

REPORT
37543-5.2.2

SCOTIABANK RIDEAU AND WILLIAM STREET STORMWATER MANAGEMENT BRIEF



Prepared for Scotiabank
by IBI Group
October 14, 2016

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Prepared for: Scotiabank


1 INTRODUCTION

IBI Group has been retained by Scotiabank to design their new building at Rideau Street and William Street in the City of Ottawa. These lands are known as 117 Rideau Street and are zoned mixed use MD S 80.

The development also forms part of the City of Ottawa's LRT project, at this location commuters will be able to access the LRT tunnel which is located under the building. The development also provides the LRT a mechanical connection point to surface where heating and ventilation is provided to the LRT facility through the building. The LRT project has previously received approval for the relocation of municipal infrastructure, for information on site services, see Pageau and Morel Site Servicing Brief for details.

This report deals with addressing the on-site attenuation of stormwater for this development. This site is bounded by existing commercial buildings on two sides and William Street and Rideau Street on the other, see **Figure 1**. This report provides details on stormwater management to support the Site Plan for this development. No pre-consultation meetings were requested with the Rideau Valley Conservation Authority (RVCA), and Ministry of Environment (MOE) to solicit input on the detailed design as this is an infill parcel with connections to existing sewers.



					PROJECT TITLE SCOTIABANK - RIDEAU AND WILLIAM BRANCH	SCALE	SKETCH NO.	ISSUE
						JOB NO. 37543	FIGURE 1	
						DRAWN BY LJJ		
					SKETCH TITLE EXISTING AREA - WILLIAM AND RIDEAU STREET	DO NOT SCALE THIS DRAWING. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TAKING AND VERIFYING ALL THE DIMENSIONS AND REPORTING ERRORS AND/OR OMISSIONS TO THE ARCHITECT IN WRITING BEFORE PROCEEDING WITH THE WORK.		
REVISION NO.	ISSUED WITH	STATUS	REVISION DATE	 ibigroup.com				

Prepared for: Scotiabank

2 STORMWATER MANAGEMENT

The proposed development replaces a previous building which as per the proposed development, occupies 100% of the site. The existing building was connected to the municipal storm system and unattenuated roof drain discharged to the storm sewer system. Based on a roof area of 512 m², C=1.0, 100 year I = 178.6 mm/hr at a Tc of 10 min., the existing building would have a peak flow of 25.86 l/s during a 1:100 yr. rainfall event.

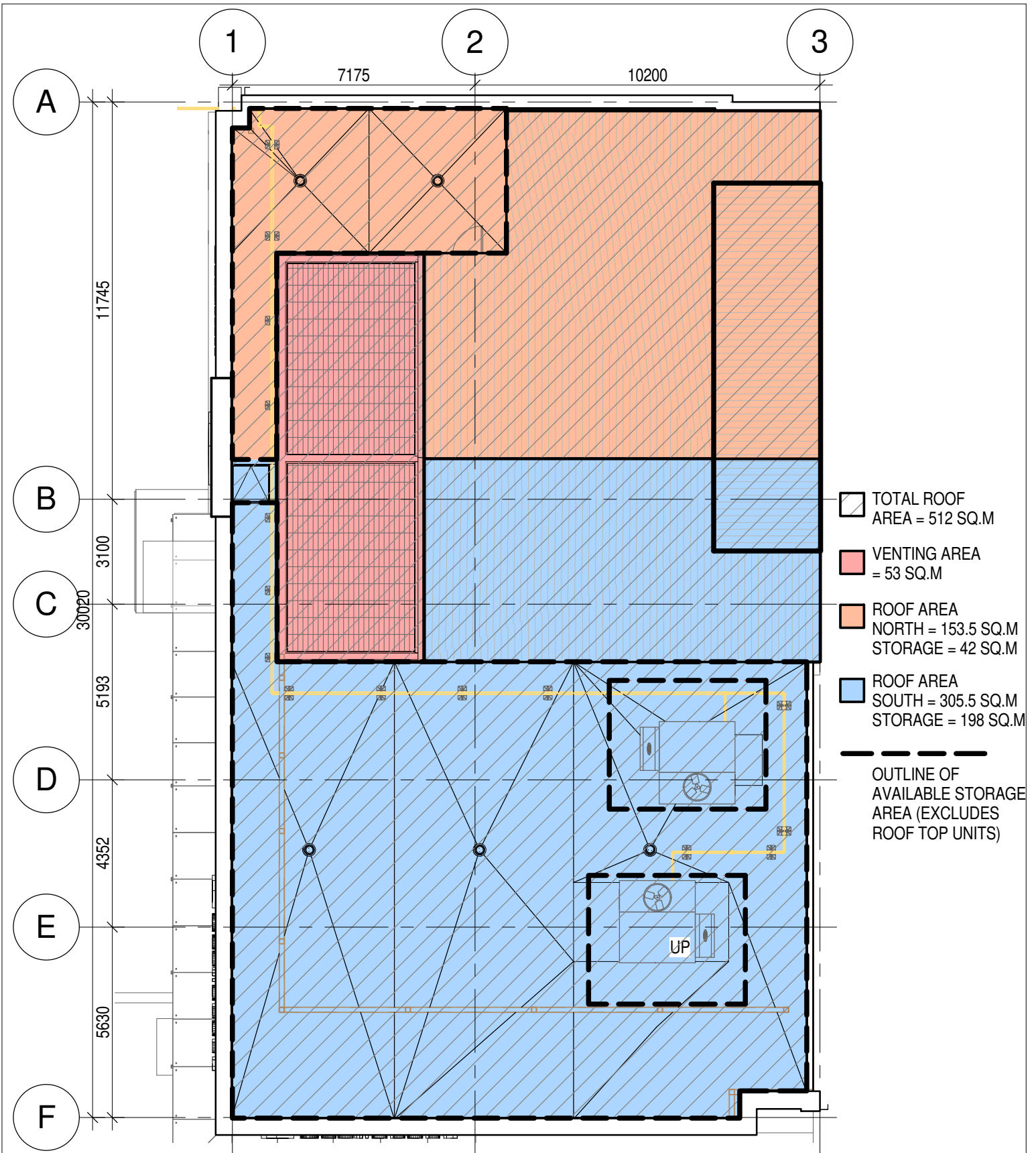
City of Ottawa design guidelines for the redevelopment of sites in the City core area (separated sewer areas) identified the preferred stormwater management, and provided on-site attenuation to achieve restricting peak flow from the site to mirror a 1:5 year rainfall event with C=0.5.


As noted previously, this building is serving dual function in that not only is it a commercial building but it provides access to grade for the LRT tunnel located below the building. This includes both LRT riders and mechanical systems. Figure 2 illustrates the proposed roof configuration for the building which includes features for the LRT's mechanical facilities. These features restrict the area available for roof top storage use. Alternative storage solutions include below grade storage, however, due to the presence of the LRT tunnel this is not possible, hence the stormwater management solution will need to work with the available roof area.

The proposed roof configuration provides for two roof drains on the north half and three on the south half. Utilizing Watts adjustable flow control roof drains (see attached spec sheet, or approved equal) at a discharge rate of 2.27 l/s (30gpm) for the north drains (2X2.27=4.54), and 1.51 l/s (20gpm) for the south drains (3X1.51=4.54), combining the roof drains, a total flow of 9.08l/s with a Tc of 10 min, for a 1:100 yr. rainfall event the effective runoff coefficient is C=0.76, which equates to a runoff coefficient of C=0.61 for a 1:5 yr. event.

The total area of the roof is 521 m², of which 240 m² is available for use as stormwater roof storage, based on 0.15 m maximum depth ponding and the proposed roof configuration. The available roof top storage for the northern and southern halves of the roof is 2.1 m³ and 7.42 m³ respectively. The modified rational method notes for the roof drainage areas with C=1.0 (1:100), and discharge rate of 4.54l/s for each of the north and south section of roof, 1.9 m³ and 6.86 m³ of storage is required respectively, see attached calculation.

While the runoff coefficient does not meet the preferred C=0.5 (because of the limited storage due to the LRT requirements) it must be recognized the existing condition peak flow during a 1:100 event is 25.86 l/s and the proposed solution reduces that peak flow to 9.08 l/s, hence the post development condition is a significant improvement.



				PROJECT TITLE	SCALE	SKETCH NO.	ISSUE
				SCOTIABANK - RIDEAU AND WILLIAM BRANCH	1 : 150	FIGURE 2	
					JOB NO. 37543		
					DRAWN BY LJJ		
				SKETCH TITLE			
				ROOF PLAN			
				DO NOT SCALE THIS DRAWING. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TAKING AND VERIFYING ALL THE DIMENSIONS AND REPORTING ERRORS AND/OR OMISSIONS TO THE ARCHITECT IN WRITING BEFORE PROCEEDING WITH THE WORK.			
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RD-100

**Large Capacity
Roof Drain**

Tag: _____

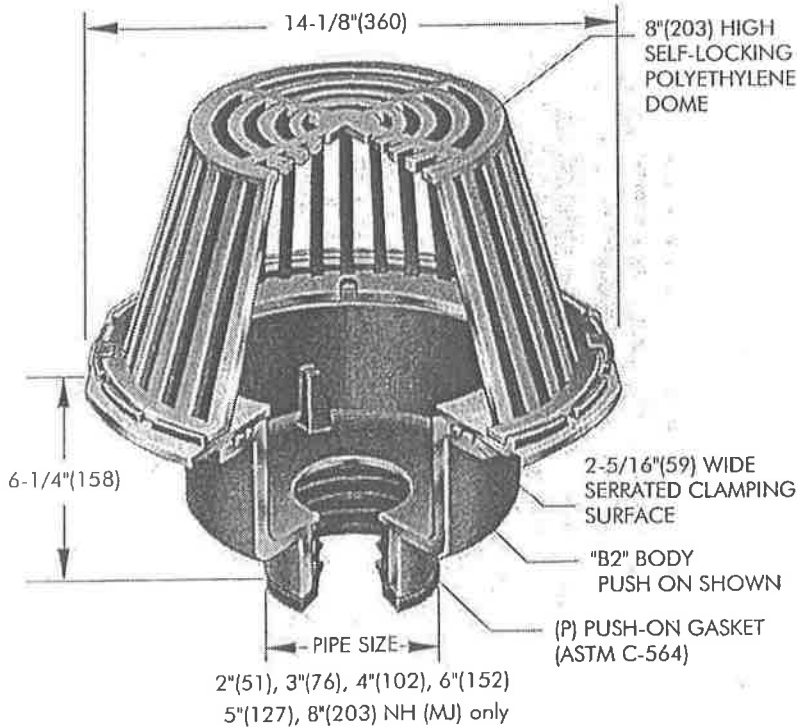
Components:



SPECIFICATION: Watts Drainage Products RD-100 epoxy coated cast iron roof drain with deep sump, wide serrated flashing flange, flashing clamp device with integral gravel stop and self-locking polyethylene (standard) dome strainer.

Order Code: RD-10 [] - [] - []

Ex. RD-102P-K



Free Area Sq. In.
137

Deck opening 10" (254)
with sump receiver 12-1/4" (337)

Pipe Sizing (Select One)		
Suffix	Description	
2	2"(51) Pipe Size	<input type="checkbox"/>
3	3"(76) Pipe Size	<input type="checkbox"/>
4	4"(102) Pipe Size	<input type="checkbox"/>
5	5"(127) Pipe Size	<input type="checkbox"/>
6	6"(152) Pipe Size	<input type="checkbox"/>
8	8"(203) Pipe Size	<input type="checkbox"/>

Outlet Type (Select One)		
Suffix	Description	
NH	No Hub (MJ)	<input type="checkbox"/>
P	Push On	<input type="checkbox"/>
T	Threaded Outlet	<input type="checkbox"/>
X	Inside Caulk	<input type="checkbox"/>

Options (Select One or More)		
Suffix	Description	
-A	Accutal weir (specify # 1-6 slots)	<input type="checkbox"/>
-B	Sump Receiver Flange	<input type="checkbox"/>
-BED	Sump Receiver, Adj Ext., Deck Clamp	<input type="checkbox"/>
-C	Secondary Membrane Clamp	<input type="checkbox"/>
-D	Underdeck Clamp	<input type="checkbox"/>
-E	Adjustable Extension	<input type="checkbox"/>
-GSS	Stainless Steel Ballast Guard	<input type="checkbox"/>
-H	Adj. to 6" IRMA Ballast Guard	<input type="checkbox"/>
-K	Ductile Iron Dome	<input type="checkbox"/>
-K80	Aluminum Dome	<input type="checkbox"/>
-L	Vandal Proof Dome	<input type="checkbox"/>
-R	2" High External Water Dam	<input type="checkbox"/>
-SO	Side Outlet**	<input type="checkbox"/>
-V	Fixed Extension (1-1/2", 2", 3", 4")	<input type="checkbox"/>
-W	Adj. Water Level Regulator	<input type="checkbox"/>
-W-1	Waterproofing Flange	<input type="checkbox"/>
-Z	Extended Integral Wide Flange	<input type="checkbox"/>
-5	Sediment Bucket	<input type="checkbox"/>
-12	Galvanized Dome	<input type="checkbox"/>
-13	All Galvanized	<input type="checkbox"/>
-83	Mash Covered Dome	<input type="checkbox"/>
-113M	Special Epoxy from 3M Range	<input type="checkbox"/>

Optional Body Material (NH Only)		
Suffix	Description	
-60	PVC Body w/Socket Outlet	<input type="checkbox"/>
-61	ABS Body w/Socket Outlet	<input type="checkbox"/>

** Side Outlet (-SO) option only available in 2"(51), 3"(76), 4"(102) pipe sizes.
Underdeck Clamp (-BED and -D options) are not available when -SO is selected.

Job Name _____ Contractor _____

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

Engineer _____ Representative _____

Watts Drainage reserves the right to modify or change product design or construction without prior notice and without incurring any obligation to make similar changes and modifications to products previously or subsequently sold. See your Watts Drainage representative for any clarification. Dimensions are subject to manufacturing tolerances.



CANADA: 5435 North Service Road, Burlington, ON, L7L 5H7 TEL: 905-332-6718 TOLL-FREE: 1-888-208-8927 Website: www.wattsdrainage.co





Adjustable Accutrol Weir

Tag: _____

Adjustable Flow Control
for Roof Drains

ADJUSTABLE ACCUTROL (for Large Sump Roof Drains only)

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

EXAMPLE:

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

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

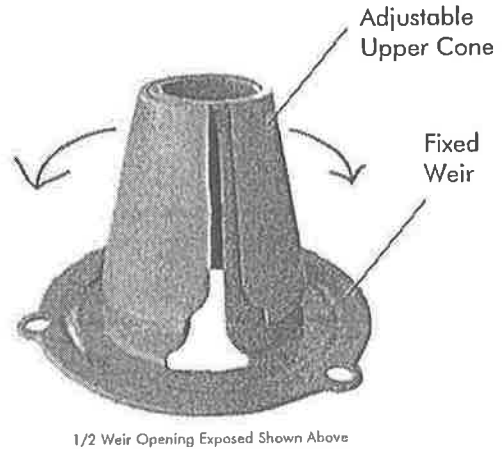
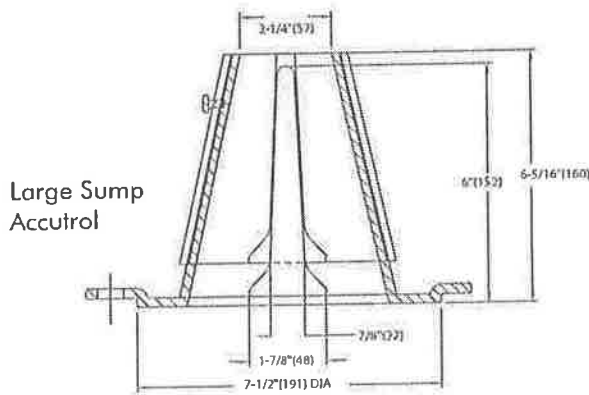


TABLE 1. Adjustable Accutrol Flow Rate Settings

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

Job Name _____ Contractor _____

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

Engineer _____ Representative _____

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IBI
333 Preston St
OTTAWA, ONTARIO
K1S 5N4

ONSITE SWM 100yr design
PROJECT: Scotia Bank Rideau/William
CITY OF OTTAWA
DEVELOPER : Scotiabank

PAGE: 1 OF 1
JOB #: 37543
DATE: Oct 14, 2016
DESIGN: DY
Rev#0

100yr design

MAXIMUM ALLOWABLE FLOW - Flow Restricted to 5yr C= 0.61

Time of concentration = 10 minutes

Area (ha) =	0.051
post C Average =	0.61
post C Average =	0.90

Intensity - 5 year event storm

10 min Tc	$i_{5yr} = 998.071 / (T+6.053)^{0.814} =$	104.2 mm/hr
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Unrestricted Flowrate (Q5)

10 min Tc	$Q_{pre-devo} = 2.78 \cdot A \cdot Cw \cdot i =$	9.08 l/s
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Intensity - 100 year event storm

10 min Tc	$i_{100yr} = 1735.688 / (T+6.014)^{0.82} =$	178.6 mm/hr
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Unrestricted Flowrate (Q100)

10 min Tc	$Q_{post-devo} = 2.78 \cdot A \cdot Cw \cdot i =$	25.42 l/s
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STORM WATER MANAGEMENT - Post-Development Controlled

(5 year post-development with 100yr inlets)

ROOF AREA (north)

153.5 sm
100 -YR FLOW
Qp (l/s)

Area(ha)=	0.0154	STORMWATER MANAGEMENT Qm =				4.54 l/s
Cw =	1.00					
Tc		Qp	Qm	Qp-Qm	Volume	
Variable	i	$2.78 \times \text{Area} \times c \times i$	(l/s)	(l/s)	(m3)	
(min)	(mm/hour)	(l/s)				
5	242.7	10.4	4.54	5.8	1.75	
6	226.0	9.6	4.54	5.1	1.84	
7	211.7	9.0	4.54	4.5	1.89	
8	199.2	8.5	4.54	4.0	1.90	
9	188.3	8.0	4.54	3.5	1.89	
10	178.6	7.6	4.54	3.1	1.85	
11	169.9	7.3	4.54	2.7	1.79	
12	162.1	6.9	4.54	2.4	1.71	
13	155.1	6.6	4.54	2.1	1.62	
14	148.7	6.3	4.54	1.8	1.52	
15	142.9	6.1	4.54	1.6	1.40	
16	137.5	5.9	4.54	1.3	1.28	

<==== Required volume for roof storage

ROOF AREA (south)

305.5 sm
100 -YR FLOW
Qp (l/s)

Area(ha)=	0.0306	STORMWATER MANAGEMENT Qm =				4.54 l/s
Cw =	1.00					
Tc		Qp	Qm	Qp-Qm	Volume	
Variable	i	$2.78 \times \text{Area} \times c \times i$	(l/s)	(l/s)	(m3)	
(min)	(mm/hour)	(l/s)				
14	148.7	12.6	4.54	8.1	6.80	
15	142.9	12.1	4.54	7.6	6.84	
16	137.5	11.7	4.54	7.1	6.86	
17	132.6	11.3	4.54	6.7	6.86	
18	128.1	10.9	4.54	6.3	6.84	
19	123.9	10.5	4.54	6.0	6.82	
20	120.0	10.2	4.54	5.6	6.78	
21	116.3	9.9	4.54	5.3	6.72	
22	112.9	9.6	4.54	5.0	6.66	
23	109.7	9.3	4.54	4.8	6.59	
24	106.7	9.1	4.54	4.5	6.51	
25	103.8	8.8	4.54	4.3	6.42	

<==== Required volume for roof storage

Prepared for: Scotiabank

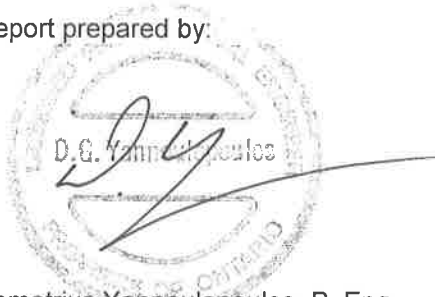
3 CONCLUSIONS

Stormwater sewers required to support the development are adjacent and available to service this site. The stormwater management approach noted in this report demonstrates the 1:100 yr post development flows from the site will be significantly reduced from pre development levels, and will not negatively impact the existing municipal storm sewer system.

The detail design is subject to governmental approval prior to construction, including but not limited to the following:

- Commence Work Order: City of Ottawa

Report prepared by:



Demetrius Yannouloupoulos, P. Eng.
Associate Director