STORMWATER MANAGEMENT & FUNCTIONAL SERVICING REPORT

FOR

TIM HORTONS
10606, 16054 & 16060 AIRPORT ROAD

TOWN OF CALEDON
REGION OF PEEL

Rev. May 25, 2022
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Project No. 1918

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TABLE OF CONTENTS

LIST OF APPENDICIES

LIST OF PLANS

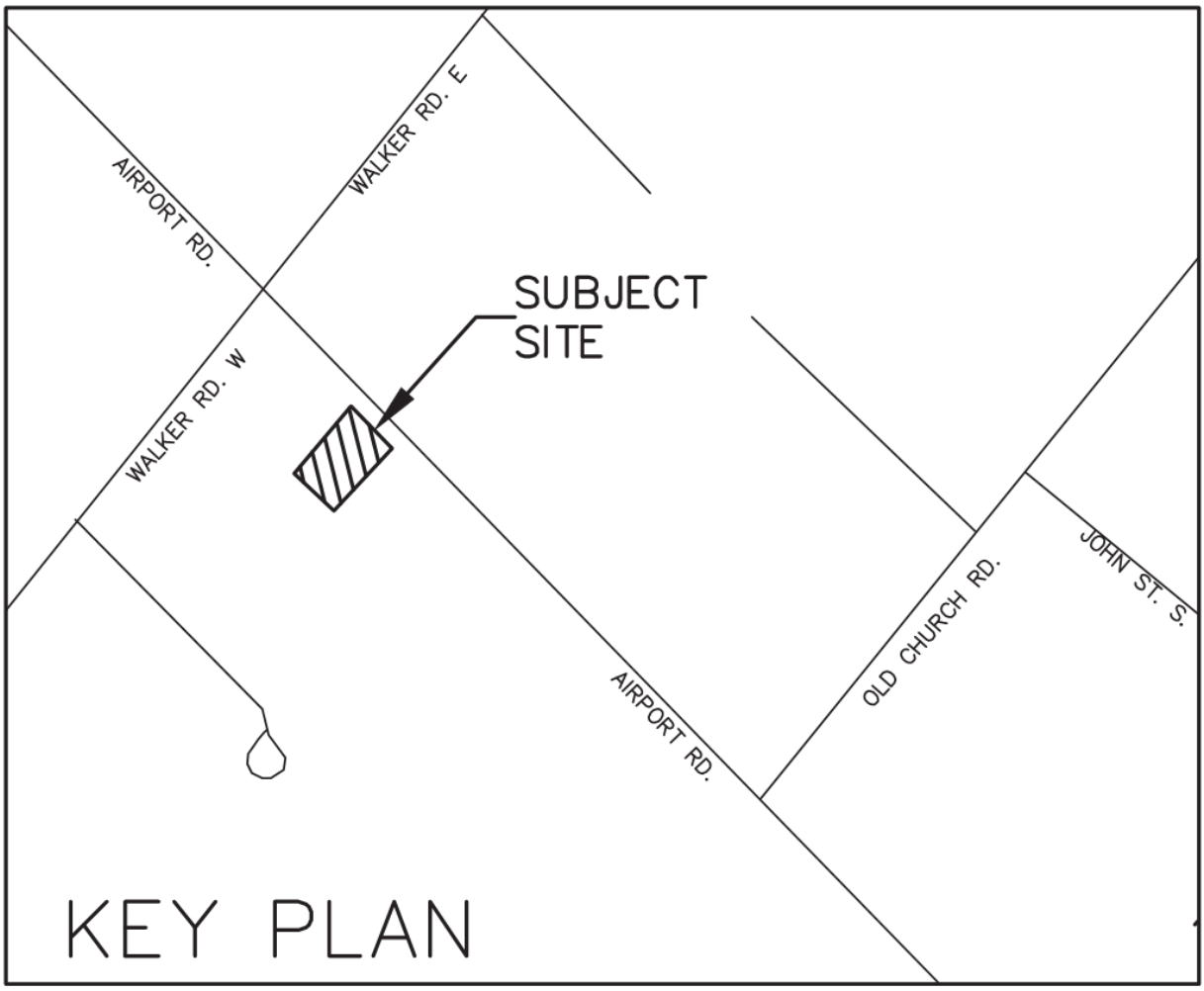
1.0 INTRODUCTION

This report presents the stormwater management (SWM) and functional servicing design for a proposed commercial development located at 10606, 16054 & 16060 Airport Road within the Town of Caledon, refer to **Figure 1** for site location.

The site is is occupied by two residential dwellings – a 2-storey stone dwelling at 16060 Airport Road and a 1.5 storey vinyl sided frame dwelling at 16054 Airport Road. In addition, there is a small commercial building at the northeast part of the site. There are two gravel driveways, and the rest of the site is composed of landscaping, bushes and trees.

A future road widening has been proposed that impacts the subject site. It is 13.0m offset from the existing centerline of Airport Road.

Figure 1 - Location Plan



2.0 SITE DESCRIPTION

2.1 Existing Site

The existing site drains overland in an eastern direction toward Airport Road. There is no external drainage that enters the site. The total site area is 3,017.4m^2 however, there is a 146.6m^2 widening along the front of the site. Removing the widening are from the total site area results in 2,870.8m^2. The widening area is omitted from the stormwater management (SWM) calculations and the weighted runoff coefficients are calculated omitting any land surface type within the widening.

Site statistics:

Roof:	=	282.7m^2	@ 0.90
Driveway	=	125.6m^2	@ 0.90
Landscaped:	=	2,462.5m^2	@ 0.25
Site Area*		2,870.8m^2	@ 0.34

*Excluding widening area of 146.6m^2.

2.2 Proposed Site

The proposed site will outlet to the existing 675mm storm sewer on Airport Road which drains south.

Site statistics:

Roof:	=	506.2m^2	@ 0.90
Paved	=	1,701.4m^2	@ 0.90
Landscaped:	=	663.1m^2	@ 0.25
Site Area*		2,870.8m^2	@ 0.75

*Excluding widening area of 146.6m^2.

3.0 STORMWATER MANAGEMENT

Stormwater management (SWM) consists of surface storage and a stone infiltration trench. The SWM design will meet the following criteria:

- The allowable stormwater discharge to be limited to the 2-year pre-development flows for all post-development storm events up to and including the 100-year storm;
- Tim Hortons does not allow rooftop controls;
- On-site detention must be provided for all storms up to and including the 100-year storm event;
- Stormwater quality control to provide 80% removal of annual total suspended solids (TSS);
- Infiltration of stormwater runoff into the ground where feasible, satisfying the 5mm infiltration volume as required in overall stormwater management master plan for water balance, as per the TRCA Stormwater Management Criteria;
- An overland flow route shall be provided, within the developed site, to direct runoff in excess of the 100-year storm to Airport Road.

3.1 Quantity Control

The quantity control objective is to control the 100-year post-development flows to the 2-year pre-development flow rates. Controls are provided by means of a Hydro-Brake control device to control the flows discharging from the site, as per Town of Caledon standards. The storage volume to detain is provided on the parking surface.

3.1.1 Allowable Discharge

The allowable site discharge is based on the 2-year storm peak discharge has been calculated using the rational method as follows:

$$Q_S = C \cdot A \cdot I \cdot N$$
$$=(0.34)\ (0.28708ha)\ (85.7mm/hr)\ (2.778)$$
$$=23.2l/s$$

Where:

Q_s = Total site allowable discharge rate (l/s)
A = Site Area
C = Runoff coefficient
I = Intensity (mm/hr)

N = Unit conversion coefficient

Rainfall Intensity for 2-year Storm:

I_{2yr}=1070· $(T + 7.85)^{-0.8759}$ where, T = 10mins

=1070· $(10 + 7.85)^{-0.8759}$

= 85.7mm/hr

3.1.2 Rooftop Controls and Rooftop Storage

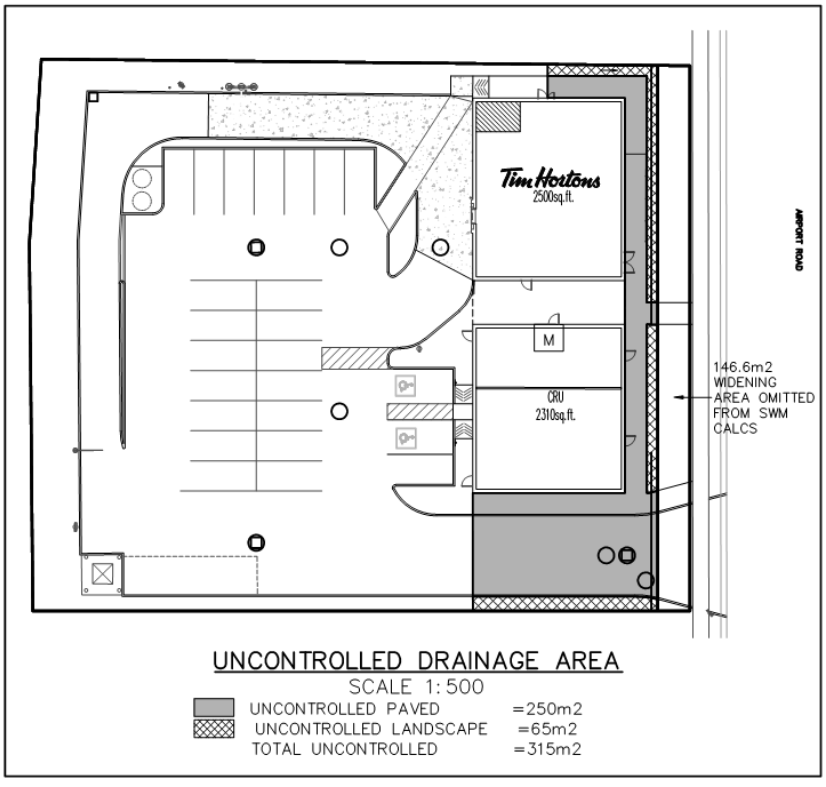
As per Tim Hortons standards (TDL), there are no rooftop controls or storage. Rooftop drains will be Thaler RD-14 with no controls, refer to **Appendix A** for details.

3.1.3 Groundwater Discharge

A hydrogeological report was completed by Azimuth Environmental Consulting, Inc. for the subject site. The report has not stated that long term discharge of groundwater is required.

3.1.4 Uncontrolled Runoff

The front of the site will discharge onto Airport Road uncontrolled, refer to **Plan G1** for the uncontrolled drainage area. The uncontrolled area is summarized as follows:



Paved	=	250m^2	@ C=0.95
Landscaped	=	65m^2	@ C=0.31
Total Area	=	315m^2	@ C=0.82

The 100-year storm uncontrolled runoff is determined as follows:

$$Q_U = C \cdot A \cdot I \cdot N$$
$$= (0.82) \cdot (0.0315\text{ha}) \cdot (196.5\text{mm/hr}) \cdot (2.778)$$
$$= 14.1\text{l/s}$$

Where:

I_{100yr} $=4688 \cdot (17+10)^{-0.9624}$ where, T = 10mins

$=4688 \cdot (17+10)^{-0.9624}$

$=196.5\text{mm/hr}$

3.1.5 Orifice Release Rate, Sizing and Detention Storage Required

An orifice is used to control the discharge from the site to the following rate:

$Q_O = Q_S - Q_U$

Q_O =23.2l/s – 14.1l/s

= 9.1l/s

Where:

Q_S =Total site allowable discharge

Q_U =Total uncontrolled discharge

Q_O =Total discharge allowed through orifice

Based on using an orifice and controlling the site to 9.1l/s, 114.2m^3 of detention storage will be required, refer to **Table 2** in **Appendix A** for details.

An orifice is located within "MH 3" on the downstream face at the east invert to control discharge from the site, refer to **Plan G1** for details. The initial orifice tube size is determined based on the total discharge allowed through the orifice and is limited to:

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

Where:

h=HWL – Inv. of Orifice

h=291.45m – 289.70m

h=1.75m

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

$$A = \frac{0.0091 m^3/s}{(0.80) \cdot \sqrt{(2 \cdot 9.81 m/s^2 \cdot 1.75 m)}}$$

$$A = 0.0019 m^2$$

$$d = \sqrt{\frac{4 \cdot 0.0019 m^2}{\pi}}$$

$$d = 0.049 m$$

A 49mm orifice tube is required to control the discharge from the site. The Town of Caledon minimum allowable orifice size is 75mm. Therefore, a Hydro-brake control device (SHE-0128-9100-1750-910) is used to control the discharge from the site. The Hydro-Brake control device with a head of 1.75m will release a peak discharge of 9.1l/s, refer to **Appendix A** for the Hydro-Brake design charts and details.

Based on the 9.1l/s release rate, 114.2m^3 of detention storage will be required, refer to **Table 2** in **Appendix A** for details.

A total detention storage volume of 142.0m^3 is provided in on the surface of the site, refer to **Plan G1** for details and ponding limits.

3.1.6 Region of Peel Drainage Analysis

The entirety of the existing site drains to Airport Road and has no controls. The existing drainage for the 100-year storm is determined as follows:

$$Q_{EX} = C \cdot A \cdot I \cdot N$$
$$= (0.34)\ (0.28708ha)\ (196.5mm/hr)\ (2.778)$$
$$= 53.3l/s$$

The post-developed site during the 100-year storm is controlled to the pre-development 2-year storm. As demonstrated above, the 100-year storm in the post-developed peak flow rate is 23.2l/s. Therefore, there is no additional flow conveyed from the subject site to the Region of Peel's infrastructure.

3.2 Quality Control

Quality controls are provided by a Stormceptor EF4 oil grit separator which is sized to for 80% removal of TSS on an annual basis. The Stormceptor is sized based on the net landscaped and paved area reaching it. Refer to **Appendix A** for the Stormceptor sizing details.

3.3 Water Balance

The TRCA requires that the 5mm storm be retained onsite to satisfy the water balance requirements. The retention volume after considering initial abstractions and evapotranspiration is determined as follows:

$2{,}870.8m^2 \times 0.005m = 14.4m^3$

A stone infiltration trench is sized to retain the minimum water balance volume of $14.4m^3$. Based on a stone having a void ratio of 40%, the required trench volume is:

$$\frac{14.4m^3}{0.40} = 36.0m^3$$

An infiltration trench which has a 0.30m depth, 9.0m width and is 13.5m long is provided west of the building. Discharge from the roof area is directed to the infiltration trench, as roof outflow is considered to be clean, as detailed on **Plan G1**.

Trench Stone Volume:	= 0.30m deep x 9.0m width x 13.5m long
	$= 36.5m^3$
Void Ratio Clear Stone	= 0.40
Infiltration Volume	$= 36.5m^3 \times 0.40$
	$= 14.6m^3$

The geotechnical report prepared by Azure Group indicates Borehole BH-4/MW-4 is located in the vicinity of the proposed infiltration stone trench, refer to **Plan G1**. The permeability is estimated to be 36mm/hr and the groundwater level was recorded to be 289.0m, refer to **Appendix B** for details.

The trench is designed so that the clean roof water, which is suitable for infiltration, will enter directly into the trench through “MH 7” and is connected by a perforated pipe to “MH 8”. The trench top of 290.30 is set equal to the outlet pipe invert. After the trench has filled up, the water will bypass the trench into the proposed storm network. The bottom of the stone

infiltration trench is set at 290.00m, which is 1.0m above the nearest groundwater level reading of 289.00m. Refer to **Plan G1** for the infiltration trench plan view and details.

3.4 Low Impact Development

As mentioned in the previous Section 3.3, an infiltration trench LID has been designed for the proposed development. As demonstrated, this LID is used to reduce runoff volumes, maintain existing infiltration/water balance patterns and improve water quality.

The CVC/TRCA Low Impact Development Stormwater Management Planning and Design Guide and the MECP (MOE) Stormwater Management Planning and Design Manual were referenced when designing the infiltration trench LID.

4.0 SANITARY

4.1 Total Sanitary Flow Rate

The peak sanitary flows for the total site area were calculated based on the Region of Peel Design Guidelines as follows:

Total Site Area Sanitary Calculations:

Population equivalent based on Commercial: = 50 people/ha
Estimate Population = 0.28708ha x 50 people/ha
Population = 14.4people
Sanitary Flow = 302.8 l/cap/day

Peaking Factor

Peaking Factor M $=1+\frac{14}{4+P^{0.5}}$ where P= Populations in thousands

$=1+\frac{14}{4+(0.0144)^{0.5}}$ = 4.40

Peak Domestic Sewage Flow

$Q = \frac{P \times q \times PF}{86400}$

$Q = \frac{14.4 \times 302.8 \text{ l/cap/day} \times 4.40}{86400}$

=0.22l/s

Infiltration and Inflow

= 0.28708ha x 0.0002 m^3/sec/ha
= 0.00005m^3/sec
= 0.05l/s

Site Peak Sanitary Flow

=0.22l/s + 0.05l/s
=0.27l/s

4.2 Sanitary Service Connection

An existing 250mm sanitary sewer is located on the on Airport Road. The sewer has a slope of 0.53% and results in a capacity of 43.3l/s.

A proposed 150mm sanitary service connection is connected to the existing 250mm sanitary sewer. The service connection has a slope of 2.00% and has a capacity of 22.5l/s. Refer to **Plan G1** for details.

5.0 WATER

There is an existing 300mm watermain located on Airport Road. A 150mm service connection is proposed to connect to this existing watermain, refer to **Plan G1** for details.

5.1 Domestic Water Demand

The Region of Peel Design Standards were used to determine the domestic water demand, as follows:

Average Demand:

= People x Average Consumption Rate(1) x Peaking Factor(2)

Where:

(1) Commercial average daily flow factor (300l/person/day)

(2) ICI Peaking factor – Max Day (1.4)

= 14.4people(3) x 300l/person/day x 1.4

= 6,048l/day = 4.2l/min

(3) Section 4.1

5.2 Fire Flow Demand

The Fire Underwriters Survey was referenced to determine the fire flow demand for the proposed development. The proposed development consists of two commercial building envelopes connected by a common roof. The entire roof area encompassing both buildings is used as the Area parameter below. The building will not be sprinklered and the building will be constructed using ordinary construction materials.

Estimate of required fire flow:

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

$$F_1 = 220 \cdot (1.0) \cdot \sqrt{506.2\text{m}^2}$$

$$F_1 = 4{,}950 \frac{\text{l}}{\text{min}}$$

$$F_2 = 5{,}000 \frac{\text{l}}{\text{min}}$$

Where:

F = Required fire flow (l/min)

C = Type of construction coefficient (1.0 = ordinary construction)

A = Total floor area – both building envelopes under the same roof (m^2)

Building Occupancy Fire Hazard Assessment:

The building occupancy type is a restaurant and can be classified as Class A. Therefore, the development presents a low hazard risk and the required fire flow can be reduced by 25%.

Sprinkler Reduction:

No sprinkler system.

Exposure Charges:

North Side (7m)	= 20%
South Side (16m)	= 15%
East Side (42m)	= 5%
West Side (44m)	= 5%
Total exposure charge	**= 45%**

Final Fire Flow

F_{final} = $F_2 - (F_2 \cdot 25\%) + (F_2 \cdot 45\%)$

= 5,000l/min –(5,000l/min · 25%) + (5,000l/min · 45%)

= 6,000l/min = 6,000l/min

Total Water Demand

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

= 6,000l/min + 4.2l/min

= 6,004.2l/min = 1,586USgpm

5.3 Hydrant Flow Test

A hydrant flow test was performed for the development, refer to **Appendix A** for details.

The flow capacity available at 20psi was determined as follows.

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

Where:

Q_R = Rated capacity at 20psi (in gpm)

Q_F = Total test flow

H_R = Static pressure minus 20psi at Q_F

H_F = Static pressure minus residual pressure

Flow Capacity Parameters

PARAMETER	VALUE
Static Pressure	86psi
Residual Pressure	80psi
Total Test Flow Rate	2,414USgpm

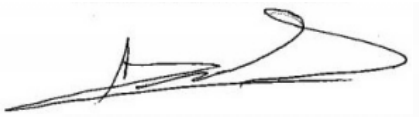
$$Q_R = 2{,}414 \cdot \left(\frac{(86-20)}{(86-80)}\right)^{0.54}$$

$$Q_R = 8{,}812\text{USgpm}$$

The available flow of 8,812USgpm at 20psi is greater than the demand of 1,586USgpm therefore, the development can be adequately serviced under the fire demand scenario.

Prepared by,

a.m. candaras associates inc.



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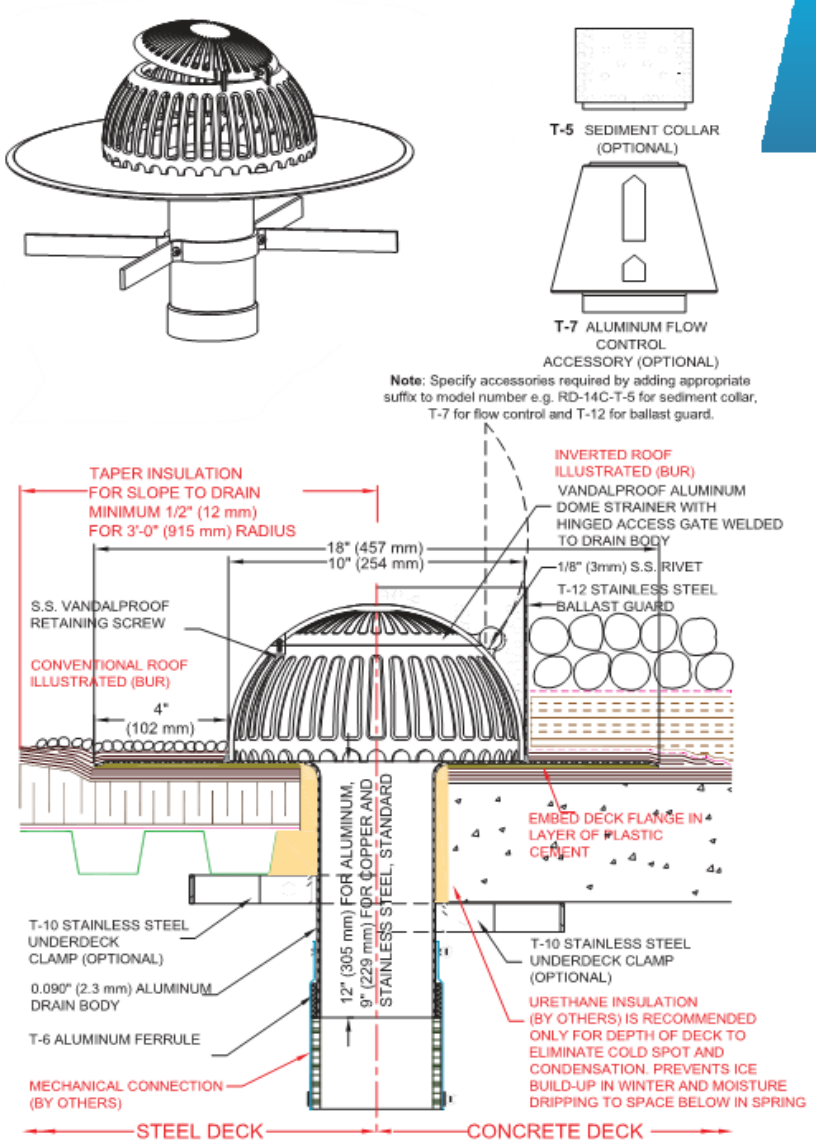
May 25, 2022

APPENDIX A – SUPPORTING DOCUMENTS

ROOF DRAIN DETAIL– THALER RD-14A – NO CONTROLS

Please be advised Thaler products may undergo improvements from time to time and are subject to change without notice.



RD-14A VANDALPROOF ALUMINUM ROOF DRAIN (All Purpose, Straight Outlet) Note: RD-14C (Copper) and RD-14SS (Stainless Steel) Roof Drain similar. See reverse side of page for material change

INSTALLATION:
"Installation Instructions" are provided with every Thaler product. Essentially, the RD-14A roof drain is installed by coring or cutting the roof assembly, fitting the drain outlet into the rainwater leader, installing the dome strainer (including any optional accessories), and as follows:

BUR: Set drain flange over membrane in layer of plastic cement and flash in with 3 overlapping layers of felt flashing.

ModBit: Torch membrane until bitumen is fluid and set drain flange into fluid. Flash in flange with two overlapping layers of ModBit and seal with asphalt sealer.

Single Ply: Set drain flange in layer of membrane adhesive before applying membrane over flange. Note: for PVC membrane, specify PVC coated drain flange by adding suffix P to end of model number, e.g. RD-14A-P; weld roofing to drain flange using PVC torch.

Precautions: If coating drain flange with a bituminous paint on site, allow 24 hours for drying before applying roof membrane.

Ordering and Availability: Available throughout North America. Contact Thaler for list of distributors and current cost information. Most products are readily available from stock.

ROOF SPECIALTIES

RD-14A VANDALPROOF ALUMINUM ROOF DRAIN (All Purpose, Straight Outlet)

DESCRIPTION:
The Thaler RD-14A Roof Drain consists of a vandalproof cast aluminum dome with hinged access gate, flat aluminum body, deck flange and straight outlet fitted with a brass ferrule.

PROMINENT FEATURES:
Non-removable dome strainer eliminates improper strainer installation or lost strainers that can result in plugged drains. Vandalproof hinged access gate (allen-key openable) allows drain to be cleaned if necessary, or dismantled by permitting access to bolts inside drain.

LEADER DIAMETERS:
With Aluminum Ferrule: 2" to 10" (51 mm to 254 mm). See detail at left for specific sizes.

OPTIONS:
Aluminum ferrule on outlet. T-5 aluminum sediment collar. Stainless steel under-deck clamp (provides snug installation in otherwise insecure applications). T-7 aluminum Flow Control accessory (weir) for utilizing roof as temporary reservoir during excessive rainfall. T-12 stainless steel ballast guard. See Thaler Roof Drain Options literature. PVC coated deck flange for PVC roof membrane. Bituminous painted deck flange for BUR and ModBit roof membrane.

RECOMMENDED USE:
For flat roofs in new or existing construction employing conventional roof (membrane above insulation) or inverted roof and new hook-up e.g. new installation in low spots subject to ponding water. Suitable for PVC, cast iron, steel, copper, or other type leaders in both Schedule 40 or 80 leader thicknesses.

APPROVALS:
Conforms to ANSI A112.21.2 Roof Drains standard.

WARRANTY:
20 year warranty against defects in materials and/or manufacture when installed in accordance with Thaler "Installation Instructions". Copy of Warranty Certificate available upon request.

MAINTENANCE:
No maintenance required (maintenance free), however, as per CRCA/NRCA recommendations, drains should be inspected twice a year (spring and fall) and any debris removed from both around and inside the strainer.

SPECIFICATION (SHORT FORM):
Roof drains: Thaler RD-14A aluminum drain for [2" to 10" (51 mm to 254 mm)] leader size with: vandalproof cast aluminum dome with hinged access gate welded to drain body; .090" (2.3 mm) spun aluminum flat drain body, deck flange and straight seamless aluminum outlet with [T-5 aluminum sediment collar;] [T-6 aluminum ferrule;] [T-10 stainless steel under-deck clamp;] [T-7 aluminum flow control accessory;] [T-12 stainless steel ballast guard;] [PVC coated deck flange] [bituminous painted deck flange]; as manufactured by Thaler Metal Industries, 1-800-387-7217 (Mississauga, Ontario, Cana- da) or 1-800-576-1200 (New Braunfels, TX), installed as per manufacturer's written instructions. Provide standard 20 year warranty against defects in materials and/or manufacture.

Table 2 – Detention Volume Required

The rational method is used to determine the required detention volume, based on a controlled release of 5.4l/s, as follows:

TIME PERIOD (min)	INTENSITY (mm/hr)	RUNOFF (l/s)	STORAGE (m^3)
30-35	14	5.7	0.0
35-40	19	8.0	0.0
40-45	29	10.8	0.5
45-50	51	16.5	2.2
50-55	114	29.0	6.0
55-60	239	64.8	16.7
60-65	141	135.8	38.0
65-70	86	80.1	21.3
70-75	59	48.9	11.9
75-80	43	33.5	7.3
80-85	33	24.4	4.6
85-90	26	18.7	2.9
90-95	21	14.8	1.7
95-100	17	11.9	0.8
100-105	15	9.7	0.2
			114.2

PARAMETER	VALUE	UNIT
C	0.80	-
A	0.25558	ha
N	2.778	-
Product	0.568	-
Release Rate	9.1	l/s

Net Paved = 1,451.4m^2 @ C = 0.95
Net Roof = 506.2m^2 @ C = 0.95
Net Landscaped = 506.2m^2 @ C = 0.31

$$\text{Storage } (m^3) = \frac{(\text{Runoff} - \text{Release Rate}) \cdot 5 \text{ min} \cdot 60 \text{ sec})}{1{,}000}$$

Where,
Release Rate = 9.1l/s

Stormceptor®

FORTERRA

Stormceptor® EF Sizing Report

STORMCEPTOR®
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

04/20/2022

Province:	Ontario
City:	caledon
Nearest Rainfall Station:	TORONTO INTL AP
Climate Station Id:	6158731
Years of Rainfall Data:	20

Site Name:	airport 2

Drainage Area (ha):	0.25
% Imperviousness:	74.00

Runoff Coefficient 'c': 0.74

Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	5.78
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	
Site Sediment Transport Rate (kg/ha/yr):	

Project Name:	1918
Project Number:	1918
Designer Name:	Zachary Schwisberg
Designer Company:	A.M. Candaras Inc.
Designer Email:	zachary@amcai.com
Designer Phone:	647-620-2022
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	94
EFO6	98
EFO8	99
EFO10	100
EFO12	100

Recommended Stormceptor EFO Model: **EFO4**

Estimated Net Annual Sediment (TSS) Load Reduction (%): **94**

Water Quality Runoff Volume Capture (%): **> 90**

Net Imperviousness (no roof):		
Impervious	1,848.0	m2
Pervious	663.1	m2
Total	2,511.2	m2
Imperviousness	74%	

imbrium

THIRD-PARTY TESTING AND VERIFICATION

►**Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

►**Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterways.

PARTICLE SIZE DISTRIBUTION (PSD)

►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

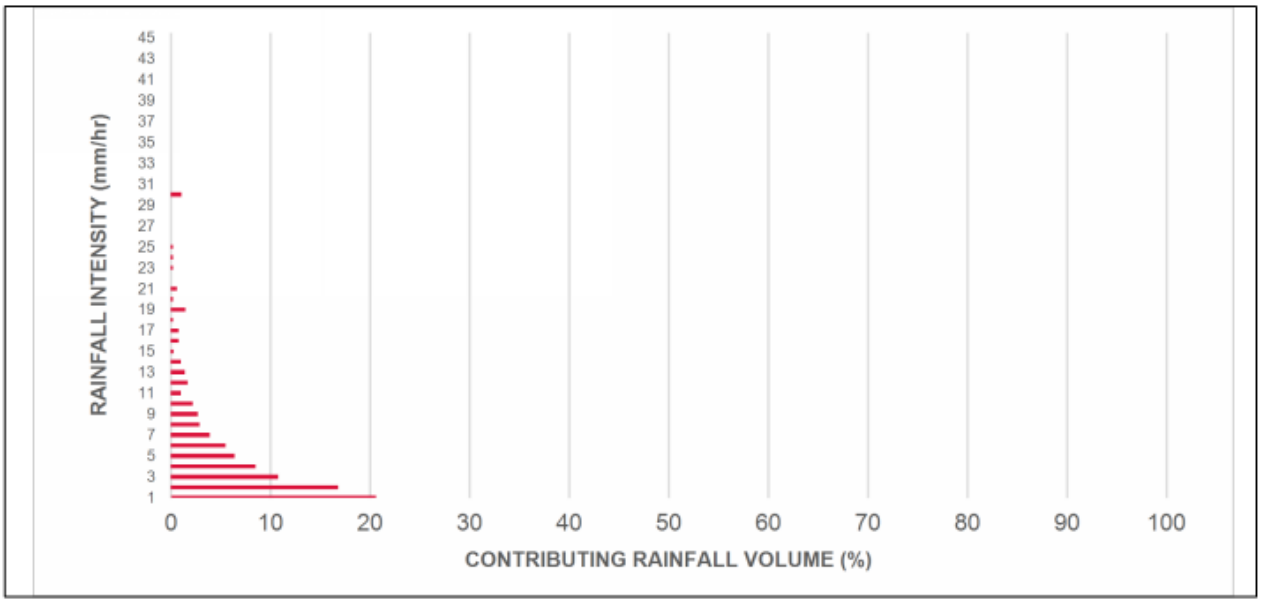
Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

Stormceptor® EF Sizing Report

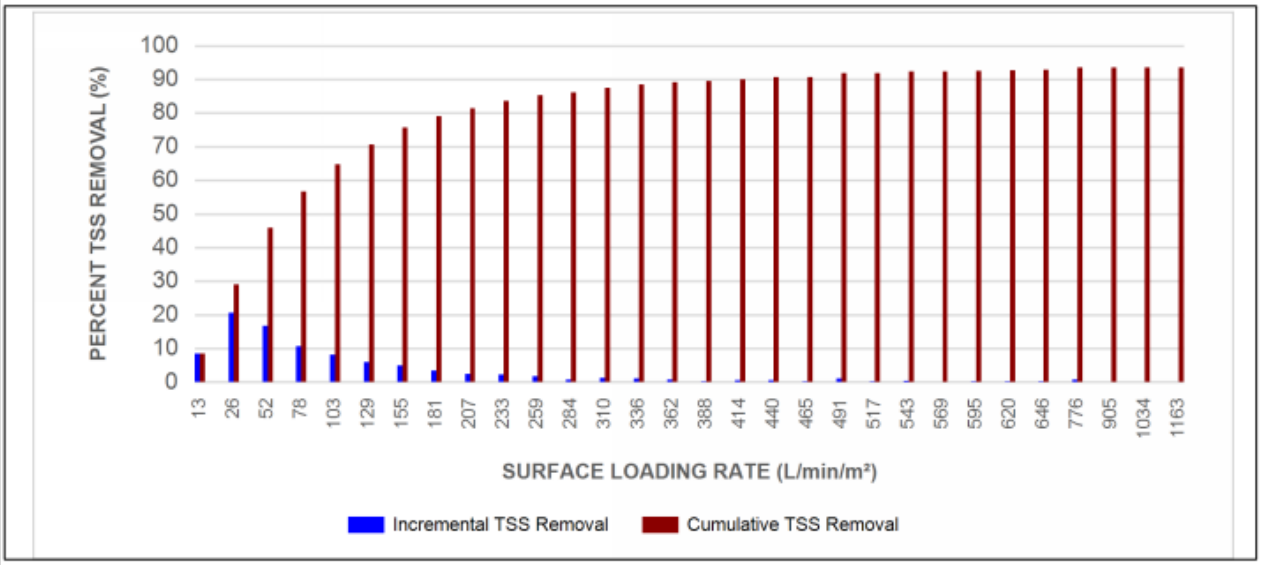
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.5	8.5	8.5	0.26	16.0	13.0	100	8.5	8.5
1	20.6	29.1	0.52	31.0	26.0	100	20.6	29.1
2	16.8	45.9	1.03	62.0	52.0	100	16.8	45.9
3	10.8	56.7	1.55	93.0	78.0	100	10.8	56.7
4	8.5	65.2	2.07	124.0	103.0	96	8.1	64.8
5	6.4	71.6	2.59	155.0	129.0	92	5.9	70.7
6	5.5	77.0	3.10	186.0	155.0	89	4.9	75.6
7	3.9	81.0	3.62	217.0	181.0	86	3.4	79.0
8	2.9	83.9	4.14	248.0	207.0	83	2.4	81.4
9	2.7	86.5	4.65	279.0	233.0	82	2.2	83.6
10	2.2	88.7	5.17	310.0	259.0	81	1.8	85.3
11	1.0	89.7	5.69	341.0	284.0	79	0.8	86.1
12	1.7	91.3	6.20	372.0	310.0	78	1.3	87.4
13	1.4	92.8	6.72	403.0	336.0	77	1.1	88.5
14	1.0	93.7	7.24	434.0	362.0	76	0.7	89.2
15	0.3	94.0	7.76	465.0	388.0	75	0.2	89.4
16	0.8	94.8	8.27	496.0	414.0	73	0.6	90.0
17	0.8	95.7	8.79	527.0	440.0	72	0.6	90.6
18	0.2	95.8	9.31	558.0	465.0	71	0.1	90.7
19	1.5	97.3	9.82	589.0	491.0	70	1.0	91.8
20	0.2	97.5	10.34	620.0	517.0	69	0.1	91.9
21	0.6	98.2	10.86	652.0	543.0	67	0.4	92.3
22	0.0	98.2	11.38	683.0	569.0	66	0.0	92.3
23	0.2	98.4	11.89	714.0	595.0	65	0.1	92.5
24	0.2	98.6	12.41	745.0	620.0	64	0.2	92.6
25	0.2	98.9	12.93	776.0	646.0	64	0.2	92.8
30	1.1	100.0	15.51	931.0	776.0	63	0.7	93.5
35	0.0	100.0	18.10	1086.0	905.0	62	0.0	93.5
40	0.0	100.0	20.68	1241.0	1034.0	61	0.0	93.5
45	0.0	100.0	23.27	1396.0	1163.0	58	0.0	93.5
Estimated Net Annual Sediment (TSS) Load Reduction =								**94 %**

Climate Station ID: 6158731 *Years of Rainfall Data*: 20

RAINFALL DATA FROM TORONTO INTL AP RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

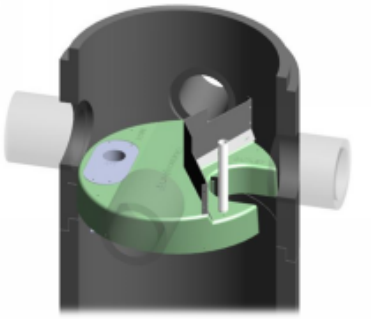
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

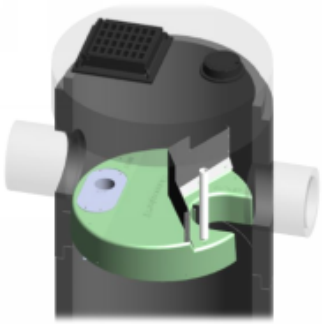
DESIGN FLEXIBILITY

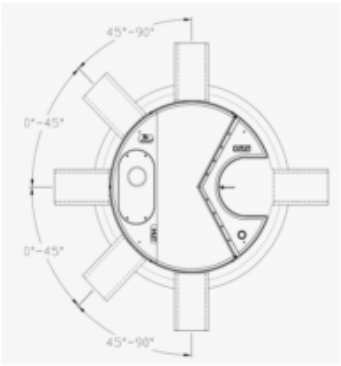
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

►While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.







INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.

0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.

45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity

** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

For specifications, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD PERFORMANCE SPECIFICATION FOR "OIL GRIT SEPARATOR" (OGS) STORMWATER QUALITY TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit Separators**

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The minimum sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m^3 sediment / 265 L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m^3 sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m^3 sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m^3 sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m^3 sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall

remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m^2 to 1400 L/min/m^2, and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m^2 and 1400 L/min/m^2 shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m^2 shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m^2. No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m^2.

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m^2 shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m^2, and shall be calculated using a simple proportioning formula, with 1400 L/min/m^2 in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m^2.

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators,** with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to

assess whether light liquids captured after a spill are effectively retained at high flow rates.

3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m^2 to 2600 L/min/m^2) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.** However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.

Technical Specification

Control Point	Head (m)	Flow (l/s)
Primary Design	1.750	9.100
Flush-Flo™	0.521	9.087
Kick-Flo®	1.070	7.225
Mean Flow		7.971

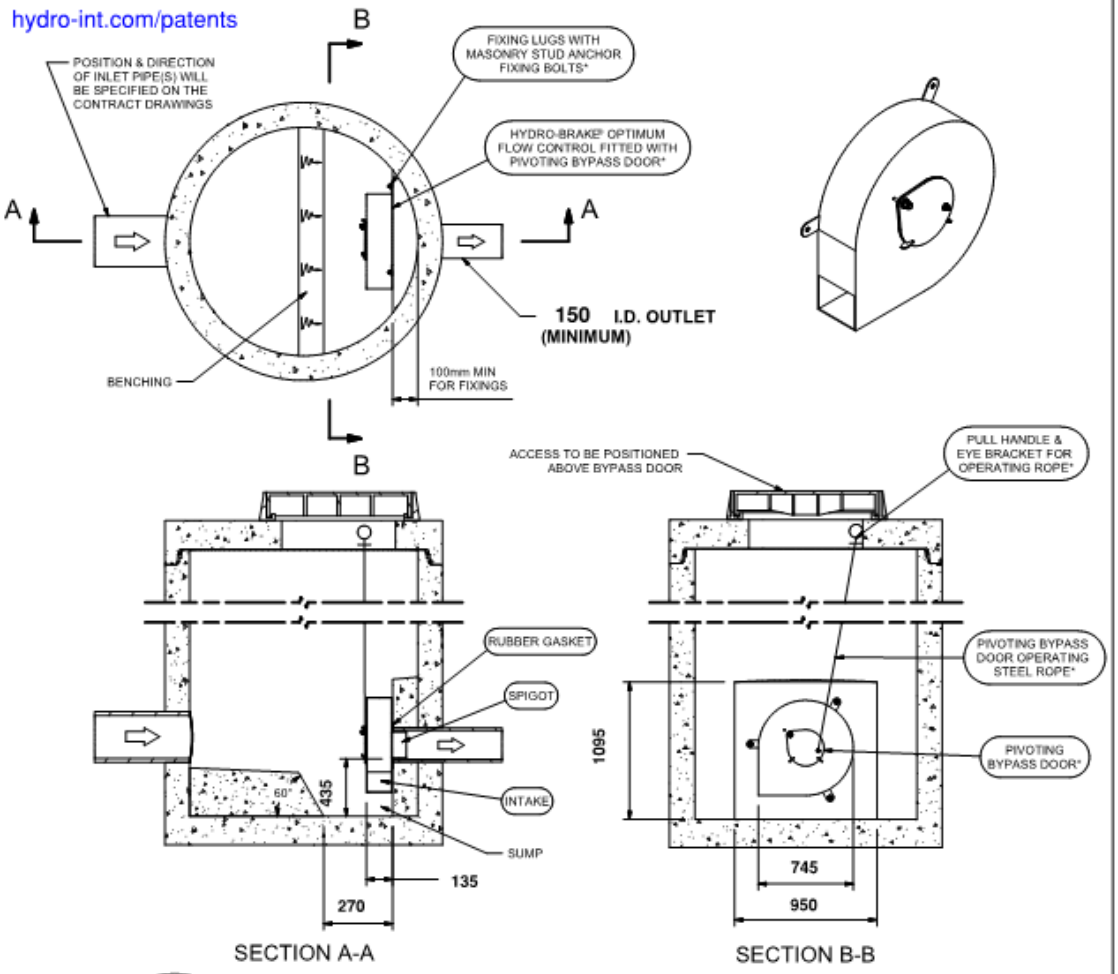
Hydro-Brake® Optimum Flow Control including:

- **3 mm** grade 304L stainless steel
- Integral stainless steel pivoting by-pass door allowing clear line of sight through to outlet, c/w stainless steel operating rope
- Beed blasted finish to maximise corrosion resistance
- Stainless steel fixings
- Rubber gasket to seal outlet
- Indicative Weight: 262 kg

BBA APPROVAL INSPECTION TESTING CERTIFICATION CERTIFICATE 08/4598

WRc Approved PT/320/0412

hydro-int.com/patents



SECTION A-A

SECTION B-B

IMPORTANT: ⬭ LIMIT OF HYDRO INTERNATIONAL SUPPLY
THE DEVICE WILL BE HANDED TO SUIT SITE CONDITIONS
FOR SITE SPECIFIC DETAILS AND MINIMUM CHAMBER SIZE REFER TO HYDRO INTERNATIONAL
ALL CIVIL AND INSTALLATION WORK BY OTHERS
* WHERE SUPPLIED
HYDRO-BRAKE® FLOW CONTROL & HYDRO-BRAKE® OPTIMUM FLOW CONTROL ARE REGISTERED TRADEMARKS FOR FLOW CONTROLS DESIGNED AND MANUFACTURED EXCLUSIVELY BY HYDRO INTERNATIONAL

THIS DESIGN LAYOUT IS FOR ILLUSTRATIVE PURPOSES ONLY. NOT TO SCALE.

DESIGN ADVICE !

The head/flow characteristics of this SHE-0128-9100-1750-9100 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.
The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

Hydro International®

DATE	4/20/2022 9:34 PM
SITE	Tim Hortons
DESIGNER	**Zachary Schwisberg**
REF	**19_12_3501**

SHE-0128-9100-1750-9100
Hydro-Brake® Optimum

 Hydro International Ltd, 94 Hutchins Drive, Portland, Maine, 04102-1930. Tel: +1 (207) 756 6200 Fax: +1 (207) 756 6212 Web: www.hydro-int.com Email: enquiries@hydro-int.com

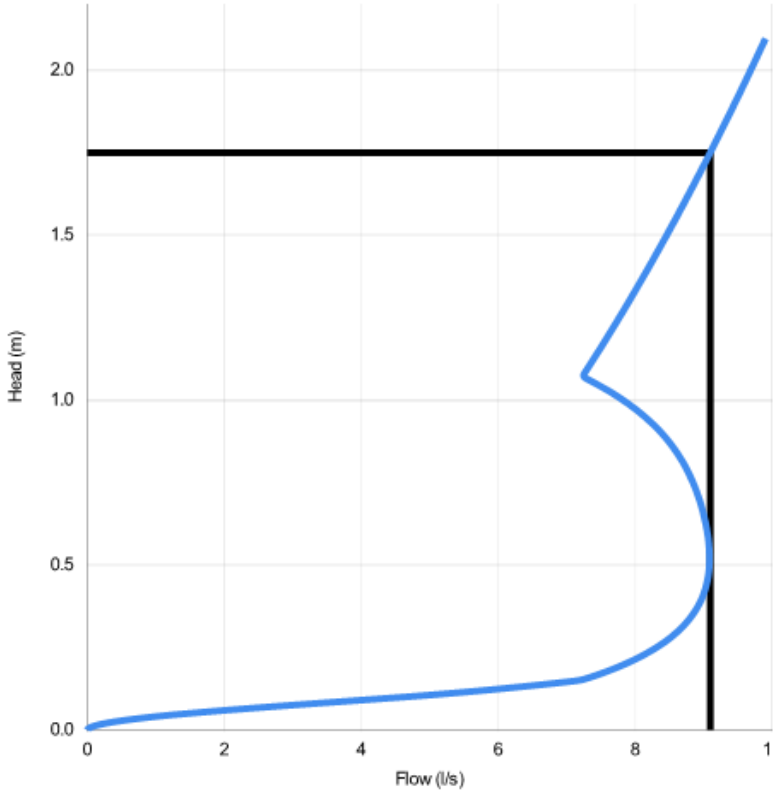
zachary@amcai.com

Technical Specification		
Control Point	Head (m)	Flow (l/s)
Primary Design	1.750	9.100
Flush-Flo	0.521	9.087
Kick-Flo®	1.070	7.225
Mean Flow		7.971

BBA APPROVAL INSPECTION TESTING CERTIFICATION
CERTIFICATE No 08/4596

WRc APPROVED
PT/329/0412

hydro-int.com/patents



Head (m)	Flow (l/s)
0.000	0.000
0.060	2.029
0.121	5.812
0.181	7.630
0.241	8.243
0.302	8.638
0.362	8.881
0.422	9.018
0.483	9.078
0.543	9.084
0.603	9.052
0.664	8.988
0.724	8.896
0.784	8.769
0.845	8.598
0.905	8.365
0.966	8.050
1.026	7.630
1.086	7.275
1.147	7.461
1.207	7.642
1.267	7.819
1.328	7.991
1.388	8.159
1.448	8.324
1.509	8.485
1.569	8.642
1.629	8.797
1.690	8.948
1.750	9.097

DESIGN ADVICE

The head/flow characteristics of this SHE-0128-9100-1750-9100 Hydro-Brake Optimum® Flow Control are unique. Dynamic hydraulic modeling evaluates the full head/flow characteristic curve.

! **The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.**

Hydro International

DATE	4/20/2022 9:34 PM
Site	Tim Hortons
DESIGNER	Zachary Schwisberg
Ref	19_12_3501

SHE-0128-9100-1750-9100

Hydro-Brake Optimum®

5-200 Connie Cres. Concord ON L4K 1M1 Phone 416-883-9777 Fax 905-303-6977

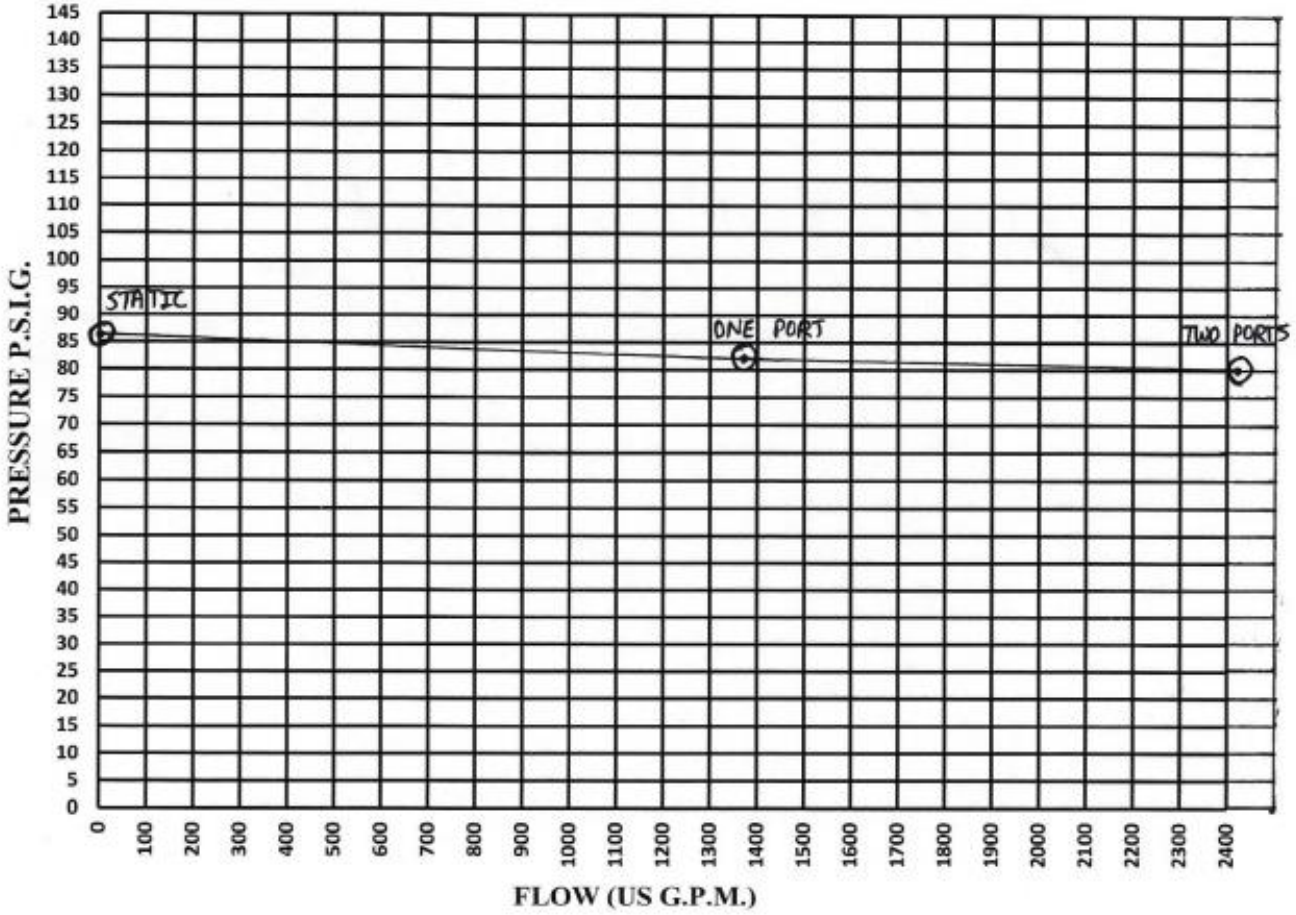
FLOW TEST REPORT

LOCATION OF RESIDUAL HYDRANT 16036 Airport Road

LOCATION OF FLOW HYDRANT 16078 Airport Road

TIME OF TEST 9:30 AM WATERMAIN SIZE 300 mm STATIC PRESSURE 86 PSI

NUMBER OF OUTLETS	PITOT PRESSURE	FLOW (US G.P.M.)	RESIDUAL PRESSURE
One 2 ½" hydrant port	68 PSI	1380	82 PSI
Two 2 ½" hydrant port	52 PSI	2414	80 PSI



PROJECT LOCATION 16054 Airport Road DATE May 13th 2022

COMPANY NAME GANNI PROPERTIES (PRINT NAME) AQUAZITION EMPLOYEE Adam Korolev. (PRINT NAME)

APPENDIX B – REPORT EXCERPTS

BORING FIGURE NUMBER 3
PAGE 1 OF 1

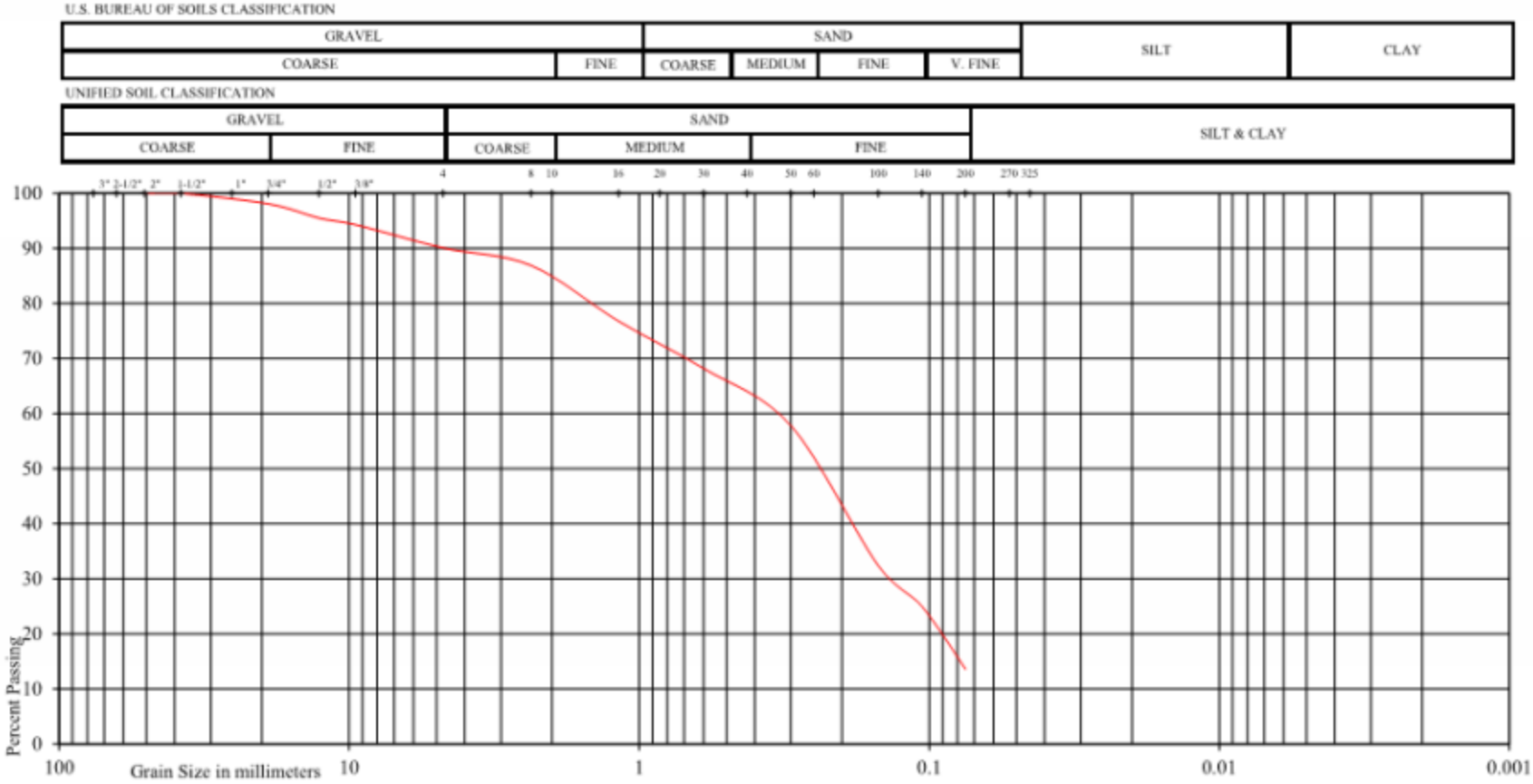
CLIENT: ***2610818 Ontario Ltd.*** *PROJECT NAME:* *Proposed Commercial Property*
PROJECT NUMBER: *1904-006* *PROJECT LOCATION:* ***16054-16060 Airport Rd, Caledon, ON.***

DATE STARTER: ***July/24/2019*** *DATE COMP.:* ***July/24/2019*** *GROUND ELEVATION:* ***293.047 m*** *HOLE SIZE :* ***50 mm***
WATER LEVEL: Dry on completion / Cave in at 10'
DRILLING METHOD: ***CONTINUOUS AUGER***
LOGGED BY: ***A.R.*** *CHECKED BY:* ***A.R.***
NOTES: mointoring well screen found at 8-18'

Depth (ft)	ELEV (293.047 m)	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors **Rock Description:** modifierm color, hardness/degree of concentration, bedding and joint characteristics, solutions, void conditions.		TYPE	N VALUE	% WATER CONTENT	% RECOVERY	"N" VALUE 20 40 60 SHEAR STRENGTH	WATER CONTENT % 10 20 30 PL O LL	REMARKS
1		TOPSOIL Fill- 130 mm thick		DO 1	3	8	63%	•	•	GSA SS5 gravel: 0% sand: 40% silt: > 55% clay:<5%
2		Silty Fine Sand and Silty Sand, trace of clay brown, damp to saturated very loose to compact								
3				DO 2	4	6.6	70%	•	•	
4										
5										
6			weathered	DO 3	12	8.8	100%	•	•	
7										
8			wet silt seam	DO 4	9	21.3	100%	•	•	
9										
10										
11			cave in	DO 5	10	19.8	100%	•	•	
12										
13										
14										
15										
16				DO 6	13	21.2	33%	•	•	
17										
18										
19										
20										
21		Silty Sand Till, traces of clay and gravel brown, wet, compact		DO 7	22	17.5	100%	•	•	
		Borehole end at 21'- mointoring well installed								

GRAIN SIZE DISTRIBUTION

Reference No: 1807-003



Project: Church Street

Location: 36 Church Street, Georgina

Borehole No: 5

Sample No: 2

Depth (m): 0.76 - 1.52

Elevation (m): 99.9

Liquid Limit (%) = -

Plastic Limit (%) = -

Plasticity Index (%) = -

Moisture Content (%) = 6

36mm/hr = Estimated Permeability (cm./sec.) = 10^{-4}

Classification of Sample [& Group Symbol]: FINE TO COARSE SAND, some silt and clay, a trace of gravel

Figure: 11

RE: 1918 - 16054 & 16060 Airport Road, Caledon

AA

Ahmed Al-Temimi <aaltemimi@azuregroup.ca>
To Zachary Schwisberg; 'Jennifer Millington'; 'Michael Vani'
Cc 'AJ Taylor'; 'Olha Dudar'; Tas Candaras

Reply | Reply All | Forward | ...

Wed 2019-08-28 5:08 PM

16054-16060 Airport Rd-Caledon.kmz
2 KB

Subject: RE: 1918 - 16054 & 16060 Airport Road, Caledon

Hi there

Please see the below updated table based on the elevation data provided. The "stick up" is the distance from the ground to the top of the measuring point that was taken at the same time as the water level measurements. For the flush-mount well our measurements are taken relative to the ground surface. This seems to be similar to your riser measurement, however our values differ. Please also note that the monitor wells were installed in July, and the seasonal high ground water table is measured from March – June so we do not have this data.

Location ID	Ground Elevation*	Total Depth	Stick Up	Manual Water Levels (mbgs)	Manual Water Levels (masl)
	(masl)	(mbgs)	(m)	July-31-2019	July-31-2019
MW-1	291.73	5.01	0.00	3.15	288.6
MW-3	293.05	5.26	0.81	4.09	289.0
MW-4	293.19	5.41	0.75	4.23	289.0

*Provided by Azure via email August 21st 2019

Jennifer Millington, M.A.Sc., P.Geo.
Hydrogeologist

Azimuth Environmental Consulting, Inc.
642 Welham Road
Barrie, ON L4N 9A1
Office: (705) 721-8451 ext. 226
Cell: (705) 790-8451
Fax: (705) 721-8926

Approximate Borehole Locations

Source: York Maps
© 2017 York Region Interactive Maps

Title	Project	Project No.	Scale	Date	Drawing No.
Borehole Locations Plan	36 Church Street, Georgina, ON	1807-003	As drawn	September 10, 2018	2