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39 Years

Proposed Residential Development
1500 Merivale Road

Serviceability and Stormwater Management Report

Proposed Residential Development
1500 Merivale Road

Serviceability and Stormwater Management Report

Prepared for:

Claridge Homes

Prepared By:

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

September 3, 2021

Novatech File: 121009
Ref No. R-2021-121

NOVATECH
Engineers, Planners & Landscape Architects

September 3, 2021

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

Attention: **Mr. Santosh Kuruvilla**

Dear Sir:

Reference: **1500 Merivale Road - Claridge Development**
Serviceability and Stormwater Management Report

Enclosed is the Serviceability and Stormwater Management Report for the proposed 1500 Merivale Road development located along Baseline Road, Merivale Road and Clyde Avenue in the City of Ottawa. This report is submitted in support of the site plan application and outlines how the site will be serviced with public infrastructure.

Trusting this report is adequate for your purposes. Should you have any questions, or require additional information, please contact me.

Yours truly,

NOVATECH

Greg MacDonald, P. Eng.
Director, Land Development and Public Sector Infrastructure

cc: Vincent, Denomme, Claridge Homes

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1.0 INTRODUCTION

This Serviceability Study has been prepared in support of Site Plan Control application for the Claridge lands located at 1500 Merivale Road, as shown in **Figure 1 – Key Plan of Subject Site**. The subject site was most recently occupied by the CJOH-TV television station until 2010. The subject site is currently served by various driveways to Baseline Road, Merivale Road and Clyde Avenue. The proposed redevelopment will include a total of 1967 apartment dwellings; approximately 1,129 m^2 of commercial; and 2022 parking spaces.

The subject site has an approximate area of 6.20 hectares, and is surrounded by the following:

- Baseline Road and commercial land uses to the north;
- Merivale Road, and commercial or residential land uses to the south;
- The Loblaws Plaza Shopping Centre and other commercial land uses to the east; and
- Clyde Avenue and commercial or residential land uses to the west.

The most recent aerial view of the subject site is provided in **Figure 1**.

Figure 1: Key Plan of Subject Site

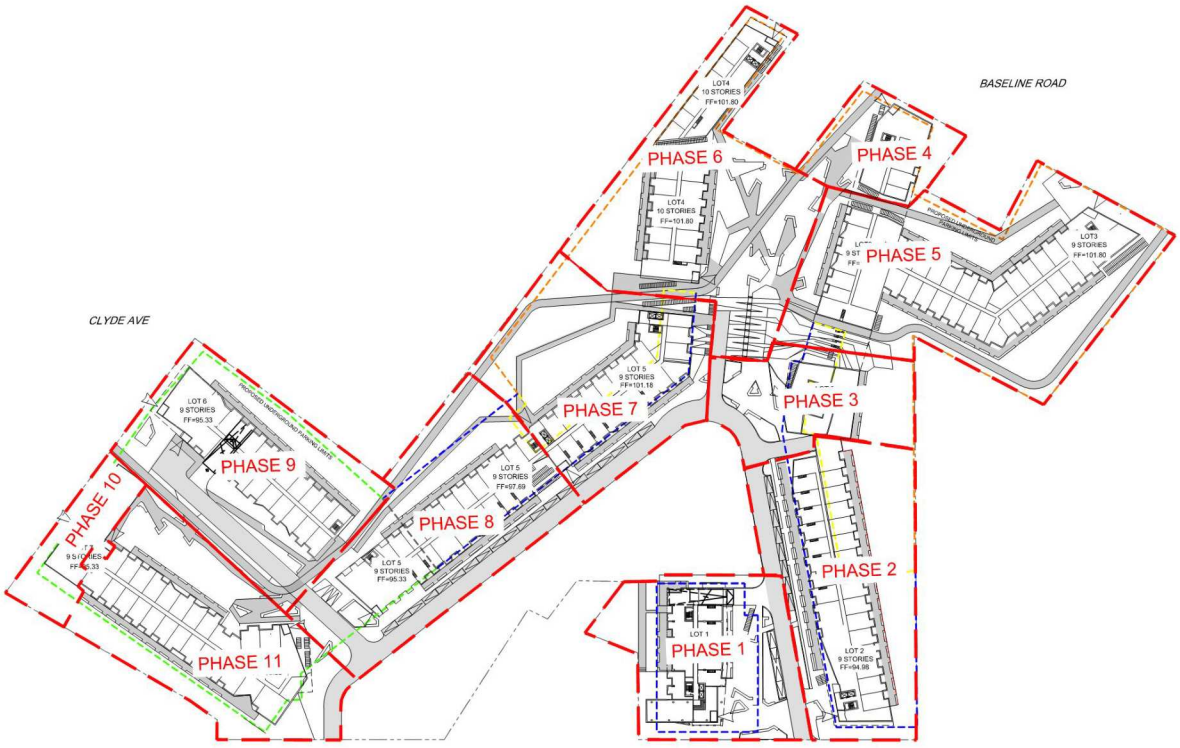
1.1 Proposed Development

The subject site is designated as 'General Urban Area' on Schedule B of the City of Ottawa's Official Plan, with frontage onto Baseline Road, Clyde Avenue, and Merivale Road, all of which have an Arterial Mainstreet designation. The property is zoned 'Arterial Mainstreet' (AM10[2217] H(34)).

The proposed development will be constructed in 11 phases as shown in **Figure 2 – Phasing Plan** and as described below.

- Phase 1:
  - 10-storeys with 115 dwellings, 100 parking spaces and approx. 169 m^2 of commercial;
- Phase 2:
  - 9-storeys with 276 dwellings, 130 parking spaces and approx. 104 m^2 of commercial;
- Phase 3:
  - 11-storeys with 63 dwellings and 96 parking spaces;
- Phase 4:
  - 9-storeys with 212 dwellings, 230 parking spaces and approx. 120 m^2 of commercial;
- Phase 5:
  - 9-storeys with 221 dwellings, 300 parking spaces and approx. 169 m^2 of commercial;
- Phase 6:
  - 10-storeys with 221 dwellings, 230 parking spaces and approx. 57 m^2 of commercial;
- Phase 7:
  - 9-storeys with 162 dwellings and 199 parking spaces;
- Phase 8:
  - 9-storeys with 198 dwellings and 132 parking spaces;
- Phase 9:
  - 9-storeys with 212 dwellings, 262 parking spaces and approx. 140 m^2 of commercial;
- Phase 10:
  - 9-storeys with 199 dwellings, 268 parking spaces and approx. 372 m^2 of commercial;
- Phase 11:
  - 11-storeys with 88 dwellings and 75 parking spaces.

Figure 2 Phasing Plan



In total, the proposed development will consist of 1967 apartment dwellings and approximately 1129 m^2 of commercial. The entire site will include 2022 parking spaces for residents and visitors and will be accessed via two driveways to Merivale Road. Phase 1 of the proposed development is anticipated to be built out by 2023, with each subsequent phase being completed approximately every 18 months. The ultimate buildout year of the development is anticipated to be in 2038.

A copy of the Site Plan is included in **Appendix A – Site Plan.**

2.0 SANITARY SEWER

The proposed development will be serviced by the existing 200mm diameter sanitary sewer on Clyde Avenue and the existing 300mm diameter sanitary sewer on Baseline Road as shown on the general plan of services.

For the north portion of the site (see GP), the services to all phases will be 200mm diameter sanitary sewers connecting to the Baseline Road sewer.

For the south portion of the site (see GP), the services to all phases will be 200mm diameter sanitary sewers connecting to an internal 250mm diameter sewer before connecting to the Clyde Avenue sewer.

The proposed development flows are based on the City of Ottawa Sewer Design Guidelines and are provided below.

2.1 Proposed Sanitary Flows from Development Site

Proposed sanitary flows are summarized in **Table 2.1 – Proposed Sanitary Flows** with detailed calculations below. Development statistics are summarized in **Table 2.2 – Development Statistics**. A Phasing Plan is shown in **Figure 2 – Phasing Plan.**

Table 2.1 Proposed Sanitary Flows

Phase	Peak Sanitary Flow (L/sec)	Phase	Peak Sanitary Flow (L/sec)
Phase 1	-	Phase 7	-
Phase 2	-	Phase 8	-
Phase 3	-	Phase 9	-
Phase 4*	-	Phase 10	-
Phase 5*	-	Phase 11	-
Phase 6*	-		
Total To Clyde Avenue			**22.62**
Total To Baseline Road			**11.57**
Grand Total			**34.19**

*Phases going to Baseline Road

Table 2.2 Development Statistics

Building Component	Area (ha)	Townhome (x2.7)	Studio (x1.4)	1 Bdr (x1.4)	2 Bdr (x2.1)	3 Bdr (x3.1)	Total
Phase 1							
Building	-	7	0	68	25	15	115
Phase 2							
Building	-	8	9	218	27	14	276
Phase 3							
Building	-	0	0	18	45	0	63
Phase 7							
Building	-	8	0	119	35	0	162
Phase 8							
Building	-	6	16	153	23	0	198
Phase 9							
Building	-	0	0	170	42	0	212

Phase 10							
Building	-	0	0	160	39	0	199
Phase 11							
Building	-	0	0	30	50	8	88
Total Clyde Ave.	**4.47**	**29**	**25**	**936**	**286**	**37**	**1,313**
Building Component	**Area (ha)**	**Townhome (x2.7)**	**Studio (x1.4)**	**1 Bdr (x1.4)**	**2 Bdr (x2.1)**	**3 Bdr (x3.1)**	**Total**
Phase 4*							
Building	-	0	6	171	27	8	212
Phase 5*							
Building	-	0	0	181	29	11	221
Phase 6*							
Building	-	0	32	132	33	24	221
Total Baseline Rd.	**1.73**	**0**	**38**	**484**	**89**	**43**	**654**
Grand Total	**6.20**	**29**	**63**	**1,420**	**375**	**80**	**1,967**

Sanitary Flows To Clyde Avenue

Area = 4.47 ha

Phase 1: 18.9 + 0 + 95.2 + 52.5 + 46.5 = 213.1 people

Phase 2: 21.6 + 12.6 + 305.2 + 56.7 + 43.4 = 439.5 people

Phase 3: 0 + 0 + 25.2 + 94.5 + 0 = 119.7 people

Phase 7: 21.6 + 0 + 166.6 + 73.5 + 0 = 261.7 people

Phase 8: 16.2 + 22.4 + 214.2 + 48.3 + 0 = 301.1 people

Phase 9: 0 + 0 + 238 + 88.2 + 0 = 326.2 people

Phase 10: 0 + 0 + 224 + 81.9 + 0 = 305.9 people

Phase 11: 0 + 0 + 42 + 105 + 24.8 = 171.8 people

Total: 2,139 people

Sanitary flows are calculated below using the City's new Sewer Design Criteria.

Population = 2,139 people
Peak Factor = $1 + 14/(4 + (P/1000)^{1/2}) \times 0.80 = 3.05$
Area = 4.47 ha

$$Q_{Tower} = \frac{(2{,}139)(280)}{86{,}400}(3.05) + (4.47)(0.33) = 22.62 \text{ L/sec}$$

Therefore, the total peak sanitary flow for **Clyde Avenue is 22.62 L/sec.**

Sanitary Flows To Baseline Road

Area = 1.73 ha

Phase 4: 0 + 8.4 + 239.4 + 56.7 + 24.8 = 329.3 people

Phase 5: 0 + 0 + 253.4 + 60.9 + 34.1 = 348.4 people

Phase 6: 0 + 44.8 + 184.8 + 69.3 + 74.4 = 373.3 people

Total: 1,051 people

Sanitary flows are calculated below using the City's new Sewer Design Criteria.

Population = 1,051 people
Peak Factor = $1 + 14/(4 + (P/1000)^{1/2}) \times 0.80 = 3.23$
Area = 1.73 ha

$$Q_{Tower} = \frac{(1{,}051)(280)}{86{,}400}(3.23) + (1.73)(0.33) = 11.57 \text{ L/sec}$$

Therefore, the total peak sanitary flow for **Baseline Road is 11.57 L/sec.**

Furthermore, the total peak sanitary flow for all **Development is 34.19 L/sec.**

3.0 STORM SEWER AND STORMWATER MANAGEMENT

The proposed development will be serviced by the existing 1050mm diameter storm sewer on Merivale Road and the existing 300mm diameter storm sewer on Baseline Road as shown on the general plan of services. As part of this development, stormwater will be controlled on-site before being discharged to Baseline Road or Merivale Road.

For the north portion of the site (see GP), the services to all phases will be 250mm diameter storm sewers connecting to the Baseline Road sewer.

For the south portion of the site (see GP), the services to all phases will be 250mm diameter storm sewers connecting to an internal 450mm diameter sewer before connecting to the Merivale Road sewer in two locations.

The site has an overall slope towards Merivale Road. The majority of storm runoff from the site is being conveyed overland towards Merivale Road, with some going towards Clyde Avenue, Baseline Road and neighboring properties.

3.1 Storm Water Management Criteria

Stormwater management (SWM) design criteria for the proposed development were established by the City of Ottawa Sewer Design Guidelines (October 2012) and correspondence with the City of Ottawa. The SWM design criteria are as follows:

<u>To Baseline Road</u>

- Control post-development peak flows up-to and including the 100-year storm event to the allowable release rate. Provide on-site water quantity control for all flow in excess of the allowable release rate. The allowable release rate is to be determined by applying the following parameters to the site area based on it going into Pinecrest Creek:
    - Full retention/infiltration for 1st 10mm
    - Then control to 34.5L/s/ha
- Minimize the impact on the downstream receiving watercourses by minimizing the potential erosion and volume of sediment entering the watercourses both on a temporary basis (during construction) and on a permanent basis.
- Provide guidelines to ensure that site preparation and construction is in accordance with the current Best Management Practices for Erosion and Sediment Control.

<u>To Merivale Road</u>

- Control post-development peak flows up-to and including the 100-year storm event to the allowable release rate. Provide on-site water quantity control for all flow in excess of the allowable release rate. The allowable release rate is to be determined by applying the following parameters to the site area based on it going into Parkwood Hills:
    - A runoff coefficient of 0.5
    - A time of concentration of 10 minutes
    - A 2-year intensity using the City of Ottawa Intensity-Duration-Frequency (IDF) curves
- Minimize the impact on the downstream receiving watercourses by minimizing the potential erosion and volume of sediment entering the watercourses both on a temporary basis (during construction) and on a permanent basis.
- Provide guidelines to ensure that site preparation and construction is in accordance with the current Best Management Practices for Erosion and Sediment Control.

3.2 Hydrologic and Hydraulic Modelling

The allowable release rate for the 6.20 ha site was determined to be 59.69 L/s for the north portion and 477.21 L/s for the south portion, based on the SWM criteria provided by the City of Ottawa.

The rational method was used to estimate post-development peak flows (quantity control targets) and determine approximate storage requirements for the site. The storage requirements for the site were determined for each phase of the development.

The post-development drainage areas were delineated based on the proposed development grading. Refer to **Drawing 121009-GR** for the proposed site grading and **Drawing 121009-STM** for the drainage areas. The storage requirements are based on meeting the allowable release rate generated for the site.

The site will be graded such that flows in excess of the 100-year storm event will be conveyed overland to Baseline Road, Merivale Road and Clyde Avenue.

Design Storms

The design storms are based on City of Ottawa design storms. Design storms were used for the 5 and 100-year return periods (i.e. storm events).

Model Parameters

Post-development catchments were modelled based on the proposed site plan and grading as shown on **Drawing 121009-STM**. All the sub-catchments are assumed to be 100% impervious with exception to the grassed areas which are 0% impervious. The building roofs were assumed to have no depression storage.

A summary of the allowable release rate, post-development parameters and output for the 5 and 100-year storm events are provided in **Appendix C – Stormwater Management Calculations**.

3.3 Water Quantity Control

On-site stormwater management will be implemented to control post-development stormwater discharge to the allowable release rate of 59.69 L/s for the north portion and 477.21 L/s for the south portion and will be achieved using internal stormwater tanks that will be directed to the storm sewer on Baseline Road for the north portion (see GP) and to the storm sewer on Merivale Road for the south portion (see GP).

Runoff from the surrounding areas (Sub-catchments A-1, A-3, A-4, A-15 and Park) will be uncontrolled and will drain towards Baseline Road, Merivale Road, Clyde Avenue and neighboring properties. The total uncontrolled flows from the site in the 100-year event will be 52.27 L/s and 239.59 L/s which requires the remaining areas of the site to be controlled to 7.41 L/s and 237.62 L/s, as shown in **Table 3.1**, in order to meet the allowable release rate.

Table 3.1 Controlled Release Rates

Phase	Drainage Area (ha)	Allowable Release Rate (L/s)
1	0.13	Part of 237.62
2	0.26	
3	0.076	

4*	0.241	7.41
5*	0.24	
6*	0.239	
7	0.177	Part of 237.62
8	0.214	
9	0.2	
10	0.219	
11	0.103	
Total	*2.1*	*245.03*

*Phases going to Baseline Road

The runoff will be collected into 11 tanks located within the development. The site was modeled so that the discharge rate was equal to the allowable release rate for both Baseline Road and Merivale Road. The tanks will be discharged to the storm sewer in Baseline Road for the north portion (see GP) at 7.41 L/sec, to the storm sewer in Merivale Road for the south portion (see GP) at 237.62 L/sec and will have emergency overflows that will connect to the ground surface. The required storage in the 100-year event is summarized in **Table 3.2**.

Table 3.2 Required Tank Storage for the 100-year Storm

Phase	Required Storage Volume (m^3)
1	121.68
2	260.81
3	49.99
4*	167.05
5*	314.27
6*	653.06
7	265.18
8	49.99
9	205.38
10	226.49
11	32.26
Total	*2,346.16*

*Phases going to Baseline Road

The storage provided allows for the proposed development to meet the allowable release rate of 59.69 L/s for the north portion and 477.21 L/s for the south portion. The total release rate from the site during the 100-year storm event is provided in **Table 3.3**.

Table 3.3 Overall Site Release Rate for the 100-year Storm

Phase	Drainage Area (ha)	Allowable Release Rate (L/s)
1 to 11	2.1	245.03
Uncontrolled	4.1	291.86
Total	*6.2*	*536.90*

3.4 Water Quality Control

Runoff from the roofs, podiums, and uncontrolled areas would be considered clean and will not require treatment. Additionally, the storage tank will allow for some settling of particulates in the stored runoff from the remaining site areas. Additional water quality treatment will not be required. Erosion and sediment control measures will be implemented during all phases of construction and inspected regularly.

Cisterns from Towers will discharge to the existing storm sewer on Baseline Road for the north portion (see GP) and to the existing storm sewer on Merivale Road for the south portion (see GP).

The site will be graded such that flows in excess of the 100-year storm event will be conveyed overland to Baseline Road, Merivale Road and Clyde Avenue.

4.0 WATERMAIN

4.1 Domestic Water Demand

The proposed development will be serviced by the existing 300mm diameter watermain on Merivale Road and the existing 400mm diameter watermain on Baseline Road as shown on the general plan of services. Shutoff valves will be provided at property lines as per City of Ottawa Specifications. The water meters will be in the basement level mechanical room of the buildings. Similarly, remote receptacle will be located at the surface near the entrance to the buildings on the exterior.

For the north portion of the site (see GP), the services to all phases will be 200mm diameter watermains connecting to the Baseline Road watermain.

For the south portion of the site (see GP), the services to all phases will be 200mm diameter watermains connecting to an internal 200mm diameter watermain before connecting to the Merivale Road watermain.

The services will be twined for each building for redundancy.

Estimated domestic water demands for the development are provided below with a detailed breakdown per phase:

Watermain Flows – Baseline Road

Average Day Demand = 4.26 L/sec

Maximum Day Demand (x2.5) = 10.65 L/sec

Peak Hour Demand (x2.2) = 23.43 L/sec

Watermain Flows – Merivale Road

Average Day Demand = 8.66 L/sec

Maximum Day Demand (x2.5) = 21.65 L/sec

Peak Hour Demand (x2.2) = 47.63 L/sec

4.2 Fire Demand

An estimate of the water required to meet firefighting demands is described below.

Section 4.2.11 of the City of Ottawa Water Design Guidelines reads:

“When calculating the fire flow requirements and affected pipe sizing, designers shall use the method developed by the Fire Underwriters Survey”, and

“The requirements for levels of fire protection on private property are covered in Section 7.2.11 of the Ontario Building Code.”

The Fire Underwriters Survey is used to assess the performance of the water distribution system on a “City Block” basis rather than an individual building basis. The Ontario Building Code governs the assessment of fire demand for individual buildings.

Section 7.2.11.1 of the Ontario Building Code states that the design, construction, installation and testing of fire service mains and water service pipe combined with fire service mains shall be in conformance with NFPA 24.

NFPA 24 is the standard for the "Installation of Private Fire Service Mains and their Appurtenances". Chapter 13 of NFPA 24 discusses sizing the private service fire mains for fire protection systems which shall be approved by the authority having jurisdiction, considering the following factors:

- Construction and Occupancy of the Building
- Fire Flow and Pressure of the Water Required
- Adequacy of the Water Supply

It is expected that any future building on the site will be sprinklered per Section 3.2.2.45 of the OBC. Section 3.2.5.7 of the OBC requires that an adequate water supply for fire fighting be provided to each building, and references Appendix A of the OBC. Sentence 3 of Section A 3.2.5.7 of the OBC (Appendix A) states that NFPA 13 be used for determining both sprinkler and hose stream demands for a sprinklered building.

The design of the sprinkler system is completed by a Fire Protection Engineer, or typically computed by the sprinkler contractor and approved by the Fire Protection Engineer. This process involves detailed hydraulic calculations based on building layout, pipe runs, head losses, fire pump requirements, etc. At this stage in the planning and site design process, these details are not available. Therefore, this report will confirm the maximum anticipated sprinkler and hose stream demands as per NFPA 13.

Section 11.2.3 of the NFPA 13, "Water Demand Requirements – Hydraulic Calculations Methods" was used to estimate the sprinkler and hose stream demands. Figure 11.2.3.1.1 – Area/Density Curves confirms the sprinkler demand, assuming Ordinary 1 construction. Table 11.2.3.1.2 confirms the hose stream allowance and water supply demand requirements, assuming ordinary hazard construction.

For Ordinary 1 type construction, design is based on a density of 0.15 gpm (US), and a maximum area of sprinkler operation limited to 1500 ft^2 (139 m^2). As per NFPA 13 Figure 11.2.3.1.1, the maximum anticipated sprinkler demand is 225 gpm (US). As per NFPA 13 Table 11.2.3.1.2, the maximum total combined inside and outside hose demand is 250 gpm (US) with a duration of 60-90 minutes.

Based on the calculations above, the total estimated sprinkler and hose demand for the development is 475 gpm (US). However, because the development has not been finalized to-date, it is recommended to add a 50% contingency. Therefore, a sprinkler demand of 713 gpm (US), 2700L/min, should be anticipated at this stage. Refer to **Appendix E – Fire Demand Calculations.**

Boundary conditions are requested from the City of Ottawa using a fire demand calculated using the **Fire Underwriters Insurance** procedure. This method is used by municipalities to assess their systems on a more global basis and results in a more conservative fire demand for individual sites, as compared to Building Code calculations. The estimated fire demand using FUS for each of the phases is provided in **Table 4.1 – Calculated Fire Demand.** Detailed calculations are included in **Appendix D – Fire Demand.**

Table 4.1 Calculated Fire Demand

Phase	Fire Demand (L/min)
1	5000
2	7000
3	4000
4	7000
5	7000
6	7000
7	5000
8	5000
9	5000
10	5000
11	4000

5.0 CONCLUSIONS

Based on the foregoing, report conclusions are:

- Adequate sanitary sewer capacity is available on Baseline Road and Clyde Avenue, per discussions with City of Ottawa.

- On site stormwater management will be implemented to control post-development flows to that value calculated using full retention/infiltration for 1st 10mm and then control to 34.5L/s/ha for Baseline Road and using a tc of 10 minutes, run-off coefficient of 0.50 and 2-year storm for Merivale Road. This will be implemented through construction of cisterns within the underground parking structure as summarized below. Uncontrolled flow from surrounding areas will drain overland to Baseline Road, Merivale Road and Clyde Avenue.

Phase	**Cistern Volume (m^3)**	**Discharge (L/s)**	**Street Sewer**
1	121.68	Part of 237.62	Merivale Road
2	260.81		
3	49.99		
4*	167.05	7.41	Baseline Road
5*	314.27		
6*	653.06		
7	265.18	Part of 237.62	Merivale Road
8	49.99		
9	205.38		
10	226.49		
11	32.26		
1, 3, 4, 15 + Park	Uncontrolled	291.86	Uncontrolled to Baseline Road, Merivale Road and Clyde Avenue
Total	**2,346.16**	**536.90**	

*Phases going to Baseline Road

- Adequate water services are available on Baseline Road and Merivale Road for domestic demand. It is expected that adequate water supply is available for firefighting which will be confirmed once boundary conditions are received from the City. Calculated fire demand ranged from 4000 to 7000 L/min. The buildings will be equipped with fire pumps and sprinklers.

NOVATECH

Prepared by:

Jazmine Gauthier, B.A.Sc.
Project Manager | Land Development

Reviewed by:

Greg MacDonald, P.Eng.
Director Land Development and Public Sector Infrastructure

APPENDIX A

Site Plan

CLIENT:

210 Gladstone Avenue
OTTAWA, ONTARIO K2P 0Y6
T: (613) 233-6030 F: (613) 233-8290

ARCHITECTS:

EVOQ

1435, RUE SAINT-ALEXANDRE, BUREAU 1000
MONTRÉAL (QUÉBEC) H3A 2G4
T. 514-393-9490 F. 514-393-9498
info@evoqarchitecture.com

LANDSCAPE ARCHITECTS:

James B. Lennox and Associates Inc.
Landscape Architects

361 Hinton Avenue South,
Ottawa, Ontario, K1Y 1A6 T : (613) 722 5168

CIVIL ENGINEERS:

NOVATECH
ENGINEERING CONSULTANTS LTD.
ENGINEERS & PLANNERS

Suite 200, 240 Michael Cowpland Dr.
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Email novainfo@novatech-eng.com

URBAN DESIGN CONSULTANTS:

FOTENN
Planning + Design

Fontenn
396 Cooper St, Suite 300
Ottawa, ON K2P 2H7
www.fotenn.com

TOPOGRAPHICAL SURVEYOR:

Annis O'Sullivan, Vollebekk Ltd.,
Ontario Land Surveyors

14 Concouse Gate, Suite 500
Nepean, Ontario, K2E 7S6
Tel : (613) 727-0850

email : nepean@aovltd.com

Nº:	DESCRIPTION:	BY	DATE

REVISION:

THE GENERAL CONTRACTOR :

1. SHALL BE RESPONSIBLE FOR VERIFYING ALL DIMENSIONS ON SITE TO ENSURE COMPLIANCE WITH THE DIMENSIONS GIVEN ON THE DRAWINGS.
2. SHALL BE RESPONSIBLE TO IMMEDIATELY SUBMIT A REPORT TO THE ARCHITECT OR ENGINEER OUTLINING ANY INACCURACIES.
3. SHALL NOT TAKE SCALED MEASUREMENTS OFF THE DRAWINGS.
4. ANY INDIVIDUAL OR FIRM THAT HAVE RECEIVED ELECTRONIC DOCUMENT SHALL USE THEM AT THEIR OWN RISK. ONLY ORIGINAL DRAWINGS, STAMPED BY THE ARCHITECT, MAY BE USED FOR CONSTRUCTION.

SEAL

NOT FOR CONSTRUCTION

PROJECT:

1500 MERIVALE

DRAWING TITLE:

SECOND FLOOR MERIVALE - GROUND FLOOR BASELINE

DESIGN: NG
APPROVED: XX
DRAWN: SJ/CH
DATE: 2021-06-28
VERIFIED: XX
SCALE: 1:500

PROJECT Nº: 9426-20
DRAWING Nº: A-102

APPENDIX B

Stormwater Management Calculations

NOVATECH ENGINEERING CONSULTANTS LTD.

Runoff Coefficients

Drainage Area	Total Area (m^2)	Hard Surface Area		Grass Area		5-Year Runoff Coefficient	100-Year Runoff Coefficient
		Area (m^2)	C	Area (m^2)	C		
R-01	1300.0	1300.0	0.95	0.0	0.20	0.95	1.00
R-02	2600.0	2600.0	0.95	0.0	0.20	0.95	1.00
R-03	760.0	760.0	0.95	0.0	0.20	0.95	1.00
R-04	2410.0	2410.0	0.95	0.0	0.20	0.95	1.00
R-05	2400.0	2400.0	0.95	0.0	0.20	0.95	1.00
R-06	2390.0	2390.0	0.95	0.0	0.20	0.95	1.00
R-07	1770.0	1770.0	0.95	0.0	0.20	0.95	1.00
R-08	2140.0	2140.0	0.95	0.0	0.20	0.95	1.00
R-09	2000.0	2000.0	0.95	0.0	0.20	0.95	1.00
R-10	2190.0	2190.0	0.95	0.0	0.20	0.95	1.00
R-11	1030.0	1030.0	0.95	0.0	0.20	0.95	1.00
A-01	4170.0	4170.0	0.95	0.0	0.20	0.95	1.00
A-02	3040.0	410.0	0.95	2630.0	0.20	0.30	0.35
A-03	2270.0	840.0	0.95	1430.0	0.20	0.48	0.53
A-04	370.0	370.0	0.95	0.0	0.20	0.95	1.00
A-05	1640.0	420.0	0.95	1220.0	0.20	0.39	0.44
A-06	3800.0	1890.0	0.90	1910.0	0.20	0.55	0.62
A-07	1530.0	310.0	0.90	1220.0	0.20	0.34	0.40
A-08	3840.0	1000.0	0.90	2840.0	0.20	0.38	0.45
A-09	1710.0	370.0	0.90	1340.0	0.20	0.35	0.41
A-10	680.0	50.0	0.90	630.0	0.20	0.25	0.31
A-11	1707.0	267.0	0.90	1440.0	0.20	0.31	0.37
A-12	620.0	460.0	0.90	160.0	0.20	0.72	0.81
A-13	2510.0	1850.0	0.90	660.0	0.20	0.72	0.80
A-14	920.0	840.0	0.90	80.0	0.20	0.84	0.93
A-15	1380.0	1380.0	0.90	0.0	0.20	0.90	1.00
A-16	1030.0	1030.0	0.90	0.0	0.20	0.90	1.00
A-17	1120.0	960.0	0.90	160.0	0.20	0.80	0.89
A-18	2020.0	1050.0	0.90	970.0	0.20	0.56	0.64
Park	6540.0	0.0	0.90	6540.0	0.20	0.20	0.25
Total	**61887.00**	**38657.0**	**0.95**	**23230.0**	**0.20**	**0.67**	**0.72**

NOVATECH ENGINEERING CONSULTANTS LTD.

Controlled Flow

5 YR

Area No.	Area (ha)	C_{5yr}	Time (min)	intensity mm/hr	Uncontrolled runoff L/s	Control System	Zurn Model Number	Release Rate (L/s/m of head)	Notches	Depth (m)	Controlled Flow (L/s)	Storage available (m^3)	Storage used (m^3)
A-01	0.4170	0.95	20.00	70.25	77.37	no control	-	-	-	-	-	-	-
A-02	0.3040	0.30	20.00	70.25	17.88	control	-	-	-	-	-	-	-
A-03	0.2270	0.48	20.00	70.25	21.17	no control	-	-	-	-	-	-	-
A-04	0.0370	0.95	20.00	70.25	6.86	no control	-	-	-	-	-	-	-
A-05	0.1640	0.39	20.00	70.25	12.56	control	-	-	-	-	-	-	-
A-06	0.3800	0.55	20.00	70.25	40.68	control	-	-	-	-	-	-	-
A-07	0.1530	0.34	20.00	70.25	10.21	control	-	-	-	-	-	-	-
A-08	0.3840	0.38	20.00	70.25	28.67	control	-	-	-	-	-	-	-
A-09	0.1710	0.35	20.00	70.25	11.74	control	-	-	-	-	-	-	-
A-10	0.0680	0.25	20.00	70.25	3.34	control	-	-	-	-	-	-	-
A-11	0.1707	0.31	20.00	70.25	10.32	control	-	-	-	-	-	-	-
A-12	0.0620	0.72	20.00	70.25	8.71	control	-	-	-	-	-	-	-
A-13	0.2510	0.72	20.00	70.25	35.10	control	-	-	-	-	-	-	-
A-14	0.0920	0.84	20.00	70.25	15.08	control	-	-	-	-	-	-	-
A-15	0.1380	0.90	20.00	70.25	24.26	no control	-	-	-	-	-	-	-
A-16	0.1030	0.90	20.00	70.25	18.10	control	-	-	-	-	-	-	-
A-17	0.1120	0.80	20.00	70.25	17.50	control	-	-	-	-	-	-	-
A-18	0.2020	0.56	20.00	70.25	22.24	control	-	-	-	-	-	-	-
Park	0.6540	0.20	20.00	70.25	25.54	no control	-	-	-	-	-	-	-
CB Storage	-	-	-	-	-	-	-	-	-	-	-	-	-
Total:	4.0897				407.33						0.00	0.00	0.00

100 YR

Area ID	Area (ha)	C_{100yr}	Time (min)	intensity mm/hr	Uncontrolled runoff L/s	Control System	Zurn Model Number	Release Rate (L/s/m of head)	Notches	Depth (m)	Controlled Flow (L/s)	Storage available (m^3)	Storage used (m^3)
A-01	0.4170	1.00	20.00	119.95	139.05	no control	-	-	-	-	-	-	-
A-02	0.3040	0.35	20.00	119.95	35.60	control	-	-	-	-	-	-	-
A-03	0.2270	0.53	20.00	119.95	39.93	no control	-	-	-	-	-	-	-
A-04	0.0370	1.00	20.00	119.95	12.34	no control	-	-	-	-	-	-	-
A-05	0.1640	0.44	20.00	119.95	24.18	control	-	-	-	-	-	-	-
A-06	0.3800	0.62	20.00	119.95	78.95	control	-	-	-	-	-	-	-
A-07	0.1530	0.40	20.00	119.95	20.51	control	-	-	-	-	-	-	-
A-08	0.3840	0.45	20.00	119.95	57.02	control	-	-	-	-	-	-	-
A-09	0.1710	0.41	20.00	119.95	23.51	control	-	-	-	-	-	-	-
A-10	0.0680	0.31	20.00	119.95	6.92	control	-	-	-	-	-	-	-
A-11	0.1707	0.37	20.00	119.95	20.91	control	-	-	-	-	-	-	-
A-12	0.0620	0.81	20.00	119.95	16.67	control	-	-	-	-	-	-	-
A-13	0.2510	0.80	20.00	119.95	67.19	control	-	-	-	-	-	-	-
A-14	0.0920	0.93	20.00	119.95	28.68	control	-	-	-	-	-	-	-
A-15	0.1380	1.00	20.00	119.95	46.02	no control	-	-	-	-	-	-	-
A-16	0.1030	1.00	20.00	119.95	34.35	control	-	-	-	-	-	-	-
A-17	0.1120	0.89	20.00	119.95	33.35	control	-	-	-	-	-	-	-
A-18	0.2020	0.64	20.00	119.95	43.10	control	-	-	-	-	-	-	-
Park	0.6540	0.25	20.00	119.95	54.52	no control	-	-	-	-	-	-	-
CB Storage	-	-	-	-	-	-	-	-	-	-	-	-	-
Total:	4.0897				782.79						0.00	0.00	0.00

Note: In all cases, there is only one notch in the Zurn roof drain and and flows through each drain is further reduced with and adjustable weir. See Zurn roof drains sheet and adjustable weir specification for more details on the reduction of flow.

REQUIRED STORAGE - 5-YEAR EVENT
AREA Phase 1 + A13 : TANK

OTTAWA IDF CURVE
Area = 0.3810 ha Qallow = 29.70
C = 0.95 Vol(max) = 49.18

Time (min)	Intensity (mm/hr)	Q Uncontrolled (L/s)	Q Controlled (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	142.06	0.00	112.35	33.71
10	104.19	104.84	0.00	75.14	45.08
15	83.56	84.08	0.00	54.37	48.94
20	70.25	70.69	0.00	40.99	49.18
25	60.90	61.27	0.00	31.57	47.36
30	53.93	54.26	0.00	24.56	44.21
35	48.52	48.82	0.00	19.12	40.15
40	44.18	44.46	0.00	14.76	35.42
45	40.63	40.88	0.00	11.18	30.18
50	37.65	37.89	0.00	8.18	24.55
55	35.12	35.34	0.00	5.64	18.61
60	32.94	33.15	0.00	3.45	12.41
65	31.04	31.24	0.00	1.53	5.98
70	29.37	29.55	0.00	-0.15	-0.62
75	27.89	28.06	0.00	-1.64	-7.38
80	26.56	26.73	0.00	-2.98	-14.28
85	25.37	25.53	0.00	-4.18	-21.30
90	24.29	24.44	0.00	-5.26	-28.42
95	23.31	23.45	0.00	-6.25	-35.64
100	22.41	22.55	0.00	-7.16	-42.94
105	21.58	21.72	0.00	-7.99	-50.31
110	20.82	20.95	0.00	-8.75	-57.75
115	20.12	20.24	0.00	-9.46	-65.26
120	19.47	19.59	0.00	-10.11	-72.82
125	18.86	18.98	0.00	-10.72	-80.43
130	18.29	18.41	0.00	-11.29	-88.09
135	17.76	17.88	0.00	-11.83	-95.80
140	17.27	17.38	0.00	-12.33	-103.54
145	16.80	16.91	0.00	-12.80	-111.33
150	16.36	16.46	0.00	-13.24	-119.15
155	15.95	16.05	0.00	-13.66	-127.00
160	15.56	15.65	0.00	-14.05	-134.88
165	15.18	15.28	0.00	-14.42	-142.80
170	14.83	14.92	0.00	-14.78	-150.74

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REQUIRED STORAGE - 100-YEAR EVENT
AREA Phase 1 + A13 : TANK

OTTAWA IDF CURVE
Area = 0.3810 ha Qallow = 29.70
C = 1.00 Vol(max) = 121.68

Time (min)	Intensity (mm/hr)	Q Uncontrolled (L/s)	Q Controlled (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	257.07	0.00	227.36	68.21
10	178.56	189.13	0.00	159.42	95.65
15	142.89	151.35	0.00	121.65	109.48
20	119.95	127.05	0.00	97.35	116.82
25	103.85	109.99	0.00	80.29	120.44
30	91.87	97.30	0.00	67.60	121.68
35	82.58	87.47	0.00	57.76	121.30
40	75.15	79.59	0.00	49.89	119.74
45	69.05	73.14	0.00	43.43	117.27
50	63.95	67.74	0.00	38.04	114.11
55	59.62	63.15	0.00	33.45	110.38
60	55.89	59.20	0.00	29.50	106.20
65	52.65	55.76	0.00	26.06	101.63
70	49.79	52.74	0.00	23.03	96.74
75	47.26	50.05	0.00	20.35	91.57
80	44.99	47.65	0.00	17.95	86.16
85	42.95	45.50	0.00	15.79	80.55
90	41.11	43.54	0.00	13.84	74.74
95	39.43	41.77	0.00	12.07	68.78
100	37.90	40.15	0.00	10.44	62.66
105	36.50	38.66	0.00	8.95	56.42
110	35.20	37.29	0.00	7.58	50.05
115	34.01	36.02	0.00	6.32	43.58
120	32.89	34.84	0.00	5.14	37.00
125	31.86	33.75	0.00	4.04	30.34
130	30.90	32.73	0.00	3.02	23.59
135	30.00	31.77	0.00	2.07	16.76
140	29.15	30.88	0.00	1.17	9.87
145	28.36	30.04	0.00	0.33	2.90
150	27.61	29.24	0.00	-0.46	-4.12
155	26.91	28.50	0.00	-1.20	-11.20
160	26.24	27.79	0.00	-1.91	-18.34
165	25.61	27.12	0.00	-2.58	-25.53
170	25.01	26.49	0.00	-3.21	-32.76

REQUIRED STORAGE - 5-YEAR EVENT
AREA Phase 2 + A2 + A14 : TANK

OTTAWA IDF CURVE
Area = 0.6560 ha Qallow = 29.70
C = 0.95 Vol(max) = 114.71

Time (min)	Intensity (mm/hr)	Q Uncontrolled (L/s)	Q Controlled (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	244.59	0.00	214.89	64.47
10	104.19	180.51	0.00	150.81	90.49
15	83.56	144.76	0.00	115.06	103.55
20	70.25	121.71	0.00	92.01	110.41
25	60.90	105.50	0.00	75.80	113.70
30	53.93	93.43	0.00	63.73	114.71
35	48.52	84.06	0.00	54.35	114.14
40	44.18	76.55	0.00	46.85	112.43
45	40.63	70.39	0.00	40.69	109.85
50	37.65	65.23	0.00	35.53	106.59
55	35.12	60.85	0.00	31.15	102.79
60	32.94	57.07	0.00	27.37	98.54
65	31.04	53.78	0.00	24.08	93.91
70	29.37	50.89	0.00	21.18	88.97
75	27.89	48.32	0.00	18.61	83.76
80	26.56	46.02	0.00	16.32	78.32
85	25.37	43.95	0.00	14.25	72.67
90	24.29	42.08	0.00	12.38	66.84
95	23.31	40.38	0.00	10.67	60.84
100	22.41	38.82	0.00	9.12	54.71
105	21.58	37.39	0.00	7.69	48.44
110	20.82	36.07	0.00	6.37	42.06
115	20.12	34.86	0.00	5.15	35.57
120	19.47	33.73	0.00	4.02	28.98
125	18.86	32.68	0.00	2.97	22.30
130	18.29	31.70	0.00	1.99	15.54
135	17.76	30.78	0.00	1.08	8.71
140	17.27	29.92	0.00	0.21	1.80
145	16.80	29.11	0.00	-0.59	-5.17
150	16.36	28.35	0.00	-1.36	-12.20
155	15.95	27.63	0.00	-2.07	-19.29
160	15.56	26.95	0.00	-2.75	-26.43
165	15.18	26.31	0.00	-3.40	-33.62
170	14.83	25.70	0.00	-4.01	-40.86

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REQUIRED STORAGE - 100-YEAR EVENT
AREA Phase 2 + A2 + A14 : TANK

OTTAWA IDF CURVE
Area = 0.6560 ha Qallow = 29.70
C = 1.00 Vol(max) = 260.81

Time (min)	Intensity (mm/hr)	Q Uncontrolled (L/s)	Q Controlled (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	442.61	0.00	412.91	123.87
10	178.56	325.63	0.00	295.93	177.56
15	142.89	260.59	0.00	230.89	207.80
20	119.95	218.75	0.00	189.05	226.86
25	103.85	189.38	0.00	159.68	239.52
30	91.87	167.54	0.00	137.84	248.10
35	82.58	150.60	0.00	120.89	253.88
40	75.15	137.04	0.00	107.34	257.61
45	69.05	125.93	0.00	96.22	259.80
50	63.95	116.63	0.00	86.93	260.79
55	59.62	108.73	0.00	79.03	260.81
60	55.89	101.93	0.00	72.23	260.03
65	52.65	96.01	0.00	66.31	258.60
70	49.79	90.80	0.00	61.10	256.61
75	47.26	86.18	0.00	56.48	254.14
80	44.99	82.05	0.00	52.35	251.26
85	42.95	78.33	0.00	48.63	248.02
90	41.11	74.97	0.00	45.27	244.46
95	39.43	71.92	0.00	42.21	240.62
100	37.90	69.12	0.00	39.42	236.52
105	36.50	66.56	0.00	36.86	232.20
110	35.20	64.20	0.00	34.50	227.67
115	34.01	62.01	0.00	32.31	222.95
120	32.89	59.99	0.00	30.29	218.07
125	31.86	58.11	0.00	28.40	213.03
130	30.90	56.35	0.00	26.65	207.84
135	30.00	54.70	0.00	25.00	202.52
140	29.15	53.16	0.00	23.46	197.08
145	28.36	51.72	0.00	22.01	191.52
150	27.61	50.35	0.00	20.65	185.86
155	26.91	49.07	0.00	19.36	180.09
160	26.24	47.85	0.00	18.15	174.24
165	25.61	46.70	0.00	17.00	168.29
170	25.01	45.61	0.00	15.91	162.27

REQUIRED STORAGE - 5-YEAR EVENT
AREA Phase 3 + A15 : TANK

OTTAWA IDF CURVE
Area = 0.2140 ha Qallow = 29.70
C = 0.95 Vol(max) = 17.51

Time (min)	Intensity (mm/hr)	Q Uncontrolled (L/s)	Q Controlled (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	79.79	0.00	50.09	15.03
10	104.19	58.89	0.00	29.18	17.51
15	83.56	47.22	0.00	17.52	15.77
20	70.25	39.70	0.00	10.00	12.00
25	60.90	34.42	0.00	4.71	7.07
30	53.93	30.48	0.00	0.78	1.40
35	48.52	27.42	0.00	-2.28	-4.79
40	44.18	24.97	0.00	-4.73	-11.35
45	40.63	22.96	0.00	-6.74	-18.20
50	37.65	21.28	0.00	-8.42	-25.27
55	35.12	19.85	0.00	-9.85	-32.51
60	32.94	18.62	0.00	-11.08	-39.90
65	31.04	17.55	0.00	-12.16	-47.41
70	29.37	16.60	0.00	-13.10	-55.03
75	27.89	15.76	0.00	-13.94	-62.73
80	26.56	15.01	0.00	-14.69	-70.51
85	25.37	14.34	0.00	-15.36	-78.36
90	24.29	13.73	0.00	-15.98	-86.27
95	23.31	13.17	0.00	-16.53	-94.23
100	22.41	12.66	0.00	-17.04	-102.23
105	21.58	12.20	0.00	-17.50	-110.28
110	20.82	11.77	0.00	-17.93	-118.37
115	20.12	11.37	0.00	-18.33	-126.49
120	19.47	11.00	0.00	-18.70	-134.64
125	18.86	10.66	0.00	-19.04	-142.82
130	18.29	10.34	0.00	-19.36	-151.03
135	17.76	10.04	0.00	-19.66	-159.26
140	17.27	9.76	0.00	-19.94	-167.52
145	16.80	9.50	0.00	-20.21	-175.80
150	16.36	9.25	0.00	-20.46	-184.10
155	15.95	9.01	0.00	-20.69	-192.41
160	15.56	8.79	0.00	-20.91	-200.75
165	15.18	8.58	0.00	-21.12	-209.10
170	14.83	8.38	0.00	-21.32	-217.46

REQUIRED STORAGE - 100-YEAR EVENT
AREA Phase 3 + A15 : TANK

OTTAWA IDF CURVE
Area = 0.2140 ha Qallow = 29.70
C = 1.00 Vol(max) = 49.99

Time (min)	Intensity (mm/hr)	Q Uncontrolled (L/s)	Q Controlled (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	144.39	0.00	114.69	34.41
10	178.56	106.23	0.00	76.53	45.92
15	142.89	85.01	0.00	55.31	49.78
20	119.95	71.36	0.00	41.66	49.99
25	103.85	61.78	0.00	32.08	48.12
30	91.87	54.65	0.00	24.95	44.91
35	82.58	49.13	0.00	19.43	40.79
40	75.15	44.71	0.00	15.00	36.01
45	69.05	41.08	0.00	11.38	30.72
50	63.95	38.05	0.00	8.35	25.04
55	59.62	35.47	0.00	5.77	19.04
60	55.89	33.25	0.00	3.55	12.78
65	52.65	31.32	0.00	1.62	6.31
70	49.79	29.62	0.00	-0.08	-0.34
75	47.26	28.11	0.00	-1.59	-7.15
80	44.99	26.77	0.00	-2.94	-14.10
85	42.95	25.55	0.00	-4.15	-21.16
90	41.11	24.46	0.00	-5.24	-28.32
95	39.43	23.46	0.00	-6.24	-35.58
100	37.90	22.55	0.00	-7.15	-42.92
105	36.50	21.71	0.00	-7.99	-50.33
110	35.20	20.94	0.00	-8.76	-57.81
115	34.01	20.23	0.00	-9.47	-65.36
120	32.89	19.57	0.00	-10.13	-72.96
125	31.86	18.96	0.00	-10.75	-80.60
130	30.90	18.38	0.00	-11.32	-88.30
135	30.00	17.85	0.00	-11.86	-96.04
140	29.15	17.34	0.00	-12.36	-103.82
145	28.36	16.87	0.00	-12.83	-111.64
150	27.61	16.43	0.00	-13.28	-119.49
155	26.91	16.01	0.00	-13.70	-127.37
160	26.24	15.61	0.00	-14.09	-135.29
165	25.61	15.24	0.00	-14.47	-143.23
170	25.01	14.88	0.00	-14.82	-151.20

REQUIRED STORAGE - 5-YEAR EVENT
AREA Phase 4 : TANK

OTTAWA IDF CURVE
Area = 0.2410 ha Qallow = 2.47
C = 0.95 Vol(max) = 79.15

Time (min)	Intensity (mm/hr)	Q Uncontrolled (L/s)	Q Controlled (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	89.86	0.00	87.39	26.22
10	104.19	66.32	0.00	63.85	38.31
15	83.56	53.18	0.00	50.71	45.64
20	70.25	44.71	0.00	42.24	50.69
25	60.90	38.76	0.00	36.29	54.43
30	53.93	34.32	0.00	31.85	57.34
35	48.52	30.88	0.00	28.41	59.66
40	44.18	28.12	0.00	25.65	61.57
45	40.63	25.86	0.00	23.39	63.15
50	37.65	23.97	0.00	21.50	64.49
55	35.12	22.36	0.00	19.89	65.62
60	32.94	20.97	0.00	18.50	66.59
65	31.04	19.76	0.00	17.29	67.43
70	29.37	18.69	0.00	16.22	68.14
75	27.89	17.75	0.00	15.28	68.76
80	26.56	16.91	0.00	14.44	69.29
85	25.37	16.15	0.00	13.68	69.75
90	24.29	15.46	0.00	12.99	70.14
95	23.31	14.83	0.00	12.36	70.47
100	22.41	14.26	0.00	11.79	70.75
105	21.58	13.74	0.00	11.27	70.98
110	20.82	13.25	0.00	10.78	71.17
115	20.12	12.81	0.00	10.34	71.32
120	19.47	12.39	0.00	9.92	71.43
125	18.86	12.00	0.00	9.53	71.51
130	18.29	11.64	0.00	9.17	71.56
135	17.76	11.31	0.00	8.84	71.58
140	17.27	10.99	0.00	8.52	71.58
145	16.80	10.69	0.00	8.22	71.55
150	16.36	10.41	0.00	7.94	71.50
155	15.95	10.15	0.00	7.68	71.43
160	15.56	9.90	0.00	7.43	71.33
165	15.18	9.66	0.00	7.19	71.23
170	14.83	9.44	0.00	6.97	71.10

REQUIRED STORAGE - 100-YEAR EVENT
AREA Phase 4 : TANK

OTTAWA IDF CURVE
Area = 0.2410 ha Qallow = 2.47
C = 1.00 Vol(max) = 167.05

Time (min)	Intensity (mm/hr)	Q Uncontrolled (L/s)	Q Controlled (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	162.61	0.00	160.14	48.04
10	178.56	119.63	0.00	117.16	70.30
15	142.89	95.74	0.00	93.27	83.94
20	119.95	80.36	0.00	77.89	93.47
25	103.85	69.58	0.00	67.11	100.66
30	91.87	61.55	0.00	59.08	106.34
35	82.58	55.33	0.00	52.86	111.00
40	75.15	50.35	0.00	47.88	114.90
45	69.05	46.26	0.00	43.79	118.24
50	63.95	42.85	0.00	40.38	121.13
55	59.62	39.95	0.00	37.48	123.67
60	55.89	37.45	0.00	34.98	125.92
65	52.65	35.27	0.00	32.80	127.93
70	49.79	33.36	0.00	30.89	129.73
75	47.26	31.66	0.00	29.19	131.36
80	44.99	30.14	0.00	27.67	132.83
85	42.95	28.78	0.00	26.31	134.17
90	41.11	27.54	0.00	25.07	135.40
95	39.43	26.42	0.00	23.95	136.52
100	37.90	25.39	0.00	22.92	137.55
105	36.50	24.45	0.00	21.98	138.49
110	35.20	23.58	0.00	21.11	139.36
115	34.01	22.78	0.00	20.31	140.16
120	32.89	22.04	0.00	19.57	140.90
125	31.86	21.35	0.00	18.88	141.58
130	30.90	20.70	0.00	18.23	142.20
135	30.00	20.10	0.00	17.63	142.78
140	29.15	19.53	0.00	17.06	143.31
145	28.36	19.00	0.00	16.53	143.81
150	27.61	18.50	0.00	16.03	144.26
155	26.91	18.03	0.00	15.56	144.67
160	26.24	17.58	0.00	15.11	145.05
165	25.61	17.16	0.00	14.69	145.40
170	25.01	16.76	0.00	14.29	145.72

REQUIRED STORAGE - 5-YEAR EVENT
AREA Phase 5 + A5 : TANK

OTTAWA IDF CURVE
Area = 0.4040 ha Qallow = 2.47
C = 0.95 Vol(max) = 151.45

Time (min)	Intensity (mm/hr)	Q Uncontrolled (L/s)	Q Controlled (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	150.63	0.00	148.16	44.45
10	104.19	111.17	0.00	108.70	65.22
15	83.56	89.15	0.00	86.68	78.01
20	70.25	74.96	0.00	72.49	86.98
25	60.90	64.97	0.00	62.50	93.76
30	53.93	57.54	0.00	55.07	99.12
35	48.52	51.77	0.00	49.30	103.52
40	44.18	47.14	0.00	44.67	107.22
45	40.63	43.35	0.00	40.88	110.37
50	37.65	40.17	0.00	37.70	113.11
55	35.12	37.48	0.00	35.01	115.52
60	32.94	35.15	0.00	32.68	117.65
65	31.04	33.12	0.00	30.65	119.54
70	29.37	31.34	0.00	28.87	121.25
75	27.89	29.76	0.00	27.29	122.79
80	26.56	28.34	0.00	25.87	124.18
85	25.37	27.07	0.00	24.60	125.45
90	24.29	25.91	0.00	23.44	126.60
95	23.31	24.87	0.00	22.40	127.66
100	22.41	23.91	0.00	21.44	128.63
105	21.58	23.03	0.00	20.56	129.51
110	20.82	22.22	0.00	19.75	130.33
115	20.12	21.47	0.00	19.00	131.08
120	19.47	20.77	0.00	18.30	131.77
125	18.86	20.12	0.00	17.65	132.40
130	18.29	19.52	0.00	17.05	132.99
135	17.76	18.95	0.00	16.48	133.53
140	17.27	18.42	0.00	15.95	134.02
145	16.80	17.93	0.00	15.46	134.47
150	16.36	17.46	0.00	14.99	134.89
155	15.95	17.02	0.00	14.55	135.27
160	15.56	16.60	0.00	14.13	135.62
165	15.18	16.20	0.00	13.73	135.94
170	14.83	15.83	0.00	13.36	136.23

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REQUIRED STORAGE - 100-YEAR EVENT
AREA Phase 5 + A5 : TANK

OTTAWA IDF CURVE
Area = 0.4040 ha Qallow = 2.47
C = 1.00 Vol(max) = 314.27

Time (min)	Intensity (mm/hr)	Q Uncontrolled (L/s)	Q Controlled (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	272.59	0.00	270.12	81.03
10	178.56	200.54	0.00	198.07	118.84
15	142.89	160.49	0.00	158.02	142.22
20	119.95	134.72	0.00	132.25	158.70
25	103.85	116.63	0.00	114.16	171.24
30	91.87	103.18	0.00	100.71	181.28
35	82.58	92.75	0.00	90.28	189.58
40	75.15	84.40	0.00	81.93	196.63
45	69.05	77.55	0.00	75.08	202.72
50	63.95	71.83	0.00	69.36	208.07
55	59.62	66.96	0.00	64.49	212.83
60	55.89	62.78	0.00	60.31	217.10
65	52.65	59.13	0.00	56.66	220.97
70	49.79	55.92	0.00	53.45	224.49
75	47.26	53.07	0.00	50.60	227.72
80	44.99	50.53	0.00	48.06	230.69
85	42.95	48.24	0.00	45.77	233.44
90	41.11	46.17	0.00	43.70	235.99
95	39.43	44.29	0.00	41.82	238.37
100	37.90	42.57	0.00	40.10	240.60
105	36.50	40.99	0.00	38.52	242.68
110	35.20	39.54	0.00	37.07	244.64
115	34.01	38.19	0.00	35.72	246.48
120	32.89	36.94	0.00	34.47	248.22
125	31.86	35.78	0.00	33.31	249.86
130	30.90	34.70	0.00	32.23	251.41
135	30.00	33.69	0.00	31.22	252.88
140	29.15	32.74	0.00	30.27	254.28
145	28.36	31.85	0.00	29.38	255.60
150	27.61	31.01	0.00	28.54	256.86
155	26.91	30.22	0.00	27.75	258.06
160	26.24	29.47	0.00	27.00	259.20
165	25.61	28.76	0.00	26.29	260.29
170	25.01	28.09	0.00	25.62	261.32

REQUIRED STORAGE - 5-YEAR EVENT
AREA Phase 6 + A6 + A7 : TANK

OTTAWA IDF CURVE
Area = 0.7720 ha Qallow = 2.47
C = 0.95 Vol(max) = 337.44

Time (min)	Intensity (mm/hr)	Q Uncontrolled (L/s)	Q Controlled (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	287.84	0.00	285.37	85.61
10	104.19	212.43	0.00	209.96	125.98
15	83.56	170.36	0.00	167.89	151.10
20	70.25	143.23	0.00	140.76	168.91
25	60.90	124.16	0.00	121.69	182.53
30	53.93	109.95	0.00	107.48	193.46
35	48.52	98.92	0.00	96.45	202.55
40	44.18	90.09	0.00	87.62	210.28
45	40.63	82.84	0.00	80.37	216.99
50	37.65	76.77	0.00	74.30	222.90
55	35.12	71.61	0.00	69.14	228.17
60	32.94	67.17	0.00	64.70	232.91
65	31.04	63.29	0.00	60.82	237.21
70	29.37	59.89	0.00	57.42	241.14
75	27.89	56.86	0.00	54.39	244.76
80	26.56	54.16	0.00	51.69	248.09
85	25.37	51.72	0.00	49.25	251.19
90	24.29	49.52	0.00	47.05	254.07
95	23.31	47.52	0.00	45.05	256.76
100	22.41	45.68	0.00	43.21	259.29
105	21.58	44.00	0.00	41.53	261.66
110	20.82	42.45	0.00	39.98	263.89
115	20.12	41.02	0.00	38.55	266.00
120	19.47	39.69	0.00	37.22	267.99
125	18.86	38.45	0.00	35.98	269.88
130	18.29	37.30	0.00	34.83	271.67
135	17.76	36.22	0.00	33.75	273.38
140	17.27	35.21	0.00	32.74	275.00
145	16.80	34.26	0.00	31.79	276.54
150	16.36	33.36	0.00	30.89	278.01
155	15.95	32.51	0.00	30.04	279.41
160	15.56	31.72	0.00	29.25	280.75
165	15.18	30.96	0.00	28.49	282.04
170	14.83	30.24	0.00	27.77	283.26

REQUIRED STORAGE - 100-YEAR EVENT
AREA Phase 6 + A6 + A7 : TANK

OTTAWA IDF CURVE
Area = 0.7720 ha Qallow = 2.47
C = 1.00 Vol(max) = 653.06

Time (min)	Intensity (mm/hr)	Q Uncontrolled (L/s)	Q Controlled (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	520.88	0.00	518.41	155.52
10	178.56	383.22	0.00	380.75	228.45
15	142.89	306.67	0.00	304.20	273.78
20	119.95	257.43	0.00	254.96	305.96
25	103.85	222.87	0.00	220.40	330.60
30	91.87	197.16	0.00	194.69	350.45
35	82.58	177.23	0.00	174.76	366.99
40	75.15	161.27	0.00	158.80	381.13
45	69.05	148.19	0.00	145.72	393.45
50	63.95	137.26	0.00	134.79	404.36
55	59.62	127.96	0.00	125.49	414.12
60	55.89	119.96	0.00	117.49	422.96
65	52.65	112.99	0.00	110.52	431.02
70	49.79	106.86	0.00	104.39	438.42
75	47.26	101.42	0.00	98.95	445.27
80	44.99	96.56	0.00	94.09	451.62
85	42.95	92.19	0.00	89.72	457.55
90	41.11	88.23	0.00	85.76	463.11
95	39.43	84.63	0.00	82.16	468.33
100	37.90	81.35	0.00	78.88	473.26
105	36.50	78.33	0.00	75.86	477.91
110	35.20	75.55	0.00	73.08	482.33
115	34.01	72.98	0.00	70.51	486.52
120	32.89	70.60	0.00	68.13	490.52
125	31.86	68.38	0.00	65.91	494.33
130	30.90	66.31	0.00	63.84	497.97
135	30.00	64.38	0.00	61.91	501.46
140	29.15	62.56	0.00	60.09	504.80
145	28.36	60.86	0.00	58.39	508.00
150	27.61	59.26	0.00	56.79	511.08
155	26.91	57.74	0.00	55.27	514.05
160	26.24	56.31	0.00	53.84	516.90
165	25.61	54.96	0.00	52.49	519.65
170	25.01	53.68	0.00	51.21	522.31

REQUIRED STORAGE - 5-YEAR EVENT
AREA Phase 7 + A8 + A16 : TANK

OTTAWA IDF CURVE
Area = 0.6640 ha Qallow = 29.70
C = 0.95 Vol(max) = 116.76

Time (min)	Intensity (mm/hr)	Q Uncontrolled (L/s)	Q Controlled (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	247.57	0.00	217.87	65.36
10	104.19	182.72	0.00	153.01	91.81
15	83.56	146.53	0.00	116.83	105.14
20	70.25	123.19	0.00	93.49	112.19
25	60.90	106.79	0.00	77.09	115.63
30	53.93	94.57	0.00	64.87	116.76
35	48.52	85.08	0.00	55.38	116.30
40	44.18	77.48	0.00	47.78	114.67
45	40.63	71.25	0.00	41.54	112.17
50	37.65	66.03	0.00	36.33	108.98
55	35.12	61.59	0.00	31.89	105.24
60	32.94	57.77	0.00	28.07	101.04
65	31.04	54.44	0.00	24.74	96.47
70	29.37	51.51	0.00	21.80	91.58
75	27.89	48.91	0.00	19.20	86.41
80	26.56	46.58	0.00	16.88	81.01
85	25.37	44.49	0.00	14.78	75.40
90	24.29	42.59	0.00	12.89	69.61
95	23.31	40.87	0.00	11.17	63.65
100	22.41	39.29	0.00	9.59	57.55
105	21.58	37.85	0.00	8.14	51.31
110	20.82	36.51	0.00	6.81	44.96
115	20.12	35.28	0.00	5.58	38.50
120	19.47	34.14	0.00	4.44	31.94
125	18.86	33.07	0.00	3.37	25.29
130	18.29	32.08	0.00	2.38	18.56
135	17.76	31.15	0.00	1.45	11.75
140	17.27	30.28	0.00	0.58	4.87
145	16.80	29.46	0.00	-0.24	-2.08
150	16.36	28.69	0.00	-1.01	-9.09
155	15.95	27.97	0.00	-1.74	-16.15
160	15.56	27.28	0.00	-2.42	-23.27
165	15.18	26.63	0.00	-3.08	-30.44
170	14.83	26.01	0.00	-3.69	-37.66

REQUIRED STORAGE - 100-YEAR EVENT
AREA Phase 7 + A8 + A16 : TANK

OTTAWA IDF CURVE
Area = 0.6640 ha Qallow = 29.70
C = 1.00 Vol(max) = 265.18

Time (min)	Intensity (mm/hr)	Q Uncontrolled (L/s)	Q Controlled (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	448.01	0.00	418.31	125.49
10	178.56	329.61	0.00	299.90	179.94
15	142.89	263.77	0.00	234.07	210.66
20	119.95	221.42	0.00	191.72	230.06
25	103.85	191.69	0.00	161.99	242.99
30	91.87	169.58	0.00	139.88	251.78
35	82.58	152.43	0.00	122.73	257.73
40	75.15	138.71	0.00	109.01	261.62
45	69.05	127.46	0.00	97.76	263.95
50	63.95	118.05	0.00	88.35	265.06
55	59.62	110.06	0.00	80.36	265.18
60	55.89	103.18	0.00	73.47	264.51
65	52.65	97.18	0.00	67.48	263.17
70	49.79	91.91	0.00	62.21	261.26
75	47.26	87.23	0.00	57.53	258.87
80	44.99	83.05	0.00	53.35	256.07
85	42.95	79.29	0.00	49.59	252.89
90	41.11	75.89	0.00	46.18	249.40
95	39.43	72.79	0.00	43.09	245.62
100	37.90	69.97	0.00	40.26	241.58
105	36.50	67.37	0.00	37.67	237.31
110	35.20	64.98	0.00	35.28	232.84
115	34.01	62.77	0.00	33.07	228.17
120	32.89	60.72	0.00	31.02	223.34
125	31.86	58.81	0.00	29.11	218.34
130	30.90	57.04	0.00	27.33	213.20
135	30.00	55.37	0.00	25.67	207.92
140	29.15	53.81	0.00	24.11	202.52
145	28.36	52.35	0.00	22.64	197.01
150	27.61	50.97	0.00	21.26	191.38
155	26.91	49.67	0.00	19.96	185.66
160	26.24	48.44	0.00	18.73	179.84
165	25.61	47.27	0.00	17.57	173.93
170	25.01	46.17	0.00	16.46	167.94

REQUIRED STORAGE - 5-YEAR EVENT
AREA Phase 8 : TANK

OTTAWA IDF CURVE
Area = 0.2140 ha Qallow = 29.70
C = 0.95 Vol(max) = 17.51

Time (min)	Intensity (mm/hr)	Q Uncontrolled (L/s)	Q Controlled (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	79.79	0.00	50.09	15.03
10	104.19	58.89	0.00	29.18	17.51
15	83.56	47.22	0.00	17.52	15.77
20	70.25	39.70	0.00	10.00	12.00
25	60.90	34.42	0.00	4.71	7.07
30	53.93	30.48	0.00	0.78	1.40
35	48.52	27.42	0.00	-2.28	-4.79
40	44.18	24.97	0.00	-4.73	-11.35
45	40.63	22.96	0.00	-6.74	-18.20
50	37.65	21.28	0.00	-8.42	-25.27
55	35.12	19.85	0.00	-9.85	-32.51
60	32.94	18.62	0.00	-11.08	-39.90
65	31.04	17.55	0.00	-12.16	-47.41
70	29.37	16.60	0.00	-13.10	-55.03
75	27.89	15.76	0.00	-13.94	-62.73
80	26.56	15.01	0.00	-14.69	-70.51
85	25.37	14.34	0.00	-15.36	-78.36
90	24.29	13.73	0.00	-15.98	-86.27
95	23.31	13.17	0.00	-16.53	-94.23
100	22.41	12.66	0.00	-17.04	-102.23
105	21.58	12.20	0.00	-17.50	-110.28
110	20.82	11.77	0.00	-17.93	-118.37
115	20.12	11.37	0.00	-18.33	-126.49
120	19.47	11.00	0.00	-18.70	-134.64
125	18.86	10.66	0.00	-19.04	-142.82
130	18.29	10.34	0.00	-19.36	-151.03
135	17.76	10.04	0.00	-19.66	-159.26
140	17.27	9.76	0.00	-19.94	-167.52
145	16.80	9.50	0.00	-20.21	-175.80
150	16.36	9.25	0.00	-20.46	-184.10
155	15.95	9.01	0.00	-20.69	-192.41
160	15.56	8.79	0.00	-20.91	-200.75
165	15.18	8.58	0.00	-21.12	-209.10
170	14.83	8.38	0.00	-21.32	-217.46

REQUIRED STORAGE - 100-YEAR EVENT
AREA Phase 8 : TANK

OTTAWA IDF CURVE
Area = 0.2140 ha Qallow = 29.70
C = 1.00 Vol(max) = 49.99

Time (min)	Intensity (mm/hr)	Q Uncontrolled (L/s)	Q Controlled (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	144.39	0.00	114.69	34.41
10	178.56	106.23	0.00	76.53	45.92
15	142.89	85.01	0.00	55.31	49.78
20	119.95	71.36	0.00	41.66	49.99
25	103.85	61.78	0.00	32.08	48.12
30	91.87	54.65	0.00	24.95	44.91
35	82.58	49.13	0.00	19.43	40.79
40	75.15	44.71	0.00	15.00	36.01
45	69.05	41.08	0.00	11.38	30.72
50	63.95	38.05	0.00	8.35	25.04
55	59.62	35.47	0.00	5.77	19.04
60	55.89	33.25	0.00	3.55	12.78
65	52.65	31.32	0.00	1.62	6.31
70	49.79	29.62	0.00	-0.08	-0.34
75	47.26	28.11	0.00	-1.59	-7.15
80	44.99	26.77	0.00	-2.94	-14.10
85	42.95	25.55	0.00	-4.15	-21.16
90	41.11	24.46	0.00	-5.24	-28.32
95	39.43	23.46	0.00	-6.24	-35.58
100	37.90	22.55	0.00	-7.15	-42.92
105	36.50	21.71	0.00	-7.99	-50.33
110	35.20	20.94	0.00	-8.76	-57.81
115	34.01	20.23	0.00	-9.47	-65.36
120	32.89	19.57	0.00	-10.13	-72.96
125	31.86	18.96	0.00	-10.75	-80.60
130	30.90	18.38	0.00	-11.32	-88.30
135	30.00	17.85	0.00	-11.86	-96.04
140	29.15	17.34	0.00	-12.36	-103.82
145	28.36	16.87	0.00	-12.83	-111.64
150	27.61	16.43	0.00	-13.28	-119.49
155	26.91	16.01	0.00	-13.70	-127.37
160	26.24	15.61	0.00	-14.09	-135.29
165	25.61	15.24	0.00	-14.47	-143.23
170	25.01	14.88	0.00	-14.82	-151.20

REQUIRED STORAGE - 5-YEAR EVENT
AREA Phase 9 + A9 + A10 + A17 : TANK

OTTAWA IDF CURVE
Area = 0.5510 ha Qallow = 29.70
C = 0.95 Vol(max) = 88.37

Time (min)	Intensity (mm/hr)	Q Uncontrolled (L/s)	Q Controlled (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	205.44	0.00	175.74	52.72
10	104.19	151.62	0.00	121.92	73.15
15	83.56	121.59	0.00	91.89	82.70
20	70.25	102.23	0.00	72.53	87.03
25	60.90	88.62	0.00	58.91	88.37
30	53.93	78.47	0.00	48.77	87.79
35	48.52	70.60	0.00	40.90	85.89
40	44.18	64.30	0.00	34.59	83.03
45	40.63	59.12	0.00	29.42	79.43
50	37.65	54.79	0.00	25.09	75.27
55	35.12	51.11	0.00	21.41	70.65
60	32.94	47.94	0.00	18.24	65.65
65	31.04	45.17	0.00	15.47	60.34
70	29.37	42.74	0.00	13.04	54.77
75	27.89	40.58	0.00	10.88	48.96
80	26.56	38.65	0.00	8.95	42.96
85	25.37	36.92	0.00	7.21	36.79
90	24.29	35.34	0.00	5.64	30.46
95	23.31	33.91	0.00	4.21	24.01
100	22.41	32.61	0.00	2.90	17.42
105	21.58	31.41	0.00	1.70	10.74
110	20.82	30.30	0.00	0.60	3.95
115	20.12	29.28	0.00	-0.42	-2.93
120	19.47	28.33	0.00	-1.37	-9.89
125	18.86	27.45	0.00	-2.26	-16.92
130	18.29	26.62	0.00	-3.08	-24.03
135	17.76	25.85	0.00	-3.85	-31.19
140	17.27	25.13	0.00	-4.57	-38.42
145	16.80	24.45	0.00	-5.25	-45.70
150	16.36	23.81	0.00	-5.89	-53.03
155	15.95	23.21	0.00	-6.50	-60.41
160	15.56	22.64	0.00	-7.07	-67.84
165	15.18	22.10	0.00	-7.61	-75.30
170	14.83	21.58	0.00	-8.12	-82.81

REQUIRED STORAGE - 100-YEAR EVENT
AREA Phase 9 + A9 + A10 + A17 : TANK

OTTAWA IDF CURVE
Area = 0.5510 ha Qallow = 29.70
C = 1.00 Vol(max) = 205.38

Time (min)	Intensity (mm/hr)	Q Uncontrolled (L/s)	Q Controlled (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	371.77	0.00	342.07	102.62
10	178.56	273.51	0.00	243.81	146.29
15	142.89	218.88	0.00	189.18	170.26
20	119.95	183.74	0.00	154.04	184.84
25	103.85	159.07	0.00	129.37	194.05
30	91.87	140.72	0.00	111.02	199.83
35	82.58	126.49	0.00	96.79	203.26
40	75.15	115.11	0.00	85.40	204.97
45	69.05	105.77	0.00	76.07	205.38
50	63.95	97.96	0.00	68.26	204.78
55	59.62	91.33	0.00	61.63	203.37
60	55.89	85.62	0.00	55.92	201.30
65	52.65	80.64	0.00	50.94	198.67
70	49.79	76.27	0.00	46.56	195.57
75	47.26	72.39	0.00	42.68	192.07
80	44.99	68.92	0.00	39.21	188.23
85	42.95	65.80	0.00	36.09	184.08
90	41.11	62.97	0.00	33.27	179.66
95	39.43	60.41	0.00	30.70	175.01
100	37.90	58.06	0.00	28.36	170.14
105	36.50	55.91	0.00	26.20	165.08
110	35.20	53.92	0.00	24.22	159.85
115	34.01	52.09	0.00	22.39	154.46
120	32.89	50.39	0.00	20.69	148.93
125	31.86	48.81	0.00	19.10	143.27
130	30.90	47.33	0.00	17.63	137.49
135	30.00	45.95	0.00	16.25	131.59
140	29.15	44.65	0.00	14.95	125.60
145	28.36	43.44	0.00	13.74	119.50
150	27.61	42.29	0.00	12.59	113.32
155	26.91	41.21	0.00	11.51	107.05
160	26.24	40.19	0.00	10.49	100.71
165	25.61	39.23	0.00	9.52	94.29
170	25.01	38.31	0.00	8.61	87.80

REQUIRED STORAGE - 5-YEAR EVENT
AREA Phase 10 + A11 + A18 : TANK

OTTAWA IDF CURVE
Area = 0.5917 ha Qallow = 29.70
C = 0.95 Vol(max) = 98.22

Time (min)	Intensity (mm/hr)	Q Uncontrolled (L/s)	Q Controlled (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	220.62	0.00	190.91	57.27
10	104.19	162.82	0.00	133.12	79.87
15	83.56	130.57	0.00	100.87	90.78
20	70.25	109.78	0.00	80.08	96.09
25	60.90	95.16	0.00	65.46	98.19
30	53.93	84.27	0.00	54.57	98.22
35	48.52	75.82	0.00	46.11	96.84
40	44.18	69.05	0.00	39.34	94.42
45	40.63	63.49	0.00	33.79	91.22
50	37.65	58.84	0.00	29.14	87.41
55	35.12	54.89	0.00	25.18	83.11
60	32.94	51.48	0.00	21.78	78.40
65	31.04	48.51	0.00	18.81	73.35
70	29.37	45.90	0.00	16.20	68.03
75	27.89	43.58	0.00	13.88	62.45
80	26.56	41.51	0.00	11.81	56.67
85	25.37	39.64	0.00	9.94	50.70
90	24.29	37.95	0.00	8.25	44.56
95	23.31	36.42	0.00	6.72	38.28
100	22.41	35.02	0.00	5.31	31.88
105	21.58	33.73	0.00	4.02	25.35
110	20.82	32.54	0.00	2.84	18.72
115	20.12	31.44	0.00	1.74	11.99
120	19.47	30.42	0.00	0.72	5.18
125	18.86	29.47	0.00	-0.23	-1.72
130	18.29	28.59	0.00	-1.11	-8.69
135	17.76	27.76	0.00	-1.94	-15.73
140	17.27	26.98	0.00	-2.72	-22.83
145	16.80	26.26	0.00	-3.45	-29.99
150	16.36	25.57	0.00	-4.13	-37.20
155	15.95	24.92	0.00	-4.78	-44.47
160	15.56	24.31	0.00	-5.39	-51.79
165	15.18	23.73	0.00	-5.97	-59.15
170	14.83	23.18	0.00	-6.52	-66.55

REQUIRED STORAGE - 100-YEAR EVENT
AREA Phase 10 + A11 + A18 : TANK

OTTAWA IDF CURVE
Area = 0.5917 ha Qallow = 29.70
C = 1.00 Vol(max) = 226.49

Time (min)	Intensity (mm/hr)	Q Uncontrolled (L/s)	Q Controlled (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	399.23	0.00	369.53	110.86
10	178.56	293.72	0.00	264.01	158.41
15	142.89	235.05	0.00	205.35	184.81
20	119.95	197.31	0.00	167.61	201.13
25	103.85	170.82	0.00	141.12	211.68
30	91.87	151.12	0.00	121.41	218.54
35	82.58	135.84	0.00	106.13	222.88
40	75.15	123.61	0.00	93.91	225.37
45	69.05	113.58	0.00	83.88	226.48
50	63.95	105.20	0.00	75.50	226.49
55	59.62	98.08	0.00	68.37	225.63
60	55.89	91.94	0.00	62.24	224.06
65	52.65	86.60	0.00	56.90	221.90
70	49.79	81.90	0.00	52.20	219.23
75	47.26	77.73	0.00	48.03	216.13
80	44.99	74.01	0.00	44.30	212.66
85	42.95	70.66	0.00	40.95	208.86
90	41.11	67.62	0.00	37.92	204.78
95	39.43	64.87	0.00	35.16	200.44
100	37.90	62.35	0.00	32.65	195.87
105	36.50	60.04	0.00	30.33	191.10
110	35.20	57.91	0.00	28.20	186.14
115	34.01	55.94	0.00	26.23	181.01
120	32.89	54.11	0.00	24.41	175.73
125	31.86	52.41	0.00	22.71	170.31
130	30.90	50.83	0.00	21.12	164.76
135	30.00	49.34	0.00	19.64	159.09
140	29.15	47.95	0.00	18.25	153.30
145	28.36	46.65	0.00	16.94	147.42
150	27.61	45.42	0.00	15.72	141.44
155	26.91	44.26	0.00	14.56	135.36
160	26.24	43.16	0.00	13.46	129.21
165	25.61	42.12	0.00	12.42	122.98
170	25.01	41.14	0.00	11.44	116.67

REQUIRED STORAGE - 5-YEAR EVENT
AREA Phase 11 + A12 : TANK

OTTAWA IDF CURVE
Area = 0.1650 ha Qallow = 29.70
C = 0.95 Vol(max) = 9.55

Time (min)	Intensity (mm/hr)	Q Uncontrolled (L/s)	Q Controlled (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	61.52	0.00	31.82	9.55
10	104.19	45.40	0.00	15.70	9.42
15	83.56	36.41	0.00	6.71	6.04
20	70.25	30.61	0.00	0.91	1.09
25	60.90	26.54	0.00	-3.17	-4.75
30	53.93	23.50	0.00	-6.20	-11.16
35	48.52	21.14	0.00	-8.56	-17.98
40	44.18	19.25	0.00	-10.45	-25.08
45	40.63	17.70	0.00	-12.00	-32.39
50	37.65	16.41	0.00	-13.29	-39.88
55	35.12	15.31	0.00	-14.40	-47.51
60	32.94	14.36	0.00	-15.35	-55.25
65	31.04	13.53	0.00	-16.17	-63.08
70	29.37	12.80	0.00	-16.90	-70.99
75	27.89	12.15	0.00	-17.55	-78.97
80	26.56	11.57	0.00	-18.13	-87.01
85	25.37	11.05	0.00	-18.65	-95.10
90	24.29	10.58	0.00	-19.12	-103.24
95	23.31	10.16	0.00	-19.55	-111.42
100	22.41	9.76	0.00	-19.94	-119.63
105	21.58	9.40	0.00	-20.30	-127.88
110	20.82	9.07	0.00	-20.63	-136.15
115	20.12	8.77	0.00	-20.94	-144.45
120	19.47	8.48	0.00	-21.22	-152.78
125	18.86	8.22	0.00	-21.48	-161.13
130	18.29	7.97	0.00	-21.73	-169.50
135	17.76	7.74	0.00	-21.96	-177.89
140	17.27	7.52	0.00	-22.18	-186.29
145	16.80	7.32	0.00	-22.38	-194.71
150	16.36	7.13	0.00	-22.57	-203.15
155	15.95	6.95	0.00	-22.75	-211.60
160	15.56	6.78	0.00	-22.92	-220.07
165	15.18	6.62	0.00	-23.09	-228.55
170	14.83	6.46	0.00	-23.24	-237.04

REQUIRED STORAGE - 100-YEAR EVENT
AREA Phase 11 + A12 : TANK

OTTAWA IDF CURVE
Area = 0.1650 ha Qallow = 29.70
C = 1.00 Vol(max) = 32.26

Time (min)	Intensity (mm/hr)	Q Uncontrolled (L/s)	Q Controlled (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	111.33	0.00	81.63	24.49
10	178.56	81.91	0.00	52.20	31.32
15	142.89	65.55	0.00	35.84	32.26
20	119.95	55.02	0.00	25.32	30.38
25	103.85	47.63	0.00	17.93	26.90
30	91.87	42.14	0.00	12.44	22.39
35	82.58	37.88	0.00	8.18	17.17
40	75.15	34.47	0.00	4.77	11.44
45	69.05	31.67	0.00	1.97	5.32
50	63.95	29.34	0.00	-0.37	-1.10
55	59.62	27.35	0.00	-2.35	-7.77
60	55.89	25.64	0.00	-4.06	-14.63
65	52.65	24.15	0.00	-5.55	-21.66
70	49.79	22.84	0.00	-6.86	-28.83
75	47.26	21.68	0.00	-8.03	-36.12
80	44.99	20.64	0.00	-9.07	-43.51
85	42.95	19.70	0.00	-10.00	-51.00
90	41.11	18.86	0.00	-10.84	-58.56
95	39.43	18.09	0.00	-11.61	-66.20
100	37.90	17.39	0.00	-12.32	-73.90
105	36.50	16.74	0.00	-12.96	-81.66
110	35.20	16.15	0.00	-13.56	-89.46
115	34.01	15.60	0.00	-14.10	-97.32
120	32.89	15.09	0.00	-14.61	-105.22
125	31.86	14.62	0.00	-15.09	-113.16
130	30.90	14.17	0.00	-15.53	-121.13
135	30.00	13.76	0.00	-15.94	-129.14
140	29.15	13.37	0.00	-16.33	-137.18
145	28.36	13.01	0.00	-16.69	-145.24
150	27.61	12.67	0.00	-17.04	-153.34
155	26.91	12.34	0.00	-17.36	-161.46
160	26.24	12.04	0.00	-17.67	-169.60
165	25.61	11.75	0.00	-17.96	-177.76
170	25.01	11.47	0.00	-18.23	-185.95

APPENDIX C

Fire Demand Calculations

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

Engineers, Planners & Landscape Architects

Novatech Project #: 121009
Project Name: 1500 Merivale Road - Phase 1
Date: 8/20/2021
Input By: Jazmine Gauthier
Reviewed By: Greg MacDonald

Legend: Input by User; No Information or Input Required

Building Description: 10 Storey Building
Fire Resistive Construction

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	0.6	
		Ordinary construction		1		
		Non-combustible construction		0.8		
		Modified Fire resistive construction (2 hrs)	Yes	0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Podium Level Footprint (m^2)	1177			
		Total Floors/Storeys (Podium)	10			
		Tower Footprint (m^2)	0			
		Total Floors/Storeys (Tower)	0			
		Protected Openings (1 hr)	Yes			
		Area of structure considered (m^2)			**1,766**	
	F	**Base fire flow without reductions**				**6,000**
		F = 220 **C** (**A**)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**5,100**
		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%	**-2,550**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	Yes	-10%	-10%	
				Cumulative Total	**-50%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	20.1 - 30 m		10%	**2,040**
		East Side	20.1 - 30 m		10%	
		South Side	3.1 - 10 m		20%	
		West Side	> 45.1m		0%	
				Cumulative Total	**40%**	
Results						
6	(1) + (2) + (3)	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**5,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**83**
				or	USGPM	1,321
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	1.75
		Required Volume of Fire Flow (m^3)			m^3	525

FUS - Fire Flow Calculations - User Guide - Fire Resistive

Novatech Project #: 121009
Project Name: 1500 Merivale Road - Pha
Date: 8/20/2021
Input By: Jazmine Gauthier
Reviewed By: Greg MacDonald

- Please use the notes below as a guide when completing the FUS Fire Flow Calculations
- When in doubt, confirm construction material, firewalls, etc. with architect/owner
- When in doubt, err on conservative side

Note: This form only applies for Fire Resistive

Enter a description of the building or unit being considered, i.e. use/most stringent condition/address

Summary		
Construction Type	Fire Resistive Construction	
Floor Area Considered	1,766	m^2
Occupancy Reduction	-15%	
Sprinkler Reduction	-50%	
Exposure Surcharge	40%	
Total Fire Flow	5,000	L/min

Project Manager Review
Date: _____
Name: _____
Signature: _____

Base Fire Flow

Construction Material

1
Does not apply for this form
Does not apply for this form
Does not apply for this form
Only Use if can be confirmed with client/architect (ISO Cl 5)
Only Use if can be confirmed with client/architect (ISO Cl 6)

Floor Area

2
If considered gross floor area, then enter 1 floor/storey. If Fire wall, then reduce footprint accordingly.
Un-Protected **8** = number of floors above first 2, up to max of 10 floors total

Protected **2** = number of additional immediately adjoining floors to be considered, up to 2

Do vertical openings have minimum 1 hour rating between floors? Confirm this with the architect.

For unprotected openings scenario only, can be mix of podium and tower

Reductions or Surcharges

Occupancy hazard reduction or surcharge

3
Residential - with no garage
Residential - with garage
General Commercial - Generally, no reduction
Check usage with FUS
Check usage with FUS

Sprinkler Reduction

4
Only Use if can be confirmed with client/architect
Only Use if can be confirmed with client/architect
Only Use if can be confirmed with client/architect

Exposure Surcharge (cumulative %)

5
For Fire walls: FUS considers a Fire wall to have a minimum 2 hour rating per NBC.

Results

6
NOTE: Refer to City Technical Bulletin ISDTB-2014-02 for additional considerations to cap this value at 10,000L/min

If IGPM is needed, divide USGPM by 1.20095

7
For Rural areas, or where required

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 121009
Project Name: 1500 Merivale Road - Phase 2
Date: 8/20/2021
Input By: Jazmine Gauthier
Reviewed By: Greg MacDonald

Legend: Input by User; No Information or Input Required

Building Description: 9 Storey Building
Fire Resistive Construction

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	0.6	
		Ordinary construction		1		
		Non-combustible construction		0.8		
		Modified Fire resistive construction (2 hrs)	Yes	0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Podium Level Footprint (m^2)	2509			
		Total Floors/Storeys (Podium)	9			
		Tower Footprint (m^2)	0			
		Total Floors/Storeys (Tower)	0			
		Protected Openings (1 hr)	Yes			
		Area of structure considered (m^2)			**3,764**	
	F	**Base fire flow without reductions**				**8,000**
		F = 220 **C** (**A**)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**6,800**
		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%	**-3,400**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	Yes	-10%	-10%	
				Cumulative Total	**-50%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	3.1 - 10 m		20%	**3,740**
		East Side	20.1 - 30 m		10%	
		South Side	20.1 - 30 m		10%	
		West Side	10.1 - 20 m		15%	
				Cumulative Total	**55%**	
Results						
6	(1) + (2) + (3)	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**7,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**117**
				or	USGPM	1,849
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	2
		Required Volume of Fire Flow (m^3)			m^3	840

FUS - Fire Flow Calculations - User Guide - Fire Resistive

Novatech Project #: 121009
Project Name: 1500 Merivale Road - Pha
Date: 8/20/2021
Input By: Jazmine Gauthier
Reviewed By: Greg MacDonald

- Please use the notes below as a guide when completing the FUS Fire Flow Calculations
- When in doubt, confirm construction material, firewalls, etc. with architect/owner
- When in doubt, err on conservative side

Note: This form only applies for Fire Resistive

Enter a description of the building or unit being considered, i.e. use/most stringent condition/address

Summary		
Construction Type	Fire Resistive Construction	
Floor Area Considered	3,764	m^2
Occupancy Reduction	-15%	
Sprinkler Reduction	-50%	
Exposure Surcharge	55%	
Total Fire Flow	7,000	L/min

Project Manager Review
Date: _____
Name: _____
Signature: _____

Base Fire Flow

Construction Material

1
Does not apply for this form
Does not apply for this form
Does not apply for this form
Only Use if can be confirmed with client/architect (ISO Cl 5)
Only Use if can be confirmed with client/architect (ISO Cl 6)

Floor Area

2
If considered gross floor area, then enter 1 floor/storey. If Fire wall, then reduce footprint accordingly.
Un-Protected **7** = number of floors above first 2, up to max of 10 floors total

Protected **2** = number of additional immediately adjoining floors to be considered, up to 2

Do vertical openings have minimum 1 hour rating between floors? Confirm this with the architect.

For unprotected openings scenario only, can be mix of podium and tower

Reductions or Surcharges

Occupancy hazard reduction or surcharge

3
Residential - with no garage
Residential - with garage
General Commercial - Generally, no reduction
Check usage with FUS
Check usage with FUS

Sprinkler Reduction

4
Only Use if can be confirmed with client/architect
Only Use if can be confirmed with client/architect
Only Use if can be confirmed with client/architect

Exposure Surcharge (cumulative %)

5
For Fire walls: FUS considers a Fire wall to have a minimum 2 hour rating per NBC.

Results

6
NOTE: Refer to City Technical Bulletin ISDTB-2014-02 for additional considerations to cap this value at 10,000L/min

If IGPM is needed, divide USGPM by 1.20095

7
For Rural areas, or where required

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 121009
Project Name: 1500 Merivale Road - Phase 3
Date: 8/20/2021
Input By: Jazmine Gauthier
Reviewed By: Greg MacDonald

Legend: Input by User; No Information or Input Required

Building Description: 10 Storey Building
Fire Resistive Construction

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	0.6	
		Ordinary construction		1		
		Non-combustible construction		0.8		
		Modified Fire resistive construction (2 hrs)	Yes	0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Podium Level Footprint (m^2)	692			
		Total Floors/Storeys (Podium)	10			
		Tower Footprint (m^2)	0			
		Total Floors/Storeys (Tower)	0			
		Protected Openings (1 hr)	Yes			
		Area of structure considered (m^2)			**1,038**	
	F	**Base fire flow without reductions**				**4,000**
		$F = 220\ C\ (A)^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**3,400**
		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%	**-1,700**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	Yes	-10%	-10%	
				Cumulative Total	**-50%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	3.1 - 10 m		20%	**1,870**
		East Side	20.1 - 30 m		10%	
		South Side	20.1 - 30 m		10%	
		West Side	10.1 - 20 m		15%	
				Cumulative Total	**55%**	
Results						
6	(1) + (2) + (3)	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**4,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**67**
				or	USGPM	1,057
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	1.5
		Required Volume of Fire Flow (m^3)			m^3	360

FUS - Fire Flow Calculations - User Guide - Fire Resistive

Novatech Project #: 121009
Project Name: 1500 Merivale Road - Pha
Date: 8/20/2021
Input By: Jazmine Gauthier
Reviewed By: Greg MacDonald

- Please use the notes below as a guide when completing the FUS Fire Flow Calculations
- When in doubt, confirm construction material, firewalls, etc. with architect/owner
- When in doubt, err on conservative side

Note: This form only applies for Fire Resistive

Enter a description of the building or unit being considered, i.e. use/most stringent condition/address

Summary		
Construction Type	Fire Resistive Construction	
Floor Area Considered	1,038	m^2
Occupancy Reduction	-15%	
Sprinkler Reduction	-50%	
Exposure Surcharge	55%	
Total Fire Flow	4,000	L/min

Project Manager Review
Date: _____
Name: _____
Signature: _____

Base Fire Flow

Construction Material

1
Does not apply for this form
Does not apply for this form
Does not apply for this form
Only Use if can be confirmed with client/architect (ISO Cl 5)
Only Use if can be confirmed with client/architect (ISO Cl 6)

Floor Area

2
If considered gross floor area, then enter 1 floor/storey. If Fire wall, then reduce footprint accordingly.
Un-Protected **8** = number of floors above first 2, up to max of 10 floors total

Protected **2** = number of additional immediately adjoining floors to be considered, up to 2

Do vertical openings have minimum 1 hour rating between floors? Confirm this with the architect.

For unprotected openings scenario only, can be mix of podium and tower

Reductions or Surcharges

Occupancy hazard reduction or surcharge

3
Residential - with no garage
Residential - with garage
General Commercial - Generally, no reduction
Check usage with FUS
Check usage with FUS

Sprinkler Reduction

4
Only Use if can be confirmed with client/architect
Only Use if can be confirmed with client/architect
Only Use if can be confirmed with client/architect

Exposure Surcharge (cumulative %)

5
For Fire walls: FUS considers a Fire wall to have a minimum 2 hour rating per NBC.

Results

6
NOTE: Refer to City Technical Bulletin ISDTB-2014-02 for additional considerations to cap this value at 10,000L/min

If IGPM is needed, divide USGPM by 1.20095

7
For Rural areas, or where required

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 121009
Project Name: 1500 Merivale Road - Phase 4
Date: 8/20/2021
Input By: Jazmine Gauthier
Reviewed By: Greg MacDonald

Legend: Input by User; No Information or Input Required

Building Description: 9 Storey Building
Fire Resistive Construction

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	0.6	
		Ordinary construction		1		
		Non-combustible construction		0.8		
		Modified Fire resistive construction (2 hrs)	Yes	0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Podium Level Footprint (m^2)	2303			
		Total Floors/Storeys (Podium)	9			
		Tower Footprint (m^2)	0			
		Total Floors/Storeys (Tower)	0			
		Protected Openings (1 hr)	Yes			
		Area of structure considered (m^2)			**3,455**	
	F	**Base fire flow without reductions**				**8,000**
		$F = 220\ C\ (A)^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**6,800**
		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%	**-3,400**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	Yes	-10%	-10%	
				Cumulative Total	**-50%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	10.1 - 20 m		15%	**4,080**
		East Side	10.1 - 20 m		15%	
		South Side	10.1 - 20 m		15%	
		West Side	10.1 - 20 m		15%	
				Cumulative Total	**60%**	
Results						
6	(1) + (2) + (3)	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**7,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**117**
				or	USGPM	1,849
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	2
		Required Volume of Fire Flow (m^3)			m^3	840

FUS - Fire Flow Calculations - User Guide - Fire Resistive

Novatech Project #: 121009
Project Name: 1500 Merivale Road - Pha
Date: 8/20/2021
Input By: Jazmine Gauthier
Reviewed By: Greg MacDonald

- Please use the notes below as a guide when completing the FUS Fire Flow Calculations
- When in doubt, confirm construction material, firewalls, etc. with architect/owner
- When in doubt, err on conservative side

Note: This form only applies for Fire Resistive

Enter a description of the building or unit being considered, i.e. use/most stringent condition/address

Summary		
Construction Type	Fire Resistive Construction	
Floor Area Considered	3,455	m^2
Occupancy Reduction	-15%	
Sprinkler Reduction	-50%	
Exposure Surcharge	60%	
Total Fire Flow	7,000	L/min

Project Manager Review
Date: _____
Name: _____
Signature: _____

Base Fire Flow

Construction Material

1
Does not apply for this form
Does not apply for this form
Does not apply for this form
Only Use if can be confirmed with client/architect (ISO Cl 5)
Only Use if can be confirmed with client/architect (ISO Cl 6)

Floor Area

2
If considered gross floor area, then enter 1 floor/storey. If Fire wall, then reduce footprint accordingly.
Un-Protected **7** = number of floors above first 2, up to max of 10 floors total

Protected **2** = number of additional immediately adjoining floors to be considered, up to 2

Do vertical openings have minimum 1 hour rating between floors? Confirm this with the architect.

For unprotected openings scenario only, can be mix of podium and tower

Reductions or Surcharges

Occupancy hazard reduction or surcharge

3
Residential - with no garage
Residential - with garage
General Commercial - Generally, no reduction
Check usage with FUS
Check usage with FUS

Sprinkler Reduction

4
Only Use if can be confirmed with client/architect
Only Use if can be confirmed with client/architect
Only Use if can be confirmed with client/architect

Exposure Surcharge (cumulative %)

5
For Fire walls: FUS considers a Fire wall to have a minimum 2 hour rating per NBC.

Results

6
NOTE: Refer to City Technical Bulletin ISDTB-2014-02 for additional considerations to cap this value at 10,000L/min

If IGPM is needed, divide USGPM by 1.20095

7
For Rural areas, or where required

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 121009
Project Name: 1500 Merivale Road - Phase 5
Date: 8/20/2021
Input By: Jazmine Gauthier
Reviewed By: Greg MacDonald

Legend: Input by User; No Information or Input Required

Building Description: 9 Storey Building
Fire Resistive Construction

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	0.6	
		Ordinary construction		1		
		Non-combustible construction		0.8		
		Modified Fire resistive construction (2 hrs)	Yes	0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Podium Level Footprint (m^2)	2101			
		Total Floors/Storeys (Podium)	9			
		Tower Footprint (m^2)	0			
		Total Floors/Storeys (Tower)	0			
		Protected Openings (1 hr)	Yes			
		Area of structure considered (m^2)			**3,152**	
	F	**Base fire flow without reductions**				**7,000**
		F = 220 **C** (**A**)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**5,950**
		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%	**-2,975**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	Yes	-10%	-10%	
				Cumulative Total	**-50%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	10.1 - 20 m		15%	**3,570**
		East Side	10.1 - 20 m		15%	
		South Side	10.1 - 20 m		15%	
		West Side	10.1 - 20 m		15%	
				Cumulative Total	**60%**	
Results						
6	(1) + (2) + (3)	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**7,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**117**
				or	USGPM	1,849
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	2
		Required Volume of Fire Flow (m^3)			m^3	840

FUS - Fire Flow Calculations - User Guide - Fire Resistive

Novatech Project #: 121009
Project Name: 1500 Merivale Road - Pha
Date: 8/20/2021
Input By: Jazmine Gauthier
Reviewed By: Greg MacDonald

- Please use the notes below as a guide when completing the FUS Fire Flow Calculations
- When in doubt, confirm construction material, firewalls, etc. with architect/owner
- When in doubt, err on conservative side

Note: This form only applies for Fire Resistive

Enter a description of the building or unit being considered, i.e. use/most stringent condition/address

Summary		
Construction Type	Fire Resistive Construction	
Floor Area Considered	3,152	m^2
Occupancy Reduction	-15%	
Sprinkler Reduction	-50%	
Exposure Surcharge	60%	
Total Fire Flow	7,000	L/min

Project Manager Review
Date: _____
Name: _____
Signature: _____

Base Fire Flow

Construction Material

1
Does not apply for this form
Does not apply for this form
Does not apply for this form
Only Use if can be confirmed with client/architect (ISO Cl 5)
Only Use if can be confirmed with client/architect (ISO Cl 6)

Floor Area

2
If considered gross floor area, then enter 1 floor/storey. If Fire wall, then reduce footprint accordingly.
Un-Protected **7** = number of floors above first 2, up to max of 10 floors total

Protected **2** = number of additional immediately adjoining floors to be considered, up to 2

Do vertical openings have minimum 1 hour rating between floors? Confirm this with the architect.

For unprotected openings scenario only, can be mix of podium and tower

Reductions or Surcharges

Occupancy hazard reduction or surcharge

3
Residential - with no garage
Residential - with garage
General Commercial - Generally, no reduction
Check usage with FUS
Check usage with FUS

Sprinkler Reduction

4
Only Use if can be confirmed with client/architect
Only Use if can be confirmed with client/architect
Only Use if can be confirmed with client/architect

Exposure Surcharge (cumulative %)

5
For Fire walls: FUS considers a Fire wall to have a minimum 2 hour rating per NBC.

Results

6
NOTE: Refer to City Technical Bulletin ISDTB-2014-02 for additional considerations to cap this value at 10,000L/min

If IGPM is needed, divide USGPM by 1.20095

7
For Rural areas, or where required

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

Engineers, Planners & Landscape Architects

Novatech Project #: 121009
Project Name: 1500 Merivale Road - Phase 6
Date: 8/20/2021
Input By: Jazmine Gauthier
Reviewed By: Greg MacDonald

Legend: Input by User; No Information or Input Required

Building Description: 10 Storey Building
Fire Resistive Construction

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	0.6	
		Ordinary construction		1		
		Non-combustible construction		0.8		
		Modified Fire resistive construction (2 hrs)	Yes	0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Podium Level Footprint (m^2)	2237			
		Total Floors/Storeys (Podium)	10			
		Tower Footprint (m^2)	0			
		Total Floors/Storeys (Tower)	0			
		Protected Openings (1 hr)	Yes			
		Area of structure considered (m^2)			**3,356**	
	F	**Base fire flow without reductions**				**8,000**
		F = 220 **C** (**A**)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**6,800**
		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%	**-3,400**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	Yes	-10%	-10%	
				Cumulative Total	**-50%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	30.1- 45 m		5%	**4,080**
		East Side	3.1 - 10 m		20%	
		South Side	10.1 - 20 m		15%	
		West Side	3.1 - 10 m		20%	
				Cumulative Total	**60%**	
Results						
6	(1) + (2) + (3)	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**7,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**117**
				or	USGPM	1,849
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	2
		Required Volume of Fire Flow (m^3)			m^3	840

FUS - Fire Flow Calculations - User Guide - Fire Resistive

Novatech Project #: 121009
Project Name: 1500 Merivale Road - Pha
Date: 8/20/2021
Input By: Jazmine Gauthier
Reviewed By: Greg MacDonald

- Please use the notes below as a guide when completing the FUS Fire Flow Calculations
- When in doubt, confirm construction material, firewalls, etc. with architect/owner
- When in doubt, err on conservative side

Note: This form only applies for Fire Resistive

Enter a description of the building or unit being considered, i.e. use/most stringent condition/address

Summary		
Construction Type	Fire Resistive Construction	
Floor Area Considered	3,356	m^2
Occupancy Reduction	-15%	
Sprinkler Reduction	-50%	
Exposure Surcharge	60%	
Total Fire Flow	7,000	L/min

Project Manager Review
Date: _____
Name: _____
Signature: _____

Base Fire Flow

Construction Material

1
Does not apply for this form
Does not apply for this form
Does not apply for this form
Only Use if can be confirmed with client/architect (ISO Cl 5)
Only Use if can be confirmed with client/architect (ISO Cl 6)

Floor Area

2
If considered gross floor area, then enter 1 floor/storey. If Fire wall, then reduce footprint accordingly.
Un-Protected **8** = number of floors above first 2, up to max of 10 floors total

Protected **2** = number of additional immediately adjoining floors to be considered, up to 2

Do vertical openings have minimum 1 hour rating between floors? Confirm this with the architect.

For unprotected openings scenario only, can be mix of podium and tower

Reductions or Surcharges

Occupancy hazard reduction or surcharge

3
Residential - with no garage
Residential - with garage
General Commercial - Generally, no reduction
Check usage with FUS
Check usage with FUS

Sprinkler Reduction

4
Only Use if can be confirmed with client/architect
Only Use if can be confirmed with client/architect
Only Use if can be confirmed with client/architect

Exposure Surcharge (cumulative %)

5
For Fire walls: FUS considers a Fire wall to have a minimum 2 hour rating per NBC.

Results

6
NOTE: Refer to City Technical Bulletin ISDTB-2014-02 for additional considerations to cap this value at 10,000L/min

If IGPM is needed, divide USGPM by 1.20095

7
For Rural areas, or where required

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 121009
Project Name: 1500 Merivale Road - Phase 7
Date: 8/20/2021
Input By: Jazmine Gauthier
Reviewed By: Greg MacDonald

Legend: Input by User; No Information or Input Required

Building Description: 9 Storey Building
Fire Resistive Construction

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	0.6	
		Ordinary construction		1		
		Non-combustible construction		0.8		
		Modified Fire resistive construction (2 hrs)	Yes	0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Podium Level Footprint (m^2)	1646			
		Total Floors/Storeys (Podium)	9			
		Tower Footprint (m^2)	0			
		Total Floors/Storeys (Tower)	0			
		Protected Openings (1 hr)	Yes			
		Area of structure considered (m^2)			**2,469**	
	F	**Base fire flow without reductions**				**7,000**
		F = 220 **C** (**A**)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**5,950**
		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%	**-2,975**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	Yes	-10%	-10%	
				Cumulative Total	**-50%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	10.1 - 20 m		15%	**2,380**
		East Side	30.1- 45 m		5%	
		South Side	30.1- 45 m		5%	
		West Side	10.1 - 20 m		15%	
				Cumulative Total	**40%**	
Results						
6	(1) + (2) + (3)	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**5,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**83**
				or	USGPM	1,321
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	1.75
		Required Volume of Fire Flow (m^3)			m^3	525

FUS - Fire Flow Calculations - User Guide - Fire Resistive

Novatech Project #: 121009
Project Name: 1500 Merivale Road - Pha
Date: 8/20/2021
Input By: Jazmine Gauthier
Reviewed By: Greg MacDonald

- Please use the notes below as a guide when completing the FUS Fire Flow Calculations
- When in doubt, confirm construction material, firewalls, etc. with architect/owner
- When in doubt, err on conservative side

Note: This form only applies for Fire Resistive

Enter a description of the building or unit being considered, i.e. use/most stringent condition/address

Summary		
Construction Type	Fire Resistive Construction	
Floor Area Considered	2,469	m^2
Occupancy Reduction	-15%	
Sprinkler Reduction	-50%	
Exposure Surcharge	40%	
Total Fire Flow	5,000	L/min

Project Manager Review
Date: _____
Name: _____
Signature: _____

Base Fire Flow

Construction Material

1
Does not apply for this form
Does not apply for this form
Does not apply for this form
Only Use if can be confirmed with client/architect (ISO Cl 5)
Only Use if can be confirmed with client/architect (ISO Cl 6)

Floor Area

2
If considered gross floor area, then enter 1 floor/storey. If Fire wall, then reduce footprint accordingly.
Un-Protected **7** = number of floors above first 2, up to max of 10 floors total

Protected **2** = number of additional immediately adjoining floors to be considered, up to 2

Do vertical openings have minimum 1 hour rating between floors? Confirm this with the architect.

For unprotected openings scenario only, can be mix of podium and tower

Reductions or Surcharges

Occupancy hazard reduction or surcharge

3
Residential - with no garage
Residential - with garage
General Commercial - Generally, no reduction
Check usage with FUS
Check usage with FUS

Sprinkler Reduction

4
Only Use if can be confirmed with client/architect
Only Use if can be confirmed with client/architect
Only Use if can be confirmed with client/architect

Exposure Surcharge (cumulative %)

5
For Fire walls: FUS considers a Fire wall to have a minimum 2 hour rating per NBC.

Results

6
NOTE: Refer to City Technical Bulletin ISDTB-2014-02 for additional considerations to cap this value at 10,000L/min

If IGPM is needed, divide USGPM by 1.20095

7
For Rural areas, or where required

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 121009
Project Name: 1500 Merivale Road - Phase 8
Date: 8/20/2021
Input By: Jazmine Gauthier
Reviewed By: Greg MacDonald

Legend: Input by User; No Information or Input Required

Building Description: 9 Storey Building
Fire Resistive Construction

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	0.6	
		Ordinary construction		1		
		Non-combustible construction		0.8		
		Modified Fire resistive construction (2 hrs)	Yes	0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Podium Level Footprint (m^2)	1973			
		Total Floors/Storeys (Podium)	9			
		Tower Footprint (m^2)	0			
		Total Floors/Storeys (Tower)	0			
		Protected Openings (1 hr)	Yes			
		Area of structure considered (m^2)			**2,960**	
	F	**Base fire flow without reductions**				**7,000**
		F = 220 **C** (**A**)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**5,950**
		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%	**-2,975**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	Yes	-10%	-10%	
				Cumulative Total	**-50%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	10.1 - 20 m		15%	**2,380**
		East Side	30.1- 45 m		5%	
		South Side	30.1- 45 m		5%	
		West Side	10.1 - 20 m		15%	
				Cumulative Total	**40%**	
Results						
6	(1) + (2) + (3)	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**5,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**83**
				or	USGPM	1,321
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	1.75
		Required Volume of Fire Flow (m^3)			m^3	525

FUS - Fire Flow Calculations - User Guide - Fire Resistive

Novatech Project #: 121009
Project Name: 1500 Merivale Road - Pha
Date: 8/20/2021
Input By: Jazmine Gauthier
Reviewed By: Greg MacDonald

- Please use the notes below as a guide when completing the FUS Fire Flow Calculations
- When in doubt, confirm construction material, firewalls, etc. with architect/owner
- When in doubt, err on conservative side

Note: This form only applies for Fire Resistive

Enter a description of the building or unit being considered, i.e. use/most stringent condition/address

Summary		
Construction Type	Fire Resistive Construction	
Floor Area Considered	2,960	m^2
Occupancy Reduction	-15%	
Sprinkler Reduction	-50%	
Exposure Surcharge	40%	
Total Fire Flow	5,000	L/min

Project Manager Review
Date: _____
Name: _____
Signature: _____

Base Fire Flow

Construction Material

1
Does not apply for this form
Does not apply for this form
Does not apply for this form
Only Use if can be confirmed with client/architect (ISO Cl 5)
Only Use if can be confirmed with client/architect (ISO Cl 6)

Floor Area

2
If considered gross floor area, then enter 1 floor/storey. If Fire wall, then reduce footprint accordingly.
Un-Protected [7] = number of floors above first 2, up to max of 10 floors total

Protected [2] = number of additional immediately adjoining floors to be considered, up to 2

Do vertical openings have minimum 1 hour rating between floors? Confirm this with the architect.

For unprotected openings scenario only, can be mix of podium and tower

Reductions or Surcharges

Occupancy hazard reduction or surcharge

3
Residential - with no garage
Residential - with garage
General Commercial - Generally, no reduction
Check usage with FUS
Check usage with FUS

Sprinkler Reduction

4
Only Use if can be confirmed with client/architect
Only Use if can be confirmed with client/architect
Only Use if can be confirmed with client/architect

Exposure Surcharge (cumulative %)

5
For Fire walls: FUS considers a Fire wall to have a minimum 2 hour rating per NBC.

Results

6
NOTE: Refer to City Technical Bulletin ISDTB-2014-02 for additional considerations to cap this value at 10,000L/min

If IGPM is needed, divide USGPM by 1.20095

7
For Rural areas, or where required

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 121009
Project Name: 1500 Merivale Road - Phase 9
Date: 8/20/2021
Input By: Jazmine Gauthier
Reviewed By: Greg MacDonald

Legend: Input by User; No Information or Input Required

Building Description: 9 Storey Building
Fire Resistive Construction

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	0.6	
		Ordinary construction		1		
		Non-combustible construction		0.8		
		Modified Fire resistive construction (2 hrs)	Yes	0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Podium Level Footprint (m^2)	1855			
		Total Floors/Storeys (Podium)	9			
		Tower Footprint (m^2)	0			
		Total Floors/Storeys (Tower)	0			
		Protected Openings (1 hr)	Yes			
		Area of structure considered (m^2)			**2,783**	
	F	**Base fire flow without reductions**				**7,000**
		F = 220 **C** (**A**)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**5,950**
		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%	**-2,975**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	Yes	-10%	-10%	
				Cumulative Total	**-50%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	10.1 - 20 m		15%	**2,380**
		East Side	10.1 - 20 m		15%	
		South Side	30.1- 45 m		5%	
		West Side	30.1- 45 m		5%	
				Cumulative Total	**40%**	
Results						
6	(1) + (2) + (3)	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**5,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**83**
				or	USGPM	1,321
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	1.75
		Required Volume of Fire Flow (m^3)			m^3	525

FUS - Fire Flow Calculations - User Guide - Fire Resistive

Novatech Project #: 121009
Project Name: 1500 Merivale Road - Pha
Date: 8/20/2021
Input By: Jazmine Gauthier
Reviewed By: Greg MacDonald

- Please use the notes below as a guide when completing the FUS Fire Flow Calculations
- When in doubt, confirm construction material, firewalls, etc. with architect/owner
- When in doubt, err on conservative side

Note: This form only applies for Fire Resistive

Enter a description of the building or unit being considered, i.e. use/most stringent condition/address

Summary		
Construction Type	Fire Resistive Construction	
Floor Area Considered	2,783	m^2
Occupancy Reduction	-15%	
Sprinkler Reduction	-50%	
Exposure Surcharge	40%	
Total Fire Flow	5,000	L/min

Project Manager Review
Date: _____
Name: _____
Signature: _____

Base Fire Flow

Construction Material

1
Does not apply for this form
Does not apply for this form
Does not apply for this form
Only Use if can be confirmed with client/architect (ISO Cl 5)
Only Use if can be confirmed with client/architect (ISO Cl 6)

Floor Area

2
If considered gross floor area, then enter 1 floor/storey. If Fire wall, then reduce footprint accordingly.
Un-Protected [7] = number of floors above first 2, up to max of 10 floors total

Protected [2] = number of additional immediately adjoining floors to be considered, up to 2

Do vertical openings have minimum 1 hour rating between floors? Confirm this with the architect.

For unprotected openings scenario only, can be mix of podium and tower

Reductions or Surcharges

Occupancy hazard reduction or surcharge

3
Residential - with no garage
Residential - with garage
General Commercial - Generally, no reduction
Check usage with FUS
Check usage with FUS

Sprinkler Reduction

4
Only Use if can be confirmed with client/architect
Only Use if can be confirmed with client/architect
Only Use if can be confirmed with client/architect

Exposure Surcharge (cumulative %)

5
For Fire walls: FUS considers a Fire wall to have a minimum 2 hour rating per NBC.

Results

6
NOTE: Refer to City Technical Bulletin ISDTB-2014-02 for additional considerations to cap this value at 10,000L/min

If IGPM is needed, divide USGPM by 1.20095

7
For Rural areas, or where required

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 121009
Project Name: 1500 Merivale Road - Phase 10
Date: 8/20/2021
Input By: Jazmine Gauthier
Reviewed By: Greg MacDonald

Legend: Input by User; No Information or Input Required

Building Description: 9 Storey Building
Fire Resistive Construction

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	0.6	
		Ordinary construction		1		
		Non-combustible construction		0.8		
		Modified Fire resistive construction (2 hrs)	Yes	0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Podium Level Footprint (m^2)	2094			
		Total Floors/Storeys (Podium)	9			
		Tower Footprint (m^2)	0			
		Total Floors/Storeys (Tower)	0			
		Protected Openings (1 hr)	Yes			
		Area of structure considered (m^2)			**3,141**	
	F	**Base fire flow without reductions**				**7,000**
		$F = 220\ C\ (A)^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**5,950**
		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%	**-2,975**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	Yes	-10%	-10%	
				Cumulative Total	**-50%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	30.1- 45 m		5%	**2,083**
		East Side	30.1- 45 m		5%	
		South Side	3.1 - 10 m		20%	
		West Side	30.1- 45 m		5%	
				Cumulative Total	**35%**	
Results						
6	(1) + (2) + (3)	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**5,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**83**
				or	USGPM	1,321
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	1.75
		Required Volume of Fire Flow (m^3)			m^3	525

FUS - Fire Flow Calculations - User Guide - Fire Resistive

Novatech Project #: 121009
Project Name: 1500 Merivale Road - Pha
Date: 8/20/2021
Input By: Jazmine Gauthier
Reviewed By: Greg MacDonald

- Please use the notes below as a guide when completing the FUS Fire Flow Calculations
- When in doubt, confirm construction material, firewalls, etc. with architect/owner
- When in doubt, err on conservative side

Note: This form only applies for Fire Resistive

Enter a description of the building or unit being considered, i.e. use/most stringent condition/address

Summary		
Construction Type	Fire Resistive Construction	
Floor Area Considered	3,141	m^2
Occupancy Reduction	-15%	
Sprinkler Reduction	-50%	
Exposure Surcharge	35%	
Total Fire Flow	5,000	L/min

Project Manager Review
Date: _____
Name: _____
Signature: _____

Base Fire Flow

Construction Material

1
Does not apply for this form
Does not apply for this form
Does not apply for this form
Only Use if can be confirmed with client/architect (ISO Cl 5)
Only Use if can be confirmed with client/architect (ISO Cl 6)

Floor Area

2
If considered gross floor area, then enter 1 floor/storey. If Fire wall, then reduce footprint accordingly.
Un-Protected **7** = number of floors above first 2, up to max of 10 floors total

Protected **2** = number of additional immediately adjoining floors to be considered, up to 2

Do vertical openings have minimum 1 hour rating between floors? Confirm this with the architect.

For unprotected openings scenario only, can be mix of podium and tower

Reductions or Surcharges

Occupancy hazard reduction or surcharge

3
Residential - with no garage
Residential - with garage
General Commercial - Generally, no reduction
Check usage with FUS
Check usage with FUS

Sprinkler Reduction

4
Only Use if can be confirmed with client/architect
Only Use if can be confirmed with client/architect
Only Use if can be confirmed with client/architect

Exposure Surcharge (cumulative %)

5
For Fire walls: FUS considers a Fire wall to have a minimum 2 hour rating per NBC.

Results

6
NOTE: Refer to City Technical Bulletin ISDTB-2014-02 for additional considerations to cap this value at 10,000L/min

If IGPM is needed, divide USGPM by 1.20095

7
For Rural areas, or where required

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 121009
Project Name: 1500 Merivale Road - Phase 11
Date: 8/20/2021
Input By: Jazmine Gauthier
Reviewed By: Greg MacDonald

Legend: Input by User; No Information or Input Required

Building Description: 10 Storey Building
Fire Resistive Construction

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	0.6	
		Ordinary construction		1		
		Non-combustible construction		0.8		
		Modified Fire resistive construction (2 hrs)	Yes	0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Podium Level Footprint (m^2)	921			
		Total Floors/Storeys (Podium)	10			
		Tower Footprint (m^2)	0			
		Total Floors/Storeys (Tower)	0			
		Protected Openings (1 hr)	Yes			
		Area of structure considered (m^2)			**1,382**	
	F	**Base fire flow without reductions**				**5,000**
		$F = 220\ C\ (A)^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**4,250**
		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%	**-2,125**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	Yes	-10%	-10%	
				Cumulative Total	**-50%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	30.1- 45 m		5%	**1,488**
		East Side	30.1- 45 m		5%	
		South Side	3.1 - 10 m		20%	
		West Side	30.1- 45 m		5%	
				Cumulative Total	**35%**	
Results						
6	(1) + (2) + (3)	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**4,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**67**
				or	USGPM	1,057
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	1.5
		Required Volume of Fire Flow (m^3)			m^3	360

FUS - Fire Flow Calculations - User Guide - Fire Resistive

Novatech Project #: 121009
Project Name: 1500 Merivale Road - Pha
Date: 8/20/2021
Input By: Jazmine Gauthier
Reviewed By: Greg MacDonald

- Please use the notes below as a guide when completing the FUS Fire Flow Calculations
- When in doubt, confirm construction material, firewalls, etc. with architect/owner
- When in doubt, err on conservative side

Note: This form only applies for Fire Resistive

Enter a description of the building or unit being considered, i.e. use/most stringent condition/address

Summary		
Construction Type	Fire Resistive Construction	
Floor Area Considered	1,382	m^2
Occupancy Reduction	-15%	
Sprinkler Reduction	-50%	
Exposure Surcharge	35%	
Total Fire Flow	4,000	L/min

Project Manager Review
Date: _____
Name: _____
Signature: _____

Base Fire Flow

Construction Material

1
Does not apply for this form
Does not apply for this form
Does not apply for this form
Only Use if can be confirmed with client/architect (ISO Cl 5)
Only Use if can be confirmed with client/architect (ISO Cl 6)

Floor Area

2
If considered gross floor area, then enter 1 floor/storey. If Fire wall, then reduce footprint accordingly.
Un-Protected **8** = number of floors above first 2, up to max of 10 floors total

Protected **2** = number of additional immediately adjoining floors to be considered, up to 2

Do vertical openings have minimum 1 hour rating between floors? Confirm this with the architect.

For unprotected openings scenario only, can be mix of podium and tower

Reductions or Surcharges

Occupancy hazard reduction or surcharge

3
Residential - with no garage
Residential - with garage
General Commercial - Generally, no reduction
Check usage with FUS
Check usage with FUS

Sprinkler Reduction

4
Only Use if can be confirmed with client/architect
Only Use if can be confirmed with client/architect
Only Use if can be confirmed with client/architect

Exposure Surcharge (cumulative %)

5
For Fire walls: FUS considers a Fire wall to have a minimum 2 hour rating per NBC.

Results

6
NOTE: Refer to City Technical Bulletin ISDTB-2014-02 for additional considerations to cap this value at 10,000L/min

If IGPM is needed, divide USGPM by 1.20095

7
For Rural areas, or where required

APPENDIX D

Servicing Study Guidelines Checklist

Development Servicing Study Checklist

4.1 General Content	Addressed (Y/N/NA)	Section	Comments
Executive Summary (for larger reports only).	NA		
Date and revision number of the report.	Y	p.1	
Location map and plan showing municipal address, boundary, and layout of proposed development.	Y	Dwgs	GP, GR, STM
Plan showing the site and location of all existing services.	Y	Dwg	GP
Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.	Y	Intro	
Summary of Pre-consultation Meetings with City and other approval agencies.	N		
Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria.	Y	Report	All sections
Statement of objectives and servicing criteria.	Y	Report	
Identification of existing and proposed infrastructure available in the immediate area.	Y	Dwg	GP
Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).	NA		
Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighboring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.	Y	Report	

Development Servicing Study Checklist

4.1 General Content	Addressed (Y/N/NA)	Section	Comments
Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.	NA		
Proposed phasing of the development, if applicable.	Y		
Reference to geotechnical studies and recommendations concerning servicing.	Y	Report	
All preliminary and formal site plan submissions should have the following information:			
Metric scale	Y		All Drawings
North arrow (including construction North)	Y		All Drawings
Key plan	Y		All Drawings
Name and contact information of applicant and property owner	Y		Drawings/Report
Property limits including bearings and dimensions	Y		Report
Existing and proposed structures and parking areas	Y		All Drawings
Easements, road widening and rights-of-way	Y		All Drawings
Adjacent street names	Y		All Drawings

Development Servicing Study Checklist

4.2 Water	Addressed (Y/N/NA)	Section	Comments
Confirm consistency with Master Servicing Study, if available.	NA		
Availability of public infrastructure to service proposed development.	Y		
Identification of system constraints.	NA		
Identify boundary conditions.	NA		
Confirmation of adequate domestic supply and pressure.	NA		
Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development.	Y		Appendix
Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.	NA		
Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design.	NA		
Address reliability requirements such as appropriate location of shut-off valves.	Y		Drawings
Check on the necessity of a pressure zone boundary modification.	NA		
Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range.	NA		
Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.	Y	Report	
Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.	NA		
Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Y	Report	
Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	NA		

Development Servicing Study Checklist

4.3 Wastewater	Addressed (Y/N/NA)	Section	Comments
Summary of proposed design criteria (Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).	Y	Report	
Confirm consistency with Master Servicing Study and/or justifications for deviations.	NA		
Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers.	NA		
Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Y	Report	Drawings
Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable)	Y	Report	Appendix
Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	NA		
Description of proposed sewer network including sewers, pumping stations, and forcemains.	Y		
Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).	NA		
Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	NA		
Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	NA		
Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	NA		
Special considerations such as contamination, corrosive environment etc.	NA		

Development Servicing Study Checklist

4.4 Stormwater	Addressed (Y/N/NA)	Section	Comments
Description of drainage outlets and downstream constraints including legality of outlet (i.e. municipal drain, right-of-way, watercourse, or private property).	Y	Report	
Analysis of the available capacity in existing public infrastructure.	NA		
A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns and proposed drainage patterns.	Y		GR, STM
Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.	Y	Report	
Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	Y	Report	
Description of stormwater management concept with facility locations and descriptions with references and supporting information.	Y	Report	
Set-back from private sewage disposal systems.	NA		
Watercourse and hazard lands setbacks.	Y		
Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	N		
Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	N		
Storage requirements (complete with calcs) and conveyance capacity for 5 yr and 100 yr events.	Y		Appendix
Identification of watercourse within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	NA		
Calculate pre and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.	Y		Appendix
Any proposed diversion of drainage catchment areas from one outlet to another.	NA		
Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and SWM facilities.	Y	Report	And Appendix
If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100-year return period storm event.	Y	Report	And Appendix

Development Servicing Study Checklist

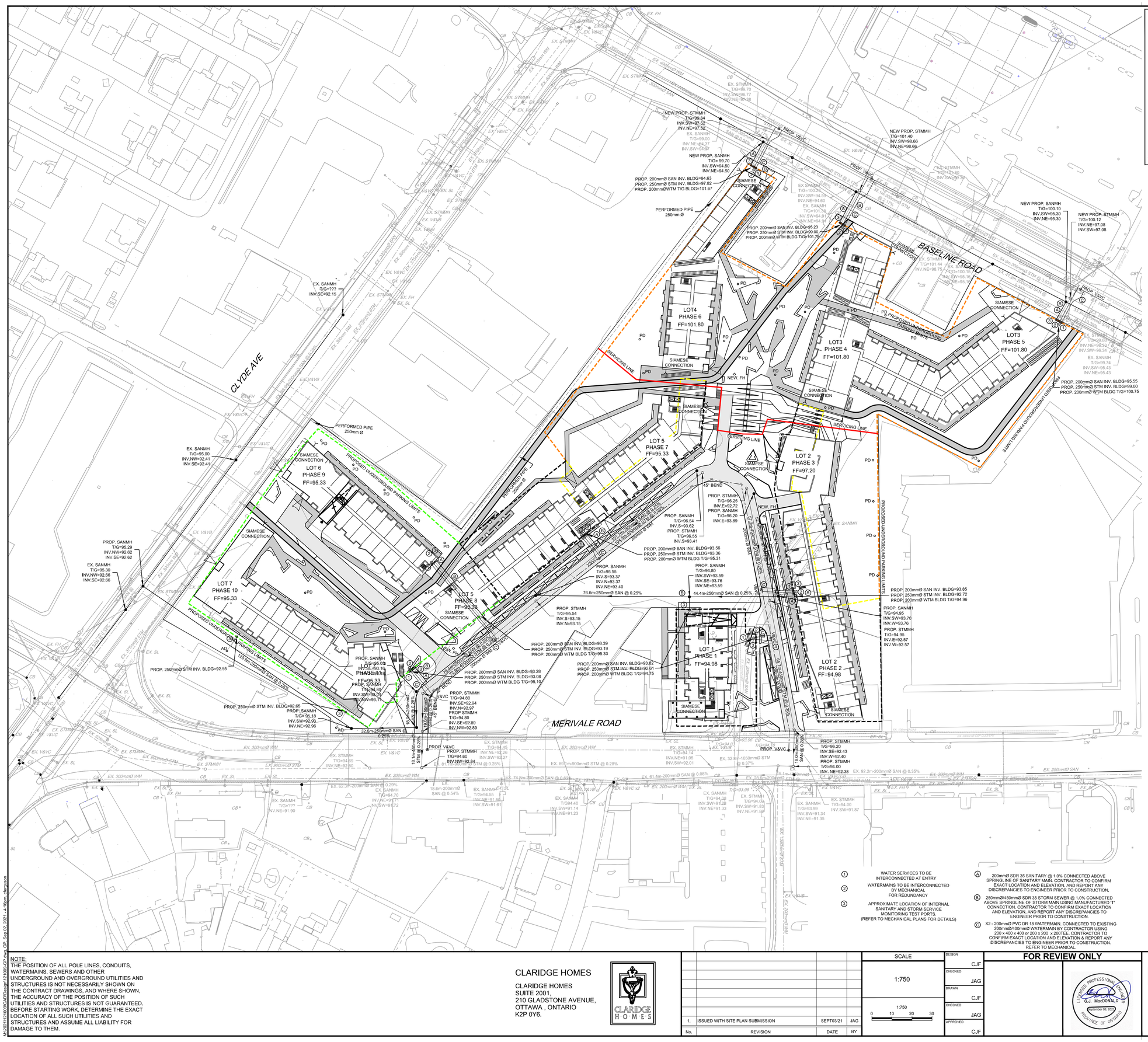
4.4 Stormwater	Addressed (Y/N/NA)	Section	Comments
Identification of municipal drains and related approval requirements.	Y	Report	
Description of how the conveyance and storage capacity will be achieved for the development.	Y	Report	
100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	Y		Appendix
Inclusion of hydraulic analysis including HGL elevations.	Y		Appendix
Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Y	Report	Drawings
Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.	NA		
Identification of fill constrains related to floodplain and geotechnical investigation.	NA		

Development Servicing Study Checklist

4.5 Approval and Permit Requirements	Addressed (Y/N/NA)	Section	Comments
Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in the Act.	NA		
Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.	NA		
Changes to Municipal Drains.	NA		
Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)	NA		

4.6 Conclusion	Addressed (Y/N/NA)	Section	Comments
Clearly stated conclusions and recommendations.	Y	Report	
Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.	NA		
All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario.	Y	Report	

DRAWINGS



- PROPOSED PROPERTY LINE
- PROPOSED WATERMAIN
- V&VC PROPOSED VALVE & VALVE CHAMBER
- PROPOSED STORM MANHOLE
- PROPOSED SANITARY SEWER
- PROPOSED CAP
- PROPOSED SIAMESE CONNECTION
- UNDERGROUND PARKING LIMITS
- PROPOSED STORM SEWER
- FH PROPOSED HYDRANT C/W VALVE & LEAD
- PD PROPOSED PODIUM DRAIN
- AD PROPOSED AREA DRAIN
- GM PROPOSED GAS METER
- TP PROPOSED SANITARY / STORM TEST PORT
- M PROPOSED WATER METER
- ▽ PROPOSED BUILDING ENTRANCE

- 225mmØ EXISTING SANITARY MANHOLE & SEWER
- 1500mmØ EXISTING STORM MANHOLE & SEWER
- CB EXISTING CATCH BASIN
- ////////////////////// EXISTING BUILDING ENVELOPE
- VC EXISITING WATERMAIN VALV E CHAMBER
- VB EXISITING WATERMAIN SHUT-OFF VALVE BOX
- 400mmØ WM EXISTING WATERMAIN
- VB EXISTING HYDRANT C/W LEAD & SHUT OFF VALVE BOX
- GV EXISTING GAS VALVE
- EXISTING GAS MAIN
- EXISTING ABANDONED GAS MAIN
- EXISTING BELL CONDUIT
- TRAFFIC EXISTING TRAFFIC CONDUIT
- EXISTING ROGERS CONDUIT
- EXISTING HYRDO CONDUIT
- EX. HYD EXISTING HYDRANT
- TMH EXISTING TRAFFIC MANHOLE
- LS EXISTING STREET LIGHT
- HH EXISTING TRAFFIC HAND HOLE
- EXISTING TRAFFIC SIGN

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. (amount of liability insurance to be verified on a project by project basis)
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 GEOTECHNICAL REPORT 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.
9. REFER TO ARCHITECT'S AND LANDSCAPE ARCHITECT'S DRAWINGS FOR BUILDING AND HARDSURFACE AREAS AND DIMENSIONS.(project teams must review drawing to ensure that this is indicated on someone's plan)
10. REFER TO STORMWATER MANAGEMENT REPORT PREPARED BY NOVATECH ENGINEERING CONSULTANTS LTD.
11. SAW CUT AND KEY GRIND ASPHALT AT ALL ROAD CUTS AND ASPHALT TIE IN POINTS AS PER CITY OF OTTAWA STANDARDS (R10).
12. PROVIDE LINE/PARKING PAINTING.
13. CONTRACTOR TO PROVIDE THE CONSULTANT WITH A GENERAL PLAN OF SERVICES INDICATING ALL SERVICING AS-BUILT INFORMATION SHOWN ON THIS PLAN. AS-BUILT INFORMATION MUST INCLUDE: PIPE MATERIAL, SIZES, LENGTHS, SLOPES, INVERT AND T/G ELEVATIONS, STRUCTURE LOCATIONS, VALVE AND HYDRANT LOCATIONS, T/WM ELEVATIONS AND ANY ALIGNMENT CHANGES, ETC. (optional note; usage to be determined on a project by project basis)

SEWER NOTES:

1. SPECIFICATIONS:

ITEM	SPEC. No.	REFERENCE
CATCHBASIN (600x600mm)	705.010	OPSD
STORM / SANITARY MANHOLE (1200Ø)	701.010	OPSD
CB, FRAME & COVER	400.020	OPSD
STORM / SANITARY MH FRAME & COVER	401.010	OPSD
SEWER TRENCH - BEDDING (GRANULAR A) COVER (GRANULAR A OR GRANULAR B TYPE I, WITH MAXIMUM PARTICLE SIZE=25mm)		
STORM SEWER	PVC DR 35	
SANITARY SEWER	PVC DR 35	
CATCHBASIN LEAD	PVC DR 35	

2. INSULATE ALL PIPES (SAN/STM) THAT HAVE LESS THAN 1.5m COVER WITH 50mmX1200mm HI-40 INSULATION. PROVIDE 150mm CLEARANCE BETWEEN PIPE AND INSULATION.
3. SERVICES ARE TO BE CONSTRUCTED TO 1.0m FROM FACE OF BUILDING AT A MINIMUM SLOPE OF 1.0%.
4. PIPE BEDDING, COVER AND BACKFILL ARE TO BE COMPACTED TO AT LEAST xx% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY. THE USE OF CLEAR CRUSHED STONE AS A BEDDING LAYER SHALL NOT BE PERMITTED.
5. FLEXIBLE CONNECTIONS ARE REQUIRED FOR CONNECTING PIPES TO MANHOLES (FOR EXAMPLE KOR-N-SEAL, PSX: POSITIVE SEAL AND DURASEAL). THE CONCRETE CRADLE FOR THE PIPE CAN BE ELIMINATED.
6. THE OWNER SHALL REQUIRE THAT THE SITE SERVICING CONTRACTOR PERFORM FIELD TESTS FOR QUALITY CONTROL OF ALL SANITARY SEWERS. LEAKAGE TESTING SHALL BE COMPLETED IN ACCORDANCE WITH OPSS 410.07.16, 410.07.16.04 AND 407.07.24. DYE TESTING IS TO BE COMPLETED ON ALL SANITARY SERVICES TO CONFIRM PROPER CONNECTION TO THE SANITARY SEWER MAIN. THE FIELD TESTS SHALL BE PERFORMED IN THE PRESENCE OF A CERTIFIED PROFESSIONAL ENGINEER WHO SHALL SUBMIT A CERTIFIED COPY OF THE TEST RESULTS.
7. STORM MANHOLES AND CBMHS ARE TO HAVE 300mm SUMPS UNLESS OTHERWISE INDICATED.
8. CONTRACTOR TO TELEVISE (CCTV) ALL PROPOSED SEWERS, 200mmØ OR GREATER PRIOR TO BASE COURSE ASPHALT. UPON COMPLETION OF CONTRACT, THE CONTRACTOR IS RESPONSIBLE TO FLUSH AND CLEAN ALL SEWERS & APPURTENANCES.

WATERMAIN NOTES:

1. SPECIFICATIONS:

ITEM	SPEC. No.	REFERENCE
WATERMAIN TRENCHING	W17	CITY OF OTTAWA
THERMAL INSULATION IN SHALLOW TRENCHES	W22	CITY OF OTTAWA
WATERMAIN CROSSING BELOW SEWER	W25	CITY OF OTTAWA
WATERMAIN	PVC DR 18	

2. SUPPLY AND CONSTRUCT ALL WATERMAINS AND APPURTENANCES IN ACCORDANCE WITH THE CITY OF OTTAWA STANDARDS AND SPECIFICATIONS. EXCAVATION, INSTALLATION, BACKFILL AND RESTORATION OF ALL WATERMAINS BY THE CONTRACTOR. CONNECTIONS AND SHUT-OFFS AT THE MAIN AND CHLORINATION OF THE WATER SYSTEM SHALL BE PERFORMED BY CITY OFFICIALS.
3. WATERMAIN SHALL BE MINIMUM 2.4m DEPTH BELOW GRADE UNLESS OTHERWISE INDICATED.
4. PROVIDE MINIMUM 0.25m CLEARANCE BETWEEN OUTSIDE OF PIPES AT ALL CROSSINGS.
5. WATER SERVICE IS TO BE CONSTRUCTED TO WITHIN 1.0m OF FOUNDATION WALL AND CAPPED, UNLESS OTHERWISE INDICATED.
6. WATER DEMAND = TBD

① WATER SERVICES TO BE INTERCONNECTED AT ENTRY

② WATERMAINS TO BE INTERCONNECTED BY MECHANICAL FOR REDUNDANCY

③ APPROXIMATE LOCATION OF INTERNAL SANITARY AND STORM SERVICE MONITORING TEST PORTS. (REFER TO MECHANICAL PLANS FOR DETAILS)

Ⓐ 200mmØ SDR 35 SANITARY @ 1.0% CONNECTED ABOVE SPRINGLINE OF SANITARY MAIN. CONTRACTOR TO CONFIRM EXACT LOCATION AND ELEVATION, AND REPORT ANY DISCREPANCIES TO ENGINEER PRIOR TO CONSTRUCTION.

Ⓑ 250mmØ/450mmØ SDR 35 STORM SEWER @ 1.0% CONNECTED ABOVE SPRINGLINE OF STORM MAIN USING MANUFACTURED 'T' CONNECTION. CONTRACTOR TO CONFIRM EXACT LOCATION AND ELEVATION, AND REPORT ANY DISCREPANCIES TO ENGINEER PRIOR TO CONSTRUCTION.

Ⓒ X2 - 200mmØ PVC DR 18 WATERMAIN. CONNECTED TO EXISTING 200mmØ/400mmØ WATERMAIN BY CONTRACTOR USING 200 x 400 x 400 or 200 x 200 x 200TEE. CONTRACTOR TO CONFIRM EXACT LOCATION AND ELEVATION & REPORT ANY DISCREPANCIES TO ENGINEER PRIOR TO CONSTRUCTION. REFER TO MECHANICAL.

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NOTE:
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CLARIDGE HOMES

CLARIDGE HOMES
SUITE 2001,
210 GLADSTONE AVENUE,
OTTAWA , ONTARIO
K2P 0Y6.

No.	REVISION	DATE	BY
1.	ISSUED WITH SITE PLAN SUBMISSION	SEPT03/21	JAG

SCALE
1:750

1:750
0 10 20 30

DESIGN CJF
CHECKED JAG
DRAWN CJF
CHECKED JAG
APPROVED CJF

FOR REVIEW ONLY

G.J. MacDONALD
September 03, 2021

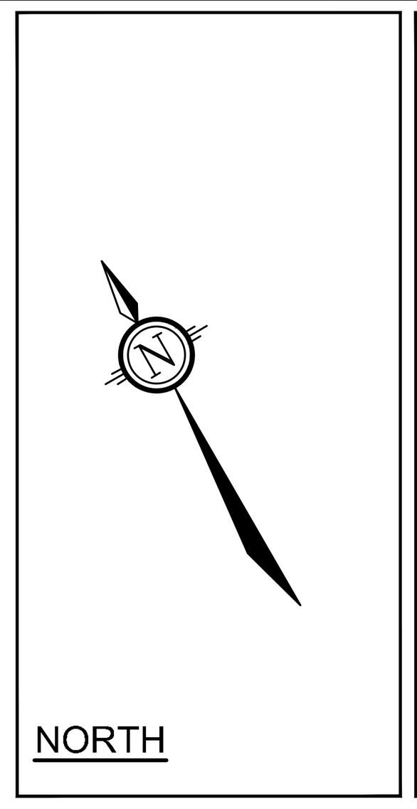
NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

LOCATION
CITY OF OTTAWA
1500 MERIVALE RD

DRAWING NAME
GENERAL PLAN OF SERVICES

PROJECT No. 121009
REV REV # 1
DRAWING No. 121009-GS

PLANB1.DWG - 1000mmx707mm



62.99	PROPOSED ELEVATION
62.97x	EXISTING ELEVATION
62.99TC	PROPOSED TOP OF CURB ELEVATION
5.0%	PROPOSED SLOPE
DC	PROPOSED DEPRESSED CURB
	PROPOSED FULL HEIGHT CURB
	PROPOSED LIMIT OF UNDERGROUND PARKING
	PROPOSED LIMIT OF BUILDING OVERHANG
	BOUNDARY LINE
V&VB	PROPOSED WATER VALVE LOCATION
	PROPOSED BOLLARD
GM	PROPOSED GAS METER
RM	PROPOSED REMOTE WATER METER
	PROPOSED SIAMESE CONNECTION
	DIRECTION OF MAJOR OVERLAND FLOW
	PROPOSED SWALE
	PROPOSED PODIUM/AREA DRAIN
	PROPOSED TERRACING SLOPE 3:1 MAX

DC	EXISTING DEPRESSED CURB
	EXISTING HYDRO TRANSFORMER
B	EXISTING BOLLARD
SP	EXISTING WATER STANDPIPE
EX. LS	EXISTING LAMP STANDARD
EX. UP	EXISTING UTILITY POLE
T/V	EXISTING TOP OF VALVE
T/G	EXISTING TOP OF GRATE
	EXISTING CATCH BASIN
	EXISTING FIRE HYDRANT
SANMH	EXISTING SANITARY MANHOLE
STMMH	EXISTING STORM MANHOLE
EX. V&VB	EXISTING VALVE & VALVE BOX
	EXISTING OVERHEAD WIRES
	EXISTING TREES / VEGETATION
	EXISTING CURB
EX UP	EXISTING UTILITY POLE C/W GUY WIRES
	EXISTING FENCE

GENERAL NOTES:

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11. SAW CUT AND KEY GRIND ASPHALT AT ALL ROAD CUTS AND ASPHALT TIE IN POINTS AS PER CITY OF OTTAWA STANDARDS (R10).
12. PROVIDE LINE/PARKING PAINTING.

GRADING NOTES:

1. ALL TOPSOIL, ORGANIC OR DELETERIOUS MATERIAL MUST BE ENTIRELY REMOVED FROM BENEATH THE PROPOSED PAVED AREAS AS DIRECTED BY THE SITE ENGINEER OR GEOTECHNICAL ENGINEER.
2. EXPOSED SUBGRADES IN PROPOSED PAVED AREAS SHOULD BE PROOF ROLLED WITH A LARGE STEEL DRUM ROLLER AND INSPECTED BY THE GEOTECHNICAL ENGINEER PRIOR TO THE PLACEMENT OF GRANULARS.
3. ANY SOFT AREAS EVIDENT FROM THE PROOF ROLLING SHOULD BE SUB-EXCAVATED AND REPLACED WITH SUITABLE MATERIAL THAT IS FROST COMPATIBLE WITH THE EXISTING SOILS AS RECOMMENDED BY THE GEOTECHNICAL ENGINEER.
4. THE GRANULAR BASE SHOULD BE COMPACTED TO AT LEAST 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. MINIMUM OF 2% GRADE FOR ALL GRASS AREAS UNLESS OTHERWISE NOTED.
6. MAXIMUM TERRACING GRADE TO BE 3:1 UNLESS OTHERWISE NOTED.
7. ALL GRADES BY CURBS ARE EDGE OF PAVEMENT GRADES UNLESS OTHERWISE INDICATED.
8. ALL CURBS SHALL BE BARRIER CURB (150mm) UNLESS OTHERWISE NOTED AND CONSTRUCTED AS PER CITY OF OTTAWA STANDARDS (SC1.1).
9. REFER TO LANDSCAPE PLAN FOR PLANTING AND OTHER LANDSCAPE FEATURE DETAILS.
13. CONTRACTOR TO PROVIDE THE CONSULTANT WITH A GRADING PLAN INDICATING AS-BUILT ELEVATIONS OF ALL DESIGN GRADES SHOWN ON THIS PLAN. (optional note; usage to be determined on a project by project basis)

PAVEMENT STRUCTURE:

LIGHT DUTY
55mm HL3
150mm GRAN "A"
250mm GRAN "B" TYPE II

HEAVY DUTY
40mm HL3
50mm HL8
150mm GRAN "A"
400mm GRAN "B" TYPE II

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OTTAWA , ONTARIO
K2P 0Y6.

No.	REVISION	DATE	BY
1.	ISSUED WITH PLAN SUBMISSION	SEPT03/21	JAG

SCALE 1:750

DESIGN	CJF
CHECKED	JAG
DRAWN	CJF
CHECKED	JAG
APPROVED	GJM

FOR REVIEW ONLY

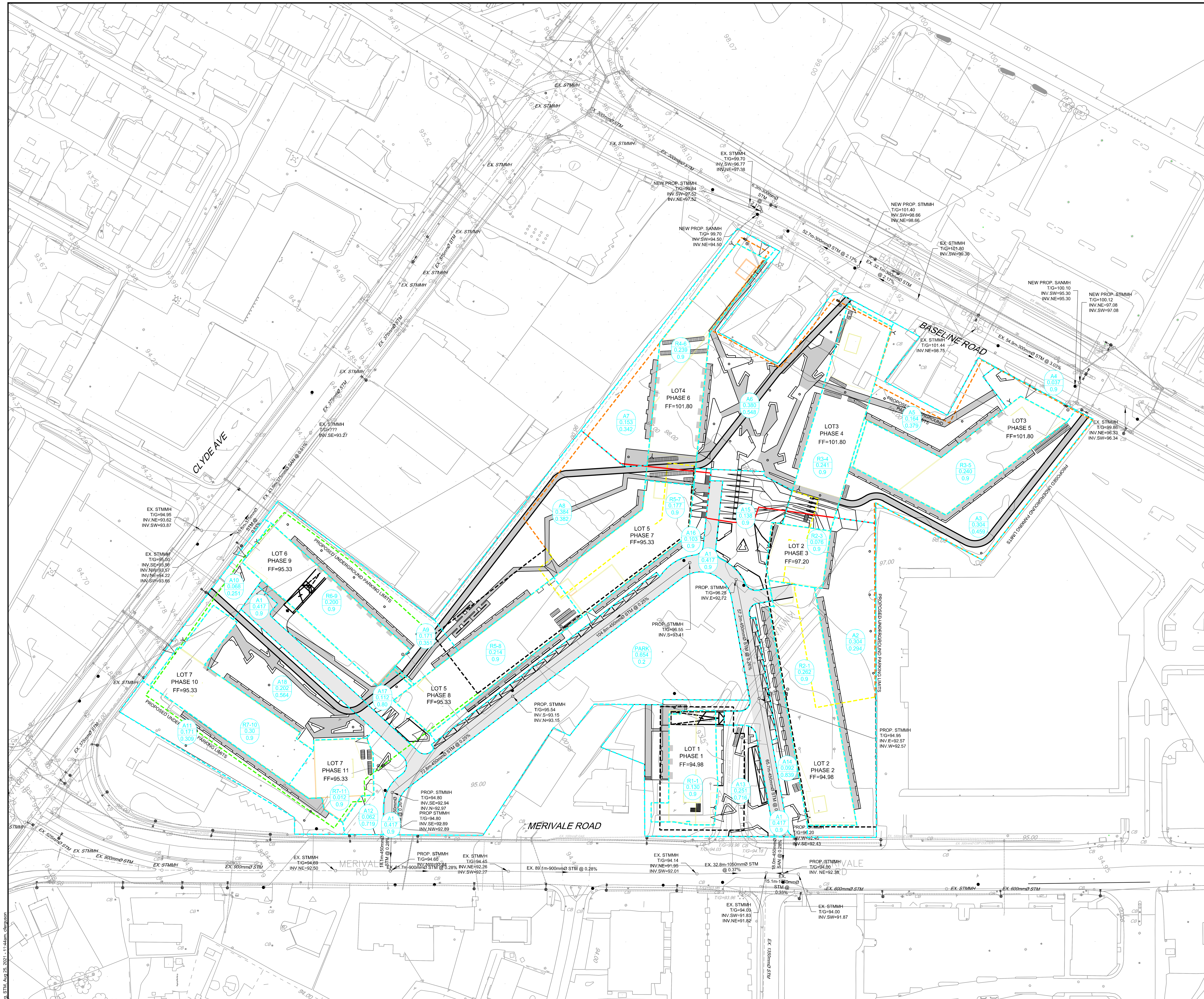
LICENSED PROFESSIONAL ENGINEER G.J. MacDONALD September 03, 2021 PROVINCE OF ONTARIO

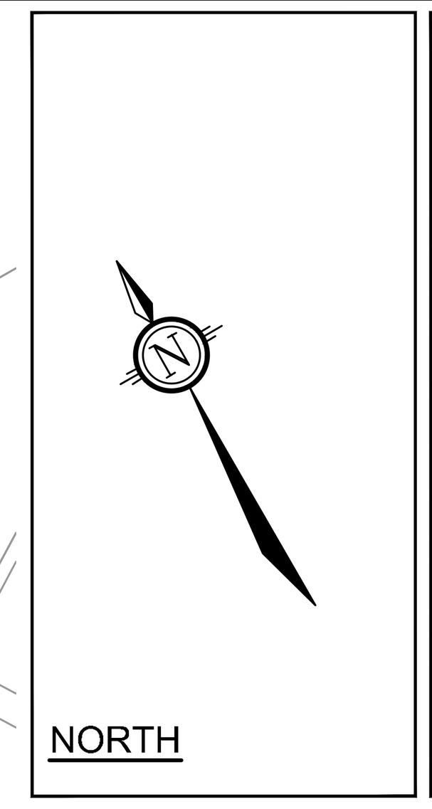
NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

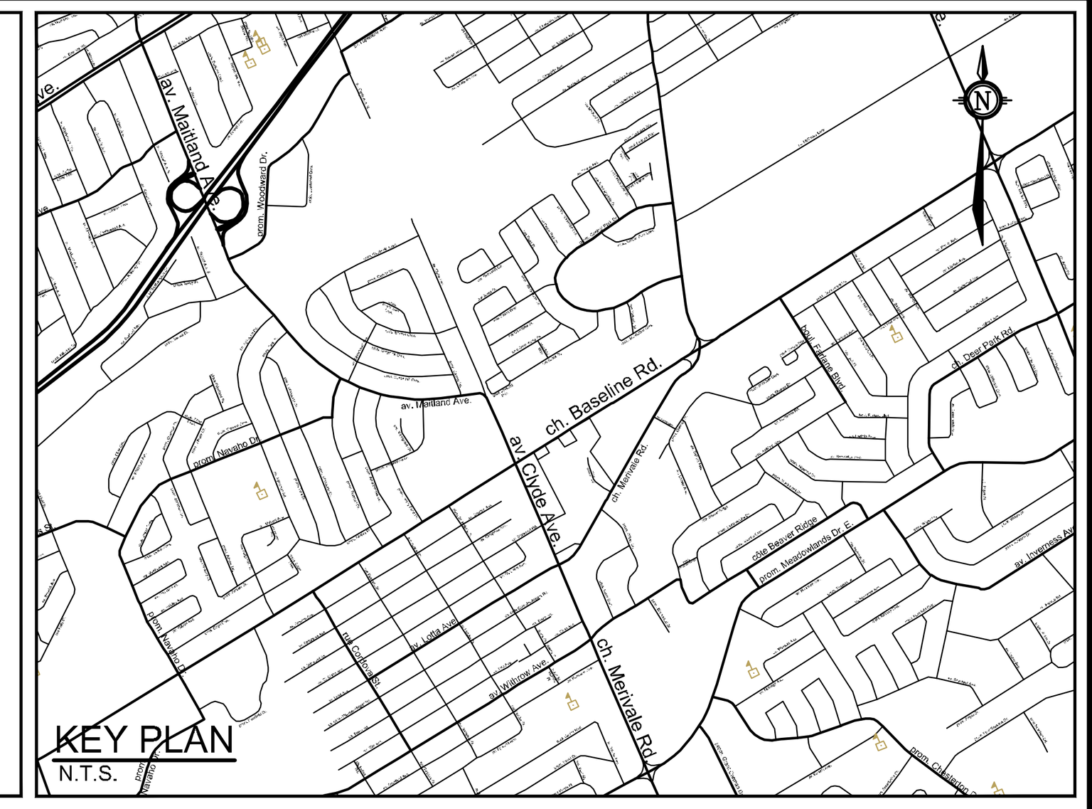
LOCATION
CITY OF OTTAWA
1500 MERIVALE ROAD

DRAWING NAME
GRADING AND EROSION SEDIMENT CONTROL PLAN

PROJECT No. 121009
REV: REV # 1
DRAWING No. 121009-GR







DRAINAGE AREA LIMITS

A-X / 0.039 / 0.46 — DRAINAGE AREA ID / AREA (ha) / RUNOFF COEFFICIENT (5-YEAR)

STORMWATER MANAGEMENT NOTES:

1. REFER TO 'SERVICEABILITY AND STORMWATER MANAGEMENT REPORT' PREPARED BY NOVATECH ENGINEERING CONSULTANTS LTD.
2. NO ROOF TOP CONTROL ALLOWED.
3. TOTAL AREA: 6.2 ha

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K2P 0Y6.

No.	REVISION	DATE	BY
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SCALE 1:750

DESIGN	CF
CHECKED	JAG
DRAWN	CF
CHECKED	JAG
APPROVED	GJM

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER — G.J. MacDONALD — September 03, 2021 — PROVINCE OF ONTARIO

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LOCATION
CITY OF OTTAWA
1500 MERIVALE ROAD

DRAWING NAME
STORMWATER MANAGEMENT PLAN

PROJECT No. 121009
REV: REV # 1
DRAWING No. 121009-STM