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Cassette Commons
119 Ryan Reynolds Way

Servicing and Stormwater Management Report

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Cassette Commons

119 Ryan Reynolds Way

City of Ottawa

Servicing and Stormwater Management Report

Prepared By:

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

July / 31 / 2023
Revised April / 23/ 2024
Revised August/9/2024

Novatech File: 123050
Ref: R-2023-131

August 9, 2024

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: **Lucy Ramirez, Planner, Development Review**

Reference: **Cassette Commons**
Servicing and Stormwater Management Report
Our File No.: 123050

Please find enclosed the 'Servicing and Stormwater Management Report' for the above noted development located in the City of Ottawa. This report is being submitted in support of the site plan application for the proposed development.

Should you have any questions or require additional information, please contact the undersigned.

Yours truly,

NOVATECH

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

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1.0 INTRODUCTION

Novatech has been retained to prepare a Servicing and Stormwater Management Report for the proposed site plan located at 119 Ryan Reynolds Way (formerly 2275 Mer Bleue) within the City of Ottawa. The proposed site is denoted as Block 27 of the Cassette subdivision and is presently named Cassette Commons. The purpose of this report is to support the site plan application for the subject development. **Figure 1 Key Plan** shows the site location.

1.1 Existing Conditions

The subject site is approximately 0.68 hectares (ha.) in size and is denoted as Block 27 of the Cassette Subdivision. Presently the site has been stripped of topsoil as part of the Cassette Subdivision works. Historically the site was a field utilized for agricultural purposes.

The site is bound by Brian Coburn Boulevard to the north, existing single unit homes, and Aquarium Avenue to the east, the future Cassette Subdivision (presently under development) to the south, and Mer Bleue Road to the west. The site is relatively flat, and drainage is not well defined. Towards the Northern edge of the site there was an old farm field drainage ditch that directed on site flows towards the existing ditches along Mer Bleue Road. The remainder of the site primarily drains from to the south with a high hill in the northeast corner at an elevation of +/- 89.22, for the first 20m into the site. Afterwards the site is flat with an elevation variance of +/- 87.70 – 87.50 for a +/- 0.20m grade differential across the site. **Figure 2** shows the existing site conditions.

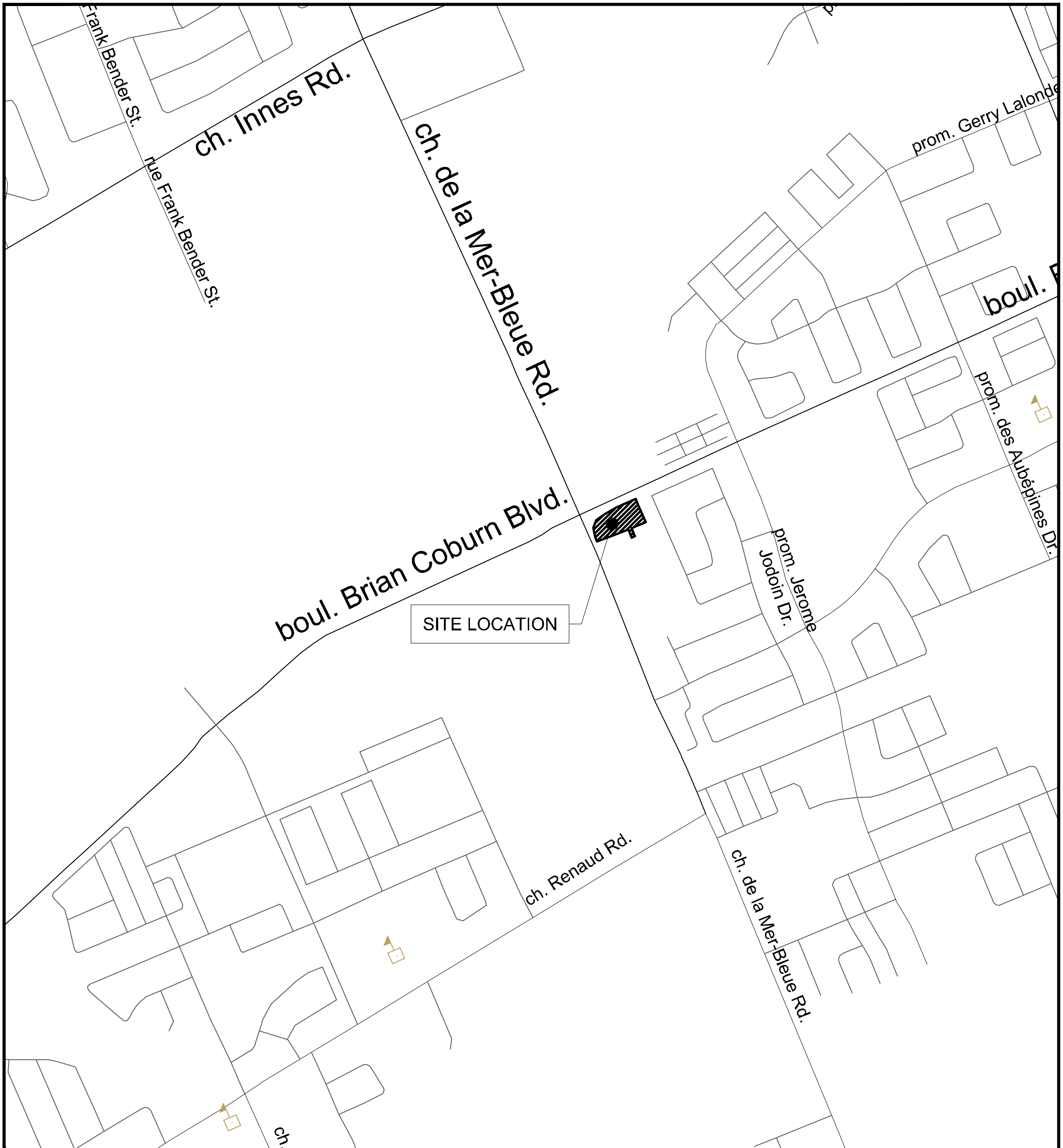
The Caivan Rhythm residential development was designed by David Schaeffer Engineering Ltd (DSEL), and stormwater modelling was preformed by J.F. Sabouring and Associates Inc. (JFSA). Design information for the subject site is provided in the following reports:

- 'Design Brief for Cassette Subdivision (2275 Mer-Bleue Road), Caivan (Mer-Bleue) Inc.', City of Ottawa, Project No.: 20-1214, June, 2022, 2^{n} Submission, prepared By DSEL (Referenced as **Design Brief**).
- 'Stormwater Management Report for Cassette Subdivision', 2275 Mer-Bleue Road, City of Ottawa, May 2022, Updated July 2022, JFSA Ref. No.: 231-22, Prepard by JFSA (Referenced as **SWM Report**)

Excerpts from the above noted reports have been provided in the Appendices for reference.

1.2 Proposed Development

It is proposed to develop the site with a six (6) storey apartment building complete with above ground parking and an underground parking structure. The building will have a footprint of 2027.2m^2, with a total of 121 residential units, and a 375m^2 medical office on the ground floor. Vehicular access to the site will be provided from Brian Coburn Boulevard while pedestrian access will be provided from both Brian Coburn Boulevard, and Mer Bleue Road. **Figure 3** shows the concept plan for the proposed development. Correspondence from the City pre-consultation meeting for the proposed development is also included in **Appendix A** for reference.



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CITY OF OTTAWA
119 RYAN REYNOLDS WAY

KEY PLAN

SCALE		
N.T.S		
DATE APRIL 2024	JOB 123050	FIGURE FIGURE 1

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SHT8X11.DWG - 216mmx279mm

LEGEND

— — — — SITE BOUNDARY

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CITY OF OTTAWA

119 RYAN REYNOLDS WAY

EXISTING CONDITIONS

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

DATE	JOB	FIGURE
APRIL 2024	123050	FIGURE 2

SHT11X17.DWG - 279mmX432mm

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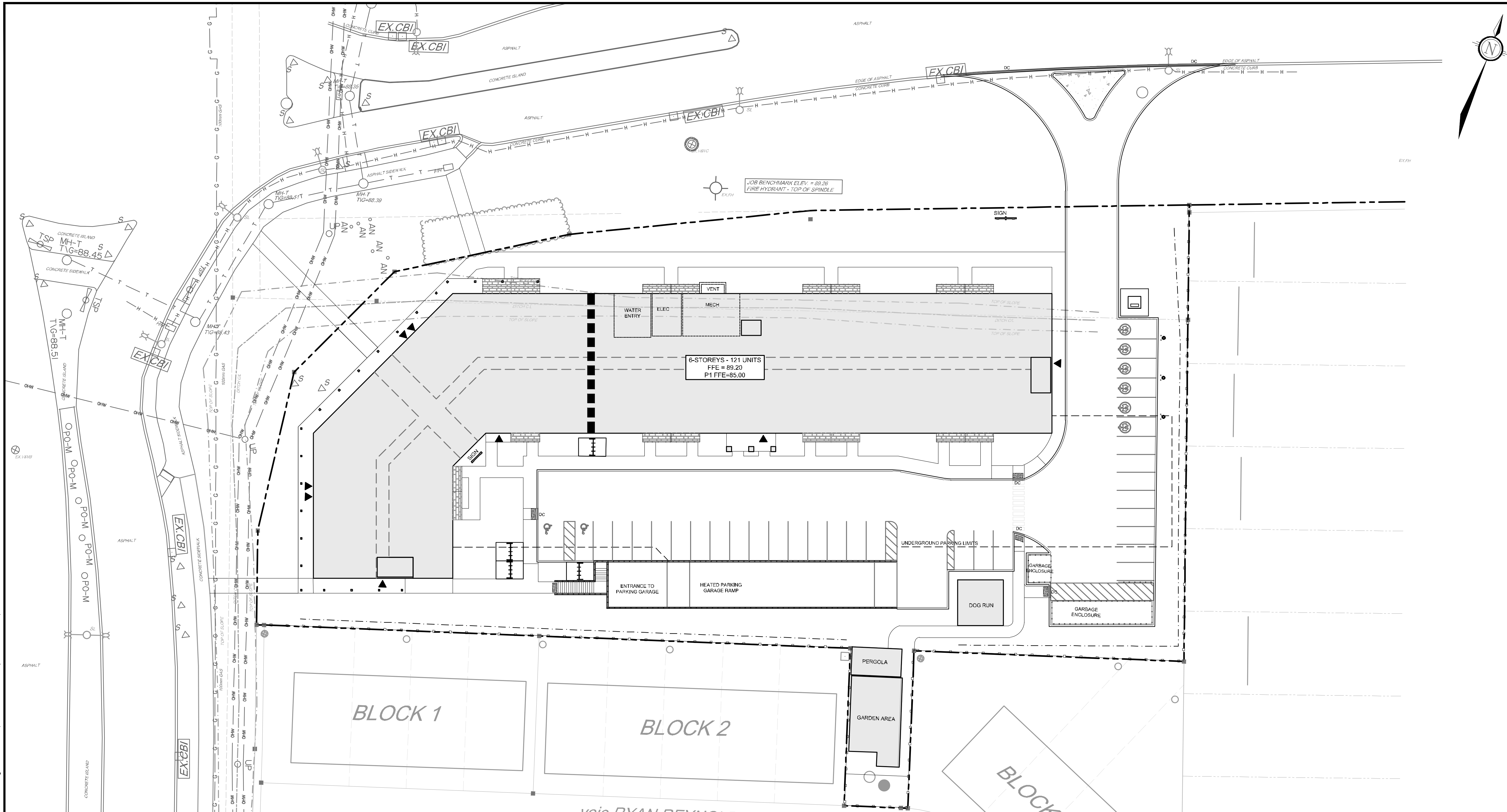

LEGEND

SITE BOUNDARY

BUILDING HATCH

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CITY OF OTTAWA
119 RYAN REYNOLDS WAY

SITE PLAN

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

DATE	JOB	FIGURE
APRIL 2024	123050	FIGURE 3

SHT11X17.DWG - 279mmX432mm

2.0 SITE CONSTRAINTS

A geotechnical investigation was completed for the subject site, and a report prepared entitled 'Geotechnical Investigation', Proposed Mixed-Use Development, 2275 Mer Bleue Road, Ottawa Ontario prepared by Paterson Group Inc. dated January 30, 2023 (PG55226-1). The following is a summary of the findings of the report:

- Based on observations, the long-term groundwater table can be expected to be at a depth of approximately 2 to 3 m throughout the subject site. It should be noted that groundwater levels are subject to seasonal fluctuations. Therefore, the groundwater levels could vary at the time of construction.

- Topsoil and deleterious fill, such as those containing significant organic materials, should be stripped from under any buildings and other settlement sensitive structures.

- The proposed site is subject to grade raise restrictions which vary from a maximum elevation of 88.0 – 88.70m across the site. If higher than permissible grade raises are required, preloading with or without a surcharge, lightweight fill, and/or other measures should be investigated to reduce the risks of unacceptable long-term post construction total and differential settlements.

- Excavation side slopes above the groundwater level extending to a maximum depth of 3m should be cut back at 1H:1V or flatter. A flatter slope is required for excavation below groundwater level. The subsurface soil is considered to be mainly a Type 2 and Type 3 soil according to the Occupational Health and Safety Act and Regulations for Construction Projects. Excavated soil should not be stockpiled directly at the top of excavations and heavy equipment should maintain safe working distance from the excavation sides. Slopes in excess of 3 m in height should be periodically inspected by the geotechnical consultant in order to detect if the slopes are exhibiting signs of distress.

- To reduce long-term lowering of the groundwater level at this site, clay seals should be provided in the service trenches.

- A temporary Ministry of the Environment, Conservation and Parks (MECP) permit to take water (PTTW) may be required for this project if more than 400,000 L/day of ground and/or surface water is to be pumped during the construction phase. A minimum 4 to 5 months should be allowed for completion of the PTTW application package and issuance of the permit by the MECP.

- For typical ground or surface water volumes being pumped during the construction phase, typically between 50,000 to 400,000 L/day, it is required to register on the Environmental Activity and Sector Registry (EASR). A minimum of two to four weeks should be allotted for completion of the EASR registration and the Water Taking and Discharge Plan to be prepared by a Qualified Person as stipulated under O.Reg. 63/16. If a project qualifies for a PTTW based upon anticipated conditions, an EASR will not be allowed as a temporary dewatering measure while awaiting the MECP review of the PTTW application.

- Atterberg limit testing determined the plasticity index of the soil is greater than 40% in all the tested clay samples. Based on this, the clay is considered to be a clay of high potential for soil volume change. Thus street planting setbacks would consist of 7.5 m for small (mature height up to 7.5 m) and medium size trees (mature tree height 7.5 to 14 m). Detailed tree planting recommendations in relation to the soil analysis are outlined within the Geotechnical report.

3.0 WATER SERVICING

The proposed development is within the city of Ottawa Zone 2E of the water distribution system. There are existing City watermains in all existing rights-of-way fronting the proposed site. There is an existing 400mm diameter (dia.) watermain within Brian Coburn Boulevard, and a 400mm dia. watermain in Mer Bleue Road. There is also a proposed 200mm PVC watermain within the Cassette Subdivision to the south of the site in the proposed right-of-way named Ryan Reynolds Way.

It is proposed to service the proposed development with the two (2) 150mm to the existing 400mm diameter watermain within Brain Coburn Boulevard. The proposed building will be sprinklered and equipped with a Siamese connection located on the east face of the building within 45m of a fire hydrant. Refer to the General Plan of Services drawing (123050-GP) for servicing details.

Water demands have been calculated using criteria from Section 4 of the City of Ottawa Water Distribution Guidelines, ISTB-2021-03, and the Ontario Building Code as follows:

- Average Domestic Flow = 280L/cap/day
- 1 Bedroom Apartment = 1.4 Persons/unit
- 2 Bedroom Apartment = 2.1 Persons/unit
- 3 Bedroom Apartment = 3.1 Persons/unit
- Retail Stores – Washrooms only = 5L/m^2/day
- Residential Peaking Factors
    - Maximum Day = 2.5 x Avg Day
    - Peak Hour = 2.2 x Max Day
- Commercial Peaking Factors
    - Maximum Day = 1.5
    - Peak Hour= 1.8

The required fire demand was calculated using the Fire Underwriters Survey 2020 (FUS) Guidelines. Through correspondence with the architect, it is understood that the proposed building is residential occupancy (Limited Combustible), composed of wood frame construction, and will contain a fully supervised sprinkler system designed as per NFPA 13. The building will contain a fire wall which will split the building into two (2) halves to reduce the required fire demands. The east side will have a footprint of 1144.25m^2, and the west side will have a footprint of 897.49m$^{2.}$

The water demand calculations, fire flow calculations and correspondence are provided in **Appendix B** for reference. A summary of the water demand and fire flows are provided in **Table 3.1**.

Table 3.1: Domestic Water Demand Summary

Population	Commercial Area (m^2)	Ave. Daily Demand (L/s)	Max. Daily Demand (L/s)	Peak Hour Demand (L/s)	Fire Flow (L/s)
258	375	0.86	3.36	5.12	216.67/ 233.33

Note as per ITSB 2018-02 the fire flow was distributed among several surrounding hydrants during modelling as outlined in **Table 3.2**.

Table 3.2: Maximum Flow to be considered from a given hydrant.

Hydrant Class	Distance to building (m)	Contribution to Fire Flow	
		(L/min)	(L/s)
AA	≤75	5700	95
	>75and ≥150	3800	63.33
A	≤75	3800	63.33
	>75and ≥150	2850	47.50
B	≤75	1900	31.67
	>75and ≥150	1500	25.00
C	≤75	800	13.33
	>75and ≥150	800	13.33

For the purpose of the model, and in light of the available pressures, it was assumed offsite Hydrants would be rated as class AA. As the Fire flow is calculated as 233 L/s, three (3) hydrants will be required to achieve the required flow. There are presently 2 existing class AA Hydrants along the south side of Brian Coburn Boulevard within 75m of the building capable of providing 190L/s of flow as per **Table 3.2**. Unfortunately, both hydrants are over 45m from the proposed Siamese connection, and as such a new public hydrant is proposed on the west side of the proposed entrance. Thus three (3) AA hydrants will be within 75m of the proposed building capable of providing 285 L/s of flow as per **Table 3.2.** Refer to **Appendix B** for calculations and the Hydrant Coverage figure.

The above water demand information was submitted to the City for boundary conditions from the City's water model. These boundary conditions were used for analyzing the performance of the proposed and existing watermain systems for three theoretical conditions:

1) High Pressure check under Average Day conditions
2) Peak Hour demand
3) Maximum Day + Fire Flow demand.

Refer to **Table 3.3** for a summary of the proposed boundary conditions and hydraulic analysis.

Table 3.3: Water Boundary Conditions and Hydraulic Analysis Summary

Criteria	Head (m)	Pressure[1] (psi)	Pressure Requirements (psi)
Connection (400mm dia. Brian Coburn Boulevard)			
Max HGL (Average Day)	130.5	58.7	< 80psi
Min HGL (Peak Hour)	126.4	52.9	> 40psi
Max Day + Fire Flow (1300L/min)	126.6	53.2	> 20psi
Max Day + Fire Flow (14000L/min)	126.5	53.0	> 20psi

[1]Pressure based on a Finished Floor elevation of 89.20m

The hydraulic analysis indicates that the system can provide adequate pressures and flow to meet the domestic and fire flow requirements for the site. Refer to **Appendix B** for detailed water demand calculations, and City of Ottawa boundary conditions.

4.0 SANITARY SERVICING

There is a proposed 200mm diameter sanitary sewer within the proposed Cassette subdivision to the South of the subject site. All other rights-of-way do not contain any existing sanitary infrastructure within the vicinity of the development. As part of the subdivision construction a 200mm diameter sanitary service complete with a sanitary manhole (MH 19A) was installed between townhome Blocks 2 and 3 to provide sanitary service to the subject development.

It is proposed to service the proposed development with the service that was installed as part of the Cassette Subdivision.

Sanitary flows for the proposed development were calculated using criteria from Section 4 of the City of Ottawa Sewer Design Guidelines and the Ontario Building Code as follows:

- Residential Average Flow = 280 L/capita/day
- 1 Bed apartment = 1.4 Person/unit
- 2 Bed apartment = 2.1 Person/unit
- Retail Stores – Washrooms only = 5 L/m^3/day
- Residential Peaking Factor = Harmon Equation (max peaking factor = 4.0)
- Harmon correction factor = 0.80
- Commercial Peaking Factor = 1.0
- Peak Extraneous Flows (Infiltration) = 0.33L/s/ha

The peak sanitary flow including infiltration for the development was calculated to be **3.22 L/s**. Detailed sanitary flow calculations are provided in **Appendix C** for reference.

As noted previously, the detailed design of the Cassette Subdivision was completed by DSELwith details provided within the **Design Brief**. The Subdivision design assumed that Block 27 was to be a residential development with 150 units for a total assumed population of 270. The design criteria are summarized below, and excerpts from the report are included within **Appendix C** for reference.

- Average Daily Flow = 280 L/capita/day
- Average Apartment = 1.8 p/unit
- Residential Peaking Factor = Harmon Equation (max peaking factor = 4.0)
- Harmon Correction Factor =0.80
- Commercial/ Institutional Peaking Factor = 1.0
- Peak Extraneous Flows (Infiltration) = 0.33 L/s/ha

The resultant assumed flow for block 27 was **3.27 L/s**. The assumed design flow is higher than the proposed design flow, thus the proposed infrastructure within the Cassette Subdivision has capacity to service the proposed development.

5.0 STORM SERVICING

There are existing City storm sewers in all existing rights-of-way fronting the proposed site. There is an existing 675m storm sewer located within the Brian Coburn Boulevard right-of-way, and an existing 675mm diameter storm sewer within the Mer Bleue right-of-way. There is also a proposed storm sewer within the proposed Ryan Reynolds way right-of-way ranging in diameter from 375mm – 600, within the proposed Cassette Subdivision. From the Ryan Reynolds Way right-of-way there is a 525mm diameter service stub complete with a manhole (MH 100) in the south-east corner of the development between townhome blocks 2 and 3 that was installed as part of the Cassette Subdivision.

It is proposed to service the proposed development with the service that was installed as part of the Cassette Subdivision. From the existing stub a private storm system will be installed that will provide a 250mm diameter building connection, and connections to two independent swale systems. The One (1) storm service will convey the uncontrolled foundation drain, and the controlled roof drain flows. As per the **SWM Report**, the existing HGL within the proposed stub connection is 86.10m during the 100-yr storm event, and the proposed service has been designed to be above this elevation at the building connection. Refer to the General Plan of Services drawing (**123050 - GP**) for more details.

The design criteria used in sizing the storm sewers are summarized below in **Table 5.1.**

Tabl.5.1: Storm Sewer Design Parameters

Parameter	Design Criteria
Local Roads	2 Year Return Period
Storm Sewer Design	Rational Method
IDF Rainfall Data	Ottawa Sewer Design Guidelines
Initial Time of Concentration (Tc)	10 min
Minimum Velocity	0.8 m/s
Maximum Velocity	3.0 m/s
Minimum Diameter	250 mm

Refer to **Appendix D** for detailed storm drainage area plans and storm sewer design sheets.

6.0 STORM DRAINAGE AND STORMWATER MANAGEMENT

The stormwater management strategy for the site is based on the established criteria from the City of Ottawa, the **Design Brief** and the **SWM Report**.

6.1 Design Criteria

Through correspondence with the City of Ottawa, the **SWM Report** and our knowledge of development requirements in the area, the following criteria have been adopted to control post-development stormwater discharge from the site:

- Control proposed development flows, up to and including the 100-year storm event, to an allowable release rate of 220L/s/ha
- Provide source controls which are in conformity with the City of Ottawa requirements, where possible;
- Limit ponding to 0.15 m for all rooftop storage areas and 0.35 m for all parking storage areas; and
- 100-year spill elevation must be 300mm lower than any building opening
- Provide guidelines to ensure that site preparation and construction is in accordance with the current Best Management Practices for Erosion and Sediment Control.

The approach to the stormwater management design is to determine the allowable release rate for the site, calculate the uncontrolled flow, and ensure that the remaining flow, in combination with the uncontrolled flow, does not exceed the allowable release rate. All proposed development runoff in excess of the allowable release rate, will be attenuated on-site prior to being released into the storm sewers within Ryan Reynolds Way.

6.2 Quantity Control

The proposed site is contained within the tributary area of the Avalon West (N5) SWM Facility. The SWM Facility was designed with sufficient storage to match the pre-development flows at key points within downstream sections of McKinnon's Creek for the 2, 5, and 100-year 24-hour SCS Type II storms. The flows from the site will be conveyed through the storm sewers of the neighboring Cassette subdivision, and the existing Avalon Encore subdivision prior to discharging to the existing pond and ultimately the McKinnon Creek. The inflow rate into the minor system of the neighboring subdivisions was limited to 220 L/s/ha, and a time of concentration of 10 minutes.

The allowable release rate for the **0.68 ha** site was calculated to be **149.6 L/s** based on the above criteria. It is proposed to control the post-development flows to the allowable release rate through the use of controlled roof drains, and Icd's within proposed catch basin structures as described in the following sections.

Design Storms

The design storms are based on City of Ottawa design storms. Design storms were used for the 5, 100, and 100+20%-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 123050-SWM** within **Appendix D**.

The site has been divided into sixteen (16) drainage areas for the post development condition. The drainage areas are as follows:

Area A-01:

- Stormwater from the proposed swale system adjacent to Blocks 1 and 2 of the neighboring subdivision and located at the south-west corner of the proposed development will be captured by a proposed landscape drain and catch basin. The flows will be uncontrolled and will drain by gravity to the existing sewer system within Ryan Reynolds Way.

Area A-02

- Flows from the proposed garage access, central parking area and outdoor amenity areas will be conveyed to the existing storm sewer in Ryan Reynolds Way. These flows will be captured by area drains, and a trench drain which will be conveyed to the proposed building connection through the mechanical system of the underground parking structure. The flows are uncontrolled and will drain by gravity to the existing sewer system. From the **SWM Report** it is understood that the down stream connection HGL will be at an approximate elevation of +/- 86.10. The storm service has been set above the downstream HGL and will be equipped with a backflow prevention device to protect the building from any potential sewer back-ups in sever storm events.

Area A-03, A-04, A-07:

- Stormwater from the proposed swale system Located to both the North and East sides of the proposed Building will be captured by proposed landscape drains and catch basins. The flows will be uncontrolled and will drain by gravity to the existing sewer system within Ryan Reynolds Way.

Area R-01-08:

- Stormwater from the building roof will be captured and controlled by flow control roof drains prior to releasing to the private storm sewer and ultimately the existing sewers within Ryan Reynolds Way. The ponding will be limited to 0.15m in depth with overflow scuppers provided for emergencies. Storage of stormwater will be provided for storms up to and including the 100-year event. Further details will be provided once a mechanical consultant is retained for the subject development.

Area A-05:

- Stormwater from the site entrance, and the parking area to the north of the underground parking structure will be captured and controlled by a proposed catch basin. Flows from the catch basin to the onsite storm system will be controlled by an inlet control device (ICD), and the flows will drain by gravity to the existing sewer system within Ryan Reynolds Way.

Area A-06:

- Stormwater from the parking area to the south of the underground parking structure will be captured and controlled by a proposed catch basin. Flows from the catch basin to the onsite storm system will be controlled by an inlet control device (ICD), and the flows will drain by gravity to the existing sewer system within Ryan Reynolds Way.

Area D-01:

- The drainage along the west frontage of the property will flow uncontrolled to the Mer Bleue Road right-of-way, where it will be captured by the existing storm system.

Area D-02:

- The drainage along the North frontage of the property will flow uncontrolled to the Brian Coburn Boulevard right-of-way, where it will be captured by the existing storm system.

Area D-03

- The drainage from the service connection corridor between Blocks 2 and 3 of the Cassette subdivision located along the southern property line will flow uncontrolled to the Ryan Reynolds Way right-of-way, where it will be captured by the existing storm system.

Table 6.1 below summarizes the proposed control devices, the post-development flow, storage required, and storage provided for each of the site drainage areas. **Table 6.2** summarizes the parking lot ponding provided during the design storm events.

Table 6.1: Stormwater Management Summary

Area ID	Area (ha)	1:5 Year Weighted Cw	1:100 Year Weighted Cw	Control Device		Outlet Location	2 Year Storm Event				5 Year Storm Event				100 Year Storm Event			
							Release (L/s)	Head (m)	Req'd Vol (cu.m)	Max. Vol. Provided (cu.m.)	Release (L/s)	Head (m)	Req'd Vol (cu.m)	Max. Vol. Provided (cu.m.)	Release (L/s)	Head (m)	Req'd Vol (cu.m)	Max. Vol. Provided (cu.m.)
D-01	0.025	0.34	0.40	N/A		Mer Bleue Road	1.80	N/A	N/A	N/A	2.40	N/A	N/A	N/A	4.90	N/A	N/A	N/A
D-02	0.038	0.42	0.48	N/A		Brian Coburn Boulevard	3.40	N/A	N/A	N/A	4.50	N/A	N/A	N/A	9.00	N/A	N/A	N/A
D-03	0.018	0.47	0.54	N/A		Ryan Reynolds Way	1.80	N/A	N/A	N/A	2.50	N/A	N/A	N/A	4.90	N/A	N/A	N/A
A-01	0.051	0.30	0.36	N/A		Ryan Reynolds Way	3.30	N/A	N/A	N/A	4.40	N/A	N/A	N/A	9.10	N/A	N/A	N/A
A-02	0.153	0.81	0.91	N/A		Ryan Reynolds Way	26.60	N/A	N/A	N/A	36.10	N/A	N/A	N/A	69.00	N/A	N/A	N/A
A-03	0.032	0.36	0.42	N/A		Ryan Reynolds Way	2.50	N/A	N/A	N/A	3.30	N/A	N/A	N/A	6.70	N/A	N/A	N/A
A-04	0.023	0.25	0.30	N/A		Ryan Reynolds Way	1.20	N/A	N/A	N/A	1.60	N/A	N/A	N/A	3.40	N/A	N/A	N/A
A-05	0.043	0.89	0.99	Tempest LMF 105		Ryan Reynolds Way	5.7	0.34	1.59	18.95	7.5	0.60	2.25	18.95	11.1	1.25	6.01	18.95
A-06	0.034	0.88	0.98	Tempest LMF 105		Ryan Reynolds Way	8.55	0.75	0.00	18.61	11.65	1.40	0.00	18.61	11.90	1.48	3.12	18.61
A-07	0.029	0.35	0.41	N/A		Ryan Reynolds Way	2.20	N/A	N/A	N/A	2.90	N/A	N/A	N/A	5.90	N/A	N/A	N/A
R-01	0.035	0.90	1.00	Accutrol RD-100-A-ADJ	3/4 Open	Ryan Reynolds Way	1.02	0.09	4.46	17.21	1.14	0.11	6.52	17.21	1.43	0.14	14.36	17.21
R-02	0.037	0.90	1.00		3/4 Open	Ryan Reynolds Way	1.03	0.09	6.99	18.33	1.15	0.11	6.99	18.33	1.46	0.14	15.28	18.33
R-03	0.031	0.90	1.00		3/4 Open	Ryan Reynolds Way	0.98	0.09	3.91	16.31	1.11	0.10	5.69	16.31	1.42	0.14	12.52	16.31
R-04	0.033	0.90	1.00		3/4 Open	Ryan Reynolds Way	0.99	0.09	4.26	17.32	1.12	0.10	6.19	17.32	1.43	0.14	13.57	17.32
R-05	0.054	0.90	1.00		3/4 Open	Ryan Reynolds Way	1.09	0.10	8.04	26.29	1.20	0.11	11.62	26.29	1.52	0.15	24.97	26.29
R-06	0.045	0.90	1.00		3/4 Open	Ryan Reynolds Way	1.06	0.10	6.32	22.09	1.18	0.11	9.15	22.09	1.50	0.14	19.81	22.09
Post-Development Flow							**63.2**	**-**	**0.0**	**0.0**	**83.6**	**-**	**0.0**	**0.0**	**144.5**	**-**	**0.0**	**0.0**
Total Allowable Release Rate							**149.6**				**149.6**				**149.6**			

Table 6.2: Parking Lot Ponding

Structure ID	Top of Grate (m)	2-Year Elevation (m)	2-Year Surface Ponding Depth (m)	5-year Elevation (m)	5-Year Surface Ponding (m)	100-Year Elevation (m)	100-Year Surface Ponding (m)	100-Year +20% Elevation (m)	100-year+20% Surface Ponding (m)
CBMH-03A	88.65	87.82	0.0	88.08	0.00	88.73	0.08	88.76	0.11
CB-02	88.60	87.95	0.0	88.60	0.00	88.68	0.08	88.71	0.11

As summarized in the above table, the post-development flows will be controlled to **144.5 L/s,** approximately **5.1 L/s** lower than the pre-development condition of the site. The flows will be controlled by two (2) proposed ICDS within catch basins 02 and 03A, as well as six (6) controlled roof drains. All other flows from the site are proposed to be free flowing. All flows conveyed by others, or the internal mechanical system, shall adhere to the values in the above table.

Refer to **Appendix D** for Rational Method calculations and Drawing **123050 SWM**-Stormwater Management Plan.

6.3 Quality Control

As noted above the subject site is tributary to the Avalon West (N5) SWM Facility. The existing facility was designed to provide an Enhanced Level of Protection (80% total suspended solids removal) per MECP guidelines. As such no onsite quality control measures are required for the proposed site.

6.4 Major Overland Flow Route

A major overland flow route will be provided for storms greater than the 100-year storm event. Stormwater will be directed to the surrounding rights-of-way, and the rear yard swale of the adjoining subdivision. The major overland system is shown on the Grading Plan (drawing 123050-GR).

7.0 EROSION AND SEDIMENT CONTROL

Temporary erosion and sediment control measures will be implemented on-site during construction in accordance with the Best Management Practices for Erosion and Sediment Control. This includes the following temporary measures:

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

Erosion and sediment control measures should be inspected daily and after every rain event to determine maintenance, repair or replacement requirements. Sediments or granulars that enter site sewers shall be removed immediately by the contractor. These measures will be implemented prior to the commencement of construction and maintained in good order until vegetation has been established. Refer to the Erosion and Sediment Control Plan (drawing 123050-ESC) for additional information.

8.0 CONCLUSIONS AND RECOMMENDATIONS

Watermain

The analysis of the existing and proposed watermain network confirms the following:

- The proposed twin 150mm dia. watermain service which connects to the existing 400mm watermain within Brian Coburn Boulevard can service the proposed development.
- There are adequate pressures in the existing watermain infrastructure to meet the required domestic demands for the development.
- There is adequate flow to service the proposed fire protections system.

Sanitary Servicing

The analysis of the existing and proposed sanitary system confirms the following:

- It is proposed to service the development with a proposed 200mm Sanitary service which will connect to existing sewers within the Ryan Reynolds Way right-of-way.
- It is anticipated there is adequate capacity within the existing sanitary infrastructure to service.

Stormwater Management

The following provides a summary of the storm sewer and stormwater management system:

- The proposed storm sewer system is to connect to the storm sewers within in the Ryan Reynolds Way Avenue right-of-way.
- Stormwater control is to be provided by rooftop storage, and parking lot storage.
- Storm flows will be attenuated through the implementation of inlet control devices.
- As per existing conditions a major overland flow routes have been provided to the surrounding rights-of-way.

Erosion and Sediment control

- Erosion and sediment control measures (i.e. filter fabric, catch basin inserts, silt fences, etc.) will be implemented prior to construction and are to remain in place until vegetation is established.

9.0 CLOSURE

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

NOVATECH

Prepared by:

Anthony Mestwarp, P.Eng
Project Manager
Land Development Engineering

Reviewed by:

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

Appendix A
Pre - Consultation Meeting Minutes

Pre-Application Consultation Meeting – City Comments

Address: 2275 Mer Bleue Road
File Number: PC2022-0140
Description: Proposal for a 6-storey apartment building on a subdivision block at the corner of Mer Bleue and Brian Coburn

Submission Requirements

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

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

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

Application Type and Fees

The application fees (2022 rates) for the proposed application is as follows:

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

Staff Comments

Planning Comments – Kelly Livingstone

- The PPS applies and you should speak to it in your Planning Rationale. Please also refer to both the 2003 and the New Official Plan in the Rationale. Both Official Plans classify these lands as Urban Area, and the new OP includes an Evolving Neighbourhood overlay. The New Official Plan also has a strong focus on the creation of 15-minute neighbourhoods and I want your rationale to include a discussion on this concept and how your proposal adds to the surrounding community. These lands are also subject to the Mer Bleue Community Design Plan and the Planning Rationale should justify how your proposal maintains the intent of the CDP.
- The Zoning By-law Amendment for these lands re-zoned these lands to GM, exception 2156. The maximum height is 18m for this zone. The rezoning was brought to Planning Committee April 28, 2022. Please refer specifically to exception 2156 in refining your proposal prior to submission. Important notes to the exception are the following policies:
    - All buildings on the lot will have commercial space on the ground floor

- For all buildings on the lot where a wall faces a public street it must have a minimum of 50% clear glazing at the first-floor level

- As communicated by the Planner on the Subdivision, the commercial space requirement was a very important part of the proposal for both the local Councillor Catherine Kitts and the surrounding community. The exception does require this so it has to be shown on the plans.
- I encourage you to consult with the community prior to submitting a Site Plan proposal, you should reach out to the Councillor directly to consult with her and ensure she is on board.
- Variances cannot be obtained for 2 years after the approval of the Zoning By-law Amendment. Therefore, the proposal must comply with the approved Zoning By-law at Council on May 11, 2022.
- Section 37 changes - In July 2022, Staff expect that the City's former Section 37 regime will be replaced with a "Community Benefits Charge" of 4% of the land value, following provincial *Planning Act* changes through Bill 108. This charge will be required for ALL buildings that are 5 or more storeys or 10 or more units and will be required at the time of building permit, unless the development is subject to an existing registered Section 37 agreement or has been issued a building permit. Additional information will be made available in a report to Committee and Council later this year. Questions regarding this change can be directed to Ranbir.Singh@ottawa.ca.
- Landscape plan is required. Please refer to the Orleans Health Hub on the Northeast corner as an example of high-quality design. The Mer Bleue Community Design Plan labels this as a "Gateway and Prominent Corner". The intent of a gateway would include both the building and the site/landscaping design.
- Please ensure you are minimum 5 metres away from the Hydro wires on Mer Bleue
- No cultural heritage impacts, not within an area of archaeological potential
- Wind study not required, does not meet the requirements
- The High-Performance Development Standard is not yet in effect, but the City is in process of phasing in these new minimum performance standards – to achieve environmental and other sustainable goals - for new Site Plan applications. Please familiarize yourselves, since if they are in effect prior to your submission you will need to meet them.
    - The current Tier 1 High Performance Development Standard Requirements are provided on the linked page: https://engage.ottawa.ca/ottawa-high-performance-development-standard1/news_feed/hpds-requirements-site-plan
    - These will be design standards required to be shown on plans and met through Site Plan review and approval.

Urban Design – Selma Hassan

1. Design Brief will be required; a Terms of Reference is attached. All the items highlighted in yellow must be addressed in the Design Brief.
2. The Design Brief is also to explain in text and graphic format how the applicable CDP and Design Guidelines have been met.
3. Please ensure the footprint of the underground parking garage and the existing ROW hydro poles are shown on the Landscape Plan.
4. This area typically has marine clay soils which can result in planting restrictions. The applicant's Geotech report should speak to any restrictions on planting and the Landscape Plan needs to respond to these.
5. Please ensure that the location of the hydro poles is taken into account when tree species are selected and in the placement of trees.

6. The building should have a principal entrance / 'front door' either on Mer Bleue Road or Brian Coburn. It is okay if the drop-off is from the rear though.
7. At the pre-consult we discussed the relationship of the ground-floor units to Mer Bleue and Brian Coburn and whether these units should have doors and patios to the street or just windows. The applicant indicated that they have various building models that could meet either scenario. If the applicant could provide examples of these (e.g., façade treatment and materials, size and nature of the patio area, any fencing or privacy barriers etc.) I will bring the examples to the larger Urban Design group for discussion and feedback.
8. This corner site is identified as a gateway to the community. The applicant should explain and illustrate how their proposal will create a gateway (e.g., architectural treatment, extensive landscaping, or both, or other means).

Engineering – Alex Polyak

Site Plan Requirements

Required:
Water Boundary condition requests must include the location of the service and the expected loads required by the proposed development. Please provide the following information:
Location of service connections (MAP provided)
Type of development and the amount of fire flow required (as per FUS).
Average daily demand: ___ l/s.
Maximum daily demand: ___l/s.
Maximum hourly daily demand: ___ l/s.

Submission Documents:
Site Plan
Topographical Plan of Survey Plan with a published Bench Mark
Removals Plan
Grading & Drainage Plan
General Plan of Services
Erosion & Sediment Control Plan
Design Brief and Stormwater Management Report
Geotechnical Report
Stationary Noise Study
Landscape Plan & TCR

Design Criteria - Civil Engineer to contact me directly
Buildings should be serviced as per the attached Cassette Subdivision DSEL Report.
Consider pedestrian Accessibilities at max 5%.

Stormwater Management as per the attached Cassette Subdivision DSEL Report.
Inflow rate into the minor system shall be limited to 220 L/s/ha.
Permissible ponding of 350mm for 100-year. No spilling to adjacent sites.
At 100-year ponding elevation you must spill to the City ROW.
100-year Spill elevation must be 300mm lower than any building opening or ramp

Minimum Drawing and File Requirements – All Plans

Plans are to be submitted on standard A1 size (594mm x 841mm) sheets, utilizing an appropriate Metric scale (1:200, 1:250, 1:300, 1:400, or 1:500).

With all submitted hard copies provide individual PDF of the DWGs and for reports please provide one PDF file of the reports. All PDF documents are to be unlocked and flattened.

Parks – Anissa McAlpine

Parkland dedication requirements for residential development at this site would appear to be satisfied through conditions of subdivision approval for D07-16-21-0001. Subject to the inclusion of the below condition in the subdivision approval, no further action is required to satisfy the parkland dedication by-law for the development of residential apartment or mixed-use residential apartments /commercial on Block 33. Should the number of units, or *unit type* change, parkland dedication requirements may also change.

The following condition addresses the subject property being Block 33:

The Owner covenants and agrees that the parkland dedication requirement has been calculated at a rate of one hectare per 500 units (residential >18units/ha), but for apartments, as defined by the zoning by-law this parkland conveyance will not exceed a maximum of 10% of the land area of the site being developed. Based on the estimated number of 123 units for this subdivision for a parkland dedication requirement of 0.246 hectares. The amount of parkland required for the multi-residential Block 33 is 0.072 hectares based on 10% of the land area of the site being developed. The parkland dedication requirement are shown in the calculation below:

In the event that the number of units change, the required parkland dedication will also change.

Parkland Dedication Required:				
Residential Units:	123			
		Total:	Calculation	Parkland Required (ha)
Unit Sub-Totals:	123	**123**	1 / 500	0.246
Block 33	0.721 hectares		10% land area being developed	0.072
			Parkland REQUIRED Total *(ha)*:	**0.318**

Transportation – Mike Giampa

A TIA is required, please proceed to step 2. Since a TIA was recently submitted for the zoning, steps 3 and 4 can be combined. Synchro files are required to deem the application complete.
A road noise study is required.

Minimum right of way protections on Brian Coburn and Mer Bleue are 40m and 37.5m.

Mer Bleue dimensions are subject to varying widening requirements of the Mer Blue ESR.

Forestry – Mark Richardson

TCR requirements:

1. If trees will be impacted, a Tree Conservation Report (TCR) must be supplied for review along with the suite of other plans/reports required by the City
2. Any removal of privately-owned trees 10cm or larger in diameter will require a tree permit issued under the Tree Protection Bylaw (Bylaw 2020 – 340)
3. The removal of city-owned trees of any diameter would also require a tree permit.
4. The Planning Forester from Planning and Growth Management as well as foresters from Forestry Services will review the submitted TCR
    a. If tree removal is required, both municipal and privately-owned trees will be addressed in a single permit issued through the Planning Forester
    b. Compensation may be required for city owned trees – if so, it will need to be paid prior to the release of the tree permit
5. The TCR must list all trees on site, as well as off-site trees if the CRZ extends into the developed area, by species, diameter and health condition
6. Please identify trees by ownership – private onsite, private on adjoining site, city owned, co-owned (trees on a property line)
7. If trees are to be removed, the TCR must clearly show where they are, and document the reason they cannot be retained
8. All retained trees must be shown, and all retained trees within the area impacted by the development process must be protected as per City guidelines available at Tree Protection Specification or by searching Ottawa.ca

a. the location of tree protection fencing must be shown on the plan

9. the City encourages the retention of healthy trees; if possible, please seek opportunities for retention of trees that will contribute to the design/function of the site.
10. For more information on the process or help with tree retention options, contact Mark Richardson mark.richardson@ottawa.ca or on City of Ottawa

LP tree planting requirements:

For additional information on the following please contact tracy.smith@Ottawa.ca

Minimum Setbacks

- Maintain 1.5m from sidewalk or MUP/cycle track or water service laterals.
- Maintain 2.5m from curb
- Coniferous species require a minimum 4.5m setback from curb, sidewalk or MUP/cycle track/pathway.
- Maintain 7.5m between large growing trees, and 4m between small growing trees. Park or open space planting should consider 10m spacing, except where otherwise approved in naturalization / afforestation areas. Adhere to Ottawa Hydro's planting guidelines (species and setbacks) when planting around overhead primary conductors.

Tree specifications

- Minimum stock size: 50mm tree caliper for deciduous, 200cm height for coniferous.

- Maximize the use of large deciduous species wherever possible to maximize future canopy coverage
- Tree planting on city property shall be in accordance with the City of Ottawa's Tree Planting Specification; and include watering and warranty as described in the specification (can be provided by Forestry Services).
- Plant native trees whenever possible
- No root barriers, dead-man anchor systems, or planters are permitted.
- No tree stakes unless necessary (and only 1 on the prevailing winds side of the tree)

Hard surface planting

- Curb style planter is highly recommended
- No grates are to be used and if guards are required, City of Ottawa standard (which can be provided) shall be used.
- Trees are to be planted at grade

Soil Volume

- Please document on the LP that adequate soil volumes can be met:

Tree Type/Size	Single Tree Soil Volume (m3)	Multiple Tree Soil Volume (m3/tree)
Ornamental	15	9
Columnar	15	9
Small	20	12
Medium	25	15
Large	30	18
Conifer	25	15

Please note that these soil volumes are not applicable in cases with Sensitive Marine Clay.

Sensitive Marine Clay

- Please follow the City's 2017 Tree Planting in Sensitive Marine Clay guidelines

Tree Canopy Cover

- The landscape plan shall show how the proposed tree planting will replace and increase canopy cover on the site over time, to support the City's 40% urban forest canopy cover target.
- At a site level, efforts shall be made to provide as much canopy cover as possible, through tree planting and tree retention, with an aim of 40% canopy cover at 40 years, as appropriate.
- Indicate on the plan the projected future canopy cover at 40 years for the site.

Appendix B
Water Servicing

Water Demand Design Sheet

NOVATECH
Engineers, Planners & Landscape Architects

Boundary Condition Request

Novatech Project #: 123050
Project Name: 119 Ryan Reynolds Way
Date: 4/5/2024
Input By: Anthony Mestwarp
Reviewed By: Greg Macdonald
Drawing Reference: Sketch/Figure/Drawing

Legend: Input by User | No Input Required | Calculated Cells →

Reference: Ottawa Design Guidelines - Water Distribution (2010 and TBs)
MOE Design Guidelines for Drinking-Water Systems (2008)
Fire Underwriter's Survey Guideline (2020)
Ontario Building Code, Part 3 (2012)

Small System = YES

	# of Dwellings	Area (ha.)	Pop. Equiv.	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Hour Demand (L/s)	Basic Day Demand (m^3/day)
Residential Input							
Singles			0.00	0.00	0.00	0.00	0.0
Semis / Townhomes			0.00	0.00	0.00	0.00	0.0
Apartments (3-BR)	21		65.10	0.21	0.84	1.28	13.0
Apartments (2-BR)	76		159.60	0.52	2.05	3.13	31.9
Apartments (1-BR)	24		33.60	0.11	0.43	0.66	6.7
Apartments (Avg)			0.00	0.00	0.00	0.00	0.0
Industrial / Commercial / Institutional (ICI) Input							
Industrial Area - Light				0.00	0.00	0.00	0.0
Industrial Area - Heavy				0.00	0.00	0.00	0.0
Commercial Area				0.00	0.00	0.00	0.0
Institutional Area				0.00	0.00	0.00	0.0
Other Area		375.00		0.02	0.03	0.06	1.1
Totals	**121**	**375.00**	**258.30**	**0.86**	**3.36**	**5.12**	**52.8**

Summary

i. Type of Development and Units:	6-Storey Apartment Building	
ii. Site Address:	2275 Mer Bleue Road	
iii. Proposed Water Service Connection Location(s):	Twin 150mm connection to the existing 400mm diameter watermain in Brian Coburn Blvd.	
iv. Average Day Flow Demand:	0.86	L/s
v. Peak Hour Flow Demand:	5.12	L/s
vi. Maximum Day Flow Demand:	3.36	L/s
vii. Required Fire Flow #1:	13000	L/min
viii. Required Fire Flow #2:	14000	L/min
ix. Required Fire Flow #3:		L/min

Water Demand Design Sheet

NOVATECH
Engineers, Planners & Landscape Architects

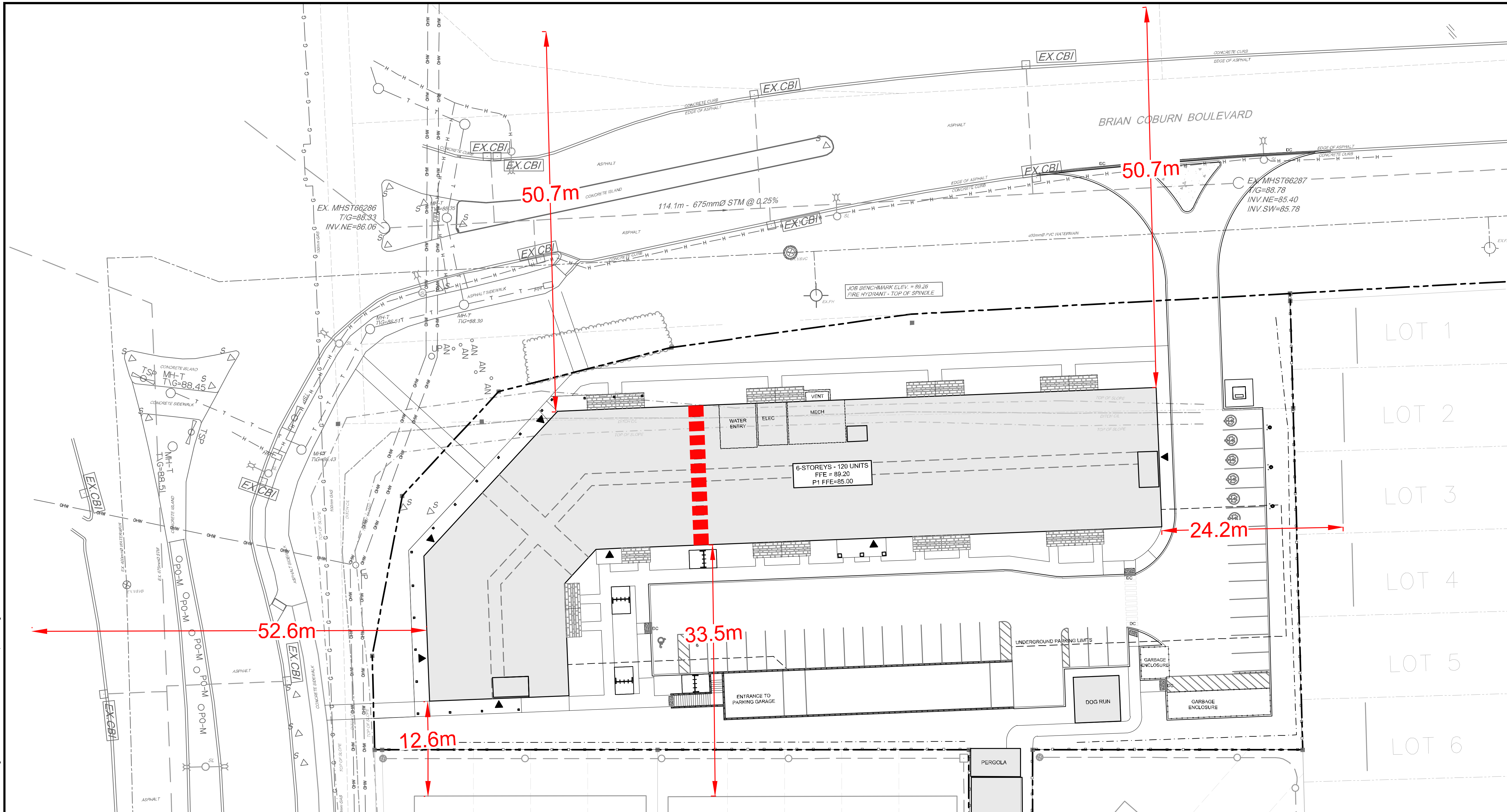
Design Parameters

Residential							Vulnerable Service Area (VSA)
Unit Type Population Equiv.	Singles	Semis/ Towns	Apts (3-BR)	Apts (2-BR)	Apts (1-BR)	Apts (Avg)	
	3.4	2.7	3.1	2.1	1.4	1.8	
Dailly Demand	L/per person/day						50
Average Demand	280						< 50 m³/day
Basic Demand	200						> 50 m³/day

Residential Peaking Factors		Max Day (x Avg Day)	Peak Hour (x Avg Day)
	Pop.		
Small System (If Applicable)	0	9.50	14.30
	30	9.50	14.30
	150	4.90	7.40
Modified	300	3.60	*5.50*
	450	3.00	*5.50*
	500	2.90	*5.50*
Large System (Default)	> 500	2.50	5.50

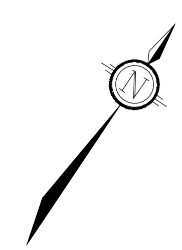
Institutional / Commercial / Industrial				
Industrial		Commercial	Institutional	Other Use
Light	Heavy			
L/gross ha/day				L/m²/day
35,000	55,000	28,000	28,000	5
10,000	17,000	17,000	17,000	3

ICI Peaking Factors	Max Day (x Avg Day)	Peak Hour (x Avg Day)
	1.50	2.70



LEGEND

- PROPERTY LINE
- PROPOSED TACTILE INDICATOR
- PROPOSED ENTRANCE
- PROPOSED DEPRESSED CURB
- 2HR FIREWALL



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Facsimile (613) 254-5867
Website www.novatech-eng.com

CITY OF OTTAWA
CASSETTE COMMONS

FUS SEPARATION

SCALE		
DATE: APRIL 2024	JOB: 123050	FIGURE: FUS

SHT11X17.DWG - 279mmX432mm

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FUS - Fire Flow Calculations

As per 2020 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 123050
Project Name: 119 Ryan Reynolds Way
Date: 6/8/2023
Input By: Curtis Ferguson, E.I.T.
Reviewed By: Anthony Mestwarp, P.Eng

Legend	
	Input by User
	No Information or Input Required

Building Description: 6 Storey Multifamily Residential Apartment (WEST)
Type V - Wood frame

Step			Input		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction C	Type V - Wood frame	Yes	1.5	1.5	
		Type IV - Mass Timber		Varies		
		Type III - Ordinary construction		1		
		Type II - Non-combustible construction		0.8		
		Type I - Fire resistive construction (2 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	897.49			
		Number of Floors/Storeys	6			
		Area of structure considered (m^2)			**5,385**	
	F	**Base fire flow without reductions** $F = 220\ C\ (A)^{0.5}$				**24,000**
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**		**FUS Table 3**	**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**20,400**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**		**FUS Table 4**	**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%	-30%	**-10,058**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	Yes	-10%	-10%	
				Cumulative Sub-Total	**-50%**	
		Area of Sprinklered Coverage (m²)	5,310	99%		
				Cumulative Total	**-49%**	
5	**Exposure Surcharge**		**FUS Table 5**		**Surcharge**	
	(3)	North Side	>30m		0%	**3,060**
		West Side	>30m		0%	
		South Side	10.1 - 20 m		15%	
		East Side	Firewall-2hr		0%	
				Cumulative Total	**15%**	
Results						
6	**(1) + (2) + (3)**	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**13,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**217**
				or	USGPM	3,435

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FUS - Fire Flow Calculations

As per 2020 Fire Underwriter's Survey Guidelines

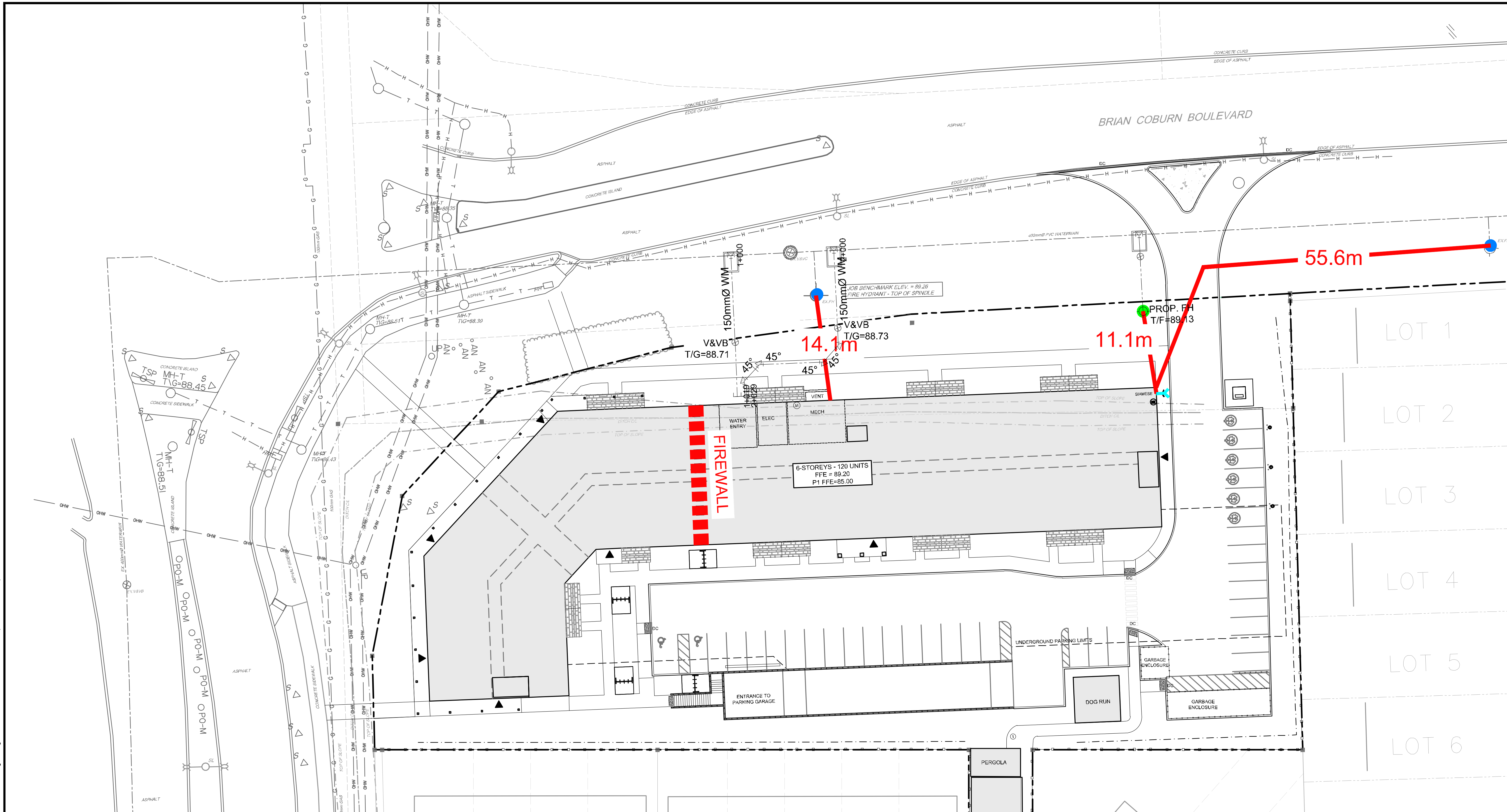
NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 123050
Project Name: 119 Ryan Reynolds Way
Date: 6/8/2023
Input By: Curtis Ferguson, E.I.T.
Reviewed By: Anthony Mestwarp, P.Eng

Legend: Input by User | No Information or Input Required

Building Description: 6 Storey Multifamily Residential Apartment (EAST)
Type V - Wood frame

Step			Input		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction C	Type V - Wood frame	Yes	1.5	1.5	
		Type IV - Mass Timber		Varies		
		Type III - Ordinary construction		1		
		Type II - Non-combustible construction		0.8		
		Type I - Fire resistive construction (2 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	1144.25			
		Number of Floors/Storeys	6			
		Area of structure considered (m^2)			**6,866**	
	F	**Base fire flow without reductions**				**27,000**
		$F = 220\ C\ (A)^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**		**FUS Table 3**	**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**22,950**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**		**FUS Table 4**	**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%	-30%	**-11,452**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	Yes	-10%	-10%	
				Cumulative Sub-Total	**-50%**	
		Area of Sprinklered Coverage (m²)	6,852	100%		
				Cumulative Total	**-50%**	
5	**Exposure Surcharge**		**FUS Table 5**		**Surcharge**	
	(3)	North Side	>30m		0%	**2,295**
		East Side	20.1 - 30 m		10%	
		South Side	>30m		0%	
		West Side	Firewall-2hr		0%	
				Cumulative Total	**10%**	
Results						
6	(1) + (2) + (3)	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**14,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**233**
				or	USGPM	3,699



LEGEND

— — —	PROPERTY LINE
Y	PROPOSED SIAMESE CONNECTION
● (blue)	EXISTING HYDRANT
● (green)	PROPOSED HYDRANT
—— (red)	DISTANCE FROM HYDRANT TO SIAMESE CONNECTION/ BUILDING ENTRANCE

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

CITY OF OTTAWA
CASSETTE COMMONS

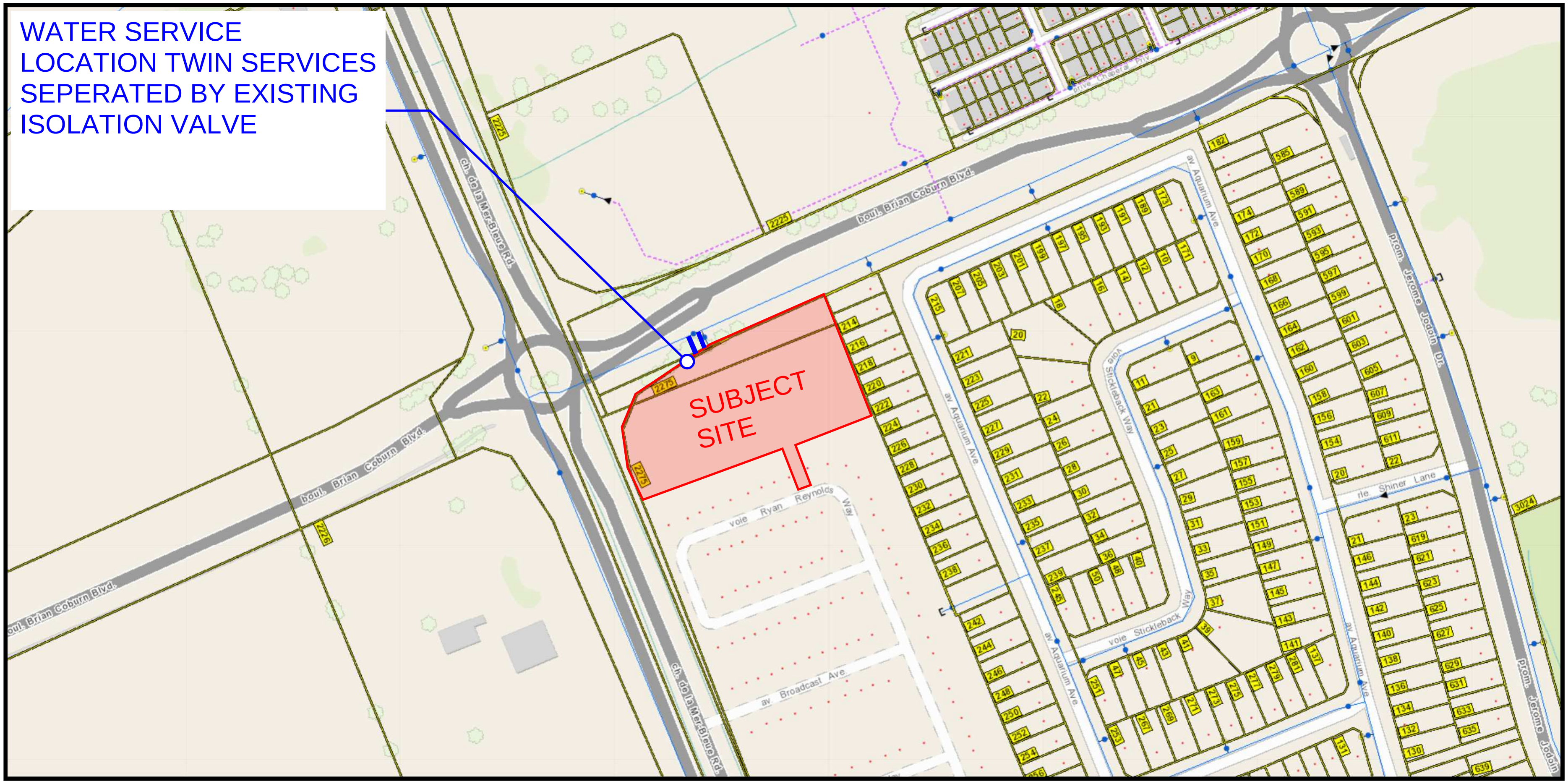
HYDRANT COVERAGE PLAN

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

DATE APRIL 2024 | JOB 123050 | FIGURE COV

SHT11X17.DWG - 279mmX432mm

M:\2023\123050\CAD\Civil\Figures\Servicing\123050-FUS-Coverage.dwg, FUS SEP, Jun 14, 2023 - 3:40pm, amestwarp



WATER SERVICE LOCATION TWIN SERVICES SEPERATED BY EXISTING ISOLATION VALVE
SUBJECT SITE
boul. Brian Coburn Blvd.
ch. de la Mer-Bleue Rd.
av. Aquarium Ave
voie Stickleback Way
voie Ryan Reynolds Way
av. Broadcast Ave
prom. Jerome Jodoin Dr.
rle Shiner Lane

From: Patrick Darcey <patrick.darcey@seymourpacific.ca>
Sent: Friday, June 16, 2023 2:01 PM
To: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Cc: Christopher Gibson <christopher.gibson@broadstreet.ca>; Eric Condon <eric.condon@broadstreet.ca>
Subject: RE: Mer Bleue - Fire Flow Demands-123050

Hi Anthony,

As per your request.

Type V – Wood Frame

Building Footprint

TOTAL FLOOR AREA = 2041.74M²
FIREWALL FLOOR AREA BREAKDOWN
LEFT SIDE FLOOR AREA = 897.49M²
RIGHT SIDE FLOOR AREA = 1144.25M²

- **Type of occupancy:**

Residential with Garage

- Residential is wood frame
- Garage is concrete

- **Sprinkler system details:**

Yes to all items under the sprinkler system

Patrick Darcey
BIM Specialist

BROADSTREET PROPERTIES LTD.
SEYMOUR PACIFIC DEVELOPMENTS LTD.
100 St. Ann's Rd, Campbell River, BC V9W 4C4
T. 250.850.3244 | **C.**
W. www.broadstreet.ca | www.seymourpacific.ca

From: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Sent: Friday, June 16, 2023 10:31 AM
To: Patrick Darcey <patrick.darcey@seymourpacific.ca>
Cc: Christopher Gibson <christopher.gibson@broadstreet.ca>; Eric Condon <eric.condon@broadstreet.ca>
Subject: Mer Bleue - Fire Flow Demands-123050

CAUTION: External Email
Hi Patrick,

It was indicated in our meetings that the building composition is the same as the Navan and Innes projects. But for our records and for referance in our report the City will require written correspondence for the following:

- **Type of Construction:**

Type V - Wood frame
Type IV - Mass Timber
Type III - Ordinary construction
Type II - Non-combustible construction
Type I - Fire resistive construction (2 hrs)

- **Building footprint for both sides of the proposed Fire wall.**

- **Type of occupancy:**

	FUS Table 3	
Non-combustible		Residential - with no garage - Not Typical
Limited combustible		Residential - with garage
Combustible		General Commercial **- Generally, for commercial buildings no reduction**
Free burning		Check usage with FUS
Rapid burning		Check usage with FUS

- **Sprinkler system details:**

Adequately Designed System (NFPA 13)	Y/N
Standard Water Supply	Y/N
Fully Supervised System	Y/N

-

Thanks,

Anthony Mestwarp, P.Eng., Project Engineer | Land Development Engineering
NOVATECH
Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext. 216

From: Elsby, Cam <Cam.Elsby@ottawa.ca>
Sent: Tuesday, April 16, 2024 11:24 AM
To: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Subject: RE: 119 Ryan Reynolds Way (Formerly 2275 Mer Bleue) - Boundary Conditions Request

Hi Anthony,

Please find attached boundary condition request results for the above noted application. Please note that since proposed twin water services are close to each other, separated by the existing isolation valve on Brian Coburn Boulevard, the results include only one connection.

Please don't hesitate to reach out should you have any questions or concerns.

Kind regards,

Cam Elsby
Project Manager, Infrastructure Approvals
Planning, Real Estate and Economic Development Department | Services de la planification, des biens immobiliers et du développement économique
Development Review – East Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 21443
cam.elsby@ottawa.ca

From: Elsby, Cam
Sent: April 08, 2024 10:35 AM
To: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Subject: RE: 119 Ryan Reynolds way (Formerly 2275 Mer Bleue) - Boundary Conditions Request

Hi Anthony,

No problem. I've reviewed the updated request, and found no concerns so I've flipped the demands over to our water resources team for processing. Please note that their current turnaround time is 2 weeks, although I've flagged to them your ideal timeline in case it may help.

I'm happy to chat about comments over a call. I'm free Wednesday anytime between 10am-12pm, or 1-3pm. Let me know what works best for you, and we can set up a quick Teams meeting.

Kind regards,

Cam Elsby
Project Manager, Infrastructure Approvals
Planning, Real Estate and Economic Development Department | Services de la planification, des biens immobiliers et du développement économique
Development Review – East Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 21443

cam.elsby@ottawa.ca

From: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Sent: April 05, 2024 5:36 PM
To: Elsby, Cam <Cam.Elsby@ottawa.ca>
Subject: RE: 119 Ryan Reynolds way (Formerly 2275 Mer Bleue) - Boundary Conditions Request

Hi Cam,

I noticed an error in the excel sheet interpolation.

The updated demands are as follows and attached,

- Average Daily Demand: 0.86 L/s
- Max Daily Demand: 3.36L/s
- Peak Hour Demand: 5.12 L/s
- Fire Flow (FUS): 217/233 L/s

Sorry for any confusion this may have caused.

As noted below :

Please note that the Client informed me that they would like to resubmit the end of next week. I would appreciate a quick turnaround if possible.

I would also like to discuss the comment regarding the water service connections if you have time next week for a quick call .

Thanks,

Anthony Mestwarp, P.Eng., Project Manager | Land Development Engineering
NOVATECH
Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext. 216

From: Anthony Mestwarp
Sent: Friday, April 5, 2024 4:26 PM
To: Elsby, Cam <Cam.Elsby@ottawa.ca>
Subject: 119 Ryan Reynolds way (Formerly 2275 Mer Bleue) - Boundary Conditions Request

Hi Cam,

As requested, please find the updated water demands utilizing the MOE table 3-3.

Total demands and fire flows are summarized below.

- Average Daily Demand: 0.86 L/s

- Max Daily Demand: 4.13 L/s
- Peak Hour Demand: 6.25 L/s
- Fire Flow (FUS): 217/233 L/s

Please note that the Client informed me that they would like to resubmit the end of next week. I would appreciate a quick turnaround if possible.

I would also like to discuss the comment regarding the water service connections if you have time next week for a quick call .

Thanks,

Anthony Mestwarp, P.Eng., Project Manager | Land Development Engineering
NOVATECH
Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext. 216

'

Boundary Conditions
119 Ryan Reynolds Way

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	52	0.86
Maximum Daily Demand	202	3.36
Peak Hour	307	5.12
Fire Flow Demand #1	13,000	216.67
Fire Flow Demand #2	14,000	233.33

Location

Results

Connection 1 - Brian Coburn Blvd

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.5	59.9
Peak Hour	126.4	54.1
Max Day plus Fire Flow #1	126.6	54.3
Max Day plus Fire Flow #2	126.5	54.3

[1] Ground Elevation = 88.3 m

Notes

1. Twin water services separated by existing isolation valve along Brian Coburn Boulevard.

Disclaimer

The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.

CALCULATED WATER DEMANDS:

Water Demands

Average Day (Maximum HGL)=	0.86	L/s
Maximum Day =	3.35	L/s
Peak Hour (Minimum HGL) =	5.11	L/s
Fire Flow #1 (FUS) =	216.67	L/s
Fire Flow #1 (FUS) =	233.33	L/s

City of Ottawa Boundary Conditions:

Average Day (Maximum HGL)=	130.5	m
Peak Hour (Minimum HGL) =	126.4	m
Max Day + Fire (1300L/min) =	126.6	m
Max Day + Fire (1400L/min) =	126.5	m

Watermain Analysis

Finished Floor Elevation = 89.20 m

High Pressure Test = Max. HGL -Finished Floor Elevation x 1.42197 PSI/m < 80 PSI

High Pressure = 58.7 PSI

Low Pressure Test = Min. HGL - Finished Floor Elevation x 1.42197 PSI/m > 40 PSI

Low Pressure = 52.9 PSI

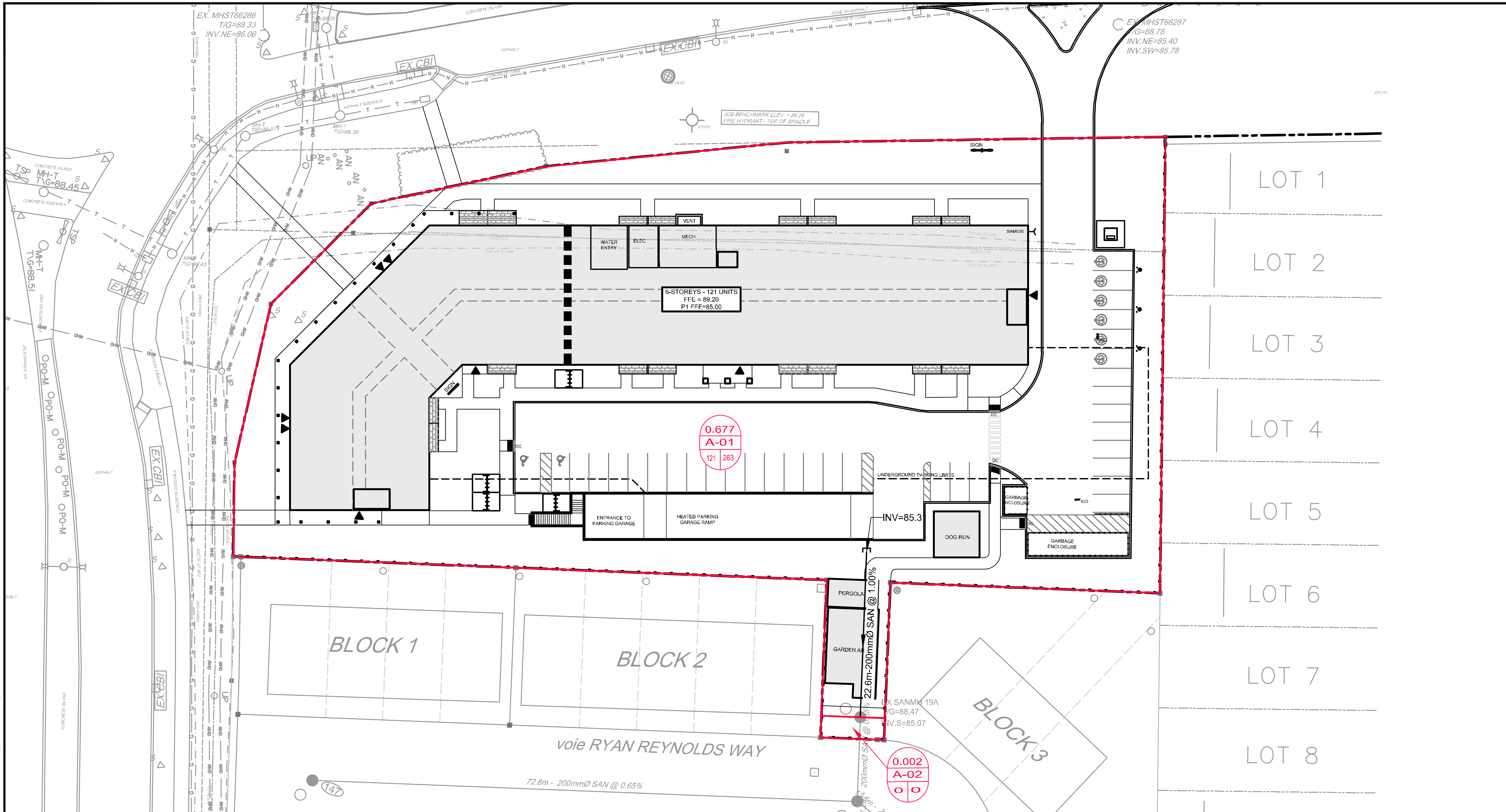
Max Day + Fire Test = Max Day + Fire Flow - Finished Floor Elevation x 1.42197 PSI/m > 20 PSI

Max Day + Fire (1300L/min) = 53.2 PSI

Max Day + Fire Test = Max Day + Fire Flow - Finished Floor Elevation x 1.42197 PSI/m > 20 PSI

Max Day + Fire (1400L/min) = 53.0 PSI

Appendix C
Sanitary Servicing



LEGEND

- PROPERTY LINE
- PROPOSED SANITARY SEWER AND MANHOLE
- SAN MH — *EXISTING SANITARY MANHOLE & SEWER*
- SANITARY SEWER DRAINAGE AREA BOUNDARY
- 0.47 — DRAINAGE AREA (ha)
- 20A-19A — SAN SEWER PIPE RUN
- 71 | 128 — NO. UNITS/POPULATION

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone	(613) 254-9643
Facsimile	(613) 254-5867
Website	www.novatech-eng.com

CITY OF OTTAWA
119 Ryan Reynolds Way
(CASSETTE COMMONS)

SANITARY DRAINAGE
AREA PLAN

SCALE			
1 : 500	0 5m 10m 20m		
DATE	APRIL 2024	JOB 123050	FIGURE SAN

M:\2023\123050\CAD\Civil\123050-SAN.dwg, SAN, Apr 16, 2024 - 5:05pm, amestwarp

SHT11X17.DWG - 279mmX432mm

SANITARY SEWER DESIGN SHEET

Novatech Project #:	123050
Project Name:	Cassette Commons
Date Prepared:	6/6/2023
Date Revised:	4/12/2024
Input By:	Curtis Ferguson, E.I.T.
Reviewed By:	Anthony Mestwarp, P.Eng
Drawing Reference:	123050- SAN

Legend:
- PROJECT SPECIFIC INFO
- USER DESIGN INPUT
- CUMULATIVE CELL
- CALCULATED DESIGN CELL OUTPUT

NOVATECH
Engineers, Planners & Landscape Architects

LOCATION			DEMAND												
			RESIDENTIAL FLOW								COMMERCIAL FLOW				
AREA	FROM MH	TO MH	1 Bed Apartment	2 Bed Apartment	3 Bed Apartment	POPULATION (in 1000's)	CUMULATIVE POPULATION (in 1000's)	PEAK FACTOR M	AVG POPULATION FLOW (L/s)	PEAKED DESIGN POP FLOW (L/s)	AREA (m^2)	CUMULATIVE AREA (m^2)	DESIGN COMMERICAL FLOW (L/s)	COMMERICAL PEAK FACTOR	PEAKED COMMERCIAL FLOW
A-01	Stub	SAN19A	21	76	24	0.263	0.263	3.48	0.85	2.97	375.000	375.000	0.02	1.00	0.02
A-02	SAN19A	MAIN	0	0	0	0.000	0.263	3.48	0.85	2.97		375.000	0.02	1.00	0.02

AREA	EXTRANEOUS FLOW				DESIGN CAPACITY: PROPOSED SEWER PIPE SIZING / DESIGN							
	Total Area (ha.)	Accum. Area (ha.)	DESIGN EXTRAN. FLOW (L/s)	TOTAL DESIGN FLOW (L/s)	PIPE LENGTH (m)	PIPE SIZE (mm) AND MATERIAL	PIPE ID ACTUAL (m)	ROUGH. (n)	DESIGN GRADE (%)	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	Qpeak Design / Qcap
A-01	0.68	0.68	0.22	3.22	17.5	200 PVC	0.203	0.013	0.65	27.6	0.85	11.7%
A-02	0.002	0.68	0.22	3.22	11.2	200 PVC	0.203	0.013	0.65	27.6	0.85	11.7%

Design Parameters:			
1. Residential Flows			
-1 Bed Apartment	1.4	Person/ Unit	As per City of Ottawa Sewer Design Guidelines, 2012
-2 Bed Apartment	2.1	Person/ Unit	
-3 Bed Apartment	3.1	Person/ Unit	
2. Commercial Flow			
-Retail Stores- Washrooms only	5	$L/m^2/day$	
3. Q Avg capita flow	280	L/capita/day	As per City of Ottawa - Technical Bulletin ISTB-2018-01
4. M = Harmon Formula (maximum of 4.0)			As per Harmon Formula
5. K =	0.8		
6. Commercial Peak Factor	1.0		As per City of Ottawa - Technical Bulletin ISTB-2018-01
7. Peak Extraneous Flow =	0.33	L/sec/ha	

CAPACITY EQUATION

Q full= (1/n) A R^(2/3)S_o^(1/2)

Where : Q full = Capacity (L/s)

n = Manning coefficient of roughness (0.013)
A = Flow area (m^2)
R = Wetter perimenter (m)
So = Pipe Slope/gradient

David Schaeffer Engineering Ltd.
120 Iber Road, Suite 103
Stittsville, ON K2S 1E9
613-836-0856
dsel.ca

DESIGN BRIEF

FOR

CASSETTE SUBDIVISION
(2275 MER-BLEUE ROAD)

CAIVAN (MER-BLEUE) INC.

CITY OF OTTAWA

PROJECT NO.: 20-1214

2ND SUBMISSION JUNE 2022

Table 5 summarizes the ***City Standards*** which have been used in the design of the proposed wastewater sewer system.

Table 5: Wastewater Design Criteria

Design Parameter	Value
Medium Density Residential	2.7 p/unit
Peak Wastewater Generation per Person	280 L/p/d
Peaking Factor Applied	Harmon's Equation (2.0 min, 4.0 max)
Harmon – Correction Factor	0.80
Commercial / Institutional Flows	28,000 L/ha/day
Commercial / Institutional Peak Factor	1.0 (ICI in contributing area is < 20%)
Infiltration and Inflow Allowance	0.33 L/s/ha
Park Peaking Factor	1.5
Sanitary sewers are to be sized employing the Manning's Equation	$Q = \frac{1}{n} A R^{2/3} S^{1/2}$
Minimum Sewer Size	200 mm diameter
Minimum Manning's 'n'	0.013
Minimum Depth of Cover	2.5 m from crown of sewer to grade
Minimum Full Flowing Velocity	0.6 m/s
Maximum Full Flowing Velocity	3.0 m/s
Extracted from Sections 4 and 6 of the City of Ottawa Sewer Design Guidelines (October 2012) and ISTB-2018-01 (March 21, 2018)	

The sanitary design sheets for the subject development area are enclosed in ***Appendix D***.

Applying the criteria in Table 5, the peak sanitary flow from the subject site to the Wwalkway/servicing Block at Aquarium Avenue is 5.95 L/s. The peak sanitary flow from the subject site to Sculpin Street is 2.16 L/s. These flows are in line with those reported within the Functional Servicing Report (5.40 L/s and 2.98 L/s respectively) and slightly higher than the flows that were designed for in the Avalon Encore Stage 6 design. Capacity in the downstream sewers was reviewed to confirm that there is sufficient capacity. It is noted that the downstream system was designed with old design guidelines and the entire network have additional theoretical capacity based on refined parameters.

4.3 Future Commercial Block Service

A sanitary control manhole (SAN Control MH 19A) has been provided to Block 27 to facilitate a future servicing outlet for that property. The manhole will have a knockout provided for the future connection when the site plan is advanced for that area under a separate process.

4.4 Sanitary Hydraulic Grade Line (HGL)

The sanitary emergency overflow structure is located within the City of Ottawa unopened road allowance near the sanitary pump station on Tenth Line Road. As noted in the ***Stage 6 Design Brief***, the sanitary HGL was calculated in conjunction with previous reports, to confirm that the minimum 0.30 m freeboard was provided throughout the proposed and existing developments. The resulting sanitary HGL elevations for the proposed outlets are shown on the Record Drawings, enclosed in ***Appendix B***. The design for the subject site has regard for the sanitary HGL, providing 0.30 m freeboard throughout the proposed development.

4.5 Wastewater Servicing Conclusion

The subject site discharges sanitary flows at two locations within Avalon Encore Stage 6: easterly to a walkway/servicing Block to Aquarium Avenue and south to Sculpin Street. The adjacent site was designed to convey flows from the subject site. Since the time of publication of the Stage 6 Design Brief, the sanitary design guidelines have been updated to reflect ISTB-2018-01 (March 21, 2018).

Although the peak flows from the proposed site are slightly greater than the flows that were considered in the adjacent design, it has been confirmed that there is sufficient residual capacity in the existing downstream system.

The design has regard for the sanitary HGL, providing 0.30 m freeboard throughout the proposed development.

The sanitary sewers have been designed in accordance with City of Ottawa standards.

LICENSED PROFESSIONAL ENGINEER
W. LIU
100167932
22-06-23
PROVINCE OF ONTARIO

SANITARY SEWER CALCULATION SHEET

Manning's n=0.013

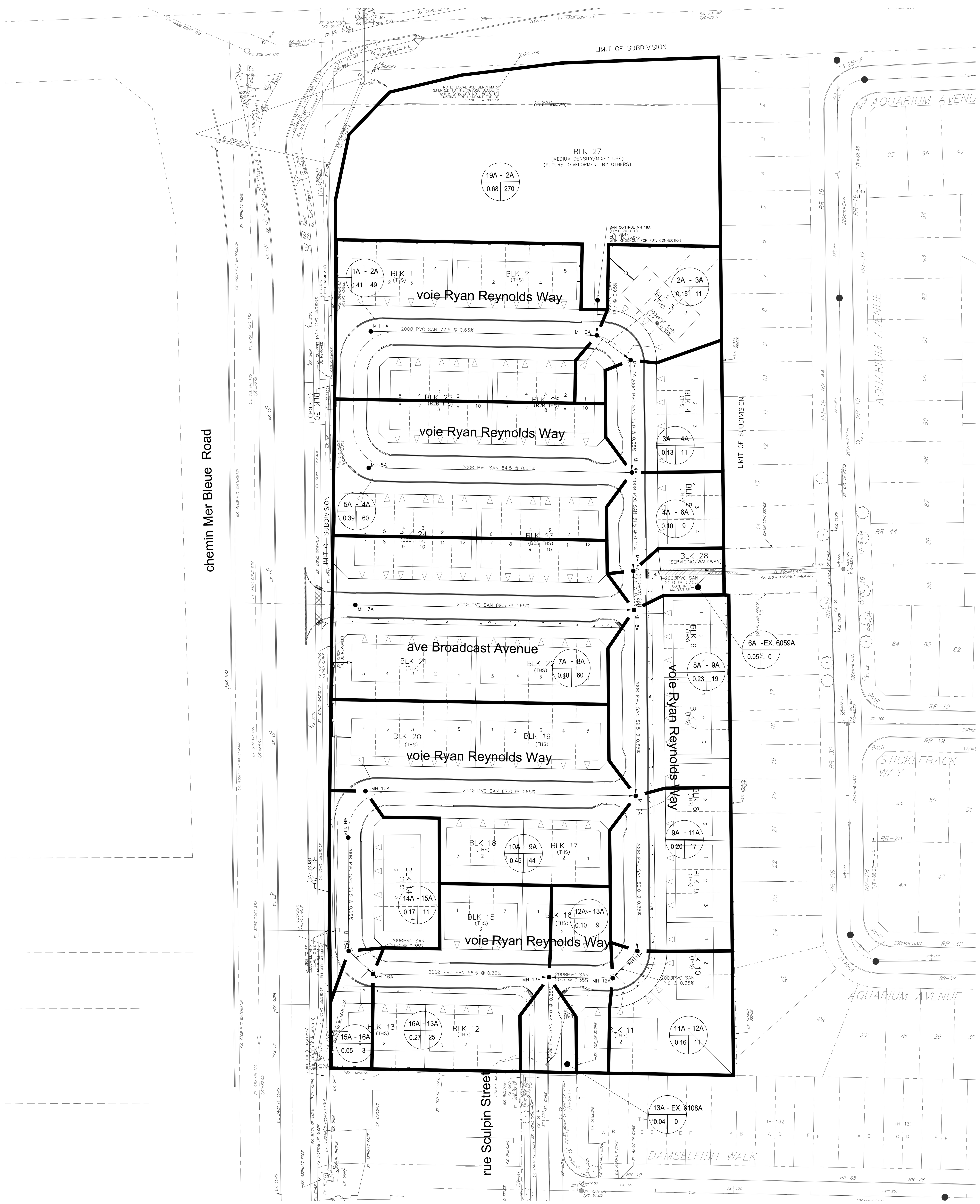
Ottawa

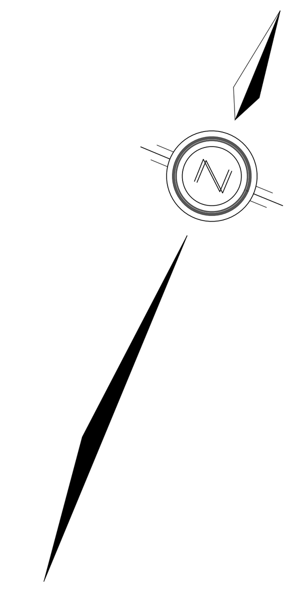
LOCATION: STREET	FROM M.H.	TO M.H.	RESIDENTIAL AREA AND POPULATION: AREA (ha)	UNITS	UNITS Singles	UNITS Townhouse	POP.	CUMULATIVE AREA (ha)	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW (l/s)	COMM AREA (ha)	COMM ACCU. AREA (ha)	INSTIT AREA (ha)	INSTIT ACCU. AREA (ha)	PARK AREA (ha)	PARK ACCU. AREA (ha)	C+I+I PEAK FLOW (l/s)	INFILTRATION TOTAL AREA (ha)	INFILTRATION ACCU. AREA (ha)	INFILT. FLOW (l/s)	TOTAL FLOW (l/s)	PIPE DIST (m)	DIA (mm)	SLOPE (%)	CAP. (FULL) (l/s)	RATIO Q act/Q cap	VEL. (FULL) (m/s)	VEL. (ACT.) (m/s)
ave Broadcast Avenue																													
	7A	8A	0.48	22		22	60	0.48	60	3.64	0.71		0.00		0.00		0.00	0.00	0.48	0.48	0.16	0.87	89.5	200	0.65	26.44	0.03	0.84	0.38
To voie Ryan Reynolds Way, Pipe 8A - 6A								0.48	60				0.00		0.00		0.00			0.48									
BLOCK 27																													
	19A	2A	0.68	150			270	0.68	270	3.48	3.04		0.00		0.00		0.00	0.00	0.68	0.68	0.22	3.27	11.5	200	0.65	26.44	0.12	0.84	0.57
To voie Ryan Reynolds Way, Pipe 2A - 3A								0.68	270				0.00		0.00		0.00			0.68									
BLOCK 28																													
Contribution From voie Ryan Reynolds Way, Pipe 4A - 6A								1.86	410				0.00		0.00		0.00		1.86	1.86									
Contribution From voie Ryan Reynolds Way, Pipe 8A - 6A								0.48	60				0.00		0.00		0.00		0.48	2.34									
	6A	6059A	0.05				0	2.39	470	3.39	5.16		0.00		0.00		0.00	0.00	0.05	2.39	0.79	5.95	25.0	200	0.35	19.40	0.31	0.62	0.54
voie Ryan Reynolds Way																													
	5A	4A	0.39	22		22	60	0.39	60	3.64	0.71		0.00		0.00		0.00	0.00	0.39	0.39	0.13	0.84	84.5	200	0.65	26.44	0.03	0.84	0.38
	80A	9A	0.23	7		7	19	0.23	19	3.71	0.23		0.00		0.00		0.00	0.00	0.23	0.23	0.08	0.30	59.5	200	0.65	26.44	0.01	0.84	0.28
Contribution From ave Broadcast Avenue, Pipe 7A - 8A								0.48	60				0.00		0.00		0.00		0.48	0.48									
	8A	6A						0.48	60	3.64	0.71		0.00		0.00		0.00	0.00	0.00	0.48	0.16	0.87	12.5	200	0.35	19.40	0.04	0.62	0.31
To BLOCK 28, Pipe 6A - 18A								0.48	60				0.00		0.00		0.00			0.48									
	14A	15A	0.17	4		4	11	0.17	11	3.73	0.13		0.00		0.00		0.00	0.00	0.17	0.17	0.06	0.19	36.5	200	0.65	26.44	0.01	0.84	0.24
	15A	16A	0.05	1		1	3	0.22	14	3.72	0.17		0.00		0.00		0.00	0.00	0.05	0.22	0.07	0.24	11.0	200	0.35	19.40	0.01	0.62	0.21
	16A	13A	0.27	9		9	25	0.49	39	3.67	0.46		0.00		0.00		0.00	0.00	0.27	0.49	0.16	0.63	56.5	200	0.35	19.40	0.03	0.62	0.28
To SCULPIN STREET, Pipe 13A - 17A								0.49	39				0.00		0.00		0.00			0.49									
	10A	9A	0.45	16		16	44	0.45	44	3.66	0.52		0.00		0.00		0.00	0.00	0.45	0.45	0.15	0.67	87.0	200	0.65	26.44	0.03	0.84	0.35
	9A	11A	0.20	6		6	17	0.88	80	3.62	0.94		0.00		0.00		0.00	0.00	0.20	0.88	0.29	1.23	50.0	200	0.35	19.40	0.06	0.62	0.34
	11A	12A	0.16	4		4	11	1.04	91	3.60	1.06		0.00		0.00		0.00	0.00	0.16	1.04	0.34	1.41	12.0	200	0.35	19.40	0.07	0.62	0.36
	12A	13A	0.10	3		3	9	1.14	100	3.59	1.17		0.00		0.00		0.00	0.00	0.10	1.14	0.38	1.54	20.5	200	0.35	19.40	0.08	0.62	0.37
To SCULPIN STREET, Pipe 13A - 17A								1.14	100				0.00		0.00		0.00			1.14									
	1A	2A	0.41	18		18	49	0.41	49	3.65	0.58		0.00		0.00		0.00	0.00	0.41	0.41	0.14	0.72	72.5	200	0.65	26.44	0.03	0.84	0.36
Contribution From BLOCK 27, Pipe 19A - 2A								0.68	270				0.00		0.00		0.00		0.68	1.09									
	2A	3A	0.15	4		4	11	1.24	330	3.45	3.69		0.00		0.00		0.00	0.00	0.15	1.24	0.41	4.10	13.5	200	0.35	19.40	0.21	0.62	0.49
	3A	4A	0.13	4		4	11	1.37	341	3.44	3.81		0.00		0.00		0.00	0.00	0.13	1.37	0.45	4.26	36.0	200	0.35	19.40	0.22	0.62	0.49
	4A	6A	0.10	3		3	9	1.86	410	3.41	4.54		0.00		0.00		0.00	0.00	0.10	1.86	0.61	5.15	31.5	200	0.35	19.40	0.27	0.62	0.52
To BLOCK 28, Pipe 6A - 18A								1.86	410				0.00		0.00		0.00			1.86									
SCULPIN STREET																													
Contribution From voie Ryan Reynolds Way, Pipe 12A - 13A								1.14	100				0.00		0.00		0.00		1.14	1.14									
Contribution From voie Ryan Reynolds Way, Pipe 16A - 13A								0.49	39				0.00		0.00		0.00		0.49	1.63									
	13A	6108A	0.04				0	1.67	139	3.56	1.60		0.00		0.00		0.00	0.00	0.04	1.67	0.55	2.16	28.0	200	0.35	19.40	0.11	0.62	0.41

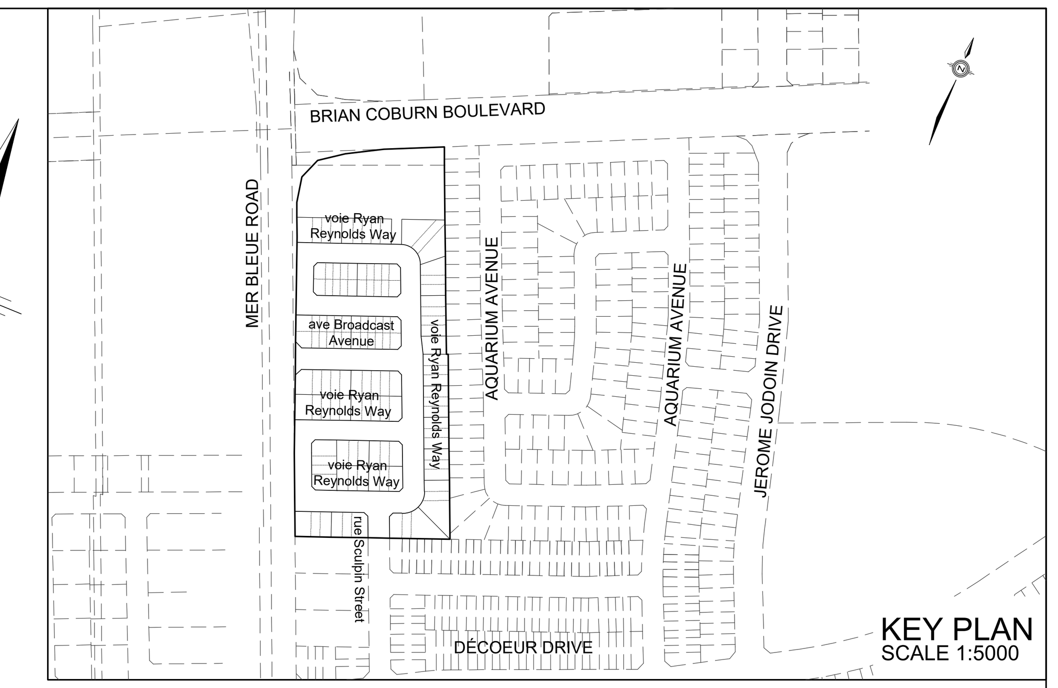
DESIGN PARAMETERS

Park Flow =	9300	L/ha/da	0.10764	l/s/Ha				
Average Daily Flow =	280	l/p/day			Industrial Peak Factor = as per MOE Graph			
Comm/Inst Flow =	28000	L/ha/da	0.3241	l/s/Ha	Extraneous Flow =		0.330	L/s/ha
Industrial Flow =	35000	L/ha/da	0.40509	l/s/Ha	Minimum Velocity =		0.600	m/s
Max Res. Peak Factor =	4.00				Manning's n =	(Conc)	0.013	(Pvc) 0.013
Commercial/Inst./Park Peak Factor =	1.00				Townhouse coeff=		2.7	
Institutional =	0.32	l/s/Ha			Single house coeff=		3.4	

Designed: A.K	PROJECT: **CASSETTE SUBDIVISION (2275 MER BLEUE ROAD)**		
Checked: W.L.	LOCATION: **City of Ottawa**		
Dwg. Reference: Sanitary Drainage Plan, Dwgs. No. 18	File Ref: 20-1214	Date: **Jun 2022**	Sheet No. 1 of 1







KEY PLAN
SCALE 1:5000

LEGEND

SANITARY DRAINAGE BOUNDARY	
SANITARY SUB-DRAINAGE BOUNDARY	
SANITARY DRAINAGE BOUNDARY (OTHER PHASES)	
UPSTREAM MH TO DOWNSTREAM MH / AREA IN HECTARES / POPULATION	43A - 44A, 0.78 61
UPSTREAM MH TO DOWNSTREAM MH / AREA IN OTHER PHASES IN HECTARES / POPULATION	43A-44A, 0.78 61
EXTERNAL AREA IN HECTARES / EXTERNAL POPULATION / DENSITY (PERSONS/HECTARE) / EXTERNAL LAND USE	A=53.63, 107, POP=5739, RESIDENTIAL
MAINTENANCE HOLE	MH202A
CAP	
EXISTING SANITARY MAINTENANCE HOLE	

TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY J.D. BARNES LIMITED, PROJECT No. 20-10-178-00. SURVEY DATED DEC 23, 2020 AND MARCH 24, 2022. TOPOGRAPHIC INFORMATION PROVIDED BY ANNIS, O'SULLIVAN, VOLLEBEKK LIMITED, PROJECT No. 18048-19. SURVEY DATED SEPTEMBER, 2020.

LEGAL INFORMATION

M-PLAN PROVIDED BY J.D. BARNES, PROJECT No. 20-10-178-00, RECEIVED ON MARCH 15, 2022.

NOT FOR CONSTRUCTION

ELEVATION NOTE

LOCAL JOB BENCHMARK REFERRED TO THE CGVD28 GEODETIC DATUM (AOV JOB NO. 18048-19) PROVIDED AT THE EXISTING FIRE HYDRANT ALONG BRIAN COBURN BOULEVARD WITH A GEODETIC ELEVATION OF 89.26m ON THE TOP OF SPINDLE

ELEVATION = 89.260m

No.	BY	DATE	DESCRIPTION
2	W.L.	22-06-23	2nd SUBMISSION (BY DSEL)
1	W.L.	22-05-05	1st SUBMISSION (BY DSEL)

CITY OF OTTAWA

PROJECT No. 20-1214

LICENSED PROFESSIONAL ENGINEER W. LIU 100167932 22-06-23 PROVINCE OF ONTARIO

SANITARY DRAINAGE PLAN

CAIVAN (MER BLEUE) INC.

CASSETTE SUBDIVISION (2275 MER-BLEUE ROAD)

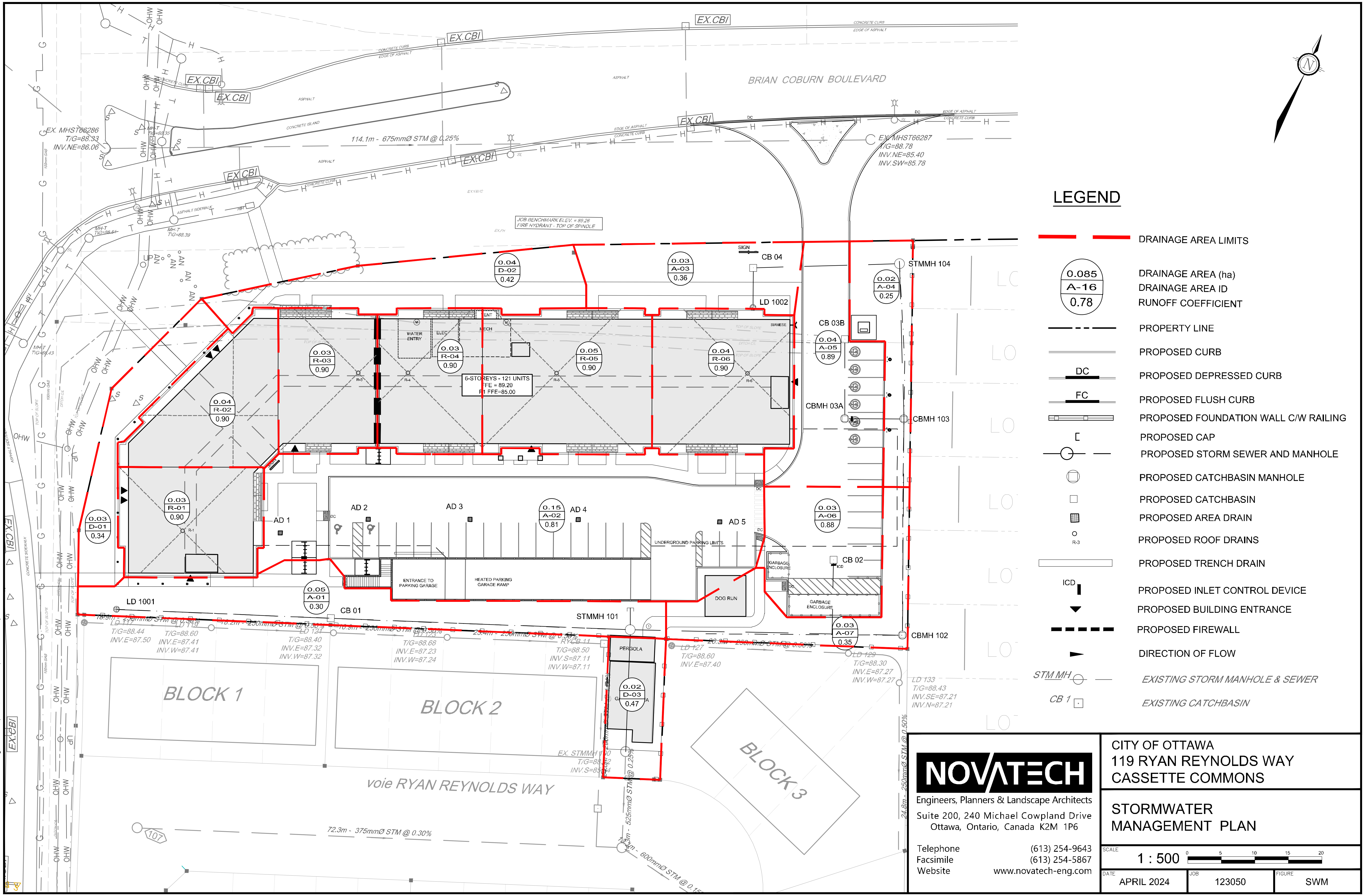
DSEL
120 Iber Road, Unit 103
Stittsville, ON K2S 1E9
Tel. (613) 836-0856
Fax. (613) 836-7183
www.DSEL.ca

DRAWN BY: A.K./V.W.	CHECKED BY: W.L.	SHEET NO.
DESIGNED BY: W.L.	CHECKED BY: C.M.	18
SCALE:	DATE: DECEMBER 2021	

CITY PLAN No. 18616

CITY FILE No. D07-16-21-0001

Appendix D
Storm Servicing


BRIAN COBURN BOULEVARD
voie RYAN REYNOLDS WAY
BLOCK 1
BLOCK 2
BLOCK 3
6-STOREYS - 121 UNITS
FFE = 89.20
P1 FFE=85.00
EX. MHST66286
T/G=88.33
INV.NE=86.06
EX. MHST66287
T/G=88.78
INV.NE=85.40
INV.SW=85.78
114.1m - 675mmØ STM @ 0.25%
72.3m - 375mmØ STM @ 0.30%
JOB BENCHMARK ELEV. = 89.28
FIRE HYDRANT - TOP OF SPINDLE
CB 04
LD 1002
CB 03B
CBMH 03A
CBMH 103
STMMH 104
CB 02
CBMH 102
STMMH 101
CB 01
LD 1001
AD 1
AD 2
AD 3
AD 4
AD 5
WATER ENTRY
ELEC
MECH
ENTRANCE TO PARKING GARAGE
HEATED PARKING GARAGE RAMP
UNDERGROUND PARKING LIMITS
DOG RUN
GARBAGE ENCLOSURE
PERGOLA
0.04 D-02 0.42
0.03 A-03 0.36
0.02 A-04 0.25
0.04 A-05 0.89
0.03 R-03 0.90
0.03 R-04 0.90
0.05 R-05 0.90
0.04 R-06 0.90
0.04 R-02 0.90
0.03 R-01 0.90
0.03 D-01 0.34
0.15 A-02 0.81
0.03 A-06 0.88
0.05 A-01 0.30
0.03 A-07 0.35
0.02 D-03 0.47
LEGEND
DRAINAGE AREA LIMITS
0.085 A-16 0.78
DRAINAGE AREA (ha)
DRAINAGE AREA ID
RUNOFF COEFFICIENT
PROPERTY LINE
PROPOSED CURB
DC PROPOSED DEPRESSED CURB
FC PROPOSED FLUSH CURB
PROPOSED FOUNDATION WALL C/W RAILING
PROPOSED CAP
PROPOSED STORM SEWER AND MANHOLE
PROPOSED CATCHBASIN MANHOLE
PROPOSED CATCHBASIN
PROPOSED AREA DRAIN
PROPOSED ROOF DRAINS
PROPOSED TRENCH DRAIN
ICD PROPOSED INLET CONTROL DEVICE
PROPOSED BUILDING ENTRANCE
PROPOSED FIREWALL
DIRECTION OF FLOW
STM MH EXISTING STORM MANHOLE & SEWER
CB 1 EXISTING CATCHBASIN
NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com
CITY OF OTTAWA
119 RYAN REYNOLDS WAY
CASSETTE COMMONS
STORMWATER
MANAGEMENT PLAN
SCALE 1 : 500
DATE APRIL 2024
JOB 123050
FIGURE SWM
SHT11X17.DWG - 279mmX432mm
M:\2023\123050\CAD\Civil\123050-SWM.dwg, SWM, Apr 16, 2024 - 6:11pm, amestwarp

STORM SEWER DESIGN SHEET

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #:	123050	Legend:	PROJECT SPECIFIC INFO
Project Name:	Cassette Commons		USER DESIGN INPUT
Date Prepared:	6/7/2023		CUMILATIVE CELL
Date Revised:	4/23/2024		CALCULATED DESIGN CELL OUTPUT
Input By:	Anthony Mestwarp, P.Eng		USER AS-BUILT INPUT
Reviewed By:	Greg MacDonald, P.Eng		
Drawing Reference:	123050-SWM		

LOCATION			DEMAND												CAPACITY								
			AREA							FLOW					PROPOSED SEWER PIPE SIZING / DESIGN								
From MH	To MH	Area ID	Hardscape 0.90	Landscaping 0.20	Total Area (ha)	Weighted Runoff Coefficient	Indivi 2.78 AR	Accum 2.78 AR	Time of Concentration (min.)	Rain Intensity (mm/hr) 2yr	5yr	100yr	Peak Flow (L/s)	TOTAL UNRESTRICTED PEAK FLOW (QDesign) (L/s)	PIPE PROPERTIES LENGTH (m)	SIZE / MATERIAL (mm / type)	ID ACTUAL (m)	ROUGHNESS	DESIGN GRADE (%)	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	TIME OF FLOW (min.)	QPEAK DESIGN / QFULL (%)
CASSETTE COMMONS																							
104	103	A-03	0.007	0.025	0.032	0.35	0.03	0.03	10.00	76.81			2.38	2.4	23.1	250 PVC	0.254	0.013	0.50	43.9	0.87	0.44	5.4%
			0.000				0.00	0.00	10.00				0.00										
			0.000				0.00	0.00	10.00				0.00										
103	102	A-04	0.002	0.021	0.023	0.25	0.02																
			0.000				0.00																
			0.000				0.00																
		A-05	0.042	0.001	0.043	0.89	0.11	0.15	10.44	75.14			11.47	11.5	32.2	250 PVC	0.254	0.013	0.50	43.9	0.87	0.62	26.2%
			0.000				0.00	0.00	10.44				0.00										
			0.000				0.00	0.00	10.44				0.00										
102	101	A-06	0.033	0.001	0.034	0.88	0.08																
			0.000				0.00																
			0.000				0.00																
		A-07	0.006	0.023	0.029	0.35	0.03	0.26	11.06	72.95			19.22	19.2	34.0	300 PVC	0.3048	0.013	0.50	71.3	0.98	0.58	26.9%
			0.000				0.00	0.00	11.06				0.00										
			0.000				0.00	0.00	11.06				0.00										
BLDG	101	R-01-06	0.235	0.000	0.235	0.90	0.59																
			0.000				0.00																
			0.000				0.00																
		A-02	0.134	0.019	0.153	0.81	0.35	0.93	10.00	76.81			71.78	71.8	1.9	250 PVC	0.254	0.013	2.00	87.7	1.73	0.02	81.8%
			0.000				0.00	0.00	10.00				0.00										
			0.000				0.00	0.00	10.00				0.00										
101	EX	A-01	0.007	0.043	0.051	0.30	0.04	1.24	11.64	71.02			88.11	88.1	15.3	525 CONC	0.5334	0.013	0.25	224.3	1.00	0.25	39.3%
			0.000				0.00	0.00	11.64				0.00										
			0.000				0.00	0.00	11.64				0.00										

DEMAND EQUATION
Q = 2.78 AIR

Where : Q = Peak flow in litres per second (L/s)
A = Area in hectares (ha)
R = Weighted runoff coefficient (increased by 25% for 100-year)
I = Rainfall intensity in millimeters per hour (mm/hr)
Rainfall Intensity (I) is based on City of Ottawa IDF data presented in the City of Ottawa Sewer Design Guidelines (Oct. 2012)

CAPACITY EQUATION
Q full= (1/n) A R^(2/3)So^(1/2

Where : Q full = Capacity (L/s)
n = Manning coefficient of roughness (0.013)
A = Flow area (m^2)
R = Wetter perimeter (m)
So = Pipe Slope/gradient

TABLE 1A: Existing Conditions

Drainage Area	Area (HA)	"C"
Block 1	0.68	0.20
Total	0.68	0.20

Site Constraints	220	L/s/ha

* Stormwater Management Report for Cassette Subdivision', 2275 Mer-Bleue Road, City of Ottawa, May 2022, Updated July 2022, JFSA Ref. No.: 231-22, Prepard by JFSA

TABLE 1B: Allowable Flows

Outlet Options	Area (ha)	Q_{ALLOW} (L/s)
Ryan Reynolds Way	0.680	**149.6**

TABLE 2A: Post-Development Runoff Coefficient "C" - D-01

Area	Surface	Ha	"C"	C_{avg}	*C_{100}
Total	Hard	0.005	0.90	0.34	0.40
0.025	Soft	0.020	0.20		

Runoff Coefficient Equation
$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$
* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

TABLE 2B: Post-Development D-01 Flows

Outlet Options	Area (ha)	C_{avg}	Tc (min)	$Q_{2\ Year}$ (L/s)	$Q_{5\ Year}$ (L/s)	$Q_{100\ Year}$ (L/s)
Mer Bleue Road	0.025	0.34	10	**1.8**	**2.4**	**4.9**

Time of Concentration	Tc=	10	min
Intensity (2 Year Event)	I_2=	76.81	mm/hr
Intensity (5 Year Event)	I_5=	104.19	mm/hr
Intensity (100 Year Event)	I_{100}=	178.56	mm/hr

100 year Intensity = 1735.688 / (Time in min + 6.014) $^{0.820}$
5 year Intensity = 998.071 / (Time in min + 6.053) $^{0.814}$
2 year Intensity = 732.951 / (Time in min + 6.199) $^{0.810}$

Equations:
Flow Equation
$Q = 2.78 \times C \times I \times A$
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

TABLE 3A: Post-Development Runoff Coefficient "C" - D-02

Area	Surface	Ha	"C"	C_{avg}	$*C_{100}$
Total	Hard	0.012	0.90	0.42	0.48
0.038	Soft	0.026	0.20		

Runoff Coefficient Equation
$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$
* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

TABLE 3B: Post-Development D-02 Flows

Outlet Options	Area (ha)	C_{avg}	Tc (min)	$Q_{2\ Year}$ (L/s)	$Q_{5\ Year}$ (L/s)	$Q_{100\ Year}$ (L/s)
Brian Coburn Boulevard	0.038	0.42	10	**3.4**	**4.5**	**9.0**

Time of Concentration	Tc=	10	min
Intensity (2 Year Event)	I_2=	76.81	mm/hr
Intensity (5 Year Event)	I_5=	104.19	mm/hr
Intensity (100 Year Event)	I_{100}=	178.56	mm/hr

100 year Intensity = 1735.688 / (Time in min + 6.014) $^{0.820}$
5 year Intensity = 998.071 / (Time in min + 6.053) $^{0.814}$
2 year Intensity = 732.951 / (Time in min + 6.199) $^{0.810}$

Equations:
Flow Equation
$Q = 2.78 \times C \times I \times A$
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

TABLE 4A: Post-Development Runoff Coefficient "C" - D-03

Area	Surface	Ha	"C"	C_{avg}	$*C_{100}$
Total	Hard	0.007	0.90	0.47	0.54
0.018	Soft	0.011	0.20		

Runoff Coefficient Equation
$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$
* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

TABLE 4B: Post-Development D-03 Flows

Outlet Options	Area (ha)	C_{avg}	Tc (min)	$Q_{2\ Year}$ (L/s)	$Q_{5\ Year}$ (L/s)	$Q_{100\ Year}$ (L/s)
Ryan Reynolds Way	0.018	0.47	10	**1.8**	**2.4**	**4.8**

Time of Concentration	Tc=	10	min
Intensity (2 Year Event)	I_2=	76.81	mm/hr
Intensity (5 Year Event)	I_5=	104.19	mm/hr
Intensity (100 Year Event)	I_{100}=	178.56	mm/hr

100 year Intensity = $1735.688 / (\text{Time in min} + 6.014)^{0.820}$
5 year Intensity = $998.071 / (\text{Time in min} + 6.053)^{0.814}$
2 year Intensity = $732.951 / (\text{Time in min} + 6.199)^{0.810}$

Equations:
Flow Equation
$Q = 2.78 \times C \times I \times A$
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

TABLE 5A: Post-Development Runoff Coefficient "C" -A-01

Area	Surface	Ha	"C"	C_{avg}	*C_{100}
Total	Hard	0.007	0.90	0.30	0.36
0.051	Soft	0.043	0.20		

Runoff Coefficient Equation
$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$
* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

TABLE 5B: Post-Development A-01 Flows

Outlet Options	Area (ha)	C_{avg}	Tc (min)	$Q_{2\ Year}$ (L/s)	$Q_{5\ Year}$ (L/s)	$Q_{100\ Year}$ (L/s)
Ryan Reynolds Way	0.051	0.30	10	**3.3**	**4.4**	**9.1**

Time of Concentration	Tc=	10	min
Intensity (2 Year Event)	I_2=	76.81	mm/hr
Intensity (5 Year Event)	I_5=	104.19	mm/hr
Intensity (100 Year Event)	I_{100}=	178.56	mm/hr

100 year Intensity = 1735.688 / (Time in min + 6.014) $^{0.820}$
5 year Intensity = 998.071 / (Time in min + 6.053) $^{0.814}$
2 year Intensity = 732.951 / (Time in min + 6.199) $^{0.810}$

Equations:
Flow Equation
$Q = 2.78 \times C \times I \times A$
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

TABLE 6A: Post-Development Runoff Coefficient "C" - A-02

Area	Surface	Ha	"C"	C_{avg}	$*C_{100}$
Total	Hard	0.134	0.90	0.81	0.91
0.153	Soft	0.019	0.20		

Runoff Coefficient Equation
$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$
* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

TABLE 6B: Post-Development A-02 Flows

Outlet Options	Area (ha)	C_{avg}	Tc (min)	$Q_{2\ Year}$ (L/s)	$Q_{5\ Year}$ (L/s)	$Q_{100\ Year}$ (L/s)
Ryan Reynolds Way	0.153	0.81	10	**26.6**	**36.1**	**69.0**

Time of Concentration	Tc=	10	min
Intensity (2 Year Event)	I_2=	76.81	mm/hr
Intensity (5 Year Event)	I_5=	104.19	mm/hr
Intensity (100 Year Event)	I_{100}=	178.56	mm/hr

100 year Intensity = $1735.688 / (\text{Time in min} + 6.014)^{0.820}$
5 year Intensity = $998.071 / (\text{Time in min} + 6.053)^{0.814}$
2 year Intensity = $732.951 / (\text{Time in min} + 6.199)^{0.810}$

Equations:
Flow Equation
$Q = 2.78 \times C \times I \times A$
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

TABLE 7A: Post-Development Runoff Coefficient "C" - A-03

Area	Surface	Ha	"C"	C_{avg}	*C_{100}
Total	Hard	0.007	0.90	0.36	0.42
0.032	Soft	0.025	0.20		

Runoff Coefficient Equation
$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$
* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

TABLE 7B: Post-Development A-03 Flows

Outlet Options	**Area (ha)**	**C_{avg}**	**Tc (min)**	**$Q_{2\ Year}$ (L/s)**	**$Q_{5\ Year}$ (L/s)**	**$Q_{100\ Year}$ (L/s)**
Ryan Reynolds Way	0.032	0.36	10	**2.5**	**3.3**	**6.7**

Time of Concentration	Tc=	10	min
Intensity (2 Year Event)	I_2=	76.81	mm/hr
Intensity (5 Year Event)	I_5=	104.19	mm/hr
Intensity (100 Year Event)	I_{100}=	178.56	mm/hr

100 year Intensity = $1735.688 / (\text{Time in min} + 6.014)^{0.820}$
5 year Intensity = $998.071 / (\text{Time in min} + 6.053)^{0.814}$
2 year Intensity = $732.951 / (\text{Time in min} + 6.199)^{0.810}$

Equations:
Flow Equation
$Q = 2.78 \times C \times I \times A$
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

TABLE 8A: Post-Development Runoff Coefficient "C" - A-04

Area	Surface	Ha	"C"	C_{avg}	*C_{100}
Total	Hard	0.002	0.90	0.25	0.30
0.023	Soft	0.021	0.20		

Runoff Coefficient Equation
$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$
* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

TABLE 8B: Post-Development A-04 Flows

Outlet Options	Area (ha)	C_{avg}	Tc (min)	$Q_{2\ Year}$ (L/s)	$Q_{5\ Year}$ (L/s)	$Q_{100\ Year}$ (L/s)
Ryan Reynolds Way	0.023	0.25	10	**1.2**	**1.6**	**3.4**

Time of Concentration	Tc=	10	min
Intensity (2 Year Event)	I_2=	76.81	mm/hr
Intensity (5 Year Event)	I_5=	104.19	mm/hr
Intensity (100 Year Event)	I_{100}=	178.56	mm/hr

100 year Intensity = 1735.688 / (Time in min + 6.014) $^{0.820}$
5 year Intensity = 998.071 / (Time in min + 6.053) $^{0.814}$
2 year Intensity = 732.951 / (Time in min + 6.199) $^{0.810}$

Equations:
Flow Equation
$Q = 2.78 \times C \times I \times A$
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

TABLE 9A: Post-Development Runoff Coefficient "C" - A-05

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	*C_{avg}
Total	Hard	0.042	0.90	0.89	1.00	0.99
0.043	Roof	0.000	0.90		1.00	
	Soft	0.001	0.20		0.25	

TABLE 9B: 2 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-05

0.043 =Area (ha)
0.89 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
2 YEAR	-5	632.75	67.17	5.7	61.47	-18.44
	0	167.22	17.75	5.7	12.05	0.00
	5	**103.57**	**10.99**	**5.7**	**5.29**	**1.59**
	10	76.81	8.15	5.7	2.45	1.47
	15	61.77	6.56	5.7	0.86	0.77

TABLE 9C: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-05

0.043 =Area (ha)
0.89 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	-5	956.98	101.59	7.500	94.09	-28.23
	0	230.48	24.47	7.500	16.97	0.00
	5	**141.18**	**14.99**	**7.500**	**7.49**	**2.25**
	10	104.19	11.06	7.500	3.56	2.14
	15	83.56	8.87	7.500	1.37	1.23

TABLE 9D: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-05

0.043 =Area (ha)
0.99 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	0	398.62	47.04	11.05	35.99	0.00
	5	242.70	28.64	11.05	17.59	5.28
	10	**178.56**	**21.07**	**11.05**	**10.02**	**6.01**
	15	142.89	16.86	11.05	5.81	5.23
	20	119.95	14.16	11.05	3.11	3.73

TABLE 9E: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-05

0.043 =Area (ha)
0.99 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR + 20	0	478.34	56.45	11.2	45.27	0.00
	5	291.24	34.37	11.2	23.19	6.96
	10	**214.27**	**25.29**	**11.2**	**14.11**	**8.46**
	15	171.47	20.24	11.2	9.06	8.15
	20	143.94	16.99	11.2	5.81	6.97

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

TABLE 9F: Catchbasin

Structures	Size Dia.(mm)	Area (m^2)	T/G	Inv OUT
CBMH03A	1200	1.13	88.65	87.38
CB03B	610X610	0.37	88.70	87.50

TABLE 9F: pipe

Structures	Dia.(mm)	Area (m^2)	Upstream inv	Down stream invert	Length (m)
CB03B-CBMH03A	250	0.05	87.50	87.44	11.80

TABLE 9G: Storage Provided -A-05

Area A-05: Above Ground Ponding

Elevation (m)	CBMH03A Ponding Depth (m)	CBMH03A Area* (m^2)	CB03B Ponding Depth (m)	CB03B Area* (m^2)	Storage Volume (m^3)
88.65	0.000	1.000	0.000	-	0.00
88.7	0.050	22.498	0.000	1.000	0.59
88.75	0.100	69.251	0.050	15.273	3.29
88.8	0.150	123.844	0.100	46.011	9.65
88.83	0.180	155.758	0.130	59.216	15.42

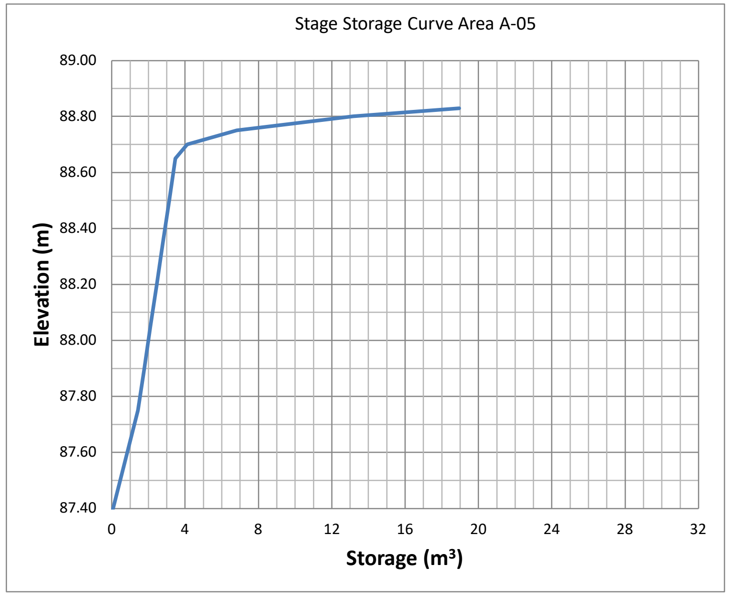


TABLE 9H: Storage Provided - A-05

Storage Table

Elevation (m)	System Depth (m)	CBMH03A Volume (m^3)	CB03B Volume (m^3)	Pipe Volume (m^3)	Underground Volume (m^3)*	Ponding Volume (m^3)	**Total Volume (m^3)**
87.380	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
87.750	0.37	0.42	0.42	0.60	1.43	0.00	**1.43**
87.900	0.52	0.59	0.59	-	1.77	0.00	**1.77**
88.050	0.67	0.76	0.76	-	2.11	0.00	**2.11**
88.200	0.82	0.93	0.93	-	2.45	0.00	**2.45**
88.350	0.97	1.10	1.10	-	2.79	0.00	**2.79**
88.500	1.12	1.27	1.27	-	3.13	0.00	**3.13**
88.650	1.27	1.44	1.44	-	3.47	0.00	**3.47**
88.700	1.32	-	1.49	-	3.53	0.59	**4.11**
88.750	1.37	-	-	-	3.53	3.29	**6.82**
88.800	1.42	-	-	-	3.53	9.65	**13.17**
88.830	1.45	-	-	-	3.53	15.42	**18.95**

TABLE 9I: Orifice Sizing information - A-05

Control Device
Tempest LMF 105

Design Event	Flow (L/S)	Head (m)	Elev (m)	Outlet dia. (mm)	Volume (m³)	Area (m²)	Equivelent Dia. (mm)
1:2 Year	5.7	0.34	87.82	200	1.59	0.0036	67.0
1:5 Year	7.5	0.60	88.08	200.00	2.25	0.0035	67.0
1:100 Year	11.1	1.25	88.73	200.00	6.01	0.0036	68.0
1:100 + 20 Year	11.2	1.28	88.76	200.00	8.46	0.0036	68.0

The design Head is calculated based on the centre of the orifice at the bottom of the pipe

Orifice Control Sizing
$Q = 0.62 \times A \times (2gh) \times 0.5$
Q is the release rate in m^3/s

A is the orifice area in m^2

g is the acceleration due to gravity, 9.81 m/s^2
h is the head of water above the orifice centre in m
d is the diameter of the orifice in m

TABLE 10A: Post-Development Runoff Coefficient "C" - A-06

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	*C_{avg}
Total	Hard	0.033	0.90	0.88	1.00	0.98
0.034	Roof	0.000	0.90		1.00	
	Soft	0.001	0.20		0.25	

TABLE 10B: 2 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-06

0.034 =Area (ha)
0.88 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
2 YEAR	-5	632.75	52.24	8.6	43.69	-13.11
	0	167.22	13.81	8.6	5.26	0.00
	5	**103.57**	**8.55**	**8.6**	**0.00**	**0.00**
	10	76.81	6.34	8.6	-2.21	-1.33
	15	61.77	5.10	8.6	-3.45	-3.11

TABLE 10C: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-06

0.034 =Area (ha)
0.88 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)*	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	-5	956.98	79.01	11.65	67.36	-20.21
	0	230.48	19.03	11.65	7.38	0.00
	5	**141.18**	**11.66**	**11.65**	**0.01**	**0.00**
	10	104.19	8.60	11.65	-3.05	-1.83
	15	83.56	6.90	11.65	-4.75	-4.28

TABLE 10D: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-06

0.034 =Area (ha)
0.98 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	-5	1716.01	157.56	11.90	145.66	-43.70
	0	398.62	36.60	11.90	24.70	0.00
	5	**242.70**	**22.28**	**11.90**	**10.38**	**3.12**
	10	178.56	16.39	11.90	4.49	2.70
	15	142.89	13.12	11.90	1.22	1.10

TABLE 10E: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-06

0.034 =Area (ha)
0.98 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)*	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR + 20	0	478.34	43.92	12.0	31.92	0.00
	5	291.24	26.74	12.0	14.74	4.42
	10	**214.27**	**19.67**	**12.0**	**7.67**	**4.60**
	15	171.47	15.74	12.0	3.74	3.37
	20	143.94	13.22	12.0	1.22	1.46

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

TABLE 10F: Catchbasin

Structures	Size Dia.(mm)	Area (m^2)	T/G	Inv OUT
CB-02	610X610	0.37	88.60	87.10

TABLE 10G: Storage Provided - A-06

Area A-06: Above Ground Ponding			
Elevation (m)	Ponding Depth (m)	Area* (m^2)	Storage Volume (m^3)
88.6	0.000	1.000	0.00
88.65	0.050	24.099	0.63
88.7	0.100	76.371	3.14
88.75	0.150	139.351	8.53
88.8	0.200	241.621	18.06

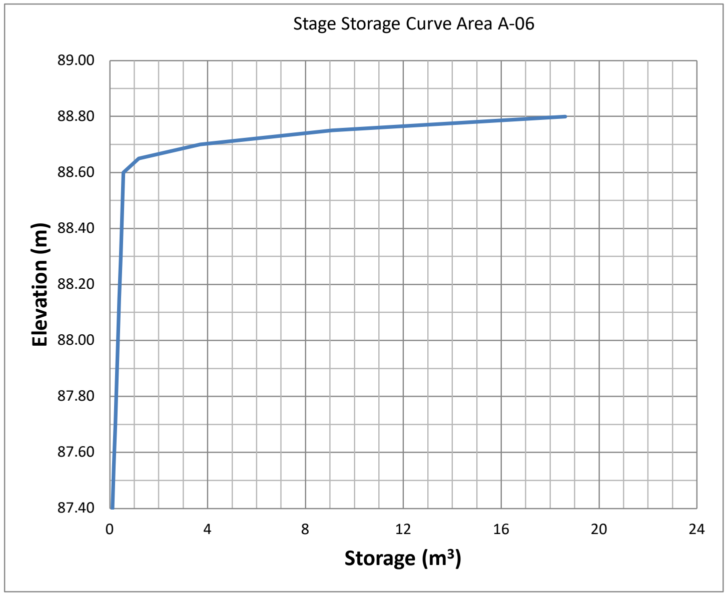


TABLE 10H: Storage Provided -A-06

Storage Table					
Elevation (m)	System Depth (m)	CB-02 Volume (m^3)	Underground Volume (m^3)*	Ponding Volume (m^3)	**Total Volume (m^3)**
87.1	0.00	0.00	0.00	0.00	**0.00**
87.250	0.15	0.06	0.06	0.00	**0.06**
87.400	0.30	0.11	0.11	0.00	**0.11**
87.550	0.45	0.17	0.17	0.00	**0.17**
87.700	0.60	0.22	0.22	0.00	**0.22**
87.850	0.75	0.28	0.28	0.00	**0.28**
88.000	0.90	0.33	0.33	0.00	**0.33**
88.150	1.05	0.39	0.39	0.00	**0.39**
88.300	1.20	0.45	0.45	0.00	**0.45**
88.450	1.35	0.50	0.50	0.00	**0.50**
88.600	1.50	0.56	0.56	0.00	**0.56**
88.650	1.55	0.56	0.56	0.63	**1.19**
88.700	1.60	0.56	0.56	3.14	**3.70**
88.750	1.65	0.56	0.56	8.53	**9.09**
88.800	1.70	0.56	0.56	18.06	**18.61**

TABLE 10I: Orifice Sizing information - A-06

Control Device
Tempest LMF 105

Design Event	**Flow (L/S)**	**Head (m)**	**Elev (m)**	**Outlet dia. (mm)**	**Volume (m³)**	**Area (m²)**	**EquivelentDia. (mm)**
1:2 Year	8.55	0.75	87.95	200	0.00	0.0036	68.0
1:5 Year	11.65	1.40	88.60	200.00	0.00	0.0036	68.0
1:100 Year	11.90	1.48	88.68	200.00	3.12	0.0036	67.0
1:100 + 20 Year	12.0	1.51	88.71	200.00	4.60	0.0036	67.0

The design Head is calculated based on the centre of the orifice at the bottom of the pipe

Orifice Control Sizing
Q = 0.62 x A x (2gh) x 0.5
Q is the release rate in m^3/s

A is the orifice area in m^2

g is the acceleration due to gravity, 9.81 m/s^2
h is the head of water above the orifice centre in m
d is the diameter of the orifice in m

TABLE 11A: Post-Development Runoff Coefficient "C" - A-07

Area	Surface	Ha	"C"	C_{avg}	*C_{100}
Total	Hard	0.006	0.90	0.35	0.41
0.029	Soft	0.023	0.20		

Runoff Coefficient Equation
$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$
* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

TABLE 11B: Post-Development A-07 Flows

Outlet Options	Area (ha)	C_{avg}	Tc (min)	$Q_{2\ Year}$ (L/s)	$Q_{5\ Year}$ (L/s)	$Q_{100\ Year}$ (L/s)
Ryan Reynolds Way	0.029	0.35	10	**2.2**	**2.9**	**5.9**

Time of Concentration	Tc=	10	min
Intensity (2 Year Event)	I_2=	76.81	mm/hr
Intensity (5 Year Event)	I_5=	104.19	mm/hr
Intensity (100 Year Event)	I_{100}=	178.56	mm/hr

100 year Intensity = 1735.688 / (Time in min + 6.014) $^{0.820}$
5 year Intensity = 998.071 / (Time in min + 6.053) $^{0.814}$
2 year Intensity = 732.951 / (Time in min + 6.199) $^{0.810}$

Equations:
Flow Equation
$Q = 2.78 \times C \times I \times A$
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

TABLE 12A: Post-Development Runoff Coefficient "C" - R-01

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	*C_{avg}
Total	Hard	0.000	0.90	0.90	1.00	1.00
0.035	Roof	0.035	0.90		1.00	
	Soft	0.000	0.20		0.25	

TABLE 12B: 2 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-01

0.035 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
2 YEAR	25	45.17	3.94	1.020	2.92	4.38
	30	40.04	3.49	1.020	2.47	4.45
	35	**36.06**	**3.15**	**1.020**	**2.13**	**4.46**
	40	32.86	2.87	1.020	1.85	4.43
	45	30.24	2.64	1.020	1.62	4.37

TABLE 12C: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-01

0.0348718 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	30	53.93	4.71	1.140	3.57	6.42
	35	48.52	4.23	1.140	3.09	6.50
	40	**44.18**	**3.86**	**1.140**	**2.72**	**6.52**
	45	40.63	3.54	1.140	2.40	6.49
	50	37.65	3.29	1.140	2.15	6.44

TABLE 12D: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-01

0.0348718 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	45	69.05	6.69	1.430	5.26	14.21
	50	63.95	6.20	1.43	4.77	14.31
	55	**59.62**	**5.78**	**1.43**	**4.35**	**14.36**
	60	55.89	5.42	1.43	3.99	14.36
	65	52.65	5.10	1.43	3.67	14.33

Equations:

Flow Equation

Q = 2.78 x C x I x A

Where:

C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

TABLE 12E: Storage Provided - R-01

Area R-01: Storage Table		
Head (m)	Area* (m^2)	Storage Volume (m^3)
0.000	0.06	0.00
0.025	10.62	0.13
0.050	39.28	0.76
0.075	86.04	2.32
0.100	150.92	5.29
0.125	233.90	10.10
0.150	334.95	17.21

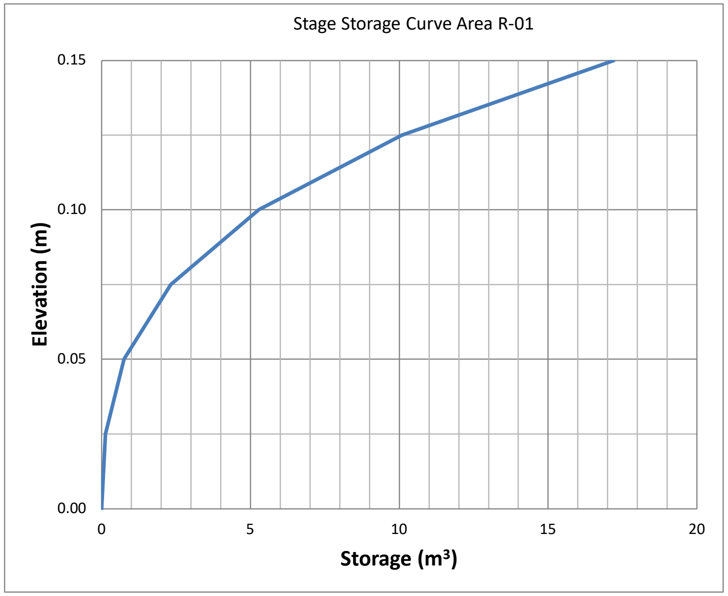


Table 12F: Roof Drain Flows - R-01

Roof Drains		
Roof Area	348.718	m²
Qty	1	
Type	Accutrol RD-100-A-ADJ	
Setting	3/4 Open	
Design Head	0.05-0.15	m
Design Flow 1" of head	0.32	L/s (ea)
Design Flow 2" of head	0.63	L/s (ea)
Design Flow 3" of head	0.87	L/s (ea)
Design Flow 4" of head	1.10	L/s (ea)
Design Flow 5" of head	1.34	L/s (ea)
Design Flow 6" of head	1.58	L/s (ea)

Table 12G: Total Roof Storage - R-01

Design Event	Roof Drain ID	Flow (L/S)	Head m	Required Volume
2 Year	R-01	1.02	0.093	4.46
5 Year		1.14	0.106	6.52
100 Year		1.43	0.140	14.36

TABLE 13A: Post-Development Runoff Coefficient "C" - R-02

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	*C_{avg}
Total	Hard	0.000	0.90	0.90	1.00	1.00
0.037	Roof	0.037	0.90		1.00	
	Soft	0.000	0.20		0.25	

TABLE 13B: 2 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-02

0.037 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
2 YEAR	25	45.17	4.15	1.030	3.12	4.68
	30	40.04	3.68	1.030	2.65	4.77
	35	**36.06**	**3.31**	**1.030**	**2.28**	**4.79**
	40	32.86	3.02	1.030	1.99	4.77
	45	30.24	2.78	1.030	1.75	4.72

TABLE 13C: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-02

0.0367193 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	30	53.93	4.95	1.145	3.81	6.86
	35	48.52	4.46	1.145	3.31	6.96
	40	**44.18**	**4.06**	**1.145**	**2.91**	**6.99**
	45	40.63	3.73	1.145	2.59	6.99
	50	37.65	3.46	1.145	2.31	6.94

TABLE 13D: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-02

0.0367193 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	50	63.95	6.53	1.460	5.07	15.21
	55	59.62	6.09	1.46	4.63	15.27
	60	**55.89**	**5.71**	**1.46**	**4.25**	**15.28**
	65	52.65	5.37	1.46	3.91	15.27
	70	49.79	5.08	1.46	3.62	15.21

Equations:
Flow Equation
$Q = 2.78 \times C \times I \times A$
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation
$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$
$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

TABLE 13E: Storage Provided - R-02

Area R-01: Storage Table		
Head (m)	Area* (m^2)	Storage Volume (m^3)
0.000	0.06	0.00
0.025	11.20	0.14
0.050	41.73	0.80
0.075	91.65	2.47
0.100	160.96	5.63
0.125	249.67	10.76
0.150	355.63	18.33

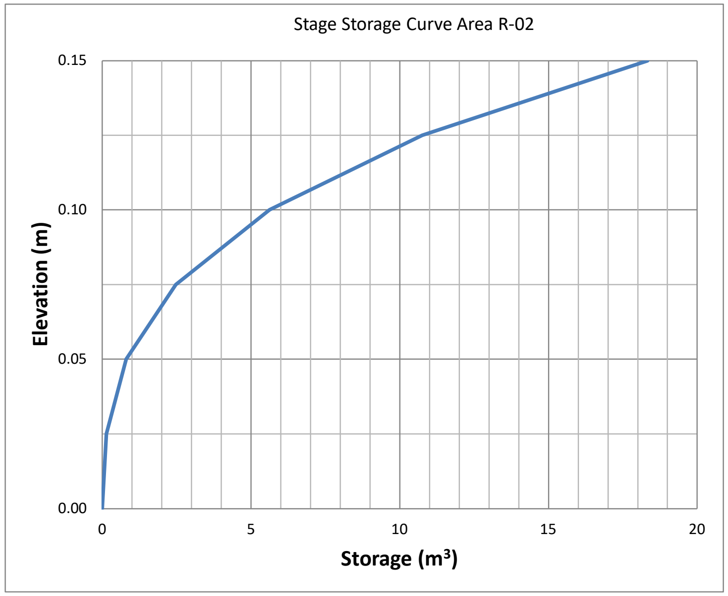


Table 13F: Roof Drain Flows - R-02

Roof Drains		
Roof Area	367.193	m²
Qty	1	
Type	Accutrol RD-100-A-ADJ	
Setting	3/4 Open	
Design Head	0.05-0.15	m
Design Flow 1" of head	0.32	L/s (ea)
Design Flow 2" of head	0.63	L/s (ea)
Design Flow 3" of head	0.87	L/s (ea)
Design Flow 4" of head	1.10	L/s (ea)
Design Flow 5" of head	1.34	L/s (ea)
Design Flow 6" of head	1.58	L/s (ea)

Table 13G: Total Roof Storage - R-02

Design Event	Roof Drain ID	Flow (L/S)	Head m	Required Volume
2 Year	R-02	1.03	0.094	4.79
5 Year		1.15	0.107	6.99
100 Year		1.46	0.140	15.28

TABLE 14A: Post-Development Runoff Coefficient "C" - R-03

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	*C_{avg}
Total	Hard	0.000	0.90	0.90	1.00	1.00
0.031	Roof	0.031	0.90		1.00	
	Soft	0.000	0.20		0.25	

TABLE 14B: 2 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-03

0.031 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
2 YEAR	20	52.03	4.10	0.980	3.12	3.74
	25	45.17	3.56	0.980	2.58	3.86
	30	**40.04**	**3.15**	**0.980**	**2.17**	**3.91**
	35	36.06	2.84	0.980	1.86	3.90
	40	32.86	2.59	0.980	1.61	3.86

TABLE 14C: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-03

0.031459 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	25	60.90	4.79	1.110	3.68	5.52
	30	53.93	4.24	1.110	3.13	5.64
	35	**48.52**	**3.82**	**1.110**	**2.71**	**5.69**
	40	44.18	3.48	1.110	2.37	5.68
	45	40.63	3.20	1.110	2.09	5.64

TABLE 14D: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-03

0.031459 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	40	75.15	6.57	1.420	5.15	12.36
	45	69.05	6.04	1.42	4.62	12.47
	50	**63.95**	**5.59**	**1.42**	**4.17**	**12.52**
	55	59.62	5.21	1.42	3.79	12.52
	60	55.89	4.89	1.42	3.47	12.49

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

TABLE 14E: Storage Provided - R-03

Area R-01: Storage Table		
Head (m)	Area* (m^2)	Storage Volume (m^3)
0.000	0.06	0.00
0.025	11.13	0.14
0.050	41.04	0.79
0.075	86.63	2.39
0.100	145.21	5.29
0.125	216.79	9.81
0.150	303.48	16.31

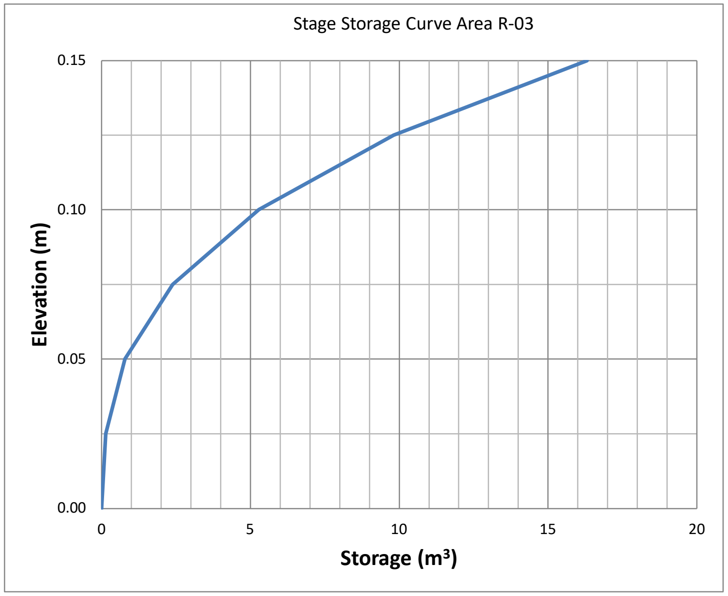


Table 14F: Roof Drain Flows - R-03

Roof Drains		
Roof Area	314.59	m²
Qty	1	
Type	Accutrol RD-100-A-ADJ	
Setting	3/4 Open	
Design Head	0.05-0.15	m
Design Flow 1" of head	0.32	L/s (ea)
Design Flow 2" of head	0.63	L/s (ea)
Design Flow 3" of head	0.87	L/s (ea)
Design Flow 4" of head	1.10	L/s (ea)
Design Flow 5" of head	1.34	L/s (ea)
Design Flow 6" of head	1.58	L/s (ea)

Table 14G: Total Roof Storage - R-03

Design Event	Roof Drain ID	Flow (L/S)	Head m	Required Volume
2 Year	R-03	0.98	0.088	3.91
5 Year		1.11	0.102	5.69
100 Year		1.42	0.135	12.52

TABLE 15A: Post-Development Runoff Coefficient "C" - R-04

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	*C_{avg}
Total	Hard	0.000	0.90	0.90	1.00	1.00
0.033	Roof	0.033	0.90		1.00	
	Soft	0.000	0.20		0.25	

TABLE 15B: 2 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-04

0.033 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
2 YEAR	25	45.17	3.78	0.990	2.79	4.18
	30	40.04	3.35	0.990	2.36	4.25
	35	**36.06**	**3.02**	**0.990**	**2.03**	**4.26**
	40	32.86	2.75	0.990	1.76	4.22
	45	30.24	2.53	0.990	1.54	4.16

TABLE 15C: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-04

0.0334372 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	30	53.93	4.51	1.117	3.39	6.11
	35	48.52	4.06	1.117	2.94	6.18
	40	**44.18**	**3.70**	**1.117**	**2.58**	**6.19**
	45	40.63	3.40	1.117	2.28	6.16
	50	37.65	3.15	1.117	2.03	6.10

TABLE 15D: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-04

0.0334372 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	45	69.05	6.42	1.430	4.99	13.47
	50	63.95	5.94	1.43	4.51	13.54
	55	**59.62**	**5.54**	**1.43**	**4.11**	**13.57**
	60	55.89	5.20	1.43	3.77	13.56
	65	52.65	4.89	1.43	3.46	13.51

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

TABLE 15E: Storage Provided - R-04

Area R-01: Storage Table		
Head (m)	Area* (m^2)	Storage Volume (m^3)
0.000	0.06	0.00
0.025	11.17	0.14
0.050	41.25	0.80
0.075	90.30	2.44
0.100	156.32	5.52
0.125	232.83	10.39
0.150	321.56	17.32

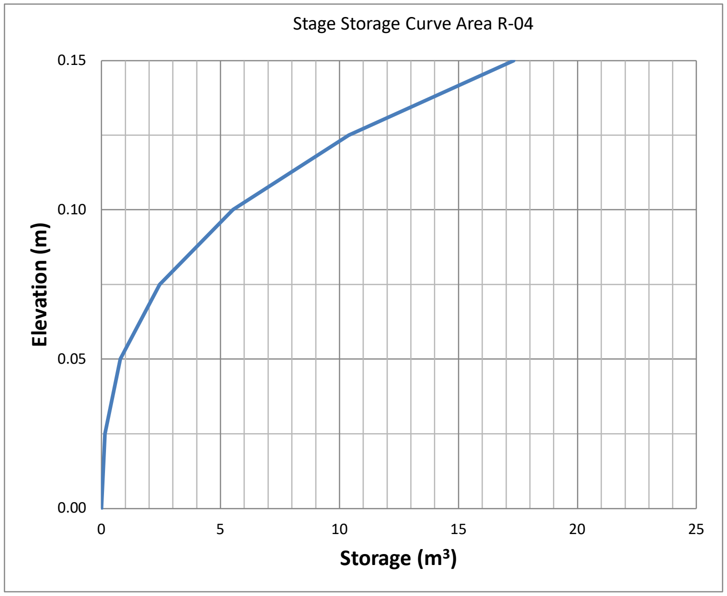


Table 15F: Roof Drain Flows - R-04

Roof Drains		
Roof Area	334.372	m²
Qty	1	
Type	Accutrol RD-100-A-ADJ	
Setting	3/4 Open	
Design Head	0.05-0.15	m
Design Flow 1" of head	0.32	L/s (ea)
Design Flow 2" of head	0.63	L/s (ea)
Design Flow 3" of head	0.87	L/s (ea)
Design Flow 4" of head	1.10	L/s (ea)
Design Flow 5" of head	1.34	L/s (ea)
Design Flow 6" of head	1.58	L/s (ea)

Table 15G: Total Roof Storage - R-04

Design Event	Roof Drain ID	Flow (L/S)	Head m	Required Volume
2 Year	R-04	0.99	0.090	4.26
5 Year		1.12	0.103	6.19
100 Year		1.43	0.137	13.57

TABLE 16A: Post-Development Runoff Coefficient "C" - R-05

Area	Surface	Ha	5 Year Event "C"	5 Year Event C_{avg}	100 Year Event "C" + 25%	100 Year Event $^*C_{avg}$
Total	Hard	0.000	0.90	0.90	1.00	1.00
0.054	Roof	0.054	0.90		1.00	
	Soft	0.000	0.20		0.25	

TABLE 16B: 2 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-05

0.054 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
2 YEAR	40	32.86	4.42	1.090	3.33	7.99
	45	30.24	4.07	1.090	2.98	8.03
	50	**28.04**	**3.77**	**1.090**	**2.68**	**8.04**
	55	26.17	3.52	1.090	2.43	8.01
	60	24.56	3.30	1.090	2.21	7.96

TABLE 16C: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-05

0.0537386 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	50	37.65	5.06	1.201	3.86	11.59
	55	35.12	4.72	1.201	3.52	11.62
	60	**32.94**	**4.43**	**1.201**	**3.23**	**11.62**
	65	31.04	4.17	1.201	2.97	11.59
	70	29.37	3.95	1.201	2.75	11.54

TABLE 16D: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-05

0.0537386 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	70	49.79	7.44	1.520	5.92	24.86
	75	47.26	7.06	1.52	5.54	24.93
	80	**44.99**	**6.72**	**1.52**	**5.20**	**24.97**
	85	42.95	6.42	1.52	4.90	24.97
	90	41.11	6.14	1.52	4.62	24.96

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

TABLE 16E: Storage Provided - R-05

Area R-01: Storage Table		
Head (m)	Area* (m^2)	Storage Volume (m^3)
0.000	0.06	0.00
0.025	15.79	0.20
0.050	59.20	1.14
0.075	130.27	3.50
0.100	229.03	8.00
0.125	355.45	15.30
0.150	523.35	26.29

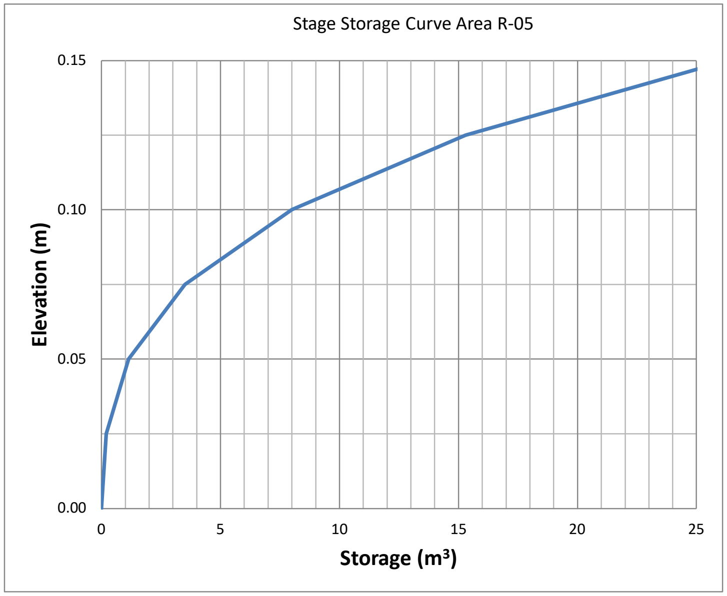


Table 16F: Roof Drain Flows - R-05

Roof Drains		
Roof Area	537.386	m²
Qty	1	
Type	Accutrol RD-100-A-ADJ	
Setting	3/4 Open	
Design Head	0.05-0.15	m
Design Flow 1" of head	0.32	L/s (ea)
Design Flow 2" of head	0.63	L/s (ea)
Design Flow 3" of head	0.87	L/s (ea)
Design Flow 4" of head	1.10	L/s (ea)
Design Flow 5" of head	1.34	L/s (ea)
Design Flow 6" of head	1.58	L/s (ea)

Table 16G: Total Roof Storage - R-05

Design Event	Roof Drain ID	Flow (L/S)	Head m	Required Volume
2 Year	R-04	1.09	0.100	8.04
5 Year		1.20	0.112	11.62
100 Year		1.52	0.147	24.97

TABLE 17A: Post-Development Runoff Coefficient "C" - R-06

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	$^*C_{avg}$
Total	Hard	0.000	0.90	0.90	1.00	1.00
0.045	Roof	0.045	0.90		1.00	
	Soft	0.000	0.20		0.25	

TABLE 17B: 2 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-06

0.045 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
2 YEAR	30	40.04	4.50	1.060	3.44	6.19
	35	36.06	4.05	1.060	2.99	6.28
	40	**32.86**	**3.69**	**1.060**	**2.63**	**6.32**
	45	30.24	3.40	1.060	2.34	6.31
	50	28.04	3.15	1.060	2.09	6.27

TABLE 17C: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-06

0.0449113 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	40	44.18	4.96	1.180	3.78	9.08
	45	40.63	4.57	1.180	3.39	9.14
	50	**37.65**	**4.23**	**1.180**	**3.05**	**9.15**
	55	35.12	3.95	1.180	2.77	9.13
	60	32.94	3.70	1.180	2.52	9.08

TABLE 17D: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-06

0.0449113 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	60	55.89	6.98	1.500	5.48	19.72
	65	52.65	6.57	1.50	5.07	19.79
	70	**49.79**	**6.22**	**1.50**	**4.72**	**19.81**
	75	47.26	5.90	1.50	4.40	19.80
	80	44.99	5.62	1.50	4.12	19.76

Equations:

Flow Equation
$Q = 2.78 \times C \times I \times A$
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation
$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$
$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

TABLE 17E: Storage Provided - R-06

Area R-01: Storage Table		
Head (m)	Area* (m^2)	Storage Volume (m^3)
0.000	0.06	0.00
0.025	13.42	0.17
0.050	50.09	0.96
0.075	110.05	2.96
0.100	193.32	6.76
0.125	299.89	12.92
0.150	433.65	22.09

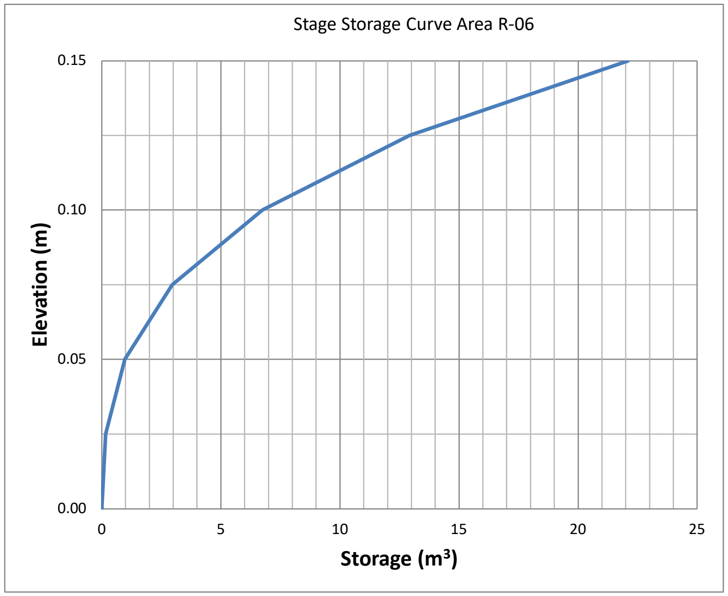


Table 17F: Roof Drain Flows - R-06

Roof Drains		
Roof Area	449.113	m²
Qty	1	
Type	Accutrol RD-100-A-ADJ	
Setting	3/4 Open	
Design Head	0.05-0.15	m
Design Flow 1" of head	0.32	L/s (ea)
Design Flow 2" of head	0.63	L/s (ea)
Design Flow 3" of head	0.87	L/s (ea)
Design Flow 4" of head	1.10	L/s (ea)
Design Flow 5" of head	1.34	L/s (ea)
Design Flow 6" of head	1.58	L/s (ea)

Table 17G: Total Roof Storage - R-06

Design Event	Roof Drain ID	Flow (L/S)	Head m	Required Volume
2 Year	R-04	1.06	0.097	6.32
5 Year		1.18	0.110	9.15
100 Year		1.50	0.144	19.81

NOVATECH
Engineers, Planners & Landscape Architects

Table 18: Post-Development Stormwater Management Summary

Area ID	Area (ha)	1:5 Year Weighted Cw	1:100 Year Weighted Cw	Control Device	Outlet Location	2 Year Storm Event				5 Year Storm Event				100 Year Storm Event			
						Release (L/s)	Head (m)	Req'd Vol (cu.m)	Max. Vol. Provided (cu.m.)	Release (L/s)	Head (m)	Req'd Vol (cu.m)	Max. Vol. Provided (cu.m.)	Release (L/s)	Head (m)	Req'd Vol (cu.m)	Max. Vol. Provided (cu.m.)
D-01	0.025	0.34	0.40	N/A	Mer Bleue Road	1.80	N/A	N/A	N/A	2.40	N/A	N/A	N/A	4.90	N/A	N/A	N/A
D-02	0.038	0.42	0.48	N/A	Brian Coburn Boulevard	3.40	N/A	N/A	N/A	4.50	N/A	N/A	N/A	9.00	N/A	N/A	N/A
D-03	0.018	0.47	0.54	N/A	Ryan Reynolds Way	1.80	N/A	N/A	N/A	2.40	N/A	N/A	N/A	4.80	N/A	N/A	N/A
A-01	0.051	0.30	0.36	N/A	Ryan Reynolds Way	3.30	N/A	N/A	N/A	4.40	N/A	N/A	N/A	9.10	N/A	N/A	N/A
A-02	0.153	0.81	0.91	N/A	Ryan Reynolds Way	26.60	N/A	N/A	N/A	36.10	N/A	N/A	N/A	69.00	N/A	N/A	N/A
A-03	0.032	0.36	0.42	N/A	Ryan Reynolds Way	2.50	N/A	N/A	N/A	3.30	N/A	N/A	N/A	6.70	N/A	N/A	N/A
A-04	0.023	0.25	0.30	N/A	Ryan Reynolds Way	1.20	N/A	N/A	N/A	1.60	N/A	N/A	N/A	3.40	N/A	N/A	N/A
A-05	0.043	0.89	0.99	Tempest LMF 105	Ryan Reynolds Way	5.70	0.34	1.59	18.95	7.50	0.60	2.25	18.95	11.05	1.25	6.01	18.95
A-06	0.034	0.88	0.98	Tempest LMF 105	Ryan Reynolds Way	8.55	0.75	0.00	18.61	11.65	1.40	0.00	18.61	11.90	1.48	3.12	18.61
A-07	0.029	0.35	0.41	N/A	Ryan Reynolds Way	2.20	N/A	N/A	N/A	2.90	N/A	N/A	N/A	5.90	N/A	N/A	N/A
R-01	0.035	0.90	1.00	Accutrol RD-100-A-ADJ 3/4 Open	Ryan Reynolds Way	1.02	0.09	4.46	17.21	1.14	0.11	6.52	17.21	1.43	0.14	14.36	17.21
R-02	0.037	0.90	1.00	Accutrol RD-100-A-ADJ 3/4 Open	Ryan Reynolds Way	1.03	0.09	6.99	18.33	1.15	0.11	6.99	18.33	1.46	0.14	15.28	18.33
R-03	0.031	0.90	1.00	Accutrol RD-100-A-ADJ 3/4 Open	Ryan Reynolds Way	0.98	0.09	3.91	16.31	1.11	0.10	5.69	16.31	1.42	0.14	12.52	16.31
R-04	0.033	0.90	1.00	Accutrol RD-100-A-ADJ 3/4 Open	Ryan Reynolds Way	0.99	0.09	4.26	17.32	1.12	0.10	6.19	17.32	1.43	0.14	13.57	17.32
R-05	0.054	0.90	1.00	Accutrol RD-100-A-ADJ 3/4 Open	Ryan Reynolds Way	1.09	0.10	8.04	26.29	1.20	0.11	11.62	26.29	1.52	0.15	24.97	26.29
R-06	0.045	0.90	1.00	Accutrol RD-100-A-ADJ 3/4 Open	Ryan Reynolds Way	1.06	0.10	6.32	22.09	1.18	0.11	9.15	22.09	1.50	0.14	19.81	22.09
Post-Development Flow						**63.2**	**-**	**0.0**	**0.0**	**83.6**	**-**	**0.0**	**0.0**	**144.5**	**-**	**0.0**	**0.0**
Total Allowable Release Rate						**149.6**				**149.6**				**149.6**			

Volume III: TEMPEST INLET CONTROL DEVICES

Municipal Technical Manual Series

SECOND EDITION

LMF (Low to Medium Flow) ICD

HF (High Flow) ICD

MHF (Medium to High Flow) ICD

IPEX by aliaxis

IPEX Tempest™ Inlet Control Devices

Municipal Technical Manual Series

Vol. I, 2nd Edition

For information contact: IPEX, Marketing,
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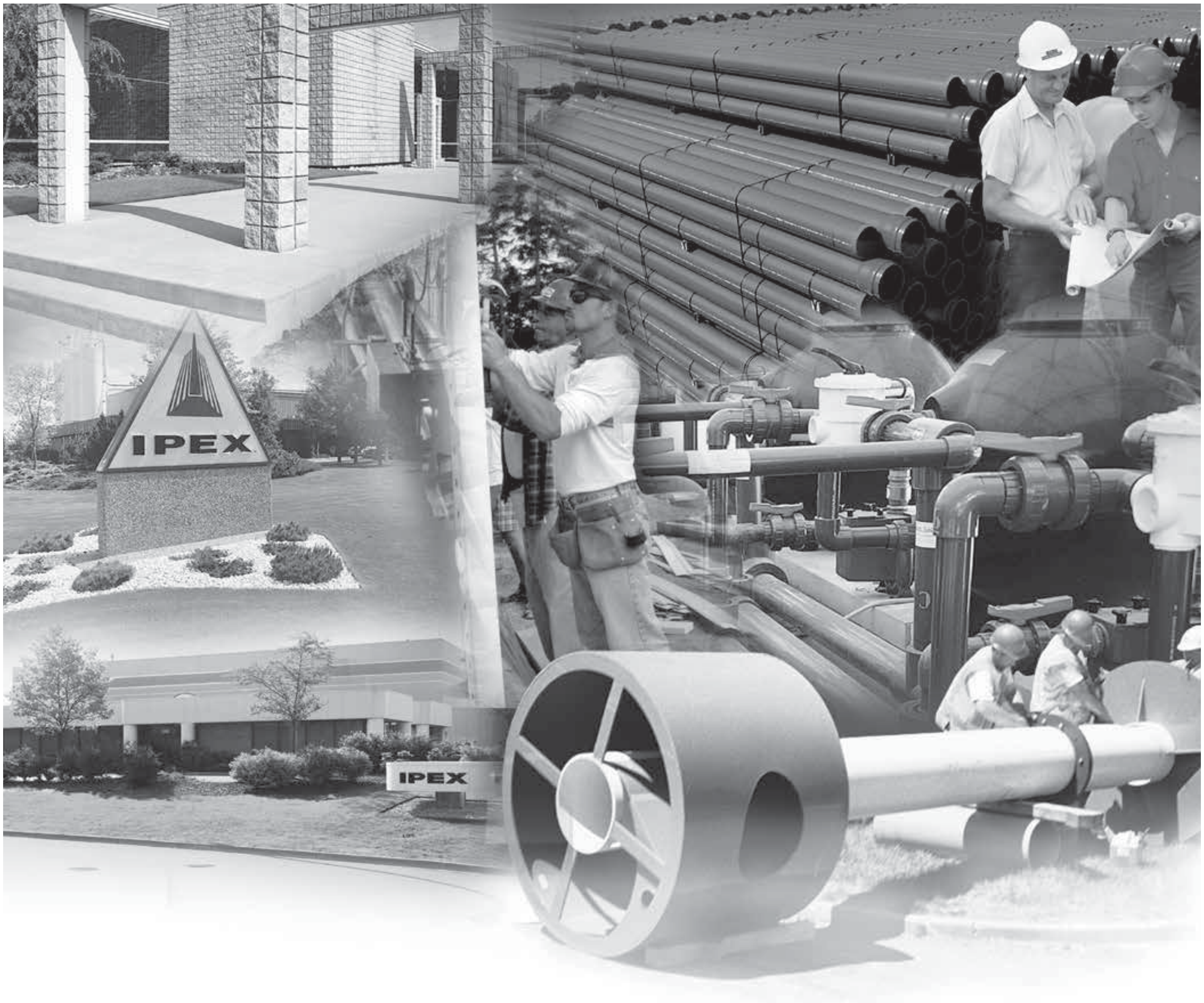


ABOUT IPEX

At IPEX, we have been manufacturing non-metallic pipe and fittings since 1951. We formulate our own compounds and maintain strict quality control during production. Our products are made available for customers thanks to a network of regional stocking locations throughout North America. We offer a wide variety of systems including complete lines of piping, fittings, valves and custom-fabricated items.

More importantly, we are committed to meeting our customers' needs. As a leader in the plastic piping industry, IPEX continually develops new products, modernizes manufacturing facilities and acquires innovative process technology. In addition, our staff take pride in their work, making available to customers their extensive thermoplastic knowledge and field experience. IPEX personnel are committed to improving the safety, reliability and performance of thermoplastic materials. We are involved in several standards committees and are members of and/or comply with the organizations listed on this page.

For specific details about any IPEX product, contact our customer service department.

CONTENTS

NOTE: Do not use or test the products in this manual with compressed air or other gases including air-over-water-boosters

PRODUCT INFORMATION: TEMPEST LOW, MEDIUM FLOW (LMF) ICD

Purpose

To control the amount of storm water runoff entering a sewer system by allowing a specified flow volume out of a catch basin or manhole at a specified head. This approach conserves pipe capacity so that catch basins downstream do not become uncontrollably surcharged, which can lead to basement floods, flash floods and combined sewer overflows.

Product Description

Our LMF ICD is designed to accommodate catch basins or manholes with sewer outlet pipes 6" in diameter and larger. Any storm sewer larger than 12" may require custom modification. However, IPEX can custom build a TEMPEST device to accommodate virtually any storm sewer size.

Available in 14 preset flow curves, the LMF ICD has the ability to provide flow rates: 2lps – 17lps (31gpm – 270gpm)

Product Function

The LMF ICD vortex flow action allows the LMF ICD to provide a narrower flow curve using a larger orifice than a conventional orifice plate ICD, making it less likely to clog. When comparing flows at the same head level, the LMF ICD has the ability to restrict more flow than a conventional ICD during a rain event, preserving greater sewer capacity.

Product Construction

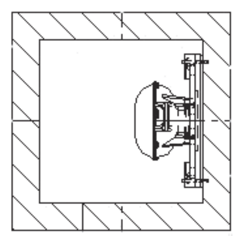
Constructed from durable PVC, the LMF ICD is light weight 8.9 Kg (19.7 lbs).

Product Applications

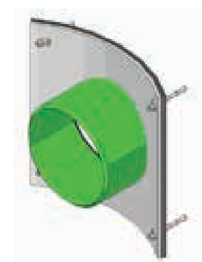
Will accommodate both square and round applications:

Square Application

Universal Mounting Plate



Round Application

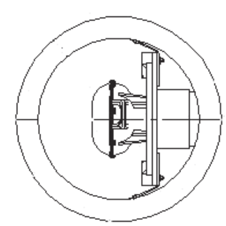


+

Spigot CB Wall Plate

=

Universal Mounting Plate Hub Adapter



NOTE: Do not use or test the products in this manual with compressed air or other gases including air-over-water-boosters

CBMH03A/ AREA A-05

Chart 1: LMF 14 Preset Flow Curves

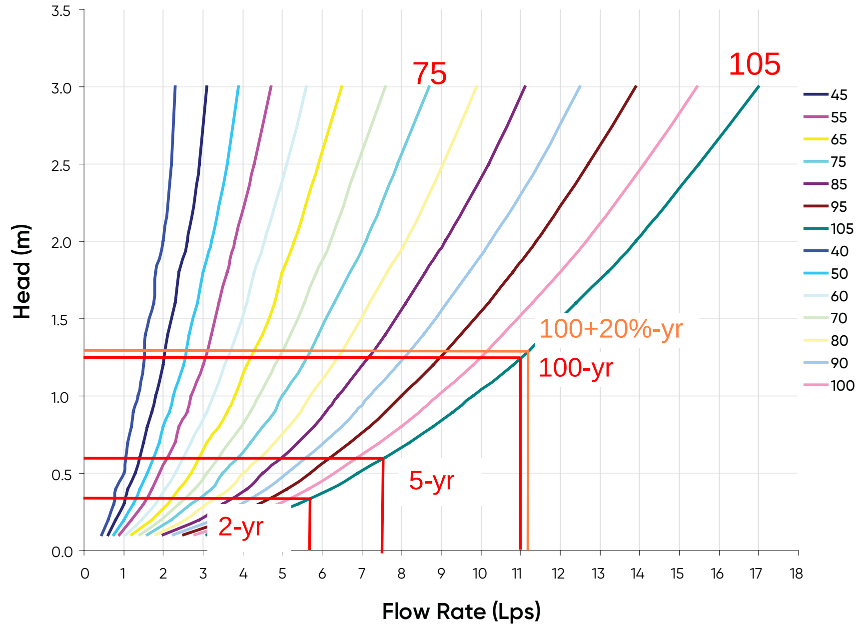
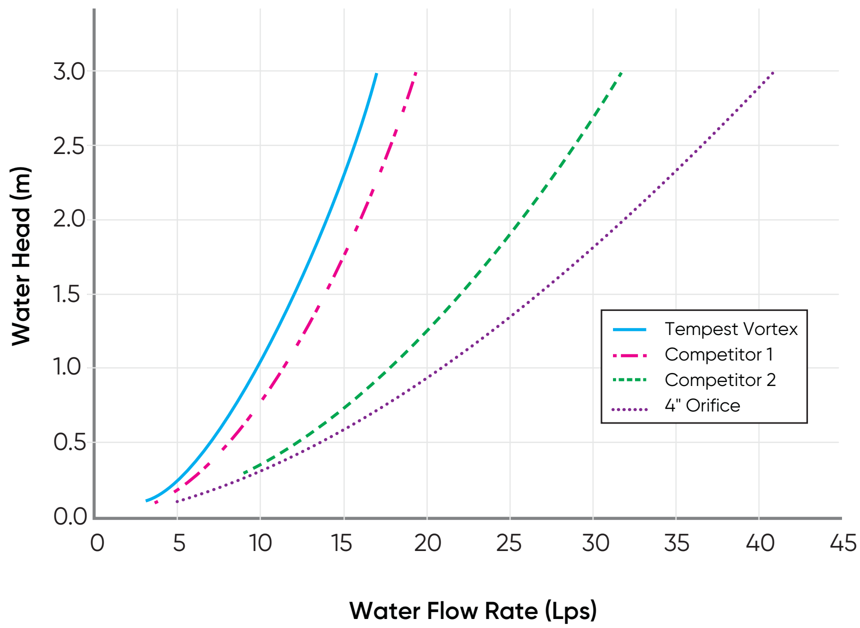


Chart 2: LMF Flow vs. ICD Alternatives



NOTE: Do not use or test the products in this manual with compressed air or other gases including air-over-water-boosters

CB02/ AREA A-06

Chart 1: LMF 14 Preset Flow Curves

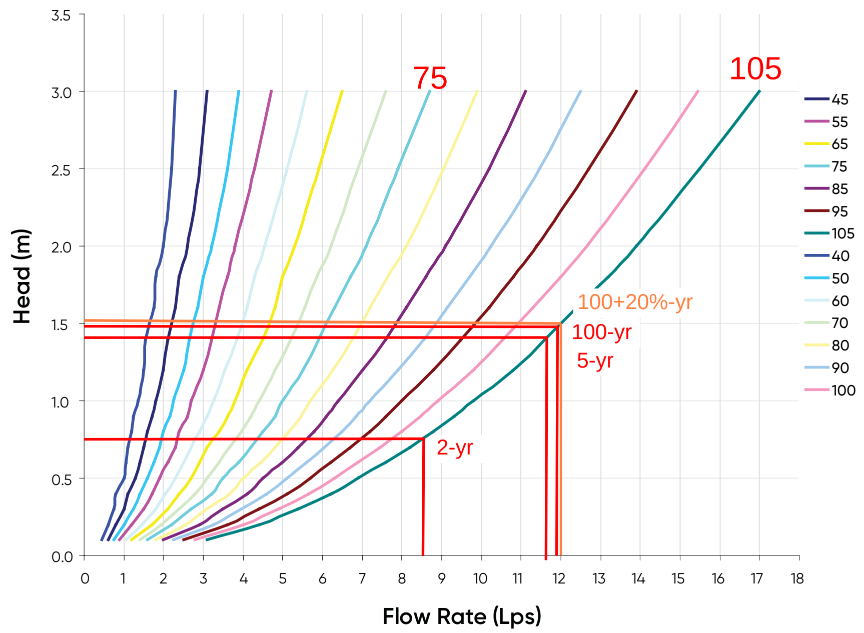
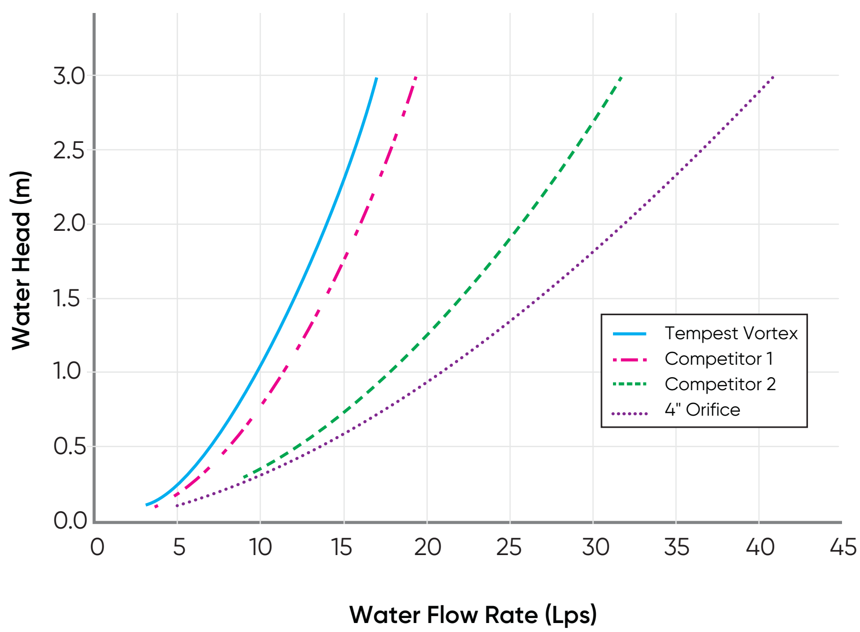


Chart 2: LMF Flow vs. ICD Alternatives



NOTE: Do not use or test the products in this manual with compressed air or other gases including air-over-water-boosters

PRODUCT INSTALLATION

Instructions to assemble a TEMPEST LMF ICD into a Square Catch Basin:

STEPS:

1. Materials and tooling verification:
    - Tooling: impact drill, 3/8" concrete bit, torque wrench for 9/16" nut, hand hammer, level, and marker.
    - Material: (4) concrete anchor 3/8 x 3-1/2, (4) washers, (4) nuts, universal mounting plate, ICD device.
2. Use the mounting wall plate to locate and mark the hole (4) pattern on the catch basin wall. You should use a level to ensure that the plate is at the horizontal.
3. Use an impact drill with a 3/8" concrete bit to make the four holes at a minimum of 1-1/2" depth up to 2-1/2". Clean the concrete dust from the holes.
4. Install the anchors (4) in the holes by using a hammer. Thread the nuts on the top of the anchors to protect the threads when you hit the anchors with the hammer. Remove the nuts from the ends of the anchors.
5. Install the universal mounting plate on the anchors and screw the 4 nuts in place with a maximum torque of 40 N.m (30 lbf-ft). There should be no gap between the wall mounting plate and the catch basin wall.
6. From the ground above using a reach bar, lower the ICD device by hooking the end of the reach bar to the handle of the ICD device. Align the triangular plate portion into the mounting wall plate. Push down the device to be sure it has centered in to the universal mounting plate and has created a seal.

⚠ WARNING

- Verify that the outlet pipe doesn't protrude into the catch basin. If it does, cut down the pipe flush to the catch basin wall.
- Call your IPEX representative for more information or if you have any questions about our products.

Instructions to assemble a TEMPEST LMF ICD into a Round Catch Basin:

STEPS:

1. Materials and tooling verification.
    - Tooling: impact drill, 3/8" concrete bit, torque wrench for 9/16" nut, hand hammer, level and marker.
    - Material: (4) concrete anchor 3/8 x 3-1/2, (4) washers and (4) nuts, spigot CB wall plate, universal mounting plate hub adapter, ICD device.
2. Use the spigot catch basin wall plate to locate and mark the hole (4) pattern on the catch basin wall. You should use a level to ensure that the plate is at the horizontal.
3. Use an impact drill with a 3/8" concrete bit to make the four holes at a depth between 1-1/2" to 2-1/2". Clean the concrete dust from the holes.
4. Install the anchors (4) in the holes by using a hammer. Thread the nuts on the top of the anchors to protect the threads when you hit the anchors with the hammer. Remove the nuts from the ends of the anchors.
5. Install the CB spigot wall plate on the anchors and screw the 4 nuts in place with a maximum torque of 40 N.m (30 lbf-ft). There should be no gap between the spigot wall plate and the catch basin wall.
6. Apply solvent cement on the hub of the universal mounting plate, hub adapter and the spigot of the CB wall plate, then slide the hub over the spigot. Make sure the universal mounting plate is at the horizontal and its hub is completely inserted onto the spigot. Normally, the corners of the universal mounting plate hub adapter should touch the catch basin wall.
7. From ground above using a reach bar, lower the ICD device by hooking the end of the reach bar to the handle of the ICD device. Align the triangular plate portion into the mounting wall plate. Push down the device to be sure it has centered in to the mounting plate and has created a seal.

⚠ WARNING

- Verify that the outlet pipe doesn't protrude into the catch basin. If it does, cut back the pipe flush to the catch basin wall.
- The solvent cement which is used in this installation is to be approved for PVC.
- The solvent cement should not be used below 0°C (32°F) or in a high humidity environment. Refer to the IPEX solvent cement guide to confirm the required curing time or visit the IPEX Online Solvent Cement Training Course available at ipexna.com.
- Call your IPEX representative for more information or if you have any questions about our products.

PRODUCT TECHNICAL SPECIFICATION

General

Inlet control devices (ICD's) are designed to provide flow control at a specified rate for a given water head level and also provide odour and floatable control. All ICD's will be IPEX Tempest or approved equal.

All devices shall be removable from a universal mounting plate. An operator from street level using only a T-bar with a hook will be able to retrieve the device while leaving the universal mounting plate secured to the catch basin wall face. The removal of the TEMPEST devices listed above must not require any unbolting or special manipulation or any special tools.

High Flow (HF) Sump devices will consist of a removable threaded cap which can be accessible from street level with out entry into the catchbasin (CB). The removal of the threaded cap shall not require any special tools other than the operator's hand.

ICD's shall have no moving parts.

Materials

ICD's are to be manufactured from Polyvinyl Chloride (PVC) or Polyurethane material, designed to be durable enough to withstand multiple freeze-thaw cycles and exposure to harsh elements.

The inner ring seal will be manufactured using a Buna or Nitrile material with hardness between Duro 50 and Duro 70.

The wall seal is to be comprised of a 3/8" thick Neoprene Closed Cell Sponge gasket which is attached to the back of the wall plate.

All hardware will be made from 304 stainless steel.

Dimensioning

The Low Medium Flow (LMF), High Flow (HF) and the High Flow (HF) Sump shall allow for a minimum outlet pipe diameter of 200mm with a 600mm deep Catch Basin sump.

Installation

Contractor shall be responsible for securing, supporting and connecting the ICD's to the existing influent pipe and catchbasin/manhole structure as specified and designed by the Engineer.

PRODUCT INFORMATION: TEMPEST HF & MHF ICD

Product Description

Our HF, HF Sump and MHF ICD's are designed to accommodate catch basins or manholes with sewer outlet pipes 6" in diameter or larger. Any storm sewer larger than 12" may require custom modification. However, IPEX can custom build a TEMPEST device to accommodate virtually any storm sewer size.

Available in 5 preset flow curves, these ICDs have the ability to provide constant flow rates: 9lps (143 gpm) and greater

Product Function

TEMPEST HF (High Flow): designed to manage moderate to higher flows 15 L/s (240 gpm) or greater and prevent the propagation of odour and floatables. With this device, the cross-sectional area of the device is larger than the orifice diameter and has been designed to limit head losses. The HF ICD can also be ordered without flow control when only odour and floatable control is required.

TEMPEST HF (High Flow) Sump: The height of a sewer outlet pipe in a catch basin is not always conveniently located. At times it may be located very close to the catch basin floor, not providing enough sump for one of the other TEMPEST ICDs with universal back plate to be installed. In these applications, the HF Sump is offered. The HF Sump offers the same features and benefits as the HF ICD; however, is designed to raise the outlet in a square or round catch basin structure. When installed, the HF sump is fixed in place and not easily removed. Any required service to the device is performed through a clean-out located in the top of the device which can be often accessed from ground level.

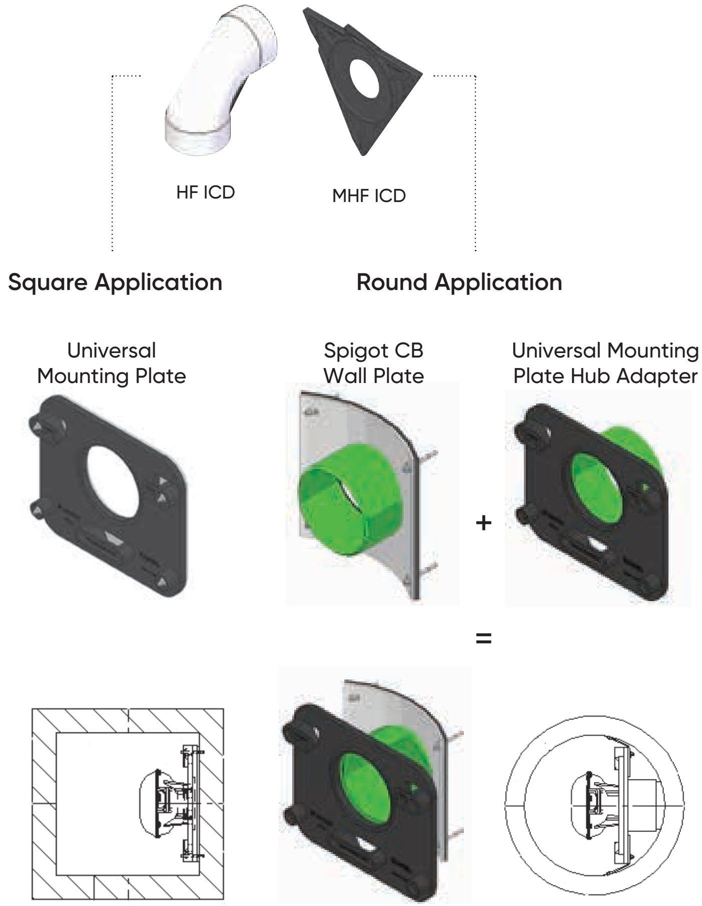
TEMPEST MHF (Medium to High Flow): The MHF plate or plug is designed to control flow rates 9 L/s (143 gpm) or greater. It is not designed to prevent the propagation of odour and floatables.

Product Construction

The HF, HF Sump and MHF ICDs are built to be light weight at a maximum weight of 6.8 Kg (14.6 lbs).

Product Applications

The HF and MHF ICD's are available to accommodate both square and round applications:



The HF Sump is available to accommodate low to no sump applications in both square and round catch basins:

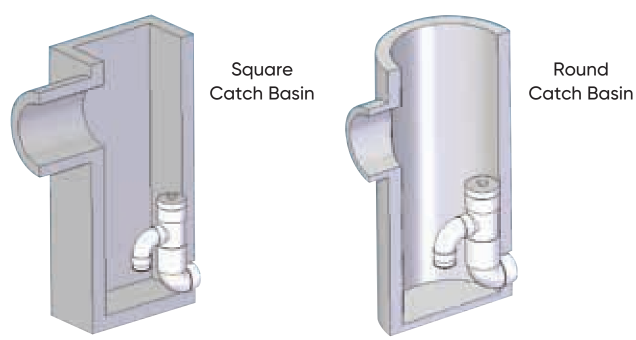
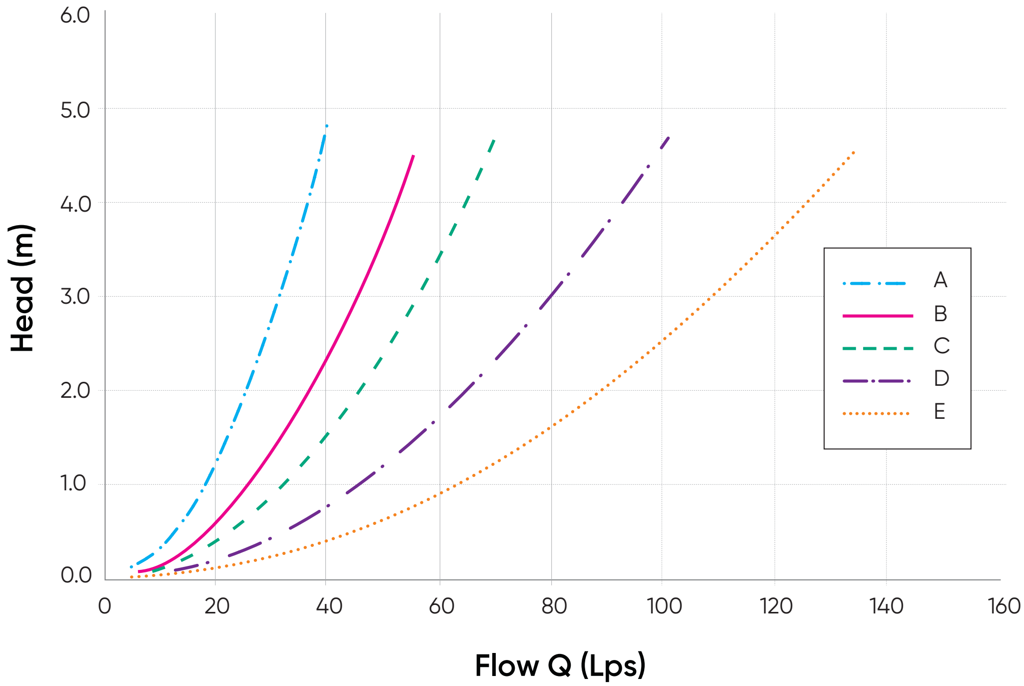


Chart 3: HF & MHF Preset Flow Curves



PRODUCT INSTALLATION

Instructions to assemble a TEMPEST HF or MHF ICD into a Square Catch Basin:

1. Materials and tooling verification:
   - Tooling: impact drill, 3/8" concrete bit, torque wrench for 9/16" nut, hand hammer, level, and marker.
   - Material: (4) concrete anchor 3/8 x 3-1/2, (4) washers, (4) nuts, universal mounting plate, ICD device
2. Use the mounting wall plate to locate and mark the hole (4) pattern on the catch basin wall. You should use a level to ensure that the plate is at the horizontal.
3. Use an impact drill with a 3/8" concrete bit to make the four holes at a minimum of 1-1/2" depth up to 2-1/2". Clean the concrete dust from the holes.
4. Install the anchors (4) in the holes by using a hammer. Thread the nuts on the top of the anchors to protect the threads when you hit the anchors with the hammer. Remove the nuts from the ends of the anchors.
5. Install the universal wall mounting plate on the anchors and screw the 4 nuts in place with a maximum torque of 40 N.m (30 lbf-ft). There should be no gap between the wall mounting plate and the catch basin wall.
6. From the ground above using a reach bar, lower the device by hooking the end of the reach bar to the handle of the ICD device. Align the triangular plate portion into the mounting wall plate. Push down the device to be sure it has centered in to the universal wall mounting plate and has created a seal.

⚠ WARNING

- Verify that the outlet pipe doesn't protrude into the catch basin. If it does, cut down the pipe flush to the catch basin wall.
- Call your IPEX representative for more information or if you have any questions about our products.

Instructions to assemble a TEMPEST HF or MHF ICD into a Round Catch Basin:

STEPS:

1. Materials and tooling verification.
   - Tooling: impact drill, 3/8" concrete bit, torque wrench for 9/16" nut, hand hammer, level and marker.
   - Material: (4) concrete anchor 3/8 x 3-1/2, (4) washers and (4) nuts, spigot CB wall plate, universal mounting plate hub adapter, ICD device.
2. Use the round catch basin spigot adaptor to locate and mark the hole (4) pattern on the catch basin wall. You should use a level to ensure that the plate is at the horizontal.
3. Use an impact drill with a 3/8" concrete bit to make the four holes at a depth between 1-1/2" to 2-1/2". Clean the concrete dust from the holes.
4. Install the anchors (4) in the holes by using a hammer. Thread the nuts on the top of the anchors to protect the threads when you hit the anchors with the hammer. Remove the nuts from the ends of the anchors.
5. Install the spigot CB wall plate on the anchors and screw the 4 nuts in place with a maximum torque of 40 N.m (30 lbf-ft). There should be no gap between the spigot CB wall plate and the catch basin wall.
6. Put solvent cement on the hub of the universal mounting plate, hub adapter and the spigot of the CB wall plate, then slide the hub over the spigot. Make sure the universal mounting plate is at the horizontal and its hub is completely inserted onto the spigot. Normally, the corners of the hub adapter should touch the catch basin wall.
7. From ground above using a reach bar, lower the device by hooking the end of the reach bar to the handle of the ICD device. Align the triangular plate portion into the mounting wall plate. Push down the device to be sure it has centered in to the wall mounting plate and has created a seal.

⚠ WARNING

- Verify that the outlet pipe doesn't protrude into the catch basin. If it does, cut down the pipe flush to the catch basin wall.
- The solvent cement which is used in this installation is to be approved for PVC.
- The solvent cement should not be used below 0°C (32°F) or in a high humidity environment. Refer to the IPEX solvent cement guide to confirm the required curing time or visit the IPEX Online Solvent Cement Training Course available at www.ipexinc.com.
- Call your IPEX representative for more information or if you have any questions about our products.

Instructions to assemble a TEMPEST HF Sump into a Square or Round Catch Basin:

STEPS:

1. Materials and tooling verification:
   - Tooling: impact drill, 3/8" concrete bit, torque wrench for 9/16" nut, hand hammer, level, mastic tape and metal strapping
   - Material: (2) concrete anchor 3/8 x 3-1/2, (2) washers, (2) nuts, HF Sump pieces (2).
2. Apply solvent cement to the spigot end of the top half of the sump. Apply solvent cement to the hub of the bottom half of the sump. Insert the spigot of the top half of the sump into the hub of the bottom half of the sump.
3. Install the 8" spigot of the device into the outlet pipe. Use the mastic tape to seal the device spigot into the outlet pipe. You should use a level to be sure that the fitting is standing at the vertical.
4. Use an impact drill with a 3/8" concrete bit to make a series of 2 holes along each side of the body throat. The depth of the hole should be between 1-1/2" to 2-1/2". Clean the concrete dust from the 2 holes.
5. Install the anchors (2) in the holes by using a hammer. Put the nuts on the top of the anchors to protect the threads when you hit the anchors. Remove the nuts from the ends of the anchors.
6. Cut the metal strapping to length and connect each end of the strapping to the anchors. Screw the nuts in place with a maximum torque of 40 N.m (30 lbf-ft). The device should be completely flush with the catch basin wall.

⚠ WARNING

- Verify that the outlet pipe doesn't protrude into the catch basin. If it does, cut down the pipe flush to the catch basin wall.
- The solvent cement which is used in this installation is to be approved for PVC.
- The solvent cement should not be used below 0°C (32°F) or in a high humidity environment. Refer to the IPEX solvent cement guide to confirm the required curing time or visit the IPEX Online Solvent Cement Training Course available at www.ipexinc.com.
- Call your IPEX representative for more information or if you have any questions about our products.

PRODUCT TECHNICAL SPECIFICATION

General

Inlet control devices (ICD's) are designed to provide flow control at a specified rate for a given water head level and also provide odour and floatable control where specified. All ICD's will be IPEX Tempest or approved equal.

All devices shall be removable from a universal mounting plate. An operator from street level using only a T-bar with a hook shall be able to retrieve the device while leaving the universal mounting plate secured to the catch basin wall face. The removal of the TEMPEST devices listed above shall not require any unbolting or special manipulation or any special tools.

High Flow (HF) Sump devices shall consist of a removable threaded cap which can be accessible from street level with out entry into the catchbasin (CB). The removal of the threaded cap shall not require any special tools other than the operator's hand.

ICD's shall have no moving parts.

Materials

ICD's are to be manufactured from Polyvinyl Chloride (PVC) or Polyurethane material, designed to be durable enough to withstand multiple freeze-thaw cycles and exposure to harsh elements.

The inner ring seal will be manufactured using a Buna or Nitrile material with hardness between Duro 50 and Duro 70.

The wall seal is to be comprised of a 3/8" thick Neoprene Closed Cell Sponge gasket which is attached to the back of the wall plate.

All hardware will be made from 304 stainless steel.

Dimensioning

The Low Medium Flow (LMF), High Flow (HF) and the High Flow (HF) Sump shall allow for a minimum outlet pipe diameter of 200mm with a 600mm deep Catch Basin sump.

Installation

Contractor shall be responsible for securing, supporting and connecting the ICD's to the existing influent pipe and catchbasin/manhole structure as specified and designed by the Engineer.

NOTE: Do not use or test the products in this manual with compressed air or other gases including air-over-water-boosters

NOTES

SALES AND CUSTOMER SERVICE

IPEX Inc.
Toll Free: (866) 473-9462
ipexna.com

About the IPEX Group of Companies

As leading suppliers of thermoplastic piping systems, the IPEX Group of Companies provides our customers with some of the largest and most comprehensive product lines. All IPEX products are backed by more than 50 years of experience. With state-of-the-art manufacturing facilities and distribution centers across North America, we have established a reputation for product innovation, quality, end-user focus and performance.

Markets served by IPEX group products are:

- Electrical systems
- Telecommunications and utility piping systems
- PVC, CPVC, PP, ABS, PEX, FR-PVDF and PE pipe and fittings (1/4" to 48")
- Industrial process piping systems
- Municipal pressure and gravity piping systems
- Plumbing and mechanical piping systems
- PE Electrofusion systems for gas and water
- Industrial, plumbing and electrical cements
- Irrigation systems

IPEX by aliaxis

MNMNTPIP110817RC

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120 Iber Road, Suite 103
Stittsville, ON K2S 1E9
613-836-0856
dsel.ca

DESIGN BRIEF

FOR

CASSETTE SUBDIVISION (2275 MER-BLEUE ROAD)

CAIVAN (MER-BLEUE) INC.

CITY OF OTTAWA

PROJECT NO.: 20-1214

2ND SUBMISSION JUNE 2022

6, including the subject site, falls within the western trunk watershed, which conveys its runoff to the Avalon West (N5) SWM Facility.

5.3 Post-Development Stormwater Management Targets

Stormwater management requirements for the stormwater management scheme have been adopted from the documents noted above, ***City Standards***, and the ***MECP SWMP Manual***.

The following specific standards are expected to be required for stormwater management within the subject property:

- Quality control is not required on site and will be provided through the existing Avalon West (N5) SWM Facility.
- Inflow rate into the minor system shall be limited to 220 L/s/ha as dictated by adjacent system designs.
- Storm sewers on local roads are to be designed to provide at least a 2-year level of service without any ponding per the City's latest Technical Bulletin PIEDTB-2016-01 using a time of concentration of 10 minutes. However, pipes may be sized larger where required in order to optimize inflow into the minor system (within the maximum allowable inflow rates) and maximize retention of larger rain events on site up to the 100-year event.
- For less frequent storms, the minor system sewer capture will be restricted with the use of inlet control devices (ICDs) to prevent excessive hydraulic surcharges.
- Under full flow conditions, the allowable velocity in storm sewers is to be no less than 0.80 m/s. The preferred maximum velocity is 3.0 m/s, with an allowance of up to 6.0 m/s on an exceptional basis only.
- For the 100-year storm and for all roads, the maximum depth of water (static and/or dynamic) on streets, rear yards, public space and parking areas shall not exceed 0.35 m at the gutter.
- The major system shall be designed with sufficient capacity to allow the excess runoff of a 100-year storm to be conveyed within the public ROW or adjacent to the right-of-way provided that the water level must not touch any part of the building envelope, must remain below all building openings during the stress test event (100-year + 20%), and must maintain 15 cm vertical clearance between spill elevation on the street and the ground elevation at the nearest building envelope.
- When catch basins are installed in rear yards, safe overland flow routes are to be provided to allow the release of excess flows from such areas. A minimum of 30 cm of vertical clearance is required between the rear yard spill elevation and the ground elevation at the adjacent building envelope.
- The product of the maximum flow depths on streets and maximum flow velocity must be less than 0.60 m^2/s on all roads.

5.3.1 Quality Control Targets

An Enhanced Level of Protection (80% total suspended solids removal) per MECP guidelines will be achieved in the Avalon West (N5) SWM Facility.

5.3.2 Quantity Control Targets

Quantity control treatment will be provided in the Avalon West (N5) SWM Facility, which was designed to include the tributary area of the subject site. The SWM Facility has been designed with sufficient storage to match pre-development flows on key points within downstream sections of McKinnon's Creek for the 2, 5, and 100-year 24-hour SCS Type II storms.

ICDs have been proposed within the development to facilitate on-site quantity controls up to the 100-year event while controlling to a maximum of 220 L/s/ha into the minor system. See further discussion in Section 5.7 of this report.

5.4 Proposed Minor System

The subject site will be serviced by a conventional storm sewer system designed in accordance with City of Ottawa standards that is to generally follow the local road network and proposed servicing blocks. There are two proposed storm outlets for the subject site, with both being tributary to the Western Trunk Sewer, which flows to the existing Avalon West (N5) SWM Facility.

The proposed storm sewers are depicted on ***Figure 5 – Storm Servicing Figure***.

Street catch basins located within low points will collect drainage from the streets and front yards, while rear yard catch basins will capture drainage from backyards. Perforated catch basin leads will be provided in rear yards, except the last segment where it connects to the right-of-way which will be solid pipe, per current City standards.

The preliminary rational method design of the minor system captures drainage for storm events up to the 2-year event for local roads, with minor system capture limited to the 5-year event for the Mixed-Use Density Block (or in this case up to the 220 L/s/ha restriction). ICDs will be used in catch basins within the subject property to limit the flows accordingly.

Table 6 summarizes the standards that are being employed in the detailed design of the storm sewer network.

Table 6: Storm Sewer Design Criteria

Design Parameter	Value
Minor System Design Return Period	1:2 year (PIEDTB-2016-01) for local roads, without ponding
Minor System Capture for Mixed-Use Density Block	1:5 year
Major System Design Return Period	100-Year
Intensity Duration Frequency Curve (IDF) 2-year storm event: A = 723.951, B = 6.199, C = 0.810 5-year storm event: A = 998.071, B = 6.053, C = 0.814	$i = \frac{A}{(t_c + B)^C}$
Initial Time of Concentration	10 minutes
Rational Method	$Q = CiA$
Minor System Inflow Rate per Avalon Encore Stage 6 Design	220 L/s/ha
Runoff coefficient for paved and roof areas	0.9
Runoff coefficient for landscaped areas	0.2
Storm sewers are to be sized employing the Manning's Equation	$Q = \frac{1}{n} AR^{2/3} S^{1/2}$
Minimum Sewer Size	250 mm diameter
Minimum Manning's 'n'	0.013
Minimum Depth of Cover	2.0 m from crown of sewer to grade
Minimum Full Flowing Velocity	0.8 m/s
Maximum Full Flowing Velocity	3.0 m/s
Extracted from Sections 5 and 6 of the City of Ottawa Sewer Design Guidelines (October 2012) and PIEDTB-2016-01 (September 6, 2016)	

The paved area and grassed area runoff coefficients of 0.9 and 0.2, respectively, were used to calculate average runoff coefficients that were applied across the site. ***Figure 6*** in the ***Figures*** section of this report has been prepared to illustrate the areas reviewed in order to assess the imperviousness for the development area.

The storm drainage area plans and design sheets for the Avalon Encore Stage 6 design are enclosed in ***Appendix E***. Based on the Atrel design, the following had been provided for the subject site:

<u>Walkway Block at Aquarium Avenue @ Existing MH 6559</u>

- 2.20 ha
- Runoff Coefficient = 0.80
- Time of Concentration = 15 minutes
- Peak Flow (5-Year Intensity) = 408.84 L/s

<u>Sculpin Street @ Existing MH 6608</u>

- 1.96 ha
- Runoff Coefficient = 0.80
- Time of Concentration = 15 minutes
- Peak Flow (5-Year Intensity) = 456.46 L/s

The storm design sheet for the subject site is enclosed in ***Appendix E*** for reference. As summarized in the ***SWM Report*** the detailed design of the storm system results in a drainage area of 2.28 ha to the east Block 28 outlet to Aquarium Avenue and 1.76 ha to the south Sculpin Street outlet. The following table derived from the JFSA Table 2B in the ***SWM Report*** demonstrates the various return period flows for the site modelled and demonstrates 5-Year flows that are comparable or less than the Atrel flows summarized above. The flows do not exceed the 220 L/s/ha constraint therefore there are no adverse impact on downstream developments.

Table 7: Comparison of Minor System Flows (3-Hour Chicago) from Development

Location	DSEL Rational Flow (m^3/s)	2-Year PCSWMM Flow (m^3/s)	5-Year PCSWMM Flow (m^3/s)	100-Year PCSWMM Flow (m^3/s)
MH6559 (East Block 28 Outlet)	0.339	0.307	0.407	0.491
MH6608 (South Sculpin Outlet)	0.190	0.196	0.268	0.384
Taken from JFSA SWM Report Table 2B.				

ICDs have been proposed to ensure that storm flows entering the minor system are limited to the appropriate peak storm flow. Beyond the 2-year capture requirements, ICDs were selected to maximize the use of available road surface storage during the 100-year storm, while still retaining the excess 100-year runoff within road ponding areas of sufficient volume, where grading allowed. In addition, JFSA has prepared Table 1B within the ***SWM Report*** which provides the approximate ponding duration in the various ponding areas (also see the Static Ponding Plan (Drawing 20) for this information. Rear yard catchbasins were connected to catchbasins on the road, where possible, in order to allow rear yard runoff access to the storage in road ponding areas at regular intervals where elevations allowed. For additional details, refer to the ***SWM Report***.

5.5 Block 27 Storm Service

A storm control manhole (STM Control MH 100) has been provided to Block 27 to facilitate a future servicing outlet for that property parcel to the north of the Cassette Subdvision. The stormwater modelling and details for on-site stormwater management will be developed for the parcel when a site plan application is advanced for that area in future. The control manhole will have a knockout provided for the future connection when the design for that area is advanced.

In terms of the minor system outlet provided within the Cassette Subdivision design, the site area of ~0.68 ha generates a minor system flow of up to 149.6 L/s based on the governing 220 L/s/ha. The provided 525mm diameter storm sewer at a design grade of 0.25% provides an outlet capacity of 224 L/s which is sufficient for future service.

5.6 Hydraulic Grade Line Analysis

Refer to Table 3 within the ***SWM Report*** for a detailed hydraulic grade line (HGL) modelling analysis for the proposed system, for the 100-year 3-hour Chicago storm, 100-year 24-hour SCS Type II storms. A minimum freeboard of 0.30 m between the HGL and the underside of footing elevations (minimum of 0.45m) has been provided throughout the proposed development for the 100-year storms and a minimum freeboard of 0 m has been provided throughout the development for the historical events.

5.7 Proposed Major System

Major system conveyance, or overland flow (OLF), will be provided to accommodate flows in excess of the minor system capacity. OLF is accommodated by generally storing stormwater up to the 100-year design event in road sags then routing additional surface flow along the road network towards the proposed outlets, as shown on the grading plan for the site. The 100-year flows on the Mixed-Use Density Block will be required to be controlled on site.

The site has three major system emergency outflow locations from the development area:

1. West along Broadcast Avenue to Mer-Bleue Road;
2. South to Sculpin Street; and
3. East to the Avalon Encore development area via a walkway/servicing block.

As noted in the ***SWM Report*** there are minor spills from the site (ranging from 0.2% to 0.5% of total runoff depending on the storm event) as the 100-year event is approached for the Mer-Bleue Road and Sculpin Street outlets. Given the minor nature of the spill, optimized surface storage, and minor system intakes up to the 220 L/s/ha restriction, it is requested that this excess spill be deemed acceptable given the minor nature of the exceedance.

5.8 Stormwater Conclusions

The storm outlet for the subject site is the Avalon West (N5) SWM Facility, which treats the flows for quantity and quality control before discharging to McKinnon's Creek. The adjacent Avalon Encore Stage 6 was designed with capacity for the subject site and will convey flows to the SWM Facility via the Western Trunk.

The minor system inflow rate shall be limited to the 220 L/s/ha with a time of concentration of 10 minutes. The sewer outlets from the development are located at the walkway/servicing Block 28 to Aquarium Avenue and at Sculpin Street. Both outlets were designed to convey a flow that is in keeping with the projected flows generated by the current design. As such, there is sufficient capacity in the downstream storm system. A hydraulic grade line analysis has been completed to confirm that 0.30 m freeboard between the estimated underside of footing elevations and the 100-year hydraulic gradeline is provided throughout the subject site.

The minor system is designed to capture the 2-year event (or more, up to the 220 L/s/ha rate, depending on requirements to minimize overland flow from the site) for local roads and minor system capture for the mixed-use density block to be limited to the 5-year event (or up to 220 L/s/ha, whichever governs).

Major system conveyance is provided to accommodate flows in excess of the minor system capacity, generally accommodated by storing stormwater up to the 100-year design event in road sags, then routing additional surface flow along the road network to the proposed outlets.

The storm sewers have been designed in accordance with the City of Ottawa and MECP standards.

Stormwater Management Report for Cassette Subdivision 2275 Mer-Bleue Road

City of Ottawa

May 2022

Updated July 2022

Prepared for: David Schaeffer Engineering Ltd.

Prepared by: JFSA Water Resources and Environmental Consultants

JFSA Ref. No.: 2321-22

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JFSA Water Resources and Environmental Consultants

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Stormwater Management Report for Cassette Subdivision 2275 Mer-Bleue Road

in the City of Ottawa

May 2022
Updated July 2022

Prepared for:

David Schaeffer Engineering Ltd.

July 2022 report updated by

Paulo Pickart, P.Eng.

Reviewed by :

LICENSED PROFESSIONAL ENGINEER
J. J. BURNETT
100227734
PROVINCE OF ONTARIO

Jonathon Burnett, B.Eng., P.Eng.

JFSA Ref. No.: 2321-22

Legend

—— Site Plan

Land Use

Mixed Use

Residential

SCALE: 1:1500

0 25 50 m

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DSEL
david schaeffer engineering ltd

Mer Bleue Subdivision

Figure 1: Site Overview

PROJECT	2321
DRAWN	MP
DATE	MAY 2022

2 DESIGN CRITERIA AND GUIDELINES

The design criteria and guidelines used for the stormwater management of the subject subdivision are those that were developed in the background documents, as well as those provided in the October 2012 *City of Ottawa Sewer Design Guidelines* and subsequent technical memorandums, and generally accepted stormwater management design guidelines.

The detailed design of the proposed Cassette development has a total drainage area of 4.04 ha with an average imperviousness of 66%. A detailed analysis of the proposed dual drainage system was required to confirm that the following general design criteria and guidelines for the minor and major systems would be met.

2.1 Minor System

a) Storm sewers are to be designed to provide a minimum 2-year level of service, while not exceeding the specified unitary release rate (220L/s/ha).

b) The 100-year hydraulic grade line (HGL) within the development's minor systems must be maintained at least 0.3 m below the underside of footing elevation where gravity house connections are installed.

c) For less frequent storms (i.e. larger than 1:2 year or 1:5 year on collector / 1:10 year on arterial roads), the minor system shall, if required, be limited with the use of inlet control devices to prevent excessive hydraulic surcharges and to maximize the use of surface storage on the road where desired.

d) Catch basins on the road are to be equipped with City standard type S19 (fish) grates or City standard type S22 side inlets, and grates for catch basins in rear yards, parks and open spaces with pedestrian traffic are to be City standard type S19, S30 and S31.

e) Both Single and double catch basins are to be equipped with 200 mm minimum lead pipes.

f) Rearyard catch basins are to be equipped with 250 mm minimum lead pipes. Catch basins installed on the street, where rearyard catch basins connect to the main storm sewer through the catch basin, are to be equipped with 250 mm minimum lead pipes for both single and double catchbasins.

g) Under full flow conditions, the allowable velocity in storm sewers is to be no less than 0.80 m/s and no greater than 3.0 m/s. Where velocities over 3.0 m/s are proposed, provisions shall be made to protect against displacement of sewers by sudden jarring or movement. Velocities greater than 6 m/s are not permitted.

2.2 Major System

a) The major system shall be designed with enough road surface storage to allow the excess runoff of a 100-year storm to be retained within road ponding areas where desired.

b) Inlet control devices should be sized such that they do not create surface ponding on the road during the 2-year design storm; it should be noted that surface ponding over grates is present during rainfall under any design, as an appropriate depth of water is required for runoff to enter the grate, although for these smaller events the ICDs have been appropriately sized to ensure that they are not acting as a restriction to the flow entering the minor system.

c) Roof leaders shall be installed to direct the runoff to splash pads and onto grassed areas.

d) For the 100-year storm, the maximum total depth of water (static + dynamic) on all roads shall not exceed 35 cm at the gutter.

e) During the 100-year + 20% stress test, the maximum extent of surface water on streets, rearyards, public spaces and parking areas shall not touch the building envelope.

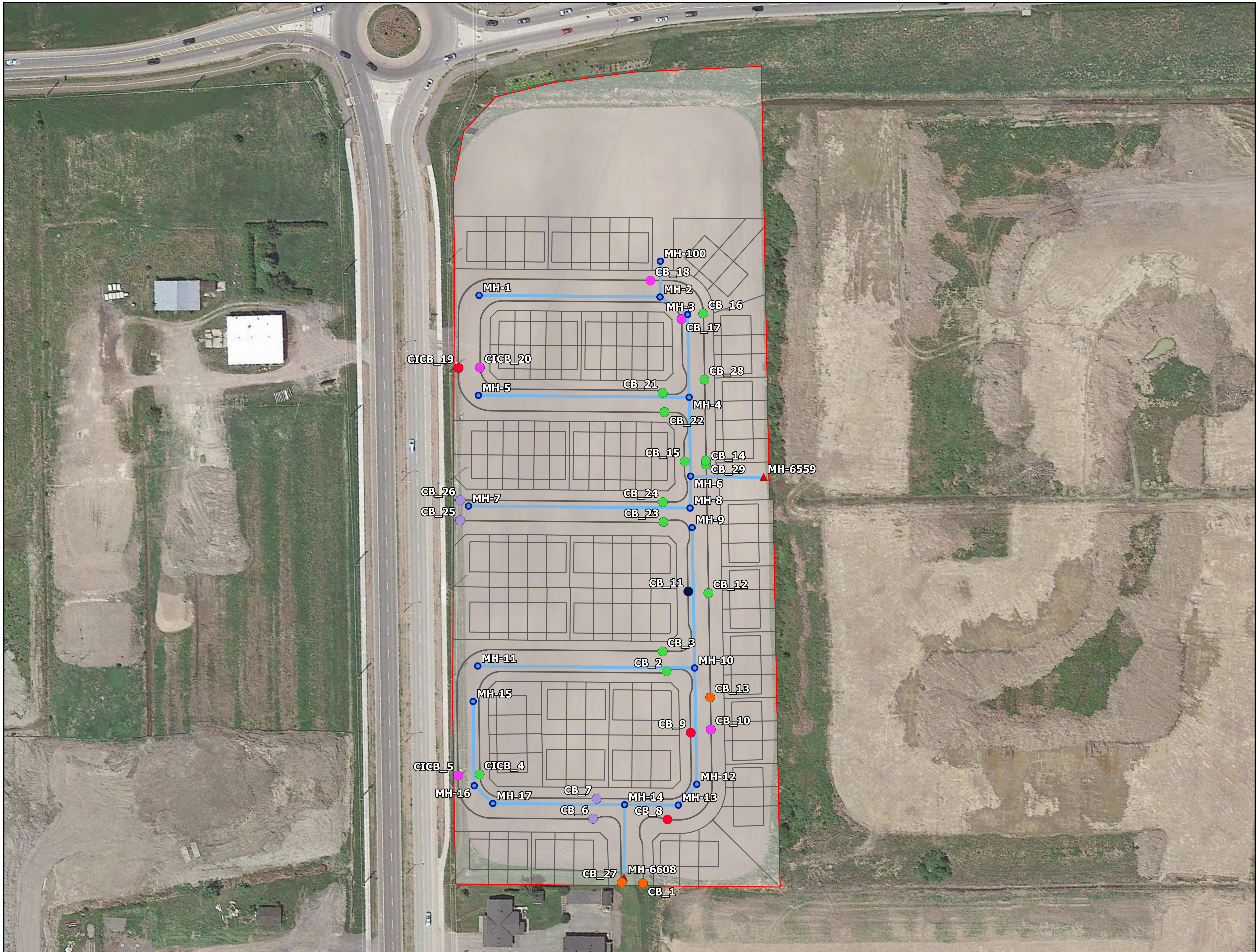
f) When catch basins are installed in rear yards, safe overland flow routes are to be provided to allow the release of excess flows from such areas.

g) The product of the maximum flow depths on streets and maximum flow velocity must be less than 0.60 m^2/s on all roads.

h) For the majority of the developments, the excess major system flows up to the 100-year return period are to be retained on-site in development blocks such as parks, schools, and commercial, unless specified otherwise.

i) There must be at least 15 cm of vertical clearance between the spill elevation on the street and the ground elevation at the nearest building envelope that is in the proximity of the flow route or ponding area.

j) There must be at least 30 cm of vertical clearance between the rear yard spill elevation and the ground elevation at the adjacent building envelope.



Legend

- Site Plan
- Site Area

Minor Outfalls
- MH

Conduits
- Minor System

Minor Junctions
- MH

ICDs
- 83mm Circular Orifice
- 94mm Circular Orifice
- 102mm Circular Orifice
- 108mm Circular Orifice
- 127mm Circular Orifice
- 152mm Circular Orifice
- 178mm Circular Orifice

N

SCALE: 1:1500

0 25 50 m

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Figure 2: Minor System

PROJECT	2321
DRAWN	JB
DATE	June 2022

N

Legend

Site Plan

Subcatchments
<NAME>
<AREA>
<% IMP>

SCALE: 1:1500

0 25 50 m

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Figure 4: Subcatchments

PROJECT	2321
DRAWN	JB
DATE	June 2022

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APPENDIX C

Modelling Reference Tables

Pipe Data and Hydraulic Simulation Results

JFSA Water Resources and Environmental Consultants

MANHOLE LOSS COEFFICIENT NOMOGRAPH AND TABLE

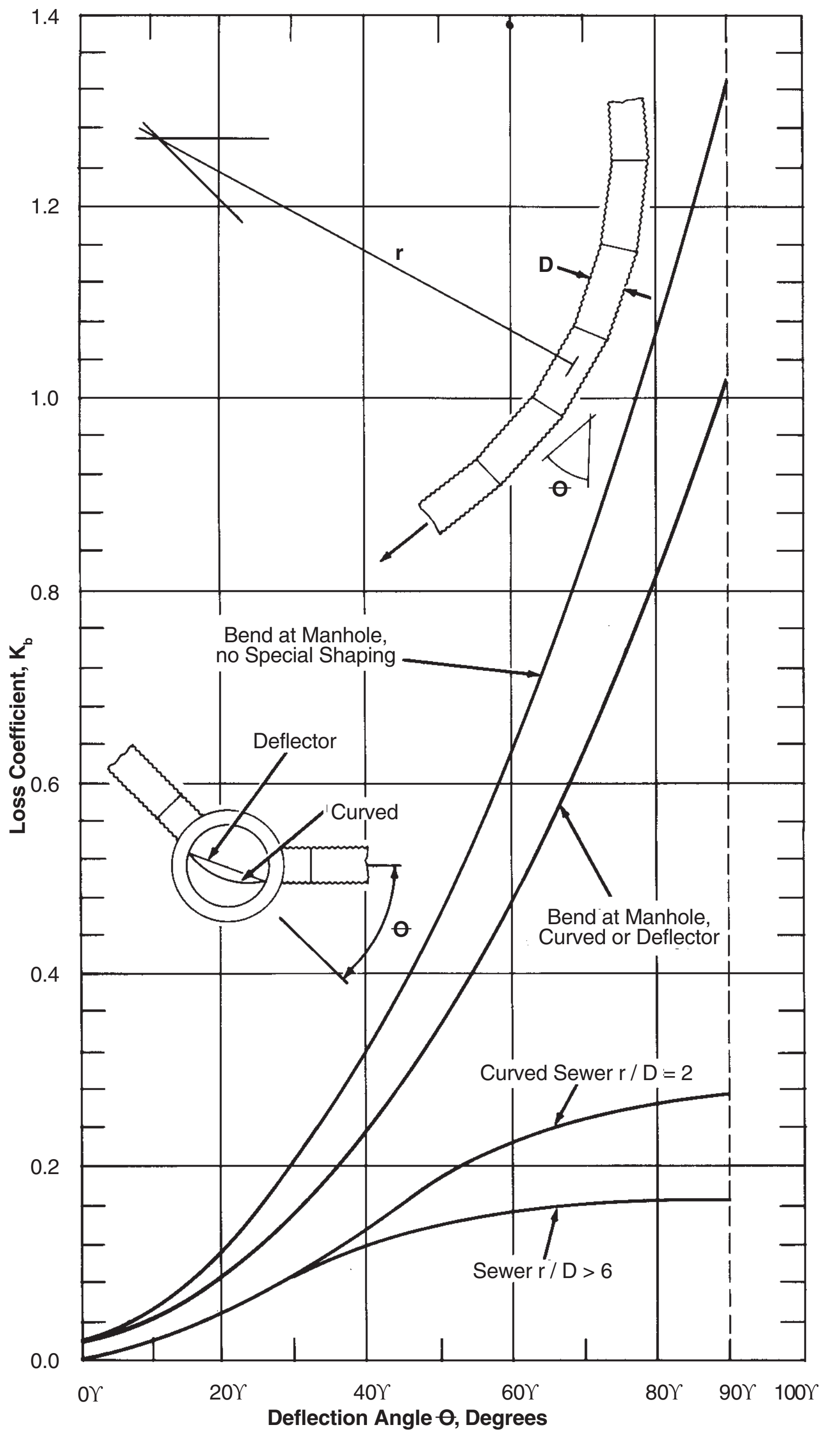

Figure 4.13 Sewer bend loss coefficient[16]

Angle	Exit Loss
0	0.02
5	0.035
10	0.055
15	0.08
20	0.11
25	0.16
30	0.21
35	0.26
40	0.32
45	0.39
50	0.47
55	0.54
60	0.635
65	0.73
70	0.84
75	0.95
80	1.07
85	1.19
90	1.33

Table C1A: Pipe Data and Hydraulic Simulation Results - 100-Year Chicago 3 Hour Event

U/S MH	D/S MH	U/S Invert (m)	D/S Invert (m)	U/S MH Cover Elevation (m)	D/S MH Cover Elevation (m)	Pipe Dia (mm)	Pipe Length (m)	Pipe Slope (%)	n (-)	Design Velocity (m/s)	Design Flow (m³/s)	Peak Pipe Flow (m³/s)	Peak Flow/ Design Flow	Surcharge U/S (m)	Time To peak (hh:mm)	Max U/S HGL (m)	Max D/S HGL (m)
MH-9	MH-10	85.707	85.492	88.57	88.49	450	56.0	0.3	0.013	0.90	0.14	0.05	0.35	-0.22	01/01/2019 01:18 AM	85.94	85.91
MH-8	MH-6	85.393	85.224	88.59	88.52	600	12.7	0.2	0.013	0.84	0.24	0.11	0.45	-0.23	01/01/2019 01:11 AM	85.76	85.72
MH-7	MH-8	85.720	85.393	87.9	88.59	450	88.3	0.2	0.013	0.80	0.13	0.11	0.84	-0.08	01/01/2019 01:11 AM	86.09	85.76
MH-6	MH-6559	85.224	85.180	88.52	88.33	750	29.2	0.2	0.013	0.98	0.43	0.49	1.13	-0.25	01/01/2019 01:12 AM	85.72	85.61
MH-5	MH-4	85.941	85.362	88.39	88.57	450	84.0	0.2	0.013	0.80	0.13	0.09	0.70	-0.13	01/01/2019 01:15 AM	86.26	85.99
MH-4	MH-6	85.362	85.224	88.57	88.52	675	31.5	0.2	0.013	1.05	0.38	0.39	1.04	-0.05	01/01/2019 01:15 AM	85.99	85.72
MH-3	MH-4	85.432	85.362	88.39	88.57	675	33.0	0.2	0.013	0.91	0.33	0.25	0.78	-0.08	01/01/2019 01:15 AM	86.02	85.99
MH-2	MH-3	85.527	85.432	88.49	88.39	600	13.0	0.2	0.013	0.85	0.24	0.19	0.80	-0.08	01/01/2019 01:14 AM	86.05	86.02
MH-17	MH-14	85.424	85.094	88.29	88.27	450	52.5	0.2	0.013	0.80	0.13	0.12	0.95	-0.06	01/01/2019 01:11 AM	85.81	85.58
MH-16	MH-17	85.529	85.424	88.2	88.29	375	10.2	0.3	0.013	0.86	0.09	0.04	0.46	-0.08	01/01/2019 01:14 AM	85.83	85.81
MH-15	MH-16	85.690	85.529	88.31	88.2	375	33.6	0.3	0.013	0.87	0.10	0.04	0.44	-0.19	01/01/2019 01:13 AM	85.87	85.83
MH-14	MH-6608	85.094	85.050	88.27	88.04	675	29.2	0.2	0.013	0.91	0.33	0.39	1.18	-0.19	01/01/2019 01:11 AM	85.58	85.48
MH-13	MH-14	85.287	85.094	88.38	88.27	525	21.4	0.2	0.013	0.89	0.19	0.19	0.96	-0.07	01/01/2019 01:13 AM	85.75	85.58
MH-12	MH-13	85.369	85.287	88.38	88.38	525	11.1	0.2	0.013	0.88	0.19	0.18	0.95	-0.09	01/01/2019 01:12 AM	85.80	85.75
MH-1	MH-2	85.968	85.527	88.53	88.49	375	72.2	0.3	0.013	0.87	0.10	0.02	0.24	-0.25	01/01/2019 01:14 AM	86.10	86.05
MH-11	MH-10	85.902	85.492	88.41	88.49	375	86.5	0.3	0.013	0.87	0.10	0.04	0.38	-0.20	01/01/2019 01:17 AM	86.07	85.91
MH-10	MH-12	85.492	85.369	88.49	88.38	525	46.4	0.2	0.013	0.89	0.19	0.18	0.94	-0.11	01/01/2019 01:12 AM	85.91	85.80
MH-100	MH-2	85.638	85.527	88.48	88.49	525	14.3	0.3	0.013	1.00	0.22	0.17	0.79	-0.07	01/01/2019 01:14 AM	86.10	86.05