FUNCTIONAL SERVICING REPORT

PROPOSED RESIDENTIAL DEVELOPMENT

SIXTY SIX TWENTY
DI BLASIO HOMES
6620 ROTHSCHILD TRAIL

CITY OF MISSISSAUGA
REGIONAL MUNICIPALITY OF PEEL

FILE NO. 218-M14

MAY 19, 2020

SKIRA & ASSOCIATES LTD.
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1.0 INTRODUCTION

The purpose of this report is to define the existing and proposed servicing scheme in support of the proposed 4-storey mid-rise condominium apartment building, consisting of 43 condominium units and two (2) single-detached dwellings fronting Rothschild Trail.

The existing parcel of land includes Lot 20 & 21, Reg. Plan 43M-1710, in Mississauga. The site is located on Rothschild Trail at the end of the cul-de-sac.

It is intended that this Functional Servicing Report will be sufficient to support amendments to the Official Plan and Zoning Bylaw and will result in an "approval in principle," of the design proposal by the City of Mississauga, Region of Peel and any other relevant authorities. Detail design will be provided as part of the Site Plan Application.

2.0 STUDY AREA INFORMATION

The subject property is known legally as Lot 20 & 21, Reg. Plan 43M-1710, in the City of Mississauga, Regional Municipality of Peel.

The site is bound by Rothschild Trail on the east, Fletcher's Creek Valley on the south, and existing residential buildings to the north. ***Refer to Figure No. 1 – Key Plan.***

The site is located on 6620 Rothschild Trail and is presently developed with a residential building. The existing building is scheduled for demolition prior to construction start.

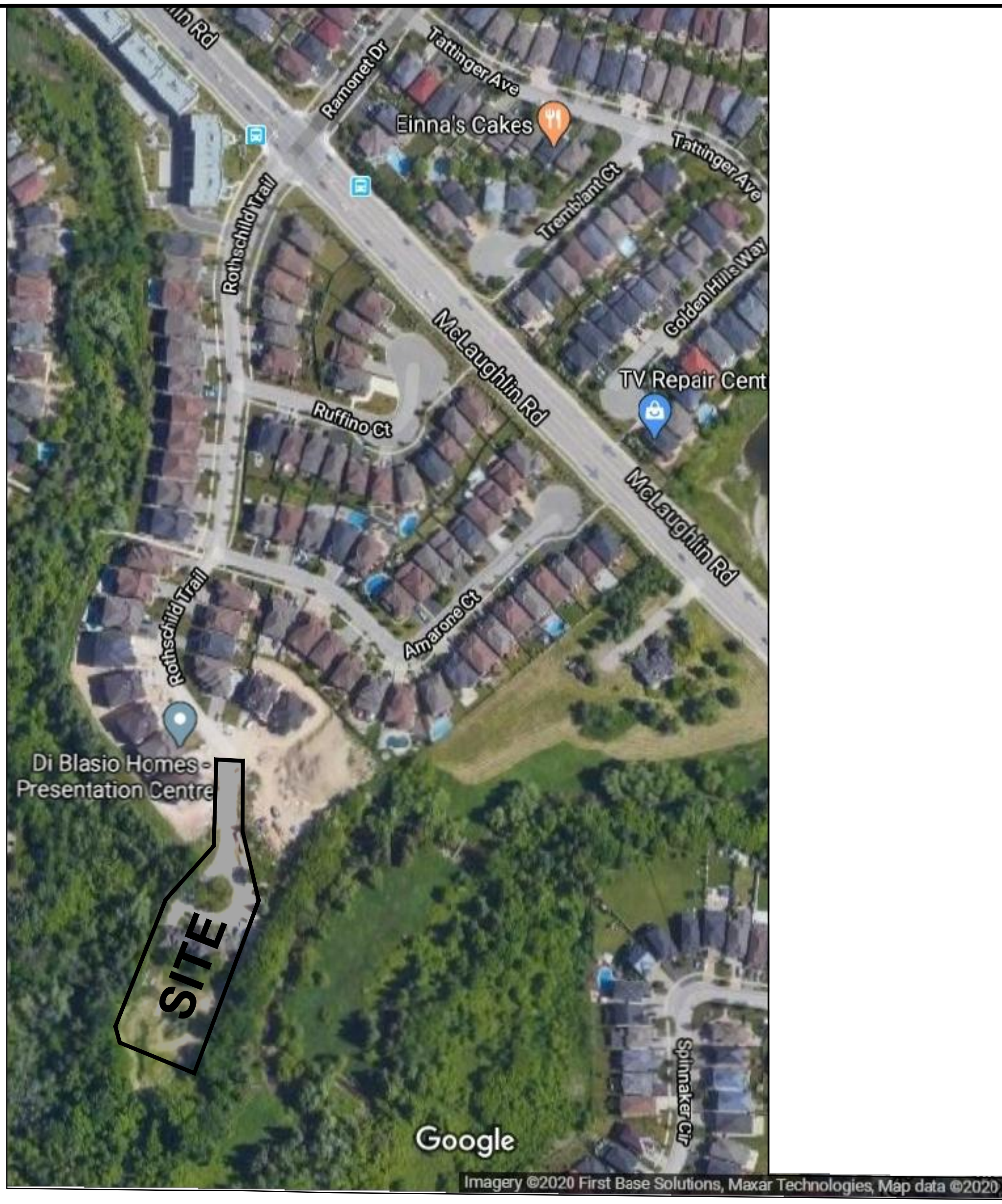
The total site area is 0.9287 Ha.

The site is relatively flat within the central portion of the lot with a gentle slope from east to west. East portion of the site grade differential is approx. 3.0m sloping towards Fletcher's Creek Valley.

An area of 0.2590 Ha, below the top of bank, surveyed by D. B. Searles, staked on May 26, 2015 by CVC, will be dedicated to the City of Mississauga. These lands are located north and west on the subject lands from part of the Fletcher's Creek Valley. Remaining area, 0.67 Ha, will create 2 lots (0.198 Ha) and condominium block (0.472 Ha).

The majority of the site will be developed with a mid-rise condominium building, driveways and loading areas. A portion of the site fronting Rothschild Trail will be subdivided into two (2) single-lot dwellings.

We have investigated existing services through City and Region records for information related to Rothschild Trail. Drawings related to DiBlasio Estates West Phase 2 by Urban Ecosystems Limited have been obtained.



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KEY PLAN

PROJECT No. 218-M14		FIGURE No. 1
DATE - MARCH 2018		
SCALE - N.T.S.	DRAWN BY - E.W.	

3.0 TRANSPORTATION SYSTEM

The subject site is located at the end of the cul-de-sac on Rothschild Trail. Access to existing property is from Rothschild Trail.

Single dwellings fronting Rothschild Trail will provided with individual driveway to municipal road. Condominium block access will be to Rothschild Trail as well. Full access driveway will be located at the centre of the property. Proposed condominium road will be designed to provide access for fire and garbage trucks. Existing driveway is to be eliminated and boulevard restored as per City of Mississauga requirements.

Rothschild Trail will provide direct access to major arterial roads, being McLaughlin Road and Derry Road. Both connect to nearby Highway 403 and 401.

4.0 STORM DRAINAGE SYSTEM

Currently the site is developed. The existing residential dwelling will be demolished prior to construction.

The existing site drainage is currently directed to Fletcher's Creek.

4.1 Pre-Development Conditions

Base on existing site conditions, site area prior to land dedication:

Area	= 0.9287 Ha
Ex. Roof	= 0.0372 Ha
Paved Area	= 0.0640 Ha
Landscaped Area	= 0.8275 Ha

Runoff Coefficient:

= (0.25 x 0.8275 + 0.90 x 0.1012) / 0.9287
= 0.321

Based on the top of bank dedication only, a 0.67 Ha will be subject to development.

4.2 Post-Development Conditions

The subject lands proposal is for residential development consisting of 2 single residential dwellings fronting Rothschild Trail and 4-storey residential condominium. Based on existing the single residential lots will continue to drain towards the previously assigned drainage area towards Rothschild Trail based on subdivision drainage plans. The proposed single dwelling area, approx. 0.19 Ha, will be designed to convey surface drainage towards right-of-way storm sewer. The storm sewer was designed to C = 0.55 runoff coefficient matching City of Mississauga subdivision criteria. The proposed condominium block will contribute runoff towards Fletcher's Creek Valley through storm connection to the existing storm easement of Lot 20.

Storm connections have been provided for residential lots. Foundation weeping tiles of each dwelling will be connected by gravity downspouts and disconnected.

The condominium block runoff has to be controlled prior to Fletcher's Creek release. Based on CVC criteria, quantity, quality, erosion, and thermal controls are required.

Quantity control on-site stormwater management will be provided to restrict 100-yr post-development flows of proposed development to 2-yr pre-development levels runoff coefficient. Max. required storage volumes for the site were arrived at using Modified Rational Method.

We have verified storm sewer capacity for the pipe located within the easement and confirm that the additional runoff conveyed from the condominium block can be accommodated. Design sheets and storm drainage plans have been enclosed in ***Appendix B***.

Q_{ALL} = 0.472 x 59.89 x 0.321 / 360
= 0.025m³/s

Where, C = 0.321 is weighted runoff coefficient previously established.

Roof controls will be applied to the main structure to restrict roof runoff to 35.0 L/s/Ha flow. The required volume will be controlled on top of roof structure for short period of time.

The remaining are of the building is proposed to be designed as green landscaped walkout patio space. Runoff from this space will be uncontrolled and discharge sheet flow towards valley.

Table 1 – Required Roof Volume

YEAR STORM
100
CITY
Mississauga

C = 0.900
A (ha) = 0.19390
Allow. Discharge Qa (m3/s) = 0.006800
Safety Factor Sf = 0%

Max. Required Detention (m3) = *73.90*

RAINFALL DURATION *Tc (min)*	RAINFALL INTENSITY *I (mm/hr)*	TOTAL UNCONTROLLED RUNOFF *Q=CIA/360 (m3/sec)*	INFLOW VOLUME Vi (m3)	OUTFLOW VOLUME Vo (m3)	REQUIRED DETENTION VOLUME (m3) *D=(Vi-Vo)*Sf*
15	140.69	0.0682	61.38	6.08	55.44
20	118.12	0.0573	68.71	8.08	60.78
25	102.41	0.0496	74.47	10.08	64.54
30	90.77	0.0440	79.21	12.09	67.29
35	81.77	0.0396	83.24	14.09	69.32
40	74.58	0.0362	86.77	16.10	70.84
45	68.68	0.0333	89.89	18.11	71.97
50	63.75	0.0309	92.71	20.11	72.78
55	59.56	0.0289	95.28	22.12	73.34
60	55.95	0.0271	97.64	24.13	73.70
65	52.81	0.0256	99.83	26.14	73.87
70	50.03	0.0243	101.87	28.15	**73.90**
75	47.58	0.0231	103.78	30.16	73.80
80	45.38	0.0220	105.58	32.17	73.59
85	43.39	0.0210	107.28	34.18	73.28
90	41.60	0.0202	108.90	36.19	72.88

Q_{ALL} = 0.025 – 0.0068
= 0.0182m³/s

Balance of the area, 0.2783 Ha, will be controlled on site.

C_W = (0.25 x 0.1303 (landscape) + 0.90 x 0.148 (asphalt)) / 0.2783
= 0.117 + 0.478
= 0.595

Table 2 – Condo Block Required Storage

YEAR STORM
100 year
CITY
Mississauga

C = 0.595
A (ha) = 0.27830
Allow. Discharge Qa (m3/s) = 0.018000
Safety Factor Sf = 0%

Max. Required Detention (m3) = *44.52*

RAINFALL DURATION *Tc (min)*	RAINFALL INTENSITY *I (mm/hr)*	TOTAL UNCONTROLLED RUNOFF *Q=CIA/360 (m3/sec)*	INFLOW VOLUME Vi (m3)	OUTFLOW VOLUME Vo (m3)	REQUIRED DETENTION VOLUME (m3) *D=(Vi-Vo)*Sf*
5	242.53	0.1116	33.47	5.73	27.74
10	176.31	0.0811	48.66	10.80	37.86
15	140.69	0.0647	58.24	15.90	42.35
20	118.12	0.0543	65.20	21.01	44.19
25	102.41	0.0471	70.66	26.14	**44.52**
30	90.77	0.0418	75.16	31.27	43.89
35	81.77	0.0376	78.99	36.41	42.57

Required volume will be accommodated within the Cultec/StormTech storage system. Final details of the volumes will be established during the Site Plan Approval stage. Preliminary design has been enclosed in the ***Appendix A***.

4.3 Water Balance Consideration

The latest City of Mississauga Water Balance Management Plan contains a water balance target/criteria that requires the site to retain 5mm of every rainfall and allow it to infiltrate back into the ground.

The impervious area amounts to 3,419m² of roof and asphalt surface.

The required volume is as follows:

V_{5mm} = 3,419m² x 0.005m
= **17.09m³** per rainfall

Green roofs over entire underground parking surface will be implemented to retain a portion of the 5mm rainfall. Detailed calculations will be provided during detailed design.

An infiltration/cooling trench will be implemented in the buffer area at the north side, providing 5.76m³ for storage infiltration and cooling. Clear gravel trench, 48m² base and 0.30m depth will be provided.

Permeable paving proposed on all visitor parking surfaces will provide remaining storage for infiltration. 230m² of permeable paving area will provide volume within the gravel portion of pavement.

$$V = 230 \times 0.30 \times 0.40 \text{ (porosity)}$$
$$= 27.6\text{m}^3$$

4.4 Quality Control

The proposed development will utilise a **treatment train** approach that includes clean roof runoff from green roofs, landscaped areas and condominium building. It will be collected and discharged through StormTech cooling trench towards Fletcher's Creek Valley.

Roof water from the green roof is considered a clean water source.

The runoff from the asphalt drive aisle will be captured in the storm system and directed to StormTech trench.

The City of Mississauga and Credit Valley Conservation Wet Weather Flow Management Guidelines state that the improvement of the quality of stormwater runoff as a primary goal. According to the Ministry of the Environment & Climate Change's Stormwater Management Planning & Design Manual, the site is required to provide a long-term removal of 80% Total Suspended Solids (TSS) for the protection of waterways.

The summary chart of the TSS removal based on-site is shown below:

Surface Type	TSS Removal (%)	Area (m²)	Area with TSS Removed (m²)
Impervious Roof (clean water)	80	1,939	1,55,
Landscape	80	1,303	1,042
Asphalt Pavement	0	1,250	0
Permeable Pavers Driveway	50	230	115
	Total:	4,722	2,708
			2,708 / 4,722 = 0.57

As the chart above illustrates, the majority of the site provides clean water with a TSS removal rate of 57%. The clean water provided by landscape and roof areas. The dirty water from the parking/asphalt area will pass through a permeable paving and StormTech gravel prior to final treatment through the oil/grit interceptor. For STC Structure TSS removal calculations see ***Appendix B***.

4.5 Orifice Control

The allowable discharge rate from the development will be controlled by means of orifice control. Plate installed over outlet pipe storm CBMH 1. 90mm dia. orifice plate is proposed. See ***Appendix B*** for detail calculations.

4.6 Overland Flow Route

Existing overland flow route is directed south towards Fletcher's Creek. Our proposed grading will continue to have the escape route in the same direction (in excess of 100-yr storm). As such, we are not modifying existing conditions.

5.0 SANITARY SEWER SYSTEM

The proposed mid-rise condominium tower will be serviced to the existing 250mm dia. sanitary sewer located within the existing sanitary sewer easement on south limit of the property. The existing 250mm dia. sanitary sewer has sufficient depth to accept sanitary flows from the mid-rise condominium building and residential dwellings.

The proposed sanitary invert at property line is approx. 178.46m. The proposed lowest finished main floor is approx. 181.00. Therefore, the building main floor and above will have gravity sewage flows. The basement and underground drains will also gravity drain to the existing sanitary system.

The proposed residential dwellings fronting Rothschild Trail will be provided with individual sanitary connections. All individual dwellings will be able to discharge sanitary sewer gravity including basement elevations.

Sanitary Flow Calculations

A. Residential Condominium Development:
   = 43 units x 2.7 PPU
   = 116.1p

B. Residential Dwellings:
   = 2 lots x 4.15
   = 8.3

Total Population = 116.1 + 8.3
= **124.4**

Peak Factor $= 1 + \frac{14}{4 + P^{0.5}}$

Where, P = population in thousands

$= 1 + \frac{14}{4 + 0.124^{0.5}}$

= 1 + 3.21
= **4.21 (max. 4.0)**

Expected Peak Factor = 302.8 x 124 x 4
= 150,188.8 L/day = 1.74 L/s

6.0 WATER DISTRIBUTION SYSTEM

The proposed mid-rise condominium apartment will be serviced to the existing 200mm dia. watermain located on Rothschild Trail. The existing 200mm watermain will be extended approx. 11m to provide better coverage.

The existing fire hydrant on Rothschild Trail will be utilised to provide external fire coverage for the single residential building and new internal fire hydrant will be constructed to provide condominium coverage.

Proposed 200mm dia. watermain connection will be constructed for fire and 100mm water service for domestic use for the proposed condominium.

The proposed 5 residential dwelling fronting Rothschild Trail will be provided with individual connections to the existing watermain of short side of the boulevard.

Water Demand Calculations

Proposed Unit (Residential) – 43 condos and 2 dwellings
(124 population, as per previous calculations)

Total Expected Peak Flow = 280 x 124 x 3.0
= 104,160 L/day = 1.20 L/s

Total Expected Max. Daily Flow = 280 x 124 x 2.0
= 69,440 L/day = 0.80 L/day

Based on *Fire Underwriters Survey 1999*, the fire flow is calculated on the area of two largest floors + 50% of 8 floors using the following formula:

$F = 220 \sqrt{A} \times C$

Where, C = coefficient of fire resistance construction = 1.0 (wood construction)
A = area
F = fire flow in L/min

$A = 1{,}116 m^3$

$F = 220 \times 1.0 \times \sqrt{1{,}116}$
= 7,349 L/min = **122.49 L/s**

Calculated value can be reduced by 50% if automatic sprinkler system is included.

Therefore, F = 122.49 x 0.50
= **61.24 L/s**

Max. Peak Flow = 1.2 (res.) + 61.24 (fire)
= **62.44 L/s**

Max. Daily Flow = **0.80 L/s**

The fire flow will be conducted on the existing watermain and confirms that the existing system can provide sufficient domestic fire flows. The fire flow test has been conducted and adequate pressure exists on Rothschild Trail to meet domestic and fire demand.

Applied
Fire Technology Inc.
Since 1987
Design • Consulting • Testing • Inspection

WATER SUPPLY TEST

Name of risk: ....
File No.: ....

Address: 6620 ROTHSCHILD TRAIL
Test by: AFTI

Municipality: MISSISSAUGA. ONT.
Date: SEPT. 25, 209

SYSTEM DATA:

Size of Main: 6 Dead End: ✓ Two Ways: .... Loop: ....

Source Reliable: ✓ If not explain: ....

Comments: ....

TEST DATA:

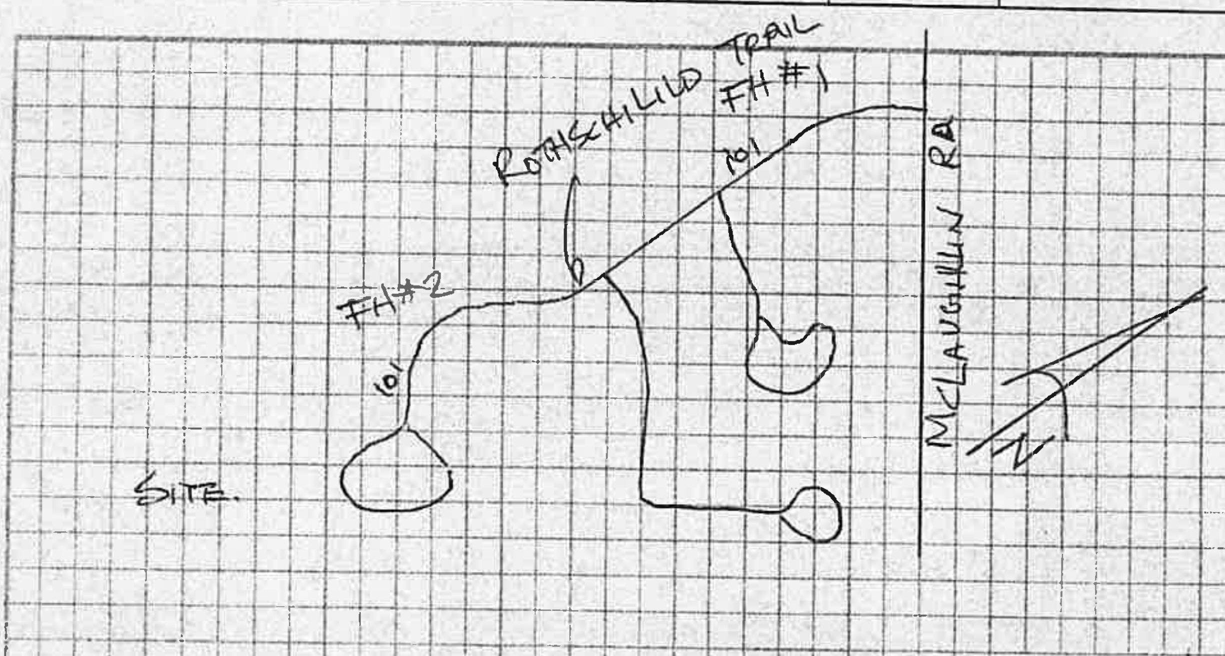
Location of test fire hydrants; Residual: #1 6692 ROTHSCHILD TRAIL, MISSISSAUGA.

Flow: #2 6628 ROTHSCHILD TRAIL, MISSISSAUGA

Static pressure 60 psi

Time: .... A.M. .... P.M.

Test No.	No. of Outlets	Orifice Size (in.)	Pitot Reading (psi)	Equivalent Flow gpm (U.S.)	Total Flow gpm (U.S.)	Residual Pressure (psi)	Comments
1	1	1¾	55	678	676	59	X0.997
2	1	2½	54	1371	1234	57	X0.9
3	2	2½	34, 34	1088, 1088	1958	55	0.9
4							



Sketch by: RW

Scale: NTS

Name and address of municipal authority who should receive a copy.

PVC.

LCED (H.O.) 102

STATIC: 60 PSI

(1) 676 USGPM@ 59 PSI

(2) 1234 USGPM@ 57 PSI

(3) 1958 USGPM@ 55 PSI

NAME OF RISK: FILE NO.:

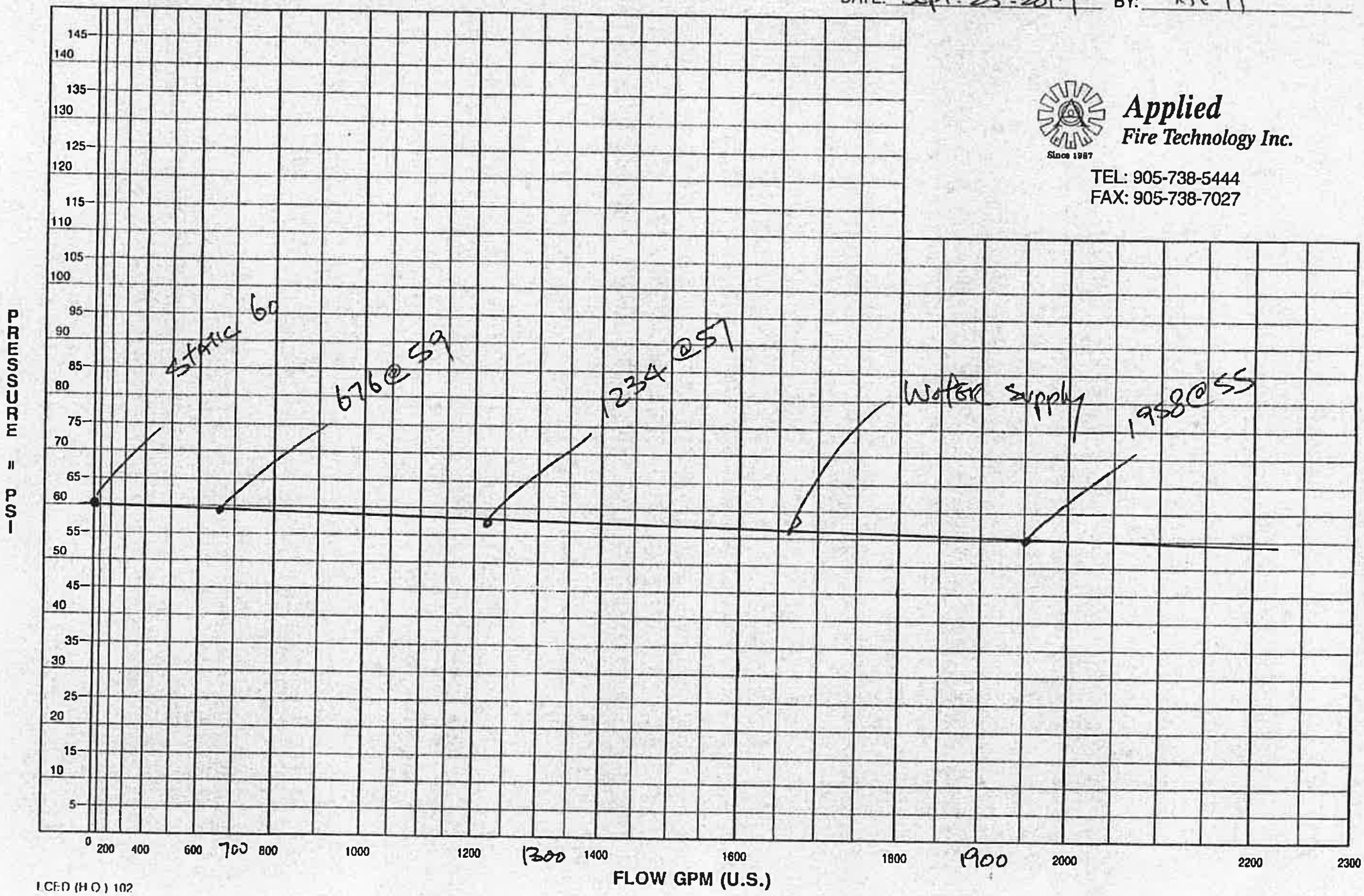
STREET: 6620 ROTHSCHILD TRAIL

CITY: MISSISSAUGA ONT.

DATE: SEPT. 25-2019 BY: AFTI

Applied
Fire Technology Inc.
Since 1987

TEL: 905-738-5444
FAX: 905-738-7027



LCED (H.O.) 102

7.0 SUMMARY

The proposed development can be fully serviced by connecting to existing services, which have been designed to accommodate the proposed development and therefore have sufficient capacity.

- Storm sewer outlet will be to municipal easement.
- Sanitary sewer is available on municipal easement.
- Watermain is available on Rothschild Trail.

The findings and recommendations were prepared in accordance with Accepted Professional Engineering Principles & Practices. Based on the above, the proposed development can be adequately serviced in accordance with City and Region Standards. The findings of this report are global and are not related to servicing functionality of this application. These findings by no means are final and are not to replace the detail review of this application which shall take place upon submission of Site Plan or Servicing Agreement. In no case is the proposed development expected to negatively impact the existing infrastructure system.

Trusting that the above information will be satisfactory to your review and approval.

Yours truly,

SKIRA & ASSOCIATES LTD.

Michael Jozwik, P. Eng.
MJ:ak

NOTE: ***Limitation of Report***

This report was prepared by ***Skira & Associates Ltd.*** *for* ***Di Blasio Homes*** *for review and approval by government agencies only.*

In light of the information available at the time of preparation of this report, any use by a ***Third Party*** *of this report are solely the responsibility of such* ***Third Party*** *and* ***Skira & Associates Ltd.*** *accepts no responsibility for any damages, if any, suffered by the* ***Third Party****.*

Appendix A
Orifice Restrictor Plate Computer Output
Cultec Volume Calculations
Stormceptor Oil/Grit Separator Computer Output

75mm dia. ORIFICE RESTRICTOR PLATE
Worksheet for Circular Orifice

Project Description	
Worksheet	Orifice - 1
Type	Circular Orifice
Solve For	Diameter

Input Data		
Discharge	).0250	m^3/s
Headwater Elevat	83.75	m
Centroid Elevatior	81.48	m
Tailwater Elevatio	81.54	m
Discharge Coeffic	0.60	

Results		
Diameter	90	mm
Headwater Height Above (	2.27	m
Tailwater Height Above C(	0.06	m
Flow Area	).0063	m^2
Velocity	3.95	m/s

CULTEC Stormwater Calculations — Created on: 13/05/2020

CULTEC

JOB #: 218-M14
Prepared for: MICHAEL JOZWIK
GeoStorm

Proposing:
CULTEC Recharger V8 Heavy Duty H20 stormwater chambers
Units placed on 6" stone base, 6"stone above and min. 12" additional cover over for H20 application.
Units placed 60" on center. 1' stone border around perimeter of bed. Stone void calculated at 40%.

Proposed bed layout of 4 Rows x 4 Units per Row

Given:
Storage required = CF CM

STORAGE PROVIDED WITHIN CULTEC RECHARGER V8HD STORMWATER CHAMBERS

Recharger V8HD dimensions:			
Width	54 inches	4.50 feet	**1.37 m**
Height	34 inches	2.83 feet	**0.86 m**
Installed Length	7.5 feet		**2.29 m**
Chamber capacity	8.933 CF/LF		**0.83 CM/LM**
Recharger V80HD Heavy Duty H20 Design Unit Capacity:			
Stone base	6 inches	0.50 feet	**0.15 m**
Stone above	6 inches	0.50 feet	**0.15 m**
Center to Center Spacing	60 inches	5.00 feet	**1.52 m**
Design Unit Height	3.83 feet		**1.17 m**
Design Unit Width	5.00 feet		**1.52 m**
Number of Recharger V8HD by design =		16 pcs	**16.00 pcs**
16 pcs x 7.5' =		120 LF	**36.58 m**
Number of Rows =		4 rows	**4.00 rows**
Total LF of chambers =		120 LF	**36.58 m**
120 ' x 8.933 CF/LF =		**1071.96 CF**	**30.34 CM**

STORAGE PROVIDED WITHIN CULTEC HVLV V-8 HEADER SYSTEM

CULTEC HVLV V8 Header System, Single Feed			
HVLV V8 dimensions:			
Width	54 inches	4.50 feet	**1.37 m**
Height	34 inches	2.83 feet	**0.86 m**
Installed Length	4.58 feet - S/E	3.33 feet - I	
Chamber capacity	8.933 CF/LF		**0.83 CM/LM**
HVLV F110x2 Feed Connector dimensions:			
Width	27.5 inches	2.29 feet	**0.70 m**
Height	12 inches	1.00 feet	**0.30 m**
Installed Length	0.5 feet		**0.15 m**
Chamber capacity	1.968 CF/LF		**0.18 CM/LM**
HVLV V8 Header, Single Feed Design Unit Capacity:			
Stone base	6 inches	0.50 feet	**0.15 m**
Stone above	6 inches	0.50 feet	**0.15 m**
Design Unit Height	3.83 feet		**1.17 m**
Design Unit Width	5.00 feet		**1.52 m**
Unit utilizes HVLV F110x2 Feed Connector Feed Lines on one side of Main Header			
Number of Single Feed HVLV V8 Starters + Ends by design =		8 pcs	**8.00 pcs**
8 pcs x 4.58' =		36.64 LF	**11.17 m**
36.64 ' x 8.933 CF/LF =		**327.31 CF**	**30.41 CM/LM**

Calculated by:
CULTEC, Inc.
PO Box 280
Brookfield, CT 06804
PH: 203-775-4416
FX: 203-775-1462
www.cultec.com
custservice@cultec.com

Number of Single Feed HVLV V8 Intermediates by design =		0 pcs	0.00 pcs
0 pcs x 3.33' =		0 LF	0.00 m
0 ' x 8.933 CF/LF =		0.00 CF	0.86 CM/LM
Number of HVLV F110x2 Feed Connectors by design =		0 pcs	0.00 pcs
0 pcs x 0.5' =		0 LF	0.00 m
0 ' x 1.968 CF/LF =		0.00 CF	0.00 CM/LM
Storage provided within HVLV Header System alone =		327.31 CF	9.26 CM

STORAGE PROVIDED WITHIN ENTIRE CULTEC STORMWATER SYSTEM - including stone

Bed width	21.5 feet		6.55 m
Bed length	41.16 feet		12.55 m
Bed depth	3.83 feet		1.17 m
Total CF of effective excavated area	3392.3 CF		96.00 CM
Total min. excavated area	1033.964 CF		29.26 CM
Total CF volume of HVLV Header & Recharger Chambers =		1399.27 CF	39.60 CM
Total stone required =	1993.00 CF 73.81 CY		56.40 CM
Storage provided within stone =	797.202 CF		22.56 CM

Total storage within CULTEC Stormwater System = **2196.47 CF** / **62.16 CM**

MATERIALS LIST

MODEL	QUANTITY
Recharger V8 IHD Intermediate Heavy Duty	16
HVLV V8 SHD Starter	4
HVLV V8 IHD Intermediate	0
HVLV V8 EHD End	4
HVLV F110x2 Feed Connector	0
12.5' x 360' CULTEC No. 410 Filter Fabric	1

Calculated by:
CULTEC, Inc.
PO Box 280
Brookfield, CT 06804
PH: 203-775-4416
FX: 203-775-1462
www.cultec.com
custservice@cultec.com

Stormceptor Sizing Detailed Report

PCSWMM for Stormceptor

Project Information

Date	6/6/2018
Project Name	Sixty Six Twenty - Di Blasio Homes
Project Number	218-M14
Location	6620 Rothschilds Trail, Mississauga

Stormwater Quality Objective

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

Stormceptor System Recommendation

The Stormceptor System model STC 300 achieves the water quality objective removing 84% TSS for a Fine (organics, silts and sand) particle size distribution.

The Stormceptor System

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

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

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

Small storms dominate hydrologic activity, US EPA reports

"*Early efforts in stormwater management focused on flood events ranging from the 2-yr to the 100-yr storm. Increasingly stormwater professionals have come to realize that small storms (i.e. < 1 in. rainfall) dominate watershed hydrologic parameters typically associated with water quality management issues and BMP design. These small storms are responsible for most annual urban runoff and groundwater recharge. Likewise, with the exception of eroded sediment, they are responsible for most pollutant washoff from urban surfaces. Therefore, the small storms are of most concern for the stormwater management objectives of ground water recharge, water quality resource protection and thermal impacts control.*"

"*Most rainfall events are much smaller than design storms used for urban drainage models. In any given area, most frequently recurrent rainfall events are small (less than 1 in. of daily rainfall).*"

"Continuous simulation offers possibilities for designing and managing BMPs on an individual site-by-site basis that are not provided by other widely used simpler analysis methods. Therefore its application and use should be encouraged."

– US EPA Stormwater Best Management Practice Design Guide, Volume 1 – General Considerations, 2004

Design Methodology

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

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

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

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

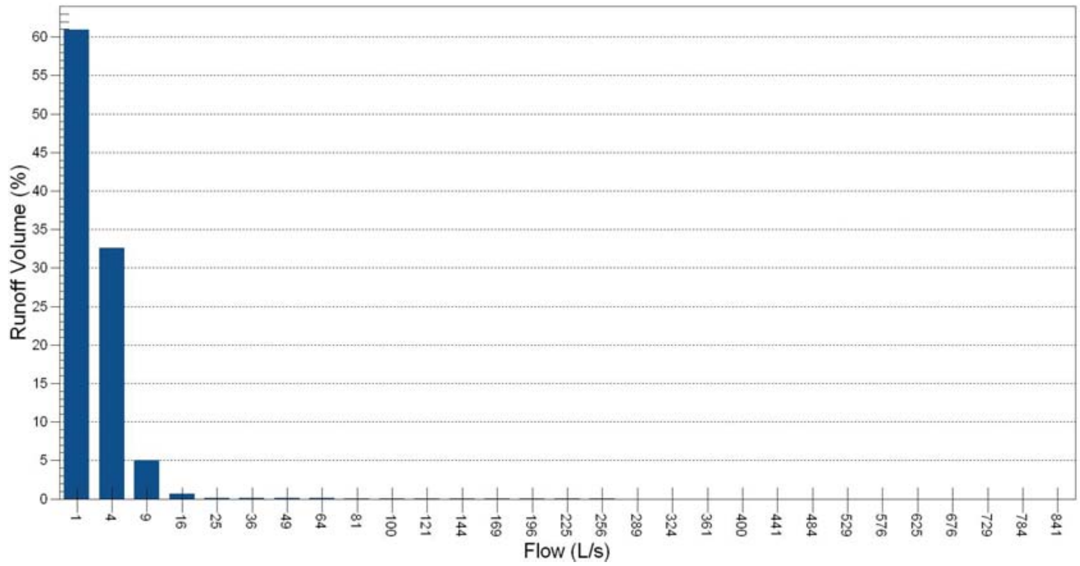


Figure 1. Runoff Volume by Flow Rate for TORONTO CENTRAL – ON 100, 1982 to 1999 for 0.46 ha, 74.2% impervious. Small frequent storm events represent the majority of annual rainfall volume. Large infrequent events have little impact on the average annual TSS removal, as they represent a small percentage of the total annual volume of runoff.

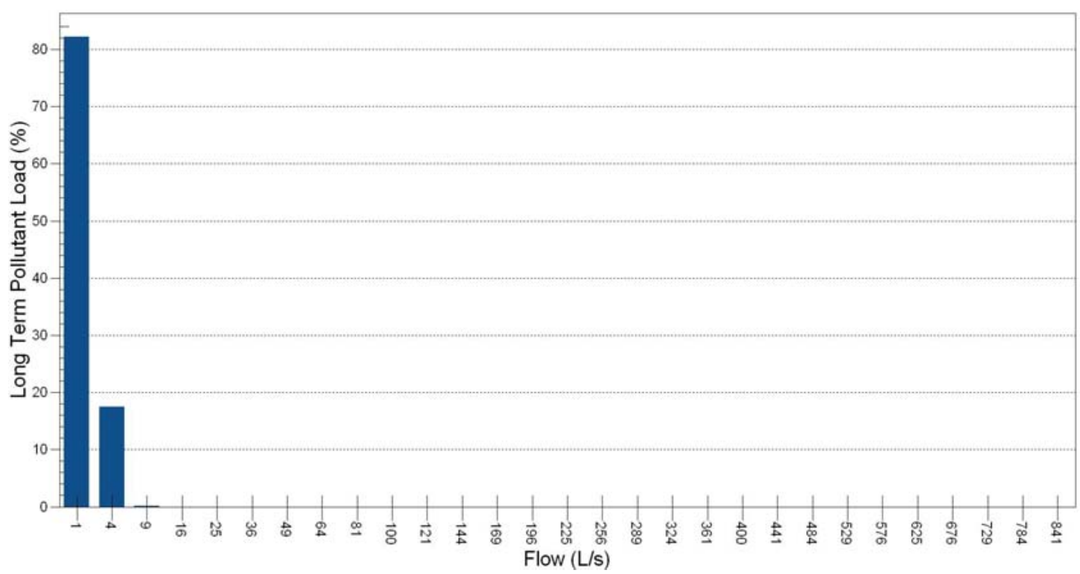
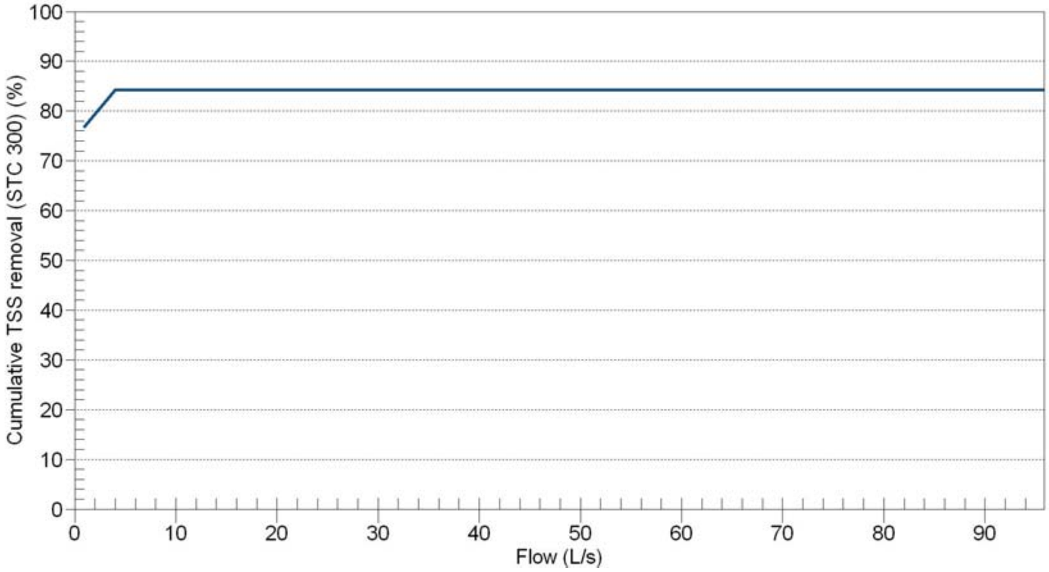


Figure 2. Long Term Pollutant Load by Flow Rate for TORONTO CENTRAL – 100, 1982 to 1999 for 0.46 ha, 74.2% impervious. The majority of the annual pollutant load is transported by small frequent storm events. Conversely, large infrequent events carry an insignificant percentage of the total annual pollutant load.



Stormceptor Model	STC 300	Drainage Area (ha)	0.46
TSS Removal (%)	84	Impervious (%)	74.2

Figure 3. Cumulative TSS Removal by Flow Rate for TORONTO CENTRAL – 100, 1982 to 1999. Stormceptor continuously removes TSS throughout the full range of storm events analyzed. Note that large events do not significantly impact the average annual TSS removal. Therefore no decline in cumulative TSS removal indicates scour does not occur as the flow rate increases.

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Appendix 1
Stormceptor Design Summary

Project Information

Date	6/6/2018
Project Name	Sixty Six Twenty - Di Blasio Homes
Project Number	218-M14
Location	6620 Rothschilds Trail, Mississauga

Designer Information

Company	Skira & Associates Ltd.
Contact	michael jozwik

Notes

N/A

Drainage Area

Total Area (ha)	0.46
Imperviousness (%)	74.2

The Stormceptor System model STC 300 achieves the water quality objective removing 84% TSS for a Fine (organics, silts and sand) particle size distribution.

Rainfall

Name	TORONTO CENTRAL
State	ON
ID	100
Years of Records	1982 to 1999
Latitude	45°30'N
Longitude	90°30'W

Water Quality Objective

TSS Removal (%)	80

Upstream Storage

Storage (ha-m)	Discharge (L/s)
0.000	00.000
0.005	10.000
0.006	12.000
0.007	14.100

Stormceptor Sizing Summary

Stormceptor Model	TSS Removal %
STC 300	**84**
STC 750	90
STC 1000	89
STC 1500	89
STC 2000	92
STC 3000	92
STC 4000	94
STC 5000	94
STC 6000	95
STC 9000	97
STC 10000	96
STC 14000	97

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Particle Size Distribution

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

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

Stormceptor Design Notes

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

Inlet and Outlet Pipe Invert Elevations Differences

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

- Design estimates are based on stable site conditions only, after construction is completed.
- Design estimates assume that the storm drain is not submerged during zero flows. For submerged applications, please contact your local Stormceptor representative.
- Design estimates may be modified for specific spills controls. Please contact your local Stormceptor representative for further assistance.
- For pricing inquiries or assistance, please contact Hanson Pipe & Precast, 1-888-888-3222.

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Appendix 2
Summary of Design Assumptions

SITE DETAILS

Site Drainage Area

Total Area (ha)	0.46	Imperviousness (%)	74.2

Surface Characteristics

Width (m)	136
Slope (%)	2
Impervious Depression Storage (mm)	0.508
Pervious Depression Storage (mm)	5.08
Impervious Manning's n	0.015
Pervious Manning's n	0.25

Maintenance Frequency

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

Maintenance Frequency (months)	12

Infiltration Parameters

Horton's equation is used to estimate infiltration

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

Evaporation

Daily Evaporation Rate (mm/day)	2.54

Dry Weather Flow

Dry Weather Flow (L/s)	No

Upstream Attenuation

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

Storage ha-m	Discharge L/s
0.000	00.000
0.005	10.000
0.006	12.000
0.007	14.100

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PARTICLE SIZE DISTRIBUTION

Particle Size Distribution

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

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

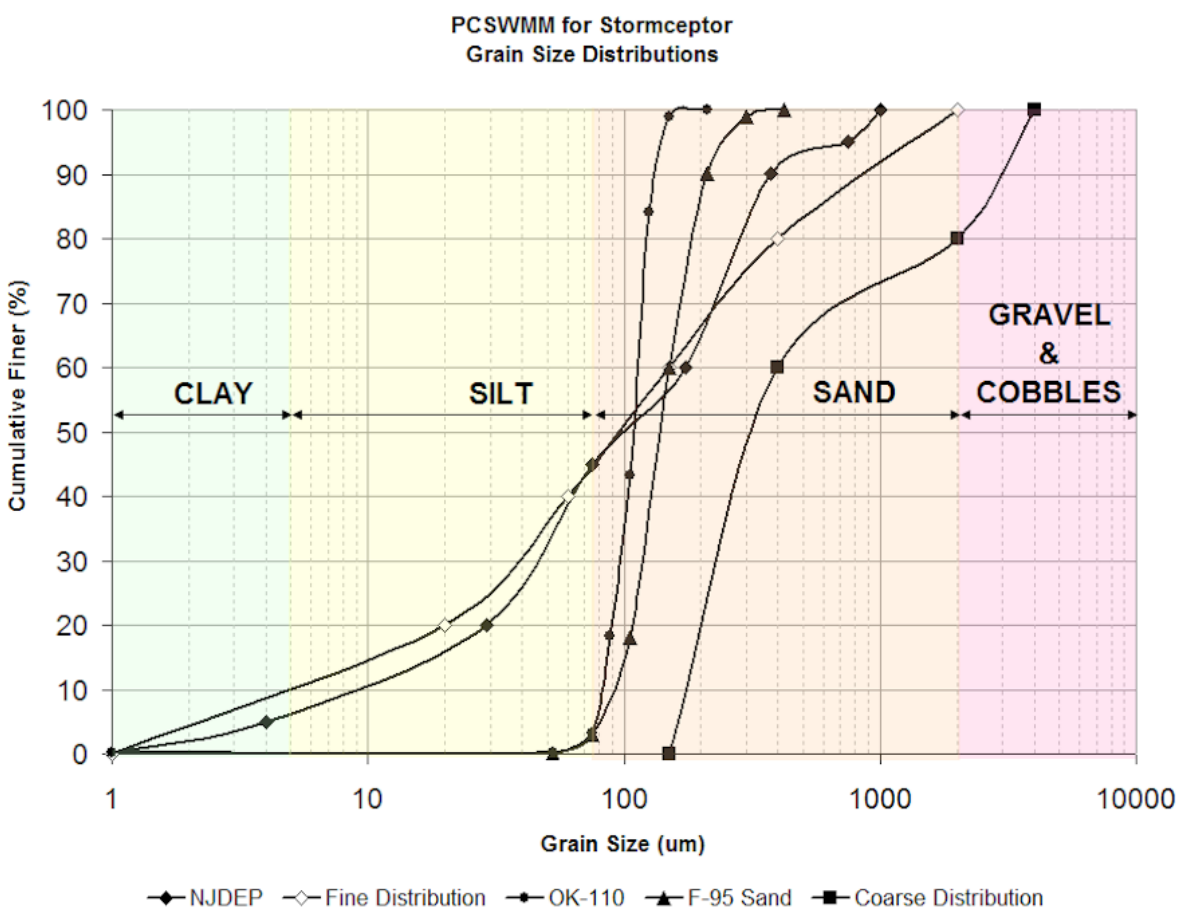

Figure 1. PCSWMM for Stormceptor standard design grain size distributions.

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TSS LOADING

TSS Loading Parameters

TSS Loading Function	Buildup / Washoff

Parameters

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

HYDROLOGY ANALYSIS

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

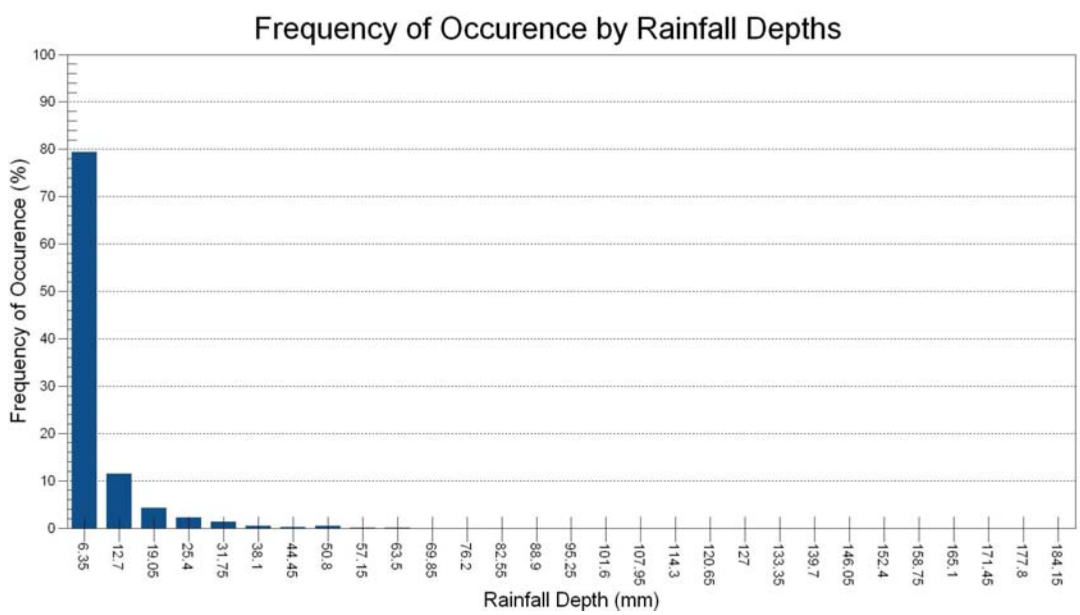
Smaller recurring storms account for the majority of rainfall events and average annual runoff volume, as observed in the historical rainfall data analyses presented in this section.

Rainfall Station

Rainfall Station	TORONTO CENTRAL		
Rainfall File Name	ON100.NDC	Total Number of Events	3020
Latitude	45°30'N	Total Rainfall (mm)	13190.7
Longitude	90°30'W	Average Annual Rainfall (mm)	732.8
Elevation (m)		Total Evaporation (mm)	963.9
Rainfall Period of Record (y)	18	Total Infiltration (mm)	3387.8
Total Rainfall Period (y)	18	Percentage of Rainfall that is Runoff (%)	67.6

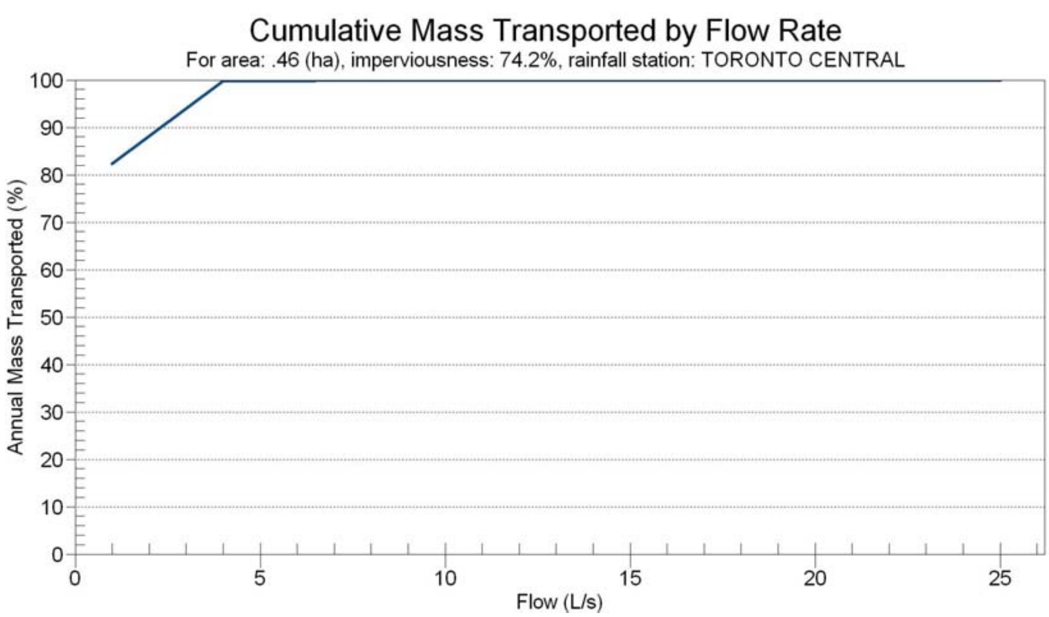
Rainfall Event Analysis

Rainfall Depth mm	No. of Events	Percentage of Total Events %	Total Volume mm	Percentage of Annual Volume %
6.35	2398	79.4	3626	27.5
12.70	346	11.5	3182	24.1
19.05	130	4.3	2037	15.4
25.40	66	2.2	1432	10.9
31.75	38	1.3	1075	8.2
38.10	16	0.5	545	4.1
44.45	7	0.2	292	2.2
50.80	13	0.4	611	4.6
57.15	2	0.1	106	0.8
63.50	2	0.1	121	0.9
69.85	0	0.0	0	0.0
76.20	0	0.0	0	0.0
82.55	1	0.0	79	0.6
88.90	1	0.0	85	0.6
95.25	0	0.0	0	0.0
101.60	0	0.0	0	0.0
107.95	0	0.0	0	0.0
114.30	0	0.0	0	0.0
120.65	0	0.0	0	0.0
127.00	0	0.0	0	0.0
133.35	0	0.0	0	0.0
139.70	0	0.0	0	0.0
146.05	0	0.0	0	0.0
152.40	0	0.0	0	0.0
158.75	0	0.0	0	0.0
165.10	0	0.0	0	0.0
171.45	0	0.0	0	0.0
177.80	0	0.0	0	0.0
184.15	0	0.0	0	0.0
190.50	0	0.0	0	0.0
196.85	0	0.0	0	0.0
203.20	0	0.0	0	0.0
209.55	0	0.0	0	0.0
>209.55	0	0.0	0	0.0



Pollutograph

Flow Rate L/s	Cumulative Mass %
1	82.3
4	99.8
9	100.0
16	100.0
25	100.0
36	100.0
49	100.0
64	100.0
81	100.0
100	100.0
121	100.0
144	100.0
169	100.0
196	100.0
225	100.0
256	100.0
289	100.0
324	100.0
361	100.0
400	100.0
441	100.0
484	100.0
529	100.0
576	100.0
625	100.0
676	100.0
729	100.0
784	100.0
841	100.0
900	100.0



Appendix B

Storm Design Sheet & Storm Drainage Plan
Di Blasio Estates

SUBDIVISION : **DiBLASIO ESTATES**

COMFT -PHASE 2

MAJOR DRAINAGE **Fletcher's Creek**

CITY FILE: **OZ 19-010**

CONSULTANT : **SKIRA & ASSOCIATES LTD.**

CITY OF MISSISSAUGA

STORM SEWER DESIGN CHART

FINAL SUBMISSION

SHEET No. 1 of 1

PROJECT No. : 218-M14

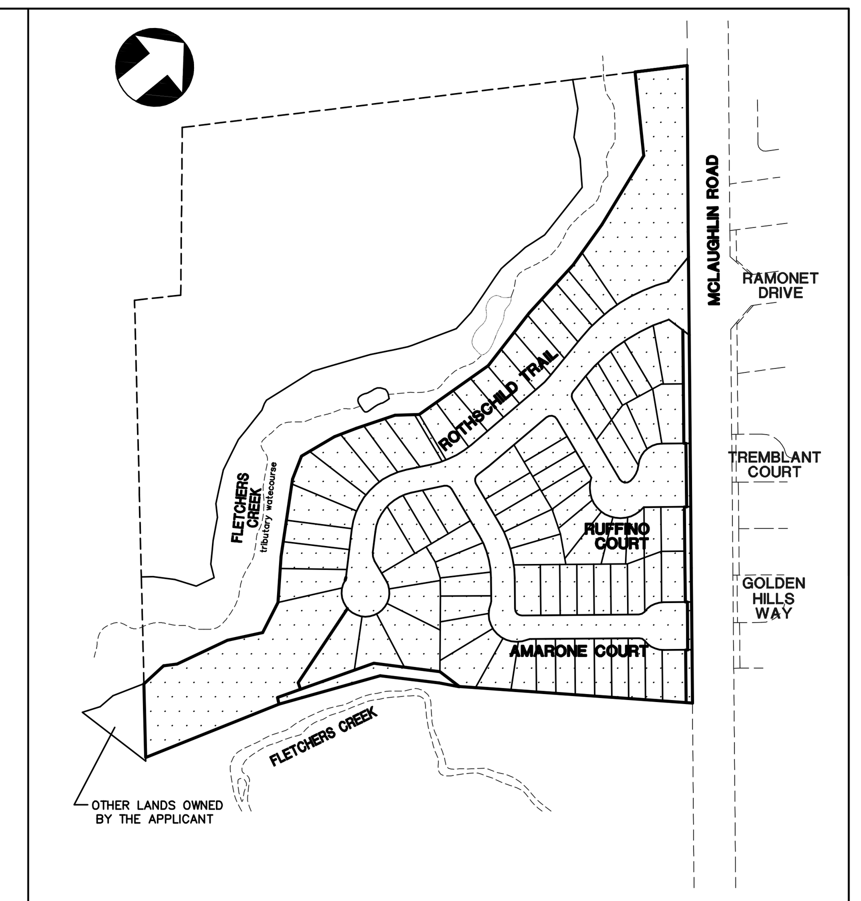
DESIGNED BY : M.J.

DATE : Jan - '20

$I_{(10YR)} = 1010/(Tc+4.6)^{0.78}$

MANNING'S ROUGHNESS COEFF. n = 0.013

LOCATION	FROM MH	TO MH	AREA	RUNOFF COEFF.		ACCUM. AREA	ACCUM. AaxCa	Tc	INTENSITY	EXPECTED FLOW	TYPE OF PIPE	LENGTH	SLOPE	PIPE SIZE NOMINAL	CAPACITY n=0.013	VELOCITY n=0.013	TIME OF FLOW	VELOCITY n = 0.009	VELOCITY ACTUAL	INVERT ELEV. UPPER	INVERT ELEV. LOWER
			Aa	**Ca**	AaxCa	A=∑Aa	C=∑AaxCa		**I**	$Q=\frac{I \cdot A \cdot C}{360}$		**L**	**S**	**D**	**Q**	**V**	$T = \frac{L}{V \times 60}$				
	MH#	MH#	ha			ha		min	mm/hr	m^3/s		m	%	mm	m^3/s	m/s	min	m/s		MH	MH
ROTHCHILD TR	34	33	0.12	0.55	0.07	0.12	0.07	15.00	99.17	**0.019**	PVC	23.0	1.04	300	**0.103**	1.41	0.19	2.04			
	33	32	0.10	0.55	0.06	0.22	0.13	15.19	98.42	**0.036**	PVC	16.5	1.09	300	**0.106**	1.44	0.13	2.09			
	32	31	0.11	0.55	0.06	0.33	0.19	15.32	97.92	**0.052**	PVC	17.5	0.91	300	**0.096**	1.32	0.15	1.91			
	31	30	0.54	0.55	0.30	0.87	0.49	15.47	97.35	**0.133**	PVC	51.5	2.12	300	**0.147**	2.01	0.30	2.91			
	30	1	0.20	0.55	0.11	1.07	0.60	15.77	96.23	**0.160**	PVC	50.0	1.12	375	**0.194**	1.70	0.34	2.45			
	1	HW	0.47	0.90	0.42	1.54	1.02	16.11	95.00	**0.183**	PVC	10.0	1.12	375	**0.194**	1.70	0.07	2.45	CONDO CONTROLLED FLOW		
																			Q= 0.025M3/S		



KEY PLAN

LEGEND

- EXISTING MANHOLE
- SANITARY MANHOLE
- STORM MANHOLE
- SINGLE CATCHBASIN
- DOUBLE CATCHBASIN
- HYDRANT & VALVE
- VALVE & BOX
- MAJOR OVERLAND FLOW DIRECTION
- EX OVERLAND FLOW DIRECTION

0.60 DRAINAGE AREA (ha)
0.45 DRAINAGE COEFFICIENT

BENCH MARK:

CITY OF MISSISSAUGA
REFERENCE No. 075023034 MISS. ELEV. 181.881m
(subtract 0.121m vertical from mississauga elev. to calculate geodetic elevation)

AT STREET : NAVIGATOR DRIVE

DESCRIPTION : W/Y SIDE OF McLAUGHLIN RD., +/-500m N OF 401 OVER PASS IN S/Y END OF WALKWAY FOR BRIDGE OVER FLETCHER'S CREEK +/- 100m N OF NAVIGATOR DRIVE.

FIRST	SECOND	INTERIM	PRE-SER	FINAL
DATE JULY 2004	DATE OCT 2004	DATE MAY 2005	DATE AUGUST 2005	DATE FEB 2006

REGISTERED PROFESSIONAL ENGINEER
ROSARIO.SACCO
MAR 31,2006
PROVINCE OF ONTARIO

DESIGNED BY
CHKD.
APPROVED BY

URBAN ECOSYSTEMS LIMITED
7050 WESTON ROAD, SUITE 705
WOODBRIDGE, ONTARIO L4L 8G7
TELEPHONE: (905)856-0629
FAX: (905)856-0698

Di BLASIO ESTATES WEST – PHASE 2

Di BLASIO CORPORATION

MISSISSAUGA Transportation And Works Department

STORM DRAINAGE AREA PLAN

21T-95019

SCALE: 1:1000	AREA:	PROJECT No. 93026
DRAWN BY D.J.S.	CHECKED BY: N.V.	PLAN No. G-4
DATE: JUNE 2004	SHEET OF	C-

PROJECTS/1993/93026/PHASE2/PRINTING/93026-STM-PH2