Controlex Realty Management

Stormwater Management and Servicing Report

Type of Document
Issue for Site Plan Approval Building 500 & 600

Project Name
3020 Hawthorne Road

Project Number
OTT-00224388-A0

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Date Submitted
11/12/2015

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Type of Document:
Issued for Site Plan Approval Building 500 & 600

Project Name:
3020 Hawthorne Road. North Hawthorne Campus

Project Number:
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1 Introduction

Exp. Services Inc. was retained by Controlex Realty Management to provide engineering services for the preparation of site grading, servicing and stormwater management report for a commercial development at 3020 Hawthorne Road.

Development of the site is proceeding in a phased manner. The first phase, completed in 2006, involved the construction of Building 700 (Acklands Grainger). The second phase, built in 2008, included Building 200, and the third phase, built in 2013, included the development of Building 300. The fourth phase, currently proposed, includes the development of Building 500 and 600.

This scope of this report addresses the servicing and stormwater management issues related to the development of Building 500 and 600.

2 Purpose

This report documents the proposed method of servicing the site as well as attenuating the stormwater runoff from the subject site. Items that are addressed include:

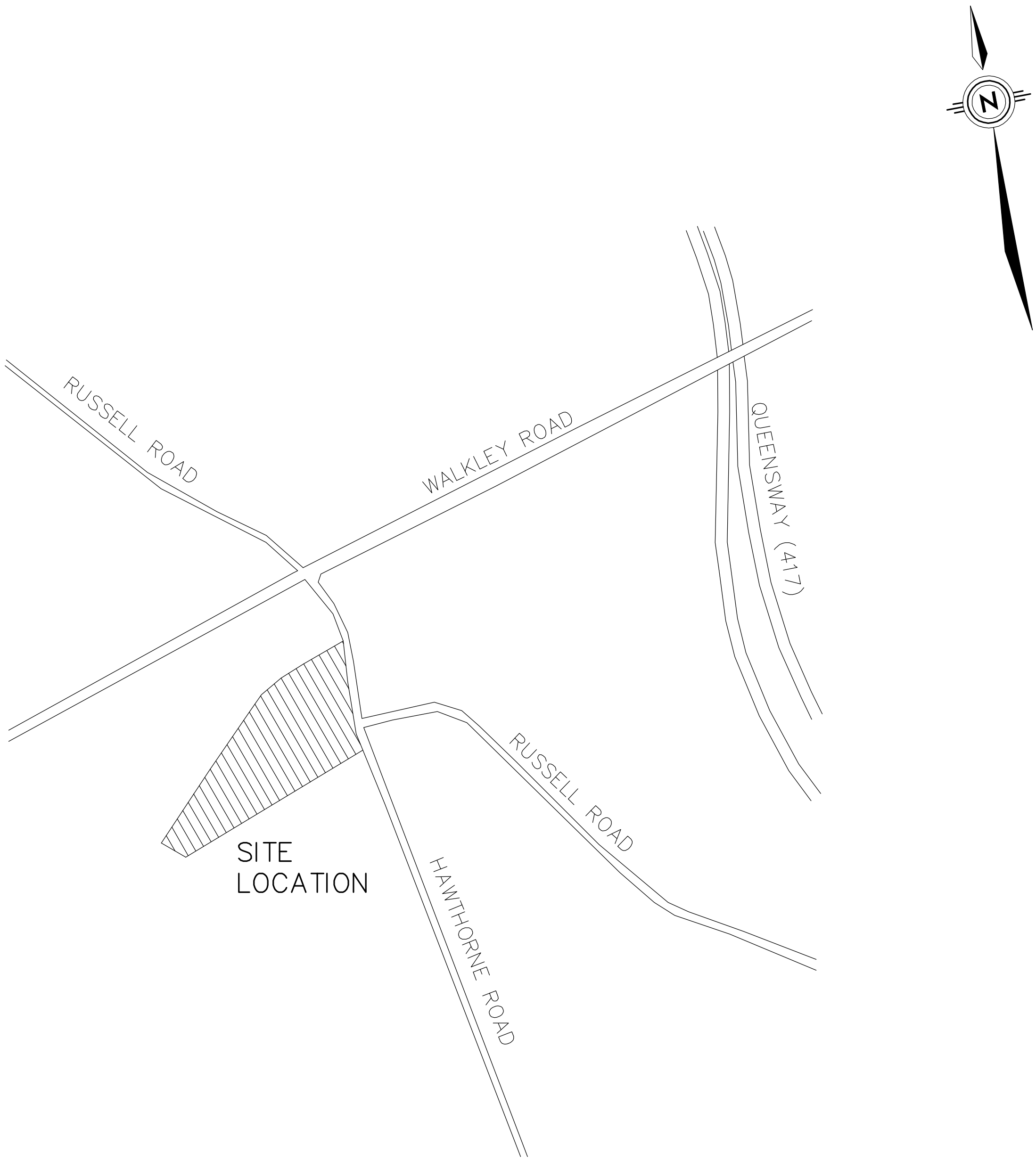
- Determining the size of water and sanitary sewer services and identifying the locations of the connections to existing services.
- Calculating the allowable stormwater release rate, post-development runoff and the corresponding storage volume requirements.
- Determining the locations, sizes and storage volumes of the proposed drainage system components located within the site.

3 Site Overview

The site is 8 hectares in area and is bound by Hawthorne Road to the east, a hydro transmission corridor to the south, the Mather Award Ditch to the west and a railway line to the north. The SWM design will address the quality and quantity control for drainage areas of Buildings 300, 500 and 600. The total drainage area included for the three buildings is 5.806.

The storm water flows from the railway corridor that was temporarily diverted via a swale to the Mather Award Ditch during the construction of Building 300 will be conveyed to the Mather Award Ditch via the existing ditch between the north property line of the Hawthorne site and the rail corridor.

The following Figure 1 is a key map showing the site location.



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scale N.T.S	CLIENT: CONTROLEX	project no. OTT-00224388
date 5/11/2015		
drawn by ML	TITLE: KEY PLAN	FIG 1

4 Watermain Distribution

The water service for Building 500 will be provided from an existing 205mm stub located along the extension of the paved limits of the main drive aisle. This stub was provided during the construction of Building 300. Building 600 will be serviced by a 205mm service connection off the existing 205mm water main that currently services Building 200. Adequacy of fire and domestic water supply for the campus was established during earlier phases of the project.

5 Sanitary Sewer Design

An existing 250mm diameter municipal sanitary sewer is located within an easement along the south side of the site and follows the alignment of the once proposed Russell Road extension. This sewer was designed to service these lands and flows westward and connects to a 375mm diameter sewer on the east bank of the Mather Ditch. The 375mm sewer flows north and connects to the 2,700mm diameter South Ottawa Collector located on the north side of the property.

A 200mm sanitary sewer that is connected to the 250mm sanitary was constructed during the construction of Building 300. This sewer will be used to service Buildings 500 and 600 as well. A 200mm sanitary stub to service Building 500 was constructed during the construction of Building 300. Sanitary service for Building 500 will be connected to this stub. It is located on the east side of Building 500. A new service 200mm diameter service lateral off the existing 200mm sanitary will be constructed to service Building 600. It will be located on the west side of Building 600.

The peak sanitary design flow is estimated using the City of Ottawa Sewer Design Guidelines as follows:

The total area being serviced by the existing 200mm sewer is 5.806 hectares.

Design Flow for Commercial Use:	50,000 L/day/ha (0.578 L/s/ha)
Peaking Factor:	1.5
Area:	5.806 hectares
Extraneous Flow:	0.28 L/s/ha
Peak Design Flow:	= (0.578 L/s/ha) (5.806 ha) (1.5) + (5.806ha) (0.28L/s/ha)
	= 5.82 L/s

The 200mm diameter existing sanitary sewer has a minimum 0.5% design slope, providing a capacity of 34 L/s at a full flow velocity of 1.0m/s. Therefore the design flow can be conveyed by the existing and proposed sewer network.

6 Storm Sewer Design

An existing municipal storm sewer runs parallel to the aforementioned 250 mm diameter sanitary sewer along the south property line. The storm sewer diameter is 600 mm at Hawthorne Road and increases in size along the south limit of the site to be 900 mm at the headwall outlet into the Mather Award Ditch. Storm service for Building 600 will be connected to the existing 375mm storm sewer on the north side of the building. Storm service to Building 500 will be connected to a new storm sewer that will be constructed on the north side of the building.

The on-site storm sewers were designed using the rational method based on a 5-year rainfall event assuming no flow control. Details for storm sewer design can be found on drawing 224388–SWM1 and the storm sewer design sheets Table 502 and 602.

7 Stormwater Management Calculations

7.1 Pre-Development Conditions

The approved SWM design of Building 300 included areas that now form part of proposed Buildings 500 and 600. Therefore, the SWM design of Buildings 500 and 600 will include Building 300. Total drainage area for these three buildings is 5.81ha. Drainage area for Buildings 300 and 600 is 3.785 ha and for Building 500 it is 2.021ha. Refer to drawing 224388-SWM1 for details.

Drainage Area Building 500:

Total Drainage Area (A):	2.021 hectares
Allowable Runoff coefficient (C):	0.65
5-year Rainfall Intensity	$I_{(5\text{-year, 20 min})}$ = 70.3 mm/hr
Allowable Release Rate	**Q** = 2.78CIA
	Q = 2.78 x 0.65 x 70.3 x 2.021
	Q = 256.7 L/s

Therefore the allowable release rate for the drainage areas for Building 500 is 256.7 L/s.

Drainage Area Building 300 and 600:

Total Drainage Area(A):	3.785 hectares
Allowable Runoff coefficient (C):	0.65
5-year Rainfall Intensity	$I_{(5\text{-year, 20 min})}$ = 70.3 mm/hr

Allowable Release Rate	**Q** = 2.78CIA
	Q = 2.78 x 0.65 x 70.3 x 3.785
	Q = 480.8 L/s

Drainage sub-area A607 and A608 totaling 0.15ha area will flow uncontrolled.

Area of uncontrolled flow (A):	0.15 hectares
Runoff coefficient (C):	0.9
5-year Rainfall Intensity	$\mathbf{I}_{(5\text{-year, }10\text{ min})}$ = 104.2 mm/hr
Allowable Release Rate	**Q** = 2.78CIA
	Q = 2.78 x 0.9 x 104.2 x 0.15
	Q = 39.1 L/s

Therefore the allowable release rate from the drainage area of Buildings 300 and 600 will be 441.7 L/s.

The total allowable release rate for drainage area of Buildings 300, 500 and 600 will be 698.4L/s.

7.2 Stormwater Management

Stormwater will be controlled and released at a rate less than the allowable release rate for storms up to and including the 100 year storm event. An overland flow route is provided for storms greater than the 100 year return event. Flow control devices will be installed in roof drains and various catchbasins/manholes in order to control stormwater prior to its release from the site.

Storage volume requirements were determined by applying a 5-year and 100-year storm at time steps of 10 minutes until a peak storage volume requirement was attained for each area. The parking lot ponding volumes are determined by applying the pyramid volume equation of one-third of the depth multiplied by the surface area of the pond. Surface ponding depths are limited to 150mm for the 5-year event and 300mm for the 100-year event.

Roof areas are assigned an assumed release rate of 40 L/s/ha, based on past experience. A peak storage volume of 392.1 cubic meters at a 60 minute return time required for Building 500 is equivalent to 41mm averaged over the entire roof. A peak storage volume of 229.8 cubic meters at a 60 minute return time required for Building 600 is equivalent to 41mm averaged over the entire roof.

Stormwater management summary sheets are provided in Table 501 and Table 601, for Buildings 500 and 600 respectively (Appendix A). Detailed calculations for storage volume requirements and storage volumes available are found in Tables 503 to 506 and Tables 603 to 609. Refer to drawing 224388-SWM for additional information.

The post-development release rate for the drainage area of Building 500 is 177.7 L/s and is significantly less than the allowable release rate of 256.7 L/s. The post-development release rate for the drainage area of Building 600 is 310.9 L/s which is significantly less than the allowable release rate of 441.7 L/s. The total post-development release rate will be 488.6 L/s.

7.3 Flow Control Device Sizing

Two types of orifice designs are specified for the site. A simple plug-type insert is suitable if the orifice diameter is 75 mm or greater. For lower release rates a more sophisticated orifice design will be employed, such as Hydrovex, to reduce the possibility of clogging often associated with a small orifice. The Hydrovex models are custom-manufactured based on specific head and release rate information. Hydrovex model types were selected based on the manufacturer's selection charts, while the simple plug-type orifice sizing has been determined per the following example:

Q = C(A)(2gh)0.5

A = Q / (C(2gh)0.5)

πr2 = Q / (C(2gh)0.5)

r = (Q / (π (C(2gh)0.5))0.5

r = $(0.0541 / (\pi (0.6(2*9.81*2.54)^{0.5}))^{0.5}$

r = 0. 064m

diameter = 2r = 2(0.064) = 0.128m = 128mm

Where;

C = 0.6 head loss coefficient for an orifice

Q = 54.1 L/s direct release rate from sub-area to sewer (= 0.0499 cub.m/s)

H = 2.54m head on orifice
(top of grate + ponding depth – pipe invert + pipe radius)
(75.00 + 0.26 – 72.49 - 0.23) = 2.54m

A = Area of orifice

r = radius of orifice

g = acceleration due to gravity

Orifice controls and their locations are shown on the Site Servicing drawing (224388-SS1).

7.4 City Stress Test

As per Technical Bulletin ISDTB-2012-1 issued by the City of Ottawa, it is now a requirement that all drainage systems be stress tested using design storms calculated on the basis of a 20% increase of the City's IDF curves rainfall values. Modifications to the drainage system would be required if severe flooding to properties is identified.

As indicated previously, stormwater is to be stored on site for storms up to and including the 100 year storm event. Therefore, the purpose of the stress test for this type of development is to analyze the overland flow route since it is the outlet for storm events greater than the 100 year event. An increase in 20% of the 100 year storm event will simply follow the proposed overland flow route and spill into the Mather Award Ditch before impacting the buildings. A review of the 100 year ponding elevations, overland flow spill elevations and the elevations of the structures has been completed that shows that the buildings will not be flooded during a major storm event. Refer to the table below.

Table 1: FFL vs Spill Elevation

Building #	FFL	Adjacent Spill Elevation
300	76.35	76.00
500	76.10	74.90
600	76.25	76.00

8 Quality Control Measures

8.1 Best Management Practices

In order to follow Best Management Practices for Erosion and Sediment Control the following measures will be employed in the proposed development:

- Geotextile cloth shall be installed between all catch basin covers and frames and sediment shall be removed from geotextile cloth on a regular basis to ensure proper operation.
- A silt fence will be installed on the down gradient side of the site to prevent migration of silt.

These erosion and sediment control measures will be implemented during construction. Erosion and Sediment Control measures to be installed and maintained during construction are shown on the Grading Plan (224388-GR1). Filter cloth catches should be inspected daily, and after every rain event to determine maintenance, repair or replacement requirements. Sediments or granular that enter site sewers shall be removed immediately by the contractor. These measures will be implemented prior to the commencement of construction and maintained in good order until vegetation has been established.

8.2 Oil/Grit Separator Unit

The City has indicated that stormwater quality control is required to meet an MOE normal level (70% removal of total suspended solids). Quality control for the drainage area of building 500 will be provided by a new Stormceptor STC 750 unit which will provide the required level of TSS removal. Refer to Appendix 1 for calculations. Quality control for the drainage area of Buildings 300 and 600 will be provided by the existing Stormceptor STC 3000.

9 Conclusion

The development can be adequately serviced with sewer and water from existing infrastructure located adjacent to the site.

The stormwater management measures proposed result in a 100-year release rate of 488.6 L/s which is significantly less than the allowable release rate of 698.4 L/s. Quality control of stormwater will be provided by the installation of a new Stormceptor STC 1500 unit as well as the existing STC 3000 unit. An overland flow route is provided that will prevent any negative impact on the proposed building during storms in excess of the 100-year event. The temporary ditch that was constructed to convey storm water flows from the rail corridor will be removed and the flows from the rail corridor will be conveyed to the Mather Award Ditch via a new storm sewer along the north property line.

Appendix A–

Tables 501 & 601 – Stormwater Management Summary Sheets

Tables 502 &602 – Storm Sewer Design Sheets

Tables 503 to 506 & 603 to 609 - Storm Storage Volume Tables

Hydrovex Selection Curves

Stormceptor STC 750 Information

224388–SWM1 Stormwater Management Plan

224388–GR1 Grading Plan

224388–SS1 Servicing Plan

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Table 501 Stormwater Management Summary Sheet Drainage Areas Building 500

Sub Area I.D.	Sub Area (ha)	C = 0.2	C = 0.9	Comp. 'C'	Outlet Location	Controlled Release (L/s)	Top of Grate (m)	Ponding Depth (m)	Required 5yr Volume (cu.m)	Required 100yr Volume (cu.m)	Available 5yr volume (cu.m)	Available 100yr volume (cu.m)	Invert or Pan Elev. (m)	Pipe dia (if plug type) (mm)	Head on Orifice (if plug) (m)	Diameter of Orifice (mm)	Hydrovex Model	Head on Hydrovex
A501	0.943		0.943	0.9	BUILDING 500	37.72	N/A	N/A	161.1	391.7	161.1	391.7	N/A	N/A	N/A	N/A	N/A	N/A
A502	0.096		0.096	0.90	CBMH411	40.0	74.60	0.15	53.7	149.6	54.3	333.7	71.85	457	2.67	108	N/A	N/A
A503	0.067		0.067															
A504	0.067		0.067															
A505	0.067		0.067															
A506	0.067		0.067															
A507	0.118		0.118															
A508	0.211		0.211	0.90	CB 413	25.0	73.70	0.30	18.0	47.8	19.3	59.3	71.65	254	2.22	90	N/A	N/A
A509	0.385		0.385	0.90	CB 419	75.0	73.70	0.30	15.2	69.7	23.3	23.3	71.00	305	2.85	146	N/A	N/A
	2.021	**0.000**	**2.021**		**Release Rate**	**177.7**			**248.0**	**658.8**	**258.0**	**808.0**						
					Allowable Release Rate	**256.7**												

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Table 601 Stormwater Management Summary Sheet Drainage Areas Building 300 and 600

Sub Area I.D.	Sub Area (ha)	C = 0.2	C = 0.9	Comp. 'C'	Outlet Location	Controlled Release (L/s)	Top of Grate (m)	Ponding Depth (m)	Required 5yr Volume (cu.m)	Required 100yr Volume (cu.m)	Available 5yr volume (cu.m)	Available 100yr volume (cu.m)	Invert or Pan Elev. (m)	Pipe dia (if plug type) (mm)	Head on Orifice (if plug) (m)	Diameter of Orifice (mm)	Hydrovex Model	Head on Hydrovex
A301	0.340	0.077	0.263															
A302	0.109	0.025	0.084															
A303	0.138	0.031	0.107	0.74	STMMH 402	54.2	75.00	0.26	69.4	232.0	69.9	232.0	72.58	457	2.45	129	N/A	N/A
A304	0.092	0.020	0.072															
A305	0.092	0.019	0.073															
A306	0.198	0.047	0.151	0.73	CB 44	62.0	74.80	0.20	0.0	16.9	7.1	16.9	73.30	254	1.57	154	N/A	N/A
A307	0.936	0.000	0.936	0.90	BLDG 300	37.6	N/A	N/A	159.6	388.2	159.6	388.2	N/A	N/A	N/A	N/A	N/A	N/A
A308	0.082	0.000	0.082															
A309	0.080	0.000	0.080	0.90	CBMH 407	10.0	75.77	0.25	46.8	113.2	46.9	145.5	72.38	381	3.45	51	75VHV-1	3.6
A310	0.105	0.000	0.105															
A601	0.553	0.000	0.553	0.90	BLDG 600	22.1	N/A	N/A	94.5	229.8	94.5	229.8	N/A	N/A	N/A	N/A	N/A	N/A
A602	0.069	0.000	0.069	0.90			74.75	0.15										
A603	0.082	0.000	0.082	0.90	CBMH 416	35.0	74.7	0.25	32.7	95.3	33.7	172.3	72.03	305	2.77	100	N/A	N/A
A604	0.192	0.000	0.192	0.90			74.65	0.30										
A605	0.518	0.000	0.518	0.90	CBMH415	90.0	74.65	0.30	58.6	180.1	58.7	219.7	72.29	254	2.53	165	N/A	N/A
A606	0.199	0.000	0.199	0.90														
	3.785	**0.219**	**3.566**		**Release Rate**	**310.9**			**461.6**	**1255.5**	**470.5**	**1404.4**						
					Allowable Release Rate	**441.7**												

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Table 502. Storm Sewer Design Sheet Building 500

LOCATION									PROPOSED SEWER							
FROM	TO	R= 0.2	R= 0.9	INDIV 2.78 AR	ACCUM 2.78 AR	TIME OF CONC.	RAINFALL INTENSITY I	PEAK FLOW Q (l/s)	PIPE SIZE (mm)	PIPE SLOPE (%)	LENGTH (m)	CAPACITY (l/s)	FULL FLOW VELOCITY (m/s)	TIME OF FLOW (min.)	EXCESS CAPACITY (l/s)	Q/Qfull
CB 47	MAIN	0.000	0.067	0.17	0.17	10.00	104.19	17.47	201.2	1.00	2.0	33.34	1.05	0.03	15.88	0.52
CB 48	MAIN	0.000	0.067	0.17	0.17	10.00	104.19	17.47	201.2	1.00	2.0	33.34	1.05	0.03	15.88	0.52
CB 49	MAIN	0.000	0.067	0.17	0.17	10.00	104.19	17.47	201.2	1.00	2.0	33.34	1.05	0.03	15.88	0.52
CB 50	MAIN	0.000	0.067	0.17	0.17	10.00	104.19	17.47	201.2	1.00	2.0	33.34	1.05	0.03	15.88	0.52
CBMH 410	CBMH 411	0.000	0.096	0.24	0.91	10.03	104.03	94.74	381.0	0.50	120.0	129.47	1.13	1.76	34.73	0.73
BUILDING 500	MAIN	0.000	0.943	2.36	2.36	10.00	104.19	245.83	381.0	2.00	17.5	258.94	2.27	0.13	13.10	0.95
CBMH 411	MH 412	0.000	0.118	0.30	3.57	11.79	95.58	340.78	457.2	1.50	63.0	364.65	2.22	0.47	23.87	0.93
CBMH 413	MAIN	0.000	0.211	0.53	0.53	10.00	104.19	55.01	254.0	1.00	11.0	62.10	1.22	0.15	7.10	0.89
CBMH419	MAIN	0.000	0.385	0.96	0.96	10.00	104.19	100.37	305.0	1.50	5.0	123.90	1.69	0.05	23.53	0.81
MH412	STMCEPTOR	0.000	0.000	0.00	5.06	12.27	93.57	473.12	533.0	2.00	47.0	633.87	2.84	0.28	160.74	0.75
STMCEPTOR	EX MH 414	0.000	0.000	0.00	5.06	12.54	92.43	467.40	533.0	1.70	3.0	584.40	2.62	0.02	117.00	0.80

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Table 602. Storm Sewer Design Sheet Building 300 and 600

LOCATION									PROPOSED SEWER							
FROM	TO	R= 0.2	R= 0.9	INDIV 2.78 AR	ACCUM 2.78 AR	TIME OF CONC.	RAINFALL INTENSITY I	PEAK FLOW Q (l/s)	PIPE SIZE (mm)	PIPE SLOPE (%)	LENGTH (m)	CAPACITY (l/s)	FULL FLOW VELOCITY (m/s)	TIME OF FLOW (min.)	EXCESS CAPACITY (l/s)	Q/Qfull
CB 41	MAIN	0.025	0.084	0.22	0.22	10.00	104.19	23.35	254.0	1.00	2.0	62.10	1.22	0.03	38.76	0.38
CB 42	MAIN	0.031	0.107	0.28	0.28	10.00	104.19	29.69	254.0	1.00	2.0	62.10	1.22	0.03	32.41	0.48
CB 43	MAIN	0.020	0.072	0.19	0.19	10.00	104.19	19.93	254.0	1.00	3.5	62.10	1.22	0.05	42.17	0.32
CBMH 401	CBMH 402	0.077	0.263	0.70	1.40	10.05	103.94	145.64	381.0	0.80	112.8	163.77	1.43	1.31	18.13	0.89
CBMH 402	STMMH 403	0.019	0.073	0.19	1.59	11.36	97.53	155.49	457.2	0.50	28.4	210.53	1.28	0.37	55.04	0.74
CB 44	STMMH 403	0.047	0.151	0.40	0.40	10.00	104.19	42.09	254.0	5.60	5.5	146.96	2.90	0.03	104.87	0.29
STMMH 403	STMMH 404	0.000	0.000	0.00	2.00	11.73	95.88	191.59	457.2	0.60	44.4	230.62	1.40	0.53	39.04	0.83
BLDG 300	STMMH 404	0.000	0.936	2.34	2.34	10.00	104.19	244.01	381.0	2.00	5.5	258.94	2.27	0.04	14.93	0.94
STMMH 404	STMMH 405	0.000	0.000	0.00	4.34	12.25	93.62	406.33	610.0	0.50	35.3	454.20	1.55	0.38	47.86	0.89
CB 45	CBMH 406	0.000	0.082	0.21	0.21	10.00	104.19	21.38	254.0	2.40	37.7	96.21	1.90	0.33	74.83	0.22
CBMH 406	CBMH 407	0.000	0.080	0.20	0.41	10.33	102.47	41.54	381.0	0.80	44.5	163.77	1.43	0.52	122.23	0.25
CBMH 407	STMMH 405	0.000	0.105	0.26	0.67	10.85	99.92	66.75	381.0	0.80	43.4	163.77	1.43	0.50	97.02	0.41
BLDG 600	MAIN	0.000	0.553	1.38	1.38	10.00	104.19	144.16	381.0	1.00	7.5	183.10	1.60	0.08	38.93	0.79
STMMH 405	STMMH 408	0.000	0.000	0.00	6.39	12.63	92.07	588.52	610.0	0.90	52.3	609.37	2.08	0.42	20.85	0.97
CBMH 418	CBMH415	0.000	0.199	0.50	0.50	10.00	104.19	51.88	254.0	1.50	42.0	76.06	1.50	0.47	24.18	0.68
CBMH415	STMMH 408	0.000	0.518	1.30	1.79	10.47	101.79	182.60	381.0	1.50	39.0	224.25	1.96	0.33	41.64	0.81
CB47	MAIN	0.000	0.080	0.20	0.20	10.00	104.19	20.86	254.0	1.00	5.0	62.10	1.22	0.07	41.25	0.34
CBMH417	CBMH 416	0.000	0.070	0.18	0.38	10.07	103.83	38.97	254.0	1.50	77.0	76.06	1.50	0.86	37.09	0.51
CBMH416	STMMH 408	0.000	0.192	0.48	0.86	10.92	99.55	85.19	305.0	1.50	31.0	123.90	1.69	0.30	38.71	0.69
STMMH 408	STMCEPTOR	0.000	0.000	0.00	9.04	13.05	90.43	817.61	685.0	0.70	4.1	732.15	1.98	0.03	-85.45	1.12
STMCEPTOR	STMMH 409	0.000	0.000	0.00	9.04	13.09	90.30	816.41	685.0	1.50	4.8	1071.76	2.91	0.03	255.35	0.76

exp Project: 224388 - Building 500 & 600 DATE: December 11 2015
Location: 3020 Hawthorne
Client: Controlex

Table 503. Storage Requirements for Area A501 (Building 500)

Area	**0.94**	hectares
5 YR Runoff Coefficient =	**0.90**	post development
100 YR Runoff Coefficient =	**1.00**	post development

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Controlled Release	Net Runoff To Be Stored (L/s)	Storage Req'd m3
5 Year	10	104.19	245.83	37.7	208.1	124.9
	20	70.25	165.75	37.7	128.0	153.6
	30	**53.93**	**127.24**	**37.7**	**89.5**	**161.1**
	40	44.18	104.25	37.7	66.5	159.7
	50	37.65	88.84	37.7	51.1	153.4
100 Year	30	91.87	240.84	37.7	203.1	365.6
	40	75.15	197.00	37.7	159.3	382.3
	50	63.95	167.66	37.7	129.9	389.8
	60	**55.89**	**146.53**	**37.7**	**108.8**	**391.7**
	70	49.79	130.53	37.7	92.8	389.8

Table 504. Storage Requirements for Area A502-A507 (CBMH 411)

Area	**0.48**	hectares
5 YR Runoff Coefficient =	**0.90**	post development
100 YR Runoff Coefficient =	**1.00**	post development

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Controlled Release	Net Runoff To Be Stored (L/s)	Storage Req'd m3
5 Year	10	104.19	125.65	40.0	85.7	51.4
	20	**70.25**	**84.72**	**40.0**	**44.7**	**53.7**
	30	53.93	65.03	40.0	25.0	45.1
	40	44.18	53.28	40.0	13.3	31.9
	50	37.65	45.41	40.0	5.4	16.2
100 Year	10	178.56	239.26	40.0	199.3	119.6
	20	119.95	160.73	40.0	120.7	144.9
	30	**91.87**	**123.10**	**40.0**	**83.1**	**149.6**
	40	75.15	100.69	40.0	60.7	145.7
	50	63.95	85.70	40.0	45.7	137.1

Table 505. Storage Requirements for Area A508 (CB413)

Area	**0.21**	hectares
5 YR Runoff Coefficient =	**0.90**	post development
100 YR Runoff Coefficient =	**1.00**	post development

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Controlled Release	Net Runoff To Be Stored (L/s)	Storage Req'd m3
5 Year	**10**	**104.19**	**55.01**	**25.0**	**30.0**	**18.0**
	20	70.25	37.09	25.0	12.1	14.5
	30	53.93	28.47	25.0	3.5	6.2
	40	44.18	23.33	25.0	-1.7	-4.0
	50	37.65	19.88	25.0	-5.1	-15.4
100 Year	**10**	**178.56**	**104.74**	**25.0**	**79.7**	**47.8**
	40	75.15	44.08	25.0	19.1	45.8
	50	63.95	37.51	25.0	12.5	37.5
	60	55.89	32.79	25.0	7.8	28.0
	70	49.79	29.21	25.0	4.2	17.7

Table 506. Storage Requirements for Area A509 (CBMH 416)

Area	**0.39**	hectares
5 YR Runoff Coefficient =	**0.90**	post development
100 YR Runoff Coefficient =	**1.00**	post development

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Controlled Release	Net Runoff To Be Stored (L/s)	Storage Req'd m3
5 Year	**10**	**104.19**	**100.37**	**75.0**	**25.4**	**15.2**
	20	70.25	67.67	75.0	-7.3	-8.8
	30	53.93	51.95	75.0	-23.1	-41.5
	40	44.18	42.56	75.0	-32.4	-77.9
	50	37.65	36.27	75.0	-38.7	-116.2
100 Year	**10**	**178.56**	**191.11**	**75.0**	**116.1**	**69.7**
	20	119.95	128.38	75.0	53.4	64.1
	30	91.87	98.33	75.0	23.3	42.0
	40	75.15	80.43	75.0	5.4	13.0
	50	63.95	68.45	75.0	-6.5	-19.6

exp Project: 224388 - Building 500 & 600
Location: 3020 Hawthorne
Client: Controlex

DATE: December 11 2015

Table 603. Storage Requirements for Area A301-A305 (CBMH 402)

Area	**0.77**	hectares
5 YR Runoff Coefficient =	**0.74**	post development
100 YR Runoff Coefficient =	**0.93**	post development

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Controlled Release	Net Runoff To Be Stored (L/s)	Storage Req'd m3
5 Year	10	104.19	166.12	54.2	111.9	67.2
	20	70.25	112.00	54.2	57.8	69.4
	30	53.93	85.98	54.2	31.8	57.2
	40	44.18	70.44	54.2	16.2	39.0
	50	37.65	60.03	54.2	5.8	17.5
100 Year	10	178.56	355.85	54.2	301.7	181.0
	20	119.95	239.05	54.2	184.9	221.8
	30	91.87	183.09	54.2	128.9	232.0
	40	75.15	149.76	54.2	95.6	229.3
	50	63.95	127.45	54.2	73.3	219.8

Table 604. Storage Requirements for Area A306 (CB 44)

Area	**0.20**	hectares
5 YR Runoff Coefficient =	**0.73**	post development
100 YR Runoff Coefficient =	**0.92**	post development

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Controlled Release	Net Runoff To Be Stored (L/s)	Storage Req'd m3
5 Year	10	104.19	42.09	62.0	-19.9	-11.9
	20	70.25	28.38	62.0	-33.6	-40.3
	30	53.93	21.78	62.0	-40.2	-72.4
	40	44.18	17.85	62.0	-44.2	-106.0
	50	37.65	15.21	62.0	-46.8	-140.4
100 Year	10	178.56	90.16	62.0	28.2	16.9
	20	119.95	60.57	62.0	-1.4	-1.7
	30	91.87	46.39	62.0	-15.6	-28.1
	40	75.15	37.94	62.0	-24.1	-57.7
	50	63.95	32.29	62.0	-29.7	-89.1

Table 605. Storage Requirements for Area A307 (BLDG 300)

Area	**0.94**	hectares
5 YR Runoff Coefficient =	**0.90**	post development
100 YR Runoff Coefficient =	**1.00**	post development

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Controlled Release	Net Runoff To Be Stored (L/s)	Storage Req'd m3
5 Year	10	104.19	244.01	37.6	206.4	123.8
	20	70.25	164.52	37.6	126.9	152.3
	30	53.93	126.29	37.6	88.7	159.6
	40	44.18	103.47	37.6	65.9	158.1
	50	37.65	88.18	37.6	50.6	151.7
100 Year	30	91.87	239.05	37.6	201.4	362.6
	40	75.15	195.53	37.6	157.9	379.0
	50	63.95	166.41	37.6	128.8	386.4
	60	55.89	145.44	37.6	107.8	388.2
	70	49.79	129.56	37.6	92.0	386.2

Table 606. Storage Requirements for Area A308-310 (CBMH 407)

Area	**0.27**	hectares
5 YR Runoff Coefficient =	**0.90**	post development
100 YR Runoff Coefficient =	**1.00**	post development

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Controlled Release	Net Runoff To Be Stored (L/s)	Storage Req'd m3
5 Year	30	53.93	36.03	10.0	26.0	46.8
	40	**44.18**	**29.52**	**10.0**	**19.5**	**46.8**
	50	37.65	25.15	10.0	15.2	45.5
	60	32.94	22.01	10.0	12.0	43.2
	70	29.37	19.62	10.0	9.6	40.4
100 Year	**70**	**49.79**	**36.96**	**10.0**	**27.0**	**113.2**
	80	44.99	33.39	10.0	23.4	112.3
	90	41.11	30.52	10.0	20.5	110.8
	100	37.90	28.13	10.0	18.1	108.8
	110	35.20	26.13	10.0	16.1	106.5

Table 607. Storage Requirements for Area A601 (Building)

Area	**0.55**	hectares
5 YR Runoff Coefficient =	**0.90**	post development
100 YR Runoff Coefficient =	**1.00**	post development

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Controlled Release	Net Runoff To Be Stored (L/s)	Storage Req'd m3
5 Year	10	104.19	144.16	22.1	122.1	73.2
	20	70.25	97.20	22.1	75.1	90.1
	30	**53.93**	**74.61**	**22.1**	**52.5**	**94.5**
	40	44.18	61.13	22.1	39.0	93.7
	50	37.65	52.10	22.1	30.0	90.0
100 Year	30	91.87	141.23	22.1	119.1	214.4
	40	75.15	115.52	22.1	93.4	224.2
	50	63.95	98.32	22.1	76.2	228.7
	60	**55.89**	**85.93**	**22.1**	**63.8**	**229.8**
	70	49.79	76.54	22.1	54.4	228.7

Table 608. Storage Requirements for Area A602-A604 (CBMH416)

Area	**0.34**	hectares
5 YR Runoff Coefficient =	**0.90**	post development
100 YR Runoff Coefficient =	**1.00**	post development

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Controlled Release	Net Runoff To Be Stored (L/s)	Storage Req'd m3
5 Year	**10**	**104.19**	**89.42**	**35.0**	**54.4**	**32.7**
	20	70.25	60.29	35.0	25.3	30.3
	30	53.93	46.28	35.0	11.3	20.3
	40	44.18	37.92	35.0	2.9	7.0
	50	37.65	32.31	35.0	-2.7	-8.1
100 Year	10	178.56	170.26	35.0	135.3	81.2
	20	**119.95**	**114.38**	**35.0**	**79.4**	**95.3**
	30	91.87	87.60	35.0	52.6	94.7
	40	75.15	71.65	35.0	36.7	88.0
	50	63.95	60.98	35.0	26.0	77.9

Table 609. Storage Requirements for Area A605-606 (CBMH 415)

Area	**0.72**	hectares
5 YR Runoff Coefficient =	**0.90**	post development
100 YR Runoff Coefficient =	**1.00**	post development

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Controlled Release	Net Runoff To Be Stored (L/s)	Storage Req'd m3
5 Year	**10**	**104.19**	**187.70**	**90.0**	**97.7**	**58.6**
	20	70.25	126.55	90.0	36.6	43.9
	30	53.93	97.15	90.0	7.1	12.9
	40	44.18	79.60	90.0	-10.4	-25.0
	50	37.65	67.83	90.0	-22.2	-66.5
100 Year	10	178.56	357.40	90.0	267.4	160.4
	20	**119.95**	**240.09**	**90.0**	**150.1**	**180.1**
	30	91.87	183.88	90.0	93.9	169.0
	40	75.15	150.41	90.0	60.4	145.0
	50	63.95	128.01	90.0	38.0	114.0

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VHV/SVHV Vortex Flow Regulator

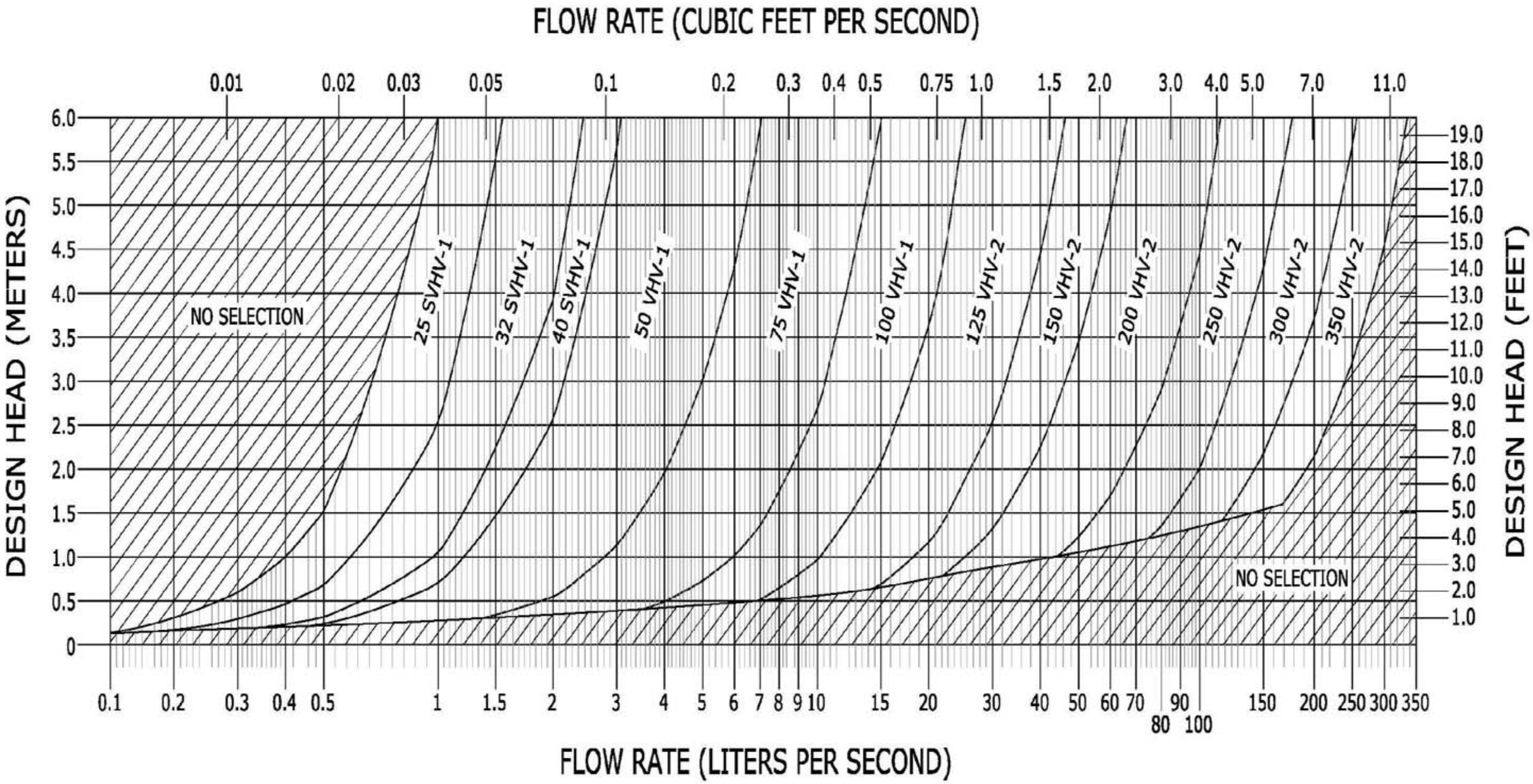


FIGURE 3

JOHN MEUNIER

Stormceptor®

Stormceptor Sizing Detailed Report

PCSWMM for Stormceptor

Project Information

Date	12/11/2015
Project Name	3020 Hawthorne - Building 500
Project Number	OTT-00224388
Location	Ottawa

Stormwater Quality Objective

This report outlines how Stormceptor System can achieve a defined water quality objective through the removal of total suspended solids (TSS). Attached to this report is the Stormceptor Sizing Summary.

Stormceptor System Recommendation

The Stormceptor System model STC 750 achieves the water quality objective removing 76% TSS for a Fine (organics, silts and sand) particle size distribution.

The Stormceptor System

The Stormceptor oil and sediment separator is sized to treat stormwater runoff by removing pollutants through gravity separation and flotation. Stormceptor's patented design generates positive TSS removal for all rainfall events, including large storms. Significant levels of pollutants such as heavy metals, free oils and nutrients are prevented from entering natural water resources and the re-suspension of previously captured sediment (scour) does not occur.

Stormceptor provides a high level of TSS removal for small frequent storm events that represent the majority of annual rainfall volume and pollutant load. Positive treatment continues for large infrequent events, however, such events have little impact on the average annual TSS removal as they represent a small percentage of the total runoff volume and pollutant load.

Stormceptor is the only oil and sediment separator on the market sized to remove TSS for a wide range of particle sizes, including fine sediments (clays and silts), that are often overlooked in the design of other stormwater treatment devices.

Small storms dominate hydrologic activity, US EPA reports
"*Early efforts in stormwater management focused on flood events ranging from the 2-yr to the 100-yr storm. Increasingly stormwater professionals have come to realize that small storms (i.e. < 1 in. rainfall) dominate watershed hydrologic parameters typically associated with water quality management issues and BMP design. These small storms are responsible for most annual urban runoff and groundwater recharge. Likewise, with the exception of eroded sediment, they are responsible for most pollutant washoff from urban surfaces. Therefore, the small storms are of most concern for the stormwater management objectives of ground water recharge, water quality resource protection and thermal impacts control.*" "*Most rainfall events are much smaller than design storms used for urban drainage models. In any given area, most frequently recurrent rainfall events are small (less than 1 in. of daily rainfall).*" *"Continuous simulation offers possibilities for designing and managing BMPs on an individual site-by-site basis that are not provided by other widely used simpler analysis methods. Therefore its application and use should be encouraged."* – US EPA Stormwater Best Management Practice Design Guide, Volume 1 – General Considerations, 2004

Design Methodology

Each Stormceptor system is sized using PCSWMM for Stormceptor, a continuous simulation model based on US EPA SWMM. The program calculates hydrology from up-to-date local historical rainfall data and specified site parameters. With US EPA SWMM's precision, every Stormceptor unit is designed to achieve a defined water quality objective.

The TSS removal data presented follows US EPA guidelines to reduce the average annual TSS load. Stormceptor's unit process for TSS removal is settling. The settling model calculates TSS removal by analyzing (summary of analysis presented in Appendix 2):

- Site parameters
- Continuous historical rainfall, including duration, distribution, peaks (Figure 1)
- Interevent periods
- Particle size distribution
- Particle settling velocities (Stokes Law, corrected for drag)
- TSS load (Figure 2)
- Detention time of the system

The Stormceptor System maintains continuous positive TSS removal for all influent flow rates. Figure 3 illustrates the continuous treatment by Stormceptor throughout the full range of storm events analyzed. It is clear that large events do not significantly impact the average annual TSS removal. There is no decline in cumulative TSS removal, indicating scour does not occur as the flow rate increases.

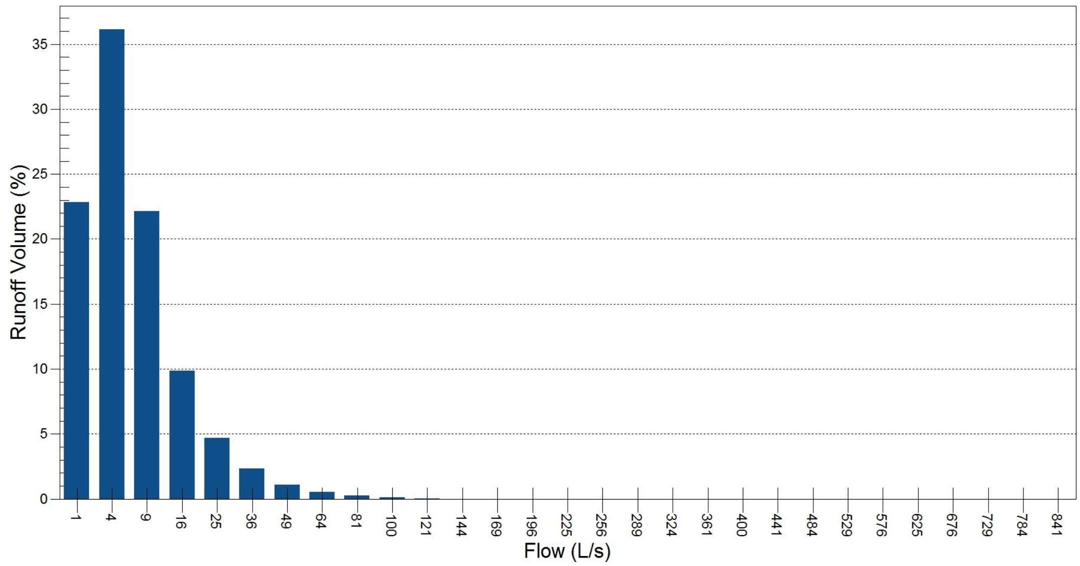


Figure 1. Runoff Volume by Flow Rate for OTTAWA MACDONALD-CARTIER INT'L A – ON 6000, 1967 to 2003 for 1.078 ha, 90% impervious. Small frequent storm events represent the majority of annual rainfall volume. Large infrequent events have little impact on the average annual TSS removal, as they represent a small percentage of the total annual volume of runoff.

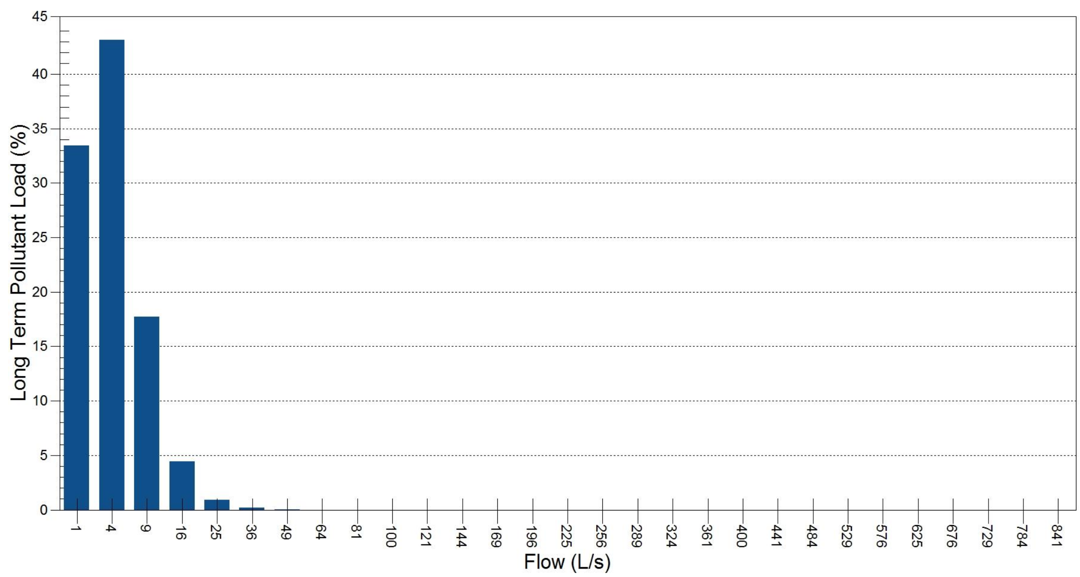
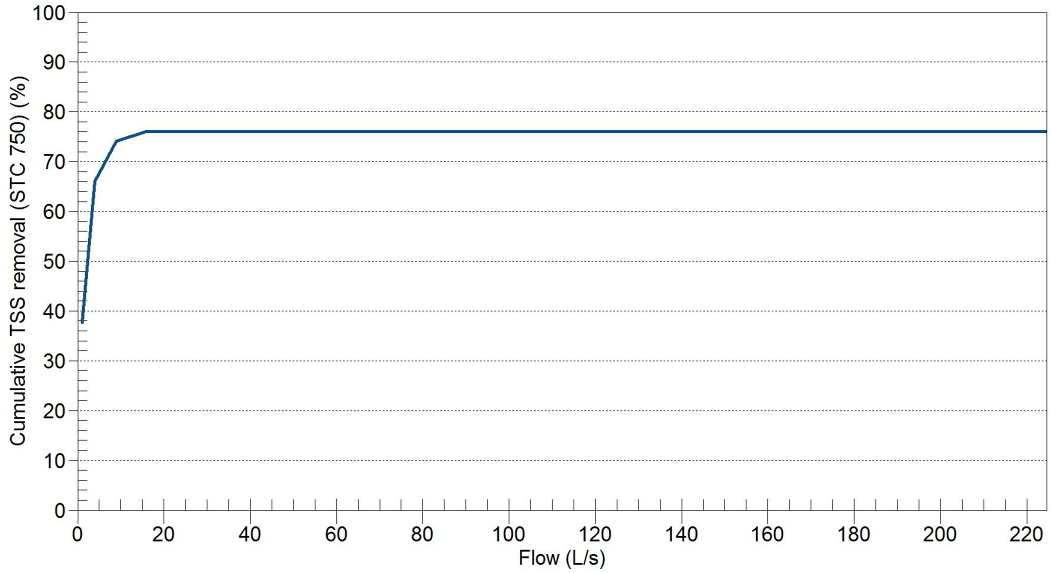


Figure 2. Long Term Pollutant Load by Flow Rate for OTTAWA MACDONALD-CARTIER INT'L A – 6000, 1967 to 2003 for 1.078 ha, 90% impervious. The majority of the annual pollutant load is transported by small frequent storm events. Conversely, large infrequent events carry an insignificant percentage of the total annual pollutant load.



Stormceptor Model	STC 750	Drainage Area (ha)	1.078
TSS Removal (%)	76	Impervious (%)	90

Figure 3. Cumulative TSS Removal by Flow Rate for OTTAWA MACDONALD-CARTIER INT'L A – 6000, 1967 to 2003. Stormceptor continuously removes TSS throughout the full range of storm events analyzed. Note that large events do not significantly impact the average annual TSS removal. Therefore no decline in cumulative TSS removal indicates scour does not occur as the flow rate increases.

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Appendix 1
Stormceptor Design Summary

Project Information

Date	12/11/2015
Project Name	3020 Hawthorne - Building 500
Project Number	OTT-00224388
Location	Ottawa

Designer Information

Company	N/A
Contact	N/A

Notes

N/A

Drainage Area

Total Area (ha)	1.078
Imperviousness (%)	90

The Stormceptor System model STC 750 achieves the water quality objective removing 76% TSS for a Fine (organics, silts and sand) particle size distribution.

Rainfall

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

Water Quality Objective

TSS Removal (%)	70

Upstream Storage

Storage (ha-m)	Discharge (L/s)
0.000	00.000
0.026	177.700
0.081	177.700

Stormceptor Sizing Summary

Stormceptor Model	TSS Removal %
STC 300	67
STC 750	**76**
STC 1000	76
STC 1500	77
STC 2000	81
STC 3000	82
STC 4000	85
STC 5000	85
STC 6000	87
STC 9000	90
STC 10000	90
STC 14000	92

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Particle Size Distribution

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

Fine (organics, silts and sand)								
Particle Size µm	Distribution %	Specific Gravity	Settling Velocity m/s		Particle Size µm	Distribution %	Specific Gravity	Settling Velocity m/s
20	20	1.3	0.0004					
60	20	1.8	0.0016					
150	20	2.2	0.0108					
400	20	2.65	0.0647					
2000	20	2.65	0.2870					

Stormceptor Design Notes

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

Inlet and Outlet Pipe Invert Elevations Differences

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

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

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Appendix 2
Summary of Design Assumptions

SITE DETAILS

Site Drainage Area

Total Area (ha)	1.078	Imperviousness (%)	90

Surface Characteristics

Width (m)	208
Slope (%)	2
Impervious Depression Storage (mm)	0.508
Pervious Depression Storage (mm)	5.08
Impervious Manning's n	0.015
Pervious Manning's n	0.25

Maintenance Frequency

Sediment build-up reduces the storage volume for sedimentation. Frequency of maintenance is assumed for TSS removal calculations.

Maintenance Frequency (months)	12

Infiltration Parameters

Horton's equation is used to estimate infiltration

Max. Infiltration Rate (mm/h)	61.98
Min. Infiltration Rate (mm/h)	10.16
Decay Rate (s^{-1})	0.00055
Regeneration Rate (s^{-1})	0.01

Evaporation

Daily Evaporation Rate (mm/day)	2.54

Dry Weather Flow

Dry Weather Flow (L/s)	No

Upstream Attenuation

Stage-storage and stage-discharge relationship used to model attenuation upstream of the Stormceptor System is identified in the table below.

Storage ha-m	Discharge L/s
0.000	00.000
0.026	177.700
0.081	177.700

PARTICLE SIZE DISTRIBUTION

Particle Size Distribution

Removing fine particles from runoff ensures the majority of pollutants, such as heavy metals, hydrocarbons, free oils and nutrients are not discharged into natural water resources. The table below identifies the particle size distribution selected to define TSS removal for the design of the Stormceptor System.

Fine (organics, silts and sand)

Particle Size µm	Distribution %	Specific Gravity	Settling Velocity m/s		Particle Size µm	Distribution %	Specific Gravity	Settling Velocity m/s
20	20	1.3	0.0004					
60	20	1.8	0.0016					
150	20	2.2	0.0108					
400	20	2.65	0.0647					
2000	20	2.65	0.2870					

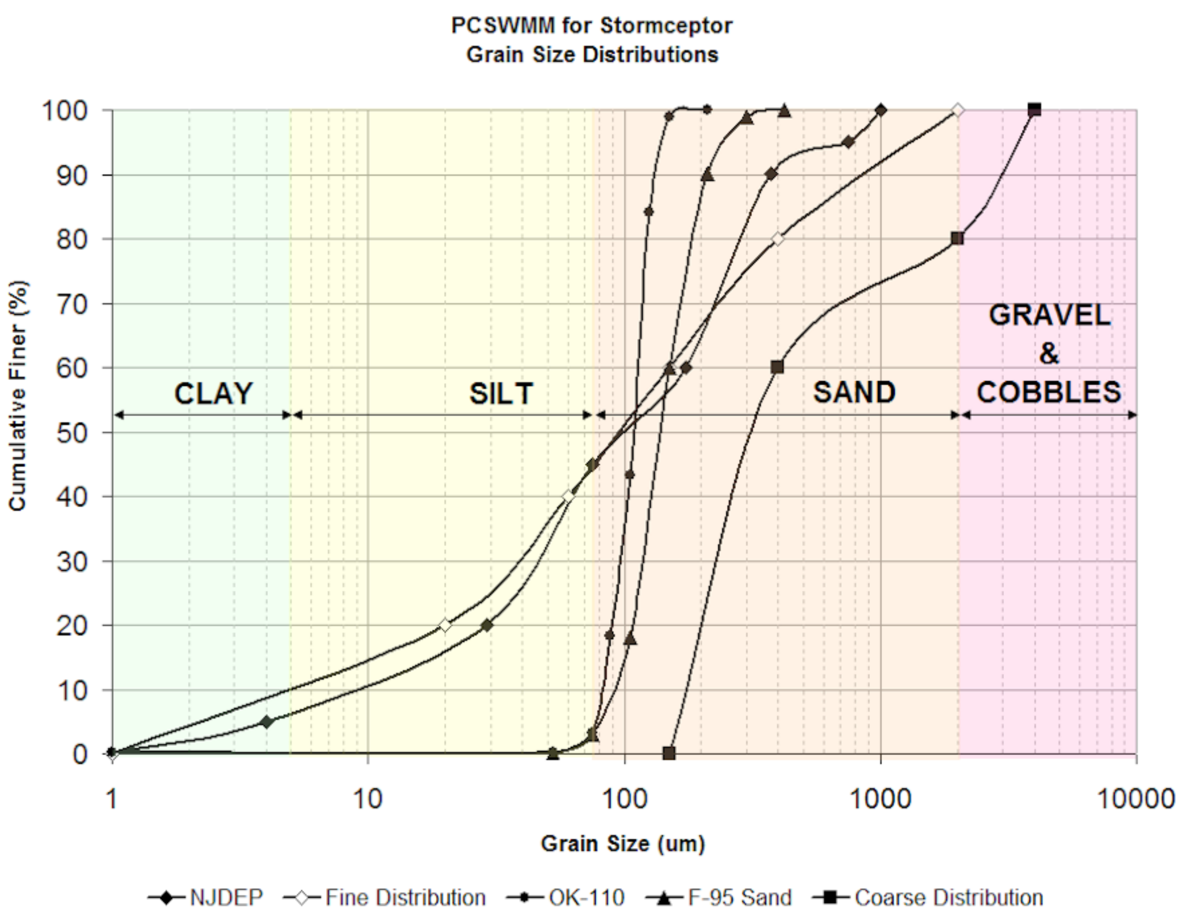

Figure 1. PCSWMM for Stormceptor standard design grain size distributions.

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TSS LOADING

TSS Loading Parameters

TSS Loading Function	Buildup / Washoff

Parameters

Target Event Mean Concentration (EMC) (mg/L)	125
Exponential Buildup Power	0.4
Exponential Washoff Exponential	0.2

HYDROLOGY ANALYSIS

PCSWMM for Stormceptor calculates annual hydrology with the US EPA SWMM and local continuous historical rainfall data. Performance calculations of the Stormceptor System are based on the average annual removal of TSS for the selected site parameters. The Stormceptor System is engineered to capture fine particles (silts and sands) by focusing on average annual runoff volume ensuring positive removal efficiency is maintained during all rainfall events, while preventing the opportunity for negative removal efficiency (scour).

Smaller recurring storms account for the majority of rainfall events and average annual runoff volume, as observed in the historical rainfall data analyses presented in this section.

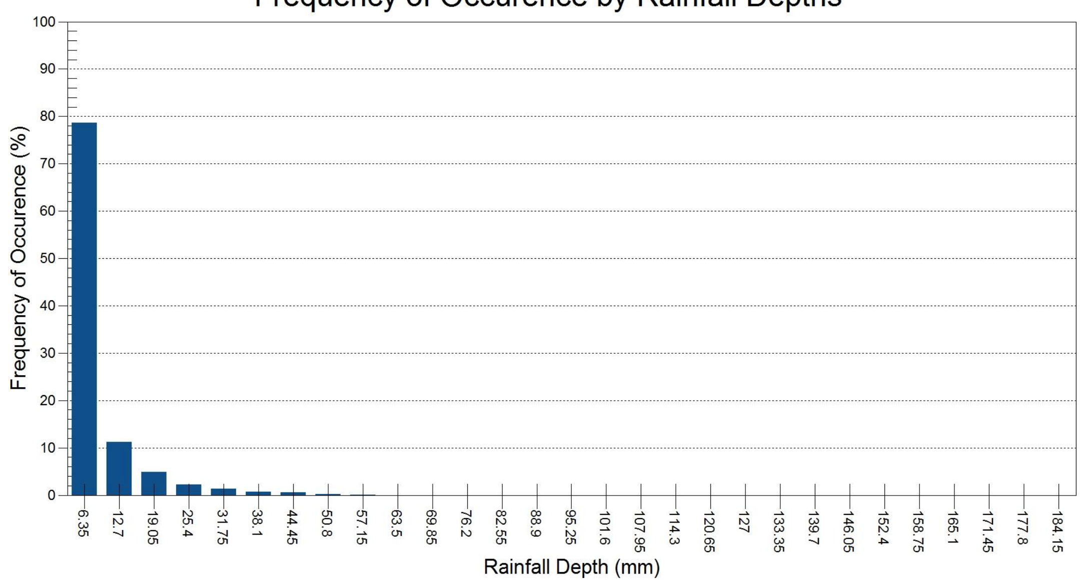
Rainfall Station

Rainfall Station	OTTAWA MACDONALD-CARTIER INT'L A		
Rainfall File Name	ON6000.NDC	Total Number of Events	4537
Latitude	45°19'N	Total Rainfall (mm)	20978.1
Longitude	75°40'W	Average Annual Rainfall (mm)	567.0
Elevation (m)	371	Total Evaporation (mm)	1804.1
Rainfall Period of Record (y)	37	Total Infiltration (mm)	2091.1
Total Rainfall Period (y)	37	Percentage of Rainfall that is Runoff (%)	81.8

Rainfall Event Analysis

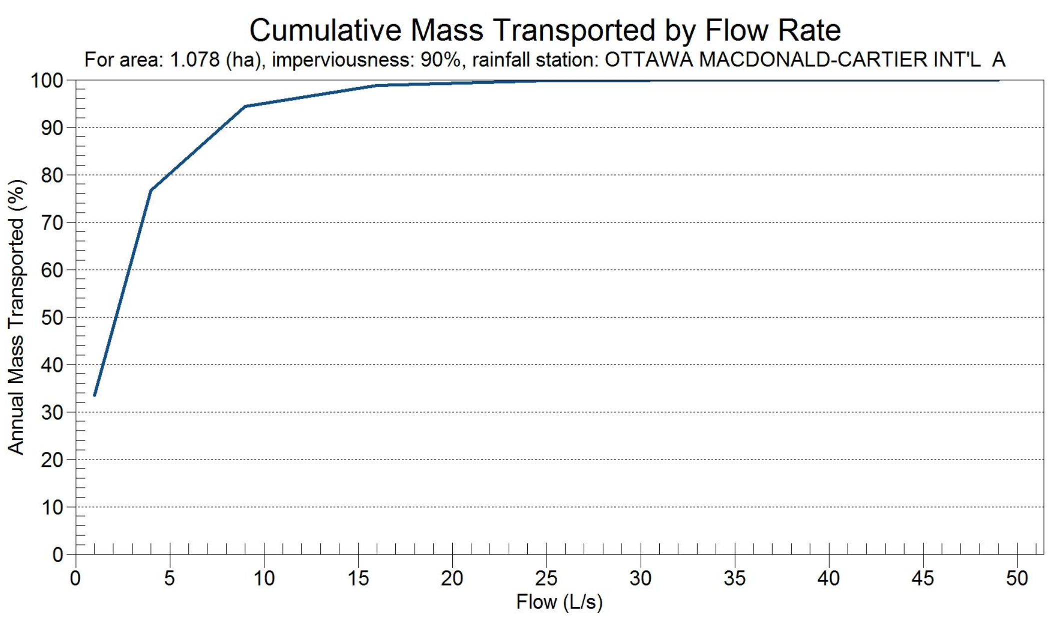
Rainfall Depth mm	No. of Events	Percentage of Total Events %	Total Volume mm	Percentage of Annual Volume %
6.35	3564	78.6	5671	27.0
12.70	508	11.2	4533	21.6
19.05	223	4.9	3434	16.4
25.40	102	2.2	2244	10.7
31.75	60	1.3	1704	8.1
38.10	33	0.7	1145	5.5
44.45	28	0.6	1165	5.6
50.80	9	0.2	416	2.0
57.15	5	0.1	272	1.3
63.50	1	0.0	63	0.3
69.85	1	0.0	64	0.3
76.20	1	0.0	76	0.4
82.55	0	0.0	0	0.0
88.90	1	0.0	84	0.4
95.25	0	0.0	0	0.0
101.60	0	0.0	0	0.0
107.95	0	0.0	0	0.0
114.30	1	0.0	109	0.5
120.65	0	0.0	0	0.0
127.00	0	0.0	0	0.0
133.35	0	0.0	0	0.0
139.70	0	0.0	0	0.0
146.05	0	0.0	0	0.0
152.40	0	0.0	0	0.0
158.75	0	0.0	0	0.0
165.10	0	0.0	0	0.0
171.45	0	0.0	0	0.0
177.80	0	0.0	0	0.0
184.15	0	0.0	0	0.0
190.50	0	0.0	0	0.0
196.85	0	0.0	0	0.0
203.20	0	0.0	0	0.0
209.55	0	0.0	0	0.0
>209.55	0	0.0	0	0.0

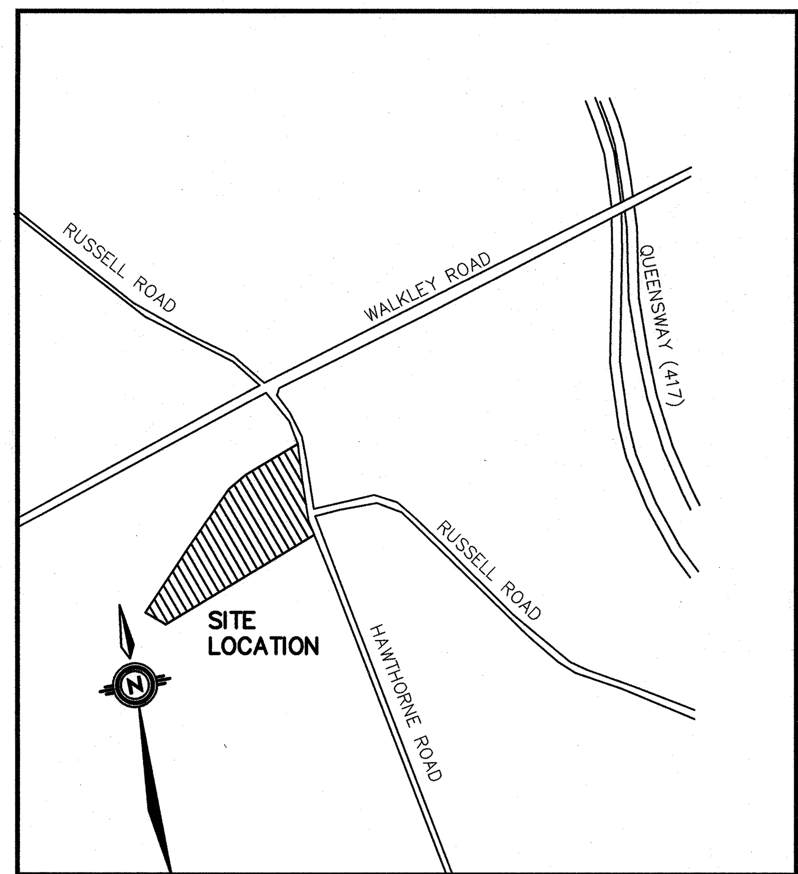
Frequency of Occurence by Rainfall Depths



Pollutograph

Flow Rate L/s	Cumulative Mass %
1	33.5
4	76.7
9	94.4
16	98.8
25	99.8
36	100.0
49	100.0
64	100.0
81	100.0
100	100.0
121	100.0
144	100.0
169	100.0
196	100.0
225	100.0
256	100.0
289	100.0
324	100.0
361	100.0
400	100.0
441	100.0
484	100.0
529	100.0
576	100.0
625	100.0
676	100.0
729	100.0
784	100.0
841	100.0
900	100.0





KEY PLAN

LEGEND

- PROPOSED HYDRANT
- PROPOSED VALVE AND VALVE BOX
- CB 1 — PROPOSED 600mm x 600mm CATCH BASIN C/W 150mm Ø PERFORATED SUBDRAIN
- CBMH 1 — PROPOSED 1200mmØ CATCH BASIN MANHOLE C/W 150mm Ø PERFORATED SUBDRAIN
- MH 401 — PROPOSED STORM MANHOLE (1200mmØ UNLESS OTHERWISE NOTED)
- MH 301 — PROPOSED SANITARY MANHOLE (1200mmØ UNLESS OTHERWISE NOTED)
- PROPOSED SITE LIGHTING
- PROPERTY LINE
- 100 YEAR PONDING AREA
- 100 YEAR PONDING LEVEL
- 5 YEAR PONDING LEVEL
- PROPOSED BUILDING ENTRANCE
- PROPOSED GRADE
- 74.65 — EXISTING ELEVATION
- 2.0% — PROPOSED SLOPE AND DRAINAGE DIRECTION
- T/G=88.45 — PROPOSED TOP OF GRATE ELEVATION
- PROPOSED RETAINING WALL
- PROPOSED BARRIER CURB
- EXISTING BUILDING ENTRANCE
- EXISTING SITE LIGHTING
- EXISTING MANHOLE
- EX CB — EXISTING CATCHBASIN
- T/G=88.45 — EXISTING TOP OF GRATE ELEVATION
- EXISTING HYDRANT
- EXISTING VALVE AND VALVE BOX
- EXISTING LIGHT POLE TO BE RELOCATED
- EMERGENCY OVERLAND FLOW ROUTE
- RUNOFF COEFFICIENT / STORM DRAINAGE AREA (0.78 | 0.06 / A301)
- STORM DRAINAGE AREA NUMBER
- STORM DRAINAGE AREA

5 AND 100 YEAR SURFACE STORAGE VOLUMES

DRAINAGE AREA ID	5 YEAR			100 YEAR		
	AREA (sq.m)	DEPTH (m)	VOLUME (cub.m)	AREA (sq.m)	DEPTH (m)	VOLUME (cub.m)
A501*	9430	0.02	161.3	9430	0.041	392.1
A502	168	0.15	8	447	0.30	44.7
A503	123	0.15	6.1	480	0.30	48
A504	159	0.15	8	485	0.30	48.5
A505	186	0.15	9.3	449	0.30	44.9
A506	156	0.15	7.8	445	0.30	45.5
A507	294	0.15	14.7	1021	0.30	102
A508	386	0.15	19.3	890	0.2	59.3
A509	466	0.15	23.3	466	0.15	23.3
A601*	5530	0.02	94.5	5530	0.041	229.8
A602	48	0.05	0.8	155	0.20	10.3
A603	196	0.10	6.5	518	0.25	43.2
A604	525	0.15	26.3	1188	0.30	118
A605	670	0.15	33.5	1280	0.30	128
A606	504	0.15	25.2	917	0.30	91.7

* - BUILDING ROOFTOP STORAGE VOLUME ASSUMED WITH UNIFORM DEPTH ACROSS ENTIRE ROOF AREA

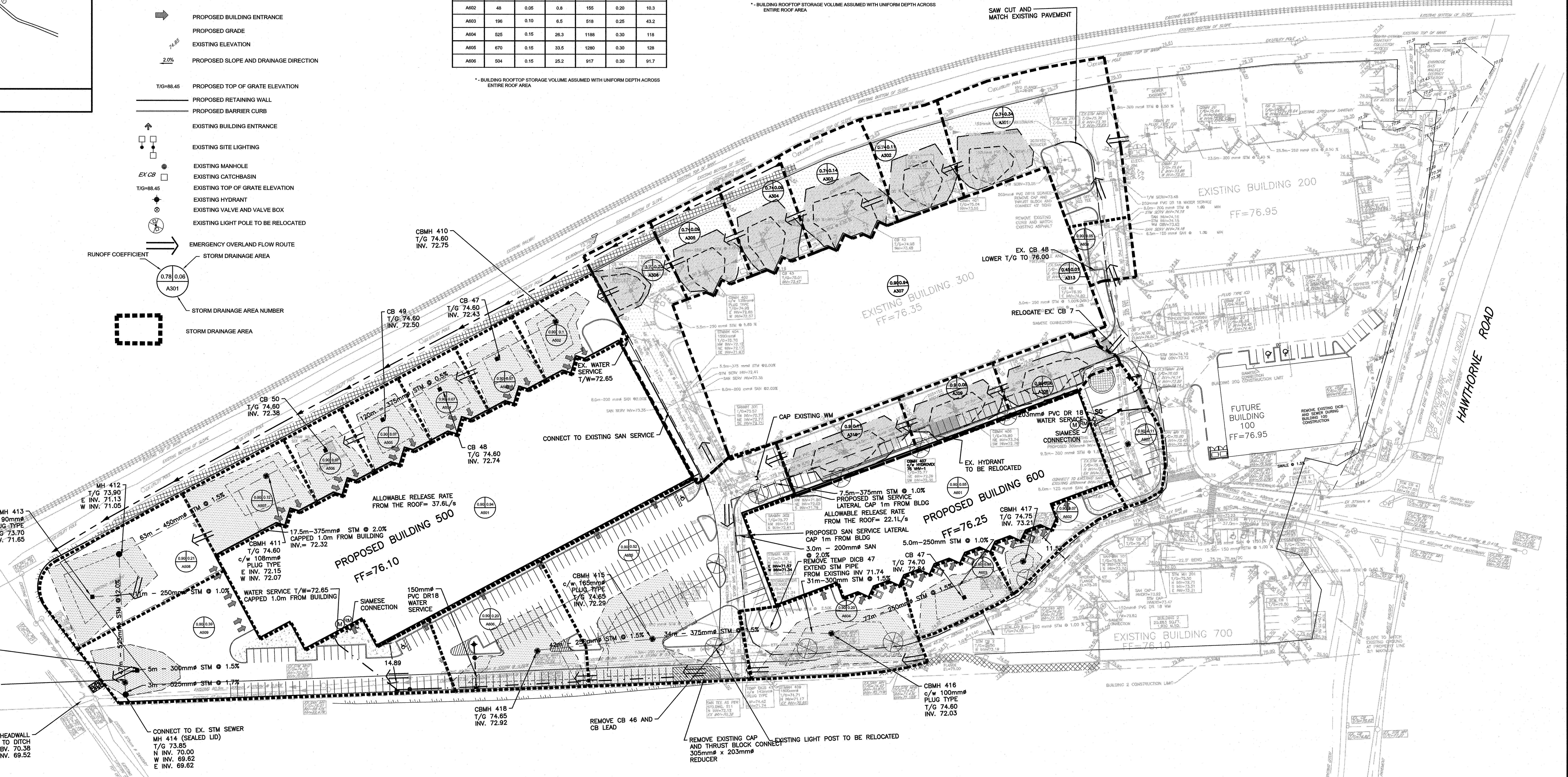
5 AND 100 YEAR SURFACE STORAGE VOLUMES

DRAINAGE AREA ID	5 YEAR			100 YEAR		
	AREA (sq.m)	DEPTH (m)	VOLUME (cub.m)	AREA (sq.m)	DEPTH (m)	VOLUME (cub.m)
A301	180	0.15	9.0	492	0.26	42.6
A302	178	0.15	8.9	475	0.26	41.2
A303	327	0.15	16.4	626	0.26	54.3
A304	189	0.15	9.5	451	0.26	39.1
A305	161	0.15	8.1	424	0.26	36.8
A306	142	0.15	7.1	254	0.20	17.0
A307*	9400	0.02	188	9400	0.041	388
A308	206	0.15	10.3	492	0.25	41.0
A309	191	0.15	9.6	476	0.25	39.7
A310	245	0.15	12.3	600	0.25	50.0

* - BUILDING ROOFTOP STORAGE VOLUME ASSUMED WITH UNIFORM DEPTH ACROSS ENTIRE ROOF AREA

ORIFICE SUMMARY

Location	Controlled Release	Outlet Pipe Dia.	Orifice Dia.	Hydrovex Model	Head on Hydrovex
CBMH 407	10.0	381	N/A	75-VHV-1	3.60
CBMH 416	35.0	305	100	N/A	N/A
BUILDING 600	22.1	381	N/A	N/A	N/A
CBMH 415	90.0	381	165	N/A	N/A
CBMH411	40.0	457	108	N/A	N/A
CB 413	25.0	254	90	N/A	N/A
CB 419	75.0	305	146	N/A	N/A
BUILDING 500	37.6	381	N/A	N/A	N/A



NOTES

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PRELIMINARY
NOT FOR CONSTRUCTION

NO.	REVISION DESCRIPTION	DATE	BY	APPD
2	REVISED ISSUE FOR SITE PLAN APPROVAL BUILDING 500 & 600	11/12/15	ML	AA
1	ISSUED FOR SITE PLAN APPROVAL BUILDING 500 & 600	09/11/15	ML	AA

SCALE 1:750

LICENSED PROFESSIONAL ENGINEER — M.A. ANSARI — PROVINCE OF ONTARIO

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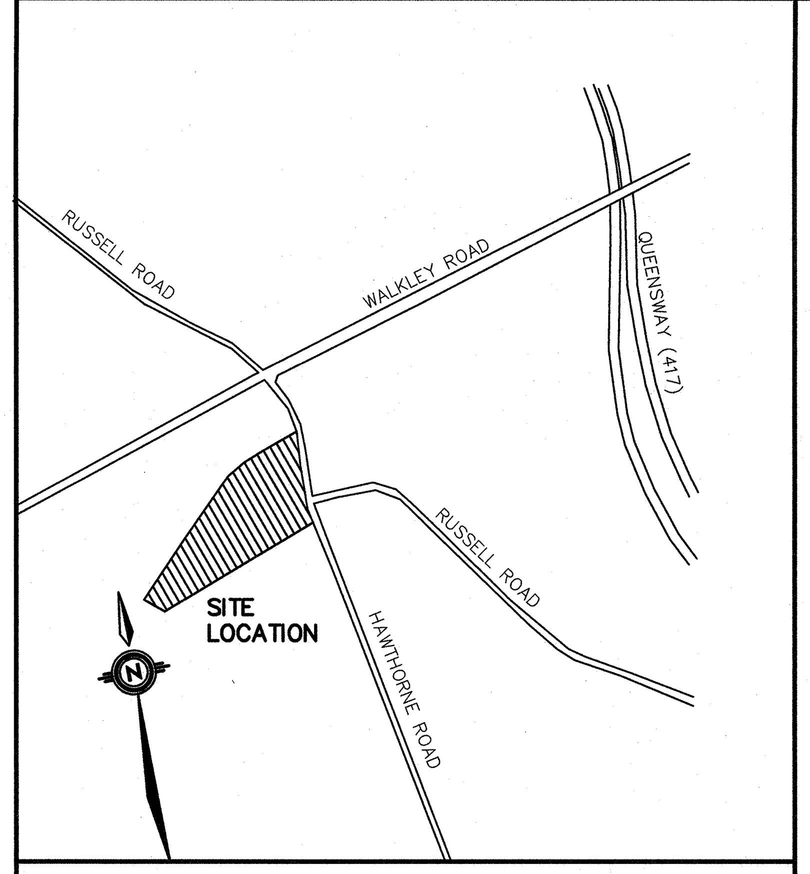
BASEPLAN	exp
DESIGN	AA/ML
CHECKED	AA
CAD	ML
PROJ. MAN	AA
APPROVED	AA

PROJECT
3020 HAWTHORNE ROAD
BUILDING 500, 600
CITY OF OTTAWA

TITLE
STORMWATER MANAGEMENT PLAN

PROJ NO.	224388
SURVEY	exp
DATE	OCT 2015
DRAWING NO.	SWM1



KEY PLAN

LEGEND

- PROPOSED HYDRANT
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- CB 1 — PROPOSED 600mm x 600mm CATCH BASIN C/W 150mm Ø PERFORATED SUBDRAIN
- CBMH 1 — PROPOSED 1200mmØ CATCH BASIN MANHOLE C/W 150mm Ø PERFORATED SUBDRAIN
- MH 401 — PROPOSED STORM MANHOLE (1200mmØ UNLESS OTHERWISE NOTED)
- MH 301 — PROPOSED SANITARY MANHOLE (1200mmØ UNLESS OTHERWISE NOTED)
- PROPOSED SITE LIGHTING
- PROPERTY LINE
- PROPOSED HEAVY DUTY ASPHALT
- EMERGENCY OVERLAND FLOW ROUTE
- PROPOSED BUILDING ENTRANCE
- 75.65 — PROPOSED GRADE
- 74.65 — EXISTING ELEVATION
- 2.0% — PROPOSED SLOPE AND DRAINAGE DIRECTION
- T/G=88.45 — PROPOSED TOP OF GRATE ELEVATION
- PROPOSED RETAINING WALL
- PROPOSED BARRIER CURB
- EXISTING BUILDING ENTRANCE
- EXISTING SITE LIGHTING
- EXISTING HEAVY DUTY ASPHALT
- EXISTING MANHOLE
- EX CB — EXISTING CATCHBASIN
- T/G=88.45 — EXISTING TOP OF GRATE ELEVATION
- EXISTING HYDRANT
- EXISTING VALVE AND VALVE BOX
- EXISTING LIGHT POLE TO BE RELOCATED

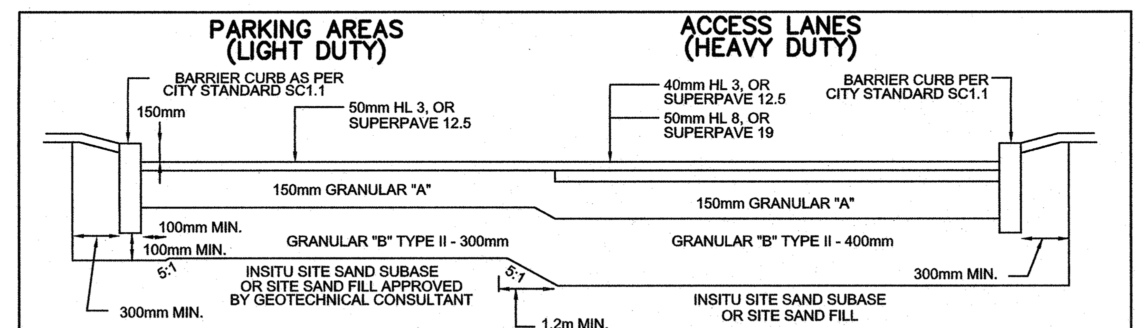
NOTES: EROSION & SEDIMENT CONTROL

1. ALL EROSION PROTECTION MEASURES SHALL BE INSPECTED DAILY AND AFTER EVERY RAINFALL.THEY SHALL BE MAINTAINED, CLEANED OUT AND REPLACED AS SOON AS SEDIMENT BUILD UP OR INCORRECT INSTALLATION IS OBSERVED BY THE CONTRACTOR OR AS REQUIRED BY THE ENGINEER, CITY OR CONSERVATION AUTHORITY. CLEAN OUT AND REPAIRS SHALL BE MAINTAINED UNTIL CONSTRUCTION IS COMPLETE AND THE SOD HAS TAKEN AND SLOPES ARE STABLE.

2. TRUCKS SHALL ONLY BE WASHED OFF AT AN APPROVED WASH OFF STATION AT AN APPROVED LOCATION ON SITE. ANY FUEL SPILLS SHALL BE CONTAINED & CLEANED UP IMMEDIATELY. THE MINISTRY OF THE ENVIRONMENT MUST BE NOTIFIED IMMEDIATELY IF A SPILL OCCURS. CONTACT THE MOE SPILLS ACTION CENTRE, 1-800-268-6060, IF OUTSIDE THE BUSINESS HOURS OF THE LOCAL MOE OFFICE. CONTAINMENT, CLEAN UP AND REMOVAL OF CONTAMINATED SOILS MUST COMPLY WITH PART X OF THE ENVIRONMENTAL PROTECTION ACT (EPA).

3. THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES, TO PROVIDE FOR PROTECTION OF THE AREA DRAINAGE SYSTEM AND THE RECEIVING WATERCOURSE, DURING CONSTRUCTION ACTIVITIES. THIS INCLUDES LIMITING THE AMOUNT OF EXPOSED SOIL, USING FILTER CLOTH UNDER THE GRATES OF CATCHBASINS AND MANHOLES AND INSTALLING SILT FENCES AND OTHER EFFECTIVE SEDIMENT TRAPS. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES MAY SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.

4. THE CONTRACTOR SHALL PROTECT ALL TREES NOT DESIGNATED FOR REMOVAL AS PER CITY SPEC. F-5651. TREES SHALL BE PROTECTED FROM: CONSTRUCTION EQUIPMENT MOVEMENTS, STOCKPILING OF ANY MATERIALS WITHIN DRIPLINES AND FROM UNNECESSARY EXCAVATION STOCKPILING OF ANY MATERIALS WITHIN DRIPLINES AND FROM UNNECESSARY EXCAVATION ENCROACHING TREE PROTECTION BARRIERS AS PER OPSD-220.01. INSPECT, MAINTAIN, REPAIR AND REPLACE AS NECESSARY UNTIL ALL CONSTRUCTION IS COMPLETE.



NOTES: REMOVE ALL ORGANICS AND DELETERIOUS MATERIALS UNDERLYING PAVEMENT CONSTRUCTION. SUPPLY AND INSTALL SUBGRADE FILL THAT HAS PRIOR APPROVAL BY GEOTECHNICAL CONSULTANT. PLACE AND COMPACT SUBGRADE FILL IN MAX 300mm LIFTS. COMPACT TO MIN. 98% SPDD.

PROOF ROLL SUBGRADE IN PRESENCE OF GEOTECHNICAL CONSULTANT. EXCAVATE SOFT AREAS AND REPLACE WITH APPROVED NATIVE OR GRANULAR MATERIAL AS DIRECTED BY GEOTECHNICAL CONSULTANT.

COMPACT GRANULARS TO MIN. 98% SPDD. SUPPLY AND PLACE WATER NECESSARY TO ACHIEVE SPECIFIED COMPACTION. INSTALLED GRANULAR "B' TO BE APPROVED BY GEOTECHNICAL CONSULTANT PRIOR TO INSTALLATION OF GRANULAR "A".

MINIMUM PERFORMANCE GRADED 58-34 ASPHALT CEMENT TO BE USED. INSTALLED GRANULAR "A"' SHALL BE APPROVED BY GEOTECHNICAL CONSULTANT PRIOR TO INSTALLATION OF ASPHALT.

PAVEMENT MAKE-UP AND INSTALLATION TO COMPLY WITH THE GEOTECHNICAL REPORT REPORT PREPARED BY PATERSON GROUP INC., DATED FEB. 6, 2013

PAVEMENT DETAIL
N.T.S.

Ottawa

NOTES

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NO.	REVISION DESCRIPTION	DATE	BY	APPD
2	REVISED ISSUE FOR SITE PLAN APPROVAL BUILDING 500 & 600	11/12/15	ML	AA
1	ISSUED FOR SITE PLAN APPROVAL BUILDING 500 & 600	09/11/15	ML	AA

SCALE 1:750

LICENSED PROFESSIONAL ENGINEER M.A. ANSARI PROVINCE OF ONTARIO

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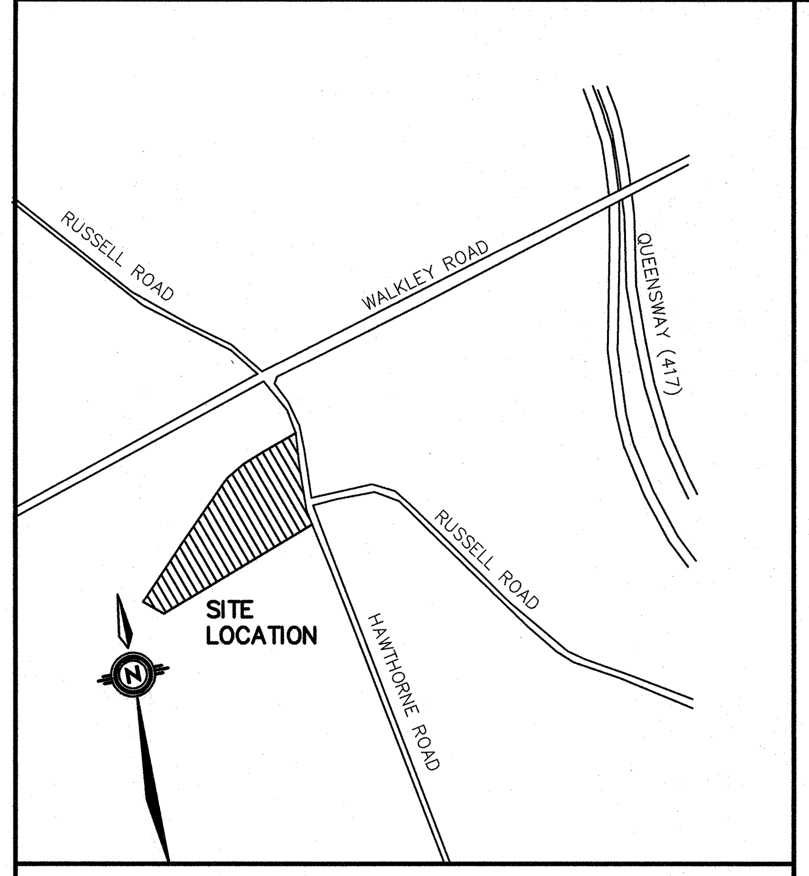
BASEPLAN	exp
DESIGN	AA/ML
CHECKED	AA
CAD	ML
PROJ. MAN	AA
APPROVED	AA

PROJECT: 3020 HAWTHORNE ROAD, BUILDING 500, 600, CITY OF OTTAWA

TITLE: GRADING AND EROSION CONTROL PLAN

PROJ. NO.	224388
SURVEY	exp.
DATE	OCTOBER 2015
DRAWING NO.	GR1



KEY PLAN

LEGEND

- PROPOSED HYDRANT
- PROPOSED VALVE AND VALVE BOX
- PROPOSED 600mm x 600mm CATCH BASIN C/W 150mm Ø PERFORATED SUBDRAIN
- PROPOSED 1200mmØ CATCH BASIN MANHOLE C/W 150mm Ø PERFORATED SUBDRAIN
- PROPOSED STORM MANHOLE (1200mmØ UNLESS OTHERWISE NOTED)
- PROPOSED SANITARY MANHOLE (1200mmØ UNLESS OTHERWISE NOTED)
- PROPOSED WATER METER
- PROPOSED REMOTE WATER METER
- PROPOSED SIAMESE CONNECTION
- PROPOSED SANITARY SEWER
- PROPOSED WATERMAIN
- PROPOSED STORM SEWER
- PROPERTY LINE
- PROPOSED SEWER EASEMENT
- PROPOSED CAP
- PROPOSED BUILDING ENTRANCE
- PROPOSED SITE LIGHTING
- PROPOSED SERVICING
- PROPOSED REDUCER
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING WATERMAIN
- EXISTING FENCE
- EXISTING UTILITY EASEMENT
- EXISTING SITE LIGHTING
- EXISTING MANHOLE
- EXISTING CATCHBASIN
- EXISTING TOP OF GRATE ELEVATION
- EXISTING HYDRANT
- EXISTING VALVE AND VALVE BOX
- EXISTING BUILDING ENTRANCE
- EXISTING LIGHT POLE TO BE RELOCATED

NOTES: SEWER

1. CATCHBASINS SHALL BE PRECAST 600 x 600 AS PER OPSD STD. 705.01, FRAMES AND COVERS SHALL BE AS PER OPSD 400.01
2. SEWER BEDDING AS PER OPSD STD. 802.03 WITH MIN. 150mm GRANULAR 'A' BEDDING COMPACTED TO 95% STANDARD PROCTOR DENSITY.
3. ALL WORK SHALL BE PERFORMED, AS APPLICABLE IN ACCORDANCE WITH CITY OF OTTAWA SPECIFICATIONS, AND IN PARTICULAR, WITH O.P.S.S. 407, AND 410.
4. ALL SANITARY SEWERS ARE TO BE THE SIZES INDICATED AND THE MATERIAL SHALL BE PVC.
5. ALL STORM SEWER TO BE PVC SDR 35 OR APPROVED EQUIVALENT.
6. ALL MANHOLES, CATCHBASINS AND CATCHBASIN MANHOLES TO BE BACKFILLED WITH MIN. 0.3m HORIZ. THICKNESS OF GRANULAR A.
7. ALL MANHOLES AND CBMH TO BE OPSD 701.010 & 701.011 COVERS TO BE PER CITY OF OTTAWA STANDARDS.
8. U/G CONTRACTOR TO CONFIRM LOCATION(S) AND ELEVATION(S) OF EXISTING SERVICES AND STRUCTURES TO BE CONNECTED TO AND EXISTING SERVICES THAT MAY CAUSE CONFLICTS PRIOR TO CONSTRUCTION OF ANY NEW SEWER, WATER AND/OR STORM WATER WORKS. THE ENGINEER SHALL BE INFORMED IMMEDIATELY OF ANY ERRORS, DISCREPANCIES, CONFLICTS, OMISSIONS etc THAT ARE
9. SUPPLY AND INSTALL ALL PIPING AND APPURTENANCES AS SHOWN TO WITHIN 1.0m OF BUILDING WALLS. PROVIDE TEMPORARY CAPS.
10. CONNECT TO CITY'S SANITARY SEWERS, USING A MANUFACTURED TEE INSTALLED AS PER STD. DWG. S11.
11. ADJUST ALL EXISTING AND PROPOSED MANHOLES TO PROPOSED GRADE.

NOTES: WATERMAIN

1. ALL WATERMAIN WORK AND MATERIAL SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STANDARDS. NO WORK SHALL COMMENCE UNLESS A CITY WATER WORKS INSPECTOR IS ON SITE.
2. INSTALLATION OF WATER METER AND REMOTE RECEPTACLE SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STANDARDS.
3. HYDRANT LOCATION AND INSTALLATION AS PER STD. DWG. W18 & W19
4. ALL WATERMAIN TO BE INSTALLED AT MINIMUM COVER OF 2.4m.
5. WATERMAIN BEDDING IS TO BE AS PER CITY OF OTTAWA DETAIL W-17.
6. CATHODIC PROTECTION REQUIRED FOR ALL IRON FITTINGS PER CITY OF OTTAWA DETAILS W-40 AND W-42.
7. IF WATERMAIN MUST BE DEFLECTED TO MEET ALIGNMENT, ENSURE THAT THE AMOUNT OF DEFLECTION USED IS LESS THAN HALF THAT RECOMMENDED BY THE MANUFACTURER.

ORIFICE SUMMARY

Location	Controlled Release	Outlet Pipe Dia.	Orifice Dia.	Hydrovex Model	Head on Hydrovex
CBMH 407	10.0	381	N/A	75-VHV-1	3.60
CBMH 416	35.0	305	100	N/A	N/A
BUILDING 600	22.1	381	N/A	N/A	N/A
CBMH 415	90.0	381	165	N/A	N/A
CBMH411	40.0	457	108	N/A	N/A
CB 413	25.0	254	90	N/A	N/A
CB 419	75.0	305	146	N/A	N/A
BUILDING 500	37.6	381	N/A	N/A	N/A

Ottawa

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1	ISSUED FOR SITE PLAN APPROVAL BUILDING 500 & 600	09/11/15	ML	AA

SCALE 1:750

LICENSED PROFESSIONAL ENGINEER — M.A. ANSARI — PROVINCE OF ONTARIO

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BASEPLAN: exp
DESIGN: AA/ML
CHECKED: AA
CAD: ML
PROJ. MAN: AA
APPROVED: AA

PROJECT: 3020 HAWTHORNE ROAD
BUILDING 500, 600
CITY OF OTTAWA

TITLE: SITE SERVICING PLAN

PROJ. NO. 224388
SURVEY: exp.
DATE: OCTOBER 2015
DRAWING NO. SS1

Appendix B–

City of Ottawa Servicing Study Checklist

4.1 General Content

☒ Executive Summary (for larger reports only).

Comments: N/A

☒ Date and revision number of the report.

Comments: Refer to front page of the Report.

☒ Location map and plan showing municipal address, boundary, and layout of proposed development.

Comments: Refer to drawings SS1, GP1 & SWM1.

☒ Plan showing the site and location of all existing services.

Comments: Refer to drawing SS1.

☒ 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.

Comments: Refer to Architectural Site Plan.

☒ Summary of Pre-consultation Meetings with City and other approval agencies.

Comments: N/A

☒ 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 defendable design criteria.

Comments: Refer to SWM and Servicing Report dated September 19, 2005 prepared by DME

☒ Statement of objectives and servicing criteria.

Comments: Refer to Section 1.0 - Introduction.

☒ Identification of existing and proposed infrastructure available in the immediate area.

Comments: Refer to drawing SS1 for location, size and depth.

☒ 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).

Comments: *N/A*

☒ Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management 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.

Comments: *Refer to drawing GP1.*

☒ 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.

Comments: *N/A*

☒ Proposed phasing of the development, if applicable.

Comments: *N/A*

☒ Reference to geotechnical studies and recommendations concerning servicing.

Comments: *N/A*

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

- ☒ Metric scale
- ☒ North arrow (including construction North)
- ☒ Key plan
- ☒ Name and contact information of applicant and property owner
- ☒ Property limits including bearings and dimensions
- ☒ Existing and proposed structures and parking areas
- ☒ Easements, road widening and rights-of-way
- ☒ Adjacent street names

Comments: *Refer to drawing SS1.*

4.2 Development Servicing Report: Water

☒ Confirm consistency with Master Servicing Study, if available

Comments: *N/A*

☒ Availability of public infrastructure to service proposed development

Comments: *Refer to section 4.0 of the servicing report.*

☒ Identification of system constraints

Comments: *N/A*

☒ Identify boundary conditions

Comments: *N/A*

☒ Confirmation of adequate domestic supply and pressure

Comments: *Refer to section 4.0 of the servicing report.*

☒ 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 at locations throughout the development.

Comments: *Refer to SWM and Servicing Report dated September 19, 2005 prepared by DME*

☒ 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.

Comments: *Refer to SWM and Servicing Report dated September 19, 2005 prepared by DME*

☒ Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design

Comments: *N/A*

☒ Address reliability requirements such as appropriate location of shut-off valves

Comments: *N/A*

☒ Check on the necessity of a pressure zone boundary modification.

Comments: *N/A*

☒ 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

Comments: *Refer to SWM and Servicing Report dated September 19, 2005 prepared by DME*

☒ Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.

Comments: *Refer to drawing SS1.*

☒ Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.

Comments: *N/A*

☒ Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.

Comments: *Refer to SWM and Servicing Report dated September 19, 2005 prepared by DME*

☒ Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.

Comments: *N/A*

4.3 Development Servicing Report: Wastewater

☒ Summary of proposed design criteria (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).

Comments: *Refer to section 5.0 of the servicing report.*

☒ Confirm consistency with Master Servicing Study and/or justifications for deviations.

Comments: *Refer to section 5.0 of the servicing report.*

☒ 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 condition of sewers.

Comments: *N/A*

☒ Description of existing sanitary sewer available for discharge of wastewater from proposed development.

Comments: *Refer to section 5.0 of the servicing 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)

Comments: *Refer to SWM and Servicing Report dated September 19, 2005 prepared by DME*

☒ Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.

Comments: *N/A*

☒ Special considerations such as contamination, corrosive environment etc.

Comments: *N/A*

4.4 Development Servicing Report: Stormwater

☒ Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)

Comments: *Refer to SWM and Servicing Report dated September 19, 2005 prepared by DME*

☒ Analysis of available capacity in existing public infrastructure.

Comments: *Refer to SWM and Servicing Report dated September 19, 2005 prepared by DME*

☒ A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.

Comments: *Refer to drawings GP1 and SWM1*

☒ Water quantity 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.

Comments: *Refer to section 7.0 of the servicing report.*

☒ Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.

Comments: *Refer to section 7.0 of the servicing report.*

☒ Description of the stormwater management concept with facility locations and descriptions with references and supporting information.

Comments: *Refer to section 8.0 of the servicing report.*

☒ Set-back from private sewage disposal systems.

Comments: *N/A*

☒ Watercourse and hazard lands setbacks.

Comments: *N/A*

☒ Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.

Comments: *N/A*

☒ Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.

Comments: *N/A*

☒ Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).

Comments: *Refer to section 7.0 and Appendix C of the servicing 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.

Comments: *N/A*

☒ 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.

Comments: *Refer to section 7.0 and Appendix A of the servicing report.*

☒ Any proposed diversion of drainage catchment areas from one outlet to another.

Comments: *No*

☒ Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.

Comments: *Refer to section 7.0 and Appendix A of the servicing report.*

☒ 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.

Comments: *N/A*

☒ Identification of potential impacts to receiving watercourses

Comments: *None*

☒ Identification of municipal drains and related approval requirements.

Comments: *N/A*

☒ Descriptions of how the conveyance and storage capacity will be achieved for the development.

Comments: *Refer to section 7.0 and Appendix C of the servicing report.*

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

Comments: *Refer to drawing SWM1.*

☒ Inclusion of hydraulic analysis including hydraulic grade line elevations.

Comments: *N/A*

☒ Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.

Comments: *Refer to section 8.0 of the servicing report.*

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

Comments: *N/A*

☒ Identification of fill constraints related to floodplain and geotechnical investigation.

Comments: *N/A*

4.5 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 the 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.

Comments:

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

Comments:

☐ Changes to Municipal Drains.

Comments:

☐ Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)

Comments:

4.6 Conclusion Checklist

☐ Clearly stated conclusions and recommendations

Comments:

☐ 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.

Comments:

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

Comments: