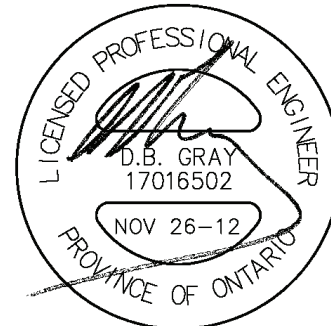


STORMWATER MANAGEMENT BRIEF

5630 Boundary Road
Ottawa, Ontario

Report No. 12043-SWM

November 26, 2012



NOT VALID UNLESS
SIGNED & DATED

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STORMWATER MANAGEMENT BRIEF

5630 Boundary Road Ottawa, Ontario

This brief is a preliminary assessment of the stormwater management requirements of a proposed 1345 sq.m. office / cross dock warehouse building located on 4.2 hectares of land at 5630 Boundary Road at the corner of Mitch Owens Road. The property is adjacent to the Simpson Municipal Drain which is located in the south side of the Mitch Owens road allowance immediately north of the property. A 15m setback from the top of the bank is required, where buildings, fences and any other permanent structure are not permitted (as per City of Ottawa drainage superintendant Eric Cryderman). The top of bank coincides with the property line.

WATER QUALITY:

It is proposed that rainfall runoff from the developed portion of the site will drain to one of three stormwater detention areas. Level spreaders at the upstream end of each detention area will evenly distribute the flow into the detention area. The bottom of each the detention area is a grassed filter strip, 10 to 30 m in length. When flow across a vegetative filter strip is restricted to 1 litre per second per metre width a filter strip 5 m long is 60% (fine particles) to greater than 95% (coarse particles) effective in the removal of sediment (Effectiveness of Vegetative Filter Strips in Removal of Sediments from Overland Flow, Ghawabaghi & Rudra/University of Guelph and Goel/MOE). It is estimated that a grass filter strip designed to the above criteria has an overall of at least 80% effectiveness in the removal of TSS.

Approximately 80% of all rainfall events in Ottawa are 10mm or less. Based on a 10 mm – 3 hour event and a 20 minute time of concentration, a rainfall intensity of 16.3 mm/hr was used and a design flow rates of 27, 51 and 27 l/s are calculated for Drainage Areas 1, 2, and 3 respectively. To achieve a maximum 1 l/s/m, a level spreaders 27, 51 and 27m are proposed for Drainage Areas 1, 2, and 3 respectively.

It is recommended that grass in the filter strip (stormwater detention area) be maintained at a minimum 75mm height to enhance the filtration of suspended solids. It is also recommended that annually, in the spring (and more frequently if necessary), that any accumulated sediment be removed from the grass so as to reduce the chance of the sediment being re-suspended. If these maintenance items are carried out, then the grassed areas will be considered well maintained.

In addition during construction, an erosion and sediment control plan will be developed to filter out construction sediment. It is expected that it will consist of such measures as a silt fence barrier installed around the perimeter of the development and pump

discharge from dewatering operations draining through silt fence barrier backed by straw bales.

WATER QUANTITY:

The stormwater quantity control measures detailed in this brief 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 existing development for both the one in five-year and one in one hundred-year storm events.

It is estimated that the pre-development conditions reflect a runoff coefficient of 0.30 (as per Table 5.7 of the Ottawa Sewer Design Guidelines: flat 0-5% slope; clay and silt soil) and a time of concentration of 20 minutes (as per Appendix 5-D.1 of the Ottawa Sewer Design Guidelines).

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

Stormwater will be stored within the development on the surface in three depressed grassed areas (stormwater detention areas) having a total storage volume of 639 cu.m. Inlet Control Devices (ICDs) located in the outlet pipe of each of the three detention areas will control the release of stormwater off the site. During the 1:100 year event, it is expected that the release of stormwater will also be controlled by a broad crested weir. Released stormwater will be conveyed off the site into the roadside ditch on Boundary Road and Simpson Municipal Drain on the south side of Mitch Owens Road.

In the past in the Ministry of Environment's opinion a cross dock warehouse facility does not require a Certificate of Approval (now called a Environmental Compliance Certificate - ECA) and as such an ECA is not expected to be required.

MAXIMUM RELEASE RATE FLOW / MAXIMUM STORAGE VOLUME:

ONE HUNDRED-YEAR EVENT:

The maximum permitted flow for the subject site is calculated as follows:

Area (A):	42,067 sq.m.
Time of Concentration (T):	20 minutes
Rainfall Intensity (100 Year Event) (i):	120 mm/hr
Runoff Coefficient (C) (0.30 x 125%):	0.375
Maximum Allowable Release Rate (2.78 AiC):	526 l/s
Maximum Storage Volume Required: (see calculations)	638 cu.m.

CONCLUSIONS:

WATER QUALITY:

Grassed filter strip designed to have an overall effectiveness in the removal of 80% of the TSS are proposed.

An erosion and sediment control plan is proposed to be implemented during construction

WATER QUANTITY:

One Hundred Year Storm Event:

The maximum allowable release rate for the 100-year storm event for the site is 526 l/s. A maximum stored volume of 638 cu.m. is required to achieve the post development release rate.

STORMWATER MANAGEMENT CALCULATIONS

Storage calculations for the stormwater detention area are based on the following formula for volume of a prismoidal 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

Boundary Road at Mitch Owens Road Ottawa, Ontario

STORM WATER MANAGEMENT QUANTITY CONTROL CALCULATIONS Rational Method

ONE HUNDRED YEAR EVENT

Pre-development Flow Maximum Allowable Release Rate

Area (A):	42067	sq.m.
Time of Concentration:	20	min.
Rainfall Intensity (i):	120	mm/hr (100 year event)
Runoff Coefficient (C):	0.375	(0.30 x 125%)

Maximum Allowable Release Rate: 526 l/s

Post-development Flow

			C
Roof Area:	1345	sq.m.	1.00
Asphalt/Concrete Area:	3159	sq.m.	1.00
Granular Area:	27526	sq.m.	0.875
Landscaped:	<u>10037</u>	<u>sq.m.</u>	<u>0.25</u>

Total Catchment Area 42067 sq.m. 0.74

Max. Release Rate: 526 l/s Max. Vol. Required: 638 cu.m.

Time	i	2.78AiC	Release	Stored	Stored
min.	mm/hr	l/s	Rate	Rate	Volume
			l/s	l/s	cu.m.
5	243	2098	526	1572	472
10	179	1544	526	1018	611
15	143	1235	526	709	638
20	120	1037	526	511	613
25	104	898	526	372	558
30	92	794	526	268	483
35	83	714	526	188	395
40	75	650	526	124	297
45	69	597	526	71	192
50	64	553	526	27	81
55	60	515	515	0	0
60	56	483	483	0	0

Surface Storage Detention Area

	Bottom	Top	Ave.		
	Area	Area	Depth		
	sq.m.	sq.m.	m		
Area 1	400	495	0.50	223	cu.m.
Area 2	530	625	0.50	288	cu.m.
Area 3	220	290	0.50	<u>127</u>	cu.m.

Boundary Road at Mitch Owens Road
Ottawa, Ontario

**STORM WATER MANAGEMENT
QUALITY CONTROL CALCULATIONS
Rational Method**

10mm - 3 hour EVENT

DRAINAGE AREA I

			C
Roof Area:	673	sq.m.	0.90
Asphalt/Concrete Area:	680	sq.m.	0.90
Granular Area:	6772	sq.m.	0.70
Landscaped:	<u>0</u>	sq.m.	<u>0.20</u>
Total Catchment Area	8125	sq.m.	0.73
Area (A):	8125	sq.m.	
Time of Concentration:	20	min.	
Rainfall Intensity (i):	16.3	mm/hr (10mm - 3 hour event)	
Runoff Coefficient (C):	0.73		
Flow Rate (2.78AiC):	27	l/s	
Minimum Length of Level Spreader:	27	m	

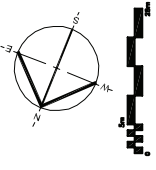
DRAINAGE AREA II

			C
Roof Area:	673	sq.m.	0.90
Asphalt/Concrete Area:	2298	sq.m.	0.90
Granular Area:	12149	sq.m.	0.70
Landscaped:	<u>408</u>	sq.m.	<u>0.20</u>
Total Catchment Area	15528	sq.m.	0.73
Area (A):	15528	sq.m.	
Time of Concentration:	20	min.	
Rainfall Intensity (i):	16.3	mm/hr (10mm - 3 hour event)	
Runoff Coefficient (C):	0.73		
Flow Rate (2.78AiC):	51	l/s	
Minimum Length of Level Spreader:	51	m	

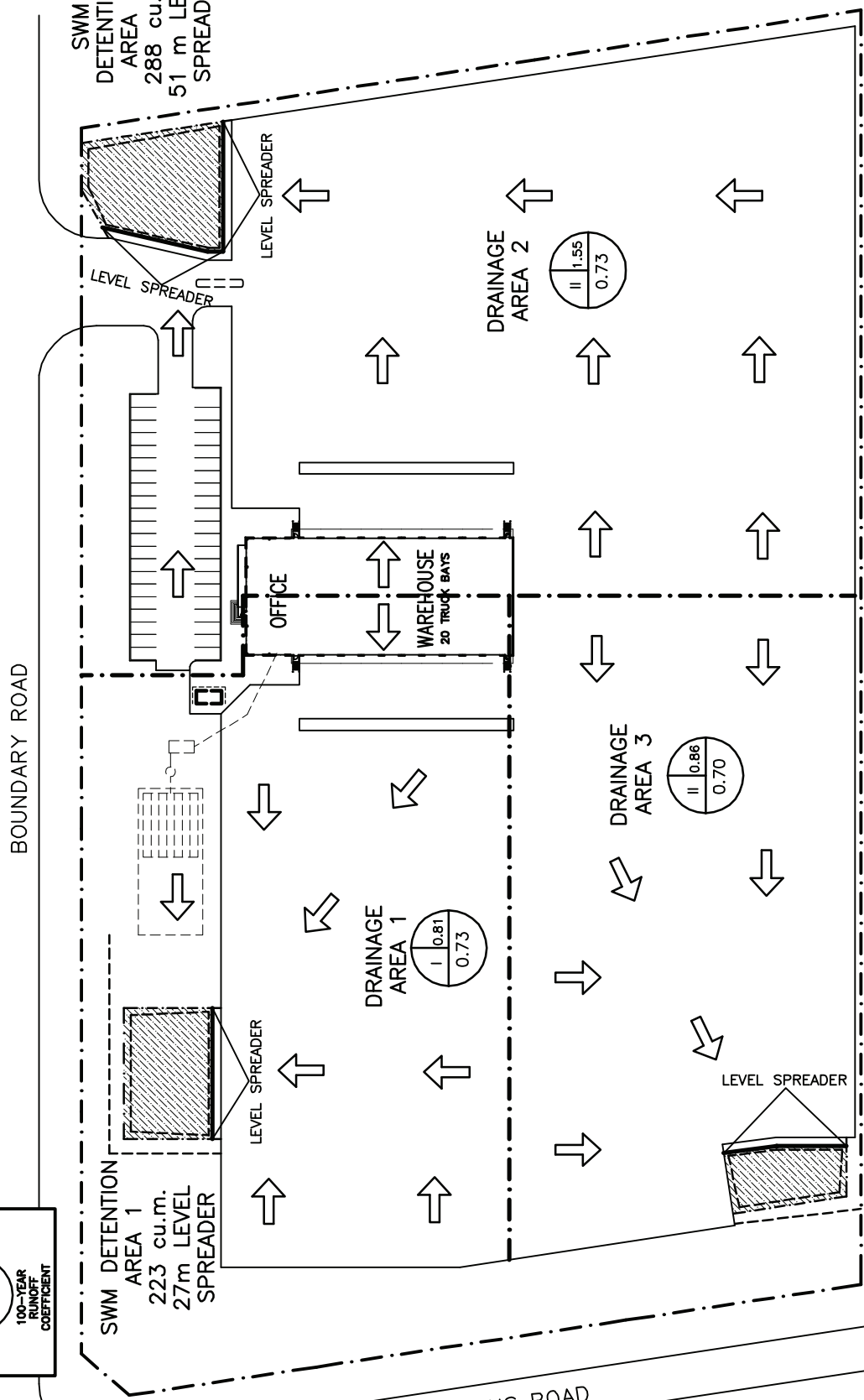
DRAINAGE AREA III

			C
Roof Area:	0	sq.m.	0.90
Asphalt/Concrete Area:	0	sq.m.	0.90
Granular Area:	8604	sq.m.	0.700
Landscaped:	<u>0</u>	sq.m.	<u>0.20</u>
Total Catchment Area	8604	sq.m.	0.70
Area (A):	8604	sq.m.	
Time of Concentration:	20	min.	
Rainfall Intensity (i):	16.3	mm/hr (10mm - 3 hour event)	
Runoff Coefficient (C):	0.70		
Flow Rate (2.78AiC):	27	l/s	
Minimum Length of Level Spreader:	27	m	

POST DEVELOPMENT DRAINAGE PLAN



LEGEND	
DRAINAGE AREA	II
AREA SIZE (ha)	0.85
100-YEAR RUNOFF COEFFICIENT	0.28



MITCH OWENS ROAD

BOUNDARY ROAD