NOVATECH
Engineers, Planners & Landscape Architects

SERVICING AND STORMWATER MANAGEMENT REPORT

212 SLATER STREET
OTTAWA, ONTARIO

Prepared by:

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

MAY 31, 2019

Novatech File: 119055
Ref No. R-2019-100

NOVATECH
Engineers, Planners & Landscape Architects

May 31, 2019

Planning and Infrastructure Approvals
City of Ottawa
110 Laurier Avenue West
Ottawa, Ontario, K1P 1J1

Attention: Ann O'Connor

Dear Ms. O'Connor

Reference: 212 Slater Street, Ottawa
Servicing and Stormwater Management Report
Our File No. : 119055

Please find enclosed the 'Servicing and Stormwater Management Report' for the above noted project. This report has been submitted for review and approval in support of the Site Plan Application.

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

Yours truly,

NOVATECH

Cara Ruddle, P.Eng.
Senior Project Manager | Land Development Engineering

cc: James Beach, Broccolini Development

Suite 200, 240 Michael Cowpland Drive, Ottawa ON K2M 1P6 Tel: 613.254.9643 Fax: 613.254.5867 www.novatech-eng.com

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1.0 INTRODUCTION

Novatech has been retained to prepare a Servicing and Stormwater Management Report for the proposed development located at 212 Slater Street, Ottawa, Ontario. This report will support a Site Plan Application for the subject development. **Figure 1** Key Plan shows the site location.

2.0 EXISTING CONDITIONS

The site is currently developed with an existing two storey brick building with multiple street level retail buisnesses. There is also a driveway pass through at ground level which provides access to surface parking at the rear of the development for the adjacent property. The site is bounded by Slater Street to the north, the Bank of Montreal Tower to the east and retail/ commercial buildings to the south and west. The majority of the property is currently developed and surface drainage drains towards the Slater Street right-of-way. There is existing municipal infrastructure in Slater Street that will service the proposed development. **Figure 2** shows the existing site conditions.

3.0 PROPOSED DEVELOPMENT

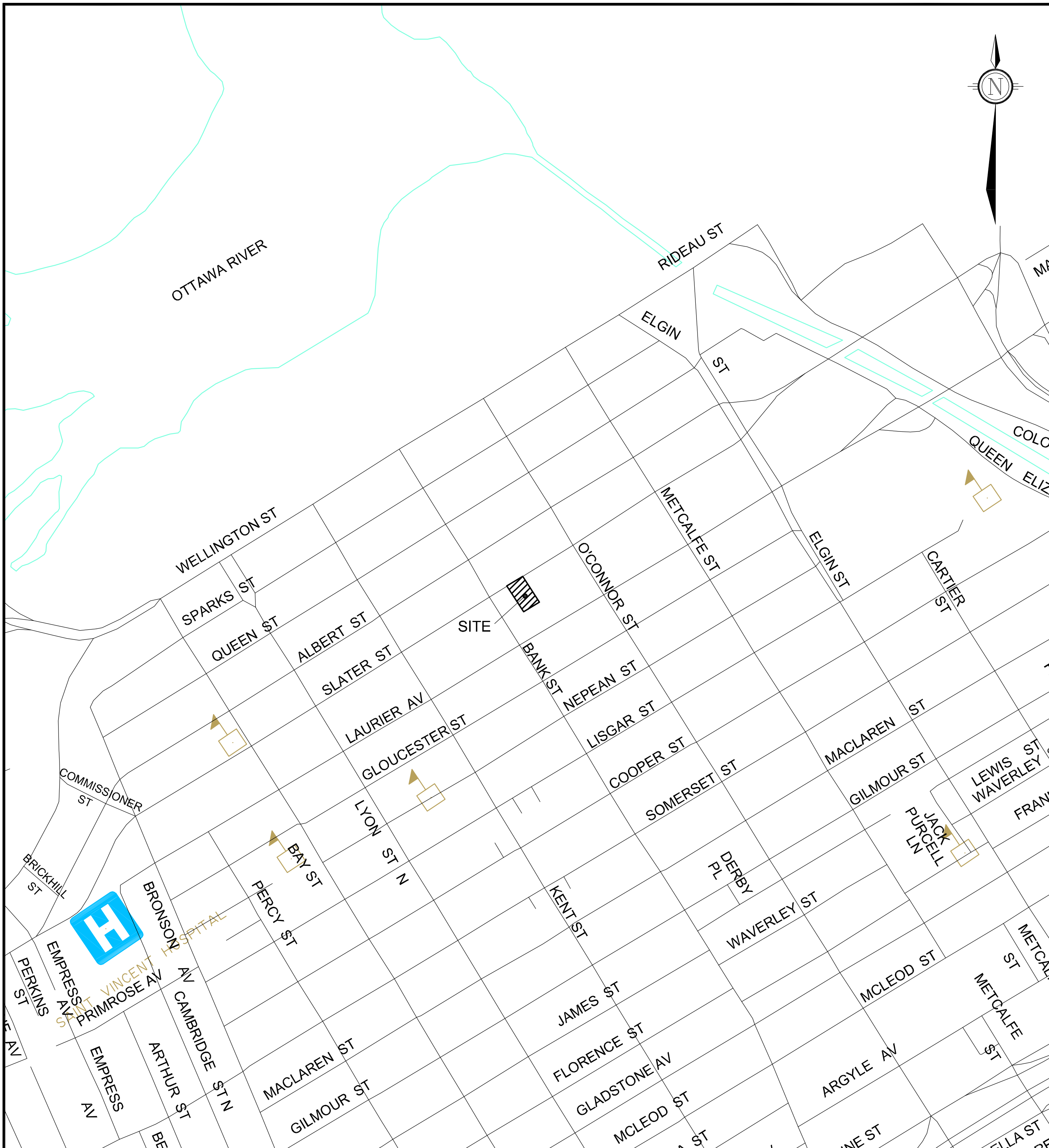
The site is approximately 0.07 hectares in size and it is proposed to develop a 22 storey, 162-unit apartment building. There will be amenity space for the residents on the east side of the ground floor level and a commercial retail space on the west side. The existing driveway pass through at the ground floor level will be widened to provide 2 way acces to the parking at the rear of the development. The total building footprint is approximately 340m^2 at the ground floor level. Access to the visitor parking, commercial retail entrance and residential entrance is proposed from Slater Street. Refer to **Figure 3** for the proposed site layout.

4.0 WATER SERVICING

The proposed development is in the 1W pressure zone of the City of Ottawa water distribution network. There is an existing 381mm diameter cast iron watermain located in Slater Street right-of-way which will service the proposed development. A portion of the City sewer mapping is included in **Appendix A** for reference which shows the existing watermain infrastructure.

As per the City of Ottawa Technical Bulletin ISDTB-2014-02, the proposed development will require two service connections separated by an isolation valve as the domestic water demands are greater than 50 cubic meters per day. The proposed 22-storey apartment building will be serviced by two new 200mm diameter water services with a connection to the existing 381mm diameter watermain in Slater Street. The proposed water service will be sized to provide both the required domestic water demand and fire flow. A shut-off valve will be provided on both service connections at the property line and a water meter and remote water meter will be provided. Refer to the General Plan of Services (119055-GP) for water servicing information

Water demand and fire flow calculations have been prepared for the proposed development. The water demand was calculated from criteria in Section 4 of the City of Ottawa Design Guidelines for Water Distribution Systems. The water demand was based on a total population 277 people from a total of 162 units and 95m^2 of commercial retail floor space. The required fire demand was



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KEY PLAN

CITY OF OTTAWA

212 SLATER STREET

DATE	JOB	FIGURE
MAY 2019	119055	1

SHT8X11.DWG - 216mmx279mm

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212 SLATER STREET

EXISTING CONDITIONS

SCALE		
N.T.S		
DATE	JOB	FIGURE
MAY 2019	119055	2

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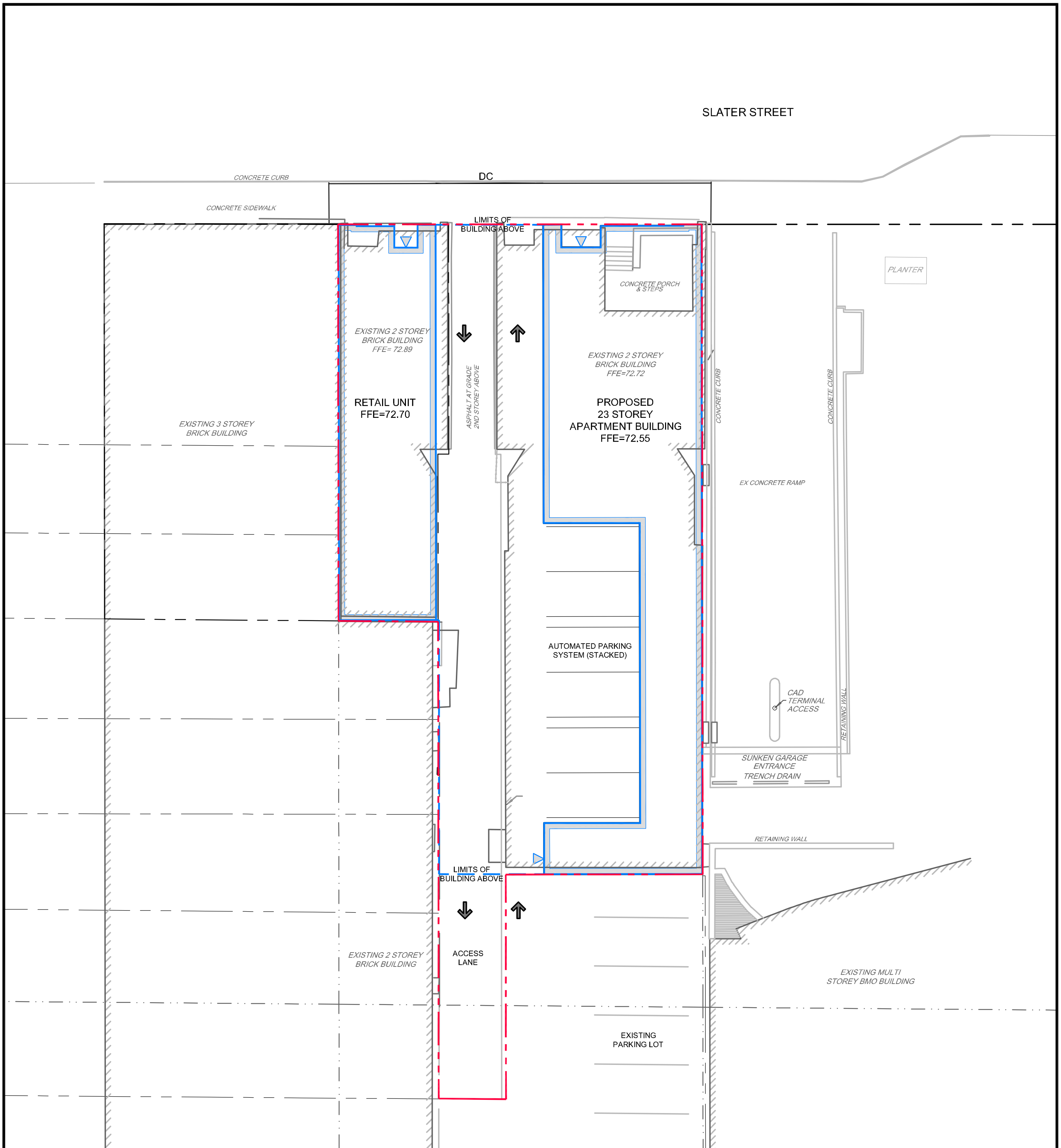

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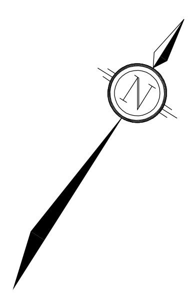


212 SLATER STREET

PROPOSED SITE PLAN

SCALE			
1 : 300 (0 3 6 9 12)			
DATE MAY 2019	JOB 119055	FIGURE 3	

SHT8X11.DWG - 216mmx279mm

calculated using the Fire Underwriters Survey (FUS) Guidelines. The proposed building is to be sprinklered with the Siamese connection located by the front entrance of the building. There are existing hydrants within the Slater Street Right-of-Way which will provide fire protection for the proposed development. Detailed water demand and fire flow calculations are provided in **Appendix A** for reference. A summary of the water demand and fire flows are provided in **Table 4.1** below.

Table 4.1 Water Demand Summary

	Proposed Development
Water Demand Rate	Residential - 350 L/person/day Commercial Retail – 2.5L/m² floor space
Units/Area	162– 1 Bedroom 95m² Retail Floor Space
Density	1.4 ppu – 1 Bedroom
Peaking Factors	Residential - MD=2.5 x avg day, PH=2.2 x max day Commercial - MD=1.8 x avg day, PH=1.5 x max day
Average Day Demand (L/s)	1.12
Maximum Daily Demand (L/s)	2.81
Peak Hour Demand (L/s)	6.18
FUS Fire Flow Requirement (L/s)	83.0
Max Day+Fire Flow (L/s)	85.81

This water demand and fire flow information was submitted to the City of Ottawa for boundary conditions provided from the City's water model. The boundary conditions were used to determine whether the existing watermain infrastructure in Slater Street has capacity for the proposed development. The boundary conditions are provided in **Table 4.2** below.

Table 4.2 Water Boundary Conditions

Criteria	**Head (m)**
<u>Connection to 381mm Watermain in Slater St</u>	
Minimum HGL	107.0
Maximum HGL	115.2
Max Day + Fire Flow HGL	108.0

These boundary conditions were used to analyze the performance of the proposed watermain for three theoretical conditions: 1) High Pressure check under Average Day conditions 2) Peak Hour demand 3) Maximum Day + Fire Flow demand. The following **Table 4.3** summarizes the results from the hydraulic water analysis.

Table 4.3 Water Analysis Results Summary

Condition	Demand (L/s)	Min/Max Allowable Operating Pressures (psi)	Limits of Design Operating Pressures (psi)
High Pressure	1.12	80psi (Max)	60.4
Max Day + Fire Flow	85.81	20psi (Min)	50.2
Peak Hour	6.18	40psi (Min)	48.8

Based on the proceeding analysis it can be concluded that the watermain, as designed, will provide adequate flow and pressures for the fire flow + maximum day demand and peak hour demand. Refer to **Appendix A** for detailed hydraulic calculations and City of Ottawa boundary conditions.

5.0 SANITARY SERVICING

There is an existing 940mm x 1118mm rectangular brick sanitary trunk sewer located in the Slater Street right-of-way which will provide service for the proposed development. The existing 940mm x 1118mm sanitary sewer flows to the east along Slater Street where it connects into an existing 900mm diameter combined sewer at Elgin Street. A portion of the City sewer mapping is included in **Appendix B** for reference which shows the existing sanitary sewer infrastructure.

The proposed 22-storey apartment building will be serviced by a new 200mm diameter sanitary service with a connection to the existing 940mm x 1118mm rectangular brick sanitary sewer mentioned above. Refer to the General Plan of Services (119055-GP) for sanitary servicing information.

Sanitary flows for the proposed 22 storey development are calculated from criteria in Section 4 of the City of Ottawa Sewer Design Guidelines and are based on a total population 277 people from a total of 162 units and 95m² of commercial retail floor space. The peak sanitary flow was calculated to be 2.97 L/s based on an average domestic demand of 280 L/day/person. Sanitary flow calculations are provided in **Appendix B** for reference.

Since the proposed development is directly serviced by a sanitary trunk sewer a downstream analysis is not required. Due to the minimal flows generated by the proposed development it is assumed there is adequate capacity in the existing sanitary trunk sewer. Therefore, at this time there are no capacity concerns with the existing sanitary sewer infrastructure for the proposed development.

6.0 STORM SERVICING

There is an existing 450mm diameter storm sewer in the Slater Street right-of-way which will service the proposed development. The existing 450mm diameter storm sewer flows to the east on Slater Street where it becomes a 1200mm diameter trunk sewer at Metcalfe Street.
There is an existing catchbasin in Slater Street directly in front of the existing development which conveys surface drainage to the 450mm diameter sewer. A portion of the City sewer mapping is included in **Appendix C** for reference which shows the existing storm sewer infrastructure.

The proposed 22-storey apartment building will be serviced by a new 200mm diameter storm service with a connection to the existing 450mm diameter storm sewer in Slater Street. Stormwater from the site will be collected by roof drains and area deck drains which are to be conveyed to an underground stormwater storage tank prior to outletting to the existing storm sewer in Slater Street. Foundation and under slab drainage will be pumped to the proposed storm service (refer to Mechanical drawings for details). Refer to the General Plan of Services (119055-GP) for storm servicing information.

7.0 STORMWATER MANAGEMENT

7.1 Stormwater Management Criteria

The following Stormwater Management criteria was provided by the City of Ottawa:

- Control post-development flow from the site to the 1:5 year pre-development level for all storm events up to and including 1:100 year storm.
- Pre-development flow to be calculated using a runoff coefficient of 0.5.
- Time of Concentration of 20 minutes.
- Quality control of stormwater is not required.

7.2 Existing Site Drainage

As indicated previously the site is currently developed with a 2 storey building with an at grade asphalt driveway pass through the building. In the existing site condition the stormwater generally sheet drains towards Slater Street and is collected by catchbasins in the roadway and conveyed to the existing storm sewer. Refer to **Figure A4** Pre-Development Drainage Area Plan in **Appendix C**.

7.3 Quantity Control

As previously mentioned stormwater from the proposed development for storms up to and including the 100-year storm event will be controlled to the 5-year pre-development level based on a run-off coefficient of 0.5 and a time of concentration of 20 minutes. The allowable release rate to the existing Slater Street storm sewer was calculated to be 6.8 L/s.

The site is made up of a single drainage area as follows:

Area A-1

- Flows from the building roof and driveway pass through will be conveyed to the existing storm sewer in Slater Street. Stormwater will be captured by roof drains and area deck drains which will convey stormwater to a stormwater storage tank in the basement of the proposed development. Flows from the storage tank to the existing storm sewer in Slater Street will be attenuated by an inlet control device. Storage will be provided for storms up to and including the 100-year+25% event within the storage tank. An overflow to the Slater street right-of-way will be provided for storm events in excess of the 100-year+25% event.

Table 8.1 below summarizes the stomwater flows, storage required and storage provided for the site drainage area.

Table 8.1 Stormwater Management Summary

Area ID	Area (ha)	1:5 Year Weighted Cw	Orifice Size & Type	5 Year Storm Event			100 Year Storm Event		
				Flow (L/s)	Req Vol (cu.m)	Max. Vol. Prov (cu.m.)	Flow (L/s)	Req Vol (cu.m)	Max. Vol. Prov (cu.m.)
A-1	0.070	0.90	LMF 85	4.4	9.5	36.0	6.4	20.7	36.0
Post-Development Release Rate				**4.4**			**6.4**		
Allowable Site Release Rate				**6.8**			**6.8**		
Pre-Development Release Rate				**18.2**			**34.7**		

Refer to **Appendix C** for Rational and Modified Method calculations and Figure A5 Post Development Drainage Area Plan.

7.4 Major Overland Flow Route

A major overland flow route will be provided for storms greater than the 100-year storm event. Stormwater from the rear of the site will be directed to the Slater Street right-of-way per existing conditions. Stormwater from the front of the building will sheet drain directly to the Slater Street right-of-way per existing conditions. The major overland system is shown on the Grading Plan.

8.0 EROSION AND SEDIMENT CONTROL

8.1 Temporary Measures

Temporary erosion and sediment control measures will be implemented during construction. Silt fence, mud mats and filter socks in catchbasins will be used as erosion and sediment control measures.

Erosion and sediment control measures should be inspected daily and after every rain event to determine maintenance, repair or replacement requirements. Sediments or granular that enter site sewers shall be removed immediately by the contractor. These measures will be implemented prior to the commencement of construction and maintained in good order until vegetation has been established. Refer to the Grading Plans (119055-GR) for additional information.

9.0 CONCLUSIONS AND RECOMMENDATIONS

- Water servicing for the proposed development will be provided by the existing 381mm diameter watermain in Slater Street. Two 200mm service connections are proposed and will be separated by an isolation valve. The existing watermain infrastructure can provide adequate domestic flows and pressure for fire protection.
- The proposed building will be serviced by a 200mm diameter sanitary service which will connect to the existing 940mm x 1118mm brick rectangular sanitary sewer in Slater Street. The proposed building service will include an internal test port in the basement level. The existing sanitary sewer in Slater Street is trunk sewer and is therefore assumed to have adequate capacity for the proposed development.
- Quantity control of stormwater will be provided through a stormwater storage tank to attenuate flows to the existing storm sewer in Slater Street to the 5-year level for storms up to and including the 100-year event. The allowable release rate is 6.8 L/s and the post-development stormwater release rates are 4.4 L/s and 6.4 L/s for the 5 and 100 year events respectively.
- Quality control of stormwater is not required.
- An overland flow route is provided;
- Erosion and sediment control measures will be implemented prior to and during construction.

NOVATECH

Prepared by:

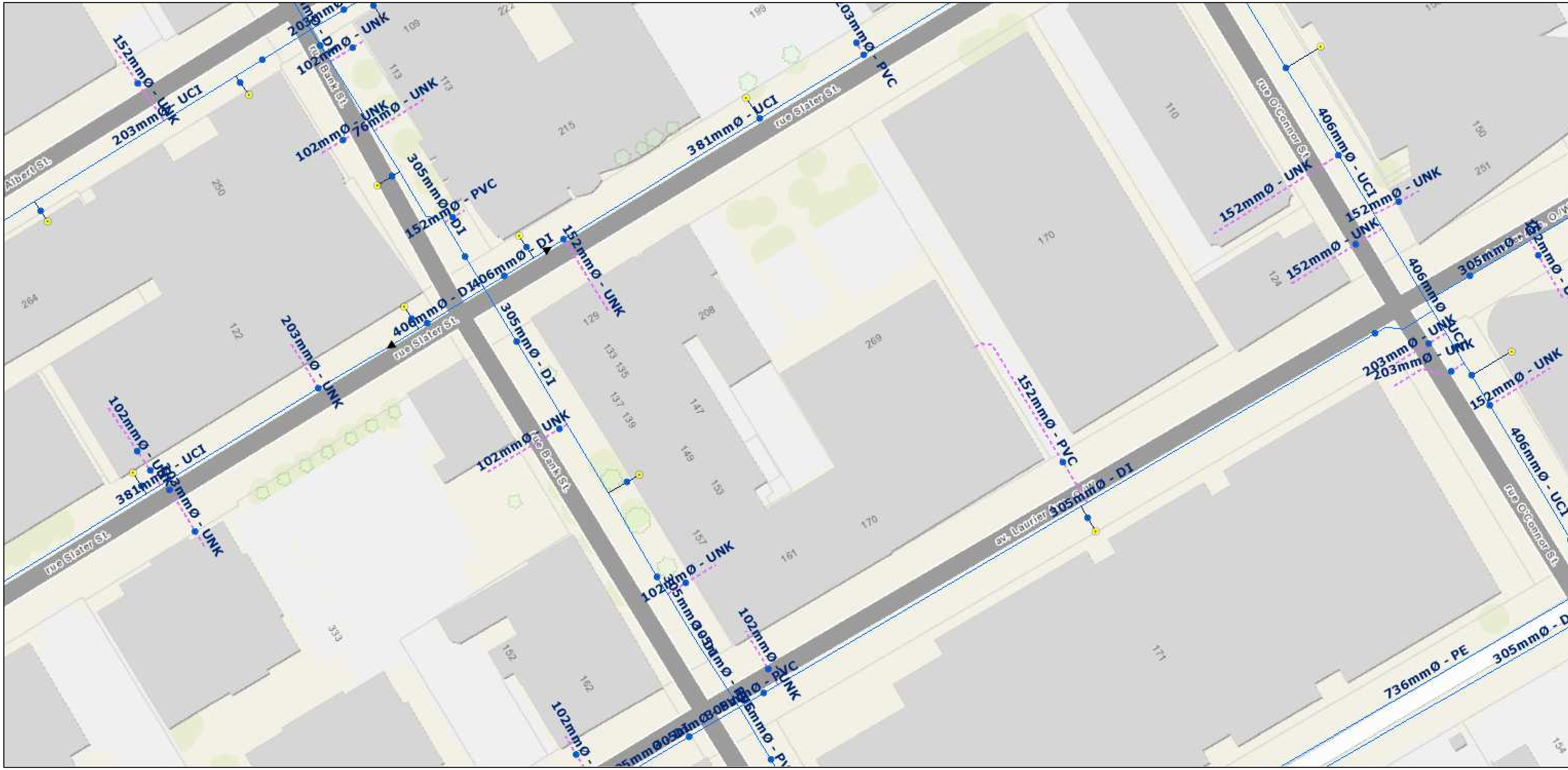
Matthew Hrehoriak, P.Eng
Project Engineer

Reviewed by:

Cara Ruddle, P. Eng.
Senior Project Manager

APPENDIX A
Water Servicing Information

Water Servicing



May 29, 2019

Combined Manholes / Regards d'égout unitaire

Combined Pipes / Conduites d'égout unitaire

Public / Branchement public

Private / Branchement privé

Water Labels / Étiquettes

Valves / Vannes

Valve / Vanne

TVS, A, D

Water Fittings / Raccords de conduite d'eau

Cap / bouchon

Reducer / réducteur

Hydrants / Bornes-fontaines

Hydrant Laterals / Branchements de borne-fontaine

Water Mains / Conduites d'eau principales

Private / Branchement privé

Public / Branchement public

Misc. Water Structures / Structures d'aqueduc - divers

Pumping Station / Station de pompage des eaux

Well Supply / Alimentation par puits

Elevated Tank / Château d'eau

In Ground Tank / Réservoir souterrain

Water Treatment Plant / Usine d'épuration des eaux

1:1,250

0 0.015 0.03 0.06 mi

0 0.0225 0.045 0.09 km

City of Ottawa

NOVATECH
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212 SLATER STREET WATER DEMANDS

	Residential Population		Residential Demand (L/s)				Commercial Demand (L/s)			Total Demand (L/s)		
	Unit Type	Total	Avg Day	Max. Daily	Peak Hour	Floor Area (m^2)	Avg Day	Max. Daily	Peak Hour	Avg Day	Max. Daily	Peak Hour
	1 Bed Apartment											
Unit Count	198	198	1.12	2.81	6.17	95.0	0.003	0.005	0.007	1.12	2.81	6.18
Unit Population	277	277								**1.12**	**2.81**	**6.18**

Design Parameters:

- 1 Bed Apartment = 1.4 persons/unit

Section 4.0 Ottawa Sewer Design Guidelines

- Average Domestic Flow	350	L/person/day
- Retail Area Flow	2500	L/(1000m^2/day)

Peaking Factors: Table 3-3 Moe Guideline for Drinking Water systems (pop < 500)

Max. Daily Demand:

- Residential	2.5	x Avg Day
- Commercial	1.8	x Avg Day

Peak Hourly Demand:

- Residential	2.2	xMax Day
- Commercial	1.5	xMax Day

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
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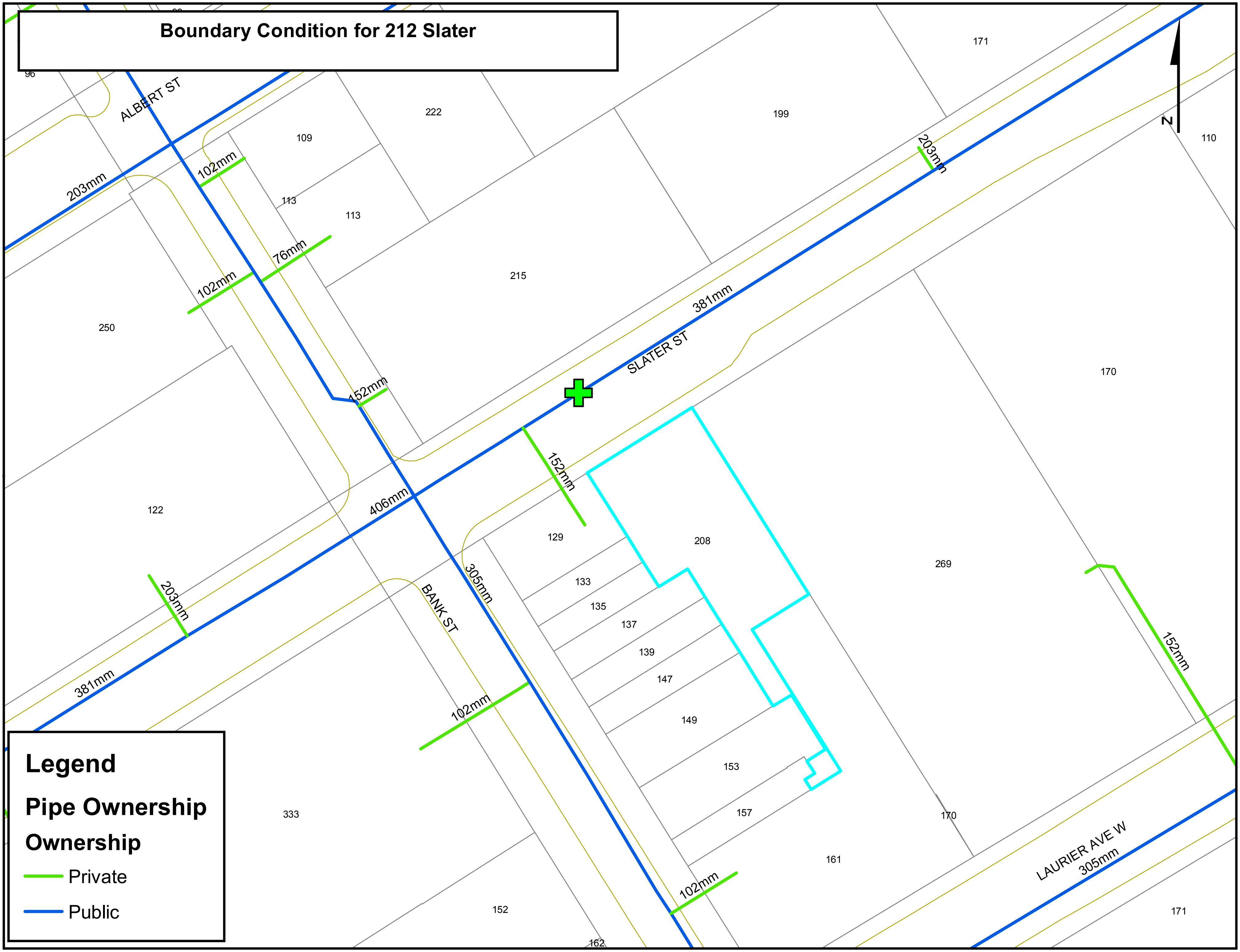
Novatech Project #: 119055
Project Name: 208-212 Slater
Date: May 15/19
Input By: Matt Hrehoriak
Reviewed By: Cara Ruddle

Legend: Input by User; No Information or Input Required

Building Description: 23-Storey Tower
Fire Resistive Construction

Step			Choose		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction C	Wood frame		1.5	0.8	
		Ordinary construction		1		
		Non-combustible construction	Yes	0.8		
		Modified Fire resistive construction (2 hrs)		0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	650			
		Number of Floors/Storeys	23			
		Protected Openings (1 hr)	Yes			
		Area of structure considered (m^2)			**975**	
	F	**Base fire flow without reductions**				**5,000**
		$F = 220\ C\ (A)^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**4,250**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**			**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%	-30%	**-2,125**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	Yes	-10%	-10%	
				Cumulative Total	**-50%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	0 - 3 m		25%	**3,188**
		East Side	0 - 3 m		25%	
		South Side	0 - 3 m		25%	
		West Side	10.1 - 20 m		15%	
				Cumulative Total	**75%**	
Results						
6	(1) + (2) + (3)	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**5,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**83**
				or	USGPM	1,321
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	1.75
		Required Volume of Fire Flow (m^3)			m^3	525

Boundary Condition for 212 Slater



Matthew Hrehoriak

To: Wu, John
Subject: RE: 212 Slater Street SWM criteria

From: Wu, John <John.Wu@ottawa.ca>
Sent: Tuesday, May 21, 2019 10:38 AM
To: Matthew Hrehoriak <m.hrehoriak@novatech-eng.com>
Subject: RE: 212 Slater Street SWM criteria

Hi, Matthew:

Is you want the boundary condition? or please forward to the person who is working on this project.

The following are boundary conditions, HGL, for hydraulic analysis at 212 Slater (zone 1W) assumed to be connected to the 381mm on Slater (see attached PDF for location).

Minimum HGL = 107.0m

Maximum HGL = 115.2m

MaxDay + Fireflow (82 L/s) = 108.0m

These are for current conditions and are based on computer model simulation.

Disclaimer: The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation.

John

Hi John,

Please find below water demand information for the proposed development at 208-212 Slater Avenue. Also, attached is a key plan showing the site location. Please provide boundary conditions for the existing watermain infrastructure highlighted on the attached plan so we can confirm the existing infrastructure has capacity for the proposed development.

Water Demands proposed development:

AVG DAY = 1.12L/s
MAX DAY = 2.81L/s
PEAK HOUR = 6.18L/s

MAX DAY + FIRE =85.81 L/s

Thanks.

Matthew Hrehoriak, P.Eng., Project Engineer | Land Development Engineering
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 x 273 | Fax: 613.254.5867

212 SLATER HYDRAULIC ANALYSIS

CALCULATED WATER DEMNADS:

PROPOSED DEVELOPMENT (23 STOREY BUILDING)

AVERAGE DAY =	1.12	L/s
MAXIMUM DAY =	2.81	L/s
PEAK HOUR =	6.18	L/s
MAX DAY + FIRE =	85.81	L/s

CITY OF OTTAWA BOUNDARY CONDITIONS:

BOUNDAY CONDITIONS BASED ON (ZONE 1W) CONNECTION TO 381mm DIA. WATERMAIN ON SLATER STREET

MINIMUM HGL =	107	m
MAXIMUM HGL =	115.2	m
MAX DAY + FIRE =	108	m

WATERMAIN ANALYSIS:

212 SLATER WATERMAIN CONNECTIONS

FINSIHED FLOOR GROUND ELEVATION = 72.70 m

HIGH PRESSURE TEST = MAX HGL - AVG GROUND ELEV x 1.42197 PSI/m < 80 PSI

HIGH PRESSURE = 60.4 PSI

LOW PRESSURE TEST = MIN HGL - AVG GROUND ELEV x 1.42197 PSI/m > 40 PSI

LOW PRESSURE = 48.8 PSI

MAX DAY + FIRE TEST = MAX DAY + FIRE - AVG GROUND ELEV x 1.42197 PSI/m > 20 PSI

LOW PRESSURE = 50.2 PSI

APPENDIX B
Sanitary Servicing Information

Sanitary Servicing

May 29, 2019

Upstream Invert / Radier amont

Downstream Invert / Radier aval

Sanitary Pipe Details / Détails de la conduite de réseau d'égout domestique

Sewer Fittings / Raccords

- Cap / bouchon
- Tee / raccord en T
- Sanitary Manholes / Regards d'égout domestique

Sanitary Pipes / Conduites d'égout domestique

- Private / Branchement privé
- Public / Branchement public

Sanitary Pump Stations and Treatment Plants / Installations d'infrastructure

- Sanitary Pump Station / Station de pompage des eaux usées
- Wastewater Treatment Plant / Usine d'épuration des eaux usées
- Combined Manholes / Regards d'égout unitaire

Combined Pipes / Conduites d'égout unitaire

- Public / Branchement public
- Private / Branchement privé

1:1,250

0 0.015 0.03 0.06 mi

0 0.0225 0.045 0.09 km

City of Ottawa

PROJECT #: 119055
PROJECT NAME: 212 SLATER STREET
LOCATION: OTTAWA

NOVATECH
Engineers, Planners & Landscape Architects

DATE PREPARED: MAY 2019

212 SLATER STREET SANITARY FLOWS

LOCATION		RESIDENTIAL						COMMERCIAL		INFILTRATION			Total Flow (l/s)	PIPE					
		Unit Type		TOTAL															
FROM	TO	1 Bed Units	Pop.	Pop.	Accum. Pop.	Peak Factor	Peak Flow (l/s)	Floor Area (m^2)	Peak Flow (L/s)	Total Area (ha)	Accum. Area (ha)	Infilt. Flow (l/s)		Size (mm)	Slope (%)	Length (m)	Capacity (l/s)	Full Flow Vel. (m/s)	Q/Q_{full} (%)
BLDG	EX	198	277	277	277	3.3	2.94	95.00	0.003	0.07	0.07	0.02	2.97	200	2.00	N/A	46.3	1.48	6.4%

Design Parameters:

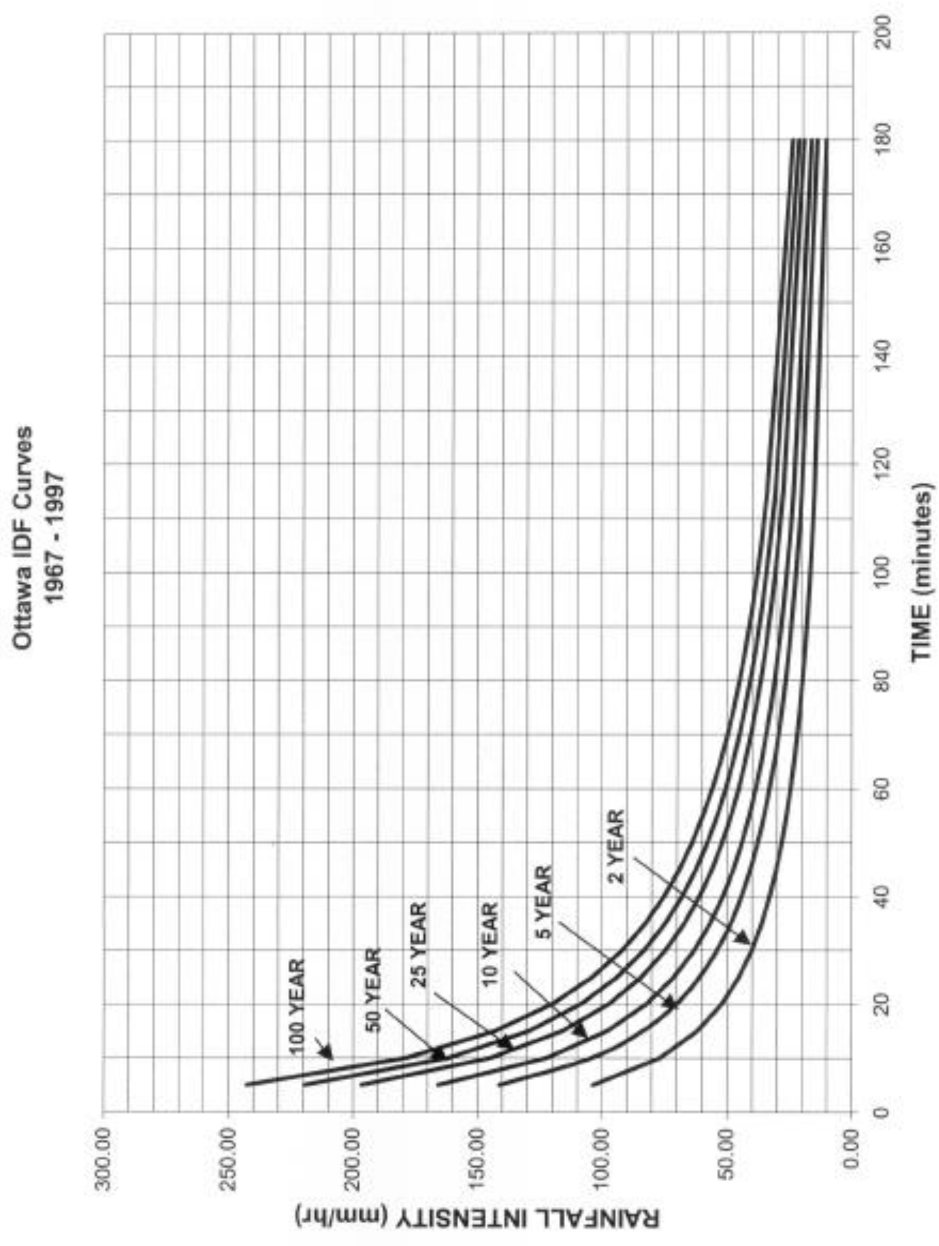
- 1 Bed Apartment = 1.4 persons/unit

Section 4.0 Ottawa Sewer Design Guidelines

- Average Domestic Flow	280	L/person/day
- Retail Area Flow	2500	L/(1000m^2/day)
- Extraneous Flows	0.33	l/s/ha
Residential Peaking Factor	Harmon Equation	
Commercial Peaking Factor	1	

APPENDIX C
Stormwater Management Calculations

APPENDIX 5-A OTTAWA INTENSITY DURATION FREQUENCY (IDF) CURVE



RATIONAL METHOD

The Rational Method was used to determine both the allowable runoff as well as the post-development runoff for the proposed site. The equation is as follows:

Q=2.78 CIA

Where:
Q is the runoff in L/s
C is the weighted runoff coefficient*
I is the rainfall intensity in mm/hr**
A is the area in hectares

*The weighted runoff coefficient is determined for each of the catchment areas as follows:

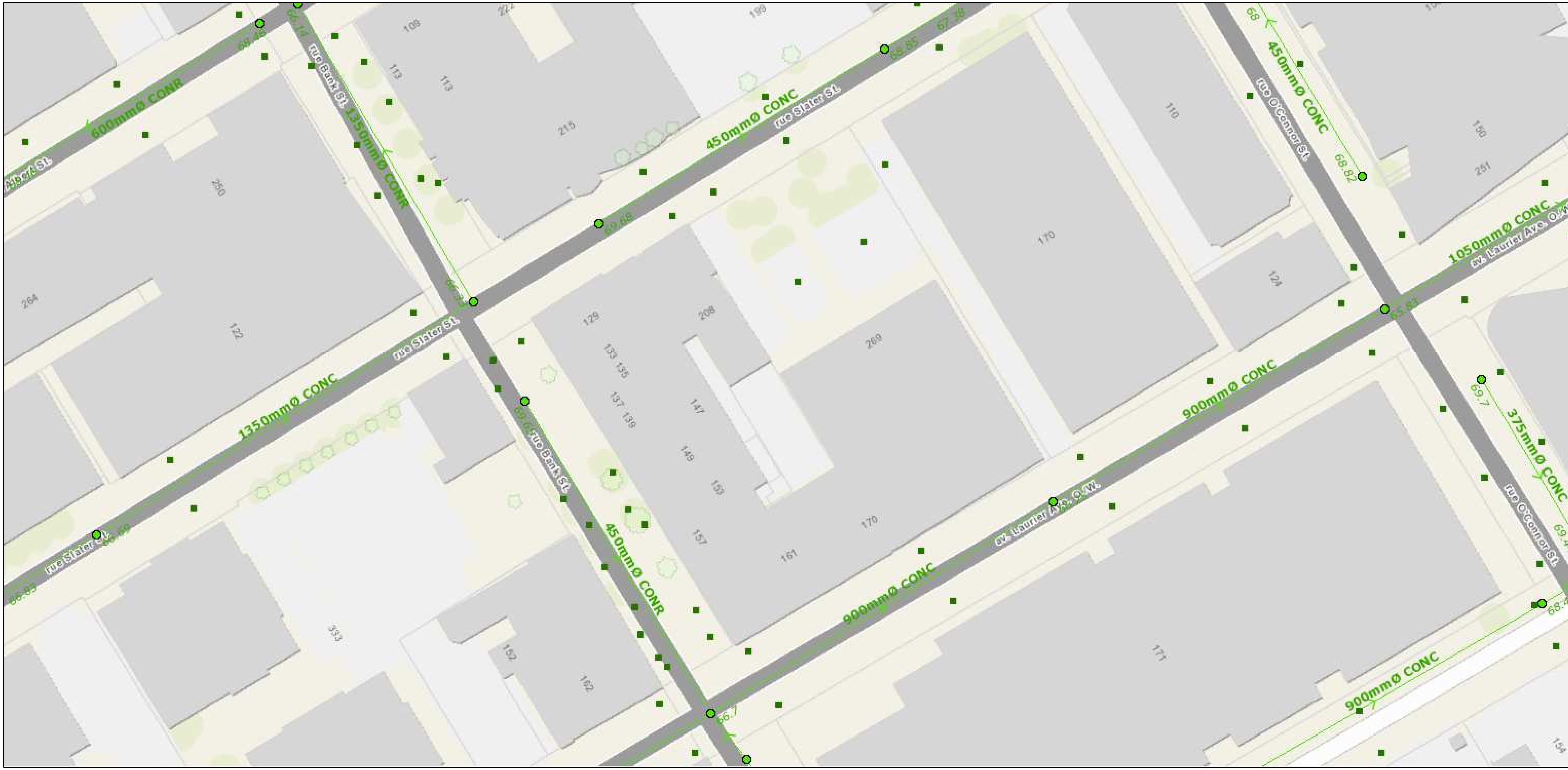
$$C = \frac{(A_p \times C_p) + (A_{imp} \times C_{imp})}{A_{tot}}$$

Where:
A_p is the pervious area in hectares
C_p is the pervious area runoff coefficient (C_{perv}=0.20)
A_{imp} is the impervious area in hectares
C_{imp} is the impervious area runoff coefficient (C_{imp}=0.90)
A_{tot} is the catchment area (A_{perv} + A_{imp}) in hectares

** The rainfall intensity is taken from the City of Ottawa IDF Curves using a time of concentration (tc) of 10 minutes resulting in a rainfall intensity of 104.2mm/hr and 178.6mm/hr for the 1:5 year and 1:100 year design events respectively.

Note: The post-development C values are to be increased by 25% for the 1:100 year event (max. C_{imp}=1.0).

Storm Servicing



May 29, 2019

1:1,250

Upstream Invert / Radier amont

Downstream Invert / Radier aval

Storm Pipe Details / Détails de la conduite d'eaux pluviales

- Storm Inlets / Prises d'entrée des eaux pluviales
- Storm Outlets / Prises de sortie des eaux pluviales
- Storm Manholes / Regards de conduites d'eaux pluviales

Storm Inlet Leads / Avaloirs des prises d'entrée des eaux pluviales

Storm Pipes / Conduites d'eaux pluviales

- Private / Branchement privé
- Public / Branchement public

Storm Pump Stations / Stations de pompage des eaux pluviales

- Storm Pump Station / Station de pompage des eaux pluviales
- Combined Manholes / Regards d'égout unitaire

Combined Pipes / Conduites d'égout unitaire

- Public / Branchement public
- Private / Branchement privé

0	0.015	0.03	0.06 mi
0	0.0225	0.045	0.09 km

City of Ottawa

PROJECT #: 119055
PROJECT NAME: 212 SLATER STREET
LOCATION: CITY OF OTTAWA

NOVATECH
Engineers, Planners & Landscape Architects

DATE PREPARED: MAY 2019

5 Year Storm Sewer Design Sheet

LOCATION		AREA (Ha)			FLOW					PROPOSED SEWER							
FROM	TO	Total Area (ha)	R= 0.2	R= 0.9	INDIV 2.78AR	ACCUM 2.78AR	Time of Concentration	Rainfall Intensity I	* Peak Flow Q (L/s)	Pipe Size (mm)	Pipe Slope (%)	Pipe Length (m)	Pipe Capacity (L/s)	Full Flow Velocity (m/s)	Time of Flow (min)	Excess Capacity (L/s)	Q/Q_{full} (%)
TANK	EX SEWER	0.070	0.000	0.070	0.18	0.18	10.00	104.19	18.25	200.0	2.00	10.4	46.43	1.48	0.12	28.18	39%

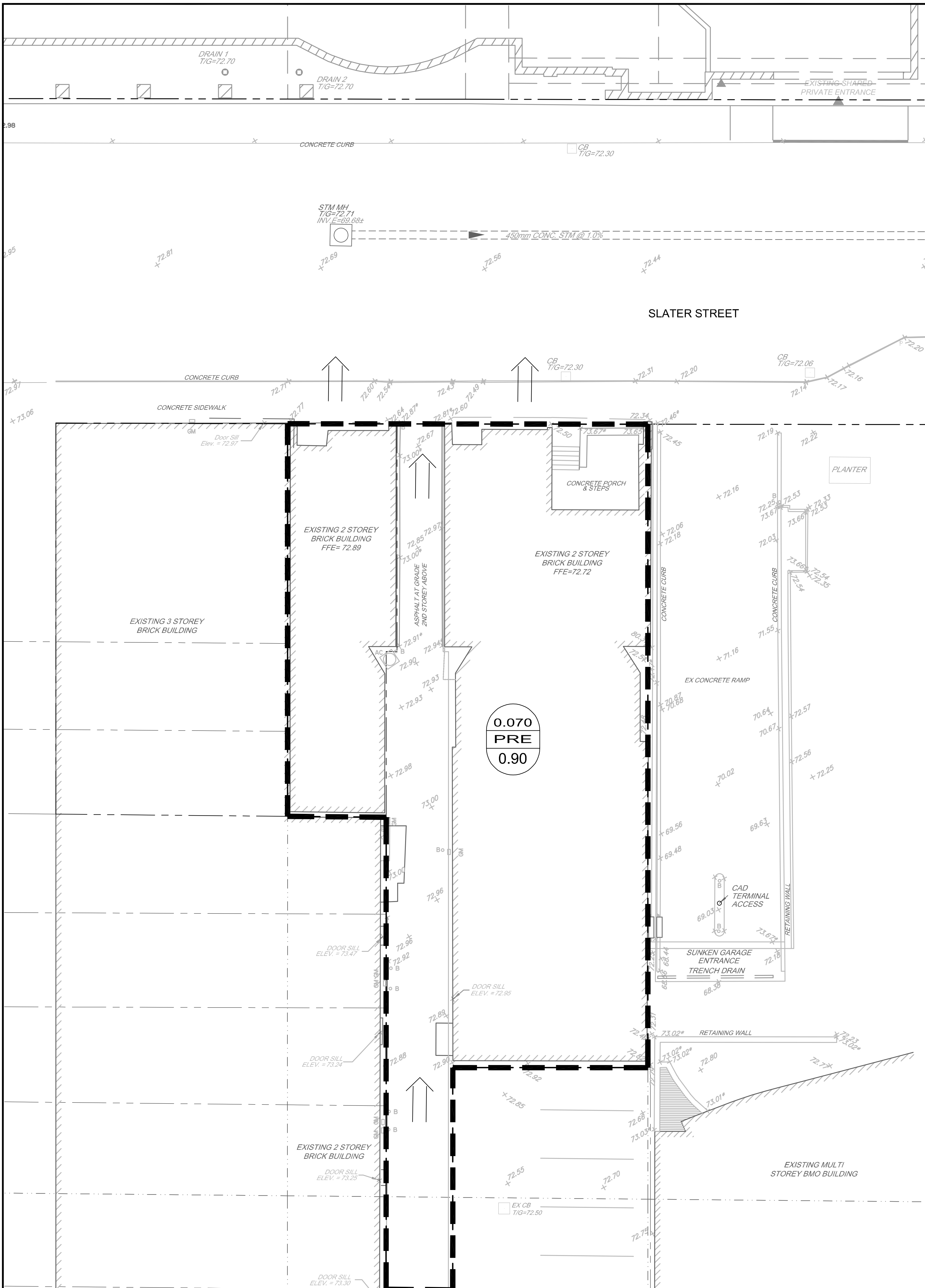
*Note: Storm sewer design sheet flows are peak uncontrolled flows. Flows will be attenuated with ICD's

Definitions

Q = 2.78 AIR
Q = Peak Flow, in Litres per second (L/s)
A = Area in hectares (ha)
I = 5 YEAR Rainfall Intensity (mm/h)
R = Runoff Coefficient

Notes:

1) Ottawa Rainfall-Intensity Curve
2) Min Velocity = 0.76 m/sec.
3) 5 Year intensity = 998.071 / (time + 6.053)$^{0.814}$



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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

LEGEND

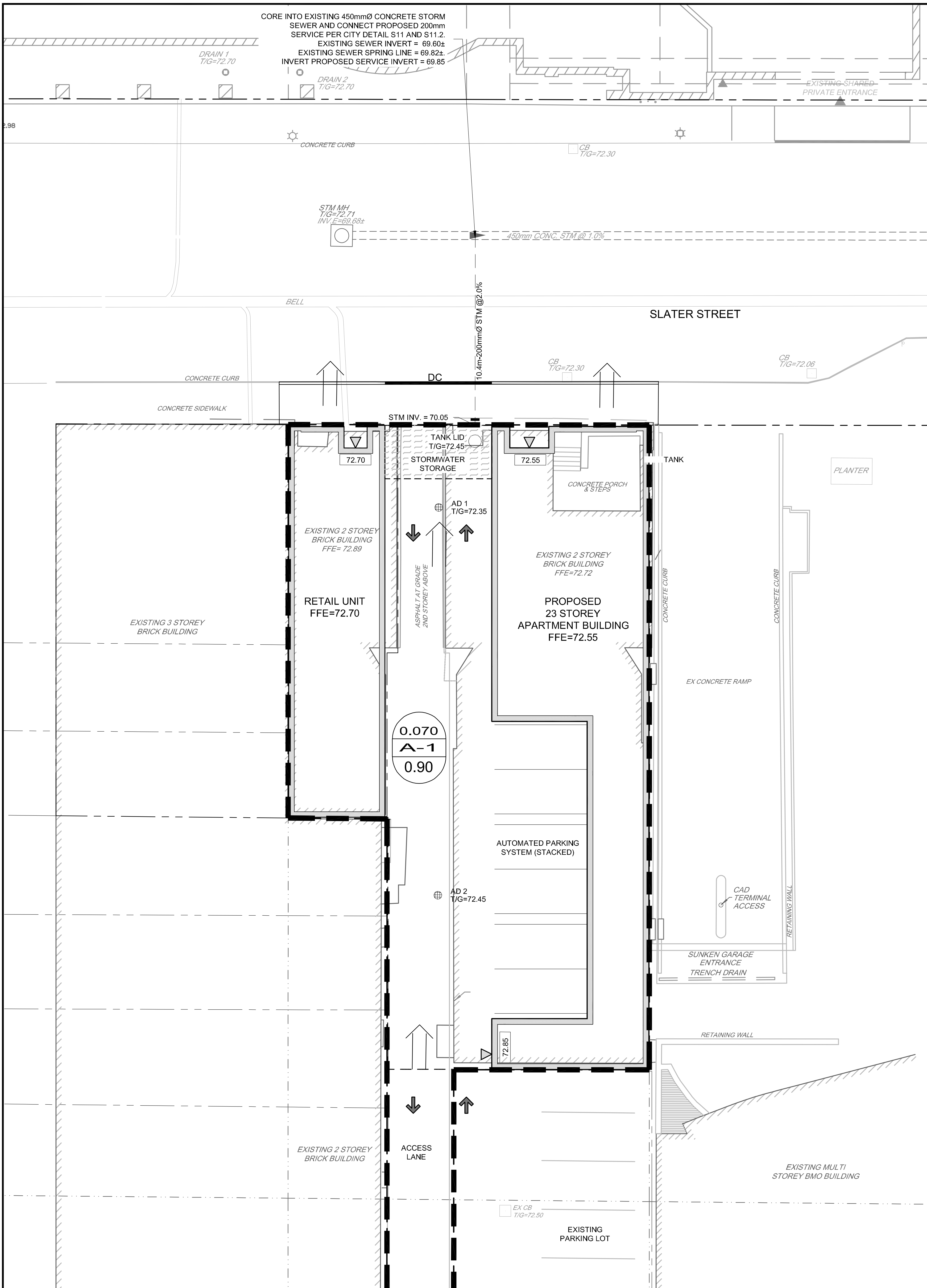
- PROPERTY LINE
- EXISTING STORM SEWER
- PRE DEVELOPMENT DRAINAGE AREA
- 0.070 — DRAINAGE AREA ha
- PRE — DRAINAGE AREA IDENTIFIER
- 0.90 — RUNOFF COEFFICIENT

212 SLATER STREET

PRE-DEVELOPMENT DRAINAGE AREA PLAN

SCALE			
1 : 200			
DATE: MAY 2019	JOB: 119055	FIGURE: A4	

SHT11X17.DWG - 279mmX432mm



LEGEND

— — —	PROPERTY LINE
—○—	EXISTING STORM SEWER
—○—	PROPOSED STORM SEWER
▬ ▬ ▬	POST DEVELOPMENT DRAINAGE AREA
0.070	DRAINAGE AREA ha
A-1	DRAINAGE AREA IDENTIFIER
0.90	RUNOFF COEFFICIENT

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212 SLATER STREET

POST-DEVELOPMENT DRAINAGE AREA PLAN

SCALE 1 : 200 (0 2 4 6 8)

DATE MAY 2019 | JOB 119055 | FIGURE A5

SHT11X17.DWG - 279mmX432mm

M:\2019\119055\CAD\Design\119055-SWM.dwg, FIG A5, May 28, 2019 - 5:19pm, mhrehorlak

Matthew Hrehoriak

From: Wu, John <John.Wu@ottawa.ca>
Sent: Tuesday, May 07, 2019 1:35 PM
To: Matthew Hrehoriak
Subject: RE: 212 Slater Street SWM criteria

yes

From: Matthew Hrehoriak <m.hrehoriak@novatech-eng.com>
Sent: May 7, 2019 1:30 PM
To: Wu, John <John.Wu@ottawa.ca>
Subject: RE: 212 Slater Street SWM criteria

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ATTENTION : Ce courriel provient d'un expéditeur externe. Ne cliquez sur aucun lien et n'ouvrez pas de pièce jointe, excepté si vous connaissez l'expéditeur.

Thanks John,

10min TC with calculations to prove?

Matthew Hrehoriak, P.Eng., Project Engineer | Land Development Engineering
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 x 273 | Fax: 613.254.5867

From: Wu, John <John.Wu@ottawa.ca>
Sent: Tuesday, May 07, 2019 1:05 PM
To: Matthew Hrehoriak <m.hrehoriak@novatech-eng.com>
Subject: RE: 212 Slater Street SWM criteria

Please use C0.5, 5 years to restrict up to 100 year's storm.

John

From: Matthew Hrehoriak <m.hrehoriak@novatech-eng.com>
Sent: May 2, 2019 2:17 PM
To: Wu, John <John.Wu@ottawa.ca>
Subject: 212 Slater Street SWM criteria

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ATTENTION : Ce courriel provient d’un expéditeur externe. Ne cliquez sur aucun lien et n’ouvrez pas de pièce jointe, excepté si vous connaissez l’expéditeur.

Hi John,

I am looking to get an understanding on the Stormwater Management Criteria for the proposed development at 212 Slater. If you could let me know it would be much appreciated.

Thanks,

Matthew Hrehoriak, P.Eng., Project Engineer | Land Development Engineering
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 x 273 | Fax: 613.254.5867

TABLE 1A: Pre-Development Runoff Coefficient "C" - PRE

Area	Surface	Ha	"C"	C_{avg}	$*C_{100}$
Total	Hard	0.070	0.90	0.90	1.00
0.070	Soft	0.000	0.20		

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

TABLE 1B: Pre-Development Flows - PRE

Outlet Options	**Area (ha)**	C_{avg}	**Tc (min)**	$Q_{5\ Year}$ **(L/s)**	$Q_{100\ Year}$ **(L/s)**
Slater Street	0.070	0.90	10	**18.2**	**34.7**

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

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

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

TABLE 2A: Allowable Runoff Coefficient "C"

Area	"C"
Total	0.50
0.070	

TABLE 2B: Allowable Flows

Outlet Options	Area (ha)	"C"	Tc (min)	$Q_{5\ Year}$ (L/s)
Slater Street	0.070	0.50	20	**6.8**

Time of Concentration	Tc=	20	min
Intensity (5 Year Event)	I_5=	70.25	mm/hr
Intensity (100 Year Event)	I_{100}=	119.95	mm/hr

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

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

TABLE 3A: Post-Development Runoff Coefficient "C" - A-1

			5 Year Event		100 Year Event	
Area	0.4	Ha	"C"	C_{avg}	"C" + 25%	*C_{avg}
Total	Hard	0.000	0.90	0.90	1.00	1.00
0.070	Roof	0.070	0.90		1.00	
	Soft	0.000	0.20		0.25	

TABLE 3B: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-1

0.070 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	10	104.19	18.25	4.4	13.85	8.31
	15	83.56	14.63	4.4	10.23	9.21
	20	**70.25**	**12.30**	**4.4**	**7.90**	**9.48**
	25	60.90	10.67	4.4	6.27	9.40
	30	53.93	9.44	4.4	5.04	9.08

TABLE 3C: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-1

0.07 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	15	142.89	27.81	6.4	21.41	19.27
	20	119.95	23.34	6.4	16.94	20.33
	25	**103.85**	**20.21**	**6.4**	**13.81**	**20.71**
	30	91.87	17.88	6.4	11.48	20.66
	35	82.58	16.07	6.4	9.67	20.31

TABLE 3D: 100+25% EVENT QUANTITY STORAGE REQUIREMENT - A-1

0.070 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 +25% YEAR	20	149.94	29.18	7.5	21.68	26.01
	25	129.81	25.26	7.5	17.76	26.64
	30	**114.84**	**22.35**	**7.5**	**14.85**	**26.72**
	35	103.22	20.09	7.5	12.59	26.43
	40	93.93	18.28	7.5	10.78	25.87

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

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

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TABLE 3D: Structure information - A-1

Structures	Size Dia.(mm)	Area (m^2)	T/G	Inv IN	Inv OUT
STORAGE TANK	N/A	18.00	72.45	N/A	70.05

TABLE 3E: Storage Provided - A-1

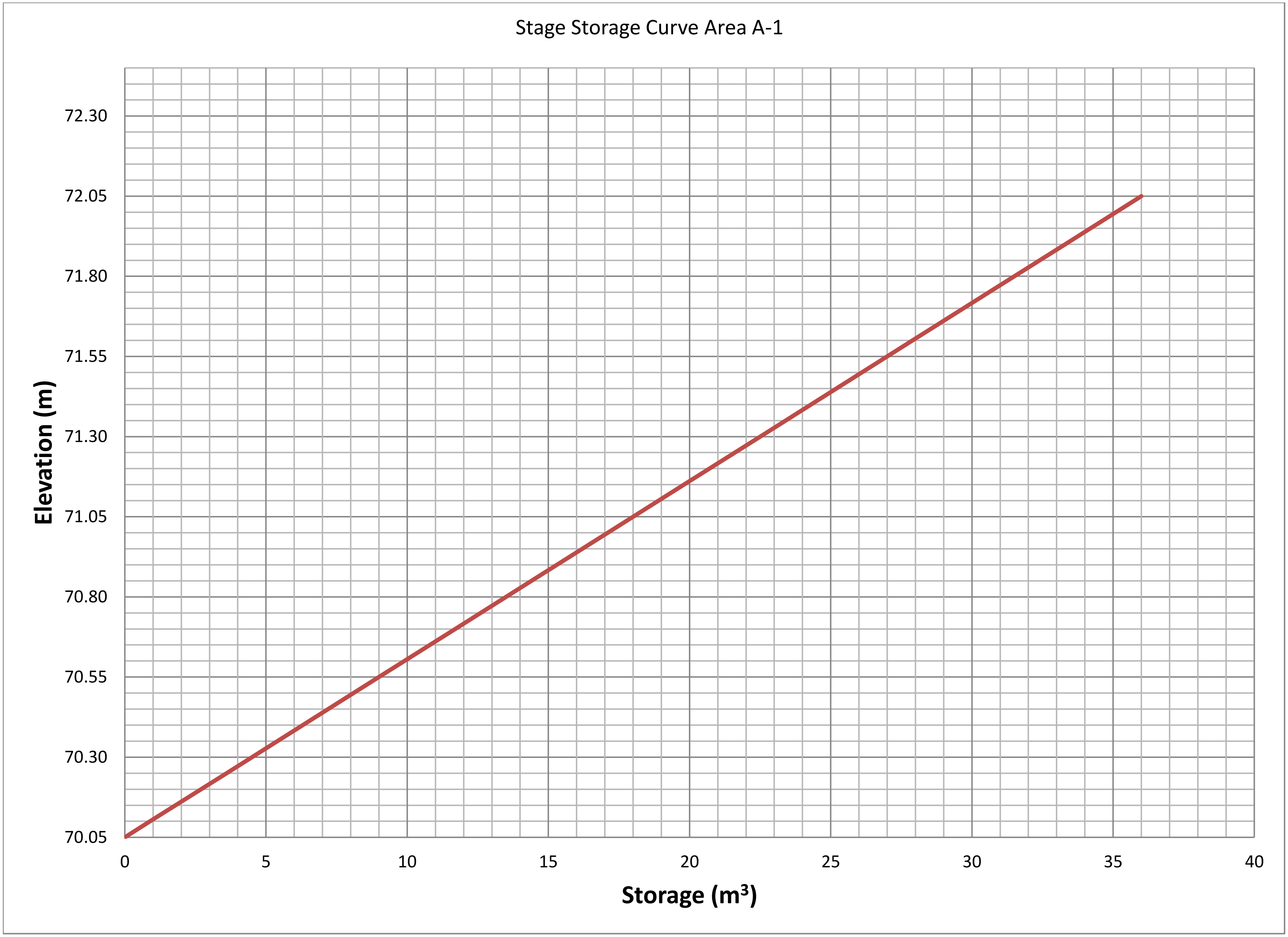
Area A-1: Storage Table

Elevation (m)	System Depth (m)	TANK Volume (m^3)	Underground Volume (m^3)*
70.050	0.00	0.00	0.00
70.100	0.05	0.90	0.90
70.250	0.20	3.60	3.60
70.400	0.35	6.30	6.30
70.550	0.50	9.00	9.00
70.700	0.65	11.70	11.70
70.850	0.80	14.40	14.40
71.000	0.95	17.10	17.10
71.150	1.10	19.80	19.80
71.300	1.25	22.50	22.50
71.450	1.40	25.20	25.20
71.600	1.55	27.90	27.90
71.750	1.70	30.60	30.60
71.900	1.85	33.30	33.30
72.050	2.00	36.00	36.00

TABLE 3F: Orfice Sizing information Area - A-1 Structure - TANK CB

Control Device					
IPEX TEMPEST LMF		**85**			
Design Event	**Flow (L/S)**	**Head (m)**	**Elev (m)**	**Outlet dia. (mm)**	**Required Volume (m^3)**
1:5 Year	4.4	0.48	70.57	250.00	9.48
1:100 Year	6.4	1.05	71.20	200.00	20.71
1:100 + 25%	7.5	1.39	71.54	200.00	26.72

*NOTE: Design head taken from the center of the outlet pipe

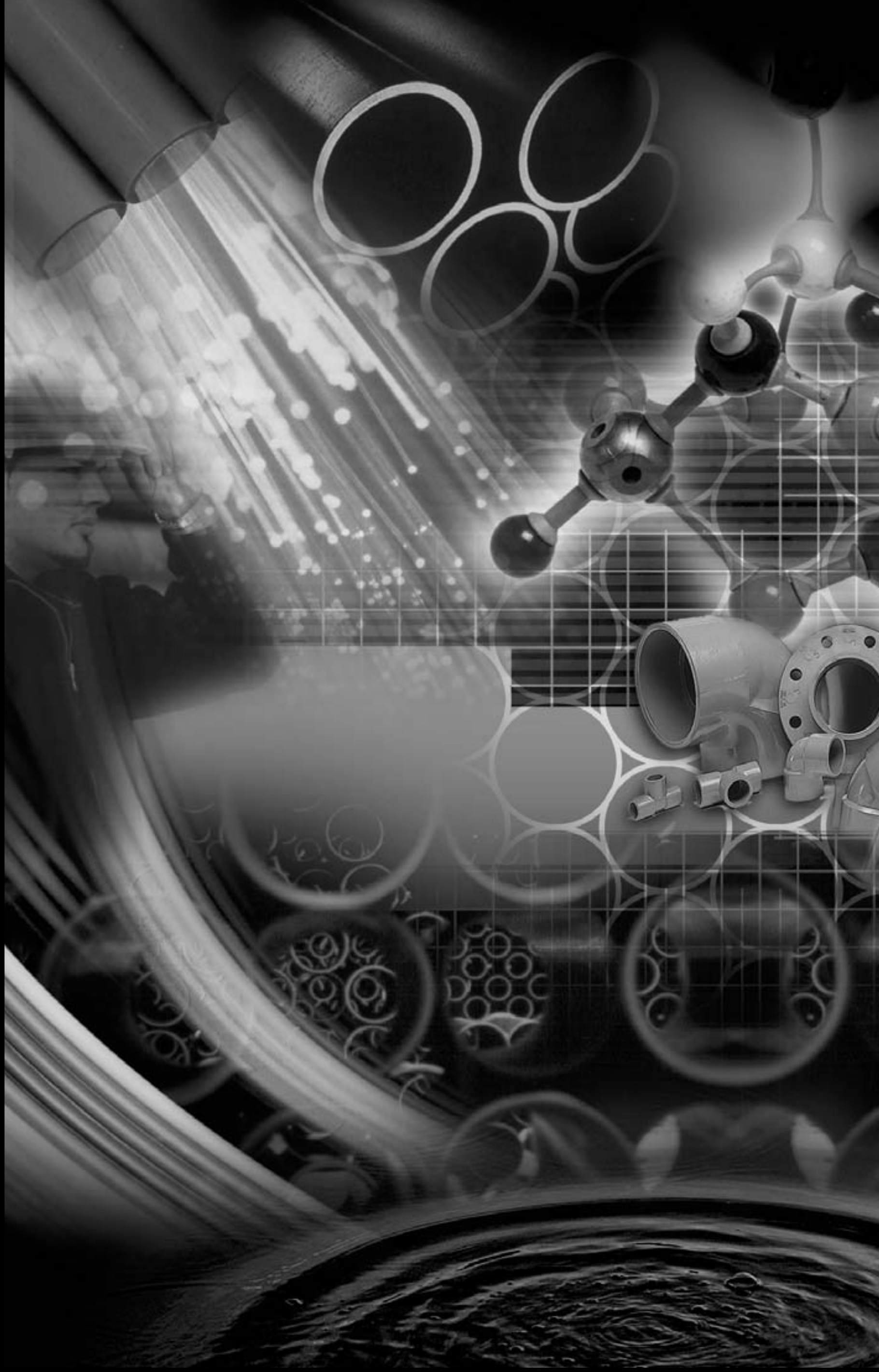


Stage Storage Curve Area A-1
Elevation (m)
72.30
72.05
71.80
71.55
71.30
71.05
70.80
70.55
70.30
70.05
0
5
10
15
20
25
30
35
40
Storage (m³)

Table 8: Post-Development Stormwater Mangement Summary

Area ID	Area (ha)	1:5 Year Weighted Cw	Oulet Location	Orifice	5 Year Storm Event				100 Year Storm Event			
					Release (L/s)	Head (m)	Req'd Vol (cu.m)	Max. Vol. Provided (cu.m.)	Release (L/s)	Head	Req'd Vol (cu.m)	Max. Vol. Provided (cu.m.)
A-1	0.070	0.90	Slater St	LMF 85	4.4	0.48	9.48	36.00	6.4	1.39	20.71	36.00
Total					**4.4**				**6.4**			
Allowable					**6.8**				**6.8**			

Volume III: TEMPEST™ INLET CONTROL DEVICES



Municipal Technical Manual Series

SECOND EDITION

LMF (Low to Medium Flow) ICD

HF (High Flow) ICD

MHF (Medium to High Flow) ICD

IPEX

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:

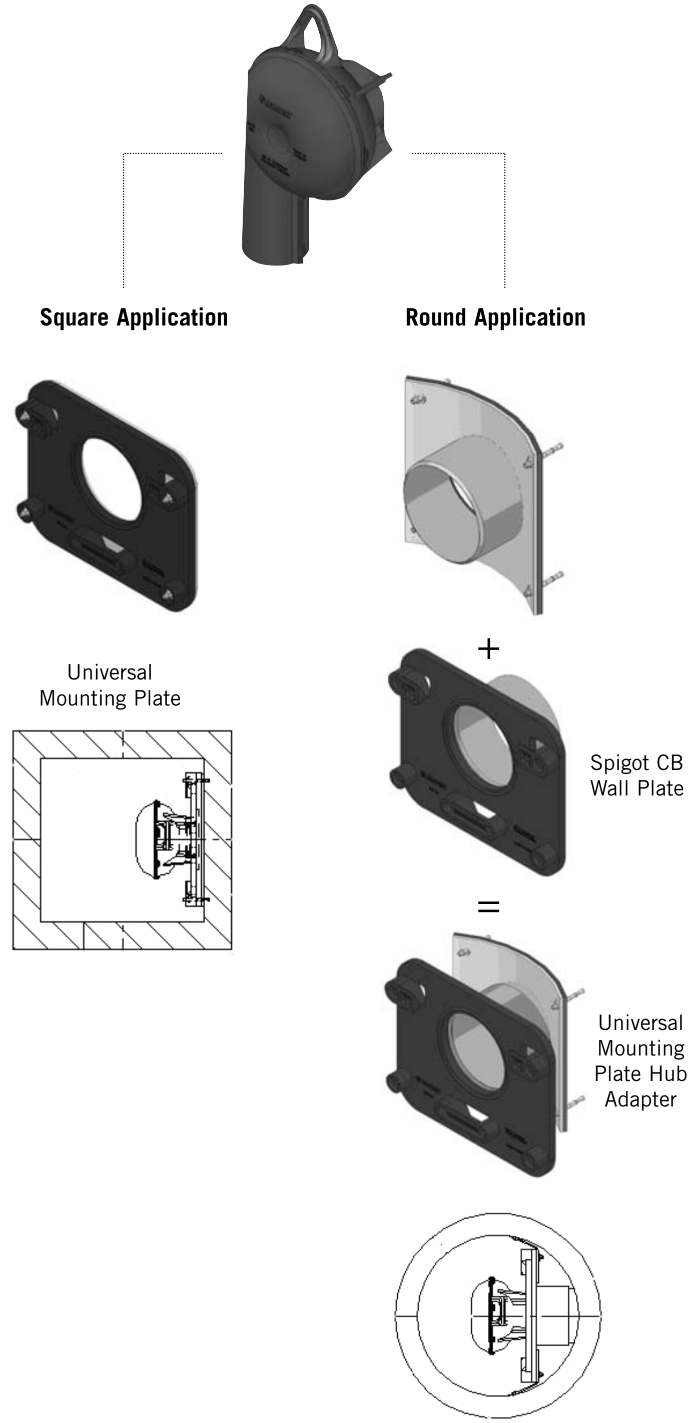


Chart 1: LMF 14 Preset Flow Curves

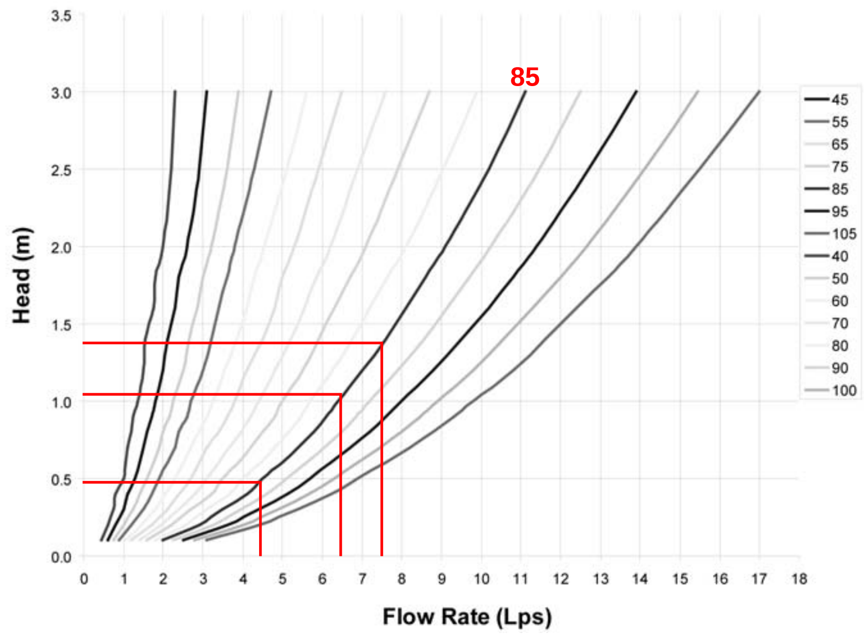
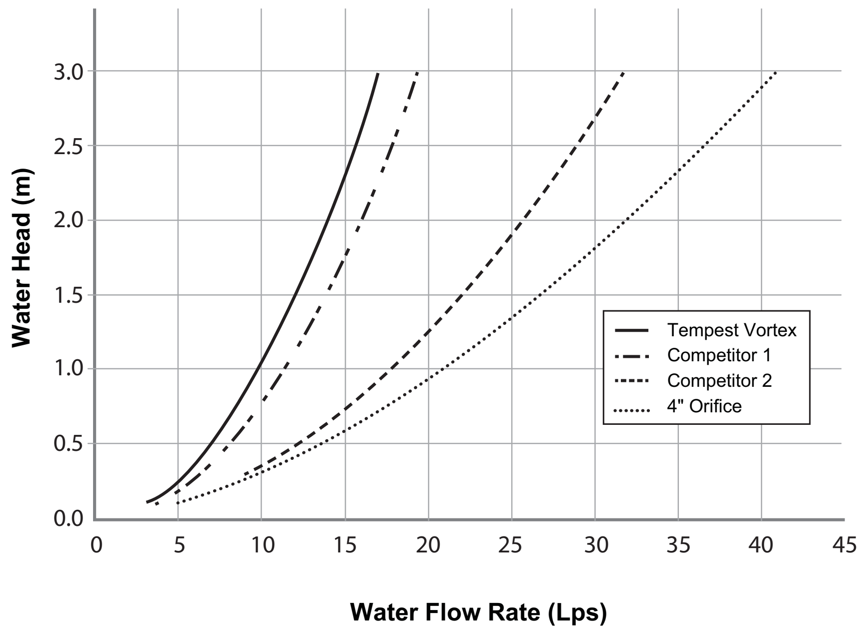


Chart 2: LMF Flow vs. ICD Alternatives



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.

APPENDIX D
Development Servicing Study Checklist

212 SLATER STREET, OTTAWA
DEVELOPMENT SERVICING STUDY CHECKLIST

4.1 General Content	Addressed (Y/N/NA)	Comments
Executive Summary (for larger reports only).	N/A	
Date and revision number of the report.	Y	
Location map and plan showing municipal address, boundary, and layout of proposed development.	Y	Refer to Report Figures
Plan showing the site and location of all existing services.	Y	Refer to Grading and Servicing Plans
Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.	Y	Refer to Site Plan
Summary of Pre-consultation Meetings with City and other approval agencies.	Y	
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.	N/A	
Statement of objectives and servicing criteria.	Y	Report Sections: 4.0 Water Servicing , 5.0 Sanitary Servicing, 6.0 Storm Servicing
Identification of existing and proposed infrastructure available in the immediate area.	Y	
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).	N/A	
Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighboring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.	Y	Refer to Grading Plan and Stormwater Management Plan

212 SLATER STREET, OTTAWA
DEVELOPMENT SERVICING STUDY CHECKLIST

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

212 SLATER STREET, OTTAWA
DEVELOPMENT SERVICING STUDY CHECKLIST

4.2 Water	Addressed (Y/N/NA)	Comments
Confirm consistency with Master Servicing Study, if available.	N/A	
Availability of public infrastructure to service proposed development.	Y	Report Sections: 4.0 Water Servicing , 5.0 Sanitary Servicing, 6.0 Storm Servicing
Identification of system constraints.	N/A	
Identify boundary conditions.	Y	Provided by City of Ottawa
Confirmation of adequate domestic supply and pressure.	Y	Refer to Appendix A
Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development.	Y	Refer to Appendix A
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.	Y	Refer to Appendix A
Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design.	N/A	
Address reliability requirements such as appropriate location of shut-off valves.	Y	Refer to Appendix A
Check on the necessity of a pressure zone boundary modification.	N/A	
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.	Y	Report Section 4.0 Water Servicing
Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.	Y	Report Section 4.0 Water Servicing
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.	N/A	
Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Y	Report Section 4.0 Water Servicing
Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	N/A	

4.3 Wastewater	Addressed (Y/N/NA)	Comments
Summary of proposed design criteria (Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed	Y	Report Section 5.0 Sanitary Servicing
Confirm consistency with Master Servicing Study and/or justifications for deviations.	N/A	
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.	N/A	
Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Y	Report Section 5.0 Sanitary Servicing
Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable)	y	Refer to Appendix B
Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	N/A	
Description of proposed sewer network including sewers, pumping stations, and forcemains.	Y	Report Section 5.0 Sanitary Servicing
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).	N/A	
Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	N/A	
Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	N/A	
Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	N/A	
Special considerations such as contamination, corrosive environment etc.	N/A	

4.4 Stormwater	**Addressed (Y/N/NA)**	**Comments**
Description of drainage outlets and downstream constraints including legality of outlet (i.e. municipal drain, right-of-way, watercourse, or private property).	Y	Report Sections 6.0 Storm Servicing and 7.0 Stormwater Management
Analysis of the available capacity in existing public infrastructure.	N/A	The allowable flow requirments was provided by the City of Ottawa.
A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns and proposed drainage patterns.	Y	Figure A4 Pre Development Drainage Area Plan Figure A5 Post Development Drainage Area Plan
Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.	Y	Report Section 7.0 Stormwater Management
Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	Y	Report Section 7.0 Stormwater Management
Description of stormwater management concept with facility locations and descriptions with references and supporting information.	Y	Report Section 7.0 Stormwater Management
Set-back from private sewage disposal systems.	N/A	
Watercourse and hazard lands setbacks.	N/A	
Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	N/A	
Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	N/A	
Storage requirements (complete with calcs) and conveyance capacity for 5 yr and 100 yr events.	Y	Refer to Appendix C
Identification of watercourse within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	N/A	
Calculate pre and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.	Y	Refer to Appendix C
Any proposed diversion of drainage catchment areas from one outlet to another.	N/A	
Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and SWM	N/A	
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.	N/A	

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4.4 Stormwater	**Addressed (Y/N/NA)**	**Comments**
Identification of potential impacts to receiving watercourses.	N/A	
Identification of municipal drains and related approval requirements.	N/A	
Description of how the conveyance and storage capacity will be achieved for the development.	Y	Report Section 7.0 Stormwater Management
100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	Y	Refer to Figure A5 Post Development Drainage Area Plan
Inclusion of hydraulic analysis including HGL elevations.	N/A	
Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Y	Report Section 8.0 Erosion and Sediment Control
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.	N/A	
Identification of fill constrains related to floodplain and geotechnical investigation.	N/A	

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

4.6 Conclusion	**Addressed (Y/N/NA)**	**Comments**
Clearly stated conclusions and recommendations.	Y	Report Section 9.0 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.	N/A	T.B.D.
All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario.	Y	

APPENDIX E
Drawings