

## **SERVICING REPORT – 3500 HAWTHORNE ROAD**

Appendix A Water Supply Servicing  
April 7, 2017

# **Appendix A WATER SUPPLY SERVICING**

## **A.1 DOMESTIC WATER DEMAND ESTIMATE**

*Estimated Water Demand per City of Ottawa Design Guidelines (July 2010)*

**WATER DEMAND**

*Estimated Area:*

$$\text{Commercial and Retail} - 250\text{m}^2 / 1000\text{m}^2 = 0.250$$

*Average Daily Demand:*

$$Q_{avg} = 0.250 \times \frac{5000L}{d} = 1250 \frac{L}{d} \times \frac{1d}{86,400s} = 0.014 \frac{L}{s}$$

*Maximum Daily Demand:*

$$Q_{max\_daily} = 1250 \frac{L}{d} \times 1.5 = 1875 \frac{L}{d} \times \frac{1d}{86,400s} = 0.022 \frac{L}{s}$$

*Peak Hourly:*

$$Q_{peak\_hourly} = 1875 \frac{L}{d} \times 1.8 = 3375 \frac{L}{d} \times \frac{1d}{86,400s} = 0.039 \frac{L}{s}$$

## **SERVICING REPORT – 3500 HAWTHORNE ROAD**

Appendix A Water Supply Servicing  
April 7, 2017

### **A.2 FIRE FLOW REQUIREMENTS PER FUS**



### FUS Fire Flow Calculation

Calculations based on: "Water Supply for Public Fire Protection" by Fire Underwriters' Survey, 1999

Stantec Project #: 1604-01302  
 Project Name: 3500 Hawthorne Road  
 Date: March 24, 2017  
 Data input by: Warren Johnson

Fire Flow Calculation #: 1  
 Building Type/Description/Name: Commercial Building  
 Gas Station / Convenience Store

Notes:

Table A: Fire Underwriters Survey Determination of Required Fire Flow - Long Method								
Step	Task	Term	Options	Multiplier Associated with Option	Choose:	Value Used	Unit	Total Fire Flow (L/min)
1	Choose Frame Used for Construction of Unit	<b>Framing Material</b>						
		Coefficient related to type of construction (C)	Wood Frame	1.5	Ordinary construction	1	-	
			Ordinary construction	1				
			Non-combustible construction	0.8				
Fire resistive construction (> 3 hrs)	0.6							
2	Choose Type of Housing (if TH, Enter Number of Units Per TH Block)	<b>Floor Space Area</b>						
		Type of Housing	Single Family	1	Other (Comm, Ind, Apt etc.)	1	Units	
			Townhouse - indicate # of units	8				
			Other (Comm, Ind, Apt etc.)	1				
2.2	# of Storeys	Number of Floors/Storeys in the Unit (do not include basement):			1	1	Storeys	
3	Enter Ground Floor Area of One Unit	Average Floor Area (A) based on fire resistive building design when vertical openings are inadequately protected:			250	250	Area in Square Meters (m <sup>2</sup> )	
					Square Metres (m <sup>2</sup> )			
4	Obtain Required Fire Flow without Reductions	Required Fire Flow (without reductions or increases per FUS) ( $F = 220 * C * \sqrt{A}$ ) Round to nearest 1000L/min						3,000
5	Apply Factors Affecting Burning	<b>Reductions/Increases Due to Factors Affecting Burning</b>						
5.1	Choose Combustibility of Building Contents	Occupancy content hazard reduction or surcharge	Non-combustible	-0.25	Combustible	0	N/A	3,000
			Limited combustible	-0.15				
			Combustible	0				
			Free burning	0.15				
			Rapid burning	0.25				
5.2	Choose Reduction Due to Presence of Sprinklers	Sprinkler reduction	Adequate Sprinkler conforms to NFPA13	-0.3	None	0	N/A	0
			None	0				
		Water Supply Credit	Water supply is standard for sprinkler and fire dept. hose line	-0.1	Water supply is not standard or N/A	0	N/A	0
			Water supply is not standard or N/A	0				
		Sprinkler Supervision Credit	Sprinkler system is fully supervised	-0.1	Sprinkler not fully supervised or N/A	0	N/A	0
			Sprinkler not fully supervised or N/A	0				
5.3	Choose Separation Distance Between Units	Exposure Distance Between Units	North Side	30.1 to 45.0m	0.05	0.2	m	600
			East Side	45.1m or greater	0			
			South Side	45.1m or greater	0			
			West Side	10.1 to 20.0m	0.15			
6	Obtain Required Fire Flow, Duration & Volume	<b>Total Required Fire Flow, rounded to nearest 1000 L/min, with max/min limits applied:</b>						<b>4,000</b>
		<b>Total Required Fire Flow (above) in L/s:</b>						<b>67</b>
		<b>Required Duration of Fire Flow (hrs)</b>						<b>1.50</b>
		<b>Required Volume of Fire Flow (m<sup>3</sup>)</b>						<b>360</b>

## **SERVICING REPORT – 3500 HAWTHORNE ROAD**

Appendix A Water Supply Servicing  
April 7, 2017

### **A.3 BOUNDARY CONDITIONS**

**From:** [Oram, Cody](#)  
**To:** [Johnson, Warren](#)  
**Cc:** [Kilborn, Kris](#)  
**Subject:** RE: Hydraulic Boundary Conditions - 3500 Hawthorne Road  
**Date:** Tuesday, March 14, 2017 11:27:14 AM  
**Attachments:** [image001.png](#)  
[3500 Hawthorne March 2017.pdf](#)

---

Hi Warren,

The following are boundary conditions, HGL, for hydraulic analysis at 3500 Hawthorne (zone 2C) assumed to be connected to the 406 mm on Hawthorne (see attached PDF for location).

Minimum HGL = 122.1 m

Maximum HGL = 133.5 m

Max day (0.022 L/s) + FireFlow (67 L/s) = 125.8 m

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.*

Regards,

**Cody Oram**, P.Eng. Senior Engineer

Development Review, South Services

Planning, Infrastructure and Economic Development Department | Services de planification, d'infrastructure et de développement économique

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 **13422**, fax/télé:613-580-2576, [cody.oram@ottawa.ca](mailto:cody.oram@ottawa.ca)



---

**From:** Johnson, Warren [<mailto:Warren.Johnson@stantec.com>]

**Sent:** Wednesday, March 08, 2017 11:19 AM

**To:** Oram, Cody

**Cc:** Kilborn, Kris

**Subject:** Hydraulic Boundary Conditions - 3500 Hawthorne Road

Hi Cody,

I'm looking for watermain hydraulic boundary conditions for the proposed site at 3500 Hawthorne Road. We anticipate connecting to the existing 400mm watermain on Hawthorne Road.

Attached are the FUS calculations for the proposed building and location plan. The intended land use is Commercial, for a 1 story gas station and convenience store with an area of 250m<sup>2</sup>.

Estimated domestic demands and fire flow requirements for the site are as follows:

Average Day Demand        - 0.014L/s  
Max Day Demand            - 0.022L/s  
Peak Hour Demand         - 0.039L/s  
Fire Flow Requirement per FUS - 67L/s

Thanks,

**Warren Johnson, C.E.T.**

Civil Engineering Technologist  
Stantec  
400 - 1331 Clyde Avenue Ottawa ON K2C 3G4  
Phone: 613-784-2272  
[warren.johnson@stantec.com](mailto:warren.johnson@stantec.com)

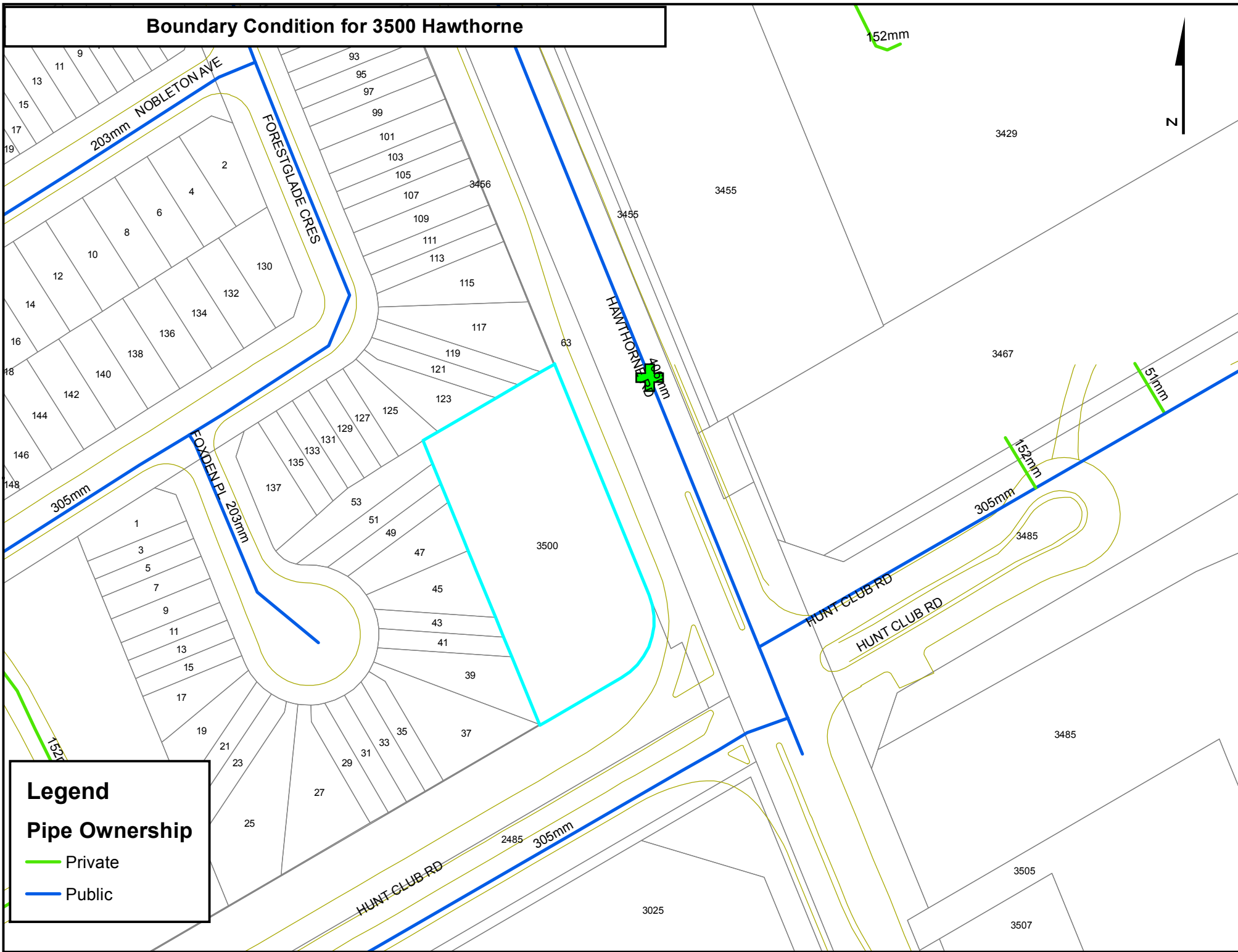
The content of this email is the confidential property of Stantec and should not be copied, modified, retransmitted, or used for any purpose except with Stantec's written authorization. If you are not the intended recipient, please delete all copies and notify us immediately.

 Please consider the environment before printing this email.

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.

Le présent courriel a été expédié par le système de courriels de la Ville d'Ottawa. Toute distribution, utilisation ou reproduction du courriel ou des renseignements qui s'y trouvent par une personne autre que son destinataire prévu est interdite. Je vous remercie de votre collaboration.

# Boundary Condition for 3500 Hawthorne



## Legend

### Pipe Ownership

- Private
- Public



## SERVICING REPORT – 3500 HAWTHORNE ROAD

Appendix B Wastewater Servicing  
April 7, 2017

# Appendix B WASTEWATER SERVICING

## B.1 SANITARY SEWER DESIGN SHEET



SUBDIVISION:  
**3500 HAWTHORNE ROAD**  
 DATE: 2017/03/24  
 REVISION: 1  
 DESIGNED BY: WAJ  
 CHECKED BY:

**SANITARY SEWER  
 DESIGN SHEET  
 (City of Ottawa)**

FILE NUMBER: 160401302

DESIGN PARAMETERS			
MAX PEAK FACTOR (RES.)=	4.0	AVG. DAILY FLOW / PERSON	350 l/p/day
MIN PEAK FACTOR (RES.)=	2.0	COMMERCIAL	50,000 l/ha/day
PEAKING FACTOR (INDUSTRIAL):	2.4	INDUSTRIAL (HEAVY)	55,000 l/ha/day
PEAKING FACTOR (COMM., INST.):	1.5	INDUSTRIAL (LIGHT)	35,000 l/ha/day
PERSONS / SINGLE	3.4	INSTITUTIONAL	50,000 l/ha/day
PERSONS / TOWNHOME	2.7	INFILTRATION	0.28 l/s/ha
PERSONS / APARTMENT	1.8		
		MINIMUM VELOCITY	0.60 m/s
		MAXIMUM VELOCITY	3.00 m/s
		MANNINGS n	0.013
		BEDDING CLASS	B
		MINIMUM COVER	2.50 m

AREA ID NUMBER	LOCATION		RESIDENTIAL AREA AND POPULATION								COMMERCIAL		INDUSTRIAL (L)		INDUSTRIAL (H)		INSTITUTIONAL		GREEN / UNUSED		C+I	INFILTRATION			TOTAL FLOW (l/s)	PIPE									
	FROM M.H.	TO M.H.	AREA (ha)	SINGLE	UNITS TOWN	APT	POP.	CUMULATIVE AREA (ha)	POP.	PEAK FACT.	PEAK FLOW (l/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)		ACCU. AREA (ha)	PEAK FLOW (l/s)	TOTAL AREA (ha)		ACCU. AREA (ha)	INFILT. FLOW (l/s)	LENGTH (m)	DIA (mm)	MATERIAL	CLASS	SLOPE (%)	CAP. (FULL) (l/s)	CAP. V PEAK FLOW (%)	VEL. (FULL) (m/s)
C1A	BLDG 1	1 EX STUB	0.00	0	0	0	0	0.00	0	4.00	0.0	0.37	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.3	0.37	0.37	0.1	0.4	2.0	150	PVC	DR 28	1.00	15.3	2.77%	0.86	0.31
			0.00	0	0	0	0	0.00	0	4.00	0.0	0.37	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.3	0.37	0.37	0.1	0.4	1.8	200	PVC	SDR 35	1.00	33.4	1.27%	1.05	0.30	
																											200								

## SERVICING REPORT – 3500 HAWTHORNE ROAD

Appendix C Stormwater Management  
April 7, 2017

# Appendix C STORMWATER MANAGEMENT

## C.1 STORM SEWER DESIGN SHEET



## SERVICING REPORT – 3500 HAWTHORNE ROAD

Appendix C Stormwater Management  
April 7, 2017

### C.2 RATIONAL METHOD CALCULATIONS

## Stormwater Management Calculations

File No: **160401302**  
 Project: **3500 Hawthorne Road**  
 Date: **24-Mar-17**

SWM Approach:  
 Post-development to Pre-development flows

**Post-Development Site Conditions:**

**Overall Runoff Coefficient for Site and Sub-Catchment Areas**

Runoff Coefficient Table									
Catchment Type	Sub-catchment Area		Area (ha) "A"	Runoff Coefficient "C"		"A x C"	Overall Runoff Coefficient		
	ID / Description								
Uncontrolled - Non-Tributary	U2A	Hard	0.005	0.9	0.004	0.00825	0.330		
		Soft	0.020	0.2	0.004				
		Subtotal		0.025					
Uncontrolled - Non-Tributary	U1A	Hard	0.006	0.9	0.005	0.00736	0.460		
		Soft	0.010	0.2	0.002				
		Subtotal		0.016					
Roof	R101A	Hard	0.025	0.9	0.023	0.0225	0.900		
		Soft	0.000	0.2	0.000				
		Subtotal		0.025					
Controlled - Tributary	L103A, L200A, L201A,	Hard	0.237	0.9	0.213	0.22718	0.740		
		Soft	0.070	0.2	0.014				
		Subtotal		0.307					
<b>Total</b>				<b>0.373</b>		<b>0.265</b>			
<b>Overall Runoff Coefficient= C:</b>								<b>0.71</b>	

Total Roof Areas	0.025 ha
Total Tributary Surface Areas (Controlled and Uncontrolled)	0.307 ha
Total Tributary Area to Outlet	0.332 ha
 Total Uncontrolled Areas (Non-Tributary)	 0.041 ha
 Total Site	 0.373 ha

# Stormwater Management Calculations

## Project #160401302, 3500 Hawthorne Road Modified Rational Method Calculators for Storage

5 yr Intensity City of Ottawa	$I = a/(t + b)^c$	a = 998.071	t (min)	I (mm/hr)
		b = 6.053	5	141.18
		c = 0.814	10	104.19
			15	83.56
			20	70.25
			25	60.90
			30	53.93
			35	48.52
			40	44.18
			45	40.63
			50	37.65
			55	35.12
			60	32.94

### 5 YEAR Predevelopment Target Release from Portion of Site

Subdrainage Area: Predevelopment Tributary Area to Outlet  
 Area (ha): 0.3730  
 C: 0.50

Typical Time of Concentration

tc (min)	I (5 yr) (mm/hr)	Qtarget (L/s)
10	104.19	54.02

### 5 YEAR Modified Rational Method for Entire Site

Subdrainage Area: U2A Uncontrolled - Non-Tributary  
 Area (ha): 0.025  
 C: 0.33

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m³)
10	104.19	2.39	2.39		
20	70.25	1.61	1.61		
30	53.93	1.24	1.24		
40	44.18	1.01	1.01		
50	37.65	0.86	0.86		
60	32.94	0.76	0.76		
70	29.37	0.67	0.67		
80	26.56	0.61	0.61		
90	24.29	0.56	0.56		
100	22.41	0.51	0.51		
110	20.82	0.48	0.48		
120	19.47	0.45	0.45		

Subdrainage Area: U1A Uncontrolled - Non-Tributary  
 Area (ha): 0.016  
 C: 0.46

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m³)
10	104.19	2.13	2.13		
20	70.25	1.44	1.44		
30	53.93	1.10	1.10		
40	44.18	0.90	0.90		
50	37.65	0.77	0.77		
60	32.94	0.67	0.67		
70	29.37	0.60	0.60		
80	26.56	0.54	0.54		
90	24.29	0.50	0.50		
100	22.41	0.46	0.46		
110	20.82	0.43	0.43		
120	19.47	0.40	0.40		

Subdrainage Area: R101A Roof Maximum Storage Depth: 150 mm  
 Area (ha): 0.025  
 C: 0.90

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m³)	Depth (mm)
10	104.19	6.52	1.51	5.01	3.01	100.4
20	70.25	4.39	1.58	2.82	3.38	103.7
30	53.93	3.37	1.60	1.78	3.20	102.1
40	44.18	2.76	1.60	1.16	2.80	97.6
50	37.65	2.36	1.60	0.76	2.27	90.0
60	32.94	2.06	1.59	0.47	1.69	81.4
70	29.37	1.84	1.58	0.26	1.07	69.9
80	26.56	1.66	1.57	0.09	0.45	52.1
90	24.29	1.52	1.55	0.00	0.00	0
100	22.41	1.40	1.53	0.00	0.00	0
110	20.82	1.30	1.51	0.00	0.00	0
120	19.47	1.22	1.49	0.00	0.00	0

Storage: Roof Storage

Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check	
5-year Water Level	103.69	0.10	1.60	3.38	10.00	0.03

Subdrainage Area: L103A, L200A, L201A, Controlled - Tributary  
 Area (ha): 0.307  
 C: 0.74

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m³)
10	104.19	65.80	42.0	23.8	14.3
20	70.25	44.37	42.0	2.4	2.8
30	53.93	34.06	42.0	0.0	0.0
40	44.18	27.91	42.0	0.0	0.0
50	37.65	23.78	42.0	0.0	0.0
60	32.94	20.81	42.0	0.0	0.0
70	29.37	18.55	42.0	0.0	0.0
80	26.56	16.78	42.0	0.0	0.0
90	24.29	15.34	42.0	0.0	0.0

## Project #160401302, 3500 Hawthorne Road Modified Rational Method Calculators for Storage

100 yr Intensity City of Ottawa	$I = a/(t + b)^c$	a = 1735.688	t (min)	I (mm/hr)
		b = 6.014	5	242.70
		c = 0.820	10	178.56
			15	142.89
			20	119.95
			25	103.85
			30	91.87
			35	82.58
			40	75.15
			45	69.05
			50	63.95
			55	59.62
			60	55.89

### 100 YEAR Modified Rational Method for Entire Site

Subdrainage Area: U2A Uncontrolled - Non-Tributary  
 Area (ha): 0.025  
 C: 0.41

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m³)
10	178.56	5.12	5.12		
20	119.95	3.44	3.44		
30	91.87	2.63	2.63		
40	75.15	2.15	2.15		
50	63.95	1.83	1.83		
60	55.89	1.60	1.60		
70	49.79	1.43	1.43		
80	44.99	1.29	1.29		
90	41.11	1.18	1.18		
100	37.90	1.09	1.09		
110	35.20	1.01	1.01		
120	32.89	0.94	0.94		

Subdrainage Area: U1A Uncontrolled - Non-Tributary  
 Area (ha): 0.016  
 C: 0.58

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m³)
10	178.56	4.57	4.57		
20	119.95	3.07	3.07		
30	91.87	2.35	2.35		
40	75.15	1.92	1.92		
50	63.95	1.64	1.64		
60	55.89	1.43	1.43		
70	49.79	1.27	1.27		
80	44.99	1.15	1.15		
90	41.11	1.05	1.05		
100	37.90	0.97	0.97		
110	35.20	0.90	0.90		
120	32.89	0.84	0.84		

Subdrainage Area: R101A Roof Maximum Storage Depth: 150 mm  
 Area (ha): 0.025  
 C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m³)	Depth (mm)
10	178.56	12.41	1.76	10.65	6.39	128.6
20	119.95	8.34	1.81	6.53	7.83	137.1
30	91.87	6.38	1.83	4.56	8.21	139.4
40	75.15	5.22	1.82	3.40	8.16	139.1
50	63.95	4.44	1.81	2.63	7.89	137.5
60	55.89	3.88	1.80	2.09	7.51	135.2
70	49.79	3.46	1.78	1.68	7.05	132.5
80	44.99	3.13	1.76	1.36	6.54	129.5
90	41.11	2.86	1.74	1.11	6.01	126.3
100	37.90	2.63	1.72	0.92	5.49	122.4
110	35.20	2.45	1.69	0.76	4.99	117.9
120	32.89	2.29	1.66	0.62	4.49	113.5

Storage: Roof Storage

Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check	
100-year Water Level	139.36	0.14	1.83	8.21	10.00	0.00

Subdrainage Area: L103A, L200A, L201A, Controlled - Tributary  
 Area (ha): 0.307  
 C: 0.93

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m³)
10	178.56	140.96	42.7	98.3	59.0
20	119.95	94.69	42.7	52.0	62.4
30	91.87	72.53	42.7	29.9	53.8
40	75.15	59.32	42.7	16.7	40.0
50	63.95	50.49	42.7	7.8	23.5
60	55.89	44.13	42.7	1.5	5.3
70	49.79	39.31	42.7	0.0	0.0
80	44.99	35.52	42.7	0.0	0.0
90	41.11	32.46	42.7	0.0	0.0

# Stormwater Management Calculations

**Project #160401302, 3500 Hawthorne Road**  
**Modified Rational Method Calculatons for Storage**

100	22.41	14.15	42.0	0.0	0.0
110	20.82	13.15	42.0	0.0	0.0
120	19.47	12.29	42.0	0.0	0.0

Storage:    Above CB

Orifice Equation:  $Q = CdA(2gh)^{0.5}$     Where C =    0.61  
 Orifice Diameter: 115.00  
 Invert Elevation 82.26    m  
 T/G Elevation 84.35    m  
 Max Ponding Depth 0.15    m  
 Downstream W/L 82.23    m

Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
5-year Water Level	84.50	2.24	42.0	14.3	64.6 OK

**SUMMARY TO OUTLET**

	Tributary Area	0.332 ha	Vrequired	Vavailable*	
	<b>Total 5yr Flow to Sewer</b>	43.6 L/s	0	0 m <sup>3</sup>	Ok
	Non-Tributary Area	0.041 ha			
	<b>Total 5yr Flow Uncontrolled</b>	4.5 L/s			
	<b>Total Area</b>	0.373 ha			
	<b>Total 5yr Flow</b>	48.1 L/s			
	<b>Target</b>	54.0 L/s			

**Project #160401302, 3500 Hawthorne Road**  
**Modified Rational Method Calculatons for Storage**

100	37.90	29.92	42.7	0.0	0.0
110	35.20	27.79	42.7	0.0	0.0
120	32.89	25.97	42.7	0.0	0.0

Storage:    Surface Storage Above CB

Orifice Equation:  $Q = CdA(2gh)^{0.5}$     Where C =    0.61  
 Orifice Diameter: 115.00 mm  
 Invert Elevation 82.26 m  
 T/G Elevation 84.35 m  
 Max Ponding Depth 0.22 m  
 Downstream W/L 82.23 m

Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
100-year Water Level	84.57	2.31	42.7	62.4	64.6 OK 2.15

**SUMMARY TO OUTLET**

	Tributary Area	0.332 ha	Vrequired	Vavailable*	
	<b>Total 100yr Flow to Sewer</b>	44.5 L/s	0	0 m <sup>3</sup>	Ok
	Non-Tributary Area	0.041 ha			
	<b>Total 100yr Flow Uncontrolled</b>	9.7 L/s			
	<b>Total Area</b>	0.373 ha			
	<b>Total 100yr Flow</b>	54.2 L/s			
	<b>Target</b>	54.0 L/s			



Roof Drain Design Calculation Sheet

**Project #160401302, 3500 Hawthorne Road  
Roof Drain Design Sheet, Area BLDG  
Standard Watts Model R1100 Accuflow Roof Drain**

Rating Curve				Volume Estimation				Water Depth (m)
Elevation (m)	Discharge Rate (cu.m/s)	Outlet Discharge (cu.m/s)	Storage (cu. m)	Elevation (m)	Area (sq. m)	Volume (cu. m)		
						Increment	Accumulated	
0.000	0.0000	0.0000	0	0.000	0	0	0	0.000
0.025	0.0003	0.0006	0	0.025	6	0	0	0.025
0.050	0.0006	0.0013	0	0.050	22	0	0	0.050
0.075	0.0007	0.0014	1	0.075	50	1	1	0.075
0.100	0.0008	0.0016	3	0.100	89	2	3	0.100
0.125	0.0009	0.0017	6	0.125	139	3	6	0.125
0.150	0.0009	0.0019	10	0.150	200	4	10	0.150

Drawdown Estimate			
Total Volume (cu.m)	Total Time (sec)	Vol (cu.m)	Detention Time (hr)
0.0	0.0	0.0	0
0.3	256.8	0.3	0.07134
1.2	619.7	0.9	0.24347
2.9	1086.0	1.7	0.54515
5.7	1627.7	2.8	0.9973
10.0	2225.9	4.2	1.6156

**Rooftop Storage Summary**

Total Building Area (sq.m)	250	
Assume Available Roof Area (sq. m)	80%	200
Roof Imperviousness		0.99
Roof Drain Requirement (sq.m/Notch)		232
Number of Roof Notches*		2
Max. Allowable Depth of Roof Ponding (m)	0.15	* As per Ontario Building Code section OBC 7.4.10.4.(2)(c).
Max. Allowable Storage (cu.m)		10
Estimated 100 Year Drawdown Time (h)		1.4

**From Watts Drain Catalogue**

Head (m)	L/s				
	Open	75%	50%	25% Closed	
0.025	0.3155	0.3155	0.3155	<b>0.3155</b>	0.3155
0.050	0.6309	0.6309	0.6309	<b>0.6309</b>	0.6309
0.075	0.9464	0.8675	0.7886	<b>0.7098</b>	0.6309
0.100	1.2618	1.1041	0.9464	<b>0.7886</b>	0.6309
0.125	1.5773	1.3407	1.1041	<b>0.8675</b>	0.6309
0.150	1.8927	1.5773	1.2618	<b>0.9464</b>	0.6309

\* Note: Number of drains can be reduced if multiple-notch drain used.

**Calculation Results**

	5yr	100yr	Available
Qresult (cu.m/s)	0.002	0.002	-
Depth (m)	0.104	0.139	0.150
Volume (cu.m)	3.4	8.2	10.0
Drain time (hrs)	0.6	1.4	



## Stormceptor Design Summary

### PCSWMM for Stormceptor

#### Project Information

Date	10/4/2017
Project Name	3500 Hawthorne Road
Project Number	160401302
Location	Ottawa, ON

#### Designer Information

Company	Stantec Consulting Ltd.
Contact	Dustin Thiffault, P.Eng.

#### Notes

N/A
-----

#### Drainage Area

Total Area (ha)	0.332
Imperviousness (%)	79

The Stormceptor System model STC 300 achieves the water quality objective removing 89% TSS for a CLOCA (clay, silt and sand) particle size distribution.

#### Rainfall

Name	OTTAWA MACDONALD-CARTIER INT'L A
State	ON
ID	6000
Years of Records	1967 to 2003
Latitude	45° 19'N
Longitude	75° 40'W

#### Water Quality Objective

TSS Removal (%)	80
-----------------	----

#### Upstream Storage

Storage (ha-m)	Discharge (L/s)
0.000	00.000
0.007	44.500

#### Stormceptor Sizing Summary

Stormceptor Model	TSS Removal %
<b>STC 300</b>	<b>89</b>
STC 750	92
STC 1000	92
STC 1500	92
STC 2000	94
STC 3000	95
STC 4000	96
STC 5000	96
STC 6000	97
STC 9000	98
STC 10000	97
STC 14000	98



### Particle Size Distribution

Removing silt particles from runoff ensures that the majority of the pollutants, such as hydrocarbons and heavy metals that adhere to fine particles, are not discharged into our natural water courses. The table below lists the particle size distribution used to define the annual TSS removal.

CLOCA (clay, silt and sand)

Particle Size µm	Distribution %	Specific Gravity	Settling Velocity m/s	Particle Size µm	Distribution %	Specific Gravity	Settling Velocity m/s
850	3.3	2.65	0.1465	50	3.9	2.65	0.0022
425	23.4	2.65	0.0698	36	2.6	2.65	0.0012
300	17.5	2.65	0.0439	22	1.3	2.65	0.0004
250	6.5	2.65	0.0335	12	1.9	2.65	0.0004
212	6.5	2.65	0.0259	9	0	2.65	0.0004
150	11.7	2.65	0.0145	6.5	1.3	2.65	0.0004
125	5.2	2.65	0.0105	3	1.3	2.65	0.0004
100	3.9	2.65	0.0070	1.5	1.3	2.65	0.0004
75	3.9	2.65	0.0040	1	4.5	2.65	0.0004

### Stormceptor Design Notes

- Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor version 1.0
- Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal.
- Only the STC 300 is adaptable to function with a catch basin inlet and/or inline pipes.
- Only the Stormceptor models STC 750 to STC 6000 may accommodate multiple inlet pipes.
- Inlet and outlet invert elevation differences are as follows:

#### Inlet and Outlet Pipe Invert Elevations Differences

Inlet Pipe Configuration	STC 300	STC 750 to STC 6000	STC 9000 to STC 14000
Single inlet pipe	75 mm	25 mm	75 mm
Multiple inlet pipes	75 mm	75 mm	Only one inlet pipe.

- Design estimates are based on stable site conditions only, after construction is completed.
- Design estimates assume that the storm drain is not submerged during zero flows. For submerged applications, please contact your local Stormceptor representative.
- Design estimates may be modified for specific spills controls. Please contact your local Stormceptor representative for further assistance.
- For pricing inquiries or assistance, please contact Imbrium Systems Inc., 1-800-565-4801.

## SERVICING REPORT – 3500 HAWTHORNE ROAD

Appendix D Drawings  
April 7, 2017

# Appendix D DRAWINGS