STORMWATER MANAGEMENT
AND
FUNCTIONAL SERVICE REPORT

FOR

HOTEL PROJECT
210 NORTH SERVICE ROAD WEST
PT 10/RP: 20R-15377

TOWN OF OAKVILLE

March 20, 2018

a.m. candaras associates inc.
8551 Weston Rd, Suite 203
Woodbridge, Ontario
L4L 9R4

Project No. 1705

a.m. candaras associates inc.
consulting engineers

TABLE OF CONTENTS

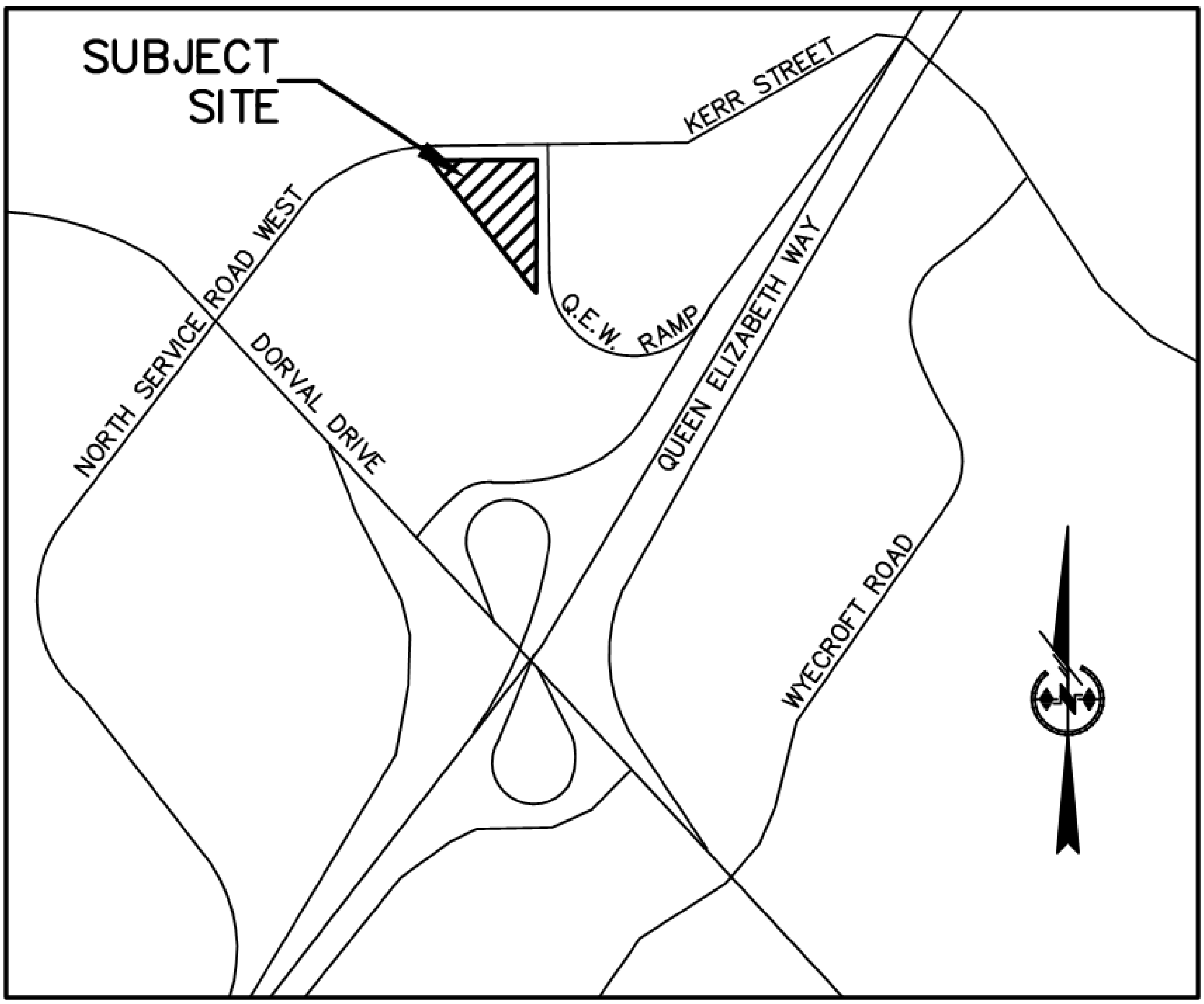
LIST OF APPENDICIES

LIST OF PLANS

1.0 INTRODUCTION

The subject site is 0.67925ha and is located within the Town of Oakville at 210 North Service Road West at the south west corner of the intersection of North Service Road West, Kerr Street and the Q.E.W. Off-ramp, refer to Figure 1. The site is currently undeveloped and will be developed with a 7-storey hotel building. Stormwater management (SWM) will consist of underground storage with no ponding on the surface. This report presents the SWM and functional servicing required to develop the site.

Figure 1 - Location Plan



2.0 DESIGN CRITERIA

a) Post to pre-development peak controls must be provided for the 2 to 100-year design storms.
b) On-site detention must be provided for the 100-year Storm Event.
c) On-site retention of the 5mm storm event volume over the impervious area is required.
d) Quality controls are to achieve 80% TSS removal as per MOEE/MNR criteria.

Refer to Appendix A for an email from the Town of Oakville summarizing the SWM criteria.

3.0 SITE DESCRIPTION

Site statistics are provided by SAI Saplys Architects Incorporated on Sheet No. ASP-100.

Roof	= 764.6m^2
Paved + Hardscape	= 3,311.1m^2
Landscape	= 2,716.8m^2
	= 6,792.5m^2

4.0 STORMWATER MANAGEMENT

4.1 Quantity Controls

4.1.1 Allowable Site Runoff

The 2-year storm peak allowable site discharge is based on pre-development conditions and is determined as follows:

$$Q_S = C \cdot A \cdot I_{2YEAR} \cdot N$$
$$= (0.25)\ (0.67925ha)\ (30.7mm/hr)\ (2.778)$$
$$= 14.5l/s$$

The 100-year storm peak allowable site discharge is based on pre-development conditions and is determined as follows:

$$Q_S = C \cdot A \cdot I_{100YEAR} \cdot N$$
$$= (0.25)\ (0.67925ha)\ (72.9mm/hr)\ (2.778)$$
$$= 34.4l/s$$

Where:

Q_s = Site Allowable Discharge Rate (l/s)

C = Runoff Coefficient

I = Intensity (mm/hr)

N = Unit Conversion Coefficient

$$I_{2yr} = \frac{725}{(T_C+4.8)^{0.808}} \quad \text{where, } T_C = 45.2\text{mins}^{(1)}$$

$$= \frac{725}{(45.2+4.8)^{0.808}}$$

$$= 30.7\text{mm/hr}$$

$$I_{100yr} = \frac{2150}{(T_C+5.7)^{0.861}} \quad \text{where, } T_C = 45.2\text{mins}^{(1)}$$

$$= \frac{2150}{(45.2+5.7)^{0.861}}$$

$$= 72.9\text{mm/hr}$$

Note: (1) T_c based on Airport Formula as follows:

$$T_c = \frac{3.26 * (1.1 - C) * L^{0.5}}{(SW)^{.33}}$$

Where

T_c = time of concentration (min)

C = Runoff Coefficient

SW = watershed slope (%): (0.85m/170m) 100 = 0.5%

L = watershed length (m): 170m

$$T_c = \frac{3.26 * (1.1 - 0.25) * (170)^{0.5}}{0.80} = 45.2\text{min}$$

4.1.2 Required Detention Volume

There will be no surface ponding and the required detention volume will be provided below the surface in StormTech chambers. Since the site flows will be provided by an orifice with limited variable head discharge relationship, the site will be controlled to the 2-year pre-development allowable rate of 14.5l/s. The SWMHYMO program was used to determine the subsurface storage volume requirements, refer to Appendix B for output.

4.1.3 Outlet Controls

An orifice plate is sized for the site and is calculated as follows:

$$Q_O = C \cdot A \cdot \sqrt{(2 \cdot g \cdot h)}$$

where:

h = HWL (top of the StormTech system, refer to Plan G1) – Inv. of Orifice

h = 118.33m – 116.88m

h = 1.45m

$$A = \frac{Q}{C \cdot \sqrt{(2 \cdot g \cdot h)}}$$

$$A = \frac{0.0145 m^3/s}{(0.63) \cdot \sqrt{(2 \cdot 9.81 m/s^2 \cdot 1.45 m)}}$$

$A = 0.0043m^2$

$$d = \sqrt{\frac{4 \cdot 0.0043 m^2}{\pi}}$$

d = 0.074m

A 74mm diameter orifice is smaller than the Town of Oakville minimum standard of 75mm. In addition, the 75mm minimum size is still susceptible to clogging. Therefore, a Hydrobrake 14”x16” Fluidic-AMP with a 150mm outlet diameter will be used to control the flows leaving the development. Based on this flow control device, the maximum flow to leave the site is 12.6l/s, refer to Appendix A for specifications and head-discharge curve.

4.1.4 Detention Volume Provided

The detention volume will be provided below the surface in 160 StormTech SC-740 chambers, refer to Plan G1 for details and the configuration of the chambers, and Appendix A for details of the StormTech chambers, respectively. Based on the Fluidic-AMP flow control device and the StormTech chamber configuration, a stage-storage-discharge relationship was established, refer to Appendix A for details.

SWMHYMO program was used to assess the performance of the on-site detention system using the stage-storage-discharge relationship, refer to Appendix B for the program output. Based on the program output, the system controls the peak 100-year flow down to 12l/s and requires $303.3m^3$ of detention storage while providing a total of $309.0m^3$ detention storage.

4.2 Water Balance

The Sixteen Mile Creek Watershed Plan requires that the 5.0mm storm be retained on-site. The volume to be retained is calculated as follows:

$$\left(\frac{5.0\text{mm}}{1000}\right) \text{x } 6{,}792.5\text{m}^2$$

$$= 34.0\text{m}^3$$

A 25.0m long x 2.4m wide x 1.5m deep stone trench will provide a total retention storage volume of 36.0m^3, using a void ratio of 40%. Sizing calculations for the infiltration trenches are shown on Plan G1. A goss trap will be provided at the inlet of MH 8 on the perforated pipe to trap any floatables in the runoff. An infiltration manhole will be provided (MH 7) for the inspection and servicing of the trenches. A bypass pipe is provided above the top of the infiltration trench to convey the flow after the trench fills up.

Based on a geotechnical report prepared by V. A. Wood Associates Limited dated March 2018, BH 2 was the closest borehole to the proposed infiltration trench. There was no groundwater encountered up to a maximum borehole depth of 4.8m (≈114.70), refer to excerpt in Appendix C. The established soil infiltration rate was determined at BH 2 to be 30mm/hr at a depth of 3.0m below the existing ground with similar soils extending to the bottom of the infiltration trench. This is a higher infiltration rate than the MOE minimum of 15mm/hr. Refer to Appendix C for report excerpts of boreholes and infiltration rates. The infiltration trench has a top of 117.50 and a bottom of 116.00, refer to Plan G1.

4.3 Quality Controls

Quality controls are to be provided which meets 80% TSS removal. An oil grit separator was sized to provide the required 80% TSS removal. Based on the proposed site characteristics, an Stormceptor STC 1000 was provided to achieve the quality control. Refer to the Stormceptor sizing design summary in Appendix A for design details and unit specifications, respectively.

4.4 Storm Service

There is no existing storm service connection provided to service the site. A storm drainage area plan and plan and profile drawings were provided by the Town of Oakville which shows the subject site draining to the east to an existing 750mm storm where it outlets into Sixteen Mile Creek, refer to Storm Drainage Area Plan S1 for in Appendix C for reference.

To service the site, the following is proposed, as indicated on Plan G1:

- Remove 2.3m of an existing 300mm PVC storm pipe between existing manhole “Ex. MH 100” and existing manhole “Ex. CBMH 101” and replace it with a 375mm PVC storm pipe while maintaining the existing pipe slope;
- Remove 55.6m an existing 300mm PVC storm pipe @ 1.79% between existing catchbasin manhole “Ex. CBMH 101” and existing manhole “Ex. CB 102” and replace it with a 375mm PVC storm pipe @ 1.00%;
- Remove existing catchbasin “Ex. CB 102” and replace with catchbasin manhole “CBMH 17”.
- Install a 250mm PVC storm pipe @ 1.0% (capacity = 59.5l/s) between manhole “MH 1”, located at the property line, and “CBMH 17”.

5.0 SANITARY

5.1 Post-Development Flow Rate

The design flow for the site, based on the site area of 0.67925ha and using the Halton Region Water & Wastewater Linear Design Manual (May 2014), is calculated as follows:

Design Flow	=	Average Dry Weather Flow	x	Average Peak Wastewater Flow Factor	+	Infiltration Allowance

<u>Average Dry Weather Flow (based on Apartments over 6 stories high)</u>

= 285persons/ha x 0.67925ha

= 193.6 persons

or

As per Site Statistics, the hotel is to have 114 rooms. Assuming 2 people per room, the total population is determined as follows:

= 114 rooms x 2persons/room

= 228 persons **<<governs>>**

228 persons x 0.003183x10^{-3}m^{3}/person/s

= 0.0007257m^{3}/s

<u>Average Peak Wastewater</u>

$$= \text{M} = \left(1 + \left(\frac{14}{4+\sqrt{Pe}}\right)\right)$$

Where = P = 228 persons

$$= \text{M} = \left(1 + \left(\frac{14}{4+\sqrt{0.228}}\right)\right)$$

= 4.13

<u>Infiltration Allowance</u>

= 0.286x10^{-3}m^{3}/ha/s x 0.67925ha

= 0.000194m^{3}/s

Design Flow

= (0. 0007257m^3/s x 4.13) + 0.000194m^3/s

= 0.000319m^3/s

= 3.19l/s

5.2 Sanitary Service

There is no existing sanitary service connection provided to service the site, nor is there a sanitary sewer on North Service Road West across the frontage of the property. Plan and profile drawings were provided by the Town of Oakville which shows the closest existing sanitary sewer being a 300mm diameter draining west from existing manhole “MH16A”, as indicated on Plan G1.

To service the site, the following is proposed, as indicated on Plan G1:

- Break into existing manhole “MH16A” and install 91.7m of a 300mm sanitary pipe @ 0.25%;
- Install sanitary manhole MH 1A;
- Install a 200mm PVC sanitary pipe @ 1.0% (capacity = 32.8l/s) between manhole “MH 2A”, located at the property line, and manhole “MH 1A”.

6.0 WATER

6.1 Water Demand

The design water demand for the site, based on the site area of 0.67925ha and using the Halton Region Water & Wastewater Linear Design Manual (May 2014), is as follows:

Maximum Daily Demand (based on Apartments over 6 stories high)

= $78.375m^3$/ha/day x 0.67925ha
= $53.2m^3$/day
= 9.8USgpm

= 9.8USgpm x 4.00 (Residential Peaking Factor)
= 39.2USgpm (148.4l/min)

6.2 Fire Flow Demand

The proposed development consists of one building, will consist of ordinary construction and will be sprinklered. The fire flow demand is calculated based on the Fire Underwriters Survey as follows:

<u>Estimate of required fire flow:</u>

$$F_1 = 220 \cdot C \cdot \sqrt{A}$$

$$F_1 = 220 \cdot (1.0) \cdot \sqrt{765m^2}$$

$$F_1 = 6{,}083 \frac{l}{min}; F_2 = 6{,}000 \frac{l}{min}$$

Where:

F = Required fire flow (l/min)
C = Type of construction coefficient (1.0 = ordinary construction)
A = Total building area (m^2)

<u>Occupancy Reduction:</u>

As per the Fire Underwriters Survey, a Hotel is considered a “Low Hazard Occupancy” and therefore, can be reduced by 25%.

Sprinkler Reduction:

The required fire flow can also be reduced by 30% as the building will include a sprinkler system (NFPA 13).

Exposure Charges:

North Side (>45m)	= 0%
South Side (>45m)	= 0%
East Side (>45m)	= 0%
West Side (30.1m – 45m)	= 5%
Total exposure charge	**= 5%**

Final Fire Flow

F_{final} = F_2 – (F_2 · (25%+30%)) + (F_2 · 45%)

= 6,000l/min – (6,000l/min · (25%+30%)) + (6,000l/min · 5%)

= 3,000l/min = 3,000l/min

Fire Flow + Max Day required water flow at a minimum of 20psi

= 3,000l/min + 148.4l/min

= 3,148.4l/min = **832USgpm**

6.3 Water Supply

Fire flow tests were performed determine if there is sufficient pressure in the existing system to satisfy the minimum Halton Region requirements for the site. The results of the hydrant flow test are provided in Appendix C, and the available flow at 20psi is determined using the larger of the flow tests as follows:

$$Q_R = Q_F \cdot \left(\frac{H_R}{H_F}\right)^{0.54}$$

Where:

Q_R = Rated capacity at 20psi (in USgpm)

Q_F = Total test flow

H_R = Static pressure minus 20psi at Q_F

H_F = Static pressure minus residual pressure

Table 1 - Flow Test – Two 2.5” Ports

Parameter	Value
Static Pressure	66psi
Residual Pressure	64psi
Test Flow Rate	2,276USgpm (8,616l/min)

$$Q_R = 2{,}276 \cdot \left(\frac{(66-20)}{(66-64)}\right)^{0.54}$$

$$Q_R = 12{,}373.9\text{USgpm} \;\; (46{,}840\text{l/min})$$

Therefore, the anticipated flow available from the existing 600mm watermain at 20psi is 12,373.9USgpm or 46,840l/min, which exceeds the total water demand of 832USgpm or 3,148.4l/min.

6.4 Water Service

A proposed 100mm domestic and 200mm fire service connection will be provided from the existing 600mm watermain on North Service Road. The water service connections are to be installed as per Region of Halton Standard 409.01. There is an existing fire hydrant located at the corner of North Service Road and the QEW off ramp which is 40m away from the proposed siamese connection, as shown on Plan G1.

Prepared by,

a.m. candaras associates inc.

LICENSED PROFESSIONAL ENGINEER
A. M. CANDARAS
PROVINCE OF ONTARIO

A.M. Candaras, P.Eng.
Consulting Engineer

Zachary Schwisberg, EIT
March 20, 2018

N:\Secretary\2017\1705\SWM & FSR\1705-SWM & FSR.001.docx

APPENDIX A – SUPPORTING DOCUMENTS

- Town of Oakville – Stormwater Management Criteria
- Fluidic Amp Details and Specifications
- StormTech SC-740 Details and Specifications
- StormTech System Stage-Storage-Discharge Relationship
- Stormceptor Design Summary
- Stormceptor STC 1000 Specifications

Zachary Schwisberg

From: Rita Juliao <rita.juliao@oakville.ca>
Sent: Monday, March 13, 2017 11:37 AM
To: Zachary Schwisberg
Cc: Charles McConnell; Paul Barrette; Philip Kelly
Subject: RE: 1705-Site Development-Sixteen Mile Creek (210 North Service Road)
Attachments: Fw: 1705-Site Development-Sixteen Mile Creek (210 North Service Road)

Hi Zach,
Sorry for the wait. I was away last week.

Stormwater Criteria for the site should follow the Sixteen Mile Creek subwatershed recommendations (see attached) and flagged for your ease of reference. Please note that onsite retention of the 5mm storm event volume over the impervious area is required. We encourage the application of low-impact-development techniques in landscape areas to meet the on-site storage criteria. Please refer to the Credit Valley Conservation Authority LID Design Manual for guidance on the selection, design, implementation of LIDs.

In addition to the development criteria attached for water quality, flooding and water balance, we require that the capacity of the existing storm infrastructure not be negatively impacted or changed (i.e. maintain the current level of service) by development. The Town's storm infrastructure information identifies an existing 450mm storm lateral from the site. I am assuming that you would be using this connection to the municipal storm sewer to discharge flows from your site? Please confirm. Post to pre-development peak flow controls for the 2-100 year design storm events is required and shall not exceed the free flow capacity of the existing storm lateral to the municipal sewer. The submission must demonstrate that the capacity of the existing infrastructure will not been exceeded.

If you have any questions or concerns, please let me know.

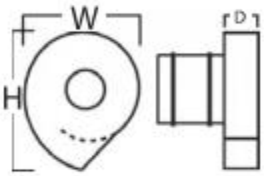
Regards,
Rita

Rita Juliao, P. Eng.
Water Resources Engineer
Development Engineering
Town of Oakville | 905-845-6601 ext.3025 | f: 905-338-4414 | www.oakville.ca

Fluidic-Amp™

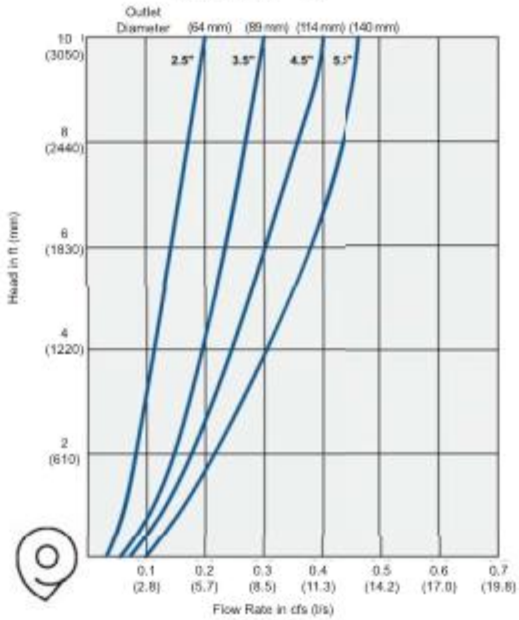
Sizes and configurations

Dimensions given are approximate outside measurements.

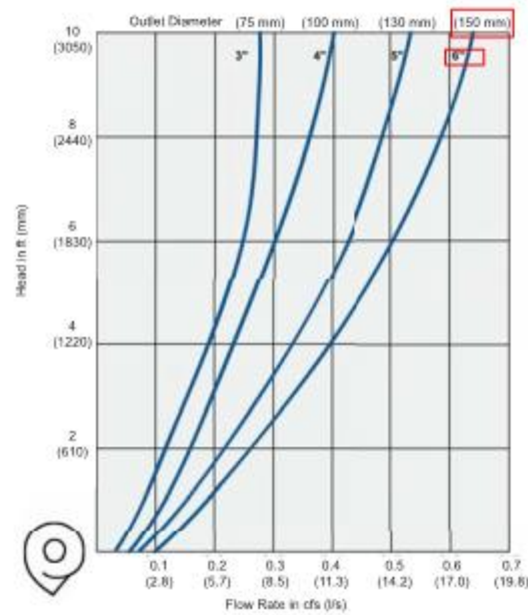


Model	Width (W)		Height (H)		Depth (D)	
	in	mm	in	mm	in	mm
12"x14"	12	305	13.8	351	4	102
14"x16"	14.5	368	16.75	425	4.5	114
17"x19"	16.75	425	19.5	495	5.5	140
20"x23"	20.25	514	23.5	597	6.5	165

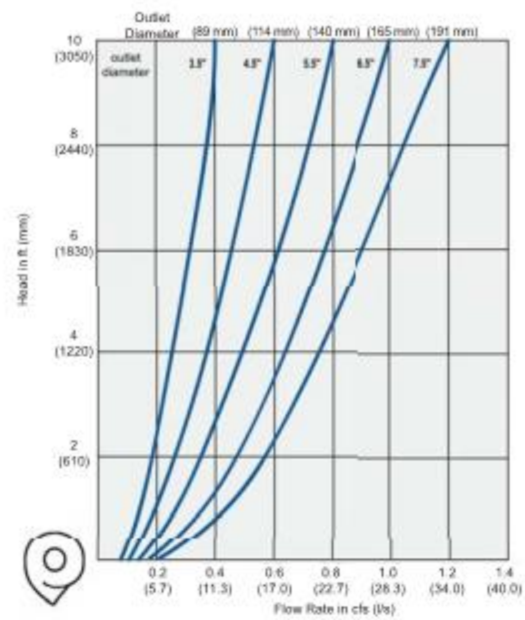
24" x 14" Fluidic-AMP
Max Sphere = 2.5"



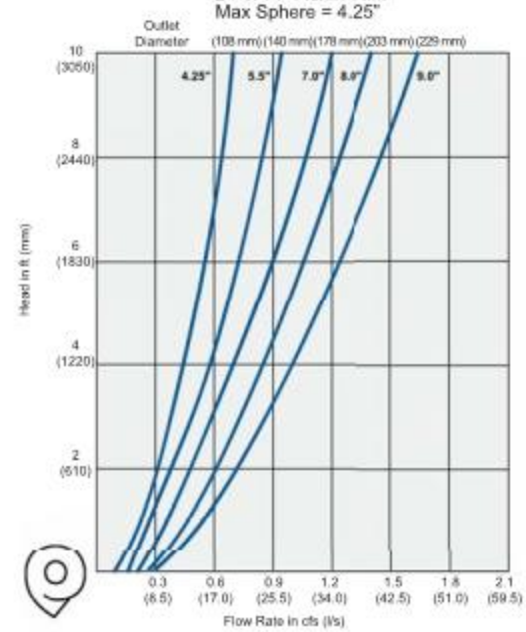
14" x 16" Fluidic-AMP
Max Sphere = 3"



17" x 19" Fluidic-AMP
Max Sphere = 3.5"

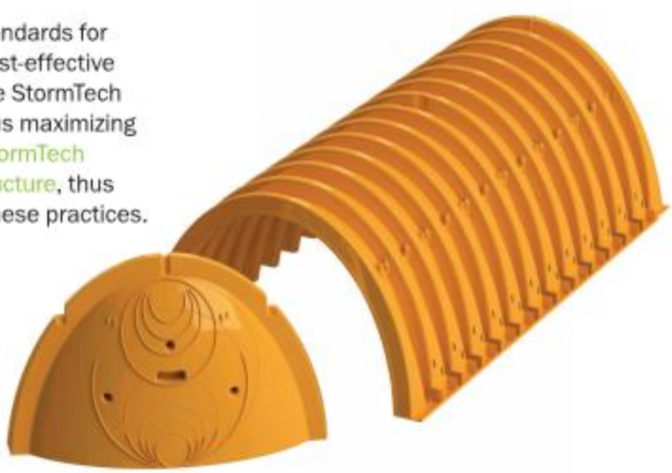


24" x 14" Fluidic-AMP
Max Sphere = 4.25"



STORMTECH SC-740 CHAMBER

Designed to meet the most stringent industry performance standards for superior structural integrity while providing designers with a cost-effective method to save valuable land and protect water resources. The StormTech system is designed primarily to be used under parking lots, thus maximizing land usage for private (commercial) and public applications. StormTech chambers can also be used in conjunction with Green Infrastructure, thus enhancing the performance and extending the service life of these practices.



STORMTECH SC-740 CHAMBER

(not to scale)

Nominal Chamber Specifications

Size (L x W x H)
85.4" x 51" x 30"
2,170 mm x 1,295 mm x 762 mm

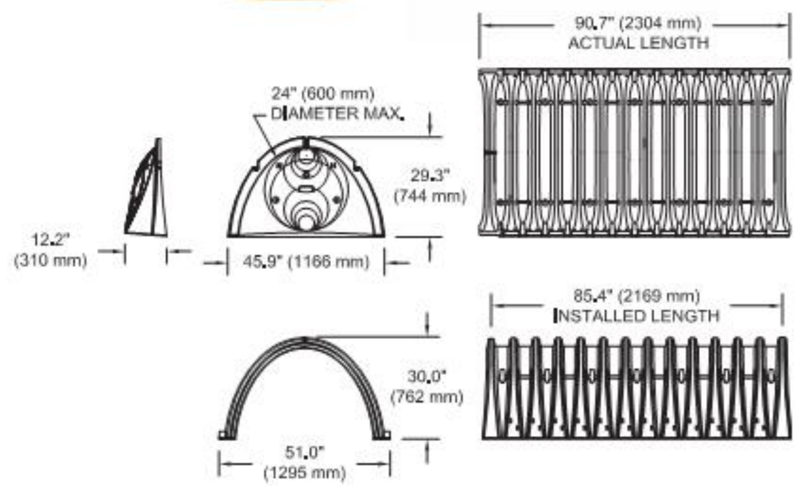
Chamber Storage
45.9 ft^3 (1.30 m^3)

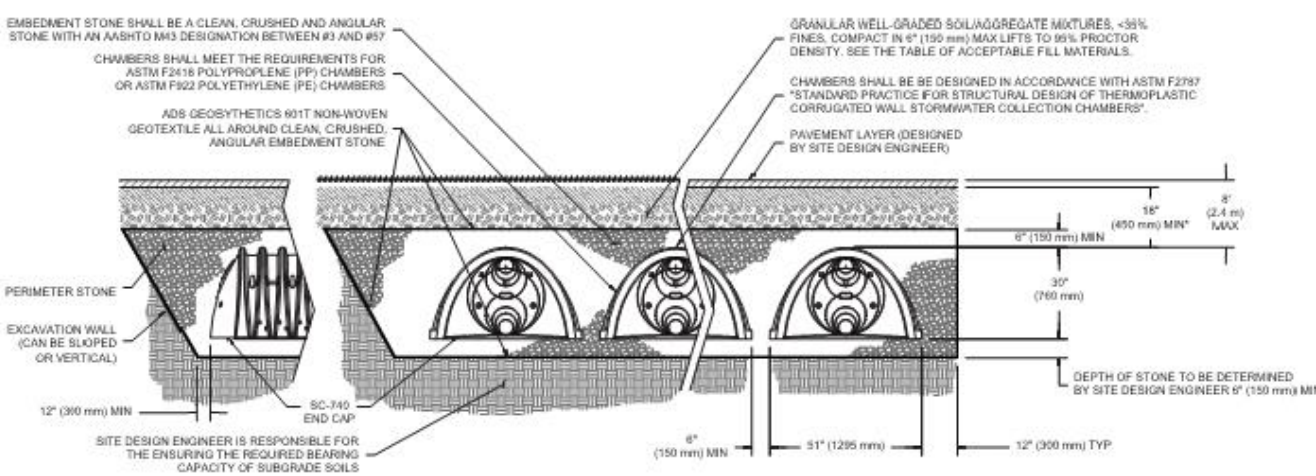
Min. Installed Storage*
74.9 ft^3 (2.12 m^3)

Weight
74.0 lbs (33.6 kg)

Shipping
30 chambers/pallet
60 end caps/pallet
12 pallets/truck

*Assumes 6" (150 mm) stone above, below and between chambers and 40% stone porosity.





*MINIMUM COVER TO BOTTOM OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING FROM VEHICLES MAY OCCUR, INCREASE COVER TO 24" (600 mm).

ELEVATION (m)	DISCHARGE (m3/s)	STORAGE (ham)*
116.88	0.000	0.0000
117.15	0.0050	0.0003
117.42	0.0070	0.0004
117.52	0.0077	0.0044
117.73	0.0090	0.0129
117.93	0.0103	0.0206
118.11	0.0113	0.0262
118.34	0.0126	0.0309

*Stormtech system effective storage starts above STC-740 invert elevation of 117.42

Project: **1705**

Chamber Model -	SC-740	
Units -	**Metric**	Click Here for Imperial
Number of chambers -	160	
Voids in the stone (porosity) -	40	%
Base of Stone Elevation -	117.27	m
Amount of Stone Above Chambers -	152	mm
Amount of Stone Below Chambers -	152	mm
Area of system -	503	sq.meters

Include Perimeter Stone in Calculations

Min. Area - 502.398 sq.meters

Height of System *(mm)*	Incremental Single Chamber *(cubic meters)*	Incremental Total Chamber *(cubic meters)*	Incremental Stone *(cubic meters)*	Incremental Ch & St *(cubic meters)*	Cumulative Chamber *(cubic meters)*	Elevation *(meters)*
1067	0.00	0.00	5.11	5.11	339.544	118.34
1041	0.00	0.00	5.11	5.11	334.434	118.31
1016	0.00	0.00	5.11	5.11	329.323	118.29
991	0.00	0.00	5.11	5.11	324.213	118.26
965	0.00	0.00	5.11	5.11	319.103	118.24
940	0.00	0.00	5.11	5.11	313.993	118.21
914	0.00	0.25	5.01	5.26	308.882	118.18
889	0.00	0.74	4.81	5.55	303.623	118.16
864	0.01	1.28	4.60	5.88	298.070	118.13
838	0.02	2.74	4.02	6.75	292.193	118.11
813	0.02	3.63	3.66	7.29	285.441	118.08
787	0.03	4.31	3.39	7.69	278.151	118.06
762	0.03	4.87	3.16	8.03	270.457	118.03
737	0.03	5.35	2.97	8.32	262.425	118.01
711	0.04	5.73	2.82	8.55	254.106	117.98
686	0.04	6.14	2.65	8.79	245.555	117.96
660	0.04	6.59	2.48	9.06	236.762	117.93
635	0.04	6.91	2.35	9.26	227.698	117.91
610	0.04	7.17	2.24	9.41	218.443	117.88
584	0.05	7.44	2.13	9.57	209.032	117.85
559	0.05	7.70	2.03	9.73	199.457	117.83
533	0.05	7.94	1.93	9.88	189.727	117.80
508	0.05	8.17	1.84	10.01	179.851	117.78
483	0.05	8.40	1.75	10.15	169.840	117.75
457	0.05	8.58	1.68	10.26	159.687	117.73
432	0.05	8.76	1.61	10.37	149.431	117.70
406	0.06	8.95	1.53	10.48	139.063	117.68
381	0.06	9.11	1.47	10.57	128.584	117.65
356	0.06	9.27	1.40	10.67	118.010	117.63
330	0.06	9.40	1.35	10.75	107.341	117.60
305	0.06	9.54	1.30	10.83	96.590	117.57
279	0.06	9.66	1.25	10.91	85.758	117.55
254	0.06	9.76	1.21	10.97	74.852	117.52
229	0.06	9.86	1.16	11.03	63.887	117.50
203	0.06	9.96	1.13	11.09	52.858	117.47
178	0.06	10.00	1.11	11.11	41.772	117.45
152	0.00	0.00	5.11	5.11	30.661	117.42
127	0.00	0.00	5.11	5.11	25.551	117.40
102	0.00	0.00	5.11	5.11	20.441	117.37
76	0.00	0.00	5.11	5.11	15.331	117.35
51	0.00	0.00	5.11	5.11	10.220	117.32
25	0.00	0.00	5.11	5.11	5.110	117.30

Stormceptor®

FORTERRA™

Brief Stormceptor Sizing Report - 1705

Project Information & Location			
Project Name	OAKVILLE HOTEL	**Project Number**	1705
City	OAKVILLE	**State/ Province**	Ontario
Country	Canada	**Date**	3/16/2018
Designer Information		**EOR Information (optional)**	
Name	Zachary Schwisberg	**Name**	
Company	A.M. Candaras Inc.	**Company**	
Phone #		**Phone #**	
Email	zachary@amcai.com	**Email**	

Stormwater Treatment Recommendation

The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	1705
Target TSS Removal (%)	80
TSS Removal (%) Provided	80
Recommended Stormceptor Model	STC 1000

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary		
Stormceptor Model	**% TSS Removal Provided**	**% Runoff Volume Captured Provided**
STC 300	69	87
STC 750	79	94
STC 1000	80	94
STC 1500	81	94
STC 2000	84	97
STC 3000	86	97
STC 4000	89	99
STC 5000	89	99
STC 6000	91	99
STC 9000	93	100
STC 10000	93	100
STC 14000	95	100
StormceptorMAX	Custom	Custom

Stormceptor® FORTERRA

Sizing Details

Drainage Area

Total Area (ha)	0.679
Imperviousness %	60.0

Rainfall

Station Name	TORONTO CENTRAL
State/Province	Ontario
Station ID #	0100
Years of Records	18
Latitude	45°30'N
Longitude	90°30'W

Water Quality Objective

TSS Removal (%)	80.0
Runoff Volume Capture (%)	90.00
Oil Spill Capture Volume (L)	
Peak Conveyed Flow Rate (L/s)	14.40
Water Quality Flow Rate (L/s)	

Up Stream Storage

Storage (ha-m)	Discharge (cms)
0.000	0.000

Up Stream Flow Diversion

Max. Flow to Stormceptor (cms)	

Particle Size Distribution (PSD)
The selected PSD defines TSS removal

City of Toronto PSD

Particle Diameter (microns)	Distribution %	Specific Gravity
10.0	20.0	2.65
30.0	10.0	2.65
50.0	10.0	2.65
95.0	20.0	2.65
265.0	20.0	2.65
1000.0	20.0	2.65

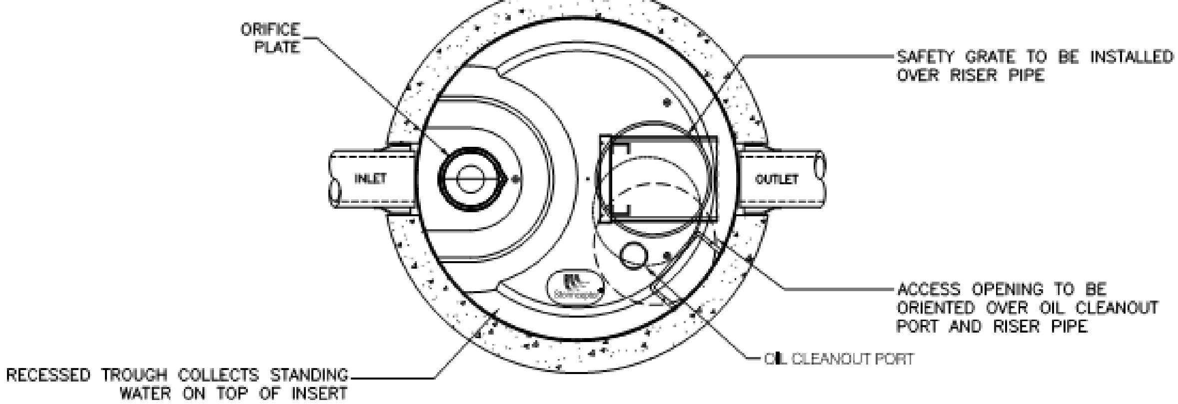
Notes

- Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
- Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
- For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

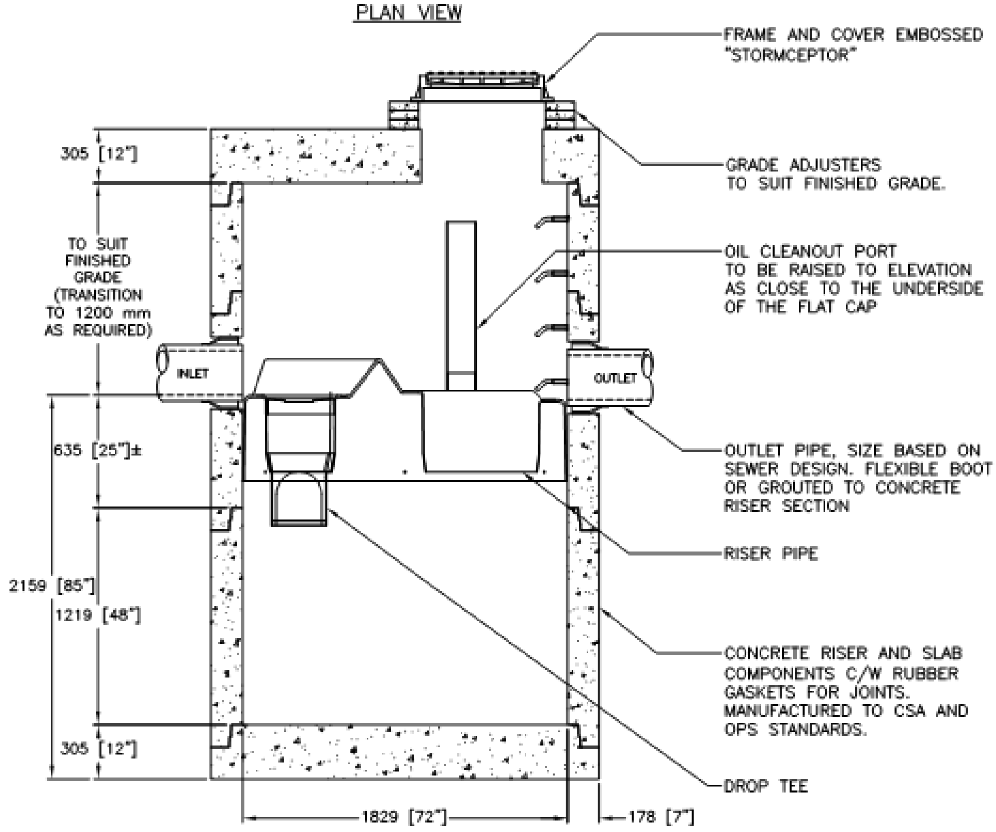
For Stormceptor Specifications and Drawings Please Visit:
http://www.imbriumsystems.com/technical-specifications

DRAWING NOT TO BE USED FOR CONSTRUCTION

THE STORMCEPTOR SYSTEM IS PROTECTED BY ONE OR MORE OF THE FOLLOWING PATENTS:
United States Patent No. 5,753,115 • 5,849,181 • 6,068,765 • 6,371,690 • 7,582,216 • 7,666,303 | Australia Patent No. 729,096 • 779,401 • 2008,279,378 • 2008,288,900 |
Canadian Patent No. 2,206,338 • 2,327,768 • 2,694,159 • 2,697,287 | Indonesian Patent No. 007058 | Japan Patent No. 9-11476 • 3,581,233 • 5,555,160 |
Korea Patent No. 10-1451593 • 0519212 | Malaysia Patent No. 118987 | New Zealand Patent No. 314,646 • 583,583 • 583,008 | South African Patent No. 2010,00683 • 2010,01796 |



PLAN VIEW



SECTION VIEW

Stormceptor®

imbrium WWW.IMBRIUMSYSTEMS.COM 7037 RIDGE ROAD, SUITE 350, HANOVER, MD 21076 USA 888-279-8826 CA 800-565-4801 INTL +1-416-960-9900	STC 1000 STANDARD MODEL ####	REV #	DATE	REVISION DESCRIPTION	BY	SHEET NUMBER 1 OF 1
	DATE: ######## SCALE: 40	PROJECT No.: #####		DRAWN: ###		CHECKED: ###

APPENDIX B –PROGRAM OUTPUT

- SWMHYMO – Storage Required
- SWMHYMO Output – Detention System Performance

```
==========================================================================

 SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999    999  =========
 S       W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9  9   9
 SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9  9   9 Ver. 4.02
     S   W W   M   M  H   H    Y    M   M  O   O      9999   9999 July 1999
 SSSSS   W W   M   M  H   H    Y    M   M   OOO          9      9 ---------
                                                     9   9  9   9 # 3813174
      StormWater Management HYdrologic Model            999    999  =========

 ************************************************************************
 ************************** SWMHYMO-99 Ver/4.02 **************************
 ******* A single event and continuous hydrologic simulation model *******
 *******     based on the principles of HYMO and its successors     *******
 *******                 OTTHYMO-83 and OTTHYMO-89.                 *******
 ************************************************************************
 ******* Distributed by:  J.F. Sabourin and Associates Inc.          *******
 *******                  Ottawa,  Ontario: (613) 727-5199          *******
 *******                  Gatineau, Quebec: (819) 243-6858          *******
 *******                  E-Mail: swmhymo@jfsa.Com                  *******
 ************************************************************************

 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++ Licensed user: A.M. Candaras Associates Inc.              +++++++
 +++++++                Woodbridge              SERIAL#:3813174    +++++++
 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 ************************************************************************
 *******          ++++++ PROGRAM ARRAY DIMENSIONS ++++++            *******
 *******          Maximum value for ID numbers  :     10            *******
 *******          Max. number of rainfall points:  15000            *******
 *******          Max. number of flow points    :  15000            *******
 ************************************************************************


 *******************   D E T A I L E D   O U T P U T   *******************
 ************************************************************************
 *      DATE: 2018-03-20      TIME: 18:28:06      RUN COUNTER: 001011      *
 ************************************************************************
 * Input   filename: C:\PROGRA~1\SWMHYMO\PROJECTS\1705\1705.dat           *
 * Output  filename: C:\PROGRA~1\SWMHYMO\PROJECTS\1705\1705.out           *
 * Summary filename: C:\PROGRA~1\SWMHYMO\PROJECTS\1705\1705.sum           *
 * User comments:                                                         *
 * 1:_____________________________________________________________________*
 * 2:_____________________________________________________________________*
 * 3:_____________________________________________________________________*
 ************************************************************************

--------------------------------------------------------------------------
001:0001------------------------------------------------------------------
*#************************************************************************
*#  Project Name: 210 NORTH SERVICE ROAD     Project Number: 1705
*#  Modeller     : Zachary Schwisberg, E.I.T.
*#  Company      : a.m. candaras associates inc.
*#  License #    : 3813174
*#  7 STOREY HOTEL
*#************************************************************************
--------------------
| START              |  Project  dir.: C:\PROGRA~1\SWMHYMO\PROJECTS\1705\
--------------------   Rainfall dir.: C:\PROGRA~1\SWMHYMO\PROJECTS\1705\
    TZERO =    .00 hrs on        0
    METOUT=    2 (output = METRIC)
    NRUN  = 001
    NSTORM=    1
           #  1=OAK100YR.STM
```


File: N:\otthymo\1705\1705.out 2018-03-20, 6:28:06 PM

```
--------------------------------------------------------------------------
001:0002------------------------------------------------------------------
--------------------
| READ STORM         |    Filename: C:\PROGRA~1\SWMHYMO\PROJECTS\1705\OAK100
| Ptotal=  75.22 mm|    Comments: *100 YR 4HR OAKVILLE STORM 5 MIN TIME ST
--------------------
              TIME     RAIN |   TIME     RAIN |   TIME     RAIN |   TIME     RAIN
               hrs    mm/hr |    hrs    mm/hr |    hrs    mm/hr |    hrs    mm/hr
               .08    3.218 |   1.08   18.650 |   2.08   10.786 |   3.08    4.487
               .17    3.444 |   1.17   31.170 |   2.17    9.636 |   3.17    4.285
               .25    3.707 |   1.25   82.041 |   2.25    8.709 |   3.25    4.101
               .33    4.017 |   1.33  279.344 |   2.33    7.947 |   3.33    3.933
               .42    4.386 |   1.42  108.461 |   2.42    7.309 |   3.42    3.778
               .50    4.835 |   1.50   55.622 |   2.50    6.769 |   3.50    3.636
               .58    5.392 |   1.58   36.064 |   2.58    6.304 |   3.58    3.505
               .67    6.103 |   1.67   26.277 |   2.67    5.901 |   3.67    3.384
               .75    7.039 |   1.75   20.522 |   2.75    5.548 |   3.75    3.271
               .83    8.328 |   1.83   16.777 |   2.83    5.237 |   3.83    3.165
               .92   10.211 |   1.92   14.166 |   2.92    4.959 |   3.92    3.067
              1.00   13.207 |   2.00   12.248 |   3.00    4.711 |   4.00    2.975

--------------------------------------------------------------------------
001:0003------------------------------------------------------------------
* POST-DEV. VOL. REQUIRED
* CN=TABLE A2-SOIL TYPE C FAIR CONDITION, =79 (USE 80)
----------------------
| DESIGN STANDHYD    |   Area    (ha)=      .68
| 01:100    DT= 1.00 |   Total Imp(%)=   63.00   Dir. Conn.(%)=   63.00
----------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .43          .25
     Dep. Storage     (mm)=       .80         1.50
     Average Slope     (%)=      2.00         2.00
     Length            (m)=     67.29        40.00
     Mannings n          =      .013         .250

     Max.eff.Inten.(mm/hr)=    279.34       113.57
                over (min)       1.00         8.00
     Storage Coeff.  (min)=      1.08 (ii)    7.79 (ii)
     Unit Hyd. Tpeak (min)=      1.00         8.00
     Unit Hyd. peak  (cms)=      1.02          .14
                                                          *TOTALS*
     PEAK FLOW       (cms)=       .33          .05          .352 (iii)
     TIME TO PEAK    (hrs)=      1.33         1.45         1.333
     RUNOFF VOLUME    (mm)=     74.42        39.60        61.538
     TOTAL RAINFALL   (mm)=     75.22        75.22        75.219
     RUNOFF COEFFICIENT  =        .99          .53          .818

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =   80.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.


--------------------------------------------------------------------------
001:0005------------------------------------------------------------------
*Variable Cutoff
--------------------
| COMPUTE VOLUME     |
| ID:01  (100    )   |              DISCHARGE      TIME
--------------------                  (cms)        (hrs)
           START CONTROLLING AT        .000         .217
           INFLOW HYD. PEAKS AT        .352        1.333
           STOP  CONTROLLING AT        .014        2.340
```

SWMHYMO - STORAGE REQUIRED

```
          REQUIRED STORAGE VOLUME (ha.m.)=     .0312
          TOTAL HYDROGRAPH VOLUME (ha.m.)=     .0418
          % OF HYDROGRAPH TO STORE        =  74.6300

          NOTE:  Storage was computed to reduce the Inflow
                 peak to      .014  (cms).


001:0007-----------------------------------------------------------------------
*********************************************************************
      FINISH
-------------------------------------------------------------------------------
*******************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
 001:0004 COMPUTE VOLUME
      *** WARNING: Calculated volume may not be the maximum.
   Simulation ended on 2018-03-20     at 18:28:06
-------------------------------------------------------------------------------
```

SWMHYMO - DETENTION SYSTEM PERFORMANCE


```
===============================================================================

 SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO       999    999  =========
 S      W W W  MM MM  H   H   Y Y   MM MM  O   O     9   9  9   9
 SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ## 9   9  9   9 Ver. 4.02
     S   W W   M   M  H   H    Y    M   M  O   O      9999   9999 July 1999
 SSSSS   W W   M   M  H   H    Y    M   M   OOO          9      9 =========
                                                     9   9  9   9 # 3813174
      StormWater Management HYdrologic Model          999    999  =========

 *************************************************************************
 ************************* SWMHYMO-99 Ver/4.02 ***************************
 ******* A single event and continuous hydrologic simulation model *******
 *******    based on the principles of HYMO and its successors     *******
 *******                OTTHYMO-83 and OTTHYMO-89.                 *******
 *************************************************************************
 ******* Distributed by:  J.F. Sabourin and Associates Inc.         *******
 *******                  Ottawa,  Ontario: (613) 727-5199          *******
 *******                  Gatineau, Quebec: (819) 243-6858          *******
 *******                  E-Mail: swmhymo@jfsa.Com                  *******
 *************************************************************************

 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++ Licensed user: A.M. Candaras Associates Inc.              +++++++
 +++++++                Woodbridge            SERIAL#:3813174      +++++++
 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 *************************************************************************
 *******           ++++++ PROGRAM ARRAY DIMENSIONS ++++++          *******
 *******           Maximum value for ID numbers  :     10          *******
 *******           Max. number of rainfall points:  15000          *******
 *******           Max. number of flow points    :  15000          *******
 *************************************************************************


 ********************   D E T A I L E D   O U T P U T   ********************
 *************************************************************************
 *      DATE: 2018-03-20     TIME: 18:28:06     RUN COUNTER: 001011       *
 *************************************************************************
 * Input   filename: C:\PROGRA~1\SWMHYMO\PROJECTS\1705\1705.dat           *
 * Output  filename: C:\PROGRA~1\SWMHYMO\PROJECTS\1705\1705.out           *
 * Summary filename: C:\PROGRA~1\SWMHYMO\PROJECTS\1705\1705.sum           *
 * User comments:                                                         *
 * 1:_____________________________________________________________________*
 * 2:_____________________________________________________________________*
 * 3:_____________________________________________________________________*
 *************************************************************************

--------------------------------------------------------------------------------
001:0001------------------------------------------------------------------------
*#******************************************************************************
*#  Project Name: 210 NORTH SERVICE ROAD      Project Number: 1705
*#  Modeller     : Zachary Schwisberg, E.I.T.
*#  Company      : a.m. candaras associates inc.
*#  License #    : 3813174
*#  7 STOREY HOTEL
*#******************************************************************************
--------------------
| START              |  Project  dir.: C:\PROGRA~1\SWMHYMO\PROJECTS\1705\
--------------------    Rainfall dir.: C:\PROGRA~1\SWMHYMO\PROJECTS\1705\
    TZERO =    .00 hrs on        0
    METOUT=    2 (output = METRIC)
    NRUN  = 001
    NSTORM=    1
           #  1=OAK100YR.STM
```



```
--------------------------------------------------------------------------------
001:0002------------------------------------------------------------------------
--------------------
| READ STORM        |    Filename: C:\PROGRA~1\SWMHYMO\PROJECTS\1705\OAK100
| Ptotal=  75.22 mm|    Comments: *100 YR 4HR OAKVILLE STORM 5 MIN TIME ST
--------------------
             TIME     RAIN |   TIME     RAIN |   TIME     RAIN |   TIME     RAIN
              hrs    mm/hr |    hrs    mm/hr |    hrs    mm/hr |    hrs    mm/hr
              .08    3.218 |   1.08   18.650 |   2.08   10.786 |   3.08    4.487
              .17    3.444 |   1.17   31.170 |   2.17    9.636 |   3.17    4.285
              .25    3.707 |   1.25   82.041 |   2.25    8.709 |   3.25    4.101
              .33    4.017 |   1.33  279.344 |   2.33    7.947 |   3.33    3.933
              .42    4.386 |   1.42  108.461 |   2.42    7.309 |   3.42    3.778
              .50    4.835 |   1.50   55.622 |   2.50    6.769 |   3.50    3.636
              .58    5.392 |   1.58   36.064 |   2.58    6.304 |   3.58    3.505
              .67    6.103 |   1.67   26.277 |   2.67    5.901 |   3.67    3.384
              .75    7.039 |   1.75   20.522 |   2.75    5.548 |   3.75    3.271
              .83    8.328 |   1.83   16.777 |   2.83    5.237 |   3.83    3.165
              .92   10.211 |   1.92   14.166 |   2.92    4.959 |   3.92    3.067
             1.00   13.207 |   2.00   12.248 |   3.00    4.711 |   4.00    2.975

--------------------------------------------------------------------------------
001:0003------------------------------------------------------------------------
* POST-DEV. VOL. REQUIRED
* CN=TABLE A2-SOIL TYPE C FAIR CONDITION, =79 (USE 80)
----------------------
| DESIGN STANDHYD     |   Area     (ha)=       .68
| 01:100     DT= 1.00 |   Total Imp(%)=    63.00   Dir. Conn.(%)=    63.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        .43          .25
     Dep. Storage      (mm)=        .80         1.50
     Average Slope      (%)=       2.00         2.00
     Length             (m)=      67.29        40.00
     Mannings n            =       .013         .250

     Max.eff.Inten.(mm/hr)=      279.34       113.57
                over (min)         1.00         8.00
     Storage Coeff.  (min)=        1.08 (ii)    7.79 (ii)
     Unit Hyd. Tpeak (min)=        1.00         8.00
     Unit Hyd. peak  (cms)=        1.02          .14
                                                              *TOTALS*
     PEAK FLOW       (cms)=         .33          .05            .352 (iii)
     TIME TO PEAK    (hrs)=        1.33         1.45           1.333
     RUNOFF VOLUME    (mm)=       74.42        39.60          61.538
     TOTAL RAINFALL   (mm)=       75.22        75.22          75.219
     RUNOFF COEFFICIENT   =         .99          .53            .818

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.


--------------------------------------------------------------------------------
001:0006------------------------------------------------------------------------
---------------------
| ROUTE RESERVOIR     |   Requested routing time step =   1.0 min.
|  IN>01:(100    )    |
| OUT<02:(101    )    |   ---------  OUTLFOW STORAGE TABLE  ---------
---------------------     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)     (ha.m.)   |   (cms)     (ha.m.)
                            .000   .0000E+00   |     .009   .1290E-01
                            .005   .3000E-03   |     .010   .2060E-01
```

```
                        .007  .4000E-03   |      .011  .2620E-01
                        .008  .4400E-02   |      .013  .3090E-01

   ROUTING RESULTS            AREA      QPEAK     TPEAK       R.V.
   --------------------       (ha)      (cms)     (hrs)       (mm)
   INFLOW >01: (100   )        .68       .352     1.333     61.538
   OUTFLOW<02: (101   )        .68       .012     2.483     61.538

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)=    3.538
                 TIME SHIFT OF PEAK FLOW         (min)=    69.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=.3033E-01

-------------------------------------------------------------------------------
001:0007-----------------------------------------------------------------------
*********************************************************************
      FINISH
===============================================================================
*******************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
 001:0004 COMPUTE VOLUME
      *** WARNING: Calculated volume may not be the maximum.
   Simulation ended on 2018-03-20     at 18:28:06
===============================================================================
```

APPENDIX C – REPORT EXCERPTS

- Geotechnical Report Excerpt – Borehole Location Plan
- Geotechnical Report Excerpt – Groundwater Level
- Geotechnical Report Excerpt – Soil Infiltration Rate
- Geotechnical Report Excerpt – Enclosure 9
- Geotechnical Report Excerpt – Enclosure 10
- Geotechnical Report Excerpt – Enclosure 11
- Hydrant Flow Test Results
- Storm Drainage Area Plan – S1

V. A. WOOD ASSOCIATES LIMITED
CONSULTING GEOTECHNICAL ENGINEERS
1080 TAPSCOTT ROAD, UNIT 24, SCARBOROUGH, ONTARIO M1X 1E7
TELEPHONE: (416) 292-2868 • FAX No: (416) 292-5375

GEOTECHNICAL INVESTIGATION PROPOSED AVID HOTEL KERR STREET NORTH/QEW OFF RAMP OAKVILLE, ONTARIO

Ref. No. 7320-18-1

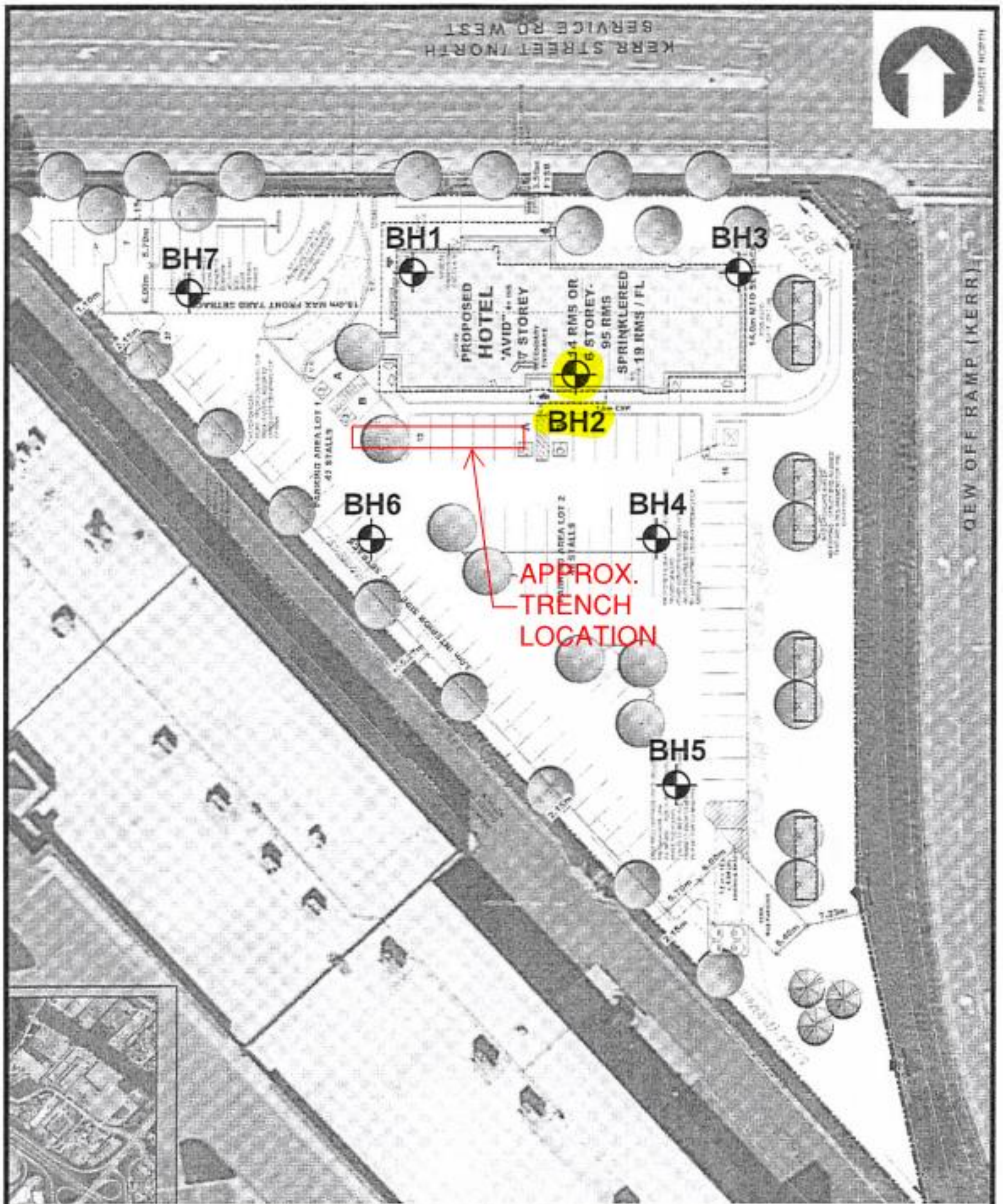
March 2018

Prepared for:

Empress Capital Group Ltd.
c/o API Development Consultants Inc.
1282 Cornwall Road
Oakville, Ontario
L6J 7W5

Ref. No. 7320-18-1

Enclosure 1



BOREHOLE LOCATION PLAN

Reference No : 7320-18-1

Borehole No : 2

Enclosure No : 3

Client : Empress Capital Group Ltd. c/o API

Project : Proposed Hotel

Method : Auger

Location : Kerr Street/QEW, Oakville, ON

Diameter : 110 mm

Datum Elevation :

Date : February 16, 2018

Elevation m	Depth m	Description (Subsurface Profile)	Symbol	Water	Sample Number	Sample Type	N-value	Standard Penetration Test blows/300mm (20 40 60 80)	Moisture Content, % (10 30 50)	Remarks
	0	Ground Surface								
		Topsoil 125 mm thick FILL Clayey silt, trace organics, dark red, moist, very loose			1	SS	3			Borehole open and dry on completion
	1	*SILT* Hard, some sand and clay, brick red to grey, moist			2	SS	51			
	2			DRY	3	SS	66			
	3	*SHALEY TILL* Very dense, clayey sandy silt with weathered shale fragments, brick red, moist			4	SS	100+			
	4				5	SS	100+			
					6	SS	100+			
	5	End of Borehole								
	6									

V.A. WOOD ASSOCIATES LIMITED

Disk :

Sheet : 1 of 1

5.8 Soil Permeability

For the design of storm water management systems, the permeability and infiltration rate of the subsoils were determined based on the grain size distribution and the soil consistency or density. The grain size distribution of representative samples of the silt and shaley till are shown in Enclosure 9, 10 and 11, and reference to this indicates that clayey silt may be classified under the USCS system as ML and the shaley till as ML to SM. The silt has a very stiff to hard consistency, and the shaley till has a very dense relative density.

Based on the findings the estimated soil permeability and infiltration rate for the subsoils are as follows:

Depth	Soil Description (USCS Classification)	Permeability, k	Infiltration Rate
1.5 m	SILT, some sand, trace clay (ML)	1×10^{-6} cm/sec	12 mm/hr
2 m	SILT and Fine SAND, trace gravel (ML)	1×10^{-5} cm/sec	30 mm/hr
3 m	SILT and SAND, some gravel (SM)	1×10^{-5} cm/sec	30 mm/hr

The groundwater level may be assumed to be located at least 4.8 m below grade.

If in-situ permeability tests are required, these may be carried out using a Guelph Permeameter. The test will require test pits to be excavated by backhoe extending to the depths where the permeability/infiltration data are required.

4.0 GROUNDWATER CONDITIONS

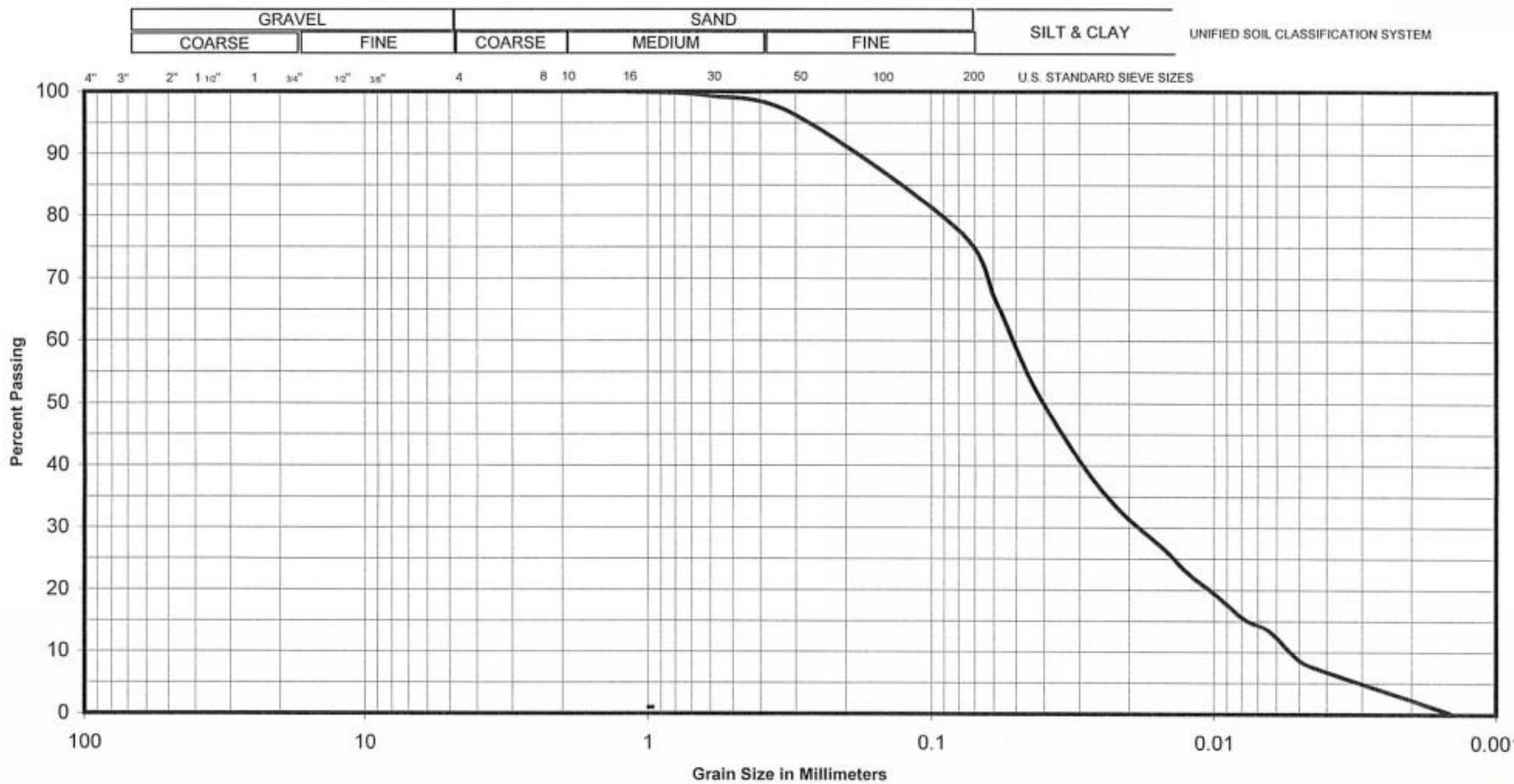
No free water was encountered in any of the boreholes, which were all open and dry to the full depth upon completion of the fieldwork. It is noted that the water measurements were carried out immediately after drilling, and it is possible that the ground water had not yet stabilized in the boreholes.

An examination of the samples revealed that they were generally moist (wet at the top in some of the boreholes), and the native subsoils had a brick red colour for the full depth of the boreholes.

Based on the findings, the groundwater table is considered to be located below the maximum depth investigated (i.e., more than 4.8 m below grade). However, perched water conditions may occur within the fill and on top of the low permeability native silt deposit.

GRAIN SIZE DISTRIBUTION

OUR REFERENCE No.: 7320-18-1



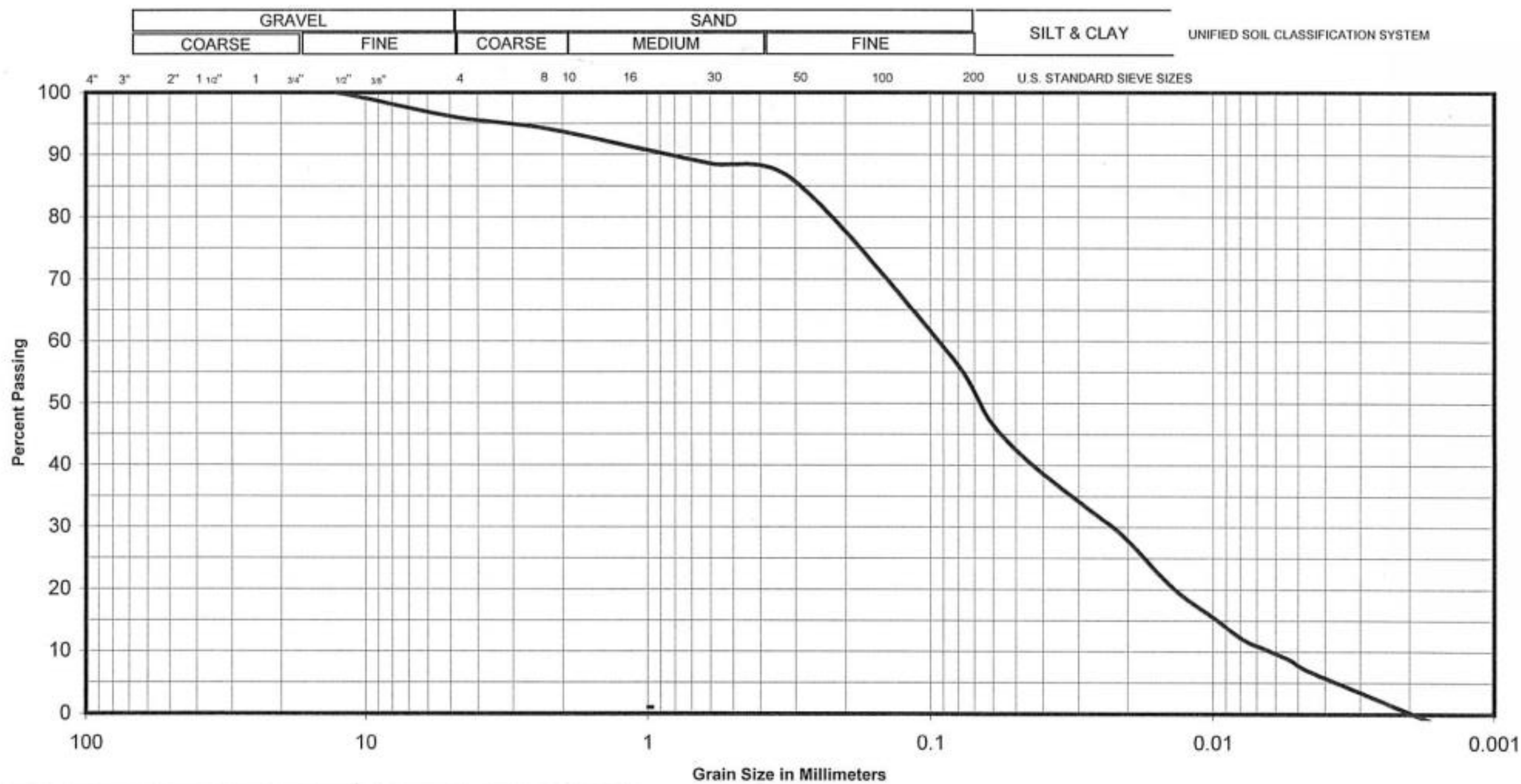
PROJECT: Proposed AVID Hotel
LOCATION: Kerr St. North/QEW Off Ramp, Oakville, ON
BOREHOLE NO.: 2
SAMPLE NO.: 2
DEPTH: 1 m
DATE: March 2018

ENCLOSURE No. 9

SILT, some sand, trace clay (ML)

GRAIN SIZE DISTRIBUTION

OUR REFERENCE No.: 7320-18-1



PROJECT: Proposed AVID Hotel

LOCATION: Kerr St. North/QEW Off Ramp, Oakville, ON

BOREHOLE NO.: 2

SAMPLE NO.: 4

DEPTH: 2.3 m

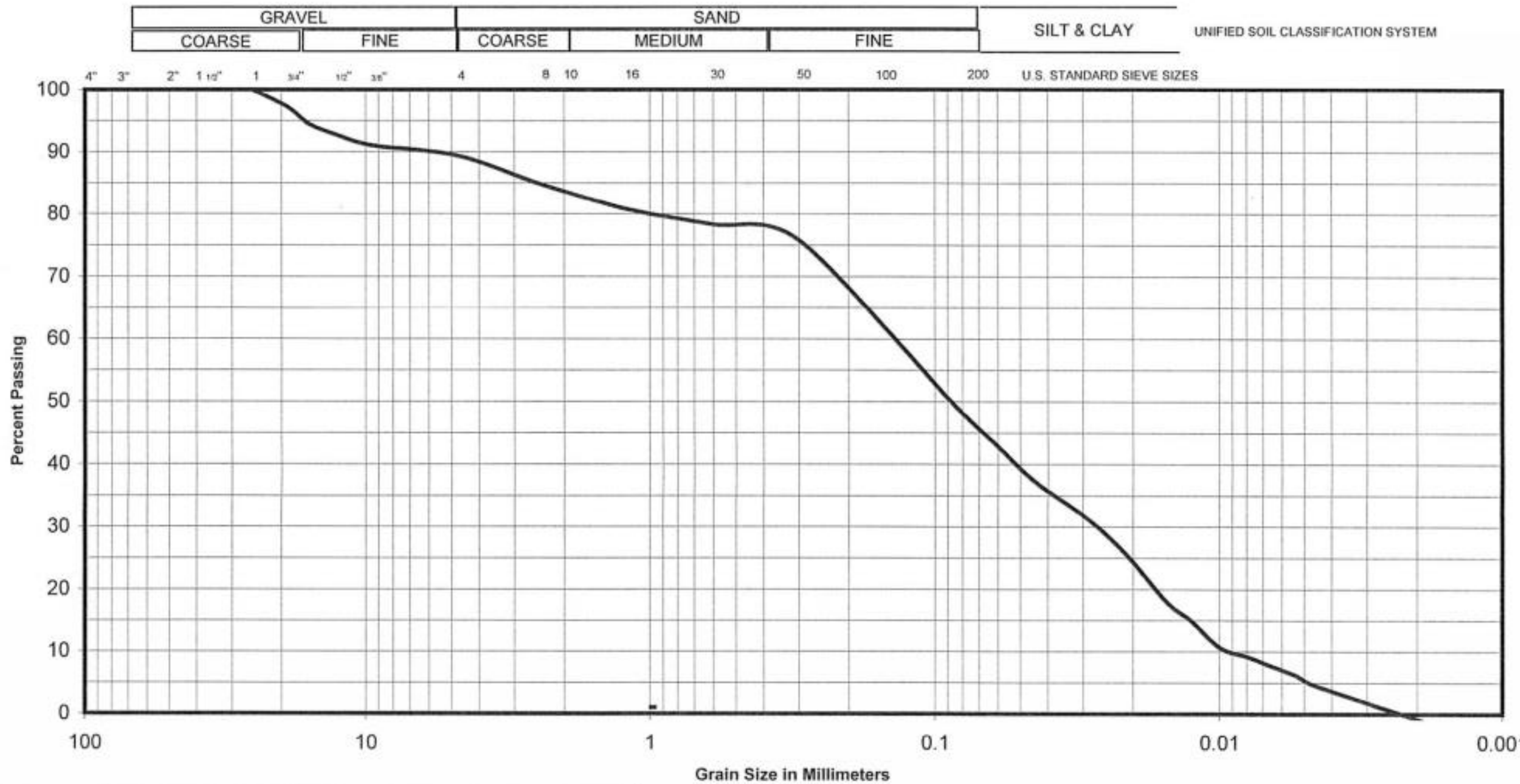
DATE: March 2018

SILT and Fine SAND, trace gravel (ML)

ENCLOSURE No. 10

GRAIN SIZE DISTRIBUTION

OUR REFERENCE No.: 7320-18-1



PROJECT: Proposed AVID Hotel	
LOCATION: Kerr St. North/QEW Off Ramp, Oakville, ON	
BOREHOLE NO.: 2	
SAMPLE NO.: 5	
DEPTH: 3.1 m	
DATE: March 2018	

SILT and SAND, some gravel (SM)

ENCLOSURE No. 11

AQUACOM
CONTRACTING
81 Todd Road Suite 202 Georgetown Ont. L7G 4R8
(o) 905-467-5853 (C) 905-971-9956 (e) mark@aquacom.ca

SITE NAME	OAKVILLE SERVICE HOTEL
TEST DATE TIME	FRIDAY 12 JAN 2018 1315
SITE ADDRESS	NORTH SERVICE ROAD, TOWN OF OAKVILLE
TECHNICIANS	B. SUTHERLAND, J. DAM
COMMENTS	ASSISTED BY ROFH OPERATOR

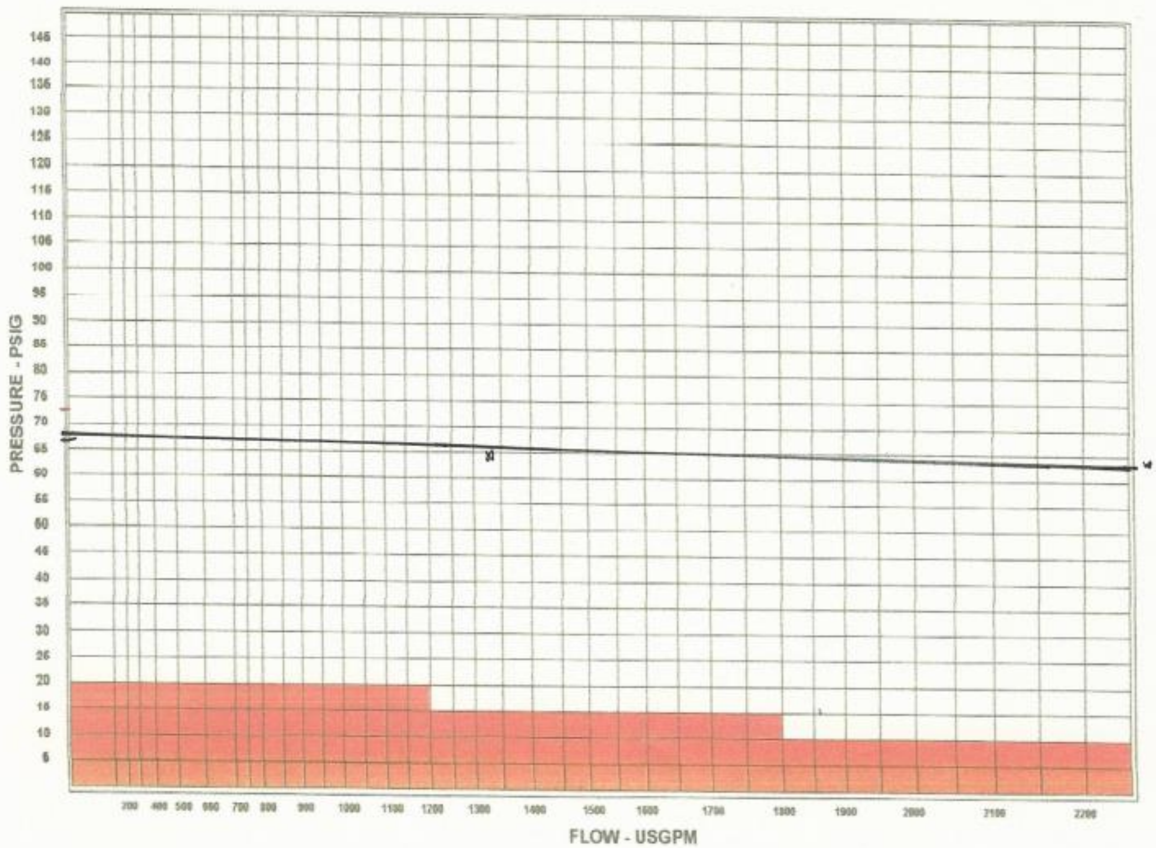
LOCATION OF FLOW HYDRANT

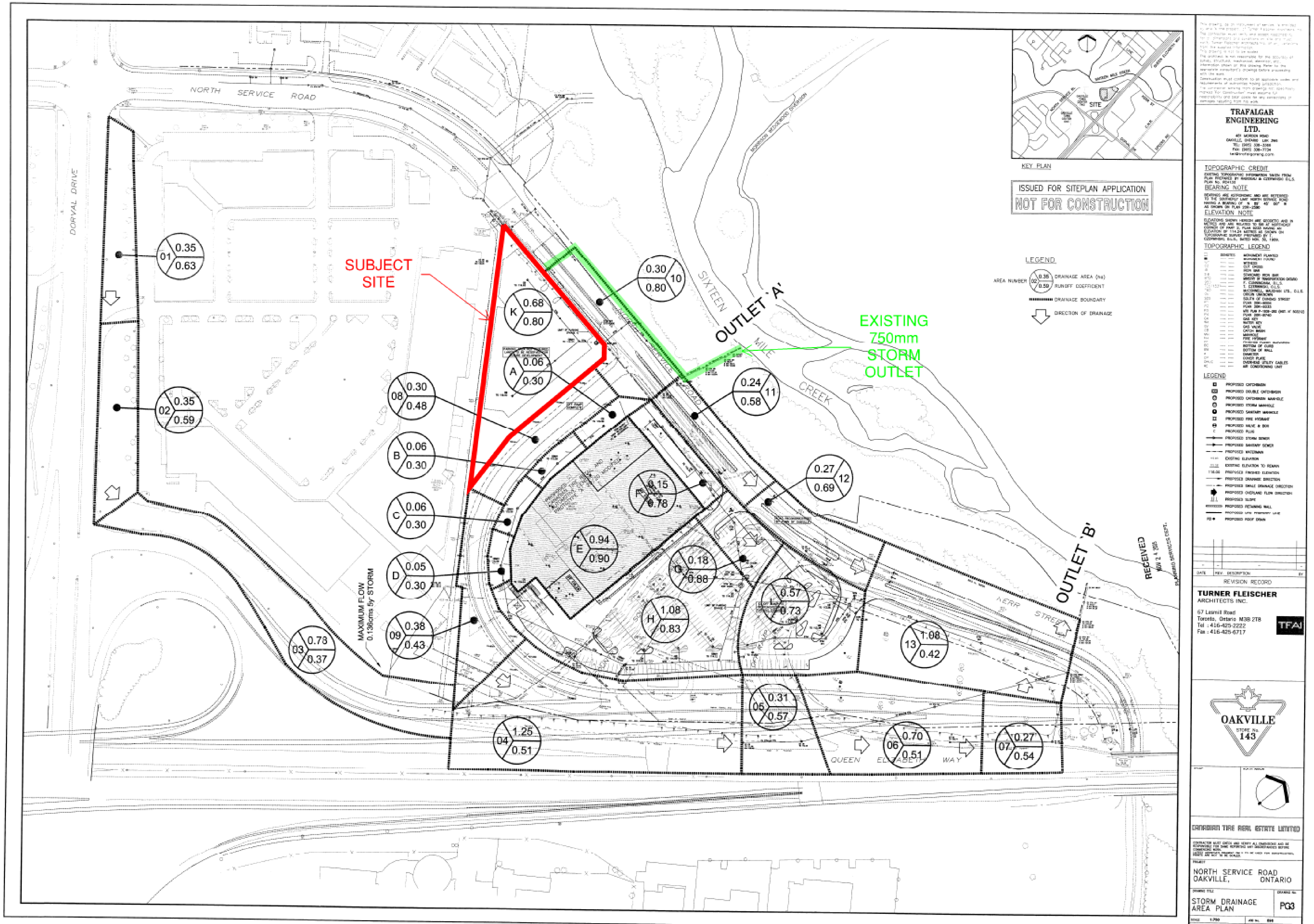
NSR AT WESTBOUND KERR ST O RAMP

LOCATION OF RESIDUAL HYDRANT

#210 NORTH SERVICE ROAD

# OUTLETS	SIZE INCHES	PITO PSI	FLOW USGPM	RESIDUAL PSI	STATIC PSI	PIPE DIA. MM
ONE	2.50	64	1344	65	66	
TWO	2.50	46	2276	64		600MM
		THEORETICAL	12374	20	TEST #	ONE
NOZZLE COEFF.		.90				




SUBJECT SITE
EXISTING 750mm STORM OUTLET
OUTLET 'A'
OUTLET 'B'
NORTH SERVICE ROAD
DORVAL DRIVE
SIXTEEN MILE CREEK
KERR STREET
QUEEN ELIZABETH WAY
MAXIMUM FLOW 0.136cms 5yr STORM
ISSUED FOR SITEPLAN APPLICATION
NOT FOR CONSTRUCTION
KEY PLAN
LEGEND
DRAINAGE AREA (ha)
RUNOFF COEFFICIENT
DRAINAGE BOUNDARY
DIRECTION OF DRAINAGE
TRAFALGAR ENGINEERING LTD.
TURNER FLEISCHER ARCHITECTS INC.
OAKVILLE
CANADIAN TIRE REAL ESTATE LIMITED
NORTH SERVICE ROAD OAKVILLE, ONTARIO
STORM DRAINAGE AREA PLAN
PG3

PLAN S1