	1.20		Q_{allow} =	0.39 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-1 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.009	ha	Qallow =	0.51
C =	1.00		Vol(max) =	3.13
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	5.86	5.35	1.61
10	178.56	4.31	3.80	2.28
15	142.89	3.45	2.94	2.65
20	119.95	2.90	2.39	2.86
25	103.85	2.51	2.00	3.00
30	91.87	2.22	1.71	3.08
35	82.58	1.99	1.48	3.12
40	75.15	1.81	1.30	3.13
45	69.05	1.67	1.16	3.13
50	63.95	1.54	1.03	3.10
55	59.62	1.44	0.93	3.07
60	55.89	1.35	0.84	3.02
65	52.65	1.27	0.76	2.97
70	49.79	1.20	0.69	2.91
75	47.26	1.14	0.63	2.84
80	44.99	1.09	0.58	2.77
85	42.95	1.04	0.53	2.69
90	41.11	0.99	0.48	2.61

Notes: Vol = Qnet x time
Qnet = Q - Qallow

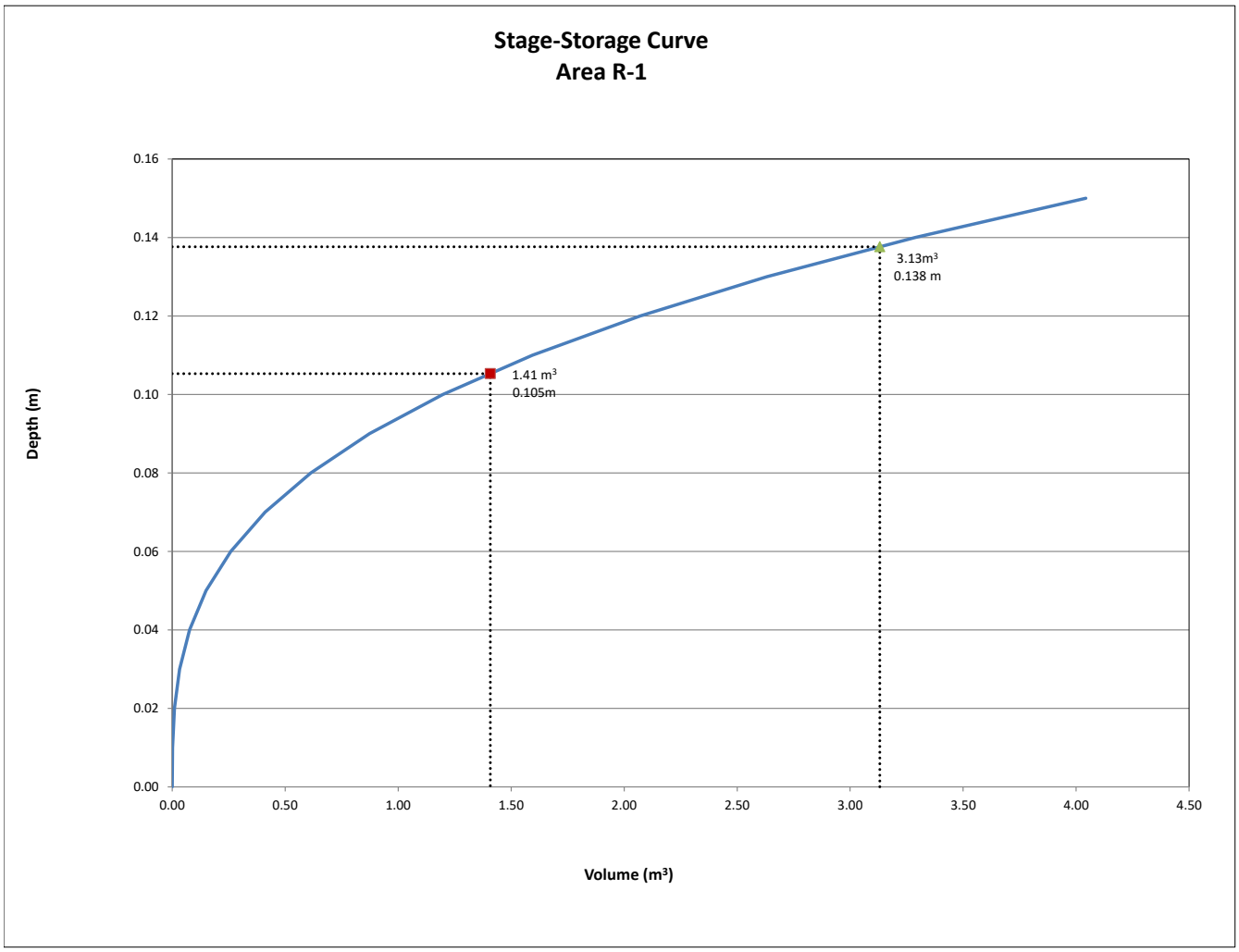
Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
3	0.03	0.03
6	0.08	0.04
9	0.15	0.05
13	0.26	0.06
18	0.41	0.07
23	0.61	0.08
29	0.87	0.09
36	1.20	0.10
43	1.59	0.11
52	2.07	0.12
61	2.63	0.13
70	3.29	0.14
81	**4.04**	**0.15**

Linear Interpolation

0.14	H	0.13		H =	0.138 m
3.29	3.13	2.63		Q_{allow} =	0.51 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head)


Stage-Storage Curve
Area R-1
Depth (m)
Volume (m³)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
3.13m³
0.138 m
1.41 m³
0.105m

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-2 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.005	ha	Qallow =	0.36
C =	0.90		Vol(max) =	0.57
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	1.67	1.32	0.40
10	104.19	1.24	0.88	0.53
15	83.56	0.99	0.64	0.57
20	70.25	0.83	0.48	0.57
25	60.90	0.72	0.37	0.55
30	53.93	0.64	0.28	0.51
35	48.52	0.58	0.22	0.46
40	44.18	0.52	0.17	0.41
45	40.63	0.48	0.13	0.34
50	37.65	0.45	0.09	0.27
55	35.12	0.42	0.06	0.20
60	32.94	0.39	0.04	0.13
65	31.04	0.37	0.01	0.05
70	29.37	0.35	-0.01	-0.03
75	27.89	0.33	-0.02	-0.11
80	26.56	0.31	-0.04	-0.19
85	25.37	0.30	-0.05	-0.28
90	24.29	0.29	-0.07	-0.36

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
2	0.02	0.03
3	0.04	0.04
5	0.08	0.05
7	0.14	0.06
10	0.23	0.07
13	0.34	0.08
16	0.48	0.09
20	0.66	0.10
24	0.88	0.11
28	1.14	0.12
33	1.45	0.13
39	1.80	0.14
44	**2.22**	**0.15**

Linear Interpolation

0.10	H	0.09		H =	0.095 m
0.66	0.57	0.48		Q_{allow} =	0.36 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-2 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.005	ha	Qallow =	0.47
C =	1.00		Vol(max) =	1.35
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	3.20	2.73	0.82
10	178.56	2.35	1.88	1.13
15	142.89	1.88	1.41	1.27
20	119.95	1.58	1.11	1.33
25	103.85	1.37	0.90	1.35
30	91.87	1.21	0.74	1.33
35	82.58	1.09	0.62	1.30
40	75.15	0.99	0.52	1.25
45	69.05	0.91	0.44	1.19
50	63.95	0.84	0.37	1.12
55	59.62	0.79	0.32	1.04
60	55.89	0.74	0.27	0.96
65	52.65	0.69	0.22	0.87
70	49.79	0.66	0.19	0.78
75	47.26	0.62	0.15	0.69
80	44.99	0.59	0.12	0.59
85	42.95	0.57	0.10	0.49
90	41.11	0.54	0.07	0.39

Notes: Vol = Qnet x time
Qnet = Q - Qallow

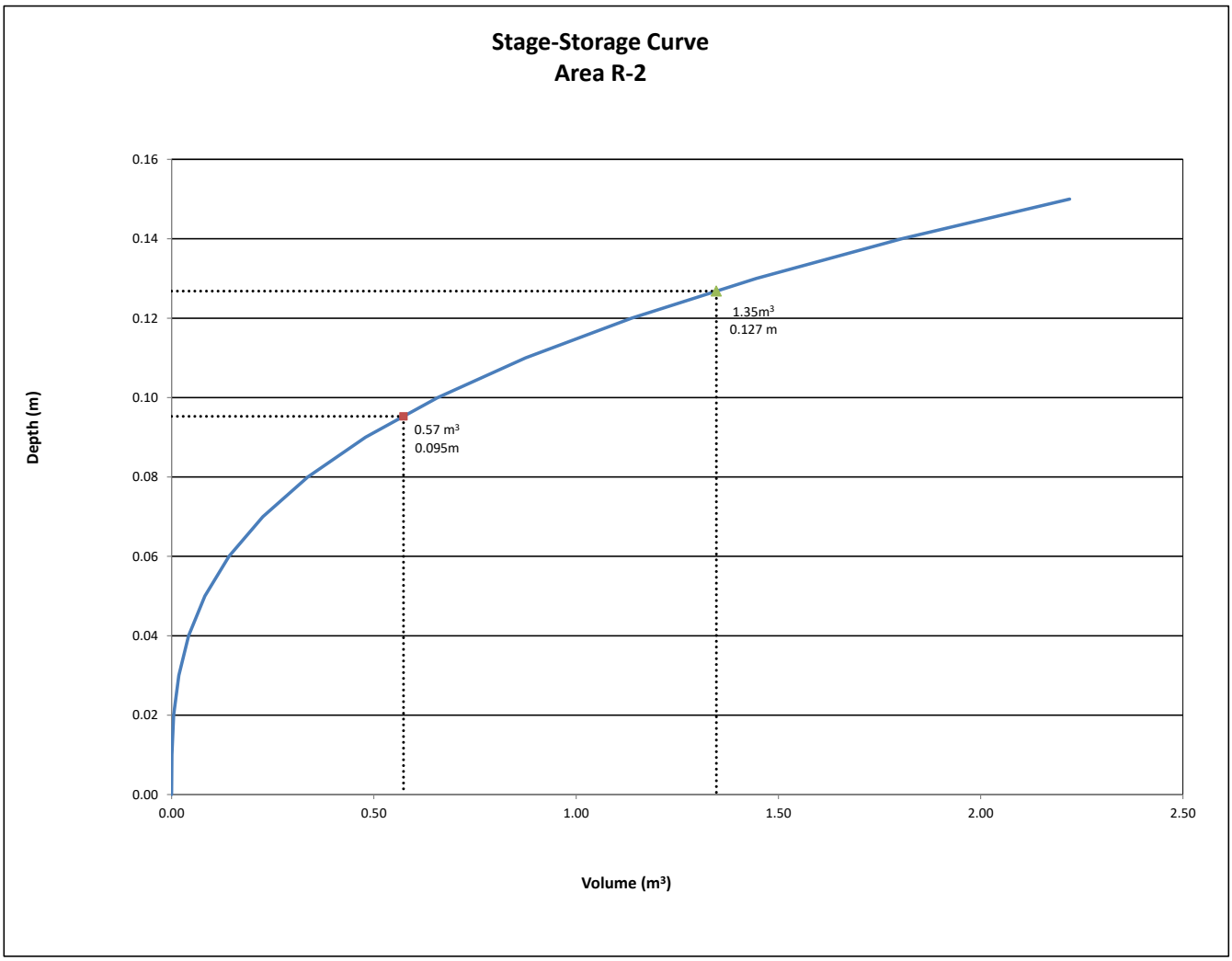
Ponding Depth (100-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
2	0.02	0.03
3	0.04	0.04
5	0.08	0.05
7	0.14	0.06
10	0.23	0.07
13	0.34	0.08
16	0.48	0.09
20	0.66	0.10
24	0.88	0.11
28	1.14	0.12
33	1.45	0.13
39	1.80	0.14
44	**2.22**	**0.15**

Linear Interpolation

0.13	H	0.12		H =	0.127 m
1.45	1.35	1.14		Q_{allow} =	0.47 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)


Stage-Storage Curve
Area R-2
Depth (m)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.50
1.00
1.50
2.00
2.50
Volume (m³)
1.35m³
0.127 m
0.57 m³
0.095m

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-3 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.005	ha	Qallow =	0.36
C =	0.90		Vol(max) =	0.58
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	1.70	1.34	0.40
10	104.19	1.25	0.89	0.54
15	83.56	1.01	0.65	0.58
20	70.25	0.85	0.49	0.58
25	60.90	0.73	0.37	0.56
30	53.93	0.65	0.29	0.52
35	48.52	0.58	0.22	0.47
40	44.18	0.53	0.17	0.41
45	40.63	0.49	0.13	0.35
50	37.65	0.45	0.09	0.28
55	35.12	0.42	0.06	0.21
60	32.94	0.40	0.04	0.13
65	31.04	0.37	0.01	0.05
70	29.37	0.35	-0.01	-0.03
75	27.89	0.34	-0.02	-0.11
80	26.56	0.32	-0.04	-0.19
85	25.37	0.31	-0.05	-0.28
90	24.29	0.29	-0.07	-0.37

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
2	0.02	0.03
3	0.04	0.04
5	0.08	0.05
7	0.14	0.06
10	0.23	0.07
13	0.34	0.08
16	0.48	0.09
20	0.66	0.10
24	0.88	0.11
28	1.14	0.12
33	1.44	0.13
39	1.80	0.14
44	**2.22**	**0.15**

Linear Interpolation

0.10	H	0.09		H =	0.096 m
0.66	0.58	0.48		Q_{allow} =	0.36 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-3 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.005	ha	Qallow =	0.48
C =	1.00		Vol(max) =	1.37
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	3.25	2.77	0.83
10	178.56	2.39	1.91	1.15
15	142.89	1.91	1.44	1.29
20	119.95	1.60	1.13	1.36
25	103.85	1.39	0.91	1.37
30	91.87	1.23	0.75	1.36
35	82.58	1.10	0.63	1.32
40	75.15	1.01	0.53	1.27
45	69.05	0.92	0.45	1.21
50	63.95	0.86	0.38	1.14
55	59.62	0.80	0.32	1.06
60	55.89	0.75	0.27	0.98
65	52.65	0.70	0.23	0.89
70	49.79	0.67	0.19	0.80
75	47.26	0.63	0.16	0.71
80	44.99	0.60	0.13	0.61
85	42.95	0.57	0.10	0.51
90	41.11	0.55	0.07	0.40

Notes: Vol = Qnet x time
Qnet = Q - Qallow

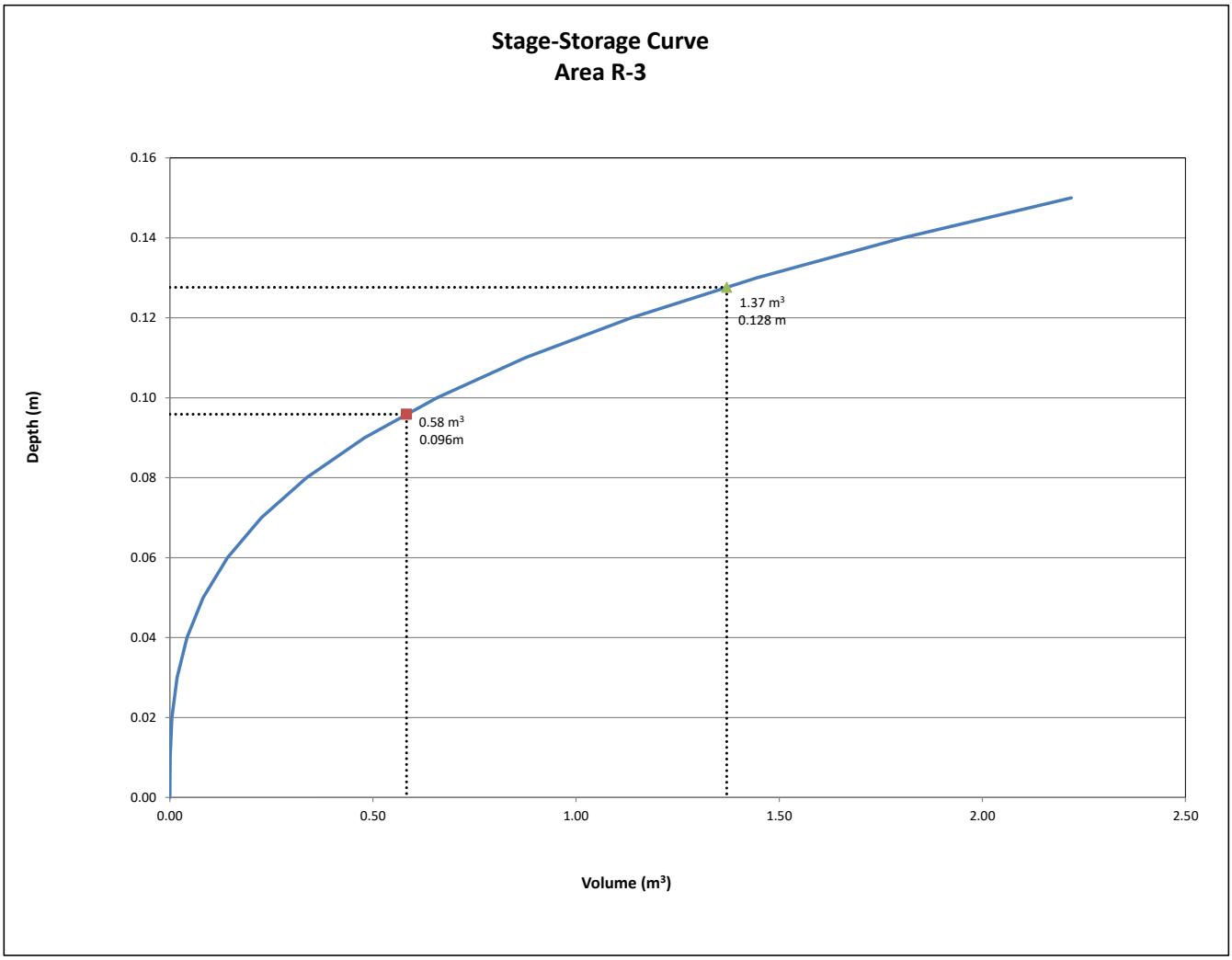
Ponding Depth (100-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
2	0.02	0.03
3	0.04	0.04
5	0.08	0.05
7	0.14	0.06
10	0.23	0.07
13	0.34	0.08
16	0.48	0.09
20	0.66	0.10
24	0.88	0.11
28	1.14	0.12
33	1.44	0.13
39	1.80	0.14
44	**2.22**	**0.15**

Linear Interpolation

0.13	H	0.12		H =	0.128 m
1.44	1.37	1.14		Q_{allow} =	0.48 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)


Stage-Storage Curve
Area R-3
Depth (m)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.50
1.00
1.50
2.00
2.50
Volume (m³)
1.37 m³
0.128 m
0.58 m³
0.096m

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-4 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.009	ha	Qallow =	0.40
C =	0.90		Vol(max) =	1.53
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	3.27	2.87	0.86
10	104.19	2.41	2.01	1.21
15	83.56	1.93	1.53	1.38
20	70.25	1.63	1.23	1.47
25	60.90	1.41	1.01	1.51
30	53.93	1.25	0.85	1.53
35	48.52	1.12	0.72	1.52
40	44.18	1.02	0.62	1.49
45	40.63	0.94	0.54	1.46
50	37.65	0.87	0.47	1.41
55	35.12	0.81	0.41	1.36
60	32.94	0.76	0.36	1.30
65	31.04	0.72	0.32	1.24
70	29.37	0.68	0.28	1.18
75	27.89	0.65	0.25	1.10
80	26.56	0.61	0.21	1.03
85	25.37	0.59	0.19	0.95
90	24.29	0.56	0.16	0.88

Notes: Vol = Qnet x time
Qnet = Q - Qallow

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-4 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.009	ha	Qallow =	0.52
C =	1.00		Vol(max) =	3.39
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	6.24	5.72	1.72
10	178.56	4.59	4.07	2.44
15	142.89	3.67	3.15	2.84
20	119.95	3.08	2.56	3.08
25	103.85	2.67	2.15	3.23
30	91.87	2.36	1.84	3.32
35	82.58	2.12	1.60	3.37
40	75.15	1.93	1.41	3.39
45	69.05	1.78	1.26	3.39
50	63.95	1.64	1.12	3.37
55	59.62	1.53	1.01	3.34
60	55.89	1.44	0.92	3.30
65	52.65	1.35	0.83	3.25
70	49.79	1.28	0.76	3.19
75	47.26	1.22	0.70	3.13
80	44.99	1.16	0.64	3.06
85	42.95	1.10	0.58	2.98
90	41.11	1.06	0.54	2.90

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
2	0.01	0.02
3	0.03	0.03
6	0.08	0.04
9	0.16	0.05
14	0.27	0.06
18	0.43	0.07
24	0.64	0.08
30	0.91	0.09
38	1.25	0.10
45	1.67	0.11
54	2.16	0.12
63	2.75	0.13
74	3.43	0.14
84	**4.22**	**0.15**

Linear Interpolation

0.11	H	0.10		H =	0.107 m
1.67	1.53	1.25		Q_{allow} =	0.40 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

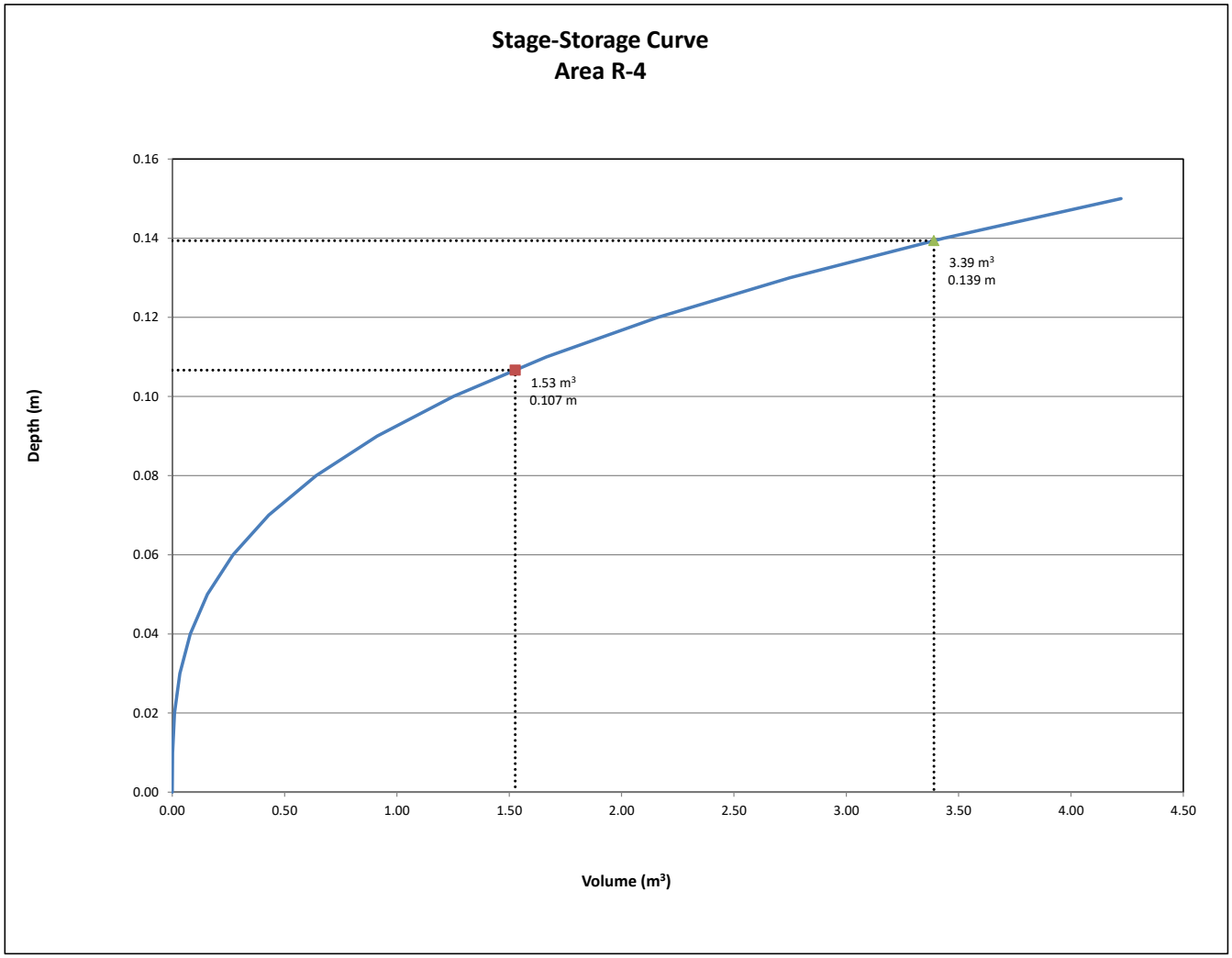
Ponding Depth (100-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
2	0.01	0.02
3	0.03	0.03
6	0.08	0.04
9	0.16	0.05
14	0.27	0.06
18	0.43	0.07
24	0.64	0.08
30	0.91	0.09
38	1.25	0.10
45	1.67	0.11
54	2.16	0.12
63	2.75	0.13
74	3.43	0.14
84	4.22	0.15

Linear Interpolation

0.14	H	0.13		H =	0.139 m
3.43	3.39	2.75		Q_{allow} =	0.52 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)


Stage-Storage Curve
Area R-4
Depth (m)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
Volume (m³)
3.39 m³
0.139 m
1.53 m³
0.107 m

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-5 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0043	ha	Qallow =	0.36
C =	0.90		Vol(max) =	0.48
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	1.52	1.16	0.35
10	104.19	1.12	0.76	0.46
15	83.56	0.90	0.54	0.48
20	70.25	0.75	0.39	0.47
25	60.90	0.65	0.29	0.44
30	53.93	0.58	0.22	0.40
35	48.52	0.52	0.16	0.34
40	44.18	0.47	0.11	0.28
45	40.63	0.44	0.08	0.21
50	37.65	0.40	0.04	0.13
55	35.12	0.38	0.02	0.06
60	32.94	0.35	-0.01	-0.02
65	31.04	0.33	-0.03	-0.10
70	29.37	0.32	-0.04	-0.19
75	27.89	0.30	-0.06	-0.27
80	26.56	0.29	-0.07	-0.36
85	25.37	0.27	-0.09	-0.45
90	24.29	0.26	-0.10	-0.53

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
2	0.02	0.03
3	0.04	0.04
5	0.08	0.05
7	0.14	0.06
9	0.22	0.07
12	0.33	0.08
15	0.46	0.09
19	0.64	0.10
23	0.85	0.11
28	1.10	0.12
32	1.40	0.13
37	1.75	0.14
43	**2.15**	**0.15**

Linear Interpolation

0.12	H	0.11		H =	0.096 m
1.10	0.48	0.85		Q_{allow} =	0.36 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-5 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0043	ha	Qallow =	0.46
C =	1.00		Vol(max) =	1.17
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	2.90	2.44	0.73
10	178.56	2.13	1.67	1.00
15	142.89	1.71	1.25	1.12
20	119.95	1.43	0.97	1.17
25	103.85	1.24	0.78	1.17
30	91.87	1.10	0.64	1.15
35	82.58	0.99	0.53	1.10
40	75.15	0.90	0.44	1.05
45	69.05	0.82	0.36	0.98
50	63.95	0.76	0.30	0.91
55	59.62	0.71	0.25	0.83
60	55.89	0.67	0.21	0.75
65	52.65	0.63	0.17	0.66
70	49.79	0.59	0.13	0.56
75	47.26	0.56	0.10	0.47
80	44.99	0.54	0.08	0.37
85	42.95	0.51	0.05	0.27
90	41.11	0.49	0.03	0.17

Notes: Vol = Qnet x time
Qnet = Q - Qallow

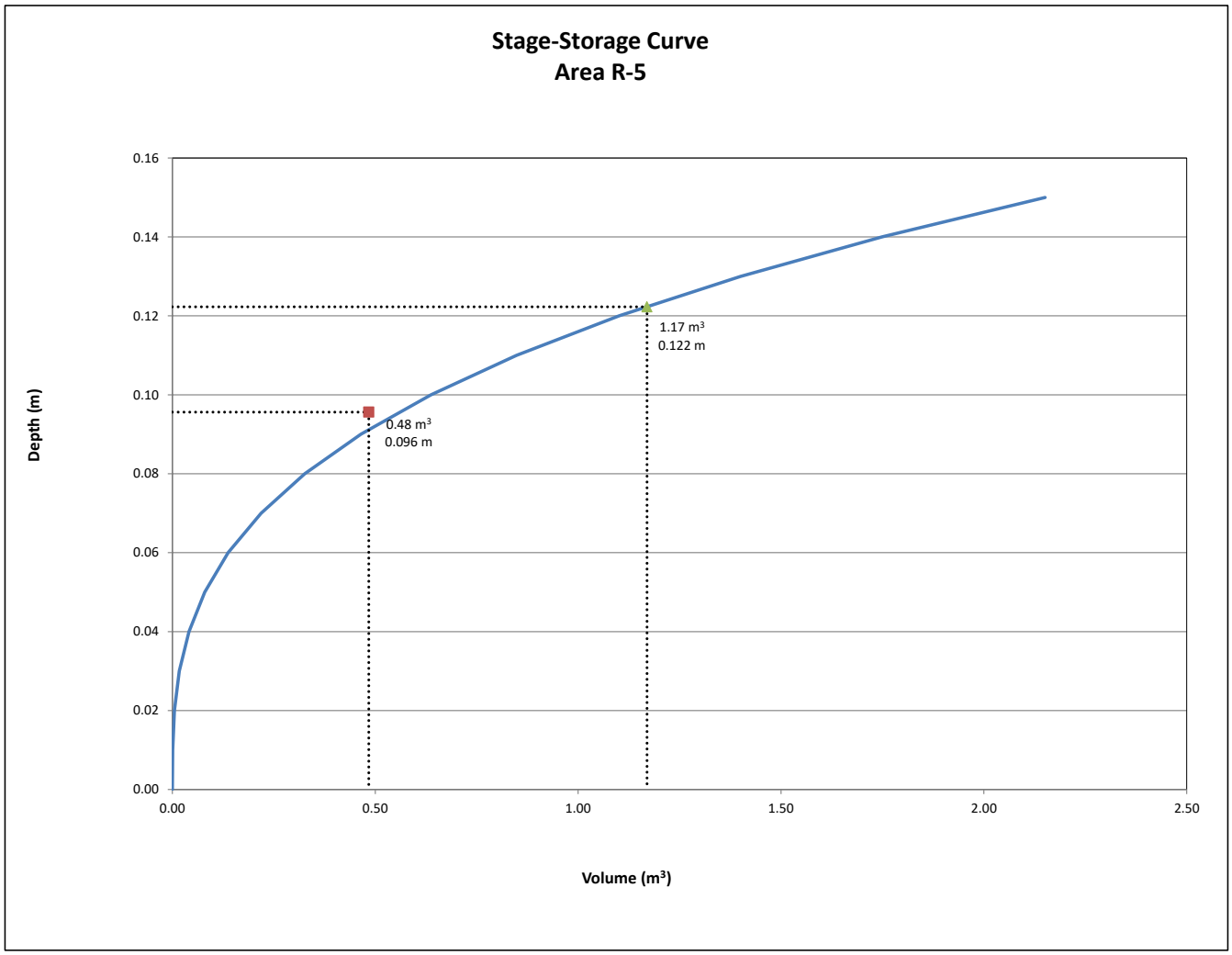
Ponding Depth (100-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
2	0.02	0.03
3	0.04	0.04
5	0.08	0.05
7	0.14	0.06
9	0.22	0.07
12	0.33	0.08
15	0.46	0.09
19	0.64	0.10
23	0.85	0.11
28	1.10	0.12
32	1.40	0.13
37	1.75	0.14
43	**2.15**	**0.15**

Linear Interpolation

0.13	H	0.12		H =	0.122 m
1.40	1.17	1.10		Q_{allow} =	0.46 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)


Stage-Storage Curve
Area R-5
Depth (m)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.50
1.00
1.50
2.00
2.50
Volume (m³)
1.17 m³
0.122 m
0.48 m³
0.096 m

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-6 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0102	ha	Qallow =	0.40
C =	0.90		Vol(max) =	1.76
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	3.60	3.20	0.96
10	104.19	2.65	2.25	1.35
15	83.56	2.13	1.73	1.56
20	70.25	1.79	1.39	1.67
25	60.90	1.55	1.15	1.73
30	53.93	1.37	0.97	1.75
35	48.52	1.24	0.84	1.76
40	44.18	1.13	0.73	1.74
45	40.63	1.03	0.63	1.71
50	37.65	0.96	0.56	1.68
55	35.12	0.89	0.49	1.63
60	32.94	0.84	0.44	1.58
65	31.04	0.79	0.39	1.52
70	29.37	0.75	0.35	1.46
75	27.89	0.71	0.31	1.40
80	26.56	0.68	0.28	1.33
85	25.37	0.65	0.25	1.26
90	24.29	0.62	0.22	1.18

Notes: Vol = Qnet x time
Qnet = Q - Qallow

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-6 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0102	ha	Qallow =	0.52
C =	1.00		Vol(max) =	3.87
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	6.87	6.35	1.90
10	178.56	5.05	4.53	2.72
15	142.89	4.04	3.52	3.17
20	119.95	3.39	2.87	3.45
25	103.85	2.94	2.42	3.63
30	91.87	2.60	2.08	3.74
35	82.58	2.34	1.82	3.82
40	75.15	2.13	1.61	3.86
45	69.05	1.95	1.43	3.87
50	63.95	1.81	1.29	3.87
55	59.62	1.69	1.17	3.85
60	55.89	1.58	1.06	3.82
65	52.65	1.49	0.97	3.78
70	49.79	1.41	0.89	3.73
75	47.26	1.34	0.82	3.68
80	44.99	1.27	0.75	3.62
85	42.95	1.22	0.70	3.55
90	41.11	1.16	0.64	3.48

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
2	0.01	0.02
4	0.04	0.03
7	0.09	0.04
11	0.18	0.05
15	0.31	0.06
21	0.49	0.07
28	0.73	0.08
35	1.04	0.09
43	1.43	0.10
52	1.91	0.11
62	2.48	0.12
73	3.15	0.13
84	3.93	0.14
97	**4.84**	**0.15**

Linear Interpolation

0.11	H	0.10		H =	0.107 m
1.91	1.76	1.43		Q_{allow} =	0.40 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

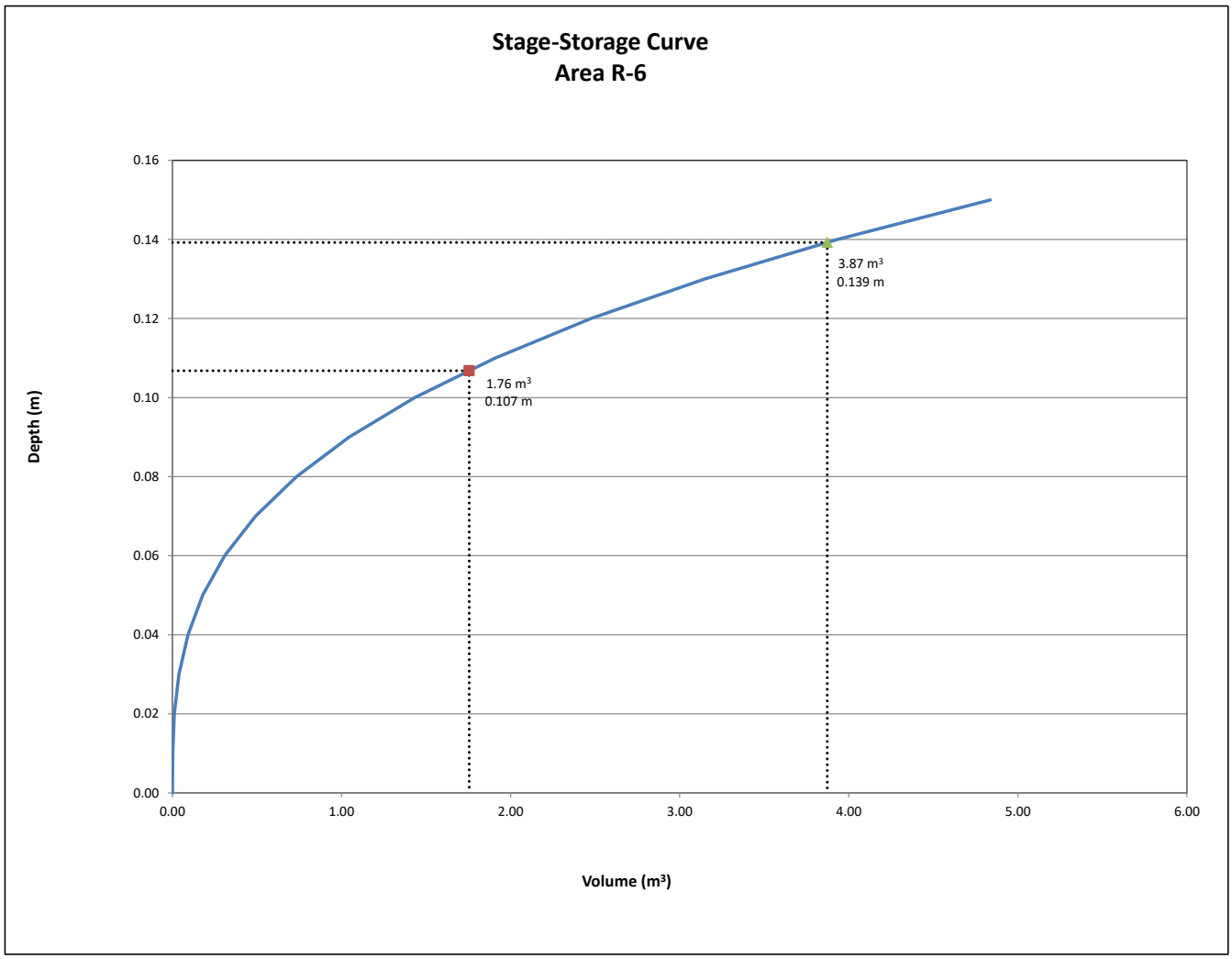
Ponding Depth (100-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
2	0.01	0.02
4	0.04	0.03
7	0.09	0.04
11	0.18	0.05
15	0.31	0.06
21	0.49	0.07
28	0.73	0.08
35	1.04	0.09
43	1.43	0.10
52	1.91	0.11
62	2.48	0.12
73	3.15	0.13
84	3.93	0.14
97	**4.84**	**0.15**

Linear Interpolation

0.14	H	0.13		H =	0.139 m
3.93	3.87	3.15		Q_{allow} =	0.52 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)


Stage-Storage Curve
Area R-6
Depth (m)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
1.00
2.00
3.00
4.00
5.00
6.00
Volume (m³)
3.87 m³
0.139 m
1.76 m³
0.107 m

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-7 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0114	ha	Qallow =	0.40
C =	0.90		Vol(max) =	2.07
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	4.03	3.63	1.09
10	104.19	2.98	2.58	1.55
15	83.56	2.39	1.99	1.79
20	70.25	2.01	1.61	1.93
25	60.90	1.74	1.34	2.01
30	53.93	1.54	1.14	2.05
35	48.52	1.39	0.99	2.07
40	44.18	1.26	0.86	2.07
45	40.63	1.16	0.76	2.05
50	37.65	1.08	0.68	2.03
55	35.12	1.00	0.60	1.99
60	32.94	0.94	0.54	1.95
65	31.04	0.89	0.49	1.90
70	29.37	0.84	0.44	1.84
75	27.89	0.80	0.40	1.78
80	26.56	0.76	0.36	1.72
85	25.37	0.72	0.32	1.65
90	24.29	0.69	0.29	1.59

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
2	0.01	0.02
4	0.04	0.03
8	0.10	0.04
12	0.20	0.05
17	0.35	0.06
24	0.55	0.07
31	0.83	0.08
39	1.18	0.09
49	1.62	0.10
59	2.15	0.11
70	2.79	0.12
82	3.55	0.13
95	4.44	0.14
109	**5.46**	**0.15**

Linear Interpolation

0.11	H	0.10		H =	0.108 m
2.15	2.07	1.62		Q_{allow} =	0.40 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-7 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0114	ha	Qallow =	0.52
C =	1.00		Vol(max) =	4.52
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	7.70	7.18	2.15
10	178.56	5.67	5.14	3.08
15	142.89	4.53	4.01	3.61
20	119.95	3.81	3.28	3.94
25	103.85	3.29	2.77	4.16
30	91.87	2.91	2.39	4.30
35	82.58	2.62	2.10	4.40
40	75.15	2.38	1.86	4.46
45	69.05	2.19	1.67	4.50
50	63.95	2.03	1.51	4.52
55	59.62	1.89	1.37	4.51
60	55.89	1.77	1.25	4.50
65	52.65	1.67	1.15	4.47
70	49.79	1.58	1.06	4.43
75	47.26	1.50	0.98	4.39
80	44.99	1.43	0.90	4.34
85	42.95	1.36	0.84	4.28
90	41.11	1.30	0.78	4.21

Notes: Vol = Qnet x time
Qnet = Q - Qallow

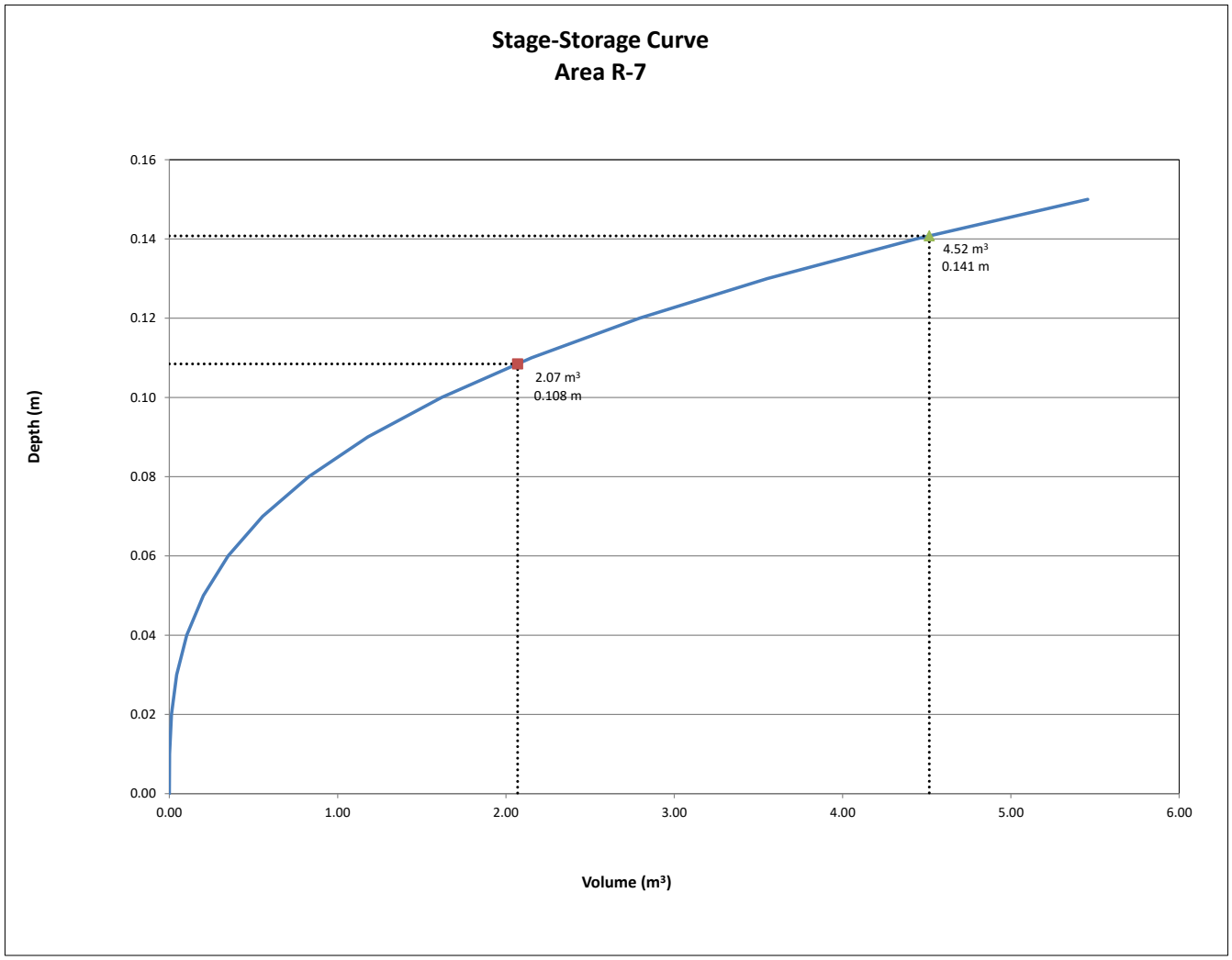
Ponding Depth (100-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
2	0.01	0.02
4	0.04	0.03
8	0.10	0.04
12	0.20	0.05
17	0.35	0.06
24	0.55	0.07
31	0.83	0.08
39	1.18	0.09
49	1.62	0.10
59	2.15	0.11
70	2.79	0.12
82	3.55	0.13
95	4.44	0.14
109	**5.46**	**0.15**

Linear Interpolation

0.15	H	0.14		H =	0.141 m
5.46	4.52	4.44		Q_{allow} =	0.52 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)


Stage-Storage Curve
Area R-7
Depth (m)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
1.00
2.00
3.00
4.00
5.00
6.00
Volume (m³)
4.52 m³
0.141 m
2.07 m³
0.108 m

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-8 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0017	ha	Qallow =	0.29
C =	0.90		Vol(max) =	0.10
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	0.61	0.33	0.10
10	104.19	0.45	0.17	0.10
15	83.56	0.36	0.08	0.07
20	70.25	0.30	0.02	0.02
25	60.90	0.26	-0.02	-0.03
30	53.93	0.23	-0.05	-0.09
35	48.52	0.21	-0.08	-0.16
40	44.18	0.19	-0.09	-0.23
45	40.63	0.18	-0.11	-0.29
50	37.65	0.16	-0.12	-0.37
55	35.12	0.15	-0.13	-0.44
60	32.94	0.14	-0.14	-0.51
65	31.04	0.13	-0.15	-0.59
70	29.37	0.13	-0.16	-0.66
75	27.89	0.12	-0.16	-0.74
80	26.56	0.11	-0.17	-0.82
85	25.37	0.11	-0.18	-0.89
90	24.29	0.11	-0.18	-0.97

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
0	0.00	0.02
1	0.01	0.03
1	0.01	0.04
2	0.03	0.05
2	0.05	0.06
3	0.07	0.07
4	0.11	0.08
5	0.16	0.09
6	0.22	0.10
8	0.29	0.11
9	0.37	0.12
11	0.47	0.13
13	0.59	0.14
15	**0.73**	**0.15**

Linear Interpolation

0.08	H	0.07		H =	0.077 m
0.11	0.10	0.07		Q_{allow} =	0.29 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-8 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0017	ha	Qallow =	0.40
C =	1.00		Vol(max) =	0.27
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	1.17	0.77	0.23
10	178.56	0.86	0.46	0.27
15	142.89	0.69	0.29	0.26
20	119.95	0.58	0.18	0.21
25	103.85	0.50	0.10	0.15
30	91.87	0.44	0.04	0.07
35	82.58	0.40	0.00	-0.01
40	75.15	0.36	-0.04	-0.09
45	69.05	0.33	-0.07	-0.18
50	63.95	0.31	-0.09	-0.28
55	59.62	0.29	-0.11	-0.37
60	55.89	0.27	-0.13	-0.47
65	52.65	0.25	-0.15	-0.57
70	49.79	0.24	-0.16	-0.67
75	47.26	0.23	-0.17	-0.78
80	44.99	0.22	-0.18	-0.88
85	42.95	0.21	-0.19	-0.99
90	41.11	0.20	-0.20	-1.09

Notes: Vol = Qnet x time
Qnet = Q - Qallow

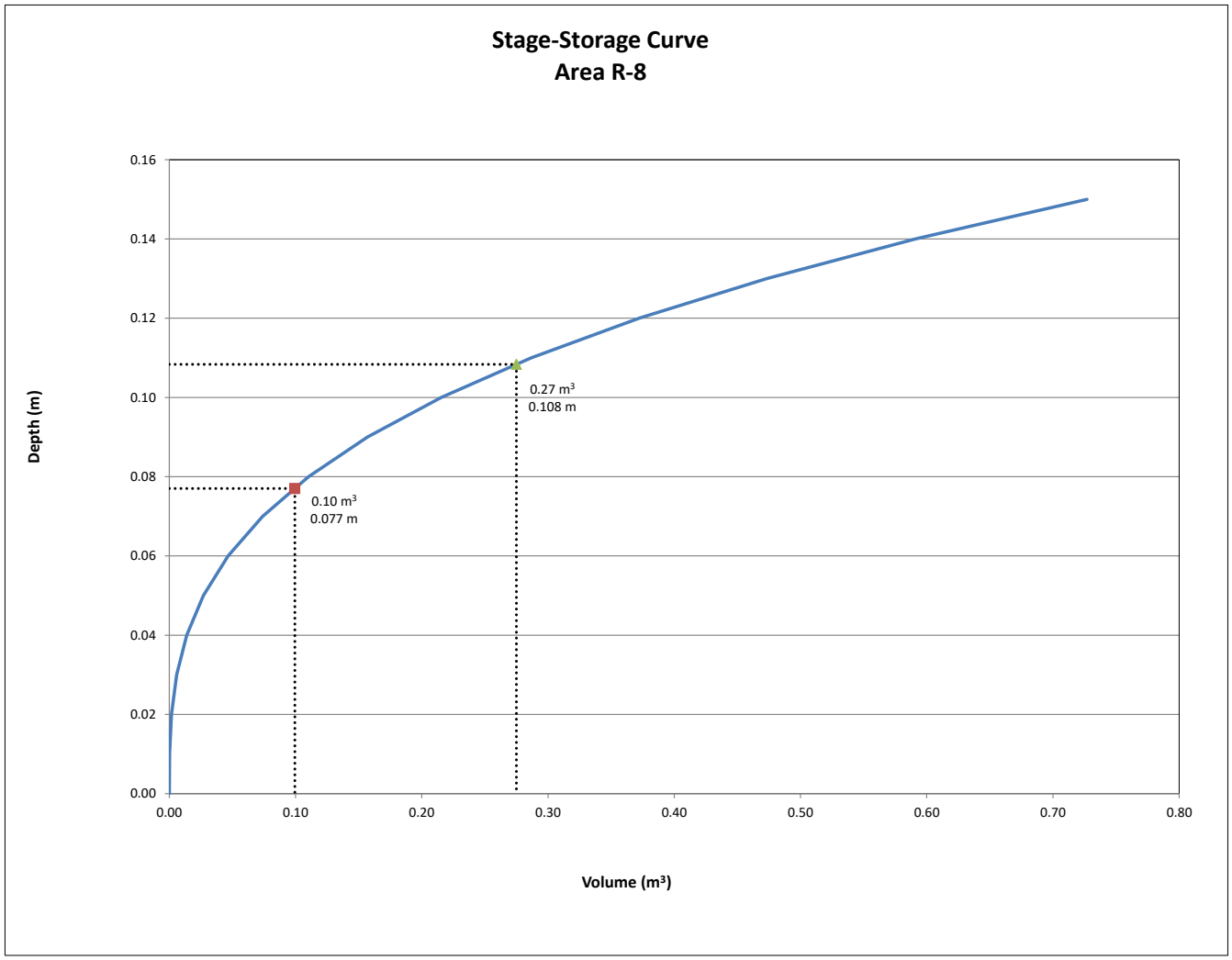
Ponding Depth (100-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
0	0.00	0.02
1	0.01	0.03
1	0.01	0.04
2	0.03	0.05
2	0.05	0.06
3	0.07	0.07
4	0.11	0.08
5	0.16	0.09
6	0.22	0.10
8	0.29	0.11
9	0.37	0.12
11	0.47	0.13
13	0.59	0.14
15	**0.73**	**0.15**

Linear Interpolation

0.11	H	0.1		H =	0.108 m
0.29	0.27	0.22		Q_{allow} =	0.40 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)


Stage-Storage Curve
Area R-8
Depth (m)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.27 m³
0.108 m
0.10 m³
0.077 m
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
Volume (m³)

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-9 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0042	ha	Qallow =	0.30
C =	0.90		Vol(max) =	0.52
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	1.48	1.18	0.35
10	104.19	1.09	0.79	0.47
15	83.56	0.87	0.57	0.52
20	70.25	0.73	0.43	0.52
25	60.90	0.64	0.34	0.50
30	53.93	0.56	0.26	0.47
35	48.52	0.51	0.21	0.43
40	44.18	0.46	0.16	0.39
45	40.63	0.42	0.12	0.34
50	37.65	0.39	0.09	0.28
55	35.12	0.37	0.07	0.22
60	32.94	0.34	0.04	0.16
65	31.04	0.32	0.02	0.09
70	29.37	0.31	0.01	0.03
75	27.89	0.29	-0.01	-0.04
80	26.56	0.28	-0.02	-0.11
85	25.37	0.27	-0.03	-0.18
90	24.29	0.25	-0.05	-0.25

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
3	0.03	0.03
5	0.06	0.04
7	0.12	0.05
10	0.20	0.06
14	0.33	0.07
18	0.49	0.08
23	0.69	0.09
28	0.95	0.10
34	1.26	0.11
41	1.64	0.12
48	2.08	0.13
56	2.60	0.14
64	**3.20**	**0.15**

Linear Interpolation

0.09	H	0.08		H =	0.082 m
0.69	0.52	0.49		Q_{allow} =	0.30 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-9 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0042	ha	Qallow =	0.40
C =	1.00		Vol(max) =	1.21
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	2.82	2.42	0.73
10	178.56	2.07	1.67	1.00
15	142.89	1.66	1.26	1.13
20	119.95	1.39	0.99	1.19
25	103.85	1.21	0.81	1.21
30	91.87	1.07	0.67	1.20
35	82.58	0.96	0.56	1.17
40	75.15	0.87	0.47	1.13
45	69.05	0.80	0.40	1.08
50	63.95	0.74	0.34	1.03
55	59.62	0.69	0.29	0.96
60	55.89	0.65	0.25	0.90
65	52.65	0.61	0.21	0.82
70	49.79	0.58	0.18	0.75
75	47.26	0.55	0.15	0.67
80	44.99	0.52	0.12	0.59
85	42.95	0.50	0.10	0.50
90	41.11	0.48	0.08	0.42

Notes: Vol = Qnet x time
Qnet = Q - Qallow

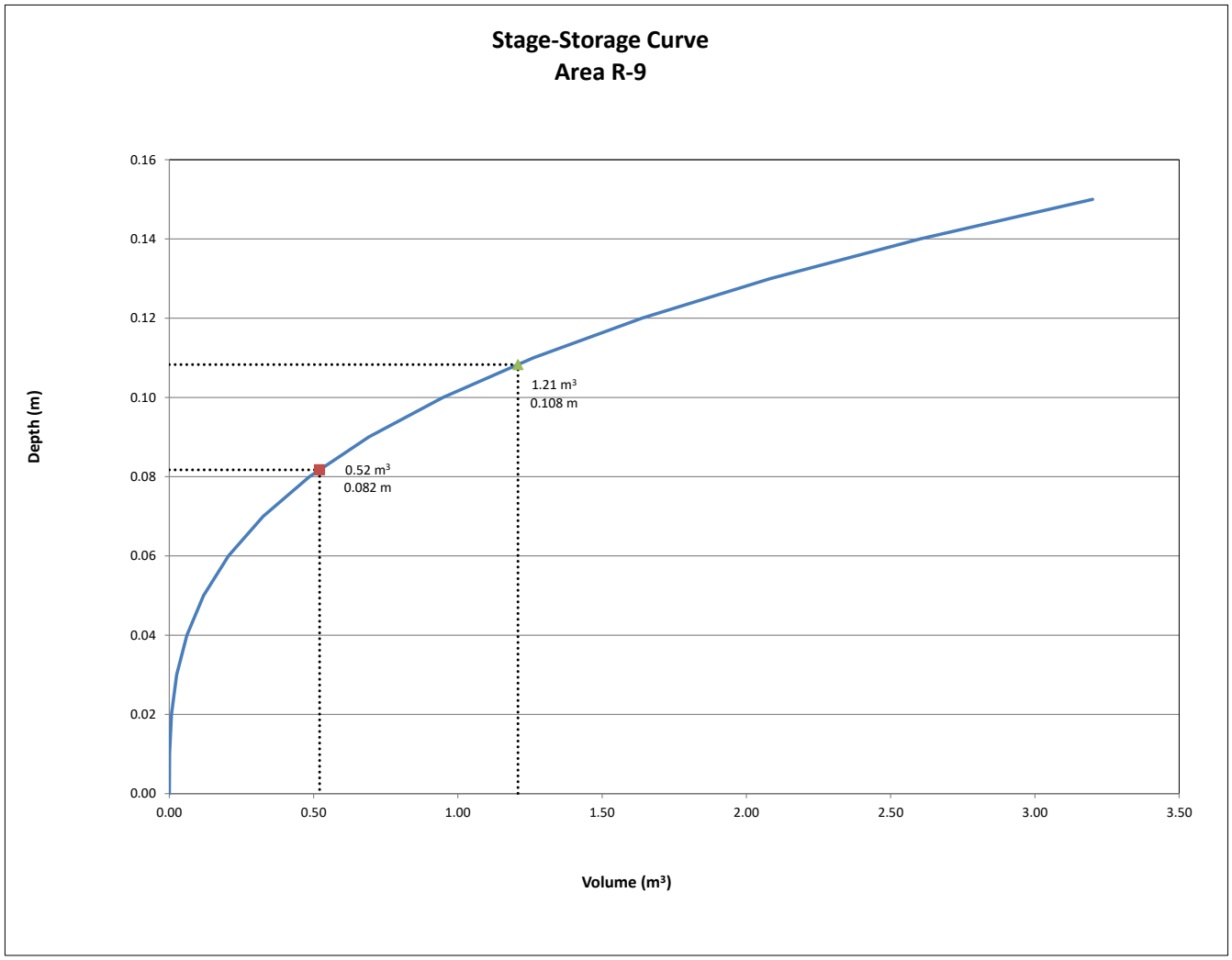
Ponding Depth (100-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
3	0.03	0.03
5	0.06	0.04
7	0.12	0.05
10	0.20	0.06
14	0.33	0.07
18	0.49	0.08
23	0.69	0.09
28	0.95	0.10
34	1.26	0.11
41	1.64	0.12
48	2.08	0.13
56	2.60	0.14
64	**3.20**	**0.15**

Linear Interpolation

0.11	H	0.1		H =	0.108 m
1.26	1.21	0.95		Q_{allow} =	0.40 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)


Stage-Storage Curve
Area R-9
Depth (m)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
Volume (m³)
1.21 m³
0.108 m
0.52 m³
0.082 m

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-10 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0154	ha	Qallow =	0.43
C =	0.90		Vol(max) =	3.06
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	5.43	5.00	1.50
10	104.19	4.00	3.57	2.14
15	83.56	3.21	2.78	2.50
20	70.25	2.70	2.27	2.72
25	60.90	2.34	1.91	2.87
30	53.93	2.07	1.64	2.96
35	48.52	1.86	1.43	3.01
40	44.18	1.70	1.27	3.04
45	40.63	1.56	1.13	3.06
50	37.65	1.45	1.02	3.05
55	35.12	1.35	0.92	3.04
60	32.94	1.27	0.84	3.01
65	31.04	1.19	0.76	2.98
70	29.37	1.13	0.70	2.94
75	27.89	1.07	0.64	2.89
80	26.56	1.02	0.59	2.84
85	25.37	0.98	0.55	2.78
90	24.29	0.93	0.50	2.72

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
1	0.00	0.01
2	0.02	0.02
5	0.05	0.03
10	0.13	0.04
15	0.25	0.05
22	0.43	0.06
29	0.69	0.07
38	1.02	0.08
49	1.46	0.09
60	2.00	0.10
73	2.66	0.11
86	3.45	0.12
101	4.39	0.13
118	5.48	0.14
135	**6.75**	**0.15**

Linear Interpolation

0.12	H	0.11		H =	0.115 m
3.45	3.06	2.66		Q_{allow} =	0.43 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-10 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0154	ha	Qallow =	0.56
C =	1.00		Vol(max) =	6.60
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	10.36	9.81	2.94
10	178.56	7.63	7.07	4.24
15	142.89	6.10	5.55	4.99
20	119.95	5.12	4.57	5.48
25	103.85	4.43	3.88	5.82
30	91.87	3.92	3.37	6.06
35	82.58	3.53	2.97	6.24
40	75.15	3.21	2.65	6.37
45	69.05	2.95	2.39	6.46
50	63.95	2.73	2.18	6.53
55	59.62	2.55	1.99	6.57
60	55.89	2.39	1.83	6.59
65	52.65	2.25	1.69	6.60
70	49.79	2.13	1.57	6.60
75	47.26	2.02	1.46	6.58
80	44.99	1.92	1.37	6.55
85	42.95	1.83	1.28	6.52
90	41.11	1.76	1.20	6.48

Notes: Vol = Qnet x time
Qnet = Q - Qallow

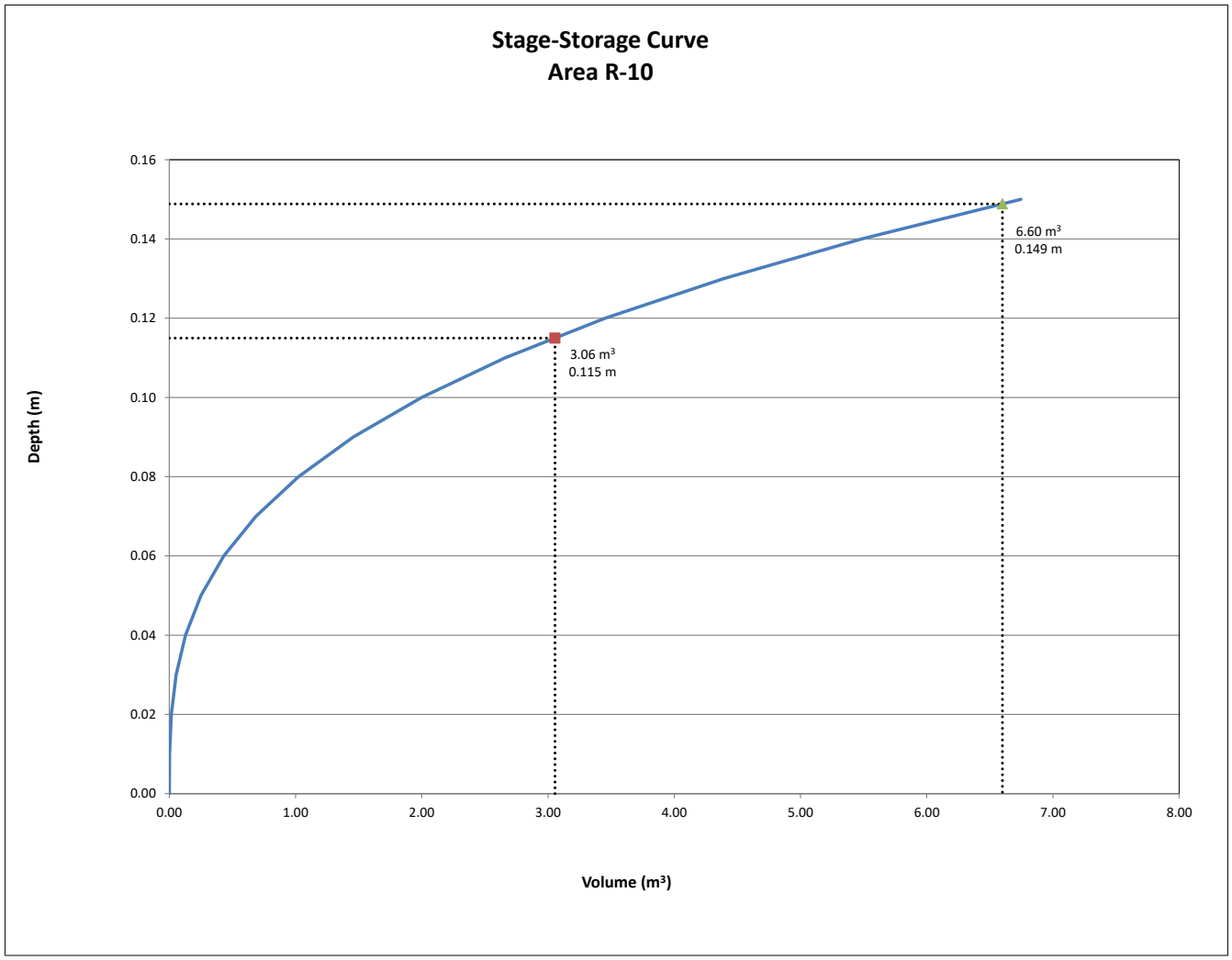
Ponding Depth (100-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
1	0.00	0.01
2	0.02	0.02
5	0.05	0.03
10	0.13	0.04
15	0.25	0.05
22	0.43	0.06
29	0.69	0.07
38	1.02	0.08
49	1.46	0.09
60	2.00	0.10
73	2.66	0.11
86	3.45	0.12
101	4.39	0.13
118	5.48	0.14
135	**6.75**	**0.15**

Linear Interpolation

0.15	H	0.14		H =	0.149 m
6.75	6.60	5.48		Q_{allow} =	0.56 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)


Stage-Storage Curve
Area R-10
Depth (m)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
Volume (m³)
6.60 m³
0.149 m
3.06 m³
0.115 m

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-11 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0104	ha	Qallow =	0.42
C =	0.90		Vol(max) =	1.77
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	3.67	3.25	0.98
10	104.19	2.71	2.29	1.37
15	83.56	2.17	1.75	1.58
20	70.25	1.83	1.41	1.69
25	60.90	1.58	1.16	1.75
30	53.93	1.40	0.98	1.77
35	48.52	1.26	0.84	1.77
40	44.18	1.15	0.73	1.75
45	40.63	1.06	0.64	1.72
50	37.65	0.98	0.56	1.68
55	35.12	0.91	0.49	1.63
60	32.94	0.86	0.44	1.57
65	31.04	0.81	0.39	1.51
70	29.37	0.76	0.34	1.45
75	27.89	0.73	0.31	1.38
80	26.56	0.69	0.27	1.30
85	25.37	0.66	0.24	1.22
90	24.29	0.63	0.21	1.14

Notes: Vol = Qnet x time
Qnet = Q - Qallow

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-11 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0104	ha	Qallow =	0.54
C =	1.00		Vol(max) =	3.92
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	7.02	6.47	1.94
10	178.56	5.16	4.62	2.77
15	142.89	4.13	3.59	3.23
20	119.95	3.47	2.92	3.51
25	103.85	3.00	2.46	3.69
30	91.87	2.66	2.11	3.80
35	82.58	2.39	1.84	3.87
40	75.15	2.17	1.63	3.91
45	69.05	2.00	1.45	3.92
50	63.95	1.85	1.30	3.91
55	59.62	1.72	1.18	3.89
60	55.89	1.62	1.07	3.86
65	52.65	1.52	0.98	3.81
70	49.79	1.44	0.90	3.76
75	47.26	1.37	0.82	3.70
80	44.99	1.30	0.76	3.63
85	42.95	1.24	0.70	3.56
90	41.11	1.19	0.64	3.48

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
2	0.01	0.02
3	0.03	0.03
6	0.08	0.04
9	0.16	0.05
14	0.27	0.06
18	0.43	0.07
24	0.64	0.08
30	0.91	0.09
38	1.25	0.10
45	1.67	0.11
54	2.17	0.12
64	2.75	0.13
74	3.44	0.14
85	**4.23**	**0.15**

Ponding Depth (100-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
2	0.01	0.02
3	0.03	0.03
6	0.08	0.04
9	0.16	0.05
14	0.27	0.06
18	0.43	0.07
24	0.64	0.08
30	0.91	0.09
38	1.25	0.10
45	1.67	0.11
54	2.17	0.12
64	2.75	0.13
74	3.44	0.14
85	**4.23**	**0.15**

Linear Interpolation

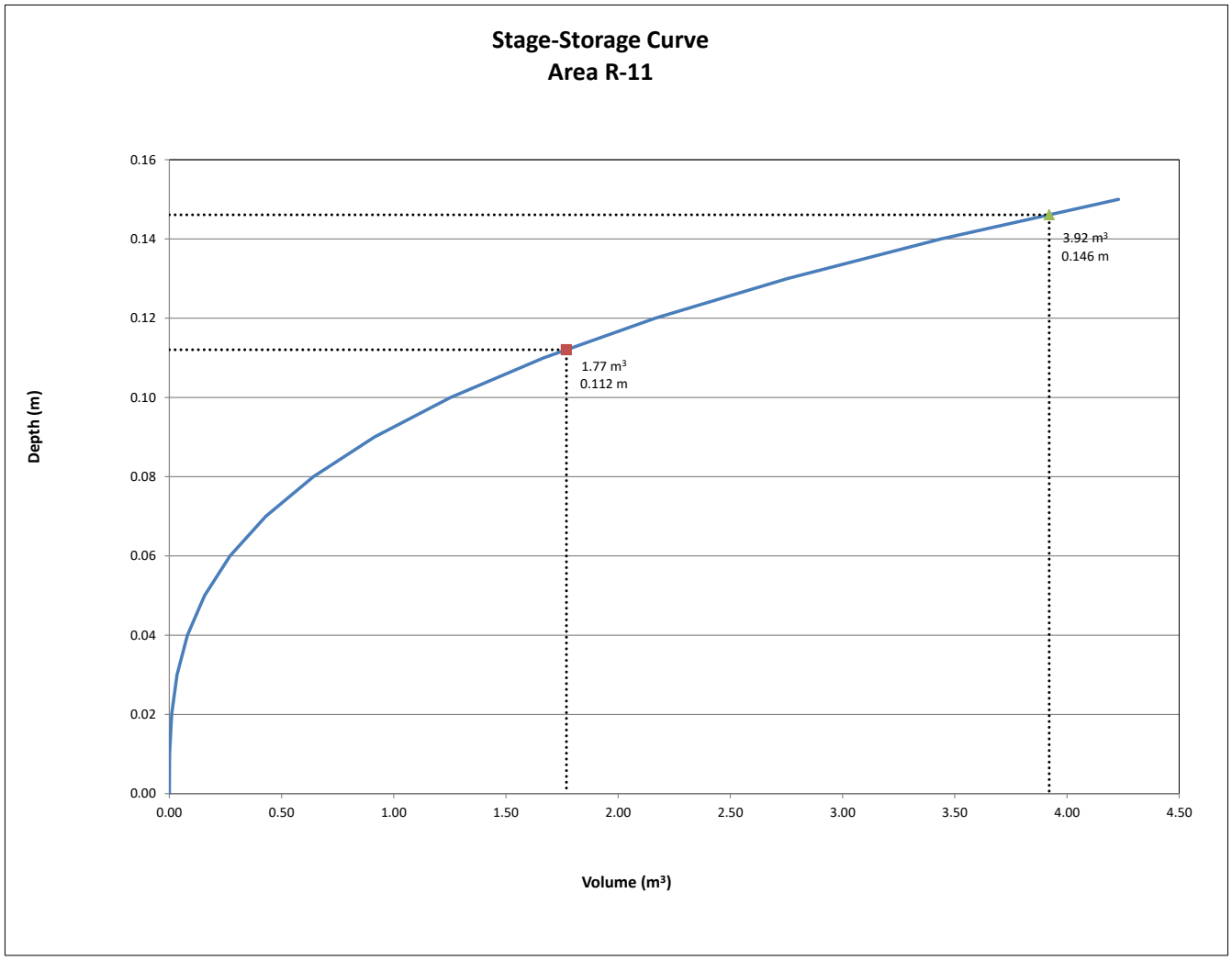
0.12	H	0.11		H =	0.112 m
2.17	1.77	1.67		Q_{allow} =	0.42 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

Linear Interpolation

0.15	H	0.14		H =	0.146 m
4.23	3.92	3.44		Q_{allow} =	0.54 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)


Stage-Storage Curve
Area R-11
Depth (m)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
Volume (m³)
1.77 m³
0.112 m
3.92 m³
0.146 m

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-12 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0063	ha	Qallow =	0.38
C =	0.90		Vol(max) =	0.87
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	2.23	1.85	0.55
10	104.19	1.64	1.26	0.76
15	83.56	1.32	0.94	0.84
20	70.25	1.11	0.73	0.87
25	60.90	0.96	0.58	0.87
30	53.93	0.85	0.47	0.85
35	48.52	0.77	0.39	0.81
40	44.18	0.70	0.32	0.76
45	40.63	0.64	0.26	0.70
50	37.65	0.59	0.21	0.64
55	35.12	0.55	0.17	0.57
60	32.94	0.52	0.14	0.50
65	31.04	0.49	0.11	0.43
70	29.37	0.46	0.08	0.35
75	27.89	0.44	0.06	0.27
80	26.56	0.42	0.04	0.19
85	25.37	0.40	0.02	0.10
90	24.29	0.38	0.00	0.02

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
2	0.02	0.03
4	0.05	0.04
6	0.11	0.05
9	0.18	0.06
12	0.29	0.07
16	0.44	0.08
21	0.62	0.09
25	0.85	0.10
31	1.13	0.11
37	1.47	0.12
43	1.87	0.13
50	2.33	0.14
57	**2.87**	**0.15**

Linear Interpolation

0.11	H	0.10		H =	0.101 m
1.13	0.87	0.85		Q_{allow} =	0.38 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-12 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0063	ha	Qallow =	0.50
C =	1.00		Vol(max) =	2.00
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	4.25	3.75	1.13
10	178.56	3.13	2.63	1.58
15	142.89	2.50	2.00	1.80
20	119.95	2.10	1.60	1.92
25	103.85	1.82	1.32	1.98
30	91.87	1.61	1.11	2.00
35	82.58	1.45	0.95	1.99
40	75.15	1.32	0.82	1.96
45	69.05	1.21	0.71	1.92
50	63.95	1.12	0.62	1.86
55	59.62	1.04	0.54	1.80
60	55.89	0.98	0.48	1.73
65	52.65	0.92	0.42	1.65
70	49.79	0.87	0.37	1.56
75	47.26	0.83	0.33	1.48
80	44.99	0.79	0.29	1.38
85	42.95	0.75	0.25	1.29
90	41.11	0.72	0.22	1.19

Notes: Vol = Qnet x time
Qnet = Q - Qallow

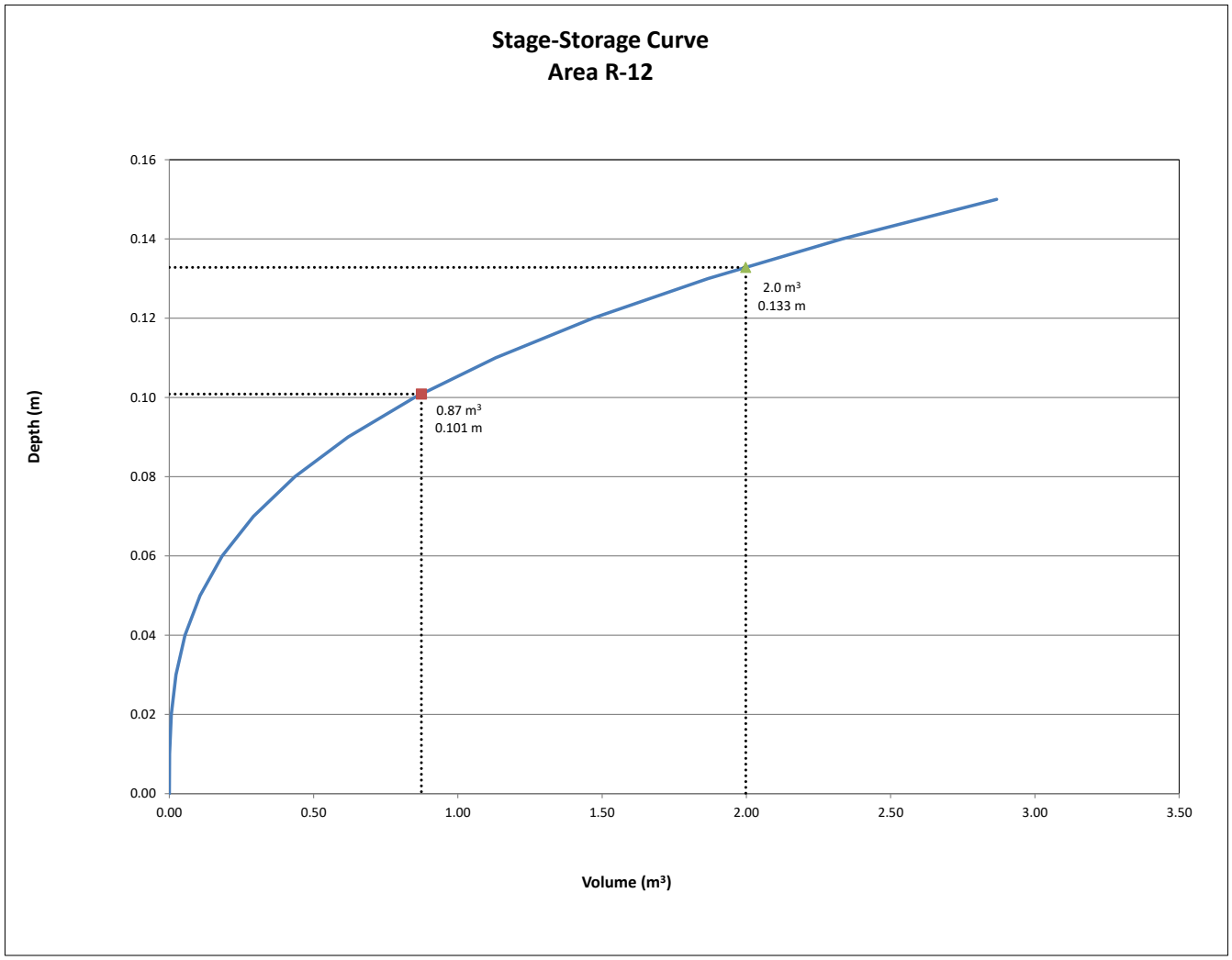
Ponding Depth (100-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
2	0.02	0.03
4	0.05	0.04
6	0.11	0.05
9	0.18	0.06
12	0.29	0.07
16	0.44	0.08
21	0.62	0.09
25	0.85	0.10
31	1.13	0.11
37	1.47	0.12
43	1.87	0.13
50	2.33	0.14
57	**2.87**	**0.15**

Linear Interpolation

0.14	H	0.13		H =	0.133 m
2.33	2.00	1.87		Q_{allow} =	0.50 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)


Stage-Storage Curve
Area R-12
Depth (m)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
Volume (m³)
2.0 m³
0.133 m
0.87 m³
0.101 m

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-13 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0049	ha	Qallow =	0.38
C =	0.90		Vol(max) =	0.58
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	1.72	1.34	0.40
10	104.19	1.27	0.89	0.54
15	83.56	1.02	0.64	0.58
20	70.25	0.86	0.48	0.58
25	60.90	0.74	0.37	0.55
30	53.93	0.66	0.28	0.51
35	48.52	0.59	0.22	0.45
40	44.18	0.54	0.16	0.39
45	40.63	0.49	0.12	0.32
50	37.65	0.46	0.08	0.25
55	35.12	0.43	0.05	0.17
60	32.94	0.40	0.03	0.09
65	31.04	0.38	0.00	0.01
70	29.37	0.36	-0.02	-0.07
75	27.89	0.34	-0.04	-0.16
80	26.56	0.32	-0.05	-0.25
85	25.37	0.31	-0.07	-0.34
90	24.29	0.30	-0.08	-0.43

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.00	0.02
2	0.02	0.03
3	0.04	0.04
4	0.07	0.05
6	0.12	0.06
8	0.19	0.07
11	0.29	0.08
14	0.41	0.09
17	0.57	0.10
21	0.75	0.11
24	0.98	0.12
29	1.24	0.13
33	1.55	0.14
38	**1.91**	**0.15**

Linear Interpolation

0.11	H	0.10		H =	0.101 m
0.75	0.58	0.57		Q_{allow} =	0.38 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-13 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0049	ha	Qallow =	0.50
C =	1.00		Vol(max) =	1.36
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	3.28	2.78	0.84
10	178.56	2.42	1.92	1.15
15	142.89	1.93	1.43	1.29
20	119.95	1.62	1.12	1.35
25	103.85	1.41	0.91	1.36
30	91.87	1.24	0.74	1.34
35	82.58	1.12	0.62	1.30
40	75.15	1.02	0.52	1.24
45	69.05	0.93	0.43	1.17
50	63.95	0.87	0.37	1.10
55	59.62	0.81	0.31	1.01
60	55.89	0.76	0.26	0.92
65	52.65	0.71	0.21	0.83
70	49.79	0.67	0.17	0.73
75	47.26	0.64	0.14	0.63
80	44.99	0.61	0.11	0.52
85	42.95	0.58	0.08	0.41
90	41.11	0.56	0.06	0.30

Notes: Vol = Qnet x time
Qnet = Q - Qallow

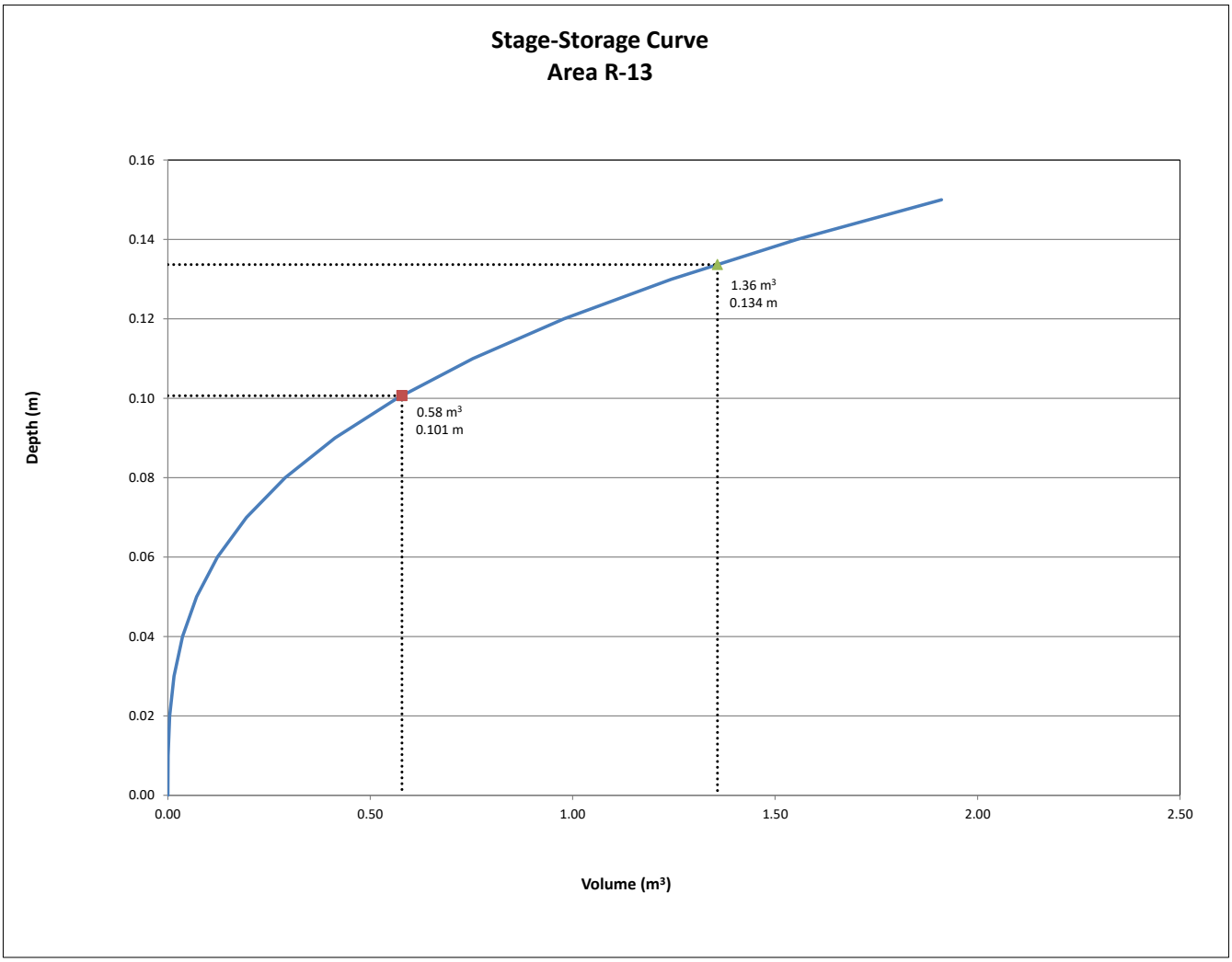
Ponding Depth (100-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.00	0.02
2	0.02	0.03
3	0.04	0.04
4	0.07	0.05
6	0.12	0.06
8	0.19	0.07
11	0.29	0.08
14	0.41	0.09
17	0.57	0.10
21	0.75	0.11
24	0.98	0.12
29	1.24	0.13
33	1.55	0.14
38	**1.91**	**0.15**

Linear Interpolation

0.14	H	0.13		H =	0.134 m
1.55	1.36	1.24		Q_{allow} =	0.50 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)


Stage-Storage Curve
Area R-13
Depth (m)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.50
1.00
1.50
2.00
2.50
Volume (m³)
1.36 m³
0.134 m
0.58 m³
0.101 m

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-14 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0059	ha	Qallow =	0.36
C =	0.90		Vol(max) =	0.81
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	2.08	1.72	0.52
10	104.19	1.54	1.18	0.71
15	83.56	1.23	0.87	0.79
20	70.25	1.04	0.68	0.81
25	60.90	0.90	0.54	0.81
30	53.93	0.80	0.44	0.79
35	48.52	0.72	0.36	0.75
40	44.18	0.65	0.29	0.70
45	40.63	0.60	0.24	0.65
50	37.65	0.56	0.20	0.59
55	35.12	0.52	0.16	0.52
60	32.94	0.49	0.13	0.46
65	31.04	0.46	0.10	0.38
70	29.37	0.43	0.07	0.31
75	27.89	0.41	0.05	0.23
80	26.56	0.39	0.03	0.15
85	25.37	0.37	0.01	0.07
90	24.29	0.36	0.00	-0.01

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
2	0.02	0.03
4	0.06	0.04
7	0.11	0.05
10	0.19	0.06
13	0.31	0.07
17	0.46	0.08
22	0.66	0.09
27	0.90	0.10
33	1.20	0.11
39	1.56	0.12
46	1.98	0.13
53	2.47	0.14
61	**3.04**	**0.15**

Linear Interpolation

0.10	H	0.09		H =	0.096 m
0.90	0.81	0.66		Q_{allow} =	0.36 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-14 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0059	ha	Qallow =	0.47
C =	1.00		Vol(max) =	1.87
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	3.98	3.51	1.05
10	178.56	2.93	2.46	1.48
15	142.89	2.34	1.87	1.69
20	119.95	1.97	1.50	1.80
25	103.85	1.70	1.23	1.85
30	91.87	1.51	1.04	1.87
35	82.58	1.35	0.88	1.86
40	75.15	1.23	0.76	1.83
45	69.05	1.13	0.66	1.79
50	63.95	1.05	0.58	1.74
55	59.62	0.98	0.51	1.68
60	55.89	0.92	0.45	1.61
65	52.65	0.86	0.39	1.54
70	49.79	0.82	0.35	1.46
75	47.26	0.78	0.31	1.37
80	44.99	0.74	0.27	1.29
85	42.95	0.70	0.23	1.20
90	41.11	0.67	0.20	1.10

Notes: Vol = Qnet x time
Qnet = Q - Qallow

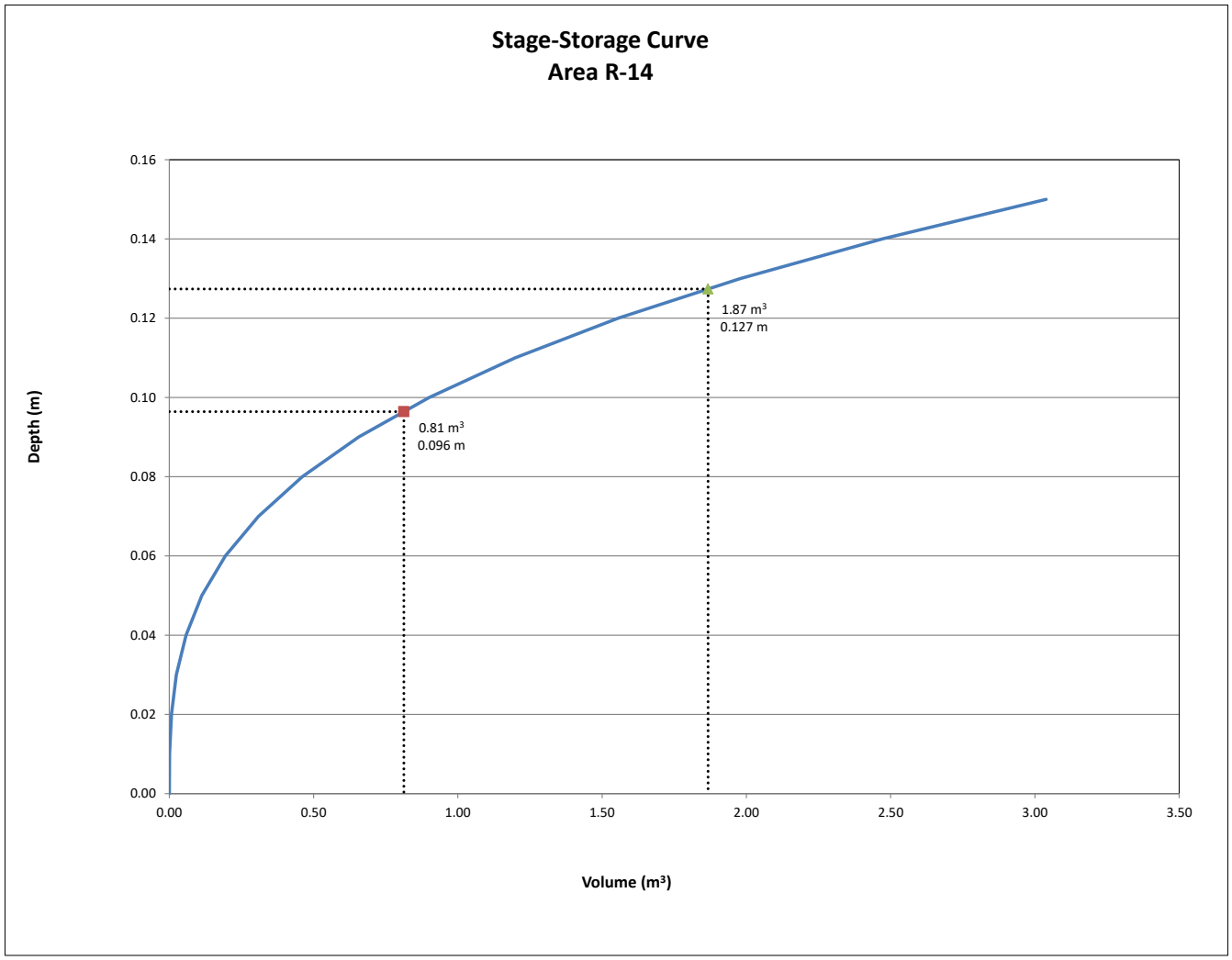
Ponding Depth (100-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
2	0.02	0.03
4	0.06	0.04
7	0.11	0.05
10	0.19	0.06
13	0.31	0.07
17	0.46	0.08
22	0.66	0.09
27	0.90	0.10
33	1.20	0.11
39	1.56	0.12
46	1.98	0.13
53	2.47	0.14
61	**3.04**	**0.15**

Linear Interpolation

0.13	H	0.12		H =	0.127 m
1.98	1.87	1.56		Q_{allow} =	0.47 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)


Stage-Storage Curve
Area R-14
Depth (m)
Volume (m³)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
1.87 m³
0.127 m
0.81 m³
0.096 m

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-15 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0044	ha	Qallow =	0.29
C =	0.90		Vol(max) =	0.58
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	1.55	1.26	0.38
10	104.19	1.15	0.86	0.51
15	83.56	0.92	0.63	0.57
20	70.25	0.77	0.48	0.58
25	60.90	0.67	0.38	0.57
30	53.93	0.59	0.30	0.55
35	48.52	0.53	0.24	0.51
40	44.18	0.49	0.20	0.47
45	40.63	0.45	0.16	0.42
50	37.65	0.41	0.12	0.37
55	35.12	0.39	0.10	0.32
60	32.94	0.36	0.07	0.26
65	31.04	0.34	0.05	0.20
70	29.37	0.32	0.03	0.14
75	27.89	0.31	0.02	0.08
80	26.56	0.29	0.00	0.01
85	25.37	0.28	-0.01	-0.06
90	24.29	0.27	-0.02	-0.12

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
3	0.03	0.03
6	0.08	0.04
9	0.15	0.05
13	0.26	0.06
18	0.41	0.07
23	0.61	0.08
29	0.87	0.09
36	1.19	0.10
43	1.58	0.11
51	2.06	0.12
60	2.62	0.13
70	3.27	0.14
80	**4.02**	**0.15**

Linear Interpolation

0.08	H	0.07		H =	0.079 m
0.61	0.58	0.41		Q_{allow} =	0.29 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-15 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0044	ha	Qallow =	0.39
C =	1.00		Vol(max) =	1.32
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	2.97	2.58	0.77
10	178.56	2.18	1.79	1.08
15	142.89	1.75	1.36	1.22
20	119.95	1.47	1.08	1.29
25	103.85	1.27	0.88	1.32
30	91.87	1.12	0.73	1.32
35	82.58	1.01	0.62	1.30
40	75.15	0.92	0.53	1.27
45	69.05	0.84	0.45	1.23
50	63.95	0.78	0.39	1.18
55	59.62	0.73	0.34	1.12
60	55.89	0.68	0.29	1.06
65	52.65	0.64	0.25	0.99
70	49.79	0.61	0.22	0.92
75	47.26	0.58	0.19	0.85
80	44.99	0.55	0.16	0.77
85	42.95	0.53	0.14	0.69
90	41.11	0.50	0.11	0.61

Notes: Vol = Qnet x time
Qnet = Q - Qallow

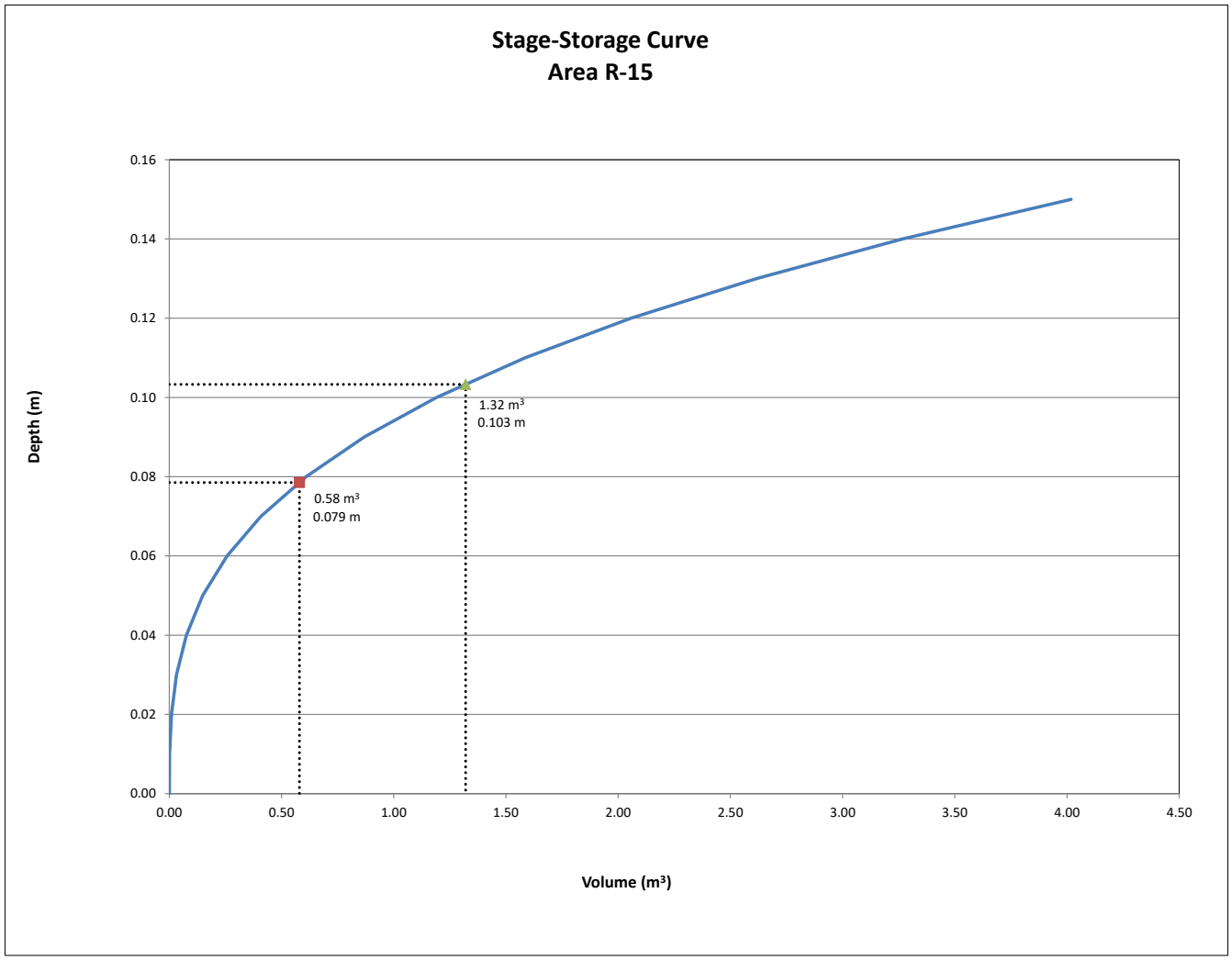
Ponding Depth (100-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
3	0.03	0.03
6	0.08	0.04
9	0.15	0.05
13	0.26	0.06
18	0.41	0.07
23	0.61	0.08
29	0.87	0.09
36	1.19	0.10
43	1.58	0.11
51	2.06	0.12
60	2.62	0.13
70	3.27	0.14
80	**4.02**	**0.15**

Linear Interpolation

0.11	H	0.1		H =	0.103 m
1.58	1.32	1.19		Q_{allow} =	0.39 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)


Stage-Storage Curve
Area R-15
Depth (m)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
Volume (m³)
1.32 m³
0.103 m
0.58 m³
0.079 m

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-16 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0084	ha	Qallow =	0.39
C =	0.90		Vol(max) =	1.34
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	2.97	2.58	0.77
10	104.19	2.19	1.80	1.08
15	83.56	1.76	1.37	1.23
20	70.25	1.48	1.09	1.31
25	60.90	1.28	0.89	1.34
30	53.93	1.13	0.74	1.34
35	48.52	1.02	0.63	1.33
40	44.18	0.93	0.54	1.30
45	40.63	0.86	0.47	1.26
50	37.65	0.79	0.40	1.21
55	35.12	0.74	0.35	1.15
60	32.94	0.69	0.30	1.09
65	31.04	0.65	0.26	1.03
70	29.37	0.62	0.23	0.96
75	27.89	0.59	0.20	0.89
80	26.56	0.56	0.17	0.81
85	25.37	0.53	0.14	0.73
90	24.29	0.51	0.12	0.65

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
3	0.03	0.03
6	0.08	0.04
9	0.15	0.05
13	0.26	0.06
18	0.41	0.07
23	0.61	0.08
29	0.87	0.09
36	1.20	0.10
44	1.60	0.11
52	2.07	0.12
61	2.63	0.13
70	3.29	0.14
81	**4.05**	**0.15**

Linear Interpolation

0.11	H	0.10		H =	0.104 m
1.60	1.34	1.20		Q_{allow} =	0.39 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-16 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0084	ha	Qallow =	0.51
C =	1.00		Vol(max) =	2.99
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	5.68	5.17	1.55
10	178.56	4.18	3.67	2.20
15	142.89	3.34	2.83	2.55
20	119.95	2.80	2.29	2.75
25	103.85	2.43	1.92	2.88
30	91.87	2.15	1.64	2.95
35	82.58	1.93	1.42	2.98
40	75.15	1.76	1.25	2.99
45	69.05	1.61	1.10	2.98
50	63.95	1.50	0.99	2.96
55	59.62	1.39	0.88	2.92
60	55.89	1.31	0.80	2.87
65	52.65	1.23	0.72	2.81
70	49.79	1.16	0.65	2.75
75	47.26	1.10	0.59	2.68
80	44.99	1.05	0.54	2.60
85	42.95	1.00	0.49	2.52
90	41.11	0.96	0.45	2.44

Notes: Vol = Qnet x time
Qnet = Q - Qallow

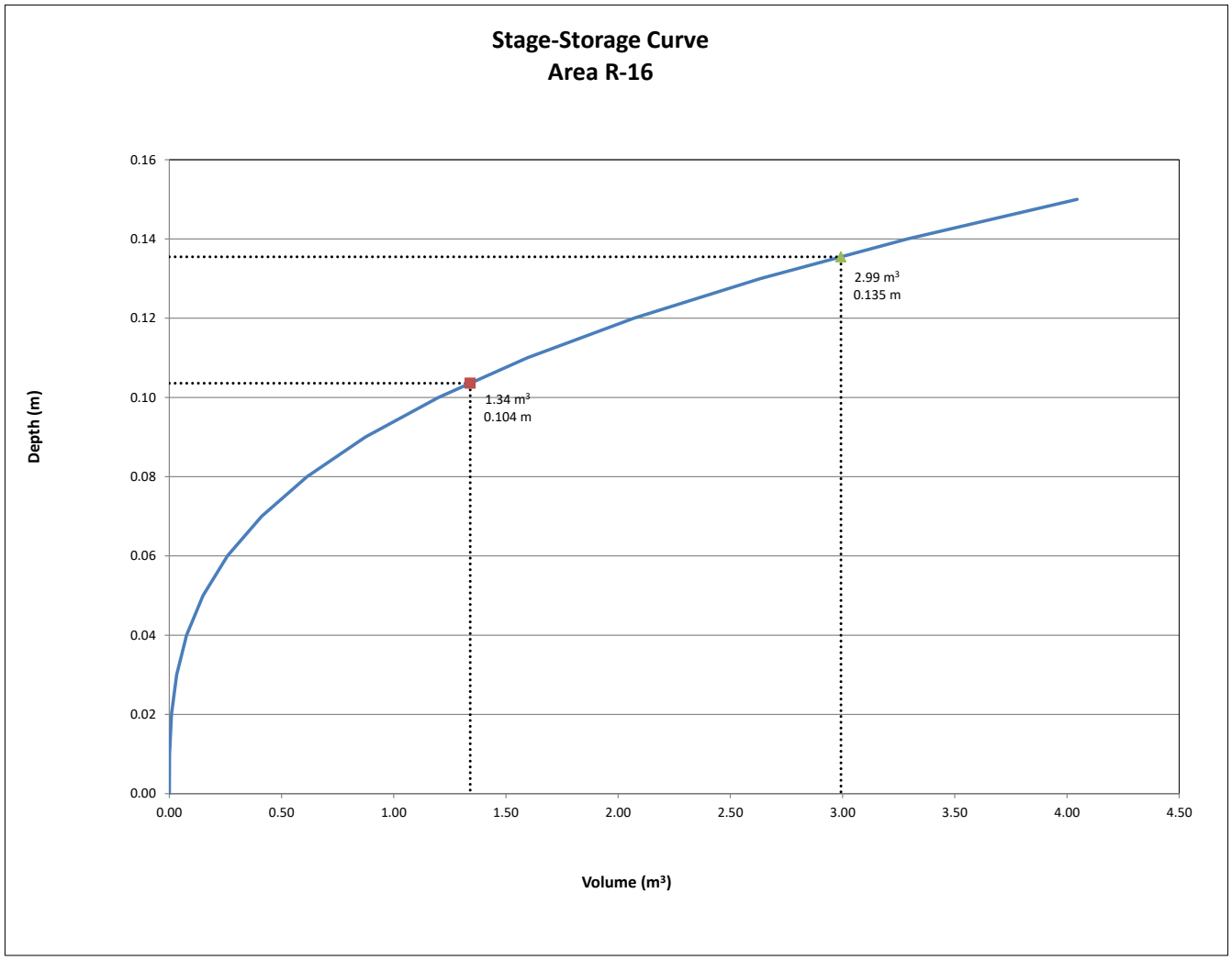
Ponding Depth (100-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
3	0.03	0.03
6	0.08	0.04
9	0.15	0.05
13	0.26	0.06
18	0.41	0.07
23	0.61	0.08
29	0.87	0.09
36	1.20	0.10
44	1.60	0.11
52	2.07	0.12
61	2.63	0.13
70	3.29	0.14
81	**4.05**	**0.15**

Linear Interpolation

0.14	H	0.13		H =	0.135 m
3.29	2.99	2.63		Q_{allow} =	0.51 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)


Stage-Storage Curve
Area R-16
Depth (m)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
Volume (m³)
2.99 m³
0.135 m
1.34 m³
0.104 m

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-17 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0080	ha	Qallow =	0.42
C =	0.90		Vol(max) =	1.19
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	2.82	2.40	0.72
10	104.19	2.08	1.66	1.00
15	83.56	1.67	1.25	1.12
20	70.25	1.40	0.98	1.18
25	60.90	1.22	0.80	1.19
30	53.93	1.08	0.66	1.18
35	48.52	0.97	0.55	1.15
40	44.18	0.88	0.46	1.11
45	40.63	0.81	0.39	1.06
50	37.65	0.75	0.33	1.00
55	35.12	0.70	0.28	0.93
60	32.94	0.66	0.24	0.86
65	31.04	0.62	0.20	0.78
70	29.37	0.59	0.17	0.70
75	27.89	0.56	0.14	0.62
80	26.56	0.53	0.11	0.53
85	25.37	0.51	0.09	0.44
90	24.29	0.49	0.07	0.35

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
2	0.02	0.03
4	0.05	0.04
6	0.10	0.05
9	0.18	0.06
12	0.29	0.07
16	0.43	0.08
20	0.61	0.09
25	0.83	0.10
30	1.11	0.11
36	1.44	0.12
42	1.83	0.13
49	2.28	0.14
56	**2.80**	**0.15**

Linear Interpolation

0.12	H	0.11		H =	0.113 m
1.44	1.19	1.11		Q_{allow} =	0.42 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-17 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0080	ha	Qallow =	0.55
C =	1.00		Vol(max) =	2.69
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	5.39	4.84	1.45
10	178.56	3.96	3.41	2.05
15	142.89	3.17	2.62	2.36
20	119.95	2.66	2.11	2.53
25	103.85	2.30	1.75	2.63
30	91.87	2.04	1.49	2.68
35	82.58	1.83	1.28	2.69
40	75.15	1.67	1.12	2.68
45	69.05	1.53	0.98	2.65
50	63.95	1.42	0.87	2.61
55	59.62	1.32	0.77	2.55
60	55.89	1.24	0.69	2.49
65	52.65	1.17	0.62	2.41
70	49.79	1.10	0.55	2.33
75	47.26	1.05	0.50	2.24
80	44.99	1.00	0.45	2.15
85	42.95	0.95	0.40	2.06
90	41.11	0.91	0.36	1.96

Notes: Vol = Qnet x time
Qnet = Q - Qallow

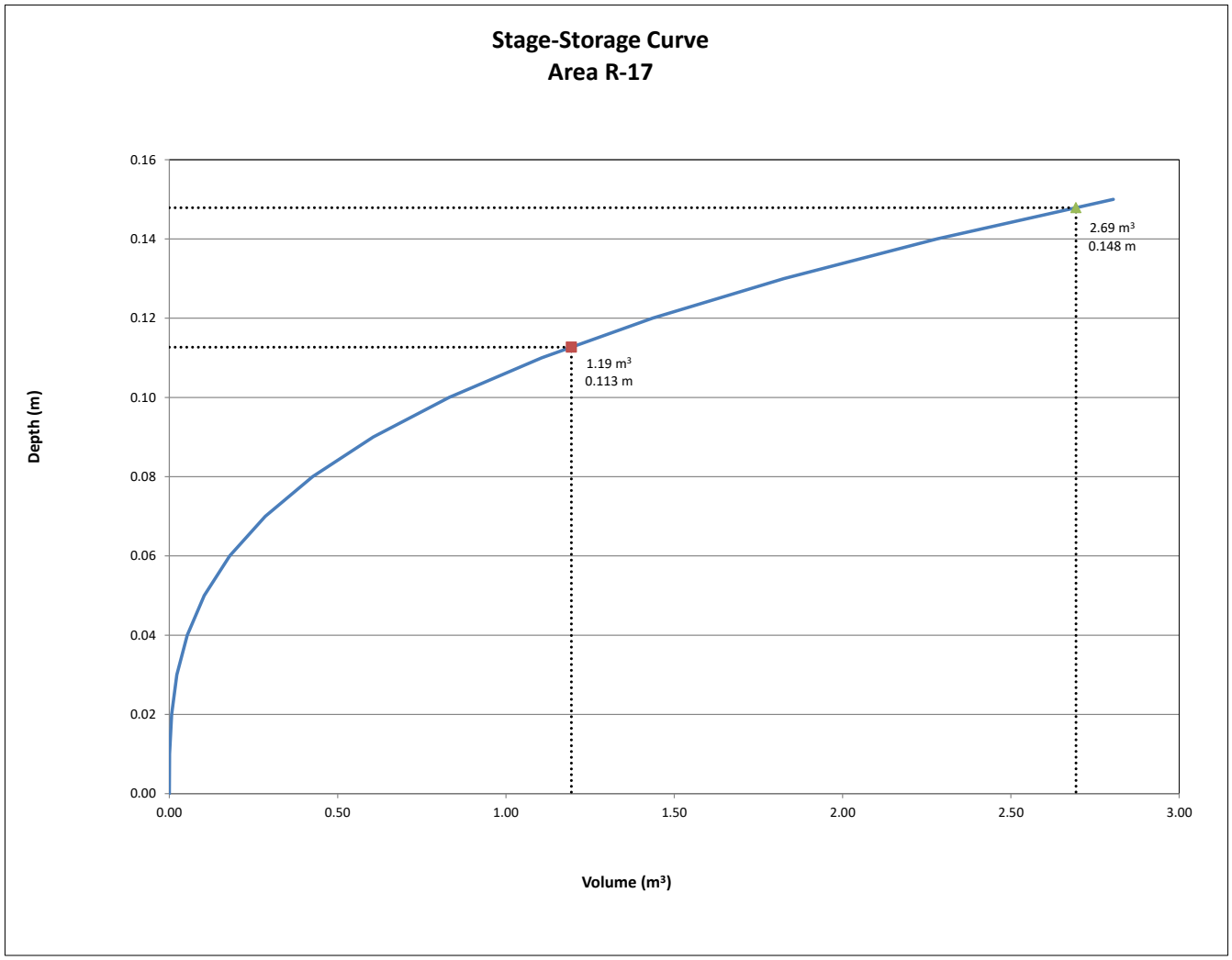
Ponding Depth (100-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
2	0.02	0.03
4	0.05	0.04
6	0.10	0.05
9	0.18	0.06
12	0.29	0.07
16	0.43	0.08
20	0.61	0.09
25	0.83	0.10
30	1.11	0.11
36	1.44	0.12
42	1.83	0.13
49	2.28	0.14
56	**2.80**	**0.15**

Linear Interpolation

0.15	H	0.14		H =	0.148 m
2.80	2.69	2.28		Q_{allow} =	0.55 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)


Stage-Storage Curve
Area R-17
Depth (m)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.50
1.00
1.50
2.00
2.50
3.00
Volume (m³)
2.69 m³
0.148 m
1.19 m³
0.113 m

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-18 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0037	ha	Qallow =	0.39
C =	0.90		Vol(max) =	0.34
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	1.31	0.92	0.27
10	104.19	0.96	0.57	0.34
15	83.56	0.77	0.38	0.34
20	70.25	0.65	0.26	0.31
25	60.90	0.56	0.17	0.26
30	53.93	0.50	0.11	0.20
35	48.52	0.45	0.06	0.12
40	44.18	0.41	0.02	0.04
45	40.63	0.38	-0.01	-0.04
50	37.65	0.35	-0.04	-0.13
55	35.12	0.32	-0.07	-0.22
60	32.94	0.30	-0.09	-0.31
65	31.04	0.29	-0.10	-0.40
70	29.37	0.27	-0.12	-0.50
75	27.89	0.26	-0.13	-0.59
80	26.56	0.25	-0.14	-0.69
85	25.37	0.23	-0.16	-0.79
90	24.29	0.22	-0.17	-0.89

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
0	0.00	0.02
1	0.01	0.03
1	0.02	0.04
2	0.04	0.05
3	0.07	0.06
5	0.11	0.07
6	0.16	0.08
8	0.23	0.09
9	0.31	0.10
11	0.41	0.11
13	0.53	0.12
16	0.68	0.13
18	0.85	0.14
21	**1.04**	**0.15**

Linear Interpolation

0.11	H	0.10		H =	0.103 m
0.41	0.34	0.31		Q_{allow} =	0.39 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-18 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0037	ha	Qallow =	0.52
C =	1.00		Vol(max) =	0.85
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	2.49	1.97	0.59
10	178.56	1.83	1.31	0.79
15	142.89	1.47	0.95	0.85
20	119.95	1.23	0.71	0.85
25	103.85	1.07	0.55	0.82
30	91.87	0.94	0.42	0.76
35	82.58	0.85	0.33	0.69
40	75.15	0.77	0.25	0.61
45	69.05	0.71	0.19	0.51
50	63.95	0.66	0.14	0.41
55	59.62	0.61	0.09	0.31
60	55.89	0.57	0.05	0.20
65	52.65	0.54	0.02	0.08
70	49.79	0.51	-0.01	-0.04
75	47.26	0.49	-0.03	-0.16
80	44.99	0.46	-0.06	-0.28
85	42.95	0.44	-0.08	-0.40
90	41.11	0.42	-0.10	-0.53

Notes: Vol = Qnet x time
Qnet = Q - Qallow

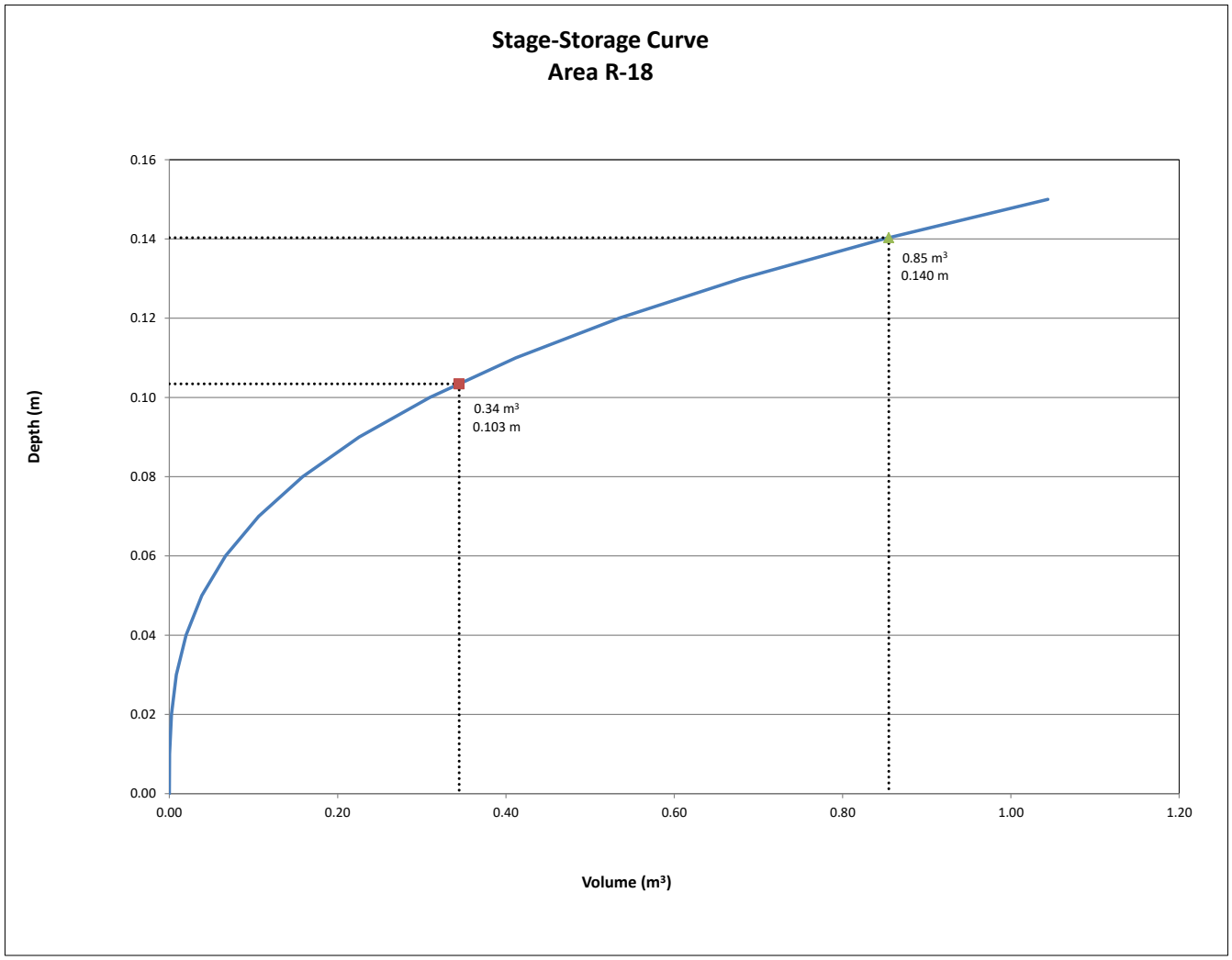
Ponding Depth (100-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
0	0.00	0.02
1	0.01	0.03
1	0.02	0.04
2	0.04	0.05
3	0.07	0.06
5	0.11	0.07
6	0.16	0.08
8	0.23	0.09
9	0.31	0.10
11	0.41	0.11
13	0.53	0.12
16	0.68	0.13
18	0.85	0.14
21	**1.04**	**0.15**

Linear Interpolation

0.15	H	0.14		H =	0.140 m
1.04	0.85	0.85		Q_{allow} =	0.52 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)


Stage-Storage Curve
Area R-18
Depth (m)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.20
0.40
0.60
0.80
1.00
1.20
Volume (m³)
0.85 m³
0.140 m
0.34 m³
0.103 m

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-19 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0035	ha	Qallow =	0.35
C =	0.90		Vol(max) =	0.35
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	1.25	0.90	0.27
10	104.19	0.92	0.57	0.34
15	83.56	0.74	0.39	0.35
20	70.25	0.62	0.27	0.33
25	60.90	0.54	0.19	0.28
30	53.93	0.48	0.13	0.23
35	48.52	0.43	0.08	0.17
40	44.18	0.39	0.04	0.10
45	40.63	0.36	0.01	0.02
50	37.65	0.33	-0.02	-0.05
55	35.12	0.31	-0.04	-0.13
60	32.94	0.29	-0.06	-0.21
65	31.04	0.27	-0.08	-0.29
70	29.37	0.26	-0.09	-0.38
75	27.89	0.25	-0.10	-0.47
80	26.56	0.23	-0.12	-0.55
85	25.37	0.22	-0.13	-0.64
90	24.29	0.21	-0.14	-0.73

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.00	0.02
1	0.01	0.03
2	0.03	0.04
3	0.05	0.05
5	0.09	0.06
6	0.14	0.07
8	0.22	0.08
10	0.31	0.09
13	0.42	0.10
15	0.56	0.11
18	0.73	0.12
21	0.93	0.13
25	1.16	0.14
28	**1.42**	**0.15**

Linear Interpolation

0.10	H	0.09		H =	0.094 m
0.42	0.35	0.31		Q_{allow} =	0.35 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-19 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0035	ha	Qallow =	0.47
C =	1.00		Vol(max) =	0.85
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	2.38	1.91	0.57
10	178.56	1.75	1.28	0.77
15	142.89	1.40	0.93	0.84
20	119.95	1.18	0.71	0.85
25	103.85	1.02	0.55	0.83
30	91.87	0.90	0.43	0.78
35	82.58	0.81	0.34	0.72
40	75.15	0.74	0.27	0.64
45	69.05	0.68	0.21	0.56
50	63.95	0.63	0.16	0.47
55	59.62	0.59	0.12	0.38
60	55.89	0.55	0.08	0.28
65	52.65	0.52	0.05	0.18
70	49.79	0.49	0.02	0.08
75	47.26	0.46	-0.01	-0.03
80	44.99	0.44	-0.03	-0.13
85	42.95	0.42	-0.05	-0.24
90	41.11	0.40	-0.07	-0.36

Notes: Vol = Qnet x time
Qnet = Q - Qallow

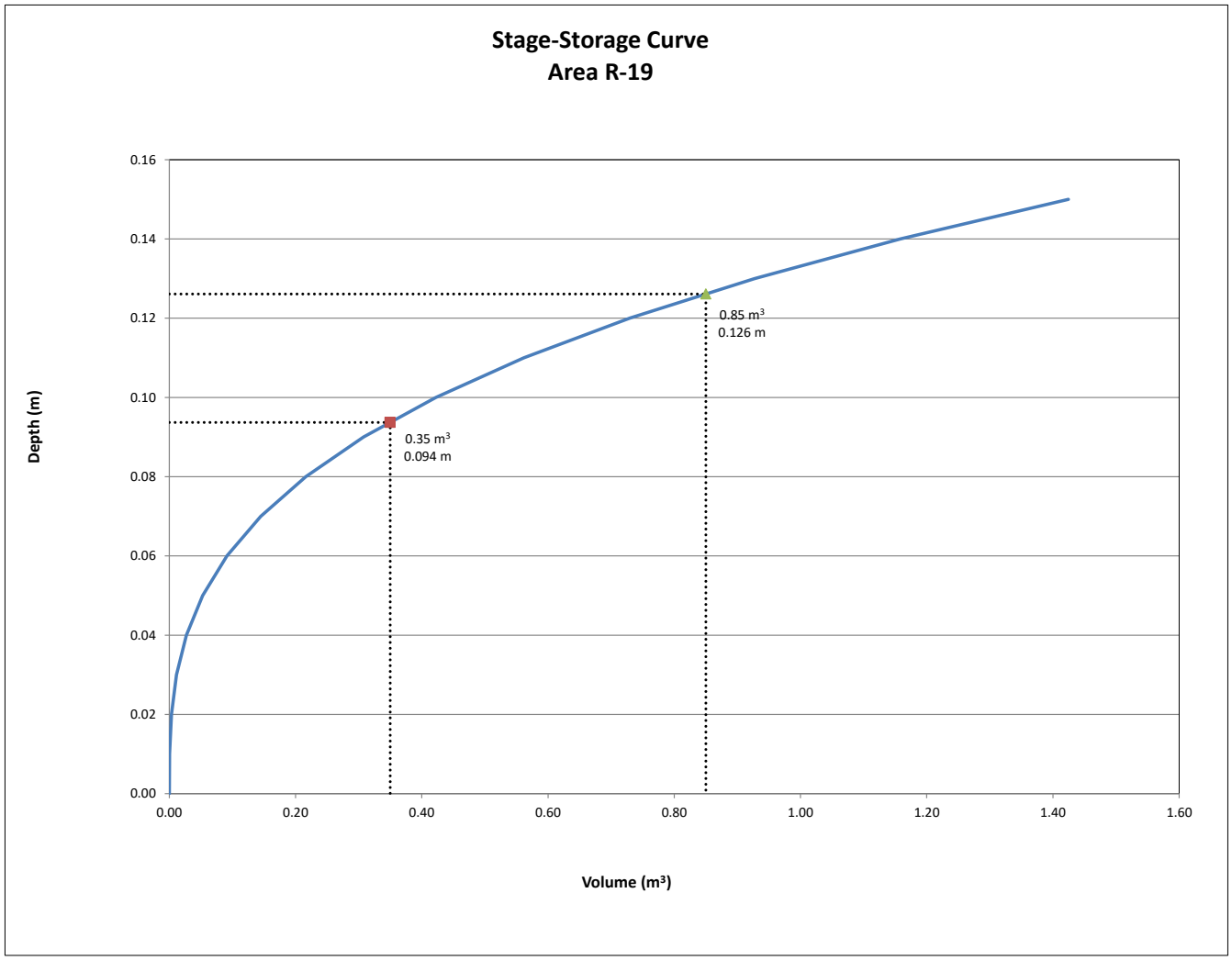
Ponding Depth (100-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.00	0.02
1	0.01	0.03
2	0.03	0.04
3	0.05	0.05
5	0.09	0.06
6	0.14	0.07
8	0.22	0.08
10	0.31	0.09
13	0.42	0.10
15	0.56	0.11
18	0.73	0.12
21	0.93	0.13
25	1.16	0.14
28	**1.42**	**0.15**

Linear Interpolation

0.13	H	0.12		H =	0.126 m
0.93	0.85	0.73		Q_{allow} =	0.47 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)


Stage-Storage Curve
Area R-19
Depth (m)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
1.60
Volume (m³)
0.85 m³
0.126 m
0.35 m³
0.094 m

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-20 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0054	ha	Qallow =	0.71
C =	0.90		Vol(max) =	0.41
			Notches =	2

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	1.90	1.19	0.36
10	104.19	1.40	0.69	0.41
15	83.56	1.12	0.41	0.37
20	70.25	0.94	0.23	0.28
25	60.90	0.82	0.11	0.16
30	53.93	0.72	0.01	0.03
35	48.52	0.65	-0.06	-0.12
40	44.18	0.59	-0.12	-0.28
45	40.63	0.55	-0.16	-0.44
50	37.65	0.51	-0.20	-0.61
55	35.12	0.47	-0.24	-0.78
60	32.94	0.44	-0.27	-0.96
65	31.04	0.42	-0.29	-1.14
70	29.37	0.39	-0.32	-1.32
75	27.89	0.37	-0.34	-1.51
80	26.56	0.36	-0.35	-1.69
85	25.37	0.34	-0.37	-1.88
90	24.29	0.33	-0.38	-2.07

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.00	0.02
1	0.01	0.03
2	0.03	0.04
4	0.06	0.05
5	0.10	0.06
7	0.16	0.07
9	0.24	0.08
11	0.34	0.09
14	0.47	0.10
17	0.63	0.11
20	0.81	0.12
24	1.04	0.13
28	1.29	0.14
32	**1.59**	**0.15**

Linear Interpolation

0.10	H	0.09		H =	0.096 m
0.47	0.41	0.34		Q_{allow} =	0.71 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-20 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0054	ha	Qallow =	0.97
C =	1.00		Vol(max) =	1.05
			Notches =	2

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	3.63	2.66	0.80
10	178.56	2.67	1.70	1.02
15	142.89	2.13	1.16	1.05
20	119.95	1.79	0.82	0.99
25	103.85	1.55	0.58	0.87
30	91.87	1.37	0.40	0.72
35	82.58	1.23	0.26	0.55
40	75.15	1.12	0.15	0.37
45	69.05	1.03	0.06	0.17
50	63.95	0.96	-0.01	-0.04
55	59.62	0.89	-0.08	-0.26
60	55.89	0.83	-0.14	-0.49
65	52.65	0.79	-0.18	-0.72
70	49.79	0.74	-0.23	-0.95
75	47.26	0.71	-0.26	-1.19
80	44.99	0.67	-0.30	-1.43
85	42.95	0.64	-0.33	-1.67
90	41.11	0.61	-0.36	-1.92

Notes: Vol = Qnet x time
Qnet = Q - Qallow

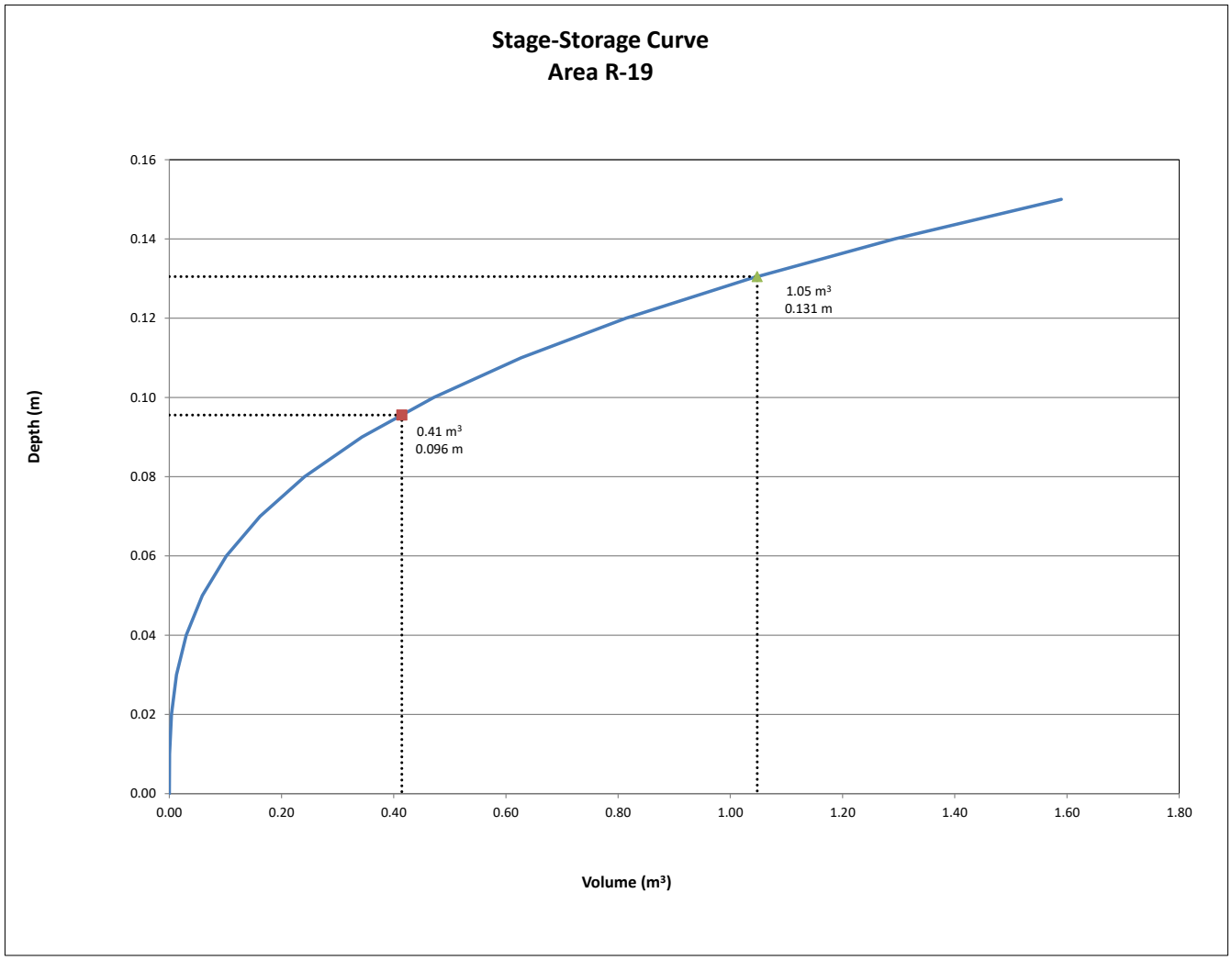
Ponding Depth (100-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.00	0.02
1	0.01	0.03
2	0.03	0.04
4	0.06	0.05
5	0.10	0.06
7	0.16	0.07
9	0.24	0.08
11	0.34	0.09
14	0.47	0.10
17	0.63	0.11
20	0.81	0.12
24	1.04	0.13
28	1.29	0.14
32	**1.59**	**0.15**

Linear Interpolation

0.14	H	0.13		H =	0.131 m
1.29	1.05	1.04		Q_{allow} =	0.97 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)


Stage-Storage Curve
Area R-19
Depth (m)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
1.60
1.80
Volume (m³)
1.05 m³
0.131 m
0.41 m³
0.096 m

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-21 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0099	ha	Qallow =	0.79
C =	0.90		Vol(max) =	1.16
			Notches =	2

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	3.51	2.72	0.82
10	104.19	2.59	1.80	1.08
15	83.56	2.08	1.29	1.16
20	70.25	1.75	0.96	1.15
25	60.90	1.51	0.72	1.08
30	53.93	1.34	0.55	0.99
35	48.52	1.21	0.42	0.87
40	44.18	1.10	0.31	0.74
45	40.63	1.01	0.22	0.59
50	37.65	0.94	0.15	0.44
55	35.12	0.87	0.08	0.27
60	32.94	0.82	0.03	0.10
65	31.04	0.77	-0.02	-0.07
70	29.37	0.73	-0.06	-0.25
75	27.89	0.69	-0.10	-0.44
80	26.56	0.66	-0.13	-0.62
85	25.37	0.63	-0.16	-0.82
90	24.29	0.60	-0.19	-1.01

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
3	0.03	0.03
5	0.06	0.04
7	0.12	0.05
10	0.21	0.06
14	0.33	0.07
19	0.50	0.08
24	0.71	0.09
29	0.97	0.10
35	1.29	0.11
42	1.67	0.12
49	2.13	0.13
57	2.66	0.14
65	**3.27**	**0.15**

Linear Interpolation

0.11	H	0.10		H =	0.106 m
1.29	1.16	0.97		Q_{allow} =	0.79 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-21 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0099	ha	Qallow =	1.05
C =	1.00		Vol(max) =	2.72
			Notches =	2

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	6.70	5.65	1.69
10	178.56	4.93	3.88	2.33
15	142.89	3.94	2.89	2.60
20	119.95	3.31	2.26	2.71
25	103.85	2.87	1.82	2.72
30	91.87	2.54	1.49	2.67
35	82.58	2.28	1.23	2.58
40	75.15	2.07	1.02	2.46
45	69.05	1.91	0.86	2.31
50	63.95	1.77	0.72	2.15
55	59.62	1.65	0.60	1.97
60	55.89	1.54	0.49	1.77
65	52.65	1.45	0.40	1.57
70	49.79	1.37	0.32	1.36
75	47.26	1.30	0.25	1.14
80	44.99	1.24	0.19	0.92
85	42.95	1.19	0.14	0.69
90	41.11	1.13	0.08	0.46

Notes: Vol = Qnet x time
Qnet = Q - Qallow

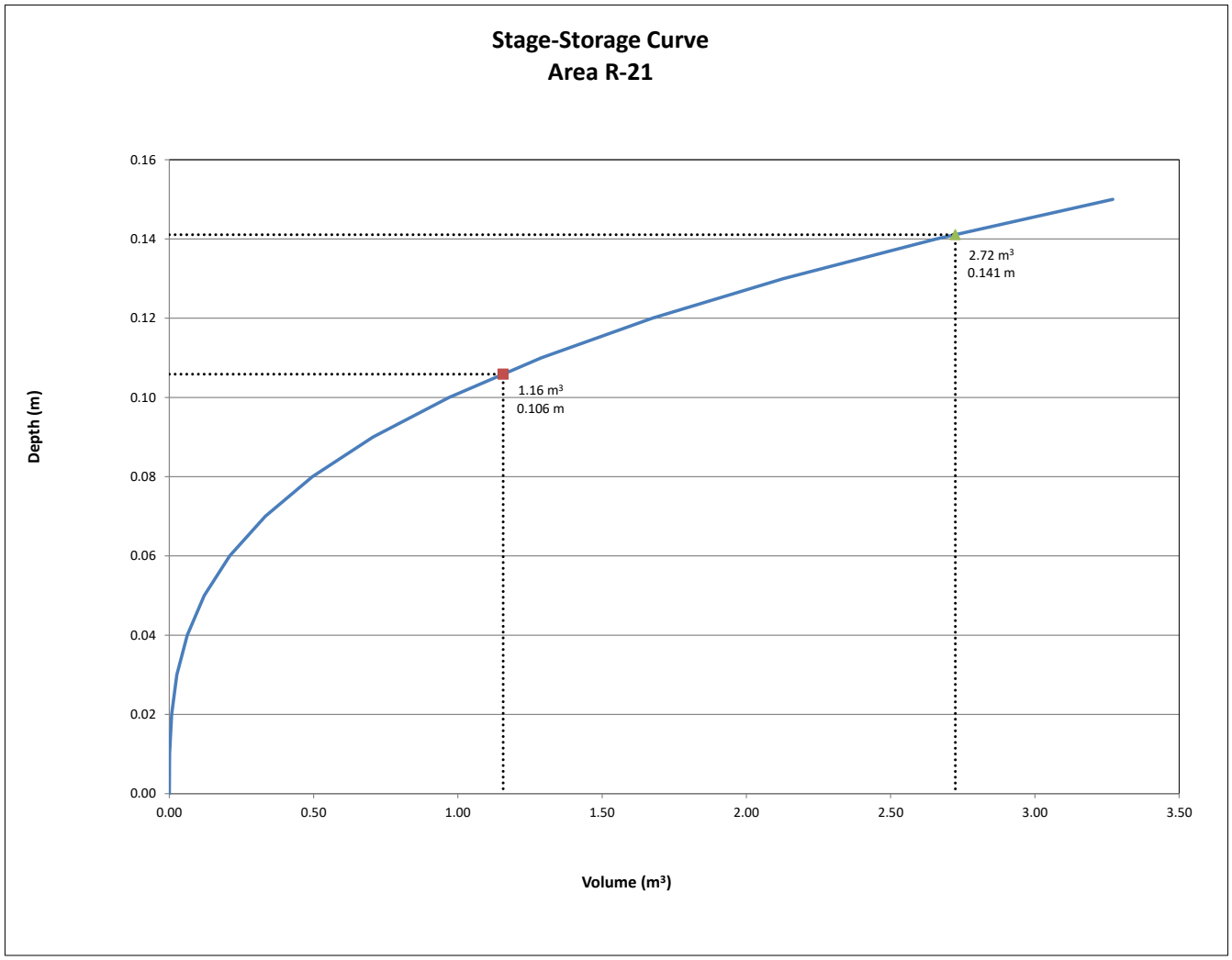
Ponding Depth (100-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
3	0.03	0.03
5	0.06	0.04
7	0.12	0.05
10	0.21	0.06
14	0.33	0.07
19	0.50	0.08
24	0.71	0.09
29	0.97	0.10
35	1.29	0.11
42	1.67	0.12
49	2.13	0.13
57	2.66	0.14
65	**3.27**	**0.15**

Linear Interpolation

0.15	H	0.14		H =	0.141 m
3.27	2.72	2.66		Q_{allow} =	1.05 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)


Stage-Storage Curve
Area R-21
Depth (m)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
Volume (m³)
2.72 m³
0.141 m
1.16 m³
0.106 m

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-22 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0099	ha	Qallow =	0.78
C =	0.90		Vol(max) =	1.16
			Notches =	2

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	3.50	2.72	0.82
10	104.19	2.58	1.80	1.08
15	83.56	2.07	1.29	1.16
20	70.25	1.74	0.96	1.15
25	60.90	1.51	0.73	1.09
30	53.93	1.34	0.56	1.00
35	48.52	1.20	0.42	0.89
40	44.18	1.09	0.31	0.75
45	40.63	1.01	0.23	0.61
50	37.65	0.93	0.15	0.46
55	35.12	0.87	0.09	0.30
60	32.94	0.82	0.04	0.13
65	31.04	0.77	-0.01	-0.04
70	29.37	0.73	-0.05	-0.22
75	27.89	0.69	-0.09	-0.40
80	26.56	0.66	-0.12	-0.59
85	25.37	0.63	-0.15	-0.77
90	24.29	0.60	-0.18	-0.96

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
3	0.03	0.03
5	0.07	0.04
8	0.13	0.05
11	0.22	0.06
15	0.35	0.07
20	0.52	0.08
25	0.75	0.09
31	1.02	0.10
37	1.36	0.11
44	1.77	0.12
52	2.25	0.13
60	2.81	0.14
69	**3.45**	**0.15**

Linear Interpolation

0.11	H	0.10		H =	0.104 m
1.36	1.16	1.02		Q_{allow} =	0.78 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-22 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0099	ha	Qallow =	1.03
C =	1.00		Vol(max) =	2.74
			Notches =	2

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	6.68	5.65	1.69
10	178.56	4.91	3.88	2.33
15	142.89	3.93	2.90	2.61
20	119.95	3.30	2.27	2.72
25	103.85	2.86	1.83	2.74
30	91.87	2.53	1.50	2.69
35	82.58	2.27	1.24	2.60
40	75.15	2.07	1.04	2.48
45	69.05	1.90	0.87	2.34
50	63.95	1.76	0.73	2.18
55	59.62	1.64	0.61	2.01
60	55.89	1.54	0.51	1.82
65	52.65	1.45	0.42	1.62
70	49.79	1.37	0.34	1.42
75	47.26	1.30	0.27	1.20
80	44.99	1.24	0.21	0.99
85	42.95	1.18	0.15	0.76
90	41.11	1.13	0.10	0.53

Notes: Vol = Qnet x time
Qnet = Q - Qallow

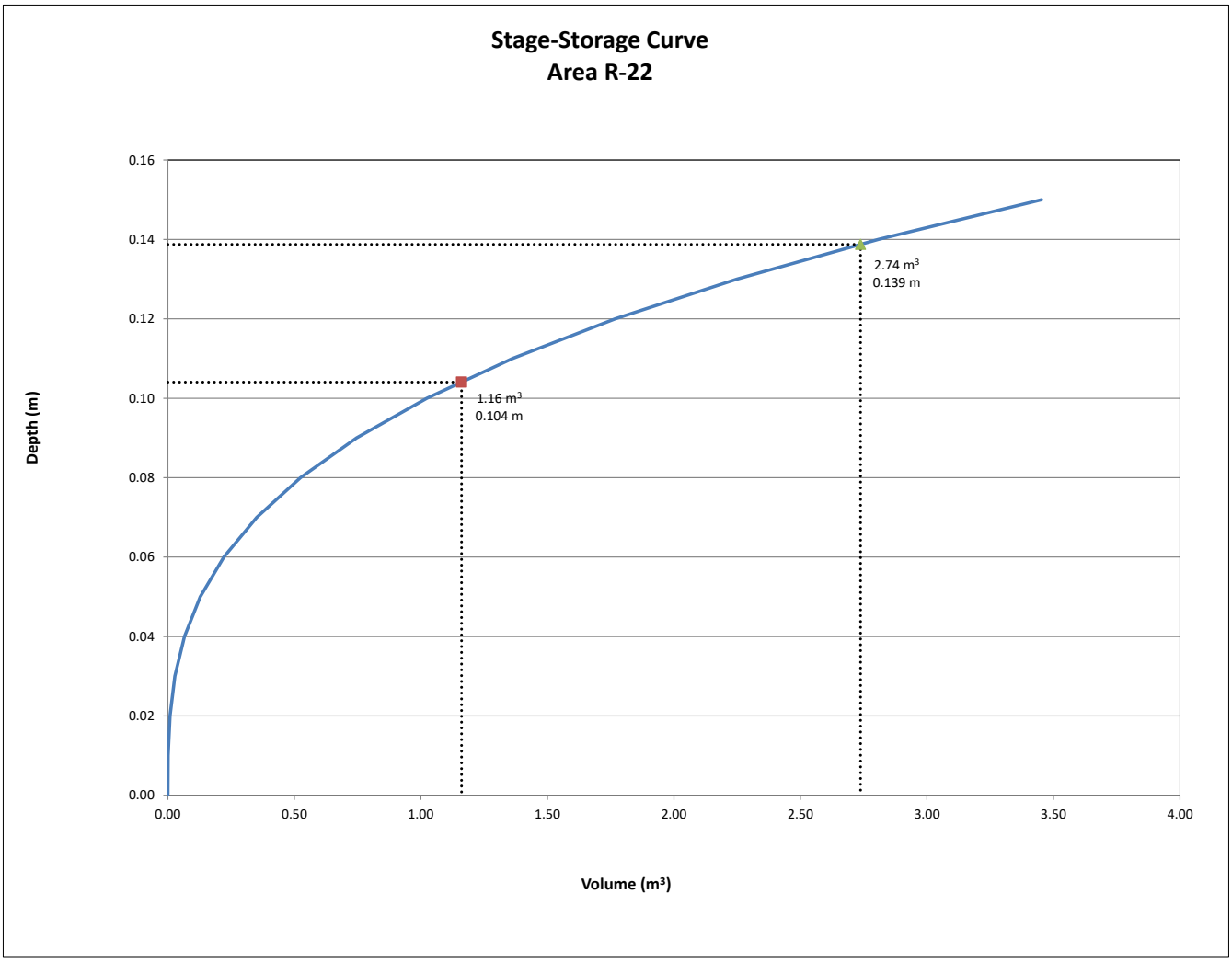
Ponding Depth (100-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
3	0.03	0.03
5	0.07	0.04
8	0.13	0.05
11	0.22	0.06
15	0.35	0.07
20	0.52	0.08
25	0.75	0.09
31	1.02	0.10
37	1.36	0.11
44	1.77	0.12
52	2.25	0.13
60	2.81	0.14
69	**3.45**	**0.15**

Linear Interpolation

0.14	H	0.13		H =	0.139 m
2.81	2.74	2.25		Q_{allow} =	1.03 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)


Stage-Storage Curve
Area R-22
Depth (m)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
Volume (m³)
2.74 m³
0.139 m
1.16 m³
0.104 m

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-23 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0087	ha	Qallow =	0.40
C =	0.90		Vol(max) =	1.40
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	3.08	2.68	0.80
10	104.19	2.27	1.87	1.12
15	83.56	1.82	1.42	1.28
20	70.25	1.53	1.13	1.36
25	60.90	1.33	0.93	1.39
30	53.93	1.18	0.78	1.40
35	48.52	1.06	0.66	1.38
40	44.18	0.96	0.56	1.35
45	40.63	0.89	0.49	1.31
50	37.65	0.82	0.42	1.27
55	35.12	0.77	0.37	1.21
60	32.94	0.72	0.32	1.15
65	31.04	0.68	0.28	1.08
70	29.37	0.64	0.24	1.01
75	27.89	0.61	0.21	0.94
80	26.56	0.58	0.18	0.86
85	25.37	0.55	0.15	0.78
90	24.29	0.53	0.13	0.70

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
3	0.03	0.03
5	0.07	0.04
8	0.14	0.05
12	0.24	0.06
16	0.38	0.07
21	0.57	0.08
27	0.81	0.09
33	1.11	0.10
40	1.48	0.11
48	1.92	0.12
56	2.44	0.13
65	3.05	0.14
75	**3.75**	**0.15**

Linear Interpolation

0.11	H	0.10		H =	0.108 m
1.48	1.40	1.11		Q_{allow} =	0.40 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-23 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0087	ha	Qallow =	0.53
C =	1.00		Vol(max) =	3.11
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	5.89	5.36	1.61
10	178.56	4.33	3.81	2.28
15	142.89	3.47	2.94	2.65
20	119.95	2.91	2.38	2.86
25	103.85	2.52	1.99	2.99
30	91.87	2.23	1.70	3.07
35	82.58	2.00	1.48	3.10
40	75.15	1.82	1.30	3.11
45	69.05	1.67	1.15	3.10
50	63.95	1.55	1.03	3.08
55	59.62	1.45	0.92	3.04
60	55.89	1.36	0.83	2.99
65	52.65	1.28	0.75	2.93
70	49.79	1.21	0.68	2.87
75	47.26	1.15	0.62	2.79
80	44.99	1.09	0.57	2.72
85	42.95	1.04	0.52	2.64
90	41.11	1.00	0.47	2.55

Notes: Vol = Qnet x time
Qnet = Q - Qallow

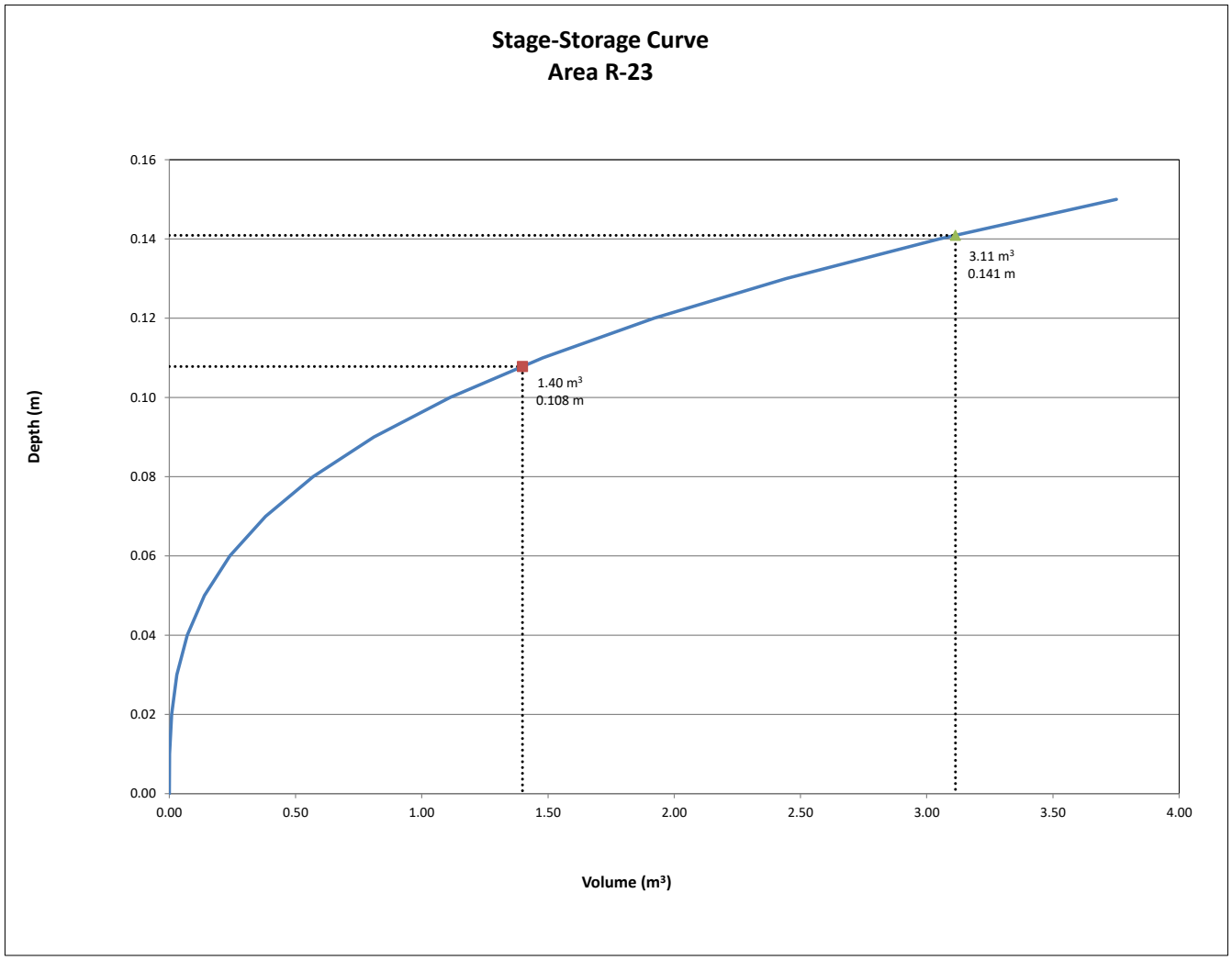
Ponding Depth (100-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
3	0.03	0.03
5	0.07	0.04
8	0.14	0.05
12	0.24	0.06
16	0.38	0.07
21	0.57	0.08
27	0.81	0.09
33	1.11	0.10
40	1.48	0.11
48	1.92	0.12
56	2.44	0.13
65	3.05	0.14
75	**3.75**	**0.15**

Linear Interpolation

0.15	H	0.14		H =	0.141 m
3.75	3.11	3.05		Q_{allow} =	0.53 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)


Stage-Storage Curve
Area R-23
Depth (m)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
Volume (m³)
3.11 m³
0.141 m
1.40 m³
0.108 m

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-24 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0074	ha	Qallow =	0.40
C =	0.90		Vol(max) =	1.09
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	2.61	2.21	0.66
10	104.19	1.93	1.53	0.92
15	83.56	1.54	1.14	1.03
20	70.25	1.30	0.90	1.08
25	60.90	1.13	0.73	1.09
30	53.93	1.00	0.60	1.07
35	48.52	0.90	0.50	1.04
40	44.18	0.82	0.42	1.00
45	40.63	0.75	0.35	0.95
50	37.65	0.70	0.30	0.89
55	35.12	0.65	0.25	0.82
60	32.94	0.61	0.21	0.75
65	31.04	0.57	0.17	0.68
70	29.37	0.54	0.14	0.60
75	27.89	0.52	0.12	0.52
80	26.56	0.49	0.09	0.44
85	25.37	0.47	0.07	0.35
90	24.29	0.45	0.05	0.27

Notes: Vol = Qnet x time
Qnet = Q - Qallow

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-24 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0074	ha	Qallow =	0.52
C =	1.00		Vol(max) =	2.47
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	4.99	4.47	1.34
10	178.56	3.67	3.15	1.89
15	142.89	2.94	2.42	2.17
20	119.95	2.46	1.94	2.33
25	103.85	2.13	1.61	2.42
30	91.87	1.89	1.37	2.46
35	82.58	1.70	1.18	2.47
40	75.15	1.54	1.02	2.46
45	69.05	1.42	0.90	2.43
50	63.95	1.31	0.79	2.38
55	59.62	1.22	0.70	2.33
60	55.89	1.15	0.63	2.26
65	52.65	1.08	0.56	2.19
70	49.79	1.02	0.50	2.11
75	47.26	0.97	0.45	2.03
80	44.99	0.92	0.40	1.94
85	42.95	0.88	0.36	1.85
90	41.11	0.84	0.32	1.75

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
2	0.02	0.03
4	0.06	0.04
7	0.11	0.05
10	0.19	0.06
13	0.31	0.07
17	0.46	0.08
22	0.65	0.09
27	0.89	0.10
32	1.19	0.11
39	1.54	0.12
45	1.96	0.13
52	2.45	0.14
60	**3.01**	**0.15**

Linear Interpolation

0.11	H	0.10		H =	0.107 m
1.19	1.09	0.89		Q_{allow} =	0.40 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

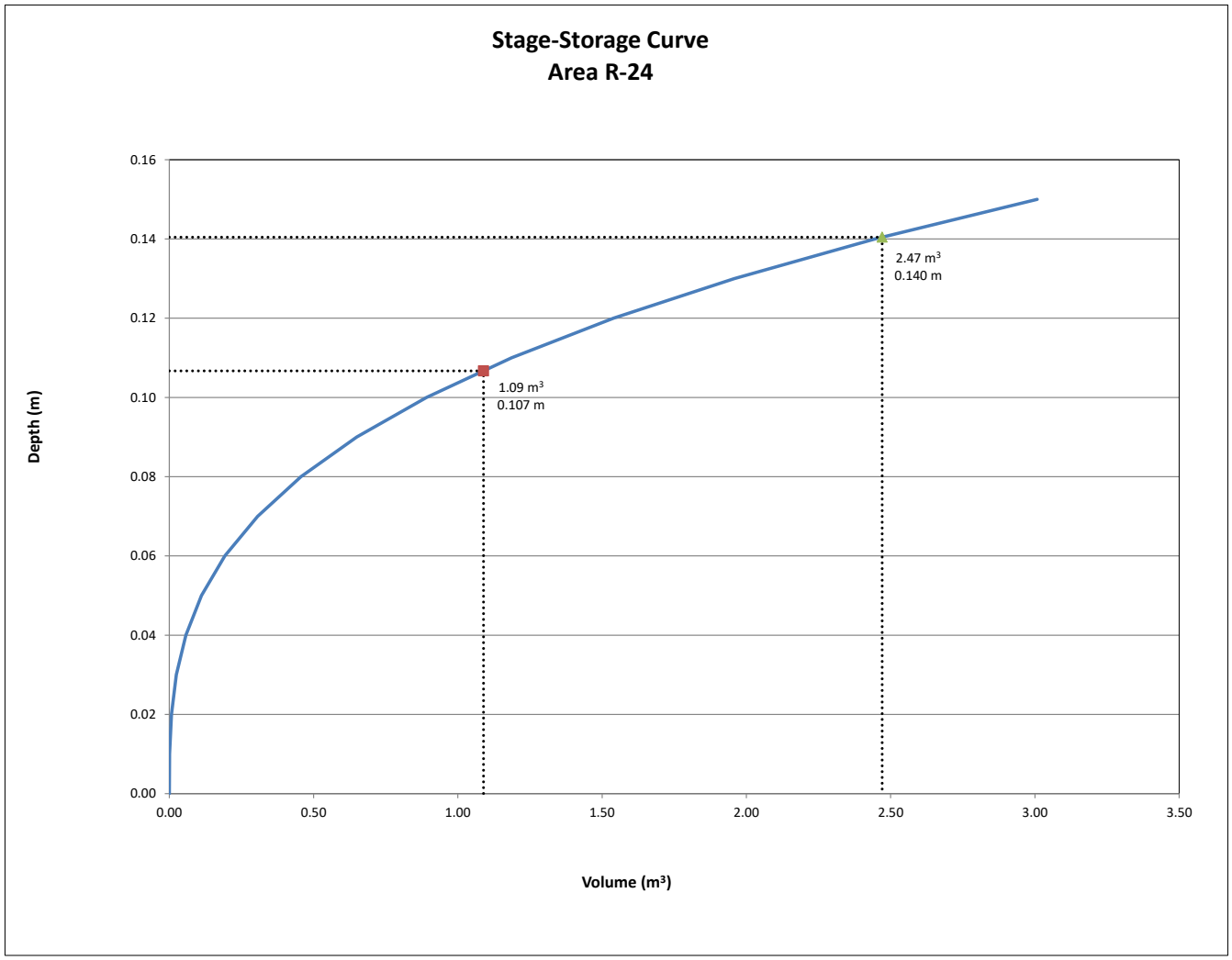
Ponding Depth (100-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
2	0.02	0.03
4	0.06	0.04
7	0.11	0.05
10	0.19	0.06
13	0.31	0.07
17	0.46	0.08
22	0.65	0.09
27	0.89	0.10
32	1.19	0.11
39	1.54	0.12
45	1.96	0.13
52	2.45	0.14
60	**3.01**	**0.15**

Linear Interpolation

0.15	H	0.14		H =	0.140 m
3.01	2.47	2.45		Q_{allow} =	0.52 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)


Stage-Storage Curve
Area R-24
Depth (m)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
Volume (m³)
2.47 m³
0.140 m
1.09 m³
0.107 m

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-25 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0064	ha	Qallow =	0.37
C =	0.90		Vol(max) =	0.91
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	2.26	1.89	0.57
10	104.19	1.67	1.30	0.78
15	83.56	1.34	0.97	0.87
20	70.25	1.12	0.75	0.90
25	60.90	0.97	0.60	0.91
30	53.93	0.86	0.49	0.89
35	48.52	0.78	0.41	0.85
40	44.18	0.71	0.34	0.81
45	40.63	0.65	0.28	0.76
50	37.65	0.60	0.23	0.70
55	35.12	0.56	0.19	0.63
60	32.94	0.53	0.16	0.56
65	31.04	0.50	0.13	0.49
70	29.37	0.47	0.10	0.42
75	27.89	0.45	0.08	0.34
80	26.56	0.42	0.05	0.26
85	25.37	0.41	0.04	0.18
90	24.29	0.39	0.02	0.10

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
2	0.02	0.03
4	0.06	0.04
7	0.11	0.05
10	0.19	0.06
13	0.31	0.07
17	0.46	0.08
22	0.65	0.09
27	0.89	0.10
32	1.19	0.11
39	1.54	0.12
45	1.96	0.13
52	2.45	0.14
60	**3.01**	**0.15**

Linear Interpolation

0.11	H	0.10		H =	0.100 m
1.19	0.91	0.89		Q_{allow} =	0.37 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-25 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0064	ha	Qallow =	0.49
C =	1.00		Vol(max) =	2.06
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	4.31	3.82	1.15
10	178.56	3.17	2.68	1.61
15	142.89	2.54	2.05	1.84
20	119.95	2.13	1.64	1.97
25	103.85	1.85	1.36	2.03
30	91.87	1.63	1.14	2.06
35	82.58	1.47	0.98	2.05
40	75.15	1.34	0.85	2.03
45	69.05	1.23	0.74	1.99
50	63.95	1.14	0.65	1.94
55	59.62	1.06	0.57	1.88
60	55.89	0.99	0.50	1.81
65	52.65	0.94	0.45	1.74
70	49.79	0.88	0.39	1.66
75	47.26	0.84	0.35	1.57
80	44.99	0.80	0.31	1.49
85	42.95	0.76	0.27	1.39
90	41.11	0.73	0.24	1.30

Notes: Vol = Qnet x time
Qnet = Q - Qallow

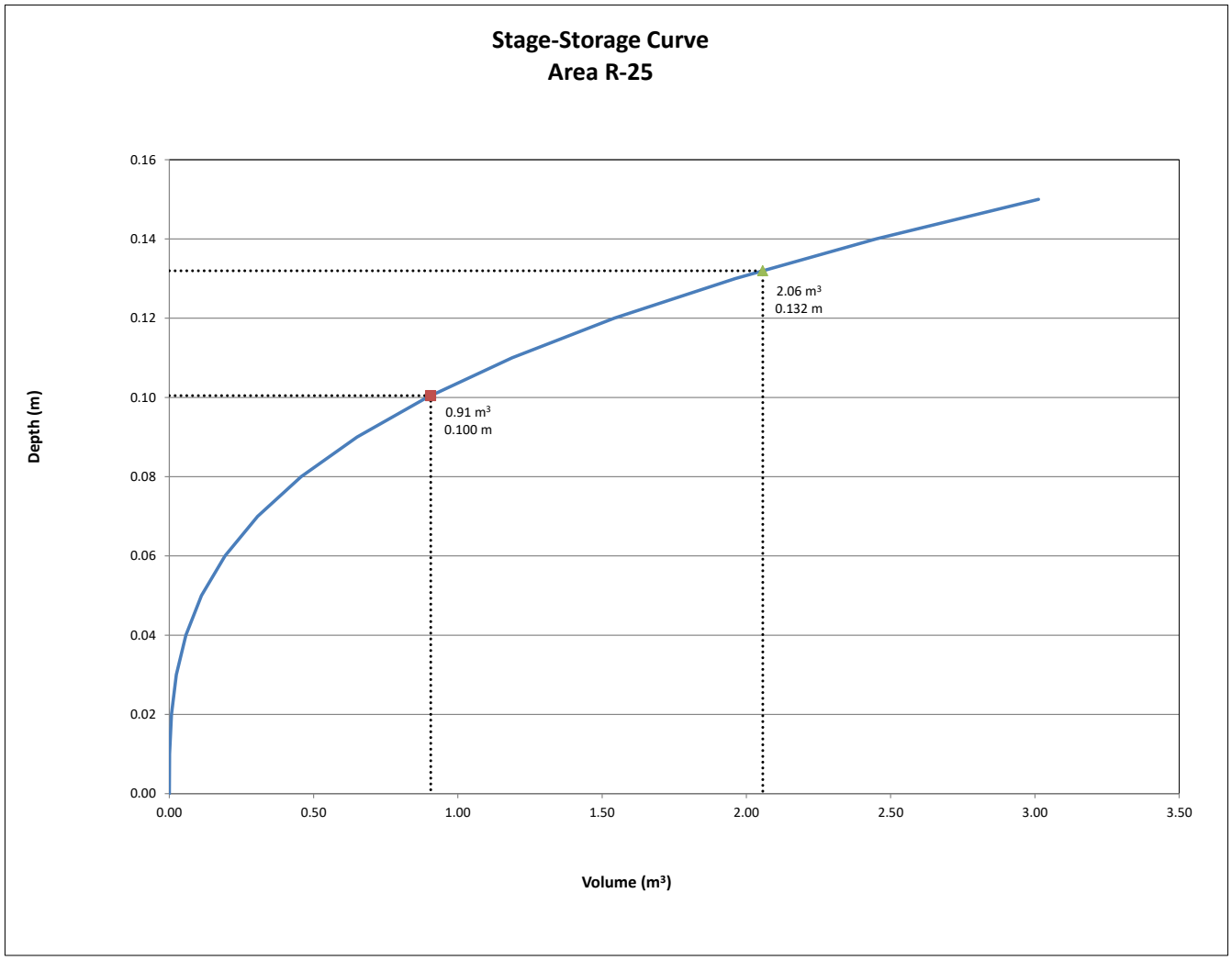
Ponding Depth (100-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
2	0.02	0.03
4	0.06	0.04
7	0.11	0.05
10	0.19	0.06
13	0.31	0.07
17	0.46	0.08
22	0.65	0.09
27	0.89	0.10
32	1.19	0.11
39	1.54	0.12
45	1.96	0.13
52	2.45	0.14
60	**3.01**	**0.15**

Linear Interpolation

0.14	H	0.13		H =	0.132 m
2.45	2.06	1.96		Q_{allow} =	0.49 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)


Stage-Storage Curve
Area R-25
Depth (m)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
Volume (m³)
2.06 m³
0.132 m
0.91 m³
0.100 m

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-26 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0097	ha	Qallow =	0.40
C =	0.90		Vol(max) =	1.63
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	3.42	3.02	0.91
10	104.19	2.53	2.13	1.28
15	83.56	2.03	1.63	1.46
20	70.25	1.70	1.30	1.57
25	60.90	1.48	1.08	1.62
30	53.93	1.31	0.91	1.63
35	48.52	1.18	0.78	1.63
40	44.18	1.07	0.67	1.61
45	40.63	0.99	0.59	1.58
50	37.65	0.91	0.51	1.54
55	35.12	0.85	0.45	1.49
60	32.94	0.80	0.40	1.44
65	31.04	0.75	0.35	1.38
70	29.37	0.71	0.31	1.31
75	27.89	0.68	0.28	1.24
80	26.56	0.64	0.24	1.17
85	25.37	0.62	0.22	1.10
90	24.29	0.59	0.19	1.02

Notes: Vol = Qnet x time
Qnet = Q - Qallow

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-26 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0097	ha	Qallow =	0.52
C =	1.00		Vol(max) =	3.62
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	6.54	6.02	1.81
10	178.56	4.81	4.29	2.58
15	142.89	3.85	3.33	3.00
20	119.95	3.23	2.71	3.26
25	103.85	2.80	2.28	3.42
30	91.87	2.48	1.96	3.52
35	82.58	2.23	1.71	3.58
40	75.15	2.03	1.51	3.61
45	69.05	1.86	1.34	3.62
50	63.95	1.72	1.20	3.61
55	59.62	1.61	1.09	3.59
60	55.89	1.51	0.99	3.55
65	52.65	1.42	0.90	3.51
70	49.79	1.34	0.82	3.45
75	47.26	1.27	0.75	3.39
80	44.99	1.21	0.69	3.33
85	42.95	1.16	0.64	3.25
90	41.11	1.11	0.59	3.18

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
2	0.01	0.02
4	0.04	0.03
6	0.08	0.04
10	0.16	0.05
14	0.28	0.06
19	0.45	0.07
25	0.67	0.08
32	0.95	0.09
39	1.30	0.10
47	1.73	0.11
56	2.25	0.12
66	2.86	0.13
76	3.57	0.14
88	**4.39**	**0.15**

Linear Interpolation

0.11	H	0.10		H =	0.108 m
1.73	1.63	1.30		Q_{allow} =	0.40 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

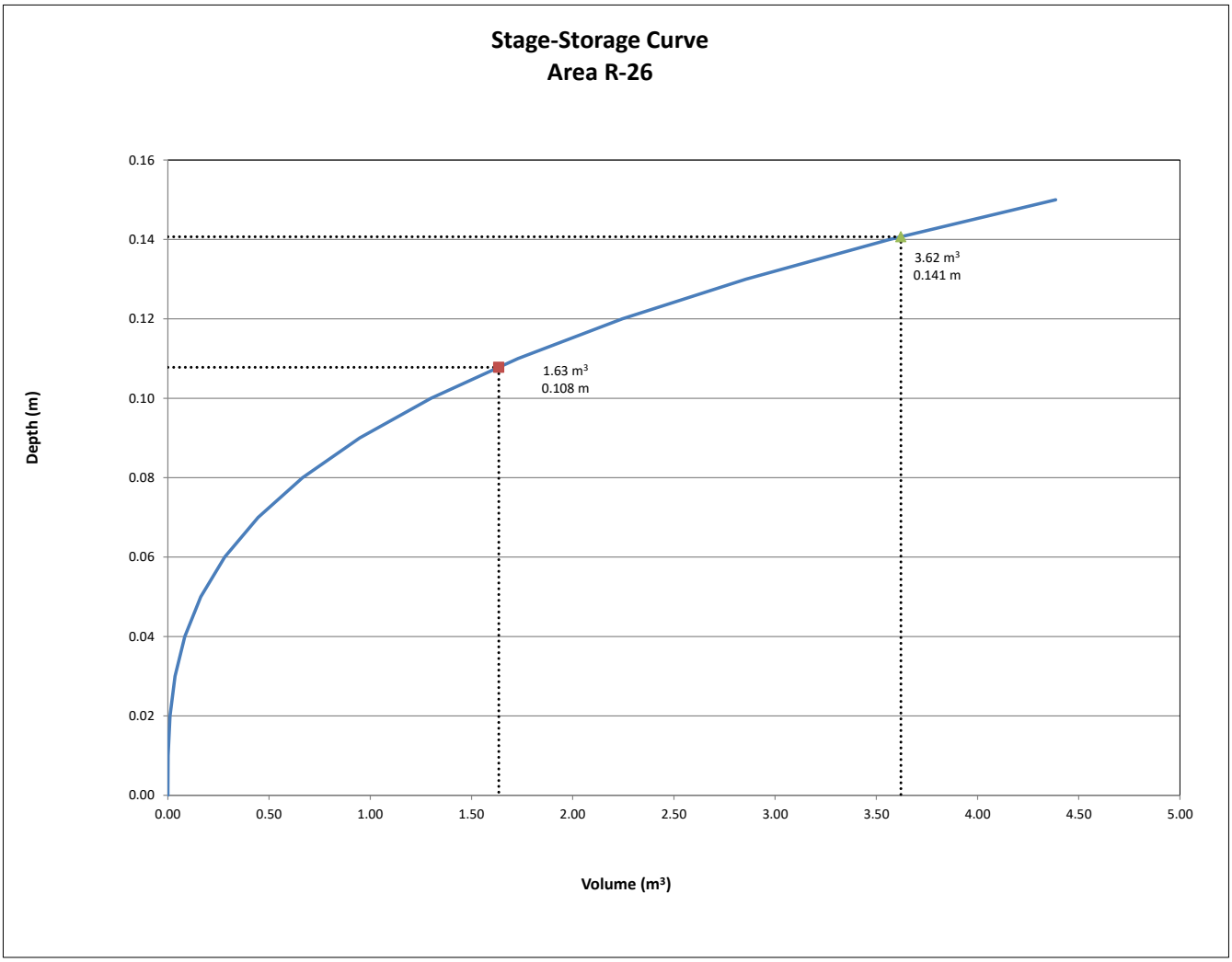
Ponding Depth (100-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
2	0.01	0.02
4	0.04	0.03
6	0.08	0.04
10	0.16	0.05
14	0.28	0.06
19	0.45	0.07
25	0.67	0.08
32	0.95	0.09
39	1.30	0.10
47	1.73	0.11
56	2.25	0.12
66	2.86	0.13
76	3.57	0.14
88	**4.39**	**0.15**

Linear Interpolation

0.15	H	0.14		H =	0.141 m
4.39	3.62	3.57		Q_{allow} =	0.52 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)


Stage-Storage Curve
Area R-26
Depth (m)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
Volume (m³)
3.62 m³
0.141 m
1.63 m³
0.108 m

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-27 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0092	ha	Qallow =	0.41
C =	0.90		Vol(max) =	1.50
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	3.26	2.85	0.85
10	104.19	2.41	2.00	1.20
15	83.56	1.93	1.52	1.37
20	70.25	1.62	1.21	1.45
25	60.90	1.41	1.00	1.49
30	53.93	1.25	0.84	1.50
35	48.52	1.12	0.71	1.49
40	44.18	1.02	0.61	1.46
45	40.63	0.94	0.53	1.43
50	37.65	0.87	0.46	1.38
55	35.12	0.81	0.40	1.32
60	32.94	0.76	0.35	1.26
65	31.04	0.72	0.31	1.20
70	29.37	0.68	0.27	1.13
75	27.89	0.64	0.23	1.05
80	26.56	0.61	0.20	0.98
85	25.37	0.59	0.18	0.90
90	24.29	0.56	0.15	0.81

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
3	0.03	0.03
5	0.07	0.04
8	0.14	0.05
12	0.24	0.06
16	0.38	0.07
21	0.56	0.08
27	0.80	0.09
33	1.10	0.10
40	1.47	0.11
48	1.91	0.12
56	2.42	0.13
65	3.03	0.14
74	**3.72**	**0.15**

Linear Interpolation

0.12	H	0.11		H =	0.111 m
1.91	1.50	1.47		Q_{allow} =	0.41 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-27 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0092	ha	Qallow =	0.54
C =	1.00		Vol(max) =	3.33
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	6.23	5.69	1.71
10	178.56	4.58	4.04	2.42
15	142.89	3.67	3.13	2.81
20	119.95	3.08	2.54	3.05
25	103.85	2.66	2.12	3.19
30	91.87	2.36	1.82	3.27
35	82.58	2.12	1.58	3.32
40	75.15	1.93	1.39	3.33
45	69.05	1.77	1.23	3.33
50	63.95	1.64	1.10	3.30
55	59.62	1.53	0.99	3.27
60	55.89	1.43	0.89	3.22
65	52.65	1.35	0.81	3.16
70	49.79	1.28	0.74	3.10
75	47.26	1.21	0.67	3.03
80	44.99	1.15	0.61	2.95
85	42.95	1.10	0.56	2.87
90	41.11	1.05	0.51	2.78

Notes: Vol = Qnet x time
Qnet = Q - Qallow

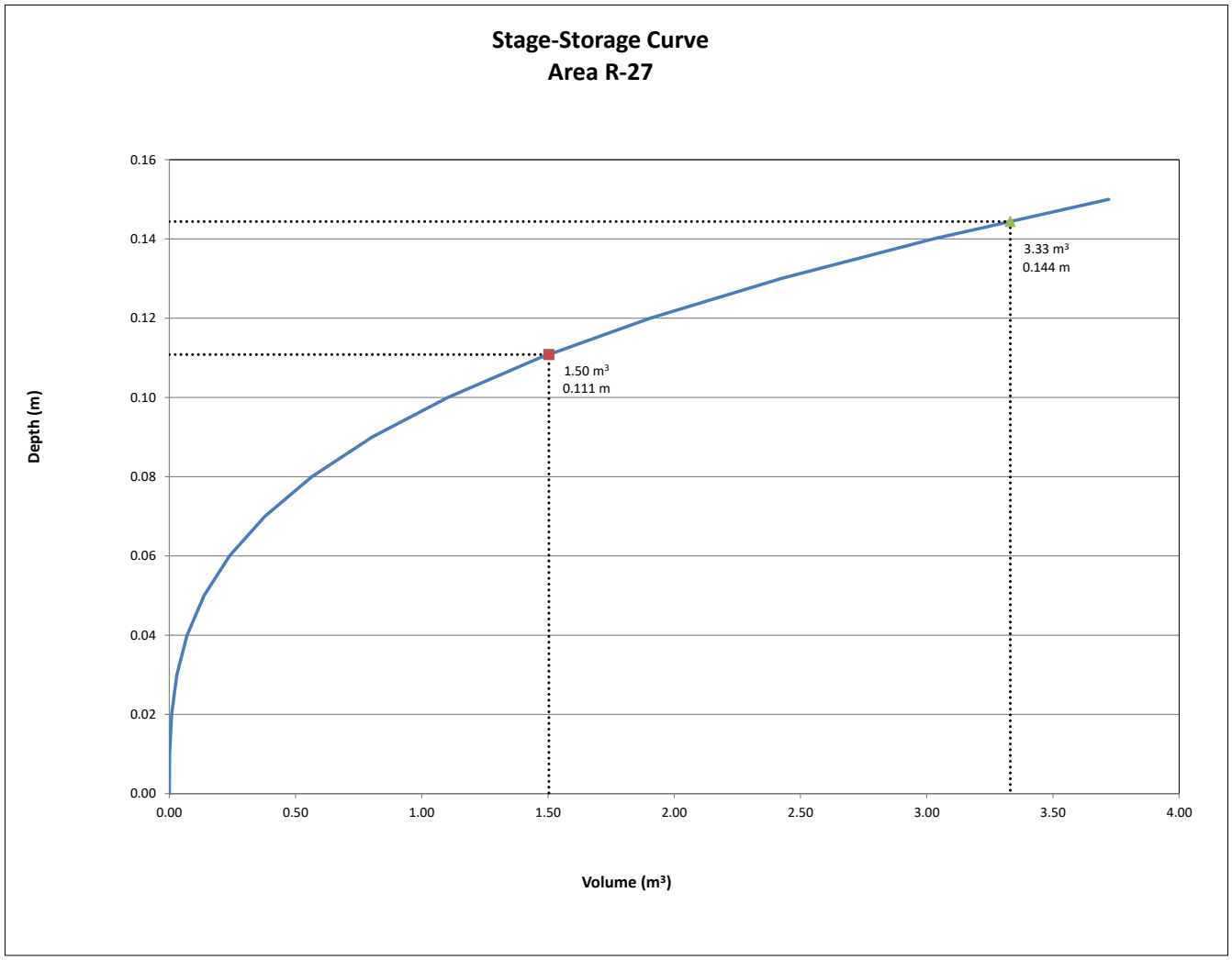
Ponding Depth (100-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
3	0.03	0.03
5	0.07	0.04
8	0.14	0.05
12	0.24	0.06
16	0.38	0.07
21	0.56	0.08
27	0.80	0.09
33	1.10	0.10
40	1.47	0.11
48	1.91	0.12
56	2.42	0.13
65	3.03	0.14
74	**3.72**	**0.15**

Linear Interpolation

0.15	H	0.14		H =	0.144 m
3.72	3.33	3.03		Q_{allow} =	0.54 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)


Stage-Storage Curve
Area R-27
Depth (m)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
Volume (m³)
3.33 m³
0.144 m
1.50 m³
0.111 m

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-28 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0092	ha	Qallow =	0.40
C =	0.90		Vol(max) =	1.51
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	3.25	2.85	0.85
10	104.19	2.40	2.00	1.20
15	83.56	1.92	1.52	1.37
20	70.25	1.61	1.21	1.46
25	60.90	1.40	1.00	1.50
30	53.93	1.24	0.84	1.51
35	48.52	1.12	0.72	1.50
40	44.18	1.02	0.62	1.48
45	40.63	0.93	0.53	1.44
50	37.65	0.87	0.47	1.40
55	35.12	0.81	0.41	1.34
60	32.94	0.76	0.36	1.29
65	31.04	0.71	0.31	1.22
70	29.37	0.68	0.28	1.16
75	27.89	0.64	0.24	1.08
80	26.56	0.61	0.21	1.01
85	25.37	0.58	0.18	0.93
90	24.29	0.56	0.16	0.86

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
3	0.03	0.03
6	0.08	0.04
9	0.15	0.05
13	0.26	0.06
18	0.41	0.07
23	0.61	0.08
29	0.87	0.09
36	1.19	0.10
43	1.59	0.11
52	2.06	0.12
61	2.62	0.13
70	3.28	0.14
81	**4.03**	**0.15**

Linear Interpolation

0.11	H	0.10		H =	0.108 m
1.59	1.51	1.19		Q_{allow} =	0.40 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-28 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0092	ha	Qallow =	0.53
C =	1.00		Vol(max) =	3.35
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	6.20	5.67	1.70
10	178.56	4.56	4.04	2.42
15	142.89	3.65	3.12	2.81
20	119.95	3.06	2.54	3.05
25	103.85	2.65	2.13	3.19
30	91.87	2.35	1.82	3.28
35	82.58	2.11	1.58	3.33
40	75.15	1.92	1.39	3.35
45	69.05	1.76	1.24	3.34
50	63.95	1.63	1.11	3.33
55	59.62	1.52	1.00	3.29
60	55.89	1.43	0.90	3.25
65	52.65	1.34	0.82	3.20
70	49.79	1.27	0.75	3.14
75	47.26	1.21	0.68	3.07
80	44.99	1.15	0.62	3.00
85	42.95	1.10	0.57	2.92
90	41.11	1.05	0.53	2.84

Notes: Vol = Qnet x time
Qnet = Q - Qallow

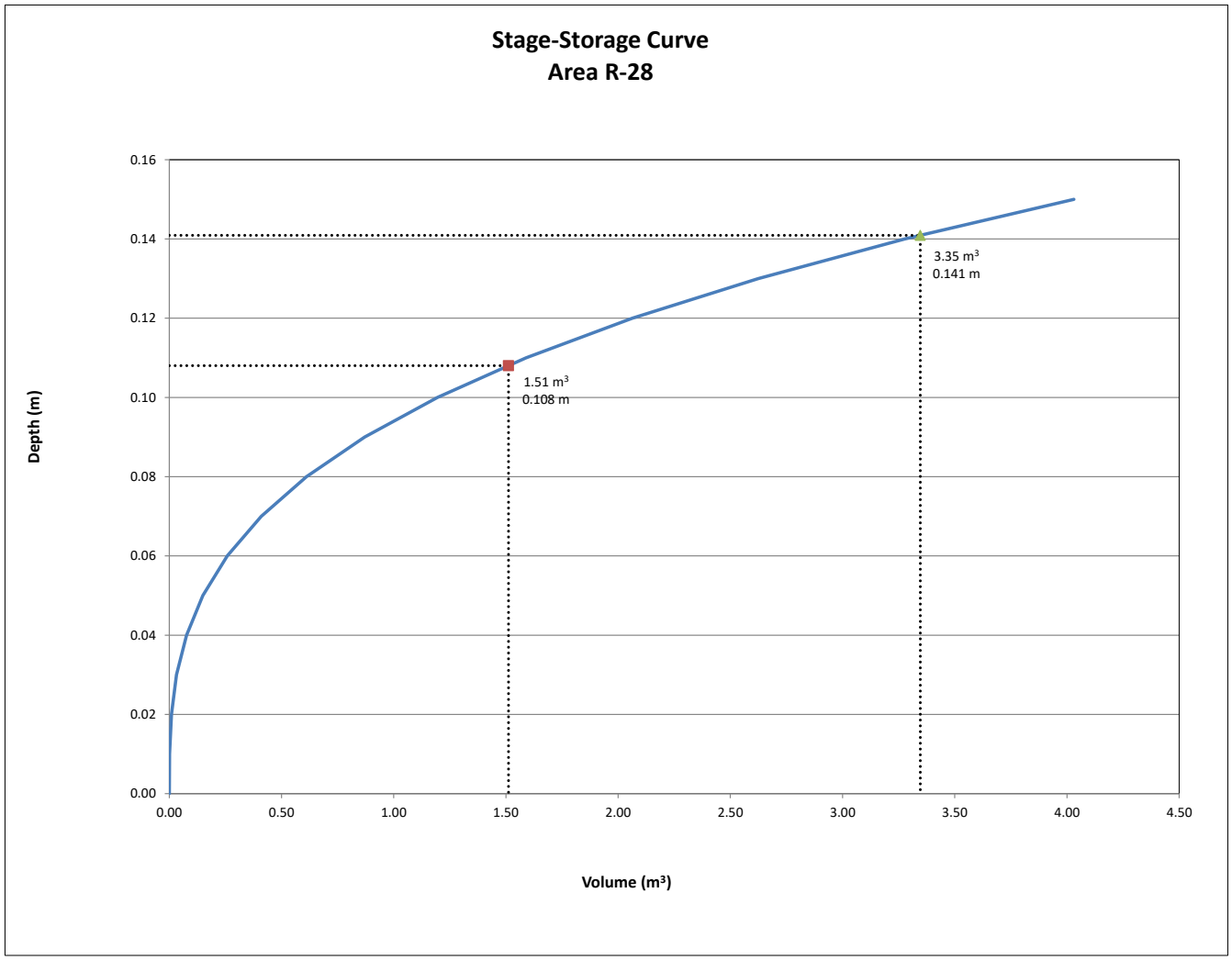
Ponding Depth (100-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
3	0.03	0.03
6	0.08	0.04
9	0.15	0.05
13	0.26	0.06
18	0.41	0.07
23	0.61	0.08
29	0.87	0.09
36	1.19	0.10
43	1.59	0.11
52	2.06	0.12
61	2.62	0.13
70	3.28	0.14
81	**4.03**	**0.15**

Linear Interpolation

0.15	H	0.14		H =	0.141 m
4.03	3.35	3.28		Q_{allow} =	0.53 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)


Stage-Storage Curve
Area R-28
Depth (m)
Volume (m³)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
3.35 m³
0.141 m
1.51 m³
0.108 m

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-29 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0073	ha	Qallow =	0.36
C =	0.90		Vol(max) =	1.13
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	2.59	2.23	0.67
10	104.19	1.91	1.55	0.93
15	83.56	1.53	1.17	1.05
20	70.25	1.29	0.93	1.11
25	60.90	1.12	0.76	1.13
30	53.93	0.99	0.63	1.13
35	48.52	0.89	0.53	1.11
40	44.18	0.81	0.45	1.08
45	40.63	0.74	0.38	1.04
50	37.65	0.69	0.33	0.99
55	35.12	0.64	0.28	0.94
60	32.94	0.60	0.24	0.88
65	31.04	0.57	0.21	0.81
70	29.37	0.54	0.18	0.75
75	27.89	0.51	0.15	0.68
80	26.56	0.49	0.13	0.61
85	25.37	0.46	0.10	0.53
90	24.29	0.45	0.09	0.46

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
3	0.03	0.03
6	0.08	0.04
9	0.15	0.05
13	0.27	0.06
18	0.42	0.07
24	0.63	0.08
30	0.90	0.09
37	1.24	0.10
45	1.65	0.11
54	2.14	0.12
63	2.72	0.13
73	3.40	0.14
84	**4.18**	**0.15**

Linear Interpolation

0.10	H	0.09		H =	0.097 m
1.24	1.13	0.90		Q_{allow} =	0.36 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-29 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0073	ha	Qallow =	0.47
C =	1.00		Vol(max) =	2.54
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	4.94	4.47	1.34
10	178.56	3.64	3.17	1.90
15	142.89	2.91	2.44	2.20
20	119.95	2.44	1.97	2.37
25	103.85	2.11	1.64	2.47
30	91.87	1.87	1.40	2.52
35	82.58	1.68	1.21	2.54
40	75.15	1.53	1.06	2.54
45	69.05	1.41	0.94	2.53
50	63.95	1.30	0.83	2.50
55	59.62	1.21	0.74	2.45
60	55.89	1.14	0.67	2.40
65	52.65	1.07	0.60	2.35
70	49.79	1.01	0.54	2.28
75	47.26	0.96	0.49	2.21
80	44.99	0.92	0.45	2.14
85	42.95	0.87	0.40	2.06
90	41.11	0.84	0.37	1.98

Notes: Vol = Qnet x time
Qnet = Q - Qallow

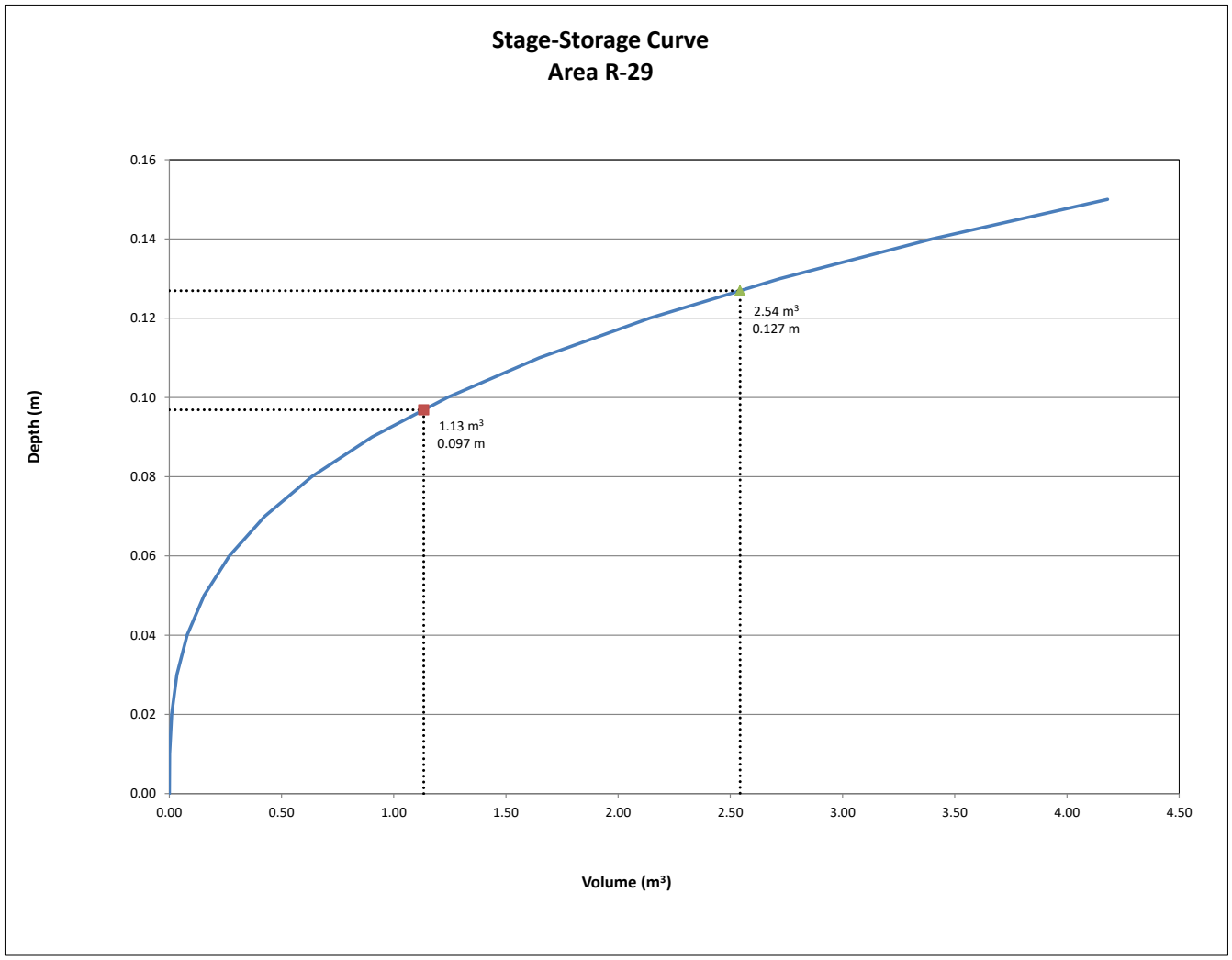
Ponding Depth (100-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
3	0.03	0.03
6	0.08	0.04
9	0.15	0.05
13	0.27	0.06
18	0.42	0.07
24	0.63	0.08
30	0.90	0.09
37	1.24	0.10
45	1.65	0.11
54	2.14	0.12
63	2.72	0.13
73	3.40	0.14
84	**4.18**	**0.15**

Linear Interpolation

0.13	H	0.12		H =	0.127 m
2.72	2.54	2.14		Q_{allow} =	0.47 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)


Stage-Storage Curve
Area R-29
Depth (m)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
Volume (m³)
2.54 m³
0.127 m
1.13 m³
0.097 m

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-30 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0126	ha	Qallow =	0.42
C =	0.90		Vol(max) =	2.34
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	4.46	4.04	1.21
10	104.19	3.29	2.87	1.72
15	83.56	2.64	2.22	2.00
20	70.25	2.22	1.80	2.16
25	60.90	1.92	1.50	2.26
30	53.93	1.70	1.28	2.31
35	48.52	1.53	1.11	2.34
40	44.18	1.40	0.98	2.34
45	40.63	1.28	0.86	2.33
50	37.65	1.19	0.77	2.31
55	35.12	1.11	0.69	2.28
60	32.94	1.04	0.62	2.24
65	31.04	0.98	0.56	2.19
70	29.37	0.93	0.51	2.13
75	27.89	0.88	0.46	2.08
80	26.56	0.84	0.42	2.01
85	25.37	0.80	0.38	1.95
90	24.29	0.77	0.35	1.88

Notes: Vol = Qnet x time
Qnet = Q - Qallow

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-30 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0126	ha	Qallow =	0.55
C =	1.00		Vol(max) =	5.09
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	8.52	7.97	2.39
10	178.56	6.27	5.72	3.43
15	142.89	5.02	4.47	4.02
20	119.95	4.21	3.66	4.39
25	103.85	3.65	3.10	4.65
30	91.87	3.23	2.68	4.82
35	82.58	2.90	2.35	4.93
40	75.15	2.64	2.09	5.01
45	69.05	2.42	1.87	5.06
50	63.95	2.25	1.70	5.09
55	59.62	2.09	1.54	5.09
60	55.89	1.96	1.41	5.09
65	52.65	1.85	1.30	5.07
70	49.79	1.75	1.20	5.03
75	47.26	1.66	1.11	4.99
80	44.99	1.58	1.03	4.94
85	42.95	1.51	0.96	4.89
90	41.11	1.44	0.89	4.83

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
2	0.01	0.02
4	0.04	0.03
8	0.10	0.04
12	0.20	0.05
17	0.34	0.06
23	0.54	0.07
30	0.81	0.08
38	1.15	0.09
47	1.58	0.10
57	2.10	0.11
68	2.73	0.12
80	3.47	0.13
93	4.33	0.14
107	**5.33**	**0.15**

Linear Interpolation

0.12	H	0.11		H =	0.114 m
2.73	2.34	2.10		Q_{allow} =	0.42 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

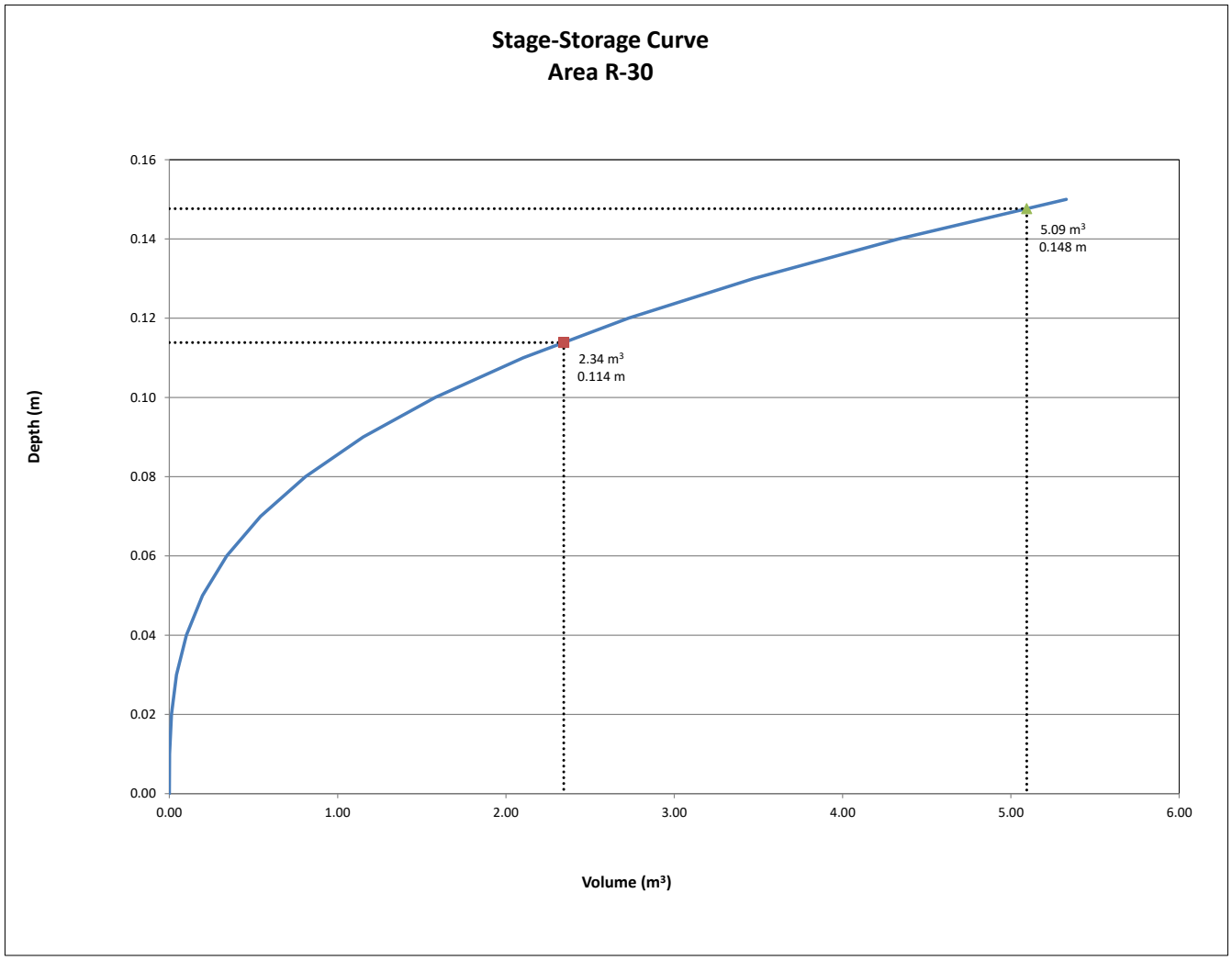
Ponding Depth (100-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
2	0.01	0.02
4	0.04	0.03
8	0.10	0.04
12	0.20	0.05
17	0.34	0.06
23	0.54	0.07
30	0.81	0.08
38	1.15	0.09
47	1.58	0.10
57	2.10	0.11
68	2.73	0.12
80	3.47	0.13
93	4.33	0.14
107	**5.33**	**0.15**

Linear Interpolation

0.15	H	0.14		H =	0.148 m
5.33	5.09	4.33		Q_{allow} =	0.55 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)


Stage-Storage Curve
Area R-30
Depth (m)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
1.00
2.00
3.00
4.00
5.00
6.00
Volume (m³)
5.09 m³
0.148 m
2.34 m³
0.114 m

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-31 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0042	ha	Qallow =	0.35
C =	0.90		Vol(max) =	0.47
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	1.48	1.13	0.34
10	104.19	1.09	0.74	0.45
15	83.56	0.88	0.53	0.47
20	70.25	0.74	0.39	0.46
25	60.90	0.64	0.29	0.43
30	53.93	0.57	0.22	0.39
35	48.52	0.51	0.16	0.33
40	44.18	0.46	0.11	0.27
45	40.63	0.43	0.08	0.20
50	37.65	0.39	0.04	0.13
55	35.12	0.37	0.02	0.06
60	32.94	0.35	0.00	-0.02
65	31.04	0.33	-0.02	-0.10
70	29.37	0.31	-0.04	-0.18
75	27.89	0.29	-0.06	-0.26
80	26.56	0.28	-0.07	-0.34
85	25.37	0.27	-0.08	-0.43
90	24.29	0.25	-0.10	-0.52

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.00	0.02
1	0.01	0.03
3	0.04	0.04
4	0.07	0.05
6	0.12	0.06
8	0.19	0.07
11	0.28	0.08
13	0.40	0.09
17	0.55	0.10
20	0.74	0.11
24	0.96	0.12
28	1.22	0.13
33	1.52	0.14
37	**1.87**	**0.15**

Linear Interpolation

0.10	H	0.09		H =	0.095 m
0.55	0.47	0.40		Q_{allow} =	0.35 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-31 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0042	ha	Qallow =	0.47
C =	1.00		Vol(max) =	1.11
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	2.83	2.36	0.71
10	178.56	2.08	1.61	0.97
15	142.89	1.66	1.19	1.08
20	119.95	1.40	0.93	1.11
25	103.85	1.21	0.74	1.11
30	91.87	1.07	0.60	1.08
35	82.58	0.96	0.49	1.03
40	75.15	0.88	0.41	0.97
45	69.05	0.80	0.33	0.90
50	63.95	0.74	0.27	0.82
55	59.62	0.69	0.22	0.74
60	55.89	0.65	0.18	0.65
65	52.65	0.61	0.14	0.56
70	49.79	0.58	0.11	0.46
75	47.26	0.55	0.08	0.36
80	44.99	0.52	0.05	0.26
85	42.95	0.50	0.03	0.15
90	41.11	0.48	0.01	0.05

Notes: Vol = Qnet x time
Qnet = Q - Qallow

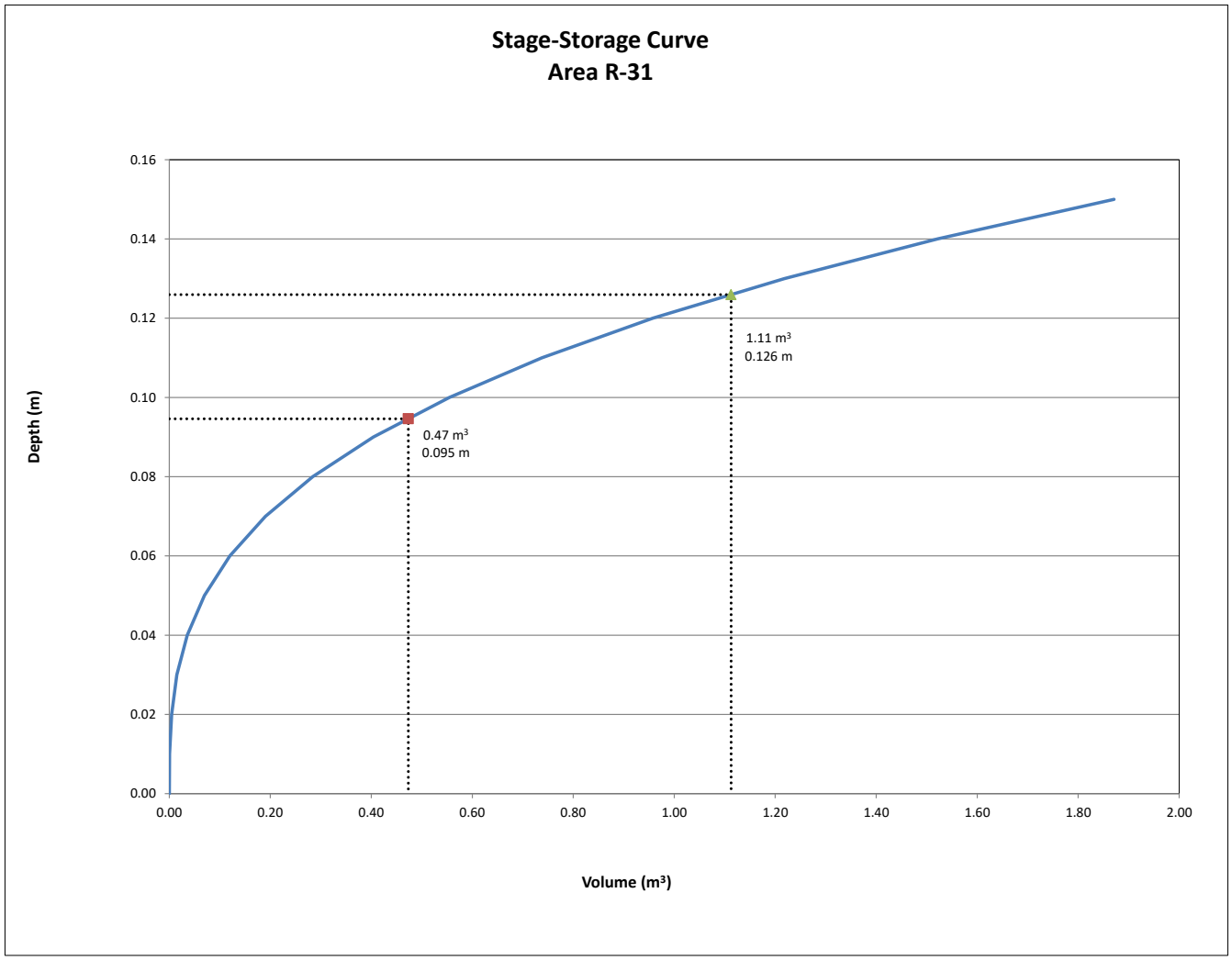
Ponding Depth (100-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.00	0.02
1	0.01	0.03
3	0.04	0.04
4	0.07	0.05
6	0.12	0.06
8	0.19	0.07
11	0.28	0.08
13	0.40	0.09
17	0.55	0.10
20	0.74	0.11
24	0.96	0.12
28	1.22	0.13
33	1.52	0.14
37	**1.87**	**0.15**

Linear Interpolation

0.13	H	0.12		H =	0.126 m
1.22	1.11	0.96		Q_{allow} =	0.47 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)


Stage-Storage Curve
Area R-31
Depth (m)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
1.60
1.80
2.00
Volume (m³)
1.11 m³
0.126 m
0.47 m³
0.095 m

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-32 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0124	ha	Qallow =	0.41
C =	0.90		Vol(max) =	2.31
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	4.39	3.98	1.19
10	104.19	3.24	2.83	1.70
15	83.56	2.60	2.19	1.97
20	70.25	2.18	1.77	2.13
25	60.90	1.89	1.48	2.22
30	53.93	1.68	1.27	2.28
35	48.52	1.51	1.10	2.30
40	44.18	1.37	0.96	2.31
45	40.63	1.26	0.85	2.30
50	37.65	1.17	0.76	2.28
55	35.12	1.09	0.68	2.25
60	32.94	1.02	0.61	2.21
65	31.04	0.96	0.55	2.16
70	29.37	0.91	0.50	2.11
75	27.89	0.87	0.46	2.05
80	26.56	0.83	0.42	1.99
85	25.37	0.79	0.38	1.93
90	24.29	0.75	0.34	1.86

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
1	0.00	0.01
2	0.01	0.02
5	0.05	0.03
8	0.11	0.04
13	0.22	0.05
19	0.37	0.06
25	0.59	0.07
33	0.88	0.08
42	1.26	0.09
52	1.73	0.10
63	2.30	0.11
75	2.99	0.12
88	3.80	0.13
102	4.74	0.14
117	**5.83**	**0.15**

Linear Interpolation

0.12	H	0.11		H =	0.110 m
2.99	2.31	2.30		Q_{allow} =	0.41 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-32 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0124	ha	Qallow =	0.53
C =	1.00		Vol(max) =	5.06
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	8.38	7.85	2.36
10	178.56	6.16	5.64	3.38
15	142.89	4.93	4.41	3.97
20	119.95	4.14	3.62	4.34
25	103.85	3.58	3.06	4.59
30	91.87	3.17	2.65	4.76
35	82.58	2.85	2.33	4.88
40	75.15	2.59	2.07	4.97
45	69.05	2.38	1.86	5.02
50	63.95	2.21	1.68	5.05
55	59.62	2.06	1.53	5.06
60	55.89	1.93	1.40	5.06
65	52.65	1.82	1.29	5.04
70	49.79	1.72	1.19	5.01
75	47.26	1.63	1.11	4.98
80	44.99	1.55	1.03	4.93
85	42.95	1.48	0.96	4.88
90	41.11	1.42	0.89	4.83

Notes: Vol = Qnet x time
Qnet = Q - Qallow

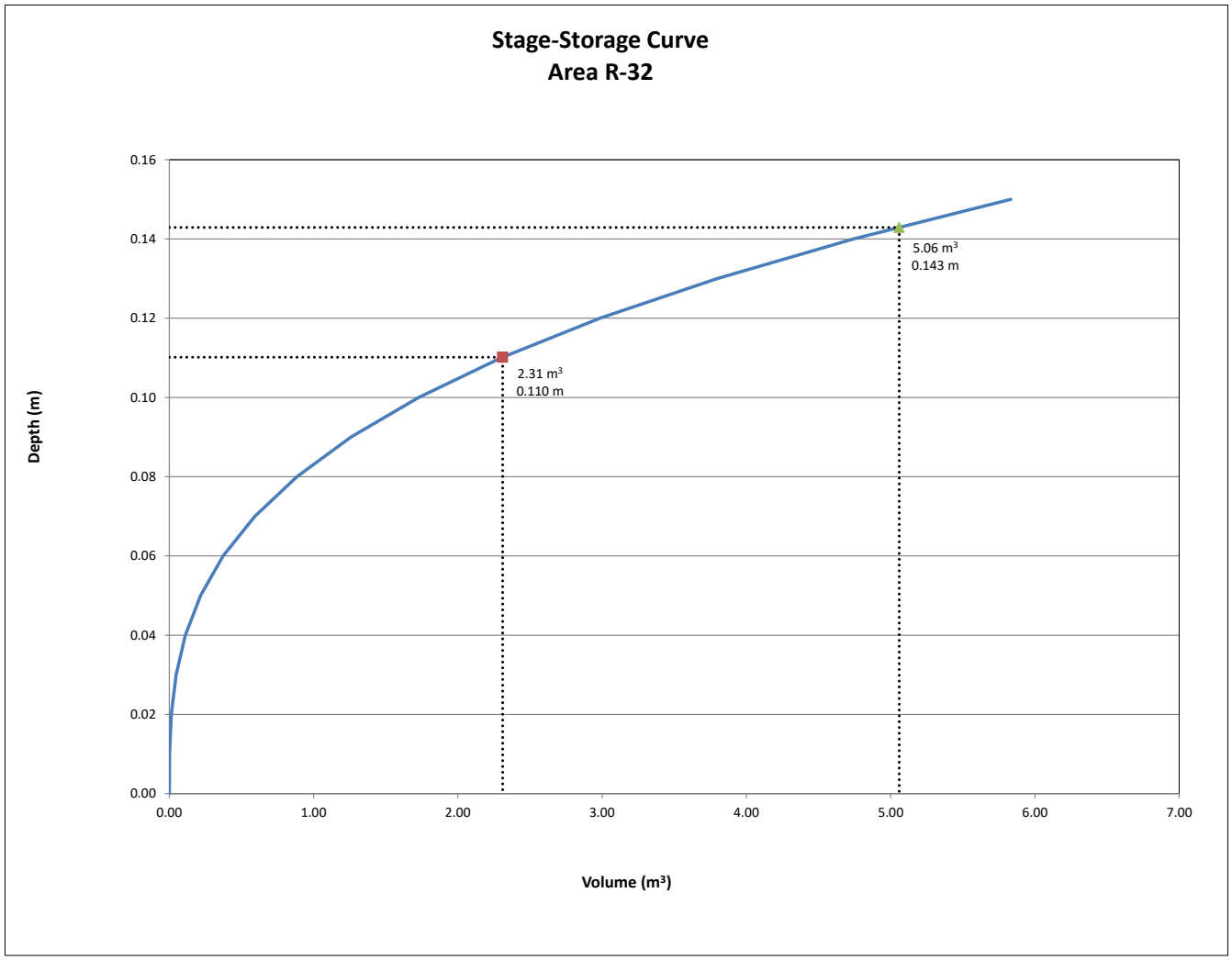
Ponding Depth (100-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
1	0.00	0.01
2	0.01	0.02
5	0.05	0.03
8	0.11	0.04
13	0.22	0.05
19	0.37	0.06
25	0.59	0.07
33	0.88	0.08
42	1.26	0.09
52	1.73	0.10
63	2.30	0.11
75	2.99	0.12
88	3.80	0.13
102	4.74	0.14
117	**5.83**	**0.15**

Linear Interpolation

0.15	H	0.14		H =	0.143 m
5.83	5.06	4.74		Q_{allow} =	0.53 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)


Stage-Storage Curve
Area R-32
Depth (m)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
Volume (m³)
5.06 m³
0.143 m
2.31 m³
0.110 m

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-33 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0064	ha	Qallow =	0.38
C =	0.90		Vol(max) =	0.90
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	2.26	1.89	0.57
10	104.19	1.67	1.29	0.78
15	83.56	1.34	0.96	0.87
20	70.25	1.13	0.75	0.90
25	60.90	0.98	0.60	0.90
30	53.93	0.86	0.49	0.88
35	48.52	0.78	0.40	0.85
40	44.18	0.71	0.33	0.80
45	40.63	0.65	0.28	0.75
50	37.65	0.60	0.23	0.68
55	35.12	0.56	0.19	0.62
60	32.94	0.53	0.15	0.55
65	31.04	0.50	0.12	0.48
70	29.37	0.47	0.10	0.40
75	27.89	0.45	0.07	0.32
80	26.56	0.43	0.05	0.24
85	25.37	0.41	0.03	0.16
90	24.29	0.39	0.01	0.08

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
2	0.02	0.03
4	0.06	0.04
7	0.11	0.05
10	0.19	0.06
13	0.30	0.07
17	0.45	0.08
21	0.64	0.09
27	0.88	0.10
32	1.18	0.11
38	1.53	0.12
45	1.94	0.13
52	2.43	0.14
60	**2.98**	**0.15**

Linear Interpolation

0.11	H	0.10		H =	0.101 m
1.18	0.90	0.88		Q_{allow} =	0.38 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-33 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0064	ha	Qallow =	0.49
C =	1.00		Vol(max) =	2.06
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	4.32	3.83	1.15
10	178.56	3.18	2.69	1.61
15	142.89	2.54	2.05	1.85
20	119.95	2.14	1.65	1.97
25	103.85	1.85	1.36	2.04
30	91.87	1.64	1.15	2.06
35	82.58	1.47	0.98	2.06
40	75.15	1.34	0.85	2.03
45	69.05	1.23	0.74	2.00
50	63.95	1.14	0.65	1.95
55	59.62	1.06	0.57	1.89
60	55.89	1.00	0.51	1.82
65	52.65	0.94	0.45	1.74
70	49.79	0.89	0.40	1.66
75	47.26	0.84	0.35	1.58
80	44.99	0.80	0.31	1.49
85	42.95	0.76	0.27	1.40
90	41.11	0.73	0.24	1.31

Notes: Vol = Qnet x time
Qnet = Q - Qallow

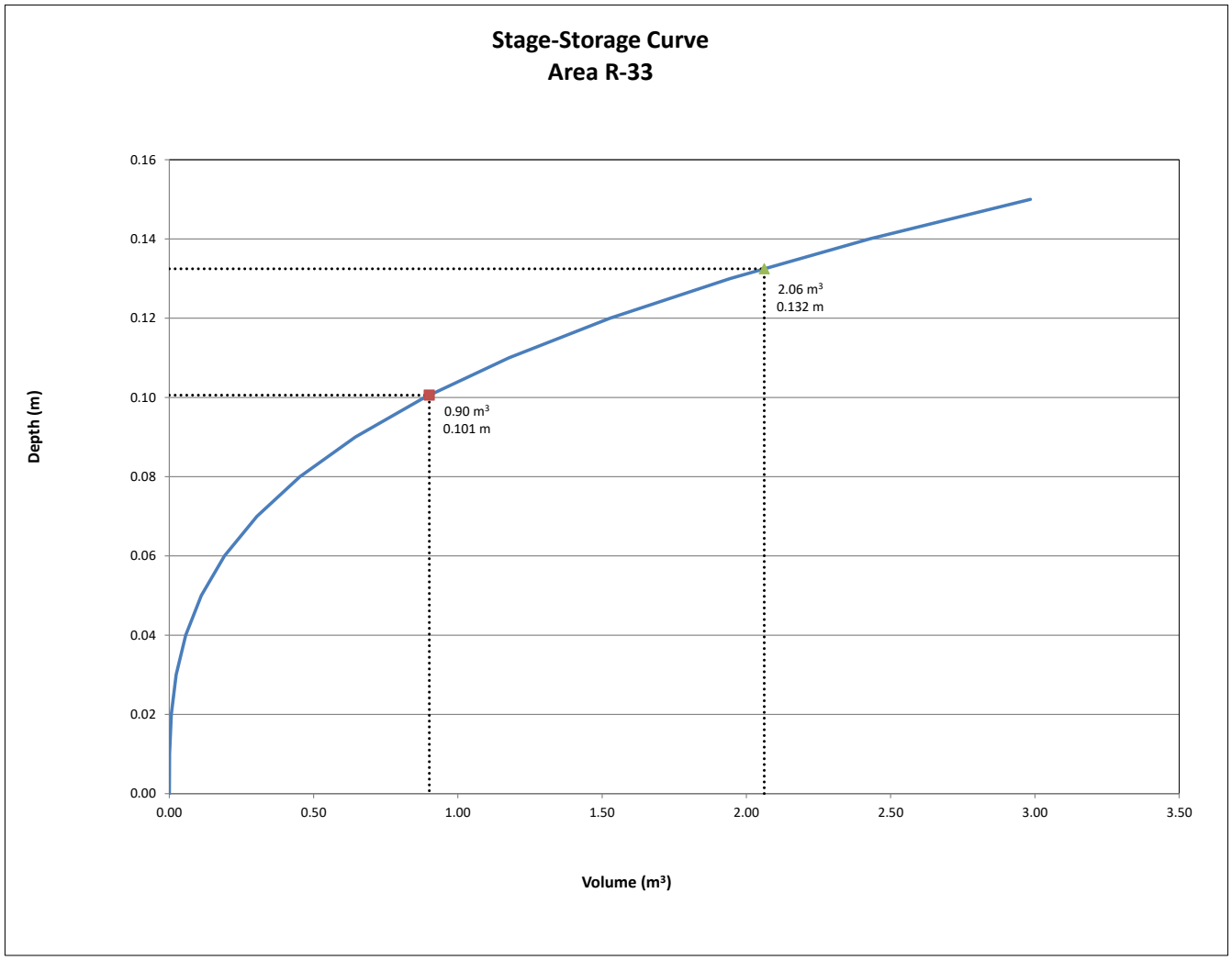
Ponding Depth (100-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
2	0.02	0.03
4	0.06	0.04
7	0.11	0.05
10	0.19	0.06
13	0.30	0.07
17	0.45	0.08
21	0.64	0.09
27	0.88	0.10
32	1.18	0.11
38	1.53	0.12
45	1.94	0.13
52	2.43	0.14
60	**2.98**	**0.15**

Linear Interpolation

0.14	H	0.13		H =	0.132 m
2.43	2.06	1.94		Q_{allow} =	0.49 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)


Stage-Storage Curve
Area R-33
Depth (m)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
Volume (m³)
2.06 m³
0.132 m
0.90 m³
0.101 m

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-34 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0061	ha	Qallow =	0.38
C =	0.90		Vol(max) =	0.83
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	2.15	1.77	0.53
10	104.19	1.58	1.20	0.72
15	83.56	1.27	0.89	0.80
20	70.25	1.07	0.69	0.83
25	60.90	0.93	0.55	0.82
30	53.93	0.82	0.44	0.79
35	48.52	0.74	0.36	0.75
40	44.18	0.67	0.29	0.70
45	40.63	0.62	0.24	0.64
50	37.65	0.57	0.19	0.58
55	35.12	0.53	0.15	0.51
60	32.94	0.50	0.12	0.44
65	31.04	0.47	0.09	0.36
70	29.37	0.45	0.07	0.28
75	27.89	0.42	0.04	0.20
80	26.56	0.40	0.02	0.12
85	25.37	0.39	0.01	0.03
90	24.29	0.37	-0.01	-0.06

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
2	0.02	0.03
4	0.05	0.04
6	0.10	0.05
9	0.17	0.06
12	0.28	0.07
15	0.41	0.08
20	0.59	0.09
24	0.80	0.10
29	1.07	0.11
35	1.39	0.12
41	1.76	0.13
47	2.20	0.14
54	**2.71**	**0.15**

Linear Interpolation

0.11	H	0.10		H =	0.101 m
1.07	0.83	0.80		Q_{allow} =	0.38 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-34 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0061	ha	Qallow =	0.50
C =	1.00		Vol(max) =	1.89
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	4.10	3.60	1.08
10	178.56	3.02	2.52	1.51
15	142.89	2.41	1.91	1.72
20	119.95	2.03	1.53	1.83
25	103.85	1.75	1.25	1.88
30	91.87	1.55	1.05	1.89
35	82.58	1.40	0.90	1.88
40	75.15	1.27	0.77	1.85
45	69.05	1.17	0.67	1.80
50	63.95	1.08	0.58	1.74
55	59.62	1.01	0.51	1.68
60	55.89	0.94	0.44	1.60
65	52.65	0.89	0.39	1.52
70	49.79	0.84	0.34	1.43
75	47.26	0.80	0.30	1.34
80	44.99	0.76	0.26	1.25
85	42.95	0.73	0.23	1.15
90	41.11	0.69	0.19	1.05

Notes: Vol = Qnet x time
Qnet = Q - Qallow

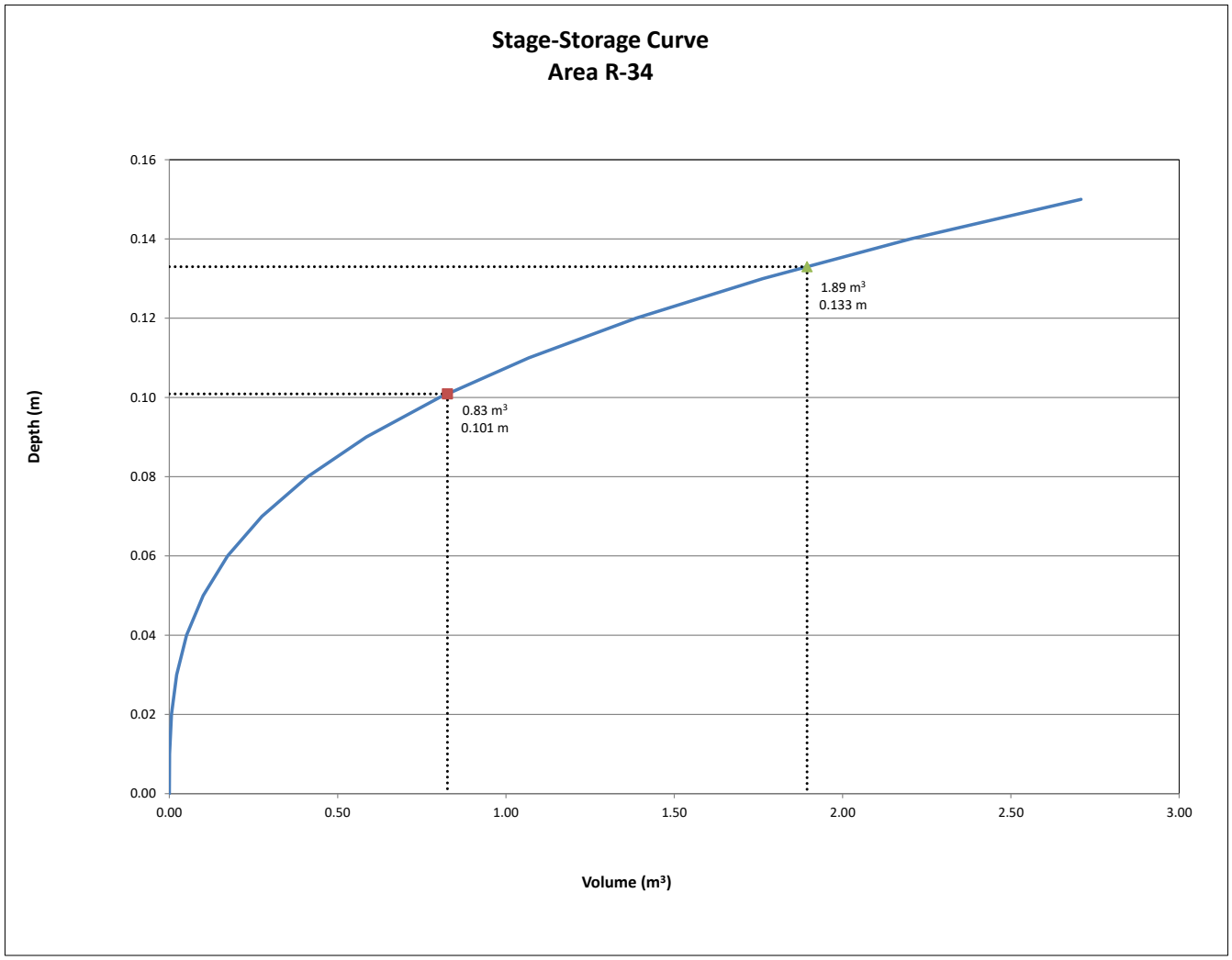
Ponding Depth (100-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
2	0.02	0.03
4	0.05	0.04
6	0.10	0.05
9	0.17	0.06
12	0.28	0.07
15	0.41	0.08
20	0.59	0.09
24	0.80	0.10
29	1.07	0.11
35	1.39	0.12
41	1.76	0.13
47	2.20	0.14
54	**2.71**	**0.15**

Linear Interpolation

0.14	H	0.13		H =	0.133 m
2.20	1.89	1.76		Q_{allow} =	0.50 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)


Stage-Storage Curve
Area R-34
Depth (m)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.50
1.00
1.50
2.00
2.50
3.00
Volume (m³)
1.89 m³
0.133 m
0.83 m³
0.101 m

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-35 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0101	ha	Qallow =	0.81
C =	0.90		Vol(max) =	1.18
			Notches =	2

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	3.58	2.77	0.83
10	104.19	2.64	1.83	1.10
15	83.56	2.12	1.31	1.18
20	70.25	1.78	0.97	1.16
25	60.90	1.54	0.73	1.10
30	53.93	1.37	0.56	1.00
35	48.52	1.23	0.42	0.88
40	44.18	1.12	0.31	0.74
45	40.63	1.03	0.22	0.59
50	37.65	0.95	0.14	0.43
55	35.12	0.89	0.08	0.26
60	32.94	0.83	0.02	0.09
65	31.04	0.79	-0.02	-0.09
70	29.37	0.74	-0.07	-0.28
75	27.89	0.71	-0.10	-0.46
80	26.56	0.67	-0.14	-0.66
85	25.37	0.64	-0.17	-0.85
90	24.29	0.62	-0.19	-1.05

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
2	0.02	0.03
4	0.06	0.04
7	0.12	0.05
10	0.20	0.06
14	0.32	0.07
18	0.47	0.08
22	0.67	0.09
28	0.93	0.10
34	1.23	0.11
40	1.60	0.12
47	2.03	0.13
54	2.54	0.14
62	**3.12**	**0.15**

Linear Interpolation

0.11	H	0.10		H =	0.108 m
1.23	1.18	0.93		Q_{allow} =	0.81 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-35 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0101	ha	Qallow =	1.07
C =	1.00		Vol(max) =	2.78
			Notches =	2

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	6.83	5.76	1.73
10	178.56	5.03	3.95	2.37
15	142.89	4.02	2.95	2.66
20	119.95	3.38	2.30	2.77
25	103.85	2.92	1.85	2.78
30	91.87	2.59	1.51	2.72
35	82.58	2.33	1.25	2.63
40	75.15	2.12	1.04	2.50
45	69.05	1.94	0.87	2.35
50	63.95	1.80	0.73	2.18
55	59.62	1.68	0.61	2.00
60	55.89	1.57	0.50	1.80
65	52.65	1.48	0.41	1.60
70	49.79	1.40	0.33	1.38
75	47.26	1.33	0.26	1.16
80	44.99	1.27	0.19	0.93
85	42.95	1.21	0.14	0.70
90	41.11	1.16	0.08	0.46

Notes: Vol = Qnet x time
Qnet = Q - Qallow

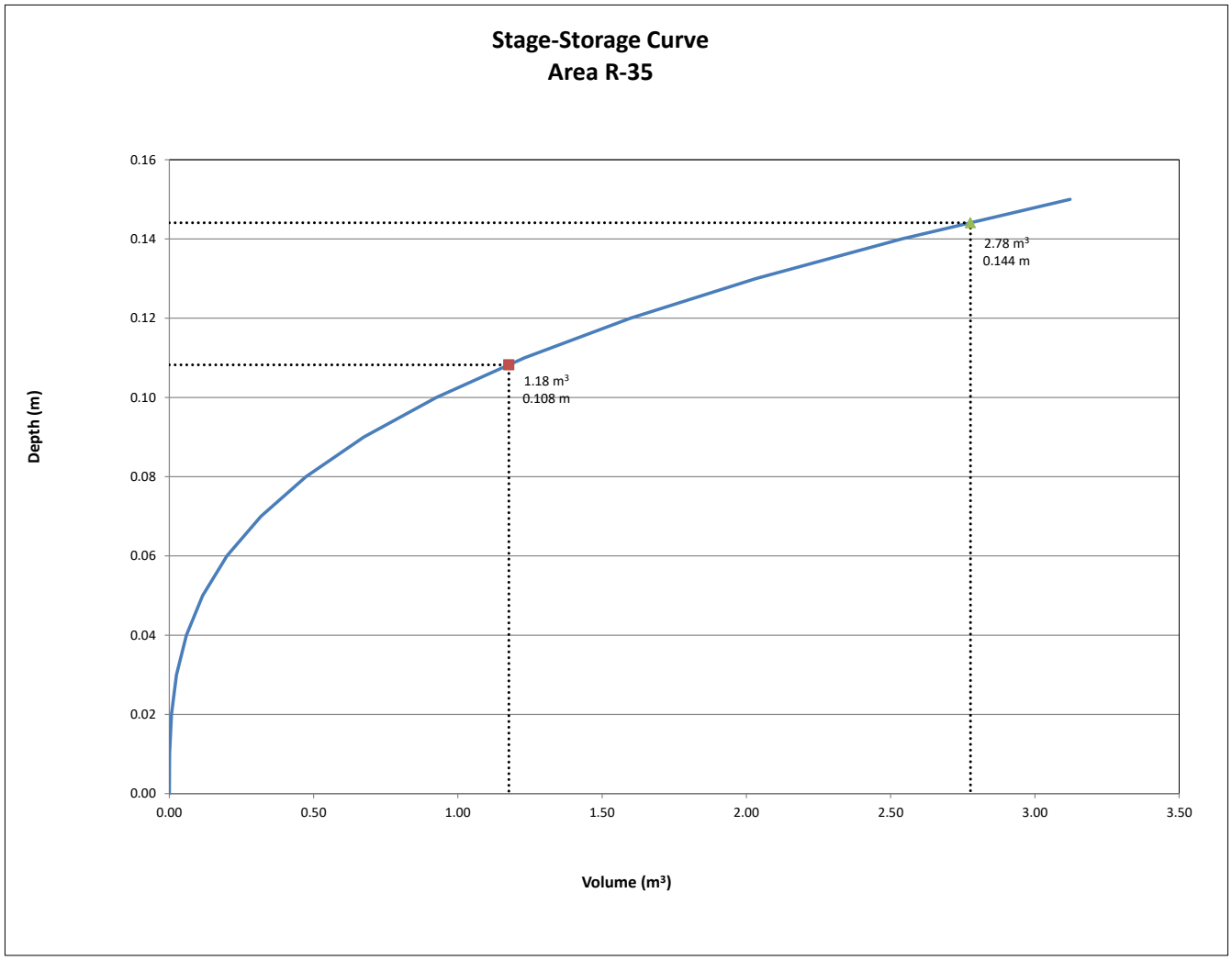
Ponding Depth (100-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
2	0.02	0.03
4	0.06	0.04
7	0.12	0.05
10	0.20	0.06
14	0.32	0.07
18	0.47	0.08
22	0.67	0.09
28	0.93	0.10
34	1.23	0.11
40	1.60	0.12
47	2.03	0.13
54	2.54	0.14
62	**3.12**	**0.15**

Linear Interpolation

0.15	H	0.14		H =	0.144 m
3.12	2.78	2.54		Q_{allow} =	1.07 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)


Stage-Storage Curve
Area R-35
Depth (m)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
Volume (m³)
1.18 m³
0.108 m
2.78 m³
0.144 m

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-36 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0055	ha	Qallow =	0.32
C =	0.90		Vol(max) =	0.77
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	1.93	1.61	0.48
10	104.19	1.42	1.10	0.66
15	83.56	1.14	0.82	0.74
20	70.25	0.96	0.64	0.77
25	60.90	0.83	0.51	0.77
30	53.93	0.74	0.42	0.75
35	48.52	0.66	0.34	0.72
40	44.18	0.60	0.28	0.68
45	40.63	0.55	0.23	0.63
50	37.65	0.51	0.19	0.58
55	35.12	0.48	0.16	0.53
60	32.94	0.45	0.13	0.47
65	31.04	0.42	0.10	0.40
70	29.37	0.40	0.08	0.34
75	27.89	0.38	0.06	0.27
80	26.56	0.36	0.04	0.20
85	25.37	0.35	0.03	0.13
90	24.29	0.33	0.01	0.06

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
3	0.03	0.03
6	0.08	0.04
9	0.15	0.05
13	0.27	0.06
18	0.42	0.07
24	0.63	0.08
30	0.90	0.09
37	1.24	0.10
45	1.65	0.11
53	2.14	0.12
63	2.72	0.13
73	3.39	0.14
84	**4.18**	**0.15**

Linear Interpolation

0.09	H	0.08		H =	0.085 m
0.90	0.77	0.63		Q_{allow} =	0.32 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-36 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0055	ha	Qallow =	0.42
C =	1.00		Vol(max) =	1.75
			Notches =	1

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	3.68	3.26	0.98
10	178.56	2.71	2.29	1.37
15	142.89	2.17	1.75	1.57
20	119.95	1.82	1.40	1.68
25	103.85	1.57	1.15	1.73
30	91.87	1.39	0.97	1.75
35	82.58	1.25	0.83	1.75
40	75.15	1.14	0.72	1.73
45	69.05	1.05	0.63	1.69
50	63.95	0.97	0.55	1.65
55	59.62	0.90	0.48	1.60
60	55.89	0.85	0.43	1.54
65	52.65	0.80	0.38	1.48
70	49.79	0.75	0.33	1.41
75	47.26	0.72	0.30	1.33
80	44.99	0.68	0.26	1.26
85	42.95	0.65	0.23	1.18
90	41.11	0.62	0.20	1.10

Notes: Vol = Qnet x time
Qnet = Q - Qallow

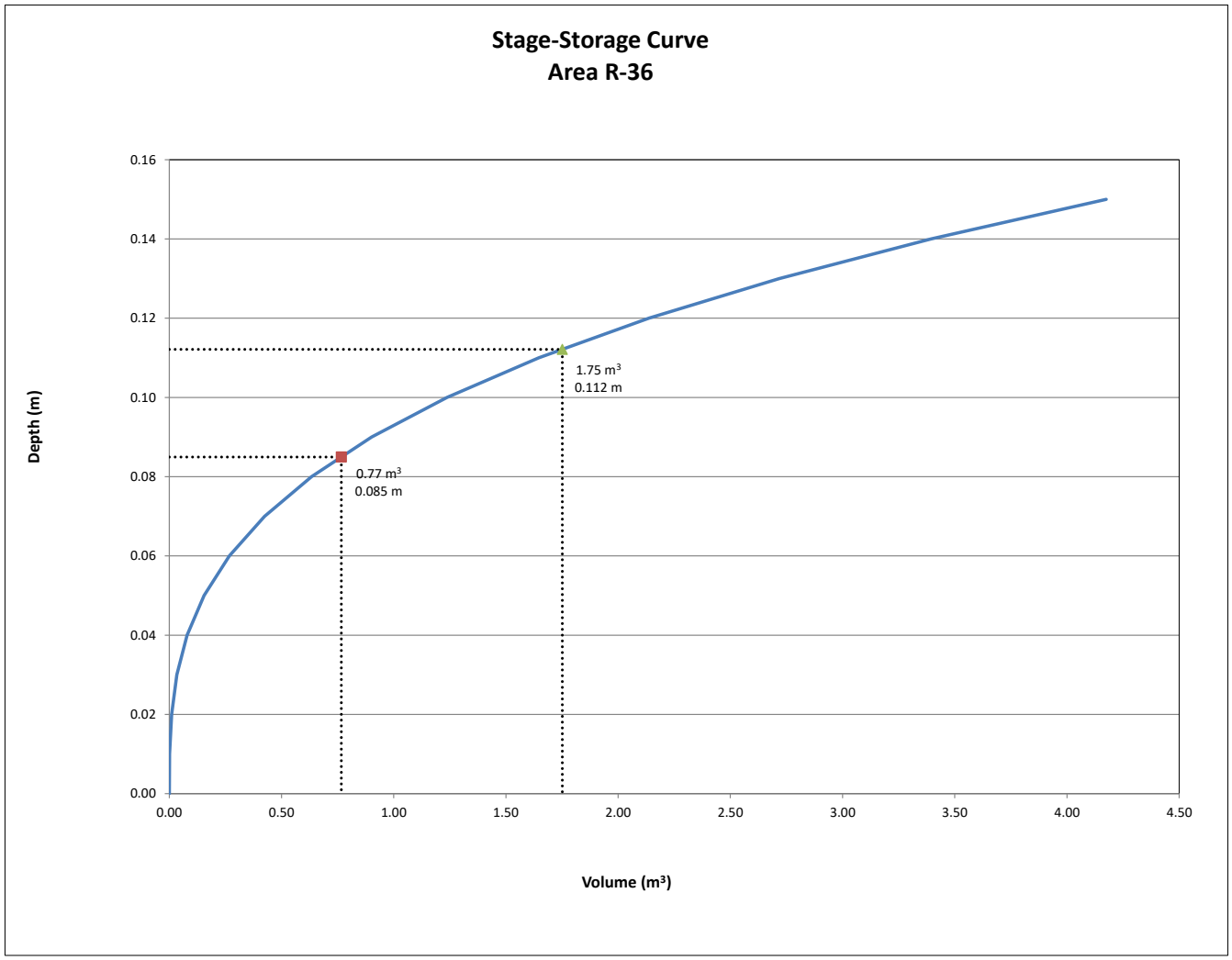
Ponding Depth (100-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
3	0.03	0.03
6	0.08	0.04
9	0.15	0.05
13	0.27	0.06
18	0.42	0.07
24	0.63	0.08
30	0.90	0.09
37	1.24	0.10
45	1.65	0.11
53	2.14	0.12
63	2.72	0.13
73	3.39	0.14
84	**4.18**	**0.15**

Linear Interpolation

0.12	H	0.11		H =	0.112 m
2.14	1.75	1.65		Q_{allow} =	0.42 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)


Stage-Storage Curve
Area R-36
Depth (m)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
Volume (m³)
1.75 m³
0.112 m
0.77 m³
0.085 m

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-37 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0096	ha	Qallow =	0.77
C =	0.90		Vol(max) =	1.11
			Notches =	2

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	3.39	2.62	0.79
10	104.19	2.50	1.73	1.04
15	83.56	2.00	1.23	1.11
20	70.25	1.69	0.92	1.10
25	60.90	1.46	0.69	1.04
30	53.93	1.29	0.52	0.94
35	48.52	1.16	0.39	0.83
40	44.18	1.06	0.29	0.70
45	40.63	0.97	0.20	0.55
50	37.65	0.90	0.13	0.40
55	35.12	0.84	0.07	0.24
60	32.94	0.79	0.02	0.07
65	31.04	0.74	-0.03	-0.10
70	29.37	0.70	-0.07	-0.27
75	27.89	0.67	-0.10	-0.45
80	26.56	0.64	-0.13	-0.64
85	25.37	0.61	-0.16	-0.82
90	24.29	0.58	-0.19	-1.01

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
3	0.03	0.03
5	0.06	0.04
8	0.13	0.05
11	0.22	0.06
15	0.34	0.07
19	0.51	0.08
24	0.73	0.09
30	1.00	0.10
36	1.33	0.11
43	1.73	0.12
51	2.20	0.13
59	2.75	0.14
68	**3.38**	**0.15**

Linear Interpolation

0.11	H	0.10		H =	0.103 m
1.33	1.11	1.00		Q_{allow} =	0.77 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-37 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0096	ha	Qallow =	1.03
C =	1.00		Vol(max) =	2.62
			Notches =	2

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	6.47	5.45	1.63
10	178.56	4.76	3.74	2.24
15	142.89	3.81	2.78	2.51
20	119.95	3.20	2.17	2.61
25	103.85	2.77	1.74	2.62
30	91.87	2.45	1.42	2.56
35	82.58	2.20	1.18	2.47
40	75.15	2.00	0.98	2.35
45	69.05	1.84	0.82	2.20
50	63.95	1.71	0.68	2.04
55	59.62	1.59	0.56	1.86
60	55.89	1.49	0.47	1.67
65	52.65	1.40	0.38	1.48
70	49.79	1.33	0.30	1.27
75	47.26	1.26	0.23	1.06
80	44.99	1.20	0.17	0.84
85	42.95	1.15	0.12	0.61
90	41.11	1.10	0.07	0.38

Notes: Vol = Qnet x time
Qnet = Q - Qallow

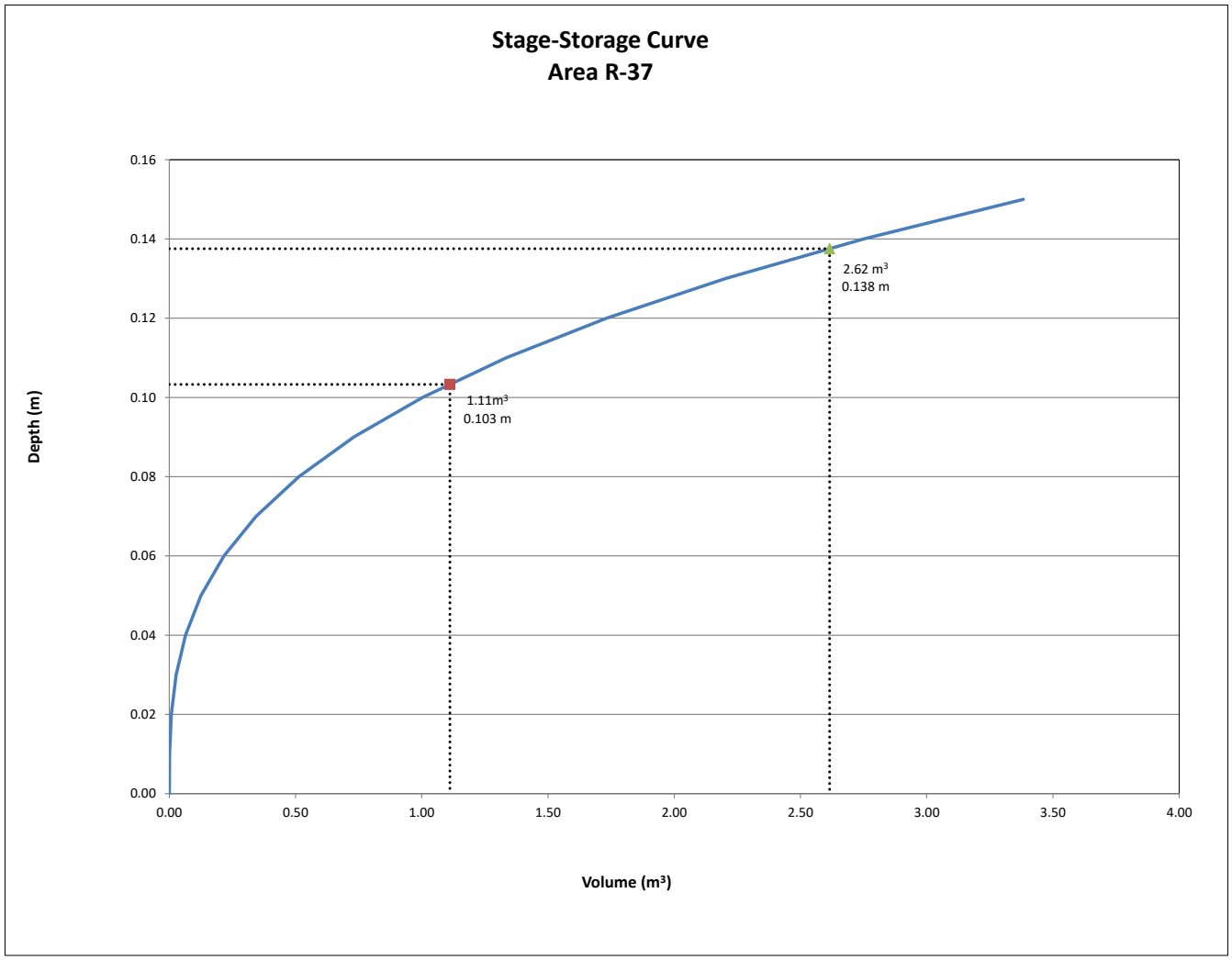
Ponding Depth (100-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
3	0.03	0.03
5	0.06	0.04
8	0.13	0.05
11	0.22	0.06
15	0.34	0.07
19	0.51	0.08
24	0.73	0.09
30	1.00	0.10
36	1.33	0.11
43	1.73	0.12
51	2.20	0.13
59	2.75	0.14
68	**3.38**	**0.15**

Linear Interpolation

0.14	H	0.13		H =	0.138 m
2.75	2.62	2.20		Q_{allow} =	1.03 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)


Stage-Storage Curve
Area R-37
Depth (m)
Volume (m³)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
2.62 m³
0.138 m
1.11m³
0.103 m

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-38 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0104	ha	Qallow =	0.85
C =	0.90		Vol(max) =	1.19
			Notches =	2

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	3.68	2.83	0.85
10	104.19	2.72	1.87	1.12
15	83.56	2.18	1.33	1.19
20	70.25	1.83	0.98	1.18
25	60.90	1.59	0.74	1.11
30	53.93	1.41	0.56	1.00
35	48.52	1.26	0.41	0.87
40	44.18	1.15	0.30	0.72
45	40.63	1.06	0.21	0.56
50	37.65	0.98	0.13	0.39
55	35.12	0.92	0.07	0.22
60	32.94	0.86	0.01	0.03
65	31.04	0.81	-0.04	-0.16
70	29.37	0.77	-0.08	-0.36
75	27.89	0.73	-0.12	-0.55
80	26.56	0.69	-0.16	-0.76
85	25.37	0.66	-0.19	-0.96
90	24.29	0.63	-0.22	-1.17

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
2	0.02	0.03
4	0.05	0.04
6	0.10	0.05
9	0.17	0.06
12	0.27	0.07
15	0.41	0.08
19	0.58	0.09
24	0.79	0.10
29	1.06	0.11
34	1.37	0.12
40	1.74	0.13
47	2.18	0.14
54	**2.68**	**0.15**

Linear Interpolation

0.12	H	0.11		H =	0.114 m
1.37	1.19	1.06		Q_{allow} =	0.85 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-38 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0104	ha	Qallow =	0.80
C =	1.00		Vol(max) =	1.00
			Notches =	2

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	7.03	6.23	1.87
10	178.56	5.17	4.37	2.62
15	142.89	4.14	3.34	3.00
20	119.95	3.47	2.67	3.21
25	103.85	3.01	2.21	3.31
30	91.87	2.66	1.86	3.35
35	82.58	2.39	1.59	3.34
40	75.15	2.18	1.38	3.30
45	69.05	2.00	1.20	3.24
50	63.95	1.85	1.05	3.16
55	59.62	1.73	0.93	3.06
60	55.89	1.62	0.82	2.95
65	52.65	1.52	0.72	2.82
70	49.79	1.44	0.64	2.69
75	47.26	1.37	0.57	2.56
80	44.99	1.30	0.50	2.41
85	42.95	1.24	0.44	2.26
90	41.11	1.19	0.39	2.11

Notes: Vol = Qnet x time
Qnet = Q - Qallow

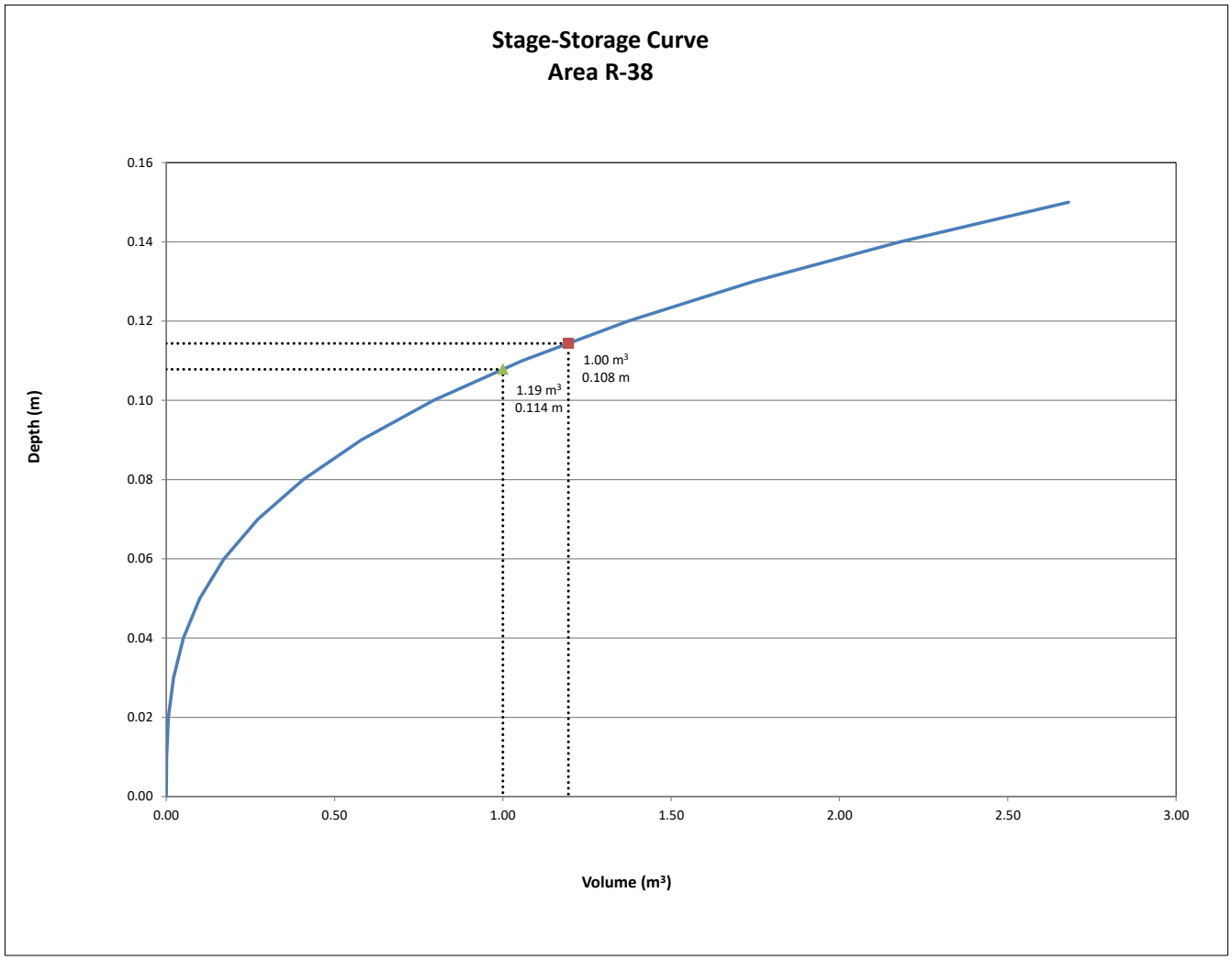
Ponding Depth (100-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
2	0.02	0.03
4	0.05	0.04
6	0.10	0.05
9	0.17	0.06
12	0.27	0.07
15	0.41	0.08
19	0.58	0.09
24	0.79	0.10
29	1.06	0.11
34	1.37	0.12
40	1.74	0.13
47	2.18	0.14
54	**2.68**	**0.15**

Linear Interpolation

0.11	H	0.1		H =	0.108 m
1.06	1.00	0.79		Q_{allow} =	0.80 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)


Stage-Storage Curve
Area R-38
Depth (m)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.50
1.00
1.50
2.00
2.50
3.00
Volume (m³)
1.00 m³
0.108 m
1.19 m³
0.114 m

NOVATECH
Engineers, Planners & Landscape Architects

REQUIRED STORAGE - 5-YEAR EVENT
AREA R-39 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0083	ha	Qallow =	0.81
C =	0.90		Vol(max) =	0.83
			Notches =	2

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	2.92	2.11	0.63
10	104.19	2.16	1.35	0.81
15	83.56	1.73	0.92	0.83
20	70.25	1.45	0.64	0.77
25	60.90	1.26	0.45	0.67
30	53.93	1.12	0.31	0.55
35	48.52	1.00	0.19	0.41
40	44.18	0.91	0.10	0.25
45	40.63	0.84	0.03	0.08
50	37.65	0.78	-0.03	-0.09
55	35.12	0.73	-0.08	-0.27
60	32.94	0.68	-0.13	-0.46
65	31.04	0.64	-0.17	-0.65
70	29.37	0.61	-0.20	-0.85
75	27.89	0.58	-0.23	-1.05
80	26.56	0.55	-0.26	-1.25
85	25.37	0.52	-0.29	-1.45
90	24.29	0.50	-0.31	-1.66

Notes: Vol = Qnet x time
Qnet = Q - Qallow

Ponding Depth (5-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
2	0.02	0.03
3	0.04	0.04
5	0.08	0.05
7	0.14	0.06
9	0.22	0.07
12	0.33	0.08
15	0.46	0.09
19	0.64	0.10
23	0.85	0.11
27	1.10	0.12
32	1.40	0.13
37	1.74	0.14
43	**2.15**	**0.15**

Linear Interpolation

0.11	H	0.10		H =	0.109 m
0.85	0.83	0.64		Q_{allow} =	0.81 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)

REQUIRED STORAGE - 100-YEAR EVENT
AREA R-39 : BUILDING ROOF

OTTAWA IDF CURVE

Area =	0.0083	ha	Qallow =	1.09
C =	1.00		Vol(max) =	2.00
			Notches =	2

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	5.58	4.49	1.35
10	178.56	4.10	3.01	1.81
15	142.89	3.28	2.19	1.98
20	119.95	2.76	1.67	2.00
25	103.85	2.39	1.30	1.95
30	91.87	2.11	1.02	1.84
35	82.58	1.90	0.81	1.70
40	75.15	1.73	0.64	1.53
45	69.05	1.59	0.50	1.34
50	63.95	1.47	0.38	1.14
55	59.62	1.37	0.28	0.93
60	55.89	1.28	0.19	0.70
65	52.65	1.21	0.12	0.47
70	49.79	1.14	0.05	0.23
75	47.26	1.09	0.00	-0.02
80	44.99	1.03	-0.06	-0.27
85	42.95	0.99	-0.10	-0.52
90	41.11	0.95	-0.14	-0.78

Notes: Vol = Qnet x time
Qnet = Q - Qallow

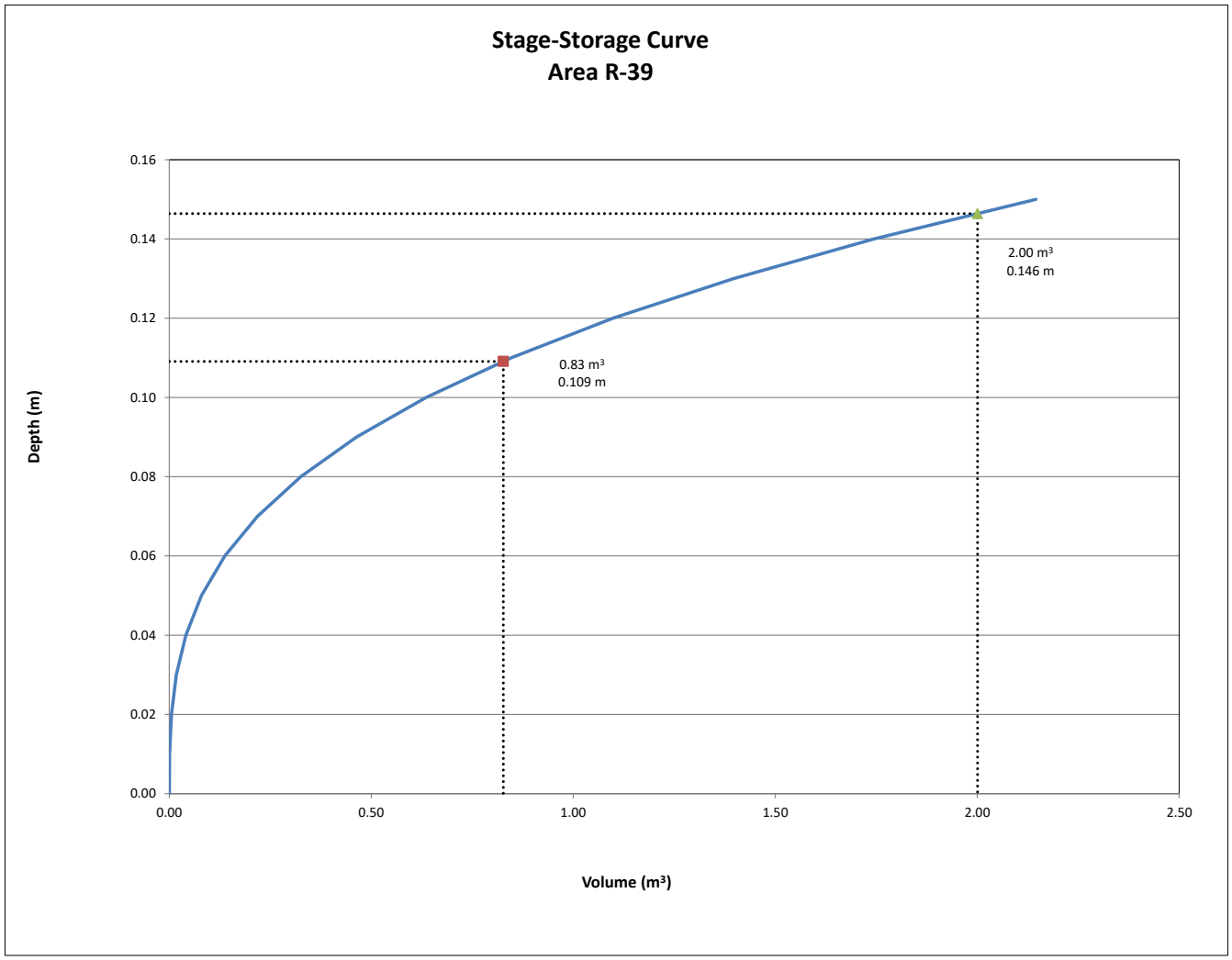
Ponding Depth (100-Year Storm)

Area m^2	V m^3	H m
0	0.00	0.00
0	0.00	0.01
1	0.01	0.02
2	0.02	0.03
3	0.04	0.04
5	0.08	0.05
7	0.14	0.06
9	0.22	0.07
12	0.33	0.08
15	0.46	0.09
19	0.64	0.10
23	0.85	0.11
27	1.10	0.12
32	1.40	0.13
37	1.74	0.14
43	**2.15**	**0.15**

Linear Interpolation

0.15	H	0.14		H =	0.146 m
2.15	2.00	1.74		Q_{allow} =	1.09 L/s

Note: Qallow is the flow rate through an overcontrolled Zurn Roof Drain (3.73 L/s/m of head.)


Stage-Storage Curve
Area R-39
Depth (m)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.50
1.00
1.50
2.00
2.50
Volume (m³)
2.00 m³
0.146 m
0.83 m³
0.109 m

Post Development Runoff Coefficient "C" including interim flows from Deschatelets Building Area as per Stormwater Management Plan (B20-INT, 114025-STM (PH3), Landscape Area = 0.02ha hard, 0.06ha green

Area	Surface	Ha	"C"	C_{avg}	$*C_{100}$
Total	Hard	0.090	0.90	0.39	0.46
0.325	Soft	0.235	0.20		

Post-Development Free Flows
Total Emergency Overland to Scholastic Avenue

Outlet Options	Area (ha)	$Q_{2\ Year}$ (L/s)	$Q_{5\ Year}$ (L/s)	$Q_{100\ Year}$ (L/s)	$Q_{100\ Year\ +20\%}$ (L/s)
	0.325	**27.1**	**36.7**	**73.8**	**88.6**

Time of Concentration	Tc=	10	min
Rainfall Intensity (2 Year Event)	I_2=	76.81	mm/hr
Rainfall Intensity (5 Year Event)	I_5=	104.19	mm/hr
Rainfall Intensity (10 Year Event)	I_{10}=	122.14	mm/hr
Rainfall Intensity (25 Year Event)	I_{25}=	144.69	mm/hr
Rainfall Intensity (50 Year Event)	I_{50}=	161.47	mm/hr
Rainfall Intensity (100 Year Event)	I_{100}=	178.56	mm/hr
Rainfall Intensity (100 Year +20% Event)	I_{100}=	214.27	mm/hr

100 year Intensity = 1735.688 / (Time in min + 6.014) $^{0.820}$
10 year Intensity = 1174.184 / (Time in min + 6.014)$^{0.816}$
5 year Intensity = 998.071 / (Time in min + 6.053) $^{0.814}$
2 year Intensity = 732.951 / (Time in min + 6.199)$^{0.810}$

For 25 year storms add 10% to C value
For 50 year storms add 20% to C value
For 100 year storms add 25% to C value

Mannings Equation Calculations - Worst Case Scenarios

Deschatelets Landscape Area between Retaining Wall / Building Accounted for as per Stormwater Management Plan (B20-INT, 114025-STM (PH3))

Pinch Point North Building

North Side

V-Bottom Ditch

Depth	m	0.201	*
Side slopes	1 to X	3	
Top Width	m	1.206	
Area	m^2	0.121	
Perimeter	m	1.27	
R=A/P	m	0.10	
n		0.035	
Slope	m/m	0.015	
Q_{max}	m^3/s	0.089	
V_{max}	m/s	0.730	

*Depth based on average swale depth

Courtyard - West Side North Building

V-Bottom Ditch

Depth	m	0.201	*
Side slopes	1 to X	3	
Top Width	m	1.206	
Area	m^2	0.121	
Perimeter	m	1.27	
R=A/P	m	0.10	
n		0.035	
Slope	m/m	0.015	
Q_{max}	m^3/s	0.089	
V_{max}	m/s	0.730	

NOVATECH
Engineers, Planners & Landscape Architects

M E M O R A N D U M

DATE: **FEBRUARY 10, 2023**

TO: **NISHANT JHAMB**

FROM: **STEVE ZORGEL / VAHID MEHDIPOUR**

RE: **GREYSTONE – PHASE 3 CONDOS**
ADDENDUM TO THE MASTER SERVICING STUDY FOR
GREYSTONE VILLAGE PHASE 2/3
114025 (PH3)

CC: **JEAN-CHARLES RENAUD, CITY OF OTTAWA**
MIKE PETEPIECE, NOVATECH

The purpose of this memo is to provide an addendum to the stormwater modelling sections of the following Master Servicing Study (MSS) completed for phase 2 /3 of the Greystone Village development.

- *Greystone Village - 175 Main Street: Site Servicing, Stormwater Management, Noise, Erosion and Sediment Control Brief (Phase 2 and 3), R-2017-089", dated May 26, 2017*.

The PCSWMM model has been updated as part of the Phase 3 Condo site located at 375 Deschatelets Avenue and also includes the following:

- As-built information for all previous site plan applications;
- As-built information on storm sewers throughout the subdivision;
- Current conditions of the Deschatelets building (no control on the roof to Oblate Avenue, landscape area adjacent to building to phase 3 system);
- Current conditions (no control) on the external St. Paul's lands.

As a result, modelling throughout the development differs from the MSS document above and requires an update.

For this addendum and simplicity, Sections 3.4 – SWM Modelling and 3.5 – PCSWMM Model Results, including all subsections, have been replaced in their entirety with the following text.

3.4 SWM Modeling

The *City of Ottawa Sewer Design Guidelines* requires hydrologic modeling of all dual drainage systems. The model of the proposed Greystone Village storm drainage system was developed using PCSWMM. The PCSWMM Model is provided as part of this report.

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

3.4.1 Design Storms

The hydrologic/hydraulic analysis was completed using the following synthetic design storms and historical storms. The IDF parameters used to generate the design storms were taken from the City of Ottawa Sewer Design Guidelines (October 2012).

3-Hour Chicago Storms:
5-year 3hr Chicago storm
100-year 3hr Chicago storm
100-year+20% 3hr Chicago storm

24-Hour Chicago Storms:
100-year 24hr Chicago storm

12-Hour SCS Type II Storms:
5-year 24-hour SCS Type II storm
100-year 24-hour SCS Type II storm

Historical Storms:
July 1, 1979 storm
August 4, 1988 storm
August 8, 1996 storm

The 3-hour Chicago distribution generates the highest peak flows for both the minor and major systems and was determined to be the critical storm distribution for the design of the storm drainage system.

The proposed drainage system has also been stress tested using a 3-hour Chicago design storm that has a 20% higher intensity and total volume compared to the 100-year event.

3.4.2 Boundary Conditions (Rideau River)

Water levels in the Rideau River have been taken into consideration in the PCSWMM modelling. There is a significant difference in timing between peak runoff from the site and peak flows in the Rideau River and it is highly unlikely that a 100-year storm over the subdivision will coincide with the 100-year water level in the Rideau River. Consequently, a combined frequency analysis was applied to the design using the following scenarios:

1) 100-year storm over the site, the 5-year water level in the Rideau River; or
2) 5-year storm over the site, 100-year water level in the Rideau River.

Rideau River Water Levels – Lower Reach

HEC-RAS Station	5-year Water Level	100-year Water Level
5555	57.85m	58.33m

A sensitivity analysis indicated that the first scenario (100-year storm, 5-year water level) resulted in the highest HGL elevations in the proposed storm sewers. Consequently, the PCSWMM model uses the 5-year water level in the Rideau River as the downstream boundary condition for the 100-year design event.

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

3.4.3 Methodology

The Greystone Village PCSWMM model is a dual-drainage model that includes both the minor and major system drainage networks: The model simulates the routing of flows through the storm sewer network *(minor system),* and overland along the road network *(major system).* The results of the analysis were used to:

- Minimize ponding in the rights-of-way during a 5-year event;
- Calculate the storm sewer hydraulic grade line for the 100-year storm event;
- Evaluate overland flow depths and ponding volumes in the right-of-way during the 100-year event; and
- Determine the total runoff from the site to the Rideau River.

The PCSWMM program uses a combination of junctions and conveyance links to represent both the major and minor drainage systems and determine the flows, velocities and ponding depths at specific points along the drainage network.

The major system is represented as an open channel based on the proposed road cross-sections, which includes separate Manning's roughness coefficients for the boulevards and the road surface. The road networks on the plan and profile drawings are used to create the major system model using all slopes and grades for the site. The conveyance links are connected to 'junctions' and 'storm inlets' which represent the gutter grades at selected points, catch basins in sags *(low points)* and overtopping points *(high points)*.

The PCSWMM model is capable of accounting for both static and dynamic storage within the rights-of-way, including the overland flow across all high points and capture/bypass curves for inlets on continuous grade. The 100-year flow depths computed by the model represent the total (static + dynamic) ponding depths at low points for areas in road sags, or the gutter flow depth where the inlets are on a continuous grade.

3.4.4 Catchment Areas & Modeling Parameters

The Greystone Village subdivision has been divided into subcatchments based on the drainage areas tributary to each inlet of the proposed storm sewer system, as shown on the PCSWMM model schematics. An overview of the hydrologic modeling parameters for each catchment area is provided in **Appendix A**.

Revised Storm Drainage Area Plans for Phase 1A/1B (114025-STM1 & STM2) and Storm Drainage Area Plan for phase 2 (114025-STM1-B) can be found in **Appendix A** and corresponding storm design sheets based on as-built information. It should be noted that some pipes are surcharging under the 100-year event, due to as-built information on previous site plan applications.

In Table 3.1, areas highlighted in orange colour are Phase 3 subcatchments that are added to the model during updating of the MSS PCSWMM model. Areas highlighted in green are either impacted by adding Phase 3 to the model and their area sizes are different from the 2017 MSS model or have been updated respecting buildings' site applications.

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

Table 3.1: Hydrologic Modeling Parameters

Area ID Model	Area ID Storm Drainage Plans	Catchment Area (ha)	Runoff Coefficient (C)	Percent Impervious (%)	No Depression (%)	Equivalent Width (m)	Average Slope (%)
A01A	1A	0.09	0.80	86	0	20	0.50
A01B	1B	0.12	0.63	61	0	28	0.50
A02	2	0.07	0.69	70	0	16	0.50
A03	3	0.14	0.90	100	100	22	1.50
A04	4	0.11	0.90	100	100	16	1.50
Condo2B_TopofRood		0.03	0.90	100	100	18	1.50
A05	5	0.12	0.60	57	0	14	0.50
A06	6	0.49	0.49	41	50	49	0.50
A07	7	0.14	0.90	100	100	21	1.50
A08	8	0.12	0.78	83	0	10	0.50
A09A	9A	0.26	0.53	47	50	35	0.50
A09B	9B	0.13	0.90	70	100	33	1.50
A09C	9C	0.08	0.90	100	100	32	1.50
A10	10	0.09	0.90	100	100	36	1.50
A11A	11	0.20	0.53	47	50	32	0.50
A11B	11B	0.07	0.90	100	100	18	1.50
A11B-TopofRoof		0.03	0.90	100	100	15	1.50
A12	12	0.08	0.80	86	50	18	0.50
A13	13	0.25	0.71	73	0	15	0.50
A14	14	0.97	0.57	53	50	99	1.50
A15A	15A	0.15	0.90	100	100	30	1.50
A15B	15B	0.16	0.70	71	50	15	0.50
A16A	16A	0.05	0.73	76	50	15	0.50
A16B	16B	0.05	0.71	73	50	16	0.50
A16C_1	16C	0.05	0.90	100	100	31	1.50
A16C_2		0.15	0.90	100	100	29	1.50
A17	17	0.12	0.86	94	50	26	0.50
A18	18	0.28	0.70	71	50	47	0.50
A19A	19A	0.03	0.74	77	50	16	0.50
A19B	19B	0.04	0.74	77	50	16	0.50
A20	20	0.11	0.62	60	0	13	0.50
A21B	21B	0.11	0.70	71	50	11	1.20
A22B	22B	0.11	0.53	47	50	11	0.70

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

Area ID Model	Area ID Storm Drainage Plans	Catchment Area (ha)	Runoff Coefficient (C)	Percent Impervious (%)	No Depression (%)	Equivalent Width (m)	Average Slope (%)
A23	23	0.13	0.69	70	50	21	0.50
A24	24	0.16	0.72	74	50	24	0.50
A25	25	0.05	0.73	76	50	31	0.50
A26	26	0.05	0.47	39	50	14	0.50
A27A	27A	0.10	0.68	69	0	9	0.50
A27B	27B	0.05	0.76	80	0	16	0.50
A28	28	0.11	0.30	14	0	8	0.50
A29	29	0.58	0.47	39	50	38	0.50
A30	30	0.12	0.86	94	50	26	0.50
A31	31	0.20	0.75	79	50	18	0.50
A32A	32A	0.02	0.74	77	50	13	0.50
A32B	32B	0.04	0.74	77	50	16	0.50
A33A	33A	0.06	0.73	76	50	36	0.50
A33B	33B	0.07	0.73	76	50	42	0.50
A34	34	0.05	0.76	80	50	25	0.50
A35	35	0.10	0.47	39	50	11	0.50
A36	36	0.13	0.70	71	0	13	0.50
B01A	B1a	0.05	0.76	80	0	20	0.50
B01B	B1b	0.08	0.72	74	0	15	0.60
B02	B2	0.01	0.69	70	50	6	0.90
B03	B3	0.19	0.70	71	50	12	2.50
B04	B4	0.19	0.66	66	50	18	2.70
B05	B5	0.18	0.60	57	0	16	3.80
B06	B6	0.06	0.68	69	0	14	2.00
B07	B7	0.09	0.73	76	50	20	1.20
B08	B8	0.07	0.80	86	50	18	1.50
B09	B9	0.11	0.80	86	50	16	4.00
B10	B10	0.07	0.73	76	50	16	1.70
B11	B11	0.04	0.69	70	50	10	1.80
B12	B12	0.09	0.79	84	50	16	1.00
B13	B13	0.09	0.65	64	50	24	2.50
B14	B14	0.08	0.63	61	50	39	0.50
B15	B15	0.15	0.62	60	50	42	0.50
B16	B16	0.12	0.65	64	50	20	0.50
B17	B17	0.07	0.77	81	0	12	1.00
B19	B19	0.16	0.90	100	100	19	1.50

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

Area ID Model	Area ID Storm Drainage Plans	Catchment Area (ha)	Runoff Coefficient (C)	Percent Impervious (%)	No Depression (%)	Equivalent Width (m)	Average Slope (%)
B20	B20A	0.08	0.48	40	50	15	0.50
B22	B22	0.07	0.60	57	50	15	0.50
B23	B23	0.17	0.90	100	100	33	1.50
B24	B24	0.12	0.80	86	50	23	0.50
B25	B25	0.06	0.90	100	100	21	1.50
TR-SB	21A	0.05	0.90	100	100	10	0.50
MR-SB		0.09	0.90	100	100	8	0.50
NA01	B21A	0.04	0.35	21	50	7	0.50
NA02	B20	0.12	0.42	31	50	24	0.50
NA03_1	B18	0.02	0.57	53	50	7	0.50
NA03_2		0.04	0.57	53	50	6	0.50
NA03_3		0.03	0.57	53	50	7	0.50
NA04_1	22A	0.04	0.50	43	50	5	0.50
NA04_2		0.01	0.50	43	50	6	0.50
NA05	21C	0.05	0.60	57	50	8	0.50
NA06	B22C	0.09	0.40	29	50	15	0.50
TR1-NB	B21	0.00	0.90	100	100	5	0.50
TR2-NB		0.06	0.90	100	100	8	0.50
MR-NB		0.10	0.90	100	100	6	0.50
Total		**10.16**	**0.70**	**67**	-	-	-

3.5 PCSWMM Model Results

The PCSWMM model schematic and model output for the 100-year event is provided in **Appendix A**.

3.5.1 Results – Inlet Control Devices (ICDs)

The majority of the storm inlets are located on continuous grade (as opposed to road sags). To accurately simulate catchbasin efficiency (captured flow vs. bypass flow), the PCSWMM model uses inlet rating curves to simulate the capture rates for catchbasins on-grade based on standard City of Ottawa rating curves.

ICDs are provided for the catch basins on a continuous grade in addition to those at sag points. During the minor system storm event, the inlet capacity controls the flow at those locations, but the ICD becomes the control in most cases during the major system storm event.

ICD sizes and design flows are provided in **Table 3.2** and **Appendix A**.

Table 3.1: Inlet Control Device Sizes and Design Flows

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

ICD Parameters				5-year Event		100-year Event	
Catchment ID Model	Area ID Storm Drainage Plans	Location	Orifice Diameter (mm)	Approach Flow (L/s)	Inlet Capture Rate (L/s) [1]	Approach Flow (L/s)	Inlet Capture Rate (L/s)[1]
Catchbasins							
A01A	1A	CB53	102	24.0	24.1	43.2	27.4
A01B	1B	CB51	94	21.5	20.6	46.7	24.2
A02	2	CB49	83	14.7	9.1	29.7	9.2
A03	3	CB82	152	40.1	56.4	69.2	65.1
B01B	B1b			17.7		34.9	
A05	5b	CB47	127	12.3	11.6	30.3	32.4
A07	7	CB45	127	40.1	40.0	69.2	45.6
A08	8			21.8		44.2	
A09A	9A	CB28	200 Lead	22.2	21.6	57.6	51.7
A11A	11A	CB26	178	19.4	40.2	49.9	67.1
A12	12			20.9		37.9	
A13	13	CB24	152	26.3	25.4	60.0	52.0
A15B	15B	CB22	178	21.4	24.1	48.7	59.4
A16A	16A	CB08	83	12.8	11.3	23.5	17.0
A16B	16B	CB06	83	12.5	11.1	23.2	16.5
A17	17	CB39	83	33.4	15.9	58.7	17.2
A18	18	CB09	178	52.9	52.9	110.7	72.5
A19A	19A	CB35	83	8.3	7.1	14.6	11.2
A19B	19B	CB36	83	10.8	8.2	19.2	12.4
A20	20	CB18	127	12.5	27.9	30.1	40.6
A21B	21B	CB34	152	20.1	25.0	41.5	49.1
A22B	22B	CB20	102	8.6	13.5	22.1	28.2
A23	23	CB16	127	23.3	21.2	49.4	39.8
A24	24	CB15	300 Lead	30.5	30.9	63.3	123.7
A25	25	CB29	83	13.9	9.5	24.3	12.4
A26	26	LCB29B	83	7.3	6.4	15.7	15.3
A27A	27A	CB01	127	12.5	15.0	28.8	29.3
A27B	27B	CB55	83	13.4	12.6	24.0	18.3
A28	28	CBMH1	375 Lead	5	72	12	139
A29	29			67		127	
A30	30	CB42	83	33.3	14.8	58.6	17.2
A31	31	CB12	152	33.5	34.7	71.4	55.2
A32A	32A	CB40	83	5.6	5.0	9.7	8.0

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

ICD Parameters				5-year Event		100-year Event	
Catchment ID Model	Area ID Storm Drainage Plans	Location	Orifice Diameter (mm)	Approach Flow (L/s)	Inlet Capture Rate (L/s) [1]	Approach Flow (L/s)	Inlet Capture Rate (L/s)[1]
A32B	32B	CB41	83	10.8	8.2	19.2	12.4
A33A	33A	CB30	83	16.6	11.5	29.1	14.3
A33B	33B	CB31	102	19.4	14.9	34.0	19.5
A34	34	CB32	83	13.9	17.0	24.4	17.2
A35	35	LCB31B	83	12.3	11.0	24.3	16.2
A36	36	CB14	127	18.3	30.7	41.4	41.4
B01A	B1a	CB60	83	13.7	12.6	26.4	19.2
B02	B2	CB58	83	2.8	2.8	4.8	5.4
B03	B3	CB62	152	32.6	23.6	70.4	36.8
B04	B4	CB65	127	36.5	35.0	76.7	45.8
B05	B5	CB75	127	30.6	23.3	69.3	29.7
B06	B6	CB76	102	15.5	16.1	28.3	24.7
B07	B7	CB80	83	23.5	15.3	42.7	18.4
B08	B8	CB63	94	19.8	12.8	34.3	18.2
B09	B9	CB78	152	31.0	40.5	53.9	55.8
B10	B10	CB71	83	18.9	11.7	33.7	11.9
B11	B11	CB69	83	10.4	11.4	18.9	17.3
B12	B12	CB67	83	24.2	16.4	43.3	18.7
B13	B13	CB70	108	23.2	18.9	42.5	28.1
B14	B14	CB73	127	19.2	18.1	36.6	27.8
B15	B15	CB79	83	28.3	15.1	60.4	15.1
B16	B16	CB74	4x 375mm	18.5	85.12	41.7	394.5
B17	B17	CB77	83	16.0	13.3	28.7	18.4
B20	B20A	CB76	102	11.6	16.1	23.9	24.7
B22	B22	CB75	127	13.0	23.3	25.6	29.8
B24	B24	CB65	127	30.5	35.0	55.4	45.8
Flat Roof Buildings							
A04	4	Roof Drain		40.1	11.2	61.21	11.2
A09B	9B	Roof Drain		32.2	10.4	60.2	10.4
A09C	9C	Roof Drain		23.2	6.4	39.7	7.73
A10	10	Roof Drain		26.0	7.2	44.6	7.2
A11B	11B	Roof Drain		28.9	7.7	49.6	6.4
A15A	15A	Roof Drain		43.2	43.2	74.3	74.3
A16C	16C	Roof Drain		67.0	67.0	115.0	102.31
B19	B19	Roof Drain		43.3	42.8	75.2	74.5

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

ICD Parameters				5-year Event		100-year Event	
Catchment ID Model	Area ID Storm Drainage Plans	Location	Orifice Diameter (mm)	Approach Flow (L/s)	Inlet Capture Rate (L/s) [1]	Approach Flow (L/s)	Inlet Capture Rate (L/s)[1]
B23	B23	Roof Drain		48.9	13.6	91.6	14.8
B25	B25	Roof Drain		17.4	4.8	29.8	4.8
North Building PH3	B21	Roof Drain		40.5	7.5	74.0	10.3
South Building PH3	21A	Roof Drain		37.6	6.5	66.2	8.9
Overland or Uncontrolled Flow							
A06	6			63	63	123	81
A14	14			165	165	326	213
NA01*	B21A			2		6.5	
NA02**	B21			15	15	40	40
NA03*	B18			12		30	
NA04*	22A			6		13	
NA05*	21C			6		16	
NA06**	22C			10	10	21	21

[1] *Inlet capture rates include upstream overland flows where CBs are on continuous grade and, as such, may exceed the peak runoff rate for the specific catchment area.*
** Areas from Phase 3 flowing overland to major system and captured via roadside catchbasins*
*** Areas from Phase 3 directed uncontrolled to minor system*

3.5.2 *Results – Overland Flow (Major System)*

The major system network was evaluated using the PCSWMM model to ensure that the overland flow depths and velocities conform to the City of Ottawa standards. The results of the 100-year modeling indicate that the overland flow depths on all streets will be less than 0.30m, the product of depth x velocity will be less than 0.60, and major system flows will be confined to the rights-of-way with no encroachment onto private property. The model results for overland flow and at low points are summarized in **Appendix A** and **Table 3.4** respectively.

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

Table 2.3: Overland Flow Results

Structure ID	Max Static Depth[1]	Chicago 100-year 3-hour				Chicago 100-year 3-hour (+20%)			
		Peak Flow	Velocity	Total Depth (static + dynamic)	Velocity x Depth	Peak Flow	Velocity	Total Depth (static + dynamic)	Velocity x Depth
	(m)	(L/s)	(m/s)	(m)	(m^2/s)	(L/s)	(m/s)	(m)	(m^2/s)
des Oblate Ave.									
CB 52/53	CG	31.9	0.23	0.14	0.03	48.7	1.38	0.20	0.28
CB 50/51	CG	31.9	0.34	0.05	0.02	48.7	0.33	0.06	0.02
CB 48/49	CG	16.4	0.34	0.03	0.01	21.2	0.33	0.04	0.01
CB 59/60	CG	4.1	0.25	0.03	0.01	20.0	0.43	0.05	0.02
CB 57/58	CG	1.3	0.42	0.01	0.00	7.2	0.58	0.01	0.01
CB 61/62	CG	4.1	0.25	0.03	0.01	20.0	0.43	0.05	0.02
CB 64/65	CG	113.5	0.75	0.06	0.05	160.1	0.81	0.06	0.05
CB 70	CG	199.9	0.99	0.07	0.07	287.1	1.06	0.08	0.08
Hazel St.									
CB 27/28	CG	5.5	0.26	0.03	0.01	11.4	0.31	0.03	0.01
CB 25/26	CG	14.4	0.10	0.08	0.01	34.8	0.16	0.09	0.01
Axel Street									
CB 46/47	CG	9.4	0.14	0.03	0.00	22.4	0.21	0.05	0.01
CB 44/45	CG	66.7	0.50	0.07	0.04	99.9	0.53	0.08	0.04
CB 23/24	CG	80.2	0.76	0.05	0.04	147.3	0.87	0.07	0.06
CB 33/34	CG	30.9	0.40	0.05	0.02	57.9	0.43	0.06	0.03
CB 19/20	CG	9.0	0.24	0.05	0.01	26.0	0.31	0.07	0.02
Bolt Street									
CB 21/22	CG	50.0	0.40	0.06	0.02	92.9	0.45	0.08	0.04
CB 7/8	CG	4.8	0.29	0.02	0.01	10.6	0.29	0.03	0.01
CB 5/6	CG	4.7	0.31	0.03	0.01	10.7	0.37	0.03	0.01
Jeremiah Kealy St.									
CB 9/10	CG	82.4	0.43	0.10	0.04	136.6	0.47	0.12	0.06
CB 17/18	CG	89.1	0.62	0.22	0.14	146.2	0.63	0.26	0.16
Telmon St.									
CB 1/2	CG	89.1	0.62	0.22	0.14	146.3	0.63	0.26	0.16
CB 11/12	CG	54.5	0.37	0.06	0.02	84.8	0.40	0.07	0.03
CB 13/14	CG	55.8	0.39	0.10	0.04	94.4	0.48	0.12	0.06
Scholastic Dr.									
CB 15	0.05	135.1	0.54	0.00	0.00	134.8	0.63	0.15	0.09
CB 16	CG	66.9	0.55	0.06	0.03	102.9	0.62	0.09	0.06
CB 77	CG	20.5	0.73	0.05	0.04	39.0	0.85	0.06	0.05
CB 76	CG	46.3	0.61	0.05	0.03	71.8	0.84	0.06	0.05
CB 75	CG	351.1	0.99	0.09	0.09	502.2	1.11	0.11	0.01

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

Structure ID	Max Static Depth[1]	Chicago 100-year 3-hour				Chicago 100-year 3-hour (+20%)			
		Peak Flow	Velocity	Total Depth (static + dynamic)	Velocity x Depth	Peak Flow	Velocity	Total Depth (static + dynamic)	Velocity x Depth
	(m)	(L/s)	(m/s)	(m)	(m^2/s)	(L/s)	(m/s)	(m)	(m^2/s)
Block 57 Pvt.									
CB 39	CG	41.5	0.58	0.05	0.03	53.4	0.62	0.05	0.03
Block 51 Pvt.									
CB 35	CG	2.9	0.15	0.02	0.00	4.3	0.17	0.03	0.01
CB 36	CG	9.0	0.26	0.03	0.01	12.8	0.25	0.03	0.01
Block 48 Pvt.									
CB 42	CG	41.3	0.35	0.04	0.01	53.4	0.38	0.05	0.02
Block 46 Pvt.									
CB 40	CG	1.6	0.11	0.02	0.00	2.2	0.12	0.02	0.002
CB 41	CG	7.7	0.18	0.03	0.01	10.9	0.15	0.03	0.005
Parish Pvt.									
CB 80	CG	22.4	0.45	0.05	0.02	32.2	0.50	0.05	0.03
CB 63	CG	36.0	0.81	0.04	0.03	50.9	0.89	0.04	0.04
CB 78	0.22	2.9	0.15	0.02	0.01	4.3	0.17	0.03	0.01
CB 68/69	CG	10.2	0.36	0.07	0.03	14.4	0.36	0.10	0.04
CB 66/67	CG	15.7	0.16	0.03	0.00	22.2	0.18	0.03	0.01
Sanctuary Pvt.									
CB 74	0.08	415.3	0.90	0.00	0.00	571.4	1.04	0.23	0.24
CB 79	CG	16.4	0.34	0.03	0.01	21.2	0.33	0.04	0.01
CB 72/73	CG	30.0	0.57	0.03	0.02	55.4	0.67	0.04	0.03
CB 71	CG	31.9	0.34	0.05	0.02	48.7	0.33	0.06	0.02

(1) CG denotes catch basin pairs on a continuous grade that do not have a static ponding depth.

Table 3.4: Overland Flow Depths at Low Points

Structure ID	Top of Grate Elevation (m)	Max Static Ponding Depth (m)	Model Results (5yr Event)	Model Results (100yr Event)	
			Ponding Depth (m)	Ponding Depth (m)	Spill Flow (L/s)
Roadway Inlets					
CB 15	62.66	0.05	0.00	0.00	0.0
CB 74	58.92	0.08	0.00	0.00	0.0
CB 78	60.11	0.22	0.00	0.18	0.0
CB 82	65.09	0.07	0.00	0.11	15.7
Rear Yard Spills to Roadway (1)					

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

Structure ID	Top of Grate Elevation (m)	Max Static Ponding Depth (m)	Model Results (5yr Event)	Model Results (100yr Event)	
			Ponding Depth (m)	Ponding Depth (m)	Spill Flow (L/s)
LCB 29B	62.50	0.15	0.00	0.00	0.00
LCB 31B	60.89	0.15	0.00	0.20	8.9 (To Block 56 / private road)

(1) Storage in the rear yards is assumed to be 0m³ in all cases.

Table 3.5 provides an overview of the major system flow leaving the Greystone Village site during the 100-year event. The majority of overland flow will be captured by the storm sewer system on Scholastic Drive and conveyed to the Rideau River through the proposed storm sewer system at Outlets 1 and 2.

Table 3.5: Major System Outlet Summary (100yr Event)

Post-Development			Pre-Development Major System Flow (L/s)
Outlet ID (PCSWMM)	Receiver Description	Major System Flow (L/s)	
Main Street(1)	Portion of Block 51 (0.33 ha)	40	
Main North	Main Street (at Oblate Ave.)	19	
Main South	Main Street (at Hazel St.)	10	
	Total (Main Street)	**69 L/s**	**76 L/s**
Clegg Street(1)	Front of Lots 1-14, Block 61 (0.28 ha)	117	
Clegg	Clegg Street @ Telmon Street	8	
Out 3	Clegg Street	0	
	Total (Clegg Street)	**125 L/s**	**73 L/s**
MH 120	Rideau River (via Storm Outlet 1)	1,629 (2)	
Out 1	Rideau River	16	
Out 2	Rideau River	14	

(1)Areas not contributing to the proposed internal storm network and not included in the model.

(2) Total 100-year outflow (Major + Minor) to Rideau River at Outlet 1.

Under post-development conditions, major system flow contributions to Main Street will consist of runoff from a portion of Block 51, as well as a small amount of overland flow from Oblate Avenue and Hazel Street. The total 100-year major system flow (69 L/s) will be slightly less than pre-development conditions (73 L/s).

The total amount of overland flow to Clegg Street will increase following development, as storm runoff from the front of Lots 1-14 will be directed to Clegg Street. The additional flow will not adversely impact any existing development or infrastructure. Overland flows on Clegg St. will be conveyed down the north side of the street and ultimately to the Rideau River via the RVCA access pathway. Any increase in erosion potential resulting from the increase in major system flow will be mitigated

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

by the proposed reinforcement of the accessway to support temporary vehicle access to the RVCA dock on the Rideau River.

It should be noted there is a very small difference in area and imperviousness to each outlet, refer to figure 5. The existing vortechnic units are still sized appropriately to handle the increase in peak flow to each outlet. See correspondence from the manufacturer in the appendix for details.

3.5.3 Results - Hydraulic Grade Line

Table 3.6 provides a summary of the 100-year HGL elevations at each storm manhole, including the surcharge depth above the storm sewer obverts, clearance from the top-of-grate elevation (T/G), and the minimum required underside of footing (USF) elevations. The results of this analysis were used to ensure that a minimum freeboard of 0.30m is provided between the 100-year HGL and the designed underside of footing elevations. The results of the analysis indicate the USF elevations are above the stress test (100-year+20%) event. The USF elevations indicated in the table below are the closest USF or the worst case USF between the manhole and downstream manhole.

Table 3.6: 100-year HGL Elevations

STM MH ID	Street	Obvert Elevation (m)	T/G Elevation (m)	HGL Elevation (m)	Stress Test HGL (m)	Sur-charge (m)	Clearance from T/G (m)	Minimum Required USF (m)	As-Built USF (m)
MH100	Telmon St.	60.28	61.69	60.92	61.29	0.64	0.77	61.22	N/A
MH102	Philosopher Pvt.	60.28	64.86	61.29	62.07	1.02	3.57	61.59	62.36
MH104	Telmon St.	60.16	62.97	60.84	61.24	0.68	2.13	61.14	NA
MH106	Telmon St.	60.16	62.18	60.79	61.20	0.63	1.39	61.09	NA
MH108	Telmon St.	60.11	62.00	60.68	61.05	0.57	1.01	60.98	61.50
MH110	De Mazenod Ave.	60.46	63.44	60.77	61.08	0.31	2.67	61.07	61.50
MH110B	Jeremiah Kealy St.	60.23	63.19	60.63	60.92	0.41	2.56	60.93	62.41
MH112B	Jeremiah Kealy St.	60.00	62.98	60.45	60.72	0.45	2.53	60.75	62.41
MH114	Scholastic Dr.	59.98	63.04	60.05	60.28	0.07	2.99	60.35	60.93
MH118	Scholastic Dr.	59.91	62.85	59.52	59.59	0.00	3.33	60.21	60.93
MH122	Telmon St.	59.91	62.93	60.05	60.23	0.14	2.88	60.35	61.12
MH122B	Telmon St.	59.21	62.84	59.85	59.97	0.64	2.99	60.15	60.98
MH124	Scholastic Dr.	61.01	63.37	60.88	60.94	0.00	2.49	61.31	61.41
MH126	Deschâtelets Ave.	61.69	63.47	61.59	61.69	0.00	1.88	61.99	63.61
MH128	Deschâtelets Ave.	60.78	63.83	61.49	61.84	0.72	2.34	61.79	61.99
MH130	Deschâtelets Ave.	62.02	63.98	61.90	62.01	0.00	2.08	62.32	NA
MH132	Deschâtelets Ave.	62.10	64.31	61.98	62.09	0.00	2.33	62.40	NA
MH136	Block 48 Pvt.	61.15	63.15	61.03	61.03	0.00	2.12	61.45	NA
MH140	Block 46 Pvt.	61.05	63.05	60.94	60.95	0.00	2.11	61.35	NA
MH144	Telmon St.	59.99	63.05	60.26	60.50	0.27	2.79	60.56	61.27
MH148	Block 51 Pvt.	61.47	63.47	61.37	61.39	0.00	2.10	61.77	NA
MH152	Block 57 Pvt.	61.58	63.58	61.46	61.46	0.00	2.12	61.88	NA

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

STM MH ID	Street	Obvert Elevation (m)	T/G Elevation (m)	HGL Elevation (m)	Stress Test HGL (m)	Sur-charge (m)	Clearance from T/G (m)	Minimum Required USF (m)	As-Built USF (m)
MH164	Deschâtelets Ave.	62.18	64.66	62.07	62.17	0.00	2.59	62.48	NA
MH166	Deschâtelets Ave.	62.25	64.87	62.20	62.31	0.00	2.67	62.55	NA
MH168	Deschâtelets Ave.	62.34	65.04	62.29	62.41	0.00	2.75	62.64	NA
MH170	Deschâtelets Ave.	62.41	65.22	62.37	62.49	0.00	2.85	62.71	NA
MH172	Deschâtelets Ave.	62.53	65.22	62.47	62.59	0.00	2.75	62.83	NA
MH174	Deschâtelets Ave.	62.58	65.23	62.68	62.77	0.10	2.55	62.98	NA
MH176	Hazel St.	63.40	65.24	63.15	63.17	0.00	2.09	63.70	NA
MH178	Hazel St.	62.55	65.44	62.41	62.44	0.00	3.03	62.85	NA
MH180	des Oblate Ave.	63.15	64.61	63.08	63.08	0.00	1.53	63.45	NA
MH182	des Oblate Ave.	62.90	64.91	62.78	62.87	0.00	2.13	63.20	NA
MH220	-	59.72	61.72	60.32	60.41	0.60	1.40	60.62	NA
MH222	-	59.33	61.00	60.07	60.16	0.75	0.92	60.38	NA
MH224	-	59.42	60.92	60.44	60.17	0.83	0.67	60.55	NA
MH226	-	60.46	62.67	60.98	61.35	0.50	1.71	61.26	NA
MH228	-	60.32	61.86	60.97	61.33	0.63	0.91	61.25	NA
MH230	Philosopher Pvt.	60.15	63.44	61.05	61.62	0.88	2.41	61.33	61.77
MH238	-	59.04	62.56	58.88	59.01	0.00	3.68	59.34	NA
MH242	-	57.01	61.68	58.44	58.59	1.42	3.25	58.73	NA
MH246	-	60.22	64.28	61.20	61.88	0.96	3.10	61.48	62.26
MH248	Deschâtelets Ave.	62.22	64.77	62.14	62.24	0.00	2.63	62.52	NA
MH250	Hazel St.	63.11	65.74	62.88	62.90	0.00	2.86	63.41	NA
MH300	des Oblate Ave.	62.28	64.86	62.44	62.45	0.00	2.42	62.95	62.58
MH302	des Oblate Ave.	61.77	64.32	61.56	61.58	0.00	2.76	62.07	62.26
MH304	des Oblate Ave.	61.21	63.44	61.02	61.03	0.00	2.42	61.51	61.40 (TOS = 62.42)*
Unit 17 – Block 4 (Worst case)	des Oblate Ave.	60.21	NA	60.09	60.15	0.00	NA	60.51	60.21 (TOS = 61.26)*
MH306	des Oblate Ave.	59.74	62.10	59.64	59.94	0.00	2.46	60.04	60.19
MH308	des Oblate Ave.	59.05	61.62	59.27	59.54	0.23	2.35	59.57	NA
MH310	des Oblate Ave.	57.22	60.06	58.85	59.02	1.63	1.21	59.15	N/A
MH312	Parish Pvt.	61.89	64.19	61.71	61.71	0.00	2.48	62.19	NA
MH314	Parish Pvt.	60.86	63.06	60.71	60.72	0.00	2.35	61.16	NA
MH316	Parish Pvt.	57.51	60.20	59.23	59.38	1.72	0.97	59.53	NA
MH318	Parish Pvt.	57.77	59.59	59.25	59.39	1.48	0.34	59.55	NA
MH320	Parish Pvt.	57.33	59.97	59.09	59.25	1.77	0.88	59.39	NA

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

STM MH ID	Street	Obvert Elevation (m)	T/G Elevation (m)	HGL Elevation (m)	Stress Test HGL (m)	Sur-charge (m)	Clearance from T/G (m)	Minimum Required USF (m)	As-Built USF (m)
MH322	Parish Pvt.	57.29	60.03	59.05	59.21	1.77	0.98	59.35	NA
MH324	Scholastic Dr.	60.97	62.79	60.73	60.73	0.00	2.06	61.27	NA
MH326	Scholastic Dr.	59.55	61.81	59.31	59.52	0.00	2.50	59.85	NA
MH328	Scholastic Dr.	58.42	60.43	59.34	59.48	0.93	1.09	59.64	NA
MH330	Sanctuary Pvt.	57.44	59.30	58.87	59.06	1.44	0.43	59.17	NA
MH332	Sanctuary Pvt.	57.28	59.20	58.85	59.05	1.57	0.34	59.15	NA
MH334	des Oblate Ave.	57.11	59.03	58.73	58.89	1.62	0.30	59.03	NA
MH336	-	56.80	58.81	58.35	58.44	1.55	0.46	58.65	NA
MH338	-	57.09	58.75	58.33	58.42	1.24	0.42	58.63	NA
MH340	-	56.76	58.33	58.15	58.21	1.39	0.18	58.45	NA

*TOS = Top of slab

It should be noted that in some cases the Underside of Footings don't have the required 0.3m clearance from the 100-year storm event or the obvert of the pipe. In these cases, the top of the floor slab (TOS) has been indicated, which is significantly above (1.0m+) the USF elevations. Therefore, will be no negative impacts on the floor / basement of the units.

For information, the worst case for clearance (Unit 17 – Block 4) for the entire site has been indicated in the table above.

We trust this satisfies comments received as part of the phase 3 development. Please contact the undersigned should you have questions or require additional information.

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

NOVATECH

Prepared by:

Vahid Mehdipour, M.Sc.
Engineering Intern | Water Resources

Vahid Mehdipour

Reviewed by:

Steve Zorgel, P. Eng.
Project Manager | Land Development Engineering

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

STORM SEWER DESIGN SHEET (5 YEAR DESIGN EVENT) - AS BUILT

Greystone Village

Developer: Greystone Village Inc.

Additional Condo Units

NOVATECH
Engineers, Planners & Landscape Architects

PROJECT #: 114025
DESIGNED BY : SAZ/JAG
CHECKED BY : MJP
DATE PREPARED : 15-Dec-15
DATE REVISED : ~~24-Feb-16~~ ~~11-Mar-16~~ ~~17-Oct-16~~ ~~27-Oct-16~~ ~~5-Jan-17~~ ~~27-Apr-17~~ ~~15-Sep-17~~ ~~6-Feb-23~~

LOCATION												PROPOSED SEWER								
STREET	FROM M.H.	TO M.H.	AREA #	INDIV AREA (ha)	INDIV R	INDIV. 2.78 AR	ACCUM. 2.78 AR	TIME OF CONC. (min)	RAINFALL INTENSITY (mm/hr)	INDIVIDUAL PEAK FLOW (where applicable) Q (L/s)	PEAK FLOW Q (L/s)	TYPE OF PIPE	PIPE SIZE (mm)	PIPE ID (mm)	GRADE (%)	LENGTH (m)	CAPACITY (L/s)	FULL FLOW VELOCITY	TIME OF FLOW (min)	CAPACITY (%)
*OBLATES AVENUE	180	182	1A	0.12	0.61	0.20	0.20	10.00	104		**42.4**	DR 35	300	305	***0.37***	***61.8***	61.4	0.84	1.22	69%
			1B	0.12	0.61	0.20	0.41													
*OBLATES AVENUE	182	174	2	0.08	0.65	0.14	0.55	11.22	98		**54.1**	DR 35	375	381	***0.31***	***71.5***	101.8	0.89	1.33	53%
*DESCHATELETS AVENUE	174	172					0.55	12.56	92		**51.0**	DR 35	375	381	***0.13***	***15.3***	65.9	0.58	0.44	77%
*DESCHATELETS AVENUE	172	170	3	0.14	0.90	0.35	0.90	13.00	91		**113.5**	CONC	450	457	**0.31**	**32.2**	165.6	1.01	0.53	69%
			4	0.14	0.90	0.35	1.25													
*DESCHATELETS AVENUE	170	168	5b	0.11	0.63	0.19	1.44	13.53	89		**128.0**	CONC	525	533	***0.26***	***27.2***	228.8	1.02	0.44	56%
*DESCHATELETS AVENUE	168	166	6	0.47	0.57	0.74	2.19	13.97	87		**190.5**	CONC	600	610	***0.27***	***33.4***	332.8	1.14	0.49	57%
*DESCHATELETS AVENUE	166	248	7	0.14	0.90	0.35	2.54	14.46	85		**216.7**	CONC	600	610	***0.17***	***17.3***	264.1	0.90	0.32	82%
*DESCHATELETS AVENUE	248	164	8	0.12	0.78	0.26	2.80	14.78	84		**236.0**	CONC	600	610	***0.56***	***19.7***	479.4	1.64	0.20	49%
								14.98												
HAZEL STREET	176	250	9A	0.26	0.53	0.38	0.38	10.00	104		**94.7**	CONC	450	457	***0.48***	***60.4***	206.1	1.26	0.80	46%
			9B	0.13	0.90	0.33	0.71													
			9C	0.08	0.90	0.20	0.91													
HAZEL STREET	250	178	10	0.09	0.90	0.23	1.13	10.80	100		**113.5**	CONC	450	457	***0.47***	***38.6***	203.9	1.24	0.52	56%
HAZEL STREET	178	164	11A	0.20	0.53	0.29	1.43	11.32	98		**156.9**	CONC	525	533	***0.24***	***37.3***	219.8	0.98	0.63	71%
ST. PAUL UNIVERSITY LANDS			12	0.08	0.80	0.18	1.61													
								11.95												
DESCHATELETS AVENUE	164	132					4.41	14.98	84		**368.5**	CONC	750	762	**0.26**	**30.8**	592.2	1.30	0.40	62%
DESCHATELETS AVENUE	132	130	11B	0.09	0.90	0.23	4.63	15.38	82		**381.5**	CONC	750	762	**0.30**	**26.4**	636.1	1.39	0.32	60%
DESCHATELETS AVENUE	130	128	13	0.25	0.71	0.49	5.12	15.69	81		**417.1**	CONC	750	762	**0.45**	**19.8**	779.1	1.71	0.19	54%
								15.88												
FORECOURT	FORECOURT	128	14	0.97	0.57	1.54	1.54	10.00	104		**160.2**	CONC	525	533	0.25	140.0	224.3	1.00	2.32	71%
								12.32												

STORM SEWER DESIGN SHEET (5 YEAR DESIGN EVENT) - AS BUILT

Greystone Village

Developer: Greystone Village Inc.

Additional Condo Units

NOVATECH
Engineers, Planners & Landscape Architects

PROJECT #: 114025
DESIGNED BY : SAZ/JAG
CHECKED BY : MJP
DATE PREPARED : 15-Dec-15
DATE REVISED : ~~24-Feb-16~~ ~~11-Mar-16~~ ~~17-Oct-16~~ ~~27-Oct-16~~ ~~5-Jan-17~~ ~~27-Apr-17~~ ~~15-Sep-17~~ 6-Feb-23

LOCATION												PROPOSED SEWER								
STREET	FROM M.H.	TO M.H.	AREA #	INDIV AREA (ha)	INDIV R	INDIV. 2.78 AR	ACCUM. 2.78 AR	TIME OF CONC. (min)	RAINFALL INTENSITY (mm/hr)	INDIVIDUAL PEAK FLOW (where applicable) Q (L/s)	PEAK FLOW Q (L/s)	TYPE OF PIPE	PIPE SIZE (mm)	PIPE ID (mm)	GRADE (%)	LENGTH (m)	CAPACITY (L/s)	FULL FLOW VELOCITY	TIME OF FLOW (min)	CAPACITY (%)
DE MAZENOD AVENUE	128	110	15A	0.15	0.90	0.38	0.38	15.88	141	53	**616.2**	CONC	750	762	***0.53***	***76.0***	845.5	1.85	0.68	73%
			15B	0.16	0.70	0.31	6.97		81	563										
								16.57												
DE MAZENOD AVENUE	108	110	16A	0.05	0.73	0.10	0.10	10.00	104	21	**143.3**	DR 35	375	381	***0.62***	***73.8***	144.0	1.26	0.97	99%
			16B	0.05	0.71	0.10	0.20													
			16C	0.19	0.90	0.48	0.68		181	122										
								10.97												
JEREMIAH KEALEY STREET	110	110b					7.17	16.57	79	565	**709.4**	CONC	825	838	***0.28***	***32.1***	792.4	1.44	0.37	90%
							1.05		137	144										
								16.94												
BLOCK 49/50	152	110b	17	0.12	0.86	0.29	0.29	10.00	104		**29.9**	DR 35	250	254	***0.55***	***36.1***	46.0	0.91	0.66	65%
								10.66												
JEREMIAH KEALEY STREET	110b	112b	18	0.28	0.70	0.54	8.01	16.94	78	623	**764.7**	CONC	825	838	***0.57***	***35.3***	1130.6	2.05	0.29	68%
							1.05		135	142										
								17.23												
BLOCK 51	148	112b	19A	0.03	0.74	0.06	0.06	10.00	104		**15.0**	DR 35	250	254	***0.51***	***41.1***	44.3	0.87	0.78	34%
			19B	0.04	0.74	0.08	0.14													
								10.78												
JEREMIAH KEALEY STREET	112b	114	20	0.11	0.62	0.19	8.34	17.23	77	642	**782.7**	CONC	825	838	***0.28***	***32.6***	792.4	1.44	0.38	99%
							1.05		134	141										
								17.61												
DESCHATELETS AVENUE	128	126	21A	0.14	0.90	0.35	0.35	10.00	104		**67.5**	DR 35	300	305	***0.48***	***50.3***	69.9	0.96	0.88	97%
			21B	0.11	0.70	0.21	0.56													
			21C	0.05	0.60	0.08	0.65													
DESCHATELETS AVENUE	126	124	22A	0.04	0.50	0.06	0.62	10.88	100	78	**95.4**	DR 35	375	381	***0.46***	***54.8***	124.1	1.09	0.84	77%
			22B	0.11	0.53	0.16	0.78													
			22C	0.09	0.40	0.10	0.10		174	17										
SCHOLASTIC DRIVE	124	114	23	0.13	0.69	0.25	1.03	11.71	96	99	**115.6**	CONC	450	457	***0.27***	***70.2***	154.6	0.94	1.24	75%
							0.10		167	17										
								12.96												

STORM SEWER DESIGN SHEET (5 YEAR DESIGN EVENT) - AS BUILT

Greystone Village

Developer: Greystone Village Inc.

Additional Condo Units

NOVATECH
Engineers, Planners & Landscape Architects

PROJECT #: 114025
DESIGNED BY : SAZ/JAG
CHECKED BY : MJP
DATE PREPARED : 15-Dec-15
DATE REVISED : ~~24-Feb-16~~ ~~11-Mar-16~~ ~~17-Oct-16~~ ~~27-Oct-16~~ ~~5-Jan-17~~ ~~27-Apr-17~~ ~~15-Sep-17~~ 6-Feb-23

LOCATION												PROPOSED SEWER								
STREET	FROM M.H.	TO M.H.	AREA #	INDIV AREA (ha)	INDIV R	INDIV. 2.78 AR	ACCUM. 2.78 AR	TIME OF CONC. (min)	RAINFALL INTENSITY (mm/hr)	INDIVIDUAL PEAK FLOW (where applicable) Q (L/s)	PEAK FLOW Q (L/s)	TYPE OF PIPE	PIPE SIZE (mm)	PIPE ID (mm)	GRADE (%)	LENGTH (m)	CAPACITY (L/s)	FULL FLOW VELOCITY	TIME OF FLOW (min)	CAPACITY (%)
SCHOLASTIC DRIVE	114	118	24	0.16	0.72	0.32	9.69	17.61	76	736	**888.4**	CONC	900	914	***0.63***	***68.5***	1499.0	2.28	0.50	59%
							1.15		132	152										
								18.11												
BLOCK 53	226	228	25	0.05	0.73	0.10	0.10	10.00	104		**10.6**	DR 35	250	254	***0.33***	***30.3***	35.6	0.70	0.72	30%
BLOCK 53	228	100	26	0.05	0.47	0.07	0.17	10.72	101		**16.8**	DR 35	250	254	***0.39***	***7.6***	38.7	0.76	0.17	43%
TELMON STREET	100	104	27A	0.10	0.68	0.19	0.36	10.88	100		**35.5**	DR 35	300	305	***0.48***	***25.1***	69.9	0.96	0.44	51%
TELMON STREET	104	106					0.36	11.32	98		**34.8**	DR 35	300	305	***0.38***	***10.6***	62.2	0.85	0.21	56%
								11.53												
ST. PAUL UNIVERSITY LANDS	DIMH1	244	29	0.58	0.47	0.76	0.76	10.00	181		**153.9**	DR 35	375	381	***0.46***	***11.0***	124.1	1.09	0.17	124%
PHILOSOPHER PRIVATE			28	0.11	0.30	0.09	0.85													
PHILOSOPHER PRIVATE	244	246					0.85	10.17	180		**152.6**	DR 35	375	381	***0.73***	***8.8***	156.3	1.37	0.11	98%
								10.28												
PHILOSOPHER PRIVATE	246	230	27B	0.05	0.76	0.11	0.11	10.28	103	11	**162.7**	DR 35	375	381	***0.41***	***14.6***	117.1	1.03	0.24	139%
							0.85		179	152										
PHILOSOPHER PRIVATE	230	106					0.11	10.51	102	11	**160.8**	DR 35	375	381	***0.61***	***9.8***	142.9	1.25	0.13	113%
							0.85		177	150										
								10.64												
TELMON STREET	106	108					0.46	11.53	97	45	**187.6**	CONC	450	457	***0.40***	***12.4***	188.1	1.15	0.18	100%
							0.85		168	143										
TELMON STREET	108	144					0.46	11.71	96	44	**186.1**	CONC	450	457	***0.26***	***30.9***	151.7	0.92	0.56	123%
							0.85		167	142										
								12.26												
BLOCK 47/48	136	144	30	0.12	0.86	0.29	0.29	10.00	104		**29.9**	DR 35	250	254	***0.30***	***36.7***	34.0	0.67	0.91	88%
								10.91												
TELMON STREET	144	122	31	0.20	0.75	0.42	1.17	12.26	94	109	**247.3**	CONC	525	533	***0.33***	***18.2***	257.7	1.15	0.26	96%
							0.85		163	138										
TELMON STREET	122	122b					1.17	12.53	93	108	**244.5**	CONC	525	533	***0.58***	***18.9***	341.7	1.53	0.21	72%
							0.85		161	137										
								12.73												

STORM SEWER DESIGN SHEET (5 YEAR DESIGN EVENT) - AS BUILT

Greystone Village

Developer: Greystone Village Inc.

Additional Condo Units

NOVATECH
Engineers, Planners & Landscape Architects

PROJECT #: 114025
DESIGNED BY : SAZ/JAG
CHECKED BY : MJP
DATE PREPARED : 15-Dec-15
DATE REVISED : ~~24-Feb-16~~ ~~11-Mar-16~~ ~~17-Oct-16~~ ~~27-Oct-16~~ ~~5-Jan-17~~ ~~27-Apr-17~~ ~~15-Sep-17~~ 6-Feb-23

LOCATION												PROPOSED SEWER								
STREET	FROM M.H.	TO M.H.	AREA #	INDIV AREA (ha)	INDIV R	INDIV. 2.78 AR	ACCUM. 2.78 AR	TIME OF CONC. (min)	RAINFALL INTENSITY (mm/hr)	INDIVIDUAL PEAK FLOW (where applicable) Q (L/s)	PEAK FLOW Q (L/s)	TYPE OF PIPE	PIPE SIZE (mm)	PIPE ID (mm)	GRADE (%)	LENGTH (m)	CAPACITY (L/s)	FULL FLOW VELOCITY	TIME OF FLOW (min)	CAPACITY (%)
BLOCK 46	140	122b	32A	0.02	0.74	0.04	0.04	10.00	104		**12.9**	DR 35	250	254	***0.51***	***39.6***	44.3	0.87	0.75	29%
			32B	0.04	0.74	0.08	0.12													
								10.75												
BLOCK 56	220	222	33A	0.06	0.73	0.12	0.12	10.00	104		**27.5**	DR 35	250	254	***0.51***	***74.7***	44.3	0.87	1.42	62%
			33B	0.07	0.73	0.14	0.26													
								11.42												
BLOCK 56	224	222	34	0.05	0.76	0.11	0.11	10.00	104		**11.0**	DR 35	250	254	***0.48***	***16.6***	43.0	0.85	0.33	26%
								10.33												
BLOCK 56	222	122b	35	0.10	0.47	0.13	0.50	11.42	97		**48.6**	DR 35	300	305	***0.36***	***30.5***	60.5	0.83	0.61	80%
								12.04												
TELMON STREET	122b	118	36	0.13	0.70	0.25	2.04	12.73	92	187	**322.6**	CONC	600	610	***0.29***	***31.1***	345.0	1.18	0.44	94%
							0.85		159	135										
								13.17												
OUTLET 1	118	236					11.73	18.11	75	876	**1136.3**	CONC	600	610	***0.67***	***3.0***	524.3	1.80	0.03	217%
							2.00		130	260										
OUTLET 1	236	238					11.73	18.13	75	876	**1135.3**	CONC	600	610	***4.44***	***1.8***	1349.7	4.62	0.01	84%
							2.00		130	260										
OUTLET 1	238	242					11.73	18.14	75	875	**1135.0**	CONC	900	914	***1.06***	***15.1***	1944.4	2.96	0.09	58%
							2.00		130	260										
OUTLET 1	242	Headwall 1					11.73	18.22	74	873	**1131.8**	CONC	900	914	***0.85***	***9.4***	1741.2	2.65	0.06	65%
							2.00		129	259										
								18.28												

*Part of future phase 2 outletting through phase 1A at outlet 1.

100-Year Flow

Definitions:

Q = Peak Flow in Litres per Second (L/s)
Q = 2.78 AIR, where
A = Area in hectares (ha)
I = Rainfall Intensity (mm/hr)
R = Runoff Coefficient

Notes:

1) **Rainfall Intensity Curves are City of Ottawa IDF Curves I(5-year) = 998.071/ [(Tc(min)+6.053)]^0.814.**
2) **Minumum Tc is 10min as per the Ottawa Design Guidelines.**
3) **Roughness Coefficient 'n' in Manning's formula shall be 0.013 for Concrete & PVC pipes as per the Ottawa Guidelines.**
4) **Minlmum diameter for on street sewer is 250mm.**
5) **Full Flow Velocity for the Outlet 1 (MH118 to Headwall 1) was modeled in PCSWMM at 2.66m/s, based on an average slope of 4.7% (invert out of the Vortech unit to invert at the outlet to the river).**

STORM SEWER DESIGN SHEET (5 YEAR DESIGN EVENT)
Greystone Village - Phase 2 and 3 (Outlet 2)
Developer: EQ Homes

NOVATECH
Engineers, Planners & Landscape Architects

PROJECT #: 114025
DESIGNED BY : SAZ
CHECKED BY : JAG
DATE PREPARED : ~~18-Nov-16~~ ~~14-Mar-17~~ ~~26-May-17~~ 10-Feb-23
ASBLT DATE: 15-Sep-17

LOCATION												PROPOSED SEWER								
STREET	FROM M.H.	TO M.H.	AREA #	INDIV AREA (ha)	INDIV R	INDIV. 2.78 AR	ACCUM. 2.78 AR	TIME OF CONC. (min)	RAINFALL INTENSITY (mm/hr)	INDIVIDUAL PEAK FLOW (where applicable) Q (L/s)	PEAK FLOW Q (L/s)	TYPE OF PIPE	PIPE SIZE (mm)	PIPE ID (mm)	GRADE (%)	LENGTH (m)	CAPACITY (L/s)	FULL FLOW VELOCITY	TIME OF FLOW (min)	CAPACITY (%)
OBLATS	174	300	B1a	0.05	0.76	0.11	0.11	10.00	104		**27.7**	DR 35	250	254	***1.79***	***32.9***	83.0	1.64	0.33	33%
			B1b	0.08	0.72	0.16	0.27													
OBLATS	300	302	B2	0.01	0.69	0.02	0.28	10.33	102		**29.2**	DR 35	250	254	***3.08***	***26.3***	108.9	2.15	0.20	27%
OBLATS	302	304					0.28	10.54	101		**28.9**	DR 35	250	254	***1.70***	***34.2***	80.9	1.60	0.36	36%
OBLATS	304	306	B3	0.19	0.70	0.37	0.65	10.90	100	80.2	**149.6**	DR 35	300	305	***3.29***	***44.7***	183.0	2.51	0.30	82%
			B25	0.06	0.90	0.15	0.80													
			B19	0.16	0.90	0.40	0.40		173	69										
OBLATS	306	308					0.80	11.19	98	79	**147.5**	DR 35	300	305	***3.89***	***13.6***	199.0	2.73	0.08	74%
							0.40		171	68										
OBLATS	308	310	B4	0.19	0.66	0.35	1.15	11.28	98	139	**207.2**	DR 35	375	381	***2.89***	***39.7***	310.9	2.73	0.24	67%
			B24	0.12	0.80	0.27	1.42													
							0.40		170	68										
								11.52												
PARISH PRIVATE	312	314	B7	0.09	0.73	0.18	0.18	10.00	104		**19.0**	DR 35	250	254	***3.12***	***33.0***	109.6	2.16	0.25	17%
PARISH PRIVATE	314	316	B8	0.07	0.80	0.16	0.34	10.25	103		**60.0**	DR 35	250	254	***3.63***	***72.7***	118.2	2.33	0.52	51%
			B9	0.11	0.80	0.24	0.58													
								10.77												
SANCTUARY PRIVATE	318	316	B10	0.07	0.73	0.14	0.14	10.00	104		**14.8**	DR 35	250	254	***0.56***	***61.2***	46.4	0.92	1.11	32%
								11.11												
SANCTUARY PRIVATE	316	320	B11	0.04	0.69	0.08	0.80	11.11	99		**79.1**	DR 35	375	381	***0.44***	***38.6***	121.3	1.06	0.60	65%
SANCTUARY PRIVATE	320	322					0.80	11.72	96		**76.9**	DR 35	375	381	***0.55***	***7.3***	135.7	1.19	0.10	57%
SANCTUARY PRIVATE	322	310	B12	0.09	0.79	0.20	1.00	11.82	95		**95.4**	DR 35	375	381	***0.27***	***21.9***	95.0	0.83	0.44	100%
								12.26												
OBLATS	310	334	B23	0.17	0.90	0.43	2.85	12.26	94	282	**346.7**	CONC	600	610	***0.26***	***34.3***	326.6	1.12	0.51	106%
			B13	0.09	0.65	0.16	3.01													
							0.40		163	65										
								12.77												

STORM SEWER DESIGN SHEET (5 YEAR DESIGN EVENT)
Greystone Village - Phase 2 and 3 (Outlet 2)
Developer: EQ Homes

NOVATECH
Engineers, Planners & Landscape Architects

PROJECT #: 114025
DESIGNED BY : SAZ
CHECKED BY : JAG
DATE PREPARED : ~~18-Nov-16~~ ~~14-Mar-17~~ ~~26-May-17~~ 10-Feb-23
ASBLT DATE: 15-Sep-17

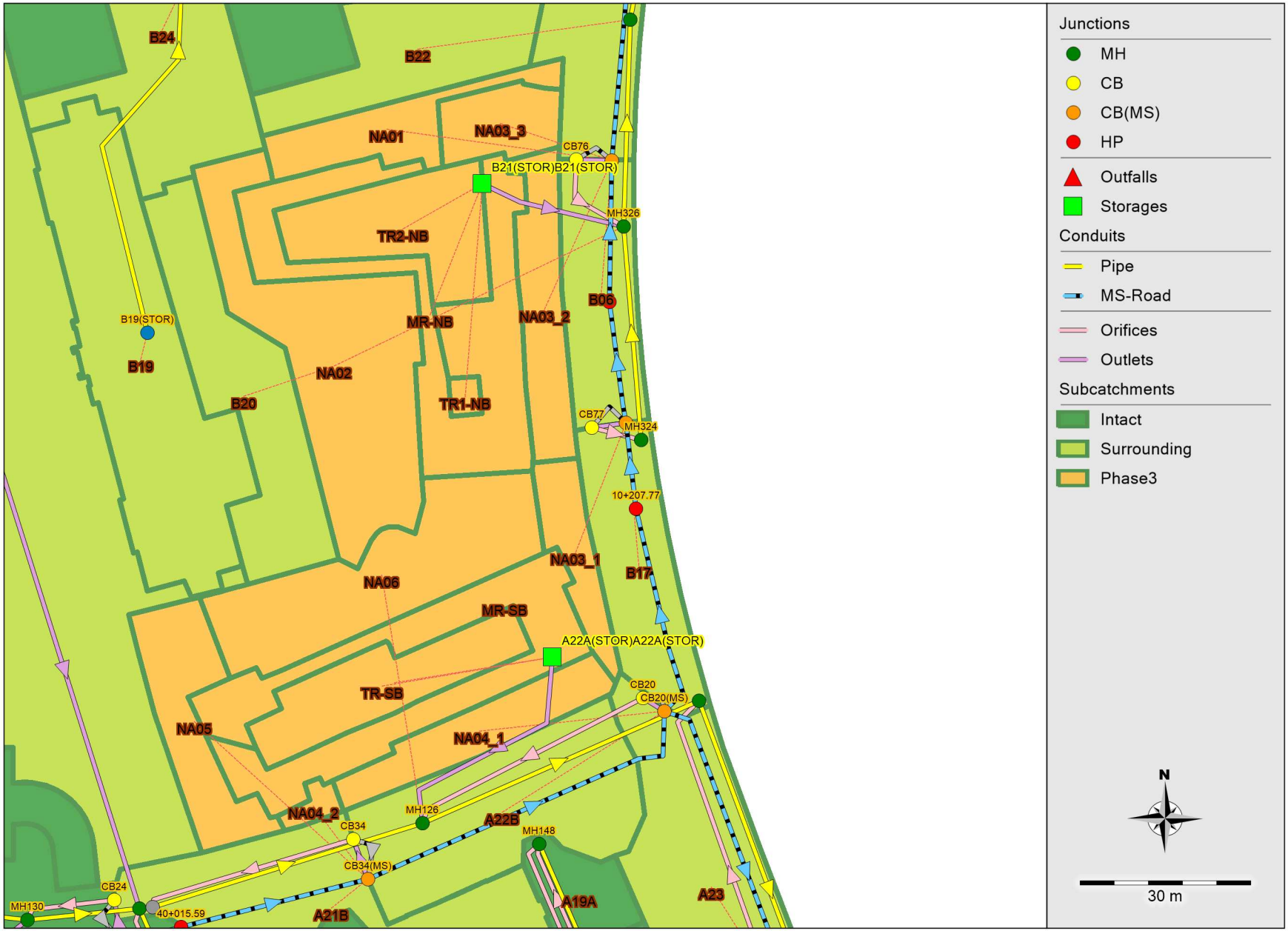
LOCATION											PROPOSED SEWER								
STREET	FROM M.H.	TO M.H.	AREA #	INDIV AREA (ha)	INDIV R	INDIV. 2.78 AR	ACCUM. 2.78 AR	TIME OF CONC. (min)	RAINFALL INTENSITY (mm/hr)	INDIVIDUAL PEAK FLOW (where applicable) Q (L/s)	PEAK FLOW Q (L/s)	TYPE OF PIPE	PIPE SIZE (mm)	PIPE ID (mm)	GRADE (%)	LENGTH (m)	CAPACITY (L/s)	FULL FLOW VELOCITY	TIME OF FLOW (min)	CAPACITY (%)
SANCTUARY PRIVATE	330	332	~~B14~~	~~0.08~~	~~0.63~~	~~0.14~~	~~0.14~~	10.00	104		**41.5**	DR 35	375	381	***0.41***	***36.8***	117.1	1.03	0.60	35%
			~~B15~~	~~0.15~~	~~0.62~~	~~0.26~~	~~0.40~~													
SANCTUARY PRIVATE	332	334	B16	0.12	0.65	0.22	0.62	10.60	101		**62.2**	CONC	750	762	***0.28***	***35.8***	614.6	1.35	0.44	10%
								11.04												
SCHOLASTIC	324	326	~~B17~~	~~0.07~~	~~0.77~~	~~0.15~~	~~0.15~~	10.00	104		**33.9**	DR 35	300	305	***3.71***	***37.7***	194.3	2.66	0.24	17%
			~~B18~~	~~0.07~~	~~0.90~~	~~0.18~~	~~0.32~~													
SCHOLASTIC	326	328	~~B6~~	~~0.06~~	~~0.68~~	~~0.11~~	~~0.44~~	10.24	103	86	**130.6**	DR 35	375	381	***3.14***	***35.4***	324.1	2.84	0.21	40%
			~~B21~~	~~0.16~~	~~0.90~~	~~0.40~~	~~0.84~~													
			~~B20~~	~~0.12~~	~~0.42~~	~~0.14~~	~~0.14~~		179	44										
			~~B20A~~	~~0.08~~	~~0.48~~	~~0.11~~	~~0.25~~													
SCHOLASTIC	328	334	~~B5~~	~~0.18~~	~~0.60~~	~~0.30~~	~~1.14~~	10.44	102	132	**175.7**	DR 35	375	381	***3.20***	***39.6***	327.2	2.87	0.23	54%
			~~B22~~	~~0.07~~	~~0.60~~	~~0.12~~	~~1.26~~													
			~~B21A~~	~~0.04~~	~~0.35~~	~~0.04~~	~~1.29~~													
							~~0.25~~		177	44										
								10.67												
OUTLET	334	336					4.92	12.77	92	450	**553.2**	CONC	750	762	***0.60***	***3.4***	899.6	1.97	0.03	61%
							0.65		159	103										
OUTLET	336	338					4.92	12.80	91	450	**552.5**	CONC	750	762	***0.28***	***3.6***	614.6	1.35	0.04	90%
							0.65		159	103										
OUTLET	338	340					4.92	12.84	91	449	**551.4**	CONC	750	762	***0.35***	***14.2***	687.1	1.51	0.16	80%
							0.65		159	103										
OUTLET	340	Headwall (342)					4.92	13.00	91	446	**547.7**	CONC	750	762	***0.40***	***2.5***	734.5	1.61	0.03	75%
							0.65		158	102										
								13.02												

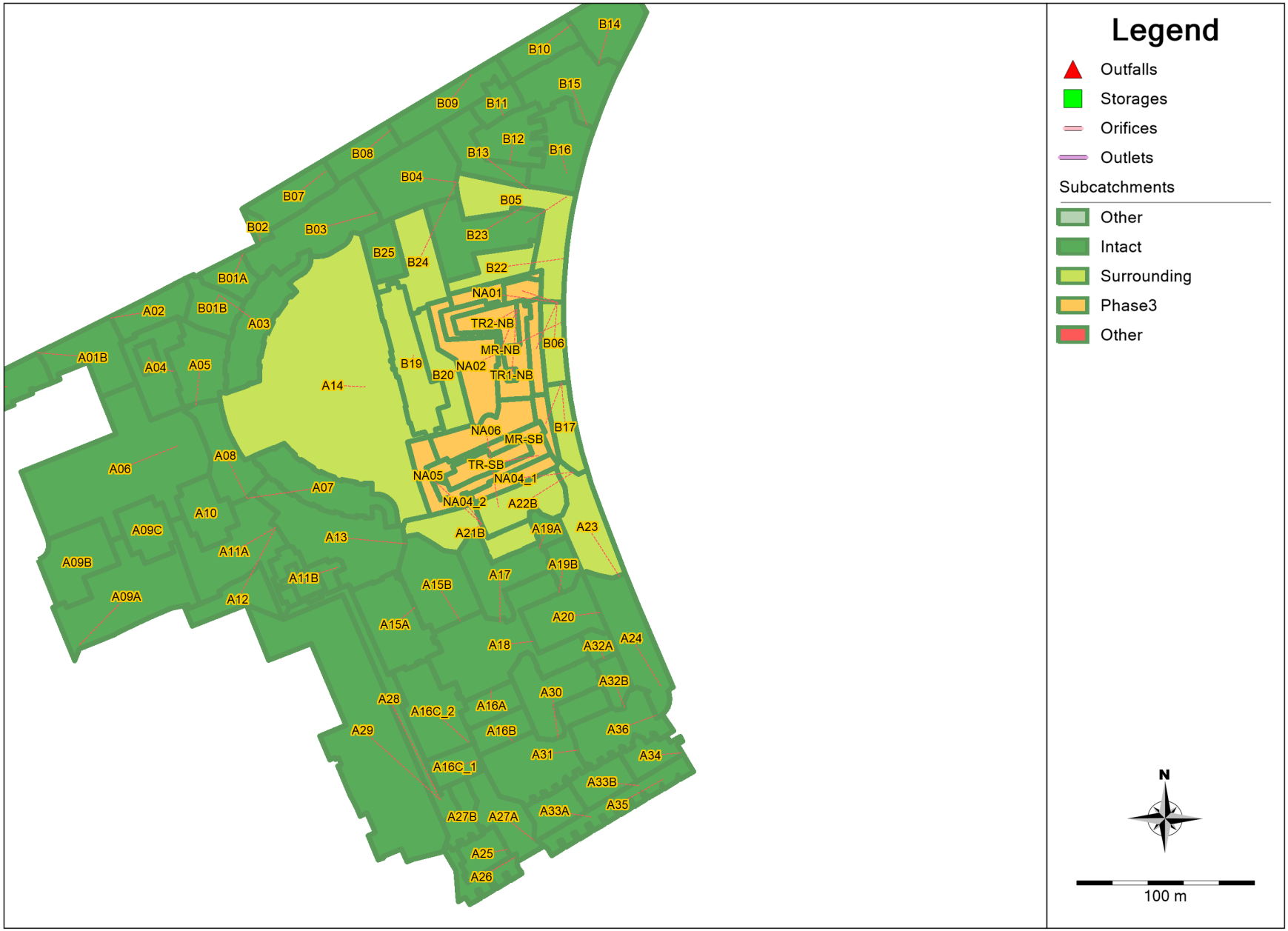
100-Year Flow

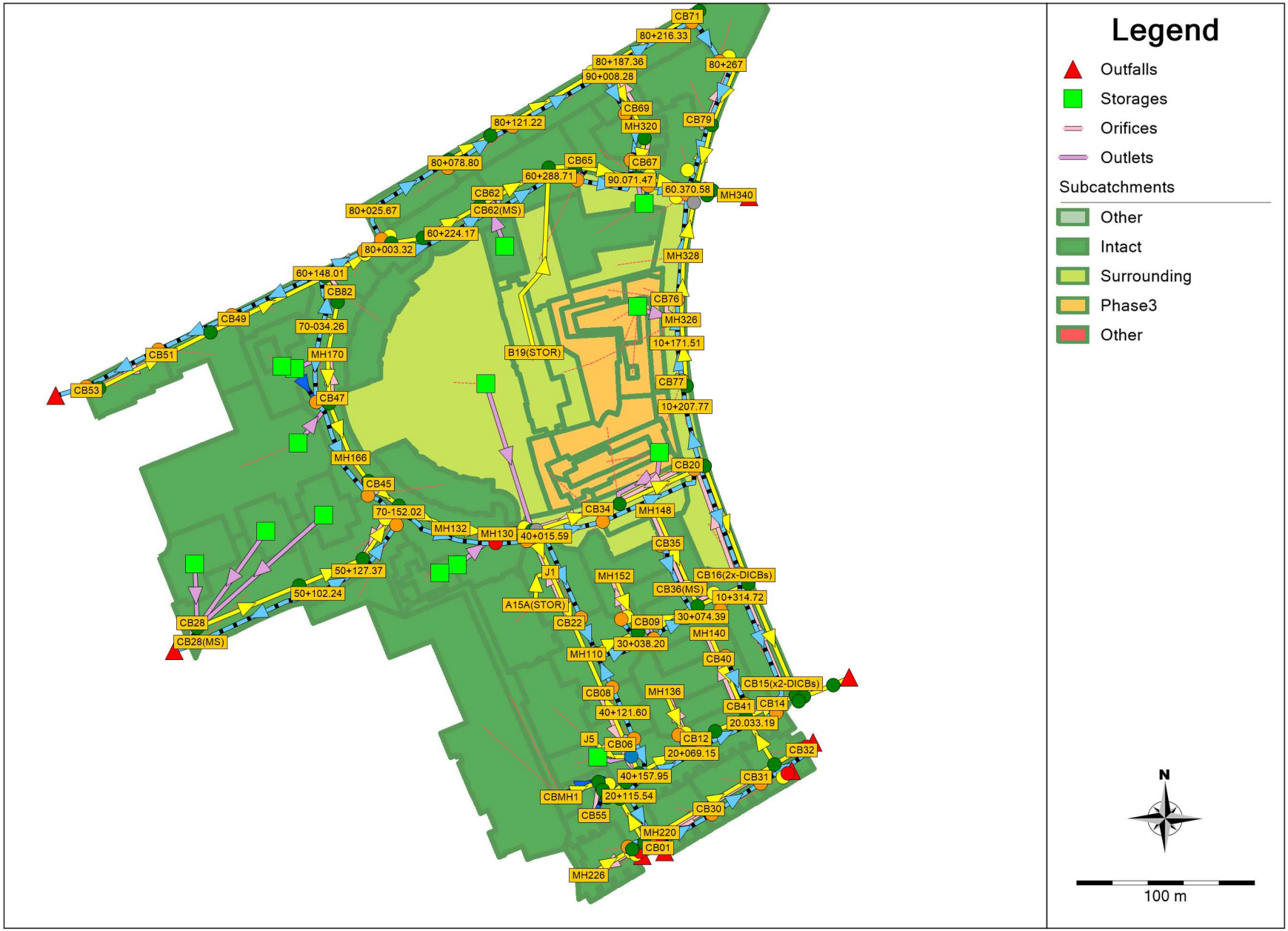
Definitions:
Q = Peak Flow in Litres per Second (L/s)
Q = 2.78 AIR, where
A = Area in hectares (ha)
I = Rainfall Intensity (mm/hr)
R = Runoff Coefficient

Notes:
1) **Rainfall Intensity Curves are City of Ottawa IDF Curves I(5-year) = 998.071/ [(Tc(min)+6.053)]^0.814**
2) **Minumum Tc is 10min as per the Ottawa Design Guidelines.**
3) **Roughness Coefficient 'n' in Manning's formula shall be 0.13 for Concrete & PVC pipes as per the Ottawa Guidelines.**
4) **Minlmum diameter for on street sewer is 250mm.**


Junctions
MH
CB
CB(MS)
HP
STUB
Outfalls
Storages
Conduits
Pipe
MS-Road
MS-Ditch
MS-CB
Weir
Orifices
Outlets
Subcatchments
Intact
Surrounding
Phase3
N
100 m


B24
B22
NA01
NA03_3
CB76
B21(STOR)B21(STOR)
MH326
TR2-NB
B06
B19(STOR)
MR-NB
NA03_2
B19
NA02
B20
TR1-NB
CB77
MH324
10+207.77
NA03_1
B17
NA06
MR-SB
A22A(STOR)A22A(STOR)
CB20
CB20(MS)
TR-SB
NA05
NA04_1
NA04_2
MH126
CB34
A22B
MH148
CB34(MS)
CB24
MH130
40+015.59
A21B
A19A
A23
Junctions
MH
CB
CB(MS)
HP
Outfalls
Storages
Conduits
Pipe
MS-Road
Orifices
Outlets
Subcatchments
Intact
Surrounding
Phase3
N
30 m


B14
B10
B15
B09
B11
B12
B08
B13
B16
B04
B07
B05
B02
B03
B23
B25
B24
B22
B01A
NA01
A02
B01B
TR2-NB
A03
B06
MR-NB
A01B
A04
A05
B19
NA02
B20
TR1-NB
A14
B17
NA06
MR-SB
A08
A06
TR-SB
NA05
NA04_1
A07
NA04_2
A22B
A10
A09C
A21B
A19A
A23
A13
A11A
A09B
A19B
A17
A11B
A15B
A09A
A12
A20
A15A
A18
A32A
A24
A32B
A28
A30
A16C_2
A16A
A29
A16B
A36
A31
A34
A16C_1
A33B
A35
A27B
A27A
A33A
A25
A26
Legend
Outfalls
Storages
Orifices
Outlets
Subcatchments
Other
Intact
Surrounding
Phase3
Other
N
100 m


CB71
80+216.33
80+187.36
80+267
90+008.28
CB69
MH320
CB79
80+121.22
80+078.80
CB65
CB67
60+288.71
90.071.47
60.370.58
MH340
CB62
CB62(MS)
80+025.67
60+224.17
80+003.32
MH328
60+148.01
CB82
CB76
CB49
MH326
70-034.26
10+171.51
CB51
MH170
B19(STOR)
CB53
CB77
CB47
10+207.77
MH166
CB20
CB45
CB34
MH148
70-152.02
MH132
MH130
40+015.59
CB35
50+127.37
J1
MH152
CB16(2x-DICBs)
CB36(MS)
50+102.24
10+314.72
A15A(STOR)
CB22
CB09
30+074.39
CB28
MH140
CB28(MS)
30+038.20
MH110
CB40
CB15(x2-DICBs)
CB08
MH136
CB41
CB14
40+121.60
20.033.19
J5
CB06
CB12
CB32
20+069.15
40+157.95
CB31
CBMH1
20+115.54
CB30
CB55
MH220
CB01
MH226
Legend
Outfalls
Storages
Orifices
Outlets
Subcatchments
Other
Intact
Surrounding
Phase3
Other
N
100 m

AREA C: 0.08ha
UNCONTROLLED

PROPOSED STORM
OUTLET #2
TO RIDEAU RIVER

Rivière Rideau River

PROPOSED STORM
OUTLET #1
TO RIDEAU RIVER

AREA B: 2.72ha
TO OUTLET 2

AREA A: 7.44ha
TO OUTLET 1

0.28ha TO
CLEGG STREET

0.32ha (55.09 L/s TO MAIN STREET

PHASE II

PHASE III

PHASE IB

PHASE IA

PHASE IC

POTENTIAL FUTURE BUILDING, ST-PAULS (NOT PART OF APPLICATION)

POTENTIAL FUTURE BUILDING, ST-PAULS (NOT PART OF APPLICATION)

POTENTIAL FUTURE BUILDING, ST-PAULS (NOT PART OF APPLICATION)

St. Paul University

avenue Springhurst Avenue
privé Sanctuary Private
privé Parish Private
avenue des Oblats Avenue
promenade Scholastic Drive
avenue Deschâtelets Avenue
rue Jeremiah Kealey Street
rue Telmon Street
avenue De Mazenod Avenue
rue Clegg Street
rue Hazel Street
rue Main Street
privé Philosopher Private

LEGEND

- PROPERTY LINE
- PROPOSED STORM SEWER
- PROPOSED DIRECTION OF FLOW
- POST DEVELOPMENT STORM DRAINAGE AREA BOUNDARY
- STORM DRAINAGE SPLIT
- PHASING LIMITS
- PART OF FUTURE ST. PAUL LANDS (NOT PART OF APPLICATION) OUTLETTING THROUGH OUTLET IN PHASE 1A
- PART OF PHASE 2 OUTLETTING THROUGH PHASE 1A AT OUTLET 1
- PART OF PHASE 2/3 OUTLETTING THROUGH PHASE 2 OUTLET 2

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

CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

OVERALL PROPOSED STORM ALIGNMENT & STORM DRAINAGE AREA PLAN

1:2000 (0 20 40 60 80)

FEB 2023 | 114025 | FIGURE 5

M:\2014\114025\CAD\Design\Figures\Design Brief\20230206-AddendumMSS\Figure 5 - STM Align.dwg, FIG-5-STM, Feb 06, 2023 - 9:31am, szorgel

SHT11X17.DWG - 279mmx432mm

From: Jennifer Knowles <Jennifer.Knowles@ContechES.com>
Sent: Wednesday, February 1, 2023 10:38 AM
To: Steve Zorgel
Cc: Mike Petepiece
Subject: RE: [EXTERNAL] Vortech Units - Greystone Village
Attachments: 542350-10 EFFY VX11000 Offline AS BUILT.pdf; 542350-10 SDC VX11000 Offline AS BUILT.pdf; 563087-010 EFFY VX5000 OFFLINE AS BUILT.pdf; 563087-010 SDC VX5000 OFFLINE AS BUILT.pdf

Hi Steve,

Please find attached as built calculations for the two Vortechs systems. Please note that Contech's project numbers changed between the time of the original design work and tender/order. Please also note that the elevations for Outlet 2 Vortechs 5000 changed since the calculations from November 2016. Let me know if you have any questions.

Best regards,

Jennifer

Jennifer Knowles, P.E.*
Sr. Design Engineer – Stormwater Products

Contech Engineered Solutions LLC
71 U.S. Route One Suite F | Scarborough, ME 04074
Off: 207-885-6134 Fax: 207-885-9825
Jennifer.Knowles@ContechES.com
www.ContechES.com
*Licensed in ME

From: Steve Zorgel <s.zorgel@novatech-eng.com>
Sent: Tuesday, January 31, 2023 12:46 PM
To: Jennifer Knowles <Jennifer.Knowles@ContechES.com>
Cc: Mike Petepiece <m.petepiece@novatech-eng.com>; damaley, Mark <MAdamaley@conteches.com>
Subject: [EXTERNAL] Vortech Units - Greystone Village

Hi Jennifer,

Back in 2016, we had two vortech units sized for two separates outlets within the Greystone Village Development. I have attached some email chains for each outlet for reference.

Based on as-built information, some peak design flows have increased for each outlet. All the other design elements (drainage areas, imperviousness, pipe sizes, inverts, etc.) have remained the same. We want to confirm the slight change in peak flows do not have an impact on the overall performance of the existing unit including targeted TSS removal (80%).

The revised peak flows are as follows:

Outlet 1 – phase 1A/1B (Site A, southern site)

- 5-Year Flow = 1006L/s
    - Previously provided flow = 1023L/s
    - Previously provided drainage area = 7.31ha
    - Previously provided Imperviousness = 68%
- 100-Year Flow = 1646L/s
    - Previously provided flow = 1622L/s

Outlet 2 – Phase 2/3 (Site B, northern site)

- 5-Year Flow = 440L/s
    - Previously provided flow = 498L/s
    - Previously provided drainage area = 2.7ha
    - Previously provided Imperviousness = 73%
- 100-Year Flow = 866L/s
    - Previously provided flow = 1350L/s

If you need more information or have any questions please let us know, thank you.

Steve Zorgel, **P.Eng.,** Project Manager | Engineering
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 x298 | Fax: 613.254.5867

VORTECHS SYSTEM® ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON AN AVERAGE PARTICLE SIZE OF 80 MICRONS
GREYSTONE VILLAGE
OTTAWA, ON
MODEL 11000 OFF-LINE
OUTLET 1 - PHASE 1A/1B

CONTECH ENGINEERED SOLUTIONS

Design Ratio[1] = $\frac{\text{(7.31 hectares) x (0.708) x (2.775)}}{\text{(7.3 m2)}}$ **= 1.96**

Bypass occurs at an elevation of 59.13m (at approximately 18 l/s/m2)

Rainfall Intensity mm/hr	Operating Rate[2] % of capacity	Flow Treated (l/s)	% Total Rainfall Volume[3]	Rmvl. Effcy[4] (%)	Rel. Effcy (%)
0.5	1.4	7.1	9.2%	98.0%	9.0%
1.0	2.9	14.3	10.6%	98.0%	10.4%
1.5	4.3	21.4	9.9%	98.0%	9.7%
2.0	5.8	28.5	8.4%	98.0%	8.2%
2.5	7.2	35.7	7.7%	97.6%	7.5%
3.0	8.6	42.8	5.9%	96.9%	5.8%
3.5	10.1	49.9	4.4%	96.0%	4.2%
4.0	11.5	57.1	4.7%	95.3%	4.4%
4.5	13.0	64.2	3.3%	94.7%	3.1%
5.0	14.4	71.3	3.0%	92.8%	2.8%
6.0	17.3	85.6	5.4%	89.9%	4.8%
7.0	20.1	99.8	4.4%	87.3%	3.8%
8.0	23.0	114.1	3.5%	85.7%	3.0%
9.0	25.9	128.4	2.8%	84.9%	2.4%
10.0	28.8	142.6	2.2%	83.1%	1.8%
15.0	43.2	213.9	5.9%	72.8%	4.3%
20.0	57.6	285.3	3.2%	60.0%	1.9%
25.0	71.9	356.6	0.9%	47.9%	0.4%
30.0	86.3	427.9	0.4%	24.4%	0.1%
35.0	100.7	499.2	0.2%	8.0%	0.0%
40.0	115.1	570.5	0.3%	8.0%	0.0%
					87.7%

Predicted Annual Runoff Volume Treated = 89.6%
Assumed removal efficiency for bypassed flows = 0.0%
Estimated reduction in efficiency[5] = 6.5%
Predicted Net Annual Load Removal Efficiency = **81%**

1 - Design Ratio = (Total Drainage Area) x (Runoff Coefficient) x (Rational Method Conversion) / Grit Chamber Area
- The Total Drainage Area and Runoff Coefficient are specified by the site engineer.
- The rational method conversion based on the units in the above equation is 2.775.

2 - Operating Rate (% of capacity) = percentage of peak operating rate of 68 l/s/m^2.

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

4 - Based on Contech Construction Products laboratory verified removal of an average particle size of 80 microns (see Technical Bulletin #1).

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

Calculated by:	JAK	2/1	Checked by:

VORTECHS SYSTEM® FLOW CALCULATIONS

CONTECH ENGINEERED SOLUTIONS

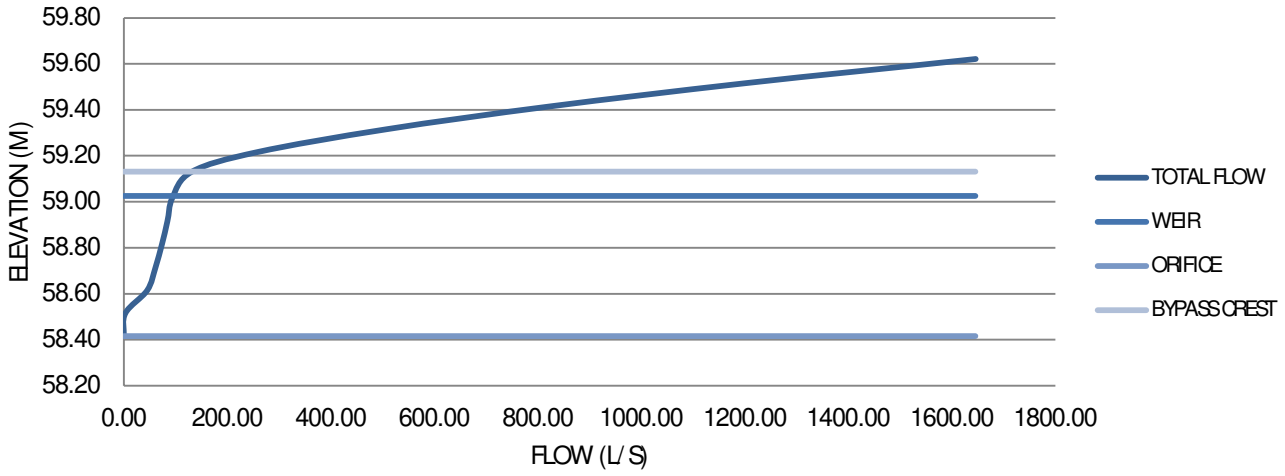
GREYSTONE VILLAGE
OTTAWA, ON
MODEL 11000 OFF-LINE
OUTLET 1 - PHASE 1A/1B

Vortechs Orifice	Vortechs Weir	Bypass Weir
Cd = 0.56	Cd = 3.4	Cd = 3.3
A (m^2) = 0.052	Weir Crest Length (m) = 0.433	Crest Length (m) = 1.829
Crest Elevation (m) = 58.42	Crest Elevation (m) = 59.03	Crest Elev. (m) = 59.13

Head (m)	Elevation (m)	Orifice Flow (l/s)	Weir Flow (l/s)	Bypass Flow (l/s)	Total Flow (l/s)
0.00	58.42	0.00	0.00	0.00	0.00
0.10	58.52	2.98	0.00	0.00	2.98
0.20	58.62	45.58	0.00	0.00	45.58
0.30	58.72	61.29	0.00	0.00	61.29
0.40	58.82	73.72	0.00	0.00	73.72
0.50	58.92	84.34	0.00	0.00	84.34
0.60	59.02	93.76	0.00	0.00	93.76
0.72	59.13	103.64	27.94	0.00	131.59
0.80	59.22	110.22	66.75	80.72	257.68
0.90	59.32	117.58	125.82	262.34	505.74
1.00	59.42	124.52	196.18	503.44	824.14
1.10	59.52	131.08	276.25	791.81	1199.15
1.20	59.62	137.65	369.79	1138.76	1646.20

Calculated by: JAK | 2/1

VORTECHS STAGE DISCHARGE CURVE

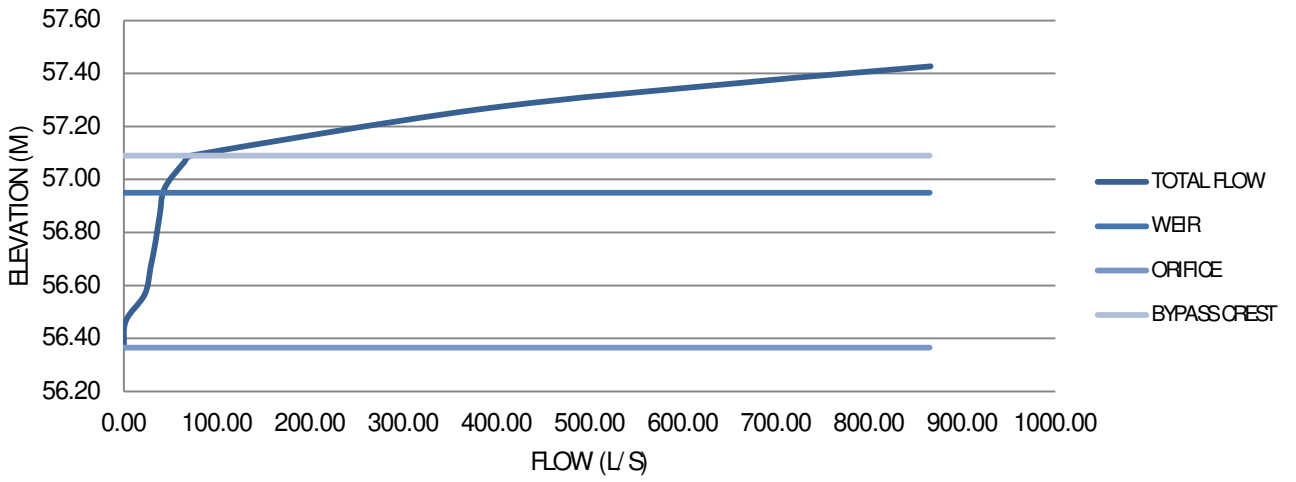


VORTECHS SYSTEM® FLOW CALCULATIONS
GREYSTONE VILLAGE- PHASE 2 & 3
OTTAWA, ON
MODEL 5000 OFF-LINE
OUTLET 2 - PHASE 2/3

Vortechs Orifice	Vortechs Weir	Bypass Weir
Cd = 0.56	Cd = 3.4	Cd = 3.3
A (m^2) = 0.023	Weir Crest Length (m) = 0.253	Crest Length (m) = 1.829
Crest Elevation (m) = 56.37	Crest Elevation (m) = 56.95	Crest Elev. (m) = 57.09

Head (m)	Elevation (m)	Orifice Flow (l/s)	Weir Flow (l/s)	Bypass Flow (l/s)	Total Flow (l/s)
0.00	56.37	0.00	0.00	0.00	0.00
0.10	56.47	1.99	0.00	0.00	1.99
0.20	56.57	22.24	0.00	0.00	22.24
0.30	56.67	28.75	0.00	0.00	28.75
0.40	56.77	34.03	0.00	0.00	34.03
0.50	56.87	38.60	0.00	0.00	38.60
0.60	56.97	42.68	0.91	0.00	43.59
0.70	57.07	46.40	18.48	0.00	64.88
0.72	57.09	47.25	24.56	0.00	71.81
0.90	57.27	53.07	83.41	245.74	382.22
1.00	57.37	56.10	126.05	482.73	664.89
1.06	57.43	57.90	155.09	653.10	866.09

Calculated by: JAK | 2/1



VORTECHS SYSTEM® ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON AN AVERAGE PARTICLE SIZE OF 80 MICRONS
GREYSTONE VILLAGE- PHASE 2 & 3
OTTAWA, ON
MODEL 5000 OFF-LINE
OUTLET 2 - PHASE 2/3

CONTECH ENGINEERED SOLUTIONS

Design Ratio[1] = $\frac{\text{(2.7 hectares) x (0.738) x (2.775)}}{\text{(3.6 m2)}}$ **= 1.54**

Bypass occurs at an elevation of 57.09m (at approximately 20 l/s/m2)

Rainfall Intensity mm/hr	Operating Rate[2] % of capacity	Flow Treated (l/s)	% Total Rainfall Volume[3]	Rmvl. Effcy[4] (%)	Rel. Effcy (%)
0.5	1.1	2.7	9.2%	98.0%	9.0%
1.0	2.3	5.4	10.6%	98.0%	10.4%
1.5	3.4	8.2	9.9%	98.0%	9.7%
2.0	4.5	10.9	8.4%	98.0%	8.2%
2.5	5.6	13.6	7.7%	98.0%	7.5%
3.0	6.8	16.3	5.9%	98.0%	5.8%
3.5	7.9	19.0	4.4%	97.6%	4.3%
4.0	9.0	21.8	4.7%	96.3%	4.5%
4.5	10.2	24.5	3.3%	96.0%	3.2%
5.0	11.3	27.2	3.0%	95.3%	2.9%
6.0	13.6	32.6	5.4%	93.8%	5.1%
7.0	15.8	38.1	4.4%	91.8%	4.0%
8.0	18.1	43.5	3.5%	88.8%	3.1%
9.0	20.3	49.0	2.8%	87.3%	2.5%
10.0	22.6	54.4	2.2%	86.1%	1.9%
15.0	33.9	81.6	6.6%	80.4%	5.3%
20.0	45.2	108.8	4.0%	69.9%	2.8%
25.0	56.5	136.0	1.0%	60.8%	0.6%
30.0	67.8	163.2	0.4%	52.0%	0.2%
35.0	79.1	190.4	0.3%	36.3%	0.1%
40.0	90.4	217.6	0.3%	18.2%	0.1%
					91.1%

Predicted Annual Runoff Volume Treated = 91.4%
Assumed removal efficiency for bypassed flows = 0.0%
Estimated reduction in efficiency[5] = 6.5%
Predicted Net Annual Load Removal Efficiency = **85%**

1 - Design Ratio = (Total Drainage Area) x (Runoff Coefficient) x (Rational Method Conversion) / Grit Chamber Area
- The Total Drainage Area and Runoff Coefficient are specified by the site engineer.
- The rational method conversion based on the units in the above equation is 2.775.

2 - Operating Rate (% of capacity) = percentage of peak operating rate of 68 l/s/m^2.

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

4 - Based on Contech Construction Products laboratory verified removal of an average particle size of 80 microns (see Technical Bulletin #1).

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

Calculated by:	JAK	2/1	Checked by:

Appendix D
Correspondence

From: Jennifer Knowles <Jennifer.Knowles@ContechES.com>
Sent: Wednesday, February 1, 2023 10:38 AM
To: Steve Zorgel
Cc: Mike Petepiece
Subject: RE: [EXTERNAL] Vortech Units - Greystone Village
Attachments: 542350-10 EFFY VX11000 Offline AS BUILT.pdf; 542350-10 SDC VX11000 Offline AS BUILT.pdf; 563087-010 EFFY VX5000 OFFLINE AS BUILT.pdf; 563087-010 SDC VX5000 OFFLINE AS BUILT.pdf

Hi Steve,

Please find attached as built calculations for the two Vortechs systems. Please note that Contech's project numbers changed between the time of the original design work and tender/order. Please also note that the elevations for Outlet 2 Vortechs 5000 changed since the calculations from November 2016. Let me know if you have any questions.

Best regards,

Jennifer

Jennifer Knowles, P.E.*
Sr. Design Engineer – Stormwater Products

Contech Engineered Solutions LLC
71 U.S. Route One Suite F | Scarborough, ME 04074
Off: 207-885-6134 Fax: 207-885-9825
Jennifer.Knowles@ContechES.com
www.ContechES.com
*Licensed in ME

From: Steve Zorgel <s.zorgel@novatech-eng.com>
Sent: Tuesday, January 31, 2023 12:46 PM
To: Jennifer Knowles <Jennifer.Knowles@ContechES.com>
Cc: Mike Petepiece <m.petepiece@novatech-eng.com>; damaley, Mark <MAdamaley@conteches.com>
Subject: [EXTERNAL] Vortech Units - Greystone Village

Hi Jennifer,

Back in 2016, we had two vortech units sized for two separates outlets within the Greystone Village Development. I have attached some email chains for each outlet for reference.

Based on as-built information, some peak design flows have increased for each outlet. All the other design elements (drainage areas, imperviousness, pipe sizes, inverts, etc.) have remained the same. We want to confirm the slight change in peak flows do not have an impact on the overall performance of the existing unit including targeted TSS removal (80%).

The revised peak flows are as follows:

Outlet 1 – phase 1A/1B (Site A, southern site)

- 5-Year Flow = 1006L/s
    - Previously provided flow = 1023L/s
    - Previously provided drainage area = 7.31ha
    - Previously provided Imperviousness = 68%
- 100-Year Flow = 1646L/s
    - Previously provided flow = 1622L/s

Outlet 2 – Phase 2/3 (Site B, northern site)

- 5-Year Flow = 440L/s
    - Previously provided flow = 498L/s
    - Previously provided drainage area = 2.7ha
    - Previously provided Imperviousness = 73%
- 100-Year Flow = 866L/s
    - Previously provided flow = 1350L/s

If you need more information or have any questions please let us know, thank you.

Steve Zorgel, **P.Eng.,** Project Manager | Engineering
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 x298 | Fax: 613.254.5867

VORTECHS SYSTEM® ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON AN AVERAGE PARTICLE SIZE OF 80 MICRONS
GREYSTONE VILLAGE
OTTAWA, ON
MODEL 11000 OFF-LINE
OUTLET 1 - PHASE 1A/1B

CONTECH ENGINEERED SOLUTIONS

Design Ratio[1] = $\frac{\text{(7.31 hectares) x (0.708) x (2.775)}}{\text{(7.3 m2)}}$ **= 1.96**

Bypass occurs at an elevation of 59.13m (at approximately 18 l/s/m2)

Rainfall Intensity mm/hr	Operating Rate[2] % of capacity	Flow Treated (l/s)	% Total Rainfall Volume[3]	Rmvl. Effcy[4] (%)	Rel. Effcy (%)
0.5	1.4	7.1	9.2%	98.0%	9.0%
1.0	2.9	14.3	10.6%	98.0%	10.4%
1.5	4.3	21.4	9.9%	98.0%	9.7%
2.0	5.8	28.5	8.4%	98.0%	8.2%
2.5	7.2	35.7	7.7%	97.6%	7.5%
3.0	8.6	42.8	5.9%	96.9%	5.8%
3.5	10.1	49.9	4.4%	96.0%	4.2%
4.0	11.5	57.1	4.7%	95.3%	4.4%
4.5	13.0	64.2	3.3%	94.7%	3.1%
5.0	14.4	71.3	3.0%	92.8%	2.8%
6.0	17.3	85.6	5.4%	89.9%	4.8%
7.0	20.1	99.8	4.4%	87.3%	3.8%
8.0	23.0	114.1	3.5%	85.7%	3.0%
9.0	25.9	128.4	2.8%	84.9%	2.4%
10.0	28.8	142.6	2.2%	83.1%	1.8%
15.0	43.2	213.9	5.9%	72.8%	4.3%
20.0	57.6	285.3	3.2%	60.0%	1.9%
25.0	71.9	356.6	0.9%	47.9%	0.4%
30.0	86.3	427.9	0.4%	24.4%	0.1%
35.0	100.7	499.2	0.2%	8.0%	0.0%
40.0	115.1	570.5	0.3%	8.0%	0.0%
					87.7%

Predicted Annual Runoff Volume Treated = 89.6%
Assumed removal efficiency for bypassed flows = 0.0%
Estimated reduction in efficiency[5] = 6.5%
Predicted Net Annual Load Removal Efficiency = **81%**

1 - Design Ratio = (Total Drainage Area) x (Runoff Coefficient) x (Rational Method Conversion) / Grit Chamber Area
- The Total Drainage Area and Runoff Coefficient are specified by the site engineer.
- The rational method conversion based on the units in the above equation is 2.775.

2 - Operating Rate (% of capacity) = percentage of peak operating rate of 68 l/s/m^2.

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

4 - Based on Contech Construction Products laboratory verified removal of an average particle size of 80 microns (see Technical Bulletin #1).

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

Calculated by:	JAK	2/1	Checked by:

VORTECHS SYSTEM® FLOW CALCULATIONS

CONTECH ENGINEERED SOLUTIONS

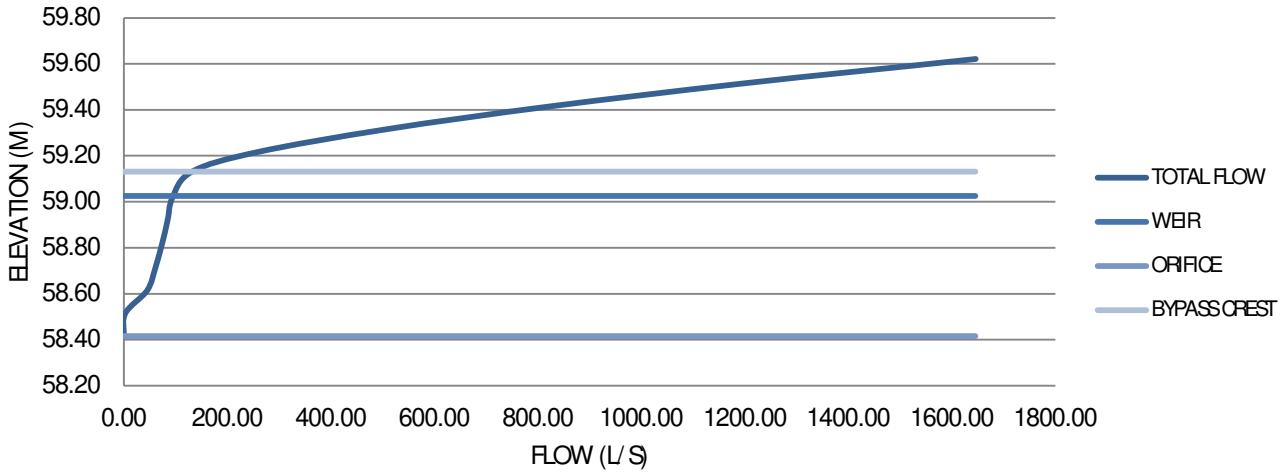
GREYSTONE VILLAGE
OTTAWA, ON
MODEL 11000 OFF-LINE
OUTLET 1 - PHASE 1A/1B

Vortechs Orifice	Vortechs Weir	Bypass Weir
Cd = 0.56	Cd = 3.4	Cd = 3.3
A (m^2) = 0.052	Weir Crest Length (m) = 0.433	Crest Length (m) = 1.829
Crest Elevation (m) = 58.42	Crest Elevation (m) = 59.03	Crest Elev. (m) = 59.13

Head (m)	Elevation (m)	Orifice Flow (l/s)	Weir Flow (l/s)	Bypass Flow (l/s)	Total Flow (l/s)
0.00	58.42	0.00	0.00	0.00	0.00
0.10	58.52	2.98	0.00	0.00	2.98
0.20	58.62	45.58	0.00	0.00	45.58
0.30	58.72	61.29	0.00	0.00	61.29
0.40	58.82	73.72	0.00	0.00	73.72
0.50	58.92	84.34	0.00	0.00	84.34
0.60	59.02	93.76	0.00	0.00	93.76
0.72	59.13	103.64	27.94	0.00	131.59
0.80	59.22	110.22	66.75	80.72	257.68
0.90	59.32	117.58	125.82	262.34	505.74
1.00	59.42	124.52	196.18	503.44	824.14
1.10	59.52	131.08	276.25	791.81	1199.15
1.20	59.62	137.65	369.79	1138.76	1646.20

Calculated by: JAK | 2/1

VORTECHS STAGE DISCHARGE CURVE

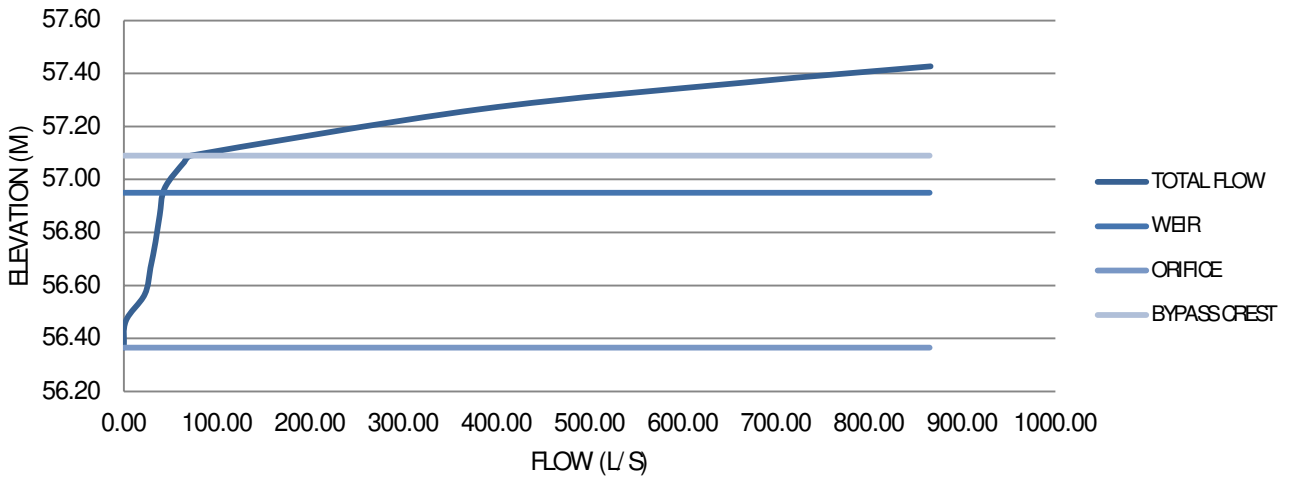


VORTECHS SYSTEM® FLOW CALCULATIONS
GREYSTONE VILLAGE- PHASE 2 & 3
OTTAWA, ON
MODEL 5000 OFF-LINE
OUTLET 2 - PHASE 2/3

Vortechs Orifice	Vortechs Weir	Bypass Weir
Cd = 0.56	Cd = 3.4	Cd = 3.3
A (m^2) = 0.023	Weir Crest Length (m) = 0.253	Crest Length (m) = 1.829
Crest Elevation (m) = 56.37	Crest Elevation (m) = 56.95	Crest Elev. (m) = 57.09

Head (m)	Elevation (m)	Orifice Flow (l/s)	Weir Flow (l/s)	Bypass Flow (l/s)	Total Flow (l/s)
0.00	56.37	0.00	0.00	0.00	0.00
0.10	56.47	1.99	0.00	0.00	1.99
0.20	56.57	22.24	0.00	0.00	22.24
0.30	56.67	28.75	0.00	0.00	28.75
0.40	56.77	34.03	0.00	0.00	34.03
0.50	56.87	38.60	0.00	0.00	38.60
0.60	56.97	42.68	0.91	0.00	43.59
0.70	57.07	46.40	18.48	0.00	64.88
0.72	57.09	47.25	24.56	0.00	71.81
0.90	57.27	53.07	83.41	245.74	382.22
1.00	57.37	56.10	126.05	482.73	664.89
1.06	57.43	57.90	155.09	653.10	866.09

Calculated by: JAK | 2/1



VORTECHS SYSTEM® ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON AN AVERAGE PARTICLE SIZE OF 80 MICRONS
GREYSTONE VILLAGE- PHASE 2 & 3
OTTAWA, ON
MODEL 5000 OFF-LINE
OUTLET 2 - PHASE 2/3

CONTECH ENGINEERED SOLUTIONS

Design Ratio[1] = $\frac{\text{(2.7 hectares) x (0.738) x (2.775)}}{\text{(3.6 m2)}}$ **= 1.54**

Bypass occurs at an elevation of 57.09m (at approximately 20 l/s/m2)

Rainfall Intensity mm/hr	Operating Rate[2] % of capacity	Flow Treated (l/s)	% Total Rainfall Volume[3]	Rmvl. Effcy[4] (%)	Rel. Effcy (%)
0.5	1.1	2.7	9.2%	98.0%	9.0%
1.0	2.3	5.4	10.6%	98.0%	10.4%
1.5	3.4	8.2	9.9%	98.0%	9.7%
2.0	4.5	10.9	8.4%	98.0%	8.2%
2.5	5.6	13.6	7.7%	98.0%	7.5%
3.0	6.8	16.3	5.9%	98.0%	5.8%
3.5	7.9	19.0	4.4%	97.6%	4.3%
4.0	9.0	21.8	4.7%	96.3%	4.5%
4.5	10.2	24.5	3.3%	96.0%	3.2%
5.0	11.3	27.2	3.0%	95.3%	2.9%
6.0	13.6	32.6	5.4%	93.8%	5.1%
7.0	15.8	38.1	4.4%	91.8%	4.0%
8.0	18.1	43.5	3.5%	88.8%	3.1%
9.0	20.3	49.0	2.8%	87.3%	2.5%
10.0	22.6	54.4	2.2%	86.1%	1.9%
15.0	33.9	81.6	6.6%	80.4%	5.3%
20.0	45.2	108.8	4.0%	69.9%	2.8%
25.0	56.5	136.0	1.0%	60.8%	0.6%
30.0	67.8	163.2	0.4%	52.0%	0.2%
35.0	79.1	190.4	0.3%	36.3%	0.1%
40.0	90.4	217.6	0.3%	18.2%	0.1%
					91.1%

Predicted Annual Runoff Volume Treated = 91.4%
Assumed removal efficiency for bypassed flows = 0.0%
Estimated reduction in efficiency[5] = 6.5%
Predicted Net Annual Load Removal Efficiency = **85%**

1 - Design Ratio = (Total Drainage Area) x (Runoff Coefficient) x (Rational Method Conversion) / Grit Chamber Area
- The Total Drainage Area and Runoff Coefficient are specified by the site engineer.
- The rational method conversion based on the units in the above equation is 2.775.

2 - Operating Rate (% of capacity) = percentage of peak operating rate of 68 l/s/m^2.

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

4 - Based on Contech Construction Products laboratory verified removal of an average particle size of 80 microns (see Technical Bulletin #1).

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

Calculated by:	JAK	2/1	Checked by:

Conseil
Écoles
catholiques
Centre-Est

September 16th 2022

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

Attention: **Nishant Jhamb**

Dear Mr. Jhamb:

Reference: **Greystone Village – Phase 3 Condo**
Retaining Wall Construction
City File Nos.: D07-12-21-0111

I, Luc Poulin, Director of Facilities Services for Conseil des écoles catholiques du Centre-Est (CECCE), acknowledge that the Deschatelets Building at 225 Scholastic Avenue is at a higher elevation than the proposed ground elevations within the Greystone Phase 3 lands (375 Deschatelets Ave). Therefore, a retaining wall is required along a portion of the shared property line, as shown in the attached Grading Plan, 114025-GR (PH3) (rev. 11) and in relation to the property boundaries described in the survey plans 4R-33420 & 4R-34268 . In order to construct the retaining wall, we understand that some soil disturbance may be required on our property.

Please accept this letter as confirmation that Greystone Village Inc. has coordinated the retaining wall location and construction with the CECCE.

Sincerely,

Conseil des écoles catholiques du Centre-Est (CECCE)

Luc Poulin

Luc Poulin

Witness

Conseil Écoles catholiques Centre-Est

Attachments:

Grading Plan, 114025-GR (PH3) (rev. 11)

Plan of survey, 4R-33420

Plan of survey, 4R-34268

From: Evan Garfinkel <egarfinkel@regionalgroup.com>
Sent: Monday, August 15, 2022 12:10 PM
To: Steve Zorgel
Cc: Marc St.Pierre
Subject: FW: Greystone Phase 3

Hi Steve,

See below as discussed. Please let me know if this would be sufficient.

Also, if you have an example of a 'permission letter' that you are able to provide for reference, that would be greatly appreciated.

Best,

Evan Garfinkel
Manager, Land Development

Regional Group
1737 Woodward Drive
Ottawa, ON K2C 0P9
T: 613-230-2100 x 6004
C: 613-884-5574

egarfinkel@regionalgroup.com
www.regionalgroup.com

From: Jonathan Bruneau <brunej@ecolecatholique.ca>
Sent: Monday, August 15, 2022 10:08 AM
To: Evan Garfinkel <egarfinkel@regionalgroup.com>
Cc: Luc Poulin <poulil@ecolecatholique.ca>; Annick Prud'homme <prudha@ecolecatholique.ca>
Subject: Re: Greystone Phase 3

Good day Evan,

Following your email, yes you are welcome to send us a draft letter for our review to address the retaining wall. I will issue it for review.

For the storm management water, I confirm that the CECCE addresses the issue to ensure water drains directly to our land sewer. The building connections to the sewer are temporary until the permanent

conduits and risers are in place. This solution works properly and no water from the storm system drains on your land behind Deschatelets.

Let me know if you require additional information, we will wait for your draft letter.

Thank you

Le ven. 12 août 2022, à 11 h 53, Evan Garfinkel <egarfinkel@regionalgroup.com> a écrit :

> Hi Jonathan,
>
> We are currently making our way through the Site Plan Control process for the Greystone Phase 3 application and we have received a few comments that apply to your lands.
>
> Firstly, the City has asked us for a permission letter for the construction of the retaining wall, as it is likely there will be some excavation for the construction of the wall required on your side of the shared property line. The City has asked for a detailed permission letter to be signed, dated, and witnessed in order for us to re-submit for our Site Plan Control re-submission. I would be happy to provide a draft letter for you to include on CECCE letterhead if you would prefer.
>
> Secondly, the City has asked for confirmation that your approved on-site SWM design is controlling only your on-site drainage and that you will not be sending any drainage into the phase 3 onsite storm system.
>
> We are hopeful that you would be able to provide us with something for next week. We would be happy to set up a quick meeting early next week if you'd like to discuss further.
>
> Best,
>
> **Evan Garfinkel**
>
> Manager, Land Development

Regional Group

1737 Woodward Drive

Ottawa, ON K2C 0P9

T: 613-230-2100 x 6004

C: 613-884-5574

egarfinkel@regionalgroup.com

www.regionalgroup.com

--

Jonathan Bruneau
Gestionnaire de projets
Conseil des écoles catholiques du Centre-Est
O. 613-744-2555 Ext:33348
M. 613-299-9242
brunej@ecolecatholique.ca

From: Renaud, Jean-Charles <Jean-Charles.Renaud@ottawa.ca>
Sent: Thursday, August 4, 2022 1:57 PM
To: Evan Garfinkel
Cc: Jhamb, Nishant; Steve Zorgel
Subject: RE: 375 Deschâtelets Avenue - 2nd Review Comments
Attachments: D07-12-21-0111 - 375 Deschatelets Ave - RVCA Comments

Hi Evan,

While the RVCA was not circulated on the last submission, they did send the attached email in response to the initial circulation, and expressed no concern.

Have a good day.

JC
Jean-Charles Renaud, MCIP/*MICU*, RPP/*UPC*
Planner II | *Urbaniste II*
Development Review, Central | *Examen des projets d'aménagement, Central*
Planning, Real Estate and Economic Development Department | *Services de la planification, des biens immobiliers et du développement économique*
City of Ottawa | *Ville d'Ottawa*
110 Laurier Avenue West. Ottawa, ON | *110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1*
613.580.2424 ext./poste 27629

From: Evan Garfinkel <egarfinkel@regionalgroup.com>
Sent: August 4, 2022 1:55 PM
To: Renaud, Jean-Charles <Jean-Charles.Renaud@ottawa.ca>
Cc: Jhamb, Nishant <nishant.jhamb@ottawa.ca>; Steve Zorgel <s.zorgel@novatech-eng.com>
Subject: RE: 375 Deschâtelets Avenue - 2nd Review Comments

Hi Jean-Charles,

Can you confirm if the RVCA was circulated on the last submission and if they had any comments?

Thanks,

Evan Garfinkel
Manager, Land Development

Regional Group
1737 Woodward Drive
Ottawa, ON K2C 0P9
T: 613-230-2100 x 6004
C: 613-884-5574

egarfinkel@regionalgroup.com
www.regionalgroup.com

From: Renaud, Jean-Charles <Jean-Charles.Renaud@ottawa.ca>
Sent: Thursday, July 7, 2022 12:59 PM
To: Evan Garfinkel <egarfinkel@regionalgroup.com>
Cc: Jhamb, Nishant <nishant.jhamb@ottawa.ca>; Dubyk, Wally <Wally.Dubyk@ottawa.ca>; Laplante, André <Andre.Laplante@ottawa.ca>; Moise, Christopher <christopher.moise@ottawa.ca>
Subject: 375 Deschâtelets Avenue - 2nd Review Comments

Good afternoon Evan,

Please find attached the second review comments for the above-noted file.

JC
Jean-Charles Renaud, MCIP/*MICU*, RPP/*UPC*
Planner II | *Urbaniste II*
Development Review, Central | *Examen des projets d'aménagement, Central*
Planning, Real Estate and Economic Development Department | *Services de la planification, des biens immobiliers et du développement économique*
City of Ottawa | *Ville d'Ottawa*
110 Laurier Avenue West. Ottawa, ON | *110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1*
613.580.2424 ext./poste 27629

****
***** Please be aware that I will be away from the office from July 11 to July 15, 2022 *****
****

'

'
'

'

Steve Zorgel

From: Eric Lalande <eric.lalande@rvca.ca>
Sent: Wednesday, September 15, 2021 8:47 PM
To: Renaud, Jean-Charles
Subject: D07-12-21-0111 - 375 Deschatelets Ave - RVCA Comments

Hi J-C,

The RVCA has reviewed the above noted Site Plan Control Application and have no objections.

Thank you,

Eric Lalande, MCIP, RPP
Planner | x1137

Rideau Valley Conservation Authority

3889 Rideau Valley Drive
PO Box 599, Manotick ON K4M 1A5
T 613-692-3571 | 1-800-267-3504 **F** 613-692-0831 | www.rvca.ca

Steve Zorgel

From: Scott Dennis <SDennis@patersongroup.ca>
Sent: Wednesday, August 10, 2022 9:37 AM
To: Steve Zorgel
Cc: Evan Garfinkel; Kevin Pickard
Subject: RE: PG5383: Grading Plan - Greystone PH.3 Condos
Attachments: Paterson Group Report PG5383-1 Rev. 1 dated March 9, 2022.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Steve,

Since we're waterproofing the foundation, long-term groundwater flows will be very low. Section 6.5 of the attached Geotechnical Investigation Report indicates the following:

Provided the proposed groundwater infiltration control system and the tanked system are properly implemented and approved by the geotechnical consultant at the time of construction, it is expected that groundwater flow will be very low to negligible (less than 2,000 L/day).

Hopefully this answers the City's question, but if they have follow up questions, please let us know.

Regards,

PATERSON GROUP
SOLUTION ORIENTED ENGINEERING

SCOTT DENNIS, P.Eng., ing.
Senior Project Manager – Geotechnical
TEL: (613) 226-7381 ext. 332

9 AURIGA DRIVE
OTTAWA ON K2E 7T9
patersongroup.ca

From: Steve Zorgel <s.zorgel@novatech-eng.com>
Sent: August 10, 2022 8:41 AM
To: Scott Dennis <SDennis@patersongroup.ca>
Subject: RE: PG5383: Grading Plan - Greystone PH.3 Condos

Hi Scott,

We received a comment from the City regarding groundwater infiltration for the phase 3 condo site within Greystone Village. Comment as follows:

7. How much ground water is anticipated to drain into storm sewer post construction, please discuss in the body of the report.

Are you able to provide a response to this that we can add to our servicing report.

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER 4082-AAZQ6P
Issue Date: June 24, 2016

Greystone Village Inc.
1737 Woodward Drive, 2nd Floor
Ottawa, Ontario
K2C 0P9

Site Location: 175 Main Street
City of Ottawa, Ontario

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

sanitary and storm sewers to be constructed in the City of Ottawa, as follows:

- sanitary sewers on Hazel Street (from Station 50+0000 to Station 50+175), Deschatelets Avenue (from Station 70+125 to Station 70+335), Scholastic Drive (from Station 10+225 to Station 10+392), Jeremiah Kealey Street (from Station 30+000 to Station 30+108), De Mazenod Avenue (from Station 40+000 to Station 40+168), Telmon Street (from Station 20+000 to Station 20+189), Clegg Street (from Station 90+000 to Station 90+179), and Easement (Block 61) (from Station 10+392 to Station 10+435); and
- storm sewers on Hazel Street (from Station 50+0000 to Station 50+175), Deschatelets Avenue (from Station 70+125 to Station 70+335), Scholastic Drive (from Station 10+225 to Station 10+392), Jeremiah Kealey Street (from Station 30+000 to Station 30+108), De Mazenod Avenue (from Station 40+000 to Station 40+168), and Telmon Street (from Station 20+000 to Station 20+189);

all in accordance with the application from Greystone Village Inc., dated May 18, 2016, including final plans and specifications prepared by Novatech Engineering.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

1. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The environmental compliance approval number;
6. The date of the environmental compliance approval;
7. The name of the Director, and;
8. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment and Climate Change
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 24th day of June, 2016

Gregory Zimmer, P.Eng.
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

YH/
c: District Manager, MOECC Ottawa District Office
M. Rick O'Connor, City Clerk, City of Ottawa
Joshua White, P.Eng., Project Manager, Development Review, City of Ottawa
Linda Carkner, Program Manager, Infrastructure, City of Ottawa
J.G. Riddell, P.Eng., Novatech Engineering

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER 8946-ACUP7W
Issue Date: August 17, 2016

Greystone Village Inc.
1737 Woodward Drive, Unit. 2
Ottawa, Ontario
K2C 0P9

Site Location: 175 Main Street
Lot H, Concession D
City of Ottawa,

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

an amendment of stormwater management Works for the Phase I of Greystone Village subdivision development, located on the north side of Clegg Street, south side of Springhurst Avenue, between Main Street and Rideau River within the Rideau watershed, in the City of Ottawa, for the collection, treatment and disposal of stormwater run-off, to add stormwater management facilities, to service approximately 7.48 hectares, discharging to Rideau River, providing Enhanced Level of quality control and erosion protection, consisting of the following:

Proposed Works:

oil and grit separator (catchment area 7.48 hectares): - one (1) oil and grit separator (Vortechs 11000 or Equivalent), located at the intersection of Telmon Street and Scholastic Drive, west side of Rideau River, receiving inflows from the storm sewers of the subdivision development, identified below, having a sediment storage capacity of approximately 4.280 m^3, an oil storage capacity of approximately 2,378 L, a total storage volume of approximately 13.592 m^3, and a maximum treatment flow rate of approximately 495 L/s, discharging via a 600 mm diameter outflow pipe to the storm sewer outfall, identified below;

storm sewer outfall (Outlet#1-catchment area 7.48 hectares): - one (1) 825 mm diameter storm sewer outfall with a concrete headwall and rip-rap protection, receiving inflows from the oil and grit separator, identified above, discharging to the Rideau River;

Previous Works:

sanitary sewers on Hazel Street (from Station 50+0000 to Station 50+175), Deschatelets Avenue (from Station 70+125 to Station 70+335), Scholastic Drive (from Station 10+225 to Station 10+392), Jeremiah Kealey Street (from Station 30+000 to Station 30+108), De Mazenod Avenue (from Station 40+000 to Station 40+168), Telmon Street (from Station 20+000 to Station 20+189), Clegg Street (from Station 90+000 to Station 90+179), and Easement (Block 61) (from Station 10+392 to Station 10+435); and

storm sewers on Hazel Street (from Station 50+0000 to Station 50+175), Deschatelets Avenue (from Station 70+125 to Station 70+335), Scholastic Drive (from Station 10+225 to Station 10+392), Jeremiah Kealey Street (from Station 30+000 to Station 30+108), De Mazenod Avenue (from Station 40+000 to Station 40+168), and Telmon Street (from Station 20+000 to Station 20+189);

including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned Works;

all in accordance with the submitted supporting documents listed in Schedule "A" forming part of this Approval.

For the purpose of this environmental compliance approval, the following definitions apply:

"Approval" means this entire document including the application and any supporting documents listed in any schedules in this Approval;

"Director" means a person appointed by the Minister pursuant to section 5 of the Environmental Protection Act for the purposes of Part II.1 of the Environmental Protection Act;

“Equivalent” means a substituted product that meets the required quality and performance standards of a named product;

"Ministry" means the ministry of the government of Ontario responsible for the Environmental Protection Act and the Ontario Water Resources Act and includes all officials, employees or other persons acting on its behalf;

"Owner" means the Greystone Village Inc., and includes their successors and assignees;

"Previous Works" means those portions of the sewage Works previously approved under an Approval;

"Works" means the sewage works described in the Owner's application(s) and this Approval.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL PROVISIONS

(1) The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the Conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

(2) The designation of the City of Ottawa as the operating authority of the site on the application for approval of the Works dose not relieve the owner from the responsibility of complying with any and all of the this approval.

(3) Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with the description given in this Approval, and the application for approval of the Works.

(4) Where there is a conflict between a provision of any submitted document referred to in this Approval and the Conditions of this Approval, the Conditions in this Approval shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

(5) Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

(6) The Conditions of this Approval are severable. If any Condition of this Approval, or the application of any requirement of this Approval to any circumstance, is held invalid or unenforceable, the application of such Condition to other circumstances and the remainder of this Approval shall not be affected thereby.

(7) The issuance of, and compliance with the Conditions of this Approval does not:

(a) relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement, including, but not limited to, the obligation to obtain approval from the local conservation authority necessary to construct or operate the sewage Works; or

(b) limit in any way the authority of the Ministry to require certain steps be taken to require the Owner to furnish any further information related to compliance with this Approval.

2. EXPIRY OF APPROVAL

(1) This Approval will cease to apply to those parts of the Works which have not been constructed within **five (5) years** of the date of this Approval.

3. CHANGE OF OWNER

(1) The Owner shall notify the Director, in writing, of any of the following changes within **thirty (30) days** of the change occurring:

(a) change of Owner;

(b) change of address of the Owner;

(c) change of partners where the Owner is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, R.S.O. 1990, c. B17 shall be included in the notification to the Director;

(d) change of name of the corporation where the Owner is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act, R.S.O. 1990, c. C39 shall be included in the notification to the Director.

4. OPERATION AND MAINTENANCE

(1) The Owner shall inspect the Works at least **once a year** and, if necessary, clean and maintain the Works to prevent the excessive build-up of sediments and/or vegetation.

(2) The Owner shall maintain a record of the results of these inspections and any cleaning and maintenance operations undertaken, and shall make the record available for inspection by the Ministry. The record shall include the following:

(a) the name of the Works; and

(b) the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed.

5. MONITORING AND REPORTING

(1) The Owner shall carry out a monitoring program for the inspection and maintenance of the Works as outline in this Approval and shall make the information available to the Ministry staff upon request. The monitoring program shall consist of annul maintenance logs listing the depth of sediment in the oil and grit separator and shall note the date of each inspection, maintenance and cleaning including an estimate of the quantity of materials removed, and maintenance operations undertaken.

6. TEMPORARY EROSION AND SEDIMENT CONTROL

(1) The Owner shall install and maintain temporary sediment and erosion control measures during construction and conduct inspections once every **two (2) weeks** and after each significant storm event (a significant storm event is defined as a minimum of 25 mm of rain in any 24 hours period). The inspections and maintenance of the temporary sediment and erosion control

measures shall continue until they are no longer required and at which time they shall be removed and all disturbed areas reinstated properly.

(2) The Owner shall maintain records of inspections and maintenance which shall be made available for inspection by the Ministry, upon request. The record shall include the name of the inspector, date of inspection, and the remedial measures, if any, undertaken to maintain the temporary sediment and erosion control measures.

7. RECORD KEEPING

The Owner shall retain for a minimum of **five (5) years** from the date of their creation, all records and information related to or resulting from the operation, maintenance and monitoring activities required by this Approval.

Schedule "A"

1. Application for Environmental Compliance Approval, dated March 9, 2016, received on March 31, 2016, submitted by Novatech;

2. Site Servicing, Stormwater Management, Noise Erosion and Sediment Control Brief, for Greystone Village 175 Main Street, Ottawa, Ontario, dated December 18, 2015, prepared by Novatech;

3. Pipe Data Form and Storm and Sanitary Sewer Design Sheets, prepared by Novatech;

4. Set of Engineering Drawings (8 drawings) for Greystone Village Phase 1A & 1B , City of Ottawa, dated December, 2015, prepared by Novatech;

5. E-mail from Justin Gauthier of Novatech to the Ministry, dated August 15, 2016; and

6. E-mail from Justin Gauthier of Novatech to the Ministry, dated August 16, 2016.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the Works are built and operated in the manner in which they were described for review and upon which approval was granted. This Condition is also included to emphasize the precedence of Conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review.

2. Condition 2 is included to ensure that, when the Works are constructed, the Works will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition 3 is included to ensure that the Ministry records are kept accurate and current with respect to approved Works and to ensure that any subsequent Owner of the Works is made aware of the Approval and continue to operate the Works in compliance with it.

4. Condition 4 is included to require that the Works be properly operated and maintained such that the environment is protected.

5. Condition 5 is included to enable the Owner to evaluate and demonstrate the performance of the Works on a continual basis, so that the Works are properly operated and maintained at a level which is consistent with the design objectives specified in the Approval and that the Works do not cause any impairment of the receiving watercourse.

6. Condition 6 is included as installation, regular inspection and maintenance of the temporary sediment and erosion control measures is required to mitigate the impact on the downstream receiving watercourse during construction, until they are no longer required.

7. Condition 7 is included to require that all records are retained for a sufficient time period to adequately evaluate the long-term operation and maintenance of the Works.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). 4082-AAZQ6P issued on June 24, 2016.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me, the Environmental Review Tribunal and in accordance with Section 47 of the Environmental Bill of Rights, 1993, S.O. 1993, c. 28 (Environmental Bill of Rights), the Environmental Commissioner, within 15 days after receipt of this Notice, require a hearing by the Tribunal. The Environmental Commissioner will place notice of your appeal on the Environmental Registry. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

1. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in

respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The environmental compliance approval number;
6. The date of the environmental compliance approval;
7. The name of the Director, and;
8. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Environmental Commissioner
1075 Bay Street, Suite 605
Toronto, Ontario
M5S 2B1

AND

The Director appointed for the purposes of
Part II.1 of the Environmental Protection Act
Ministry of the Environment and
Climate Change
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or www.ert.gov.on.ca**

This instrument is subject to Section 38 of the Environmental Bill of Rights, 1993, that allows residents of Ontario to seek leave to appeal the decision on this instrument. Residents of Ontario may seek leave to appeal within 15 days from the date this decision is placed on the Environmental Registry. By accessing the Environmental Registry at www.ebr.gov.on.ca , you can determine when the leave to appeal period ends.

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 17th day of August, 2016

Gregory Zimmer, P.Eng.
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

TN/

c: District Manager, MOECC Ottawa Office
M. Rick O'Connor, City Clerk, City of Ottawa
Joshua White, P.Eng., Project Manager, Development Review, City of Ottawa
Linda Carkner, Program Manager, Infrastructure, City of Ottawa
J.G. Riddell, Novatech Engineering
Justin Gauthier, Novatech Engineering

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER 3454-APEHFQ
Issue Date: July 31, 2017

Greystone Village Inc.
1737 Woodward Drive, 2nd Floor
Ottawa, Ontario
K2C 0P9

Site Location: Greystone Village Phase 2 and 3
175 Main Street
City of Ottawa, Ontario

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

storm sewers and an associated **stormwater outfall** to be constructed in the City of Ottawa on Block 58, from Station (0+024.35) to Station (0+056.7), and discharging to the Rideau River;

one (1) oil/grit separator (catchment area - 2.7 hectares): - the establishment of an off-line oil/grit separator (model stormceptor 5000 or Equivalent) in the City of Ottawa, for the treatment and disposal of stormwater run-off for all storm events up to and including the 100-year storm event, to provide Enhanced Level water quality protection for a total catchment area of approximately 2.7 hectares, having a sediment storage capacity of 20,940 litres, an oil storage capacity of 3,360 litres, a total holding capacity of 24,710 litres, and a maximum treatment flow rate of 61 litres/second, discharging to Rideau River;

including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned Works;

all in accordance with the submitted supporting documents listed in Schedule "A" forming part of this Approval.

For the purpose of this environmental compliance approval, the following definitions apply:

1. "*Approval* " means this entire document and any schedules attached to it, and the application;

2. *"Director* " means a person appointed by the Minister pursuant to section 5 of the *EPA* for the

purposes of Part II.1 of the *EPA;*

3. "*District Manager* " means the *District Manager* of the appropriate local District Office of the *Ministry* , where the *Works* are geographically located;

4. "*EPA* " means the Environmental Protection Act, R.S.O. 1990, c.E.19, as amended;

5. "*Equivalent* " means a substituted oil and grit separator that meets the required quality and performance standards of the approved oil and grit separator;

6. "*Ministry* " means the ministry of the government of Ontario responsible for the *EPA* and *OWRA* and includes all officials, employees or other persons acting on its behalf;

7. "*Owner* " means Greystone Village Inc., and includes its successors and assignees;

8. "*OWRA* " means the Ontario Water Resources Act, R.S.O. 1990, c. O.40, as amended;

9. "*Water Supervisor* " means the *Water Supervisor* of the appropriate local office of the Safe Drinking Water Branch of the *Ministry,* where the *Works* are geographically located;

10. "*Works* " means the sewage works described in the *Owner's* application, and this *Approval.*

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL CONDITIONS

1. The *Owner* shall ensure that any person authorized to carry out work on or operate any aspect of the *Works* is notified of this *Approval* and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

2. Except as otherwise provided by these Conditions, the *Owner* shall design, build, install, operate and maintain the *Works* in accordance with the description given in this *Approval,* and the application for approval of the *Works.*

3. Where there is a conflict between a provision of any document in the schedule referred to in this *Approval* and the conditions of this *Approval,* the conditions in this *Approval* shall take precedence, and where there is a conflict between the documents in the schedule, the document bearing the most recent date shall prevail.

4. Where there is a conflict between the documents listed in Schedule 'A' and the application, the

application shall take precedence unless it is clear that the purpose of the document was to amend the application.

5. The conditions of this *Approval* are severable. If any condition of this *Approval,* or the application of any requirement of this *Approval* to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this *Approval* shall not be affected thereby.

6. The issuance of, and compliance with the conditions of, this *Approval* does not:

   a. relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement, including, but not limited to, the obligation to obtain approval from the local conservation authority/MNR necessary to construct or operate the sewage works; or

   b. limit in any way the authority of the *Ministry* to require certain steps be taken to require the *Owner* to furnish any further information related to compliance with this *Approval.*

2. EXPIRY OF APPROVAL

1. This *Approval* will cease to apply to those parts of the *Work* which have not been constructed within five (5) years of the date of this *Approval.*
2. In the event that completion and commissioning of any portion of the *Works* is anticipated to be delayed beyond the specified expiry period, the *Owner* shall submit an application of extension to the expiry period, at least twelve (12) months prior to the end of the period. The application for extension shall include the reason(s) for the delay, whether there is any design change(s) and a review of whether the standards applicable at the time of *Approval* of the *Works* are still applicable at the time of request for extension, to ensure the ongoing protection of the environment.

3. CHANGE OF OWNER

1. The *Owner* shall notify the District Manager and the *Director,* in writing, of any of the following changes within thirty (30) days of the change occurring:

   a. change of *Owner;*

   b. change of address of the *Owner;*

   c. change of partners where the *Owner* is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, R.S.O. 1990, c.B17 shall be included in the notification to the District Manager*;* or

   d. change of name of the corporation where the *Owner* is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act,

R.S.O. 1990, c. C39 shall be included in the notification to the District Manager.

2. In the event of any change in ownership of the *Works* , other than a change to a successor municipality, the *Owner* shall notify in writing the succeeding owner of the existence of this *Approval* , and a copy of such notice shall be forwarded to the District Manager and the *Director.*

3. The *Owner* shall ensure that all communications made pursuant to this condition refer to the number at the top of this *Approval.*

4. Notwithstanding any other requirements in this *Approval* , upon transfer of the ownership or assumption of the *Works* to a municipality if applicable, any reference to the *District Manager* shall be replaced with the *Water Supervisor.*

4. OPERATION AND MAINTENANCE

1. If applicable, any proposed storm sewers or other stormwater conveyance in this *Approval* can be constructed but not operated until the proposed stormwater management facilities in this *Approval* or any other *Approval* that are designed to service the storm sewers or other stormwater conveyance are in operation.

2. The *Owner* shall make all necessary investigations, take all necessary steps and obtain all necessary approvals so as to ensure that the physical structure, siting and operations of the *Works* do not constitute a safety or health hazard to the general public.

3. The *Owner* shall undertake an inspection of the condition of the *Works,* at least once a year, and undertake any necessary cleaning and maintenance to ensure that sediment, debris and excessive decaying vegetation are removed from the *Works* to prevent the excessive build-up of sediment, oil/grit, debris and/or decaying vegetation, to avoid reduction of the capacity and/or permeability of the *Works,* as applicable. The *Owner* shall also regularly inspect and clean out the inlet to and outlet from the *Works* to ensure that these are not obstructed.

4. The *Owner* shall design, construct and operate the *Works* with the objective that the effluent from the *Works* is essentially free of floating and settleable solids and does not contain oil or any other substance in amounts sufficient to create a visible film, sheen, foam or discoloration on the receiving waters.

5. The *Owner* shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall keep the logbook at the *Owner's* administration office for inspection by the *Ministry.* The logbook shall include the following:

   a. the name of the *Works;* and

   b. the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed and method of clean-out of the *Works.*

6. The *Owner* shall prepare an operations manual prior to the commencement of operation of the *Works* that includes, but is not necessarily limited to, the following information:

    a. operating and maintenance procedures for routine operation of the *Works;*

    b. inspection programs, including frequency of inspection, for the *Works* and the methods or tests employed to detect when maintenance is necessary;

    c. repair and maintenance programs, including the frequency of repair and maintenance for the *Works;*

    d. contingency plans and procedures for dealing with potential spills and any other abnormal situations and for notifying the District Manager*;* and

    e. procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

7. The *Owner* shall maintain the operations manual current and retain a copy at the location of the *Works* for the operational life of the *Works.* Upon request, the *Owner* shall make the manual available to *Ministry* staff.

5. TEMPORARY EROSION AND SEDIMENT CONTROL

1. The *Owner* shall install and maintain temporary sediment and erosion control measures during construction and conduct inspections once every two (2) weeks and after each significant storm event (a significant storm event is defined as a minimum of 25 mm of rain in any 24 hours period). The inspections and maintenance of the temporary sediment and erosion control measures shall continue until they are no longer required and at which time they shall be removed and all disturbed areas reinstated properly.

2. The *Owner* shall maintain records of inspections and maintenance which shall be made available for inspection by the *Ministry,* upon request. The record shall include the name of the inspector, date of inspection, and the remedial measures, if any, undertaken to maintain the temporary sediment and erosion control measures.

6. REPORTING

1. One (1) week prior to the start-up of the operation of the *Works,* the *Owner* shall notify the District Manager (in writing) of the pending start-up date.
2. The *Owner* shall, upon request, make all manuals, plans, records, data, procedures and supporting documentation available to *Ministry* staff.
3. The *Owner* shall prepare and submit a performance report to the District Manager on an annual basis, within ninety (90) days following the end of the period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the *Works* and subsequent reports shall be submitted to cover successive annual periods following

thereafter. The reports shall contain, but shall not be limited to, the following information:

a. a description of any operating problems encountered and corrective actions taken;

b. a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the *Works,* including an estimate of the quantity of any materials removed from the *Works;*

c. a summary of any complaints received during the reporting period and any steps taken to address the complaints;

d. a summary of all spill or abnormal discharge events; and

e. any other information the District Manager requires from time to time.

Schedule "A"

1. Application for Environmental Compliance Approval under M&P Sewage Works, dated May 15, 2017 and received on June 29, 2017, submitted by The Greystone Village Inc.;

2. Greystone Village Phase 2 and 3, 175 Main Street, Plan and Profile, Storm Outlet 2 (including Grading, Erosion and Sediment Control) Revision 4, dated May 26, 2017, prepared by Novatech Engineering;

3. Greystone Village Phase 2 and 3, 175 Main Street, Site Servicing, stormwater management, Noise, Erosion & Sediment Control design beirf, revised May 26, 2017, prepared by Novatech Engineering;

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the *Works* are constructed and operated in the manner in which they were described and upon which approval was granted. This condition is also included to emphasize the precedence of conditions in the *Approval* and the practice that the *Approval* is based on the most current document, if several conflicting documents are submitted for review. Condition 1.6 is included to emphasize that the issuance of this *Approval* does not diminish any other statutory and regulatory obligations to which the *Owner* is subject in the construction, maintenance and operation of the *Works* . The Condition specifically highlights the need to obtain any necessary conservation authority approvals. The Condition also emphasizes the fact that this *Approval* doesn't limit the authority of the *Ministry* to require further information.

2. Condition 2 is included to ensure that, when the *Works* are constructed, the *Works* will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition 3 is included to ensure that the *Ministry* records are kept accurate and current with respect to approved *Works* and to ensure that subsequent owners of the *Works* are made aware of the *Approval* and continue to operate the *Works* in compliance with it.

4. Condition 4 is included as regular inspection and necessary removal of sediment and excessive decaying vegetation from the *Works* are required to mitigate the impact of sediment, debris and/or decaying vegetation on the treatment capacity of the *Works* . The Condition also ensures that adequate storage is maintained in the *Works* at all times as required by the design. Furthermore, this Condition is included to ensure that the *Works* are operated and maintained to function as designed. Condition 4.1 is included to prevent the operation of stormwater pipes and other conveyance until such time that their required associated stormwater management Works are also constructed.

5. Condition 5 is included as installation, regular inspection and maintenance of the temporary sediment and erosion control measures is required to mitigate the impact on the downstream receiving watercourse during construction until they are no longer required.

6. Condition 6 is included to provide a performance record for future references, to ensure that the *Ministry* is made aware of problems as they arise, and to provide a compliance record for all the terms and conditions outlined in this *Approval* , so that the *Ministry* can work with the *Owner* in resolving any problems in a timely manner.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

a. The portions of the environmental compliance approval or each term or condition in the environmental compliance

approval in respect of which the hearing is required, and;

b. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of
Part II.1 of the Environmental Protection Act
Ministry of the Environment and
Climate Change
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 31st day of July, 2017

C. Labarge

Christina Labarge, P.Eng.
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

MS/

c: District Manager, MOECC Ottawa office
Justin Gauthier, Project Manager, Novatech Engineering
City Clerk, City of Ottawa (File No. D07-16-15-0001)
Joshua White, P.Eng., Senior Engineer, Development Review, City of Ottawa
Linda Carkner, Program Manager, Row Unit, City of Ottawa

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER 0292-AP6PWR
Issue Date: July 12, 2017

Greystone Village Inc.
1737 Woodward Drive, Unit 2
Ottawa, Ontario
K2C 0P9

Site Location: Greystone Village, Phase 2 and 3
175 Main Street
City of Ottawa, Ontario

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

storm and sanitary sewers to be constructed in the City of Ottawa, as follows:

- sanitary sewers on Oblates Avenue (from Station 60+007.53 to Station 60+373.35), Scholastics Drive (from Station 10+0075 to Station 10+195.89), Deschatelets Avenue (from Station 70+000 to Station 70+132), and Block 58 (from Station 0+002 to Station 0+048.5); and

- storm sewers on Oblates Avenue (from Station 60+007.53 to Station 60+373.35), Scholastics Drive (from Station 10+0075 to Station 10+195.89), and Deschatelets Avenue (from Station 70+000 to Station 70+132);

all in accordance with the submitted application and supporting documents listed in Schedule "A" forming part of this Approval.

For the purpose of this environmental compliance approval, the following definitions apply:

1. "*Approval* " means this entire document and any schedules attached to it, and the application;

2. "*Director* " means a person appointed by the Minister pursuant to section 5 of the EPA for the purposes of Part II.1 of the EPA;

3. "*District Manager* " means the District Manager of the appropriate local District Office of the Ministry, where the Works are geographically located;

4. "*EPA* " means the Environmental Protection Act, R.S.O. 1990, c.E.19, as amended;

5. "*Ministry* " means the ministry of the government of Ontario responsible for the EPA and OWRA and includes all officials, employees or other persons acting on its behalf;

6. "*Owner* " means Greystone Village Inc., and includes their successors and assignees;

7. "*OWRA* " means the Ontario Water Resources Act, R.S.O. 1990, c. O.40, as amended;

8. "*Works* " means the sewage works described in the Owner's application, and this Approval;

9. "*Professional Engineer* " means a person entitled to practice as a Professional Engineer in the Province of Ontario under a licence issued under the *Professional Engineers Act.*

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL CONDITIONS

1. The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

2. Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with the description given in this Approval, and the application for approval of the Works.

3. Where there is a conflict between a provision of any document in the schedule referred to in this Approval and the conditions of this Approval, the conditions in this Approval shall take precedence, and where there is a conflict between the documents in the schedule, the document bearing the most recent date shall prevail.

4. Where there is a conflict between the documents listed in Schedule 'A' and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

5. The conditions of this Approval are severable. If any condition of this Approval, or the application of any requirement of this Approval to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this Approval shall not be affected thereby.

6. The issuance of, and compliance with the conditions of, this Approval does not:

   a. relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement, including, but not limited to, the obligation to obtain approval from the local conservation authority/MNR necessary to construct or operate the sewage works; or

   b. limit in any way the authority of the Ministry to require certain steps be taken to require the Owner to furnish any further information related to compliance with this Approval.

2. EXPIRY OF APPROVAL

1. This Approval will cease to apply to those parts of the Work which have not been constructed within five (5) years of the date of this Approval.

2. In the event that completion and commissioning of any portion of the Works is anticipated to be delayed beyond the specified expiry period, the Owner shall submit an application of extension to the expiry period, at least twelve (12) months prior to the end of the period. The application for extension shall include the reason(s) for the delay, whether there is any design change(s) and a review of whether the standards applicable at the time of Approval of the Works are still applicable at the time of request for extension, to ensure the ongoing protection of the environment.

3. CHANGE OF OWNER

1. The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within thirty (30) days of the change occurring:

   a. change of Owner;

   b. change of address of the Owner;

   c. change of partners where the Owner is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, R.S.O. 1990, c.B17 shall be included in the notification to the District Manager; or

   d. change of name of the corporation where the Owner is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act, R.S.O. 1990, c. C39 shall be included in the notification to the District Manager.

2. In the event of any change in ownership of the Works, other than a change to a successor municipality, the Owner shall notify in writing the succeeding owner of the existence of this Approval, and a copy of such notice shall be forwarded to the District Manager and the Director.

3. The Owner shall ensure that all communications made pursuant to this condition refer to the

number at the top of this Approval.

4. Notwithstanding any other requirements in this Approval, upon transfer of the ownership or assumption of the Works to a municipality if applicable, any reference to the District Manager shall be replaced with the Water Supervisor.

4. OPERATION AND MAINTENANCE

1. If applicable, any proposed storm sewers or other stormwater conveyance in this Approval can be constructed but not operated until the proposed stormwater management facilities in this Approval or any other Approval that are designed to service the storm sewers or other stormwater conveyance are in operation.

Schedule "A"

1. Application for Environmental Compliance Approval for Municipal and Private Sewage Works, dated May 17, 2017 and received on June 14, 2017, submitted by Greystone Village Inc.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the Works are constructed and operated in the manner in which they were described and upon which approval was granted. This condition is also included to emphasize the precedence of conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. Condition 1.6 is included to emphasize that the issuance of this Approval does not diminish any other statutory and regulatory obligations to which the Owner is subject in the construction, maintenance and operation of the Works. The Condition specifically highlights the need to obtain any necessary conservation authority approvals. The Condition also emphasizes the fact that this Approval doesn't limit the authority of the Ministry to require further information.

2. Condition 2 is included to ensure that, when the Works are constructed, the Works will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition 3 is included to ensure that the Ministry records are kept accurate and current with respect to approved Works and to ensure that subsequent owners of the Works are made aware of the Approval and continue to operate the Works in compliance with it.

4. Condition 4 is included to prevent the operation of stormwater pipes and other conveyance until such time that their required associated stormwater management Works are also constructed.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

a. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
b. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario

AND

The Director appointed for the purposes of
Part II.1 of the Environmental Protection Act
Ministry of the Environment and
Climate Change
135 St. Clair Avenue West, 1st Floor

M5G 1E5

Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 12th day of July, 2017

C. Labarge

Christina Labarge, P.Eng.
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

SW/

c: District Manager, MOECC Ottawa District Office
City Clerk, City of Ottawa (File No. D07-16-15-0001)
Justin Gauthier, Project Manager, Novatech Engineering
Joshua White, P.Eng., Senior Engineer, Development Review, City of Ottawa
Linda Carkner, Program Manager, ROW Unit, City of Ottawa

RIDEAU VALLEY CONSERVATION AUTHORITY

YEARS 1966-2016

50 years of conservation in the Rideau Valley

Athens
Augusta
Beckwith
Central Frontenac
Clarence-Rockland
Drummond/North Elmsley
Elizabethtown-Kitley
Merrickville-Wolford
Montague
North Dundas
North Grenville
Ottawa
Perth
Rideau Lakes
Smiths Falls
South Frontenac
Tay Valley
Westport

AMENDED LETTER OF PERMISSION – ONTARIO REGULATION 174/06, SECTION 28 CONSERVATION AUTHORITIES ACT 1990, AS AMENDED.

Date: April 14, 2016
File: RV3-56/15
Contact: Hal Stimson
(613) 692-3571 ext. 1127
hal.stimson@rvca.ca

Mr. David Kardish
Greystone Village Inc.
c/o The Regional Group
1737 Woodward Dr. 2nd Flr
Ottawa, Ontario
K2C 0P9

Permit for development under Section 28 of the Conservation Authorities Act for fill remediation in a regulated area at Lot Part H Concession D (old Nepean Township) City of Ottawa known municipally as 175 Main Street

Dear Mr. Kardish,

The Rideau Valley Conservation Authority has reviewed your application and understands the proposal to be for the removal of fill in the regulated limits area of the Rideau River in the vicinity of Clegg Street. The work involves removal of contaminated soil and replacement with suitable clean fill material for future development. The work will be carried out under a Brownfield application and falls outside the 1:100 year flood plain elevation of 58.35m geodetic. This amended permit also authorizes excavation work as described without shoring within the RVCA 30m setback zone provided the work is only for the soil remediation work and all grades are restored to existing and stabilized upon completion of the remediation work.

This proposal was reviewed under Ontario Regulation 174/06, the "Development, Interference with Wetlands and Alterations to Shorelines and Watercourses" regulation.

PERMISSION AND CONDITIONS

By this letter the Rideau Valley Authority hereby grants you approval to undertake this project as outlined in your permit application but subject to the following conditions:

1. Approval is subject to the understanding of the project as described above and outlined in the application and submitted plans including:
   - Drawing No. 114025-LG2 for Project No. 114025 titled RVCA Remediation Permit Plan Phase 1A and 1B, dated Mar 07/16, revision No. 2, as prepared by Novatech Engineering and stamped by J. G. Riddell, P. Eng.
   - Technical Memorandum for project No. 1525113 dated March 10, 2016 by S. A. Trickey, P. Eng and M. Cunningham, P. Eng of Golder and Associates titled Excavation Side Slope Recommendations **No conditions are subject to change/revision by the on-site contractor(s).**

2. No encroachment for fill remediation purposes is to occur within 15m of the top of the river bank. Construction access fencing should be installed at this 15m boundary to clearly demarcate the construction access limits.

3. All grades within the 30m setback are to be restored to existing and stabilized upon completion of the remediation work.

4. It is recommended that you retain the services of a professional engineer to conduct on-site inspections to ensure adequacy of the work, verify stability of the final grade and slopes and confirm all imported fill is of suitable type and has been adequately placed and compacted.

5. No in-water work is proposed, however work in-water shall not be conducted at times when flows are elevated due to local rain events, storms or seasonal floods.

6. **A Sediment and Erosion Control Plan must be submitted by the contractor to this office for review prior to construction activities commencing.**

7. It is recommended that you ensure your contractor(s) are provided with a copy of this letter so as to ensure compliance with the conditions listed herein.

8. Only clean non-contaminated fill material will be used.

9. **Any excess excavated material, as a result of the work, must be disposed of in a suitable location outside any regulatory floodplain and fill regulated area and local area grades to match as proposed.**

10. Sediment and erosion control measures shall be in place before any excavation or construction works commence. All sediment/erosion control measures are to be monitored regularly by experienced personnel and maintained as necessary to ensure good working order. In the event that the erosion and sedimentation control measures are deemed not to be performing adequately, the contractor shall undertake immediate additional measures as appropriate to the situation to the satisfaction of the Conservation Authority.

11. Sediment barriers should be used on site in an appropriate method according to the Ontario Provincial Standard Specifications (OPSS) for silt barriers as a minimum. If the sediment and erosion control methods include silt fence it should be placed along the shoreline to prevent overland flow on disturbed areas from

entering any watercourse. Soil type, slope of land, drainage area, weather, predicted sediment load and deposition should be considered when selecting the type of sediment/erosion control.

12. All materials and equipment used for the purpose of site preparation and project completion must be operated and stored in a manner that prevents any deleterious substance (e.g. petroleum products, silt, debris etc.) from entering the water.

13. The waters of the river are NOT to be considered as machine staging areas. Activities such as equipment refuelling and maintenance must be conducted away from the water to prevent entry of petroleum products, debris, or other deleterious substances into the water.

14. All disturbed soil areas must be appropriately stabilized to prevent erosion.

15. **There will be no in-water works between March 15 and July 1, of any given year to protect local aquatic species populations during their spawning and nursery time periods.**

16. Develop a response plan that is to be implemented immediately in the event of a sediment release or spill of a deleterious substance. This plan is to include measures to: a) stop work, contain sediment-laden water and other deleterious substances and prevent their further migration into the watercourse and downstream receiving watercourses; b) notify the RVCA and all applicable authorities in the area c) promptly clean-up and appropriately dispose of the sediment-laden water and deleterious substances; and d) ensure clean-up measures are suitably applied so as not to result in further alteration of the bed and/or banks of the watercourse.

17. That the Conservation Authority be given 48 hours notice prior to the start of construction and within 48 hours of project completion.

18. The applicant agrees that Authority staff may visit the subject property before, during and after project completion to ensure compliance with the conditions as set out in this letter of permission.

19. A new application must be submitted should any work as specified in this letter be ongoing or planned for or after January 18, 2018.

20. All other approvals as might be required from the Municipality, and/or other Provincial or Federal Agencies must be obtained prior to initiation of work. This includes but is not limited to the Endangered Species Act, the Ontario Water Resources Act, Environmental Protection Act, Public Lands Act, or the Fisheries Act.

By this letter the Rideau Valley Conservation Authority assumes no responsibility or liability for any flood, erosion, or slope failure damage which may occur either to your property or the structures on it or if any activity undertaken by you adversely affects the property or interests of adjacent landowners. This letter does not relieve you of the necessity or responsibility for obtaining any other federal, provincial or municipal permits. This permit is not transferable to subsequent property owners.

Should you have any questions regarding this letter please contact Hal Stimson at our Manotick office.

Terry K. Davidson P.Eng
Conservation Authority S. 28 Signing delegate
O. Reg. 174/06

Cc: M. St. Pierre, P. Eng. Novatech

- Pursuant to the provisions of S. 28(12) of the Conservation Authorities Act (R.S.O.1990, as amended.) any or all of the conditions set out above may be appealed to the Executive Committee of the Conservation Authority in the event that they are not satisfactory or cannot be complied with.
- Failure to comply with the conditions of approval or the scope of the project may result in the cancelling of the permission and/or initiation of legal action under S. 28(16) of the Act.
- This letter of permission does not come into full force and effect until the attached copy of this letter is returned to the Authority offices in Manotick signed and dated which return shall be taken as indicating acceptance of the conditions of the Authority's approval and acknowledgement that the details of the proposal as described in this letter are a fair and accurate representation of the proposed undertaking.

Name: _____ (print)

Signed: _____ Date: _____

TECHNICAL MEMORANDUM

DATE March 10, 2016 **PROJECT No.** 1525113

TO Trevor Mackay
Novatech Engineering Consultants Ltd.

FROM Susan Trickey, P.Eng.
Mike Cunningham, P.Eng.

EMAIL strickey@golder.com
mcunningham@golder.com

EXCAVATION SIDE SLOPE RECOMMENDATIONS
EASTERN PROPERTY LIMIT
GREYSTONE VILLAGE REMEDIATION/ENGINEERED FILL PLACEMENT
175 MAIN STREET, OTTAWA, ONTARIO

The following memo provides recommendations for excavation side slopes for the eastern property limit for the remediation and engineered fill placement at the Greystone Village development located at 175 Main Street in Ottawa, Ontario.

It is understood that consideration is being given to carrying out the excavation for the Greystone Village remediation without the use of shoring along the eastern edge of the site. It is also understood that the excavations would extend from the development line back into the 30 m buffer area along the Rideau River.

Golder Associates completed a previous geotechnical investigation on the property for the Draft Plan of Subdivision Application to the City of Ottawa. The results of that investigation were provided in a report titled "Geotechnical Investigation, Proposed Development, Oblates Property, 175 Main Street, Ottawa, Ontario", dated December 2014 (Report No. 14-1122-0005-5100). Based on the results of that investigation as well as observation of the construction activities that are currently taking place as part of the site remediation, the subsurface conditions on the site generally consist of up to about 7 to 8 metres of fill overlying a thick deposit of sensitive silty clay, which is underlain by layers of silty sand and glacial till with the bedrock surface between 25 and 30 metres depth.

Based on observation of excavations made in the fill to date, this material would generally be classified as Type 3 soil in accordance with the Occupational Health and Safety Act (OHSA) and therefore unsupported side slopes cut back at an inclination no steeper than 1 horizontal to 1 vertical (1H:1V) would be considered feasible. However, there is potential that the excavation slopes may ultimately slough to a somewhat flatter inclination depending on the length of time that they remain open as well as due to freeze-thaw of the exposed soil face. Therefore, consideration should be given to setting back the construction fencing by a distance of about 4 metres from the crest of the excavation as an added safety measure for the public. In addition, ongoing inspection of the excavation side slopes should be made as the remediation activities continue, to confirm the above recommendations.

We trust that this memo contains sufficient information for your present requirements. If you have any questions concerning this memo, please contact undersigned.

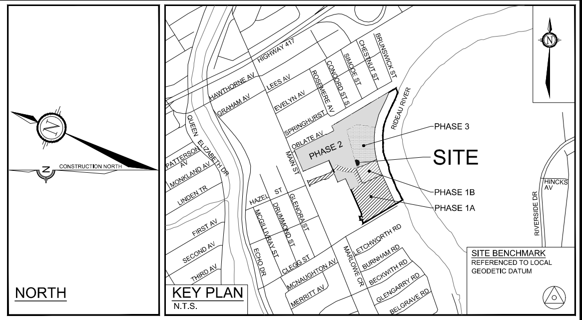
Yours truly,

GOLDER ASSOCIATES LTD.

Susan Trickey, P.Eng.
Geotechnical Engineer

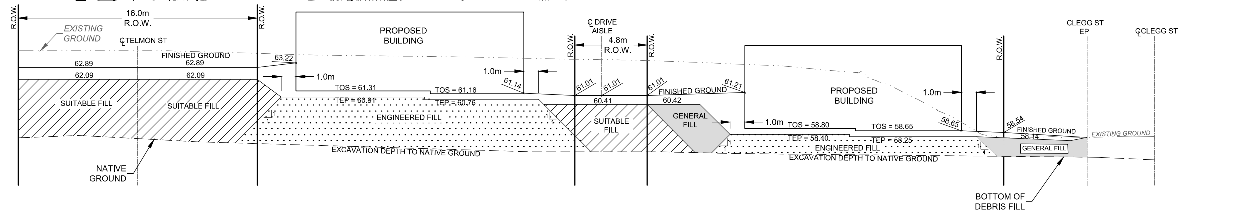
Mike Cunningham, P.Eng.
Geotechnical Engineer, Principal

SAT/MIC/ob
n:\active\2015\3 proj\1525113 regional oblates brownfields 175 main st\geotechnical t&i\1525113 geotech t&i tm-002.docx

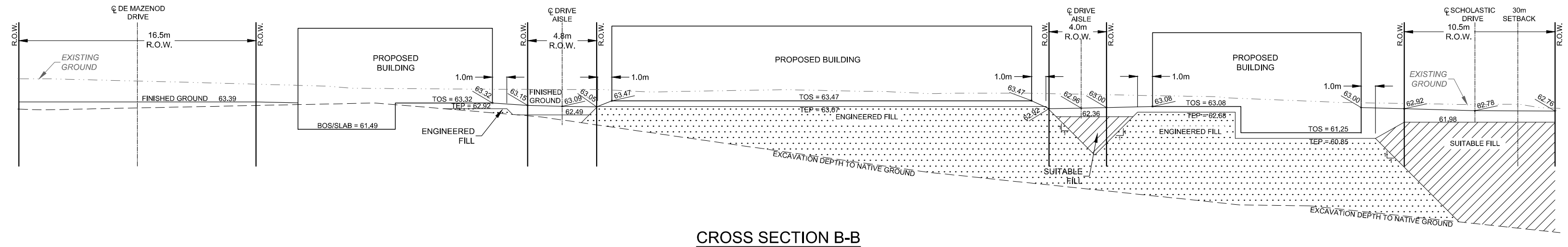


LEGEND

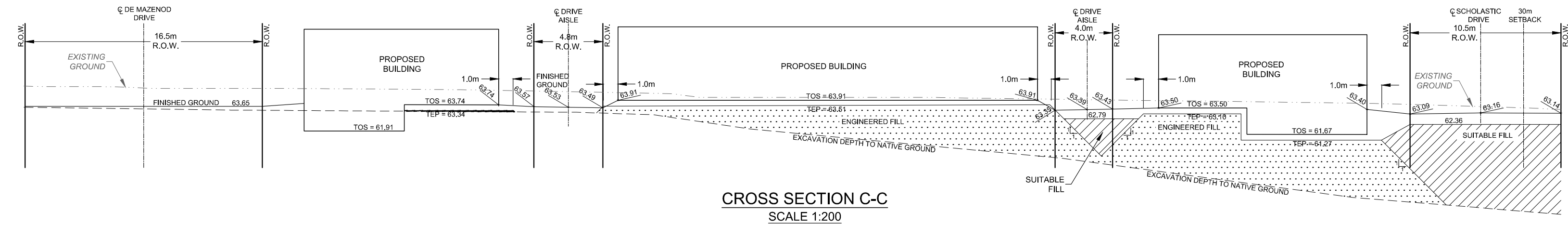
- SITE BOUNDARY
- PHASING LIMITS
- APPROXIMATE DEBRIS FILL BOUNDARY LIMIT
- 1:100YR FLOODPLAIN LIMIT
- FLOODPLAIN REGULATORY LIMIT
- ORIGINAL GROUND CONTOUR LINE AND CONTOUR ELEVATION
- REMEDIATION AREA REQUIRING A RVCA PERMIT



CROSS SECTION A-A
SCALE 1:200



CROSS SECTION B-B
SCALE 1:200



CROSS SECTION C-C
SCALE 1:200

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

No.	REVISION	DATE	BY
2.	REVISED REGULATORY REMEDIATION AREA	MAR 07/16	MSP
1.	ISSUED FOR RVCA PERMIT	NOV 23/15	MSP

SCALE 1:400

DESIGN JAG · CHECKED MSP · DRAWN RBG · CHECKED JAG · APPROVED JGR

FOR REVIEW ONLY

REGISTERED PROFESSIONAL ENGINEER J.G. RIDDELL 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

CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

DRAWING NAME
RVCA REMEDIATION PERMIT PLAN
PHASE 1A AND 1B

PROJECT No. 114025
REV # 2
DRAWING No. 114025-LG2

RIDEAU VALLEY
CONSERVATION AUTHORITY

3889 Rideau Valley Drive, P.O. Box 599, Manotick, ON K4M 1A5
tel 613-692-3571 | 1-800-267-3504 | fax 613-692-0831 | www.rvca.ca

LETTER OF PERMISSION – ONT. REG. 174/06, SECTION 28 CONSERVATION AUTHORITIES ACT 1990, AS AMENDED.

Date: 21 April, 2017.
File: RV3-08/17
Contact: Hal Stimson
(613) 692-3571 Ext 1127
hal.stimson@rvca.ca

Mr. David Kardish
Greystone Village Inc.
c/o The Regional Group
1737 Woodward Dr.
Ottawa, Ontario
K2C 0P9

Permit for development under Section 28 of the Conservation Authorities Act for storm water outlet and soil remediation in a regulated area at Lot Part H Concession D (old Nepean Township) City of Ottawa known municipally as 175 Main Street

Dear Mr. Kardish

The Rideau Valley Conservation Authority has reviewed your application on behalf of Regional Group and understands the proposal to be for: 1) the installation of a new 750 mm diameter concrete stormwater outlet pipe including headwall and river stone plunge pool discharging to the Rideau River east of the intersection of Oblate Avenue and Scholastic Drive and including a compensatory cut of fill previously approved.2) removal and replacement of contaminated soil in the RVCA regulated area with existing grades to be re-established.

This proposal was reviewed under Ontario Regulation 174/06, the "*Development, Interference with Wetlands and Alterations to Shorelines and Watercourses*" regulation and is approved in an amended form noting that the construction of buildings request (lots 12 and 13) will need to form a separate application pending registration of the lots and verification of appropriate flood proofing measures in the final building design.

PERMISSION AND CONDITIONS

By this letter the Rideau Valley Conservation Authority hereby grants you approval to undertake this project as outlined in your permit application but subject to the following conditions:

1. Approval is subject to the understanding of the project as described above and outlined in the application and submitted plans including:
   - Drawing No. 114025-PR6-B for Project No. 114025-00 titled Plan and Profile Phase 2 and 3 Storm Outlet 2 (Incl. Grading, Erosion and Sediment Control) Station 0+000 to 0+54, dated Nov 21/16, revision No. 1, as prepared by Novatech Engineering and stamped by J. G. Riddell, P. Eng.
   - Drawing No. 114025-GR3-B for Project No. 114025-00 titled Grading, Erosion and Sediment Control Plan Phase 2 and 3, dated Nov 21/16, revision No. 1, as prepared by Novatech Engineering and stamped by J. G. Riddell, P. Eng.
   - Drawing No. 114025-GP3-B for Project No. 114025-00 titled General Plan of Services Phase 2 and 3, dated Nov 21/16, revision No. 1, as prepared by Novatech Engineering.
   - Drawing No. 114025-LG-B for Project No. 114025-00 titled RVCA Remediation Permit Plan, dated Feb 13/17, revision No. 1, as prepared by Novatech Engineering.
   - Technical memorandum for project 14-1122-0005 dated February 3, 2017 from Susan Trickey, P. Eng. of Golder Associates.

   No conditions are subject to change/revision by the on-site contractor(s).

2. **<u>There will be no in-water works between March 15 and July 1, of any given year</u> to protect local aquatic species populations during their spawning and nursery time periods.**

3. No encroachment for fill remediation purposes is to occur within 15m of the top of the river bank. Construction access fencing should be installed to clearly demarcate the construction access limits.

4. All grades within the 30m setback are to be restored to existing and stabilized upon completion of the remediation work.

5. It is recommended that you retain the services of an engineer to conduct on-site inspections to ensure adequacy of the work, verify stability of the final grade and confirm all imported fill is of a suitable type and has been adequately placed and compacted and that the recommendations of the geotechnical technical memorandum are followed.

6. **A De-watering Plan and Sediment and Erosion Control Plan must be submitted by the contractor to this office for review prior to construction activities commencing on the storm outlet.**

7. It is recommended that you ensure your contractor(s) are provided with a copy of this letter so as to ensure compliance with the conditions listed herein.

8. All disturbed soil areas must be appropriately stabilized to prevent erosion.

9. Any excess excavated material, as a result of the work, must be disposed of in a suitable location outside any regulatory floodplain and fill regulated area. No changes to area grades are to occur as a result of the work.

10. A final as built grading plan shall be submitted immediately upon completion of the approved works prepared by an Ontario Land Surveyor or Professional Engineer licensed to practice in Ontario indicating that grades achieved on the site conform to those indicated on the approved plan. Only clean material free from particulate matter may be placed in the water.

11. Operate machinery from outside the water, or on the water in a manner that minimizes disturbance to the banks or bed of the watercourse. Equipment shall not be cleaned in the watercourse or where wash-water can enter any watercourse. Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks.

12. All materials and equipment used for the purpose of site preparation and project completion must be operated (washed, refuelled, and serviced) and all fuel stored in a manner that prevents any deleterious substance (e.g. petroleum products, silt, debris etc.) from entering any watercourse.

13. Any stockpiled materials shall be stored and stabilized away from the water.

14. Work in water shall not be conducted at times when flows are elevated due to local rain events, storms or seasonal floods.

15. Sediment barriers should be used on site in an appropriate method according to the Ontario Provincial Standard Specifications (OPSS) for silt barriers as a minimum. If the sediment and erosion control methods include silt fence it should be placed along the shoreline to prevent overland flow on disturbed areas from entering the watercourse. Soil type, slope of land, drainage area, weather, predicted sediment load and deposition should be considered when selecting the type of sediment/erosion control.

16. Sediment and erosion control measures shall be in place before any excavation or construction works commence. All sediment/erosion control measures are to be monitored regularly by experienced personnel and maintained as necessary to ensure good working order. In the event that the erosion and sedimentation control measures are deemed not to be performing adequately, the contractor shall undertake immediate additional measures as appropriate to the situation to the satisfaction of the Conservation Authority.

17. Develop a response plan that is to be implemented immediately in the event of flooding, a sediment release or spill of a deleterious substance. This plan is to include measures to: a) stop work, contain sediment-laden water and other deleterious substances and prevent their further migration into the watercourse and downstream receiving watercourses; b) notify the RVCA and all applicable authorities in the area c) promptly clean-up and appropriately dispose of the sediment-laden water and deleterious

substances; and d) ensure clean-up measures are suitably applied so as not to result in further alteration of the bed and/or banks of the watercourse.

18. The owner is ultimately responsible for failure to comply with any and/or all of these conditions and must take all precautions to ensure no sediment runoff from the work site into any watercourse during and after the construction period. Failure to comply with the approval and/or conditions of this letter will result in the permit being revoked and may also result in legal action being initiated to resolve the matter to the Conservation Authority's satisfaction.

19. The applicant agrees that Authority staff may visit the subject property, before, during and after project completion, to ensure compliance with the conditions as set out in this letter of permission.

20. A new application must be submitted should any work as specified in this letter be ongoing or planned for or after April 25, 2019.

21. That the Authority be given twenty-four hours notice prior to the start of construction and within twenty-four hours of project completion.

22. All other approvals as might be required from the Municipality, and/or other Provincial or Federal Agencies must be obtained prior to initiation of work. This includes but is not limited to the Endangered Species Act., the Ontario Water Resources Act., Environmental Protection Act., Public Lands Act, and the Fisheries Act.

By this letter the Rideau Valley Conservation Authority assumes no responsibility or liability for any flood, erosion, or slope failure damage which may occur either to your property or the structures on it or if any activity undertaken by you adversely affects the property or interests of adjacent landowners. This letter does not relieve you of the necessity or responsibility for obtaining any other federal, provincial or municipal permits. This permit is not transferable to subsequent property owners.

Should you have any questions regarding this letter, please contact Hal Stimson at our Manotick office.

Terry K. Davidson

Terry K. Davidson, P. Eng.
Conservation Authority S. 28 Signing delegate
O. Reg. 174/06

Cc: J. Gauthier, E.I.T. Novatech
T. McLaurin, MNRF Kemptville

- Pursuant to the provisions of S. 28(12) of the Conservation Authorities Act (R.S.O.1990, as amended.) any or all of the conditions set out above may be appealed to the Executive Committee of the Conservation Authority in the event that they are not satisfactory or cannot be complied with.
- Failure to comply with the conditions of approval or the scope of the project may result in the cancelling of the permission and/or initiation of legal action under S. 28(16) of the Act.
- This letter of permission does not come into full force and effect until the attached copy of this letter is returned to the Authority offices in Manotick signed and dated which return shall be taken as indicating acceptance of the conditions of the Authority's approval and acknowledgement that the details of the proposal as described in this letter are a fair and accurate representation of the proposed undertaking.

Name: _____ (print)

Signed: _____ Date: _____

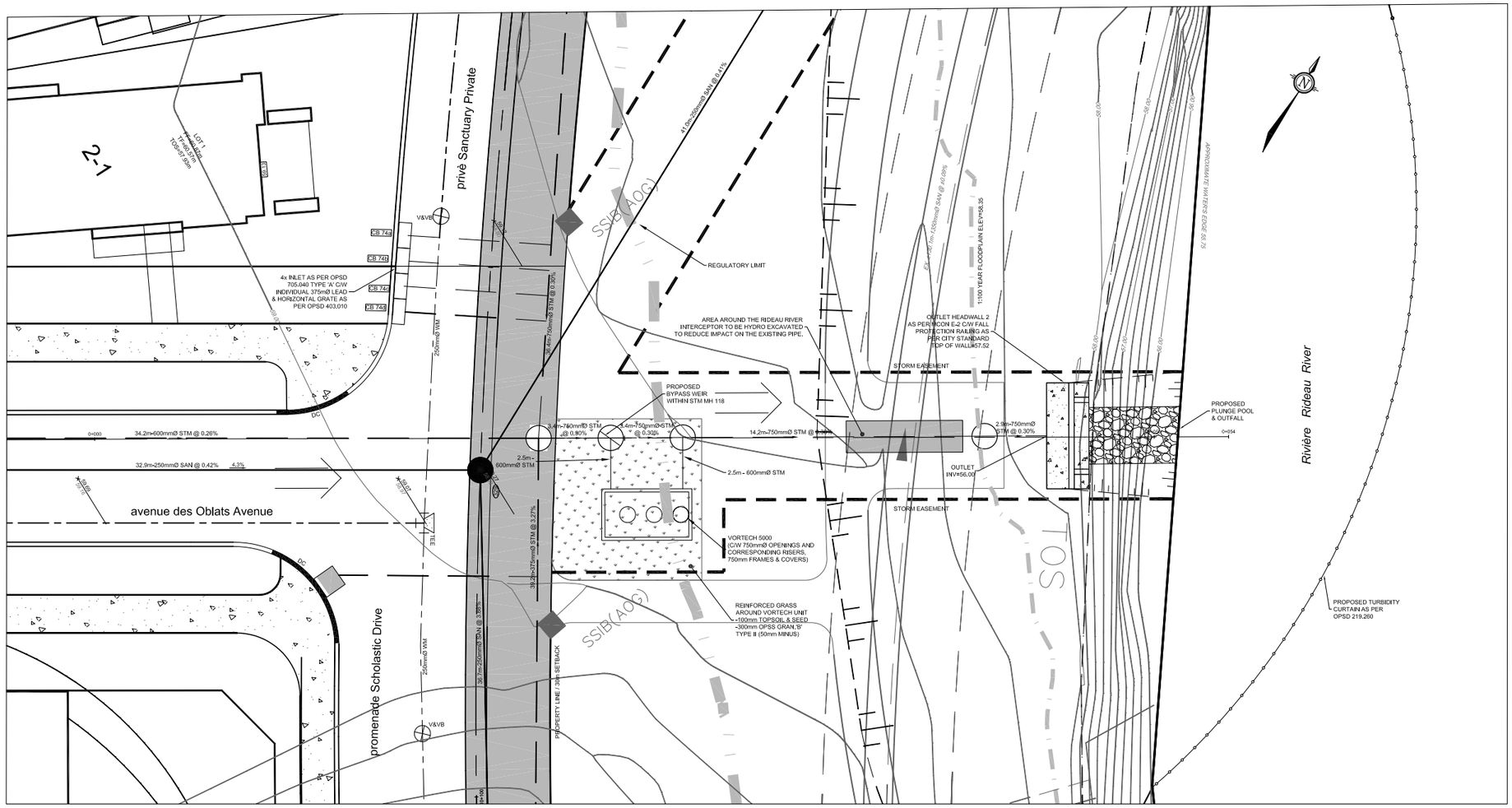
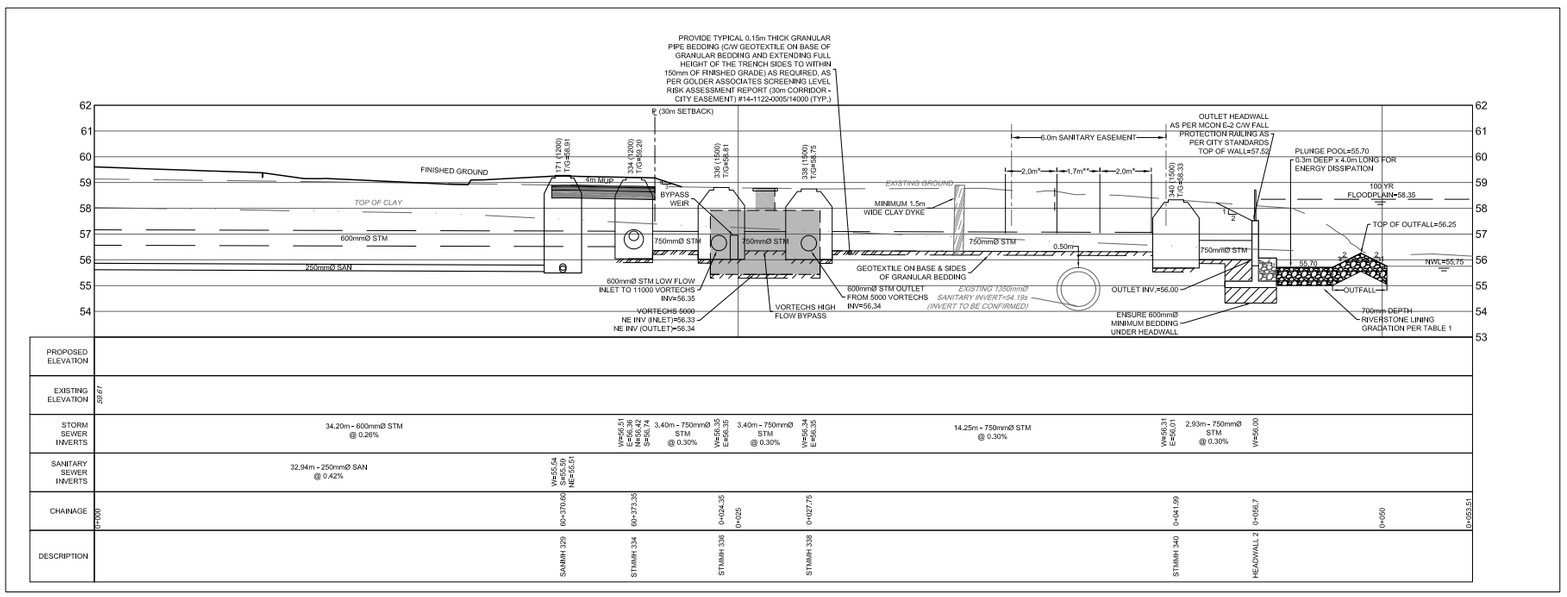


TABLE 1: RIVERSTONE GRADATION	
% PASSING	STONE DIAMETER (mm)
100	450
85	400
50	300
30	200
15	GRANULAR "A"

NOTE:

* LIGHT COMPACTION EQUIPMENT & NOMINAL LEVELS OF COMPACTION EFFORT WITHIN 2.0m OF EXISTING 1350mmØ SANITARY PIPE

** NO PROOF ROLLING/COMPACTION DIRECTLY OVER EXISTING 1350mmØ SANITARY PIPE



REFER TO 114025-N&L-B FOR ADDITIONAL NOTES AND CATCHBASIN TABLES

D07-16-15-0001 PHASE 2 AND 3

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

PRELIMINARY NOT FOR CONSTRUCTION

No.	REVISION	DATE	BY
1.	ISSUED FOR CITY OF OTTAWA REVIEW	NOV 21/16	JAG

SCALE
1:100 HORIZONTAL
1:100 VERTICAL
1:100
0 1 2 3 4

DESIGN JAG
CHECKED MSP
DRAWN MTM
CHECKED JAG
APPROVED JGR

FOR REVIEW ONLY

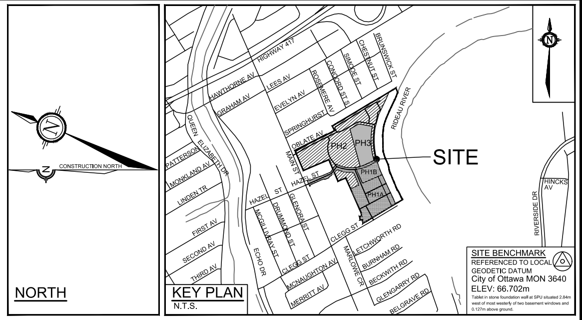
REGISTERED PROFESSIONAL ENGINEER PROVINCE OF ONTARIO J.G. RIDDELL

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

CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

DRAWING NAME
PLAN AND PROFILE
PHASE 2 AND 3
STORM OUTLET 2 (INCL. GRADING, EROSION AND SEDIMENT CONTROL)
STATION 0+000 TO 0+54

PROJECT No. 114025-00
REV REV # 1
DRAWING No. 114025-PR6-B



LEGEND

SITE BOUNDARY	
PHASING LIMITS	
63.52 / 63.46	PROPOSED ELEVATION / EXISTING ELEVATION
65.25(S)	PROPOSED SWALE ELEVATION
65.00(T/S)	PROPOSED TOP OF SLOPE
65.50(HP)	PROPOSED HIGH POINT
65.50(T/W) / 63.31(B/W)	PROPOSED TOP OF RETAINING WALL / PROPOSED BOTTOM OF RETAINING WALL
FFE=	FINISHED FLOOR ELEVATION
TF=	TOP OF FOOTING ELEVATION
TOS=	TOP OF SLAB ELEVATION
USF=	UNDERSIDE OF FOOTING ELEVATION
MUSF=	MINIMUM UNDERSIDE OF FOOTING ELEVATION
SD	INDICATES A STANDARD UNIT
L/O	INDICATES A LOOK OUT UNIT
W/O	INDICATES A WALK OUT UNIT
127.55	PROPOSED TERRACE ELEVATION
2.0%	PROPOSED GRADE AND DIRECTION
	MAJOR OVERLAND FLOW ROUTE
	MAXIMUM 3:1 SIDESLOPE
	PROPOSED CENTRELINE SWALE
	PART OF PH.2 OUTLETTING THROUGH PH.1A AT OUTLET 1
	PHASE 1A AND 1B OUTLETTING THOUGH PH.1A AT OUTLET 1
HYD	PROPOSED HYDRANT LOCATION
TF=127.55	PROPOSED TOP OF BOTTOM FLANGE
V&VB	PROPOSED VALVE AND VALVE BOX
101	PROPOSED SANITARY MANHOLE
100	PROPOSED STORM MANHOLE
CB 10	PROPOSED ROADSIDE CATCH BASIN
CB 20	PROPOSED ROADSIDE CATCH BASIN WITH INLET CONTROL DEVICE
RYCB 1 T/G=97.05	PROPOSED REARYARD CATCHBASIN MANHOLE WITH TOP OF GRATE ELEVATION
RYCBMH 1 T/G=97.01	PROPOSED REARYARD CATCHBASIN WITH TOP OF GRATE ELEVATION
RYE-1 T/G=98.67	REAR YARD ELBOW WITH TOP OF GRATE
RYT-1 T/G=98.67	REAR YARD TEE WITH TOP OF GRATE
CMB	PROPOSED COMMUNITY MAIL BOX
	PROPOSED STREET LIGHT
	PROPOSED SERVICE LOCATION (REFER TO DETAIL)

NOTE: SILT FENCE TO BE INSTALLED AROUND ENTIRE SITE. (SEE OPSD 219.110 ON SHEET 114025-D3-B)

D07-16-15-0001 PHASE 2 AND 3

REFER TO 114025-N&L-B FOR ADDITIONAL NOTES AND CATCHBASIN TABLES

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

PRELIMINARY NOT FOR CONSTRUCTION

No.	REVISION	DATE	BY
1.	ISSUED FOR CITY OF OTTAWA REVIEW	NOV 21/16	JAG

SCALE 1:300

DESIGN JAG
CHECKED MSP
DRAWN MTM
CHECKED JAG
APPROVED JGR

FOR REVIEW ONLY

J.G. RIDDELL — REGISTERED PROFESSIONAL ENGINEER — PROVINCE OF ONTARIO — 21/11/16

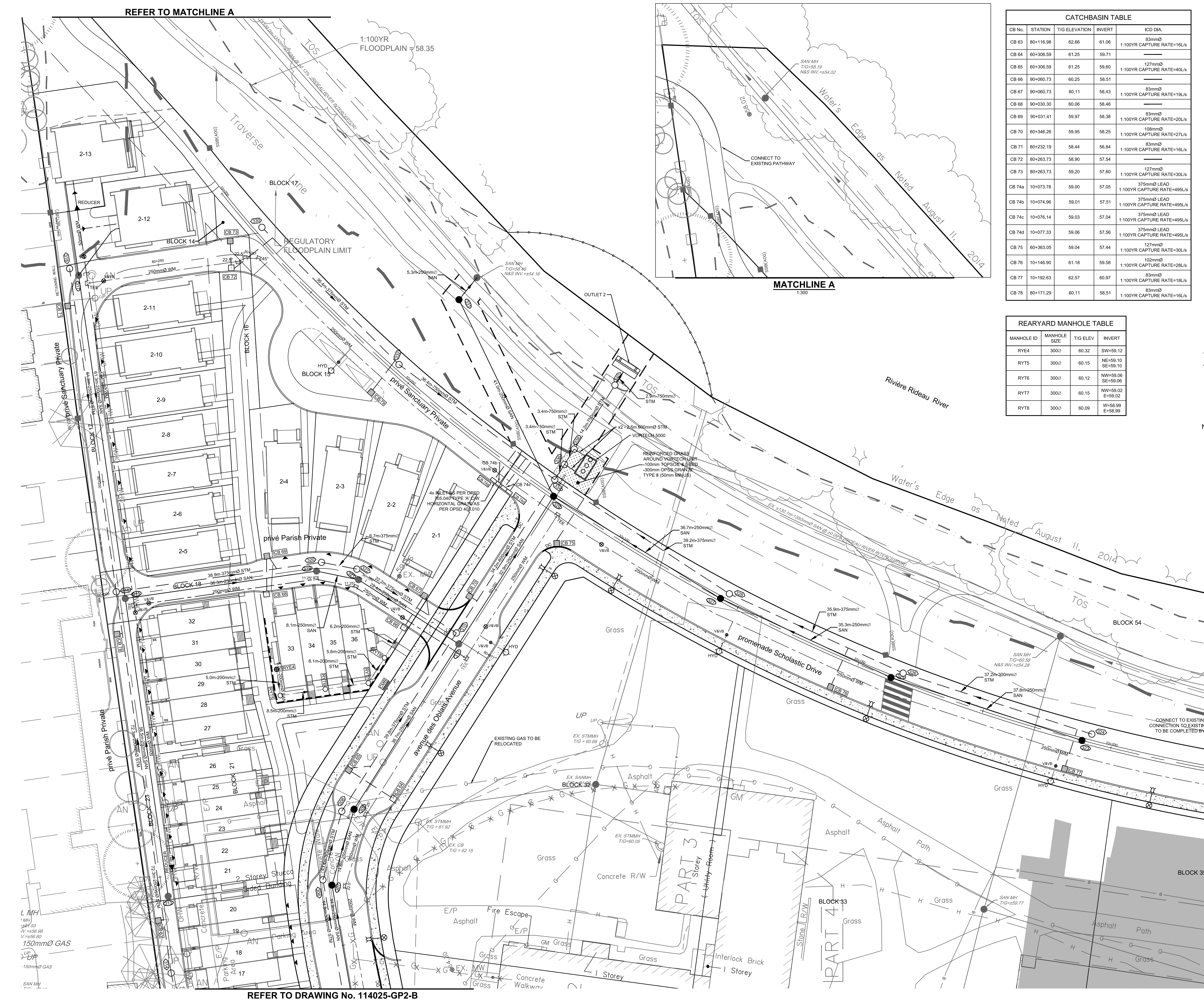
NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

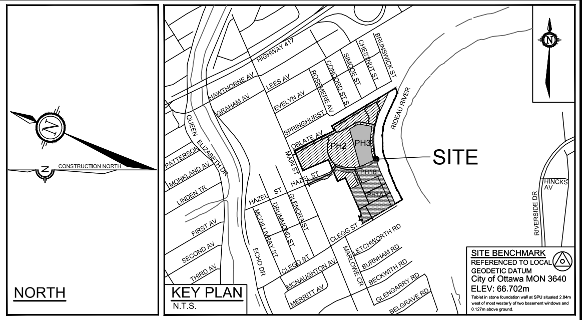
CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

DRAWING NAME
GRADING, EROSION AND SEDIMENT CONTROL PLAN PHASE 2 AND 3

PROJECT No. 114025-00
REV REV # 1
DRAWING No. 114025-GR3-B

PLANB1.DWG - 1000mmx707mm





CATCHBASIN TABLE				
CB No.	STATION	T/G ELEVATION	INVERT	ICD DIA.
CB 63	80+116.98	62.66	61.06	83mmØ 1:100YR CAPTURE RATE=16L/s
CB 64	60+306.59	61.25	59.71	——
CB 65	60+306.59	61.25	59.60	127mmØ 1:100YR CAPTURE RATE=40L/s
CB 66	90+060.73	60.25	58.51	——
CB 67	90+060.73	60.11	58.43	83mmØ 1:100YR CAPTURE RATE=19L/s
CB 68	90+030.30	60.06	58.46	——
CB 69	90+031.41	59.97	58.38	83mmØ 1:100YR CAPTURE RATE=20L/s
CB 70	60+346.26	59.95	58.25	108mmØ 1:100YR CAPTURE RATE=27L/s
CB 71	80+232.19	58.44	56.84	83mmØ 1:100YR CAPTURE RATE=16L/s
CB 72	80+263.73	58.90	57.54	——
CB 73	80+263.73	59.20	57.60	127mmØ 1:100YR CAPTURE RATE=30L/s
CB 74a	10+073.78	59.00	57.05	375mmØ LEAD 1:100YR CAPTURE RATE=495L/s
CB 74b	10+074.96	59.01	57.51	375mmØ LEAD 1:100YR CAPTURE RATE=495L/s
CB 74c	10+076.14	59.03	57.04	375mmØ LEAD 1:100YR CAPTURE RATE=495L/s
CB 74d	10+077.33	59.06	57.56	375mmØ LEAD 1:100YR CAPTURE RATE=495L/s
CB 75	60+363.05	59.04	57.44	127mmØ 1:100YR CAPTURE RATE=30L/s
CB 76	10+146.90	61.18	59.58	102mmØ 1:100YR CAPTURE RATE=28L/s
CB 77	10+192.63	62.57	60.97	83mmØ 1:100YR CAPTURE RATE=18L/s
CB 78	80+171.29	60.11	58.51	83mmØ 1:100YR CAPTURE RATE=16L/s

REARYARD MANHOLE TABLE			
MANHOLE ID	MANHOLE SIZE	T/G ELEV	INVERT
RYE4	300Ø	60.32	SW=59.12
RYT5	300Ø	60.15	NE=59.10 SE=59.10
RYT6	300Ø	60.12	NW=59.06 SE=59.06
RYT7	300Ø	60.15	NW=59.02 E=59.02
RYT8	300Ø	60.09	W=58.99 E=58.99

LEGEND

(line)	SITE BOUNDARY
(line)	PHASING LIMITS
63.52 / 63.46	PROPOSED ELEVATION / EXISTING ELEVATION
65.25(S)	PROPOSED SWALE ELEVATION
65.00(T/S)	PROPOSED TOP OF SLOPE
65.50(HP)	PROPOSED HIGH POINT
65.50(T/W) / 63.31(B/W)	PROPOSED TOP OF RETAINING WALL / PROPOSED BOTTOM OF RETAINING WALL
FFE=	FINISHED FLOOR ELEVATION
TF=	TOP OF FOOTING ELEVATION
USF=	UNDERSIDE OF FOOTING ELEVATION
MUSF=	MINIMUM UNDERSIDE OF FOOTING ELEVATION
SD	INDICATES A STANDARD UNIT
L/O	INDICATES A LOOK OUT UNIT
W/O	INDICATES A WALK OUT UNIT
127.55	PROPOSED TERRACE ELEVATION
2.0%	PROPOSED GRADE AND DIRECTION
(arrow)	MAJOR OVERLAND FLOW ROUTE
(line)	MAXIMUM 3:1 SIDESLOPE
(line)	PROPOSED CENTRELINE SWALE
(grey fill)	PART OF PH.2 OUTLETTING THROUGH PH.1A AT OUTLET 1
(hatch)	PHASE 1A AND 1B OUTLETTING THOUGH PH.1A AT OUTLET 1
HYD	PROPOSED HYDRANT LOCATION
TF=127.55	PROPOSED TOP OF BOTTOM FLANGE
V&VB	PROPOSED VALVE AND VALVE BOX
101	PROPOSED SANITARY MANHOLE
100	PROPOSED STORM MANHOLE
CB 10	PROPOSED ROADSIDE CATCH BASIN
CB 20	PROPOSED ROADSIDE CATCH BASIN WITH INLET CONTROL DEVICE
RYCB 1 T/G=97.05	PROPOSED REARYARD CATCHBASIN MANHOLE WITH TOP OF GRATE ELEVATION
RYCBMH 1 T/G=97.01	PROPOSED REARYARD CATCHBASIN WITH TOP OF GRATE ELEVATION
RYE-1 T/G=98.67	REAR YARD ELBOW WITH TOP OF GRATE
RYT-1 T/G=98.67	REAR YARD TEE WITH TOP OF GRATE
CMB	PROPOSED COMMUNITY MAIL BOX
(symbol)	PROPOSED STREET LIGHT
(symbol)	PROPOSED SERVICE LOCATION (REFER TO DETAIL)

NOTE: SILT FENCE TO BE INSTALLED AROUND ENTIRE SITE. (SEE OPSD 219.110 ON SHEET 114025-D3-B)

D07-16-15-0001 PHASE 2 AND 3

REFER TO 114025-N&L-B FOR ADDITIONAL NOTES AND CATCHBASIN TABLES

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

PRELIMINARY
NOT FOR
CONSTRUCTION

No.	REVISION	DATE	BY
1.	ISSUED FOR CITY OF OTTAWA REVIEW	NOV 21/16	JAG

SCALE 1:300

DESIGN JAG
CHECKED MSP
DRAWN MTM
CHECKED JAG
APPROVED JGR

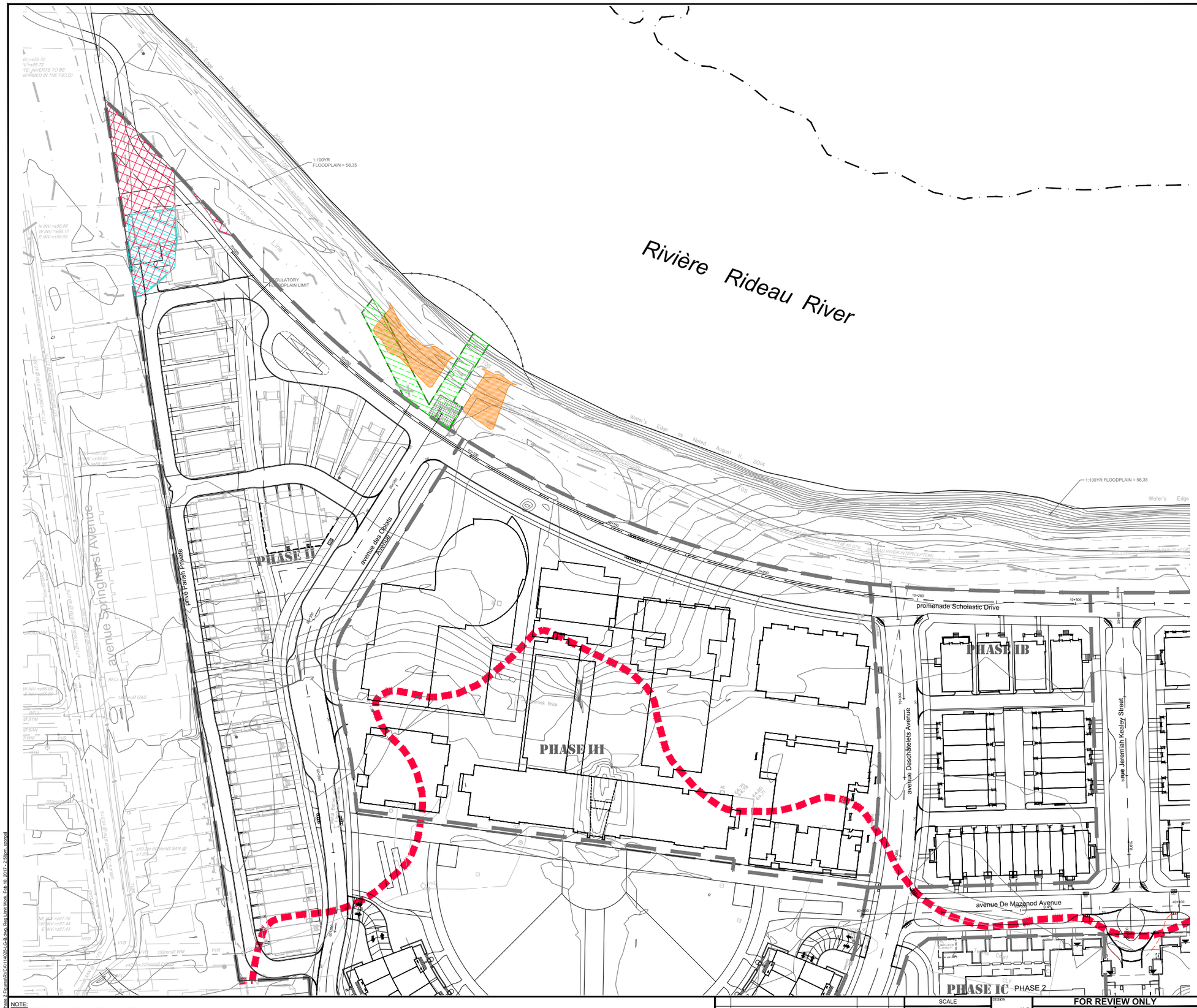
FOR REVIEW ONLY

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

CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

DRAWING NAME
GENERAL PLAN OF SERVICES
PHASE 2 AND 3

PROJECT No. 114025-00
REV REV # 1
DRAWING No. 114025-GP3-B



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
1.	ISSUED FOR RVCA PERMIT	FEB 13/17	JAG

SCALE 1:500

1:500
0 5 10 15 20

DESIGN JAG
CHECKED MSP
DRAWN RBG
CHECKED JAG
APPROVED JGR

FOR REVIEW ONLY

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

CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

DRAWING NAME
RVCA REMEDIATION PERMIT PLAN (OUTLET WORK, RESIDENTIAL CONSTRUCTION AND PREVIOUSLY APPROVED CUT COMPENSATION LIMITS WITHIN REGULATORY LIMITS)

PROJECT No. 114025-00
REV. REV # 1
DRAWING No. 114025-LG-B

Appendix E
Development Servicing Study Checklist

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	Fig 1 & 2	
Plan showing the site and location of all existing services.	Y	Fig 3	& General Plan of Services, 114025-GP (PH3)
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.	Y	1.0	
Summary of Pre-consultation Meetings with City and other approval agencies.	Y	Appendix	Appendix D - Correspondence
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	1.2, 3.0-5.0	
Statement of objectives and servicing criteria.	Y	3.0-5.0	
Identification of existing and proposed infrastructure available in the immediate area.	Y		General Plan of Services, 114025-GP (PH3)
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	1.3	
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		Grading, Erosion and Sediment Control Plan, 114025-GR (PH3)

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.	NA		
Proposed phasing of the development, if applicable.	Y		General Plan of Services, 114025-GP (PH3)
Reference to geotechnical studies and recommendations concerning servicing.	Y	1.1	
All preliminary and formal site plan submissions should have the following information:			
Metric scale	Y		
North arrow (including construction	Y		
Key plan	Y		
Name and contact information of applicant and property owner	Y		
Property limits including bearings and dimensions	Y		
Existing and proposed structures and parking areas	Y		
Easements, road widening and rights-of-way	Y		
Adjacent street names	Y		

Development Servicing Study Checklist

4.2 Water	Addressed (Y/N/NA)	Section	Comments
Confirm consistency with Master Servicing Study, if available.	Y	3.0	
Availability of public infrastructure to service proposed development.	Y	3.0	
Identification of system constraints.	Y	3.0	
Identify boundary conditions.	Y	3.0	Appendix B
Confirmation of adequate domestic supply and pressure.	Y	3.0	Appendix B
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	3.0	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	3.0	Appendix B
Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design.	NA		
Address reliability requirements such as appropriate location of shut-off valves.	Y		General Plan of Services, 114025-GP (PH3)
Check on the necessity of a pressure zone boundary modification.	Y	3.0	
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	3.0	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	3.0	Appendix B
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	3.0	
Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Y	3.0	
Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	Y		Appendix B

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	2.0	
Confirm consistency with Master Servicing Study and/or justifications for deviations.	Y	2.0	
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.	Y	2.0	
Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Y	2.0	
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	2.0	
Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	Y		Appendix A
Description of proposed sewer network including sewers, pumping stations, and forcemains.	Y	2.0	
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	
A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns and proposed drainage patterns.	Y		Storm Drainage Area Plan, 114025-STM (PH3)
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.	NA		
Watercourse and hazard lands setbacks.	Y	4.0	
Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	Y		Appendix D
Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	Y	4.0	
Storage requirements (complete with calcs) and conveyance capacity for 5 yr and 100 yr events.	Y		Appendix C
Identification of watercourse within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	Y	4.0	
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	
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	
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.	Y	4.0	

Development Servicing Study Checklist

4.4 Stormwater	Addressed (Y/N/NA)	Section	Comments
Identification of municipal drains and related approval requirements.	Y	4.0	
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	4.0	
Inclusion of hydraulic analysis including HGL elevations.	N/A		See Master Servicing Report
Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Y	7.0	
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.	Y	4.0	
Identification of fill constrains related to floodplain and geotechnical investigation.	Y	1.0, 4.0	

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	
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	2.0-5.0	
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.	Y		Included as separate letter.
All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario.	Y		