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PROPOSED COMMERCIAL DEVELOPMENT
150 DUN SKIPPER DRIVE

Servicing and Stormwater Management Report

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PROPOSED COMMERCIAL DEVELOPMENT

150 DUN SKIPPER DRIVE
OTTAWA, ONTARIO

SERVICING AND STORMWATER MANAGEMENT REPORT

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NOVATECH
Engineers, Planners & Landscape Architects

January 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 Commercial 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 commercial 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

M. Savić

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1.0 INTRODUCTION

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

The proposed commercial development is the eastern part of the 150 Dun Skipper Drive site and will have frontage on Banks Street and Dun Skipper Drive. Residential development is proposed for the western part of the subject site, with frontage to Cedar Creek Drive. The residential portion of the site will be a future application.

This report addresses the approach to servicing and stormwater management and is being submitted in support of the Site Plan Control application for the commercial portion of the site. The residential development will be 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 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 was held on Aug 28, 2024. Refer to **Appendix A** for feedback from the City of Ottawa following the Phase 2 Phase 2 pre-consultation meeting.

1.3 Proposed Development

The proposed commercial development will consist of five buildings, including a grocery store (Building A), discount store (Building B), retail store, dental office and quick service restaurants (Building C), and bank (Building D). The development will include a paved parking lot, loading bays, and landscaped areas. The site will have two access driveways off Bank Street and an access driveway off Don Skipper Drive. Refer to **Appendix B** for the proposed Site Plan.

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. A servicing easement within the residential portion of the site will be required to service the proposed commercial development.

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 (PG7262-2, October 1, 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 commercial development will be serviced by connecting to the existing municipal watermain, sanitary sewer and storm sewer stubs off Cedar Creek Drive. The site services to the commercial site will be provided via the residential portion of the site. An 11m wide service easement on future residential property will be required to service the site.

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 on site watermain system consisting of 250mm 200mm, and 150mm diameter watermains. A 250mm watermain will be extended through the future residential development land and connected to the 250mm diameter watermain stub. A second 250mm diameter watermain connection to the Cedar Creek Drive watermain will be provided on the south side of the existing water valve for redundancy. Two private fire hydrants will be provided on site for fire protection.

2.2.1 Proposed Development Domestic Water 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 2.1** 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 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**

2.2.2 Proposed Development Fire Protection System

The proposed Building A, Building B, and Building C will be sprinklered. The proposed Building D will not be sprinklered. Fire protection for the proposed buildings will be provided from two private fire hydrants. The hydrants have been located within 45m unobstructed path to the fire department siamese connection location on sprinklered buildings A, B, and C, and within 90m unobstructed path to the principal entrance of non-sprinklered building D.

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. Refer to **Appendix C** for E-mail correspondence with the client.

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 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)

2.2.3 Future Residential Development Water Demands and Fire Flows

Future residential development will consist of two 6-storey apartment buildings. The theoretical water demands for the future residential development were calculated using number of units provided the architect and the design criteria from Section 4 – 'Water Distribution Systems' of the Ottawa Design Guidelines – Water Distribution.

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

Table 2.3: Residential Development Water Demand

Future Residential Development	Ave. Daily Demand (L/s)	Max. Daily Demand (L/s)	Peak Hour Demand(L/s)
Domestic Water Demand	1.46	4.39	6.58

The Fire Underwriters Survey (FUS) was used to estimate fire flow requirements for the future residential development. The fire flow calculations are 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 2.4**. The detailed FUS fire flow calculations are included in **Appendix C**.

Table 2.4: Future Residential Development Fire Underwriters Survey (FUS) Fire Flow

Building 1	Building 2
183 L/s (11,000 L/min)	200 L/s (12,000 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 twin 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 connection to the existing watermain stub off 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 fire flow demands, are applied at the proposed fire hydrant locations (J5, and J9) and the domestic water demands are applied at the building services (J2, J7, and J10). The future residential development domestic water demands are applied at junction J12 where the building services will be connected to the proposed watermain.

It is anticipated that a multi-hydrant approach to firefighting will be required to supply adequate FUS fire flow to the proposed Building A, B, and C. Therefore, a maximum flow of 95 L/s (5,700 L/min) was modelled at junctions 5 and 9, based on the City of Ottawa Technical Bulletin ISTB-2018-02, Table 1 - Maximum Flow to be considered from a given hydrant. The combined maximum flow from the two on site hydrants exceeds the FUS fire flow requirements for the proposed development.

Furthermore, there are two existing blue bonnet municipal hydrants in Bank Street in vicinity of the subject site (one near the northeast corner and one near the southeast corner of the property) that can provide additional fire flow to the site if required.

Tables 2.5, 2.6, and 2.7 summarize the demands and hydraulic model results under the various operating conditions. Refer to **Appendix C** for detailed modelling results.

Table 2.5: Hydraulic Model Results – Maximum Day + Fire Flow Demand

Pressure Zone	Operating Condition	Minimum Pressure
Current (Pre SUC)	Max Day + Fire Flow Demand	138.8 kPa (20.1 psi)
Future (Post SUC)	Max Day + Fire Flow Demand	259.8 kPa (42.9 psi)

Table 2.6: Hydraulic Model Results – Peak Hour Demand

Pressure Zone	Operating Condition	Minimum Pressure
Current (Pre SUC)	Peak Hour Demand	404.7 kPa (58.7 psi)
Future (Post SUC)	Peak Hour Demand	430.2 kPa (62.4 psi)

Table 2.7: 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 Building A & B water entry room 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 commercial development will be serviced by on-site sanitary sewer system 200mm in diameter. A 250mm diameter sanitary sewer will be extended through future residential development lands and connected to the existing 300mm diameter sewer stub. A monitoring manhole will be provided near the property line as per the City of Ottawa standards. The proposed buildings will be provided with 150mm diameter services.

3.2.1 Peak Sanitary Flows

The theoretical peak sanitary flow for the proposed warehouse 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 3.1**. 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)
Commercial	0.77	0.64	1.40

The proposed 200mm diameter sanitary sewer at a minimum slope of 0.40% has a full flow capacity of 21.6 L/s. Therefore, the proposed on-site sanitary sewer system has sufficient capacity to convey the peak sanitary flows from the proposed development.

3.2.2 Future Residential Development Sanitary Flows

Future residential development will consist of two 6-storey apartment buildings. The peak sanitary flow for the future residential development were calculated using number of units provided the architect and the design criteria per The City of Ottawa Sewer Design Guidelines.

The peak sanitary flow calculations are summarized below in **Table 3.12**. Detailed calculations are included in **Appendix D**.

Table 3.2: Future Residential Development Peak Sanitary Flow Summary

Proposed Development	Peak Flow (L/s)	Infiltration Flow (L/s)	Total Peak Flow (L/s)
Future Residential	4.97	0.33	5.30

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 3.24 L/s (1.40 + 5.30 – 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 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 15000mm 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 1.93 ha commercial development site area as follows: (562 L/s / 3.01 ha) x 1.93 ha = 360 L/s. All flows in excess of 360 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 stubs. The on-site storm sewer system will include storm sewers ranging in size from 200mm to 825mm in diameter.

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 Bank Street. The post-development flow from area was calculated using the Rational Method to be 3.8 L/s during the 5-year design event and 7.7 L/s during the 100-year design event.

4.3.2 Area A-2 Direct Runoff

Stormwater runoff from this sub-catchment area will sheet drain to Bank Street and Dun Skipper Drive. The post-development flow from area was calculated using the Rational Method to be 13.4 L/s during the 5-year design event and 26.7 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 drain to the proposed trench drain in the Building A loading area 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 8.9 L/s during the 5-year design event and 16.9 L/s during the 100-year design event.

4.3.4 Area A-4 Uncontrolled Site Flows

Stormwater runoff from this sub-catchment area will drain to the proposed CB 4 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 14.5 L/s during the 5-year design event, and 27.8 L/s during the 100-year design event.

4.3.5 Area A-5 Uncontrolled Site Flows

Stormwater runoff from this sub-catchment area will drain to the proposed CB 5 and CBMH 8 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 11.6 L/s during the 5-year design event, and 22.3 L/s during the 100-year design event.

4.3.6 Area A-6 Controlled Site Flows

Stormwater runoff from this sub-catchment area will be captured by the proposed CB 1, CB 2, and CB 3 and will be attenuated by an ICD installed in the STMMH 102 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-6					
	ICD Type	Peak Flow	Water Storage Elevation	Average Flow (50% Qpeak)	Storage Volume Required	Max Storage Provided
2-Year	Tempest Vortex LMF ICD Model 105	11.0 L/s	0cm ponding (96.32 m)	5.5 L/s	21.4 m³	73.40 m³
5-Year		14.7 L/s	11cm ponding (97.28 m)	7.4 L/s	28.9 m³	
100-Year		15.1 L/s	22cm ponding (97.39 m)	7.6 L/s	70.5 m³	

Refer to **Appendix E** for detailed SWM calculations and to **Appendix F** for ICD information.

4.3.7 Area A-7 Controlled Site Flows

Stormwater runoff from this sub-catchment area will be captured by the proposed CBMH 1, CBMH 2, CBMH 3, and CBMH 7, and will be attenuated by an ICD installed in the outlet pipe of CBNH 3. 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 4.2 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 4.2: Stormwater Flows, ICD & Surface Storage

Design Event	Controlled Site Flows from Area A-7					
	ICD Type	**Peak Flow**	**Water Storage Elevation**	**Average Flow (50% Qpeak)**	**Storage Volume Required**	**Max Storage Provided**
2-Year	Circular Plug Type 91mm dia. Orifice	25.8 L/s	0cm ponding (97.20m)	12.9 L/s	39.4 m³	177.5 m³
5-Year		31.0 L/s	12cm ponding (98.12 m)	15.5 L/s	56.3 m³	
100-Year		31.7 L/s	26cm ponding (98.26 m)	56.3 L/s	137.6 m³	

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

4.3.8 Area A-8 Controlled Site Flows

Stormwater runoff from this sub-catchment area will be captured by the proposed CBMH 4, CBMH 5, and CBMH 6. The flow will be attenuated by an ICD installed in the outlet pipe of CBMH 6.

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 4.3 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 4.3: Stormwater Flows, ICD & Surface Storage

Design Event	Controlled Site Flows from Area A-8					
	ICD Type	**Peak Flow**	**Water Storage Elevation**	**Average Flow (50% Qpeak)**	**Storage Volume Required**	**Max Storage Provided**
2-Year	Circular Plug Type 226mm dia. Orifice	92.0 L/s	0cm ponding 96.14 m	46.0 L/s	28.4 m³	89.7 m³
5-Year		111.7 L/s	0cm ponding 96.47 m3	55.9 L/s	42.0 m³	
100-Year		189.5 L/s	20cm ponding	94.8 L/s	87.6 m³	

Design Event	Controlled Site Flows from Area A-8					
	ICD Type	Peak Flow	Water Storage Elevation	Average Flow (50% Qpeak)	Storage Volume Required	Max Storage Provided
			98.40 m			

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

4.3.9 Area R1: Building A Controlled Flow Roof Drains

The post-development flow from Building A 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 4.4 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 4.4: Design Flow and Roof Drain Table

Roof Drain ID	Number of Roof Drains	Watts Roof Drain Model ID (Weir Opening)	Controlled Flow per Drain (L/s)		Approximate Ponding Depth Above Drains (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	1	RD-100-A-ADJ (3/4 Exposed)	1.34	1.58	12	15	11.2	24.8	25.5
RD-2	1	RD-100-A-ADJ (3/4 Exposed)	1.10	1.34	11	14	8.2	18.0	21.0
RD-3	1	RD-100-A-ADJ (Fully Exposed)	1.26	1.58	11	14	13.2	28.3	30.3
RD-4	1	RD-100-A-ADJ (3/4 Exposed)	1.10	1.34	11	14	9.7	21.1	23.0
RD-5	1	RD-100-A-ADJ (3/4 Exposed)	1.10	1.34	11	14	8.5	18.7	21.3
RD-6	1	RD-100-A-ADJ (Fully Exposed)	1.26	1.89	11	14	14.8	30	32.1
Total Roof	**6**	**-**	**7.16**	**9.10**	**-**	**-**	**65.6**	**141.0**	**153.2**

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.

4.3.10 Area R2: Building B Controlled Flow Roof Drains

The post-development flow from Building B will be attenuated by three (3) Watts Adjustable flow control roof drains prior to being directed to the proposed storm service connected to Empress.

Table 4.5 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 4.5: Design Flow and Roof Drain Table

Roof Drain ID	Number of Roof Drains	Watts Roof Drain Model ID (Weir Opening)	Controlled Flow per Drain (L/s)		Approximate Ponding Depth Above Drains (cm)		Storage Volume Required (m^3)		Max. Storage Available (m^3)
			5-Yr	100-Yr	5-Yr	100-Yr	5-Yr	100-Yr	
RD-1,2, &3	3	RD-100-A-ADJ (1/2 Exposed)	0.95	1.10	11	13	17.1	38.7	55.70
Total Roof	**3**	**-**	**2.85**	**3.30**	**-**	**-**	**17.1**	**38.7**	**55.70**

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.

4.3.11 Area R3: Building C Controlled Flow Roof Drains

The post-development flow from Building C will be attenuated by four (4) Watts Adjustable flow control roof drains prior to being directed to the proposed storm service connected to Empress.

Table 4.6 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 4.6: Design Flow and Roof Drain Table

Roof Drain ID	Number of Roof Drains	Watts Roof Drain Model ID (Weir Opening)	Controlled Flow per Drain (L/s)		Approximate Ponding Depth Above Drains (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	1	RD-100-A-ADJ (1/2 Exposed)	0.95	1.10	11	14	5.7	12.9	14.8
RD-2	1	RD-100-A-ADJ (1/2 Exposed)	0.95	1.10	10	13	3.7	8.6	11.2
RD-3	1	RD-100-A-ADJ (1/2 Exposed)	0.95	1.10	10	13	3.7	8.6	11.2
RD-4	1	RD-100-A-ADJ (1/2Exposed)	0.95	1.10	11	14	5.1	11.7	13.5
Total Roof	**4**	**-**	**3.80**	**4.40**	**-**	**-**	**18.2**	**41.7**	**50.6**

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.

4.3.12 Area R4: Building D Controlled Flow Roof Drains

The post-development flow from Building D will be attenuated by three (3) Watts Adjustable flow control roof drains prior to being directed to the proposed storm service connected to Empress.

Table 4.6 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 4.6: Design Flow and Roof Drain Table

Roof Drain ID	Number of Roof Drains	Watts Roof Drain Model ID (Weir Opening)	Controlled Flow per Drain (L/s)		Approximate Ponding Depth Above Drains (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	1	RD-100-A-ADJ (1/2 Exposed)	0.95	1.10	11	14	3.9	9.1	11.2
RD-2	1	RD-100-A-ADJ (1/4 Exposed)	0.79	0.87	10	13	1.6	4.0	5.9
RD-3	1	RD-100-A-ADJ (1/2 Exposed)	0.79	0.87	10	13	1.6	4.0	5.4
Total Roof	**3**	**-**	**2.53**	**2.84**	**-**	**-**	**7.1**	**17.0**	**22.5**

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.

4.3.13 Stormwater Flow Summary

Table 4.7 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	0.044	3.8	7.7
A-2	0.113	13.2	26.3
A-3	0.034	8.9	16.9
A-4	0.065	14.5	27.8
A-5	0.063	11.6	22.3
A-6	0.206	14.7	15.1
A-7	0.358	31.0	31.7
A-8	0.505	111.7	189.5
R-1	0.304	7.16	9.1

R-2	0.089	2.9	3.3
R-3	0.103	3.8	4.4
R-4	0.046	2.5	2.8
Totals :	**1.930**	**225.6**	**356.9**

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 356.9 L/s during the 1:100-year design event, and 225.6 L/s during the 1:5-year event, both of which are less than or equal to the allowable flow for the site of 360 L/s.

The proposed storm sewer system has sufficient capacity to convey the post-development flows from the site. 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 7262-2, dated October 1, 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 300mm diameter watermain stub off Cedar Creek Drive.
- The water supply for fire protection will be provided from the two on-site fire hydrants.

- The proposed watermain system will provide adequate water supply and pressures to the proposed development.

Sanitary Servicing

- The proposed development will be serviced by an on-site sanitary sewer system connected to the existing 300mm diameter sanitary sewer stub off 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 Bank Street.

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

NOVATECH

Prepared by: Reviewed by:

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

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

APPENDIX A

Correspondence

File No.: PC2024-0331

September 9, 2024

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

Subject: **Phase 2 Pre-Consultation: Meeting Feedback**
Proposed 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 August 28, 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.

Next Steps

1. A review of the materials submitted for the above-noted pre-consultation has been undertaken and staff are satisfied that the information is consistent with previous direction provided and sufficient to move to a Phase 3 pre-consultation.

2. Please note that if your development proposal changes significantly in scope, design, or density between the Phase 2 pre-consultation review and Phase 3 pre-consultation submission, you may be required to repeat the Phase 2 pre-consultation process.

3. In your Phase 3 pre-consultation submission, please ensure that all comments detailed herein are addressed. A detailed cover letter stating how each comment has been addressed must be included with the submission materials. Please coordinate the numbering of your responses within the cover letter with the comment number(s) herein

Supporting Information and Material Requirements

1. The attached **Study and Plan Identification List** outlines the information and material that has been further identified and/or confirmed, during this phase of pre-consultation, as 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.

Overview Discussion

- The proposal has been revised to no longer include the residential buildings on the western half of the property, known municipally as 1500 Cedar Creek Drive. The Cedar Creek Drive frontage is still intended for future residential development, but it will be part of a separate site plan control application.
- The current proposal is for a shopping centre with three single-storey buildings with a total GFA of 5,416 m^2. A range of uses are proposed including a grocery store, restaurant and bank. A grocery store would anchor the site in Building A; the uses in the remaining Commercial Retail Units (CRUs) will be confirmed through leasing.
- It is the intent of the applicant to be zoning compliant and align with the Official Plan policies.
- The subject site falls within the Suburban Transect, with an Evolving Neighourhood Overlay and Mainstreet Corridor land use designation.
- The subject site falls within the Airport Vicinity Zone.

Figure 1 Proposed Subject Lands

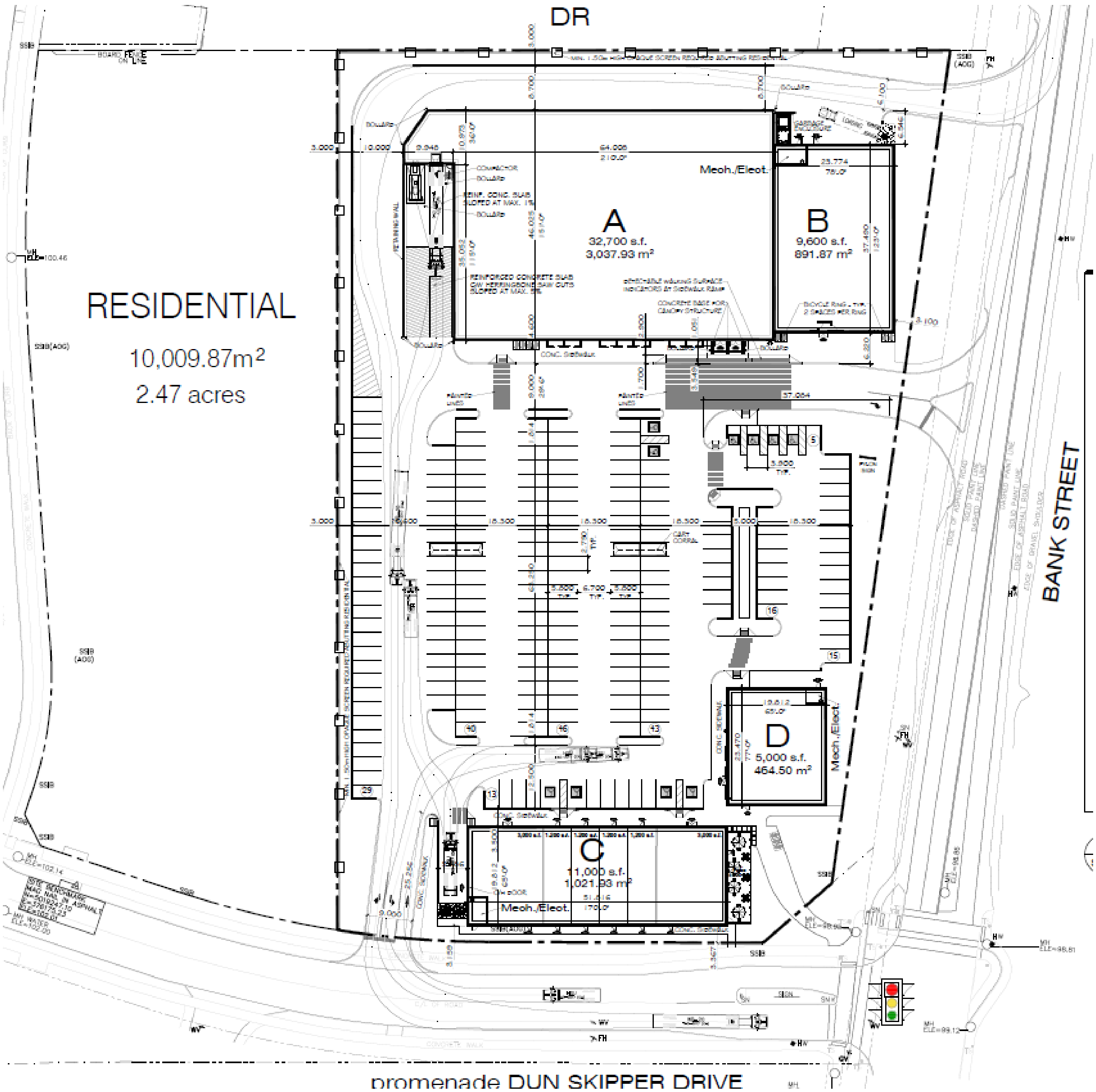


Figure 2 150 Dun Skipper Drive Proposed Site Plan (August 1, 2024)

<u>Planning – Samantha Gatchene (samantha.gatchene@ottawa.ca)</u>

Comments:

1. The subject property is also located within the Neighbourhood Overlay, Mainstreet Corridor land use designation. Mainstreet Corridors can accommodate higher density development, a greater degree of mixed-use and residential uses that integrate with a dense, mixed-use urban environment. The

maximum height along Mainstreet Corridors, within the Suburban Transect, is 9 storeys.

2. The subject property falls within the Leitrim CDP and is designated as a “mixed-use” centre with “high density residential” to the rear of the property. Under section 5.4 of the CDP, it notes that centres are located to be well connected to the residential neighbourhoods and are envisioned with street-related buildings that help to create beautiful, pedestrian friendly streets. The view of the centres shall be one of well-designed buildings, sidewalks, and pedestrian areas rich with amenities and tree lined streets, not dominated by parking.

3. The revisions to the site design are an improvement from the original proposal. The pedestrian walkway on the east side of the parking lot is appreciated along with the increased plantings and trees along the road frontages. The elimination of the proposed drive-throughs is appreciated.

4. The 1.5 metre opaque screen along the western edge of the site does not appear to be required by the zoning. It may be more appropriate to consider long-term fencing options when the lands intended for residential development on the west side (1500 Cedar Creek Drive) are developed. The purpose being to enable future connections between the properties.

5. The subject property falls within the Airport Vicinity Zone. Please contact Delroy Brown at YOW to confirm any studies or requirements: delroy.brown@yow.ca

6. The “Shopping Centre” parking provisions and minimum parking space rates at 3.6 per 100m^2 of gross leasable floor area is applicable.

7. Earth bins are proposed east of Building C, at the end of the loading space. All outdoor refuse collection and refuse loading areas contained within or accessed via a parking lot must be:

    a. Located at least 9m from a ot line abutting a public street;

    b. Located at least 3m from any other lot line; and

    c. Screened by view by an opaque screen with a minmum height of 2.0 metres

    d. Where an in-ground refuse container is provided, the screening requirement of Section (3) (c) above may be achieved with soft landscaping.

8. The Site Plan Terms of Reference must be adhered to: https://documents.ottawa.ca/sites/documents/files/site_plan_tor_en.pdf

9. It is recommended that a courtesy heads-up be provided to the local ward councillor Steve Desroches – Ward 22 Riverside South – Findlay Creek.

10. Review Urban Design Guidelines for Large-Format Retail to achieve high-quality architectural design for large-format retail buildings, a comfortable pedestrian environment and enhanced landscaping to minimize heat island effect.

Urban Design – Lisa Stern (lisa.stern@ottawa.ca)

Submission Requirements:

10. 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.

11. Additional drawings and studies are required as shown on the ASPIL. Please follow the terms of references (Planning application submission information and materials | City of Ottawa) the prepare these drawings and studies. Two separate lists as per the different proposal heights, this includes:
    a. Design Brief
    b. Site Plan
    c. Landscape Plan
    d. Elevations
    e. Floor plans (conceptual)

Comments on Preliminary Design Applicants are to provide a response to these comments in the Design Brief.

12. The following policy and guidelines apply:
    a. Leitrim CDP – Mixed Use Centre
    b. Large Format Retail Guidelines
    c. Bird Friendly Design Guidelines

13. 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.

14. Consider providing public access through the site from Pingwi Place to Bank, as this will be a desire line for residents.

15. Removal of drive throughs and relocation of loading is appreciated.

16. Please provide CRU entrances on Bank Street. Please ensure that buildings are well glazed to provide active frontages. Blank walls are not appropriate.

17. Provide continuous walkway connections from parking and buildings to the ROW.

18. Please consider increasing the length of building wall along Bank Street – would there be opportunity to swap building C and D?

19. Please consider additional locations for tree plantings. Please consider providing a wider landscape buffer along the west property line to accommodate tree planting.

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

Engineering – Tyler Cassidy (tyler.cassidy@ottawa.ca)

Comments:

20. 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.

21. Available Services:

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

        i. 900mm concrete storm sewer

        ii. 300mm concrete sanitary sewer

        iii. 254mm PVC watermain

    b. These services are available to the proposed site through easements. Separate connections to the Cedar Creek Drive municipal services will also be permitted. Note the developer will be responsible to cap and abandon the existing service stubs if they are not used.

22. 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:

a. Location of service

b. Type of development and the amount of fire flow required (as per FUS).

c. Average daily demand: l/s.

d. Maximum daily demand: l/s.

e. Maximum hourly daily demand: l/s.

A twin connection to the watermain on Cedar Creek Drive may be required if basic day demands exceed 50m3/day.

A DMA (W3.1) chamber, or a fireline water meter, may be required (input from the Water Operations Engineer is forthcoming – to be provided after initial review).

23. An MECP Environmental Compliance Approval for Municipal/Private Sewage Works will be required for the proposed development. Please contact the Ministry of the Environment, Conservation and Parks, Ottawa District Office to arrange a pre- submission consultation:

    a. Charlie Primeau at (613) 521-3450, ext. 251 or Charlie.Primeau@ontario.ca

    b. An ECA will only be required if there are different owners for the Cedar Creek properties and the subject property.

24. Stormwater

    a. As referenced above, SWM criteria should 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).

    b. Quality control is provided downstream by the Findlay Creek Village Stormwater Facility.

    c. Emergency overland flow is to be directed to Bank Street (per Design Brief).

    d. Area-Specific stormwater development charge applies to this development.

25. Sanitary:

    a. Total flow of 3.46 L/s calculated from Design Brief.

b. Monitoring maintenance hole is required

26. Background studies

    c. 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., Infrastructure Project Manager, for follow-up questions.

Noise

Comments:

27. The applicant was informed that it is best practice to review roadway noise for the proposed land use and has elected not to submit a noise study. No further comments.

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

Transportation – Josiane Gervais (josiane.gervais@ottawa.ca)

List of Studies and Plans Reviewed:

- **TIA Scoping Report**, prepared by Novatech, dated August 2024.

Comments:

Note the following comments were provided to Novatech on August 16, 2024 via email.

Transportation Engineering Services

28. Section 1.2 Proposed Development: Provide more information, if known, on the development plans for the residential lands located on the west side of the property in Appendix A.

29. Section 2.4.1 Trip Generation: Please note Land Use Code 850 is Supermarket. The Land Use Code for Shopping Center (with Yes supermarket sub-category) is 821. Please clarify which land use code is used and update Table 4.

30. Section 2.5 Access Design:

    e. Regarding the proposed access locations, consider the following:

        i. Bank Street is a designated Mainstreet Corridor (per Schedule B7) in the study area, and therefore Policy 6.2.1 4) b) applies, which states that for “development of lands with frontage on both a

Corridor and a parallel street or side street… vehicular access shall generally be provided from the parallel street or side street".

ii. Bank Street also includes existing and planned cycling facilities, and therefore Policy 4.1.2 4) applies, which states that "development of land abutting an existing or planned cycling facility… will be designed to minimize vehicle access across the cycling facility in order to reduce potential conflict points, such as by providing vehicular access to parking and service areas from side streets or rear lanes."

f. Therefore, the provision of two accesses on the Bank Street frontage are not supported, and TES does not recommend relief from Section 25(m)(i) of the Private Approach By-law. Modify the site plan to reduce the number of Bank Street accesses to a maximum of one, preferably zero. To replace the Bank Street access(es), consider an access through the reserved residential lands to/from Cedar Creek Drive.

g. Clear throat length is measured from the ends of the driveway curb return radii at the roadway to the point of first conflict on-site. The measurement shown on the preliminary site plan considers the point of first conflict to be the first on-site drive aisle. However, the point of first conflict should be considered the wide crosswalk to/from the supermarket main entrance. Please correct measurement.

h. Measure the clear throat length of the loading access and discuss its acceptability.

i. Any remaining Bank Street access will need to assess the need for an auxiliary southbound right-turn lane for deceleration and storage on Bank Street.

j. Assess the need for auxiliary turn lanes at the Dun Skipper Drive access.

31. Other Preliminary Site Plan Comments:

k. For enhanced pedestrian access from the community, provide a pedestrian connection through the reserved residential lands to/from Cedar Creek Drive.

l. Straighten (i.e. make perpendicular to the drive aisle) the north-south crosswalk on the north side of Building D.

m. Provide additional pedestrian connections between the south side of Building C and the Dun Skipper Drive sidewalk.

Traffic Engineering

32. No comments.

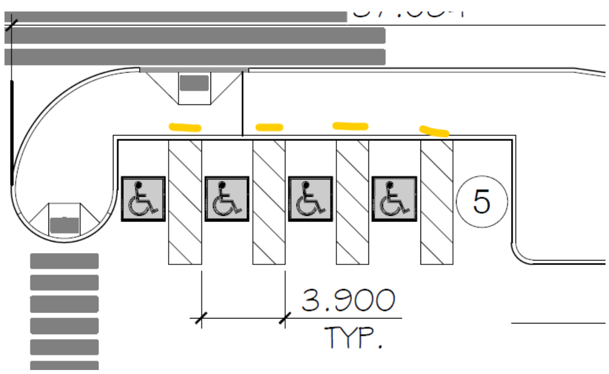
Transit Services

33. Comments were not provided.

Transportation Project Manager

34. Section 2.2.1: With the opening of O-Train Line 2 & 4, note OC Transpo will be revising it's overall transit service, the details can be found on the New Ways to Bus webpage.

35. Site Plan: Ensure TWSIs and curb returns are provided at the end of the access aisles noted in yellow below, as per AODA.



36. The following modules are to be included within the Strategy Report:

Module	Criteria	**Inclusion**
Design Review Component		
4.1.1: Development for Sustainable Modes	All	Yes
4.1.2: Circulation and Access	All	Yes
4.1.3: New Street Networks	Subdivisions Only	No
4.2.1: Parking Supply	All	Yes
4.2.2: Spillover	Module deleted	No
4.3: Boundary Street Design	All	Yes
4.5.1: Context for TDM	All	Yes
4.5.2: Need and Opportunity	All	Yes
4.5.3: TDM Program	All	Yes
3.2: Background Network Travel Demands	> 75 auto and/or transit trips	Yes
3.3: Demand Rationalization	> 75 auto trips	Yes
Network Impact Component		
4.6: Neighborhood Traffic Calming	Reference criteria	No
4.7.1: Transit Route Capacity	> 75 transit trips	No
4.7.2: Transit Priority Requirements	> 75 auto trips	Yes
4.8: Network Concept	> 200 person trips	No
4.9.1: Intersection Controls & 4.4.2: Access Control)	> 75 auto trips	Yes
4.9.2: Intersection Design & 4.4.3: Access Design	> 75 auto trips	Yes

37. Please address the above comments within the next submission and proceed to the Strategy Report. 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. The Strategy Report must be submitted with the formal submission to deem complete.

New comments, following pre-consultation meeting held August 28, 2024.

38. On Site Plan, show dimensions for site elements, i.e. lane/aisle widths, access width and throat length, parking stalls, sidewalks, pedestrian pathways, etc.

39. No funding has been identified for widening Bank Street south of Blais Road. The timeline will be identified in the TMP update scheduled for 2025. The need for a southbound right turn lane should be assessed as part of the Strategy Report. If warrants are met, the applicant team is encouraged to initiate a discussion with the City prior to undertaking design work as the work would ultimately become throw-away.

40. Staff continue to encourage the applicant to reduce the number of accesses on Bank Street. Consideration can be given to modifying the access at the rear of the site to accommodate all vehicular traffic so that heavy vehicles and pedestrian movements do not conflict.

41. Show turning movements of WB-20 from Dun Skipper onto Bank Street.

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

Environment – Mark Elliot (mark.elliot@ottawa.ca)

Comments:

42. The potential presence of species-at-risk Butternut trees along the northern property line would trigger the need for an Environmental Impact Statement (EIS). However, as these trees are the only natural feature of concern, and a Tree Conservation Report (TCR) has been requested by Forestry (see below), the TCR can be accepted as a substitute for the EIS so long as it specifically addresses whether or not Butternut are present and is completed by a certified Butternut Health Assessor.

    Please note that Butternut are *expected* to be in this area. Butternuts have been identified for this site in the Remer Idone Lands Environmental Management Plan (EMP). The field work that found these trees is more than 10 years old at this point, but it is likely that some of those trees remain on site.

    Aside from the abovementioned Butternut, there do not appear to be any other issues that need to be flagged from the Remer Idone EMP, but the applicant is encouraged to review that document and ensure that this application meets the requirements within.

43. Any commerical development (aside from small restaurants) and all mid-rise or higher residential buildings will be required to adhere to the recommendations of the City's Bird Safe Design Guidelines.

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

45. This site is in the Airport Bird Hazard zone, which affects the type of trees that should be planted. A list of plant species to avoid will be provided.

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

Forestry – Hayley Murray (hayley.murray@ottawa.ca)

Comments:

46. The Landscape Plan (LP) must align with the Terms of Reference. The LP must also be prepared in conjunction with the Geotechnical Report. Include a note on the LP confirming this.

47. Submit a Tree Conservation Report aligning with Schedule E of the Tree Protection By-law.

48. The Tree Conservation Report must account for all protected trees with critical root zones extending into the development site. Provide an adequate tree retention plan for all healthy boundary and adjacently owned trees. Removal of a boundary or adjacently owned tree would require written permission from the adjacent property owner.

49. Increase tree cover on site to reduce the urban heat island effect (Section 2.2.3 of the Official Plan) and contribute to the 40% canopy cover target (Section 4.8.2. of the Official Plan). Section 4.1.4 of the Official Plan provides direction on surface parking lots. Policy 11 notes landscaping requirements shall be in addition to landscaping requirements in the right of way and around the perimeter of parking lots. Include regular spacing of tree islands that support the growth of mature shade trees. The current conceptual plan lacks future shade trees.

50. It's not recommended species are grouped in rows to prevent mortality gaps if for example disease or pest outbreaks occur. Please intermix species.

51. If these setbacks are feasible, please push trees either onto the property boundary or into the City Right of Way:

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

o. Maintain 2.5m from curb

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

q. 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.

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

52. Incorporate large canopy native species wherever possible. Prioritize street trees meeting this description, particularly where overhead wires are not present on Dun Skipper.

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

Other

1. 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. Please be advised that this is expected to occur in Q3 2024.

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

Submission Requirements and Fees

1. A Site Plan Control – Complex application is 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.

We look forward to further discussing your project with you.

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

Yours Truly,
Samantha Gatchene, MCIP, RPP

Encl. Study and Plan Identification List
Urban Design Brief Terms of Reference
Airport Bird Hazard Plant List

c.c. Tyler Cassidy, IPM
Josiane Gervais, TPM
Lisa Stern, Urban Design
Mark Elliott, Environment
Hayley Murray, Forestry

APPLICANT'S STUDY AND PLAN IDENTIFICATION LIST

Proposed Site Plan Control (Complex) Application – 150 Dun Skipper Drive – PC2024-0331

Legend: **R** = Required, the study or plan is required with application submission
A = Advised, the study or plan is advised to evaluate the application or satisfy a condition of approval/draft approval
1 - OPA, **2** - ZBA, **3** - Plan of Subdivision, **4** - Plan of Condominium, **5** - SPC

Core studies required for certain applications all the time (Remaining studies are site specific)

For information and guidance on preparing required studies and plans refer here:

ENGINEERING

R	A	Study/ Plan Name	Description	When Required 1	2	3	4	5	Applicable Study Components & Other Comments
☒	☐	1. Environmental Site Assessment (Phase 1 & Phase 2)	Ensures development only takes place on sites where the environmental conditions are suitable for the proposed use	☒	☒	☒	☒	☒	Record of Site Condition Yes ☐ No ☐
				Study Trigger Details: All cases					
☒	☐	2. Geotechnical Study	Geotechnical design requirements for the subsurface conditions	☒	☒	☒	☒	☒	
				Study Trigger Details: All cases					
☒	☐	3. Grading and Drainage Plan	Grading relationships between connecting (or abutting) properties and surface runoff control	☐	☐	☒	☐	☒	
				Study Trigger Details: All cases					
☐	☒	4. Hydrogeological and Terrain Analysis	A scientific study or evaluation that includes a description of the ground and surface hydrology, geology, terrain, affected landform and its susceptibility	☐	☐	☒	☒	☒	Reasonable Use Study Yes ☐ No ☐ Groundwater Impact Study Yes ☐ No ☐
				Study Trigger Details: When developing on private services or when urban development is in close proximity to existing private serviced development					
☐	☒	5. Noise Control Study	Potential impacts of noise on a development	☒	☒	☒	☒	☒	Vibration Study Yes ☐ No ☐
				Study Trigger Details: See Terms of Reference for full details.					

☐	☐	6. Rail Proximity Study	Development on land adjacent to all Protected Transportation Corridors and facilities shown on Schedule C2 of the Official Plan, to follow rail safety and risk mitigation best practices	☐	☒	☒	☒	☒	Rail Safety Report Yes ☐ No ☐ O-Train Network Proximity Study Yes ☐ No ☐
				Study Trigger Details: Within the Development Zone of Influence for existing and future rapid transit stations and corridors, as shown on Annex 2 of the OP OR on land adjacent to all Protected Transportation Corridors and facilities shown on Schedule C2 of the Official Plan					
☒	☐	7. Site Servicing Study	Provides servicing details based on proposed scale of development with an engineering overview taking into consideration surrounding developments and connections.	☐	☒	☒	☒	☒	Fluvial Geomorphological Report Yes ☐ No ☒ Assessment of Adequacy of Public Services Yes ☐ No ☒ Servicing Options Report Yes ☐ No ☒ Erosion and Sediment Control Plan / Brief Yes ☒ No ☐ Hydraulic Water Main Analysis Yes ☐ No ☒ Stormwater Management Report and Detailed Design Brief Yes ☒ No ☐
				Study Trigger Details: All cases					
☐	☐	8. Slope Stability Study	Assessment of slope stability and measures to provide safe set-back.	☐	☒	☒	☒	☒	Retrogressive Landslide Analysis Yes ☐ No ☐
				Study Trigger Details: Where the potential for Hazard Lands exists on a site.					
☒	☐	9. Transportation Impact Assessment	Identify on and off-site measures to align a development with City transportation objectives.	☐	☒	☒	☒	☒	Roadway Modification Functional Design Yes ☐ No ☐
				Study Trigger Details: If the development generates 60 person-trips or more; or if the development is located in a Location Trigger; or if the development has a Safety Trigger.					

☐	☐	10. Water Budget Assessment	Identify impact of land use changes on the hydrologic cycle and post-development mitigation targets.	☐	☒	☒	☒	☒	
				<u>Study Trigger Details</u>: May be required for site plan control applications for sites with private servicing and / or proximity to hydrogeologically-sensitive areas. Draft plans of subdivision are required to integrate water budget assessments into supporting stormwater management plans and analysis for the study area.					
☐	☐	11. Wellhead Protection Study	Delineate a Wellhead Protection Area (WHPA) and characterize vulnerability for new communal residential drinking water well systems, in accordance with Technical Rules under *Clean Water Act.*	☐	☒	☒	☒	☒	
				<u>Study Trigger Details</u>: Required for all new communal residential drinking water well systems; including new municipal wells, new private communal wells (small water works) that require a Municipal Responsibility Agreement (MRA), expansions or increased water takings from an existing municipal well or existing private communal well and new private communal wells.					

PLANNING									
R	A	Study/Plan Name	Description	When Required					Applicable Study Components & Other Comments
				1	2	3	4	5	
☐	☐	12. Agrology and Soil Capability Study	Confirm or recommend alterations to mapping of agricultural lands in the City.	☒	☐	☐	☐	☐	
				Study Trigger Details: For the expansion of a settlement area or identification of a new settlement area through a comprehensive review; or where it is demonstrated that the land does not meet the requirements for an Agricultural Resource Area.					
☒	☐	13. Archaeological Assessment	Discover any archaeological resources on site, evaluate cultural heritage value and conservation strategies	☒	☒	☒	☒	☒	
				Study Trigger Details: When the land has either: a known archaeological site; or the potential to have archaeological sites; or where the City's Archaeological Resource Potential Mapping Study indicates archaeological potential, outside of the historic core; or upon discovery of any archaeological resource during construction in the City's historic core area.					
☒	☐	14. Building Elevations	Visual of proposed development to understand facing of building including direction of sunlight, height, doors, and windows.	☒	☒	☐	☐	☒	
				Study Trigger Details: Site Plan: for residential buildings with 25 or more residential units; or for residential buildings with less than 25 residential units, if the units are within the Urban area or the High-performance Development Standard threshold in the rural area. Official Plan or Zoning By-law: if staff deem it necessary to determine compliance with OP policies, the Zoning By-law or City of Ottawa Urban Design Guidelines.					

☐	☐	15. Heritage Impact Assessment	Determine impacts of proposed development on cultural heritage resources.	☒	☒	☒	☒	☒	Conservation Plan Yes ☐ No ☐
				Study Trigger Details: Where development or an application under the Ontario Heritage Act is proposed on, adjacent to, across the street from or within 30 metres of a protected heritage property; or for any development adjacent to the Rideau Canal UNESCO World Heritage Site and its landscaped buffer.					
☐	☐	16. Heritage Act Acknowledgement Report	A submission requirement to demonstrate that the *Ontario Heritage Act* requirements have been satisfied, to ensure that multiple applications are considered currently.	☐	☒	☒	☒	☒	Heritage Permit Application Yes ☐ No ☐ Notice of Intent to Demolish Yes ☐ No ☐
				Study Trigger Details: Where the subject property is listed on the Heritage Register and the applicant must submit a Heritage Permit Application (designated heritage property listed on the Heritage Register) or provide notice of intent to demolish or remove a building (non-designated property listed on the Heritage Register).					
☐	☐	17. Impact Assessment Study – Mineral Aggregate	Mineral aggregate extraction activities; and to protect known high quality mineral aggregate resources from development and activities that would preclude or hinder their existence (ability to be extracted) or expansion.	☒	☒	☒	☒	☒	
				Study Trigger Details: New Development within 500 metres of lands within the Bedrock Overlay , or within 300 metres of lands within the Sand and Gravel Resource Area Overlay.					
☐	☐	18. Impact Assessment Study – Mining Hazards	To identify or confirm known mineral deposits or petroleum resources and significant areas of mineral potential. To protect mineral and petroleum resources from development and activities which would preclude or hinder the establishment of new operations or access to the resources.	☒	☒	☒	☒	☒	
				Study Trigger Details: For all applications in proximity to mining operations.					

☐	☐	19. Impact Assessment Study – Waste Disposal Sites / Former Landfill Sites	To identify or confirm known proximity of existing or former waste disposal sites. To ensure issues of public health, public safety and environmental impact are addressed.	☒	☒	☒	☒	☒	
				Study Trigger Details: For the establishment of any new Solid Waste Disposal Site or for a footprint expansion of an operating Solid Waste Disposal Site; or development within three kilometers of an operating or non-operating Waste Disposal Site.					
☒	☐	20. Landscape Plan	A plan to demonstrate how the canopy cover, urban design, health, and climate change objectives of Official Plan will be met through tree planting and other site design elements.	☒	☒	☒	☒	☒	
				Study Trigger Details: Site Plan, Plan of Subdivision, and Plan of Condominium: always required, except where it is demonstrated that the landscape component of a project is not relevant to the review of the application. A high-level conceptual Landscape Plan may be required to support Zoning By-law and Official Plan Amendment applications.					
☐	☐	21. Mature Neighbourhood Streetscape Character Analysis	In the Mature Neighbourhoods a Streetscape Character Analysis is required to determine the applicable zoning requirements.	☐	☒	☐	☐	☐	
				Study Trigger Details: Zoning By-law amendment application in areas covered by the Mature Neighbourhoods zoning overlay for applications of residential development of four storeys or less located in a R1, R2, R3, or R4 zone.					
☐	☐	22. Minimum Distance Separation	Provincial land use planning tool that determines setback distances between livestock barns, manure storages or anaerobic digesters and surrounding land uses, with the objective of minimizing land use conflicts and nuisance complaints related to odour.	☒	☒	☒	☒	☒	
				Study Trigger Details: Applications in the Rural Area, outside of a village.					

☐	☐	23. Parking Plan	A tool to assess the sufficiency of on-street parking in plans of subdivision.	☐	☐	☒	☒	☐	
				Study Trigger Details: For new or revised plans of subdivision with public streets.					
☒	☐	24. Plan of Survey	A Plan of Survey depicts legal boundaries and is a specialized map of a parcel of land and it delineates boundary locations, building locations, physical features and other items of spatial importance.	☒	☒	☒	☒	☒	
				Study Trigger Details: Required for all *Planning Act* applications.					
☐	☐	25. Plan of Subdivision	Proposed subdivision layout to be used for application approval	☐	☒	☒	☐	☐	
				Study Trigger Details: Always required with the submission of plan of subdivision application. Only required with a Zoning By-law Amendment application, where such ZBLA is in response to enable a subdivision.					
☐	☐	26. Plan of Condominium	Proposed condominium layout to be used for application approval	☐	☐	☐	☒	☐	
				Study Trigger Details: With the submission of plan of condominium application.					
☐	☐	27. Planning Rationale	Provides the planning justification in support of the *Planning Act* application and to assist staff and the public in the review of the proposal.	☒	☒	☒	☐	☐	Integrated Environmental Review Summary Yes ☐ No ☐
				Study Trigger Details: For all Official Plan amendment, Zoning By-law amendment, or plan of subdivision applications.					
☒	☐	28. Preliminary Construction Management Plan	A checklist that shows a development proposal's anticipated impacts to all modes of transportation and all elements in the right of way during construction.	☐	☐	☒	☐	☒	
				Study Trigger Details: For all Site Plan and plan of subdivision applications.					

☐	☐	29. Public Consultation Strategy	Proposal to reach and collect public input as part of development application.	☒	☒	☒	☒	☒	
				Study Trigger Details: Official Plan Amendment, Zoning By-law Amendment and Subdivision: Always required. Condominium: Vacant Land only Site Plan: At the discretion of the City's file lead in consultation with the Business and Technical Support Services Manager.					
☐	☐	30. Shadow Analysis	A visual model of how the proposed development will cast its shadow.	☐	☒	☐	☐	☐	
				Study Trigger Details: When there is an increase in height or massing proposed for a residential, commercial or office use. Two triggers: 1. Inside the Greenbelt: proposed development is over 5 storeys in height (≤15 meters). If a development proposal is 5 storeys or less, but is proposing an increase in height and/or massing and is in close proximity to a shadow sensitive area, a shadow analysis may be requested. 2. Outside the Greenbelt: proposed development is over 3 storeys in height (≤9 meters) and is in close proximity to a shadow sensitive area. Where a proposed development is not in close proximity to a shadow sensitive area (e.g. industrial development) the trigger for a shadow analysis is over 5 storeys in height (≤15 meters).					
☒	☐	31. Site Plan	A Site Plan is a visual drawing that illustrates the proposed development of a site in two dimensions.	☒	☒	☒	☒	☒	Site Plan Yes ☐ No ☐ Concept Plan – for Yes ☐ No ☐
				Study Trigger Details: Site Plan: All Other applications: where a layout of the					

				public realm, building massing, heights, densities or massing of the proposal provides changes to the planned context; sites proposing multiple land uses; sites with multiple landowners; sites with two or more buildings, on-site park dedication, and/or a new public or private street(s); sites with proposed changes to connectivity (such as active transportation networks, vehicular circulation or access to transit); sites where the development potential on adjacent properties may be impacted by or could be integrated into the proposed site.	Facility Fit Plan Yes ☐ No ☐ A composite site plan is also required for the entire mixed-use area, including the planned residential lands along Cedar Creek Drive.
☒	☐	32. Urban Design Brief	Illustrate how a development proposal represents high-quality and context sensitive design that implements policies of the Official Plan, relevant secondary plans, and Council approved plans and guidelines.	☒ ☒ ☒ ☐ ☒ Study Trigger Details: For all Official Plan amendment, Zoning By-law amendment, and plan of subdivision applications. For SPC applications: proposals for residential buildings with 25 or more residential units, or for proposals for residential buildings with less than 25 residential units, if the units are within the Urban area or the High-performance Development Standard threshold in the rural area where OP Policy 11.3 (3) is relevant; for non-residential and mixed-use proposals.	
☐	☐	33. Urban Design Review Panel Report	Demonstrates that a development proposal has attended an Urban Design Review Panel formal review meeting, received, and responded to the associated recommendations, if applicable	☒ ☒ ☒ ☒ ☒ Study Trigger Details: Required for all planning act applications subject to UDRP review, in accordance with the UDRP Panel Terms of Reference.	
☐	☐	34. Wind Analysis	A visual model and a written evaluation of how a proposed development will impact pedestrian-level wind conditions.	☐ ☒ ☐ ☐ ☒ Study Trigger Details: Applications seeking an increase in height and/or massing which is either: a tall building(s), 10 storeys or more or a proposed building that is more than twice the height of	

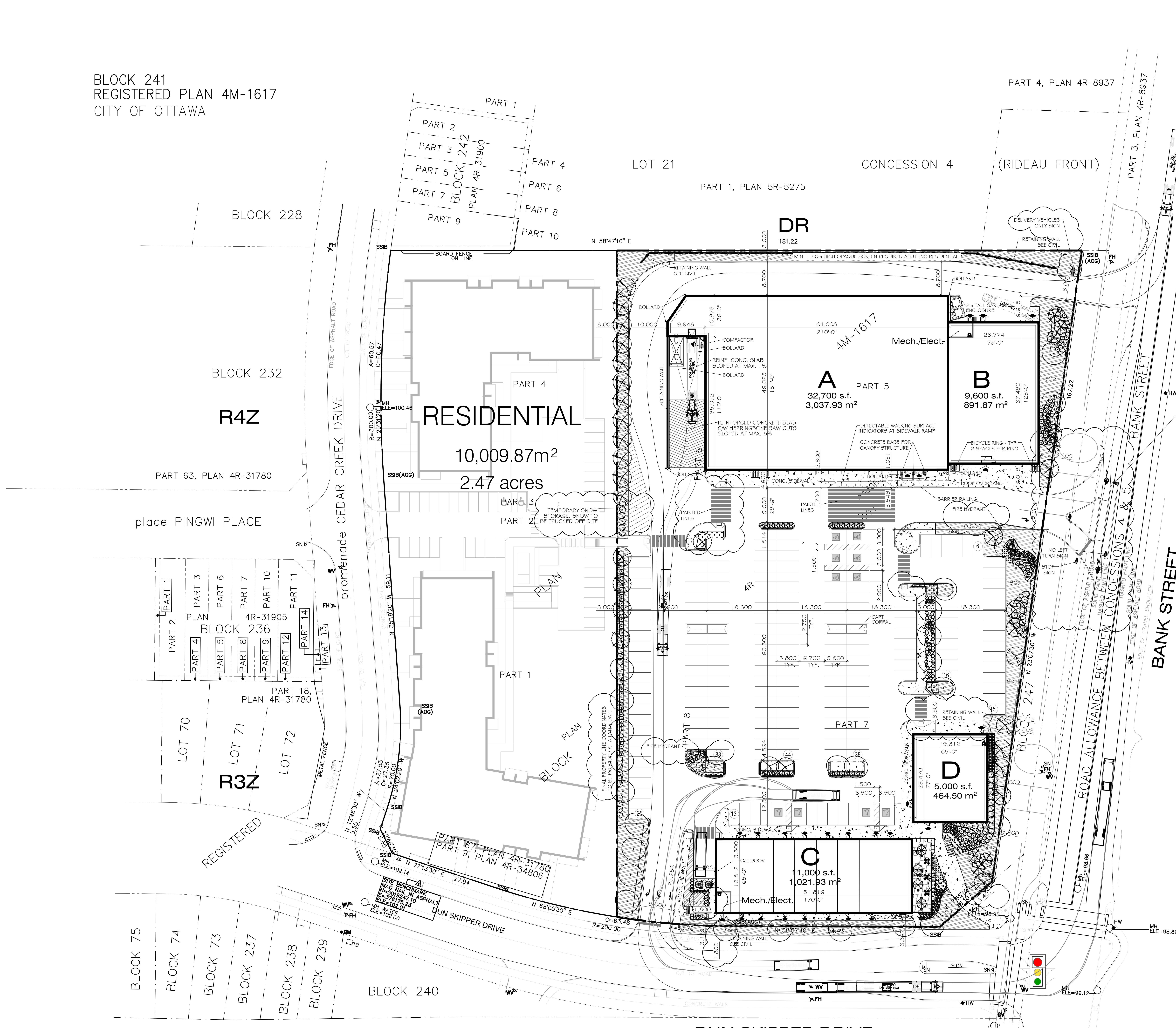
				adjacent existing buildings and is greater than five storeys in height and is adjacent to existing or planned low rise development, open spaces, water bodies and large public amenity areas.					
☒	☐	35. Zoning Confirmation Report	The purpose of the Zoning Confirmation Report (ZCR) is to identify all zoning compliance issues, if any, at the outset of a planning application.	☐	☒	☐	☐	☒	
				Study Trigger Details: Required for all SPC and ZBLA applications.					

ENVIRONMENTAL									
R	**A**	**Study / Plan Name**	**Description**	**When Required**					**Applicable Study Components & Other Comments**
				1	**2**	**3**	**4**	**5**	
☐	☐	36. Community Energy Plan	Includes a community energy analysis, alongside mitigation measures, and other associated information. The community energy analysis refers to the overall assessment process to identify on and off-site measures to align the design of the development with City climate objectives.	☐	☐	☐	☐	☐	
				NOT IMPLEMENTED & NOT REQUIRED					
☐	☐	37. Energy Modelling Report	The Energy Modeling Report is a Site Plan Control application submission requirement to show how climate change mitigation, and energy objectives will be met through exterior building design elements.	☐	☐	☐	☐	☐	
				NOT IMPLEMENTED & NOT REQUIRED					
☐	☐	38. Environmental Impact Study	Assessment of environmental impacts of a project and documents the existing natural features, identifies the potential environmental impacts,	☒	☒	☒	☐	☒	Assessment of Landform Features Yes ☐ No ☐ Integrated Environmental Review Yes ☐ No ☐
				Study Trigger Details: Is required when development or site alteration is proposed in or within a					

			recommends ways to avoid and reduce the negative impacts, and proposes ways to enhance natural features and functions.	specified distance of environmentally designated lands, natural heritage features, the City's Natural Heritage System, or hazardous forest types for wildland fire. The EIS Decision Tool (Appendix 2 of the Environmental Impact Study Guidelines) provides a checklist of the natural heritage features and adjacent areas within which an EIS is required to support development applications under the *Planning Act.*	Protocol for Wildlife Protection during Construction Yes ☐ No ☐ Significant Woodlands Guidelines for Identification, Evaluation, and Impact Assessment Yes ☐ No ☐
☐	☐	39. Environmental Management Plan	A comprehensive environmental planning document that identifies, evaluates, and mitigates the potential impacts of proposed development on the natural environment and its ecological functions at local planning stage.	☒ ☐ ☐ ☐ ☐ Study Trigger Details: Official Plan amendments for local plans (area-specific policy or secondary plan, where: there is significant change in the conditions upon which the original study was based; there are proposed changes to planned infrastructure needed to service a subdivision that would have a significant impact on the infrastructure needs of another subdivision within the EMP study area, or the applicable Class Environmental Assessment approval has expired.	
☐	☐	40. High-performance Development Standard	A collection of voluntary and required standards that raise performance of new building projects to achieve sustainable and resilient design	☐ ☐ ☐ ☐ ☐ NOT IMPLEMENTED & NOT REQUIRED	
☒	☐	41. Tree Conservation Report	Demonstrates how tree cover will be retained and protected on the site, including mature trees, stands of trees, and hedgerows.	☐ ☐ ☒ ☒ ☒ Study Trigger Details: Where there is a tree of 10 centimeters in diameter or greater on the site and/or if there is a tree on an adjacent site that has a Critical Root Zone (CRZ) extending onto the development site.	Adjacently owned trees must be protected. Address the protection measures in this plan. Required to address whether or not Butternut trees are present and is completed by a certified Butternut Health Assessor.

APPENDIX B

Site Plan



1 SITE PLAN
A1.1 1:500

SCALE 1 : 500

ZONE : GM General Mixed Use Zone

TOTAL SITE AREA	19,272.67 m^2	4.76 acres
ZONING MECHANISMS	**REQUIRED**	**PROVIDED**
Minimum Lot Area	No minimum	21,185.50 m^2
Minimum Lot Width	No minimum	109.30 metres
Min. Front Yard & Corner Yard setbacks	3.0m	3.0 metres
Minimum Interior Side Yard setback	5.0m from Res.	16.1 metres
Minimum Interior Side Yard setback	No minimum	N/A
Minimum Rear Yard Setback	7.50m from Res.	11.22 metres
Minimum Rear Yard Setback	3.0m abutting street	N/A
Minimum Rear Yard Setback	No minimum	N/A
Maximum Building Height	18.0m	11.50 metres
Maximum Floor Space Index	2	0.28
Minimum Width of Landscaped Area	3.0m	3.00 metres
Landscape % of Parking Area	N/A	18.3%
Parking Area		9,127.8 m^2
Landscape Area		1,669.4 m^2
Min. Parking Lot Landscaping	3.0m	3.00 metres

BUILDING	FLOOR AREA $ft.^2$	FLOOR AREA m^2	GLFA m^2
A	32,700	3,037.93	2,886.03
B	9,600	891.87	847.28
C	11,000	1,021.93	970.84
D	5,000	464.52	441.29
TOTAL	58,300	5,416.25	5,145.43

PARKING MINIMUM	REQUIRED	PROVIDED
3.60 spaces / 100 m^2 Gross Leasable Floor Area	185 spaces	195 spaces 3.6 spaces / 1,000 s.f.

ACCESSIBLE PARKING
16 spaces provided

REQUIRED PARKING SPACE : 2.60m x 5.20m, 6.70m AISLE

BARRIER FREE SPACE MIN. : 3.90m x 5.20m

FIRE ROUTE : 6.0m WIDE, MIN. 12.0m ℄ RADIUS

LOADING	REQUIRED	PROVIDED
4.30m x 13.0m & 3.50m x 9.0m 5,000-9,999m^2 GFA	1+1 spaces	3 spaces

BICYCLE PARKING	REQUIRED	PROVIDED
0.6m x 1.80m 1 space / 250m GFA²	22 spaces	24 space

2 SITE STATISTICS
A1.1 N.T.S.

IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO:

- CHECK AND VERIFY ALL DIMENSIONS ON SITE;
- REPORT ALL ERRORS AND/OR OMISSIONS TO GREYSTONE ARCHITECTURAL PARTNERS BEFORE CONTINUING WITH ANY WORK.

THESE DRAWINGS MAY NOT BE USED FOR CONSTRUCTION UNLESS NOTED OTHERWISE

THESE DRAWINGS ARE NOT TO BE SCALED.ERRORS MADE BY PERSONS SCALING THESE DRAWINGS SHALL NOT BE THE RESPONSIBILITY OF GREYSTONE ARCHITECTURAL PARTNERS

THESE DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL OTHER RELATED DOCUMENTS.

PROJECT NORTH

Greystone

Cambridge
154 King Street East
Cambridge, Ontario N3H 3M4
(519) 896-1010 ext.100

Toronto
522 Mount Pleasant Rd
Suite 200
Toronto, Ontario M4S 2M3
(416) 440-0058

REV.	DESCRIPTION	DATE
4	SPA SECOND SUBMISSION	2025.01.09
3	FOR CONSULTANT COORD	2025.01.02
2	FOR CONSULTANT COORD	2024.12.18
1	ISSUED FOR SPA	2024.10.24

REVISION ISSUED APPROVAL

PROJECT FOR:
MAVERICK DEVELOPMENT CORPORATION

PROJECT:
NEW BUILD

FINDLAY CREEK
DUN SKIPPER & BANK STREET
OTTAWA, ONTARIO

DRAWING:
SITE PLAN

DRAWN:	CHECKED:	JOB NUMBER:
N.B.	S.R.	24422

DATE (YYYY/MM/DD):	SCALE:
2025.01.10	1:500

DRAWING NUMBER:	REVISION NUMBER:
A1.1	R0

APPENDIX C

Water Demands, FUS Calculations, Boundary Conditions

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** $F = 220\ C\ (A)^{0.5}$				**11,000**
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 (m²)	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 (m²)	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

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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 (m²)	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

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Miro Savic

From: Paul Paglialunga <paul@maverickdevelopments.com>
Sent: Friday, June 14, 2024 12:14 PM
To: Miro Savic
Cc: Lee Sheets
Subject: RE: 150 Dun Skipper - FUS Building Construction Details

Miro,

Please see below

Thank you,

Paul Paglialunga

From: Miro Savic <m.savic@novatech-eng.com>
Sent: Friday, June 14, 2024 12:06 PM
To: Paul Paglialunga <paul@maverickdevelopments.com>
Cc: Lee Sheets <l.sheets@novatech-eng.com>
Subject: 150 Dun Skipper - FUS Building Construction Details

Paul,

I'm preparing the Fire Underwriters Survey (FUS) fire flow calculations for the proposed development and would like you to confirm some building construction details for each building (A, B, C, and D).

- Will the building structure be non-combustible (unprotected concrete/steel), or fire-resistive? Non-combustible
- If fire resistive, what will it be rated to? (ie 2 hours)
- Will the building be sprinklered? Bldgs A, B & C will be sprinklered.
- Building use/occupancy Bldg A Grocery, Bldg B Retail, Bldg C Retail & QSR, Bldg D Bank

Thank you,

Miroslav Savic, P.Eng., Senior Project Manager | Land Development Engineering
NOVATECH
Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 x 265

150 DUN SKIPPER DRIVE
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
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
WATER DEMAND

Daily Demands Per OBC Table 8.2.1.3. B

<u>Retail Store (Building C):</u>		
Daily Volume per 1.0 m^2 of floor space	5	L/day
<u>Quick Service Restaurants (Builidng C):</u>		
Daily Volume per seat	125	L/day
<u>Dental Office (Building C):</u>		
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
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

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** $F = 220\ C\ (A)^{0.5}$				**14,000**
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

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	2.7	

BUILDING 2 NUMBER OF UNITS

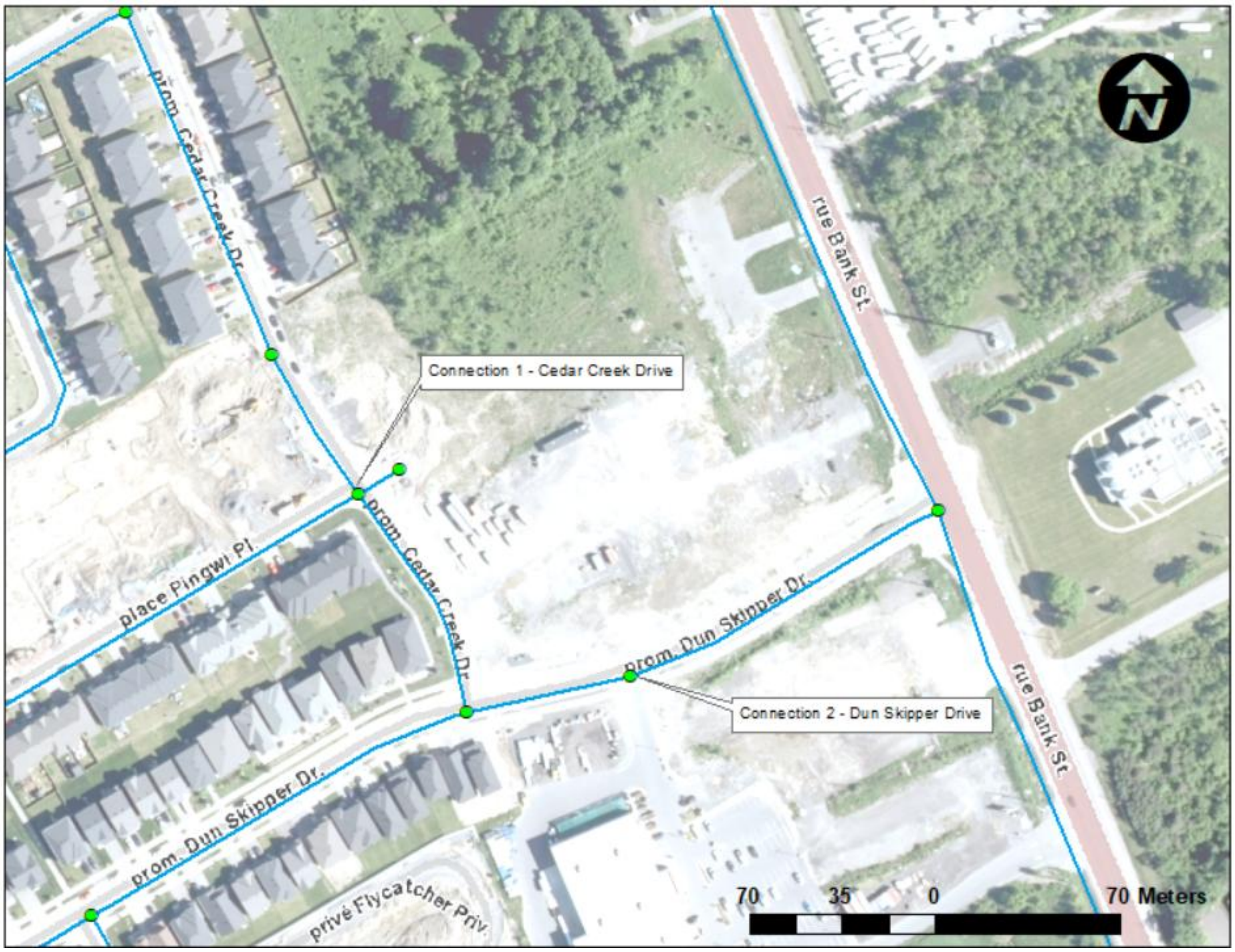
1 BED	66	
Persons per 1 BED Unit	1.4	
2 BED	40	
Persons per 2 BED Unit	2.7	
Total Population	451	
Average Day Demand	280	L/c/day
Average Day Demand	126	m^3/day
Average Day Demand	**1.46**	**L/s**
Maximum Day Demand (3.0 x Avg Day per MOE Table 3-3)	**4.39**	**L/s**
Peak Hour Demand (4.5 x Avg Day per MOE Table 3-3)	**6.58**	**L/s**

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

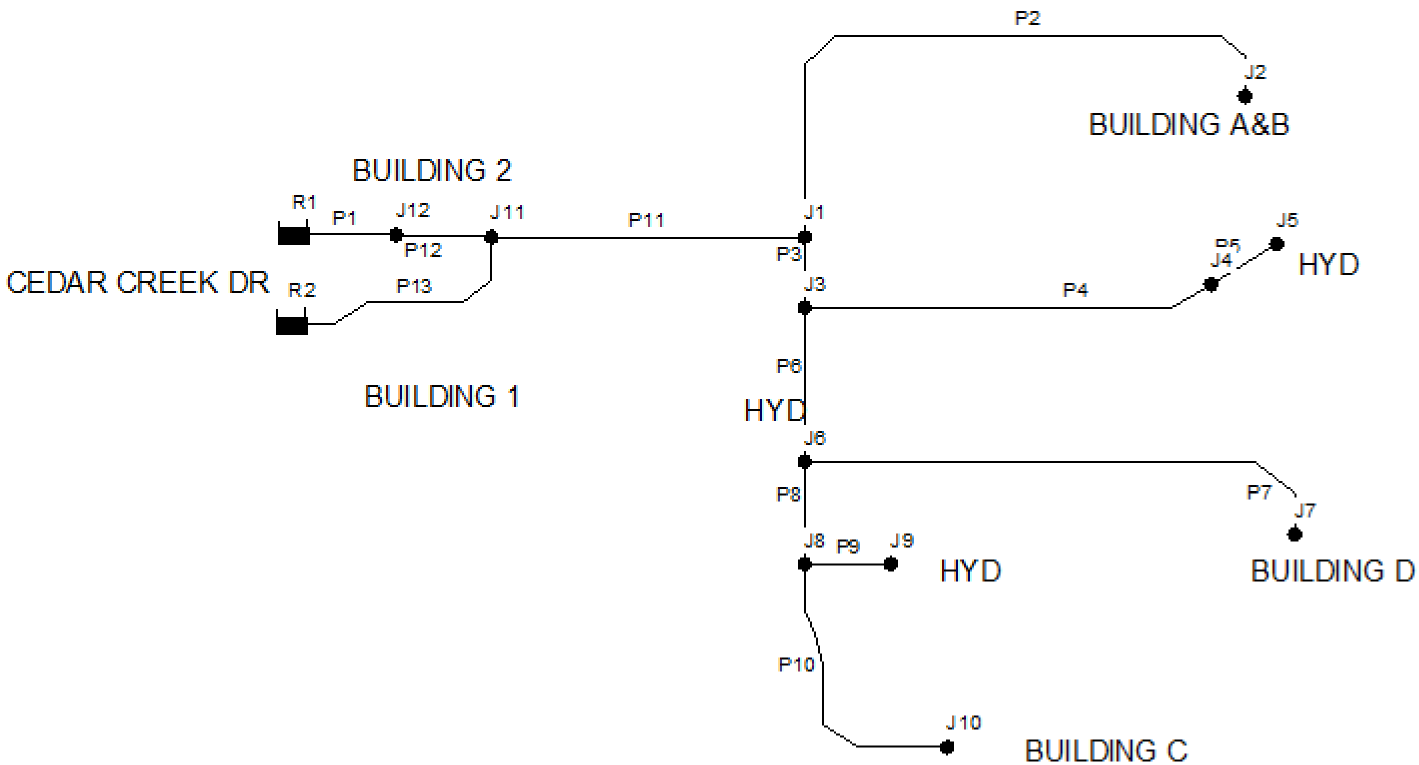
Notes

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.

150 DUN SKIPPER DRIVE



150 DUN SKIPPER - COMMERCIAL DEVELOPMENT
WATERMAIN MODELING RESULTS - CURRENT PRESSURE ZONE

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	115.56	17.26	169.3	24.6
Junc J5	98.55	95	113.78	15.23	149.4	21.7
Junc J6	99.06	0	116.43	17.37	170.4	24.7
Junc J7	99.85	0.06	116.43	16.58	162.6	23.6
Junc J8	99.38	0	116.19	16.81	164.9	23.9
Junc J9	99.4	95	113.55	14.15	138.8	20.1
Junc J10	100.15	0.21	116.19	16.04	157.4	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	4.93	121.83	20.98	205.8	29.9
Resvr R1	122.3	-105.4	122.3	0	0.0	0.0
Resvr R2	122.3	-94.1	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	105.4	2.2	23.5
Pipe P12	5	250	110	100.47	2.1	21.5
Pipe P13	30.2	250	110	94.1	1.9	19.0

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	6.58	142.1	41.25	404.7	58.7
Resvr R1	142.1	-6.54	142.1	0	0.0	0.0
Resvr R2	142.1	-5.22	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	6.54	0.1	0.1
Pipe P12	5	250	110	-0.04	0.0	0.0
Pipe P13	30.2	250	110	5.22	0.1	0.1

150 DUN SKIPPER - COMMERCIAL DEVELOPMENT
WATERMAIN MODELING RESULTS - FUTURE PRESSURE ZONE (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	131.56	33.26	326.3	47.3
Junc J5	98.55	95	129.78	31.23	306.4	44.4
Junc J6	99.06	0	132.43	33.37	327.4	47.5
Junc J7	99.85	0.06	132.43	32.58	319.6	46.4
Junc J8	99.38	0	132.19	32.81	321.9	46.7
Junc J9	99.4	95	129.55	30.15	295.8	42.9
Junc J10	100.15	0.21	132.19	32.04	314.3	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	4.93	137.83	36.98	362.8	52.6
Resvr R1	138.3	-105.4	138.3	0	0.0	0.0
Resvr R2	138.3	-94.1	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	105.4	2.2	23.5
Pipe P12	5	250	110	100.47	2.1	21.5
Pipe P13	30.2	250	110	94.1	1.9	19.0

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	6.58	144.7	43.85	430.2	62.4
Resvr R1	144.7	-6.54	144.7	0	0.0	0.0
Resvr R2	144.7	-5.22	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	6.54	0.1	0.1
Pipe P12	5	250	110	-0.04	0.0	0.0
Pipe P13	30.2	250	110	5.22	0.1	0.1

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

Average Day Demand - Current Pressure Zone
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	0.14	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	1.46	154.6	53.75	527.3	76.5
Resvr R1	154.6	-3.15	154.6	0	0.0	0.0
Resvr R2	154.6	-2.62	154.6	0	0.0	0.0

Average Day Demand - Future Pressure Zone (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	0.14	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	1.46	147.3	46.45	455.7	66.1
Resvr R1	147.3	-3.15	147.3	0	0.0	0.0
Resvr R2	147.3	-2.62	147.3	0	0.0	0.0

APPENDIX D

Sanitary Flow Calculation

150 DUN SKIPPER DRIVE
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**

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	2.7	
BUILDING 2 NUMBER OF UNITS		
1 BED	66	
Persons per 1 BED Unit	1.4	
2 BED	40	
Persons per 2 BED Unit	2.7	
Total Population	451	
Average Daily Flow	280	L/c/day
Average Daily Volume	126,392	L/day
Peak Factor (Harmon Formula)	3.40	
Peak Sanitary Flow	**4.97**	**L/s**
Site Area	1.00	ha
Infiltration Allowance	0.33	L/s/ha
Peak Extraneous Flows	**0.33**	**L/s**
Peak Sanitary Flow	**5.30**	**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	UNIT TYPES				AREA w/o Units	POPULATION		PEAK FACTOR	PEAK FLOW	AREA (Ha) INSTITUTIONAL		COMMERCIAL		INDUSTRIAL		PEAK FLOW	AREA (Ha)		FLOW				CAPACITY	LENGTH	DIA	SLOPE	VELOCITY (full)	AVAILABLE CAPACITY	
STREET	AREA ID	FROM MH	TO MH	(Ha)	SF	SD	TH	APT	(Ha)	IND	CUM		(L/s)	IND	CUM	IND	CUM	IND	CUM	(L/s)	IND	CUM	(L/s)	IND	CUM	(L/s)	(L/s)	(m)	(mm)	(%)	(m/s)	L/s	(%)
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:

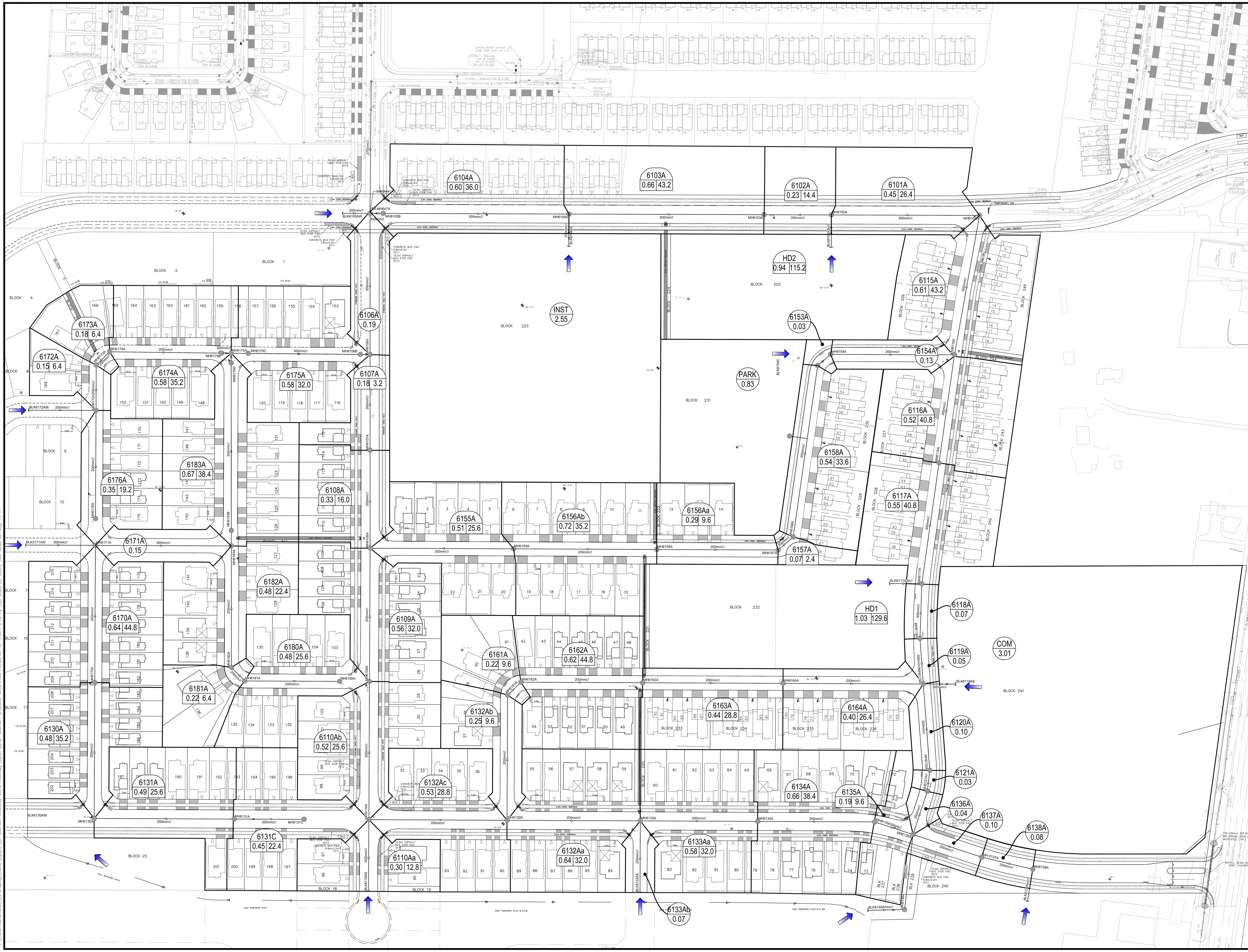
Residential			ICI Areas			Peak Factor
SF	3.2	p/p/u	INST	50,000	L/Ha/day	1.5
TH/SD	2.4	p/p/u	COM	50,000	L/Ha/day	1.5
APT	1.9	p/p/u	IND	35,000	L/Ha/day	MOE Chart
Other	43	p/p/Ha		17000	L/Ha/day	

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



REVIEWED BY
DEVELOPMENT REVIEW SERVICES BRANCH

Signed ____________________

Date ____________________ 2017

Plan Number ____________________

LEGEND :

- 6115A — AREA NUMBER
- 0.81 43.2 — POPULATION / AREA IN HECTARES
- (arrow) — 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	Date
J.I.M.	NOV 2016
Drawn	Checked
D.D.	----
Project No.	Drawing No.
33956	501

D07-16-13-0023

#17367

Miro Savic

From: Cassidy, Tyler <tyler.cassidy@ottawa.ca>
Sent: Friday, November 8, 2024 12:46 PM
To: Miro Savic
Cc: Lee Sheets
Subject: RE: 150 Dun Skipper - Downstream Sanitary Sewer Capacity (124107)

Hi Miro,

That will suffice.

Regards,

Tyler Cassidy, P.Eng
Infrastructure Project Manager,
Planning, Development and Building Services department (PDBS)/ Direction générale des services de la planification, de l'aménagement et du bâtiment (DGSPAB) - South Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 12977, Tyler.Cassidy@ottawa.ca

From: Miro Savic <m.savic@novatech-eng.com>
Sent: November 08, 2024 12:39 PM
To: Cassidy, Tyler <tyler.cassidy@ottawa.ca>
Cc: Lee Sheets <l.sheets@novatech-eng.com>
Subject: RE: 150 Dun Skipper - Downstream Sanitary Sewer Capacity (124107)

Hi Tyler,

We can update the sanitary design sheet for the sewer segments included in the Pathway at Findley Creek design brief. Will that suffice?
We have no design information further downstream.

Regards,

Miroslav Savic, P.Eng., Senior Project Manager | Land Development Engineering
NOVATECH
Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 x 205

From: Cassidy, Tyler <tyler.cassidy@ottawa.ca>
Sent: Friday, November 8, 2024 11:18 AM

To: Miro Savic <m.savic@novatech-eng.com>
Cc: Lee Sheets <l.sheets@novatech-eng.com>
Subject: RE: 150 Dun Skipper - Downstream Sanitary Sewer Capacity (124107)

Hi Miro,

I've confirmed with our Infrastructure Services department that we don't have any immediate concerns with increasing wastewater flows from this block. As for additional requirements, we request that you provide an **updated design sheet** which includes the downstream sewer segments through the Findlay Creek Subdivision. Please confirm there are no issues introduced downstream of this development due to the increased wastewater flows from this block.

If you have any other questions, please let me know.

Thank you,

Tyler Cassidy, P.Eng
Infrastructure Project Manager,
Planning, Development and Building Services department (PDBS)/ Direction générale des services de la planification, de l'aménagement et du bâtiment (DGSPAB) - South Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 12977, Tyler.Cassidy@ottawa.ca

From: Cassidy, Tyler
Sent: November 01, 2024 11:42 AM
To: Miro Savic <m.savic@novatech-eng.com>
Cc: Lee Sheets <l.sheets@novatech-eng.com>
Subject: RE: 150 Dun Skipper - Downstream Sanitary Sewer Capacity (124107)

Hi Miro,

I've sent your wastewater demands over to our Infrastructure Services (IS) department, we should have a response early next week on capacity. I should note that with an increased wastewater peak flow, we may need to do a deeper analysis and confirm SAN HGL freeboard within the subdivision, however I'll send any additional requirements once I hear back from IS.

Thank you,

Tyler Cassidy, P.Eng
Infrastructure Project Manager,
Planning, Development and Building Services department (PDBS)/ Direction générale des services de la planification, de l'aménagement et du bâtiment (DGSPAB) - South Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 12977, Tyler.Cassidy@ottawa.ca

From: Miro Savic <m.savic@novatech-eng.com>
Sent: October 29, 2024 10:47 AM
To: Cassidy, Tyler <tyler.cassidy@ottawa.ca>
Cc: Lee Sheets <l.sheets@novatech-eng.com>
Subject: 150 Dun Skipper - Downstream Sanitary Sewer Capacity (124107)

Hello Tyler,

Please find the attached preliminary sanitary flow calculations for the purpose of conformation of available capacity in the downstream sanitary sewer system. The combined peak sanitary flow from the commercial and residential developments (6.58 L/s) exceeds the flow allocated to this block of land (3.46 L/s) by 3.12 L/s.

Based on a review of *Design Brief, Pathways at Findlay Creek, 4800 Bank Street (Remer Lands), Phase 1, Leitrim development Area, prepared by IBI (August 2017)*, there is enough spare capacity in the downstream system up to the exiting 375mm diameter sewer in Kelly Farm Drive to accommodate the proposed development. Refer to the attached Sanitary Drainage Area Plan and Sanitary Sewer Design Sheet from the design brief.

Can you please confirm if there are any capacity constraints in the municipal sanitary sewer systems further downstream.

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 avai capacity must be confirmed. Contact the Infrastructure Project Manag Tyler Cassidy, P.Eng., with proposed sanitary demands.

Regards,

Miroslav Savic, P.Eng., Senior Project Manager | Land Development Engineering
NOVATECH
Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 x 205

This e-mail originates from the City of Ottawa e-mail system. Any distribution, use or copying of this e-mail or the information it contains by other than the intended recipient(s) is unauthorized. Thank you.

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 – Residential Flow											
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.)
Dun Skipper Road	6132Aa	MH6132A	MH6133A	10					0.034	0.034	0.11	3.68	0.41	0.640	0.640
				DRAFT 2016 UPDATED SERVICEABILITY REPORT											
Street No. 7	EXT2		BLK6133AS						0.124	0.124	0.40	3.57	1.43	0.000	0.640
Street No. 7	6133Ab	BLK6133AS	MH6133A						0.000	0.124	0.40	3.57	1.43	0.070	0.710
Dun Skipper Road	6133Aa	MH6133A	MH6134A	10					0.034	0.192	0.62	3.52	2.19	0.580	1.290
Dun Skipper Road	6134A	MH6134A	MH6135A	12					0.041	0.233	0.75	3.50	2.64	0.660	1.950
Dun Skipper Road	6135A	MH6135A	MH6136A	3					0.010	0.243	0.79	3.49	2.75	0.190	2.140
				DRAFT 2016 UPDATED SERVICEABILITY REPORT											
Easement	EXT3	BLK6145A	MH6146A						0.251	0.251	0.81	3.49	2.84	2.500	4.640
Easement		MH6146A	MH6136A						0.000	0.251	0.81	3.49	2.84	0.000	4.640
				DRAFT 2016 UPDATED SERVICEABILITY REPORT											
	EXT4	BLK6138A	MH6138A						0.000	0.000	0.00	3.80	0.00	0.000	4.640
Dun Skipper Road	6138A	MH6138A	MH6137A						0.000	0.000	0.00	3.80	0.00	0.080	4.720
Dun Skipper Road	6137A	MH6137A	MH6136A						0.000	0.000	0.00	3.80	0.00	0.100	4.820
Cedar Creek Drive	6136A	MH6136A	MH6121A						0.000	0.494	1.60	3.38	5.41	0.040	4.860
Cedar Creek Drive	6121A	MH6121A	MH6120A						0.000	0.494	1.60	3.38	5.41	0.030	4.890
Cedar Creek Drive	6120A	MH6120A	MH6119A						0.000	0.494	1.60	3.38	5.41	0.100	4.990
Pingwi Place	6132Ab	MH6132A	MH6161A	3					0.010	0.010	0.03	3.73	0.12	0.250	5.240
Pingwi Place	6161A	MH6161A	MH6162A	3					0.010	0.020	0.07	3.70	0.24	0.220	5.460
Pingwi Place	6162A	MH6162A	MH6163A	14					0.048	0.068	0.22	3.63	0.80	0.620	6.080
Pingwi Place	6163A	MH6163A	MH6164A		12				0.032	0.100	0.33	3.59	1.17	0.440	6.520
Pingwi Place	6164A	MH6164A	MH6119A		11				0.030	0.130	0.42	3.57	1.50	0.400	6.920
Block 429	COM + RES	BLK6119AE	MH6119A			145	92		0.451	0.451	1.46	3.40	4.97	1.000	7.920
Cedar Creek Drive	6119A	MH6119A	MH6118A						0.000	0.624	2.02	3.34	6.75	0.050	7.970
Cedar Creek Drive	6118A	MH6118A	MH6117A						0.000	0.624	2.02	3.34	6.75	0.070	8.040
Block 443	HD1	BLK6117AW	MH6117A						0.130	0.130	0.42	3.57	1.50	1.030	9.070
Cedar Creek Drive	6117A	MH6117A	MH6116A		17				0.046	0.799	2.59	3.29	8.52	0.550	9.620
Cedar Creek Drive	6116A	MH6116A	MH6115A		17				0.046	0.845	2.74	3.28	8.97	0.520	10.140
Salamander Way	6156Aa	MH6156A	MH6157A	3					0.010	0.010	0.03	3.73	0.12	0.290	10.430
Salamander Way	6157A	MH6157A	MH6158A		1				0.003	0.013	0.04	3.72	0.16	0.070	10.500
Salamander Way	6158A	MH6158A	MH6153A		14				0.038	0.051	0.16	3.65	0.60	0.540	11.040
Block 436	PARK	BLK6153C	MH6153A						0.000	0.000	0.00	3.80	0.00	0.830	11.870
Salamander Way	6153A	MH6153A	MH6154A						0.000	0.051	0.16	3.65	0.60	0.030	11.070
Salamander Way	6154A	MH6154A	MH6115A						0.000	0.051	0.16	3.65	0.60	0.130	11.200
Cedar Creek Drive	6115A	MH6115A	MH6101A		18				0.049	0.944	3.06	3.25	9.96	0.610	11.810
Miikana Road	6101A	MH6101A	MH6102A		11				0.030	0.974	3.16	3.25	10.25	0.450	12.260
Block 436	HD2	BLK6102AS	MH6102A						0.115	0.115	0.37	3.58	1.34	0.940	13.200
Miikana Road	6102A	MH6102A	MH6103A		6				0.016	1.106	3.58	3.22	11.53	0.230	13.430
Miikana Road	6103A	MH6103A	MH6104A		18				0.049	1.154	3.74	3.21	12.00	0.660	14.090
Block 450	INST	BLK6104AS	MH6104A						0.000	0.000	0.00	3.80	0.00	0.000	14.090
Miikana Road	6104A	MH6104A	MH6105B		15				0.041	1.195	3.87	3.20	12.38	0.600	14.690
Miikana Road		MH6105B	EX. MH647A						0.000	1.195	3.87	3.20	12.38	0.000	14.690
Kelly Farm Drive		EX. MH647A	EX. MH742A		5				0.014	3.539	11.47	2.90	33.31	0.280	14.970
Totals				58	145	145	92	0.000	1.660	1.660	5.38	3.12	16.77	15.800	15.800

Location			Demand – Industrial / Commercial / Institutional (ICI) Flow										Extraneous Flow Area Method		Total Design Flow	Design Capacity – Proposed Sewer Pipe Sizing / Design					Available Capacity	
Street	Area ID	From MH	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 Qfull (L/s)	Full Flow Velocity (m/s)	L/s	(%)
Dun Skipper Road	6132Aa	MH6132A	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%
Street No. 7	EXT2		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	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	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	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	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%
Easement	EXT3	BLK6145A	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	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%
	EXT4	BLK6138A	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	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	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	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	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	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	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	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	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	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	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	0.000	0.000	0.00	1.50	1.930	1.930	0.63	1.50	1.930	0.94	1.930	0.64	6.54	20.0	300 PVC	0.20	45.1	0.62	38.57	85.49%
Cedar Creek Drive	6119A	MH6119A	0.000	0.000	0.00	1.50	0.000	4.070	1.32	1.50	4.070	2.92	15.850	5.23	14.89	28.0	300 PVC	0.20	45.1	0.62	30.22	66.99%
Cedar Creek Drive	6118A	MH6118A	0.000	0.000	0.00	1.50	0.000	4.070	1.32	1.50	4.070	2.92	15.920	5.25	14.92	33.8	300 PVC	0.20	45.1	0.62	30.20	66.93%
Block 443	HD1	BLK6117AW	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	0.000	0.000	0.00	1.50	0.000	4.070	1.32	1.50	4.070	1.98	17.500	5.78	16.27	75.1	300 PVC	0.20	45.1	0.62	28.84	63.94%
Cedar Creek Drive	6116A	MH6116A	0.000	0.000	0.00	1.50	0.000	4.070	1.32	1.50	4.070	1.98	18.020	5.95	16.90	67.2	300 PVC	0.35	59.7	0.82	42.78	71.68%
Salamander Way	6156Aa	MH6156A	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	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	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	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	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	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	0.000	0.000	0.00	1.50	0.000	4.070	1.32	1.50	4.070	1.98	20.520	6.77	18.71	87.2	300 PVC	0.35	59.7	0.82	40.98	68.66%
Miikana Road	6101A	MH6101A	0.000	0.000	0.00	1.50	0.000	4.070	1.32	1.50	4.070	1.98	20.970	6.92	19.15	91.2	300 PVC	0.35	59.7	0.82	40.54	67.92%
Block 436	HD2	BLK6102AS	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	0.000	0.000	0.00	1.50	0.000	4.070	1.32	1.50	4.070	1.98	22.140	7.31	20.81	41.4	300 PVC	0.35	59.7	0.82	38.87	65.13%
Miikana Road	6103A	MH6103A	0.000	0.000	0.00	1.50	0.000	4.070	1.32	1.50	4.070	1.98	22.800	7.52	21.50	120.0	300 PVC	0.35	59.7	0.82	38.18	63.98%
Block 450	INST	BLK6104AS	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	0.000	0.000	0.00	1.50	0.000	6.620	2.15	1.50	6.620	3.22	25.950	8.56	24.17	114.4	300 PVC	0.35	59.7	0.82	35.52	59.51%
Miikana Road		MH6105B	0.000	0.000	0.00	1.50	0.000	6.620	2.15	1.50	6.620	3.22	25.950	8.56	24.17	8.0	300 PVC	0.20	45.1	0.62	20.95	46.43%
Kelly Farm Drive		EX. MH647A	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			0.000	0.000	0.00	1.50	8.550	8.550	2.77	1.50	8.550	4.16	24.350	8.04	28.96	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	2.7

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 = $1000*(1/n)*A_p*R^{2/3}*So^{0.5}$

Definitions

Q full = Capacity (L/s)
n = Manning coefficient of roughness (0.013)
A_p **=** 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

NOVATECH
Engineers, Planners & Landscape Architects

Proposed Commercial 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	1.930	**360**

[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	0.044	0.006	0.038	0.30	0.35	3.8	7.7	-	-	-	-	-
A-2	Direct Runoff	0.113	0.033	0.080	0.40	0.47	13.2	26.3	-	-	-	-	-
A-3	Uncontrolled Site Flows	0.034	0.034	0.000	0.90	1.00	8.9	16.9	-	-	-	-	-
A-4	Uncontrolled Site Flows	0.065	0.053	0.012	0.77	0.86	14.5	27.8	-	-	-	-	-
A-5	Uncontrolled Site Flows	0.063	0.039	0.024	0.63	0.71	11.6	22.3	-	-	-	-	-
A-6	Controlled Site Flows	0.206	0.164	0.042	0.76	0.85	-	-	14.7	15.1	28.9	70.5	73.4
A-7	Controlled Site Flows	0.358	0.344	0.014	0.87	0.97	-	-	31.0	31.7	56.3	137.6	177.5
A-8	Controlled Site Flows	0.505	0.483	0.022	0.87	0.97	-	-	111.7	189.5	42.8	89.4	89.7
R-1	Building A Controlled Roof Flows	0.304	0.304	0.000	0.90	1.00	-	-	7.16	9.1	65.6	141.0	153.2
R-2	Building B Controlled Roof Flows	0.089	0.089	0.000	0.90	1.00	-	-	2.9	3.3	17.1	38.7	55.7
R-3	Building C Controlled Roof Flows	0.103	0.103	0.000	0.90	1.00	-	-	3.8	4.4	18.2	41.7	50.6
R-4	Building D Controlled Roof Flows	0.046	0.046	0.000	0.90	1.00		-	2.5	2.8	7.1	17.0	22.5
	Totals :	1.930	-	-	-	-	**51.9**	**101.0**	**173.7**	**255.9**	**236.1**	**536.0**	**622.6**
							Total Stormwater Flows :		**225.6**	**356.9**			
									Overcontrolled	3.4			

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

OTTAWA IDF CURVE

Area =	0.044	ha	Qallow =	3.8	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	5.10	1.34	0.40
10	104.19	3.77	0.00	0.00
15	83.56	3.02	-0.75	-0.67
20	70.25	2.54	-1.23	-1.47
25	60.90	2.20	-1.56	-2.35
30	53.93	1.95	-1.82	-3.27
35	48.52	1.75	-2.01	-4.23
40	44.18	1.60	-2.17	-5.20
45	40.63	1.47	-2.30	-6.20
50	37.65	1.36	-2.40	-7.21
55	35.12	1.27	-2.50	-8.24
60	32.94	1.19	-2.57	-9.27
65	31.04	1.12	-2.64	-10.31
70	29.37	1.06	-2.70	-11.36
75	27.89	1.01	-2.76	-12.41
80	26.56	0.96	-2.81	-13.47
85	25.37	0.92	-2.85	-14.53
90	24.29	0.88	-2.89	-15.59

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

OTTAWA IDF CURVE

Area =	0.044	ha	Qallow =	7.7	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	10.46	2.76	0.83
10	178.56	7.69	0.00	0.00
15	142.89	6.16	-1.54	-1.38
20	119.95	5.17	-2.53	-3.03
25	103.85	4.47	-3.22	-4.83
30	91.87	3.96	-3.74	-6.72
35	82.58	3.56	-4.14	-8.69
40	75.15	3.24	-4.46	-10.69
45	69.05	2.98	-4.72	-12.74
50	63.95	2.76	-4.94	-14.81
55	59.62	2.57	-5.12	-16.91
60	55.89	2.41	-5.29	-19.03
65	52.65	2.27	-5.43	-21.16
70	49.79	2.15	-5.55	-23.30
75	47.26	2.04	-5.66	-25.46
80	44.99	1.94	-5.76	-27.63
85	42.95	1.85	-5.84	-29.80
90	41.11	1.77	-5.92	-31.98

Proposed Commercial Development
Novatech Project No. 124107
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA A-2 Direct Runoff

OTTAWA IDF CURVE

Area =	0.113	ha	Qallow =	13.2	L/s
C =	0.40		Vol(max) =	0.0	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	17.94	4.70	1.41
10	104.19	13.24	0.00	0.00
15	83.56	10.62	-2.62	-2.36
20	70.25	8.93	-4.31	-5.17
25	60.90	7.74	-5.50	-8.25
30	53.93	6.85	-6.39	-11.49
35	48.52	6.16	-7.07	-14.85
40	44.18	5.61	-7.62	-18.30
45	40.63	5.16	-8.08	-21.80
50	37.65	4.78	-8.45	-25.36
55	35.12	4.46	-8.77	-28.96
60	32.94	4.19	-9.05	-32.59
65	31.04	3.94	-9.29	-36.24
70	29.37	3.73	-9.51	-39.92
75	27.89	3.54	-9.69	-43.62
80	26.56	3.37	-9.86	-47.34
85	25.37	3.22	-10.01	-51.07
90	24.29	3.09	-10.15	-54.82

Proposed Commercial Development
Novatech Project No. 124107
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA A-2 Direct Runoff

OTTAWA IDF CURVE

Area =	0.113	ha	Qallow =	26.3	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	242.70	35.76	9.45	2.83
10	178.56	26.31	-0.01	0.00
15	142.89	21.05	-5.26	-4.73
20	119.95	17.67	-8.64	-10.37
25	103.85	15.30	-11.01	-16.52
30	91.87	13.54	-12.78	-23.00
35	82.58	12.17	-14.15	-29.71
40	75.15	11.07	-15.24	-36.58
45	69.05	10.17	-16.14	-43.58
50	63.95	9.42	-16.89	-50.68
55	59.62	8.78	-17.53	-57.85
60	55.89	8.24	-18.08	-65.09
65	52.65	7.76	-18.56	-72.38
70	49.79	7.34	-18.98	-79.71
75	47.26	6.96	-19.35	-87.09
80	44.99	6.63	-19.69	-94.49
85	42.95	6.33	-19.99	-101.93
90	41.11	6.06	-20.26	-109.39

Proposed Commercial Development
Novatech Project No. 124107
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA A-3 Uncontrolled Site Flows

OTTAWA IDF CURVE

Area =	0.034	ha	Qallow =	8.9	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	12.01	3.15	0.94
10	104.19	8.86	0.00	0.00
15	83.56	7.11	-1.76	-1.58
20	70.25	5.98	-2.89	-3.46
25	60.90	5.18	-3.68	-5.52
30	53.93	4.59	-4.28	-7.70
35	48.52	4.13	-4.74	-9.95
40	44.18	3.76	-5.10	-12.25
45	40.63	3.46	-5.41	-14.60
50	37.65	3.20	-5.66	-16.98
55	35.12	2.99	-5.88	-19.39
60	32.94	2.80	-6.06	-21.82
65	31.04	2.64	-6.22	-24.27
70	29.37	2.50	-6.36	-26.73
75	27.89	2.37	-6.49	-29.21
80	26.56	2.26	-6.60	-31.70
85	25.37	2.16	-6.71	-34.20
90	24.29	2.07	-6.80	-36.70

Proposed Commercial Development
Novatech Project No. 124107
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA A-3 Uncontrolled Site Flows

OTTAWA IDF CURVE

Area =	0.034	ha	Qallow =	16.9	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	22.94	6.06	1.82
10	178.56	16.88	0.00	0.00
15	142.89	13.51	-3.37	-3.04
20	119.95	11.34	-5.54	-6.65
25	103.85	9.82	-7.07	-10.60
30	91.87	8.68	-8.20	-14.76
35	82.58	7.81	-9.08	-19.06
40	75.15	7.10	-9.78	-23.47
45	69.05	6.53	-10.35	-27.96
50	63.95	6.04	-10.84	-32.51
55	59.62	5.64	-11.25	-37.11
60	55.89	5.28	-11.60	-41.75
65	52.65	4.98	-11.91	-46.43
70	49.79	4.71	-12.18	-51.14
75	47.26	4.47	-12.41	-55.87
80	44.99	4.25	-12.63	-60.62
85	42.95	4.06	-12.82	-65.39
90	41.11	3.89	-13.00	-70.18

Proposed Commercial Development
Novatech Project No. 124107
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA A-4 Uncontrolled Site Flows

OTTAWA IDF CURVE

Area = 0.065 ha Qallow = 14.5 L/s
C = 0.77 Vol(max) = 0.0 m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	19.66	5.15	1.55
10	104.19	14.51	0.00	0.00
15	83.56	11.64	-2.87	-2.59
20	70.25	9.78	-4.73	-5.67
25	60.90	8.48	-6.03	-9.04
30	53.93	7.51	-7.00	-12.60
35	48.52	6.76	-7.75	-16.28
40	44.18	6.15	-8.36	-20.06
45	40.63	5.66	-8.85	-23.90
50	37.65	5.24	-9.27	-27.80
55	35.12	4.89	-9.62	-31.74
60	32.94	4.59	-9.92	-35.72
65	31.04	4.32	-10.19	-39.73
70	29.37	4.09	-10.42	-43.77
75	27.89	3.88	-10.63	-47.82
80	26.56	3.70	-10.81	-51.90
85	25.37	3.53	-10.98	-55.99
90	24.29	3.38	-11.13	-60.09

Proposed Commercial Development
Novatech Project No. 124107
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA A-4 Uncontrolled Site Flows

OTTAWA IDF CURVE

Area = 0.065 ha Qallow = 27.8 L/s
C = 0.86 Vol(max) = 0.0 m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	37.78	9.98	2.99
10	178.56	27.80	-0.01	0.00
15	142.89	22.25	-5.56	-5.00
20	119.95	18.67	-9.13	-10.96
25	103.85	16.17	-11.64	-17.46
30	91.87	14.30	-13.50	-24.30
35	82.58	12.86	-14.95	-31.39
40	75.15	11.70	-16.11	-38.65
45	69.05	10.75	-17.05	-46.05
50	63.95	9.96	-17.85	-53.54
55	59.62	9.28	-18.52	-61.12
60	55.89	8.70	-19.10	-68.77
65	52.65	8.20	-19.61	-76.47
70	49.79	7.75	-20.05	-84.22
75	47.26	7.36	-20.45	-92.01
80	44.99	7.00	-20.80	-99.84
85	42.95	6.69	-21.12	-107.70
90	41.11	6.40	-21.40	-115.58

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

OTTAWA IDF CURVE

Area =	0.063	ha	Qallow =	11.6	L/s
C =	0.63		Vol(max) =	0.0	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	141.18	15.66	4.10	1.23
10	104.19	11.56	0.00	0.00
15	83.56	9.27	-2.29	-2.06
20	70.25	7.79	-3.76	-4.52
25	60.90	6.75	-4.80	-7.20
30	53.93	5.98	-5.58	-10.04
35	48.52	5.38	-6.18	-12.97
40	44.18	4.90	-6.66	-15.97
45	40.63	4.51	-7.05	-19.04
50	37.65	4.18	-7.38	-22.14
55	35.12	3.90	-7.66	-25.28
60	32.94	3.65	-7.90	-28.45
65	31.04	3.44	-8.11	-31.64
70	29.37	3.26	-8.30	-34.86
75	27.89	3.09	-8.46	-38.09
80	26.56	2.95	-8.61	-41.33
85	25.37	2.81	-8.74	-44.59
90	24.29	2.69	-8.86	-47.86

Proposed Commercial Development
Novatech Project No. 124107
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA A-5 Uncontrolled Site Flows

OTTAWA IDF CURVE

Area =	0.063	ha	Qallow =	22.3	L/s
C =	0.71		Vol(max) =	0.0	m^3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m^3)
5	242.70	30.36	8.02	2.41
10	178.56	22.34	-0.01	0.00
15	142.89	17.88	-4.47	-4.02
20	119.95	15.01	-7.34	-8.80
25	103.85	12.99	-9.35	-14.03
30	91.87	11.49	-10.85	-19.53
35	82.58	10.33	-12.01	-25.23
40	75.15	9.40	-12.94	-31.06
45	69.05	8.64	-13.70	-37.00
50	63.95	8.00	-14.34	-43.03
55	59.62	7.46	-14.88	-49.12
60	55.89	6.99	-15.35	-55.26
65	52.65	6.59	-15.76	-61.45
70	49.79	6.23	-16.11	-67.68
75	47.26	5.91	-16.43	-73.94
80	44.99	5.63	-16.71	-80.23
85	42.95	5.37	-16.97	-86.54
90	41.11	5.14	-17.20	-92.88

Proposed Commercial Development
Novatech Project No. 124107
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA A-6 Controlled Site Flows

Storage Calculations Using Average Release Rate Equal to 50% of the Qpeak

OTTAWA IDF CURVE

Area =	0.206	ha	Qpeak =	11.0	L/s
C =	0.76		Qavg =	5.5	L/s
			Vol(max) =	21.4	m3

(Vol calculated for Qavg)

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	44.92	39.42	11.83
10	76.81	33.31	27.81	16.69
15	61.77	26.79	21.29	19.16
20	52.03	22.56	17.06	20.48
25	45.17	19.59	14.09	21.13
30	40.04	17.37	11.87	21.36
35	36.06	15.64	10.14	21.29
40	32.86	14.25	8.75	21.01
45	30.24	13.11	7.61	20.56
50	28.04	12.16	6.66	19.98
55	26.17	11.35	5.85	19.30
60	24.56	10.65	5.15	18.54
65	23.15	10.04	4.54	17.71
70	21.91	9.50	4.00	16.81
75	20.81	9.03	3.53	15.87
90	18.14	7.87	2.37	12.79
105	16.13	7.00	1.50	9.43
120	14.56	6.32	0.82	5.87
135	13.30	5.77	0.27	2.16
150	12.25	5.31	-0.19	-1.68

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

Storage Calculations Using Average Release Rate Equal to 50% of the Qpeak

OTTAWA IDF CURVE

Area =	0.206	ha	Qpeak =	14.7	L/s
C =	0.76		Qavg =	7.4	L/s
			Vol(max) =	28.9	m3

(Vol calculated for Qavg)

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	61.23	53.88	16.16
10	104.19	45.19	37.84	22.70
15	83.56	36.24	28.89	26.00
20	70.25	30.47	23.12	27.74
25	60.90	26.41	19.06	28.59
30	53.93	23.39	16.04	28.87
35	48.52	21.04	13.69	28.75
40	44.18	19.16	11.81	28.35
45	40.63	17.62	10.27	27.73
50	37.65	16.33	8.98	26.94
55	35.12	15.23	7.88	26.01
60	32.94	14.29	6.94	24.97
65	31.04	13.46	6.11	23.84
70	29.37	12.74	5.39	22.63
75	27.89	12.09	4.74	21.35
90	24.29	10.53	3.18	17.19
105	21.58	9.36	2.01	12.66
120	19.47	8.44	1.09	7.87
135	17.76	7.70	0.35	2.87
150	16.36	7.10	-0.25	-2.29

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

Storage Calculations Using Average Release Rate Equal to 50% of the Qpeak

OTTAWA IDF CURVE

Area =	0.206	ha	Qpeak =	15.1	L/s
C =	0.85		Qavg =	7.6	L/s
			Vol(max) =	70.5	m3

(Vol calculated for Qavg)

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	117.74	110.19	33.06
10	178.56	86.62	79.07	47.44
15	142.89	69.32	61.77	55.59
20	119.95	58.19	50.64	60.77
25	103.85	50.38	42.83	64.24
30	91.87	44.57	37.02	66.63
35	82.58	40.06	32.51	68.27
40	75.15	36.45	28.90	69.37
45	69.05	33.50	25.95	70.06
50	63.95	31.02	23.47	70.42
55	59.62	28.92	21.37	70.53
60	55.89	27.12	19.57	70.43
65	52.65	25.54	17.99	70.16
70	49.79	24.15	16.60	69.73
75	47.26	22.92	15.37	69.18
90	41.11	19.94	12.39	66.92
105	36.50	17.71	10.16	63.98
120	32.89	15.96	8.41	60.53
135	30.00	14.55	7.00	56.71
150	27.61	13.39	5.84	52.60

Structures	Size (mm)	Area (m^2)	T/G	Inv IN	Inv OUT
STMMH 102	1219	1.17	97.35	95.10	94.97
STMMH 100	1219	1.17	97.24	-	95.23

Area A-6: Storage Table

				Underground Storage	Surface Storage						Total Storage		
					CB 1		CB 2		CB 3				
Elevation (m)	System Depth (m)	STMMH 102 Volume (m^3)	STMMH 100 Volume (m^3)	Combined Volume (m^3)	Area (m^2)	Volume (m^3)	Area (m^2)	Volume (m^3)	Area (m^2)	Volume (m^3)	Ponding Volume (m^3)	**Total Volume (m^3)**	
94.97	0.00	-	-	-	-	-	-	-	-	-	-	**0**	Design Head
95.14	0.17	0.20	-0.11	1.93	-	-	-	-	-	-	-	**1.9**	-
95.37	0.40	0.47	0.16	9.81	-	-	-	-	-	-	-	**9.8**	0.04
95.74	0.77	0.90	0.60	19.85	-	-	-	-	-	-	-	**19.8**	0.27
96.50	1.53	1.79	1.48	21.62	-	-	-	-	-	-	-	**21.6**	0.64
97.00	2.03	2.37	2.07	22.79	-	-	-	-	-	-	-	**22.8**	1.40
97.10	2.13	2.49	2.07	22.90	-	-	-	-	-	-	-	**22.9**	1.90
97.17	2.20	2.49	2.07	22.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**22.9**	2.00
97.25	2.28	2.49	2.07	22.90	27.68	1.11	29.82	1.19	28.68	1.15	3.45	**26.4**	2.07
97.30	2.33	2.49	2.07	22.90	68.87	3.52	72.00	3.74	64.80	3.48	10.74	**33.6**	2.15
97.35	2.38	2.49	2.07	22.90	130.36	8.50	131.88	8.84	119.15	8.08	25.42	**48.3**	2.20
97.40	2.43	2.49	2.07	22.90	217.00	17.19	214.48	17.49	190.18	15.82	50.50	**73.4**	2.30

PI =	3.141592654
pipe I.D.=	609

U/G Storage Pipe Volume

End Area	0.291	(m^2)
Total Length	63.0	(m)
Pipe Volume	18.4	(m^3)

Tempest Vortex LMF ICD 105

1:100 Yr	
Flow (L/s) =	15.1
Head (m) =	2.29
Elevation (m) =	**97.39**
Outlet Pipe Dia.(mm) =	254
Volume (m3) =	70.5
1:5 Yr	
Flow (L/s) =	14.7
Head (m) =	2.18
Elevation (m) =	**97.28**
Outlet Pipe Dia.(mm) =	254
Volume (m3) =	28.9
1:2 Yr	
Flow (L/s) =	11.0
Head (m) =	1.22
Elevation (m) =	**96.32**
Outlet Pipe Dia.(mm) =	254
Volume (m3) =	21.4

Orifice Size - 1:100 yr Flow Check

Q=0.62xAx(2gh)^0.5

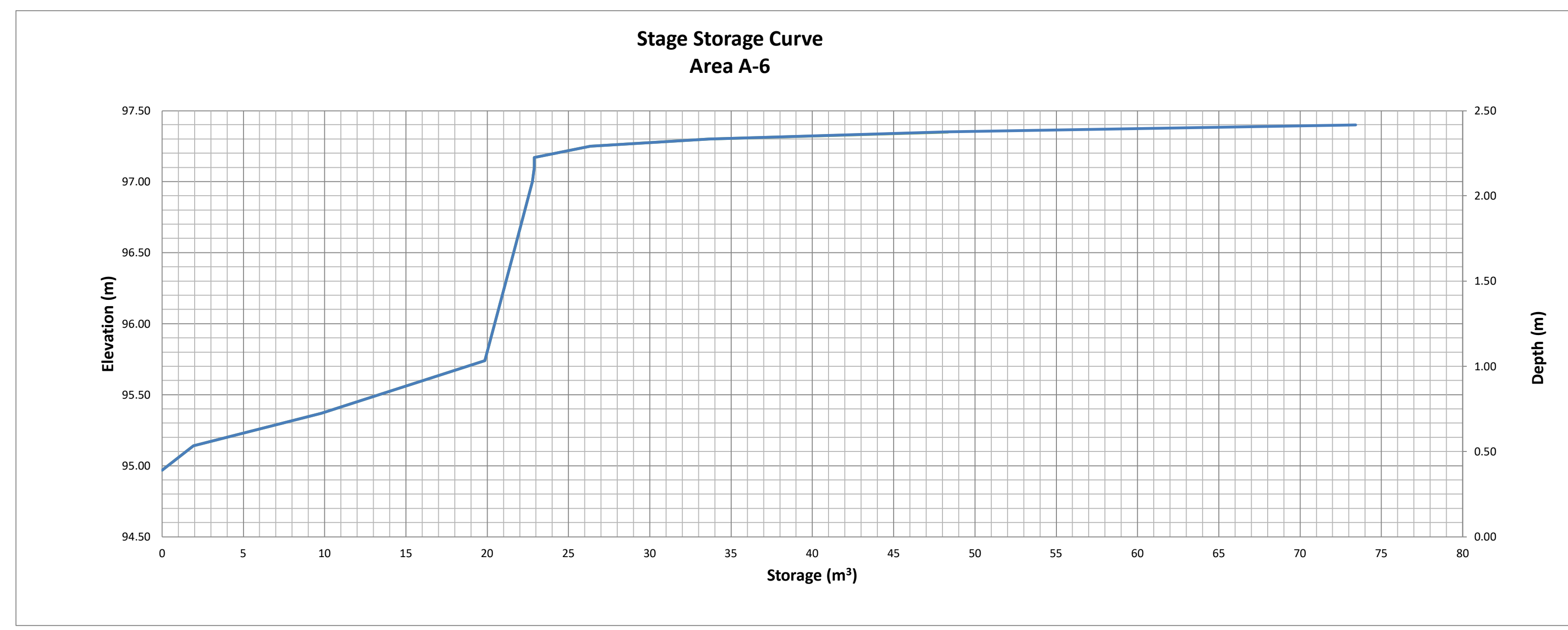
	1:100 yr	Flow Check
Q (m^3/s) =	0.0151	**0.0151**
g (m/s^2) =	9.81	9.81
h (m) =	**2.29**	2.29
A (m^2) =	**0.003631063**	**0.00363**
D (m) =	**0.067994209**	**0.06800**
D (mm) =	**68**	68.0

1:5 yr Flow Check

	1:5 yr
Q (m^3/s) =	0.0147
g (m/s^2) =	9.81
h (m) =	**2.18**
A (m^2) =	**0.00363**
D (m) =	**0.068**
D (mm) =	**68**

1:2 yr Flow Check

	1:2 yr
Q (m^3/s) =	0.0110
g (m/s^2) =	9.81
h (m) =	**1.22**
A (m^2) =	**0.00363**
D (m) =	**0.068**
D (mm) =	**68**



Proposed Commercial Development — Storage Calculations Using Average Release Rate Equal to 50% of the Qpeak
Novatech Project No. 124107
REQUIRED STORAGE - 1:2 YEAR EVENT
AREA A-7 Controlled Site Flows

OTTAWA IDF CURVE
Area = 0.358 ha; C = 0.87
Qpeak = 25.8 L/s
Qavg = 12.9 L/s
Vol(max) = 39.4 m3
(Vol calculated for Qavg)

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	89.87	76.97	23.09
10	76.81	66.64	53.74	32.25
15	61.77	53.60	40.70	36.63
20	52.03	45.15	32.25	38.70
25	45.17	39.19	26.29	39.44
30	40.04	34.75	21.85	39.32
35	36.06	31.29	18.39	38.62
40	32.86	28.52	15.62	37.48
45	30.24	26.24	13.34	36.01
50	28.04	24.33	11.43	34.29
55	26.17	22.71	9.81	32.37
60	24.56	21.31	8.41	30.27
65	23.15	20.09	7.19	28.03
70	21.91	19.01	6.11	25.68
75	20.81	18.06	5.16	23.22
90	18.14	15.74	2.84	15.35
105	16.13	14.00	1.10	6.92
120	14.56	12.64	-0.26	-1.91
135	13.30	11.54	-1.36	-11.04
150	12.25	10.63	-2.27	-20.42

Proposed Commercial Development — Storage Calculations Using Average Release Rate Equal to 50% of the Qpeak
Novatech Project No. 124107
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA A-7 Controlled Site Flows

OTTAWA IDF CURVE
Area = 0.358 ha; C = 0.87
Qpeak = 31.0 L/s
Qavg = 15.5 L/s
Vol(max) = 56.3 m3
(Vol calculated for Qavg)

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	122.50	107.00	32.10
10	104.19	90.41	74.91	44.94
15	83.56	72.50	57.00	51.30
20	70.25	60.96	45.46	54.55
25	60.90	52.84	37.34	56.01
30	53.93	46.79	31.29	56.33
35	48.52	42.10	26.60	55.86
40	44.18	38.34	22.84	54.81
45	40.63	35.25	19.75	53.33
50	37.65	32.67	17.17	51.51
55	35.12	30.48	14.98	49.42
60	32.94	28.58	13.08	47.11
65	31.04	26.94	11.44	44.60
70	29.37	25.49	9.99	41.94
75	27.89	24.20	8.70	39.14
90	24.29	21.07	5.57	30.10
105	21.58	18.73	3.23	20.33
120	19.47	16.89	1.39	10.02
135	17.76	15.41	-0.09	-0.69
150	16.36	14.20	-1.30	-11.72

Proposed Commercial Development — Storage Calculations Using Average Release Rate Equal to 50% of the Qpeak
Novatech Project No. 124107
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA A-7 Controlled Site Flows

OTTAWA IDF CURVE
Area = 0.358 ha; C = 0.97
Qpeak = 31.7 L/s
Qavg = 15.9 L/s
Vol(max) = 137.6 m3
(Vol calculated for Qavg)

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	234.26	218.41	65.52
10	178.56	172.35	156.50	93.90
15	142.89	137.92	122.07	109.87
20	119.95	115.78	99.93	119.91
25	103.85	100.23	84.38	126.58
30	91.87	88.67	72.82	131.08
35	82.58	79.71	63.86	134.10
40	75.15	72.53	56.68	136.04
45	69.05	66.65	50.80	137.16
50	63.95	61.73	45.88	137.64
55	59.62	57.55	41.70	137.61
60	55.89	53.95	38.10	137.16
65	52.65	50.82	34.97	136.36
70	49.79	48.06	32.21	135.27
75	47.26	45.61	29.76	133.93
90	41.11	39.68	23.83	128.69
105	36.50	35.23	19.38	122.08
120	32.89	31.75	15.90	114.48
135	30.00	28.95	13.10	106.14
150	27.61	26.65	10.80	97.20

Structures	Size (mm)	Area (m^2)	T/G	Inv IN	Inv OUT
CBMH 3	1524	1.82	98.00	95.12	94.99
CBMH 2	1524	1.82	98.00	95.20	95.18
CBMH 1	1524	1.82	98.00	95.28	95.26
CBMH 7	1524	1.82	98.00	-	95.32

Area A-7: Storage Table

Elevation (m)	System Depth (m)	CBMH 3 Volume (m^3)	CBMH 2 Volume (m^3)	CBMH 1 Volume (m^3)	CBMH 7 Volume (m^3)	Underground Storage: Combined Volume (m^3)	Surface Storage: CBMH 3 Area (m^2)	CBMH 3 Volume (m^3)	CBMH 2 Area (m^2)	CBMH 2 Volume (m^3)	CBMH 1 Area (m^2)	CBMH 1 Volume (m^3)	CBMH 7 Area (m^2)	CBMH 7 Volume (m^3)	Total Storage: Ponding Volume (m^3)	**Total Volume (m^3)**	Design Head
94.99	0.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**0**	-
95.12	0.13	0.24	-	-	-	0.24	-	-	-	-	-	-	-	-	-	**0.2**	0.00
95.18	0.19	0.35	0.00	-	-	0.35	-	-	-	-	-	-	-	-	-	**0.3**	0.06
95.26	0.27	0.49	0.15	0.00	-	0.64	-	-	-	-	-	-	-	-	-	**0.6**	0.14
95.32	0.33	0.60	0.26	0.11	0.00	3.43	-	-	-	-	-	-	-	-	-	**3.4**	0.56
95.68	0.69	1.26	0.91	0.77	0.66	15.91	-	-	-	-	-	-	-	-	-	**15.9**	0.56
96.10	1.11	2.02	1.68	1.53	1.42	31.28	-	-	-	-	-	-	-	-	-	**31.3**	0.98
97.00	2.01	3.67	3.32	3.17	3.06	37.84	-	-	-	-	-	-	-	-	-	**37.8**	1.88
97.70	2.71	4.94	4.60	4.45	4.33	42.95	-	-	-	-	-	-	-	-	-	**42.9**	2.58
98.00	3.01	4.94	4.60	4.45	4.88	43.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**43.5**	2.88
98.05	3.06	4.94	4.60	4.45	4.88	43.49	15.24	0.38	27.95	0.70	12.54	0.31	0.00	0.00	1.39	**43.5**	2.93
98.10	3.11	4.94	4.60	4.45	4.88	43.49	43.36	1.85	72.84	3.22	40.17	1.63	0.00	0.00	6.70	**50.2**	2.98
98.15	3.16	4.94	4.60	4.45	4.88	43.49	89.93	5.18	125.52	8.18	83.14	4.71	0.00	0.00	18.07	**61.6**	3.03
98.20	3.21	4.94	4.60	4.45	4.88	43.49	152.09	11.23	191.45	16.10	142.82	10.36	20.21	0.51	38.70	**82.2**	3.08
98.25	3.26	4.94	4.60	4.45	4.88	43.49	246.86	21.20	284.08	27.99	221.31	19.47	64.90	2.63	73.92	**117.4**	3.13
98.30	3.31	4.94	4.60	4.45	4.88	43.49	373.89	36.72	422.67	45.66	479.03	36.97	122.53	7.32	133.99	**177.5**	3.18

Circular Plug Type 91mm Orifice

1:100 Yr
Flow (L/s) = 31.7
Head (m) = 3.14
Elevation (m) = **98.26**
Outlet Pipe Dia.(mm) = 254
Volume (m3) = 137.6

1:5 Yr
Flow (L/s) = 31.0
Head (m) = 3.00
Elevation (m) = **98.12**
Outlet Pipe Dia.(mm) = 254
Volume (m3) = 56.3

1:2 Yr
Flow (L/s) = 25.8
Head (m) = 2.08
Elevation (m) = **97.20**
Outlet Pipe Dia.(mm) = 254
Volume (m3) = 39.4

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

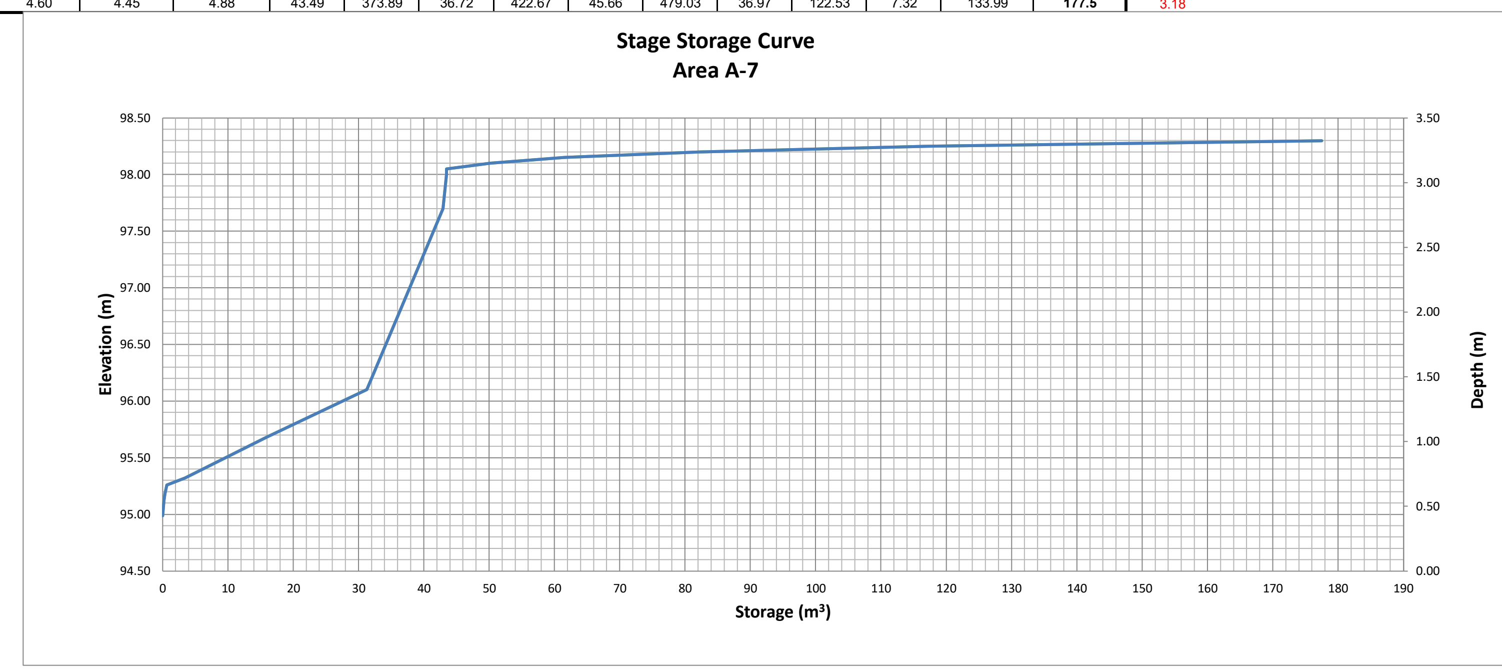
	1:100 yr	Flow Check
Q (m^3/s) =	0.0317	**0.0317**
g (m/s^2) =	9.81	9.81
h (m) =	**3.14**	3.14
A (m^2) =	**0.006510973**	**0.00650**
D (m) =	**0.091049591**	**0.09100**
D (mm) =	**91**	91.0

1:5 yr Flow Check

	1:5 yr
Q (m^3/s) =	0.0310
g (m/s^2) =	9.81
h (m) =	**3.00**
A (m^2) =	**0.00650**
D (m) =	**0.091**
D (mm) =	**91**

1:2 yr Flow Check

	1:2 yr
Q (m^3/s) =	0.0258
g (m/s^2) =	9.81
h (m) =	**2.08**
A (m^2) =	**0.00650**
D (m) =	**0.091**
D (mm) =	**91**



PI = 3.141592654
pipe I.D.= 762
U/G Storage Pipe Volume
End Area 0.456 (m^2)
Total Length 26.9 (m)
Pipe Volume 12.3 (m^3)

PI = 3.141592654
pipe I.D.= 762
U/G Storage Pipe Volume
End Area 0.456 (m^2)
Total Length 27.1 (m)
Pipe Volume 12.4 (m^3)

PI = 3.141592654
pipe I.D.= 762
U/G Storage Pipe Volume
End Area 0.456 (m^2)
Total Length 13.3 (m)
Pipe Volume 6.1 (m^3)

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-8 Controlled Site Flows

OTTAWA IDF CURVE

Area = 0.505 ha — Qpeak = 92.0 L/s
C = 0.87 — Qavg = 46.0 L/s
Vol(max) = 28.7 m3
(Vol calculated for Qavg)

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	103.57	126.43	80.43	24.13
10	76.81	93.76	47.76	28.65
15	61.77	75.40	29.40	26.46
20	52.03	63.51	17.51	21.02
25	45.17	55.14	9.14	13.70
30	40.04	48.88	2.88	5.19
35	36.06	44.02	-1.98	-4.16
40	32.86	40.12	-5.88	-14.12
45	30.24	36.91	-9.09	-24.53
50	28.04	34.23	-11.77	-35.31
55	26.17	31.95	-14.05	-46.38
60	24.56	29.98	-16.02	-57.68
65	23.15	28.26	-17.74	-69.18
70	21.91	26.75	-19.25	-80.86
75	20.81	25.41	-20.59	-92.67
90	18.14	22.15	-23.85	-128.81
105	16.13	19.69	-26.31	-165.73
120	14.56	17.78	-28.22	-203.21
135	13.30	16.23	-29.77	-241.14
150	12.25	14.96	-31.04	-279.40

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-8 Controlled Site Flows

OTTAWA IDF CURVE

Area = 0.505 ha — Qpeak = 189.5 L/s
C = 0.97 — Qavg = 94.8 L/s
Vol(max) = 89.4 m3
(Vol calculated for Qavg)

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	329.60	234.85	70.45
10	178.56	242.49	147.74	88.64
15	142.89	194.05	99.30	89.37
20	119.95	162.90	68.15	81.78
25	103.85	141.03	46.28	69.42
30	91.87	124.76	30.01	54.02
35	82.58	112.14	17.39	36.53
40	75.15	102.05	7.30	17.52
45	69.05	93.77	-0.98	-2.64
50	63.95	86.85	-7.90	-23.70
55	59.62	80.97	-13.78	-45.47
60	55.89	75.91	-18.84	-67.84
65	52.65	71.50	-23.25	-90.69
70	49.79	67.62	-27.13	-113.96
75	47.26	64.17	-30.58	-137.59
90	41.11	55.83	-38.92	-210.17
105	36.50	49.56	-45.19	-284.67
120	32.89	44.67	-50.08	-360.56
135	30.00	40.74	-54.01	-437.51
150	27.61	37.50	-57.25	-515.28

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-8 Controlled Site Flows

OTTAWA IDF CURVE

Area = 0.505 ha — Qpeak = 111.7 L/s
C = 0.87 — Qavg = 55.9 L/s
Vol(max) = 42.8 m3
(Vol calculated for Qavg)

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	172.34	116.49	34.95
10	104.19	127.19	71.34	42.80
15	83.56	102.00	46.15	41.53
20	70.25	85.76	29.91	35.89
25	60.90	74.34	18.49	27.73
30	53.93	65.83	9.98	17.96
35	48.52	59.23	3.38	7.09
40	44.18	53.94	-1.91	-4.59
45	40.63	49.60	-6.25	-16.89
50	37.65	45.96	-9.89	-29.66
55	35.12	42.88	-12.97	-42.82
60	32.94	40.21	-15.64	-56.29
65	31.04	37.89	-17.96	-70.02
70	29.37	35.85	-20.00	-83.98
75	27.89	34.04	-21.81	-98.13
90	24.29	29.65	-26.20	-141.49
105	21.58	26.35	-29.50	-185.88
120	19.47	23.76	-32.09	-231.02
135	17.76	21.69	-34.16	-276.73
150	16.36	19.97	-35.88	-322.89

Structures	Size (mm)	Area (m^2)	T/G	Inv IN	Inv OUT
CBMH 6	1829	2.63	98.20	95.44	95.29
CBMH 5	1829	2.63	98.20	95.52	95.50
CBMH 4	1829	2.63	98.20	-	95.58

Area A-8: Storage Table

Elevation (m)	System Depth (m)	CBMH 6 Volume (m^3)	CBMH 5 Volume (m^3)	CBMH 4 Volume (m^3)	Underground Storage: Combined Volume (m^3)	Surface Storage: CBMH 6 Area (m^2)	CBMH 6 Volume (m^3)	CBMH 5 Area (m^2)	CBMH 5 Volume (m^3)	CBMH 4 Area (m^2)	CBMH 4 Volume (m^3)	Total Storage: Ponding Volume (m^3)	**Total Volume (m^3)**	Design Head
95.29	0.00	-	-	-	-	-	-	-	-	-	-	-	**0**	-
95.50	0.21	0.55	-	-	0.55	-	-	-	-	-	-	-	**0.6**	0.06
95.58	0.29	0.76	0.21	0.00	4.83	-	-	-	-	-	-	-	**4.8**	0.14
95.96	0.67	1.76	1.21	1.00	21.49	-	-	-	-	-	-	-	**21.5**	0.52
96.49	1.20	3.15	2.60	2.39	43.18	-	-	-	-	-	-	-	**43.2**	1.05
97.00	1.71	4.49	3.94	3.73	47.20	-	-	-	-	-	-	-	**47.2**	1.56
97.80	2.51	6.59	6.04	5.83	53.51	-	-	-	-	-	-	-	**53.5**	2.36
98.00	2.71	6.59	6.04	5.83	53.51	-	-	-	-	-	-	-	**53.5**	2.56
98.20	2.91	6.59	6.04	5.83	53.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**53.5**	2.76
98.25	2.96	6.59	6.04	5.83	53.51	15.18	0.38	18.48	0.46	14.13	0.35	1.19	**54.7**	2.81
98.30	3.01	6.59	6.04	5.83	53.51	45.29	1.89	56.22	2.33	42.41	1.77	5.99	**59.5**	2.86
98.35	3.06	6.59	6.04	5.83	53.51	91.36	5.31	113.94	6.58	85.59	4.97	16.86	**70.4**	2.91
98.40	3.11	6.59	6.04	5.83	53.51	150.17	11.35	191.36	14.22	141.97	10.66	36.22	**89.7**	2.96

PI =	3.141592654
pipe I.D.=	914
U/G Storage Pipe Volume	
End Area	0.656 (m^2)
Total Length	26.6 (m)
Pipe Volume	17.5 (m^3)

PI =	3.141592654
pipe I.D.=	914
U/G Storage Pipe Volume	
End Area	0.656 (m^2)
Total Length	26.8 (m)
Pipe Volume	17.6 (m^3)

Circular Plug Type 226mm Orifice

1:100 Yr	
Flow (L/s) =	189.5
Head (m) =	2.96
Elevation (m) =	**98.40**
Outlet Pipe Dia.(mm) =	305
Volume (m3) =	89.4
1:5 Yr	
Flow (L/s) =	111.7
Head (m) =	1.03
Elevation (m) =	**96.47**
Outlet Pipe Dia.(mm) =	305
Volume (m3) =	42.8
1:2 Yr	
Flow (L/s) =	92.0
Head (m) =	0.70
Elevation (m) =	**96.14**
Outlet Pipe Dia.(mm) =	305
Volume (m3) =	28.7

Orifice Size - 1:100 yr Flow Check

Q=0.62xAx(2gh)^0.5

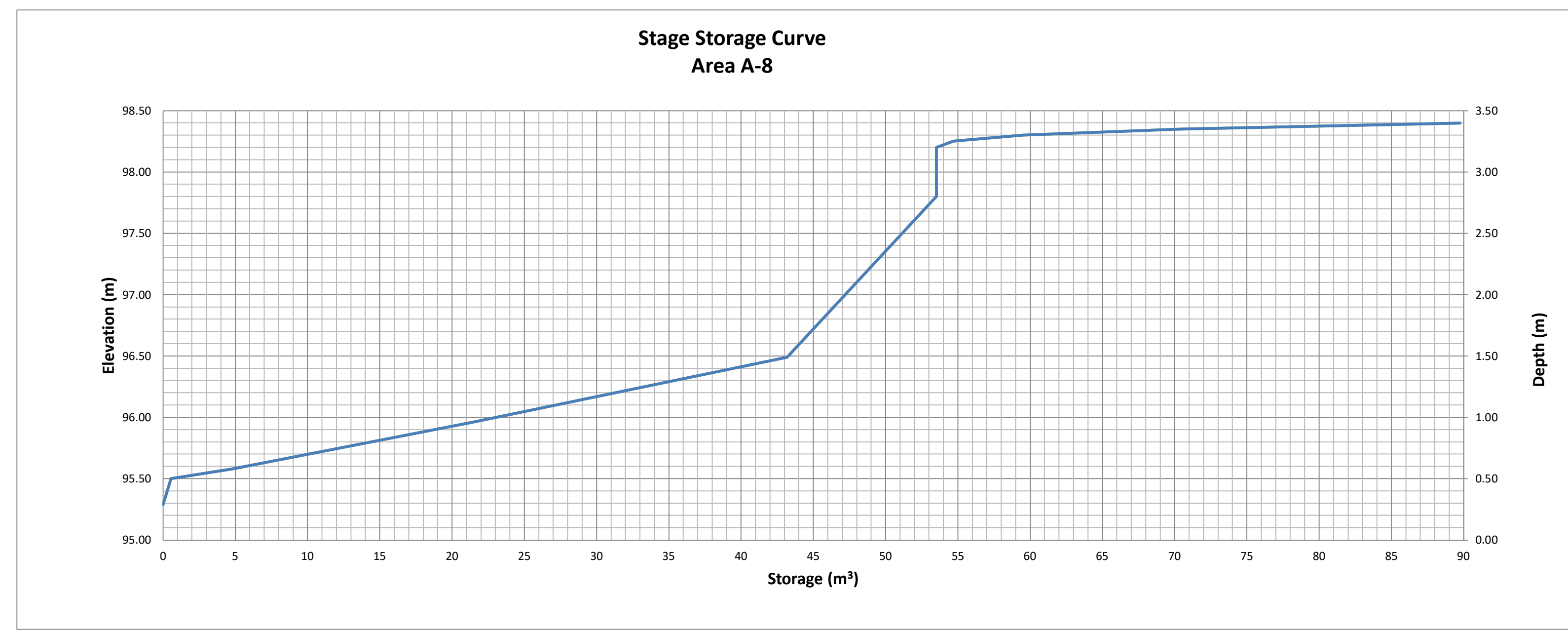
	1:100 yr	Flow Check
Q (m^3/s) =	0.1895	**0.1895**
g (m/s^2) =	9.81	9.81
h (m) =	**2.96**	2.96
A (m^2) =	**0.040124132**	**0.04011**
D (m) =	**0.226025731**	**0.22600**
D (mm) =	**226**	226.0

1:5 yr Flow Check

	1:5 yr
Q (m^3/s) =	0.1117
g (m/s^2) =	9.81
h (m) =	**1.03**
A (m^2) =	**0.04011**
D (m) =	**0.226**
D (mm) =	**226**

1:2 yr Flow Check

	1:2 yr
Q (m^3/s) =	0.0920
g (m/s^2) =	9.81
h (m) =	**0.70**
A (m^2) =	**0.04011**
D (m) =	**0.226**
D (mm) =	**226**



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 = 0.054 ha Qallow = 1.34 L/s
C = 0.90 Vol(max) = 11.2 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	19.00	17.66	5.30
10	104.19	14.02	12.68	7.61
15	83.56	11.24	9.90	8.91
20	70.25	9.45	8.11	9.74
25	60.90	8.20	6.86	10.28
30	53.93	7.26	5.92	10.65
35	48.52	6.53	5.19	10.90
40	44.18	5.95	4.61	11.05
45	40.63	5.47	4.13	11.14
50	37.65	5.07	3.73	11.18
55	35.12	4.73	3.39	11.18
60	32.94	4.43	3.09	11.14
65	31.04	4.18	2.84	11.07
70	29.37	3.95	2.61	10.97
75	27.89	3.75	2.41	10.86
90	24.29	3.27	1.93	10.41
105	21.58	2.90	1.56	9.86
120	19.47	2.62	1.28	9.22

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 = 0.054 ha Qallow = 1.58 L/s
C = 1.00 Vol(max) = 24.8 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	36.43	34.85	10.46
10	178.56	26.81	25.23	15.14
15	142.89	21.45	19.87	17.88
20	119.95	18.01	16.43	19.71
25	103.85	15.59	14.01	21.01
30	91.87	13.79	12.21	21.98
35	82.58	12.40	10.82	22.72
40	75.15	11.28	9.70	23.28
45	69.05	10.37	8.79	23.72
50	63.95	9.60	8.02	24.06
55	59.62	8.95	7.37	24.32
60	55.89	8.39	6.81	24.52
65	52.65	7.90	6.32	24.66
70	49.79	7.47	5.89	24.76
75	47.26	7.09	5.51	24.81
90	41.11	6.17	4.59	24.79
105	36.50	5.48	3.90	24.56
120	32.89	4.94	3.36	24.18

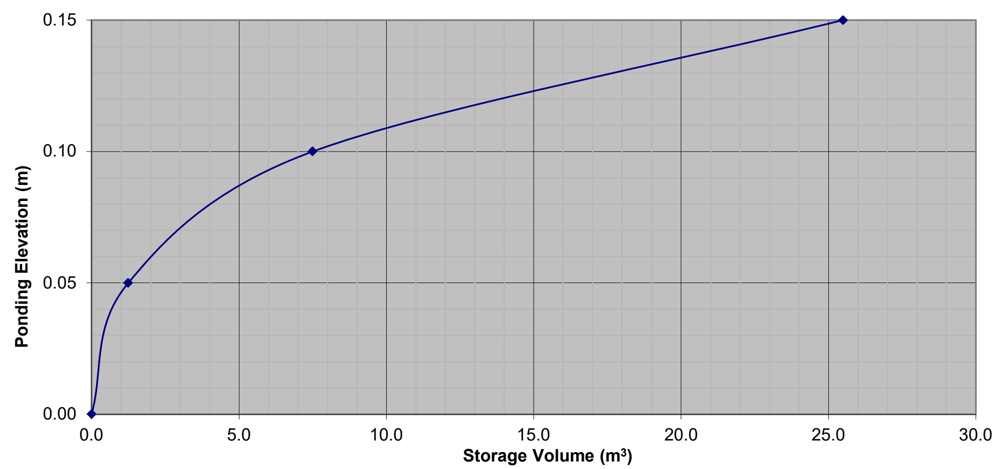
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to 3/4 Exposed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:5 Year	1.34	1.34	12	11.2	25.5
1:100 Year	1.58	1.58	15	24.8	25.5

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	49.6	1.2
0.10	200.4	7.5
0.15	519.7	25.5

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 = 0.041 ha   Qallow = 1.10 L/s
C = 0.90   Vol(max) = 8.2 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	14.33	13.23	3.97
10	104.19	10.58	9.48	5.69
15	83.56	8.48	7.38	6.64
20	70.25	7.13	6.03	7.24
25	60.90	6.18	5.08	7.62
30	53.93	5.47	4.37	7.87
35	48.52	4.93	3.83	8.03
40	44.18	4.49	3.39	8.13
45	40.63	4.12	3.02	8.17
50	37.65	3.82	2.72	8.17
55	35.12	3.57	2.47	8.14
60	32.94	3.34	2.24	8.08
65	31.04	3.15	2.05	8.00
70	29.37	2.98	1.88	7.90
75	27.89	2.83	1.73	7.79
90	24.29	2.47	1.37	7.38
105	21.58	2.19	1.09	6.87
120	19.47	1.98	0.88	6.31

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 = 0.041 ha   Qallow = 1.34 L/s
C = 1.00   Vol(max) = 18.0 m3

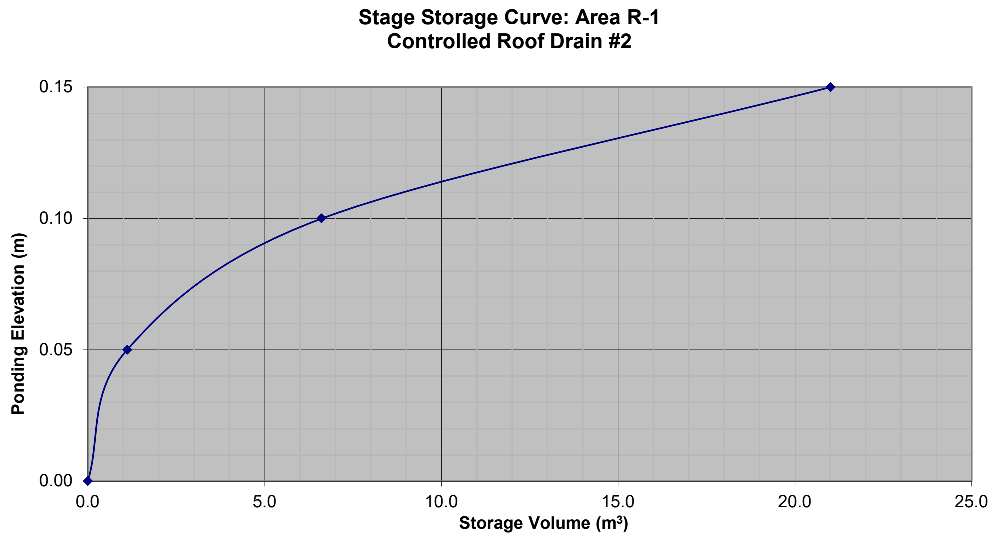
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	27.38	26.04	7.81
10	178.56	20.14	18.80	11.28
15	142.89	16.12	14.78	13.30
20	119.95	13.53	12.19	14.63
25	103.85	11.71	10.37	15.56
30	91.87	10.36	9.02	16.24
35	82.58	9.32	7.98	16.75
40	75.15	8.48	7.14	17.13
45	69.05	7.79	6.45	17.41
50	63.95	7.21	5.87	17.62
55	59.62	6.73	5.39	17.77
60	55.89	6.31	4.97	17.87
65	52.65	5.94	4.60	17.93
70	49.79	5.62	4.28	17.96
75	47.26	5.33	3.99	17.96
90	41.11	4.64	3.30	17.81
105	36.50	4.12	2.78	17.50
120	32.89	3.71	2.37	17.07

Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to 3/4 Exposed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:5 Year	1.10	1.10	11	8.2	21.0
1:100 Year	1.34	1.34	14	18.0	21.0

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	44.4	1.1
0.10	175.6	6.6
0.15	400.5	21.0



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 = 0.060 ha Qallow = 1.26 L/s
C = 0.90 Vol(max) = 13.2 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	21.09	19.83	5.95
10	104.19	15.57	14.31	8.58
15	83.56	12.48	11.22	10.10
20	70.25	10.50	9.24	11.08
25	60.90	9.10	7.84	11.76
30	53.93	8.06	6.80	12.23
35	48.52	7.25	5.99	12.58
40	44.18	6.60	5.34	12.82
45	40.63	6.07	4.81	12.99
50	37.65	5.63	4.37	13.10
55	35.12	5.25	3.99	13.16
60	32.94	4.92	3.66	13.18
65	31.04	4.64	3.38	13.17
70	29.37	4.39	3.13	13.14
75	27.89	4.17	2.91	13.08
90	24.29	3.63	2.37	12.79
105	21.58	3.22	1.96	12.38
120	19.47	2.91	1.65	11.87

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 = 0.060 ha Qallow = 1.58 L/s
C = 1.00 Vol(max) = 28.3 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	40.29	38.71	11.61
10	178.56	29.64	28.06	16.84
15	142.89	23.72	22.14	19.93
20	119.95	19.91	18.33	22.00
25	103.85	17.24	15.66	23.49
30	91.87	15.25	13.67	24.61
35	82.58	13.71	12.13	25.47
40	75.15	12.47	10.89	26.15
45	69.05	11.46	9.88	26.68
50	63.95	10.62	9.04	27.11
55	59.62	9.90	8.32	27.45
60	55.89	9.28	7.70	27.72
65	52.65	8.74	7.16	27.92
70	49.79	8.27	6.69	28.08
75	47.26	7.84	6.26	28.19
90	41.11	6.82	5.24	28.32
105	36.50	6.06	4.48	28.22
120	32.89	5.46	3.88	27.94

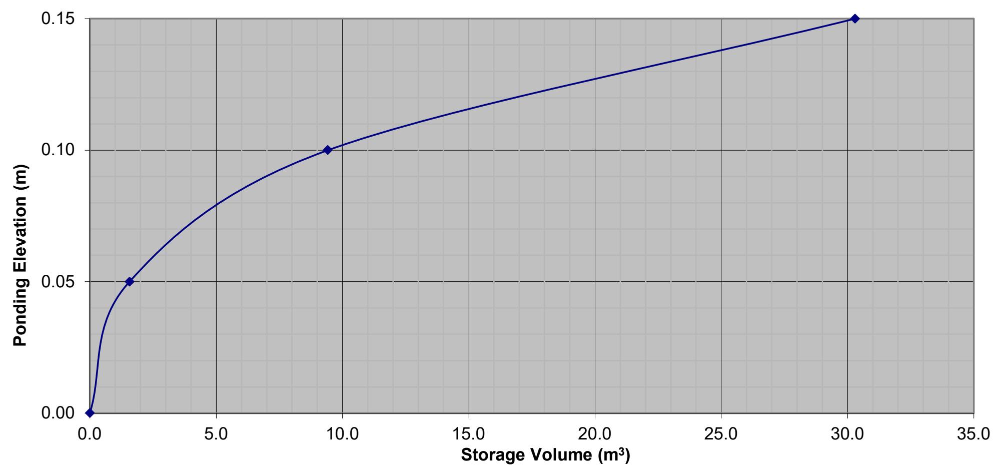
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to Fully Exposed

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	13.2	30.3
1:100 Year	1.58	1.58	14	28.3	30.3

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	62.8	1.6
0.10	251.2	9.4
0.15	584.2	30.3

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 = 0.046 ha Qallow = 1.10 L/s
C = 0.90 Vol(max) = 9.7 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	16.23	15.13	4.54
10	104.19	11.98	10.88	6.53
15	83.56	9.61	8.51	7.66
20	70.25	8.08	6.98	8.37
25	60.90	7.00	5.90	8.85
30	53.93	6.20	5.10	9.18
35	48.52	5.58	4.48	9.41
40	44.18	5.08	3.98	9.55
45	40.63	4.67	3.57	9.64
50	37.65	4.33	3.23	9.69
55	35.12	4.04	2.94	9.70
60	32.94	3.79	2.69	9.68
65	31.04	3.57	2.47	9.63
70	29.37	3.38	2.28	9.56
75	27.89	3.21	2.11	9.48
90	24.29	2.79	1.69	9.14
105	21.58	2.48	1.38	8.70
120	19.47	2.24	1.14	8.20

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 = 0.046 ha Qallow = 1.34 L/s
C = 1.00 Vol(max) = 21.1 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	31.01	29.67	8.90
10	178.56	22.81	21.47	12.88
15	142.89	18.26	16.92	15.22
20	119.95	15.32	13.98	16.78
25	103.85	13.27	11.93	17.89
30	91.87	11.74	10.40	18.71
35	82.58	10.55	9.21	19.34
40	75.15	9.60	8.26	19.83
45	69.05	8.82	7.48	20.20
50	63.95	8.17	6.83	20.49
55	59.62	7.62	6.28	20.72
60	55.89	7.14	5.80	20.88
65	52.65	6.73	5.39	21.01
70	49.79	6.36	5.02	21.09
75	47.26	6.04	4.70	21.14
90	41.11	5.25	3.91	21.13
105	36.50	4.66	3.32	20.93
120	32.89	4.20	2.86	20.61

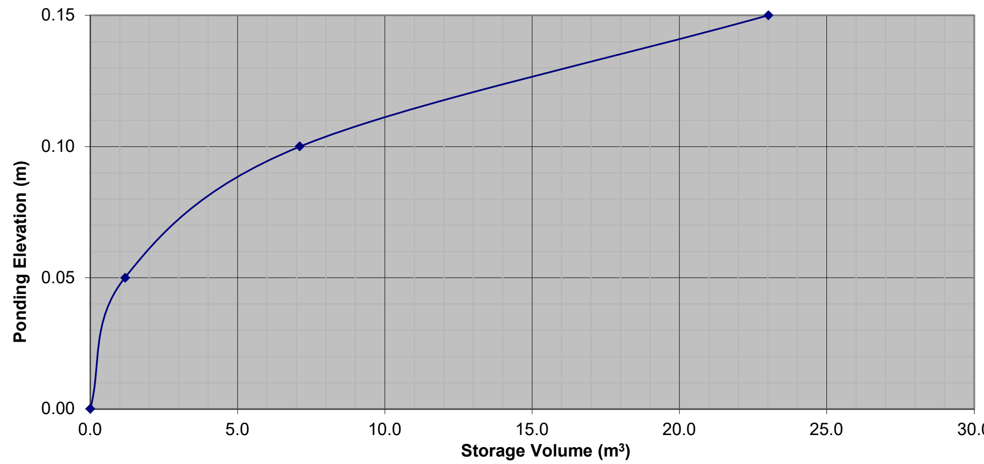
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to 3/4 Exposed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:5 Year	1.10	1.10	11	9.7	23.0
1:100 Year	1.34	1.34	14	21.1	23.0

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	47.2	1.2
0.10	189.8	7.1
0.15	446.5	23.0

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 = 0.042 ha   Qallow = 1.10 L/s
C = 0.90   Vol(max) = 8.5 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	14.78	13.68	4.10
10	104.19	10.90	9.80	5.88
15	83.56	8.74	7.64	6.88
20	70.25	7.35	6.25	7.50
25	60.90	6.37	5.27	7.91
30	53.93	5.64	4.54	8.18
35	48.52	5.08	3.98	8.35
40	44.18	4.62	3.52	8.46
45	40.63	4.25	3.15	8.51
50	37.65	3.94	2.84	8.52
55	35.12	3.68	2.58	8.50
60	32.94	3.45	2.35	8.45
65	31.04	3.25	2.15	8.38
70	29.37	3.07	1.97	8.29
75	27.89	2.92	1.82	8.18
90	24.29	2.54	1.44	7.79
105	21.58	2.26	1.16	7.30
120	19.47	2.04	0.94	6.75

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 = 0.042 ha   Qallow = 1.34 L/s
C = 1.00   Vol(max) = 18.7 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	28.22	26.88	8.06
10	178.56	20.76	19.42	11.65
15	142.89	16.62	15.28	13.75
20	119.95	13.95	12.61	15.13
25	103.85	12.08	10.74	16.10
30	91.87	10.68	9.34	16.82
35	82.58	9.60	8.26	17.35
40	75.15	8.74	7.40	17.76
45	69.05	8.03	6.69	18.06
50	63.95	7.44	6.10	18.29
55	59.62	6.93	5.59	18.46
60	55.89	6.50	5.16	18.58
65	52.65	6.12	4.78	18.65
70	49.79	5.79	4.45	18.69
75	47.26	5.50	4.16	18.70
90	41.11	4.78	3.44	18.58
105	36.50	4.24	2.90	18.30
120	32.89	3.83	2.49	17.89

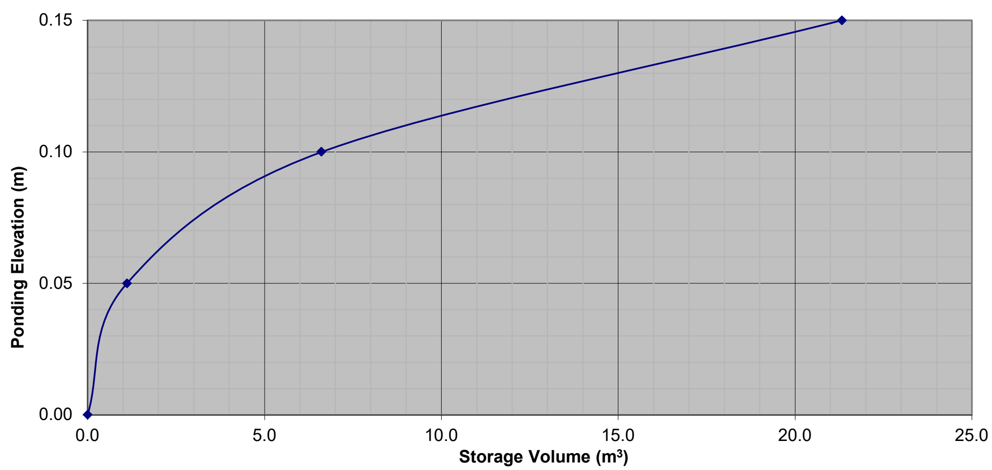
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to 3/4 Exposed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:5 Year	1.10	1.10	11	8.5	21.3
1:100 Year	1.34	1.34	14	18.7	21.3

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	44.4	1.1
0.10	175.7	6.6
0.15	412.8	21.3

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 = 0.065 ha; Qallow = 1.26 L/s
C = 0.90; Vol(max) = 14.8 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	23.03	21.77	6.53
10	104.19	16.99	15.73	9.44
15	83.56	13.63	12.37	11.13
20	70.25	11.46	10.20	12.24
25	60.90	9.93	8.67	13.01
30	53.93	8.80	7.54	13.57
35	48.52	7.91	6.65	13.97
40	44.18	7.21	5.95	14.27
45	40.63	6.63	5.37	14.49
50	37.65	6.14	4.88	14.64
55	35.12	5.73	4.47	14.75
60	32.94	5.37	4.11	14.81
65	31.04	5.06	3.80	14.83
70	29.37	4.79	3.53	14.83
75	27.89	4.55	3.29	14.80
90	24.29	3.96	2.70	14.59
105	21.58	3.52	2.26	14.24
120	19.47	3.18	1.92	13.79

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 = 0.065 ha; Qallow = 1.89 L/s
C = 1.00; Vol(max) = 30.0 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	43.99	42.10	12.63
10	178.56	32.36	30.47	18.28
15	142.89	25.90	24.01	21.61
20	119.95	21.74	19.85	23.82
25	103.85	18.82	16.93	25.40
30	91.87	16.65	14.76	26.57
35	82.58	14.97	13.08	27.46
40	75.15	13.62	11.73	28.15
45	69.05	12.51	10.62	28.69
50	63.95	11.59	9.70	29.10
55	59.62	10.81	8.92	29.42
60	55.89	10.13	8.24	29.66
65	52.65	9.54	7.65	29.84
70	49.79	9.02	7.13	29.96
75	47.26	8.56	6.67	30.03
90	41.11	7.45	5.56	30.03
105	36.50	6.61	4.72	29.76
120	32.89	5.96	4.07	29.32

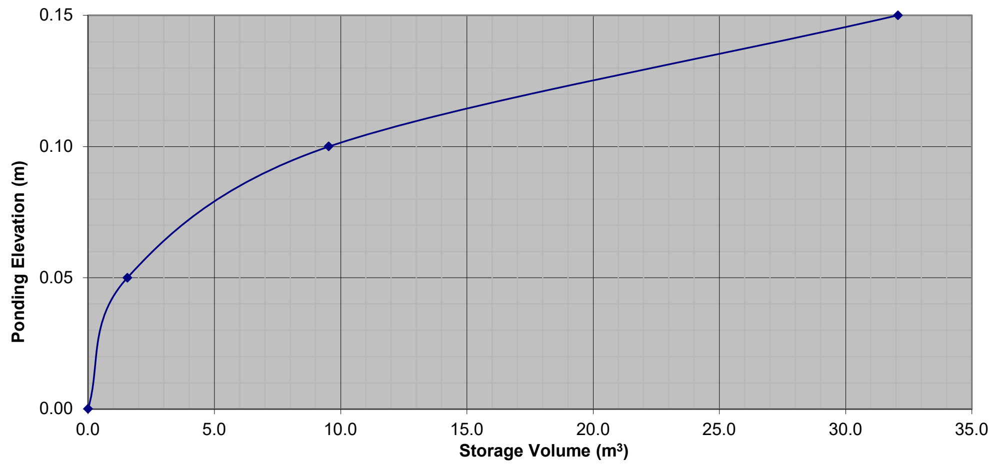
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to Fully Exposed

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	14.8	32.1
1:100 Year	1.89	1.89	14	30.0	32.1

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	62.2	1.6
0.10	256.6	9.5
0.15	645.2	32.1

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-2 **Controlled Roof Drain RD 1, RD 2, RD 3**

OTTAWA IDF CURVE
Area = 0.090 ha Qallow = 2.85 L/s
C = 0.90 Vol(max) = 17.1 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	31.89	29.04	8.71
10	104.19	23.53	20.68	12.41
15	83.56	18.87	16.02	14.42
20	70.25	15.87	13.02	15.62
25	60.90	13.75	10.90	16.36
30	53.93	12.18	9.33	16.79
35	48.52	10.96	8.11	17.03
40	44.18	9.98	7.13	17.11
45	40.63	9.18	6.33	17.08
50	37.65	8.50	5.65	16.96
55	35.12	7.93	5.08	16.77
60	32.94	7.44	4.59	16.53
65	31.04	7.01	4.16	16.23
70	29.37	6.63	3.78	15.89
75	27.89	6.30	3.45	15.52
90	24.29	5.49	2.64	14.23
105	21.58	4.87	2.02	12.76
120	19.47	4.40	1.55	11.14

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

OTTAWA IDF CURVE
Area = 0.090 ha Qallow = 3.30 L/s
C = 1.00 Vol(max) = 38.7 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	60.91	57.61	17.28
10	178.56	44.81	41.51	24.91
15	142.89	35.86	32.56	29.30
20	119.95	30.10	26.80	32.16
25	103.85	26.06	22.76	34.14
30	91.87	23.06	19.76	35.56
35	82.58	20.72	17.42	36.59
40	75.15	18.86	15.56	37.34
45	69.05	17.33	14.03	37.88
50	63.95	16.05	12.75	38.25
55	59.62	14.96	11.66	38.49
60	55.89	14.03	10.73	38.62
65	52.65	13.21	9.91	38.66
70	49.79	12.50	9.20	38.62
75	47.26	11.86	8.56	38.52
90	41.11	10.32	7.02	37.89
105	36.50	9.16	5.86	36.91
120	32.89	8.26	4.96	35.68

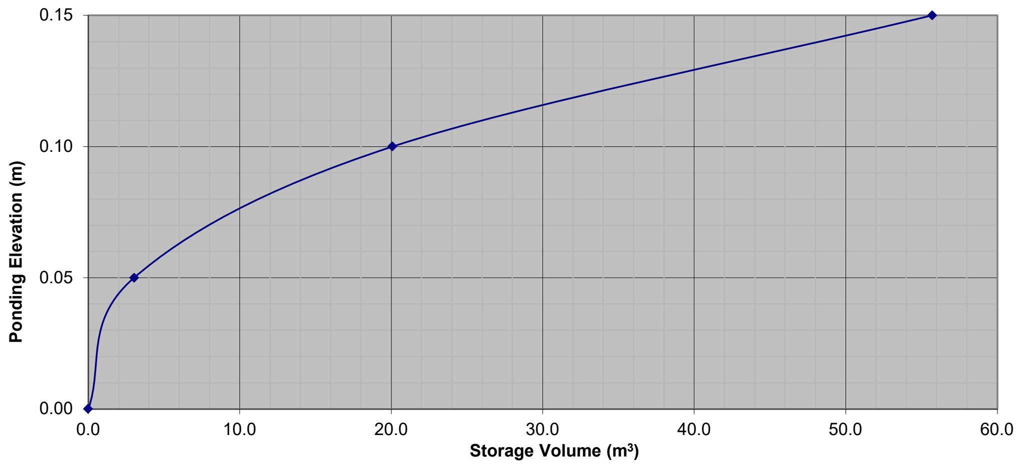
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to 1/2 Exposed

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	2.85	11	17.1	55.7
1:100 Year	1.10	3.30	13	38.7	55.7

Roof Drain Storage Table for Building B RD-1,2,3

Elevation	Area RD 1	Total Volume
m	m^2	m^3
0.00	0	0
0.05	121.2	3.0
0.10	560.7	20.1
0.15	865.1	55.7

Stage Storage Curve: Area R-2
Controlled Roof Drain #1,2,&3



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

OTTAWA IDF CURVE

Area = 0.030 ha Qallow = 0.95 L/s
C = 0.90 Vol(max) = 5.7 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	10.64	9.69	2.91
10	104.19	7.85	6.90	4.14
15	83.56	6.30	5.35	4.81
20	70.25	5.29	4.34	5.21
25	60.90	4.59	3.64	5.46
30	53.93	4.06	3.11	5.60
35	48.52	3.66	2.71	5.68
40	44.18	3.33	2.38	5.71
45	40.63	3.06	2.11	5.70
50	37.65	2.84	1.89	5.66
55	35.12	2.65	1.70	5.60
60	32.94	2.48	1.53	5.52
65	31.04	2.34	1.39	5.42
70	29.37	2.21	1.26	5.30
75	27.89	2.10	1.15	5.18
90	24.29	1.83	0.88	4.75
105	21.58	1.63	0.68	4.26
120	19.47	1.47	0.52	3.72

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

OTTAWA IDF CURVE

Area = 0.030 ha Qallow = 1.10 L/s
C = 1.00 Vol(max) = 12.9 m3

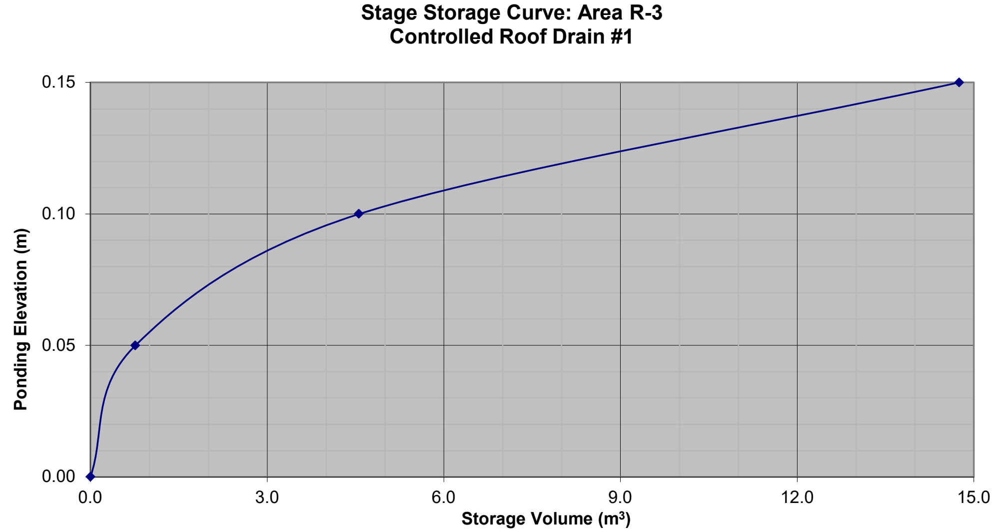
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	20.32	19.22	5.77
10	178.56	14.95	13.85	8.31
15	142.89	11.96	10.86	9.78
20	119.95	10.04	8.94	10.73
25	103.85	8.69	7.59	11.39
30	91.87	7.69	6.59	11.86
35	82.58	6.91	5.81	12.21
40	75.15	6.29	5.19	12.46
45	69.05	5.78	4.68	12.64
50	63.95	5.35	4.25	12.76
55	59.62	4.99	3.89	12.84
60	55.89	4.68	3.58	12.89
65	52.65	4.41	3.31	12.90
70	49.79	4.17	3.07	12.89
75	47.26	3.96	2.86	12.85
90	41.11	3.44	2.34	12.64
105	36.50	3.06	1.96	12.32
120	32.89	2.75	1.65	11.91

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	11	5.7	14.8
1:100 Year	1.10	1.10	14	12.9	14.8

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	30.5	0.8
0.10	121.4	4.6
0.15	286.4	14.8



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

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-3 Controlled Roof Drain RD 2

OTTAWA IDF CURVE

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

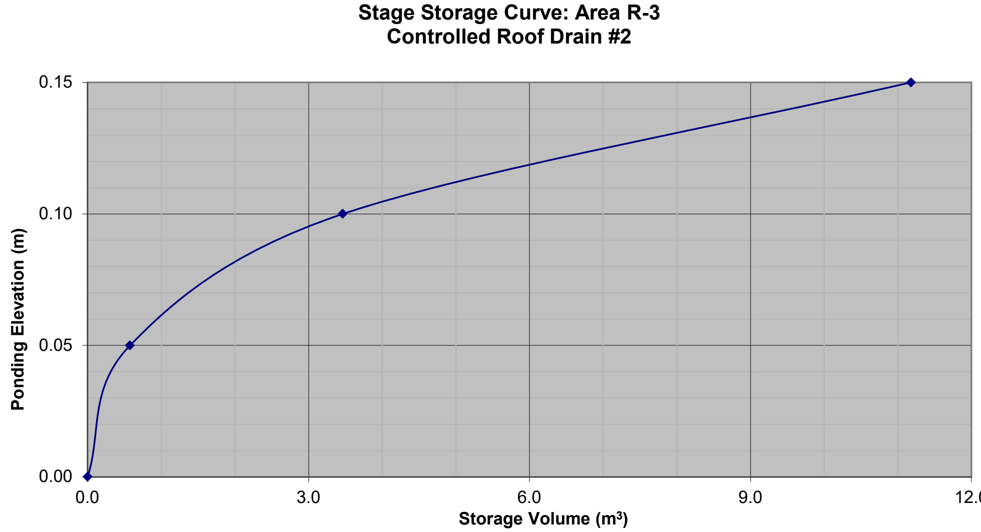
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	15.02	13.92	4.18
10	178.56	11.05	9.95	5.97
15	142.89	8.84	7.74	6.97
20	119.95	7.42	6.32	7.59
25	103.85	6.43	5.33	7.99
30	91.87	5.68	4.58	8.25
35	82.58	5.11	4.01	8.42
40	75.15	4.65	3.55	8.52
45	69.05	4.27	3.17	8.57
50	63.95	3.96	2.86	8.57
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	Storage (m^3) Provided
1:5 Year	0.95	0.95	10	3.7	11.2
1:100 Year	1.10	1.10	13	8.6	11.2

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	23.0	0.6
0.10	92.4	3.5
0.15	216.3	11.2



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

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	7.89	6.94	2.08
10	104.19	5.82	4.87	2.92
15	83.56	4.67	3.72	3.35
20	70.25	3.93	2.98	3.57
25	60.90	3.40	2.45	3.68
30	53.93	3.01	2.06	3.72
35	48.52	2.71	1.76	3.70
40	44.18	2.47	1.52	3.65
45	40.63	2.27	1.32	3.57
50	37.65	2.10	1.15	3.46
55	35.12	1.96	1.01	3.34
60	32.94	1.84	0.89	3.21
65	31.04	1.74	0.79	3.06
70	29.37	1.64	0.69	2.90
75	27.89	1.56	0.61	2.74
90	24.29	1.36	0.41	2.20
105	21.58	1.21	0.26	1.61
120	19.47	1.09	0.14	0.99

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

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	15.07	13.97	4.19
10	178.56	11.09	9.99	5.99
15	142.89	8.87	7.77	7.00
20	119.95	7.45	6.35	7.62
25	103.85	6.45	5.35	8.02
30	91.87	5.71	4.61	8.29
35	82.58	5.13	4.03	8.46
40	75.15	4.67	3.57	8.56
45	69.05	4.29	3.19	8.61
50	63.95	3.97	2.87	8.61
55	59.62	3.70	2.60	8.59
60	55.89	3.47	2.37	8.54
65	52.65	3.27	2.17	8.46
70	49.79	3.09	1.99	8.37
75	47.26	2.93	1.83	8.26
90	41.11	2.55	1.45	7.85
105	36.50	2.27	1.17	7.35
120	32.89	2.04	0.94	6.79

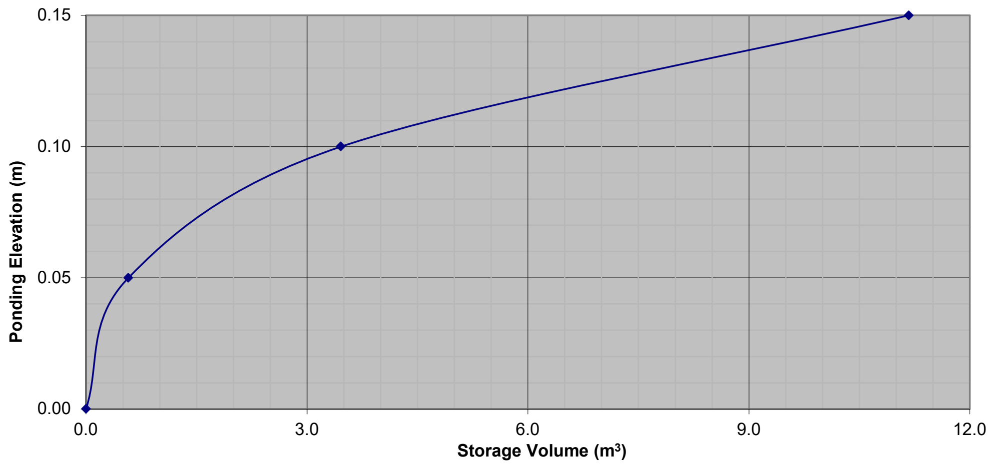
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to 1/2 Exposed

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	3.7	11.2
1:100 Year	1.10	1.10	13	8.6	11.2

Roof Drain Storage Table for Building C RD-3

Elevation	Area RD 1	Total Volume
m	m^2	m^3
0.00	0	0
0.05	23.0	0.6
0.10	92.3	3.5
0.15	216.1	11.2

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



150 DUN SKIPPER DRIVE
PROJECT NO: 124107
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-3 Controlled Roof Drain RD 4

OTTAWA IDF CURVE
Area = 0.028 ha Qallow = 0.95 L/s
C = 0.90 Vol(max) = 5.1 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	9.86	8.91	2.67
10	104.19	7.28	6.33	3.80
15	83.56	5.84	4.89	4.40
20	70.25	4.91	3.96	4.75
25	60.90	4.25	3.30	4.95
30	53.93	3.77	2.82	5.07
35	48.52	3.39	2.44	5.12
40	44.18	3.09	2.14	5.13
45	40.63	2.84	1.89	5.10
50	37.65	2.63	1.68	5.04
55	35.12	2.45	1.50	4.96
60	32.94	2.30	1.35	4.86
65	31.04	2.17	1.22	4.75
70	29.37	2.05	1.10	4.62
75	27.89	1.95	1.00	4.49
90	24.29	1.70	0.75	4.03
105	21.58	1.51	0.56	3.51
120	19.47	1.36	0.41	2.95

150 DUN SKIPPER DRIVE
PROJECT NO: 124107
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-3 Controlled Roof Drain RD 4

OTTAWA IDF CURVE
Area = 0.028 ha Qallow = 1.10 L/s
C = 1.00 Vol(max) = 11.7 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	18.83	17.73	5.32
10	178.56	13.85	12.75	7.65
15	142.89	11.09	9.99	8.99
20	119.95	9.31	8.21	9.85
25	103.85	8.06	6.96	10.44
30	91.87	7.13	6.03	10.85
35	82.58	6.41	5.31	11.15
40	75.15	5.83	4.73	11.35
45	69.05	5.36	4.26	11.50
50	63.95	4.96	3.86	11.59
55	59.62	4.63	3.53	11.64
60	55.89	4.34	3.24	11.65
65	52.65	4.08	2.98	11.64
70	49.79	3.86	2.76	11.61
75	47.26	3.67	2.57	11.55
90	41.11	3.19	2.09	11.29
105	36.50	2.83	1.73	10.91
120	32.89	2.55	1.45	10.46

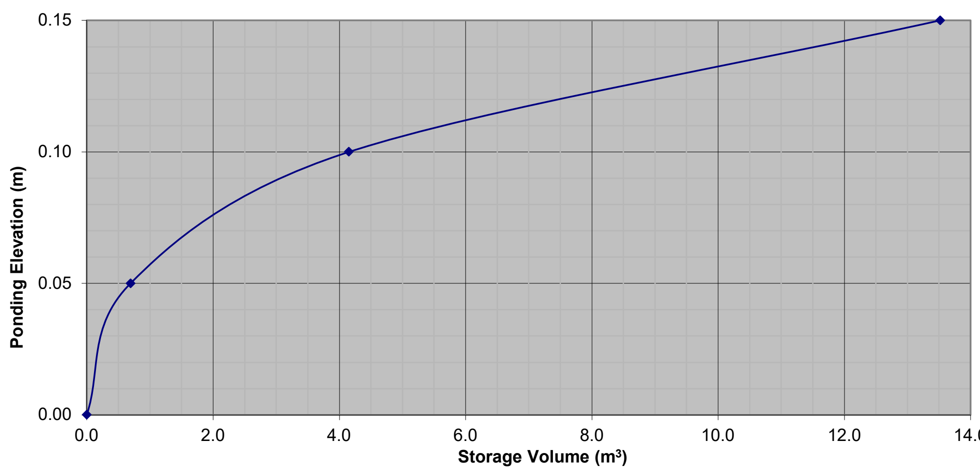
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to 1/2 Exposed

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	11	5.1	13.5
1:100 Year	1.10	1.10	14	11.7	13.5

Roof Drain Storage Table for Building C RD-4

Elevation	Area RD 1	Total Volume
m	m^2	m^3
0.00	0	0
0.05	27.7	0.7
0.10	110.5	4.2
0.15	264.3	13.5

Stage Storage Curve: Area R-3
Controlled Roof Drain #4



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

OTTAWA IDF CURVE

Area = 0.023 ha Qallow = 0.95 L/s
C = 0.90 Vol(max) = 3.9 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	141.18	8.18	7.23	2.17
10	104.19	6.04	5.09	3.05
15	83.56	4.84	3.89	3.50
20	70.25	4.07	3.12	3.75
25	60.90	3.53	2.58	3.87
30	53.93	3.13	2.18	3.92
35	48.52	2.81	1.86	3.91
40	44.18	2.56	1.61	3.86
45	40.63	2.35	1.40	3.79
50	37.65	2.18	1.23	3.70
55	35.12	2.04	1.09	3.58
60	32.94	1.91	0.96	3.45
65	31.04	1.80	0.85	3.31
70	29.37	1.70	0.75	3.16
75	27.89	1.62	0.67	3.00
90	24.29	1.41	0.46	2.47
105	21.58	1.25	0.30	1.89
120	19.47	1.13	0.18	1.28

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

OTTAWA IDF CURVE

Area = 0.023 ha Qallow = 1.10 L/s
C = 1.00 Vol(max) = 9.1 m3

Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	15.63	14.53	4.36
10	178.56	11.50	10.40	6.24
15	142.89	9.20	8.10	7.29
20	119.95	7.72	6.62	7.95
25	103.85	6.69	5.59	8.38
30	91.87	5.92	4.82	8.67
35	82.58	5.32	4.22	8.86
40	75.15	4.84	3.74	8.97
45	69.05	4.45	3.35	9.03
50	63.95	4.12	3.02	9.05
55	59.62	3.84	2.74	9.04
60	55.89	3.60	2.50	9.00
65	52.65	3.39	2.29	8.93
70	49.79	3.21	2.11	8.84
75	47.26	3.04	1.94	8.74
90	41.11	2.65	1.55	8.35
105	36.50	2.35	1.25	7.87
120	32.89	2.12	1.02	7.33

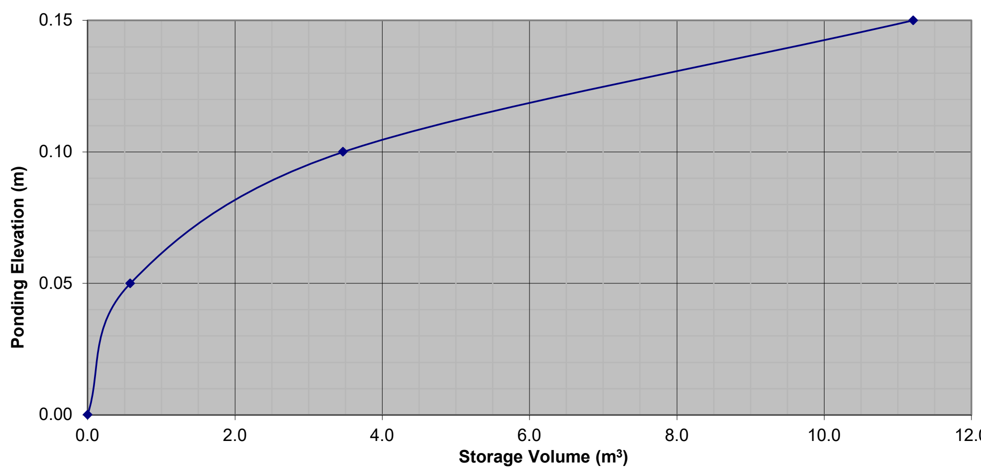
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to 1/2 Exposed

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	11	3.9	11.2
1:100 Year	1.10	1.10	14	9.1	11.2

Roof Drain Storage Table for Building D RD-1

Elevation	Area RD 1	Total Volume
m	m^2	m^3
0.00	0	0
0.05	23.2	0.6
0.10	92.3	3.5
0.15	217.4	11.2

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



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

OTTAWA IDF CURVE

Area = 0.012 ha Qallow = 0.79 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	4.29	3.50	1.05
10	104.19	3.17	2.38	1.43
15	83.56	2.54	1.75	1.58
20	70.25	2.14	1.35	1.61
25	60.90	1.85	1.06	1.59
30	53.93	1.64	0.85	1.53
35	48.52	1.47	0.68	1.44
40	44.18	1.34	0.55	1.33
45	40.63	1.24	0.45	1.20
50	37.65	1.14	0.35	1.06
55	35.12	1.07	0.28	0.92
60	32.94	1.00	0.21	0.76
65	31.04	0.94	0.15	0.60
70	29.37	0.89	0.10	0.43
75	27.89	0.85	0.06	0.26
90	24.29	0.74	-0.05	-0.28
105	21.58	0.66	-0.13	-0.84
120	19.47	0.59	-0.20	-1.43

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

OTTAWA IDF CURVE

Area = 0.012 ha Qallow = 0.87 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	8.20	7.33	2.20
10	178.56	6.03	5.16	3.10
15	142.89	4.83	3.96	3.56
20	119.95	4.05	3.18	3.82
25	103.85	3.51	2.64	3.96
30	91.87	3.10	2.23	4.02
35	82.58	2.79	1.92	4.03
40	75.15	2.54	1.67	4.00
45	69.05	2.33	1.46	3.95
50	63.95	2.16	1.29	3.87
55	59.62	2.01	1.14	3.77
60	55.89	1.89	1.02	3.66
65	52.65	1.78	0.91	3.54
70	49.79	1.68	0.81	3.41
75	47.26	1.60	0.73	3.27
90	41.11	1.39	0.52	2.80
105	36.50	1.23	0.36	2.29
120	32.89	1.11	0.24	1.74

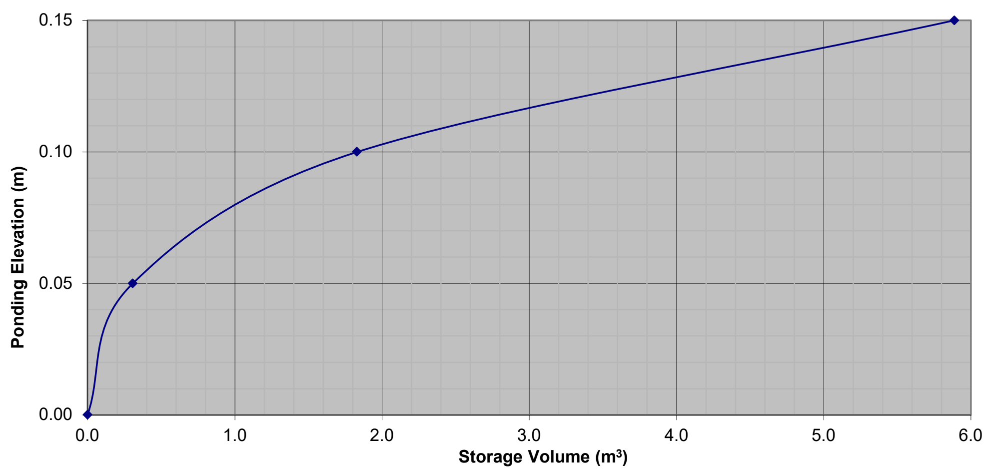
Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to 1/4 Exposed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:5 Year	0.79	0.79	10	1.6	5.9
1:100 Year	0.87	0.87	13	4.0	5.9

Roof Drain Storage Table for Building D RD-2

Elevation	Area RD 1	Total Volume
m	m^2	m^3
0.00	0	0
0.05	12.3	0.3
0.10	48.6	1.8
0.15	113.7	5.9

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



150 DUN SKIPPER DRIVE
PROJECT NO: 124107
REQUIRED STORAGE - 1:5 YEAR EVENT
AREA R-4 Controlled Roof Drain RD 3

OTTAWA IDF CURVE

Area = 0.012 ha Qallow = 0.79 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	4.24	3.45	1.03
10	104.19	3.13	2.34	1.40
15	83.56	2.51	1.72	1.55
20	70.25	2.11	1.32	1.58
25	60.90	1.83	1.04	1.56
30	53.93	1.62	0.83	1.49
35	48.52	1.46	0.67	1.40
40	44.18	1.33	0.54	1.29
45	40.63	1.22	0.43	1.16
50	37.65	1.13	0.34	1.02
55	35.12	1.05	0.26	0.87
60	32.94	0.99	0.20	0.72
65	31.04	0.93	0.14	0.55
70	29.37	0.88	0.09	0.39
75	27.89	0.84	0.05	0.21
90	24.29	0.73	-0.06	-0.33
105	21.58	0.65	-0.14	-0.89
120	19.47	0.58	-0.21	-1.48

150 DUN SKIPPER DRIVE
PROJECT NO: 124107
REQUIRED STORAGE - 1:100 YEAR EVENT
AREA R-4 Controlled Roof Drain RD 3

OTTAWA IDF CURVE

Area = 0.012 ha Qallow = 0.87 L/s
C = 1.00 Vol(max) = 4.0 m3

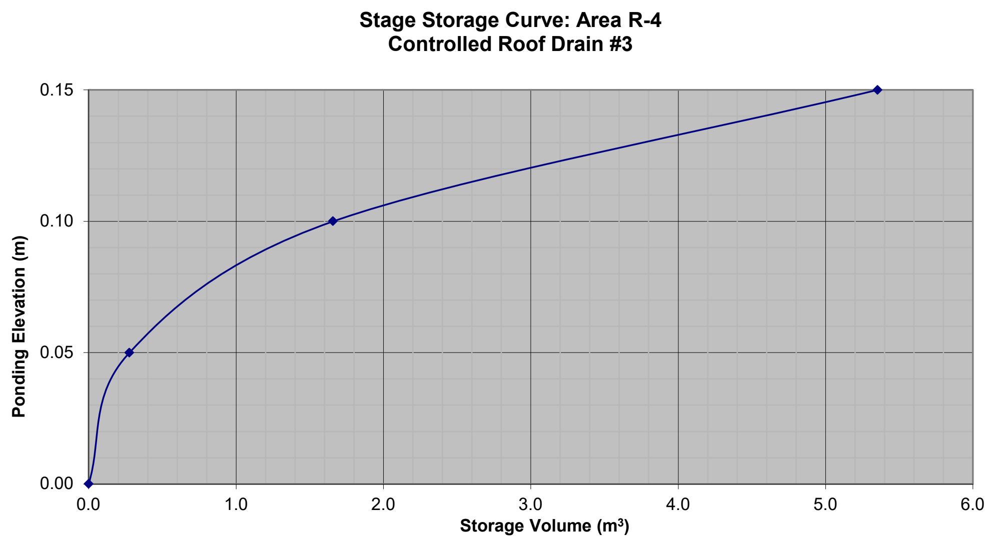
Time (min)	Intensity (mm/hr)	Q (L/s)	Qnet (L/s)	Vol (m3)
5	242.70	8.10	7.23	2.17
10	178.56	5.96	5.09	3.05
15	142.89	4.77	3.90	3.51
20	119.95	4.00	3.13	3.76
25	103.85	3.46	2.59	3.89
30	91.87	3.06	2.19	3.95
35	82.58	2.75	1.88	3.96
40	75.15	2.51	1.64	3.93
45	69.05	2.30	1.43	3.87
50	63.95	2.13	1.26	3.79
55	59.62	1.99	1.12	3.69
60	55.89	1.86	0.99	3.58
65	52.65	1.76	0.89	3.46
70	49.79	1.66	0.79	3.32
75	47.26	1.58	0.71	3.18
90	41.11	1.37	0.50	2.71
105	36.50	1.22	0.35	2.19
120	32.89	1.10	0.23	1.64

Watts Accutrol Flow Control Roof Drains: RD-100-A-ADJ set to 1/4 Exposed

Design Event	Flow/Drain (L/s)	Total Flow (L/s)	Ponding (cm)	Storage (m^3) Required	Storage (m^3) Provided
1:5 Year	0.79	0.79	10	1.6	5.4
1:100 Year	0.87	0.87	13	4.0	5.4

Roof Drain Storage Table for Building D RD-3

Elevation	Area RD 1	Total Volume
m	m^2	m^3
0.00	0	0
0.05	11.1	0.3
0.10	44.2	1.7
0.15	103.6	5.4



150 Dun Skipper Drive - Commercial Development
1:5 yr Storm Design Sheet

NOVATECH
Engineers, Planners & Landscape Architects

PROJECT NO: 124107
DESIGNED BY: MA
CHECKED BY: MS
DATE: September 30, 2024

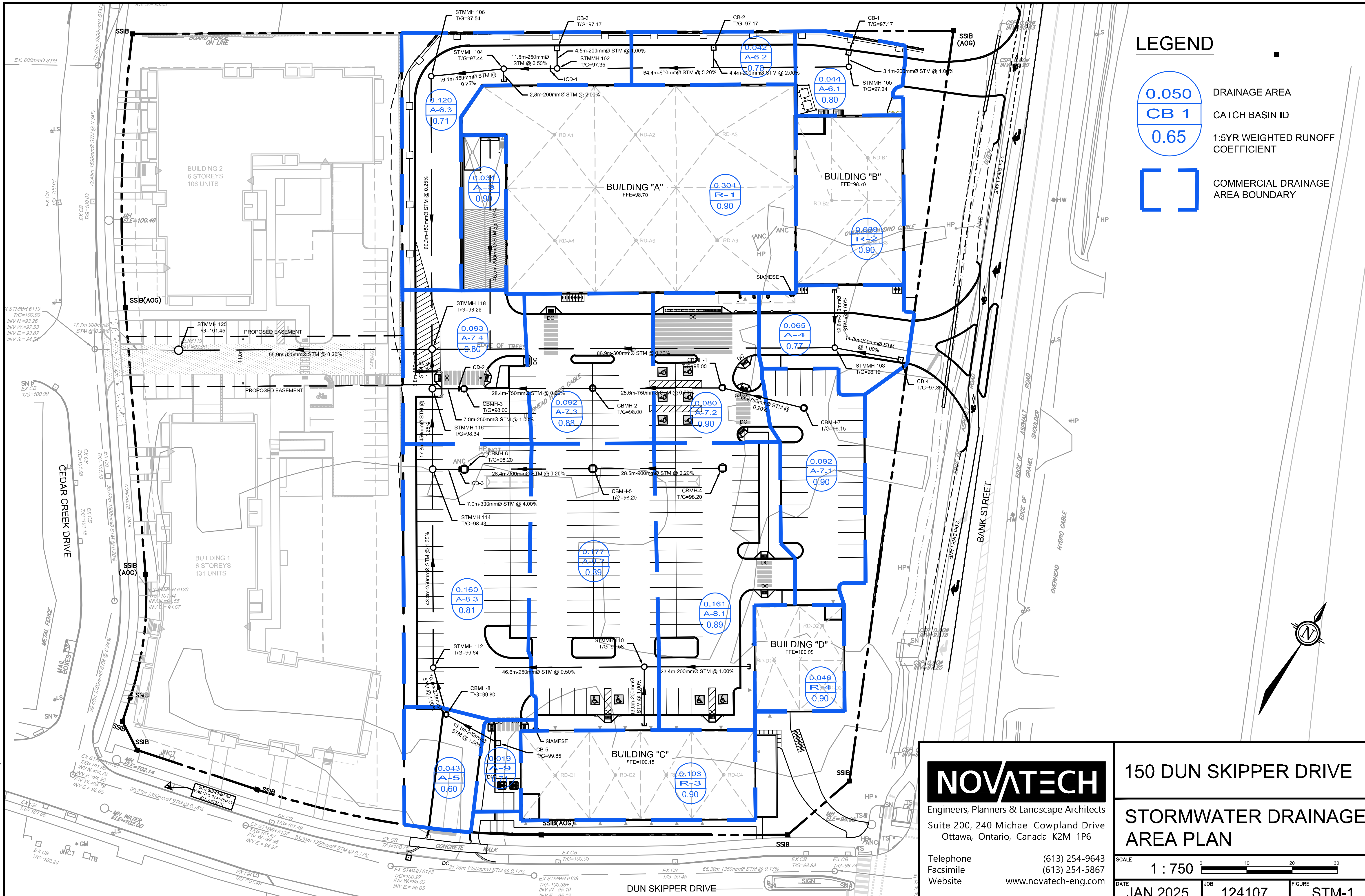
AREA	FROM MH	TO MH	AREA (ha) Total Area	C= 0.20	C = 0.90	INDIV 2.78 AC	ACCUM 2.78 AC	TIME OF CONC. (min)	RAINFALL INTENSITY (mm/hr)	CONTROLLED FLOW* Q (L/s)	PEAK FLOW Q (L/s)	PROPOSED SEWER TYPE OF PIPE	PIPE SIZE (mm)	PIPE ID (mm)	GRADE (%)	LENGTH (m)	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	TIME OF FLOW (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%
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								**250.1**	284.7	CONC	825	838.2	0.20	56.8	**669.7**	1.21	0.78	37%

NOTES:
1) Refer to Novatech Drawing 124107-GP for storm structure designations, storm pipe details and control structure tables.
2) Refer to Novatech Drawing 124107-SWM 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)$^{0.814}$



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150 DUN SKIPPER DRIVE

STORMWATER DRAINAGE AREA PLAN

SCALE 1 : 750

DATE JAN 2025 | JOB 124107 | FIGURE STM-1

SHT11X17.DWG - 279mmX432mm

M:\2024\124107\CAD\Civil\124107-STM.dwg, STM 11x17 L, Jan 07, 2025 - 8:52am, madeoti 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.

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**.

<u>Design Storms</u>

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.

<u>Area and Imperviousness</u>

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

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.

<u>Major System</u>

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.

<u>Street segments</u>

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.

<u>Rear yards</u>

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 (m³)	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 (m³)	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 (m³)	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

Inlet Control Device (ICD) Information

IPEX Tempest™ Inlet Control Devices

Municipal Technical Manual Series

Vol. I, 2nd Edition

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

Purpose

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

Product Description

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

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

Product Function

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

Product Construction

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

Product Applications

Will accommodate both square and round applications:

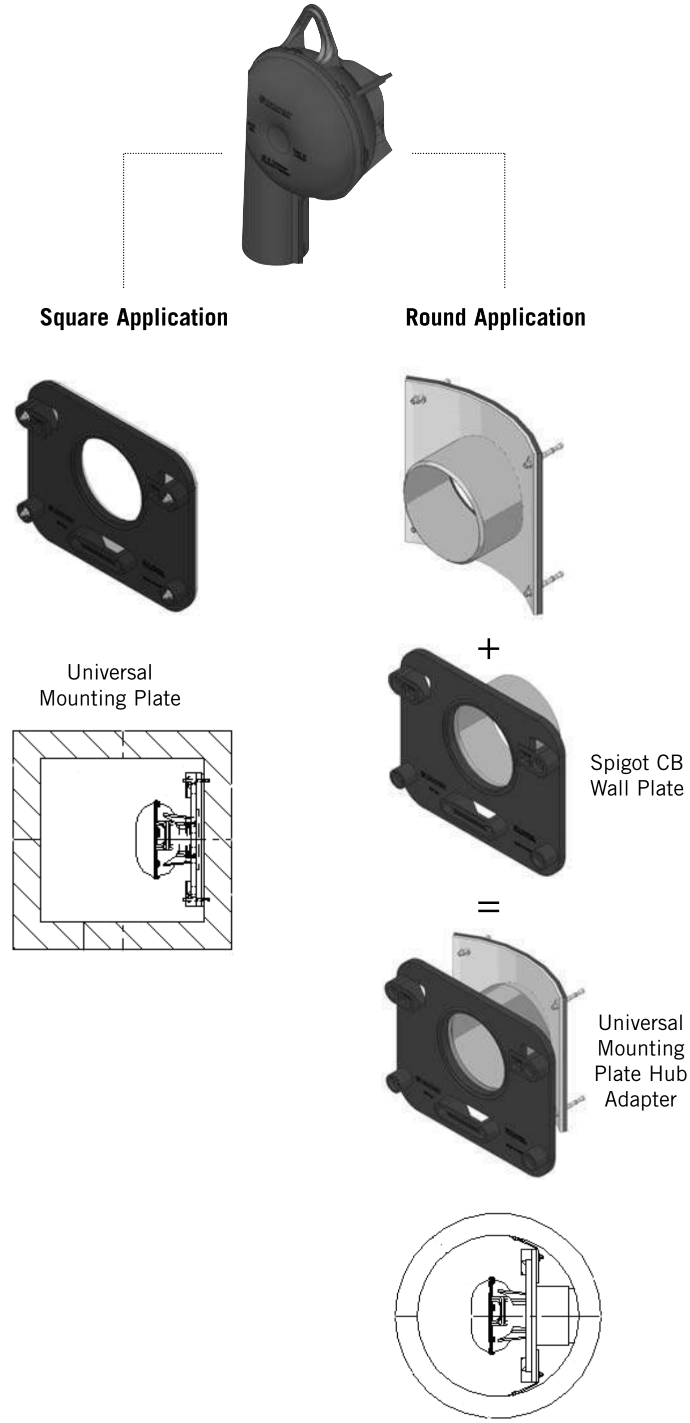


Chart 1: LMF 14 Preset Flow Curves

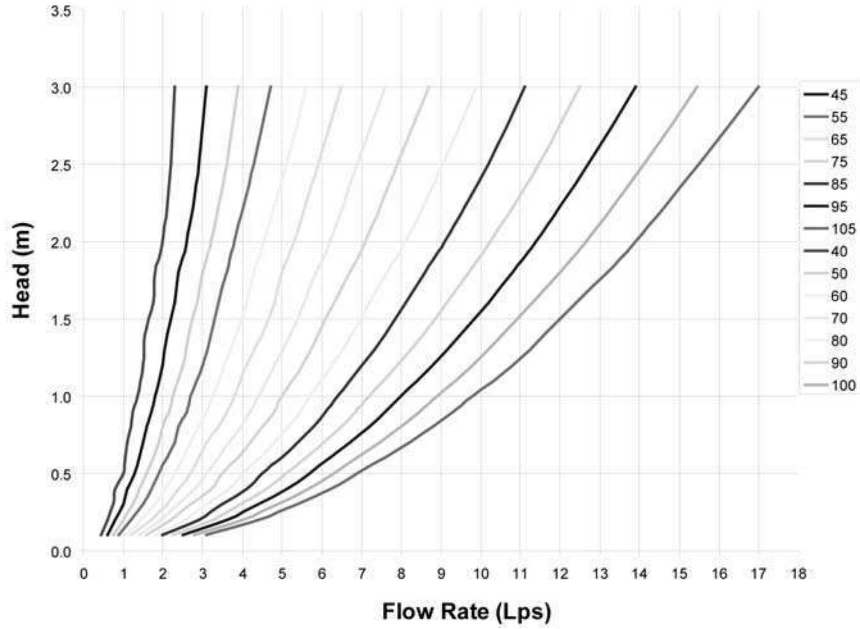
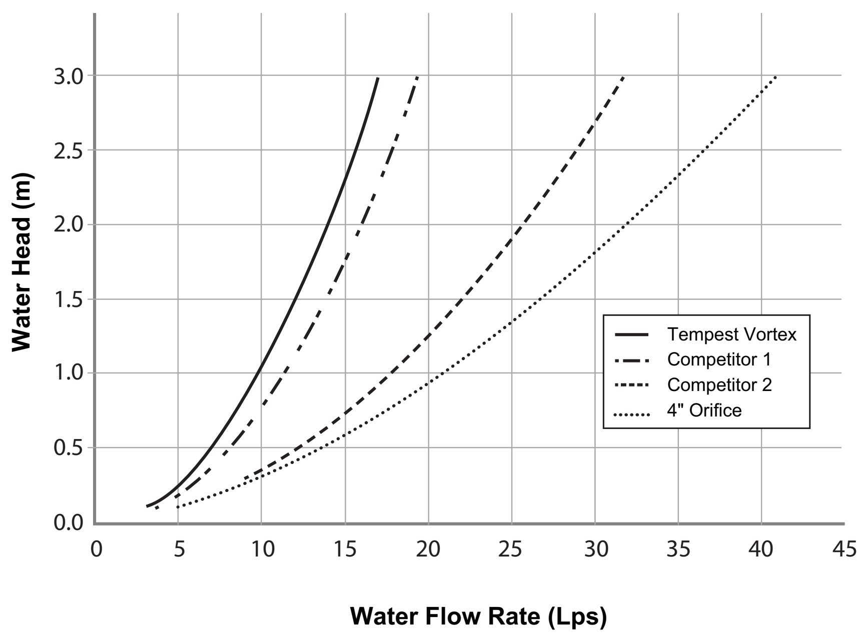


Chart 2: LMF Flow vs. ICD Alternatives



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

PRODUCT INSTALLATION

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

STEPS:

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

⚠ WARNING

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

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

STEPS:

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

⚠ WARNING

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

PRODUCT TECHNICAL SPECIFICATION

General

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

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

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

ICD's shall have no moving parts.

Materials

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

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

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

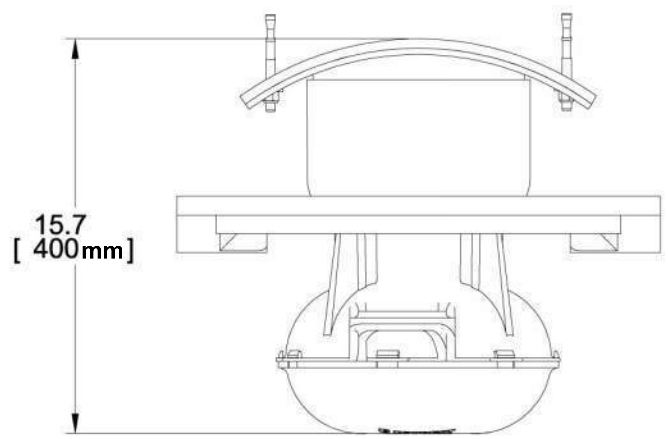
All hardware will be made from 304 stainless steel.

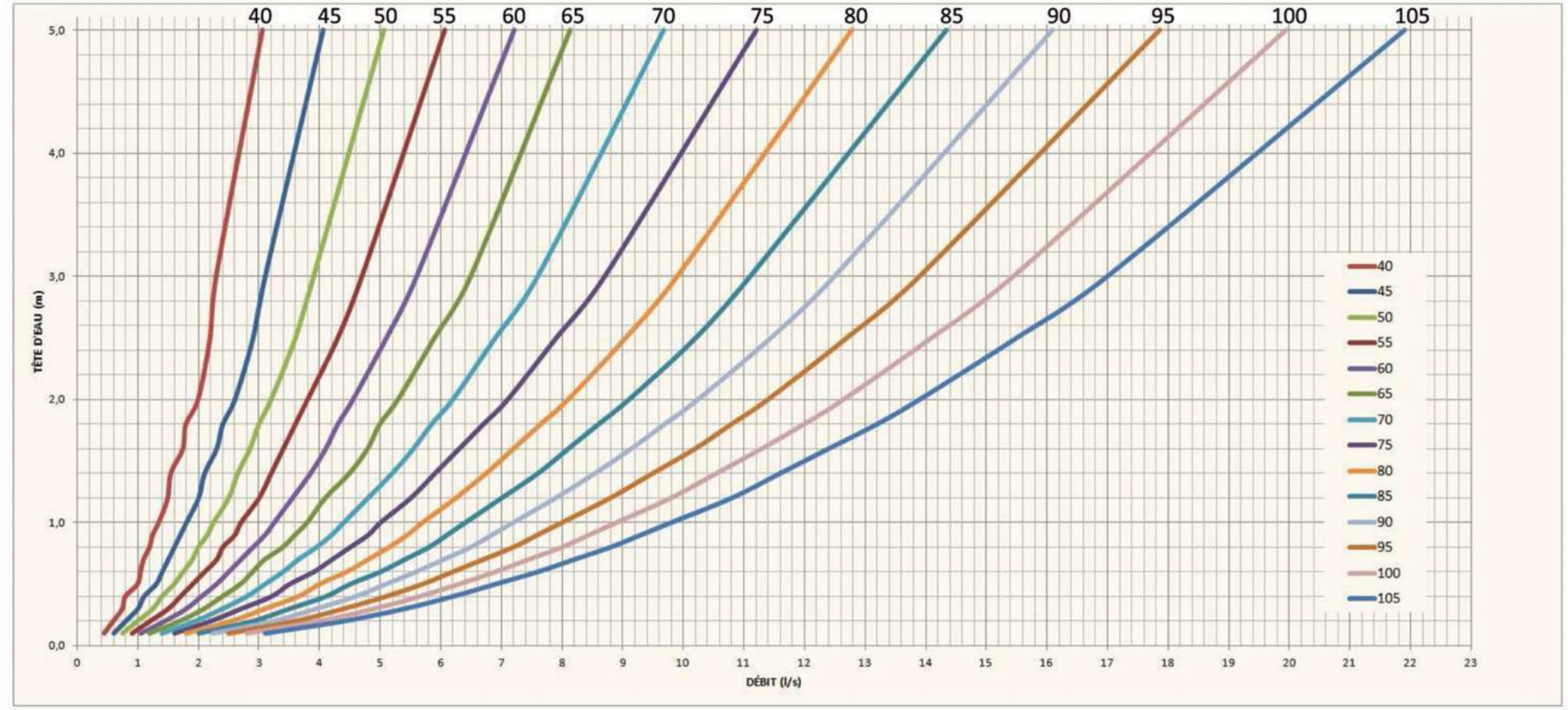
Dimensioning

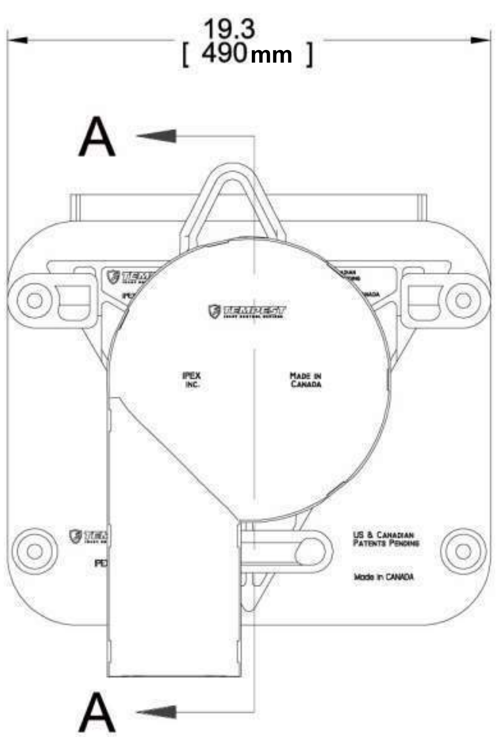
The Low Medium Flow (LMF), High Flow (HF) and the High Flow (HF) Sump shall allow for a minimum outlet pipe diameter of 200mm with a 600mm deep Catch Basin sump.

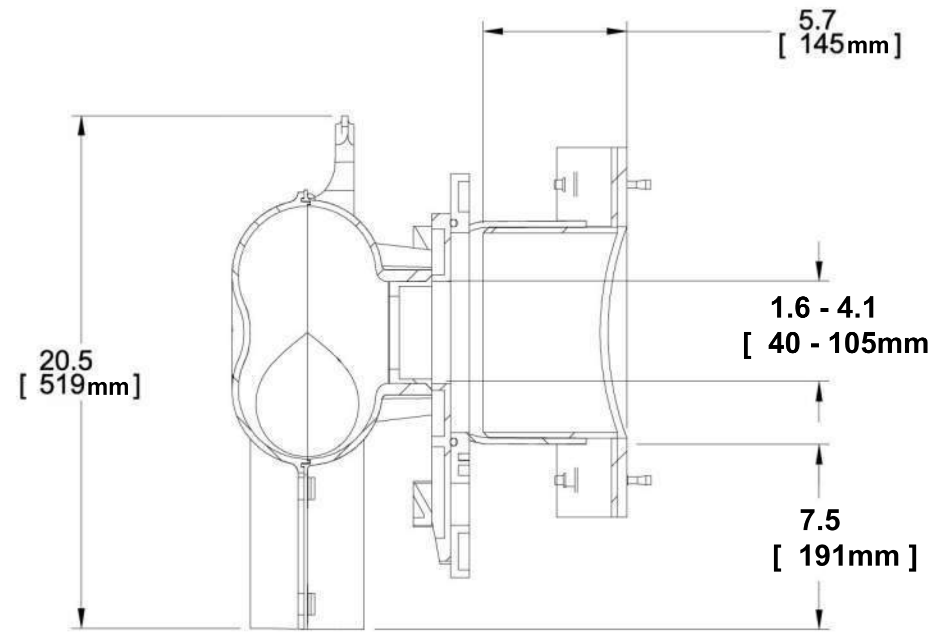
Installation

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

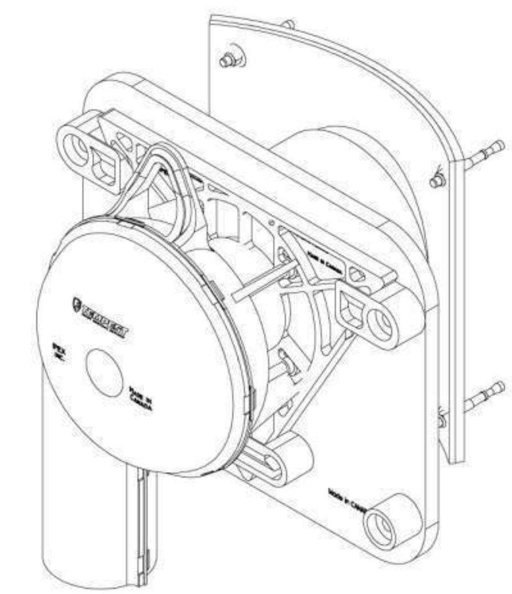








SECTION A-A



IPEX

Product development engineering
3 Place du commerce, Suite 101
Île des Soeurs, Montréal, QC, H3E 1H7
Canada Tel 514 769 2200
www.ipexna.com

PROJECTION	UNITS	TITLE		
	in [mm]	Tempest LMF round CB assembly [VORTEX]	SIZE B	SCALE(S) 1/8	1-2014

APPENDIX G

Flow Control Roof Drain Information

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

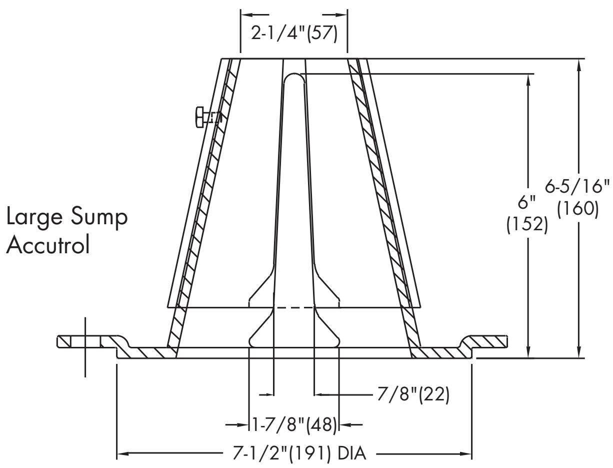
ADJUSTABLE ACCUTROL (for Large Sump Roof Drains only)

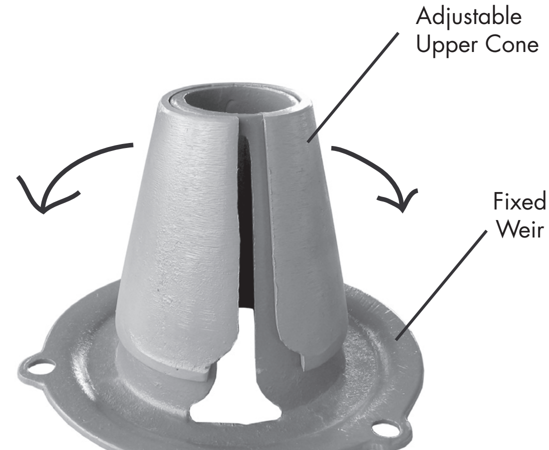
For more flexibility in controlling flow with heads deeper than 2", Watts Drainage offers the Adjustable Accutrol. The Adjustable Accutrol Weir is designed with a single parabolic opening that can be covered to restrict flow above 2" of head to less than 5 gpm per inch, up to 6" of head. To adjust the 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 ____________

WATTS®
A Watts Water Technologies Company

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APPENDIX H

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 J

Drawings

INLET CONTROL DEVICE 1 DATA TABLE - AREA A-6								
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	IPEX TEMPEST VORTEX LMF ICD 105	1200mmØ STMMH 102	250mmØ PVC	11.0	1.22	96.32	21.4	73.4 m^3
1:5 YR				14.7	2.18	97.28	28.9	
1:100 YR				15.1	2.29	97.39	70.5	

INLET CONTROL DEVICE 2 DATA TABLE - AREA A-7								
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 91mm ORIFICE	1500mmØ CBMH-3	250mmØ PVC	25.8	2.08	97.20	39.4	177.5 m^3
1:5 YR				31.0	3.00	98.12	59.3	
1:100 YR				31.7	3.14	98.26	137.6	

INLET CONTROL DEVICE 3 DATA TABLE - AREA A-8								
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 226mm ORIFICE	1800mmØ CBMH-6	300mmØ PVC	92.0	0.70	96.14	28.7	89.7 m^3
1:5 YR				111.7	1.03	96.47	42.8	
1:100 YR				189.5	2.96	98.40	89.4	

ROOF DRAIN TABLE: AREA R-1 (FOR DRAINS RD A1 to RD A6)						
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 A1 (RD-100-A-ADJ)	3/4 EXPOSED	1.34 L/s	12 cm	1.58 L/s	15 cm
R-1	RD A2 (RD-100-A-ADJ)	3/4 EXPOSED	1.10 L/s	11 cm	1.34 L/s	14 cm
R-1	RD A3 (RD-100-A-ADJ)	FULLY EXPOSED	1.26 L/s	11 cm	1.58 L/s	14 cm
R-1	RD A4 (RD-100-A-ADJ)	3/4 EXPOSED	1.10 L/s	11 cm	1.34 L/s	14 cm
R-1	RD A5 (RD-100-A-ADJ)	3/4 EXPOSED	1.10 L/s	11 cm	1.34 L/s	14 cm
R-1	RD A6 (RD-100-A-ADJ)	FULLY EXPOSED	1.26 L/s	11 cm	1.89 L/s	14 cm
TOTALS	-	-	7.16 L/s	-	9.07 L/s	-

ROOF DRAIN TABLE: AREA R-2 (FOR DRAINS RD B1 to RD B3)						
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 B1 (RD-100-A-ADJ)	1/2 EXPOSED	0.95 L/s	11 cm	1.10 L/s	13 cm
R-2	RD B2 (RD-100-A-ADJ)	1/2 EXPOSED	0.95 L/s	11 cm	1.10 L/s	13 cm
R-2	RD B3 (RD-100-A-ADJ)	1/2 EXPOSED	0.95 L/s	11 cm	1.10 L/s	13 cm
TOTALS	-	-	2.85 L/s	-	3.30 L/s	-

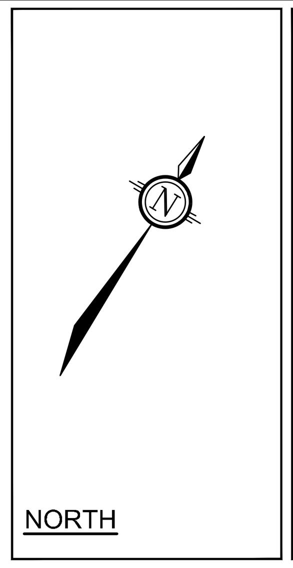
ROOF DRAIN TABLE: AREA R-3 (FOR DRAINS RD C1 to RD C4)						
AREA ID *	ROOF DRAIN No. (WATTS MODEL)	WEIR SETTING	1:5 YEAR RELEASE RATE	APPROX. 5 YR PONDING DEPTH	1:100 YEAR RELEASE RATE	APPROX. 100 YR PONDING DEPTH
R-3	RD C1 (RD-100-A-ADJ)	1/2 EXPOSED	0.95 L/s	11 cm	1.10 L/s	14 cm
R-3	RD C2 (RD-100-A-ADJ)	1/2 EXPOSED	0.95 L/s	11 cm	1.10 L/s	14 cm
R-3	RD C3 (RD-100-A-ADJ)	1/2 EXPOSED	0.95 L/s	11 cm	1.10 L/s	13 cm
R-3	RD C4 (RD-100-A-ADJ)	1/2 EXPOSED	0.95 L/s	11 cm	1.10 L/s	14 cm
TOTALS	-	-	3.80 L/s	-	4.40 L/s	-

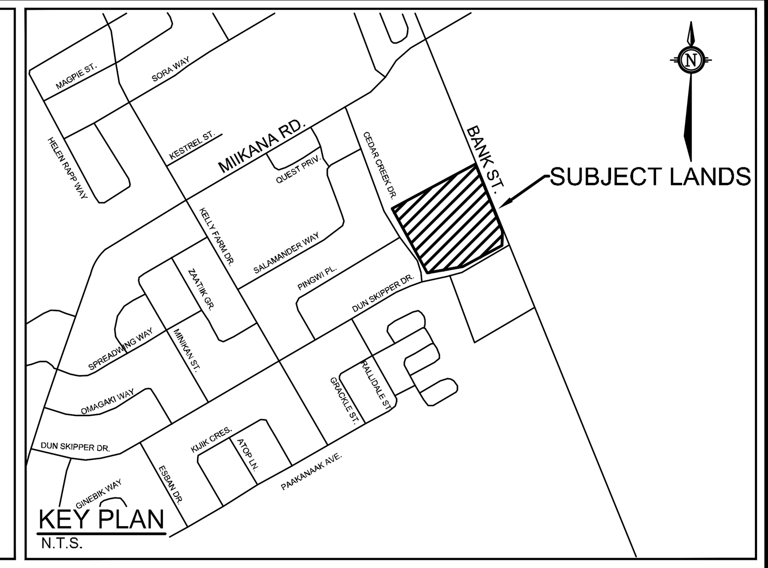
ROOF DRAIN TABLE: AREA R-4 (FOR DRAINS RD D1 to RD D3)						
AREA ID *	ROOF DRAIN No. (WATTS MODEL)	WEIR SETTING	1:5 YEAR RELEASE RATE	APPROX. 5 YR PONDING DEPTH	1:100 YEAR RELEASE RATE	APPROX. 100 YR PONDING DEPTH
R-4	RD D1 (RD-100-A-ADJ)	1/2 EXPOSED	0.95 L/s	11 cm	1.10 L/s	14 cm
R-4	RD D2 (RD-100-A-ADJ)	1/4 EXPOSED	0.79 L/s	10 cm	0.87 L/s	13 cm
R-4	RD D3 (RD-100-A-ADJ)		0.95 L/s	11 cm	0.87 L/s	13 cm
TOTALS	-	-	2.69 L/s	-	2.84 L/s	-

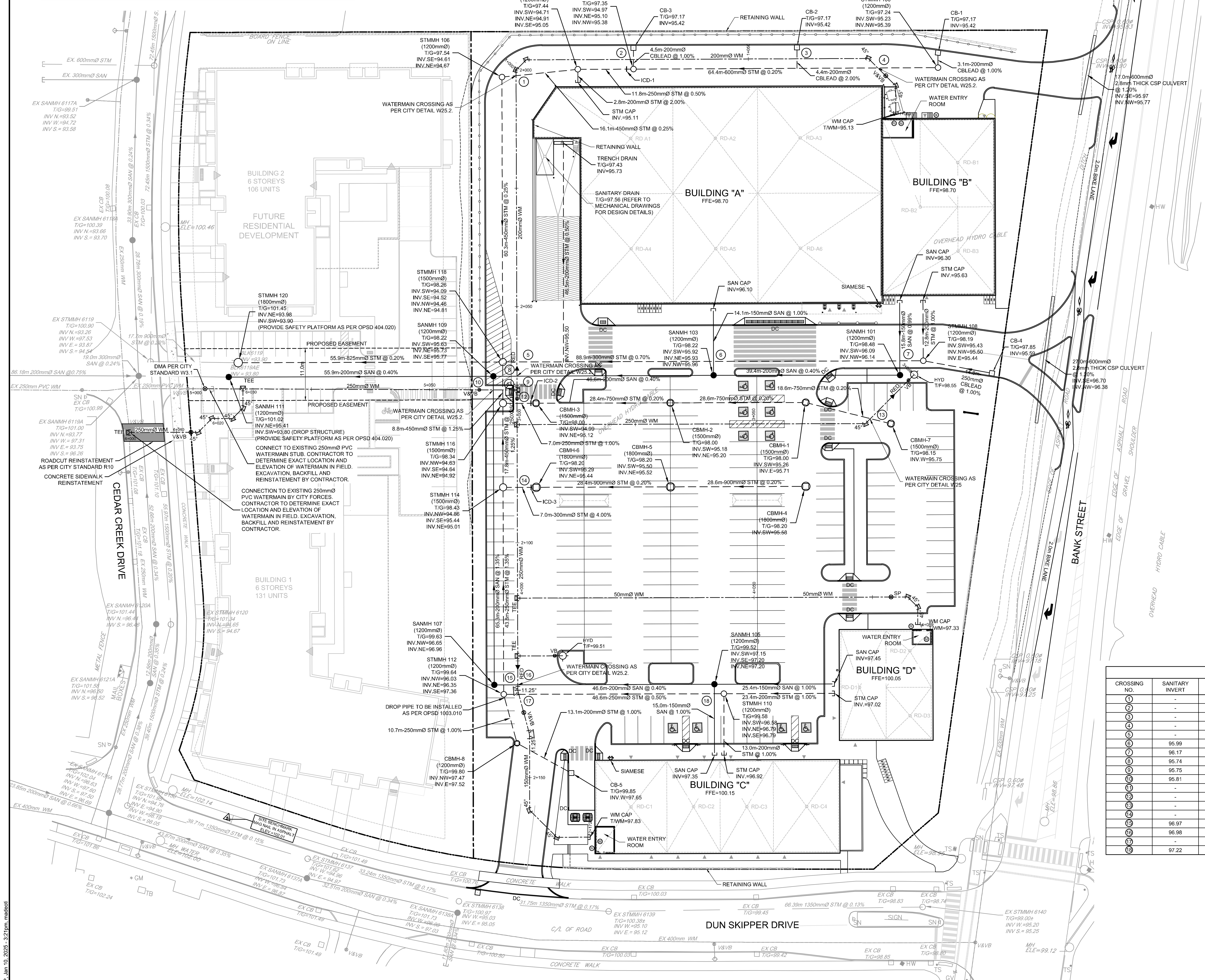
* REFER TO THE SERVICING AND STORMWATER MANAGEMENT REPORT' (R-2024-074) PREPARED BY NOVATECH FOR DRAINAGE AREA IDENTIFIERS AND STORMWATER MANAGEMENT DETAILS.

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
- PROPOSED BUILDING ENTRANCE
- DIRECTION OF FLOW
- PROPOSED RETAINING WALL
- M RM PROPOSED WATER METER AND REMOTE METER
- PRV PROPOSED PRESSURE REDUCING VALVE
- 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 PG7262-2, DATED OCTOBER 01, 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-2024-074) 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
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 ALL PIPES (SAN/STM) THAT HAVE LESS THAN 2.0m COVER WITH HI-40 INSULATION PER INSULATION DETAIL FOR SHALLOW SEWERS. PROVIDE 150mm CLEARANCE BETWEEN PIPE AND INSULATION.
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. 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
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.

UTILITY CROSSING TABLE							
CROSSING NO.	SANITARY INVERT	STORM INVERT	TOP OF 50mmØ WATERMAIN	TOP OF 150mmØ WATERMAIN	TOP OF 200mmØ WATERMAIN	TOP OF 250mmØ WATERMAIN	CLEARANCE
1	-	94.45	-	-	95.35	-	0.25
2	-	95.40	-	-	94.87	-	0.53
3	-	95.21	-	-	94.86	-	0.35
4	-	94.81	-	-	95.86	-	0.25
5	-	94.83	-	-	95.82	-	0.49
6	95.99	95.12	-	-	-	-	0.57
7	96.17	95.40	-	-	-	-	0.48
8	95.74	94.55	-	-	-	-	0.66
9	95.75	-	-	-	96.45	-	0.25
10	95.81	-	-	-	-	96.56	0.29
11	-	94.60	-	-	-	95.84	0.53
12	-	94.91	-	-	-	95.66	0.25
13	-	95.74	-	-	95.24	-	0.50
14	-	95.13	-	-	-	95.93	0.25
15	96.97	96.00	-	-	-	-	0.72
16	96.98	-	-	97.58	-	-	0.25
17	-	96.36	-	97.18	-	-	0.37
18	97.22	96.57	-	-	-	-	0.35

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
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.

200mmø WATERMAIN TABLE			
CHAINAGE	FINISHED GRADE	TOP OF WATERMAIN	COMMENT
1+000.0	97.55	95.15	45° HORIZONTAL BEND
1+003.1	97.48	95.08	45° HORIZONTAL BEND
1+025.0	97.27	94.87	STATION 1+025
1+050.0	97.40	95.00	STATION 1+075
1+075.0	97.39	94.99	STATION 1+075
1+075.3	97.39	94.99	45° HORIZONTAL BEND
1+080.5	97.49	95.09	VALVE & VALVE BOX
1+083.5	97.41	95.01	45° HORIZONTAL BEND
1+089.0	97.46	95.06	CONNECTION TO BUILDING (CAPPED)
2+000.0	97.55	95.15	45° HORIZONTAL BEND
2+004.4	97.63	95.23	VALVE & VALVE BOX
2+025.0	98.04	95.00	STATION 2+025
2+050.0	98.58	96.18	STATION 2+050
2+063.1	98.23	95.83	REDUCER

250mmø WATERMAIN TABLE			
CHAINAGE	FINISHED GRADE	TOP OF WATERMAIN	COMMENT
2+063.1	98.23	95.83	REDUCER
2+067.7	98.10	95.70	250mm X 250mm TEE CONNECTION
2+069.5	98.11	95.71	VALVE AND VALVE BOX
2+075.0	98.22	95.82	250mm X 250mm TEE CONNECTION
2+100.0	98.67	96.27	STATION 2+100
2+111.7	99.06	96.66	250mm X 50mm TEE CONNECTION
2+123.9	99.40	96.00	250mm X 150mm TEE CONNECTION
2+126.2	99.46	97.06	REDUCER
3+000.0	98.22	95.82	250mm X 250mm TEE CONNECTION
3+025.0	98.24	95.84	STATION 3+025
3+050.0	98.33	95.93	STATION 3+050
3+073.7	98.25	95.85	45° HORIZONTAL BEND
3+075.0	98.22	95.82	STATION 3+075
3+081.8	98.30	95.90	REDUCER

50mmø WATERMAIN TABLE			
CHAINAGE	FINISHED GRADE	TOP OF WATERMAIN	COMMENT
4+000.0	99.06	96.66	250mm X 50mm TEE CONNECTION
4+025.0	99.02	96.62	STATION 4+025
4+050.0	99.02	99.62	STATION 4+050
4+075.0	99.11	96.00	STATION 4+075
4+078.8	99.20	96.80	VALVE & VALVE BOX
4+082.5	99.30	96.90	45° HORIZONTAL BEND
4+085.5	99.46	97.06	45° HORIZONTAL BEND
4+089.1	99.79	97.39	CONNECTION TO BUILDING (CAPPED)

150mmø WATERMAIN TABLE			
CHAINAGE	FINISHED GRADE	TOP OF WATERMAIN	COMMENT
2+126.2	99.46	97.06	REDUCER
2+131.2	99.50	97.10	11.25° HORIZONTAL BEND
2+136.1	99.66	97.26	VALVE & VALVE BOX
2+140.8	99.76	97.36	11.25° HORIZONTAL BEND
2+150.0	100.11	97.71	STATION 2+150
2+156.9	100.36	97.96	45° HORIZONTAL BEND
2+165.0	100.54	98.14	45° HORIZONTAL BEND
2+172.0	100.34	97.94	CONNECTION TO BUILDING (CAPPED)
3+081.8	98.30	95.90	REDUCER
3+086.5	98.55	96.15	VALVE & VALVE BOX
3+088.0	98.55	96.15	HYDRANT

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	DMA
5+010.6	100.75	98.35	250mm x 250mm TEE CONNECTION
5+025.0	100.53	98.13	STATION 5+025
5+050.0	99.90	97.50	STATION 5+050
5+060.5	98.48	96.56	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)

* WATERMAIN TABLE IS TO BE COORDINATED WITH FUTURE RESIDENTIAL DEVELOPMENT GRADING

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+014.6	101.36	98.64	45° HORIZONTAL BEND
6+018.7	101.38	98.60	45° HORIZONTAL BEND
6+023.1	101.31	98.60	45° HORIZONTAL BEND
6+026.2	100.88	98.48	45° HORIZONTAL BEND
6+030.2	100.75	98.35	CONNECT TO PROPOSED 250mmØ WATERMAIN

* WATERMAIN TABLE IS TO BE COORDINATED WITH FUTURE RESIDENTIAL DEVELOPMENT GRADING

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
4.	REVISED PER CITY COMMENTS	JAN 10/25	MS
3.	ISSUED FOR SITE PLAN APPLICATION	OCT 24/24	MS
2.	ISSUED FOR CLIENT REVIEW	OCT 17/24	MS
1.	PHASE 2 PRE-CONSULATION	AUG 22/24	MS

SCALE 1:400

1:400
0 4 8 12 16

DESIGN CV
CHECKED MS
DRAWN CV
CHECKED MS
APPROVED JLS

FOR REVIEW ONLY

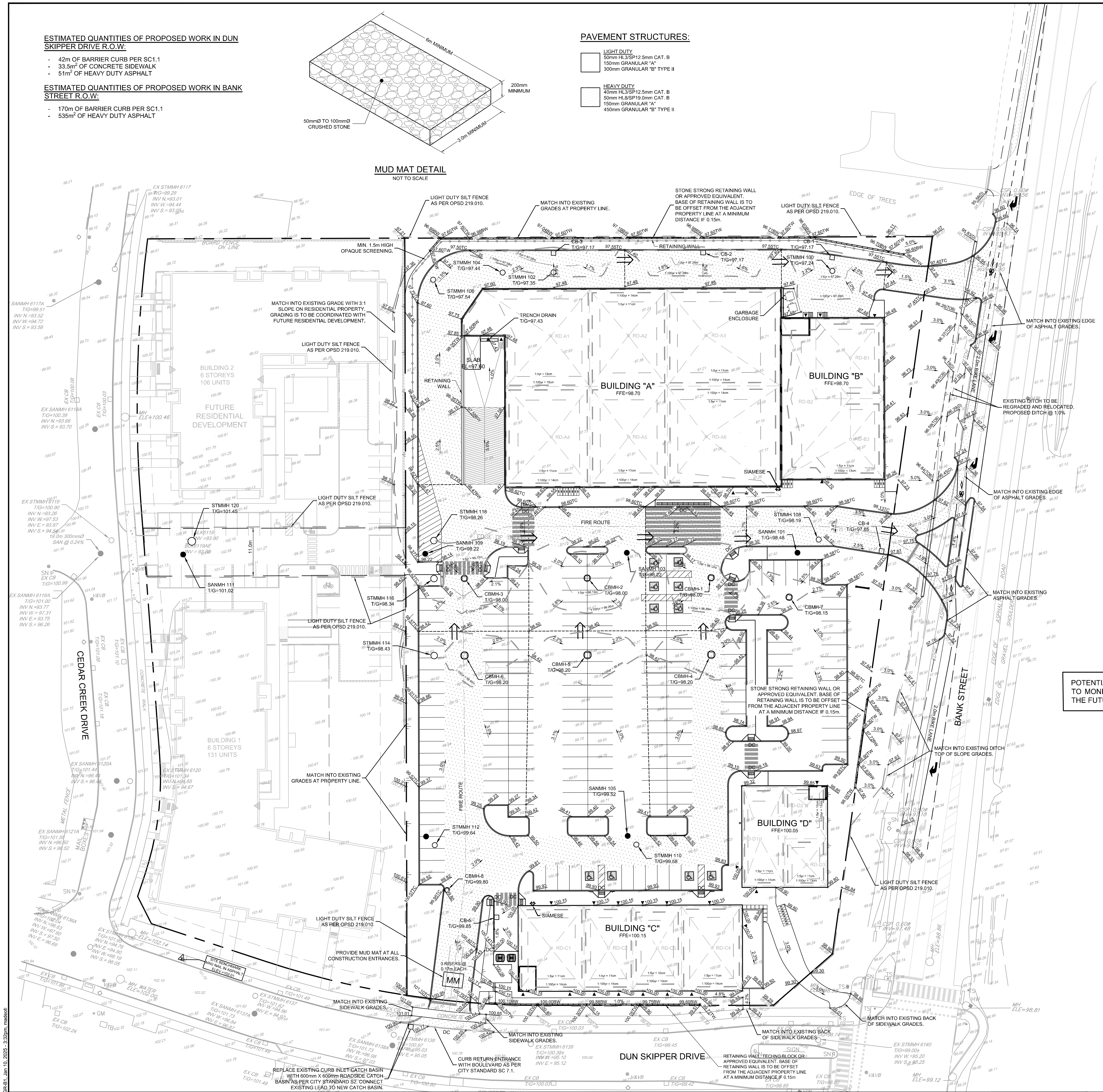
LICENSED PROFESSIONAL ENGINEER
M. SAVIC
100102651
1/10/2025
PROVINCE OF ONTARIO

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

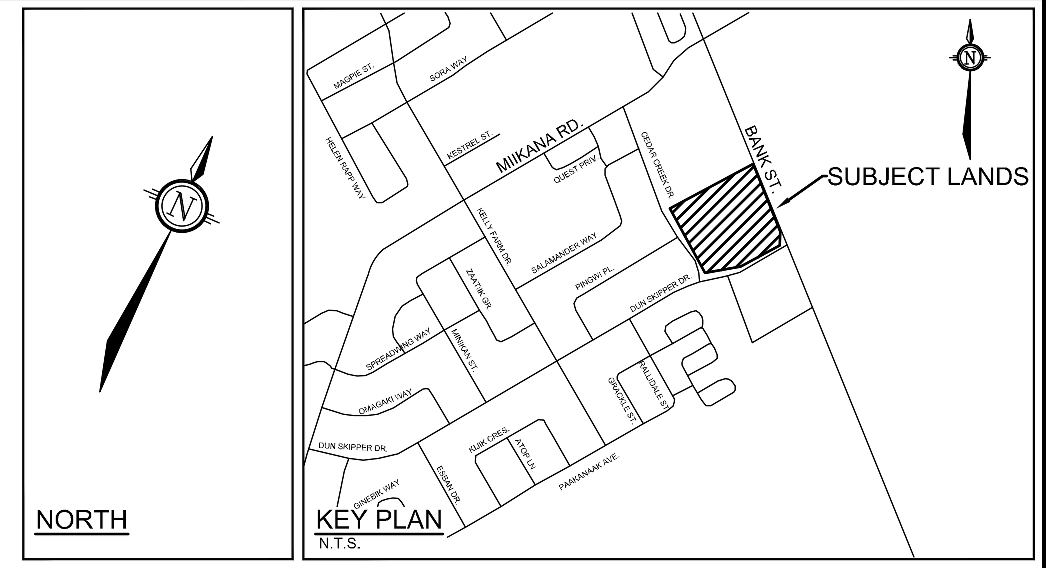
DRAWING NAME
GENERAL PLAN OF SERVICES

PROJECT No. 124107
REV
REV # 4
DRAWING No.
124107-GP



LEGEND

- PROPERTY LINE
- PROPOSED ELEVATION
- EXISTING ELEVATION
- PROPOSED DITCH ELEVATION
- PROPOSED TOP OF BANK 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 (1:5 YR, 1:100 YR)
- PROPOSED DEPRESSED CURB
- TACTILE WALKING SURFACE INDICATOR (TWSI) PER OPSD 310.039
- 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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9. REFER TO ARCHITECT'S AND LANDSCAPE ARCHITECT'S DRAWINGS FOR BUILDING AND HARD SURFACE AREAS AND DIMENSIONS.
10. REFER TO SERVICING AND STORMWATER MANAGEMENT REPORT(R-2024-074) 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).

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.

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 Fabric	Location as Indicated in ESC Note #3	Erosion and Sediment Control Notes	Developer's Contractor	Developer's Contractor	Weekly (as a minimum)	Consultant	Developer's Contractor	N/A
	Mud Mat	MM	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
4.	REVISED PER CITY COMMENT	JAN 10/25	MS
3.	ISSUED FOR SITE PLAN APPLICATION	OCT 24/24	MS
2.	ISSUED FOR CLIENT REVIEW	OCT 17/24	MS
1.	PHASE 2 PRE-CONSULATION	AUG 22/24	MS

SCALE 1:400

DESIGN CV | CHECKED MS | DRAWN CV | CHECKED MS | APPROVED JLS

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER M. SAVIC 100102651 1/10/2025 PROVINCE OF ONTARIO

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
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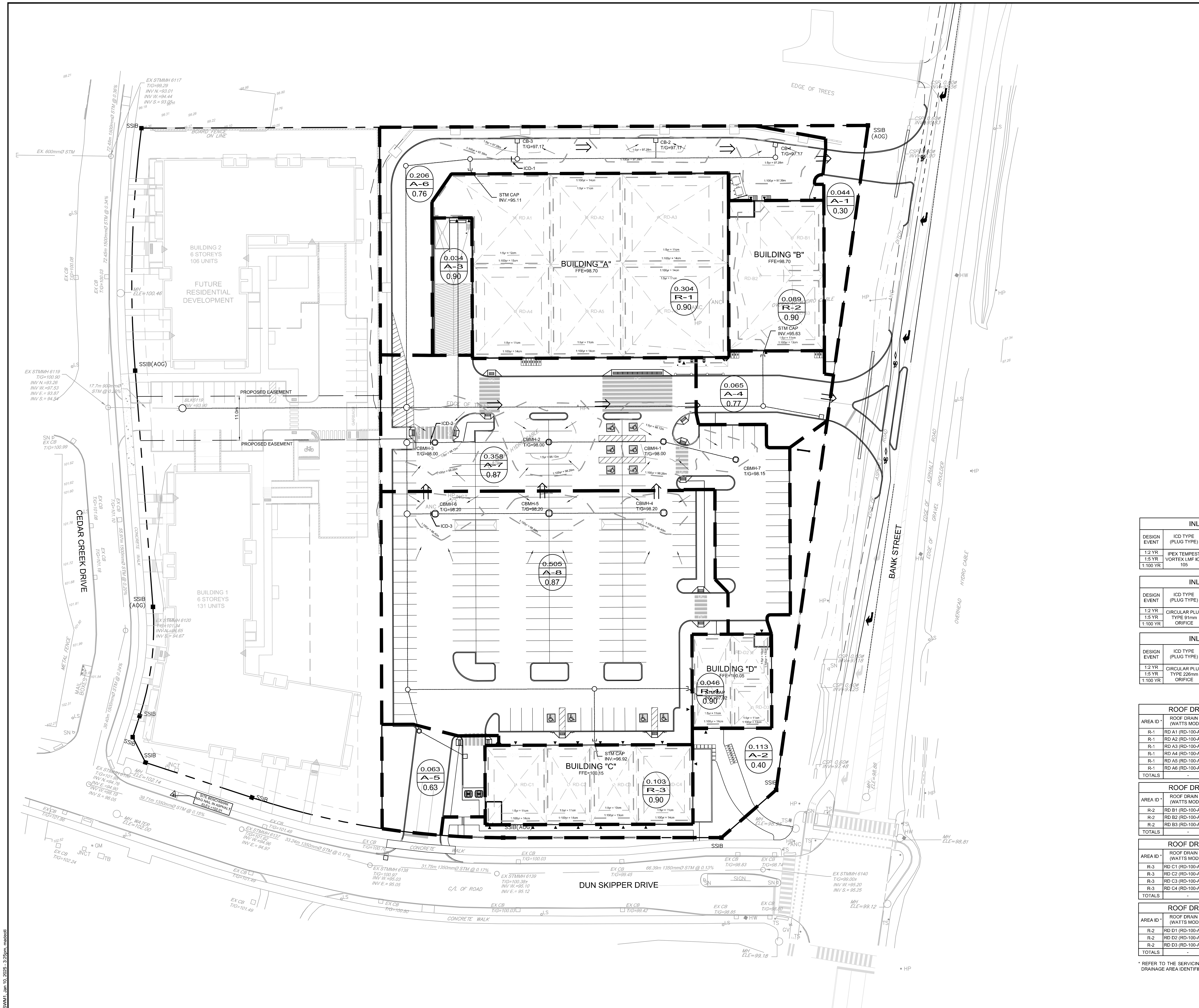
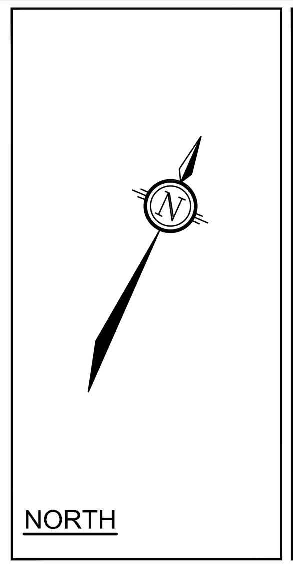
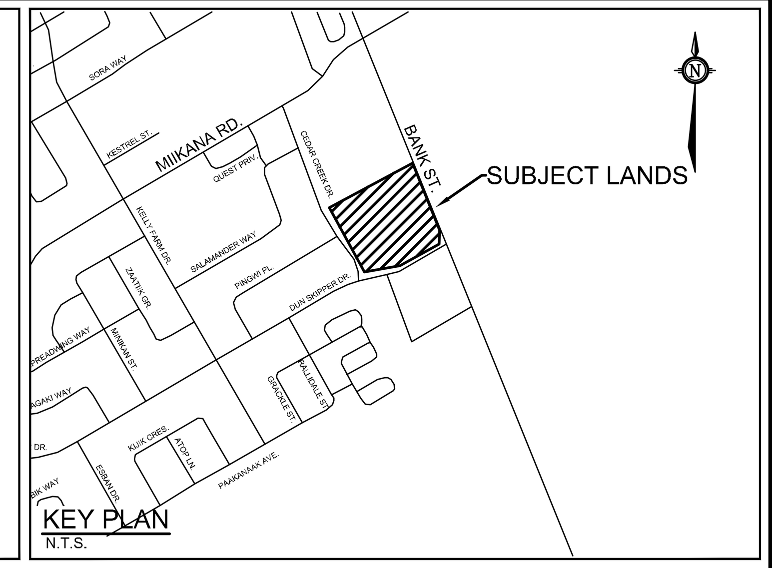
LOCATION
CITY OF OTTAWA
150 DUN SKIPPER DRIVE

DRAWING NAME
GRADING AND EROSION & SEDIMENT CONTROL PLAN

PROJECT No. 124107
REV # 4
DRAWING No. 124107-GR







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 1 DATA TABLE - AREA A-6

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	IPEX TEMPEST VORTEX LMF ICD 105	1200mmØ STMMH 102	250mmØ PVC	11.0	1.22	96.32	21.4	73.4 m^3
1:5 YR				14.7	2.18	97.28	28.9	
1:100 YR				15.1	2.29	97.39	70.5	

INLET CONTROL DEVICE 2 DATA TABLE - AREA A-7

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 91mm ORIFICE	1500mmØ CBMH-3	250mmØ PVC	25.8	2.08	97.20	39.4	177.5 m^3
1:5 YR				31.0	3.00	98.12	59.3	
1:100 YR				31.7	3.14	98.26	137.6	

INLET CONTROL DEVICE 3 DATA TABLE - AREA A-8

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 226mm ORIFICE	1800mmØ CBMH-6	300mmØ PVC	92.0	0.70	96.14	28.7	89.7 m^3
1:5 YR				111.7	1.03	96.47	42.8	
1:100 YR				189.5	2.96	98.40	89.4	

ROOF DRAIN TABLE: AREA R-1 (FOR DRAINS RD A1 to RD A6)

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 A1 (RD-100-A-ADJ)	3/4 EXPOSED	1.34 L/s	12 cm	1.58 L/s	15 cm
R-1	RD A2 (RD-100-A-ADJ)	3/4 EXPOSED	1.10 L/s	11 cm	1.34 L/s	14 cm
R-1	RD A3 (RD-100-A-ADJ)	FULLY EXPOSED	1.26 L/s	11 cm	1.58 L/s	14 cm
R-1	RD A4 (RD-100-A-ADJ)	3/4 EXPOSED	1.10 L/s	11 cm	1.34 L/s	14 cm
R-1	RD A5 (RD-100-A-ADJ)	3/4 EXPOSED	1.10 L/s	11 cm	1.34 L/s	14 cm
R-1	RD A6 (RD-100-A-ADJ)	FULLY EXPOSED	1.26 L/s	11 cm	1.89 L/s	14 cm
TOTALS	-	-	7.16 L/s	-	9.07 L/s	-

ROOF DRAIN TABLE: AREA R-2 (FOR DRAINS RD B1 to RD B3)

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 B1 (RD-100-A-ADJ)	1/2 EXPOSED	0.95 L/s	11 cm	1.10 L/s	13 cm
R-2	RD B2 (RD-100-A-ADJ)	1/2 EXPOSED	0.95 L/s	11 cm	1.10 L/s	13 cm
R-2	RD B3 (RD-100-A-ADJ)	1/2 EXPOSED	0.95 L/s	11 cm	1.10 L/s	13 cm
TOTALS	-	-	2.85 L/s	-	3.30 L/s	-

ROOF DRAIN TABLE: AREA R-3 (FOR DRAINS RD C1 to RD C4)

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-3	RD C1 (RD-100-A-ADJ)	1/2 EXPOSED	0.95 L/s	11 cm	1.10 L/s	14 cm
R-3	RD C2 (RD-100-A-ADJ)	1/2 EXPOSED	0.95 L/s	11 cm	1.10 L/s	14 cm
R-3	RD C3 (RD-100-A-ADJ)	1/2 EXPOSED	0.95 L/s	11 cm	1.10 L/s	13 cm
R-3	RD C4 (RD-100-A-ADJ)	1/2 EXPOSED	0.95 L/s	11 cm	1.10 L/s	14 cm
TOTALS	-	-	3.80 L/s	-	4.40 L/s	-

ROOF DRAIN TABLE: AREA R-4 (FOR DRAINS RD D1 to RD D3)

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 D1 (RD-100-A-ADJ)	1/2 EXPOSED	0.95 L/s	11 cm	1.10 L/s	14 cm
R-2	RD D2 (RD-100-A-ADJ)	1/4 EXPOSED	0.79 L/s	10 cm	0.87 L/s	13 cm
R-2	RD D3 (RD-100-A-ADJ)		0.95 L/s	11 cm	0.87 L/s	13 cm
TOTALS	-	-	2.69 L/s	-	2.84 L/s	-

* REFER TO THE SERVICING AND STORMWATER MANAGEMENT REPORT' (R-2024-074) PREPARED BY NOVATECH FOR DRAINAGE AREA IDENTIFIERS AND STORMWATER MANAGEMENT DETAILS.

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SCALE
1:400
1 : 400

DESIGN CV
CHECKED MS
DRAWN CV
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APPROVED JLS

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER
M. SAVIC
100102651
1/10/2025
PROVINCE OF ONTARIO

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LOCATION
CITY OF OTTAWA
150 DUN SKIPPER DRIVE

DRAWING NAME
STORMWATER MANAGEMENT PLAN

PROJECT No. 124107
REV REV # 3
DRAWING No. 124107-SWM1

PLANB1.DWG - 1000mmx707mm