Site Servicing Brief

Greystone Village Phase 3 Condos

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Site Servicing Brief

Prepared For:

Greystone Village Inc.

Prepared By:

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

June 3, 2022

Novatech File: 114025
Ref: R-2022-020

June 3, 2022

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

Attention: **Jean Charles**

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

Please find enclosed a copy of the 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 Oblats Avenue, west of Scholastic Avenue 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

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- 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

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 142 and 130 units respectively. A total of approximately 179 underground parking spaces will be provided on 2 levels of 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 August 11, 2020) 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:

- *Geotechnical Investigation – Proposed Multi-Storey Buildings – Greystone Village - Phase 3 – Scholastic Drive – Ottawa, Ontario; PG5383-1; dated August 11, 2020;*
- *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 Oblats Avenue – Greystone Village 2A / 2B Mixed Use Building: Site Servicing And Stormwater Management Memorandum, dated March 11 2020;*
- *360 Deschatelets Ave – The Spencer (Greystone Village 1c Building): Site Servicing And Stormwater Management Memorandum, dated August 6, 2020;*
- *225 Scholastic Avenue – Greystone Village Deschatelets 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

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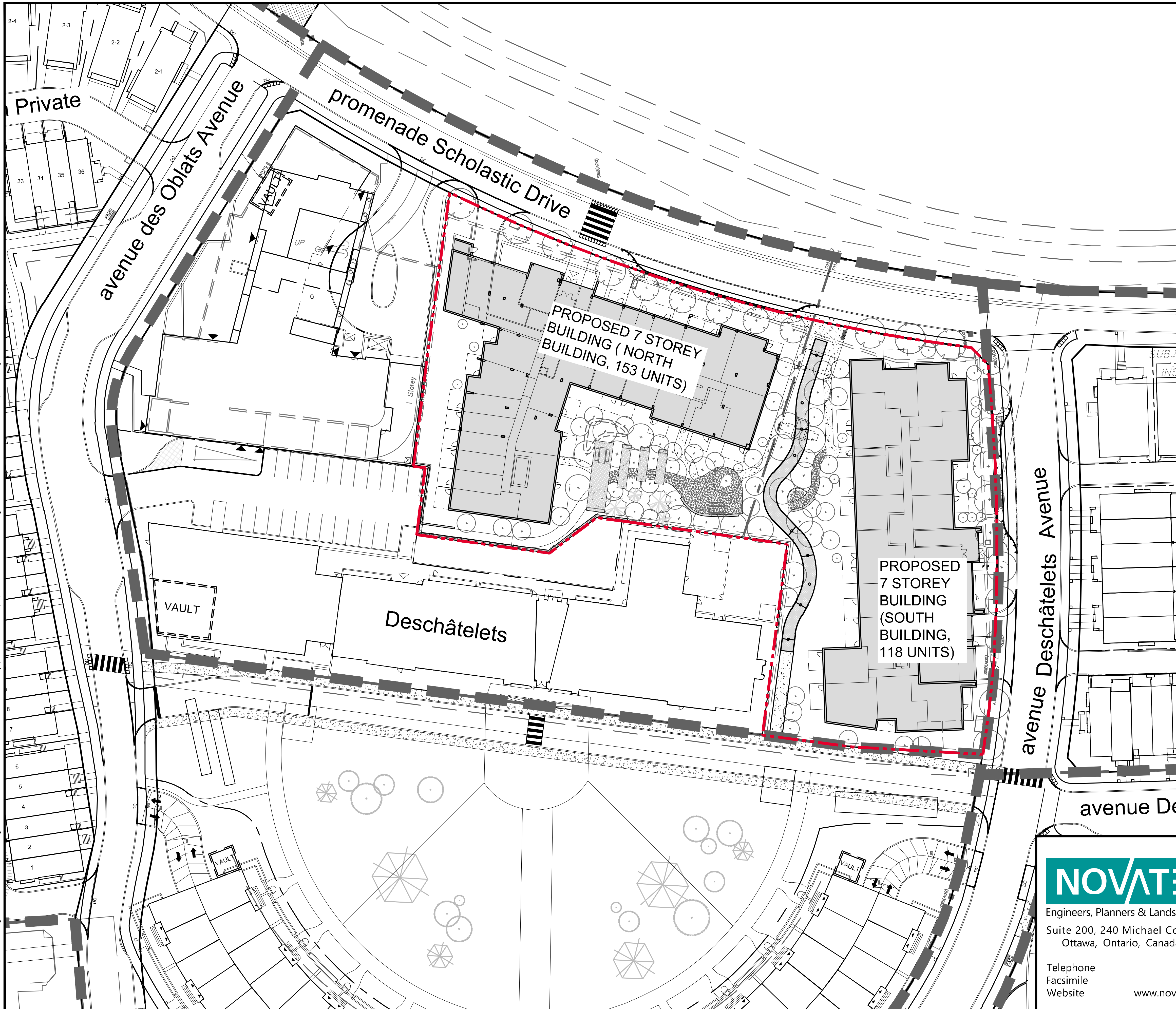

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CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

CONCEPT PLAN - PHASE 3 CONDOS

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JUNE 2022	114025	FIGURE 2

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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

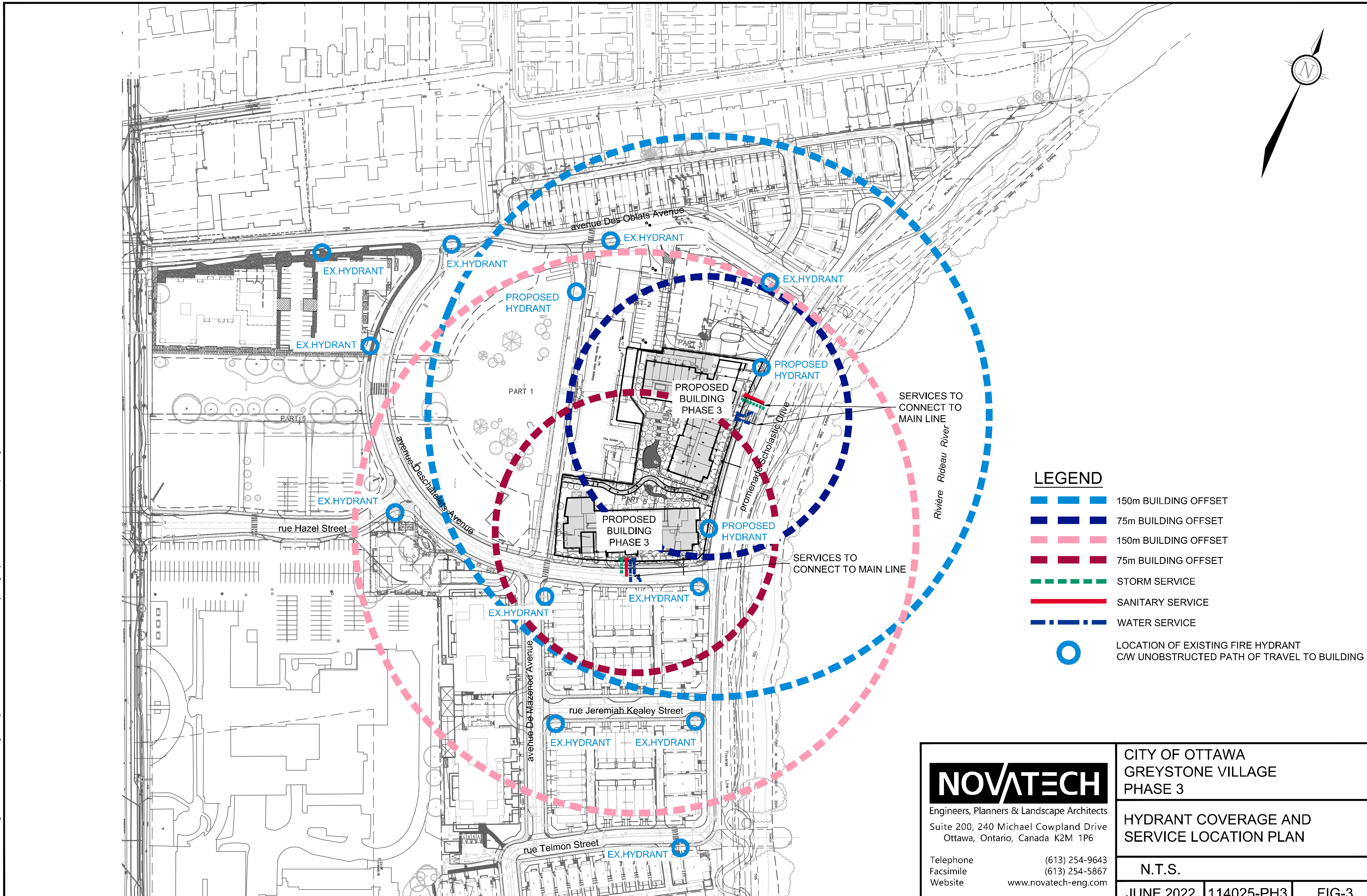
2.0 SANITARY SERVICING

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



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Engineers, Planners & Landscape Architects
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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

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Based on the criteria 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 2.1**. Refer to **Appendix A** for Sanitary Design Sheets and to the Sanitary Drainage Areas Plans (Drawings **114025-SAN1**, **SAN2 and SAN1-B**) for additional information.

Table 2.1: 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* for further details.

2.2 Proposed Sanitary Design

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

Based on the criteria, the calculated peak sanitary design flow for Greystone was determined to be:

- Phase 1A/1B (Outlet 1) = 18.23 L/s
- Phase 2/3 (Outlet 2) = 10.72 L/s

The peak sanitary flows are summarized below in **Table 4.2**. Refer to **Appendix A** for Sanitary Design Sheets and to the revised Sanitary Drainage Areas Plans (Drawings **114025-SAN1**, **SAN2 and SAN1-B**) for additional information.

Table 2.2: 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

2.3 Sanitary Conclusion

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 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 have adequate capacity to accommodate the peak sanitary flow from the Greystone Village Phase 3 Condos and the remainder of the Greystone Village development. Refer to Sanitary Sewer Design sheet in **Appendix A** for details.

3.0 WATERMAIN

The two (2) proposed 7-storey buildings at the corner of Scholastic Avenue/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 Avenue 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:

<u>Demands:</u>

- 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)
- 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:

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

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

- Phase 3 Condos (maximum):
    - 300 L/s (7 Storey building Fronting Scholastic Avenue #16)
    - 267 L/s (7 Storey building Fronting Deschatelets Avenue #15)
- Remainder of Greystone Village (Maximum)
    - 141.40L/s (Singles)
    - 259.36L/s (Row Towns)
    - 219.97L/s (Back to Back Row Towns)
    - 240.45L/s (Deschatelets Building #14)
    - 251.52L/s (6 Storey Non-Combustible Construction Condo)
    - 286.45L/s (9 Storey Non-Combustible Construction Condo)
    - 260.73L/s (Retirement Residence)
    - 249.76L/s (School Residence)
    - 133.33 (Domicile Building - offsite)
    - 173.37 (Sister's Building – offsite)

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 300 L/s under the fireflow operating conditions, refer to **Figure 3 –** Hydrant Coverage and Service Location plan for coverage areas.

The Greystone Village watermain including the phase 3 condos was analyzed under three operating conditions: high pressure, maximum daily demand plus fire flow, and peak hour. The high-pressure condition (average daily demand) was analyzed to ensure the system meets the design criteria for maximum pressure and quality. The maximum daily demand plus fire flow and peak hour conditions were analyzed to ensure the system meets the design criteria for maximum flow and minimum pressure. The fire flow considered is based on the Fire Underwriter's Survey. The boundary conditions were provided by the City of Ottawa. Refer to **Appendix B** for boundary conditions.

Domestic demand has been updated for the entire development to reflect current unit counts and design criteria as per Technical Bulletin ISTB 2018-01 & ISTB-2021-03.

Hydraulic modelling was completed using EPANET 2.0. **Table 3.1** summarizes the performance of the watermain during all operating conditions.

Table 3.1: Water Demand Summary

Condition	Demand (L/s)	Fire Flow (L/s)	Allowable Pressure (kPa/psi)	Max/Min Pressure (kPa/psi)	Time (hrs)
High Pressure	8.57	N/A	690/80 (Max)	551.6/80 (Max)	15.8
Max Daily Demand and Fire Flow	21.42	300 (Worst Case)	138/20 (Min)	199.3/28.91 (Min)	N/A
Peak Hour	47.12	N/A	276/40 (Min)	385.9/55.97 (Min)	N/A

Table 3.2: Hydraulic Model Results

Operating Condition	Minimum Operating Pressure
Max Daily Demand + Fire Flow (Phase 3)	**Watermain**
MD = 2.07 L/s FF= 300 L/s (at Node N21)	238.68 kPa psi (at Node N21) 34.62 psi
MD = 1.67L/s FF= 267 L/s (at Node N22)	288.81 kPa (at Node N22) 41.89 psi
Max Daily Demand + Fire Flow (Remainder of Greystone Village)	**Watermain**
MD = 0.36 L/s FF= 286.45 L/s (at Node N3)	296.65 kPa (at Node N2) 43.03 psi
MD = 0.29 L/s FF= 167 L/s (at Node N4)	300.09 kPa (at Node N4) 43.52 psi
MD = 3.49 L/s FF= 286.45 L/s (at Node N6)	294.30 kPa (at Node N6) 42.68 psi
MD = 0.06 L/s FF= 300 L/s (at Node N7)	270.07 kPa (at Node N7) 39.17 psi
MD = 0.13 L/s FF= 286.45 L/s (at Node N8)	300.77 kPa (at Node N8) 43.62 psi
MD = 0.00 L/s FF= 249.76 L/s (at Node N11)	272.62 kPa (at Node N11) 39.54 psi
MD = 0.46 L/s FF= 228.95 L/s (at Node N12)	251.82 kPa (at Node N12) 36.52 psi
MD = 2.78 L/s FF= 230.67 L/s (at Node N13)	247.70 kPa (at Node N13) 35.93 psi
MD = 0.15 L/s FF= 260.73 L/s (at Node N14)	245.45 kPa (at Node N14) 35.60 psi

MD = 1.85 L/s FF= 260.73 L/s (at Node N15)	245.25 kPa (at Node N30) 35.57 psi
MD = 0.00 L/s FF= 300.0 L/s (at Node N17)	216.02 kPa (at Node N30) 31.33 psi
MD = 2.02 L/s FF= 228.95 L/s (at Node N28)	199.34 kPa (at Node N28) 28.91 psi
Peak Hour Demand	
PH = 47.30 L/s	385.93 kPa (at Node N10) 55.97 psi
Maximum High Pressure	
MHP = node N25	551.91 kPa 80.05 psi
Maximum Time On Site	
MTS = node N30	15.8 hours

A copy of the City of Ottawa provided boundary conditions, fire flow calculations, and detailed hydraulic analysis results are included in **Appendix B**.

The water distribution network as proposed can provide an adequate system pressure for the maximum day plus fire and the peak hour design conditions at all nodes throughout the development. These adequate pressures can be achieved under the current conditions of existing infrastructure.

4.0 STORMWATER MANAGEMENT

The two (2) proposed 7-storey buildings at the corner of Scholastic Avenue/Deschâtelets Avenue will each be serviced by a 200mm diameter storm service that connects to the existing 375mm diameter storm sewer on Scholastic Avenue and 375mm diameter storm sewer and 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 Greystone Village, including the proposed Greystone Village Phase 3 Condos,
- City of Ottawa Sewer Design Guidelines (October, 2012).

4.1.1 Minor System (Storm Sewers)

- Storm sewers on Scholastic Avenue and Deschâtelets Avenue were to be designed using the Rational Method for a 1:5-year return period;
- Storm sewers on site (area drains) in the courtyard will be connected to the underground parking structure and outlet to Scholastic Avenue. Area drains are designed to capture the 100-year flow.
- Runoff from the flat roof buildings will utilize rooftop controls to control and store up to the 100-year event prior to entering the storm sewers on Scholastic Avenue and Deschâtelets Avenue. Runoff that exceeds these controls will outlet via scuppers on the roof.
- Provide additional storage (if necessary) to control runoff for all storms up to the 100-year event to the allowable minor system release rate (5-year storm);

4.1.2 Major System (Emergency Overland Flow)

- Runoff that exceeds the 100-year storm event will be conveyed overland to Scholastic Avenue or Deschâtelets Avenue.

4.1.3 Water Quality Control

- Water quality control will be provided via two Vortechnic type structures and previously approved. Refer to Section 1.2 for approved master servicing reports (2016 & 2017)

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 Proposed Stormwater System

4.2.1 Storm Drainage Areas – Previous Studies

The proposed sewers on Scholastic Avenue and Deschâtelets Avenue were sized using the Rational Method based on a 5-year level of service. Stormwater flows from the proposed site were split between :

- Outlet 1 located within phase 1 of the Greystone Village development;
- Outlet 2 located within phase 2-3 of the Greystone Village development.

The allowable stormwater flows were calculated using the new property line boundaries and the previous storm drainage areas identified in the master servicing reports. Refer to the Storm Drainage Area Plan (**114025-STM-PH3**) for previous drainage boundaries compared to phase 3 condo property line. Refer to **Appendix C** for allowable release rate calculations.

The allowable release rate was determined to be **67.74L/s** for Outlet 1 and **86.48L/s** for Outlet 2. Refer to **Appendix C** for allowable release rate summary.

4.2.1 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 drain overland to Scholastic Avenue or Deschâtelets Avenue.

Area drains 1-6 within the courtyard and the roof drains on the northern building will outlet to the existing 375mm storm sewer on Scholastic Avenue.

Area drains 7-8 within the courtyard and 9-12 along Deschâtelets Avenue and controlled roof drains on the southern building are proposed to outlet to the existing 375mm storm sewer on Deschâtelets Avenue. This approach is consistent with the phasing of the site.

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 at the same rate as the incoming flow, therefore no ECA will be required.

Stormwater flows will be captured via area drains, controlled roof and trench drains and conveyed to the underground parking structure where it will be gravity fed or pumped to the service lateral. Foundation drains and sub floor drains will be conveyed to the underground parking sump where it will be pumped with appropriate back up power, sufficient sized pump and back flow prevention to the existing service lateral provided. Therefore, all runoff can be connected to this service lateral.

Stormwater flows from the proposed site were calculated using the 100-year storm event for both the roof and courtyard. The courtyard area drains will convey uncontrolled flow while the roof will control and store up to the 100-year event on the roof. Refer to the Storm Drainage Area Plan (**114025-STM-PH3**) for drainage boundaries. Refer to **Appendix C** for allowable release rate calculations.

Table 4.1 provides a summary of the proposed controlled and uncontrolled stormwater flows to Scholastic Avenue and Deschâtelets Avenue.

Table 4.1 – Stormwater Flow Summary – 100-year Storm Event

Outlet	Street	Uncontrolled Flow Area Drains (L/s)	Roof Controlled Flow (L/s)	Total Flow (L/s)
Outlet 1 – Phase 1	Deschâtelets Avenue	49.52 (Area Drains 7-8, 9-12)	10.49	**60.01**
Outlet 2 – Phase 2-3	Scholastic Avenue	64.65 (Area Drains 1-6)	12.29	**76.94**

There is a 7.73 L/s reduction of stormwater flow into the existing Outlet 1 and a reduction of 9.54 L/s for Outlet 2. Therefore, the existing storm sewers have adequate capacity to accommodate the stormwater flows from the Greystone Village Phase 3 Condos and will have no adverse effects on the downstream system. Refer to **Appendix C** for details.

4.2.2 Major System (Emergency Overland Flow)

Since the minor system is capturing or controlling (roof) up to the 100-year flow, the major system has been designed to convey the emergency overland flow to either Scholastic Avenue 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%). Calculations can be found in **Appendix C.**

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

4.2.1 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.*

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 Oblats 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>

- Sanitary flows have been updated 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 have adequate capacity to accommodate the peak sanitary flow from the Greystone Village Phase 3 Condo and the remainder of the Greystone Village developments.

<u>Watermain</u>

- The existing 250mm dia. watermain on Deschâtelets Avenue and Scholastic Avenue 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 Avenue/Deschâtelets Avenue will each be serviced by a 200mm diameter storm service that connects to the existing 375mm diameter storm sewer on Scholastic Avenue 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 Avenue or Deschâtelets Avenue.
- There is a 7.73 L/s reduction of stormwater flow into the existing Outlet 1 and a reduction of 9.54 L/s for Outlet 2. Therefore, the existing storm sewers have adequate capacity to accommodate the stormwater flows from the Greystone Village Phase 3 Condos and will have no adverse effects on the downstream system.
- Emergency Overland flow from Scholastic Avenue 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%).

Noise

- 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.

Utilities

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

Erosion and Sediment Control

- 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:

Jacob Lyon, B. Eng.
Engineering Intern | Land Development Engineering

Reviewed by:

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

Appendix A
Sanitary Design

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
*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%

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						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.)	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
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

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

Steve Zorgel

From: White, Joshua <Joshua.White@ottawa.ca>
Sent: Thursday, November 5, 2015 10:34 AM
To: Justin Gauthier
Subject: RE: Fire Conditions -Greystone
Attachments: 175 Main St Nov 2015.pdf

Follow Up Flag: Follow up
Flag Status: Completed

Here are the updated boundary conditions...

The following are boundary conditions, HGL, for hydraulic analysis at 175 Main St (zone 1W) assumed to be connected to the 406mm on Main St and the 203mm on Clegg St (see attached PDF for locations). A proposed loop consisting of 305mm and 254mm watermains was assumed between Clegg and Main. Demands were attributed in the middle of the future internal watermain.

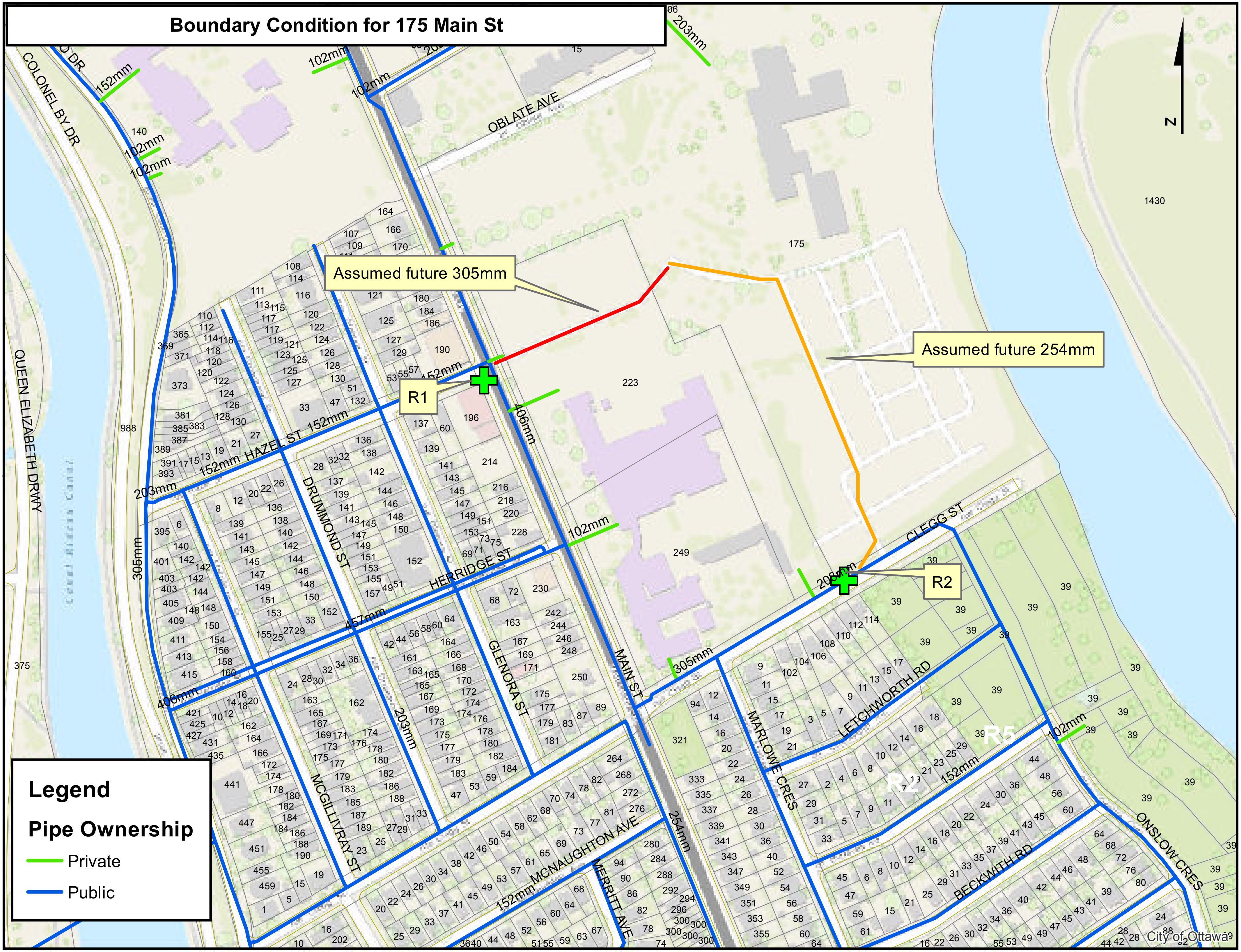
	R1 (Main St)	R2 (Clegg St)
Minimum HGL	105.0m	104.8m
Maximum HGL	114.5m	114.5m
MaxDay + FireFlow (300 L/s)	102.9m	97.2m
MaxDay + FireFlow (400 L/s)	100.7m	91.3m

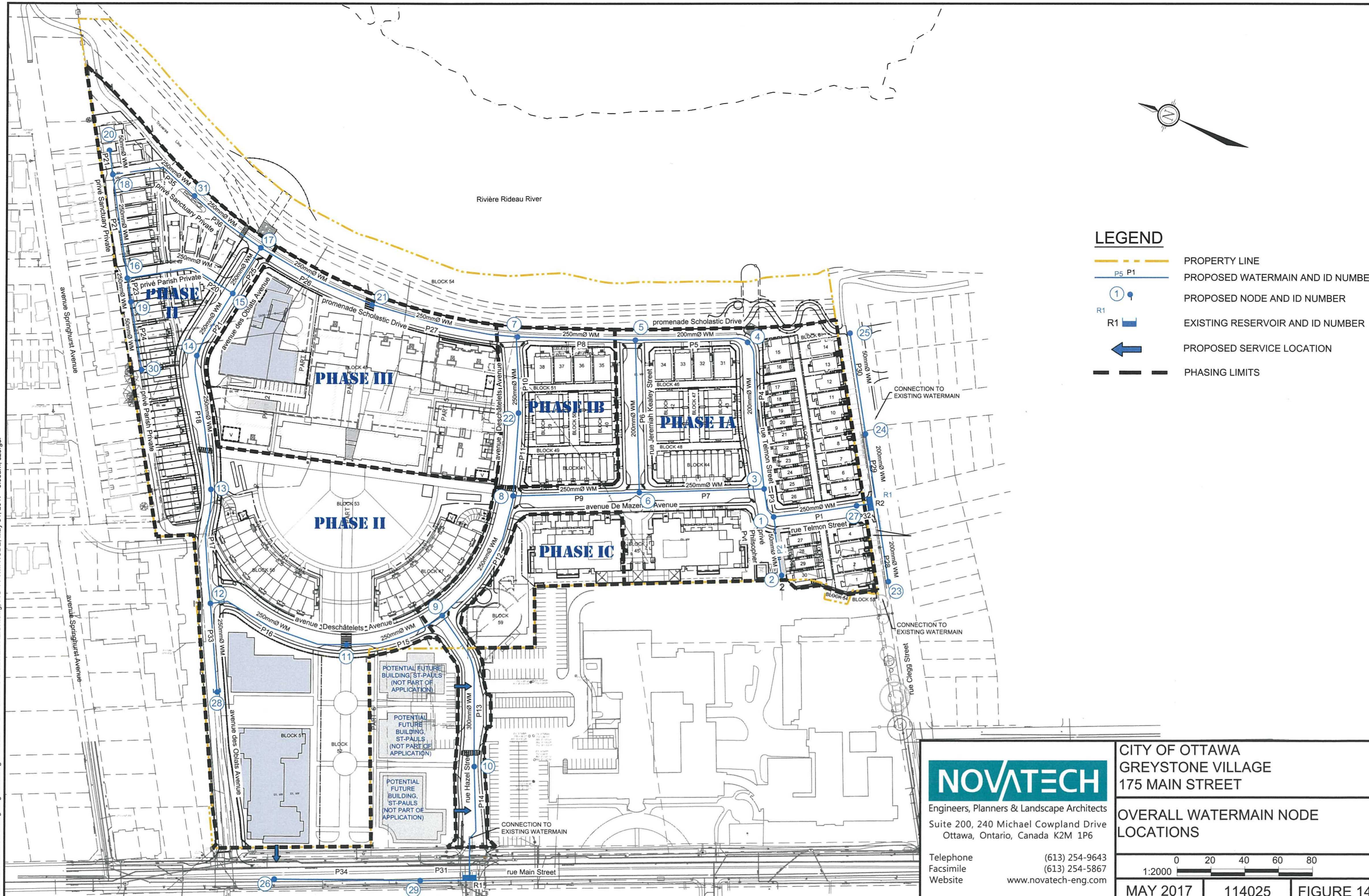
These are for current conditions and are based on computer model simulation.

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.

From: Justin Gauthier [mailto:j.gauthier@novatech-eng.com]
Sent: Thursday, November 05, 2015 12:49 AM
To: White, Joshua
Subject: Re: Fire Conditions -Greystone

Hi Josh,


Boundary Condition for 175 Main St
Assumed future 305mm
Assumed future 254mm
R1
R2
Legend
Pipe Ownership
Private
Public
MAIN ST
CLEGG ST
OBLATE AVE
HAZEL ST
HERRIDGE ST
DRUMMOND ST
GLENORA ST
MCGILLIVRAY ST
MCNAUGHTON AVE
MERRITT AVE
MARLOWE CRES
LETCHWORTH RD
BECKWITH RD
ONSLOW CRES
COLONEL BY DR
QUEEN ELIZABETH DRWY
406mm
457mm
305mm
254mm
203mm
152mm
102mm
175
223
249
1430
City of Ottawa



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

Population and Consumption Rate Calculations

Node	Number of Single Units	Number of Townhouse Units	Number of 2 Bedroom Apartment Units	Number of 3 Bedroom Apartment Units	Number of School Residence	Number of Retirement or Studio Units	Commercial Area (ha)	Population	Consumption Rates (L/s) Average Daily	Maximum Daily	Maximum Hourly
R1	0										
R2	0										
N1								0	0.00	0.00	0.00
N2	4							14	0.04	0.11	0.24
N3	6	9						45	0.14	0.36	0.80
N4	8	3						35	0.11	0.29	0.63
N5	4	6						30	0.10	0.24	0.53
N6		18	122			90		431	1.40	3.49	7.68
N7	2	0						7	0.02	0.06	0.12
N8		6						16	0.05	0.13	0.29
N9		21	43			42		206	0.67	1.67	3.67
N10					112			224	0.23	0.58	1.28
N11								0	0.00	0.00	0.00
N12		21						57	0.18	0.46	1.01
N13		13	0			220 *		343	1.11	2.78	6.12
N14		7						19	0.06	0.15	0.34
N15	4	4				146		229	0.74	1.85	4.08
N16								0	0.00	0.00	0.00
N17								0	0.00	0.00	0.00
N18	7							24	0.08	0.19	0.42
N19		6						16	0.05	0.13	0.29
N20	2							7	0.02	0.06	0.12
N21			59			94		256	0.83	2.07	4.55
N22		6	35			83		206	0.67	1.67	3.67
N23	4							14	0.04	0.11	0.24
N24	6							20	0.07	0.17	0.36
N25	4							14	0.04	0.11	0.24
N26			125					263	0.85	2.13	4.68
							0		0.00	0.00	0.00
N27								0	0.00	0.00	0.00
N28			119					250	0.81	2.02	4.45
N29					88			176	0.18	0.46	1.01
N30		6						16	0.05	0.13	0.29
N31								0	0.00	0.00	0.00
	51	**126**	**503**	**0**	**200**	**675**	**0.00**	**2915**	**8.57**	**21.42**	**47.12**

Water Demand Parameters

Singles	3.4	persons/unit
Towns	2.7	persons/unit
Apartment Units- 2 bedroom	2.1	persons/unit
Apartment Units- 3 bedroom	3.1	persons/unit
Retirement Residence ore Studio Apt	1.4	persons/unit
School Residence	2	persons/unit
School Residence Demand	90	L/student/day
Residential Demand	280	L/c/day
Residential Max Day	2.5	x Avg Day
Residential Peak Hour	2.2	x Max Day
Single Fire Flow	141.40	L/s
Row Townhouse Fire Flow	259.36	L/s
Row/Back to Back Townhouse Fire Flow	219.97	L/s
Deschatelets Building (#14)	240.45	L/s
6 Storey Condo Building Fire Flow (#11)	251.52	L/s
7 Storey Condo Building Fire Flow (#15)	267.00	L/s
7 Storey Condo Building Fire Flow (#16)	300.00	L/s
9 Storey Condo Building (1A/1B) Fire Flow (#9)	286.45	L/s
Retirement Res Fire Flow (#17)	260.73	L/s
School Residence Fire Flow (#12)	249.76	L/s
Domicile Building (offsite fire protection)	133.33	L/s
Sister's Building (offsite fire protection)	173.37	L/s

Phase 3 Condo Buildings

Notes *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

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi	Age hours
Resvr R1	114.50	-5.31	114.50	0.00	0.00	0.00	0.0
Resvr R2	114.50	-3.26	114.50	0.00	0.00	0.00	0.0
Junc N1	63.33	0.00	114.50	51.17	501.98	72.81	0.3
Junc N2	64.62	0.04	114.50	49.88	489.32	70.97	0.8
Junc N3	63.21	0.14	114.50	51.29	503.15	72.98	0.4
Junc N4	62.75	0.11	114.50	51.75	507.67	73.63	1.3
Junc N5	63.00	0.10	114.50	51.50	505.22	73.28	2.6
Junc N6	63.35	1.40	114.50	51.15	501.78	72.78	0.9
Junc N7	63.35	0.02	114.50	51.15	501.78	72.78	3.2
Junc N8	63.50	0.05	114.50	51.00	500.31	72.56	2.0
Junc N9	64.71	0.67	114.50	49.79	488.44	70.84	0.8
Junc N10	65.58	0.23	114.50	48.92	479.91	69.60	0.4
Junc N11	65.01	0.00	114.50	49.49	485.50	70.42	1.2
Junc N12	65.27	0.18	114.49	49.22	482.85	70.03	1.7
Junc N13	64.48	1.11	114.49	50.01	490.60	71.16	3.8
Junc N14	62.13	0.06	114.49	52.36	513.65	74.50	12.8
Junc N15	60.14	0.74	114.49	54.35	533.17	77.33	7.6
Junc N16	60.25	0.00	114.49	54.24	532.09	77.17	13.4
Junc N17	58.90	0.00	114.49	55.59	545.34	79.09	4.8
Junc N18	59.20	0.08	114.49	55.29	542.39	78.67	9.5
Junc N19	60.33	0.05	114.49	54.16	531.31	77.06	15.3
Junc N20	59.43	0.02	114.49	55.06	540.14	78.34	9.8
Junc N21	61.00	0.83	114.49	53.49	524.74	76.11	3.8
Junc N22	63.50	0.67	114.50	51.00	500.31	72.56	2.4
Junc N23	61.42	0.04	114.50	53.08	520.71	75.52	9.4
Junc N24	59.36	0.07	114.50	55.14	540.92	78.45	3.4
Junc N25	58.24	0.04	114.50	56.26	551.91	80.05	4.2
Junc N26	64.52	0.85	114.50	49.98	490.30	71.11	4.7
Junc N27	60.44	0.00	114.50	54.06	530.33	76.92	0.1
Junc N28	64.90	0.81	114.49	49.59	486.48	70.56	2.7
Junc N29	65.07	0.18	114.50	49.43	484.91	70.33	1.2
Junc N30	62.54	0.05	114.49	51.95	509.63	73.92	15.8
Junc N31	59.12	0.00	114.49	55.37	543.18	78.78	7.0

(orange)	Maximum Pressure in Greystone Subdivision
(cyan)	Maximum Age

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	50.00	250	110	3.11	0.06	0.03	0.042
Pipe P2	38.00	50	100	-0.04	0.02	0.03	0.078
Pipe P3	17.00	250	110	3.07	0.06	0.03	0.043
Pipe P4	90.00	200	110	0.84	0.03	0.01	0.049
Pipe P5	66.00	200	110	0.73	0.02	0.01	0.051
Pipe P6	92.00	200	110	-0.25	0.01	0.00	0.063
Pipe P7	72.00	250	110	2.09	0.04	0.02	0.044
Pipe P8	70.00	200	110	0.88	0.03	0.01	0.049
Pipe P9	73.00	250	110	-0.44	0.01	0.00	0.054
Pipe P10	46.00	250	110	-0.97	0.02	0.00	0.051
Pipe P11	47.00	250	110	-1.70	0.03	0.01	0.046
Pipe P12	84.00	250	110	-1.31	0.03	0.01	0.048
Pipe P13	80.00	300	120	-4.05	0.06	0.02	0.035
Pipe P14	80.00	300	120	-4.28	0.06	0.02	0.035
Pipe P15	60.00	250	110	-2.07	0.04	0.02	0.045
Pipe P16	90.00	250	110	-2.07	0.04	0.02	0.044
Pipe P17	78.00	250	110	-1.08	0.02	0.00	0.049
Pipe P18	62.00	250	110	-0.03	0.00	0.00	0.000
Pipe P19	34.00	250	110	-0.09	0.00	0.00	0.000
Pipe P20	66.00	250	110	-0.11	0.00	0.00	0.130
Pipe P21	62.00	250	110	-0.21	0.00	0.00	0.039
Pipe P22	14.00	50	100	0.02	0.01	0.01	0.088
Pipe P23	14.00	250	110	0.10	0.00	0.00	0.786
Pipe P24	41.00	50	100	0.05	0.03	0.05	0.075
Pipe P25	32.00	250	110	-0.72	0.01	0.00	0.054
Pipe P26	74.00	250	110	-1.03	0.02	0.00	0.049
Pipe P27	87.00	250	110	-1.83	0.04	0.01	0.045
Pipe P28	43.00	200	110	0.04	0.00	0.00	0.000
Pipe P29	43.00	200	110	0.11	0.00	0.00	0.069
Pipe P30	59.00	50	100	0.04	0.02	0.03	0.078
Pipe P31	35.00	400	120	1.03	0.01	0.00	0.031
Pipe P32	10.00	250	110	-3.11	0.06	0.03	0.042
Pipe P33	57.00	250	110	0.81	0.02	0.00	0.053
Pipe P34	86.00	400	120	0.85	0.01	0.00	0.056
Pipe P35	57.00	250	110	-0.31	0.01	0.00	0.059
Pipe P36	50.00	250	110	-0.31	0.01	0.00	0.067

MAXIMUM HOUR DEMAND

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi
Resvr R1	105.00	-39.34	105.00	0.00	0.00	0.00
Resvr R2	104.80	-7.96	104.80	0.00	0.00	0.00
Junc N1	63.33	0.00	104.79	41.46	406.72	58.99
Junc N2	64.62	0.24	104.76	40.14	393.77	57.11
Junc N3	63.21	0.80	104.79	41.58	407.90	59.16
Junc N4	62.75	0.63	104.78	42.03	412.31	59.80
Junc N5	63.00	0.53	104.78	41.78	409.86	59.45
Junc N6	63.35	7.68	104.78	41.43	406.43	58.95
Junc N7	63.35	0.12	104.77	41.42	406.33	58.93
Junc N8	63.50	0.29	104.79	41.29	405.05	58.75
Junc N9	64.71	3.67	104.85	40.14	393.77	57.11
Junc N10	65.58	1.28	104.92	39.34	385.93	55.97
Junc N11	65.01	0.00	104.82	39.81	390.54	56.64
Junc N12	65.27	1.01	104.77	39.50	387.50	56.20
Junc N13	64.48	6.12	104.75	40.27	395.05	57.30
Junc N14	62.13	0.34	104.75	42.62	418.10	60.64
Junc N15	60.14	4.08	104.75	44.61	437.62	63.47
Junc N16	60.25	0.00	104.75	44.50	436.55	63.32
Junc N17	58.90	0.00	104.75	45.85	449.79	65.24
Junc N18	59.20	0.42	104.75	45.55	446.85	64.81
Junc N19	60.33	0.29	104.75	44.42	435.76	63.20
Junc N20	59.43	0.12	104.75	45.32	444.59	64.48
Junc N21	61.00	4.55	104.76	43.76	429.29	62.26
Junc N22	63.50	3.67	104.78	41.28	404.96	58.73
Junc N23	61.42	0.24	104.80	43.38	425.56	61.72
Junc N24	59.36	0.36	104.80	45.44	445.77	64.65
Junc N25	58.24	0.24	104.75	46.51	456.26	66.18
Junc N26	64.52	4.68	105.00	40.48	397.11	57.60
Junc N27	60.44	0.00	104.80	44.36	435.17	63.12
Junc N28	64.90	4.45	104.77	39.87	391.12	56.73
Junc N29	65.07	1.01	105.00	39.93	391.71	56.81
Junc N30	62.54	0.29	104.70	42.16	413.59	59.99
Junc N31	59.12	0.00	104.75	45.63	447.63	64.92

Minimum Pressure

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	50.00	250	110	7.12	0.15	0.16	0.037
Pipe P2	38.00	50	100	-0.24	0.12	0.91	0.060
Pipe P3	17.00	250	110	6.88	0.14	0.15	0.037
Pipe P4	90.00	200	110	2.24	0.07	0.06	0.043
Pipe P5	66.00	200	110	1.61	0.05	0.03	0.045
Pipe P6	92.00	200	110	-1.77	0.06	0.04	0.044
Pipe P7	72.00	250	110	3.84	0.08	0.05	0.041
Pipe P8	70.00	200	110	2.85	0.09	0.09	0.041
Pipe P9	73.00	250	110	5.61	0.11	0.10	0.039
Pipe P10	46.00	250	110	-5.37	0.11	0.09	0.039
Pipe P11	47.00	250	110	-9.38	0.19	0.27	0.036
Pipe P12	84.00	250	110	-15.28	0.31	0.66	0.033
Pipe P13	80.00	300	120	-32.37	0.46	0.92	0.026
Pipe P14	80.00	300	120	-33.65	0.48	0.99	0.026
Pipe P15	60.00	250	110	-13.42	0.27	0.52	0.034
Pipe P16	90.00	250	110	-13.42	0.27	0.52	0.034
Pipe P17	78.00	250	110	-7.96	0.16	0.20	0.037
Pipe P18	62.00	250	110	1.84	0.04	0.01	0.045
Pipe P19	34.00	250	110	1.50	0.03	0.01	0.047
Pipe P20	66.00	200	110	-0.07	0.00	0.00	0.121
Pipe P21	62.00	250	110	-0.65	0.01	0.00	0.051
Pipe P22	14.00	50	100	0.12	0.06	0.25	0.066
Pipe P23	14.00	250	110	0.58	0.01	0.00	0.047
Pipe P24	41.00	50	100	0.29	0.15	1.29	0.058
Pipe P25	32.00	250	110	-2.51	0.05	0.02	0.044
Pipe P26	74.00	250	110	-3.70	0.08	0.05	0.041
Pipe P27	87.00	250	110	-8.10	0.16	0.20	0.037
Pipe P28	43.00	200	110	0.24	0.01	0.00	0.058
Pipe P29	43.00	200	110	0.60	0.02	0.00	0.051
Pipe P30	59.00	50	100	0.24	0.12	0.91	0.060
Pipe P31	35.00	400	120	5.69	0.05	0.01	0.035
Pipe P32	10.00	250	110	-7.12	0.15	0.16	0.037
Pipe P33	57.00	250	110	4.45	0.09	0.07	0.040
Pipe P34	86.00	400	120	4.68	0.04	0.01	0.036
Pipe P35	57.00	250	110	-1.19	0.02	0.01	0.049
Pipe P36	50.00	250	110	-1.19	0.02	0.01	0.048

MAXIMUM DAY + FIRE FLOW DEMAND AT N1

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi
Resvr R1	102.90	-132.76	102.90	0.00	0.00	0.00
Resvr R2	97.20	-29.80	97.20	0.00	0.00	0.00
Junc N1	63.33	141.40	97.07	33.74	330.99	48.01
Junc N2	64.62	0.11	97.06	32.44	318.24	46.16
Junc N3	63.21	0.36	97.51	34.30	336.48	48.80
Junc N4	62.75	0.29	98.16	35.41	347.37	50.38
Junc N5	63.00	0.24	98.64	35.64	349.63	50.71
Junc N6	63.35	3.49	98.57	35.22	345.51	50.11
Junc N7	63.35	0.06	99.47	36.12	354.34	51.39
Junc N8	63.50	0.13	99.51	36.01	353.26	51.24
Junc N9	64.71	1.67	100.96	36.25	355.61	51.58
Junc N10	65.58	0.58	101.93	36.35	356.59	51.72
Junc N11	65.01	0.00	100.75	35.74	350.61	50.85
Junc N12	65.27	0.46	100.42	35.15	344.82	50.01
Junc N13	64.48	2.78	100.17	35.69	350.12	50.78
Junc N14	62.13	0.15	99.99	37.86	371.41	53.87
Junc N15	60.14	1.85	99.90	39.76	390.05	56.57
Junc N16	60.25	0.00	99.88	39.63	388.77	56.39
Junc N17	58.90	0.00	99.85	40.95	401.72	58.26
Junc N18	59.20	0.19	99.87	40.67	398.97	57.87
Junc N19	60.33	0.13	99.88	39.55	387.99	56.27
Junc N20	59.43	0.06	99.87	40.44	396.72	57.54
Junc N21	61.80	2.07	99.66	37.86	371.41	53.87
Junc N22	63.50	1.67	99.49	35.99	353.06	51.21
Junc N23	61.42	0.11	97.20	35.78	351.00	50.91
Junc N24	59.36	0.17	97.20	37.84	371.21	53.84
Junc N25	58.24	0.11	97.19	38.95	382.10	55.42
Junc N26	64.52	2.13	102.90	38.38	376.51	54.61
Junc N27	60.44	0.00	97.18	36.74	360.42	52.27
Junc N28	64.90	2.02	100.42	35.52	348.45	50.54
Junc N29	65.07	0.46	102.90	37.83	371.11	53.83
Junc N30	62.54	0.13	99.87	37.33	366.21	53.11
Junc N31	59.12	0.00	99.86	40.74	399.66	57.97

Minimum Pressure

MAXIMUM DAY + FIRE FLOW DEMAND AT N1

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	50.00	250	110	29.41	0.60	2.21	0.030
Pipe P2	38.00	50	100	-0.11	0.06	0.21	0.067
Pipe P3	17.00	250	110	-112.10	2.28	26.30	0.025
Pipe P4	90.00	200	110	-30.84	0.98	7.14	0.029
Pipe P5	66.00	200	110	-31.13	0.99	7.27	0.029
Pipe P6	92.00	200	110	9.25	0.29	0.77	0.035
Pipe P7	72.00	250	110	-81.62	1.66	14.61	0.026
Pipe P8	70.00	200	110	-40.62	1.29	11.90	0.028
Pipe P9	73.00	250	110	76.37	1.56	12.92	0.026
Pipe P10	46.00	250	110	-11.10	0.23	0.36	0.035
Pipe P11	47.00	250	110	-12.98	0.26	0.49	0.034
Pipe P12	84.00	250	110	-89.48	1.82	17.32	0.026
Pipe P13	80.00	300	120	-129.59	1.83	12.05	0.021
Pipe P14	80.00	300	120	-130.17	1.84	12.15	0.021
Pipe P15	60.00	250	110	-38.44	0.78	3.62	0.029
Pipe P16	90.00	250	110	-38.44	0.78	3.62	0.029
Pipe P17	78.00	250	110	-35.96	0.73	3.20	0.029
Pipe P18	62.00	250	110	33.97	0.69	2.88	0.030
Pipe P19	34.00	250	110	33.82	0.69	2.86	0.030
Pipe P20	66.00	250	110	8.35	0.17	0.21	0.036
Pipe P21	62.00	250	110	8.09	0.16	0.20	0.037
Pipe P22	14.00	50	100	0.06	0.03	0.07	0.073
Pipe P23	14.00	250	110	0.26	0.01	0.00	0.116
Pipe P24	41.00	50	100	0.13	0.07	0.29	0.065
Pipe P25	32.00	250	110	23.62	0.48	1.47	0.031
Pipe P26	74.00	250	110	31.46	0.64	2.50	0.030
Pipe P27	87.00	250	110	29.58	0.60	2.23	0.030
Pipe P28	43.00	200	110	0.11	0.00	0.00	0.069
Pipe P29	43.00	200	110	0.28	0.01	0.00	0.053
Pipe P30	59.00	50	100	0.11	0.06	0.21	0.067
Pipe P31	35.00	400	120	2.59	0.02	0.00	0.039
Pipe P32	10.00	250	110	-29.41	0.60	2.21	0.030
Pipe P33	57.00	250	110	2.02	0.04	0.02	0.045
Pipe P34	86.00	400	120	2.13	0.02	0.00	0.041
Pipe P35	57.00	250	110	7.84	0.16	0.19	0.037
Pipe P36	50.00	250	110	7.84	0.16	0.19	0.037

MAXIMUM DAY + FIRE FLOW DEMAND AT N3

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi
Resvr R1	102.90	-168.82	102.90	0.00	0.00	0.00
Resvr R2	97.20	-138.79	97.20	0.00	0.00	0.00
Junc N1	63.33	0.00	94.87	31.54	309.41	44.88
Junc N2	64.62	0.11	94.86	30.24	296.65	43.03
Junc N3	63.21	286.81	94.21	31.00	304.11	44.11
Junc N4	62.75	0.29	95.29	32.54	319.22	46.30
Junc N5	63.00	0.24	96.09	33.09	324.61	47.08
Junc N6	63.35	3.49	95.97	32.62	320.00	46.41
Junc N7	63.35	0.06	97.46	34.11	334.62	48.53
Junc N8	63.50	0.13	97.52	34.02	333.74	48.40
Junc N9	64.71	1.67	99.85	35.14	344.72	50.00
Junc N10	65.58	0.58	101.37	35.79	351.10	50.92
Junc N11	65.01	0.00	99.52	34.51	338.54	49.10
Junc N12	65.27	0.46	99.02	33.75	331.09	48.02
Junc N13	64.48	2.78	98.63	34.15	335.01	48.59
Junc N14	62.13	0.15	98.34	36.21	355.22	51.52
Junc N15	60.14	1.85	98.18	38.04	373.17	54.12
Junc N16	60.25	0.00	98.16	37.91	371.90	53.94
Junc N17	58.90	0.00	98.10	39.20	384.55	55.77
Junc N18	59.20	0.19	98.14	38.94	382.00	55.40
Junc N19	60.33	0.13	98.16	37.83	371.11	53.83
Junc N20	59.43	0.06	98.14	38.71	379.75	55.08
Junc N21	61.80	2.07	97.79	35.99	353.06	51.21
Junc N22	63.50	1.67	97.49	33.99	333.44	48.36
Junc N23	61.42	0.11	97.20	35.78	351.00	50.91
Junc N24	59.36	0.17	97.20	37.84	371.21	53.84
Junc N25	58.24	0.11	97.19	38.95	382.10	55.42
Junc N26	64.52	2.13	102.90	38.38	376.51	54.61
Junc N27	60.44	0.00	96.81	36.37	356.79	51.75
Junc N28	64.90	2.02	99.02	34.12	334.72	48.55
Junc N29	65.07	0.46	102.90	37.83	371.11	53.83
Junc N30	62.54	0.13	98.15	35.61	349.33	50.67
Junc N31	59.12	0.00	98.12	39.00	382.59	55.49

Minimum Pressure

MAXIMUM DAY + FIRE FLOW DEMAND AT N3

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	50.00	250	110	138.40	2.82	38.85	0.024
Pipe P2	38.00	50	100	-0.11	0.06	0.21	0.067
Pipe P3	17.00	250	110	138.29	2.82	38.79	0.024
Pipe P4	90.00	200	110	-40.73	1.30	11.96	0.028
Pipe P5	66.00	200	110	-41.02	1.31	12.11	0.028
Pipe P6	92.00	200	110	12.01	0.38	1.25	0.033
Pipe P7	72.00	250	110	-107.80	2.20	24.46	0.025
Pipe P8	70.00	200	110	-53.27	1.70	19.65	0.027
Pipe P9	73.00	250	110	99.78	2.03	21.20	0.025
Pipe P10	46.00	250	110	-13.74	0.28	0.54	0.034
Pipe P11	47.00	250	110	-15.62	0.32	0.68	0.033
Pipe P12	84.00	250	110	-115.53	2.35	27.81	0.025
Pipe P13	80.00	300	120	-165.65	2.34	18.98	0.020
Pipe P14	80.00	300	120	-166.23	2.35	19.10	0.020
Pipe P15	60.00	250	110	-48.45	0.99	5.56	0.028
Pipe P16	90.00	250	110	-48.45	0.99	5.56	0.028
Pipe P17	78.00	250	110	-45.97	0.94	5.05	0.028
Pipe P18	62.00	250	110	43.98	0.90	4.65	0.028
Pipe P19	34.00	250	110	43.83	0.89	4.62	0.028
Pipe P20	66.00	250	110	10.89	0.22	0.35	0.035
Pipe P21	62.00	250	110	10.63	0.22	0.34	0.035
Pipe P22	14.00	50	100	0.06	0.03	0.07	0.073
Pipe P23	14.00	250	110	0.26	0.01	0.00	0.000
Pipe P24	41.00	50	100	0.13	0.07	0.29	0.065
Pipe P25	32.00	250	110	31.09	0.63	2.44	0.030
Pipe P26	74.00	250	110	41.47	0.84	4.17	0.029
Pipe P27	87.00	250	110	39.59	0.81	3.83	0.029
Pipe P28	43.00	200	110	0.11	0.00	0.00	0.069
Pipe P29	43.00	200	110	0.28	0.01	0.00	0.053
Pipe P30	59.00	50	100	0.11	0.06	0.21	0.067
Pipe P31	35.00	400	120	2.59	0.02	0.00	0.039
Pipe P32	10.00	250	110	-138.40	2.82	38.85	0.024
Pipe P33	57.00	250	110	2.02	0.04	0.02	0.045
Pipe P34	86.00	400	120	2.13	0.02	0.00	0.041
Pipe P35	57.00	250	110	10.38	0.21	0.32	0.035
Pipe P36	50.00	250	110	10.38	0.21	0.32	0.035

MAXIMUM DAY + FIRE FLOW DEMAND AT N4

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi
Resvr R1	102.90	-154.30	102.90	0.00	0.00	0.00
Resvr R2	97.20	-33.86	97.20	0.00	0.00	0.00
Junc N1	63.33	0.00	97.03	33.70	330.60	47.95
Junc N2	64.62	0.11	97.02	32.40	317.84	46.10
Junc N3	63.21	0.36	96.98	33.77	331.28	48.05
Junc N4	62.75	167.29	93.34	30.59	300.09	43.52
Junc N5	63.00	0.24	96.67	33.67	330.30	47.91
Junc N6	63.35	3.49	97.34	33.99	333.44	48.36
Junc N7	63.35	0.06	98.27	34.92	342.57	49.68
Junc N8	63.50	0.13	98.39	34.89	342.27	49.64
Junc N9	64.71	1.67	100.33	35.62	349.43	50.68
Junc N10	65.58	0.58	101.61	36.03	353.45	51.26
Junc N11	65.01	0.00	100.04	35.03	343.64	49.84
Junc N12	65.27	0.46	99.60	34.33	336.78	48.85
Junc N13	64.48	2.78	99.26	34.78	341.19	49.49
Junc N14	62.13	0.15	99.01	36.88	361.79	52.47
Junc N15	60.14	1.85	98.88	38.74	380.04	55.12
Junc N16	60.25	0.00	98.86	38.61	378.76	54.94
Junc N17	58.90	0.00	98.81	39.91	391.52	56.78
Junc N18	59.20	0.19	98.84	39.64	388.87	56.40
Junc N19	60.33	0.13	98.86	38.53	377.98	54.82
Junc N20	59.43	0.06	98.84	39.41	386.61	56.07
Junc N21	61.80	2.07	98.55	36.75	360.52	52.29
Junc N22	63.50	1.67	98.32	34.82	341.58	49.54
Junc N23	61.42	0.11	97.20	35.78	351.00	50.91
Junc N24	59.36	0.17	97.20	37.84	371.21	53.84
Junc N25	58.24	0.11	97.19	38.95	382.10	55.42
Junc N26	64.52	2.13	102.90	38.38	376.51	54.61
Junc N27	60.44	0.00	97.17	36.73	360.32	52.26
Junc N28	64.90	2.02	99.60	34.70	340.41	49.37
Junc N29	65.07	0.46	102.90	37.83	371.11	53.83
Junc N30	62.54	0.13	98.85	36.31	356.20	51.66
Junc N31	59.12	0.00	98.82	39.70	389.46	56.49

Minimum Pressure

MAXIMUM DAY + FIRE FLOW DEMAND AT N4

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	50.00	250	110	33.47	0.68	2.80	0.030
Pipe P2	38.00	50	100	-0.11	0.06	0.21	0.067
Pipe P3	17.00	250	110	33.36	0.68	2.79	0.030
Pipe P4	90.00	200	110	78.67	2.50	40.47	0.025
Pipe P5	66.00	200	110	-88.62	2.82	50.45	0.025
Pipe P6	92.00	200	110	-31.19	0.99	7.29	0.029
Pipe P7	72.00	250	110	-45.67	0.93	4.98	0.028
Pipe P8	70.00	200	110	-57.67	1.84	22.77	0.027
Pipe P9	73.00	250	110	80.86	1.65	14.36	0.026
Pipe P10	46.00	250	110	-21.57	0.44	1.24	0.032
Pipe P11	47.00	250	110	-23.45	0.48	1.45	0.031
Pipe P12	84.00	250	110	-104.44	2.13	23.06	0.025
Pipe P13	80.00	300	120	-151.13	2.14	16.01	0.021
Pipe P14	80.00	300	120	-151.71	2.15	16.13	0.021
Pipe P15	60.00	250	110	-45.02	0.92	4.85	0.028
Pipe P16	90.00	250	110	-45.02	0.92	4.85	0.028
Pipe P17	78.00	250	110	-42.54	0.87	4.37	0.029
Pipe P18	62.00	250	110	40.55	0.83	4.00	0.029
Pipe P19	34.00	250	110	40.40	0.82	3.97	0.029
Pipe P20	66.00	250	110	10.02	0.20	0.30	0.035
Pipe P21	62.00	250	110	9.76	0.20	0.29	0.035
Pipe P22	14.00	50	100	0.06	0.03	0.07	0.073
Pipe P23	14.00	250	110	0.26	0.01	0.00	0.000
Pipe P24	41.00	50	100	0.13	0.07	0.29	0.065
Pipe P25	32.00	250	110	28.53	0.58	2.09	0.030
Pipe P26	74.00	250	110	38.04	0.77	3.55	0.029
Pipe P27	87.00	250	110	36.16	0.74	3.23	0.029
Pipe P28	43.00	200	110	0.11	0.00	0.00	0.069
Pipe P29	43.00	200	110	0.28	0.01	0.00	0.053
Pipe P30	59.00	50	100	0.11	0.06	0.21	0.067
Pipe P31	35.00	400	120	2.59	0.02	0.00	0.039
Pipe P32	10.00	250	110	-33.47	0.68	2.80	0.030
Pipe P33	57.00	250	110	2.02	0.04	0.02	0.044
Pipe P34	86.00	400	120	2.13	0.02	0.00	0.041
Pipe P35	57.00	250	110	9.51	0.19	0.27	0.036
Pipe P36	50.00	250	110	9.51	0.19	0.27	0.036

MAXIMUM DAY + FIRE FLOW DEMAND AT N5

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi
Resvr R1	102.90	-162.01	102.90	0.00	0.00	0.00
Resvr R2	97.20	-26.15	97.20	0.00	0.00	0.00
Junc N1	63.33	0.00	97.10	33.77	331.28	48.05
Junc N2	64.62	0.11	97.09	32.47	318.53	46.20
Junc N3	63.21	0.36	97.07	33.86	332.17	48.18
Junc N4	62.75	0.29	96.01	33.26	326.28	47.32
Junc N5	63.00	167.24	95.24	32.24	316.27	45.87
Junc N6	63.35	3.49	97.11	33.76	331.19	48.03
Junc N7	63.35	0.06	97.71	34.36	337.07	48.89
Junc N8	63.50	0.13	97.99	34.49	338.35	49.07
Junc N9	64.71	1.67	100.08	35.37	346.98	50.33
Junc N10	65.58	0.58	101.49	35.91	352.28	51.09
Junc N11	65.01	0.00	99.75	34.74	340.80	49.43
Junc N12	65.27	0.46	99.25	33.98	333.34	48.35
Junc N13	64.48	2.78	98.86	34.38	337.27	48.92
Junc N14	62.13	0.15	98.58	36.45	357.57	51.86
Junc N15	60.14	1.85	98.42	38.28	375.53	54.47
Junc N16	60.25	0.00	98.40	38.15	374.25	54.28
Junc N17	58.90	0.00	98.34	39.44	386.91	56.12
Junc N18	59.20	0.19	98.38	39.18	384.36	55.75
Junc N19	60.33	0.13	98.40	38.07	373.47	54.17
Junc N20	59.43	0.06	98.38	38.95	382.10	55.42
Junc N21	61.80	2.07	98.04	36.24	355.51	51.56
Junc N22	63.50	1.67	97.84	34.34	336.88	48.86
Junc N23	61.42	0.11	97.20	35.78	351.00	50.91
Junc N24	59.36	0.17	97.20	37.84	371.21	53.84
Junc N25	58.24	0.11	97.19	38.95	382.10	55.42
Junc N26	64.52	2.13	102.90	38.38	376.51	54.61
Junc N27	60.44	0.00	97.18	36.74	360.42	52.27
Junc N28	64.90	2.02	99.25	34.35	336.97	48.87
Junc N29	65.07	0.46	102.90	37.83	371.11	53.83
Junc N30	62.54	0.13	98.39	35.85	351.69	51.01
Junc N31	59.12	0.00	98.36	39.24	384.94	55.83

Minimum Pressure

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	50.00	250	110	25.76	0.52	1.73	0.031
Pipe P2	38.00	50	100	-0.11	0.06	0.21	0.067
Pipe P3	17.00	250	110	25.65	0.52	1.71	0.031
Pipe P4	90.00	200	110	40.34	1.28	11.75	0.028
Pipe P5	66.00	200	110	40.05	1.27	11.59	0.028
Pipe P6	92.00	200	110	-54.22	1.73	20.31	0.027
Pipe P7	72.00	250	110	-15.05	0.31	0.64	0.033
Pipe P8	70.00	200	110	-72.97	2.32	35.20	0.026
Pipe P9	73.00	250	110	73.27	1.49	11.96	0.026
Pipe P10	46.00	250	110	-33.65	0.69	2.83	0.030
Pipe P11	47.00	250	110	-35.53	0.72	3.13	0.029
Pipe P12	84.00	250	110	-108.93	2.22	24.93	0.025
Pipe P13	80.00	300	120	-158.84	2.25	17.56	0.020
Pipe P14	80.00	300	120	-159.42	2.26	17.68	0.020
Pipe P15	60.00	250	110	-48.24	0.98	5.52	0.028
Pipe P16	90.00	250	110	-48.24	0.98	5.52	0.028
Pipe P17	78.00	250	110	-45.76	0.93	5.00	0.028
Pipe P18	62.00	250	110	43.77	0.89	4.61	0.028
Pipe P19	34.00	250	110	43.62	0.89	4.58	0.028
Pipe P20	66.00	250	110	10.84	0.22	0.35	0.035
Pipe P21	62.00	250	110	10.58	0.22	0.33	0.035
Pipe P22	14.00	50	100	0.06	0.03	0.07	0.073
Pipe P23	14.00	250	110	0.26	0.01	0.00	0.116
Pipe P24	41.00	50	100	0.13	0.07	0.29	0.065
Pipe P25	32.00	250	110	30.93	0.63	2.42	0.030
Pipe P26	74.00	250	110	41.26	0.84	4.13	0.029
Pipe P27	87.00	250	110	39.38	0.80	3.79	0.029
Pipe P28	43.00	200	110	0.11	0.00	0.00	0.069
Pipe P29	43.00	200	110	0.28	0.01	0.00	0.053
Pipe P30	59.00	50	100	0.11	0.06	0.21	0.067
Pipe P31	35.00	400	120	2.59	0.02	0.00	0.039
Pipe P32	10.00	250	110	-25.76	0.52	1.73	0.031
Pipe P33	57.00	250	110	2.02	0.04	0.02	0.045
Pipe P34	86.00	400	120	2.13	0.02	0.00	0.041
Pipe P35	57.00	250	110	10.33	0.21	0.32	0.035
Pipe P36	50.00	250	110	10.33	0.21	0.32	0.035

MAXIMUM DAY + FIRE FLOW DEMAND AT N6

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi
Resvr R1	102.90	-192.40	102.90	0.00	0.00	0.00
Resvr R2	97.20	-115.21	97.20	0.00	0.00	0.00
Junc N1	63.33	0.00	95.55	32.22	316.08	45.84
Junc N2	64.62	0.11	95.54	30.92	303.33	43.99
Junc N3	63.21	0.36	95.08	31.87	312.64	45.35
Junc N4	62.75	0.29	95.04	32.29	316.76	45.94
Junc N5	63.00	0.24	95.01	32.01	314.02	45.54
Junc N6	63.35	289.94	93.35	30.00	294.30	42.68
Junc N7	63.35	0.06	95.97	32.62	320.00	46.41
Junc N8	63.50	0.13	95.97	32.47	318.53	46.20
Junc N9	64.71	1.67	99.00	34.29	336.38	48.79
Junc N10	65.58	0.58	100.95	35.37	346.98	50.33
Junc N11	65.01	0.00	98.59	33.58	329.42	47.78
Junc N12	65.27	0.46	97.97	32.70	320.79	46.53
Junc N13	64.48	2.78	97.47	32.99	323.63	46.94
Junc N14	62.13	0.15	97.10	34.97	343.06	49.76
Junc N15	60.14	1.85	96.90	36.76	360.62	52.30
Junc N16	60.25	0.00	96.87	36.62	359.24	52.10
Junc N17	58.90	0.00	96.80	37.90	371.80	53.92
Junc N18	59.20	0.19	96.85	37.65	369.35	53.57
Junc N19	60.33	0.13	96.87	36.54	358.46	51.99
Junc N20	59.43	0.06	96.85	37.42	367.09	53.24
Junc N21	61.80	2.07	96.41	34.61	339.52	49.24
Junc N22	63.50	1.67	95.97	32.47	318.53	46.20
Junc N23	61.42	0.11	97.20	35.78	351.00	50.91
Junc N24	59.36	0.17	97.20	37.84	371.21	53.84
Junc N25	58.24	0.11	97.19	38.95	382.10	55.42
Junc N26	64.52	2.13	102.90	38.38	376.51	54.61
Junc N27	60.44	0.00	96.93	36.49	357.97	51.92
Junc N28	64.90	2.02	97.96	33.06	324.32	47.04
Junc N29	65.07	0.46	102.90	37.83	371.11	53.83
Junc N30	62.54	0.13	96.86	34.32	336.68	48.83
Junc N31	59.12	0.00	96.82	37.70	369.84	53.64

Minimum Pressure

MAXIMUM DAY + FIRE FLOW DEMAND AT N6

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	50.00	250	110	115.51	2.35	27.79	0.025
Pipe P2	38.00	50	100	-0.14	0.07	0.33	0.065
Pipe P3	17.00	250	110	115.37	2.35	27.73	0.025
Pipe P4	90.00	200	110	7.59	0.24	0.53	0.036
Pipe P5	66.00	200	110	7.23	0.23	0.49	0.036
Pipe P6	92.00	200	110	50.97	1.62	18.12	0.027
Pipe P7	72.00	250	110	107.33	2.19	24.26	0.025
Pipe P8	70.00	200	110	-44.04	1.40	13.82	0.028
Pipe P9	73.00	250	110	132.98	2.71	36.08	0.024
Pipe P10	46.00	250	110	0.99	0.02	0.00	0.049
Pipe P11	47.00	250	110	-0.17	0.00	0.00	0.078
Pipe P12	84.00	250	110	-133.31	2.72	36.25	0.024
Pipe P13	80.00	300	120	-189.58	2.68	24.37	0.020
Pipe P14	80.00	300	120	-190.03	2.69	24.47	0.020
Pipe P15	60.00	250	110	-54.10	1.10	6.82	0.028
Pipe P16	90.00	250	110	-54.10	1.10	6.82	0.028
Pipe P17	78.00	250	110	-51.83	1.06	6.30	0.028
Pipe P18	62.00	250	110	51.07	1.04	6.13	0.028
Pipe P19	34.00	250	110	50.88	1.04	6.09	0.028
Pipe P20	66.00	250	110	12.57	0.26	0.46	0.034
Pipe P21	62.00	250	110	12.38	0.25	0.44	0.034
Pipe P22	14.00	50	100	0.07	0.04	0.09	0.072
Pipe P23	14.00	250	110	0.19	0.00	0.00	0.000
Pipe P24	41.00	50	100	0.03	0.02	0.02	0.081
Pipe P25	32.00	250	110	36.06	0.73	3.22	0.029
Pipe P26	74.00	250	110	48.13	0.98	5.49	0.028
Pipe P27	87.00	250	110	45.65	0.93	4.98	0.028
Pipe P28	43.00	200	110	0.14	0.00	0.00	0.086
Pipe P29	43.00	200	110	0.35	0.01	0.00	0.055
Pipe P30	59.00	50	100	0.14	0.07	0.33	0.065
Pipe P31	35.00	400	120	2.65	0.02	0.00	0.038
Pipe P32	10.00	250	110	-115.51	2.35	27.80	0.025
Pipe P33	57.00	250	110	1.70	0.03	0.01	0.046
Pipe P34	86.00	400	120	2.29	0.02	0.00	0.041
Pipe P35	57.00	250	110	12.07	0.25	0.42	0.034
Pipe P36	50.00	250	110	12.07	0.25	0.42	0.034

MAXIMUM DAY + FIRE FLOW DEMAND AT N7

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi
Resvr R1	102.90	-220.25	102.90	0.00	0.00	0.00
Resvr R2	97.20	-100.91	97.20	0.00	0.00	0.00
Junc N1	63.33	0.00	95.91	32.58	319.61	46.36
Junc N2	64.62	0.11	95.90	31.28	306.86	44.51
Junc N3	63.21	0.36	95.55	32.34	317.26	46.01
Junc N4	62.75	0.29	94.54	31.79	311.86	45.23
Junc N5	63.00	0.24	93.81	30.81	302.25	43.84
Junc N6	63.35	3.49	94.94	31.59	309.90	44.95
Junc N7	63.35	300.06	90.88	27.53	270.07	39.17
Junc N8	63.50	0.13	94.89	31.39	307.94	44.66
Junc N9	64.71	1.67	97.88	33.17	325.40	47.19
Junc N10	65.58	0.58	100.38	34.80	341.39	49.51
Junc N11	65.01	0.00	96.96	31.95	313.43	45.46
Junc N12	65.27	0.46	95.60	30.33	297.54	43.15
Junc N13	64.48	2.78	94.47	29.99	294.20	42.67
Junc N14	62.13	0.15	93.62	31.49	308.92	44.80
Junc N15	60.14	1.85	93.16	33.02	323.93	46.98
Junc N16	60.25	0.00	93.09	32.84	322.16	46.73
Junc N17	58.90	0.00	92.91	34.01	333.64	48.39
Junc N18	59.20	0.19	93.02	33.82	331.77	48.12
Junc N19	60.33	0.13	93.09	32.76	321.38	46.61
Junc N20	59.43	0.06	93.02	33.59	329.52	47.79
Junc N21	61.80	2.07	91.96	30.16	295.87	42.91
Junc N22	63.50	1.67	92.84	29.34	287.83	41.75
Junc N23	61.42	0.11	97.20	35.78	351.00	50.91
Junc N24	59.36	0.17	97.20	37.84	371.21	53.84
Junc N25	58.24	0.11	97.19	38.95	382.10	55.42
Junc N26	64.52	2.13	102.90	38.38	376.51	54.61
Junc N27	60.44	0.00	96.99	36.55	358.56	52.00
Junc N28	64.90	2.02	95.59	30.69	301.07	43.67
Junc N29	65.07	0.46	102.90	37.83	371.11	53.83
Junc N30	62.54	0.13	93.07	30.53	299.50	43.44
Junc N31	59.12	0.00	97.07	37.95	372.29	54.00

Minimum Pressure

MAXIMUM DAY + FIRE FLOW DEMAND AT N7

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	50.00	250	110	100.52	2.05	21.49	0.025
Pipe P2	38.00	50	100	-0.11	0.06	0.21	0.067
Pipe P3	17.00	250	110	100.41	2.05	21.44	0.025
Pipe P4	90.00	200	110	39.32	1.25	11.20	0.028
Pipe P5	66.00	200	110	39.03	1.24	11.05	0.028
Pipe P6	92.00	200	110	-41.30	1.31	12.27	0.028
Pipe P7	72.00	250	110	60.74	1.24	8.45	0.027
Pipe P8	70.00	200	110	80.08	2.55	41.82	0.025
Pipe P9	73.00	250	110	-15.44	0.31	0.67	0.033
Pipe P10	46.00	250	110	-145.41	2.96	42.57	0.024
Pipe P11	47.00	250	110	-147.29	3.00	43.60	0.024
Pipe P12	84.00	250	110	-131.98	2.69	35.58	0.024
Pipe P13	80.00	300	120	-217.08	3.07	31.31	0.020
Pipe P14	80.00	300	120	-217.66	3.08	31.47	0.020
Pipe P15	60.00	250	110	-83.42	1.70	15.21	0.026
Pipe P16	90.00	250	110	-83.42	1.70	15.21	0.026
Pipe P17	78.00	250	110	-80.94	1.65	14.39	0.026
Pipe P18	62.00	250	110	78.95	1.61	13.74	0.026
Pipe P19	34.00	250	110	78.80	1.61	13.69	0.026
Pipe P20	66.00	250	110	19.78	0.40	1.06	0.032
Pipe P21	62.00	250	110	19.52	0.40	1.03	0.032
Pipe P22	14.00	50	100	0.06	0.03	0.07	0.073
Pipe P23	14.00	250	110	0.26	0.01	0.00	0.116
Pipe P24	41.00	50	100	0.13	0.07	0.29	0.065
Pipe P25	32.00	250	110	57.17	1.16	7.56	0.027
Pipe P26	74.00	250	110	76.44	1.56	12.94	0.026
Pipe P27	87.00	250	110	74.56	1.52	12.36	0.026
Pipe P28	43.00	200	110	0.11	0.00	0.00	0.069
Pipe P29	43.00	200	110	0.28	0.01	0.00	0.053
Pipe P30	59.00	50	100	0.11	0.06	0.21	0.067
Pipe P31	35.00	400	120	2.59	0.02	0.00	0.039
Pipe P32	10.00	250	110	-100.52	2.05	21.49	0.025
Pipe P33	57.00	250	110	2.02	0.04	0.02	0.045
Pipe P34	86.00	400	120	2.13	0.02	0.00	0.041
Pipe P35	57.00	250	110	19.27	0.39	1.01	0.032
Pipe P36	50.00	250	110	19.27	0.39	1.01	0.032

MAXIMUM DAY + FIRE FLOW DEMAND AT N8

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi
Resvr R1	102.90	-214.44	102.90	0.00	0.00	0.00
Resvr R2	97.20	-93.17	97.20	0.00	0.00	0.00
Junc N1	63.33	0.00	96.09	32.76	321.38	46.61
Junc N2	64.62	0.11	96.08	31.46	308.62	44.76
Junc N3	63.21	0.36	95.77	32.56	319.41	46.33
Junc N4	62.75	0.29	95.37	32.62	320.00	46.41
Junc N5	63.00	0.24	95.08	32.08	314.70	45.64
Junc N6	63.35	3.49	95.02	31.67	310.68	45.06
Junc N7	63.35	0.06	94.95	31.60	310.00	44.96
Junc N8	63.50	286.58	94.16	30.66	300.77	43.62
Junc N9	64.71	1.67	98.12	33.41	327.75	47.54
Junc N10	65.58	0.58	100.51	34.93	342.66	49.70
Junc N11	65.01	0.00	97.69	32.68	320.59	46.50
Junc N12	65.27	0.46	97.04	31.77	311.66	45.20
Junc N13	64.48	2.78	96.52	32.04	314.31	45.59
Junc N14	62.13	0.15	96.14	34.01	333.64	48.39
Junc N15	60.14	1.85	95.93	35.79	351.10	50.92
Junc N16	60.25	0.00	95.90	35.65	349.73	50.72
Junc N17	58.90	0.00	95.82	36.92	362.19	52.53
Junc N18	59.20	0.19	95.87	36.67	359.73	52.17
Junc N19	60.33	0.13	95.90	35.57	348.94	50.61
Junc N20	59.43	0.06	95.87	36.44	357.48	51.85
Junc N21	61.80	2.07	95.40	33.60	329.62	47.81
Junc N22	63.50	1.67	94.54	31.04	304.50	44.16
Junc N23	61.42	0.11	97.20	35.78	351.00	50.91
Junc N24	59.36	0.17	97.20	37.84	371.21	53.84
Junc N25	58.24	0.11	97.19	38.95	382.10	55.42
Junc N26	64.52	2.13	102.90	38.38	376.51	54.61
Junc N27	60.44	0.00	97.01	36.57	358.75	52.03
Junc N28	64.90	2.02	97.04	32.14	315.29	45.73
Junc N29	65.07	0.46	102.90	37.83	371.11	53.83
Junc N30	62.54	0.13	95.88	33.34	327.07	47.44
Junc N31	59.12	0.00	95.84	36.72	360.22	52.25

Minimum Pressure

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	50.00	250	110	92.78	1.89	18.52	0.025
Pipe P2	38.00	50	100	-0.11	0.06	0.21	0.067
Pipe P3	17.00	250	110	92.67	1.89	18.48	0.025
Pipe P4	90.00	200	110	24.03	0.76	4.50	0.030
Pipe P5	66.00	200	110	23.74	0.76	4.40	0.030
Pipe P6	92.00	200	110	8.50	0.27	0.66	0.035
Pipe P7	72.00	250	110	68.28	1.39	10.50	0.027
Pipe P8	70.00	200	110	15.00	0.48	1.88	0.032
Pipe P9	73.00	250	110	-72.78	1.48	11.81	0.026
Pipe P10	46.00	250	110	61.90	1.26	8.75	0.027
Pipe P11	47.00	250	110	60.02	1.22	8.27	0.027
Pipe P12	84.00	250	110	-153.79	3.13	47.23	0.024
Pipe P13	80.00	300	120	-211.27	2.99	29.78	0.020
Pipe P14	80.00	300	120	-211.85	3.00	29.93	0.020
Pipe P15	60.00	250	110	-55.82	1.14	7.23	0.027
Pipe P16	90.00	250	110	-55.82	1.14	7.23	0.027
Pipe P17	78.00	250	110	-53.34	1.09	6.64	0.028
Pipe P18	62.00	250	110	51.35	1.05	6.19	0.028
Pipe P19	34.00	250	110	51.20	1.04	6.16	0.028
Pipe P20	66.00	250	110	12.76	0.26	0.47	0.034
Pipe P21	62.00	250	110	12.50	0.25	0.45	0.034
Pipe P22	14.00	50	100	0.06	0.03	0.07	0.073
Pipe P23	14.00	250	110	0.26	0.01	0.00	0.000
Pipe P24	41.00	50	100	0.13	0.07	0.29	0.065
Pipe P25	32.00	250	110	36.58	0.75	3.31	0.029
Pipe P26	74.00	250	110	48.84	0.99	5.64	0.028
Pipe P27	87.00	250	110	46.96	0.96	5.25	0.028
Pipe P28	43.00	200	110	0.11	0.00	0.00	0.069
Pipe P29	43.00	200	110	0.28	0.01	0.00	0.053
Pipe P30	59.00	50	100	0.11	0.06	0.21	0.067
Pipe P31	35.00	400	120	2.59	0.02	0.00	0.039
Pipe P32	10.00	250	110	-92.78	1.89	18.52	0.025
Pipe P33	57.00	250	110	2.02	0.04	0.02	0.045
Pipe P34	86.00	400	120	2.13	0.02	0.00	0.041
Pipe P35	57.00	250	110	12.25	0.25	0.44	0.034
Pipe P36	50.00	250	110	12.25	0.25	0.44	0.034

MAXIMUM DAY + FIRE FLOW DEMAND AT N9

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi
Resvr R1	102.90	-235.62	102.90	0.00	0.00	0.00
Resvr R2	97.20	-5.51	97.20	0.00	0.00	0.00
Junc N1	63.33	0.00	97.19	33.86	332.17	48.18
Junc N2	64.62	0.11	97.19	32.57	319.51	46.34
Junc N3	63.21	0.36	97.19	33.98	333.34	48.35
Junc N4	62.75	0.29	97.19	34.44	337.86	49.00
Junc N5	63.00	0.24	97.19	34.19	335.40	48.65
Junc N6	63.35	3.49	97.19	33.84	331.97	48.15
Junc N7	63.35	0.06	97.19	33.84	331.97	48.15
Junc N8	63.50	0.13	97.19	33.69	330.50	47.93
Junc N9	64.71	221.64	97.20	32.49	318.73	46.23
Junc N10	65.58	0.58	100.04	34.46	338.05	49.03
Junc N11	65.01	0.00	97.19	32.18	315.69	45.79
Junc N12	65.27	0.46	97.19	31.92	313.14	45.42
Junc N13	64.48	2.78	97.18	32.70	320.79	46.53
Junc N14	62.13	0.15	97.18	35.05	343.84	49.87
Junc N15	60.14	1.85	97.18	37.04	363.36	52.70
Junc N16	60.25	0.00	97.18	36.93	362.28	52.54
Junc N17	58.90	0.00	97.18	38.28	375.53	54.47
Junc N18	59.20	0.19	97.18	37.98	372.58	54.04
Junc N19	60.33	0.13	97.18	36.85	361.50	52.43
Junc N20	59.43	0.06	97.18	37.75	370.33	53.71
Junc N21	61.80	2.07	97.18	35.38	347.08	50.34
Junc N22	63.50	1.67	97.19	33.69	330.50	47.93
Junc N23	61.42	0.11	97.20	35.78	351.00	50.91
Junc N24	59.36	0.17	97.20	37.84	371.21	53.84
Junc N25	58.24	0.11	97.19	38.95	382.10	55.42
Junc N26	64.52	2.13	102.9	38.38	376.51	54.61
Junc N27	60.44	0.00	97.2	36.76	360.62	52.30
Junc N28	64.90	2.02	97.18	32.28	316.67	45.93
Junc N29	65.07	0.46	102.90	37.83	371.11	53.83
Junc N30	62.54	0.13	97.17	34.63	339.72	49.27
Junc N31	59.12	0.00	97.18	38.06	373.37	54.15

Minimum Pressure

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	50.00	250	110	5.12	0.10	0.09	0.039
Pipe P2	38.00	50	100	-0.11	0.06	0.21	0.067
Pipe P3	17.00	250	110	5.01	0.10	0.08	0.039
Pipe P4	90.00	200	110	1.43	0.05	0.02	0.046
Pipe P5	66.00	200	110	1.14	0.04	0.02	0.047
Pipe P6	92.00	200	110	-0.68	0.02	0.01	0.051
Pipe P7	72.00	250	110	3.22	0.07	0.04	0.042
Pipe P8	70.00	200	110	1.58	0.05	0.03	0.045
Pipe P9	73.00	250	110	1.46	0.03	0.01	0.047
Pipe P10	46.00	250	110	-2.04	0.04	0.02	0.045
Pipe P11	47.00	250	110	-3.92	0.08	0.05	0.041
Pipe P12	84.00	250	110	-5.51	0.11	0.10	0.039
Pipe P13	80.00	300	120	-232.45	3.29	35.54	0.019
Pipe P14	80.00	300	120	-233.03	3.30	35.71	0.019
Pipe P15	60.00	250	110	-5.30	0.11	0.09	0.039
Pipe P16	90.00	250	110	-5.30	0.11	0.09	0.039
Pipe P17	78.00	250	110	-2.82	0.06	0.03	0.043
Pipe P18	62.00	250	110	0.83	0.02	0.00	0.051
Pipe P19	34.00	250	110	0.68	0.01	0.00	0.056
Pipe P20	66.00	250	110	-0.03	0.00	0.00	0.000
Pipe P21	62.00	250	110	-0.29	0.01	0.00	0.063
Pipe P22	14.00	50	100	0.06	0.03	0.07	0.073
Pipe P23	14.00	250	110	0.26	0.01	0.00	0.000
Pipe P24	41.00	50	100	0.13	0.07	0.29	0.065
Pipe P25	32.00	250	110	-1.14	0.02	0.01	0.048
Pipe P26	74.00	250	110	-1.68	0.03	0.01	0.046
Pipe P27	87.00	250	110	-3.56	0.07	0.04	0.041
Pipe P28	43.00	200	110	0.11	0.00	0.00	0.069
Pipe P29	43.00	200	110	0.28	0.01	0.00	0.053
Pipe P30	59.00	50	100	0.11	0.06	0.21	0.067
Pipe P31	35.00	400	120	2.59	0.02	0.00	0.039
Pipe P32	10.00	250	110	-5.12	0.10	0.09	0.039
Pipe P33	57.00	250	110	2.02	0.04	0.02	0.045
Pipe P34	86.00	400	120	2.13	0.02	0.00	0.041
Pipe P35	57.00	250	110	-0.54	0.01	0.00	0.053
Pipe P36	50.00	250	110	-0.54	0.01	0.00	0.053

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi
Resvr R1	102.90	-307.55	102.90	0.00	0.00	0.00
Resvr R2	97.20	36.63	97.20	0.00	0.00	0.00
Junc N1	63.33	0.00	97.40	34.07	334.23	48.48
Junc N2	64.62	0.11	97.39	32.77	321.47	46.63
Junc N3	63.21	0.36	97.46	34.25	335.99	48.73
Junc N4	62.75	0.29	97.54	34.79	341.29	49.50
Junc N5	63.00	0.24	97.61	34.61	339.52	49.24
Junc N6	63.35	3.49	97.60	34.25	335.99	48.73
Junc N7	63.35	0.06	97.73	34.38	337.27	48.92
Junc N8	63.50	0.13	97.74	34.24	335.89	48.72
Junc N9	64.71	1.67	98.00	33.29	326.57	47.37
Junc N10	65.58	250.34	98.20	32.62	320.00	46.41
Junc N11	65.01	0.00	97.95	32.94	323.14	46.87
Junc N12	65.27	0.46	97.88	32.61	319.90	46.40
Junc N13	64.48	2.78	97.83	33.35	327.16	47.45
Junc N14	62.13	0.15	97.80	35.67	349.92	50.75
Junc N15	60.14	1.85	97.78	37.64	369.25	53.55
Junc N16	60.25	0.00	97.78	37.53	368.17	53.40
Junc N17	58.90	0.00	97.77	38.87	381.31	55.31
Junc N18	59.20	0.19	97.78	38.58	378.47	54.89
Junc N19	60.33	0.13	97.78	37.45	367.38	53.28
Junc N20	59.43	0.06	97.78	38.35	376.21	54.57
Junc N21	61.80	2.07	97.75	35.95	352.67	51.15
Junc N22	63.50	1.67	97.73	34.23	335.80	48.70
Junc N23	61.42	0.11	97.20	35.78	351.00	50.91
Junc N24	59.36	0.17	97.20	37.84	371.21	53.84
Junc N25	58.24	0.11	97.19	38.95	382.10	55.42
Junc N26	64.52	2.13	102.9	38.38	376.51	54.61
Junc N27	60.44	0.00	97.23	36.79	360.91	52.35
Junc N28	64.90	2.02	97.88	32.98	323.53	46.92
Junc N29	65.07	0.46	102.90	37.83	371.11	53.83
Junc N30	62.54	0.13	97.77	35.23	345.61	50.13
Junc N31	59.12	0.00	97.78	38.66	379.25	55.01

Minimum Pressure

MAXIMUM DAY + FIRE FLOW DEMAND AT N10

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	50.00	250	110	-37.02	0.75	3.38	0.029
Pipe P2	38.00	50	100	-0.11	0.06	0.21	0.067
Pipe P3	17.00	250	110	-37.13	0.76	3.40	0.029
Pipe P4	90.00	200	110	-10.28	0.33	0.93	0.034
Pipe P5	66.00	200	110	-10.57	0.34	0.98	0.034
Pipe P6	92.00	200	110	3.46	0.11	0.12	0.040
Pipe P7	72.00	250	110	-27.21	0.55	1.91	0.031
Pipe P8	70.00	200	110	-14.27	0.45	1.71	0.033
Pipe P9	73.00	250	110	27.75	0.57	1.98	0.030
Pipe P10	46.00	250	110	-5.66	0.12	0.10	0.039
Pipe P11	47.00	250	110	-7.54	0.15	0.18	0.037
Pipe P12	84.00	250	110	-35.41	0.72	3.11	0.029
Pipe P13	80.00	300	120	-54.62	0.77	2.43	0.024
Pipe P14	80.00	300	120	-304.96	4.31	58.77	0.019
Pipe P15	60.00	250	110	-17.54	0.36	0.85	0.033
Pipe P16	90.00	250	110	-17.54	0.36	0.85	0.033
Pipe P17	78.00	250	110	-15.06	0.31	0.64	0.033
Pipe P18	62.00	250	110	13.07	0.27	0.49	0.034
Pipe P19	34.00	250	110	12.92	0.26	0.48	0.034
Pipe P20	66.00	250	110	3.03	0.06	0.03	0.042
Pipe P21	62.00	250	110	2.77	0.06	0.03	0.043
Pipe P22	14.00	50	100	0.06	0.03	0.07	0.073
Pipe P23	14.00	250	110	0.26	0.01	0.00	0.000
Pipe P24	41.00	50	100	0.13	0.07	0.29	0.065
Pipe P25	32.00	250	110	8.04	0.16	0.20	0.037
Pipe P26	74.00	250	110	10.56	0.22	0.33	0.035
Pipe P27	87.00	250	110	8.68	0.18	0.23	0.036
Pipe P28	43.00	200	110	0.11	0.00	0.00	0.069
Pipe P29	43.00	200	110	0.28	0.01	0.00	0.053
Pipe P30	59.00	50	100	0.11	0.06	0.21	0.067
Pipe P31	35.00	400	120	2.59	0.02	0.00	0.039
Pipe P32	10.00	250	110	37.02	0.75	3.38	0.029
Pipe P33	57.00	250	110	2.02	0.04	0.02	0.044
Pipe P34	86.00	400	120	2.13	0.02	0.00	0.041
Pipe P35	57.00	250	110	2.52	0.05	0.02	0.043
Pipe P36	50.00	250	110	2.52	0.05	0.02	0.043

MAXIMUM DAY + FIRE FLOW DEMAND AT N11

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi
Resvr R1	102.90	-236.36	102.90	0.00	0.00	0.00
Resvr R2	97.20	-34.56	97.20	0.00	0.00	0.00
Junc N1	63.33	0.00	97.03	33.70	330.60	47.95
Junc N2	64.62	0.11	97.02	32.40	317.84	46.10
Junc N3	63.21	0.36	96.98	33.77	331.28	48.05
Junc N4	62.75	0.29	96.86	34.11	334.62	48.53
Junc N5	63.00	0.24	96.78	33.78	331.38	48.06
Junc N6	63.35	3.49	96.89	33.54	329.03	47.72
Junc N7	63.35	0.06	96.48	33.13	325.01	47.14
Junc N8	63.50	0.13	96.88	33.38	327.46	47.49
Junc N9	64.71	1.67	97.17	32.46	318.43	46.18
Junc N10	65.58	0.58	100.03	34.45	337.95	49.02
Junc N11	65.01	249.76	92.80	27.79	272.62	39.54
Junc N12	65.27	0.46	93.44	28.17	276.35	40.08
Junc N13	64.48	2.78	94.05	29.57	290.08	42.07
Junc N14	62.13	0.15	94.56	32.43	318.14	46.14
Junc N15	60.14	1.85	94.84	34.70	340.41	49.37
Junc N16	60.25	0.00	94.88	34.63	339.72	49.27
Junc N17	58.90	0.00	95.00	36.10	354.14	51.36
Junc N18	59.20	0.19	94.93	35.73	350.51	50.84
Junc N19	60.33	0.13	94.88	34.55	338.94	49.16
Junc N20	59.43	0.06	94.93	35.50	348.26	50.51
Junc N21	61.80	2.07	95.66	33.86	332.17	48.18
Junc N22	63.50	1.67	96.67	33.17	325.40	47.19
Junc N23	61.42	0.11	97.20	35.78	351.00	50.91
Junc N24	59.36	0.17	97.20	37.84	371.21	53.84
Junc N25	58.24	0.11	97.19	38.95	382.10	55.42
Junc N26	64.52	2.13	102.9	38.38	376.51	54.61
Junc N27	60.44	0.00	97.17	36.73	360.32	52.26
Junc N28	64.90	2.02	93.44	28.54	279.98	40.61
Junc N29	65.07	0.46	102.90	37.83	371.11	53.83
Junc N30	62.54	0.13	94.87	32.33	317.16	46.00
Junc N31	59.12	0.00	94.97	35.85	351.69	51.01

Minimum Pressure

MAXIMUM DAY + FIRE FLOW DEMAND AT N11

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	50.00	250	110	34.17	0.70	2.91	0.029
Pipe P2	38.00	50	100	-0.11	0.06	0.21	0.067
Pipe P3	17.00	250	110	34.06	0.69	2.90	0.030
Pipe P4	90.00	200	110	12.22	0.39	1.29	0.033
Pipe P5	66.00	200	110	11.93	0.38	1.23	0.033
Pipe P6	92.00	200	110	-11.63	0.37	1.17	0.034
Pipe P7	72.00	250	110	21.48	0.44	1.23	0.032
Pipe P8	70.00	200	110	23.32	0.74	4.26	0.030
Pipe P9	73.00	250	110	-5.85	0.12	0.11	0.038
Pipe P10	46.00	250	110	-41.09	0.84	4.10	0.029
Pipe P11	47.00	250	110	-42.97	0.88	4.45	0.029
Pipe P12	84.00	250	110	-37.25	0.76	3.42	0.029
Pipe P13	80.00	300	120	-233.19	3.30	35.75	0.019
Pipe P14	80.00	300	120	-233.77	3.31	35.92	0.019
Pipe P15	60.00	250	110	-194.27	3.96	72.80	0.023
Pipe P16	90.00	250	110	55.49	1.13	7.15	0.027
Pipe P17	78.00	250	110	57.97	1.18	7.75	0.027
Pipe P18	62.00	250	110	-59.96	1.22	8.25	0.027
Pipe P19	34.00	250	110	-60.11	1.22	8.29	0.027
Pipe P20	66.00	250	110	-15.52	0.32	0.68	0.033
Pipe P21	62.00	250	110	-15.78	0.32	0.70	0.033
Pipe P22	14.00	50	100	0.06	0.03	0.07	0.073
Pipe P23	14.00	250	110	0.26	0.01	0.00	0.116
Pipe P24	41.00	50	100	0.13	0.07	0.29	0.065
Pipe P25	32.00	250	110	-46.44	0.95	5.14	0.028
Pipe P26	74.00	250	110	-62.47	1.27	8.90	0.027
Pipe P27	87.00	250	110	-64.35	1.31	9.41	0.027
Pipe P28	43.00	200	110	0.11	0.00	0.00	0.069
Pipe P29	43.00	200	110	0.28	0.01	0.00	0.053
Pipe P30	59.00	50	100	0.11	0.06	0.21	0.067
Pipe P31	35.00	400	120	2.59	0.02	0.00	0.039
Pipe P32	10.00	250	110	-34.17	0.70	2.91	0.030
Pipe P33	57.00	250	110	2.02	0.04	0.02	0.045
Pipe P34	86.00	400	120	2.13	0.02	0.00	0.041
Pipe P35	57.00	250	110	-16.03	0.33	0.72	0.033
Pipe P36	50.00	250	110	-16.03	0.33	0.72	0.033

MAXIMUM DAY + FIRE FLOW DEMAND AT N12

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi
Resvr R1	102.90	-221.48	102.90	0.00	0.00	0.00
Resvr R2	97.20	-28.63	97.20	0.00	0.00	0.00
Junc N1	63.33	0.00	97.08	33.75	331.09	48.02
Junc N2	64.62	0.11	97.07	32.45	318.33	46.17
Junc N3	63.21	0.36	97.04	33.83	331.87	48.13
Junc N4	62.75	0.29	96.89	34.14	334.91	48.58
Junc N5	63.00	0.24	96.79	33.79	331.48	48.08
Junc N6	63.35	3.49	97.00	33.65	330.11	47.88
Junc N7	63.35	0.06	96.31	32.96	323.34	46.90
Junc N8	63.50	0.13	97.01	33.51	328.73	47.68
Junc N9	64.71	1.67	97.82	33.11	324.81	47.11
Junc N10	65.58	0.58	100.36	34.78	341.19	49.49
Junc N11	65.01	0.00	95.07	30.06	294.89	42.77
Junc N12	65.27	229.41	90.94	25.67	251.82	36.52
Junc N13	64.48	2.78	92.04	27.56	270.36	39.21
Junc N14	62.13	0.15	92.95	30.82	302.34	43.85
Junc N15	60.14	1.85	93.46	33.32	326.87	47.41
Junc N16	60.25	0.00	93.54	33.29	326.57	47.37
Junc N17	58.90	0.00	93.74	34.84	341.78	49.57
Junc N18	59.20	0.19	93.61	34.41	337.56	48.96
Junc N19	60.33	0.13	93.54	33.21	325.79	47.25
Junc N20	59.43	0.06	93.61	34.18	335.31	48.63
Junc N21	61.80	2.07	94.90	33.10	324.71	47.10
Junc N22	63.50	1.67	96.65	33.15	325.20	47.17
Junc N23	61.42	0.11	97.20	35.78	351.00	50.91
Junc N24	59.36	0.17	97.20	37.84	371.21	53.84
Junc N25	58.24	0.11	97.19	38.95	382.10	55.42
Junc N26	64.52	2.13	102.9	38.38	376.51	54.61
Junc N27	60.44	0.00	97.18	36.74	360.42	52.27
Junc N28	64.90	2.02	90.94	26.04	255.45	37.05
Junc N29	65.07	0.46	102.90	37.83	371.11	53.83
Junc N30	62.54	0.13	93.52	30.98	303.91	44.08
Junc N31	59.12	0.00	93.68	34.56	339.03	49.17

Minimum Pressure

MAXIMUM DAY + FIRE FLOW DEMAND AT N12

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	50.00	250	110	28.24	0.58	2.05	0.030
Pipe P2	38.00	50	100	-0.11	0.06	0.21	0.067
Pipe P3	17.00	250	110	28.13	0.57	2.03	0.030
Pipe P4	90.00	200	110	13.94	0.44	1.64	0.033
Pipe P5	66.00	200	110	13.65	0.43	1.58	0.033
Pipe P6	92.00	200	110	-16.77	0.53	2.31	0.032
Pipe P7	72.00	250	110	13.83	0.28	0.55	0.034
Pipe P8	70.00	200	110	30.18	0.96	6.86	0.029
Pipe P9	73.00	250	110	6.94	0.14	0.15	0.037
Pipe P10	46.00	250	110	-56.28	1.15	7.34	0.027
Pipe P11	47.00	250	110	-58.16	1.18	7.80	0.027
Pipe P12	84.00	250	110	-65.22	1.33	9.64	0.027
Pipe P13	80.00	300	120	-218.31	3.09	31.64	0.020
Pipe P14	80.00	300	120	-218.89	3.10	31.80	0.020
Pipe P15	60.00	250	110	-151.42	3.08	45.89	0.024
Pipe P16	90.00	250	110	-151.42	3.08	45.89	0.024
Pipe P17	78.00	250	110	80.01	1.63	14.08	0.026
Pipe P18	62.00	250	110	-82.00	1.67	14.74	0.026
Pipe P19	34.00	250	110	-82.15	1.67	14.79	0.026
Pipe P20	66.00	250	110	-21.12	0.43	1.20	0.032
Pipe P21	62.00	250	110	-21.38	0.44	1.22	0.032
Pipe P22	14.00	50	100	0.06	0.03	0.07	0.073
Pipe P23	14.00	250	110	0.26	0.01	0.00	0.000
Pipe P24	41.00	50	100	0.13	0.07	0.29	0.065
Pipe P25	32.00	250	110	-62.88	1.28	9.01	0.027
Pipe P26	74.00	250	110	-84.51	1.72	15.58	0.026
Pipe P27	87.00	250	110	-86.39	1.76	16.23	0.026
Pipe P28	43.00	200	110	0.11	0.00	0.00	0.069
Pipe P29	43.00	200	110	0.28	0.01	0.00	0.053
Pipe P30	59.00	50	100	0.11	0.06	0.21	0.067
Pipe P31	35.00	400	120	2.59	0.02	0.00	0.039
Pipe P32	10.00	250	110	-28.24	0.58	2.05	0.030
Pipe P33	57.00	250	110	2.02	0.04	0.02	0.045
Pipe P34	86.00	400	120	2.13	0.02	0.00	0.041
Pipe P35	57.00	250	110	-21.63	0.44	1.25	0.032
Pipe P36	50.00	250	110	-21.63	0.44	1.25	0.032

MAXIMUM DAY + FIRE FLOW DEMAND AT N13

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi
Resvr R1	102.90	-216.65	102.90	0.00	0.00	0.00
Resvr R2	97.20	-35.18	97.20	0.00	0.00	0.00
Junc N1	63.33	0.00	97.02	33.69	330.50	47.93
Junc N2	64.62	0.11	97.01	32.39	317.75	46.09
Junc N3	63.21	0.36	96.97	33.76	331.19	48.03
Junc N4	62.75	0.29	96.76	34.01	333.64	48.39
Junc N5	63.00	0.24	96.61	33.61	329.71	47.82
Junc N6	63.35	3.49	96.91	33.56	329.22	47.75
Junc N7	63.35	0.06	95.91	32.56	319.41	46.33
Junc N8	63.50	0.13	96.92	33.42	327.85	47.55
Junc N9	64.71	1.67	98.03	33.32	326.87	47.41
Junc N10	65.58	0.58	100.46	34.88	342.17	49.63
Junc N11	65.01	0.00	95.82	30.81	302.25	43.84
Junc N12	65.27	0.46	92.51	27.24	267.22	38.76
Junc N13	64.48	233.45	89.73	25.25	247.70	35.93
Junc N14	62.13	0.15	91.07	28.94	283.90	41.18
Junc N15	60.14	1.85	91.80	31.66	310.58	45.05
Junc N16	60.25	0.00	91.91	31.66	310.58	45.05
Junc N17	58.90	0.00	92.22	33.32	326.87	47.41
Junc N18	59.20	0.19	92.02	32.82	321.96	46.70
Junc N19	60.33	0.13	91.91	31.58	309.80	44.93
Junc N20	59.43	0.06	92.02	32.59	319.71	46.37
Junc N21	61.80	2.07	93.89	32.09	314.80	45.66
Junc N22	63.50	1.67	96.40	32.90	322.75	46.81
Junc N23	61.42	0.11	97.20	35.78	351.00	50.91
Junc N24	59.36	0.17	97.20	37.84	371.21	53.84
Junc N25	58.24	0.11	97.19	38.95	382.10	55.42
Junc N26	64.52	2.13	102.9	38.38	376.51	54.61
Junc N27	60.44	0.00	97.17	36.73	360.32	52.26
Junc N28	64.90	2.02	92.5	27.6	270.76	39.27
Junc N29	65.07	0.46	102.90	37.83	371.11	53.83
Junc N30	62.54	0.13	91.90	29.36	288.02	41.77
Junc N31	59.12	0.00	92.13	33.01	323.83	46.97

Minimum Pressure

MAXIMUM DAY + FIRE FLOW DEMAND AT N13

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	50.00	250	110	34.79	0.71	3.01	0.029
Pipe P2	38.00	50	100	-0.11	0.06	0.21	0.067
Pipe P3	17.00	250	110	34.68	0.71	2.99	0.029
Pipe P4	90.00	200	110	16.95	0.54	2.36	0.032
Pipe P5	66.00	200	110	16.66	0.53	2.28	0.032
Pipe P6	92.00	200	110	-20.30	0.65	3.29	0.031
Pipe P7	72.00	250	110	17.37	0.35	0.83	0.033
Pipe P8	70.00	200	110	36.72	1.17	9.87	0.028
Pipe P9	73.00	250	110	6.93	0.14	0.15	0.037
Pipe P10	46.00	250	110	-68.39	1.39	10.53	0.027
Pipe P11	47.00	250	110	-70.27	1.43	11.07	0.027
Pipe P12	84.00	250	110	-77.34	1.58	13.22	0.026
Pipe P13	80.00	300	120	-213.48	3.02	30.36	0.020
Pipe P14	80.00	300	120	-214.06	3.03	30.51	0.020
Pipe P15	60.00	250	110	-134.47	2.74	36.83	0.024
Pipe P16	90.00	250	110	-134.47	2.74	36.83	0.024
Pipe P17	78.00	250	110	-131.99	2.69	35.59	0.024
Pipe P18	62.00	250	110	-100.67	2.05	21.54	0.025
Pipe P19	34.00	250	110	-100.82	2.05	21.60	0.025
Pipe P20	66.00	250	110	-25.87	0.53	1.74	0.031
Pipe P21	62.00	250	110	-26.13	0.53	1.77	0.031
Pipe P22	14.00	50	100	0.06	0.03	0.07	0.073
Pipe P23	14.00	250	110	0.26	0.01	0.00	0.116
Pipe P24	41.00	50	100	0.13	0.07	0.29	0.065
Pipe P25	32.00	250	110	-76.80	1.56	13.05	0.026
Pipe P26	74.00	250	110	-103.18	2.10	22.55	0.025
Pipe P27	87.00	250	110	-105.06	2.14	23.32	0.025
Pipe P28	43.00	200	110	0.11	0.00	0.00	0.069
Pipe P29	43.00	200	110	0.28	0.01	0.00	0.053
Pipe P30	59.00	50	100	0.11	0.06	0.21	0.067
Pipe P31	35.00	400	120	2.59	0.02	0.00	0.039
Pipe P32	10.00	250	110	-34.79	0.71	3.01	0.029
Pipe P33	57.00	250	110	2.02	0.04	0.02	0.045
Pipe P34	86.00	400	120	2.13	0.02	0.00	0.041
Pipe P35	57.00	250	110	-26.38	0.54	1.80	0.031
Pipe P36	50.00	250	110	-26.38	0.54	1.80	0.031

MAXIMUM DAY + FIRE FLOW DEMAND AT N14

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi
Resvr R1	102.90	-224.21	102.90	0.00	0.00	0.00
Resvr R2	97.20	-57.68	97.20	0.00	0.00	0.00
Junc N1	63.33	0.00	96.74	33.41	327.75	47.54
Junc N2	64.62	0.11	96.74	32.12	315.10	45.70
Junc N3	63.21	0.36	96.62	33.41	327.75	47.54
Junc N4	62.75	0.29	96.24	33.49	328.54	47.65
Junc N5	63.00	0.24	95.97	32.97	323.44	46.91
Junc N6	63.35	3.49	96.41	33.06	324.32	47.04
Junc N7	63.35	0.06	94.85	31.50	309.02	44.82
Junc N8	63.50	0.13	96.41	32.91	322.85	46.83
Junc N9	64.71	1.67	97.71	33.00	323.73	46.95
Junc N10	65.58	0.58	100.30	34.72	340.60	49.40
Junc N11	65.01	0.00	95.47	30.46	298.81	43.34
Junc N12	65.27	0.46	92.13	26.86	263.50	38.22
Junc N13	64.48	2.78	89.32	24.84	243.68	35.34
Junc N14	62.13	260.88	87.15	25.02	245.45	35.60
Junc N15	60.14	1.85	88.33	28.19	276.54	40.11
Junc N16	60.25	0.00	88.52	28.27	277.33	40.22
Junc N17	58.90	0.00	89.00	30.10	295.28	42.83
Junc N18	59.20	0.19	88.69	29.49	289.30	41.96
Junc N19	60.33	0.13	88.52	28.19	276.54	40.11
Junc N20	59.43	0.06	88.69	29.26	287.04	41.63
Junc N21	61.80	2.07	91.65	29.85	292.83	42.47
Junc N22	63.50	1.67	95.61	32.11	315.00	45.69
Junc N23	61.42	0.11	97.20	35.78	351.00	50.91
Junc N24	59.36	0.17	97.20	37.84	371.21	53.84
Junc N25	58.24	0.11	97.19	38.95	382.10	55.42
Junc N26	64.52	2.13	102.90	38.38	376.51	54.61
Junc N27	60.44	0.00	97.12	36.68	359.83	52.19
Junc N28	64.90	2.02	92.13	27.23	267.13	38.74
Junc N29	65.07	0.46	102.90	37.83	371.11	53.83
Junc N30	62.54	0.13	88.51	25.97	254.77	36.95
Junc N31	59.12	0.00	88.85	29.73	291.65	42.30

Minimum Pressure

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	50.00	250	110	57.29	1.17	7.58	0.027
Pipe P2	38.00	50	100	-0.11	0.06	0.21	0.067
Pipe P3	17.00	250	110	57.18	1.16	7.56	0.027
Pipe P4	90.00	200	110	23.15	0.74	4.20	0.030
Pipe P5	66.00	200	110	22.86	0.73	4.10	0.030
Pipe P6	92.00	200	110	-24.97	0.79	4.83	0.030
Pipe P7	72.00	250	110	33.67	0.69	2.83	0.030
Pipe P8	70.00	200	110	47.59	1.51	15.95	0.027
Pipe P9	73.00	250	110	-4.70	0.10	0.07	0.040
Pipe P10	46.00	250	110	-86.86	1.77	16.39	0.026
Pipe P11	47.00	250	110	-88.74	1.81	17.06	0.026
Pipe P12	84.00	250	110	-84.17	1.71	15.47	0.026
Pipe P13	80.00	300	120	-221.04	3.13	32.38	0.020
Pipe P14	80.00	300	120	-221.62	3.14	32.54	0.019
Pipe P15	60.00	250	110	-135.20	2.75	37.20	0.024
Pipe P16	90.00	250	110	-135.20	2.75	37.20	0.024
Pipe P17	78.00	250	110	-132.72	2.70	35.95	0.024
Pipe P18	62.00	250	110	130.73	2.66	34.96	0.024
Pipe P19	34.00	250	110	-130.15	2.65	34.67	0.024
Pipe P20	66.00	250	110	-33.32	0.68	2.78	0.030
Pipe P21	62.00	250	110	-33.58	0.68	2.82	0.030
Pipe P22	14.00	50	100	0.06	0.03	0.07	0.073
Pipe P23	14.00	250	110	0.26	0.01	0.00	0.000
Pipe P24	41.00	50	100	0.13	0.07	0.29	0.065
Pipe P25	32.00	250	110	-98.68	2.01	20.76	0.025
Pipe P26	74.00	250	110	-132.51	2.70	35.84	0.024
Pipe P27	87.00	250	110	-134.39	2.74	36.79	0.024
Pipe P28	43.00	200	110	0.11	0.00	0.00	0.069
Pipe P29	43.00	200	110	0.28	0.01	0.00	0.053
Pipe P30	59.00	50	100	0.11	0.06	0.21	0.067
Pipe P31	35.00	400	120	2.59	0.02	0.00	0.039
Pipe P32	10.00	250	110	-57.29	1.17	7.58	0.027
Pipe P33	57.00	250	110	2.02	0.04	0.02	0.045
Pipe P34	86.00	400	120	2.13	0.02	0.00	0.041
Pipe P35	57.00	250	110	-33.83	0.69	2.86	0.030
Pipe P36	50.00	250	110	-33.83	0.69	2.86	0.030

MAXIMUM DAY + FIRE FLOW DEMAND AT N15

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi
Resvr R1	102.90	-221.78	102.90	0.00	0.00	0.00
Resvr R2	97.20	-60.11	97.20	0.00	0.00	0.00
Junc N1	63.33	0.00	96.71	33.38	327.46	47.49
Junc N2	64.62	0.11	96.70	32.08	314.70	45.64
Junc N3	63.21	0.36	96.57	33.36	327.26	47.47
Junc N4	62.75	0.29	96.15	33.40	327.65	47.52
Junc N5	63.00	0.24	95.86	32.86	322.36	46.75
Junc N6	63.35	3.49	96.35	33.00	323.73	46.95
Junc N7	63.35	0.06	94.61	31.26	306.66	44.48
Junc N8	63.50	0.13	96.35	32.85	322.26	46.74
Junc N9	64.71	1.67	97.81	33.10	324.71	47.10
Junc N10	65.58	0.58	100.35	34.77	341.09	49.47
Junc N11	65.01	0.00	95.82	30.81	302.25	43.84
Junc N12	65.27	0.46	92.83	27.56	270.36	39.21
Junc N13	64.48	2.78	90.33	25.85	253.59	36.78
Junc N14	62.13	0.15	88.41	26.28	257.81	37.39
Junc N15	60.14	262.58	87.35	27.21	266.93	38.71
Junc N16	60.25	0.00	87.56	27.31	267.91	38.86
Junc N17	58.90	0.00	88.09	29.19	286.35	41.53
Junc N18	59.20	0.19	87.75	28.55	280.08	40.62
Junc N19	60.33	0.13	87.56	27.23	267.13	38.74
Junc N20	59.43	0.06	87.75	28.32	277.82	40.29
Junc N21	61.80	2.07	91.05	29.25	286.94	41.62
Junc N22	63.50	1.67	95.46	31.96	313.53	45.47
Junc N23	61.42	0.11	97.20	35.78	351.00	50.91
Junc N24	59.36	0.17	97.20	37.84	371.21	53.84
Junc N25	58.24	0.11	97.19	38.95	382.10	55.42
Junc N26	64.52	2.13	102.90	38.38	376.51	54.61
Junc N27	60.44	0.00	97.12	36.68	359.83	52.19
Junc N28	64.90	2.02	92.83	27.93	273.99	39.74
Junc N29	65.07	0.46	102.90	37.83	371.11	53.83
Junc N30	62.54	0.13	87.54	25.00	245.25	35.57
Junc N31	59.12	0.00	87.93	28.81	282.63	40.99

Minimum Pressure

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	50.00	250	110	59.72	1.22	8.19	0.027
Pipe P2	38.00	50	100	-0.11	0.06	0.21	0.067
Pipe P3	17.00	250	110	59.61	1.21	8.16	0.027
Pipe P4	90.00	200	110	24.38	0.78	4.62	0.030
Pipe P5	66.00	200	110	24.09	0.77	4.52	0.030
Pipe P6	92.00	200	110	-26.52	0.84	5.40	0.030
Pipe P7	72.00	250	110	34.86	0.71	3.02	0.029
Pipe P8	70.00	200	110	50.37	1.60	17.72	0.027
Pipe P9	73.00	250	110	-4.35	0.09	0.06	0.040
Pipe P10	46.00	250	110	-92.12	1.88	18.28	0.025
Pipe P11	47.00	250	110	-94.00	1.91	18.98	0.025
Pipe P12	84.00	250	110	-89.78	1.83	17.43	0.026
Pipe P13	80.00	300	120	-218.61	3.09	31.73	0.020
Pipe P14	80.00	300	120	-219.19	3.10	31.88	0.020
Pipe P15	60.00	250	110	-127.16	2.59	33.21	0.024
Pipe P16	90.00	250	110	-127.16	2.59	33.21	0.024
Pipe P17	78.00	250	110	-124.68	2.54	32.02	0.024
Pipe P18	62.00	250	110	122.69	2.50	31.08	0.024
Pipe P19	34.00	250	110	122.54	2.50	31.01	0.024
Pipe P20	66.00	250	110	-35.37	0.72	3.10	0.029
Pipe P21	62.00	250	110	-35.63	0.73	3.15	0.029
Pipe P22	14.00	50	100	0.06	0.03	0.07	0.073
Pipe P23	14.00	250	110	0.26	0.01	0.00	0.000
Pipe P24	41.00	50	100	0.13	0.07	0.29	0.065
Pipe P25	32.00	250	110	-104.67	2.13	23.16	0.025
Pipe P26	74.00	250	110	-140.55	2.86	39.97	0.024
Pipe P27	87.00	250	110	-142.43	2.90	40.97	0.024
Pipe P28	43.00	200	110	0.11	0.00	0.00	0.069
Pipe P29	43.00	200	110	0.28	0.01	0.00	0.053
Pipe P30	59.00	50	100	0.11	0.06	0.21	0.067
Pipe P31	35.00	400	120	2.59	0.02	0.00	0.039
Pipe P32	10.00	250	110	-59.72	1.22	8.19	0.027
Pipe P33	57.00	250	110	2.02	0.04	0.02	0.045
Pipe P34	86.00	400	120	2.13	0.02	0.00	0.041
Pipe P35	57.00	250	110	-35.88	0.73	3.19	0.029
Pipe P36	50.00	250	110	-35.88	0.73	3.19	0.029

MAXIMUM DAY + FIRE FLOW DEMAND AT N17

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi
Resvr R1	102.90	-237.58	102.90	0.00	0.00	0.00
Resvr R2	97.20	-83.58	97.20	0.00	0.00	0.00
Junc N1	63.33	0.00	96.29	32.96	323.34	46.90
Junc N2	64.62	0.11	96.28	31.66	310.58	45.05
Junc N3	63.21	0.36	96.04	32.83	322.06	46.71
Junc N4	62.75	0.29	95.39	32.64	320.20	46.44
Junc N5	63.00	0.24	94.93	31.93	313.23	45.43
Junc N6	63.35	3.49	95.58	32.23	316.18	45.86
Junc N7	63.35	0.06	93.16	29.81	292.44	42.41
Junc N8	63.50	0.13	95.52	32.02	314.12	45.56
Junc N9	64.71	1.67	97.11	32.40	317.84	46.10
Junc N10	65.58	0.58	100.00	34.42	337.66	48.97
Junc N11	65.01	0.00	94.76	29.75	291.85	42.33
Junc N12	65.27	0.46	91.24	25.97	254.77	36.95
Junc N13	64.48	2.78	88.29	23.81	233.58	33.88
Junc N14	62.13	0.15	86.01	23.88	234.26	33.98
Junc N15	60.14	1.85	84.76	24.62	241.52	35.03
Junc N16	60.25	0.00	84.57	24.32	238.58	34.60
Junc N17	58.90	300.00	84.10	25.20	247.21	35.86
Junc N18	59.20	0.19	84.40	25.20	247.21	35.86
Junc N19	60.33	0.13	84.57	24.24	237.79	34.49
Junc N20	59.43	0.06	84.39	24.96	244.86	35.51
Junc N21	61.80	2.07	88.22	26.42	259.18	37.59
Junc N22	63.50	1.67	94.31	30.81	302.25	43.84
Junc N23	61.42	0.11	97.20	35.78	351.00	50.91
Junc N24	59.36	0.17	97.20	37.84	371.21	53.84
Junc N25	58.24	0.11	97.19	38.95	382.10	55.42
Junc N26	64.52	2.13	102.90	38.38	376.51	54.61
Junc N27	60.44	0.00	97.05	36.61	359.14	52.09
Junc N28	64.90	2.02	91.24	26.34	258.40	37.48
Junc N29	65.07	0.46	102.90	37.83	371.11	53.83
Junc N30	62.54	0.13	84.56	22.02	216.02	31.33
Junc N31	59.12	0.00	84.24	25.12	246.43	35.74

Minimum Pressure

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	50.00	250	110	83.19	1.69	15.13	0.026
Pipe P2	38.00	50	100	-0.11	0.06	0.21	0.067
Pipe P3	17.00	250	110	83.08	1.69	15.10	0.026
Pipe P4	90.00	200	110	30.83	0.98	7.14	0.029
Pipe P5	66.00	200	110	30.54	0.97	7.02	0.029
Pipe P6	92.00	200	110	-30.69	0.98	7.08	0.029
Pipe P7	72.00	250	110	51.88	1.06	6.31	0.028
Pipe P8	70.00	200	110	61.00	1.94	25.26	0.026
Pipe P9	73.00	250	110	-17.19	0.35	0.82	0.033
Pipe P10	46.00	250	110	-109.01	2.22	24.97	0.025
Pipe P11	47.00	250	110	-110.89	2.26	25.77	0.025
Pipe P12	84.00	250	110	-93.84	1.91	18.92	0.025
Pipe P13	80.00	300	120	-234.41	3.32	36.10	0.019
Pipe P14	80.00	300	120	-234.99	3.32	36.27	0.019
Pipe P15	60.00	250	110	-138.91	2.83	39.11	0.024
Pipe P16	90.00	250	110	-138.91	2.83	39.11	0.024
Pipe P17	78.00	250	110	-136.43	2.78	37.83	0.024
Pipe P18	62.00	250	110	134.44	2.74	36.82	0.024
Pipe P19	34.00	250	110	134.29	2.74	36.74	0.024
Pipe P20	66.00	250	110	33.88	0.69	2.87	0.030
Pipe P21	62.00	250	110	33.62	0.68	2.83	0.030
Pipe P22	14.00	50	100	0.06	0.03	0.07	0.073
Pipe P23	14.00	250	110	0.26	0.01	0.00	0.000
Pipe P24	41.00	50	100	0.13	0.07	0.29	0.065
Pipe P25	32.00	250	110	98.56	2.01	20.72	0.025
Pipe P26	74.00	250	110	-168.07	3.42	55.67	0.023
Pipe P27	87.00	250	110	-169.95	3.46	56.83	0.023
Pipe P28	43.00	200	110	0.11	0.00	0.00	0.069
Pipe P29	43.00	200	110	0.28	0.01	0.00	0.053
Pipe P30	59.00	50	100	0.11	0.06	0.21	0.067
Pipe P31	35.00	400	120	2.59	0.02	0.00	0.039
Pipe P32	10.00	250	110	-83.19	1.69	15.13	0.026
Pipe P33	57.00	250	110	2.02	0.04	0.02	0.045
Pipe P34	86.00	400	120	2.13	0.02	0.00	0.041
Pipe P35	57.00	250	110	33.37	0.68	2.79	0.030
Pipe P36	50.00	250	110	33.37	0.68	2.79	0.030

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi
Resvr R1	102.90	-231.03	102.90	0.00	0.00	0.00
Resvr R2	97.20	-90.13	97.20	0.00	0.00	0.00
Junc N1	63.33	0.00	96.16	32.83	322.06	46.71
Junc N2	64.62	0.11	96.15	31.53	309.31	44.86
Junc N3	63.21	0.36	95.86	32.65	320.30	46.46
Junc N4	62.75	0.29	95.08	32.33	317.16	46.00
Junc N5	63.00	0.24	94.52	31.52	309.21	44.85
Junc N6	63.35	3.49	95.35	32.00	313.92	45.53
Junc N7	63.35	0.06	92.33	28.98	284.29	41.23
Junc N8	63.50	0.13	95.30	31.80	311.96	45.25
Junc N9	64.71	1.67	97.41	32.70	320.79	46.53
Junc N10	65.58	0.58	100.15	34.57	339.13	49.19
Junc N11	65.01	0.00	95.70	30.69	301.07	43.67
Junc N12	65.27	0.46	93.15	27.88	273.50	39.67
Junc N13	64.48	2.78	91.02	26.54	260.36	37.76
Junc N14	62.13	0.15	89.38	27.25	267.32	38.77
Junc N15	60.14	1.85	88.48	28.34	278.02	40.32
Junc N16	60.25	0.00	88.35	28.10	275.66	39.98
Junc N17	58.90	0.00	88.01	29.11	285.57	41.42
Junc N18	59.20	0.19	88.22	29.02	284.69	41.29
Junc N19	60.33	0.13	88.35	28.02	274.88	39.87
Junc N20	59.43	0.06	88.22	28.79	282.43	40.96
Junc N21	61.80	302.07	86.13	24.33	238.68	34.62
Junc N22	63.50	1.67	93.78	30.28	297.05	43.08
Junc N23	61.42	0.11	97.20	35.78	351.00	50.91
Junc N24	59.36	0.17	97.20	37.84	371.21	53.84
Junc N25	58.24	0.11	97.19	38.95	382.10	55.42
Junc N26	64.52	2.13	102.90	38.38	376.51	54.61
Junc N27	60.44	0.00	97.03	36.59	358.95	52.06
Junc N28	64.90	2.02	93.14	28.24	277.03	40.18
Junc N29	65.07	0.46	102.90	37.83	371.11	53.83
Junc N30	62.54	0.13	88.33	25.79	253.00	36.69
Junc N31	59.12	0.00	88.11	28.99	284.39	41.25

Minimum Pressure

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	50.00	250	110	89.74	1.83	17.41	0.026
Pipe P2	38.00	50	100	-0.11	0.06	0.21	0.067
Pipe P3	17.00	250	110	89.63	1.83	17.38	0.026
Pipe P4	90.00	200	110	34.14	1.09	8.62	0.029
Pipe P5	66.00	200	110	33.85	1.08	8.49	0.029
Pipe P6	92.00	200	110	-34.93	1.11	9.00	0.029
Pipe P7	72.00	250	110	55.13	1.12	7.06	0.027
Pipe P8	70.00	200	110	68.54	2.18	31.35	0.026
Pipe P9	73.00	250	110	-16.20	0.33	0.73	0.033
Pipe P10	46.00	250	110	-123.51	2.52	31.47	0.024
Pipe P11	47.00	250	110	-125.39	2.55	32.36	0.024
Pipe P12	84.00	250	110	-109.32	2.23	25.10	0.025
Pipe P13	80.00	300	120	-227.86	3.22	34.26	0.019
Pipe P14	80.00	300	120	-228.44	3.23	34.42	0.019
Pipe P15	60.00	250	110	-116.87	2.38	28.41	0.025
Pipe P16	90.00	250	110	-116.87	2.38	28.41	0.025
Pipe P17	78.00	250	110	-114.39	2.33	27.30	0.025
Pipe P18	62.00	250	110	112.40	2.29	26.43	0.025
Pipe P19	34.00	250	110	112.25	2.29	26.36	0.025
Pipe P20	66.00	250	110	28.28	0.58	2.05	0.030
Pipe P21	62.00	250	110	28.02	0.57	2.02	0.030
Pipe P22	14.00	50	100	0.06	0.03	0.07	0.073
Pipe P23	14.00	250	110	0.26	0.01	0.00	0.000
Pipe P24	41.00	50	100	0.13	0.07	0.29	0.065
Pipe P25	32.00	250	110	82.12	1.67	14.78	0.026
Pipe P26	74.00	250	110	109.89	2.24	25.34	0.025
Pipe P27	87.00	250	110	-191.99	3.91	71.22	0.023
Pipe P28	43.00	200	110	0.11	0.00	0.00	0.069
Pipe P29	43.00	200	110	0.28	0.01	0.00	0.053
Pipe P30	59.00	50	100	0.11	0.06	0.21	0.067
Pipe P31	35.00	400	120	2.59	0.02	0.00	0.039
Pipe P32	10.00	250	110	-89.74	1.83	17.41	0.026
Pipe P33	57.00	250	110	2.02	0.04	0.02	0.045
Pipe P34	86.00	400	120	2.13	0.02	0.00	0.041
Pipe P35	57.00	250	110	27.77	0.57	1.98	0.030
Pipe P36	50.00	250	110	27.77	0.57	1.98	0.030

MAXIMUM DAY + FIRE FLOW DEMAND AT N22

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi
Resvr R1	102.90	-205.48	102.90	0.00	0.00	0.00
Resvr R2	97.20	-82.68	97.20	0.00	0.00	0.00
Junc N1	63.33	0.00	96.31	32.98	323.53	46.92
Junc N2	64.62	0.11	96.30	31.68	310.78	45.07
Junc N3	63.21	0.36	96.06	32.85	322.26	46.74
Junc N4	62.75	0.29	95.56	32.81	321.87	46.68
Junc N5	63.00	0.24	95.20	32.20	315.88	45.81
Junc N6	63.35	3.49	95.55	32.20	315.88	45.81
Junc N7	63.35	0.06	94.03	30.68	300.97	43.65
Junc N8	63.50	0.13	95.40	31.90	312.94	45.39
Junc N9	64.71	1.67	98.49	33.78	331.38	48.06
Junc N10	65.58	0.58	100.69	35.11	344.43	49.96
Junc N11	65.01	0.00	97.89	32.88	322.55	46.78
Junc N12	65.27	0.46	97.00	31.73	311.27	45.15
Junc N13	64.48	2.78	96.28	31.80	311.96	45.25
Junc N14	62.13	0.15	95.74	33.61	329.71	47.82
Junc N15	60.14	1.85	95.44	35.30	346.29	50.23
Junc N16	60.25	0.00	95.40	35.15	344.82	50.01
Junc N17	58.90	0.00	95.29	36.39	356.99	51.78
Junc N18	59.20	0.19	95.36	36.16	354.73	51.45
Junc N19	60.33	0.13	95.40	35.07	344.04	49.90
Junc N20	59.43	0.06	95.36	35.93	352.47	51.12
Junc N21	61.80	2.07	94.69	32.89	322.65	46.80
Junc N22	63.50	268.67	92.94	29.44	288.81	41.89
Junc N23	61.42	0.11	97.20	35.78	351.00	50.91
Junc N24	59.36	0.17	97.20	37.84	371.21	53.84
Junc N25	58.24	0.11	97.19	38.95	382.10	55.42
Junc N26	64.52	2.13	102.90	38.38	376.51	54.61
Junc N27	60.44	0.00	97.05	36.61	359.14	52.09
Junc N28	64.90	2.02	97.00	32.10	314.90	45.67
Junc N29	65.07	0.46	102.90	37.83	371.11	53.83
Junc N30	62.54	0.13	95.39	32.85	322.26	46.74
Junc N31	59.12	0.00	96.34	37.22	365.13	52.96

Minimum Pressure

MAXIMUM DAY + FIRE FLOW DEMAND AT N22

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	50.00	250	110	82.29	1.68	14.83	0.026
Pipe P2	38.00	50	100	-0.11	0.06	0.21	0.067
Pipe P3	17.00	250	110	82.18	1.67	14.80	0.026
Pipe P4	90.00	200	110	26.99	0.86	5.58	0.030
Pipe P5	66.00	200	110	26.70	0.85	5.47	0.030
Pipe P6	92.00	200	110	-22.27	0.71	3.91	0.031
Pipe P7	72.00	250	110	54.83	1.12	6.99	0.028
Pipe P8	70.00	200	110	48.73	1.55	16.67	0.027
Pipe P9	73.00	250	110	-28.56	0.58	2.09	0.030
Pipe P10	46.00	250	110	106.10	2.16	23.75	0.025
Pipe P11	47.00	250	110	-162.78	3.32	52.47	0.023
Pipe P12	84.00	250	110	-134.35	2.74	36.77	0.024
Pipe P13	80.00	300	120	-202.31	2.86	27.48	0.020
Pipe P14	80.00	300	120	-202.89	2.87	27.63	0.020
Pipe P15	60.00	250	110	-66.29	1.35	9.94	0.027
Pipe P16	90.00	250	110	-66.29	1.35	9.94	0.027
Pipe P17	78.00	250	110	-63.81	1.30	9.26	0.027
Pipe P18	62.00	250	110	61.82	1.26	8.73	0.027
Pipe P19	34.00	250	110	61.67	1.26	8.69	0.027
Pipe P20	66.00	250	110	15.43	0.31	0.67	0.033
Pipe P21	62.00	250	110	15.17	0.31	0.65	0.033
Pipe P22	14.00	50	100	0.06	0.03	0.07	0.073
Pipe P23	14.00	250	110	0.26	0.01	0.00	0.000
Pipe P24	41.00	50	100	0.13	0.07	0.29	0.065
Pipe P25	32.00	250	110	44.39	0.90	4.73	0.028
Pipe P26	74.00	250	110	59.31	1.21	8.09	0.027
Pipe P27	87.00	250	110	57.43	1.17	7.62	0.027
Pipe P28	43.00	200	110	0.11	0.00	0.00	0.069
Pipe P29	43.00	200	110	0.28	0.01	0.00	0.053
Pipe P30	59.00	50	100	0.11	0.06	0.21	0.067
Pipe P31	35.00	400	120	2.59	0.02	0.00	0.039
Pipe P32	10.00	250	110	-82.29	1.68	14.83	0.026
Pipe P33	57.00	250	110	2.02	0.04	0.02	0.045
Pipe P34	86.00	400	120	2.13	0.02	0.00	0.041
Pipe P35	57.00	250	110	14.92	0.30	0.63	0.033
Pipe P36	50.00	250	110	14.92	0.30	0.63	0.033

MAXIMUM DAY + FIRE FLOW DEMAND AT N23

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi
Resvr R1	102.90	-117.01	102.90	0.00	0.00	0.00
Resvr R2	97.20	-45.55	97.20	0.00	0.00	0.00
Junc N1	63.33	0.00	98.39	35.06	343.94	49.88
Junc N2	64.62	0.11	98.38	33.76	331.19	48.03
Junc N3	63.21	0.36	98.73	35.52	348.45	50.54
Junc N4	62.75	0.29	99.21	36.46	357.67	51.88
Junc N5	63.00	0.24	99.58	36.58	358.85	52.05
Junc N6	63.35	3.49	99.52	36.17	354.83	51.46
Junc N7	63.35	0.06	100.21	36.86	361.60	52.45
Junc N8	63.50	0.13	100.25	36.75	360.52	52.29
Junc N9	64.71	1.67	101.38	36.67	359.73	52.17
Junc N10	65.58	0.58	102.13	36.55	358.56	52.00
Junc N11	65.01	0.00	101.20	36.19	355.02	51.49
Junc N12	65.27	0.46	100.94	35.67	349.92	50.75
Junc N13	64.48	2.78	100.75	36.27	355.81	51.61
Junc N14	62.13	0.15	100.61	38.48	377.49	54.75
Junc N15	60.14	1.85	100.53	40.39	396.23	57.47
Junc N16	60.25	0.00	100.52	40.27	395.05	57.30
Junc N17	58.90	0.00	100.50	41.60	408.10	59.19
Junc N18	59.20	0.19	100.51	41.31	405.25	58.78
Junc N19	60.33	0.13	100.52	40.19	394.26	57.18
Junc N20	59.43	0.06	100.51	41.08	402.99	58.45
Junc N21	61.80	2.07	100.36	38.56	378.27	54.86
Junc N22	63.50	1.67	100.23	36.73	360.32	52.26
Junc N23	61.42	141.51	92.04	30.62	300.38	43.57
Junc N24	59.36	0.17	97.20	37.84	371.21	53.84
Junc N25	58.24	0.11	97.19	38.95	382.10	55.42
Junc N26	64.52	2.13	102.90	38.38	376.51	54.61
Junc N27	60.44	0.00	97.40	36.96	362.58	52.59
Junc N28	64.90	2.02	100.94	36.04	353.55	51.28
Junc N29	65.07	0.46	102.90	37.83	371.11	53.83
Junc N30	62.54	0.13	100.51	37.97	372.49	54.02
Junc N31	59.12	0.00	100.50	41.38	405.94	58.88

Minimum Pressure

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	50.00	250	110	-96.24	1.96	19.82	0.025
Pipe P2	38.00	50	100	-0.11	0.06	0.21	0.067
Pipe P3	17.00	250	110	-96.35	1.96	19.87	0.025
Pipe P4	90.00	200	110	-26.52	0.84	5.40	0.030
Pipe P5	66.00	200	110	-26.81	0.85	5.51	0.030
Pipe P6	92.00	200	110	8.04	0.26	0.59	0.036
Pipe P7	72.00	250	110	-70.19	1.43	11.05	0.027
Pipe P8	70.00	200	110	-35.10	1.12	9.08	0.029
Pipe P9	73.00	250	110	66.15	1.35	9.90	0.027
Pipe P10	46.00	250	110	-9.95	0.20	0.30	0.035
Pipe P11	47.00	250	110	-11.83	0.24	0.41	0.035
Pipe P12	84.00	250	110	-78.11	1.59	13.47	0.026
Pipe P13	80.00	300	120	-113.84	1.61	9.48	0.022
Pipe P14	80.00	300	120	-114.42	1.62	9.57	0.021
Pipe P15	60.00	250	110	-34.06	0.69	2.90	0.030
Pipe P16	90.00	250	110	-34.06	0.69	2.90	0.030
Pipe P17	78.00	250	110	-31.58	0.64	2.52	0.030
Pipe P18	62.00	250	110	29.59	0.60	2.23	0.030
Pipe P19	34.00	250	110	29.44	0.60	2.21	0.030
Pipe P20	66.00	250	110	7.23	0.15	0.16	0.037
Pipe P21	62.00	250	110	6.97	0.14	0.15	0.037
Pipe P22	14.00	50	100	0.06	0.03	0.07	0.073
Pipe P23	14.00	250	110	0.26	0.01	0.00	0.000
Pipe P24	41.00	50	100	0.13	0.07	0.29	0.065
Pipe P25	32.00	250	110	20.36	0.41	1.12	0.032
Pipe P26	74.00	250	110	27.08	0.55	1.89	0.031
Pipe P27	87.00	250	110	25.20	0.51	1.66	0.031
Pipe P28	43.00	200	110	141.51	4.50	120.04	0.023
Pipe P29	43.00	200	110	0.28	0.01	0.00	0.053
Pipe P30	59.00	50	100	0.11	0.06	0.21	0.067
Pipe P31	35.00	400	120	2.59	0.02	0.00	0.039
Pipe P32	10.00	250	110	96.24	1.96	19.82	0.025
Pipe P33	57.00	250	110	2.02	0.04	0.02	0.045
Pipe P34	86.00	400	120	2.13	0.02	0.00	0.041
Pipe P35	57.00	250	110	6.72	0.14	0.14	0.038
Pipe P36	50.00	250	110	6.72	0.14	0.14	0.038

MAXIMUM DAY + FIRE FLOW DEMAND AT N26

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi
Resvr R1	102.90	-368.53	102.90	0.00	0.00	0.00
Resvr R2	97.20	95.85	97.20	0.00	0.00	0.00
Junc N1	63.33	0.00	98.39	35.06	343.94	49.88
Junc N2	64.62	0.11	98.38	33.76	331.19	48.03
Junc N3	63.21	0.36	98.73	35.52	348.45	50.54
Junc N4	62.75	0.29	99.21	36.46	357.67	51.88
Junc N5	63.00	0.24	99.58	36.58	358.85	52.05
Junc N6	63.35	3.49	99.52	36.17	354.83	51.46
Junc N7	63.35	0.06	100.21	36.86	361.60	52.45
Junc N8	63.50	0.13	100.25	36.75	360.52	52.29
Junc N9	64.71	1.67	101.38	36.67	359.73	52.17
Junc N10	65.58	0.58	102.13	36.55	358.56	52.00
Junc N11	65.01	0.00	101.20	36.19	355.02	51.49
Junc N12	65.27	0.46	100.94	35.67	349.92	50.75
Junc N13	64.48	2.78	100.75	36.27	355.81	51.61
Junc N14	62.13	0.15	100.61	38.48	377.49	54.75
Junc N15	60.14	1.85	100.53	40.39	396.23	57.47
Junc N16	60.25	0.00	100.52	40.27	395.05	57.30
Junc N17	58.90	0.00	100.50	41.60	408.10	59.19
Junc N18	59.20	0.19	100.51	41.31	405.25	58.78
Junc N19	60.33	0.13	100.52	40.19	394.26	57.18
Junc N20	59.43	0.06	100.51	41.08	402.99	58.45
Junc N21	61.80	2.07	100.36	38.56	378.27	54.86
Junc N22	63.50	1.67	100.23	36.73	360.32	52.26
Junc N23	61.42	0.11	97.20	35.78	351.00	50.91
Junc N24	59.36	0.17	97.20	37.84	371.21	53.84
Junc N25	58.24	0.11	97.19	38.95	382.10	55.42
Junc N26	64.52	253.65	101.65	37.13	364.25	52.83
Junc N27	60.44	0.00	97.40	36.96	362.58	52.59
Junc N28	64.90	2.02	100.94	36.04	353.55	51.28
Junc N29	65.07	0.46	102.54	37.47	367.58	53.31
Junc N30	62.54	0.13	100.51	37.97	372.49	54.02
Junc N31	59.12	0.00	100.50	41.38	405.94	58.88

Minimum Pressure

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	50.00	250	110	-96.24	1.96	19.82	0.025
Pipe P2	38.00	50	100	-0.11	0.06	0.21	0.067
Pipe P3	17.00	250	110	-96.35	1.96	19.87	0.025
Pipe P4	90.00	200	110	-26.52	0.84	5.40	0.030
Pipe P5	66.00	200	110	-26.81	0.85	5.51	0.030
Pipe P6	92.00	200	110	8.04	0.26	0.59	0.036
Pipe P7	72.00	250	110	-70.19	1.43	11.05	0.027
Pipe P8	70.00	200	110	-35.10	1.12	9.08	0.029
Pipe P9	73.00	250	110	66.15	1.35	9.90	0.027
Pipe P10	46.00	250	110	-9.95	0.20	0.30	0.035
Pipe P11	47.00	250	110	-11.83	0.24	0.41	0.035
Pipe P12	84.00	250	110	-78.11	1.59	13.47	0.026
Pipe P13	80.00	300	120	-113.84	1.61	9.48	0.022
Pipe P14	80.00	300	120	-114.42	1.62	9.57	0.021
Pipe P15	60.00	250	110	-34.06	0.69	2.90	0.030
Pipe P16	90.00	250	110	-34.06	0.69	2.90	0.030
Pipe P17	78.00	250	110	-31.58	0.64	2.52	0.030
Pipe P18	62.00	250	110	29.59	0.60	2.23	0.030
Pipe P19	34.00	250	110	29.44	0.60	2.21	0.030
Pipe P20	66.00	250	110	7.23	0.15	0.16	0.037
Pipe P21	62.00	250	110	6.97	0.14	0.15	0.037
Pipe P22	14.00	50	100	0.06	0.03	0.07	0.073
Pipe P23	14.00	250	110	0.26	0.01	0.00	0.000
Pipe P24	41.00	50	100	0.13	0.07	0.29	0.065
Pipe P25	32.00	250	110	20.36	0.41	1.12	0.032
Pipe P26	74.00	250	110	27.08	0.55	1.89	0.031
Pipe P27	87.00	250	110	25.20	0.51	1.66	0.031
Pipe P28	43.00	200	110	0.11	0.00	0.00	0.069
Pipe P29	43.00	200	110	0.28	0.01	0.00	0.053
Pipe P30	59.00	50	100	0.11	0.06	0.21	0.067
Pipe P31	35.00	400	120	254.11	2.02	10.32	0.020
Pipe P32	10.00	250	110	96.24	1.96	19.82	0.025
Pipe P33	57.00	250	110	2.02	0.04	0.02	0.045
Pipe P34	86.00	400	120	253.65	2.02	10.29	0.020
Pipe P35	57.00	250	110	6.72	0.14	0.14	0.038
Pipe P36	50.00	250	110	6.72	0.14	0.14	0.038

MAXIMUM DAY + FIRE FLOW DEMAND AT N28

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi
Resvr R1	102.90	-221.48	102.90	0.00	0.00	0.00
Resvr R2	97.20	-28.63	97.20	0.00	0.00	0.00
Junc N1	63.33	0.00	97.08	33.75	331.09	48.02
Junc N2	64.62	0.11	97.07	32.45	318.33	46.17
Junc N3	63.21	0.36	97.04	33.83	331.87	48.13
Junc N4	62.75	0.29	96.89	34.14	334.91	48.58
Junc N5	63.00	0.24	96.79	33.79	331.48	48.08
Junc N6	63.35	3.49	97.00	33.65	330.11	47.88
Junc N7	63.35	0.06	96.31	32.96	323.34	46.90
Junc N8	63.50	0.13	97.01	33.51	328.73	47.68
Junc N9	64.71	1.67	97.82	33.11	324.81	47.11
Junc N10	65.58	0.58	100.36	34.78	341.19	49.49
Junc N11	65.01	0.00	95.07	30.06	294.89	42.77
Junc N12	65.27	0.46	90.94	25.67	251.82	36.52
Junc N13	64.48	2.78	92.04	27.56	270.36	39.21
Junc N14	62.13	0.15	92.95	30.82	302.34	43.85
Junc N15	60.14	1.85	93.46	33.32	326.87	47.41
Junc N16	60.25	0.00	93.54	33.29	326.57	47.37
Junc N17	58.90	0.00	93.74	34.84	341.78	49.57
Junc N18	59.20	0.19	93.61	34.41	337.56	48.96
Junc N19	60.33	0.13	93.54	33.21	325.79	47.25
Junc N20	59.43	0.06	93.61	34.18	335.31	48.63
Junc N21	61.80	2.07	94.90	33.10	324.71	47.10
Junc N22	63.50	1.67	96.65	33.15	325.20	47.17
Junc N23	61.42	0.11	97.20	35.78	351.00	50.91
Junc N24	59.36	0.17	97.20	37.84	371.21	53.84
Junc N25	58.24	0.11	97.19	38.95	382.10	55.42
Junc N26	64.52	2.13	102.90	38.38	376.51	54.61
Junc N27	60.44	0.00	97.18	36.74	360.42	52.27
Junc N28	64.90	230.97	85.22	20.32	199.34	28.91
Junc N29	65.07	0.46	102.90	37.83	371.11	53.83
Junc N30	62.54	0.13	93.52	30.98	303.91	44.08
Junc N31	59.12	0.00	93.68	34.56	339.03	49.17

Minimum Pressure

MAXIMUM DAY + FIRE FLOW DEMAND AT N28

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	50.00	250	110	28.24	0.58	2.05	0.030
Pipe P2	38.00	50	100	-0.11	0.06	0.21	0.067
Pipe P3	17.00	250	110	28.13	0.57	2.03	0.030
Pipe P4	90.00	200	110	13.94	0.44	1.64	0.033
Pipe P5	66.00	200	110	13.65	0.43	1.58	0.033
Pipe P6	92.00	200	110	-16.77	0.53	2.31	0.032
Pipe P7	72.00	250	110	13.83	0.28	0.55	0.034
Pipe P8	70.00	200	110	30.18	0.96	6.86	0.029
Pipe P9	73.00	250	110	6.94	0.14	0.15	0.037
Pipe P10	46.00	250	110	-56.28	1.15	7.34	0.027
Pipe P11	47.00	250	110	-58.16	1.18	7.80	0.027
Pipe P12	84.00	250	110	-65.22	1.33	9.64	0.027
Pipe P13	80.00	300	120	-218.31	3.09	31.64	0.020
Pipe P14	80.00	300	120	-218.89	3.10	31.80	0.020
Pipe P15	60.00	250	110	-151.42	3.08	45.89	0.024
Pipe P16	90.00	250	110	-151.42	3.08	45.89	0.024
Pipe P17	78.00	250	110	80.01	1.63	14.08	0.026
Pipe P18	62.00	250	110	-82.00	1.67	14.74	0.026
Pipe P19	34.00	250	110	-82.15	1.67	14.79	0.026
Pipe P20	66.00	250	110	-21.12	0.43	1.20	0.032
Pipe P21	62.00	250	110	-21.38	0.44	1.22	0.032
Pipe P22	14.00	50	100	0.06	0.03	0.07	0.073
Pipe P23	14.00	250	110	0.26	0.01	0.00	0.000
Pipe P24	41.00	50	100	0.13	0.07	0.29	0.065
Pipe P25	32.00	250	110	-62.88	1.28	9.01	0.027
Pipe P26	74.00	250	110	-84.51	1.72	15.58	0.026
Pipe P27	87.00	250	110	-86.39	1.76	16.23	0.026
Pipe P28	43.00	200	110	0.11	0.00	0.00	0.069
Pipe P29	43.00	200	110	0.28	0.01	0.00	0.053
Pipe P30	59.00	50	100	0.11	0.06	0.21	0.067
Pipe P31	35.00	400	120	2.59	0.02	0.00	0.039
Pipe P32	10.00	250	110	-28.24	0.58	2.05	0.030
Pipe P33	57.00	250	110	230.97	4.71	100.30	0.022
Pipe P34	86.00	400	120	2.13	0.02	0.00	0.041
Pipe P35	57.00	250	110	-21.63	0.44	1.25	0.032
Pipe P36	50.00	250	110	-21.63	0.44	1.25	0.032

MAXIMUM DAY + FIRE FLOW DEMAND AT N29

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi
Resvr R1	102.90	-366.77	102.90	0.00	0.00	0.00
Resvr R2	97.20	95.85	97.20	0.00	0.00	0.00
Junc N1	63.33	0.00	98.39	35.06	343.94	49.88
Junc N2	64.62	0.11	98.38	33.76	331.19	48.03
Junc N3	63.21	0.36	98.73	35.52	348.45	50.54
Junc N4	62.75	0.29	99.21	36.46	357.67	51.88
Junc N5	63.00	0.24	99.58	36.58	358.85	52.05
Junc N6	63.35	3.49	99.52	36.17	354.83	51.46
Junc N7	63.35	0.06	100.21	36.86	361.60	52.45
Junc N8	63.50	0.13	100.25	36.75	360.52	52.29
Junc N9	64.71	1.67	101.38	36.67	359.73	52.17
Junc N10	65.58	0.58	102.13	36.55	358.56	52.00
Junc N11	65.01	0.00	101.20	36.19	355.02	51.49
Junc N12	65.27	0.46	100.94	35.67	349.92	50.75
Junc N13	64.48	2.78	100.75	36.27	355.81	51.61
Junc N14	62.13	0.15	100.61	38.48	377.49	54.75
Junc N15	60.14	1.85	100.53	40.39	396.23	57.47
Junc N16	60.25	0.00	100.52	40.27	395.05	57.30
Junc N17	58.90	0.00	100.50	41.60	408.10	59.19
Junc N18	59.20	0.19	100.51	41.31	405.25	58.78
Junc N19	60.33	0.13	100.52	40.19	394.26	57.18
Junc N20	59.43	0.06	100.51	41.08	402.99	58.45
Junc N21	61.80	2.07	100.36	38.56	378.27	54.86
Junc N22	63.50	1.67	100.23	36.73	360.32	52.26
Junc N23	61.42	0.11	97.20	35.78	351.00	50.91
Junc N24	59.36	0.17	97.20	37.84	371.21	53.84
Junc N25	58.24	0.11	97.19	38.95	382.10	55.42
Junc N26	64.52	2.13	102.54	38.02	372.98	54.10
Junc N27	60.44	0.00	97.40	36.96	362.58	52.59
Junc N28	64.90	2.02	100.94	36.04	353.55	51.28
Junc N29	65.07	250.22	102.54	37.47	367.58	53.31
Junc N30	62.54	0.13	100.51	37.97	372.49	54.02
Junc N31	59.12	0.00	100.50	41.38	405.94	58.88

Minimum Pressure

MAXIMUM DAY + FIRE FLOW DEMAND AT N29

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	50.00	250	110	-96.24	1.96	19.82	0.025
Pipe P2	38.00	50	100	-0.11	0.06	0.21	0.067
Pipe P3	17.00	250	110	-96.35	1.96	19.87	0.025
Pipe P4	90.00	200	110	-26.52	0.84	5.40	0.030
Pipe P5	66.00	200	110	-26.81	0.85	5.51	0.030
Pipe P6	92.00	200	110	8.04	0.26	0.59	0.036
Pipe P7	72.00	250	110	-70.19	1.43	11.05	0.027
Pipe P8	70.00	200	110	-35.10	1.12	9.08	0.029
Pipe P9	73.00	250	110	66.15	1.35	9.90	0.027
Pipe P10	46.00	250	110	-9.95	0.20	0.30	0.035
Pipe P11	47.00	250	110	-11.83	0.24	0.41	0.035
Pipe P12	84.00	250	110	-78.11	1.59	13.47	0.026
Pipe P13	80.00	300	120	-113.84	1.61	9.48	0.022
Pipe P14	80.00	300	120	-114.42	1.62	9.57	0.021
Pipe P15	60.00	250	110	-34.06	0.69	2.90	0.030
Pipe P16	90.00	250	110	-34.06	0.69	2.90	0.030
Pipe P17	78.00	250	110	-31.58	0.64	2.52	0.030
Pipe P18	62.00	250	110	29.59	0.60	2.23	0.030
Pipe P19	34.00	250	110	29.44	0.60	2.21	0.030
Pipe P20	66.00	250	110	7.23	0.15	0.16	0.037
Pipe P21	62.00	250	110	6.97	0.14	0.15	0.037
Pipe P22	14.00	50	100	0.06	0.03	0.07	0.073
Pipe P23	14.00	250	110	0.26	0.01	0.00	0.000
Pipe P24	41.00	50	100	0.13	0.07	0.29	0.065
Pipe P25	32.00	250	110	20.36	0.41	1.12	0.032
Pipe P26	74.00	250	110	27.08	0.55	1.89	0.031
Pipe P27	87.00	250	110	25.20	0.51	1.66	0.031
Pipe P28	43.00	200	110	0.11	0.00	0.00	0.069
Pipe P29	43.00	200	110	0.28	0.01	0.00	0.053
Pipe P30	59.00	50	100	0.11	0.06	0.21	0.067
Pipe P31	35.00	400	120	252.35	2.01	10.19	0.020
Pipe P32	10.00	250	110	96.24	1.96	19.82	0.025
Pipe P33	57.00	250	110	2.02	0.04	0.02	0.045
Pipe P34	86.00	400	120	2.13	0.02	0.00	0.041
Pipe P35	57.00	250	110	6.72	0.14	0.14	0.038
Pipe P36	50.00	250	110	6.72	0.14	0.14	0.038

MAXIMUM DAY + FIRE FLOW DEMAND AT N31

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi
Resvr R1	102.90	-174.31	102.90	0.00	0.00	0.00
Resvr R2	97.20	31.90	97.20	0.00	0.00	0.00
Junc N1	63.33	0.00	97.36	34.03	333.83	48.42
Junc N2	64.62	0.11	97.35	32.73	321.08	46.57
Junc N3	63.21	0.36	97.40	34.19	335.40	48.65
Junc N4	62.75	0.29	97.41	34.66	340.01	49.31
Junc N5	63.00	0.24	97.42	34.42	337.66	48.97
Junc N6	63.35	3.49	97.56	34.21	335.60	48.67
Junc N7	63.35	0.06	97.37	34.02	333.74	48.40
Junc N8	63.50	0.13	97.93	34.43	337.76	48.99
Junc N9	64.71	1.67	99.66	34.95	342.86	49.73
Junc N10	65.58	0.58	101.28	35.70	350.22	50.79
Junc N11	65.01	0.00	98.98	33.97	333.25	48.33
Junc N12	65.27	0.46	97.96	32.69	320.69	46.51
Junc N13	64.48	2.78	97.13	32.65	320.30	46.46
Junc N14	62.13	0.15	96.51	34.38	337.27	48.92
Junc N15	60.14	1.85	96.17	36.03	353.45	51.26
Junc N16	60.25	0.00	95.89	35.64	349.63	50.71
Junc N17	58.90	0.00	96.12	37.22	365.13	52.96
Junc N18	59.20	0.19	95.64	36.44	357.48	51.85
Junc N19	60.33	0.13	95.89	35.56	348.84	50.60
Junc N20	59.43	0.06	95.64	36.21	355.22	51.52
Junc N21	61.80	2.07	96.68	34.88	342.17	49.63
Junc N22	63.50	1.67	97.64	34.14	334.91	48.58
Junc N23	61.42	0.11	97.20	35.78	351.00	50.91
Junc N24	59.36	0.17	97.20	37.84	371.21	53.84
Junc N25	58.24	0.11	97.19	38.95	382.10	55.42
Junc N26	64.52	2.13	102.90	38.38	376.51	54.61
Junc N27	60.44	0.00	97.23	36.79	360.91	52.35
Junc N28	64.90	2.02	97.96	33.06	324.32	47.04
Junc N29	65.07	0.46	102.90	37.83	371.11	53.83
Junc N30	62.54	0.13	95.88	33.34	327.07	47.44
Junc N31	59.12	121.25	95.41	36.29	356.00	51.63

Minimum Pressure

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	50.00	250	110	-32.29	0.66	2.62	0.030
Pipe P2	38.00	50	100	-0.11	0.06	0.21	0.067
Pipe P3	17.00	250	110	-32.40	0.66	2.64	0.030
Pipe P4	90.00	200	110	-3.51	0.11	0.13	0.040
Pipe P5	66.00	200	110	-3.80	0.12	0.15	0.040
Pipe P6	92.00	200	110	-13.18	0.42	1.48	0.033
Pipe P7	72.00	250	110	-29.25	0.60	2.18	0.030
Pipe P8	70.00	200	110	9.14	0.29	0.75	0.035
Pipe P9	73.00	250	110	46.43	0.95	5.14	0.028
Pipe P10	46.00	250	110	-49.80	1.01	5.85	0.028
Pipe P11	47.00	250	110	-51.68	1.05	6.27	0.028
Pipe P12	84.00	250	110	-98.24	2.00	20.59	0.025
Pipe P13	80.00	300	120	-171.14	2.42	20.16	0.020
Pipe P14	80.00	300	120	-171.72	2.43	20.29	0.020
Pipe P15	60.00	250	110	-71.23	1.45	11.35	0.026
Pipe P16	90.00	250	110	-71.23	1.45	11.35	0.026
Pipe P17	78.00	250	110	-68.75	1.40	10.63	0.027
Pipe P18	62.00	250	110	66.76	1.36	10.07	0.027
Pipe P19	34.00	250	110	66.61	1.36	10.03	0.027
Pipe P20	66.00	250	110	41.31	0.84	4.14	0.029
Pipe P21	62.00	250	110	41.05	0.84	4.09	0.029
Pipe P22	14.00	50	100	0.06	0.03	0.07	0.073
Pipe P23	14.00	250	110	0.26	0.01	0.00	0.116
Pipe P24	41.00	50	100	0.13	0.07	0.29	0.065
Pipe P25	32.00	250	110	23.44	0.48	1.45	0.031
Pipe P26	74.00	250	110	-57.00	1.16	7.51	0.027
Pipe P27	87.00	250	110	-58.88	1.20	7.98	0.027
Pipe P28	43.00	200	110	0.11	0.00	0.00	0.069
Pipe P29	43.00	200	110	0.28	0.01	0.00	0.053
Pipe P30	59.00	50	100	0.11	0.06	0.21	0.067
Pipe P31	35.00	400	120	2.59	0.02	0.00	0.039
Pipe P32	10.00	250	110	32.29	0.66	2.62	0.030
Pipe P33	57.00	250	110	2.02	0.04	0.02	0.045
Pipe P34	86.00	400	120	2.13	0.02	0.00	0.041
Pipe P35	57.00	250	110	40.80	0.83	4.05	0.029
Pipe P36	50.00	250	110	-80.45	1.64	14.22	0.026

MAXIMUM DAY +
FIRE FLOW DEMAND SUMMARY

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

Fire at Junction	Demand (L/s)			Minimum Pressure			
	Maximum Daily	Fire Flow	Max Day + Fire	(m)	kPa	psi	Node
N1	0.00	141.40	141.40	32.44	318.24	46.16	N2
N3	0.36	286.45	286.81	30.24	296.65	43.03	N2
N4	0.29	167.00	167.29	30.59	300.09	43.52	N4
N5	0.24	167.00	167.24	32.24	316.27	45.87	N5
N6	3.49	286.45	289.94	30.00	294.30	42.68	N6
N7	0.06	300.00	300.06	27.53	270.07	39.17	N7
N8	0.13	286.45	286.58	30.66	300.77	43.62	N8
N9	1.67	219.97	221.64	31.92	313.14	45.42	N12
N10	0.58	249.76	250.34	32.61	319.90	46.40	N12
N11	0.00	249.76	249.76	27.79	272.62	39.54	N11
N12	0.46	228.95	229.41	25.67	251.82	36.52	N12
N13	2.78	230.67	233.45	25.25	247.70	35.93	N13
N14	0.15	260.73	260.88	25.02	245.45	35.60	N14
N15	1.85	260.73	262.58	25.00	245.25	35.57	N30
N17	0.00	300.00	300.00	22.02	216.02	31.33	N30
N21	2.07	300.00	302.07	24.33	238.68	34.62	N21
N22	1.67	267.00	268.67	29.44	288.81	41.89	N22
N23	0.11	141.40	141.51	30.62	300.38	43.57	N23
N26	2.13	251.52	253.65	33.76	331.19	48.03	N2
N28	2.02	228.95	230.97	20.32	199.34	28.91	N28
N29	0.46	249.76	250.22	33.76	331.19	48.03	N2
N31	0.00	121.25	121.25	32.65	320.30	46.46	N13

Note:
Nodes not appearing in summary are either on 50mm leads or are in locations that are not subject to fireflow.

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

GREYSTONE VILLAGE

PROPOSED WATERMAIN CONNECTION POINTS AND UNITS FOR FIRE FLOW CALCULATIONS

SCALE		
1 : 2000		
DATE JUNE 2022	JOB 114025	FIGURE FIGURE 1

M:\2014\114025\CAD\Design\Figures\Hydraulic\20220603-114025-Fireflow calcs.dwg, WM FIG 1 - Fireflow Calcs, Feb 11, 2022 - 3:03pm, szorgel

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

Novatech Project #: 114025 - Phase 3 Site Plan
Project Name: Greystone Village - Phase 3 Site Plan
Date: 6/3/2022
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 (#16)
Non-combustible construction **(conservative)**

Step			Input		Value Used	Total Fire Flow (L/min)
	Base Fire Flow					
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction C	Wood frame		1.5	0.8	
		Ordinary construction		1		
		Non-combustible construction	Yes	0.8		
		Modified Fire resistive construction (2 hrs)		0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	1850			
		Number of Floors/Storeys	7			
		Area of structure considered (m^2)			**12,950**	
	F	**Base fire flow without reductions**				**20,000**
		$F = 220\ C\ (A)^{0.5}$				
	Reductions or Surcharges					
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**17,000**
		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%	**-6,800**
		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%	**7,650**
		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**	**18,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**300**
				or	USGPM	4,756
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	4
		Required Volume of Fire Flow (m^3)			m^3	4320

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

Engineers, Planners & Landscape Architects

Novatech Project #: 114025 - Phase 3 Site Plan
Project Name: Greystone Village - Phase 3 Site Plan
Date: 6/3/2022
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 (#15)
Non-combustible construction **(conservative)**

Step			Input		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction C	Wood frame		1.5	0.8	
		Ordinary construction		1		
		Non-combustible construction	Yes	0.8		
		Modified Fire resistive construction (2 hrs)		0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	1890			
		Number of Floors/Storeys	7			
		Area of structure considered (m^2)			**13,230**	
	F	**Base fire flow without reductions**				**20,000**
		$F = 220\ C\ (A)^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**17,000**
		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%	**-6,800**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System		-10%		
				Cumulative Total	**-40%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	3.1 - 10 m		20%	**5,950**
		East Side	> 45.1m		0%	
		South Side	20.1 - 30 m		10%	
		West Side	30.1- 45 m		5%	
				Cumulative Total	**35%**	
Results						
6	(1) + (2) + (3)	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**16,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**267**
				or	USGPM	4,227
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	3.5
		Required Volume of Fire Flow (m^3)			m^3	3360

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,

NEUF ARCHITECT(E)S 50

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

Fire Flow Calculations - Single Units

As per Fire Underwriter's Survey Guidelines

PROJECT: Greystone Village - 175 Main St **DATE: May 10, 2017**
JOB#: 114025
SINGLE UNIT #1

C	**Coefficient related to type of construction**	[yes/no]			
	◆ Wood frame	yes	1.5		
	◆ Ordinary construction		1		
	◆ Non-combustible construction		0.8		
	◆ Fire resistive construction (< 2 hrs)		0.7		
	◆ Fire resistive construction (> 2 hrs)		0.6		
	◆ Interpolation (Using FUS Tables)				
A	**Area of structure considered (m^2)**	***336***	<==>	3,617 ft^2	
	(All floors excluding Basement)				
F	**Required fire flow (L/min)**				
	$F = 220\ C\ (A)^{0.5}$			***6,049 L/min***	
	Occupancy hazard reduction of surcharge	[yes/no]			
	◆ Non-combustible		-25%		
	◆ Limited combustible	yes	-15%		
	◆ Combustible		0%		
	◆ Free burning		15%		
	◆ Rapid burning		25%		
				5,142 L/min	**(1)**
	Sprinkler Reduction				
	◆ Non-combustible - Fire Resistive (3)	no	50%	***0 L/min***	**(2)**
	Exposure surcharge (cumulative (%))	[yes/no]			
	0 - 3 m	yes	25%	2 side	50%
	3.1 - 10 m		20%		
	10.1 - 20 m	yes	15%	1 side	15%
	20.1 - 30 m		10%		
	30.1- 45 m		5%		
			Cumulative Total		**65%**
				3,342 L/min	
	Fire Wall Separation				
	◆ Number of Party Walls * 1000 L/min				
	(As per City of Ottawa Standard)			***3,342 L/min***	**(3)**

REQUIRED FIRE FLOW [(1) - (2) + (3)]		***8,484 L/min***
(2,000 L/min < Fire Flow < 45,000 L/min)	***or***	***141.4 L/s***
	or	***1,868 IGPM***

BY: *Steve Zorgel*

Fire Flow Calculations - Single Units

As per Fire Underwriter's Survey Guidelines

PROJECT: Greystone Village - 175 Main St **DATE: May 10, 2017**
JOB#: 114025
SINGLE UNIT #2

C	**Coefficient related to type of construction**	[yes/no]			
	◆ Wood frame	yes	1.5		
	◆ Ordinary construction		1		
	◆ Non-combustible construction		0.8		
	◆ Fire resistive construction (< 2 hrs)		0.7		
	◆ Fire resistive construction (> 2 hrs)		0.6		
	◆ Interpolation (Using FUS Tables)				
A	**Area of structure considered (m^2)**	***295***	<==>	3,175 ft^2	
	(All floors excluding Basement)				
F	**Required fire flow (L/min)**				
	$F = 220\ C\ (A)^{0.5}$			***5,668 L/min***	
	Occupancy hazard reduction of surcharge	[yes/no]			
	◆ Non-combustible		-25%		
	◆ Limited combustible	yes	-15%		
	◆ Combustible		0%		
	◆ Free burning		15%		
	◆ Rapid burning		25%		
				4,818 L/min	**(1)**
	Sprinkler Reduction				
	◆ Non-combustible - Fire Resistive (3)	no	50%	***0 L/min***	**(2)**
	Exposure surcharge (cumulative (%))	[yes/no]			
	0 - 3 m	yes	25%	1 side	25%
	3.1 - 10 m		20%		
	10.1 - 20 m	yes	15%	1 side	15%
	20.1 - 30 m	yes	10%	1 side	10%
	30.1- 45 m		5%		
			Cumulative Total		**50%**
				2,409 L/min	
	Fire Wall Separation				
	◆ Number of Party Walls * 1000 L/min				
	(As per City of Ottawa Standard)			***2,409 L/min***	**(3)**

REQUIRED FIRE FLOW [(1) - (2) + (3)]		***7,227 L/min***
(2,000 L/min < Fire Flow < 45,000 L/min)	***or***	***120.44 L/s***
	or	***1,591 IGPM***

BY: *Steve Zorgel*

Fire Flow Calculations - Single Units

As per Fire Underwriter's Survey Guidelines

PROJECT: PROJECT: Greystone Village - 175 Main St **DATE: May 10, 2017**
JOB#: 114025
SINGLE UNIT #3

C **Coefficient related to type of construction** [yes/no]

◆ Wood frame	yes	1.5
◆ Ordinary construction		1
◆ Non-combustible construction		0.8
◆ Fire resistive construction (< 2 hrs)		0.7
◆ Fire resistive construction (> 2 hrs)		0.6
◆ Interpolation (Using FUS Tables)		

A **Area of structure considered (m^2)** ***164*** <==> 1,765 ft^2
(All floors excluding Basement)

F **Required fire flow (L/min)**
$F = 220\ C\ (A)^{0.5}$ ***4,226 L/min***

Occupancy hazard reduction of surcharge [yes/no]

◆ Non-combustible		-25%	
◆ Limited combustible	yes	-15%	
◆ Combustible		0%	
◆ Free burning		15%	
◆ Rapid burning		25%	
			3,592 L/min **(1)**

Sprinkler Reduction

◆ Non-combustible - Fire Resistive (3)	no	50%	***0 L/min*** **(2)**

Exposure surcharge (cumulative (%)) [yes/no]

0 - 3 m	yes	25%	2 side	50%
3.1 - 10 m		20%		
10.1 - 20 m	yes	15%	1 side	15%
20.1 - 30 m	yes	10%	1 side	10%
30.1- 45 m		5%		
		Cumulative Total		**75%**

2,694 L/min

Fire Wall Separation
◆ Number of Party Walls * 1000 L/min
(As per City of Ottawa Standard) ***2,694 L/min*** **(3)**

REQUIRED FIRE FLOW [(1) - (2) + (3)]		***6,286 L/min***
(2,000 L/min < Fire Flow < 45,000 L/min)	***or***	***104.77 L/s***
	or	***1,384 IGPM***

BY: *Steve Zorgel*

Fire Flow Calculations - Townhouse Units

As per Fire Underwriter's Survey Guidelines

PROJECT: Greystone Village - 175 Main St **DATE: May 10, 2017**

JOB#: 114025

TOWNHOUSE UNIT #4a - 1 Firebreak - Minimum requirement based on area.

C	**Coefficient related to type of construction**	[yes/no]			
	◆ Wood frame	yes	1.5		
	◆ Ordinary construction		1		
	◆ Non-combustible construction		0.8		
	◆ Fire resistive construction (< 2 hrs)		0.7		
	◆ Fire resistive construction (> 2 hrs)		0.6		
	◆ Interpolation (Using FUS Tables)				
A	**Area of structure considered (m^2)**	***980***	<==>	10,549 ft^2	
	(All floors excluding Basement)				
F	**Required fire flow (L/min)**				
	$F = 220\, C\, (A)^{0.5}$			***10,331 L/min***	
	Occupancy hazard reduction of surcharge	[yes/no]			
	◆ Non-combustible		-25%		
	◆ Limited combustible	yes	-15%		
	◆ Combustible		0%		
	◆ Free burning		15%		
	◆ Rapid burning		25%		
				8,781 L/min	**(1)**
	Sprinkler Reduction				
	◆ Non-combustible - Fire Resistive (3)	no	50%	***0 L/min***	**(2)**
	Exposure surcharge (cumulative (%))	[yes/no]			
	0 - 3 m		25%		
	3.1 - 10 m	yes	20%	1 side	20%
	10.1 - 20 m		15%		
	20.1 - 30 m	yes	10%	3 side	30%
	30.1- 45 m		5%		
			Cumulative Total		**50%**
	Note: Exposure surcharge accounts for Fire Wall at 10% as per FUS.			4,391 L/min	
	Fire Wall Separation				
	◆ Number of Party Walls * 1000 L/min				
	(As per City of Ottawa Standard)			***4,391 L/min***	**(3)**

REQUIRED FIRE FLOW [(1) - (2) + (3)]		***13,172 L/min***
(2,000 L/min < Fire Flow < 45,000 L/min)	***or***	***219.53 L/s***
	or	***2,900 IGPM***

BY: *Steve Zorgel*

Fire Flow Calculations - Townhouse Units

As per Fire Underwriter's Survey Guidelines

PROJECT: Greystone Village - 175 Main St **DATE: May 10, 2017**
JOB#: 114025
TOWNHOUSE UNIT #4b - 2 firebreaks

C	**Coefficient related to type of construction**	[yes/no]			
	◆ Wood frame	yes	1.5		
	◆ Ordinary construction		1		
	◆ Non-combustible construction		0.8		
	◆ Fire resistive construction (< 2 hrs)		0.7		
	◆ Fire resistive construction (> 2 hrs)		0.6		
	◆ Interpolation (Using FUS Tables)				
A	**Area of structure considered (m^2)**	***636***	<==>	6,846 ft^2	
	(All floors excluding Basement)				
F	**Required fire flow (L/min)**				
	$F = 220\ C\ (A)^{0.5}$			***8,322 L/min***	
	Occupancy hazard reduction of surcharge	[yes/no]			
	◆ Non-combustible		-25%		
	◆ Limited combustible	yes	-15%		
	◆ Combustible		0%		
	◆ Free burning		15%		
	◆ Rapid burning		25%		
				7,074 L/min	**(1)**
	Sprinkler Reduction				
	◆ Non-combustible - Fire Resistive (3)	no	50%	***0 L/min***	**(2)**
	Exposure surcharge (cumulative (%))	[yes/no]			
	0 - 3 m		25%		
	3.1 - 10 m	yes	20%	1 side	20%
	10.1 - 20 m		15%		
	20.1 - 30 m	yes	10%	3 side	30%
	30.1- 45 m		5%		
			Cumulative Total		**50%**
	Note: Exposure surcharge accounts for 2 Fire Walls at 10% as per FUS.			3,537 L/min	
	Fire Wall Separation				
	◆ Number of Party Walls * 1000 L/min				
	(As per City of Ottawa Standard)			***3,537 L/min***	**(3)**

REQUIRED FIRE FLOW [(1) - (2) + (3)]		***10,611 L/min***
(2,000 L/min < Fire Flow < 45,000 L/min)	***or***	***176.85 L/s***
	or	***2,336 IGPM***

BY: *Steve Zorgel*

Fire Flow Calculations - Townhouse Units

As per Fire Underwriter's Survey Guidelines

PROJECT: Greystone Village - 175 Main St **DATE: May 10, 2017**
JOB#: 114025
TOWNHOUSE UNIT #4c - 3 firebreaks

C Coefficient related to type of construction [yes/no]

	[yes/no]	
◆ Wood frame	yes	1.5
◆ Ordinary construction		1
◆ Non-combustible construction		0.8
◆ Fire resistive construction (< 2 hrs)		0.7
◆ Fire resistive construction (> 2 hrs)		0.6
◆ Interpolation (Using FUS Tables)		

A Area of structure considered (m^2) ***483*** <==> 5,199 ft^2
(All floors excluding Basement)

F Required fire flow (L/min)
$F = 220\, C\, (A)^{0.5}$ ***7,252 L/min***

Occupancy hazard reduction of surcharge [yes/no]

	[yes/no]	
◆ Non-combustible		-25%
◆ Limited combustible	yes	-15%
◆ Combustible		0%
◆ Free burning		15%
◆ Rapid burning		25%

6,165 L/min **(1)**

Sprinkler Reduction
◆ Non-combustible - Fire Resistive (3) no 50% ***0 L/min*** **(2)**

Exposure surcharge (cumulative (%)) [yes/no]

	[yes/no]			
0 - 3 m		25%		
3.1 - 10 m	yes	20%	1 side	20%
10.1 - 20 m		15%		
20.1 - 30 m	yes	10%	3 side	30%
30.1- 45 m		5%		
			Cumulative Total	**50%**

Note: Exposure surcharge accounts for 2 Fire Walls at 10% as per FUS. 3,082 L/min

Fire Wall Separation
◆ Number of Party Walls * 1000 L/min
(As per City of Ottawa Standard) ***3,082 L/min*** **(3)**

REQUIRED FIRE FLOW [(1) - (2) + (3)] ***9,247 L/min***
(2,000 L/min < Fire Flow < 45,000 L/min) ***or*** ***154.12 L/s***
or ***2,036 IGPM***

BY: *Steve Zorgel*

Fire Flow Calculations - Townhouse Units

As per Fire Underwriter's Survey Guidelines

PROJECT: Greystone Village - 175 Main St **DATE: May 10, 2017**
JOB#: 114025
TOWNHOUSE UNIT #5

C	**Coefficient related to type of construction**	[yes/no]			
	◆ Wood frame	yes	1.5		
	◆ Ordinary construction		1		
	◆ Non-combustible construction		0.8		
	◆ Fire resistive construction (< 2 hrs)		0.7		
	◆ Fire resistive construction (> 2 hrs)		0.6		
	◆ Interpolation (Using FUS Tables)				
A	**Area of structure considered (m^2)**	***1,215***	<==>	13,078 ft^2	
	(All floors excluding Basement)				
F	**Required fire flow (L/min)**				
	$F = 220\ C\ (A)^{0.5}$			***11,503 L/min***	
	Occupancy hazard reduction of surcharge	[yes/no]			
	◆ Non-combustible		-25%		
	◆ Limited combustible	yes	-15%		
	◆ Combustible		0%		
	◆ Free burning		15%		
	◆ Rapid burning		25%		
				9,777 L/min	**(1)**
	Sprinkler Reduction				
	◆ Non-combustible - Fire Resistive (3)	no	50%	***0 L/min***	**(2)**
	Exposure surcharge (cumulative (%))	[yes/no]			
	0 - 3 m		25%		
	3.1 - 10 m	yes	20%	2 side	40%
	10.1 - 20 m	yes	15%	1 side	15%
	20.1 - 30 m	yes	10%	1 side	10%
	30.1- 45 m		5%		
			Cumulative Total		**65%**
				6,355 L/min	
	Fire Wall Separation				
	◆ Number of Party Walls * 1000 L/min				
	(As per City of Ottawa Standard)			***6,355 L/min***	**(3)**

REQUIRED FIRE FLOW [(1) - (2) + (3)]		***16,133 L/min***
(2,000 L/min < Fire Flow < 45,000 L/min)	***or***	***268.88 L/s***
	or	***3,552 IGPM***

BY: *Steve Zorgel*

Fire Flow Calculations - Deschatelets Unit

As per Fire Underwriter's Survey Guidelines

PROJECT: Greystone Village - 175 Main St **DATE: May 10, 2017**
JOB#: 114025
Townhouse Unit #7a - 2 Firebreaks

C Coefficient related to type of construction [yes/no]

◆ Wood frame	yes	1.5
◆ Ordinary construction		1
◆ Non-combustible construction		0.8
◆ Fire resistive construction (< 2 hrs)		0.7
◆ Fire resistive construction (> 2 hrs)		0.6
◆ Interpolation (Using FUS Tables)		

A Area of structure considered (m^2) ***1,310*** <==> 14,101 ft^2

(All floors excluding Basement)

F Required fire flow (L/min)

F = 220 C $(A)^{0.5}$ ***11,944 L/min***

Occupancy hazard reduction of surcharge [yes/no]

◆ Non-combustible		-25%
◆ Limited combustible	yes	-15%
◆ Combustible		0%
◆ Free burning		15%
◆ Rapid burning		25%

10,152 L/min **(1)**

Sprinkler Reduction

◆ Non-combustible - Fire Resistive (3) no 50% ***0 L/min*** **(2)**

Exposure surcharge (cumulative (%)) [yes/no]

0 - 3 m		25%		
3.1 - 10 m		20%		
10.1 - 20 m		15%		
20.1 - 30 m	yes	10%	3 side	30%
30.1- 45 m		5%		
			Cumulative Total	**30%**

Note: Exposure surcharge accounts for 2 Fire Walls at 10% as per FUS. 3,046 L/min

Fire Wall Separation

◆ Number of Party Walls * 1000 L/min

(As per City of Ottawa Standard) ***3,046 L/min*** **(3)**

REQUIRED FIRE FLOW [(1) - (2) + (3)]		***13,198 L/min***
(2,000 L/min < Fire Flow < 45,000 L/min)	***or***	***219.97 L/s***
	or	***2,906 IGPM***

BY: *Steve Zorgel*

Fire Flow Calculations - Deschatelets Unit

As per Fire Underwriter's Survey Guidelines

PROJECT: Greystone Village - 175 Main St **DATE: May 10, 2017**
JOB#: 114025
Townhouse Unit #7b - 3 firebreaks

C	**Coefficient related to type of construction**	[yes/no]			
	◆ Wood frame	yes	1.5		
	◆ Ordinary construction		1		
	◆ Non-combustible construction		0.8		
	◆ Fire resistive construction (< 2 hrs)		0.7		
	◆ Fire resistive construction (> 2 hrs)		0.6		
	◆ Interpolation (Using FUS Tables)				
A	**Area of structure considered (m^2)**	***1,115***	<==>	12,002 ft^2	
	(All floors excluding Basement)				
F	**Required fire flow (L/min)**				
	$F = 220\ C\ (A)^{0.5}$			***11,019 L/min***	
	Occupancy hazard reduction of surcharge	[yes/no]			
	◆ Non-combustible		-25%		
	◆ Limited combustible	yes	-15%		
	◆ Combustible		0%		
	◆ Free burning		15%		
	◆ Rapid burning		25%		
				9,366 L/min	**(1)**
	Sprinkler Reduction				
	◆ Non-combustible - Fire Resistive (3)	no	50%	***0 L/min***	**(2)**
	Exposure surcharge (cumulative (%))	[yes/no]			
	0 - 3 m		25%		
	3.1 - 10 m		20%		
	10.1 - 20 m	yes	15%	1 side	15%
	20.1 - 30 m	yes	10%	1 side	10%
	30.1- 45 m	yes	5%	1 side	5%
				Cumulative Total	**30%**
	Note: Exposure surcharge accounts for Fire Wall at 10% as per FUS.			2,810 L/min	
	Fire Wall Separation				
	◆ Number of Party Walls * 1000 L/min				
	(As per City of Ottawa Standard)			***2,810 L/min***	**(3)**

REQUIRED FIRE FLOW [(1) - (2) + (3)]		***12,176 L/min***
(2,000 L/min < Fire Flow < 45,000 L/min)	***or***	***202.94 L/s***
	or	***2,681 IGPM***

BY: *Steve Zorgel*

Fire Flow Calculations - Condo Units

As per Fire Underwriter's Survey Guidelines

PROJECT: Greystone Village - 175 Main St **DATE: June 3, 2022**
JOB#: 114025
CONDO UNIT #8 - 9 Floors

C	**Coefficient related to type of construction**	[yes/no]		
	◆ Wood frame		1.5	
	◆ Ordinary construction		1	
	◆ Non-combustible construction	yes	0.8	
	◆ Fire resistive construction (< 2 hrs)		0.7	
	◆ Fire resistive construction (> 2 hrs)		0.6	
	◆ Interpolation (Using FUS Tables)			
A	**Area of structure considered (m^2)**	***7,830***	<==>	84,281 ft^2
	(All floors excluding Basement)			
F	**Required fire flow (L/min)**			
	$F = 220\ C\ (A)^{0.5}$			***15,574 L/min***

Occupancy hazard reduction of surcharge	[yes/no]				
◆ Non-combustible		-25%			
◆ Limited combustible	yes	-15%			
◆ Combustible		0%			
◆ Free burning		15%			
◆ Rapid burning		25%			
				13,238 L/min	**(1)**
Sprinkler Reduction					
◆ Non-combustible - Fire Resistive (3)	yes	50%		***6,619 L/min***	**(2)**
Exposure surcharge (cumulative (%))	[yes/no]				
0 - 3 m		25%			
3.1 - 10 m	yes	20%	1 side	20%	
10.1 - 20 m		15%			
20.1 - 30 m	yes	10%	2 side	20%	
30.1- 45 m		5%			
		Cumulative Total		**40%**	
Note: Exposure surcharge accounts for 2 Fire Walls at 10% as per FUS.				5,295 L/min	
Fire Wall Separation					
◆ Number of Party Walls * 1000 L/min					
(As per City of Ottawa Standard)				***5,295 L/min***	**(3)**

REQUIRED FIRE FLOW [(1) - (2) + (3)]		***11,914 L/min***
(2,000 L/min < Fire Flow < 45,000 L/min)	***or***	***198.57 L/s***
	or	***2,623 IGPM***

BY: *Steve Zorgel*

Fire Flow Calculations - Condo Units

As per Fire Underwriter's Survey Guidelines

PROJECT: Greystone Village - 175 Main St **DATE: May 10, 2017**

JOB#: 114025

CONDO UNIT #9a - full area of two 9 storey condos

C Coefficient related to type of construction [yes/no]

Wood frame		1.5
Ordinary construction		1
Non-combustible construction	yes	0.8
Fire resistive construction (< 2 hrs)		0.7
Fire resistive construction (> 2 hrs)		0.6
Interpolation (Using FUS Tables)		

A Area of structure considered (m^2) ***28,500*** <==> 306,771 ft^2

(All floors excluding Basement)

F Required fire flow (L/min)

$F = 220\, C\, (A)^{0.5}$ ***29,712 L/min***

Occupancy hazard reduction of surcharge [yes/no]

Non-combustible		-25%
Limited combustible	yes	-15%
Combustible		0%
Free burning		15%
Rapid burning		25%

25,255 L/min **(1)**

Sprinkler Reduction

- Non-combustible - Fire Resistive (3) yes 50% ***12,628 L/min*** **(2)**

Exposure surcharge (cumulative (%)) [yes/no]

0 - 3 m		25%		
3.1 - 10 m	yes	20%	1 side	20%
10.1 - 20 m		15%		
20.1 - 30 m	yes	10%	2 side	20%
30.1- 45 m	yes	5%	1 side	5%
		Cumulative Total		**45%**

11,365 L/min

Fire Wall Separation

- Number of Party Walls * 1000 L/min

(As per City of Ottawa Standard) ***11,365 L/min*** **(3)**

REQUIRED FIRE FLOW [(1) - (2) + (3)]		***23,993 L/min***
(2,000 L/min < Fire Flow < 45,000 L/min)	***or***	***399.88 L/s***
	or	***5,282 IGPM***

BY: *Steve Zorgel*

Fire Flow Calculations - Condo Units

As per Fire Underwriter's Survey Guidelines

PROJECT: Greystone Village - 175 Main St **DATE: May 10, 2017**
JOB#: 114025
CONDO UNIT #9b - firebreak at phase line to divide 9 storey buildings
50% sprinkler system, Limited Combustiblility

C	**Coefficient related to type of construction**	[yes/no]			
	◆ Wood frame		1.5		
	◆ Ordinary construction		1		
	◆ Non-combustible construction	yes	0.8		
	◆ Fire resistive construction (< 2 hrs)		0.7		
	◆ Fire resistive construction (> 2 hrs)		0.6		
	◆ Interpolation (Using FUS Tables)				
A	**Area of structure considered (m^2)**	***14,625***	<==>	157,422 ft^2	
	(All floors excluding Basement)				
F	**Required fire flow (L/min)**				
	$F = 220\ C\ (A)^{0.5}$			***21,284 L/min***	
	Occupancy hazard reduction of surcharge	[yes/no]			
	◆ Non-combustible		-25%		
	◆ Limited combustible	yes	-15%		
	◆ Combustible		0%		
	◆ Free burning		15%		
	◆ Rapid burning		25%		
				18,092 L/min	**(1)**
	Sprinkler Reduction				
	◆ Non-combustible - Fire Resistive (3)	yes	50%	***9,046 L/min***	**(2)**
	Exposure surcharge (cumulative (%))	[yes/no]			
	0 - 3 m		25%		
	3.1 - 10 m	yes	20%	1 side	20%
	10.1 - 20 m		15%		
	20.1 - 30 m	yes	10%	2 side	20%
	30.1- 45 m	yes	5%	1 side	5%
			Cumulative Total		**45%**
	Note: Exposure surcharge accounts for Fire Wall at 10% as per FUS.			8,141 L/min	
	Fire Wall Separation				
	◆ Number of Party Walls * 1000 L/min				
	(As per City of Ottawa Standard)			***8,141 L/min***	**(3)**

REQUIRED FIRE FLOW [(1) - (2) + (3)]		***17,187 L/min***
(2,000 L/min < Fire Flow < 45,000 L/min)	***or***	***286.45 L/s***
	or	***3,784 IGPM***

BY: *Steve Zorgel*

Fire Flow Calculations - Condo Units

As per Fire Underwriter's Survey Guidelines

PROJECT: Greystone Village - 175 Main St **DATE: March 12, 2020**

JOB#: 114025

CONDO UNIT #10 - 8 Floors

C	**Coefficient related to type of construction**	[yes/no]			
	◆ Wood frame		1.5		
	◆ Ordinary construction		1		
	◆ Non-combustible construction	yes	0.8		
	◆ Fire resistive construction (< 2 hrs)		0.7		
	◆ Fire resistive construction (> 2 hrs)		0.6		
	◆ Interpolation (Using FUS Tables)				
A	**Area of structure considered (m^2)**	***11,670***	<==>	125,615 ft^2	
	(All floors excluding Basement)				
F	**Required fire flow (L/min)**				
	$F = 220\ C\ (A)^{0.5}$			***19,013 L/min***	
	Occupancy hazard reduction of surcharge	[yes/no]			
	◆ Non-combustible		-25%		
	◆ Limited combustible	yes	-15%		
	◆ Combustible		0%		
	◆ Free burning		15%		
	◆ Rapid burning		25%		
				16,161 L/min	**(1)**
	Sprinkler Reduction				
	◆ Non-combustible - Fire Resistive (3)	yes	50%	***8,080 L/min***	**(2)**
	Exposure surcharge (cumulative (%))	[yes/no]			
	0 - 3 m		25%		
	3.1 - 10 m		20%		
	10.1 - 20 m		15%		
	20.1 - 30 m	yes	10%	3 side	30%
	30.1- 45 m	yes	5%	1 side	5%
			Cumulative Total		**35%**
				5,656 L/min	
	Fire Wall Separation				
	◆ Number of Party Walls * 1000 L/min				
	(As per City of Ottawa Standard)			***5,656 L/min***	**(3)**

REQUIRED FIRE FLOW [(1) - (2) + (3)]		***13,737 L/min***
(2,000 L/min < Fire Flow < 45,000 L/min)	*or*	***228.95 L/s***
	or	***3,024 IGPM***

BY: *Steve Zorgel*

Fire Flow Calculations - Condo Units

As per Fire Underwriter's Survey Guidelines

PROJECT: Greystone Village - 175 Main St **DATE: May 10, 2017**

JOB#: 114025

CONDO UNIT #11 - 6 Floors

C	**Coefficient related to type of construction**	[yes/no]			
	◆ Wood frame		1.5		
	◆ Ordinary construction		1		
	◆ Non-combustible construction	yes	0.8		
	◆ Fire resistive construction (< 2 hrs)		0.7		
	◆ Fire resistive construction (> 2 hrs)		0.6		
	◆ Interpolation (Using FUS Tables)				
A	**Area of structure considered (m^2)**	***15,900***	<==>	171,146 ft^2	
	(All floors excluding Basement)				
F	**Required fire flow (L/min)**				
	$F = 220\ C\ (A)^{0.5}$			***22,193 L/min***	
	Occupancy hazard reduction of surcharge	[yes/no]			
	◆ Non-combustible		-25%		
	◆ Limited combustible	yes	-15%		
	◆ Combustible		0%		
	◆ Free burning		15%		
	◆ Rapid burning		25%		
				18,864 L/min	**(1)**
	Sprinkler Reduction				
	◆ Non-combustible - Fire Resistive (3)	yes	50%	***9,432 L/min***	**(2)**
	Exposure surcharge (cumulative (%))	[yes/no]			
	0 - 3 m		25%		
	3.1 - 10 m		20%		
	10.1 - 20 m		15%		
	20.1 - 30 m	yes	10%	2 side	20%
	30.1- 45 m	yes	5%	2 side	10%
			Cumulative Total		**30%**
				5,659 L/min	
	Fire Wall Separation				
	◆ Number of Party Walls * 1000 L/min				
	(As per City of Ottawa Standard)			***5,659 L/min***	**(3)**

REQUIRED FIRE FLOW [(1) - (2) + (3)]		***15,091 L/min***
(2,000 L/min < Fire Flow < 45,000 L/min)	***or***	***251.52 L/s***
	or	***3,323 IGPM***

BY: *Steve Zorgel*

Fire Flow Calculations -School Units

As per Fire Underwriter's Survey Guidelines

PROJECT: Greystone Village - 175 Main St **DATE: May 10, 2017**
JOB#: 114025
SCHOOL BUILDING #12

C Coefficient related to type of construction [yes/no]

◆ Wood frame		1.5
◆ Ordinary construction		1
◆ Non-combustible construction	yes	0.8
◆ Fire resistive construction (< 2 hrs)		0.7
◆ Fire resistive construction (> 2 hrs)		0.6
◆ Interpolation (Using FUS Tables)		

A Area of structure considered (m^2) ***11,118*** <==> 119,673 ft^2
(All floors excluding Basement)

F Required fire flow (L/min)
$F = 220\ C\ (A)^{0.5}$ ***18,558 L/min***

Occupancy hazard reduction of surcharge [yes/no]

◆ Non-combustible		-25%
◆ Limited combustible	yes	-15%
◆ Combustible		0%
◆ Free burning		15%
◆ Rapid burning		25%

15,774 L/min **(1)**

Sprinkler Reduction
◆ Non-combustible - Fire Resistive (3) yes 50% ***7,887 L/min*** **(2)**

Exposure surcharge (cumulative (%)) [yes/no]

0 - 3 m		25%		
3.1 - 10 m	yes	20%	1 side	20%
10.1 - 20 m		15%		
20.1 - 30 m	yes	10%	2 side	20%
30.1- 45 m	yes	5%	1 side	5%
		Cumulative Total		**45%**

7,098 L/min

Fire Wall Separation
◆ Number of Party Walls * 1000 L/min
(As per City of Ottawa Standard) ***7,098 L/min*** **(3)**

REQUIRED FIRE FLOW [(1) - (2) + (3)]		***14,985 L/min***
(2,000 L/min < Fire Flow < 45,000 L/min)	***or***	***249.76 L/s***
	or	***3,299 IGPM***

BY: *Steve Zorgel*

Fire Flow Calculations - Deschatelets Unit + Addition

As per Fire Underwriter's Survey Guidelines

PROJECT: Greystone Village - 175 Main St **DATE: June 3, 2022**

JOB#: 114025

DESCHATELETS UNIT #14 - 4 storeys + Gym Addition (assumed 4 storeys, conservative)

C Coefficient related to type of construction [yes/no]

◆ Wood frame		1.5	
◆ Ordinary construction		1	
◆ Non-combustible construction	yes	0.8	
◆ Fire resistive construction (< 2 hrs)		0.7	
◆ Fire resistive construction (> 2 hrs)		0.6	
◆ Interpolation (Using FUS Tables)			

A Area of structure considered (m^2) ***9,300*** <==> 100,104 ft^2

(All floors excluding Basement)

F Required fire flow (L/min)

$F = 220\ C\ (A)^{0.5}$ ***16,973 L/min***

Occupancy hazard reduction of surcharge [yes/no]

◆ Non-combustible		-25%		
◆ Limited combustible	yes	-15%		
◆ Combustible		0%		
◆ Free burning		15%		
◆ Rapid burning		25%		
			14,427 L/min	(1)

Sprinkler Reduction

◆ Non-combustible - Fire Resistive (3)	yes	50%	***7,213 L/min***	(2)

Exposure surcharge (cumulative (%)) [yes/no]

0 - 3 m		25%		
3.1 - 10 m	yes	20%	1 side	20%
10.1 - 20 m	yes	15%	1 side	15%
20.1 - 30 m	yes	10%	1 side	10%
30.1- 45 m	yes	5%	1 side	5%
		Cumulative Total		**50%**

7,213 L/min

Fire Wall Separation

◆ Number of Party Walls * 1000 L/min

(As per City of Ottawa Standard) ***7,213 L/min*** (3)

REQUIRED FIRE FLOW [(1) - (2) + (3)]		***14,427 L/min***
(2,000 L/min < Fire Flow < 45,000 L/min)	*or*	***240.45 L/s***
	or	***3,176 IGPM***

BY: *Steve Zorgel*

Fire Flow Calculations - Retirement Residence Unit

As per Fire Underwriter's Survey Guidelines

PROJECT: Greystone Village - 175 Main St **DATE:June 3, 2022**

JOB#: 114025

RETIREMENT RESIDENCE #17 - 8 Floors

C	**Coefficient related to type of construction**	[yes/no]			
	◆ Wood frame		1.5		
	◆ Ordinary construction		1		
	◆ Non-combustible construction	yes	0.8		
	◆ Fire resistive construction (< 2 hrs)		0.7		
	◆ Fire resistive construction (> 2 hrs)		0.6		
	◆ Interpolation (Using FUS Tables)				
A	**Area of structure considered (m^2)**	***13,500***	<==>	145,313 ft^2	
	(All floors excluding Basement)				
F	**Required fire flow (L/min)**				
	$F = 220\ C\ (A)^{0.5}$			***20,449 L/min***	
	Occupancy hazard reduction of surcharge	[yes/no]			
	◆ Non-combustible		-25%		
	◆ Limited combustible	yes	-15%		
	◆ Combustible		0%		
	◆ Free burning		15%		
	◆ Rapid burning		25%		
				17,382 L/min	**(1)**
	Sprinkler Reduction				
	◆ Non-combustible - Fire Resistive (3)	yes	50%	***8,691 L/min***	**(2)**
	Exposure surcharge (cumulative (%))	[yes/no]			
	0 - 3 m		25%		
	3.1 - 10 m		20%		
	10.1 - 20 m	yes	15%	2 side	30%
	20.1 - 30 m	yes	10%	1 side	10%
	30.1- 45 m		5%		
			Cumulative Total		**40%**
				6,953 L/min	
	Fire Wall Separation				
	◆ Number of Party Walls * 1000 L/min				
	(As per City of Ottawa Standard)			***6,953 L/min***	**(3)**

REQUIRED FIRE FLOW [(1) - (2) + (3)]		***15,644 L/min***
(2,000 L/min < Fire Flow < 45,000 L/min)	*or*	***260.73 L/s***
	or	***3,444 IGPM***

BY: *Steve Zorgel*

Fire Flow Calculations - Townhouse Unit

As per Fire Underwriter's Survey Guidelines

PROJECT: Greystone Village - 175 Main St **DATE: May 10, 2017**

JOB#: 114025

Townhouse Unit (6 units) #18 - North Village

C	**Coefficient related to type of construction**	[yes/no]			
	◆ Wood frame	yes	1.5		
	◆ Ordinary construction		1		
	◆ Non-combustible construction		0.8		
	◆ Fire resistive construction (< 2 hrs)		0.7		
	◆ Fire resistive construction (> 2 hrs)		0.6		
	◆ Interpolation (Using FUS Tables)				
A	**Area of structure considered (m^2)**	***1,005***	<==>	10,818 ft^2	
	(All floors excluding Basement)				
F	**Required fire flow (L/min)**				
	$F = 220\ C\ (A)^{0.5}$			***10,462 L/min***	
	Occupancy hazard reduction of surcharge	[yes/no]			
	◆ Non-combustible		-25%		
	◆ Limited combustible	yes	-15%		
	◆ Combustible		0%		
	◆ Free burning		15%		
	◆ Rapid burning		25%		
				8,892 L/min	**(1)**
	Sprinkler Reduction				
	◆ Non-combustible - Fire Resistive (3)	no	50%	***0 L/min***	**(2)**
	Exposure surcharge (cumulative (%))	[yes/no]			
	0 - 3 m	yes	25%	2 side	50%
	3.1 - 10 m		20%		
	10.1 - 20 m	yes	15%	1 side	15%
	20.1 - 30 m	yes	10%	1 side	10%
	30.1- 45 m		5%		
			Cumulative Total		**75%**
				6,669 L/min	
	Fire Wall Separation				
	◆ Number of Party Walls * 1000 L/min				
	(As per City of Ottawa Standard)			***6,669 L/min***	**(3)**

REQUIRED FIRE FLOW [(1) - (2) + (3)]		***15,562 L/min***
(2,000 L/min < Fire Flow < 45,000 L/min)	***or***	***259.36 L/s***
	or	***3,426 IGPM***

BY: *Steve Zorgel*

Fire Flow Calculations - Townhouse Unit

As per Fire Underwriter's Survey Guidelines

PROJECT: Greystone Village - 175 Main St **DATE: May 10, 2017**
JOB#: 114025
Townhouse Unit (6 units) #19

C	**Coefficient related to type of construction**	[yes/no]			
	◆ Wood frame	yes	1.5		
	◆ Ordinary construction		1		
	◆ Non-combustible construction		0.8		
	◆ Fire resistive construction (< 2 hrs)		0.7		
	◆ Fire resistive construction (> 2 hrs)		0.6		
	◆ Interpolation (Using FUS Tables)				
A	**Area of structure considered (m^2)**	***1,005***	<==>	10,818 ft^2	
	(All floors excluding Basement)				
F	**Required fire flow (L/min)**				
	$F = 220\ C\ (A)^{0.5}$			***10,462 L/min***	
	Occupancy hazard reduction of surcharge	[yes/no]			
	◆ Non-combustible		-25%		
	◆ Limited combustible	yes	-15%		
	◆ Combustible		0%		
	◆ Free burning		15%		
	◆ Rapid burning		25%		
				8,892 L/min	**(1)**
	Sprinkler Reduction				
	◆ Non-combustible - Fire Resistive (3)	no	50%	***0 L/min***	**(2)**
	Exposure surcharge (cumulative (%))	[yes/no]			
	0 - 3 m	yes	25%	1 side	25%
	3.1 - 10 m	yes	20%	2 side	40%
	10.1 - 20 m	yes	15%	1 side	15%
	20.1 - 30 m		10%		
	30.1- 45 m		5%		
			Cumulative Total		**75%**
				6,669 L/min	
	Fire Wall Separation				
	◆ Number of Party Walls * 1000 L/min				
	(As per City of Ottawa Standard)			***6,669 L/min***	**(3)**

REQUIRED FIRE FLOW [(1) - (2) + (3)]		***15,562 L/min***
(2,000 L/min < Fire Flow < 45,000 L/min)	*or*	***259.36 L/s***
	or	***3,426 IGPM***

BY: *Steve Zorgel*

Fire Flow Calculations - Single Unit

As per Fire Underwriter's Survey Guidelines

PROJECT: Greystone Village - 175 Main St **DATE: May 10, 2017**
JOB#: 114025
SINGLE UNIT #20

C	**Coefficient related to type of construction**	[yes/no]			
	◆ Wood frame	yes	1.5		
	◆ Ordinary construction		1		
	◆ Non-combustible construction		0.8		
	◆ Fire resistive construction (< 2 hrs)		0.7		
	◆ Fire resistive construction (> 2 hrs)		0.6		
	◆ Interpolation (Using FUS Tables)				
A	**Area of structure considered (m^2)**	***160***	<==>	1,722 ft^2	
	(All floors excluding Basement)				
F	**Required fire flow (L/min)**				
	$F = 220\ C\ (A)^{0.5}$			***4,174 L/min***	
	Occupancy hazard reduction of surcharge	[yes/no]			
	◆ Non-combustible		-25%		
	◆ Limited combustible	yes	-15%		
	◆ Combustible		0%		
	◆ Free burning		15%		
	◆ Rapid burning		25%		
				3,548 L/min	**(1)**
	Sprinkler Reduction				
	◆ Non-combustible - Fire Resistive (3)	no	50%	***0 L/min***	**(2)**
	Exposure surcharge (cumulative (%))	[yes/no]			
	0 - 3 m	yes	25%	2 side	50%
	3.1 - 10 m	yes	20%	1 side	20%
	10.1 - 20 m	yes	15%	1 side	15%
	20.1 - 30 m		10%		
	30.1- 45 m		5%		
			Cumulative Total		**75%**
				2,661 L/min	
	Fire Wall Separation				
	◆ Number of Party Walls * 1000 L/min				
	(As per City of Ottawa Standard)			***2,661 L/min***	**(3)**

REQUIRED FIRE FLOW [(1) - (2) + (3)]		***6,209 L/min***
(2,000 L/min < Fire Flow < 45,000 L/min)	***or***	***103.49 L/s***
	or	***1,367 IGPM***

BY: *Steve Zorgel*

Fire Flow Calculations - Single Unit

As per Fire Underwriter's Survey Guidelines

PROJECT: Greystone Village - 175 Main St **DATE: May 10, 2017**
JOB#: 114025
SINGLE UNIT #21

C Coefficient related to type of construction

	[yes/no]			
◆ Wood frame	yes	1.5		
◆ Ordinary construction		1		
◆ Non-combustible construction		0.8		
◆ Fire resistive construction (< 2 hrs)		0.7		
◆ Fire resistive construction (> 2 hrs)		0.6		
◆ Interpolation (Using FUS Tables)				

A Area of structure considered (m^2) ***205*** <==> 2,207 ft^2
(All floors excluding Basement)

F Required fire flow (L/min)
$F = 220\ C\ (A)^{0.5}$ ***4,725 L/min***

Occupancy hazard reduction of surcharge	[yes/no]			
◆ Non-combustible		-25%		
◆ Limited combustible	yes	-15%		
◆ Combustible		0%		
◆ Free burning		15%		
◆ Rapid burning		25%		
			4,016 L/min	(1)
Sprinkler Reduction				
◆ Non-combustible - Fire Resistive (3)	no	50%	***0 L/min***	(2)

Exposure surcharge (cumulative (%))	[yes/no]			
0 - 3 m	yes	25%	1 side	25%
3.1 - 10 m		20%		
10.1 - 20 m	yes	15%	2 side	30%
20.1 - 30 m		10%		
30.1- 45 m		5%		
		Cumulative Total		**55%**

2,209 L/min

Fire Wall Separation
◆ Number of Party Walls * 1000 L/min
(As per City of Ottawa Standard) ***2,209 L/min*** (3)

REQUIRED FIRE FLOW [(1) - (2) + (3)]		***6,225 L/min***
(2,000 L/min < Fire Flow < 45,000 L/min)	*or*	***103.75 L/s***
	or	***1,371 IGPM***

BY: *Steve Zorgel*

Fire Flow Calculations - Single Unit

As per Fire Underwriter's Survey Guidelines

PROJECT: Greystone Village - 175 Main St **DATE: May 10, 2017**
JOB#: 114025
SINGLE UNIT #22

C	**Coefficient related to type of construction**	[yes/no]			
	◆ Wood frame	yes	1.5		
	◆ Ordinary construction		1		
	◆ Non-combustible construction		0.8		
	◆ Fire resistive construction (< 2 hrs)		0.7		
	◆ Fire resistive construction (> 2 hrs)		0.6		
	◆ Interpolation (Using FUS Tables)				
A	**Area of structure considered (m^2)**	***280***	<==>	3,014 ft^2	
	(All floors excluding Basement)				
F	**Required fire flow (L/min)**				
	$F = 220\ C\ (A)^{0.5}$			***5,522 L/min***	
	Occupancy hazard reduction of surcharge	[yes/no]			
	◆ Non-combustible		-25%		
	◆ Limited combustible	yes	-15%		
	◆ Combustible		0%		
	◆ Free burning		15%		
	◆ Rapid burning		25%		
				4,694 L/min	**(1)**
	Sprinkler Reduction				
	◆ Non-combustible - Fire Resistive (3)	no	50%	***0 L/min***	**(2)**
	Exposure surcharge (cumulative (%))	[yes/no]			
	0 - 3 m	yes	25%	1 side	25%
	3.1 - 10 m	yes	20%	1 side	20%
	10.1 - 20 m		15%		
	20.1 - 30 m	yes	10%	1 side	10%
	30.1- 45 m		5%		
			Cumulative Total		**55%**
				2,582 L/min	
	Fire Wall Separation				
	◆ Number of Party Walls * 1000 L/min				
	(As per City of Ottawa Standard)			***2,582 L/min***	**(3)**

REQUIRED FIRE FLOW [(1) - (2) + (3)]		***7,275 L/min***
(2,000 L/min < Fire Flow < 45,000 L/min)	*or*	***121.25 L/s***
	or	***1,602 IGPM***

BY: *Steve Zorgel*

Fire Flow Calculations - Single Unit

As per Fire Underwriter's Survey Guidelines

PROJECT: Greystone Village - 175 Main St **DATE: May 10, 2017**
JOB#: 114025
SINGLE UNIT #23

C Coefficient related to type of construction [yes/no]

Wood frame	yes	1.5
Ordinary construction		1
Non-combustible construction		0.8
Fire resistive construction (< 2 hrs)		0.7
Fire resistive construction (> 2 hrs)		0.6
Interpolation (Using FUS Tables)		

A Area of structure considered (m^2) ***300*** <==> 3,229 ft^2
(All floors excluding Basement)

F Required fire flow (L/min)
$F = 220\ C\ (A)^{0.5}$ ***5,716 L/min***

Occupancy hazard reduction of surcharge [yes/no]

Non-combustible		-25%
Limited combustible	yes	-15%
Combustible		0%
Free burning		15%
Rapid burning		25%

4,858 L/min **(1)**

Sprinkler Reduction

Non-combustible - Fire Resistive (3)	no	50%	***0 L/min*** **(2)**

Exposure surcharge (cumulative (%)) [yes/no]

0 - 3 m	yes	25%	2 side	50%
3.1 - 10 m	yes	20%	1 side	20%
10.1 - 20 m		15%		
20.1 - 30 m		10%		
30.1- 45 m		5%		
		Cumulative Total		**70%**

3,401 L/min

Fire Wall Separation
- Number of Party Walls * 1000 L/min

(As per City of Ottawa Standard) ***3,401 L/min*** **(3)**

REQUIRED FIRE FLOW [(1) - (2) + (3)]		***8,259 L/min***
(2,000 L/min < Fire Flow < 45,000 L/min)	*or*	***137.65 L/s***
	or	***1,818 IGPM***

BY: *Steve Zorgel*

Fireflows at Node Locations (if applicable)

Date: June 3, 2022

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	300.00L/s
	Condo Unit 16 - 300.00L/s	
	Condo 15 - 267.00L/s L/s	
	Single Unit 23 - 137.65L/s	
N8	Townhouse 4a - 1 firebreak = 219.53L/s	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 15 - 267.00L/s L/s	
	Condo 8 - 198.57L/s L/s	
N9	Townhouse 7a - 219.97L/s	219.97L/s
	Townhouse 7b - 202.94L/s	
	Condo 8 - 198.57L/s L/s	
N10	School 12 - 249.76L/s	249.76L/s

Fireflows at Node Locations (if applicable)

Date: June 3, 2022

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 - 228.95L/s	
N12	Townhouse 7a - 219.97L/s	228.95L/s
	Townhouse 7b - 202.94L/s	
	Condo 10 - 228.95L/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	Deschatelets Building 14 - 240.45L/s	260.73L/s
	Retirement Residence Unit 17 - 260.73L/s	
	Townhouse 18 (259.36) - capped at 167L/s	
	Townhouse 19 - 259.36L/s	
N15	Retirement Residence Unit 17 - 260.73L/s	260.73L/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	Condo Unit 16 - 300.00L/s	300.00L/s
	Retirement Residence Unit 17 - 260.73L/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	Condo Unit 16 - 300.00L/s	300.00L/s
	Condo Unit 15 - 267.00L/s	
	Retirement Residence Unit 17 - 260.73L/s	
N22	Townhouse 5 - (268.88) capped at 167L/s	267.00L/s
	Condo Unit 15 - 267.00L/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: June 3, 2022

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 - 228.95L/s	228.95L/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

Fire Flow Calculations - Offsite Sisters' Building

As per Fire Underwriter's Survey Guidelines

PROJECT: Greystone Village - 175 Main St **DATE: May 10, 2017**

JOB#: 114025

Sisters' Building - West and North Wing (east wing separated by firewall). Sprinklered area only.

		[yes/no]				
C	**Coefficient related to type of construction**					
	• Wood frame		1.5			
	• Ordinary construction	yes	1			
	• Non-combustible construction		0.8			
	• Fire resistive construction (< 2 hrs)		0.7			
	• Fire resistive construction (> 2 hrs)		0.6			
	• Interpolation (Using FUS Tables)					
A	**Area of structure considered (m^2)**	***2,760***	<==>	29,708 ft^2		
	(All floors excluding Basement)					
F	**Required fire flow (L/min)**					
	F = 220 C $(A)^{0.5}$			***11,558 L/min***		
	Occupancy hazard reduction of surcharge	[yes/no]				
	• Non-combustible	yes	-25%			
	• Limited combustible		-15%			
	• Combustible		0%			
	• Free burning		15%			
	• Rapid burning		25%			
				8,668 L/min		**(1)**
	Sprinkler Reduction					
	• Non-combustible - Fire Resistive (3)	yes	30%	***2,601 L/min***		**(2)**
	Exposure surcharge (cumulative (%))	[yes/no]				
	0 - 3 m		25%			
	3.1 - 10 m	yes	20%	1 side	20%	
	10.1 - 20 m		15%			
	20.1 - 30 m	yes	10%	3 side	30%	
	30.1- 45 m		5%			
			Cumulative Total		**50%**	
				4,334 L/min		
	Fire Wall Separation					
	• Number of Party Walls * 1000 L/min					
	(As per City of Ottawa Standard)			***4,334 L/min***		**(3)**

REQUIRED FIRE FLOW [(1) - (2) + (3)]		***10,402 L/min***
(2,000 L/min < Fire Flow < 45,000 L/min)	***or***	***173.37 L/s***
	or	***2,290 IGPM***

BY: *Steve Zorgel*

Note: Building composition, firewalls, and location of sprinklers determined from meeting with site supervisor.

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required

1. Base Requirement

$F = 220C\sqrt{A}$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Non-Combustible Construction

C	0.8		*Type of Construction Coefficient per FUS Part II, Section 1*
A	4525.0	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	11839.2 L/min	
	12000.0 L/min	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Non-Combustible	-25%
Fire Flow	**9000.0 L/min**

3. Reduction for Sprinkler Protection

Sprinklered	-50%
Reduction	**-4500 L/min**

4. Increase for Separation Distance

N	10.1m-20m	15%	
S	30.1m-45m	5%	
E	3.1m-10m	20%	
W	>45m	0%	
	% Increase	**40%**	*value not to exceed 75% per FUS Part II, Section 4*
	Increase	**3600.0 L/min**	

Total Fire Flow

Fire Flow	8100.0 L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section*
	8000.0 L/min	*rounded to the nearest 1,000 L/min*

Notes:

-Type of construction, Occupancy Type and Sprinkler Protection information provided by client.

-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Calculations - Offsite Sisters' Building

As per Fire Underwriter's Survey Guidelines

PROJECT: Greystone Village - 175 Main St **DATE: May 10, 2017**

JOB#: 114025

Sisters' Building - West and North Wing (east wing separated by firewall). Sprinklered area only.

C	**Coefficient related to type of construction**	[yes/no]			
	◆ Wood frame		1.5		
	◆ Ordinary construction	yes	1		
	◆ Non-combustible construction		0.8		
	◆ Fire resistive construction (< 2 hrs)		0.7		
	◆ Fire resistive construction (> 2 hrs)		0.6		
	◆ Interpolation (Using FUS Tables)				
A	**Area of structure considered (m^2)**	***2,760***	<==>	29,708 ft^2	
	(All floors excluding Basement)				
F	**Required fire flow (L/min)**				
	$F = 220\ C\ (A)^{0.5}$			***11,558 L/min***	
	Occupancy hazard reduction of surcharge	[yes/no]			
	◆ Non-combustible	yes	-25%		
	◆ Limited combustible		-15%		
	◆ Combustible		0%		
	◆ Free burning		15%		
	◆ Rapid burning		25%		
				8,668 L/min	**(1)**
	Sprinkler Reduction				
	◆ Non-combustible - Fire Resistive (3)	yes	30%	***2,601 L/min***	**(2)**
	Exposure surcharge (cumulative (%))	[yes/no]			
	0 - 3 m		25%		
	3.1 - 10 m	yes	20%	1 side 20%	
	10.1 - 20 m		15%		
	20.1 - 30 m	yes	10%	3 side 30%	
	30.1- 45 m		5%		
			Cumulative Total	**50%**	
				4,334 L/min	
	Fire Wall Separation				
	◆ Number of Party Walls * 1000 L/min				
	(As per City of Ottawa Standard)			***4,334 L/min***	**(3)**

REQUIRED FIRE FLOW [(1) - (2) + (3)]		***10,402 L/min***
(2,000 L/min < Fire Flow < 45,000 L/min)	*or*	***173.37 L/s***
	or	***2,290 IGPM***

BY: *Steve Zorgel*

Note: Building composition, firewalls, and location of sprinklers determined from meeting with site supervisor.

3.0 WATER SUPPLY SERVICING

3.1 Existing Water Supply Services

The subject property lies within the City of Ottawa 1W pressure zone; as shown by the Pressure Zone map included in ***Appendix B***.

The site is currently serviceable via existing 203mm diameter local PVC watermains located within Main Street and Springhurst Avenue right-of-ways; as shown by the Water Distribution System map included in ***Drawings/Figures***.

3.2 Water Supply Servicing Design

It is proposed that the development be serviced via an independent 200mm diameter service connection to the existing 203mm diameter watermain within Springhurst Avenue. Servicing details are illustrated by ***SSGP-1***.

An existing municipally owned hydrant is located approximately 43m northwest of the residential entrance along the west side of Main Street.

Table 1 summarizes the ***Water Supply Guidelines*** employed in the preparation of the water demand estimate.

Table 1

Water Supply Design Criteria

Design Parameter	Value
Residential Bachelor Apartment	1.4 per/unit
Residential 1 Bedroom Apartment	1.4 per/unit
Residential 2 Bedroom Apartment	2.1 per/unit
Residential Average Daily Demand	350 L/d/P
Residential Maximum Daily Demand**	3.6 x Average Daily
Residential Maximum Hourly**	5.4 x Average Daily
Minimum Watermain Size	150mm diameter
Commercial floor space	2.5 $L/m^2/d$
Commercial Maximum Daily Demand	1.5 x Average Daily
Commercial Maximum Hourly	1.8 x Maximum Daily
Minimum Depth of Cover	2.4m from top of watermain to finished grade
During Peak Hourly Demand desired operating pressure is within	350kPa and 480kPa
During normal operating conditions pressure must not drop below	275kPa
During normal operating conditions pressure must not exceed	552kPa
During fire flow operating pressure must not drop below	140kPa

Daily average based on Appendix 4-A from **City Standards*
***Residential Max. Daily and Max. Hourly peaking factors per MOE Guidelines for Drinking-Water Systems Table 3-3 for 0 to 500 persons.*
-Table updated to reflect ISD-2010-2

Table 2 summarizes the anticipated water demand and boundary conditions for the proposed development based on the ***Water Supply Guidelines***.

Table 2

Water Demand and Boundary Conditions

Design Parameter	Anticipated Demand[1] (L/min)	Boundary Condition[2] (m H_2O / kPa)
Average Daily Demand	65.1	115.5 / 493.9
Max Day + Fire Flow	229.8 + 8,000 = 8229.8	89.2 / 235.9
Peak Hour	345.7	104.2 / 383.1

1) Water demand calculation per ***Water Supply Guidelines***. See ***Appendix B*** for detailed calculations.
2) Boundary conditions supplied by the City of Ottawa. Assumed ground elevation 65.15m. See ***Appendix A.***

Fire flow requirements are to be determined in accordance with Local Guidelines (***FUS***), City of Ottawa ***Water Supply Guidelines***, and the Ontario Building Code. For the proposed development, the ***FUS*** estimates that approximately ***8000L/s*** in addition to maximum daily demand is required for fire protection. A certified fire protection system specialist shall be employed to design the building fire suppression system(s) and confirm the actual fire flow demand. Detailed calculations are provided in ***Appendix B***.

The City of Ottawa was contacted to obtain boundary conditions associated with the estimated water demand as indicated in ***Appendix B***. The proposed demands in ***Table 2*** have increased approximately 3% over the requested demands as indicated in the correspondence in ***Appendix B***. The change in demand is not anticipated to have a significant impact on the boundary conditions.

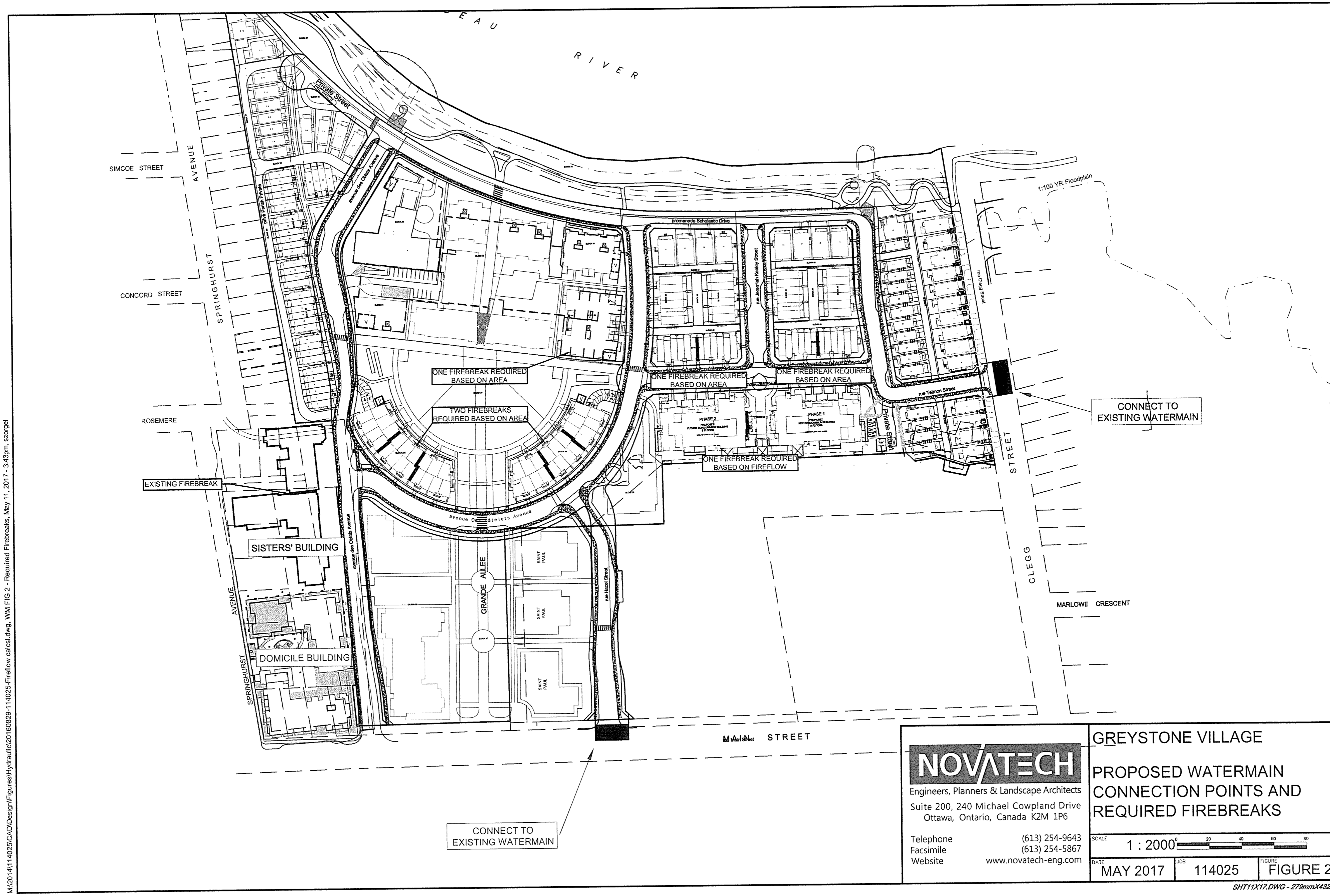
The minimum and maximum water pressure is available within the City's required pressure range during periods of average daily demand and peak hour demand (ie between 275kPa and 552kPa) at the ground floor level. The building will need to be equipped with a booster pump to meet desired pressure ranges at the higher floors.

Water for the purpose of firefighting is available above 140kPa; therefore sufficient water is available for firefighting purposes.

3.3 Water Supply Conclusion

Anticipated water demand under proposed conditions was submitted to the City of Ottawa for establishing boundary conditions. The City of Ottawa required pressure ranges are respected during all simulated conditions.

The proposed design conforms to the relevant City of Ottawa ***Water Supply Guidelines***.



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

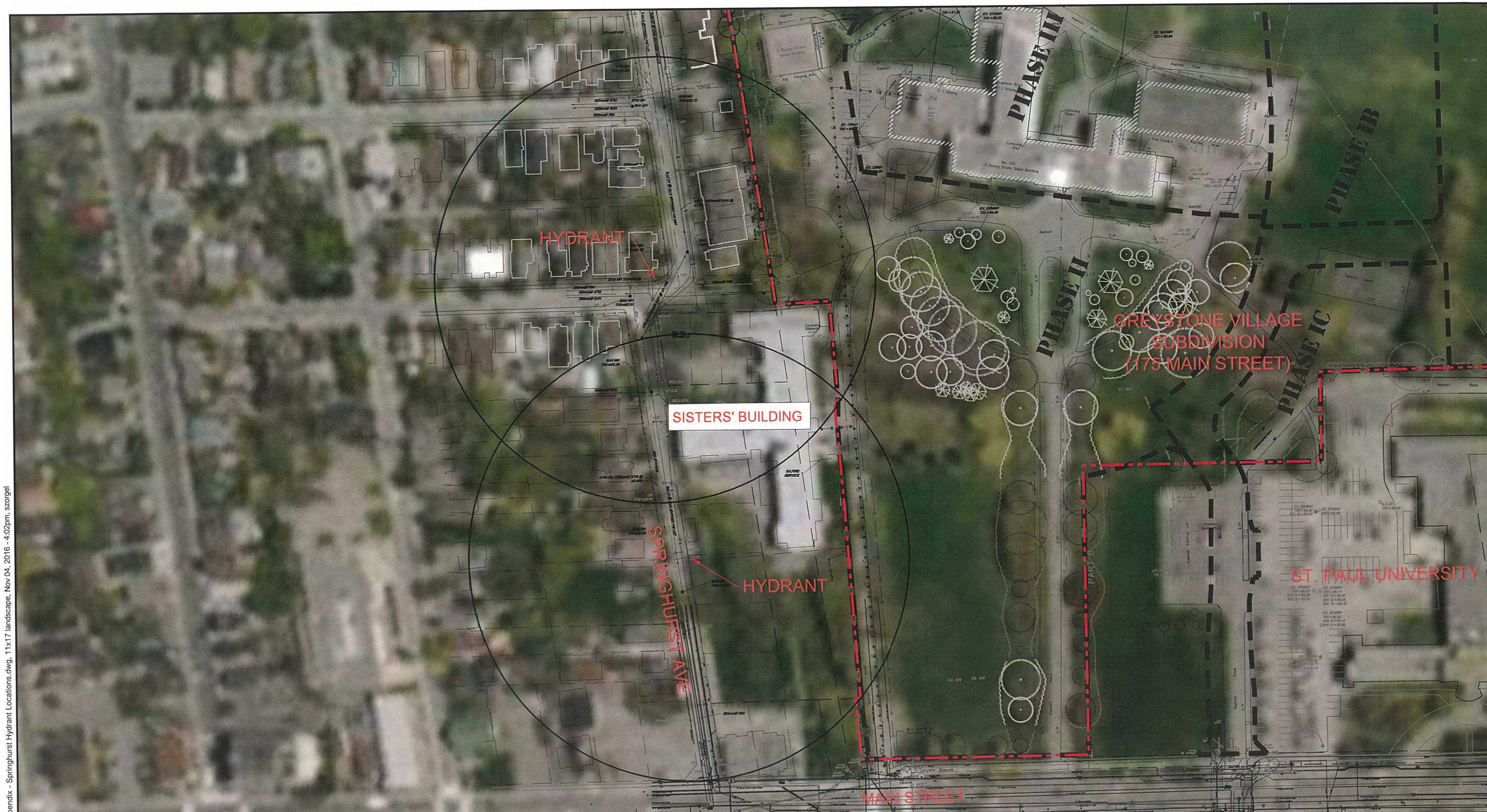
GREYSTONE VILLAGE

PROPOSED WATERMAIN CONNECTION POINTS AND REQUIRED FIREBREAKS

SCALE		
1 : 2000		
DATE MAY 2017	JOB 114025	FIGURE FIGURE 2

SHT11X17.DWG - 279mmX432mm

M:\2014\114025\CAD\Design\Figures\Hydraulic\20160829-114025-Fireflow calcs\.dwg, WM FIG 2 - Required Firebreaks, May 11, 2017 - 3:43pm, szorgel



M:\2014\114025\CAD\Design\Figures\Design Brief\Appendix - Springhurst Hydrant Locations.dwg, 11x17 landscape, Nov 04, 2016 - 4:02pm, szorgel

LEGEND

SITE BOUNDARY/PROPERTY LINE

FIRE PROTECTION AREA (90m RADIUS)

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

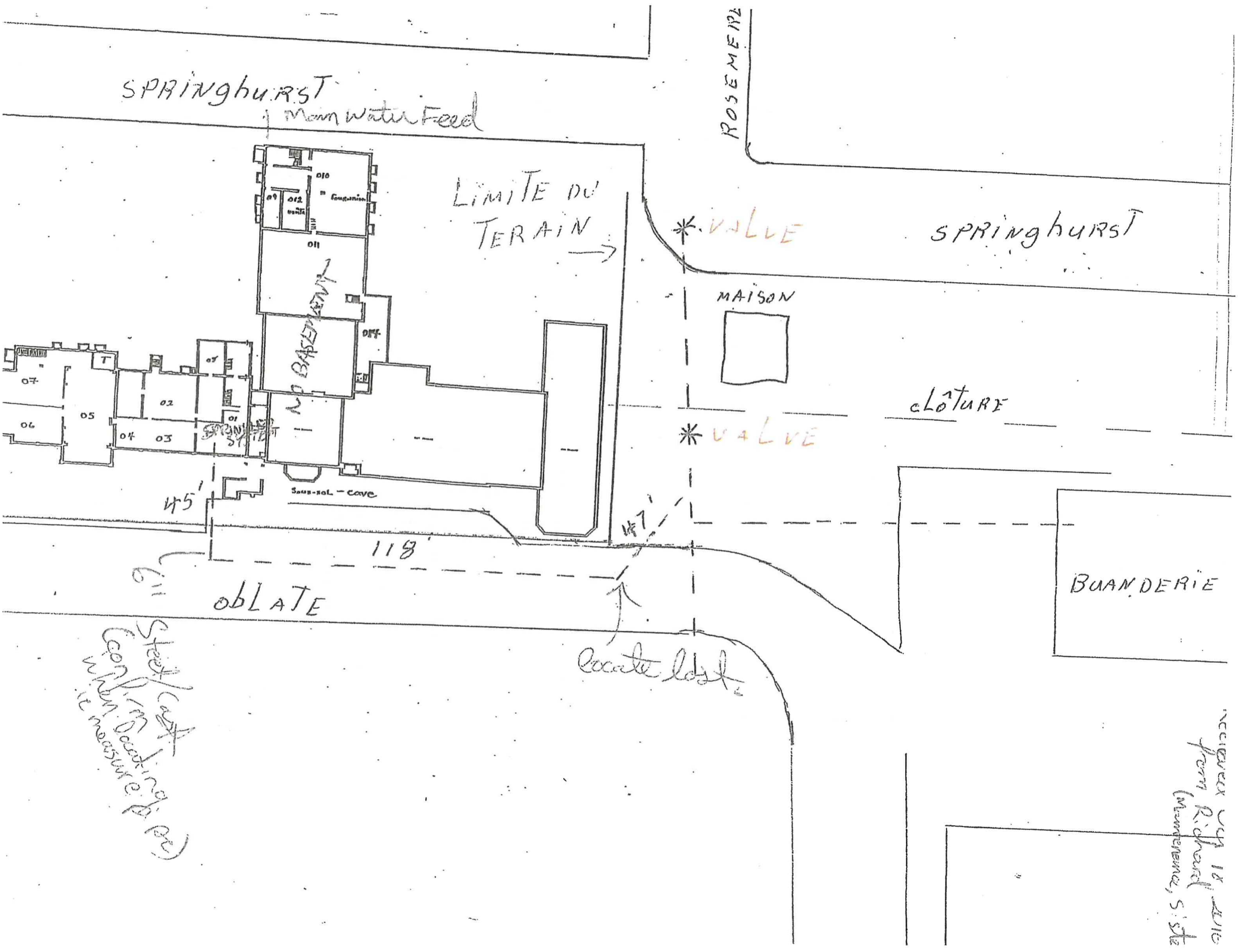
CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

HYDRANT FIRE PROTECTION AREA - SPRINGHURST AVE.

1 : 1500

MAY 2017	114025	FIGURE 3

SHT11X17.DWG - 279mmX432mm



SPRINGhuRST
Main water Feed
ROSEMERE
LIMITE DU TERAIN
VALVE
SPRINGhuRST
MAISON
CLÔTURE
VALVE
BUANDERIE
NO BASEMENT
Sous-sol - cave
OFF
010
011
012
09
07
05
06
02
03
04
01
45'
47'
118'
6''
oblATE
Locate last
Street
confirm location
from Richard
(Maintenance

Appendix C
Stormwater Management

GREYSTONE VILLAGE PHASE 3 CONDOS

Allowable Release Rate

Area ID	Area*	C Coefficent	Time (tc)	intensity	Qallow
	(ha)		min	mm/hr	(m^3)
Outlet 1					
14	0.018	0.57	10.00	104.19	2.96
21A	0.120	0.90	10.00	104.19	31.28
21B	0.020	0.70	10.00	104.19	4.01
22A	0.075	0.90	10.00	104.19	19.53
22B	0.061	0.53	10.00	104.19	9.33
24	0.003	0.72	10.00	104.19	0.63
Subtotal	0.30				67.74
Outlet 2					
B24	0.002	0.80	10.00	104.19	0.46
B17	0.030	0.77	10.00	104.19	6.69
B18	0.070	0.90	10.00	104.19	18.20
B19	0.052	0.90	10.00	104.19	13.45
B6	0.030	0.68	10.00	104.19	5.91
B20	0.163	0.48	10.00	104.19	22.68
B21	0.056	0.90	10.00	104.19	14.62
B5	0.010	0.60	10.00	104.19	1.76
B22	0.016	0.60	10.00	104.19	2.71
Subtotal	0.43				86.48
Grand Total	0.72				154.22

*Contributing areas from the Master Storm Drainage Plans 114025-STM1,114025-STM1-B,114025-STM2 within the Phase 3 Condo site boundary

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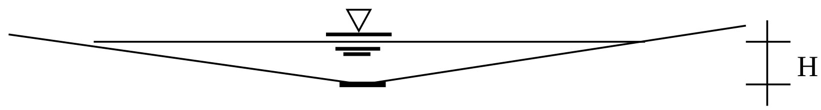
Runoff Coefficients

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**			

Zurn Roof Drains

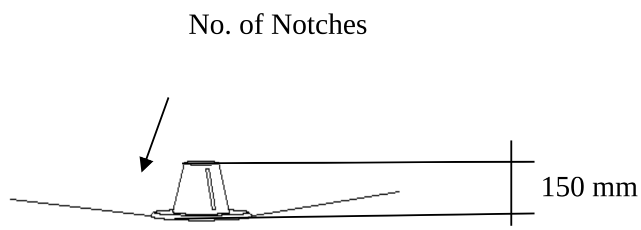
Opening	G.P.M. Per Inch of Head	L.P.M. Per Inch (25 mm) of Head	L/s Per Metre of Head	L/s Per 0.15 m of Head
Standard - X1	5.00	22.730	14.915	2.237
Reduced - X2	3.75	17.048	11.186	1.678
Reduced - X3	2.50	11.365	7.458	1.119
Max Reduced - X4	1.25	5.683	3.729	0.559



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

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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**

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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

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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.)

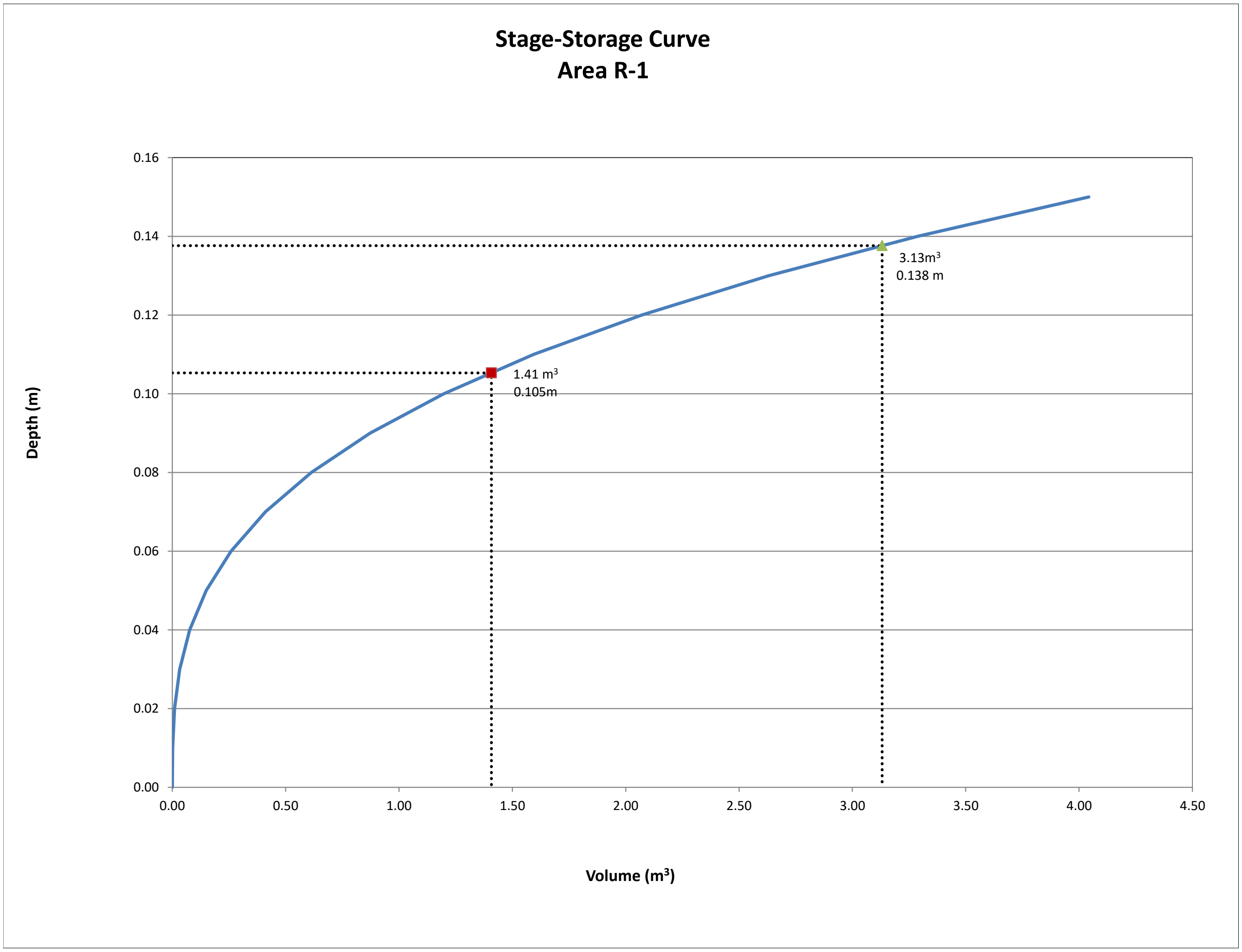
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	R-1	: BUILDING ROOF		
OTTAWA IDF CURVE				
Area =	0.009	ha	Qallow =	0.51
C =	1.00		Vol(max) =	3.13
			Notches =	1
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	5.86	5.35	1.61
10	178.56	4.31	3.80	2.28
15	142.89	3.45	2.94	2.65
20	119.95	2.90	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)
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)
3.13m³
0.138 m
1.41 m³
0.105m

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.)

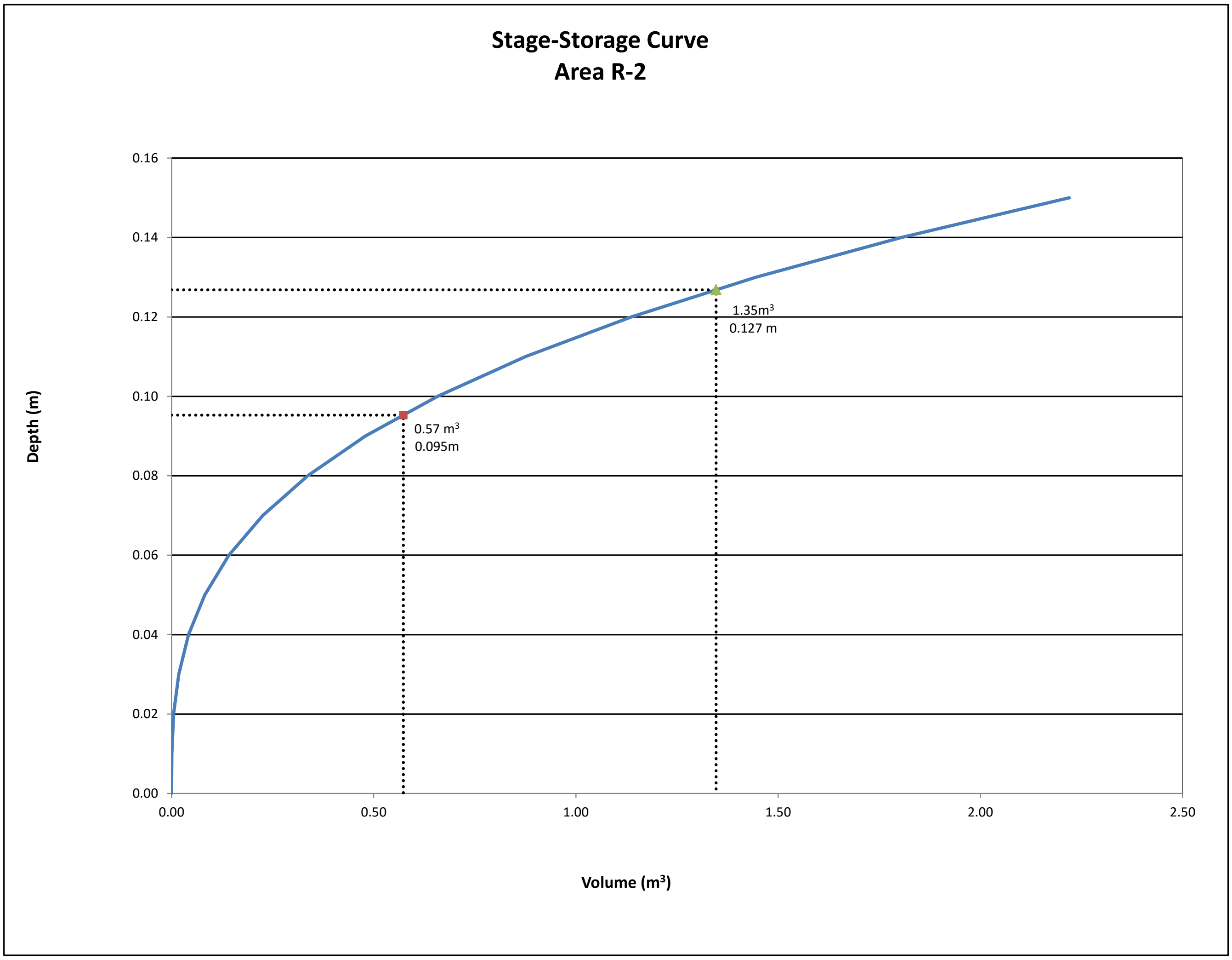
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	**R-2**	**: BUILDING ROOF**		
OTTAWA IDF CURVE				
Area =	0.005	ha	Qallow =	0.47
C =	1.00		Vol(max) =	1.35
			Notches =	1
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	3.20	2.73	0.82
10	178.56	2.35	1.88	1.13
15	142.89	1.88	1.41	1.27
20	119.95	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)
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
0.57 m³
0.095m
1.35m³
0.127 m

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.)

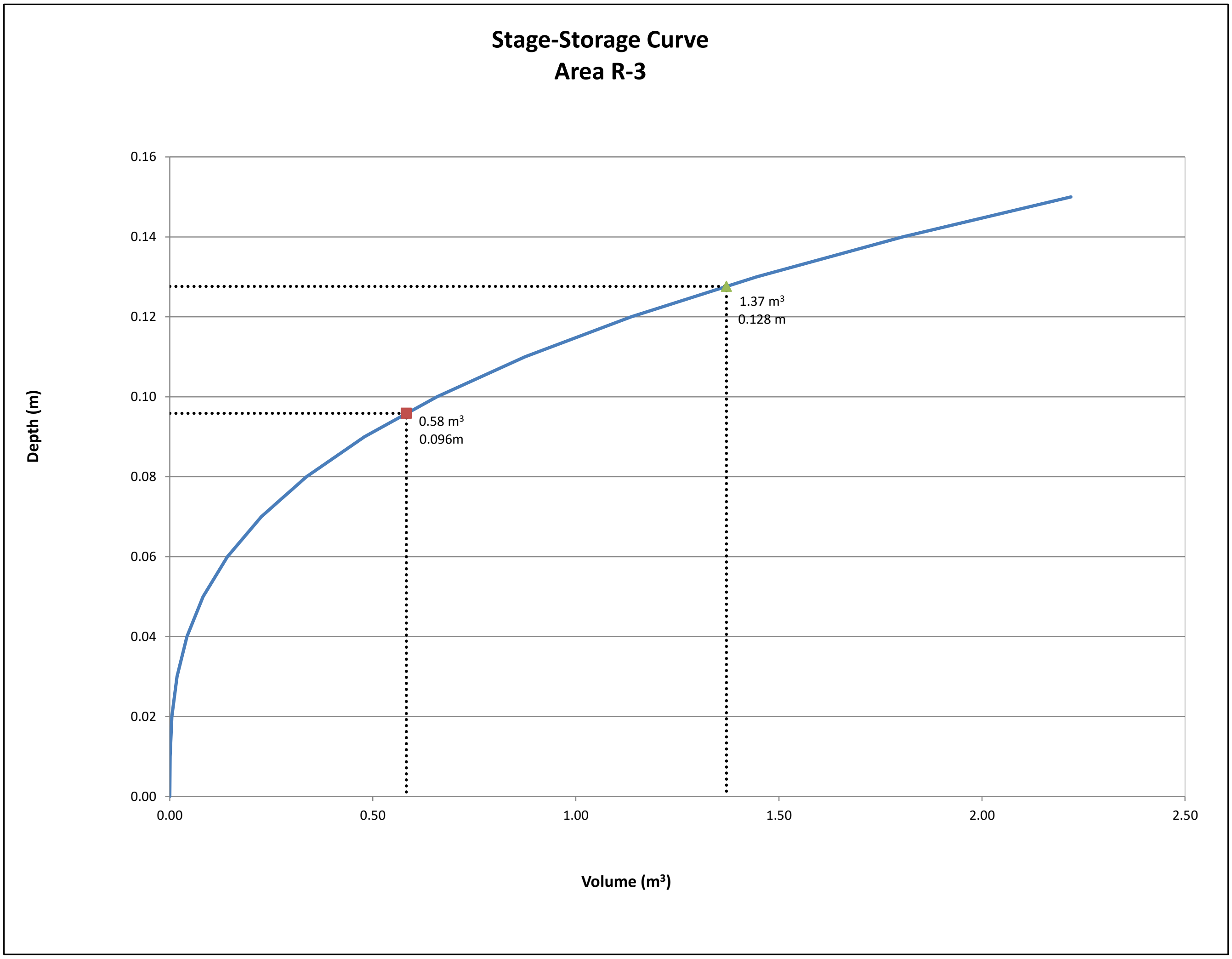
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	R-3	: BUILDING ROOF		
OTTAWA IDF CURVE				
Area =	0.005	ha	Qallow =	0.48
C =	1.00		Vol(max) =	1.37
			Notches =	1
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	3.25	2.77	0.83
10	178.56	2.39	1.91	1.15
15	142.89	1.91	1.44	1.29
20	119.95	1.60	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)
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
0.58 m³
0.096m
1.37 m³
0.128 m

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

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.)

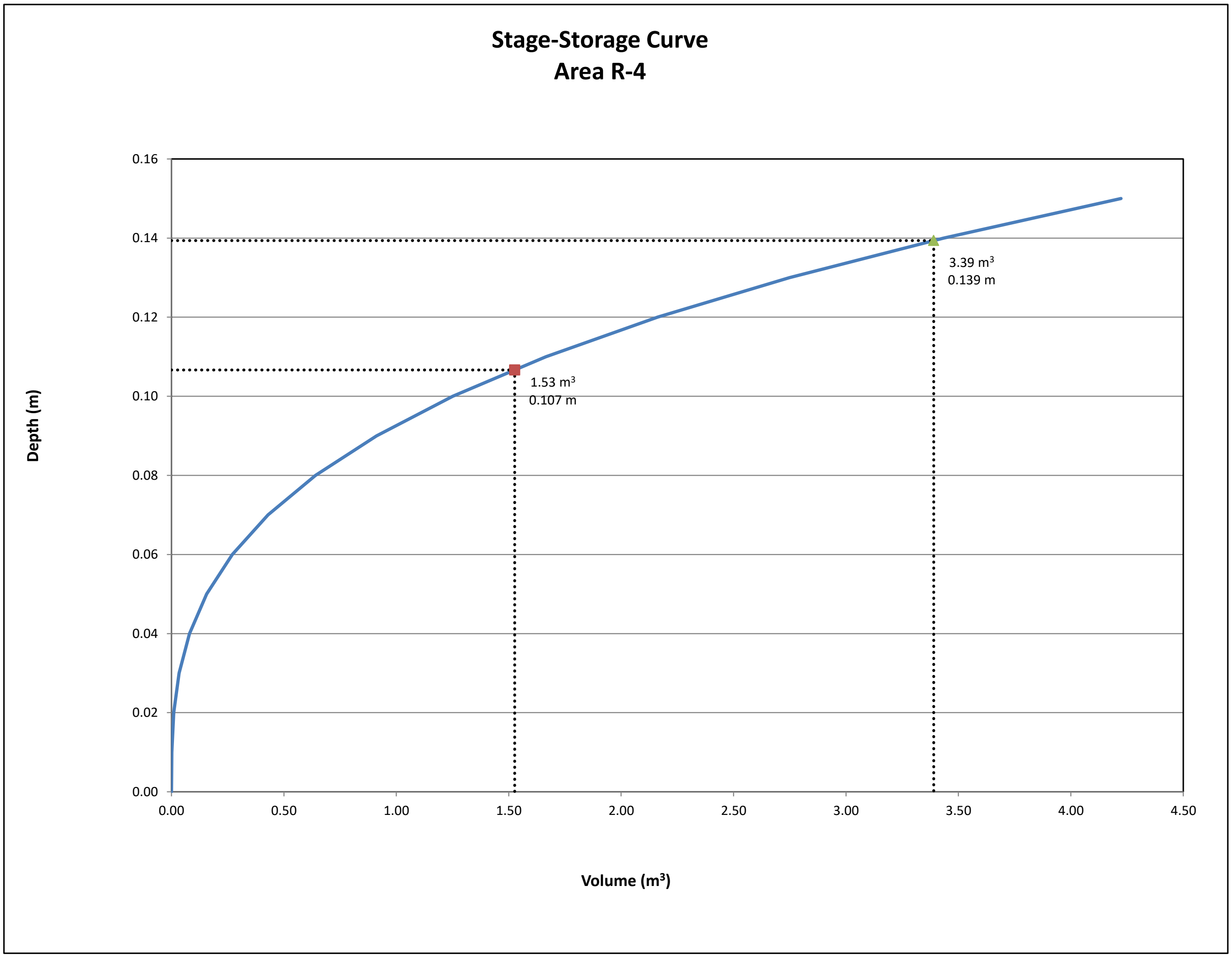
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	**R-4**	**: BUILDING ROOF**		
OTTAWA IDF CURVE				
Area =	0.009	ha	Qallow =	0.52
C =	1.00		Vol(max) =	3.39
			Notches =	1
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	6.24	5.72	1.72
10	178.56	4.59	4.07	2.44
15	142.89	3.67	3.15	2.84
20	119.95	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 (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)
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
3.39 m³
0.139 m
1.53 m³
0.107 m

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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.)

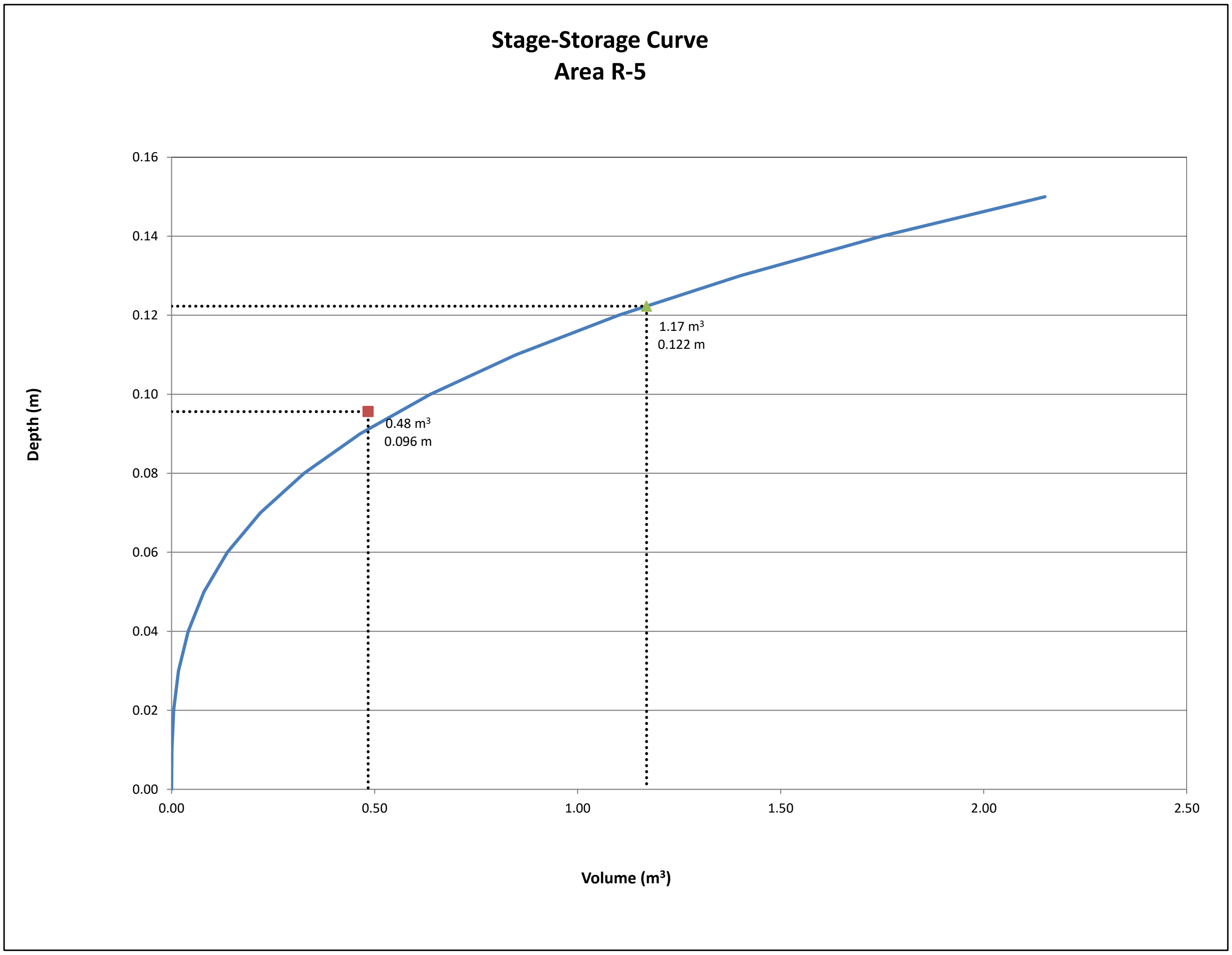
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	**R-5**	**: BUILDING ROOF**		
OTTAWA IDF CURVE				
Area =	0.0043	ha	Qallow =	0.46
C =	1.00		Vol(max) =	1.17
			Notches =	1
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	2.90	2.44	0.73
10	178.56	2.13	1.67	1.00
15	142.89	1.71	1.25	1.12
20	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
1.17 m³
0.122 m
0.48 m³
0.096 m
Volume (m³)

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

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.)

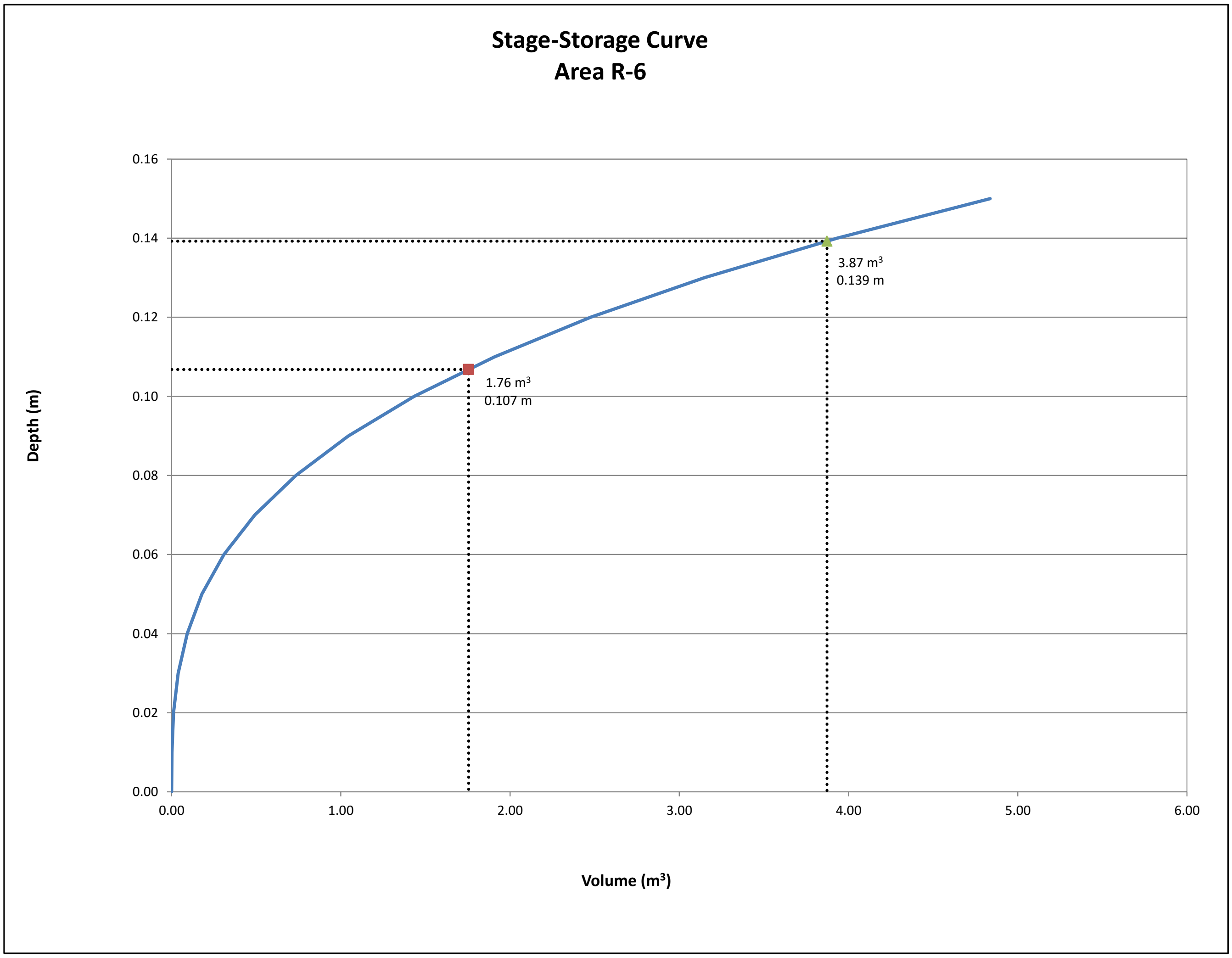
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	R-6	: BUILDING ROOF		
OTTAWA IDF CURVE				
Area =	0.0102	ha	Qallow =	0.52
C =	1.00		Vol(max) =	3.87
			Notches =	1
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	6.87	6.35	1.90
10	178.56	5.05	4.53	2.72
15	142.89	4.04	3.52	3.17
20	119.95	3.39	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 (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

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.)

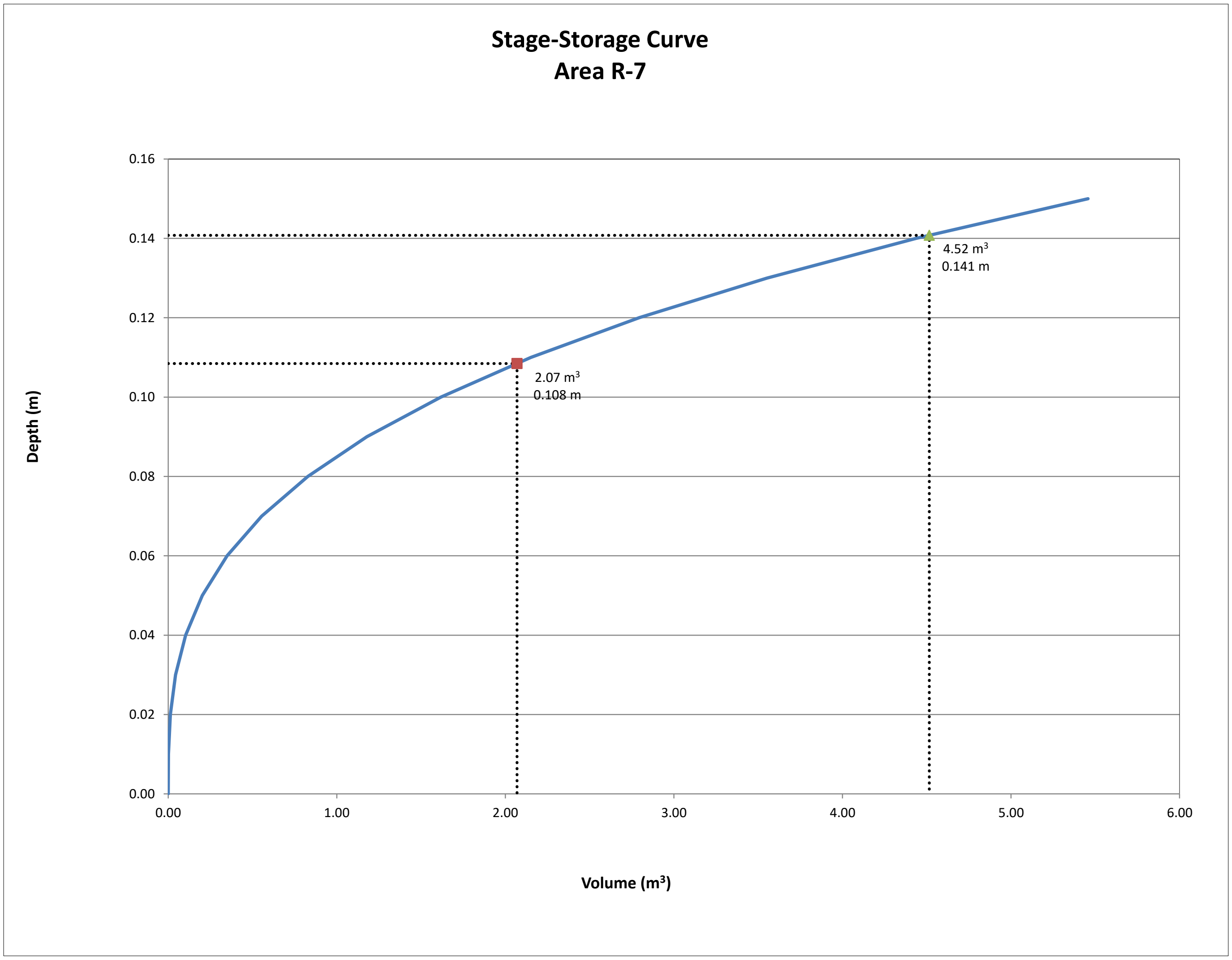
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	R-7	: BUILDING ROOF		
OTTAWA IDF CURVE				
Area =	0.0114	ha	Qallow =	0.52
C =	1.00		Vol(max) =	4.52
			Notches =	1
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	7.70	7.18	2.15
10	178.56	5.67	5.14	3.08
15	142.89	4.53	4.01	3.61
20	119.95	3.81	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)
2.07 m3
0.108 m
4.52 m3
0.141 m

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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.)

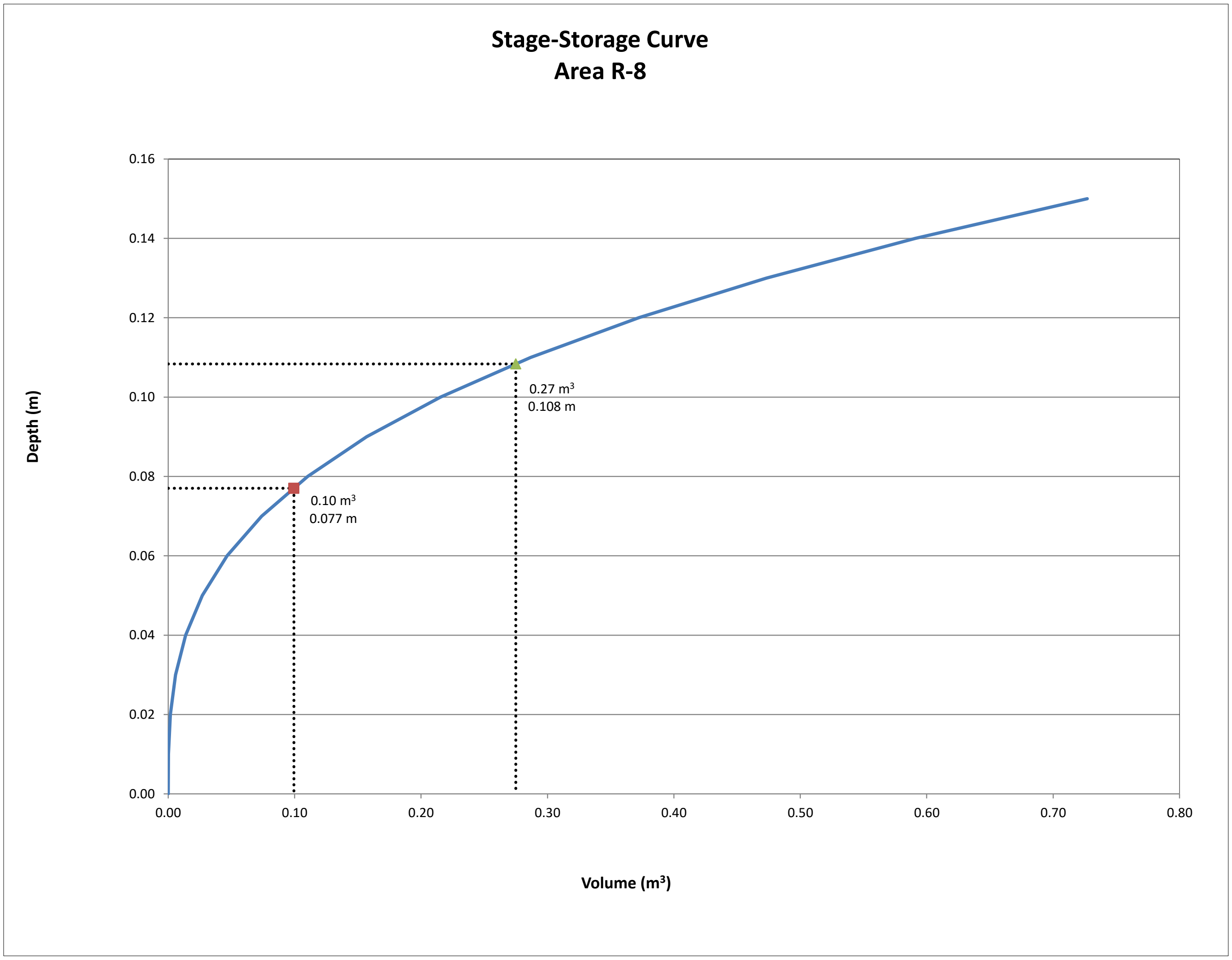
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	R-8	: BUILDING ROOF		
OTTAWA IDF CURVE				
Area =	0.0017	ha	Qallow =	0.40
C =	1.00		Vol(max) =	0.27
			Notches =	1
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	1.17	0.77	0.23
10	178.56	0.86	0.46	0.27
15	142.89	0.69	0.29	0.26
20	119.95	0.58	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
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
Volume (m³)
0.27 m³
0.108 m
0.10 m³
0.077 m

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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.)

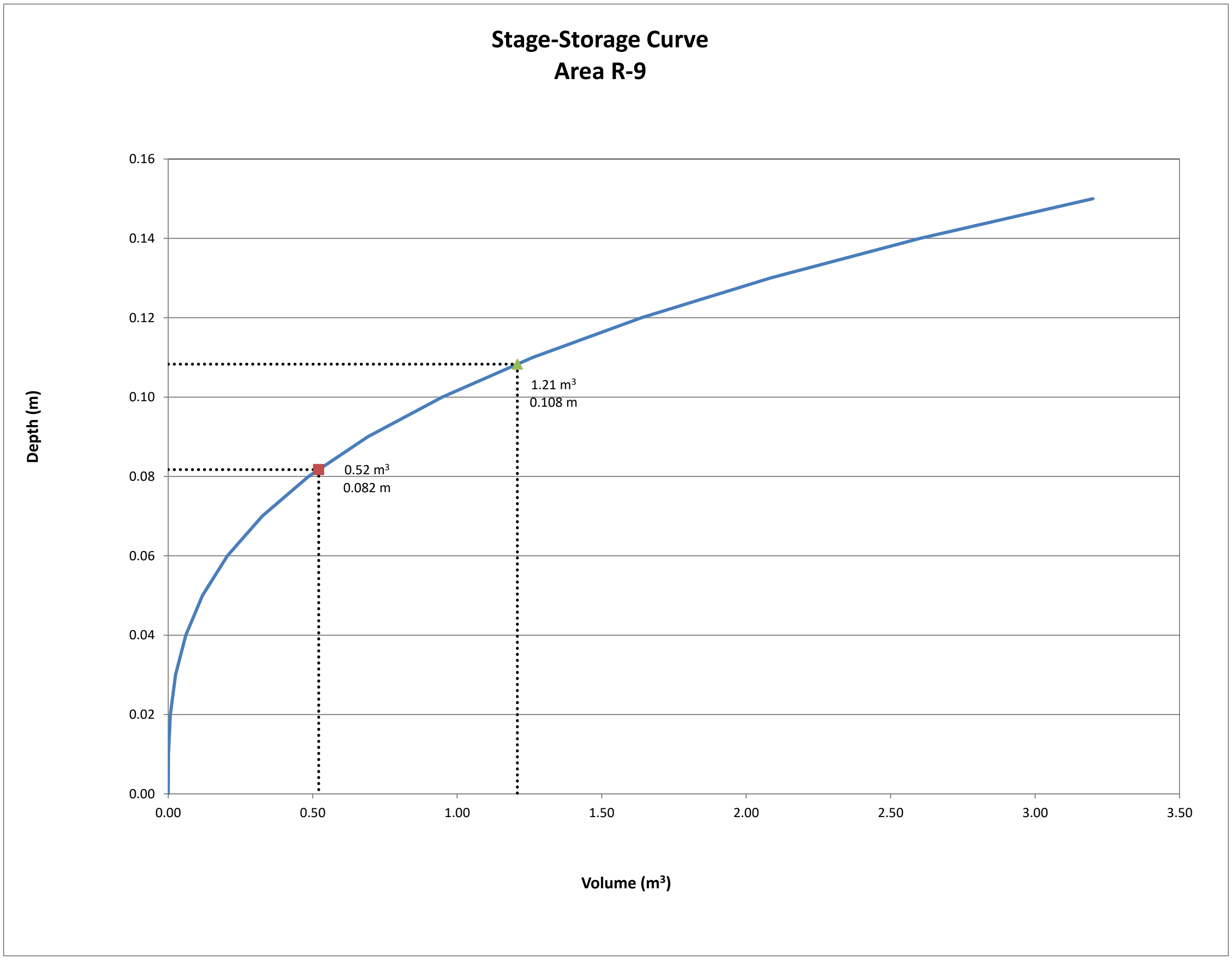
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	R-9	: BUILDING ROOF		
OTTAWA IDF CURVE				
Area =	0.0042	ha	Qallow =	0.40
C =	1.00		Vol(max) =	1.21
			Notches =	1
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	2.82	2.42	0.73
10	178.56	2.07	1.67	1.00
15	142.89	1.66	1.26	1.13
20	119.95	1.39	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

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.)

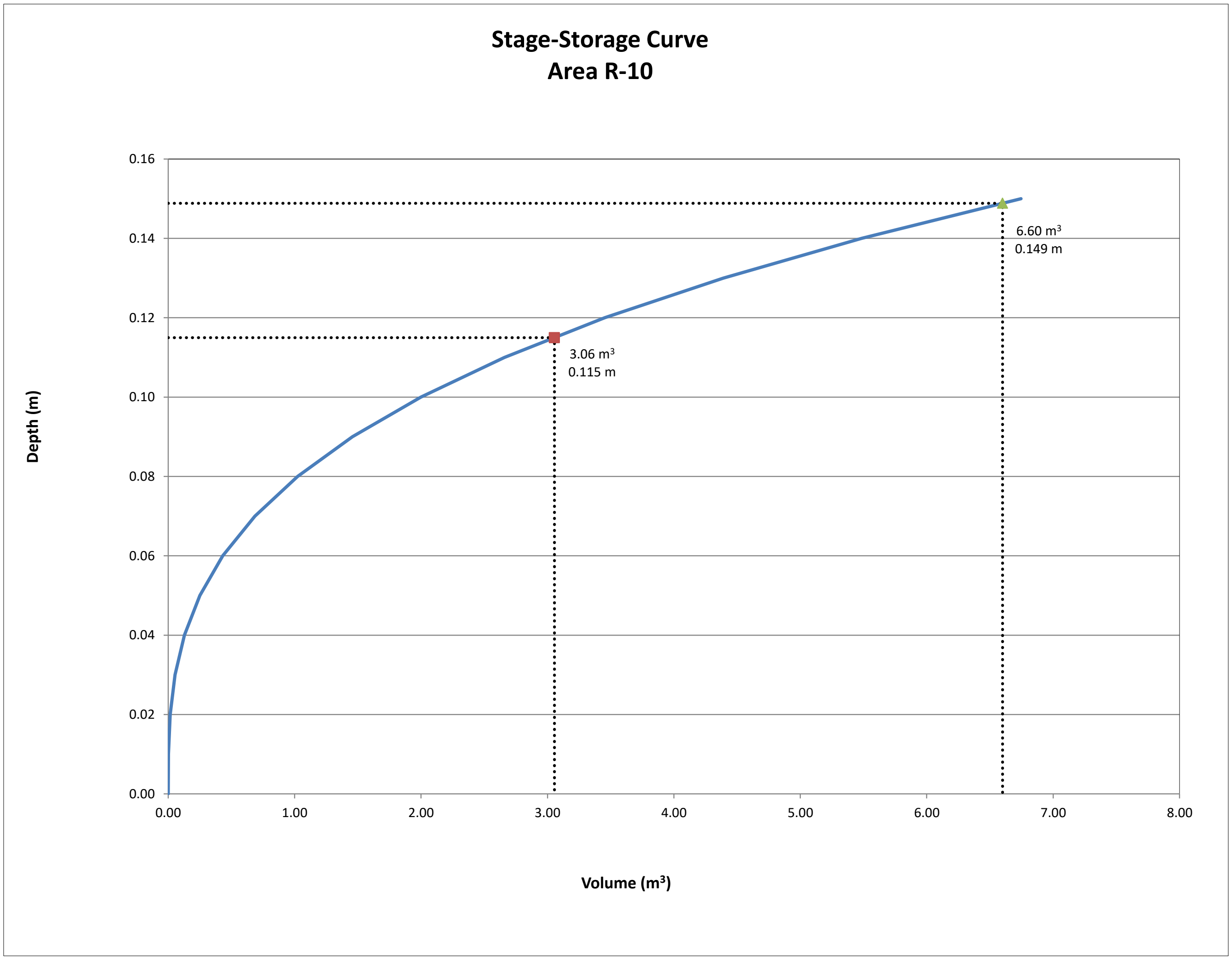
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	R-10	: BUILDING ROOF		
OTTAWA IDF CURVE				
Area =	0.0154	ha	Qallow =	0.56
C =	1.00		Vol(max) =	6.60
			Notches =	1
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	10.36	9.81	2.94
10	178.56	7.63	7.07	4.24
15	142.89	6.10	5.55	4.99
20	119.95	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)
Volume (m³)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
3.06 m³
0.115 m
6.60 m³
0.149 m

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

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**

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.)

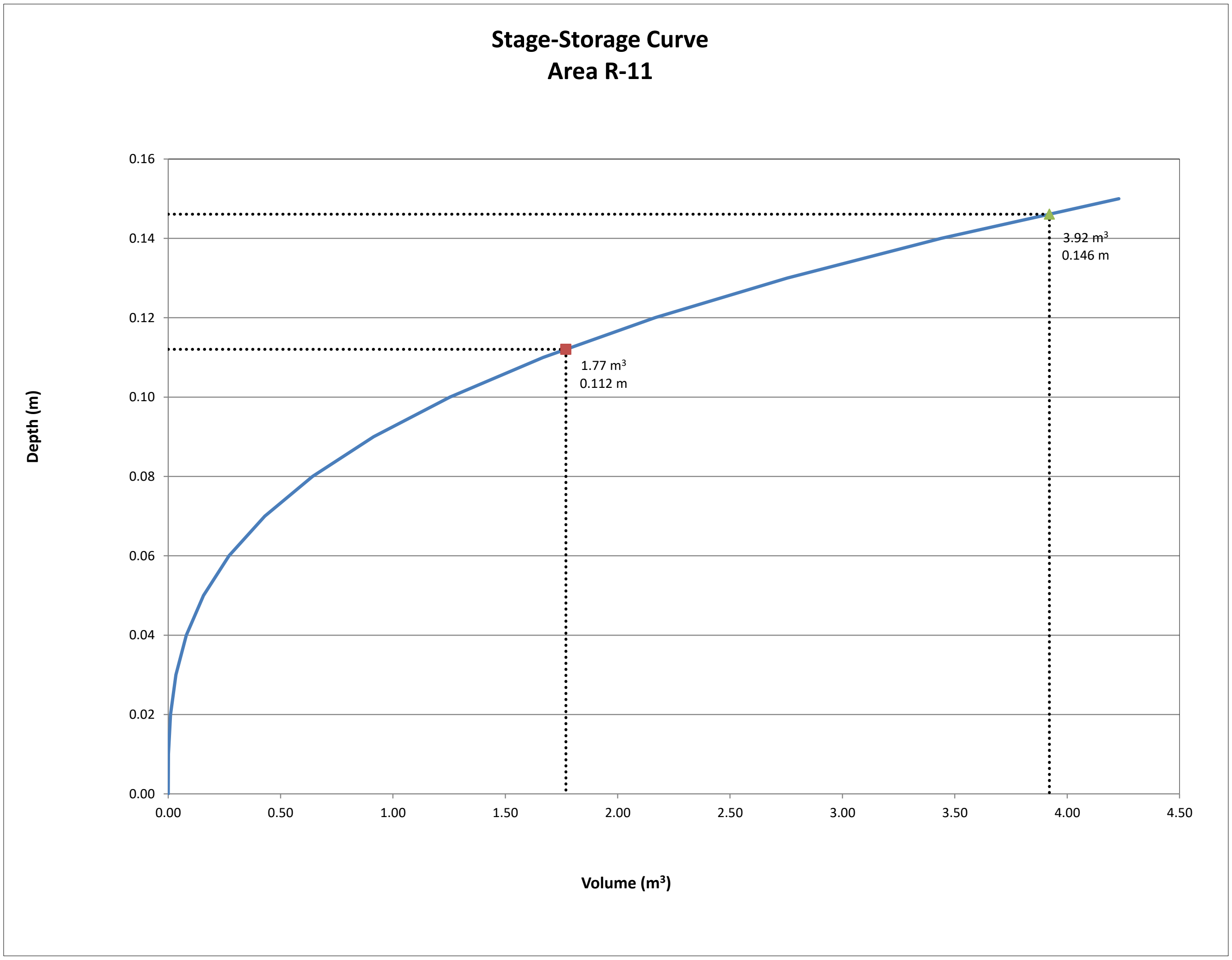
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	R-11	: BUILDING ROOF		
OTTAWA IDF CURVE				
Area =	0.0104	ha	Qallow =	0.54
C =	1.00		Vol(max) =	3.92
			Notches =	1
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	7.02	6.47	1.94
10	178.56	5.16	4.62	2.77
15	142.89	4.13	3.59	3.23
20	119.95	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 (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					
0.15	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
3.92 m^3
0.146 m
1.77 m^3
0.112 m
Volume (m^3)

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.)

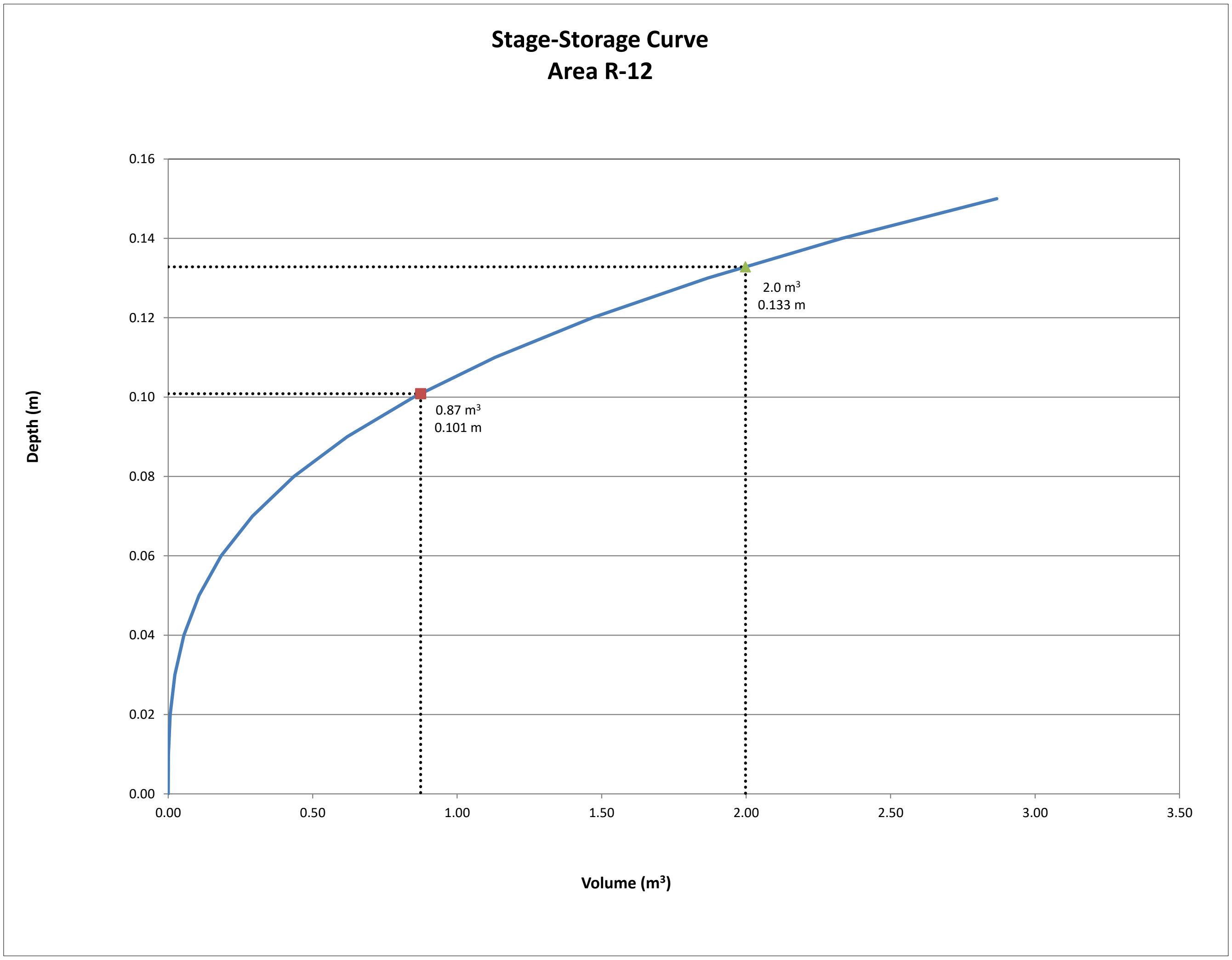
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	**R-12**	**: BUILDING ROOF**		
OTTAWA IDF CURVE				
Area =	0.0063	ha	Qallow =	0.50
C =	1.00		Vol(max) =	2.00
			Notches =	1
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	4.25	3.75	1.13
10	178.56	3.13	2.63	1.58
15	142.89	2.50	2.00	1.80
20	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)
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
2.0 m3
0.133 m
0.87 m3
0.101 m

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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.)

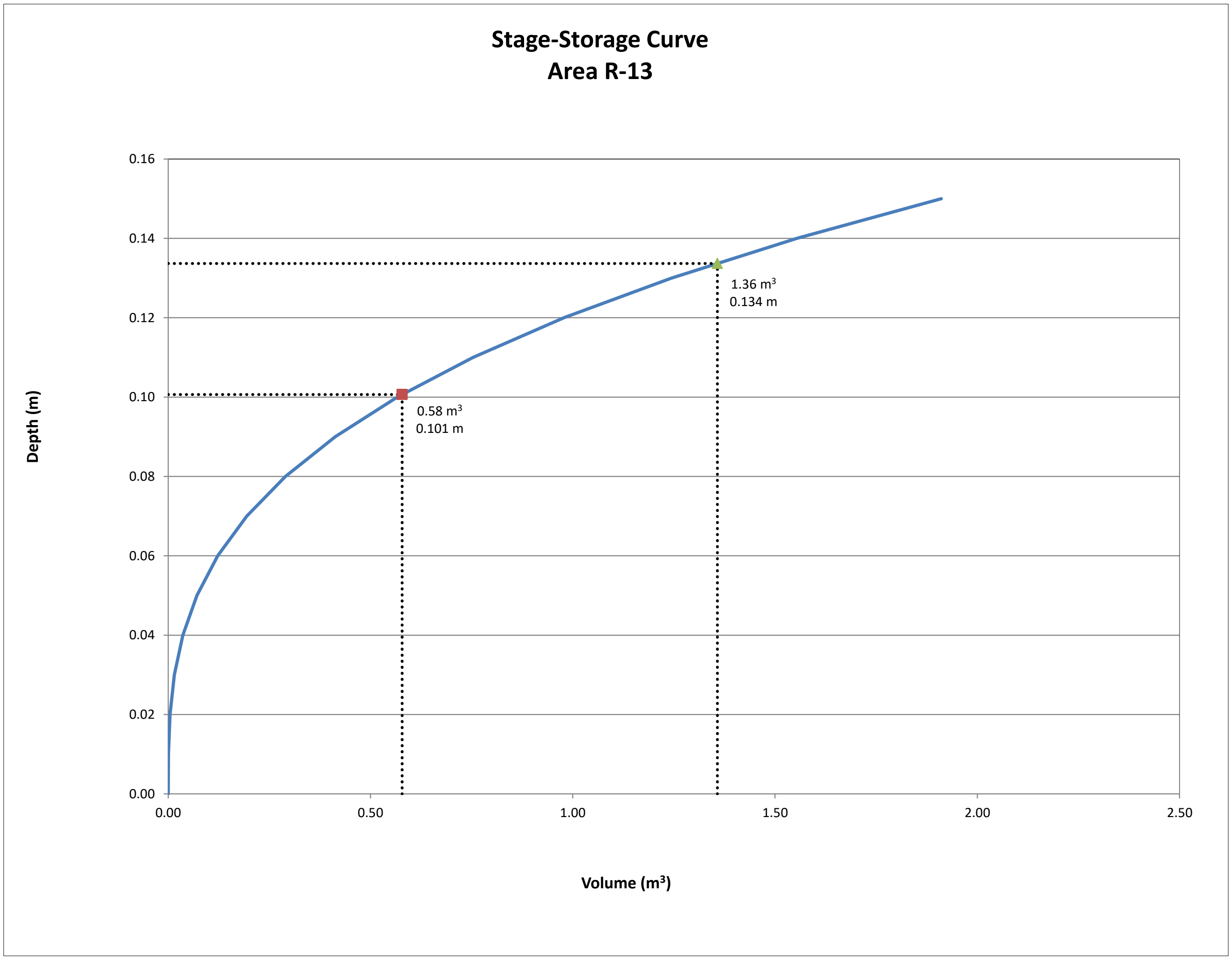
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	**R-13**	**: BUILDING ROOF**		
OTTAWA IDF CURVE				
Area =	0.0049	ha	Qallow =	0.50
C =	1.00		Vol(max) =	1.36
			Notches =	1
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	3.28	2.78	0.84
10	178.56	2.42	1.92	1.15
15	142.89	1.93	1.43	1.29
20	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)
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
1.36 m³
0.134 m
0.58 m³
0.101 m

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.)

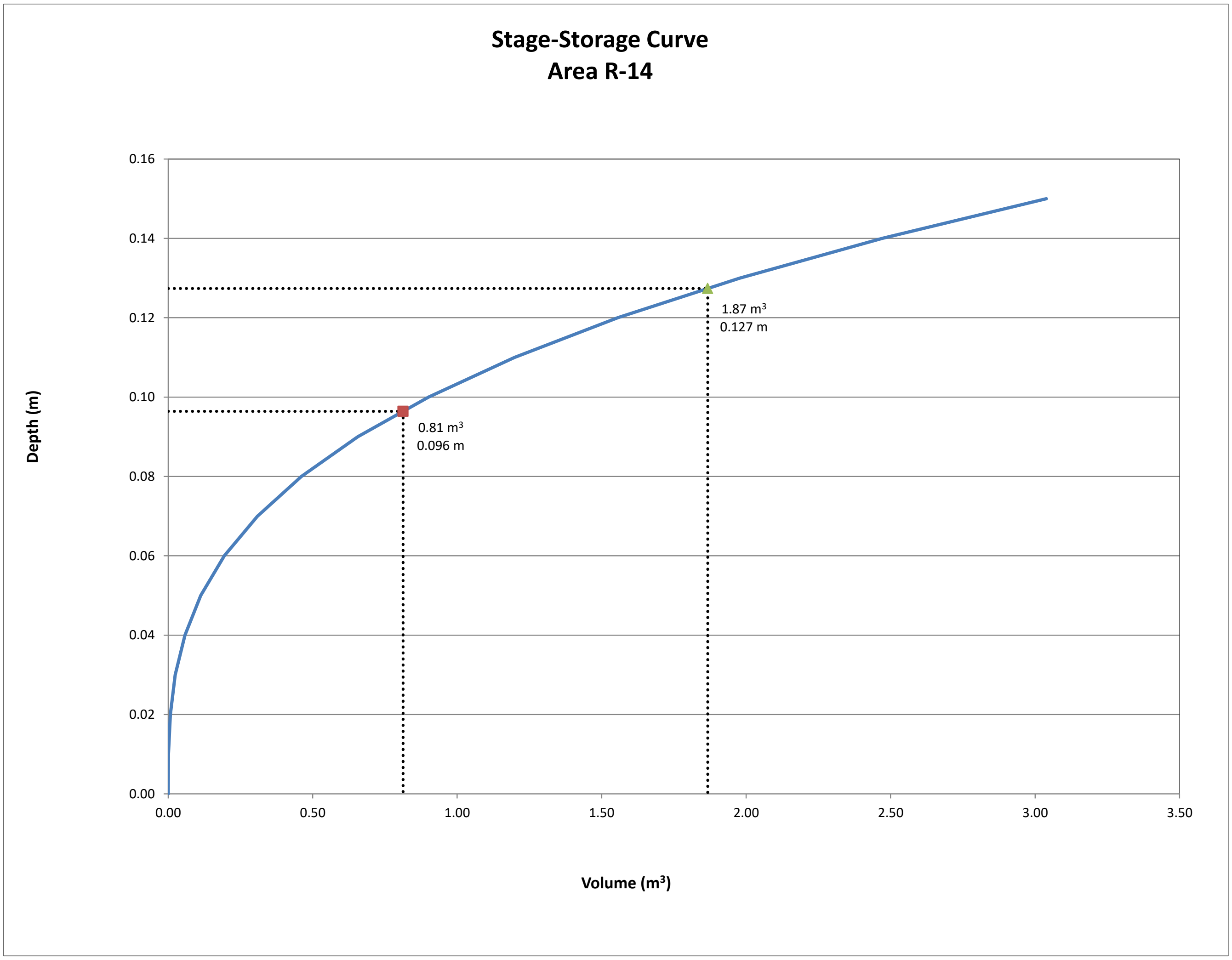
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	R-14	: BUILDING ROOF		
OTTAWA IDF CURVE				
Area =	0.0059	ha	Qallow =	0.47
C =	1.00		Vol(max) =	1.87
			Notches =	1
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	3.98	3.51	1.05
10	178.56	2.93	2.46	1.48
15	142.89	2.34	1.87	1.69
20	119.95	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)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
0.50
1.00
1.50
2.00
2.50
3.00
3.50
0.81 m³
0.096 m
1.87 m³
0.127 m

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.)

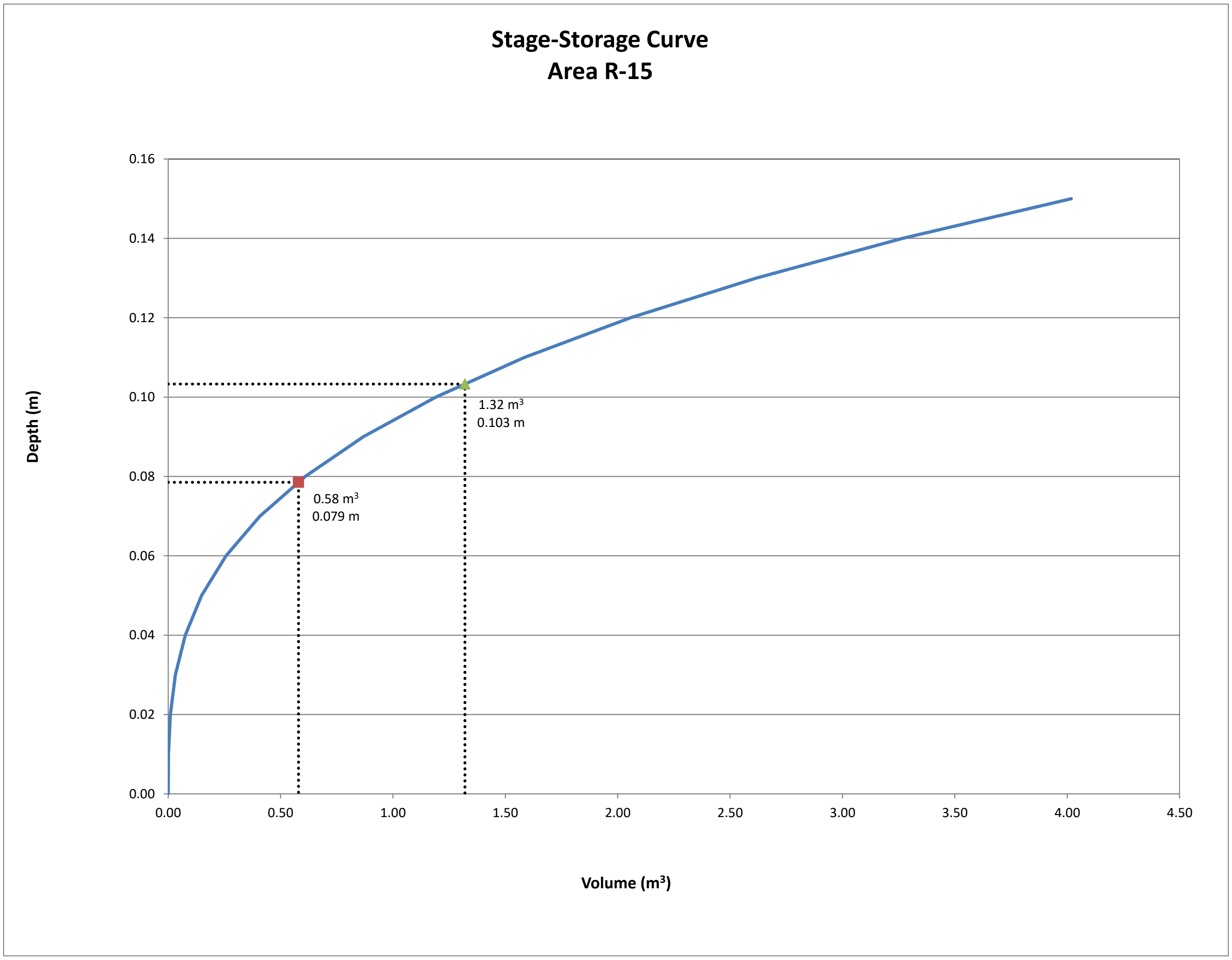
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	R-15	: BUILDING ROOF		
OTTAWA IDF CURVE				
Area =	0.0044	ha	Qallow =	0.39
C =	1.00		Vol(max) =	1.32
			Notches =	1
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	2.97	2.58	0.77
10	178.56	2.18	1.79	1.08
15	142.89	1.75	1.36	1.22
20	119.95	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
1.32 m3
0.103 m
0.58 m3
0.079 m
Volume (m3)

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.)

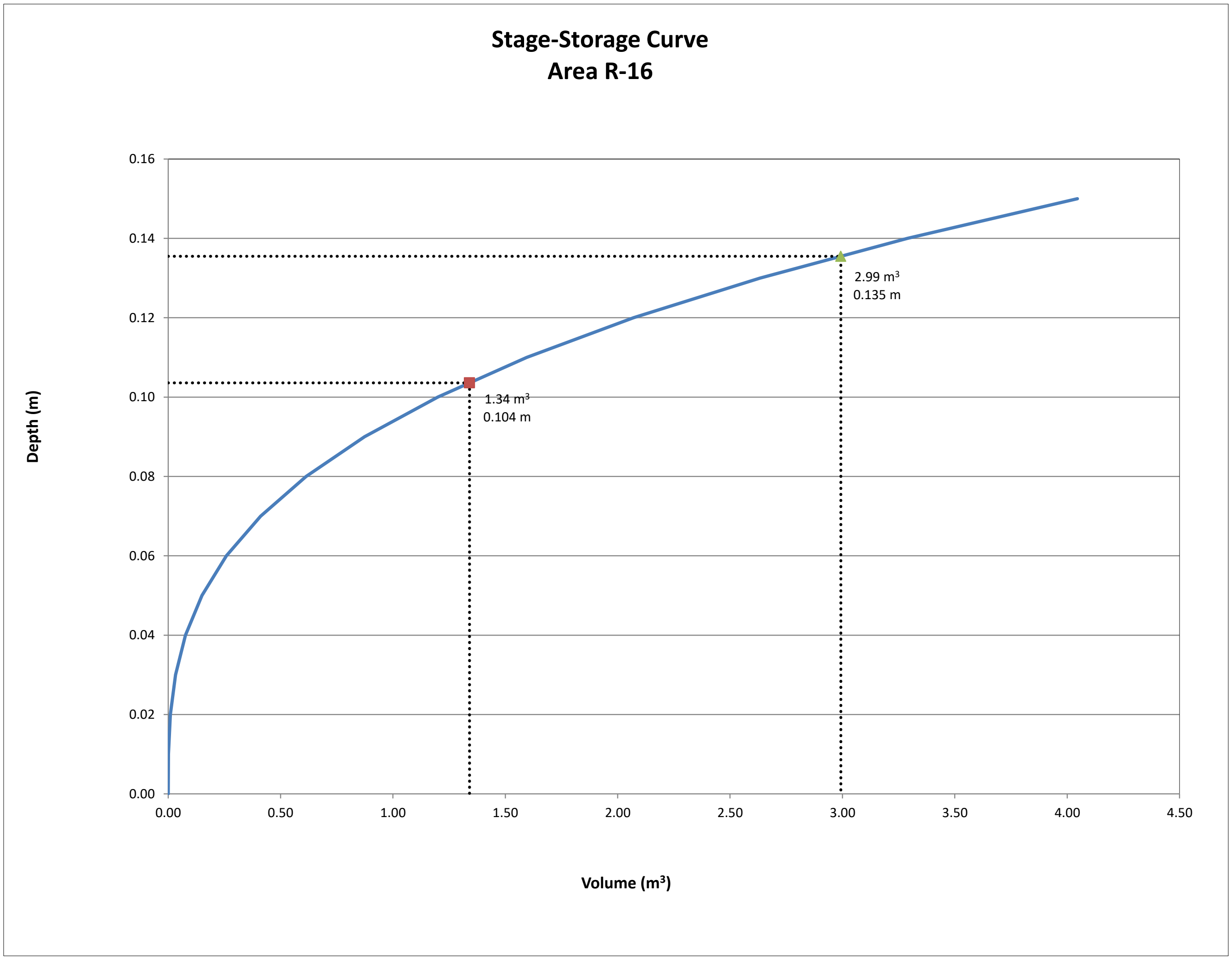
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	R-16	: BUILDING ROOF		
OTTAWA IDF CURVE				
Area =	0.0084	ha	Qallow =	0.51
C =	1.00		Vol(max) =	2.99
			Notches =	1
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	5.68	5.17	1.55
10	178.56	4.18	3.67	2.20
15	142.89	3.34	2.83	2.55
20	119.95	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)
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
2.99 m³
0.135 m
1.34 m³
0.104 m

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.)

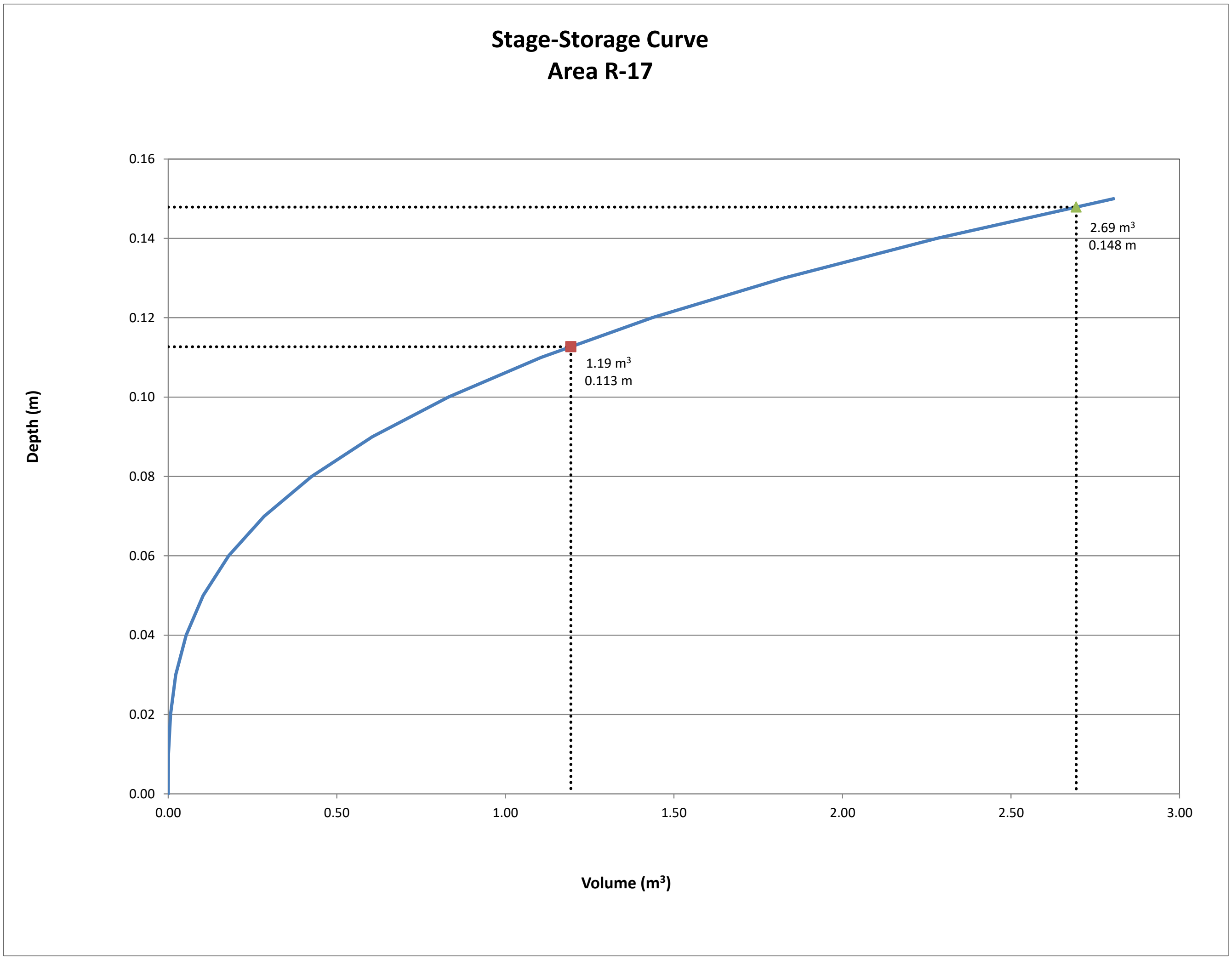
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	R-17	: BUILDING ROOF		
OTTAWA IDF CURVE				
Area =	0.0080	ha	Qallow =	0.55
C =	1.00		Vol(max) =	2.69
			Notches =	1
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	5.39	4.84	1.45
10	178.56	3.96	3.41	2.05
15	142.89	3.17	2.62	2.36
20	119.95	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)
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
1.19 m³
0.113 m
2.69 m³
0.148 m

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.)

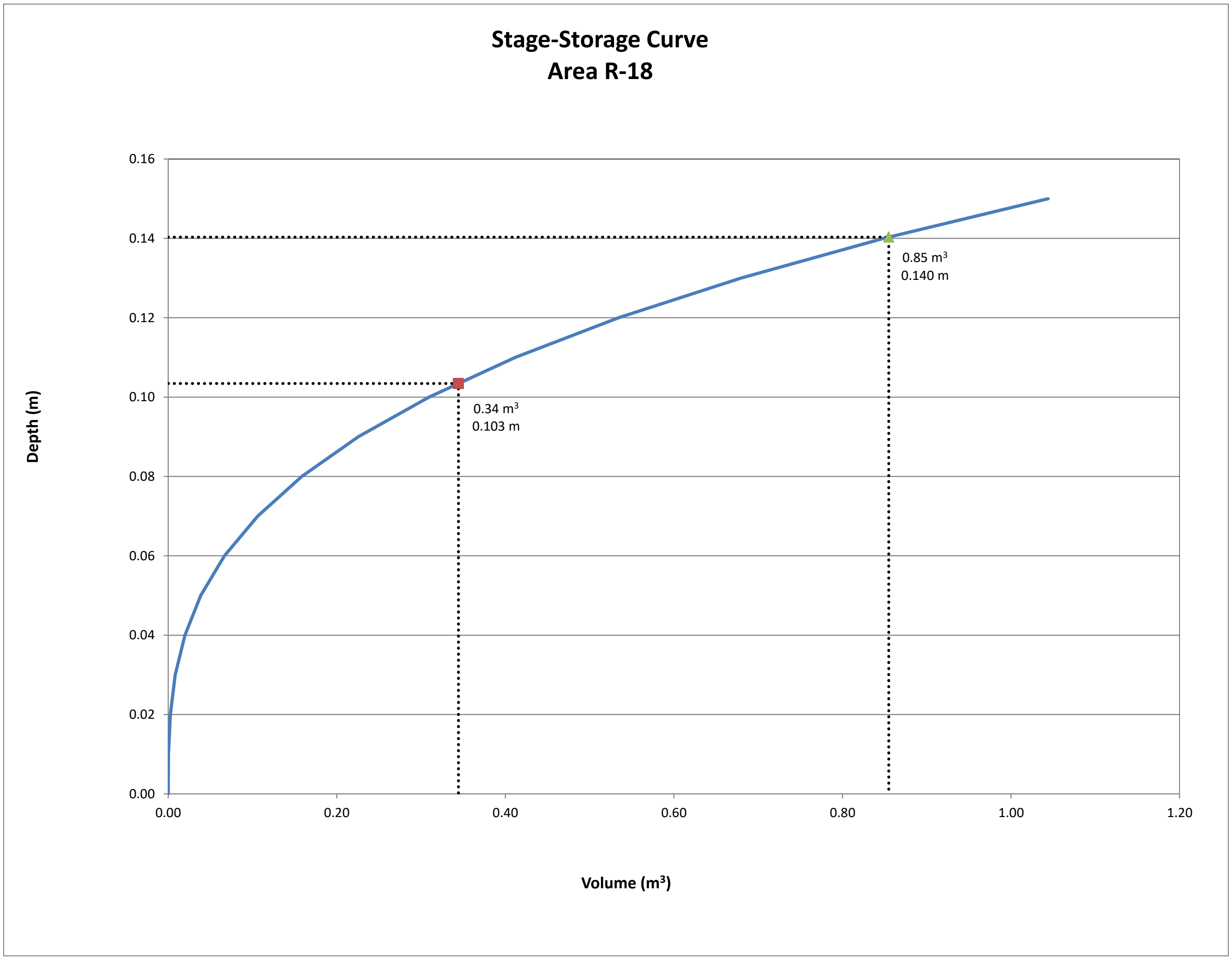
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	**R-18**	**: BUILDING ROOF**		
OTTAWA IDF CURVE				
Area =	0.0037	ha	Qallow =	0.52
C =	1.00		Vol(max) =	0.85
			Notches =	1
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	2.49	1.97	0.59
10	178.56	1.83	1.31	0.79
15	142.89	1.47	0.95	0.85
20	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
0.85 m3
0.140 m
0.34 m3
0.103 m
Volume (m3)

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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.)

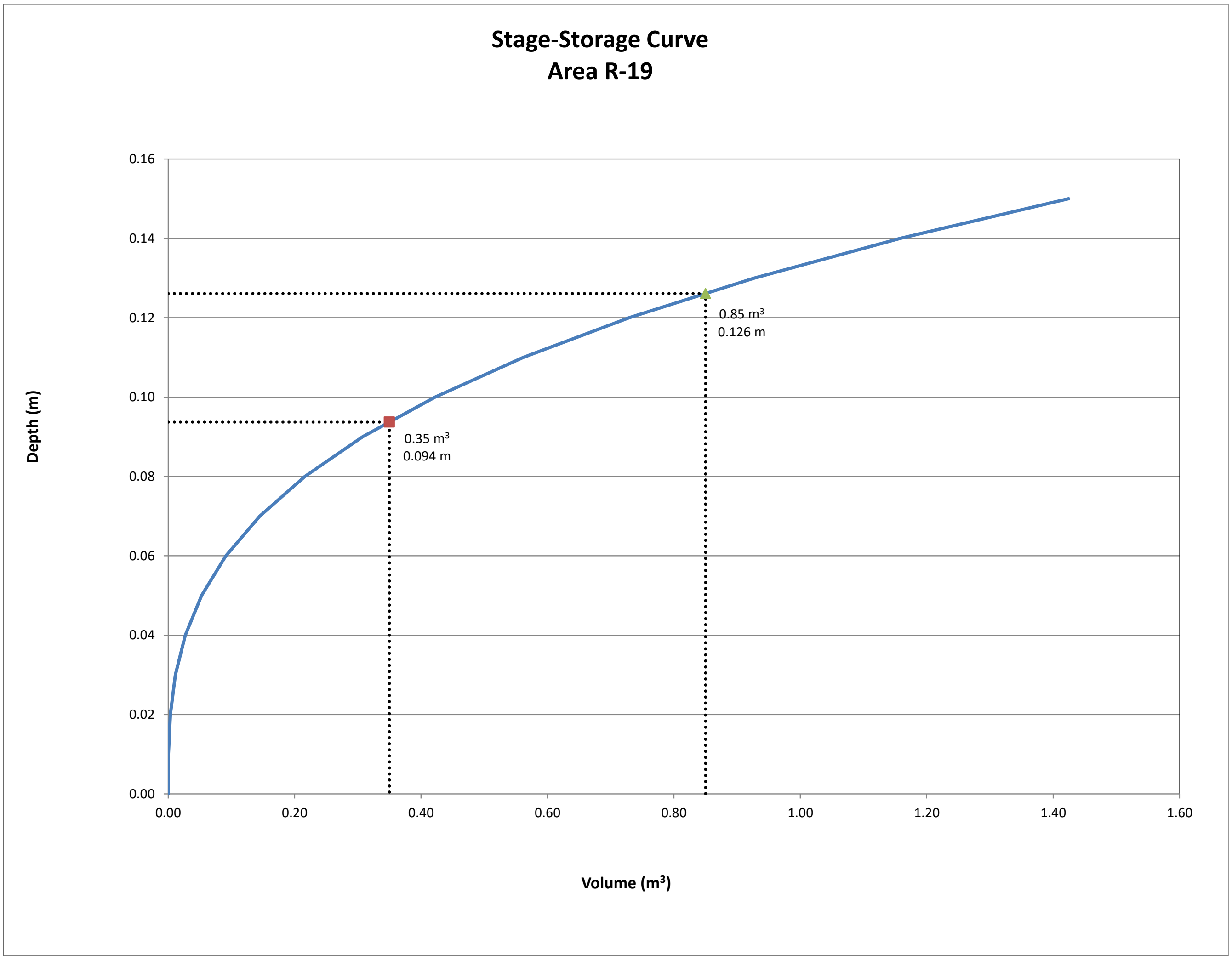
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	R-19	: BUILDING ROOF		
OTTAWA IDF CURVE				
Area =	0.0035	ha	Qallow =	0.47
C =	1.00		Vol(max) =	0.85
			Notches =	1
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	2.38	1.91	0.57
10	178.56	1.75	1.28	0.77
15	142.89	1.40	0.93	0.84
20	119.95	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)
Volume (m³)
0.35 m³
0.094 m
0.85 m³
0.126 m
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
1.60

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.)

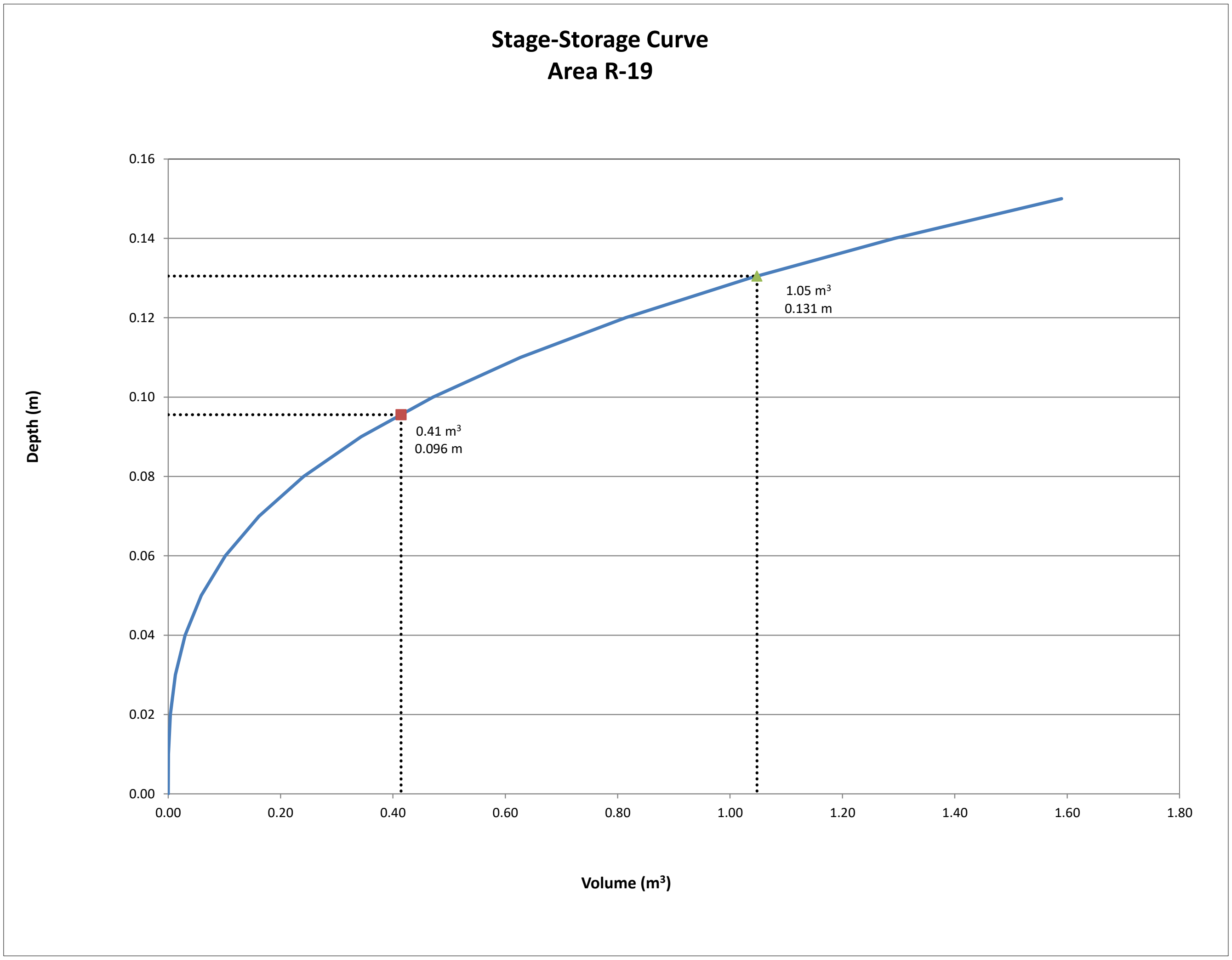
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	R-20	: BUILDING ROOF		
OTTAWA IDF CURVE				
Area =	0.0054	ha	Qallow =	0.97
C =	1.00		Vol(max) =	1.05
			Notches =	2
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	3.63	2.66	0.80
10	178.56	2.67	1.70	1.02
15	142.89	2.13	1.16	1.05
20	119.95	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)
Volume (m³)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
0.20
0.40
0.60
0.80
1.00
1.20
1.40
1.60
1.80
0.41 m³
0.096 m
1.05 m³
0.131 m

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.)

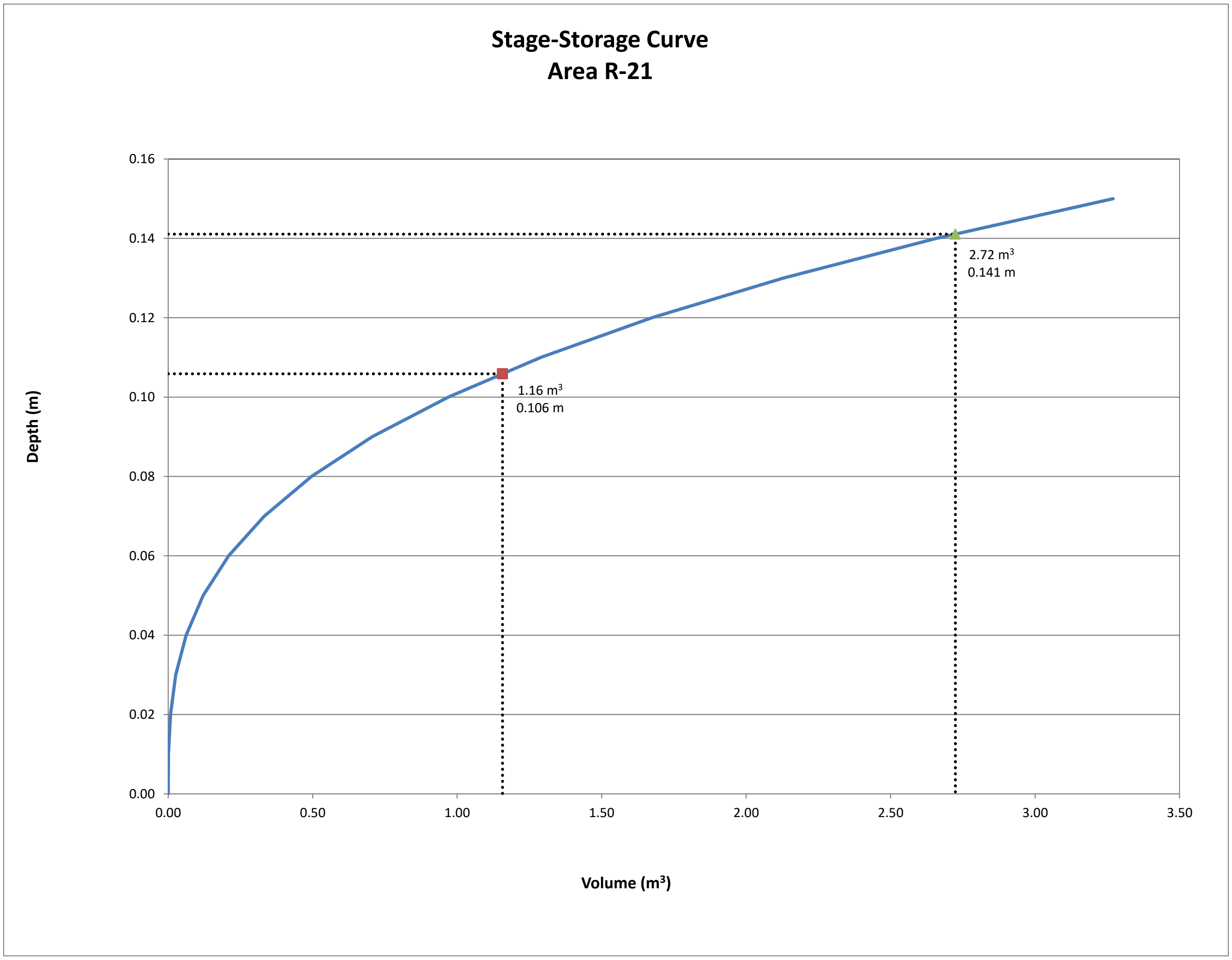
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	**R-21**	**: BUILDING ROOF**		
OTTAWA IDF CURVE				
Area =	0.0099	ha	Qallow =	1.05
C =	1.00		Vol(max) =	2.72
			Notches =	2
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	6.70	5.65	1.69
10	178.56	4.93	3.88	2.33
15	142.89	3.94	2.89	2.60
20	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)
1.16 m³
0.106 m
2.72 m³
0.141 m

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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.)

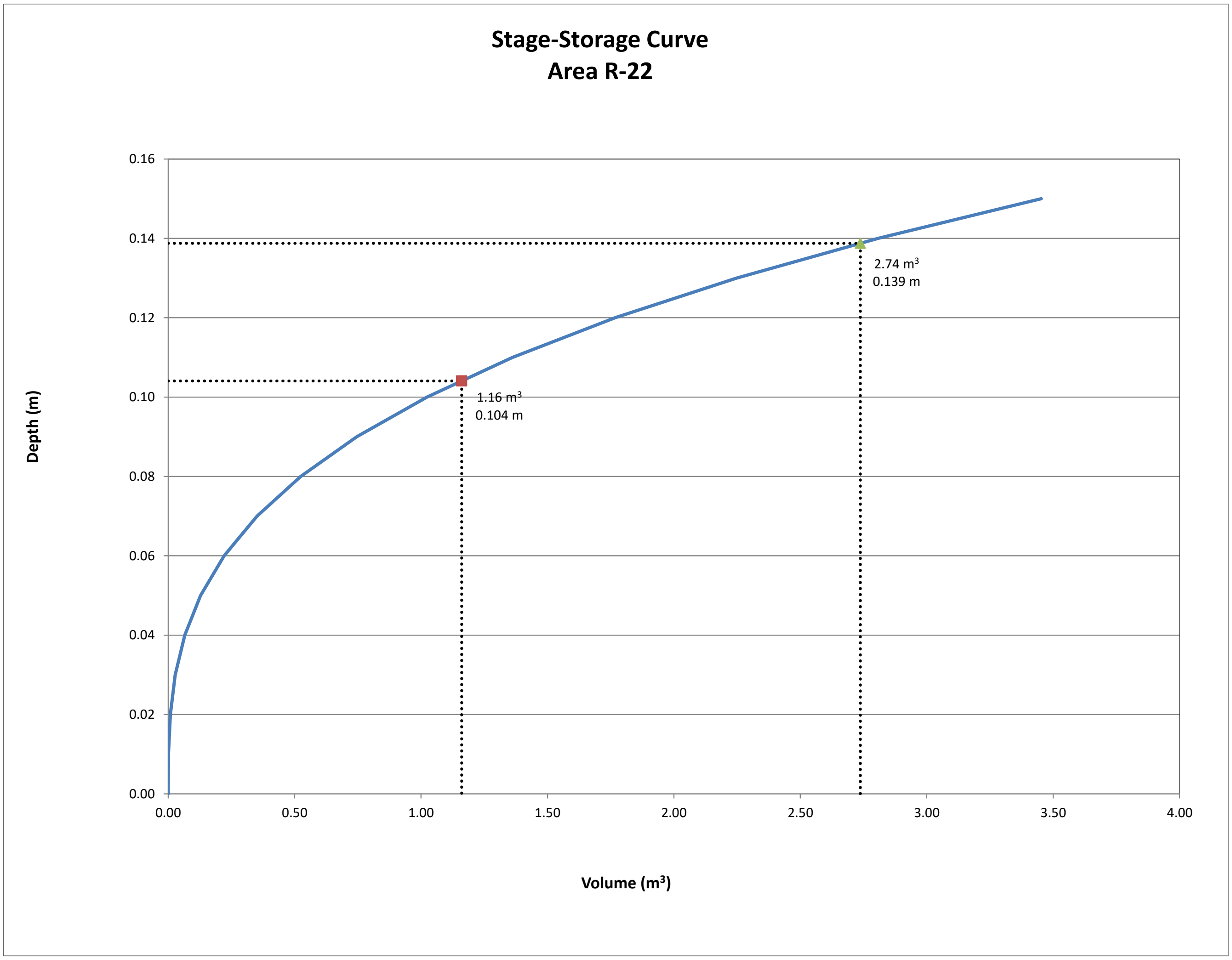
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	R-22	: BUILDING ROOF		
OTTAWA IDF CURVE				
Area =	0.0099	ha	Qallow =	1.03
C =	1.00		Vol(max) =	2.74
			Notches =	2
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	6.68	5.65	1.69
10	178.56	4.91	3.88	2.33
15	142.89	3.93	2.90	2.61
20	119.95	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)
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
1.16 m³
0.104 m
2.74 m³
0.139 m

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.)

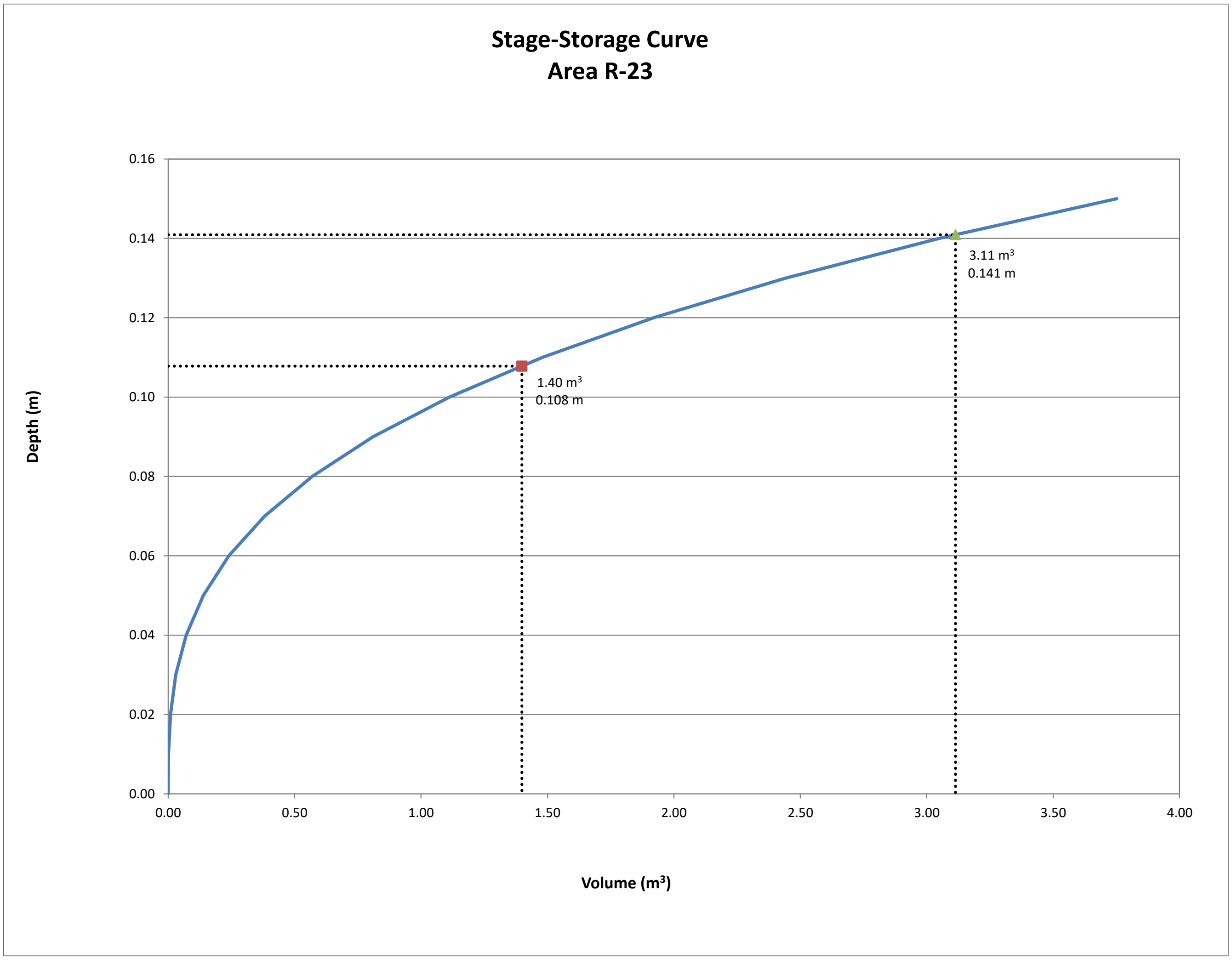
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	R-23	: BUILDING ROOF		
OTTAWA IDF CURVE				
Area =	0.0087	ha	Qallow =	0.53
C =	1.00		Vol(max) =	3.11
			Notches =	1
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	5.89	5.36	1.61
10	178.56	4.33	3.81	2.28
15	142.89	3.47	2.94	2.65
20	119.95	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
3.11 m3
0.141 m
1.40 m3
0.108 m
Volume (m3)

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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

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.)

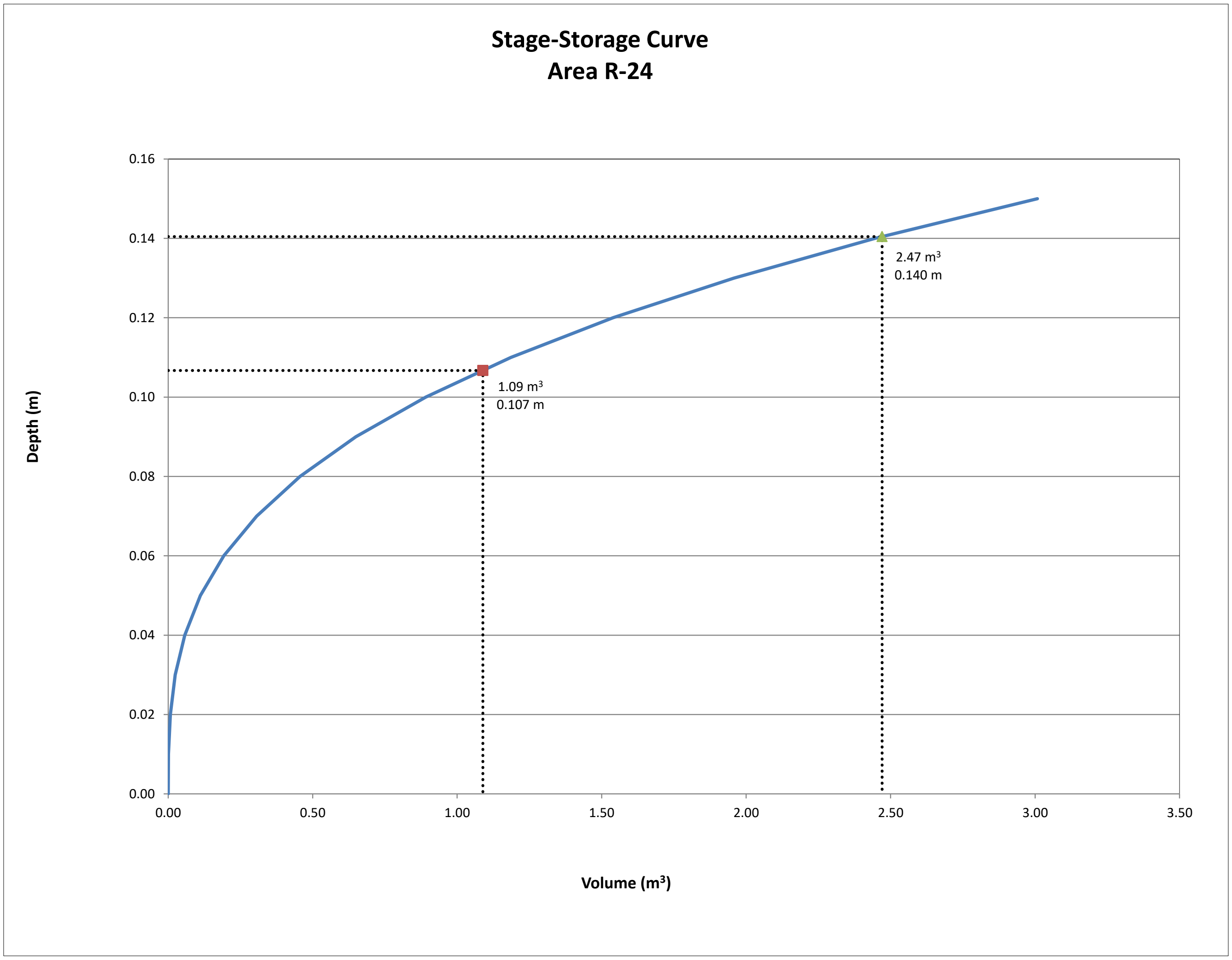
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	R-24	: BUILDING ROOF		
OTTAWA IDF CURVE				
Area =	0.0074	ha	Qallow =	0.52
C =	1.00		Vol(max) =	2.47
			Notches =	1
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	4.99	4.47	1.34
10	178.56	3.67	3.15	1.89
15	142.89	2.94	2.42	2.17
20	119.95	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 (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
2.47 m3
0.140 m
1.09 m3
0.107 m
Volume (m3)

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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.)

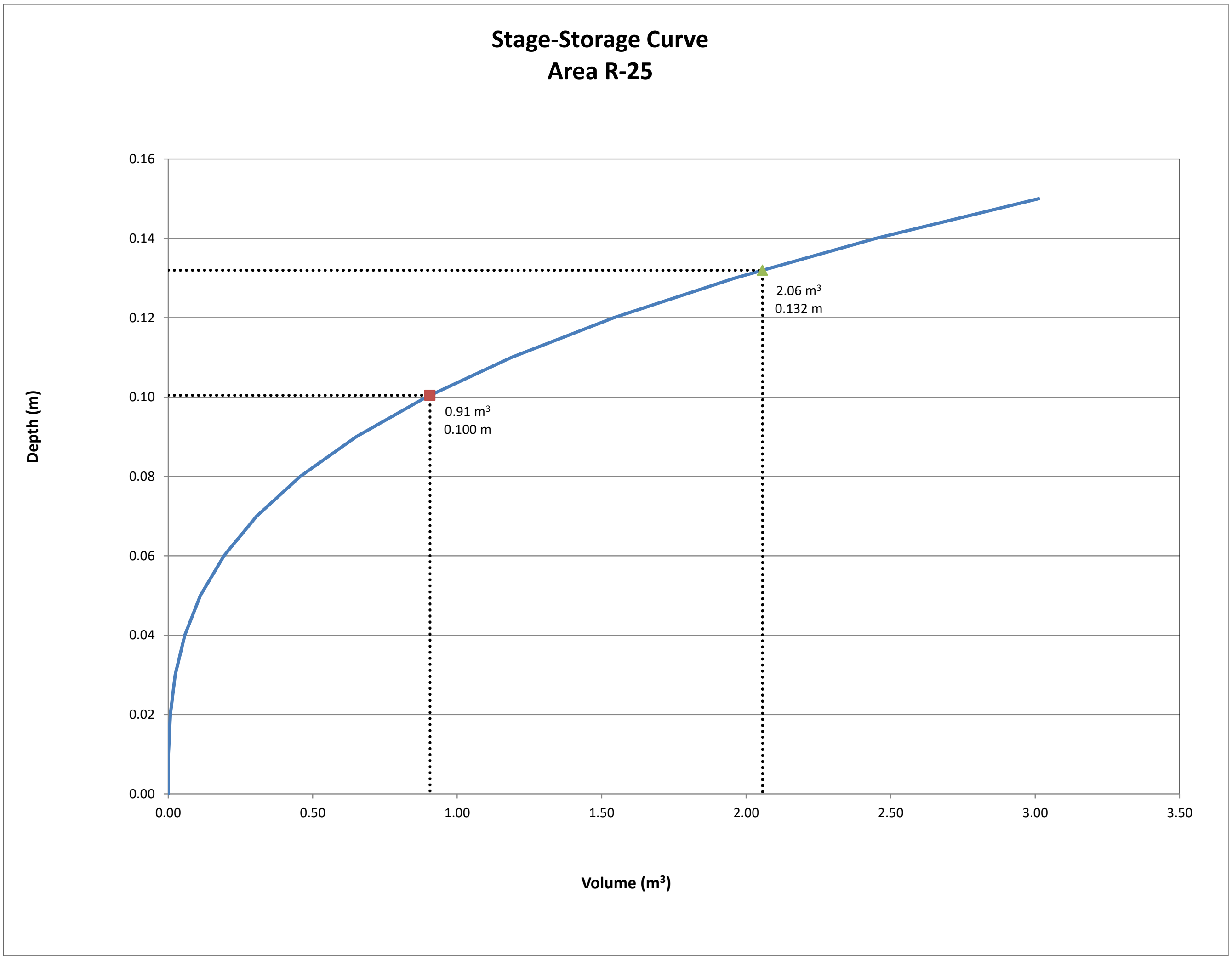
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	R-25	: BUILDING ROOF		
OTTAWA IDF CURVE				
Area =	0.0064	ha	Qallow =	0.49
C =	1.00		Vol(max) =	2.06
			Notches =	1
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	4.31	3.82	1.15
10	178.56	3.17	2.68	1.61
15	142.89	2.54	2.05	1.84
20	119.95	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)
0.00
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
Volume (m³)
0.91 m³
0.100 m
2.06 m³
0.132 m

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

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.)

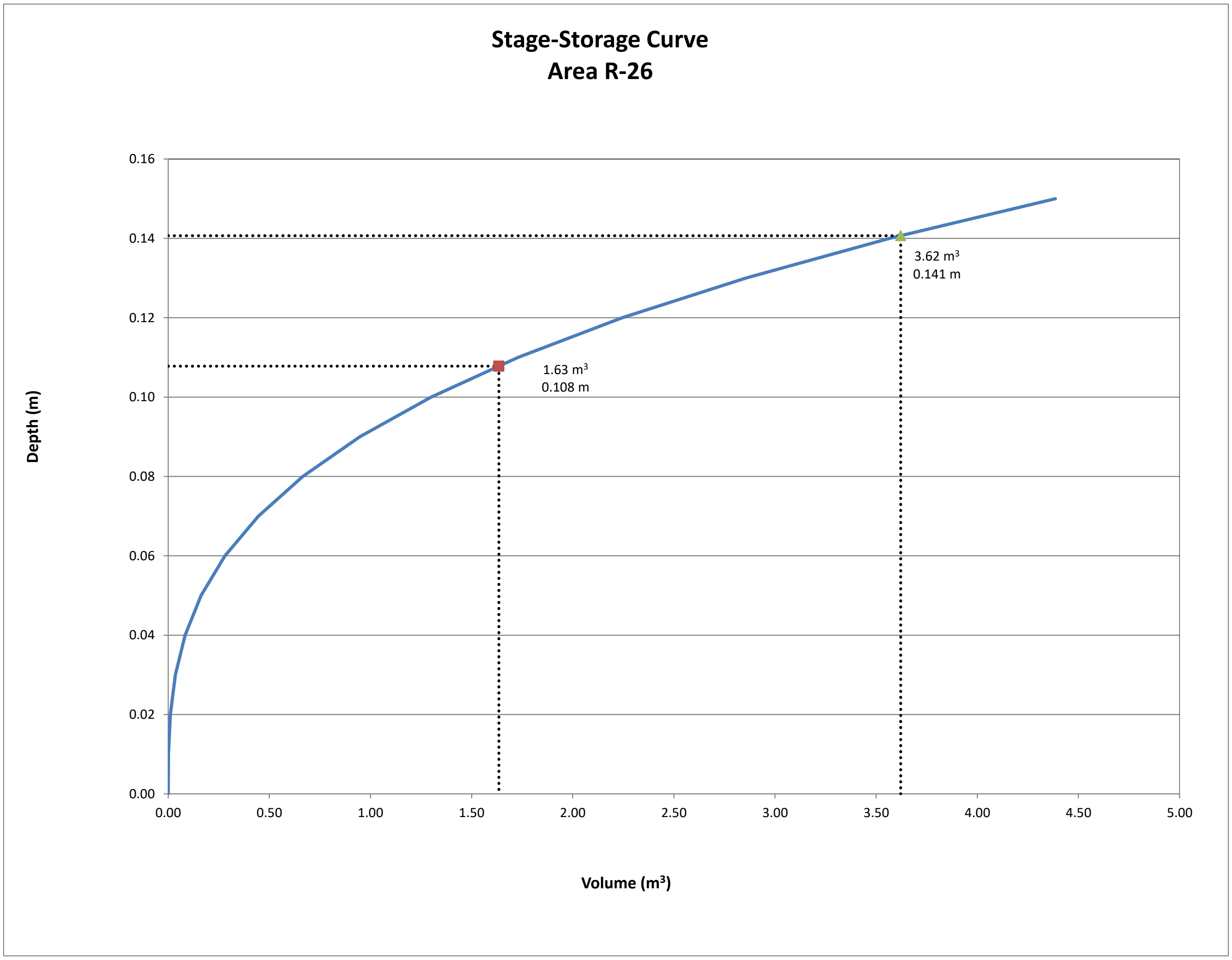
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	R-26	: BUILDING ROOF		
OTTAWA IDF CURVE				
Area =	0.0097	ha	Qallow =	0.52
C =	1.00		Vol(max) =	3.62
			Notches =	1
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	6.54	6.02	1.81
10	178.56	4.81	4.29	2.58
15	142.89	3.85	3.33	3.00
20	119.95	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 (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)
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
5.00
3.62 m³
0.141 m
1.63 m³
0.108 m

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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.)

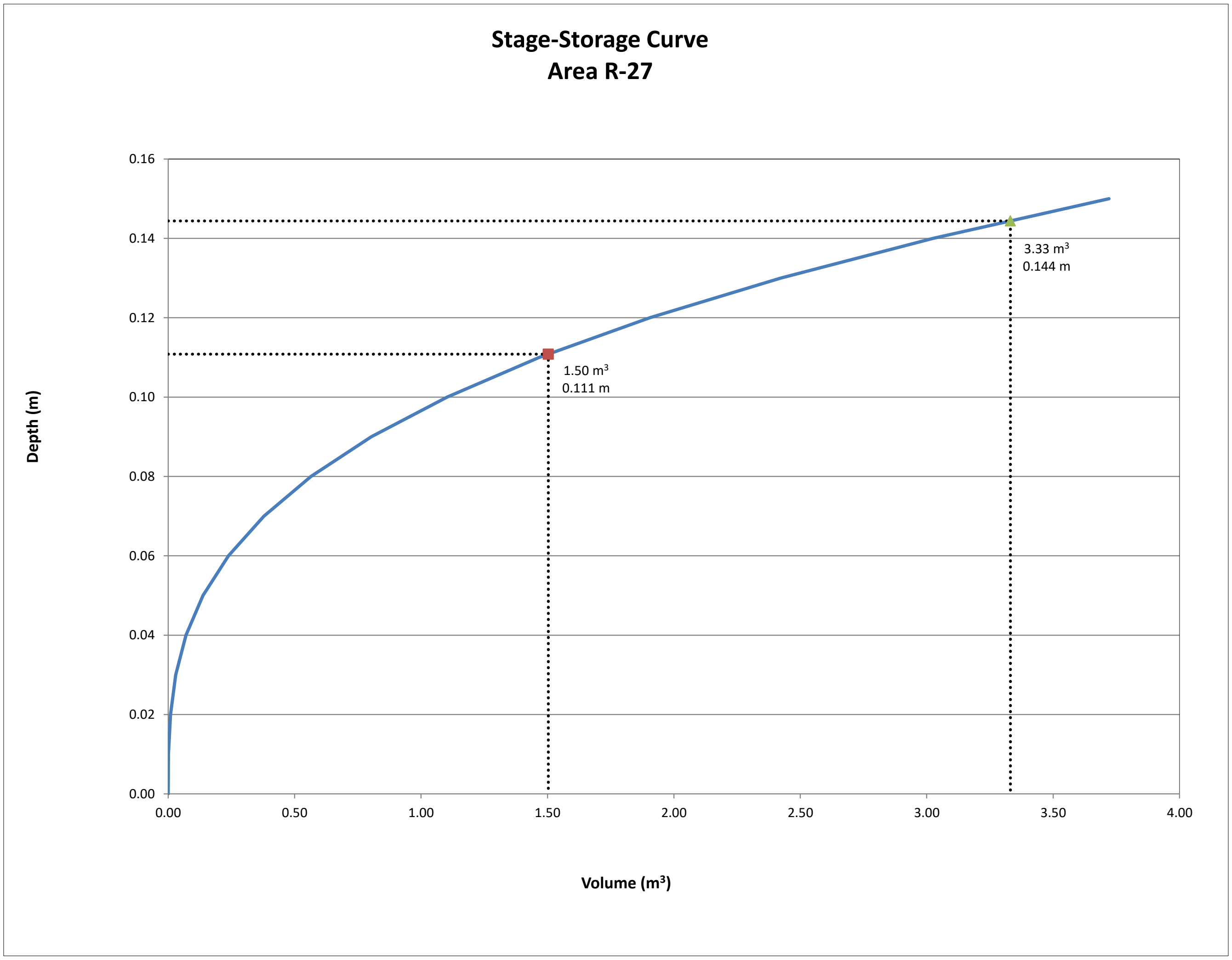
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	**R-27**	**: BUILDING ROOF**		
OTTAWA IDF CURVE				
Area =	0.0092	ha	Qallow =	0.54
C =	1.00		Vol(max) =	3.33
			Notches =	1
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	6.23	5.69	1.71
10	178.56	4.58	4.04	2.42
15	142.89	3.67	3.13	2.81
20	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)
1.50 m³
0.111 m
3.33 m³
0.144 m

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.)

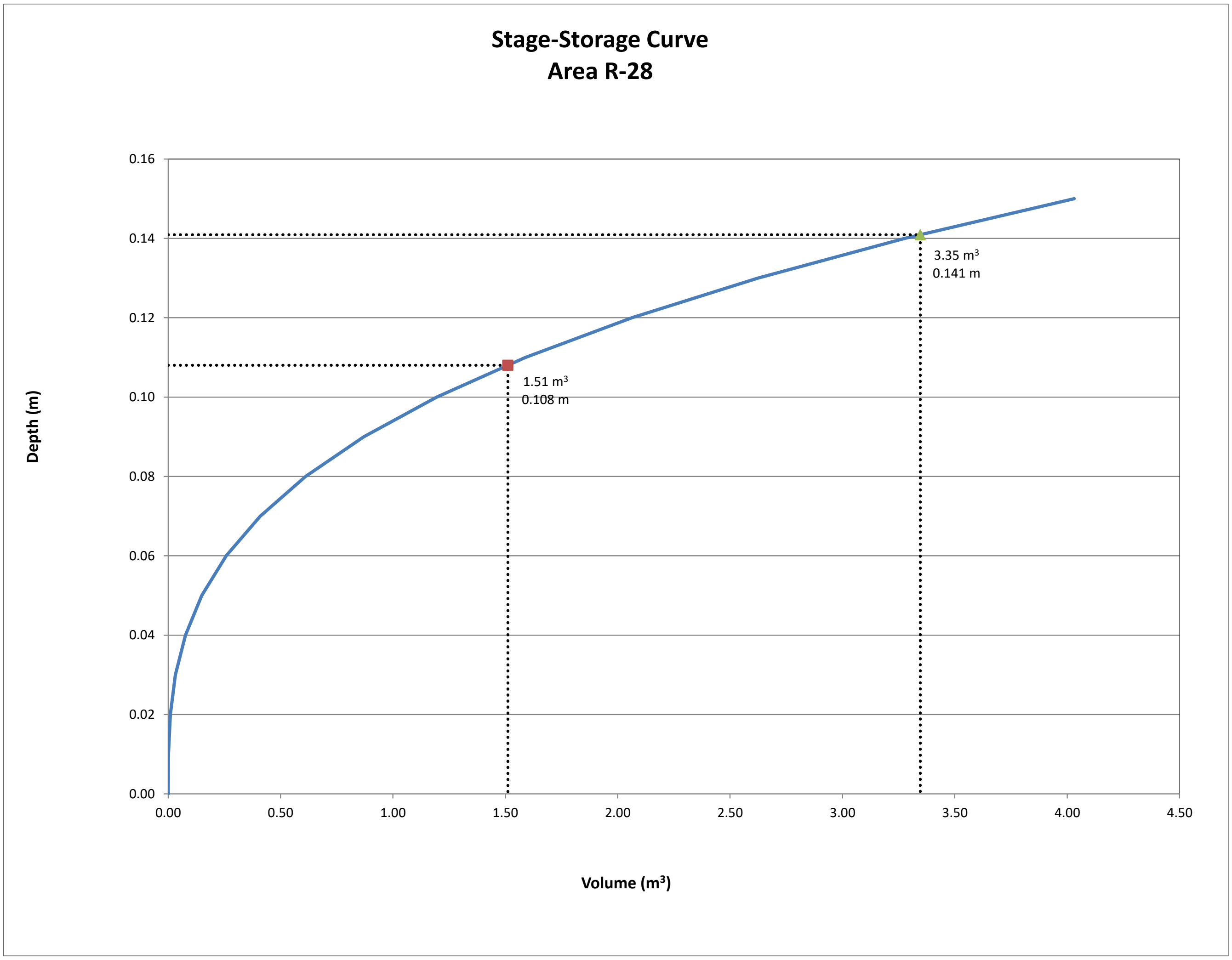
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	R-28	: BUILDING ROOF		
OTTAWA IDF CURVE				
Area =	0.0092	ha	Qallow =	0.53
C =	1.00		Vol(max) =	3.35
			Notches =	1
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	6.20	5.67	1.70
10	178.56	4.56	4.04	2.42
15	142.89	3.65	3.12	2.81
20	119.95	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)
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)
1.51 m³
0.108 m
3.35 m³
0.141 m

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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.)

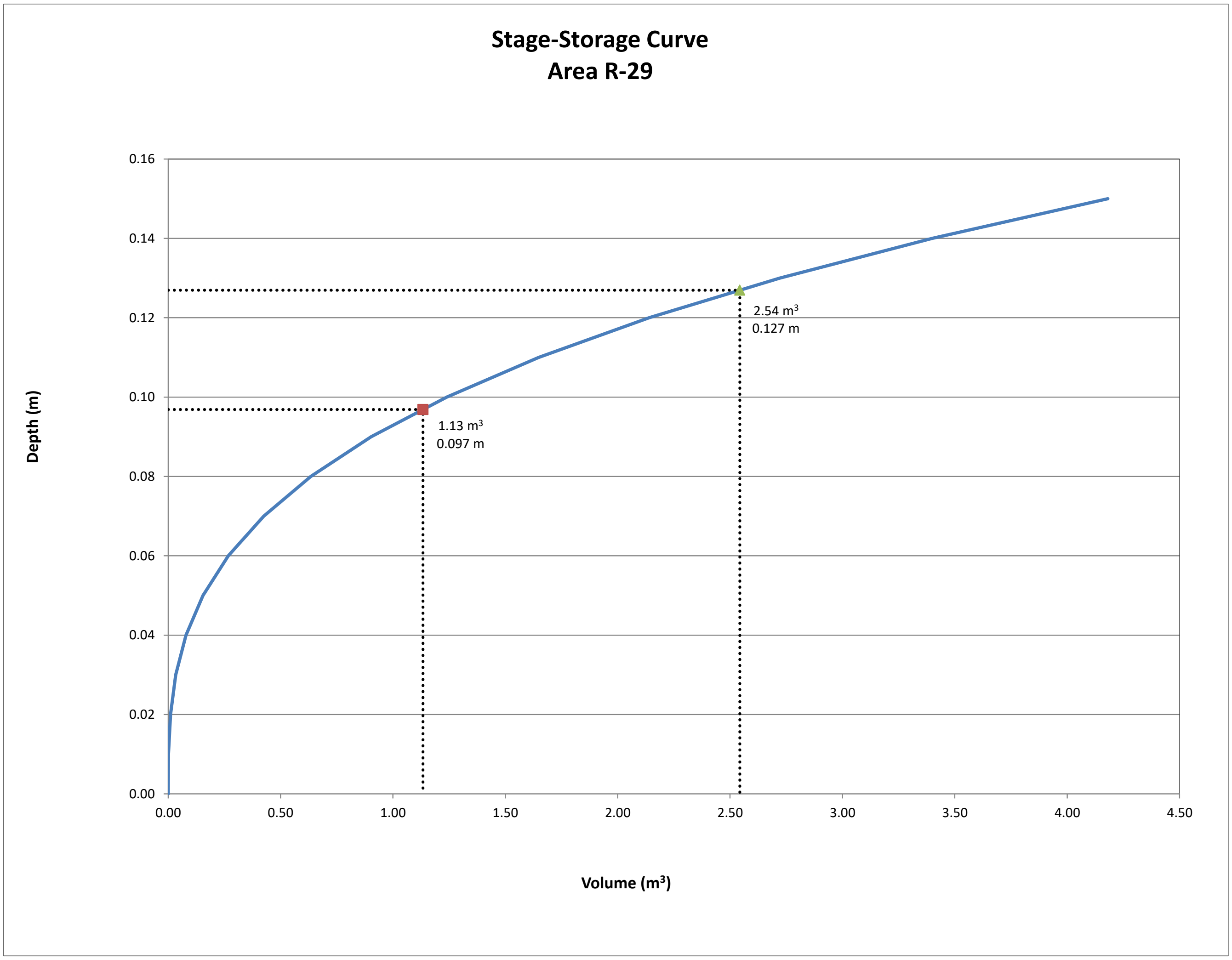
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	R-29	: BUILDING ROOF		
OTTAWA IDF CURVE				
Area =	0.0073	ha	Qallow =	0.47
C =	1.00		Vol(max) =	2.54
			Notches =	1
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	4.94	4.47	1.34
10	178.56	3.64	3.17	1.90
15	142.89	2.91	2.44	2.20
20	119.95	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)
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
2.54 m³
0.127 m
1.13 m³
0.097 m

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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

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.)

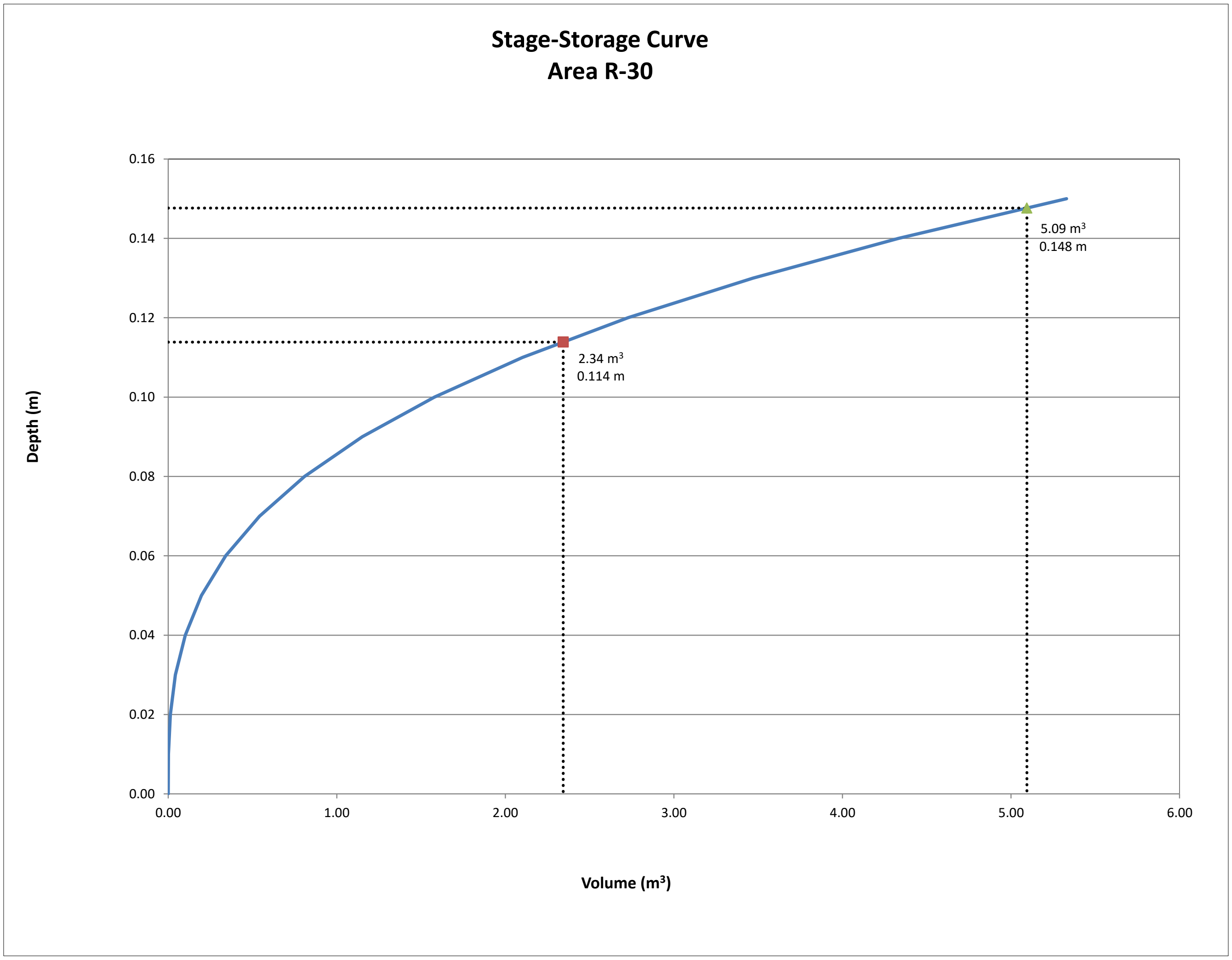
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	R-30	: BUILDING ROOF		
OTTAWA IDF CURVE				
Area =	0.0126	ha	Qallow =	0.55
C =	1.00		Vol(max) =	5.09
			Notches =	1
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	8.52	7.97	2.39
10	178.56	6.27	5.72	3.43
15	142.89	5.02	4.47	4.02
20	119.95	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 (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)
Volume (m³)
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
2.34 m³
0.114 m
5.09 m³
0.148 m

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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.)

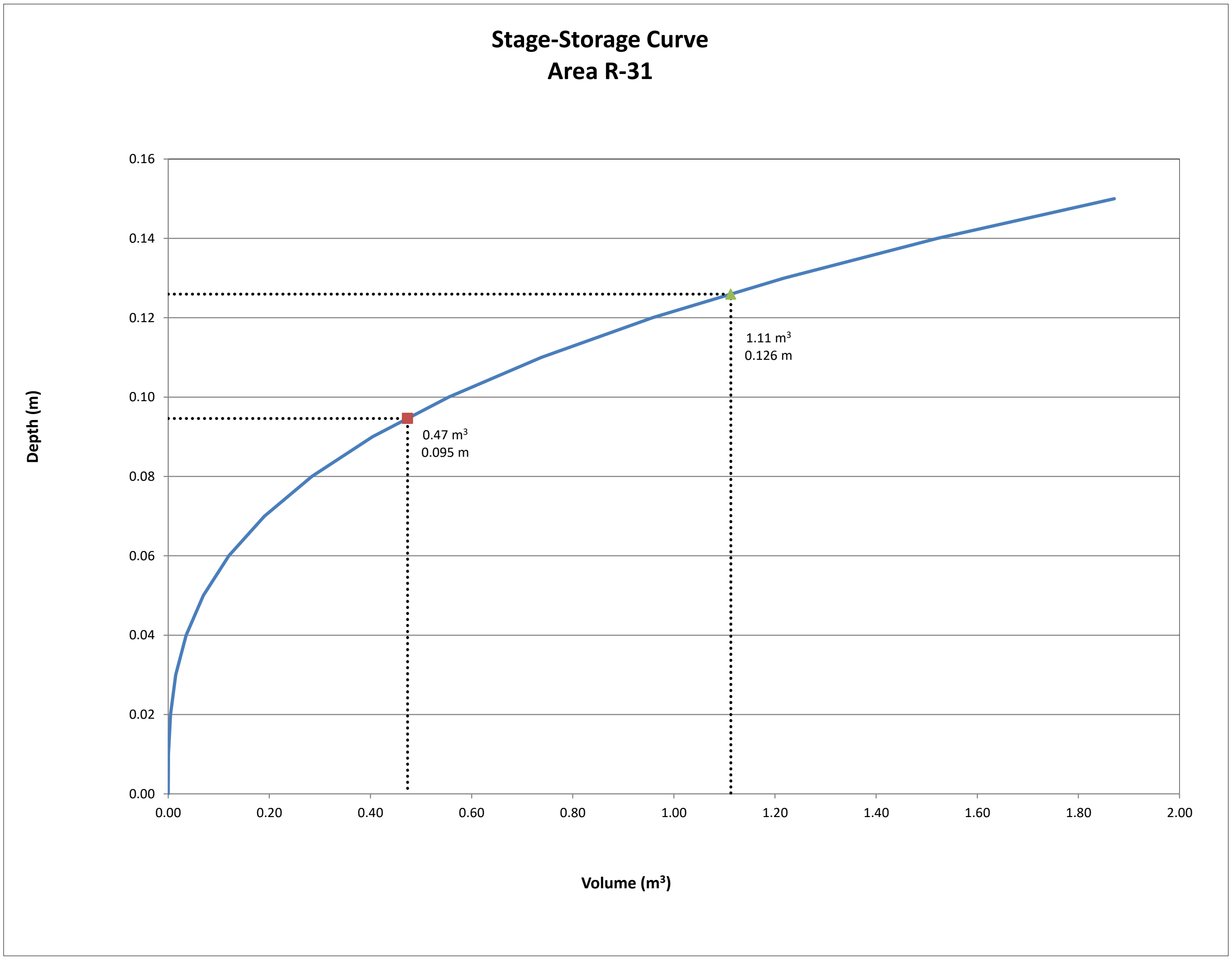
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	**R-31**	**: BUILDING ROOF**		
OTTAWA IDF CURVE				
Area =	0.0042	ha	Qallow =	0.47
C =	1.00		Vol(max) =	1.11
			Notches =	1
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	2.83	2.36	0.71
10	178.56	2.08	1.61	0.97
15	142.89	1.66	1.19	1.08
20	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)
Volume (m³)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
0.20
0.40
0.60
0.80
1.00
1.20
1.40
1.60
1.80
2.00
0.47 m³
0.095 m
1.11 m³
0.126 m

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.)

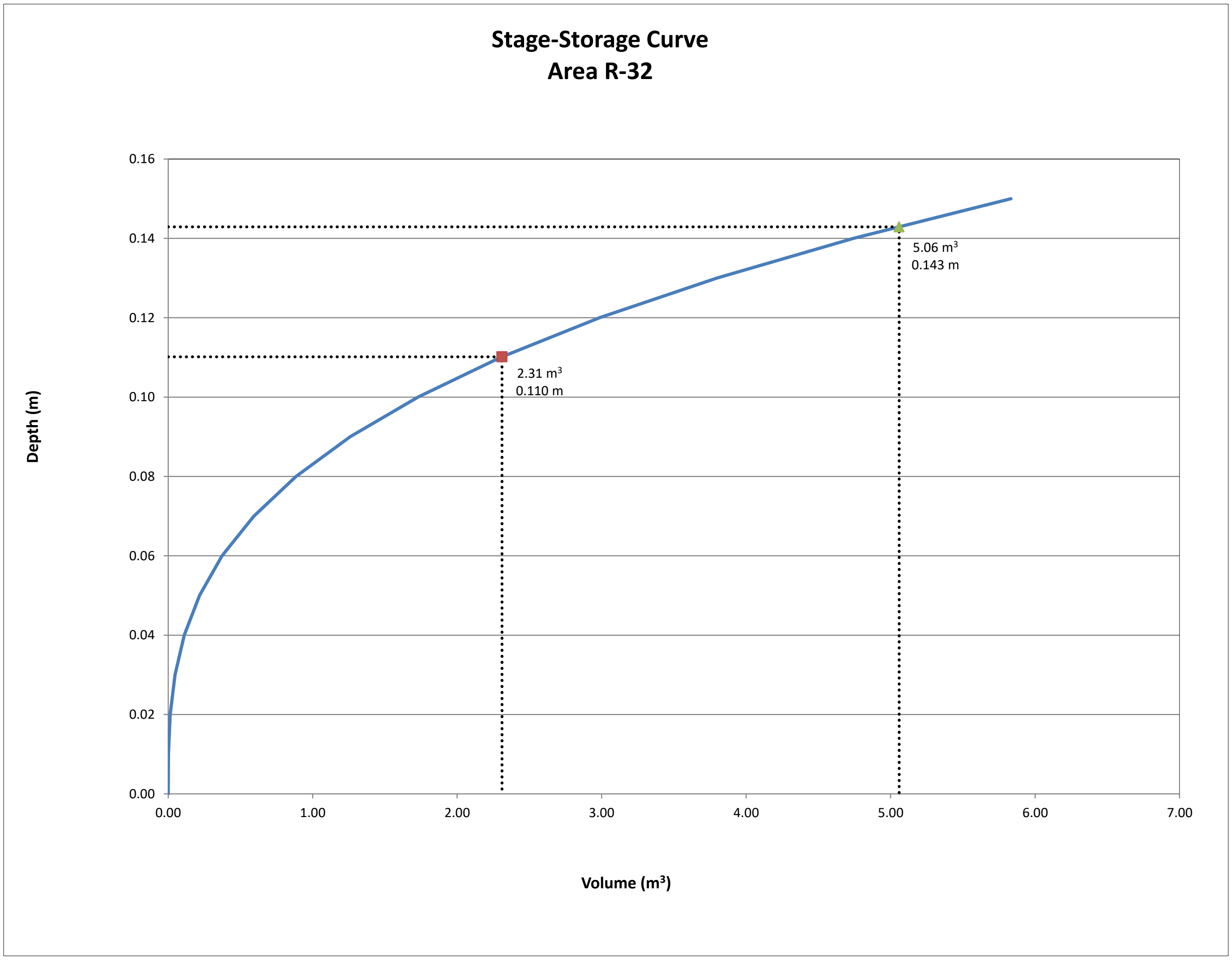
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	R-32	: BUILDING ROOF		
OTTAWA IDF CURVE				
Area =	0.0124	ha	Qallow =	0.53
C =	1.00		Vol(max) =	5.06
			Notches =	1
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	8.38	7.85	2.36
10	178.56	6.16	5.64	3.38
15	142.89	4.93	4.41	3.97
20	119.95	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

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.)

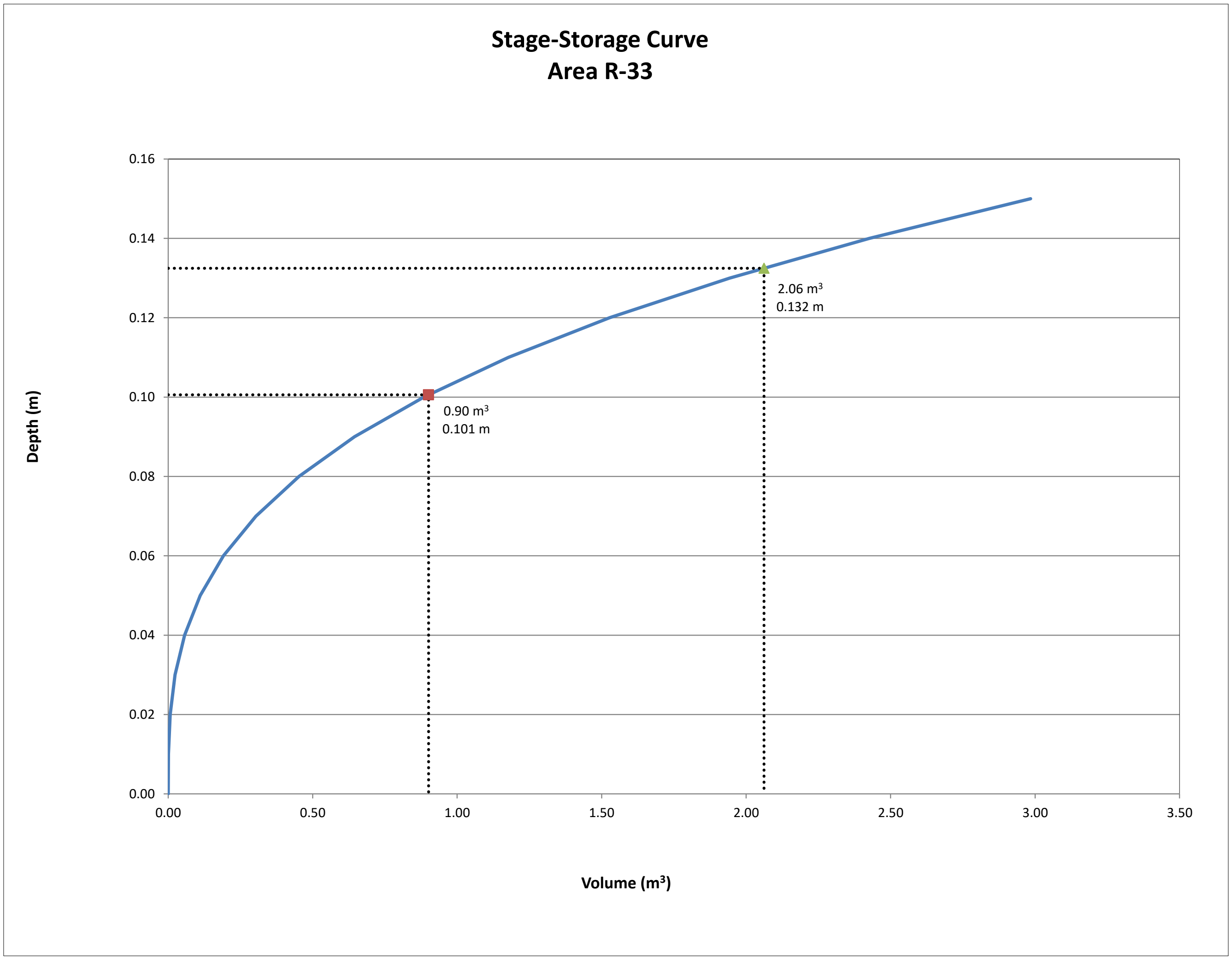
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	**R-33**	**: BUILDING ROOF**		
OTTAWA IDF CURVE				
Area =	0.0064	ha	Qallow =	0.49
C =	1.00		Vol(max) =	2.06
			Notches =	1
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	4.32	3.83	1.15
10	178.56	3.18	2.69	1.61
15	142.89	2.54	2.05	1.85
20	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)
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
0.90 m³
0.101 m
2.06 m³
0.132 m

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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.)

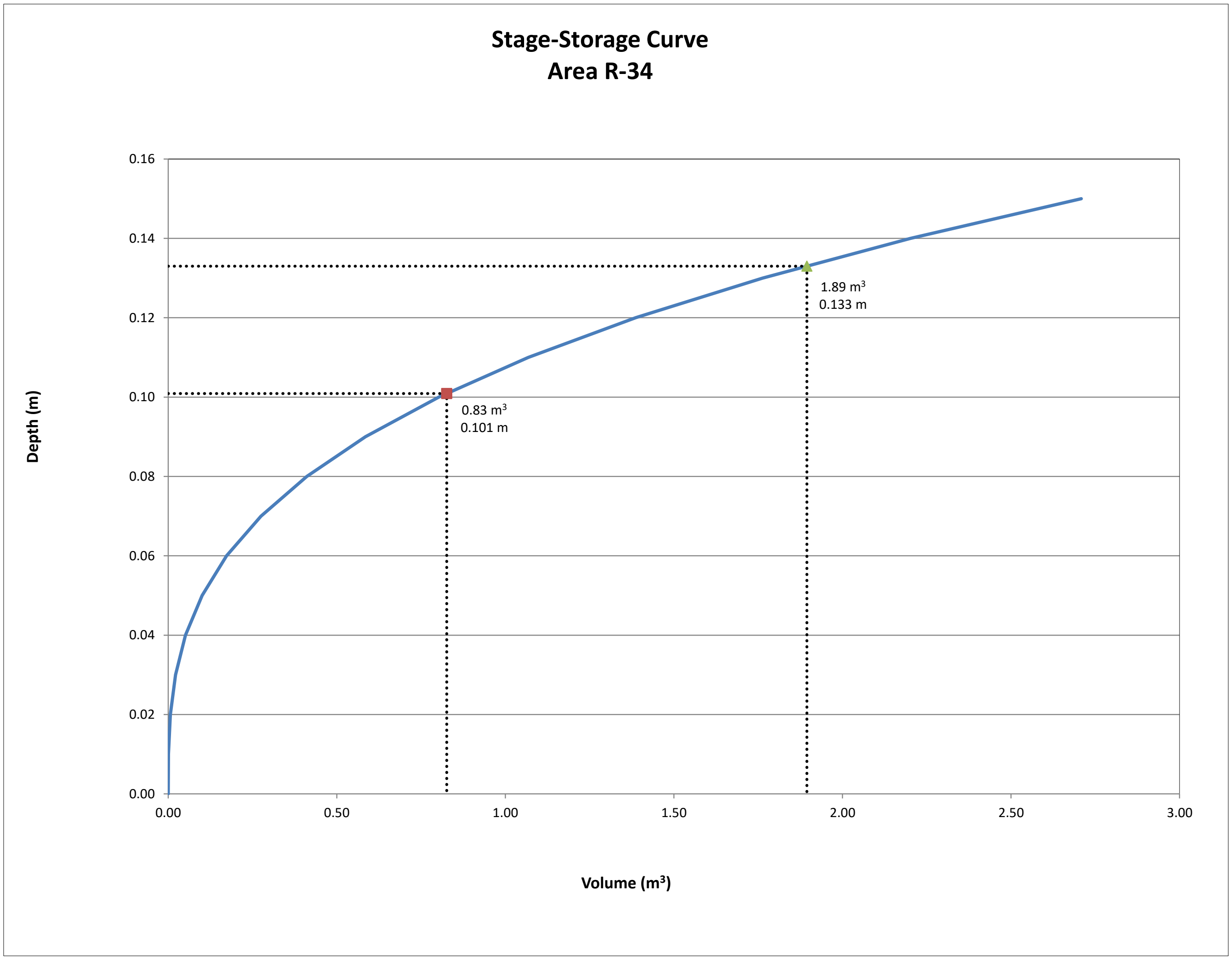
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	R-34	: BUILDING ROOF		
OTTAWA IDF CURVE				
Area =	0.0061	ha	Qallow =	0.50
C =	1.00		Vol(max) =	1.89
			Notches =	1
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	4.10	3.60	1.08
10	178.56	3.02	2.52	1.51
15	142.89	2.41	1.91	1.72
20	119.95	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)
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
1.89 m³
0.133 m
0.83 m³
0.101 m

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.)

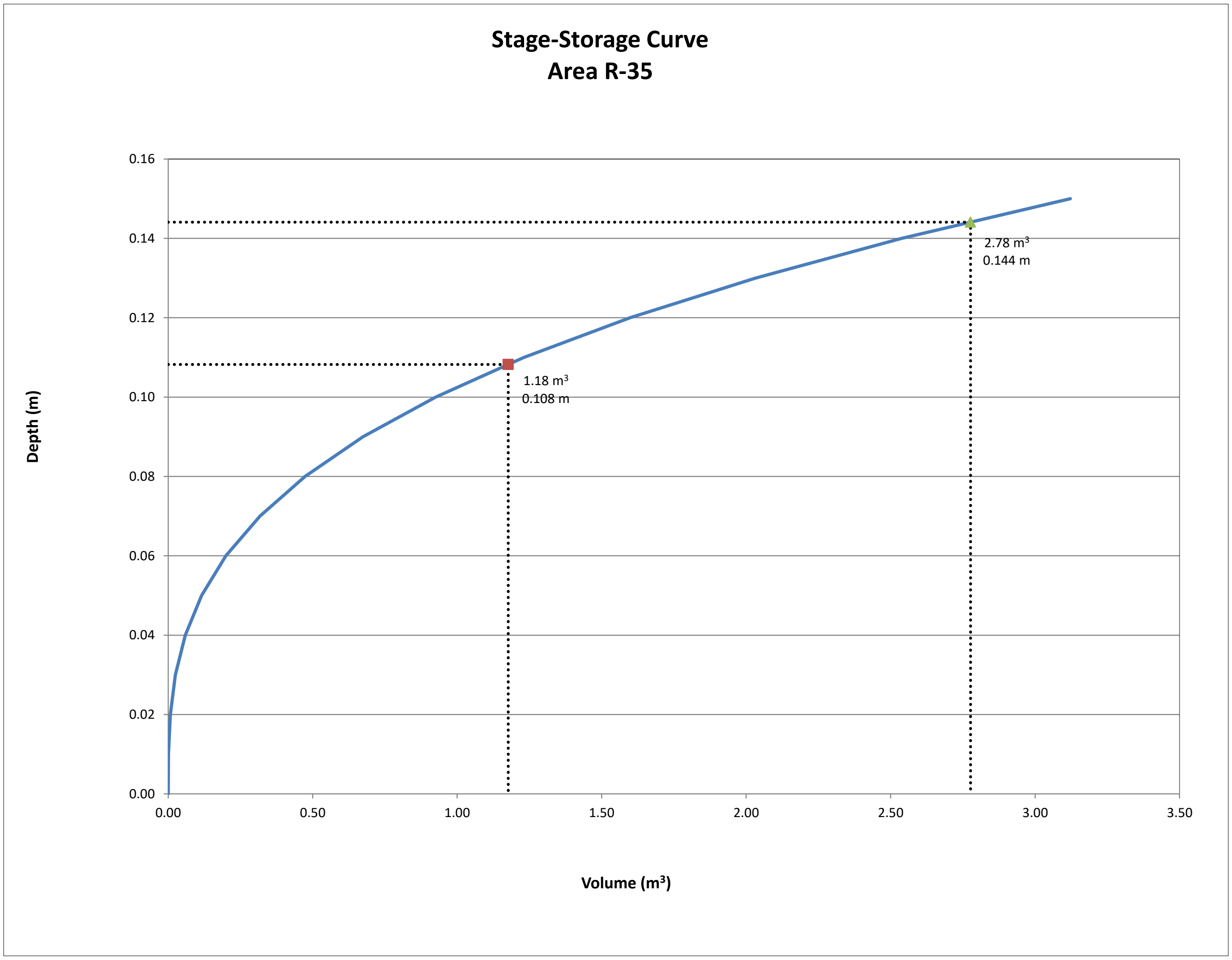
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	R-35	: BUILDING ROOF		
OTTAWA IDF CURVE				
Area =	0.0101	ha	Qallow =	1.07
C =	1.00		Vol(max) =	2.78
			Notches =	2
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	6.83	5.76	1.73
10	178.56	5.03	3.95	2.37
15	142.89	4.02	2.95	2.66
20	119.95	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)
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
1.18 m³
0.108 m
2.78 m³
0.144 m

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.)

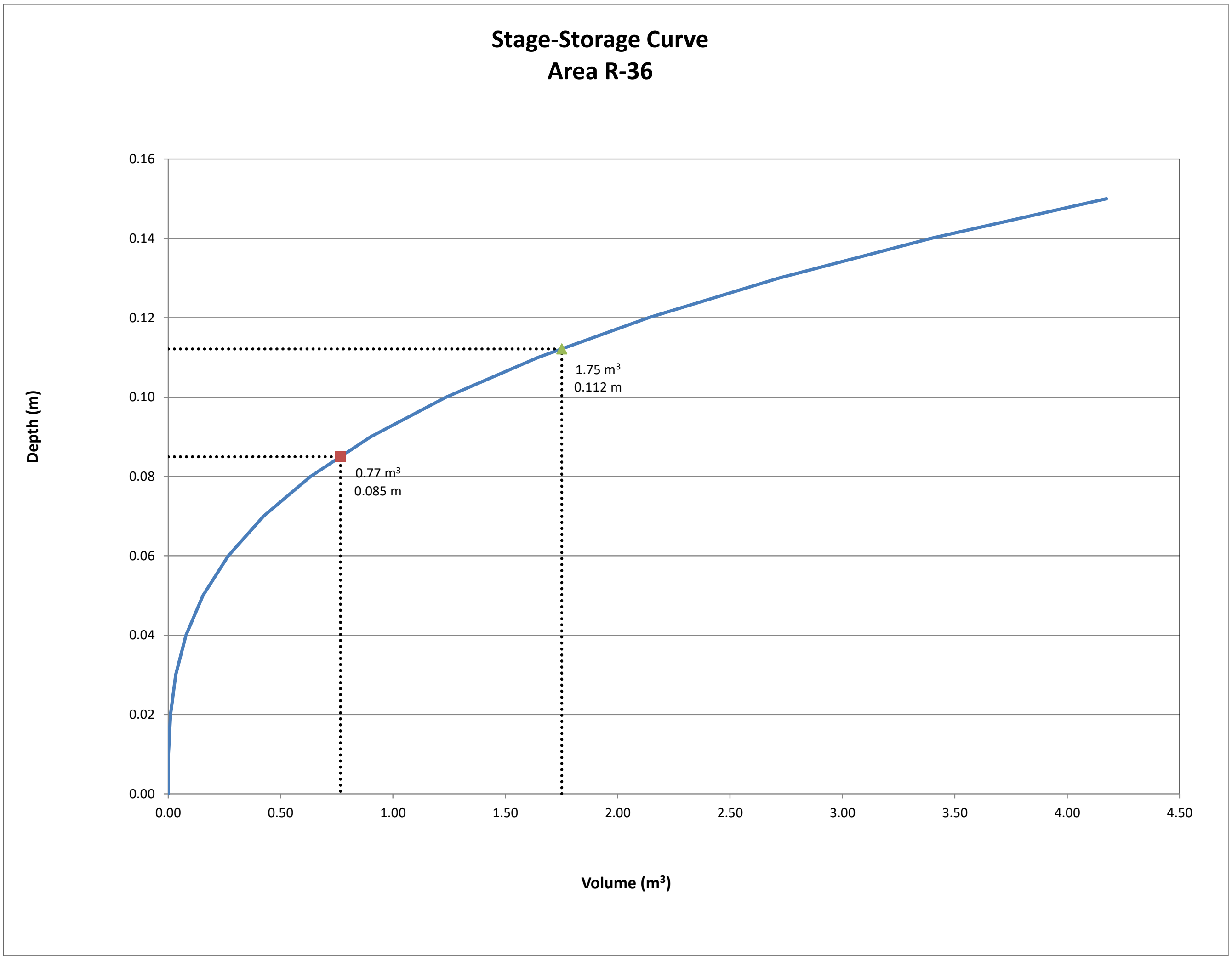
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	**R-36**	**: BUILDING ROOF**		
OTTAWA IDF CURVE				
Area =	0.0055	ha	Qallow =	0.42
C =	1.00		Vol(max) =	1.75
			Notches =	1
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	3.68	3.26	0.98
10	178.56	2.71	2.29	1.37
15	142.89	2.17	1.75	1.57
20	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)
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
1.75 m³
0.112 m
0.77 m³
0.085 m

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.)

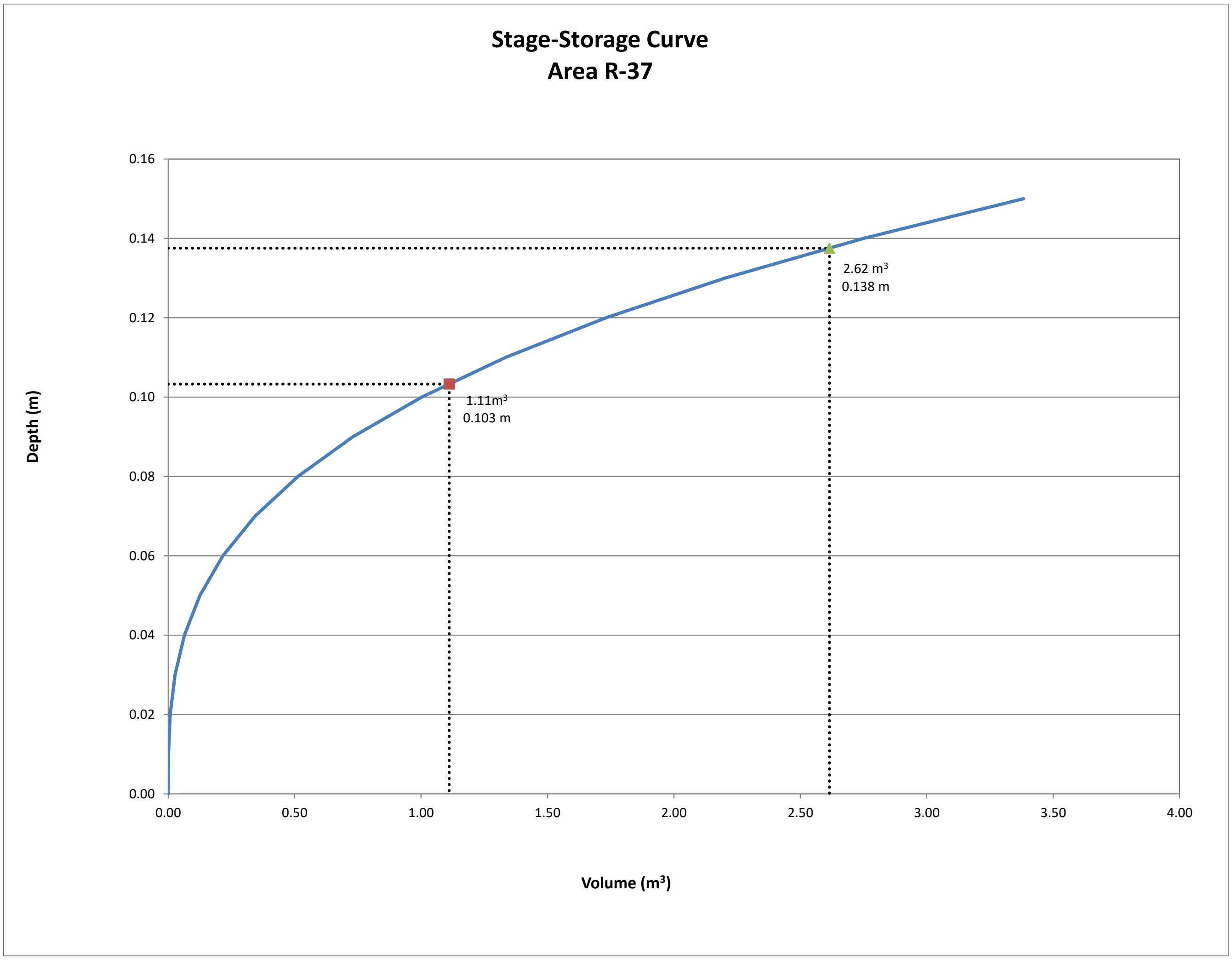
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	R-37	: BUILDING ROOF		
OTTAWA IDF CURVE				
Area =	0.0096	ha	Qallow =	1.03
C =	1.00		Vol(max) =	2.62
			Notches =	2
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	6.47	5.45	1.63
10	178.56	4.76	3.74	2.24
15	142.89	3.81	2.78	2.51
20	119.95	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)
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)
1.11m³
0.103 m
2.62 m³
0.138 m

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.)

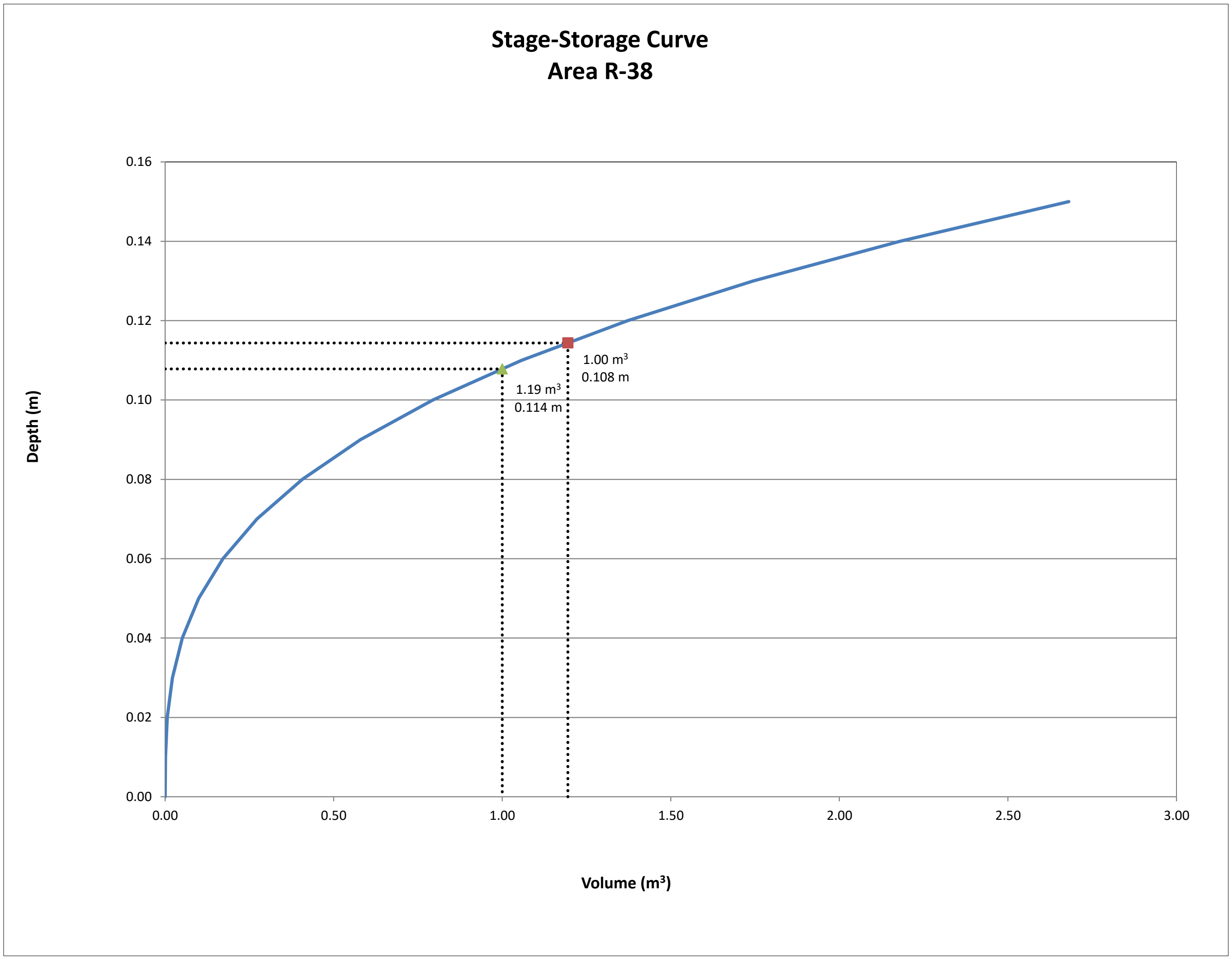
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	R-38	: BUILDING ROOF		
OTTAWA IDF CURVE				
Area =	0.0104	ha	Qallow =	0.80
C =	1.00		Vol(max) =	1.00
			Notches =	2
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	7.03	6.23	1.87
10	178.56	5.17	4.37	2.62
15	142.89	4.14	3.34	3.00
20	119.95	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)
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
1.00 m³
0.108 m
1.19 m³
0.114 m

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.)

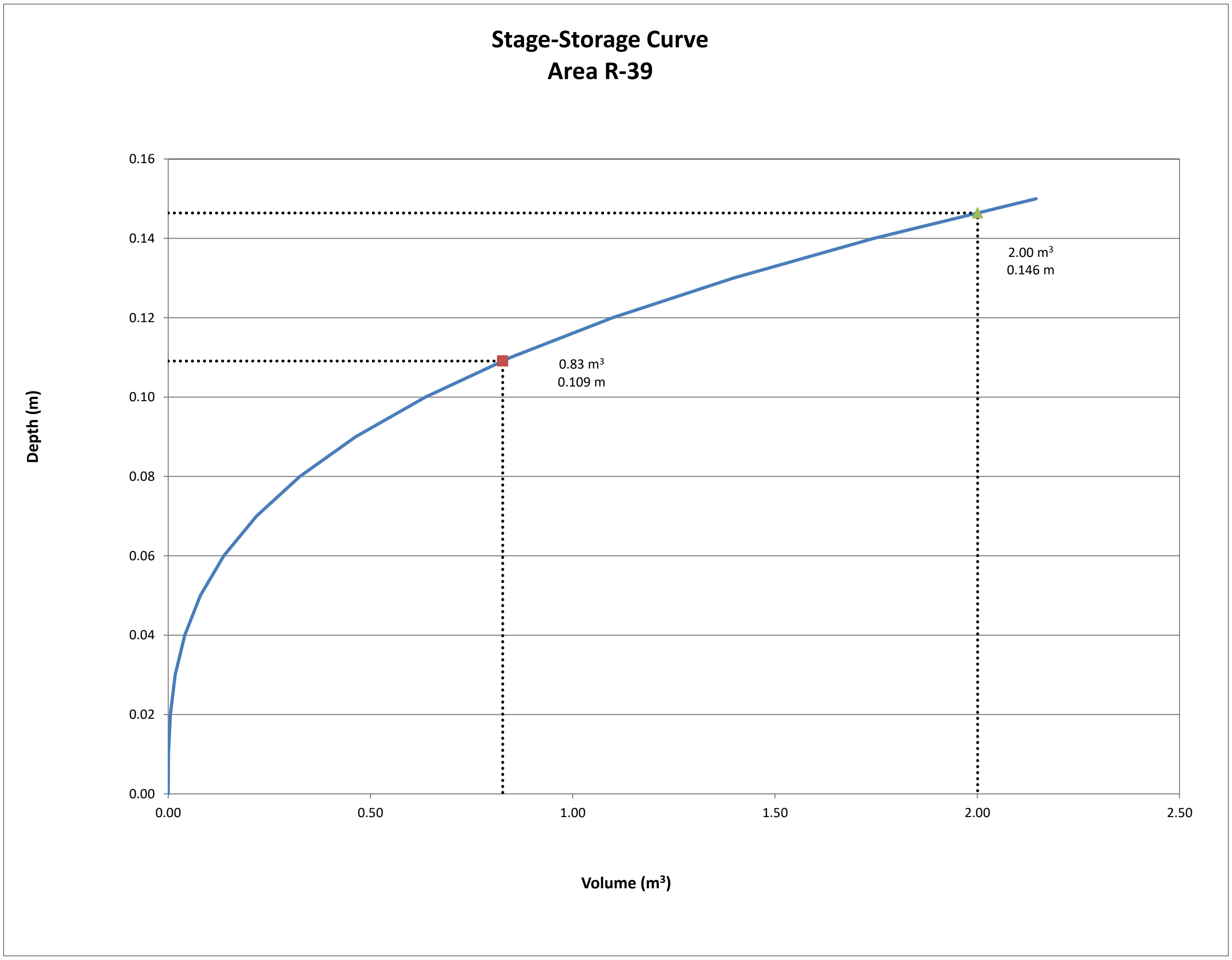
REQUIRED STORAGE - 100-YEAR EVENT				
AREA	R-39	: BUILDING ROOF		
OTTAWA IDF CURVE				
Area =	0.0083	ha	Qallow =	1.09
C =	1.00		Vol(max) =	2.00
			Notches =	2
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	5.58	4.49	1.35
10	178.56	4.10	3.01	1.81
15	142.89	3.28	2.19	1.98
20	119.95	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)
0.83 m3
0.109 m
2.00 m3
0.146 m

Mannings Equation Calculations - Worst Case Scenarios

Pinch Point North Building North Side

V-Bottom Ditch

Depth	m	0.2
Side slopes	1 to X	3
Top Width	m	1.2
Area	m^2	0.120
Perimeter	m	1.26
R=A/P	m	0.09
n		0.035
Slope	m/m	0.015
Q_{max}	m^3/s	0.087
V_{max}	m/s	0.728

Courtyard - West Side North Building

V-Bottom Ditch

Depth	m	0.08
Side slopes	1 to X	25
Top Width	m	4
Area	m^2	0.160
Perimeter	m	4.00
R=A/P	m	0.04
n		0.035
Slope	m/m	0.02
Q_{max}	m^3/s	0.076
V_{max}	m/s	0.472

Post Development Runoff Coefficient "C"

Area	Surface	Ha	"C"	C_{avg}	*C_{100}
Total	Hard	0.070	0.90	0.40	0.46
0.245	Soft	0.175	0.20		

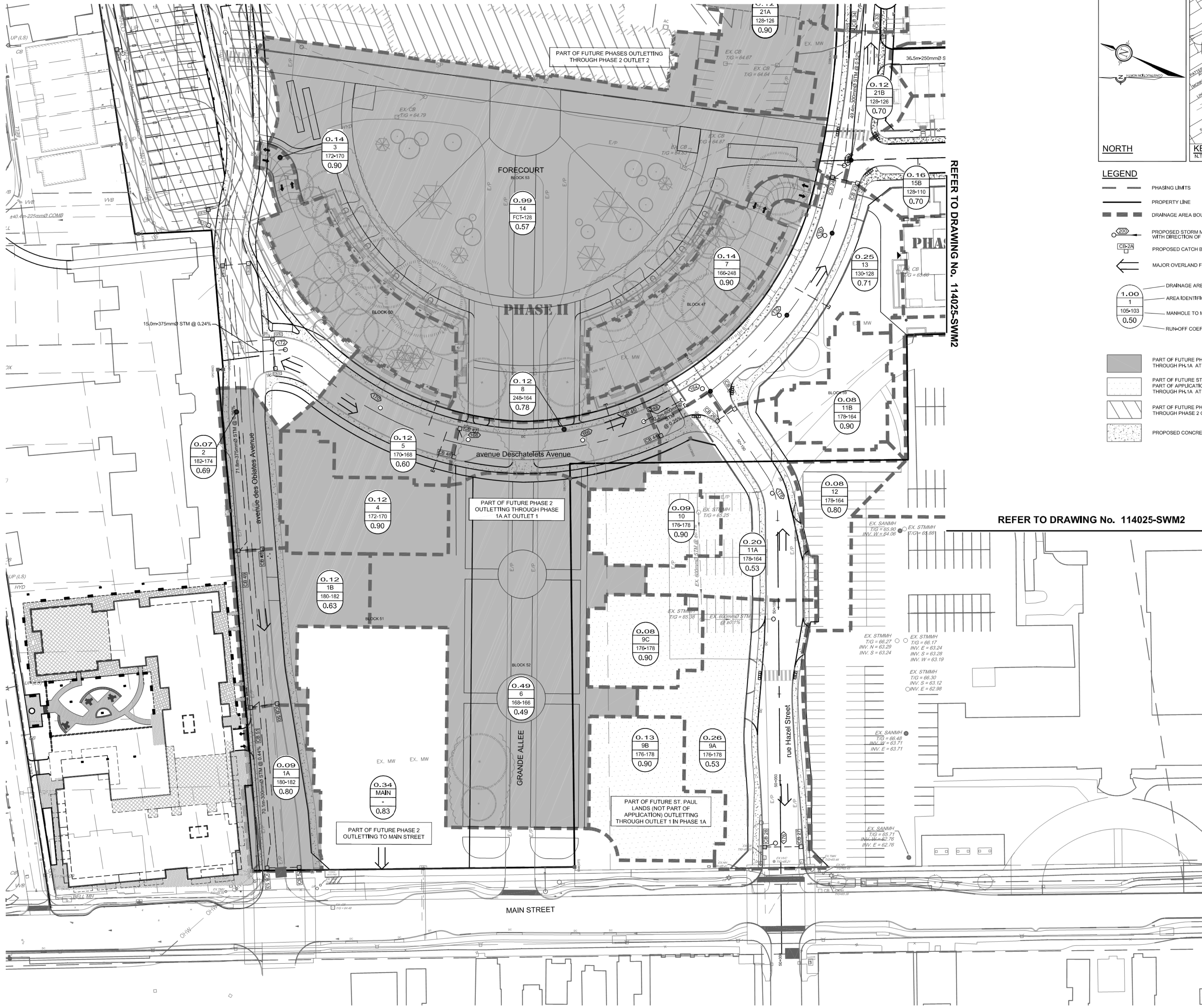
Post-Development Free Flows
Total Emergency Overland to Scholastic Avenue

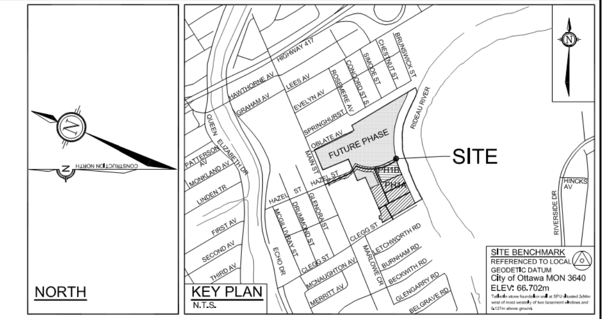
Outlet Options	Area (ha)	$Q_{2\ Year}$ (L/s)	$Q_{5\ Year}$ (L/s)	$Q_{100\ Year}$ (L/s)	$Q_{100\ Year\ +20\%}$ (L/s)
	0.245	**20.9**	**28.4**	**56.5**	**67.8**

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





LEGEND

	PHASING LIMITS
	PROPERTY LINE
	DRAINAGE AREA BOUNDARY
200	PROPOSED STORM MH & SEWER WITH DIRECTION OF FLOW
CB-2A	PROPOSED CATCH BASIN
	MAJOR OVERLAND FLOW ROUTE
1.00	DRAINAGE AREA (hectares)
1	AREA IDENTIFICATION
105-103	MANHOLE TO MANHOLE
0.50	RUN-OFF COEFFICIENT
	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

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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
6.	UPDATED TO REFLECT PH2 DRAINAGE AREAS	MAY 26/17	MJP
5.	ISSUED FOR CONSTRUCTION	JULY 7/16	JAG
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 SAZ
CHECKED JAG
DRAWN SAZ
CHECKED JAG
APPROVED MSP

FOR REVIEW ONLY

REGISTERED PROFESSIONAL ENGINEER
J.G. RIDDELL
26/5/17
PROVINCE OF ONTARIO

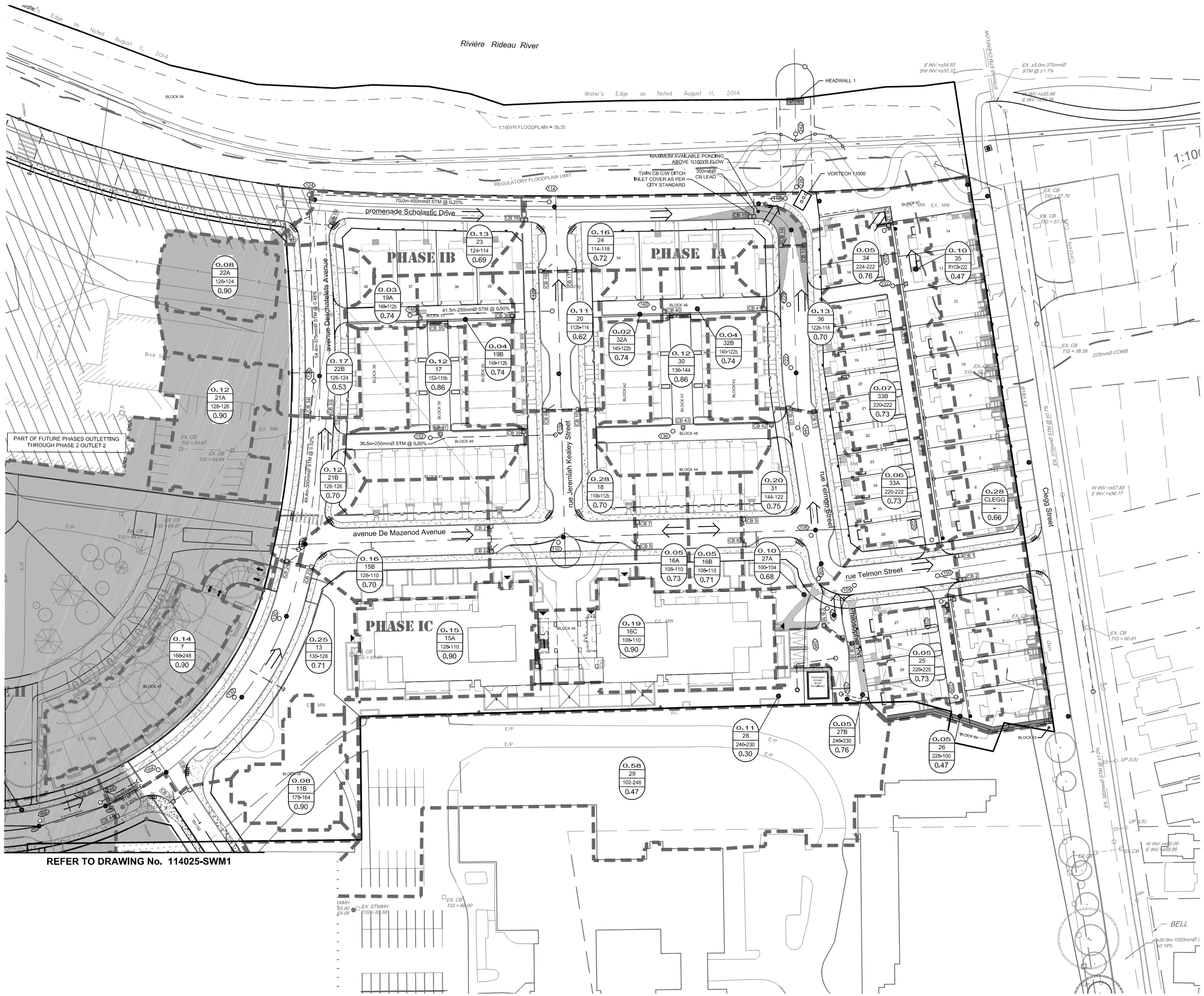
NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

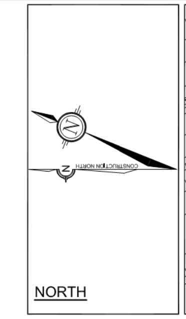
CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

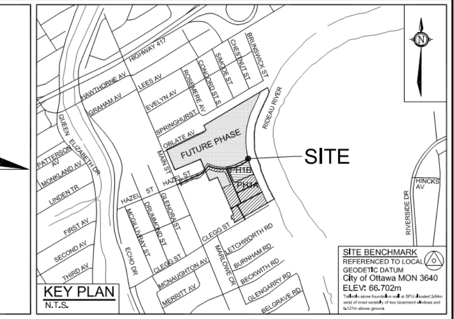
DRAWING NAME
STORM DRAINAGE AREAS PLAN
PHASE 1A AND 1B

PROJECT No. 114025-00
REV REV # 5
DRAWING No. 114025-STM1

PLANB1.DWG - 1000mmx707mm







LEGEND

- PHASING LIMITS
- PROPERTY LINE
- DRAINAGE AREA BOUNDARY
- PROPOSED STORM MH & SEWER WITH DIRECTION OF FLOW
- PROPOSED CATCH BASIN
- MAJOR OVERLAND FLOW ROUTE
- DRAINAGE AREA (hectares)
- AREA IDENTIFICATION
- MANHOLE TO MANHOLE
- RUN-OFF COEFFICIENT
- 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

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No.	REVISION	DATE	BY
6.	UPDATED TO REFLECT PH2 DRAINAGE AREAS	MAY 26/17	MJP
5.	ISSUED FOR CONSTRUCTION	JULY 7/16	JAG
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 SAZ
CHECKED JAG
DRAWN SAZ
CHECKED JAG
APPROVED MSP

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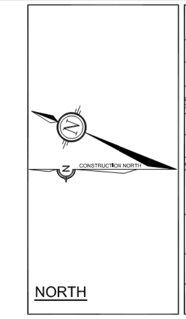
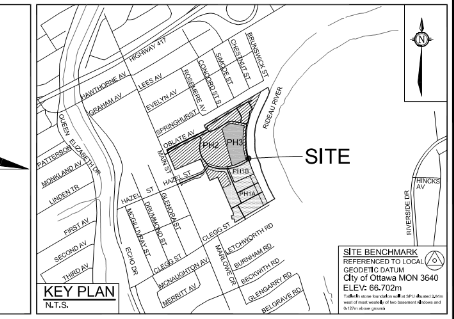
CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

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

PROJECT No. 114025-00
REV # 5
DRAWING No. 114025-STM2

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.





LEGEND

- PHASING LIMITS
- PROPERTY LINE
- APPROVED PHASE 1A/B DRAINAGE AREA BOUNDARY
- PHASE 2/3 DRAINAGE AREA BOUNDARY
- PROPOSED STORM MH & SEWER WITH DIRECTION OF FLOW
- PROPOSED CATCH BASIN
- MAJOR OVERLAND FLOW ROUTE
- 1.00 DRAINAGE AREA (hectares); 1 AREA IDENTIFICATION; 105-103 MANHOLE TO MANHOLE; 0.50 RUN-OFF COEFFICIENT
- 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
- PROPOSED WATERPROOF BASEMENT LIMITS (NO WEEPING TILE)

D07-16-15-0001 PHASE 2 AND 3

REFER TO 114025-STM1 AND STM2 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

DESIGN SAZ
CHECKED JAG
DRAWN SAZ
CHECKED JAG
APPROVED MSP

FOR REVIEW ONLY

REGISTERED PROFESSIONAL ENGINEER
J.G. RIDDELL
26/5/17
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
STORM DRAINAGE AREAS PLAN
PHASE 2 AND 3
(OUTLETTING THROUGH
STORM OUTLET 2)

PROJECT No. 114025-00
REV REV # 3
DRAWING No. 114025-STM1-B

Appendix D
Correspondence

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

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

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

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

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

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: ______________________________

Golder Associates

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.

LICENSED PROFESSIONAL ENGINEER
S. A. TRICKEY
100104579
PROVINCE OF ONTARIO

Susan Trickey, P.Eng.
Geotechnical Engineer

Mike Cunningham, P.Eng.
Geotechnical Engineer, Principal

SAT/MIC/ob
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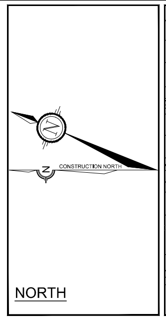
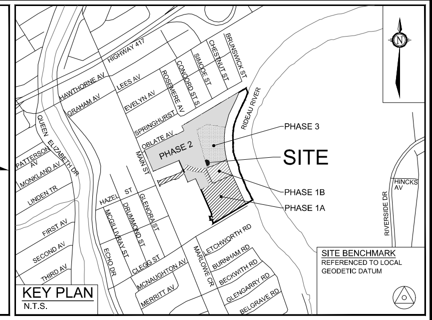
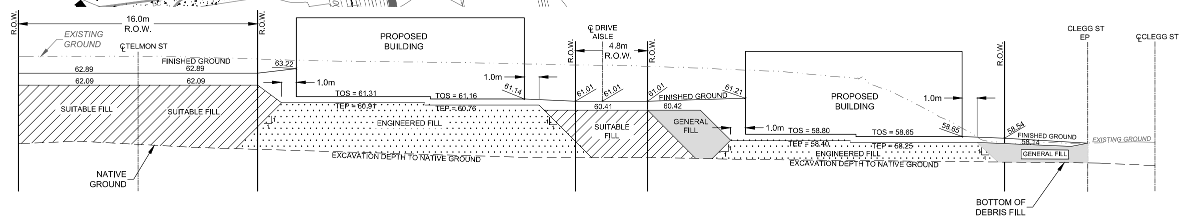


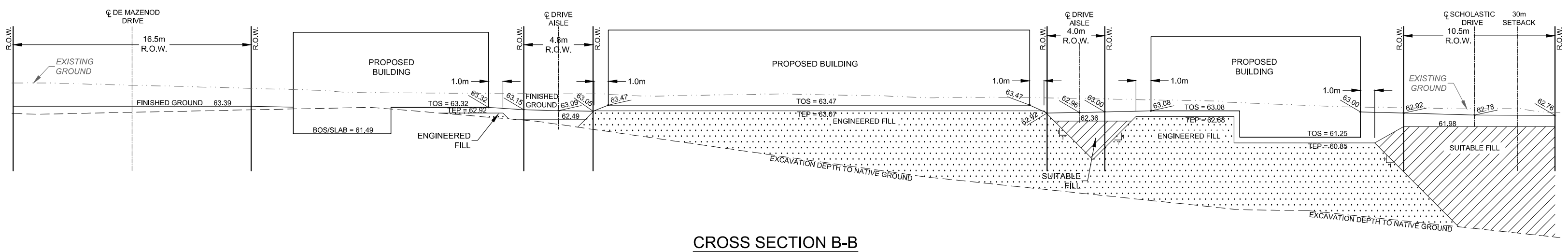


LEGEND

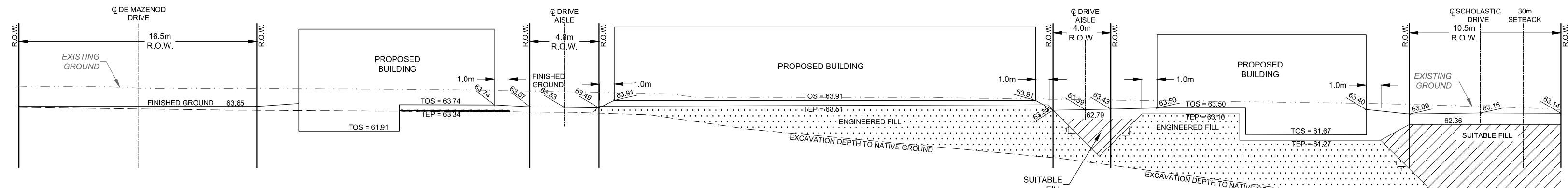
- SITE BOUNDARY
- PHASING LIMITS
- APPROXIMATE DEBRIS FILL BOUNDARY LIMIT
- 1:100YR FLOODPLAIN LIMIT
- FLOODPLAIN REGULATORY LIMIT
- ORIGINAL GROUND CONTOUR LINE AND CONTOUR ELEVATION
- REMEDIATION AREA REQUIRING A RVCA PERMIT



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

PLANB1.DWG - 1000mmx707mm

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

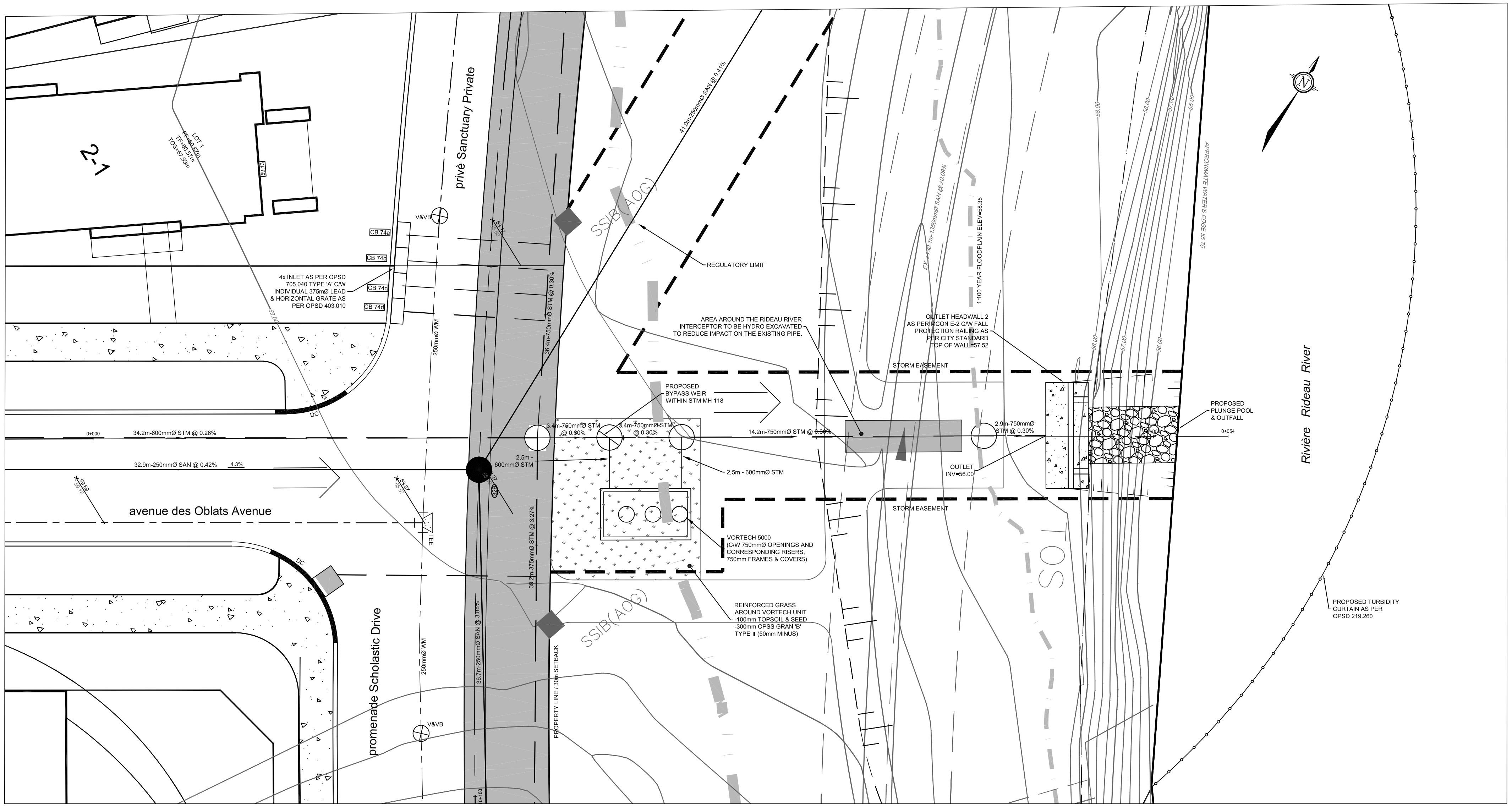
Terry K. Davidson, P. Eng.
Conservation Authority S. 28 Signing delegate
O. Reg. 174/06

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: ________________________________



LEGEND

200mmØ WM	PROPOSED WATERMAIN AND DIAMETER
	PROPOSED SANITARY MH & SEWER WITH DIRECTION OF FLOW
	PROPOSED STORM MH & SEWER WITH DIRECTION OF FLOW
	PROPOSED CLAY DYKE
	PROPOSED CATCH BASIN LEAD
CB 14	PROPOSED ROADSIDE CATCHBASIN
CB 26	PROPOSED ROADSIDE CATCH BASIN WITH INLET CONTROL DEVICE
	PROPOSED VORTECHS 11000 STORMWATER TREATMENT UNIT
	PROPOSED PLUNGE POOL & OUTFALL
	PROPOSED STORM EASEMENT
61.97	PROPOSED ELEVATION
4.0%	PROPOSED GRADE AND DIRECTION
	MAXIMUM 2:1 SIDELSOPE
	MAJOR OVERLAND FLOW ROUTE
	PROPOSED FENCELINE
61.00	EXISTING GROUND SURFACE CONTOUR (MAJOR/MINOR)
	PROPOSED SILT FENCE PER OPSD 219.110
	PROPOSED TURBIDITY CURTAIN AS PER OPSD 219.260
	PROPOSED MULTI-USE PATHWAY

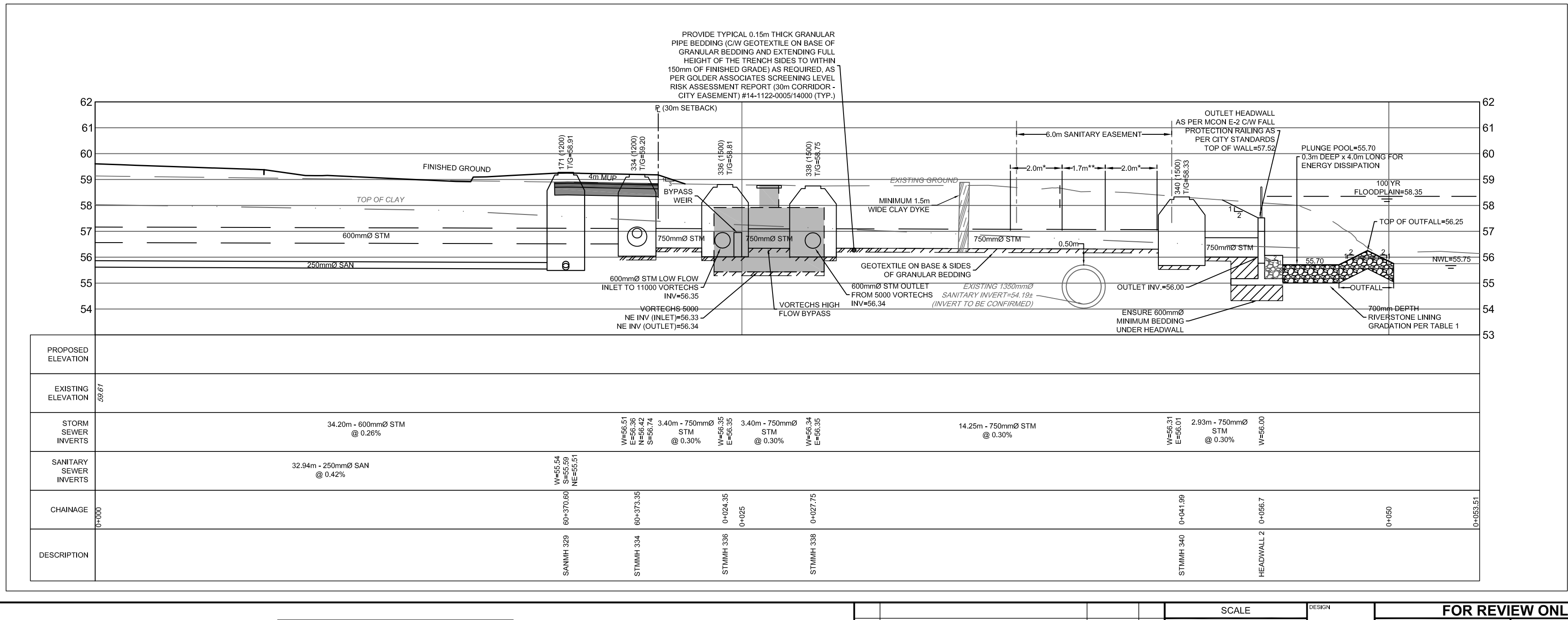
TABLE 1: RIVERSTONE GRADATION

% 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

DESIGN: JAG
CHECKED: MSP
DRAWN: MTM
CHECKED: JAG
APPROVED: JGR

FOR REVIEW ONLY

REGISTERED PROFESSIONAL ENGINEER J.G. RIDDELL PROVINCE OF ONTARIO

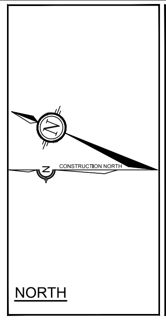
NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

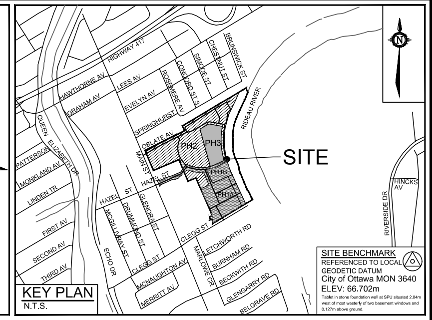
CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

DRAWING NAME
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

PLANB1.DWG - 1000mmx707mm





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:
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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

REGISTERED PROFESSIONAL ENGINEER J.G. RIDDELL 21/11/16 PROVINCE OF ONTARIO

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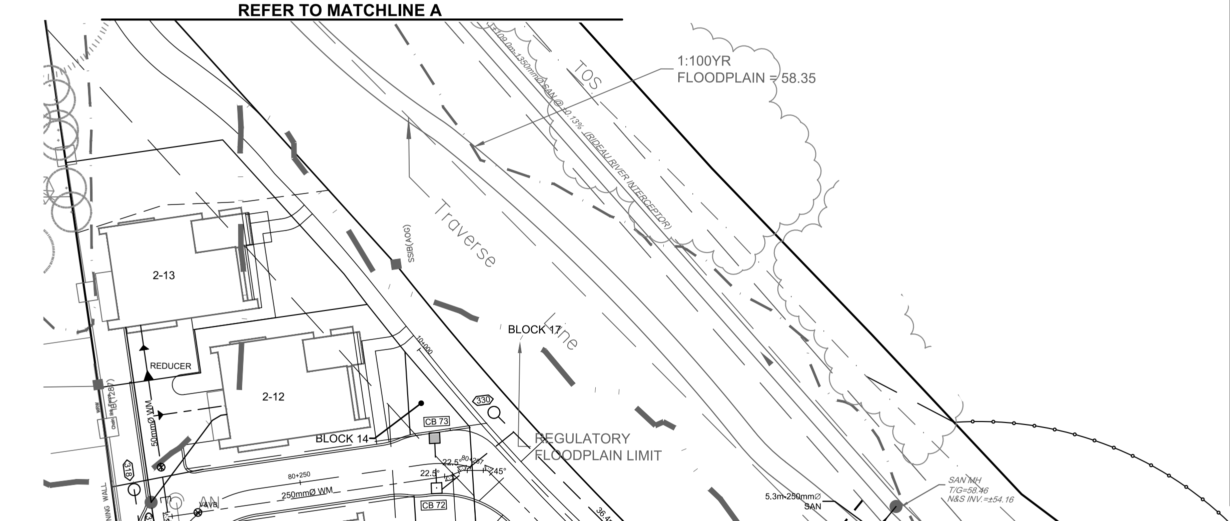
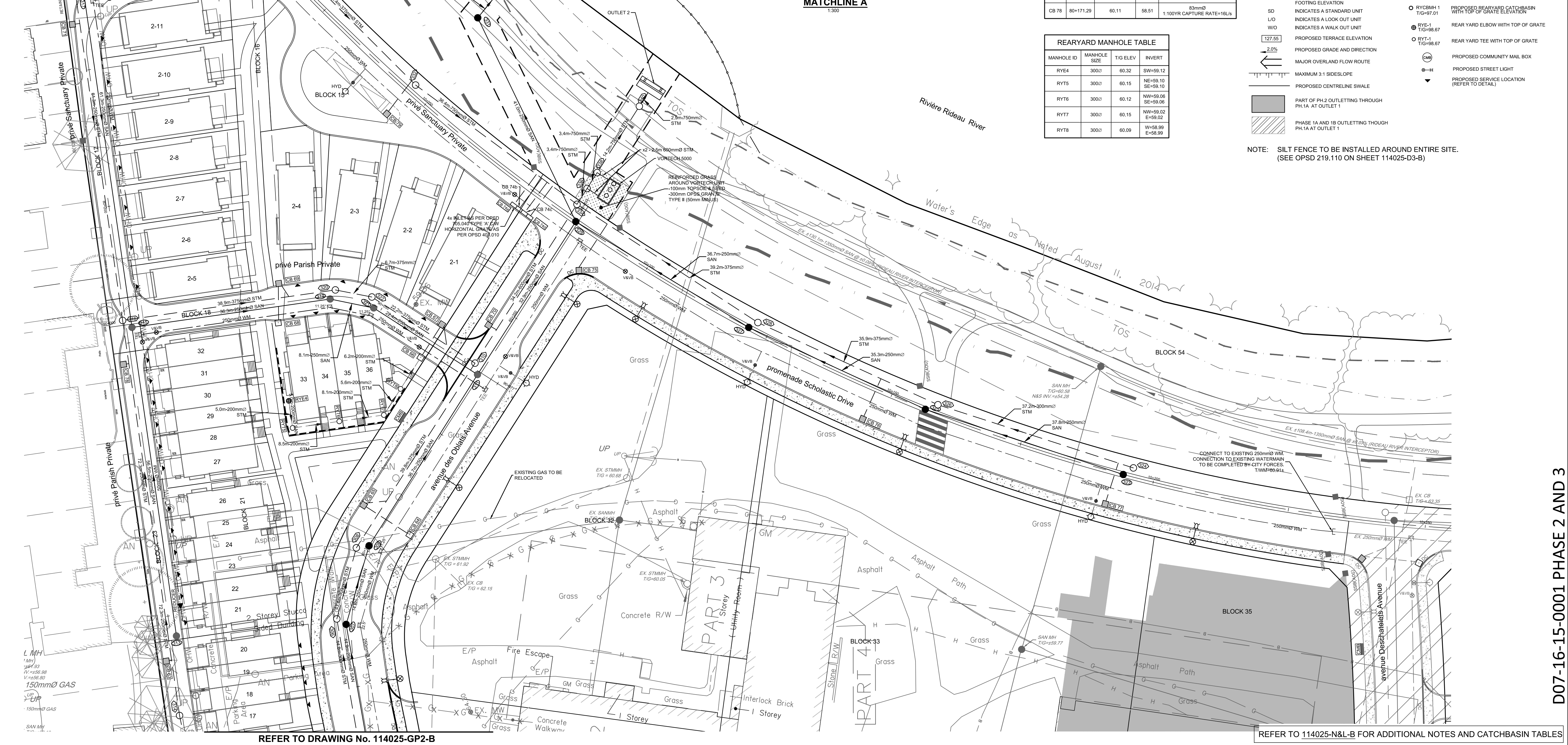
CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

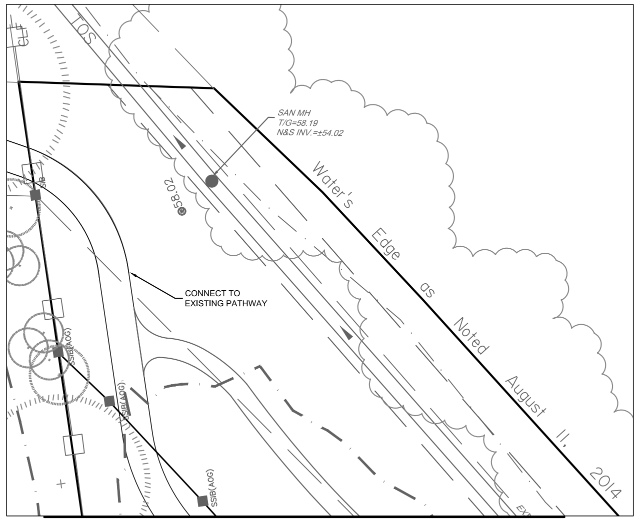
DRAWING NAME
GRADING, EROSION AND SEDIMENT CONTROL PLAN PHASE 2 AND 3

PROJECT No. 114025-00
REV REV # 1
DRAWING No. 114025-GR3-B

PLANB1.DWG - 1000mmx707mm

REFER TO MATCHLINE A

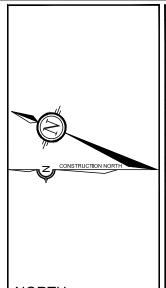


MATCHLINE A

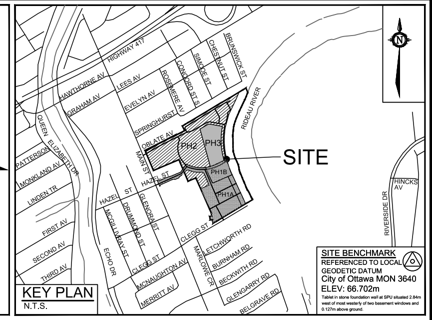
1:300

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



NORTH



KEY PLAN
N.T.S.

SITE BENCHMARK
REFERENCED TO LOCAL GEODETIC DATUM
City of Ottawa MON 3640
ELEV: 66.702m
Tablet in stone foundation wall at SPU situated 2.84m west of most westerly of two basement windows and 0.127m above ground.

LEGEND

	SITE BOUNDARY
	PHASING LIMITS
63.52 / 63.46	PROPOSED ELEVATION / EXISTING ELEVATION
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127.55	PROPOSED TERRACE ELEVATION
2.0%	PROPOSED GRADE AND DIRECTION
	MAJOR OVERLAND FLOW ROUTE
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	PROPOSED CENTRELINE SWALE
	PART OF PH.2 OUTLETTING THROUGH PH.1A AT OUTLET 1
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	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

REFER TO DRAWING No. 114025-GP2-B

NOTE:
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PRELIMINARY
NOT FOR
CONSTRUCTION

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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

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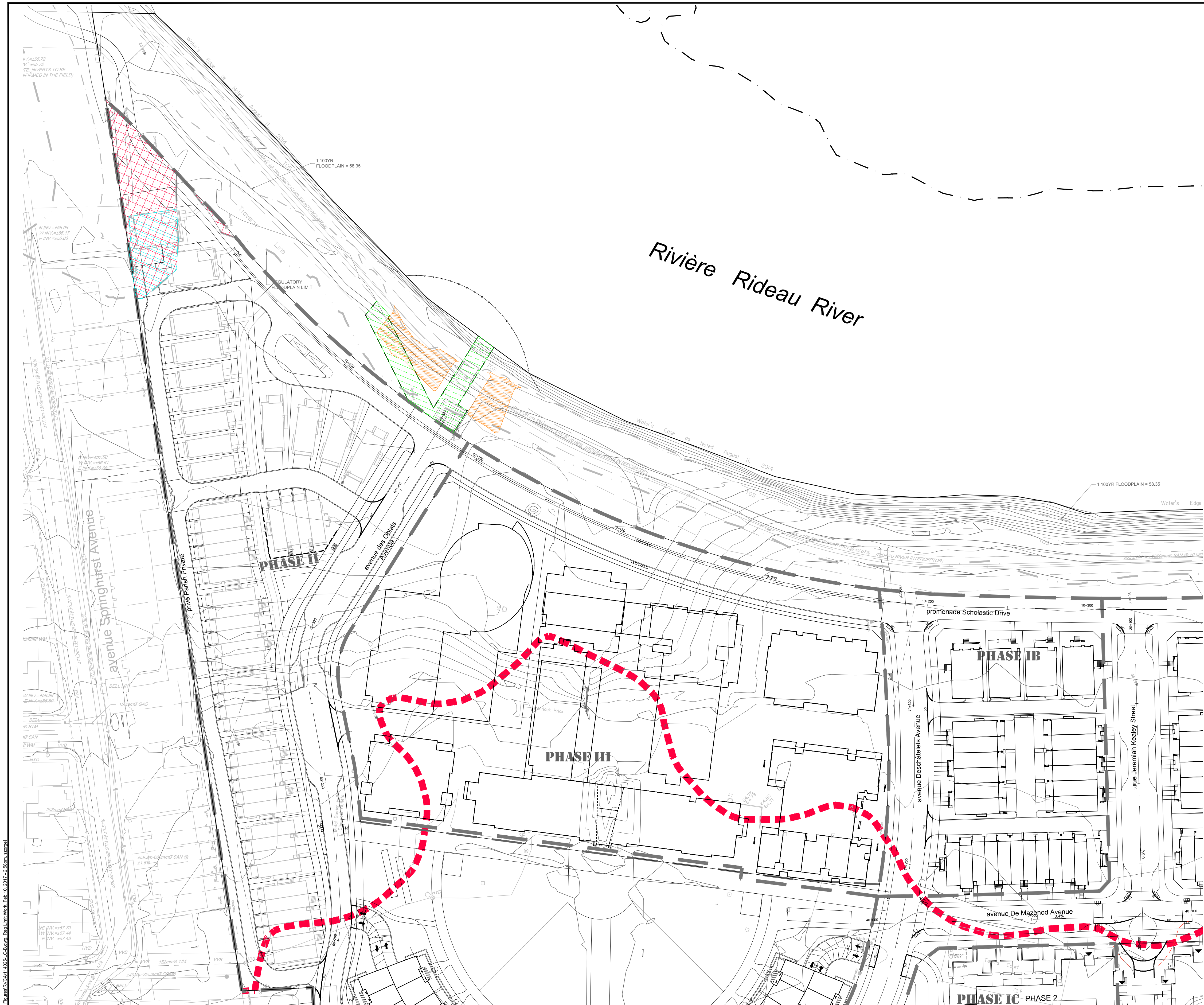
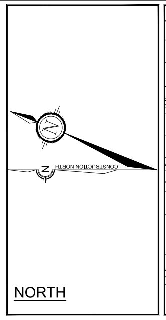
CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

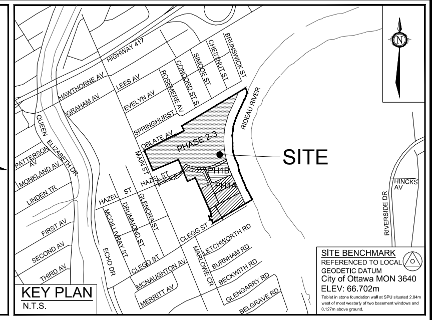
DRAWING NAME
GENERAL PLAN OF SERVICES
PHASE 2 AND 3

PROJECT No. 114025-00
REV REV # 1
DRAWING No. 114025-GP3-B

PLANB1.DWG - 1000mmx707mm







LEGEND

- SITE BOUNDARY
- PHASING LIMITS
- APPROXIMATE DEBRIS FILL BOUNDARY LIMIT
- 1:100YR FLOODPLAIN LIMIT
- FLOODPLAIN REGULATORY LIMIT
- 61.00 / 60.00 — ORIGINAL GROUND CONTOUR LINE AND CONTOUR ELEVATION
- REMEDIATION AREA REQUIRING A RVCA PERMIT
- RESIDENTIAL DWELLING TO BE CONSTRUCTED REQUIRING A RVCA PERMIT
- STORM AND SANITARY OUTLETS TO BE CONSTRUCTED REQUIRING A RVCA PERMIT
- PREVIOUSLY APPROVED CUT COMPENSATION AREA

NOTE:
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No.	REVISION	DATE	BY
1.	ISSUED FOR RVCA PERMIT	FEB 13/17	JAG

SCALE 1:500

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
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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

PLANB1.DWG - 1000mmx707mm

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		