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Greystone Village

Site Servicing, Stormwater Management, Noise, Erosion and Sediment Control Brief

Phase 2 and 3

(Master Servicing Study Update)

Prepared for: Greystone Village Inc.

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GREYSTONE VILLAGE
175 MAIN STREET
OTTAWA, ONTARIO

SITE SERVICING, STORMWATER MANAGEMENT, NOISE, EROSION AND SEDIMENT CONTROL BRIEF
PHASE 2 AND 3
(MASTER SERVICING STUDY UPDATE)

Prepared for:

Greystone Village Inc.

Prepared by:

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

Issued: November 21, 2016 (R-2016-169)
Revised: May 26, 2017
Updated: August 7, 2024
Revised: October 23, 2024
Revised: December 5, 2024
Revised: December 20, 2024
Revised: January 28, 2025
Revised: March 4, 2025
Revised: April 1, 2025

Ref: R-2017-089
Novatech File No. 114025

NOVATECH
Engineers, Planners & Landscape Architects

April 1, 2025

Planning and Growth Management Department
City of Ottawa
110 Laurier Ave. West, 4th Floor
Ottawa, Ontario
K1P 1J1

Attention: Vincent Duquette, E.I.T.

Dear Sir:

Re: Greystone Village - 175 Main Street
Site Servicing, Stormwater Management, Noise, Erosion and Sediment Control Brief - Phase 2 and 3 (Master Servicing Study Update)
Our File No.: 114025
City of Ottawa File No.: D07-16-15-0001 (D02-02-15-0004)

Please find enclosed updated report entitled, “Greystone Village, 175 Main Street – Site Servicing, Stormwater Management, Noise, Erosion and Sediment Control Brief – Phase 2 and 3 (Master Servicing Study Update)” dated April 1, 2025, which includes the updated stormwater management modelling and results based on the site plan & subdivision applications prepared to date.

The report includes the same information included in the report supporting Phases 1A, 1B, 2, & 3, however Sections 1.3, 1.4, 3, 4, and 5 have been updated to reflect the as-built conditions of the subdivision servicing and the subsequent site plan applications to provide an overall updated report for future development applications.

If you have any questions, please contact the undersigned.

Sincerely,

NOVATECH

Trevor McKay, P.Eng.
Senior Project Manager, Land Development

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See Engineering Drawing Set

1.0 INTRODUCTION

A Draft Plan of Subdivision Application was submitted to the City of Ottawa for the lands located at 175 Main Street (the "Subject Site"). The Draft Plan of Subdivision divided the existing parcel into a total of sixty-seven (67) blocks. Since that time, the subdivision was divided in two (2) submissions to the City of Ottawa, and it is intended that two plans of subdivision will be registered; one for Phases 1A/B/C and one for Phases 2/3. Phases 1A & 1B consist of sixty-one (61) blocks; a mix of residential, and open space uses, including 38 residential lots, 8 residential blocks and 1 open space. The remaining 15 blocks are for shared right-of-ways pathways and reserves.

Phases 2 & 3 will consist of thirty-three (33) blocks; a mix of residential, commercial and open space uses, including 13 residential lots, 8 residential blocks, 1 mixed use block and 2 open spaces. The remaining 9 blocks are for shard right-of-ways and pathways. The existing Deschâtelets Building was recently designated by the City of Ottawa Council as a heritage building under Part IV of the Ontario Heritage Act.

The Deschâtelets Building could be repurposed for a variety of uses. The existing tree-lined access from Main Street to the Deschâtelets Building, the 'Grande Allée', will be repurposed as a pedestrian-oriented linear park.

The existing semi-circular greenspace, the 'Forecourt', will be dedicated as a park space to the City of Ottawa. A corridor along the Rideau River will be maintained as greenspace and a multi-use pathway will be created along the west side of this corridor.

The Draft Plan of Subdivision has been organized into five phases of development. Prior to the start of construction of Phases 1A/1B, an area of contaminated fill located at the southeast corner of the Subject Site was remediated.

This revised Servicing Brief has been prepared in support of the engineering detailed design submission for Phase 2 and 3 of Greystone Village Inc.'s subdivision for the subject property along the Rideau River.

1.1 Study Area

The proposed Oblate lands development, Greystone Village at 175 Main Street, owned by Greystone Village Inc. consists of a 10.8ha site located in the City of Ottawa. The Oblate lands development is located east of Main Street, north of Clegg Street, south of Springhurst Avenue and west of the Rideau River as shown on **Figure 1** – Key Plan. St. Paul University also adjoins the site to the southwest. Three conceptual buildings are shown on the St. Paul lands for illustrative purposes only. These potential buildings have been conservatively accounted for in the servicing strategy.

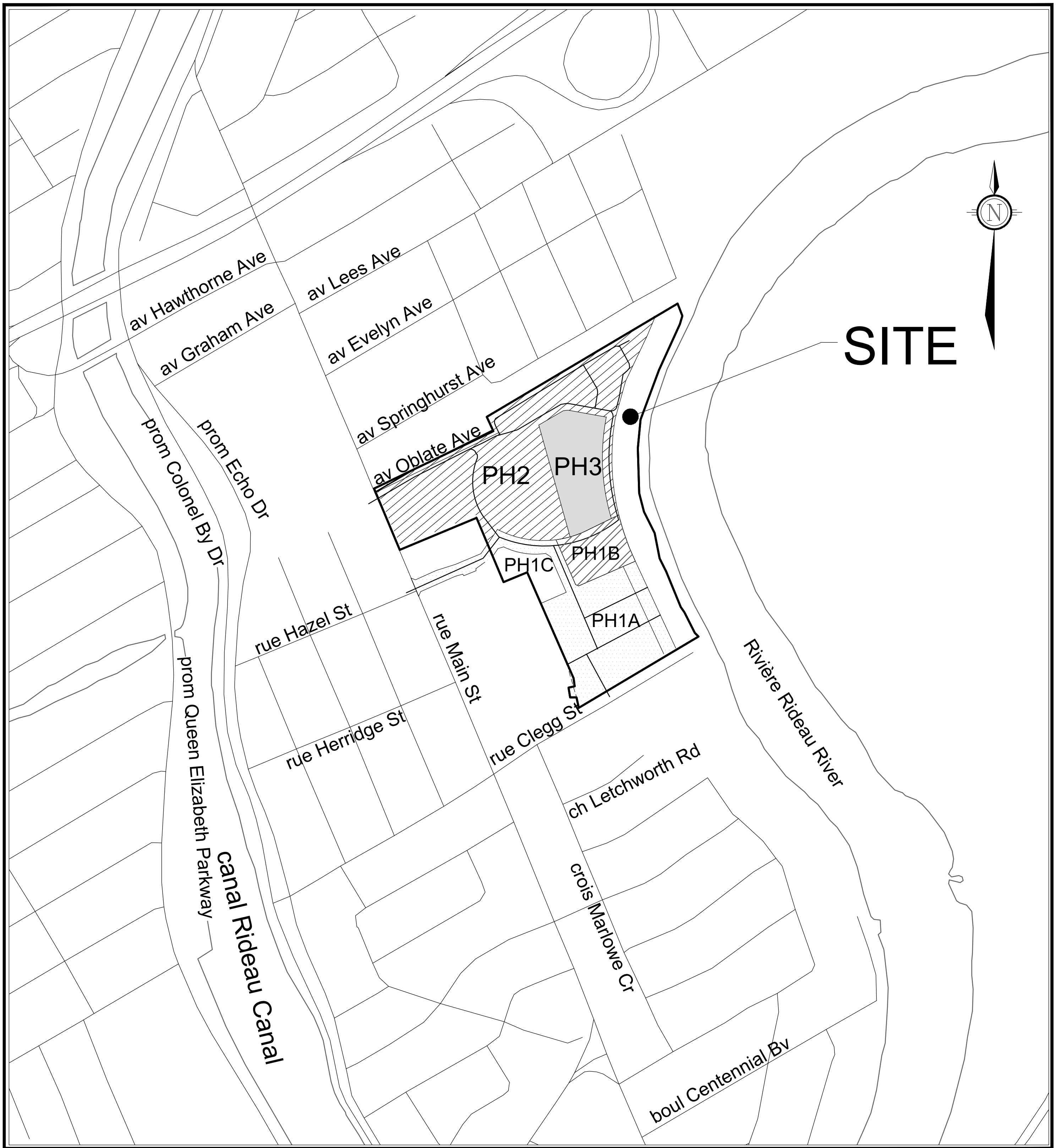
The Greystone Village development will consist of approximately 51 singles, 84 row townhouses, 42 back-to-back townhouses, 819 condo units, as well as a potential additional 146 retirement residence units within a new retirement residence building. The existing Deschâtelets building will contain approximately 38 apartments and other provisions for school, daycare and community centre. Refer to **Figure 2** – Concept Plan.

1.2 Existing Conditions

The parcel of land consisted of an existing residence on a large lot, largely comprised of grassed fields with a moderate amount of trees, as shown on **Figure 3** – Existing Conditions Plan and Drawing **114025-ECDN** – Existing Conditions Plan.

The grade was relatively flat in the south and west portions of the site adjacent to Clegg Street and Main Street. The grade falls to the north and east of the existing Deschâtelets building, approximately 5.0m in elevation, matching grades along the Rideau River bank and lots along Springhurst Avenue.

Most of the stormwater sheet drained across the site from west to east and outlet directly to the Rideau River. There is also an existing outlet at the back of the existing Deschâtelets building that outlet's along



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CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

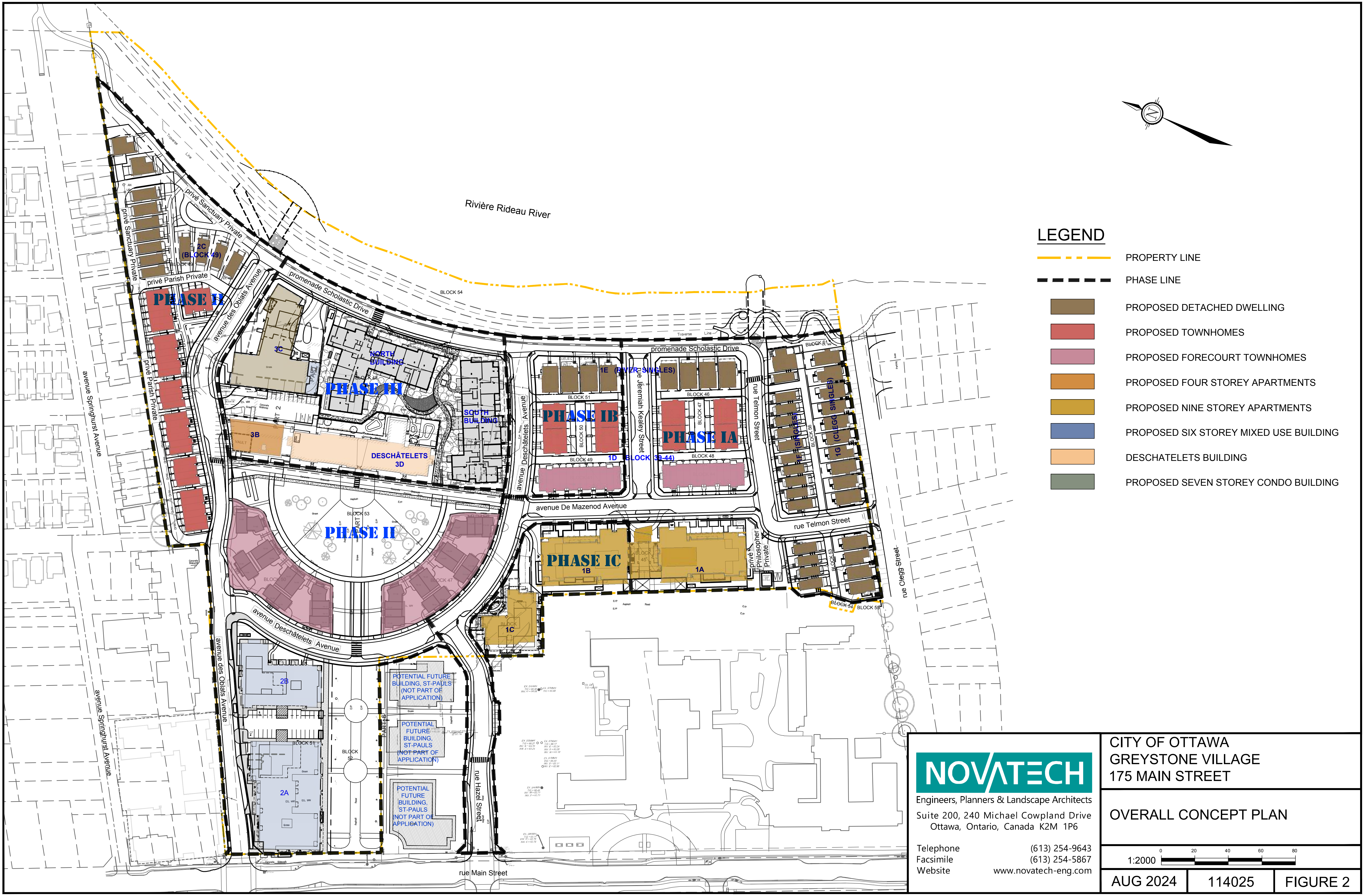
OVERALL KEY PLAN

N.T.S.

AUG 2024
114025
FIGURE 1

M:\2014\114025\CAD\Design\Figures\Design Brief\20240425 - MSS Update\FIG-1-KP.dwg, KP, May 30, 2017 - 2:35pm, szorgel

SHT8X11.DWG - 216mmx279mm



M:\2014\114025\CAD\Design\Figures\Design Brief\20240425 - MSS Update\FIG-2-CP.dwg, FIG-2-CP, Sep 11, 2024 - 5:45pm, tmckay

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CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

OVERALL CONCEPT PLAN

1:2000 0 20 40 60 80

AUG 2024 | 114025 | FIGURE 2

SHT11X17.DWG - 279mmX432mm

LEGEND

▬ ▪ ▬	REGIONAL SITE BOUNDARY/PROPERTY LINE
▬ ▬ ▬	PHASE LINE

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CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

OVERALL EXISTING
CONDITIONS PLAN

1:2500 0 25 50 75 100

AUG 2024 | 114025 | FIGURE 3

SHT11X17.DWG - 279mmX432mm

M:\2014\114025\CAD\Design\Figures\Design Brief\20240425 - MSS Update\FIG-3-EX.dwg, FIG-3-EX, May 30, 2017 - 3:16pm, szorgel the bank of the Rideau River. A small portion along the west side of the site sheet drains to swales along Main Street and St. Paul University parking lot.

1.3 Development Applications

Greystone Village has undergone modifications since the Draft Plan Submission (2015). A list of the development applications is as follows:

Draft Plan Applications

2015	Greystone Village Draft Plan Submission	175 Main St.

Subdivision Applications

2016	Greystone Village Phase 1A/1B	175 Main St.
2017	Greystone Village Phase 2/3	175 Main St.

Site Plan Applications

2017	Greystone Terraces (1A/1B)	530 & 570 Mazenod Ave.
2018	Greystone Manor Retirement Residence	225 Scholastic Dr.
2020	The Spencer (1C)	360 Deschâtelets Ave.
2020	Mixed Use Buildings (2A/2B)	10 Des Oblats Ave.
2020	Existing Deschâtelets Building Retrofit	48 & 60 Oblats Ave.
2023	Greystone Village Phase 3 Condos	205 Scholastic Dr. & 375 Deschâtelets Ave.
2024	Forecourt Townhomes (Blocks 28 & 29)	295 & 355 Deschâtelets Ave.

Future Development Blocks

2025	Forecourt	City Park
-	Potential Future Buildings (By Others)	St. Paul's University

1.4 Previous Studies

The Greystone Village development has undergone numerous changes and development applications. The list of previous studies for each development application is provided below:

Draft Plan Submission (2015)

1) Greystone Village, 175 Main Street
   Site Servicing, Stormwater Management, Noise, Erosion and Sediment Control Brief
   (Novatech, August 27, 2015)

2) Greystone Village, 175 Main Street
   Potential Low Impact Development Opportunities Memorandum
   (Novatech, November 25, 2015)

Phase 1A/1B Submission (2016)

3) Greystone Village, 175 Main Street
   Site Servicing, Stormwater Management, Noise, Erosion and Sediment Control Brief
   Phase 1A/1B
   (Novatech, February 24, 2016)

Phase 2/3 Submission (2017)

4) Greystone Village, 175 Main Street
   Site Servicing, Stormwater Management, Noise, Erosion and Sediment Control Brief
   Phase 2/3
   (Novatech, May 26, 2017)

Greystone Terraces (1A/1B) (2017)

5) 175 Main Street – Greystone Terraces
   Site Servicing and Stormwater Management Memorandum
   (Novatech, June 30, 2017)

6) Greystone Village (175 Main Street)
   Technical Memorandum for Site Servicing, Stormwater Management, Noise, Erosion and Sediment Control Brief
   (Novatech, June 30, 2017)

Greystone Manor Retirement Residence (2018)

7) 225 Scholastic Drive – Greystone Village Retirement Residence
   Site Servicing and Stormwater Management Memorandum
   (Novatech, March 23, 2018)

The Spencer (1C) (2020)

8) 360 Deschâtelets Ave – The Spencer (Greystone Village 1C Building)
   Site Servicing and Stormwater Management Memorandum
   (Novatech, August 6, 2020)

Mixed Use Buildings (2A/2B) (2020)

9) Greystone Village 2A

10) 10 Des Oblate Avenue – Greystone Village 2A / 2B Mixed Use Building
    Site Servicing and Stormwater Management Memorandum
    (Novatech, March 11, 2020)

Existing Deschâtelets Building Retrofit (2020)

11) 225 Scholastic Drive – Greystone Village Deschâtelets Building
    Site Servicing And Stormwater Management Memorandum
    (Novatech, May 15, 2020)

Greystone Village Phase 3 Condos (2023)

12) Greystone Village Phase 3 Condos – 375 Deschâtelets Avenue
    Site Servicing Brief
    (Novatech, February 10, 2023)

13) Greystone Village – Phase 3 Condos
    Addendum to the Master Servicing Study for Greystone Village Phase 2/3 Memorandum
    (Novatech, February 10, 2023)

14) 375 Deschâtelets Ave – Site Plan Control
    Runoff Coefficient Calculation of Areas Above Underground Parking Roof Slab Memorandum
    (Novatech, December 2, 2022)

Greystone Village Forecourt Townhomes (2024)

15) Greystone Village Forecourt Townhomes – 295 & 355 Deschâtelets Avenue
    Site Servicing Brief
    (Novatech, March 25, 2025)

1.5 List of Drawings

This report pertains to the servicing of all phases of the development and should be read in conjunction with the engineering drawing set which includes the following drawings:

Phase 1A/B/C Engineering Drawings

114025-COV	Cover Sheet
114025-N&L	Notes, Tables and Legend
114025-ECDN	Existing Conditions Plan
114025-BP	Concept Plan with Road Cross Sections
114025-GP1	General Plan of Services
114025-GP2	General Plan of Services
114025-GP3	General Plan of Services
114025-GP4	General Plan of Services
114025-GP5	General Plan of Services
114025-PR1	Plan and Profile, rue Hazel Street
114025-PR2	Plan and Profile, avenue Deschâtelets Avenue
114025-PR3	Plan and Profile, promenade Scholastic Drive
114025-PR4	Plan and Profile, rue Jeremiah Kealey Street
114025-PR5	Plan and Profile, avenue De Mazenod Avenue
114025-PR6	Plan and Profile, rue Telmon Street
114025-PR7	Plan and Profile, privé Philosopher Private
114025-PR8	Plan and Profile, rue Clegg Street
114025-PR9	Plan and Profile, Storm Outlet 1 & Grading, Erosion and Sediment Control Plan
114021-GR1	Grading, Erosion and Sediment Control Plan
114021-GR2	Grading, Erosion and Sediment Control Plan
114021-GR3	Grading, Erosion and Sediment Control Plan
114021-GR4	Grading, Erosion and Sediment Control Plan
114021-GR5	Grading, Erosion and Sediment Control Plan
113191-SAN1	Sanitary Drainage Areas Plan
113191-SAN2	Sanitary Drainage Areas Plan
114025-STM1	Storm Drainage Areas Plan
114025-STM2	Storm Drainage Areas Plan
114025-D1	Detail Sheet
114025-D2	Detail Sheet
114025-D3	Detail Sheet
114025-D4	Detail Sheet
114025-D5	Detail Sheet
114025-U1	Composite Utility Plan
114025-U2	Composite Utility Plan
114025-U3	Composite Utility Plan
114025-U4	Composite Utility Plan
114025-U5	Composite Utility Plan
114025-U6	Notes and Details
114025-SL1	Streetlighting Layout and Levels Plan
114025-SL2	Streetlighting Layout and Levels Plan
114025-SL3	Streetlighting Layout and Levels Plan
114025-SL4	Streetlighting Layout and Levels Plan
114025-SL5	Streetlighting Layout and Levels Plan

114025-L1	Planting Plan
114025-L2	Planting Plan
114025-L3	Planting Plan
114025-L4	Planting Plan
114025-L5	Planting Plan
114025-L6	Landscape Details

Phases 2/3 Engineering Drawings

114025-COV-B	Cover Sheet - Phase 2 and 3
114025-N&L-B	Notes, Tables and Legend - Phase 2 and 3
114025-ECDN-B	Existing Conditions Plan - Phase 2 and 3

114025-TC1-B	Tree Conservation Plan - Phased Removals - Phase 2 and 3
114025-TC2-B	Tree Conservation Plan - Inset privé Parish Private / privé Sanctuary Private - Phase 2 and 3
114025-BP-B	Concept Plan with Road Cross Sections - Phase 2 and 3

114025-GP1-B	General Plan of Services - Phase 2 and 3
114025-GP2-B	General Plan of Services - Phase 2 and 3
114025-GP3-B	General Plan of Services - Phase 2 and 3

114025-PR1-B	avenue Des Oblats Avenue
114025-PR2-B	avenue Des Oblats Avenue / privé Parish Private
114025-PR3-B	privé Sanctuary Private / promenade Scholastic Drive
114025-PR4-B	avenue Deschâtelets Avenue
114025-PR5-B	privé Parish Private
114025-PR6-B	Storm Outlet 2 (incl. Grading, Erosion and Sediment Control)

114025-GR1-B	Grading, Erosion and Sediment Control Plan - Phase 2 and 3
114025-GR2-B	Grading, Erosion and Sediment Control Plan - Phase 2 and 3
114025-GR3-B	Grading, Erosion and Sediment Control Plan - Phase 2 and 3

114025-SAN1-B	Sanitary Drainage Areas Plan - Phase 2 and 3
114025-STM1-B	Storm Drainage Areas Plan - Phase 2 and 3

114025-U-B	Concept Plan with Proposed Hydro Layout / Road Cross Sections - Phase 2 and 3

114025-SL1-B	Streetlighting Layout and Levels Plan - Phase 2 and 3
114025-SL2-B	Streetlighting Layout and Levels Plan - Phase 2 and 3
114025-SL3-B	Streetlighting Layout and Levels Plan - Phase 2 and 3

114025-L1-B	Planting Plan - Phase 2 and 3
114025-L2-B	Planting Plan - Phase 2 and 3
114025-L3-B	Planting Plan - Phase 2 and 3
114025-L4-B	Landscape Details - Phase 2 and 3

114025-D1-B	Detail Sheet #1 - Phase 2 and 3
114025-D2-B	Detail Sheet #2 - Phase 2 and 3
114025-D3-B	Detail Sheet #3 - Phase 2 and 3
114025-D4-B	Detail Sheet #4 - Phase 2 and 3

2.0 GEOTECHNICAL INVESTIGATION

Golder Associates Ltd. conducted a geotechnical investigation in support of the proposed residential development on the Oblate lands, *Geotechnical Investigation, Proposed Development, Oblates Property, 175 Main Street, Ottawa, Ontario, December 2014, Report No.: 14-1122-0005 (5100).*

The field investigation was performed March 24 to 31, 2013 as well as July 30 to August 31, 2014 and consisted of the following:

First Stage

- Three (3) widely spaced boreholes advanced on the northeast, central and southeast portions of the site to a maximum depth of 10.0m.
- Four (4) closely spaced boreholes advanced on the north portion of the site to a maximum depth of 6.1m.
- Twelve (12) test pits advanced in the northeast, east and south portions of the site ranging from 1.3 to 4.4m.
- Groundwater monitoring devices were installed throughout the site.

Second Stage

- Ten (10) boreholes advanced at various locations within the proposed low-rise housing area to a maximum depth of 7.9m.
- Six (6) boreholes advanced at various locations in the areas of the proposed 3, 4, 6 and 9-storey buildings to a maximum depth of 18.9m.
- One (1) boreholes advanced in the southeast corner of the site where existing fill is expected to be the thickest to a maximum depth of 18.9m.
- Thirty-three (33) test pits advanced in the northeast, east and south portions of the site ranging from 1.2 to 4.2m.
- Groundwater monitoring devices were installed throughout the site.

The principal findings of this investigation determined that the soil profile generally consists of 0.6 to 6.7m of surficial fill thickening towards the river bank up to a maximum of 8.0m adjacent to Clegg Street (southeast corner). The surficial fill is underlain by a thick deposit of sensitive marine clay with a stiff to very stiff consistency to depths of about 9 to 15m. A layer of silty sand exists below the silty clay, followed by glacial till.

Practical refusal on assumed boulders or bedrock was encountered at depths ranging from 20 to 29.5m. Groundwater measured in a range from about 2m to 5.5m below ground surface. From a geotechnical perspective, the site is suitable for the proposed development. Refer to *Geotechnical Investigation – Proposed Development - Oblates Property, 175 Main Street, Ottawa, ON, prepared by Golder Associates Ltd. dated December 2014* for complete report.

Golder Associates Ltd. conducted a geotechnical investigation in support of Phase 1 of the Greystone Village Development, *Geotechnical Investigation, Proposed Development, Greystone Phase 1, 175 Main Street, Ottawa, Ontario, April 2016, Report No.: 14-1122-0005-5100-2*.

Additional field investigations were performed between August 31, 2014 and December 2015 and consisted of the following:

- Five (5) boreholes advanced at various locations within phase 1 to a maximum depth of 31.1m.
- Three (3) boreholes advanced at various locations within phase 1 for environmental assessment purposes to a maximum depth of 12.8m.
- Thirteen (13) test pits were put down as part of an ongoing site remediation to a maximum depth of 7.8m.

The principal findings of this investigation determined that the soil profile generally consists of existing fill, ranging from 0.6 to 7.8m, generally thickening towards the east (riverbank) and southern portions of the site. A thick deposit of sensitive clay was found at depths of about 9 to 13m, generally thickening to a greater depth towards the east portion of the site (riverbank). A discontinuous layer of silty clay and silt underlain by silty sand, sand and sandy silt was found at a depth of 12.3m. Glacial till was found at depths ranging from 13 to 26m and is inferred to slope down towards the southeast corner of the site.

Practical refusal to dynamic cone penetration was encountered at depths ranging from 20 to 29.5m from either cobbles, boulders or bedrock. Practical refusal to augering was encountered at depths ranging from 30.7 to 31.1m from likely bedrock. Bedrock was found at a depth of 31.1m from coring to a depth of 36.6m. Groundwater measured in a range from about 1.9m to 7.8m below ground surface.

Refer to *Geotechnical Investigation, Proposed Development, Greystone Phase 1,175 Main Street, Ottawa, Ontario, April 2016, Report No.: 14-1122-0005-5100-2* for complete report.

Also, refer to Screening Level Risk Assessment – Greystone Village – 30-meter Corridor – City Easements – 175 Main Street, Ottawa, ON, prepared by Golder Associates Ltd. dated December 2015 for specific information on pipe bedding requirements, etc.

Golder Associates Ltd. also conducted a geotechnical investigation in support of Phase 2 and 3 of the Greystone Village Development. *Geotechnical Investigation, Proposed Development, Greystone Village – Phase 2 and 3, 175 Main Street, Ottawa, Ontario, May 2017, Report NO.: 14-1122-0005-5100-3.*

The principal findings of this investigation determined that the soil profile generally consists of existing fill, ranging from 0.6 to 5.8m, generally thickening towards the east (riverbank) and southern portions of the site. A thick deposit of sensitive clay was found at depths of up to 14.5 metres. A discontinuous layer of silt beneath the silty clay was found at depths ranging from 10 to 14.5 metres. The silty clay and silt are underlain by a layer of silty sand to sandy silt at depths ranging from 9.1m to 18.3 metres. The silty sand was proven to extend to depths of 14.6 to 27.1 metres. Glacial till was proven/inferred to depths ranging from 14.6 to 31.8 metres.

Practical refusal to dynamic cone penetration was encountered at depths ranging from 20 to 29.5 metres from either cobbles, boulders or bedrock. Bedrock was found at a depth of 31.8 from coring to a depth of 33.4 metres.

Refer to *Geotechnical Investigation, Proposed Development, Greystone Village – Phase 2 and 3, 175 Main Street, Ottawa, Ontario, May 2017, Report NO.: 14-1122-0005-5100-3* for complete report.

2.1 Additional Geotechnical Reports

This report provides information on the considerations and approach by which Novatech has designed and evaluated the proposed servicing for Phase 2 and 3 of Greystone Village. This report should be read in conjunction with the following reports completed for each individual site plan:

Tower 1C

- *Geotechnical Investigation, Greystone Village Development, Proposed Multi-Storey Building, Tower 1C, 360 Deschatelets* Avenue, Ottawa*, Ontario; PG5249-1; dated April 20, 2021;*

Mixed Use Buildings (2A/2B)

- *Geotechnical Investigation, Greystone Village Development, Building 2A and 2B, 175 Main Street, Ottawa, Ontario; PG4404-1; dated February 2018;*

Greystone Village Phase 3 Condos

- *Proposed Retaining Wall, Proposed Development, Greystone Phase 3, PG5383, Rev. 1, completed by Paterson Group, dated November 4, 2022;*
- *Greystone Village, Phase 3, Scholastic Drive, Grading Plan Review Memorandum, dated June 6, 2022, PG5383.MEMO.02 Revision 1;*
- *Greystone Village, Phase 3, Scholastic Drive, Site Servicing Plan Review Memorandum, dated June 6, 2022, PG5383.MEMO.03 Revision 1;*

Forecourt Towns

- *Geotechnical Investigation, Proposed Residential Development, 295 & 355 Deschatelets Avenue, Ottawa, Ontario; PG6948-1; dated February 1, 2024;*
- *Geotechnical Tree Planting Recommendations within 4.5m Setback – Proposed Residential Development – 295 & 355 Deschatelets Avenue – Ottawa, Ontario; PG6948-MEMO.01; dated April 29, 2024;*

Grand Allee

- *Geotechnical Investigation, Pavement Rehabilitation Design, Proposed Greystone Village Development – Grand Allee, Ottawa, Ontario; PG4404-LET.01; dated December 20, 2018;*

3.0 STORMWATER MANAGEMENT

3.1 Changes and Updates to the 2017 Master Servicing Study

This Master Servicing Study (MSS) report reflects several significant updates to the original 2017 study. The revisions encompass the addition of new subcatchments, modifications to both minor and major system networks, changes to subcatchment parameters, adjustments to storage sizes, and updates to inlet control devices. These changes are essential to align the model with the current design and as-built conditions.

Key updates include:

- Incorporation of Phase 3 Condo: The addition of Phase 3 to the model required revisions to the as-built areas. Detailed information regarding these changes is provided in the Greystone Village Phase 3 Condos Site Servicing Brief (375 Deschâtelets Avenue), dated February 10, 2023.
- Inclusion of Forecourt Townhomes: This MSS update also integrates the Forecourt Townhomes as outlined in the Greystone Village Forecourt Townhomes Site Servicing Brief (295 & 355 Deschâtelets Avenue), dated March 4, 2025.
- Impact on Subcatchment Areas: The subcatchment areas surrounding the Forecourt Townhomes have been impacted by the development, and revisions to the subcatchments have been incorporated into this update.
- Revised Parking Lot Subcatchment: A parking lot near Grande Allée, previously part of the park area, has now been designated as a separate Subcatchment, with updated flow controls to manage runoff more effectively.
- Subcatchment modelling parameters (primarily the equivalent widths) have been changed.
- The City of Ottawa Design guidelines have been updated since the original design to change the minimum storm sewer size for local streets from the 5-year event without ponding to the 2-year event without ponding (PIEDTB-2016-01). Rational method calculations (storm sewer design sheets used to verify the adequacy of the sewer pipe sizing have been changed to use 2-year rainfall intensities. All stormwater management models (PCSWMM) to ensure the functionality of the system during the design storms has remained using the 5-year and the 100-year storm events.

3.2 Existing Conditions

The existing development consisted of the Deschâtelets Building, plus the parking and loading areas on the north, south, and east sides of the building. The remainder of the site consisted of vacant land with some mature trees within and around the periphery. The Rideau River Nature Trail ran along the eastern limit of the site. Access was provided from Main Street by Oblate Avenue and the Grande Allée.

Topography and Drainage

The site had an overall slope towards the Rideau River to the East. While the south and west portions of the site were relatively flat, there was a ridge in the northeast portion of the site where the existing ground elevation dropped by approximately 5m. There was also a relatively steep vegetated slope adjacent to the Rideau River, and a berm along the southern portion of the site adjacent to Clegg Street.

Storm runoff from the majority of the site was conveyed overland towards the Rideau River. There was also an existing outlet at the back of the existing Deschâtelets building that discharged along the bank of the Rideau River, which was abandoned/removed and the flows directed to the new proposed outlet. The southernmost portion of the site drained overland onto Clegg Street. There was also some external overland drainage from St. Paul University to be included in the storm system. Refer to **Figure 4** – Existing Storm Drainage Area Plan for details.

3.3 SWM Criteria

A small portion of the site will be tributary to the existing storm system on Main Street. The majority of the site will outlet directly to the Rideau River. The stormwater management criteria used in the design of the Greystone Village are presented below. They were developed in consultation with the City of Ottawa and the Rideau Valley Conservation Authority.

3.3.1 Water Quality Control

- Provide an Enhanced level of water quality control, corresponding to a long-term TSS removal rate of 80% for lands draining to the Rideau River
- No water quality treatment is required for areas tributary to the existing storm sewer on Main Street.

3.3.2 Quantity Control

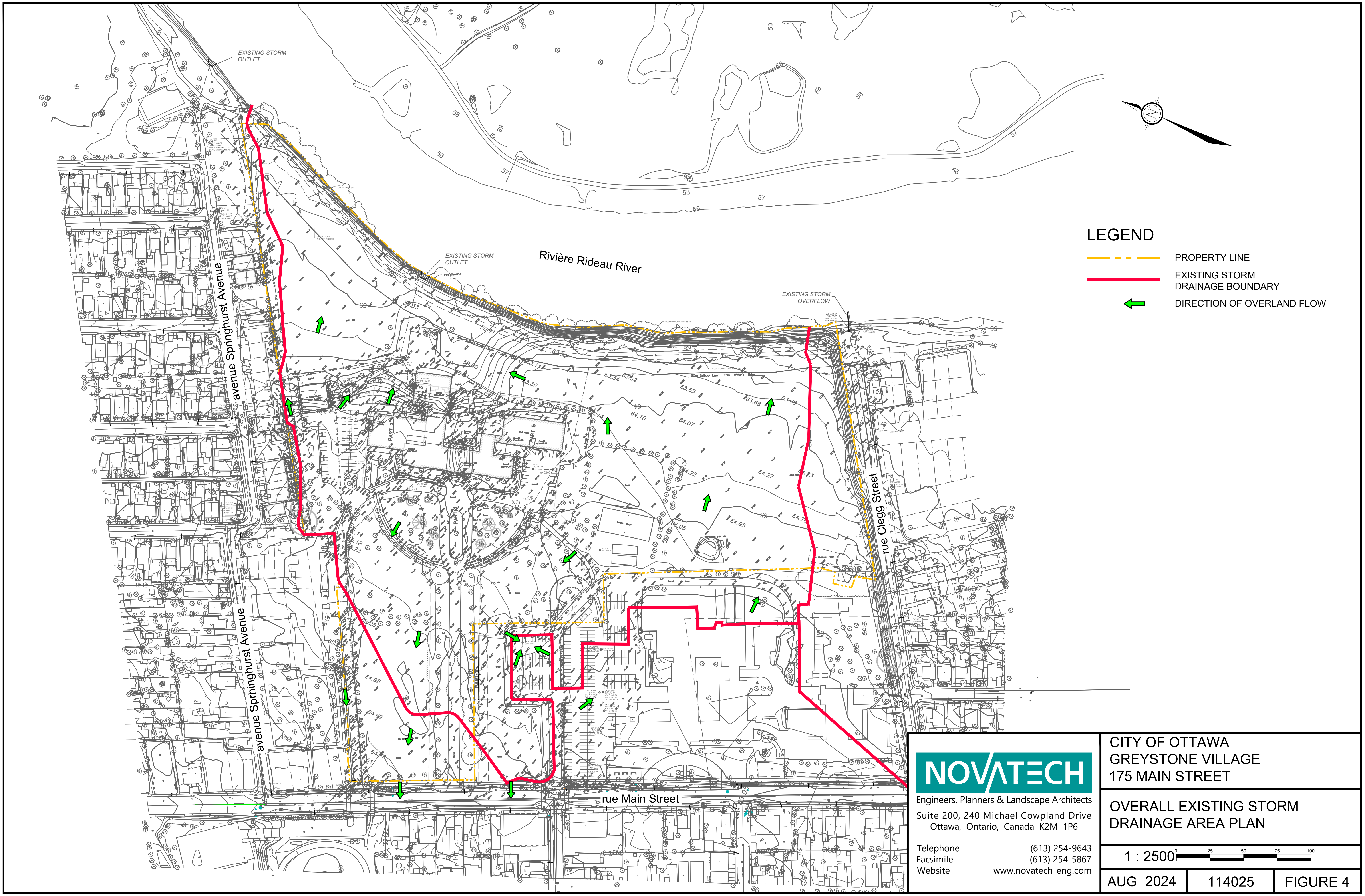
- Quantity control is not required for sewers discharging directly to the Rideau River, provided the outlets are designed with suitable erosion protection measures.
- Areas tributary to the Main Street storm sewer are to be controlled to either:
    - the allowable release rate for the system (to be confirmed by City);
    - to pre-development flow rates.

3.3.3 Minor System (Storm Sewers)

- Storm sewers are to be designed using the Rational Method for a 1:2-year return period (per PIEDTB-2016-01);
- Storm water modelling and ICD design will be done using the 5-year storm event.
- Inlet control devices (ICDs) are to be installed in road and rear yard catch basins to control inflows to the storm sewers;
- Ensure that underside of footing (USF) elevations for both existing and proposed developments is a minimum of 0.3 m above the 1:100-year HGL in the storm sewer system or that the top of slab elevation are a minimum of 0.6m above the 1:100-year HGL in the storm sewer system for units with over-depth USFs.

3.3.4 Major System

- Overland flows which exceed the capacity of the minor system are to be confined within the rights-of-way and/or defined drainage easements for all storms up to and including the 1:100-year event.
- The major system flow route(s) are to be designed to ensure a maximum depth of 0.30m within the rights-of-way.
- For major system flows, ensure that the product of the velocity (m/s) x depth (m) within the rights-of-way does not exceed 0.6.



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CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

OVERALL EXISTING STORM
DRAINAGE AREA PLAN

AUG 2024

114025

FIGURE 4

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3.3.5 Erosion and Sediment Control

- Provide an Erosion and Sediment Control Plan outlining the erosion prevention and sediment control measures to be implemented during construction and on a permanent basis.
- Storm outfalls to the Rideau River are to incorporate energy dissipation and erosion control features.

3.3.6 Low Impact Development

- Where feasible, low-impact stormwater management design techniques will be considered for implementation in suitable areas, see section 3.10.

3.4 Proposed Storm Drainage System

Storm servicing for the Greystone Village will be provided using a dual drainage system. Runoff from frequent events will be conveyed by storm sewers (minor system), while flows from large storm events which exceed the capacity of the minor system will be conveyed overland along defined overland flow routes (major system).

Figure 5 – Overall Proposed Storm Alignment and Storm Drainage Area Plan provides an overview of the proposed drainage system. The post-development drainage boundaries, particularly between St. Paul University and Main Street, were agreed upon through discussions with City staff (refer to correspondence in **Appendix C**).

- Storm runoff from "Area A" will be directed to Storm Outlet #1 at the intersection of Telmon Street and Scholastic Drive.
- Storm runoff from "Area B" will be directed to Storm Outlet #2 at the intersection of des Oblats Avenue and Scholastic Drive.
- Storm runoff from "Area C" will flow overland to the Rideau River.
- Storm runoff from the front half of the proposed units on Clegg Street will be directed to the existing storm sewer on Clegg Street – rear yard drainage from these units will be directed to Storm Outlet #1.

3.4.1 Minor System (Storm Sewers)

The proposed storm sewers have been designed using the Rational Method to convey peak flows associated with the 1:2-year event. The storm sewer design sheets are provided in **Appendix A** and should be read in conjunction with the Storm Drainage Area Plans (Drawings **114025-STM1**, **STM2 & STM1-B**), also provided in **Appendix A**.

<u>Inlet Control Devices</u>

Inflows to the minor system will be controlled using inlet control devices (ICDs) installed in catchbasins. Pairs of road catch basins will be interconnected and will act as a single inlet to the storm sewer. Proposed ICDs will consist of circular orifices on removable vertical sliding plates, with a minimum orifice size of 83mm. ICD's have generally been sized to convey the 1:5-year event in accordance with the approved stormwater management model (PCSWM, January 17, 2025).

3.4.2 Major System

There is no minimum requirement for on-site storage, as quantity control is not required for the areas draining to the Rideau River. Major system flows from the Greystone Village lands will be conveyed directly to the Rideau River following the overland flow routes shown on the Storm Drainage Area Plans (Drawings **114025-STM1**, **STM2 & STM1-B**).

LEGEND

— · — PROPERTY LINE
— PROPOSED STORM SEWER
⬅ PROPOSED DIRECTION OF FLOW
– – POST DEVELOPMENT STORM DRAINAGE AREA BOUNDARY
– – STORM DRAINAGE SPLIT
– – PHASING LIMITS
🟧 PART OF FUTURE ST. PAUL LANDS (NOT PART OF APPLICATION) OUTLETTING THROUGH OUTLET IN PHASE 1A
🟩 PART OF PHASE 2 OUTLETTING THROUGH PHASE 1A AT OUTLET 1
🟦 PART OF PHASE 2/3 OUTLETTING THROUGH PHASE 2 OUTLET 2

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CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

OVERALL PROPOSED STORM ALIGNMENT & STORM DRAINAGE AREA PLAN

1:2000 0 20 40 60 80

JAN 2025	114025	FIGURE 5

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The site grading for the Greystone Village lands has been designed to provide an overland flow route using a maximum of 0.30 m of overland flow depth in the right-of-way. The site has sufficient topographic relief that saw-toothed grading of the roads is generally not required. Major system flows will be confined to the right-of-way, and there will be no encroachment onto private property for all storms up to and including the 100-year event. Additional information on the major system, including model results, is provided in **Appendix A**.

3.4.3 Storm Outlets to Rideau River

To prevent erosion of the bank of the Rideau River from increased overland flow following development, high-capacity catchbasins will be installed on Scholastic Drive to capture all major system flows from the upstream areas for storms up to and including the 100-year event. This will allow major system runoff to be conveyed to the Rideau River via the storm sewer outfalls, as shown on the following figures:

- **Figure 6** Storm Outlet 1 - Plan View
- **Figure 7** Proposed Storm Outlet 2 - Plan View
- **Figure 8A** Storm Outlet 1 – Profile (Sta 0+000 to Sta 0+028.9)
- **Figure 8B** Storm Outlet 1 – Profile (Sta 0+028.9 to Sta 0+050)
- **Figure 9** Proposed Storm Outlet 2 – Profile (Sta 0+000 to St0+053.51)

There is sufficient fall to the Rideau River that the storm sewer system on Scholastic Drive does not require oversizing in order to convey the 100-year peak flow. However, the storm sewer on Sanctuary Pvt. required upsizing to accommodate the 100-year flows. The number and location of maintenance holes down the slope have been designed to ensure that full-flow velocities do not exceed 3.0 m/s in the design sheet calculations or more detailed PCSWMM modeling.

Energy dissipation will be required at the outfall to the Rideau River to mitigate against excessive erosion and scour. The proposed outfall incorporates energy dissipation features and will discharge to a rock-lined plunge pool to reduce flow velocities before entering the Rideau River – refer to **Figures 6, 7**, **8A/B and 9**. For addition information on storm outfall design refer to the “Storm Outfalls to Rideau River – Updates to Flows, Drainage areas and Erosion Protection Calculations”, addressed to the RVCA and dated February 18, 2025, and the corresponding clearance letter from the RVCA dated March 6, 2025, both contained in **Appendix A**.

3.5 SWM Modeling

The *City of Ottawa Sewer Design Guidelines* requires hydrologic modeling of all dual drainage systems. The model of the proposed Greystone Village storm drainage system was developed using PCSWMM. The PCSWMM Model is provided as part of this report.

3.5.1 Design Storms

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

3 Hour Chicago Storms:

5-year, 3-hour Chicago storm
100-year, 3-hour Chicago storm
100-year+20% 3-hour Chicago storm

24 Hour Chicago Storms:

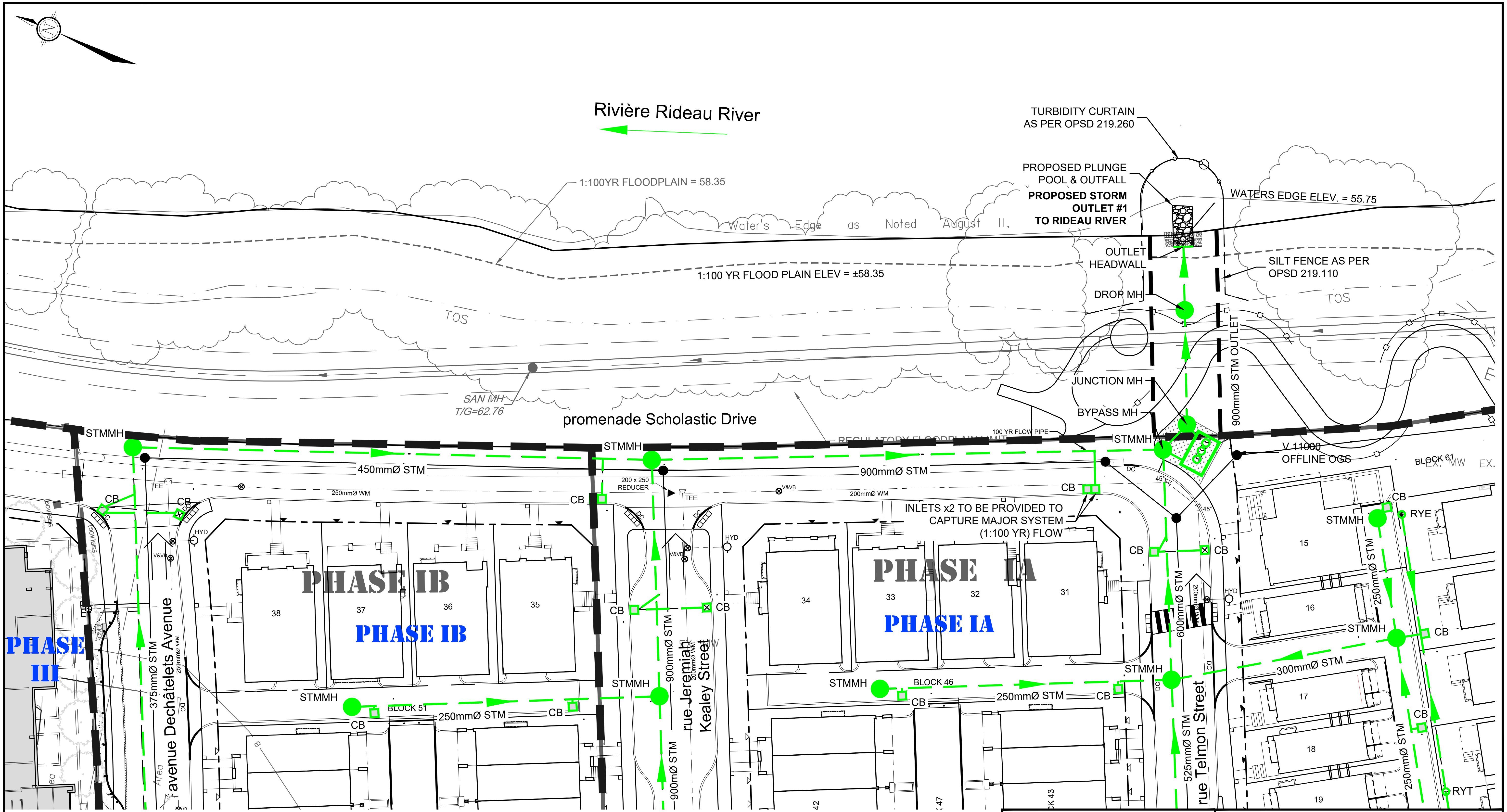
100-year, 24-hour Chicago storm

12 Hour SCS Type II Storms:

5-year, 24-hour SCS Type II storm
100-year, 24-hour SCS Type II storm

Historical Storms:

July 1, 1979 storm
August 4, 1988 storm
August 8, 1996 storm



LEGEND

▬ ▶ ▬	STORM SEWER AND DIRECTION OF FLOW
CB ☐	CATCHBASIN
STMMH ●	STORM MANHOLE
RYE/RYT ○	REAR YARD CATCHBASIN ELBOW / TEE
⟵	OVERLAND FLOW DIRECTION
▬	STORM OUTLET HEADWALL
— — —	SILT FENCE AS PER OPSD 219.260
—○—○—	TURBIDITY CURTAIN AS PER OPSD 219.260
▨	PLUNGE POOL & OUTFALL
▬ ▬ ▬	PHASING LIMITS

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CITY OF OTTAWA
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175 MAIN STREET

STORM OUTLET 1 PLAN VIEW

1:500 0 5 10 15 20

AUG 2024	114025	FIGURE 6

M:\2014\114025\CAD\Design\Figures\Design Brief\20240425 - MSS Update\FIG-6-STM-OUTLETS.dwg, FIG-6-STM-OUTLET-1, Apr 25, 2024 - 1:18pm, jlyon

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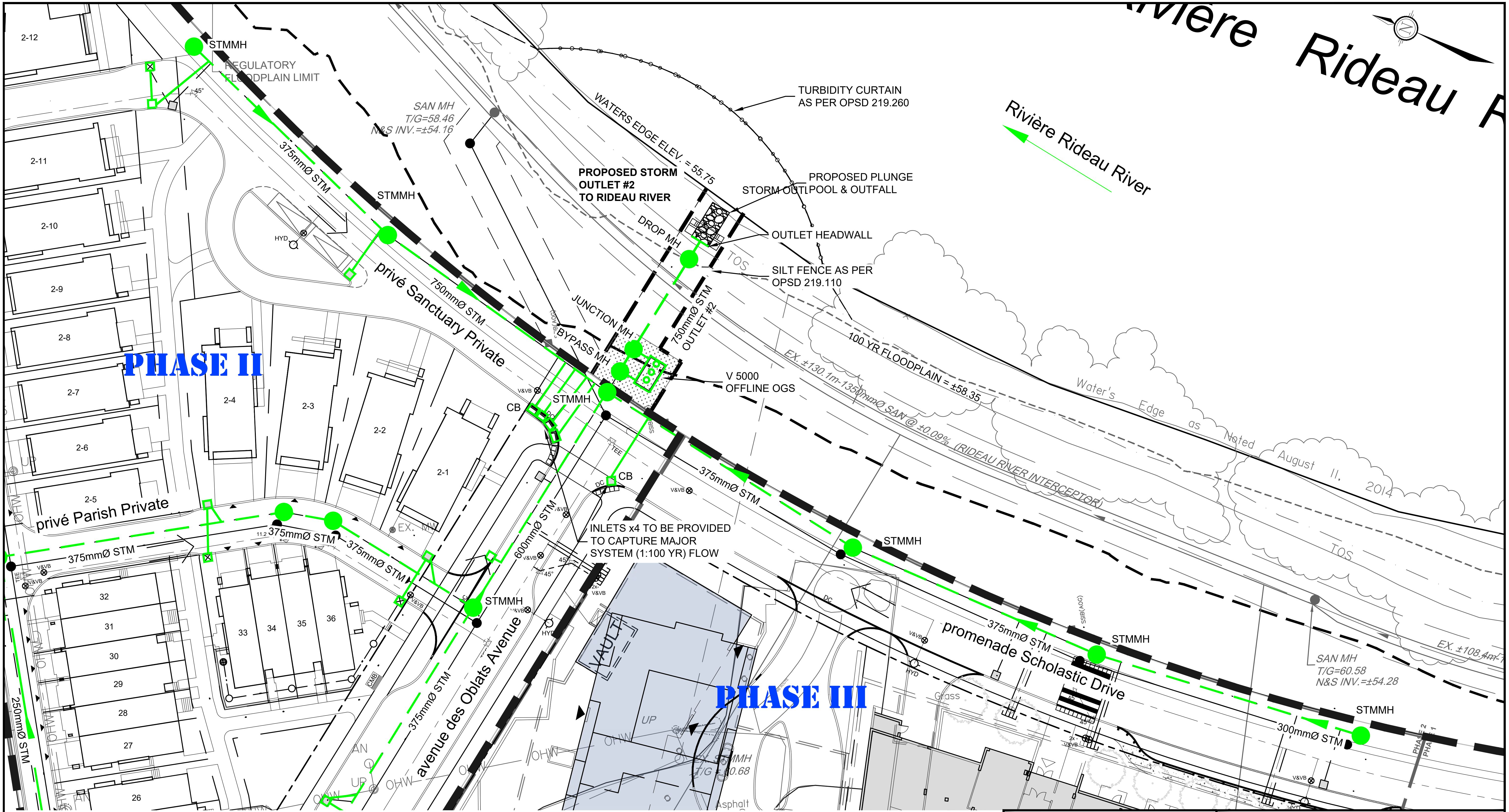

LEGEND

🟩 ➔	PROPOSED STORM SEWER AND DIRECTION OF FLOW
▬ ▬ ▬	PHASING LIMITS
CB ☐	PROPOSED CATCHBASIN
STMMH ●	PROPOSED STORM MANHOLE
←	OVERLAND FLOW DIRECTION

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CITY OF OTTAWA
GREYSTONE VILLAGE
(175 MAIN STREET)

PROPOSED STORM OUTLET 2
PLAN VIEW

1:500 0 5 10 15 20

AUG 2024 | 114025 | FIGURE 7

M:\2014\114025\CAD\Design\Figures\Design Brief\20240425 - MSS Update\FIG-6-STM-OUTLET-2.dwg, FIG-7-STM-OUTLET-2, May 30, 2017 - 3:45pm, szorgel

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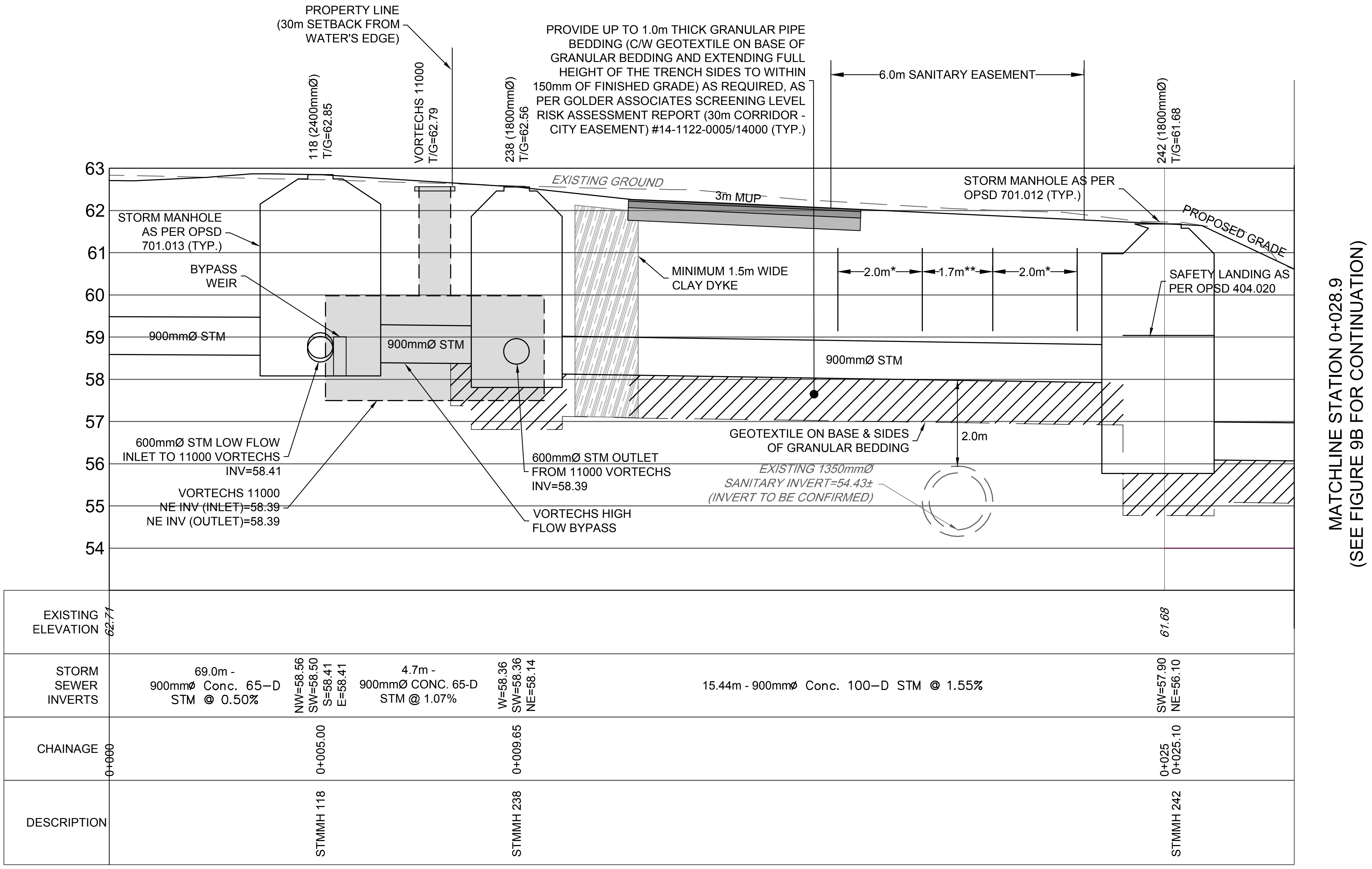

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CITY OF OTTAWA
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STORM OUTLET 1 PROFILE (STA 0+000 TO 0+028.9)

SCALE: 1:100H 1:100V

AUG 2024	114025	FIGURE 8A

M:\2014\114025\CAD\Design\Figures\Design Brief\20240425 - MSS Update\FIG -8A-8B.dwg, FIG-8A-STM-PR, May 13, 2024 - 9:31am, jlyon

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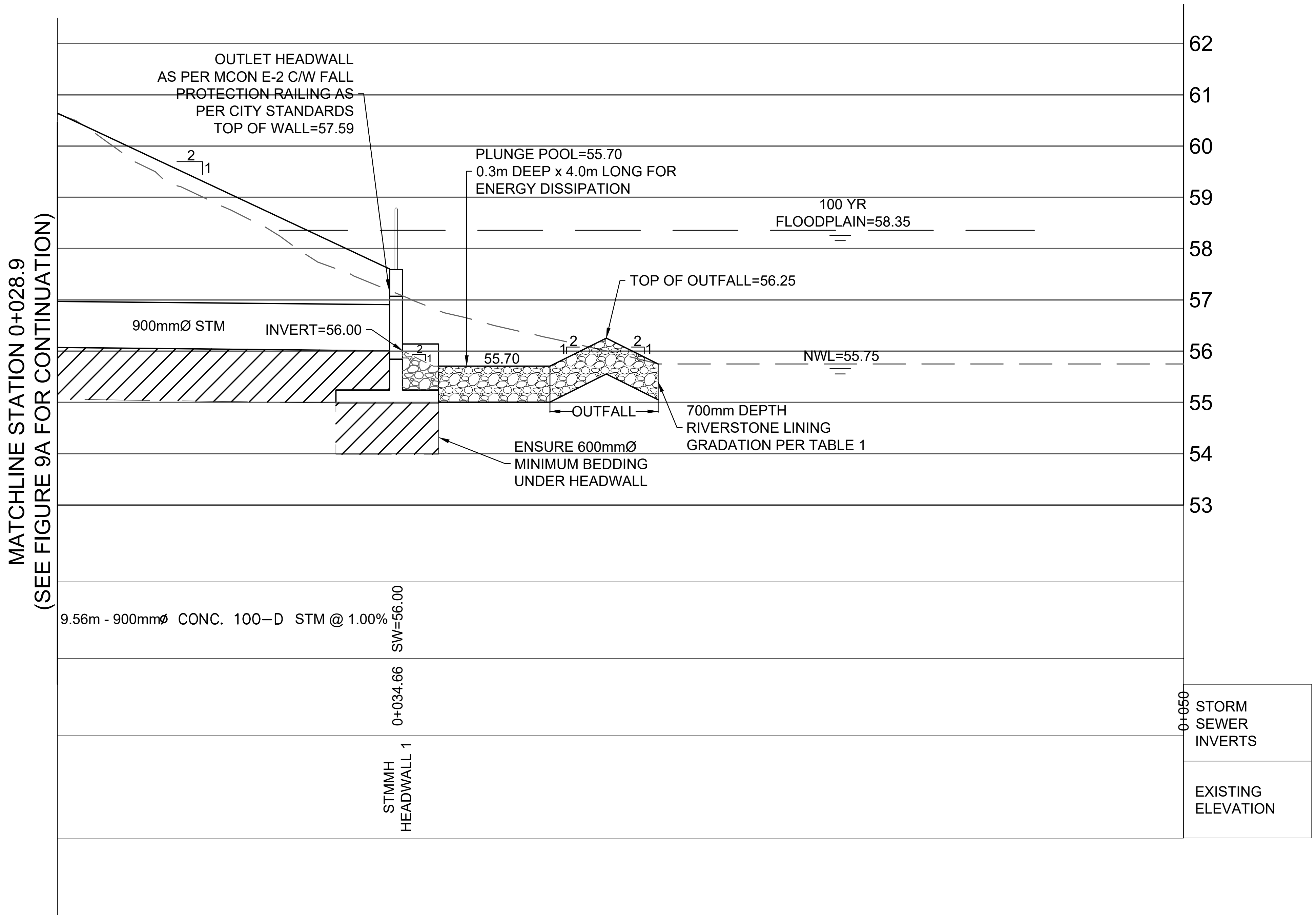

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CITY OF OTTAWA
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STORM OUTLET 1 PROFILE (STA 0+028.9 TO 0+050)

SCALE: 1:100H 1:100V

AUG 2024	114025	FIGURE 8B

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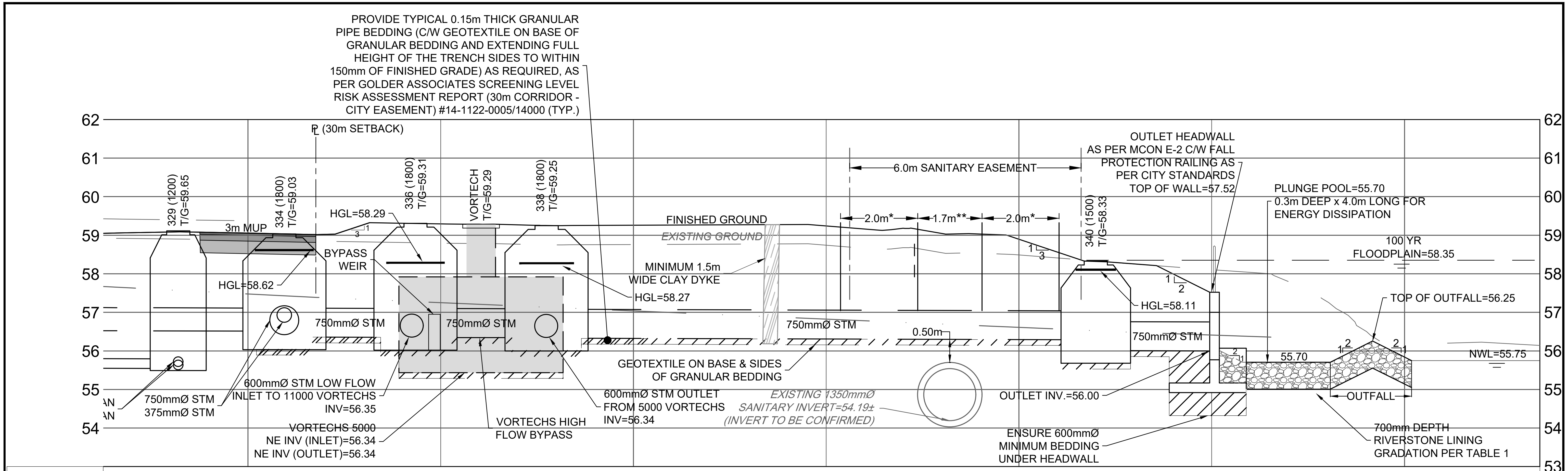

PROPOSED ELEVATION			59.05				59.30			59.26	59.24	58.90						
EXISTING ELEVATION			*58.88*				*58.80*			*58.76*	*58.74*	*58.49*			*58.11*		*55.79*	*55.75*
STORM SEWER INVERTS	34.20m - 600mmØ STM @ 0.26%			W=56.51 E=56.36 N=56.42 S=56.74	3.40m - 750mmØ STM @ 0.30%	W=56.35 E=56.35 S=56.35		3.40m - 750mmØ STM @ 0.30%	W=56.34 E=56.33 S=56.33		14.25m - 750mmØ STM @ 0.30%		W=56.29 E=56.01	2.93m - 750mmØ STM @ 0.30%		W=56.00		
SANITARY SEWER INVERTS	32.94m - 250mmØ SAN @ 0.42%	W=55.54 S=55.59 NE=55.51																
CHAINAGE		60+370.60	0+020	0+020.95		0+024.35	0+025		0+027.75	0+030	0+035	0+040	0+041.99		0+045	0+046.7	0+050	0+053.51
DESCRIPTION		SANMH 329		STMMH 334		STMMH 336			STMMH 338				STMMH 340			HEADWALL 2		

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CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

PROPOSED STORM OUTLET 2
PROFILE (STA 0+000 TO 0+053.51)

SCALE: 1:100H 1:100V

DATE AUG 2024
JOB 114025
FIGURE FIGURE 9

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

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

3.5.2 Boundary Conditions (Rideau River)

Water levels in the Rideau River have been taken into consideration in the PCSWMM modelling. There is a significant difference in timing between peak runoff from the site and peak flows in the Rideau River and it is highly unlikely that a 100-year storm over the subdivision will coincide with the 100-year water level in the Rideau River. Consequently, a combined frequency analysis was applied to the design using the following scenarios:

1) 100-year storm over the site, 5-year water level in the Rideau River; or
2) 5-year storm over the site, 100-year water level in the Rideau River.

Rideau River Water Levels – Lower Reach

HEC-RAS Station	5-year Water Level	100-year Water Level
5555	57.85m	58.33m

A sensitivity analysis indicated that the first scenario (100-year storm, 5-year water level) resulted in the highest HGL elevations in the proposed storm sewers. Consequently, the PCSWMM model uses the 5-year water level in the Rideau River as the downstream boundary condition for the 100-year design event.

3.5.3 Methodology

The Greystone Village PCSWMM model is a dual-drainage model that includes both the minor and major system drainage networks: The model simulates the routing of flows through the storm sewer network *(minor system),* and overland along the road network *(major system).* The results of the analysis were used to:

- Minimize ponding in the rights-of-way during a 5-year event;
- Calculate the storm sewer hydraulic grade line for the 100-year storm event;
- Evaluate overland flow depths and ponding volumes in the right-of-way during the 100-year event; and
- Determine the total runoff from the site to the Rideau River.

The PCSWMM program uses a combination of junctions and conveyance links to represent both the major and minor drainage systems and determine the flows, velocities and ponding depths at specific points along the drainage network.

The major system is represented as an open channel based on the proposed road cross-sections, which includes separate Manning's roughness coefficients for the boulevards and the road surface. The road networks on the plan and profile drawings are used to create the major system model using all slopes and grades for the site. The conveyance links are connected to 'junctions' and 'storm inlets' which represent the gutter grades at selected points, catch basins in sags *(low points)* and overtopping points *(high points)*.

The PCSWMM model is capable of accounting for both static and dynamic storage within the rights-of-way, including the overland flow across all high points and capture/bypass curves for inlets on continuous grade. The 100-year flow depths computed by the model represent the total (static + dynamic) ponding depths at low points for areas in road sags, or the gutter flow depth where the inlets are on a continuous grade.

3.5.4 Catchment Areas & Modeling Parameters

The Greystone Village subdivision has been divided into subcatchments based on the drainage areas tributary to each inlet of the proposed storm sewer system, as shown on the PCSWMM model schematics. Hydraulic and modelling parameters are provided In **Table 3.1**.

Revised Storm Drainage Area Plans for Phase 1A/1B (114025-STM1 & STM2) and Storm Drainage Area Plan for Phase 2 (114025-STM1-B) can be found in **Appendix A** and corresponding storm design sheets based on as-built information.

Table 3.1: Hydrologic Modeling Parameters

Area ID Model	Area ID Storm Drainage Plans	Catchment Area (ha)	Runoff Coefficient (C)	% Imperv (%)	No Depression (%)	Equivalent Width (m)	Slope (%)
Areas Contributing to Outlet 1							
A01A	1A	0.09	0.80	86	0	94	0.7
A01B	1B	0.08	0.63	61	0	88	0.5
A02	2	0.07	0.69	70	0	90	0.5
A04	4	0.10	0.90	100	100	14	1.5
A05	5	0.10	0.60	57	0	82	0.5
A06A	6A	0.25	0.58	54	50	100	1.5
A06B	6B	0.18	0.22	3	50	100	1.5
A08	8	0.12	0.78	83	0	110	0.5
A09A	9A	0.26	0.53	47	50	150	0.5
A09B	9B	0.13	0.90	100	100	33	1.5
A09C	9C	0.08	0.90	100	100	32	1.5
A10	10	0.09	0.90	100	100	36	1.5
A11A	11A	0.20	0.53	47	50	60	0.5
A11B	11B	0.08	0.90	100	75	17	1.5
A11B-TR		0.03	0.90	100	100	15	1.5
A12	12	0.08	0.80	86	50	18	0.5
A13	13	0.19	0.71	73	50	100	0.5
A14	14	0.80	0.52	46	50	53	1.5
A15A	15A	0.15	0.90	100	100	30	1.5
A15B	15B	0.16	0.70	71	50	106	0.5
A16A	16A	0.05	0.73	76	50	30	0.5
A16B	16B	0.05	0.71	73	50	30	0.5
A16C_1	16C_1	0.05	0.90	100	100	32	1.5
A16C_2	16C_2	0.14	0.90	100	100	28	1.5
A17	17	0.12	0.86	94	50	41	0.5
A18	18	0.28	0.70	71	50	80	0.6

Area ID Model	**Area ID Storm Drainage Plans**	**Catchment Area (ha)**	**Runoff Coefficient (C)**	**% Imperv (%)**	**No Depression (%)**	**Equivalent Width (m)**	**Slope (%)**
A19A	19A	0.03	0.74	77	50	24	0.5
A19B	19B	0.04	0.74	77	50	29	0.5
A1C	1C	0.09	0.90	100	0	21	1.5
A20	20	0.11	0.62	60	0	80	0.5
A21B	21B	0.11	0.70	71	50	70	1.2
A22B	22B	0.11	0.53	47	50	100	0.7
A23	23	0.13	0.69	70	50	58	0.5
A24	24	0.16	0.72	74	50	78	0.5
A25	25	0.05	0.73	76	50	29	0.5
A26	26	0.05	0.47	39	50	15	0.5
A27A	27A	0.10	0.68	69	0	80	0.5
A27B	27B	0.05	0.76	80	0	18	0.5
A28	28	0.11	0.30	14	0	8	0.5
A29	29	0.58	0.47	39	50	38	0.5
A30	30	0.12	0.86	94	50	26	0.5
A31	31	0.20	0.75	79	50	70	0.5
A32A	32A	0.02	0.74	77	50	13	0.5
A32B	32B	0.04	0.74	77	50	50	0.5
A33A	33A	0.06	0.73	76	50	35	0.5
A33B	33B	0.07	0.73	76	50	41	0.5
A34	34	0.05	0.76	80	50	29	0.5
A35	35	0.10	0.47	39	50	93	0.5
A36	36	0.13	0.70	71	0	94	0.5
A3-A-2	A3-A2	0.05	0.79	84	50	15	1.0
A3-A-3	A3-A3	0.05	0.83	90	50	15	0.5
A3-A-4	A3-A4	0.02	0.78	83	50	10	2.0
A3-DR3[1]	A3-DR3	0.01	0.61	59	50	4	1.5
A3-DR4	A3-DR4	0.01	0.55	50	50	6	2.3
A7-A-5	A7-A5	0.02	0.78	83	50	10	2.2
A7-A-6	A7-A6	0.04	0.86	94	50	13	2.0
A7-A-7	A7-A7	0.06	0.78	83	50	17	1.5
A7-A-8	A7-A8	0.06	0.82	89	50	17	1.6

1 – Area A3-DR3 is outletting to the highpoint (drainage split) on Deschatelets Avenue. The result is that 50% of the flows go to the ROW draining to Outlet 1 and 50% of the flows go to the ROW draining to Outlet 2. The storm drainage area plans have broken this area into A3-DR3-1 and A3-DR3-2 to reflect this flow split in the rational method calculations.

Area ID Model	Area ID Storm Drainage Plans	Catchment Area (ha)	Runoff Coefficient (C)	% Imperv (%)	No Depression (%)	Equivalent Width (m)	Slope (%)
A7-DR5	A7-DR5	0.01	0.56	51	50	6	1.0
A7-DR6	A7-DR6	0.01	0.62	60	50	4	1.5
A7-DR7	A7-DR7	0.01	0.61	59	50	4	1.5
A7-DR8	A7-DR8	0.03	0.72	74	50	11	2.0
MR-SB	21A	0.09	0.90	100	100	8	0.5
TR-SB		0.05	0.90	100	100	10	0.5
NA04_1	22A	0.035	0.50	43	50	5	0.5
NA04_2		0.005	0.50	43	50	6	0.5
NA05	21C	0.05	0.40	29	50	8	0.5
NA06	22C	0.09	0.40	29	50	15	0.5
Areas Contributing to Outlet 2							
A3-DR1	A3-DR1	0.03	0.66	66	50	13	1.8
A3-DR2	A3-DR2	0.03	0.57	53	50	10	1.5
A3-A-1	A3-A1	0.06	0.79	84	50	17	1.5
B01A	B1a	0.03	0.76	80	0	28	1.1
B01B	B1b	0.06	0.72	74	0	64	0.6
B02	B2	0.01	0.69	70	50	18	0.9
B03	B3	0.24	0.83	90	50	130	2.1
B04	B4	0.19	0.66	66	50	100	2.7
B05	B5	0.18	0.60	57	0	107	3.8
B06	B6	0.06	0.68	69	0	45	2.0
B07	B7	0.09	0.73	76	50	47	1.2
B08	B8	0.07	0.80	86	50	40	1.5
B09	B9	0.11	0.80	86	50	70	4.0
B10	B10	0.07	0.73	76	50	45	1.7
B11	B11	0.04	0.69	70	50	20	1.8
B12	B12	0.09	0.79	84	50	28	1.0
B13	B13	0.09	0.65	64	50	15	2.5
B14	B14	0.08	0.63	61	50	36	0.5
B15	B15	0.15	0.62	60	50	60	0.5
B16	B16	0.12	0.65	64	50	90	0.5
B17	B17	0.07	0.77	81	0	45	1.0
B19	B19	0.16	0.90	100	100	19	1.5
B20A	B20A	0.08	0.48	40	50	14	0.5
B22	B22	0.07	0.60	57	50	15	0.5

Area ID Model	Area ID Storm Drainage Plans	Catchment Area (ha)	Runoff Coefficient (C)	% Imperv (%)	No Depression (%)	Equivalent Width (m)	Slope (%)
B23	B23	0.17	0.90	100	100	33	1.5
B24	B24	0.12	0.80	86	50	23	0.5
B25	B25	0.06	0.90	100	100	21	1.5
NA01	B21A	0.04	0.35	21	50	7	0.5
NA02	B20	0.12	0.42	31	50	24	0.5
NA03_1	B18	0.03	0.57	53	50	6	0.5
NA03_2		0.04	0.57	53	50	6	0.5
NA03_3		0.01	0.57	53	50	3	0.5
MR-NB	B21	0.11	0.90	100	100	6	0.5
TR1-NB		0.01	0.90	100	100	17	0.5
TR2-NB		0.04	0.90	100	100	5	0.5

3.6 PCSWMM Model Results

The PCSWMM model schematics and model output for the 100-year, 3-hour Chicago storm event are provided in **Appendix A**. The update to the model has resulted in some pipes being predicted to surcharge under the 100-year event. The model indicates that the storm sewer still functions as intended and the minimum clearance from basement floor slabs to the 100-year HGL is still achieved. Refer to section 3.6.3 for further discussion.

3.6.1 Results – Inlet Control Devices (ICDs)

The majority of the storm inlets are located on continuous grade (as opposed to road sags). To accurately simulate catchbasin efficiency (captured flow vs. bypass flow), the PCSWMM model uses inlet rating curves to simulate the capture rates for catchbasins on-grade based on standard City of Ottawa and low to medium flow control devices (LMF) rating curves (provided in **Appendix A**).

ICDs are provided for the catch basins on a continuous grade in addition to those at sag points. During the minor system storm event, the inlet capacity controls the flow at those locations, but the ICD becomes the control in most cases during the major system storm event. ICD sizes and design flows are provided in **Table 3.2**. Roadway catchbasin leads are interconnected and the ICD has been located in the downstream catch basin on the outlet pipe to the storm sewer main.

Table 3.2: Inlet Control Device Sizes and Design Flows

ICD Parameters			5-year Event		100-year Event	
Catchment ID Model	**Location**	**Orifice Dia. (mm)**	**Approach Flow from Catchment (L/s)**	**Inlet Capture Rate (L/s)[1]**	**Approach Flow from Catchment (L/s)**	**Inlet Capture Rate (L/s)[1]**
Catchbasins						
A01A	CB53	102	24	25	44	27
A01B	CB51	94	17	18	36	24
A02	CB49	83	16	9	33	9
A3-A-1	CB3	83	17	16	29	16
A3-A-2	CBMH4	83	14	13	24	16
A3-A-3	CB5	83	14	13	24	16
A3-A-4	CB1	LMF	6	3	10	4
A05	CB47	127	20	19	43	37
A7-A-5	CB2	LMF	6	4	10	4
A7-A-6	CB6	LMF	11	11	20	11
A7-A-7	CBMH7	83	17	16	29	16
A7-A-8	CB8	83	17	16	29	16
A06A	CB1-GAPark	178	51	49	111	93
A06B	GA-ParkSouth Storage	94	10	9	47	22
A08	CB45	127	31	27	58	45
A09A	CB28	200	41	37	94	74
A11A	CB26	178	29	45	62	68
A12			21		38	

ICD Parameters			5-year Event		100-year Event	
Catchment ID Model	**Location**	**Orifice Dia.**	**Approach Flow from Catchment**	**Inlet Capture Rate**	**Approach Flow from Catchment**	**Inlet Capture Rate**
		(mm)	**(L/s)**	**(L/s) [1]**	**(L/s)**	**(L/s)[1]**
A13	CB24	152	43	34	85	56
A15B	CB22	178	36	38	72	67
A16A	CB08	83	12	11	23	17
A16B	CB06	83	11	11	23	17
A17	CB39	83	33	16	59	17
A18	CB09	178	62	64	126	76
A19A	CB35	83	8	7	15	11
A19B	CB36	83	11	8	19	13
A1C	J14	203	26	26	45	45
A20	CB18	127	25	34	51	41
A21B	CB34	152	26	27	51	51
A22B	CB20	102	19	23	45	28
A23	CB16(2x-DICBs)	127	28	28	56	40
A24	CB15(x2-DICBs)	300	36	41	71	154
A25	CB29	83	14	9	24	12
A26	LCB29B	83	4	4	13	13
A27A	CB01	127	22	24	45	37
A27B	CB55	83	13	13	24	18
A28	CBMH1	375 Lead	1	16	6	63
A29			15		57	
A30	CB42	83	33	15	59	17
A31	CB12	152	47	41	90	59
A32A	CB40	83	5	5	10	8
A32B	CB41	83	11	9	19	13
A33A	CB30	83	16	11	29	16
A33B	CB31	102	19	15	34	21
A34	CB32	83	14	17	24	17
A35	LCB31B	83	15	13	37	19
A36	CB14	127	29	41	59	42
B01A	CB60	83	8	11	14	19
B01B	CB82	152	15	14	28	30
B02	CB58	83	3	3	5	10
B03	CB62	152	65	43	115	59
B04	CB65	127	43	46	87	46
B24			30		55	
B05	CB75	127	38	20	81	29

ICD Parameters			5-year Event		100-year Event	
Catchment ID Model	Location	Orifice Dia. (mm)	Approach Flow from Catchment (L/s)	Inlet Capture Rate (L/s)[1]	Approach Flow from Catchment (L/s)	Inlet Capture Rate (L/s)[1]
B06	CB76	102	14	14	28	25
B07	CB80	83	22	15	42	18
B08	CB63	94	19	13	34	19
B09	CB78	152	30	39	53	60
B10	CB71	83	17	12	33	14
B11	CB69	83	9	10	18	17
B12	CB67	83	23	16	42	20
B13	CB70	108	18	20	39	24
B14	CB73	127	16	17	35	29
B15	CB79	83	28	18	64	15
B16	CB74	375 Lead	30	104	57	457
B17	CB77	83	18	14	33	19
A04	Roof Drain		29	11	49	11
A09B	Roof Drain		38	10	64	10
A09C	Roof Drain		23	7	40	8
A10	Roof Drain		26	7	45	7
A11B	Roof Drain		23	8	40	8
A15A	Roof Drain		43	43	74	74
A16C_1	Roof Drain		14	14	25	25
A16C_1	Roof Drain		40	40	69	69
A14	Controlled Area		109	109	206	109
B19	Roof Drain		45	45	79	78
B23	Roof Drain		49	15	84	15
B25	Roof Drain		17	5	30	5
North Building PH3	Roof Drain		39	7	72	10
South Building PH3	Roof Drain		37	6	66	9
B20A	-		4	-	15	-
B22	-		12	-	23	-
A3-DR1	-		8	-	14	-
A3-DR2	-		6	-	13	-
A3-DR3	-		2	-	5	-
A3-DR4	-		2	-	5	-
A7-DR5	-		2	-	4	-

ICD Parameters			5-year Event		100-year Event	
Catchment ID Model	**Location**	**Orifice Dia. (mm)**	**Approach Flow from Catchment (L/s)**	**Inlet Capture Rate (L/s) [1]**	**Approach Flow from Catchment (L/s)**	**Inlet Capture Rate (L/s)[1]**
A7-DR6	-		2	-	5	-
A7-DR7	-		2	-	5	-
A7-DR8	-		8	-	14	-
NA01*	-		1	-	5	-
NA02**	-		7	-	27	-
NA03*	-		7	-	21	-
NA04*	-		5	-	9	-
NA05*	-		2	-	7	-
NA06**	-		8	-	18	-

[1] Inlet capture rates include upstream overland flows where CBs are on continuous grade and, as such, may exceed the peak runoff rate for the specific catchment area.
** Areas from Phase 3 condo site flowing overland to major system and captured via roadside catchbasins*
*** Areas from Phase 3 condo directed uncontrolled to minor system*
[2] Low to medium flow inlet control devices.

3.6.2 Results – Overland Flow (Major System)

The major system network was evaluated using the PCSWMM model to ensure that the overland flow depths and velocities conform to the City of Ottawa standards. The results of the 100-year modeling indicate that the overland flow depths on all streets will be less than 0.30m, the product of depth x velocity will be less than 0.60, and major system flows will be confined to the rights-of-way with no encroachment onto private property. The model results for overland flow results are summarized in **Table 3.3** and flow depths at low points are summarized in **Table 3.4**.

Table 3.3: Overland Flow Results

		3-hour Chicago 100-year				3-hour Chicago 100-year + 20%			
Structure ID	**Max Static Depth[1] (m)**	**Peak Flow (L/s)**	**Velocity (m/s)**	**Total Depth (static + dynamic) (m)**	**Velocity x Depth[2] (m^2/s)**	**Peak Flow (L/s)**	**Velocity (m/s)**	**Total Depth (static + dynamic) (m)**	**Velocity x Depth (m^2/s)**
des Oblate Ave.									
CB 52/53	CG	25	0.20	0.17	0.03	41	0.21	0.17	0.04
CB 50/51	CG	25	0.43	0.06	0.03	41	0.44	0.06	0.03
CB 48/49	CG	20	0.43	0.04	0.02	27	0.44	0.04	0.02
CB 59/60	CG	4	0.12	0.05	0.01	10	0.16	0.04	0.01
CB 57/58	CG	8	0.59	0.02	0.01	15	0.62	0.02	0.01
CB 61/62	CG	4	0.12	0.05	0.01	10	0.16	0.04	0.01
CB 64/65	CG	167	0.72	0.09	0.06	227	0.78	0.07	0.05
CB 70	CG	266	1.70	0.08	0.14	362	1.81	0.09	0.16

		3-hour Chicago 100-year				**3-hour Chicago 100-year + 20%**			
Structure ID	**Max Static Depth[1] (m)**	**Peak Flow (L/s)**	**Velocity (m/s)**	**Total Depth (static + dynamic) (m)**	**Velocity x Depth[2] (m^2/s)**	**Peak Flow (L/s)**	**Velocity (m/s)**	**Total Depth (static + dynamic) (m)**	**Velocity x Depth (m^2/s)**
Hazel St.									
CB 27/28	CG	16	0.34	0.05	0.02	28	0.39	0.05	0.02
CB 25/26	CG	28	0.18	0.10	0.02	51	0.22	0.09	0.02
Deschâtelets Ave									
CB 46/47	CG	15	0.21	0.05	0.01	25	0.23	0.05	0.01
CB 44/45	CG	36	0.36	0.07	0.03	65	0.42	0.06	0.03
CB 23/24	CG	126	0.82	0.08	0.07	209	0.86	0.08	0.07
CB 33/34	CG	39	0.34	0.08	0.03	107	0.46	0.08	0.04
CB 19/20	CG	22	0.23	0.08	0.02	50	0.27	0.09	0.02
De Mazenod Ave									
CB 21/22	CG	79	0.42	0.11	0.05	201	0.52	0.11	0.06
CB 7/8	CG	5	0.19	0.03	0.01	10	0.18	0.03	0.01
CB 5/6	CG	5	0.32	0.03	0.01	11	0.35	0.03	0.01
Jeremiah Kealy St.									
CB 9/10	CG	122	0.35	0.25	0.09	277	0.33	0.14	0.05
CB 17/18	CG	125	0.26	0.29	0.08	164	0.24	0.30	0.07
Telmon St.									
CB 1/2	CG	125	0.26	0.29	0.08	164	0.24	0.30	0.07
CB 11/12	CG	70	0.40	0.08	0.03	108	0.43	0.08	0.03
CB 13/14	CG	79	0.50	0.13	0.07	133	0.59	0.14	0.08
Scholastic Dr.									
CB 77	CG	42	0.87	0.07	0.06	76	1.01	0.07	0.07
CB 76	CG	54	0.90	0.07	0.06	95	1.06	0.07	0.07
CB 75	CG	101	1.14	0.09	0.10	166	1.22	0.12	0.15
Block 57 Pvt.									
CB 39	CG	41	0.47	0.05	0.02	53	0.51	0.05	0.03
Block 51 Pvt.									
CB 35	CG	3	0.15	0.03	0.00	4	0.17	0.03	0.01
CB 36	CG	9	0.34	0.03	0.01	13	0.31	0.03	0.01
Block 48 Pvt.									
CB 42	CG	41	0.32	0.05	0.02	53	0.34	0.05	0.02
Block 46 Pvt.									
CB 40	CG	2	0.11	0.02	0.00	2	0.12	0.02	0.00
CB 41	CG	8	0.12	0.03	0.00	11	0.13	0.03	0.00

Structure ID	**Max Static Depth[1]**	**3-hour Chicago 100-year**				**3-hour Chicago 100-year + 20%**			
		Peak Flow	**Velocity**	**Total Depth (static + dynamic)**	**Velocity x Depth[2]**	**Peak Flow**	**Velocity**	**Total Depth (static + dynamic)**	**Velocity x Depth**
	(m)	**(L/s)**	**(m/s)**	**(m)**	**(m^2/s)**	**(L/s)**	**(m/s)**	**(m)**	**(m^2/s)**
Parish Pvt.									
CB 80	CG	23	0.45	0.20	0.09	32	0.50	0.20	0.10
CB 63	CG	36	0.77	0.20	0.15	50	0.84	0.20	0.17
CB 68/69	CG	9	0.37	0.09	0.03	14	0.38	0.09	0.03
CB 66/67	CG	14	0.15	0.03	0.00	21	0.16	0.03	0.00
Sanctuary Pvt.									
CB 79	CG	20	0.43	0.04	0.02	27	0.44	0.04	0.02
CB 72/73	CG	24	0.53	0.04	0.02	50	0.60	0.00	0.00
CB 71	CG	25	0.43	0.06	0.03	41	0.44	0.06	0.03
				Max =	**0.15**			**Max =**	**0.17**

(1) CG denotes catch basin pairs on a continuous grade that do not have a static ponding depth.
(2) Roads modelled as major system conduits with a 0.3m depth throughout the site.

Table 3.4: Overland Flow Depths at Low Points

Structure ID	**Top of Grate Elevation (m)**	**Max Static Ponding Elevation (m)**	**Model Results**		
			5-year	**100-year**	
			Ponding Depth (m)	**Ponding Depth (m)**	**Spill Flow (L/s)**
Roadway Inlets					
CB1	64.92	64.95	0.00	0.06	1
CB2	64.84	64.87	0.00	0.05	6
CB3	64.84	64.90	0.00	0.07	13
CB5	65.13	65.18	0.00	0.06	8
CB6	64.71	64.75	0.00	0.05	10
CB8	64.04	64.07	0.00	0.04	13
CBMH4	65.15	65.20	0.00	0.05	8
CBMH7	64.45	64.50	0.00	0.06	13
CB 15	62.64	62.76	0.00	0.00	0
CB 74	58.92	59.06	0.00	0.00	0
CB 78	60.11	60.33	0.00	0.11	0
CB 82	65.09	65.18	0.00	0.00	0
Rear Yard Spills to Roadway (1)					
LCB 29B	62.50	62.65	0.00	0.00	0.00
LCB 31B	60.89	61.04	0.00	0.23	20[2]

(1) Storage in the rear yards is assumed to be $0m^3$ in all cases.
(2) To Block 56 / private road.

Table 3.5 provides an overview of the major system flow leaving the Greystone Village site during the 100-year event. The majority of overland flow will be captured by the storm sewer system on Scholastic Drive and conveyed to the Rideau River through the proposed storm sewer system at Outlets 1 and 2.

Table 3.5: Major System Outlet Summary (100-year Event)

Post-Development			Pre-Development Major System Flow (L/s)
Outlet ID	**Receiver Description**	**Major System Flow (L/s)**	
Main Street[(1)]	Controlled flow from cistern of Block 51 (0.26 ha)	55	
Main Street[(1)]	0.06 ha direct runoff from Block 51	13	
Main North	Main Street (at Oblate Ave.)	0	
Main South	Main Street (at Hazel St.)	16	
	Total (Main Street)	**84 L/s**	**76 L/s**
Clegg Street[(1)]	Front of Lots 1-14, Block 61 (0.28 ha)	92	
Clegg	Clegg Street @ Telmon Street	11	
Out 3	Clegg Street	0	
	Total (Clegg Street)	**103 L/s**	**73 L/s**
Outlet 1-Phase 1	Rideau River (via Storm Outlet 1)	1,695	
Outlet 2-Phase 2&3	Rideau River (via Storm Outlet 2)	920	
Out 1	Rideau River	25	
Out 2	Rideau River	20	
Phase 1-Major System Spill	Emergency overflow for Phase 1	0	
Phase 2- Major System Spill	Emergency overflow for Phase 2	0	

(1)Areas not contributing to the proposed internal storm network are not included in the model. Refer to SWM plan.

Under post-development conditions, major system flow contributions to Main Street will consist of runoff from a portion of Block 51, as well as a small amount of overland flow from Oblate Avenue and Hazel Street. The total 100-year major system flow (84 L/s) will be slightly more than pre-development conditions (76 L/s).

The total amount of overland flow to Clegg Street will increase following development, as storm runoff from the front of Lots 1-14 will be directed to Clegg Street. The additional flow will not adversely impact any existing development or infrastructure. Overland flows on Clegg St. will be conveyed down the north side of the street and ultimately to the Rideau River via the RVCA access pathway. Any increase in erosion potential resulting from the increase in major system flow will be mitigated by the proposed reinforcement of the accessway to support temporary vehicle access to the RVCA dock on the Rideau River.

The flows to each outlet have changed slightly since the 2017 report due to slight modifications to drainage area boundaries and properties. The outlets are sized adequately to accommodate the marginal change in outflows. The model results indicate that the major system flow is being captured on site and conveyed to the Rideau River through the storm outlet pipes and there is no overflow being directed over the banks of the River.

3.6.3 Results - Hydraulic Grade Line

Table 3.6 provides a summary of the 100-year HGL elevations at each storm manhole, including the surcharge depth above the storm sewer obverts, clearance from the top-of-grate elevation (T/G), and the minimum required underside of footing (USF) elevations. The results of this analysis were used to ensure that a minimum freeboard of 0.30m is provided between the 100-year HGL and the designed underside of footing elevations. The results of the analysis indicate the USF elevations are above the stress test (100-year+20%) event. The USF elevations indicated in the table below are the closest USF or the worst-case USF between the upstream & downstream maintenance holes.

In some cases, the units in this development have been designed with over depth footings (slab on grade or due to proximity of trees). In these situations, the results were used to ensure a minimum freeboard of 0.60m is provided between the 100-year HGL and the top of basement floor slab elevations and that the results of the analysis indicate the top of slab elevations are a minimum of 0.3m above the stress test (100-year+20%) event.

Table 3.6: Hydraulic Grade Elevations for 100yr and Stress Test

STM MH ID	Street	Obvert Elev. (m)	T/G Elev. (m)	100 yr HGL Elev. (m)	Stress Test HGL (m)	Min. Req. USF (m)	As-Built USF (m)
MH100	Telmon St.	60.28	61.69	60.34	60.75	60.75	NA
MH102	Philosopher Pvt.	60.28	64.86	60.30	60.81	60.81	62.47
MH104	Telmon St.	60.16	62.97	60.26	60.67	60.67	NA
MH106	Telmon St.	60.16	62.18	60.21	60.62	60.62	61.89
MH108	Telmon St.	60.11	62.00	60.18	60.59	60.59	61.33
MH110	De Mazenod Ave.	60.41	63.44	60.67	60.86	60.97	NA
MH110B	Jeremiah Kealy St.	60.25	63.19	60.57	60.76	61.87 *TOS= 62.17**	62.43 *TOS= 63.62**
MH112B	Jeremiah Kealy St.	60.07	62.98	60.42	60.60	60.72	NA
MH114	Scholastic Dr.	59.80	63.04	60.05	60.21	60.35	60.93
MH118	Scholastic Dr.	59.01	62.85	59.46	59.48	59.76	60.93
MH122	Telmon St.	59.91	62.93	59.87	60.06	60.21	61.06
MH122B	Telmon St.	59.21	62.84	59.77	59.91	60.07	60.86
MH124	Scholastic Dr.	61.01	63.37	60.90	60.92	61.31	61.41
MH126	Deschâtelets Ave.	61.69	63.47	61.62	61.66	61.99 *TOS= 62.29**	62.83 *TOS= 64.02**
MH128	Deschâtelets Ave.	60.77	63.83	61.27	61.55	61.57 *TOS= 61.87**	61.60 *TOS= 62.28***
MH130	Deschâtelets Ave.	62.02	63.98	61.97	62.01	62.32	NA
MH132	Deschâtelets Ave.	62.10	64.31	62.04	62.11	62.40	NA
MH136	Block 48 Pvt.	61.15	63.15	61.02	61.02	61.45	NA
MH140	Block 46 Pvt.	61.05	63.05	60.94	60.95	61.35	NA
MH144	Telmon St.	59.99	63.05	59.96	60.22	60.29	61.12
MH148	Block 51 Pvt.	61.47	63.47	61.37	61.38	61.77	NA
MH152	Block 49 Pvt.	61.58	63.58	61.45	61.45	61.88	NA
MH164	Deschâtelets Ave.	62.18	64.66	62.12	62.21	62.48	NA
MH166	Deschâtelets Ave.	62.25	64.87	62.23	62.35	62.55	NA

STM MH ID	**Street**	**Obvert Elev. (m)**	**T/G Elev. (m)**	**100 yr HGL Elev. (m)**	**Stress Test HGL (m)**	**Min. Req. USF (m)**	**As-Built USF (m)**
MH168	Deschâtelets Ave.	62.34	65.04	62.32	62.47	62.64	NA
MH170	Deschâtelets Ave.	62.41	65.22	62.37	62.53	62.71	NA
MH172	Deschâtelets Ave.	62.53	65.22	62.43	62.60	62.83	NA
MH174	Deschâtelets Ave.	62.58	65.23	62.55	62.68	62.88	NA
MH176	Hazel St.	63.40	65.24	63.17	63.19	63.70	NA
MH178	Hazel St.	62.55	65.44	62.43	62.46	62.85	NA
MH180	des Oblate Ave.	63.15	64.61	63.07	63.07	63.45	NA
MH182	des Oblate Ave.	62.90	64.91	62.76	62.78	63.20	NA
MH220	Block 56	59.72	61.72	60.22	60.33	60.52	NA
MH222	Block 56	59.33	61.00	59.95	60.08	60.25	NA
MH224	Block 56	59.42	60.92	59.97	60.09	60.27	NA
MH226	Block 53	60.46	62.67	60.38	60.79	60.79	NA
MH228	Block 53	60.32	61.86	60.36	60.78	60.78	NA
MH230	Philosopher Pvt.	60.15	63.44	60.23	60.66	60.66	61.77
MH238	Outlet 1	59.04	62.42	58.78	58.84	59.34	NA
MH242	Outlet 1	57.01	61.68	58.29	58.40	58.59	NA
MH246	Philosopher Pvt.	60.22	64.28	60.28	60.77	60.77	61.77
MH248	Deschâtelets Ave.	62.22	64.77	62.17	62.28	62.52	NA
MH250	Hazel St.	63.11	65.74	62.90	62.93	63.41	NA
MH300	des Oblate Ave.	62.65	64.86	62.49	62.50	62.95 TOS= 63.25*	62.45 TOS= 63.09****
MH302	des Oblate Ave.	61.77	64.32	61.62	61.63	62.07 TOS= 62.37*	61.66 TOS= 62.62*
MH304**	des Oblate Ave.	61.21	63.44	61.06	61.07	61.51 *TOS=* *61.81*	60.80 TOS= 61.96*
MH306	des Oblate Ave.	59.74	62.10	59.67	60.06	60.04 *TOS=* *60.34*	60.19 TOS= 61.26*
MH308	des Oblate Ave.	59.05	61.62	59.20	59.54	59.50	N/A***
MH310	des Oblate Ave.	57.22	60.06	58.65	58.87	58.95	N/A***
MH312	Parish Pvt.	61.89	64.19	61.71	61.71	62.19	N/A***
MH314	Parish Pvt.	60.86	63.06	60.71	60.72	61.16	N/A***
MH316	Parish Pvt.	57.51	60.20	59.00	59.21	59.30	N/A***
MH318	Parish Pvt.	57.77	59.59	59.03	59.23	59.33	N/A***
MH320	Parish Pvt.	57.33	59.97	58.85	59.07	59.15	N/A***
MH322	Parish Pvt.	57.29	60.03	58.82	59.04	59.12	N/A***
MH324	Scholastic Dr.	60.97	62.79	60.73	60.73	61.27	NA
MH326	Scholastic Dr.	59.55	61.81	59.30	59.31	59.85	NA
MH328	Scholastic Dr.	58.42	60.43	58.73	59.02	59.03	NA
MH330	Sanctuary Pvt.	57.44	59.30	58.69	58.95	58.99	N/A***

STM MH ID	Street	Obvert Elev. (m)	T/G Elev. (m)	100 yr HGL Elev. (m)	Stress Test HGL (m)	Min. Req. USF (m)	As-Built USF (m)
MH332	Sanctuary Pvt.	57.28	59.20	58.66	58.94	58.96	N/A***
MH334	des Oblate Ave.	57.11	59.03	58.53	58.75	58.83	N/A***
MH336	Outlet 2	56.96	59.31	58.21	58.32	58.51	NA
MH338	Outlet 2	57.09	59.31	58.18	58.29	58.48	NA
MH340	Outlet 2	56.76	58.33	58.09	58.16	58.39	NA
MH402	Forecourt TH	63.14	64.88	62.95	62.95	63.44 *TOS= 63.74*	63.11 *TOS= 65.45**
MH406	Forecourt TH	63.07	65.21	62.86	62.86	63.37 *TOS= 63.67**	63.41 *TOS= 65.75**
MH410	Forecourt TH	62.81	64.76	62.55	62.55	63.11 *TOS= 63.41**	62.96 *TOS= 65.30**
MH414	Forecourt TH	62.18	64.27	62.05	62.11	62.48 *TOS= 62.78**	62.56 *TOS= 64.90**

*TOS = Top of slab

**TOS for Block 41 is applicable for Units 1, 2, 11 & 12. Units 3-10 are standard units with TOS=0.3m (61.90) above USF.

***Phase 2 units (except Units 1-20) have waterproofed basements with no storm sewer services.

****The critical TOS is located 21.5m from MH 300 (towards MH 302). Pipe slope in this section of sewer is 3.08%.

A review of the table indicates that there is a potential HGL issue between MH 300 and MH 302 on Oblats Avenue. The two units closest to MH 300 (Units 1 & 2) have a top of slab elevation of 63.41, which is acceptable. The next four units (Units 3, 4, 5, & 6) all have a top of slab elevation of 63.09. The unit closest to MH 300 is unit 3 which is 21.5m from MH 300. The 100-year HGL (top of pipe) in this location is 61.99, giving a minimum required top of slab elevation of 62.59. Therefore, there are no HGL conflicts with basement floor slabs in this section of storm sewer.

The modelling update demonstrated that there will be some surcharging of the storm sewer system during the 100-year storm event based on as built conditions, however there is no negative impact to all previously constructed units and the minimum clearance requirements are still achieved in line with the objectives of the 2017 report. Refer to **Appendix A** for as-built USF plans, 114025-USF1-4, for details.

3.6.4 Phase 3 Site Plan Revisions to the Approved PCSWMM Model

The preceding modelling results are based on the PCSWMM models submitted to the Coty of Ottawa on January 17, 2025 and reviewed and approved on January 25, 2025. Following the review and approval of the PCSWMM model, there were several minor changes made to the site plan application for the Phase 3 parcel. A memorandum detailing the changes and the results of the updates to the model has been prepared (PCSWMM Model Updates for Phase 3, dated March 4, 2025) and is included in **Appendix A**.

The changes to the drainage areas are summarized in **Table 3.7**.

Table 3.7: Revised Drainage Areas

Drainage Area ID	Old Area (ha)	New Area (ha)	Old C	New C
Storm Outlet 1				
21A	0.14	***0.16***	0.90	0.90
21B	0.11	0.11	0.70	0.70
21C	0.05	***0.03***	0.40	***0.33***
22A	0.04	0.04	0.50	***0.53***
22B	0.11	0.11	0.53	0.53
22C	0.09	***0.08***	0.40	***0.46***
Storm Outlet 2				
B18	0.09	***0.07***	0.57	***0.51***
B20	0.12	0.12	0.45	***0.44***
B20A	0.08	0.08	0.48	***0.35***

There were changes made to the roof drain flows from the south building of Phase 3 (Area 21A). Refer to **Table 3.8** for changes. In addition, the PCSWMM model previously had this area outletting to the Deschatelets Avenue storm sewer at MH126. The model revision has added a junction (J21) between MH128 and MH126 to more accurately reflect the proposed location of the storm sewer connection from the portion of the Phase 3 site that is tributary to Outlet 1.

Table 3.8: Revised Roof Drain Flows

Area 21A (South Building Roof)	Peak Flow (L/s)	
	5-year	100-year
Old Roof Flows	8.25	10.49
New Roof Flows	9.80	13.08

The updated model was reviewed for both the 5-year and the 100-year storm events to ensure that there were no negative impacts to the existing sewer system. The results are presented in **Table 3.9** and **Table 3.10**.

Table 3.9: Revised Peak Outlet Flows

Outlet 1 - Phase 1	Peak Flow (L/s)	
	5-year	100-year
Storm Outlet 1		
Old Flows	1,103	1,695
New Flows	1,105	1,698
Difference	*2*	*3*
Storm Outlet 2		
Old Flows	489	920
New Flows	487	913
Difference	*-2*	*-7*

Table 3.10: Revised Hydraulic Grade Elevations (100yr Event)

MH/ Node ID	HGL Elevations (100-Year Event)			
	Old HGL (m)	**New HLG (m)**	***Difference (m)***	**As-Built USF (m)**
Storm Outlet 1				
J21 (storm service lateral from Phase 3)	61.17	61.18	*0.01*	61.61
MH128	61.27	61.28	*0.01*	61.60
MH126	61.62	61.64	*0.02*	62.83
MH124	60.90	60.91	*0.01*	61.41
MH114	60.05	60.06	*0.01*	60.93
MH118	59.46	59.46	*0.00*	60.93
Storm Outlet 2				
MH306	59.67	59.67	*0.00*	60.19
MH308	59.20	59.19	*-0.01*	N/A
MH310	58.65	58.64	*-0.01*	N/A
MH324	60.73	60.73	*0.00*	N/A
MH326	59.30	59.30	*0.00*	N/A
MH328	58.73	58.72	*-0.01*	N/A
MH334	58.53	58.52	*-0.01*	N/A

The change in flows during the 100-year event (increase of 3L/s or 0.2% for Outlet 1 and a decrease of 7L/s or 0.8%) are negligible, as are the minor changes in the HGL. The changes from the Phase 3 site plan will not have a discernible impact on the functioning of the storm sewer system within the Greystone Village subdivision. Based on these findings, it is reasonable of rely on the approved PCSWMM model (January 17, 2025) as the basis for the MSSU.

The updated PCSWMM models (5-year and 100-year) incorporating the Phase 3 changes have been included with this report for reference in the future, along with the approved January 17, 2025 models.

3.7 Release Rates for Future Development

The following section provides general guidelines for release rates for future development. Any changes to the proposed land use that significantly differ from the assumptions used in this analysis (land use, imperviousness, storage, etc.) should be identified and discussed with the City as part of the individual Site Plan submissions.

3.7.1 Flat Roof Buildings (Subcatchments A09B, A09C, A10)

Existing Conditions

Currently these areas consist of an elevated parking lot with an ICD controlled storm sewer connection to the Hazel Street storm sewer. The remainder of the area is grass and lies lower than the surrounding ROW’s. These areas currently infiltrate all smaller rain events, with large events spilling to the adjacent Deschatelets Avenue ROW when the available storage has been exceeded.

Future Conditions

Runoff from proposed flat-roof buildings connecting to the storm sewer is to be controlled to a maximum release rate of 80 L/s/ha (equivalent to one drain per 250m^2 of roof area with a capacity of 2 L/s). This release rate would apply to any land use being proposed for these sites, including parking lots and also applies to roof areas draining to Main Street.

3.7.2 St. Paul's University

Existing Conditions

Storm runoff from Area 29 (St. Paul's lands draining north) will flow overland easterly towards Greystone Village and be collected in a proposed 375mm pipe that will convey flows to MH 102. Flows greater than the 5-year peak flow will spill onto Philosopher Pvt. and into the major drainage system on the site.

Future Conditions

Storm water runoff from currently undeveloped areas adjacent to Hazel Street (parts of subcatchments A09A, A11A and A12) are intended to have surface drainage directed to the Hazel Street right of way (ROW) and flows will be controlled by the ROW catchbasins.

3.7.3 The Grande Allée

Grande Allée Park, designated as Area 6, is divided into two subcatchments: 6A and 6B. Area 6B includes a portion of the land owned by St. Paul's University. This area is primarily restricted from future development by the existing heritage boundary. The combined total allowable release rate for these two areas is 165L/s/ha. The total area is 0.44ha, for an allowable release rate of 72.6L/s from the entire area.

Existing Conditions

Northern Portion (Subcatchment 06A): Stormwater from the northern portion of area 6 is captured by the park's minor storm system. This system directs the flow into a 250mm diameter pipe, which ultimately connects downstream of Storm Maintenance hole 168. Currently, there are no flow control measures in place on this pipe, allowing the stormwater to freely enter the downstream system. The 100-year release rate from this area is 66.8L/s. The minor system is also capable of conveying the stress test (100-year +20%) flows of 87.0L/s with no surface ponding.

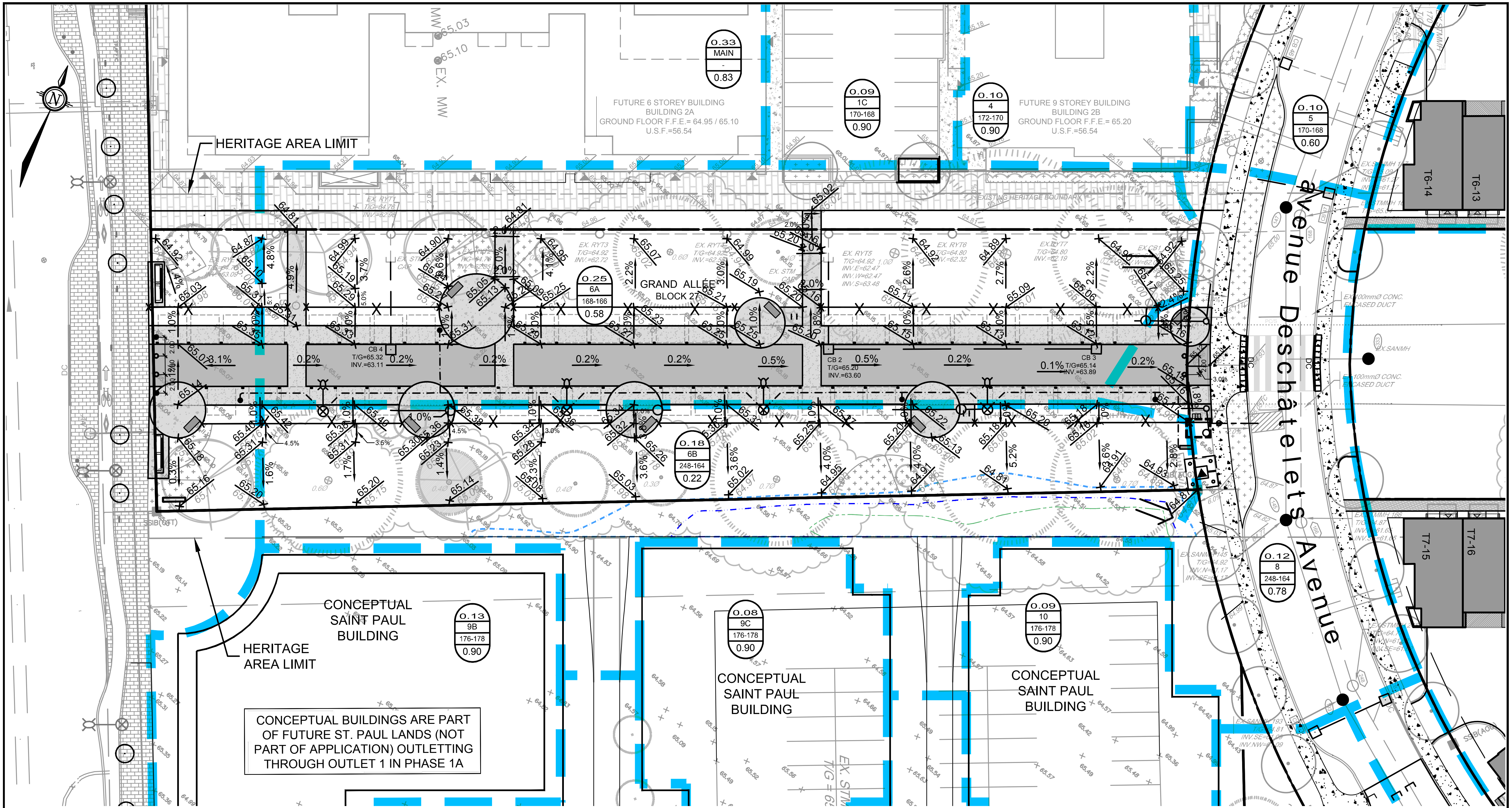
Southern Portion (Subcatchment 06B): The southern portion of area 6 drains to a low-lying area along the park property line with the St. Paul lands. This area does not currently have a storm sewer connection. Under existing conditions, rainfall accumulates within this area, primarily infiltrating into the ground. During larger events, this area will spill to the major system on Deschâtelets Avenue. The storage requirement during the 100-year + 20% event is 61m^3, which is accommodated in the existing depression with no overflow to the adjacent ROW.

Refer to **Figure-STM** for the storm drainage areas and ponding limits under current conditions.

Future Conditions

In the future, if a storm sewer connection for the southern area (Area 6B) is desired, either by the City of Ottawa Parks Department or by St. Paul's University, the allowable flow rate for Area 6 can be redistributed.

Based on the use of more conservative subcatchment parameters, as directed by the City of Ottawa, the modelled flow rate in the 100-year event is higher than the original design values. To ensure the available surface ponding capacity is not exceeded (specifically in Area A06A), the allowable to the minor system in the 100-year event has been increased to 115L/s (261L/s/ha). The model results have indicated that there are no negative impacts to the downstream sewer system due to this increase in minor system flows.



CONCEPTUAL BUILDINGS ARE PART OF FUTURE ST. PAUL LANDS (NOT PART OF APPLICATION) OUTLETTING THROUGH OUTLET 1 IN PHASE 1A

LEGEND

1.00	DRAINAGE AREA (hectares)
1	AREA IDENTIFICATION
105-103	MANHOLE TO MANHOLE
0.50	RUN-OFF COEFFICIENT

▬ ▬	DRAINAGE BOUNDARY AREA
⇐	MAJOR OVERLAND FLOW DIRECTION
100	PROPOSED STORM MAINTENANCE HOLE & SEWER WITH DIRECTION OF FLOW
100	EXISTING STORM MAINTENANCE HOLE & SEWER WITH DIRECTION OF FLOW

CB 8 T/G=96.55 ☐	PROPOSED CATCHBASIN
CB T/G=95.45 ☐	EXISTING CATCHBASIN
- · - · -	1:5yr PONDING LIMITS*
- · - · -	1:100yr PONDING LIMITS*
- - - -	1:100yr + 20% PONDING LIMITS*

* PONDING LIMITS (& CORRESPONDING STORAGE VOLUMES) HAVE BEEN CONTAINED WITHIN THE HERITAGE BOUNDARY.

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GREYSTONE VILLAGE GRAND ALLÉE PARK

STORM DRAINAGE AREA PLAN

SCALE 1 : 400 (0 4 8 12 16)

DATE JAN 2025
JOB 114025
FIGURE FIG-STM

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Flow controls (ICD's) could be added to restrict flows from subcatchment A06A to allow capacity for flows from A06B. Based on current assumptions, the PCSWM model results indicate that a 178mm dia. ICD on the existing storm sewer outlet from Area 6A would result in 93L/s of flow and a storage requirement of 9m^3 in the 100-year event. A 94mm dia. ICD on a future storm sewer outlet from Area 6B would result in 22L/s of flow and a storage requirement of 9m^3 in the 100-year event.

Refer to **Figure-STM-FUT** for details of the potential future stormwater drainage from the Grande Allee Park.

3.7.4 Existing Deschatelets Building (225 Deschatelets Building)

Storm runoff from Area 19 and Area 20A are intended to be captured and conveyed to a storm tank located within the parking lot. The storm tank will control storm flows to 23.2L/s, up to the 100-year storm event prior to ultimately outletting to Oblats Avenue.

In storms that exceed the 100-year event, surface flows will be directed from Area 19 to Oblats Avenue, similar to the minor flows. Surface flows from Area 20A will be directed through the Phase 3 condo property. The design for overland flow and swale depths within the Phase 3 Condo property have accounted for the flows from A20A. Refer to calculation excerpts from the Phase 3 report in **Appendix A.**

This property parcel includes the storm catchment area B25 (Block 31). It is understood that the property owner intends to pursue an addition to the existing building as a future phase of the building redevelopment. The allowable release rate for this area (B25) is 4.8L/s. The release rate is consistent with a flat roof building controlled to a maximum release rate of 80L/s/ha.

3.7.5 Forecourt Park (Subcatchment A14)

The 5-year storm runoff from Area 14 is intended to be captured within the area and outlet to the existing catchbasin maintenance hole (CBMH2) connected to MH128 at the intersection of Deschatelets Avenue and De Mazenod Avenue. Flows up to the 100-year event are intended to be accommodated on-site.

In the 2017 MSS, the subcatchment had previously been modelled with an allowable release rate of 220L/s/ha to the minor system with an estimated storage requirement of 40m^3 in the 100-year event.

The modelling update has indicated that the 5-year flow rate from the area is 109L/s (135L/s/ha) with a 100-year storage requirement of 40m^3.

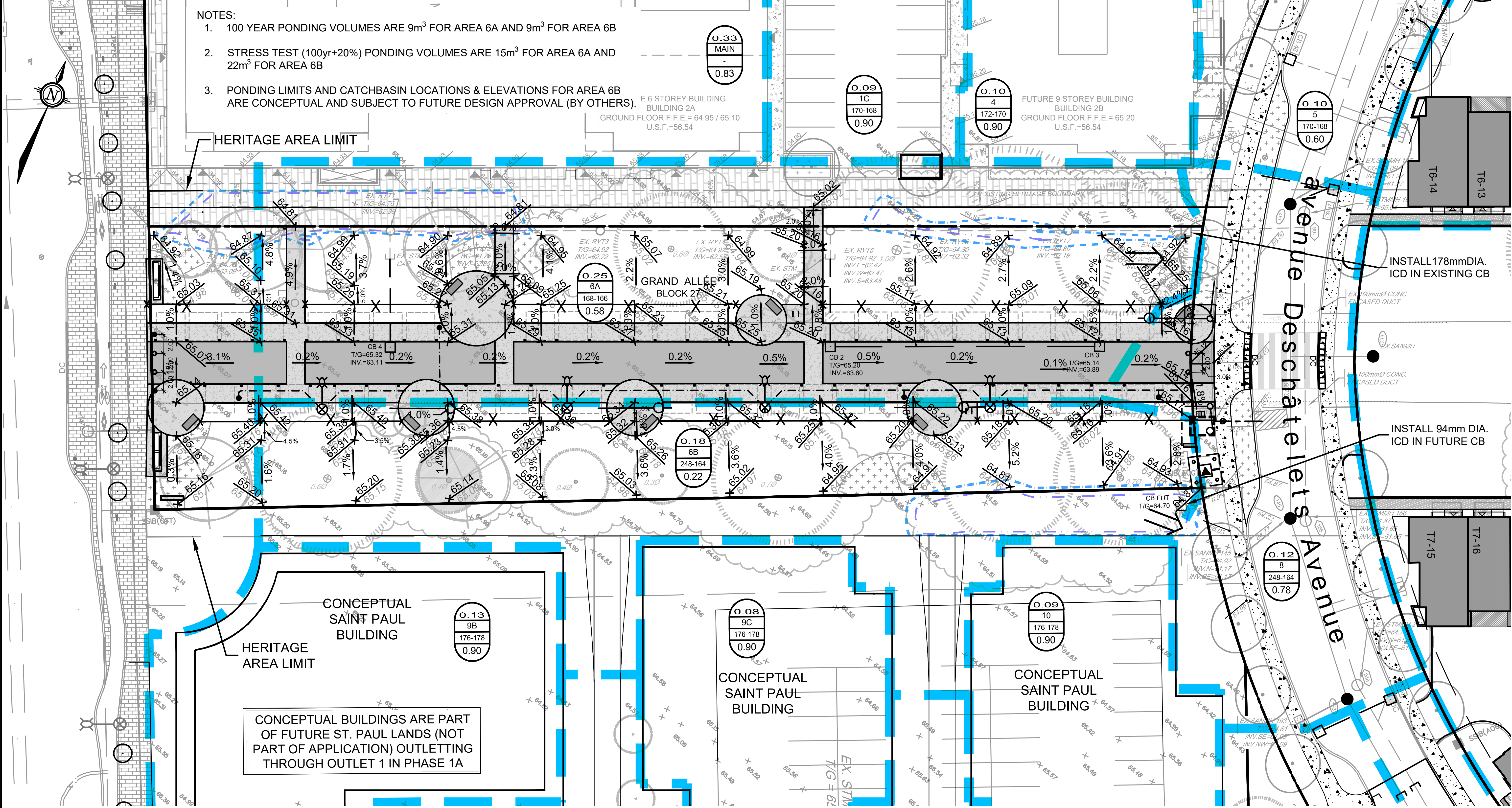
For the stress test model, an overflow conduit has been installed to connect with the major system at an elevation that limits the available storage volume to approximately 40 m^3. The model results, as shown in Table 3.3, indicate that is no adverse impact on the downstream major system from these overland flows in the stress test event.

3.8 Water Quality Control

Water quality treatment for the areas tributary to the Rideau River is provided using hydrodynamic separators (HDS) upstream of the storm outfalls. The proposed HDS units will be located within the right-of-way or defined easements to ensure sufficient access for inspection and clean-out. Refer to **Figures 6, 7, 8A, 8B and 9**.

Outlet #1: Vortechs Model 11000 off-line
Outlet #2: Vortechs Model 5000 off-line

The Vortechs units were designed to achieve a minimum of 80% long-term removal of Total Suspended Solids (TSS) based on a mean particle size of 80 microns. As-built flow information was provided to the manufacturer of the Vortechs units, and it was determined that the existing Vortechs units are sized appropriately to provide the required level of service (80% TSS removal) based on the as-built conditions.



NOTES:

1. 100 YEAR PONDING VOLUMES ARE 9m^3 FOR AREA 6A AND 9m^3 FOR AREA 6B
2. STRESS TEST (100yr+20%) PONDING VOLUMES ARE 15m^3 FOR AREA 6A AND 22m^3 FOR AREA 6B
3. PONDING LIMITS AND CATCHBASIN LOCATIONS & ELEVATIONS FOR AREA 6B ARE CONCEPTUAL AND SUBJECT TO FUTURE DESIGN APPROVAL (BY OTHERS).

CONCEPTUAL BUILDINGS ARE PART
OF FUTURE ST. PAUL LANDS (NOT
PART OF APPLICATION) OUTLETTING
THROUGH OUTLET 1 IN PHASE 1A

LEGEND

1.00 — DRAINAGE AREA (hectares)
1 — AREA IDENTIFICATION
105-103 — MANHOLE TO MANHOLE
0.50 — RUN-OFF COEFFICIENT

▬ ▬ DRAINAGE BOUNDARY AREA
⇐ MAJOR OVERLAND FLOW DIRECTION
100 PROPOSED STORM MAINTENANCE HOLE & SEWER WITH DIRECTION OF FLOW
100 EXISTING STORM MAINTENANCE HOLE & SEWER WITH DIRECTION OF FLOW

CB 8 T/G=96.55 ☐ PROPOSED CATCHBASIN
CB T/G=95.45 ☐ EXISTING CATCHBASIN
CB 8 T/G=94.70 ☐ FUTURE CATCHBASIN
– – – 1:100yr PONDING LIMITS [1]
- - - - 1:100yr + 20% PONDING LIMITS [2]

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GREYSTONE VILLAGE
GRAND ALLÉE PARK

FUTURE STORM
DRAINAGE AREA PLAN

SCALE 1 : 400 (0 4 8 12 16)
DATE JAN 2025
JOB 114025
FIGURE FIG-STM-FUT

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Correspondence and design calculations based on as-built information are provided in **Appendix A**. Refer to Storm Outfalls to Rideau River memo in **Appendix A** that addresses the Vortech units and erosion measures at each outfall during peak storm events.

3.9 Rideau River Backwater Effects

The Rideau River has a 100-year elevation near the site of approximately 58.33m. While this flood elevation does not exceed the storm sewer elevations near Outlet #1, it is above Outlet #2, and a portion of that storm sewer system will be submerged during periods of elevated water levels in the Rideau River. However, since the normal water level in the Rideau River remains well below the proposed outlet elevations, the outlets are not considered to be submerged and are not subject to Section 8.3.8.3 of the OSDG.

Even if Section 8.3.8.3 were to be applied, it is worth noting that the proposed sewers have been greatly oversized based on the minimum requirements. The outlet pipes have been designed to convey the 100-year flow where the minimum required pipe size is the 2-year, which is at least 25% of additional capacity. It is highly unlikely, therefore, that flooding in the Rideau River will have any meaningful impact on the level of service provided by the proposed storm sewers or increase their operational constraints and maintenance requirements.

Backwater from the Rideau River was accounted for in the design of the HDS units. As the HDS for Outlet 1 is located above the 100-year flood line, it did not need to consider the impact of backwater from the Rideau River. However, the Outlet 2 HDS invert is located between the 5-year flood elevation and the normal water level in the Rideau River. While backwater effects can have an impact on the treatment efficiency of a HDS unit, as long as there is sufficient hydraulic gradient across the unit, these effects are minimal and can easily be overcome by upsizing the HDS to accommodate them.

The 5-year and 100-year flood elevations were provided to the HDS supplier (Contech) to consider in the sizing of the HDS, and those backwater effects have been accommodated in the design sheets provided in **Appendix A**. Specifically, the designs are generally modified by adjusting the heights on the internal weir walls in the HDS as well as the elevation of the deflection weir in the upstream maintenance hole.

3.10 Low Impact Development (LID)

Refer to the report entitled: “Greystone Village -175 Main Street - Potential Low Impact Development Opportunities” (Novatech, November 25th, 2015, R-2015-182); submitted under separate cover for more detailed information on potential LID features.

Rights-of-Way

Based on the proposed roadway cross-sections, there are limited options for LID techniques within the rights-of-way.

Lot Level Controls

There will be more opportunities for the implementation of LID techniques, which can be explored at the site plan stage.

Design elements fitting this LID framework were reviewed for the subdivision portion and will be reviewed further at the site plan stage to be implemented where feasible and appropriate. Design elements may include rain gardens/infiltration trenches, planted curb bump-outs, grass swales, bioswales, permeable pavers, perforated pipe systems, stormwater irrigation cisterns, permeable pavers, and vegetated filter strips.

4.0 SANITARY SEWER SYSTEM

4.1 Proposed Sanitary Sewer System

It is proposed that the entirety of the development area will be serviced by 250mm gravity sewers, including a small portion on Clegg Street (in proximity to the outlet #1). The development area will ultimately outlet via two connections to the existing 1350mm Rideau River Interceptor trunk sewer that runs parallel to the Rideau River on the eastern portion of the site. Outlet #1 will connect east of Clegg Street and upstream of the existing manhole on the Rideau River Interceptor to an existing sewer using an offline proposed manhole and the existing 900mm combined sewer pipe. Outlet #2 will connect northeast of the existing building (175 Deschâtelets) and Oblats Avenue to an existing manhole using an offline proposed manhole. A portion of the existing sanitary sewer that currently services the existing building will be removed and replaced with 250mm gravity sewers that will connect to the proposed sanitary system. The buildings along Main Street will be serviced by the proposed 450mm dia. sanitary sewers (replacing existing 375/450mm dia. sanitary sewers) within Main Street. Refer to **Figure 10** – Overall Proposed Sanitary Alignment for details, **Figure 11** – Sanitary Outlet 1 Plan View and **Figure 12** – Proposed Sanitary Outlet 2 Plan View for details on the Phase 1A/1B and the Phase 2/3 connection to the existing trunk sewer.

4.2 Sanitary Design

The design flows were calculated for the development using estimated populations based on design plans and composition of the townhouses/condo buildings and have been updated to reflect the revisions to the City of Ottawa Sewer Design Guidelines using the following design criteria:

- 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 (250mm) = 0.24%
- Minimum Full Flow Velocity = 0.6m/s
- Maximum Full Flow Velocity = 3.0m/s

Using the above criteria, the theoretical peak design flow from phase 1A and 1B (Outlet 1) was determined to be 17.64 L/s. The theoretical peak design flow from phase 2 and 3 (Outlet 2) was determined to be 9.63 L/s. The peak sanitary flows are summarized below in **Table 4.1**. Refer to **Appendix B** for Sanitary Design Sheets and to the Sanitary Drainage Areas Plans (Drawings **114025-SAN1**, **SAN2 and SAN1-B**) for additional information. There are no capacity or flow velocity concerns within the proposed 250mm pipe network.

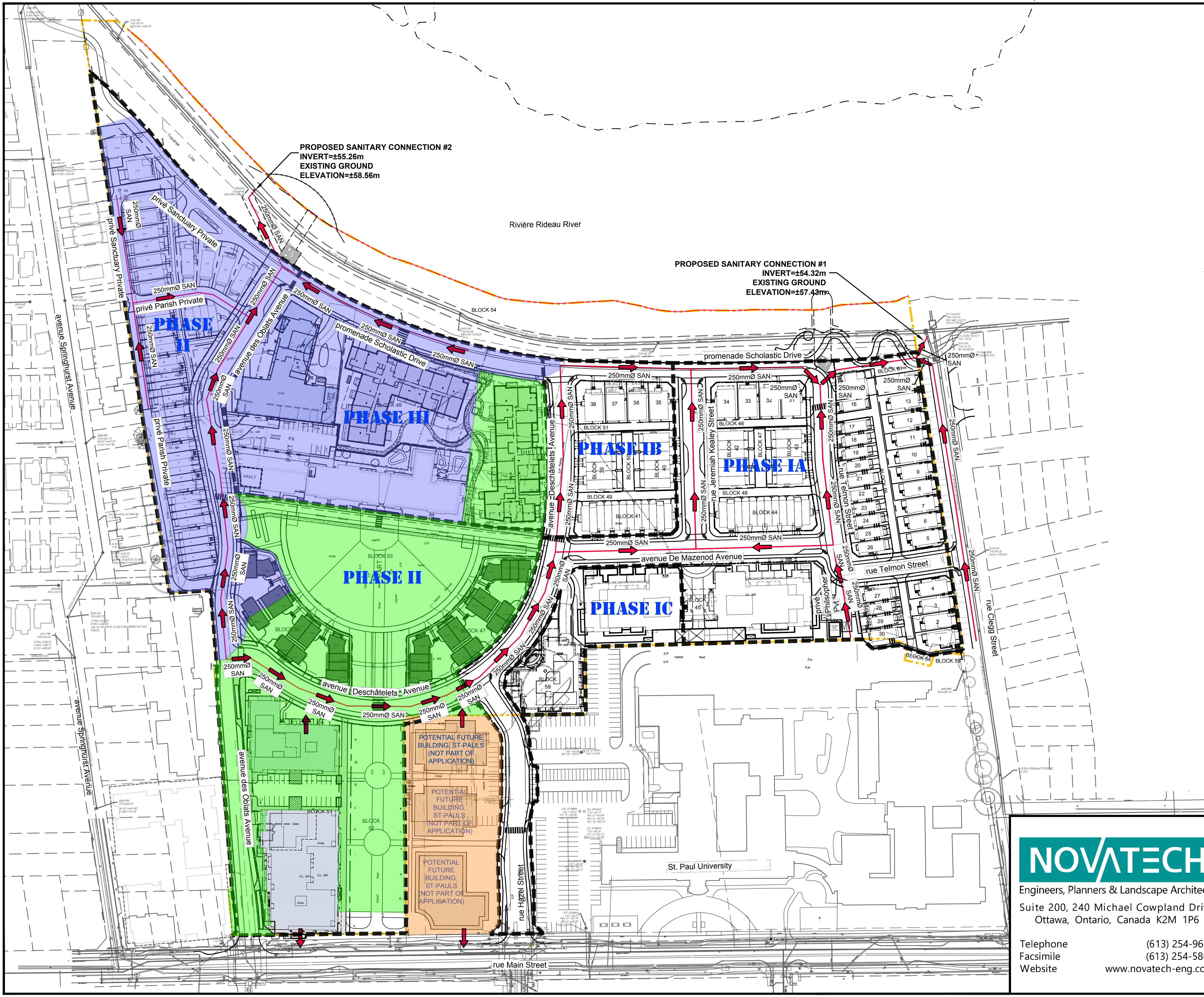
Table 4.1: Sanitary Flow Summary

Development Condition	Population	Peak Res. Flow (L/s)	Peak Ext. Flow (L/s)	Peak Design Flow (L/s)
Total Flow Outlet 1**	1524	15.51	1.82	17.64*
Total Flow Outlet 2***	814	8.66	0.97	9.63

* 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, in Appendix B

***Refer to Sanitary Sewer Design Sheet Greystone Village, 175 Main-Phase 2 and 3 (Outlet 2), in Appendix B



LEGEND

— · —	PROPERTY LINE
—	PROPOSED SANITARY SEWER
⬅	PROPOSED DIRECTION OF FLOW
— — —	PHASING LIMITS
🟧	PART OF FUTURE ST. PAUL LANDS (NOT PART OF APPLICATION) OUTLETTING THROUGH OUTLET IN PHASE 1A
🟩	PART OF PHASE 2 OUTLETTING THROUGH PHASE 1A AT OUTLET 1
🟦	PART OF PHASE 2/3 OUTLETTING THROUGH PHASE 2 OUTLET 2

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CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

OVERALL PROPOSED
SANITARY ALIGNMENT

1:2000 0 20 40 60 80

AUG 2024 | 114025 | FIGURE 10

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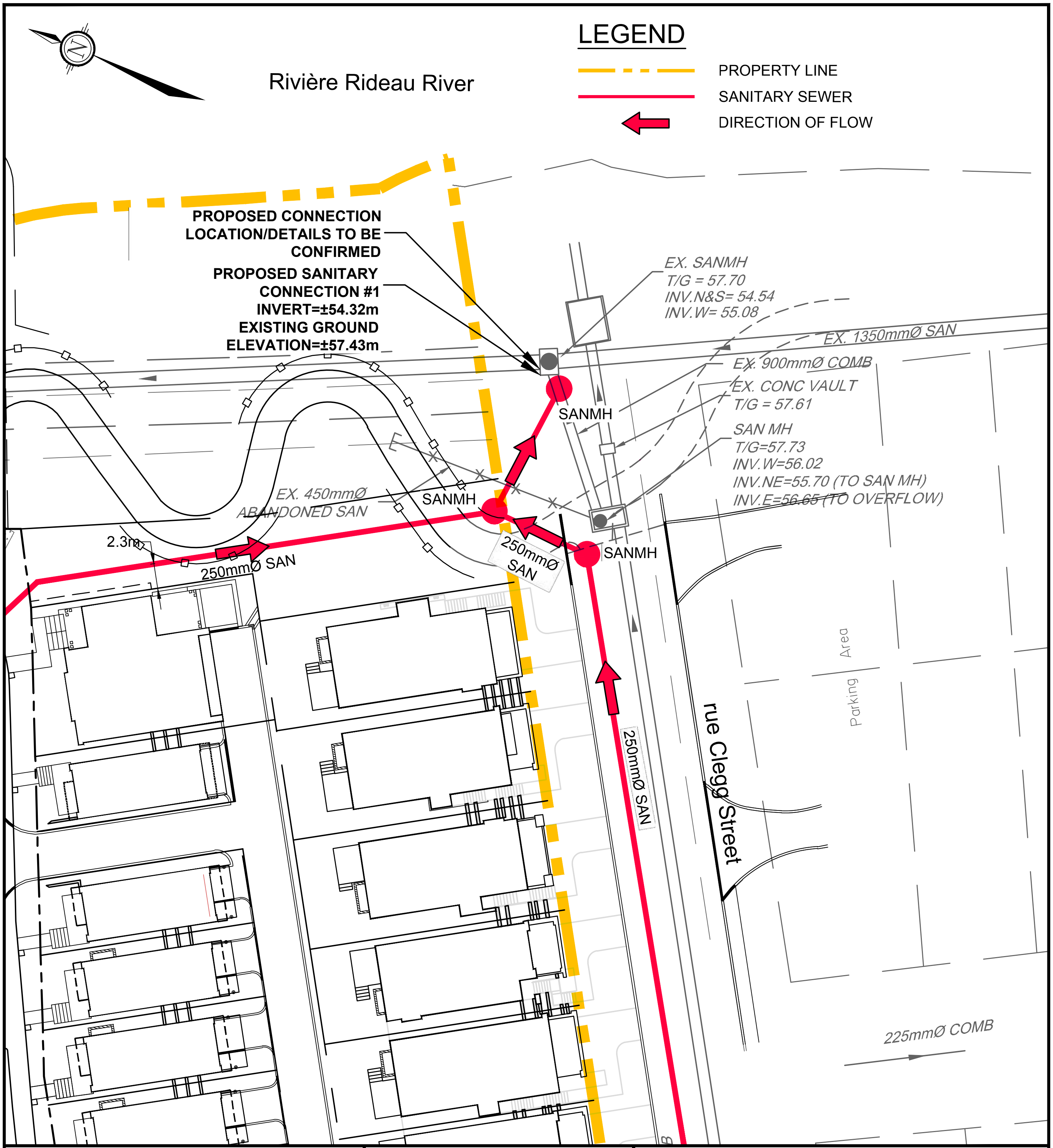

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CITY OF OTTAWA
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175 MAIN STREET

SANITARY OUTLET 1
PLAN VIEW

1 : 500 0 5m 10m 20m

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FIGURE 11

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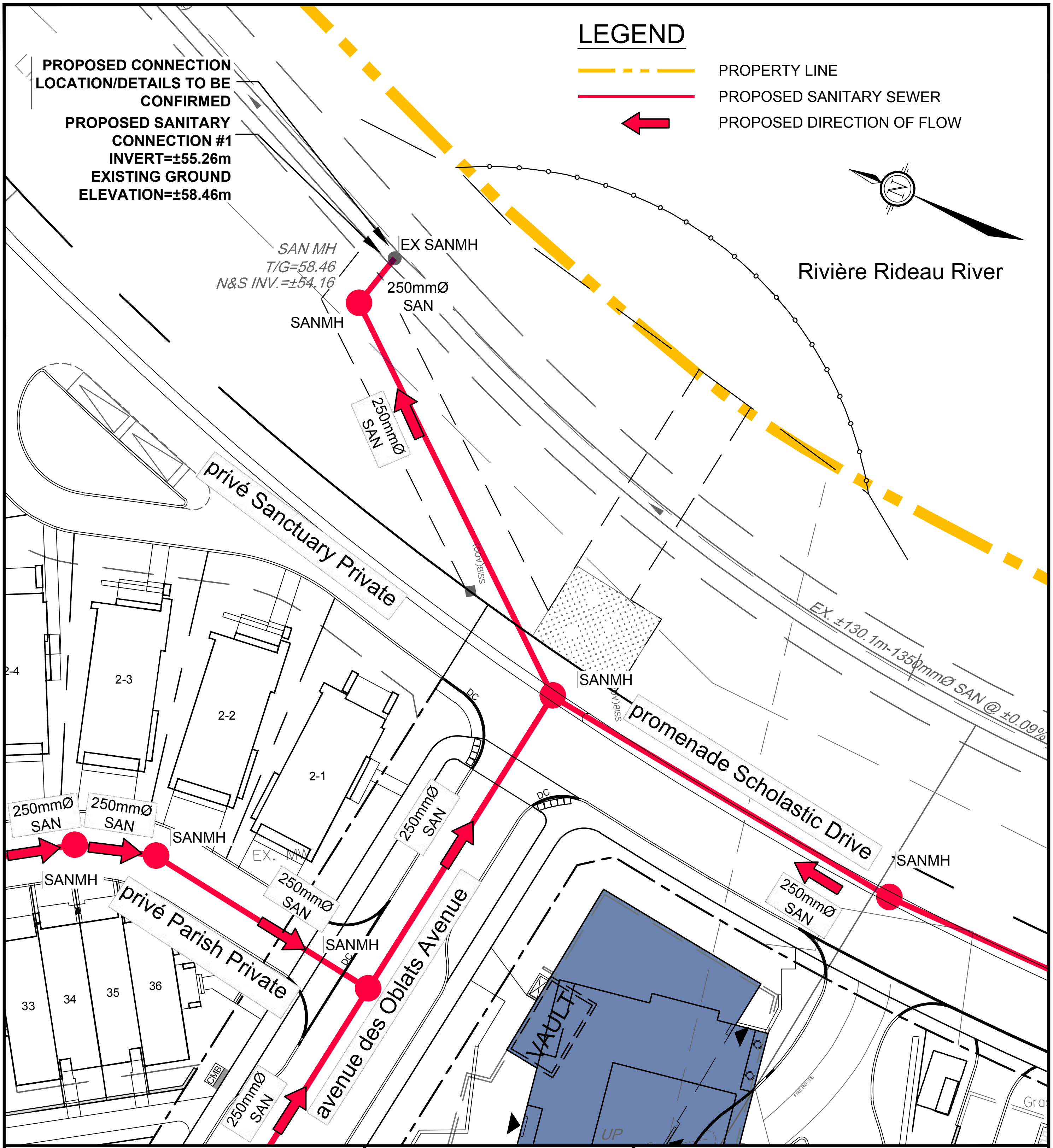

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CITY OF OTTAWA
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175 MAIN STREET

PROPOSED SANITARY OUTLET 2
PLAN VIEW

1 : 500 0 5m 10m 20m

AUG 2024 | 114025 | FIGURE 12

SHT8X11.DWG - 216mmx279mm

From correspondence from the City of Ottawa on May 15, 2014, a peak flow of 25.71 L/s (+2.62 L/s infiltration) represented a 2% increase in flow to the 1350mm Rideau River Interceptor trunk sewer running parallel to the Rideau River, which was acceptable, see **Appendix C – Correspondence** for details. Since that time the demand has been revised to reflect a greater demand from the future university residences and revised unit counts throughout the site. The theoretical peak design flow of 27.27 L/s would represent approximately a 2.12% increase in peak flows to the 1350mm Rideau River Interceptor truck sanitary sewer. Since this is a marginal increase from the accepted 2% increase (as per City correspondence (see **Appendix C**), it is suggested that the 1350mm sanitary Rideau River Interceptor trunk sewer would still have adequate capacity to service this development.

5.0 WATER SUPPLY

The City of Ottawa requires the developer to prepare a servicing study confirming capacity in the water system within the Plan of Subdivision as it relates to the existing infrastructure. The purpose of this report is to confirm that the development can be adequately serviced from the existing 400mm watermain located on Main Street and the existing 200mm watermain on Clegg Street.

The objectives of the report are as follows:

- Review the existing water supply infrastructure for connection to the proposed network;
- Describe the design criteria necessary for the operation of the network;
- Develop a hydraulic model of the proposed water plant; and
- Evaluate the operating conditions of the proposed hydraulic network.

5.1 Design Criteria

The following design criteria were used to determine the watermain performance on-site. Fire flow calculations are based on the Fire Underwriters Survey (FUS) 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 2020

Residential

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

System Requirements:

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

Fire Flow (maximum):

- 141.40L/s (Singles)
- 259.36L/s (Row Towns)
- 219.97L/s (Forecourt Towns)
- 230.67L/s (4 Storey Combustible Construction Condo)
- 251.52L/s (6 Storey Non-Combustible Construction Condo)
- 286.45L/s (9 Storey Non-Combustible Construction Condo)
- 300.24L/s (Retirement Residence) (Fronting Phase 3 Scholastic Drive)
- 229.03 L/s (4 Storey Condo) (Fronting Phase 3 Deschâtelets Avenue)
- 249.76L/s (School Residence)
- 133.33 (Domicile Building - offsite)
- 173.37 (Sister’s Building – offsite)
- 233 L/s (Phase 3 - 7 Storey building Fronting Scholastic Drive)
- 200 L/s (Phase 3 - 7 Storey building Fronting Deschâtelets Avenue)

Friction Factors:

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

5.2 Existing Water Supply System

The Greystone Village site will be serviced internally with a combination of 300mm, 250mm, 200mm PVC and 50mm copper pipe with two connections to the existing watermain. The first connection is to the 400mm watermain on Main Street (upgraded in the spring of 2015). The second connection is to the 200mm watermain on Clegg Street.

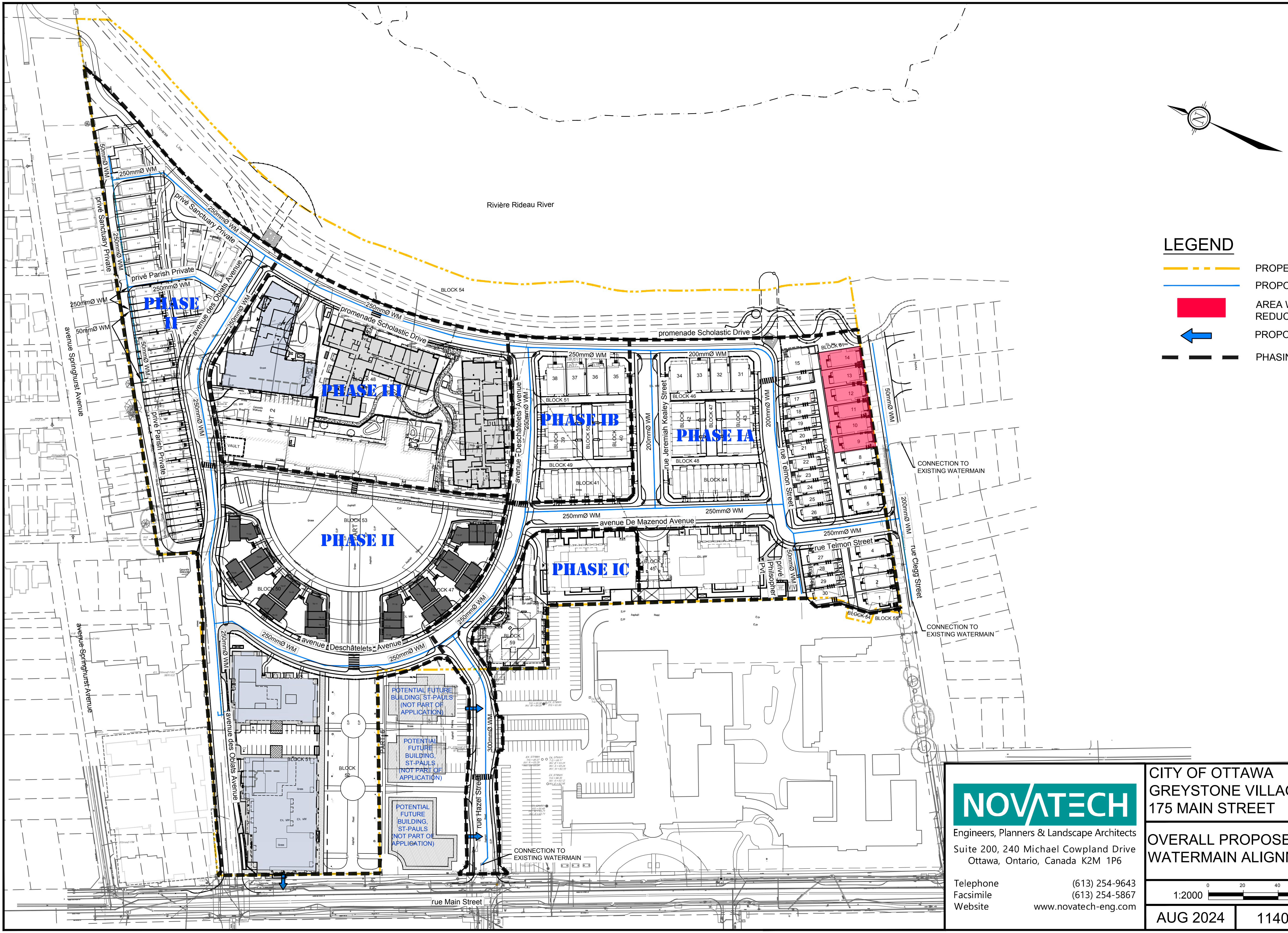
The hydraulic grade line (HGL) boundary conditions were obtained from the City of Ottawa. The HGL elevations for at the existing 400mm diameter watermain (on Main Street) are 102.9m for the maximum day plus fire flow, 105m for the peak hour flow and 114.5m for the high-pressure check. The HGL elevations for at the existing 200mm diameter watermain (on Clegg Street) are 97.2 for the maximum day plus fire flow, 104.8m for the peak hour flow and 114.5m for the high-pressure check. The boundary conditions were based on a maximum day plus fire flow of 300L/s.

5.3 Proposed Water Supply System

It is proposed to service the site with a combination of 300mm, 250mm, 200mm PVC and 50mm copper pipe. Several options were explored to connect to the Greystone subdivision that included a combination (up to 5) of connection points along Clegg Street, Main Street and Springhurst Avenue to the existing watermains. The most economical and simple combination was chosen that will connect to the existing 200mm dia. watermain along Clegg Street as well as the watermain along Main Street (existing 200mm dia. was replaced by a new 400mm dia. in the Spring of 2015). **Figure 13** – Overall Watermain Alignment highlights the proposed works and connection points. All existing watermain boundary conditions were provided by the City of Ottawa and are included in **Appendix C**. Refer to **Figure 14** – Overall Watermain Node Locations for details on the watermain node network.

5.4 Hydraulic Modeling

A hydraulic analysis was performed for the Greystone Village subdivision. **Table 5.1** summarizes the watermain operating conditions during the high pressure, maximum daily demand and fire flow, and peak hour demands. Results of the hydraulic analysis are included in **Appendix D**. Note that site specific hydraulic modelling has been completed as required for the individual site plan applications.



LEGEND

— · — · —	PROPERTY LINE
———	PROPOSED WATERMAIN
🟥	AREA WITH PRESSURE REDUCING VALVES
⬅	PROPOSED SERVICE LOCATION
— — —	PHASING LIMITS

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CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

OVERALL PROPOSED
WATERMAIN ALIGNMENT

1:2000 0 20 40 60 80

AUG 2024	114025	FIGURE 13

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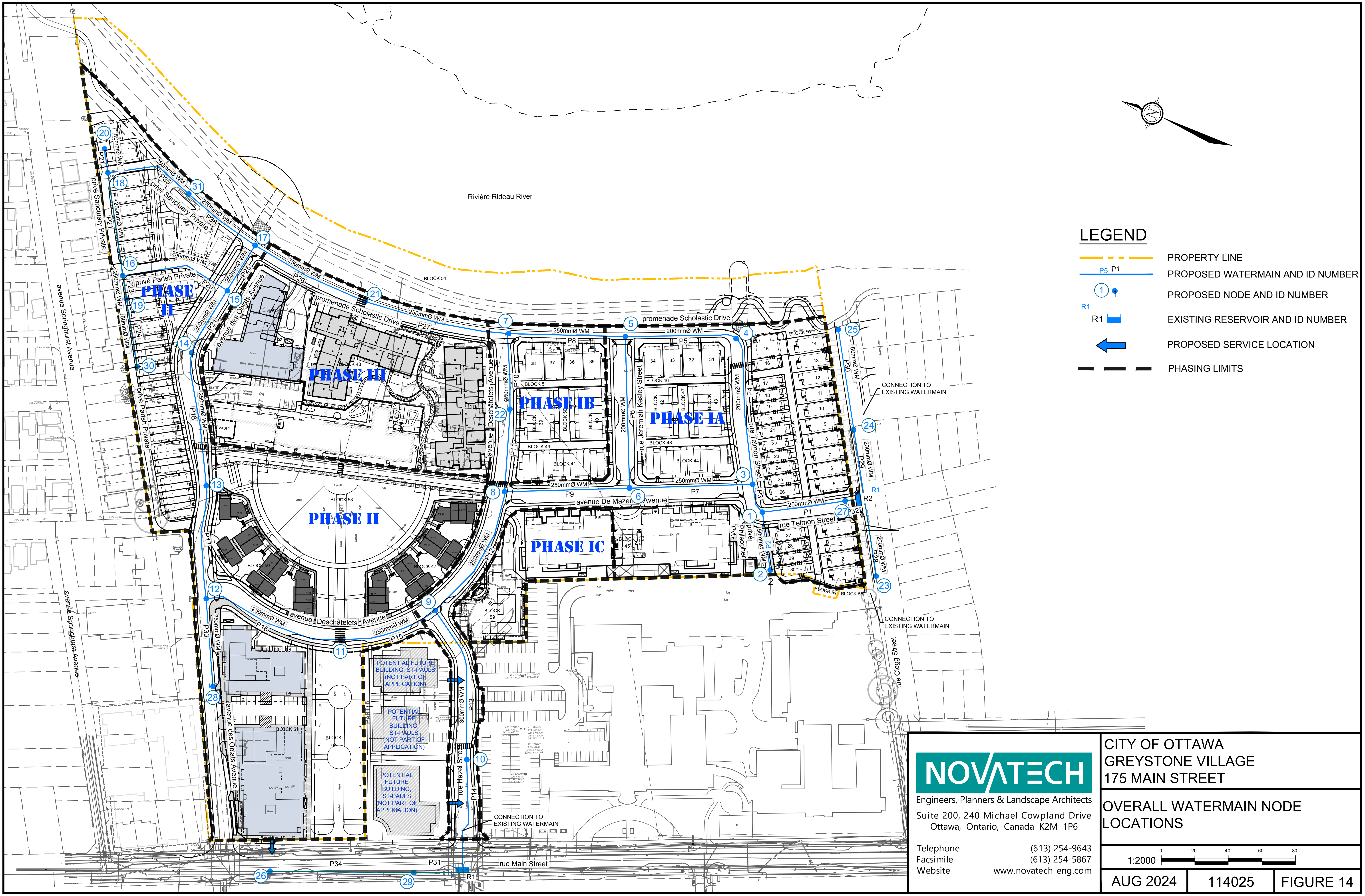

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CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

OVERALL WATERMAIN NODE LOCATIONS

1:2000
0 20 40 60 80

AUG 2024	114025	FIGURE 14

SHT11X17.DWG - 279mmX432mm

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Table 5.1: Water Demand Summary

Condition	Demand (L/s)	Min/Max Allowable Pressure (kPa/psi)	Peak Operating Pressure (kPa/psi)
High Pressure	8.57	689.5/100 (Max)	551.91/80.05 (Max)
Maximum Daily Demand (c/w Fire Flow)	302.07 (worst case)	137.9/20.0 (Min)	199.34/28.91 (Min)
Peak Hour	47.12	275.8/40.0 (Min)	385.93/55.97 (Min)

Detailed hydraulic modeling of the proposed system network was conducted for Greystone Village to confirm the proposed watermain layout and system has adequate capacity to service the development. The analysis pinpoints the minimum system pressures expected as a result of the maximum daily demand, the maximum daily demand plus fire flow and the peak hour demand design conditions in various locations throughout the site, as shown in **Table 5.2**. Refer to **Appendix D** for the detailed results and additional information.

Table 5.2: Hydraulic Model Results

Operating Condition	Minimum Operating Pressure
Max Daily Demand + Fire Flow	**Watermain**
MD = 0.36 L/s FF= 286.81 L/s at node N3	296.65 kPa 43.03 psi
MD = 0.29 L/s FF= 167 L/s at node N4	300.09 kPa 43.52 psi
MD = 3.49 L/s FF= 289.94 L/s at node N6	294.30 kPa 42.68 psi
MD = 0.06 L/s FF= 300.06 L/s at node N7	270.07 kPa 39.17 psi
MD = 0.13 L/s FF= 286.58 L/s at node N8	300.77 kPa 43.62 psi
MD = 0.46 L/s FF= 229.41 L/s at node N12	251.82 kPa 36.52 psi
MD = 1.85L/s FF= 262.58 L/s at node N15	245.25 kPa 35.57 psi
MD = 2.07 L/s FF= 302.07 L/s at node N21	238.68 kPa 34.62 psi
MD = 0.11 L/s FF= 141.51 L/s at node N23	300.38 kPa 43.57 psi
MD = 2.13 L/s FF= 253.65 L/s at node N26	331.19 kPa 48.03 psi
MD =2.02 L/s FF= 230.97 L/s at node N28	119.34 kPa 28.91 psi

Peak Hour Demand	
PH = 47.12 L/s	385.93 kPa (At Node 10) 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

The results indicate that acceptable minimum system pressures will exist throughout the proposed distribution system under all design conditions.

In some locations (Clegg Street) the maximum system pressures modeled during the high-pressure check are above 555 kPa (80 psi). Pressure reducing valves will be required in these areas. Refer to **Figure 13** – Overall Watermain Alignment for locations.

The Domicile building will have a Siamese connection fronting Oblats Avenue located within 45m of the hydrant (Node 28) for fire protection. There will be no domestic demand from this building.

The only demand on the dead end watermain (Node 28) serving as fire protection (mentioned above) on Oblats Avenue is the 6 Storey Condo building. Until the condo is completed, as an interim condition to prevent stagnation, the fire hydrant will require flushing approximately once a week for a couple years to stay within the City of Ottawa's acceptable maximum age guidelines.

The existing Sisters' building currently has a watermain connection from an existing 150mm watermain used to service the existing Deschâtelets building. This connection is only used to supply water to the sprinkler system installed within a portion of the Sisters building in case of a fire. There is no domestic demand from this connection. Refer to **Appendix D** for sketches illustrating the existing connection and existing sprinkler system installed on each floor of the Sisters' building. The existing 150mm watermain will be decommissioned and the existing building will have a connection to the internal system proposed within the Greystone Village development. The Sisters' building is currently serviced domestically on Springhurst Avenue and fire protection is also provided via two hydrants on Springhurst Avenue. Refer to **Appendix D**, **Figure 3** – Hydrant Fire Protection Area – Springhurst Avenue, for map and hydrant locations. The connection to the Greystone Village system will only accommodate the sprinkler system as per existing conditions.

Fire flows for the two offsite buildings (Domicile and Sisters') can be found in **Appendix D.**

5.5 Watermain Conclusions

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.

6.0 PHASING

The proposed subdivision will be split into three (3) phases of development, as shown on **Figure 15** – Overall Phasing Plan. Emergency vehicle access will be from both Main Street and Clegg Street for all phases of the development. The following details how each will be serviced.

6.1 Phase 1a (previously submitted)

The phase 1a which has approximately 164 units will be serviced by the storm outlet #1 near Clegg Street, the sanitary outlet #1 at the end of Clegg Street and by the watermain loop from Clegg Street to Main Street. The houses fronting on Clegg Street will be serviced by the existing storm sewer, the proposed sanitary sewer as well as the relocated and new watermain located on Clegg Street.

6.2 Phase 1b (previously submitted)

The phase 1b which has approximately 28 units will also be serviced by the storm outlet #1 near Clegg Street, the sanitary outlet #1 at the end of Clegg Street and by the watermain loop from Clegg Street to Main Street. The watermain loop portion will be installed as part of phase 1a.

6.3 Phase 1c (previously submitted)

The phase 1c which has approximately 191 units in two condo buildings will also be serviced by the storm outlet #1 near Clegg Street, the sanitary outlet #1 at the end of Clegg Street and by the watermain loop from Clegg Street to Main Street. The watermain loop portion will be installed as part of phase 1a.

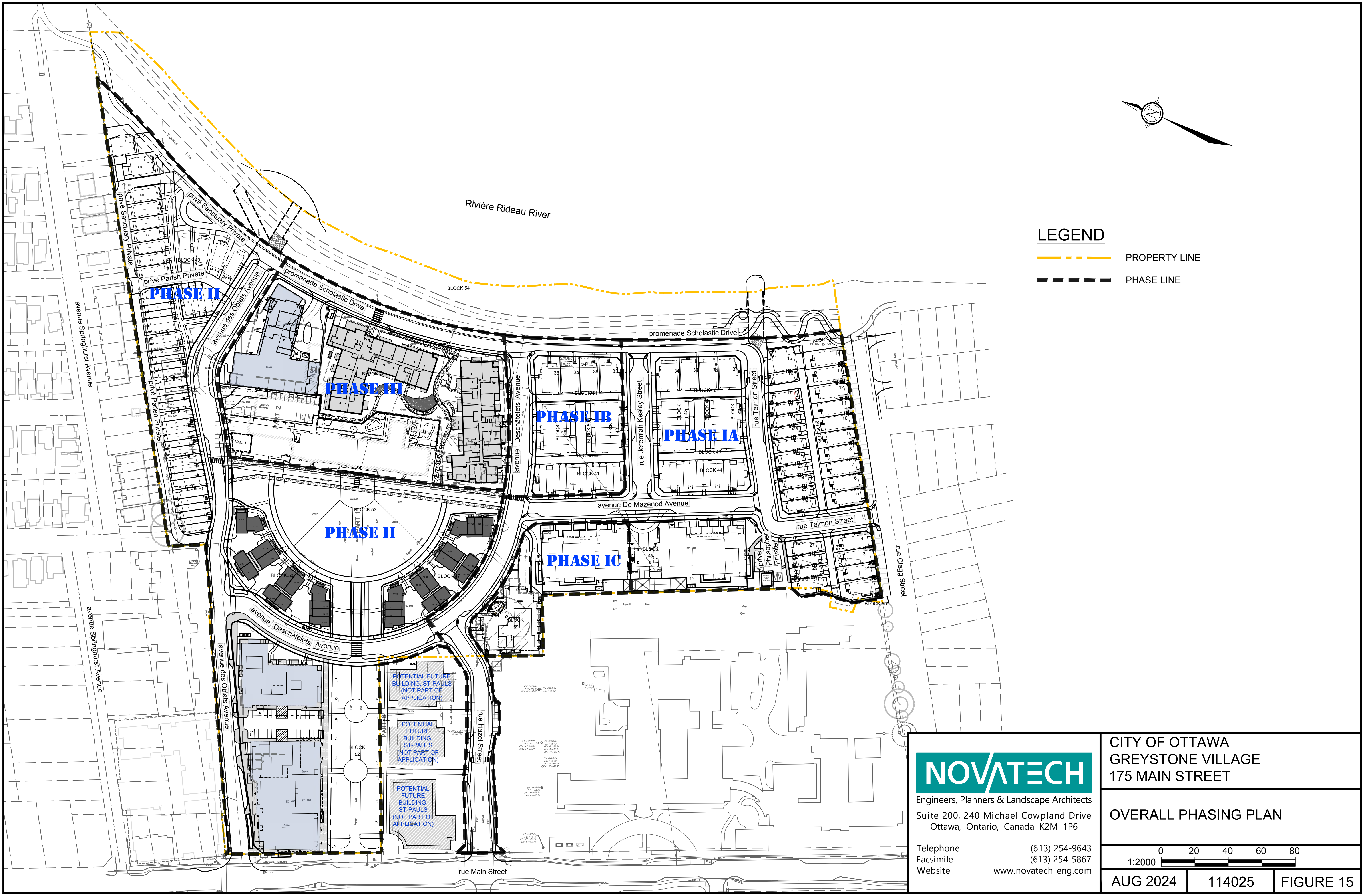
6.4 Phase 2 (previously submitted)

The phase 2 which has approximately 341 units and includes the Grande Allée / Forecourt and the North Village will be serviced by the storm outlet #1 near Clegg Street as well as the storm outlet #2 near Springhurst Avenue, the sanitary outlet #1 at the end of Clegg Street as well as the sanitary outlet #2 at the end of Springhurst Avenue and by the watermain loop from Clegg Street to Main Street. The Grande Allée/Forecourt will drain through Phase 1a and therefore services will be through storm outlet #1, sanitary outlet #1 as well as the watermain loop from Clegg Street to Main Street.

6.5 Phase 3 (previously submitted)

The phase 3 which has approximately 455 proposed units (with 38 existing units within the Deschâtelets building) will be serviced by the storm outlet #2 near Springhurst Avenue, the sanitary outlet #2 at the end of Springhurst Avenue and by the watermain loop from Clegg Street to Main Street.

The building fronting on Main Street at the corner of Oblats Avenue can be completed concurrently with any of the phases above and will be serviced by the storm and sanitary sewers as well as watermain located on Main Street.



LEGEND

▬ · ▬ ·	PROPERTY LINE
▬ ▬ ▬	PHASE LINE

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CITY OF OTTAWA
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175 MAIN STREET

OVERALL PHASING PLAN

1:2000 0 20 40 60 80

AUG 2024 | 114025 | FIGURE 15

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7.0 NOISE CONTROL

7.1 Introduction

For the purposes of this report, an assessment of the environmental impact of noise was considered for various locations within phase 1A and 1B, as well as phase 2 and 3.

7.2 Noise Sources

The City of Ottawa Official Plan stipulates that a noise study shall be prepared when a new development is proposed within distances as follows;

- 100 metres from the right-of-way of an arterial road, major collector road or bus Transitway
- 250 meters from the right-of-way of a highway, light rail transit corridor or a Secondary Main Railway line
- 500 meters from the right-of-way of a freeway or 400-series provincial highway or a Principle Main railway line

There are two potential surface road noise sources that are considered for phase 2 and 3 of the site: Main Street to the west and Highway 417 to the North, as all other roadways within the zone of influence were not arterial or major collector roadways. Main Street and Highway 417 will not be considered in a noise assessment for phase 1A and 1B as both potential noise sources are outside the zone of influence. A detailed noise analysis will be required for at site plan stage for the condo buildings along Main Street/Oblate Avenue, once the design details are finalized. See **Figure 16** – Noise Source Distance Plan and Receiver Location Plan for further details.

Main Street classification is based on the City of Ottawa's Official Plan. The current protected Right-of-Way (ROW) and classification of Main Street is a of 2-Lane Urban Arterial roadway (15,000 veh/day) with a protected ROW of 20.0m (24.0m fronting our site). The posted speed that will be considered in the analysis is 50kph. The Main Street roadway has been reconstructed as a 2-lane roadway with on-street parking as part of the Main Street redevelopment.

Highway 417 classification is based on the City of Ottawa's Environmental Noise Control Guidelines. Highway 417 is a six (6) lane Queensway highway with an AADT of 18,333 veh/lane/day. The posted speed that will be considered in the analysis is 100kph.

There is no railway within 250m that impacts this site.

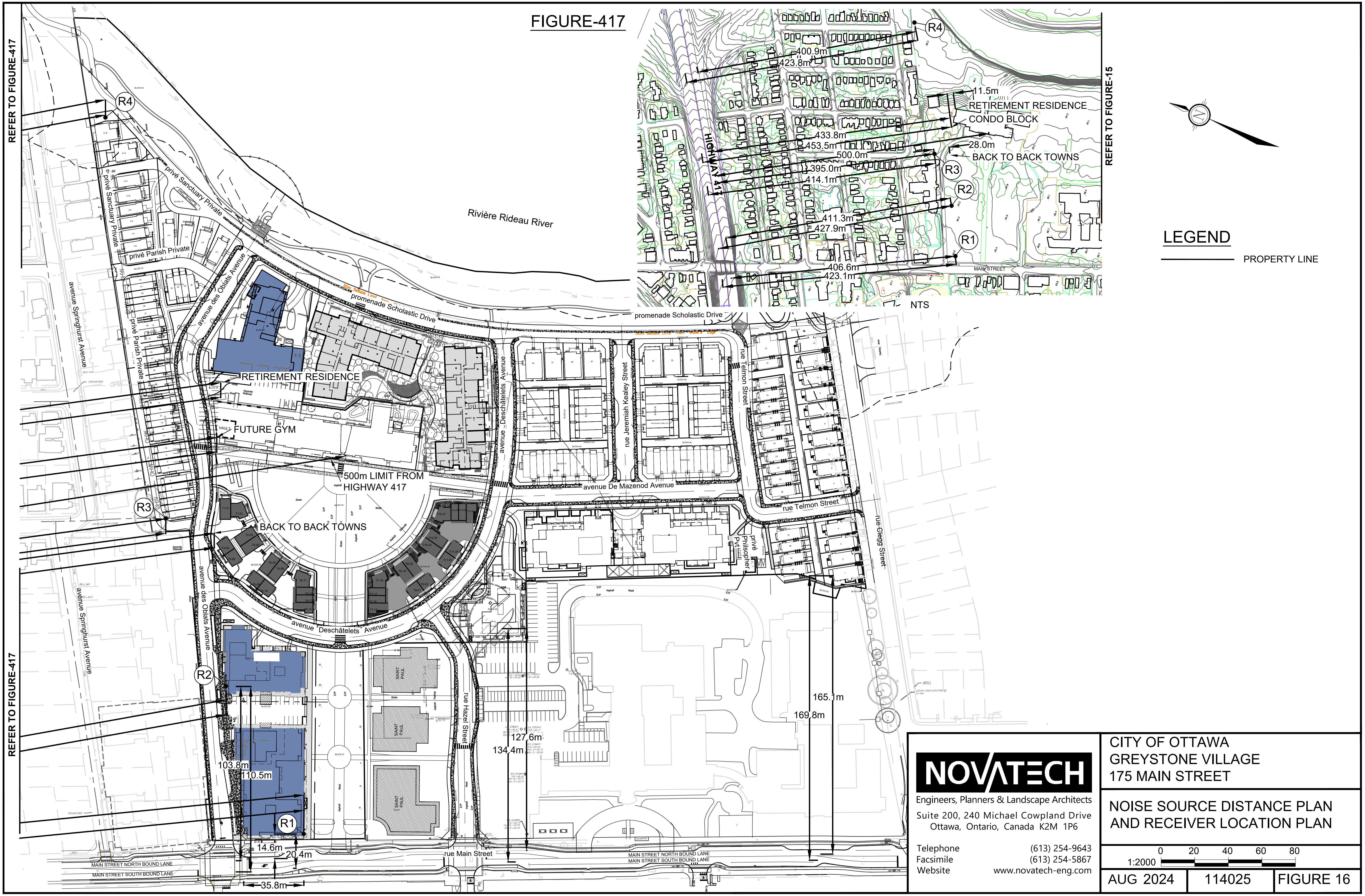
There is no airport noise affecting this site.

7.3 Noise Level Analysis

The noise levels were analyzed using version 5.03 of the STAMSON computer program issued by the MOE. Noise levels were generated for a number of receiver locations as shown on **Figure 16** – Noise Source Distance Plan and Receiver Location Plan, using Main Street and Highway 417 traffic and roadway parameters. Proposed grades required by STAMSON were attained from grading plans and City of Ottawa topographic maps.

The residential condo immediately adjacent to Main Street will experience the highest sound levels due to its proximity to the noise source. Therefore, the analysis was initiated on the condo immediately beside Main Street to establish a baseline sound level exposure from which various noise attenuation strategies were investigated.

The traffic and roadway parameters used for sound level predictions are shown in **Table 7.1**.



LEGEND

PROPERTY LINE

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175 MAIN STREET

NOISE SOURCE DISTANCE PLAN
AND RECEIVER LOCATION PLAN

AUG 2024 | 114025 | FIGURE 16

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Table 7.1: Traffic and Roadway Parameters

	Main Street Avenue	**417 Queensway**
Roadway Classification	2 Lane Urban Arterial-Undivided	6-Lane 400 Series Highway
Annual Average Daily Traffic (AADT)	15,000 vehicles/day	18,333 vehicles/lane/day
Day/Night Split (%)	92/8	92/8
Medium Trucks (%)	7	7
Heavy Trucks (%)	5	5
Posted Speed	50 km/hr	100 km/hr

7.4 Noise Level Criteria

The City of Ottawa is concerned with noise from aircraft, roads, transitways and railways as expressed in the City of Ottawa Official Plan (May 2003) since it can affect the quality of life of residents. To protect residents from unacceptable levels of noise, the City of Ottawa has specific environmental noise control guidelines, which are based on the technical guidelines and recommendations prepared by the Ontario Ministry of Environment. The City of Ottawa's Environmental Noise Control Guidelines (ENCG), January 2016 has been used for the purpose of this report.

The quantitative sound level criteria, which require that specific outdoor and indoor living areas of residential developments meet certain energy equivalent sound levels (Leq), are summarized in **Table 7.2** and **Table 7.3**. Compliance with the outdoor sound level criteria will generally ensure compliance with the indoor sound level criteria.

Table 7.2: City of Ottawa Outdoor Noise Level Criteria (Road and/or Rail Noise)

Time Period	**Receiver Location**	**Noise Level Criteria (Leq)**
Daytime (07:00 – 23:00)	Outdoor Living Area (OLA)	55 dBA

The outdoor living area is defined as that part of an outdoor amenity area, which is provided for the quiet enjoyment of the outdoor environment during the daytime period. These amenity areas are typically backyards, gardens, terraces and patios.

Table 7.3: City of Ottawa Indoor Noise Level Criteria

Time Period	**Receiver Location**	**Noise Level Criteria (Leq)**
Daytime (07:00 – 23:00)	General offices, reception areas, retail stores, etc.	50 dBA
Daytime (07:00 – 23:00)	Living/Dining Rooms of residential dwelling units, theatres, places of worship, school, individual or semi-private offices, conference rooms, reading rooms, classrooms, etc.	45 dBA
Nighttime (23:00 – 07:00)	Sleeping quarters of residential units, hospitals, nursing homes, senior citizen homes, etc.	40 dBA

Noise attenuation requirements at an Outdoor Living Area (OLA) and a Plane of Window (POW) are outlined in **Table 7.2** and **7.3.**

7.5 Noise Level Results/Recommendations

The predicted noise levels at the selected receiver locations within the development are illustrated in **Table 7.4.** Daytime and nighttime noise levels are shown.

Table 7.4: Simulation Results

Location	File/Receiver Name	Noise Levels Leq (dBA)	
		Daytime	Night-time
Condo Building Main Street – 6th Floor	R1	67.99	60.39
Condo Building Oblats Avenue – 6th Floor	R2	52.62	44.97
Townhouse Dwelling Unit	R3	52.67	45.07
Single Dwelling Unit	R4	52.62	45.02

The 6-storey condo building along Oblate Avenue/Main Street (R1) exceeds the allowable noise level criteria for the indoor noise criteria. This condo building will require a detailed analysis and warning clauses at site plan stage when details are finalized. The following is a summary of the proposed attenuation measures that may be utilized in accordance with the City of Ottawa Noise Control Guidelines.

- Installation of a forced air ventilation system with provision for central air conditioning;
- Installation of central air conditioning;
- Custom building design, construction and/or acoustical insulation;
- Warning clause be registered on title.

The condo building located at the Oblate/Deschâtelets Ave. intersection (R2), the townhouse blocks (R3) and the single units (R4) all exceed the allowable indoor noise criteria specified in **Table 7.3.** As per section 2.2 of the City of Ottawa Noise Control Guidelines (2016), developments should be consistent with NPC-300 (MOE publication, 2013). As stated in section 7.1.2 and 7.1.3 of NPC-300, ventilation provisions and warning clauses are not required if the plane of window (daytime) noise level is below 55dBA and the plane of window (nighttime) sound level is below 50 dBA. Additionally, building components (such as windows, walls and doors) shall be designed so that the indoor sounds levels comply with the noise level criteria only when plane of window sound levels exceed 65 dBA for daytime and 60dBA for nighttime. Refer to **Appendix E** for excerpts from NCP-300. The Building Code construction requirements for building components (windows, walls, doors) exceed the minimum requirements to mitigate indoor noise levels. The Building Code required building components generally mitigate noise levels up to 65 dBA for daytime and 60dBA for nighttime.

All condo buildings north of the existing Deschâtelets building are further from the Highway 417 noise source than Receiver R2. Therefore, noise levels are expected to be below R2 and no further mitigation is required, as stated above.

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

Upon further review, all the 9 storey condo buildings behind St. Paul University fall outside the zone of influence mentioned in section 7.2, and therefore do not require a detailed noise analysis. See **Figure 16** – Noise Source Distance Plan & Receiver Location Plan for further details.

The noise attenuation measures mentioned above are based on detailed grading plans for all phases of the development.

8.0 COMMUNITY TRANSPORTATION STUDY

An analysis of the effect from the proposed Greystone Village Inc. Lands development on the existing traffic patterns has been performed and detailed in the report entitled: *175 Main Street – Greystone Village – Community Transportation Study by Novatech dated January 2015* and is submitted under a separate cover. Please refer to this report for more details.

Also, an additional Community Transportation Study Addendum was prepared in support of the Greystone Village Subdivision Phases 2/3. It addresses the increased site traffic generated by the revised Phase 3 development and the proposed widening of Scholastic Drive to accommodate two-way traffic between Oblates and Deschâtelets. It was submitted by email to both Erin, Wally and Josh by email on May 16, 2017.

9.0 UTILITIES

The development will be serviced by hydro, gas, bell and rogers, which will be constructed in modified hybrid trenches, as per the modified City and utility standard right-of-way cross-sections illustrated on the utility plans. The hydro will be concrete encased and located under the sidewalks throughout the development. 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.

Moreover, the North Village units will be serviced; either directly from Oblats Avenue ROW, Private Road ROW or from the utility corridors located within the front yards. The hydro feed for this area will come from a new hydro vault to be located adjacent to the existing Deschâtelets building. The other utilities will come from Oblats Avenue / Scholastic Drive, with a gas main extension through one of the Springhurst properties to the north. The utilities located within the utility corridor will follow the same layouts as the Scholastic Drive cross section.

For additional information on the proposed utility servicing, refer to the Phase 1A/1B utility plans (Drawings **114025-U1** to **U7**) which has been reviewed/approved by all the utilities (previously circulated) as well as the Phase 2/3 preliminary utility plan (Drawing **114025-U-B**) which has been circulated to all the utilities (included as part of the drawing set).

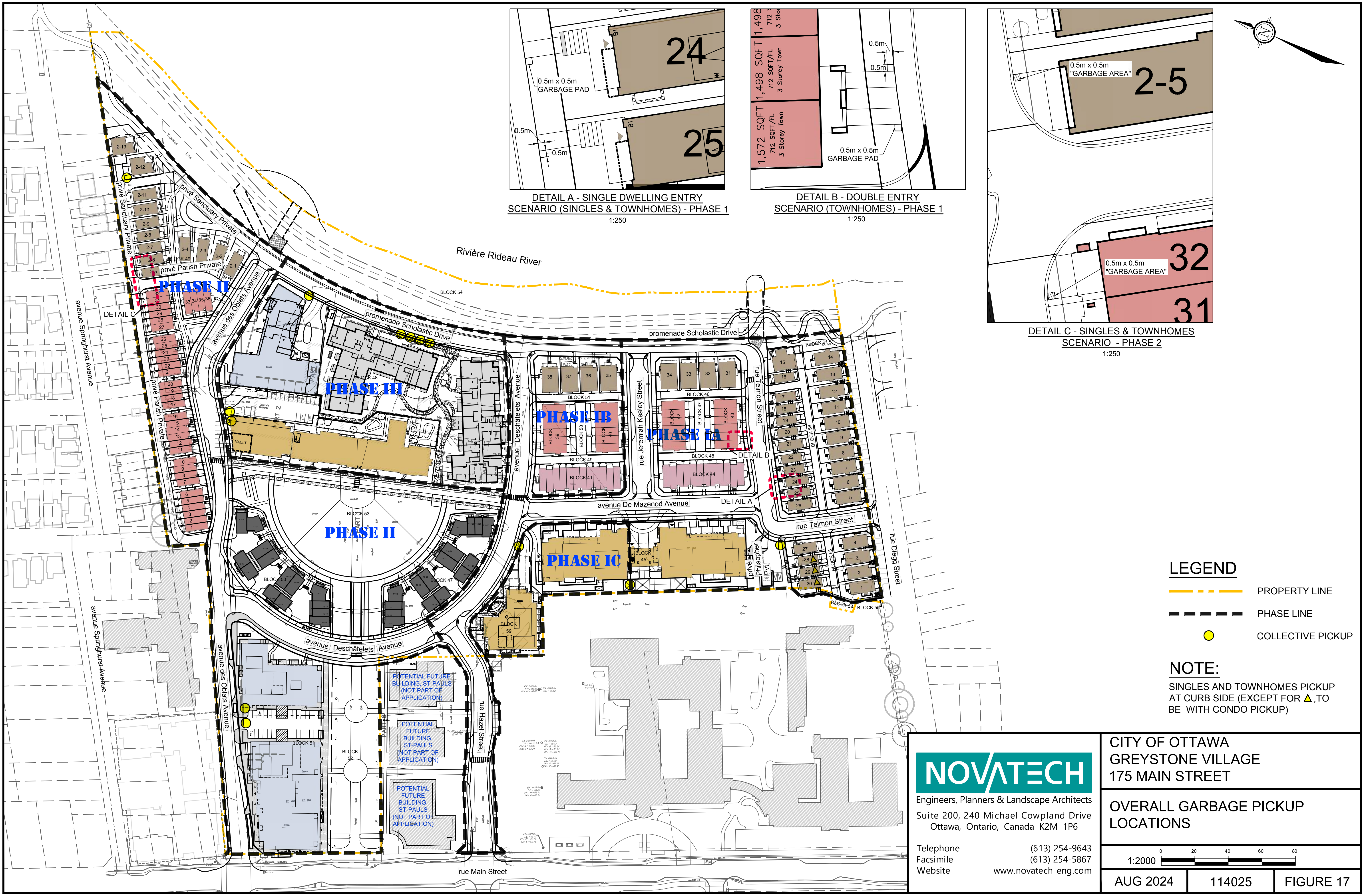
10.0 GARBAGE COLLECTION

The development will be serviced by city garbage collection in individual pickup areas at the curb for singles and towns and in tentative collective pickup areas for condos as illustrated on **Figure 17** –Overall Garbage Pickup Locations.

11.0 ROADWAY GRADING

Clegg Street roadway will require reconstruction after the current installation of sanitary sewer and extension of the watermain, however, in general the roadway shall be rebuilt to existing grades. At the end of Clegg Street, the existing grades will be raised to ensure the last three lots will be set above the 100-year floodplain elevation. Preliminary grading for phase 1a/1b/1c was completed for the proposed development using existing Clegg Street grades as a tie-in point, other than at the east end as mentioned previously as well as using existing (new) Main Street grades as a tie-in point. There have been discussions with the RVCA and a cut/fill application has been submitted as part of detail design.

The proposed entrance (tie-in location) to the development near the southwest corner of the site will rise sharply to the private road intersection to accommodate a significant rise in elevation to the proposed development. This portion of roadway will drain towards Clegg Street and catchbasins will be added to capture a portion of the 5-year event. A high point for Phase 1A will be located in front of the 9 storey condo



DETAIL A - SINGLE DWELLING ENTRY SCENARIO (SINGLES & TOWNHOMES) - PHASE 1
1:250

DETAIL B - DOUBLE ENTRY SCENARIO (TOWNHOMES) - PHASE 1
1:250

DETAIL C - SINGLES & TOWNHOMES SCENARIO - PHASE 2
1:250

LEGEND

— · —	PROPERTY LINE
- - - -	PHASE LINE
●	COLLECTIVE PICKUP

NOTE:

SINGLES AND TOWNHOMES PICKUP AT CURB SIDE (EXCEPT FOR △ ,TO BE WITH CONDO PICKUP)

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CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

OVERALL GARBAGE PICKUP LOCATIONS

1:2000 0 20 40 60 80

AUG 2024 | 114025 | FIGURE 17

SHT11X17.DWG - 279mmX432mm

M:\2014\114025\CAD\Design\Figures\Design Brief\20240425 - MSS Update\FIG-17-GARBAGE.dwg, FIG-17-GARBAGE, Apr 25, 2024 - 3:01pm, jlyon buildings where overland flow will be directed gradually north and south to the intersections where it will be directed gradually towards Rideau River and ultimately to the southeast corner of the site. The majority of Phases 2 and 3 will follow the same concept of draining down towards the river at the storm and sanitary outlet #2 north of the Oblats/Scholastic intersection. Refer to **Figure 18** – Grades Within Phase 1A/1B for details.

Oblats Avenue and the North Village directly front onto properties along Springhurst Avenue. Oblats Avenue currently has a gentle slope from the existing Sister's building towards Main Street. The proposed Oblats Avenue will follow this concept and with the high point located at the Oblats Avenue/Deschâtelets Avenue intersection. East of the Oblats Avenue/Deschâtelets Avenue intersection Oblats Avenue and the private road within the North Village gently slope towards the Rideau River. Existing grading along the private road fall steeply adjacent to the Concord/Springhurst Avenue intersection. The private road (and Oblats Avenue) will follow the same concept and the use of retaining walls or terracing will be required along this section of private roadway. All proposed drainage is generally directed towards the Rideau River east of the Oblats Avenue/Deschâtelets Avenue intersection as per existing conditions. Refer to Grading Plans (114025-GR1-3) and **Figure 20A, B and C – Tie-in with Springhurst Avenue Properties** for details.

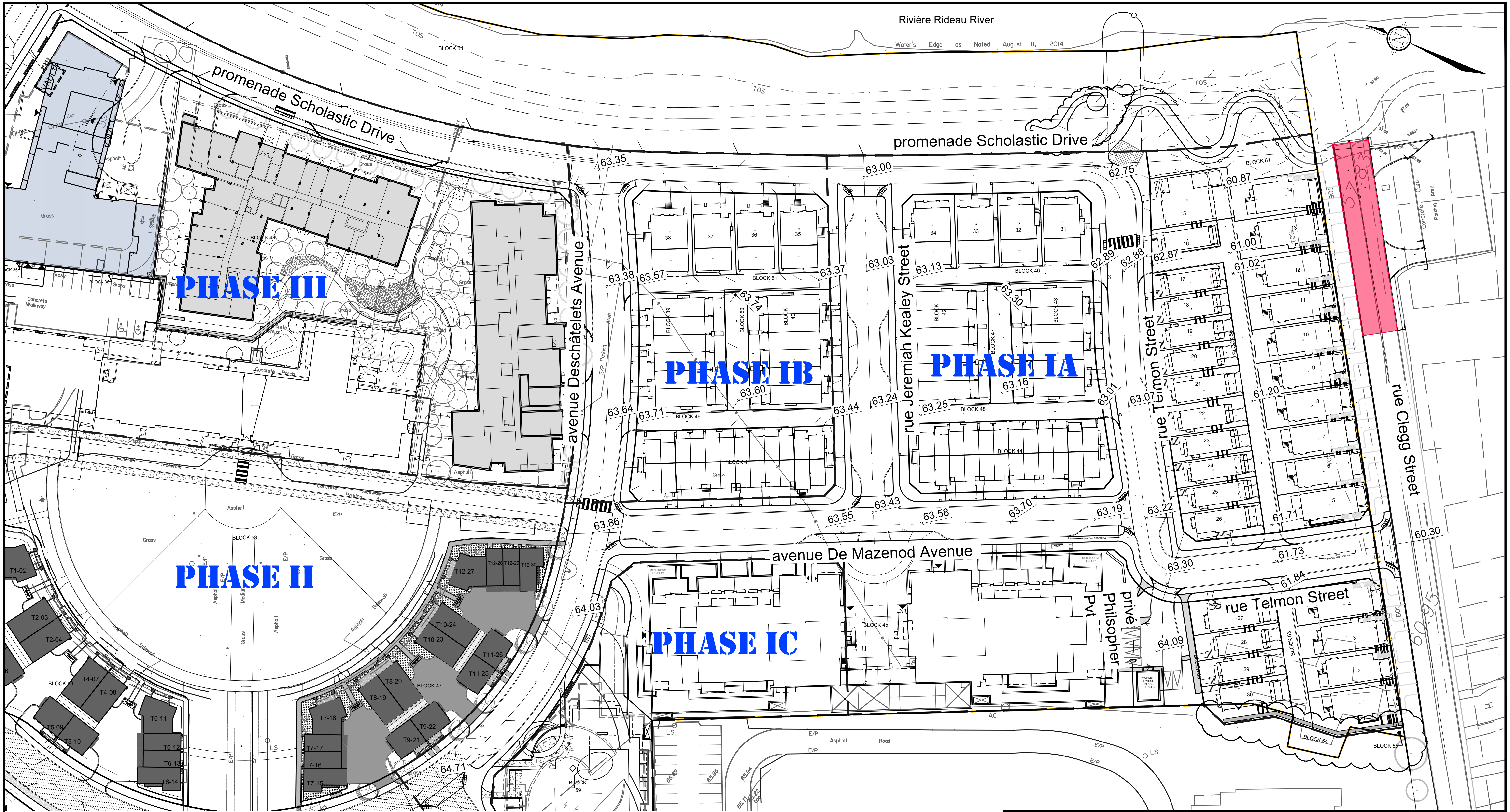
12.0 MULTI-USE PATHWAY

A multi-use pathway (MUP) is proposed along the east side of the development near Rideau River and will tie into the proposed raised grades at the east limit of Clegg Street. The MUP will meander next to the single dwellings units before tying in adjacent to and at the same elevation as the proposed adjusted roadway at Clegg. The tie-in location at the window street will be at the end of the curb radius where the road cross section changes to a 3.5m wide driving lane with a 1.0m concrete strip and 3.0m MUP. The purpose of the proposed tie-in location along the roadway is to maintain a minimum 6.0m fire route along this section of roadway (one-way). The MUP will also tie-into the existing pathway at the end of northern end, around Springhurst. Refer to **Figure 19A** – Path Tie-in with Clegg Street and **Figure 19B** – Path Tie-in with Springhurst Avenue for details. The design and construction of the MUP will be subject to a front ending agreement with the city.

13.0 PUBLIC ROAD PLANTING

The proposed street cross-sections for the development (Phases 1-3) significantly influenced the selection of tree species and design approach for the treed streetscape. See Drawing **114025-BP-B** – Concept Plan with Road Cross Sections - Phase 2 and 3 for details on locations. The following includes the major considerations (refer to Golder's "Geotechnical Assessment – Tree Planting Considerations" for additional information):

- Tree height will not be restricted by overhead lines or wires because none are proposed.
- Salt spray is only a major concern for the main bus route as the City indicated that less salt will be utilized for the other internal roads. Additionally, most of the cross-sections setback the trees further from the roadway (0.6m into the right-of-way), buffered by the sidewalk. This too will lower the impact of the harsh conditions to which street trees are typically subjected.
- Instead of providing a small tree pit for each tree, entire boulevards will have a minimum planting soil depth of 0.6m. The 'linked tree pits' will increase the soil volume available to each tree which will improve the overall health and sustainability of the proposed trees. The goal is to provide each tree with a minimum of $10m^3$ of topsoil.
- As the cross-sections indicate, tree locations are very close to the buildings. Cross-sections, A, B, C, E, F, and H, propose trees to be 3.6m from the building face. This proximity restricts tree selection to those with narrow upright forms, in order to reduce canopy conflict with the building face as trees mature. Many native species grow to have large spreading canopies. Native species will be proposed on cross-section G and possibly some intersection areas where the buildings are not as close. By necessity, the majority of the streetscape trees will have narrow canopies, with several columnar in form. All of these will be non-invasive species and natives will be incorporated where logical.



LEGEND

PROPERTY LINE

64.71 PROPOSED FINISHED GROUND ELEVATION

0.5% PROPOSED SLOPE

65.18 EXISTING GROUND ELEVATION

🟥 BALANCE CUT/FILL AREA

PHASING LIMITS

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CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

GRADES WITHIN PHASE 1A/1B

1 : 1000 0 10 20 30 40

AUG 2024	114025	FIGURE 18

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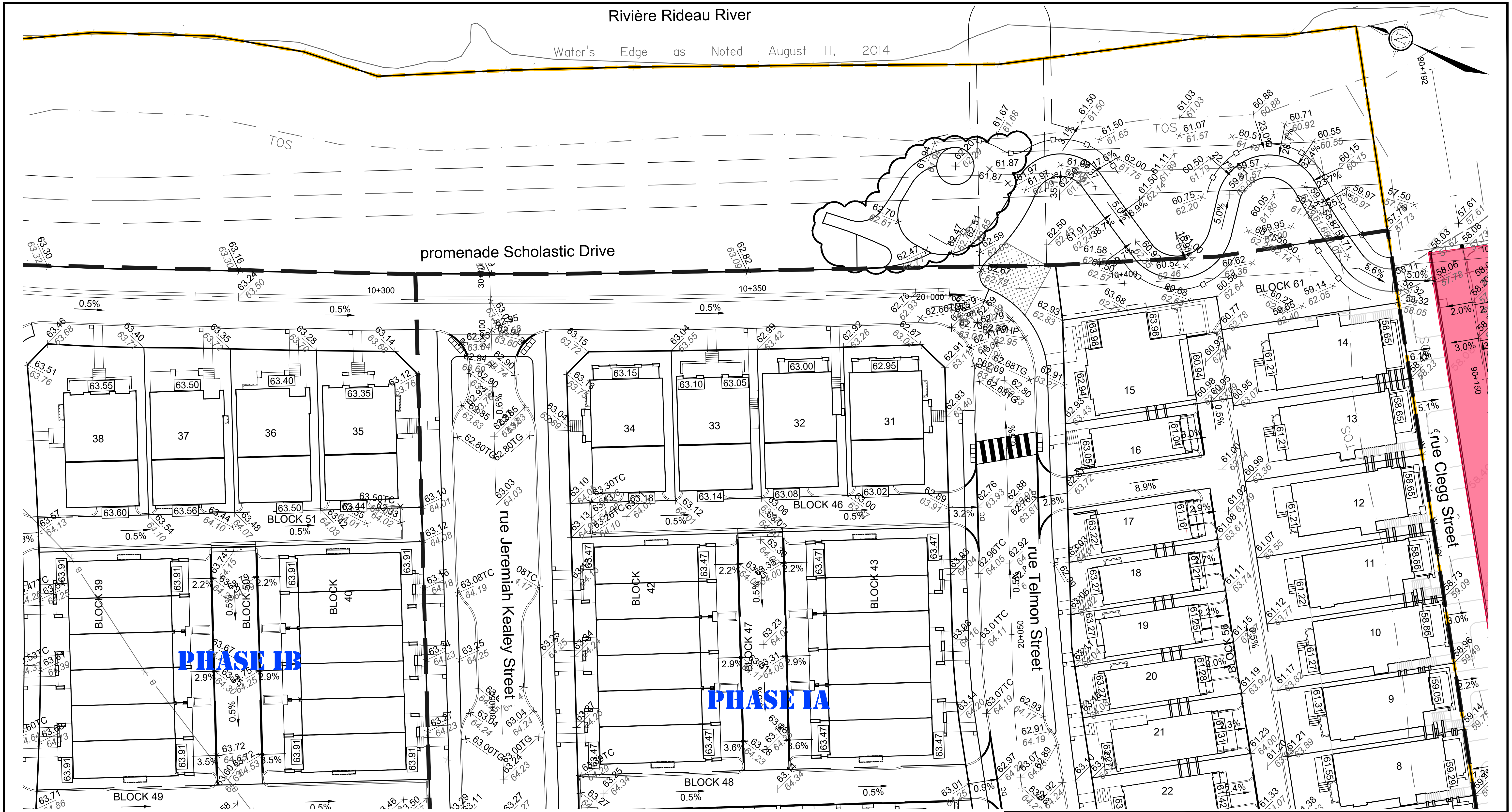

LEGEND

PROPERTY LINE

63.78 PROPOSED FINISHED GROUND ELEVATION

0.5% PROPOSED SLOPE

65.18 EXISTING GROUND ELEVATION

🟥 BALANCE CUT/FILL AREA

PHASING LIMITS

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CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

175 MAIN STREET - PATH TIE IN WITH CLEGG STREET

1 : 500

0 5m 10m 20m

AUG 2024

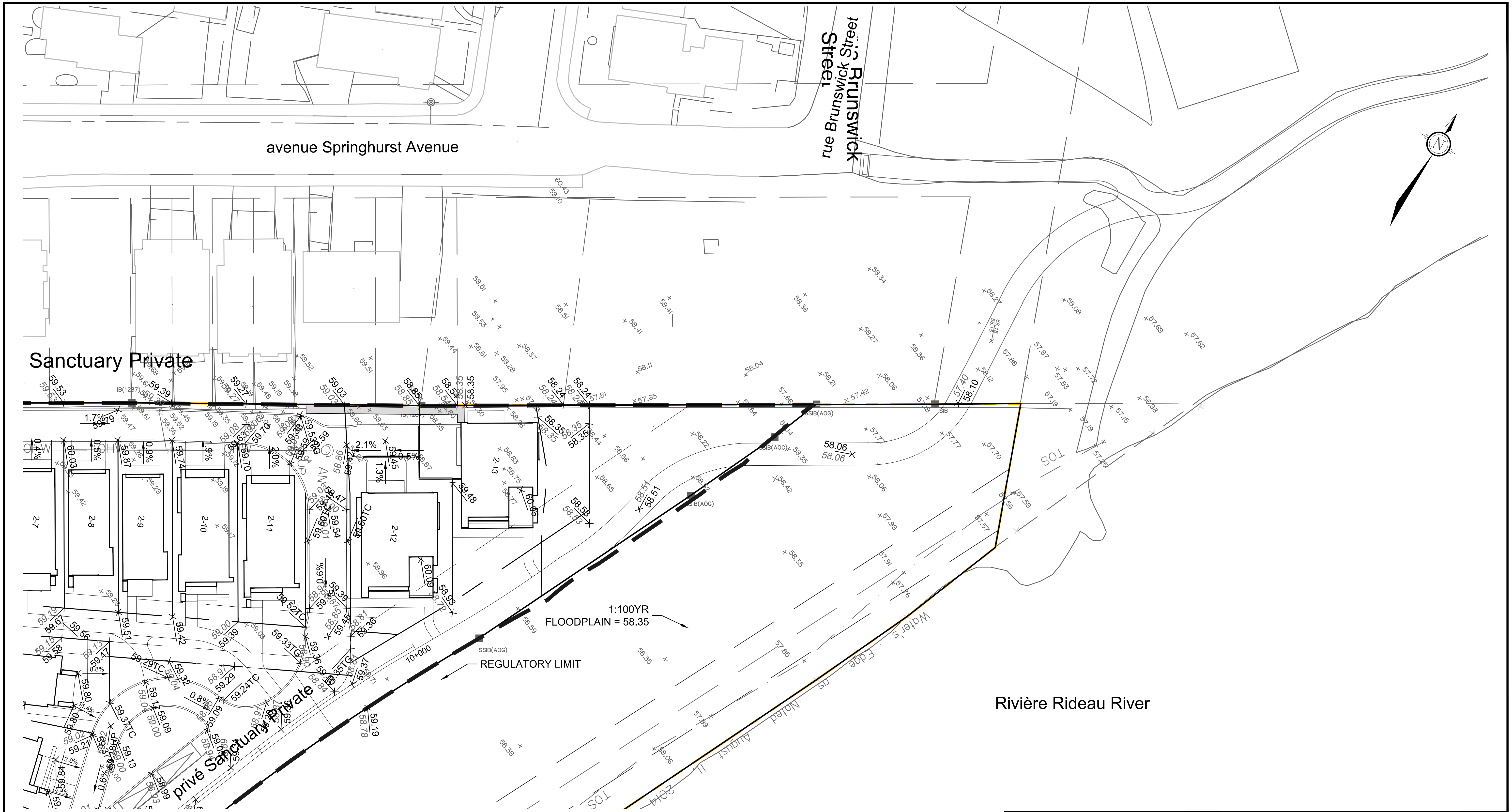
114025

FIGURE 19A

M:\2014\114025\CAD\Design\Figures\Design Brief\20240425 - MSS Update\FIG-18-PRELIM-GR.dwg, FIG-19-GR-CLEGG-PATH, Apr 25, 2024 - 3:27pm, jlyon

SHT11X17.DWG - 279mmX432mm

M:\2014\114025\CAD\Design\Figures\Design Brief\20240425 - MSS Update\FIG-18-PRELIM-GR.dwg, FIG-19B-GR-springhurst-PATH, Apr 25, 2024 - 3:27pm, jlyon



LEGEND

— - —	PROPERTY LINE
×63.78	PROPOSED FINISHED GROUND ELEVATION
◄ 0.5%	PROPOSED SLOPE
+65.18	EXISTING GROUND ELEVATION
▬ ▬ ▬	PHASING LIMITS

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CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

175 MAIN STREET - PATH TIE IN
WITH SPRINGHURST AVENUE

1 : 500 (0 5m 10m 20m)

AUG 2024 | 114025 | FIGURE 19B

SHT11X17.DWG - 279mmX432mm

LEGEND

	PROPERTY LINE
64.71	PROPOSED FINISHED GROUND ELEVATION
0.5%	PROPOSED SLOPE
65.18	EXISTING GROUND ELEVATION
	PHASING LIMITS

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CITY OF OTTAWA
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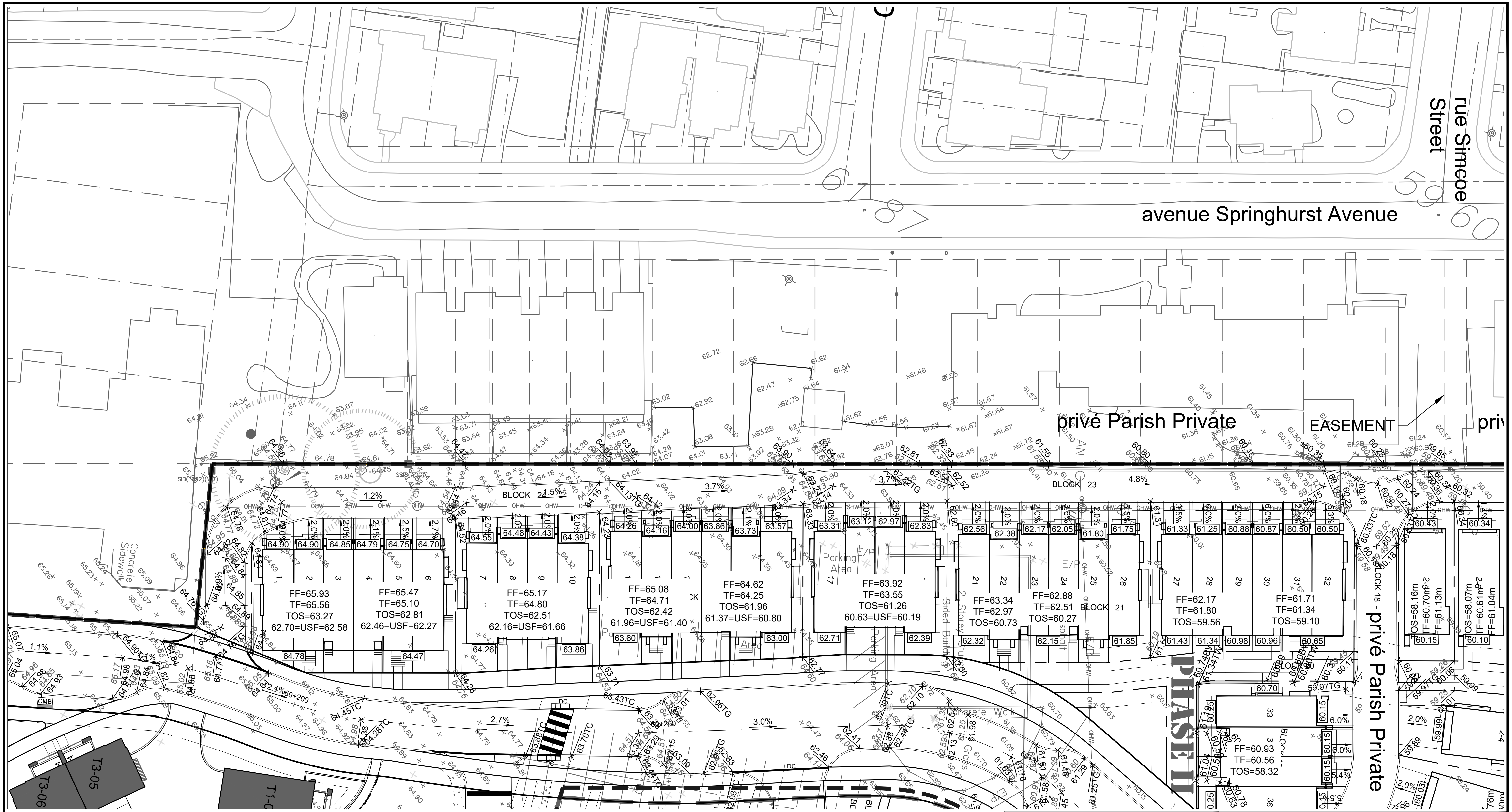
175 MAIN STREET

TIE IN WITH SPRINGHURST AVENUE PROPERTIES

1 : 500 0 5m 10m 20m

AUG 2024 | 114025 | FIGURE 20A

M:\2014\114025\CAD\Design\Figures\Design Brief\20240425 - MSS Update\FIG-18-PRELIM-GR.dwg, FIG 20A-SPRINGHURST, Apr 25, 2024 - 3:27pm, jlyon



LEGEND

PROPERTY LINE

64.71 PROPOSED FINISHED GROUND ELEVATION

0.5% PROPOSED SLOPE

65.18 EXISTING GROUND ELEVATION

PHASING LIMITS

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CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

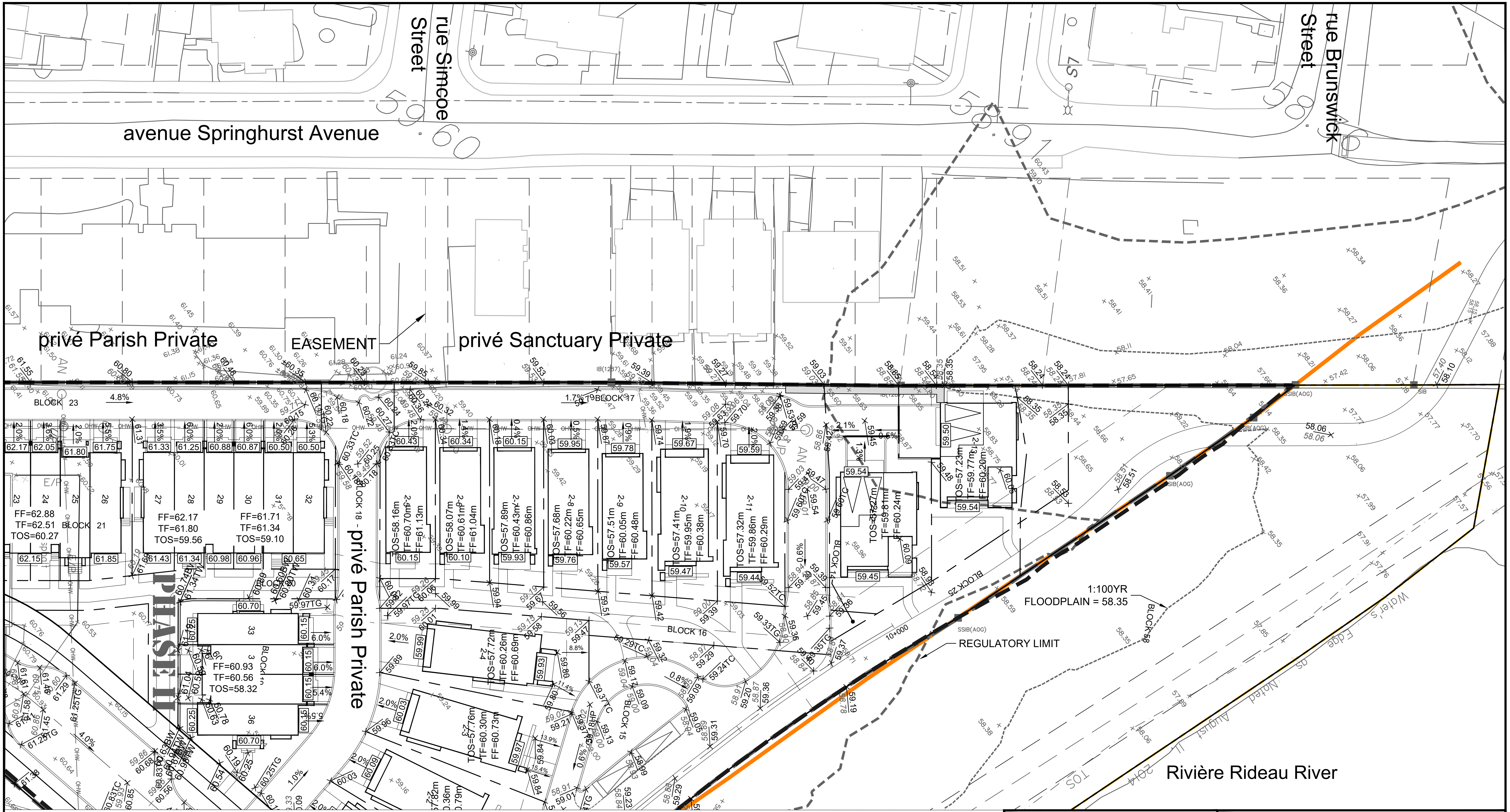
TIE IN WITH SPRINGHURST AVENUE PROPERTIES

1 : 500 0 5m 10m 20m

AUG 2024 | 114025 | FIGURE 20B

M:\2014\114025\CAD\Design\Figures\Design Brief\20240425 - MSS Update\FIG-18-PRELIM-GR.dwg, FIG 20B-SPRINGHURST, Apr 25, 2024 - 3:27pm, jlyon

M:\2014\114025\CAD\Design\Figures\Design Brief\20240425 - MSS Update\FIG-18-PRELIM-GR.dwg, FIG 20C-SPRINGHURST, Apr 25, 2024 - 3:27pm, jlyon



LEGEND

▬ · ▬	PROPERTY LINE
64.71	PROPOSED FINISHED GROUND ELEVATION
0.5%	PROPOSED SLOPE
+ 65.18	EXISTING GROUND ELEVATION
▬ ▬ ▬	PHASING LIMITS

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CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

TIE IN WITH SPRINGHURST AVENUE PROPERTIES

1 : 500 0 5m 10m 20m

AUG 2024 | 114025 | FIGURE 20C

SHT11X17.DWG - 279mmX432mm

- The site plan has rear lanes which means driveways will not break up the streetscape and more trees can be planted continuously. In addition, driveway snow storage and removal conflicts are also eliminated.

Overall, the proposed cross-sections contribute to the improvement and promotion of tree health with the only restriction being canopy width for the majority of the cross-sections. As the majority of the existing trees for Phase 1a are either invasive or in poor condition, the proposed plantings will improve the aesthetic and biodiversity of the site. See **Table 13.1** for proposed species.

When the site was initially designed and utilized in the late 1800's, a 'Cathedral of Elms' directed users to the main building. To pay homage to that striking design gesture, New Horizon Elms, a disease resistant variety, will be proposed for the Petite Allée's. These are special pedestrian connections to the open space lands which have a wider offset from the building face (cross-section D). As the Petite Allée's are only two short street segments, on opposite ends of the site, we feel confident planting these with a single species that will not be used anywhere else for the project. Otherwise proposed plantings always include a mixture of species to hedge against unforeseen losses in the future.

Table 13.1: Proposed street tree species

BOTANICAL NAME	**COMMON NAME**
NARROW FORM DECIDUOUS TREES	
Acer nigrum 'Greencolumn'	Greencolumn Black Maple
Acer rubrum 'Autumn Spire'	Autumn Spire Red Maple
Acer rubrum 'New World'	New World Maple
Acer rubrum 'Redpointe'	Redpointe Red Maple
Acer saccharum 'Autumn Fest'	Autumn Fest Sugar Maple
Corylus colurna	Turkish Hazelnut
Ginkgo biloba 'Autumn Gold'	Autumn Gold Ginkgo
Ginkgo biloba 'JFS-UGAZ'	Golden Colonnade Gingko
Gleditsia triacanthos var. inermis 'Skycole'	Skycole Honeylocust
Gleditsia triacanthos var. inermis 'Draves'	Street Keeper Locust
Gymnocladus dioicus 'Espresso'	Espresso Kentucky Coffee Tree
Quercus macrocarpa 'Urban Pinnacle'	Urban Pinnacle Oak
Tilia cordata 'Corzam'	Corinthian Linden
Tilia cordata 'Ronald'	Norlin Linden
PETITE ALLÉE	
Ulmus 'New Horizon'	New Horizon Elm

14.0 EROSION AND SEDIMENT CONTROL

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).

Typical erosion and sediment control measures recommended include, but are not limited to, the use of silt fences around perimeter of site (OPSD 219.110), inserts under catch basin/maintenance hole lids, heavy duty silt fence barrier (OPSD 219.130), straw bale check dams (OPSD 219.180), rock check dams (219.210 or OPSD 219.211), turbidity curtain (OPSD 219.260), dewatering trap (OPSD 219.240), temporary water passage system (OPSD 221.030), riprap (OPSS 511), mud mats, silt bags for dewatering operations, topsoil and sod to disturbed areas and natural grassed waterways. Dewatering and sediment control techniques will be developed for the individual situations based on the above guidelines and utilizing typical measures to ensure erosion and sediment control is controlled in an acceptable manner and there is no negative impact to adjacent lands, water bodies or water treatment/conveyance facilities.

It will be the responsibility of the Contractor to submit a detailed construction schedule and appropriate staging, dewatering and erosion and sediment control plans to the Contract Administrator for review and approval prior to the commencement of work. The City of Ottawa Special Provision F-1004 will become part of any contract which outlines the contractual requirements which includes preparation of a detailed erosion and sediment control plan.

General

- All erosion and sediment control measures are to be installed to the satisfaction of the engineer, the municipality and the conservation authority prior to undertaking any site alterations (filling, grading, removal of vegetation, etc.) and remain present during all phases of site preparation and construction.
- A qualified inspector should conduct daily visits during construction to ensure that the contractor is working in accordance with the design drawings and that mitigation measures are being implemented as specified.
    - A light duty silt fence barrier is to be installed in the locations shown on the Erosion and Sediment Control Plan.
    - Straw bale barriers are to be installed in drainage ditches that will remain open as part of the development.
    - Inserts are to be placed under the grates of all proposed and existing catchbasins and structures.
    - After complete build-out, all sewers are to be inspected and cleaned and all sediment and construction fencing is to be removed.
- The contractor shall ensure that proper dust control is provided with the application of water (and if required, calcium chloride) during dry periods.
- The contractor shall immediately report to the engineer or inspector any accidental discharges of sediment material into any ditch or sewer system. Appropriate response measures shall be carried out by the contractor without delay.
- The contractor acknowledges that failure to implement erosion and sediment control measures may result in penalties imposed by any applicable regulatory agency.

15.0 DEVIATIONS FROM CITY STANDARDS, SEWER DESIGN GUIDELINES, ETC

Standard City of Ottawa Residential Road Cross-Section

The deviations from the standard City of Ottawa Residential Road cross-sections incorporated within the subdivision help to achieve many of the innovative aspects of the proposed Oblates redevelopment and support the vision set out in the Community Design Plan for Old Ottawa East. (e.g. pavement widths, boulevards configuration, infrastructure location, ROW width reduction, etc.)

Clegg Street Services

The services along Clegg Street will deviate from the City Standards since they will be situated under the driveways due to the fact that the garage extends to the majority of the lot frontage and the remaining portion will have substantial stairs to get up to the main floor situated above the garage (reverse walkout units).

Waterproofed Basements

The northeast end of Phase 2 is a low-lying area which, due to various depth constraints, will be subject to HGL's higher than the basement elevations. Due to this circumstance, it is intended to construct waterproof basements, without storm connections, for a limited number of units (13 singles and 16 towns) in Phase 2. This approach has been reviewed and approved in principle by the City and is supported by the following rational:

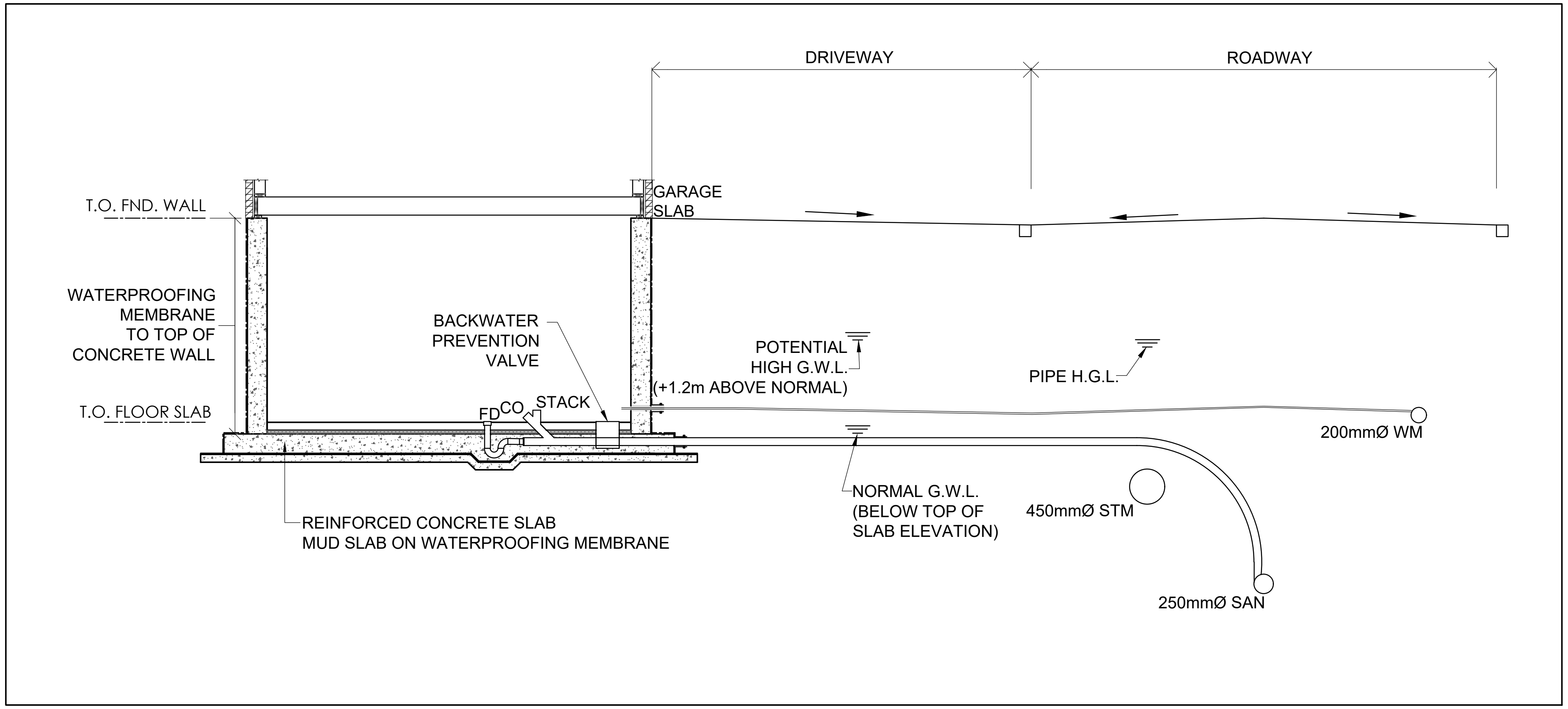
1. The proposed waterproofing methodology is frequently used and is proven, reliable technology.
2. The construction requirements are very straightforward and easily implemented. Constructability is not an issue.
3. The likelihood of significant hydrostatic pressure around the basement is very low; nonetheless, a very conservative approach of waterproofing to ground level is proposed.
4. The proposed system is a double (structural and membrane) passive system with no moving parts, and will require minimal maintenance over the lifespan of the structure.
5. The properties under consideration are located on a private street; therefore, City maintenance and liability is considered to be negligible.
6. To further protect the City, the following warning clause will be added to both the subdivision agreement and the agreements of purchase and sale with respect to 13 singles and 16 towns located in Phase 2 (Oblates/Greystone):

> "*The Owner acknowledges and agrees that the hydraulic grade line (HGL) in the private storm sewer will be above the proposed underside of footing and basement floor level for homes located on lots 1-13 and Blocks 19 and 21 on Plan 4M-xxxx. The soil adjacent to the building will remain un-drained and in rare events, the ground water table may raise to 1.5 metres above the footing and basement floor level.*
>
> *The Owner acknowledges that the basements of these dwelling units have been constructed as waterproof structures through structural design and by the installation of a continuous waterproof membrane installed under the foundation and extending up the full height of the foundation walls. While it is expected that such membrane will perform in a satisfactory manner for the lifetime of the dwelling unit, any future maintenance of such membrane will be the sole responsibility of the Owner.*
>
> *It is acknowledged and agreed that each dwelling unit shall be equipped with eaves troughing and the Owner agrees that it shall maintain such eaves troughing in a good working condition so as to direct water flows away from the building towards hard surfaces for collection by the storm water drainage system, at its own expense. The Owner further acknowledges and agrees that the City shall not be responsible and will not take responsibility for any flooding claims. The Owner acknowledges and agrees that in no event will the City have any responsibility to perform any repairs to the membrane or damage to the dwelling unit and agrees to make no claim against the City in such regard.*"

Refer to **Appendix F** for the following supporting documentation that was previously submitted in support of this approach:

a) Letter from Golder dated September 1, 2016 dealing with geotechnical and hydrogeological considerations;
b) Letter from Barry J. Hobin & Associates outlining similar approved installations;
c) Memo from Peter James, Novatech, providing an outline of the proposed design elements for the waterproofed basements;
d) North Village preliminary grading, servicing and waterproofing plan.

Refer to **SK-WB1** – Waterproof Basement Typical Section & Detail Phase 2 and 3 and **SK-WB2** – North Village Preliminary Grading, Servicing and Waterproofing Phase 2 and 3 for preliminary design details.



TYPICAL SECTION

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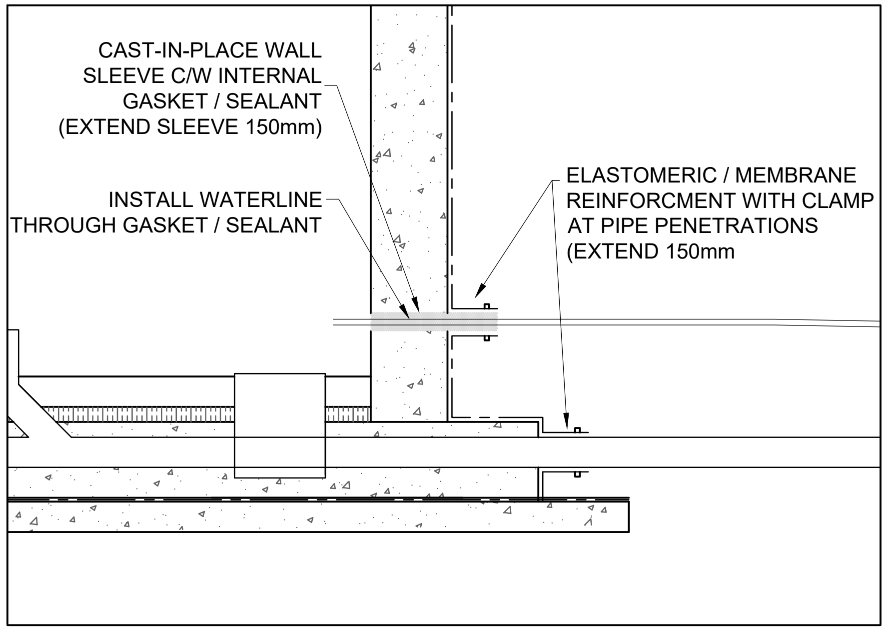
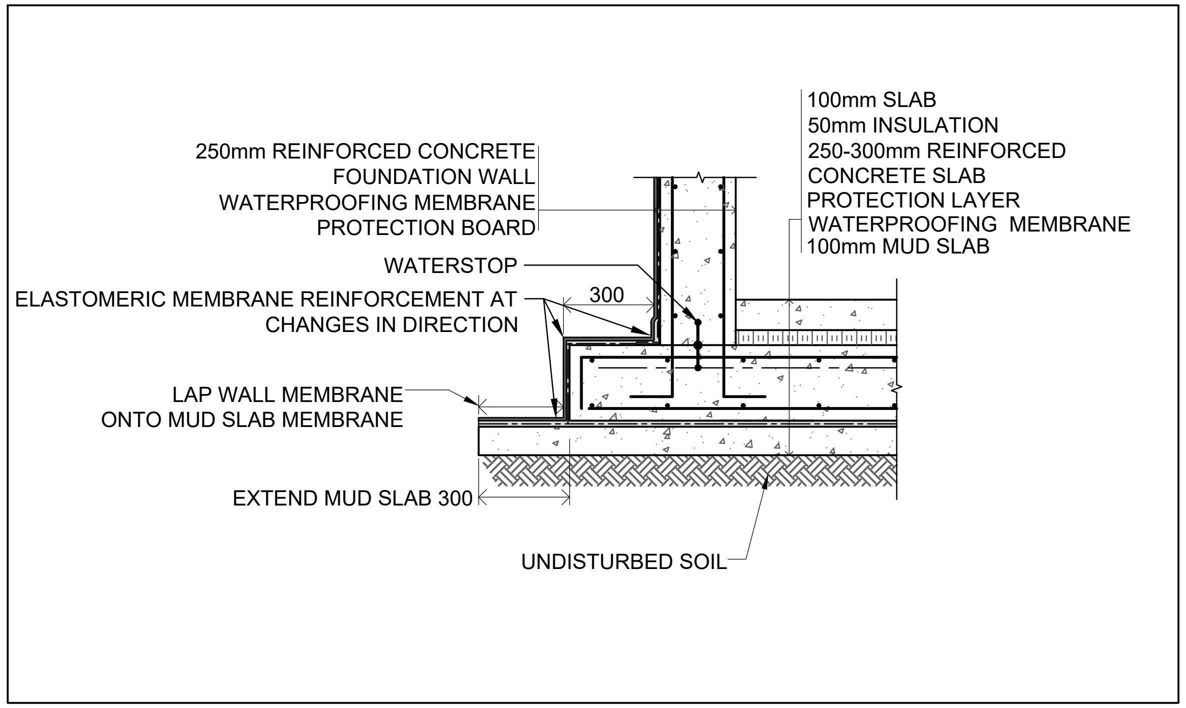


DETAIL 2

SCALE = 1:25



DETAIL 1

SCALE = 1:25

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CITY OF OTTAWA
175 MAIN STREET
GREYSTONE VILLAGE

WATERPROOF BASEMENT
TYPICAL SECTION & DETAIL
PHASE 2 AND 3

SCALE: AS SHOWN

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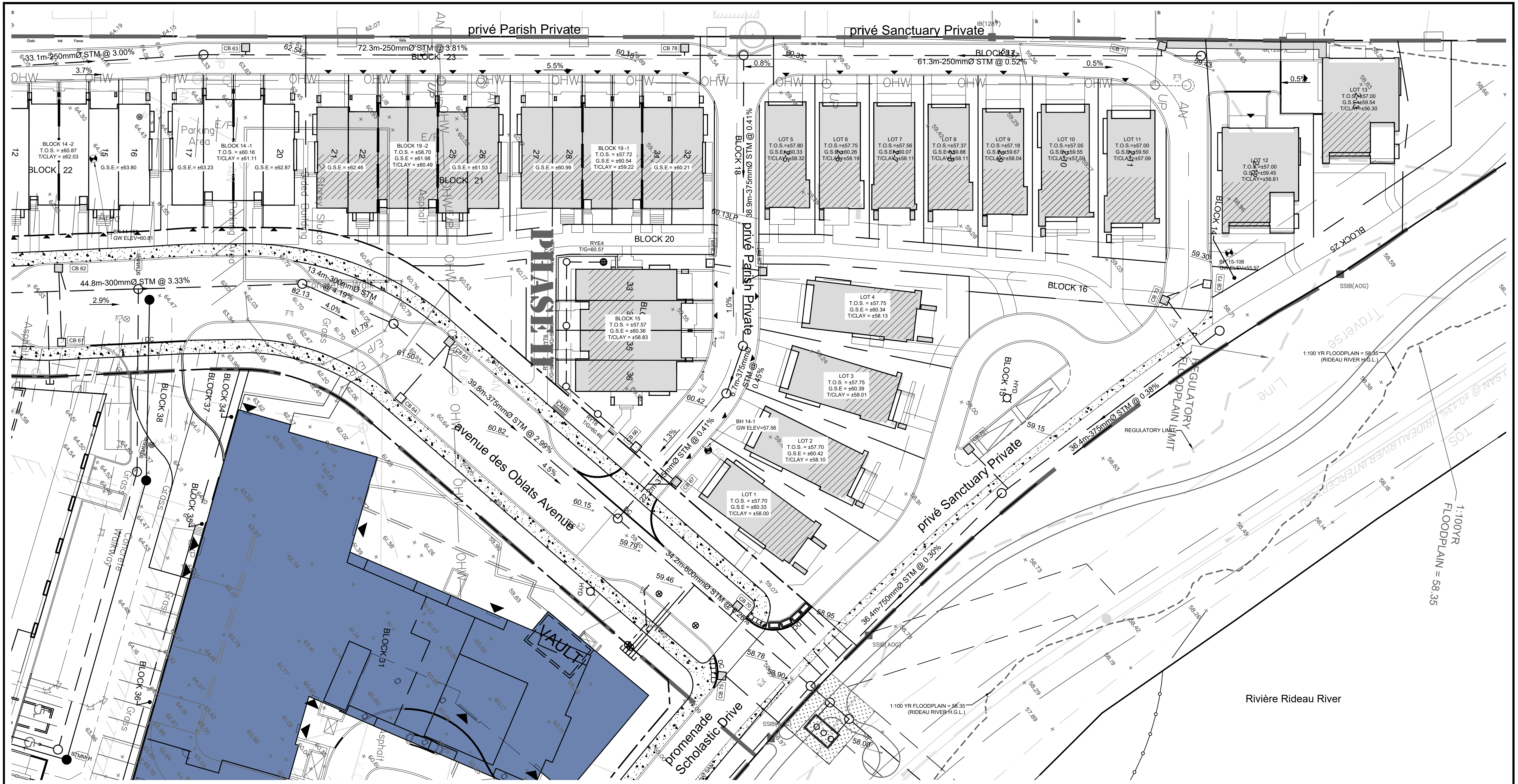

LEGEND

- — — — SITE BOUNDARY
- ● PROPOSED SANITARY MH
- 100 ○ PROPOSED STORM MH
- — — — PROPOSED STORM SEWER
- 58.78 PROPOSED ELEVATION
- ×59.00 EXISTING ELEVATION
- BH BOREHOLE LOCATION

GW	GROUND WATER ELEVATION
T.O.S.	TOP OF SLAB ELEVATION
G.S.E.	GARAGE SLAB ELEVATION
T/CLAY	TOP OF CLAY ELEVATION
H.G.L.	100YR PIPE HYDRAULIC GRADE LINE ELEVATION
— · — ·	100YR RIDEAU RIVER HYDRAULIC GRADE LINE
▬ ▬	REGULATORY LIMIT
▬ ▬ ▬	DROP BETWEEN UNITS

- PROPOSED UNITS WITH STANDARD STORM CONNECTION
- PROPOSED UNITS WITH WATERPROOF BASEMENTS
- ▨ TYPICAL BASEMENT AREA

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CITY OF OTTAWA
175 MAIN STREET
GREYSTONE VILLAGE

NORTH VILLAGE
PRELIMINARY GRADING, SERVICING AND WATERPROOFING
PHASE 2 AND 3

SCALE 1 : 500

AUG 2024 | JOB 114025 | FIGURE SK-WB2

M:\2014\114025\CAD\Design\Figures\Design Brief\20240425 - MSS Update\20160824-N_Village.dwg, FIGURE SK-WB2, Nov 21, 2016 - 2:25pm, szorgel

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For latest design details, refer to **Appendix F** for the following:

- SK-WB1 – Typical Section and Detail
- SK-WB2 – Service Penetrations
- SK-WB3 – Reinforcement Layout
- SK-WB4 – Reinforcement Details
- Calculations, Specifications and Product Data

Appendix A includes the 100-year HGL elevations and the grading plans include the proposed building specific grading information.

16.0 CONCLUSIONS

The report demonstrates that the servicing strategy for the stormwater management, the sanitary servicing as well as the watermain servicing meets the design criteria for the development and that the as-built conditions of the subdivision are sufficient to accommodate the remaining development areas, as proposed.

- The stormwater flows will be collected by the on-site storm sewer system and directed to Vortechs units for water quality control at the two outlets before being directed to the Rideau River along the eastern portion of the site. Within the development, a combination of 250mm perforated pipe, as well as 300mm to 900mm diameter storm sewers will be utilized.
- A minimum clearance of 0.30m will be provided between the 100-year hydraulic grade line (HGL) and the designed underside of footing elevations. In some cases, the Underside of Footings don't have the required 0.3m clearance from the 100-year storm event or the obvert of the pipe. In these cases, the top of the floor slab (TOS) has been indicated, which is significantly above (1.0m+) the USF elevations. Therefore, will be no negative impacts on the floor / basement of the units.
- The sanitary flows will be collected by the on-site sanitary sewer system and directed to the two outlets before being directed to the existing 1350mm Rideau River Interceptor trunk sewer that runs parallel to the Rideau River along the eastern portion of the site. Within the development 250mm diameter sanitary sewers will be utilized.
- The watermain flows will be supplied by the on-site loop connecting to the 200mm dia. watermain on Clegg Street and the 400mm dia. watermain on Main Street. Within the development, a combination of 50mm, 200mm, 250mm and 300mm diameter watermains will be utilized.
- Local roadways will vary from the City of Ottawa standards, as illustrated on the concept plan and with varied protected ROW. Sidewalks will be provided on both sides of the street to provide pedestrian access for the development and dedicated on-street will be provided on one side.
- Main Street and Highway 417 will not be considered in a noise assessment for Phase 1A and 1B as both potential noise sources are outside the zone of influence. No mitigation is required within Phase 2 and 3 except for the condo buildings along Main Street/Oblate Avenue. A detailed noise analysis will be required at site plan stage once the design details are finalized.
- Erosion and sediment control measures (i.e. filter fabric, silt fences, etc.) will be implemented prior to construction and are to remain in place until vegetation is established.
- Erosion and sediment control measures associated with construction are to be implemented as outlined in Section 14.0.
- The development will be serviced by hydro, gas, phone and cable, which will be constructed in modified trenches, as illustrated on the utility plans. Canada Post will service the site with community mailboxes, as well as lobby mailboxes (condos). Site lighting will be provided along roadways as per City standards. OC Transpo will have a temporary turnaround until such time as the phase 2 is completed, which will provide a loop. Moreover, the North Village units will be serviced; either from Oblats ROW, Private road ROW or utility corridors located within the front yards.

In closing, Novatech respectfully requests that the City of Ottawa accept the findings of this updated Site Servicing Brief in support of the engineering detail design and provide site plan approval for the applications currently under review that lie within the Greystone Village Subdivision at 175 Main Street, Ottawa, Ontario.

Respectfully issued,

NOVATECH

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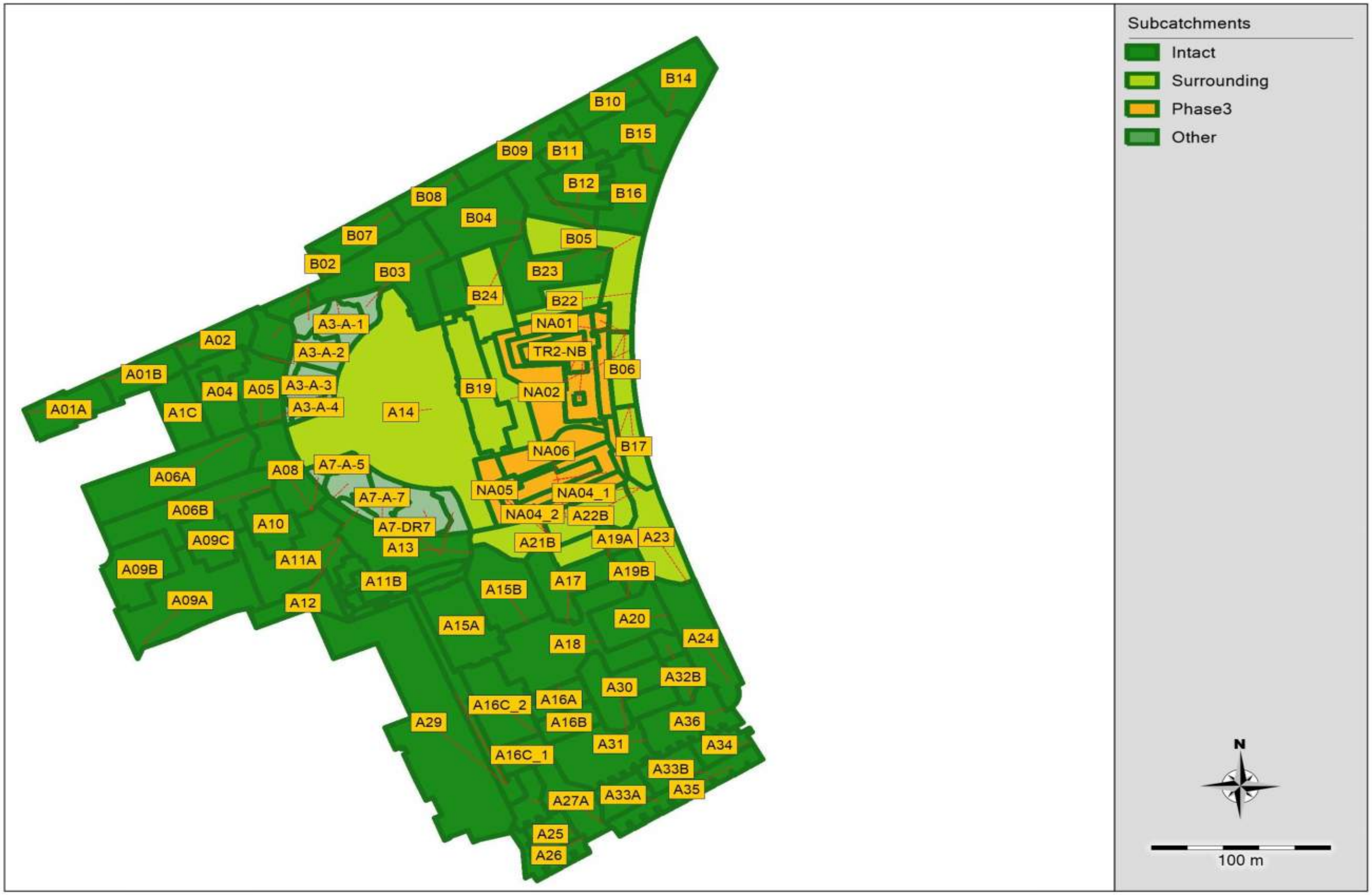
APRIL 1, 2025
PROVINCE OF ONTARIO

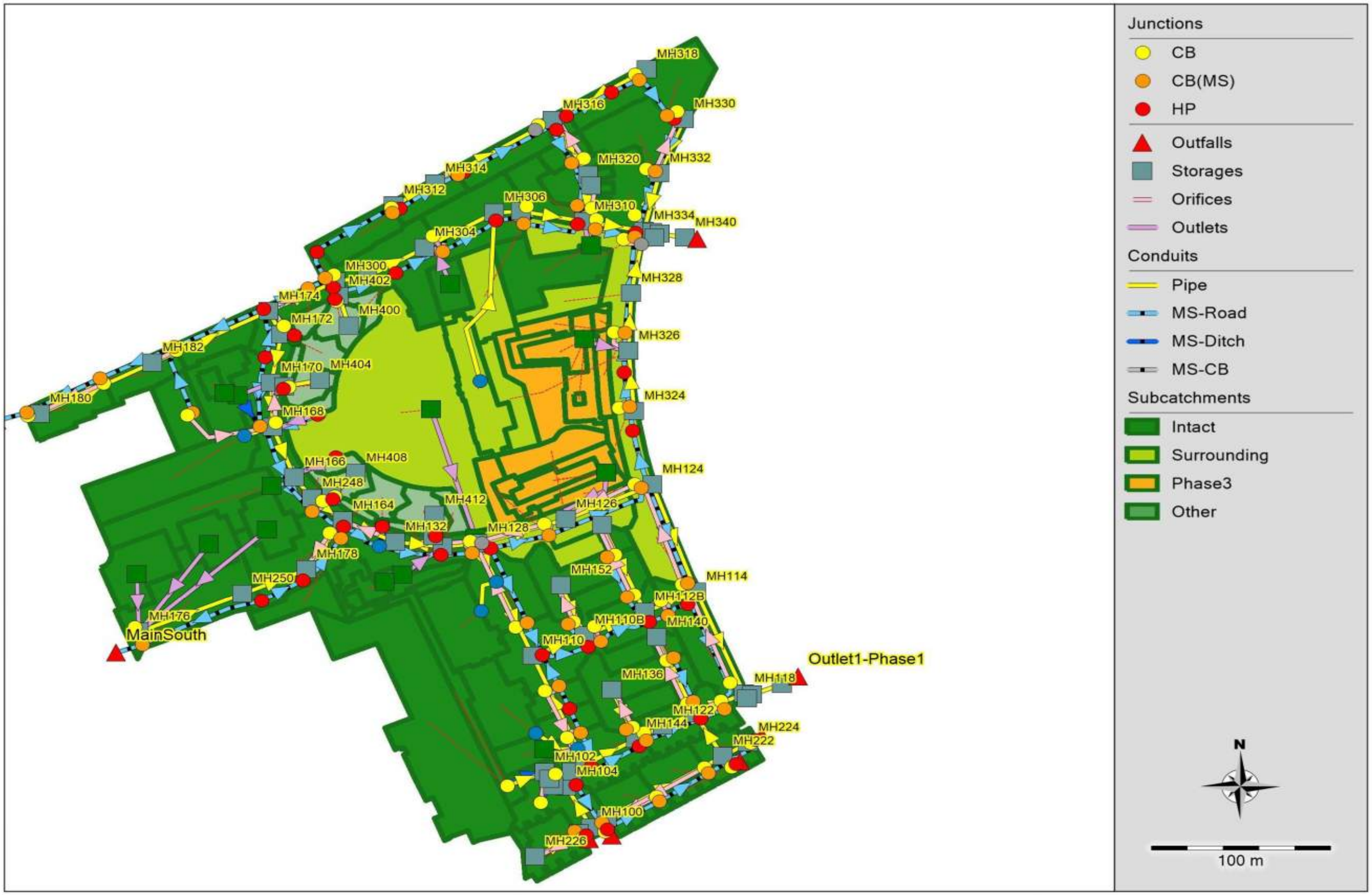
APPENDIX A

Stormwater Management Calculations

Greystone Subcatchments



Model Details



114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

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EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.011)

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Latest Update:

January 21, 2025 – Vahid Mehdipour Novatech


*************

Element Count

*************

Number of rain gages ...... 1

Number of subcatchments ... 104

Number of nodes ........... 263

Number of links ........... 381

Number of pollutants ...... 0

Number of land uses ....... 0



****************

Raingage Summary

****************

                                    Data      Recording

Name             Data Source             Type      Interval

------------------------------------------------------------------------

RG01             3hrChic-100yr             INTENSITY   10 min.



********************

Subcatchment Summary

********************

Name                  Area     Width   %Imperv    %Slope Rain Gage           Outlet

---------------------------------------------------------------------------------------------------------

A01A                  0.09     94.00     85.70    0.7000 RG01               CB53(MS)

A01B                  0.08     88.00     61.40    0.5000 RG01               CB51(MS)

A02                   0.07     90.00     70.00    0.5000 RG01               CB49(MS)

A04                   0.10     14.29    100.00    1.5000 RG01               A04(STOR)
```

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

A05	0.10	82.00	57.10	0.5000	RG01	CB47(MS)
A06A	0.25	100.00	54.00	1.5000	RG01	CB1-GAPark
A06B	0.18	100.00	3.00	1.5000	RG01	GA-ParkSouthStorage
A08	0.12	110.00	83.00	0.5000	RG01	CB45(MS)
A09A	0.26	150.00	47.00	0.5000	RG01	CB28(MS)
A09B	0.13	33.50	100.00	1.5000	RG01	A09B(STOR)
A09C	0.08	32.42	100.00	1.5000	RG01	A09C(STOR)
A10	0.09	36.38	100.00	1.5000	RG01	A10(STOR)
A11A	0.20	60.00	47.00	0.5000	RG01	CB26(MS)
A11B	0.08	17.00	100.00	1.5000	RG01	A11B(STOR)
A11B-TR	0.03	15.00	100.00	1.5000	RG01	J2
A12	0.08	17.80	86.00	0.5000	RG01	CB26(MS)
A13	0.19	100.00	73.00	0.5000	RG01	CB24(MS)
A14	0.80	53.33	46.00	1.5000	RG01	A14(STOR)
A15A	0.15	30.00	100.00	1.5000	RG01	A15A(STOR)
A15B	0.16	106.00	71.00	0.5000	RG01	CB22(MS)
A16A	0.05	30.00	76.00	0.5000	RG01	CB08(MS)
A16B	0.05	30.00	73.00	0.5000	RG01	CB06(MS)
A16C_1	0.05	31.79	100.00	1.5000	RG01	A16C(STOR)
A16C_2	0.14	28.00	100.00	1.5000	RG01	J5
A17	0.12	40.67	94.00	0.5000	RG01	CB39(MS)
A18	0.28	80.00	71.00	0.6000	RG01	CB09(MS)
A19A	0.03	24.32	77.00	0.5000	RG01	CB35(MS)
A19B	0.04	29.36	77.00	0.5000	RG01	CB36(MS)
A1C	0.09	21.06	100.00	1.5000	RG01	CB-PL
A20	0.11	80.00	60.00	0.5000	RG01	CB18(MS)
A21B	0.11	70.00	71.40	1.2000	RG01	CB34(MS)
A22B	0.11	100.00	47.10	0.7000	RG01	CB20(MS)
A23	0.13	58.44	70.00	0.5000	RG01	CB16(MS)
A24	0.16	78.00	74.00	0.5000	RG01	CB15(x2-DICBs)
A25	0.05	29.41	76.00	0.5000	RG01	CB29(MS)
A26	0.05	15.00	39.00	0.5000	RG01	CB29B(L)
A27A	0.10	80.00	69.00	0.5000	RG01	CB01(MS)
A27B	0.05	17.86	80.00	0.5000	RG01	CB55
A28	0.11	8.09	14.00	0.5000	RG01	CBMH1
A29	0.58	38.09	39.00	0.5000	RG01	CBMH1

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

A30	0.12	25.67	94.00	0.5000	RG01	CB42(MS)
A31	0.20	70.00	79.00	0.5000	RG01	CB12(MS)
A32A	0.02	12.74	77.00	0.5000	RG01	CB40(MS)
A32B	0.04	50.00	77.00	0.5000	RG01	CB41(MS)
A33A	0.06	35.29	76.00	0.5000	RG01	CB30(MS)
A33B	0.07	41.18	76.00	0.5000	RG01	CB31(MS)
A34	0.05	29.41	80.00	0.5000	RG01	CB32
A35	0.10	93.00	39.00	0.5000	RG01	CB31B(L)
A36	0.13	94.00	71.00	0.5000	RG01	CB14(MS)
A3-A-1	0.06	17.14	84.00	1.5000	RG01	CB3
A3-A-2	0.05	14.71	84.00	1.0000	RG01	CBMH4
A3-A-3	0.05	14.71	90.00	0.5000	RG01	CB5
A3-A-4	0.02	10.00	83.00	2.0000	RG01	CB1
A3-DR1	0.03	13.04	66.00	1.8000	RG01	60+224.17
A3-DR2	0.03	10.00	53.00	1.5000	RG01	CB60(MS)
A3-DR3	0.01	4.17	59.00	1.5000	RG01	70-034.26
A3-DR4	0.01	6.25	50.00	2.3000	RG01	CB47(MS)
A7-A-5	0.02	10.00	83.00	2.2000	RG01	CB2
A7-A-6	0.04	13.33	94.00	2.0000	RG01	CB6
A7-A-7	0.06	17.14	83.00	1.5000	RG01	CBMH7
A7-A-8	0.06	17.14	89.00	1.6000	RG01	CB8
A7-DR5	0.01	5.56	51.00	1.0000	RG01	CB45(MS)
A7-DR6	0.01	4.00	60.00	1.5000	RG01	70-152.02
A7-DR7	0.01	4.00	59.00	1.5000	RG01	70-208.50
A7-DR8	0.03	10.71	74.00	2.0000	RG01	70-208.50
B01A	0.03	27.76	80.00	1.1000	RG01	CB60(MS)
B01B	0.06	64.00	74.00	0.6000	RG01	CB82
B02	0.01	18.00	70.00	0.9000	RG01	CB58(MS)
B03	0.24	130.00	90.00	2.1000	RG01	CB62(MS)
B04	0.19	100.00	66.00	2.7000	RG01	CB65(MS)
B05	0.18	107.00	57.00	3.8000	RG01	CB75(MS)
B06	0.06	45.00	69.00	2.0000	RG01	CB76(MS)
B07	0.09	47.00	76.00	1.2000	RG01	CB80(MS)
B08	0.07	40.00	86.00	1.5000	RG01	CB63(MS)
B09	0.11	70.00	86.00	4.0000	RG01	CB78
B10	0.07	45.00	76.00	1.7000	RG01	CB71(MS)

```
B11              0.04    20.00    70.00   1.8000 RG01          CB69(MS)
B12              0.09    28.00    84.00   1.0000 RG01          CB67(MS)
B13              0.09    15.00    64.00   2.5000 RG01          CB70(MS)
B14              0.08    36.00    61.00   0.5000 RG01          CB73(MS)
B15              0.15    60.00    60.00   0.5000 RG01          CB79(MS)
B16              0.12    90.00    64.00   0.5000 RG01          CB74(4x-DICBs)
B17              0.07    45.00    81.00   1.0000 RG01          CB77(MS)
B19              0.16    18.68   100.00   1.5000 RG01          B19(STOR)
B20A             0.08    13.55    40.00   0.5000 RG01          NA02
B22              0.07    14.80    57.00   0.5000 RG01          MH328
B23              0.17    32.81   100.00   1.5000 RG01          B23(STOR)
B24              0.12    23.44    86.00   0.5000 RG01          CB65(MS)
B25              0.06    20.80   100.00   1.5000 RG01          B25(STOR)
Condo2B_TR       0.02    11.77   100.00   1.5000 RG01          J4
MR-NB            0.11     6.47   100.00   0.5000 RG01          B21(STOR)
MR-SB            0.09     7.50   100.00   0.5000 RG01          A22A(STOR)
NA01             0.04     7.27    21.00   0.5000 RG01          CB76(MS)
NA02             0.12    24.00    31.00   0.5000 RG01          MH326
NA03_1           0.03     5.71    53.00   0.5000 RG01          CB77(MS)
NA03_2           0.04     6.15    53.00   0.5000 RG01          CB76(MS)
NA03_3           0.01     2.50    53.00   0.5000 RG01          CB76(MS)
NA04_1           0.04     5.38    43.00   0.5000 RG01          CB20(MS)
NA04_2           0.01     6.25    43.00   0.5000 RG01          CB34(MS)
NA05             0.05     8.33    29.00   0.5000 RG01          CB34(MS)
NA06             0.09    15.00    28.50   0.5000 RG01          MH126
TR1-NB           0.01    16.67   100.00   0.5000 RG01          B21(STOR)
TR2-NB           0.04     5.00   100.00   0.5000 RG01          B21(STOR)
TR-SB            0.05    10.42   100.00   0.5000 RG01          A22A(STOR)


************
Node Summary
************
                           Invert     Max.   Ponded   External
Name             Type       Elev.    Depth     Area   Inflow
-------------------------------------------------------------------------------
```

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

10+171.51	JUNCTION	62.19	0.30	0.0
10+207.77	JUNCTION	62.95	0.30	0.0
10+314.72	JUNCTION	62.96	0.30	0.0
20.033.19	JUNCTION	62.71	0.30	0.0
20+069.15	JUNCTION	62.92	0.30	0.0
20+115.54	JUNCTION	63.18	0.30	0.0
30+038.20	JUNCTION	63.17	0.30	0.0
30+074.39	JUNCTION	62.99	0.30	0.0
40+015.59	JUNCTION	63.53	0.30	0.0
40+084.71	JUNCTION	63.25	0.30	0.0
40+121.60	JUNCTION	63.57	0.30	0.0
40+157.95	JUNCTION	63.10	0.30	0.0
50+102.24	JUNCTION	65.72	0.30	0.0
50+127.37	JUNCTION	65.53	0.30	0.0
60+148.01	JUNCTION	65.19	0.30	0.0
60+224.17	JUNCTION	63.88	0.30	0.0
60+288.71	JUNCTION	61.96	0.30	0.0
70-034.26	JUNCTION	65.16	0.30	0.0
70-152.02	JUNCTION	64.61	0.30	0.0
70-208.50	JUNCTION	63.90	0.32	0.0
80+003.32	JUNCTION	64.85	0.30	0.0
80+025.67	JUNCTION	64.79	0.30	0.0
80+078.80	JUNCTION	64.12	0.30	0.0
80+121.22	JUNCTION	62.54	0.30	0.0
80+187.36	JUNCTION	60.33	0.30	0.0
80+216.33	JUNCTION	59.71	0.30	0.0
80+267	JUNCTION	59.16	0.30	0.0
90.071.47	JUNCTION	59.98	0.30	0.0
90+008.28	JUNCTION	60.60	0.30	0.0
A15A(STOR)	JUNCTION	63.40	0.30	0.0
B19(STOR)	JUNCTION	63.00	0.30	0.0
CB01	JUNCTION	60.14	1.49	0.0
CB01(MS)	JUNCTION	61.33	0.30	0.0
CB06	JUNCTION	61.94	1.59	0.0
CB06(MS)	JUNCTION	63.23	0.30	0.0
CB08	JUNCTION	62.05	1.66	0.0

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

```
CB08(MS)          JUNCTION          63.41     0.30      0.0
CB09            JUNCTION          61.74     1.60      0.0
CB09(MS)          JUNCTION          63.04     0.30      0.0
CB1             JUNCTION          63.72     1.42      0.0
CB12            JUNCTION          61.45     1.78      0.0
CB12(MS)          JUNCTION          62.93     0.30      0.0
CB14            JUNCTION          61.23     1.75      0.0
CB14(MS)          JUNCTION          62.68     0.30      0.0
CB15(x2-DICBs)      JUNCTION          61.08     1.86      0.0
CB16(2x-DICBs)      JUNCTION          61.63     1.61      0.0
CB16(MS)          JUNCTION          62.94     0.30      0.0
CB18            JUNCTION          61.54     1.57      0.0
CB18(MS)          JUNCTION          62.81     0.30      0.0
CB2             JUNCTION          63.64     1.50      0.0
CB20            JUNCTION          61.46     1.99      0.0
CB20(MS)          JUNCTION          63.15     0.30      0.0
CB22            JUNCTION          62.08     1.52      0.0
CB22(MS)          JUNCTION          63.30     0.30      0.0
CB24            JUNCTION          62.40     1.66      0.0
CB24(MS)          JUNCTION          63.76     0.30      0.0
CB26            JUNCTION          63.38     1.51      0.0
CB26(MS)          JUNCTION          64.59     0.30      0.0
CB28            JUNCTION          63.57     1.84      0.0
CB28(MS)          JUNCTION          65.11     0.30      0.0
CB29            JUNCTION          60.45     1.70      0.0
CB29(MS)          JUNCTION          61.85     0.30      0.0
CB29B(L)         JUNCTION          60.38     2.13      0.0
CB3             JUNCTION          63.64     1.50      0.0
CB30            JUNCTION          59.71     1.82      0.0
CB30(MS)          JUNCTION          61.23     0.30      0.0
CB31            JUNCTION          59.50     1.82      0.0
CB31(MS)          JUNCTION          61.02     0.30      0.0
CB31B(L)         JUNCTION          59.39     1.80      0.0
CB32            JUNCTION          59.47     1.72      0.0
CB34            JUNCTION          62.16     1.61      0.0
CB34(MS)          JUNCTION          63.47     0.30      0.0
```

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

```
CB35          JUNCTION       61.90    1.82    0.0

CB35(MS)        JUNCTION       63.42    0.30    0.0

CB36          JUNCTION       61.92    1.71    0.0

CB36(MS)        JUNCTION       63.33    0.30    0.0

CB39          JUNCTION       62.00    1.70    0.0

CB39(MS)        JUNCTION       63.40    0.30    0.0

CB40          JUNCTION       61.77    1.53    0.0

CB40(MS)        JUNCTION       63.00    0.30    0.0

CB41          JUNCTION       61.60    1.55    0.0

CB41(MS)        JUNCTION       62.85    0.30    0.0

CB42          JUNCTION       61.81    1.70    0.0

CB42(MS)        JUNCTION       63.21    0.30    0.0

CB45          JUNCTION       62.92    2.09    0.0

CB45(MS)        JUNCTION       64.71    0.30    0.0

CB47          JUNCTION       63.22    2.04    0.0

CB47(MS)        JUNCTION       64.96    0.35    0.0

CB49          JUNCTION       64.82    0.71    0.0

CB49(MS)        JUNCTION       65.23    0.30    0.0

CB5          JUNCTION       63.93    1.50    0.0

CB51          JUNCTION       63.02    1.98    0.0

CB51(MS)        JUNCTION       64.70    0.30    0.0

CB53          JUNCTION       63.04    1.74    0.0

CB53(MS)        JUNCTION       64.48    0.30    0.0

CB55          JUNCTION       62.51    1.82    0.0

CB56          JUNCTION       62.42    1.57    0.0

CB58          JUNCTION       63.26    1.80    0.0

CB58(MS)        JUNCTION       64.76    0.30    0.0

CB6          JUNCTION       63.51    1.50    0.0

CB60          JUNCTION       63.16    2.04    0.0

CB60(MS)        JUNCTION       64.90    0.30    0.0

CB62          JUNCTION       61.16    2.14    0.0

CB62(MS)        JUNCTION       63.00    0.30    0.0

CB63          JUNCTION       61.06    1.90    0.0

CB63(MS)        JUNCTION       62.66    0.30    0.0

CB65          JUNCTION       59.43    2.12    0.0

CB65(MS)        JUNCTION       61.25    0.30    0.0
```

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

```
CB67              JUNCTION          58.43     2.11      0.0
CB67(MS)          JUNCTION          60.24     0.30      0.0
CB69              JUNCTION          58.38     1.89      0.0
CB69(MS)          JUNCTION          59.97     0.30      0.0
CB70              JUNCTION          57.81     2.10      0.0
CB70(MS)          JUNCTION          59.26     0.41      0.0
CB71              JUNCTION          57.66     2.23      0.0
CB71(MS)          JUNCTION          59.59     0.30      0.0
CB73              JUNCTION          57.75     1.85      0.0
CB73(MS)          JUNCTION          59.30     0.30      0.0
CB74(4x-DICBs)      JUNCTION          56.95     2.47      0.0
CB75              JUNCTION          57.62     1.83      0.0
CB75(MS)          JUNCTION          59.15     0.30      0.0
CB76              JUNCTION          59.61     1.90      0.0
CB76(MS)          JUNCTION          61.21     0.30      0.0
CB77              JUNCTION          60.97     1.90      0.0
CB77(MS)          JUNCTION          62.57     0.30      0.0
CB78              JUNCTION          58.46     1.95      0.0
CB79              JUNCTION          57.34     1.91      0.0
CB79(MS)          JUNCTION          58.95     0.30      0.0
CB8               JUNCTION          62.83     1.51      0.0
CB80              JUNCTION          62.53     1.90      0.0
CB80(MS)          JUNCTION          64.13     0.30      0.0
CB82              JUNCTION          63.39     2.00      0.0
CBMH1             JUNCTION          61.92     3.38      0.0
CBMH4             JUNCTION          63.95     1.50      0.0
CBMH7             JUNCTION          63.25     1.50      0.0
CB-PL             JUNCTION          64.93     0.37      0.0
HP                JUNCTION          59.20     0.30      0.0
HP01              JUNCTION          61.04     0.30      0.0
HP02              JUNCTION          61.28     0.30      0.0
HP03              JUNCTION          60.87     0.30      0.0
HP04              JUNCTION          62.65     0.30      0.0
J1                JUNCTION          62.76     0.32      0.0
J10               JUNCTION          64.87     0.30      0.0
J11               JUNCTION          64.75     0.30      0.0
```

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

```
J12              JUNCTION          64.50     0.30      0.0
J13              JUNCTION          64.07     0.30      0.0
J14              JUNCTION          63.60     1.63      0.0
J15              JUNCTION          58.41     4.44      0.0
J16              JUNCTION          64.32     0.30      0.0
J17              JUNCTION          56.35     2.46      0.0
J18              JUNCTION          59.06     0.50      0.0
J19              JUNCTION          58.39     4.05      0.0
J20              JUNCTION          56.34     2.94      0.0
J3              JUNCTION          60.28     1.93      0.0
J5              JUNCTION          61.42     0.20      0.0
J6              JUNCTION          64.90     0.30      0.0
J7              JUNCTION          65.20     0.30      0.0
J8              JUNCTION          65.18     0.30      0.0
J9              JUNCTION          64.95     0.30      0.0
MH314(DUMMY)       JUNCTION          58.40     1.85      0.0
MH328(DUMMY)       JUNCTION          57.01     2.51      0.0
Clegg            OUTFALL          61.30     0.30      0.0
MainNorth          OUTFALL          64.70     0.30      0.0
MainSouth          OUTFALL          65.02     0.30      0.0
OF1              OUTFALL          56.00     0.30      0.0
Out1             OUTFALL          60.50     0.30      0.0
Out2             OUTFALL          60.50     0.30      0.0
Out3             OUTFALL          62.50     0.30      0.0
Outlet1-Phase1      OUTFALL          56.03     0.90      0.0
Outlet2-Phase2&3     OUTFALL          56.03     0.75      0.0
Phase1-EmergencyOverflow OUTFALL          56.00     4.30      0.0
Phase2-EmergencyOverflow OUTFALL          56.00     0.50      0.0
A04(STOR)          STORAGE          61.13     4.00      0.0
A09B(STOR)         STORAGE          100.00     0.15      0.0
A09C(STOR)         STORAGE          100.00     0.15      0.0
A10(STOR)          STORAGE          100.00     0.15      0.0
A11B(STOR)         STORAGE           60.98     3.05      0.0
A14(STOR)          STORAGE          62.70     1.50      0.0
A16C(STOR)         STORAGE           65.22     0.78      0.0
A22A(STOR)         STORAGE          100.00     0.15      0.0
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114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

```
B21(STOR)         STORAGE         100.00    0.15     0.0

B23(STOR)         STORAGE          56.51    3.69     0.0

B25(STOR)         STORAGE         100.00    0.15     0.0

CB1-GAPark         STORAGE          61.99    3.23     0.0

CBMH2            STORAGE          60.98    3.00     0.0

Dummy-MH128        STORAGE          59.91    3.81     0.0

GA-ParkSouthStorage  STORAGE          63.10    2.30     0.0

J2              STORAGE          65.37    0.15     0.0

J4              STORAGE         100.00    0.15     0.0

MH100            STORAGE          59.97    1.72     0.0

MH102            STORAGE          59.90    4.96     0.0

MH104            STORAGE          59.84    3.13     0.0

MH106            STORAGE          59.65    2.53     0.0

MH108            STORAGE          59.59    2.41     0.0

MH110            STORAGE          59.63    3.81     0.0

MH110B            STORAGE          59.42    3.77     0.0

MH112B            STORAGE          59.24    3.74     0.0

MH114            STORAGE          58.08    4.96     0.0

MH118            STORAGE          58.41    4.44     0.0

MH122            STORAGE          59.30    3.63     0.0

MH122B            STORAGE          58.58    4.26     0.0

MH124            STORAGE          60.55    2.82     0.0

MH126            STORAGE          61.31    2.15     0.0

MH128            STORAGE          60.02    3.81     0.0

MH130            STORAGE          60.98    3.00     0.0

MH132            STORAGE          61.34    2.97     0.0

MH136            STORAGE          60.90    2.25     0.0

MH140            STORAGE          60.80    2.25     0.0

MH144            STORAGE          59.44    3.61     0.0

MH148            STORAGE          61.22    2.25     0.0

MH152            STORAGE          59.92    3.66     0.0

MH164            STORAGE          61.43    3.23     0.0

MH166            STORAGE          61.65    3.22     0.0

MH168            STORAGE          61.74    3.30     0.0

MH170            STORAGE          61.13    4.09     0.0

MH172            STORAGE          62.06    3.16     0.0
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114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

MH174	STORAGE	62.17	3.06	0.0
MH176	STORAGE	62.90	2.34	0.0
MH178	STORAGE	62.02	3.42	0.0
MH180	STORAGE	62.85	1.76	0.0
MH182	STORAGE	62.48	2.43	0.0
MH220	STORAGE	59.47	2.25	0.0
MH222	STORAGE	59.03	1.97	0.0
MH224	STORAGE	59.17	1.75	0.0
MH226	STORAGE	60.21	2.46	0.0
MH228	STORAGE	60.07	1.79	0.0
MH230	STORAGE	59.77	3.67	0.0
MH238	STORAGE	58.14	4.28	0.0
MH242	STORAGE	56.00	5.68	0.0
MH246	STORAGE	59.84	4.44	0.0
MH248	STORAGE	61.61	3.16	0.0
MH250	STORAGE	62.63	3.11	0.0
MH300	STORAGE	62.40	2.46	0.0
MH302	STORAGE	61.52	2.79	0.0
MH304	STORAGE	60.91	2.53	0.0
MH306	STORAGE	59.44	2.65	0.0
MH308	STORAGE	58.67	2.95	0.0
MH310	STORAGE	56.51	3.55	0.0
MH312	STORAGE	61.64	2.55	0.0
MH314	STORAGE	60.61	2.45	0.0
MH316	STORAGE	57.13	3.07	0.0
MH318	STORAGE	57.52	2.07	0.0
MH320	STORAGE	56.95	3.02	0.0
MH322	STORAGE	56.91	3.12	0.0
MH324	STORAGE	60.65	2.14	0.0
MH326	STORAGE	59.17	2.64	0.0
MH328	STORAGE	58.04	2.39	0.0
MH330	STORAGE	57.05	2.25	0.0
MH332	STORAGE	56.53	2.67	0.0
MH334	STORAGE	56.33	2.70	0.0
MH336	STORAGE	56.35	2.96	0.0
MH338	STORAGE	56.33	2.98	0.0

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MH340           STORAGE          56.01     2.32      0.0

MH400           STORAGE          62.79     2.45      0.0

MH402           STORAGE          62.86     2.02      0.0

MH404           STORAGE          63.26     2.27      0.0

MH406           STORAGE          62.79     2.42      0.0

MH408           STORAGE          62.98     2.32      0.0

MH410           STORAGE          62.49     2.27      0.0

MH412           STORAGE          62.28     2.28      0.0

MH414           STORAGE          61.90     2.37      0.0

VortechsPh1        STORAGE          58.40     4.04      0.0

VortechsPh2        STORAGE          56.34     2.95      0.0



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Link Summary

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Name          From Node       To Node        Type          Length    %Slope Roughness

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1             A04(STOR)       CB47(MS)       CONDUIT         22.3    0.7629    0.0350

10            CBMH4          J7            CONDUIT          2.6   -1.9497    0.0160

11            MH406         MH170          CONDUIT          7.5    1.9898    0.0130

12            J8            CB47(MS)       CONDUIT          5.0    4.4043    0.0160

13            J6            80+003.32      CONDUIT          5.0    1.0001    0.0160

14            J9            CB47(MS)       CONDUIT         36.2   -0.0276    0.0160

15            J7            CB82          CONDUIT          5.0   38.8338    0.0160

16            CB5           J8            CONDUIT          5.0   -1.0001    0.0160

17            CB74(4x-DICBs)   J18           CONDUIT          5.0   -2.8011    0.0160

18            J10           CB45(MS)       CONDUIT         57.6    0.2778    0.0160

19            MH412          MH414          CONDUIT         19.5    1.7924    0.0130

2             MH402          MH300          CONDUIT          9.3    2.0391    0.0130

20            MH408          MH410          CONDUIT         20.9    2.0090    0.0130

21            J18           Phase2-EmergencyOverflow CONDUIT          3.0  102.0000    0.0350

22            MH410          MH248          CONDUIT          7.6    1.9689    0.0130

23            J11           CB45(MS)       CONDUIT          5.0    0.8000    0.0160

24            CB1           J9            CONDUIT          5.0   -2.2005    0.0160

25            CB2           J10           CONDUIT          1.8   -1.6753    0.0160
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114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

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26        CB15(x2-DICBs)   J1         CONDUIT      5.0   -2.4007    0.0160
27        J1         Phase1-EmergencyOverflow CONDUIT      5.0   66.1994    0.0350
28        J12        J16        CONDUIT      5.0    3.6224    0.0160
29        CB6        J11        CONDUIT      5.0   -0.8000    0.0160
3         GA-ParkSouthStorage CB45(MS)     CONDUIT      5.0    6.4131    0.0350
30        CBMH7      J12        CONDUIT      5.0   -1.0001    0.0160
31        CB79(MS)      HP         CONDUIT      6.5   -3.8490    0.0160
32        CB8        J13        CONDUIT      5.0   -0.6000    0.0160
33        J13        70-208.50     CONDUIT      5.0    3.0014    0.0160
35        J14        CB-PL      CONDUIT      5.9    0.0052    0.0160
36        A14(STOR)     40+015.59     CONDUIT      5.0    8.5915    0.0160
37        CB-PL      CB49(MS)      CONDUIT      5.0   -4.6049    0.0160
4         CB3        J6         CONDUIT      5.0   -1.2001    0.0160
5         B23(STOR)     CB70(MS)      CONDUIT     10.3    7.2017    0.0160
6         J5         J3         CONDUIT     20.0    5.7244    0.0130
7         CB1-GAPark     CB47(MS)      CONDUIT      5.0   -0.8000    0.0350
8         HP         OF1        CONDUIT     32.0   10.0504    0.0350
9         MH414      MH132      CONDUIT      7.1    1.5495    0.0130
A15A(OUT)     A15A(STOR)     Dummy-MH128     CONDUIT      6.8   53.3333    0.0130
B19(OUT)      B19(STOR)      MH306      CONDUIT    110.0    1.8185    0.0130
C01       10+171.51     CB76(MS)      CONDUIT     24.5    3.9841    0.0160
C02       10+207.77     CB77(MS)      CONDUIT     15.0    2.5158    0.0160
C03       10+314.72     CB15(x2-DICBs)   CONDUIT     54.8    0.5788    0.0160
C04       20.033.19     CB14(MS)      CONDUIT     14.5    0.2063    0.0160
C05       20+069.15     CB12(MS)      CONDUIT      5.4   -0.1866    0.0160
C06       20+115.54     40+157.95     CONDUIT     14.5    0.5522    0.0160
C07       20+115.54     CB01(MS)      CONDUIT     27.3    6.8039    0.0160
C08       30+038.20     CB09(MS)      CONDUIT      7.8    1.7202    0.0160
C09       30+074.39     CB18(MS)      CONDUIT     11.2    1.6519    0.0160
C10       40+015.59     CB34(MS)      CONDUIT     33.5    0.1851    0.0160
C100      CB55       CB56       CONDUIT     19.4    1.7515    0.0350
C101      CB56       20+115.54     CONDUIT     13.4    3.8084    0.0350
C102      CB58       CB58(MS)      CONDUIT      5.0    0.0061    0.0160
C103      CB58(MS)      80+003.32     CONDUIT      7.4   -1.2218    0.0160
C104      CB58(MS)      80+025.67     CONDUIT     17.5   -0.1718    0.0160
C105      CB60       CB60(MS)      CONDUIT      5.0    0.0061    0.0160
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114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

C106	CB60(MS)	80+003.32	CONDUIT	16.1	0.3110	0.0160
C107	CB62	CB62(MS)	CONDUIT	5.0	0.0061	0.0160
C108	CB62(MS)	60+288.71	CONDUIT	35.1	2.9504	0.0160
C109	CB63	CB63(MS)	CONDUIT	5.0	0.0061	0.0160
C11	40+015.59	CB22(MS)	CONDUIT	50.4	0.4606	0.0160
C110	CB63(MS)	80+121.22	CONDUIT	5.0	2.4007	0.0160
C111	CB65	CB65(MS)	CONDUIT	5.0	0.0061	0.0160
C112	CB65(MS)	90.071.47	CONDUIT	33.8	3.7497	0.0160
C113	CB67	CB67(MS)	CONDUIT	5.0	0.0061	0.0160
C114	CB67(MS)	90.071.47	CONDUIT	11.3	2.2636	0.0160
C115	CB69	CB69(MS)	CONDUIT	5.0	0.0061	0.0160
C116	CB69(MS)	CB67(MS)	CONDUIT	28.2	-0.9585	0.0160
C117	CB70	CB70(MS)	CONDUIT	5.0	0.0061	0.0160
C118	CB70(MS)	CB74(4x-DICBs)	CONDUIT	6.0	5.6758	0.0160
C119	CB71	CB71(MS)	CONDUIT	5.0	0.0061	0.0160
C12	40+084.71	30+038.20	CONDUIT	26.7	0.2880	0.0160
C120	CB71(MS)	CB73(MS)	CONDUIT	27.2	1.0652	0.0160
C121	CB73	CB73(MS)	CONDUIT	5.0	0.0061	0.0160
C122	CB73(MS)	80+267	CONDUIT	5.0	2.8011	0.0160
C123	CB74(4x-DICBs)	CB75(MS)	CONDUIT	8.0	-2.8762	0.0160
C124	CB74(4x-DICBs)	MH332	CONDUIT	5.0	1.0001	0.0130
C125	CB75	CB75(MS)	CONDUIT	5.0	0.0061	0.0160
C126	CB76	CB76(MS)	CONDUIT	5.0	0.0061	0.0160
C127	CB76(MS)	CB75(MS)	CONDUIT	60.0	3.4342	0.0160
C128	CB77	CB77(MS)	CONDUIT	5.0	0.0061	0.0160
C129	CB77(MS)	10+171.51	CONDUIT	21.2	1.8082	0.0160
C13	40+121.60	CB08(MS)	CONDUIT	15.3	1.0579	0.0160
C130	CB78	80+187.36	CONDUIT	20.6	-1.0697	0.0160
C131	CB79	CB79(MS)	CONDUIT	5.0	0.0061	0.0160
C132	CB79(MS)	CB74(4x-DICBs)	CONDUIT	32.7	0.0917	0.0160
C133	CB80	CB80(MS)	CONDUIT	5.0	0.0061	0.0160
C134	CB80(MS)	80+078.80	CONDUIT	5.0	0.2000	0.0160
C135	CBMH1	CB56	CONDUIT	31.1	4.2138	0.0350
C136	HP01	Out2	CONDUIT	5.0	10.8635	0.0350
C137	HP02	Clegg	CONDUIT	5.0	-0.4000	0.0160
C138	HP03	Out1	CONDUIT	5.0	7.4203	0.0350

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

C139	HP04	Out3	CONDUIT	5.0	3.0014	0.0350
C14	40+121.60	CB06(MS)	CONDUIT	16.1	2.1287	0.0160
C140	MH100	MH104	CONDUIT	25.1	0.4787	0.0130
C141	MH102	MH246	CONDUIT	10.6	0.5192	0.0130
C142	MH104	MH106	CONDUIT	10.6	0.3774	0.0130
C143	MH106	MH108	CONDUIT	12.4	0.4039	0.0130
C144	MH108	MH144	CONDUIT	30.9	0.2593	0.0130
C145_1	MH108	J3	CONDUIT	10.0	0.5300	0.0130
C145_2	J3	MH110	CONDUIT	63.8	0.4969	0.0130
C146	MH110	MH110B	CONDUIT	31.4	0.6688	0.0130
C147	MH110B	MH112B	CONDUIT	36.2	0.4972	0.0130
C148	MH112B	MH114	CONDUIT	31.9	0.5014	0.0130
C149	MH114	MH118	CONDUIT	69.0	0.4928	0.0130
C15	40+157.95	20+069.15	CONDUIT	30.6	0.5877	0.0160
C150	J15	MH238	CONDUIT	4.8	2.0751	0.0130
C151	MH118	VortechsPh1	CONDUIT	5.0	0.2000	0.0130
C152	MH122	MH122B	CONDUIT	18.9	0.2541	0.0130
C153	MH122B	MH118	CONDUIT	31.1	0.2891	0.0130
C154	MH124	MH114	CONDUIT	70.2	0.2707	0.0130
C155	MH126	MH124	CONDUIT	54.8	0.4839	0.0130
C156_1	MH128	Dummy-MH128	CONDUIT	21.5	0.5114	0.0130
C156_2	Dummy-MH128	MH110	CONDUIT	54.7	0.5117	0.0130
C158	MH128	MH126	CONDUIT	49.4	0.5062	0.0130
C159	MH130	MH128	CONDUIT	19.8	0.4541	0.0130
C16	50+102.24	CB28(MS)	CONDUIT	72.0	0.8543	0.0160
C160	MH132	MH130	CONDUIT	26.4	0.3028	0.0130
C161	MH136	MH144	CONDUIT	36.4	0.4996	0.0130
C162	MH140	MH122B	CONDUIT	39.3	0.5007	0.0130
C163	MH144	MH122	CONDUIT	18.2	0.6590	0.0130
C164	MH148	MH112B	CONDUIT	41.5	0.4989	0.0130
C165	MH152	MH110B	CONDUIT	36.5	0.5007	0.0130
C166	MH164	MH132	CONDUIT	30.8	0.2595	0.0130
C167	MH166	MH248	CONDUIT	17.3	0.1734	0.0130
C168	MH168	MH166	CONDUIT	33.4	0.2698	0.0130
C169	MH170	MH168	CONDUIT	27.2	0.2574	0.0130
C17	50+102.24	50+127.37	CONDUIT	26.2	0.7620	0.0160

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

C170	MH172	MH170	CONDUIT	32.2	0.3102	0.0130
C171	MH174	MH172	CONDUIT	15.2	0.1318	0.0130
C172	MH174	MH300	CONDUIT	32.9	1.7931	0.0130
C173	MH176	MH250	CONDUIT	60.4	0.4801	0.0130
C174	MH178	MH164	CONDUIT	37.3	0.2410	0.0130
C175	MH180	MH182	CONDUIT	61.8	0.3725	0.0130
C176	MH182	MH174	CONDUIT	71.5	0.3076	0.0130
C177	MH220	MH222	CONDUIT	75.1	0.5061	0.0130
C178	MH222	MH122B	CONDUIT	30.9	0.4989	0.0130
C179	MH224	MH222	CONDUIT	16.4	0.5014	0.0130
C18	50+127.37	CB26(MS)	CONDUIT	33.5	2.7931	0.0160
C180	MH226	MH228	CONDUIT	28.3	0.5026	0.0130
C181	MH228	MH100	CONDUIT	7.6	0.5283	0.0130
C182	MH230	MH106	CONDUIT	9.1	0.4952	0.0130
C183	MH238	MH242	CONDUIT	15.1	1.3890	0.0130
C184	MH242	Outlet1-Phase1	CONDUIT	9.4	0.8538	0.0130
C185	MH246	MH230	CONDUIT	14.8	0.4744	0.0130
C186	MH248	MH164	CONDUIT	12.2	0.5757	0.0130
C187	MH250	MH178	CONDUIT	38.5	0.4669	0.0130
C188	MH300	MH302	CONDUIT	26.3	3.0825	0.0130
C189	MH302	MH304	CONDUIT	34.1	1.7865	0.0130
C190	MH304	MH306	CONDUIT	44.7	3.2874	0.0130
C191	MH306	MH308	CONDUIT	13.6	3.8943	0.0130
C192	MH308	MH310	CONDUIT	39.7	2.8950	0.0130
C193	MH310	MH334	CONDUIT	34.2	0.2632	0.0130
C194	MH312	MH314	CONDUIT	33.0	3.1256	0.0130
C195	MH314	MH314(DUMMY)	CONDUIT	72.7	3.0400	0.0130
C196	MH314(DUMMY)	MH316	CONDUIT	7.7	5.7446	0.0130
C197	MH316	MH320	CONDUIT	38.6	0.4404	0.0130
C198	MH318	MH316	CONDUIT	61.1	-0.1145	0.0130
C199	MH320	MH322	CONDUIT	7.3	0.5472	0.0130
C20	60+148.01	CB49(MS)	CONDUIT	55.0	-0.0818	0.0160
C200	MH322	MH310	CONDUIT	21.9	0.2738	0.0130
C201	MH324	MH326	CONDUIT	37.7	3.7131	0.0130
C202	MH326	MH328	CONDUIT	35.4	3.1407	0.0130
C203	MH328	MH328(DUMMY)	CONDUIT	29.6	3.4783	0.0130

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

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C204      MH328(DUMMY)   MH334        CONDUIT       10.0   2.4007   0.0130

C205      MH330      MH332      CONDUIT      36.8   0.4072   0.0130

C206      MH332      MH334      CONDUIT      35.8   0.5585   0.0130

C207      MH334      MH336      CONDUIT       5.0   0.2000   0.0130

C208      MH336      VortechsPh2    CONDUIT       5.0   0.2000   0.0130

C209      J17       MH338      CONDUIT      3.6   0.0085   0.0130

C21       60+148.01    CB60(MS)     CONDUIT       27.7   1.0286   0.0160

C210      MH338      MH340      CONDUIT      14.2   0.4237   0.0130

C211      MH340      Outlet2-Phase2&3 CONDUIT       2.5   0.4000   0.0130

C212_2     J19       MH238      CONDUIT       5.0   0.0061   0.0130

C213_2     J20       MH338      CONDUIT       5.0   0.0061   0.0130

C22       60+148.01    CB82       CONDUIT      21.6   0.4389   0.0160

C23       60+224.17    CB62(MS)     CONDUIT       29.5   2.9667   0.0160

C24       60+288.71    CB65(MS)     CONDUIT       16.5   4.3385   0.0160

C25       70-034.26    CB82       CONDUIT      24.9   0.2688   0.0160

C26       70-034.26    CB47(MS)     CONDUIT       42.7   0.4610   0.0160

C27_1      70-152.02    J16        CONDUIT      24.0   1.1915   0.0160

C27_2      J16       70-208.50    CONDUIT      35.0   1.1903   0.0160

C28       70-208.50    CB24(MS)     CONDUIT       17.5   0.8136   0.0160

C29       80+003.32    60+224.17    CONDUIT       38.7   2.5211   0.0160

C30       80+025.67    CB80(MS)     CONDUIT       50.3   1.3125   0.0160

C31       80+078.80    CB63(MS)     CONDUIT       38.4   3.8029   0.0160

C32       80+121.22    CB78       CONDUIT      53.9   4.5098   0.0160

C33       80+187.36    90+008.28    CONDUIT       10.7  -2.5152   0.0160

C34       80+187.36    80+216.33    CONDUIT       28.9   2.1432   0.0160

C35       80+216.33    CB71(MS)     CONDUIT       17.4   0.6911   0.0160

C36       80+267      CB79(MS)     CONDUIT      36.3   0.5789   0.0160

C37       90.071.47    CB70(MS)     CONDUIT       19.0   3.8186   0.0160

C38       90+008.28    CB69(MS)     CONDUIT       23.3   2.7014   0.0160

C39       CB01       CB01(MS)     CONDUIT       5.0   0.0061   0.0160

C40       CB01(MS)     CB30(MS)     CONDUIT       36.6   0.2735   0.0160

C41       CB01(MS)     HP02       CONDUIT       5.5   0.9091   0.0160

C42       CB06       CB06(MS)     CONDUIT       5.0   0.0061   0.0160

C43       CB06(MS)     40+157.95    CONDUIT       22.2   0.5845   0.0160

C44       CB08       CB08(MS)     CONDUIT       5.0   0.0061   0.0160

C45       CB08(MS)     40+084.71    CONDUIT       21.2   0.7448   0.0160
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114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

C46	CB09	CB09(MS)	CONDUIT	5.0	0.0061	0.0160
C47	CB09(MS)	30+074.39	CONDUIT	30.6	0.1472	0.0160
C48	CB12	CB12(MS)	CONDUIT	5.0	0.0061	0.0160
C49	CB12(MS)	20.033.19	CONDUIT	33.2	0.6627	0.0160
C50	CB14	CB14(MS)	CONDUIT	5.0	0.0061	0.0160
C51	CB14(MS)	CB15(x2-DICBs)	CONDUIT	17.9	0.2232	0.0160
C52	CB16(2x-DICBs)	CB16(MS)	CONDUIT	5.0	0.0061	0.0160
C53	CB16(MS)	10+314.72	CONDUIT	13.2	-0.1285	0.0160
C54	CB18	CB18(MS)	CONDUIT	5.0	0.0061	0.0160
C55	CB18(MS)	10+314.72	CONDUIT	13.6	-1.0819	0.0160
C56	CB20	CB20(MS)	CONDUIT	5.0	0.0061	0.0160
C57	CB20(MS)	CB16(MS)	CONDUIT	65.7	0.3196	0.0160
C58	CB20(MS)	10+207.77	CONDUIT	37.6	0.5403	0.0160
C59	CB22	CB22(MS)	CONDUIT	5.0	0.0061	0.0160
C60	CB22(MS)	40+084.71	CONDUIT	21.7	0.2216	0.0160
C61	CB24	CB24(MS)	CONDUIT	5.0	0.0061	0.0160
C62	CB24(MS)	40+015.59	CONDUIT	10.6	2.1474	0.0160
C63	CB26	CB26(MS)	CONDUIT	5.0	0.0061	0.0160
C64	CB26(MS)	70-152.02	CONDUIT	7.5	-0.1999	0.0160
C65	CB28	CB28(MS)	CONDUIT	5.0	0.0061	0.0160
C66	CB28(MS)	MainSouth	CONDUIT	15.5	0.6017	0.0160
C67	CB29	CB29(MS)	CONDUIT	5.0	0.0061	0.0160
C68	CB29(MS)	CB01(MS)	CONDUIT	16.3	3.1971	0.0160
C69	CB29B(L)	HP04	CONDUIT	5.0	-51.0954	0.0350
C70	CB30	CB30(MS)	CONDUIT	5.0	0.0061	0.0160
C71	CB30(MS)	CB31(MS)	CONDUIT	32.6	0.6438	0.0160
C72	CB31	CB31(MS)	CONDUIT	5.0	0.0061	0.0160
C73	CB31(MS)	CB32	CONDUIT	31.5	0.4004	0.0160
C74	CB31B(L)	HP01	CONDUIT	5.0	-2.9212	0.0350
C75	CB32	HP03	CONDUIT	5.0	0.0061	0.0350
C76	CB34	CB34(MS)	CONDUIT	5.0	0.0061	0.0160
C77	CB34(MS)	CB20(MS)	CONDUIT	63.4	0.5045	0.0160
C78	CB35	CB35(MS)	CONDUIT	5.0	0.0061	0.0160
C79	CB35(MS)	CB36(MS)	CONDUIT	28.2	0.3187	0.0160
C80	CB36	CB36(MS)	CONDUIT	5.0	0.0061	0.0160
C81	CB36(MS)	30+074.39	CONDUIT	20.3	1.6493	0.0160

114025 (MSSU) PCSWMM Model Output
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C82	CB39	CB39(MS)	CONDUIT	5.0	0.0061	0.0160
C83	CB39(MS)	30+038.20	CONDUIT	18.0	1.2471	0.0160
C84	CB40	CB40(MS)	CONDUIT	5.0	0.0061	0.0160
C85	CB40(MS)	CB41(MS)	CONDUIT	29.2	0.5143	0.0160
C86	CB41	CB41(MS)	CONDUIT	5.0	0.0061	0.0160
C87	CB41(MS)	20.033.19	CONDUIT	11.4	1.2325	0.0160
C88	CB42	CB42(MS)	CONDUIT	5.0	0.0061	0.0160
C89	CB42(MS)	20+069.15	CONDUIT	13.8	2.1080	0.0160
C90	CB45	CB45(MS)	CONDUIT	5.0	0.0061	0.0160
C91	CB45(MS)	70-152.02	CONDUIT	20.1	0.5224	0.0160
C92	CB47	CB47(MS)	CONDUIT	5.0	0.0061	0.0160
C93	CB47(MS)	CB45(MS)	CONDUIT	61.3	0.4079	0.0160
C94	CB49	CB49(MS)	CONDUIT	5.0	0.0061	0.0160
C95	CB49(MS)	CB51(MS)	CONDUIT	45.7	1.1604	0.0160
C96	CB51	CB51(MS)	CONDUIT	5.0	0.0061	0.0160
C97	CB51(MS)	CB53(MS)	CONDUIT	45.8	0.4806	0.0160
C98	CB53	CB53(MS)	CONDUIT	5.0	0.0061	0.0160
C99	CB53(MS)	MainNorth	CONDUIT	17.8	-1.2388	0.0160
OR52	CBMH1	MH102	CONDUIT	7.6	0.3947	0.0130
STM-15	MH404	MH406	CONDUIT	22.1	1.9913	0.0130
STM-390	CBMH2	MH128	CONDUIT	9.2	0.9804	0.0130
STM-68	MH400	MH402	CONDUIT	20.4	0.9804	0.0130
W1	VortechsPh2	J20	CONDUIT	5.0	0.0061	0.0160
Weir-Outlet1	MH118	J15	CONDUIT	5.0	0.2000	0.0130
Weir-Outlet2	MH336	J17	CONDUIT	5.0	0.2000	0.0130
1C-OR	J14	MH168	ORIFICE			
A06(OUT)	CB1-GAPark	MH168	ORIFICE			
A3-A1-OR	CB3	MH402	ORIFICE			
A3-A2-OR	CBMH4	MH172	ORIFICE			
A3-A3-OR	CB5	MH406	ORIFICE			
A7-A7-OR	CBMH7	MH164	ORIFICE			
A7-A8-OR	CB8	MH414	ORIFICE			
C212_1	VortechsPh1	J19	ORIFICE			
C213_1	VortechsPh2	J20	ORIFICE			
OR01	CB01	MH100	ORIFICE			
OR02	CB06	MH108	ORIFICE			

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

OR03	CB08	MH108	ORIFICE
OR04	CB09	MH110B	ORIFICE
OR05	CB12	MH144	ORIFICE
OR06	CB14	MH122B	ORIFICE
OR07	CB15(x2-DICBs)	MH114	ORIFICE
OR08	CB16(2x-DICBs)	MH124	ORIFICE
OR09	CB18	MH112B	ORIFICE
OR1	GA-ParkSouthStorage	MH166	ORIFICE
OR10	CB20	MH126	ORIFICE
OR11	CB22	MH110	ORIFICE
OR12	CB24	MH130	ORIFICE
OR13	CB26	MH178	ORIFICE
OR14	CB28	MH176	ORIFICE
OR15	CB29	MH226	ORIFICE
OR16	CB29B(L)	MH228	ORIFICE
OR17	CB30	MH220	ORIFICE
OR18	CB31	MH220	ORIFICE
OR19	CB31B(L)	MH222	ORIFICE
OR20	CB32	MH224	ORIFICE
OR21	CB34	MH126	ORIFICE
OR22	CB35	MH148	ORIFICE
OR23	CB36	MH148	ORIFICE
OR24	CB39	MH152	ORIFICE
OR25	CB40	MH140	ORIFICE
OR26	CB41	MH140	ORIFICE
OR27	CB42	MH136	ORIFICE
OR28	CB45	MH248	ORIFICE
OR29	CB47	MH170	ORIFICE
OR30	CB49	MH182	ORIFICE
OR31	CB51	MH180	ORIFICE
OR32	CB53	MH180	ORIFICE
OR33	CB55	MH102	ORIFICE
OR34	CB56	MH230	ORIFICE
OR35	CB58	MH300	ORIFICE
OR36	CB60	MH174	ORIFICE
OR37	CB62	MH304	ORIFICE

114025 (MSSU) PCSWMM Model Output
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OR38	CB63	MH314	ORIFICE
OR39	CB65	MH308	ORIFICE
OR40	CB67	MH322	ORIFICE
OR41	CB69	MH316	ORIFICE
OR42	CB70	MH310	ORIFICE
OR43	CB71	MH318	ORIFICE
OR44	CB73	MH330	ORIFICE
OR45	CB75	MH328(DUMMY)	ORIFICE
OR46	CB76	MH326	ORIFICE
OR47	CB77	MH324	ORIFICE
OR48	CB78	MH314(DUMMY)	ORIFICE
OR49	CB79	MH330	ORIFICE
OR50	CB80	MH312	ORIFICE
OR51	CB82	MH174	ORIFICE
34	VortechsPh1	J19	WEIR
1C-Out	CB-PL	J14	OUTLET
1CTopofRooftoTank	J2	A11B(STOR)	OUTLET
A04(OUT)	A04(STOR)	MH170	OUTLET
A09B(OUT)	A09B(STOR)	MH176	OUTLET
A09C(OUT)	A09C(STOR)	MH176	OUTLET
A10(OUT)	A10(STOR)	MH176	OUTLET
A11B(OUT)	A11B(STOR)	MH130	OUTLET
A14(OUT)	A14(STOR)	CBMH2	OUTLET
A16C(OUT)	A16C(STOR)	J3	OUTLET
A22A(OUT)	A22A(STOR)	MH126	OUTLET
A3-A4-LMF	CB1	MH168	OUTLET
A7-A5-LMF	CB2	MH166	OUTLET
A7-A6-LMF	CB6	MH410	OUTLET
B21(OUT)	B21(STOR)	MH326	OUTLET
B23(OUT)	B23(STOR)	MH310	OUTLET
B25(OUT)	B25(STOR)	MH304	OUTLET
O01	CB01(MS)	CB01	OUTLET
O02	CB06(MS)	CB06	OUTLET
O03	CB08(MS)	CB08	OUTLET
O04	CB09(MS)	CB09	OUTLET
O05	CB12(MS)	CB12	OUTLET

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

O06	CB14(MS)	CB14	OUTLET
O07	CB16(MS)	CB16(2x-DICBs)	OUTLET
O08	CB18(MS)	CB18	OUTLET
O09	CB20(MS)	CB20	OUTLET
O10	CB22(MS)	CB22	OUTLET
O11	CB24(MS)	CB24	OUTLET
O12	CB26(MS)	CB26	OUTLET
O13	CB28(MS)	CB28	OUTLET
O14	CB29(MS)	CB29	OUTLET
O15	CB30(MS)	CB30	OUTLET
O16	CB31(MS)	CB31	OUTLET
O17	CB34(MS)	CB34	OUTLET
O18	CB35(MS)	CB35	OUTLET
O19	CB36(MS)	CB36	OUTLET
O20	CB39(MS)	CB39	OUTLET
O21	CB40(MS)	CB40	OUTLET
O22	CB41(MS)	CB41	OUTLET
O23	CB42(MS)	CB42	OUTLET
O24	CB45(MS)	CB45	OUTLET
O25	CB47(MS)	CB47	OUTLET
O26	CB49(MS)	CB49	OUTLET
O27	CB51(MS)	CB51	OUTLET
O28	CB53(MS)	CB53	OUTLET
O29	CB58(MS)	CB58	OUTLET
O30	CB60(MS)	CB60	OUTLET
O31	CB62(MS)	CB62	OUTLET
O32	CB63(MS)	CB63	OUTLET
O33	CB65(MS)	CB65	OUTLET
O34	CB67(MS)	CB67	OUTLET
O35	CB69(MS)	CB69	OUTLET
O36	CB70(MS)	CB70	OUTLET
O37	CB71(MS)	CB71	OUTLET
O38	CB73(MS)	CB73	OUTLET
O39	CB75(MS)	CB75	OUTLET
O40	CB76(MS)	CB76	OUTLET
O41	CB77(MS)	CB77	OUTLET

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

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O42          CB79(MS)       CB79          OUTLET

O43          CB80(MS)       CB80          OUTLET

OL1          J4           A04(STOR)      OUTLET




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Cross Section Summary

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                          Full    Full    Hyd.     Max.   No. of     Full

Conduit        Shape             Depth    Area     Rad.    Width  Barrels     Flow

---------------------------------------------------------------------------------------

1             TRIANGULAR         0.30    0.45    0.15    3.00       1   312.94

10             RECT_OPEN         0.30    1.50    0.27    5.00       1  5439.79

11             CIRCULAR         0.25    0.05    0.06    0.25       1    83.89

12             RECT_OPEN         0.30    1.50    0.27    5.00       1  8175.91

13             RECT_OPEN         0.30    1.50    0.27    5.00       1  3895.92

14             RECT_OPEN         0.30    0.42    0.21    1.40       1   154.15

15             RECT_OPEN         0.30    1.50    0.27    5.00       1 24277.53

16             RECT_OPEN         0.30    1.50    0.27    5.00       1  3895.92

17             RECT_OPEN         0.50    0.15    0.12    0.30       1   371.90

18             RECT_OPEN         0.30    0.42    0.21    1.40       1   488.81

19             CIRCULAR         0.25    0.05    0.06    0.25       1    79.62

2             CIRCULAR          0.25    0.05    0.06    0.25       1    84.92

20             CIRCULAR         0.25    0.05    0.06    0.25       1    84.29

21             RECT_OPEN         0.50    0.15    0.12    0.30       1  1025.92

22             CIRCULAR         0.25    0.05    0.06    0.25       1    83.45

23             RECT_OPEN         0.30    1.50    0.27    5.00       1  3484.59

24             RECT_OPEN         0.30    1.50    0.27    5.00       1  5779.14

25             RECT_OPEN         0.30    1.50    0.27    5.00       1  5042.46

26             RECT_OPEN         0.30    1.50    0.27    5.00       1  6036.26

27             RECT_OPEN         0.30    1.50    0.27    5.00       1 14490.34

28             RECT_OPEN         0.30    1.50    0.27    5.00       1  7414.75

29             RECT_OPEN         0.30    1.50    0.27    5.00       1  3484.59

3             RECT_OPEN         0.30    1.50    0.27    5.00       1  4510.11

30             RECT_OPEN         0.30    1.50    0.27    5.00       1  3895.92

31             RECT_OPEN         0.30    1.50    0.27    5.00       1  7643.17
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114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

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32           RECT_OPEN         0.30    1.50    0.27    5.00      1  3017.72
33           RECT_OPEN         0.30    1.50    0.27    5.00      1  6749.29
35           RECT_OPEN         0.30    1.50    0.27    5.00      1   280.54
36           RECT_OPEN         0.30    1.50    0.27    5.00      1 11419.18
37           RECT_OPEN         0.30    1.50    0.27    5.00      1  8360.04
4           RECT_OPEN         0.30    1.50    0.27    5.00      1  4267.82
5           TRIANGULAR         0.30    0.45    0.15    3.00      1  2103.22
6           CIRCULAR          0.20    0.03    0.05    0.20      1    78.48
7           RECT_OPEN         0.35    1.05    0.28    3.00      1  1158.84
8           RECT_OPEN         0.30    1.50    0.27    5.00      1  5646.02
9           CIRCULAR          0.25    0.05    0.06    0.25      1    74.03
A15A(OUT)      CIRCULAR          0.20    0.03    0.05    0.20      1   239.54
B19(OUT)       CIRCULAR          0.30    0.07    0.07    0.30      1   130.41
C01          HALF(A1-A1)Scholastic(13mROW)    0.30    1.12    0.17    6.51      1  4235.12
C02          HALF(A1-A1)Scholastic(13mROW)    0.30    1.12    0.17    6.51      1  3365.43
C03          HALF(A-A)Scholastic(10.5mROW)    0.30    1.03    0.19    5.26      1  1609.23
C04          (I-I)Telmon(upper)(16mROW)    0.30    2.52    0.16   16.00      1  2075.23
C05          (I-I)Telmon(upper)(16mROW)    0.30    2.52    0.16   16.00      1  1973.36
C06          (B-B)Telmon(lower)(16mROW)    0.30    2.52    0.16   16.00      1  3395.06
C07          (B-B)Telmon(lower)(16mROW)    0.30    2.52    0.16   16.00      1 11917.03
C08          (D-D)Oblates(upper)(20mROW)    0.30    3.07    0.00   20.00      1   475.52
C09          (D-D)Oblates(upper)(20mROW)    0.30    3.07    0.00   20.00      1   465.97
C10          (E1-E1)Deschatelets(upper)16.5mROW    0.30    2.61    0.16   16.50      1  2032.76
C100          Ditch            0.30    0.45    0.15    3.00      1   472.89
C101          Ditch            0.30    0.45    0.15    3.00      1   697.31
C102          RECT_OPEN         0.30    1.50    0.28    5.00      1   315.55
C103          (PVT)PrivateSt(11mROW)    0.30    2.15    0.20   11.00      1  5020.42
C104          (PVT)PrivateSt(11mROW)    0.30    2.15    0.20   11.00      1  1882.67
C105          RECT_OPEN         0.30    1.50    0.28    5.00      1   315.55
C106          (D-D)Oblates(upper)(20mROW)    0.30    3.07    0.00   20.00      1   202.20
C107          RECT_OPEN         0.30    1.50    0.28    5.00      1   315.55
C108          (D-D)Oblates(upper)(20mROW)    0.30    3.07    0.00   20.00      1   622.76
C109          RECT_OPEN         0.30    1.50    0.28    5.00      1   315.55
C11          (E-E)DeMazenod(16.5mROW)    0.30    2.61    0.16   16.50      1  3206.46
C110          (PVT)PrivateSt(11mROW)    0.30    2.15    0.20   11.00      1  7037.47
C111          RECT_OPEN         0.30    1.50    0.28    5.00      1   315.55
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114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

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C112     (D-D)Oblates(upper)(20mROW)    0.30    3.07    0.00   20.00      1   702.06

C113     RECT_OPEN         0.30    1.50    0.28    5.00      1   315.55

C114     (PVT)PrivateSt(11mROW)    0.30    2.15    0.20   11.00      1  6833.62

C115     RECT_OPEN         0.30    1.50    0.28    5.00      1   315.55

C116     (PVT)PrivateSt(11mROW)    0.30    2.15    0.20   11.00      1  4446.87

C117     RECT_OPEN         0.30    1.50    0.28    5.00      1   315.55

C118     OblateFinalSection    0.41    3.89    0.14   20.00      1 15529.43

C119     RECT_OPEN         0.30    1.50    0.28    5.00      1   315.55

C12     (D-D)Oblates(upper)(20mROW)    0.30    3.07    0.00   20.00      1   194.57

C120     (A2-A2)Sanctuary(11mROW)    0.30    2.15    0.20   11.00      1  4687.70

C121     RECT_OPEN         0.30    1.50    0.28    5.00      1   315.55

C122     (A2-A2)Sanctuary(11mROW)    0.30    2.15    0.20   11.00      1  7601.73

C123     HALF(A2-A2)Sanctuary(11mROW)    0.30    1.07    0.19    5.51      1  3750.07

C124     CIRCULAR          0.38    0.11    0.09    0.38      4   175.35

C125     RECT_OPEN         0.30    1.50    0.28    5.00      1   315.55

C126     RECT_OPEN         0.30    1.50    0.28    5.00      1   315.55

C127     HALF(A1-A1)Scholastic(13mROW)    0.30    1.12    0.17    6.51      1  3932.02

C128     RECT_OPEN         0.30    1.50    0.28    5.00      1   315.55

C129     HALF(A1-A1)Scholastic(13mROW)    0.30    1.12    0.17    6.51      1  2853.13

C13     (E-E)DeMazenod(16.5mROW)    0.30    2.61    0.16   16.50      1  4859.44

C130     (PVT)PrivateSt(11mROW)    0.30    2.15    0.20   11.00      1  4697.71

C131     RECT_OPEN         0.30    1.50    0.28    5.00      1   315.55

C132     HALF(A2-A2)Sanctuary(11mROW)    0.30    1.07    0.19    5.51      1   669.55

C133     RECT_OPEN         0.30    1.50    0.28    5.00      1   315.55

C134     (PVT)PrivateSt(11mROW)    0.30    2.15    0.20   11.00      1  2031.05

C135     Ditch          0.30    0.45    0.15    3.00      1   733.48

C136     Ditch          0.30    0.45    0.15    3.00      1  1177.71

C137     (B-B)Telmon(lower)(16mROW)    0.30    2.52    0.16   16.00      1  2889.48

C138     Ditch          0.30    0.45    0.15    3.00      1   973.34

C139     Ditch          0.30    0.45    0.15    3.00      1   619.03

C14     (E-E)DeMazenod(16.5mROW)    0.30    2.61    0.16   16.50      1  6893.11

C140     CIRCULAR          0.30    0.07    0.07    0.30      1    66.91

C141     CIRCULAR          0.38    0.11    0.09    0.38      1   126.34

C142     CIRCULAR          0.30    0.07    0.07    0.30      1    59.41

C143     CIRCULAR          0.45    0.16    0.11    0.45      1   181.20

C144     CIRCULAR          0.45    0.16    0.11    0.45      1   145.19
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114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

C145_1	CIRCULAR	0.38	0.11	0.09	0.38	1	127.65
C145_2	CIRCULAR	0.38	0.11	0.09	0.38	1	123.60
C146	CIRCULAR	0.82	0.53	0.21	0.82	1	1173.98
C147	CIRCULAR	0.82	0.53	0.21	0.82	1	1012.27
C148	CIRCULAR	0.82	0.53	0.21	0.82	1	1016.50
C149	CIRCULAR	0.90	0.64	0.23	0.90	1	1270.86
C15	(I-I)Telmon(upper)(16mROW)	0.30	2.52	0.16	16.00	1	3502.31
C150	CIRCULAR	0.90	0.64	0.23	0.90	1	2607.97
C151	CIRCULAR	0.60	0.28	0.15	0.60	1	274.61
C152	CIRCULAR	0.53	0.22	0.13	0.53	1	216.80
C153	CIRCULAR	0.60	0.28	0.15	0.60	1	330.17
C154	CIRCULAR	0.45	0.16	0.11	0.45	1	148.33
C155	CIRCULAR	0.38	0.11	0.09	0.38	1	121.98
C156_1	CIRCULAR	0.75	0.44	0.19	0.75	1	796.19
C156_2	CIRCULAR	0.75	0.44	0.19	0.75	1	796.40
C158	CIRCULAR	0.30	0.07	0.07	0.30	1	68.80
C159	CIRCULAR	0.75	0.44	0.19	0.75	1	750.24
C16	(G-G)Hazel(15mROW)	0.30	2.34	0.15	15.00	1	3880.91
C160	CIRCULAR	0.75	0.44	0.19	0.75	1	612.65
C161	CIRCULAR	0.25	0.05	0.06	0.25	1	42.04
C162	CIRCULAR	0.25	0.05	0.06	0.25	1	42.08
C163	CIRCULAR	0.53	0.22	0.13	0.53	1	349.14
C164	CIRCULAR	0.25	0.05	0.06	0.25	1	42.01
C165	CIRCULAR	0.25	0.05	0.06	0.25	1	42.08
C166	CIRCULAR	0.75	0.44	0.19	0.75	1	567.14
C167	CIRCULAR	0.60	0.28	0.15	0.60	1	255.71
C168	CIRCULAR	0.60	0.28	0.15	0.60	1	318.94
C169	CIRCULAR	0.53	0.22	0.13	0.53	1	218.18
C17	(G-G)Hazel(15mROW)	0.30	2.34	0.15	15.00	1	3665.07
C170	CIRCULAR	0.45	0.16	0.11	0.45	1	158.79
C171	CIRCULAR	0.38	0.11	0.09	0.38	1	63.67
C172	CIRCULAR	0.25	0.05	0.06	0.25	1	79.63
C173	CIRCULAR	0.45	0.16	0.11	0.45	1	197.55
C174	CIRCULAR	0.53	0.22	0.13	0.53	1	211.15
C175	CIRCULAR	0.30	0.07	0.07	0.30	1	59.02
C176	CIRCULAR	0.38	0.11	0.09	0.38	1	97.24

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

C177	CIRCULAR	0.25	0.05	0.06	0.25	1	42.31
C178	CIRCULAR	0.30	0.07	0.07	0.30	1	68.31
C179	CIRCULAR	0.25	0.05	0.06	0.25	1	42.11
C18	(G-G)Hazel(15mROW)	0.30	2.34	0.15	15.00	1	7017.20
C180	CIRCULAR	0.25	0.05	0.06	0.25	1	42.16
C181	CIRCULAR	0.25	0.05	0.06	0.25	1	43.23
C182	CIRCULAR	0.38	0.11	0.09	0.38	1	123.39
C183	CIRCULAR	0.90	0.64	0.23	0.90	1	2133.70
C184	CIRCULAR	0.90	0.64	0.23	0.90	1	1672.87
C185	CIRCULAR	0.38	0.11	0.09	0.38	1	120.77
C186	CIRCULAR	0.60	0.28	0.15	0.60	1	465.90
C187	CIRCULAR	0.45	0.16	0.11	0.45	1	194.83
C188	CIRCULAR	0.25	0.05	0.06	0.25	1	104.41
C189	CIRCULAR	0.25	0.05	0.06	0.25	1	79.49
C190	CIRCULAR	0.30	0.07	0.07	0.30	1	175.34
C191	CIRCULAR	0.30	0.07	0.07	0.30	1	190.84
C192	CIRCULAR	0.38	0.11	0.09	0.38	1	298.34
C193	CIRCULAR	0.60	0.28	0.15	0.60	1	315.00
C194	CIRCULAR	0.25	0.05	0.06	0.25	1	105.14
C195	CIRCULAR	0.25	0.05	0.06	0.25	1	103.69
C196	CIRCULAR	0.25	0.05	0.06	0.25	1	142.54
C197	CIRCULAR	0.38	0.11	0.09	0.38	1	116.36
C198	CIRCULAR	0.25	0.05	0.06	0.25	1	20.12
C199	CIRCULAR	0.38	0.11	0.09	0.38	1	129.71
C20	(H-H)Oblates(lower)12.2mROW	0.30	2.13	0.18	12.20	1	1196.90
C200	CIRCULAR	0.38	0.11	0.09	0.38	1	91.76
C201	CIRCULAR	0.30	0.07	0.07	0.30	1	186.35
C202	CIRCULAR	0.38	0.11	0.09	0.38	1	310.74
C203	CIRCULAR	0.38	0.11	0.09	0.38	1	327.01
C204	CIRCULAR	0.38	0.11	0.09	0.38	1	271.68
C205	CIRCULAR	0.38	0.11	0.09	0.38	1	111.88
C206	CIRCULAR	0.75	0.44	0.19	0.75	1	832.04
C207	CIRCULAR	0.75	0.44	0.19	0.75	1	497.90
C208	CIRCULAR	0.60	0.28	0.15	0.60	1	274.61
C209	CIRCULAR	0.75	0.44	0.19	0.75	1	102.44
C21	(D-D)Oblates(upper)(20mROW)	0.30	3.07	0.00	20.00	1	367.70

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

```
C210         CIRCULAR          0.75    0.44    0.19    0.75      1  724.73

C211         CIRCULAR          0.75    0.44    0.19    0.75      1  704.14

C212_2         CIRCULAR          0.60    0.28    0.15    0.60      1   47.94

C213_2         CIRCULAR          0.60    0.28    0.15    0.60      1   47.94

C22          (F-F)Deschatelets(lower)(17.5mROW)    0.30    2.77    0.16   17.50      1  3320.08

C23          (D-D)Oblates(upper)(20mROW)    0.30    3.07    0.00   20.00      1   624.47

C24          (D-D)Oblates(upper)(20mROW)    0.30    3.07    0.00   20.00      1   755.17

C25          (F-F)Deschatelets(lower)(17.5mROW)    0.30    2.77    0.16   17.50      1  2598.18

C26          (F-F)Deschatelets(lower)(17.5mROW)    0.30    2.77    0.16   17.50      1  3402.69

C27_1          (E1-E1)Deschatelets(upper)16.5mROW    0.30    2.61    0.16   16.50      1  5157.14

C27_2          (E1-E1)Deschatelets(upper)16.5mROW    0.30    2.61    0.16   16.50      1  5154.43

C28          (E1-E1)Deschatelets(upper)16.5mROW    0.30    2.61    0.16   16.50      1  4261.64

C29          (D-D)Oblates(upper)(20mROW)    0.30    3.07    0.00   20.00      1   575.66

C30          (PVT)PrivateSt(11mROW)    0.30    2.15    0.20   11.00      1  5203.58

C31          (PVT)PrivateSt(11mROW)    0.30    2.15    0.20   11.00      1  8857.33

C32          (PVT)PrivateSt(11mROW)    0.30    2.15    0.20   11.00      1  9645.59

C33          (PVT)PrivateSt(11mROW)    0.30    2.15    0.20   11.00      1  7203.39

C34          (A2-A2)Sanctuary(11mROW)    0.30    2.15    0.20   11.00      1  6649.28

C35          (A2-A2)Sanctuary(11mROW)    0.30    2.15    0.20   11.00      1  3775.78

C36          (A2-A2)Sanctuary(11mROW)    0.30    2.15    0.20   11.00      1  3455.87

C37          (D-D)Oblates(upper)(20mROW)    0.30    3.07    0.00   20.00      1   708.48

C38          (PVT)PrivateSt(11mROW)    0.30    2.15    0.20   11.00      1  7465.18

C39          RECT_OPEN          0.30    1.50    0.28    5.00      1   315.55

C40          (PVT)PrivateSt(11mROW)    0.30    2.15    0.20   11.00      1  2375.48

C41          (B-B)Telmon(lower)(16mROW)    0.30    2.52    0.16   16.00      1  4356.13

C42          RECT_OPEN          0.30    1.50    0.28    5.00      1   315.55

C43          (E-E)DeMazenod(16.5mROW)    0.30    2.61    0.16   16.50      1  3612.18

C44          RECT_OPEN          0.30    1.50    0.28    5.00      1   315.55

C45          (E-E)DeMazenod(16.5mROW)    0.30    2.61    0.16   16.50      1  4077.31

C46          RECT_OPEN          0.30    1.50    0.28    5.00      1   315.55

C47          (D-D)Oblates(upper)(20mROW)    0.30    3.07    0.00   20.00      1   139.11

C48          RECT_OPEN          0.30    1.50    0.28    5.00      1   315.55

C49          (I-I)Telmon(upper)(16mROW)    0.30    2.52    0.16   16.00      1  3719.08

C50          RECT_OPEN          0.30    1.50    0.28    5.00      1   315.55

C51          HALF(A-A)Scholastic(10.5mROW)    0.30    1.03    0.19    5.26      1   999.16

C52          RECT_OPEN          0.30    1.50    0.28    5.00      1   315.55
```

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

```
C53     HALF(A-A)Scholastic(10.5mROW)   0.30   1.03   0.19   5.26     1  758.28
C54     RECT_OPEN      0.30   1.50   0.28   5.00     1  315.55
C55     (D-D)Oblates(upper)(20mROW)   0.30   3.07   0.00   20.00     1  377.11
C56     RECT_OPEN      0.30   1.50   0.28   5.00     1  315.55
C57     HALF(A-A)Scholastic(10.5mROW)   0.30   1.03   0.19   5.26     1 1195.77
C58     HALF(A1-A1)Scholastic(13mROW)   0.30   1.12   0.17   6.51     1 1559.67
C59     RECT_OPEN      0.30   1.50   0.28   5.00     1  315.55
C60     (E-E)DeMazenod(16.5mROW)   0.30   2.61   0.16   16.50     1 2224.30
C61     RECT_OPEN      0.30   1.50   0.28   5.00     1  315.55
C62     (E1-E1)Deschatelets(upper)16.5mROW   0.30   2.61   0.16   16.50     1 6923.35
C63     RECT_OPEN      0.30   1.50   0.28   5.00     1  315.55
C64     (G-G)Hazel(15mROW)   0.30   2.34   0.15   15.00     1 1877.10
C65     RECT_OPEN      0.30   1.50   0.28   5.00     1  315.55
C66     (G-G)Hazel(15mROW)   0.30   2.34   0.15   15.00     1 3256.87
C67     RECT_OPEN      0.30   1.50   0.28   5.00     1  315.55
C68     (PVT)PrivateSt(11mROW)   0.30   2.15   0.20   11.00     1 8121.33
C69     Ditch      0.30   0.45   0.15   3.00     1 2554.13
C70     RECT_OPEN      0.30   1.50   0.28   5.00     1  315.55
C71     (PVT)PrivateSt(11mROW)   0.30   2.15   0.20   11.00     1 3644.41
C72     RECT_OPEN      0.30   1.50   0.28   5.00     1  315.55
C73     (PVT)PrivateSt(11mROW)   0.30   2.15   0.20   11.00     1 2874.14
C74     Ditch      0.30   0.45   0.15   3.00     1  610.71
C75     Ditch      0.30   0.45   0.15   3.00     1   27.90
C76     RECT_OPEN      0.30   1.50   0.28   5.00     1  315.55
C77     (E1-E1)Deschatelets(upper)16.5mROW   0.30   2.61   0.16   16.50     1 3355.76
C78     RECT_OPEN      0.30   1.50   0.28   5.00     1  315.55
C79     (PVT)PrivateSt(11mROW)   0.30   2.15   0.20   11.00     1 2564.21
C80     RECT_OPEN      0.30   1.50   0.28   5.00     1  315.55
C81     (PVT)PrivateSt(11mROW)   0.30   2.15   0.20   11.00     1 5833.00
C82     RECT_OPEN      0.30   1.50   0.28   5.00     1  315.55
C83     (PVT)PrivateSt(11mROW)   0.30   2.15   0.20   11.00     1 5072.27
C84     RECT_OPEN      0.30   1.50   0.28   5.00     1  315.55
C85     (PVT)PrivateSt(11mROW)   0.30   2.15   0.20   11.00     1 3257.14
C86     RECT_OPEN      0.30   1.50   0.28   5.00     1  315.55
C87     (PVT)PrivateSt(11mROW)   0.30   2.15   0.20   11.00     1 5042.43
C88     RECT_OPEN      0.30   1.50   0.28   5.00     1  315.55
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C89          (PVT)PrivateSt(11mROW)    0.30    2.15    0.20   11.00       1  6594.57
C90          RECT_OPEN         0.30    1.50    0.28    5.00       1   315.55
C91          (F-F)Deschatelets(lower)(17.5mROW)    0.30    2.77    0.16   17.50       1  3622.38
C92          RECT_OPEN         0.30    1.50    0.28    5.00       1   315.55
C93          (F-F)Deschatelets(lower)(17.5mROW)    0.30    2.77    0.16   17.50       1  3200.63
C94          RECT_OPEN         0.30    1.50    0.28    5.00       1   315.55
C95          (H-H)Oblates(lower)12.2mROW    0.30    2.13    0.18   12.20       1  4506.89
C96          RECT_OPEN         0.30    1.50    0.28    5.00       1   315.55
C97          (H-H)Oblates(lower)12.2mROW    0.30    2.13    0.18   12.20       1  2900.43
C98          RECT_OPEN         0.30    1.50    0.28    5.00       1   315.55
C99          (H-H)Oblates(lower)12.2mROW    0.30    2.13    0.18   12.20       1  4656.58
OR52          CIRCULAR          0.38    0.11    0.09    0.38       1   110.16
STM-15         CIRCULAR          0.25    0.05    0.06    0.25       1    83.92
STM-390        CIRCULAR          0.30    0.07    0.07    0.30       1    95.76
STM-68         CIRCULAR          0.25    0.05    0.06    0.25       1    58.89
W1           RECT_CLOSED       0.77    0.19    0.10    0.25       1    19.82
Weir-Outlet1    RECT_OPEN         0.90    2.16    0.51    2.40       1  4770.04
Weir-Outlet2    RECT_OPEN         0.75    1.35    0.41    1.80       1  2559.44



****************
Transect Summary
****************

Transect (A1-A1)Scholastic(13mROW)
Area:
      0.0005    0.0021    0.0048    0.0085    0.0133
      0.0192    0.0262    0.0342    0.0433    0.0534
      0.0646    0.0769    0.0902    0.1047    0.1201
      0.1367    0.1543    0.1730    0.1928    0.2129
      0.2330    0.2531    0.2732    0.2934    0.3135
      0.3339    0.3549    0.3765    0.3987    0.4215
      0.4448    0.4687    0.4933    0.5184    0.5441
      0.5704    0.5972    0.6247    0.6528    0.6814
      0.7106    0.7404    0.7708    0.8018    0.8334
```

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

```
          0.8655    0.8983    0.9316    0.9655    1.0000
Hrad:
          0.0167    0.0334    0.0500    0.0667    0.0834
          0.1001    0.1167    0.1334    0.1501    0.1668
          0.1835    0.2001    0.2168    0.2335    0.2502
          0.2669    0.2835    0.3002    0.3196    0.3524
          0.3851    0.4177    0.4502    0.4826    0.5149
          0.5473    0.5782    0.6077    0.6359    0.6628
          0.6885    0.7129    0.7362    0.7584    0.7796
          0.7997    0.8189    0.8372    0.8546    0.8712
          0.8870    0.9021    0.9164    0.9301    0.9432
          0.9557    0.9675    0.9789    0.9897    1.0000
Width:
          0.0307    0.0614    0.0921    0.1228    0.1535
          0.1842    0.2149    0.2456    0.2763    0.3069
          0.3376    0.3683    0.3990    0.4297    0.4604
          0.4911    0.5218    0.5525    0.5781    0.5782
          0.5782    0.5783    0.5783    0.5784    0.5785
          0.5953    0.6122    0.6290    0.6459    0.6628
          0.6796    0.6965    0.7134    0.7302    0.7471
          0.7639    0.7808    0.7977    0.8145    0.8314
          0.8482    0.8651    0.8820    0.8988    0.9157
          0.9326    0.9494    0.9663    0.9831    1.0000


Transect (A2-A2)Sanctuary(11mROW)
Area:
          0.0006    0.0022    0.0050    0.0090    0.0140
          0.0202    0.0274    0.0358    0.0453    0.0560
          0.0677    0.0806    0.0946    0.1097    0.1259
          0.1433    0.1618    0.1814    0.2021    0.2239
          0.2463    0.2687    0.2911    0.3135    0.3359
          0.3585    0.3814    0.4046    0.4282    0.4521
          0.4763    0.5009    0.5258    0.5510    0.5766
          0.6025    0.6287    0.6553    0.6822    0.7094
          0.7369    0.7648    0.7931    0.8216    0.8505
          0.8798    0.9093    0.9392    0.9694    1.0000
```

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

```
Hrad:

        0.0148   0.0295   0.0443   0.0591   0.0738

        0.0886   0.1034   0.1181   0.1329   0.1476

        0.1624   0.1772   0.1919   0.2067   0.2215

        0.2362   0.2510   0.2658   0.2805   0.2953

        0.3243   0.3533   0.3822   0.4110   0.4398

        0.4688   0.4971   0.5249   0.5520   0.5785

        0.6044   0.6297   0.6544   0.6786   0.7022

        0.7254   0.7479   0.7700   0.7916   0.8127

        0.8334   0.8536   0.8733   0.8926   0.9115

        0.9300   0.9481   0.9657   0.9831   1.0000

Width:

        0.0364   0.0729   0.1093   0.1457   0.1822

        0.2186   0.2551   0.2915   0.3279   0.3644

        0.4008   0.4372   0.4737   0.5101   0.5465

        0.5830   0.6194   0.6559   0.6923   0.7287

        0.7288   0.7289   0.7289   0.7290   0.7291

        0.7399   0.7508   0.7616   0.7724   0.7833

        0.7941   0.8049   0.8158   0.8266   0.8375

        0.8483   0.8591   0.8700   0.8808   0.8916

        0.9025   0.9133   0.9241   0.9350   0.9458

        0.9567   0.9675   0.9783   0.9892   1.0000


Transect (A-A)Scholastic(10.5mROW)

Area:

        0.0006   0.0023   0.0052   0.0093   0.0146

        0.0210   0.0286   0.0373   0.0472   0.0583

        0.0705   0.0839   0.0985   0.1142   0.1311

        0.1492   0.1684   0.1888   0.2104   0.2323

        0.2543   0.2762   0.2982   0.3201   0.3421

        0.3642   0.3867   0.4096   0.4327   0.4563

        0.4801   0.5044   0.5290   0.5539   0.5791

        0.6048   0.6307   0.6570   0.6837   0.7107

        0.7381   0.7658   0.7939   0.8223   0.8510

        0.8801   0.9096   0.9394   0.9695   1.0000

Hrad:
```

```
          0.0147    0.0294    0.0441    0.0588    0.0735
          0.0882    0.1029    0.1176    0.1323    0.1470
          0.1617    0.1764    0.1911    0.2058    0.2205
          0.2352    0.2499    0.2646    0.2816    0.3105
          0.3394    0.3681    0.3967    0.4253    0.4538
          0.4826    0.5107    0.5381    0.5649    0.5910
          0.6165    0.6414    0.6657    0.6894    0.7125
          0.7351    0.7571    0.7786    0.7995    0.8200
          0.8400    0.8595    0.8786    0.8972    0.9153
          0.9331    0.9504    0.9673    0.9838    1.0000
  Width:
          0.0380    0.0760    0.1140    0.1520    0.1900
          0.2280    0.2660    0.3040    0.3420    0.3800
          0.4180    0.4560    0.4940    0.5320    0.5700
          0.6080    0.6460    0.6841    0.7157    0.7158
          0.7159    0.7160    0.7160    0.7161    0.7162
          0.7275    0.7389    0.7502    0.7616    0.7730
          0.7843    0.7957    0.8070    0.8184    0.8297
          0.8411    0.8524    0.8638    0.8751    0.8865
          0.8978    0.9092    0.9205    0.9319    0.9432
          0.9546    0.9659    0.9773    0.9886    1.0000


  Transect (B-B)Telmon(lower)(16mROW)
  Area:
          0.0005    0.0019    0.0043    0.0076    0.0119
          0.0172    0.0234    0.0305    0.0386    0.0477
          0.0577    0.0686    0.0805    0.0934    0.1072
          0.1220    0.1377    0.1544    0.1720    0.1906
          0.2097    0.2288    0.2478    0.2669    0.2860
          0.3054    0.3256    0.3466    0.3683    0.3908
          0.4141    0.4381    0.4628    0.4884    0.5146
          0.5417    0.5695    0.5981    0.6274    0.6575
          0.6883    0.7199    0.7522    0.7854    0.8192
          0.8539    0.8893    0.9254    0.9623    1.0000
  Hrad:
          0.0186    0.0373    0.0559    0.0745    0.0932
```

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

```
          0.1118    0.1304    0.1490    0.1677    0.1863
          0.2049    0.2236    0.2422    0.2608    0.2795
          0.2981    0.3167    0.3354    0.3540    0.3726
          0.4093    0.4459    0.4823    0.5187    0.5549
          0.5908    0.6246    0.6563    0.6859    0.7136
          0.7395    0.7637    0.7862    0.8072    0.8268
          0.8451    0.8620    0.8778    0.8925    0.9062
          0.9190    0.9308    0.9418    0.9521    0.9616
          0.9705    0.9787    0.9863    0.9934    1.0000
Width:
          0.0251    0.0501    0.0752    0.1002    0.1253
          0.1503    0.1754    0.2004    0.2255    0.2505
          0.2756    0.3006    0.3257    0.3507    0.3758
          0.4008    0.4259    0.4509    0.4760    0.5010
          0.5011    0.5011    0.5012    0.5012    0.5013
          0.5212    0.5412    0.5611    0.5811    0.6010
          0.6210    0.6409    0.6609    0.6808    0.7008
          0.7207    0.7407    0.7606    0.7806    0.8005
          0.8205    0.8404    0.8604    0.8803    0.9002
          0.9202    0.9402    0.9601    0.9801    1.0000


Transect (C-C)Oblates(mid)(19mROW)
Area:
          0.0004    0.0016    0.0036    0.0064    0.0100
          0.0145    0.0197    0.0257    0.0325    0.0401
          0.0486    0.0578    0.0678    0.0787    0.0903
          0.1028    0.1160    0.1301    0.1449    0.1606
          0.1770    0.1943    0.2123    0.2312    0.2509
          0.2717    0.2939    0.3175    0.3418    0.3667
          0.3923    0.4185    0.4454    0.4729    0.5011
          0.5299    0.5593    0.5893    0.6201    0.6514
          0.6834    0.7160    0.7493    0.7832    0.8177
          0.8529    0.8887    0.9252    0.9623    1.0000
Hrad:
          0.0190    0.0380    0.0570    0.0760    0.0950
          0.1140    0.1329    0.1519    0.1709    0.1899
```

```
          0.2089    0.2279    0.2469    0.2659    0.2849
          0.3039    0.3229    0.3419    0.3609    0.3798
          0.3988    0.4178    0.4368    0.4558    0.4748
          0.4935    0.5106    0.5355    0.5680    0.5991
          0.6288    0.6572    0.6843    0.7102    0.7349
          0.7586    0.7811    0.8027    0.8234    0.8432
          0.8621    0.8801    0.8975    0.9140    0.9299
          0.9452    0.9597    0.9737    0.9871    1.0000
Width:
          0.0211    0.0422    0.0633    0.0844    0.1055
          0.1266    0.1477    0.1688    0.1899    0.2109
          0.2320    0.2531    0.2742    0.2953    0.3164
          0.3375    0.3586    0.3797    0.4008    0.4219
          0.4430    0.4641    0.4852    0.5063    0.5274
          0.5652    0.6031    0.6304    0.6472    0.6640
          0.6808    0.6976    0.7144    0.7312    0.7480
          0.7648    0.7816    0.7984    0.8152    0.8320
          0.8488    0.8656    0.8824    0.8992    0.9160
          0.9328    0.9496    0.9664    0.9832    1.0000


Transect (D-D)Oblates(upper)(20mROW)
Area:
          0.0004    0.0016    0.0035    0.0063    0.0098
          0.0141    0.0192    0.0251    0.0317    0.0392
          0.0474    0.0564    0.0662    0.0768    0.0881
          0.1002    0.1132    0.1269    0.1414    0.1566
          0.1727    0.1895    0.2072    0.2256    0.2447
          0.2651    0.2869    0.3101    0.3341    0.3587
          0.3841    0.4102    0.4370    0.4645    0.4927
          0.5216    0.5513    0.5816    0.6126    0.6443
          0.6767    0.7098    0.7436    0.7781    0.8134
          0.8493    0.8859    0.9232    0.9613    1.0000
Hrad:
          0.4342    0.8683    1.3025    1.7367    2.1709
          2.6050    3.0392    3.4734    3.9075    4.3417
          4.7759    5.2100    5.6442    6.0784    6.5126
```

```
          6.9467     7.3809     7.8151     8.2492     8.6834
          9.1176     9.5517     9.9859    10.4201    10.8543
         11.2588    11.6279     0.4937     0.5205     0.5467
          0.5723     0.5974     0.6220     0.6463     0.6702
          0.6937     0.7170     0.7399     0.7627     0.7851
          0.8074     0.8294     0.8513     0.8730     0.8945
          0.9159     0.9371     0.9582     0.9792     1.0000
Width:
          0.0200     0.0401     0.0601     0.0802     0.1002
          0.1202     0.1403     0.1603     0.1804     0.2004
          0.2204     0.2405     0.2605     0.2806     0.3006
          0.3206     0.3407     0.3607     0.3808     0.4008
          0.4208     0.4409     0.4609     0.4810     0.5010
          0.5390     0.5769     0.6049     0.6228     0.6408
          0.6588     0.6767     0.6947     0.7126     0.7306
          0.7486     0.7665     0.7845     0.8024     0.8204
          0.8384     0.8563     0.8743     0.8922     0.9102
          0.9282     0.9461     0.9641     0.9820     1.0000


Transect (E1-E1)Deschatelets(upper)16.5mROW
Area:
          0.0005     0.0018     0.0041     0.0073     0.0115
          0.0165     0.0225     0.0294     0.0372     0.0459
          0.0555     0.0661     0.0776     0.0900     0.1033
          0.1175     0.1327     0.1487     0.1657     0.1836
          0.2024     0.2220     0.2416     0.2612     0.2808
          0.3007     0.3214     0.3428     0.3650     0.3879
          0.4115     0.4359     0.4610     0.4868     0.5134
          0.5407     0.5687     0.5975     0.6270     0.6572
          0.6882     0.7199     0.7524     0.7855     0.8194
          0.8541     0.8895     0.9256     0.9624     1.0000
Hrad:
          0.0186     0.0373     0.0559     0.0745     0.0931
          0.1118     0.1304     0.1490     0.1677     0.1863
          0.2049     0.2235     0.2422     0.2608     0.2794
          0.2980     0.3167     0.3353     0.3539     0.3726
```

```
          0.3912    0.4218    0.4584    0.4949    0.5313

          0.5674    0.6014    0.6334    0.6636    0.6919

          0.7185    0.7434    0.7668    0.7887    0.8093

          0.8286    0.8466    0.8635    0.8794    0.8942

          0.9082    0.9212    0.9334    0.9449    0.9556

          0.9657    0.9751    0.9840    0.9922    1.0000

Width:

          0.0242    0.0484    0.0726    0.0968    0.1210

          0.1452    0.1694    0.1936    0.2178    0.2420

          0.2662    0.2904    0.3146    0.3387    0.3629

          0.3871    0.4113    0.4355    0.4597    0.4839

          0.5081    0.5162    0.5163    0.5163    0.5164

          0.5357    0.5551    0.5744    0.5937    0.6131

          0.6324    0.6518    0.6711    0.6905    0.7098

          0.7292    0.7485    0.7679    0.7872    0.8065

          0.8259    0.8452    0.8646    0.8839    0.9033

          0.9226    0.9420    0.9613    0.9807    1.0000


Transect (E-E)DeMazenod(16.5mROW)

Area:

          0.0005    0.0018    0.0041    0.0073    0.0115

          0.0165    0.0225    0.0294    0.0372    0.0459

          0.0555    0.0661    0.0776    0.0900    0.1033

          0.1175    0.1327    0.1487    0.1657    0.1836

          0.2024    0.2220    0.2416    0.2612    0.2808

          0.3007    0.3214    0.3428    0.3650    0.3879

          0.4115    0.4359    0.4610    0.4868    0.5134

          0.5407    0.5687    0.5975    0.6270    0.6572

          0.6882    0.7199    0.7524    0.7855    0.8194

          0.8541    0.8895    0.9256    0.9624    1.0000

Hrad:

          0.0186    0.0373    0.0559    0.0745    0.0931

          0.1118    0.1304    0.1490    0.1677    0.1863

          0.2049    0.2235    0.2422    0.2608    0.2794

          0.2980    0.3167    0.3353    0.3539    0.3726

          0.3912    0.4218    0.4584    0.4949    0.5313
```

```
          0.5674    0.6014    0.6334    0.6636    0.6919

          0.7185    0.7434    0.7668    0.7887    0.8093

          0.8286    0.8466    0.8635    0.8794    0.8942

          0.9082    0.9212    0.9334    0.9449    0.9556

          0.9657    0.9751    0.9840    0.9922    1.0000

Width:

          0.0242    0.0484    0.0726    0.0968    0.1210

          0.1452    0.1694    0.1936    0.2178    0.2420

          0.2662    0.2904    0.3146    0.3387    0.3629

          0.3871    0.4113    0.4355    0.4597    0.4839

          0.5081    0.5162    0.5163    0.5163    0.5164

          0.5357    0.5551    0.5744    0.5937    0.6131

          0.6324    0.6518    0.6711    0.6905    0.7098

          0.7292    0.7485    0.7679    0.7872    0.8065

          0.8259    0.8452    0.8646    0.8839    0.9033

          0.9226    0.9420    0.9613    0.9807    1.0000


Transect (F-F)Deschatelets(lower)(17.5mROW)

Area:

          0.0004    0.0017    0.0039    0.0069    0.0108

          0.0156    0.0212    0.0276    0.0350    0.0432

          0.0523    0.0622    0.0730    0.0847    0.0972

          0.1106    0.1248    0.1400    0.1559    0.1728

          0.1905    0.2091    0.2285    0.2488    0.2694

          0.2903    0.3120    0.3343    0.3573    0.3810

          0.4054    0.4305    0.4562    0.4827    0.5099

          0.5377    0.5662    0.5955    0.6254    0.6560

          0.6873    0.7193    0.7519    0.7853    0.8194

          0.8541    0.8895    0.9257    0.9625    1.0000

Hrad:

          0.0187    0.0374    0.0561    0.0748    0.0935

          0.1121    0.1308    0.1495    0.1682    0.1869

          0.2056    0.2243    0.2430    0.2617    0.2804

          0.2991    0.3177    0.3364    0.3551    0.3738

          0.3925    0.4112    0.4299    0.4516    0.4884

          0.5248    0.5593    0.5921    0.6232    0.6526
```

```
          0.6805    0.7068    0.7318    0.7553    0.7777

          0.7988    0.8187    0.8377    0.8556    0.8725

          0.8885    0.9037    0.9181    0.9318    0.9447

          0.9570    0.9686    0.9796    0.9901    1.0000

     Width:

          0.0228    0.0456    0.0685    0.0913    0.1141

          0.1369    0.1598    0.1826    0.2054    0.2282

          0.2511    0.2739    0.2967    0.3195    0.3423

          0.3652    0.3880    0.4108    0.4336    0.4565

          0.4793    0.5021    0.5249    0.5440    0.5440

          0.5622    0.5805    0.5987    0.6170    0.6352

          0.6534    0.6717    0.6899    0.7082    0.7264

          0.7446    0.7629    0.7811    0.7994    0.8176

          0.8358    0.8541    0.8723    0.8906    0.9088

          0.9270    0.9453    0.9635    0.9818    1.0000


     Transect (G-G)Hazel(15mROW)

     Area:

          0.0005    0.0021    0.0046    0.0082    0.0129

          0.0185    0.0252    0.0329    0.0417    0.0515

          0.0623    0.0741    0.0870    0.1009    0.1158

          0.1318    0.1488    0.1667    0.1847    0.2027

          0.2207    0.2388    0.2568    0.2748    0.2929

          0.3113    0.3306    0.3507    0.3716    0.3933

          0.4158    0.4392    0.4634    0.4884    0.5142

          0.5409    0.5683    0.5966    0.6257    0.6556

          0.6864    0.7180    0.7503    0.7835    0.8176

          0.8524    0.8881    0.9246    0.9619    1.0000

     Hrad:

          0.0188    0.0377    0.0565    0.0753    0.0942

          0.1130    0.1318    0.1507    0.1695    0.1883

          0.2072    0.2260    0.2448    0.2637    0.2825

          0.3013    0.3202    0.3481    0.3851    0.4220

          0.4588    0.4954    0.5319    0.5684    0.6047

          0.6406    0.6741    0.7052    0.7340    0.7606

          0.7851    0.8077    0.8284    0.8475    0.8649
```

```
          0.8809    0.8956    0.9089    0.9212    0.9323
          0.9424    0.9517    0.9600    0.9677    0.9745
          0.9808    0.9864    0.9914    0.9960    1.0000
Width:
          0.0267    0.0534    0.0802    0.1069    0.1336
          0.1603    0.1870    0.2138    0.2405    0.2672
          0.2939    0.3206    0.3474    0.3741    0.4008
          0.4275    0.4542    0.4676    0.4677    0.4677
          0.4678    0.4678    0.4679    0.4679    0.4680
          0.4893    0.5106    0.5318    0.5531    0.5744
          0.5957    0.6170    0.6382    0.6595    0.6808
          0.7021    0.7234    0.7446    0.7659    0.7872
          0.8085    0.8298    0.8510    0.8723    0.8936
          0.9149    0.9362    0.9574    0.9787    1.0000


Transect (H-H)Oblates(lower)12.2mROW
Area:
          0.0006    0.0023    0.0051    0.0091    0.0141
          0.0204    0.0277    0.0362    0.0458    0.0566
          0.0684    0.0815    0.0956    0.1109    0.1273
          0.1448    0.1635    0.1831    0.2029    0.2228
          0.2426    0.2624    0.2822    0.3020    0.3218
          0.3419    0.3626    0.3839    0.4058    0.4282
          0.4512    0.4749    0.4991    0.5238    0.5492
          0.5752    0.6017    0.6288    0.6566    0.6849
          0.7137    0.7432    0.7733    0.8039    0.8351
          0.8669    0.8993    0.9323    0.9659    1.0000
Hrad:
          0.0164    0.0329    0.0493    0.0658    0.0822
          0.0986    0.1151    0.1315    0.1480    0.1644
          0.1808    0.1973    0.2137    0.2301    0.2466
          0.2630    0.2795    0.3039    0.3362    0.3684
          0.4004    0.4324    0.4643    0.4961    0.5278
          0.5596    0.5899    0.6189    0.6466    0.6729
          0.6981    0.7220    0.7447    0.7664    0.7870
          0.8066    0.8253    0.8431    0.8600    0.8761
```

```
          0.8914    0.9059    0.9198    0.9330    0.9456
          0.9575    0.9689    0.9798    0.9901    1.0000
Width:
          0.0329    0.0657    0.0986    0.1314    0.1643
          0.1971    0.2300    0.2628    0.2957    0.3285
          0.3614    0.3942    0.4271    0.4599    0.4928
          0.5256    0.5585    0.5750    0.5750    0.5751
          0.5751    0.5752    0.5753    0.5753    0.5754
          0.5924    0.6094    0.6264    0.6433    0.6603
          0.6773    0.6943    0.7113    0.7283    0.7452
          0.7622    0.7792    0.7962    0.8132    0.8302
          0.8471    0.8641    0.8811    0.8981    0.9151
          0.9321    0.9490    0.9660    0.9830    1.0000


Transect (I-I)Telmon(upper)(16mROW)
Area:
          0.0005    0.0019    0.0043    0.0076    0.0119
          0.0172    0.0234    0.0305    0.0386    0.0477
          0.0577    0.0686    0.0805    0.0934    0.1072
          0.1220    0.1377    0.1544    0.1720    0.1906
          0.2097    0.2288    0.2478    0.2669    0.2860
          0.3054    0.3256    0.3466    0.3683    0.3908
          0.4141    0.4381    0.4628    0.4884    0.5146
          0.5417    0.5695    0.5981    0.6274    0.6575
          0.6883    0.7199    0.7522    0.7854    0.8192
          0.8539    0.8893    0.9254    0.9623    1.0000
Hrad:
          0.0186    0.0373    0.0559    0.0745    0.0932
          0.1118    0.1304    0.1490    0.1677    0.1863
          0.2049    0.2236    0.2422    0.2608    0.2795
          0.2981    0.3167    0.3354    0.3540    0.3726
          0.4093    0.4459    0.4823    0.5187    0.5549
          0.5908    0.6246    0.6563    0.6859    0.7136
          0.7395    0.7637    0.7862    0.8072    0.8268
          0.8451    0.8620    0.8778    0.8925    0.9062
          0.9190    0.9308    0.9418    0.9521    0.9616
```

```
          0.9705    0.9787    0.9863    0.9934    1.0000

Width:

          0.0251    0.0501    0.0752    0.1002    0.1253

          0.1503    0.1754    0.2004    0.2255    0.2505

          0.2756    0.3006    0.3257    0.3507    0.3758

          0.4008    0.4259    0.4509    0.4760    0.5010

          0.5011    0.5011    0.5012    0.5012    0.5013

          0.5212    0.5412    0.5611    0.5811    0.6010

          0.6210    0.6409    0.6609    0.6808    0.7008

          0.7207    0.7407    0.7606    0.7806    0.8005

          0.8205    0.8404    0.8604    0.8803    0.9002

          0.9202    0.9402    0.9601    0.9801    1.0000


Transect (J1-J1)Clegg(lower)(20mROW)

Area:

          0.0004    0.0016    0.0037    0.0066    0.0103

          0.0148    0.0202    0.0263    0.0333    0.0412

          0.0498    0.0593    0.0696    0.0807    0.0926

          0.1054    0.1190    0.1334    0.1486    0.1647

          0.1816    0.1993    0.2177    0.2362    0.2548

          0.2737    0.2936    0.3144    0.3361    0.3587

          0.3822    0.4066    0.4319    0.4581    0.4852

          0.5132    0.5421    0.5719    0.6026    0.6342

          0.6667    0.7002    0.7345    0.7697    0.8058

          0.8429    0.8808    0.9196    0.9594    1.0000

Hrad:

          0.0209    0.0418    0.0627    0.0836    0.1045

          0.1254    0.1463    0.1671    0.1880    0.2089

          0.2298    0.2507    0.2716    0.2925    0.3134

          0.3343    0.3552    0.3761    0.3970    0.4179

          0.4388    0.4597    0.4907    0.5318    0.5727

          0.6129    0.6501    0.6844    0.7160    0.7451

          0.7718    0.7962    0.8185    0.8390    0.8576

          0.8747    0.8902    0.9044    0.9173    0.9290

          0.9397    0.9493    0.9581    0.9661    0.9733

          0.9798    0.9857    0.9910    0.9957    1.0000
```

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

Width:

0.0200	0.0401	0.0601	0.0802	0.1002
0.1202	0.1403	0.1603	0.1804	0.2004
0.2204	0.2405	0.2605	0.2806	0.3006
0.3206	0.3407	0.3607	0.3808	0.4008
0.4208	0.4409	0.4509	0.4510	0.4510
0.4730	0.4949	0.5169	0.5388	0.5608
0.5828	0.6047	0.6267	0.6486	0.6706
0.6926	0.7145	0.7365	0.7584	0.7804
0.8024	0.8243	0.8463	0.8682	0.8902
0.9122	0.9341	0.9561	0.9780	1.0000

Transect (J-J)Clegg(upper)(20mROW)

Area:

0.0004	0.0016	0.0037	0.0066	0.0103
0.0148	0.0202	0.0263	0.0333	0.0412
0.0498	0.0593	0.0696	0.0807	0.0926
0.1054	0.1190	0.1334	0.1486	0.1647
0.1816	0.1993	0.2177	0.2362	0.2548
0.2737	0.2936	0.3144	0.3361	0.3587
0.3822	0.4066	0.4319	0.4581	0.4852
0.5132	0.5421	0.5719	0.6026	0.6342
0.6667	0.7002	0.7345	0.7697	0.8058
0.8429	0.8808	0.9196	0.9594	1.0000

Hrad:

0.0209	0.0418	0.0627	0.0836	0.1045
0.1254	0.1463	0.1671	0.1880	0.2089
0.2298	0.2507	0.2716	0.2925	0.3134
0.3343	0.3552	0.3761	0.3970	0.4179
0.4388	0.4597	0.4907	0.5318	0.5727
0.6129	0.6501	0.6844	0.7160	0.7451
0.7718	0.7962	0.8185	0.8390	0.8576
0.8747	0.8902	0.9044	0.9173	0.9290
0.9397	0.9493	0.9581	0.9661	0.9733
0.9798	0.9857	0.9910	0.9957	1.0000

Width:

```
          0.0200    0.0401    0.0601    0.0802    0.1002

          0.1202    0.1403    0.1603    0.1804    0.2004

          0.2204    0.2405    0.2605    0.2806    0.3006

          0.3206    0.3407    0.3607    0.3808    0.4008

          0.4208    0.4409    0.4509    0.4510    0.4510

          0.4730    0.4949    0.5169    0.5388    0.5608

          0.5828    0.6047    0.6267    0.6486    0.6706

          0.6926    0.7145    0.7365    0.7584    0.7804

          0.8024    0.8243    0.8463    0.8682    0.8902

          0.9122    0.9341    0.9561    0.9780    1.0000


Transect (P-P)PrivateSt(4mRoad)

Area:

          0.0007    0.0028    0.0063    0.0111    0.0174

          0.0250    0.0340    0.0445    0.0563    0.0695

          0.0841    0.1001    0.1174    0.1362    0.1563

          0.1779    0.2008    0.2249    0.2491    0.2732

          0.2974    0.3216    0.3458    0.3700    0.3942

          0.4184    0.4426    0.4668    0.4910    0.5152

          0.5394    0.5637    0.5879    0.6121    0.6363

          0.6606    0.6848    0.7090    0.7333    0.7575

          0.7817    0.8060    0.8302    0.8545    0.8787

          0.9030    0.9272    0.9515    0.9757    1.0000

Hrad:

          0.0130    0.0260    0.0389    0.0519    0.0649

          0.0779    0.0909    0.1038    0.1168    0.1298

          0.1428    0.1557    0.1687    0.1817    0.1947

          0.2077    0.2206    0.2412    0.2665    0.2917

          0.3168    0.3418    0.3667    0.3915    0.4162

          0.4407    0.4652    0.4895    0.5138    0.5379

          0.5620    0.5859    0.6098    0.6335    0.6571

          0.6807    0.7041    0.7275    0.7507    0.7739

          0.7969    0.8198    0.8427    0.8654    0.8881

          0.9107    0.9331    0.9555    0.9778    1.0000

Width:

          0.0573    0.1146    0.1719    0.2292    0.2864
```

```
          0.3437    0.4010    0.4583    0.5156    0.5729
          0.6302    0.6875    0.7448    0.8020    0.8593
          0.9166    0.9739    0.9964    0.9966    0.9967
          0.9969    0.9970    0.9972    0.9973    0.9975
          0.9977    0.9978    0.9980    0.9981    0.9983
          0.9984    0.9986    0.9987    0.9988    0.9989
          0.9989    0.9990    0.9991    0.9992    0.9992
          0.9993    0.9994    0.9995    0.9995    0.9996
          0.9997    0.9998    0.9998    0.9999    1.0000


Transect (PVT)PrivateSt(11mROW)
Area:
          0.0006    0.0022    0.0050    0.0090    0.0140
          0.0202    0.0274    0.0358    0.0453    0.0560
          0.0677    0.0806    0.0946    0.1097    0.1259
          0.1433    0.1618    0.1814    0.2021    0.2239
          0.2463    0.2687    0.2911    0.3135    0.3359
          0.3585    0.3814    0.4046    0.4282    0.4521
          0.4763    0.5009    0.5258    0.5510    0.5766
          0.6025    0.6287    0.6553    0.6822    0.7094
          0.7369    0.7648    0.7931    0.8216    0.8505
          0.8798    0.9093    0.9392    0.9694    1.0000
Hrad:
          0.0148    0.0295    0.0443    0.0591    0.0738
          0.0886    0.1034    0.1181    0.1329    0.1476
          0.1624    0.1772    0.1919    0.2067    0.2215
          0.2362    0.2510    0.2658    0.2805    0.2953
          0.3243    0.3533    0.3822    0.4110    0.4398
          0.4688    0.4971    0.5249    0.5520    0.5785
          0.6044    0.6297    0.6544    0.6786    0.7022
          0.7254    0.7479    0.7700    0.7916    0.8127
          0.8334    0.8536    0.8733    0.8926    0.9115
          0.9300    0.9481    0.9657    0.9831    1.0000
Width:
          0.0364    0.0729    0.1093    0.1457    0.1822
          0.2186    0.2551    0.2915    0.3279    0.3644
```

```
        0.4008    0.4372    0.4737    0.5101    0.5465
        0.5830    0.6194    0.6559    0.6923    0.7287
        0.7288    0.7289    0.7289    0.7290    0.7291
        0.7399    0.7508    0.7616    0.7724    0.7833
        0.7941    0.8049    0.8158    0.8266    0.8375
        0.8483    0.8591    0.8700    0.8808    0.8916
        0.9025    0.9133    0.9241    0.9350    0.9458
        0.9567    0.9675    0.9783    0.9892    1.0000


Transect Ditch
Area:
        0.0004    0.0016    0.0036    0.0064    0.0100
        0.0144    0.0196    0.0256    0.0324    0.0400
        0.0484    0.0576    0.0676    0.0784    0.0900
        0.1024    0.1156    0.1296    0.1444    0.1600
        0.1764    0.1936    0.2116    0.2304    0.2500
        0.2704    0.2916    0.3136    0.3364    0.3600
        0.3844    0.4096    0.4356    0.4624    0.4900
        0.5184    0.5476    0.5776    0.6084    0.6400
        0.6724    0.7056    0.7396    0.7744    0.8100
        0.8464    0.8836    0.9216    0.9604    1.0000
Hrad:
        0.0200    0.0400    0.0600    0.0800    0.1000
        0.1200    0.1400    0.1600    0.1800    0.2000
        0.2200    0.2400    0.2600    0.2800    0.3000
        0.3200    0.3400    0.3600    0.3800    0.4000
        0.4200    0.4400    0.4600    0.4800    0.5000
        0.5200    0.5400    0.5600    0.5800    0.6000
        0.6200    0.6400    0.6600    0.6800    0.7000
        0.7200    0.7400    0.7600    0.7800    0.8000
        0.8200    0.8400    0.8600    0.8800    0.9000
        0.9200    0.9400    0.9600    0.9800    1.0000
Width:
        0.0200    0.0400    0.0600    0.0800    0.1000
        0.1200    0.1400    0.1600    0.1800    0.2000
        0.2200    0.2400    0.2600    0.2800    0.3000
```

```
          0.3200    0.3400    0.3600    0.3800    0.4000
          0.4200    0.4400    0.4600    0.4800    0.5000
          0.5200    0.5400    0.5600    0.5800    0.6000
          0.6200    0.6400    0.6600    0.6800    0.7000
          0.7200    0.7400    0.7600    0.7800    0.8000
          0.8200    0.8400    0.8600    0.8800    0.9000
          0.9200    0.9400    0.9600    0.9800    1.0000


Transect HALF(A1-A1)Scholastic(13mROW)
Area:
          0.0005    0.0021    0.0048    0.0085    0.0133
          0.0192    0.0261    0.0341    0.0432    0.0534
          0.0646    0.0768    0.0902    0.1046    0.1200
          0.1366    0.1542    0.1729    0.1926    0.2127
          0.2328    0.2529    0.2730    0.2931    0.3133
          0.3337    0.3547    0.3763    0.3984    0.4212
          0.4446    0.4685    0.4930    0.5182    0.5439
          0.5702    0.5970    0.6245    0.6526    0.6812
          0.7104    0.7403    0.7707    0.8017    0.8333
          0.8654    0.8982    0.9315    0.9655    1.0000
Hrad:
          0.0175    0.0349    0.0524    0.0698    0.0873
          0.1047    0.1222    0.1396    0.1571    0.1745
          0.1920    0.2094    0.2269    0.2443    0.2618
          0.2792    0.2967    0.3141    0.3343    0.3680
          0.4016    0.4349    0.4681    0.5010    0.5338
          0.5665    0.5976    0.6272    0.6553    0.6820
          0.7074    0.7314    0.7542    0.7758    0.7963
          0.8156    0.8340    0.8514    0.8679    0.8835
          0.8982    0.9122    0.9254    0.9379    0.9498
          0.9610    0.9716    0.9816    0.9910    1.0000
Width:
          0.0306    0.0613    0.0919    0.1226    0.1532
          0.1839    0.2145    0.2452    0.2758    0.3065
          0.3371    0.3678    0.3984    0.4291    0.4597
          0.4904    0.5210    0.5517    0.5772    0.5773
```

```
          0.5774    0.5775    0.5777    0.5778    0.5779

          0.5948    0.6116    0.6285    0.6454    0.6623

          0.6792    0.6961    0.7130    0.7298    0.7467

          0.7636    0.7805    0.7974    0.8143    0.8312

          0.8480    0.8649    0.8818    0.8987    0.9156

          0.9325    0.9493    0.9662    0.9831    1.0000


Transect HALF(A2-A2)Sanctuary(11mROW)

Area:

          0.0006    0.0022    0.0050    0.0089    0.0140

          0.0201    0.0274    0.0358    0.0453    0.0559

          0.0677    0.0805    0.0945    0.1096    0.1258

          0.1432    0.1616    0.1812    0.2019    0.2237

          0.2461    0.2685    0.2909    0.3132    0.3356

          0.3582    0.3811    0.4043    0.4279    0.4518

          0.4760    0.5006    0.5255    0.5507    0.5763

          0.6022    0.6284    0.6550    0.6819    0.7092

          0.7367    0.7647    0.7929    0.8215    0.8504

          0.8797    0.9092    0.9392    0.9694    1.0000

Hrad:

          0.0154    0.0308    0.0462    0.0615    0.0769

          0.0923    0.1077    0.1231    0.1385    0.1539

          0.1693    0.1846    0.2000    0.2154    0.2308

          0.2462    0.2616    0.2770    0.2923    0.3077

          0.3375    0.3672    0.3966    0.4259    0.4550

          0.4844    0.5130    0.5408    0.5679    0.5944

          0.6201    0.6452    0.6696    0.6934    0.7166

          0.7391    0.7611    0.7825    0.8034    0.8237

          0.8435    0.8627    0.8815    0.8998    0.9176

          0.9349    0.9518    0.9683    0.9844    1.0000

Width:

          0.0364    0.0727    0.1091    0.1455    0.1819

          0.2182    0.2546    0.2910    0.3273    0.3637

          0.4001    0.4364    0.4728    0.5092    0.5456

          0.5819    0.6183    0.6547    0.6910    0.7274

          0.7275    0.7277    0.7278    0.7279    0.7281
```

0.7389 0.7498 0.7607 0.7716 0.7825

0.7933 0.8042 0.8151 0.8260 0.8368

0.8477 0.8586 0.8695 0.8804 0.8912

0.9021 0.9130 0.9239 0.9347 0.9456

0.9565 0.9674 0.9782 0.9891 1.0000

Transect HALF(A-A)Scholastic(10.5mROW)

Area:

0.0006 0.0023 0.0052 0.0093 0.0146

0.0210 0.0285 0.0373 0.0472 0.0582

0.0704 0.0838 0.0984 0.1141 0.1310

0.1490 0.1683 0.1886 0.2102 0.2321

0.2540 0.2760 0.2979 0.3199 0.3418

0.3640 0.3864 0.4093 0.4324 0.4560

0.4798 0.5041 0.5287 0.5536 0.5789

0.6045 0.6305 0.6568 0.6835 0.7105

0.7379 0.7656 0.7937 0.8221 0.8509

0.8800 0.9095 0.9393 0.9695 1.0000

Hrad:

0.0154 0.0308 0.0461 0.0615 0.0769

0.0923 0.1077 0.1231 0.1384 0.1538

0.1692 0.1846 0.2000 0.2153 0.2307

0.2461 0.2615 0.2769 0.2947 0.3244

0.3540 0.3834 0.4126 0.4416 0.4705

0.4996 0.5279 0.5554 0.5822 0.6083

0.6336 0.6582 0.6821 0.7053 0.7279

0.7499 0.7712 0.7920 0.8121 0.8317

0.8508 0.8693 0.8873 0.9048 0.9218

0.9383 0.9544 0.9700 0.9852 1.0000

Width:

0.0379 0.0759 0.1138 0.1517 0.1897

0.2276 0.2655 0.3034 0.3414 0.3793

0.4172 0.4552 0.4931 0.5310 0.5690

0.6069 0.6448 0.6828 0.7144 0.7145

0.7147 0.7148 0.7149 0.7151 0.7152

0.7266 0.7380 0.7494 0.7608 0.7722

```
          0.7836    0.7949    0.8063    0.8177    0.8291
          0.8405    0.8519    0.8633    0.8747    0.8861
          0.8975    0.9089    0.9203    0.9316    0.9430
          0.9544    0.9658    0.9772    0.9886    1.0000


Transect OblateFinalSection
Area:
          0.0004    0.0017    0.0039    0.0069    0.0108
          0.0156    0.0212    0.0277    0.0351    0.0433
          0.0524    0.0623    0.0732    0.0849    0.0974
          0.1100    0.1227    0.1354    0.1483    0.1619
          0.1764    0.1916    0.2077    0.2246    0.2423
          0.2608    0.2801    0.3002    0.3211    0.3428
          0.3654    0.3887    0.4129    0.4383    0.4654
          0.4942    0.5246    0.5560    0.5882    0.6214
          0.6553    0.6902    0.7259    0.7625    0.7999
          0.8382    0.8773    0.9174    0.9583    1.0000
Hrad:
          0.0288    0.0577    0.0865    0.1154    0.1442
          0.1731    0.2019    0.2308    0.2596    0.2885
          0.3173    0.3462    0.3750    0.4039    0.4429
          0.4992    0.5552    0.6109    0.6656    0.7154
          0.7600    0.7997    0.8350    0.8663    0.8939
          0.9182    0.9395    0.9582    0.9746    0.9888
          1.0011    1.0118    1.0210    1.0285    1.0320
          1.0324    1.0304    1.0283    1.0262    1.0240
          1.0217    1.0194    1.0170    1.0147    1.0122
          1.0098    1.0074    1.0049    1.0025    1.0000
Width:
          0.0205    0.0411    0.0616    0.0821    0.1026
          0.1232    0.1437    0.1642    0.1847    0.2053
          0.2258    0.2463    0.2669    0.2874    0.3004
          0.3005    0.3005    0.3006    0.3141    0.3333
          0.3524    0.3715    0.3907    0.4098    0.4289
          0.4481    0.4672    0.4863    0.5055    0.5246
          0.5437    0.5629    0.5835    0.6231    0.6626
```

```
    0.7022   0.7339   0.7544   0.7748   0.7953
    0.8158   0.8362   0.8567   0.8772   0.8976
    0.9181   0.9386   0.9591   0.9795   1.0000


*********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
*********************************************************


****************
Analysis Options
****************
Flow Units ............... LPS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ YES
  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
Starting Date ............ 01/07/2025 00:00:00
Ending Date .............. 01/08/2025 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:10:00
Wet Time Step ............ 00:00:30
Dry Time Step ............ 00:01:00
Routing Time Step ........ 1.00 sec
Variable Time Step ....... NO
Maximum Trials ........... 8
Number of Threads ........ 4
Head Tolerance ........... 0.001500 m
```

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

```
*********************

Control Actions Taken

*********************



**************************        Volume        Depth

Runoff Quantity Continuity     hectare-m           mm

**************************     ---------      -------

Initial LID Storage ......        0.005        0.491

Total Precipitation ......        0.723       71.667

Evaporation Loss .........        0.000        0.000

Infiltration Loss ........        0.166       16.403

Surface Runoff ...........        0.558       55.283

Final Storage ............        0.005        0.492

Continuity Error (%) .....       -0.027



**************************        Volume       Volume

Flow Routing Continuity       hectare-m      10^6 ltr

**************************     ---------     ---------

Dry Weather Inflow .......        0.000        0.000

Wet Weather Inflow .......        0.558        5.578

Groundwater Inflow .......        0.000        0.000

RDII Inflow .............        0.000        0.000

External Inflow ..........        0.000        0.000

External Outflow .........        0.558        5.581

Flooding Loss ............        0.000        0.000

Evaporation Loss .........        0.000        0.000

Exfiltration Loss ........        0.000        0.000

Initial Stored Volume ....        0.015        0.154

Final Stored Volume ......        0.016        0.156

Continuity Error (%) .....       -0.106
```

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

```
*************************

Highest Continuity Errors

*************************

Node 60+148.01 (14.49%)

Node CB6 (-12.28%)

Node J9 (-10.68%)

Node 40+157.95 (9.21%)

Node 80+267 (-4.25%)



*********************************

Highest Flow Instability Indexes

*********************************

Link C213_1 (143)

Link W1 (142)

Link C208 (142)

Link C213_2 (140)

Link OR44 (134)



*************************

Routing Time Step Summary

*************************

Minimum Time Step         :    1.00 sec

Average Time Step         :    1.00 sec

Maximum Time Step         :    1.00 sec

Percent in Steady State    :    0.00

Average Iterations per Step :    2.00

Percent Not Converging     :    0.02



***************************

Subcatchment Runoff Summary

***************************


------------------------------------------------------------------------------------------------------
```

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

```
                 Total    Total    Total    Total    Total     Total    Peak  Runoff
                 Precip   Runon    Evap     Infil    Runoff    Runoff   Runoff  Coeff
Subcatchment              mm       mm       mm       mm        mm     10^6 ltr   LPS
--------------------------------------------------------------------------------------------------------
A01A              71.67    0.00     0.00     6.26     65.44     0.06    43.65  0.913
A01B              71.67    0.00     0.00    17.07     54.62     0.04    35.59  0.762
A02              71.67    0.00     0.00    13.20     58.50     0.04    32.61  0.816
A04              71.67    0.00     0.00     0.00     71.68     0.07    49.39  1.000
A05              71.67    0.00     0.00    19.13     52.56     0.05    43.24  0.733
A06A              71.67    0.00     0.00    25.07     46.63     0.12   111.46  0.651
A06B              71.67    0.00     0.00    44.48     27.20     0.05    47.25  0.379
A08              71.67    0.00     0.00     7.46     64.23     0.08    57.64  0.896
A09A              71.67    0.00     0.00    24.00     47.68     0.12    93.84  0.665
A09B              71.67    0.00     0.00     0.00     71.68     0.09    64.46  1.000
A09C              71.67    0.00     0.00     0.00     71.69     0.06    39.68  1.000
A10              71.67    0.00     0.00     0.00     71.69     0.06    44.64  1.000
A11A              71.67    0.00     0.00    24.73     46.94     0.09    62.29  0.655
A11B              71.67    0.00     0.00     0.00     71.68     0.06    39.64  1.000
A11B-TR             71.67    0.00     0.00     0.00     71.69     0.02    14.88  1.000
A12              71.67    0.00     0.00     8.91     62.77     0.05    38.38  0.876
A13              71.67    0.00     0.00    12.03     59.66     0.11    84.69  0.832
A14              71.67    0.00     0.00    27.11     44.56     0.36   206.06  0.622
A15A              71.67    0.00     0.00     0.00     71.68     0.11    74.31  1.000
A15B              71.67    0.00     0.00    12.88     58.81     0.09    71.84  0.821
A16A              71.67    0.00     0.00    10.64     61.05     0.03    22.94  0.852
A16B              71.67    0.00     0.00    11.99     59.69     0.03    22.54  0.833
A16C_1             71.67    0.00     0.00     0.00     71.70     0.04    24.80  1.000
A16C_2             71.67    0.00     0.00     0.00     71.68     0.10    69.36  1.000
A17              71.67    0.00     0.00     2.63     69.05     0.08    58.70  0.963
A18              71.67    0.00     0.00    17.12     54.57     0.15   126.45  0.761
A19A              71.67    0.00     0.00    13.56     58.14     0.02    14.57  0.811
A19B              71.67    0.00     0.00    13.59     58.11     0.02    19.41  0.811
A1C              71.67    0.00     0.00     0.00     71.68     0.06    44.61  1.000
A20              71.67    0.00     0.00    22.27     49.43     0.05    50.99  0.690
A21B              71.67    0.00     0.00    12.62     59.08     0.06    50.88  0.824
A22B              71.67    0.00     0.00    23.54     48.15     0.05    44.92  0.672
```

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

A23	71.67	0.00	0.00	13.45	58.23	0.08	55.78	0.813
A24	71.67	0.00	0.00	11.59	60.09	0.10	71.33	0.839
A25	71.67	0.00	0.00	14.20	57.50	0.03	24.16	0.802
A26	71.67	0.00	0.00	32.35	39.33	0.02	13.36	0.549
A27A	71.67	0.00	0.00	13.73	57.96	0.06	45.04	0.809
A27B	71.67	0.00	0.00	12.17	59.51	0.03	24.07	0.830
A28	71.67	0.00	0.00	50.05	21.62	0.02	6.27	0.302
A29	71.67	0.00	0.00	37.58	34.09	0.20	57.16	0.476
A30	71.67	0.00	0.00	4.05	67.64	0.08	58.66	0.944
A31	71.67	0.00	0.00	9.39	62.29	0.12	89.97	0.869
A32A	71.67	0.00	0.00	13.63	58.07	0.01	9.69	0.810
A32B	71.67	0.00	0.00	13.46	58.24	0.02	19.44	0.813
A33A	71.67	0.00	0.00	14.20	57.50	0.03	29.00	0.802
A33B	71.67	0.00	0.00	14.20	57.50	0.04	33.83	0.802
A34	71.67	0.00	0.00	12.00	59.69	0.03	24.33	0.833
A35	71.67	0.00	0.00	27.34	44.35	0.04	37.28	0.619
A36	71.67	0.00	0.00	12.86	58.83	0.08	58.73	0.821
A3-A-1	71.67	0.00	0.00	9.80	61.90	0.04	29.32	0.864
A3-A-2	71.67	0.00	0.00	9.85	61.84	0.03	24.39	0.863
A3-A-3	71.67	0.00	0.00	6.42	65.27	0.03	24.49	0.911
A3-A-4	71.67	0.00	0.00	10.20	61.50	0.01	9.78	0.858
A3-DR1	71.67	0.00	0.00	19.27	52.43	0.02	14.28	0.732
A3-DR2	71.67	0.00	0.00	25.59	46.10	0.01	12.88	0.643
A3-DR3	71.67	0.00	0.00	22.75	48.95	0.00	4.61	0.683
A3-DR4	71.67	0.00	0.00	26.58	45.13	0.00	4.62	0.630
A7-A-5	71.67	0.00	0.00	10.19	61.51	0.01	9.78	0.858
A7-A-6	71.67	0.00	0.00	3.82	67.88	0.03	19.74	0.947
A7-A-7	71.67	0.00	0.00	10.37	61.33	0.04	29.28	0.856
A7-A-8	71.67	0.00	0.00	6.87	64.82	0.04	29.48	0.905
A7-DR5	71.67	0.00	0.00	26.33	45.37	0.00	4.44	0.633
A7-DR6	71.67	0.00	0.00	22.29	49.41	0.00	4.62	0.689
A7-DR7	71.67	0.00	0.00	22.77	48.93	0.00	4.59	0.683
A7-DR8	71.67	0.00	0.00	15.20	56.49	0.02	14.49	0.788
B01A	71.67	0.00	0.00	8.77	62.94	0.02	14.39	0.878
B01B	71.67	0.00	0.00	11.44	60.26	0.04	28.22	0.841
B02	71.67	0.00	0.00	17.03	54.70	0.01	4.82	0.763

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

B03	71.67	0.00	0.00	4.37	67.33	0.16	115.27	0.939
B04	71.67	0.00	0.00	14.99	56.71	0.11	87.05	0.791
B05	71.67	0.00	0.00	18.95	52.75	0.09	81.10	0.736
B06	71.67	0.00	0.00	13.62	58.08	0.03	28.03	0.810
B07	71.67	0.00	0.00	10.59	61.10	0.05	42.02	0.853
B08	71.67	0.00	0.00	6.13	65.56	0.05	33.92	0.915
B09	71.67	0.00	0.00	6.12	65.59	0.07	53.46	0.915
B10	71.67	0.00	0.00	10.55	61.15	0.04	33.16	0.853
B11	71.67	0.00	0.00	13.25	58.44	0.02	18.35	0.816
B12	71.67	0.00	0.00	7.08	64.60	0.06	42.42	0.901
B13	71.67	0.00	0.00	20.61	51.08	0.05	39.30	0.713
B14	71.67	0.00	0.00	21.99	49.70	0.04	35.20	0.694
B15	71.67	0.00	0.00	22.54	49.15	0.07	63.80	0.686
B16	71.67	0.00	0.00	20.30	51.39	0.06	56.60	0.717
B17	71.67	0.00	0.00	8.35	63.34	0.04	33.42	0.884
B19	71.67	0.00	0.00	0.00	71.68	0.11	78.72	1.000
B20A	71.67	0.00	0.00	33.10	38.57	0.03	15.03	0.538
B22	71.67	0.00	0.00	20.24	51.44	0.04	23.48	0.718
B23	71.67	0.00	0.00	0.00	71.68	0.12	84.21	1.000
B24	71.67	0.00	0.00	6.29	65.39	0.08	54.75	0.912
B25	71.67	0.00	0.00	0.00	71.69	0.04	29.76	1.000
Condo2B_TR	71.67	0.00	0.00	0.00	71.69	0.01	9.92	1.000
MR-NB	71.67	0.00	0.00	0.00	71.66	0.08	47.95	1.000
MR-SB	71.67	0.00	0.00	0.00	71.67	0.06	41.61	1.000
NA01	71.67	0.00	0.00	41.83	29.85	0.01	4.93	0.416
NA02	71.67	25.72	0.00	38.52	58.88	0.07	26.59	0.605
NA03_1	71.67	0.00	0.00	26.60	45.08	0.01	8.29	0.629
NA03_2	71.67	0.00	0.00	26.97	44.71	0.02	9.69	0.624
NA03_3	71.67	0.00	0.00	26.23	45.45	0.00	3.21	0.634
NA04_1	71.67	0.00	0.00	28.04	43.64	0.02	9.44	0.609
NA04_2	71.67	0.00	0.00	25.33	46.37	0.00	2.08	0.647
NA05	71.67	0.00	0.00	38.42	33.25	0.02	7.06	0.464
NA06	71.67	0.00	0.00	35.62	36.05	0.03	18.38	0.503
TR1-NB	71.67	0.00	0.00	0.00	71.70	0.01	4.96	1.000
TR2-NB	71.67	0.00	0.00	0.00	71.67	0.03	19.26	1.000
TR-SB	71.67	0.00	0.00	0.00	71.68	0.04	24.62	1.000

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

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Node Depth Summary

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                      Average  Maximum  Maximum  Time of Max    Reported

                        Depth    Depth      HGL   Occurrence   Max Depth

Node              Type       Meters   Meters   Meters  days hr:min      Meters

---------------------------------------------------------------------------------

10+171.51          JUNCTION     0.00     0.05    62.24     0  01:10        0.05

10+207.77          JUNCTION     0.00     0.04    62.99     0  01:11        0.04

10+314.72          JUNCTION     0.00     0.09    63.04     0  01:15        0.07

20.033.19         JUNCTION     0.00     0.09    62.80     0  01:10        0.09

20+069.15          JUNCTION     0.01     0.08    63.00     0  01:10        0.08

20+115.54          JUNCTION     0.00     0.00    63.18     0  00:00        0.00

30+038.20          JUNCTION     0.00     0.07    63.25     0  01:10        0.07

30+074.39          JUNCTION     0.00     0.09    63.08     0  01:11        0.08

40+015.59          JUNCTION     0.00     0.07    63.60     0  01:10        0.07

40+084.71          JUNCTION     0.00     0.10    63.35     0  01:12        0.09

40+121.60          JUNCTION     0.00     0.00    63.57     0  00:00        0.00

40+157.95          JUNCTION     0.00     0.02    63.12     0  01:11        0.02

50+102.24          JUNCTION     0.00     0.00    65.72     0  00:00        0.00

50+127.37          JUNCTION     0.00     0.00    65.53     0  00:00        0.00

60+148.01          JUNCTION     0.00     0.01    65.20     0  01:13        0.01

60+224.17          JUNCTION     0.00     0.04    63.91     0  01:10        0.04

60+288.71          JUNCTION     0.00     0.06    62.02     0  01:10        0.06

70-034.26         JUNCTION     0.00     0.02    65.18     0  01:10        0.02

70-152.02         JUNCTION     0.00     0.06    64.66     0  01:10        0.06

70-208.50         JUNCTION     0.00     0.07    63.98     0  01:10        0.07

80+003.32          JUNCTION     0.00     0.03    64.88     0  01:10        0.03

80+025.67          JUNCTION     0.00     0.00    64.79     0  00:00        0.00

80+078.80          JUNCTION     0.00     0.03    64.15     0  01:10        0.03

80+121.22          JUNCTION     0.00     0.03    62.57     0  01:10        0.03

80+187.36          JUNCTION     0.00     0.00    60.33     0  00:00        0.00
```

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

```
80+216.33        JUNCTION    0.00    0.00    59.71    0  00:00       0.00

80+267           JUNCTION    0.00    0.04    59.20    0  01:11       0.04

90.071.47        JUNCTION    0.00    0.08    60.07    0  01:08       0.08

90+008.28        JUNCTION    0.00    0.00    60.60    0  00:00       0.00

A15A(STOR)       JUNCTION    0.00    0.08    63.48    0  01:10       0.08

B19(STOR)        JUNCTION    0.01    0.17    63.17    0  01:10       0.17

CB01             JUNCTION    0.02    1.20    61.34    0  01:10       1.20

CB01(MS)         JUNCTION    0.00    0.03    61.36    0  01:10       0.03

CB06             JUNCTION    0.02    1.30    63.24    0  01:10       1.30

CB06(MS)         JUNCTION    0.00    0.03    63.26    0  01:10       0.03

CB08             JUNCTION    0.02    1.37    63.42    0  01:10       1.37

CB08(MS)         JUNCTION    0.00    0.02    63.43    0  01:10       0.02

CB09             JUNCTION    0.03    1.33    63.07    0  01:11       1.33

CB09(MS)         JUNCTION    0.00    0.15    63.19    0  01:11       0.14

CB1              JUNCTION    0.04    1.26    64.98    0  01:13       1.25

CB12             JUNCTION    0.02    1.48    62.93    0  01:10       1.48

CB12(MS)         JUNCTION    0.00    0.06    62.99    0  01:10       0.06

CB14             JUNCTION    0.03    1.52    62.75    0  01:10       1.52

CB14(MS)         JUNCTION    0.00    0.11    62.79    0  01:10       0.11

CB15(x2-DICBs)   JUNCTION    0.01    0.80    61.88    0  01:10       0.78

CB16(2x-DICBs)   JUNCTION    0.03    1.40    63.03    0  01:14       1.38

CB16(MS)         JUNCTION    0.00    0.11    63.05    0  01:14       0.09

CB18             JUNCTION    0.03    1.47    63.01    0  01:14       1.45

CB18(MS)         JUNCTION    0.00    0.24    63.05    0  01:14       0.22

CB2              JUNCTION    0.03    1.25    64.89    0  01:10       1.25

CB20             JUNCTION    0.03    1.72    63.18    0  01:11       1.72

CB20(MS)         JUNCTION    0.00    0.06    63.21    0  01:10       0.06

CB22             JUNCTION    0.02    1.08    63.16    0  01:11       1.05

CB22(MS)         JUNCTION    0.00    0.08    63.38    0  01:10       0.08

CB24             JUNCTION    0.02    1.37    63.77    0  01:10       1.36

CB24(MS)         JUNCTION    0.00    0.06    63.82    0  01:10       0.06

CB26             JUNCTION    0.02    1.09    64.47    0  01:10       1.09

CB26(MS)         JUNCTION    0.00    0.08    64.67    0  01:10       0.08

CB28             JUNCTION    0.01    0.85    64.42    0  01:10       0.84

CB28(MS)         JUNCTION    0.00    0.04    65.15    0  01:10       0.04

CB29             JUNCTION    0.01    0.74    61.19    0  01:10       0.73
```

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

```
CB29(MS)      JUNCTION    0.00    0.02    61.87    0  01:10      0.02
CB29B(L)      JUNCTION    0.01    0.86    61.23    0  01:10      0.82
CB3           JUNCTION    0.02    1.27    64.91    0  01:10      1.27
CB30          JUNCTION    0.02    1.52    61.23    0  01:11      1.43
CB30(MS)      JUNCTION    0.00    0.04    61.27    0  01:10      0.04
CB31          JUNCTION    0.02    1.52    61.02    0  01:11      1.41
CB31(MS)      JUNCTION    0.00    0.05    61.07    0  01:10      0.05
CB31B(L)      JUNCTION    0.03    1.73    61.12    0  01:10      1.73
CB32          JUNCTION    0.03    1.54    61.01    0  01:11      1.53
CB34          JUNCTION    0.02    1.13    63.29    0  01:10      1.07
CB34(MS)      JUNCTION    0.00    0.05    63.52    0  01:10      0.05
CB35          JUNCTION    0.01    0.64    62.54    0  01:10      0.63
CB35(MS)      JUNCTION    0.00    0.02    63.44    0  01:10      0.02
CB36          JUNCTION    0.01    0.78    62.70    0  01:11      0.77
CB36(MS)      JUNCTION    0.00    0.03    63.36    0  01:10      0.03
CB39          JUNCTION    0.03    1.41    63.41    0  01:10      1.41
CB39(MS)      JUNCTION    0.00    0.05    63.45    0  01:10      0.05
CB40          JUNCTION    0.00    0.34    62.11    0  01:10      0.33
CB40(MS)      JUNCTION    0.00    0.02    63.02    0  01:10      0.02
CB41          JUNCTION    0.01    0.79    62.39    0  01:10      0.78
CB41(MS)      JUNCTION    0.00    0.03    62.88    0  01:10      0.03
CB42          JUNCTION    0.03    1.41    63.22    0  01:10      1.41
CB42(MS)      JUNCTION    0.00    0.04    63.25    0  01:10      0.04
CB45          JUNCTION    0.02    1.80    64.72    0  01:10      1.80
CB45(MS)      JUNCTION    0.00    0.05    64.76    0  01:10      0.05
CB47          JUNCTION    0.02    1.22    64.44    0  01:11      1.14
CB47(MS)      JUNCTION    0.00    0.04    65.00    0  01:10      0.04
CB49          JUNCTION    0.01    0.44    65.26    0  01:10      0.44
CB49(MS)      JUNCTION    0.00    0.04    65.27    0  01:10      0.04
CB5           JUNCTION    0.02    1.26    65.19    0  01:10      1.26
CB51          JUNCTION    0.03    1.70    64.72    0  01:10      1.70
CB51(MS)      JUNCTION    0.00    0.05    64.75    0  01:10      0.05
CB53          JUNCTION    0.04    1.54    64.58    0  01:13      1.53
CB53(MS)      JUNCTION    0.00    0.12    64.60    0  01:13      0.10
CB55          JUNCTION    0.02    1.58    64.09    0  01:10      1.58
CB56          JUNCTION    0.00    0.15    62.57    0  01:10      0.13
```

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

```
CB58          JUNCTION    0.00    0.61   63.87    0  01:11       0.49

CB58(MS)        JUNCTION    0.00    0.01   64.77    0  01:10       0.01

CB6          JUNCTION    0.02    1.25   64.76    0  01:10       1.25

CB60          JUNCTION    0.02    1.75   64.91    0  01:10       1.75

CB60(MS)        JUNCTION    0.00    0.03   64.93    0  01:10       0.03

CB62          JUNCTION    0.03    1.53   62.69    0  01:10       1.52

CB62(MS)        JUNCTION    0.00    0.06   63.06    0  01:10       0.06

CB63          JUNCTION    0.02    1.06   62.12    0  01:10       1.05

CB63(MS)        JUNCTION    0.00    0.04   62.70    0  01:10       0.04

CB65          JUNCTION    0.04    1.85   61.28    0  01:10       1.85

CB65(MS)        JUNCTION    0.00    0.08   61.33    0  01:10       0.08

CB67          JUNCTION    0.03    1.82   60.25    0  01:10       1.82

CB67(MS)        JUNCTION    0.00    0.03   60.27    0  01:10       0.03

CB69          JUNCTION    0.02    1.62   60.00    0  01:11       1.62

CB69(MS)        JUNCTION    0.00    0.05   60.02    0  01:11       0.05

CB70          JUNCTION    0.06    1.49   59.30    0  01:10       1.48

CB70(MS)        JUNCTION    0.00    0.08   59.34    0  01:10       0.08

CB71          JUNCTION    0.22    1.94   59.60    0  01:10       1.94

CB71(MS)        JUNCTION    0.00    0.04   59.63    0  01:10       0.04

CB73          JUNCTION    0.11    1.56   59.31    0  01:10       1.55

CB73(MS)        JUNCTION    0.00    0.03   59.33    0  01:10       0.03

CB74(4x-DICBs)      JUNCTION    0.91    1.83   58.78    0  01:10       1.80

CB75          JUNCTION    0.25    1.55   59.17    0  01:10       1.54

CB75(MS)        JUNCTION    0.00    0.07   59.22    0  01:10       0.07

CB76          JUNCTION    0.02    1.33   60.94    0  01:11       1.21

CB76(MS)        JUNCTION    0.00    0.06   61.27    0  01:10       0.06

CB77          JUNCTION    0.03    1.62   62.59    0  01:10       1.62

CB77(MS)        JUNCTION    0.00    0.06   62.63    0  01:10       0.06

CB78          JUNCTION    0.03    1.76   60.22    0  01:11       1.75

CB79          JUNCTION    0.54    1.71   59.05    0  01:12       1.69

CB79(MS)        JUNCTION    0.00    0.12   59.07    0  01:12       0.10

CB8          JUNCTION    0.02    1.25   64.08    0  01:10       1.25

CB80          JUNCTION    0.03    1.61   64.14    0  01:10       1.61

CB80(MS)        JUNCTION    0.00    0.05   64.18    0  01:10       0.05

CB82          JUNCTION    0.01    0.44   63.83    0  01:10       0.43

CBMH1          JUNCTION    0.02    0.26   62.18    0  01:20       0.26
```

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

```
CBMH4           JUNCTION    0.02    1.25    65.20    0  01:06      1.25

CBMH7           JUNCTION    0.02    1.26    64.51    0  01:10      1.26

CB-PL           JUNCTION    0.00    0.03    64.96    0  01:10      0.03

HP              JUNCTION    0.00    0.00    59.20    0  00:00      0.00

HP01            JUNCTION    0.00    0.07    61.11    0  01:10      0.06

HP02            JUNCTION    0.02    0.06    61.34    0  01:10      0.06

HP03            JUNCTION    0.00    0.08    60.95    0  01:11      0.07

HP04            JUNCTION    0.00    0.00    62.65    0  00:00      0.00

J1              JUNCTION    0.00    0.00    62.76    0  00:00      0.00

J10             JUNCTION    0.00    0.02    64.89    0  01:10      0.02

J11             JUNCTION    0.00    0.01    64.76    0  01:10      0.01

J12             JUNCTION    0.00    0.01    64.51    0  01:10      0.01

J13             JUNCTION    0.00    0.01    64.08    0  01:10      0.01

J14             JUNCTION    0.01    0.36    63.96    0  01:10      0.36

J15             JUNCTION    0.01    0.47    58.88    0  01:13      0.44

J16             JUNCTION    0.00    0.06    64.38    0  01:10      0.06

J17             JUNCTION    1.50    1.85    58.20    0  01:11      1.83

J18             JUNCTION    0.00    0.00    59.06    0  00:00      0.00

J19             JUNCTION    0.06    0.61    59.00    0  01:13      0.60

J20             JUNCTION    1.51    1.85    58.19    0  01:11      1.83

J3              JUNCTION    0.01    0.34    60.62    0  01:11      0.31

J5              JUNCTION    0.01    0.15    61.57    0  01:10      0.15

J6              JUNCTION    0.00    0.01    64.91    0  01:10      0.01

J7              JUNCTION    0.00    0.00    65.20    0  01:10      0.00

J8              JUNCTION    0.00    0.00    65.18    0  01:10      0.00

J9              JUNCTION    0.01    0.03    64.98    0  01:13      0.03

MH314(DUMMY)      JUNCTION    0.01    0.94    59.34    0  01:12      0.85

MH328(DUMMY)      JUNCTION    0.85    1.64    58.65    0  01:11      1.58

Clegg           OUTFALL    0.00    0.04    61.34    0  01:10      0.04

MainNorth         OUTFALL    0.00    0.00    64.70    0  00:00      0.00

MainSouth         OUTFALL    0.00    0.04    65.05    0  01:10      0.04

OF1             OUTFALL    0.00    0.00    56.00    0  00:00      0.00

Out1            OUTFALL    0.00    0.08    60.58    0  01:11      0.07

Out2            OUTFALL    0.00    0.06    60.56    0  01:10      0.06

Out3            OUTFALL    0.00    0.00    62.50    0  00:00      0.00

Outlet1-Phase1     OUTFALL    1.82    1.82    57.85    0  00:00      1.82
```

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

```
Outlet2-Phase2&3     OUTFALL     1.82     1.82    57.85     0  00:00       1.82

Phase1-EmergencyOverflow OUTFALL     0.00     0.00    56.00     0  00:00       0.00

Phase2-EmergencyOverflow OUTFALL     0.00     0.00    56.00     0  00:00       0.00

A04(STOR)          STORAGE     0.84     2.51    63.64     0  01:26       2.51

A09B(STOR)         STORAGE     0.00     0.04   100.04     0  01:26       0.04

A09C(STOR)         STORAGE     0.00     0.04   100.04     0  01:25       0.04

A10(STOR)          STORAGE     0.00     0.04   100.04     0  01:25       0.04

A11B(STOR)         STORAGE     0.41     1.98    62.96     0  01:30       1.97

A14(STOR)          STORAGE     0.05     1.25    63.95     0  01:13       1.25

A16C(STOR)         STORAGE     0.00     0.01    65.23     0  01:10       0.01

A22A(STOR)         STORAGE     0.01     0.11   100.11     0  01:37       0.11

B21(STOR)          STORAGE     0.01     0.11   100.11     0  01:40       0.11

B23(STOR)          STORAGE     1.43     3.57    60.08     0  01:09       3.57

B25(STOR)          STORAGE     0.00     0.04   100.04     0  01:25       0.04

CB1-GAPark         STORAGE     0.02     2.22    64.21     0  01:11       2.12

CBMH2              STORAGE     0.02     0.41    61.39     0  01:12       0.29

Dummy-MH128        STORAGE     0.04     1.26    61.17     0  01:12       1.18

GA-ParkSouthStorage  STORAGE     0.03     1.45    64.55     0  01:20       1.45

J2                 STORAGE     0.01     0.04    65.41     0  01:30       0.04

J4                 STORAGE     0.01     0.03   100.03     0  01:20       0.03

MH100              STORAGE     0.02     0.37    60.34     0  01:13       0.24

MH102              STORAGE     0.01     0.40    60.30     0  01:13       0.23

MH104              STORAGE     0.03     0.42    60.26     0  01:13       0.29

MH106              STORAGE     0.08     0.56    60.21     0  01:13       0.43

MH108              STORAGE     0.09     0.59    60.18     0  01:13       0.48

MH110              STORAGE     0.03     1.04    60.67     0  01:12       0.98

MH110B             STORAGE     0.04     1.15    60.57     0  01:12       1.08

MH112B             STORAGE     0.04     1.18    60.42     0  01:12       1.12

MH114              STORAGE     0.87     1.97    60.05     0  01:12       1.92

MH118              STORAGE     0.11     1.05    59.46     0  01:13       1.03

MH122              STORAGE     0.10     0.57    59.87     0  01:13       0.48

MH122B             STORAGE     0.10     1.19    59.77     0  01:13       1.10

MH124              STORAGE     0.03     0.35    60.90     0  01:11       0.34

MH126              STORAGE     0.02     0.31    61.62     0  01:10       0.30

MH128              STORAGE     0.04     1.25    61.27     0  01:12       1.16

MH130              STORAGE     0.32     0.99    61.97     0  01:12       0.97
```

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

MH132	STORAGE	0.04	0.70	62.04	0	01:11	0.68
MH136	STORAGE	0.01	0.12	61.02	0	01:10	0.12
MH140	STORAGE	0.01	0.14	60.94	0	01:11	0.14
MH144	STORAGE	0.04	0.52	59.96	0	01:13	0.42
MH148	STORAGE	0.01	0.15	61.37	0	01:11	0.15
MH152	STORAGE	1.42	1.53	61.45	0	01:10	1.53
MH164	STORAGE	0.03	0.69	62.12	0	01:12	0.67
MH166	STORAGE	0.02	0.58	62.23	0	01:11	0.55
MH168	STORAGE	0.02	0.58	62.32	0	01:11	0.56
MH170	STORAGE	0.77	1.24	62.37	0	01:11	1.21
MH172	STORAGE	0.03	0.37	62.43	0	01:11	0.34
MH174	STORAGE	0.05	0.38	62.55	0	01:11	0.37
MH176	STORAGE	0.07	0.27	63.17	0	01:10	0.27
MH178	STORAGE	0.02	0.41	62.43	0	01:11	0.40
MH180	STORAGE	0.01	0.22	63.07	0	01:12	0.22
MH182	STORAGE	0.05	0.28	62.76	0	01:17	0.27
MH220	STORAGE	0.01	0.75	60.22	0	01:14	0.58
MH222	STORAGE	0.03	0.92	59.95	0	01:14	0.79
MH224	STORAGE	0.02	0.80	59.97	0	01:14	0.66
MH226	STORAGE	0.00	0.16	60.38	0	01:13	0.09
MH228	STORAGE	0.01	0.29	60.36	0	01:13	0.18
MH230	STORAGE	0.01	0.46	60.23	0	01:13	0.31
MH238	STORAGE	0.03	0.64	58.78	0	01:13	0.61
MH242	STORAGE	1.86	2.29	58.29	0	01:13	2.24
MH246	STORAGE	0.02	0.44	60.28	0	01:13	0.28
MH248	STORAGE	0.03	0.56	62.17	0	01:11	0.54
MH250	STORAGE	0.05	0.27	62.90	0	01:10	0.27
MH300	STORAGE	0.00	0.09	62.49	0	01:11	0.09
MH302	STORAGE	0.00	0.10	61.62	0	01:12	0.10
MH304	STORAGE	0.01	0.15	61.06	0	01:10	0.15
MH306	STORAGE	0.01	0.23	59.67	0	01:10	0.23
MH308	STORAGE	0.01	0.53	59.20	0	01:11	0.39
MH310	STORAGE	1.35	2.14	58.65	0	01:11	2.07
MH312	STORAGE	0.00	0.07	61.71	0	01:10	0.07
MH314	STORAGE	0.01	0.10	60.71	0	01:10	0.10
MH316	STORAGE	0.73	1.87	59.00	0	01:12	1.76

```
MH318          STORAGE    0.34    1.51   59.03    0  01:12       1.37

MH320          STORAGE    0.91    1.90   58.85    0  01:11       1.81

MH322          STORAGE    0.95    1.91   58.82    0  01:11       1.82

MH324          STORAGE    0.02    0.08   60.73    0  01:10       0.08

MH326          STORAGE    0.01    0.13   59.30    0  01:12       0.12

MH328          STORAGE    0.01    0.69   58.73    0  01:11       0.62

MH330          STORAGE    0.81    1.64   58.69    0  01:10       1.59

MH332          STORAGE    1.33    2.13   58.66    0  01:10       2.10

MH334          STORAGE    1.53    2.20   58.53    0  01:11       2.16

MH336          STORAGE    1.50    1.86   58.21    0  01:11       1.83

MH338          STORAGE    1.52    1.85   58.18    0  01:11       1.83

MH340          STORAGE    1.84    2.08   58.09    0  01:11       2.06

MH400          STORAGE    0.00    0.00   62.79    0  00:00       0.00

MH402          STORAGE    0.00    0.09   62.95    0  01:10       0.09

MH404          STORAGE    0.00    0.00   63.26    0  00:00       0.00

MH406          STORAGE    0.00    0.07   62.86    0  01:10       0.07

MH408          STORAGE    0.00    0.00   62.98    0  00:00       0.00

MH410          STORAGE    0.00    0.06   62.55    0  01:10       0.06

MH412          STORAGE    0.00    0.00   62.28    0  00:00       0.00

MH414          STORAGE    0.00    0.15   62.05    0  01:11       0.11

VortechsPh1      STORAGE    0.12    0.95   59.35    0  01:13       0.94

VortechsPh2      STORAGE    1.51    1.86   58.20    0  01:11       1.83



*******************

Node Inflow Summary

*******************



-------------------------------------------------------------------------------------------------

                      Maximum  Maximum                Lateral       Total        Flow

                      Lateral    Total  Time of Max      Inflow       Inflow     Balance

                       Inflow   Inflow   Occurrence      Volume       Volume       Error

Node             Type         LPS      LPS  days hr:min    10^6 ltr    10^6 ltr     Percent

-------------------------------------------------------------------------------------------------

10+171.51        JUNCTION     0.00    41.74    0  01:10          0      0.0243       0.031

10+207.77        JUNCTION     0.00    25.55    0  01:10          0      0.0134       0.608
```

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

```
10+314.72     JUNCTION    0.00    97.50   0  01:13        0      0.0467     0.576
20.033.19     JUNCTION    0.00    77.78   0  01:10        0      0.0493     0.780
20+069.15     JUNCTION    0.00    43.47   0  01:10        0      0.0339    -0.073
20+115.54     JUNCTION    0.00     0.00   0  00:00        0           0     0.000 ltr
30+038.20     JUNCTION    0.00    86.42   0  01:10        0      0.0669    -0.337
30+074.39     JUNCTION    0.00   129.59   0  01:11        0      0.0757    -0.032
40+015.59     JUNCTION    0.00   126.17   0  01:10        0      0.0717     0.637
40+084.71     JUNCTION    0.00    71.63   0  01:10        0      0.0373     2.790
40+121.60     JUNCTION    0.00     0.00   0  00:00        0           0     0.000 ltr
40+157.95     JUNCTION    0.00     4.55   0  01:10        0     0.00154    10.140
50+102.24     JUNCTION    0.00     0.00   0  00:00        0           0     0.000 ltr
50+127.37     JUNCTION    0.00     0.00   0  00:00        0           0     0.000 ltr
60+148.01     JUNCTION    0.00     2.10   0  01:10        0     0.00119    16.947
60+224.17     JUNCTION   14.28    22.02   0  01:10   0.0157      0.0187     0.779
60+288.71     JUNCTION    0.00    74.73   0  01:10        0       0.051     0.336
70-034.26     JUNCTION    4.61     4.61   0  01:10  0.00489     0.00489     1.217
70-152.02     JUNCTION    4.62    68.73   0  01:10  0.00494      0.0357    -0.168
70-208.50     JUNCTION   19.08   106.56   0  01:10   0.0218       0.067     0.141
80+003.32     JUNCTION    0.00    16.69   0  01:10        0     0.00581     1.383
80+025.67     JUNCTION    0.00     0.00   0  00:00        0           0     0.000 ltr
80+078.80     JUNCTION    0.00    22.53   0  01:10        0      0.0119     0.462
80+121.22     JUNCTION    0.00    35.61   0  01:10        0      0.0216    -0.210
80+187.36     JUNCTION    0.00     0.00   0  00:00        0           0     0.000 ltr
80+216.33     JUNCTION    0.00     0.00   0  00:00        0           0     0.000 ltr
80+267        JUNCTION    0.00    23.88   0  01:10        0      0.0112    -4.072
90.071.47     JUNCTION    0.00   181.44   0  01:10        0       0.113     0.016
90+008.28     JUNCTION    0.00     0.00   0  00:00        0           0     0.000 ltr
A15A(STOR)    JUNCTION   74.31    74.31   0  01:10    0.108       0.108     0.016
B19(STOR)     JUNCTION   78.72    78.72   0  01:10    0.115       0.115    -0.003
CB01          JUNCTION    0.00    39.97   0  01:05        0      0.0591     0.010
CB01(MS)      JUNCTION   45.04    56.58   0  01:10    0.058      0.0656    -0.098
CB06          JUNCTION    0.00    18.77   0  01:07        0      0.0283     0.007
CB06(MS)      JUNCTION   22.54    22.54   0  01:10   0.0298      0.0298    -0.009
CB08          JUNCTION    0.00    18.95   0  01:07        0      0.0288     0.015
CB08(MS)      JUNCTION   22.94    22.94   0  01:10   0.0305      0.0305    -0.532
CB09          JUNCTION    0.00    77.00   0  01:08        0        0.15     0.004
```

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

```
CB09(MS)          JUNCTION    126.45   205.41    0  01:10      0.153       0.22      -0.146

CB1             JUNCTION     9.78     9.78    0  01:10     0.0123     0.0123     -0.066

CB12             JUNCTION     0.00    59.45    0  01:09         0      0.114      0.011

CB12(MS)          JUNCTION     89.97   131.10    0  01:10      0.125      0.158     -0.193

CB14             JUNCTION     0.00    48.96    0  01:03         0     0.0869      0.005

CB14(MS)          JUNCTION     58.73   127.51    0  01:10     0.0765      0.125      0.046

CB15(x2-DICBs)      JUNCTION     71.33   156.18    0  01:10     0.0962      0.175      0.000

CB16(2x-DICBs)      JUNCTION     0.00    44.70    0  01:03         0     0.0883      0.013

CB16(MS)          JUNCTION     55.78    76.66    0  01:10     0.0757     0.0926      0.470

CB18             JUNCTION     0.00    48.66    0  01:09         0     0.0877      0.019

CB18(MS)          JUNCTION     50.99   163.23    0  01:11     0.0544      0.131      0.651

CB2             JUNCTION     9.78     9.78    0  01:10     0.0123     0.0125     -0.019

CB20             JUNCTION     0.00    34.90    0  01:05         0     0.0646     -0.005

CB20(MS)          JUNCTION     54.37    90.93    0  01:10     0.0682     0.0893     -0.431

CB22             JUNCTION     0.00    67.74    0  01:10         0      0.108      0.010

CB22(MS)          JUNCTION     71.84   147.97    0  01:10     0.0941      0.142     -0.552

CB24             JUNCTION     0.00    58.04    0  01:08         0      0.109      0.008

CB24(MS)          JUNCTION     84.69   184.84    0  01:10      0.113       0.18     -0.093

CB26             JUNCTION     0.00    68.10    0  01:10         0      0.132      0.004

CB26(MS)          JUNCTION    100.68   100.68    0  01:10      0.144      0.145     -0.029

CB28             JUNCTION     0.00    74.77    0  01:10         0      0.116      0.006

CB28(MS)          JUNCTION     93.84    93.84    0  01:10      0.124      0.124     -0.042

CB29             JUNCTION     0.00    12.59    0  01:10         0     0.0211      0.000

CB29(MS)          JUNCTION     24.16    24.16    0  01:10     0.0287     0.0287      0.022

CB29B(L)         JUNCTION     13.36    13.36    0  01:10     0.0197     0.0197     -0.303

CB3             JUNCTION    29.32    29.32    0  01:10     0.0371     0.0372      0.037

CB30             JUNCTION     0.00    18.36    0  01:10         0     0.0274     -0.005

CB30(MS)          JUNCTION     29.00    35.38    0  01:10     0.0345     0.0368      0.397

CB31             JUNCTION     0.00    23.30    0  01:10         0     0.0349     -0.003

CB31(MS)          JUNCTION     33.83    49.68    0  01:10     0.0402     0.0495      0.248

CB31B(L)         JUNCTION     37.28    37.28    0  01:10     0.0444     0.0444     -0.010

CB32             JUNCTION    24.33    48.82    0  01:10     0.0298     0.0443      0.038

CB34             JUNCTION     0.00    51.52    0  01:10         0     0.0863      0.009

CB34(MS)          JUNCTION     59.84    97.26    0  01:10     0.0839      0.107     -0.274

CB35             JUNCTION     0.00    11.62    0  01:10         0     0.0157      0.000

CB35(MS)          JUNCTION     14.57    14.57    0  01:10     0.0174     0.0174     -0.021
```

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

```
CB36          JUNCTION     0.00    13.00    0  01:10        0     0.0194      0.000

CB36(MS)          JUNCTION    19.41    22.32    0  01:10     0.0232      0.025     -0.660

CB39          JUNCTION     0.00    21.01    0  01:04        0     0.0523      0.000

CB39(MS)          JUNCTION    58.70    58.70    0  01:10     0.0829     0.0829     -0.029

CB40          JUNCTION     0.00     8.09    0  01:10        0     0.0107      0.000

CB40(MS)          JUNCTION     9.69     9.69    0  01:10     0.0116     0.0116      0.093

CB41          JUNCTION     0.00    12.99    0  01:10        0     0.0192      0.000

CB41(MS)          JUNCTION    19.44    21.00    0  01:10     0.0233     0.0242     -0.286

CB42          JUNCTION     0.00    19.82    0  01:07        0     0.0489     -0.009

CB42(MS)          JUNCTION    58.66    58.66    0  01:10     0.0812     0.0812      0.067

CB45          JUNCTION     0.00    48.22    0  01:08        0     0.0763     -0.004

CB45(MS)          JUNCTION    62.09    89.34    0  01:10     0.0816     0.0944     -0.105

CB47          JUNCTION     0.00    38.49    0  01:10        0      0.058      0.009

CB47(MS)          JUNCTION    47.87    59.00    0  01:10      0.059     0.0653      0.026

CB49          JUNCTION     0.00    14.11    0  01:01        0     0.0289     -0.014

CB49(MS)          JUNCTION    32.61    32.61    0  01:10     0.0409     0.0409     -0.266

CB5          JUNCTION    24.49    24.49    0  01:10     0.0326     0.0326     -0.018

CB51          JUNCTION     0.00    30.04    0  01:06        0     0.0449      0.003

CB51(MS)          JUNCTION    35.59    55.62    0  01:10     0.0437     0.0547     -1.472

CB53          JUNCTION     0.00    38.22    0  01:02        0     0.0685     -0.004

CB53(MS)          JUNCTION    43.65    67.91    0  01:10     0.0589     0.0695      1.498

CB55          JUNCTION    24.07    24.07    0  01:10     0.0298     0.0298     -0.005

CB56          JUNCTION     0.00     5.43    0  01:10        0    0.00118      0.003

CB58          JUNCTION     0.00    12.43    0  01:10        0    0.00828      0.003

CB58(MS)          JUNCTION     4.82    12.73    0  01:10    0.00547    0.00828     -0.040

CB6          JUNCTION    19.74    19.74    0  01:10     0.0272     0.0272    -10.937

CB60          JUNCTION     0.00    23.59    0  01:07        0      0.032      0.005

CB60(MS)          JUNCTION    27.27    27.69    0  01:10     0.0327     0.0332     -0.024

CB62          JUNCTION     0.00    59.84    0  01:10        0      0.127      0.009

CB62(MS)          JUNCTION   115.27   135.85    0  01:10      0.159      0.177     -0.206

CB63          JUNCTION     0.00    19.65    0  01:10        0     0.0362      0.008

CB63(MS)          JUNCTION    33.92    55.91    0  01:10     0.0459     0.0577     -0.113

CB65          JUNCTION     0.00    56.43    0  01:02        0      0.132      0.010

CB65(MS)          JUNCTION   141.80   215.41    0  01:10      0.186      0.237     -0.009

CB67          JUNCTION     0.00    24.28    0  01:05        0     0.0454      0.014

CB67(MS)          JUNCTION    42.42    42.42    0  01:10     0.0581     0.0581     -0.159
```

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

```
CB69            JUNCTION     0.00    22.67    0  01:06         0      0.028      -0.029

CB69(MS)            JUNCTION    18.35    27.68    0  01:10     0.0234     0.0282      0.753

CB70            JUNCTION     0.00    29.05    0  01:06         0     0.0466      0.019

CB70(MS)            JUNCTION    39.30   288.41    0  01:10      0.046       0.18      0.183

CB71            JUNCTION     0.00    16.81    0  01:07         0     0.0321     -0.062

CB71(MS)            JUNCTION    33.16    33.16    0  01:10     0.0428     0.0428      0.204

CB73            JUNCTION     0.00    31.51    0  01:09         0     0.0404      0.113

CB73(MS)            JUNCTION    35.20    54.61    0  01:10     0.0398     0.0505      0.256

CB74(4x-DICBs)      JUNCTION    56.60   460.04    0  01:10     0.0617      0.301     -0.001

CB75            JUNCTION     0.00    31.11    0  01:08         0     0.0673     -0.007

CB75(MS)            JUNCTION    81.10   133.91    0  01:10      0.095      0.133      0.009

CB76            JUNCTION     0.00    26.67    0  01:10         0     0.0557      0.002

CB76(MS)            JUNCTION    45.56    84.76    0  01:10     0.0692     0.0935      0.182

CB77            JUNCTION     0.00    22.14    0  01:06         0     0.0468     -0.021

CB77(MS)            JUNCTION    41.64    62.85    0  01:10     0.0579     0.0712      0.093

CB78            JUNCTION    53.46    88.04    0  01:10     0.0722     0.0938     -0.243

CB79            JUNCTION     0.00    21.63    0  01:05         0     0.0463     -0.017

CB79(MS)            JUNCTION    63.80    83.57    0  01:10     0.0737     0.0854      0.808

CB8            JUNCTION    29.48    29.48    0  01:10     0.0389     0.0389     -0.013

CB80            JUNCTION     0.00    21.05    0  01:06         0      0.043     -0.004

CB80(MS)            JUNCTION    42.02    42.02    0  01:10      0.055      0.055      0.163

CB82            JUNCTION    28.22    37.98    0  01:10     0.0362     0.0407     -0.000

CBMH1            JUNCTION    63.44    63.44    0  01:20      0.221      0.221     -0.000

CBMH4            JUNCTION    24.39    24.39    0  01:10     0.0309     0.0309      0.020

CBMH7            JUNCTION    29.28    29.28    0  01:10     0.0368     0.0368     -0.008

CB-PL            JUNCTION    44.61    44.61    0  01:10     0.0645     0.0645     -0.078

HP            JUNCTION     0.00     0.00    0  00:00         0          0      0.000 ltr

HP01            JUNCTION     0.00    20.10    0  01:10         0    0.00561      0.110

HP02            JUNCTION     0.00    11.67    0  01:10         0    0.00419      0.270

HP03            JUNCTION     0.00    24.73    0  01:11         0     0.0123      0.045

HP04            JUNCTION     0.00     0.00    0  00:00         0          0      0.000 ltr

J1            JUNCTION     0.00     0.00    0  00:00         0          0      0.000 ltr

J10            JUNCTION     0.00     7.62    0  01:04         0    0.00242     -0.015

J11            JUNCTION     0.00     9.23    0  01:05         0    0.00322     -0.164

J12            JUNCTION     0.00    13.04    0  01:10         0    0.00475      0.000

J13            JUNCTION     0.00    13.29    0  01:10         0    0.00545     -0.040
```

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

```
J14            JUNCTION    0.00    44.61    0  01:10         0     0.0646      0.011

J15            JUNCTION    0.00  1359.58    0  01:13         0       2.2       0.000

J16            JUNCTION    0.00    79.17    0  01:10         0     0.0399      0.391

J17            JUNCTION    0.00   830.62    0  01:11         0       1.57      -0.005

J18            JUNCTION    0.00     0.00    0  00:00         0         0       0.000 ltr

J19            JUNCTION    0.00   335.59    0  01:13         0       1.69      -0.000

J20            JUNCTION    0.00    89.48    0  01:11         0      0.243      -1.130

J3             JUNCTION    0.00    94.16    0  01:10         0      0.15       0.922

J5             JUNCTION   69.36    69.36    0  01:10        0.1      0.1       0.004

J6             JUNCTION    0.00    13.25    0  01:05         0    0.00462     -0.001

J7             JUNCTION    0.00     9.07    0  01:06         0    0.00245      0.013

J8             JUNCTION    0.00     8.82    0  01:07         0    0.00218     -0.018

J9             JUNCTION    0.00     8.85    0  01:08         0   0.000827     -9.653

MH314(DUMMY)       JUNCTION    0.00    90.08    0  01:04         0      0.173     -0.013

MH328(DUMMY)       JUNCTION    0.00   127.48    0  01:13         0      0.391      0.008

Clegg            OUTFALL     0.00    11.27    0  01:10         0    0.00418      0.000

MainNorth          OUTFALL      0.00     0.00    0  00:00         0         0       0.000 ltr

MainSouth          OUTFALL      0.00    16.26    0  01:10         0    0.00821      0.000

OF1              OUTFALL      0.00     0.00    0  00:00         0         0       0.000 ltr

Out1             OUTFALL      0.00    24.72    0  01:11         0     0.0123      0.000

Out2             OUTFALL      0.00    19.96    0  01:10         0    0.00559      0.000

Out3             OUTFALL      0.00     0.00    0  00:00         0         0       0.000 ltr

Outlet1-Phase1      OUTFALL      0.00  1695.26    0  01:13         0       3.89      0.000

Outlet2-Phase2&3     OUTFALL      0.00   920.19    0  01:11         0       1.66      0.000

Phase1-EmergencyOverflow OUTFALL      0.00     0.00    0  00:00         0         0       0.000 ltr

Phase2-EmergencyOverflow OUTFALL      0.00     0.00    0  00:00         0         0       0.000 ltr

A04(STOR)          STORAGE     49.39    51.79    0  01:10     0.0717       0.1      0.455

A09B(STOR)          STORAGE     64.46    64.46    0  01:10     0.0932     0.0932     -0.011

A09C(STOR)          STORAGE     39.68    39.68    0  01:10     0.0574     0.0574     -0.009

A10(STOR)          STORAGE     44.64    44.64    0  01:10     0.0645     0.0645     -0.009

A11B(STOR)          STORAGE     39.64    41.74    0  01:10     0.0573     0.0845      0.035

A14(STOR)          STORAGE    206.06   206.06    0  01:10      0.356      0.356     -0.003

A16C(STOR)          STORAGE     24.80    24.80    0  01:10     0.0358     0.0358     -0.021

A22A(STOR)          STORAGE     66.23    66.23    0  01:10       0.1       0.1      0.000

B21(STOR)          STORAGE     72.17    72.17    0  01:10      0.115      0.115      0.001

B23(STOR)          STORAGE     84.21    84.21    0  01:10      0.122       0.14      0.019
```

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

```
B25(STOR)          STORAGE     29.76    29.76    0  01:10      0.043      0.043      -0.009

CB1-GAPark          STORAGE     111.46   111.46    0  01:10      0.117      0.117      0.003

CBMH2            STORAGE      0.00   109.00    0  01:01         0      0.356     -0.001

Dummy-MH128        STORAGE      0.00   804.44    0  01:11         0      1.95      0.012

GA-ParkSouthStorage  STORAGE     47.25    47.25    0  01:10      0.049      0.049      0.005

J2               STORAGE     14.88    14.88    0  01:10     0.0215     0.0245     -0.209

J4               STORAGE      9.92      9.92    0  01:10     0.0143     0.0173     -2.651

MH100            STORAGE      0.00    59.95    0  01:10         0       0.1      0.086

MH102            STORAGE      0.00    74.34    0  01:13         0      0.25      0.025

MH104            STORAGE      0.00    57.03    0  01:10         0       0.1      0.188

MH106            STORAGE      0.00   130.57    0  01:16         0      0.351     -0.000

MH108            STORAGE      0.00   243.19    0  01:12         0      0.462      0.002

MH110            STORAGE      0.00   868.01    0  01:11         0      2.16     -0.066

MH110B            STORAGE      0.00   925.09    0  01:10         0      2.35     -0.000

MH112B            STORAGE      0.00   980.59    0  01:11         0      2.47     -0.003

MH114            STORAGE      0.00  1267.14    0  01:12         0      3.02      0.015

MH118            STORAGE      0.00  1695.14    0  01:13         0      3.89     -0.014

MH122            STORAGE      0.00   310.63    0  01:12         0      0.626      0.008

MH122B            STORAGE      0.00   431.78    0  01:13         0      0.875      0.011

MH124            STORAGE      0.00   138.92    0  01:11         0      0.372     -0.002

MH126            STORAGE     18.38   102.33    0  01:10     0.0324      0.284      0.000

MH128            STORAGE      0.00   763.71    0  01:12         0      1.85      0.000

MH130            STORAGE      0.00   656.38    0  01:11         0      1.49     -0.007

MH132            STORAGE      0.00   592.46    0  01:11         0       1.3      0.009

MH136            STORAGE      0.00    17.20    0  01:10         0     0.0489     -0.002

MH140            STORAGE      0.00    20.71    0  01:10         0     0.0299     -0.006

MH144            STORAGE      0.00   312.96    0  01:12         0      0.625      0.002

MH148            STORAGE      0.00    24.04    0  01:10         0     0.0351     -0.005

MH152            STORAGE      0.00    17.23    0  01:10         0     0.0539     -0.001

MH164            STORAGE      0.00   576.56    0  01:10         0      1.27      0.008

MH166            STORAGE      0.00   343.53    0  01:10         0      0.67      0.002

MH168            STORAGE      0.00   321.21    0  01:10         0      0.611      0.065

MH170            STORAGE      0.00   189.43    0  01:11         0      0.419     -0.012

MH172            STORAGE      0.00   125.56    0  01:11         0      0.244     -0.091

MH174            STORAGE      0.00   109.80    0  01:10         0      0.216      0.171

MH176            STORAGE      0.00    98.01    0  01:10         0      0.331      0.221
```

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

```
MH178       STORAGE   0.00   164.00   0  01:11      0      0.463    -0.001
MH180       STORAGE   0.00    51.37   0  01:11      0      0.113    -0.004
MH182       STORAGE   0.00    60.53   0  01:11      0      0.142    -0.473
MH220       STORAGE   0.00    36.82   0  01:10      0      0.0623   -0.072
MH222       STORAGE   0.00    64.22   0  01:15      0      0.133     0.111
MH224       STORAGE   0.00    17.38   0  01:04      0      0.032    -0.028
MH226       STORAGE   0.00    12.32   0  01:10      0      0.0211   -0.074
MH228       STORAGE   0.00    25.57   0  01:10      0      0.0409   -0.149
MH230       STORAGE   0.00    78.42   0  01:16      0      0.251    -0.053
MH238       STORAGE   0.00  1695.13   0  01:13      0      3.89      0.000
MH242       STORAGE   0.00  1695.24   0  01:13      0      3.9      -0.000
MH246       STORAGE   0.00    75.45   0  01:15      0      0.25     -0.031
MH248       STORAGE   0.00   399.00   0  01:10      0      0.773    -0.036
MH250       STORAGE   0.00    97.54   0  01:10      0      0.33     -0.280
MH300       STORAGE   0.00    27.38   0  01:11      0      0.0408   -0.001
MH302       STORAGE   0.00    27.35   0  01:11      0      0.0408    0.029
MH304       STORAGE   0.00    90.30   0  01:10      0      0.21     -0.007
MH306       STORAGE   0.00   167.90   0  01:10      0      0.325     0.023
MH308       STORAGE   0.00   214.36   0  01:10      0      0.457    -0.008
MH310       STORAGE   0.00   363.90   0  01:12      0      0.887    -0.034
MH312       STORAGE   0.00    18.43   0  01:10      0      0.043    -0.003
MH314       STORAGE   0.00    37.44   0  01:10      0      0.0792    0.021
MH316       STORAGE   0.00   111.67   0  01:08      0      0.235    -0.041
MH318       STORAGE   0.00    13.67   0  01:07      0      0.0329    0.024
MH320       STORAGE   0.00   120.59   0  01:15      0      0.236    -0.000
MH322       STORAGE   0.00   142.68   0  01:15      0      0.281    -0.000
MH324       STORAGE   0.00    18.50   0  01:10      0      0.0468   -0.001
MH326       STORAGE  26.59    77.37   0  01:12      0.0707 0.288    -0.051
MH328       STORAGE  23.48    96.52   0  01:10      0.036  0.324     0.065
MH330       STORAGE   0.00    38.38   0  01:08      0      0.0884   -0.055
MH332       STORAGE   0.00   488.08   0  01:10      0      0.389    -0.000
MH334       STORAGE   0.00   925.62   0  01:10      0      1.67      0.000
MH336       STORAGE   0.00   920.75   0  01:11      0      1.74     -0.001
MH338       STORAGE   0.00   920.06   0  01:11      0      1.74      0.010
MH340       STORAGE   0.00   920.18   0  01:11      0      1.67      0.000
MH400       STORAGE   0.00     0.00   0  00:00      0      0         0.000 ltr
```

```
MH402             STORAGE      0.00    16.32     0  01:10          0     0.0325      -0.000

MH404             STORAGE      0.00     0.00    0  00:00          0          0       0.000 ltr

MH406             STORAGE      0.00    16.22     0  01:10          0     0.0305      -0.001

MH408             STORAGE      0.00     0.00    0  00:00          0          0       0.000 ltr

MH410             STORAGE      0.00    11.01     0  01:10          0     0.0273       2.203

MH412             STORAGE      0.00     0.00    0  00:00          0          0       0.000 ltr

MH414             STORAGE      0.00    16.19     0  01:10          0     0.0334       0.044

VortechsPh1         STORAGE      0.00   335.59     0  01:13          0       1.69       0.000

VortechsPh2         STORAGE      0.00    89.94     0  01:10          0      0.245       0.158



**********************

Node Surcharge Summary

**********************


Surcharging occurs when water rises above the top of the highest conduit.

---------------------------------------------------------------------

                                  Max. Height   Min. Depth

                         Hours       Above Crown    Below Rim

Node               Type      Surcharged        Meters       Meters

---------------------------------------------------------------------

CB29B(L)           JUNCTION        0.23          0.557        1.268

J17                JUNCTION       24.00         0.515        0.605

J20                JUNCTION       24.00         0.473        1.087

MH314(DUMMY)        JUNCTION        0.26          0.689        0.911

MH328(DUMMY)        JUNCTION       24.00          1.264        0.871



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Node Flooding Summary

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No nodes were flooded.



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114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

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Storage Volume Summary

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              Average     Avg  Evap Exfil     Maximum     Max    Time of Max    Maximum

               Volume    Pcnt  Pcnt  Pcnt      Volume    Pcnt     Occurrence     Outflow

Storage Unit         1000 m3    Full  Loss  Loss       1000 m3    Full    days hr:min        LPS

--------------------------------------------------------------------------------------------------

A04(STOR)            0.015     21     0     0        0.045      63       0  01:26      11.20

A09B(STOR)           0.002      1     0     0        0.043      23       0  01:26      10.40

A09C(STOR)           0.002      1     0     0        0.027      23       0  01:25       6.40

A10(STOR)            0.002      1     0     0        0.030      23       0  01:25       7.20

A11B(STOR)           0.007     14     0     0        0.035      65       0  01:30       7.73

A14(STOR)            0.001      0     0     0        0.040       3       0  01:13     109.00

A16C(STOR)           0.000      0     0     0        0.000       1       0  01:10      24.80

A22A(STOR)           0.005      5     0     0        0.056      53       0  01:37       8.84

B21(STOR)            0.006      5     0     0        0.063      50       0  01:40      10.17

B23(STOR)            0.019     39     0     0        0.048      97       0  01:09      84.24

B25(STOR)            0.001      1     0     0        0.020      23       0  01:25       4.80

CB1-GAPark           0.000      0     0     0        0.009      58       0  01:11      93.30

CBMH2                0.000      1     0     0        0.000      14       0  01:12     112.63

Dummy-MH128          0.000      1     0     0        0.000      33       0  01:12     800.74

GA-ParkSouthStorage  0.000      0     0     0        0.009       6       0  01:20      22.35

J2                   0.004      8     0     0        0.013      29       0  01:30       2.10

J4                   0.003      7     0     0        0.008      17       0  01:20       2.40

MH100                0.000      1     0     0        0.000      21       0  01:13      57.03

MH102                0.000      0     0     0        0.000       8       0  01:13      75.45

MH104                0.000      1     0     0        0.000      13       0  01:13      53.63

MH106                0.000      3     0     0        0.001      22       0  01:13     133.87

MH108                0.000      4     0     0        0.001      25       0  01:13     242.69

MH110                0.000      1     0     0        0.003      27       0  01:12     865.39

MH110B               0.000      1     0     0        0.002      31       0  01:12     916.32

MH112B               0.000      1     0     0        0.002      32       0  01:12     975.93

MH114                0.004     18     0     0        0.009      40       0  01:12    1265.21

MH118                0.001      2     0     0        0.005      24       0  01:13    1695.17

MH122                0.000      3     0     0        0.001      16       0  01:13     310.29
```

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

MH122B	0.000	2	0	0	0.001	28	0	01:13	431.98
MH124	0.000	1	0	0	0.000	12	0	01:11	138.32
MH126	0.000	1	0	0	0.000	14	0	01:10	99.33
MH128	0.000	1	0	0	0.003	33	0	01:12	763.79
MH130	0.001	11	0	0	0.002	33	0	01:12	654.87
MH132	0.000	1	0	0	0.001	24	0	01:11	592.91
MH136	0.000	0	0	0	0.000	5	0	01:10	17.20
MH140	0.000	0	0	0	0.000	6	0	01:11	20.62
MH144	0.000	1	0	0	0.001	14	0	01:13	310.63
MH148	0.000	0	0	0	0.000	7	0	01:11	23.91
MH152	0.002	39	0	0	0.002	42	0	01:10	17.23
MH164	0.000	1	0	0	0.001	21	0	01:12	576.21
MH166	0.000	1	0	0	0.001	18	0	01:11	342.64
MH168	0.000	1	0	0	0.001	17	0	01:11	317.94
MH170	0.001	19	0	0	0.001	30	0	01:11	190.17
MH172	0.000	1	0	0	0.000	12	0	01:11	125.31
MH174	0.000	2	0	0	0.000	12	0	01:11	109.37
MH176	0.000	3	0	0	0.000	12	0	01:10	97.54
MH178	0.000	1	0	0	0.000	12	0	01:11	163.36
MH180	0.000	1	0	0	0.000	13	0	01:12	51.36
MH182	0.000	2	0	0	0.000	11	0	01:17	60.62
MH220	0.000	1	0	0	0.001	33	0	01:14	33.43
MH222	0.000	2	0	0	0.001	47	0	01:14	69.27
MH224	0.000	1	0	0	0.001	46	0	01:14	17.63
MH226	0.000	0	0	0	0.000	7	0	01:13	12.31
MH228	0.000	0	0	0	0.000	16	0	01:13	25.58
MH230	0.000	0	0	0	0.001	12	0	01:13	81.59
MH238	0.000	1	0	0	0.002	15	0	01:13	1695.24
MH242	0.005	33	0	0	0.006	40	0	01:13	1695.26
MH246	0.000	0	0	0	0.001	10	0	01:13	78.20
MH248	0.000	1	0	0	0.001	18	0	01:11	398.32
MH250	0.000	1	0	0	0.000	9	0	01:10	96.28
MH300	0.000	0	0	0	0.000	4	0	01:11	27.35
MH302	0.000	0	0	0	0.000	4	0	01:12	27.33
MH304	0.000	0	0	0	0.000	6	0	01:10	90.20
MH306	0.000	0	0	0	0.000	9	0	01:10	168.25

```
MH308           0.000    0   0   0     0.001    18     0  01:11    207.57

MH310           0.002   38   0   0     0.002    60     0  01:11    375.71

MH312           0.000    0   0   0     0.000     3     0  01:10    18.43

MH314           0.000    0   0   0     0.000     4     0  01:10    37.40

MH316           0.001   24   0   0     0.002    61     0  01:12    120.59

MH318           0.000   17   0   0     0.002    73     0  01:12     17.76

MH320           0.001   30   0   0     0.002    63     0  01:11    126.55

MH322           0.001   31   0   0     0.002    61     0  01:11    147.06

MH324           0.000    1   0   0     0.000     4     0  01:10    18.49

MH326           0.000    0   0   0     0.000     5     0  01:12    77.37

MH328           0.000    1   0   0     0.001    29     0  01:11    100.24

MH330           0.001   36   0   0     0.002    73     0  01:10     45.34

MH332           0.001   50   0   0     0.002    80     0  01:10    480.52

MH334           0.004   57   0   0     0.006    82     0  01:11    920.75

MH336           0.004   51   0   0     0.005    63     0  01:11    920.17

MH338           0.004   51   0   0     0.005    62     0  01:11    920.18

MH340           0.003   79   0   0     0.004    90     0  01:11    920.19

MH400           0.000    0   0   0     0.000     0     0  00:00     0.00

MH402           0.000    0   0   0     0.000     4     0  01:10    16.32

MH404           0.000    0   0   0     0.000     0     0  00:00     0.00

MH406           0.000    0   0   0     0.000     3     0  01:10    16.22

MH408           0.000    0   0   0     0.000     0     0  00:00     0.00

MH410           0.000    0   0   0     0.000     3     0  01:10    11.01

MH412           0.000    0   0   0     0.000     0     0  00:00     0.00

MH414           0.000    0   0   0     0.000     6     0  01:11    21.14

VortechsPh1       0.000    3   0   0     0.002    23     0  01:13    335.59

VortechsPh2       0.002   51   0   0     0.002    63     0  01:11    89.48




***********************

Outfall Loading Summary

***********************



-----------------------------------------------------------

                 Flow     Avg     Max     Total

                 Freq    Flow    Flow    Volume
```

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

```
Outfall Node         Pcnt      LPS      LPS    10^6 ltr
-----------------------------------------------------------
Clegg              2.75     1.75     11.27      0.004
MainNorth           0.00     0.00     0.00      0.000
MainSouth           3.81     2.48     16.26      0.008
OF1                0.00     0.00     0.00      0.000
Out1               1.44     9.89     24.72      0.012
Out2               0.95     6.84     19.96      0.006
Out3               0.00     0.00     0.00      0.000
Outlet1-Phase1      48.75    92.38   1695.26      3.891
Outlet2-Phase2&3     70.63    27.25    920.19      1.663
Phase1-EmergencyOverflow   0.00     0.00     0.00      0.000
Phase2-EmergencyOverflow   0.00     0.00     0.00      0.000
-----------------------------------------------------------
System            11.67    140.59   2630.80      5.584



********************
Link Flow Summary
********************


-----------------------------------------------------------------------------
                       Maximum  Time of Max   Maximum    Max/    Max/
                        |Flow|   Occurrence    |Veloc|    Full    Full
Link             Type        LPS  days hr:min     m/sec    Flow   Depth
-----------------------------------------------------------------------------
1                CONDUIT     0.00     0  00:00     0.00    0.00    0.07
10               CONDUIT     9.07     0  01:06     0.07    0.00    0.09
11               CONDUIT    16.22     0  01:10     1.32    0.19    0.30
12               CONDUIT     8.25     0  01:10     0.08    0.00    0.07
13               CONDUIT    12.99     0  01:10     0.26    0.00    0.06
14               CONDUIT     0.90     0  01:18     0.03    0.01    0.11
15               CONDUIT     8.18     0  01:10     0.01    0.00    0.50
16               CONDUIT     8.82     0  01:07     0.06    0.00    0.10
17               CONDUIT     0.00     0  00:00     0.00    0.00    0.00
18               CONDUIT     5.67     0  01:10     0.12    0.01    0.12
```

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

```
19              CONDUIT     0.00    0  00:00     0.00   0.00   0.24

2              CONDUIT    16.32    0  01:10     1.18   0.19   0.33

20              CONDUIT     0.00    0  00:00     0.00   0.00   0.00

21              CONDUIT     0.00    0  00:00     0.00   0.00   0.00

22              CONDUIT    11.01    0  01:10     1.18   0.13   0.25

23              CONDUIT     9.73    0  01:10     0.07   0.00   0.11

24              CONDUIT     8.85    0  01:08     0.03   0.00   0.29

25              CONDUIT     7.62    0  01:04     0.09   0.00   0.11

26              CONDUIT     0.00    0  00:00     0.00   0.00   0.00

27              CONDUIT     0.00    0  00:00     0.00   0.00   0.00

28              CONDUIT    13.03    0  01:10     0.10   0.00   0.11

29              CONDUIT     9.23    0  01:05     0.08   0.00   0.11

3              CONDUIT     0.00    0  00:00     0.00   0.00   0.09

30              CONDUIT    13.04    0  01:10     0.08   0.00   0.11

31              CONDUIT     0.00    0  00:00     0.00   0.00   0.19

32              CONDUIT    13.29    0  01:10     0.11   0.00   0.08

33              CONDUIT    13.29    0  01:10     0.14   0.00   0.10

35              CONDUIT    18.05    0  01:10     0.20   0.06   0.06

36              CONDUIT     0.00    0  00:00     0.00   0.00   0.12

37              CONDUIT     0.00    0  00:00     0.00   0.00   0.06

4              CONDUIT    13.25    0  01:05     0.08   0.00   0.13

5              CONDUIT    69.44    0  01:10     2.09   0.03   0.27

6              CONDUIT    69.36    0  01:10     2.40   0.88   0.87

7              CONDUIT     0.00    0  00:00     0.00   0.00   0.06

8              CONDUIT     0.00    0  00:00     0.00   0.00   0.00

9              CONDUIT    21.14    0  01:13     1.21   0.29   0.80

A15A(OUT)          CONDUIT    74.31    0  01:10     5.47   0.31   0.69

B19(OUT)          CONDUIT    78.38    0  01:10     1.93   0.60   0.56

C01              CHANNEL    41.01    0  01:10     0.90   0.01   0.17

C02              CHANNEL    25.07    0  01:11     0.64   0.01   0.17

C03              CHANNEL    72.39    0  01:15     0.60   0.04   0.28

C04              CHANNEL    73.84    0  01:10     0.25   0.04   0.33

C05              CHANNEL    44.34    0  01:11     0.27   0.02   0.25

C06              CHANNEL     0.00    0  00:00     0.00   0.00   0.03

C07              CHANNEL     0.00    0  00:00     0.00   0.00   0.05

C08              CHANNEL    82.74    0  01:10     0.35   0.17   0.36
```

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

```
C09           CHANNEL   125.04    0  01:12     0.26    0.27    0.54
C10           CHANNEL    38.81    0  01:10     0.29    0.02    0.21
C100          CHANNEL     5.43    0  01:10     0.37    0.01    0.18
C101          CHANNEL     0.00    0  00:00     0.00    0.00    0.00
C102          CONDUIT     0.00    0  00:00     0.00    0.00    0.02
C103          CHANNEL     8.16    0  01:10     0.59    0.00    0.07
C104          CHANNEL     0.00    0  00:00     0.00    0.00    0.02
C105          CONDUIT     0.00    0  00:00     0.00    0.00    0.08
C106          CHANNEL     3.79    0  01:10     0.12    0.02    0.10
C107          CONDUIT     0.00    0  00:00     0.00    0.00    0.11
C108          CHANNEL    74.73    0  01:10     0.59    0.12    0.20
C109          CONDUIT     0.00    0  00:00     0.00    0.00    0.07
C11           CHANNEL    79.06    0  01:10     0.42    0.02    0.25
C110          CHANNEL    35.61    0  01:10     0.77    0.01    0.12
C111          CONDUIT     0.00    0  00:00     0.00    0.00    0.19
C112          CHANNEL   167.09    0  01:10     0.72    0.24    0.28
C113          CONDUIT     0.00    0  00:00     0.00    0.00    0.06
C114          CHANNEL    14.35    0  01:10     0.15    0.00    0.19
C115          CONDUIT     0.00    0  00:00     0.00    0.00    0.14
C116          CHANNEL     9.34    0  01:10     0.37    0.00    0.13
C117          CONDUIT     0.00    0  00:00     0.00    0.00    0.19
C118          CHANNEL   265.73    0  01:10     1.70    0.02    0.19
C119          CONDUIT     0.00    0  00:00     0.00    0.00    0.08
C12           CHANNEL    54.29    0  01:11     0.24    0.28    0.28
C120          CHANNEL    19.51    0  01:10     0.53    0.00    0.12
C121          CONDUIT     0.00    0  00:00     0.00    0.00    0.06
C122          CHANNEL    23.88    0  01:10     0.53    0.00    0.13
C123          CHANNEL   101.49    0  01:10     1.14    0.03    0.24
C124          CONDUIT   457.23    0  01:10     1.03    0.65    1.00
C125          CONDUIT     0.00    0  00:00     0.00    0.00    0.15
C126          CONDUIT     0.00    0  00:00     0.00    0.00    0.09
C127          CHANNEL    54.05    0  01:10     0.82    0.01    0.21
C128          CONDUIT     0.00    0  00:00     0.00    0.00    0.13
C129          CHANNEL    41.74    0  01:10     0.87    0.01    0.18
C13           CHANNEL     0.00    0  00:00     0.00    0.00    0.04
C130          CHANNEL     0.00    0  00:00     0.00    0.00    0.18
```

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

```
C131         CONDUIT     0.00    0  00:00     0.00    0.00    0.35
C132         CHANNEL    52.03    0  01:12     0.35    0.08    0.31
C133         CONDUIT     0.00    0  00:00     0.00    0.00    0.09
C134         CHANNEL    22.53    0  01:10     0.45    0.01    0.13
C135         CHANNEL     0.00    0  00:00     0.00    0.00    0.00
C136         CHANNEL    19.96    0  01:10     0.94    0.02    0.22
C137         CHANNEL    11.27    0  01:10     0.14    0.00    0.16
C138         CHANNEL    24.72    0  01:11     0.86    0.03    0.25
C139         CHANNEL     0.00    0  00:00     0.00    0.00    0.00
C14         CHANNEL     0.00    0  00:00     0.00    0.00    0.04
C140         CONDUIT    57.03    0  01:10     0.93    0.85    1.00
C141         CONDUIT    75.45    0  01:15     0.92    0.60    1.00
C142         CONDUIT    53.63    0  01:09     1.02    0.90    1.00
C143         CONDUIT   133.87    0  01:16     1.00    0.74    1.00
C144         CONDUIT   242.69    0  01:13     1.59    1.67    0.92
C145_1         CONDUIT    90.16    0  01:12     1.02    0.71    0.75
C145_2         CONDUIT    71.81    0  01:06     1.08    0.58    0.95
C146         CONDUIT   832.52    0  01:10     1.77    0.71    1.00
C147         CONDUIT   916.32    0  01:10     1.71    0.91    1.00
C148         CONDUIT   975.93    0  01:11     1.83    0.96    1.00
C149         CONDUIT  1265.21    0  01:12     1.99    1.00    1.00
C15         CHANNEL     2.77    0  01:11     0.03    0.00    0.17
C150         CONDUIT  1359.60    0  01:13     4.07    0.52    0.52
C151         CONDUIT   335.59    0  01:13     1.19    1.22    1.00
C152         CONDUIT   310.29    0  01:13     1.59    1.43    0.88
C153         CONDUIT   431.98    0  01:13     1.53    1.31    1.00
C154         CONDUIT   138.32    0  01:12     1.24    0.93    0.66
C155         CONDUIT    99.33    0  01:11     1.17    0.81    0.72
C156_1         CONDUIT   763.79    0  01:12     1.73    0.96    1.00
C156_2         CONDUIT   800.74    0  01:11     1.81    1.01    1.00
C158         CONDUIT     0.00    0  00:00     0.00    0.00    0.39
C159         CONDUIT   654.87    0  01:12     1.72    0.87    0.80
C16         CHANNEL     0.00    0  00:00     0.00    0.00    0.06
C160         CONDUIT   592.91    0  01:11     1.39    0.97    0.93
C161         CONDUIT    17.20    0  01:11     0.79    0.41    0.45
C162         CONDUIT    20.62    0  01:11     0.83    0.49    0.50
```

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

```
C163        CONDUIT   310.63   0  01:12    1.46   0.89   0.98
C164        CONDUIT    23.91   0  01:11    0.86   0.57   0.55
C165        CONDUIT    17.23   0  01:10    0.80   0.41   0.45
C166        CONDUIT   576.21   0  01:11    1.36   1.02   0.92
C167        CONDUIT   342.64   0  01:10    1.28   1.34   0.94
C168        CONDUIT   317.94   0  01:10    1.17   1.00   0.96
C169        CONDUIT   190.17   0  01:12    1.06   0.87   0.94
C17         CHANNEL     0.00   0  00:00    0.00   0.00   0.00
C170        CONDUIT   125.31   0  01:11    1.16   0.79   0.81
C171        CONDUIT   109.37   0  01:11    1.18   1.72   0.79
C172        CONDUIT     0.00   0  00:00    0.00   0.00   0.16
C173        CONDUIT    97.54   0  01:10    1.18   0.49   0.51
C174        CONDUIT   163.36   0  01:11    1.11   0.77   0.65
C175        CONDUIT    51.36   0  01:12    1.04   0.87   0.66
C176        CONDUIT    60.62   0  01:10    0.91   0.62   0.63
C177        CONDUIT    33.43   0  01:14    0.68   0.79   1.00
C178        CONDUIT    69.27   0  01:18    0.98   1.01   1.00
C179        CONDUIT    17.63   0  01:22    0.36   0.42   1.00
C18         CHANNEL     0.00   0  00:00    0.00   0.00   0.13
C180        CONDUIT    12.31   0  01:11    0.56   0.29   0.83
C181        CONDUIT    25.58   0  01:15    0.72   0.59   1.00
C182        CONDUIT    81.59   0  01:16    1.01   0.66   1.00
C183        CONDUIT  1695.24   0  01:13    3.60   0.79   0.69
C184        CONDUIT  1695.26   0  01:13    2.66   1.01   1.00
C185        CONDUIT    78.20   0  01:16    0.92   0.65   1.00
C186        CONDUIT   398.32   0  01:10    1.52   0.85   0.94
C187        CONDUIT    96.28   0  01:11    1.19   0.49   0.51
C188        CONDUIT    27.35   0  01:11    1.78   0.26   0.35
C189        CONDUIT    27.33   0  01:12    1.15   0.34   0.50
C190        CONDUIT    90.20   0  01:10    2.03   0.51   0.63
C191        CONDUIT   168.25   0  01:10    2.99   0.88   0.85
C192        CONDUIT   207.57   0  01:09    1.99   0.70   1.00
C193        CONDUIT   375.71   0  01:13    1.33   1.19   1.00
C194        CONDUIT    18.43   0  01:10    1.23   0.18   0.35
C195        CONDUIT    37.40   0  01:10    1.45   0.36   0.71
C196        CONDUIT    88.06   0  01:05    2.13   0.62   1.00
```

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

```
C197       CONDUIT   120.59   0  01:15    1.09   1.04   1.00

C198       CONDUIT    17.76   0  01:22    0.36   0.88   1.00

C199       CONDUIT   126.55   0  01:15    1.15   0.98   1.00

C20        CHANNEL     2.10   0  01:10    0.11   0.00   0.08

C200       CONDUIT   147.06   0  01:15    1.33   1.60   1.00

C201       CONDUIT    18.49   0  01:10    1.68   0.10   0.21

C202       CONDUIT    77.37   0  01:12    2.24   0.25   0.67

C203       CONDUIT   100.24   0  01:13    1.00   0.31   1.00

C204       CONDUIT   127.64   0  01:13    1.16   0.47   1.00

C205       CONDUIT    45.34   0  01:12    0.41   0.41   1.00

C206       CONDUIT   480.52   0  01:10    1.09   0.58   1.00

C207       CONDUIT   920.75   0  01:11    2.08   1.85   1.00

C208       CONDUIT    89.94   0  01:10    0.32   0.33   1.00

C209       CONDUIT   830.61   0  01:11    1.88   8.11   1.00

C21        CHANNEL     0.66   0  01:13    0.11   0.00   0.08

C210       CONDUIT   920.18   0  01:11    2.08   1.27   1.00

C211       CONDUIT   920.19   0  01:11    2.08   1.31   1.00

C212_2     CONDUIT   335.56   0  01:13    1.34   7.00   0.83

C213_2     CONDUIT    89.45   0  01:11    0.32   1.87   1.00

C22        CHANNEL     0.54   0  01:13    0.13   0.00   0.04

C23        CHANNEL    21.02   0  01:10    0.32   0.03   0.17

C24        CHANNEL    73.89   0  01:10    0.46   0.10   0.23

C25        CHANNEL     1.28   0  01:10    0.14   0.00   0.06

C26        CHANNEL     2.94   0  01:10    0.17   0.00   0.10

C27_1      CHANNEL    66.74   0  01:10    0.59   0.01   0.19

C27_2      CHANNEL    76.76   0  01:10    0.52   0.01   0.22

C28        CHANNEL   103.89   0  01:10    0.70   0.02   0.23

C29        CHANNEL     7.93   0  01:10    0.21   0.01   0.11

C30        CHANNEL     0.00   0  00:00    0.00   0.00   0.08

C31        CHANNEL    22.21   0  01:10    0.56   0.00   0.12

C32        CHANNEL    34.89   0  01:10    0.76   0.00   0.24

C33        CHANNEL     0.00   0  00:00    0.00   0.00   0.00

C34        CHANNEL     0.00   0  00:00    0.00   0.00   0.00

C35        CHANNEL     0.00   0  00:00    0.00   0.00   0.06

C36        CHANNEL    22.02   0  01:11    0.15   0.01   0.26

C37        CHANNEL   180.09   0  01:10    0.86   0.25   0.27
```

C38	CHANNEL	0.00	0	00:00	0.00	0.00	0.08
C39	CONDUIT	0.00	0	00:00	0.00	0.00	0.07
C40	CHANNEL	6.40	0	01:10	0.16	0.00	0.11
C41	CHANNEL	11.67	0	01:10	0.16	0.00	0.15
C42	CONDUIT	0.00	0	00:00	0.00	0.00	0.06
C43	CHANNEL	4.55	0	01:10	0.32	0.00	0.07
C44	CONDUIT	0.00	0	00:00	0.00	0.00	0.05
C45	CHANNEL	4.50	0	01:10	0.19	0.00	0.19
C46	CONDUIT	0.00	0	00:00	0.00	0.00	0.30
C47	CHANNEL	121.61	0	01:11	0.27	0.87	0.38
C48	CONDUIT	0.00	0	00:00	0.00	0.00	0.11
C49	CHANNEL	69.82	0	01:10	0.40	0.02	0.25
C50	CONDUIT	0.00	0	00:00	0.00	0.00	0.29
C51	CHANNEL	79.13	0	01:10	0.50	0.08	0.32
C52	CONDUIT	0.00	0	00:00	0.00	0.00	0.32
C53	CHANNEL	21.34	0	01:10	0.26	0.03	0.32
C54	CONDUIT	0.00	0	00:00	0.00	0.00	0.74
C55	CHANNEL	97.50	0	01:13	0.11	0.26	0.55
C56	CONDUIT	0.00	0	00:00	0.00	0.00	0.16
C57	CHANNEL	22.11	0	01:10	0.23	0.02	0.26
C58	CHANNEL	25.55	0	01:10	0.55	0.02	0.18
C59	CONDUIT	0.00	0	00:00	0.00	0.00	0.13
C60	CHANNEL	67.36	0	01:10	0.30	0.03	0.28
C61	CONDUIT	0.00	0	00:00	0.00	0.00	0.12
C62	CHANNEL	126.17	0	01:10	0.82	0.02	0.23
C63	CONDUIT	0.00	0	00:00	0.00	0.00	0.13
C64	CHANNEL	28.21	0	01:10	0.18	0.02	0.23
C65	CONDUIT	0.00	0	00:00	0.00	0.00	0.06
C66	CHANNEL	16.26	0	01:10	0.34	0.00	0.13
C67	CONDUIT	0.00	0	00:00	0.00	0.00	0.04
C68	CHANNEL	11.54	0	01:10	0.60	0.00	0.09
C69	CHANNEL	0.00	0	00:00	0.00	0.00	0.50
C70	CONDUIT	0.00	0	00:00	0.00	0.00	0.07
C71	CHANNEL	15.99	0	01:10	0.26	0.00	0.14
C72	CONDUIT	0.00	0	00:00	0.00	0.00	0.08
C73	CHANNEL	24.79	0	01:10	0.27	0.01	0.27

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

```
C74            CHANNEL    20.10    0  01:10     0.19    0.03    0.49

C75            CHANNEL    24.73    0  01:11     0.43    0.89    0.36

C76            CONDUIT     0.00    0  00:00     0.00    0.00    0.09

C77            CHANNEL    37.35    0  01:10     0.34    0.01    0.19

C78            CONDUIT     0.00    0  00:00     0.00    0.00    0.04

C79            CHANNEL     2.91    0  01:10     0.15    0.00    0.08

C80            CONDUIT     0.00    0  00:00     0.00    0.00    0.04

C81            CHANNEL     9.24    0  01:10     0.34    0.00    0.18

C82            CONDUIT     0.00    0  00:00     0.00    0.00    0.10

C83            CHANNEL    41.36    0  01:10     0.47    0.01    0.20

C84            CONDUIT     0.00    0  00:00     0.00    0.00    0.03

C85            CHANNEL     1.56    0  01:10     0.11    0.00    0.07

C86            CONDUIT     0.00    0  00:00     0.00    0.00    0.04

C87            CHANNEL     7.97    0  01:10     0.12    0.00    0.19

C88            CONDUIT     0.00    0  00:00     0.00    0.00    0.08

C89            CHANNEL    41.31    0  01:10     0.32    0.01    0.21

C90            CONDUIT     0.00    0  00:00     0.00    0.00    0.10

C91            CHANNEL    36.04    0  01:10     0.36    0.01    0.18

C92            CONDUIT     0.00    0  00:00     0.00    0.00    0.07

C93            CHANNEL    14.51    0  01:10     0.21    0.00    0.15

C94            CONDUIT     0.00    0  00:00     0.00    0.00    0.11

C95            CHANNEL    20.05    0  01:10     0.43    0.00    0.14

C96            CONDUIT     0.00    0  00:00     0.00    0.00    0.11

C97            CHANNEL    24.73    0  01:10     0.20    0.01    0.26

C98            CONDUIT     0.00    0  00:00     0.00    0.00    0.36

C99            CHANNEL     0.00    0  00:00     0.00    0.00    0.19

OR52            CONDUIT    63.38    0  01:20     0.93    0.58    0.60

STM-15            CONDUIT     0.00    0  00:00     0.00    0.00    0.09

STM-390            CONDUIT    112.63    0  01:14     1.68    1.18    1.00

STM-68            CONDUIT     0.00    0  00:00     0.00    0.00    0.12

W1             CONDUIT    84.97    0  01:11     0.44    4.29    1.00

Weir-Outlet1       CONDUIT   1359.58    0  01:13     1.76    0.29    0.36

Weir-Outlet2       CONDUIT    830.62    0  01:11     0.62    0.32    1.00

1C-OR           ORIFICE    44.60    0  01:10                  1.00

A06(OUT)          ORIFICE    93.30    0  01:11                  1.00

A3-A1-OR          ORIFICE    16.32    0  01:10                  1.00
```

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

```
A3-A2-OR      ORIFICE    16.21    0  01:06              1.00

A3-A3-OR      ORIFICE    16.22    0  01:10              1.00

A7-A7-OR      ORIFICE    16.24    0  01:10              1.00

A7-A8-OR      ORIFICE    16.19    0  01:10              1.00

C212_1        ORIFICE    81.45    0  00:50              1.00

C213_1        ORIFICE     5.07    0  01:09              1.00

OR01          ORIFICE    36.76    0  01:08              1.00

OR02          ORIFICE    16.50    0  01:10              1.00

OR03          ORIFICE    16.94    0  01:10              1.00

OR04          ORIFICE    75.50    0  01:11              1.00

OR05          ORIFICE    58.53    0  01:10              1.00

OR06          ORIFICE    41.53    0  01:10              1.00

OR07          ORIFICE   154.49    0  01:10              1.00

OR08          ORIFICE    39.79    0  01:14              1.00

OR09          ORIFICE    40.86    0  01:14              1.00

OR1           ORIFICE    22.35    0  01:20              1.00

OR10          ORIFICE    28.09    0  01:20              1.00

OR11          ORIFICE    67.46    0  01:11              1.00

OR12          ORIFICE    56.05    0  01:10              1.00

OR13          ORIFICE    67.89    0  01:10              1.00

OR14          ORIFICE    74.01    0  01:10              1.00

OR15          ORIFICE    12.32    0  01:10              1.00

OR16          ORIFICE    13.29    0  01:10              1.00

OR17          ORIFICE    15.73    0  01:10              1.00

OR18          ORIFICE    21.22    0  01:10              1.00

OR19          ORIFICE    17.82    0  01:05              1.00

OR20          ORIFICE    17.38    0  01:04              1.00

OR21          ORIFICE    50.58    0  01:10              1.00

OR22          ORIFICE    11.37    0  01:10              1.00

OR23          ORIFICE    12.68    0  01:11              1.00

OR24          ORIFICE    17.23    0  01:10              1.00

OR25          ORIFICE     7.97    0  01:10              1.00

OR26          ORIFICE    12.73    0  01:10              1.00

OR27          ORIFICE    17.20    0  01:10              1.00

OR28          ORIFICE    45.36    0  01:10              1.00

OR29          ORIFICE    37.12    0  01:11              1.00
```

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

```
OR30            ORIFICE     9.26    0  01:10                 1.00

OR31            ORIFICE    24.27    0  01:10                 1.00

OR32            ORIFICE    27.15    0  01:13                 1.00

OR33            ORIFICE    18.26    0  01:10                 1.00

OR34            ORIFICE     4.95    0  01:10                 1.00

OR35            ORIFICE    11.08    0  01:11                 1.00

OR36            ORIFICE    19.27    0  01:10                 1.00

OR37            ORIFICE    59.47    0  01:10                 1.00

OR38            ORIFICE    19.01    0  01:10                 1.00

OR39            ORIFICE    46.11    0  01:10                 1.00

OR40            ORIFICE    19.61    0  01:06                 1.00

OR41            ORIFICE    16.84    0  01:06                 1.00

OR42            ORIFICE    24.39    0  01:06                 1.00

OR43            ORIFICE    13.67    0  01:07                 1.00

OR44            ORIFICE    28.50    0  01:12                 1.00

OR45            ORIFICE    28.61    0  01:08                 1.00

OR46            ORIFICE    25.17    0  01:11                 1.00

OR47            ORIFICE    18.50    0  01:10                 1.00

OR48            ORIFICE    60.38    0  01:04                 1.00

OR49            ORIFICE    15.30    0  01:33                 1.00

OR50            ORIFICE    18.43    0  01:10                 1.00

OR51            ORIFICE    29.91    0  01:10                 1.00

34              WEIR      259.86    0  01:13                 0.38

1C-Out            DUMMY      26.56    0  01:10

1CTopofRooftoTank    DUMMY       2.10    0  00:42

A04(OUT)          DUMMY      11.20    0  00:58

A09B(OUT)          DUMMY      10.40    0  01:01

A09C(OUT)          DUMMY       6.40    0  01:01

A10(OUT)          DUMMY       7.20    0  01:01

A11B(OUT)          DUMMY       7.73    0  00:59

A14(OUT)          DUMMY     109.00    0  01:01

A16C(OUT)          DUMMY      24.80    0  01:10

A22A(OUT)          DUMMY       8.84    0  01:37

A3-A4-LMF          DUMMY       3.62    0  01:13

A7-A5-LMF          DUMMY       3.60    0  01:10

A7-A6-LMF          DUMMY      11.01    0  01:10
```

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

```
B21(OUT)        DUMMY     10.17    0  01:40

B23(OUT)        DUMMY     14.80    0  00:54

B25(OUT)        DUMMY      4.80    0  01:01

O01          DUMMY     39.97    0  01:05

O02          DUMMY     18.77    0  01:07

O03          DUMMY     18.95    0  01:07

O04          DUMMY     77.00    0  01:08

O05          DUMMY     59.45    0  01:09

O06          DUMMY     48.96    0  01:03

O07          DUMMY     44.70    0  01:03

O08          DUMMY     48.66    0  01:09

O09          DUMMY     34.90    0  01:05

O10          DUMMY     67.74    0  01:10

O11          DUMMY     58.04    0  01:08

O12          DUMMY     68.10    0  01:10

O13          DUMMY     74.77    0  01:10

O14          DUMMY     12.59    0  01:10

O15          DUMMY     18.36    0  01:10

O16          DUMMY     23.30    0  01:10

O17          DUMMY     51.52    0  01:10

O18          DUMMY     11.62    0  01:10

O19          DUMMY     13.00    0  01:10

O20          DUMMY     21.01    0  01:04

O21          DUMMY      8.09    0  01:10

O22          DUMMY     12.99    0  01:10

O23          DUMMY     19.82    0  01:07

O24          DUMMY     48.22    0  01:08

O25          DUMMY     38.49    0  01:10

O26          DUMMY     14.11    0  01:01

O27          DUMMY     30.04    0  01:06

O28          DUMMY     38.22    0  01:02

O29          DUMMY     12.43    0  01:10

O30          DUMMY     23.59    0  01:07

O31          DUMMY     59.84    0  01:10

O32          DUMMY     19.65    0  01:10

O33          DUMMY     56.43    0  01:02
```

```
O34            DUMMY     24.28    0  01:05

O35            DUMMY     22.67    0  01:06

O36            DUMMY     29.05    0  01:06

O37            DUMMY     16.81    0  01:07

O38            DUMMY     31.51    0  01:09

O39            DUMMY     31.11    0  01:08

O40            DUMMY     26.67    0  01:10

O41            DUMMY     22.14    0  01:06

O42            DUMMY     21.63    0  01:05

O43            DUMMY     21.05    0  01:06

OL1            DUMMY      2.40    0  00:50



***************************

Flow Classification Summary

***************************


-------------------------------------------------------------------------------------

               Adjusted    ---------- Fraction of Time in Flow Class ----------

                /Actual       Up    Down  Sub   Sup   Up    Down  Norm  Inlet

Conduit           Length    Dry   Dry   Dry   Crit  Crit  Crit  Crit  Ltd   Ctrl

-------------------------------------------------------------------------------------

1                  1.00  0.83  0.17  0.00  0.00  0.00  0.00  0.00  0.00  0.00

10                 1.00  0.99  0.00  0.00  0.01  0.00  0.00  0.00  0.95  0.00

11                 1.00  0.00  0.00  0.00  0.00  0.00  0.00  1.00  0.00  0.00

12                 1.00  0.83  0.16  0.00  0.01  0.00  0.00  0.00  0.95  0.00

13                 1.00  0.00  0.98  0.00  0.02  0.00  0.00  0.00  0.95  0.00

14                 1.00  0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00

15                 1.00  0.35  0.65  0.00  0.01  0.00  0.00  0.00  0.95  0.00

16                 1.00  0.99  0.00  0.00  0.01  0.00  0.00  0.00  0.00  0.00

17                 1.00  1.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00

18                 1.00  0.83  0.14  0.00  0.03  0.00  0.00  0.00  0.95  0.00

19                 1.00  0.96  0.04  0.00  0.00  0.00  0.00  0.00  0.00  0.00

2                  1.00  0.00  0.00  0.00  0.00  0.00  0.00  1.00  0.00  0.00

20                 1.00  1.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00

21                 1.00  1.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00
```

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

22	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
23	1.00	0.83	0.15	0.00	0.03	0.00	0.00	0.00	0.95	0.00
24	1.00	0.00	0.00	0.00	0.02	0.00	0.00	0.98	0.00	0.00
25	1.00	0.97	0.00	0.00	0.01	0.00	0.00	0.02	0.00	0.00
26	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	1.00	0.00	0.99	0.00	0.01	0.00	0.00	0.00	0.95	0.00
29	1.00	0.97	0.00	0.00	0.01	0.00	0.00	0.02	0.00	0.00
3	1.00	0.83	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	1.00	0.99	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
31	1.00	0.90	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32	1.00	0.98	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00
33	1.00	0.97	0.01	0.00	0.02	0.00	0.00	0.00	0.96	0.00
35	1.00	0.79	0.00	0.00	0.00	0.00	0.21	0.00	0.00	0.00
36	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
37	1.00	0.85	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00
4	1.00	0.98	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00
5	1.00	0.84	0.14	0.00	0.00	0.01	0.00	0.00	0.95	0.00
6	1.00	0.00	0.00	0.00	0.83	0.17	0.00	0.00	0.97	0.00
7	1.00	0.83	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00
8	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	1.00	0.00	0.00	0.00	0.01	0.00	0.00	0.99	0.00	0.00
A15A(OUT)	1.00	0.00	0.00	0.00	0.01	0.02	0.00	0.97	0.03	0.00
B19(OUT)	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C01	1.00	0.00	0.00	0.00	0.91	0.09	0.00	0.00	0.11	0.00
C02	1.00	0.00	0.00	0.00	0.99	0.01	0.00	0.00	0.12	0.00
C03	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C04	1.00	0.00	0.00	0.00	0.77	0.23	0.00	0.00	0.02	0.00
C05	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.03	0.00
C06	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C07	1.00	0.85	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C08	1.00	0.00	0.00	0.00	0.66	0.34	0.00	0.00	0.03	0.00
C09	1.00	0.00	0.00	0.00	0.79	0.21	0.00	0.00	0.02	0.00
C10	1.00	0.00	0.00	0.00	0.77	0.23	0.00	0.00	0.02	0.00
C100	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C101	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

C102	1.00	0.90	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00
C103	1.00	0.00	0.00	0.00	0.90	0.10	0.00	0.00	0.01	0.00
C104	1.00	0.90	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C105	1.00	0.85	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.00
C106	1.00	0.00	0.85	0.00	0.14	0.01	0.00	0.00	0.94	0.00
C107	1.00	0.79	0.00	0.00	0.00	0.00	0.21	0.00	0.00	0.00
C108	1.00	0.00	0.79	0.00	0.19	0.02	0.00	0.00	0.88	0.00
C109	1.00	0.83	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.00
C11	1.00	0.00	0.00	0.00	0.71	0.29	0.00	0.00	0.04	0.00
C110	1.00	0.00	0.83	0.00	0.05	0.12	0.00	0.00	0.94	0.00
C111	1.00	0.75	0.00	0.00	0.01	0.00	0.24	0.00	0.00	0.00
C112	1.00	0.00	0.75	0.00	0.23	0.02	0.00	0.00	0.97	0.00
C113	1.00	0.81	0.00	0.00	0.01	0.00	0.19	0.00	0.00	0.00
C114	1.00	0.00	0.81	0.00	0.19	0.01	0.00	0.00	0.99	0.00
C115	1.00	0.85	0.00	0.00	0.01	0.00	0.14	0.00	0.00	0.00
C116	1.00	0.81	0.00	0.00	0.08	0.11	0.00	0.00	0.01	0.00
C117	1.00	0.84	0.00	0.00	0.01	0.00	0.15	0.00	0.00	0.00
C118	1.00	0.84	0.00	0.00	0.00	0.00	0.00	0.16	0.00	0.00
C119	1.00	0.83	0.00	0.00	0.00	0.00	0.16	0.00	0.00	0.00
C12	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.98	0.00
C120	1.00	0.83	0.00	0.00	0.06	0.11	0.00	0.00	0.00	0.00
C121	1.00	0.89	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C122	1.00	0.00	0.89	0.00	0.10	0.01	0.00	0.00	0.98	0.00
C123	1.00	0.84	0.00	0.00	0.00	0.00	0.00	0.16	0.00	0.00
C124	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C125	1.00	0.84	0.00	0.00	0.00	0.00	0.16	0.00	0.00	0.00
C126	1.00	0.85	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00
C127	1.00	0.83	0.02	0.00	0.08	0.08	0.00	0.00	0.95	0.00
C128	1.00	0.82	0.00	0.00	0.01	0.00	0.17	0.00	0.00	0.00
C129	1.00	0.00	0.82	0.00	0.05	0.12	0.00	0.00	0.87	0.00
C13	1.00	0.84	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C130	1.00	0.99	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C131	1.00	0.90	0.00	0.00	0.02	0.00	0.08	0.00	0.00	0.00
C132	1.00	0.90	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00
C133	1.00	0.82	0.00	0.00	0.00	0.00	0.18	0.00	0.00	0.00
C134	1.00	0.00	0.82	0.00	0.18	0.00	0.00	0.00	0.87	0.00

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

C135	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C136	1.00	0.00	0.00	0.00	0.97	0.03	0.00	0.00	0.93	0.00
C137	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.01	0.00
C138	1.00	0.00	0.00	0.00	0.95	0.05	0.00	0.00	0.93	0.00
C139	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C14	1.00	0.84	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C140	1.00	0.00	0.11	0.00	0.89	0.00	0.00	0.00	0.96	0.00
C141	1.00	0.00	0.00	0.00	0.10	0.01	0.00	0.89	0.01	0.00
C142	1.00	0.00	0.00	0.00	0.02	0.00	0.00	0.98	0.00	0.00
C143	1.00	0.00	0.45	0.00	0.55	0.00	0.00	0.00	0.92	0.00
C144	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C145_1	1.00	0.00	0.94	0.00	0.00	0.00	0.06	0.00	0.00	0.00
C145_2	1.00	0.00	0.00	0.00	0.01	0.00	0.00	0.99	0.00	0.00
C146	1.00	0.00	0.00	0.00	0.88	0.12	0.00	0.00	0.82	0.00
C147	1.00	0.00	0.01	0.00	0.98	0.01	0.00	0.00	0.88	0.00
C148	1.00	0.00	0.00	0.00	0.02	0.00	0.00	0.98	0.00	0.00
C149	1.00	0.00	0.00	0.00	0.13	0.00	0.00	0.87	0.02	0.00
C15	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
C150	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C151	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C152	1.00	0.00	0.00	0.00	0.01	0.00	0.00	0.99	0.00	0.00
C153	1.00	0.00	0.00	0.00	0.14	0.00	0.00	0.86	0.01	0.00
C154	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C155	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C156_1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.84	0.00
C156_2	1.00	0.00	0.00	0.00	0.90	0.10	0.00	0.00	0.10	0.00
C158	1.00	0.91	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C159	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C16	1.00	0.84	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C160	1.00	0.00	0.07	0.00	0.93	0.00	0.00	0.00	0.88	0.00
C161	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C162	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C163	1.00	0.00	0.05	0.00	0.95	0.00	0.00	0.00	0.96	0.00
C164	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C165	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C166	1.00	0.00	0.00	0.00	0.93	0.00	0.00	0.07	0.00	0.00

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

C167	1.00	0.00	0.03	0.00	0.97	0.00	0.00	0.00	0.73	0.00
C168	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.73	0.00
C169	1.00	0.00	0.00	0.00	0.02	0.00	0.00	0.98	0.00	0.00
C17	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C170	1.00	0.00	0.00	0.00	0.01	0.00	0.00	0.99	0.00	0.00
C171	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C172	1.00	0.90	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C173	1.00	0.00	0.06	0.00	0.94	0.00	0.00	0.01	0.96	0.00
C174	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C175	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C176	1.00	0.00	0.00	0.00	0.01	0.00	0.00	0.99	0.00	0.00
C177	1.00	0.00	0.00	0.00	0.09	0.00	0.00	0.91	0.07	0.00
C178	1.00	0.00	0.00	0.00	0.11	0.00	0.00	0.89	0.01	0.00
C179	1.00	0.00	0.00	0.00	0.09	0.00	0.00	0.91	0.05	0.00
C18	1.00	0.81	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C180	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.95	0.00
C181	1.00	0.00	0.00	0.00	0.02	0.00	0.00	0.98	0.00	0.00
C182	1.00	0.00	0.00	0.00	0.07	0.00	0.00	0.93	0.03	0.00
C183	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C184	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C185	1.00	0.00	0.82	0.00	0.18	0.00	0.00	0.00	0.85	0.00
C186	1.00	0.00	0.00	0.00	0.01	0.00	0.00	0.98	0.00	0.00
C187	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C188	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C189	1.00	0.00	0.84	0.00	0.15	0.01	0.00	0.00	0.97	0.00
C190	1.00	0.00	0.00	0.00	0.86	0.14	0.00	0.00	0.99	0.00
C191	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C192	1.00	0.00	0.01	0.00	0.99	0.00	0.00	0.00	0.98	0.00
C193	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C194	1.00	0.00	0.00	0.00	0.84	0.16	0.00	0.00	0.33	0.00
C195	1.00	0.00	0.00	0.00	0.83	0.17	0.00	0.00	0.99	0.00
C196	1.00	0.00	0.00	0.00	0.01	0.00	0.00	0.98	0.00	0.00
C197	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C198	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C199	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C20	1.00	0.00	0.85	0.00	0.15	0.00	0.00	0.00	0.95	0.00

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

C200	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C201	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C202	1.00	0.00	0.00	0.00	0.01	0.00	0.00	0.99	0.01	0.00
C203	1.00	0.00	0.01	0.00	0.99	0.00	0.00	0.00	0.98	0.00
C204	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C205	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C206	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C207	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C208	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C209	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C21	1.00	0.00	0.00	0.00	0.87	0.13	0.00	0.00	0.02	0.00
C210	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C211	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C212_2	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C213_2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C22	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C23	1.00	0.00	0.00	0.00	0.72	0.28	0.00	0.00	0.05	0.00
C24	1.00	0.00	0.00	0.00	0.92	0.08	0.00	0.00	0.92	0.00
C25	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C26	1.00	0.00	0.00	0.00	0.83	0.17	0.00	0.00	0.05	0.00
C27_1	1.00	0.00	0.00	0.00	0.98	0.02	0.00	0.00	0.95	0.00
C27_2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
C28	1.00	0.00	0.00	0.00	0.58	0.42	0.00	0.00	0.03	0.00
C29	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
C30	1.00	0.82	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C31	1.00	0.00	0.00	0.00	0.95	0.05	0.00	0.00	0.12	0.00
C32	1.00	0.00	0.00	0.00	0.01	0.00	0.00	0.99	0.01	0.00
C33	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C34	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C35	1.00	0.83	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C36	1.00	0.00	0.00	0.00	0.97	0.03	0.00	0.00	0.08	0.00
C37	1.00	0.00	0.00	0.00	0.76	0.24	0.00	0.00	0.00	0.00
C38	1.00	0.85	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C39	1.00	0.85	0.00	0.00	0.01	0.00	0.15	0.00	0.00	0.00
C40	1.00	0.85	0.00	0.00	0.15	0.01	0.00	0.00	0.96	0.00
C41	1.00	0.00	0.85	0.00	0.15	0.00	0.00	0.00	0.99	0.00

114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

C42	1.00	0.84	0.00	0.00	0.00	0.00	0.16	0.00	0.00	0.00
C43	1.00	0.00	0.84	0.00	0.14	0.02	0.00	0.00	0.95	0.00
C44	1.00	0.84	0.00	0.00	0.00	0.00	0.16	0.00	0.00	0.00
C45	1.00	0.00	0.84	0.00	0.15	0.02	0.00	0.00	0.96	0.00
C46	1.00	0.83	0.00	0.00	0.01	0.00	0.17	0.00	0.00	0.00
C47	1.00	0.00	0.83	0.00	0.17	0.00	0.00	0.00	0.93	0.00
C48	1.00	0.77	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00
C49	1.00	0.00	0.77	0.00	0.22	0.02	0.00	0.00	0.96	0.00
C50	1.00	0.80	0.00	0.00	0.01	0.00	0.19	0.00	0.00	0.00
C51	1.00	0.80	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.00
C52	1.00	0.83	0.00	0.00	0.01	0.00	0.16	0.00	0.00	0.00
C53	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.02	0.00
C54	1.00	0.88	0.00	0.00	0.02	0.00	0.10	0.00	0.00	0.00
C55	1.00	0.00	0.00	0.00	0.93	0.07	0.00	0.00	0.03	0.00
C56	1.00	0.83	0.00	0.00	0.01	0.00	0.16	0.00	0.00	0.00
C57	1.00	0.81	0.02	0.00	0.14	0.02	0.00	0.00	0.01	0.00
C58	1.00	0.00	0.83	0.00	0.13	0.03	0.00	0.00	0.91	0.00
C59	1.00	0.80	0.00	0.00	0.00	0.00	0.20	0.00	0.00	0.00
C60	1.00	0.00	0.80	0.00	0.18	0.02	0.00	0.00	0.95	0.00
C61	1.00	0.76	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00
C62	1.00	0.00	0.76	0.00	0.19	0.04	0.00	0.00	0.96	0.00
C63	1.00	0.81	0.00	0.00	0.00	0.00	0.19	0.00	0.00	0.00
C64	1.00	0.00	0.00	0.00	0.97	0.03	0.00	0.00	0.06	0.00
C65	1.00	0.84	0.00	0.00	0.00	0.00	0.16	0.00	0.00	0.00
C66	1.00	0.84	0.00	0.00	0.14	0.03	0.00	0.00	0.91	0.00
C67	1.00	0.89	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C68	1.00	0.85	0.05	0.00	0.01	0.09	0.00	0.00	0.01	0.00
C69	1.00	0.87	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C70	1.00	0.89	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C71	1.00	0.89	0.00	0.00	0.11	0.00	0.00	0.00	0.96	0.00
C72	1.00	0.89	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00
C73	1.00	0.89	0.00	0.00	0.01	0.00	0.00	0.09	0.01	0.00
C74	1.00	0.00	0.00	0.00	0.01	0.00	0.00	0.99	0.00	0.00
C75	1.00	0.00	0.00	0.00	0.01	0.00	0.99	0.00	0.00	0.00
C76	1.00	0.82	0.00	0.00	0.00	0.00	0.18	0.00	0.00	0.00
C77	1.00	0.80	0.02	0.00	0.14	0.04	0.00	0.00	0.01	0.00

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C78                1.00   0.89  0.00  0.00  0.00  0.00  0.11  0.00  0.00  0.00

C79                1.00   0.89  0.00  0.00  0.11  0.00  0.00  0.00  0.96  0.00

C80                1.00   0.89  0.00  0.00  0.00  0.00  0.11  0.00  0.00  0.00

C81                1.00   0.00  0.89  0.00  0.10  0.01  0.00  0.00  0.96  0.00

C82                1.00   0.74  0.00  0.00  0.01  0.00  0.25  0.00  0.00  0.00

C83                1.00   0.00  0.74  0.00  0.24  0.02  0.00  0.00  0.98  0.00

C84                1.00   0.89  0.00  0.00  0.00  0.00  0.11  0.00  0.00  0.00

C85                1.00   0.89  0.00  0.00  0.11  0.00  0.00  0.00  0.96  0.00

C86                1.00   0.89  0.00  0.00  0.00  0.00  0.11  0.00  0.00  0.00

C87                1.00   0.00  0.89  0.00  0.11  0.00  0.00  0.00  0.97  0.00

C88                1.00   0.87  0.00  0.00  0.00  0.00  0.13  0.00  0.00  0.00

C89                1.00   0.00  0.87  0.00  0.13  0.00  0.00  0.00  0.98  0.00

C90                1.00   0.83  0.00  0.00  0.00  0.00  0.17  0.00  0.00  0.00

C91                1.00   0.00  0.83  0.00  0.15  0.03  0.00  0.00  0.96  0.00

C92                1.00   0.83  0.00  0.00  0.00  0.00  0.17  0.00  0.00  0.00

C93                1.00   0.81  0.02  0.00  0.17  0.00  0.00  0.00  0.99  0.00

C94                1.00   0.85  0.00  0.00  0.01  0.00  0.14  0.00  0.00  0.00

C95                1.00   0.84  0.01  0.00  0.07  0.08  0.00  0.00  0.10  0.00

C96                1.00   0.85  0.00  0.00  0.01  0.00  0.14  0.00  0.00  0.00

C97                1.00   0.84  0.01  0.00  0.08  0.07  0.00  0.00  0.02  0.00

C98                1.00   0.85  0.00  0.00  0.02  0.00  0.13  0.00  0.00  0.00

C99                1.00   0.85  0.15  0.00  0.00  0.00  0.00  0.00  0.00  0.00

OR52                 1.00   0.00  0.00  0.00  0.00  0.00  0.00  1.00  0.00  0.00

STM-15                 1.00   0.97  0.03  0.00  0.00  0.00  0.00  0.00  0.00  0.00

STM-390                 1.00   0.00  0.00  0.00  0.00  0.00  0.00  1.00  0.00  0.00

STM-68                 1.00   0.96  0.04  0.00  0.00  0.00  0.00  0.00  0.00  0.00

W1                 1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00

Weir-Outlet1           1.00   0.92  0.00  0.00  0.00  0.00  0.00  0.08  0.00  0.00

Weir-Outlet2           1.00   0.00  0.00  0.00  1.00  0.00  0.00  0.00  0.00  0.00



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Conduit Surcharge Summary

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114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

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                                   Hours      Hours
                 --------- Hours Full --------   Above Full   Capacity
Conduit              Both Ends  Upstream  Dnstream   Normal Flow   Limited
---------------------------------------------------------------------------
15                    0.01      0.01      0.11      0.01        0.01
6                     0.01      0.01      0.24      0.01        0.01
9                     0.01      0.01      0.03      0.01        0.01
A15A(OUT)             0.01      0.01      0.37      0.01        0.01
C124                 24.00     24.00     24.00      0.17        0.09
C140                  0.07      0.07      0.10      0.01        0.01
C141                  0.05      0.05      0.08      0.01        0.01
C142                  0.10      0.10      0.10      0.01        0.10
C143                  0.07      0.07      0.09      0.01        0.01
C144                  0.01      0.09      0.01      0.19        0.01
C145_2                0.01      0.01      0.19      0.01        0.01
C146                  0.15      0.15      0.21      0.01        0.01
C147                  0.21      0.21      0.25      0.01        0.01
C148                  0.16      0.25      0.16      0.01        0.16
C149                  0.01      0.23      0.01      0.01        0.01
C151                  2.55      2.55      2.56      0.30        2.22
C152                  0.01      0.01      0.01      0.18        0.01
C153                  0.94      0.94      2.07      0.18        0.32
C156_1                0.19      0.19      0.20      0.01        0.01
C156_2                0.18      0.20      0.18      0.03        0.18
C163                  0.01      0.01      0.03      0.01        0.01
C166                  0.01      0.01      0.01      0.04        0.01
C167                  0.01      0.01      0.01      0.21        0.01
C171                  0.01      0.01      0.01      0.33        0.01
C177                  0.29      0.29      0.49      0.01        0.01
C178                  0.51      0.51      1.23      0.04        0.19
C179                  0.40      0.40      0.49      0.01        0.01
C180                  0.01      0.01      0.06      0.01        0.01
C181                  0.06      0.06      0.07      0.01        0.01
C182                  0.09      0.09      0.11      0.01        0.01
C184                 24.00     24.00     24.00      0.05        0.45
C185                  0.08      0.08      0.09      0.01        0.01
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114025 (MSSU) PCSWMM Model Output
100-year, 3-Hour Chicago Storm

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C192           0.04    0.04    0.53    0.01     0.01
C193          24.00   24.00   24.00    0.19     0.19
C195           0.01    0.01    0.26    0.01     0.01
C196           0.26    0.26    0.33    0.01     0.01
C197          24.00   24.00   24.00    0.07     0.09
C198          24.00   24.00   24.00    0.01     0.01
C199          24.00   24.00   24.00    0.01     0.08
C200          24.00   24.00   24.00    0.30     0.35
C202           0.01    0.01    0.13    0.01     0.01
C203           0.14    0.14   23.83    0.01     0.01
C204          24.00   24.00   24.00    0.01     0.01
C205          24.00   24.00   24.00    0.01     0.01
C206          24.00   24.00   24.00    0.01     0.01
C207          24.00   24.00   24.00    0.28     0.69
C208          24.00   24.00   24.00    0.01     0.01
C209          24.00   24.00   24.00    0.96     0.97
C210          24.00   24.00   24.00    0.13     0.13
C211          24.00   24.00   24.00    0.14     0.56
C212_2          0.01    0.10    0.01    2.94     0.01
C213_2         24.00   24.00   24.00    0.28    11.93
STM-390          0.07    0.08    0.07    0.53     0.07
W1            24.00   24.00   24.00    0.51    11.90
Weir-Outlet2     24.00   24.00   24.00    0.01     0.01


Analysis begun on:  Fri Jan 17 10:30:44 2025
Analysis ended on:  Fri Jan 17 10:30:58 2025
Total elapsed time: 00:00:14
```

5yr 12hr SCS		**100yr 12hr SCS**		**100yr +20% 12hr SCS**	
Time (h:mm)	**Intensity (mm/hr)**	**Time (h:mm)**	**Intensity (mm/hr)**	**Time (h:mm)**	**Intensity (mm/hr)**
0:00	0.00	0:00	0.00	0:00	0.00
0:30	1.69	0:30	2.82	0:30	3.38
1:00	0.79	1:00	1.31	1:00	1.58
1:30	1.46	1:30	2.44	1:30	2.93
2:00	1.46	2:00	2.44	2:00	2.93
2:30	1.91	2:30	3.19	2:30	3.83
3:00	1.69	3:00	2.82	3:00	3.38
3:30	2.25	3:30	3.76	3:30	4.51
4:00	2.25	4:00	3.76	4:00	4.51
4:30	3.03	4:30	5.07	4:30	6.09
5:00	3.82	5:00	6.39	5:00	7.66
5:30	6.07	5:30	10.14	5:30	12.17
6:00	48.08	6:00	80.38	6:00	96.46
6:30	12.25	6:30	20.47	6:30	24.57
7:00	5.39	7:00	9.02	7:00	10.82
7:30	3.60	7:30	6.01	7:30	7.21
8:00	3.15	8:00	5.26	8:00	6.31
8:30	2.47	8:30	4.13	8:30	4.96
9:00	2.58	9:00	4.32	9:00	5.18
9:30	1.69	9:30	2.82	9:30	3.38
10:00	1.35	10:00	2.25	10:00	2.70
10:30	1.91	10:30	3.19	10:30	3.83
11:00	1.24	11:00	2.07	11:00	2.48
11:30	1.12	11:30	1.88	11:30	2.25
12:00	1.12	12:00	1.88	12:00	2.25
Total Rainfall	**56.17 mm**	**Total Rainfall**	**93.91 mm**	**Total Rainfall**	**112.69 mm**

July 1 1979		**August 4 1988**		**August 8 1996**	
Time (h:mm)	**Intensity (mm/hr)**	**Time (h:mm)**	**Intensity (mm/hr)**	**Time (h:mm)**	**Intensity (mm/hr)**
0:00	0.0	0:00	0.0	0:00	0.0
0:05	2.3	0:05	0.1	0:05	4.0
1:05	2.3	1:05	0.1	1:05	11.9
2:05	8.9	2:05	0.0	2:05	26.5
3:05	8.9	3:05	3.7	3:05	13.3
4:05	8.9	4:05	6.2	4:05	0.0
5:05	8.9	5:05	101.5	5:05	2.7
6:05	38.1	6:05	15.5	6:05	0.0
7:05	38.1	7:05	29.3	7:05	8.0

8:05	38.1	8:05	19.8	8:05	18.6
9:05	38.1	9:05	1.5	9:05	10.6
10:05	38.1	10:05	1.7	10:05	21.2
11:05	38.1	11:05	5.4	11:05	2.7
12:05	38.1	12:05	24.6	12:05	2.7
13:05	50.8	13:05	26.5	13:05	15.9
14:05	50.8	14:05	34.9	14:05	66.3
15:05	76.2	15:05	10.2	15:05	55.7
16:05	106.7	16:05	27.1	16:05	122.0
17:05	106.7	17:05	104.4	17:05	88.9
18:05	71.1	18:05	27.5	18:05	9.3
19:05	71.1	19:05	62.5	19:05	8.0
20:05	30.5	20:05	31.8	20:05	4.0
21:05	30.5	21:05	79.8	21:05	0.0
22:05	30.5	22:05	67.5	22:05	2.7
23:05	30.5	23:05	156.2	23:05	0.0
0:05	3.8	0:05	5.1	0:05	0.0
1:05	3.8	1:05	0.2	1:05	0.0
2:05	3.8	2:05	0.2	2:05	5.3
3:05	3.8	3:05	0.2	3:05	0.0
4:05	3.8	4:05	0.2	4:05	0.0
5:05	3.8	5:05	0.2	5:05	0.0
6:05	3.8	6:05	0.2	6:05	0.0
7:05	3.8	7:05	0.2	7:05	0.0
8:05	3.8	8:05	0.2	8:05	0.0
9:05	3.8	9:05	0.2	9:05	4.0
10:05	3.8	10:05	0.2	10:05	53.1
11:05	3.8	11:05	12.8	11:05	69.0
		12:05	14.0	12:05	63.7
Total Rainfall	**83.99 mm**	13:05	22.2	13:05	58.4
		14:05	21.8	14:05	47.8
		15:05	1.4	15:05	15.9
		16:05	0.2	16:05	13.3
		17:05	0.2	17:05	8.0
		18:05	0.2	18:05	5.3
		19:05	0.2	19:05	6.6
		20:05	0.2	20:05	2.7
		21:05	0.2	21:05	4.0
		22:05	0.2	22:05	2.7
		23:05	0.2	23:05	4.0
		0:05	0.2	0:05	2.7
		1:05	0.2	1:05	5.3
		2:05	0.2	2:05	4.0
		3:05	0.2	3:05	2.7
		4:05	0.2	4:05	4.0
		5:05	0.2	5:05	2.7
		6:05	0.2	6:05	1.3

7:05	0.2
8:05	0.2
9:05	0.2
10:05	0.2
11:05	2.9
12:05	7.8
13:05	10.0
14:05	6.3
15:05	5.1
16:05	9.8
17:05	2.6
18:05	1.7
19:05	0.0
20:05	0.0
21:05	0.0
22:05	0.0
23:05	0.0

Total Rainfall 80.59 mm

7:05	1.3
8:05	0.0
9:05	0.0
10:05	0.0
11:05	0.0
12:05	2.7
13:05	0.0
14:05	0.0
15:05	0.0
16:05	0.0
17:05	0.0
18:05	0.0
19:05	0.0
20:05	1.3
21:05	0.0
22:05	0.0
23:05	0.0

Total Rainfall 73.90 mm

5yr 3hr Chicago

Time (h:mm)	Intensity (mm/hr)
0:00	0.00
0:10	3.68
0:20	4.58
0:30	6.15
0:40	9.61
0:50	24.17
1:00	104.19
1:10	32.04
1:20	16.34
1:30	10.96
1:40	8.29
1:50	6.69
2:00	5.63
2:10	4.87
2:20	4.30
2:30	3.86
2:40	3.51
2:50	3.22
3:00	2.98

Total Rainfall 42.51 mm

100yr 3hr Chicago

Time (h:mm)	Intensity (mm/hr)
0:00	0.00
0:10	6.05
0:20	7.54
0:30	10.16
0:40	15.97
0:50	40.65
1:00	178.56
1:10	54.05
1:20	27.32
1:30	18.24
1:40	13.74
1:50	11.06
2:00	9.29
2:10	8.02
2:20	7.08
2:30	6.35
2:40	5.76
2:50	5.28
3:00	4.88

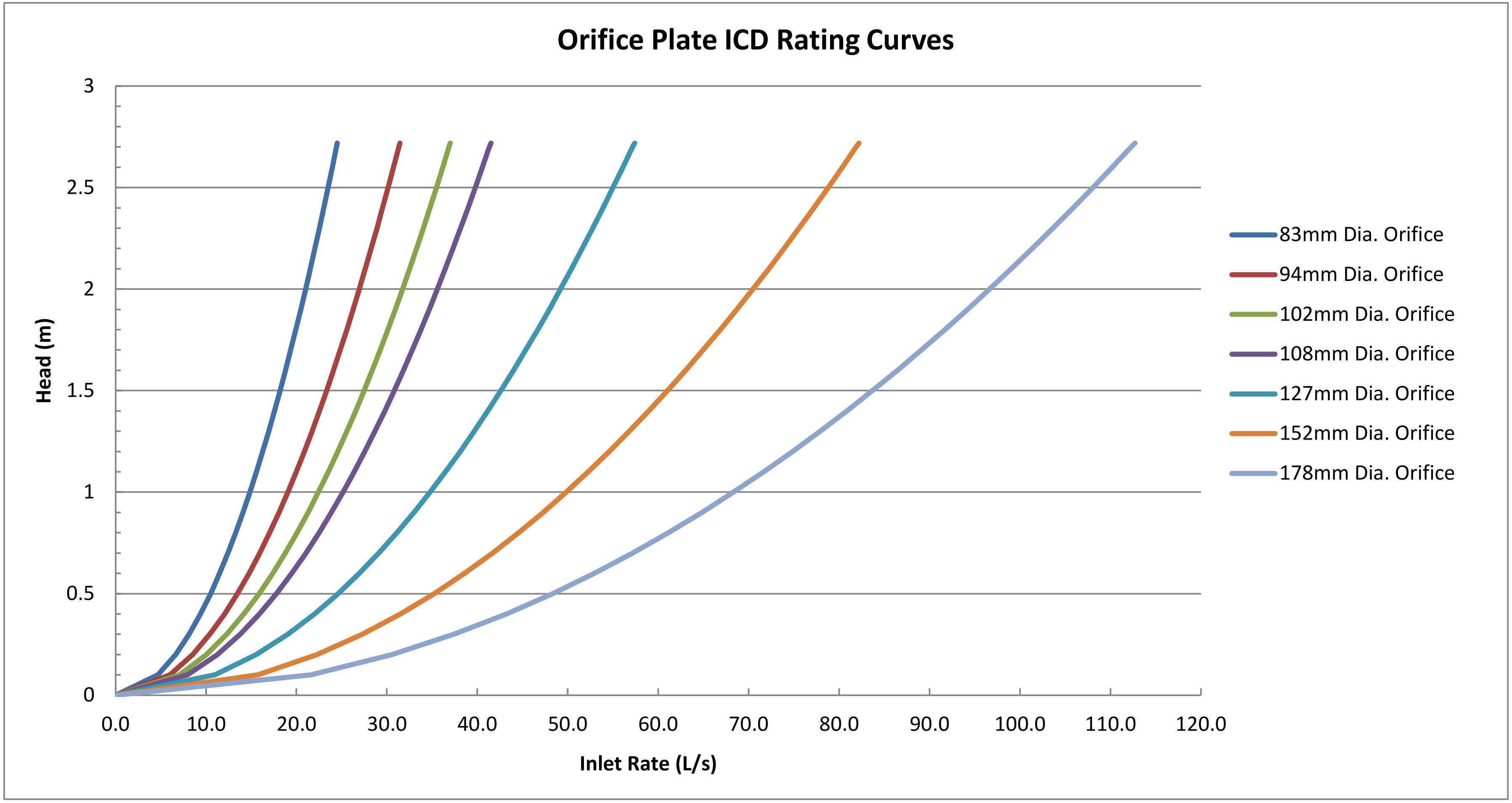
Total Rainfall 71.67 mm

100yr +20% 3hr Chicago

Time (h:mm)	Intensity (mm/hr)
0:00	0.00
0:10	7.26
0:20	9.05
0:30	12.19
0:40	19.16
0:50	48.78
1:00	214.27
1:10	64.86
1:20	32.78
1:30	21.89
1:40	16.49
1:50	13.27
2:00	11.15
2:10	9.62
2:20	8.50
2:30	7.62
2:40	6.91
2:50	6.34
3:00	5.86

Total Rainfall 86.00 mm

ICD Rating Curves



Prepared By: Novatech Engineering Consultants
Date: 8/9/2023

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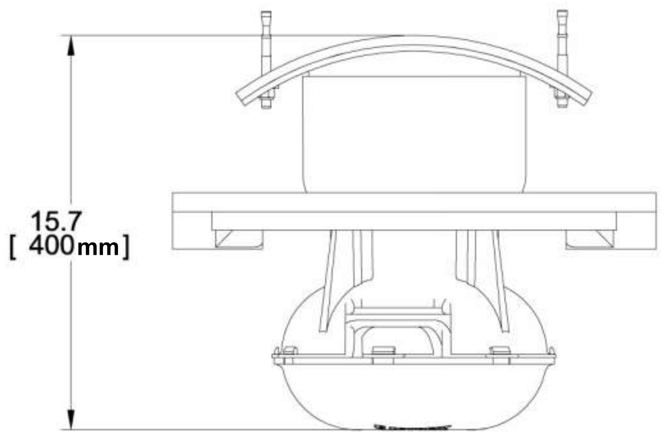
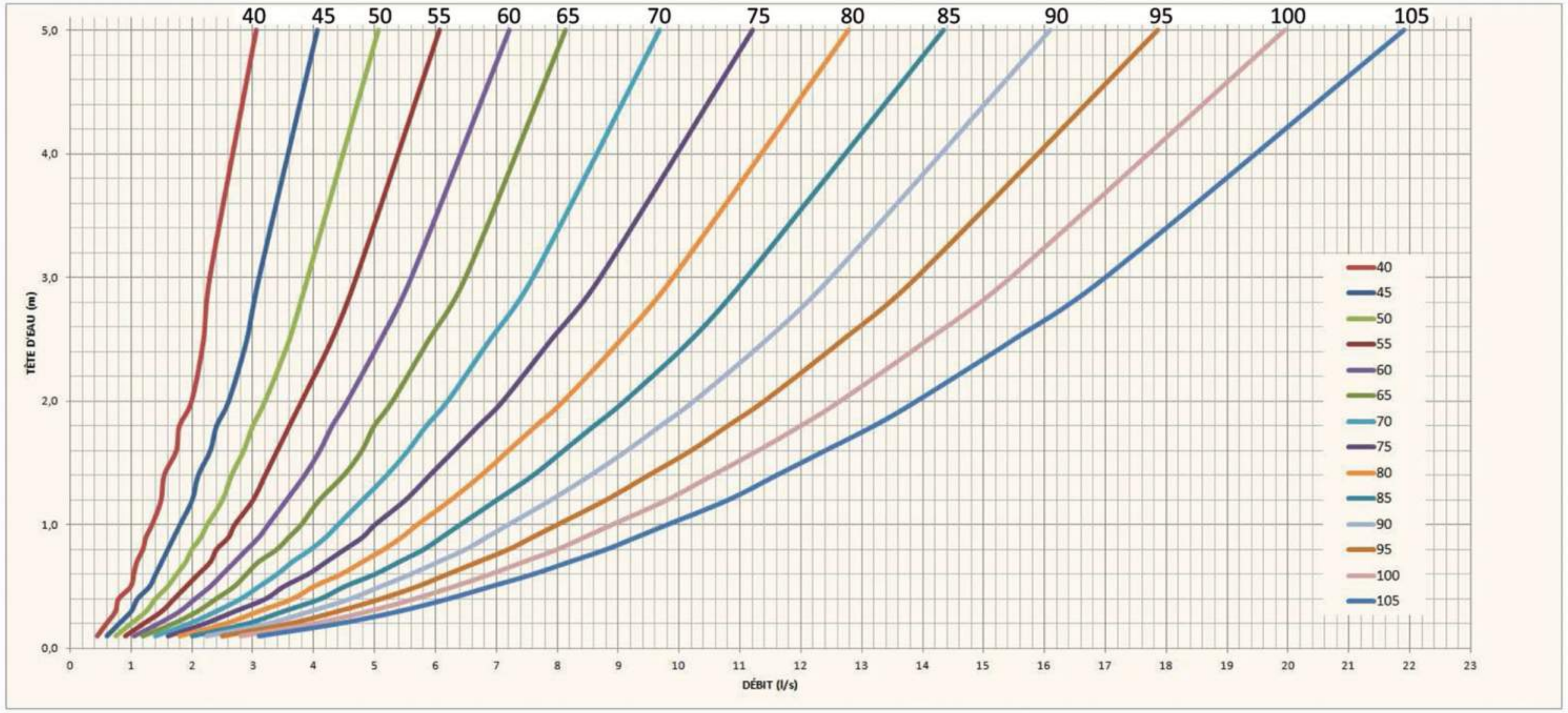
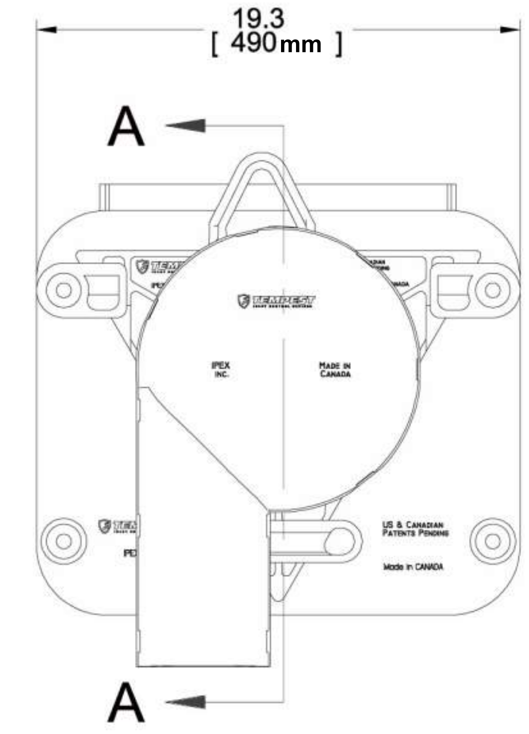
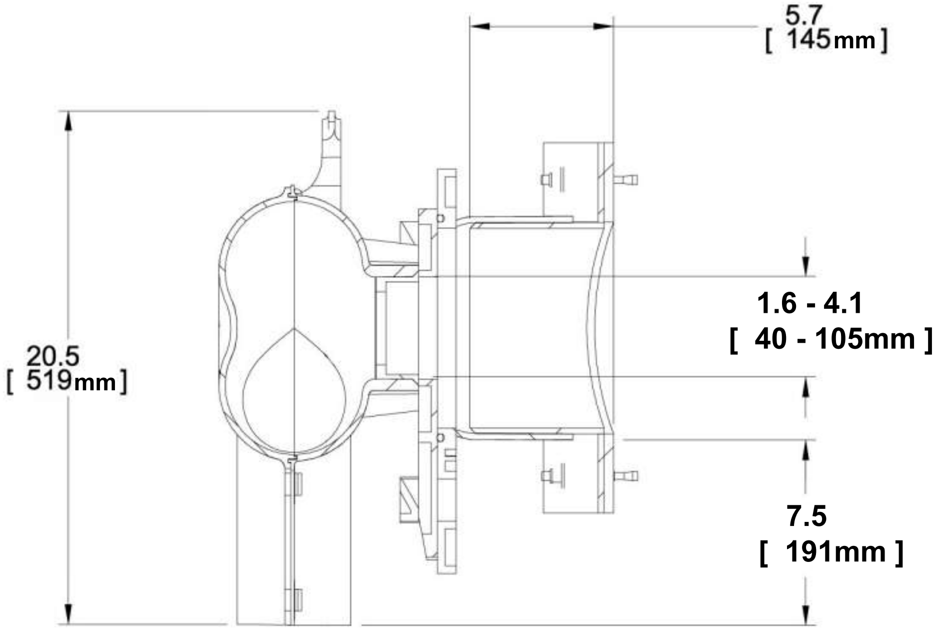
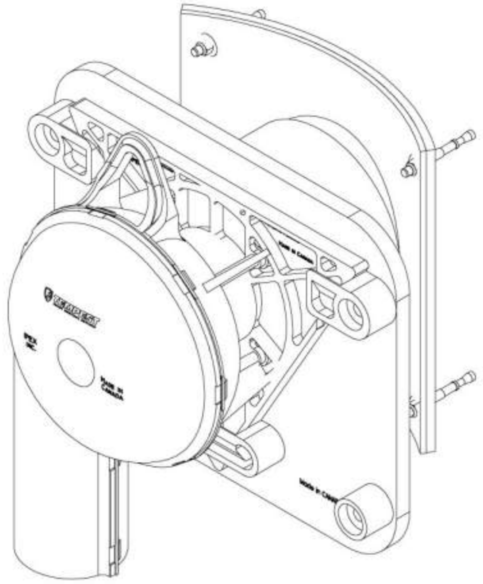








SECTION A-A



Product development engineering
3 Place du commerce, Suite 101
Île des Soeurs, Montréal, QC, H3E 1H7
Canada Tel 514 769 2200
www.ipexna.com

PROJECTION	UNITS	TITLE
	in [mm]	Tempest LMF round CB assembly [VORTEX]

SIZE B
SCALE(S) 1/8
1-2014

NOVATECH
Engineers, Planners & Landscape Architects

MEMORANDUM

DATE:	**MAY 26, 2017**
TO:	**JUSTIN GAUTHIER**
FROM:	**CONRAD STANG**
RE:	**GREYSTONE VILLAGE (175 MAIN STREET)** **INLET CALCULATIONS FOR CB 15 & CB 74**
CC:	**MIKE PETEPIECE**

This technical memorandum provides the inlet calculations for CB 15 and CB 74.

The capacity of the 100-year inlets on Scholastic is governed by the flowrate through the grated opening, as well as the capacity of the pipe(s) connecting the major system inlets to the storm sewer.

- The capacity of the grated openings was evaluated using MTO Design Chart 4.20 (Appendix 7-A.21 of the Ottawa Sewer Design Guidelines) (see attached).
- The capacity of the catchbasin leads was evaluated using the PCSWMM model.

The model results indicate that the catchbasin leads will surcharge during the 100-year event, but will provide sufficient capacity to convey the captured 100-year overland flows into the storm sewer on Scholastic.

As shown in Table 1 below, the HGL in CB 15 and CB 74 is below the top-of-grate elevations. As such, there will be no ponding during the 100-year event (3-hour Chicago storm).

Table 1: 100-year HGL and Ponding Depths (3-hour Chicago storm)

Catchbasin ID	Outlet Pipe Size (mm)	T/G Elev. (m)	100-year HGL Elev. (m)	100-year Ponding Depth (m)
CB 15 (Ph.1)	300mm	62.66	61.72	0.00
CB 74 (Ph.2)	4x 375mm	58.92	58.87	0.00

Attachments:

- DICB Inlet Curves for CB 15 and CB 74

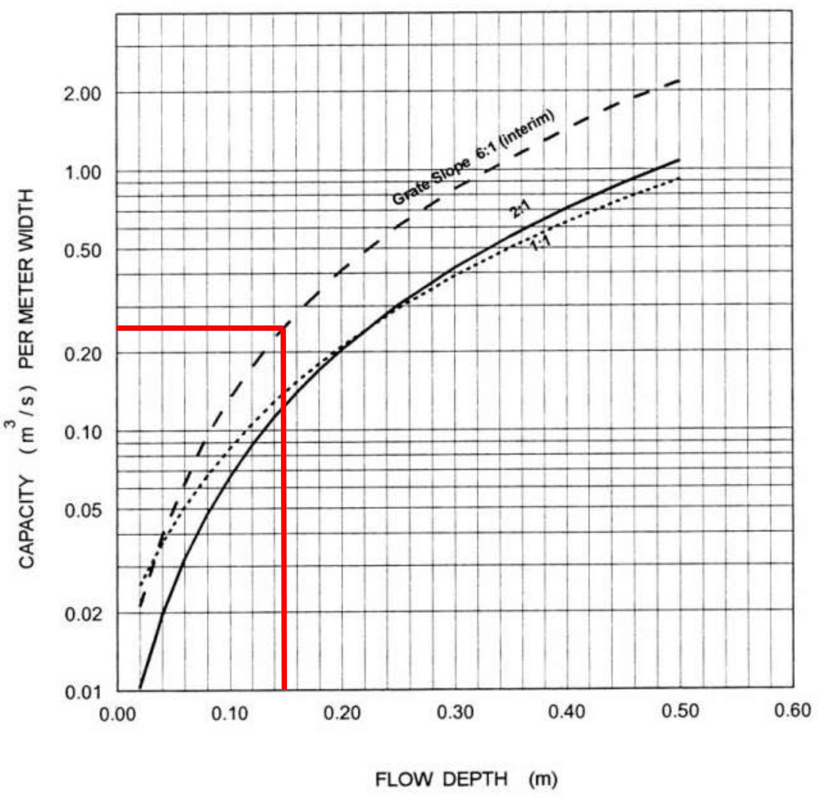
Inlet Calculation for CB 15

Ditch Inlet Capture Curves[17]

It is noted that the inlet curve is not 100% representative of the grate owing to slightly thicker grate material to be used to meet City road standards. It is, however, reasonable in the context of this design.

Design Chart 4.20: Ditch Inlet Capacity

The 100-year inflow (per the SSA model) is 135L/s. The maximum permissible depth is 0.15m. Grate slope is horizontal, but in this case it is reasonably assumed that the 6:1 curve is appropriate. At that depth, the inlet capacity is 250L/s/m. The proposed inlet has a length of 2.4m (twin 1200x600 DI grates), and therefore a total capacity of 600L/s, allowing for almost 50% blockage of the inlet due to debris. While the 50% blockage threshold is not quite achieved, this shortfall is not significant in due to the return period capacity of the inlet, the physical size of the inlet, and the proximity of the spill point to the Rideau River.



Notes:

1. Curves apply to grate Type 403.01, but may be used for straight - bar inlets without significant loss of accuracy.
2. Capacities given by curves are for unobstructed grates only. For design use working capacity ≯ 0.5 x unobstructed capacity.
3. Capacities of grates operating in high velocity flows are less than indicated.

---

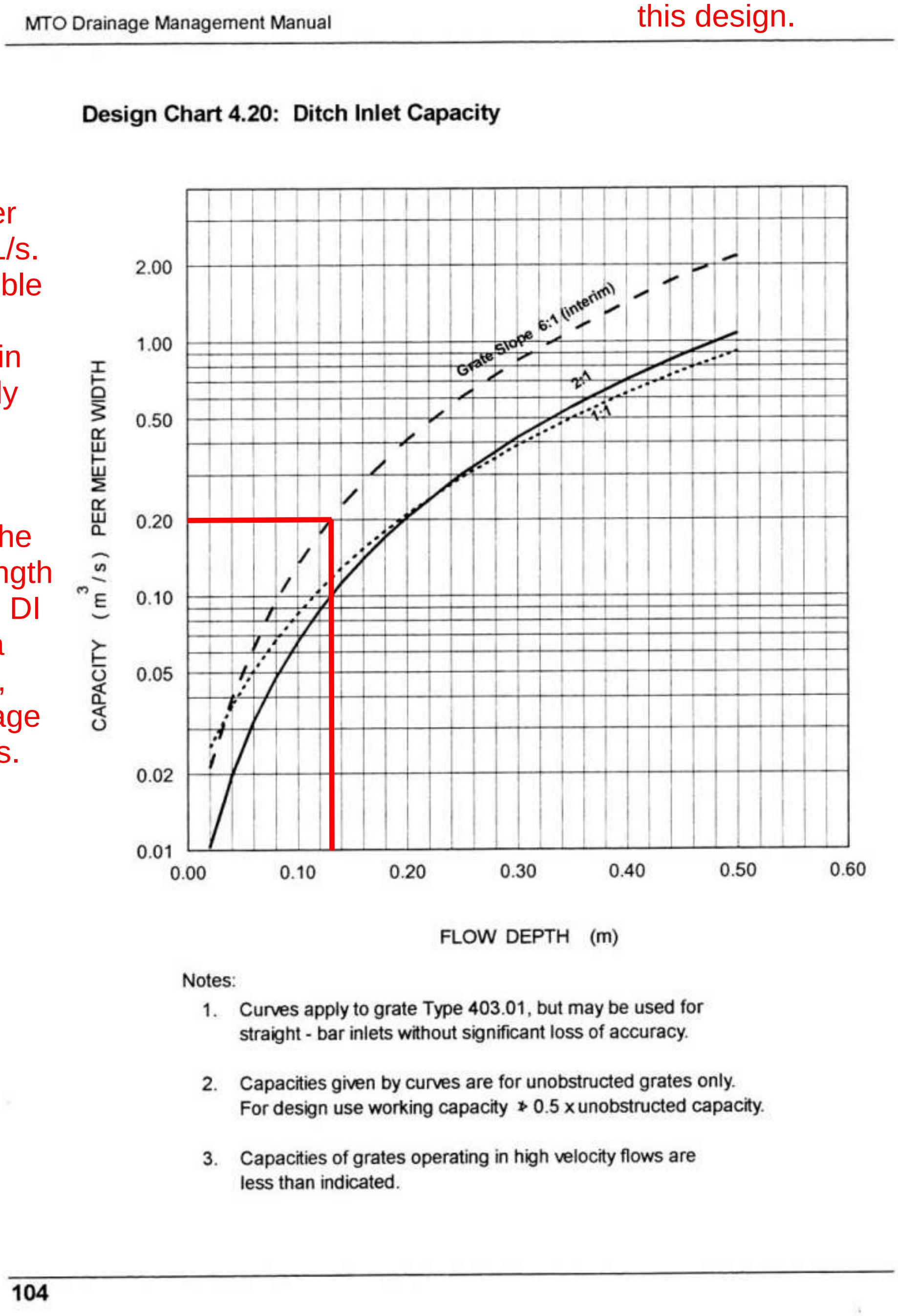
[17] From the *MTO Drainage Management Manual*

Inlet Calculation for CB 74

Ditch Inlet Capture Curves[17]

It is noted that the inlet curve is not 100% representative of the grate owing to slightly thicker grate material to be used to meet City road standards. It is, however, reasonable in the context of this design.

The 100-year inflow (per the SSA model) is 415L/s. The maximum permissible depth is 0.13m. Grate slope is horizontal, but in this case it is reasonably assumed that the 6:1 curve is appropriate. At that depth, the inlet capacity is 200L/s/m. The proposed inlet has a length of 4.8m (four 1200x600 DI grates), and therefore a total capacity of 960L/s, allowing for 50% blockage of the inlet due to debris.


MTO Drainage Management Manual

Design Chart 4.20: Ditch Inlet Capacity

Notes:

1. Curves apply to grate Type 403.01, but may be used for straight - bar inlets without significant loss of accuracy.
2. Capacities given by curves are for unobstructed grates only. For design use working capacity ≯ 0.5 x unobstructed capacity.
3. Capacities of grates operating in high velocity flows are less than indicated.

104

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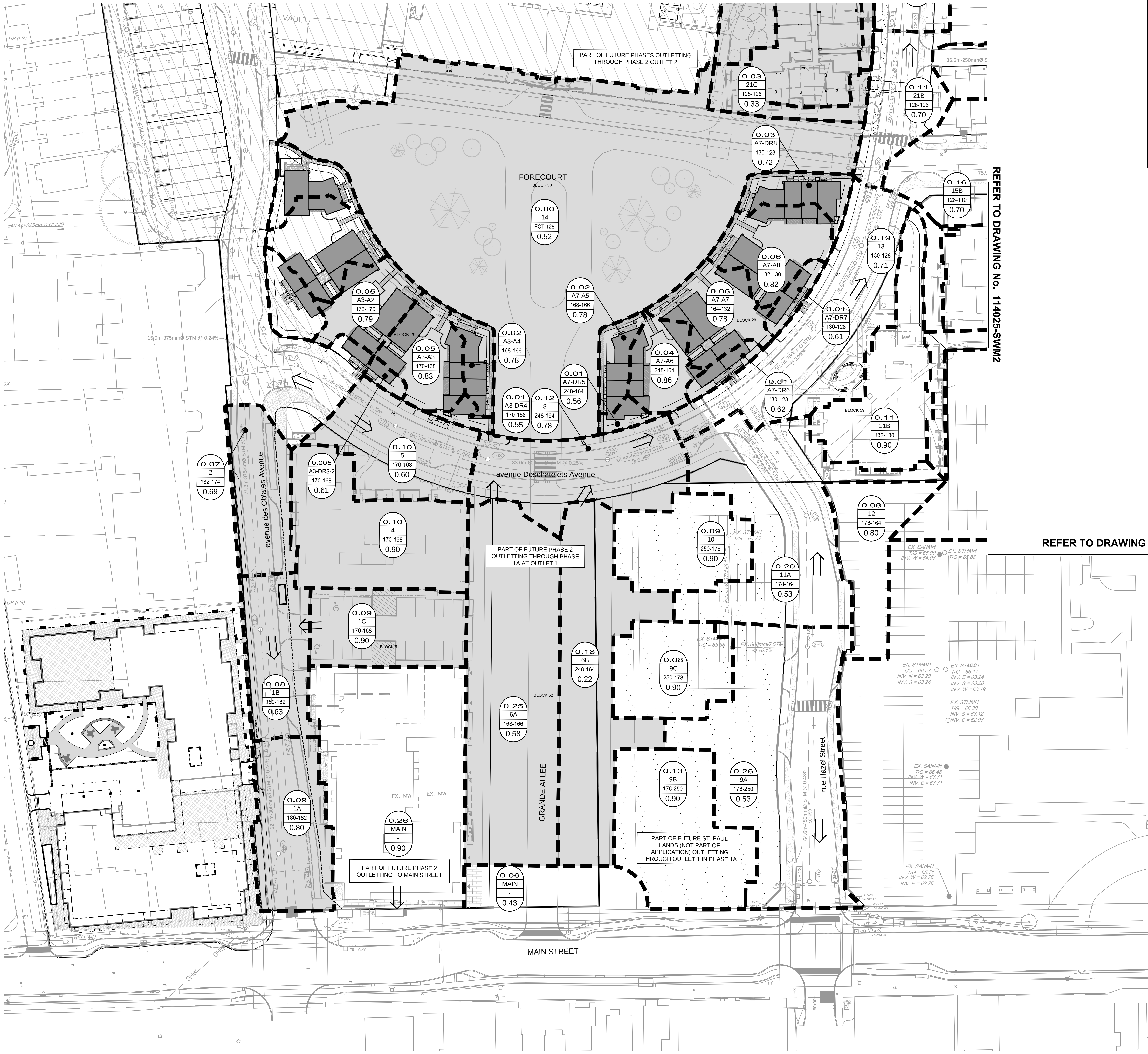
[17] From the *MTO Drainage Management Manual*



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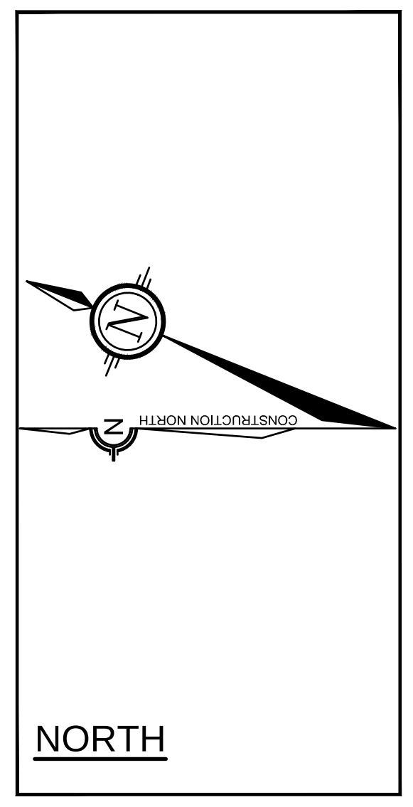

SITE BENCHMARK
REFERENCED TO LOCAL
GEODETIC DATUM
City of Ottawa MON 3640
ELEV: 66.702m
Tablet in stone foundation wall at SPU situated 2.84m west of most westerly of two basement windows and 0.127m above ground.

LEGEND

▬ ▬	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

M:\2014\114025\CAD\Design\Issued Drawings\MSS Addendum\114025-STM-PH1-Addendum.dwg, STM1, Mar 10, 2025 - 11:52am, channa

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	No.	REVISION	DATE	BY
				8.	ISSUED TO THE RVCA FOR ECA AMENDMENT CLEARANCE	JUNE 21/24	SAZ
				7.	REVISED AS PER CITY OF OTTAWA COMMENTS	FEB 10/23	SAZ
				6.	UPDATED TO REFLECT PH2 DRAINAGE AREAS	MAY 26/17	MJP
				5.	ISSUED FOR CONSTRUCTION	JULY 7/16	JAG
12.	UPDATED FOR MAINTENANCE HOLE NUMBERING	MAR 04/25	SAZ	4.	REVISED AS PER CITY COMMENTS & ISSUED FOR E.C.A.	MAY 24/16	JAG
11.	ISSUED FOR CITY OF OTTAWA REVIEW	FEB 10/25	SAZ	3.	ISSUED FOR TENDER	APR 20/16	JAG
10.	REVISED AS PER CITY OF OTTAWA COMMENTS	OCT 23/24	SAZ	2.	REVISED AS PER CITY COMMENTS	APR 13/16	JAG
9.	REVISED AS PER CITY OF OTTAWA COMMENTS	AUG 7/24	SAZ	1.	ISSUED FOR CITY OF OTTAWA REVIEW	DEC 18/15	JAG

SCALE
1:500

1:500
0 5 10 15 20

DESIGN	SAZ
CHECKED	JAG
DRAWN	SAZ
CHECKED	JAG
APPROVED	MSP

LICENSED PROFESSIONAL ENGINEER
T. J. MCKAY
100195434
MARCH 4, 2025
PROVINCE OF ONTARIO

NOVATECH
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Facsimile	(613) 254-5867
Website	www.novatech-eng.com

CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

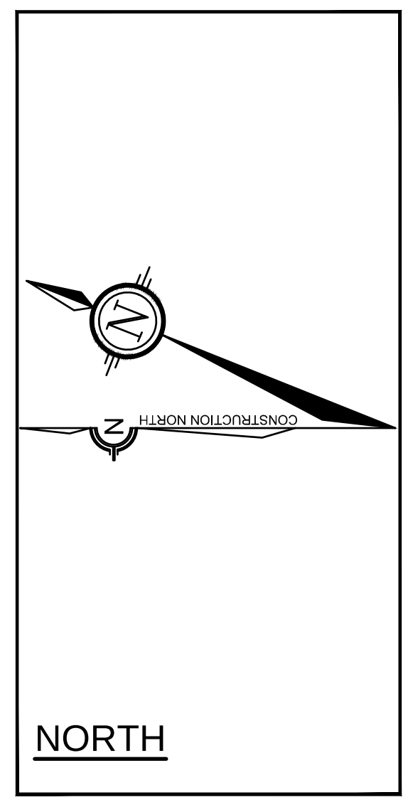
DRAWING NAME

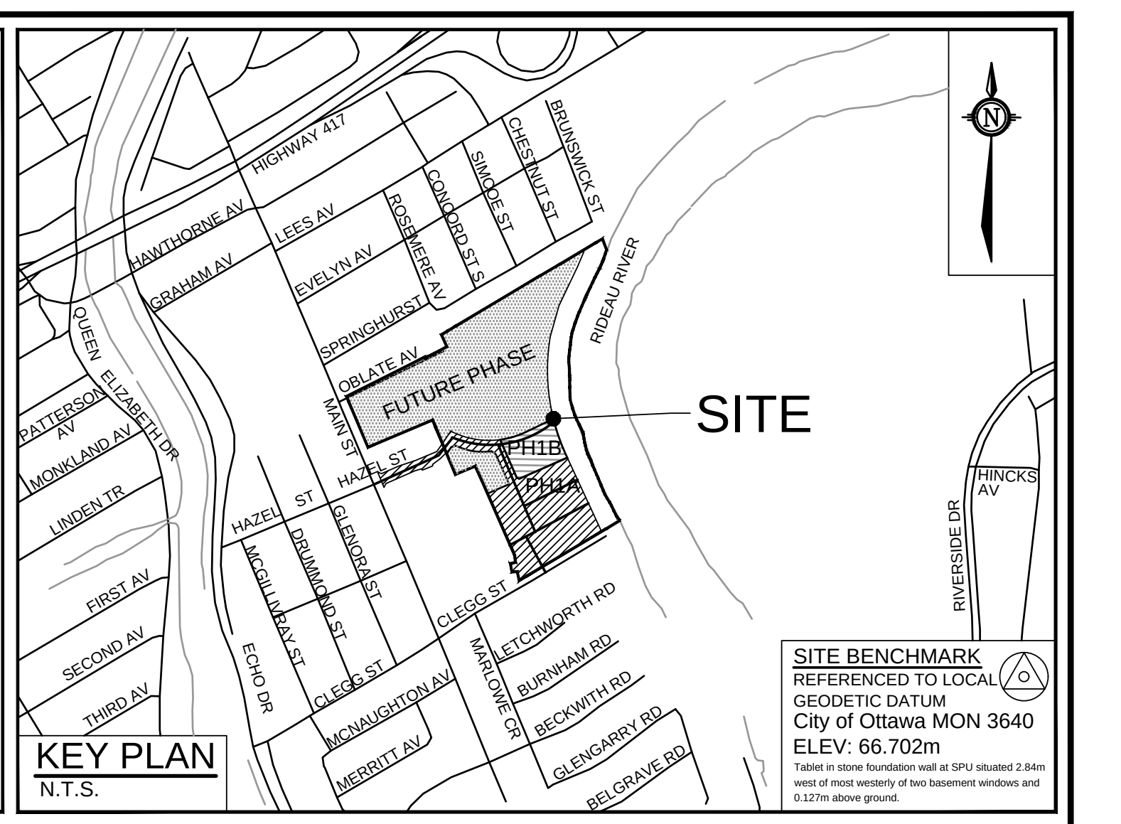
STORM DRAINAGE AREAS PLAN
PHASE 1A AND 1B

PROJECT No. 114025-00
REV: REV # 12
DRAWING No. 114025-STM1

PLANB1.DWG - 1000mmx707mm

REFER TO DRAWING No. 114025-SWM1





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

▬ ▬	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
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No.	REVISION	DATE	BY
12.	UPDATED FOR MAINTENANCE HOLE NUMBERING	MAR 04/25	SAZ
11.	ISSUED FOR CITY OF OTTAWA REVIEW	FEB 10/25	SAZ
10.	REVISED AS PER CITY OF OTTAWA COMMENTS	OCT 23/24	SAZ
9.	REVISED AS PER CITY OF OTTAWA COMMENTS	AUG 7/24	SAZ
8.	ISSUED TO THE RVCA FOR ECA AMENDMENT CLEARANCE	JUNE 21/24	SAZ
7.	REVISED AS PER CITY OF OTTAWA COMMENTS	FEB 10/23	SAZ
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

1:500
0 5 10 15 20

DESIGN	SAZ
CHECKED	JAG
DRAWN	SAZ
CHECKED	JAG
APPROVED	MSP

LICENSED PROFESSIONAL ENGINEER
T. J. MCKAY
100195434
MARCH 4, 2025
PROVINCE OF ONTARIO

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone	(613) 254-9643
Facsimile	(613) 254-5867
Website	www.novatech-eng.com

CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

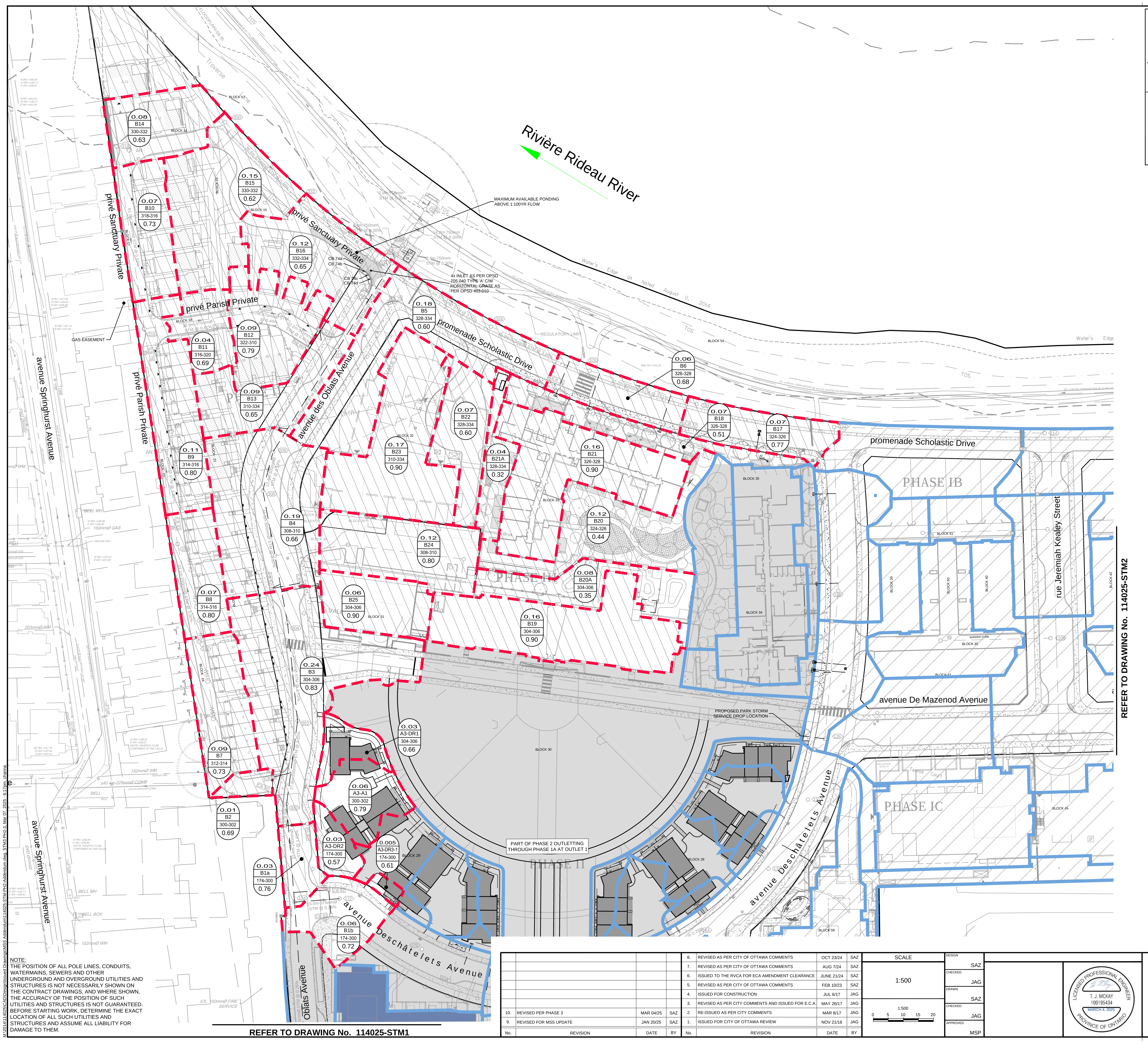
DRAWING NAME

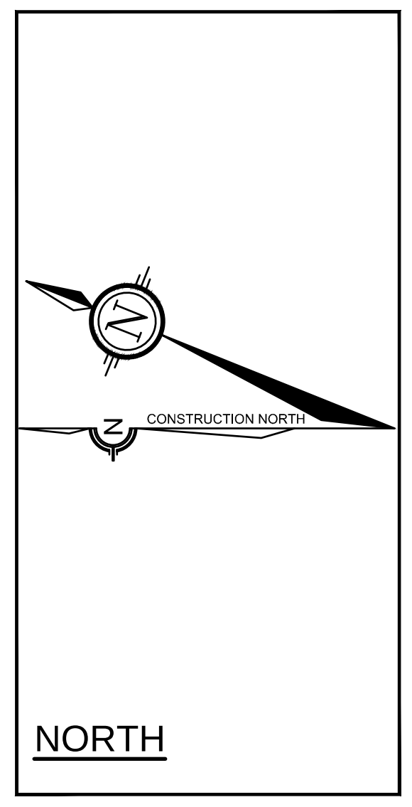
STORM DRAINAGE AREAS PLAN
PHASE 1A AND 1B

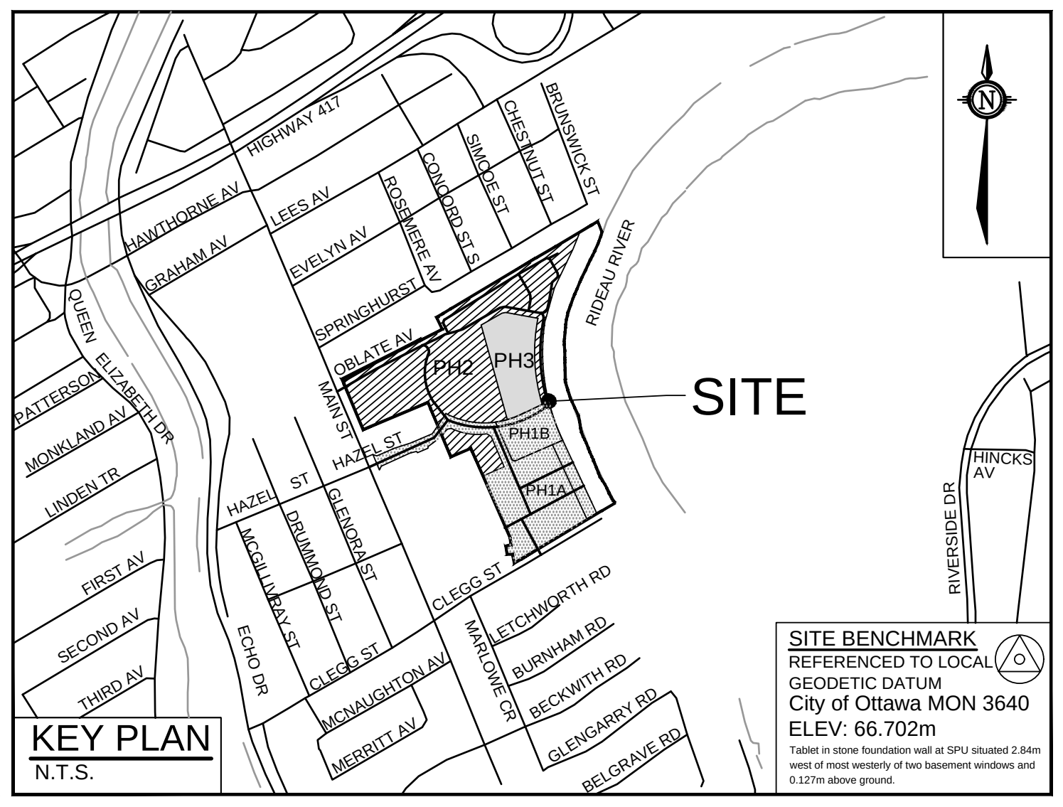
PROJECT No.	114025-00
REV	REV # 12
DRAWING No.	114025-STM2

PLANB1.DWG - 1000mmx707mm

M:\2014\114025\CAD\Design\Issued Drawings\MSS Addendum\114025-STM-PH1-Addendum.dwg, STM2, Mar 10, 2025 - 11:52am, dhanna







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

▬	PHASING LIMITS
▬	PROPERTY LINE
▬	APPROVED PHASE 1A/B DRAINAGE AREA BOUNDARY
▬ ▬	PHASE 2/3 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 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)

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.

M:\2014\114025\CAD\Design\Issued Drawings\MSS Addendum\114025-STM-PH2-Addendum.dwg, STM3 PH2-3, Mar 07, 2025 - 6:17pm, channa

REFER TO 114025-STM1 AND STM2 FOR ADDITIONAL DRAINAGE DETAILS OUTLETTING TO PHASE 1A OUTLET 1

No.	REVISION	DATE	BY
10.	REVISED PER PHASE 3	MAR 04/25	SAZ
9.	REVISED FOR MSS UPDATE	JAN 20/25	SAZ
8.	REVISED AS PER CITY OF OTTAWA COMMENTS	OCT 23/24	SAZ
7.	REVISED AS PER CITY OF OTTAWA COMMENTS	AUG 7/24	SAZ
6.	ISSUED TO THE RVCA FOR ECA AMENDMENT CLEARANCE	JUNE 21/24	SAZ
5.	REVISED AS PER CITY OF OTTAWA COMMENTS	FEB 10/23	SAZ
4.	ISSUED FOR CONSTRUCTION	JUL 6/17	JAG
3.	REVISED AS PER CITY COMMENTS AND ISSUED FOR E.C.A.	MAY 26/17	JAG
2.	RE-ISSUED AS PER CITY COMMENTS	MAR 8/17	JAG
1.	ISSUED FOR CITY OF OTTAWA REVIEW	NOV 21/16	JAG

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

DESIGN	SAZ
CHECKED	JAG
DRAWN	SAZ
CHECKED	JAG
APPROVED	MSP

LICENSED PROFESSIONAL ENGINEER
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MARCH 4, 2025
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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 # 10
DRAWING No. 114025-STM1-B

PLANB1.DWG - 1000mmx707mm

STORM SEWER DESIGN SHEET (*2 YEAR* DESIGN EVENT) - AS BUILT
Greystone Village
Developer: Greystone Village Inc.
Additional Condo Units

NOVATECH
Engineers, Planners & Landscape Architects

PROJECT #: 114025
DESIGNED BY : SAZ/JAG/VM
CHECKED BY : MJP
DATE PREPARED : 15-Dec-15
DATE REVISED : ~~24-Feb-16~~ ~~11-Mar-16~~ ~~17-Oct-16~~ ~~27-Oct-16~~ ~~5-Jan-17~~ ~~27-Apr-17~~ ~~15-Sep-17~~ ~~6-Feb-23~~ ~~27-Feb-23~~ ~~24-May-24~~ ~~7-Aug-24~~ ~~23-Oct-24~~ ~~10-Feb-25~~ 4-Mar-25

LOCATION											PROPOSED SEWER								
STREET	FROM M.H.	TO M.H.	AREA #	INDIV AREA (ha)	INDIV R	INDIV. 2.78 AR	ACCUM. 2.78 AR	TIME OF CONC. (min)	RAINFALL INTENSITY (mm/hr)	PEAK FLOW Q (L/s)	TYPE OF PIPE	PIPE SIZE (mm)	PIPE ID (mm)	GRADE (%)	LENGTH (m)	CAPACITY (L/s)	FULL FLOW VELOCITY	TIME OF FLOW (min)	CAPACITY (%)
OBLATS AVENUE[1]	180	182	1A	0.09	0.80	0.20	0.20	10.00	77	**26.1**	DR 35	300	305	***0.37***	***61.8***	61.4	0.84	1.22	43%
			1B	0.08	0.63	0.14	0.34												
OBLATS AVENUE[1]	182	174	2	0.07	0.69	0.13	0.47	11.22	72	**34.4**	DR 35	375	381	***0.31***	***71.5***	101.8	0.89	1.33	34%
DESCHATELETS AVENUE[1]	174	172					0.47	12.56	68	**32.4**	DR 35	375	381	***0.13***	***15.3***	65.9	0.58	0.44	49%
DESCHATELETS AVENUE[1]	172	170	A3-A2	0.05	0.79	0.11	0.58	13.00	67	**55.9**	CONC	450	457	**0.31**	**32.2**	165.6	1.01	0.53	34%
			4	0.10	0.90	0.25	0.83												
DESCHATELETS AVENUE[1]	170	168	5	0.10	0.60	0.17	1.00	13.53	65	**89.4**	CONC	525	533	***0.26***	***27.2***	228.8	1.02	0.44	39%
			A3-DR3-2	0.005	0.61	0.01	1.01												
			A3-A3	0.05	0.83	0.12	1.13												
			A3-DR4	0.01	0.55	0.02	1.14												
			1C	0.09	0.90	0.23	1.37												
DESCHATELETS AVENUE[1]	168	166	6A	0.25	0.58	0.40	1.77	13.97	64	**119.3**	CONC	600	610	***0.27***	***33.4***	332.8	1.14	0.49	36%
			A3-A4	0.02	0.78	0.04	1.81												
			A7-A5	0.02	0.78	0.04	1.86												
DESCHATELETS AVENUE[1]	166	248					1.86	14.46	63	**117.0**	CONC	600	610	***0.17***	***17.3***	264.1	0.90	0.32	44%
DESCHATELETS AVENUE[1]	248	164	8	0.12	0.78	0.26	2.12	14.78	62	**145.6**	CONC	600	610	***0.56***	***19.7***	479.4	1.64	0.20	30%
			A7-DR5	0.01	0.56	0.02	2.13												
			A7-A6	0.04	0.86	0.10	2.23												
			6B	0.18	0.22	0.11	2.34												
								14.98											
HAZEL STREET	176	250	9A	0.26	0.53	0.38	0.38	10.00	77	**54.4**	CONC	450	457	***0.48***	***60.4***	206.1	1.26	0.80	26%
			9B	0.13	0.90	0.33	0.71												
HAZEL STREET	250	178	9C	0.08	0.90	0.20	0.91	10.80	74	**83.7**	CONC	450	457	***0.47***	***38.6***	203.9	1.24	0.52	41%
			10	0.09	0.90	0.23	1.13												
HAZEL STREET / ST. PAUL UNIVERSITY LANDS	178	164	11A	0.20	0.53	0.29	1.43	11.32	72	**115.8**	CONC	525	533	***0.24***	***37.3***	219.8	0.98	0.63	53%
			12	0.08	0.80	0.18	1.61												
								11.95											
DESCHATELETS AVENUE	164	132	A7-A7	0.06	0.78	0.13	4.07	14.98	62	**251.8**	CONC	750	762	**0.26**	**30.8**	592.2	1.30	0.40	43%
DESCHATELETS AVENUE	132	130	11B	0.11	0.90	0.28	4.35	15.38	61	**273.1**	CONC	750	762	**0.30**	**26.4**	636.1	1.39	0.32	43%
			A7-A8	0.06	0.82	0.14	4.49												
DESCHATELETS AVENUE	130	128	13	0.19	0.71	0.38	4.86	15.69	60	**298.2**	CONC	750	762	**0.45**	**19.8**	779.1	1.71	0.19	38%
			A7-DR6	0.01	0.62	0.02	4.88												
			A7-DR7	0.01	0.61	0.02	4.89												
			A7-DR8	0.03	0.72	0.06	4.95												
								15.88											
FORECOURT	CBMH	128	14	0.80	0.52	1.16	1.16	10.00	77	**88.8**	DR 35	300	305	***1.00***	***9.2***	100.9	1.38	0.11	88%
								10.11											

STORM SEWER DESIGN SHEET (*2 YEAR* DESIGN EVENT) - AS BUILT

Greystone Village

Developer: Greystone Village Inc.

Additional Condo Units

NOVATECH
Engineers, Planners & Landscape Architects

PROJECT #: **114025**
DESIGNED BY : **SAZ/JAG/VM**
CHECKED BY : **MJP**
DATE PREPARED : **15-Dec-15**
DATE REVISED : **~~24-Feb-16~~ ~~11-Mar-16~~ ~~17-Oct-16~~ ~~27-Oct-16~~ ~~5-Jan-17~~ ~~27-Apr-17~~ ~~15-Sep-17~~ ~~6-Feb-23~~ ~~27-Feb-23~~ ~~24-May-24~~ ~~7-Aug-24~~ ~~23-Oct-24~~ ~~10-Feb-25~~ 4-Mar-25**

LOCATION											**PROPOSED SEWER**								
STREET	**FROM M.H.**	**TO M.H.**	**AREA #**	**INDIV AREA (ha)**	**INDIV R**	**INDIV. 2.78 AR**	**ACCUM. 2.78 AR**	**TIME OF CONC. (min)**	**RAINFALL INTENSITY (mm/hr)**	**PEAK FLOW Q (L/s)**	**TYPE OF PIPE**	**PIPE SIZE (mm)**	**PIPE ID (mm)**	**GRADE (%)**	**LENGTH (m)**	**CAPACITY (L/s)**	**FULL FLOW VELOCITY**	**TIME OF FLOW (min)**	**CAPACITY (%)**
DE MAZENOD AVENUE	128	110	15A	0.15	0.90	0.38	6.49	15.88	60	**406.2**	CONC	750	762	***0.53***	***76.0***	845.5	1.85	0.68	48%
			15B	0.16	0.70	0.31	6.80												
								16.57											
DE MAZENOD AVENUE	108	110	16A	0.05	0.73	0.10	0.10	10.00	77	**51.9**	DR 35	375	381	***0.62***	***73.8***	144.0	1.26	0.97	36%
			16B	0.05	0.71	0.10	0.20												
			16C	0.19	0.90	0.48	0.68												
								10.97											
JEREMIAH KEALEY STREET	110	110b					7.47	16.57	58	**435.7**	CONC	825	838	***0.28***	***32.1***	792.4	1.44	0.37	55%
								16.94											
BLOCK 49/50	152	110b	17	0.12	0.86	0.29	0.29	10.00	77	**22.0**	DR 35	250	254	***0.55***	***36.1***	46.0	0.91	0.66	48%
								10.66											
JEREMIAH KEALEY STREET	110b	112b	18	0.28	0.70	0.54	8.31	16.94	58	**477.9**	CONC	825	838	***0.57***	***35.3***	1130.6	2.05	0.29	42%
								17.23											
BLOCK 51	148	112b	19A	0.03	0.74	0.06	0.06	10.00	77	**11.1**	DR 35	250	254	***0.51***	***41.1***	44.3	0.87	0.78	25%
			19B	0.04	0.74	0.08	0.14												
								10.78											
JEREMIAH KEALEY STREET	112b	114	20	0.11	0.62	0.19	8.64	17.23	57	**492.1**	CONC	825	838	***0.28***	***32.6***	792.4	1.44	0.38	62%
								17.61											
DESCHATELETS AVENUE	128	126	21A	0.16	0.90	0.40	0.40	10.00	77	**57.2**	DR 35	300	305	***0.48***	***50.3***	69.9	0.96	0.88	82%
			21B	0.11	0.70	0.21	0.61												
			21C	0.03	0.33	0.03	0.64												
			22C	0.08	0.46	0.10	0.74												
DESCHATELETS AVENUE	126	124	22A	0.04	0.53	0.06	0.80	10.88	74	**71.0**	DR 35	375	381	***0.46***	***54.8***	124.1	1.09	0.84	57%
			22B	0.11	0.53	0.16	0.97												
SCHOLASTIC DRIVE	124	114	23	0.13	0.69	0.25	1.21	11.71	71	**86.0**	CONC	450	457	***0.27***	***70.2***	154.6	0.94	1.24	56%
								12.96											

STORM SEWER DESIGN SHEET (*2 YEAR* DESIGN EVENT) - AS BUILT

Greystone Village

Developer: Greystone Village Inc.

Additional Condo Units

NOVATECH
Engineers, Planners & Landscape Architects

PROJECT #: 114025
DESIGNED BY : SAZ/JAG/VM
CHECKED BY : MJP
DATE PREPARED : 15-Dec-15
DATE REVISED : ~~24-Feb-16~~ ~~11-Mar-16~~ ~~17-Oct-16~~ ~~27-Oct-16~~ ~~5-Jan-17~~ ~~27-Apr-17~~ ~~15-Sep-17~~ ~~6-Feb-23~~ ~~27-Feb-23~~ ~~24-May-24~~ ~~7-Aug-24~~ ~~23-Oct-24~~ ~~10-Feb-25~~ 4-Mar-25

LOCATION											PROPOSED SEWER								
STREET	FROM M.H.	TO M.H.	AREA #	INDIV AREA (ha)	INDIV R	INDIV. 2.78 AR	ACCUM. 2.78 AR	TIME OF CONC. (min)	RAINFALL INTENSITY (mm/hr)	PEAK FLOW Q (L/s)	TYPE OF PIPE	PIPE SIZE (mm)	PIPE ID (mm)	GRADE (%)	LENGTH (m)	CAPACITY (L/s)	FULL FLOW VELOCITY	TIME OF FLOW (min)	CAPACITY (%)
SCHOLASTIC DRIVE	114	118	24	0.16	0.72	0.32	10.17	17.61	56	**572.1**	CONC	900	914	***0.63***	***68.5***	1499.0	2.28	0.50	38%
								18.11											
BLOCK 53	226	228	25	0.05	0.73	0.10	0.10	10.00	77	**7.8**	DR 35	250	254	***0.33***	***30.3***	35.6	0.70	0.72	22%
BLOCK 53	228	100	26	0.05	0.47	0.07	0.17	10.72	74	**12.4**	DR 35	250	254	***0.39***	***7.6***	38.7	0.76	0.17	32%
TELMON STREET	100	104	27A	0.10	0.68	0.19	0.36	10.88	74	**26.2**	DR 35	300	305	***0.48***	***25.1***	69.9	0.96	0.44	37%
TELMON STREET	104	106					0.36	11.32	72	**25.6**	DR 35	300	305	***0.38***	***10.6***	62.2	0.85	0.21	41%
								11.53											
ST. PAUL UNIVERSITY LANDS	DIMH1	244	29	0.58	0.47	0.76	0.76	10.00	77	**65.3**	DR 35	375	381	***0.46***	***11.0***	124.1	1.09	0.17	53%
PHILOSOPHER PRIVATE			28	0.11	0.30	0.09	0.85												
PHILOSOPHER PRIVATE	244	246					0.85	10.17	76	**64.7**	DR 35	375	381	***0.73***	***8.8***	156.3	1.37	0.11	41%
								10.28											
PHILOSOPHER PRIVATE	246	230	27B	0.05	0.76	0.11	0.96	10.28	76	**72.4**	DR 35	375	381	***0.41***	***14.6***	117.1	1.03	0.24	62%
PHILOSOPHER PRIVATE	230	106					0.96	10.51	75	**71.5**	DR 35	375	381	***0.61***	***9.8***	142.9	1.25	0.13	50%
								10.64											
TELMON STREET	106	108					1.31	11.53	71	**93.6**	CONC	450	457	***0.40***	***12.4***	188.1	1.15	0.18	50%
TELMON STREET	108	144					1.31	11.71	71	**92.8**	CONC	450	457	***0.26***	***30.9***	151.7	0.92	0.56	61%
								12.26											
BLOCK 47/48	136	144	30	0.12	0.86	0.29	0.29	10.00	77	**22.0**	DR 35	250	254	***0.30***	***36.7***	34.0	0.67	0.91	65%
								10.91											
TELMON STREET	144	122	31	0.20	0.75	0.42	2.01	12.26	69	**139.2**	CONC	525	533	***0.33***	***18.2***	257.7	1.15	0.26	54%
TELMON STREET	122	122b					2.01	12.53	68	**137.6**	CONC	525	533	***0.58***	***18.9***	341.7	1.53	0.21	40%
								12.73											

STORM SEWER DESIGN SHEET (*2 YEAR* DESIGN EVENT) - AS BUILT
Greystone Village
Developer: Greystone Village Inc.
Additional Condo Units

NOVATECH
Engineers, Planners & Landscape Architects

PROJECT #: **114025**
DESIGNED BY : **SAZ/JAG/VM**
CHECKED BY : **MJP**
DATE PREPARED : **15-Dec-15**
DATE REVISED : **~~24-Feb-16~~ ~~11-Mar-16~~ ~~17-Oct-16~~ ~~27-Oct-16~~ ~~5-Jan-17~~ ~~27-Apr-17~~ ~~15-Sep-17~~ ~~6-Feb-23~~ ~~27-Feb-23~~ ~~24-May-24~~ ~~7-Aug-24~~ ~~23-Oct-24~~ ~~10-Feb-25~~ 4-Mar-25**

LOCATION											PROPOSED SEWER								
STREET	FROM M.H.	TO M.H.	AREA #	INDIV AREA (ha)	INDIV R	INDIV. 2.78 AR	ACCUM. 2.78 AR	TIME OF CONC. (min)	RAINFALL INTENSITY (mm/hr)	PEAK FLOW Q (L/s)	TYPE OF PIPE	PIPE SIZE (mm)	PIPE ID (mm)	GRADE (%)	LENGTH (m)	CAPACITY (L/s)	FULL FLOW VELOCITY	TIME OF FLOW (min)	CAPACITY (%)
BLOCK 46	140	122b	32A	0.02	0.74	0.04	0.04	10.00	77	**9.5**	DR 35	250	254	***0.51***	***39.6***	44.3	0.87	0.75	21%
			32B	0.04	0.74	0.08	0.12												
								10.75											
BLOCK 56	220	222	33A	0.06	0.73	0.12	0.12	10.00	77	**20.3**	DR 35	250	254	***0.51***	***74.7***	44.3	0.87	1.42	46%
			33B	0.07	0.73	0.14	0.26												
								11.42											
BLOCK 56	224	222	34	0.05	0.76	0.11	0.11	10.00	77	**8.1**	DR 35	250	254	***0.48***	***16.6***	43.0	0.85	0.33	19%
								10.33											
BLOCK 56	222	122b	35	0.10	0.47	0.13	0.50	11.42	72	**35.9**	DR 35	300	305	***0.36***	***30.5***	60.5	0.83	0.61	59%
								12.04											
TELMON STREET	122b	118	36	0.13	0.70	0.25	2.89	12.73	68	**195.7**	CONC	600	610	***0.29***	***31.1***	345.0	1.18	0.44	57%
								13.17											
OUTLET 1[2]	118	238					13.07	18.11	55	**722.4**	CONC	900	914	***2.07***	***4.8***	2717.2	4.14	0.02	27%
OUTLET 1[2]	238	242					13.07	18.12	55	**721.9**	CONC	900	914	***1.06***	***15.1***	1944.4	2.96	0.09	37%
OUTLET 1[2]	242	Headwall 1					13.07	18.21	55	**719.9**	CONC	900	914	***0.85***	***9.4***	1741.2	2.65	0.06	41%
								18.27											

Note 1: Part of Phase 2 outletting through Phase 1A at Outlet 1.

Note 2: Excludes 600mm dia. low flow pipes and the OGS unit (MH 236), which are connected in parrallel at MH 118 and MH 238.

Definitions:

Q = Peak Flow in Litres per Second (L/s)
Q = 2.78 AIR, where
A = Area in hectares (ha)
I = Rainfall Intensity (mm/hr)
R = Runoff Coefficient

Notes:

1) **Rainfall Intensity Curves are City of Ottawa IDF Curves I(2-year) = 732.951/ [(Tc(min)+6.199)]^0.810.**
2) **Minumum Tc is 10min as per the Ottawa Design Guidelines.**
3) **Roughness Coefficient 'n' in Manning's formula shall be 0.013 for Concrete & PVC pipes as per the Ottawa Guidelines.**
4) **MinImum diameter for on street sewer is 250mm.**
5) **Full Flow Velocity for the Outlet 1 (MH118 to Headwall 1) was modeled in PCSWMM at 2.60m/s, based on an average slope of 1.1% (invert out of the Vortech unit to invert at the outlet to the river).**

LICENSED PROFESSIONAL ENGINEER
T. J. MCKAY
100195434
MARCH 4, 2025
PROVINCE OF ONTARIO

STORM SEWER DESIGN SHEET (*2 YEAR* DESIGN EVENT)
Greystone Village - Phase 2 and 3 (Outlet 2)
Developer: EQ Homes

Engineers, Planners & Landscape Architects

PROJECT #: 114025
DESIGNED BY : SAZ/VM
CHECKED BY : TJM
DATE PREPARED : ~~18-Nov-16~~ ~~14-Mar-17~~ ~~26-May-17~~ ~~10-Feb-23~~ ~~27-Feb-23~~ ~~24-May-24~~ ~~07-Aug-24~~ ~~23-Oct-24~~ ~~20-Jan-25~~ 04-Mar-25
ASBLT DATE: ~~15-Sep-17~~

LOCATION											PROPOSED SEWER								
STREET	FROM M.H.	TO M.H.	AREA #	INDIV AREA (ha)	INDIV R	INDIV. 2.78 AR	ACCUM. 2.78 AR	TIME OF CONC. (min)	RAINFALL INTENSITY (mm/hr)	PEAK FLOW Q (L/s)	TYPE OF PIPE	PIPE SIZE (mm)	PIPE ID (mm)	GRADE (%)	LENGTH (m)	CAPACITY (L/s)	FULL FLOW VELOCITY	TIME OF FLOW (min)	CAPACITY (%)
OBLATS	174	300	B1a	0.03	0.76	0.06	0.06	10.00	77	**18.4**	DR 35	250	254	***1.79***	***32.9***	83.0	1.64	0.33	22%
			B1b	0.06	0.72	0.12	0.18												
			A3-DR3-1	0.005	0.61	0.01	0.19												
			A3-DR2	0.03	0.57	0.05	0.24												
OBLATS	300	302	B2	0.01	0.69	0.02	0.26	10.33	76	**29.5**	DR 35	250	254	***3.08***	***26.3***	108.9	2.15	0.20	27%
			A3-A1	0.06	0.79	0.13	0.39												
OBLATS	302	304					0.39	10.54	75	**29.2**	DR 35	250	254	***1.70***	***34.2***	80.9	1.60	0.36	36%
OBLATS	304	306	B3	0.24	0.83	0.55	0.94	10.90	74	**119.7**	DR 35	300	305	***3.29***	***44.7***	183.0	2.51	0.30	65%
			B25	0.06	0.90	0.15	1.09												
			A3-DR1	0.03	0.66	0.06	1.15												
			B20A	0.08	0.35	0.08	1.23												
			B19	0.16	0.90	0.40	1.63												
OBLATS	306	308					1.63	11.19	73	**118.0**	DR 35	300	305	***3.89***	***13.6***	199.0	2.73	0.08	59%
OBLATS	308	310	B4	0.19	0.66	0.35	1.98	11.28	72	**162.0**	DR 35	375	381	***2.89***	***39.7***	310.9	2.73	0.24	52%
			B24	0.12	0.80	0.27	2.24												
								11.52											
PARISH PRIVATE	312	314	B7	0.09	0.73	0.18	0.18	10.00	77	**14.0**	DR 35	250	254	***3.12***	***33.0***	109.6	2.16	0.25	13%
PARISH PRIVATE	314	316	B8	0.07	0.80	0.16	0.34	10.25	76	**44.2**	DR 35	250	254	***3.63***	***72.7***	118.2	2.33	0.52	37%
			B9	0.11	0.80	0.24	0.58												
								10.77											
SANCTUARY PRIVATE	318	316	B10	0.07	0.73	0.14	0.14	10.00	77	**10.9**	DR 35	250	254	***0.56***	***61.2***	46.4	0.92	1.11	24%
								11.11											
SANCTUARY PRIVATE	316	320	B11	0.04	0.69	0.08	0.80	11.11	73	**58.4**	DR 35	375	381	***0.44***	***38.6***	121.3	1.06	0.60	48%
SANCTUARY PRIVATE	320	322					0.80	11.72	71	**56.8**	DR 35	375	381	***0.55***	***7.3***	135.7	1.19	0.10	42%
SANCTUARY PRIVATE	322	310	B12	0.09	0.79	0.20	1.00	11.82	70	**70.4**	DR 35	375	381	***0.27***	***21.9***	95.0	0.83	0.44	74%
								12.26											

STORM SEWER DESIGN SHEET (*2 YEAR* DESIGN EVENT)
Greystone Village - Phase 2 and 3 (Outlet 2)
Developer: EQ Homes

NOVATECH
Engineers, Planners & Landscape Architects

PROJECT #: **114025**
DESIGNED BY : **SAZ/VM**
CHECKED BY : **TJM**
DATE PREPARED : ~~18-Nov-16~~ ~~14-Mar-17~~ ~~26-May-17~~ ~~10-Feb-23~~ ~~27-Feb-23~~ ~~24-May-24~~ ~~07-Aug-24~~ ~~23-Oct-24~~ ~~20-Jan-25~~ **04-Mar-25**
ASBLT DATE: ~~15-Sep-17~~

LOCATION											PROPOSED SEWER								
STREET	FROM M.H.	TO M.H.	AREA #	INDIV AREA (ha)	INDIV R	INDIV. 2.78 AR	ACCUM. 2.78 AR	TIME OF CONC. (min)	RAINFALL INTENSITY (mm/hr)	PEAK FLOW Q (L/s)	TYPE OF PIPE	PIPE SIZE (mm)	PIPE ID (mm)	GRADE (%)	LENGTH (m)	CAPACITY (L/s)	FULL FLOW VELOCITY	TIME OF FLOW (min)	CAPACITY (%)
OBLATS	310	334	B23	0.17	0.90	0.43	3.67	12.26	69	**264.7**	CONC	600	610	***0.26***	***34.3***	326.6	1.12	0.51	81%
			B13	0.09	0.65	0.16	3.83												
								12.77											
SANCTUARY PRIVATE	330	332	B14	0.08	0.63	0.14	0.14	10.00	77	**30.6**	DR 35	375	381	***0.41***	***36.8***	117.1	1.03	0.60	26%
			B15	0.15	0.62	0.26	0.40												
SANCTUARY PRIVATE	332	334	B16	0.12	0.65	0.22	0.62	10.60	75	**45.9**	CONC	750	762	***0.28***	***35.8***	614.6	1.35	0.44	7%
								11.04											
SCHOLASTIC	324	326	B17	0.07	0.77	0.15	0.15	10.00	77	**22.8**	DR 35	300	305	***3.71***	***37.7***	194.3	2.66	0.24	12%
			B20	0.12	0.44	0.15	0.30												
SCHOLASTIC	326	328	B6	0.06	0.68	0.11	0.41	10.24	76	**69.0**	DR 35	375	381	***3.14***	***35.4***	324.1	2.84	0.21	21%
			B18	0.07	0.51	0.10	0.51												
			B21	0.16	0.90	0.40	0.91												
SCHOLASTIC	328	334	B5	0.18	0.60	0.30	1.21	10.44	75	**102.4**	DR 35	375	381	***3.20***	***39.6***	327.2	2.87	0.23	31%
			B22	0.07	0.60	0.12	1.33												
			B21A	0.04	0.32	0.04	1.36												
								10.67											
OUTLET 2[1]	334	336					5.81	12.77	68	**392.6**	CONC	750	762	***0.60***	***3.4***	899.6	1.97	0.03	44%
OUTLET 2[1]	336	338					5.81	12.80	68	**392.1**	CONC	750	762	***0.28***	***3.6***	614.6	1.35	0.04	64%
OUTLET 2[1]	338	340					5.81	12.84	67	**391.4**	CONC	750	762	***0.35***	***14.2***	687.1	1.51	0.16	57%
OUTLET 2[1]	340	Headwall (342)					5.81	13.00	67	**388.8**	CONC	750	762	***0.40***	***2.5***	734.5	1.61	0.03	53%
								13.02											

Note 1: Excludes 600mm dia. low flow pipes and the OGS (Vorthechnics) unit, which are connected in parrallel at MH 336 and MH 338.

Definitions:

Q = Peak Flow in Litres per Second (L/s)
Q = 2.78 AIR, where
A = Area in hectares (ha)
I = Rainfall Intensity (mm/hr)
R = Runoff Coefficient

Notes:

1) **Rainfall Intensity Curves are City of Ottawa IDF Curves I(2-year) = 732.951/ [(Tc(min)+6.199)]^0.810.**
2) **Minumum Tc is 10min as per the Ottawa Design Guidelines.**
3) **Roughness Coefficient 'n' in Manning's formula shall be 0.13 for Concrete & PVC pipes as per the Ottawa Guidelines.**
4) **MinImum diameter for on street sewer is 250mm.**

LICENSED PROFESSIONAL ENGINEER
T. J. MCKAY
100195434
MARCH 4, 2025
PROVINCE OF ONTARIO

Mannings Equation Calculations - Worst Case Scenarios

Deschatelets Landscape Area between Retaining Wall / Building Accounted for as per Stormwater Management Plan (B20-INT, 114025-STM (PH3))

Pinch Point North Building North Side

V-Bottom Ditch

Depth	m	0.201	*
Side slopes	1 to X	3	
Top Width	m	1.206	
Area	m^2	0.121	
Perimeter	m	1.27	
R=A/P	m	0.10	
n		0.035	
Slope	m/m	0.015	
Q_{max}	m^3/s	0.089	
V_{max}	m/s	0.730	

Courtyard - West Side North Building

V-Bottom Ditch

Depth	m	0.201	*
Side slopes	1 to X	3	
Top Width	m	1.206	
Area	m^2	0.121	
Perimeter	m	1.27	
R=A/P	m	0.10	
n		0.035	
Slope	m/m	0.015	
Q_{max}	m^3/s	0.089	
V_{max}	m/s	0.730	

*Depth based on average swale depth

Post Development Runoff Coefficient "C" including interim flows from Deschatelets Building Area as per Stormwater Management Plan (B20-INT, 114025-STM (PH3), Landscape Area = 0.02ha hard, 0.06ha green

Area	Surface	Ha	"C"	C_{avg}	$*C_{100}$
Total	Hard	0.090	0.90	0.39	0.46
0.325	Soft	0.235	0.20		

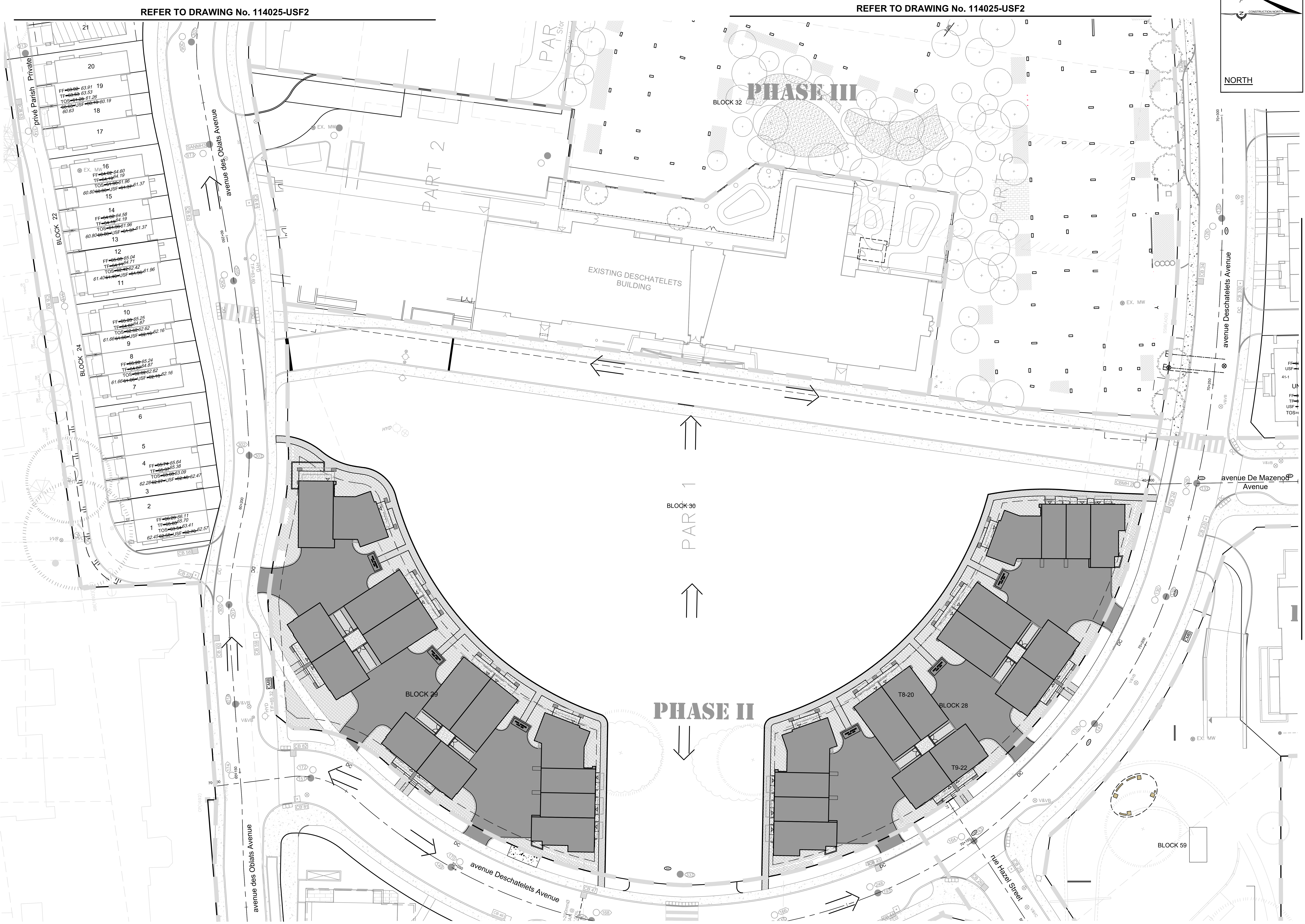
Post-Development Free Flows
Total Emergency Overland to Scholastic Avenue

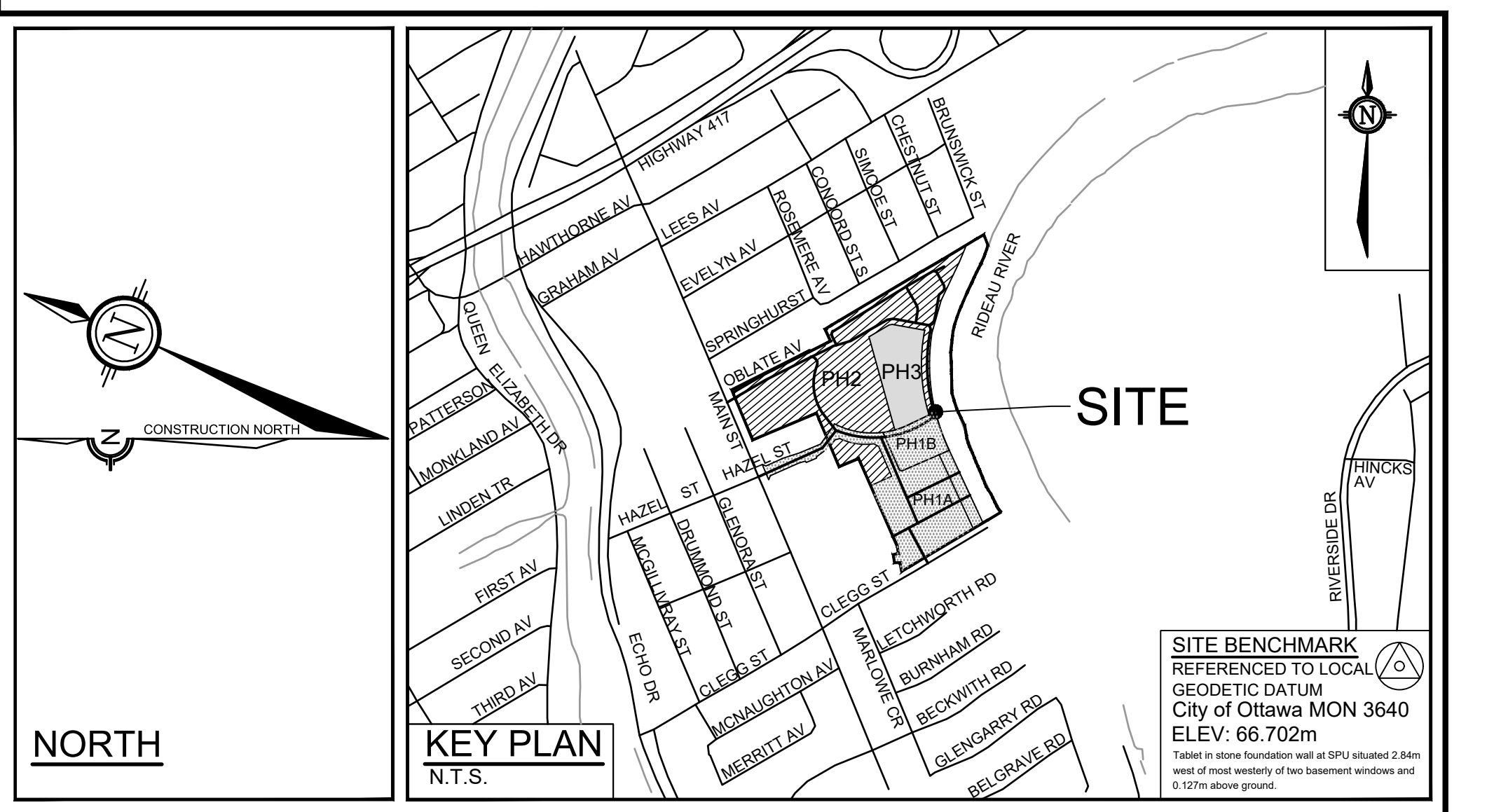
Outlet Options	Area (ha)	$Q_{2\ Year}$ (L/s)	$Q_{5\ Year}$ (L/s)	$Q_{100\ Year}$ (L/s)	$Q_{100\ Year\ +20\%}$ (L/s)
	0.325	**27.1**	**36.7**	**73.8**	**88.6**

Time of Concentration	Tc=	10	min
Rainfall Intensity (2 Year Event)	I_2=	76.81	mm/hr
Rainfall Intensity (5 Year Event)	I_5=	104.19	mm/hr
Rainfall Intensity (10 Year Event)	I_{10}=	122.14	mm/hr
Rainfall Intensity (25 Year Event)	I_{25}=	144.69	mm/hr
Rainfall Intensity (50 Year Event)	I_{50}=	161.47	mm/hr
Rainfall Intensity (100 Year Event)	I_{100}=	178.56	mm/hr
Rainfall Intensity (100 Year +20% Event)	I_{100}=	214.27	mm/hr

100 year Intensity = 1735.688 / (Time in min + 6.014) $^{0.820}$
10 year Intensity = 1174.184 / (Time in min + 6.014)$^{0.816}$
5 year Intensity = 998.071 / (Time in min + 6.053) $^{0.814}$
2 year Intensity = 732.951 / (Time in min + 6.199)$^{0.810}$

For 25 year storms add 10% to C value
For 50 year storms add 20% to C value
For 100 year storms add 25% to C value





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
FF= 55.00	FINISHED FLOOR ELEVATION
TF= 55.00	TOP OF FOOTING ELEVATION
TOS= 55.00	TOP OF SLAB ELEVATION
USF= 55.00	UNDERSIDE OF FOOTING ELEVATION
FF~~= 55.00~~ *55.50*	AS-BUILT FINISHED FLOOR ELEVATION
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▨	UNITS WITH WATERTIGHT BASEMENTS (REFER TO WATERPROOFING PACKAGE)
⇐	MAJOR OVERLAND FLOW ROUTE

D07-16-15-0001 PHASE 2 AND 3

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NOTE:
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AS-BUILT

No.	REVISION	DATE	BY
2.	ISSUED FOR MASTER SERVICING UPDATE	DEC 5/24	SAZ
1.	ISSUED FOR INFORMATION	FEB 15/23	SAZ

SCALE
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DESIGN JAG
CHECKED MSP
DRAWN MTM
CHECKED JAG
APPROVED JGR

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

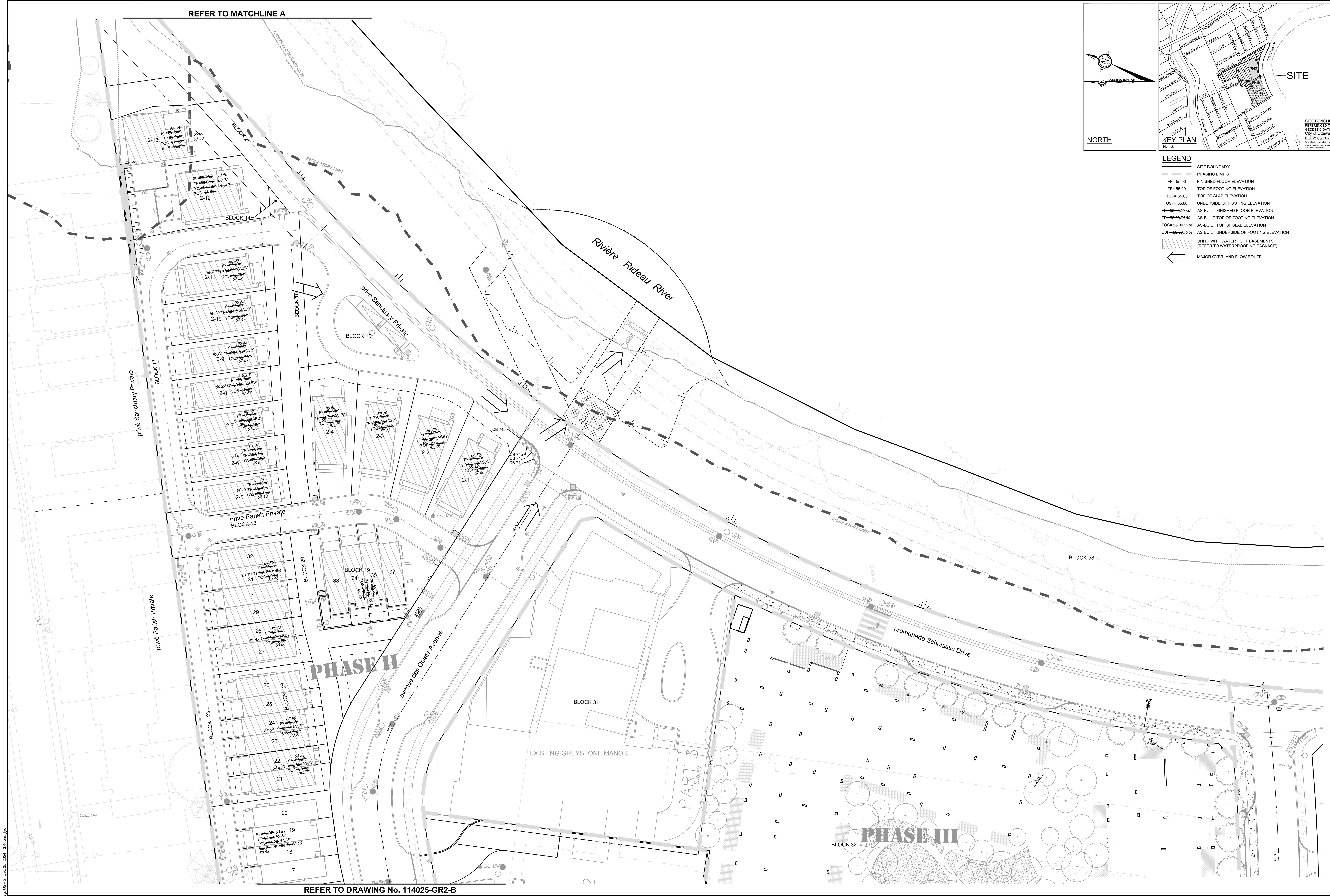
CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

DRAWING NAME
AS-BUILT UNDERSIDE OF FOOTINGS

PROJECT No. 114025-00
REV REV # 2
DRAWING No. 114025-USF1

PLANB1.DWG - 1000mmx707mm

REFER TO MATCHLINE A



SITE BENCHMARK
REFERENCED TO LOCAL GEODETIC DATUM
City of Ottawa MON 3640
ELEV: 66.702m
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USF~~= 55.00~~ 55.50	AS-BUILT UNDERSIDE OF FOOTING ELEVATION
▨	UNITS WITH WATERTIGHT BASEMENTS (REFER TO WATERPROOFING PACKAGE)
⇐	MAJOR OVERLAND FLOW ROUTE

D07-16-15-0001 PHASE 2 AND 3

REFER TO DRAWING No. 114025-GR2-B

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NOTE:
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No.	REVISION	DATE	BY
2.	ISSUED FOR MASTER SERVICING UPDATE	DEC 5/24	SAZ
1.	ISSUED FOR INFORMATION	FEB 15/23	SAZ

SCALE
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DESIGN JAG
CHECKED MSP
DRAWN MTM
CHECKED JAG
APPROVED JGR

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CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

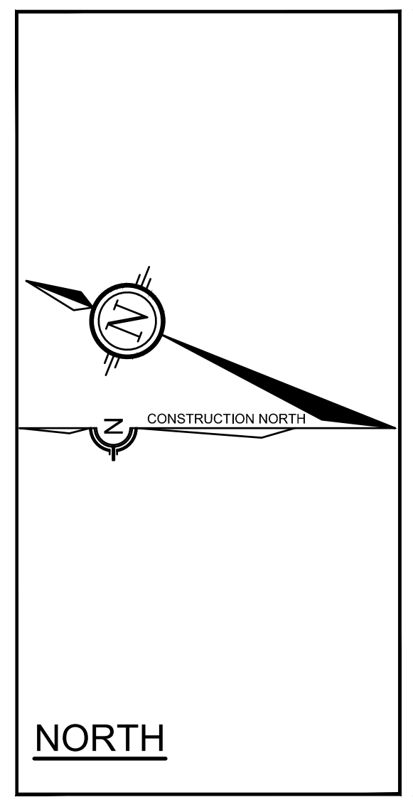
DRAWING NAME
AS-BUILT UNDERSIDE OF FOOTINGS

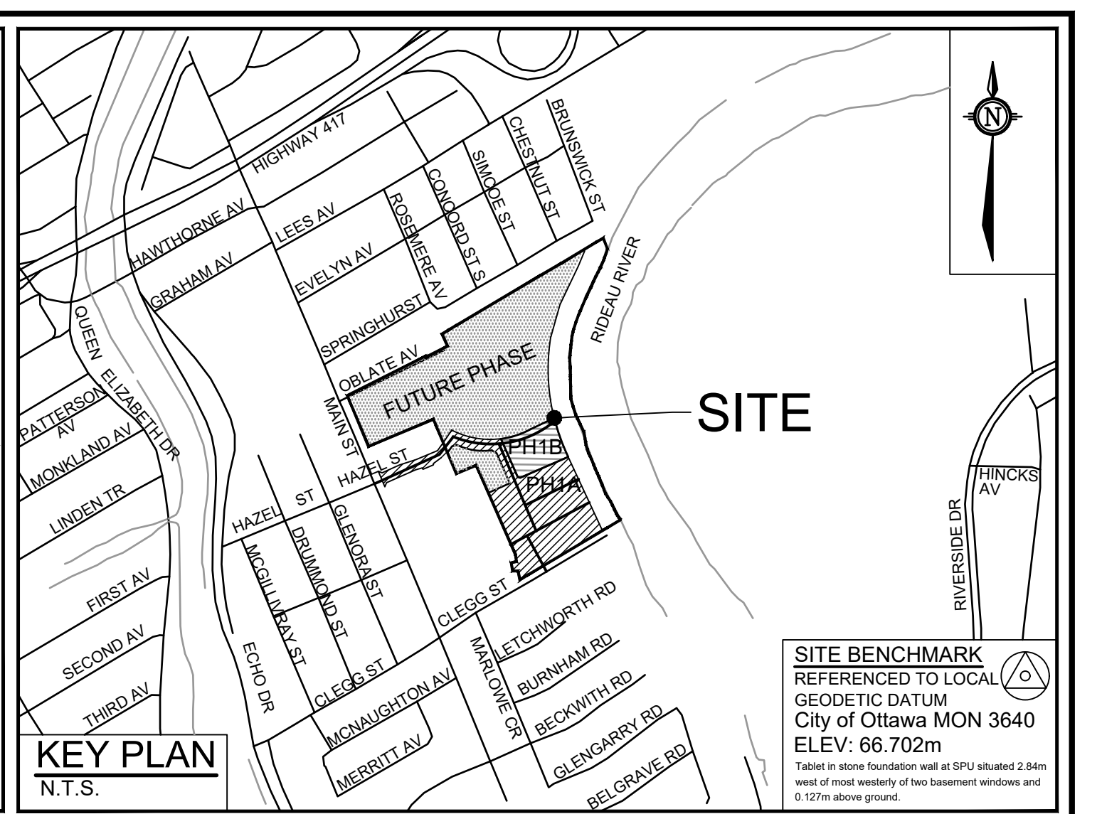
PROJECT No. 114025-00
REV REV # 2
DRAWING No. 114025-USF2

PLANB1.DWG - 1000mmx707mm

REFER TO DRAWING No. 114025-USF4

REFER TO DRAWING No. 114025-USF4





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

LEGEND

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▬ ▬ ▬	PHASING LIMITS
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TOS= 55.00	TOP OF SLAB ELEVATION
USF= 55.00	UNDERSIDE OF FOOTING ELEVATION
FF= ~~55.00~~ 55.50	AS-BUILT FINISHED FLOOR ELEVATION
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TOS= ~~55.00~~ 55.50	AS-BUILT TOP OF SLAB ELEVATION
USF= ~~55.00~~ 55.50	AS-BUILT UNDERSIDE OF FOOTING ELEVATION
▨	UNITS WITH WATERTIGHT BASEMENTS (REFER TO WATERPROOFING PACKAGE)
⇐	MAJOR OVERLAND FLOW ROUTE

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NOTE:
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AS-BUILT

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2.	ISSUED FOR MASTER SERVICING UPDATE	DEC 5/24	SAZ
1.	ISSUED FOR INFORMATION	FEB 15/23	SAZ

SCALE
1:300

DESIGN	JAG
CHECKED	MSP
DRAWN	MTM
CHECKED	JAG
APPROVED	JGR

FOR REVIEW ONLY

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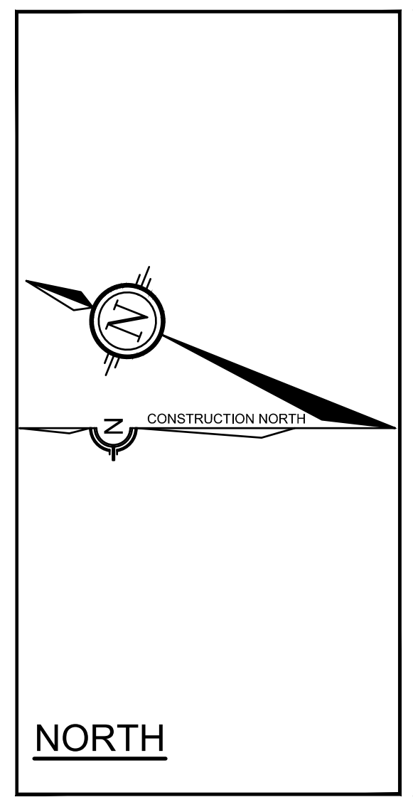
CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

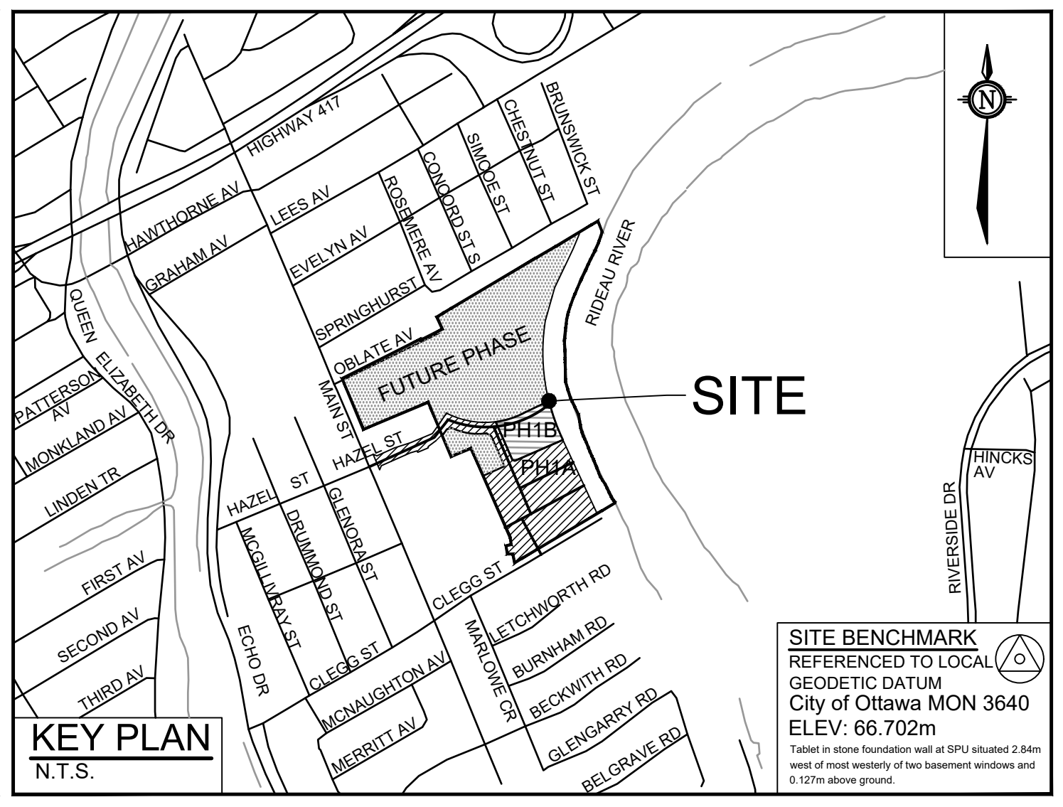
DRAWING NAME
AS-BUILT UNDERSIDE OF FOOTINGS

PROJECT No. 114025-00
REV REV # 2
DRAWING No. 114025-USF3

PLANB1.DWG - 1000mmx707mm

REFER TO DRAWING No. 114025-USF3





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

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⇐	MAJOR OVERLAND FLOW ROUTE

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AS-BUILT

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SCALE
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DESIGN	JAG
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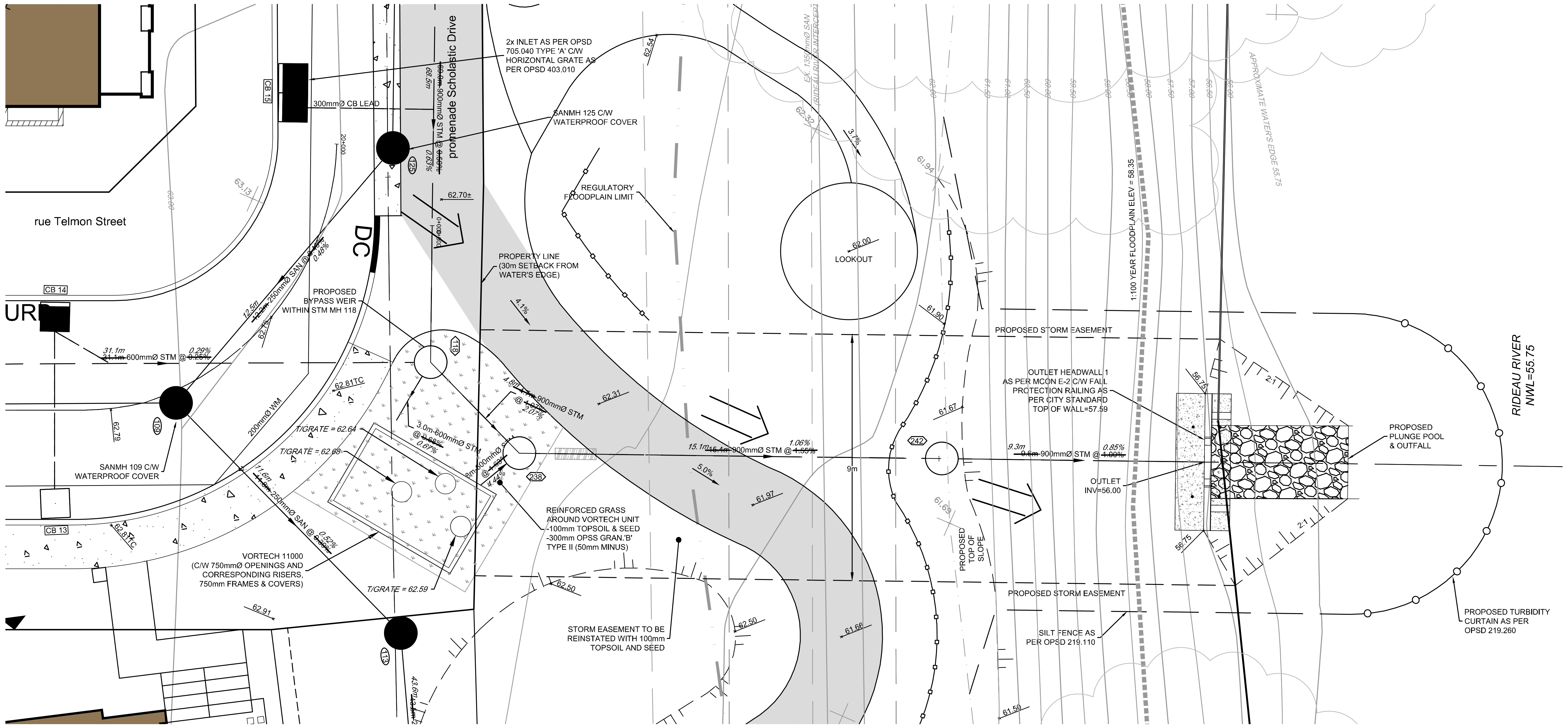
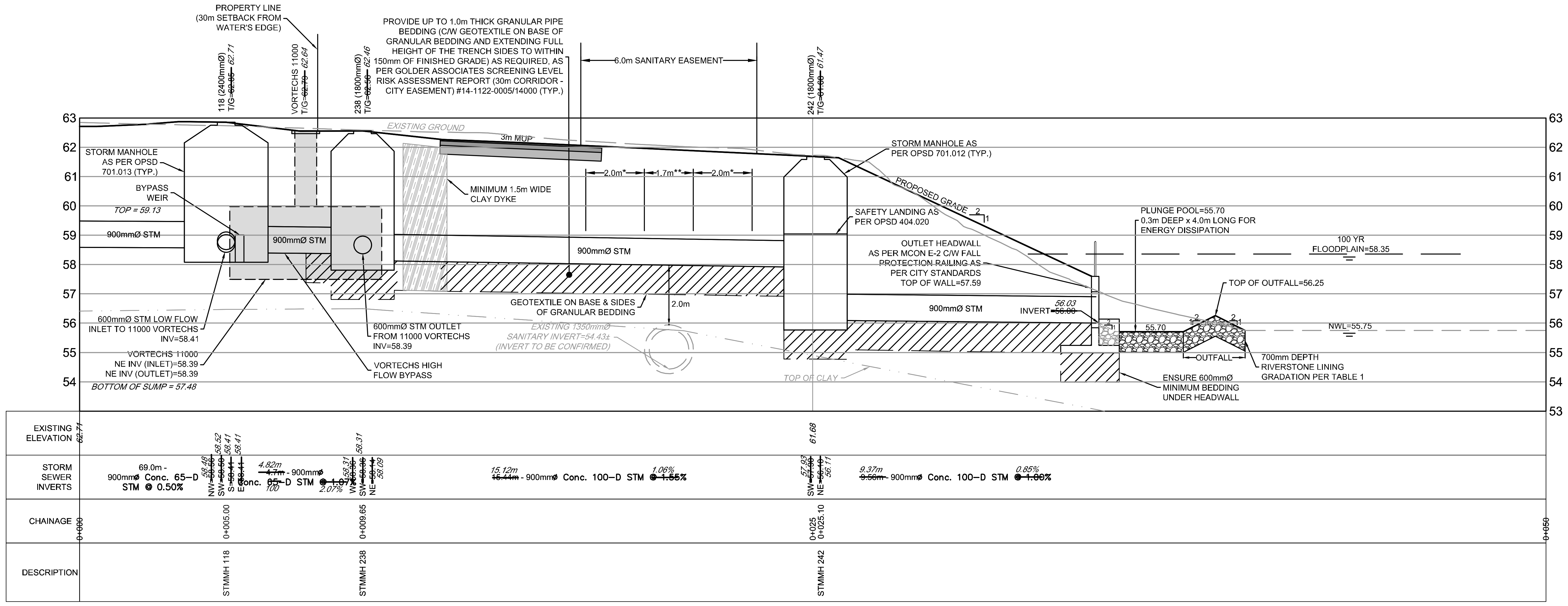
CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

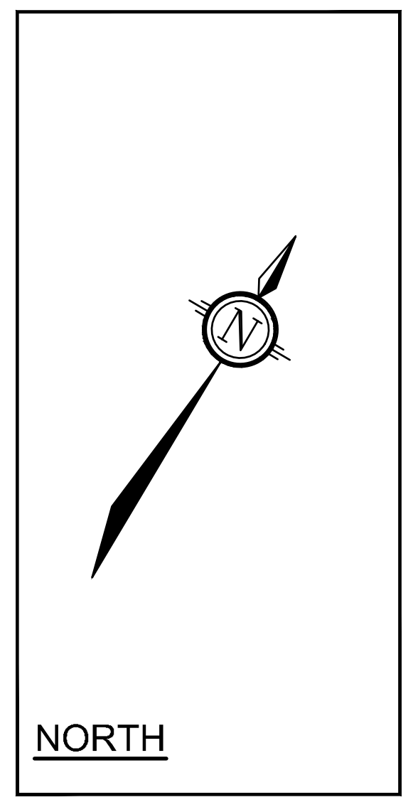
DRAWING NAME
AS-BUILT UNDERSIDE OF FOOTINGS

PROJECT No. 114025-00
REV REV # 2
DRAWING No. 114025-USF4

PLANB1.DWG - 1000mmx707mm







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

56.10	PROPOSED ELEVATION
56.11 ~~56.10~~	AS-BUILT ELEVATION
1.55%	PROPOSED SEWER GRADIENT
1.06% ~~1.55%~~	AS-BUILT SEWER GRADIENT
9.56m	PROPOSED SEWER LENGTH
9.37m ~~9.56m~~	AS-BUILT SEWER LENGTH
200mmØ WM	PROPOSED WATERMAIN AND DIAMETER
● (101) ←	PROPOSED SANITARY MH & SEWER WITH DIRECTION OF FLOW
○ (100) ←	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
—o—	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 FOR ADDITIONAL NOTES

M:\2014\114025\CAD\Design\Asbuilts\202501XX-Ph1A-1B-2-3-STMOutlet\114025-PR9-ASB.dwg, PR 9 (B1), Jan 17, 2025 - 9:38am, mabdul

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.

AS-BUILT

No.	REVISION	DATE	BY
14.	T/G AS-BUILTS ADDED FOR OMM	JAN 17/25	TJM
13.	PHASE 1B SERVICING AS-BUILT	MAY 11/17	JAG
12.	PHASE 1A SERVICING AS-BUILT	FEB 28/17	JAG
11.	RE-ISSUED FOR CONSTRUCTION	AUG 26/16	JAG
10.	ISSUED FOR CITY APPROVAL/COMMENCE WORK	AUG 18/16	JAG
9.	ISSUED FOR EARLY SERVICING	JULY 7/16	JAG
8.	ISSUED FOR CONSTRUCTION	JULY 7/16	JAG
7.	ISSUED FOR ORDERING OF MATERIAL	JUNE 14/16	JAG
6.	REVISED AS PER CITY COMMENTS & ISSUED FOR E.C.A.	MAY 24/16	JAG
5.	ISSUED FOR TENDER	APR 20/16	JAG
4.	REVISED AS PER CITY COMMENTS	APR 13/16	JAG
3.	REVISED AS PER CITY STORM OUTFALL COMMENTS #2	MAR 11/16	JAG
2.	REVISED AS PER CITY STORM OUTFALL COMMENTS	FEB 25/16	JAG
1.	ISSUED FOR CITY OF OTTAWA REVIEW	DEC 18/15	JAG

SCALE
1:100 HORIZONTAL
1:100 VERTICAL
1:100
0 1 2 3 4

DESIGN DDB
CHECKED DDB
DRAWN MWC
CHECKED DDB
APPROVED JGR

NOVATECH
Engineers, Planners & Landscape Architects
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Website www.novatech-eng.com

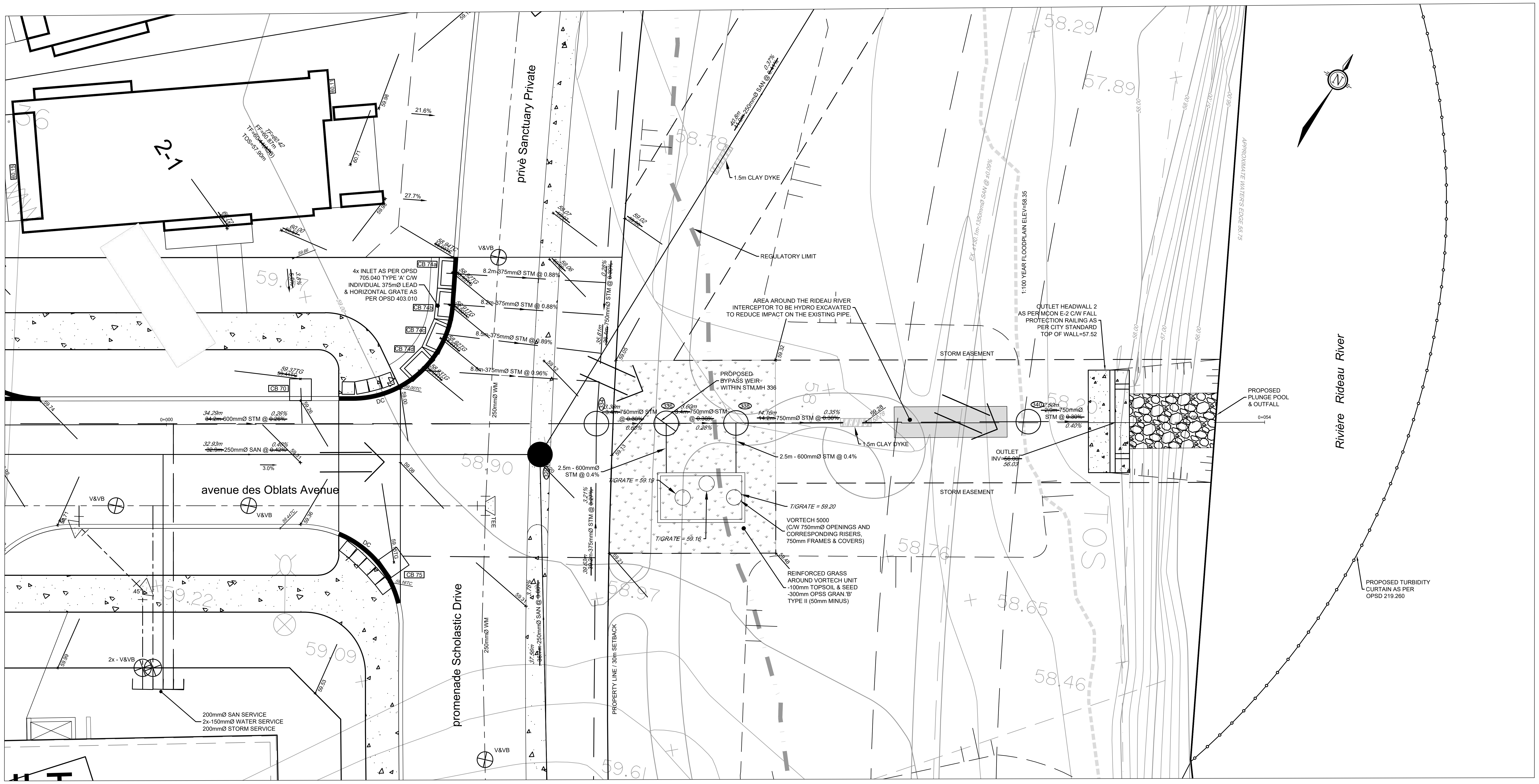
CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

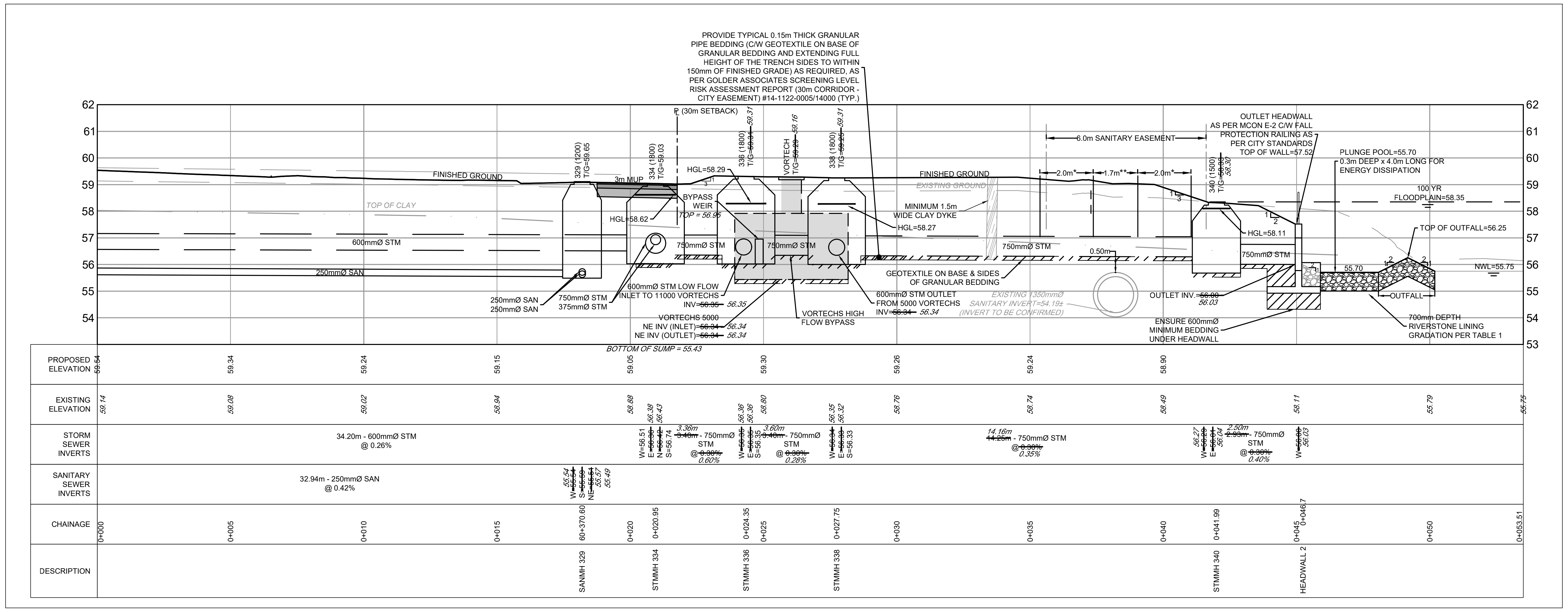
DRAWING NAME
STORM OUTLET
PLAN AND PROFILE &
GRADING, EROSION AND
SEDIMENT CONTROL PLAN
STATION 0+000 TO 0+050

PROJECT No. 114025-00
REV REV # 14
DRAWING No. 114025-PR9

D07-16-15-0001 PHASE 1 A&B

PLANB1.DWG - 1000mmx707mm
PLAN # 17206





LEGEND

200mmØ WM	PROPOSED WATERMAIN AND DIAMETER
101	PROPOSED SANITARY MH & SEWER WITH DIRECTION OF FLOW
100	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 AND SANITARY 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
☐	PONDING LIMITS
63.41	AS-BUILT ELEVATION
52.80m	AS-BUILT LENGTH
2.0%	AS-BUILT SLOPE

TABLE 1: RIVERSTONE GRADATION	
% PASSING	STONE DIAMETER (mm)
100	450
85	400
50	300
30	200
15	GRANULAR "A"

NOTE:

* HYDRO-EXCAVATION TO BE USED AND LIGHT COMPACTION EQUIPMENT & NOMINAL LEVELS OF COMPACTION EFFORT WITHIN 2.0m OF EXISTING 1350mmØ SANITARY PIPE

** HYDRO-EXCAVATION TO BE USED AND NO PROOF ROLLING/COMPACTION DIRECTLY OVER EXISTING 1350mmØ SANITARY PIPE

AS-BUILT

REFER TO 114025-N&L-B FOR ADDITIONAL NOTES AND CATCHBASIN TABLES

NOTE:
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No.	REVISION	DATE	BY
11.	T/G AS-BUILTS ADDED FOR OMM	JAN 17/25	TJM
10.	SERVICING AS-BUILTS	SEPT 29/17	JAG
9.	ISSUED AS PER SITE INSTRUCTION NO.5	AUG 22/17	JAG
8.	ISSUED FOR EARLY SERVICING	JUL 12/17	JAG
7.	RE-ISSUED FOR CONSTRUCTION	JUL 12/17	JAG
6.	ISSUED FOR CONSTRUCTION	JUL 6/17	JAG
5.	ISSUED FOR ORDERING OF MATERIAL	JUN 14/17	JAG
4.	REVISED AS PER CITY COMMENTS AND ISSUED FOR E.C.A.	MAY 26/17	JAG
3.	ISSUED FOR TENDER	APR 19/17	JAG
2.	RE-ISSUED AS PER CITY COMMENTS	MAR 8/17	JAG
1.	ISSUED FOR CITY OF OTTAWA REVIEW	NOV 21/16	JAG

SCALE
1:100 HORIZONTAL
1:100 VERTICAL
1:100
0 1 2 3 4

DESIGN	JAG
CHECKED	MSP
DRAWN	MTM
CHECKED	JAG
APPROVED	JGR

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Ottawa, Ontario, Canada K2M 1P6
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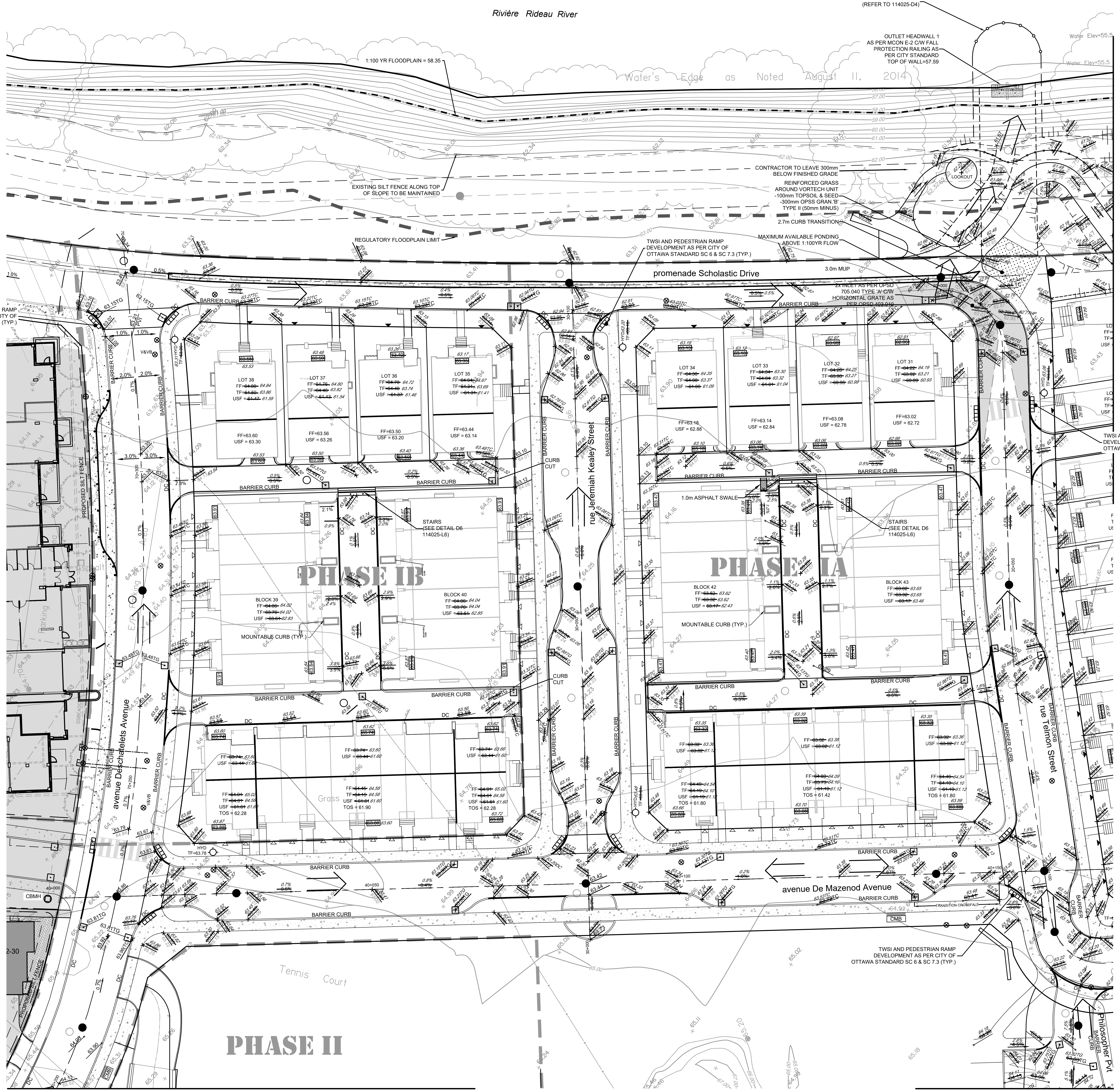
Facsimile (613) 254-5867
Website www.novatech-eng.com

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 # 11
DRAWING No. 114025-PR8-B

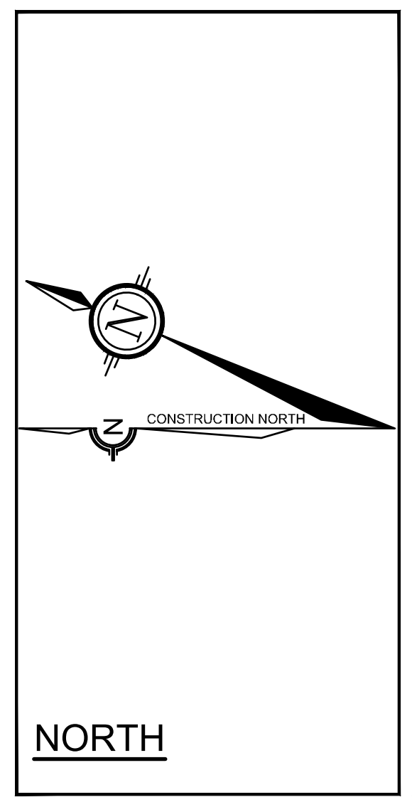
D07-16-15-0001 PHASE 2 AND 3



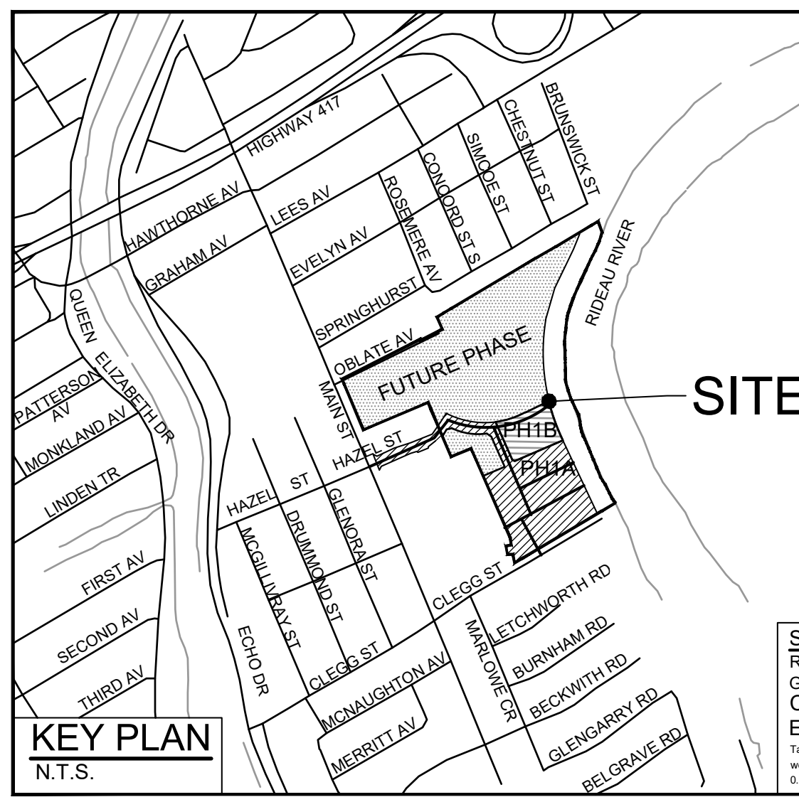
REFER TO DRAWING No. 114025-GR5

REFER TO DRAWING No. 114025-GR2

REFER TO DRAWING No. 114025-GR4



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
63.50 ~~63.52~~ 63.46	AS-BUILT ELEVATION PROPOSED ELEVATION EXISTING ELEVATION
65.26(S) ~~65.25~~(S)	AS-BUILT SWALE ELEVATION PROPOSED SWALE ELEVATION
65.01TC ~~65.00~~TC	AS-BUILT TOP OF CURB ELEVATION PROPOSED TOP OF CURB ELEVATION
65.51HP ~~65.50~~HP	AS-BUILT HIGH POINT PROPOSED HIGH POINT
65.51T/W ~~65.50~~T/W	AS-BUILT TOP OF RETAINING WALL PROPOSED TOP OF RETAINING WALL
64.61TG ~~64.60~~TG	AS-BUILT TOP OF GRATE ELEVATION PROPOSED TOP OF GRATE ELEVATION
FFE=	FINISHED FLOOR ELEVATION
TF=	TOP OF FOOTING ELEVATION
USF=	UNDERSIDE OF FOOTING ELEVATION
MUSF=	MINIMUM UNDERSIDE OF FOOTING ELEVATION
SD	INDICATES A STANDARD UNIT
L/O	INDICATES A LOOK OUT UNIT
W/O	INDICATES A WALK OUT UNIT
127.55	PROPOSED TERRACE ELEVATION
2.1% ~~2.0%~~ ←	AS-BUILT GRADE AND DIRECTION PROPOSED GRADE AND DIRECTION
⇐	MAJOR OVERLAND FLOW ROUTE
┬┬ ┼ ┬┬	MAXIMUM 3:1 SIDESLOPE
── ─ ──	PROPOSED CENTRELINE SWALE
▬	PROPOSED WEIGHTED STRAW BALE CHECK DAM
▭	PROPOSED ROCK FLOW CHECK DAM
— — —	SILT FENCE
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)
☐	LOCAL ROADWAYS
▨	COLLECTOR ROADWAYS / BUS LOOP

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.

M:\2014\114025\CAD\Design\Asbuilts\20201006-PH1A-1B Grading\114025-GR1-ASB.dwg, GR 3, Jan 13, 2025 - 3:59pm, mabdul

AS-BUILT

No.	REVISION	DATE	BY	No.	REVISION	DATE	BY
				8.	ISSUED FOR CONSTRUCTION	AUG 26/16	JAG
				7.	ISSUED FOR CITY APPROVAL/COMMENCE WORK	AUG 18/16	JAG
				6.	ISSUED FOR COORDINATION	JUNE 29/16	JAG
				5.	REVISED AS PER CITY COMMENTS & ISSUED FOR E.C.A.	MAY 24/16	JAG
				4.	ISSUED FOR TENDER	APR 20/16	JAG
11.	PARTIAL AS-BUILT, FOR MSSU	JAN 17/25	TJM	3.	REVISED AS PER CITY COMMENTS	APR 13/16	JAG
10.	RE-ISSUED FOR CONSTRUCTION	SEP 15/17	JAG	2.	ISSUED FOR CITY OF OTTAWA REVIEW	DEC 18/15	JAG
9.	ISSUED WITH CCN NO.15	MAY 5/17	JAG	1.	ISSUED FOR COORDINATION	NOV 06/15	JAG

SCALE
1:300

1:300
0 3 6 9 12

DESIGN JAG
CHECKED MSP
DRAWN MTM
CHECKED JAG
APPROVED JGR

NOVATECH
Engineers, Planners & Landscape Architects
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Ottawa, Ontario, Canada K2M 1P6
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Facsimile (613) 254-5867
Website www.novatech-eng.com

CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

DRAWING NAME

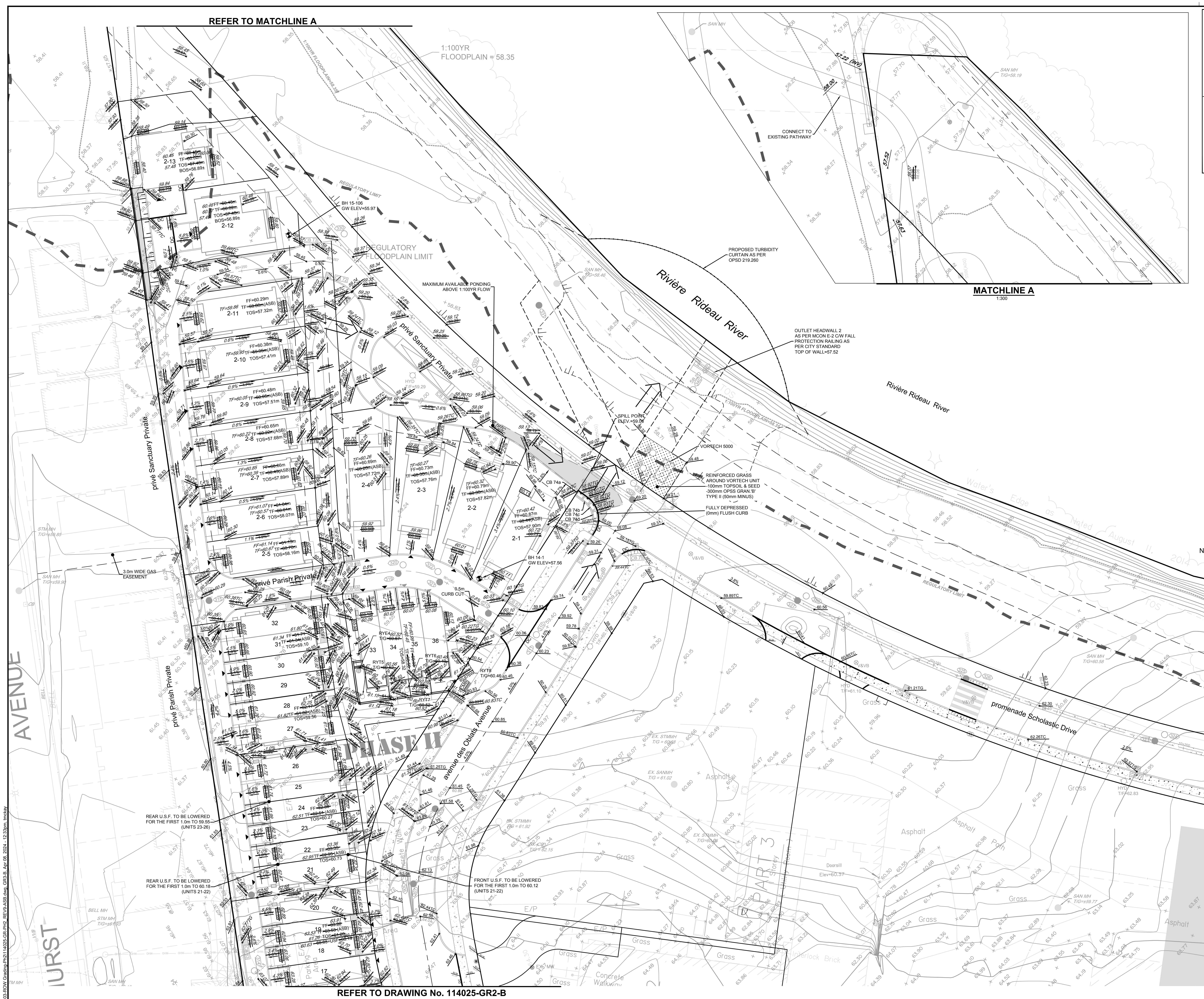
GRADING, EROSION AND
SEDIMENT CONTROL PLAN
PHASE 1A AND 1B

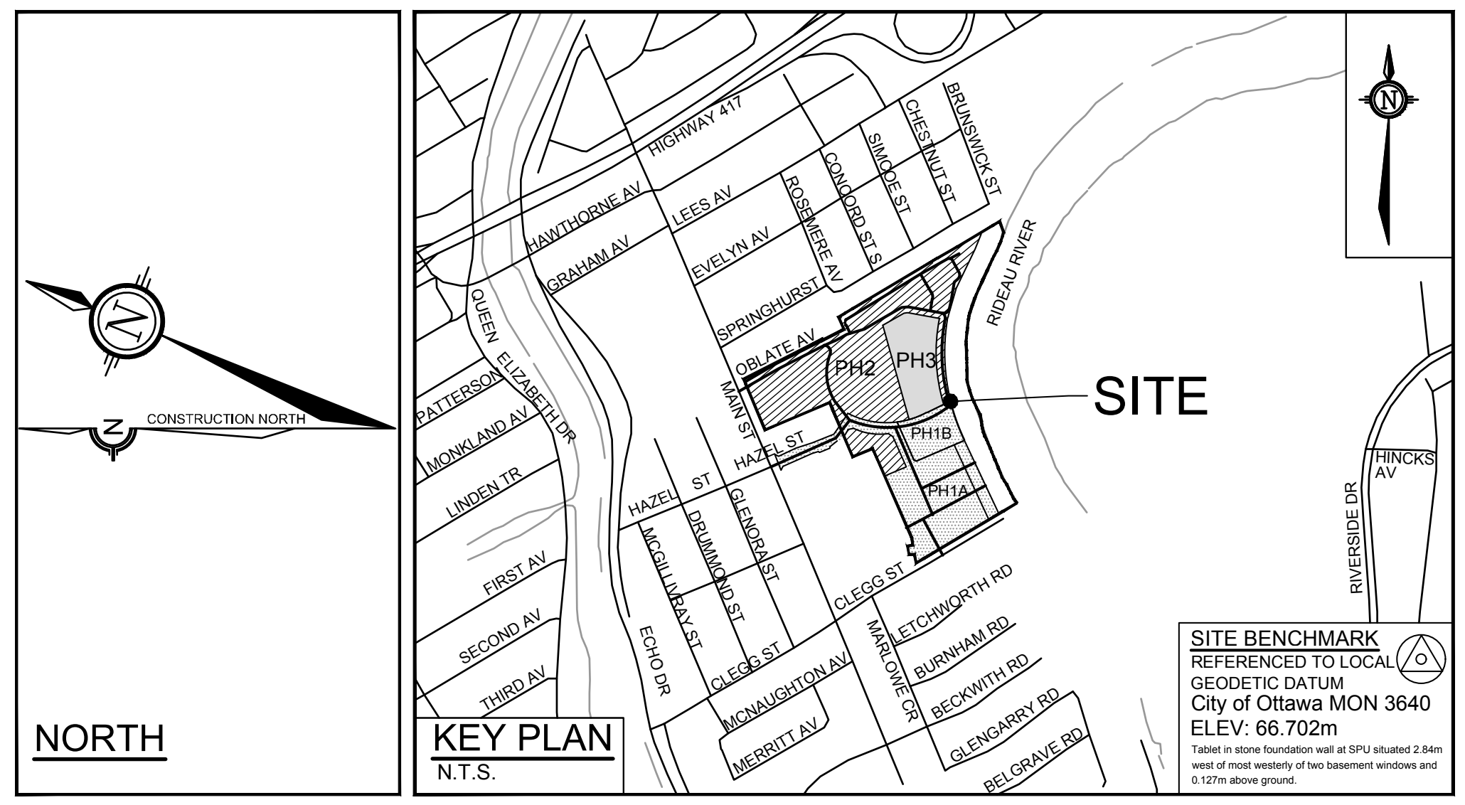
PROJECT No. 114025-00
REV REV # 11
DRAWING No. 114025-GR3

PLANB1.DWG - 1000mmx707mm

D07-16-15-0001

#17206





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
63.50 ~~63.52~~ 63.46	AS-BUILT ELEVATION PROPOSED ELEVATION EXISTING ELEVATION
63.50 ~~63.52~~ 63.46	AS-BUILT ELEVATION PROPOSED ELEVATION EXISTING ELEVATION
65.26(S) ~~66.25~~(S)	AS-BUILT SWALE ELEVATION PROPOSED SWALE ELEVATION
65.01(T/S) ~~65.00~~(T/S)	AS-BUILT TOP OF SLOPE PROPOSED TOP OF SLOPE
65.51HP ~~65.50~~(HP)	AS-BUILT HIGH POINT PROPOSED HIGH POINT
65.52(T/W) ~~65.50~~(T/W) ~~63.34~~(B/W) 63.30(B/W)	AS-BUILT TOP OF RETAINING WALL PROPOSED TOP OF RETAINING WALL PROPOSED BOTTOM OF RETAINING WALL AS-BUILT BOTTOM OF RETAINING WALL
═	PROPOSED BARRIER CURB
DC	PROPOSED DEPRESSED CURB
═	PROPOSED MOUNTABLE CURB
▬	PROPOSED BARRIER CURB (3" EXPOSED)
FF	FINISHED FLOOR ELEVATION
TF	TOP OF FOOTING ELEVATION
TOS=	TOP OF SLAB ELEVATION
USF=	UNDERSIDE OF FOOTING ELEVATION
65.55	PROPOSED TERRACE ELEVATION
2.1% ~~2.0%~~	AS-BUILT GRADE AND DIRECTION PROPOSED GRADE AND DIRECTION
⇐	MAJOR OVERLAND FLOW ROUTE
╷╷ ╷╷ ╷╷	MAXIMUM 3:1 SIDESLOPE
	PROPOSED CENTRELINE SWALE
F.F.	FINISHED FLOOR
T.F.	TOP OF FOOTING
U.S.F	UNDER SIDE OF FOOTING
T.O.S	TOP OF SLAB

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 SINGLE UNIT SERVICE LOCATION
*▽	PROPOSED SERVICE LOCATION (PROVIDE 22.5° BENDS AS REQUIRED)
▩	PART OF PH.2 OUTLETTING THROUGH PH.1A AT OUTLET 1
▨	PHASE 1A AND 1B OUTLETTING THOUGH PH.1A AT OUTLET 1
☐	LOCAL ROADWAYS
⠿	COLLECTOR ROADWAYS / BUS LOOP
▦	INTERLOCK PAVERS (DELINEATES PUBLIC / PRIVATE LAND)

NOTE: SILT FENCE TO BE INSTALLED AROUND ENTIRE SITE.
(SEE OPSD 219.110 ON SHEET 114025-D3-B)

REFER TO 114025-NL-B FOR ADDITIONAL NOTES AND CATCHBASIN TABLES

NOTE:
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AS-BUILT

No.	REVISION	DATE	BY
9.	AS-BUILT- SANCTUARY PVT. & PARISH PVT.	JAN 13/25	TJM

No.	REVISION	DATE	BY
8.	RE-ISSUED FOR CONSTRUCTION	NOV 1/18	JAG
7.	ISSUED FOR CITY APPROVAL/COMMENCE WORK	OCT 16/17	JAG
6.	ISSUED FOR ROAD BOX CONSTRUCTION	AUG 30/17	JAG
5.	ISSUED FOR INFORMATION	AUG 1/17	JAG
4.	REVISED AS PER CITY COMMENTS AND ISSUED FOR E.C.A.	MAY 26/17	JAG
3.	ISSUED FOR TENDER	APR 19/17	JAG
2.	RE-ISSUED AS PER CITY COMMENTS	MAR 8/17	JAG
1.	ISSUED FOR CITY OF OTTAWA REVIEW	NOV 21/16	JAG

SCALE
1:300

1:300
0 3 6 9 12

DESIGN	JAG
CHECKED	MSP
DRAWN	MTM
CHECKED	JAG
APPROVED	JGR

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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 # 9
DRAWING No. 114025-GR3-B

PLANB1.DWG - 1000mmx707mm

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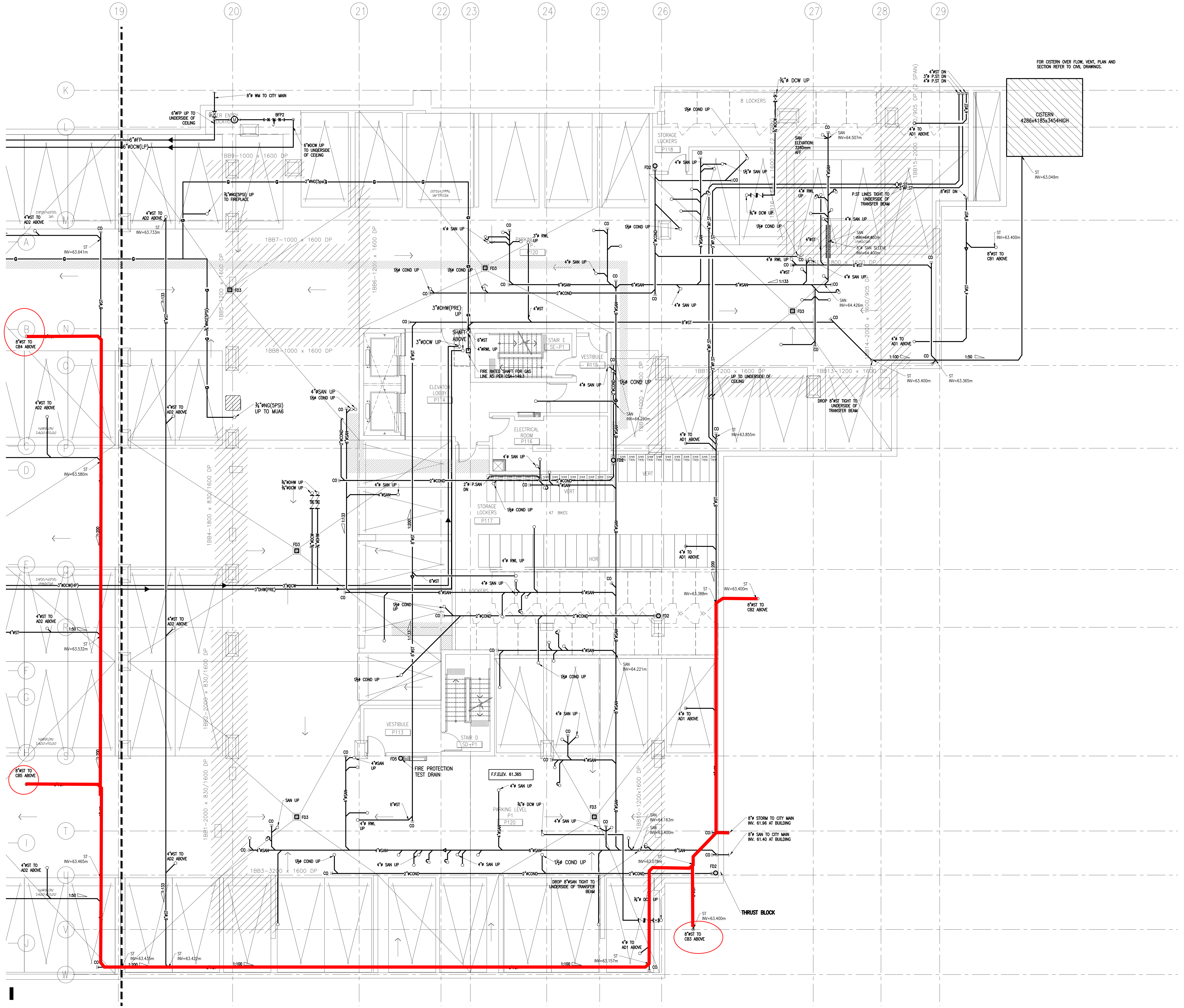
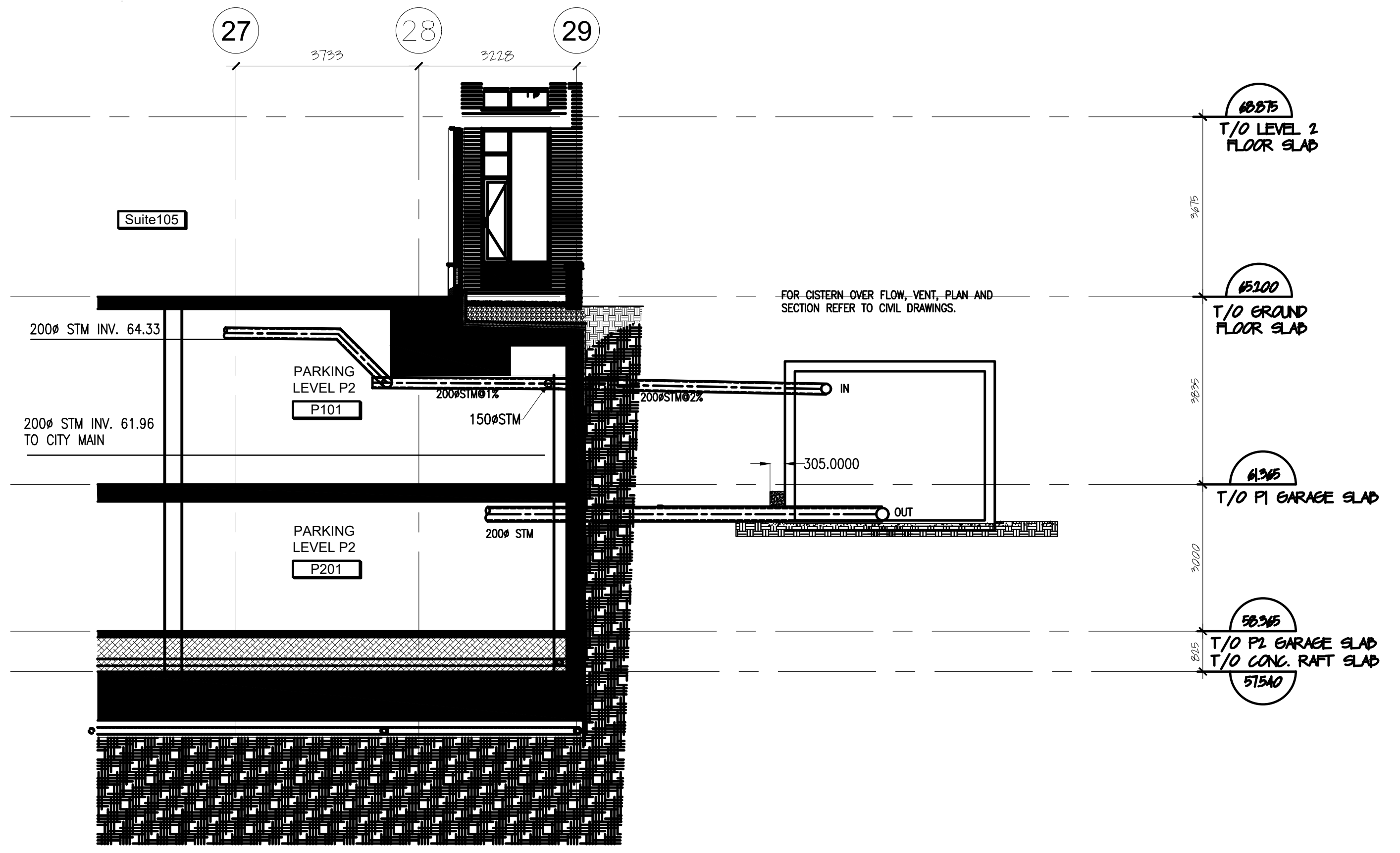


REFER TO MA2.2 FOR CONTINUATION

① MB2.2 **P1 PLUMBING - NEW WORK**
1:100



② MB2.2 **ELEVATION VIEW CISTERN BESIDE BUILDING 2B**
N.T.S.

REGIONAL

Client

DATE	REVISION	REF
2020-06-05	ISSUED FOR CONSTRUCTION	8
2020-05-29	ISSUED FOR COORDINATION	7
2020-04-24	ISSUED FOR CONTRACTOR PRICING	6
2020-04-09	ISSUED FOR BUILDING PERMIT	5
2019-07-02	ISSUED FOR TENDER	4
2019-05-16	ISSUED FOR BUILDING PERMIT	3
2019-05-09	ISSUED FOR 66% REVIEW	2
2018-08-01	ISSUED FOR PROGRESS 30%	1

Goodkey Weedmark
Consulting Engineers

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1688 Woodward Dr.
Ottawa Ontario
Canada K2C 3R8

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613 727-5115	Fax
www.gwal.com	Web

Project north
Nord du projet

Seal/Sceau

Project/Projet

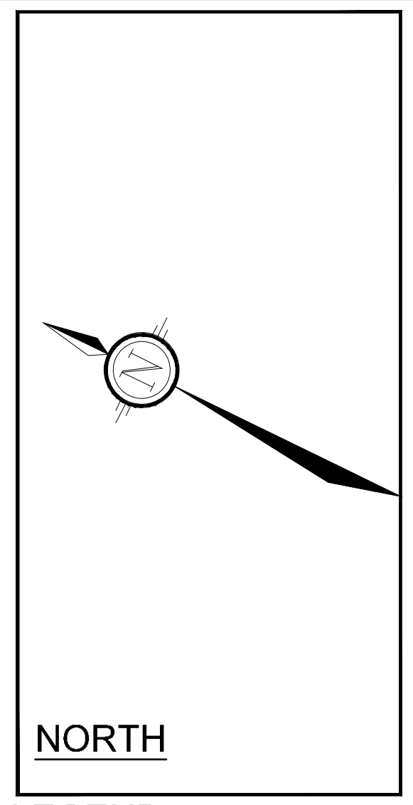
BUILDING B
MIXED USE DEVELOPMENT

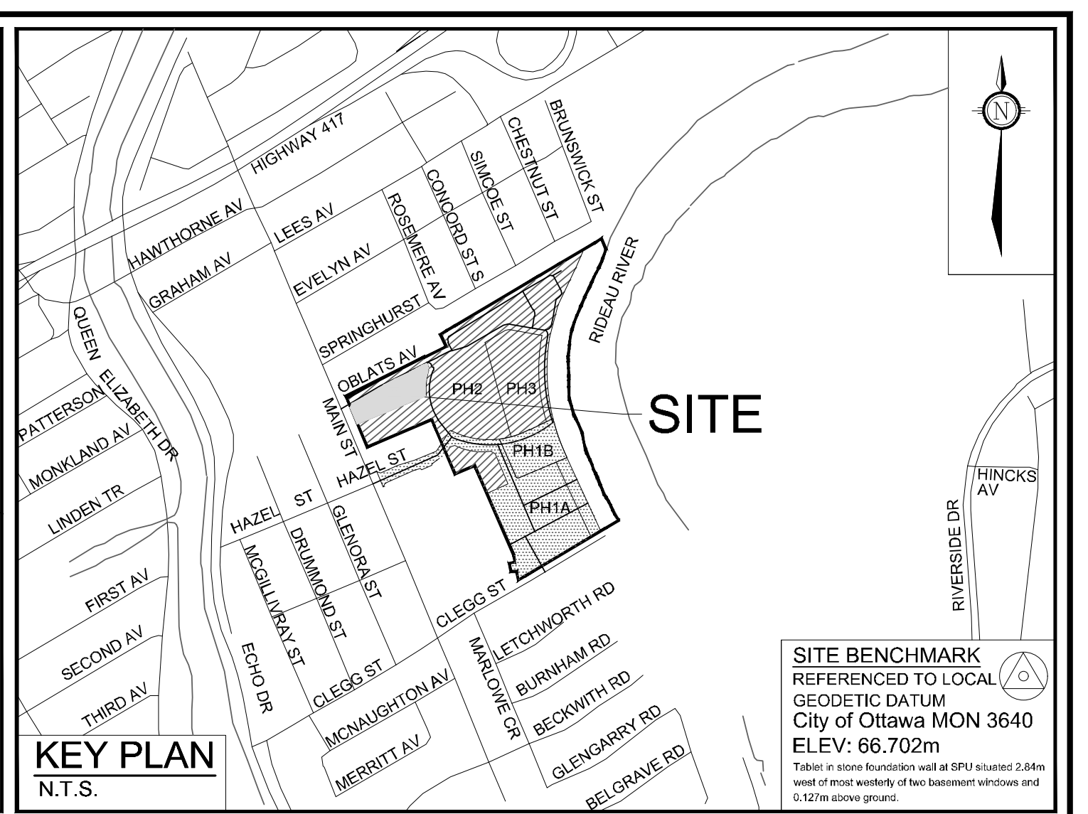
10 OBLATS AVE., OTTAWA, ON

Drawing title/Titre du dessin
MECHANICAL PLUMBING -
PARKING LEVEL P1 CONT.

Scale Échelle	AS NOTED	Project no./No. du projet	2016-642
Design by Conçu par	M.ELGEZARY	Drawing/Dessin	MB2.2
Drawn by Dessiné par	K.K./H.F./R.S.		
Reviewed by Examiné par	F.BANN		55
Date Date	JUNE 2020	Revision no: —	Acad file/Fichier: —

GRANDE ALLEE SIDEWALK CROSS SECTION - TYP.
HORIZONTAL SCALE - 1:75
VERTICAL SCALE - 1:7.5


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	PROPOSED STREETLIGHT
64.95 PROPOSED ELEVATION 65.00 *EXISTING ELEVATION*	PROPOSED BOLLARD (SEE LANDSCAPE PLANS)
65.50 PROPOSED TOP OF WALL ELEVATION	VVB *EXISTING VALVE AND VALE BOX*
65.27TC *EXISTING TOP OF CURB ELEVATION*	*EXISTING FIRE HYDRANT*
64.96TG *EXISTING TOP OF GRATE ELEVATION*	EX.CB *EXISTING CATCHBASIN*
2.0% PROPOSED GRADE AND DIRECTION	T/G *EXISTING TOP OF GRATE*
PROPOSED TERRACING (MAX 3:1)	EX UP *EXISTING UTILITY POLE C/W GUY WIRES*
PROPOSED SILT FENCE	*EXISTING STREETLIGHT*
AD 1 PROPOSED AREA DRAIN	*EXISTING HYDRANT*
PROPOSED SIAMESE CONNECTION	*EXISTING TREES*
PROPOSED BUILDING ENTRANCE	PROPOSED CONCRETE LIMITS
PROPOSED RETAINING WALL	64.93 ASBUILT ELEVATION ~~64.95~~ PROPOSED ELEVATION 65.00 *EXISTING ELEVATION*
PROPOSED BARRIER CURB	
DC PROPOSED DEPRESSED CURB	
PROPOSED DEPRESSED MOUNTABLE CURB (50mm)	
EXTENT OF LANDSCAPING WORKS	

GENERAL NOTES:

1) COORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.

2) DETERMINE THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION. PROTECT AND ASSUME RESPONSIBILITY FOR ALL EXISTING UTILITIES WHETHER OR NOT SHOWN ON THIS DRAWING.

3) OBTAIN ALL NECESSARY PERMITS AND APPROVALS FROM THE CITY OF OTTAWA BEFORE COMMENCING CONSTRUCTION.

4) BEFORE COMMENCING CONSTRUCTION OBTAIN AND PROVIDE PROOF OF COMPREHENSIVE, ALL RISK AND OPERATIONAL LIABILITY INSURANCE FOR $5,000,000.00. INSURANCE POLICY TO NAME OWNERS, ENGINEERS AND ARCHITECTS AS CO-INSURED.

5) RESTORE ALL DISTURBED AREAS ON-SITE AND OFF-SITE, INCLUDING TRENCHES AND SURFACES ON PUBLIC ROAD ALLOWANCES TO EXISTING CONDITIONS OR BETTER TO THE SATISFACTION OF THE CITY OF OTTAWA AND ENGINEER.

6) REMOVE FROM SITE ALL EXCESS EXCAVATED MATERIAL, ORGANIC MATERIAL AND DEBRIS UNLESS OTHERWISE INSTRUCTED BY ENGINEER. EXCAVATE AND REMOVE FROM SITE ANY CONTAMINATED MATERIAL. ALL CONTAMINATED MATERIAL SHALL BE DISPOSED OF AT A LICENSED LANDFILL FACILITY.

7) ALL ELEVATIONS ARE GEODETIC.

8) REFER TO ARCHITECT'S AND LANDSCAPE ARCHITECT'S DRAWINGS FOR BUILDING AND HARDSURFACE AREAS AND DIMENSIONS.

9) REFER TO SERVICING DESIGN BRIEF PREPARED BY NOVATECH ENGINEERING CONSULTANTS LTD.

10) SAW CUT AND KEY GRIND ASPHALT AT ALL ROAD CUTS AND ASPHALT TIE IN POINTS AS PER CITY OF OTTAWA STANDARDS (R10).

11) PROVIDE LINE/PARKING PAINTING.

12) CONTRACTOR TO PROVIDE THE CONSULTANT WITH A GRADING PLAN INDICATING THE AS-BUILT ELEVATION OF EVERY DESIGN GRADE SHOWN ON THIS PLAN.

13) REFER TO GEOTECHNICAL REPORT (NO 1668819, JUNE 2017) PREPARED BY GOLDER ASSOCIATES FOR SUBSURFACE CONDITIONS, CONSTRUCTION RECOMMENDATIONS, AND GEOTECHNICAL INSPECTION REQUIREMENTS. THE GEOTECHNICAL CONSULTANT IS TO REVIEW ON-SITE CONDITIONS AFTER EXCAVATION PRIOR TO PLACEMENT OF THE GRANULAR MATERIAL.

14) ALL MATERIALS AND CONSTRUCTION METHODS SHALL BE IN ACCORDANCE WITH THE CITY OF OTTAWA STANDARDS AND SPECIFICATIONS AND ONTARIO PROVINCIAL STANDARDS AND SPECIFICATIONS. ONTARIO PROVINCIAL STANDARDS AND SPECIFICATIONS WILL APPLY WHERE NO CITY STANDARDS ARE AVAILABLE.

15) ALL PRIVATE APPROACHES MUST BE CONSTRUCTED AS PER CITY SPECIFICATION SC13.

GRADING NOTES:

1) ALL TOPSOIL, ORGANIC OR DELETERIOUS MATERIAL MUST BE ENTIRELY REMOVED FROM BENEATH THE PROPOSED PAVED AREAS.

2) EXPOSED SUBGRADES IN PROPOSED PAVED AREAS SHOULD BE PROOF ROLLED WITH A LARGE STEEL DRUM ROLLER AND INSPECTED BY THE GEOTECHNICAL CONSULTANT.

3) ANY SOFT AREAS EVIDENT FROM THE PROOF ROLLING SHOULD BE SUBEXCAVATED AND REPLACED WITH SUITABLE MATERIAL THAT IS FROST COMPATIBLE WITH THE EXISTING SOILS.

4) THE GRANULAR BASE SHOULD BE COMPACTED TO AT LEAST 100% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY VALUE. ANY ADDITIONAL GRANULAR FILL USED BELOW THE PROPOSED PAVEMENT SHOULD BE COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY VALUE.

5) GRADE AND/OR FILL BEHIND PROPOSED CURB AND BETWEEN BUILDINGS AND CURBS, WHERE REQUIRED TO PROVIDE POSITIVE DRAINAGE.

6) MINIMUM OF 2% GRADE FOR ALL GRASS AREAS UNLESS OTHERWISE NOTED.

7) ALL GRADES BY CURBS ARE EDGE OF PAVEMENT GRADES UNLESS OTHERWISE INDICATED.

8) ALL CURBS SHALL BE BARRIER CURB (150mm) UNLESS OTHERWISE NOTED AND CONSTRUCTED AS PER CITY OF OTTAWA STANDARDS (SC1.1).

9) REFER TO LANDSCAPE PLAN FOR PLANTING AND OTHER LANDSCAPE FEATURE DETAILS.

PAVEMENT STRUCTURE DETAILS:

PAVEMENT STRUCTURE

- 40mm Superpave 12.5mm PG 58-34
- 50mm Superpave 19.0mm PG 58-34
- 150mm GRANULAR 'A' BASE
- 375mm GRANULAR 'B' TYPE II SUBBASE
- OPSS SELECT SUBGRADE MATERIAL (SSM)

PAVEMENT STRUCTURE (OVER UNDERGROUND PARKING)

- 40mm Superpave 12.5mm PG58-34, TRAF. CAT.B
- 50mm Superpave 19mm PG58-34, TRAF. CAT.B
- 300mm GRANULAR 'A' BASE
  [INSULATION TO BE PER TRAF. LOAD (i.e. H160)]

EROSION AND SEDIMENT CONTROL NOTES :

1) ALL EROSION AND SEDIMENT CONTROLS ARE TO BE INSTALLED TO THE SATISFACTION OF THE ENGINEER AND THE CITY OF OTTAWA. THEY ARE TO BE APPROPRIATE TO THE SITE CONDITIONS, PRIOR TO UNDERTAKING ANY SITE ALTERATIONS (FILLING, GRADING, REMOVAL OF VEGETATION, ETC.) AND DURING ALL PHASES OF SITE PREPARATION AND CONSTRUCTION. THESE PRACTICES ARE TO BE IMPLEMENTED IN ACCORDANCE WITH THE CURRENT BEST MANAGEMENT PRACTICES FOR EROSION AND SEDIMENT CONTROL AND SHOULD INCLUDE AS A MINIMUM THOSE MEASURES INDICATED ON THE PLAN.

2) TO PREVENT SURFACE EROSION FROM ENTERING THE DITCH OR STORM SYSTEM DURING CONSTRUCTION, FILTER CLOTH WILL BE PLACED UNDER GRATES OF CATCHBASINS AND STRUCTURES. A LIGHT DUTY SILT FENCE BARRIER WILL ALSO BE INSTALLED ALONG THE PROPERTY LINES. THESE CONTROL MEASURES WILL REMAIN IN PLACE UNTIL VEGETATION HAS BEEN ESTABLISHED AND CONSTRUCTION IS COMPLETE.

3) THE SEDIMENT CONTROL MEASURES SHALL ONLY BE REMOVED WHEN, IN THE OPINION OF THE ENGINEER, THE MEASURES ARE NO LONGER REQUIRED. NO CONTROL MEASURES MAY BE PERMANENTLY REMOVED WITHOUT PRIOR AUTHORIZATION FROM THE ENGINEER.

4) THE CONTRACTOR SHALL IMMEDIATELY REPORT TO THE ENGINEER ANY ACCIDENTAL DISCHARGES OF SEDIMENT MATERIAL INTO ANY DITCH OR STORM SEWER SYSTEM. APPROPRIATE RESPONSE MEASURES, INCLUDING ANY REPAIRS TO EXISTING CONTROL MEASURES OR THE IMPLEMENTATION OF ADDITIONAL CONTROL MEASURES, SHALL BE CARRIED OUT BY THE CONTRACTOR WITHOUT DELAY.

5) THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.

6) ROADWAYS ARE TO BE SWEPT AS REQUIRED OR AS DIRECTED BY THE ENGINEER AND/OR MUNICIPALITY.

7) THE CONTRACTOR SHALL ENSURE PROPER DUST CONTROL IS PROVIDED WITH THE APPLICATION OF WATER (AND IF REQUIRED, CALCIUM CHLORIDE) DURING DRY PERIODS.

\\novatech2018\nova2\2014\114025\CAD\Design\Condo Site Plan 2A-2B\Asbuilt\114025-GR-2A-2B-ASB.dwg, GR 2A-2B, Jun 24, 2022 - 8:21am, jmy

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.

AS-BUILT

No.	REVISION	DATE	BY	No.	REVISION	DATE	BY
				8.	ISSUED FOR CONSTRUCTION	SEPT 27/19	JAG
15.	AS-BUILT	JUNE 16/22	TJM	7.	ISSUED FOR TENDER	JULY 2/19	JAG
14.	REVISED GRADING AS PER LANDSCAPE CHANGES	JUL 26/21	JAG	6.	REVISED AS PER CITY COMMENTS	MAY 16/19	JAG
13.	REVISED GRADING AS PER LANDSCAPE CHANGES	JUL 20/21	JAG	5.	REVISED AS PER CITY COMMENTS	MAR 21/19	JAG
12.	REVISED GRADES FOR LAYBY / BUILDING / etc...	APR 14/21	JAG	4.	REVISED PER CITY COMMENTS	DEC 7/18	JAG
11.	ISSUED FOR PERMIT BUILDING 2B	APR 7/20	JAG	3.	ISSUED FOR COORDINATION	NOV 30/18	JAG
10.	RE-ISSUED FOR BUILDING 2B APPROVAL	FEB 26/20	JAG	2.	REVISED PER CITY COMMENTS	OCT 9/18	JAG
9.	RE-ISSUED FOR BUILDING 2B APPROVAL	JAN 30/20	JAG	1.	ISSUED WITH SITE PLAN APPLICATION	MAR 9/18	JAG

1:300

1:300
0 3 6 9 12

DESIGN JAG
CHECKED MSP
DRAWN MTM
CHECKED JAG
APPROVED JGR

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

LOCATION
CITY OF OTTAWA
Greystone Village Buildings 2A-2B

DRAWING NAME
GRADING, EROSION & SEDIMENT CONTROL PLAN

PROJECT No. 114025-00
REV REV # 15
DRAWING No. 114025-GR(2A/2B)

D07-12-18-0040

PLANB1.DWG - 1000mmx707mm

#17825

Conservation Partners
Partenaires en conservation

Mississippi Valley Conservation Authority
Rideau Valley Conservation Authority
South Nation Conservation de la Nation Sud

March 6, 2025

City of Ottawa
Development Review Services
110 Laurier Avenue West
Ottawa, ON   K1P 1J1

Attention: Nishant Jhamb, P.Eng, Project Manager

Subject: **Arcadis, Greystone Village, 175 Main Street**
Storm Outfalls to Rideau River - Updates to Flows, Drainage Areas and Erosion Protection Calculations
Novatech Project # 114025-b

Dear Mr. Jhamb,

In response to a request for a clearance for amending the existing ECA, the Rideau Valley Conservation Authority has reviewed and have accepted the following:

> Storm Outfalls to Rideau River - Updates to Flows and Drainage Areas and Erosion Protection Calculations prepared by Novatech Engineering dated February 18, 2025

The RVCA is satisfied that the design objectives are appropriate to support the characteristics and sensitivity of the receiving watercourse. Note that any alterations to the outlets shall require additional permitting from our office, however none are anticipated as a result of this update.

Please contact me should you require anything else.

Respectfully,

E Lalande

Eric Lalande, MCIP, RPP
Senior Planner, Planning and Regulations
Rideau Valley Conservation Authority
613-692-3571 ext. 1137
eric.lalande@rvca.ca

MEMORANDUM

DATE: **FEBRUARY 18, 2025**

TO: **ERIC LALANDE (RVCA)**

FROM: **MICHAEL PETEPIECE**

RE: **GREYSTONE VILLAGE, 175 MAIN STREET**
STORM OUTFALLS TO RIDEAU RIVER - UPDATES TO FLOWS, DRAINAGE AREAS AND EROSION PROTECTION CALCULATIONS
NOVATECH PROJECT # 114025-B

CC: **STEVE ZORGEL; TREVOR McKAY (NOVATECH)**

As part of the 2024 Master Servicing Study update for Greystone Village, Novatech has updated the stormwater modeling (PCSWMM) to reflect changes to drainage patterns and flows at the two storm sewer outfalls to the Rideau River since 2017. The results of this analysis are presented in this memo and are also reflected in the updated MSS report. The MSS report is titled "Site Servicing, Stormwater Management, Noise, Erosion and Sediment Control Brief for Greystone Village" but is hereafter referred to as the MSS.

Note: A previous version of this memo was submitted to RVCA on June 21, 2024. Since that time, there have been additional updates to the PCSWMM model for Greystone Village, and the design flows and velocities listed in this memo have been updated to be consisted with the current model. A section on the water quality units has also been added.

Environmental Compliance Approvals (ECAs)

The two storm sewer outfalls to the Rideau River have been approved as per the ECAs listed in **Table 1**. The based on the information in the reference reports issued with the ECA applications.

Storm Outfall Location	ECA Number & Date Issued	Description	Reference Report
Telmon Street	8946-ACUP7W Amended ECA, Issued August 17, 2016	825mm storm sewer with concrete headwall and rip-rap protection. Catchment Area 7.48 ha.	Site Servicing, Stormwater Management, Noise, Erosion and Sediment Control Brief, for Greystone Village 175 Main Street (December 18, 2015).
Oblats Avenue	3454-APEHFQ Issued July 31, 2017	Storm Sewer outfall. Catchment Area approximately 2.7 ha.	Greystone Village Phase 2 and 3, 175 Main Street, Site Servicing, Stormwater Management, Noise, Erosion and Sediment Control Brief (Revised May 26, 2017).

Changes to Drainage Patterns & Flows

There have been numerous small changes to drainage patterns, catchment areas, and subdivision/site plan layouts within Greystone Village since the original ECAs for the two storm outfalls were issued.

Telmon Street Outfall

The ECA for the Telmon Street outfall was issued on August 17, 2016 and was based on Novatech's servicing report dated December 18, 2015. The ECA describes the outfall as an 825mm pipe with a contributing drainage area of 7.48 ha. In the 2017 MSS, the outfall was upsized to a 900mm sewer to provide additional capacity for the 100-year flows.

For the 2025 MSS Update, the model has been revised to reflect the most up-to-date drainage information. A comparison of the drainage areas, flows and velocities for the Telmon Street outfall between the 2017 and updated 2025 models is provided below.

Reference	**Outlet Pipe Size**	**Catchment Area**	**Peak Flow (L/s)**		**Velocity (m/s)**	
			5yr	**100yr**	**5yr**	**100yr**
2016 ECA	825mm	7.48 ha	-	-	-	-
2017 MSS	900mm	7.26 ha	962	1,576	1.51	2.48
2025 MSS Update	900mm	7.22 ha	1,103	1,695	2.15	2.66
		Difference	+141 L/s (+15%)	+119 L/s (7%)	+0.64m/s	+0.18 m/s

Oblats Avenue Outfall

The ECA for the Oblats Avenue outfall was issued on July 31, 2017 and was based on Novatech's servicing report dated May 26, 2017. The ECA lists the contributing drainage area as approximately 2.7ha but does not include the size of the outfall. The 2017 PCSWMM model has a contributing drainage area of 2.86ha upstream of this outfall.

For the 2025 MSS Update, the model has been revised to reflect the most up-to-date drainage information. A comparison of the drainage areas, flows and velocities for the Oblats Avenue outfall between the 2017 and updated 2025 models is provided below.

Reference	**Outlet Pipe Size**	**Catchment Area**	**Peak Flow (L/s)**		**Velocity (m/s)**	
			5yr	**100yr**	**5yr**	**100yr**
2017 ECA	-	2.70 ha	-	-	-	-
2017 MSS	750mm	2.86 ha	444	798	1.01	1.23
2025 MSS Update	750mm	2.87 ha	489	920	1.[MP1]50	2.08
		Difference	+45 L/s (10%)	+122 L/s (15%)	+0.49 m/s	+0.85 m/s

Water Quality Unit Analysis

Water quality treatment for the areas that drain to the Rideau River is provided using hydrodynamic separators (HDS) located upstream of the storm outfalls.

Outlet	Vortechs Model	Total Contributing Area (ha)		Runoff Coefficient (%)	
		Designed	Current	Designed	Current
Outlet 1	Model 11000 - off-line	7.22	7.20	69	66
Outlet 2	Model 5000 - off-line	2.90	2.87	74	72

These treatment units were designed to achieve a minimum 80% long-term average removal of Total Suspended Solids (TSS) based on a mean particle size of 80 microns. For additional details, please refer to the document titled “Site Servicing, Stormwater Management, Noise, Erosion, and Sediment Control Brief, Phase 2 & 3, Master Servicing Study Update”. Dated January 28, 2025.

The sizing calculations for the Vortechs units are performed using long term rainfall data based on the size and runoff coefficient of the upstream area. The performance of the units is not affected by changes to peak flows associated with design storm events, as these peak flows represent a very small fraction of the long-term runoff volumes treated by the units. As shown in the above table, there have been no significant changes to the contributing drainage areas or runoff coefficients, the increases in peak flow at the outfalls will not affect the performance of these units. A correspondence email from Contech dated January 16, 2025 (attached) is confirming that previously sized units are still appropriate.

Erosion Protection Analysis

The storm outfalls include plunge pools for energy dissipation and erosion protection. For both outfalls, the plunge pools are 5.0m wide x 4.0m long and are lined with riverstone (700mm deep) with a median stone size (D_{50}) of 300mm, stone sizes ranging from 200-450mm, and 15% Granular ‘A’. The design of the plunge pools has been evaluated as follows.

U.S Department of Transportation, Federal Highway Administration HEC-14

The plunge pools have been evaluated using the methodology outlined in *Hydraulic Engineering Circular No 14, Third Edition (HEC-14) – Hydraulic Design of Energy Dissipators for Culverts and Channels (Publication No. FHWA-NHI-06-086, July 2006). Chapter 10: Riprap Basins and Aprons*.

The designs of the energy dissipation basins were evaluated based on the 100-year peak flows at the outfalls, using the 5-year water level in the Rideau River as the tailwater elevation. The results of this analysis are summarized below. Supporting calculations are attached.

Outfall	100yr Peak Flow	Pipe Diameter	Pipe Invert	Tailwater Elevation	Apron Dimensions as per HEC-14 (Equation 10.4)			
					Length	Width	Stone Depth	Med. Stone Size (D_{50})
Telmon Street	1,695 L/s	900 mm	56.00	57.85 m	3.6 m	5.1 m	0.50 m	150 mm
Oblats Avenue	920 L/s	750 mm	56.00	57.85 m	2.4 m	3.4 m	0.50 m	150 mm
Basin Dimensions (Both Outfalls)					**4.0m**	**±5.0m**	**0.70 m**	**300 mm**

Based on the HEC-14 analysis, the riverstone basins at the outfalls are adequately sized to provide erosion protection.

MTO Highway Drainage Design Standards (WC-3)

The required stone size was also checked using the MTO Highway Drainage Design Standards (January 2008), WC-3 Scour and Armouring – Section 3.3, which provides recommendations for stone size based on velocity. The maximum 100-year velocity is 2.66 m/s at the Telmon Street outfall. The MTO design chart in Section WC-3 recommends a nominal stone size of 300mm for velocities between than 2.60-3.00 m/s. The riverstone used at the outfall has a median stone size of 300mm and therefore is adequately sized for erosion protection.

Conclusions

There are no required changes to the existing storm quality units and outfalls to the Rideau River resulting from changes to storm drainage patterns and flows in Greystone Village since 2017. The outlet sewers provide sufficient capacity to convey the 5-year flows under free-flow conditions. For the 100-year event, the hydraulic performance of the outfalls and the upstream storm sewers have been simulated using PCSWMM to account for tailwater elevations in the Rideau River which will submerge the outfalls.

The results of this analysis indicate that there are no adverse impacts to the level of service in the development resulting from changes to drainage patterns since 2017. The erosion protection at the outfalls has been evaluated using the updated flows and the results of this analysis confirm that the existing design is adequately sized for the updated flows.

Attachments:

1. Supporting Calculations – Erosion Analysis
2. Email from Contech, dated January 16, 2025 – Vortech TSS Removal Verification
3. Vortech Calculations – As-Built

Greystone Village - Erosion Protection at Storm Outfalls

Novatech Project: 114025-B

Date: February 18, 2025

U.S. DOT FHWA HEC-14

Telmon Street Outfall (900mm)

100-year Flow (Q)	1.695	m^3/s (from PCSWMM)
Inlet Pipe Diameter (D)	0.900	m
Inlet Pipe Invert	56.00	m
Tailwater Elevation	57.85	m (5yr WL in Rideau R.)
Tailwater Depth	1.85	m
Riprap Size (D_{50})	55	mm
Min. Riprap Size (Table 10.1)	150	mm
Apron Length	**3.6**	**m**
Apron Width	**5.1**	**m**
Apron Depth	**0.50**	**m**

Oblats Avenue Outfall (750mm)

100-year Flow (Q)	0.920	m^3/s (from PCSWMM)
Inlet Pipe Diameter (D)	0.600	m
Inlet Pipe Invert	56.00	m
Tailwater Elevation	57.85	m (5yr WL in Rideau R.)
Tailwater Depth	1.85	m
Riprap Size (D_{50})	42	mm
Min. Riprap Size (Table 10.1)	150	mm
Apron Length	**2.4**	**m**
Apron Width	**3.4**	**m**
Apron Depth	**0.50**	**m**

HEC-14 Equation 10.4

$$D_{50} = 0.2\,D\left(\frac{Q}{\sqrt{g}D^{2.5}}\right)^{4/3}\left(\frac{D}{TW}\right)$$

where,

D_{50} = riprap size, m (ft)

Q = design discharge, m^3/s (ft^3/s)

D = culvert diameter (circular), m (ft)

TW = tailwater depth, m (ft)

g = acceleration due to gravity, 9.81 m/s^2 (32.2 ft/s^2)

Width (at apron end) = 3D + (2/3)L

HEC-14 - Table 10.1. Example Riprap Classes and Apron Dimensions

Class	D_{50} (mm)	D_{50} (in)	Apron Length[1]	Apron Depth
1	125	5	4D	$3.5D_{50}$
2	150	6	4D	$3.3D_{50}$
3	250	10	5D	$2.4D_{50}$
4	350	14	6D	$2.2D_{50}$
5	500	20	7D	$2.0D_{50}$
6	550	22	8D	$2.0D_{50}$

[1] *D is the culvert rise.*

MTO Highway Drainage Design Standards (January 2008)

WC-3 Scour and Armouring - Section 3.3

	Stone Sizes For Scour And Erosion Protection – Low Volume Roads						
Velocity (m/s)	< 2.0	< 2.6	< 3.0	< 3.5	< 4.0	< 4.7	< 5.2
Nominal Stone Size(1) (mm)	100	200	300	400	500	800	1000
Notes 1) Maximum stone size to be 1.5 times the nominal stone size. 80% of stones (by mass) must have a diameter of at least 60% of nominal stone size.							

Velocity at Outlet (100yr)	2.66	m/s (from PCSWMM)
Minimum Riprap Size	**300**	**mm**

From: Jennifer Knowles <Jennifer.Knowles@ContechES.com>
Sent: Thursday, January 16, 2025 6:04 AM
To: Trevor McKay
Cc: Steve Zorgel; Vahid Mehdipour; Mike Petepiece
Subject: RE: [EXTERNAL] Vortech Units - Greystone Village
Attachments: 542350-10 EFFY VX11000 Offline AS BUILT 01-16-25.pdf; 542350-10 SDC VX11000 Offline AS BUILT 01-16-25.pdf; 563087-010 EFFY VX5000 OFFLINE AS BUILT 01-16-25.pdf; 563087-010 SDC VX5000 OFFLINE AS BUILT 01-16-25.pdf

Good morning Trevor,

Please find attached updated as-built calculations. Both Vortechs are predicted to still meet 80% TSS efficiency.
Let me know if you need anything else.

Best regards,

Jennifer

Jennifer Knowles, P.E.*
Project Engineer – Stormwater Products

Contech Engineered Solutions LLC
71 U.S. Route One Suite F | Scarborough, ME 04074
Off: 207-885-6134 Fax: 207-885-9825
Jennifer.Knowles@ContechES.com
www.ContechES.com
*Licensed in ME

From: Trevor McKay <t.mcKay@novatech-eng.com>
Sent: Tuesday, January 14, 2025 6:08 PM
To: Jennifer Knowles <Jennifer.Knowles@ContechES.com>
Cc: Steve Zorgel <s.zorgel@novatech-eng.com>; Vahid Mehdipour <v.mehdipour@novatech-eng.com>; Mike Petepiece <m.petepiece@novatech-eng.com>
Subject: RE: [EXTERNAL] Vortech Units - Greystone Village

Jennifer,

We have had to complete some additional updates to storm drainage areas for the Greystone Village project. In addition, there has been a slight tweak to the imperviousness of the site.

Lastly, the as-built information provided to us indicates that the by-pass weir upstream of the Phase 2/3 Vortech Unit (Model 5000) was constructed 12cm lower and 0.3m shorter in length then recommended in the Contech Design sheets.

Would you have a few minutes in the next day or two to review the information and let us know if the structures can still meet the design treatment efficiency (80% TSS)? We'd be happy to have a quick call if that would be helpful.

Outlet 1 – phase 1A/1B (Site A, southern site) – Model 11000

- Minor System 5-Year Flow = 1101L/s
    - Previously provided drainage area = 7.31ha - 7.22ha
    - Previously provided Imperviousness = 68% - 65.5%
    - Impervious Area - 4.73ha
- Minor System 100-Year Flow = 1753L/s

As-built By-pass Weir Elevation = 59.13, Length = +/-2.4m (matches design)

Outlet 2 – Phase 2/3 (Site B, northern site) – Model 5000

- Minor System 5-Year Flow = 486L/s
    - Previously provided drainage area = 2.7ha - 2.9ha
    - Previously provided Imperviousness = 73% - 73.4%
    - Impervious Area - 2.13ha
- Minor System 100-Year Flow = 957L/s

As-built By-pass Weir Elevation = 56.95 (12cm low), Length = +/-1.5m (0.3m short)

Thank you,

Trevor McKay, P.Eng., Senior Project Manager | Land Development Engineering
NOVATECH
Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext: 291 | Cell: 613.263.9113

From: Steve Zorgel <s.zorgel@novatech-eng.com>
Sent: Tuesday, January 14, 2025 9:01 AM
To: Trevor McKay <t.mcKay@novatech-eng.com>
Subject: FW: [EXTERNAL] Vortech Units - Greystone Village

Is this the email you were looking for?

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

From: Jennifer Knowles <Jennifer.Knowles@ContechES.com>
Sent: Wednesday, February 1, 2023 10:38 AM
To: Steve Zorgel <s.zorgel@novatech-eng.com>
Cc: Mike Petepiece <m.petepiece@novatech-eng.com>
Subject: RE: [EXTERNAL] Vortech Units - Greystone Village

Hi Steve,

Please find attached as built calculations for the two Vortechs systems. Please note that Contech's project numbers changed between the time of the original design work and tender/order. Please also note that the elevations for Outlet 2 Vortechs 5000 changed since the calculations from November 2016. Let me know if you have any questions.

VORTECHS SYSTEM® FLOW CALCULATIONS

CONTECH ENGINEERED SOLUTIONS

GREYSTONE VILLAGE
OTTAWA, ON
MODEL 11000 OFF-LINE
OUTLET 1 - PHASE 1A/1B

Vortechs Orifice

Cd = 0.56
A (m^2) = 0.052
Crest Elevation (m) = 58.42

Vortechs Weir

Cd = 3.4
Weir Crest Length (m) = 0.433
Crest Elevation (m) = 59.03

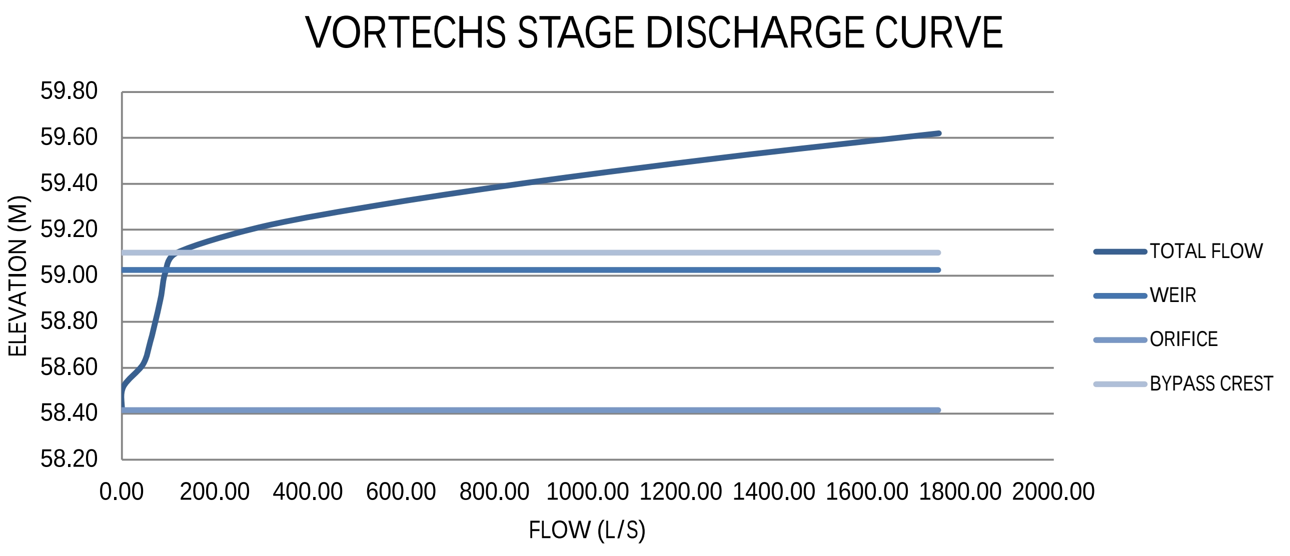
Bypass Weir

Cd = 3.3
Crest Length (m) = 1.829
Crest Elev. (m) = 59.10

Head	Elevation	Orifice Flow	Weir Flow	Bypass Flow	Total Flow
(m)	(m)	(l/s)	(l/s)	(l/s)	(l/s)
0.00	58.42	0.00	0.00	0.00	0.00
0.10	58.52	2.98	0.00	0.00	2.98
0.20	58.62	45.58	0.00	0.00	45.58
0.30	58.72	61.29	0.00	0.00	61.29
0.40	58.82	73.72	0.00	0.00	73.72
0.50	58.92	84.34	0.00	0.00	84.34
0.60	59.02	93.76	0.00	0.00	93.76
0.69	59.10	101.15	16.84	0.00	117.98
0.80	59.22	110.22	66.75	128.59	305.56
0.90	59.32	117.58	125.82	330.28	573.68
1.00	59.42	124.52	196.18	586.72	907.42
1.10	59.52	131.08	276.25	888.03	1295.36
1.20	59.62	137.64	369.56	1246.00	1753.19

Calculated by: JAK

1/16



VORTECHS SYSTEM® ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON AN AVERAGE PARTICLE SIZE OF 80 MICRONS
GREYSTONE VILLAGE
OTTAWA, ON
MODEL 11000 OFF-LINE
OUTLET 1 - PHASE 1A/1B

Design Ratio[1] = **(7.22 hectares) x (0.693) x (2.775) / (7.3 m2)** **= 1.89**

Bypass occurs at an elevation of 59.13m (at approximately 16 l/s/m2)

Rainfall Intensity mm/hr	Operating Rate[2] % of capacity	Flow Treated (l/s)	% Total Rainfall Volume[3]	Rmvl. Effcy[4] (%)	Rel. Effcy (%)
0.5	1.4	6.9	9.2%	98.0%	9.0%
1.0	2.8	13.8	10.6%	98.0%	10.4%
1.5	4.2	20.7	9.9%	98.0%	9.7%
2.0	5.6	27.6	8.4%	98.0%	8.2%
2.5	7.0	34.5	7.7%	98.0%	7.5%
3.0	8.4	41.4	5.9%	96.9%	5.8%
3.5	9.7	48.3	4.4%	96.3%	4.2%
4.0	11.1	55.2	4.7%	95.3%	4.4%
4.5	12.5	62.1	3.3%	94.7%	3.1%
5.0	13.9	69.0	3.0%	93.8%	2.8%
6.0	16.7	82.8	5.4%	90.6%	4.9%
7.0	19.5	96.6	4.4%	88.0%	3.8%
8.0	22.3	110.4	3.5%	86.1%	3.0%
9.0	25.1	124.2	2.8%	84.9%	2.4%
10.0	27.8	137.9	2.2%	83.8%	1.8%
15.0	41.8	206.9	5.9%	75.0%	4.4%
20.0	55.7	275.9	3.2%	61.3%	1.9%
25.0	69.6	344.9	0.9%	50.0%	0.4%
30.0	83.5	413.8	0.4%	30.1%	0.1%
35.0	97.4	482.8	0.2%	10.9%	0.0%
40.0	111.3	551.8	0.3%	8.0%	0.0%
					88.1%

Predicted Annual Runoff Volume Treated = 89.7%
Assumed removal efficiency for bypassed flows = 0.0%
Estimated reduction in efficiency[5] = 6.5%
Predicted Net Annual Load Removal Efficiency = **82%**

1 - Design Ratio = (Total Drainage Area) x (Runoff Coefficient) x (Rational Method Conversion) / Grit Chamber Area
- The Total Drainage Area and Runoff Coefficient are specified by the site engineer.
- The rational method conversion based on the units in the above equation is 2.775.

2 - Operating Rate (% of capacity) = percentage of peak operating rate of 68 l/s/m^2.
3 - Based on 42 years of hourly rainfall data from Canadian Station 6105976, Ottawa, ON
4 - Based on Contech Construction Products laboratory verified removal of an average particle size of 80 microns (see Technical Bulletin #1).
5- Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

Calculated by: JAK 1/16
Checked by:

VORTECHS SYSTEM® FLOW CALCULATIONS
GREYSTONE VILLAGE- PHASE 2 & 3
OTTAWA, ON
MODEL 5000 OFF-LINE
OUTLET 2 - PHASE 2/3

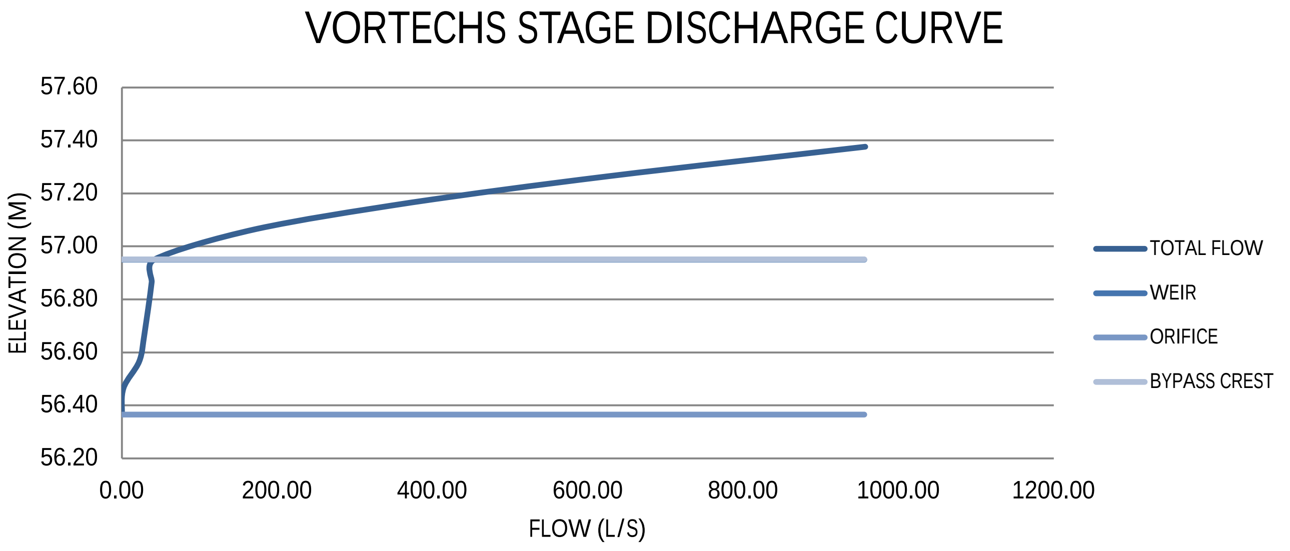
CONTECH ENGINEERED SOLUTIONS

Vortechs Orifice	**Vortechs Weir**	**Bypass Weir**
Cd = 0.56 A (m^2) = 0.023 Crest Elevation (m) = 56.37	Cd = 3.4 Weir Crest Length (m) = 0.253 Crest Elevation (m) = 56.95	Cd = 3.3 Crest Length (m) = 1.524 Crest Elev. (m) = 56.95

Head (m)	Elevation (m)	Orifice Flow (l/s)	Weir Flow (l/s)	Bypass Flow (l/s)	Total Flow (l/s)
0.00	56.37	0.00	0.00	0.00	0.00
0.10	56.47	1.99	0.00	0.00	1.99
0.20	56.57	22.24	0.00	0.00	22.24
0.30	56.67	28.75	0.00	0.00	28.75
0.40	56.77	34.03	0.00	0.00	34.03
0.50	56.87	38.60	0.00	0.00	38.60
0.58	56.95	42.09	0.00	0.00	42.09
0.70	57.07	46.40	18.48	108.22	173.10
0.80	57.17	49.84	47.09	276.68	373.61
0.90	57.27	53.07	83.41	490.69	627.16
1.01	57.38	56.41	130.78	769.92	957.11

Calculated by: JAK

1/16



VORTECHS SYSTEM® ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION BASED ON AN AVERAGE PARTICLE SIZE OF 80 MICRONS

GREYSTONE VILLAGE- PHASE 2 & 3

OTTAWA, ON

MODEL 5000 OFF-LINE

OUTLET 2 - PHASE 2/3

Design Ratio[1] = $\frac{(2.9 \text{ hectares}) \times (0.7404) \times (2.775)}{(3.6 \text{ m2})}$ **= 1.66**

Bypass occurs at an elevation of 56.95m (at approximately 12 l/s/m2)

Rainfall Intensity mm/hr	Operating Rate[2] % of capacity	Flow Treated (l/s)	% Total Rainfall Volume[3]	Rmvl. Effcy[4] (%)	Rel. Effcy (%)
0.5	1.2	2.9	9.2%	98.0%	9.0%
1.0	2.4	5.9	10.6%	98.0%	10.4%
1.5	3.6	8.8	9.9%	98.0%	9.7%
2.0	4.9	11.7	8.4%	98.0%	8.2%
2.5	6.1	14.6	7.7%	98.0%	7.5%
3.0	7.3	17.6	5.9%	97.6%	5.8%
3.5	8.5	20.5	4.4%	96.9%	4.2%
4.0	9.7	23.4	4.7%	96.3%	4.5%
4.5	10.9	26.4	3.3%	96.0%	3.2%
5.0	12.2	29.3	3.0%	94.7%	2.9%
6.0	14.6	35.1	5.4%	92.8%	5.0%
7.0	17.0	41.0	4.4%	89.9%	3.9%
8.0	19.5	46.9	3.5%	88.0%	3.1%
9.0	21.9	52.7	2.7%	86.8%	2.3%
10.0	24.3	58.6	1.7%	85.3%	1.5%
15.0	36.5	87.9	4.3%	78.8%	3.4%
20.0	48.7	117.1	2.2%	66.3%	1.5%
25.0	60.8	146.4	0.7%	58.0%	0.4%
30.0	73.0	175.7	0.3%	46.2%	0.1%
35.0	85.2	205.0	0.2%	26.2%	0.0%
40.0	97.3	234.3	0.2%	10.9%	0.0%
					86.6%

Predicted Annual Runoff Volume Treated =	86.1%
Assumed removal efficiency for bypassed flows =	0.0%
Estimated reduction in efficiency[5] =	6.5%
Predicted Net Annual Load Removal Efficiency =	**80%**

1 - Design Ratio = (Total Drainage Area) x (Runoff Coefficient) x (Rational Method Conversion) / Grit Chamber Area

- The Total Drainage Area and Runoff Coefficient are specified by the site engineer.
- The rational method conversion based on the units in the above equation is 2.775.

2 - Operating Rate (% of capacity) = percentage of peak operating rate of 68 $l/s/m^2$.

3 - Based on 42 years of hourly rainfall data from Canadian Station 6105976, Ottawa CDA, ON

4 - Based on Contech Construction Products laboratory verified removal of an average particle size of 80 microns (see Technical Bulletin #1).

5- Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

Calculated by: JAK 1/16

Checked by:

NOVATECH
Engineers, Planners & Landscape Architects

MEMORANDUM

DATE: **FEBRUARY 14, 2025**

REVISED: **MARCH 4, 2025**

TO: **VINCENT DUQUETTE**

FROM: **MICHAEL PETEPIECE / KALLIE AULD**

RE: **GREYSTONE VILLAGE**
PCSWMM MODEL UPDATES FOR PHASE 3
NOVATECH PROJECT # 114025

CC: **ABDUL MOTTALIB, CITY OF OTTAWA**

Following the submission of the Greystone Village Master Servicing Study (MSS) Updated PCSWMM model on January 17, 2025, which was reviewed and approved on January 25, 2025, and the updated MSS report on January 28, 2025, there have been some minor changes to the storm drainage design for the Phase 3 site plan. The PCSWMM model has been updated to reflect the changes and confirm there are no adverse impacts when compared to the previous model. This memo provides a list of the changes made to the model and a summary of the model results.

Model Updates

The following sections outline the changes made to the PCSWMM model:

- Drainage areas have been updated to reflect changes to building footprints and surrounding areas;
- Roof flows have been updated to reflect new roof drain calculations;
- The connection point from the building service to Deschatelets Avenue has been updated to reflect the revised design.

Drainage Areas

The table below outlines the changes to the area and runoff coefficients for the six (6) catchments that have been revised as part of this update.

Drainage Area ID	Old Area (ha)	New Area (ha)	Old C	New C
Storm Outlet 1				
21A	0.14	0.16	0.90	0.90
21B	0.11	0.11	0.70	0.70
21C	0.05	0.03	0.40	0.33
22A	0.04	0.04	0.50	0.53
22B	0.11	0.11	0.53	0.53
22C	0.09	0.08	0.40	0.46

Drainage Area ID	Old Area (ha)	New Area (ha)	Old C	New C
Storm Outlet 2				
B18	0.09	0.07	0.57	0.51
B20	0.12	0.12	0.45	0.44
B20A	0.08	0.08	0.48	0.35

Refer to the following plans for the old and new catchment areas:

- Phase 3 Site Area: *Stormwater Management Plan, dated January 20, 2025*
- Outlet 1 – Old: *Storm Drainage Areas Plan - Phase 1A and 1B, dated October 23, 2024*
- Outlet 1 – New: *Storm Drainage Areas Plan - Phase 1A and 1B, dated March 4, 2025*
- Outlet 2 – Old: *Storm Drainage Areas Plan - Phase 2 and 3, dated January 20, 2025*
- Outlet 2 – New: *Storm Drainage Areas Plan - Phase 2 and 3, dated March 4, 2025*

Roof Flows

The roof design has been revised and the PCSWMM model has been updated to reflect the new controlled roof drain flows from the south building (Area 21A). The revised flows are slightly higher than the previous model but the increase is not significant with respect to the capacity of the receiving sewer on Deschatelets Avenue.

Area 21A (South Building Roof)	Peak Flow (L/s)	
	5-year	100-year
Old Roof Flows	8.25	10.49
New Roof Flows	9.80	13.08

Storm Service Connection

In the previously approved PCSWMM model (January 17, 2025), the storm service from the Phase 3 south building (Area 21A) was connected to the storm sewer on Deschatelets Avenue at MH126. The model has been updated to more accurately show the service connection location between MH128 and MH126 by adding a new node to the model (J21).

Model Results

The impacts to the model resulting from the model updates for Phase 3 (peak flows, HGL elevations) are summarized below.

Peak Flows at Outlet 1

Outlet 1 - Phase 1	Peak Flow (L/s)	
	5-year	100-year
Old Flows	1,103	1,695
New Flows	1,105	1,698

Peak flows at the Phase 1 Outlet have increased by approximately 3L/s (0.2% increase) during the 100-year event, which will not have any adverse impact on the receiving watercourse.

Peak Flows at Outlet 2

Outlet 2 - Phase 2&3	Peak Flow (L/s)	
	5-year	**100-year**
Old Flows	489	920
New Flows	487	913

Peak flows at the Phase 2/3 Outlet have decreased by approximately 7L/s (0.8% decrease) during the 100-year event, which will not have any adverse impact on the receiving watercourse.

Hydraulic Grade Line (HGL)

The 100-year HGL elevations in the receiving storm sewer were checked to evaluate whether the changes to the model had any adverse impacts on the level of service provided. The model results show a maximum increase in the HGL of 2cm at MH126, which is the next MH downstream of the storm service connection tributary to Outlet 1 from the Phase 3 building. Changes to areas tributary to Outlet 2 resulted in a slight decrease in HGL elevations in the Outlet 2 sewers. The HGL elevations are still at least 0.3m below the as-built USF elevations, so there is no adverse impact resulting from the model updates.

MH/ Node ID	HGL Elevations (100-Year Event)		
	Old HGL (m)	**New HLG (m)**	**As-Built USF (m)**
Phase 1			
J21 (storm service lateral from Phase 3)	61.17	61.18	61.61
MH128	61.27	61.28	61.60
MH126	61.62	61.64	62.83
MH124	60.90	60.91	61.41
MH114	60.05	60.06	60.93
MH118	59.46	59.46	60.93
Phase 2&3			
MH306	59.67	59.67	60.19
MH308	59.20	59.19	N/A
MH310	58.65	58.64	N/A
MH324	60.73	60.73	N/A
MH326	59.30	59.30	N/A
MH328	58.73	58.72	N/A
MH334	58.53	58.52	N/A

Conclusions

The updates to the PCSWMM model to reflect the changes to the Phase 3 site plan since the previous submission result in very minor changes to flows (+3 L/s or 0.2% increase at Outlet 1, and - 8 L/s or 0.8% decrease at Outlet 2) and the HGL elevations (maximum increase of 0.02m at MH 126).

Based on these findings, we believe that a full review of the PCSWMM model is not required and that the January 17, 2025 approved model should continue to form the basis for the Master Servicing Study Update (MSSU). A section describing the changes to the Phase 3 site plan and the modelling results will be added to the MSSU and a copy of the updated PCSWMM files will be provided for the City of Ottawa's future use.

NOVATECH

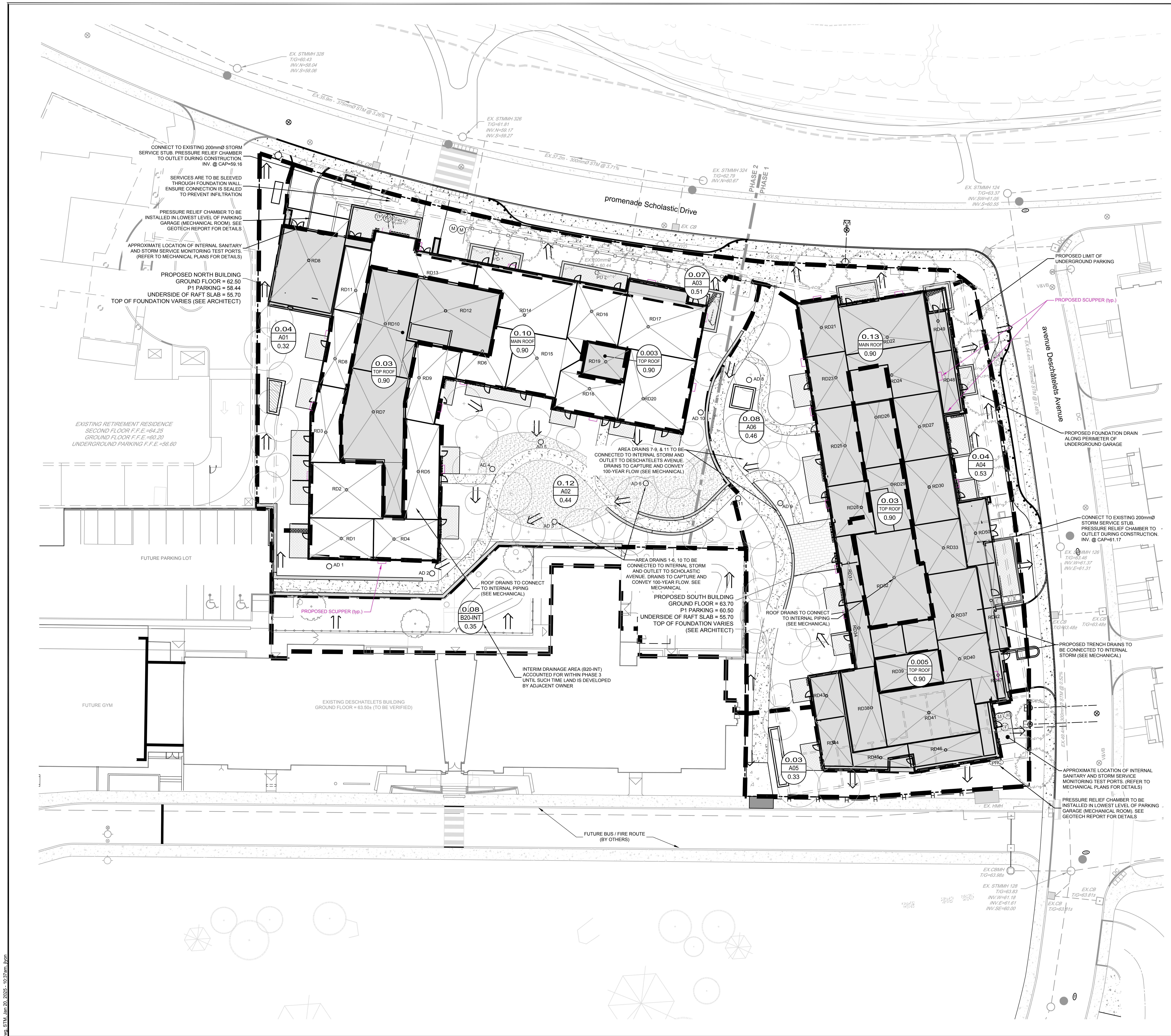
Michael Petepiece, P.Eng
Sr. Project Manager | Water Resources

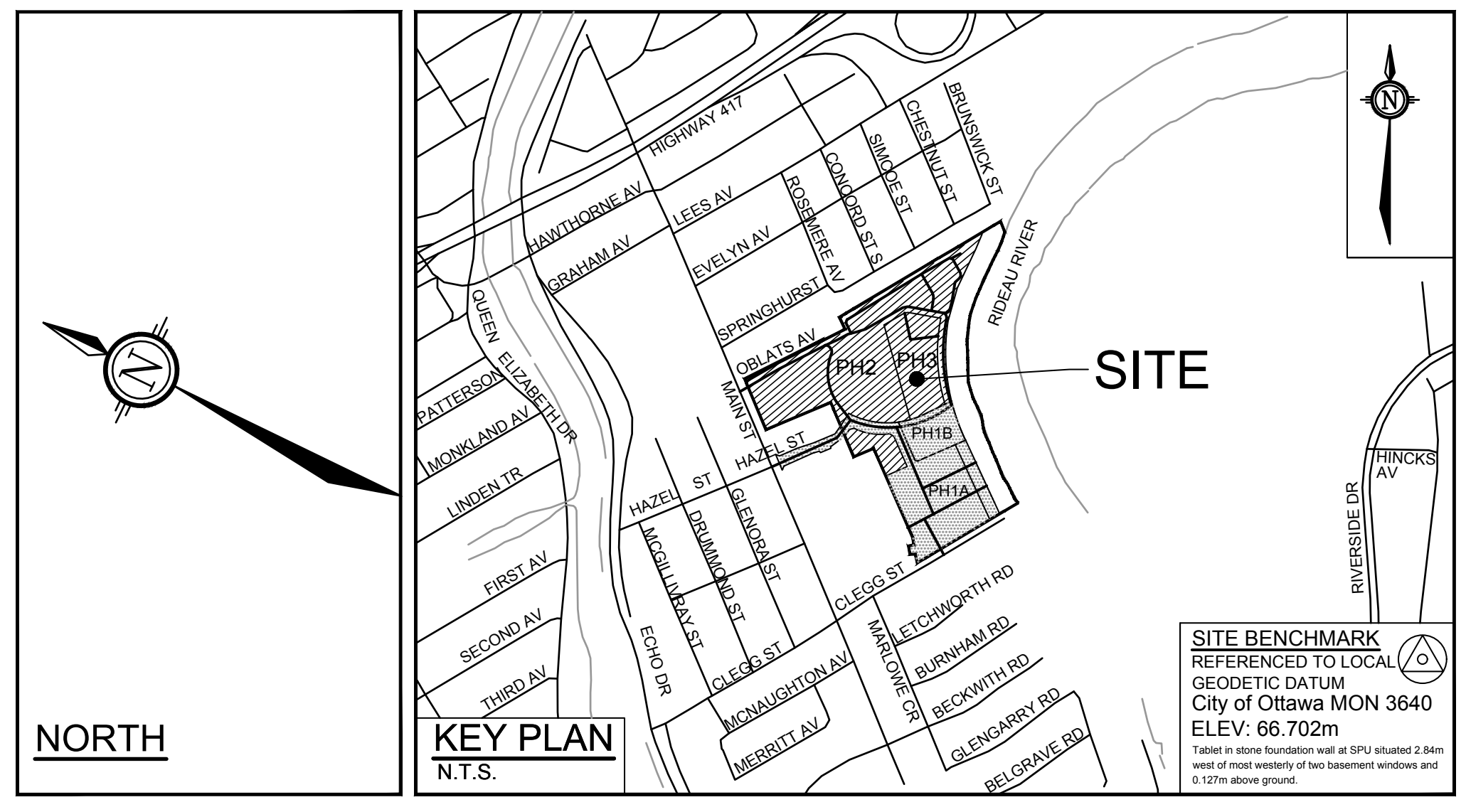
Attachments:

- Stormwater Management Plan, dated January 20, 2025

Refer to Appendix A of the MSSU, dated March 4, 2025 for the following documents:
- Storm Drainage Areas Plan, Phase 1A and 1B, dated October 23, 2024
- Storm Drainage Areas Plan, Phase 1A and 1B, dated March 4, 2025
- Storm Drainage Areas Plan Phase 2 and 3, dated January 20, 2025
- Storm Drainage Areas Plan Phase 2 and 3, dated March 4, 2025

Refer to the MSSU (March 4, 2025) submission package for the following files:
- PCSWMM Model 114025-MSSU_20250117_5yr-Approved.pcz
- PCSWMM Model 114025-MSSU_20250117_100yr-Approved.pcz
- PCSWMM Model 114025-MSSU_20250304_5yr.pcz
- PCSWMM Model 114025-MSSU_20250304_100yr.pcz





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

PHASE 3 CONDOS - ROOF DRAIN TABLE

AREA ID	ZURN SPECIFICATION	NOTCHES	POST DEVELOPMENT ZURN ROOFDRAIN CONTROL PARAMETERS					
			1:5 - YEAR EVENT			1:100 - YEAR EVENT		
			HEAD(m)	Q(l/s)	VOL(m³)	HEAD(m)	Q(l/s)	VOL(m³)
NORTH BUILDING								
RD1	ZCF121-1W-X4-Z-105-10-77	1	0.099	0.37	0.88	0.131	0.49	2.00
RD2	ZCF121-1W-X4-Z-105-10-77	1	0.105	0.39	1.63	0.137	0.51	3.60
RD3	ZCF121-1W-X4-Z-105-10-77	1	0.097	0.36	0.71	0.129	0.48	1.63
RD4	ZCF121-1W-X4-Z-105-10-77	1	0.100	0.37	0.88	0.131	0.49	2.01
RD5	ZCF121-1W-X4-Z-105-10-77	1	0.103	0.39	1.20	0.134	0.50	2.71
RD6	ZCF121-1W-X4-Z-105-10-77	1	0.095	0.35	0.64	0.125	0.47	1.48
RD7	ZCF121-1W-X4-Z-105-10-77	1	0.109	0.41	2.45	0.141	0.53	5.34
RD8	ZCF121-1W-X4-Z-105-10-77	1	0.110	0.41	2.76	0.142	0.53	5.98
RD9	ZCF121-1W-X4-Z-105-10-77	1	0.100	0.37	0.93	0.131	0.49	2.11
RD10	ZCF121-1W-X4-Z-105-10-77	1	0.109	0.41	2.36	0.141	0.53	5.14
RD11	ZCF121-1W-X4-Z-105-10-77	1	0.093	0.35	0.48	0.124	0.46	1.14
RD12	ZCF121-1W-X4-Z-105-10-77	1	0.109	0.41	2.37	0.141	0.53	5.14
RD13	ZCF121-1W-X4-Z-105-10-77	1	0.108	0.40	1.10	0.133	0.50	2.47
RD14	ZCF121-1W-X4-Z-105-10-77	1	0.108	0.40	2.17	0.140	0.52	4.74
RD15	ZCF121-1W-X4-Z-105-10-77	1	0.105	0.39	1.20	0.137	0.51	2.69
RD16	ZCF121-1W-X4-Z-105-10-77	1	0.103	0.38	1.09	0.135	0.50	2.45
RD17	ZCF121-1W-X4-Z-105-10-77	1	0.114	0.43	2.29	0.148	0.55	5.00
RD18	ZCF121-1W-X4-Z-105-10-77	1	0.101	0.38	0.87	0.134	0.50	2.00
RD19	ZCF121-1W-X4-Z-105-10-77	1	0.090	0.33	0.31	0.121	0.45	0.76
RD20	ZCF121-1W-X4-Z-105-10-77	1	0.108	0.40	2.06	0.140	0.52	4.52
SUBTOTAL				7.70	28.39		10.05	62.91
SOUTH BUILDING								
RD21	ZCF121-1W-X4-Z-105-10-77	1	0.097	0.36	0.67	0.128	0.48	1.54
RD22	ZCF121-1W-X4-Z-105-10-77	1	0.106	0.40	1.78	0.138	0.52	3.92
RD23	ZCF121-1W-X4-Z-105-10-77	1	0.095	0.36	0.65	0.126	0.47	1.50
RD24	ZCF121-1W-X4-Z-105-10-77	1	0.105	0.39	1.75	0.137	0.51	3.84
RD25	ZCF121-1W-X4-Z-105-10-77	1	0.101	0.38	1.11	0.133	0.50	2.51
RD26	ZCF121-1W-X4-Z-105-10-77	1	0.111	0.41	1.45	0.144	0.54	3.21
RD27	ZCF121-1W-X4-Z-105-10-77	1	0.101	0.38	1.05	0.133	0.49	2.39
RD28	ZCF121-1W-X4-Z-105-10-77	1	0.096	0.36	0.63	0.127	0.47	1.47
RD29	ZCF121-1W-X4-Z-105-10-77	1	0.109	0.40	0.73	0.144	0.54	1.69
RD30	ZCF121-1W-X4-Z-105-10-77	1	0.101	0.38	1.05	0.133	0.49	2.39
RD31	ZCF121-1W-X4-Z-105-10-77	1	0.089	0.33	0.32	0.120	0.45	0.78
RD32	ZCF121-1W-X4-Z-105-10-77	1	0.110	0.41	2.57	0.143	0.53	5.61
RD33	ZCF121-1W-X4-Z-105-10-77	1	0.097	0.36	0.72	0.128	0.48	1.64
RD34	ZCF121-1W-X4-Z-105-10-77	1	0.099	0.37	0.73	0.130	0.49	1.67
RD37	ZCF121-1W-X4-Z-105-10-77	1	0.107	0.40	1.76	0.139	0.52	3.88
RD38	ZCF121-1W-X4-Z-105-10-77	1	0.047	0.17	0.10	0.102	0.38	1.00
RD39	ZCF121-1W-X4-Z-105-10-77	1	0.095	0.30	0.60	0.127	0.47	1.42
RD40	ZCF121-1W-X4-Z-105-10-77	1	0.107	0.40	0.89	0.141	0.53	2.03
RD41	ZCF121-1W-X4-Z-105-10-77	1	0.109	0.41	2.19	0.141	0.53	4.80
RD42	ZCF121-1W-X4-Z-105-10-77	1	0.092	0.34	0.41	0.141	0.46	0.97
RD43	ZCF121-1W-X4-Z-105-10-77	1	0.087	0.32	0.32	0.117	0.44	0.77
RD44	ZCF121-1W-X4-Z-105-10-77	1	0.088	0.33	0.35	0.118	0.44	0.84
RD45	ZCF121-1W-X4-Z-105-10-77	1	0.082	0.31	0.20	0.111	0.42	0.51
RD46	ZCF121-1W-X4-Z-105-10-77	1	0.098	0.36	0.74	0.101	0.38	0.82
RD47	ZCF121-1W-X4-Z-105-10-77	1	0.058	0.22	0.02	0.084	0.31	0.08
RD48	ZCF121-1W-X4-Z-105-10-77	1	0.082	0.31	0.21	0.112	0.42	0.53
RD49	ZCF121-1W-X4-Z-105-10-77	1	0.082	0.31	0.21	0.112	0.42	0.53
RD50	ZCF121-1W-X4-Z-105-10-77	1	0.083	0.35	0.49	0.118	0.44	1.00
SUBTOTAL				9.80	23.71		13.08	53.34
	TOTAL			17.50	52.10		23.13	116.25

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
10.	ISSUED FOR CONSTRUCTION	JAN 20/25	SAZ
9.	REVISED ROOF DRAINS	NOV 7/24	SAZ

No.	REVISION	DATE	BY
8.	REVISED ROOF DRAINS	NOV 5/24	SAZ
7.	REVISED ROOF DRAINS	OCT 29/24	SAZ
6.	REVISED AS PER CITY OF OTTAWA COMMENTS	JAN 20/23	SAZ
5.	REVISED AS PER CITY OF OTTAWA COMMENTS	NOV 24/22	SAZ
4.	REVISED AS PER CITY OF OTTAWA COMMENTS	AUG 19/22	SAZ
3.	ISSUED FOR COORDINATION	AUG 10/22	SAZ
2.	REVISED AS PER CITY OF OTTAWA COMMENTS	JUN 3/22	SAZ
1.	ISSUED WITH SITE PLAN APPLICATION	JUL 22/21	JAG

SCALE
1:250
1:250
0 2 4 6 8 10

DESIGN	SAZ
CHECKED	MSP
DRAWN	MTM
CHECKED	SAZ
APPROVED	MSP

LICENSED PROFESSIONAL ENGINEER
S.A.N. ZORGEL
100191487
Jan.20/25
PROVINCE OF ONTARIO

NOVATECH
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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
375 DESCHÂTELETS AVENUE
GREYSTONE VILLAGE PHASE 3

DRAWING NAME
STORMWATER MANAGEMENT PLAN

PROJECT No.
114025-PH3
REV
REV # 10
DRAWING No.
114025-STM(PH3)

D07-12-21-0111

#17640

C:\temp\AcPublish_6520\114025-STM(Ph3).dwg, STM, Jan 20, 2025 - 10:37am, jlyon

PLANB1.DWG - 1000mmx707mm

APPENDIX B

Sanitary

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

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~~ 7-Aug-24

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	1A							0.000	0.20	0.000	0.200	3.8	0.00	0.07	0.07	***30.4***	200	203.20	DR 35	***0.72***	29.0	0.90	1%
			1B		4					0.011	0.08	0.011	0.280	3.7	0.13	0.09	0.22								
*DESCHATELETS AVENUE	149	147	2				119			0.250	0.28	0.261	0.560	3.5	2.94	0.18	3.13	***28.0***	200	203.20	DR 35	***0.29***	18.4	0.57	18%
			1C		6					0.016	0.09	0.277	0.650	3.5	3.12	0.21	3.33								
**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	20%
*DESCHATELETS AVENUE			3							0.000	0.31	0.277	0.960	3.5	3.12	0.32	3.75								
*DESCHATELETS AVENUE	145	193	4					112		0.224	0.47	0.501	1.430	3.4	5.49	0.47	6.27	***20.1***	200	203.20	DR 35	***0.40***	21.6	0.67	29%
*DESCHATELETS AVENUE	193	143	5							0.000	0.06	0.501	1.490	3.4	5.49	0.49	6.29	***21.2***	200	203.20	DR 35	***0.19***	14.9	0.46	42%
			8D		6					0.016	0.09	0.517	1.580	3.4	5.65	0.52	6.49								
DESCHATELETS AVENUE	143	141	6							0.000	0.06	0.517	1.640	3.4	5.65	0.54	6.51	***30.9***	200	203.20	DR 35	***0.46***	23.2	0.72	28%
			8C		4					0.011	0.07	0.528	1.710	3.4	5.76	0.56	6.64								
DESCHATELETS AVENUE	141	139	7				43		42	0.149	0.23	0.677	1.940	3.3	7.29	0.64	8.24	***26.3***	200	203.20	DR 35	***0.38***	21.1	0.65	39%
			8B		6					0.016	0.09	0.693	2.030	3.3	7.45	0.67	8.44								
DESCHATELETS AVENUE	139	133	8A							0.000	0.05	0.693	2.080	3.3	7.45	0.69	8.45	***21.6***	200	203.20	DR 35	***0.55***	25.4	0.78	33%
DE MAZENOD AVENUE	133	195	10A		1					0.003	0.04	0.696	2.120	3.3	7.48	0.70	8.50	***17.9***	200	203.20	DR 35	***0.67***	28.0	0.86	30%
DE MAZENOD AVENUE	195	131	10B		11		61		45	0.221	0.44	0.917	2.560	3.3	9.68	0.84	10.84	***56.6***	200	203.20	DR 35	***0.42***	22.2	0.68	49%
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	1.156	3.230	3.2	12.02	1.07	13.40	***47.5***	250	254.00	DR 35	***0.23***	29.8	0.59	45%
JEREMIAH KEALEY STREET	129	127	13		6					0.016	0.19	1.173	3.420	3.2	12.17	1.13	13.62	***49.1***	250	254.00	DR 35	***0.35***	36.7	0.72	37%
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	1.406	4.350	3.2	14.39	1.44	16.15	***59.1***	250	254.00	DR 35	***0.59***	47.7	0.94	34%
SCHOLASTIC DRIVE	125	109								0.000		1.406	4.350	3.2	14.39	1.44	16.15	***12.5***	250	254.00	DR 35	***0.48***	43.0	0.85	38%
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		1.476	5.110	3.1	15.06	1.69	17.06	***11.6***	250	254.00	DR 35	***0.52***	44.7	0.88	38%
OUTLET	113	115	23							0.000	0.04	1.476	5.150	3.1	15.06	1.70	17.07	***43.6***	250	254.00	DR 35	***3.81***	121.1	2.39	14%

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

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~~ 7-Aug-24

LOCATION				INDIVIDUAL								CUMULATIVE		PEAK FACTOR M	POPULATION FLOW Q(p) (L/s)	PEAK EXTRAN. FLOW Q(i) (L/s)	PEAK DESIGN FLOW Q(d) (L/s)	PROPOSED SEWER							
STREET	FROM MH	TO MH	Area	Single Units	Townhouse Units	3 Bedroom Condo Units	2 Bedroom Condo Units	Future School Residence	Retirement Home Units or Studio Apartment	Population (in 1000's)	AREA (ha.)	Population (in 1000's)	AREA (ha.)					LENGTH (m)	PIPE SIZE (mm)	PIPE ID (mm)	TYPE OF PIPE	GRADE %	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	Qpeak/ Qcap
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		1.524	5.510	3.1	15.51	1.82	17.64	***11.2***	250	254.00	DR 35	***0.36***	37.2	0.73	47%

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

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%

LICENSED PROFESSIONAL ENGINEER
T. J. MCKAY
100195434
JANUARY 28, 2025
PROVINCE OF ONTARIO

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 7-Aug-24
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		7				0.019	0.17	0.019	0.210	3.7	0.23	0.07	0.30	***27.2***	250	254.00	DR 35	***2.43***	96.7	1.91	0%
OBLATS AVENUE	303	305	B3		7				0.019	0.15	0.038	0.360	3.7	0.45	0.12	0.57	***33.0***	250	254.00	DR 35	***3.40***	114.4	2.26	0%
OBLATS AVENUE*	305	307	B4		10			144	0.229	0.69	0.266	1.050	3.5	3.00	0.35	3.35	***45.4***	250	254.00	DR 35	***3.11***	109.4	2.16	3%
OBLATS AVENUE	307	309	B5						0.000	0.03	0.266	1.080	3.5	3.00	0.36	3.36	***14.9***	250	254.00	DR 35	***4.70***	134.5	2.65	2%
OBLATS AVENUE	309	311	B6						0.000	0.09	0.266	1.170	3.5	3.00	0.39	3.39	***36.8***	250	254.00	DR 35	***3.76***	120.3	2.37	3%
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	0.558	2.300	3.4	6.08	0.76	6.84	***32.9***	250	254.00	DR 35	***0.39***	38.7	0.76	18%
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									0.814	2.940	3.3	8.66	0.97	9.63	***40.8***	250	254.00	DR 35	***0.37***	37.7	0.74	26%
OUTLET	331	EXMH									0.814	2.940	3.3	8.66	0.97	9.63	***5.2***	250	254.00	DR 35	***0.77***	54.4	1.07	18%

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

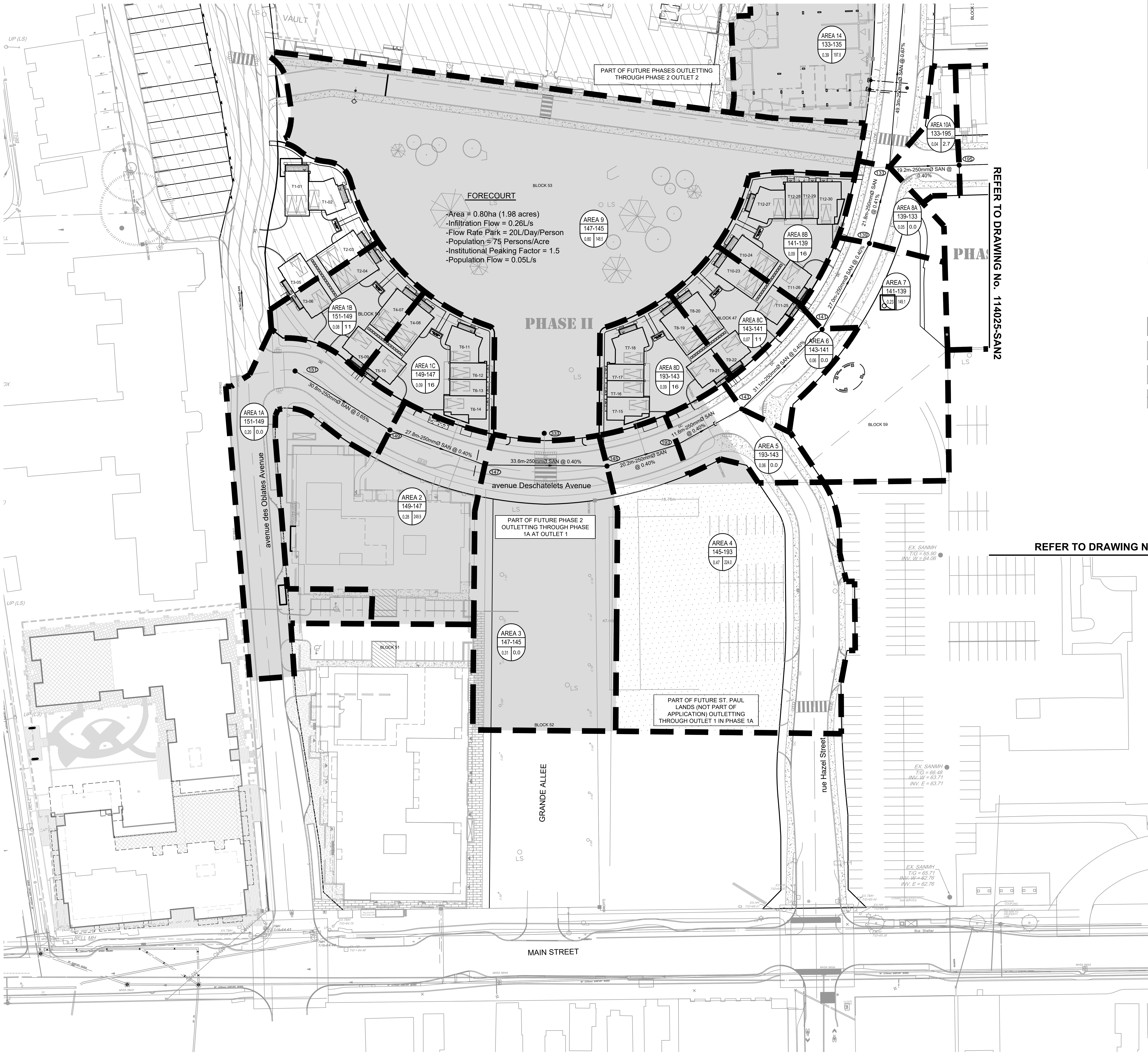
Definitions:
Q(d) = Design Flow (L/sec)
Q(p) = Population Flow (L/sec)
Q(i) = Extraneous Flow (L/sec)

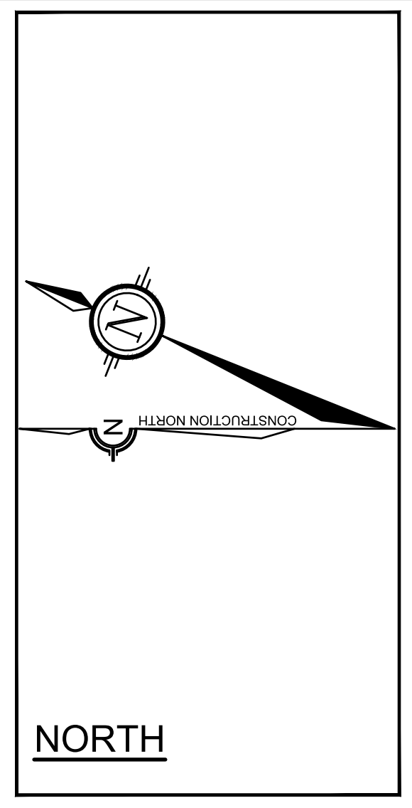
Institutional Peaking factor = 1.5 if ICI >20%, 1.0 <20%

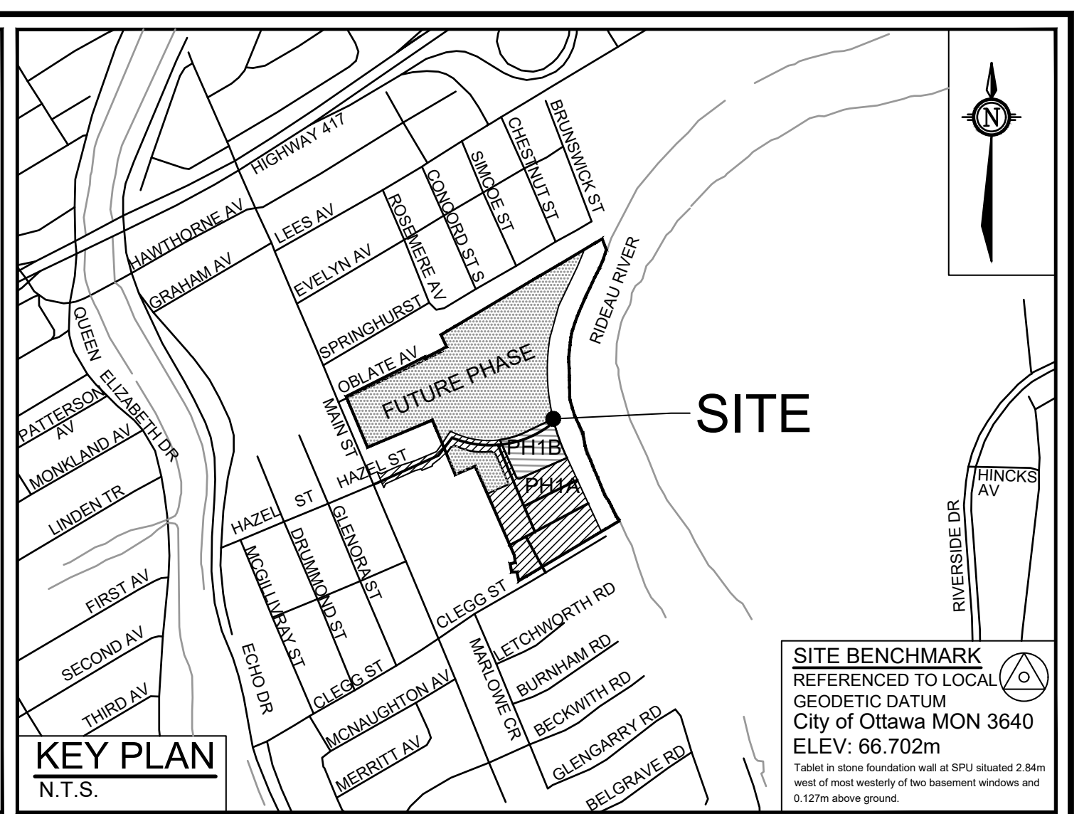
P = Population (3.4 persons/single unit, 2.7 persons/townhouse, 3.1 persons/3-bed apartment, 2.1 persons/2-bed apartment, 2.0 persons/ school residence, 1.4 persons/retirement residence or studio apartment)
q = Average per capita flow = 280 L/cap/day - Residential
q = Average per gross ha. flow = 35000 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 144 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

LICENSED PROFESSIONAL ENGINEER
T. J. MCKAY
100195434
JANUARY 28, 2025
PROVINCE OF ONTARIO







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
AREA 1	AREA ID
815-813	MANHOLE TO MANHOLE
89.1	POPULATION EQUIVALENT
0.81	AREA IN HECTARES
▬ ▬	SANITARY DRAINAGE AREA BOUNDARY
●─ 817	PROPOSED SANITARY SEWER AND MANHOLE WITH DIRECTION OF FLOW
●─ 109	EXISTING SANITARY SEWER AND MANHOLE WITH DIRECTION OF FLOW
▨	PART OF FUTURE PH.2 OUTLETTING THROUGH PH.1A AT OUTLET 1
▨	PART OF FUTURE ST. PAUL LANDS (NOT PART OF APPLICATION) OUTLETTING THROUGH PH.1A AT OUTLET 1
▨	PART OF FUTURE PHASES OUTLETTING THROUGH PHASE 2 OUTLET 2
▨	PROPOSED CONCRETE SIDEWALK

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NOTE:
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9.	REVISED AS PER CITY OF OTTAWA COMMENTS	JAN 20/23	SAZ

No.	REVISION	DATE	BY
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7.	REVISED AS PER CITY OF OTTAWA COMMENTS	AUG 19/22	SAZ
6.	REVISED AS PER CITY OF OTTAWA COMMENTS	JUN 3/22	SAZ
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

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DRAWN	MTM
CHECKED	SAZ
APPROVED	MSP

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER
S.A.N. ZORGEL
100191487
Aug 7/24
PROVINCE OF ONTARIO

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone	(613) 254-9643
Facsimile	(613) 254-5867
Website	www.novatech-eng.com

CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

DRAWING NAME

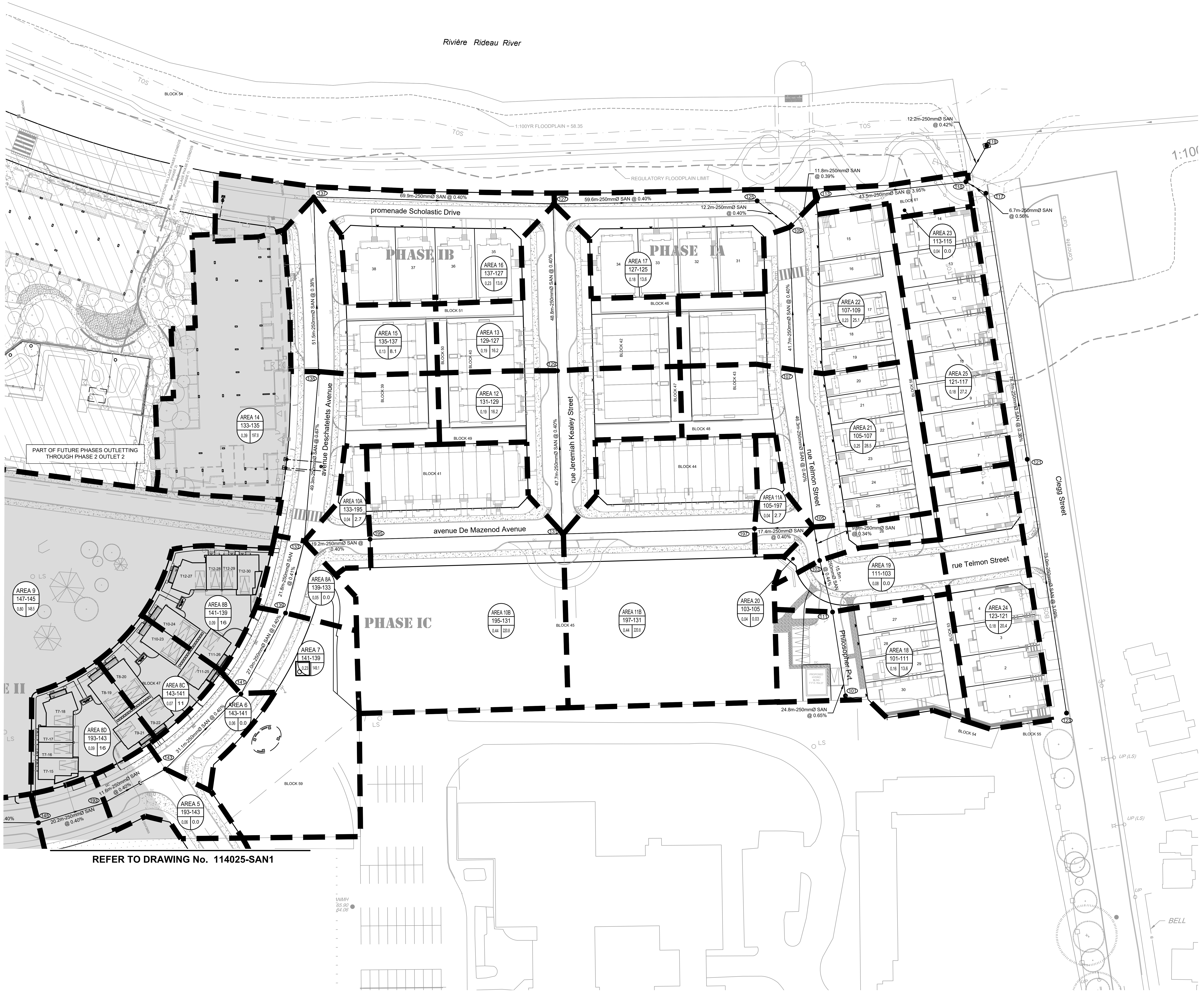
SANITARY DRAINAGE AREAS PLAN PHASE 1A AND 1B

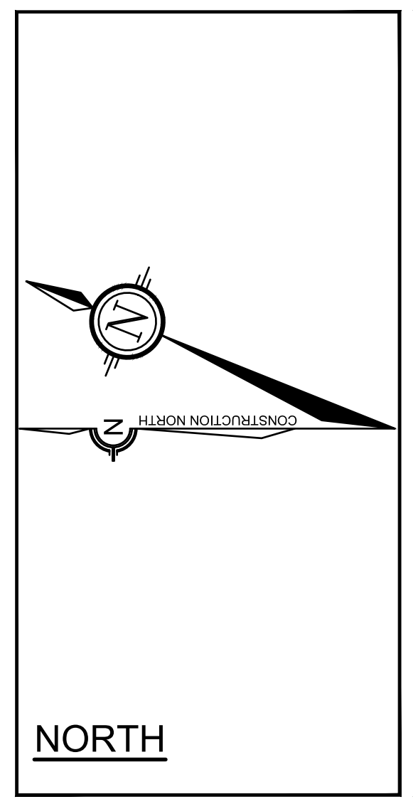
PROJECT No.
114025-00

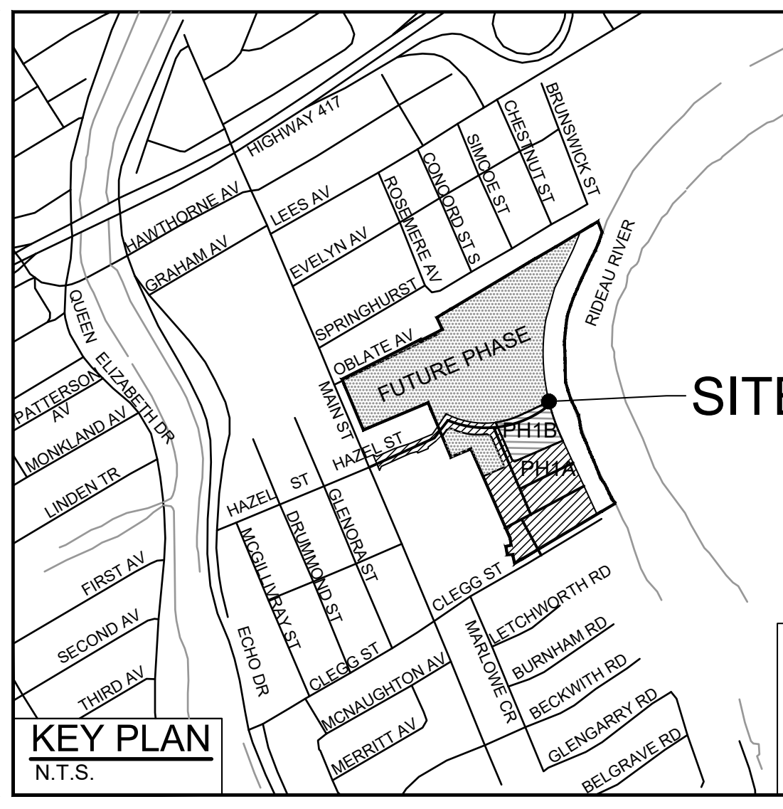
REV
REV # 10

DRAWING No.
114025-SAN1

PLANB1.DWG - 1000mmx707mm







SITE BENCHMARK
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GEODETIC DATUM
City of Ottawa MON 3640
ELEV: 66.702m
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LEGEND

—	SITE BOUNDARY
AREA 1	AREA ID
815-813	MANHOLE TO MANHOLE
89.1	POPULATION EQUIVALENT
0.81	AREA IN HECTARES
▬ ▬	SANITARY DRAINAGE AREA BOUNDARY
817 ●	PROPOSED SANITARY SEWER AND MANHOLE WITH DIRECTION OF FLOW
109 ●	EXISTING SANITARY SEWER AND MANHOLE WITH DIRECTION OF FLOW
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▨	PROPOSED CONCRETE SIDEWALK

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5.	ISSUED FOR CONSTRUCTION	JULY 7/16	JAG
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3.	ISSUED FOR TENDER	APR 20/16	JAG
2.	REVISED AS PER CITY COMMENTS	APR 13/16	JAG
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CHECKED	SAZ
APPROVED	MSP

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LICENSED PROFESSIONAL ENGINEER
S.A.N. ZORGEL
100191487
Aug.7/24
PROVINCE OF ONTARIO

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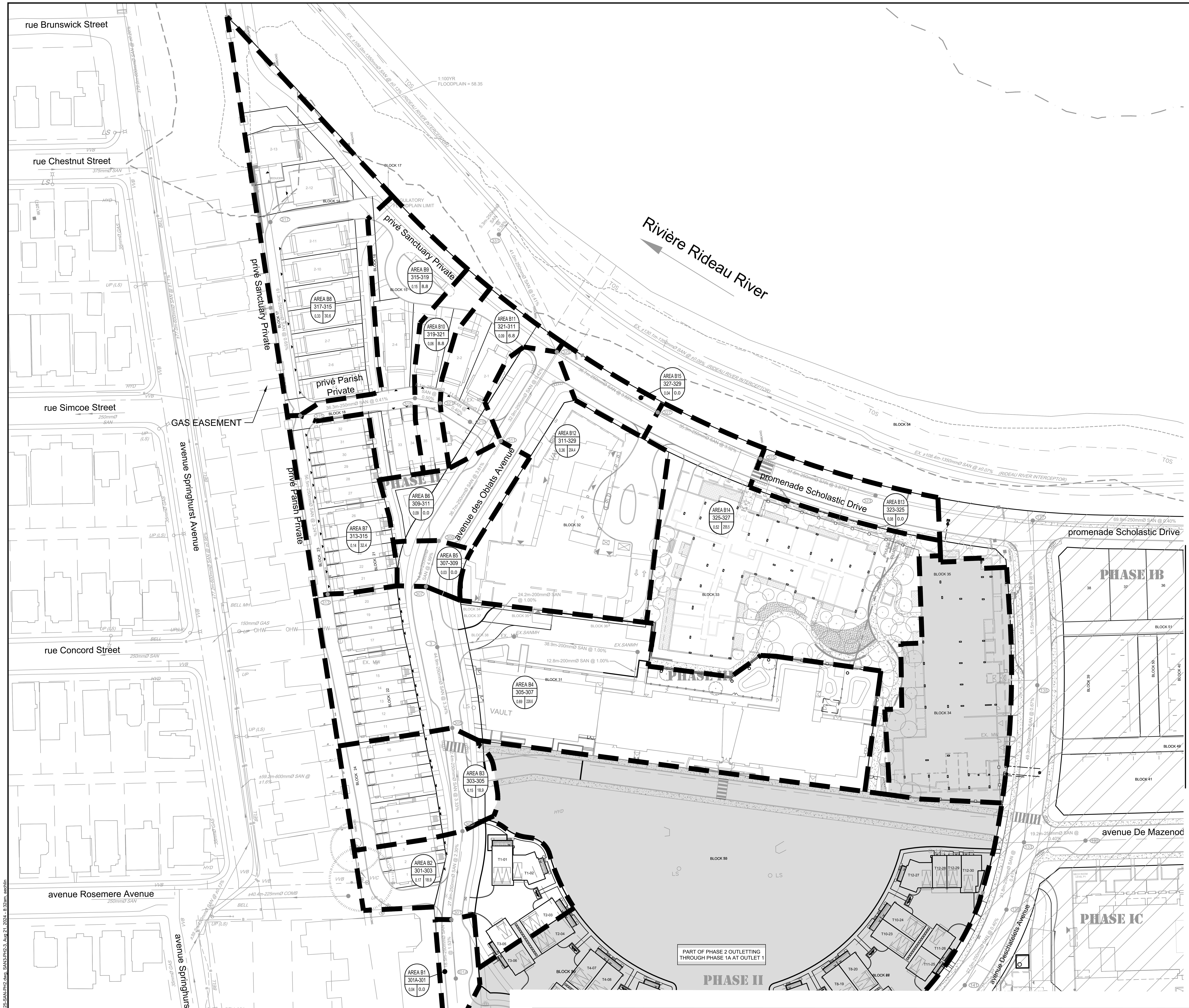
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

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

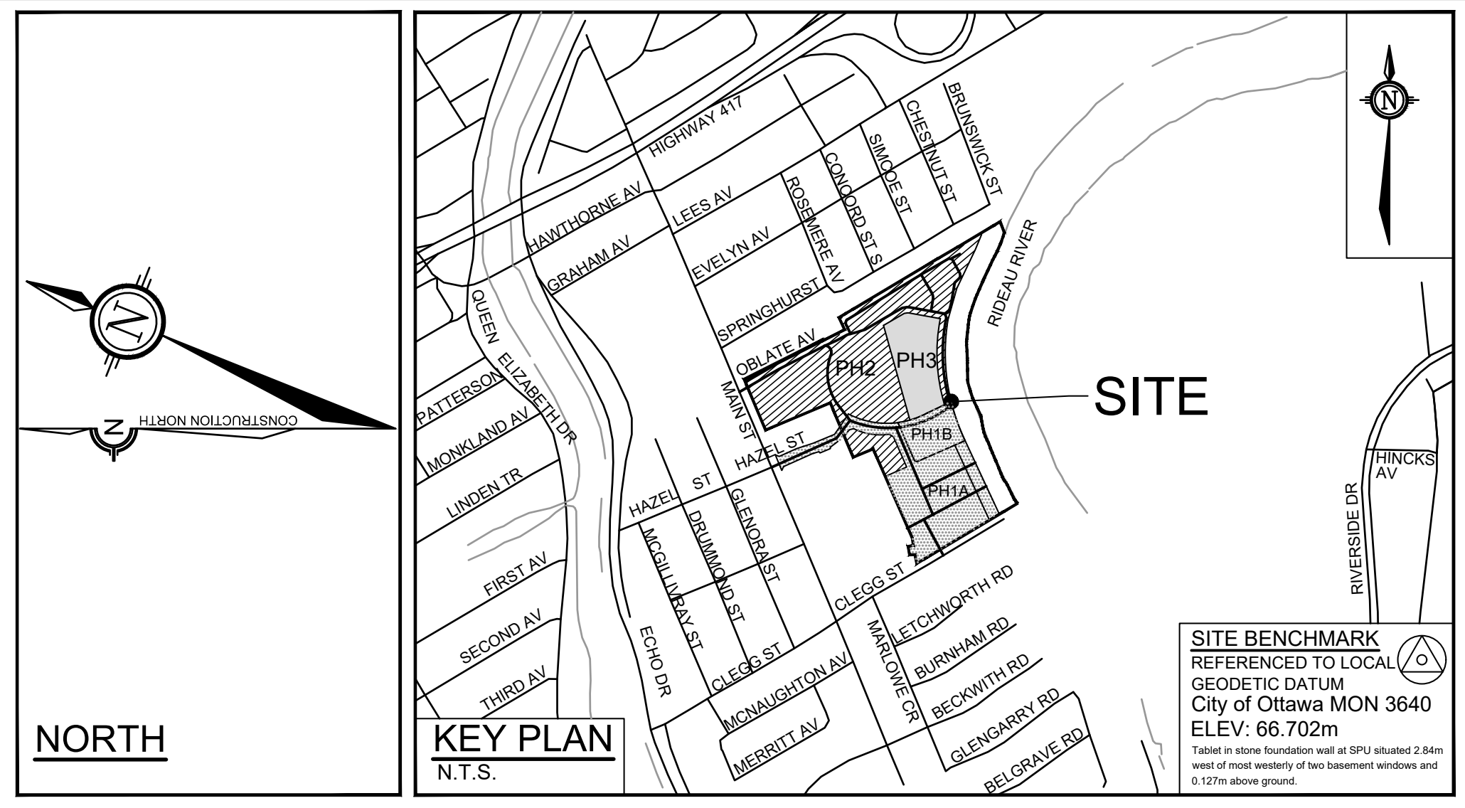
PROJECT No. 114025-00
REV REV # 10
DRAWING No. 114025-SAN2

PLANB1.DWG - 1000mmx707mm



REFER TO DRAWING No. 114025-SAN2

REFER TO DRAWING No. 114025-SAN1



LEGEND

—	SITE BOUNDARY
▬ ▬	SANITARY DRAINAGE AREA BOUNDARY
AREA 6	AREA ID
143-141	MANHOLE TO MANHOLE
231.0	POPULATION EQUIVALENT
0.21	AREA IN HECTARES
	SANITARY DRAINAGE AREA BOUNDARY
817	PROPOSED SANITARY SEWER AND MANHOLE
→	POPOSED SANITARY SEWER WITH DIRECTION OF FLOW
109	EXISTING SANITARY SEWER AND MANHOLE
→	EXISTING SANITARY SEWER WITH DIRECTION OF FLOW
▨	PART OF PH.2 OUTLETTING THROUGH PH.1A AT OUTLET 1
▨	PHASE 1A AND 1B OUTLETTING THOUGH PH.1A AT OUTLET 1
▨	PROPOSED CONCRETE SIDEWALK

D07-16-15-0001 PHASE 2 AND 3

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

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4.	ISSUED FOR CONSTRUCTION	JUL 6/17	JAG
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

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S.A.N. ZORGEL
100191487
Aug.7/24
PROVINCE OF ONTARIO

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CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

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

PROJECT No. 114025-00
REV REV # 9
DRAWING No. 114025-SAN1-B

PLANB1.DWG - 1000mmx707mm

APPENDIX C

Correspondence: City of Ottawa

Justin Gauthier

From: Buchanan, Richard [Richard.Buchanan@ottawa.ca]
Sent: May-15-14 10:38 AM
To: Justin Gauthier
Cc: John Riddell
Subject: FW: 175 Main Street (Oblate Re-Development)

Follow Up Flag: Follow up
Flag Status: Completed

Justin

The flow from the site represent a 2% increase in peak flows in the RRI and the HGL remains within the pipe. We don't see any issues at this time.

Richard Buchanan, CET
Program Manager, Development Review
(Urban Services) Outer
Planning and Growth Management Dept
City of Ottawa
Tel: 613-580-2424 ext 27801
Fax: 613-560-6006

From: Justin Gauthier [mailto:j.gauthier@novatech-eng.com]
Sent: May 13, 2014 1:01 PM
To: Buchanan, Richard
Cc: John Riddell
Subject: 175 Main Street (Oblate Re-Development)

Hi Richard,

Following your discussion with John, the following are the estimated sanitary flows for the site at 175 Main Street:

$Q_{san, ave}$ = 7.18 L/s (+infiltration)
$Q_{san, peak}$ = 25.71 L/s (+ infiltration)

Infiltration Flow = 2.62 L/s

Don't hesitate to give me a call if you have any questions or require anything further.

Regards,

Justin A. Gauthier | B.A.Sc., E.I.T.
Novatech Engineering Consultants Ltd. | 200-240 Michael Cowpland Drive, Ottawa, ON K2M 1P6
Office 613.254.9643 x217 | **Fax** 613.254.5867 | **Email** j.gauthier@novatech-eng.com

Steve Zorgel

From: White, Joshua <Joshua.White@ottawa.ca>
Sent: November-05-15 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,

Not sure if I am just missing it, but I can't seem to see the new boundary conditions. Could you please resend and we will look at how this affects our model.

Thanks in advance.

Regards,

Justin A. Gauthier | B.A.Sc., E.I.T.

NOVATECH Engineers, Planners & Landscape Architects

Sent from my Samsung Mobile on the Rogers Wireless Network.

-------- Original message --------
From: "White, Joshua"
Date:11-04-2015 17:14 (GMT-05:00)
To: "Herweyer, Don" ,Josh Kardish ,"Smit, John"
Cc: David Kardish ,John Riddell ,Justin Gauthier ,"O'Connell, Erin"
Subject: RE: Fire Conditions -Greystone

Hello Josh,

I have had the boundary conditions re run based off of the looped infrastructure that was approved in the master servicing study for the subdivision. At the time of the initial boundary conditions the demand was split equally between the water mains on Main Street and on Clegg, this resulting in a lower pressures due to the size of the water main on Clegg. The below boundary conditions were done by placing the fire flow demand in the centre of the loop, at the approximate location of the 9 storey condo. The fire flows were based off of the FUS calc for the building with out a fire wall (aprox 400 L/s) and with a fire wall at the phasing line (approx 300 L/s). Please rerun your model based off of the below boundary conditions, and let me know if this resolves the issue with the FUS calculations. If you have any questions don't hesitate to contact me.

Joshua White, P.Eng.

Project Manager, Infrastructure Approvals

Development Review, Urban Services, City of Ottawa

Please consider the environment before printing this e-mail.

PLANNING AND GROWTH MANAGEMENT
URBANISME ET GESTION DE LA CROISSANCE

City of Ottawa | Ville d'Ottawa

☎ 613.580.2424 ext./poste 15843

Email: joshua.white@ottawa.ca

ottawa.ca/planning / ottawa.ca/urbanisme

From: Herweyer, Don
Sent: Tuesday, November 03, 2015 4:25 PM
To: Josh Kardish; Smit, John
Cc: David Kardish; John Riddell (j.riddell@novatech-eng.com); White, Joshua
Subject: RE: Fire Conditions -Greystone

Hi Josh,

Our folks have rerun your water system through the City model and there may have been an error in the assumptions used originally and the boundary condition. Apparently the numbers are looking a lot better – Josh W hopes to be in touch with you by end of day tomorrow with some updated results.

Stay tuned,

Don

From: Josh Kardish [mailto:jkardish@regionalgroup.com]
Sent: Monday, November 02, 2015 1:41 PM
To: Smit, John
Cc: Herweyer, Don; David Kardish; John Riddell (j.riddell@novatech-eng.com)
Subject: RE: Fire Conditions -Greystone

thanks kindly to you both

Josh

From: Smit, John [mailto:John.Smit@ottawa.ca]
Sent: November-02-15 1:40 PM
To: Josh Kardish <jkardish@regionalgroup.com>
Cc: Herweyer, Don <Don.Herweyer@ottawa.ca>
Subject: RE: Fire Conditions -Greystone

Josh – thanks for this. I have discussed this matter with Don and for the most, we are all in agreement that Greystone is not a Greenfield subdivision and should not be subject to the same standards that would apply in a Greenfields situation. Don has advise that various staff are looking more closely into the situation to find an acceptable solution that will work for you. Don will follow-up further.

John

From: Josh Kardish [mailto:jkardish@regionalgroup.com]
Sent: Friday, October 30, 2015 4:40 PM
To: Smit, John
Subject: Fire Conditions -Greystone

Hi John

With apologies for the delay, attached are the four fire services conditions that we agreed to and I have added in italics a new condition that I believe will help ensure that the application of FUS in our development doesn't create any unreasonable demands. Can I please ask you to review and let me know if this might have some traction as a solution…

Regards

Josh Kardish

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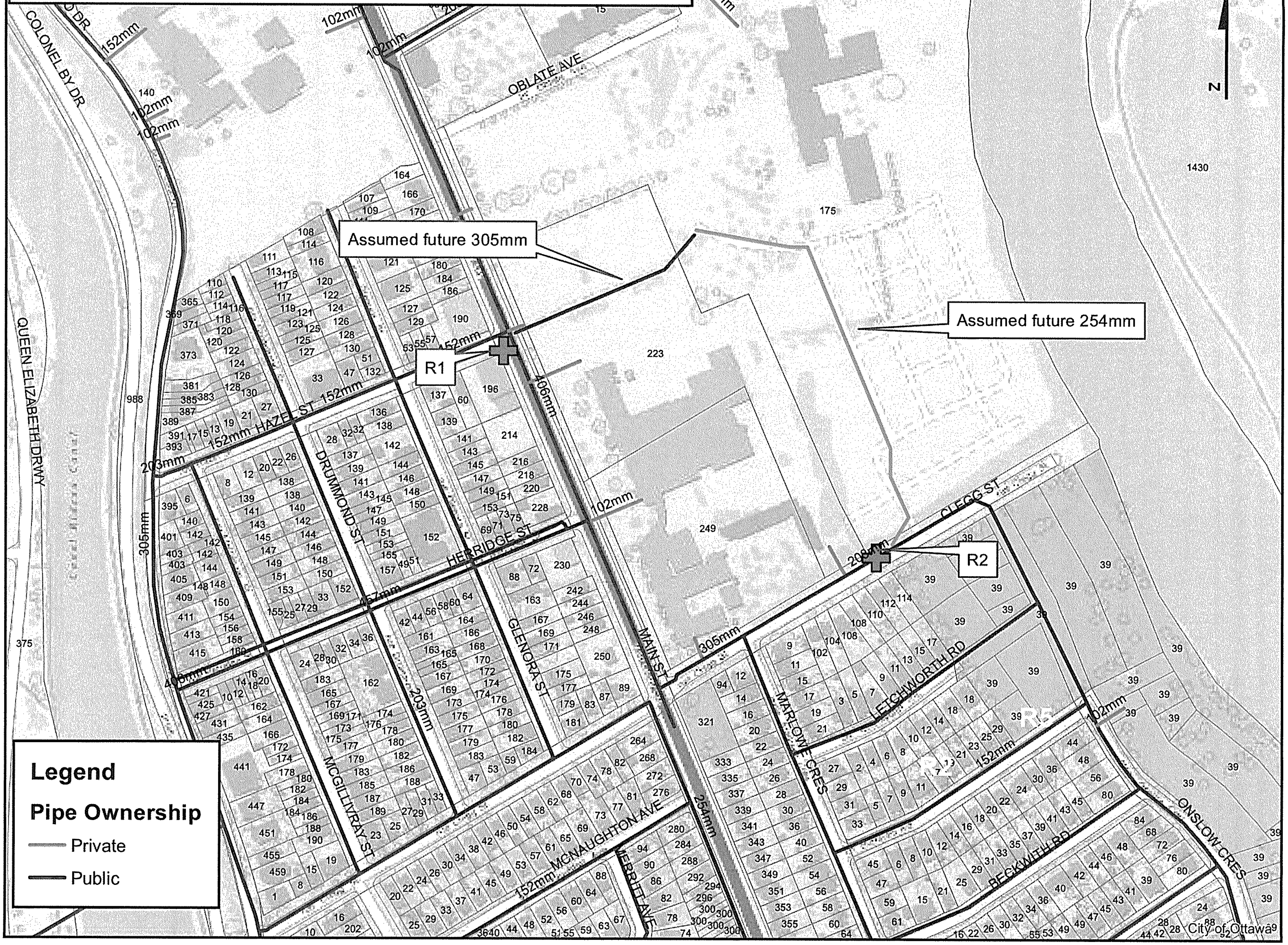
Boundary Condition for 175 Main St



Justin Gauthier

From: Tousignant, Eric [Eric.Tousignant@ottawa.ca]
Sent: June-17-15 1:00 PM
To: Justin Gauthier
Subject: RE: Greystone Village - St Paul Storm Drainage Areas

That's correct Justin, that is the discussion we had yesterday and the drainage areas were agreed to.

Eric

From: Justin Gauthier [mailto:j.gauthier@novatech-eng.com]
Sent: Wednesday, June 17, 2015 11:28 AM
To: Tousignant, Eric
Cc: John Riddell
Subject: RE: Greystone Village - St Paul Storm Drainage Areas

Hi Eric,

Following our discussion from yesterday, I wanted to confirm that you were in agreement with the revised proposed drainage areas we sent to you for the Greystone Village lands as well as the St Paul lands. Also, you suggested that we inform St Paul that if they redevelop any part of their lands in the future, on-site stormwater management would be required.

Please confirm by return email, thanks in advance.

Regards,

Justin A. Gauthier | B.A.Sc., E.I.T.
NOVATECH Engineers, Planners & Landscape Architects
200-240 Michael Cowpland Drive, Ottawa, ON K2M 1P6 |**Tel** 613.254.9643 x217 | **Fax** 613.254.5867

From: Justin Gauthier
Sent: June-16-15 11:27 AM
To: 'Tousignant, Eric'
Cc: John Riddell
Subject: RE: Greystone Village - St Paul Storm Drainage Areas

Hi Eric,

Following your discussion with John Riddell, please find attached a revised Figure 6 showing the corrected drainage areas. The one building located at the Oblate Ave/Main St intersection will be connected to the Main St sewer as per the Sales Centre service discussions and the other areas fronting Main St (Oblate Ave/Grande Allée/Hazel St & Future St Paul Building) will be accounted for in the subdivision's storm sewer system.

Regards,

Justin A. Gauthier | B.A.Sc., E.I.T.
NOVATECH Engineers, Planners & Landscape Architects
200-240 Michael Cowpland Drive, Ottawa, ON K2M 1P6 |**Tel** 613.254.9643 x217 | **Fax** 613.254.5867

From: Justin Gauthier
Sent: June-12-15 1:50 PM
To: 'Elliott, Gord'
Cc: Tousignant, Eric; O'Connell, Erin; John Riddell; 'Josh Kardish'
Subject: Greystone Village - St Paul Storm Drainage Areas

Hi Gord,

Please find attached memorandum as well as drawings for the St Paul storm drainage areas.

Regards,

Justin A. Gauthier | B.A.Sc., E.I.T.
NOVATECH Engineers, Planners & Landscape Architects
200-240 Michael Cowpland Drive, Ottawa, ON K2M 1P6 |**Tel** 613.254.9643 x217 | **Fax** 613.254.5867

Golder Associates

TECHNICAL MEMORANDUM

DATE April 23, 2015

PROJECT No. 14-1122-0005-5100

TO Jessica Palacios
Novatech

CC Steve Cunliffe
175 Main Street Regional Inc.

FROM Susan Trickey, P.Eng.;
Mike Cunningham, P.Eng.

EMAIL strickey@golder.com;
mcunningham@golder.com

GEOTECHNICAL ASSESSMENT – TREE PLANTING CONSIDERATIONS
OBLATES PROPERTY – GREYSTONE VILLAGE
175 MAIN STREET
OTTAWA, ONTARIO

This memo provides a geotechnical assessment relating to tree planting considerations for the proposed Greystone Village residential development to be located on the Oblates Property (175 Main Street) in Ottawa, Ontario.

Background

The site is bounded to the north by Oblates Avenue, Convent Les Soeurs de Sacré-Coeur, and by the existing development along Springhurst Avenue; to the west by Main Street and St. Paul University; to the south by Clegg Street; and to the east by the Rideau River.

Golder Associates carried out a geotechnical investigation on the site in 2014, the results of which are summarized in a report to 175 Main Street Regional Inc. titled "Geotechnical Investigation, Proposed Development, Oblates Property, 175 Main Street, Ottawa, Ontario" (Report No. 14-1122-0005-5100). Based on that investigation the subsurface conditions on the site consist of a layer of fill, overlying a thick deposit of silty clay to clayey silt (extending to about 9 to 15 metres depth), underlain by a layer of silty sand, and then followed by glacial till.

It is understood that the site is proposed for development with a mix of residential, commercial and open space uses, including mid-rise residential with one or two basement levels, single and townhouse residential lots, mixed-use commercial-residential blocks, and park blocks. It is also understood that the design finished grades on the site will generally be within about 1 metre of the existing grade. In addition, some cutting of the existing grade at the south end of the site will also be required in order to tie-in to Clegg Street.

Geotechnical Considerations

Champlain Sea clay (as present on this site) is potentially volumetrically sensitive to water depletion by numerous factors, including dewatering by tree roots during periods of dry weather. When trees draw water from the clayey soil, the soil undergoes shrinkage that can result in settlement of adjacent structures.

Additional laboratory testing on the clayey soils at the site was carried out to help assess the potential of these particular soils to shrink due to the water demand of tree roots (from both future and existing trees). This potential can be evaluated, in part, based on the plasticity of the soil (as determined by the Plasticity Index measured by Atterberg Limit testing). Although a specific correlation between the plasticity index and the magnitude of potential settlement (or the required tree set-back from a house) is not yet available for Ottawa (and which would need to consider numerous additional factors such as climate, tree species, foundation types, etc.), it is considered that the guidelines in the National House Builders Council's (NHBC) Technical Standards of the United Kingdom provides a general assessment methodology that can be used to guide the evaluation. In the NHBC standards, the volume change potential (i.e., shrinkage potential) is divided into three categories, based on the soil's plasticity index, as follows:

Plasticity Index (%)	Volume Change Potential
> 40	High
20-40	Medium
< 20	Low

It is generally considered that the practical depth of influence of most tree roots, from the perspective of the tree's water-uptake causing soil-shrinkage, is limited to about 3.5 metres. This depth is based largely on studies carried out by the National Research Council (NRC) in the 1950's. The laboratory testing for this assessment was therefore focused on soils within about 3.5 metres depth from the future finished grade, the results of which are provided on the attached Figure 1. Based on the results of the laboratory testing as well as the preliminary site finished grading, the following comments are provided:

- The native soils on the site within 3.5 metres of the proposed finished grade would generally be classified as having a "low" volume change potential, based on the NHBC standards.
- Tree planting setbacks (and restrictions on tree types) would not apply, from a geotechnical perspective, for structures with founding levels at greater than 4 metres depth (e.g., the multi-storey buildings proposed for the site which have multiple basement levels), since these foundations will be sufficiently deep that they will be founded below the depth of the influence of the tree roots.
- Reduced tree planting setbacks would be justified (i.e., to less than the City of Ottawa's typical requirement of 7.5 metres between a building's foundation and the nearest planted tree for clay sites).
- An assessment based on the NHBC guidelines indicates that a 3.5 metre setback distance would be acceptable for a maximum mature tree of about 18 metres height, assuming a conventional single basement founding level of 2.2 metres depth below finished grade. It should be noted, however, that the NHBC guidelines are based on the soil properties, native tree species, and weather conditions present in the United Kingdom. They are also based on minimizing, but not eliminating, the potential for ground settlement beneath buildings due to soil shrinkage. The homeowners ultimately must have some responsibility for controlling the risks of tree-related damage, which could include watering the tree during periods of dry weather, periodically trimming the tree, and ultimately removing the tree when it becomes too large.
- Although the surficial clay soils at this site have a *relatively* low potential for volume change, trees with low to moderate water demand are nonetheless generally recommended for those portions of the site with single basement levels and where the trees will be in close proximity.

We trust that this memo provides sufficient information for your present requirements. If you have any questions concerning this memo, please contact the undersigned.

Yours truly,

GOLDER ASSOCIATES LTD.

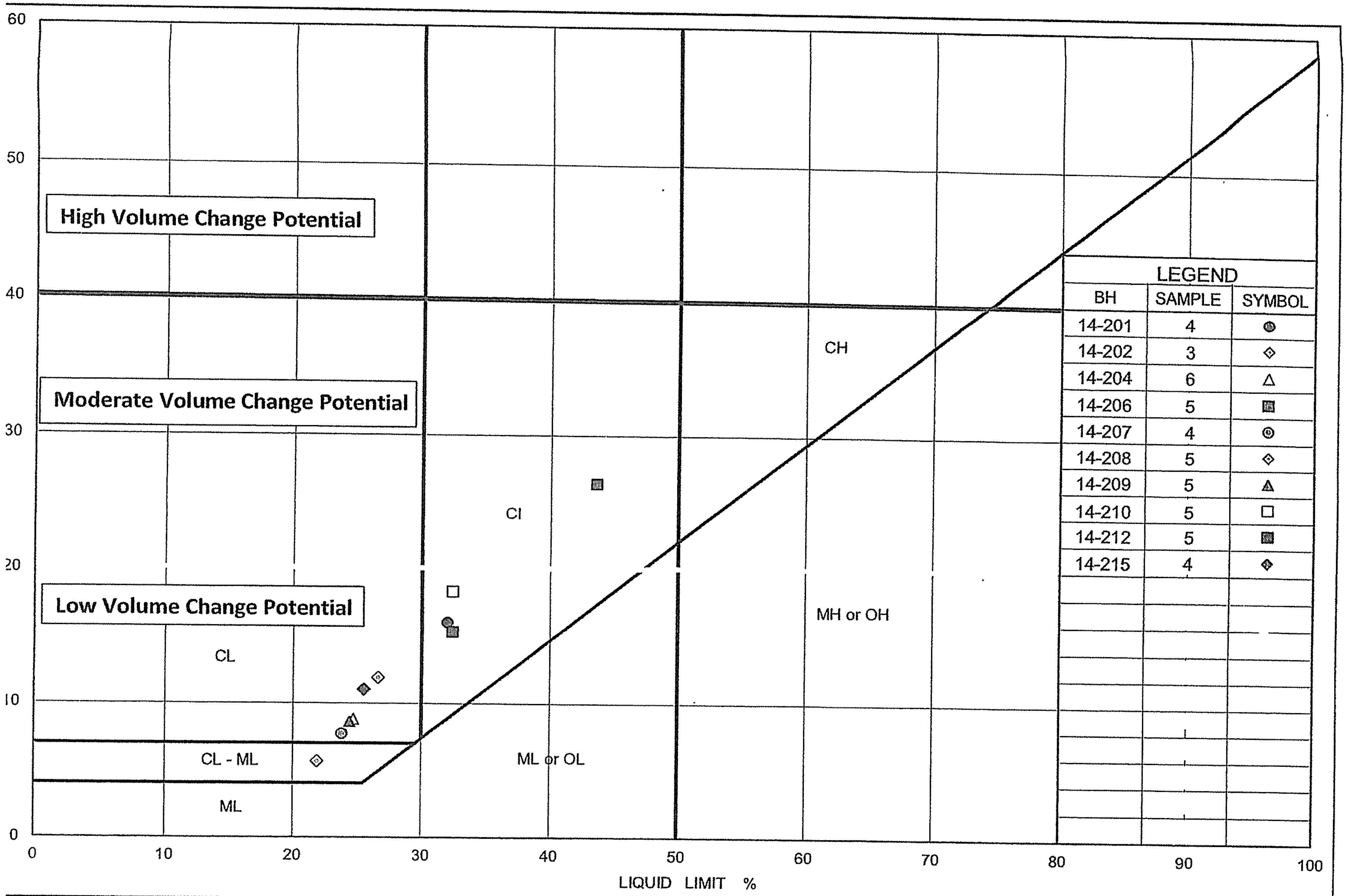
LICENSED PROFESSIONAL ENGINEER
S. A. TRICKEY
[illegible]
PROVINCE OF ONTARIO

S Trickey
Susan Trickey, P.Eng.
Geotechnical Engineer

Mike C.
Mike Cunningham, P.Eng.
Principal - Geotechnical Engineer

SAT/MIC/PAS/md
n:\active\2014\1122 - clg\14-1122-0005 regional group oblates property ottawa\phase 5100 - additional geotechnical\trees\14-1122-0005-5100 techmemo-001 trees.docx

Attachment: Figure 1 – Plasticity Chart



BH	SAMPLE	SYMBOL
14-201	4	●
14-202	3	◇
14-204	6	△
14-206	5	▨
14-207	4	◎
14-208	5	◇
14-209	5	▲
14-210	5	□
14-212	5	■
14-215	4	◆

Golder Associates

PLASTICITY CHART
Oblates Development

Figure No. 1
Project No. 14-1122-0005
Checked By: SAT

APPENDIX D
Fire Flow Analysis

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

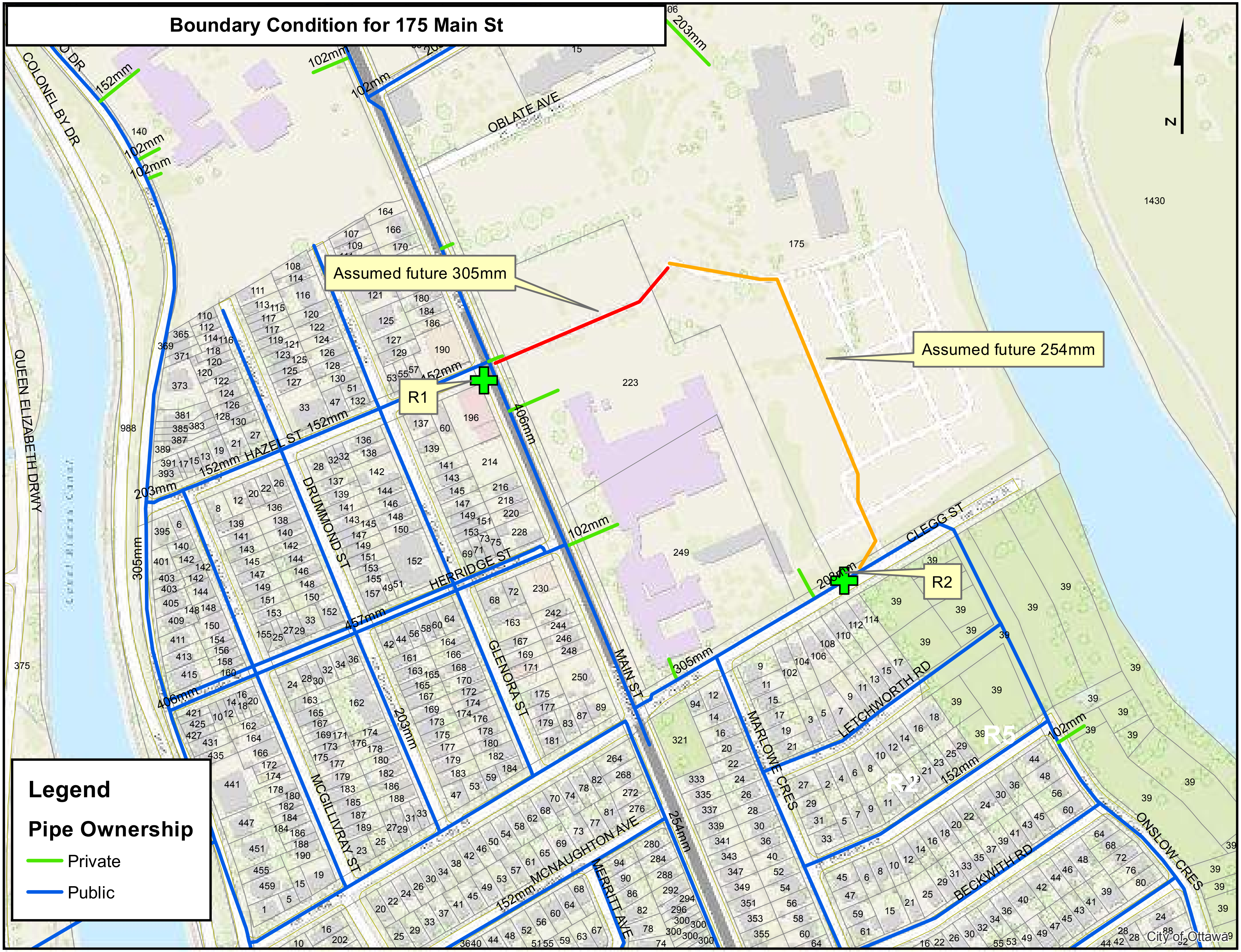
These are for current conditions and are based on computer model simulation.

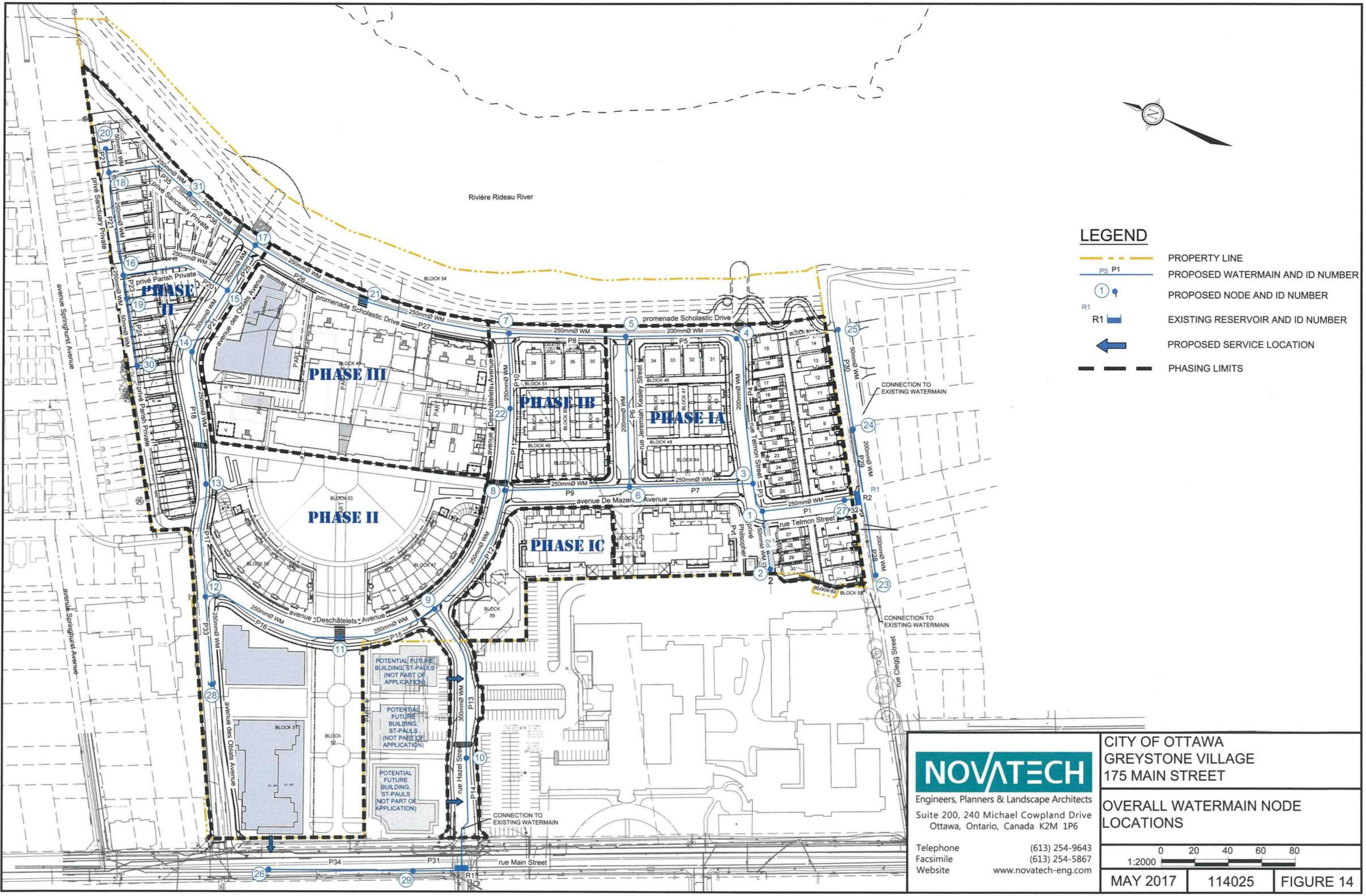
Disclaimer: The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation 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





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

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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

WATERMAIN DESIGN SHEET

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)	200.00	(south tower)	L/s
7 Storey Condo Building Fire Flow (#16)	233.00	(north tower)	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

AVERAGE DAY DEMAND / HIGH PRESSURE CHECK

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

🟧	Maximum Pressure in Greystone Subdivision
🟦	Maximum Age

AVERAGE DAY DEMAND / HIGH PRESSURE CHECK

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
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

MAXIMUM HOUR DEMAND

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

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

MAXIMUM DAY + FIRE FLOW DEMAND AT N5

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

June 3, 2022

MAXIMUM DAY + FIRE FLOW DEMAND AT N7

File No.: 114025
Greystone Village

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

MAXIMUM DAY + FIRE FLOW DEMAND AT N8

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

MAXIMUM DAY + FIRE FLOW DEMAND AT N9

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

MAXIMUM DAY + FIRE FLOW DEMAND AT N10

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

MAXIMUM DAY + FIRE FLOW DEMAND AT N14

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

MAXIMUM DAY + FIRE FLOW DEMAND AT N15

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

MAXIMUM DAY + FIRE FLOW DEMAND AT N17

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

MAXIMUM DAY + FIRE FLOW DEMAND AT N21

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

MAXIMUM DAY + FIRE FLOW DEMAND AT N21

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

MAXIMUM DAY + FIRE FLOW DEMAND AT N23

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

June 3, 2022

MAXIMUM DAY + FIRE FLOW DEMAND AT N26

File No.: 114025
Greystone Village

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

MAXIMUM DAY + FIRE FLOW DEMAND AT N26

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

MAXIMUM DAY + FIRE FLOW DEMAND AT N31

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

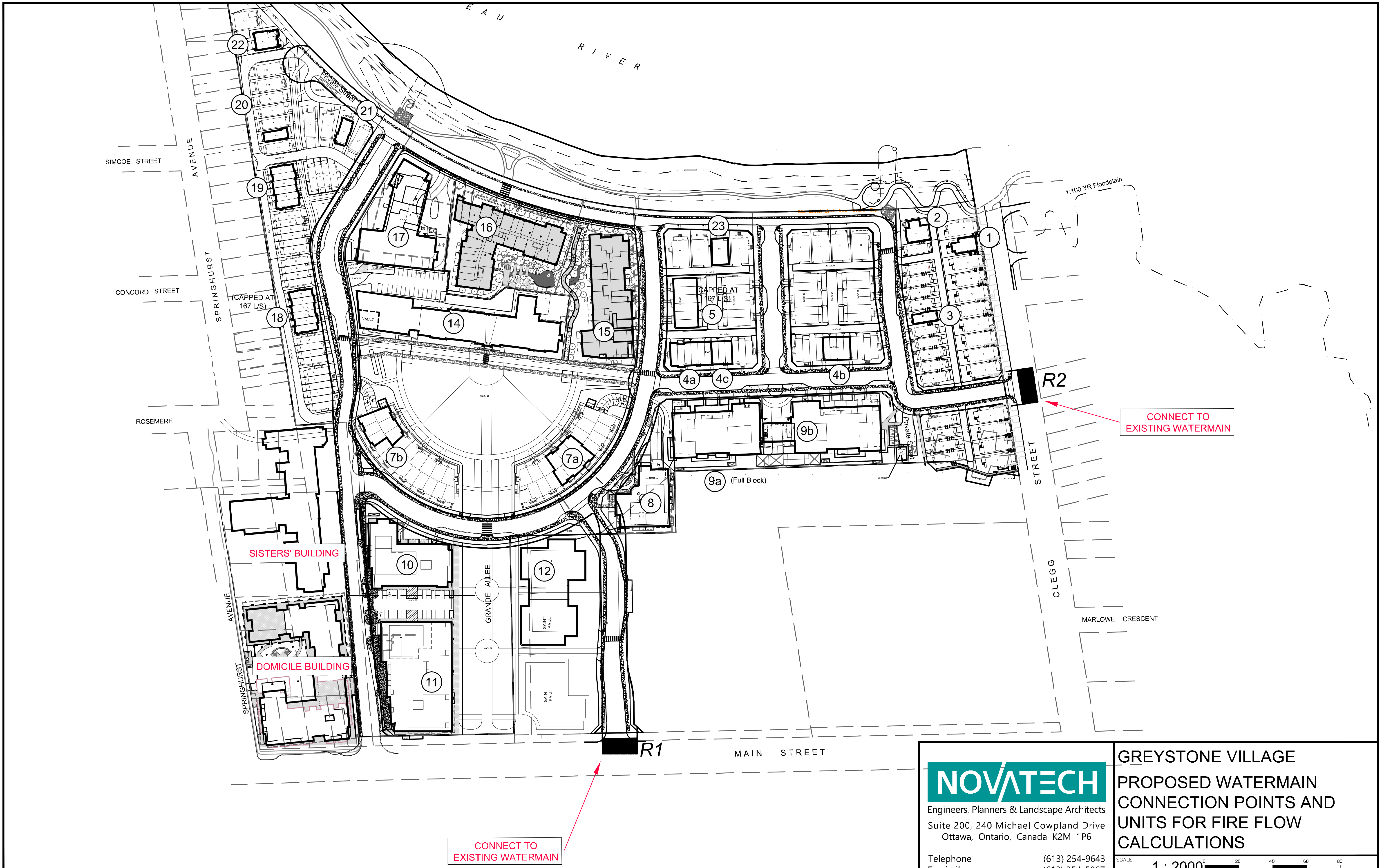
MAXIMUM DAY +
FIRE FLOW DEMAND SUMMARY

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.

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



NOVATECH
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GREYSTONE VILLAGE

PROPOSED WATERMAIN CONNECTION POINTS AND UNITS FOR FIRE FLOW CALCULATIONS

SCALE
1 : 2000
0 20 40 60 80

DATE
JUNE 2022

JOB
114025

FIGURE
FIGURE 1

FUS - Fire Flow Calculations

As per 2020 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

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

Legend	
	Input by User
	No Information or Input Required

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

Step			Choose		Value Used	Total Fire Flow (L/min)
	Base Fire Flow					
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction C	Wood frame		1.5	0.8	
		Ordinary construction		1		
		Non-combustible construction	Yes	0.8		
		Modified Fire resistive construction (2 hrs)		0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	1800			
		Number of Floors/Storeys	7			
		Protected Openings (1 hr)				
		Area of structure considered (m^2)			**8,100**	
	F	**Base fire flow without reductions**				**16,000**
		$F = 220\ C\ (A)^{0.5}$				
	Reductions or Surcharges					
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**13,600**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**			**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%	-30%	**-5,440**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	No	-10%		
		Cumulative Total			**-40%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	10.1 - 20 m		15%	**6,120**
		East Side	> 45.1m		0%	
		South Side	10.1 - 20 m		15%	
		West Side	10.1 - 20 m		15%	
		Cumulative Total			**45%**	
	Results					
6	(1) + (2) + (3)	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**14,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**233**
				or	USGPM	3,699
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	3
		Required Volume of Fire Flow (m^3)			m^3	2520

FUS - Fire Flow Calculations

As per 2020 Fire Underwriter's Survey Guidelines

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

Engineers, Planners & Landscape Architects

Legend	
	Input by User
	No Information or Input Required

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

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

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
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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]		
	◆ 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)** *(All floors excluding Basement)*	***483***	<==>	5,199 ft^2
F	**Required fire flow (L/min)** $F = 220\ C\ (A)^{0.5}$			***7,252 L/min***
	Occupancy hazard reduction of surcharge	[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]			
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)** *(All floors excluding Basement)*	***1,215***	<==>	13,078 ft^2

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

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

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

	[yes/no]				
Occupancy hazard reduction of surcharge					
◆ 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)**

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

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

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

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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)** *(All floors excluding Basement)*	***14,625***	<==>	157,422 ft^2

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)** *(All floors excluding Basement)*	***11,670***	<==>	125,615 ft^2
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)

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

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

	[yes/no]		
Occupancy hazard reduction of surcharge			
◆ 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)**

	[yes/no]			
Exposure surcharge (cumulative (%))				
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)** *(All floors excluding Basement)*	***160***	<==>	1,722 ft^2

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)

(All floors excluding Basement)

300 <==> 3,229 ft^2

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.

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.

13-704

Domicile
141 Main Street
FUS-Fire Flow Demand

2014-08-05

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.

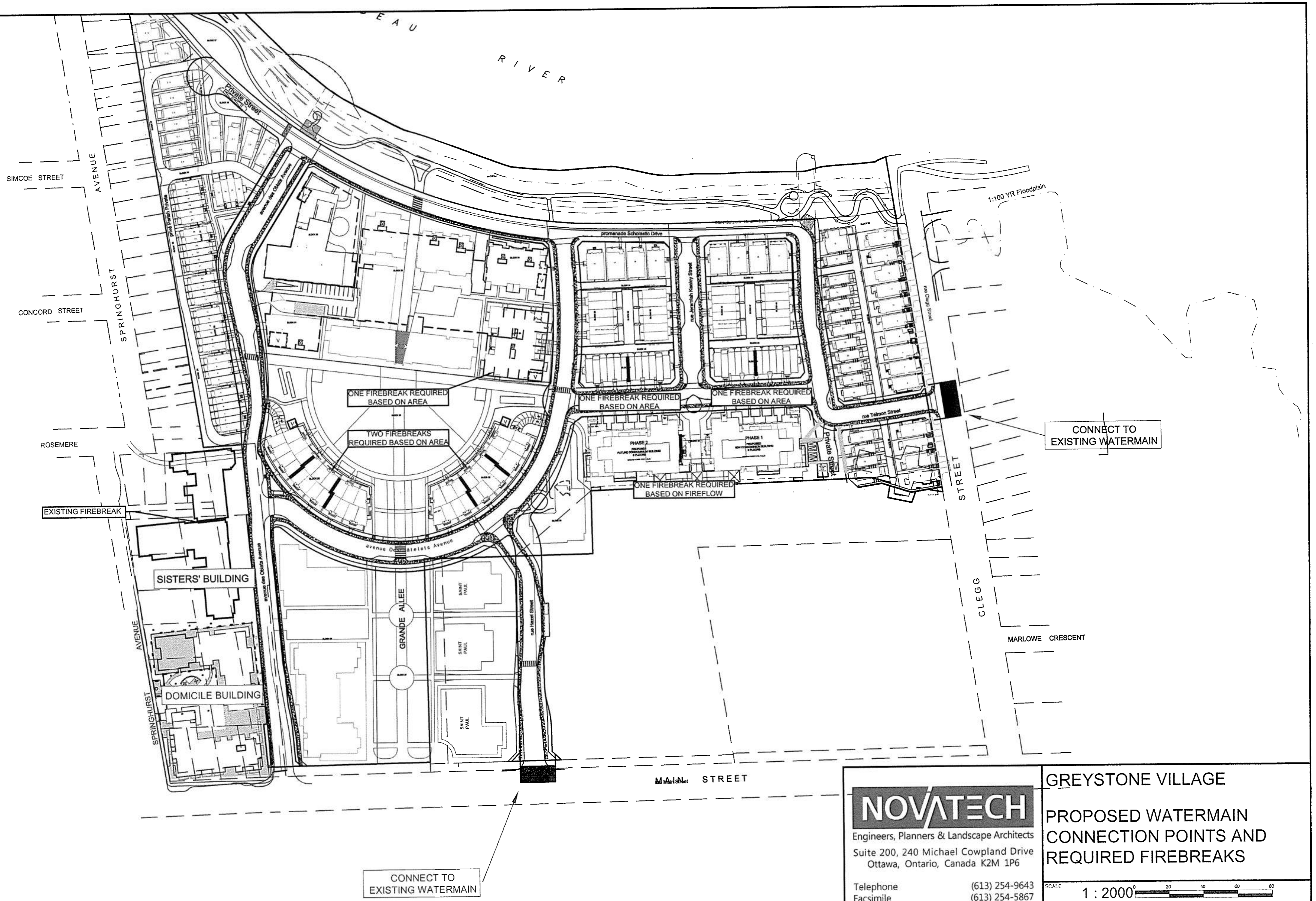
The minimum and maximum water pressure is available within the City's required pressure range during periods of average daily demand and peak hour demand (ie between 275kPa and 552kPa) at the ground floor level. The building will need to be equipped with a booster pump to meet desired pressure ranges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

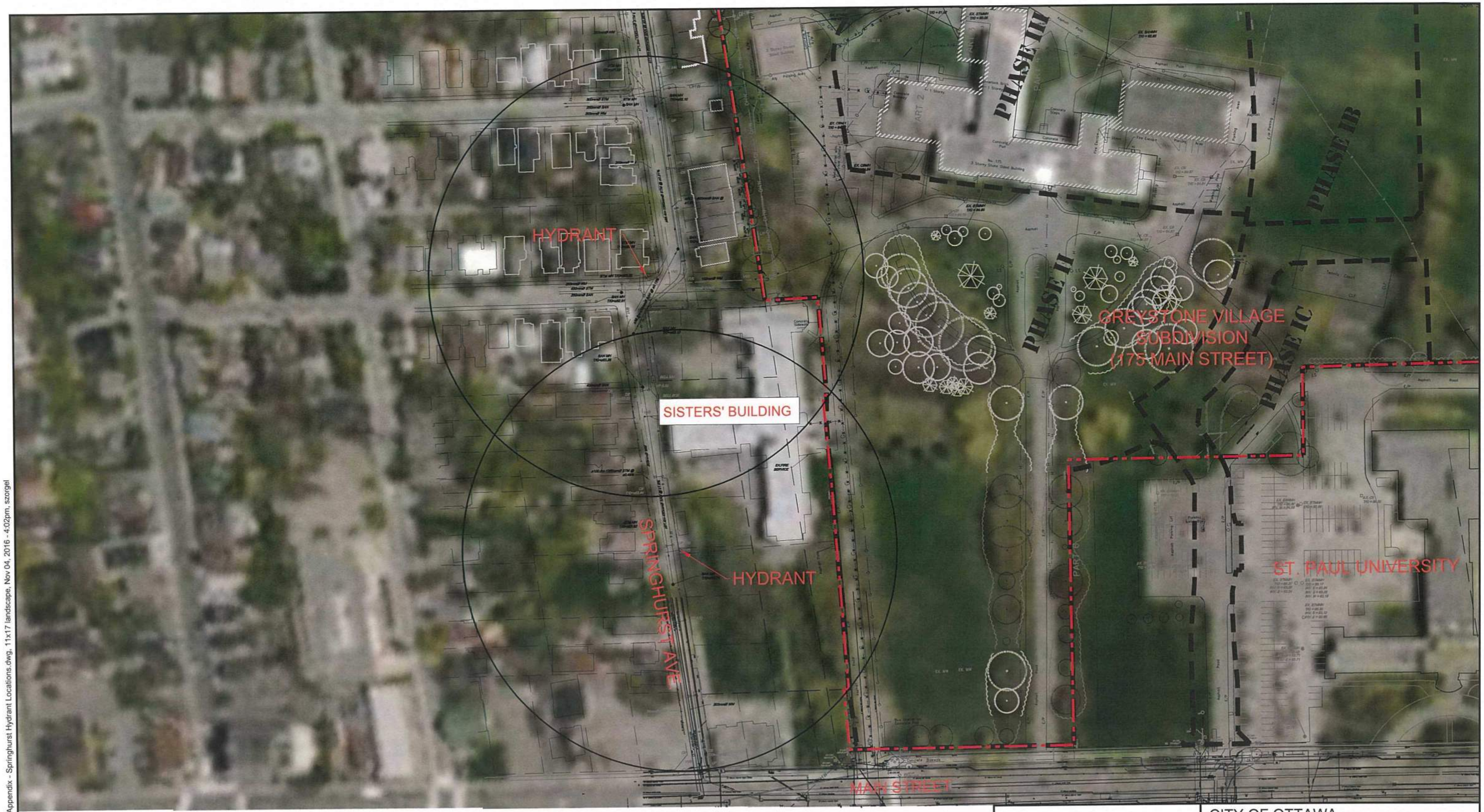
PROPOSED WATERMAIN CONNECTION POINTS AND REQUIRED FIREBREAKS

SCALE 1 : 2000 0 20 40 60 80

DATE	JOB	FIGURE
MAY 2017	114025	FIGURE 2

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

SHT11X17.DWG - 279mmX432mm



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 0 15 30 45 60

MAY 2017	114025	FIGURE 3

SHT11X17.DWG - 279mmX432mm

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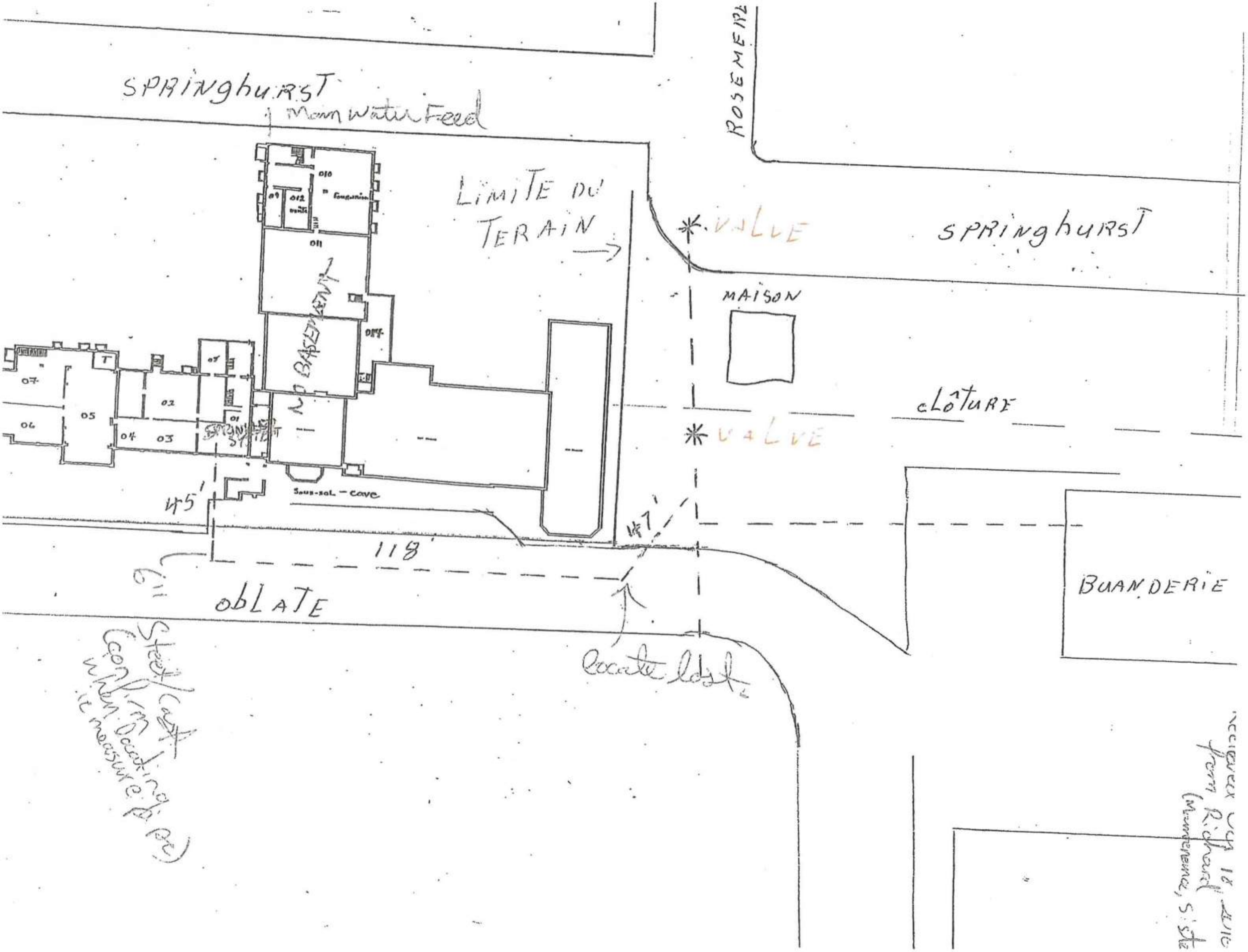
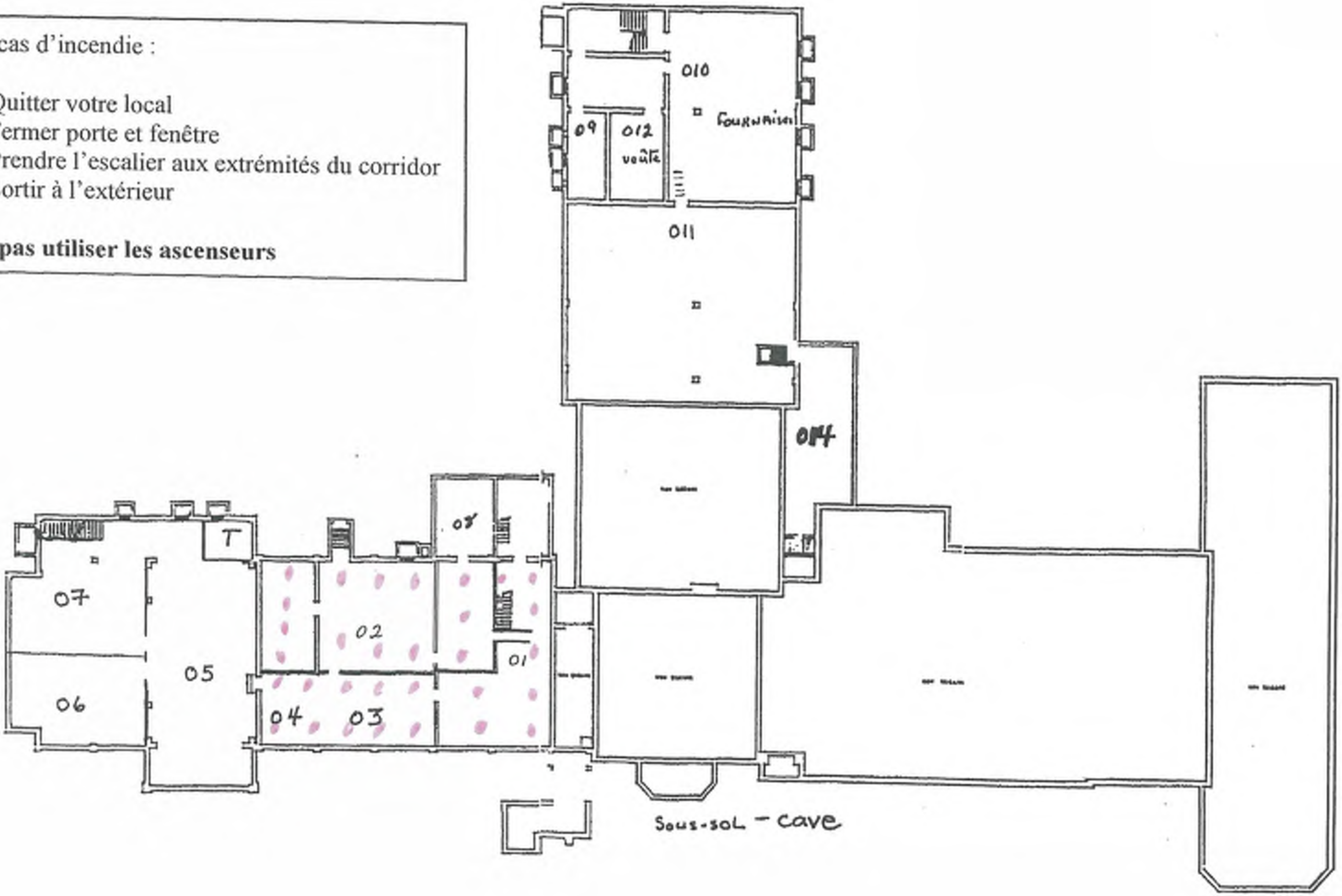

SPRINGhuRST
Main water Feed
ROSEMERE
LIMITE DU TERAIN
VALVE
SPRINGhuRST
MAISON
CLÔTURE
VALVE
010
012
09
011
OFF.
NO BASEMENT
07
02
01
03
04
05
06
07
T
SPRINKLER SYSTEM
Sous-sol - cave
45'
47'
118'
6"
OBLATE
BUANDERIE
locate last
Steel/cast confirm when locating & measure it (or?)
Received Sept 18 2016 from Richard (Maintenance, Site)

En cas d'incendie :

1. Quitter votre local
2. Fermer porte et fenêtre
3. Prendre l'escalier aux extrémités du corridor
4. Sortir à l'extérieur

Ne pas utiliser les ascenseurs

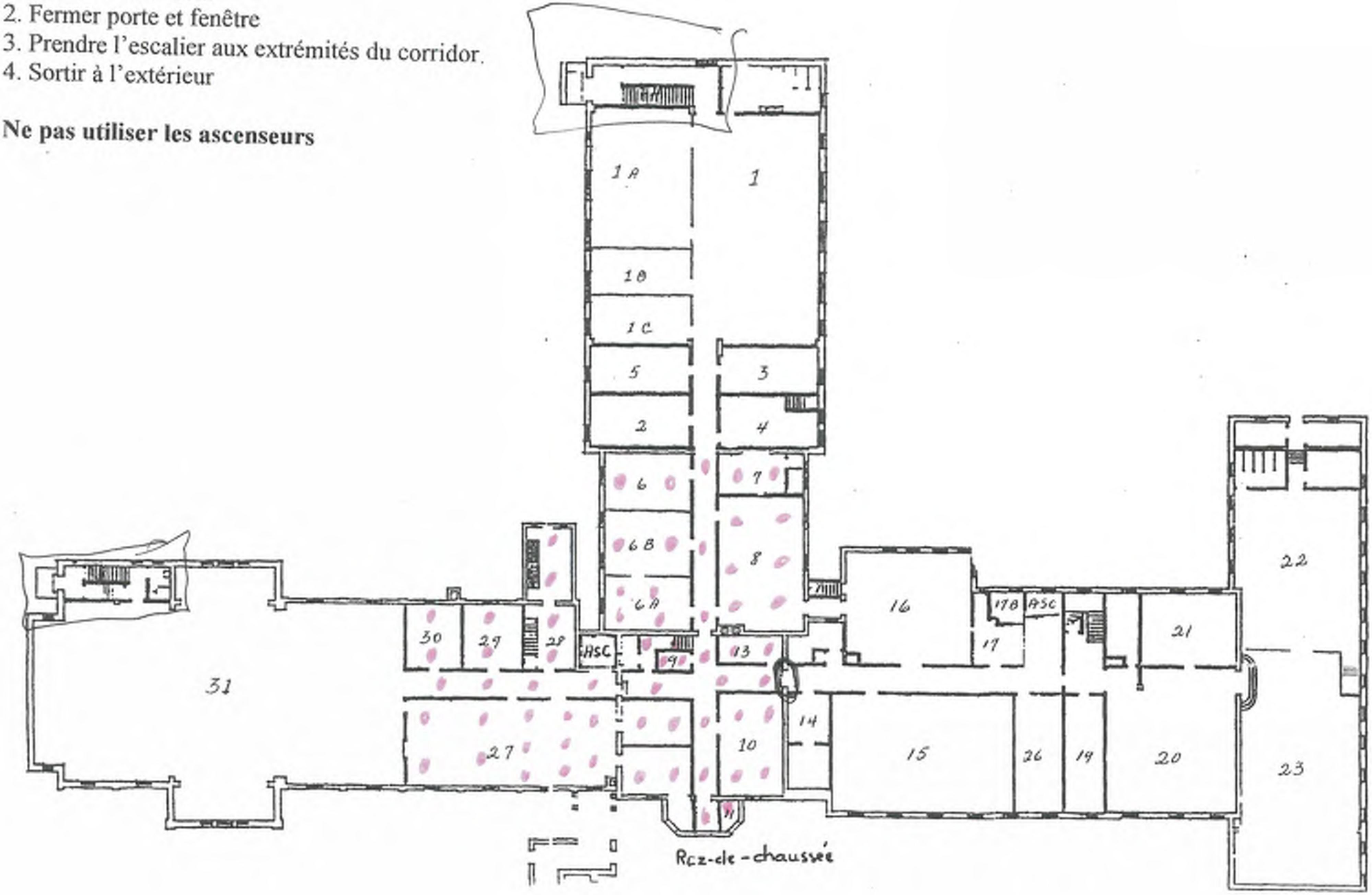


Sous-sol – cave

En cas d'incendie :

1. Quitter votre local
2. Fermer porte et fenêtre
3. Prendre l'escalier aux extrémités du corridor.
4. Sortir à l'extérieur

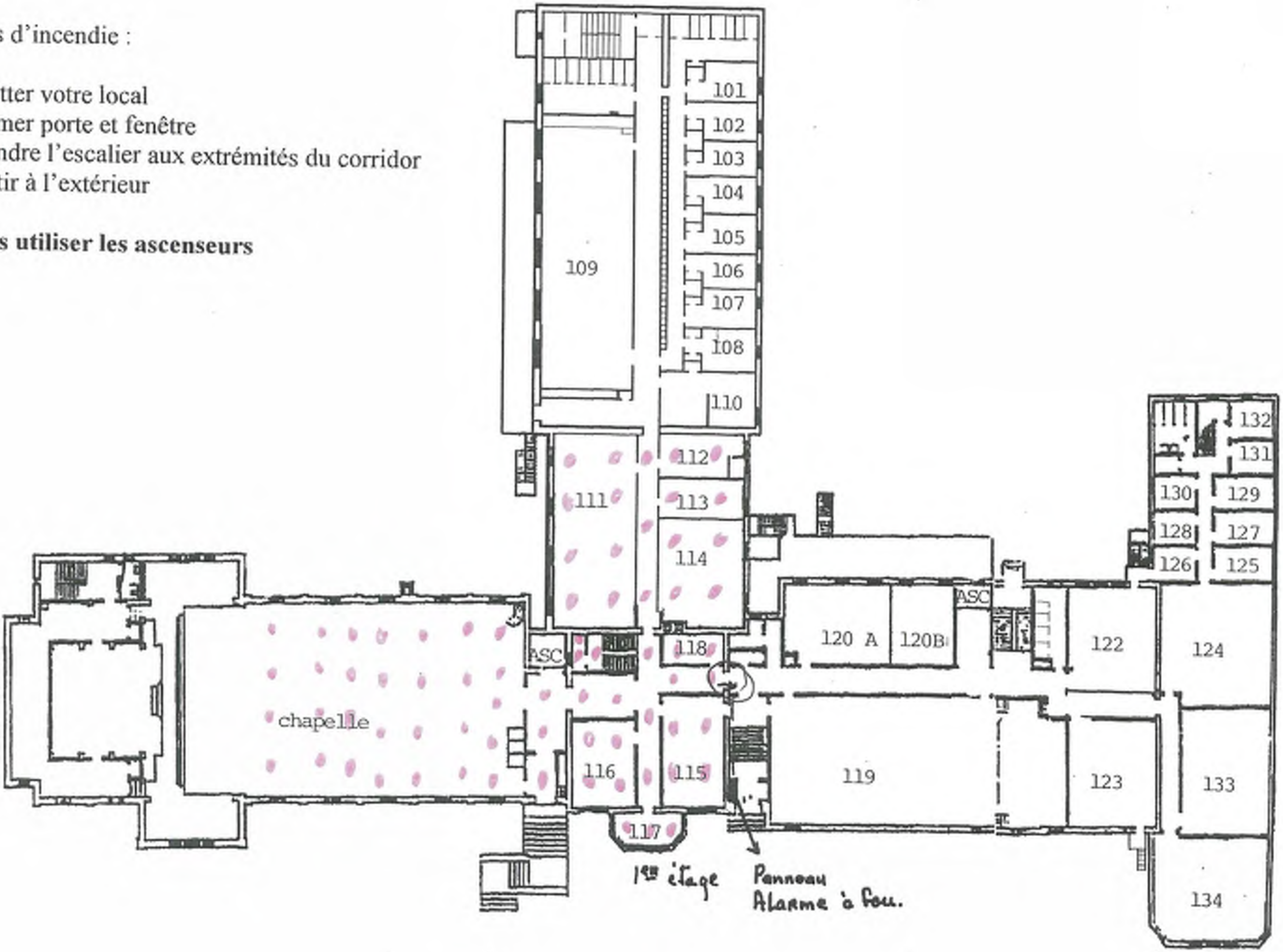
Ne pas utiliser les ascenseurs



En cas d'incendie :

1. Quitter votre local
2. Fermer porte et fenêtre
3. Prendre l'escalier aux extrémités du corridor
4. Sortir à l'extérieur

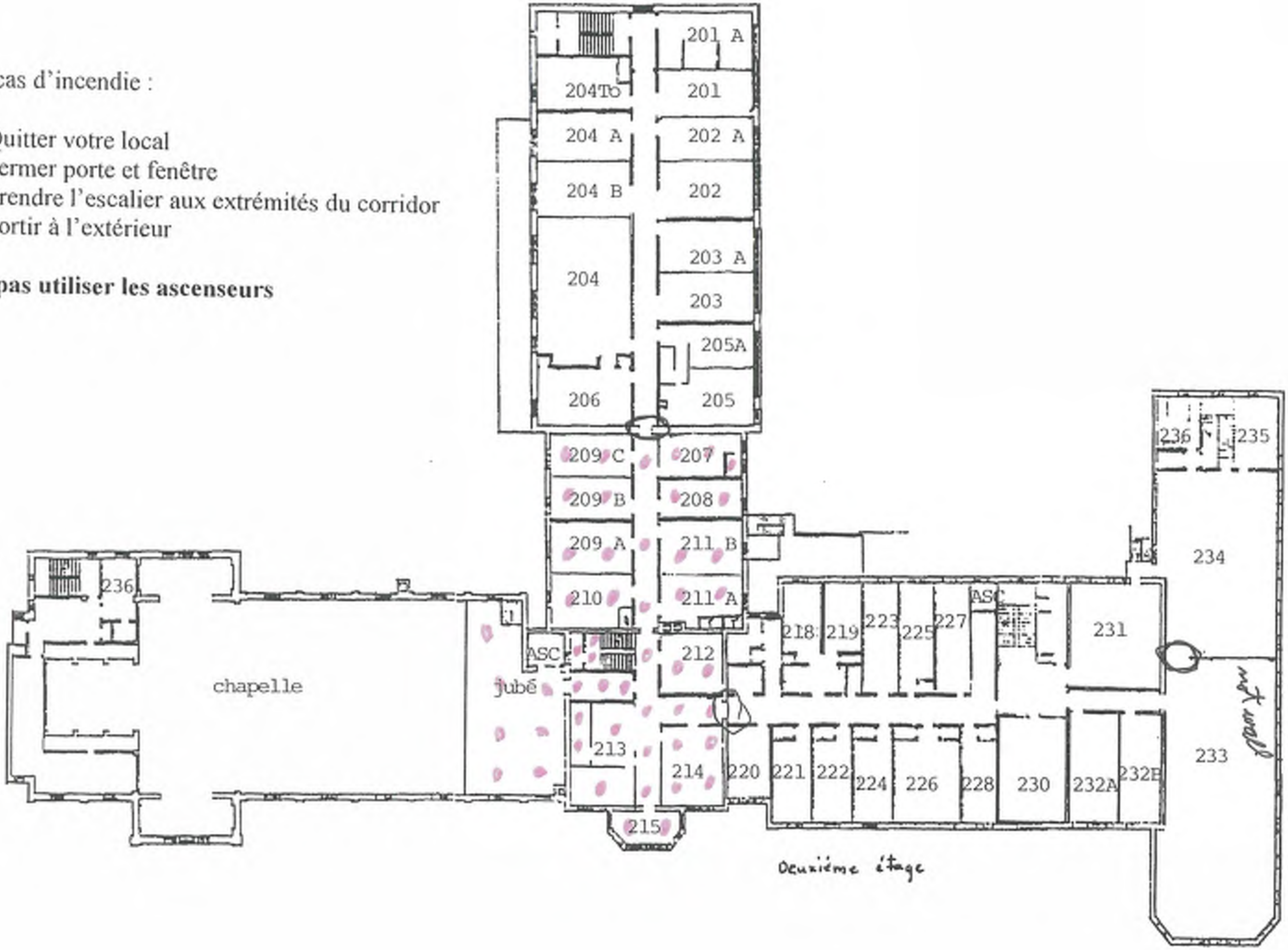
Ne pas utiliser les ascenseurs



En cas d'incendie :

1. Quitter votre local
2. Fermer porte et fenêtre
3. Prendre l'escalier aux extrémités du corridor
4. Sortir à l'extérieur

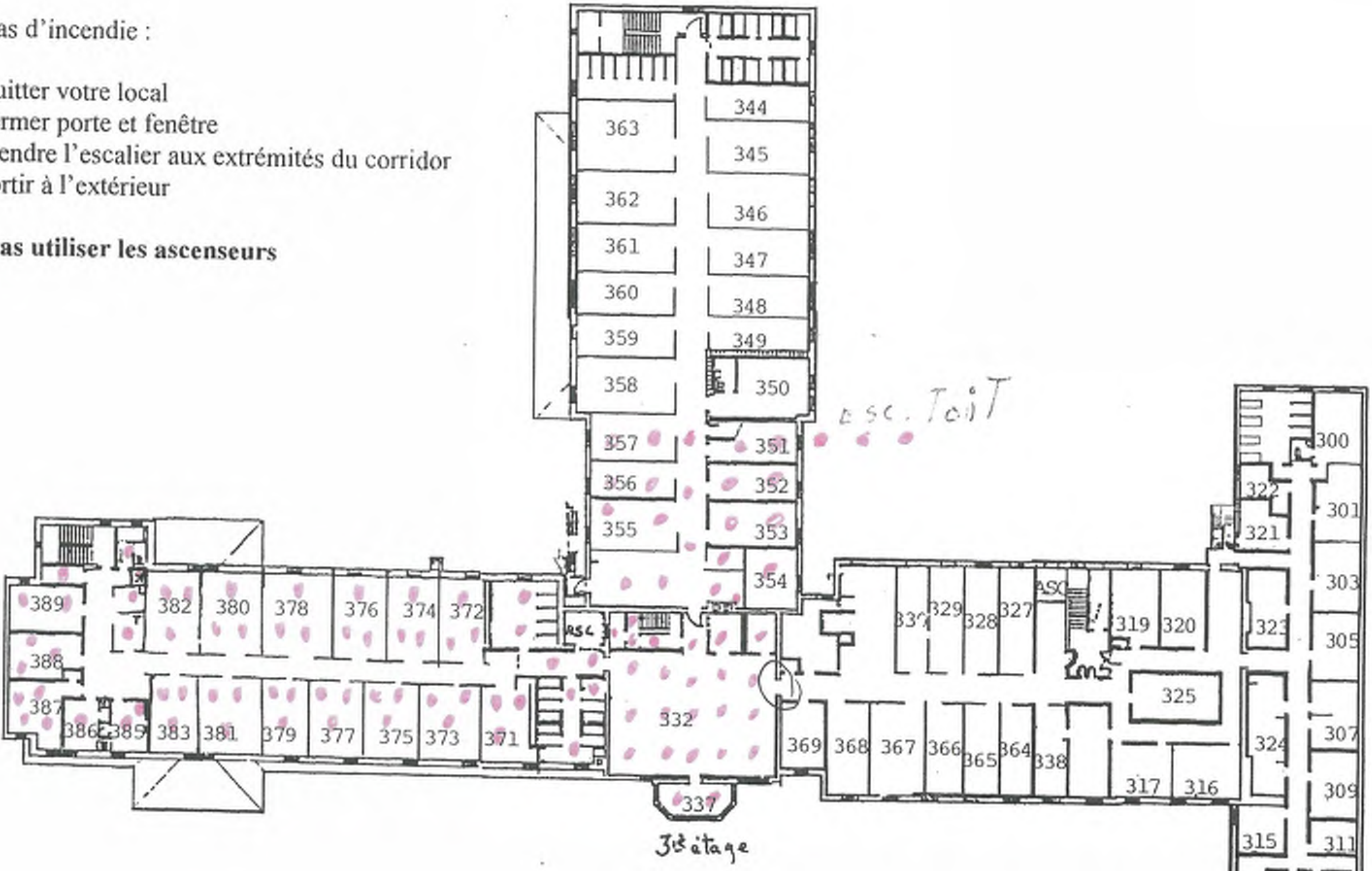
Ne pas utiliser les ascenseurs



En cas d'incendie :

1. Quitter votre local
2. Fermer porte et fenêtre
3. Prendre l'escalier aux extrémités du corridor
4. Sortir à l'extérieur

Ne pas utiliser les ascenseurs



APPENDIX E

Noise Analysis

```
STAMSON 5.0       SUMMARY REPORT       Date: 13-10-2016 10:21:35
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r1.te               Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: Main St N (day/night)
---------------------------------------------
Car traffic volume  :  6072/528   veh/TimePeriod  *
Medium truck volume :   483/42    veh/TimePeriod  *
Heavy truck volume  :   345/30    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

    24 hr Traffic Volume (AADT or SADT):   7500
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: Main St N (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  15.00 / 15.00  m
Receiver height           :  16.50 / 16.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


Road data, segment # 2: Main St S (day/night)
---------------------------------------------
Car traffic volume  :  6072/528   veh/TimePeriod  *
Medium truck volume :   483/42    veh/TimePeriod  *
Heavy truck volume  :   345/30    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

    24 hr Traffic Volume (AADT or SADT):   7500
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00
```

```
Data for Segment # 2: Main St S (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  20.40 / 20.40  m
Receiver height           :  16.50 / 16.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


Road data, segment # 3: HWY 417 E (day/night)
---------------------------------------------
Car traffic volume    : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

    24 hr Traffic Volume (AADT or SADT):  55000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 3: HWY 417 E (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      7 / 7
House density             :     95 %
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 406.60 / 406.60 m
Receiver height           :  16.50 / 16.50  m
Topography                :      3       (Elevated; no barrier)
Elevation                 :  13.15 m
Reference angle           :   0.00


Road data, segment # 4: HWY 417 W (day/night)
---------------------------------------------
Car traffic volume    : 44528/3872  veh/TimePeriod
Medium truck volume :  3542/308   veh/TimePeriod
Heavy truck volume  :  2530/220   veh/TimePeriod
Posted speed limit  :   100 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)
```

```
Data for Segment # 4: HWY 417 W (day/night)
-------------------------------------------
Angle1   Angle2            : -90.00 deg   90.00 deg
Wood depth                 :      0       (No woods.)
No of house rows           :      7 / 7
House density              :     95 %
Surface                    :      2       (Reflective ground surface)
Receiver source distance   : 423.10 / 423.10 m
Receiver height            :  16.50 / 16.50  m
Topography                 :      3       (Elevated; no barrier)
Elevation                  :  12.90 m
Reference angle            :   0.00

Result summary (day)
--------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+----------+----------+----------
 1.Main St N        !     1.50 !    65.47 !    65.47
 2.Main St S        !     1.50 !    64.13 !    64.13
 3.HWY 417 E        !     1.50 !    49.64 !    49.64
 4.HWY 417 W        !     1.50 !    49.53 !    49.53
--------------------+----------+----------+----------
                      Total                  67.99 dBA

Result summary (night)
----------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+----------+----------+----------
 1.Main St N        !     1.50 !    57.87 !    57.87
 2.Main St S        !     1.50 !    56.54 !    56.54
 3.HWY 417 E        !     1.50 !    42.04 !    42.04
 4.HWY 417 W        !     1.50 !    41.93 !    41.93
--------------------+----------+----------+----------
                      Total                  60.39 dBA


TOTAL Leq FROM ALL SOURCES (DAY): 67.99
                        (NIGHT): 60.39
```

```
STAMSON 5.0        SUMMARY REPORT        Date: 13-10-2016 10:10:02
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r2.te                  Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: HWY 417 E (day/night)
---------------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod
Medium truck volume :  3872/308   veh/TimePeriod
Heavy truck volume  :  2530/220   veh/TimePeriod
Posted speed limit  :   100 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: HWY 417 E (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      7 / 7
House density             :     95 %
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 411.30 / 411.30 m
Receiver height           :  16.50 / 16.50  m
Topography                :      3       (Elevated; no barrier)
Elevation                 :   3.25 m
Reference angle           :   0.00


Road data, segment # 2: HWY 417 W (day/night)
---------------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod
Medium truck volume :  3542/308   veh/TimePeriod
Heavy truck volume  :  2530/220   veh/TimePeriod
Posted speed limit  :   100 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 2: HWY 417 W (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      7 / 7
House density             :     95 %
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 427.90 / 427.90 m
Receiver height           :  16.50 / 16.50  m
Topography                :      3       (Elevated; no barrier)
Elevation                 :   3.25 m
Reference angle           :   0.00
```

```
Result summary (day)
--------------------

                    !  source  !  Road   !  Total
                    !  height  !  Leq    !  Leq
                    !   (m)    !  (dBA)  !  (dBA)
--------------------+----------+---------+---------
 1.HWY 417 E        !     1.49 !   49.72 !   49.72
 2.HWY 417 W        !     1.50 !   49.50 !   49.50
--------------------+----------+---------+---------
                      Total                  52.62 dBA

Result summary (night)
----------------------

                    !  source  !  Road   !  Total
                    !  height  !  Leq    !  Leq
                    !   (m)    !  (dBA)  !  (dBA)
--------------------+----------+---------+---------
 1.HWY 417 E        !     1.50 !   42.01 !   42.01
 2.HWY 417 W        !     1.50 !   41.90 !   41.90
--------------------+----------+---------+---------
                      Total                  44.97 dBA


TOTAL Leq FROM ALL SOURCES (DAY): 52.62
                         (NIGHT): 44.97
```

```
STAMSON 5.0        SUMMARY REPORT        Date: 13-10-2016 10:20:39
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r3.te                  Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: HWY 417 E (day/night)
---------------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod
Medium truck volume :  3542/308   veh/TimePeriod
Heavy truck volume  :  2530/220   veh/TimePeriod
Posted speed limit  :   100 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: HWY 417 E (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      7 / 7
House density             :     95 %
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 395.00 / 395.00 m
Receiver height           :   1.50 / 4.50   m
Topography                :      3       (Elevated; no barrier)
Elevation                 :   2.00 m
Reference angle           :   0.00


Road data, segment # 2: HWY 417 W (day/night)
---------------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod
Medium truck volume :  3542/308   veh/TimePeriod
Heavy truck volume  :  2530/220   veh/TimePeriod
Posted speed limit  :   100 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 2: HWY 417 W (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      7 / 7
House density             :     95 %
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 414.10 / 414.10 m
Receiver height           :   1.50 / 4.50   m
Topography                :      3       (Elevated; no barrier)
Elevation                 :   2.25 m
Reference angle           :   0.00
```

```
Result summary (day)
--------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.HWY 417 E        !     1.50 !    49.72 !    49.72
 2.HWY 417 W        !     1.50 !    49.59 !    49.59
--------------------+---------+---------+---------
                      Total                52.67 dBA

Result summary (night)
----------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.HWY 417 E        !     1.50 !    42.13 !    42.13
 2.HWY 417 W        !     1.50 !    41.99 !    41.99
--------------------+---------+---------+---------
                      Total                45.07 dBA


TOTAL Leq FROM ALL SOURCES (DAY): 52.67
                         (NIGHT): 45.07
```

```
STAMSON 5.0        SUMMARY REPORT        Date: 13-10-2016 10:25:37
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r4.te                Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: HWY 417 E (day/night)
---------------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod
Medium truck volume :  3542/308   veh/TimePeriod
Heavy truck volume  :  2530/220   veh/TimePeriod
Posted speed limit  :   100 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: HWY 417 E (day/night)
-------------------------------------------
Angle1   Angle2             : -90.00 deg   90.00 deg
Wood depth                  :      0       (No woods.)
No of house rows            :      7 / 7
House density               :     95 %
Surface                     :      2       (Reflective ground surface)
Receiver source distance    : 400.90 / 400.90 m
Receiver height             :   1.50 / 4.50   m
Topography                  :      3       (Elevated; no barrier)
Elevation                   :   4.75 m
Reference angle             :   0.00


Road data, segment # 2: HWY 417 W (day/night)
---------------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod
Medium truck volume :  3542/308   veh/TimePeriod
Heavy truck volume  :  2530/220   veh/TimePeriod
Posted speed limit  :   100 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 2: HWY 417 W (day/night)
-------------------------------------------
Angle1   Angle2             : -90.00 deg   90.00 deg
Wood depth                  :      0       (No woods.)
No of house rows            :      7 / 7
House density               :     95 %
Surface                     :      2       (Reflective ground surface)
Receiver source distance    : 423.80 / 423.80 m
Receiver height             :   1.50 / 4.50   m
Topography                  :      3       (Elevated; no barrier)
Elevation                   :   4.50 m
Reference angle             :   0.00
```

```
Result summary (day)
--------------------

                     !  source  !   Road   !  Total
                     !  height  !   Leq    !   Leq
                     !   (m)    !  (dBA)   !  (dBA)
--------------------+----------+----------+---------
 1.HWY 417 E         !     1.50 !    49.68 !    49.68
 2.HWY 417 W         !     1.50 !    49.53 !    49.53
--------------------+----------+----------+---------
                       Total                   52.62 dBA

Result summary (night)
----------------------

                     !  source  !   Road   !  Total
                     !  height  !   Leq    !   Leq
                     !   (m)    !  (dBA)   !  (dBA)
--------------------+----------+----------+---------
 1.HWY 417 E         !     1.50 !    42.08 !    42.08
 2.HWY 417 W         !     1.50 !    41.93 !    41.93
--------------------+----------+----------+---------
                       Total                   45.02 dBA


TOTAL Leq FROM ALL SOURCES (DAY): 52.62
                         (NIGHT): 45.02
```

Environmental Noise Guideline

Stationary and Transportation Sources – Approval and Planning

Publication NPC-300

Ontario

Table C-10
Supplementary Indoor Aircraft Noise Limits
(Applicable over 24-hour period)

Type of Space	Indoor NEF/NEP*
General offices, reception areas, retail stores, etc.	15
Individual or semi-private offices, conference rooms, etc.	10
Living/dining areas of residences, sleeping quarters of hotels/motels, theatres, libraries, schools, daycare centres, places of worship, etc.	5
Sleeping quarters of residences, hospitals, nursing/retirement homes, etc.	0

* The indoor NEF/NEP values listed in Table C-10 are not obtained from NEF/NEP contour maps. The values are representative of the indoor sound levels and are used as assessment criteria for the evaluation of acoustical insulation requirements.

C7 Noise Control Measures

The following sections provide MOE guidance for appropriate noise control measures. These sections constitute requirements that are applied to MOE approvals for stationary sources. This information is also provided as guidance which land use planning authorities may consider adopting.

The definition in Part A describes the various types and application of noise control measures. All the noise control measures described in the definition are appropriate to address the impact of noise of transportation sources (road, rail and aircraft) on planned sensitive land uses. Only some of the noise control measures described in the definition are appropriate to address the noise impact of stationary sources on planned sensitive land uses.

C7.1 Road Noise Control Measures

C7.1.1 Outdoor Living Areas

If the 16-Hour Equivalent Sound Level, L_{eq} (16) in the OLA is greater than 55 dBA and less than or equal to 60 dBA, noise control measures may be applied to reduce the sound level to 55 dBA. If measures are not provided, prospective purchasers or tenants should be informed of potential noise problems by a warning clause Type A.

If the 16-Hour Equivalent Sound Level, L_{eq} (16) in the OLA is greater than 60 dBA, noise control measures should be implemented to reduce the level to 55 dBA. Only in cases where the required noise control measures are not feasible for technical, economic or administrative reasons would an excess above the limit (55 dBA) be acceptable with a warning clause Type B. In the above situations, any excess above the limit will not be acceptable if it exceeds 5 dBA.

C7.1.2 Plane of a Window – Ventilation Requirements

C7.1.2.1 Daytime Period, 07:00 – 23:00 Hours

Noise control measures may not be required if the L_{eq} (16) daytime sound level in the plane of a bedroom or living/dining room window is less than or equal to 55 dBA. If the sound level in the plane of a bedroom or living/dining room window is greater than 55 dBA and less than or equal to 65 dBA, the dwelling should be designed with a provision for the installation of central air conditioning in the future, at the occupant's discretion. Warning clause Type C is also recommended.

If the daytime sound level in the plane of a bedroom or living/dining room window is greater than 65 dBA, installation of central air conditioning should be implemented with a warning clause Type D. In addition, building components including windows, walls and doors, where applicable, should be designed so that the indoor sound levels comply with the sound level limits in Table C-2. The location and installation of the outdoor air conditioning device should comply with sound level limits of Publication NPC-216, Reference [32], and guidelines contained in Environmental Noise Guidelines for Installation of Residential Air Conditioning Devices, Reference [6], or should comply with other criteria specified by the municipality.

C7.1.2.2 Nighttime Period, 23:00 – 07:00 Hours

Noise control measures may not be required if the L_{eq} (8) nighttime sound level in the plane of a bedroom or living/dining room window is less than or equal to 50 dBA. If the sound level in the plane of a bedroom or living/dining room window is greater than 50 dBA and less than or equal to 60 dBA, the dwelling should be designed with a provision for the installation of central air conditioning in the future, at the occupant's discretion. Warning clause Type C is also recommended.

If the nighttime sound level in the plane of a bedroom or living/dining room window is greater than 60 dBA, installation of central air conditioning should be implemented, with a warning clause Type D. In addition, building components including windows, walls and doors, where applicable, should be designed so that the indoor sound levels comply with the sound level limits in Table C-2. The location and installation of the outdoor air conditioning device should comply with sound level limits of Publication NPC-216, Reference [32], and guidelines contained in Environmental Noise Guidelines for Installation of Residential Air Conditioning Devices, Reference [6], or should comply with other criteria specified by the municipality.

C7.1.3 Indoor Living Areas – Building Components

If the nighttime sound level outside the bedroom or living/dining room windows exceeds 60 dBA or the daytime sound level outside the bedroom or living/dining area windows exceeds 65 dBA, building components including windows, walls and doors, where applicable, should be designed so that the indoor sound levels comply with the sound level limits in Table C-2. The acoustical performance of the building components (windows, doors and walls) should be specified.

C7.2 Rail Noise Control Measures

C7.2.1 Outdoor Living Areas

Whistle noise is not included in the determination of the outdoor daytime sound level due to railway trains. All the provisions of Section C7.1.1 apply also to noise control requirements for rail noise.

C7.2.2 Plane of a Window – Ventilation Requirements

Whistle noise is not included in the determination of the sound level in the plane of a window. All the provisions of Section C7.1.2 apply also to noise control requirements for rail noise.

C7.2.3 Indoor Living Areas – Building Components

The sound level, L_{eq}, during the daytime (16-hour) and nighttime (8-hour) periods is determined using the prediction method STEAM, Reference [34], immediately outside the dwelling envelope. Whistle noise is included in the determination of the sound level.

If the nighttime sound level outside the bedroom or living/dining room windows exceeds 55 dBA or the daytime sound level outside the bedroom or living/dining area windows exceeds 60 dBA, building components including windows, walls and doors, where applicable, need to be designed so that the indoor sound levels comply with the sound level limits in Table C-2. The acoustical performance of the building components (windows, doors and walls) needs to be specified.

In addition, the exterior walls of the first row of dwellings next to railway tracks are to be built to a minimum of brick veneer or masonry equivalent construction, from the foundation to the rafters when the rail traffic L_{eq} (24-hour), estimated at a location of a nighttime receptor, is greater than 60 dBA, and when the first row of dwellings is within 100 metres of the tracks.

C7.3 Combination of Road and Rail Noise

The noise impact in the OLA and in the plane of a window, and the requirements for outdoor measures, ventilation measures and warning clauses, should be determined by combining road and rail traffic sound levels.

The assessment of the indoor sound levels and the resultant requirement for the acoustical descriptors of the building components should be done separately for road

In Class 4 areas, where windows for noise sensitive spaces are assumed to be closed, the use of central air conditioning may be acceptable if it forms an essential part of the overall building designs.

C7.9 Verification of Noise Control Measures

It is recommended that the implementation of noise control measures be verified by qualified individuals with experience in environmental acoustics.

C8 Warning Clauses

The use of warning clauses or easements in respect of noise are recommended when circumstances warrant. Noise warning clauses may be used to warn of potential annoyance due to an existing source of noise and/or to warn of excesses above the sound level limits. Direction on the use of warning clauses should be included in agreements that are registered on title to the lands in question. The warning clauses would be included in agreements of Offers of Purchase and Sale, lease/rental agreements and condominium declarations. Alternatively, the use of easements in respect of noise may be appropriate in some circumstances. Additional guidance on the use of noise warning clauses is provided in Section C7.1.1, Section C7.1.2.1, Section C7.1.2.2, Section C7.3 and Section C7.4.

C8.1 Transportation Sources

The following warning clauses may be used individually or in combination:

TYPE A: (see Section C7.1.1)

> "Purchasers/tenants are advised that sound levels due to increasing road traffic (rail traffic) (air traffic) may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment."

TYPE B: (see Section C7.1.1 and Section C7.4)

> "Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing road traffic (rail traffic) (air traffic) may on occasions interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment."

TYPE C: (see Section C7.1.2.1, Section C7.1.2.2 and Section C7.4)

> "This dwelling unit has been designed with the provision for adding central air conditioning at the occupant's discretion. Installation of

central air conditioning by the occupant in low and medium density developments will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment."

TYPE D: (see Section C7.1.2.1, Section C7.1.2.2 and Section C7.4)

"This dwelling unit has been supplied with a central air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment."

C8.2 Stationary Sources

It is not acceptable to use warning clauses in place of physical noise control measures to identify an excess over the MOE sound level limits. Warning clause (Type E) for stationary sources may identify a potential concern due to the proximity of the facility but it is not acceptable to justify exceeding the sound level limits.

TYPE E: (see Section C7.6)

"Purchasers/tenants are advised that due to the proximity of the adjacent industry (facility) (utility), noise from the industry (facility) (utility) may at times be audible."

C8.3 Class 4 Area Notification

TYPE F: (see Section B9.2 and Section C4.4.2)

"Purchasers/tenants are advised that sound levels due to the adjacent industry (facility) (utility) are required to comply with sound level limits that are protective of indoor areas and are based on the assumption that windows and exterior doors are closed. This dwelling unit has been supplied with a ventilation/air conditioning system which will allow windows and exterior doors to remain closed."

APPENDIX F

Waterproof Basement Details

Latest Waterproof Basement Details

- SK-WB1 – Typical Section and Detail
- SK-WB2 – Service Penetrations
- SK-WB3 – Reinforcement Layout
- SK-WB4 – Reinforcement Details
- Calculations, Specifications and Product Data

Golder Associates

September 1, 2016

Project No. 1411220005/6100

Josh White, Project Manager Development Review
City of Ottawa
Infrastructure Approvals Services Branch
110 Laurier Avenue W.
Ottawa, ON
K1P 1J1

GEOTECHNICAL AND HYDROGEOLOGICAL CONSIDERATIONS, PROPOSED NORTH VILLAGE AREA, GREYSTONE VILLAGE, OTTAWA

Dear Josh

This letter discusses the geotechnical and hydrogeological aspects of the northeast portion of the North Village (Phase 2) area of the above project, the development of which is proposed to consist of singles and townhouses.

Background

From the preliminary site grading and servicing design prepared by Novatech Engineering Consultants, it is understood that the 100-year hydraulic grade line (HGL) associated with the storm sewer is above the proposed underside of footing and basement floor level in the 13 singles and 16 adjacent townhouses in the northeast portion.

Because the HGL is above the underside of footing level, it is understood that consideration is being given to not providing perimeter drainage of the foundations but instead providing waterproof basements in these units designed to resist the hydrostatic pressure and maintain the basements in a dry condition.

The subsurface conditions in this northeast area of the site generally consist of about 1.5 to 2.5 metres of fill material comprised of both debris fill (typically silty sand containing debris) and soil fill (silty sand, sandy silt and silty clay essentially free of debris), overlying the native silty clay. Similar subsurface conditions also underlie the 30 metre wide corridor between the eastern limit of development and the Rideau River, with the thickness of fill material being about 2.5 metres in the corridor area closest to the river. From investigations at the site, the slope of the groundwater table is known to roughly mirror the downward sloping of the clay from west to east towards the Rideau River, which is the direction of groundwater flow. The groundwater table is typically within the upper portion of the silty clay below the fill/clay interface and is expected to rise a limited amount during the spring and other wetter periods of the year.

The current ground surface in the northern part of the site adjacent to the Rideau River is about 2 metres above normal river level, and slopes upward towards the west. Preparation of the area for redevelopment will involve remediation by excavation and removal of the impacted debris fill from the site. Below the proposed houses, the

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sand fill will also be removed. Where the proposed underside of footing level is below the surface of the silty clay, the houses will be supported on spread footings on the clay. Where the fill extends to below the underside of footing level, the grade will be raised with a compacted granular fill to provide a pad on which to support the footings. It is understood that the finished ground surface in the area of those units where the underside of footing is below the HGL will range from about 0.5 metres higher than to similar to existing ground surface. The subsurface materials within the 30 m corridor between the limit of development will remain as is, comprised of the debris and soil fill materials.

The normal operating level in the Rideau River adjacent to the site is at about 55.2 to 55.5 mASL depending on the seasons and year to year fluctuations. It is understood that under the 100 year flood conditions the Rideau River is predicted to quickly rise some 2.85 m to elevation 58.35 mASL, and typically maintains this level for up to a week and then declines. The geotechnical and hydrogeological aspects associated the proposed development are discussed below.

Servicing

By not providing perimeter drains for the units where the HGL is above the underside of footing level, these units will not be connected to the storm sewer system and hence should be unaffected by the HGL associated with the storm sewer system under flood conditions in the river. The waterproof foundation design approach for these units should consider the expected seasonally high groundwater elevations in this portion of the site and be designed to resist the corresponding hydrostatic pressure.

The two locations where the proposed servicing is within or crosses the 30 m river front corridor are the sanitary sewer connection to the existing trunk sewer within the corridor and the storm sewer outfall to the river. To avoid a potential direct hydraulic interconnection between the river bank area/river and the development area, it is proposed that the granular bedding and backfill zone around each of these pipes be interrupted with a seepage barrier consisting of compacted silty clay, which is keyed into the underlying silty clay and extends up through the granular bedding and backfill layers.

Because these units will not have a perimeter drain, it is suggested that consideration be given to providing eaves troughs on the units to direct precipitation away from the beside the foundations and thereby minimize the introduction of additional standing water at this location.

Potential Effect of Rideau River Flood Level

The limit of development and the Rideau River are separated by a 30 metre wide corridor underlain by soil and debris fill materials, followed by native silty clay. The potential effect of the temporary raised Rideau River flood level on the groundwater level within the proposed development area was assessed, assuming that a direct hydraulic connection between the river and the development area along the servicing is eliminated as described above.

The soil and debris fill materials within the 30 m corridor are above the groundwater level (unsaturated). During a flood event on the Rideau River, the rewetting of these fill materials and the distance back from the river bank to which the flood level will cause a rise in the groundwater level will be primarily controlled by the unsaturated flow characteristics of the fill material. Because the unsaturated flow characteristics of this fill material are unknown, two different approaches were used in modelling simulations. In the first simulation, a VanGenuchten approach was used with unsaturated soil parameters selected that were similar to a medium-coarse sand unit; this is considered conservative because the fill material is a mixture of silty sand, sandy silt and silty clay. In the second simulation, simplified "spline" curves were used to define the soil suction (negative pressure), residual saturation and hydraulic conductivity relationships. As defined, the spline curves resulted in higher hydraulic conductivities of the fill material in unsaturated conditions compared to the VanGenuchten approach, which is even more conservative.

A simplified cross-sectional groundwater flow model was constructed using FEFLOW and simulations were completed to evaluate the water table response within the site resulting from a temporarily raised flood water stage in the Rideau River (approximating a seasonal river flood event). The cross-section was chosen to represent the subsurface conditions at the northern portion of the site where the baseline groundwater elevation is closest to the proposed final grade elevation. The cross-section extended 75 metres in length inland from the river, and was oriented to parallel the general west to east direction of groundwater flow. Two material types were used in the model to represent the fill and native weathered silty clay, which were assigned representative saturated hydraulic conductivities of $1x10^{-5}$ m/s and $1x10^{-7}$ m/s, respectively. A fixed-head boundary condition was specified at the upgradient (west) limit of the model at the groundwater elevation of 58 mASL, and a second fixed-head boundary condition was specified at the downgradient limit of the model to control the Rideau River level.

The model was run transiently with the Rideau River level increasing from 55.5 mASL to 58.35 mASL over the period of one day, maintaining an elevation of 58.35 mASL for one week, then dropping back to 55.5 mASL for the duration of the simulation. The simulated change in groundwater elevation was determined at distances of 30 metres from the Rideau River (corresponding to the limit of development), and 40 metres from the Rideau River (corresponding to the location of the nearest buildings in the proposed development plan).

In the first simulation (i.e., using the VanGenuchten approach), the maximum increase in groundwater elevation at 30 metre and 40 metre distances from the river was 0.03 metres and 0.01 metres, respectively. In the second simulation (i.e., using the even more conservative spline curve approach), the maximum increase in groundwater elevation at 30 metre and 40 metre distances from the river was 1.17 metres and 0.70 metres, respectively. In view of the conservatism used in parameter selection, it is considered that the first simulation is likely closer to what will happen at the site. The modelling demonstrates that the 30 metre width of fill material is expected to have a significant effect in buffering the effects from the Rideau River flood level on the groundwater level within the development area at this site.

These results suggest that the waterproof basement designs should consider the seasonally high groundwater level within the development area, but not temporary increases in the groundwater table associated with flood levels in the Rideau River.

We trust that this provides sufficient information on this matter. However, should there be any questions please do not hesitate to contact us.

GOLDER ASSOCIATES LTD.

Paul Smolkin

Paul Smolkin, P.Eng.
Principal

NB/PAS/mvrd
n:\active\2014\1122 - clg\14-1122-0005 regional group oblates property ottawa\phase 6100 - new project management & meetings\north village design\ltr geotech and hydrog aspects 2016aug31.docx

CC: Mr. Josh Kardish, Greystone Village Inc.
Mr. John Riddell, Novatech Engineering Consultants

BARRY J. HOBIN & ASSOCIATES ARCHITECTS INCORPORATED

Principals

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September 1, 2016

City of Ottawa
Planning and Growth Management
110 Laurier Avenue West
Ottawa, ON K1P 1J1

ATTENTION: Joshua White, Project Manager, Infrastructure Approvals

Dear Mr. White:

RE: Greystone Phase 2 – HGL/High Water Table Issues
Our File 1607

I am writing to you to add the support of Barry J. Hobin & Associates for the design of Phase 2 as currently proposed. While the proposal to waterproof townhouse and single home basements may be unconventional, such measures have been proposed and approved previously by the City of Ottawa.

Attached you will find drawings as approved for 171 Grandview Road including:

- Site Plan
- Foundation Plan
- Basement Plan
- Building Section
- Details
- Structural Schedule

This custom home was constructed in 2006 with full approvals from both the City and the RVCA. The new home, which sits partially within the flood plain, was approved through a combination of cut and fill grading and the waterproofing of the basement. Both measures were fully engineered. The foundation structure was designed to withstand potential hydrostatic pressure. A torched on waterproof membrane was applied to the top of the 4" thick mud slab. The basement was then constructed on top of the mud slab and a torched on waterproof membrane was applied to the exterior face of the walls and sealed to the mud slab membrane to provide a fully sealed envelope. There has never been a problem reported back to us in the 10 years since it was completed.

The city routinely approves similar strategies for basements for large buildings without any special conditions. Most of the large condominium towers constructed in the last decade have multi-level basement parking garages constructed with blind side waterproofing. These include the Merit at 108 Lisgar, the Gardens Phase 1 at Queen and Bronson and the Gardens Phase 2 at Albert and Bronson. While these buildings are very different from single family homes, the desire for dry basements is the same.

I believe that both of these precedents should support the solution proposed.

Regards

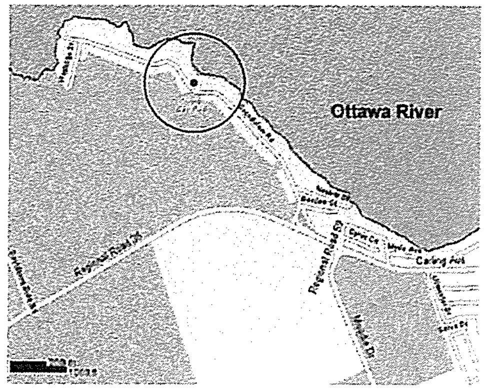
Gord Lorimer, OAA, FRAIC

cc: David Kardish
John Riddell

SURVEY INFO:

SURVEY INFORMATION TAKEN FROM A TOPOGRAPHICAL PLAN OF SURVEY OF LOT 29, REGISTERED PLAN 444, FORMERLY CITY OF NEPEAN, NOW CITY OF OTTAWA PREPARED BY ANNIS, O'SULLIVAN, VOLLEBEKK LTD., ONTARIO LAND SURVEYORS ON MAY 5, 2005.

LOCATION MAP:

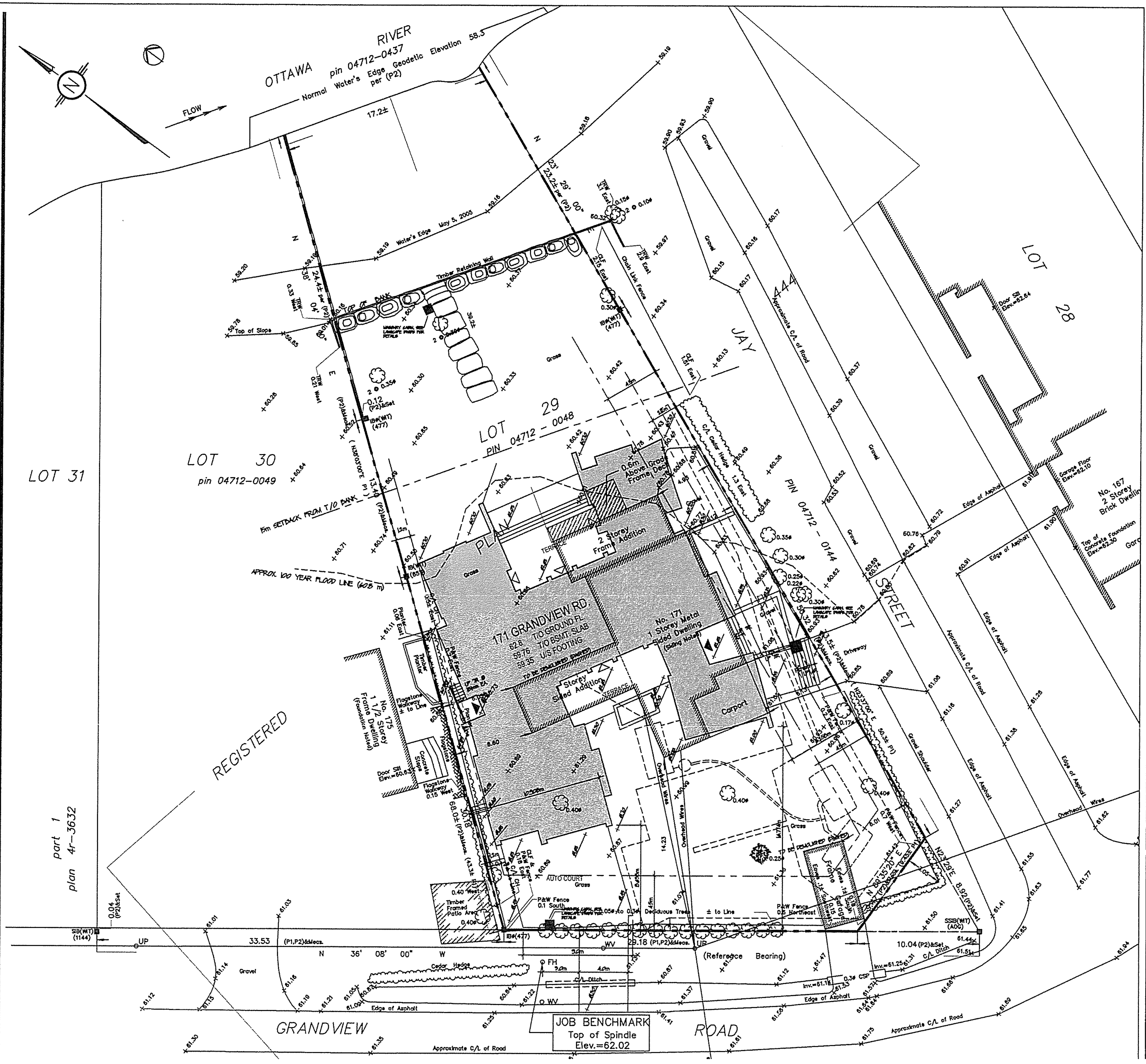


ZONING:

ZONING:	NEPEAN ZONING DESIGNATION 'R1A'
BLDG. SETBACKS:	FRONT YARD: 4.5 METRES SIDE YARDS: 1.2 METRES REAR YARD: 30m FROM NORMAL HIGH WATER MARK or WHERE THERE IS A DEFINED BANK or 15m FROM TOP OF BANK or 15m FROM 100 YEAR FLOOD LINE, WHICHEVER IS GREATEST.
HEIGHT LIMIT:	MAX. 10.7m (35'-1") ABOVE AVERAGE GRADE
LOT COVERAGE:	MAX. 25% OF LOT AREA

PROJECT & SITE STATISTICS

SITE AREA:	1930 SQM (20,775 SQFT)
LOT FRONTAGE:	+/- 33.5m (110'-0")
BLDG. AREA (FOOTPRINT):	424.75 SQM (4572 SQFT)
GROSS BLDG. AREA:	500.52 SQM (5392 SQFT)
BLDG. HEIGHT:	+/- 9.2m FROM AVERAGE GRADE



GENERAL NOTES:

1. SEE LANDSCAPE PLAN FOR FINISH GRADE & MATERIALS

no.	date	revision
5	NOV. 3/05	ISSUED FOR CONSTRUCTION
4	OCT. 24/05	ISSUED FOR CONCRETE TENDER
3	OCT. 13/05	TRUSS PACKAGE
2	OCT. 3/05	REVISED FOR BUILDING PERMIT
1	SEPT. 5/05	ISSUED FOR BUILDING PERMIT

It is the responsibility of the appropriate contractor to check and verify all dimensions on site and report all errors and/or omissions to the architect.

All contractors must comply with all pertinent codes and by-laws.

Do not scale drawings.

This drawing may not be used for construction until signed.

BARRY J. HOBIN & ASSOCIATES ARCHITECTS INCORPORATED
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OTTAWA, ONT. K1S 3V1
613-238-7200 Fax: 613-235-2005
Email: mail@hobinarc.com

project
TREMBLAY RESIDENCE
171 GRANDVIEW RD.

drawing title
SITE PLAN

drawn	date	scale
RKB / WF	AUG. 2005	1:150

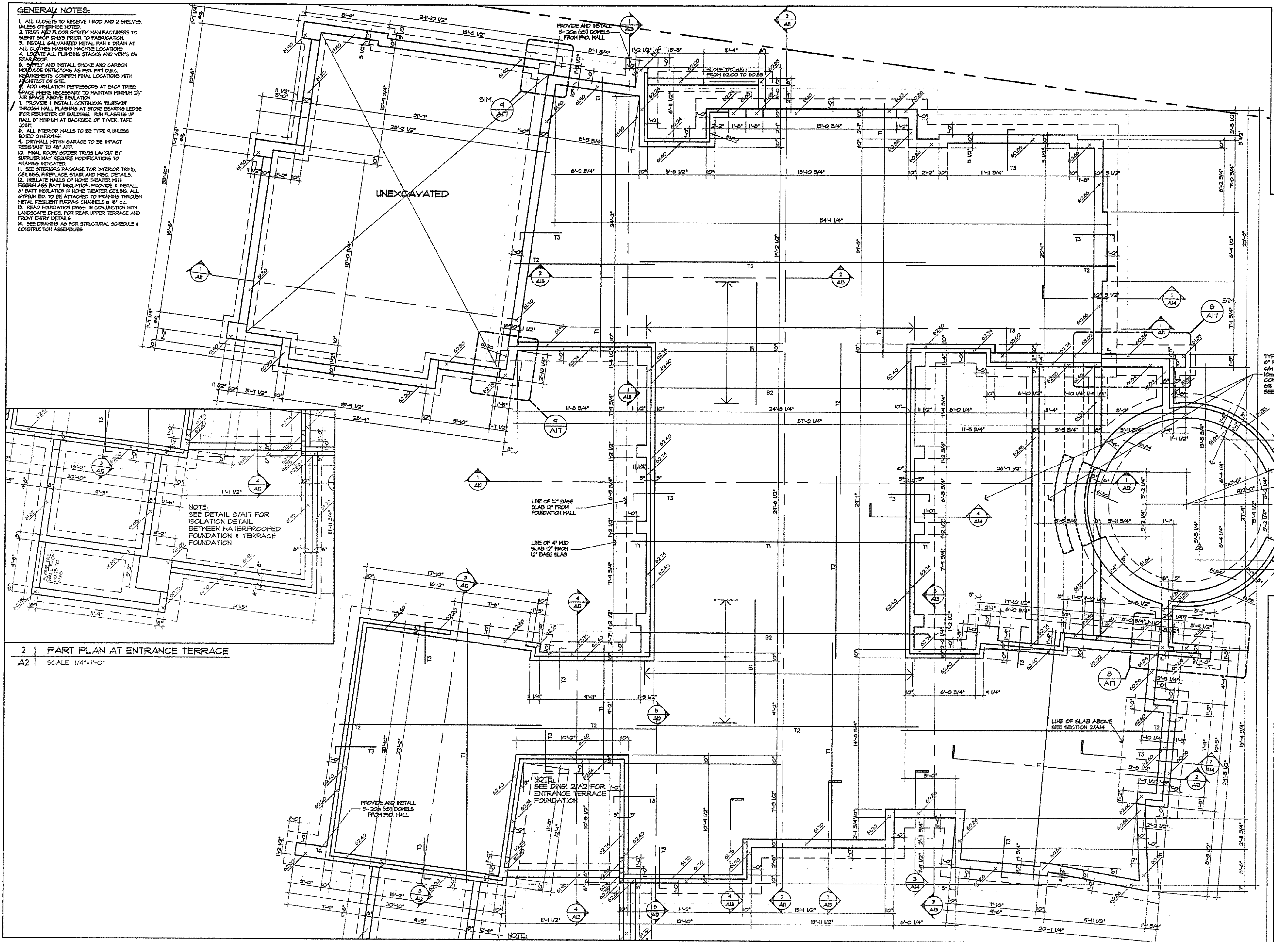
project
0605

drawing no.
A1

DATE-PLOT
DWGNAME

GENERAL NOTES:

1. ALL CLOSETS TO RECEIVE 1 ROD AND 2 SHELVES, UNLESS OTHERWISE NOTED.
2. TRUSS AND FLOOR SYSTEM MANUFACTURERS TO SUBMIT SHOP DWG'S PRIOR TO FABRICATION.
3. INSTALL GALVANIZED METAL PAN & DRAIN AT ALL CLOTHES WASHING MACHINE LOCATIONS.
4. LOCATE ALL PLUMBING STACKS AND VENTS ON REAR ROOF.
5. SUPPLY AND INSTALL SMOKE AND CARBON MONOXIDE DETECTORS AS PER 1997 O.B.C. REQUIREMENTS. CONFIRM FINAL LOCATIONS WITH ARCHITECT ON SITE.
6. ADD INSULATION DEPRESSORS AT EACH TRUSS SPACE WHERE NECESSARY TO MAINTAIN MINIMUM 2½" AIR SPACE ABOVE INSULATION.
7. PROVIDE & INSTALL CONTINUOUS 'BLUESKIN' THROUGH WALL FLASHING AT STONE BEARING LEDGE (FOR PERIMETER OF BUILDING). RUN FLASHING UP WALL 8" MINIMUM AT BACKSIDE OF TYVEK, TAPE JOINT.
8. ALL INTERIOR WALLS TO BE TYPE 9, UNLESS NOTED OTHERWISE.
9. DRYWALL WITHIN GARAGE TO BE IMPACT RESISTANT TO 48" AFF.
10. FINAL ROOF/ GIRDER TRUSS LAYOUT BY SUPPLIER MAY REQUIRE MODIFICATIONS TO FRAMING INDICATED.
11. SEE INTERIORS PACKAGE FOR INTERIOR TRIMS, CEILINGS, FIREPLACE, STAIR AND MISC. DETAILS.
12. INSULATE WALLS OF HOME THEATER WITH FIBERGLASS BATT INSULATION. PROVIDE & INSTALL 8" BATT INSULATION IN HOME THEATER CEILING. ALL GYPSUM BD. TO BE ATTACHED TO FRAMING THROUGH METAL RESILIENT FURRING CHANNELS @ 16" o.c.
13. READ FOUNDATION DWGS. IN CONJUNCTION WITH LANDSCAPE DWGS. FOR REAR UPPER TERRACE AND FRONT ENTRY DETAILS.
14. SEE DRAWING A6 FOR STRUCTURAL SCHEDULE & CONSTRUCTION ASSEMBLIES.



2 | PART PLAN AT ENTRANCE TERRACE
A2 | SCALE 1/4"=1'-0"

DATE-PLOT
DWGNAME

7	JUL. 25/06	ISSUED FOR STUCCO TENDER
6	DEC. 16/05	PROGRESS UPDATE
5	NOV. 14/05	REVISED REAR TERRACE
4	NOV. 2/05	ISSUED FOR CONSTRUCTION
3	OCT. 26/05	ISSUED FOR CONCRETE TENDER
2	OCT. 18/05	TRUSS PACKAGE
1	SEPT. 4/05	ISSUED FOR BUILDING PERMIT
no.	date	revision

It is the responsibility of the appropriate contractor to check and verify all dimensions on site and report all errors and/ or omissions to the architect.

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Do not scale drawings.

This drawing may not be used for construction until signed.

BARRY J. HOBIN
& ASSOCIATES
ARCHITECTS
INCORPORATED

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613-238-7200 Fax: 613-235-2005
Email: mail@hobinarc.com

project
TREMBLAY RESIDENCE
171 GRANDVIEW RD.

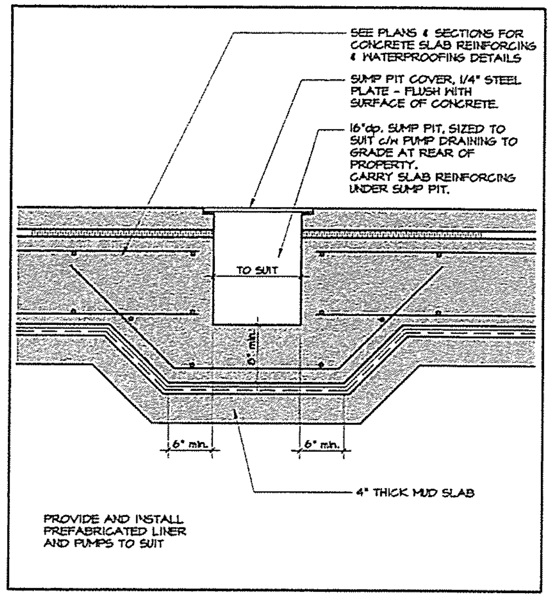
drawing title
FOUNDATION PLAN

drawn	date	scale
RKB / WF	AUG. 2005	1/4" = 1'-0"

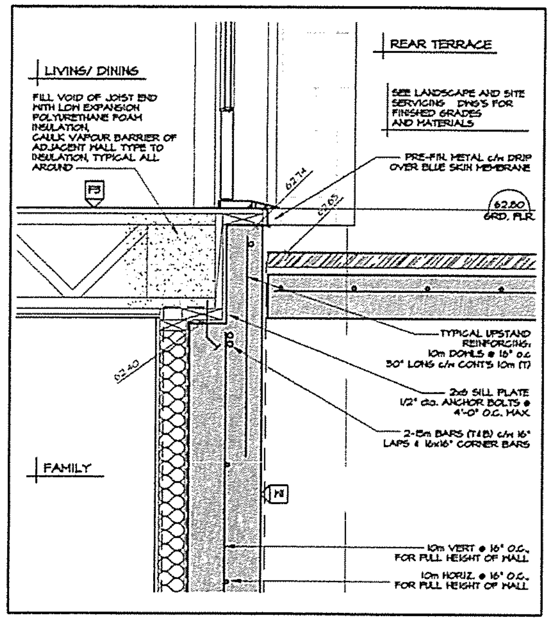
project
0605

drawing no.
A2

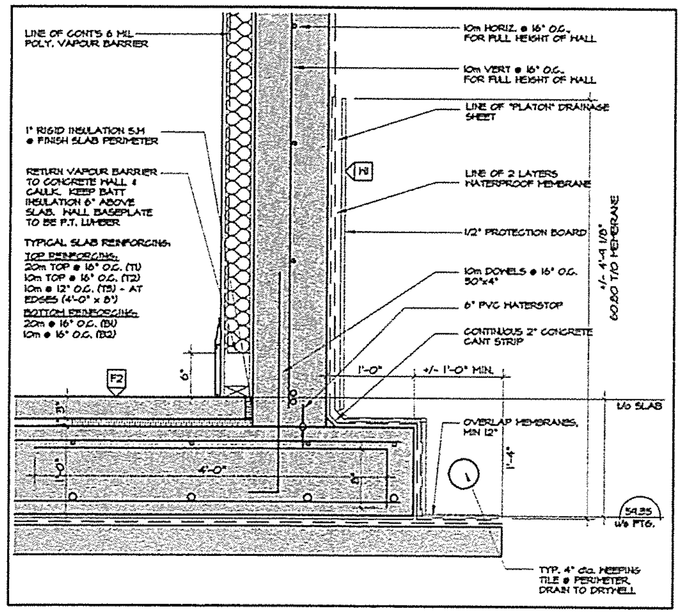
revision no. 6



2 | SECTION AT TYP. SUMP PIT
A3 | SCALE 1"=1'-0"

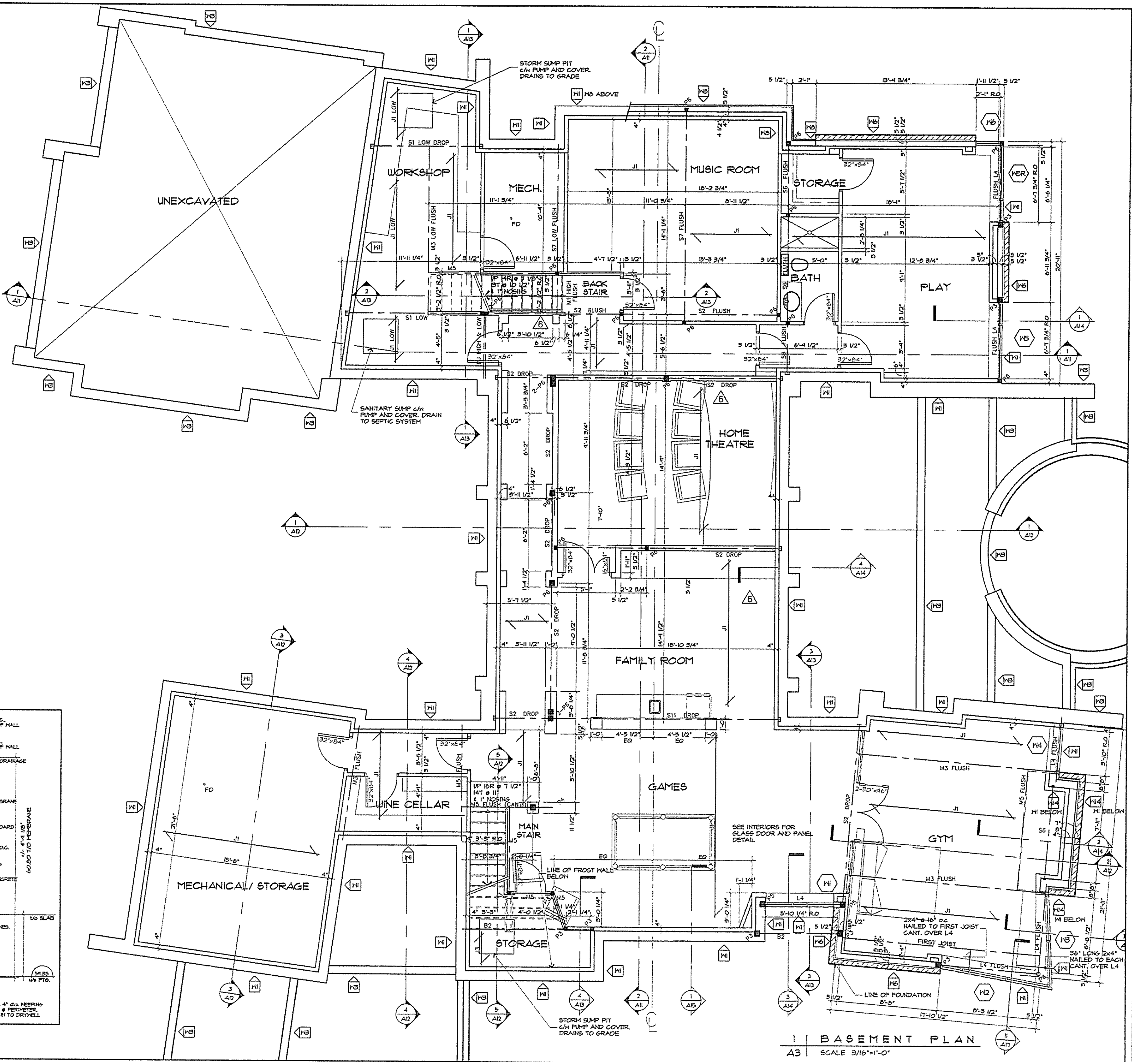


3 | TYP. CONCRETE CURB / TOP OF WALL
A3 | SCALE 1"=1'-0"



4 | WATERPROOF SLAB & WALL
A3 | SCALE 1"=1'-0"

DATE-PLOT
DWGNAME



1 | BASEMENT PLAN
A3 | SCALE 3/16"=1'-0"

GENERAL NOTES:

1. ALL CLOSETS TO RECEIVE 1 ROD AND 2 SHELVES, UNLESS OTHERWISE NOTED.
2. TRUSS AND FLOOR SYSTEM MANUFACTURERS TO SUBMIT SHOP DWG'S PRIOR TO FABRICATION.
3. INSTALL GALVANIZED METAL PAN & DRAIN AT ALL CLOTHES WASHING MACHINE LOCATIONS.
4. LOCATE ALL PLUMBING STACKS AND VENTS ON REAR ROOF.
5. SUPPLY AND INSTALL SMOKE AND CARBON MONOXIDE DETECTORS AS PER 1997 O.B.C. REQUIREMENTS. CONFIRM FINAL LOCATIONS WITH ARCHITECT ON SITE.
6. ADD INSULATION DEPRESSORS AT EACH TRUSS SPACE WHERE NECESSARY TO MAINTAIN MINIMUM 2½" AIR SPACE ABOVE INSULATION.
7. PROVIDE & INSTALL CONTINUOUS 'BLUESKIN' THROUGH WALL FLASHING AT STONE BEARING LEDGE (FOR PERIMETER OF BUILDING). RUN FLASHING UP WALL 8" MINIMUM AT BACKSIDE OF TYVEK, TAPE JOINT.
8. ALL INTERIOR WALLS TO BE TYPE 9, UNLESS NOTED OTHERWISE.
9. DRYWALL WITHIN GARAGE TO BE IMPACT RESISTANT TO 48" AFF.
10. FINAL ROOF/ GIRDER TRUSS LAYOUT BY SUPPLIER MAY REQUIRE MODIFICATIONS TO FRAMING INDICATED.
11. SEE INTERIORS PACKAGE FOR INTERIOR TRIMS, CEILINGS, FIREPLACE, STAIR AND MISC. DETAILS.
12. INSULATE WALLS OF HOME THEATER WITH FIBERGLASS BATT INSULATION. PROVIDE & INSTALL 8" BATT INSULATION IN HOME THEATER CEILING. ALL GYPSUM BD. TO BE ATTACHED TO FRAMING THROUGH METAL RESILIENT FURRING CHANNELS @ 16" o.c.
13. READ FOUNDATION DWGS. IN CONJUNCTION WITH LANDSCAPE DWGS. FOR REAR UPPER TERRACE AND FRONT ENTRY DETAILS.
14. SEE DRAWING A6 FOR STRUCTURAL SCHEDULE & CONSTRUCTION ASSEMBLIES.

no.	date	revision
7	JUL. 25/06	ISSUED FOR STUCCO TENDER
6	JUNE 6/06	PLAN REVISION
5	DEC. 16/05	PROGRESS UPDATE
4	NOV. 2/05	ISSUED FOR CONSTRUCTION
3	OCT. 26/05	ISSUED FOR CONCRETE TENDER
2	OCT. 18/05	TRUSS PACKAGE
1	SEPT. 9/05	ISSUED FOR BUILDING PERMIT

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613-238-7200 Fax: 613-235-2005
Email: mail@hobinarc.com

project
TREMBLAY RESIDENCE
171 GRANDVIEW RD.

drawing title
BASEMENT PLAN & FOUNDATION DETAILS

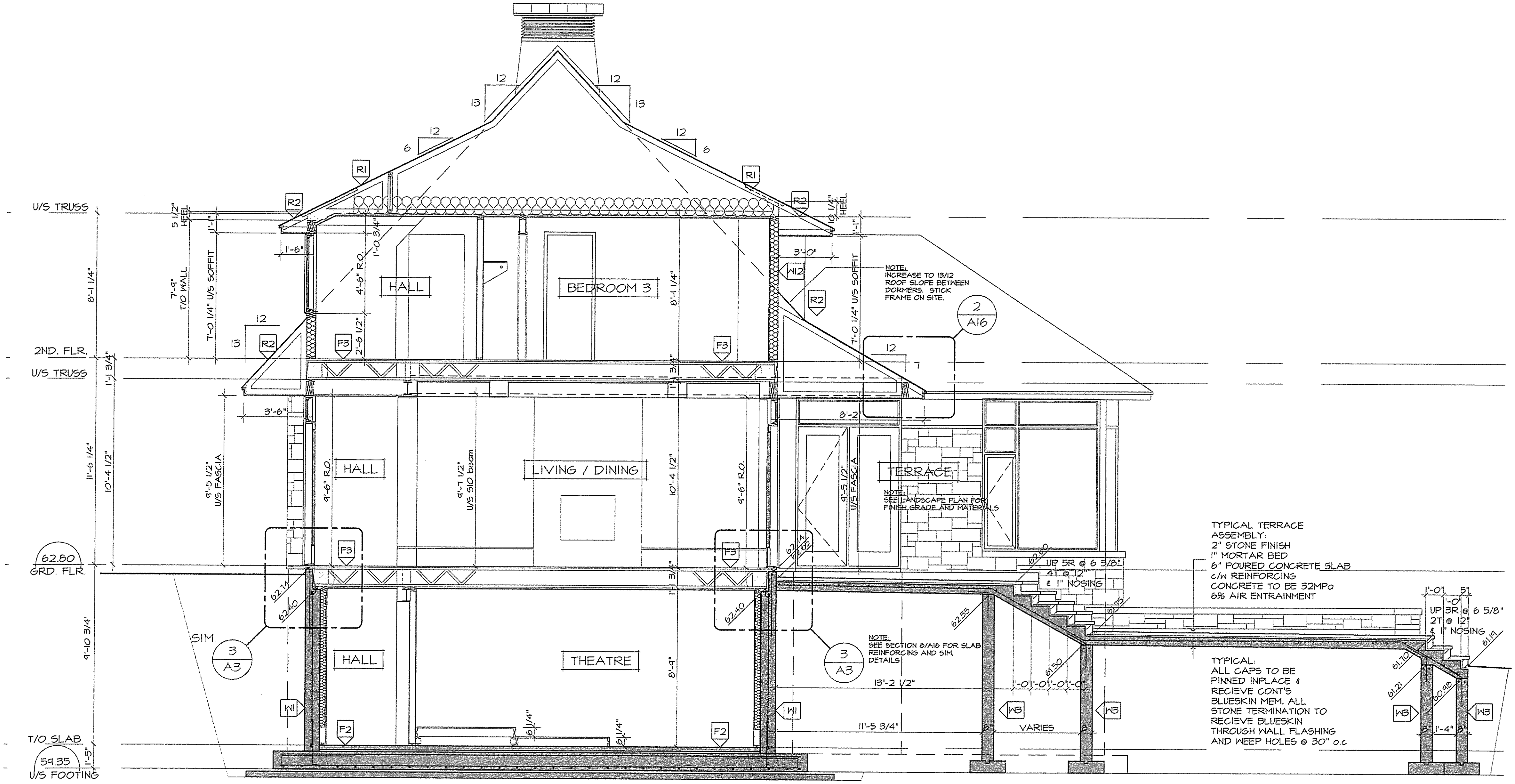
drawn	date	scale
RKB / WF	AUG. 2005	1/4" = 1'-0"

PROJECT
TRUE NORTH

project
0605

drawing no.
A3

revision no. 5



NOTE:
INCREASE TO 13/12
ROOF SLOPE BETWEEN
DORMERS. STICK
FRAME ON SITE.

NOTE:
SEE LANDSCAPE PLAN FOR
FINISH GRADE AND MATERIALS

TYPICAL TERRACE
ASSEMBLY:
2" STONE FINISH
1" MORTAR BED
6" POURED CONCRETE SLAB
c/w REINFORCING
CONCRETE TO BE 32MPa
6% AIR ENTRAINMENT

NOTE:
SEE SECTION 8/A16 FOR SLAB
REINFORCING AND SIM.
DETAILS

TYPICAL:
ALL CAPS TO BE
PINNED INPLACE &
RECIEVE CONT'S
BLUESKIN MEM. ALL
STONE TERMINATION TO
RECIEVE BLUESKIN
THROUGH WALL FLASHING
AND WEEP HOLES @ 30" o.c

STRUCTURAL SCHEDULE:

FOOTING SCHEDULE:

FOUNDATION BASE SLAB - 12" THICK c/w REINFORCING AS PER PLAN. BASE SLAB PROJECTION TO BE 12" PAST EXTERIOR FACE OF CONCRETE WALLS.

OTHER WALL FOOTING- 24"x8" dp CONT. STRIP (AT GARAGE & TERRACE FOUNDATIONS). EXTEND FOOTINGS MIN. 10" PAST ALL THICKENED WALL FACES.

FOOTINGS DESIGNED FOR ALLOWABE BEARING CAPACITY OF 95 KPa TO BE CONFIRMED BY SOILS CONSULTANT PRIOR TO POURING CONCRETE

ALL CONCRETE WALLS/FOOTINGS TO BE MIN. 20 MPa @ 28 DAYS.
GARAGE/PORCH SLABS- 32 MPa & 6% AIR ENTRAINMENT
BSMT. SLABS- 25 MPa

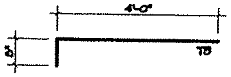
STEPPING OF FOOTINGS TO BE CONFIRMED ON SITE TO SUIT GRADING AND APPROVED BEARING AND FROST COVER.
MAX. FOOTING STEP HEIGHT 24"
MIN. FOOTING RUN 24".

GALVANIZED MASONRY TIES FIXED TO STUDS @ 16" HORIZONTALLY (MAX.) & 24" VERTICALLY (MAX.)

CONCRETE REINFORCING

BOTTOM REINFORCING:
B1 20m (x12'-0") @ 12" o.c.
B2 10m @ 16" o.c.

TOP REINFORCING:
T1 20m @ 16" o.c.
T2 10m @ 16" o.c.
T3 10m @ 12" o.c.
(T3 TYP. AT ALL BASE SLAB EDGES)



WALL TYPE W3 REINFORCING:
2-15m (T) CONT'S c/w 16" LAPS AND 2-15m CORNER BARS AT JUNCTIONS (16x16")

POSTS

P1 TELEPOST
P2 2-2x4/6
P3 3-2x4/6
P4 4-2x4/6
P5 5-2x4/6
P6 HSS 3"x3"x0.188" c/w 5x3/8x9" BOTTOM & TOP PLATE
P7 HSS 4"x4"x0.188" c/w 6x3/8x9" BOTTOM & TOP PLATE
P8 HSS 5.562" o.d x 0.188"

LINTELS

L1 2-2x8
L2 3-2x8
L3 2-2x10 *(U/N)
L4 3-2x10
L5 3-2x12
L6 3-2x6
L7 2-2x6

BEAMS (WOOD)

B1 2-2x8
B2 3-2x8
B3 4-2x8
B4 2-2x10
B5 3-2x10
B6 4-2x10
B7 RESERVED
B8 3-2x6

BEAMS (LVL)

M1 2-1 3/4" x 9 1/2"
M2 3-1 3/4" x 9 1/2"
M3 2-1 3/4" x 13"
M4 3-1 3/4" x 13"
M5 1-1 3/4" x 13"
M6 2-1 3/4" x 11 7/8"
M7 3-1 3/4" x 11 7/8"
M8 2-1 3/4" x 7 1/4"
M9 3-1 3/4" x 7 1/4"

BEAMS (STEEL)

S1 W200 x 21
S2 W200 x 27
S3 W200 x 31
S4 W150 x 30
S5 W150 x 22
S6 W250 x 24
S7 W250 x 33
S8 W200 x 36
S9 W250 x 39
S10 W310 x 60
S11 W250 x 49

JOISTS

J1 13" OPEN WEB WOOD JOISTS "OPEN JOIST 2000"
J2 2x8" CEDAR JOISTS @ 16" o.c
J3 2x8" WOOD JOISTS @ 16" o.c
J4 2x8" WOOD JOISTS @ 12" o.c

NOTE:
JOIST MANU. TO CONFIRM SIZES & SPACING. SUPPLIER TO SUBMIT JOIST PLACEMENT DWG'S PRIOR TO INSTALLATION. JOIST SPACING TO BE 16" o.c MAX.

Ⓣ - TRUSS

Ⓖ - GIRDER TRUSS

NOTES:

1. ALL BEAMS TO BE DROPPED UNLESS OTHERWISE NOTED.
2. ALL LINTELS TO BE L3 UNLESS NOTED OTHER WISE.
3. ALL GUARDS AND RAILS TO MEET O.B.C. 1997
4. FLUSH BEAMS IN BASEMENT TO BE MECHANICALLY ANCHORED TO TOP OF THE FOUNDATION WALL
5. ALL POSTS TO BE TAKEN TO SOUND BEARING
6. CONTRACTOR TO SUBMIT APPROVED SHOP DWG'S TO CITY BUILDING INSPECTOR FOR BOTH FLOOR JOISTS AND ROOF TRUSSES.
7. ALL JOIST HANGERS TO BE HEAVY DUTY TYPE.
8. SET A 1/4" STEEL PLATE IN CONCRETE AT ALL LOCATIONS WHERE STEEL BEAMS BEAR ON CONCRETE.

NOVATECH
Engineers, Planners & Landscape Architects

MEMORANDUM

DATE: 2016-09-01

FROM: PETER JAMES

TO: JOHN RIDDELL

RE: GREYSTONES VILLAGE - PHASE 2 - WATERPROOF BASEMENTS

This memo describes the proposed design principles and construction methods for basements and foundations of houses where the groundwater elevations are expected to be higher than the basement floor elevations.

Two design conditions have been considered – the "normal" groundwater table under stable long-term conditions; and short-term seasonal groundwater elevations during flood conditions. The probable groundwater elevations are discussed in the Golder Associates' report.

Based on current site grades, borehole data, the Golder report, and the calculated 100-year HGLs, it is anticipated that in the most severe case, the pipe 100-year HGL may rise to about 1.5 metres above the basement floor.

In this case, where the short-term HGL elevation is higher than the "standard" underside of footing elevation (300 mm below the basement floor), it is proposed that the basements will be designed as waterproof structures, without foundation drains, and without connections to the stormwater sewer system. Refer to the Golder report for a conservative assessment of potential groundwater levels.

The primary design considerations for the basements will be hydrostatic pressure forces, and selection of appropriate waterproofing systems.

The hydrostatic pressure from the groundwater will create uplift forces on the basements. The basement floor slab and the foundation walls will be designed and reinforced to resist the local hydrostatic pressures; and the weight of the building as a whole (slab, foundation walls, superstructure) will be designed to ensure it is sufficient to resist the entire uplift force. If more weight is required, the slabs and/or walls will be made thicker as necessary.

The construction will be made waterproof to prevent water entry into the basements. This will be achieved in two ways – by designing and reinforcing the slabs and walls to be "crack-free" under the hydrostatic pressure; and by installing a continuous waterproof membrane under the slab, extending up the full height of the foundation walls.

Typical structural details and waterproofing details are shown on sketches WB1 & WB2, attached. These details are based on standard practices for the design of uplift-resistant underground structures; and on standard details developed by waterproofing system manufacturers, used on many projects. The structural design and waterproofing details will conform to or exceed the applicable requirements of the Ontario Building Code.

The waterproofing system will be a rubberized membrane, either a "peel-and-stick" or "torch-on" sheet material, or a hot-applied liquid material. Standard manufacturers' details, for example reinforced internal and external corners, will be used.

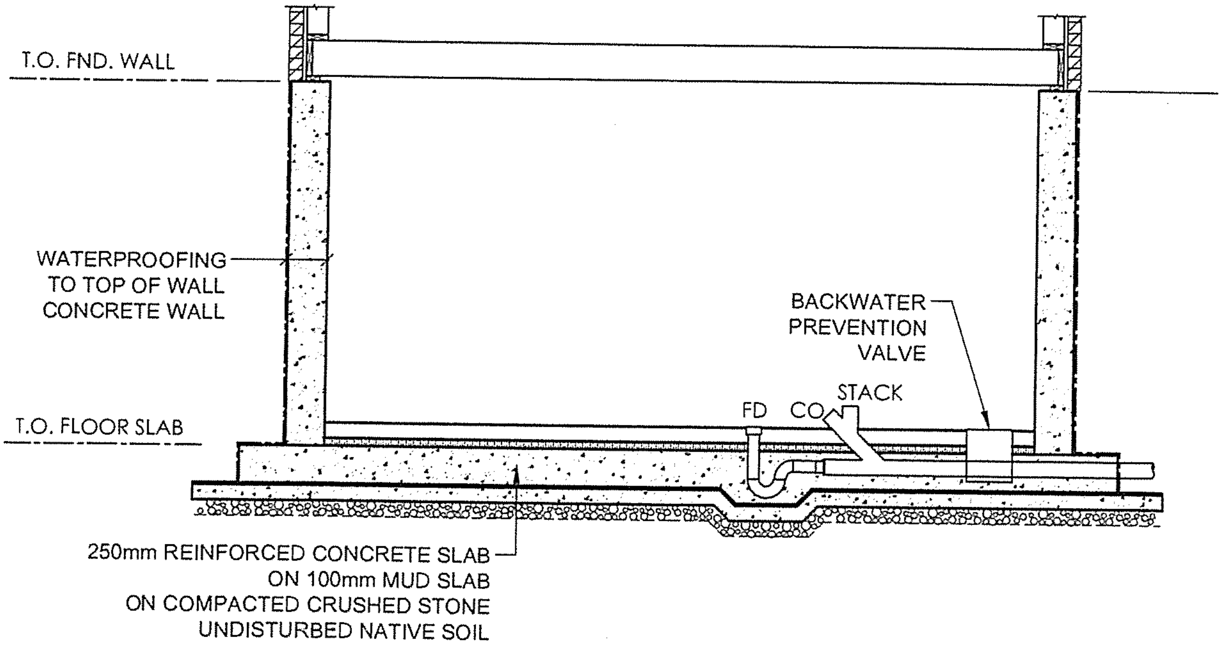
A concrete "mud slab" will be constructed, to provide a smooth clean surface for the under-slab waterproofing system. The under-slab waterproofing system will be covered with membrane protection board, and then fully protected by the structural slab. The waterproofing system on the walls will be lapped and bonded to the under-slab system at the mud slab projections, and covered with membrane protection board before backfilling. The waterproofing system will have both superior protection and a less-demanding environment than similar waterproofing systems installed on slabs above-ground that are typically exposed to wide temperature changes, physical damage, etc.

The basement floor drains and the main plumbing stacks will be connected to the sanitary sewer within the thickness of the structural slab. This will limit penetrations of the waterproofing system to one location, at the edge of the slab, where the waterproofing around the sewer penetration can be properly installed and inspected during construction. There will be no hidden penetrations under the slab.

To minimize the accumulation of incidental surface water around the foundations, eavestrough downpipes and other surface water flows will be directed away from the buildings towards drainage swales, hard surfaces, etc, for collection by the stormwater drainage system. Foundation drains, which ordinarily are installed to collect groundwater that may accumulate outside the foundation so that it cannot enter basements through construction joints and cracks, are not required when basements are waterproofed. Any incidental surface water that does collect at the foundation walls will percolate down the elevation of the stable groundwater.

In conclusion, the proposed design methods and construction details have proven long-term performance histories in similar or more demanding environments, typically subjected to wide seasonal temperature changes, such as waterproofed podium decks and underground water-retaining structures, without maintenance.

For this project the basement structures and the waterproofing systems will be subjected to considerably less-severe conditions, and it can be expected that they will perform in a satisfactory manner for the lifetime of the buildings, with minimal maintenance and at negligible risk to the homeowners.



1 SECTION
WB1 SCALE = 1:50

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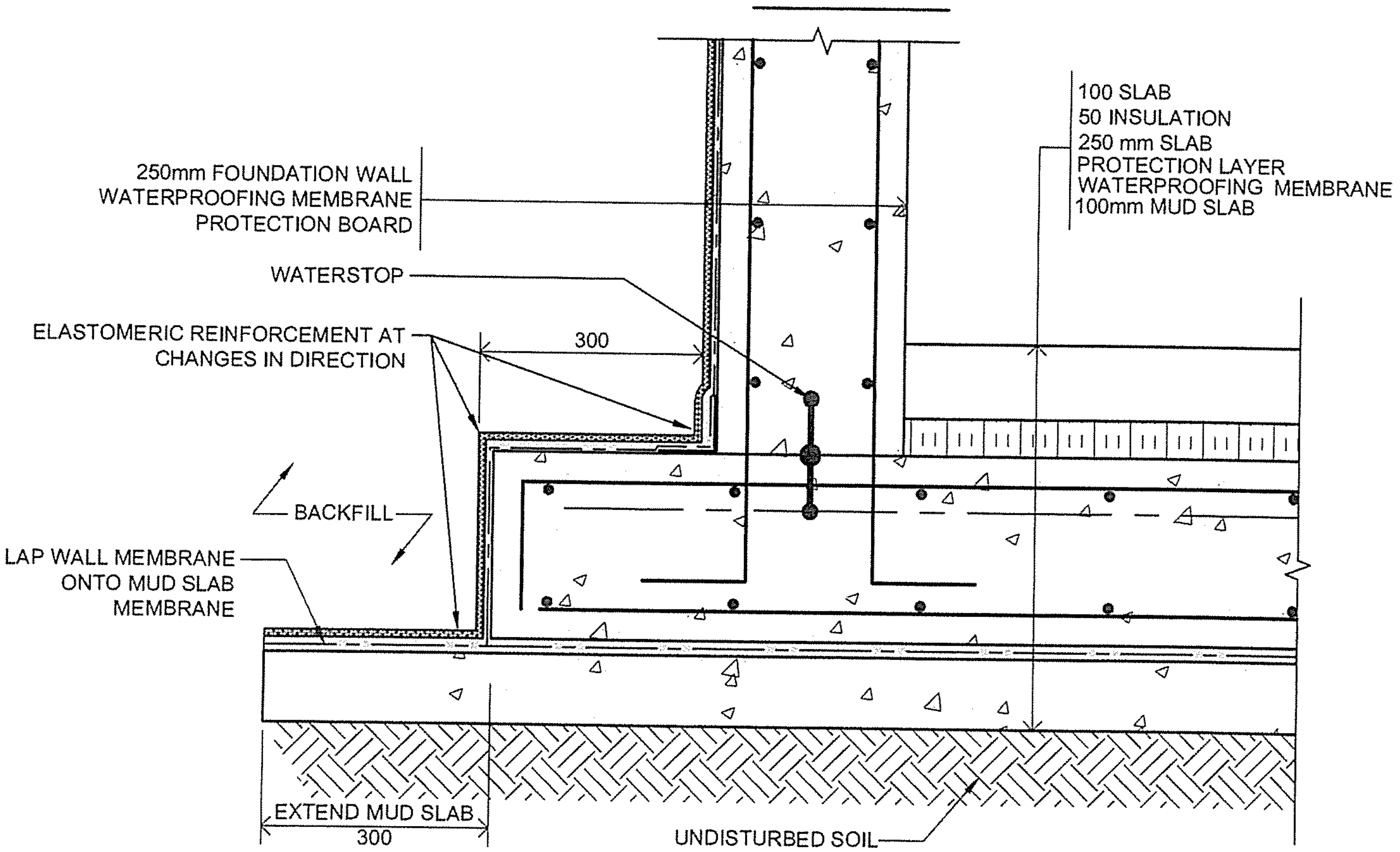
GREYSTONE VILLAGE

WATERPROOF BASEMENT
TYPICAL SECTION

SCALE
AS SHOWN

DATE AUG 2016
JOB 114025
FIGURE WB1

SHT8X11.DWG - 216mmx279mm



1 / WB2 DETAIL
SCALE = 1:10

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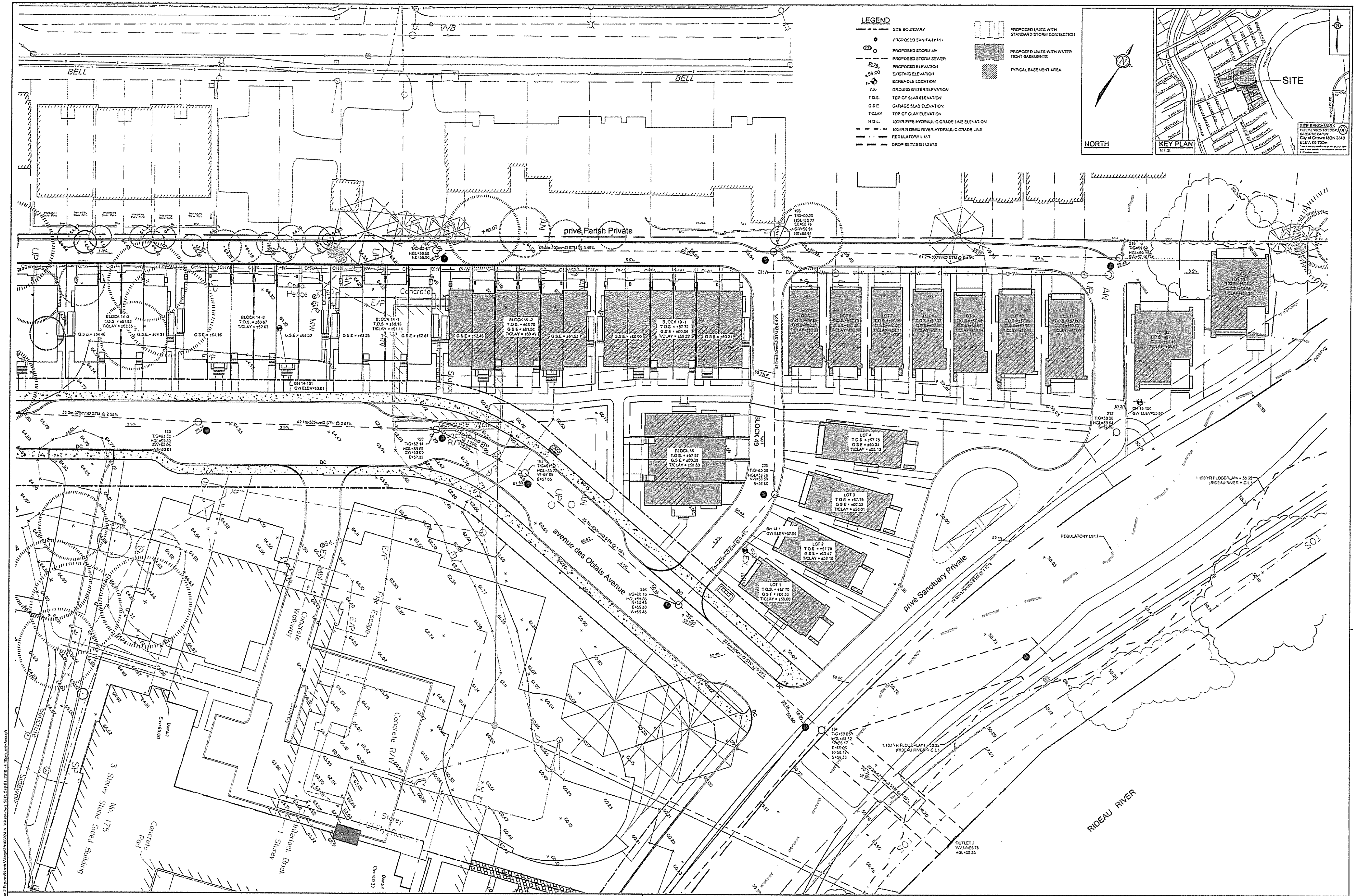
GREYSTONE VILLAGE

WATERPROOF BASEMENT
TYPICAL DETAILS

SCALE
AS SHOWN

DATE	JOB	FIGURE
AUG 2016	114025	WB2



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

2	ISSUED FOR CITY REVIEW / DISCUSSION	SEPT 1.16	JAG
1	ISSUED FOR DISCUSSION PURPOSES	AUG 25.16	MSP

SCALE
1:250

DESIGN JAG
CHECKED MSP
DRAWN MTM
CHECKED JAG

FOR REVIEW ONLY

REGISTERED PROFESSIONAL ENGINEER
J.G. RIDDELL
PROVINCE OF ONTARIO

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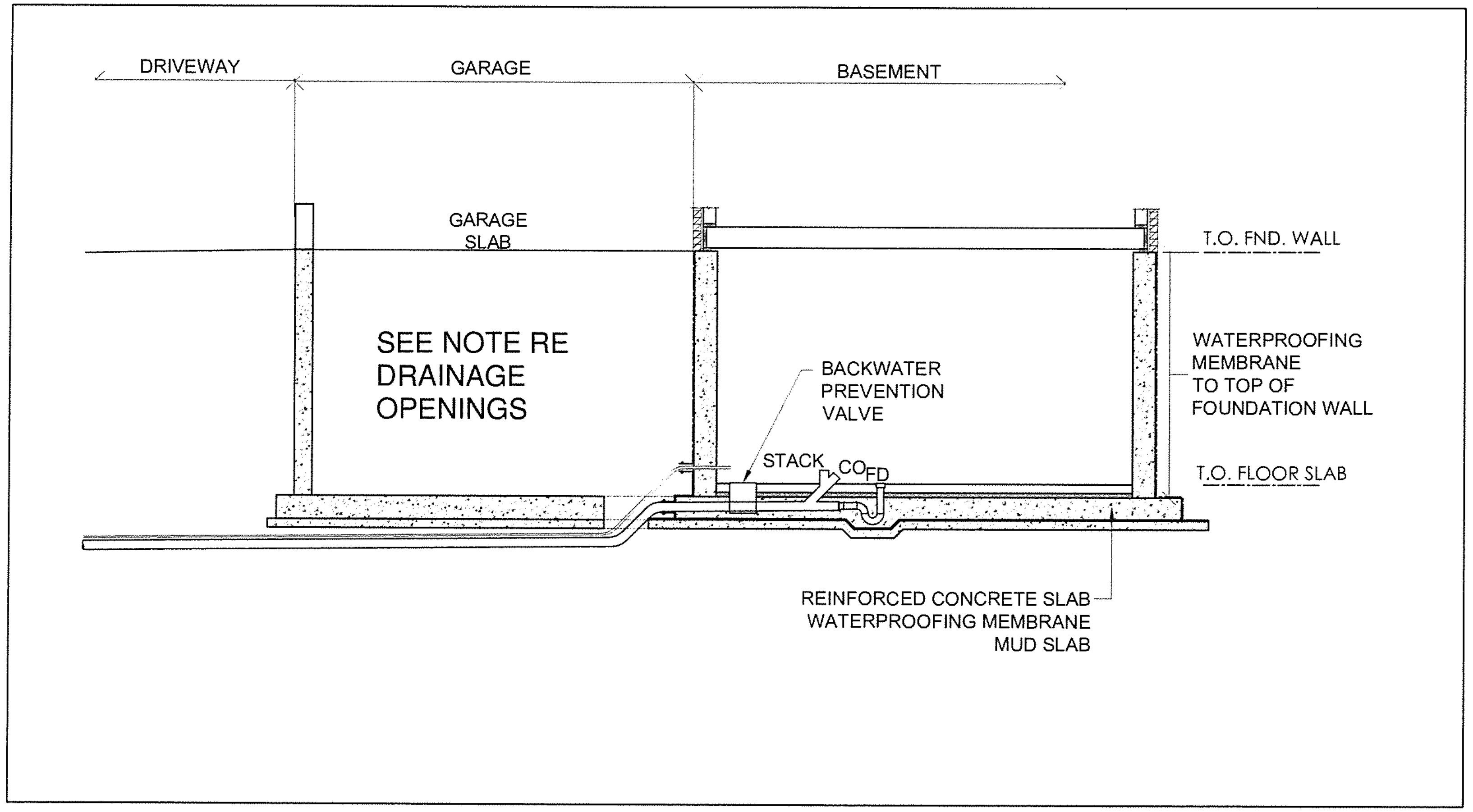
CITY OF OTTAWA
GREYSTONE VILLAGE
175 MAIN STREET

DRAWING NAME
NORTH VILLAGE
PRELIMINARY GRADING,
SERVICING AND WATERPROOFING

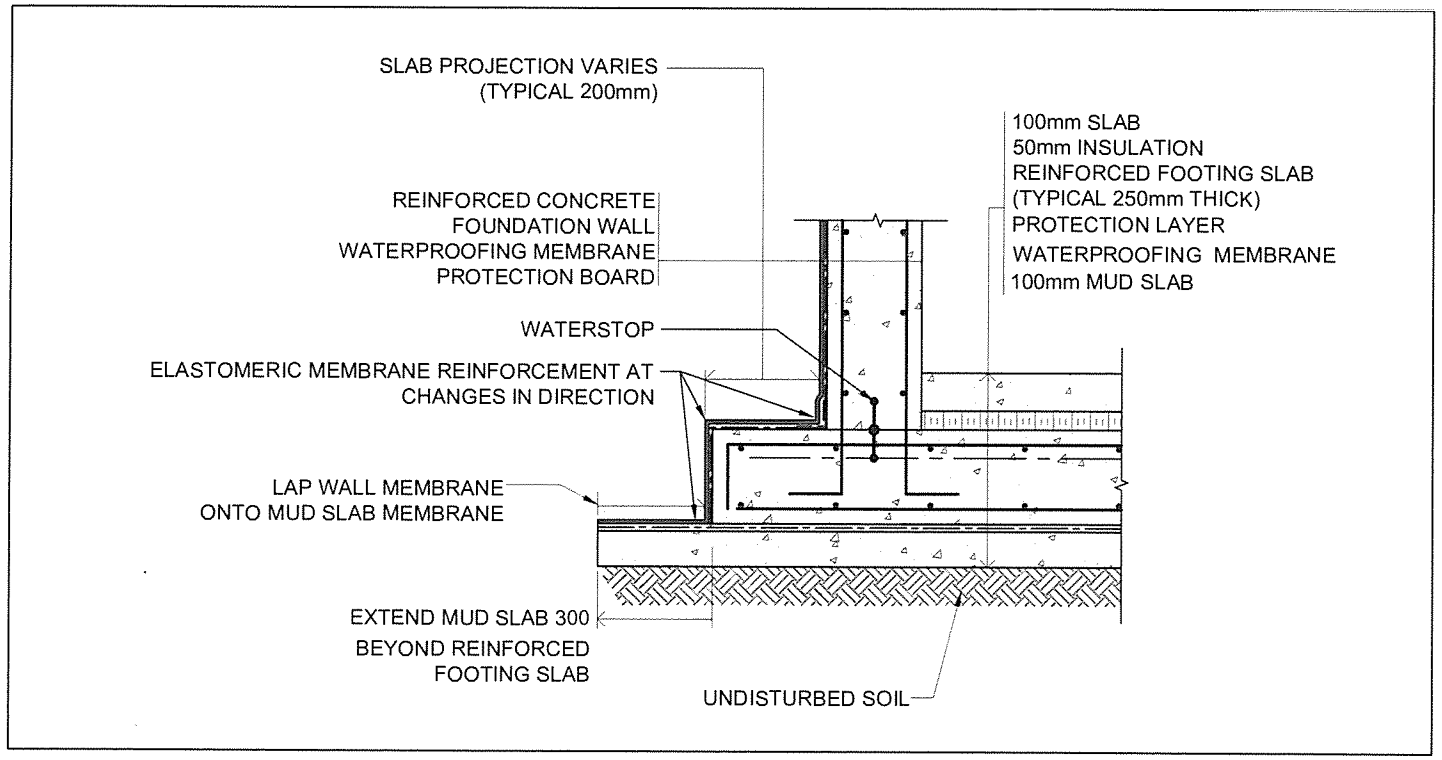
PROJECT No. 114025-00
REV REV # 2
DRAWING No.

Latest Waterproof Basement Details

- SK-WB1 – Typical Section and Detail
- SK-WB2 – Service Penetrations
- SK-WB3 – Reinforcement Layout
- SK-WB4 – Reinforcement Details
- Calculations, Specifications and Product Data



1 WB1 TYPICAL SECTION
SCALE = 1:75



2 WB1 TYPICAL DETAILS
SCALE = 1:20

DRAINAGE OPENINGS:

PROVIDE 150 DIA OR 150 x 150 DRAINAGE OPENINGS THROUGH FOOTING SLABS
GARAGE: 4 OPENINGS
PORCH: 1 OPENING

No.	REVISION	DATE	BY
1.	PRELIMINARY - PRICING	MAR 13/2017	PMJ

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GREYSTONES PHASE 2
WATERPROOFED BASEMENTS

TYPICAL SECTION & DETAIL

SCALE: AS SHOWN

NOV 2016	114025	SK-WB1

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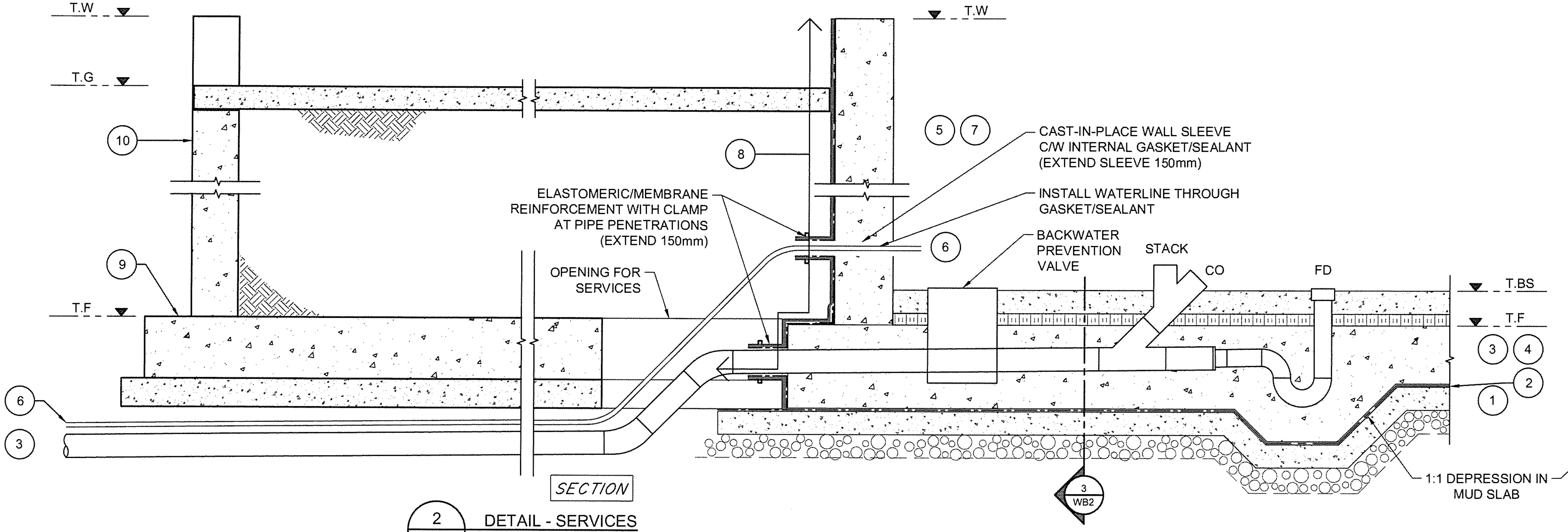
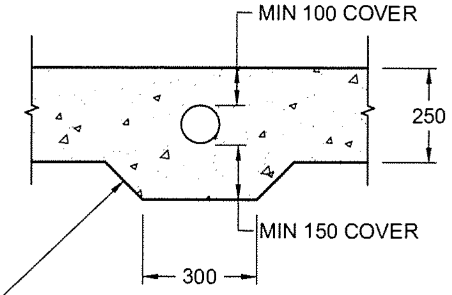
SHT11X17.DWG - 279mmX432mm



2
WB2

DETAIL - SERVICES

SCALE = 1:20



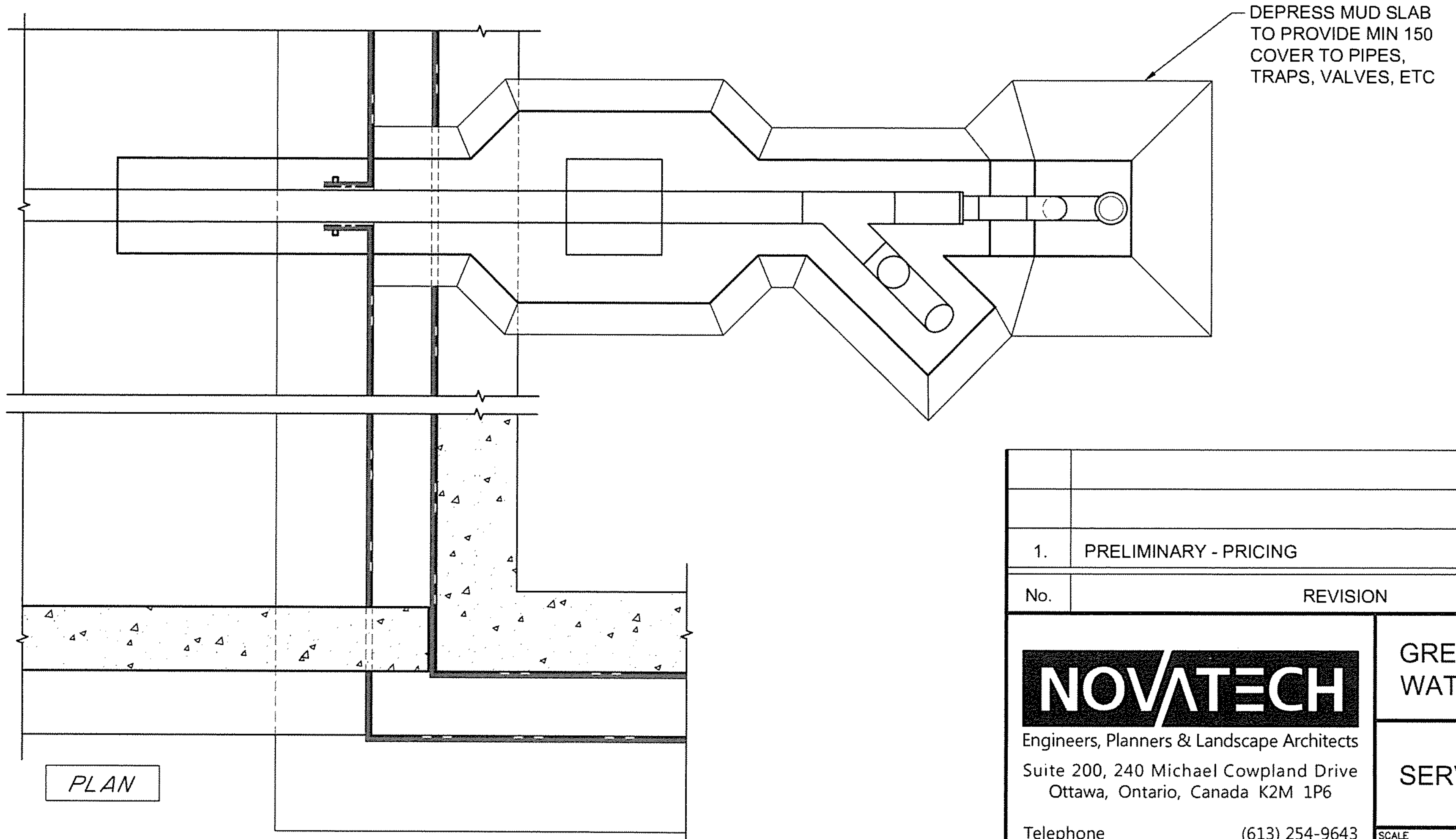
3
WB2

DETAIL - SECTION

SCALE = 1:20

CONSTRUCTION SEQUENCE

1 MUD SLAB
2 WP MUD SLAB
3 SANITARY SEWER
4 HOUSE RAFT
5 HOUSE WALLS
6 WATERLINE
7 CURING - WALLS
8 WP RAFT (EDGE & TOP) & HOUSE WALLS, INCLUDING PENETRATIONS
9 GARAGE RAFT
10 GARAGE WALLS



1
WB2

DETAIL - PLAN

SCALE = 1:20

No.	REVISION	DATE	BY
1.	PRELIMINARY - PRICING	MAR 13/2017	PMJ

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GREYSTONES PHASE 2
WATERPROOFED BASEMENTS

SERVICE PENETRATIONS

SCALE AS SHOWN

DATE FEB 2017
JOB 114025
FIGURE SK-WB2

SHT11X17.DWG - 279mmX432mm

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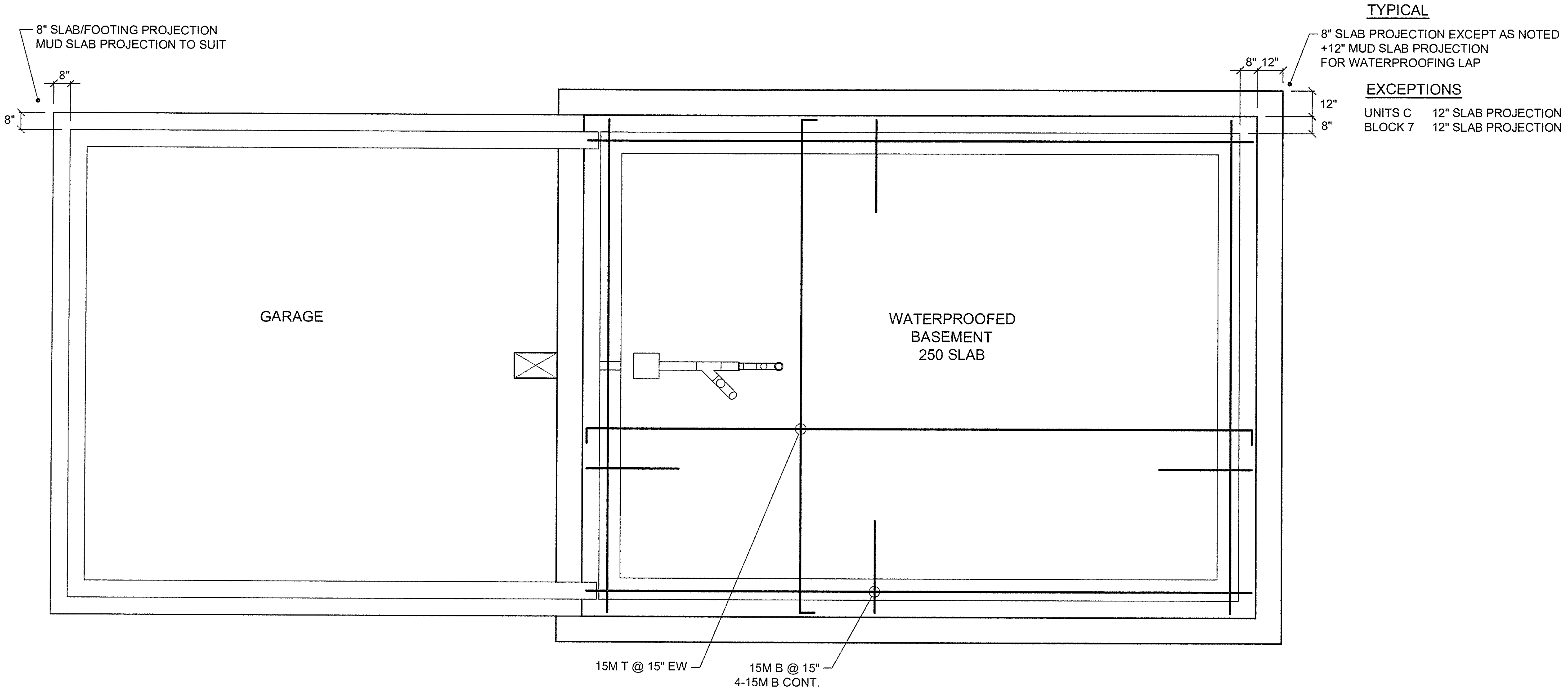
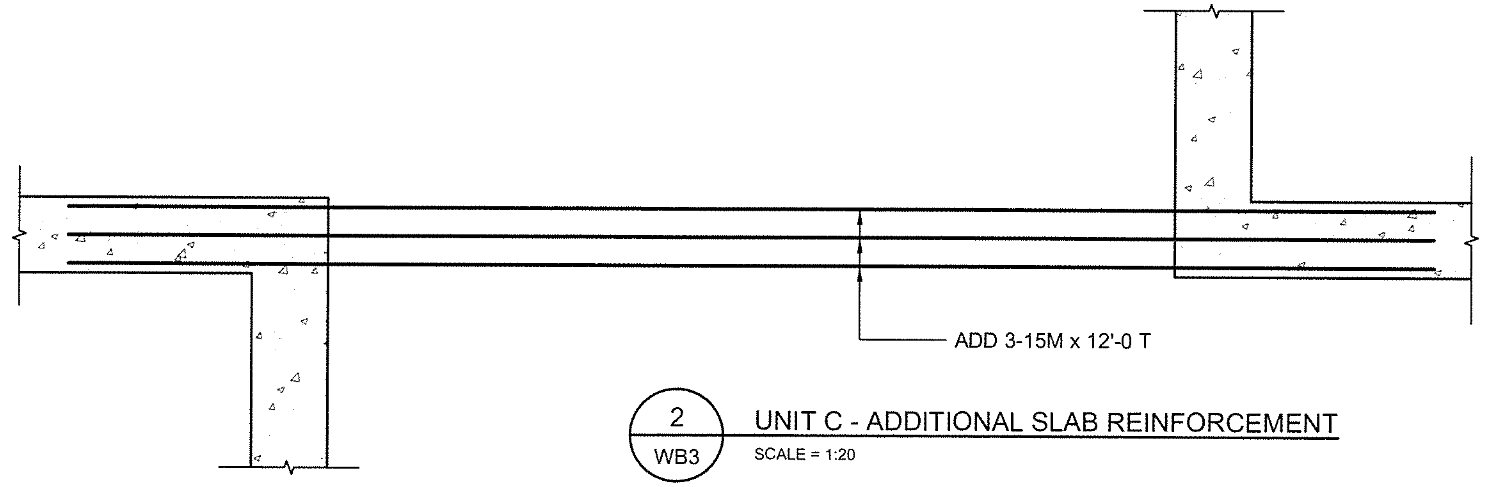


1
WB3
UNITS A, B & C(TOWNHOUSES SIMILAR)
SCALE = 1:50



2
WB3
UNIT C - ADDITIONAL SLAB REINFORCEMENT
SCALE = 1:20

1.	PRELIMINARY - PRICING	MAR 13/2017	PMJ
No.	REVISION	DATE	BY

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GREYSTONES PHASE 2
WATERPROOFED BASEMENTS

REINFORCEMENT LAYOUT

SCALE AS SHOWN

DATE MAR 2017

JOB 114025

FIGURE SK-WB3

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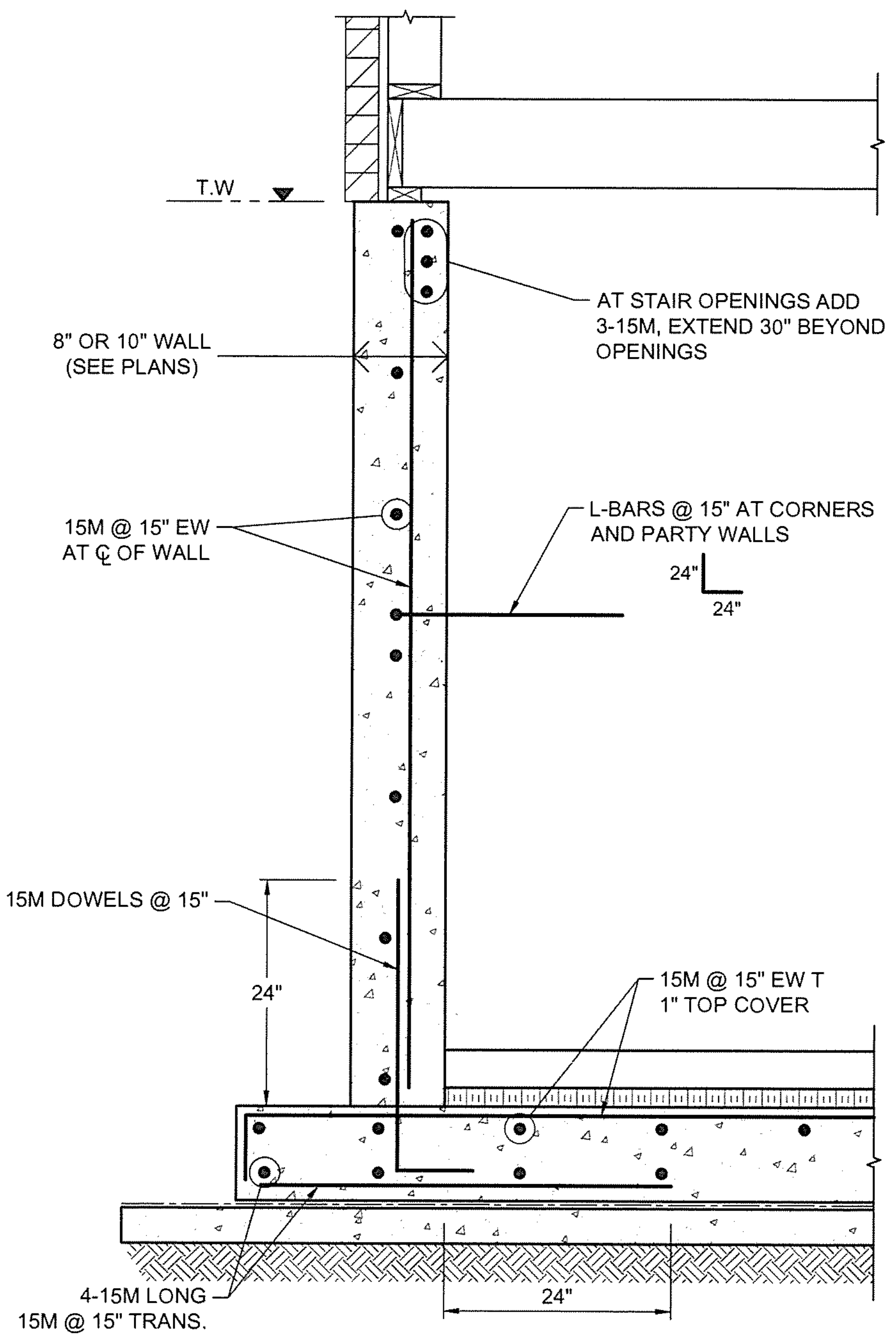
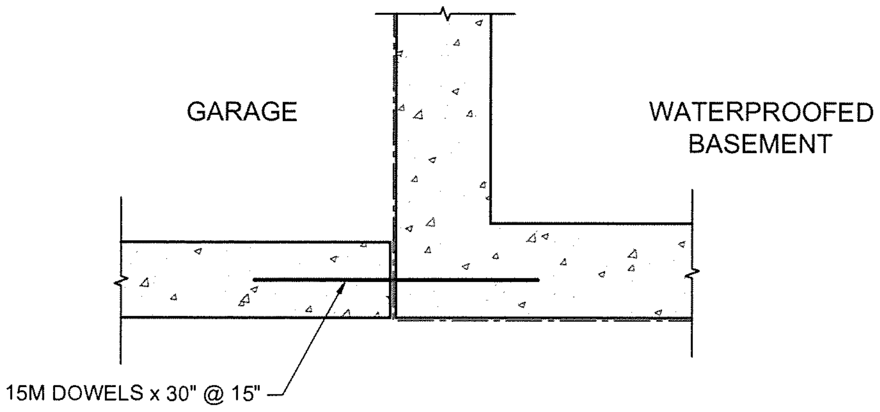
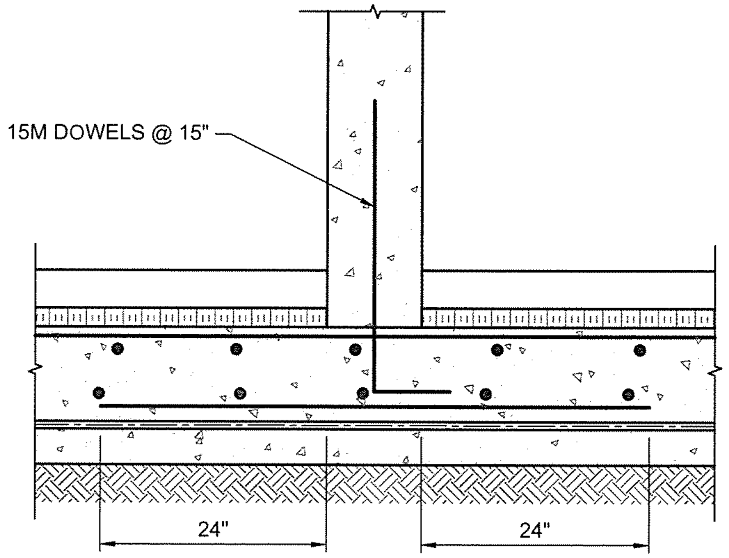


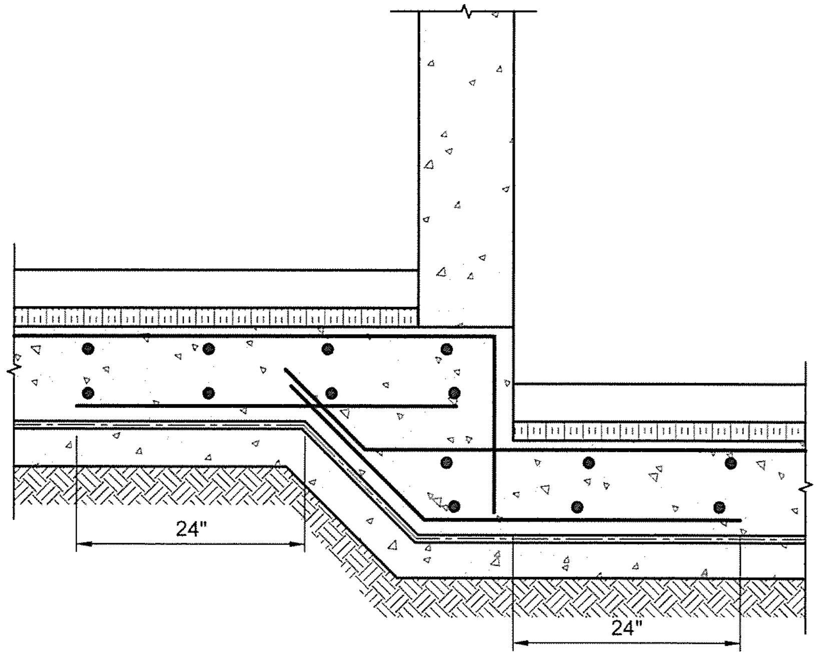
1 WB4 TYPICAL SLAB & WALL DETAILS
SCALE = 1:20



3 WB4 DOWELS INTO WALLS OUTSIDE WATERPROOFED BASEMENT
SCALE = 1:20



2 WB4 TOWNHOUSE PARTY WALL - NO STEP
SCALE = 1:20



4 WB4 TOWNHOUSE PARTY WALL - STEP
SCALE = 1:20

No.	REVISION	DATE	BY
1.	PRELIMINARY - PRICING	MAR 13/2017	PMJ

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GREYSTONES PHASE 2
WATERPROOFED BASEMENTS

REINFORCEMENT DETAILS

SCALE AS SHOWN

DATE MAR 2017
JOB 114025
FIGURE SK-WB4

SHT11X17.DWG - 279mmX432mm

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Part 1 General

1.1 REFERENCE STANDARDS

.1 ASTM International

  .1 ASTM D2178, Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing.

.2 Canadian General Standards Board (CGSB)

  .1 CGSB 37-GP-9Ma, Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing.

  .2 CAN/CGSB-37.29, Rubber-Asphalt Sealing Compound.

  .3 CAN/CGSB-37.50, Hot Applied, Rubberized Asphalt for Roofing and Waterproofing.

  .4 CAN/CGSB-37.51, Application for Hot-Applied Rubberized Asphalt, for Roofing and Waterproofing.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:

  .1 Submit manufacturer's instructions, printed product literature and data sheets. Include product characteristics, performance criteria, physical size, finish and limitations.

.3 Details:

  .1 Submit manufacturer's standard and custom details.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Stand roll materials on end.

.3 Remove only in quantities required for same day use.

.4 Store and protect materials from damage.

.5 Replace defective or damaged materials with new.

1.4 PROJECT/SITE ENVIRONMENTAL REQUIREMENTS

.1 Ambient Conditions.

.2 Temperature, relative humidity, moisture content.

  .1 Apply membranes only when surfaces and ambient temperatures are within manufacturers' prescribed limits.

  .2 Do not install membrane when air and substrate temperature remains 5°C or when wind chill gives equivalent cooling effect.

  .3 Install membrane on dry substrate, free of snow and ice, use only dry materials and apply only during weather that will not introduce moisture into system.

Part 2 Products

2.1 PERFORMANCE REQUIREMENTS

.1 Waterproofing System: capable of resisting moisture/water head of 3 metres.

2.2 COMPATIBILITY

.1 Use compatible products only from one manufacturer.

2.3 PRIMERS

.1 Asphalt primer: to CGSB 37-GP-9Ma.

2.4 RUBBERIZED ASPHALT

.1 Hot applied rubberized asphalt: to CAN/CGSB-37.50.

2.5 REINFORCEMENT

.1 Membrane reinforcement: fabric, glass mat or spun-bonded polyester as recommended by membrane manufacturer.

.2 Crack and joint reinforcement: elastomeric sheet, Butyl, EPDM or Chloroprene rubber, uncured neoprene thickness minimum 1.2 mm.

2.6 SEPARATION SHEET

.1 Asphalt impregnated glass felt: to ASTM D2178, Type IV.

2.7 PROTECTION BOARD

.1 6 mm board, compatible with systems materials, recommended by system manufacturer.

2.8 SEALERS

.1 Plastic cement: hot rubberized asphalt membrane.

.2 Sealing compound: to CAN/CGSB-37.29, rubber asphalt type.

.3 Sealant: asbestos-free sealant, compatible with systems materials, recommended by system manufacturer.

2.9 FIXING BARS

.1 Metal bars 3 mm thick x 25 mm wide, predrilled for fasteners at 225 mm on centre.

2.10 CLAMPING RINGS

.1 Adjustable, non corrosive metal rings.

2.11 LATEX FILLER

.1 Filler: latex modified cement.

Part 3 Execution

3.1 SUBSTRATE EXAMINATION

.1 Verify that conditions of substrate are acceptable in accordance with manufacturer's written instructions.

.2 Prior to start of Work make sure:

  .1 Substrates are firm, straight, smooth, dry, free of snow, ice or frost, contamination and swept clean of dust and debris.

  .2 Curbs have been built.

  .3 Drains have been installed at proper elevations relative to finished surfaces.

  .4 Sleeves, vents, pipes and other items passing through substrates receiving work of this Section are properly and rigidly installed.

3.2 PREPARATION

.1 Free substrates from curing compounds, dust and loose particles, grease, paint, frost, form oil and other material detrimental to bond of membrane materials.

.2 Fill surface honeycomb depressions and voids with latex filler.

.3 Apply primer to dry substrate in accordance with CAN/CGSB-37.51.

.4 If metal connectors used, treat connectors and decking with rust proofing or galvanization.

3.3 MEMBRANE

.1 Install hot applied rubberized asphalt, reinforcement fabric and flashings in accordance with CAN/CGSB-37.51.

.2 Heat membrane in double shell indirect fired melter using high flash point oil as heat transfer medium. Equip melter with positive mechanically operated agitator, and thermometers. Under no circumstances is membrane material to be heated in direct heating kettle.

.3 Reinforce substrate cracks less than 3 mm wide with layer of hot rubberized asphalt 300 mm wide centred on crack and 150 mm wide fabric reinforcing sheet embedded into it.

.4 Reinforce substrate cracks larger than 3 mm with layer of hot rubberized asphalt 300 mm wide centred over crack and 225 mm wide strip of standard thickness elastomeric reinforcing sheet embedded into it.

.5 At penetrations, provide standard elastomeric reinforcing sheet around protrusions through membrane. Set and seal with membrane and clamping ring. Install prefabricated metal sleeves for substrate perforations.

3.4 MEMBRANE PROTECTION

.1 Protect from traffic and damage.

.2 Place plywood runways over work to enable movement of material and other traffic.

.3 At end of each day's work or when stoppage occurs due to inclement weather, provide protection for completed Work and materials out of storage.

.4 Seal and ballast exposed edges

3.5 SEPARATION SHEET

.1 Place separation sheet in asphalt while still hot enough to assure good bond but not so hot as to damage sheet.

.2 Begin application at low end, lapping sheets 50 mm.

.3 Carry sheet up vertical faces over rubberized asphalt while still warm.

3.6 OVERLAY BOARD

.1 Ensure membrane is undamaged before application of protection board.

.2 Install protection board while rubberized asphalt membrane is still "tacky". Lap 10 mm to 25 mm to ensure complete coverage.

3.7 FIELD QUALITY CONTROL

.1 Inspection and testing of membrane application will be carried out by testing laboratory designated by Consultant.

.2 Do not conceal waterproofing until inspection and testing are completed and approved by Consultant.

3.8 CLEANING

.1 Leave Work area clean at end of each day.

END OF SECTION

Greystones Phase 2
Waterproofed Basements

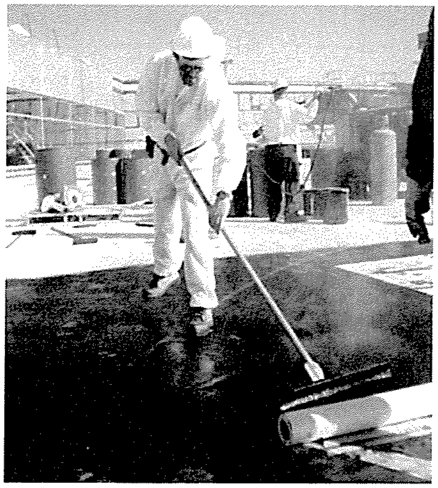
Project No: **114025**
Date: **2017-03-13**

Block	Unit	Type	Est Design GWL	Approx Ext Grade	Ground ToGF	Basmt ToS	US Raft	Top FdnW	FdnW proj
							to US raft		Fdn Wall ht
						2.97	0.40		2.55
14	2-12	C	58.50	59.45	60.24	57.27	56.87	59.82	0.37
	2-13	C	58.50	59.50	60.20	57.23	56.83	59.78	0.28
16	2-1	A	58.50	59.15	60.87	57.90	57.50	60.45	1.30
	2-2	A	58.50	59.30	60.79	57.82	57.42	60.37	1.07
	2-3	A	58.50	59.40	60.73	57.76	57.36	60.31	0.91
	2-4	A	58.50	59.55	60.69	57.72	57.32	60.27	0.72
	2-10	A	58.50	59.50	60.38	57.41	57.01	59.96	0.46
	2-11	A	58.50	59.45	60.29	57.32	56.92	59.87	0.42
16	2-5	B	58.50	60.15	61.13	58.16	57.76	60.71	0.56
	2-6	B	58.50	60.10	61.04	58.07	57.67	60.62	0.52
	2-7	B	58.50	59.95	60.86	57.89	57.49	60.44	0.49
	2-8	B	58.50	59.75	60.65	57.68	57.28	60.23	0.48
	2-9	B	58.50	59.60	60.48	57.51	57.11	60.06	0.46
							to US raft		Fdn Wall ht
						2.61	0.40		2.24
5	21	T	60.50	62.30	63.34	60.73	60.33	63.28	0.98
	22	T	60.50	62.20	63.34	60.73	60.33	63.28	1.08
	23	T	60.50	62.15	62.88	60.27	59.87	62.82	0.67
	24	T	60.50	62.15	62.88	60.27	59.87	62.82	0.67
	25	T	60.50	61.85	62.88	60.27	59.87	62.82	0.97
	26	T	60.50	61.85	62.88	60.27	59.87	62.82	0.97
6	27	T	60.00	61.30	62.17	59.56	59.16	62.11	0.81
	28	T	60.00	61.30	62.17	59.56	59.16	62.11	0.81
	29	T	59.50	60.90	61.71	59.10	58.70	61.65	0.75
	30	T	59.50	60.90	61.71	59.10	58.70	61.65	0.75
	31	T	59.50	60.50	61.71	59.10	58.70	61.65	1.15
	32	T	59.50	60.50	61.71	59.10	58.70	61.65	1.15
7	33	T	59.50	60.20	60.93	58.32	57.92	60.87	0.67
	34	T	59.50	60.20	60.93	58.32	57.92	60.87	0.67
	35	T	59.50	60.20	60.93	58.32	57.92	60.87	0.67
	36	T	59.50	60.20	60.93	58.32	57.92	60.87	0.67

MONOLITHIC MEMBRANE 6125®/
MONOLITHIC MEMBRANE 6125®EV

HYDROTECH®

Tech Data



1. Product Name

Monolithic Membrane 6125® and Monolithic Membrane 6125®EV (environmental grade).

2. Product Description

Basic Use

Monolithic Membrane 6125 (MM6125®) is designed for use as a waterproofing and roofing membrane, typically on concrete structures in vertical and horizontal applications such as roof decks, parking decks, reflecting pools, plazas, mechanical room sub-floors, foundation walls, mud slabs, tunnels or planters. MM6125 is available in an environmental grade, MM6125®EV, for Garden Roof®/green roof and LEED credit opportunities.

Limitations

- MM6125/MM6125EV is not intended as an exposed or traffic-bearing membrane.
- Do not install MM6125/MM6125EV over lightweight structural concrete without prior written approval from Hydrotech.
- Lightweight insulating concrete is not an acceptable substrate.
- For applications below 0°F, consult Hydrotech.

Composition and Materials

MM6125EV is a hot-applied rubberized asphalt specially formulated from refined asphalts, synthetic rubber and inert clay filler. MM6125EV can be formulated with up to 25% post-consumer recycled content.

Container/Weight/Coverage

MM6125/MM6125EV is packaged in cardboard cartons, with a single 40 lb. cake of membrane per carton. The membrane is also available in metal 55 gallon drums weighing approximately 500 lbs. Each drum contains 8-10 cakes of membrane (approximately 50 lbs. each) which are double wrapped in low density polyethylene.

PHYSICAL PROPERTIES

Property	Requirement	Test Method
Flash Point	500° F (240° C)* <500° F (260° C)*, MM6125EV	CGSB 37.50-M89, ASTM D-92
Low Temperature Crack Bridging Capability	No cracking, adhesion loss, or splitting	CGSB 37.50-M89
Water Vapor Permeability	1.7 ng/Pa(s)m max (0.027 perm)	CGSB 37.50-M89 ASTM E-96, Procedure E
Water Resistance (5 days/50° C)	No delamination, blistering, emulsification, or deterioration	CGSB 37.50-M89
Water Absorption	Gain in weight 0.35 g max Loss in weight 0.18 g max	CGSB 37.50-M89
Elasticity/Ratio of Toughness to Peak Load	Min. toughness of 5.5 joules (48.67 in pound)/.04 (1.50)	CGSB 37.50-M89
Viscosity	2-15 seconds	CGSB 37.50-M89
Heat Stability	No change in viscosity, penetration, flow or low temperature flexibility	CGSB 37.50-M89
Low Temperature Flexibility (-25° C)	No delamination, adhesion loss, or cracking	CGSB 37.50-M89
Penetration	@ 77°F (25°C) max 110 @ 122°F (50°C) max 200	CGSB 37.50-M89 ASTM D-5329
Flow	@ 140°F (60°C) 3.0mm-max	CGSB 37.50-M89 ASTM D-5329
Softening Point	180°F (82°C)	ASTM D-36
Elongation	1000% min	ASTM D-5329
Resiliency	40% min	ASTM D-5329
Bond to Concrete (0°F, -18°C)	Pass	ASTM D-5329
Hydrostatic Pressure Resistance	100 psi (=231 foot head of water)	ASTM D-08.22, Draft 2
Acid Resistance	Pass – Nitric Acid Pass – Sulfuric Acid	ASTM D-896-84 Procedure 7.1 Note 8
Salt Water Resistance (20% sodium carbonate and calcium chloride)	No delamination, blistering, emulsification, or deterioration	ASTM D-896 similar
Fertilizer Resistance (undiluted 15/5/5 nitrogen /phosphorus/potash)	No delamination, blistering, emulsification, or deterioration	ASTM D-896 similar
Animal Waste Resistance	No deterioration	3 year exposure
Solids Content	100% – no solvents	
Shelf Life	10 years (sealed containers)	
Specific Gravity	1.25	

* or alternatively not less than 77°F (25°C) above the manufacturer's maximum recommended application temperature.

The weight of the installed membrane is approximately 1.17 pounds per square foot for the 180 mils thick standard assembly. For the fabric reinforced assembly the weight of the installed membrane is approximately 1.4 pounds per square foot.

The fabric reinforced assembly for waterproofing/roofing applications is required for the following conditions:

- Over extremely rough substrates
- Retrofit applications
- Over wood plank and plywood substrates
- Over gypsum board secured to metal deck substrates
- Over concrete block units
- Or, as otherwise directed by Hydrotech

This type of installation consists of a coat of membrane at a minimum thickness of 90 mils, a reinforcing fabric (Flex Flash F) embedded into it followed by a second coat of membrane applied at a minimum thickness of 125 mils.

Applicable Standards

Meets or exceeds the performance requirements of The Canadian General Standards Board, CGSB-37.50-M89 and applicable ASTM Test Methods.

3. Technical Data

Typical physical properties of Monolithic Membrane 6125® and Monolithic Membrane 6125®EV are shown in Table 1 (on first page).

4. Installation

Surface Preparation

All concrete surfaces must be clean, dry, free of voids, projections, loose material, laitance, dust, oil, unapproved curing compounds or other contaminants. Hydrotech recommends structural weight concrete to cure/dry 28 days, minimum 14 days, prior to the application of the membrane. Concrete must have a wood-float or wood troweled finish. All exposed metal shall be free of paint, oil, rust and contaminants.

Priming

Hydrotech's Surface Conditioner should be spray applied to concrete at a rate of approximately 300 to 600 square feet per gallon. Allow surface conditioner to dry thoroughly before membrane is to be applied. Other substrates such as wood and metal do not need to be primed.

Application

Use a double-jacketed, oil-bath or air jacketed melter with mechanical agitation specifically designed for preparation of hot-applied, rubberized asphalt materials. Melter must be capable of maintaining the membrane temperature between 350°F and 400°F (177°C-204°C). Construction joints, control joints and all cracks greater than 1/16" shall be treated with a 125 mil coat of MM6125®/MM6125®EV. All flashing and detail work should be completed prior to the application of the membrane. MM6125/MM6125EV may be squeegee applied on to horizontal surfaces and hand troweled or roller applied on to vertical surfaces.

For the standard assembly MM6125/MM6125EV should be applied at 180 mils (3/16", 4.8mm), minimum 125 mils (1/8", 3.2mm) in a continuous, monolithic coating.

For the fabric reinforced assembly MM6125/MM6125EV is initially applied to the substrate at a minimum thickness of 90 mils. The fabric reinforcing (Flex Flash F) is embedded into the membrane while it is still warm and tacky. A second coat of MM6125/MM6125EV is then applied at a minimum thickness of 125 mils, fully encapsulating the fabric reinforcing within the membrane.

If a leak test is to be conducted, it may be carried out electronically or by flood testing. For flood testing, submerge the membrane in a minimum depth of 2" of ponding water for 48 hours after the membrane and protection layer are installed.

Complete MM6125/MM6125EV specifications and guideline details are available upon request.

Precautions

Use in well ventilated area. In areas with limited ventilation, wear a positive pressure air supplied niosh/MSMA approved respirator. Avoid skin and eye contact. User must read container label and Material Safety Data Sheets for health and safety precautions prior to use.

5. Availability and Costs

Availability

Through American Hydrotech, Inc. Sales Representatives worldwide.

Costs

MM6125/MM6125EV is competitively priced. Contact your local American Hydrotech, Inc. representative or Hydrotech directly at:

American Hydrotech, Inc.
303 East Ohio Street
Chicago, IL 60611-3387
Phone 312.337.4998
Fax 312.661.0731

6. Guarantees

Contact American Hydrotech, Inc. for specific warranty information.

7. Maintenance

None required. Damaged Monolithic Membrane 6125/6125EV is easily repaired by removal of the damaged material and coating with new Monolithic Membrane 6125/6125EV.

Technical Service

Technical support is provided by a trained network of sales representatives and a Technical Services Department.

HYDROTECH

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303 East Ohio Street, Chicago, Illinois 60611
800.877.6125; 312.337.4998
312.661.0731 (fax)
info@hydrotechuso.com

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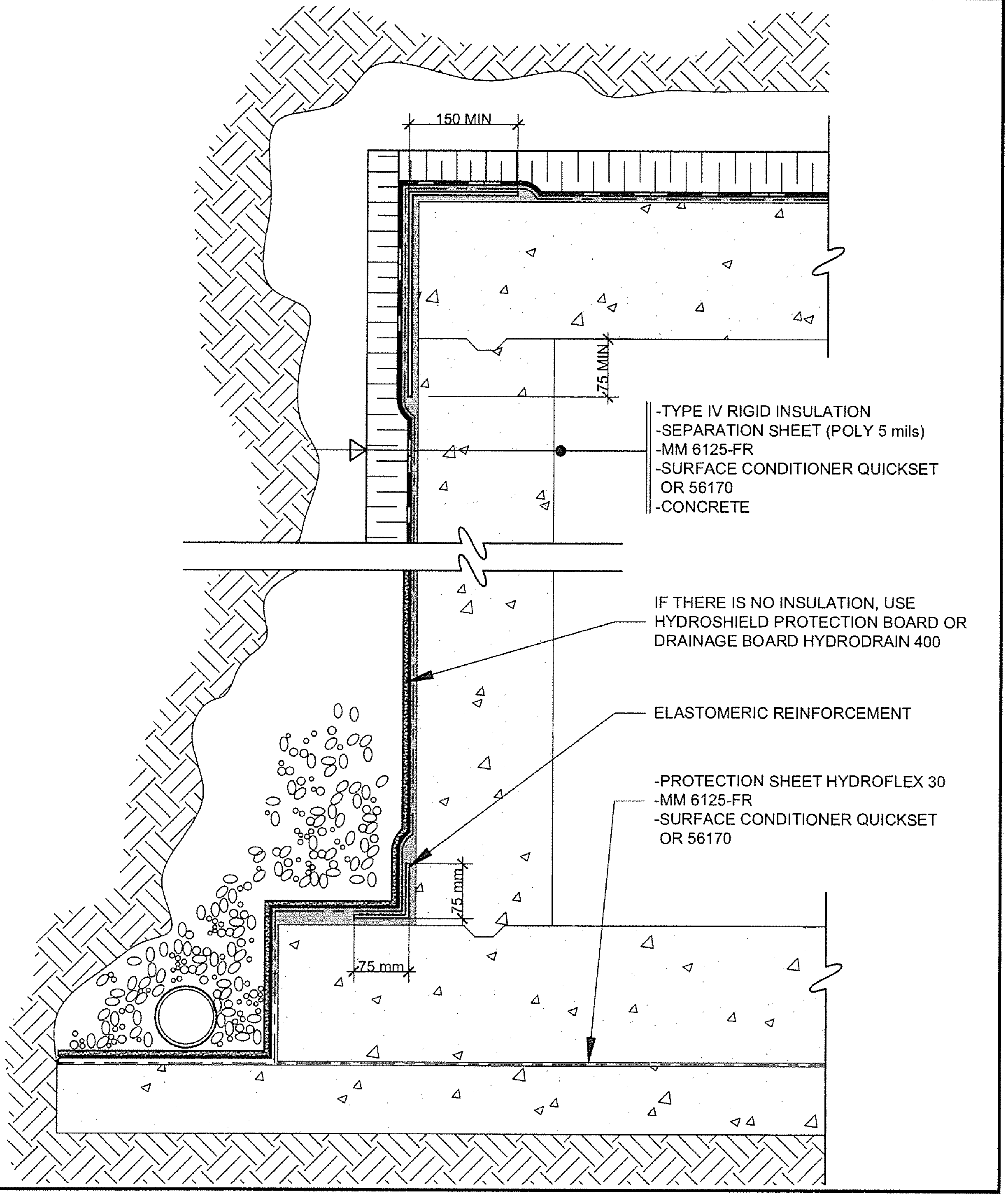

-TYPE IV RIGID INSULATION
-SEPARATION SHEET (POLY 5 mils)
-MM 6125-FR
-SURFACE CONDITIONER QUICKSET
OR 56170
-CONCRETE

IF THERE IS NO INSULATION, USE HYDROSHIELD PROTECTION BOARD OR DRAINAGE BOARD HYDRODRAIN 400

ELASTOMERIC REINFORCEMENT

-PROTECTION SHEET HYDROFLEX 30
-MM 6125-FR
-SURFACE CONDITIONER QUICKSET
OR 56170

HYDROTECH™

MONOLITHIC
MEMBRANE
#6125
WATERPROOFING SYSTEMS

HYDROTECH MEMBRANE CORP.

FONDATION WALL AND
MUD SLAB

NO SCALE	WC–1A