

## SERVICING REPORT – 130-138 ROBINSON AVENUE

Appendix A Water Supply Servicing  
November 7, 2018

# Appendix A WATER SUPPLY SERVICING

## A.1 DOMESTIC WATER DEMAND ESTIMATE

**134-138 Robinson Ave**

- Based on Rubin and Rotman Architectes' Site Plan 2018/05/01 (160401443)

Building ID	Area (m <sup>2</sup> )	Population	Daily Rate of Demand <sup>1</sup>	Avg Day Demand		Max Day Demand <sup>2</sup>		Peak Hour Demand <sup>2</sup>	
				(L/min)	(L/s)	(L/min)	(L/s)	(L/min)	(L/s)
BLDG		72.1	350	17.5	0.29	43.8	0.73	96.4	1.61
<b>Total Site :</b>				<b>17.5</b>	<b>0.29</b>	<b>43.8</b>	<b>0.73</b>	<b>96.4</b>	<b>1.61</b>

1 Average day water demand for residential areas equal to 350 L/cap/d

2 The City of Ottawa water demand criteria used to estimate peak demand rates for residential areas are as follows:

maximum day demand rate = 2.5 x average day demand rate

peak hour demand rate = 2.2 x maximum day demand rate

## **SERVICING REPORT – 130-138 ROBINSON AVENUE**

Appendix A Water Supply Servicing  
November 7, 2018

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



**FUS Fire Flow Calculation Sheet**

Stantec Project #: 160401443  
 Project Name: FUS Protocol Test Drive  
 Date: 10/31/2018

Fire Flow Calculation #: 1  
 Description: 130-138 Robinson Avenue

Notes: Second and Third Floors

Step	Task	Notes	Value Used	Req'd Fire Flow (L/min)					
1	Determine Type of Construction	Wood Frame	1.5	-					
2	Determine Ground Floor Area of One Unit	-	623	-					
	Determine Number of Adjoining Units	Includes adjacent wood frame structures separated by 3m or less	1	-					
3	Determine Height in Storeys	Does not include floors >50% below grade or open attic space	1	-					
4	Determine Required Fire Flow	( $F = 220 \times C \times A^{1/2}$ ). Round to nearest 1000 L/min	-	8000					
5	Determine Occupancy Charge	Limited Combustible	-15%	6800					
6	Determine Sprinkler Reduction	Conforms to NFPA 13	-30%	-2720					
		Standard Water Supply	-10%						
		Not Fully Supervised or N/A	0%						
		% Coverage of Sprinkler System	100%						
7	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	-	-
		North	10.1 to 20	4	3	0-30	Wood Frame or Non-Combustible	12%	816
		East	0 to 3	12	3	31-60	Ordinary or Fire Resistive (Blank Wall)	0%	
		South	> 45	27	0	0-30	Ordinary or Fire-Resistive with Unprotected Openings	0%	
		West	0 to 3	20	1	0-30	Ordinary or Fire Resistive (Blank Wall)	0%	
8	Determine Final Required Fire Flow	Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min							5000
		Total Required Fire Flow in L/s							83.3
		Required Duration of Fire Flow (hrs)							2.00
		Required Volume of Fire Flow (m <sup>3</sup> )							600

## **SERVICING REPORT – 130-138 ROBINSON AVENUE**

Appendix A Water Supply Servicing  
November 7, 2018

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

## Odam, Cameron

---

**From:** Wu, John <John.Wu@ottawa.ca>  
**Sent:** Thursday, October 18, 2018 10:50 AM  
**To:** Odam, Cameron  
**Subject:** RE: 134-138 Robinson Avenue - Boundary Conditions Request  
**Attachments:** 134 Robinson Oct 2018.pdf

Here is the result:

The following are boundary conditions, HGL, for hydraulic analysis at 134 Robinson (zone 1W) assumed to be connected to the 152mm on Lees (see attached PDF for location).

Minimum HGL = 105.2m

Maximum HGL = 114.7m

Available Flow @20psi = 85 L/s assuming a ground elevation of 60.0m

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

---

**From:** Odam, Cameron <Cameron.Odam@stantec.com>  
**Sent:** Friday, October 12, 2018 3:39 PM  
**To:** Wu, John <John.Wu@ottawa.ca>  
**Cc:** Kilborn, Kris <kris.kilborn@stantec.com>  
**Subject:** 134-138 Robinson Avenue - Boundary Conditions Request

Hi John,

Would you be able to provide me with watermain hydraulic boundary conditions for a proposed site located at 134-138 Robinson Avenue? The site consists of a proposed 3 storey residential apartment building that will take up lots 130,134, and 138. The water servicing will connect to the existing 150mm watermain on Robinson Avenue adjacent to the site.

Attached are the FUS calculations for the proposed building and the site location as well as the approximate location of the proposed connection point to the watermain.

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

Average Day Demand	- 0.29L/s
Max Day Demand	- 0.73L/s
Peak Hour Demand	- 1.61L/s

Fire Flow Requirement per FUS – 233.3L/s

Thanks,

**Cameron Odam**

Engineering Intern

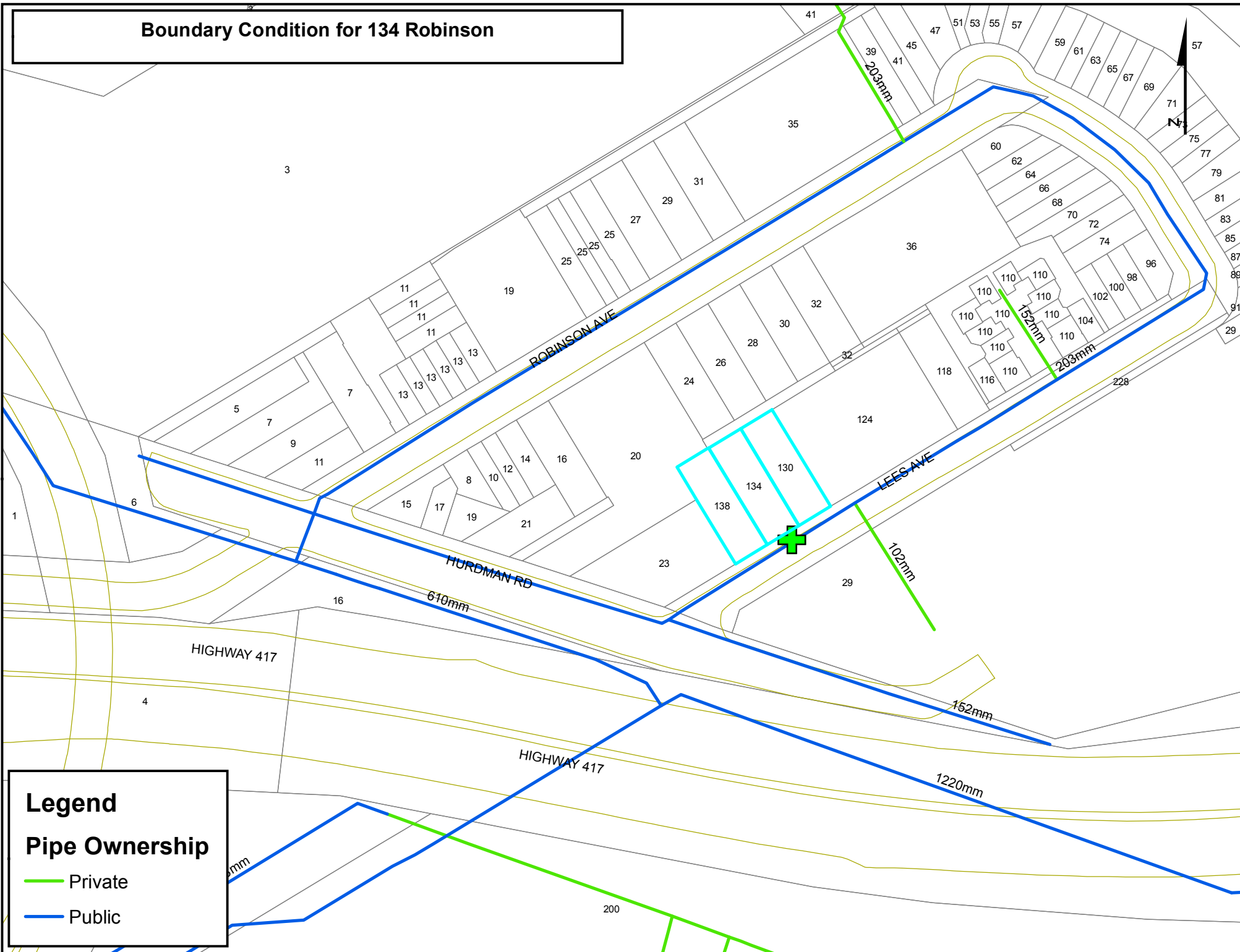
Direct: (613) 72-44353  
Fax: (613) 722-2799  
Cameron.Odam@stantec.com

Stantec  
400 - 1331 Clyde Avenue  
Ottawa ON K2C 3G4 CA



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.

# Boundary Condition for 134 Robinson



## Legend

### Pipe Ownership

- Private
- Public



## SERVICING REPORT – 130-138 ROBINSON AVENUE

Appendix B Wastewater Servicing  
November 7, 2018

# Appendix B WASTEWATER SERVICING

## B.1 SANITARY SEWER DESIGN SHEET



SUBDIVISION:  
**130-138 ROBINSON AVE**  
 DATE: 10/30/2018  
 REVISION: 1  
 DESIGNED BY: WJ  
 CHECKED BY: -

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

FILE NUMBER: 160401443

DESIGN PARAMETERS			
MAX PEAK FACTOR (RES.)=	4.0	AVG. DAILY FLOW / PERSON	280 l/p/day
MIN PEAK FACTOR (RES.)=	2.0	COMMERCIAL	28,000 l/ha/day
PEAKING FACTOR (INDUSTRIAL):	2.4	INDUSTRIAL (HEAVY)	55,000 l/ha/day
PEAKING FACTOR (ICI >20%):	1.5	INDUSTRIAL (LIGHT)	35,000 l/ha/day
PERSONS / BACHELOR	1.4	INSTITUTIONAL	28,000 l/ha/day
PERSONS / 1 BEDROOM	1.4	INFILTRATION	0.33 l/s/ha
PERSONS / 2 BEDROOM	2.1		
MINIMUM VELOCITY	0.60 m/s		
MAXIMUM VELOCITY	3.00 m/s		
MANNINGS n	0.013		
BEDDING CLASS	B		
MINIMUM COVER	2.50 m		
HARMON CORRECTION FACTOR	0.8		


LOCATION			RESIDENTIAL AREA AND POPULATION								COMMERCIAL		INDUSTRIAL (L)		INDUSTRIAL (H)		INSTITUTIONAL		GREEN / UNUSED		C+H	INFILTRATION			TOTAL	PIPE									
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA (ha)	BACHELOR	1 BEDROOM	2 BEDROOM	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)	FLOW (l/s)	LENGTH (m)	DIA (mm)	MATERIAL	CLASS	SLOPE (%)	CAP. (FULL) (l/s)	CAP. V PEAK FLOW (%)	VEL. (FULL) (m/s)	VEL. (ACT.) (m/s)
BLDG	BLDG	TEE	0.110	37	13	1	72	0.11	72	4.00	0.93	0.000	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.110	0.11	0.04	0.97	9.7	150	PVC	DR 28	1.00	15.3	6.33%	0.86	0.41

## SERVICING REPORT – 130-138 ROBINSON AVENUE

Appendix C Stormwater Management  
November 7, 2018

# Appendix C **STORMWATER MANAGEMENT**

## C.1 STORM SEWER DESIGN SHEET

	130-138 Robinson Avenue		<b>STORM SEWER DESIGN SHEET</b> (City of Ottawa)										<b>DESIGN PARAMETERS</b> I = a / (t+b) <sup>c</sup> (As per City of Ottawa Guidelines, 2012)																	
	DATE:	30-Oct-2018	<b>FILE NUMBER: 1604-01443</b>										<table border="1"> <tr> <td>1:2 yr</td> <td>1:100 yr</td> </tr> </table>		1:2 yr	1:100 yr	MANNING'S n = 0.013		BEDDING CLASS = B											
	1:2 yr	1:100 yr																												
REVISION:	1	a =											732.951	1735.688	MINIMUM COVER: 2.00 m															
DESIGNED BY:	WJ	b =	6.199	6.014	TIME OF ENTRY: 10 min																									
CHECKED BY:		c =	0.810	0.820																										
LOCATION			DRAINAGE AREA										PIPE SELECTION																	
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA (2-YEAR) (ha)	AREA (10-YEAR) (ha)	AREA (ROOF) (ha)	C (-)	ACCUM. AREA (2YR) (ha)	A x C (2-YEAR) (ha)	ACCUM. Ax C (2YR) (ha)	ACCUM. AREA (100YR) (ha)	A x C (100-YEAR) (ha)	ACCUM. Ax C (100YR) (ha)	T of C (min)	I <sub>5</sub> -YEAR (mm/h)	I <sub>10</sub> -YEAR (mm/h)	Q <sub>CONTROL</sub> (NOTE 1) (L/s)	ACCUM. Q <sub>CONTROL</sub> (L/s)	Q <sub>ACT</sub> (CIA/360) (L/s)	LENGTH (m)	PIPE WIDTH OR DIAMETER (mm)	PIPE HEIGHT (mm)	PIPE SHAPE (-)	MATERIAL (-)	CLASS (-)	SLOPE (%)	Q <sub>CAP</sub> (FULL) (L/s)	% FULL (-)	VEL. (FULL) (m/s)	VEL. (ACT) (m/s)	TIME OF FLOW (min)
SITE	CB 1	MAIN	0.10	0.00	0.00	0.81	0.10	0.082	0.082	0.00	0.000	0.000	10.00	76.81	178.56	0.0	0.0	17.5	9.3	200	200	CIRCULAR	PVC	-	1.00	33.3	52.60%	1.05	0.91	0.17
													10.17								300	300								

## SERVICING REPORT – 130-138 ROBINSON AVENUE

Appendix C Stormwater Management  
November 7, 2018

### C.2 RATIONAL METHOD CALCULATIONS

## Stormwater Management Calculations

File No: 160401443  
 Project: 134 ROBINSON AVE  
 Date: 31-Oct-18

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	ID / Description	Area (ha) "A"	Runoff Coefficient "C"	"A x C"	Overall Runoff Coefficient		
Roof	BLDG	Hard	0.058	0.9	0.052	0.900		
		Soft	0.000	0.2	0.000			
		Subtotal		0.058			0.0522	
Controlled - Tributary	CB-1	Hard	0.026	0.9	0.023	0.620		
		Soft	0.017	0.2	0.003			
		Subtotal		0.043			0.02666	
Uncontrolled - Non-Tributary	UNC-2	Hard	0.001	0.9	0.001	0.280		
		Soft	0.007	0.2	0.001			
		Subtotal		0.008			0.00224	
Uncontrolled - Non-Tributary	UNC-1	Hard	0.001	0.9	0.001	0.900		
		Soft	0.000	0.2	0.000			
		Subtotal		0.001			0.0009	
<b>Total</b>			<b>0.110</b>		<b>0.082</b>			
<b>Overall Runoff Coefficient= C:</b>						<b>0.75</b>		

Total Roof Areas	0.058 ha
Total Tributary Surface Areas (Controlled and Uncontrolled)	0.043 ha
Total Tributary Area to Outlet	0.101 ha
 Total Uncontrolled Areas (Non-Tributary)	 0.009 ha
 Total Site	 0.110 ha

# Stormwater Management Calculations

**Project #160401443, 134 ROBINSON AVE**  
**Modified Rational Method Calculators for Storage**

2 yr Intensity City of Ottawa	I = a/(t + b)		a =	732.951	t (min)	I (mm/hr)
			b =	6.199	10	76.81
			c =	0.81	20	52.03
					30	40.04
				40	32.86	
				50	28.04	
				60	24.56	
				70	21.91	
				80	19.83	
				90	18.14	
				100	16.75	
				110	15.57	
				120	14.56	

**2 YEAR Predevelopment Target Release from Portion of Site**

Subdrainage Area: Predevelopment Tributary Area to Outlet  
 Area (ha): 0.1100  
 C: 0.40

Typical Time of Concentration

tc (min)	I (2 yr) (mm/hr)	Qtarget (L/s)
10	76.81	9.39

**2 YEAR Modified Rational Method for Entire Site**

Subdrainage Area: BLDG Roof  
 Area (ha): 0.06  
 C: 0.90  
 Maximum Storage Depth: 150 mm

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m³)	Depth (mm)
10	76.81	11.15	2.04	9.11	5.46	91.1
20	52.03	7.55	2.16	5.39	6.47	97.5
30	40.04	5.81	2.17	3.64	6.55	98.0
40	32.86	4.77	2.14	2.63	6.31	96.4
50	28.04	4.07	2.09	1.97	5.92	94.0
60	24.56	3.56	2.04	1.52	5.48	91.2
70	21.91	3.18	1.99	1.19	5.01	88.3
80	19.83	2.88	1.93	0.95	4.54	85.3
90	18.14	2.63	1.88	0.76	4.08	82.5
100	16.75	2.43	1.82	0.61	3.64	79.7
110	15.57	2.26	1.77	0.49	3.21	77.0
120	14.56	2.11	1.72	0.39	2.83	74.2

Storage: Roof Storage

Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
97.98	0.10	2.17	6.55	23.20	0.00

Subdrainage Area: CB-1 Controlled - Tributary  
 Area (ha): 0.04  
 C: 0.62

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m³)
10	76.81	7.73	3.03	4.70	2.82
20	52.03	6.02	3.29	2.72	3.27
30	40.04	5.14	3.31	1.83	3.29
40	32.86	4.58	3.25	1.33	3.19
50	28.04	4.17	3.16	1.01	3.04
60	24.56	3.86	3.06	0.80	2.87
70	21.91	3.61	2.97	0.64	2.70
80	19.83	3.40	2.87	0.53	2.55
90	18.14	3.22	2.78	0.44	2.40
100	16.75	3.06	2.69	0.38	2.26
110	15.57	2.93	2.60	0.32	2.13
120	14.56	2.80	2.52	0.28	2.00

Orifice Diameter: LMF90 mm  
 Invert Elevation: 58.10 m  
 T/G Elevation: 59.94 m  
 Max Ponding Depth: 0.22 m  
 Downstream W/L: 0.00 m

Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
2-year Water Level	60.16	0.22	3.31	3.29	11.96 OK

Subdrainage Area: UNC-2 Uncontrolled - Non-Tributary  
 Area (ha): 0.01  
 C: 0.28

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m³)
10	76.81	0.48	0.48		
20	52.03	0.32	0.32		
30	40.04	0.25	0.25		
40	32.86	0.20	0.20		
50	28.04	0.17	0.17		
60	24.56	0.15	0.15		
70	21.91	0.14	0.14		
80	19.83	0.12	0.12		
90	18.14	0.11	0.11		
100	16.75	0.10	0.10		
110	15.57	0.10	0.10		
120	14.56	0.09	0.09		

Subdrainage Area: UNC-1 Uncontrolled - Non-Tributary

**Project #160401443, 134 ROBINSON AVE**  
**Modified Rational Method Calculators for Storage**

100 yr Intensity City of Ottawa	I = a/(t + b)		a =	1735.688	t (min)	I (mm/hr)
			b =	6.014	10	178.56
			c =	0.820	20	119.95
					30	91.87
				40	75.15	
				50	63.95	
				60	55.89	
				70	49.79	
				80	44.99	
				90	41.11	
				100	37.90	
				110	35.20	
				120	32.89	

**100 YEAR Predevelopment Target Release from Portion of Site**

Subdrainage Area: Predevelopment Tributary Area to Outlet  
 Area (ha): 0.1100  
 C: 0.40

Qtarget 9.39 L/s  
 2-Year Pre Development Discharge 9.39 L/s  
 Less Peak Sanitary Discharge of 0.97 L/s  
**Target Release Rate 8.42 L/s**

**100 YEAR Modified Rational Method for Entire Site**

Subdrainage Area: BLDG Roof  
 Area (ha): 0.06  
 C: 1.00  
 Maximum Storage Depth: 150 mm

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m³)	Depth (mm)
10	178.56	28.79	2.79	26.00	15.60	130.6
20	119.95	19.34	2.98	16.36	19.63	140.9
30	91.87	14.81	3.06	11.76	21.16	144.8
40	75.15	12.12	3.08	9.04	21.68	146.1
50	63.95	10.31	3.08	7.23	21.69	146.1
60	55.89	9.01	3.07	5.94	21.40	145.4
70	49.79	8.03	3.04	4.98	20.93	144.2
80	44.99	7.25	3.02	4.24	20.34	142.7
90	41.11	6.63	2.98	3.64	19.68	141.0
100	37.90	6.11	2.95	3.16	18.97	139.2
110	35.20	5.68	2.91	2.76	18.23	137.3
120	32.89	5.30	2.88	2.43	17.47	135.4

Storage: Roof Storage

Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
146.14	0.15	3.08	21.69	23.20	0.00

Subdrainage Area: CB-1 Controlled - Tributary  
 Area (ha): 0.04  
 C: 0.78

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m³)
10	178.56	19.33	5.47	13.86	8.31
20	119.95	14.09	5.94	8.15	9.79
30	91.87	11.57	6.01	5.56	10.00
40	75.15	10.04	5.95	4.09	9.82
50	63.95	9.01	5.84	3.16	9.49
60	55.89	8.25	5.72	2.53	9.10
70	49.79	7.66	5.59	2.07	8.69
80	44.99	7.18	5.46	1.72	8.28
90	41.11	6.79	5.33	1.46	7.88
100	37.90	6.46	5.21	1.25	7.49
110	35.20	6.18	5.09	1.08	7.13
120	32.89	5.92	4.98	0.94	6.79

Orifice Diameter: LMF90 mm  
 Invert Elevation: 58.10 m  
 T/G Elevation: 59.94 m  
 Max Storage Depth: 0.70 m  
 Downstream W/L: 57.69 m  
 Volume in CB1 and CB 2 when head = 0.90: 0.65  
 Max available volume in CB's: 0.84

Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
100-year Water Level	60.64	0.70	6.01	10.00	11.96 OK

Subdrainage Area: UNC-2 Uncontrolled - Non-Tributary  
 Area (ha): 0.01  
 C: 0.35

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m³)
10	178.56	1.39	1.39		
20	119.95	0.93	0.93		
30	91.87	0.72	0.72		
40	75.15	0.58	0.58		
50	63.95	0.50	0.50		
60	55.89	0.44	0.44		
70	49.79	0.39	0.39		
80	44.99	0.35	0.35		
90	41.11	0.32	0.32		
100	37.90	0.30	0.30		
110	35.20	0.27	0.27		
120	32.89	0.26	0.26		

Subdrainage Area: UNC-1 Uncontrolled - Non-Tributary

# Stormwater Management Calculations

**Project #160401443, 134 ROBINSON AVE**  
**Modified Rational Method Calculatons for Storage**

Area (ha):		0.00				
C:		0.90				
tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m <sup>3</sup> )	
10	76.81	0.19	0.19			
20	52.03	0.13	0.13			
30	40.04	0.10	0.10			
40	32.86	0.08	0.08			
50	28.04	0.07	0.07			
60	24.56	0.06	0.06			
70	21.91	0.05	0.05			
80	19.83	0.05	0.05			
90	18.14	0.05	0.05			
100	16.75	0.04	0.04			
110	15.57	0.04	0.04			
120	14.56	0.04	0.04			

**SUMMARY TO OUTLET**

	Tributary Area	0.101 ha	Vrequired	Vavailable*
	<b>Total 2yr Flow to Sewer</b>	5.48 L/s	0	0 m <sup>3</sup> OK
	Non-Tributary Area	0.009 ha		
	<b>Total 2yr Flow Uncontrolled</b>	0.67 L/s		
	<b>Total Area</b>	0.110 ha		
	<b>Total 2yr Flow</b>	6.15 L/s		
	<b>Target</b>	8.42 L/s		

**Project #160401443, 134 ROBINSON AVE**  
**Modified Rational Method Calculatons for Storage**

Area (ha):		0.00				
C:		1.00				
tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m <sup>3</sup> )	
10	178.56	0.50	0.50			
20	119.95	0.33	0.33			
30	91.87	0.26	0.26			
40	75.15	0.21	0.21			
50	63.95	0.18	0.18			
60	55.89	0.16	0.16			
70	49.79	0.14	0.14			
80	44.99	0.13	0.13			
90	41.11	0.11	0.11			
100	37.90	0.11	0.11			
110	35.20	0.10	0.10			
120	32.89	0.09	0.09			

**SUMMARY TO OUTLET**

	Tributary Area	0.101 ha	Vrequired	Vavailable*
	<b>Total 100yr Flow to Sewer</b>	6.01 L/s	0	0 m <sup>3</sup> OK
	Non-Tributary Area	0.009 ha		
	<b>Total 100yr Flow Uncontrolled</b>	1.89 L/s		
	<b>Total Area</b>	0.110 ha		
	<b>Total 100yr Flow</b>	7.90 L/s		
	<b>Target</b>	8.42 L/s		



**Roof Drain Design Calculation Sheet**

**Project #160401443, 134 ROBINSON AVE  
Roof Drain Design Sheet, Area BLDG  
Standard Watts Model R1100 Accutrol 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	13	0	0	0.025
0.050	0.0006	0.0013	1	0.050	52	1	1	0.050
0.075	0.0009	0.0017	3	0.075	116	2	3	0.075
0.100	0.0011	0.0022	7	0.100	206	4	7	0.100
0.125	0.0013	0.0027	13	0.125	322	7	13	0.125
0.150	0.0016	0.0032	23	0.150	464	10	23	0.150

Drawdown Estimate			
Total Volume (cu.m)	Total Time (sec)	Vol (cu.m)	Detention Time (hr)
0.0	0.0	0.0	0
0.8	595.9	0.8	0.16552
2.8	1176.2	2.0	0.49225
6.8	1799.7	4.0	0.99217
13.3	2443.5	6.6	1.67092
23.1	3098.4	9.8	2.5316

**Roof Storage Summary**

Total Building Area (sq.m)	580	
Assume Available Roof Area (sq. 80%)	464	
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)	23	
Estimated 100 Year Drawdown Time (h)	2.4	

**From Watts Drain Catalogue**

Head (m)	L/s	Open	75%	50%	25%	Closed
0.025	0.3155	<b>0.3155</b>	0.3155	0.3155	0.3155	0.3155
0.050	0.6309	<b>0.6309</b>	0.6309	0.6309	0.3155	0.3155
0.075	0.9464	<b>0.8675</b>	0.7886	0.7098	0.3155	0.3155
0.100	1.2618	<b>1.1041</b>	0.9464	0.7886	0.3155	0.3155
0.125	1.5773	<b>1.3407</b>	1.1041	0.8675	0.3155	0.3155
0.150	0	<b>1.5773</b>	1.2618	0.9464	0.3155	0.3155

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

Calculation Results	2yr	100yr	Available
Qresult (cu.m/s)	0.002	0.003	-
Depth (m)	0.098	0.146	0.150
Volume (cu.m)	6.6	21.7	23.2
Drain time (hrs)	1.0	2.4	

## SERVICING REPORT – 130-138 ROBINSON AVENUE

Appendix D Geotechnical Investigation  
November 7, 2018

# Appendix D      GEOTECHNICAL INVESTIGATION

## SERVICING REPORT – 130-138 ROBINSON AVENUE

Appendix E Drawings  
November 7, 2018

# Appendix E DRAWINGS