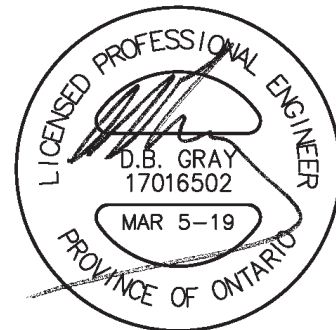


SERVICING BRIEF & STORMWATER MANAGEMENT REPORT

Mitch Owens / Boundary Road
Ottawa, Ontario

Report No. 18029

December 18, 2018
Revised March 5, 2019



NOT VALID UNLESS
SIGNED & DATED

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SERVICING BRIEF & STORMWATER MANAGEMENT REPORT

Mitch Owens / Boundary Road
Ottawa, Ontario

This Servicing Brief & Stormwater Management Report is a description of the services for a 5,213 sq.m. (+56,000 sq.ft.) cross dock facility and addresses the stormwater management requirements of 4.2 hectares of land located at the southwest of the Mitch Owens Road / Boundary Road intersection.

This report forms part of the stormwater management design for the proposed development. Also refer to drawings C-1 to C-8 prepared by D. B. Gray Engineering Inc.

WATER SUPPLY FOR FIREFIGHTING:

The property is in a rural area with no municipal water supply. The proposed building will have a sprinkler system. The mechanical engineer has calculated that 114,000 litres (+25,000 imperial gallons) is the required water supply. A water fill station (an underground tank with a water chute and draw pipe) with this capacity is proposed to be located adjacent to the fire route near the entrance to the site. A fire pump will draw from the underground tank and supply the sprinkler system (see mechanical engineering drawings documents).

ON-SITE WELL:

A drilled well is proposed to be located approximately 3m from the front (north) façade of the proposed building.

ON-SITE SEWAGE SYSTEM:

An on-site septic system is proposed. It will be is a Class 4 system consisting of a 30,000 L septic tank, a dosing reservoir, two ECOFLO ST-730P Biofilter treatment units, a pump chamber and an area bed. A septic permit has been issued by the Ottawa Septic System Office (OSSO).

STORMWATER MANAGEMENT:

Water Quality:

The South Nation Conservation Authority (SNC) has advised that 80% total suspended solids (TSS) removal is required.

Rainfall runoff from approximately 86% of the total developed (and virtually all of the hard surfaces) will drain to one of three grassed stormwater detention areas prior to discharging to the roadside ditch. The grassed detention areas will have minimal slopes that will keep flow velocities low making them effective for pollutant removal and they will tend to increase the removal of TSS. The low flow conditions in these grassed areas will filter out coarse sediment from runoff and the grass will take up nutrients.

Infiltration trenches located in each stormwater detention area have been sized to remove 80% TSS as per the MOE Design Manual. The underlying soil is silty clay having an estimated percolation rate of 6 to 12mm /hr. To be conservative 6 mm/hr was used.

As per the geotechnical report groundwater was observed at 0.6 to 1.6m below the ground surface or about an elevation of 75.30 to 76.30. Groundwater was observed in the septic system test pits at 0.9 to 1.4m below the ground surface or about an elevation of 75.35 to 75.88. The bottom of the infiltration trench elevation averages 76.40 or about 0.1m 1.1m above groundwater. The MOE Design Manual recommends that the bottom of an infiltration trench be 1m above groundwater. Although the conditions are marginal, the infiltration trenches are proposed because there are no practicable alternatives.

An erosion and sediment control plan has been developed to be implemented during construction, (see drawing C-3 and notes 2.1 to 2.5 on drawing C-5). In summary: to filter out construction sediment a silt fence barrier will be installed around the perimeter of the site; straw bale check dams will be installed in the roadside ditch and swales; and geotextile fabric mud mats will be install at all points of egress to public roads

Water Quantity:

The stormwater quantity control measures detailed in this report are based on the criteria that the release rate for post-development storm events is equal to or less than the flow produced by the pre-development (existing) conditions

Calculations are based on the Rational Method. The runoff coefficients for the 100 year event are increased by 25% to maximum 1.00.

It is calculated that the pre-development conditions reflect a 5-year runoff coefficient of 0.30 and 0.38 for the 100-year. Using the Airport Formula for sheet flow, it is calculated that the existing time of concentration is 52 minutes for the 5-year event and 47 minutes

for the 100-year. Using the Rational Method; the pre-development (existing) 5-year peak flow is 128.28 l/s and 292.61 l/s for the 100-year.

Stormwater will be stored within the development on the roof of the proposed building in three stormwater detention areas (depressed grassed areas).

Drainage Area I (Uncontrolled Flow Off Site – 6,060 sq.m.):

The runoff from the perimeter of the site (about 14% of the total) will be allowed to flow uncontrolled off the site.

	100-year	5-year
The maximum flow rate:	76.20 l/s	35.57 l/s

Drainage Area II (Roof 1 – 1087 sq.m.):

The roof drain on Roof 1 will be a flow control type which will restrict the flow and cause the storm water to pond on Roof 1. The flow control type roof drain shall be installed with a parabolic shaped slotted weir (3 slot per weir drain at 0.0124 l/s per mm per slot - 5 USgpm per inch per slot): Watts roof drain with a Watts Accutrol Weir RD-100 or equal. As per the Ontario Building Code scuppers are required to prevent the water on the roof from exceeding 150mm. During the 100-year event about 9% of the flow will flow out of the scuppers.

	100-year	5-year
The maximum roof drain release rate:	8.50 l/s	6.14 l/s
The maximum scupper release rate:	<u>0.88 l/s</u>	<u>0.00 l/s</u>
The maximum release rate:	9.38 l/s	6.14 l/s
The maximum ponding depth:	114 mm	83 mm
The maximum stored volume:	33.09 cu.m.	15.63 cu.m.

Drainage Area II (Roof 2 – 805 sq.m.):

The roof drain on Roof 2 will be a flow control type which will restrict the flow and cause the storm water to pond on Roof 2. The flow control type roof drain shall be installed with a parabolic shaped slotted weir (2 slot per weir drain at 0.0124 l/s per mm per slot - 5 USgpm per inch per slot): Watts roof drain with a Watts Accutrol Weir RD-100 or equal. As per the Ontario Building Code scuppers are required to prevent the water on the roof from exceeding 150mm. During the 100-year event about 17% of the flow will flow out of the scuppers.

	100-year	5-year
The maximum roof drain release rate:	5.67 l/s	4.16 l/s
The maximum scupper release rate:	<u>1.15 l/s</u>	<u>0.00 l/s</u>
The maximum release rate:	6.82 l/s	4.16 l/s
The maximum ponding depth:	114 mm	84 mm
The maximum stored volume:	24.73 cu.m.	12.15 cu.m.

Drainage Area III (Roof 3 – 872 sq.m.):

The roof drain on Roof 3 will be a flow control type which will restrict the flow and cause the storm water to pond on Roof 3. The flow control type roof drain shall be installed with a parabolic shaped slotted weir (2 slot per weir drain at 0.0124 l/s per mm per slot - 5 USgpm per inch per slot): Watts roof drain with a Watts Accutrol Weir RD-100 or equal. As per the Ontario Building Code scuppers are required to prevent the water on the roof from exceeding 150mm. During the 100-year event about 23% of the flow will flow out of the scuppers.

	100-year	5-year
The maximum roof drain release rate:	5.67 l/s	4.22 l/s
The maximum scupper release rate:	<u>1.69 l/s</u>	<u>0.00 l/s</u>
The maximum release rate:	7.36 l/s	4.22 l/s
The maximum ponding depth:	114 mm	85 mm
The maximum stored volume:	26.84 cu.m.	13.60 cu.m.

Drainage Area III (Roof 4 – 805 sq.m.):

The roof drain on Roof 4 will be a flow control type which will restrict the flow and cause the storm water to pond on Roof 4. The flow control type roof drain shall be installed with a parabolic shaped slotted weir (2 slot per weir drain at 0.0124 l/s per mm per slot - 5 USgpm per inch per slot): Watts roof drain with a Watts Accutrol Weir RD-100 or equal. As per the Ontario Building Code scuppers are required to prevent the water on the roof from exceeding 150mm. During the 100-year event less than 1% of the flow will flow out of the scuppers.

	100-year	5-year
The maximum roof drain release rate:	5.67 l/s	4.04 l/s
The maximum scupper release rate:	<u>0.03 l/s</u>	<u>0.00 l/s</u>
The maximum release rate:	5.70 l/s	4.04 l/s
The maximum ponding depth:	114 mm	81 mm
The maximum stored volume:	26.84 cu.m.	12.34 cu.m.

Drainage Area III (Roof 5 – 805 sq.m.):

The roof drain on Roof 5 will be a flow control type which will restrict the flow and cause the storm water to pond on Roof 5. The flow control type roof drain shall be installed with a parabolic shaped slotted weir (2 slot per weir drain at 0.0124 l/s per mm per slot - 5 USgpm per inch per slot): Watts roof drain with a Watts Accutrol Weir RD-100 or equal. As per the Ontario Building Code scuppers are required to prevent the water on the roof from exceeding 150mm. During the 100-year event less than 1% of the flow will flow out of the scuppers.

	100-year	5-year
The maximum roof drain release rate:	5.67 l/s	4.04 l/s
The maximum scupper release rate:	<u>0.03 l/s</u>	<u>0.00 l/s</u>
The maximum release rate:	5.70 l/s	4.04 l/s
The maximum ponding depth:	114 mm	81 mm
The maximum stored volume:	26.84 cu.m.	12.34 cu.m.

Drainage Area III (Roof 6 – 618 sq.m.):

The roof drain on Roof 6 will be a flow control type which will restrict the flow and cause the storm water to pond on Roof 6. The flow control type roof drain shall be installed with a parabolic shaped slotted weir (2 slot per weir drain at 0.0124 l/s per mm per slot - 5 USgpm per inch per slot): Watts roof drain with a Watts Accutrol Weir RD-100 or equal. As per the Ontario Building Code scuppers are required to prevent the water on the roof from exceeding 150mm.

	100-year	5-year
The maximum roof drain release rate:	5.63 l/s	3.98 l/s
The maximum scupper release rate:	<u>0.00 l/s</u>	<u>0.00 l/s</u>
The maximum release rate:	5.63 l/s	3.98 l/s
The maximum ponding depth:	113 mm	80 mm
The maximum stored volume:	18.32 cu.m.	8.26 cu.m.

Drainage Area IV (9,479 sq.m.):

During five-year event an inlet control device (ICD) located in the inlet of the outlet culvert for Stormwater Detention Area A1 will control the release of stormwater from Drainage Area IV. During the one hundred-year event, in addition to the ICD, a broad-crested weir will control the release of stormwater. The ICD and weir will restrict the flow and force the stormwater to back up into the detention area. The broad-crested weir will be a concrete curb with a 6.96m long depressed section. The top of the depressed portion of the curb will be 0.02 m below the 100-year ponding elevation and will release 33.57 l/s. The ICD shall be a plug style with a round orifice design manufactured by Pedro Plastics (or approved equal manufactured by IPEX) and shall be sized by the manufacturer for a discharge rate of 31.71 l/s at 0.49m head. It is calculated that an orifice area of 16,719 sq.mm. (+146 mm diameter) and a discharge coefficient of 0.61 will restrict the outflow rate to 31.71 l/s at a head of 0.49m. Based on this orifice the maximum outflow rate for the 1:5 year storm event is calculated to be 27.97 l/s at 0.38 m.

	100-year	5-year
The maximum ICD release rate:	31.71 l/s	27.97 l/s
The maximum weir release rate:	<u>33.57 l/s</u>	<u>0.00 l/s</u>
The maximum release rate:	65.28 l/s	27.97 l/s
The maximum ponding elevation:	77.21 m	77.10 m
The maximum ponding depth:	0.57 m	0.46 m
The maximum stored volume:	271.69 cu.m.	150.22 cu.m.

Drainage Area V (10,256 sq.m.):

During five-year event an inlet control device (ICD) located in the inlet of the outlet culvert for Stormwater Detention Area B1 will control the release of stormwater from Drainage Area V. During the one hundred-year event, in addition to the ICD, a broad-crested weir will control the release of stormwater. The ICD and weir will restrict the flow and force the stormwater to back up into the detention area. The broad-crested weir will be a concrete curb with a 2.65m long depressed section. The top of the depressed portion of the curb will be 0.05 m below the 100-year ponding elevation and will release 50.68 l/s. The ICD shall be a plug style with a round orifice design

manufactured by Pedro Plastics (or approved equal manufactured by IPEX) and shall be sized by the manufacturer for a discharge rate of 65.13 l/s at 0.43m head. It is calculated that an orifice area of 36,679 sq.mm. (± 216 mm diameter) and a discharge coefficient of 0.61 will restrict the outflow rate to 65.13 l/s at a head of 0.43m. Based on this orifice the maximum outflow rate for the 1:5 year storm event is calculated to be 56.66 l/s at 0.33 m.

	100-year	5-year
The maximum ICD release rate:	65.13 l/s	56.66 l/s
The maximum weir release rate:	<u>50.68 l/s</u>	<u>0.00 l/s</u>
The maximum release rate:	115.82 l/s	56.66 l/s
The maximum ponding elevation:	77.22 m	77.11 m
The maximum ponding depth:	0.54 m	0.33m
The maximum stored volume:	235.57 cu.m.	115.54 cu.m.

Drainage Area IV (11,280 sq.m.):

During five-year event an inlet control device (ICD) located in the inlet of the outlet culvert for Stormwater Detention Area C1 will control the release of stormwater from Drainage Area IV. During the one hundred-year event, in addition to the ICD, a broad-crested weir will control the release of stormwater. The ICD and weir will restrict the flow and force the stormwater to back up into the detention area. The broad-crested weir will be a concrete curb with a 5.50m long depressed section. The top of the depressed portion of the curb will be 0.02 m below the 100-year ponding elevation and will release 26.53 l/s. The ICD shall be a plug style with a round orifice design manufactured by Pedro Plastics (or approved equal manufactured by IPEX) and shall be sized by the manufacturer for a discharge rate of 8.79 l/s at 0.54m head. It is calculated that an orifice area of 5.945 sq.mm. (± 75 mm diameter) and a discharge coefficient of 0.61 will restrict the outflow rate to 8.79 l/s at a head of 0.54m. Based on this orifice the maximum outflow rate for the 1:5 year storm event is calculated to be 8.09 l/s at 0.46 m.

	100-year	5-year
The maximum ICD release rate:	8.79 l/s	8.09 l/s
The maximum weir release rate:	<u>26.53 l/s</u>	<u>0.00 l/s</u>
The maximum release rate:	35.32 l/s	8.09 l/s
The maximum ponding elevation:	77.22 m	77.14 m
The maximum ponding depth:	0.58 m	0.46 m
The maximum stored volume:	369.33 cu.m.	248.42 cu.m.

As previously stated the maximum allowable release rate (pre-development flow rate) for the 100-year storm event for the site is 292.61 l/s. The maximum post-development release rate for the 100-year storm event is calculated to be 292.61 l/s, equal to the maximum allowable. To achieve this release rate the total maximum required storage capacity for the 1:100-year event is 1033.25 cu.m.

The maximum allowable release rate (pre-development flow rate) for the 5-year storm event for the site is 128.28 l/s. The maximum post-development release rate for the 5-year storm event is calculated to be 128.28 l/s, equal to the maximum allowable. To

achieve this release rate the total maximum required storage capacity for the 1:5-year event is 588.50 cu.m.

CONCLUSIONS:

1. The mechanical engineer has calculated that 25,000 imperial gallons is the required water supply for the sprinkler system and for firefighting. A water fill station with this capacity is proposed.
2. A drilled well is proposed.
3. An on-site Class 4 septic system is proposed. An application for a septic permit has been submitted to the Ottawa Septic System Office (OSSO).
4. Infiltration trenches located in each stormwater detention area have been sized to remove 80% TSS.
5. An erosion and sediment control plan has been developed to be implemented during construction.
6. With the proposed stormwater management design the post-development storm events are less than the flow produced by the (existing) pre-development.

STORMWATER MANAGEMENT CALCULATIONS

The orifice calculations are based on the following formula:

$$Q = C_d \times A_o \sqrt{2gh} \times 1000$$

where:

Q = flowrate in litres per second

C_d = coefficient of discharge

A_o = orifice area in sq.m.

g = 9.81 m/s²

h = head above orifice in meters

Storage calculations on the roof are based on the following formula for volume of a cone:

$$V = (A \times d)/3$$

where:

V = volume in cu.m.

A = ponding area in sq.m.

d = ponding depth in meters

Storage calculations for the stormwater detention area are based on the following formula for volume of a prismatical shape (the formula is accurate if both length and width are changing proportionally):

$$V = (A_{\text{top}} + A_{\text{bottom}} + (A_{\text{top}} \times A_{\text{bottom}})^{0.5}) / 3 \times d$$

where:

V = volume in cu.m.

A_{top} = area of pond in sq.m.

A_{bottom} = area of bottom of depressed area

d = ponding depth in meters

Mitch Owens Road / Boundary Road Ottawa, Ontario

INFILTRATION CALCULATIONS

DRAINAGE AREA IV

			C
Roof Area:	0	sq.m	0.90
Asphalt/Concrete Area:	4399	sq.m	0.90
Gravel Area:	3942	sq.m	0.70
Landscaped Area:	<u>1138</u>	<u>sq.m</u>	<u>0.20</u>
Total Catchment Area	9479	sq.m.	0.73

Require Storage Volume *: 73% Impervious Level 34.2 cu.m. (interpolated from Table 3.2 *)
(for 80% TSS removal)

* As per MOE Stormwater Management Planning and Design Manual, March 2003

Infiltration Trench			
		Total	Void
Depth	Area	Volume	40%
m	sq.m.	cu.m.	cu.m.
0.30	288	86.4	34.6

Percolation Rate: 6 mm/hr (silty sand)

Time to Draw Down: 50 Hours

INFILTRATION CALCULATIONS (Continued)

DRAINAGE AREA V

			C
Roof Area:	0	sq.m	0.90
Asphalt/Concrete Area:	457	sq.m	0.90
Gravel Area:	9128	sq.m	0.70
Landscaped Area:	<u>671</u>	<u>sq.m</u>	<u>0.20</u>
Total Catchment Area	10256	sq.m.	0.68

Require Storage Volume *: 68% Impervious Level 35.1 cu.m. (interpolated from Table 3.2 *)
 (for 80% TSS removal)

* As per MOE Stormwater Management Planning and Design Manual, March 2003

Infiltration Trench			
			Void
		Total	Volume
Depth	Area	Volume	40%
m	sq.m.	cu.m.	cu.m.
0.30	294	88.2	35.3

Percolation Rate: 6 mm/hr (silty sand)

Time to Draw Down: 50 Hours

DRAINAGE AREA VI

			C
Roof Area:	0	sq.m	0.90
Asphalt/Concrete Area:	2787	sq.m	0.90
Gravel Area:	5572	sq.m	0.70
Landscaped Area:	<u>2921</u>	<u>sq.m</u>	<u>0.20</u>
Total Catchment Area	11280	sq.m.	0.62

Require Storage Volume *: 62% Impervious Level 36.5 cu.m. (interpolated from Table 3.2 *)
 (for 80% TSS removal)

* As per MOE Stormwater Management Planning and Design Manual, March 2003

Infiltration Trench			
			Void
		Total	Volume
Depth	Area	Volume	40%
m	sq.m.	cu.m.	cu.m.
0.30	304	91.2	36.5

Percolation Rate: 6 mm/hr (silty sand)

Time to Draw Down: 50 Hours

Summary Table

ONE HUNDRED YEAR EVENT				
Drainage Area	Maximum Allowable Release Rate	Maximum Release Rate	Maximum Volume Required	Maximum Volume Stored
	L/s	L/s	cu.m	cu.m
AREA I (Uncontrolled Flow Off Site)	-	76.20	-	-
AREA II (Roof 1 & 2) 50% Drains to Area IV - 50% to VI	-	16.20	57.81	57.81
AREA III (Roof 3, 4, 5 & 6) Drains to Area V	-	24.39	98.84	98.84
AREA IV	-	65.28	271.69	271.69
AREA V	-	115.82	235.57	235.57
AREA VI	-	35.32	369.33	369.33
TOTAL Release Rate: Area I + IV + V + VI)	292.61	292.61	1033.25	1033.25

FIVE YEAR EVENT				
Drainage Area	Maximum Allowable Release Rate	Maximum Release Rate	Maximum Volume Required	Maximum Volume Stored
	L/s	L/s	cu.m	cu.m
AREA I (Uncontrolled Flow Off Site)	-	35.57	-	-
AREA II (Roof 1 & 2) 50% Drains to Area IV - 50% to VI	-	10.30	27.79	27.79
AREA III (Roof 3, 4, 5 & 6) Drains to Area V	-	16.28	46.53	46.53
AREA IV	-	27.97	150.22	150.22
AREA V	-	56.66	115.54	115.54
AREA VI	-	8.09	248.42	248.42
TOTAL Release Rate: Area I + IV + V + VI)	128.28	128.28	588.50	588.50

Mitch Owens Road / Boundary Road
Ottawa, Ontario

STORM WATER MANAGEMENT CALCULATIONS
Rational Method

ONE HUNDRED YEAR EVENT

Maximum Allowable Release Rate

Pre-Development Conditions

			C	
Roof Area:	0	sq.m	1.00	
Asphalt/Concrete Area:	0	sq.m	1.00	
Gravel Area:	0	sq.m	0.875	
"Woofland" Area:	42067	sq.m	0.375	as per Table 5.7 Ottawa Sewer Design Guidelines: Woodland - Flat Clay / Silt Loam x 125%
<hr/>			<hr/>	
Total Catchment Area:	42067	sq.m	0.38	

Airport Formula

$$T_c = \frac{3.26 (1.1 - C) (L)^{1/2}}{S_w^{0.33}} \text{ min}$$

Runoff Coefficient (C):	0.38	
Sheet Flow Distance (L):	180	m
Slope of Land (Sw):	0.3	%
Time of Concentration (Sheet Flow):	47	min

Area (A):	42067	sq.m
Time of Concentration:	47	min
Rainfall Intensity (i):	66.7	mm/hr (100-year event)
Runoff Coefficient (C):	0.38	

Pre-development 100-year Flow Rate (2.78AiC): 292.61 L/s
(100-Year Maximum Allowable Release Rate)

DRAINAGE AREA I (Uncontrolled Flow Off Site)

(ONE HUNDRED-YEAR EVENT)

			C
Roof Area:	0	sq.m	1.00
Asphalt/Concrete Area:	0	sq.m	1.00
Gravel Area:	32	sq.m	0.875
Landscaped Area:	6028	sq.m	0.25
Total Catchment Area:	6060	sq.m	0.25
Area (A):	6060	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	178.6	mm/hr (100-year event)	
Runoff Coefficient (C):	0.25		
Flow Rate (2.78AIC):	76.20	L/s	

DRAINAGE AREA II (Roof 1)

(ONE HUNDRED-YEAR EVENT)

			C
Roof Area:	1087	sq.m	1.00
Asphalt/Concrete Area:	0	sq.m	1.00
Gravel Area:	0	sq.m	0.875
Landscaped Area:	0	sq.m	0.25

Total Catchment Area: 1087 sq.m 1.00

No. of Roof Drains: 2
 Slots per Wier: 3 0.0124 L/s/mm/slot (5 USGPM/in/slot)

Depth at Roof Drain: 114 mm

Maximum Roof Drain Release Rate:	8.50	L/s		Pond Area:	688	sq.m
Maximum Scupper Release Rate:	0.88	L/s		Achieved Volume:	33.09	cu.m
	9.38	L/s		Max. Volume Required:	33.09	cu.m

Time	i	2.78AiC	Roof Drain Release Rate	Scupper Release Rate	Total Release Rate	Stored Rate	Stored Volume
min.	mm/hr	L/s	L/s	L/s	L/s	L/s	cu.m
5	242.7	73.34	8.50	0.00	8.50	64.84	19.45
10	178.6	53.96	8.50	0.00	8.50	45.45	27.27
15	142.9	43.18	8.50	0.00	8.50	34.68	31.21
20	120.0	36.25	8.50	0.17	8.68	27.57	33.09
25	103.8	31.38	8.50	0.82	9.32	22.06	33.09
30	91.9	27.76	8.50	0.88	9.38	18.38	33.09
35	82.6	24.95	8.50	0.70	9.20	15.75	33.09
40	75.1	22.71	8.50	0.42	8.92	13.79	33.09
45	69.1	20.87	8.50	0.11	8.61	12.25	33.09
50	64.0	19.33	8.50	0.00	8.50	10.82	32.47
55	59.6	18.02	8.50	0.00	8.50	9.51	31.39
60	55.9	16.89	8.50	0.00	8.50	8.39	30.19
65	52.6	15.91	8.50	0.00	8.50	7.41	28.88
70	49.8	15.05	8.50	0.00	8.50	6.54	27.48
75	47.3	14.28	8.50	0.00	8.50	5.78	25.99
80	45.0	13.60	8.50	0.00	8.50	5.09	24.44
85	43.0	12.98	8.50	0.00	8.50	4.48	22.83
90	41.1	12.42	8.50	0.00	8.50	3.92	21.16
95	39.4	11.92	8.50	0.00	8.50	3.41	19.45
100	37.9	11.45	8.50	0.00	8.50	2.95	17.70
105	36.5	11.03	8.50	0.00	8.50	2.53	15.91
110	35.2	10.64	8.50	0.00	8.50	2.13	14.08
115	34.0	10.28	8.50	0.00	8.50	1.77	12.23
120	32.9	9.94	8.50	0.00	8.50	1.44	10.34
125	31.9	9.63	8.50	0.00	8.50	1.12	8.43
130	30.9	9.34	8.50	0.00	8.50	0.83	6.50
135	30.0	9.06	8.50	0.00	8.50	0.56	4.54
140	29.2	8.81	8.50	0.00	8.50	0.31	2.57
145	28.4	8.57	8.50	0.00	8.50	0.07	0.57
150	27.6	8.34	8.34	0.00	8.34	0.00	0.00
180	23.9	7.22	7.22	0.00	7.22	0.00	0.00
210	21.1	6.39	6.39	0.00	6.39	0.00	0.00
240	19.0	5.74	5.74	0.00	5.74	0.00	0.00
270	17.3	5.23	5.23	0.00	5.23	0.00	0.00
300	15.9	4.80	4.80	0.00	4.80	0.00	0.00
330	14.7	4.45	4.45	0.00	4.45	0.00	0.00
360	13.7	4.15	4.15	0.00	4.15	0.00	0.00
390	12.9	3.89	3.89	0.00	3.89	0.00	0.00
420	12.1	3.66	3.66	0.00	3.66	0.00	0.00
450	11.5	3.46	3.46	0.00	3.46	0.00	0.00
480	10.9	3.29	3.29	0.00	3.29	0.00	0.00
510	10.4	3.13	3.13	0.00	3.13	0.00	0.00
540	9.9	2.99	2.99	0.00	2.99	0.00	0.00
570	9.5	2.86	2.86	0.00	2.86	0.00	0.00
600	9.1	2.74	2.74	0.00	2.74	0.00	0.00
630	8.7	2.64	2.64	0.00	2.64	0.00	0.00
660	8.4	2.54	2.54	0.00	2.54	0.00	0.00
690	8.1	2.45	2.45	0.00	2.45	0.00	0.00
720	7.8	2.36	2.36	0.00	2.36	0.00	0.00

DRAINAGE AREA II (Roof 2)

(ONE HUNDRED-YEAR EVENT)

			C
Roof Area:	805	sq.m	1.00
Asphalt/Concrete Area:	0	sq.m	1.00
Gravel Area:	0	sq.m	0.875
Landscaped Area:	0	sq.m	0.25
Total Catchment Area:	805	sq.m	1.00

No. of Roof Drains: 2
 Slots per Wier: 2 0.0124 L/s/mm/slot (5 USGPM/in/slot)

Depth at Roof Drain: 114 mm

Maximum Roof Drain Release Rate:	5.67	L/s	Pond Area:	514	sq.m
Maximum Scupper Release Rate:	1.15	L/s	Achieved Volume:	24.73	cu.m
	6.82	L/s	Max. Volume Required:	24.73	cu.m

Time	i	2.78AIC	Roof Drain Release Rate	Scupper Release Rate	Total Release Rate	Stored Rate	Stored Volume
min.	mm/hr	L/s	L/s	L/s	L/s	L/s	cu.m
5	242.7	54.31	5.67	0.00	5.67	48.65	14.59
10	178.6	39.96	5.67	0.00	5.67	34.29	20.57
15	142.9	31.98	5.67	0.00	5.67	26.31	23.68
20	120.0	26.84	5.67	0.57	6.24	20.61	24.73
25	103.8	23.24	5.67	1.08	6.75	16.49	24.73
30	91.9	20.56	5.67	1.15	6.82	13.74	24.73
35	82.6	18.48	5.67	1.04	6.70	11.78	24.73
40	75.1	16.82	5.67	0.84	6.51	10.30	24.73
45	69.1	15.45	5.67	0.62	6.29	9.16	24.73
50	64.0	14.31	5.67	0.40	6.07	8.24	24.73
55	59.6	13.34	5.67	0.18	5.85	7.49	24.73
60	55.9	12.51	5.67	0.00	5.67	6.84	24.62
65	52.6	11.78	5.67	0.00	5.67	6.11	23.84
70	49.8	11.14	5.67	0.00	5.67	5.47	22.99
75	47.3	10.58	5.67	0.00	5.67	4.91	22.08
80	45.0	10.07	5.67	0.00	5.67	4.40	21.12
85	43.0	9.61	5.67	0.00	5.67	3.94	20.11
90	41.1	9.20	5.67	0.00	5.67	3.53	19.07
95	39.4	8.83	5.67	0.00	5.67	3.16	17.99
100	37.9	8.48	5.67	0.00	5.67	2.81	16.88
105	36.5	8.17	5.67	0.00	5.67	2.50	15.74
110	35.2	7.88	5.67	0.00	5.67	2.21	14.58
115	34.0	7.61	5.67	0.00	5.67	1.94	13.39
120	32.9	7.36	5.67	0.00	5.67	1.69	12.18
125	31.9	7.13	5.67	0.00	5.67	1.46	10.96
130	30.9	6.91	5.67	0.00	5.67	1.25	9.71
135	30.0	6.71	5.67	0.00	5.67	1.04	8.45
140	29.2	6.52	5.67	0.00	5.67	0.85	7.18
145	28.4	6.35	5.67	0.00	5.67	0.68	5.89
150	27.6	6.18	5.67	0.00	5.67	0.51	4.59
180	23.9	5.35	5.35	0.00	5.35	0.00	0.00
210	21.1	4.73	4.73	0.00	4.73	0.00	0.00
240	19.0	4.25	4.25	0.00	4.25	0.00	0.00
270	17.3	3.87	3.87	0.00	3.87	0.00	0.00
300	15.9	3.56	3.56	0.00	3.56	0.00	0.00
330	14.7	3.29	3.29	0.00	3.29	0.00	0.00
360	13.7	3.07	3.07	0.00	3.07	0.00	0.00
390	12.9	2.88	2.88	0.00	2.88	0.00	0.00
420	12.1	2.71	2.71	0.00	2.71	0.00	0.00
450	11.5	2.56	2.56	0.00	2.56	0.00	0.00
480	10.9	2.43	2.43	0.00	2.43	0.00	0.00
510	10.4	2.32	2.32	0.00	2.32	0.00	0.00
540	9.9	2.21	2.21	0.00	2.21	0.00	0.00
570	9.5	2.12	2.12	0.00	2.12	0.00	0.00
600	9.1	2.03	2.03	0.00	2.03	0.00	0.00
630	8.7	1.95	1.95	0.00	1.95	0.00	0.00
660	8.4	1.88	1.88	0.00	1.88	0.00	0.00
690	8.1	1.81	1.81	0.00	1.81	0.00	0.00
720	7.8	1.75	1.75	0.00	1.75	0.00	0.00

DRAINAGE AREA III (Roof 3)

(ONE HUNDRED-YEAR EVENT)

			C
Roof Area:	872	sq.m	1.00
Asphalt/Concrete Area:	0	sq.m	1.00
Gravel Area:	0	sq.m	0.875
Landscaped Area:	0	sq.m	0.25

Total Catchment Area: 872 sq.m 1.00

No. of Roof Drains: 2
 Slots per Wier: 2 0.0124 L/s/mm/slot (5 USGPM/in/slot)

Depth at Roof Drain: 114 mm

Maximum Roof Drain Release Rate:	5.67	L/s	Pond Area:	558	sq.m
Maximum Scupper Release Rate:	1.69	L/s	Achieved Volume:	26.84	cu.m
	7.36	L/s			

Max. Volume Required: 26.84 cu.m

Time min.	i mm/hr	2.78AiC L/s	Roof Drain	Scupper	Total	Stored Rate L/s	Stored Volume cu.m
			Release Rate L/s	Release Rate L/s	Release Rate L/s		
5	242.7	58.84	5.67	0.00	5.67	53.17	15.95
10	178.6	43.29	5.67	0.00	5.67	37.62	22.57
15	142.9	34.64	5.67	0.00	5.67	28.97	26.07
20	120.0	29.08	5.67	1.04	6.71	22.37	26.84
25	103.8	25.17	5.67	1.61	7.28	17.89	26.84
30	91.9	22.27	5.67	1.69	7.36	14.91	26.84
35	82.6	20.02	5.67	1.57	7.24	12.78	26.84
40	75.1	18.22	5.67	1.36	7.03	11.18	26.84
45	69.1	16.74	5.67	1.13	6.80	9.94	26.84
50	64.0	15.50	5.67	0.89	6.56	8.95	26.84
55	59.6	14.45	5.67	0.65	6.32	8.13	26.84
60	55.9	13.55	5.67	0.43	6.09	7.46	26.84
65	52.6	12.76	5.67	0.21	5.88	6.88	26.84
70	49.8	12.07	5.67	0.01	5.68	6.39	26.84
75	47.3	11.46	5.67	0.00	5.67	5.79	26.04
80	45.0	10.91	5.67	0.00	5.67	5.24	25.14
85	43.0	10.41	5.67	0.00	5.67	4.74	24.19
90	41.1	9.97	5.67	0.00	5.67	4.30	23.20
95	39.4	9.56	5.67	0.00	5.67	3.89	22.17
100	37.9	9.19	5.67	0.00	5.67	3.52	21.11
105	36.5	8.85	5.67	0.00	5.67	3.18	20.02
110	35.2	8.53	5.67	0.00	5.67	2.86	18.90
115	34.0	8.24	5.67	0.00	5.67	2.57	17.76
120	32.9	7.97	5.67	0.00	5.67	2.30	16.60
125	31.9	7.72	5.67	0.00	5.67	2.05	15.41
130	30.9	7.49	5.67	0.00	5.67	1.82	14.20
135	30.0	7.27	5.67	0.00	5.67	1.60	12.98
140	29.2	7.07	5.67	0.00	5.67	1.40	11.74
145	28.4	6.87	5.67	0.00	5.67	1.21	10.49
150	27.6	6.69	5.67	0.00	5.67	1.02	9.22
180	23.9	5.79	5.67	0.00	5.67	0.13	1.35
210	21.1	5.13	5.13	0.00	5.13	0.00	0.00
240	19.0	4.61	4.61	0.00	4.61	0.00	0.00
270	17.3	4.19	4.19	0.00	4.19	0.00	0.00
300	15.9	3.85	3.85	0.00	3.85	0.00	0.00
330	14.7	3.57	3.57	0.00	3.57	0.00	0.00
360	13.7	3.33	3.33	0.00	3.33	0.00	0.00
390	12.9	3.12	3.12	0.00	3.12	0.00	0.00
420	12.1	2.94	2.94	0.00	2.94	0.00	0.00
450	11.5	2.78	2.78	0.00	2.78	0.00	0.00
480	10.9	2.64	2.64	0.00	2.64	0.00	0.00
510	10.4	2.51	2.51	0.00	2.51	0.00	0.00
540	9.9	2.40	2.40	0.00	2.40	0.00	0.00
570	9.5	2.29	2.29	0.00	2.29	0.00	0.00
600	9.1	2.20	2.20	0.00	2.20	0.00	0.00
630	8.7	2.11	2.11	0.00	2.11	0.00	0.00
660	8.4	2.04	2.04	0.00	2.04	0.00	0.00
690	8.1	1.96	1.96	0.00	1.96	0.00	0.00
720	7.8	1.90	1.90	0.00	1.90	1.90	81.95

DRAINAGE AREA III (Roof 4)

(ONE HUNDRED-YEAR EVENT)

			C
Roof Area:	805	sq.m	1.00
Asphalt/Concrete Area:	0	sq.m	1.00
Gravel Area:	0	sq.m	0.875
Landscaped Area:	0	sq.m	0.25

Total Catchment Area: 805 sq.m 1.00

No. of Roof Drains: 2
 Slots per Wier: 2 0.0124 L/s/mm/slot (5 USGPM/in/slot)

Depth at Roof Drain: 114 mm

Maximum Roof Drain Release Rate: 5.67 L/s
 Maximum Scupper Release Rate: 0.03 L/s
5.70 L/s

Pond Area: 558 sq.m

Achieved Volume: 26.84 cu.m

Max. Volume Required: 26.84 cu.m

Time min.	i mm/hr	2.78AiC L/s	Roof Drain	Scupper	Total	Stored Rate L/s	Stored Volume cu.m
			Release Rate L/s	Release Rate L/s	Release Rate L/s		
5	242.7	54.31	5.67	0.00	5.67	48.65	14.59
10	178.6	39.96	5.67	0.00	5.67	34.29	20.57
15	142.9	31.98	5.67	0.00	5.67	26.31	23.68
20	120.0	26.84	5.67	0.00	5.67	21.17	25.41
25	103.8	23.24	5.67	0.00	5.67	17.57	26.36
30	91.9	20.56	5.67	0.00	5.67	14.89	26.80
35	82.6	18.48	5.67	0.03	5.70	12.78	26.84
40	75.1	16.82	5.67	0.00	5.67	11.15	26.75
45	69.1	15.45	5.67	0.00	5.67	9.78	26.42
50	64.0	14.31	5.67	0.00	5.67	8.64	25.93
55	59.6	13.34	5.67	0.00	5.67	7.67	25.32
60	55.9	12.51	5.67	0.00	5.67	6.84	24.62
65	52.6	11.78	5.67	0.00	5.67	6.11	23.84
70	49.8	11.14	5.67	0.00	5.67	5.47	22.99
75	47.3	10.58	5.67	0.00	5.67	4.91	22.08
80	45.0	10.07	5.67	0.00	5.67	4.40	21.12
85	43.0	9.61	5.67	0.00	5.67	3.94	20.11
90	41.1	9.20	5.67	0.00	5.67	3.53	19.07
95	39.4	8.83	5.67	0.00	5.67	3.16	17.99
100	37.9	8.48	5.67	0.00	5.67	2.81	16.88
105	36.5	8.17	5.67	0.00	5.67	2.50	15.74
110	35.2	7.88	5.67	0.00	5.67	2.21	14.58
115	34.0	7.61	5.67	0.00	5.67	1.94	13.39
120	32.9	7.36	5.67	0.00	5.67	1.69	12.18
125	31.9	7.13	5.67	0.00	5.67	1.46	10.96
130	30.9	6.91	5.67	0.00	5.67	1.25	9.71
135	30.0	6.71	5.67	0.00	5.67	1.04	8.45
140	29.2	6.52	5.67	0.00	5.67	0.85	7.18
145	28.4	6.35	5.67	0.00	5.67	0.68	5.89
150	27.6	6.18	5.67	0.00	5.67	0.51	4.59
180	23.9	5.35	5.35	0.00	5.35	0.00	0.00
210	21.1	4.73	4.73	0.00	4.73	0.00	0.00
240	19.0	4.25	4.25	0.00	4.25	0.00	0.00
270	17.3	3.87	3.87	0.00	3.87	0.00	0.00
300	15.9	3.56	3.56	0.00	3.56	0.00	0.00
330	14.7	3.29	3.29	0.00	3.29	0.00	0.00
360	13.7	3.07	3.07	0.00	3.07	0.00	0.00
390	12.9	2.88	2.88	0.00	2.88	0.00	0.00
420	12.1	2.71	2.71	0.00	2.71	0.00	0.00
450	11.5	2.56	2.56	0.00	2.56	0.00	0.00
480	10.9	2.43	2.43	0.00	2.43	0.00	0.00
510	10.4	2.32	2.32	0.00	2.32	0.00	0.00
540	9.9	2.21	2.21	0.00	2.21	0.00	0.00
570	9.5	2.12	2.12	0.00	2.12	0.00	0.00
600	9.1	2.03	2.03	0.00	2.03	0.00	0.00
630	8.7	1.95	1.95	0.00	1.95	0.00	0.00
660	8.4	1.88	1.88	0.00	1.88	0.00	0.00
690	8.1	1.81	1.81	0.00	1.81	0.00	0.00
720	7.8	1.75	1.75	0.00	1.75	0.00	0.00

DRAINAGE AREA III (Roof 5)

(ONE HUNDRED-YEAR EVENT)

			C
Roof Area:	805	sq.m	1.00
Asphalt/Concrete Area:	0	sq.m	1.00
Gravel Area:	0	sq.m	0.875
Landscaped Area:	0	sq.m	0.25
Total Catchment Area:	805	sq.m	1.00

No. of Roof Drains: 2
 Slots per Wier: 2 0.0124 L/s/mm/slot (5 USGPM/in/slot)

Depth at Roof Drain: 114 mm

Maximum Roof Drain Release Rate:	5.67	L/s	Pond Area:	558	sq.m
Maximum Scupper Release Rate:	0.03	L/s	Achieved Volume:	26.84	cu.m
	5.70	L/s	Max. Volume Required:	26.84	cu.m

Time	i	2.78AIC	Roof Drain Release Rate	Scupper Release Rate	Total Release Rate	Stored Rate	Stored Volume
min.	mm/hr	L/s	L/s	L/s	L/s	L/s	cu.m
5	242.7	54.31	5.67	0.00	5.67	48.65	14.59
10	178.6	39.96	5.67	0.00	5.67	34.29	20.57
15	142.9	31.98	5.67	0.00	5.67	26.31	23.68
20	120.0	26.84	5.67	0.00	5.67	21.17	25.41
25	103.8	23.24	5.67	0.00	5.67	17.57	26.36
30	91.9	20.56	5.67	0.00	5.67	14.89	26.80
35	82.6	18.48	5.67	0.03	5.70	12.78	26.84
40	75.1	16.82	5.67	0.00	5.67	11.15	26.75
45	69.1	15.45	5.67	0.00	5.67	9.78	26.42
50	64.0	14.31	5.67	0.00	5.67	8.64	25.93
55	59.6	13.34	5.67	0.00	5.67	7.67	25.32
60	55.9	12.51	5.67	0.00	5.67	6.84	24.62
65	52.6	11.78	5.67	0.00	5.67	6.11	23.84
70	49.8	11.14	5.67	0.00	5.67	5.47	22.99
75	47.3	10.58	5.67	0.00	5.67	4.91	22.08
80	45.0	10.07	5.67	0.00	5.67	4.40	21.12
85	43.0	9.61	5.67	0.00	5.67	3.94	20.11
90	41.1	9.20	5.67	0.00	5.67	3.53	19.07
95	39.4	8.83	5.67	0.00	5.67	3.16	17.99
100	37.9	8.48	5.67	0.00	5.67	2.81	16.88
105	36.5	8.17	5.67	0.00	5.67	2.50	15.74
110	35.2	7.88	5.67	0.00	5.67	2.21	14.58
115	34.0	7.61	5.67	0.00	5.67	1.94	13.39
120	32.9	7.36	5.67	0.00	5.67	1.69	12.18
125	31.9	7.13	5.67	0.00	5.67	1.46	10.96
130	30.9	6.91	5.67	0.00	5.67	1.25	9.71
135	30.0	6.71	5.67	0.00	5.67	1.04	8.45
140	29.2	6.52	5.67	0.00	5.67	0.85	7.18
145	28.4	6.35	5.67	0.00	5.67	0.68	5.89
150	27.6	6.18	5.67	0.00	5.67	0.51	4.59
180	23.9	5.35	5.35	0.00	5.35	0.00	0.00
210	21.1	4.73	4.73	0.00	4.73	0.00	0.00
240	19.0	4.25	4.25	0.00	4.25	0.00	0.00
270	17.3	3.87	3.87	0.00	3.87	0.00	0.00
300	15.9	3.56	3.56	0.00	3.56	0.00	0.00
330	14.7	3.29	3.29	0.00	3.29	0.00	0.00
360	13.7	3.07	3.07	0.00	3.07	0.00	0.00
390	12.9	2.88	2.88	0.00	2.88	0.00	0.00
420	12.1	2.71	2.71	0.00	2.71	0.00	0.00
450	11.5	2.56	2.56	0.00	2.56	0.00	0.00
480	10.9	2.43	2.43	0.00	2.43	0.00	0.00
510	10.4	2.32	2.32	0.00	2.32	0.00	0.00
540	9.9	2.21	2.21	0.00	2.21	0.00	0.00
570	9.5	2.12	2.12	0.00	2.12	0.00	0.00
600	9.1	2.03	2.03	0.00	2.03	0.00	0.00
630	8.7	1.95	1.95	0.00	1.95	0.00	0.00
660	8.4	1.88	1.88	0.00	1.88	0.00	0.00
690	8.1	1.81	1.81	0.00	1.81	0.00	0.00
720	7.8	1.75	1.75	0.00	1.75	0.00	0.00

DRAINAGE AREA III (Roof 6)

(ONE HUNDRED-YEAR EVENT)

			C
Roof Area:	618	sq.m	1.00
Asphalt/Concrete Area:	0	sq.m	1.00
Gravel Area:	0	sq.m	0.875
Landscaped Area:	0	sq.m	0.25
Total Catchment Area:	618	sq.m	1.00

No. of Roof Drains: 2
 Slots per Wier: 2 0.0124 L/s/mm/slot (5 USGPM/in/slot)

Depth at Roof Drain: 113 mm

Maximum Roof Drain Release Rate:	5.63	L/s		Pond Area:	383	sq.m
Maximum Scupper Release Rate:	0.00	L/s		Achieved Volume:	18.32	cu.m
	5.63	L/s		Max. Volume Required:	18.32	cu.m

Time	i	2.78AIC	Roof Drain Release Rate	Scupper Release Rate	Total Release Rate	Stored Rate	Stored Volume
min.	mm/hr	L/s	L/s	L/s	L/s	L/s	cu.m
5	242.7	41.70	5.63	0.00	5.63	36.07	10.82
10	178.6	30.68	5.63	0.00	5.63	25.05	15.03
15	142.9	24.55	5.63	0.00	5.63	18.92	17.03
20	120.0	20.61	5.63	0.00	5.63	14.98	17.98
25	103.8	17.84	5.63	0.00	5.63	12.21	18.32
30	91.9	15.78	5.63	0.00	5.63	10.16	18.28
35	82.6	14.19	5.63	0.00	5.63	8.56	17.98
40	75.1	12.91	5.63	0.00	5.63	7.28	17.48
45	69.1	11.86	5.63	0.00	5.63	6.24	16.84
50	64.0	10.99	5.63	0.00	5.63	5.36	16.08
55	59.6	10.24	5.63	0.00	5.63	4.62	15.24
60	55.9	9.60	5.63	0.00	5.63	3.98	14.31
65	52.6	9.04	5.63	0.00	5.63	3.42	13.33
70	49.8	8.55	5.63	0.00	5.63	2.93	12.29
75	47.3	8.12	5.63	0.00	5.63	2.49	11.21
80	45.0	7.73	5.63	0.00	5.63	2.10	10.09
85	43.0	7.38	5.63	0.00	5.63	1.75	8.94
90	41.1	7.06	5.63	0.00	5.63	1.44	7.76
95	39.4	6.78	5.63	0.00	5.63	1.15	6.54
100	37.9	6.51	5.63	0.00	5.63	0.89	5.31
105	36.5	6.27	5.63	0.00	5.63	0.64	4.05
110	35.2	6.05	5.63	0.00	5.63	0.42	2.78
115	34.0	5.84	5.63	0.00	5.63	0.22	1.49
120	32.9	5.65	5.63	0.00	5.63	0.02	0.18
125	31.9	5.47	5.47	0.00	5.47	0.00	0.00
130	30.9	5.31	5.31	0.00	5.31	0.00	0.00
135	30.0	5.15	5.15	0.00	5.15	0.00	0.00
140	29.2	5.01	5.01	0.00	5.01	0.00	0.00
145	28.4	4.87	4.87	0.00	4.87	0.00	0.00
150	27.6	4.74	4.74	0.00	4.74	0.00	0.00
180	23.9	4.11	4.11	0.00	4.11	0.00	0.00
210	21.1	3.63	3.63	0.00	3.63	0.00	0.00
240	19.0	3.27	3.27	0.00	3.27	0.00	0.00
270	17.3	2.97	2.97	0.00	2.97	0.00	0.00
300	15.9	2.73	2.73	0.00	2.73	0.00	0.00
330	14.7	2.53	2.53	0.00	2.53	0.00	0.00
360	13.7	2.36	2.36	0.00	2.36	0.00	0.00
390	12.9	2.21	2.21	0.00	2.21	0.00	0.00
420	12.1	2.08	2.08	0.00	2.08	0.00	0.00
450	11.5	1.97	1.97	0.00	1.97	0.00	0.00
480	10.9	1.87	1.87	0.00	1.87	0.00	0.00
510	10.4	1.78	1.78	0.00	1.78	0.00	0.00
540	9.9	1.70	1.70	0.00	1.70	0.00	0.00
570	9.5	1.63	1.63	0.00	1.63	0.00	0.00
600	9.1	1.56	1.56	0.00	1.56	0.00	0.00
630	8.7	1.50	1.50	0.00	1.50	0.00	0.00
660	8.4	1.44	1.44	0.00	1.44	0.00	0.00
690	8.1	1.39	1.39	0.00	1.39	0.00	0.00
720	7.8	1.34	1.34	0.00	1.34	0.00	0.00

DRAINAGE AREA IV

(ONE HUNDRED-YEAR EVENT)

		C	
Roof Area:	0	sq.m	1.00
Asphalt/Concrete Area:	4399	sq.m	1.00
Gravel Area:	3942	sq.m	0.875
Landscaped Area:	1138	sq.m	0.25
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Total Catchment Area:	9479	sq.m	0.86

Water Elevation:	77.21	m							
Invert of Culvert Inlet:	76.64	m							
Centroid of ICD Orifice:	76.71	m (ICD in Culvert Inlet)							
Head:	0.49	m							
Orifice Diameter:	146	mm							
Orifice Area:	16719	sq.mm							
Coefficient of Discharge:	0.61								
Maximum ICD Release Rate:	31.71	L/s							
Maximum Weir Release Rate:	33.57	L/s							
Maximum Release Rate:	65.28	L/s							
<hr/>									
Granular Surface Storage									
		Area	Max. Depth						
		sq.m	m						
		1003	0.27	88.78	cu.m				
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Stormwater Detention Area A1									
		Area	Avg. Depth						
		sq.m	m						
		370	0.46	139.20	cu.m				
<hr/>									
Stormwater Detention Area A2									
		Area	Avg. Depth						
		sq.m	m						
		166	0.32	43.71	cu.m				
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Achieved Volume:								271.69	cu.m
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Max. Volume Required:								271.69	cu.m

Time min.	i mm/hr	2.78AiC L/s	50% of Release Rate		Total Inflow L/s	ICD Release Rate L/s	Weir Release Rate L/s	Total Release L/s	Stored Rate L/s	Stored Volume cu.m
			from Roof 1 L/s	from Roof 2 L/s						
5	242.7	548.73	4.25	2.83	555.82	31.71	0.00	31.71	524.11	157.23
10	178.6	403.70	4.25	2.83	410.79	31.71	0.00	31.71	379.08	227.45
15	142.9	323.07	4.25	2.83	330.16	31.71	0.00	31.71	298.45	268.60
20	120.0	271.20	4.34	3.12	278.65	31.71	20.54	52.25	226.41	271.69
25	103.8	234.79	4.66	3.38	242.83	31.71	29.99	61.70	181.13	271.69
30	91.9	207.71	4.69	3.41	215.81	31.71	33.16	64.87	150.94	271.69
35	82.6	186.70	4.60	3.35	194.65	31.71	33.57	65.28	129.38	271.69
40	75.1	169.90	4.46	3.26	177.61	31.71	32.70	64.41	113.20	271.69
45	69.1	156.12	4.31	3.15	163.57	31.71	31.24	62.94	100.63	271.69
50	64.0	144.59	4.25	3.03	151.88	31.71	29.61	61.32	90.56	271.69
55	59.6	134.80	4.25	2.92	141.98	31.71	27.94	59.65	82.33	271.69
60	55.9	126.37	4.25	2.83	133.46	31.71	26.28	57.99	75.47	271.69
65	52.6	119.03	4.25	2.83	126.12	31.71	24.74	56.45	69.66	271.69
70	49.8	112.57	4.25	2.83	119.66	31.71	23.26	54.97	64.69	271.69
75	47.3	106.84	4.25	2.83	113.93	31.71	21.84	53.55	60.38	271.69
80	45.0	101.72	4.25	2.83	108.81	31.71	20.50	52.20	56.60	271.69
85	43.0	97.11	4.25	2.83	104.20	31.71	19.22	50.93	53.27	271.69
90	41.1	92.95	4.25	2.83	100.03	31.71	18.01	49.72	50.31	271.69
95	39.4	89.16	4.25	2.83	96.24	31.71	16.87	48.58	47.66	271.69
100	37.9	85.70	4.25	2.83	92.78	31.71	15.79	47.50	45.28	271.69
105	36.5	82.52	4.25	2.83	89.60	31.71	14.77	46.48	43.13	271.69
110	35.2	79.59	4.25	2.83	86.68	31.71	13.80	45.51	41.16	271.69
115	34.0	76.88	4.25	2.83	83.97	31.71	12.89	44.59	39.38	271.69
120	32.9	74.37	4.25	2.83	81.46	31.71	12.02	43.72	37.73	271.69
125	31.9	72.04	4.25	2.83	79.12	31.71	11.19	42.90	36.23	271.69
130	30.9	69.86	4.25	2.83	76.94	31.71	10.40	42.11	34.83	271.69
135	30.0	67.82	4.25	2.83	74.91	31.71	9.66	41.36	33.54	271.69
140	29.2	65.91	4.25	2.83	73.00	31.71	8.94	40.65	32.34	271.69
145	28.4	64.12	4.25	2.83	71.20	31.71	8.27	39.97	31.23	271.69
150	27.6	62.43	4.17	2.83	69.43	31.71	7.54	39.24	30.19	271.69
180	23.9	54.04	3.61	2.67	60.33	31.71	3.46	35.17	25.16	271.69
210	21.1	47.81	3.19	2.37	53.37	31.71	0.10	31.80	21.56	271.69
240	19.0	42.97	2.87	2.13	47.97	31.71	0.00	31.71	16.26	234.15
270	17.3	39.10	2.61	1.94	43.65	31.71	0.00	31.71	11.94	193.46
300	15.9	35.93	2.40	1.78	40.11	31.71	0.00	31.71	8.40	151.21
330	14.7	33.28	2.22	1.65	37.15	31.71	0.00	31.71	5.44	107.71
360	13.7	31.02	2.07	1.54	34.63	31.71	0.00	31.71	2.92	63.16
390	12.9	29.08	1.94	1.44	32.47	31.71	0.00	31.71	0.76	17.73
420	12.1	27.39	1.83	1.36	30.58	30.58	0.00	30.58	0.00	0.00
450	11.5	25.91	1.73	1.28	28.92	28.92	0.00	28.92	0.00	0.00
480	10.9	24.59	1.64	1.22	27.45	27.45	0.00	27.45	0.00	0.00
510	10.4	23.41	1.56	1.16	26.13	26.13	0.00	26.13	0.00	0.00
540	9.9	22.35	1.49	1.11	24.95	24.95	0.00	24.95	0.00	0.00
570	9.5	21.39	1.43	1.06	23.88	23.88	0.00	23.88	0.00	0.00
600	9.1	20.52	1.37	1.02	22.90	22.90	0.00	22.90	0.00	0.00
630	8.7	19.72	1.32	0.98	22.01	22.01	0.00	22.01	0.00	0.00
660	8.4	18.99	1.27	0.94	21.20	21.20	0.00	21.20	0.00	0.00
690	8.1	18.32	1.22	0.91	20.45	20.45	0.00	20.45	0.00	0.00
720	7.8	17.69	1.18	0.88	19.75	19.75	0.00	19.75	0.00	0.00

DRAINAGE AREA V

(ONE HUNDRED-YEAR EVENT)

		C
Roof Area:	0	sq.m 1.00
Asphalt/Concrete Area:	457	sq.m 1.00
Gravel Area:	9128	sq.m 0.875
Landscaped Area:	671	sq.m 0.25
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Total Catchment Area:	10256	sq.m 0.84

Water Elevation:	77.22	m				Granular Surface Storage
						Area Max. Depth
Invert of Culvert Inlet:	76.68	m				sq.m m
						1137 0.33 125.07 cu.m
Centroid of ICD Orifice:	76.79	m (ICD in Culvert Inlet)				
						Stormwater Detention Area B1
Head:	0.43	m				Area Avg. Depth
						sq.m m
Orifice Diameter:	216	mm				247 0.44 83.50 cu.m
						Stormwater Detention Area B2
Orifice Area:	36679	sq.mm				Area Avg. Depth
						sq.m m
Coefficient of Discharge:	0.61					110 0.30 27.00 cu.m
Maximum ICD Release Rate:	65.13	L/s				
Maximum Weir Release Rate:	50.68	L/s				
Maximum Release Rate:	115.82	L/s				Achieved Volume: 235.57 cu.m
						Max. Volume Required: 235.57 cu.m

Time	i	2.78AiC	Release Rate				Total Inflow	ICD Release Rate	Weir Release Rate	Total Release Rate	Stored Rate	Stored Volume
			from Roof 3	from Roof 4	from Roof 5	from Roof 6						
min.	mm/hr	L/s	L/s	L/s	L/s	L/s	L/s	L/s	L/s	L/s	cu.m	
5	242.7	581.05	5.67	5.67	5.67	5.63	603.68	65.13	0.00	65.13	538.55	161.56
10	178.6	427.48	5.67	5.67	5.67	5.63	450.12	65.13	0.00	65.13	384.98	230.99
15	142.9	342.10	5.67	5.67	5.67	5.63	364.73	65.13	37.85	102.99	261.74	235.57
20	120.0	287.17	6.71	5.67	5.67	5.63	310.85	65.13	49.40	114.54	196.31	235.57
25	103.8	248.62	7.28	5.67	5.67	5.63	272.86	65.13	50.68	115.82	157.05	235.57
30	91.9	219.94	7.36	5.67	5.67	5.63	244.26	65.13	48.26	113.39	130.87	235.57
35	82.6	197.70	7.24	5.70	5.70	5.63	221.96	65.13	44.65	109.79	112.18	235.57
40	75.1	179.90	7.03	5.67	5.67	5.63	203.90	65.13	40.61	105.75	98.15	235.57
45	69.1	165.31	6.80	5.67	5.67	5.63	189.08	65.13	36.69	101.83	87.25	235.57
50	64.0	153.11	6.56	5.67	5.67	5.63	176.63	65.13	32.98	98.11	78.52	235.57
55	59.6	142.74	6.32	5.67	5.67	5.63	166.03	65.13	29.51	94.64	71.38	235.57
60	55.9	133.82	6.09	5.67	5.67	5.63	156.88	65.13	26.30	91.44	65.44	235.57
65	52.6	126.04	5.88	5.67	5.67	5.63	148.89	65.13	23.35	88.48	60.40	235.57
70	49.8	119.20	5.68	5.67	5.67	5.63	141.84	65.13	20.62	85.76	56.09	235.57
75	47.3	113.13	5.67	5.67	5.67	5.63	135.77	65.13	18.28	83.42	52.35	235.57
80	45.0	107.71	5.67	5.67	5.67	5.63	130.35	65.13	16.13	81.27	49.08	235.57
85	43.0	102.83	5.67	5.67	5.67	5.63	125.47	65.13	14.14	79.28	46.19	235.57
90	41.1	98.42	5.67	5.67	5.67	5.63	121.06	65.13	12.30	77.43	43.62	235.57
95	39.4	94.41	5.67	5.67	5.67	5.63	117.04	65.13	10.58	75.72	41.33	235.57
100	37.9	90.74	5.67	5.67	5.67	5.63	113.38	65.13	8.98	74.12	39.26	235.57
105	36.5	87.38	5.67	5.67	5.67	5.63	110.01	65.13	7.49	72.62	37.39	235.57
110	35.2	84.28	5.67	5.67	5.67	5.63	106.91	65.13	6.08	71.22	35.69	235.57
115	34.0	81.41	5.67	5.67	5.67	5.63	104.05	65.13	4.77	69.91	34.14	235.57
120	32.9	78.75	5.67	5.67	5.67	5.63	101.39	65.13	3.53	68.67	32.72	235.57
125	31.9	76.28	5.67	5.67	5.67	5.47	98.76	65.13	2.22	67.35	31.41	235.57
130	30.9	73.97	5.67	5.67	5.67	5.31	96.29	65.13	0.95	66.09	30.20	235.57
135	30.0	71.81	5.67	5.67	5.67	5.15	93.98	65.13	0.00	65.13	28.84	233.62
140	29.2	69.79	5.67	5.67	5.67	5.01	91.81	65.13	0.00	65.13	26.67	224.06
145	28.4	67.89	5.67	5.67	5.67	4.87	89.77	65.13	0.00	65.13	24.64	214.34
150	27.6	66.10	5.67	5.67	5.67	4.74	87.85	65.13	0.00	65.13	22.72	204.47
180	23.9	57.22	5.67	5.35	5.35	4.11	77.70	65.13	0.00	65.13	12.56	135.69
210	21.1	50.62	5.13	4.73	4.73	3.63	68.84	65.13	0.00	65.13	3.71	46.73
240	19.0	45.50	4.61	4.25	4.25	3.27	61.88	61.88	0.00	61.88	0.00	0.00
270	17.3	41.40	4.19	3.87	3.87	2.97	56.31	56.31	0.00	56.31	0.00	0.00
300	15.9	38.05	3.85	3.56	3.56	2.73	51.74	51.74	0.00	51.74	0.00	0.00
330	14.7	35.24	3.57	3.29	3.29	2.53	47.92	47.92	0.00	47.92	0.00	0.00
360	13.7	32.85	3.33	3.07	3.07	2.36	44.68	44.68	0.00	44.68	0.00	0.00
390	12.9	30.80	3.12	2.88	2.88	2.21	41.88	41.88	0.00	41.88	0.00	0.00
420	12.1	29.01	2.94	2.71	2.71	2.08	39.45	39.45	0.00	39.45	0.00	0.00
450	11.5	27.43	2.78	2.56	2.56	1.97	37.31	37.31	0.00	37.31	0.00	0.00
480	10.9	26.03	2.64	2.43	2.43	1.87	35.41	35.41	0.00	35.41	0.00	0.00
510	10.4	24.79	2.51	2.32	2.32	1.78	33.71	33.71	0.00	33.71	0.00	0.00
540	9.9	23.66	2.40	2.21	2.21	1.70	32.18	32.18	0.00	32.18	0.00	0.00
570	9.5	22.65	2.29	2.12	2.12	1.63	30.80	30.80	0.00	30.80	0.00	0.00
600	9.1	21.73	2.20	2.03	2.03	1.56	29.55	29.55	0.00	29.55	0.00	0.00
630	8.7	20.88	2.11	1.95	1.95	1.50	28.40	28.40	0.00	28.40	0.00	0.00
660	8.4	20.11	2.04	1.88	1.88	1.44	27.35	27.35	0.00	27.35	0.00	0.00
690	8.1	19.39	1.96	1.81	1.81	1.39	26.37	26.37	0.00	26.37	0.00	0.00
720	7.8	18.73	0.00	1.75	1.75	1.34	23.58	23.58	0.00	23.58	0.00	0.00

DRAINAGE AREA VI

(ONE HUNDRED-YEAR EVENT)

		C	
Roof Area:	0	sq.m	1.00
Asphalt/Concrete Area:	2787	sq.m	1.00
Gravel Area:	5572	sq.m	0.875
Landscaped Area:	2921	sq.m	0.25
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Total Catchment Area:	11280	sq.m	0.74

Water Elevation:	77.22	m			
Invert of Culvert Inlet:	76.64	m			
Centroid of ICD Orifice:	76.68	m (ICD in Culvert Inlet)			
Head:	0.54	m			
Orifice Diameter:	75	mm			
Orifice Area:	4418	sq.mm			
Coefficient of Discharge:	0.61				
Maximum Release Rate:	8.79	L/s			
Maximum Weir Release Rate:	26.53	L/s			
Maximum Release Rate:	35.32	L/s			

Granular Surface Storage		
Area	Max. Depth	
sq.m	m	
1137	0.34	128.86 cu.m

Stormwater Detention Area C		
Area	Avg. Depth	
sq.m	m	
577	0.45	240.47 cu.m

Achieved Volume:	369.33	cu.m
Max. Volume Required:	369.33	cu.m

Time min.	i mm/hr	2.78AiC L/s	50% of Release Rate		Total Inflow L/s	ICD Release Rate L/s	Weir Release Rate L/s	Total Release L/s	Stored Rate L/s	Stored Volume cu.m
			from Roof 1 L/s	from Roof 2 L/s						
			5	242.7						
10	178.6	416.61	4.25	2.83	423.70	8.79	0.00	8.79	414.91	248.94
15	142.9	333.40	4.25	2.83	340.49	8.79	0.00	8.79	331.69	298.52
20	120.0	279.87	4.34	3.12	287.32	8.79	0.00	8.79	278.53	334.24
25	103.8	242.29	4.66	3.38	250.33	8.79	0.00	8.79	241.54	362.31
30	91.9	214.35	4.69	3.41	222.45	8.79	8.47	17.26	205.19	369.33
35	82.6	192.67	4.60	3.35	200.62	8.79	15.96	24.75	175.87	369.33
40	75.1	175.33	4.46	3.26	183.05	8.79	20.36	29.16	153.89	369.33
45	69.1	161.11	4.31	3.15	168.56	8.79	22.98	31.77	136.79	369.33
50	64.0	149.22	4.25	3.03	156.50	8.79	24.60	33.39	123.11	369.33
55	59.6	139.11	4.25	2.92	146.29	8.79	25.58	34.37	111.92	369.33
60	55.9	130.41	4.25	2.83	137.50	8.79	26.11	34.91	102.59	369.33
65	52.6	122.83	4.25	2.83	129.92	8.79	26.43	35.22	94.70	369.33
70	49.8	116.17	4.25	2.83	123.25	8.79	26.53	35.32	87.94	369.33
75	47.3	110.26	4.25	2.83	117.34	8.79	26.48	35.27	82.07	369.33
80	45.0	104.97	4.25	2.83	112.06	8.79	26.32	35.11	76.94	369.33
85	43.0	100.22	4.25	2.83	107.31	8.79	26.10	34.89	72.42	369.33
90	41.1	95.92	4.25	2.83	103.01	8.79	25.82	34.61	68.40	369.33
95	39.4	92.01	4.25	2.83	99.10	8.79	25.51	34.30	64.80	369.33
100	37.9	88.43	4.25	2.83	95.52	8.79	25.17	33.97	61.56	369.33
105	36.5	85.16	4.25	2.83	92.24	8.79	24.83	33.62	58.62	369.33
110	35.2	82.13	4.25	2.83	89.22	8.79	24.47	33.26	55.96	369.33
115	34.0	79.34	4.25	2.83	86.43	8.79	24.11	32.90	53.53	369.33
120	32.9	76.75	4.25	2.83	83.84	8.79	23.75	32.54	51.30	369.33
125	31.9	74.34	4.25	2.83	81.43	8.79	23.39	32.18	49.24	369.33
130	30.9	72.09	4.25	2.83	79.18	8.79	23.04	31.83	47.35	369.33
135	30.0	69.99	4.25	2.83	77.07	8.79	22.69	31.48	45.60	369.33
140	29.2	68.02	4.25	2.83	75.10	8.79	22.34	31.14	43.97	369.33
145	28.4	66.16	4.25	2.83	73.25	8.79	22.01	30.80	42.45	369.33
150	27.6	64.42	4.17	2.83	71.43	8.79	21.60	30.39	41.04	369.33
180	23.9	55.77	3.61	2.67	62.06	8.79	19.07	27.86	34.20	369.33
210	21.1	49.33	3.19	2.37	54.89	8.79	16.79	25.58	29.31	369.33
240	19.0	44.34	2.87	2.13	49.34	8.79	14.90	23.69	25.65	369.33
270	17.3	40.35	2.61	1.94	44.90	8.79	13.31	22.10	22.80	369.33
300	15.9	37.08	2.40	1.78	41.26	8.79	11.95	20.74	20.52	369.33
330	14.7	34.34	2.22	1.65	38.21	8.79	10.77	19.56	18.65	369.33
360	13.7	32.01	2.07	1.54	35.62	8.79	9.73	18.52	17.10	369.33
390	12.9	30.01	1.94	1.44	33.40	8.79	8.82	17.61	15.78	369.33
420	12.1	28.27	1.83	1.36	31.45	8.79	8.01	16.80	14.66	369.33
450	11.5	26.73	1.73	1.28	29.75	8.79	7.28	16.07	13.68	369.33
480	10.9	25.37	1.64	1.22	28.23	8.79	6.62	15.41	12.82	369.33
510	10.4	24.16	1.56	1.16	26.88	8.79	6.02	14.81	12.07	369.33
540	9.9	23.06	1.49	1.11	25.66	8.79	5.47	14.26	11.40	369.33
570	9.5	22.07	1.43	1.06	24.56	8.79	4.97	13.76	10.80	369.33
600	9.1	21.17	1.37	1.02	23.56	8.79	4.51	13.30	10.26	369.33
630	8.7	20.35	1.32	0.98	22.64	8.79	4.08	12.87	9.77	369.33
660	8.4	19.60	1.27	0.94	21.80	8.79	3.69	12.48	9.33	369.33
690	8.1	18.90	1.22	0.91	21.03	8.79	3.32	12.11	8.92	369.33
720	7.8	18.26	1.18	0.88	20.32	8.79	2.97	11.77	8.55	369.33

FIVE YEAR EVENT

Maximum Allowable Release Rate

Pre-Development Conditions

			C
Roof Area:	0	sq.m	0.90
Asphalt/Concrete Area:	0	sq.m	0.90
Gravel Area:	0	sq.m	0.70
"Woodland" Area:	42067	sq.m	0.30
			as per Table 5.7 Ottawa Sewer Design Guildlines: Woodland - Flat Clay / Silt Loam x 125%
<hr/>			<hr/>
Total Catchment Area:	42067	sq.m	0.30

Airport Formula

$$T_c = \frac{3.26 (1.1 - C) (L)^{1/2}}{S_w^{0.33}} \text{ min}$$

Runoff Coefficient (C):	0.30	
Sheet Flow Distance (L):	180	m
Slope of Land (Sw):	0.3	%
Time of Concentration (Sheet Flow):	52	min

Area (A):	42067	sq.m
Time of Concentration:	52	min
Rainfall Intensity (i):	36.6	mm/hr (5-year event)
Runoff Coefficient (C):	0.30	

Pre-development 100-year Flow Rate (2.78AiC): 128.28 L/s
(5-Year Maximum Allowable Release Rate)

DRAINAGE AREA I (Uncontrolled Flow Off Site)

(FIVE-YEAR EVENT)

			C
Roof Area:	0	sq.m	0.90
Asphalt/Concrete Area:	0	sq.m	0.90
Gravel Area:	32	sq.m	0.70
Landscaped Area:	6028	sq.m	0.20
<hr/>			
Total Catchment Area:	6060	sq.m	0.20
Area (A):	6060	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	104.2	mm/hr (5-year event)	
Runoff Coefficient (C):	0.20		
Flow Rate (2.78A/C):	35.57	L/s	

DRAINAGE AREA II (Roof 1)

(FIVE-YEAR EVENT)

			C
Roof Area:	1087	sq.m	0.90
Asphalt/Concrete Area:	0	sq.m	0.90
Gravel Area:	0	sq.m	0.70
Landscaped Area:	0	sq.m	0.20

Total Catchment Area: 1087 sq.m 0.90

No. of Roof Drains: 2
 Slots per Wier: 3 0.0124 L/s/mm/slot (5 USGPM/in/slot)

Depth at Roof Drain: 83 mm

Maximum Roof Drain Release Rate:	6.14	L/s		Pond Area:	420	sq.m
Maximum Scupper Release Rate:	0.00	L/s				
	6.14	L/s		Achieved Volume:	15.63	cu.m

Max. Volume Required: 15.63 cu.m

Time min.	i mm/hr	2.78AiC L/s	Roof Drain	Scupper	Total	Stored Rate L/s	Stored Volume cu.m
			Release Rate L/s	Release Rate L/s	Release Rate L/s		
5	141.2	38.40	6.14	0.00	6.14	32.26	9.68
10	104.2	28.34	6.14	0.00	6.14	22.20	13.32
15	83.6	22.72	6.14	0.00	6.14	16.59	14.93
20	70.3	19.11	6.14	0.00	6.14	12.97	15.56
25	60.9	16.56	6.14	0.00	6.14	10.42	15.63
30	53.9	14.67	6.14	0.00	6.14	8.53	15.35
35	48.5	13.20	6.14	0.00	6.14	7.06	14.82
40	44.2	12.02	6.14	0.00	6.14	5.88	14.11
45	40.6	11.05	6.14	0.00	6.14	4.91	13.26
50	37.7	10.24	6.14	0.00	6.14	4.10	12.31
55	35.1	9.55	6.14	0.00	6.14	3.41	11.27
60	32.9	8.96	6.14	0.00	6.14	2.82	10.16
65	31.0	8.44	6.14	0.00	6.14	2.30	8.99
70	29.4	7.99	6.14	0.00	6.14	1.85	7.77
75	27.9	7.58	6.14	0.00	6.14	1.45	6.51
80	26.6	7.22	6.14	0.00	6.14	1.09	5.21
85	25.4	6.90	6.14	0.00	6.14	0.76	3.88
90	24.3	6.61	6.14	0.00	6.14	0.47	2.52
95	23.3	6.34	6.14	0.00	6.14	0.20	1.14
100	22.4	6.09	6.09	0.00	6.09	0.00	0.00
105	21.6	5.87	5.87	0.00	5.87	0.00	0.00
110	20.8	5.66	5.66	0.00	5.66	0.00	0.00
115	20.1	5.47	5.47	0.00	5.47	0.00	0.00
120	19.5	5.29	5.29	0.00	5.29	0.00	0.00
125	18.9	5.13	5.13	0.00	5.13	0.00	0.00
130	18.3	4.98	4.98	0.00	4.98	0.00	0.00
135	17.8	4.83	4.83	0.00	4.83	0.00	0.00
140	17.3	4.70	4.70	0.00	4.70	0.00	0.00
145	16.8	4.57	4.57	0.00	4.57	0.00	0.00
150	16.4	4.45	4.45	0.00	4.45	0.00	0.00
180	14.2	3.86	3.86	0.00	3.86	0.00	0.00
210	12.6	3.41	3.41	0.00	3.41	0.00	0.00
240	11.3	3.07	3.07	0.00	3.07	0.00	0.00
270	10.3	2.80	2.80	0.00	2.80	0.00	0.00
300	9.5	2.57	2.57	0.00	2.57	0.00	0.00
330	8.8	2.38	2.38	0.00	2.38	0.00	0.00
360	8.2	2.22	2.22	0.00	2.22	0.00	0.00
390	7.7	2.09	2.09	0.00	2.09	0.00	0.00
420	7.2	1.96	1.96	0.00	1.96	0.00	0.00
450	6.8	1.86	1.86	0.00	1.86	0.00	0.00
480	6.5	1.76	1.76	0.00	1.76	0.00	0.00
510	6.2	1.68	1.68	0.00	1.68	0.00	0.00
540	5.9	1.61	1.61	0.00	1.61	0.00	0.00
570	5.7	1.54	1.54	0.00	1.54	0.00	0.00
600	5.4	1.47	1.47	0.00	1.47	0.00	0.00
630	5.2	1.42	1.42	0.00	1.42	0.00	0.00
660	5.0	1.37	1.37	0.00	1.37	0.00	0.00
690	4.8	1.32	1.32	0.00	1.32	0.00	0.00
720	4.7	1.27	1.27	0.00	1.27	0.00	0.00

DRAINAGE AREA II (Roof 2)

(FIVE-YEAR EVENT)

			C
Roof Area:	805	sq.m	0.90
Asphalt/Concrete Area:	0	sq.m	0.90
Gravel Area:	0	sq.m	0.70
Landscaped Area:	0	sq.m	0.20
			0.20
Total Catchment Area:	805	sq.m	0.90

No. of Roof Drains: 2
 Slots per Wier: 2 0.0124 L/s/mm/slot (5 USGPM/in/slot)

Depth at Roof Drain: 84 mm

Maximum Roof Drain Release Rate:	4.16	L/s	Pond Area:	322	sq.m
Maximum Scupper Release Rate:	0.00	L/s	Achieved Volume:	12.15	cu.m
	4.16	L/s	Max. Volume Required:	12.15	cu.m

Time	i	2.78A _{iC}	Roof Drain Release Rate	Scupper Release Rate	Total Release Rate	Stored Rate	Stored Volume
min.	mm/hr	L/s	L/s	L/s	L/s	L/s	cu.m
5	141.2	28.43	4.16	0.00	4.16	24.27	7.28
10	104.2	20.99	4.16	0.00	4.16	16.82	10.09
15	83.6	16.83	4.16	0.00	4.16	12.67	11.40
20	70.3	14.15	4.16	0.00	4.16	9.99	11.98
25	60.9	12.27	4.16	0.00	4.16	8.10	12.15
30	53.9	10.86	4.16	0.00	4.16	6.70	12.06
35	48.5	9.77	4.16	0.00	4.16	5.61	11.78
40	44.2	8.90	4.16	0.00	4.16	4.74	11.36
45	40.6	8.18	4.16	0.00	4.16	4.02	10.85
50	37.7	7.58	4.16	0.00	4.16	3.42	10.26
55	35.1	7.07	4.16	0.00	4.16	2.91	9.60
60	32.9	6.64	4.16	0.00	4.16	2.47	8.90
65	31.0	6.25	4.16	0.00	4.16	2.09	8.14
70	29.4	5.92	4.16	0.00	4.16	1.75	7.36
75	27.9	5.62	4.16	0.00	4.16	1.45	6.54
80	26.6	5.35	4.16	0.00	4.16	1.19	5.69
85	25.4	5.11	4.16	0.00	4.16	0.95	4.82
90	24.3	4.89	4.16	0.00	4.16	0.73	3.93
95	23.3	4.69	4.16	0.00	4.16	0.53	3.02
100	22.4	4.51	4.16	0.00	4.16	0.35	2.09
105	21.6	4.35	4.16	0.00	4.16	0.18	1.15
110	20.8	4.19	4.16	0.00	4.16	0.03	0.20
115	20.1	4.05	4.05	0.00	4.05	0.00	0.00
120	19.5	3.92	3.92	0.00	3.92	0.00	0.00
125	18.9	3.80	3.80	0.00	3.80	0.00	0.00
130	18.3	3.68	3.68	0.00	3.68	0.00	0.00
135	17.8	3.58	3.58	0.00	3.58	0.00	0.00
140	17.3	3.48	3.48	0.00	3.48	0.00	0.00
145	16.8	3.38	3.38	0.00	3.38	0.00	0.00
150	16.4	3.30	3.30	0.00	3.30	0.00	0.00
180	14.2	2.86	2.86	0.00	2.86	0.00	0.00
210	12.6	2.53	2.53	0.00	2.53	0.00	0.00
240	11.3	2.27	2.27	0.00	2.27	0.00	0.00
270	10.3	2.07	2.07	0.00	2.07	0.00	0.00
300	9.5	1.90	1.90	0.00	1.90	0.00	0.00
330	8.8	1.77	1.77	0.00	1.77	0.00	0.00
360	8.2	1.65	1.65	0.00	1.65	0.00	0.00
390	7.7	1.54	1.54	0.00	1.54	0.00	0.00
420	7.2	1.45	1.45	0.00	1.45	0.00	0.00
450	6.8	1.38	1.38	0.00	1.38	0.00	0.00
480	6.5	1.31	1.31	0.00	1.31	0.00	0.00
510	6.2	1.24	1.24	0.00	1.24	0.00	0.00
540	5.9	1.19	1.19	0.00	1.19	0.00	0.00
570	5.7	1.14	1.14	0.00	1.14	0.00	0.00
600	5.4	1.09	1.09	0.00	1.09	0.00	0.00
630	5.2	1.05	1.05	0.00	1.05	0.00	0.00
660	5.0	1.01	1.01	0.00	1.01	0.00	0.00
690	4.8	0.98	0.98	0.00	0.98	0.00	0.00
720	4.7	0.94	0.94	0.00	0.94	0.00	0.00

DRAINAGE AREA III (Roof 3)

(FIVE-YEAR EVENT)

Roof Area:	872	sq.m				C 0.90
Asphalt/Concrete Area:	0	sq.m				0.90
Gravel Area:	0	sq.m				0.70
Landscaped Area:	0	sq.m				0.20

Total Catchment Area: 872 sq.m 0.90

No. of Roof Drains: 2
 Slots per Wier: 2 0.0124 L/s/mm/slot (5 USGPM/in/slot)

Depth at Roof Drain: 85 mm

Maximum Roof Drain Release Rate:	4.22	L/s			Pond Area:	357	sq.m
Maximum Scupper Release Rate:	0.00	L/s			Achieved Volume:	13.60	cu.m
	4.22	L/s			Max. Volume Required:	13.60	cu.m

Time min.	i mm/hr	2.78AiC L/s	Roof Drain	Scupper	Total	Stored Rate L/s	Stored Volume cu.m
			Release Rate L/s	Release Rate L/s	Release Rate L/s		
5	141.2	30.80	4.22	0.00	4.22	26.58	7.97
10	104.2	22.73	4.22	0.00	4.22	18.51	11.11
15	83.6	18.23	4.22	0.00	4.22	14.01	12.61
20	70.3	15.33	4.22	0.00	4.22	11.11	13.33
25	60.9	13.29	4.22	0.00	4.22	9.06	13.60
30	53.9	11.77	4.22	0.00	4.22	7.54	13.58
35	48.5	10.59	4.22	0.00	4.22	6.36	13.36
40	44.2	9.64	4.22	0.00	4.22	5.42	13.00
45	40.6	8.86	4.22	0.00	4.22	4.64	12.53
50	37.7	8.21	4.22	0.00	4.22	3.99	11.98
55	35.1	7.66	4.22	0.00	4.22	3.44	11.36
60	32.9	7.19	4.22	0.00	4.22	2.97	10.68
65	31.0	6.77	4.22	0.00	4.22	2.55	9.95
70	29.4	6.41	4.22	0.00	4.22	2.19	9.18
75	27.9	6.08	4.22	0.00	4.22	1.86	8.38
80	26.6	5.80	4.22	0.00	4.22	1.57	7.55
85	25.4	5.53	4.22	0.00	4.22	1.31	6.70
90	24.3	5.30	4.22	0.00	4.22	1.08	5.82
95	23.3	5.08	4.22	0.00	4.22	0.86	4.92
100	22.4	4.89	4.22	0.00	4.22	0.67	4.00
105	21.6	4.71	4.22	0.00	4.22	0.49	3.07
110	20.8	4.54	4.22	0.00	4.22	0.32	2.12
115	20.1	4.39	4.22	0.00	4.22	0.17	1.16
120	19.5	4.25	4.22	0.00	4.22	0.03	0.18
125	18.9	4.11	4.11	0.00	4.11	0.00	0.00
130	18.3	3.99	3.99	0.00	3.99	0.00	0.00
135	17.8	3.88	3.88	0.00	3.88	0.00	0.00
140	17.3	3.77	3.77	0.00	3.77	0.00	0.00
145	16.8	3.67	3.67	0.00	3.67	0.00	0.00
150	16.4	3.57	3.57	0.00	3.57	0.00	0.00
180	14.2	3.09	3.09	0.00	3.09	0.00	0.00
210	12.6	2.74	2.74	0.00	2.74	0.00	0.00
240	11.3	2.46	2.46	0.00	2.46	0.00	0.00
270	10.3	2.24	2.24	0.00	2.24	0.00	0.00
300	9.5	2.06	2.06	0.00	2.06	0.00	0.00
330	8.8	1.91	1.91	0.00	1.91	0.00	0.00
360	8.2	1.78	1.78	0.00	1.78	0.00	0.00
390	7.7	1.67	1.67	0.00	1.67	0.00	0.00
420	7.2	1.58	1.58	0.00	1.58	0.00	0.00
450	6.8	1.49	1.49	0.00	1.49	0.00	0.00
480	6.5	1.42	1.42	0.00	1.42	0.00	0.00
510	6.2	1.35	1.35	0.00	1.35	0.00	0.00
540	5.9	1.29	1.29	0.00	1.29	0.00	0.00
570	5.7	1.23	1.23	0.00	1.23	0.00	0.00
600	5.4	1.18	1.18	0.00	1.18	0.00	0.00
630	5.2	1.14	1.14	0.00	1.14	0.00	0.00
660	5.0	1.10	1.10	0.00	1.10	0.00	0.00
690	4.8	1.06	1.06	0.00	1.06	0.00	0.00
720	4.7	1.02	1.02	0.00	1.02	1.02	44.12

DRAINAGE AREA III (Roof 4)

(FIVE-YEAR EVENT)

					C
Roof Area:	805	sq.m			0.90
Asphalt/Concrete Area:	0	sq.m			0.90
Gravel Area:	0	sq.m			0.70
Landscaped Area:	0	sq.m			0.20

Total Catchment Area: 805 sq.m 0.90

No. of Roof Drains: 2
 Slots per Wier: 2 0.0124 L/s/mm/slot (5 USGPM/in/slot)

Depth at Roof Drain: 81 mm

Maximum Roof Drain Release Rate: 4.04 L/s
 Maximum Scupper Release Rate: 0.00 L/s
 4.04 L/s

Pond Area: 335 sq.m

Achieved Volume: 12.34 cu.m

Max. Volume Required: 12.34 cu.m

Time min.	i mm/hr	2.78AiC L/s	Roof Drain	Scupper	Total	Stored Rate L/s	Stored Volume cu.m
			Release Rate L/s	Release Rate L/s	Release Rate L/s		
5	141.2	28.43	4.04	0.00	4.04	24.39	7.32
10	104.2	20.99	4.04	0.00	4.04	16.94	10.17
15	83.6	16.83	4.04	0.00	4.04	12.79	11.51
20	70.3	14.15	4.04	0.00	4.04	10.11	12.13
25	60.9	12.27	4.04	0.00	4.04	8.22	12.34
30	53.9	10.86	4.04	0.00	4.04	6.82	12.28
35	48.5	9.77	4.04	0.00	4.04	5.73	12.04
40	44.2	8.90	4.04	0.00	4.04	4.86	11.66
45	40.6	8.18	4.04	0.00	4.04	4.14	11.18
50	37.7	7.58	4.04	0.00	4.04	3.54	10.63
55	35.1	7.07	4.04	0.00	4.04	3.03	10.01
60	32.9	6.64	4.04	0.00	4.04	2.59	9.34
65	31.0	6.25	4.04	0.00	4.04	2.21	8.63
70	29.4	5.92	4.04	0.00	4.04	1.87	7.87
75	27.9	5.62	4.04	0.00	4.04	1.58	7.09
80	26.6	5.35	4.04	0.00	4.04	1.31	6.28
85	25.4	5.11	4.04	0.00	4.04	1.07	5.45
90	24.3	4.89	4.04	0.00	4.04	0.85	4.60
95	23.3	4.69	4.04	0.00	4.04	0.65	3.72
100	22.4	4.51	4.04	0.00	4.04	0.47	2.83
105	21.6	4.35	4.04	0.00	4.04	0.31	1.93
110	20.8	4.19	4.04	0.00	4.04	0.15	1.01
115	20.1	4.05	4.04	0.00	4.04	0.01	0.08
120	19.5	3.92	3.92	0.00	3.92	0.00	0.00
125	18.9	3.80	3.80	0.00	3.80	0.00	0.00
130	18.3	3.68	3.68	0.00	3.68	0.00	0.00
135	17.8	3.58	3.58	0.00	3.58	0.00	0.00
140	17.3	3.48	3.48	0.00	3.48	0.00	0.00
145	16.8	3.38	3.38	0.00	3.38	0.00	0.00
150	16.4	3.30	3.30	0.00	3.30	0.00	0.00
180	14.2	2.86	2.86	0.00	2.86	0.00	0.00
210	12.6	2.53	2.53	0.00	2.53	0.00	0.00
240	11.3	2.27	2.27	0.00	2.27	0.00	0.00
270	10.3	2.07	2.07	0.00	2.07	0.00	0.00
300	9.5	1.90	1.90	0.00	1.90	0.00	0.00
330	8.8	1.77	1.77	0.00	1.77	0.00	0.00
360	8.2	1.65	1.65	0.00	1.65	0.00	0.00
390	7.7	1.54	1.54	0.00	1.54	0.00	0.00
420	7.2	1.45	1.45	0.00	1.45	0.00	0.00
450	6.8	1.38	1.38	0.00	1.38	0.00	0.00
480	6.5	1.31	1.31	0.00	1.31	0.00	0.00
510	6.2	1.24	1.24	0.00	1.24	0.00	0.00
540	5.9	1.19	1.19	0.00	1.19	0.00	0.00
570	5.7	1.14	1.14	0.00	1.14	0.00	0.00
600	5.4	1.09	1.09	0.00	1.09	0.00	0.00
630	5.2	1.05	1.05	0.00	1.05	0.00	0.00
660	5.0	1.01	1.01	0.00	1.01	0.00	0.00
690	4.8	0.98	0.98	0.00	0.98	0.00	0.00
720	4.7	0.94	0.94	0.00	0.94	0.00	0.00

DRAINAGE AREA III (Roof 5)

(FIVE-YEAR EVENT)

			C
Roof Area:	805	sq.m	0.90
Asphalt/Concrete Area:	0	sq.m	0.90
Gravel Area:	0	sq.m	0.70
Landscaped Area:	0	sq.m	0.20
			0.20
Total Catchment Area:	805	sq.m	0.90

No. of Roof Drains:	2			
Slots per Wier:	2	0.0124 L/s/mm/slot (5 USGPM/in/slot)		
Depth at Roof Drain:	81	mm		
Maximum Roof Drain Release Rate:	4.04	L/s	Pond Area:	335 sq.m
Maximum Scupper Release Rate:	0.00	L/s		
	4.04	L/s	Achieved Volume:	12.34 cu.m
			Max. Volume Required:	12.34 cu.m

Time	i	2.78AIC	Roof Drain Release Rate	Scupper Release Rate	Total Release Rate	Stored Rate	Stored Volume
min.	mm/hr	L/s	L/s	L/s	L/s	L/s	cu.m
5	141.2	28.43	4.04	0.00	4.04	24.39	7.32
10	104.2	20.99	4.04	0.00	4.04	16.94	10.17
15	83.6	16.83	4.04	0.00	4.04	12.79	11.51
20	70.3	14.15	4.04	0.00	4.04	10.11	12.13
25	60.9	12.27	4.04	0.00	4.04	8.22	12.34
30	53.9	10.86	4.04	0.00	4.04	6.82	12.28
35	48.5	9.77	4.04	0.00	4.04	5.73	12.04
40	44.2	8.90	4.04	0.00	4.04	4.86	11.66
45	40.6	8.18	4.04	0.00	4.04	4.14	11.18
50	37.7	7.58	4.04	0.00	4.04	3.54	10.63
55	35.1	7.07	4.04	0.00	4.04	3.03	10.01
60	32.9	6.64	4.04	0.00	4.04	2.59	9.34
65	31.0	6.25	4.04	0.00	4.04	2.21	8.63
70	29.4	5.92	4.04	0.00	4.04	1.87	7.87
75	27.9	5.62	4.04	0.00	4.04	1.58	7.09
80	26.6	5.35	4.04	0.00	4.04	1.31	6.28
85	25.4	5.11	4.04	0.00	4.04	1.07	5.45
90	24.3	4.89	4.04	0.00	4.04	0.85	4.60
95	23.3	4.69	4.04	0.00	4.04	0.65	3.72
100	22.4	4.51	4.04	0.00	4.04	0.47	2.83
105	21.6	4.35	4.04	0.00	4.04	0.31	1.93
110	20.8	4.19	4.04	0.00	4.04	0.15	1.01
115	20.1	4.05	4.04	0.00	4.04	0.01	0.08
120	19.5	3.92	3.92	0.00	3.92	0.00	0.00
125	18.9	3.80	3.80	0.00	3.80	0.00	0.00
130	18.3	3.68	3.68	0.00	3.68	0.00	0.00
135	17.8	3.58	3.58	0.00	3.58	0.00	0.00
140	17.3	3.48	3.48	0.00	3.48	0.00	0.00
145	16.8	3.38	3.38	0.00	3.38	0.00	0.00
150	16.4	3.30	3.30	0.00	3.30	0.00	0.00
180	14.2	2.86	2.86	0.00	2.86	0.00	0.00
210	12.6	2.53	2.53	0.00	2.53	0.00	0.00
240	11.3	2.27	2.27	0.00	2.27	0.00	0.00
270	10.3	2.07	2.07	0.00	2.07	0.00	0.00
300	9.5	1.90	1.90	0.00	1.90	0.00	0.00
330	8.8	1.77	1.77	0.00	1.77	0.00	0.00
360	8.2	1.65	1.65	0.00	1.65	0.00	0.00
390	7.7	1.54	1.54	0.00	1.54	0.00	0.00
420	7.2	1.45	1.45	0.00	1.45	0.00	0.00
450	6.8	1.38	1.38	0.00	1.38	0.00	0.00
480	6.5	1.31	1.31	0.00	1.31	0.00	0.00
510	6.2	1.24	1.24	0.00	1.24	0.00	0.00
540	5.9	1.19	1.19	0.00	1.19	0.00	0.00
570	5.7	1.14	1.14	0.00	1.14	0.00	0.00
600	5.4	1.09	1.09	0.00	1.09	0.00	0.00
630	5.2	1.05	1.05	0.00	1.05	0.00	0.00
660	5.0	1.01	1.01	0.00	1.01	0.00	0.00
690	4.8	0.98	0.98	0.00	0.98	0.00	0.00
720	4.7	0.94	0.94	0.00	0.94	0.00	0.00

DRAINAGE AREA III (Roof 6)

(FIVE-YEAR EVENT)

			C
Roof Area:	618	sq.m	0.90
Asphalt/Concrete Area:	0	sq.m	0.90
Gravel Area:	0	sq.m	0.70
Landscaped Area:	0	sq.m	0.20
			0.20
Total Catchment Area:	618	sq.m	0.90

No. of Roof Drains:	2		
Slots per Wier:	2	0.0124 L/s/mm/slot (5 USGPM/in/slot)	
Depth at Roof Drain:	80	mm	
Maximum Roof Drain Release Rate:	3.98	L/s	Pond Area: 227 sq.m
Maximum Scupper Release Rate:	0.00	L/s	
	3.98	L/s	Achieved Volume: 8.26 cu.m
			Max. Volume Required: 8.26 cu.m

Time	i	2.78AIC	Roof Drain Release	Scupper Release	Total Release	Stored Rate	Stored Volume
min.	mm/hr	L/s	L/s	L/s	L/s	L/s	cu.m
5	141.2	21.83	3.98	0.00	3.98	17.85	5.36
10	104.2	16.11	3.98	0.00	3.98	12.14	7.28
15	83.6	12.92	3.98	0.00	3.98	8.94	8.05
20	70.3	10.86	3.98	0.00	3.98	6.89	8.26
25	60.9	9.42	3.98	0.00	3.98	5.44	8.16
30	53.9	8.34	3.98	0.00	3.98	4.36	7.85
35	48.5	7.50	3.98	0.00	3.98	3.53	7.41
40	44.2	6.83	3.98	0.00	3.98	2.86	6.86
45	40.6	6.28	3.98	0.00	3.98	2.31	6.23
50	37.7	5.82	3.98	0.00	3.98	1.85	5.54
55	35.1	5.43	3.98	0.00	3.98	1.46	4.80
60	32.9	5.09	3.98	0.00	3.98	1.12	4.03
65	31.0	4.80	3.98	0.00	3.98	0.82	3.22
70	29.4	4.54	3.98	0.00	3.98	0.57	2.38
75	27.9	4.31	3.98	0.00	3.98	0.34	1.52
80	26.6	4.11	3.98	0.00	3.98	0.13	0.63
85	25.4	3.92	3.92	0.00	3.92	0.00	0.00
90	24.3	3.76	3.76	0.00	3.76	0.00	0.00
95	23.3	3.60	3.60	0.00	3.60	0.00	0.00
100	22.4	3.46	3.46	0.00	3.46	0.00	0.00
105	21.6	3.34	3.34	0.00	3.34	0.00	0.00
110	20.8	3.22	3.22	0.00	3.22	0.00	0.00
115	20.1	3.11	3.11	0.00	3.11	0.00	0.00
120	19.5	3.01	3.01	0.00	3.01	0.00	0.00
125	18.9	2.92	2.92	0.00	2.92	0.00	0.00
130	18.3	2.83	2.83	0.00	2.83	0.00	0.00
135	17.8	2.75	2.75	0.00	2.75	0.00	0.00
140	17.3	2.67	2.67	0.00	2.67	0.00	0.00
145	16.8	2.60	2.60	0.00	2.60	0.00	0.00
150	16.4	2.53	2.53	0.00	2.53	0.00	0.00
180	14.2	2.19	2.19	0.00	2.19	0.00	0.00
210	12.6	1.94	1.94	0.00	1.94	0.00	0.00
240	11.3	1.75	1.75	0.00	1.75	0.00	0.00
270	10.3	1.59	1.59	0.00	1.59	0.00	0.00
300	9.5	1.46	1.46	0.00	1.46	0.00	0.00
330	8.8	1.36	1.36	0.00	1.36	0.00	0.00
360	8.2	1.26	1.26	0.00	1.26	0.00	0.00
390	7.7	1.19	1.19	0.00	1.19	0.00	0.00
420	7.2	1.12	1.12	0.00	1.12	0.00	0.00
450	6.8	1.06	1.06	0.00	1.06	0.00	0.00
480	6.5	1.00	1.00	0.00	1.00	0.00	0.00
510	6.2	0.96	0.96	0.00	0.96	0.00	0.00
540	5.9	0.91	0.91	0.00	0.91	0.00	0.00
570	5.7	0.87	0.87	0.00	0.87	0.00	0.00
600	5.4	0.84	0.84	0.00	0.84	0.00	0.00
630	5.2	0.81	0.81	0.00	0.81	0.00	0.00
660	5.0	0.78	0.78	0.00	0.78	0.00	0.00
690	4.8	0.75	0.75	0.00	0.75	0.00	0.00
720	4.7	0.72	0.72	0.00	0.72	0.00	0.00

DRAINAGE AREA IV

(FIVE-YEAR EVENT)

		C
Roof Area:	0 sq.m	0.90
Asphalt/Concrete Area:	4399 sq.m	0.90
Gravel Area:	3942 sq.m	0.70
Landscaped Area:	1138 sq.m	0.20
Total Catchment Area:	9479 sq.m	0.73

Water Elevation:	77.10	m					
							Granular Surface Storage
							Area Max. Depth
Invert of Culvert Inlet:	76.64	m					sq.m m
							412 0.16 21.49 cu.m
Centroid of ICD Orifice:	76.71	m (ICD in Culvert Inlet)					
							Stormwater Detention Area A1
							Area Avg. Depth
Head:	0.38	m					sq.m m
Orifice Diameter:	146	mm					341 0.35 101.54 cu.m
Orifice Area:	16719	sq.mm					
							Stormwater Detention Area A2
							Area Avg. Depth
Coefficient of Discharge:	0.61						sq.m m
							148 0.21 27.19 cu.m
Maximum ICD Release Rate:	27.97	L/s					
Maximum Weir Release Rate:	0.00	L/s					
Maximum Release Rate:	27.97	L/s					Achieved Volume: 150.216 cu.m
							Max. Volume Required: 150.216 cu.m

Time min.	i mm/hr	2.78AiC L/s	50% of Release Rate		Total Inflow L/s	ICD Release Rate L/s	Weir Release Rate L/s	Total Release L/s	Stored Rate L/s	Stored Volume cu.m
			from Roof 1 L/s	from Roof 2 L/s						
5	141.2	272.62	3.07	2.08	277.77	27.97	0.00	27.97	249.80	74.94
10	104.2	201.20	3.07	2.08	206.35	27.97	0.00	27.97	178.38	107.03
15	83.6	161.35	3.07	2.08	166.50	27.97	0.00	27.97	138.53	124.68
20	70.3	135.66	3.07	2.08	140.81	27.97	0.00	27.97	112.84	135.40
25	60.9	117.59	3.07	2.08	122.74	27.97	0.00	27.97	94.77	142.16
30	53.9	104.14	3.07	2.08	109.29	27.97	0.00	27.97	81.32	146.37
35	48.5	93.69	3.07	2.08	98.84	27.97	0.00	27.97	70.87	148.83
40	44.2	85.32	3.07	2.08	90.47	27.97	0.00	27.97	62.50	150.00
45	40.6	78.45	3.07	2.08	83.61	27.97	0.00	27.97	55.64	150.22
50	37.7	72.71	3.07	2.08	77.86	27.97	0.00	27.97	49.89	149.67
55	35.1	67.82	3.07	2.08	72.98	27.97	0.00	27.97	45.00	148.52
60	32.9	63.61	3.07	2.08	68.77	27.97	0.00	27.97	40.80	146.86
65	31.0	59.95	3.07	2.08	65.10	27.97	0.00	27.97	37.13	144.80
70	29.4	56.72	3.07	2.08	61.87	27.97	0.00	27.97	33.90	142.37
75	27.9	53.85	3.07	2.08	59.00	27.97	0.00	27.97	31.03	139.65
80	26.6	51.29	3.07	2.08	56.44	27.97	0.00	27.97	28.47	136.67
85	25.4	48.99	3.07	2.08	54.14	27.97	0.00	27.97	26.17	133.46
90	24.3	46.90	3.07	2.08	52.05	27.97	0.00	27.97	24.08	130.04
95	23.3	45.00	3.07	2.08	50.15	27.97	0.00	27.97	22.18	126.45
100	22.4	43.27	3.05	2.08	48.40	27.97	0.00	27.97	20.43	122.56
105	21.6	41.68	2.93	2.08	46.69	27.97	0.00	27.97	18.72	117.95
110	20.8	40.21	2.83	2.08	45.12	27.97	0.00	27.97	17.15	113.20
115	20.1	38.85	2.74	2.03	43.61	27.97	0.00	27.97	15.64	107.94
120	19.5	37.59	2.65	1.96	42.20	27.97	0.00	27.97	14.23	102.45
125	18.9	36.42	2.56	1.90	40.88	27.97	0.00	27.97	12.91	96.86
130	18.3	35.33	2.49	1.84	39.66	27.97	0.00	27.97	11.69	91.16
135	17.8	34.30	2.42	1.79	38.51	27.97	0.00	27.97	10.54	85.37
140	17.3	33.35	2.35	1.74	37.43	27.97	0.00	27.97	9.46	79.48
145	16.8	32.44	2.28	1.69	36.42	27.97	0.00	27.97	8.45	73.52
150	16.4	31.60	2.22	1.65	35.47	27.97	0.00	27.97	7.50	67.48
180	14.2	27.38	1.93	1.43	30.74	27.97	0.00	27.97	2.77	29.89
210	12.6	24.24	1.71	1.26	27.22	27.22	0.00	27.22	0.00	0.00
240	11.3	21.81	1.54	1.14	24.48	24.48	0.00	24.48	0.00	0.00
270	10.3	19.86	1.40	1.04	22.29	22.29	0.00	22.29	0.00	0.00
300	9.5	18.26	1.29	0.95	20.50	20.50	0.00	20.50	0.00	0.00
330	8.8	16.92	1.19	0.88	19.00	19.00	0.00	19.00	0.00	0.00
360	8.2	15.78	1.11	0.82	17.72	17.72	0.00	17.72	0.00	0.00
390	7.7	14.80	1.04	0.77	16.62	16.62	0.00	16.62	0.00	0.00
420	7.2	13.95	0.98	0.73	15.66	15.66	0.00	15.66	0.00	0.00
450	6.8	13.20	0.93	0.69	14.82	14.82	0.00	14.82	0.00	0.00
480	6.5	12.53	0.88	0.65	14.07	14.07	0.00	14.07	0.00	0.00
510	6.2	11.93	0.84	0.62	13.40	13.40	0.00	13.40	0.00	0.00
540	5.9	11.40	0.80	0.59	12.80	12.80	0.00	12.80	0.00	0.00
570	5.7	10.91	0.77	0.57	12.25	12.25	0.00	12.25	0.00	0.00
600	5.4	10.47	0.74	0.55	11.75	11.75	0.00	11.75	0.00	0.00
630	5.2	10.07	0.71	0.53	11.30	11.30	0.00	11.30	0.00	0.00
660	5.0	9.70	0.68	0.51	10.88	10.88	0.00	10.88	0.00	0.00
690	4.8	9.35	0.66	0.49	10.50	10.50	0.00	10.50	0.00	0.00
720	4.7	9.04	0.64	0.47	10.15	10.15	0.00	10.15	0.00	0.00

DRAINAGE AREA V

(FIVE-YEAR EVENT)

Roof Area:	0	sq.m				C	0.90
Asphalt/Concrete Area:	457	sq.m					0.90
Gravel Area:	9128	sq.m					0.70
Landscaped Area:	671	sq.m					0.20
Total Catchment Area:	10256	sq.m					0.68

Water Elevation:	77.11	m					
						Granular Surface Storage	
						Area	Max. Depth
Invert of Culvert Inlet:	76.68	m				sq.m	m
						528	0.22
Centroid of ICD Orifice:	76.79	m (ICD in Culvert Inlet)					39.59
							cu.m
Head:	0.33	m				Stormwater Detention Area B1	
						Area	Avg. Depth
Orifice Diameter:	216	mm				sq.m	m
						220	0.34
							59.57
							cu.m
Orifice Area:	36679	sq.mm				Stormwater Detention Area B2	
						Area	Avg. Depth
Coefficient of Discharge:	0.61					sq.m	m
						97	0.20
							16.38
							cu.m
Maximum ICD Release Rate:	56.66	L/s					
Maximum Weir Release Rate:	0.00	L/s					
Maximum Release Rate:	56.66	L/s					
						Achieved Volume:	115.54
							cu.m
						Max. Volume Required:	115.54
							cu.m

Time	i	2.78AiC	Release Rate				Total Inflow	ICD Release Rate	Weir Release Rate	Total Release Rate	Stored Rate	Stored Volume
			from Roof 3	from Roof 4	from Roof 5	from Roof 6						
min.	mm/hr	L/s	L/s	L/s	L/s	L/s	L/s	L/s	L/s	L/s	cu.m	
5	141.2	272.19	4.22	4.04	4.04	3.98	288.47	56.66	0.00	56.66	231.81	69.54
10	104.2	200.88	4.22	4.04	4.04	3.98	217.16	56.66	0.00	56.66	160.50	96.30
15	83.6	161.09	4.22	4.04	4.04	3.98	177.37	56.66	0.00	56.66	120.71	108.64
20	70.3	135.44	4.22	4.04	4.04	3.98	151.72	56.66	0.00	56.66	95.06	114.07
25	60.9	117.41	4.22	4.04	4.04	3.98	133.68	56.66	0.00	56.66	77.03	115.54
30	53.9	103.97	4.22	4.04	4.04	3.98	120.25	56.66	0.00	56.66	63.59	114.46
35	48.5	93.54	4.22	4.04	4.04	3.98	109.82	56.66	0.00	56.66	53.16	111.64
40	44.2	85.19	4.22	4.04	4.04	3.98	101.46	56.66	0.00	56.66	44.81	107.53
45	40.6	78.33	4.22	4.04	4.04	3.98	94.61	56.66	0.00	56.66	37.95	102.47
50	37.7	72.59	4.22	4.04	4.04	3.98	88.87	56.66	0.00	56.66	32.21	96.64
55	35.1	67.72	4.22	4.04	4.04	3.98	84.00	56.66	0.00	56.66	27.34	90.21
60	32.9	63.51	4.22	4.04	4.04	3.98	79.79	56.66	0.00	56.66	23.13	83.28
65	31.0	59.85	4.22	4.04	4.04	3.98	76.13	56.66	0.00	56.66	19.47	75.94
70	29.4	56.63	4.22	4.04	4.04	3.98	72.91	56.66	0.00	56.66	16.25	68.24
75	27.9	53.77	4.22	4.04	4.04	3.98	70.05	56.66	0.00	56.66	13.39	60.24
80	26.6	51.21	4.22	4.04	4.04	3.98	67.49	56.66	0.00	56.66	10.83	51.99
85	25.4	48.91	4.22	4.04	4.04	3.92	65.14	56.66	0.00	56.66	8.48	43.23
90	24.3	46.83	4.22	4.04	4.04	3.76	62.89	56.66	0.00	56.66	6.23	33.63
95	23.3	44.93	4.22	4.04	4.04	3.60	60.84	56.66	0.00	56.66	4.18	23.83
100	22.4	43.20	4.22	4.04	4.04	3.46	58.97	56.66	0.00	56.66	2.31	13.86
105	21.6	41.61	4.22	4.04	4.04	3.34	57.25	56.66	0.00	56.66	0.59	3.73
110	20.8	40.14	4.22	4.04	4.04	3.22	55.67	55.67	0.00	55.67	0.00	0.00
115	20.1	38.79	4.22	4.04	4.04	3.11	54.20	54.20	0.00	54.20	0.00	0.00
120	19.5	37.53	4.22	3.92	3.92	3.01	52.61	52.61	0.00	52.61	0.00	0.00
125	18.9	36.36	4.11	3.80	3.80	2.92	50.99	50.99	0.00	50.99	0.00	0.00
130	18.3	35.27	3.99	3.68	3.68	2.83	49.46	49.46	0.00	49.46	0.00	0.00
135	17.8	34.25	3.88	3.58	3.58	2.75	48.03	48.03	0.00	48.03	0.00	0.00
140	17.3	33.29	3.77	3.48	3.48	2.67	46.69	46.69	0.00	46.69	0.00	0.00
145	16.8	32.39	3.67	3.38	3.38	2.60	45.42	45.42	0.00	45.42	0.00	0.00
150	16.4	31.55	3.57	3.30	3.30	2.53	44.24	44.24	0.00	44.24	0.00	0.00
180	14.2	27.34	3.09	2.86	2.86	2.19	38.34	38.34	0.00	38.34	0.00	0.00
210	12.6	24.21	2.74	2.53	2.53	1.94	33.94	33.94	0.00	33.94	0.00	0.00
240	11.3	21.78	2.46	2.27	2.27	1.75	30.54	30.54	0.00	30.54	0.00	0.00
270	10.3	19.83	2.24	2.07	2.07	1.59	27.81	27.81	0.00	27.81	0.00	0.00
300	9.5	18.23	2.06	1.90	1.90	1.46	25.57	25.57	0.00	25.57	0.00	0.00
330	8.8	16.90	1.91	1.77	1.77	1.36	23.69	23.69	0.00	23.69	0.00	0.00
360	8.2	15.76	1.78	1.65	1.65	1.26	22.10	22.10	0.00	22.10	0.00	0.00
390	7.7	14.78	1.67	1.54	1.54	1.19	20.73	20.73	0.00	20.73	0.00	0.00
420	7.2	13.93	1.58	1.45	1.45	1.12	19.53	19.53	0.00	19.53	0.00	0.00
450	6.8	13.18	1.49	1.38	1.38	1.06	18.48	18.48	0.00	18.48	0.00	0.00
480	6.5	12.51	1.42	1.31	1.31	1.00	17.54	17.54	0.00	17.54	0.00	0.00
510	6.2	11.92	1.35	1.24	1.24	0.96	16.71	16.71	0.00	16.71	0.00	0.00
540	5.9	11.38	1.29	1.19	1.19	0.91	15.96	15.96	0.00	15.96	0.00	0.00
570	5.7	10.90	1.23	1.14	1.14	0.87	15.28	15.28	0.00	15.28	0.00	0.00
600	5.4	10.45	1.18	1.09	1.09	0.84	14.66	14.66	0.00	14.66	0.00	0.00
630	5.2	10.05	1.14	1.05	1.05	0.81	14.09	14.09	0.00	14.09	0.00	0.00
660	5.0	9.68	1.10	1.01	1.01	0.78	13.58	13.58	0.00	13.58	0.00	0.00
690	4.8	9.34	1.06	0.98	0.98	0.75	13.10	13.10	0.00	13.10	0.00	0.00
720	4.7	9.02	0.00	0.94	0.94	0.72	11.63	11.63	0.00	11.63	0.00	0.00

DRAINAGE AREA VI

(FIVE-YEAR EVENT)

		C
Roof Area:	0 sq.m	0.90
Asphalt/Concrete Area:	2787 sq.m	0.90
Gravel Area:	5572 sq.m	0.70
Landscaped Area:	2921 sq.m	0.20
Total Catchment Area:	11280 sq.m	0.62

Water Elevation:	77.14 m			
Invert of Culvert Inlet:	76.64 m			
Centroid of ICD Orifice:	76.68 m (ICD in Culvert Inlet)			
Head:	0.46 m			
Orifice Diameter:	75 mm			
Orifice Area:	4418 sq.mm			
Coefficient of Discharge:	0.61			
Maximum Release Rate:	8.09 L/s			
Maximum Weir Release Rate:	0.00 L/s			
Maximum Release Rate:	8.09 L/s			

Granular Surface Storage				
Area	Max. Depth			
sq.m	m			
646	0.26	55.18	cu.m	

Stormwater Detention Area C				
Area	Avg. Depth			
sq.m	m			
562	0.37	193.25	cu.m	

Achieved Volume:	248.42	cu.m
Max. Volume Required:	248.42	cu.m

Time min.	i mm/hr	2.78AiC L/s	50% of Release Rate		Total Inflow L/s	ICD Release Rate L/s	Weir Release Rate L/s	Total Release Rate L/s	Stored Rate L/s	Stored Volume cu.m
			from Roof 1 L/s	from Roof 2 L/s						
			5	141.2						
10	104.2	202.55	3.07	2.08	207.71	8.09	0.00	8.09	199.62	119.77
15	83.6	162.44	3.07	2.08	167.59	8.09	0.00	8.09	159.50	143.55
20	70.3	136.57	3.07	2.08	141.72	8.09	0.00	8.09	133.64	160.36
25	60.9	118.38	3.07	2.08	123.53	8.09	0.00	8.09	115.45	173.17
30	53.9	104.84	3.07	2.08	109.99	8.09	0.00	8.09	101.90	183.43
35	48.5	94.32	3.07	2.08	99.47	8.09	0.00	8.09	91.39	191.91
40	44.2	85.90	3.07	2.08	91.05	8.09	0.00	8.09	82.96	199.11
45	40.6	78.98	3.07	2.08	84.13	8.09	0.00	8.09	76.05	205.33
50	37.7	73.20	3.07	2.08	78.35	8.09	0.00	8.09	70.27	210.80
55	35.1	68.28	3.07	2.08	73.43	8.09	0.00	8.09	65.35	215.64
60	32.9	64.04	3.07	2.08	69.19	8.09	0.00	8.09	61.11	219.99
65	31.0	60.35	3.07	2.08	65.50	8.09	0.00	8.09	57.42	223.92
70	29.4	57.10	3.07	2.08	62.25	8.09	0.00	8.09	54.17	227.50
75	27.9	54.22	3.07	2.08	59.37	8.09	0.00	8.09	51.28	230.77
80	26.6	51.64	3.07	2.08	56.79	8.09	0.00	8.09	48.70	233.78
85	25.4	49.32	3.07	2.08	54.47	8.09	0.00	8.09	46.38	236.56
90	24.3	47.22	3.07	2.08	52.37	8.09	0.00	8.09	44.28	239.13
95	23.3	45.31	3.07	2.08	50.46	8.09	0.00	8.09	42.37	241.52
100	22.4	43.56	3.05	2.08	48.69	8.09	0.00	8.09	40.60	243.62
105	21.6	41.96	2.93	2.08	46.97	8.09	0.00	8.09	38.89	245.00
110	20.8	40.48	2.83	2.08	45.39	8.09	0.00	8.09	37.31	246.23
115	20.1	39.11	2.74	2.03	43.88	8.09	0.00	8.09	35.79	246.95
120	19.5	37.85	2.65	1.96	42.45	8.09	0.00	8.09	34.37	247.45
125	18.9	36.67	2.56	1.90	41.13	8.09	0.00	8.09	33.04	247.84
130	18.3	35.57	2.49	1.84	39.90	8.09	0.00	8.09	31.81	248.12
135	17.8	34.54	2.42	1.79	38.74	8.09	0.00	8.09	30.66	248.31
140	17.3	33.57	2.35	1.74	37.66	8.09	0.00	8.09	29.57	248.41
145	16.8	32.66	2.28	1.69	36.64	8.09	0.00	8.09	28.55	248.42
150	16.4	31.81	2.22	1.65	35.68	8.09	0.00	8.09	27.60	248.36
180	14.2	27.57	1.93	1.43	30.92	8.09	0.00	8.09	22.84	246.64
210	12.6	24.41	1.71	1.26	27.38	8.09	0.00	8.09	19.29	243.11
240	11.3	21.96	1.54	1.14	24.63	8.09	0.00	8.09	16.54	238.24
270	10.3	19.99	1.40	1.04	22.43	8.09	0.00	8.09	14.34	232.36
300	9.5	18.38	1.29	0.95	20.62	8.09	0.00	8.09	12.54	225.66
330	8.8	17.04	1.19	0.88	19.11	8.09	0.00	8.09	11.03	218.30
360	8.2	15.89	1.11	0.82	17.83	8.09	0.00	8.09	9.74	210.39
390	7.7	14.90	1.04	0.77	16.72	8.09	0.00	8.09	8.63	202.01
420	7.2	14.04	0.98	0.73	15.75	8.09	0.00	8.09	7.67	193.24
450	6.8	13.29	0.93	0.69	14.90	8.09	0.00	8.09	6.82	184.13
480	6.5	12.62	0.88	0.65	14.15	8.09	0.00	8.09	6.07	174.71
510	6.2	12.02	0.84	0.62	13.48	8.09	0.00	8.09	5.39	165.02
540	5.9	11.48	0.80	0.59	12.87	8.09	0.00	8.09	4.79	155.10
570	5.7	10.99	0.77	0.57	12.32	8.09	0.00	8.09	4.24	144.96
600	5.4	10.54	0.74	0.55	11.82	8.09	0.00	8.09	3.74	134.63
630	5.2	10.13	0.71	0.53	11.37	8.09	0.00	8.09	3.28	124.12
660	5.0	9.76	0.68	0.51	10.95	8.09	0.00	8.09	2.87	113.46
690	4.8	9.42	0.66	0.49	10.56	8.09	0.00	8.09	2.48	102.65
720	4.7	9.10	0.64	0.47	10.21	8.09	0.00	8.09	2.12	91.70

Mitch Owens Road / Boundary Road Ottawa, Ontario

BROAD CRESTED WEIR CALCULATIONS

1:100 YEAR EVENT

DRAINAGE AREA IV

(SWM Detention Area A1 Overflow Weir)

Length of Weir based on an assumed coefficient of discharge (Cd):

if Q =	33.57	L/s (maximum permitted flow)	
=	0.03357	cu.m/s	assumes Cd= 0.577
& H =	0.02	m (max. depth of water above top of weir)	(assumes P/H is large)
then L =	6.96	m (length of weir)	$L = Q / ((1.705) \times H^{(3/2)})$

Length of Weir based on a calculated coefficient of discharge (Cd):

if P =	0.49	m (depth of pond)	
& Lp =	10.0	m (width of pond perpendicular to direction of flow)	
then Vp =	0.01	m/s (velocity in pond)	$Vp = Q / ((P+H) / Lp)$
& E =	0.02	m (energy)	$E = H + V^2/2g$
& Cd =	0.577		$= 0.577 \times (E/H)^{(3/2)}$
if Q =	33.57	L/s (maximum permitted flow)	
=	0.03357	cu.m/s	
& H =	0.02	m (depth of water above top of weir)	
then L =	6.96	m (length of weir)	$L = Q / (Cd^{(2/3)} \times (2 \times 9.81)^{(1/2)} \times H^{(3/2)})$

DRAINAGE AREA V (SWM Detention Area B1 Overflow Weir)

Length of Weir based on an assumed coefficient of discharge (Cd):

if Q =	50.68	L/s (maximum permitted flow)	assumes Cd= 0.577
=	0.05068	cu.m/s	(assumes P/H is large)
& H =	0.05	m (max. depth of water above top of weir)	
then L =	2.66	m (length of weir) $L = Q / ((1.705) \times H^{(3/2)})$	

Length of Weir based on a calculated coefficient of discharge (Cd):

if P =	0.43	m (depth of pond)	
& Lp =	3.2	m (width of pond perpendicular to direction of flow)	
then Vp =	0.03	m/s (velocity in pond) $Vp = Q / ((P+H) / Lp)$	
& E =	0.05	m (energy) $E = H + V^2/2g$	
& Cd =	0.578	= $0.577 \times (E/H)^{(3/2)}$	
if Q =	50.68	L/s (maximum permitted flow)	
=	0.05068	cu.m/s	
& H =	0.05	m (depth of water above top of weir)	
then L =	2.65	m (length of weir) $L = Q / (Cd^{(2/3)} \times (2 \times 9.81)^{(1/2)} \times H^{(3/2)})$	

DRAINAGE AREA VI (SWM Detention Area C Overflow Weir)

Length of Weir based on an assumed coefficient of discharge (Cd):

if Q =	26.53	L/s (maximum permitted flow)	assumes Cd= 0.577
=	0.02653	cu.m/s	(assumes P/H is large)
& H =	0.02	m (max. depth of water above top of weir)	
then L =	5.50	m (length of weir) $L = Q / ((1.705) \times H^{(3/2)})$	

Length of Weir based on a calculated coefficient of discharge (Cd):

if P =	0.50	m (depth of pond)	
& Lp =	19.0	m (width of pond perpendicular to direction of flow)	
then Vp =	0.00	m/s (velocity in pond) $Vp = Q / ((P+H) / Lp)$	
& E =	0.02	m (energy) $E = H + V^2/2g$	
& Cd =	0.577	= $0.577 \times (E/H)^{(3/2)}$	
if Q =	26.53	L/s (maximum permitted flow)	
=	0.02653	cu.m/s	
& H =	0.02	m (depth of water above top of weir)	
then L =	5.50	m (length of weir) $L = Q / (Cd^{(2/3)} \times (2 \times 9.81)^{(1/2)} \times H^{(3/2)})$	

City of Ottawa Servicing Study Checklist

General Content

Executive Summary (for large reports only): not applicable

Date and revision number of the report: see page 1 of Servicing Brief and Stormwater Management Report

Location map and plan showing municipal address, boundary, and layout of proposed development: see drawings C-1 to C-6

Plan showing the site and location of all existing services: see drawings C-1 to C63

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: not applicable

Summary of Pre-consultation Meetings with City and other approval agencies: not available

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 defensible design criteria: not applicable

Statement of objectives and servicing criteria: see page 1 of Servicing Brief and Stormwater Management Report

Identification of existing and proposed infrastructure available in the immediate area: see drawings C-1 to C-6

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). see drawings C-1 to C-6

Concept level master grading plan to confirm existing and proposed grades in the development and drainage, soil removal and fill constraints, and potential impacts to neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths: not applicable

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: not applicable

Proposed phasing of the development, if applicable: not applicable

Reference to geotechnical studies and recommendations concerning servicing: see note 1.5 on drawing C-1

All preliminary and formal site plan submissions should have the following information:

- **Metric scale:** included
- **North arrow:** included
 - **(including construction North):** not included
- **Key Plan:** included

- **Name and contact information of applicant and property owner:** not available
- **Property limits:** included
 - **including bearings and dimensions:** not included
- **Existing and proposed structures and parking areas:** included
- **Easements, road widening and rights-of-way:** included
- **Adjacent street names:** included

Development Servicing Report: Water

Confirm consistency with Master Servicing Study, if available: not applicable

Availability of public infrastructure to service proposed development: see page 2 of Servicing Brief and Stormwater Management Report

Identification of system constraints: see page 2 of Servicing Brief and Stormwater Management Report

Confirmation of adequate domestic supply and pressure: not applicable

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 locations throughout the development: see page 2 Servicing Brief and Stormwater Management Report

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: not applicable

Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design: not applicable

Address reliability requirements such as appropriate location of shut-off valves: not applicable

Check on the necessity of a pressure zone boundary modification:. not applicable

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: not applicable

Description of the proposed water distribution network, including locations of proposed connections to the existing systems, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions: not applicable

Description of off-site required feeder mains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation: not applicable

Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines: not applicable

Provision of a model schematic showing the boundary conditions locations, streets , parcels, and building locations for reference: not applicable

Development Servicing Report: Wastewater

Summary of proposed design criteria: see page 2 of Servicing Brief

(Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure): not applicable

Confirm consistency with Master Servicing Study and /or justification for deviations: not applicable

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 conditions of sewers: not applicable

Descriptions of existing sanitary sewer available for discharge of wastewater from proposed development: see page 3 Servicing Brief and Stormwater Management Report

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): not applicable

Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix C) format. not applicable

Description of proposed sewer network including sewers, pumping stations, and forcemains: not applicable

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): not applicable

Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development: not applicable

Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity: not applicable

Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding: not applicable

Special considerations such as contamination, corrosive environment etc: not applicable

Development Servicing Report: Stormwater Checklist

Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property): see pages 2-5 of Servicing Brief and Stormwater Management Report

Analysis of available capacity in existing public infrastructure. not applicable

A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern: see drawing C-1

Water quality 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: see Servicing Brief and Stormwater Management Report

Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements: Servicing Brief and Stormwater Management Report

Descriptions of the references and supporting information.
Set-back from private sewage disposal systems. not applicable

Watercourse and hazard lands setbacks: not applicable

Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed: the pre-application consultation record is not yet been issued

Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists: not applicable

Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period). see drawings C-1 to C-6 and Servicing Brief and Stormwater Management Report

Identification of watercourses within the proposed development and how watercourses will be protected, or , if necessary, altered by the proposed development with applicable approvals. see drawings C-1 to C-6 and Servicing Brief and Stormwater Management Report

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: see Servicing Brief and Stormwater Management Report

Any proposed diversion of drainage catchment areas from one outlet to another. : not applicable

Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities. : not applicable

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: not applicable

Identification of potential impacts to receiving watercourses: Servicing Brief and Stormwater Management Report

Identification of municipal drains and related approval requirements. : not applicable

Descriptions of how the conveyance and storage capacity will be achieved for the development: see pages 2-5 of Servicing Brief and Stormwater Management Report

100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading:

Inclusion of hydraulic analysis including hydraulic grade line elevations. : not applicable

Description of approach to erosion and sediment control during construction for the protection of receiving watercourses of drainage corridors: see notes 2.1 to 2.5 on drawing C-3

Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplains elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current: not applicable

Identification of fill constraints related to floodplain and geotechnical investigation. : not applicable

Approval and Permit Requirements: Checklist

The Servicing Study shall provide a list of applicable permits and regulatory approvals necessary for the proposed development as well as the relevant issues affecting each approval. The approval and permitting shall include but not be limited to the following:

Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not 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: see page 2 of Servicing Brief and Stormwater Management Report

Application for Certificate of Approval (CofA) under the Ontario Water Resources Act:

Changes to Municipal Drains. : not applicable

Other permits (National Capital commission, Parks Canada, public Works and Government Services Canada, Ministry of transportation etc.) : not applicable

Conclusion Checklist

Clearly stated conclusions and recommendations: see page 5 of Servicing Brief and Stormwater Management Report

Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.

All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario: included