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PROPOSED RESIDENTIAL DEVELOPMENT
150 DUN SKIPPER DRIVE

Servicing and Stormwater Management Report

PROPOSED RESIDENTIAL DEVELOPMENT

150 DUN SKIPPER DRIVE
OTTAWA, ONTARIO

SERVICING AND STORMWATER MANAGEMENT REPORT

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Issued: January 17, 2025

Revised: April 10, 2025

Novatech File: 124107
Report Ref: R-2024-129

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Engineers, Planners & Landscape Architects

April 10, 2025

City of Ottawa
Planning, Real Estate and Economic Development Department
Development Review – South Branch
110 Laurier Avenue West
Ottawa, ON
K1P 1J1

Attention: **Mr. Tyler Cassidy**

Reference: **Servicing and Stormwater Management Report**
Proposed Residential Development
150 Dun Skipper Drive, Ottawa, Ontario
Novatech File No.: 124127

Enclosed is a copy of the revised 'Servicing and Stormwater Management Report' for the proposed residential development located at 150 Dun Skipper Drive, in the City of Ottawa. This report addresses the approach to site servicing and stormwater management and is submitted in support of the Site Plan Control application.

Please contact the undersigned, should you have any questions or require additional information.

Yours truly,

NOVATECH

Miroslav Savic, P. Eng.
Senior Project Manager | Land Development Engineering

cc: Raad Akrawri (Zayoun Group Inc.)

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1.0 INTRODUCTION

Novatech has been retained to complete the site servicing and stormwater management design for the proposed residential development located at 150 Dun Skipper Drive, in the City of Ottawa.

The proposed residential development is the western part of the 150 Dun Skipper Drive site and will have frontage on Cedar Creek Drive. Commercial development is proposed for the easter part of the subject site, with frontages to Dun Skipper Drive and Bank Street.

This report addresses the approach to servicing and stormwater management and is being submitted in support of the Site Plan Control application for the residential portion of the site. The commercial development is a subject of a separate Site Plan Control application.

1.1 Site Description and Location

The subject site is part of the Pathways and Findlay Creek subdivision development and is located on the north side Dun Skipper Drive, between Bank Street and Cedar Creek Drive.

The 2.93ha site is currently vacant, and it is covered by gravel and green areas. The legal description of the subject site is designated as Block 241, Registered Plan 4-M-1617, City of Ottawa.

Figure 1 – **Aerial Plan** provides an aerial view of the site.

1.2 Pre-Consultation Information

Two pre-consultation meetings were held with the City of Ottawa. The Phase 1 pre-consultation meeting was held on March 11, 2024, at which time the client was advised of the general submission requirements. The Phase 2 pre-consultation for residential development was held on October 15, 2024. Refer to **Appendix A** for feedback from the City of Ottawa following the Phase 2 pre-consultation meeting.

1.3 Proposed Development

The proposed residential development will consist of two 6-storey apartment buildings having a total of 237 units. Building 1 will have 79 1-bedroom units and 52 2-bedroom units. Building B will have 66 1-bedroon units and 40 2-bedroom units. The development will include two underground parking garages (one for each building), a surface parking lot, and landscaped areas. The site will have an access driveway off Cedar Creek Drive. Refer to **Appendix B** for the proposed Site Plan.

1.4 Background Documents

The following documents were reviewed in preparation of the report:

- Geotechnical Investigation Proposed Commercial Development, 4828 Bank Street, prepared by Patterson Group (PG7262-1, October 4, 2024).
- Design Brief, Pathways at Findlay Creek, 4800 Bank Street (Remer Lands), Phase 1, Leitrim development Area, prepared by IBI (August 2017).
- City of Ottawa Sewer Design Guidelines (October 2012)
- Ottawa Design Guidelines - Water Distribution (July 2010)

1.5 Site Servicing

The objective of the site servicing design is to provide proper sewage outlets, a suitable domestic water supply and to ensure that appropriate fire protection is provided for the proposed development. The servicing criteria, the expected sewage flows, and the water demands are to conform to the City of Ottawa municipal design guidelines for sewer and water distribution systems.

The City of Ottawa Servicing Study Guidelines for Development Applications requires that a Development Servicing Study Checklist be included to confirm that each applicable item is deemed complete and ready for review by City of Ottawa Infrastructure Approvals. Completed checklist is enclosed in **Appendix H** of the report.

The proposed development will be serviced by connecting to the existing watermain, sanitary and storm sewer stubs off Cedar Creek Drive that are constructed as a part of the subdivision servicing works. The water, sanitary and storm services will be extended to the east to service the proposed commercial development. An 11m wide service easement will be provided on residential property.

Refer to General Plan of Services (124107-GP1) enclosed in **Appendix H** for detailed site servicing information.

2.0 WATER SERVICING

2.1 Existing Water Servicing

There is a 250mm diameter watermain stub connected to the existing 250mm diameter watermain in Cedar Creek Drive that was constructed to service the site as a part of the subdivision servicing works.

2.2 Proposed Water Servicing

The proposed development will be serviced by the existing 250mm diameter service stub that was constructed as a part of subdivision works. A second 250mm diameter watermain connection to the Cedar Creek Drive watermain is provided to meet the City of Ottawa requirements for developments with basic day demand exceeding 50 m^3/day. Since each of the proposed buildings water demand exceeds 50 m3/day, both buildings are provided with two water service connections to the looped section of the proposed watermain with a valve between the two connections. This will assure uninterrupted water supply to each of the proposed buildings in case of the watermain failure at any single point in the system.

Fire protection for the proposed residential development will be provided from the existing fire hydrants in Cedar Creek Drive and Dun Skipper Drive.

A 250mm watermain will be extended to the east to service the proposed commercial development.

2.2.1 Proposed Development Domestic Water Demands

The City of Ottawa design criteria were used to calculate the theoretical water demands for the proposed development. The following design criteria were taken from Section 4 – 'Water Distribution Systems' of the Ottawa Design Guidelines – Water Distribution:

- Residential Units (1-Bedroom or Studio): 1.4 people per unit
- Residential Units (2-Bedroom): 2.1 people per unit
- Residential Units (3-Bedroom): 3.1 people per unit
- Average Daily Residential Water Demand: 280 L/person/day (ISTB-2021-03)
- Maximum Day Demand Peaking Factor = 3.2 x Avg. Day Demand (MOE Table 3-3)
- Peak Hour Demand Peaking Factor = 4.8 x Avg. Day Demand (MOE Table 3-3)

The calculated water demands are summarized in **Table 2.1** below. Detailed calculations are included in **Appendix C**.

Table 2.1: Domestic Water Demand

Proposed Development	Ave. Daily Demand (L/s)	Max. Daily Demand (L/s)	Peak Hour Demand(L/s)
Building 1	0.71	2.28	3.42
Building 2	0.57	1.83	2.74
Total Demand	**1.28**	**4.11**	**6.16**

2.2.2 Proposed Development Fire Protection System

The proposed buildings will fully sprinklered. Water supply for fire protection will be provided from the existing municipal hydrants in Cedar Creek Drive and Dun Skipper Drive. A fire department siamese connection will be provided on the west facade of each building within 45m unobstructed path to the closest hydrant in Cedar Creek Drive.

The Fire Underwriters Survey (FUS) was used to estimate fire flow requirements for the proposed buildings. The fire flow calculations have been based on the building information provided by the client (non-combustible construction and fully sprinklered buildings).

The calculated fire flow demands are summarized in **Table 2.2**. The detailed FUS fire flow calculations are included in **Appendix C**.

Table 2.2: Fire Underwriters Survey (FUS) Fire Flow

Building 1	Building 2
183 L/s (11,000 L/min)	200 L/s (12,000 L/min)

It is anticipated that a multi-hydrant approach to firefighting will be required to supply adequate FUS fire flow to the proposed development. There are currently five (5) Class AA (blue bonnet) hydrants within 150m of the proposed site. Based on the City of Ottawa Technical Bulletin ISTB-2018-02, Class AA hydrants within 75m have a maximum capacity of 95 L/s while hydrants between 75m and 150m have a maximum capacity of 63 L/s (at a pressure of 20 PSI). Refer to the hydrant sketch in **Appendix C** showing the approximate distances from the existing hydrants to the proposed buildings.

Table 2.3 summarizes the theoretical combined fire flow available from the nearby municipal fire hydrants and compares it to the fire flow demands based on the FUS calculations.

Table 2.3: **Theoretical Fire Protection Summary Table**

Proposed Development	FUS Fire Flow Demand (L/s)	Fire Hydrants within 75m (~ 95 L/s each)	Fire Hydrants within 150m (~ 63 L/s each)	Theoretical Combined Available Fire Flow (L/s)
Building 1	**183**	2	2	**~316**
Building 2	**200**	2	2	**~316**

The theoretical combined maximum flow from these hydrants exceeds the FUS fire flow requirements for the proposed development.

2.2.3 Commercial Development Domestic and Fire Flow Demands

The domestic water demands for the proposed development were calculated based on the following criteria from Section 8 of the Ontario Building Code and the peaking factors as per the City of Ottawa Water Distribution Design Guidelines.

- Grocery Store Water Demand
  - per each 9.25 m^2 of floor space excluding delicatessen, bakery and meat departments = 40L/day

  - per each 9.25 m^2 of delicatessen floors space = 150 L/day
  - per each 9.25 m^2 of bakery floors space = 190 L/day
  - per each 9.25 m^2 of meat department floors space = 190 L/day
  - per water closed = 950 L/day
- Discount Store Water Demand
  - per each 1.0 m^2 floor space = 5 L/day
- Retail Store Water Demand
  - per each 1.0 m^2 floor space = 5 L/day
- Bank Water Demand
  - per each 9.3m^2 floor space = 75 L/day
- Dental Office Water Demand
  - Per wet service chair = 275 L/day
- Quick Service Restaurant Water Demand
  - per seat = 125 L/day
- Peak Factor
  - Max Day = 1.5
  - Peak Hour = 1.8

The calculated water demands are summarized in **Table 2.3** below. Detailed calculations are included in **Appendix C**.

Table 2.3: Domestic Water Demand

Proposed Development	Ave. Daily Demand (L/s)	Max. Daily Demand (L/s)	Peak Hour Demand(L/s)
Building A &B	0.33	0.50	0.89
Building C	0.14	0.21	0.37
Building D	0.04	0.06	0.12
Total Demand	**0.51**	**0.77**	**1.38**

The Fire Underwriters Survey (FUS) was used to estimate fire flow requirements for the proposed buildings. The fire flow calculations have been based on the building information provided by the client.

The calculated fire flow demands are summarized in **Table 2.4**. The detailed FUS fire flow calculations are included in **Appendix C**.

Table 2.4: Fire Underwriters Survey (FUS) Fire Flow

Building A & B	Building C	Building D
183 L/s (11,000 L/min)	100 L/s (6,000 L/min)	67 L/s (4,000 L/min)

2.2.4 Watermain Hydraulic Analysis

The above domestic water demands, and fire flow requirements were provided to the City of Ottawa. These values were used to generate the municipal watermain network boundary conditions at the service connection point at Cedar Creek Drive. **Table 2.5 and Table 2.6**

summarize the information provided by the City for two conditions: Existing Condition (Pre-SUC Zone reconfiguration), and Future Condition (Post-SUC Zone Reconfiguration).

Table 2.25: Existing Condition (Pre-SUC Zone Reconfiguration)

Demand Scenario	Head (m)	Pressure (psi)*
Maximum HGL	154.6	77.4
Peak Hour	142.1	59.6
Max Day + Fire Flow	122.3	31.6

Table 2.26: Future Condition (Post-SUC Zone Reconfiguration)

Demand Scenario	Head (m)	Pressure (psi)*
Maximum HGL	147.3	67.0
Peak Hour	144.7	63.3
Max Day + Fire Flow	138.3	54.2

The following design criteria were taken from Section 4.2.2 – 'Watermain Pressure and Demand Objectives' of the City of Ottawa Design Guidelines for Water Distribution:

- Maximum system pressure is not to exceed 552 kPa (80 psi)
- Minimum system pressures are to be >276 kPa (40 psi) under Peak Hour demand
- Minimum system pressures are to be >140 kPa (20 psi) under Max Day + Fire Flow demand

The hydraulic model EPANET was used for the purpose of analysing the performance of the proposed watermain. The model is based on the watermain boundary conditions provided by the City of Ottawa at the connections to the existing municipal watermain in Cedar Creek Drive.

A schematic representation of the hydraulic network in enclosed in **Appendix C**. The schematic depicts the junction and pipe numbers used in the model.

The modelling highlights the system pressures during 1) Maximum Day + Fire Flow Demand, 2) Peak Hour Demand, and 3) Average Day Demand conditions. The residential domestic water demands are applied at the building services (J13 and J14). The commercial fire flow demands, are applied at the proposed fire hydrant locations (J5, and J9) and the commercial domestic water demands are applied at the building services (J2, J7, and J10). The residential fire flow demands were not included in the model since the fire protection for the residential development will be provided from the existing municipal hydrants in Cedar Creek Drive and Dun Skipper Drive.

Tables 2.6, 2.7, and 2.8 summarize the demands and hydraulic model results under the various operating conditions. Refer to **Appendix C** for detailed modelling results.

Table 2.6: Hydraulic Model Results – Maximum Day + Fire Flow Demand

Pressure Zone	Operating Condition	Minimum Pressure
Current (Pre SUC)	Max Day + Fire Flow Demand	138.9 kPa (20.1 psi)
Future (Post SUC)	Max Day + Fire Flow Demand	295.9 kPa (42.9 psi)

Table 2.7: Hydraulic Model Results – Peak Hour Demand

Pressure Zone	Operating Condition	Minimum Pressure
Current (Pre SUC)	Peak Hour Demand	390.8 kPa (56.7 psi)
Future (Post SUC)	Peak Hour Demand	416.3 kPa (60.4 psi)

Table 2.8: Hydraulic Model Results – Average Day Demand

Pressure Zone	Operating Condition	Maximum Pressure
Current (Pre SUC)	Average Day Demand	560.3 kPa (81.3 psi)
Future (Post SUC)	Average Day Demand	488.7 kPa (70.9 psi)

Based on the preceding analysis, the proposed watermain system will provide adequate system pressures to the proposed development. Due to high pressure (>80 psi) under the Pre SUC Pressure Zone Reconfiguration, a pressure reducing valve will be required to be installed in the commercial Building A & B as per the Ontario Building Code (OBC).

3.0 SANITARY SERVICING

3.1 Existing Sanitary Sewer

There is a 300mm diameter sanitary service stub connected to the existing 300mm sewer in Cedar Creek Drive that was constructed to service the subject site as a part of the subdivision servicing works.

3.2 Proposed Sanitary Services

The proposed residential development will be serviced the existing 300mm diameter sewer stub off Cedar Creek Drive. A monitoring manhole will be provided near the property line as per the City of Ottawa standards. The proposed buildings will be provided with 200mm diameter services.

A 250mm diameter sanitary sewer will be extended to the west to service the proposed commercial development.

3.2.1 Peak Sanitary Flows

The theoretical peak sanitary flow for the proposed development was calculated based on the following criteria from the City of Ottawa Sewer Design Guidelines.

- Residential Units (1-Bedroom): 1.4 people per unit
- Residential Units (2-Bedroom): 2.1 people per unit
- Residential Units (3-Bedroom): 3.1 people per unit
- Average Daily Residential Sewage Flow: 280 L/person/day (ISTB-2018-01)
- Residential Peaking Factor calculated by the Harmon Equation
- Infiltration Allowance: 0.33 L/s/ha

The peak sanitary flow calculations are summarized below in **Table 3.1**. Detailed calculations are included in **Appendix D**.

Table 3.1: Peak Sanitary Flow Summary

Proposed Development	Peak Flow (L/s)	Infiltration Flow (L/s)	Total Peak Flow (L/s)
Residential	4.39	0.33	4.72

3.2.2 Commercial Development Sanitary Flows

The proposed commercial development upstream of the subject site will consist of five buildings, including grocery store, discount store, retail store, dental office and quick service restaurant, and bank. The theoretical peak sanitary flow for the proposed commercial development was calculated based on the following criteria from Section 8 of the Ontario Building Code and the peak factor and infiltration rate as per the City of Ottawa Sewer Design Guidelines.

- Grocery Store Sewage Volume
  - per each 9.25 m^2 of floor space excluding delicatessen, bakery and meat departments = 40L/day
  - per each 9.25 m^2 of delicatessen floors space = 150 L/day
  - per each 9.25 m^2 of bakery floors space = 190 L/day
  - per each 9.25 m^2 of meat department floors space = 190 L/day
  - per water closed = 950 L/day
- Discount Store Sewage Volume
  - per each 1.0 m^2 floor space = 5 L/day
- Retail Store Sewage Volume
  - per each 1.0 m^2 floor space = 5 L/day
- Bank Water Sewage Volume
  - per each 9.3m^2 floor space = 75 L/day
- Dental Office Sewage Volume
  - Per wet service chair = 275 L/day
- Quick Service Restaurant Sewage Volume
  - per seat = 125 L/day
- Commercial Peak Factor = 1.5
- Infiltration Rate = 0.33 L/s/ha

The peak sanitary flow calculations are summarized below in **Table 3.2**. Detailed calculations are included in **Appendix D**.

Table 3.2: Peak Sanitary Flow Summary

Proposed Development	Peak Flow (L/s)	Infiltration Flow (L/s)	Total Peak Flow (L/s)
Commercial	0.77	0.64	1.40

The existing 300mm diameter sanitary sewer stub @ 0.24% slope has a full flow capacity of 49.4 L/s which is sufficient to service the proposed residential and commercial developments.

3.2.3 Pathways at Findlay Creek Sanitary Flow Allotment

The Design Brief, Pathways at Findlay Creek, 4800 Bank Street (Remer Lands), Phase 1, Leitrim Development Area, prepared by IBI (August 2017) provides sanitary flow allotment for the subject site.

The peak sanitary flow from the subject site calculated in the IBI Design Brief is 3.46 L/s. Refer to Appendix D for a copy of the Sanitary Drainage Area Plan and the Sanitary Sewer Design sheet from the design brief.

The combined peak sanitary flow from the commercial and future residential developments exceeds the sanitary flow allotment for the sites by 2.66 L/s (1.40 + 4.72 - 3.46). Based on a review of the Sanitary Design Sheet from the IBI design brief, there is 21.6 L/s spare capacity in the downstream system to accommodate the proposed development.

As per discussions with the City of Ottawa, the City's Infrastructure Services Department has no immediate concerns with increasing the sanitary flows from the subject site. As requested by the City, the Sanitary Sewer Design Sheet for the subdivision has been updated using the increased sanitary flows from the site, and the current criteria from the City of Ottawa Sewer Design Guidelines (e.g. 280 L/c/day average residential flow, 28,000 L/d/ha average commercial flow, 0.33 L/s/ha infiltration). Based on the updated design sheet included in Appendix D, there is adequate capacity within the subdivision sewer system to accommodate increase in sanitary flows from the proposed commercial and residential developments.

Refer to **Appendix D** for e-mail correspondence with the City and the updated Sanitary Sewer Design Sheet.

4.0 STORM SERVICING AND STORMWATER MANAGEMENT

4.1 Existing Conditions

There is a 900mm storm service stub connected to the existing 1500mm diameter storm sewer in Cedar Creek Drive that was constructed to service the site as a part of the subdivision servicing works.

4.2 Stormwater Management Criteria

4.2.1 Stormwater Quality Control

Stormwater quality control for the site is provided downstream in the Findlay Creek Village Stormwater Facility. On-site stormwater quality measures are not required.

4.2.2 Stormwater Quantity Control

The stormwater quantity control criteria for the site are based on the *Design Brief, Pathways at Findlay Creek, 4800 Bank Street (Remer Lands), Phase 1, Leitrim Development Area, prepared by IBI (August 2017).*

The allowable release rate for the 3.01 ha block of land included in the subdivision design is 562 L/s. The allowable release rate is based on the 5-year flow, modeled in the IBI Design Brief. Refer to Section 4.9.2 Storm and Drainage Areas parameters - Future Lands and Table 4.4 from the IBI Design Brief included in **Appendix E** for details.

The above allowable release rate is prorated to the 1.00 ha commercial development site area as follows: (562 L/s / 3.01 ha) x 1.00 ha = 187 L/s. All flows in excess of 187 L/s up to and including 1:100-year design event will be controlled and stored on site.

4.3 Proposed Conditions

The proposed development will be serviced by an on-site storm sewer system connected to the existing 900mm dia. concrete storm sewer stub. The on-site storm sewer system will include storm sewers ranging in size from 250mm to 825mm in diameter.

The proposed 825mm diameter storm sewer will be extended to the west to service the proposed commercial development.

The proposed storm drainage and stormwater management design for the site is discussed in the following sections of the report.

4.3.1 Area A-1 Direct Runoff

Stormwater runoff from this sub-catchment area will sheet drain to Cedar Creek Drive. The post-development flow from area was calculated using the Rational Method to be 4.2 L/s during the 5-year design event and 8.3 L/s during the 100-year design event.

4.3.2 Area A-2 Uncontrolled Site Flows

Stormwater runoff from the proposed ramp to Building 1 u/g garage will be collected by an internal trench drain at the bottom of the ramp and will flow uncontrolled to the proposed building service via internal mechanical plumbing. The post-development flow from this sub-catchment area was calculated using the Rational Method to be 1.6 L/s during the 5-year design event and 3.0 L/s during the 100-year design event.

4.3.3 Area A-3 Uncontrolled Site Flows

Stormwater runoff from this sub-catchment area will sheet drain to Cedar Creek Drive. The post-development flow from this area was calculated using the Rational Method to be 3.7 L/s during the 5-year design event and 7.6 L/s during the 100-year design event.

4.3.4 Area A-4 Uncontrolled Site Flows

Stormwater runoff from the proposed ramp to Building 2 u/g garage will be collected by an internal trench drain at the bottom of the ramp and will flow uncontrolled to the proposed building service via internal mechanical plumbing. The post-development flow from this sub-catchment area was calculated using the Rational Method to be 2.9 L/s during the 5-year design event and 5.5 L/s during the 100-year design event.

4.3.5 Area A-5 Controlled Site Flows

Stormwater runoff from this sub-catchment area will be captured by the proposed landscape drains, CBMH 204, CBMH 205 and CBMH 206, and will be attenuated by an ICD installed in the CBMH 204 outlet pipe. Adequate storage for all storms up-to and including the 100-year storm event will be provided underground in the oversized storm pipes, and on the parking lot surface. There will be no surface ponding during the 2-year storm event.

Table 4.1 summarizes the post-development design flow from this sub-catchment area as well as the type of ICD, the anticipated water storage elevations in the system, storage volumes required and storage volume provided for the 2-year, 5-year and the 100-year design events.

Table 4.1: Stormwater Flows, ICD & Surface Storage

Design Event	Controlled Site Flows from Area A-5					
	ICD Type	Peak Flow	Water Storage Elevation	Average Flow (50% Qpeak)	Storage Volume Required	Max Storage Provided
2-Year	Circular Plug Type 117mm dia. Orifice	27.3 L/s	0cm ponding (97.95 m)	13.7 L/s	4.8 m³	50.2 m³
5-Year		34.7 L/s	0 cm ponding (98.48 m)	17.4 L/s	7.3 m³	
100-Year		47.8 L/s	17cm ponding (99.72 m)	23.9 L/s	20.7 m³	

Refer to **Appendix E** for detailed SWM calculations.

4.3.6 Area A-6 Uncontrolled Site Flows

Stormwater runoff from this sub-catchment area will drain to the proposed CB 1, CBMH 201, CBMH 202 and CBMH 203, and will flow uncontrolled to the Cedar Creek Drive storm sewer. The post-development flow from this area was calculated using the Rational Method to be 48.0 L/s during the 5-year design event, and 93.3 L/s during the 100-year design event.

4.3.7 Area R1: Building 1 Controlled Flow Roof Drains

The post-development flow from Building 1 will be attenuated by eight (8) Watts Adjustable flow control roof drains prior to being directed to the proposed storm service.

Table 4.2 summarizes the post-development design flows from this sub-catchment area as well as the type of roof drains, the maximum anticipated ponding depths, storage volumes required, and storage volumes provided for both the 5-year and the 100-year design events.

Table 4.2: Design Flow and Roof Drain Table

Roof Drain ID	Watts Roof Drain Model ID (Weir Opening)	Controlled Flow per Drain (L/s)		Approx. Ponding Depth Above Drain (cm)		Storage Volume Required (m^3)		Max. Storage Available (m^3)
		5-Yr	100-Yr	5-Yr	100-Yr	5-Yr	100-Yr	
RD-1	RD-100-A-ADJ (Fully Exposed)	1.26	1.58	10	13	5.0	11.3	14.7
RD-2	RD-100-A-ADJ (Fully Exposed)	1.26	1.58	10	14	4.8	10.8	13.9
RD-3	RD-100-A-ADJ (1/2 Exposed)	0.95	1.10	10	13	1.6	4.0	5.4
RD-4	RD-100-A-ADJ (1/2 Exposed)	0.95	1.10	10	13	3.1	7.4	10.3
RD-5	RD-100-A-ADJ (Fully Exposed)	1.26	1.58	11	14	5.5	12.3	15.3
RD-6	RD-100-A-ADJ (1/2 Exposed)	0.95	1.10	10	13	4.1	9.5	12.8
RD-7	RD-100-A-ADJ (1/2 Exposed)	0.95	1.10	10	13	4.1	9.5	12.8
RD-8	RD-100-A-ADJ (1/2 Exposed)	0.95	1.10	10	13	3.7	8.6	12.7
Total Roof	**-**	**8.5**	**10.2**	**-**	**-**	**32.0**	**73.3**	**98.0**

Refer to **Appendix E** for detailed SWM calculations and to **Appendix F** for roof drain information. As indicated in the table above, the building roof will provide sufficient storage for both the 5-year and 100-year design events.

4.3.8 Area R2: Building 2 Controlled Flow Roof Drains

The post-development flow from Building B will be attenuated by six (6) Watts Adjustable flow control roof drains prior to being directed to the proposed storm service connected to Empress.

Table 4.3 summarizes the post-development design flows from this sub-catchment area as well as the type of roof drains, the maximum anticipated ponding depths, storage volumes required, and storage volumes provided for both the 5-year and the 100-year design events.

Table 4.3: Design Flow and Roof Drain Table

Roof Drain ID	Watts Roof Drain Model ID (Weir Opening)	Controlled Flow per Drain (L/s)		Approx. Ponding Depth Above Drain (cm)		Storage Volume Required (m^3)		Max. Storage Available (m^3)
		5-Yr	100-Yr	5-Yr	100-Yr	5-Yr	100-Yr	
RD-1	RD-100-A-ADJ (Fully Exposed)	1.26	1.58	10	13	4.3	9.7	13.0
RD-2	RD-100-A-ADJ (Fully Exposed)	1.26	1.58	10	13	5.8	12.9	17.2

RD-3	RD-100-A-ADJ (1/2 Exposed)	0.95	1.10	10	13	1.6	4.0	5.2
RD-4	RD-100-A-ADJ (1/2 Exposed)	0.95	1.10	10	13	3.6	8.4	11.3
RD-5	RD-100-A-ADJ (Fully Exposed)	1.26	1.58	10	13	5.0	11.3	14.8
RD-6	RD-100-A-ADJ (Fully Exposed)	1.26	1.58	11	14	6.0	13.4	16.6
Total Roof	**-**	**6.9**	**8.5**	**-**	**-**	**26.3**	**59.7**	**78.0**

Refer to **Appendix E** for detailed SWM calculations and to **Appendix G** for roof drain information. As indicated in the table above, the building roof will provide sufficient storage for both the 5-year and 100-year design events.

4.3.9 Stormwater Flow Summary

Table 4.4 provides a summary of the total post-development flows from the site to be developed.

Table 4.7: Stormwater Flows Summary

Post - Development Site Flows			
Area ID	***Area (ha)***	**5-Year Flow (L/s)**	**100-Year Flow (L/s)**
A-1	0.031	4.2	8.3
A-2	0.006	1.6	3.5
A-3	0.043	3.7	7.6
A-4	0.011	2.9	5.5
A-5	0.246	34.7	47.8
A-6	0.293	48.0	93.3
R-1	0.206	8.5	10.2
R-2	0.164	6.9	8.5
Totals :	**1.000**	**110.4**	**184.2**

As indicated in **Table 4.7** the total post-development flow from the site will be released from the proposed development at a combined maximum rate of 184.0 L/s during the 1:100-year design event, and 110.3 L/s during the 1:5-year event, both of which are less than the allowable flow for the site of 187 L/s.

The proposed storm sewer system has sufficient capacity to convey the post-development flows from both, the proposed residential and commercial developments. Refer to Storm Drainage Area Plan and Storm Sewer Design Sheet enclosed in **Appendix E**.

5.0 GEOTECHNICAL INVESTIGATIONS

A geotechnical Investigation report has been prepared by Patterson Group for the proposed development. Refer to the Geotechnical Investigation Proposed Commercial Development, 4828 Bank Street, Report PG 7262-1, dated October 4, 2024).

6.0 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 (catch basin inserts) will be placed in existing and proposed catch basins and catch basin 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 mat will be installed at the site entrance,
- 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. These measures will be implemented prior to the commencement of construction and maintained in good order until vegetation has been established.

7.0 CONCLUSIONS AND RECOMMENDATIONS

This report has been prepared in support of the Site Plan Control applications for the proposed development. The conclusions are as follows:

Watermain

- The proposed development will be serviced by an on-site watermain system connected to the existing 250mm diameter watermain stub in Cedar Creek Drive.
- The water supply for fire protection will be provided from the existing fire hydrants in Cedar Creek Drive and Dun Skipper Drive.
- The proposed watermain system will provide adequate water supply and pressures to the proposed development.

Sanitary Servicing

- The proposed development will be serviced by the existing 300mm diameter sanitary sewer stub connected to the existing 300mm diameter sanitary sewer in Cedar Creek Drive.
- There is adequate capacity within the proposed sanitary sewers and existing sanitary infrastructure to service the proposed development.

Stormwater Management

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

- The proposed development will be serviced by an on-site storm sewer system connected to the existing 900mm diameter storm sewer stub off Cedar Creek Drive.
- Stormwater quality control for the site is provided downstream in the Findlay Creek Village Stormwater Facility.
- The proposed development will control the 100-year peak flows from the site to 5-year allowable release rate provided in the Pathways at Findley Creek subdivision design.
- There will be no surface ponding on the parking lot for the 2-year storm event.
- Parking lot is graded to ensure that ponding depths for storms greater than the 100-year event do not exceed 0.30m.
- Major overland flow routes are provided to Cedar Creek Drive.

It is recommended that the proposed site servicing and stormwater management design be approved for implementation.

NOVATECH

Prepared by:

Miroslav Savic, P.Eng.
Senior Project Manager
Land Development Engineering

Reviewed by:

J. Lee Sheets, C.E.T.
Director
Land Development & Public Sector Infrastructure

APPENDIX A

Correspondence

File No.: PC2024-0404

October 21, 2024

James Ireland
Novatech
Via email: j.ireland@novatech-eng.com

Subject: **Pre-Consultation: Meeting Feedback**
Proposed Zoning By-law Amendment & Site Plan Control Application – 150 Dun Skipper Drive

Please find below information regarding next steps as well as consolidated comments from the above-noted pre-consultation meeting held on October 15, 2024.

Pre-Consultation Preliminary Assessment

1 ☐	**2** ☐	**3** ☐	**4** ☒	**5** ☐

One (1) indicates that considerable major revisions are required while five (5) suggests that the proposal appears to meet the City's key land use policies and guidelines. This assessment is purely advisory and does not consider technical aspects of the proposal or in any way guarantee application approval.

Consultation with Technical Agencies

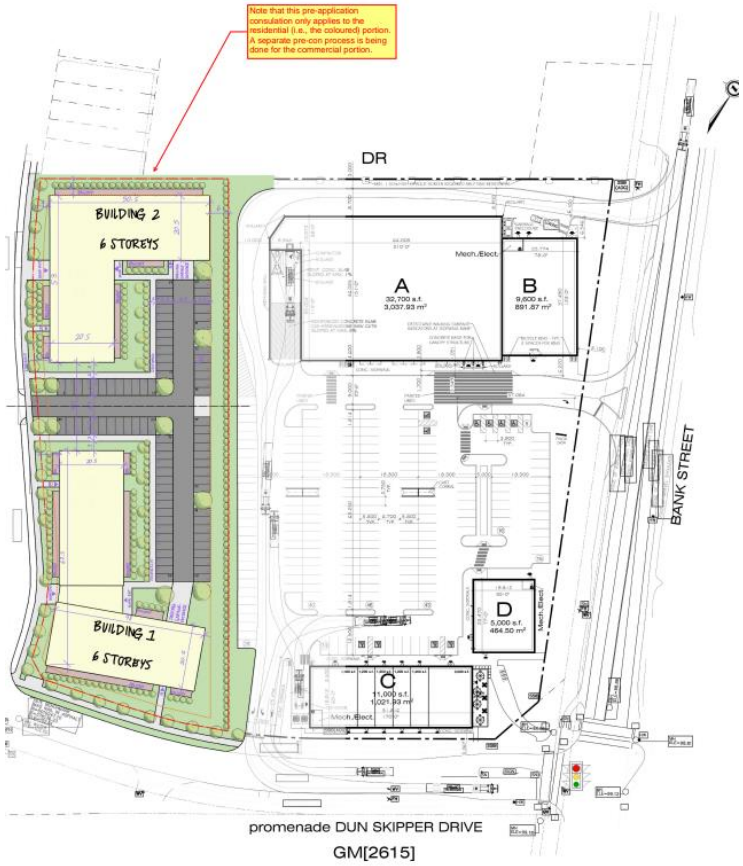
1. You are encouraged to consult with technical agencies early in the development process and throughout the development of your project concept. A list of technical agencies and their contact information is enclosed.

Planning

Comments:

1. The site is designated Mainstreet Corridor in the Suburban Transect and it falls within the Evolving Neighbourhood overlay. It is currently zoned General Mixed-Use [GM].

2. Based on the pre-consultation meeting, the plan is to sever 150 Dun Skipper Drive into two properties, one of which is the portion subject to this pre-consultation (the residential portion shown in colour below). The severance is planned to be submitted after the site plan application for the commercial portion is submitted.



3. The proposed development is for 240 residential units within two six-storey buildings (mid-rise) with a mix of surface and underground parking. Mid-rise apartment buildings are a permitted use in the GM zone.

    a. The proposed development is coming in for Site Plan Control and a Minor Zoning By-law Amendment. The requested minor Zoning By-law Amendment seeks to increase the maximum building height to just below 20m due to the wood framing used for the building and to reduce required residential parking from 1.2 spaces per unit to 1 space per unit. Please provide rationale for both in the planning rationale submitted with the Zoning By-law Amendment application.

4. The provision of a new housing typology to this area is appreciated and helps create more diversity in housing options.

5. The orientation of the buildings to frame Cedar Creek Drive and Dun Skipper Drive is appreciated.

6. Official Plan policies to make note of:

a. The Suburban Transect supports the gradual evolution towards 15-minute neighbourhoods and new greenfield development should consider how it is contributing to the 15-minute neighbourhood.

b. Within the Suburban Transect active transportation linkages are encourged between residential areas and places of retail. Please consider pedestrian connections between the residential development and the shopping centre. It was discussed during the pre-consultation that a pedestrian connection will be provided, this should be included on the site plan and landscape plan in the formal submission.

c. Section 4.6.6 in the Official Plan speaks to the sensitive integration of new development including requirements for transitions in building heights. Built form transition between a Corridor and a surrounding Low-rise area should occur within the Corridor. Please discuss how the proposed buildings will transition to the low-rise neighbourhood in the Planning Rationale for the Zoning By-law Amendment.

d. Consider as you are developping the landscape plan for the site reducing the urban heat island effect by improving access to shade and other cooling amenities (refer to Section 2.2.3 of the Official Plan).

e. As per Policy 11 in Section 4.1.4 of the Official Plan, surface parking lots should provide safe, direct and well-defined pedestrian and cycling connections and the provision of electric vehicle charging spaces and dedicated car share spaces are encouraged. Please consider this when developing the parking plans for the two buildings.

7. The site is located within the Leitrim Community Design Plan area. Policies and guidelines to make note of:

    a. Leitrim is identified as a developing community with the goal of being compact and mixed-use. The proposed site is located within one of the three mixed-use centres along Bank Street. Each of the mixed-use centres are required to have a composite site plan demonstrating how all the land uses will work together. Further direction on this requirement will be provided shortly.

8. Zoning provisions to make note of:

    a. Bicycle parking is required at the rates set out in Table 111A in the zoning by-law. The bicycle parking spaces should be in a location that is convenient to access from main entrances or well-used areas. Please refer to Section 111 for additional bicycle parking provisions.

b. Amenity area is required at the rate set out in Table 137 in the zoning by-law.

c. A rear yard setback of 7.5 metres is required for any portion of a rear lot line abutting a residential zone.

d. Please provide the floor space index on the site plan.

9. There is Archaeological Potential on 150 Dun Skipper Drive therefore an archaeological assessment is required.

10. Section 37 requirements / Community Benefits Charge applies.

    a. The former Section 37 regime has been replaced with a "Community Benefits Charge", By-law No. 2022-307, of 4% of the land value. This charge will be required for ALL buildings that are 5 or more storeys and 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. Questions regarding this change can be directed to Ranbir.Singh@ottawa.ca.

11. The site falls within the Airport Vicinity Development Zone and the Airport Zoning Regulations. Please reach out to Delroy Brown (delroy.brown@yow.ca) to confirm any studies or requirements. We recommend doing this early in the process.

12. While preparing the required plans and studies please refer to the City's Terms of Reference to ensure all components of the plans/studies are provided.

Feel free to contact Tess Peterman, Development Review Planner, for follow-up questions.

Urban Design

Submission Requirements:

13. Urban Design Brief is required. Please see attached customized Terms of Reference to guide the preparation.

    a. The Urban Design Brief should be structured by generally following the headings highlighted under Section 3 – Contents of these Terms of Reference.

    b. The proposal is not subject to the Urban Design Review Panel.

14. Additional drawings and studies are required as shown on the SPIL. Please follow the terms of references (Planning application submission information and materials | City of Ottawa) while preparing these drawings and studies. This includes:
    a. Design Brief
    b. Site Plan
    c. Landscape Plan
    d. Elevations
    e. Floor plans (conceptual)

Comments:

Applicants are to provide a response to these comments in the Urban Design Brief.

15. The following policy and guidelines apply:
    a. Leitrim CDP – Mixed Use Centre
    b. Bird Friendly Design Guidelines
16. For each of the Mixed-Use areas along Bank Street, a composite site plan for the entire Mixed-Use area must be approved prior to the first development application for the area. This composite site plan must demonstrate how all land uses will work together, including surrounding land uses, how the CDP's guidelines can be achieved, and how individual proposals will fit within the overall plan.
17. Consider providing public access through the site from Pingwi Place to Bank, as this will be a desire line for residents. Please ensure that direct safe, pedestrian connections are provided.
18. Landscaping and street trees should be provided along public roadway frontages.
19. Please provide tree planting on-site.
20. Please determine an appropriate ground floor program based on the assessment of streetscape character. For instance – are individual ground floor entries and terraces appropriate?
21. Please align front setbacks with buildings to the north to create a consistent streetscape.

22. Please consider transition between this development and surrounding residential to the north – for instance, consider screening landscaping and removing overlooking balconies from upper floors

Feel free to contact Lisa Stern, Urban Design Planner, for follow-up questions.

Engineering

Comments:

23. The Stormwater Management Criteria, for the subject site, is to be based on the Design Brief, Pathways at Findlay Creek, 4800 Bank Street (Remer Lands), Phase 1, Leitrim Development Area, prepared by IBI (August 2017)

    a. Pre-development flow is to be controlled to 562 L/s for the entire block (1140 Cedar Creek, 1500 Cedar Creek, 150 Dun Skipper and 4828 Bank). Release rate for the proposed site needs to be calculated based on the above mentioned release rate.

    a. Quality control is provided by the Findlay Creek Stormwater Management Facility; however, best management practices and a treatment train approach are recommended for this development.

24. Deep Services (Storm, Sanitary and/or Water Supply)

    a. Storm, sanitary, and water services have been dropped at the west side of the site, connecting to municipal infrastructure along Cedar Creek Drive, consisting of:

        a. 900 mm dia. concrete storm sewer

        b. 300 mm dia. concrete sanitary sewer

        c. 254 mm PVC watermain

    b. It is the applicants responsibility to ensure easements and private infrastructure agreements are considered/established for this application.

    c. A sanitary monitoring maintenance hole is required, placed as close to the property line as possible.

    d. Perimeter water meters will be required for this development.

25. An MECP Environmental Compliance Approval **Private Sewage Works** may be required for the proposed development. A Ministry contact has been provided below but please work with City staff on the need (or not) of an application.

a. Shannon Hamilton-Browne at (613) 521-3450 or Shannon.Hamilton-Browne@ontario.ca

26. Water

    a. Water Boundary condition requests must include the location of the service (map or plan with connection location(s) indicated) and the expected loads required by the proposed development, including calculations. Please provide the following information:

        i. Location of service

        ii. Type of development

        iii. The amount of fire flow required (per OBC or FUS).

        iv. Average daily demand: ___ l/s.

        v. Maximum daily demand: ___l/s.

        vi. Maximum hourly daily demand: ___ l/s.

27. Sewer (sanitary and storm)

    a. If sanitary demands are greater than what was allocated for this block (cumulatively) in the subdivision level study, then confirmation of available capacity must be confirmed. Contact the Infrastructure Project Manager, Tyler Cassidy, P.Eng., with proposed sanitary demands.

28. Background studies: **Design Brief, Pathways at Findlay Creek, 4800 Bank Street (Remer Lands), Phase 1**, Leitrim Development Area, prepared by IBI (August 2017)

Feel free to contact Tyler Cassidy, P.Eng., Project Manager, for follow-up questions.

Noise

Comments:

29. In support of the Site Plan application, Noise Impact Studies are required for the following:

    a. Road, as the site is within proximity to Bank St.

    b. Aircraft, as the site falls within the Airport Vicinity Development Zone.

c. Stationary, due to the proximity to neighboring exposed mechanical equipment or other noise generating sources due and/or if there will be any exposed mechanical equipment due to the proximity to neighboring noise sensitive land uses.

Feel free to contact Josiane Gervais, TPM, for follow-up questions.

Transportation

Comments:

30. Follow Transportation Impact Assessment Guidelines:

    a. Note that the TIA Guidelines have been updated, the changes are available on the City's website.

    b. A Transportation Impact Assessment is required. Please submit the Scoping/Forecasting report to josiane.gervais@ottawa.ca at your earliest convenience, or as part of the Phase 2 pre-con package. The applicant is responsible to submit the Scoping Report prior to application and must allow for a 14 day circulation period.

    c. The Strategy Report must be submitted with the formal submission to deem complete. The applicant is strongly encouraged to submit the Strategy Report to the TPM prior to formal submission and allow for a 14 day circulation period.

    d. If an RMA is required to support the proposed development, the functional plan and/or RMA plans must be submitted with the formal submission to deem complete. Request base mapping asap if RMA is required, contact Engineering Services

31. ROW Protection:

    a. Ensure that the development proposal complies with the Right-of-Way protection requirements of the Official Plan's Schedule C16.

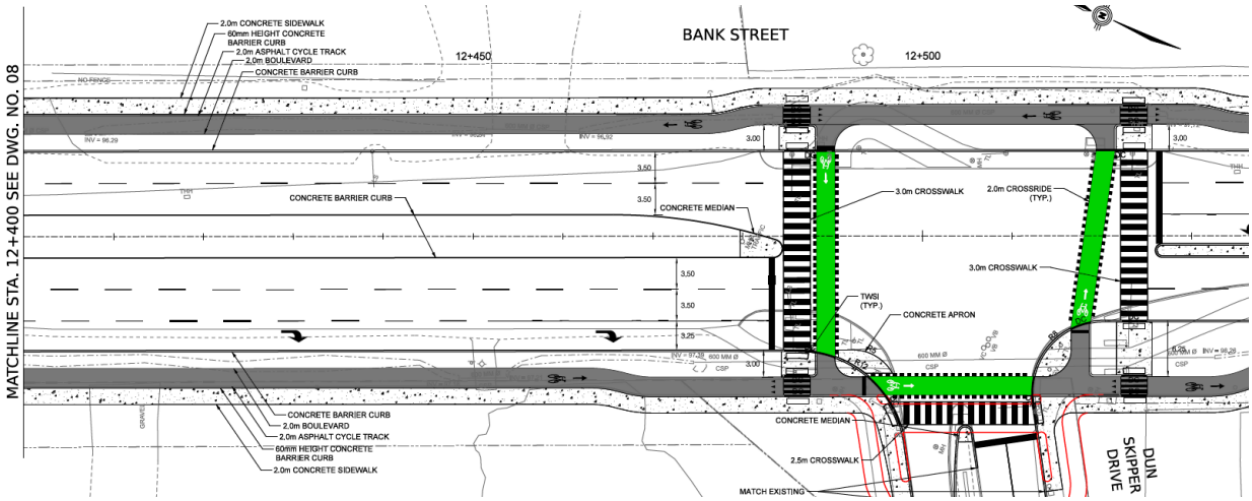
    b. Any requests for exceptions to ROW protection requirements must be discussed with Transportation Planning and concurrence provided by Transportation Planning management.

    c. When applicable, ROW must be unincumbered and conveyed at no cost to the City. Note that conveyance of the ROW/corner triangle will be required prior to registration of the SP agreement. Additional information on the conveyance process can be provided upon request.

32. Corner clearances should follow minimum distances set out within TAC Figure 8.8.2.

33. TMP includes Bank Street widening (2031 Affordable Network) from Leitrim to Rideau. Note that the widening from Leitrim to Blais is tentatively scheduled to start this year.

34. EA of Bank Street widening is complete and is shown below. Note there is no timeline nor funding confirmed for this work.



35. Ensure the existing transit stop (#0496) along the property frontage is adequately shown on the Site Plan.

36. As the site proposed is residential, AODA legislation applies for all areas accessible to the public (i.e. outdoor pathways, parking, etc.).

37. On site plan:

    a. Ensure site access meets the City's Private Approach Bylaw.

    b. Show all details of the roads abutting the site; include such items as pavement markings, accesses and/or sidewalks.

    c. Show dimensions for site elements (i.e. lane/aisle widths, access width and throat length, parking stalls, sidewalks, pedestrian pathways, etc.)

    d. Show all curb radii measurements; ensure that all curb radii are reduced as much as possible and fall within TAC guidelines (Figure 8.5.1).

    e. Sidewalks are to be provided on Dun Skipper and Cedar Creek Dr frontages.

f. Sidewalk is to be continuous across access as per City Specification 7.1.

g. Turning movement diagrams required for all accesses showing the largest vehicle to access/egress the site.

h. Turning movement diagrams required for internal movements (loading areas, garbage).

i. Show slope of garage ramp on site plan. Note that underground ramps should be limited to a 12% grade and must contain a subsurface melting device when exceeding 6%. Ramp grades greater than 15% can be psychological barriers to some drivers. When the underground parking ramp's break over slope exceeds 8%, a vertical-curve transition or a transition slope of half the ramp slope should be used. Without this transition, bottoming out of vehicles may occur.

j. Grey out any area that will not be impacted by this application.

Feel free to contact Josiane Gervais, Transportation Project Manager, for follow-up questions.

Environment

Comments:

38. There are no natural heritage features, surface water features, or species-at-risk habitat on or near the site that would trigger the need for an Environmental Impact Statement (EIS). An EIS is not required for either the zoning or site plan applications.

39. This site is located in the Leitrim / Remer-Idone Environmental Management Plan area and will be expected to conform with the recommendations of that report.

    While an initial City review of that document did not reveal any potential issues, it remains the applicant's responsibility to ensure that the development is in agreement with all recommendations of the EMP.

40. The buildings will be required to incorporate mitigation measures from the City's Bird Safe Design Guidelines. Of particular note is Guideline 2, regarding glazing treatment for 90% of all glazing below 16m in height.

41. This site is located in the Airport Bird Hazard Zone, which affects the type of trees that should be planted on site. Fruit-bearing trees are discouraged to reduce the chances of birds nesting close to the airport. A full list of trees to avoid will be provided.

42. Additional tree plantings to help meet the City's urban forest canopy goals, as well as to reduce the impacts of climate change and the urban heat island effect, are always encouraged. Please note that the City prefers that all plantings be of native and non-invasive species.

Feel free to contact Mark Elliott, Environmental Planner, for follow-up questions.

Forestry

Comments:

43. A Tree Conservation Report and Landscape Plan (LP) are submission requirements for the Site Plan Control Application. If the Zoning By-law Amendment is submitted in advance, please provide a conceptual LP. This would show it's feasible to plant trees on the site with the zoning proposed.

44. If underground parking is proposed, there should be at least 3 m of seperation between the garage walls and the lot line to leave space for trees. This is a provision proposed in the new zoning by-law.

45. Plant large canopy trees along the lot line that separates the residential lot from the commercial lot.

46. Overall am supportive of the first concept that shows street trees, trees within the parking area and throughout the development. Please maximize planting of native large canopy species in remaining openings. The City is working towards a 40% canopy cover target (OP section 4.8.2).

47. Tree Conservation Report requirements. The following Tree Conservation Report (TCR) requirements have been adapted from the Schedule E of the Urban Tree Protection Guidelines – for more information on these requirements please contact hayley.murray@ottawa.ca

    a. A Tree Conservation Report (TCR) must be supplied for review along with the suite of other plans/reports required by the City

    b. Any tree 10 cm in diameter or greater and City-owned trees of any diameter requires a tree permit issued under the Tree Protection Bylaw (Bylaw 2020 – 340); the permit will be based on an approved TCR and made available at or near plan approval.

    c. The TCR must contain 2 separate plans/maps:

        i. Plan/Map 1 - show existing conditions with tree cover information.

ii. Plan/Map 2 - show proposed development with tree cover information.

d. The TCR must list all trees on site, as well as off-site trees if the CRZ (critical root zone) extends into the developed area, by species, diameter, and health condition. Please note that averages can be used if there are forested areas.

e. Please identify trees by ownership – private onsite, private on adjoining site, city owned, co-owned (trees on a property line)

f. If trees are to be removed, the TCR must clearly show where they are, and document the reason they cannot be retained.

g. The removal of trees on a property line will require the permission of both property owners.

h. 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

i. 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.

j. Removal of a City tree is not permitted unless justified. If justified, monetary compensation for the value of the tree must be paid before a tree removal permit is issued.

48. Landscape Plan (LP) requirements.

a. Landscape Plan Terms of Reference must be adhered to for all tree planting: Click Here. For more information on these requirements please contact hayley.murray@ottawa.ca

49. Additional Elements for Tree Planting in the Right of Way:

a. Please ensure any retained trees are shown on the LP

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

c. Soil Volume - Please demonstrate as per the Landscape Plan Terms of Reference that the available soil volumes for new plantings will meet or exceed the minimum soil volumes requested.

d. The city requests that consideration be given to planting native species wherever there is a high probability of survival to maturity.

e. Efforts shall be made to provide as much future canopy cover as possible at a site level, through tree planting and tree retention. The Landscape Plan shall show/document that the proposed tree planting and retention will contribute to the City's overall canopy cover over time. Please provide a projection of the future canopy cover for the site to 40 years

f. Minimum Setbacks

    i. Maintain 1.5m from sidewalk or MUP/cycle track or water service laterals.

    ii. Maintain 2.5m from curb

    iii. Coniferous species require a minimum 4.5m setback from curb, sidewalk, or MUP/cycle track/pathway.

    iv. 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.

    v. Adhere to Ottawa Hydro's planting guidelines (species and setbacks) when planting around overhead primary conductors.

g. Tree specifications

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

    ii. Maximize the use of large deciduous species wherever possible to maximize future canopy coverage.

    iii. Tree planting on city property shall be in accordance with the City of Ottawa's Tree Planting Specification; and if possible, include watering and warranty as described in the specification.

    iv. No root barriers, dead-man anchor systems, or planters are permitted.

v. No tree stakes unless necessary (and only 1 on the prevailing winds side of the tree)

h. Hard surface planting

i. If there are hard surface plantings, a planting detail must be provided.

ii. Curb style planters are highly recommended.

iii. No grates are to be used and if guards are required, City of Ottawa standard (which can be provided) shall be used.

iv. Trees are to be planted at grade.

Feel free to contact Hayley Murray, Planning Forester, for follow-up questions.

Parkland

Comments:

50. The proposed development site is served by several recently developed parks in Leitrim including Miikana Park, Salamander Park and Dun Skipper Park. Salamander Park is the nearest park and is located approximately 100m from 150 Dun Skipper Drive.

51. Parkland dedication at a 2% commercial parkland dedication rate was provided for Block 241 on Plan 4M-1617 when the Pathways at Findlay Creek Phase 1 subdivision agreement was registered (4800 Bank Street, File No. D07-16-03-0018).

52. Cash-in-lieu of parkland dedication will be required as a condition of site plan approval for the proposed residential development.

53. The following is a draft of the parkland dedication condition for the future delegated authority report.

    The Owner agrees to provide cash-in-lieu of parkland dedication on the subject lands within Ward 22 such value of the land to be determined by the City's Realty Services Branch, to the satisfaction of the General Manager, Recreation, Cultural and Facility Services. The Owner further agrees to pay for the cost of the appraisal inclusive of HST. In accordance with the *Planning Act* and the City of Ottawa Parkland Dedication By-law No. 2022-280, a land area of 800 m^2 has been calculated for the cash-in-lieu of parkland dedication requirement. If there is a change to the number of net residential units or the gross land area of the apartment land uses, the amount of cash-in-lieu of parkland dedication may also

change. The parkland dedication requirement may also change if the Parkland Dedication By-law is amended. The land area for the cash-in-lieu of parkland requirement has been calculated as follows:

Table 1: Estimated Cash-in-lieu of Parkland Dedication Requirement, 150 Dun Skipper Drive (Block 241 on Plan 4M-1617)

Land Use	Net Residential Units	Gross Land Area	Cash-in-lieu of Parkland Dedication Rate	Parkland Dedication Requirement
Mid-Rise Apartment (residential units)	240	10,009.87 m^2	1 ha per 1,000 net residential units up to 10% of the gross land area	1,001 m^2
Commercial		19,272.67 m^2	2% of gross land area	385 m^2
Credit for previous parkland dedication at subdivision agreement registration (commercial land use)		29,283 m^2	2% of gross land area	(586 m^2)
Net Parkland Dedication Requirement				800 m^2

The cash-in-lieu of parkland dedication shall be directed 60% towards the Ward 22 cash-in-lieu of parkland reserve (Account 830311) and 40% towards the City-wide cash-in-lieu of parkland reserve (Account 830015).

54. In the event that any affordable residential units or attainable residential units are proposed to be included in the development, please note that subsection 42 (3.0.3) of the *Planning Act* indicates that affordable residential units and attainable residential units as defined in subsection 4.1 (1) of the *Development Charges Act* shall be excluded from the number of net residential units for the purpose of applying the alternative residential parkland dedication rate.

Feel free to contact Burl Walker, Parks Planner, for follow-up questions.

Other

55. The High-Performance Development Standard (HPDS) is a collection of voluntary and required standards that raise the performance of new building projects to achieve sustainable and resilient design and will be applicable to Site Plan Control and Plan of Subdivision applications.

    a. The HPDS was passed by Council on April 13, 2022, but is not in effect at this time, as Council has referred the 2023 HPDS Update Report back to staff with the direction to bring forward an updated report to Committee at a later date. The timing of an updated report to Committee is unknown at this time, and updates will be shared when they are available.

    b. Please refer to the HPDS information at ottawa.ca/HPDS for more information.

56. Under the Affordable Housing Community Improvement Plan, a Tax Increment Equivalent Grant (TIEG) program was created to incentivize the development of affordable rental units. It provides a yearly fixed grant for 20 years. The grant helps offset the revenue loss housing providers experience when incorporating affordable units in their developments.

    a. To be eligible for the TIEG program you must meet the following criteria:

        i. the greater of five units OR 15 per cent of the total number of units within the development must be made affordable

        ii. provide a minimum of 15 per cent of each unit type in the development as affordable

        iii. enter into an agreement with the city to ensure the units maintain affordable for a minimum period of 20 years at or below the city-wide average market rent for the entire housing stock based on building form and unit type, as defined by the Canada Mortgage and Housing Corporation

        iv. must apply after a formal Site Plan Control submission, or Building Permit submission for projects not requiring Site Plan Control, and prior to Occupancy Permit issuance

    b. Please refer to the TIEG information *at Affordable housing community improvement plan / Plan d'améliorations communautaires pour le logement abordable for more details or contact the TIEG coordinator via email at affordablehousingcip@ottawa.ca.*

Submission Requirements and Fees

1. Site Plan Control – Complex and Minor Zoning By-law Amendment applications are required.
    a. Additional information regarding fees related to planning applications can be found here.
2. The attached **Study and Plan Identification List** outlines the information and material that has been identified as either required (R) or advised (A) as part of a future complete application submission.
    a. The required plans and studies must meet the City's Terms of Reference (ToR) and/or Guidelines, as available on Ottawa.ca. These ToR and Guidelines outline the specific requirements that must be met for each plan or study to be deemed adequate.
3. All of the above comments or issues should be addressed to ensure the effectiveness of the application submission review.

Should there be any questions, please do not hesitate to contact myself or the contact identified for the above areas / disciplines.

Yours Truly,
Tess Peterman

Encl. SPC – Study and Plan Identification List
ZBLA – Study and Plan Identification List
Urban Design Brief TOR
List of Technical Agencies
Airport Bird Hazard Plant Species
ADS Site Plan Checklist
HPDS Overview for Applicants
HPDS Example Checklist

c.c. Kelby Lodoen Unseth
Tyler Cassidy
Lisa Stern
Josiane Gervais
Mark Elliott
Hayley Murray
Burl Walker
Amy MacPherson

APPENDIX B

Site Plan

1 SITE PLAN
1 : 300

SITE INFORMATION & DEVELOPMENT STATISTICS

LOTS		PIN
		04328 - 4465 (LT)
ZONING		GM[2615]
SITE AREA		
TOTAL SITE AREA:		~10,009.87 m² (1ha)
UNITS		
BUILDING 1:		
RESIDENTIAL:		131 UNITS
BUILDING 2:		
RESIDENTIAL:		106 UNITS
TOTAL NUMBER OF UNITS:		237 UNITS

SPECIFIC PROVISIONS	REQUIRED	PROVIDED
MINIMUM LOT AREA	NO MIN.	10,009.87 m²
MINIMUM LOT WIDTH	NO MIN.	-
SETBACKS		
MINIMUM FRONT YARD:	3 m	3 m
MINIMUM CORNER SIDE YARD:	3 m	3 m
MINIMUM INTERIOR SIDE YARD:		
NON-RESIDENTIAL OR MIXED-USE:	5 m	-
RESIDENTIAL HEIGHT ≤ 11m :	1.2 m	-
RESIDENTIAL HEIGHT > 11m :	3 m	6.09 m
MINIMIM REAR YARD:		
ABUTTING A STREET:	3 m	-
FROM A RESIDENTIAL ZONE:	7.5 m	7.5 m
FOR A RESIDENTIAL BUILDING:	7.5 m	7.5 m
MAXIMUM BUILDING HEIGHT	18 m	19.5 m
MAXIMUM FLOOR SPACE INDEX	2	1.71

PARKING RATES	REQUIRED	PROVIDED
BUILDING 1:		
R12 - APARTEMENTS	1.2 p/unit = 157	131 (1.0 p/unit)
VISITOR:	0.2 p/unit = 26	26 (0.2 p/unit)
BUILDING 2:		
R12 - APARTEMENTS	1.2 p/unit = 127	106 (1.0 p/unit)
VISITOR:	0.2 p/unit = 21	21 (0.2 p/unit)
		TOTAL: 284

BIKE PARKING	REQUIRED	PROVIDED
BUILDING 1:	0.5 p/unit = 66	66
BUILDING 2:	0.5 p/unit = 53	53

AMENITY AREA	REQUIRED	PROVIDED
BUILDING 1:		
PRIVATE:	3m² p/unit = 393m²	1,040m²
SHARED:	3m² p/unit = 393m²	987m²
BUILDING 2:		
PRIVATE:	3m² p/unit = 318m²	927m²
SHARED:	3m² p/unit = 318m²	567m²

GFA - CITY OF OTTAWA	PROVIDED
BUILDING 1:	9,538m²
BUILDING 2:	7,537m²

WASTE CALCULATIONS	REQUIRED	PROVIDED
BUILDING 1 (131 UNITS):		
GARBAGE (COMPACTED):	0.053v³ p/unit = 6.94v³	2 x 4v³ CONTAINER
RECYCLING (FEL GMP):	0.018v³ p/unit = 2.36v³	1 x 4v³ CONTAINER
RECYCLING (FEL FIBRE):	0.038v³ p/unit = 4.98v³	2 x 4v³ CONTAINER
ORGANICS:	240L p/50 units = 2.62	3 x 240L CONTAINER
BUILDING 2 (106 UNITS):		
GARBAGE (COMPACTED):	0.053v³ p/unit = 5.62v³	2 x 4v³ CONTAINER
RECYCLING (FEL GMP):	0.018v³ p/unit = 1.91v³	1 x 4v³ CONTAINER
RECYCLING (FEL FIBRE):	0.038v³ p/unit = 4.02v³	1 x 4v³ CONTAINER
ORGANICS:	240L p/50 units = 2.12	3 x 240L CONTAINER

*EACH BUILDING HAS AN UNDERGROUND COLLECTION ROOM (SEE UNDERGROUND PARKING PLANS. THE COLLECTION DAY, THE CONTAINER ARE BRING UP TO THE COLLECTION PAD.

NOTE

1. ASSUME TYPICAL RESIDENTIAL FLOOR HEIGHT OF 3m.

2. THE BASE PLAN (LOT LINES, EXISTING ROADS AND SURROUNDING AREAS) IS BASED ON THE TOPOGRAPHICAL PLAN OF SURVEY OF J.D. BARNES LIMITED - REFERENCE NUMBER 24-10-059-00.

3. DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0,3048.

SITE PLAN LEGEND

- LOT LINE
- SETBAKCS
- ELECTRICS LINES
- EASEMENTS
- PROTECTION ZONE
- 0000 GEO — GEO ELEVATION
- EXISTING BUILDING
- BUILDING TO BE DEMOLISHED
- GRASS
- CONCRETE
- CONCRETE BALCONY
- NEW DECIDUOUS TREE
- NEW SHRUBS
- NEW CONIFEROUS TREE
- TWSI
- PAVERS
- RADIANT ZONE
- PEA GRAVEL
- ASPHALT
- LANDSCAPE

PROJECT

FINDLAY CREEK DEVLEOPMENT

150 DUN SKIPPER DRIVE, GLOUCESTER, ON K1X 0G2

OWNER

MAVERICK DEVELOPMENT CORPORATION
209 WICKSTEED AVENUE, SUITE 30
TORONTO, ON M4G 0B1

ARCHITECT

PMA ARCHITECTES
(418) 651-8954
INFO@PMAARCHITECTES.COM
3070, CHEMIN DES QUATRE-BOURGEOIS
QUÉBEC (QC) G1W 2K4
PMAARCHITECTES.COM

CIVIL / LANDSCAPE / PLANNER

NOVATECH
Engineers, Planners & Landscape Architects
NOVATECH
240 MICHAEL COWPLAND DRIVE, SUITE 200,
OTTAWA, ON K2M 1P6

SURVEYOR

J.D. BARNES LIMITED
62 STEACIE DRIVE, SUITE 103,
KANATA, ON K2K 2A9

STRUCTURAL

MECHANICAL

KEY PLAN

ARCHITECT SEAL

REVISIONS

NO	DESCRIPTION	DATE
2	FOR CITY REVIEW	2025-01-17
1	FOR COORDINATION	2024-12-17

NOTE

IT IS THE RESPONSIBILITY OF THE APPROPRIATE CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON THE SITE AND TO REPORT ALL ERRORS AND/OR OMISSIONS TO THE ARCHITECT. ALL CONTRACTORS MUST COMPLY WITH ALL PERTINENT CODES AND BY-LAWS. DO NOT SCALE DRAWINGS.

DO NOT USE FOR CONSTRUCTION

DATE	DESIGNED
2025-04-08	P.POMERLEAU
	DRAWN P.POMERLEAU
PROJECT No 24061	CHECKED P.MARTIN

SHEET TITLE

SITE PLAN

SHEET No

A101

Autodesk Docs://FINDLAY CREEK/24061_FINDLAY_CREEK_SITE_R24.rvt

APPENDIX C

Water Demands, FUS Calculations, Boundary Conditions

150 DUN SKIPPER DRIVE
RESIDENTIAL DEVELOPMENT WATER DEMAND

BUILDING 1 NUMBER OF UNITS

1 BED	79	
Persons per 1 BED Unit	1.4	
2 BED	52	
Persons per 2 BED Unit	2.1	
Population	220	

BUILDING 2 NUMBER OF UNITS

1 BED	66	
Persons per 1 BED Unit	1.4	
2 BED	40	
Persons per 2 BED Unit	2.1	
Population	176	

Total Population	396	
Average Day Demand	280	L/c/day
Average Day Demand	111	m^3/day

Maximum Day Demand Peak Factor per MOE Table 3-3	3.2	
Maximum Day Demand Peak Factor per MOE Table 3-3	5.1	

Building 1 Average Day Demand	0.71	L/s
Building 1 Maximum Day Demand	2.28	L/s
Building 1 Average Day Demand	3.63	L/s

Building 2 Average Day Demand	0.57	L/s
Building 2 Maximum Day Demand	1.83	L/s
Building 2 Average Day Demand	2.92	L/s

Total Average Day Demand	**1.28**	**L/s**
Total Maximum Day Demand	**4.11**	**L/s**
Total Peak Hour Demand	**6.55**	**L/s**

FUS - Fire Flow Calculations

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 124107
Project Name: 150 Dun Skipper
Date: 11/17/2024
Input By: MS
Reviewed By:
Drawing Reference:

Legend: Input by User
No Input Required
Reference: Fire Underwriter's Survey Guideline (2020)
Formula Method

Building Description: Buillding 1 (6-Storey Appartment Building)
Type II - Non-combustible construction

Step			Choose		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		1.5	0.8	
		Type IV - Mass Timber		Varies		
		Type III - Ordinary construction		1		
		Type II - Non-combustible construction	Yes	0.8		
		Type I - Fire resistive construction (2 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	1996			
		Number of Floors/Storeys	6			
		Protected Openings (1 hr) if C<1.0				
		Area of structure considered (m^2)			**7,984**	
	F	**Base fire flow without reductions**				**16,000**
		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%	**13,600**
		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%	**-5,440**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	No	-10%		
				Cumulative Sub-Total	**-40%**	
		Area of Sprinklered Coverage (m^2)	11976	100%		
				Cumulative Total	**-40%**	
5	**Exposure Surcharge**		**FUS Table 5**		**Surcharge**	
	(3)	North Side	20.1 - 30 m		10%	**2,720**
		East Side	>30m		0%	
		South Side	>30m		0%	
		West Side	20.1 - 30 m		10%	
				Cumulative Total	**20%**	
Results						
6	**(1) + (2) + (3)**	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**11,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**183**
				or	USGPM	2,906

FUS - Fire Flow Calculations

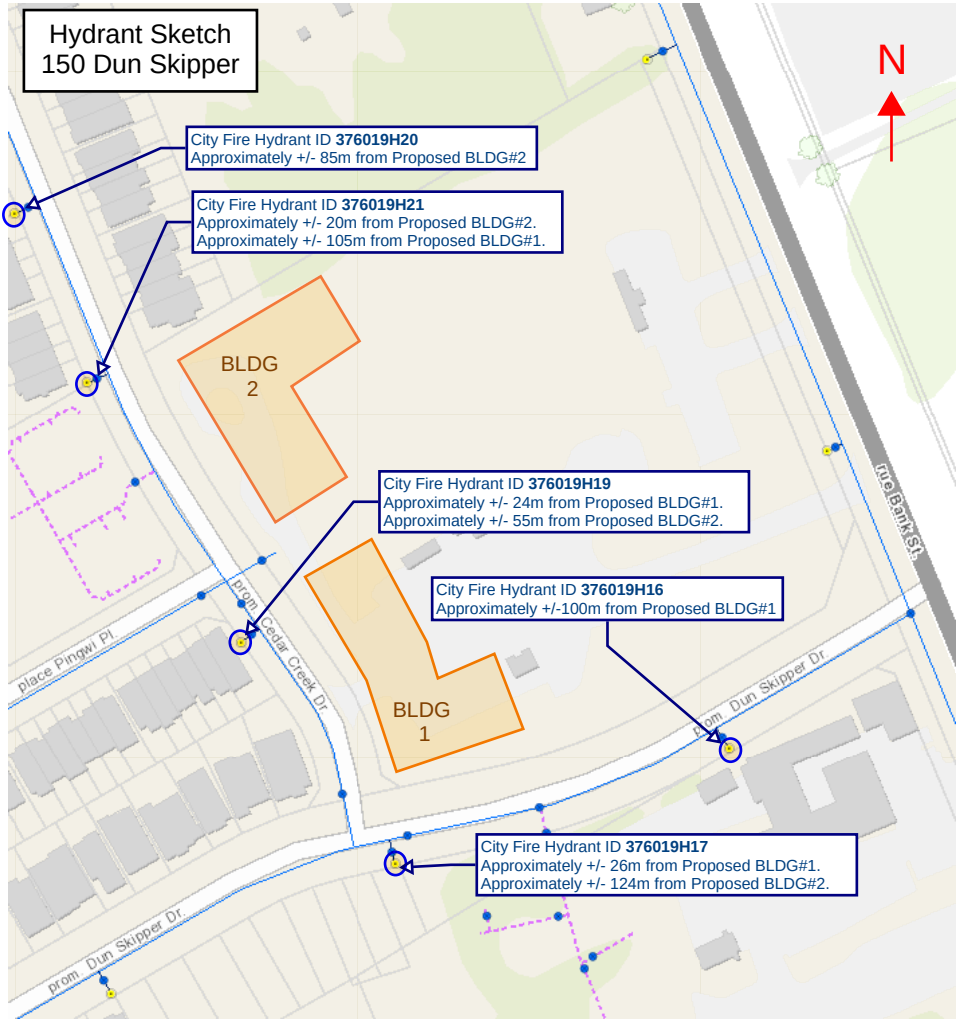
NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 124107
Project Name: 150 Dun Skipper
Date: 11/17/2024
Input By: MS
Reviewed By:
Drawing Reference:

Legend: Input by User
No Input Required
Reference: Fire Underwriter's Survey Guideline (2020)
Formula Method

Building Description: Building 2 (6-Storey Appartment Building)
Type II - Non-combustible construction

Step			Choose		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		1.5	0.8	
		Type IV - Mass Timber		Varies		
		Type III - Ordinary construction		1		
		Type II - Non-combustible construction	Yes	0.8		
		Type I - Fire resistive construction (2 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	1580			
		Number of Floors/Storeys	6			
		Protected Openings (1 hr) if C<1.0				
		Area of structure considered (m^2)			**6,320**	
	F	**Base fire flow without reductions**				**14,000**
		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%	**11,900**
		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%	**-4,760**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	No	-10%		
				Cumulative Sub-Total	**-40%**	
		Area of Sprinklered Coverage (m^2)	9480	100%		
				Cumulative Total	**-40%**	
5	**Exposure Surcharge**		**FUS Table 5**		**Surcharge**	
	(3)	North Side	10.1 - 20 m		15%	**4,760**
		East Side	10.1 - 20 m		15%	
		South Side	20.1 - 30 m		10%	
		West Side	>30m		0%	
				Cumulative Total	**40%**	
Results						
6	**(1) + (2) + (3)**	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**12,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**200**
				or	USGPM	3,170


Hydrant Sketch
150 Dun Skipper
N
City Fire Hydrant ID 376019H20
Approximately +/- 85m from Proposed BLDG#2
City Fire Hydrant ID 376019H21
Approximately +/- 20m from Proposed BLDG#2.
Approximately +/- 105m from Proposed BLDG#1.
BLDG 2
City Fire Hydrant ID 376019H19
Approximately +/- 24m from Proposed BLDG#1.
Approximately +/- 55m from Proposed BLDG#2.
City Fire Hydrant ID 376019H16
Approximately +/-100m from Proposed BLDG#1
BLDG 1
City Fire Hydrant ID 376019H17
Approximately +/- 26m from Proposed BLDG#1.
Approximately +/- 124m from Proposed BLDG#2.
prom Cedar Creek Dr
prom Dun Skipper Dr
prom Dun Skipper Dr
prom Dun Skipper Dr
rue Bank St

150 DUN SKIPPER DRIVE
COMMERCIAL DEVELOPMENT WATER DEMAND

Daily Demands Per OBC Table 8.2.1.3. B

Grocery Store (Building A):		
Daily Volume per 9.25 m^2 of floor space, excluding delicatessen, bakery, and meet department	40	L/day
Daily Volume per 9.25 m^2 of delicatessen floor space	190	L/day
Daily Volume per 9.25 m^2 of bakery floor space	190	L/day
Daily Volume per 9.25 m^2 of meet department floor space	380	L/day
Daily Volume per Water Closet, and	950	L/day
Discount Store (Building B):		
Daily Volume per 1.0 m^2 of floor space	5	L/day
Retail Store (Building C):		
Daily Volume per 1.0 m^2 of floor space	5	L/day
Quick Service Restaurants (Builidng C):		
Daily Volume per seat	125	L/day
Dental Office (Building C):		
Per wet service chair	275	L/day
Bank (Building D):		
Daily Volume per 9.3 m^2 of floor space	75	L/day
Grocery store floor area excluding delicatessen, bakery, and meet department	2,745	m^2
Delicatessen floor area	90	m^2
Bakery floor area	133	m^2
Meet department floor area	70	m^2
Number of grocery store water closets	5	
Discount Store floor area	892	m^2
Retail Store floor area	297	m^2
Quick Service Restaurants number of seats	70	
Dental Office number of chairs	6	
Bank floor area	464	m^2
Total Daily Demand	44,163	L/day
Average Day Demand	**0.51**	**L/s**
Maximum Day Demand (1.5 x avg. day)	**0.77**	**L/s**
Peak Hour Demand (1.8 x max. day)	**1.38**	**L/s**

150 DUN SKIPPER DRIVE
BUILDING A&B WATER DEMAND

Daily Demands Per OBC Table 8.2.1.3. B

<u>Grocery Store (Building A):</u>		
Daily Volume per 9.25 m^2 of floor space, excluding delicatessen, bakery, and meet department	40	L/day
Daily Volume per 9.25 m^2 of delicatessen floor space	190	L/day
Daily Volume per 9.25 m^2 of bakery floor space	190	L/day
Daily Volume per 9.25 m^2 of meet department floor space	380	L/day
Daily Volume per Water Closet, and	950	L/day
<u>Discount Store (Building B):</u>		
Daily Volume per 1.0 m^2 of floor space	5	L/day
Grocery store floor area excluding delicatessen, bakery, and meet department	2,745	m^2
Delicatessen floor area	90	m^2
Bakery floor area	133	m^2
Meet department floor area	70	m^2
Number of grocery store water closets	5	
Discount Store floor area	892	m^2
Total Daily Demand	28,536	L/day
Average Day Demand	**0.33**	**L/s**
Maximum Day Demand (1.5 x avg. day)	**0.50**	**L/s**
Peak Hour Demand (1.8 x max. day)	**0.89**	**L/s**

150 DUN SKIPPER DRIVE
BUILDING C WATER DEMAND

Daily Demands Per OBC Table 8.2.1.3. B

Retail Store (Building C):		
Daily Volume per 1.0 m^2 of floor space	5	L/day
Quick Service Restaurants (Builidng C):		
Daily Volume per seat	125	L/day
Dental Office (Building C):		
Per wet service chair	275	L/day
Retail Store floor area	297	m^2
Quick Service Restaurants number of seats	70	
Dental Office number of chairs	6	
Total Daily Demand	11,885	L/day
Average Day Demand	**0.14**	**L/s**
Maximum Day Demand (1.5 x avg. day)	**0.21**	**L/s**
Peak Hour Demand (1.8 x max. day)	**0.37**	**L/s**

150 DUN SKIPPER DRIVE
BUILDING D WATER DEMAND

Daily Demands Per OBC Table 8.2.1.3. B

Bank (Building D):

Daily Volume per 9.3 m^2 of floor space	75	L/day
Bank floor area	464	m^2
Total Daily Demand	3,742	L/day
Average Day Demand	**0.04**	**L/s**
Maximum Day Demand (1.5 x avg. day)	**0.06**	**L/s**
Peak Hour Demand (1.8 x max. day)	**0.12**	**L/s**

FUS - Fire Flow Calculations

As per 2020 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 124107
Project Name: 150 Dun Skipper Drive
Date: September 16, 2024
Input By: MS
Reviewed By:

Legend: Input by User; No Information or Input Required

Building Description: Building A&B (1-Storey Commercial)
Type II - Non-combustible construction

Step			Choose		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		1.5	0.8	
		Type IV - Mass Timber		Varies		
		Type III - Ordinary construction		1		
		Type II - Non-combustible construction	Yes	0.8		
		Type I - Fire resistive construction (2 hrs)		0.6		
2	**Floor Area**					
	A	Building Area (m^2)	3930			
		Number of Floors/Storeys	1			
		Protected Openings (1 hr)				
		Area of structure considered (m^2)			**3,930**	
	F	**Base fire flow without reductions**				**11,000**
		F = 220 **C** (**A**)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**		**FUS Table 3**	**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	0%	**11,000**
		Limited combustible		-15%		
		Combustible	Yes	0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**		**FUS Table 4**	**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%	-30%	**0**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System		-10%		
				Cumulative Sub-Total	**-40%**	
		Area of Sprinklered Coverage (m^2)	0	0%		
				Cumulative Total	**0%**	
5	**Exposure Surcharge**		**FUS Table 6**		**Surcharge**	
	(3)	North Side	>30m		0%	**0**
		East Side	>30m		0%	
		South Side	>30m		0%	
		West Side	>30m		0%	
				Cumulative Total	**0%**	
Results						
6	**(1) + (2) + (3)**	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**11,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**183**
				or	USGPM	2,906

FUS - Fire Flow Calculations

As per 2020 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 124107
Project Name: 150 Dun Skipper Drive
Date: September 16, 2024
Input By: MS
Reviewed By:

Legend: Input by User; No Information or Input Required

Building Description: Building C (1-Storey Commercial)
Type II - Non-combustible construction

Step			Choose		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		1.5	0.8	
		Type IV - Mass Timber		Varies		
		Type III - Ordinary construction		1		
		Type II - Non-combustible construction	Yes	0.8		
		Type I - Fire resistive construction (2 hrs)		0.6		
2	**Floor Area**					
	A	Building Area (m^2)	1022			
		Number of Floors/Storeys	1			
		Protected Openings (1 hr)				
		Area of structure considered (m^2)			**1,022**	
	F	**Base fire flow without reductions**				**6,000**
		F = 220 **C** (**A**)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**		**FUS Table 3**	**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	0%	**6,000**
		Limited combustible		-15%		
		Combustible	Yes	0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**		**FUS Table 4**	**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%	-30%	**0**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System		-10%		
				Cumulative Sub-Total	**-40%**	
		Area of Sprinklered Coverage (m^2)	0	0%		
				Cumulative Total	**0%**	
5	**Exposure Surcharge**		**FUS Table 6**		**Surcharge**	
	(3)	North Side	>30m		0%	**0**
		East Side	>30m		0%	
		South Side	>30m		0%	
		West Side	>30m		0%	
				Cumulative Total	**0%**	
Results						
6	**(1) + (2) + (3)**	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**6,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**100**
				or	USGPM	1,585

FUS - Fire Flow Calculations

As per 2020 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

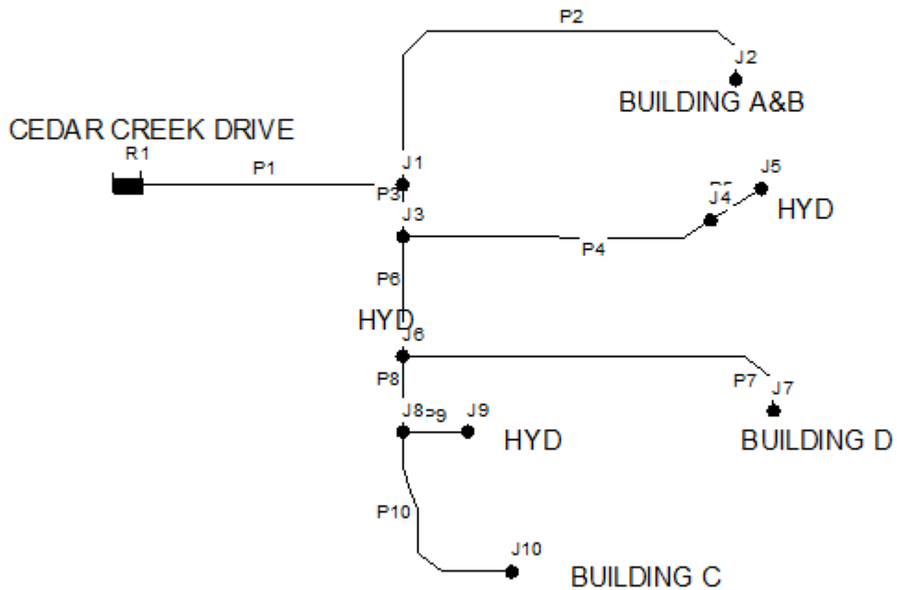
Novatech Project #: 124107
Project Name: 150 Dun Skipper Drive
Date: September 16, 2024
Input By: MS
Reviewed By:

Legend: Input by User; No Information or Input Required

Building Description: Building D (1-Storey Commercial)
Type II - Non-combustible construction

Step			Choose		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		1.5	0.8	
		Type IV - Mass Timber		Varies		
		Type III - Ordinary construction		1		
		Type II - Non-combustible construction	Yes	0.8		
		Type I - Fire resistive construction (2 hrs)		0.6		
2	**Floor Area**					
	A	Building Area (m^2)	465			
		Number of Floors/Storeys	1			
		Protected Openings (1 hr)				
		Area of structure considered (m^2)			**465**	
	F	**Base fire flow without reductions**				**4,000**
		F = 220 **C** (**A**)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**		**FUS Table 3**	**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	0%	**4,000**
		Limited combustible		-15%		
		Combustible	Yes	0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**		**FUS Table 4**	**Reduction**		
	(2)	Adequately Designed System (NFPA 13)		-30%		**0**
		Standard Water Supply		-10%		
		Fully Supervised System		-10%		
				Cumulative Sub-Total	**0%**	
		Area of Sprinklered Coverage (m^2)	0	0%		
				Cumulative Total	**0%**	
5	**Exposure Surcharge**		**FUS Table 6**		**Surcharge**	
	(3)	North Side	>30m		0%	**0**
		East Side	>30m		0%	
		South Side	>30m		0%	
		West Side	>30m		0%	
				Cumulative Total	**0%**	
Results						
6	**(1) + (2) + (3)**	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**4,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**67**
				or	USGPM	1,057

150 DUN SKIPPER DRIVE



150 DUN SKIPPER - RESIDENTIAL DEVELOPMENT
WATERMAIN MODELING RESULTS - CURRENT PRESSURE ZONE (PRE-SUC)

Maximum Day + Fire Flow Demand
Network Table - Nodes

Node ID	Elevation m	Demand LPS	Head m	Pressure m	kPa	psi
Junc J2	97.48	0.5	117.66	20.18	198.0	28.7
Junc J4	98.3	0	115.57	17.27	169.4	24.6
Junc J5	98.55	95	113.79	15.24	149.5	21.7
Junc J6	99.06	0	116.44	17.38	170.5	24.7
Junc J7	99.85	0.06	116.43	16.58	162.6	23.6
Junc J8	99.38	0	116.2	16.82	165.0	23.9
Junc J9	99.4	95	113.56	14.16	138.9	20.1
Junc J10	100.15	0.21	116.2	16.05	157.5	22.8
Junc J1	98.35	0	117.66	19.31	189.4	27.5
Junc J3	98.56	0	117.15	18.59	182.4	26.5
Junc J11	100.75	3.8	121.73	20.98	205.8	29.9
Junc J12	100.85	0	121.84	20.99	205.9	29.9
Junc J13	102.25	2.28	121.83	19.58	192.1	27.9
Junc J14	100.85	1.83	121.83	20.98	205.8	29.9
Resvr R1	122.3	-104.9	122.3	0	0.0	0.0
Resvr R2	122.3	-93.78	122.3	0	0.0	0.0

Maximum Day + Fire Flow Demand
Network Table - Links

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Unit Headloss m/km
Pipe P5	6.4	150	100	95	5.4	278.0
Pipe P7	89.2	50	100	0.06	0.0	0.1
Pipe P8	12.2	250	110	95.21	1.9	19.4
Pipe P9	9.5	150	100	95	5.4	278.0
Pipe P10	40.8	150	100	0.21	0.0	0.0
Pipe P2	157.1	200	110	0.5	0.0	0.0
Pipe P3	7.3	250	110	190.27	3.9	70.1
Pipe P4	81.8	250	110	95	1.9	19.4
Pipe P6	36.7	250	110	95.27	1.9	19.5
Pipe P11	57.8	250	110	190.77	3.9	70.4
Pipe P1	19.9	250	110	104.9	2.1	23.3
Pipe P12	5	250	110	100.79	2.1	21.6
Pipe P13	30.2	250	110	93.78	1.9	18.9
Pipe P14	10.4	150	100	2.28	0.1	0.3
Pipe P15	17.3	150	100	1.83	0.1	0.2

150 DUN SKIPPER - RESIDENTIAL DEVELOPMENT
WATERMAIN MODELING RESULTS - CURRENT PRESSURE ZONE (PRE-SUC)

Peak Hour Demand
Network Table - Nodes

Node ID	Elevation m	Demand LPS	Head m	Pressure m	kPa	psi
Junc J2	97.48	0.89	142.1	44.62	437.7	63.5
Junc J4	98.3	0	142.1	43.8	429.7	62.3
Junc J5	98.55	0	142.1	43.55	427.2	62.0
Junc J6	99.06	0	142.1	43.04	422.2	61.2
Junc J7	99.85	0.12	142.07	42.22	414.2	60.1
Junc J8	99.38	0	142.1	42.72	419.1	60.8
Junc J9	99.4	0	142.1	42.7	418.9	60.8
Junc J10	100.15	0.37	142.1	41.95	411.5	59.7
Junc J1	98.35	0	142.1	43.75	429.2	62.2
Junc J3	98.56	0	142.1	43.54	427.1	61.9
Junc J11	100.75	3.8	142.1	41.35	405.6	58.8
Junc J12	100.85	0	142.1	41.25	404.7	58.7
Junc J13	102.25	3.42	142.09	39.84	390.8	56.7
Junc J14	100.85	2.74	142.09	41.24	404.6	58.7
Resvr R1	142.1	-6.31	142.1	0	0.0	0.0
Resvr R2	142.1	-5.03	142.1	0	0.0	0.0

Peak Hour Demand
Network Table - Links

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Unit Headloss m/km
Pipe P5	6.4	150	100	0	0.0	0.0
Pipe P7	89.2	50	100	0.12	0.1	0.3
Pipe P8	12.2	250	110	0.37	0.0	0.0
Pipe P9	9.5	150	100	0	0.0	0.0
Pipe P10	40.8	150	100	0.37	0.0	0.0
Pipe P2	157.1	200	110	0.89	0.0	0.0
Pipe P3	7.3	250	110	0.49	0.0	0.0
Pipe P4	81.8	250	110	0	0.0	0.0
Pipe P6	36.7	250	110	0.49	0.0	0.0
Pipe P11	57.8	250	110	1.38	0.0	0.0
Pipe P1	19.9	250	110	6.31	0.1	0.1
Pipe P12	5	250	110	0.15	0.0	0.0
Pipe P13	30.2	250	110	5.03	0.1	0.1
Pipe P14	10.4	150	100	3.42	0.2	0.6
Pipe P15	17.3	150	100	2.74	0.2	0.4

150 DUN SKIPPER - RESIDENTIAL DEVELOPMENT
WATERMAIN MODELING RESULTS - FUTURE PRESSURE ZONE (POST-SUC)

Maximum Day + Fire Flow Demand
Network Table - Nodes

Node ID	Elevation m	Demand LPS	Head m	Pressure m	kPa	psi
Junc J2	97.48	0.5	133.66	36.18	354.9	51.5
Junc J4	98.3	0	131.57	33.27	326.4	47.3
Junc J5	98.55	95	129.79	31.24	306.5	44.4
Junc J6	99.06	0	132.44	33.38	327.5	47.5
Junc J7	99.85	0.06	132.43	32.58	319.6	46.4
Junc J8	99.38	0	132.2	32.82	322.0	46.7
Junc J9	99.4	95	129.56	30.16	295.9	42.9
Junc J10	100.15	0.21	132.2	32.05	314.4	45.6
Junc J1	98.35	0	133.66	35.31	346.4	50.2
Junc J3	98.56	0	133.15	34.59	339.3	49.2
Junc J11	100.75	3.8	137.73	36.98	362.8	52.6
Junc J12	100.85	0	137.84	36.99	362.9	52.6
Junc J13	102.25	2.28	137.83	35.58	349.0	50.6
Junc J14	100.85	1.83	137.83	36.98	362.8	52.6
Resvr R1	138.3	-104.9	138.3	0	0.0	0.0
Resvr R2	138.3	-93.78	138.3	0	0.0	0.0

Maximum Day + Fire Flow Demand
Network Table - Links

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Unit Headloss m/km
Pipe P5	6.4	150	100	95	5.4	278.0
Pipe P7	89.2	50	100	0.06	0.0	0.1
Pipe P8	12.2	250	110	95.21	1.9	19.4
Pipe P9	9.5	150	100	95	5.4	278.0
Pipe P10	40.8	150	100	0.21	0.0	0.0
Pipe P2	157.1	200	110	0.5	0.0	0.0
Pipe P3	7.3	250	110	190.27	3.9	70.1
Pipe P4	81.8	250	110	95	1.9	19.4
Pipe P6	36.7	250	110	95.27	1.9	19.5
Pipe P11	57.8	250	110	190.77	3.9	70.4
Pipe P1	19.9	250	110	104.9	2.1	23.3
Pipe P12	5	250	110	100.79	2.1	21.6
Pipe P13	30.2	250	110	93.78	1.9	18.9
Pipe P14	10.4	150	100	2.28	0.1	0.3
Pipe P15	17.3	150	100	1.83	0.1	0.2

150 DUN SKIPPER - RESIDENTIAL DEVELOPMENT
WATERMAIN MODELING RESULTS - FUTURE PRESSURE ZONE (POST-SUC)

Peak Hour Demand
Network Table - Nodes

Node ID	Elevation m	Demand LPS	Head m	Pressure m	kPa	psi
Junc J2	97.48	0.89	144.7	47.22	463.2	67.2
Junc J4	98.3	0	144.7	46.4	455.2	66.0
Junc J5	98.55	0	144.7	46.15	452.7	65.7
Junc J6	99.06	0	144.7	45.64	447.7	64.9
Junc J7	99.85	0.12	144.67	44.82	439.7	63.8
Junc J8	99.38	0	144.7	45.32	444.6	64.5
Junc J9	99.4	0	144.7	45.3	444.4	64.5
Junc J10	100.15	0.37	144.7	44.55	437.0	63.4
Junc J1	98.35	0	144.7	46.35	454.7	65.9
Junc J3	98.56	0	144.7	46.14	452.6	65.6
Junc J11	100.75	3.8	144.7	43.95	431.1	62.5
Junc J12	100.85	0	144.7	43.85	430.2	62.4
Junc J13	102.25	3.42	144.69	42.44	416.3	60.4
Junc J14	100.85	2.74	144.69	43.84	430.1	62.4
Resvr R1	144.7	-6.31	144.7	0	0.0	0.0
Resvr R2	144.7	-5.03	144.7	0	0.0	0.0

Peak Hour Demand
Network Table - Links

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Unit Headloss m/km
Pipe P5	6.4	150	100	0	0.0	0.0
Pipe P7	89.2	50	100	0.12	0.1	0.3
Pipe P8	12.2	250	110	0.37	0.0	0.0
Pipe P9	9.5	150	100	0	0.0	0.0
Pipe P10	40.8	150	100	0.37	0.0	0.0
Pipe P2	157.1	200	110	0.89	0.0	0.0
Pipe P3	7.3	250	110	0.49	0.0	0.0
Pipe P4	81.8	250	110	0	0.0	0.0
Pipe P6	36.7	250	110	0.49	0.0	0.0
Pipe P11	57.8	250	110	1.38	0.0	0.0
Pipe P1	19.9	250	110	6.31	0.1	0.1
Pipe P12	5	250	110	0.15	0.0	0.0
Pipe P13	30.2	250	110	5.03	0.1	0.1
Pipe P14	10.4	150	100	3.42	0.2	0.6
Pipe P15	17.3	150	100	2.74	0.2	0.4

150 DUN SKIPPER - COMMERCIAL DEVELOPMENT
WATERMAIN MODELING RESULTS - MAXIMUM PRESSURE CHECK

Average Day Demand - Current Pressure Zone (Pre-SUC)
Network Table - Nodes

	Elevation	Demand	Head	Pressure		
Node ID	m	LPS	m	m	kPa	psi
Junc J2	97.48	0.33	154.6	57.12	560.3	81.3
Junc J4	98.3	0	154.6	56.3	552.3	80.1
Junc J5	98.55	0	154.6	56.05	549.9	79.7
Junc J6	99.06	0	154.6	55.54	544.8	79.0
Junc J7	99.85	0.04	154.6	54.75	537.1	77.9
Junc J8	99.38	0	154.6	55.22	541.7	78.6
Junc J9	99.4	0	154.6	55.2	541.5	78.5
Junc J10	100.15	0.21	154.6	54.45	534.2	77.5
Junc J1	98.35	0	154.6	56.25	551.8	80.0
Junc J3	98.56	0	154.6	56.04	549.8	79.7
Junc J11	100.75	3.8	154.6	53.85	528.3	76.6
Junc J12	100.85	0	154.6	53.75	527.3	76.5
Junc J13	102.25	0.71	154.6	52.35	513.6	74.5
Junc J14	100.85	0.57	154.6	53.75	527.3	76.5
Resvr R1	154.6	-3.08	154.6	0	0.0	0.0
Resvr R2	154.6	-2.58	154.6	0	0.0	0.0

Average Day Demand - Future Pressure Zone (Post-SUC)
Network Table - Nodes

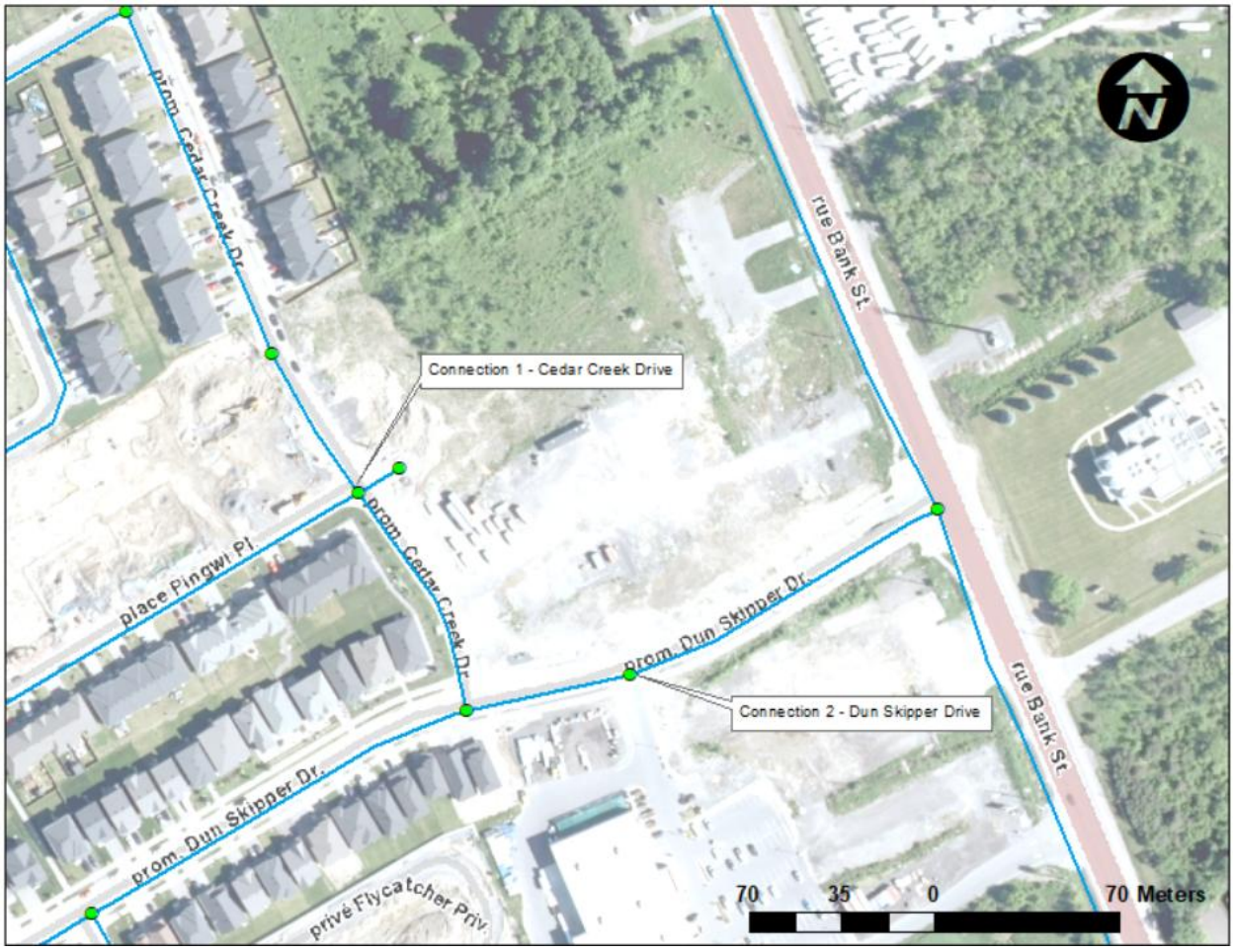
	Elevation	Demand	Head	Pressure		
Node ID	m	LPS	m	m	kPa	psi
Junc J2	97.48	0.33	147.3	49.82	488.7	70.9
Junc J4	98.3	0	147.3	49	480.7	69.7
Junc J5	98.55	0	147.3	48.75	478.2	69.4
Junc J6	99.06	0	147.3	48.24	473.2	68.6
Junc J7	99.85	0.04	147.3	47.45	465.5	67.5
Junc J8	99.38	0	147.3	47.92	470.1	68.2
Junc J9	99.4	0	147.3	47.9	469.9	68.2
Junc J10	100.15	0.21	147.3	47.15	462.5	67.1
Junc J1	98.35	0	147.3	48.95	480.2	69.6
Junc J3	98.56	0	147.3	48.74	478.1	69.3
Junc J11	100.75	3.8	147.3	46.55	456.7	66.2
Junc J12	100.85	0	147.3	46.45	455.7	66.1
Junc J13	102.25	0.71	147.3	45.05	441.9	64.1
Junc J14	100.85	0.57	147.3	46.45	455.7	66.1
Resvr R1	147.3	-3.08	147.3	0	0.0	0.0
Resvr R2	147.3	-2.58	147.3	0	0.0	0.0

Boundary Conditions
Updated – 150 Dun Skipper Drive

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	117	1.95
Maximum Daily Demand	305	5.09
Peak Hour	472	7.87
Fire Flow Demand #1	12,000	200.00

Location



Results

Scenario 1 – Twin connection off Cedar Creek Drive stub

Existing Condition (Pre- SUC Pressure Zone Reconfiguration)

Connection 1 – Cedar Creek Drive

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	154.6	77.4
Peak Hour	142.1	59.6
Max Day plus Fire Flow 1	122.3	31.6
[1] Ground Elevation =	100.1	m

Future Condition (Post- SUC Pressure Zone Reconfiguration)

Connection 1 – Cedar Creek Drive

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	147.3	67.0
Peak Hour	144.7	63.3
Max Day plus Fire Flow 1	138.3	54.2
[1] Ground Elevation =	100.1	m

Scenario 2 – Two connections (Cedar Creek Drive stub & Dun Skipper Drive)

Existing Condition (Pre- SUC Pressure Zone Reconfiguration)

Connection 1 – Cedar Creek Drive

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	154.6	77.4
Peak Hour	142.1	59.6
Max Day plus Fire Flow 1	122.4	31.6
[1] Ground Elevation =	100.1	m

Connection 2 – Dun Skipper Drive

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	154.6	77.5
Peak Hour	142.1	59.7
Max Day plus Fire Flow 1	123.6	33.4
[1] Ground Elevation =	100.1	m

Future Condition (Post- SUC Pressure Zone Reconfiguration)

Connection 1 – Cedar Creek Drive

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	147.3	67.0
Peak Hour	144.7	63.3
Max Day plus Fire Flow 1	138.3	54.2
[1] Ground Elevation =	100.1	m

Connection 2 – Dun Skipper Drive

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	147.3	67.1
Peak Hour	144.6	63.2
Max Day plus Fire Flow 1	139.3	55.8
[1] Ground Elevation =	100.1	m

Notes

1. Demands for proposed Connection 1 at existing water main stub off Cedar Creek Drive were assigned to upstream junction at Cedar Creek Drive & Pingwi Place off the public looped watermains. The engineer must calculate headloss off the dead-end main.
2. Any connection to a watermain 400 mm or larger should be approved by DWS as per the Water Design Guidelines Section 2.4 Review by Drinking Water Services.

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.

APPENDIX D

Sanitary Flow Calculation

150 DUN SKIPPER DRIVE
RESIDENTIAL SANITARY FLOW

BUILDING 1 NUMBER OF UNITS

1 BED	79	
Persons per 1 BED Unit	1.4	
2 BED	52	
Persons per 2 BED Unit	2.1	

BUILDING 2 NUMBER OF UNITS

1 BED	66	
Persons per 1 BED Unit	1.4	
2 BED	40	
Persons per 2 BED Unit	2.1	

Total Population	396	
Average Daily Flow	280	L/c/day
Average Daily Volume	110,936	L/day
Peak Factor (Harmon Formula)	3.42	
Peak Sanitary Flow	**4.39**	**L/s**
Site Area	1.00	ha
Infiltration Allowance	0.33	L/s/ha
Peak Extraneous Flows	**0.33**	**L/s**
Peak Sanitary Flow	**4.72**	**L/s**

150 DUN SKIPPER DRIVE
COMMERCIAL DEVELOPMENT SANITARY FLOW

Daily Demands Per OBC Table 8.2.1.3. B

Grocery Store (Building A):		
Daily Volume per each 9.25 m^2 of floor space, excluding delicatessen, bakery, and meet department	40	L/day
Daily Volume per each 9.25 m^2 of delicatessen floor space	190	L/day
Daily Volume per each 9.25 m^2 of bakery floor space	190	L/day
Daily Volume per each 9.25 m^2 of meet department floor space	380	L/day
Daily Volume per Water Closet, and	950	L/day
Discount Store (Building B):		
Daily Volume per each 1.0 m^2 of floor space	5	L/day
Retail Store (Building C):		
Daily Volume per each 1.0 m^2 of floor space	5	L/day
Quick Service Restaurants (Builidng C):		
Daily Volume per seat	125	L/day
Dental Office (Building C):		
Per wet service chair	275	L/day
Bank (Building D):		
Daily Volume per each 9.3 m^2 of floor space	75	L/day
Grocery store floor area excluding delicatessen, bakery, and meet department	2,745	m^2
Delicatessen floor area	90	m^2
Bakery floor area	133	m^2
Meet department floor area	70	m^2
Number of grocery store water closets	5	
Discount Store floor area	892	m^2
Retail Store floor area	297	m^2
Quick Service Restaurants number of seats	70	
Dental Office number of chairs	6	
Bank floor area	464	m^2
Total Daily Volume	44,163	L/day
Peaking Factor	1.5	
Peak Sanitary Flow	**0.77**	**L/s**
Site Area	1.93	ha
Infiltration Allowance	0.33	L/s/ha
Peak Extraneous Flows	**0.64**	**L/s**
Total Peak Sanitary Flow	**1.40**	**L/s**

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LEGEND
Red text High level sanitary sewer

SANITARY SEWER DESIGN SHEET

Remer Lands Phase 1
City of ottawa
Leitrim South Holdings Inc. (Regional Group)

LOCATION				RESIDENTIAL										ICI AREAS							INFILTRATION ALLOWANCE			FIXED FLOW (L/s)		TOTAL FLOW	PROPOSED SEWER DESIGN						
				AREA w/ Units (Ha)	UNIT TYPES				AREA w/o Units (Ha)	POPULATION		PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)						PEAK FLOW (L/s)	AREA (Ha)		FLOW				CAPACITY	LENGTH	DIA	SLOPE	VELOCITY (full)	AVAILABLE CAPACITY	
STREET	AREA ID	FROM MH	TO MH		SF	SD	TH	APT		IND	CUM			INSTITUTIONAL		COMMERCIAL		INDUSTRIAL			IND	CUM	(L/s)	IND	CUM	(L/s)	(L/s)	(m)	(mm)	(%)	(m/s)	L/s	(%)
														IND	CUM	IND	CUM	IND	CUM													
Dun Skipper Road	6132Aa	MH6132A	MH6133A	0.64	10					32.0	32.0	4.00	0.52		0.00		0.00		0.00	0.00	0.64	0.64	0.18		0.00	0.70	43.28	82.00	200	1.60	1.335	42.58	98.39%
				DRAFT 2016 UPDATED SERVICEABILITY REPORT																													
Street No. 7	EXT2		BLK6133AS						2.88	123.8	123.8	4.00	2.01		0.00		0.00		0.00	0.00	2.88	2.88	0.81										
Street No. 7	6133Ab	BLK6133AS	MH6133A	0.07						0.0	123.8	4.00	2.01		0.00		0.00		0.00	0.00	0.07	2.95	0.83		0.00	2.83	24.19	44.00	200	0.50	0.746	21.36	88.29%
Dun Skipper Road	6133Aa	MH6133A	MH6134A	0.58	10					32.0	187.8	4.00	3.04		0.00		0.00		0.00	0.00	0.58	4.17	1.17		0.00	4.21	37.48	72.14	200	1.20	1.156	33.27	88.76%
Dun Skipper Road	6134A	MH6134A	MH6135A	0.66	12					38.4	226.2	4.00	3.67		0.00		0.00		0.00	0.00	0.66	4.83	1.35		0.00	5.02	28.63	72.09	200	0.70	0.883	23.61	82.47%
Dun Skipper Road	6135A	MH6135A	MH6136A	0.19	3					9.6	235.8	4.00	3.82		0.00		0.00		0.00	0.00	0.19	5.02	1.41		0.00	5.23	28.63	24.81	200	0.70	0.883	23.40	81.74%
				DRAFT 2016 UPDATED SERVICEABILITY REPORT																													
Easement	EXT3	BLK6145A	MH6146A	2.50						250.8	250.8	4.00	4.06		0.00		0.00		0.00	0.00	2.50	2.50	0.70		0.00	4.76	21.64	22.70	200	0.40	0.667	16.88	77.99%
Easement		MH6146A	MH6136A							0.0	250.8	4.00	4.06		0.00		0.00		0.00	0.00	0.00	2.50	0.70		0.00	4.76	21.64	46.46	200	0.40	0.667	16.88	77.99%
				DRAFT 2016 UPDATED SERVICEABILITY REPORT																													
	EXT4	BLK6138A	MH6138A							0.0	0.0	4.00	0.00		0.00	4.07	4.07		0.00	3.53	4.07	4.07	1.14		0.00	4.67	20.24	20.00	200	0.35	0.624	15.57	76.92%
Dun Skipper Road	6138A	MH6138A	MH6137A	0.08						0.0	0.0	4.00	0.00		0.00		4.07		0.00	3.53	0.08	4.15	1.16		0.00	4.69	20.24	32.25	200	0.35	0.624	15.55	76.81%
Dun Skipper Road	6137A	MH6137A	MH6136A	0.10						0.0	0.0	4.00	0.00		0.00		4.07		0.00	3.53	0.10	4.25	1.19		0.00	4.72	20.24	44.44	200	0.35	0.624	15.52	76.67%
Cedar Creek Drive	6136A	MH6136A	MH6121A	0.04						0.0	486.6	3.98	7.85		0.00		4.07		0.00	3.53	0.04	11.81	3.31		0.00	14.69	20.24	28.03	200	0.35	0.624	5.56	27.45%
Cedar Creek Drive	6121A	MH6121A	MH6120A	0.03						0.0	486.6	3.98	7.85		0.00		4.07		0.00	3.53	0.03	11.84	3.32		0.00	14.69	20.24	12.97	200	0.35	0.624	5.55	27.41%
Cedar Creek Drive	6120A	MH6120A	MH6119A	0.10						0.0	486.6	3.98	7.85		0.00		4.07		0.00	3.53	0.10	11.94	3.34		0.00	14.72	20.24	53.29	200	0.35	0.624	5.52	27.27%
Pingwi Place	6132Ab	MH6132A	MH6161A	0.25	3					9.6	9.6	4.00	0.16		0.00		0.00		0.00	0.00	0.25	0.25	0.07		0.00	0.23	56.22	77.03	200	2.70	1.734	56.00	99.60%
Pingwi Place	6161A	MH6161A	MH6162A	0.22	3					9.6	19.2	4.00	0.31		0.00		0.00		0.00	0.00	0.22	0.47	0.13		0.00	0.44	24.19	11.41	200	0.50	0.746	23.75	98.17%
Pingwi Place	6162A	MH6162A	MH6163A	0.62	14					44.8	64.0	4.00	1.04		0.00		0.00		0.00	0.00	0.62	1.09	0.31		0.00	1.34	20.24	74.88	200	0.35	0.624	18.90	93.37%
Pingwi Place	6163A	MH6163A	MH6164A	0.44			12			28.8	92.8	4.00	1.50		0.00		0.00		0.00	0.00	0.44	1.53	0.43		0.00	1.93	20.24	86.35	200	0.35	0.624	18.31	90.46%
Pingwi Place	6164A	MH6164A	MH6119A	0.40			11			26.4	119.2	4.00	1.93		0.00		0.00		0.00	0.00	0.40	1.93	0.54		0.00	2.47	29.63	86.29	200	0.75	0.914	27.16	91.66%
Block 429	COM	BLK6119AE	MH6119A							0.0	0.0	4.00	0.00		0.00	3.01	3.01		0.00	2.61	3.01	3.01	0.84		0.00	3.46	45.12	20.00	300	0.20	0.618	41.66	92.34%
Cedar Creek Drive	6119A	MH6119A	MH6118A	0.05						0.0	605.8	3.93	9.64		0.00		7.08		0.00	6.15	0.05	16.93	4.74		0.00	20.53	45.12	28.01	300	0.20	0.618	24.58	54.49%
Cedar Creek Drive	6118A	MH6118A	MH6117A	0.07						0.0	605.8	3.93	9.64		0.00		7.08		0.00	6.15	0.07	17.00	4.76		0.00	20.55	45.12	33.76	300	0.20	0.618	24.57	54.45%
Block 443	HD1	BLK6117AW	MH6117A	1.03						129.6	129.6	4.00	2.10		0.00		0.00		0.00	0.00	1.03	1.03	0.29		0.00	2.39	20.24	20.00	200	0.35	0.624	17.85	88.20%
Cedar Creek Drive	6117A	MH6117A	MH6116A	0.55			17			40.8	776.2	3.87	12.16		0.00		7.08		0.00	6.15	0.55	18.58	5.20		0.00	23.51	45.12	75.05	300	0.20	0.618	21.60	47.89%
Cedar Creek Drive	6116A	MH6116A	MH6115A	0.52			17			40.8	817.0	3.85	12.76		0.00		7.08		0.00	6.15	0.52	19.10	5.35		0.00	24.25	59.68	67.16	300	0.35	0.818	35.43	59.36%
Salamander Way	6156Aa	MH6156A	MH6157A	0.29	3					9.6	9.6	4.00	0.16		0.00		0.00		0.00	0.00	0.29	0.29	0.08		0.00	0.24	31.55	74.63	200	0.85	0.973	31.31	99.25%
Salamander Way	6157A	MH6157A	MH6158A	0.07			1			2.4	12.0	4.00	0.19		0.00		0.00		0.00	0.00	0.07	0.36	0.10		0.00	0.30	34.22	12.28	200	1.00	1.055	33.92	99.14%
Salamander Way	6158A	MH6158A	MH6153A	0.54			14			33.6	45.6	4.00	0.74		0.00		0.00		0.00	0.00	0.54	0.90	0.25		0.00	0.99	56.22	106.46	200	2.70	1.734	55.23	98.24%
Block 436	PARK	BLK6153C	MH6153A						0.83	0.0	0.0	4.00	0.00		0.00		0.00		0.00	0.00	0.83	0.83	0.23		0.00	0.23	24.19	13.25	200	0.50	0.746	23.96	99.04%
Salamander Way	6153A	MH6153A	MH6154A	0.03						0.0	45.6	4.00	0.74		0.00		0.00		0.00	0.00	0.03	1.76	0.49		0.00	1.23	28.63	10.53	200	0.70	0.883	27.40	95.70%
Salamander Way	6154A	MH6154A	MH6115A	0.13						0.0	45.6	4.00	0.74		0.00		0.00		0.00	0.00	0.13	1.89	0.53		0.00	1.27	24.19	76.18	200	0.50	0.746	22.93	94.76%
Cedar Creek Drive	6115A	MH6115A	MH6101A	0.61			18			43.2	905.8	3.83	14.04		0.00		7.08		0.00	6.15	0.61	21.60	6.05		0.00	26.24	59.68	87.15	300	0.35	0.818	33.44	56.04%
Miikana Road	6101A	MH6101A	MH6102A	0.45			11			26.4	932.2	3.82	14.42		0.00		7.08		0.00	6.15	0.45	22.05	6.17		0.00	26.74	59.68	91.17	300	0.35	0.818	32.94	55.19%
Block 436	HD2	BLK6102AS	MH6102A	0.94						115.2	115.2	4.00	1.87		0.00		0.00		0.00	0.00	0.94	0.94	0.26		0.00	2.13	20.24	20.00	200	0.35	0.624	18.11	89.48%
Miikana Road	6102A	MH6102A	MH6103A	0.23			6			14.4	1061.8	3.78	16.27		0.00		7.08		0.00	6.15	0.23	23.22	6.50		0.00	28.92	59.68	41.44	300	0.35	0.818	30.76	51.54%
Miikana Road	6103A	MH6103A	MH6104A	0.66			18			43.2	1105.0	3.77	16.88		0.00		7.08		0.00	6.15	0.66	23.88	6.69		0.00	29.72	59.68	120.00	300	0.35	0.818	29.97	50.21%
Block 450	INST	BLK6104AS	MH6104A							0.0	0.0	4.00	0.00	2.55	2.55		0.00		0.00	2.21	2.55	2.55	0.71		0.00	2.93	20.24	20.00	200	0.35	0.624	17.32	85.54%
Miikana Road	6104A	MH6104A	MH6105B	0.60			15			36.0	1141.0	3.76	17.39		2.55		7.08		0.00	8.36	0.60	27.03	7.57		0.00	33.32	59.68	114.40	300	0.35	0.818	26.36	44.17%
Miikana Road		MH6105B	*EX. MH647A*							0.0	1141.0	3.76	17.39		2.55		7.08		0.00	8.36	0.00	27.03	7.57		0.00	33.32	45.12	8.00	300	0.20	0.618	11.80	26.15%
Kelly Farm Drive		*EX. MH647A*	*EX. MH742A*	*0.28*			*5*			*12.0*	3538.6	3.38	48.46		2.55		7.08		0.00	8.36	0.28	75.56	21.16		0.00	77.97	101.84	*80.31*	*375*	*0.31*	0.893	23.87	23.43%

Design Parameters:

Residential

SF	3.2	p/p/u
TH/SD	2.4	p/p/u
APT	1.9	p/p/u
Other	43	p/p/Ha

ICI Areas

			Peak Factor
INST	50,000	L/Ha/day	1.5
COM	50,000	L/Ha/day	1.5
IND	35,000	L/Ha/day	MOE Chart
	17000	L/Ha/day	

Notes:
1. Mannings coefficient (n) = 0.013
2. Demand (per capita): 350 L/day 300 L/day
3. Infiltration allowance: 0.28 L/s/Ha
4. Residential Peaking Factor:
Harmon Formula = 1+(14/(4+P^0.5))
where P = population in thousands

Designed: WY
Checked: JM
Dwg. Reference: 501, 501A

No.	Revision	Date
1.	City Submission No. 1	11/23/2016
2.	City Submission No. 2	5/12/2017
3.	City Submission No. 3	7/5/2017
4.	Updated Street Name for MOE Submission	8/3/2017

File Reference: 33956.5.7.1
Date: 5/10/2017
Sheet No: 2 of 2

REVIEWED BY
DEVELOPMENT REVIEW SERVICES BRANCH

Signed _____

Date _____ 2017

Plan Number _____

LEGEND :

6115A
0.81 | 43.2

- AREA NUMBER
- POPULATION
- AREA IN HECTARES
- FUTURE FLOW DIRECTION

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5	REVISED BLOCK NUMBERS	J.I.M.	2017:08:11
4	RE-SUBMISSION FOR MOECC APPROVAL & REVISED STREET NAMES	J.I.M.	2017:08:02
3	SUBMISSION FOR MOECC APPROVAL	J.I.M.	2017:07:07
2	SUBMISSION No.2 FOR CITY REVIEW	J.I.M.	2017:05:12
1	SUBMISSION No.1 FOR CITY REVIEW	J.I.M.	2016:11:23

LEITRIM SOUTH HOLDINGS INC.

IBI GROUP
400 – 333 Preston Street
Ottawa ON K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

Project Title

pathways at FINDLAY CREEK

LICENSED PROFESSIONAL ENGINEER
J. I. MOFFATT
2017/08/02
PROVINCE OF ONTARIO

Drawing Title

SANITARY DRAINAGE AREA PLAN

Scale	
1 : 1000	
Design: J.I.M.	Date: NOV 2016
Drawn: D.D.	Checked: ----
Project No.: 33956	Drawing No.: 501

D07-16-13-0023

#17367

J:\33956-RemainLands\5.9 Drawings\5.9civil\layouts\501 SANITARY DRAINAGE AREA PLAN.dwg Layout: Name: SANITARY DRAINAGE AREA PLAN Plotted At: 8/11/2017 2:09 PM Last Saved By: DDORE Last Saved At: Aug. 11, 17

UPDATED SANITARY SEWER DESIGN SHEET

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 124107
Project Name: 150 Dun Skipper Drive
Date: 12/11/2024
Input By: JAK
Reviewed By: MS
Drawing Reference: Pathways at Findlay Creek Sanitary Drainage Area Plan

Design Input by User
As-Built Input by User
Cumulative Cell
Calculated Design Cell Output
City of Ottawa - Sewer Design Guidelines (2012 and TBs)
MOE - Design Guidelines for Sewage Works (2008)

Location				Demand																				Design Capacity							
				Residential Flow									Industrial / Commercial / Institutional (ICI) Flow										Extraneous Flow Area Method		Total Design Flow	Proposed Sewer Pipe Sizing / Design					Available Capacity	
Street	Area ID	From MH	To MH	Singles	Semis / Towns	1 Bedroom Apts	2 Bedroom Apts	Park Area	Population (in 1000's)	Cumulative Population (in 1000's)	Average Pop. Flow Q(q) (L/s)	Design Peaking Factor M	Peak Design Pop. Flow Q(p) (L/s)	Res. Drainage Area (ha.)	Cumulative Res. Drainage Area (ha.)	Industrial Area (ha.)	Cumulative Industrial Area (ha.)	Average Design Industrial Flow (L/s)	Industrial Peaking Factor	Commercial / Institutional Area (ha.)	Cumulative Commercial / Institutional Area (ha.)	Average Design Commercial / Institutional Flow (L/s)	Commercial / Institutional Peaking Factor	Cumulative ICI Area (ha.)	Peak Design ICI Flow Q (ici) (L/s)	Cumulative Extraneous Drainage Area (ha.)	Design Extraneous Flow Q(e) (L/s)	Total Peak Design Flow Q(D) (L/s)	Pipe Length (m)	Pipe Size (mm) and Material	Design Grade So (%)	Capacity Q/full (L/s)	Full Flow Velocity (m/s)	L/s	(%)
Dun Skipper Road	6132Aa	MH6132A	MH6133A	10					0.034	0.034	0.11	3.68	0.41	0.640	0.640	0.000	0.000	0.00	1.00	0.000	0.000	0.00	1.00	0.000	0.00	0.640	0.21	0.62	82.0	200 PVC	1.60	43.3	1.33	42.66	98.58%
				DRAFT 2016 UPDATED SERVICEABILITY REPORT																													
Street No. 7	EXT2		BLK6133AS						0.124	0.124	0.40	3.57	1.43	0.000	0.640	0.000	0.000	0.00	1.00	0.000	0.000	0.00	1.00	0.000	0.00	2.880	0.95	2.38							
Street No. 7	6133Ab	BLK6133AS	MH6133A						0.000	0.124	0.40	3.57	1.43	0.070	0.710	0.000	0.000	0.00	1.00	0.000	0.000	0.00	1.00	0.000	0.00	2.950	0.97	2.41	44.0	200 PVC	0.50	24.2	0.75	21.79	90.05%
Dun Skipper Road	6133Aa	MH6133A	MH6134A	10					0.034	0.192	0.62	3.52	2.19	0.580	1.290	0.000	0.000	0.00	1.00	0.000	0.000	0.00	1.00	0.000	0.00	4.170	1.38	3.57	72.1	200 PVC	1.20	37.5	1.16	33.92	90.49%
Dun Skipper Road	6134A	MH6134A	MH6135A	12					0.041	0.233	0.75	3.50	2.64	0.660	1.950	0.000	0.000	0.00	1.00	0.000	0.000	0.00	1.00	0.000	0.00	4.830	1.59	4.23	72.1	200 PVC	0.70	28.6	0.88	24.40	85.22%
Dun Skipper Road	6135A	MH6135A	MH6136A	3					0.010	0.243	0.79	3.49	2.75	0.190	2.140	0.000	0.000	0.00	1.00	0.000	0.000	0.00	1.00	0.000	0.00	5.020	1.66	4.41	24.8	200 PVC	0.70	28.6	0.88	24.22	84.61%
				DRAFT 2016 UPDATED SERVICEABILITY REPORT																													
Easement	EXT3	BLK6145A	MH6146A						0.251	0.251	0.81	3.49	2.84	2.500	4.640	0.000	0.000	0.00	1.00	0.000	0.000	0.00	1.00	0.000	0.00	2.500	0.83	3.66	22.7	200 PVC	0.40	21.6	0.67	17.98	83.09%
Easement		MH6146A	MH6136A						0.000	0.251	0.81	3.49	2.84	0.000	4.640	0.000	0.000	0.00	1.00	0.000	0.000	0.00	1.00	0.000	0.00	2.500	0.83	3.66	46.5	200 PVC	0.40	21.6	0.67	17.98	83.09%
				DRAFT 2016 UPDATED SERVICEABILITY REPORT																													
	EXT4	BLK6138A	MH6138A						0.000	0.000	0.00	3.80	0.00	0.000	4.640	0.000	0.000	0.00	1.50	4.070	4.070	1.32	1.50	4.070	1.98	4.070	1.34	3.32	20.0	200 PVC	0.35	20.2	0.62	16.92	83.59%
Dun Skipper Road	6138A	MH6138A	MH6137A						0.000	0.000	0.00	3.80	0.00	0.080	4.720	0.000	0.000	0.00	1.50	0.000	4.070	1.32	1.50	4.070	1.98	4.150	1.37	3.35	32.3	200 PVC	0.35	20.2	0.62	16.89	83.46%
Dun Skipper Road	6137A	MH6137A	MH6136A						0.000	0.000	0.00	3.80	0.00	0.100	4.820	0.000	0.000	0.00	1.50	0.000	4.070	1.32	1.50	4.070	1.98	4.250	1.40	3.38	44.4	200 PVC	0.35	20.2	0.62	16.86	83.30%
Cedar Creek Drive	6136A	MH6136A	MH6121A						0.000	0.494	1.60	3.38	5.41	0.040	4.860	0.000	0.000	0.00	1.50	0.000	4.070	1.32	1.50	4.070	1.98	11.810	3.90	11.29	28.0	200 PVC	0.35	20.2	0.62	8.96	44.25%
Cedar Creek Drive	6121A	MH6121A	MH6120A						0.000	0.494	1.60	3.38	5.41	0.030	4.890	0.000	0.000	0.00	1.50	0.000	4.070	1.32	1.50	4.070	1.98	11.840	3.91	11.30	13.0	200 PVC	0.35	20.2	0.62	8.95	44.20%
Cedar Creek Drive	6120A	MH6120A	MH6119A						0.000	0.494	1.60	3.38	5.41	0.100	4.990	0.000	0.000	0.00	1.50	0.000	4.070	1.32	1.50	4.070	1.98	11.940	3.94	11.33	53.3	200 PVC	0.35	20.2	0.62	8.91	44.04%
Pingwi Place	6132Ab	MH6132A	MH6161A	3					0.010	0.010	0.03	3.73	0.12	0.250	5.240	0.000	0.000	0.00	1.00	0.000	0.000	0.00	1.00	0.000	0.00	0.250	0.08	0.21	77.0	200 PVC	2.70	56.2	1.73	56.02	99.63%
Pingwi Place	6161A	MH6161A	MH6162A	3					0.010	0.020	0.07	3.70	0.24	0.220	5.460	0.000	0.000	0.00	1.00	0.000	0.000	0.00	1.00	0.000	0.00	0.470	0.16	0.40	11.4	200 PVC	0.50	24.2	0.75	23.79	98.35%
Pingwi Place	6162A	MH6162A	MH6163A	14					0.048	0.068	0.22	3.63	0.80	0.620	6.080	0.000	0.000	0.00	1.00	0.000	0.000	0.00	1.00	0.000	0.00	1.090	0.36	1.16	74.9	200 PVC	0.35	20.2	0.62	19.08	94.27%
Pingwi Place	6163A	MH6163A	MH6164A		12				0.032	0.100	0.33	3.59	1.17	0.440	6.520	0.000	0.000	0.00	1.00	0.000	0.000	0.00	1.00	0.000	0.00	1.530	0.50	1.67	86.3	200 PVC	0.35	20.2	0.62	18.57	91.73%
Pingwi Place	6164A	MH6164A	MH6119A		11				0.030	0.130	0.42	3.57	1.50	0.400	6.920	0.000	0.000	0.00	1.00	0.000	0.000	0.00	1.00	0.000	0.00	1.930	0.64	2.14	86.3	200 PVC	0.75	29.6	0.91	27.49	92.77%
Block 429	COM + RES	BLK6119AE	MH6119A			145	92		0.396	0.396	1.28	3.42	4.39	1.000	1.000	0.000	0.000	0.00	1.50	1.930	1.930	0.63	1.50	1.930	0.94	2.930	0.97	6.30	20.0	300 PVC	0.20	45.1	0.62	38.82	86.05%
Cedar Creek Drive	6119A	MH6119A	MH6118A						0.000	0.624	2.02	3.34	6.75	0.050	7.970	0.000	0.000	0.00	1.50	0.000	4.070	1.32	1.50	4.070	2.92	16.850	5.56	15.22	28.0	300 PVC	0.20	45.1	0.62	29.89	66.25%
Cedar Creek Drive	6118A	MH6118A	MH6117A						0.000	0.624	2.02	3.34	6.75	0.070	8.040	0.000	0.000	0.00	1.50	0.000	4.070	1.32	1.50	4.070	2.92	16.920	5.58	15.25	33.8	300 PVC	0.20	45.1	0.62	29.87	66.20%
Block 443	HD1	BLK6117AW	MH6117A						0.130	0.130	0.42	3.57	1.50	1.030	9.070	0.000	0.000	0.00	1.00	0.000	0.000	0.00	1.00	0.000	0.00	1.030	0.34	1.84	20.0	200 PVC	0.35	20.2	0.62	18.40	90.92%
Cedar Creek Drive	6117A	MH6117A	MH6116A		17				0.046	0.799	2.59	3.29	8.52	0.550	9.620	0.000	0.000	0.00	1.50	0.000	4.070	1.32	1.50	4.070	1.98	18.500	6.11	16.60	75.1	300 PVC	0.20	45.1	0.62	28.51	63.20%
Cedar Creek Drive	6116A	MH6116A	MH6115A		17				0.046	0.845	2.74	3.28	8.97	0.520	10.140	0.000	0.000	0.00	1.50	0.000	4.070	1.32	1.50	4.070	1.98	19.020	6.28	17.23	67.2	300 PVC	0.35	59.7	0.82	42.45	71.13%
Salamander Way	6156Aa	MH6156A	MH6157A	3					0.010	0.010	0.03	3.73	0.12	0.290	10.430	0.000	0.000	0.00	1.00	0.000	0.000	0.00	1.00	0.000	0.00	0.290	0.10	0.22	74.6	200 PVC	0.85	31.5	0.97	31.33	99.31%
Salamander Way	6157A	MH6157A	MH6158A		1				0.003	0.013	0.04	3.72	0.16	0.070	10.500	0.000	0.000	0.00	1.00	0.000	0.000	0.00	1.00	0.000	0.00	0.360	0.12	0.27	12.3	200 PVC	1.00	34.2	1.06	33.94	99.20%
Salamander Way	6158A	MH6158A	MH6153A		14				0.038	0.051	0.16	3.65	0.60	0.540	11.040	0.000	0.000	0.00	1.00	0.000	0.000	0.00	1.00	0.000	0.00	0.900	0.30	0.90	106.5	200 PVC	2.70	56.2	1.73	55.33	98.40%
Block 436	PARK	BLK6153C	MH6153A						0.000	0.000	0.00	3.80	0.00	0.830	11.870	0.000	0.000	0.00	1.00	0.000	0.000	0.00	1.00	0.000	0.00	0.830	0.27	0.27	13.3	200 PVC	0.50	24.2	0.75	23.92	98.87%
Salamander Way	6153A	MH6153A	MH6154A						0.000	0.051	0.16	3.65	0.60	0.030	11.070	0.000	0.000	0.00	1.00	0.000	0.000	0.00	1.00	0.000	0.00	1.760	0.58	1.18	10.5	200 PVC	0.70	28.6	0.88	27.45	95.88%
Salamander Way	6154A	MH6154A	MH6115A						0.000	0.051	0.16	3.65	0.60	0.130	11.200	0.000	0.000	0.00	1.00	0.000	0.000	0.00	1.00	0.000	0.00	1.890	0.62	1.22	76.2	200 PVC	0.50	24.2	0.75	22.97	94.94%
Cedar Creek Drive	6115A	MH6115A	MH6101A		18				0.049	0.944	3.06	3.25	9.96	0.610	11.810	0.000	0.000	0.00	1.50	0.000	4.070	1.32	1.50	4.070	1.98	21.520	7.10	19.04	87.2	300 PVC	0.35	59.7	0.82	40.65	68.11%
Miikana Road	6101A	MH6101A	MH6102A		11				0.030	0.974	3.16	3.25	10.25	0.450	12.260	0.000	0.000	0.00	1.50	0.000	4.070	1.32	1.50	4.070	1.98	21.970	7.25	19.48	91.2	300 PVC	0.35	59.7	0.82	40.21	67.37%
Block 436	HD2	BLK6102AS	MH6102A						0.115	0.115	0.37	3.58	1.34	0.940	13.200	0.000	0.000	0.00	1.00	0.000	0.000	0.00	1.00	0.000	0.00	0.940	0.31	1.65	20.0	200 PVC	0.35	20.2	0.62	18.60	91.86%
Miikana Road	6102A	MH6102A	MH6103A		6				0.016	1.106	3.58	3.22	11.53	0.230	13.430	0.000	0.000	0.00	1.50	0.000	4.070	1.32	1.50	4.070	1.98	23.140	7.64	21.14	41.4	300 PVC	0.35	59.7	0.82	38.54	64.58%
Miikana Road	6103A	MH6103A	MH6104A		18				0.049	1.154	3.74	3.21	12.00	0.660	14.090	0.000	0.000	0.00	1.50	0.000	4.070	1.32	1.50	4.070	1.98	23.800	7.85	21.83	120.0	300 PVC	0.35	59.7	0.82	37.85	63.43%
Block 450	INST	BLK6104AS	MH6104A						0.000	0.000	0.00	3.80	0.00	0.000	14.090	0.000	0.000	0.00	1.50	2.550	2.550	0.83	1.50	2.550	1.24	2.550	0.84	2.08	20.0	200 PVC	0.35	20.2	0.62	18.16	89.72%
Miikana Road	6104A	MH6104A	MH6105B		15				0.041	1.195	3.87	3.20	12.38	0.600	14.690	0.000	0.000	0.00	1.50	0.000	6.620	2.15	1.50	6.620	3.22	26.950	8.89	24.50	114.4	300 PVC	0.35	59.7	0.82	35.19	58.96%
Miikana Road		MH6105B	*EX. MH647A*						0.000	1.195	3.87	3.20	12.38	0.000	14.690	0.000	0.000	0.00	1.50	0.000	6.620	2.15	1.50	6.620	3.22	26.950	8.89	24.50	8.0	300 PVC	0.20	45.1	0.62	20.62	45.70%
Kelly Farm Drive		*EX. MH647A*	*EX. MH742A*		5				0.014	3.539	11.47	2.90	33.31	0.280	14.970	0.000	0.000	0.00	1.50	0.000	6.620	2.15	1.50	6.620	3.22	75.560	24.93	61.46	80.3	375 PVC	0.31	101.8	0.89	40.38	39.65%
Totals				**58**	**145**	**145**	**92**	**0.000**	**1.604**	**1.604**	**5.20**	**3.13**	**16.26**	**15.800**	**15.800**	**0.000**	**0.000**	**0.00**	**1.50**	**8.550**	**8.550**	**2.77**	**1.50**	**8.550**	**4.16**	**24.350**	**8.04**	**28.45**	**2010.9**						

Demand Equation / Parameters

1. **Q(D) =** Q(p) + Q(ici) + Q(e)
2. **Q(p) =** (P x q x M x K / 86,400)
3. **q =** 280 L/per person/day (design)
4. **M = Harmon Formula (maximum of 4.0)**
5. **K =** 0.8 (design)
6. **Park flow is considered equivalent to a single unit / ha**
   Park Demand = 4 single unit equivalent / park ha (~ 3,600 L/ha/day)
7. **Q(ici) =** ICI Area x ICI Flow x ICI Peak
8. **Q(e) =** 0.33 L/s/ha (design)

Definitions

Q(D) = Peak Design Flow (L/s)
Q(p) = Peak Design Population Flow (L/s)
Q(q) = Average Population Flow (L/s)

	Singles	Semis / Towns	1 Bedroom Apts	2 Bedroom Apts
P = Residential Population =	3.4	2.7	1.4	2.1

q = Average Capita Flow
M = Harmon Formula
K = Harmon Correction Factor
Q(ici) = Industrial / Commercial / Institutional Flow (L/s)
Q(e) = Extraneous Flow (L/s)

Institutional / Commercial / Industrial	Industrial	Commercial / Institutional	
Design =	28000	28000	L/gross ha/day
ICI Peak *			
Design =	1.5	1.5	* ICI Peak = 1.0 Default, 1.5 if ICI in contributing area is >20% (design only)

Capacity Equation

Q full = $1000*(1/n)*A_s*R^{2/3}*S_o^{0.5}$

Definitions

Q full = Capacity (L/s)
n = Manning coefficient of roughness (0.013)
A_s = Pipe flow area (m^2)
R = Hydraulic Radius of wetted area (dia./4 for full pipes)
So = Pipe slope/gradient

APPENDIX E

SWM Calculations, Excerpt from Pathways at Findlay Creek Design Brief

Date: 4/9/2025

Proposed Residential Development
150 Dun Skipper Drive

Allowable Flow		
Description	***Area (ha)***	**Allowable Flow 5-year (L/s)**
Allowable Flow per IBI Design Brief[1]	3.010	**562**
Allocated Flow for Commercial Site	1.000	**187**

[1] Design Brief, Pathways at Findlay Creek, 4800 Bank Street (Remer Lands), Phase 1, Leitrim Development Area, prepared by IBI (August 2017).

Post - Development Site Flows													
Area	**Description**	***Area (ha)***	A_{imp} ***(ha)*** ***C=0.9***	A_{perv} ***(ha)*** ***C=0.2***	C_5	C_{100}	**Uncontrolled Flow (L/s)**		**Controlled Flow (L/s)**		**Storage Required (m^3)**		**Storage Provided (m^3)**
							5-year	**100-year**	**5-year**	**100-year**	**5-year**	**100-year**	
A-1	Direct Runoff	0.031	0.012	0.019	0.47	0.54	4.2	8.3	-	-	-	-	-
A-2	Uncontrolled Site Flows	0.006	0.006	0.000	0.90	1.00	1.6	3.0	-	-	-	-	-
A-3	Direct Runoff	0.043	0.006	0.037	0.30	0.35	3.7	7.6	-	-	-	-	-
A-4	Uncontrolled Site Flows	0.011	0.011	0.000	0.90	1.00	2.9	5.5	-	-	-	-	-
A-5	Controlled Site Flows	0.246	0.075	0.171	0.41	0.48	-	-	34.7	47.8	7.3	20.7	50.2
A-6	Uncontrolled Site Flows	0.293	0.153	0.140	0.57	0.64	48.0	93.3	-	-	-	-	-
R-1	Building 1 Controlled Roof Flows	0.206	0.206	0.000	0.90	1.00	-	-	8.5	10.2	32.0	73.3	98.0
R-2	Building 2 Controlled Roof Flows	0.164	0.164	0.000	0.90	1.00	-	-	6.9	8.5	26.3	59.7	78.0
	Totals :	1.000	-	-	-	-	**60.3**	**117.7**	**50.1**	**66.6**	**65.6**	**153.8**	**226.2**
							Total Stormwater Flows :		**110.4**	**184.2**			
									Overcontrolled	2.5			

Proposed Commercial Development
Novatech Project No. 124107
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA A-1 Direct Runoff

OTTAWA IDF CURVE

Area =	0.031	ha	Qallow =	4.2	L/s
C =	0.47		Vol(max) =	0.0	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	5.73	1.50	0.45
10	104.19	4.23	0.00	0.00
15	83.56	3.39	-0.84	-0.75
20	70.25	2.85	-1.38	-1.65
25	60.90	2.47	-1.76	-2.64
30	53.93	2.19	-2.04	-3.67
35	48.52	1.97	-2.26	-4.75
40	44.18	1.79	-2.44	-5.85
45	40.63	1.65	-2.58	-6.97
50	37.65	1.53	-2.70	-8.10
55	35.12	1.43	-2.80	-9.25
60	32.94	1.34	-2.89	-10.41
65	31.04	1.26	-2.97	-11.58
70	29.37	1.19	-3.04	-12.75
75	27.89	1.13	-3.10	-13.94
80	26.56	1.08	-3.15	-15.12
85	25.37	1.03	-3.20	-16.32
90	24.29	0.99	-3.24	-17.51

Proposed Commercial Development
Novatech Project No. 124107
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA A-1 Direct Runoff

OTTAWA IDF CURVE

Area =	0.031	ha	Qallow =	8.3	L/s
C =	0.54		Vol(max) =	0.0	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	11.30	2.99	0.90
10	178.56	8.31	0.00	0.00
15	142.89	6.65	-1.66	-1.49
20	119.95	5.59	-2.73	-3.27
25	103.85	4.84	-3.48	-5.22
30	91.87	4.28	-4.04	-7.27
35	82.58	3.85	-4.47	-9.39
40	75.15	3.50	-4.82	-11.56
45	69.05	3.22	-5.10	-13.77
50	63.95	2.98	-5.34	-16.01
55	59.62	2.78	-5.54	-18.28
60	55.89	2.60	-5.71	-20.56
65	52.65	2.45	-5.86	-22.87
70	49.79	2.32	-6.00	-25.18
75	47.26	2.20	-6.11	-27.51
80	44.99	2.10	-6.22	-29.85
85	42.95	2.00	-6.31	-32.20
90	41.11	1.91	-6.40	-34.56

Proposed Commercial Development
Novatech Project No. 124107
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA A-2 Uncontrolled Site Flows

OTTAWA IDF CURVE

Area =	0.006	ha	Qallow =	1.6	L/s
C =	0.90		Vol(max) =	0.0	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	2.12	0.56	0.17
10	104.19	1.56	0.00	0.00
15	83.56	1.25	-0.31	-0.28
20	70.25	1.05	-0.51	-0.61
25	60.90	0.91	-0.65	-0.97
30	53.93	0.81	-0.75	-1.36
35	48.52	0.73	-0.84	-1.76
40	44.18	0.66	-0.90	-2.16
45	40.63	0.61	-0.95	-2.58
50	37.65	0.57	-1.00	-3.00
55	35.12	0.53	-1.04	-3.42
60	32.94	0.49	-1.07	-3.85
65	31.04	0.47	-1.10	-4.28
70	29.37	0.44	-1.12	-4.72
75	27.89	0.42	-1.15	-5.15
80	26.56	0.40	-1.17	-5.59
85	25.37	0.38	-1.18	-6.03
90	24.29	0.36	-1.20	-6.48

Proposed Commercial Development
Novatech Project No. 124107
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA A-2 Uncontrolled Site Flows

OTTAWA IDF CURVE

Area =	0.006	ha	Qallow =	3.0	L/s
C =	1.00		Vol(max) =	0.0	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	4.05	1.07	0.32
10	178.56	2.98	0.00	0.00
15	142.89	2.38	-0.60	-0.54
20	119.95	2.00	-0.98	-1.17
25	103.85	1.73	-1.25	-1.87
30	91.87	1.53	-1.45	-2.60
35	82.58	1.38	-1.60	-3.36
40	75.15	1.25	-1.73	-4.14
45	69.05	1.15	-1.83	-4.93
50	63.95	1.07	-1.91	-5.74
55	59.62	0.99	-1.98	-6.55
60	55.89	0.93	-2.05	-7.37
65	52.65	0.88	-2.10	-8.19
70	49.79	0.83	-2.15	-9.02
75	47.26	0.79	-2.19	-9.86
80	44.99	0.75	-2.23	-10.70
85	42.95	0.72	-2.26	-11.54
90	41.11	0.69	-2.29	-12.38

Proposed Commercial Development
Novatech Project No. 124107
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA A-3 Direct Runoff

OTTAWA IDF CURVE

Area =	0.043	ha	Qallow =	3.7	L/s
C =	0.30		Vol(max) =	0.0	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	5.02	1.32	0.39
10	104.19	3.71	0.00	0.00
15	83.56	2.97	-0.73	-0.66
20	70.25	2.50	-1.21	-1.45
25	60.90	2.17	-1.54	-2.31
30	53.93	1.92	-1.79	-3.22
35	48.52	1.73	-1.98	-4.16
40	44.18	1.57	-2.14	-5.12
45	40.63	1.45	-2.26	-6.11
50	37.65	1.34	-2.37	-7.10
55	35.12	1.25	-2.46	-8.11
60	32.94	1.17	-2.54	-9.13
65	31.04	1.10	-2.60	-10.15
70	29.37	1.05	-2.66	-11.18
75	27.89	0.99	-2.72	-12.22
80	26.56	0.95	-2.76	-13.26
85	25.37	0.90	-2.80	-14.30
90	24.29	0.86	-2.84	-15.35

Proposed Commercial Development
Novatech Project No. 124107
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA A-3 Direct Runoff

OTTAWA IDF CURVE

Area =	0.043	ha	Qallow =	7.6	L/s
C =	0.35		Vol(max) =	0.0	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	10.29	2.72	0.82
10	178.56	7.57	0.00	0.00
15	142.89	6.06	-1.51	-1.36
20	119.95	5.09	-2.49	-2.98
25	103.85	4.40	-3.17	-4.75
30	91.87	3.89	-3.68	-6.62
35	82.58	3.50	-4.07	-8.55
40	75.15	3.19	-4.39	-10.53
45	69.05	2.93	-4.64	-12.54
50	63.95	2.71	-4.86	-14.58
55	59.62	2.53	-5.04	-16.65
60	55.89	2.37	-5.20	-18.73
65	52.65	2.23	-5.34	-20.83
70	49.79	2.11	-5.46	-22.94
75	47.26	2.00	-5.57	-25.06
80	44.99	1.91	-5.66	-27.19
85	42.95	1.82	-5.75	-29.33
90	41.11	1.74	-5.83	-31.48

Proposed Commercial Development
Novatech Project No. 124107
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA A-4 Direct Runoff

OTTAWA IDF CURVE

Area =	0.011	ha	Qallow =	2.9	L/s
C =	0.90		Vol(max) =	0.0	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	3.89	1.02	0.31
10	104.19	2.87	0.00	0.00
15	83.56	2.30	-0.57	-0.51
20	70.25	1.93	-0.93	-1.12
25	60.90	1.68	-1.19	-1.79
30	53.93	1.48	-1.38	-2.49
35	48.52	1.34	-1.53	-3.22
40	44.18	1.22	-1.65	-3.96
45	40.63	1.12	-1.75	-4.72
50	37.65	1.04	-1.83	-5.49
55	35.12	0.97	-1.90	-6.27
60	32.94	0.91	-1.96	-7.06
65	31.04	0.85	-2.01	-7.85
70	29.37	0.81	-2.06	-8.65
75	27.89	0.77	-2.10	-9.45
80	26.56	0.73	-2.14	-10.26
85	25.37	0.70	-2.17	-11.06
90	24.29	0.67	-2.20	-11.87

Proposed Commercial Development
Novatech Project No. 124107
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA A-4 Direct Runoff

OTTAWA IDF CURVE

Area =	0.011	ha	Qallow =	5.5	L/s
C =	1.00		Vol(max) =	0.0	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	7.42	1.96	0.59
10	178.56	5.46	0.00	0.00
15	142.89	4.37	-1.09	-0.98
20	119.95	3.67	-1.79	-2.15
25	103.85	3.18	-2.29	-3.43
30	91.87	2.81	-2.65	-4.77
35	82.58	2.53	-2.94	-6.17
40	75.15	2.30	-3.16	-7.59
45	69.05	2.11	-3.35	-9.05
50	63.95	1.96	-3.51	-10.52
55	59.62	1.82	-3.64	-12.01
60	55.89	1.71	-3.75	-13.51
65	52.65	1.61	-3.85	-15.02
70	49.79	1.52	-3.94	-16.54
75	47.26	1.45	-4.02	-18.07
80	44.99	1.38	-4.09	-19.61
85	42.95	1.31	-4.15	-21.16
90	41.11	1.26	-4.20	-22.70

Proposed Commercial Development — Storage Calculations Using Average
Novatech Project No. 124107 — Release Rate Equal to 50% of the Qpeak
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA A-5 Controlled Site Flows

OTTAWA IDF CURVE — Qpeak = 27.3 L/s
Area = 0.246 ha — Qavg = 13.7 L/s
C = 0.41 — Vol(max) = 4.8 m3
(Vol calculated for Qavg)

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	29.28	15.63	4.69
10	76.81	21.71	8.06	4.84
15	61.77	17.46	3.81	3.43
20	52.03	14.71	1.06	1.27
25	45.17	12.77	-0.88	-1.32
30	40.04	11.32	-2.33	-4.19
35	36.06	10.19	-3.46	-7.26
40	32.86	9.29	-4.36	-10.46
45	30.24	8.55	-5.10	-13.77
50	28.04	7.93	-5.72	-17.17
55	26.17	7.40	-6.25	-20.63
60	24.56	6.94	-6.71	-24.14
65	23.15	6.55	-7.10	-27.71
70	21.91	6.20	-7.45	-31.31
75	20.81	5.88	-7.77	-34.95
90	18.14	5.13	-8.52	-46.01
105	16.13	4.56	-9.09	-57.26
120	14.56	4.12	-9.53	-68.64
135	13.30	3.76	-9.89	-80.12
150	12.25	3.46	-10.19	-91.68

Proposed Commercial Development — Storage Calculations Using Average
Novatech Project No. 124107 — Release Rate Equal to 50% of the Qpeak
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA A-5 Controlled Site Flows

OTTAWA IDF CURVE — Qpeak = 34.7 L/s
Area = 0.246 ha — Qavg = 17.4 L/s
C = 0.41 — Vol(max) = 7.3 m3
(Vol calculated for Qavg)

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	39.91	22.56	6.77
10	104.19	29.46	12.11	7.26
15	83.56	23.62	6.27	5.65
20	70.25	19.86	2.51	3.01
25	60.90	17.22	-0.13	-0.20
30	53.93	15.25	-2.10	-3.79
35	48.52	13.72	-3.63	-7.63
40	44.18	12.49	-4.86	-11.66
45	40.63	11.49	-5.86	-15.83
50	37.65	10.65	-6.70	-20.11
55	35.12	9.93	-7.42	-24.49
60	32.94	9.31	-8.04	-28.93
65	31.04	8.78	-8.57	-33.44
70	29.37	8.30	-9.05	-37.99
75	27.89	7.88	-9.47	-42.59
90	24.29	6.87	-10.48	-56.61
105	21.58	6.10	-11.25	-70.86
120	19.47	5.50	-11.85	-85.29
135	17.76	5.02	-12.33	-99.85
150	16.36	4.63	-12.72	-114.52

Proposed Commercial Development — Storage Calculations Using Average
Novatech Project No. 124107 — Release Rate Equal to 50% of the Qpeak
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA A-5 Controlled Site Flows

OTTAWA IDF CURVE — Qpeak = 47.8 L/s
Area = 0.246 ha — Qavg = 23.9 L/s
C = 0.48 — Vol(max) = 20.7 m3
(Vol calculated for Qavg)

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	79.45	55.55	16.66
10	178.56	58.45	34.55	20.73
15	142.89	46.78	22.88	20.59
20	119.95	39.27	15.37	18.44
25	103.85	33.99	10.09	15.14
30	91.87	30.07	6.17	11.11
35	82.58	27.03	3.13	6.58
40	75.15	24.60	0.70	1.68
45	69.05	22.60	-1.30	-3.50
50	63.95	20.94	-2.96	-8.89
55	59.62	19.52	-4.38	-14.46
60	55.89	18.30	-5.60	-20.17
65	52.65	17.23	-6.67	-26.00
70	49.79	16.30	-7.60	-31.93
75	47.26	15.47	-8.43	-37.94
90	41.11	13.46	-10.44	-56.39
105	36.50	11.95	-11.95	-75.30
120	32.89	10.77	-13.13	-94.55
135	30.00	9.82	-14.08	-114.05
150	27.61	9.04	-14.86	-133.76

Structures	Size (mm)	Area (m^2)	T/G	Inv IN	Inv OUT
CBMH 204	1219	1.17	99.55	97.10	96.97
CBMH 205	1219	1.17	99.60	97.30	97.27
CBMH 206	1219	1.17	100.55	98.83	98.25

Area A-8: Storage Table

Elevation (m)	System Depth (m)	CBMH 204 Volume (m^3)	CBMH 205 Volume (m^3)	CBMH 206 Volume (m^3)	Underground Storage: Combined Volume (m^3)	Surface Storage: CBMH 204 & CBMH 205 Area (m^2)	Surface Storage: CBMH 204 & CBMH 205 Volume (m^3)	Total Storage: Ponding Volume (m^3)	Total Storage: **Total Volume (m^3)**	Design Head
96.97	0.00	-	-	-	-	-	-	-	**0.0**	-
97.10	0.13	0.00	0.00	0.00	0.00	-	-	-	**0.0**	0.00
97.30	0.33	0.39	0.04	0.00	1.01	-	-	-	**1.0**	0.20
97.60	0.63	0.74	0.39	0.00	3.01	-	-	-	**3.0**	0.50
98.25	1.28	1.49	1.14	0.00	6.09	-	-	-	**6.1**	1.15
98.55	1.58	1.84	1.49	0.35	7.71	-	-	-	**7.7**	1.45
99.55	2.58	3.01	2.66	1.52	11.21	-	-	-	**11.2**	2.45
99.60	2.63	3.01	2.66	1.52	11.21	0.00	-	-	**11.2**	2.50
99.65	2.68	3.01	2.66	1.52	11.21	64.00	1.60	1.60	**12.8**	2.55
99.70	2.73	3.01	2.66	1.52	11.21	138.90	5.07	5.07	**16.3**	2.60
99.75	2.78	3.01	2.66	1.52	11.21	200.90	13.57	13.57	**24.8**	2.65
99.80	2.83	3.01	2.66	1.52	11.21	260.70	25.11	25.11	**36.3**	2.70
99.85	2.88	3.01	2.66	1.52	11.21	295.70	39.02	39.02	**50.2**	2.75

PI = 3.141592654
pipe I.D.= 254
U/G Storage Pipe Volume

End Area	0.051	(m^2)
Total Length	23.4	(m)
Pipe Volume	1.2	(m^3)

PI = 3.141592654
pipe I.D.= 254
U/G Storage Pipe Volume

End Area	0.051	(m^2)
Total Length	55.9	(m)
Pipe Volume	2.8	(m^3)

Circular Plug Type 117mm Orifice

1:100 Yr
Flow (L/s) = 47.8
Head (m) = 2.62
Elevation (m) = **99.72**
Outlet Pipe Dia.(mm) = 254
Volume (m3) = 20.7

1:5 Yr
Flow (L/s) = 34.7
Head (m) = 1.38
Elevation (m) = **98.48**
Outlet Pipe Dia.(mm) = 254
Volume (m3) = 7.3

1:2 Yr
Flow (L/s) = 27.3
Head (m) = 0.85
Elevation (m) = **97.95**
Outlet Pipe Dia.(mm) = 254
Volume (m3) = 4.8

Orifice Size - 1:100 yr Flow Check
Q=0.62xAx(2gh)^0.5

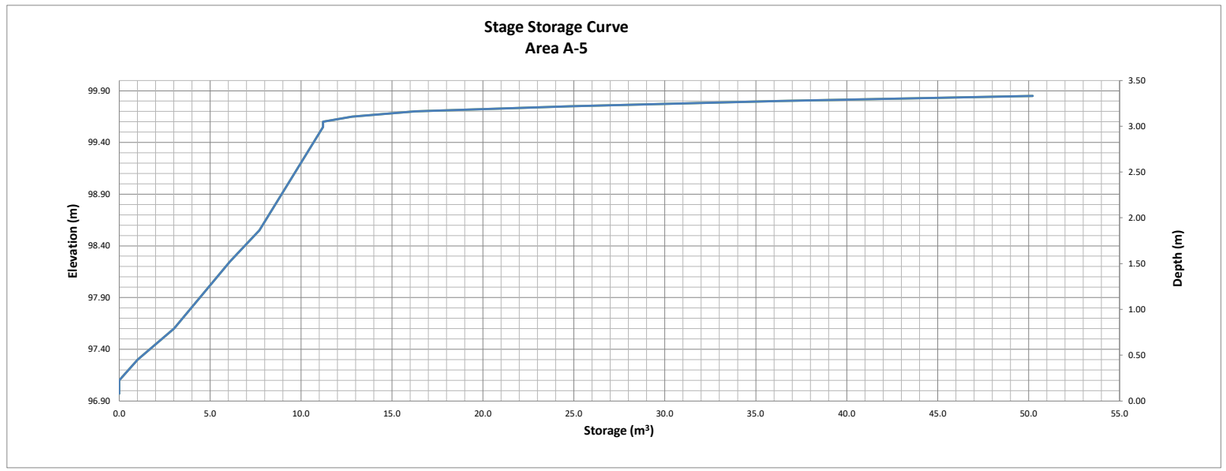
	1:100 yr	Flow Check
Q (m^3/s) =	0.0478	**0.0478**
g (m/s^2) =	9.81	9.81
h (m) =	**2.62**	2.62
A (m^2) =	**0.010747008**	**0.01075**
D (m) =	**0.116976558**	**0.11700**
D (mm) =	**117**	117.0

1:5 yr Flow Check

	1:5 yr
Q (m^3/s) =	0.0347
g (m/s^2) =	9.81
h (m) =	**1.38**
A (m^2) =	**0.01075**
D (m) =	**0.117**
D (mm) =	**117**

1:2 yr Flow Check

	1:2 yr
Q (m^3/s) =	0.0273
g (m/s^2) =	9.81
h (m) =	**0.85**
A (m^2) =	**0.01075**
D (m) =	**0.117**
D (mm) =	**117**



Proposed Commercial Development
Novatech Project No. 124107
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA A-6 Uncontrolled Site Flows

OTTAWA IDF CURVE

Area =	0.293	ha	Qallow =	48.0	L/s
C =	0.57		Vol(max) =	0.0	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	65.03	17.04	5.11
10	104.19	48.00	0.00	0.00
15	83.56	38.49	-9.50	-8.55
20	70.25	32.36	-15.63	-18.76
25	60.90	28.05	-19.94	-29.91
30	53.93	24.84	-23.15	-41.68
35	48.52	22.35	-25.65	-53.86
40	44.18	20.35	-27.64	-66.34
45	40.63	18.72	-29.28	-79.05
50	37.65	17.34	-30.65	-91.95
55	35.12	16.18	-31.82	-104.99
60	32.94	15.18	-32.82	-118.15
65	31.04	14.30	-33.69	-131.41
70	29.37	13.53	-34.46	-144.75
75	27.89	12.85	-35.15	-158.17
80	26.56	12.24	-35.76	-171.64
85	25.37	11.69	-36.31	-185.17
90	24.29	11.19	-36.81	-198.75

Proposed Commercial Development
Novatech Project No. 124107
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA A-6 Uncontrolled Site Flows

OTTAWA IDF CURVE

Area =	0.293	ha	Qallow =	93.3	L/s
C =	0.64		Vol(max) =	0.0	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	126.85	33.50	10.05
10	178.56	93.32	-0.02	-0.01
15	142.89	74.68	-18.66	-16.80
20	119.95	62.69	-30.65	-36.78
25	103.85	54.27	-39.07	-58.60
30	91.87	48.01	-45.33	-81.59
35	82.58	43.16	-50.18	-105.39
40	75.15	39.27	-54.07	-129.77
45	69.05	36.09	-57.25	-154.59
50	63.95	33.42	-59.92	-179.76
55	59.62	31.16	-62.18	-205.20
60	55.89	29.21	-64.13	-230.87
65	52.65	27.52	-65.83	-256.73
70	49.79	26.02	-67.32	-282.75
75	47.26	24.70	-68.65	-308.91
80	44.99	23.51	-69.83	-335.18
85	42.95	22.45	-70.89	-361.56
90	41.11	21.49	-71.86	-388.03

150 DUN SKIPPER DRIVE
PROJECT NO: 124107
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-1 **Controlled Roof Drain RD 1**

OTTAWA IDF CURVE

Area =	0.030	ha	Qallow =	1.26	L/s
C =	0.90		Vol(max) =	5.0	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	10.60	9.34	2.80
10	104.19	7.82	6.56	3.94
15	83.56	6.27	5.01	4.51
20	70.25	5.27	4.01	4.82
25	60.90	4.57	3.31	4.97
30	53.93	4.05	2.79	5.02
35	48.52	3.64	2.38	5.00
40	44.18	3.32	2.06	4.94
45	40.63	3.05	1.79	4.83
50	37.65	2.83	1.57	4.70
55	35.12	2.64	1.38	4.54
60	32.94	2.47	1.21	4.37
65	31.04	2.33	1.07	4.17
70	29.37	2.20	0.94	3.97
75	27.89	2.09	0.83	3.75
90	24.29	1.82	0.56	3.04
105	21.58	1.62	0.36	2.27
120	19.47	1.46	0.20	1.45

150 DUN SKIPPER DRIVE
PROJECT NO: 124107
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-1 **Controlled Roof Drain RD 1**

OTTAWA IDF CURVE

Area =	0.030	ha	Qallow =	1.58	L/s
C =	1.00		Vol(max) =	11.3	m3

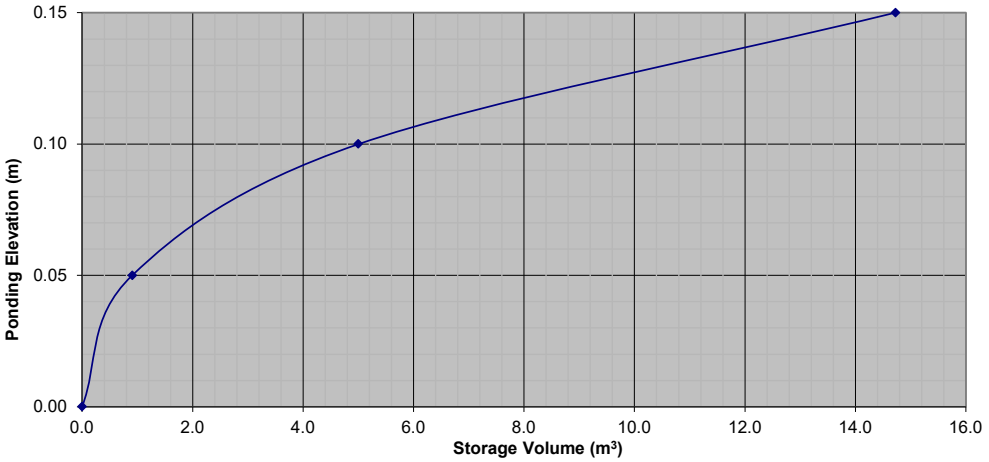
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	20.24	18.66	5.60
10	178.56	14.89	13.31	7.99
15	142.89	11.92	10.34	9.30
20	119.95	10.00	8.42	10.11
25	103.85	8.66	7.08	10.62
30	91.87	7.66	6.08	10.95
35	82.58	6.89	5.31	11.14
40	75.15	6.27	4.69	11.25
45	69.05	5.76	4.18	11.28
50	63.95	5.33	3.75	11.26
55	59.62	4.97	3.39	11.20
60	55.89	4.66	3.08	11.09
65	52.65	4.39	2.81	10.96
70	49.79	4.15	2.57	10.80
75	47.26	3.94	2.36	10.62
90	41.11	3.43	1.85	9.98
105	36.50	3.04	1.46	9.22
120	32.89	2.74	1.16	8.38

Watts Accutrol Flow Control Roof Drains:			RD-100-A-ADJ set to Fully Exposed		
Design Event	**Flow/Drain (L/s)**	**Total Flow (L/s)**	**Ponding (cm)**	**Storage (m^3)**	
				Required	**Provided**
1:5 Year	1.26	1.26	10	5.0	14.7
1:100 Year	1.58	1.58	13	11.3	14.7

Roof Drain Storage Table for Building A RD-1

Elevation	Area RD 1	Total Volume
m	m^2	m^3
0.00	0	0
0.05	36.4	0.9
0.10	127.3	5.0
0.15	261.7	14.7

Stage Storage Curve: Area R-1
Controlled Roof Drain #1



150 DUN SKIPPER DRIVE
PROJECT NO: 124107
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-1 **Controlled Roof Drain RD 2**

OTTAWA IDF CURVE

Area =	0.029	ha	Qallow =	1.26	L/s
C =	0.90		Vol(max) =	4.8	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	10.24	8.98	2.70
10	104.19	7.56	6.30	3.78
15	83.56	6.06	4.80	4.32
20	70.25	5.10	3.84	4.60
25	60.90	4.42	3.16	4.74
30	53.93	3.91	2.65	4.78
35	48.52	3.52	2.26	4.75
40	44.18	3.21	1.95	4.67
45	40.63	2.95	1.69	4.56
50	37.65	2.73	1.47	4.42
55	35.12	2.55	1.29	4.25
60	32.94	2.39	1.13	4.07
65	31.04	2.25	0.99	3.87
70	29.37	2.13	0.87	3.66
75	27.89	2.02	0.76	3.44
90	24.29	1.76	0.50	2.71
105	21.58	1.57	0.31	1.93
120	19.47	1.41	0.15	1.10

150 DUN SKIPPER DRIVE
PROJECT NO: 124107
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-1 **Controlled Roof Drain RD 2**

OTTAWA IDF CURVE

Area =	0.029	ha	Qallow =	1.58	L/s
C =	1.00		Vol(max) =	10.8	m3

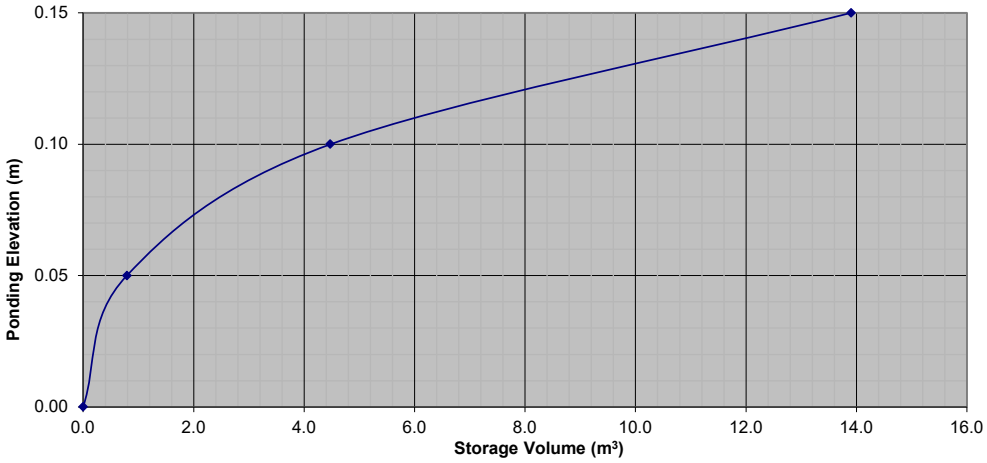
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	19.57	17.99	5.40
10	178.56	14.40	12.82	7.69
15	142.89	11.52	9.94	8.95
20	119.95	9.67	8.09	9.71
25	103.85	8.37	6.79	10.19
30	91.87	7.41	5.83	10.49
35	82.58	6.66	5.08	10.66
40	75.15	6.06	4.48	10.75
45	69.05	5.57	3.99	10.76
50	63.95	5.16	3.58	10.73
55	59.62	4.81	3.23	10.65
60	55.89	4.51	2.93	10.53
65	52.65	4.24	2.66	10.39
70	49.79	4.01	2.43	10.22
75	47.26	3.81	2.23	10.03
90	41.11	3.31	1.73	9.37
105	36.50	2.94	1.36	8.58
120	32.89	2.65	1.07	7.72

Watts Accutrol Flow Control Roof Drains:			RD-100-A-ADJ set to Fully Exposed		
Design Event	**Flow/Drain (L/s)**	**Total Flow (L/s)**	**Ponding (cm)**	**Storage (m^3)**	
				Required	**Provided**
1:5 Year	1.26	1.26	10	4.8	13.9
1:100 Year	1.58	1.58	14	10.8	13.9

Roof Drain Storage Table for Building A RD-2

Elevation	Area RD 1	Total Volume
m	m^2	m^3
0.00	0	0
0.05	31.7	0.8
0.10	115.6	4.5
0.15	261.6	13.9

Stage Storage Curve: Area R-1
Controlled Roof Drain #2



150 DUN SKIPPER DRIVE
PROJECT NO: 124107
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-1 **Controlled Roof Drain RD 3**

OTTAWA IDF CURVE

Area =	0.013	ha	Qallow =	0.95	L/s
C =	0.90		Vol(max) =	1.6	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	4.59	3.64	1.09
10	104.19	3.39	2.44	1.46
15	83.56	2.72	1.77	1.59
20	70.25	2.28	1.33	1.60
25	60.90	1.98	1.03	1.55
30	53.93	1.75	0.80	1.45
35	48.52	1.58	0.63	1.32
40	44.18	1.44	0.49	1.17
45	40.63	1.32	0.37	1.00
50	37.65	1.22	0.27	0.82
55	35.12	1.14	0.19	0.63
60	32.94	1.07	0.12	0.44
65	31.04	1.01	0.06	0.23
70	29.37	0.96	0.01	0.02
75	27.89	0.91	-0.04	-0.19
90	24.29	0.79	-0.16	-0.86
105	21.58	0.70	-0.25	-1.56
120	19.47	0.63	-0.32	-2.28

150 DUN SKIPPER DRIVE
PROJECT NO: 124107
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-1 **Controlled Roof Drain RD 3**

OTTAWA IDF CURVE

Area =	0.013	ha	Qallow =	1.10	L/s
C =	1.00		Vol(max) =	4.0	m3

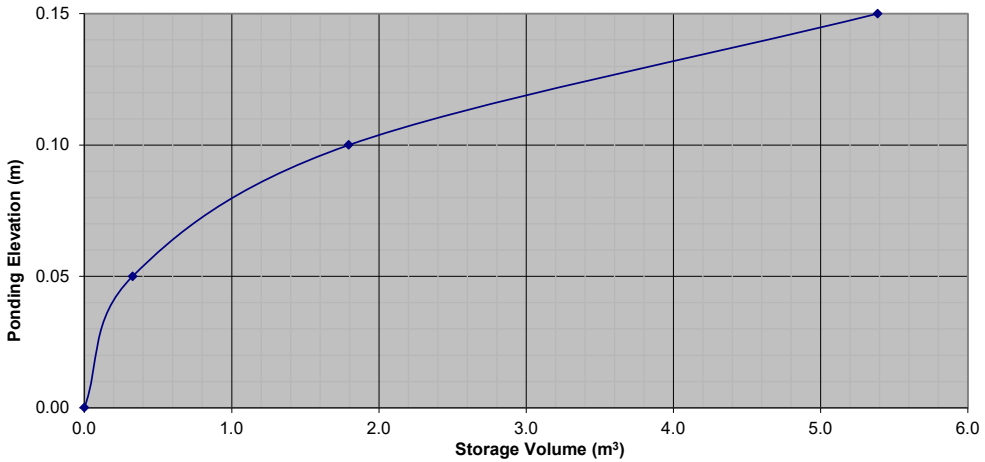
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	8.77	7.67	2.30
10	178.56	6.45	5.35	3.21
15	142.89	5.16	4.06	3.66
20	119.95	4.34	3.24	3.88
25	103.85	3.75	2.65	3.98
30	91.87	3.32	2.22	4.00
35	82.58	2.98	1.88	3.96
40	75.15	2.72	1.62	3.88
45	69.05	2.50	1.40	3.77
50	63.95	2.31	1.21	3.63
55	59.62	2.15	1.05	3.48
60	55.89	2.02	0.92	3.31
65	52.65	1.90	0.80	3.13
70	49.79	1.80	0.70	2.94
75	47.26	1.71	0.61	2.74
90	41.11	1.49	0.39	2.08
105	36.50	1.32	0.22	1.38
120	32.89	1.19	0.09	0.64

Watts Accutrol Flow Control Roof Drains:			RD-100-A-ADJ set to 1/2 Exposed		
Design Event	**Flow/Drain (L/s)**	**Total Flow (L/s)**	**Ponding (cm)**	**Storage (m^3)**	
				Required	**Provided**
1:5 Year	0.95	0.95	10	1.6	5.4
1:100 Year	1.10	1.10	13	4.0	5.4

Roof Drain Storage Table for Building A RD-3

Elevation	Area RD 1	Total Volume
m	m^2	m^3
0.00	0	0
0.05	13.1	0.3
0.10	45.6	1.8
0.15	98.1	5.4

Stage Storage Curve: Area R-1
Controlled Roof Drain #3



150 DUN SKIPPER DRIVE
PROJECT NO: 124107
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-1 Controlled Roof Drain RD 4

OTTAWA IDF CURVE

Area =	0.020	ha	Qallow =	0.95	L/s
C =	0.90		Vol(max) =	3.1	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	7.06	6.11	1.83
10	104.19	5.21	4.26	2.56
15	83.56	4.18	3.23	2.91
20	70.25	3.52	2.57	3.08
25	60.90	3.05	2.10	3.15
30	53.93	2.70	1.75	3.15
35	48.52	2.43	1.48	3.10
40	44.18	2.21	1.26	3.03
45	40.63	2.03	1.08	2.92
50	37.65	1.88	0.93	2.80
55	35.12	1.76	0.81	2.66
60	32.94	1.65	0.70	2.51
65	31.04	1.55	0.60	2.35
70	29.37	1.47	0.52	2.18
75	27.89	1.40	0.45	2.00
90	24.29	1.22	0.27	1.43
105	21.58	1.08	0.13	0.82
120	19.47	0.97	0.02	0.17

150 DUN SKIPPER DRIVE
PROJECT NO: 124107
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-1 Controlled Roof Drain RD 4

OTTAWA IDF CURVE

Area =	0.020	ha	Qallow =	1.10	L/s
C =	1.00		Vol(max) =	7.4	m3

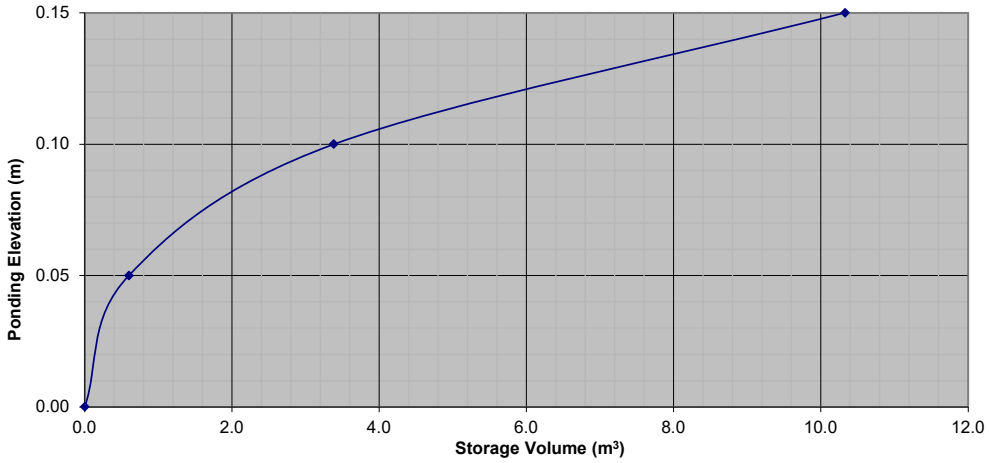
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	13.49	12.39	3.72
10	178.56	9.93	8.83	5.30
15	142.89	7.94	6.84	6.16
20	119.95	6.67	5.57	6.68
25	103.85	5.77	4.67	7.01
30	91.87	5.11	4.01	7.21
35	82.58	4.59	3.49	7.33
40	75.15	4.18	3.08	7.39
45	69.05	3.84	2.74	7.40
50	63.95	3.56	2.46	7.37
55	59.62	3.32	2.22	7.31
60	55.89	3.11	2.01	7.23
65	52.65	2.93	1.83	7.13
70	49.79	2.77	1.67	7.01
75	47.26	2.63	1.53	6.87
90	41.11	2.29	1.19	6.40
105	36.50	2.03	0.93	5.85
120	32.89	1.83	0.73	5.25

Watts Accutrol Flow Control Roof Drains:			RD-100-A-ADJ set to 1/2 Exposed		
Design Event	**Flow/Drain (L/s)**	**Total Flow (L/s)**	**Ponding (cm)**	**Storage (m^3)**	
				Required	**Provided**
1:5 Year	0.95	0.95	10	3.1	10.3
1:100 Year	1.10	1.10	13	7.4	10.3

Roof Drain Storage Table for Building A RD-4

Elevation	Area RD 1	Total Volume
m	m^2	m^3
0.00	0	0
0.05	24.0	0.6
0.10	87.3	3.4
0.15	190.4	10.3

Stage Storage Curve: Area R-1
Controlled Roof Drain #4



150 DUN SKIPPER DRIVE
PROJECT NO: 124107
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-1 **Controlled Roof Drain RD 5**

OTTAWA IDF CURVE

Area =	0.032	ha	Qallow =	1.26	L/s
C =	0.90		Vol(max) =	5.5	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	11.30	10.04	3.01
10	104.19	8.34	7.08	4.25
15	83.56	6.69	5.43	4.89
20	70.25	5.62	4.36	5.24
25	60.90	4.88	3.62	5.42
30	53.93	4.32	3.06	5.50
35	48.52	3.88	2.62	5.51
40	44.18	3.54	2.28	5.47
45	40.63	3.25	1.99	5.38
50	37.65	3.01	1.75	5.26
55	35.12	2.81	1.55	5.12
60	32.94	2.64	1.38	4.96
65	31.04	2.49	1.23	4.78
70	29.37	2.35	1.09	4.58
75	27.89	2.23	0.97	4.38
90	24.29	1.94	0.68	3.70
105	21.58	1.73	0.47	2.95
120	19.47	1.56	0.30	2.15

150 DUN SKIPPER DRIVE
PROJECT NO: 124107
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-1 **Controlled Roof Drain RD 5**

OTTAWA IDF CURVE

Area =	0.032	ha	Qallow =	1.58	L/s
C =	1.00		Vol(max) =	12.3	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	21.59	20.01	6.00
10	178.56	15.88	14.30	8.58
15	142.89	12.71	11.13	10.02
20	119.95	10.67	9.09	10.91
25	103.85	9.24	7.66	11.49
30	91.87	8.17	6.59	11.87
35	82.58	7.35	5.77	12.11
40	75.15	6.68	5.10	12.25
45	69.05	6.14	4.56	12.32
50	63.95	5.69	4.11	12.33
55	59.62	5.30	3.72	12.29
60	55.89	4.97	3.39	12.21
65	52.65	4.68	3.10	12.10
70	49.79	4.43	2.85	11.97
75	47.26	4.20	2.62	11.81
90	41.11	3.66	2.08	11.22
105	36.50	3.25	1.67	10.50
120	32.89	2.93	1.35	9.69

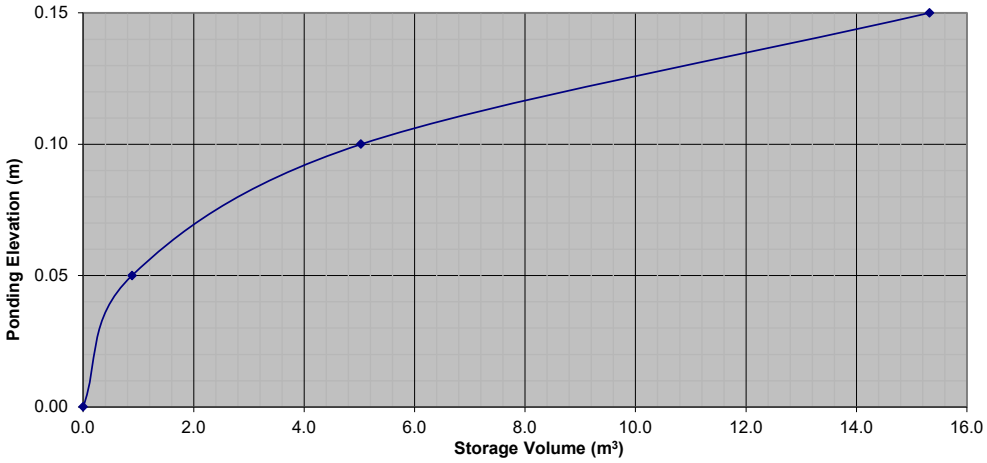
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to Fully Exposed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:5 Year	1.26	1.26	11	5.5	15.3
1:100 Year	1.58	1.58	14	12.3	15.3

Roof Drain Storage Table for Building A RD-5

Elevation	Area RD 1	Total Volume
m	m^2	m^3
0.00	0	0
0.05	35.4	0.9
0.10	130.3	5.0
0.15	281.6	15.3

Stage Storage Curve: Area R-1
Controlled Roof Drain #5



150 DUN SKIPPER DRIVE
PROJECT NO: 124107
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-1 **Controlled Roof Drain RD 6**

OTTAWA IDF CURVE

Area =	0.024	ha	Qallow =	0.95	L/s
C =	0.90		Vol(max) =	4.1	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	8.48	7.53	2.26
10	104.19	6.26	5.31	3.18
15	83.56	5.02	4.07	3.66
20	70.25	4.22	3.27	3.92
25	60.90	3.66	2.71	4.06
30	53.93	3.24	2.29	4.12
35	48.52	2.91	1.96	4.12
40	44.18	2.65	1.70	4.09
45	40.63	2.44	1.49	4.02
50	37.65	2.26	1.31	3.93
55	35.12	2.11	1.16	3.82
60	32.94	1.98	1.03	3.70
65	31.04	1.86	0.91	3.57
70	29.37	1.76	0.81	3.42
75	27.89	1.67	0.72	3.26
90	24.29	1.46	0.51	2.75
105	21.58	1.30	0.35	2.18
120	19.47	1.17	0.22	1.58

150 DUN SKIPPER DRIVE
PROJECT NO: 124107
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-1 **Controlled Roof Drain RD 6**

OTTAWA IDF CURVE

Area =	0.024	ha	Qallow =	1.10	L/s
C =	1.00		Vol(max) =	9.5	m3

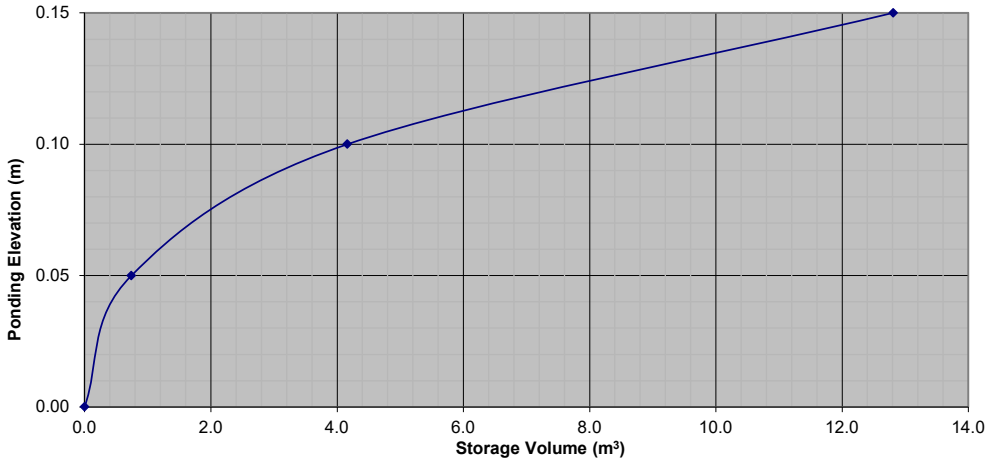
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	16.19	15.09	4.53
10	178.56	11.91	10.81	6.49
15	142.89	9.53	8.43	7.59
20	119.95	8.00	6.90	8.28
25	103.85	6.93	5.83	8.74
30	91.87	6.13	5.03	9.05
35	82.58	5.51	4.41	9.26
40	75.15	5.01	3.91	9.39
45	69.05	4.61	3.51	9.47
50	63.95	4.27	3.17	9.50
55	59.62	3.98	2.88	9.50
60	55.89	3.73	2.63	9.47
65	52.65	3.51	2.41	9.41
70	49.79	3.32	2.22	9.33
75	47.26	3.15	2.05	9.24
90	41.11	2.74	1.64	8.87
105	36.50	2.44	1.34	8.41
120	32.89	2.19	1.09	7.88

Watts Accutrol Flow Control Roof Drains:			RD-100-A-ADJ set to 1/2 Exposed		
Design Event	**Flow/Drain (L/s)**	**Total Flow (L/s)**	**Ponding (cm)**	**Storage (m^3)**	
				Required	**Provided**
1:5 Year	0.95	0.95	10	4.1	12.8
1:100 Year	1.10	1.10	13	9.5	12.8

Roof Drain Storage Table for Building A RD-6

Elevation	Area RD 1	Total Volume
m	m^2	m^3
0.00	0	0
0.05	29.7	0.7
0.10	107.0	4.2
0.15	239.0	12.8

Stage Storage Curve: Area R-1
Controlled Roof Drain #6



150 DUN SKIPPER DRIVE
PROJECT NO: 124107
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-3 Controlled Roof Drain RD 7

OTTAWA IDF CURVE

Area =	0.024	ha	Qallow =	0.95	L/s
C =	0.90		Vol(max) =	4.1	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	8.48	7.53	2.26
10	104.19	6.26	5.31	3.18
15	83.56	5.02	4.07	3.66
20	70.25	4.22	3.27	3.92
25	60.90	3.66	2.71	4.06
30	53.93	3.24	2.29	4.12
35	48.52	2.91	1.96	4.12
40	44.18	2.65	1.70	4.09
45	40.63	2.44	1.49	4.02
50	37.65	2.26	1.31	3.93
55	35.12	2.11	1.16	3.82
60	32.94	1.98	1.03	3.70
65	31.04	1.86	0.91	3.57
70	29.37	1.76	0.81	3.42
75	27.89	1.67	0.72	3.26
90	24.29	1.46	0.51	2.75
105	21.58	1.30	0.35	2.18
120	19.47	1.17	0.22	1.58

150 DUN SKIPPER DRIVE
PROJECT NO: 124107
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-3 Controlled Roof Drain RD 7

OTTAWA IDF CURVE

Area =	0.024	ha	Qallow =	1.10	L/s
C =	1.00		Vol(max) =	9.5	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	16.19	15.09	4.53
10	178.56	11.91	10.81	6.49
15	142.89	9.53	8.43	7.59
20	119.95	8.00	6.90	8.28
25	103.85	6.93	5.83	8.74
30	91.87	6.13	5.03	9.05
35	82.58	5.51	4.41	9.26
40	75.15	5.01	3.91	9.39
45	69.05	4.61	3.51	9.47
50	63.95	4.27	3.17	9.50
55	59.62	3.98	2.88	9.50
60	55.89	3.73	2.63	9.47
65	52.65	3.51	2.41	9.41
70	49.79	3.32	2.22	9.33
75	47.26	3.15	2.05	9.24
90	41.11	2.74	1.64	8.87
105	36.50	2.44	1.34	8.41
120	32.89	2.19	1.09	7.88

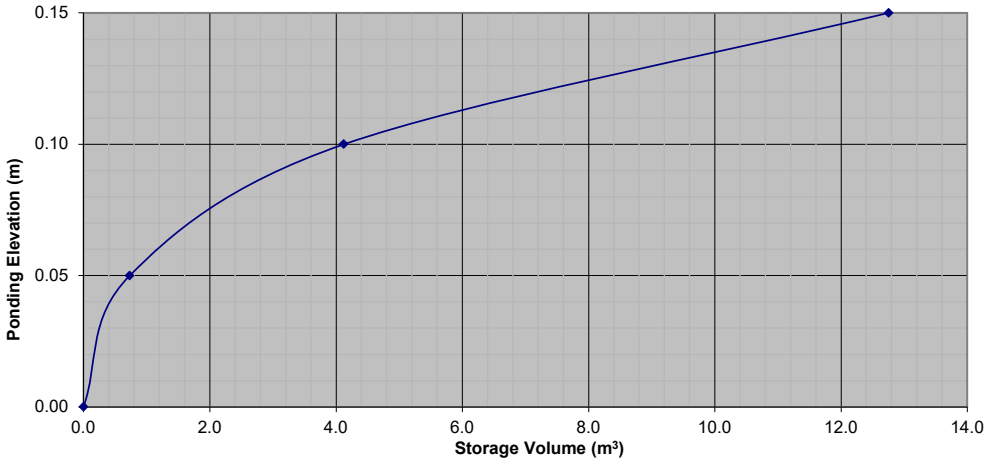
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to 1/2 Exposed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:5 Year	0.95	0.95	10	4.1	12.8
1:100 Year	1.10	1.10	13	9.5	12.8

Roof Drain Storage Table for Building C RD-1

Elevation	Area RD 1	Total Volume
m	m^2	m^3
0.00	0	0
0.05	29.3	0.7
0.10	106.3	4.1
0.15	239.0	12.8

Stage Storage Curve: Area R-1
Controlled Roof Drain #7



150 DUN SKIPPER DRIVE
PROJECT NO: 124107
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-1 **Controlled Roof Drain RD 8**

OTTAWA IDF CURVE

Area =	0.022	ha	Qallow =	0.95	L/s
C =	0.90		Vol(max) =	3.7	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	7.86	6.91	2.07
10	104.19	5.80	4.85	2.91
15	83.56	4.65	3.70	3.33
20	70.25	3.91	2.96	3.55
25	60.90	3.39	2.44	3.66
30	53.93	3.00	2.05	3.70
35	48.52	2.70	1.75	3.68
40	44.18	2.46	1.51	3.63
45	40.63	2.26	1.31	3.54
50	37.65	2.10	1.15	3.44
55	35.12	1.96	1.01	3.32
60	32.94	1.83	0.88	3.18
65	31.04	1.73	0.78	3.04
70	29.37	1.64	0.69	2.88
75	27.89	1.55	0.60	2.71
90	24.29	1.35	0.40	2.17
105	21.58	1.20	0.25	1.59
120	19.47	1.08	0.13	0.97

150 DUN SKIPPER DRIVE
PROJECT NO: 124107
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-1 **Controlled Roof Drain RD 8**

OTTAWA IDF CURVE

Area =	0.022	ha	Qallow =	1.10	L/s
C =	1.00		Vol(max) =	8.6	m3

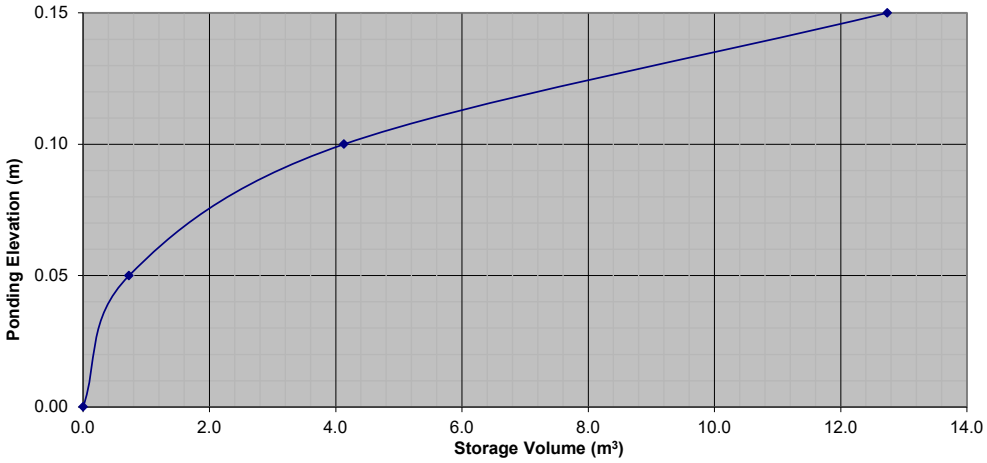
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	15.02	13.92	4.18
10	178.56	11.05	9.95	5.97
15	142.89	8.84	7.74	6.97
20	119.95	7.42	6.32	7.59
25	103.85	6.43	5.33	7.99
30	91.87	5.68	4.58	8.25
35	82.58	5.11	4.01	8.42
40	75.15	4.65	3.55	8.52
45	69.05	4.27	3.17	8.57
50	63.95	3.96	2.86	8.57
55	59.62	3.69	2.59	8.55
60	55.89	3.46	2.36	8.49
65	52.65	3.26	2.16	8.42
70	49.79	3.08	1.98	8.32
75	47.26	2.92	1.82	8.21
90	41.11	2.54	1.44	7.80
105	36.50	2.26	1.16	7.30
120	32.89	2.04	0.94	6.74

Watts Accutrol Flow Control Roof Drains:			RD-100-A-ADJ set to 1/2 Exposed		
Design Event	**Flow/Drain (L/s)**	**Total Flow (L/s)**	**Ponding (cm)**	**Storage (m^3)**	
				Required	**Provided**
1:5 Year	0.95	0.95	10	3.7	12.7
1:100 Year	1.10	1.10	13	8.6	12.7

Roof Drain Storage Table for Building C RD-2

Elevation	Area RD 1	Total Volume
m	m^2	m^3
0.00	0	0
0.05	29.1	0.7
0.10	107.0	4.1
0.15	237.4	12.7

Stage Storage Curve: Area R-1
Controlled Roof Drain #8



150 DUN SKIPPER DRIVE
PROJECT NO: 124107
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-2 Controlled Roof Drain RD 1

OTTAWA IDF CURVE

Area =	0.027	ha	Qallow =	1.26	L/s
C =	0.90		Vol(max) =	4.3	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	9.54	8.28	2.48
10	104.19	7.04	5.78	3.47
15	83.56	5.64	4.38	3.95
20	70.25	4.75	3.49	4.18
25	60.90	4.11	2.85	4.28
30	53.93	3.64	2.38	4.29
35	48.52	3.28	2.02	4.24
40	44.18	2.98	1.72	4.14
45	40.63	2.74	1.48	4.01
50	37.65	2.54	1.28	3.85
55	35.12	2.37	1.11	3.67
60	32.94	2.23	0.97	3.48
65	31.04	2.10	0.84	3.26
70	29.37	1.98	0.72	3.04
75	27.89	1.88	0.62	2.81
90	24.29	1.64	0.38	2.06
105	21.58	1.46	0.20	1.25
120	19.47	1.32	0.06	0.40

150 DUN SKIPPER DRIVE
PROJECT NO: 124107
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-2 Controlled Roof Drain RD 1

OTTAWA IDF CURVE

Area =	0.027	ha	Qallow =	1.58	L/s
C =	1.00		Vol(max) =	9.7	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	18.22	16.64	4.99
10	178.56	13.40	11.82	7.09
15	142.89	10.73	9.15	8.23
20	119.95	9.00	7.42	8.91
25	103.85	7.79	6.21	9.32
30	91.87	6.90	5.32	9.57
35	82.58	6.20	4.62	9.70
40	75.15	5.64	4.06	9.74
45	69.05	5.18	3.60	9.73
50	63.95	4.80	3.22	9.66
55	59.62	4.48	2.90	9.55
60	55.89	4.20	2.62	9.42
65	52.65	3.95	2.37	9.25
70	49.79	3.74	2.16	9.06
75	47.26	3.55	1.97	8.85
90	41.11	3.09	1.51	8.13
105	36.50	2.74	1.16	7.30
120	32.89	2.47	0.89	6.40

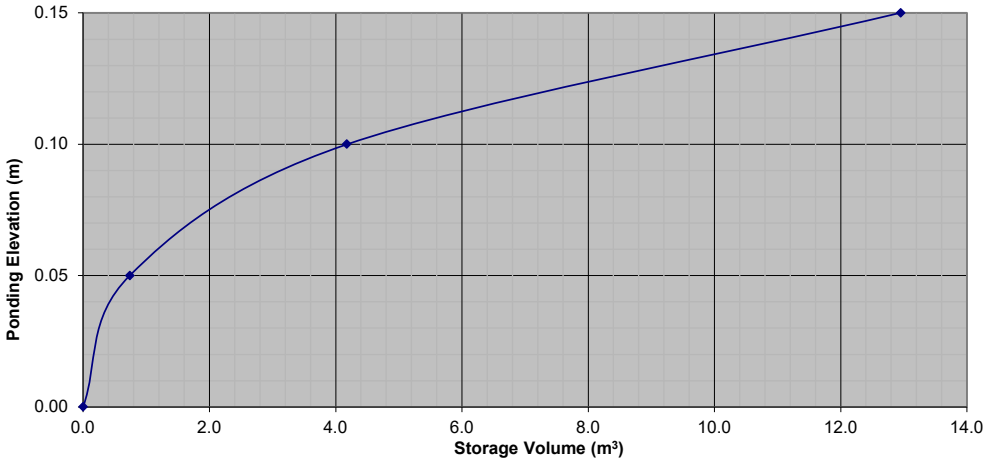
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to Fully Exposed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:5 Year	1.26	1.26	10	4.3	13.0
1:100 Year	1.58	1.58	13	9.7	13.0

Roof Drain Storage Table for Building C RD-2

Elevation	Area RD 1	Total Volume
m	m^2	m^3
0.00	0	0
0.05	29.6	0.7
0.10	107.9	4.2
0.15	243.0	13.0

Stage Storage Curve: Area R-2
Controlled Roof Drain #1



150 DUN SKIPPER DRIVE
PROJECT NO: 124107
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-2 Controlled Roof Drain RD 2

OTTAWA IDF CURVE

Area =	0.033	ha	Qallow =	1.26	L/s
C =	0.90		Vol(max) =	5.8	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	11.66	10.40	3.12
10	104.19	8.60	7.34	4.41
15	83.56	6.90	5.64	5.08
20	70.25	5.80	4.54	5.45
25	60.90	5.03	3.77	5.65
30	53.93	4.45	3.19	5.75
35	48.52	4.01	2.75	5.77
40	44.18	3.65	2.39	5.73
45	40.63	3.35	2.09	5.66
50	37.65	3.11	1.85	5.55
55	35.12	2.90	1.64	5.41
60	32.94	2.72	1.46	5.26
65	31.04	2.56	1.30	5.08
70	29.37	2.43	1.17	4.89
75	27.89	2.30	1.04	4.69
90	24.29	2.01	0.75	4.03
105	21.58	1.78	0.52	3.29
120	19.47	1.61	0.35	2.50

150 DUN SKIPPER DRIVE
PROJECT NO: 124107
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-2 Controlled Roof Drain RD 2

OTTAWA IDF CURVE

Area =	0.033	ha	Qallow =	1.58	L/s
C =	1.00		Vol(max) =	12.9	m3

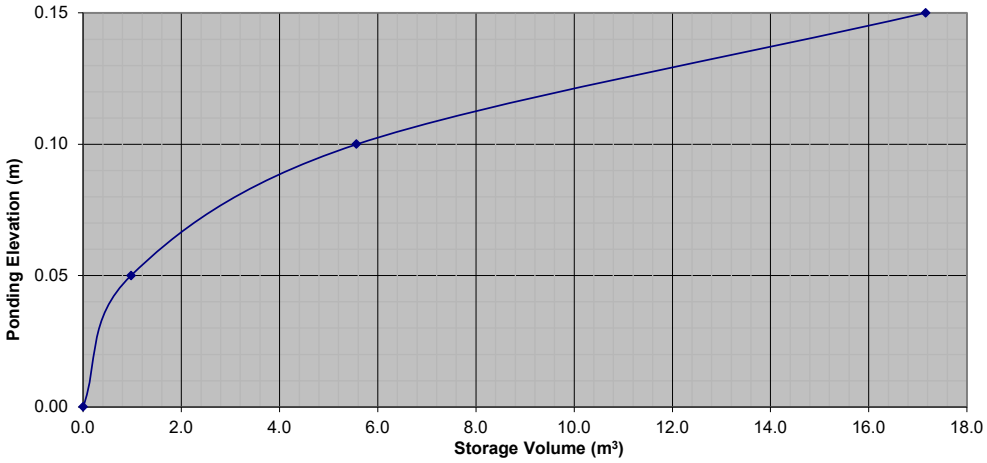
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	22.27	20.69	6.21
10	178.56	16.38	14.80	8.88
15	142.89	13.11	11.53	10.38
20	119.95	11.00	9.42	11.31
25	103.85	9.53	7.95	11.92
30	91.87	8.43	6.85	12.33
35	82.58	7.58	6.00	12.59
40	75.15	6.89	5.31	12.75
45	69.05	6.33	4.75	12.84
50	63.95	5.87	4.29	12.86
55	59.62	5.47	3.89	12.84
60	55.89	5.13	3.55	12.77
65	52.65	4.83	3.25	12.67
70	49.79	4.57	2.99	12.55
75	47.26	4.34	2.76	12.40
90	41.11	3.77	2.19	11.83
105	36.50	3.35	1.77	11.14
120	32.89	3.02	1.44	10.35

Watts Accutrol Flow Control Roof Drains:			RD-100-A-ADJ set to Fully Exposed		
Design Event	**Flow/Drain (L/s)**	**Total Flow (L/s)**	**Ponding (cm)**	**Storage (m^3)**	
				Required	**Provided**
1:5 Year	1.26	1.26	10	5.8	17.2
1:100 Year	1.58	1.58	13	12.9	17.2

Roof Drain Storage Table for Building C RD-2

Elevation	Area RD 1	Total Volume
m	m^2	m^3
0.00	0	0
0.05	39.0	1.0
0.10	144.7	5.6
0.15	319.1	17.2

Stage Storage Curve: Area R-2
Controlled Roof Drain #2



150 DUN SKIPPER DRIVE
PROJECT NO: 124107
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-2 **Controlled Roof Drain RD 3**

OTTAWA IDF CURVE

Area =	0.013	ha	Qallow =	0.95	L/s
C =	0.90		Vol(max) =	1.6	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	4.59	3.64	1.09
10	104.19	3.39	2.44	1.46
15	83.56	2.72	1.77	1.59
20	70.25	2.28	1.33	1.60
25	60.90	1.98	1.03	1.55
30	53.93	1.75	0.80	1.45
35	48.52	1.58	0.63	1.32
40	44.18	1.44	0.49	1.17
45	40.63	1.32	0.37	1.00
50	37.65	1.22	0.27	0.82
55	35.12	1.14	0.19	0.63
60	32.94	1.07	0.12	0.44
65	31.04	1.01	0.06	0.23
70	29.37	0.96	0.01	0.02
75	27.89	0.91	-0.04	-0.19
90	24.29	0.79	-0.16	-0.86
105	21.58	0.70	-0.25	-1.56
120	19.47	0.63	-0.32	-2.28

150 DUN SKIPPER DRIVE
PROJECT NO: 124107
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-2 **Controlled Roof Drain RD 3**

OTTAWA IDF CURVE

Area =	0.013	ha	Qallow =	1.10	L/s
C =	1.00		Vol(max) =	4.0	m3

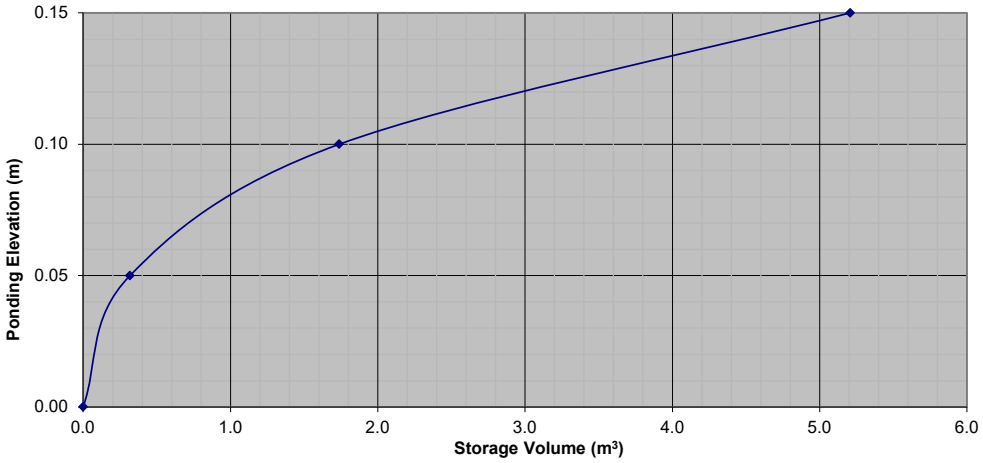
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	8.77	7.67	2.30
10	178.56	6.45	5.35	3.21
15	142.89	5.16	4.06	3.66
20	119.95	4.34	3.24	3.88
25	103.85	3.75	2.65	3.98
30	91.87	3.32	2.22	4.00
35	82.58	2.98	1.88	3.96
40	75.15	2.72	1.62	3.88
45	69.05	2.50	1.40	3.77
50	63.95	2.31	1.21	3.63
55	59.62	2.15	1.05	3.48
60	55.89	2.02	0.92	3.31
65	52.65	1.90	0.80	3.13
70	49.79	1.80	0.70	2.94
75	47.26	1.71	0.61	2.74
90	41.11	1.49	0.39	2.08
105	36.50	1.32	0.22	1.38
120	32.89	1.19	0.09	0.64

Watts Accutrol Flow Control Roof Drains:			RD-100-A-ADJ set to 1/2 Exposed		
Design Event	**Flow/Drain (L/s)**	**Total Flow (L/s)**	**Ponding (cm)**	**Storage (m^3)**	
				Required	**Provided**
1:5 Year	0.95	0.95	10	1.6	5.2
1:100 Year	1.10	1.10	13	4.0	5.2

Roof Drain Storage Table for Building C RD-2

Elevation	Area RD 1	Total Volume
m	m^2	m^3
0.00	0	0
0.05	12.7	0.3
0.10	44.1	1.7
0.15	94.7	5.2

Stage Storage Curve: Area R-2
Controlled Roof Drain #3



150 DUN SKIPPER DRIVE
PROJECT NO: 124107
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-2 Controlled Roof Drain RD 4

OTTAWA IDF CURVE

Area =	0.022	ha	Qallow =	0.95	L/s
C =	0.90		Vol(max) =	3.6	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	7.77	6.82	2.05
10	104.19	5.74	4.79	2.87
15	83.56	4.60	3.65	3.28
20	70.25	3.87	2.92	3.50
25	60.90	3.35	2.40	3.60
30	53.93	2.97	2.02	3.63
35	48.52	2.67	1.72	3.61
40	44.18	2.43	1.48	3.56
45	40.63	2.24	1.29	3.47
50	37.65	2.07	1.12	3.37
55	35.12	1.93	0.98	3.24
60	32.94	1.81	0.86	3.11
65	31.04	1.71	0.76	2.96
70	29.37	1.62	0.67	2.80
75	27.89	1.54	0.59	2.63
90	24.29	1.34	0.39	2.09
105	21.58	1.19	0.24	1.50
120	19.47	1.07	0.12	0.88

150 DUN SKIPPER DRIVE
PROJECT NO: 124107
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-2 Controlled Roof Drain RD 4

OTTAWA IDF CURVE

Area =	0.022	ha	Qallow =	1.10	L/s
C =	1.00		Vol(max) =	8.4	m3

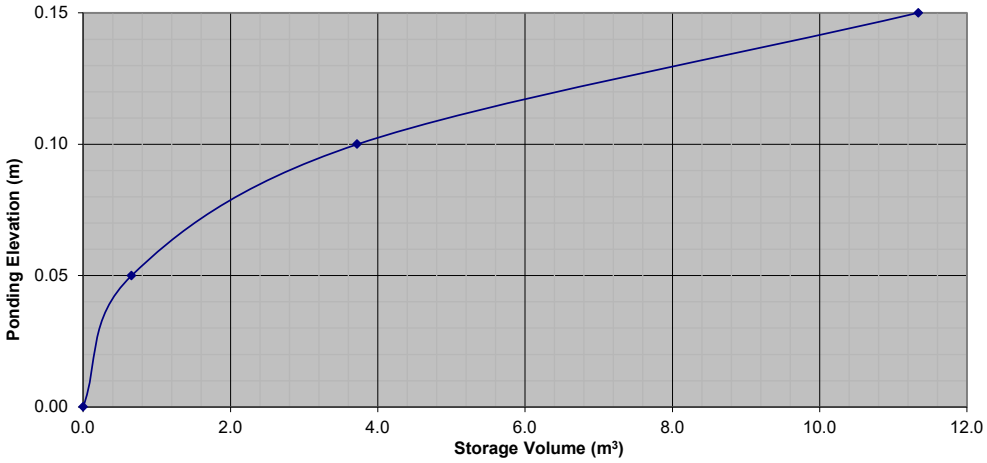
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	14.84	13.74	4.12
10	178.56	10.92	9.82	5.89
15	142.89	8.74	7.64	6.88
20	119.95	7.34	6.24	7.48
25	103.85	6.35	5.25	7.88
30	91.87	5.62	4.52	8.13
35	82.58	5.05	3.95	8.30
40	75.15	4.60	3.50	8.39
45	69.05	4.22	3.12	8.43
50	63.95	3.91	2.81	8.43
55	59.62	3.65	2.55	8.40
60	55.89	3.42	2.32	8.35
65	52.65	3.22	2.12	8.27
70	49.79	3.05	1.95	8.17
75	47.26	2.89	1.79	8.06
90	41.11	2.51	1.41	7.64
105	36.50	2.23	1.13	7.13
120	32.89	2.01	0.91	6.57

Watts Accutrol Flow Control Roof Drains:			RD-100-A-ADJ set to 1/2 Exposed		
Design Event	**Flow/Drain (L/s)**	**Total Flow (L/s)**	**Ponding (cm)**	**Storage (m^3)**	
				Required	**Provided**
1:5 Year	0.95	0.95	10	3.6	11.3
1:100 Year	1.10	1.10	13	8.4	11.3

Roof Drain Storage Table for Building C RD-2

Elevation	Area RD 1	Total Volume
m	m^2	m^3
0.00	0	0
0.05	26.3	0.7
0.10	96.2	3.7
0.15	208.6	11.3

Stage Storage Curve: Area R-2
Controlled Roof Drain #4



150 DUN SKIPPER DRIVE
PROJECT NO: 124107
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-2 Controlled Roof Drain RD 5

OTTAWA IDF CURVE

Area =	0.030	ha	Qallow =	1.26	L/s
C =	0.90		Vol(max) =	5.0	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	10.60	9.34	2.80
10	104.19	7.82	6.56	3.94
15	83.56	6.27	5.01	4.51
20	70.25	5.27	4.01	4.82
25	60.90	4.57	3.31	4.97
30	53.93	4.05	2.79	5.02
35	48.52	3.64	2.38	5.00
40	44.18	3.32	2.06	4.94
45	40.63	3.05	1.79	4.83
50	37.65	2.83	1.57	4.70
55	35.12	2.64	1.38	4.54
60	32.94	2.47	1.21	4.37
65	31.04	2.33	1.07	4.17
70	29.37	2.20	0.94	3.97
75	27.89	2.09	0.83	3.75
90	24.29	1.82	0.56	3.04
105	21.58	1.62	0.36	2.27
120	19.47	1.46	0.20	1.45

150 DUN SKIPPER DRIVE
PROJECT NO: 124107
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-2 Controlled Roof Drain RD 5

OTTAWA IDF CURVE

Area =	0.030	ha	Qallow =	1.58	L/s
C =	1.00		Vol(max) =	11.3	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	20.24	18.66	5.60
10	178.56	14.89	13.31	7.99
15	142.89	11.92	10.34	9.30
20	119.95	10.00	8.42	10.11
25	103.85	8.66	7.08	10.62
30	91.87	7.66	6.08	10.95
35	82.58	6.89	5.31	11.14
40	75.15	6.27	4.69	11.25
45	69.05	5.76	4.18	11.28
50	63.95	5.33	3.75	11.26
55	59.62	4.97	3.39	11.20
60	55.89	4.66	3.08	11.09
65	52.65	4.39	2.81	10.96
70	49.79	4.15	2.57	10.80
75	47.26	3.94	2.36	10.62
90	41.11	3.43	1.85	9.98
105	36.50	3.04	1.46	9.22
120	32.89	2.74	1.16	8.38

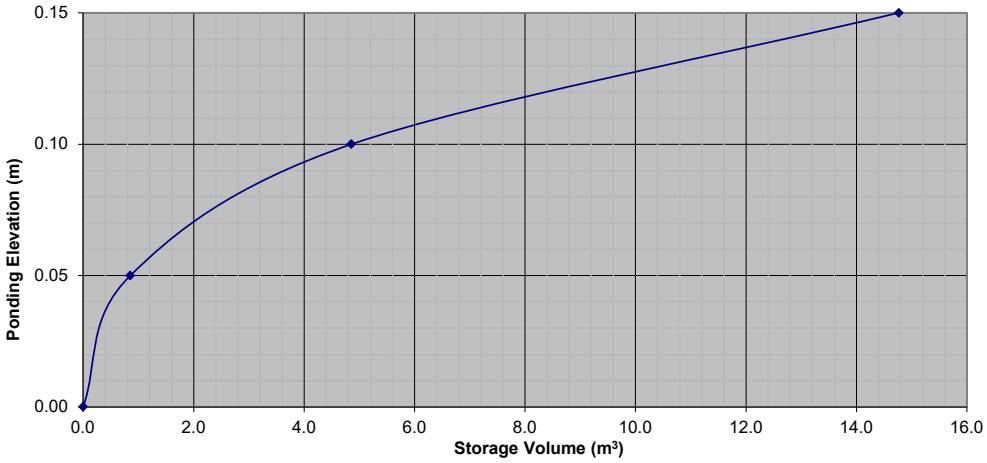
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to Fully Exposed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:5 Year	1.26	1.26	10	5.0	14.8
1:100 Year	1.58	1.58	13	11.3	14.8

Roof Drain Storage Table for Building C RD-2

Elevation	Area RD 1	Total Volume
m	m^2	m^3
0.00	0	0
0.05	34.1	0.9
0.10	126.0	4.9
0.15	270.4	14.8

Stage Storage Curve: Area R-2
Controlled Roof Drain #5



150 DUN SKIPPER DRIVE
PROJECT NO: 124107
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-2 **Controlled Roof Drain RD 6**

OTTAWA IDF CURVE

Area =	0.034	ha	Qallow =	1.26	L/s
C =	0.90		Vol(max) =	6.0	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	12.01	10.75	3.22
10	104.19	8.86	7.60	4.56
15	83.56	7.11	5.85	5.26
20	70.25	5.98	4.72	5.66
25	60.90	5.18	3.92	5.88
30	53.93	4.59	3.33	5.99
35	48.52	4.13	2.87	6.02
40	44.18	3.76	2.50	6.00
45	40.63	3.46	2.20	5.93
50	37.65	3.20	1.94	5.83
55	35.12	2.99	1.73	5.70
60	32.94	2.80	1.54	5.55
65	31.04	2.64	1.38	5.39
70	29.37	2.50	1.24	5.20
75	27.89	2.37	1.11	5.01
90	24.29	2.07	0.81	4.35
105	21.58	1.84	0.58	3.63
120	19.47	1.66	0.40	2.85

150 DUN SKIPPER DRIVE
PROJECT NO: 124107
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-2 **Controlled Roof Drain RD 6**

OTTAWA IDF CURVE

Area =	0.034	ha	Qallow =	1.58	L/s
C =	1.00		Vol(max) =	13.4	m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	22.94	21.36	6.41
10	178.56	16.88	15.30	9.18
15	142.89	13.51	11.93	10.73
20	119.95	11.34	9.76	11.71
25	103.85	9.82	8.24	12.35
30	91.87	8.68	7.10	12.79
35	82.58	7.81	6.23	13.07
40	75.15	7.10	5.52	13.25
45	69.05	6.53	4.95	13.36
50	63.95	6.04	4.46	13.39
55	59.62	5.64	4.06	13.38
60	55.89	5.28	3.70	13.33
65	52.65	4.98	3.40	13.24
70	49.79	4.71	3.13	13.13
75	47.26	4.47	2.89	12.99
90	41.11	3.89	2.31	12.45
105	36.50	3.45	1.87	11.78
120	32.89	3.11	1.53	11.01

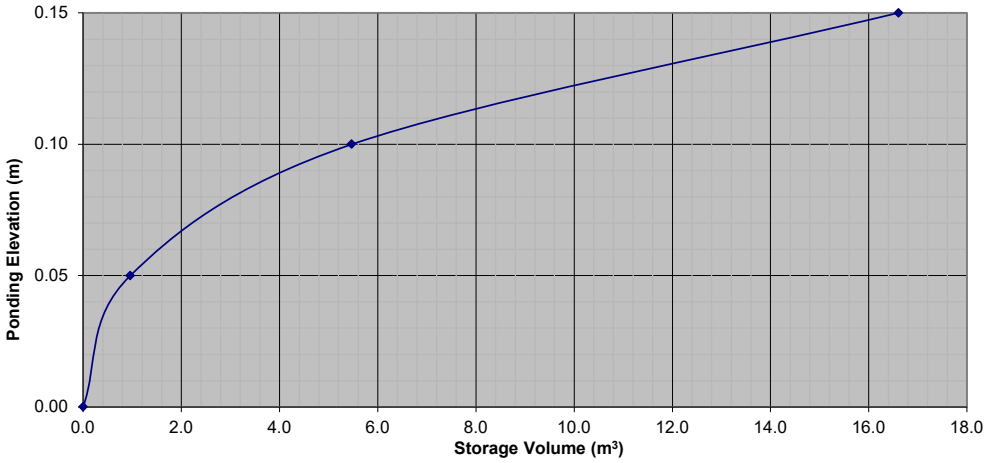
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to Fully Exposed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:5 Year	1.26	1.26	11	6.0	16.6
1:100 Year	1.58	1.58	14	13.4	16.6

Roof Drain Storage Table for Building C RD-2

Elevation	Area RD 1	Total Volume
m	m^2	m^3
0.00	0	0
0.05	38.4	1.0
0.10	142.0	5.5
0.15	303.5	16.6

Stage Storage Curve: Area R-2
Controlled Roof Drain #6



LEGEND

- 0.050 / CB 1 / 0.65 — DRAINAGE AREA; CATCH BASIN ID; 1:5YR WEIGHTED RUNOFF COEFFICIENT
- COMMERCIAL DRAINAGE AREA BOUNDARY
- RESIDENTIAL DRAINAGE AREA BOUNDARY

NOTE:
MANHOLES SANMH 111 AND STMMH 120 TO HAVE SAFETY PLATFORMS AS PER CITY STANDARD OPSD 404.020

BUILDING 1
6 STOREYS
131 UNITS
FFE=102.41
U1 = 98.81
U2 = 96.08

BUILDING 2
6 STOREYS
106 UNITS
FFE=101.01
U1 = 97.41
U2 = 94.68

BUILDING "A"
FFE=98.70

BUILDING "B"
FFE=98.70

BUILDING "C"
FFE=100.15

BUILDING "D"
FFE=100.05

CEDAR CREEK DRIVE

DUN SKIPPER DRIVE

BANK STREET

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

150 DUN SKIPPER DRIVE

STORMWATER DRAINAGE AREA PLAN

SCALE 1 : 750 (0 10 20 30)
DATE APR 2025
JOB 124107
FIGURE STM-1

M:\2024\124107\CAD\Civil\Residential\124107-SWM1.dwg, STM, Apr 09, 2025 - 9:20am, lcolbran

SHT11X17.DWG - 279mmX432mm

150 Dun Skipper Drive
1:5 yr Storm Design Sheet

NOVATECH
Engineers, Planners & Landscape Architects

PROJECT NO: 124107
DESIGNED BY: LC
CHECKED BY: MS
DATE: April 15, 2025

AREA	FROM MH	TO MH	AREA (ha)			INDIV 2.78 AC	ACCUM 2.78 AC	TIME OF CONC. (min)	RAINFALL INTENSITY (mm/hr)	CONTROLLED FLOW* Q (L/s)	PEAK FLOW Q (L/s)	PROPOSED SEWER								
			Total Area	C= 0.20	C = 0.90							TYPE OF PIPE	PIPE SIZE (mm)	PIPE ID (mm)	GRADE (%)	LENGTH (m)	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	TIME OF FLOW (min)	PERCENTAGE OF CAPACITY
A-6.1 Uncontrolled	CB 1	STMMH 100	0.044	0.006	0.038	0.10	0.10	10.00	104.19		10.3	PVC	200	203.2	1.00	3.1	**34.2**	1.06	0.05	30%
A-6.2 Uncontrolled	CB 2	STM SEWER	0.042	0.008	0.034	0.09	0.09	10.00	104.19		9.4	PVC	200	203.2	2.00	4.4	**48.4**	1.49	0.05	19%
	STMMH 100	STMMH 102					0.19	10.05	103.93		19.6	CONC	600	609.6	0.20	64.4	**286.5**	0.98	1.09	7%
A-6.3 Uncontrolled	CB 3	STMMH 102	0.120	0.032	0.088	0.24	0.24	10.00	104.19		24.8	PVC	200	203.2	1.00	4.5	**34.2**	1.06	0.07	72%
Controlled Flow From A-6.1 - A-6.3	STMMH 102	STMMH 104		**A-6.1 - A-6.3 is controlled to a maximum of 15 L/s by ICD in the outlet pipe of STMMH 102**						**15.0**	15.0	PVC	250	254.0	0.50	11.8	**43.9**	0.87	0.23	34%
R-1 Controlled	CAP	STMMH 104	0.304	**R-1 is controlled to a maximum of 9.07 L/s by RD A1 to RD A6**						**9.1**	9.1	PVC	200	203.2	2.00	2.8	**48.4**	1.49	0.03	19%
Controlled A-6.1 - A-6.3 + Controlled R-1	STMMH 104	STMMH 106								**24.1**	24.1	PVC	450	457.2	0.25	16.1	**148.7**	0.91	0.30	16%
	STMMH 106	STMMH 118								**24.1**	24.1	PVC	450	457.2	0.25	61.2	**148.7**	0.91	1.13	16%
R-2 Controlled	CAP	STMMH 108	0.089	**R-2 is controlled to a maximum of 3.30 L/s by RD B1 to RD B3**						**3.3**	3.3	PVC	200	203.2	1.00	12.8	**34.2**	1.06	0.20	10%
A-4 Uncontrolled	CB 4	STMMH 108	0.065	0.013	0.053	0.14	0.14	10.00	104.19		14.4	PVC	250	254.0	1.00	14.8	**62.0**	1.22	0.20	23%
A-3 Uncontrolled	Trench Drain	STM SEWER	0.034		0.034	0.09	0.09	10.00	104.19		8.9	PVC	200	203.2	0.50	46.5	**24.2**	0.75	1.04	37%
Uncontrolled A-4 - A-3 + Controlled R-1	STMMH 108	STMMH 118					0.22	11.04	99.01		25.4	PVC	300	304.8	0.70	88.9	**84.4**	1.16	1.28	30%
A-7.1 Uncontrolled	CBMH 7	CBMH 1	0.092		0.092	0.23	0.23	10.00	104.19		24.0	CONC	750	762.0	0.20	18.6	**519.4**	1.14	0.27	5%
A-7.2 Uncontrolled	CBMH 1	CBMH 2	0.080		0.080	0.20	0.43	10.27	102.78		44.2	CONC	750	762.0	0.20	28.6	**519.4**	1.14	0.42	9%
A-7.3 Uncontrolled	CBMH 2	CBMH 3	0.092	0.002	0.090	0.23	0.66	10.69	100.68		66.1	CONC	750	762.0	0.20	28.4	**519.4**	1.14	0.42	13%
Controlled Flow From A-7.1 - A-7.4	CBMH 3	STMMH 116		**A-7.1 - A-7.4 is controlled to a maximum of 28.4 L/s by ICD in the outlet pipe of CBMH 3**						**28.4**	28.4	PVC	250	254.0	1.00	7.0	**62.0**	1.22	0.10	46%
A-8.1 Uncontrolled	CBMH 4	CBMH 5	0.161	0.001	0.160	0.40	0.40	10.00	104.19		41.8	CONC	900	914.4	0.20	28.6	**844.6**	1.29	0.37	5%
A-8.2 Uncontrolled	CBMH 5	CBMH 6	0.177	0.001	0.176	0.44	0.84	10.37	102.28		86.1	CONC	900	914.4	0.20	28.4	**844.6**	1.29	0.37	10%
Controlled Flow From A-8.1 - A-8.3	CBMH 6	STMMH 114		**A-8.1 - A-8.3 is controlled to a maximum of 187.1 L/s by ICD in the outlet pipe of CBMH 6**						**187.1**	187.1	PVC	300	304.8	4.00	7.0	**201.8**	2.77	0.04	93%
R-4 Controlled	CAP	STMMH 110	0.046	**R-4 is controlled to a maximum of 2.84 L/s by RD D1 to RD D3**						**2.8**	2.8	PVC	200	203.2	1.00	23.4	**34.2**	1.06	0.37	8%
R-3 Controlled	CAP	STMMH 110	0.103	**R-3 is controlled to a maximum of 4.40 L/s by RD C1 to RD C4**						**4.4**	4.4	PVC	200	203.2	1.00	13.0	**34.2**	1.06	0.21	13%
Controlled R-4 + Controlled R-3	STMMH 110	STMMH 112								**7.2**	7.2	PVC	250	254.0	0.50	46.6	**43.9**	0.87	0.90	17%
A-9 Uncontrolled	CB 5	CBMH 8	0.019	0.005	0.014	0.04	0.04	10.00	104.19		3.9	PVC	200	203.2	1.00	13.1	**34.2**	1.06	0.21	12%
A-5 Uncontrolled	CBMH 8	STMMH 112	0.043	0.019	0.025	0.07	0.11	10.21	103.11		11.3	PVC	250	254.0	1.00	10.7	**62.0**	1.22	0.15	18%
Controlled R-4 & R-3 + A-5 Uncontrolled	STMMH 112	STMMH 114								**7.2**	18.5	PVC	250	254.0	1.35	43.8	**72.1**	1.42	0.51	26%
Controlled R-4 & R-3 + Controllled A-8.1 - A-8.3 + A-5 Uncontrolled	STMMH 114	STMMH 116								**194.3**	205.6	PVC	450	457.2	1.25	17.8	**332.5**	2.03	0.15	62%
Controlled R-4 & R-3, A-7.1 - A-7.4, A-8.1 - A-8.3, A-5 Uncontrolled	STMMH 116	STMMH 118								**222.7**	234.0	PVC	450	457.2	1.25	8.8	**332.5**	2.03	0.07	70%

150 Dun Skipper Drive
1:5 yr Storm Design Sheet

PROJECT NO: 124107
DESIGNED BY: LC
CHECKED BY: MS
DATE: April 15, 2025

AREA	FROM MH	TO MH	AREA (ha)			INDIV 2.78 AC	ACCUM 2.78 AC	TIME OF CONC. (min)	RAINFALL INTENSITY (mm/hr)	CONTROLLED FLOW* Q (L/s)	PEAK FLOW Q (L/s)	PROPOSED SEWER								
			Total Area	C= 0.20	C = 0.90							TYPE OF PIPE	PIPE SIZE (mm)	PIPE ID (mm)	GRADE (%)	LENGTH (m)	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	TIME OF FLOW (min)	PERCENTAGE OF CAPACITY
A-5	CBMH 206	CBMH 205	0.047	0.015	0.032	0.09	0.09	10.00	104.19		9.2	PVC	300	304.8	1.50	57.1	**123.6**	1.69	0.56	7%
A-6	CBMH 205	CBMH 204	0.143	0.126	0.017	0.11	0.20	10.56	101.32		20.4	PVC	300	304.8	1.00	24.6	**100.9**	1.38	0.30	20%
Controlled Flow From A-5 - A7	CBMH 204	MAIN		**A-5 - A-7 is controlled to a maximum of 47.8 L/s by ICD in the outlet pipe of CBMH 204**						**47.8**	47.8	PVC	250	254.0	1.00	18.5	**62.0**	1.22	0.25	77%
A-8	CB 1	CBMH 201	0.021		0.021	0.05	0.05	10.00	104.19		5.5	PVC	250	254.0	0.50	51.0	**43.9**	0.87	0.98	12%
A-9	CBMH 201	CBMH 202	0.028		0.028	0.07	0.12	10.98	99.28		12.2	PVC	250	254.0	0.50	31.8	**43.9**	0.87	0.61	28%
A-10	CBMH 202	CBMH 203	0.023		0.023	0.06	0.18	11.59	96.47		17.4	PVC	250	254.0	0.50	21.1	**43.9**	0.87	0.41	40%
A-11	CBMH 203	MAIN	0.221	0.064	0.157	0.43	0.61	12.00	94.69		57.6	PVC	300	304.8	1.00	14.4	**100.9**	1.38	0.17	57%
Controlled R-1-R-4, A-6.1 - A-6.3, A-7.1 - A-7.4, A-8.1 - A-8.3, Uncontrolled A-3 - A-5, A-9	STMMH 118	STMMH 120								**297.9**	332.5	CONC	825	838.2	0.20	56.4	**669.7**	1.21	0.77	44%

NOTES:

1) Refer to Novatech Drawing 124107-GP1 for storm structure designations, storm pipe details and control structure tables.
2) Refer to Novatech Drawing 124107-SWM1 for the on-site tributary drainage areas and Figure STM-1 for specific sewer design sheet pipe segment breakdowns.

Definitions
Q = 2.78 AIR
Q = Peak Flow, in Litres per second (L/s)
A = Area in hectares (ha)
I = Rainfall Intensity (mm/h)
R = Runoff Coefficient

Notes:

1) City of Ottawa Rainfall-Intensity Curve
2) Min Velocity = 0.80 m/sec.
3) 5 year Intensity = 998.071 / (Time in min + 6.053) $^{0.814}$

4.9 Hydrological Evaluation

Hydrological analysis of the proposed dual drainage system was conducted using DDSWMM. This technique offers a single storm event flow generation and routing. Land use, selected modeling routines, and input parameters are discussed in the following sections. A model schematic is presented on **Drawing 700** and model files are included in **Appendix E**. It should be noted that hydrographs generated by the DDSWMM model were downloaded to the XPSWMM model to evaluate the hydraulic performance of the proposed local system and the overall LDA.

For ease hydrological modeling of the site, Phase 1 Pathways at Findlay Creek has been evaluated using two DDSWMM models. These are referred to as Phase 1 East and Phase 1 West. The respective model catchments are indicated on **Drawing 700**. It should be noted that the models are interconnected via a major flow hydrograph from street segment S6105A in Phase 1 East entered in the Phase 1 West model.

4.9.1 Land Use

Phase 1 Pathways at Findlay Creek will be developed with a mix of single family units and townhouses. The land use of Phase 1 also includes a park area, a school, two high density stacked townhouse sites and commercial sites.

There are several future external areas to Phase 1 Pathways at Findlay Creek which include the following assumed land use; residential, high density stacked townhomes and a portion of future Earl Armstrong Road (an arterial road). **Table 4.2** includes a summary of the future external areas and their inflow rates. The DDSWMM schematic is presented in **Drawing 700**.

4.9.2 Storms and Drainage Area Parameters

The main hydrological parameters for the subject site and external areas are summarized below and in **Table 4.4**. Supporting calculations are presented in **Appendix E**.

Design Storms

The site was evaluated using the following storm events:

- 2, 5 and 100 year 3 hour Chicago storm events (10 minute time step), as per the OSDG*;*
- 100 year 24 hour SCS Type II storm event (103.2 mm) as per OSDG;
- July 1, 1979 Historical storm (5 minute time step) as per the OSDG;
- 100 year 24 hour Type II storm event (103.2 mm) with 20% increase for Climate Change consideration, as per OSDG; and
- 100 year 3 hour Chicago storm event (10 minute time step) with 20% increase for Climate Change consideration, as per the OSDG.

Area and Imperviousness

Catchment areas for the subject site are based on the rational method spreadsheet with some minor modifications for modeling purposes. See **Drawing 700** for the catchment areas used in the DDSWMM modeling for the subject site.

Imperviousness for the subject site was determined by obtaining the footprint of the model units intended for the site and placing the maximum footprint on the lots. For the subject site, the

imperviousness ratios for the units were calculated for a typical street and rear yard segment (calculations are enclosed in **Appendix D**). Runoff coefficient values used in the rational method design are also based on these values. The high density townhouses, commercial sites, school and park and were assigned impervious rates of 86%, 79%, 79% and 14%, respectively.

Infiltration

Infiltration losses were selected to be consistent with the OSDG. The Horton values are as follows: f_o = 76.2 mm/h, f_c = 13.2 mm/h, k = 0.00115 s^{-1}.

Subcatchment Width

The catchment width was based on the conveyance route length of the drainage area and multiplied by two. The multiplier of two was only used if the drainage area had runoff contribution from both sides of the drainage area. For the future external areas, the subcatchment width of 225 m/ha was used.

Slope

The ground slope was based upon the average slope for both impervious and pervious area. Generally, the slope is approximately 2% (0.02 m/m). This assumes a slope of approximately 1% for impervious or road surfaces and 3% for pervious surfaces (lot grading).

Initial Abstraction (Detention Storage)

Detention storage depths of 1.5 mm and 4.67 mm were used for impervious and pervious areas, respectively. These values are consistent with the OSDG.

Manning's Roughness

Manning's roughness coefficients of 0.013 and 0.25 were used for impervious and pervious areas, respectively.

Baseflow

No baseflow components were assumed for any of the areas contributing runoff to the minor system within the DDSWMM model.

Minor System Capture

The minor system for Phase 1 Pathways at Findlay Creek is connected to the south sub-trunk storm sewer which is tributary to the western trunk and Findlay Creek Village Stormwater Facility western inlet. As noted previously, most of the street segments within the subject site are continuous grade and there is limited saw-tooth road grade patterns with on-site detention (see **Drawing 751**). Inlet control devices (ICDs) are proposed to limit the flow into the minor system during the 100 year event. For those segments on continuous grade, ICDs are proposed to protect the minor system during storm events greater than the 100 year. The sizing and placement of the ICDs within the subject site were determined as part of this evaluation.

As noted in **Section 4.8**, the inflow rate for the CBs located at most of the low points within Phase 1 were increased to maintain the major system flow dynamic depth at 0.35 m throughout the site.

In addition to the capture rate of the site, consideration is taken with respect to the design of the subject site as it relates to the overall LDA, which includes a hydraulic connection between the storm and sanitary system via the sanitary overflows.

Based on the optimization exercise, the average inflow rate from the subject site (street and rear yard segments only) is 254 l/s/ha, during the 100 year storm event, excluding external or future lands. **Table 4.4** summarizes and compares the 2 and 5 year modeled flow versus the ICD flow.

ICD Restricted Inflow

The City has requested specific ICD sizes to be specified for use on the site. These ICD sizes are documented in City of Ottawa MS-18.4 Inlet Control Devices (ICD's, March 2017). Within the aforementioned document eight (8) ICD sizes are noted. The following table summarizes the ICD sizes assigned to the site including the head assumed and associated flowrate.

Table 4.3 Standard ICD Sizes, Heads and Flowrates

ICD Diameter (mm)	Orifice Area (m^2)	Assumed Fixed Head (m)	Flowrate (l/s)
Street Segments with Ponding and Continuous Grade			
Vortex	n/a	n/a	6
83	0.0054	1.65	19
94	0.0069	1.65	24
102	0.0082	1.65	28
108	0.0092	1.65	32
127	0.0127	1.65	44
152	0.0181	1.65	63
178	0.0249	1.65	86
Rear Yard Segments			
Vortex	n/a	n/a	6
83	0.0054	1.35	17
94	0.0069	1.35	22
102	0.0082	1.35	26
108	0.0092	1.35	29
127	0.0127	1.35	40
152	0.0181	1.35	57
178	0.0249	1.35	78

The standard ICDs were assigned to each CB within Phase 1. There are exceptions to the above related either to the head assumed for and ICD, capacity of the CB lead or the capacity of the CBs grates dictating the inflow. Any exemptions to the above ICDs are noted in **Table 4.3.**

The ICD size, head and flow is provided on **Drawing 010**. To accommodate the fixed head for the ICDs, the invert of the CBs were adjusted. The table provided on **Drawing 010** presents the inverts of the CBs for the site.

Street and rear yard segments were considered independently. For Phase 1 East, the restricted inflow from street segments is 2028 l/s, which an average flow rate of 339 l/s/ha during the 100 year event. From the rear yards for Phase 1 East, the flow into the minor system is 496 l/s, which is an average flow rate of 152 l/s/ha during the 100 year event.

For Phase 1 West, the restricted inflow from street segments is 1363 l/s, which an average flow rate of 268 l/s/ha during the 100 year event. From the rear yards for Phase 1 West, the flow into the minor system is 1090 l/s, which is an average flow rate of 208 l/s/ha during the 100 year event.

For the Phase 1 site, the total restricted inflow from street segments is 3391 l/s, which is an average flow rate of 306 l/s/ha during the 100 year event. The total restricted inflow to the minor system for the entire Phase 1 for the rear yards is 1586 l/s, which is an average inflow rate of 186 l/s/ha during the 100 year event.

The total ICD inflow to the minor system from the Phase 1 site (streets and rear yards) is 4977 l/s from a total area of 19.59 ha. The average restricted inflow is 254 l/s/ha. This is greater than the 218 l/s/ha noted within the 2016 Updated Serviceability Report. As noted in **Section 4.8** under the heading *Summary of Dual Drainage Design*, there is a major system restriction on-site where at S6106 where the depth of static ponding is 0.27 m. During the 100 year storm event, 0.35 m total dynamic and static depth cannot exceed 0.35 m. The maximum dynamic flow to push the allowable 0.08 m extra of flow over the spill crest is approximately 70 l/s. Taking into consideration that the majority of the site upstream is continuous grade with limited inflow at sag locations leading to this downstream intersection (Kelly Farm Drive and Miikana Road), the minor system inflow at all sags and rear yards was increased to meet the maximum 0.35 m depth of total ponding at street segment S6106.

Major System

As noted in **Section 4.8**, the major system was modeled with DDSWMM. The majority of the subject site is continuous grade with some saw-tooth design grade pattern with inlet control devices (ICDs) installed at the catchbasins within low points. The saw-tooth design is based on maximum 350 mm separation between the low point at the catchbasin and high point overflow at the downstream end of the segment. The flow is attenuated within these localized low points with potential overflow cascading to the next downstream segment. Rear yard segments have a saw-tooth pattern with some storage available, but the storage is not accounted for as part of the analysis.

Street segments

For those street segments which have continuous grade profiles, the computer simulations were based on the approach-capture characteristics of the catchbasin with the constraint that during the critical storms the maximum cascading flow would not exceed 350 mm.

For those street segments with saw-tooth profiles, the computer simulations were based on the constraint that during the 100 year storm event the maximum depth of ponding or cascading flow would not exceed 350 mm. This was achieved by adjusting the spacing of catchbasins and providing shallower sags where possible. This design allows more major flow to cascade to the next downstream segment while ensuring a maximum depth of 350 mm.

Where surface storage is available, the storage-outflow characteristics for each low point were taken into consideration in DDSWMM. The evaluation was undertaken assuming static conditions. The ponding plan for the subject site is presented on **Drawing 751**. Major flow from Phase 1 Pathways at Findlay Creek is conveyed to the Leitrim Core Wetland Buffer via the one major system outlet.

Rear yards

Similar to street segments, rear yards for the subject site were considered independently and rear yard catch basins were also incorporated into the DDSWMM model. Storage volume in rear yards

was not accounted for as available on-site storage. Inlet restriction was also proposed for rear yards and overflow from the rear yards cascades to a major system street segment via swales.

Major System Storage Attenuation and Routing (Double Routing)

For street segments, the cascading overflow to the next segment or low point, utilizes the static storage available plus an additional amount of storage equivalent to the depth required for the flow to carry over the high point. The attenuation in street sags was evaluated to account for static storage and, if overflow occurs, dynamic storage. Within this report it is referred to as double routing.

The DDSWMM model does not have a direct way of coding double routing since it does not allow the user to code dynamic storage over the high point. For this analysis, an alternative method was employed where the overflow from a street segment (regular static storage at a sag) is conveyed to a dummy segment. In other words, a regular low point segment was provided with a downstream dummy segment for further flow attenuation to account for the dynamic ponding during overflow.

The dummy segment does not have any drainage area attributes associated with it since it is a segment for routing. In addition, there is no inflow to the minor system from these dummy segments. The overflow hydrograph from the upstream catchment is routed in the dummy segment to the next "real" downstream segment. The dummy segments have specific characteristics which are noted below:

- Segment Length – equivalent to length of maximum static storage from the street segment contributing to it.

- Road Type – equivalent to appropriate right-of-way characteristics from the segment contributing to it, and with a minimum longitudinal slope of 0.01% (0.0001 m/m).

The double routing method noted above applied to DDSWMM, is a feasible method outlined in the February 2014 Technical Bulletin ISDTB 2014-01.

The dummy segments for major system routing were applied to the analysis of the subject site. The segments are referenced as D1, D2, D3, etc. within the DDSWMM modelling file. The DDSWMM schematic presented in **Drawing 700** does not show the dummy segments, but DDSWMM computer output file shows the dummy segments immediately following the corresponding major segment which cascades into that dummy segment.

Future Lands

In addition to the above noted assumptions with respect to Phase 1 Pathways at Findlay Creek, the following assumptions were used to model the minor and major system flow from the future areas which are tributary to and contribute flow (minor and major) to the subject site. A summary of the areas, storages, inflows and parameter assumptions are provided in **Table 4.4**.

- Commercial Sites (DDSWMM ID: COM and EXT4)

  These commercial areas were assumed to be restricted to the 5 year modeled flow. It was also assumed that full on-site storage will be provided in both sites (all major flow contained on-site up to and including the 100 year event). Emergency overflow for both sites will be routed to Bank Street (DDSWMM ID BANK).

- Park Site (DDSWMM ID: PARK1)

  This park area is assumed to be restricted to the 5 year modeled flow. It was also assumed that the balance of flow generated by the park area itself would be fully stored on-site up to, and including, the 100 year event. Emergency overflow will be routed to DDSWMM ID S6164.

- School Site (DDSWMM ID: INST)

  This school site is assumed to be restricted to 5 year modeled flow. It was also assumed that full on-site storage will be provided in the school site (all major flow contained on-site up to and including the 100 year event). Emergency overflow will be routed to DDSWMM ID S6105A.

- High Density Residential (DDSWMM ID: HD1 and HD2)

  There are two high density residential areas proposed for the site and each have different assumptions regarding stormwater management.

  Due to its location in Phase 1, HD1 has an inflow restricted to the 5 year modeled flow. Due to the topography of the site, full on-site storage of the 100 year storm event may be difficult, however, some on-site detention would benefit the Phase 1 major system. Therefore, it is assumed that a minimum of 100 m^3 could be reasonably accommodated on-site. The major flow exceeding this storage would be conveyed onto the street which has been accommodated and accounted for in the modeling. During detail design, the on-site storage should be optimized and effort should be made to provide additional storage, if possible. Major flow from the site is to S6117A.

  The second high density residential site, HD2, is located adjacent to Miikana Road. The minor system inflow from this site was assumed to the 5 year modeled flow. Due to site topography, on-site detention should be provided to the 100 year storm event (112 m^3). During detail design, the on-site storage should be optimized. The emergency overflow outlet from this site is to S6102A.

- Future Earl Armstrong (DDSWMM ID: EA)

  A small portion of the future Earl Armstrong Road was assumed to be serviced through the Pathways at Findlay Creek and Idone site. An area of 2.06 ha is assumed to be serviced. Future Earl Armstrong is an arterial road and therefore has a 10 year level of service. The assumed inflow rate is 523 l/s with 12.57 m^3 of storage available within the road right-of-way. The overflow route for Earl Armstrong was assumed to be Bank Street (DDSWMM ID BANK).

- Future Residential Lands (DDSWMM ID: EXT1A, EXT1B, EXT2, EXT3, S631A, EXT7, EXT8B, EXT8AA, EXT8AB, EXT8AC and EXT8AD)

  The future residential lands upstream and downstream of Phase 1 were assumed to contribute minor to the south sub-trunk and major flow to the northern outlet to the Leitrim Core Wetland Buffer. The future areas were delineated into separate areas based on preliminary grading plans. The impervious values are consistent with those for Phase 1 street segments. Street segment slopes are based on preliminary grading.

  Inlet restriction for future areas EXT1A, EXT1B, EXT2, EXT3 and EXT7 was assumed to be the 5 year modeled flow. EXT1A, EXT1B and EXT2 were assumed to have be a continuous grade based on topography. Some on-site storage was assumed for EXT 3 and EXT7 (125 m^3 and 6.3 m^3, respectively).

  Future external areas S631A and EXT8B are downstream and receive major flow from Phase 1. For these areas, there was some on-site detention assumed (8.8 m^3/ha) and the on-site

restriction was assumed to be the 5 year modeled flow. The major flow from these future areas will be conveyed to the northern major flow outlet to the Leitrim Core Wetland Buffer from the south.

Future external areas EXT8AA, EXT8AB, EXT8AC and EXT8AD are located along Miikana Road and most of the major flow from Phase 1 will be conveyed to these areas. These areas will be sawtooth design and on-site storage will be available. Based on preliminary grading, the drainage areas were delineated and preliminary ponding plan developed (see **Drawing 751**). The details of these areas are provided in **Table 4.4**. The preliminary minor system inflow rate is the 5 year modeled flow for the areas with the exception of EXT8AD which is 150 l/s. The inflow rates will be optimized during detail design to provide a maximum 0.35 m of total ponding (static and dynamic) during the 100 year storm event. Since this is future outlet for major flow for Phase 1, a preliminary velocity x depth has been provided in **Tables 4.5 and 4.6**.

Once detail design is undertaken for all the future lands, a detailed minor and major system evaluation will be completed and any downstream areas to which major flow is contributed will be re-evaluated.

Drawing 700 presents the future external areas contributing major and minor flow to the subject site including their segment IDs.

Table 4.4 summarizes the main hydrological parameters used in the DDSWMM model. The drainage area plan (DDSWMM schematic) is presented in **Drawing 700**. A summary of the determination of the parameters used in the DDSWMM model and model output files are enclosed in **Appendix E**.

Summary of Hydrology Modeling Output Files

For ease of review, the following is a reference list of the computer modeling output files including names and storm event evaluated. The modeling output files are on the enclosed CD in **Appendix E**.

DDSWMM

Phase 1 East

- 33956-PH1E-3CHI2.dat/out
- 33956-PH1E-3CHI5.dat/out
- 33956-PH1E-3CHI100.dat/out
- 33956-PH1E-24SCS100.dat/out
- 33956-PH1E-JULY-79.dat/out
- 33956-PH1E-3CHI120.dat/out
- 33956-PH1E-24SCS120.dat/out

Phase 1 West

- 33956-PH1W-3CHI2.dat/out
- 33956-PH1W-3CHI5.dat/out
- 33956-PH1W-3CHI100.dat/out
- 33956-PH1W-24SCS100.dat/out
- 33956-PH1W-JULY-79.dat/out
- 33956-PH1W-3CHI120.dat/out

- 33956-PH1W-24SCS120.dat/out

SWMHYMO

- RPH1Evxd.dat/out
- RPH1Wvxd.dat/out

Table 4.4 Hydrological Parameters and Modeling Results

(DDSWMM Output File Names listed below)

Drainage Area		Downstream Segment ID	XPSWMM Node ID	IMP Ratio (%)	Segment Length (m)	Subcatchment Width (m)	Road ROW Cross Section	Max. Storage Available (m^3)	Minor System Restriction		
Segment ID	Area (ha)								2 Year Modeled Flow (l/s)*	5 Year Modeled Flow (l/s)*	ICD Flow (l/s)*
Phase 1 Pathways at Findlay Creek											
Street Segments – East*											
S6132B	0.20	S6133A	S6132B	70	50	100	24	n/a	7	10	12
S6133B	0.20	S6133A	BLK6133S	70	77	154	18	n/a	58	76	76
S6133A	0.30	S6146	S6133	70	74	148	24	n/a	42	55	56
S6135	0.18	S6120A	S6135	70	88	88	24	n/a	3	5	6
S6146	0.20	S6120B	S6146	70	117	117	24	n/a	20	26	28
S6120A	0.09	S6164B	S6120	70	68	68	20	n/a	11	14	19
S6120B	0.08	S6118B	S6120	70	68	68	20	n/a	35	44	44
S6132C	0.17	S6162	S6132A	70	68	136	18	n/a	12	15	25
S6162	0.22	S6163	S6162	70	62	124	18	40.20	40	56	56
S6163	0.23	S6164A	S6163	70	70	140	18	n/a	13	17	25
S6164A	0.24	S6164B	S6164	70	76	152	18	n/a	18	24	25
S6164B	0.14	S6118A	S6164	70	60	120	18	0.14	65	97	97
S6118A	0.08	S6117A	S6119	70	94	94	20	n/a	6	8	19
S6118B	0.06	S6117B	S6119	70	62	62	20	n/a	38	50	63
S6117A	0.14	S6116A	S6117	70	85	85	20	n/a	10	12	19
S6117B	0.13	S6116B	S6117	70	85	85	20	n/a	30	42	44
S6116A	0.15	S6115C	S6116	70	81	81	20	n/a	12	16	19
S6116B	0.17	S6115B	S6116	70	81	81	20	n/a	27	40	44
S6156B	0.24	S6158A	S6156B	70	83	166	18	n/a	14	17	25
S6158A	0.18	S6158B	S6158	70	71	71	18	n/a	18	25	25
S6158B	0.17	S6154	S6158	70	63	63	18	n/a	16	21	25
S6154	0.16	S6115C	S6154	70	69	138	18	3.44	44	68	72
S6115C	0.05	S6115A	S6115	70	22	22	18	n/a	10	14	19
S6115A	0.14	S6102B	S6115	70	67	67	20	n/a	11	15	19
S6115B	0.18	S6102B	S6115	70	88	88	20	0.28	102	212	***245***
S6101B	0.05	S6115B	S6101	70	36	36	24	n/a	1	1	6
S6101A	0.09	S6102B	S6101	70	47	47	24	n/a	0	0	0

Drainage Area		Downstream Segment ID	XPSWMM Node ID	IMP Ratio (%)	Segment Length (m)	Subcatchment Width (m)	Road ROW Cross Section	Max. Storage Available (m^3)	Minor System Restriction		
Segment ID	Area (ha)								2 Year Modeled Flow (l/s)*	5 Year Modeled Flow (l/s)*	ICD Flow (l/s)*
S6102B	0.18	S6102A	S6102	70	48	96	24	9.50	56	79	126
S6102A	0.16	S6103	S6102	70	47	94	24	4.76	21	29	107
S6103	0.16	S6104B	S6103	70	46	92	24	6.18	21	29	126
S6104B	0.16	S6104A	S6104	70	47	94	24	5.90	21	29	126
S6104A	0.16	S6105C	S6104	70	46	92	24	6.21	21	29	48
S6105C	0.16	S6105B	S6105	70	47	94	24	4.78	21	29	95
S6105B	0.16	S6105A	S6105	70	46	92	24	7.39	21	29	88
S6105A	0.16	EXT8AA	S6105	70	48	96	24	4.64	21	29	126
S6138A	0.07	S6138B	S6138	70	31	62	24	n/a	2	3	12
S6138B	0.06	S6140A	S6138	70	26	52	24	n/a	4	5	12
S6140A	0.09	S6140B	S6140	70	39	78	24	n/a	5	8	12
S6140B	0.08	S6140C	S6140	70	32	64	24	n/a	7	9	12
S6140C	0.15	BANK	S6140	70	35	70	24	n/a	9	13	25
Total Flow for Street Segments – Phase 1 East (l/s)											**2028**
Street Segments - West†											
S6110B	0.16	S6110A	BLK6110S	70	81	81	24	n/a	14	17	19
S6110C	0.17	S6110D	BLK6110S	70	81	81	24	n/a	14	17	19
S6132A	0.21	S6110D	S6132	70	61	122	24	n/a	12	17	25
S6110A	0.14	S6108A	S6110	70	72	72	24	n/a	15	19	19
S6110D	0.15	S6155B	S6110	70	72	72	24	n/a	18	23	24
S6155B	0.30	S6108B	S6155	70	95	186	18	0.64	86	127	***168***
S6108A	0.15	S6108B	S6108	70	85	85	24	n/a	6	9	19
S6156C	0.11	S6155A	S6156	70	56	56	18	n/a	6	9	19
S6156D	0.10	S6155B	S6156	70	56	56	18	n/a	6	8	19
S6155A	0.13	S6108B	S6155	70	76	76	18	n/a	9	11	19
S6108B	0.21	S6107	S6108	70	61	122	24	n/a	31	41	43
S6131B	0.30	S6131A	S6131B	70	86	172	24	n/a	16	21	25
S6131A	0.19	S6130B	S6131	70	57	114	24	n/a	10	14	25
S6130B	0.13	S6170B	S6130	70	81	81	18	n/a	17	22	24
S6170B	0.14	S631A	S6170	70	74	74	18	n/a	21	28	28
S6170C	0.10	S6170B	S6170	70	83	83	20	n/a	0	0	0
S6130A	0.12	S6170A	S6130	70	81	81	18	n/a	7	9	19
S6170A	0.12	S631A	S6170	70	87	87	18	n/a	11	14	19
S6171	0.15	S631A	S6171	70	90	90	20	1.27	20	25	25
S6181	0.29	S6182	S6181	70	80	160	18	n/a	15	19	25

Drainage Area		Downstream Segment ID	XPSWMM Node ID	IMP Ratio (%)	Segment Length (m)	Subcatchment Width (m)	Road ROW Cross Section	Max. Storage Available (m^3)	Minor System Restriction		
Segment ID	Area (ha)								2 Year Modeled Flow (l/s)*	5 Year Modeled Flow (l/s)*	ICD Flow (l/s)*
S6182	0.20	S6183B	S6182	70	66	132	18	n/a	21	28	30
S6183B	0.26	S6183A	S6183	70	91	182	18	n/a	20	27	30
S6183A	0.12	S6107	S6183	70	41	82	18	2.20	53	79	***181***
S6175	0.18	S6106	S6175	70	90	90	20	n/a	9	12	19
S6107	0.25	S6106	S6107	70	72	166	24	13.51	80	122	***249***
S6106	0.24	EXT8AA	S6106	70	93	186	24	66.46	44	62	172
S6176	0.05	S6173	S6176	70	47	47	18	n/a	3	4	6
S6172	0.11	S6173	S6172	70	76	76	18	n/a	6	8	19
S6173	0.31	EXT8AD	S6173	70	75	150	18	10.42	51	72	72
								Total Flow for Street Segments – Phase 1 West (l/s)			**1363**
								Total Flow for Street Segments – Phase 1 (l/s)			**3391**
Rear Yard Segments – East*											
R6132C	0.27	R6132A	S6132B	49	57	114	swale	n/a	25	34	40
R6132A	0.43	R6132D	S6132B	49	108	216	swale	n/a	41	56	57
R6133	0.16	R6134	S6133	49	76	76	swale	n/a	15	21	22
R6134	0.20	S6146	S6134	49	60	60	swale	n/a	18	25	26
R6163	0.24	R6164	S6163	49	57	114	swale	n/a	23	31	40
R6164	0.33	R6120	S6164	49	76	152	swale	n/a	31	43	57
R6120	0.14	S6120A	S6120	49	34	68	swale	n/a	13	18	22
R6132B	0.34	S6132C	S6132A	49	72	144	swale	n/a	32	44	57
R6156C	0.11	S6156B	S6156B	49	57	57	swale	n/a	10	14	17
R6158	0.25	R6154	S6158	49	58	116	swale	n/a	23	33	40
R6154	0.26	S6154	S6154	49	64	128	swale	n/a	24	34	40
R6116A	0.14	R6116B	S6116	49	63	63	swale	n/a	13	18	22
R6116B	0.13	R6101	S6116	49	62	62	swale	n/a	12	17	17
R6101	0.15	S6101B	S6101	49	78	78	swale	n/a	14	20	22
R6102	0.12	S6102B	S6102	49	65	65	swale	n/a	11	16	17
								Total Flow for Rear Yard Segments – Phase 1 East (l/s)			**496**
Rear Yard Segments - West†											
R6132D	0.11	S6132A	S6132	49	32	32	Swale	n/a	10	14	57
R6109	0.31	R6155	S6109	49	53	106	Swale	n/a	28	40	78
R6156A	0.30	R6155	S6156	49	64	128	Swale	n/a	28	39	78
R6155	0.54	S6155B	S6155	49	92	153	Swale	n/a	49	68	78
R6156B	0.14	R6108A	S6156	49	49	49	Swale	n/a	13	18	22
R6108A	0.21	S6108B	S6108	49	109	109	Swale	n/a	20	28	78

Drainage Area		Downstream Segment ID	XPSWMM Node ID	IMP Ratio (%)	Segment Length (m)	Subcatchment Width (m)	Road ROW Cross Section	Max. Storage Available (m^3)	Minor System Restriction		
Segment ID	Area (ha)								2 Year Modeled Flow (l/s)*	5 Year Modeled Flow (l/s)*	ICD Flow (l/s)*
R6182	0.31	R6183	S6182	49	72	115	Swale	n/a	29	40	78
R6183	0.26	R6108B	S6183	49	32	64	Swale	n/a	23	32	78
R6108B	0.25	S6107	S6108	70	65	100	Swale	n/a	32	45	78
R6131B	0.54	S6131B	S6131B	49	107	183	Swale	n/a	49	69	78
R6181	0.47	R6170	S6181	49	101	195	Swale	n/a	44	61	78
R6130	0.10	R6170	S6130	49	37	37	Swale	n/a	9	13	19
R6170	0.25	R6171	S6170	49	47	94	Swale	n/a	23	32	40
R6171	0.32	S6170C	S6171	49	66	132	Swale	n/a	30	41	57
R6106	0.27	S6106	S6106	49	68	136	Swale	n/a	25	35	78
R6173	0.40	EXT8AD	S6173	49	68	136	Swale	n/a	37	51	57
R6176B	0.21	R6176A	S6176	49	45	90	Swale	n/a	20	27	29
R6176A	0.25	S6172	S6176	49	50	70	Swale	n/a	23	29	29
Total Flow for Rear Yard Segments – Phase 1 West (l/s)											**1090**
Total Flow for Rear Yard Segments – Phase 1 (l/s)											**1586**
Total Flow from Street and Rear Yard Segments –Phase 1 (l/s)											**4977**
Future External Areas											
EXT2	2.72	S6133B	BLK6133S	64	306	612	18	n/a	304	424	86
EXT3	2.50	S6146	BLK6145	79	281	563	24	125.00	336	469	469
HD1	1.02	S6117A	BLK6117B	86	115	230	n/a	100.00	148	206	206
PARK1	0.83	S6154	S6153	14	93	187	swale	150.00	23	33	38
HD2	0.94	S6102A	S6102	86	106	212	n/a	115.00	136	190	190
INST	2.55	S6105C	S6104	79	287	574	n/a	290.00	343	479	476
EA	2.06	BANK	BLK900	79	232	464	n/a	12.57	277	387	523
EXT4	4.06	BANK	BLK900	79	457	914	n/a	462.00	546	762	760
COM	3.01	BANK	S6119	79	339	677	n/a	345.00	405	565	562
EXT1A	0.23	S6110B	BLK6110S	79	26	52	24	n/a	12	15	19
EXT1B	0.21	S6110C	BLK6110S	79	24	47	24	n/a	11	14	19
S631A	2.12	EXT8B	BLK3171W	79	239	477	20	18.60	334	471	467
EXT8B	4.38	EXT8AD	BLK6105W	79	493	986	24	38.43	590	822	809
EXT8AA	0.26	EXT8AB	BLK6105W	79	60	120	24	3.80	38	53	52
EXT8AB	0.46	EXT8AC	BLK6105W	79	61	122	24	6.74	63	88	88
EXT8AC	0.57	EXT8AD	BLK6105W	79	58	116	24	6.74	76	106	105
EXT8AD	0.24	OUT	BLK6105W	79	61	122	24	17.85	35	49	150
EXT7	0.72	S6173	BLK6172W	79	81	162	n/a	6.32	97	135	134

Notes: * Pathways at Findlay Creek Phase 1 East modeled flow is from the DDSWMM output file 33956-PH1E-3CHI2.out, 33956-PH1E-3CHI5.out and 33956-PH1E-3CHI100.out which are all presented on the CD in **Appendix E**.

APPENDIX F

Flow Control Roof Drain Information

WATTS®	Adjustable Accutrol Weir Tag: _____	Adjustable Flow Control for Roof Drains

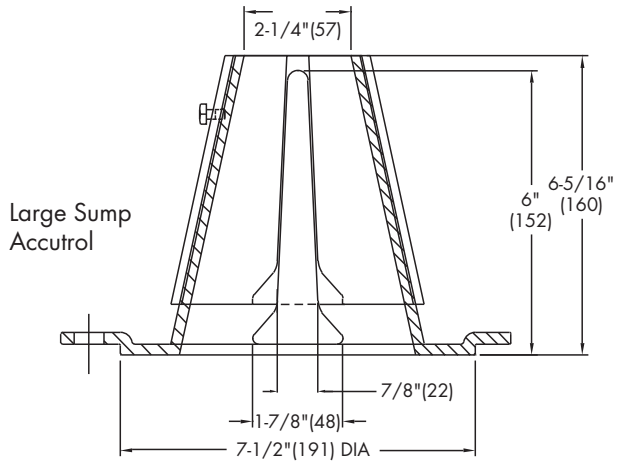
ADJUSTABLE ACCUTROL (for Large Sump Roof Drains only)

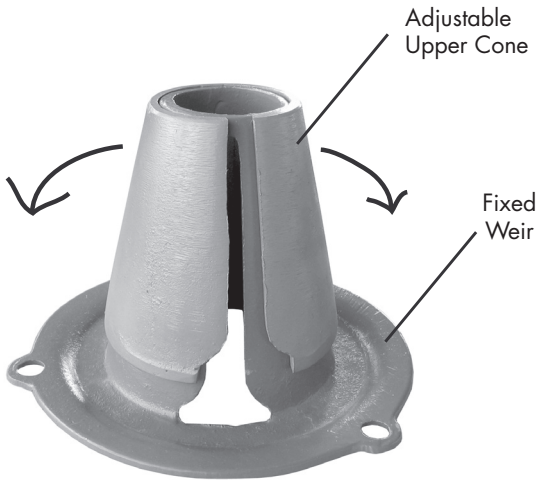
For more flexibility in controlling flow with heads deeper than 2", Watts Drainage offers the Adjustable Accutrol. The Adjustable Accutrol Weir is designed with a single parabolic opening that can be covered to restrict flow above 2" of head to less than 5 gpm per inch, up to 6" of head. To adjust the flow rate for depths over 2" of head, set the slot in the adjustable upper cone according to the flow rate required. Refer to Table 1 below.
Note: Flow rates are directly proportional to the amount of weir opening that is exposed.

EXAMPLE:

For example, if the adjustable upper cone is set to cover 1/2 of the weir opening, flow rates above 2"of head will be restricted to 2-1/2 gpm per inch of head.

Therefore, at 3"of head, the flow rate through the Accutrol Weir that has 1/2 the slot exposed will be:
[5 gpm (per inch of head) x 2 inches of head] + 2-1/2 gpm (for the third inch of head) = 12-1/2 gpm.





1/2 Weir Opening Exposed Shown Above

TABLE 1. Adjustable Accutrol Flow Rate Settings

Weir Opening Exposed	1"	2"	3"	4"	5"	6"
	Flow Rate (gallons per minute)					
Fully Exposed	5	10	15	20	25	30
3/4	5	10	13.75	17.5	21.25	25
1/2	5	10	12.5	15	17.5	20
1/4	5	10	11.25	12.5	13.75	15
Closed	5	5	5	5	5	5

Job Name _____ Contractor _____

Job Location _____ Contractor's P.O. No. _____

Engineer _____ Representative _____

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APPENDIX G

Development Servicing Study Checklist

Servicing study guidelines for development applications

4. Development Servicing Study Checklist

The following section describes the checklist of the required content of servicing studies. It is expected that the proponent will address each one of the following items for the study to be deemed complete and ready for review by City of Ottawa Infrastructure Approvals staff.

The level of required detail in the Servicing Study will increase depending on the type of application. For example, for Official Plan amendments and re-zoning applications, the main issues will be to determine the capacity requirements for the proposed change in land use and confirm this against the existing capacity constraint, and to define the solutions, phasing of works and the financing of works to address the capacity constraint. For subdivisions and site plans, the above will be required with additional detailed information supporting the servicing within the development boundary.

4.1 General Content

- ☐ Executive Summary (for larger reports only).
- ☒ Date and revision number of the report.
- ☒ Location map and plan showing municipal address, boundary, and layout of proposed development.
- ☒ Plan showing the site and location of all existing services.
- ☒ Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.
- ☒ Summary of Pre-consultation Meetings with City and other approval agencies.
- ☒ Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria.
- ☒ Statement of objectives and servicing criteria.
- ☒ Identification of existing and proposed infrastructure available in the immediate area.
- ☐ Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).
- ☐ Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.
- ☐ Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.
- ☐ Proposed phasing of the development, if applicable.

☒ Reference to geotechnical studies and recommendations concerning servicing.

☒ All preliminary and formal site plan submissions should have the following information:
- Metric scale
- North arrow (including construction North)
- Key plan
- Name and contact information of applicant and property owner
- Property limits including bearings and dimensions
- Existing and proposed structures and parking areas
- Easements, road widening and rights-of-way
- Adjacent street names

4.2 Development Servicing Report: Water

☒ Confirm consistency with Master Servicing Study, if available
☒ Availability of public infrastructure to service proposed development
☒ Identification of system constraints
☒ Identify boundary conditions
☒ Confirmation of adequate domestic supply and pressure
☒ Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development.
☒ Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.
☐ Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design
☒ Address reliability requirements such as appropriate location of shut-off valves
☐ Check on the necessity of a pressure zone boundary modification.
☒ Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range

- ☒ Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.
- ☐ Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.
- ☒ Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.
- ☒ Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.

4.3 Development Servicing Report: Wastewater

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

4.4 Development Servicing Report: Stormwater Checklist

- ☒ Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)
- ☐ Analysis of available capacity in existing public infrastructure.
- ☒ A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.
- ☒ Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.
- ☐ Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.
- ☒ Description of the stormwater management concept with facility locations and descriptions with references and supporting information.
- ☐ Set-back from private sewage disposal systems.
- ☐ Watercourse and hazard lands setbacks.
- ☐ Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.
- ☐ Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.
- ☒ Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).
- ☐ Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.
- ☒ Calculate pre and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.
- ☐ Any proposed diversion of drainage catchment areas from one outlet to another.
- ☒ Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.
- ☒ If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100 year return period storm event.
- ☐ Identification of potential impacts to receiving watercourses
- ☐ Identification of municipal drains and related approval requirements.
- ☒ Descriptions of how the conveyance and storage capacity will be achieved for the development.
- ☒ 100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.

- ☐ Inclusion of hydraulic analysis including hydraulic grade line elevations.
- ☒ Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.
- ☐ Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.
- ☐ Identification of fill constraints related to floodplain and geotechnical investigation.

4.5 Approval and Permit Requirements: Checklist

The Servicing Study shall provide a list of applicable permits and regulatory approvals necessary for the proposed development as well as the relevant issues affecting each approval. The approval and permitting shall include but not be limited to the following:

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

4.6 Conclusion Checklist

- ☒ Clearly stated conclusions and recommendations
- ☐ Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.
- ☒ All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario

APPENDIX H

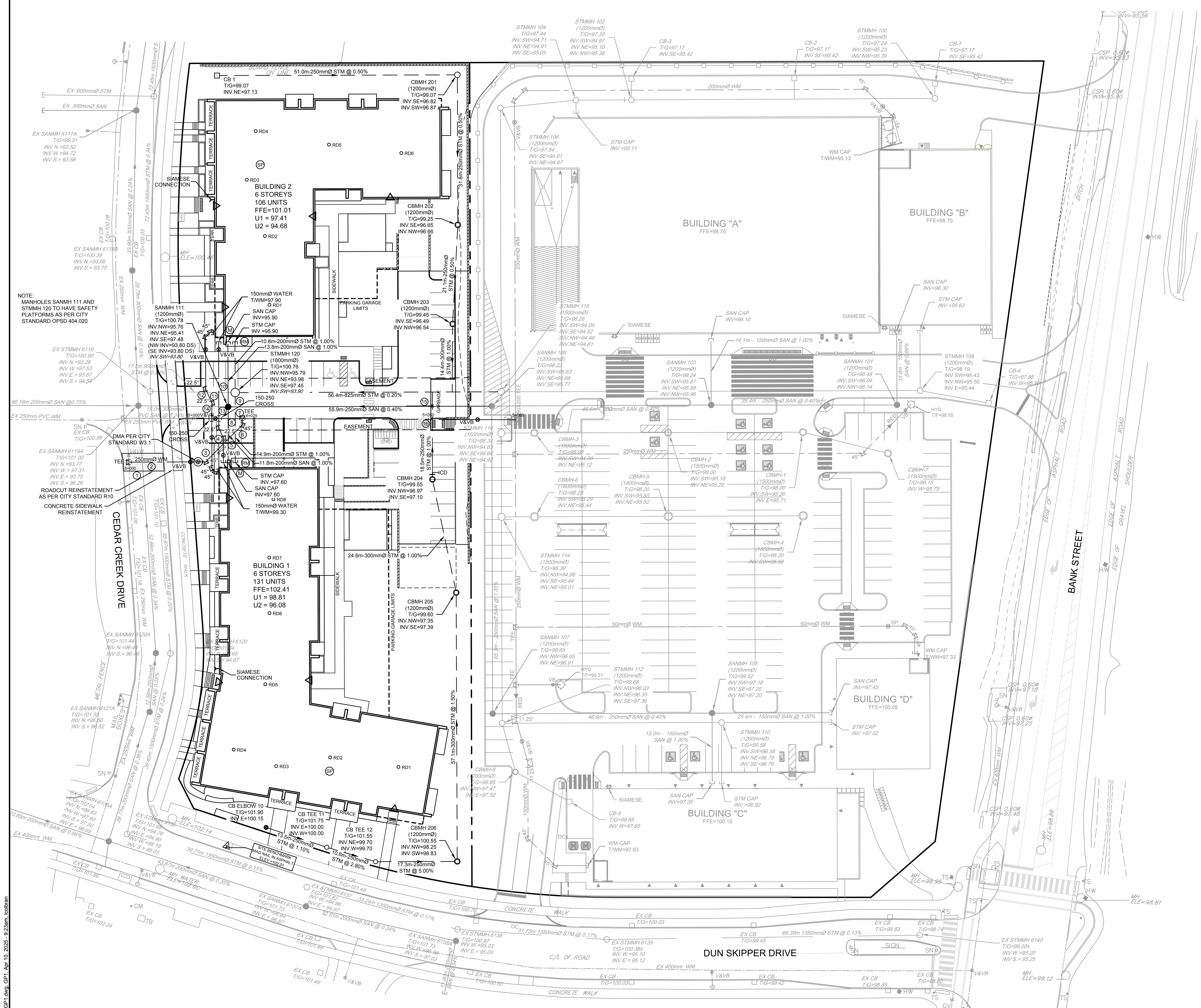
Drawings

INLET CONTROL DEVICE DATA TABLE - AREA A-5								
DESIGN EVENT	ICD TYPE (PLUG TYPE)	OUTLET STRUCTURE	DIAMETER OF OUTLET PIPE (mm)	PEAK DESIGN FLOW (L/s)	DESIGN HEAD (m)	WATER ELEVATION (m)	VOLUME (m^3)	AVAILABLE STORAGE
1:2 YR	CIRCULAR PLUG TYPE 117mm ORIFICE	1200mmØ STMMH 204	250mmØ PVC	27.3	0.90	97.95	4.8	50.2 m^3
1:5 YR				34.7	1.38	98.48	7.3	
1:100 YR				47.8	2.62	99.72	20.7	

ROOF DRAIN TABLE: AREA R-1 (FOR DRAINS RD 1 to RD 8)						
AREA ID *	ROOF DRAIN No. (WATTS MODEL)	WEIR SETTING	1:5 YEAR RELEASE RATE	APPROX. 5 YR PONDING DEPTH	1:100 YEAR RELEASE RATE	APPROX. 100 YR PONDING DEPTH
R-1	RD 1 (RD-100-A-ADJ)	FULLY EXPOSED	1.26 L/s	10 cm	1.58 L/s	13 cm
R-1	RD 2 (RD-100-A-ADJ)	FULLY EXPOSED	1.26 L/s	10 cm	1.58 L/s	14 cm
R-1	RD 3 (RD-100-A-ADJ)	1/2 EXPOSED	0.95 L/s	10 cm	1.10 L/s	13 cm
R-1	RD 4 (RD-100-A-ADJ)	1/2 EXPOSED	0.95 L/s	10 cm	1.10 L/s	13 cm
R-1	RD 5 (RD-100-A-ADJ)	FULLY EXPOSED	1.26 L/s	11 cm	1.58 L/s	14 cm
R-1	RD 6 (RD-100-A-ADJ)	1/2 EXPOSED	0.95 L/s	10 cm	1.10 L/s	13 cm
R-1	RD 7 (RD-100-A-ADJ)	1/2 EXPOSED	0.95 L/s	10 cm	1.10 L/s	13 cm
R-1	RD 8 (RD-100-A-ADJ)	1/2 EXPOSED	0.95 L/s	10 cm	1.10 L/s	13 cm
TOTALS	-	-	8.53 L/s	-	10.24 L/s	-

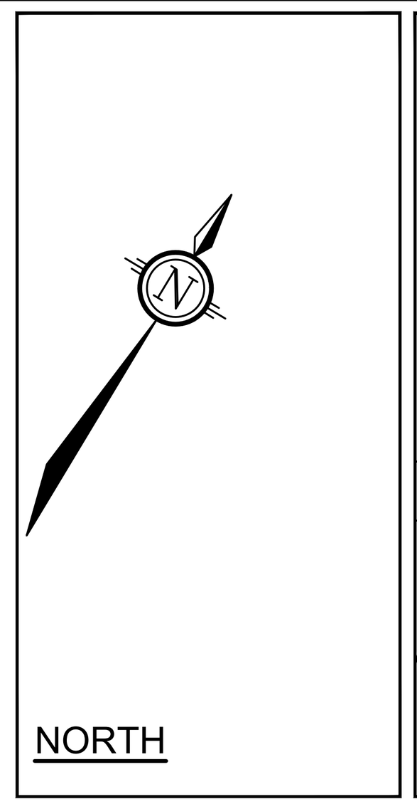
ROOF DRAIN TABLE: AREA R-2 (FOR DRAINS RD 1 to RD 6)						
AREA ID *	ROOF DRAIN No. (WATTS MODEL)	WEIR SETTING	1:5 YEAR RELEASE RATE	APPROX. 5 YR PONDING DEPTH	1:100 YEAR RELEASE RATE	APPROX. 100 YR PONDING DEPTH
R-2	RD 1 (RD-100-A-ADJ)	FULLY EXPOSED	1.26 L/s	10 cm	1.58 L/s	13 cm
R-2	RD 2 (RD-100-A-ADJ)	FULLY EXPOSED	1.26 L/s	10 cm	1.58 L/s	13 cm
R-2	RD 3 (RD-100-A-ADJ)	1/2 EXPOSED	0.95 L/s	10 cm	1.10 L/s	13 cm
R-2	RD 4 (RD-100-A-ADJ)	1/2 EXPOSED	0.95 L/s	10 cm	1.10 L/s	13 cm
R-2	RD 5 (RD-100-A-ADJ)	FULLY EXPOSED	1.26 L/s	10 cm	1.58 L/s	13 cm
R-2	RD 6 (RD-100-A-ADJ)	FULLY EXPOSED	1.26 L/s	11 cm	1.58 L/s	14 cm
TOTALS	-	-	6.94 L/s	-	8.52 L/s	-

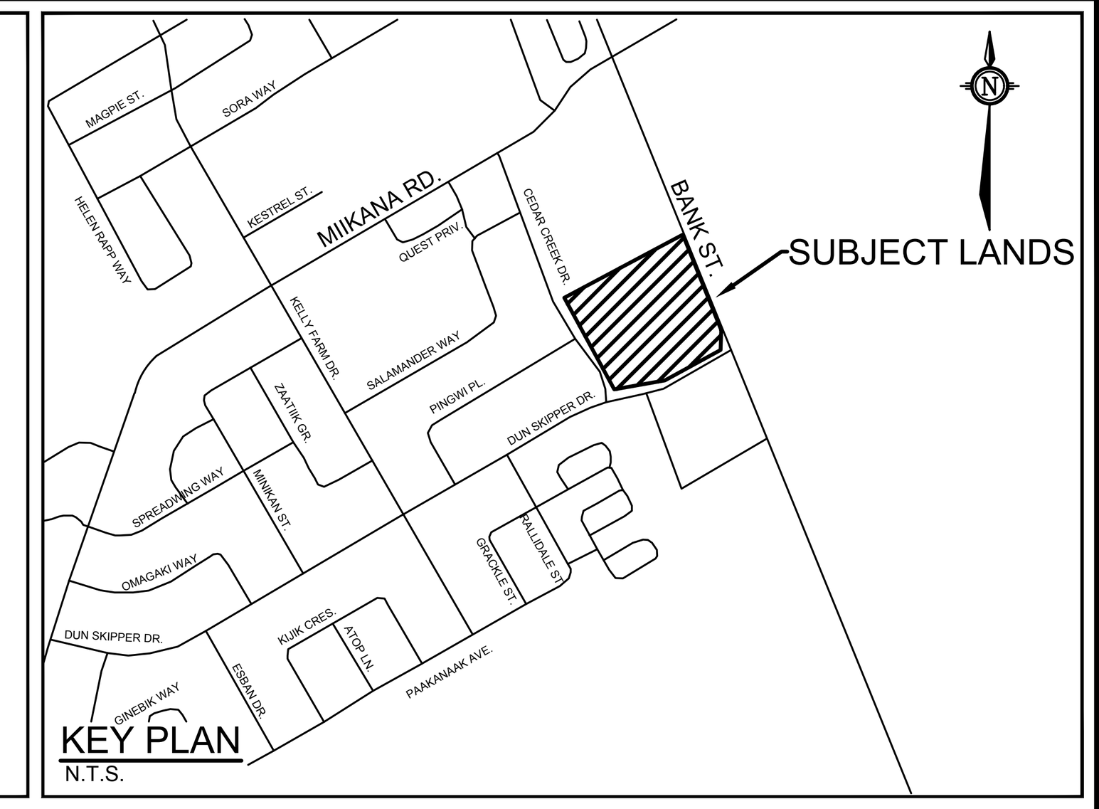
* REFER TO THE SERVICING AND STORMWATER MANAGEMENT REPORT' (R-2024-129) PREPARED BY NOVATECH FOR DRAINAGE AREA IDENTIFIERS AND STORMWATER MANAGEMENT DETAILS.



LEGEND

- PROPERTY LINE
- PROPOSED CURB
- DC PROPOSED DEPRESSED CURB
- PROPOSED CAP
- PROPOSED SANITARY SEWER AND MANHOLE
- PROPOSED STORM SEWER AND MANHOLE
- PROPOSED CATCHBASIN MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED WATER SERVICE
- PROPOSED HYDRANT c/w LEAD & VALVE
- V&VB PROPOSED VALVE AND VALVE BOX
- DMA PROPOSED DISTRICT METER AREA CHAMBER PER CITY STANDARD W3.1
- M PROPOSED WATER METER
- RM PROPOSED REMOTE METER
- SP APPROXIMATE LOCATION OF SUMP PUMP EXACT LOCATION TO BE COORDINATED WITH MECHANICAL
- PROPOSED BUILDING ENTRANCE
- DIRECTION OF FLOW
- PROPOSED RETAINING WALL
- *EXISTING UTILITY POLE C/W GUY WIRES*
- V&VC *EXISTING WATERMAIN C/W VALVE & VALVE CHAMBER*
- *EXISTING HYDRANT C/W VALVE & LEAD*
- SAN MH *EXISTING SANITARY MANHOLE & SEWER*
- STM MH *EXISTING STORM MANHOLE & SEWER*
- *EXISTING CATCHBASIN*





GENERAL NOTES:

1. COORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
2. DETERMINE THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION. PROTECT AND ASSUME RESPONSIBILITY FOR ALL EXISTING UTILITIES WHETHER OR NOT SHOWN ON THIS DRAWING.
3. OBTAIN ALL NECESSARY PERMITS AND APPROVALS FROM THE CITY OF OTTAWA BEFORE COMMENCING CONSTRUCTION.
4. BEFORE COMMENCING CONSTRUCTION OBTAIN AND PROVIDE PROOF OF COMPREHENSIVE, ALL RISK AND OPERATIONAL LIABILITY INSURANCE FOR $5,000,000.00. INSURANCE POLICY TO NAME OWNERS, ENGINEERS AND ARCHITECTS AS CO-INSURED.
5. RESTORE ALL DISTURBED AREAS ON-SITE AND OFF-SITE, INCLUDING TRENCHES AND SURFACES ON PUBLIC ROAD ALLOWANCES TO EXISTING CONDITIONS OR BETTER TO THE SATISFACTION OF THE CITY OF OTTAWA AND ENGINEER.
6. REMOVE FROM SITE ALL EXCESS EXCAVATED MATERIAL, ORGANIC MATERIAL AND DEBRIS UNLESS OTHERWISE INSTRUCTED BY ENGINEER. EXCAVATE AND REMOVE FROM SITE ANY CONTAMINATED MATERIAL. ALL CONTAMINATED MATERIAL SHALL BE DISPOSED OF AT A LICENSED LANDFILL FACILITY.
7. ALL ELEVATIONS ARE GEODETIC.
8. REFER TO GEOTECHNICAL REPORT PG7262-1, DATED NOVEMBER 14, 2024, PREPARED BY PATERSON GROUP, FOR SUBSURFACE CONDITIONS, CONSTRUCTION RECOMMENDATIONS, AND GEOTECHNICAL INSPECTION REQUIREMENTS. THE GEOTECHNICAL CONSULTANT IS TO REVIEW ON-SITE CONDITIONS AFTER EXCAVATION PRIOR TO PLACEMENT OF THE GRANULAR MATERIAL.
9. REFER TO ARCHITECT'S AND LANDSCAPE ARCHITECT'S DRAWINGS FOR BUILDING AND HARDSURFACE AREAS AND DIMENSIONS.
10. REFER TO SERVICING AND STORMWATER MANAGEMENT REPORT (R-2024-129) PREPARED BY NOVATECH ENGINEERING CONSULTANTS LTD.
11. SAW CUT AND KEY GRIND ASPHALT AT ALL ROAD CUTS AND ASPHALT TIE IN POINTS AS PER CITY OF OTTAWA STANDARDS (R10).
12. PROVIDE LINE/PARKING PAINTING.
13. CONTRACTOR TO PROVIDE THE CONSULTANT WITH A GENERAL PLAN OF SERVICES INDICATING ALL SERVICING AS-BUILT INFORMATION SHOWN ON THIS PLAN. AS-BUILT INFORMATION MUST INCLUDE: PIPE MATERIAL, SIZES, LENGTHS, SLOPES, INVERT AND T/G ELEVATIONS, STRUCTURE LOCATIONS, VALVE AND HYDRANT LOCATIONS, T/WM ELEVATIONS AND ANY ALIGNMENT CHANGES, ETC.

SEWER NOTES:

1. SUPPLY AND CONSTRUCT ALL SEWERS AND APPURTENANCES IN ACCORDANCE WITH THE MOST CURRENT CITY OF OTTAWA STANDARDS AND SPECIFICATIONS.
2. SPECIFICATIONS:

ITEM	SPEC. No.	REFERENCE
CATCHBASIN (600x600mm)	705.010	OPSD
STORM / SANITARY MANHOLE (1200mmØ)	701.010	OPSD
STORM / SANITARY MANHOLE (1500mmØ)	701.011	OPSD
STORM / SANITARY MANHOLE (1800mmØ)	701.012	OPSD
CB, FRAME & COVER	S19	CITY OF OTTAWA
STORM / SANITARY MH FRAME & COVER	401.010 -TYPE 'A'	OPSD
CATCHBASIN MANHOLE FRAME & COVER	401.010-TYPE 'B'	OPSD
SEWER TRENCH	S6	CITY OF OTTAWA
PERFORATED PIPE (SUBDRAIN)	S29	CITY OF OTTAWA
CATCHBASIN TEE	S30	CITY OF OTTAWA
CATCHBASIN ELBOW	S31	CITY OF OTTAWA
INSULATION FOR SHALLOW SEWERS	S35	CITY OF OTTAWA
ALUMINUM SAFETY PLATFORM	404.020	OPSD
DROP STRUCTURE	1003.010	OPSD
STORM SEWER	PVC DR 35 / CONC 65-D	
CATCHBASIN LEAD	PVC DR 35	

3. ALL STORM AND SANITARY SERVICE LATERALS SHALL BE EQUIPPED WITH BACKFLOW PREVENTION DEVICES AS PER THE CITY OF OTTAWA STANDARD DETAILS S14 AND S14.1 OR S14.2.
4. INSULATE SANITARY AND STORM PIPES THAT HAVE LESS THAN 2.0m COVER WITH HI-40 INSULATION PER CITY OF OTTAWA STANDARD DETAIL S35.
5. SERVICES ARE TO BE CONSTRUCTED TO 1.0m FROM FACE OF BUILDING AT A MINIMUM SLOPE OF 1.0%.
6. PIPE BEDDING, COVER AND BACKFILL ARE TO BE COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY. THE USE OF CLEAR CRUSHED STONE AS A BEDDING LAYER SHALL NOT BE PERMITTED.
7. FLEXIBLE CONNECTIONS ARE REQUIRED FOR CONNECTING PIPES TO MANHOLES (FOR EXAMPLE KOR-N-SEAL, PSX: POSITIVE SEAL AND DURASEAL). THE CONCRETE CRADLE FOR THE PIPE CAN BE ELIMINATED.
8. THE OWNER SHALL REQUIRE THAT THE SITE SERVICING CONTRACTOR PERFORM FIELD TESTS FOR QUALITY CONTROL OF ALL SANITARY SEWERS. LEAKAGE TESTING SHALL BE COMPLETED IN ACCORDANCE WITH OPSS 410.07.16, 410.07.16.04 AND 407.07.24. DYE TESTING IS TO BE COMPLETED ON ALL SANITARY SERVICES TO CONFIRM PROPER CONNECTION TO THE SANITARY SEWER MAIN. THE FIELD TESTS SHALL BE PERFORMED IN THE PRESENCE OF A CERTIFIED PROFESSIONAL ENGINEER WHO SHALL SUBMIT A CERTIFIED COPY OF THE TEST RESULTS.
9. ALL STORM MANHOLES AND CATCHBASIN MANHOLES ARE TO HAVE 300mm SUMPS UNLESS OTHERWISE INDICATED. ALL CATCHBASINS ARE TO HAVE 600mm SUMPS UNLESS OTHERWISE INDICATED. ALL CATCHBASINS TO HAVE 3.0m OF FILTER-CLOTH WRAPPED 100mm PVC PERFORATED SUBDRAIN IN AN UPGRADIENT DIRECTION PER GEOTECHNICAL RECOMMENDATIONS.
10. ALL CATCHBASINS, MANHOLES AND/OR CATCHBASIN MANHOLES THAT ARE TO HAVE ICD'S INSTALLED WITHIN THEM ARE TO HAVE 600mm SUMPS.
11. ALL WEEPING TILE CONNECTIONS TO BE MADE TO THE PROPOSED STORM SEWER SYSTEM DOWNSTREAM OF ANY INLET CONTROL DEVICES.
12. ROOF DRAINAGE IS NOT PERMITTED TO BE CONNECTED TO THE BUILDING FOUNDATION DRAINAGE SYSTEM.
13. CONTRACTOR TO TELEVISE (CCTV) ALL PROPOSED SEWERS, 200mmØ OR GREATER PRIOR TO BASE COURSE ASPHALT. UPON COMPLETION OF CONTRACT, THE CONTRACTOR IS RESPONSIBLE TO FLUSH AND CLEAN ALL SEWERS & APPURTENANCES
14. CONTRACTOR TO PROVIDE THE CONSULTANT WITH A GENERAL PLAN OF SERVICES INDICATING ALL SERVICING AS-BUILT INFORMATION SHOWN ON THIS PLAN. AS-BUILT INFORMATION MUST INCLUDE: PIPE MATERIAL, SIZES, LENGTHS, SLOPES, INVERT AND T/G ELEVATIONS, STRUCTURE LOCATIONS, VALVE AND HYDRANT LOCATIONS, T/WM ELEVATIONS AND ANY ALIGNMENT CHANGES, ETC.

BENCHMARK NOTES:

1. ELEVATIONS SHOWN ARE GEODETIC AND ARE REFERRED TO CITY OF OTTAWA 2016-0350, HAVING A PUBLISHED ELEVATION OF 64.947 METRES (CGVD28:78).
2. IT IS THE RESPONSIBILITY OF THE USER OF THIS INFORMATION TO VERIFY THAT THE JOB BENCHMARK HAS NOT BEEN ALTERED OR DISTURBED AND THAT IT'S RELATIVE ELEVATION AND DESCRIPTION AGREES WITH THE INFORMATION SHOWN ON THIS DRAWING.
3. BENCHMARK WAS PROVIDED ON PLAN OF SURVEY BLOCK 241, REGISTERED PLAN 4M-1617, CITY OF OTTAWA, SURVEYED BY J.D. BARNES LIMITED.

WATERMAIN NOTES:

1. SPECIFICATIONS:

ITEM	SPEC. No.	REFERENCE
WATERMAIN TRENCHING	W17	CITY OF OTTAWA
THERMAL INSULATION IN SHALLOW TRENCHES	W22	CITY OF OTTAWA
THERMAL INSULATION BY OPEN STRUCTURES	W23	CITY OF OTTAWA
CONCRETE THRUST BLOCKS (UNDER 400mmØ)	W25.3	CITY OF OTTAWA
THRUST BLOCK TABLE (UNDER 400mmØ)	W25.4	CITY OF OTTAWA
WATERMAIN CROSSING BELOW SEWER	W25	CITY OF OTTAWA
WATERMAIN CROSSING ABOVE SEWER	W25.2	CITY OF OTTAWA
FLOW MONITORING CHAMBER	W3.1	CITY OF OTTAWA
WATERMAIN (100mmØ AND LARGER)	PVC DR 18	
WATERMAIN (50mmØ AND SMALLER)	TYPE K COPPER	

2. SUPPLY AND CONSTRUCT ALL WATERMAINS AND APPURTENANCES IN ACCORDANCE WITH THE CITY OF OTTAWA STANDARDS AND SPECIFICATIONS. EXCAVATION, INSTALLATION, BACKFILL AND RESTORATION OF ALL WATERMAINS BY THE CONTRACTOR. CONNECTIONS AND SHUT-OFFS AT THE MAIN AND CHLORINATION OF THE WATER SYSTEM SHALL BE PERFORMED BY CITY FORCES.
3. EXCAVATION, INSTALLATION, BACKFILL AND RESTORATION OF ALL WATERMAINS BY THE CONTRACTOR. CONNECTIONS AND SHUT-OFFS AT THE MAIN AND CHLORINATION OF THE WATER SYSTEM SHALL BE PERFORMED BY CITY OFFICIALS. EXCAVATION, INSTALLATION OF SERVICE, BACKFILL AND RESTORATION BY THE CONTRACTOR.
4. WATERMAIN SHALL BE MINIMUM 2.4m DEPTH BELOW GRADE UNLESS OTHERWISE INDICATED. WHERE DEPTH OF COVER IS LESS THAN 2.4m, WATERMAIN SHALL BE INSULATED PER CITY OF OTTAWA STANDARD DETAIL W22. WATERMAIN SHALL BE INSULATED BY OPEN STRUCTURES PER W23.
5. PROVIDE MINIMUM 0.25m CLEARANCE BETWEEN OUTSIDE OF PIPES AT ALL CROSSINGS.
6. WATER SERVICE IS TO BE CONSTRUCTED TO WITHIN 1.0m OF FOUNDATION WALL AND CAPPED, UNLESS OTHERWISE INDICATED.

250mmØ WATERMAIN TABLE			
CHAINAGE	FINISHED GRADE	TOP OF WATERMAIN	COMMENT
5+000.0	100.93	98.81	CONNECT TO EXISTING WITH 22.5° VERT BEND
5+000.9	100.92	98.35	22.5° VERTICAL BEND
5+002.5	100.91	98.35	VALVE AND VALVE BOX
5+004.1	100.89	98.35	250mm x 150mm CROSS CONNECTION
5+004.8	100.87	98.35	VALVE AND VALVE BOX
5+005.6	100.86	98.35	250mm x 150mm CROSS CONNECTION
5+010.6	100.75	98.35	250mm x 250mm TEE CONNECTION
5+014.8	100.75	98.35	TOP OF WATERMAIN ELEVATION
5+031.5	100.30	97.90	TOP OF WATERMAIN ELEVATION
5+056.5	100.02	96.46	TOP OF WATERMAIN ELEVATION
5+060.5	98.48	96.51	VALVE AND VALVE BOX
5+064.7	98.40	96.56	22.5° VERTICAL BEND
5+068.5	98.08	95.68	250mm x 250mm TEE CONNECTION (ROTATED)

250mmØ WATERMAIN TABLE *			
CHAINAGE	FINISHED GRADE	TOP OF WATERMAIN	COMMENT
6+000.0	101.05	98.85	CONNECT TO EXISTING 250mmØ WATERMAIN
6+013.0	101.32	98.66	VALVE AND VALVE BOX
6+014.7	101.36	98.63	DISTRICT METER AREA CHAMBER (DMA)
6+016.3	101.38	98.60	45° HORIZONTAL BEND
6+021.6	101.16	98.50	WATER CROSSING (0.25m SEPARATION MIN)
6+027.3	100.88	98.40	45° HORIZONTAL BEND
6+029.0	100.75	98.35	CONNECT TO PROPOSED 250mmØ WATERMAIN

SEWER PIPE CROSSING TABLE			
CROSSING	HIGHER PIPE	LOWER PIPE	CLEARANCE
1	250mmØ WM BOTTOM=98.55	200mmØ SAN TOP=96.51	± 2.04m
2	250mmØ WM BOTTOM=98.51	1500mmØ STM TOP=96.24	± 2.27m
3	150mmØ WM BOTTOM=99.05	250mmØ WM TOP=98.58	± 0.47m
4	150mmØ WM BOTTOM=99.14	250mmØ WM TOP=98.51	± 0.63m
5	250mmØ WM BOTTOM=98.21	200mmØ SAN TOP=97.76	± 0.45m
6	250mmØ WM BOTTOM=98.17	200mmØ SAN TOP=97.74	± 0.43m
7	250mmØ WM BOTTOM=98.09	200mmØ STM TOP=97.72	± 0.37m
8	250mmØ WM BOTTOM=98.09	200mmØ SAN TOP=97.72	± 0.37m
9	200mmØ STM BOTTOM=97.47	250mmØ SAN TOP=95.68	± 1.79m
10	200mmØ SAN BOTTOM=95.78	900mmØ STM TOP=94.92	± 1.06m
11	150mmØ WM BOTTOM=98.15	900mmØ STM TOP=94.91	± 3.24m
12	150mmØ WM BOTTOM=98.00	900mmØ STM TOP=94.90	± 3.10m
13	150mmØ WM BOTTOM=98.09	300mmØ SAN TOP=94.10	± 3.99m
14	150mmØ WM BOTTOM=98.09	300mmØ SAN TOP=94.09	± 4.00m
15	250mmØ STM BOTTOM=96.93	250mmØ SAN TOP=95.88	± 1.05m
16	250mmØ STM BOTTOM=96.96	250mmØ WM TOP=96.46	± 0.50m

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

No.	REVISION	DATE	BY
2	REVISED AS PER CITY COMMENTS	APR 10/25	MS
1	ISSUED FOR SPC APPLICATION	JAN 17/25	MS

SCALE 1:400

DESIGN MS / LSC — CHECKED MS — DRAWN LSC — CHECKED MS — APPROVED MS

FOR REVIEW ONLY

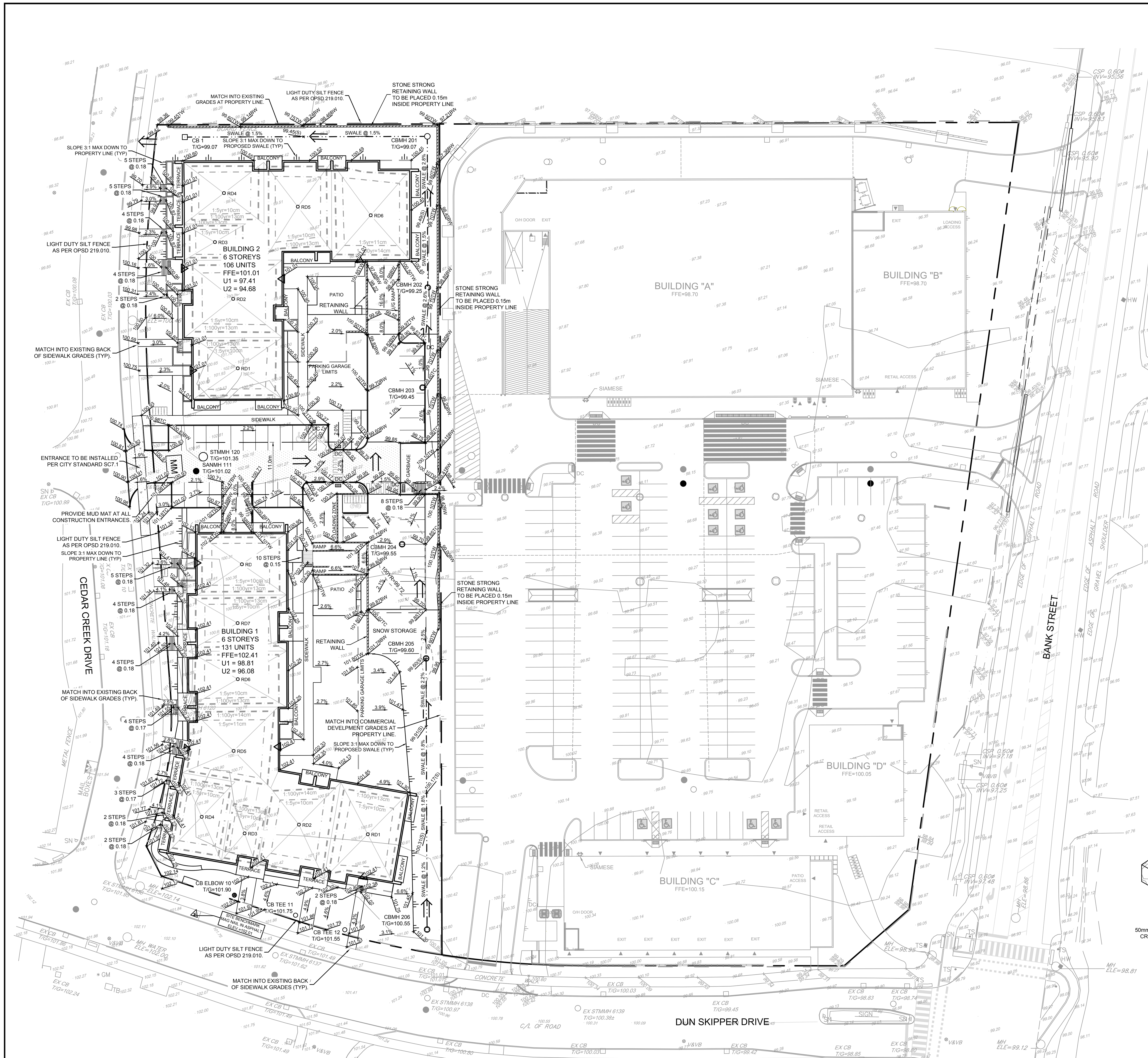
LICENSED PROFESSIONAL ENGINEER M. SAVIC 100102651 4/10/2025 PROVINCE OF ONTARIO

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

LOCATION
CITY OF OTTAWA
150 DUN SKIPPER DRIVE

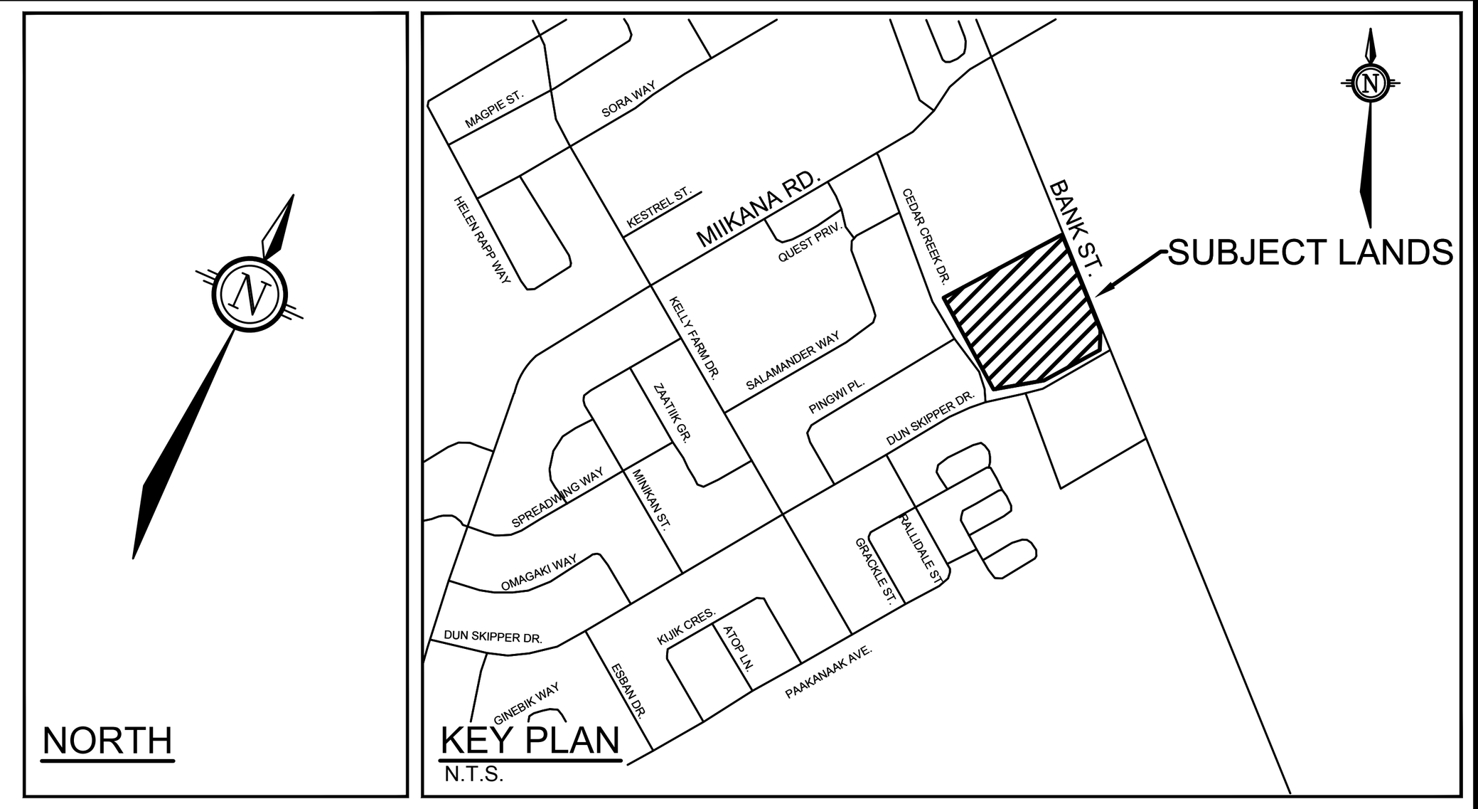
DRAWING NAME
GENERAL PLAN OF SERVICES

PROJECT No. 124107
REV # 2
DRAWING No. 124107-GP1



LEGEND

- PROPERTY LINE
- PROPOSED ELEVATION
- EXISTING ELEVATION
- PROPOSED SWALE ELEVATION
- PROPOSED BUILDING ENTRANCE
- DIRECTION OF MAJOR OVERLAND FLOW
- PROPOSED SAN MANHOLE
- PROPOSED RETAINING WALL
- PROPOSED STORM MANHOLE
- PROPOSED CATCHBASIN MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED FIRE HYDRANT
- PROPOSED VALVE AND VALVE BOX
- PROPOSED HIGH POINT
- PROPOSED CURB
- APPROXIMATE PONDING LIMITS
- PROPOSED DEPRESSED CURB
- PROPOSED TACTILE WALKING SURFACE INDICATOR (TWSI)
- SWALE AND DIRECTION OF FLOW
- TERRACING 3:1 SLOPE MAX (UNLESS OTHERWISE INDICATED)
- SLOPE AND DIRECTION
- EXISTING VALVE & VALVE CHAMBER
- EXISTING VALVE & VALVE BOX
- EXISTING HYDRANT
- EXISTING SANITARY MANHOLE
- EXISTING STORM MANHOLE
- EXISTING CATCHBASIN
- EXISTING LIGHT STANDARD
- EXISTING HANDWELL
- EXISTING HYDRO POLE
- EXISTING SIGN
- EXISTING TRAFFIC SIGNAL
- EXISTING HYDRO ANCHOR
- EXISTING GAS VALVE



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5. RESTORE ALL DISTURBED AREAS ON-SITE AND OFF-SITE, INCLUDING TRENCHES AND SURFACES ON PUBLIC ROAD ALLOWANCES TO EXISTING CONDITIONS OR BETTER TO THE SATISFACTION OF THE CITY OF OTTAWA AND ENGINEER.
6. REMOVE FROM SITE ALL EXCESS EXCAVATED MATERIAL, ORGANIC MATERIAL AND DEBRIS UNLESS OTHERWISE INSTRUCTED BY ENGINEER. EXCAVATE AND REMOVE FROM SITE ANY CONTAMINATED MATERIAL. ALL CONTAMINATED MATERIAL SHALL BE DISPOSED OF AT A LICENSED LANDFILL FACILITY.
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11. SAW CUT AND KEY GRIND ASPHALT AT ALL ROAD CUTS AND ASPHALT TIE IN POINTS AS PER CITY OF OTTAWA STANDARDS (R10).
12. PROVIDE LINE/PARKING PAINTING.
13. CONTRACTOR TO PROVIDE THE CONSULTANT WITH A GENERAL PLAN OF SERVICES INDICATING ALL SERVICING AS-BUILT INFORMATION SHOWN ON THIS PLAN. AS-BUILT INFORMATION MUST INCLUDE: PIPE MATERIAL, SIZES, LENGTHS, SLOPES, INVERT AND T/G ELEVATIONS, STRUCTURE LOCATIONS, VALVE AND HYDRANT LOCATIONS, T/WM ELEVATIONS AND ANY ALIGNMENT CHANGES, ETC.

GRADING NOTES:

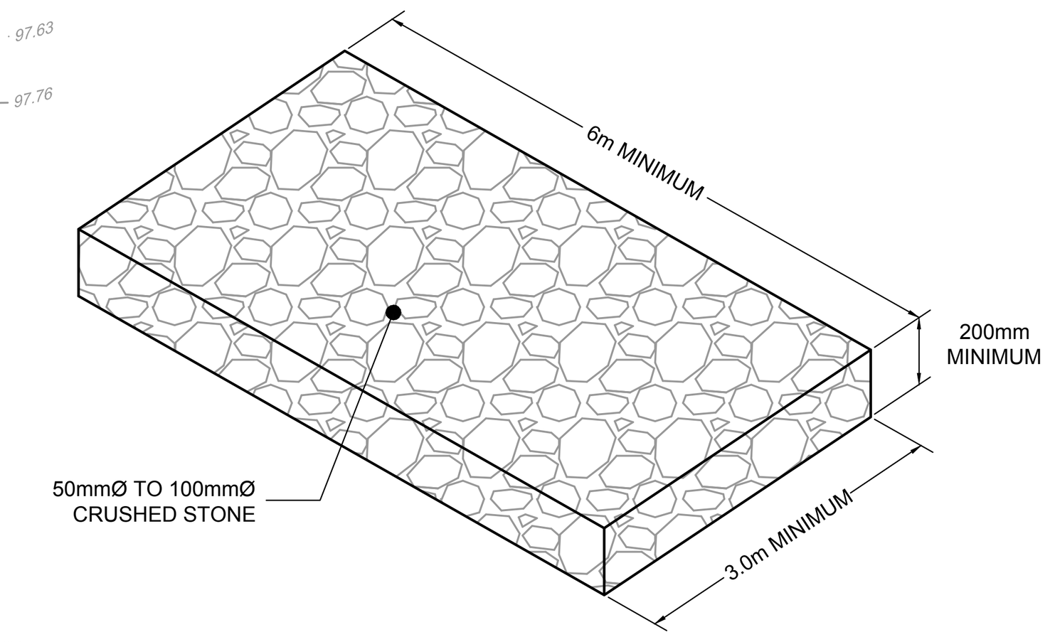
1. ALL TOPSOIL, ORGANIC OR DELETERIOUS MATERIAL MUST BE ENTIRELY REMOVED FROM BENEATH THE PROPOSED PAVED AREAS AS DIRECTED BY THE SITE ENGINEER OR GEOTECHNICAL ENGINEER.
2. EXPOSED SUBGRADES IN PROPOSED PAVED AREAS SHOULD BE PROOF ROLLED WITH A LARGE STEEL DRUM ROLLER AND INSPECTED BY THE GEOTECHNICAL ENGINEER PRIOR TO THE PLACEMENT OF GRANULARS.
3. ANY SOFT AREAS EVIDENT FROM THE PROOF ROLLING SHOULD BE SUB-EXCAVATED AND REPLACED WITH SUITABLE MATERIAL THAT IS FROST COMPATIBLE WITH THE EXISTING SOILS AS RECOMMENDED BY THE GEOTECHNICAL ENGINEER.
4. THE GRANULAR BASE SHOULD BE COMPACTED TO AT LEAST 100% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY VALUE. ANY ADDITIONAL GRANULAR FILL USED BELOW THE PROPOSED PAVEMENT SHOULD BE COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY VALUE.
5. MINIMUM OF 2% GRADE FOR ALL GRASS AREAS UNLESS OTHERWISE NOTED.
6. MAXIMUM TERRACING GRADE TO BE 3:1 UNLESS OTHERWISE NOTED.
7. ALL GRADES BY CURBS ARE EDGE OF PAVEMENT GRADES UNLESS OTHERWISE INDICATED.
8. ALL CURBS SHALL BE BARRIER CURB (150mm) UNLESS OTHERWISE NOTED AND CONSTRUCTED AS PER CITY OF OTTAWA STANDARDS (SC1.1)
9. CONCRETE CURB AND SIDEWALK SHALL BE AS PER CITY OF OTTAWA STANDARD SC1.4
10. REFER TO LANDSCAPE PLAN FOR PLANTING AND OTHER LANDSCAPE FEATURE DETAILS.
11. CONTRACTOR TO PROVIDE THE CONSULTANT WITH A GRADING PLAN INDICATING AS-BUILT ELEVATIONS OF ALL DESIGN GRADES SHOWN ON THIS PLAN.

EROSION AND SEDIMENT CONTROL NOTES :

1. THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES, TO PROVIDE FOR PROTECTION OF THE AREA DRAINAGE SYSTEM AND THE RECEIVING WATERCOURSE, DURING CONSTRUCTION ACTIVITIES. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.
2. ALL EROSION AND SEDIMENT CONTROLS ARE TO BE INSTALLED TO THE SATISFACTION OF THE ENGINEER AND THE CITY OF OTTAWA. THEY ARE TO BE APPROPRIATE TO THE SITE CONDITIONS, PRIOR TO UNDERTAKING ANY SITE ALTERATIONS (FILLING, GRADING, REMOVAL OF VEGETATION, ETC.) AND DURING ALL PHASES OF SITE PREPARATION AND CONSTRUCTION. THESE PRACTICES ARE TO BE IMPLEMENTED IN ACCORDANCE WITH THE CURRENT BEST MANAGEMENT PRACTICES FOR EROSION AND SEDIMENT CONTROL AND SHOULD INCLUDE AS A MINIMUM THOSE MEASURES INDICATED ON THE PLAN.
3. EROSION AND SEDIMENT CONTROL MEASURES WILL BE IMPLEMENTED DURING CONSTRUCTION IN ACCORDANCE WITH THE "GUIDELINES ON EROSION AND SEDIMENT CONTROL FOR URBAN CONSTRUCTION SITES" (GOVERNMENT OF ONTARIO, MAY 1987). THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR MEETING ALL REGULATORY AGENCY REQUIREMENTS.
4. TO PREVENT SURFACE EROSION FROM ENTERING ANY STORM SEWER SYSTEM DURING CONSTRUCTION, FILTER BAGS WILL BE PLACED UNDER GRATES OF NEARBY CATCHBASINS AND STRUCTURES. A LIGHT DUTY SILT FENCE BARRIER WILL ALSO BE INSTALLED AROUND THE CONSTRUCTION AREA (WHERE APPLICABLE).
5. TO LIMIT EROSION: MINIMIZE THE AMOUNT OF EXPOSED SOILS AT ANY GIVEN TIME, RE-VEGETATE EXPOSED AREAS AND SLOPES AS SOON AS POSSIBLE AND PROTECT EXPOSED SLOPES WITH NATURAL OR SYNTHETIC MULCHES.
6. FOR MATERIAL STOCKPILING: MINIMIZE THE AMOUNT OF EXPOSED MATERIALS AT ANY GIVEN TIME; APPLY TEMPORARY SEEDING, TARPS, COMPACTION AND/OR SURFACE ROUGHENING AS REQUIRED TO STABILIZE STOCKPILED MATERIALS THAT WILL NOT BE USED WITHIN 14 DAYS.
7. THE SEDIMENT CONTROL MEASURES SHALL ONLY BE REMOVED WHEN, IN THE OPINION OF THE ENGINEER, THE MEASURES ARE NO LONGER REQUIRED. NO CONTROL MEASURES MAY BE PERMANENTLY REMOVED WITHOUT PRIOR AUTHORIZATION FROM THE ENGINEER.
8. THE CONTRACTOR SHALL IMMEDIATELY REPORT TO THE ENGINEER ANY ACCIDENTAL DISCHARGES OF SEDIMENT MATERIAL INTO ANY STORM SEWER SYSTEM. APPROPRIATE RESPONSE MEASURES, INCLUDING ANY REPAIRS TO EXISTING CONTROL MEASURES OR THE IMPLEMENTATION OF ADDITIONAL CONTROL MEASURES, SHALL BE CARRIED OUT BY THE CONTRACTOR WITHOUT DELAY.
9. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.
10. ROADWAYS ARE TO BE SWEPT AS REQUIRED OR AS DIRECTED BY THE ENGINEER AND/OR THE MUNICIPALITY.
11. THE CONTRACTOR SHALL ENSURE PROPER DUST CONTROL IS PROVIDED WITH THE APPLICATION OF WATER (AND IF REQUIRED, CALCIUM CHLORIDE) DURING DRY PERIODS. MONITOR DUST LEVELS DURING SITE PREPARATION/EXCAVATION, AND CONSTRUCTION ACTIVITIES, AND WHEN DUST LEVELS BECOME VISUALLY APPARENT SPRAY WATER TO MINIMIZE THE RELEASE OF DUST FROM GRAVEL, PAVED AREAS AND EXPOSED SOILS. USE CHEMICAL DUST SUPPRESSANTS ONLY WHERE NECESSARY ON PROBLEM AREAS.

BENCHMARK NOTES:

1. ELEVATIONS SHOWN ARE GEODETIC AND ARE REFERRED TO CITY OF OTTAWA 2016-0350, HAVING A PUBLISHED ELEVATION OF 64.947 METRES (CGVD28:78).
2. IT IS THE RESPONSIBILITY OF THE USER OF THIS INFORMATION TO VERIFY THAT THE JOB BENCHMARK HAS NOT BEEN ALTERED OR DISTURBED AND THAT IT'S RELATIVE ELEVATION AND DESCRIPTION AGREES WITH THE INFORMATION SHOWN ON THIS DRAWING.
3. BENCHMARK WAS PROVIDED ON PLAN OF SURVEY BLOCK 241, REGISTERED PLAN 4M-1617, CITY OF OTTAWA, SURVEYED BY J.D. BARNES LIMITED.



MUD MAT DETAIL

NOT TO SCALE

PAVEMENT STRUCTURES:

LIGHT DUTY
50mm HL3/SP12.5mm CAT. B
150mm GRANULAR "A"
300mm GRANULAR "B" TYPE II

HEAVY DUTY
40mm HL3/SP12.5mm CAT. B
50mm HL8/SP19.0mm CAT. B
150mm GRANULAR "A"
450mm GRANULAR "B" TYPE II

Erosion and Sediment Control Responsibilities:

				During Construction			After Construction Prior to Final Acceptance		After Final Acceptance
	ESC Measure	Symbol	Specification	Installation Responsibility	Inspection/Maintenance Responsibility	Inspection Frequency	Approval to Remove	Removal Responsibility	Inspection/Maintenance Responsibility
Temporary Measures	Silt Fence		OPSD 219.110	Developer's Contractor	Developer's Contractor	Weekly (as a minimum)	Consultant	Developer's Contractor	N/A
	Filter Bag	Location as Indicated in ESC Note #4	Erosion and Sediment Control Notes	Developer's Contractor	Developer's Contractor	Weekly (as a minimum)	Consultant	Developer's Contractor	N/A
	Mud Mat		Drawing Details	Developer's Contractor	Developer's Contractor	Weekly (as a minimum)	Developer's Contractor	Developer's Contractor	N/A
	Dust Control	Location as Required Around Site	Erosion and Sediment Control Notes	Developer's Contractor	Developer's Contractor	Weekly (as a minimum)	Consultant	Developer's Contractor	N/A
	Stabilized Material Stockpiling	Location as Required by Contractor	Erosion and Sediment Control Notes	Developer's Contractor	Developer's Contractor	Weekly (as a minimum)	Developer's Contractor	Developer's Contractor	N/A
	Sediment Basin (for flows being pumped out of excavations)	Location as Required by Contractor	- - -	Developer's Contractor	Developer's Contractor	After Every Rainstorm	Developer's Contractor	Developer's Contractor	N/A

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

No.	REVISION	DATE	BY
2	REVISED PER CITY COMMENTS	APR 10/25	MS
1	ISSUED FOR SPC APPLICATION	JAN 17/25	MS

SCALE 1:400

DESIGN MS / LSC
CHECKED MS
DRAWN LSC
CHECKED MS
APPROVED MS

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER
M. SAVIC
100102651
4/10/2025
PROVINCE OF ONTARIO

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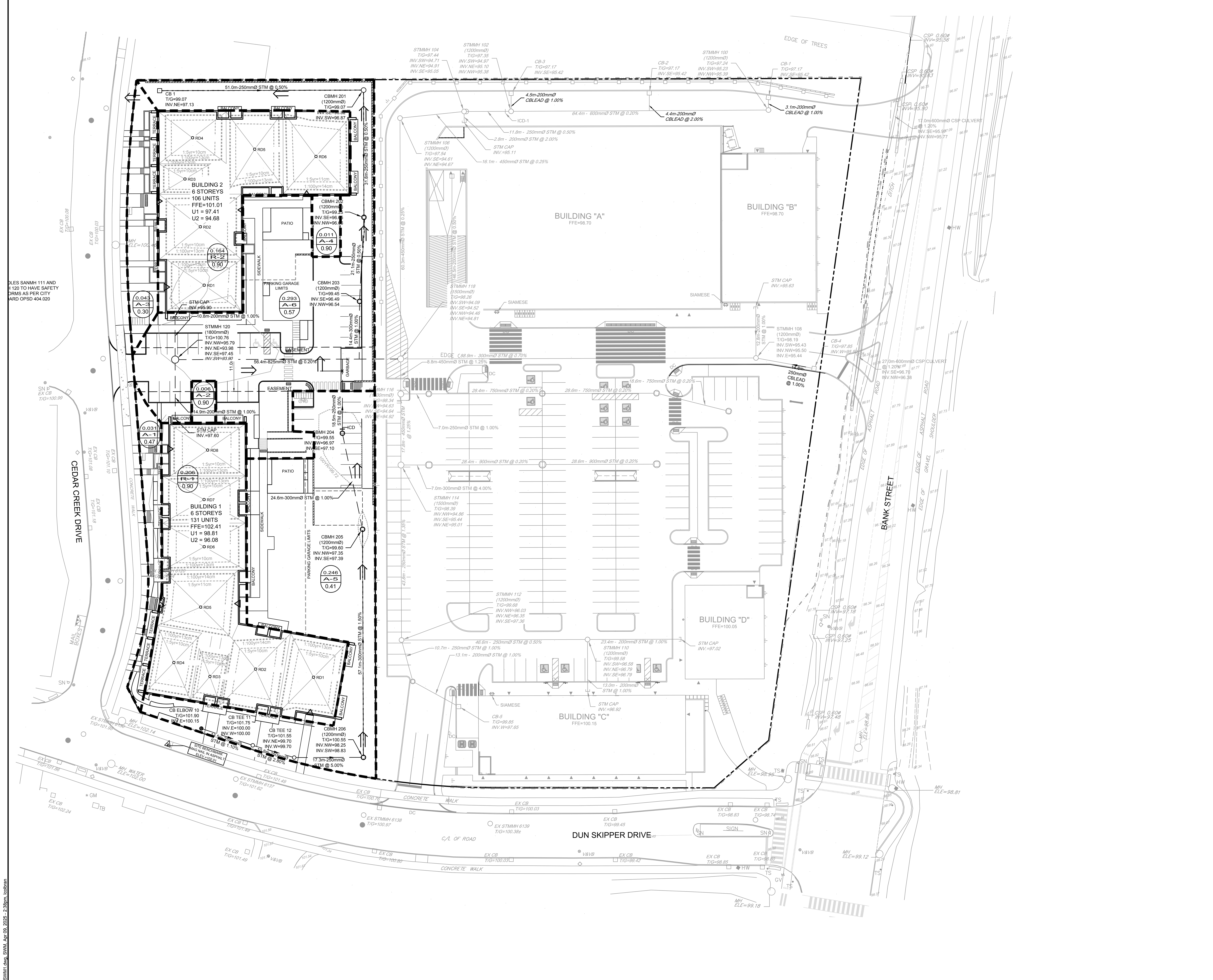
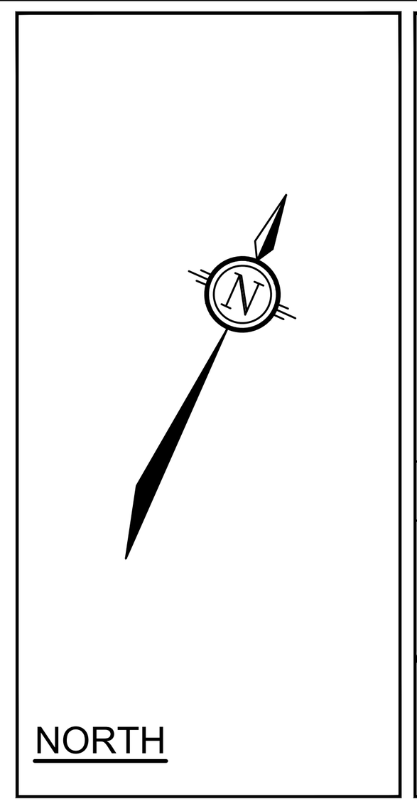
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

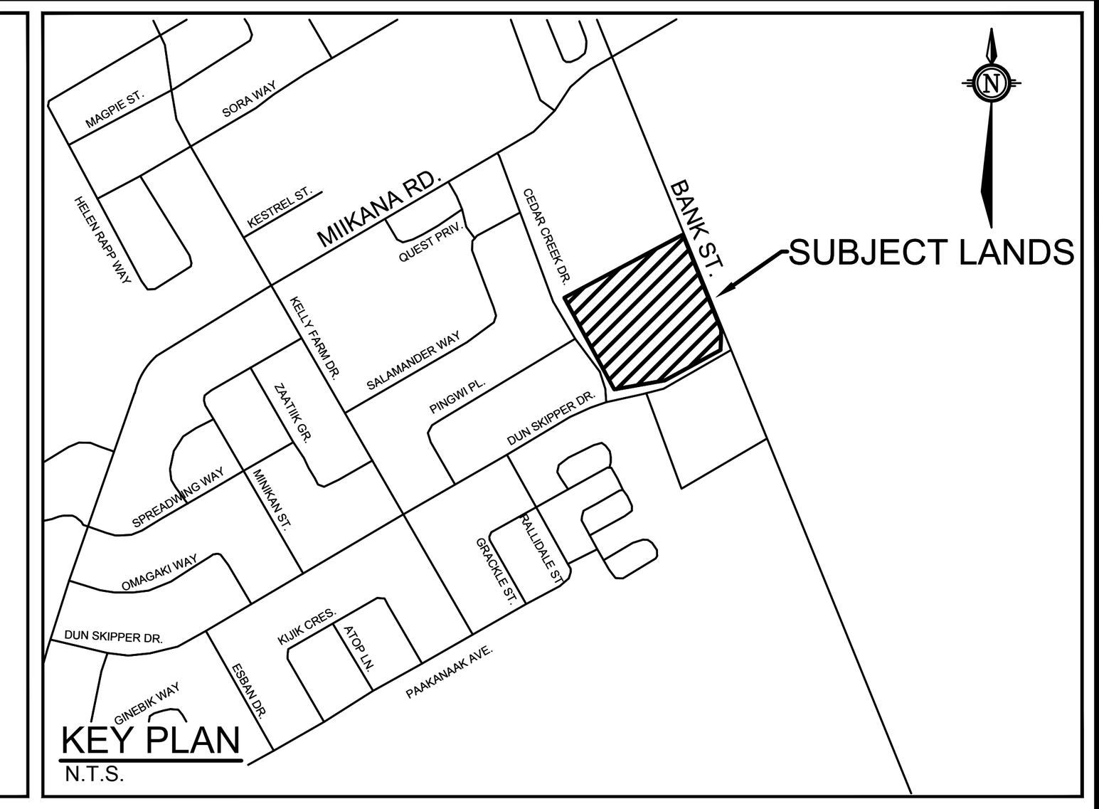
LOCATION
CITY OF OTTAWA
150 DUN SKIPPER DRIVE

DRAWING NAME
GRADING AND EROSION & SEDIMENT CONTROL PLAN

PROJECT No. 124107
REV # 2
DRAWING No. 124107-GR1







LEGEND

- PROPERTY LINE
- PROPOSED CURB
- DC PROPOSED DEPRESSED CURB
- PROPOSED STORM SEWER AND MANHOLE
- PROPOSED CATCHBASIN MANHOLE
- PROPOSED CATCHBASIN
- STM MH EXISTING STORM MANHOLE & SEWER
- EXISTING CATCHBASIN
- DRAINAGE AREA LIMITS
- A-2 POST-DEVELOPMENT AREA ID
- 0.170 POST-DEVELOPMENT DRAINAGE AREA (ha)
- 0.62 1:5 YEAR WEIGHTED RUNOFF COEFICIENT
- DIRECTION OF MAJOR OVERLAND FLOW
- DIRECTION OF FLOW
- PROPOSED RETAINING WALL
- 1:5 YR / 1:100 YR APPROXIMATE PONDING LIMITS
- RD CONTROLLED FLOW ROOF DRAIN
- ICD PROPOSED INLET CONTROL DEVICE
- MAXIMUM 3:1 SIDESLOPE

INLET CONTROL DEVICE DATA TABLE - AREA A-5

DESIGN EVENT	ICD TYPE (PLUG TYPE)	OUTLET STRUCTURE	DIAMETER OF OUTLET PIPE (mm)	PEAK DESIGN FLOW (L/s)	DESIGN HEAD (m)	WATER ELEVATION (m)	VOLUME (m^3)	AVAILABLE STORAGE
1:2 YR	CIRCULAR PLUG TYPE 117mm ORIFICE	1200mmØ STMMH 204	250mmØ PVC	27.3	0.90	97.95	4.8	50.2 m^3
1:5 YR				34.7	1.38	98.48	7.3	
1:100 YR				47.8	2.62	99.72	20.7	

ROOF DRAIN TABLE: AREA R-1 (FOR DRAINS RD 1 to RD 8)

AREA ID *	ROOF DRAIN No. (WATTS MODEL)	WEIR SETTING	1:5 YEAR RELEASE RATE	APPROX. 5 YR PONDING DEPTH	1:100 YEAR RELEASE RATE	APPROX. 100 YR PONDING DEPTH
R-1	RD 1 (RD-100-A-ADJ)	FULLY EXPOSED	1.26 L/s	10 cm	1.58 L/s	13 cm
R-1	RD 2 (RD-100-A-ADJ)	FULLY EXPOSED	1.26 L/s	10 cm	1.58 L/s	13 cm
R-1	RD 3 (RD-100-A-ADJ)	1/2 EXPOSED	0.95 L/s	10 cm	1.10 L/s	13 cm
R-1	RD 4 (RD-100-A-ADJ)	1/2 EXPOSED	0.95 L/s	10 cm	1.10 L/s	13 cm
R-1	RD 5 (RD-100-A-ADJ)	FULLY EXPOSED	1.26 L/s	11 cm	1.58 L/s	14 cm
R-1	RD 6 (RD-100-A-ADJ)	1/2 EXPOSED	0.95 L/s	10 cm	1.10 L/s	13 cm
R-1	RD 7 (RD-100-A-ADJ)	1/2 EXPOSED	0.95 L/s	10 cm	1.10 L/s	13 cm
R-1	RD 8 (RD-100-A-ADJ)	1/2 EXPOSED	0.95 L/s	10 cm	1.10 L/s	13 cm
TOTALS	-	-	8.53 L/s	-	10.24 L/s	-

ROOF DRAIN TABLE: AREA R-2 (FOR DRAINS RD 1 to RD 6)

AREA ID *	ROOF DRAIN No. (WATTS MODEL)	WEIR SETTING	1:5 YEAR RELEASE RATE	APPROX. 5 YR PONDING DEPTH	1:100 YEAR RELEASE RATE	APPROX. 100 YR PONDING DEPTH
R-2	RD 1 (RD-100-A-ADJ)	FULLY EXPOSED	1.26 L/s	10 cm	1.58 L/s	13 cm
R-2	RD 2 (RD-100-A-ADJ)	FULLY EXPOSED	1.26 L/s	10 cm	1.58 L/s	13 cm
R-2	RD 3 (RD-100-A-ADJ)	1/2 EXPOSED	0.95 L/s	10 cm	1.10 L/s	13 cm
R-2	RD 4 (RD-100-A-ADJ)	1/2 EXPOSED	0.95 L/s	10 cm	1.10 L/s	13 cm
R-2	RD 5 (RD-100-A-ADJ)	FULLY EXPOSED	1.26 L/s	10 cm	1.58 L/s	13 cm
R-2	RD 6 (RD-100-A-ADJ)	FULLY EXPOSED	1.26 L/s	11 cm	1.58 L/s	14 cm
TOTALS	-	-	6.94 L/s	-	8.52 L/s	-

* REFER TO THE SERVICING AND STORMWATER MANAGEMENT REPORT' (R-2024-129) PREPARED BY NOVATECH FOR DRAINAGE AREA IDENTIFIERS AND STORMWATER MANAGEMENT DETAILS.

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APPROVED MS

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER
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100102651
4/10/2025
PROVINCE OF ONTARIO

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

LOCATION
CITY OF OTTAWA
150 DUN SKIPPER DRIVE

DRAWING NAME
STORMWATER MANAGEMENT PLAN

PROJECT No. 124107
REV REV # 2
DRAWING No. 124107-SWM1

PLANB1.DWG - 1000mmx707mm