FUNCTIONAL SERVICING REPORT

PROPOSED HIGH-RISE CONDOMINIUM

420 LAKESHORE ROAD EAST
PLAZA CORP.

FILE NO. 220-M44

MAY 27, 2020

SKIRA & ASSOCIATES LTD.
CONSULTING ENGINEERS

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1.0 INTRODUCTION

Skira & Associates Ltd. (Skira) was retained by Plaza Corp. to prepare a Functional Servicing Report (FSR) in support of an Official Plan Amendment and Zoning Bylaw Amendment for a proposed 12-storey high-rise condominium consisting of 300.0m^2 retail commercial space and 195 condominium units in the City of Mississauga, Regional Municipality of Peel.

The purpose of this report is to define the existing municipal services to the subject parcel of land and the proposed servicing details in support of the proposed development.

It is intended that this FSR will result in an ‘approval in principle’ of the design proposal by the City of Mississauga, Regional Municipality of Peel and any other relevant authorities. Detailed design will be provided during the Site Plan Application process.

2.0 SITE AREA INFORMATION

The subject property is located on 420 Lakeshore Road East and covers an area of approx. 0.375 Ha. It is legally known as Lot 12, Conc. 3, South of Dundas Street in the City of Mississauga, Regional Municipality of Peel.

The site is bounded by Lakeshore Road East on the north, Enola Avenue on the east, existing residential on the south, and existing commercial plaza to the west. ***Refer to Figure 1 – Key Plan.***

Currently, the property is developed with a building and at-grade parking, former Beer Store. The existing building and parking surface is scheduled for demolition prior to the start of construction.

The majority of the site will be developed with a high-rise condominium building, including 2 levels of underground garage.

3.0 SITE ACCESS

The subject site is located on the southwest corner of Lakeshore Road East and Enola Avenue, east of Hurontario Street. Currently, there are accesses for the existing building from Lakeshore Road East and Enola Avenue.

All existing accesses will be removed. Access to the proposed high-rise condominium will be from Enola Avenue.

Enola Avenue is currently constructed as municipal 20m ROW with 8.0m pavement.

Existing boulevards will be reconstructed at minimum 2.00% slope to the satisfaction of City of Mississauga on both Lakeshore Road and Enola Avenue.

The existing road network will provide access to arterial roads, being Hurontario Street, Lakeshore Road, and Cawthra Road and to nearby major highways, Highways 427, and Queen Elizabeth Way.

This existing road pattern will provide good access to nearby commercial districts, employment districts, schools, municipal offices, community centres, and parks.

4.0 STORM DRAINAGE SYSTEM

According to available records, there is an existing 525mm dia. storm sewer running south on Enola Avenue. The existing system discharges directly to Cumberland Creek at the bottom of Enola Avenue.

The subject property is within the Cooksville Creek sub-watershed; however, the site will contribute and drains directly to Cumberland Creek sub-watershed. Accordingly, on-site quantity stormwater management will not be required.

4.1 Existing Drainage Conditions

Currently the land is developed with an existing building, parking surface area, and landscaped area. Existing runoff coefficient C = 0.84. The site has an existing 250mm dia. storm connection at the south corner of the property, connecting to the existing 525mm dia. storm sewer on Enola Avenue. This connection will be abandoned.

The land is relatively flat in topography, with gentle sloping from north to south, with a grade differential of approx. 2.0m. The entire site sheet flows to the existing right-of-way on Enola Avenue. Enola Avenue is graded with a gentle slope south from Lakeshore Road East southerly, and storm runoff is captured by the existing storm sewer system on Enola Avenue.

Total Site Area = 3,750m²
Development Area = 3,405m²

The pre-development site statistics and associated runoff coefficients are summarised as follows:

Area Description	Area	Runoff Coefficient
Paved Building/Roof Landscape	2,910 460 380	0.09 0.95 0.25
Total Development/Site:	**3,750**	**0.84**

Existing storm sewer has been designed for 10-ye storm intensity.
Refer to Figure 2 – Storm Sewer Drainage Plan.

The pre-development flow for a 10-yr storm event is as follows:

$Q = 0.0028\ CIA$

Where,
A = area in hectares, 0.375 Ha
C = runoff coefficient, 0.84
T_c = 15.00 min
$I_{10\text{-}yr}$ = 99.18

$Q_{10\text{-}yr}$ = **0.087m³/s**

Therefore, the maximum allowable discharge from the site is **0.087m³/s**.

Existing 525mm storm sewer on Enola Avenue has capacity to accept drainage from subject property.
See Appendix A *for design sheets.*

4.2 Post-Development Storm Drainage Servicing

The proposed high-rise condominium will be provided with a new 300mm dia. storm connection located at the southeast corner of the site and will outlet to the proposed storm sewer on Enola Avenue. The connection will provide sufficient depth and capacity for pose-development stormwater runoff.

The storm sewer on Enola Avenue will be extended to capture drainage from the site and approx. 60m of the road; a 300mm dia. storm sewer is proposed. Enola Avenue and the property were previously designed to discharge to the same storm sewer system. There are no existing drainage records for the area and confirmation of capacity in the existing storm sewer system on Enola Avenue, downstream of the development.

The proposed high-rise condominium will cover majority of the site; most of the site will be covered by rooftops and amenity terraces.

As previously noted, no stormwater management quantity control is required for this area.

4.3 Stormwater Runoff Volume Reduction

The City of Mississauga requires stormwater runoff volume reduction, where the first 5mm of runoff shall be retained on-site and managed by way of infiltration, evapotranspiration, or reuse.

As such, the required volume to be retained on-site is:

V_{5mm} = 3,750m² x 0.005m
= **18.75m³** per rainfall

As majority of the site area is occupied by the proposed high-rise condominium and underground parking, infiltration is not feasible for this project. Therefore, water evapotranspiration and reuse will be the primary mechanisms utilized to address water balance.

The stormwater tank will be extended beneath the proposed outlet to provide storage of the required 5mm volume. As previously mentioned, approximately 400m² of green roof is proposed to be installed on the 2nd, 3rd, 7th or 12th floor, where currently amenity terraces are proposed. The reuse strategy for this site will be to utilize the stored water from the storage tank for irrigation.

Detailed design of the green roof and irrigation/grey water reuse systems will be provided at the Site Plan Application stage. Mechanical design for the irrigation system will ensure that the water temporarily stored in the sump storage of the tank will be emptied before switching to the potable water.

4.4 Quality Control

The City of Mississauga requires a minimum treatment of 80% total suspended solids (TSS) removal for the protection of waterways. On-site best management practice (BMP) is required to ensure the overall water quality from the proposed development meets this minimum.

As previously mentioned, majority of the site is covered by rooftops, green roofs, and amenity terraces. Surface vehicle parking at grade is limited and some of the driveway will be covered by the building rooftops and terraces above. Portion of the surface parking will be provided with permeable surface.

Runoff from the rooftops, green roofs and amenity terraces is generally considered to be clean. Sediment and contaminant generating activities are not expected in high quantities and considered minor outside the roof coverage areas. The minor runoff generated outside the roof coverage areas will be directed to the oil/grit interceptor located at property limit. An STC 1000 structure is proposed. For detail design ***see Appendix B***.

5.0 SANITARY DRAINAGE SYSTEM

According to available records, there is an existing 675mm dia. sanitary sewer running south on Enola Avenue and an existing 900mm dia. sanitary sewer running east on Lakeshore Road East.

Based on information obtained from Peel Capital Works, the existing 675mm sanitary sewer on Enola Avenue will be decommissioned and 67.5m of new 250mm sanitary will be constructed. ***See Appendix C*** for information on connecting to 675mm trunk on the greenway.

Currently, the site has a sanitary connection, which will be disconnected as per Region of Peel standards.

The proposed high-rise condominium will be serviced to the future 250mm dia. sanitary sewer on Enola Avenue. Proposed sanitary manhole and 250mm dia. sanitary connection will be provided to service the development to the sanitary sewer. ***Refer to Appendix C.***

The proposed 250mm dia. sanitary sewer has sufficient depth to accept the sanitary flows from the high-rise condominium building. The proposed sanitary invert at property line is approx. 76.67m. The proposed lowest finished main floor is approx. 72.85. Therefore, the building main floor and above floors will have gravity sewage flows. The basement and underground parking drains will require sanitary ejection pumps.

Refer to Dwg. 220-M44-1 – Concept Site Servicing Plan

Sanitary Flow Calculation

Residential
195 units x 2.54 PPU = 495.3 ~ 496

Commercial
0.0300 floor hectares x 50p/hectares = 1.5 population ~ 2

Total Population = 496 + 2
= **498**

Peak Factor $= 1 + \frac{14}{4 + P^{0.5}}$ Where, P = population in thousands

$= 1 + \frac{14}{4 + 0.498^{0.5}}$

= 1 + 2.97
= **3.97**

Expected Peak Flow Rate = 302.8 x 498 x 3.97
= 598,653 L/day = **6.93 L/s**

6.0 WATERMAIN DISTRIBUTION SYSTEM

According to available records, there is an existing 300mm dia. watermain on Lakeshore Road East and an existing 150mm dia. watermain on Enola Avenue.

Currently, the site has a water service connection, which will be disconnected as per Region of Peel standards.

The existing fire hydrants on Lakeshore Road East and Enola Avenue will be utilised to provide external fire coverage for the building.

The proposed high-rise condominium will be serviced to the existing 300mm dia. watermain located on Lakeshore Road East. Proposed 200mm dia. watermain connection will be constructed for fire and 100mm dia. water service for domestic use for the proposed condominium.

Refer to Dwg. No. 220-M44-1 – Concept Site Servicing Plan

Water Demand Calculations

Residential
Proposed Unit (Residential 496 population, as per previous calculation)

Site Average Flow	= 280 Litres/capita/day
	= 280 x 496
	= 138,880 L/day = 1.60 L/s
Total Expected Peak Flow Rate	= Site Average Flow x Peak Hour Factor
	= 138,880 x 3.0
	= 416,640 L/day = **4.80 L/s**
Total Expected Max. Daily Flow	= Site Average Flow x Max. Day Factor
	= 138,880 x 2.0
	= 277,760 L/day = **3.20 L/s**

Commercial
Population = 2 persons, as previously calculated

Site Average Flow	= 300 Litres/capita/day
	= 300 x 2
	= 600 L/day = 0.007 L/s
Total Expected Peak Flow Rate	= Site Average Flow x Peak Hour Factor
	= 600 x 3.0
	= 1,800 L/day = **0.02 L/s**
Total Expected Max. Daily Flow	= Site Average Flow x Max. Day Factor
	= 600 x 1.4
	= 840 L/day = **0.01 L/s**

Based on *Fire Underwriters Survey 1999*, the fire flow is calculated on the area of the largest floor + 25% of 2 immediately adjoining floors using the following formula:

$F = 220\, C\sqrt{A}$ Where, C = coefficient for fire resistance construction = 0.60
A = area = 5,340m²
F = fire flow in L.min

F = 220 x 0.60 x √5,340
= 9,645 L/min ≈ 10,000 L/min

A decrease can be applied for occupancy having a low contents fire hazard:

F = 10,000 L/min – 25%
= 7,500 L/min

The building is sprinklered, therefore a 30% reduction can be applied:

F = 7,500 L/min x 30%
= 2,250 L/min

Therefore, the fire flow demand is:

F = 7,500 – 2,250
= 5,250 L/min ≈ 6,000 L/min = **100.00 L/s**

Max. Peak Flow = 4.80 (res.) + 0.02 (com.) + 100.00 (fire)
= **104.82 L/s**

Max. Daily Flow = 3.20 (res.) + 0.01 (com.)
= **3.21 L/s**

Due to COVID-19 State of Emergency in Ontario, the fire flow test cannot be obtained at present time and will be completed when order is lifted.

Refer to Appendix D.

7.0 SUMMARY

The findings and recommendations were prepared in accordance with accepted professional engineering principles and practices and reveal that the proposed high-rise condominium can be fully serviced to the available services on Lakeshore Road East and Enola Avenue. The findings of this report are global and are related to the servicing functionality of this application. These findings by 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.

The conclusion is as follows:

- Storm sewer outlet will be to the existing 525mm dia. storm sewer on Enola Avenue.
- Future capital works 250mm dia. sanitary sewer will be available on Enola Avenue.
- A 300mm dia. watermain is available on Lakeshore Road East with fire protection from Enola Avenue.

We respectively submit this report with intention of obtaining approval in principal the recommendation.

Yours truly,

SKIRA & ASSOCIATES LTD.

Michael Jozwik, P. Eng.
MJ:ak

LICENSED PROFESSIONAL ENGINEER
M. JOZWIK
May 27, 2020
PROVINCE OF ONTARIO

NOTE: ***Limitation of Report***

*This report was prepared by **Skira & Associates Ltd.** for **Plaza Corp.** 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
Storm Sewer Drainage Records
& Storm Sewer Design Chart

REVISIONS

DATE	DETAILS	INIT

BENCHMARK
1. M.B.M. No. 734 ELEV. 79.784 m ON THE S. FACE AT THE W. CORNER OF ST. JAMES SEPARATE SCHOOL AT THE E. END OF WANITA ROAD.
2. TEMP. BENCHMARK ELEV.

LEGEND
- HECTARES / COEFFICIENT
- FLOW DIRECTION OF STORM DRAINAGE AREAS
- OVERLAND FLOW ROUTE

KEY PLAN
N.T.S.

SUBMISSIONS 1st 2nd PRE-SERV.
DATE 82.03 INTERIM FINAL

REGISTERED PROFESSIONAL ENGINEER M. D. PAPPAS PROVINCE OF ONTARIO

DESIGNED APPROVED
CHK'D

R. E. WINTER & ASSOCIATES LTD.
CONSULTING ENGINEERS
77 CITY CENTRE DRIVE MISSISSAUGA L5B 1M5 270-0110

NU·WEST DEVELOPMENT CORPORATION

REG. No. T-78077 CITY FILE No. 16 III 78 159

CITY OF MISSISSAUGA
REGIONAL MUNICIPALITY OF PEEL
ENGINEERING DEPARTMENT

STORM DESIGN AREAS AND OVERLAND FLOW

METRIC SCALE 1:500	AREA Z-7	REWA. 7313 X5	
DRAWN Stan.	CHK'D	PLAN No.	
DATE SEPT. 1981	SHEET 1 OF 1		

DWG No. D2

D2

SUBDIVISION NU-WEST DEVELOPMENT CORP. LTD.

CONSULTANT R.E. WINTER & ASSOCIATES LTD.

DRAINAGE AREA PLAN Nº Z-7

CITY OF MISSISSAUGA

STORM SEWER DESIGN CHART

SHEET Nº 1 OF 2

PROJECT Nº 7313 x 5 n = 0.013

DESIGNED BY J.M. DATE 81-02

LOCATION	FROM M.H.	TO M.H.	AREA (ha.)	RUNOFF COEFF	A x R	ACCUM A x R	T. OF C. (minutes)	INTENSITY (mm./hr)	EXPECTED FLOW (c.m.s)	INVERT ELEVATION UPPER M.H.	INVERT ELEVATION LOWER M.H.	FALL (meters)	LENGTH (meters)	GRADIENT %	PIPE SIZE (mm)	CAPACITY (c.m.s)	VELOCITY (m.p.s.)	TIME OF FLOW (minutes)	DROP IN LOWER M.H.
ENOLA AVE	–	–	0.480	0.85	0.408	–													
	CB (LOT 3)	525⌀	0.250	0.40	0.100	0.508	15.0	100	0.141	77.500	77.38	0.12	6.0	2.00	300	0.145	2.00	0.05	
	ROAD CB	525⌀	0.120	0.40	0.048	0.048	15.0	100	0.013	78.000	77.88	0.12	12.0	1.00	250	0.060	1.20	0.20	
	CB (EX. LOT)	525⌀	0.060 0.244	0.85 0.40	0.051 0.098	0.149	15.0	100	0.042	77.600	77.525	0.075	7.5	1.00	250	0.060	1.20	0.08	
	CB (EX. LOT)	525⌀	0.194	0.40	0.077	0.077	15.0	100	0.022	77.075	77.000	0.075	7.5	1.00	250	0.060	1.20	0.08	
	1	2	0	0	0	0.782	15.2	99	0.21	77.200	76.780	0.420	120	0.35	525	0.26	1.20	1.6	0.030
	CB (LOT 26)	525⌀	0.229	0.40	0.092	0.092	15.0	100	0.026	76.940	79.860	0.080	4.0	2.00	250	0.085	1.70	0.04	
	CB (EX. LOT)	525⌀	0.196	0.40	0.078	0.078	15.0	100	0.022	77.045	76.950	0.095	9.5	1.00	250	0.060	1.20	0.13	
	2	CHANNEL	0	0	0	0.952	16.8	92	0.246	77.750	76.582	0.168	48	0.35	525	0.26	1.20	0.6	
THE THICKET	3	4	0.465	0.40	0.186	0.186	15.0	100	0.052	77.710	77.530	0.180	60	0.30	375	0.095	0.88	1.1	0.035
			0.077	0.40	0.031														
	CB LOT 6	CBMH LOT 8	0.078	0.85	0.066	0.097	15.0	100	0.03	77.920	77.655	0.255	53	0.50	250	0.042	0.86	0.3	0.065
	CB LOT 8	CB MH LOT 8	0.035	0.40	0.014	0.014	15.0	100	0.04	77.770	77.655	0.115	23	0.05	250	0.042	0.86	0.4	0.065
	CBMH LOT 8	4	0.050 0.091	0.40 0.85	0.020 0.077	0.208	15.8	95	0.055	77.590	77.370	0.220	40	0.55	300	0.075	1.02	0.6	0.087
	4	CONC. CULV.	0.144	0.40	0.058	0.452	16.4	94	0.118	77.280	77.195	0.085	17.0	0.50	375	0.130	1.13	0.2	
			0.110	0.85	0.094														
	CB LOT 10	CONC. CULV	0.115	0.40	0.046	0.140	15.0	100	0.039					1.00	250	0.06	1.20		
WANITA ROAD	5	6	0.506	0.40	0.202	0.202	15.0	100	0.056	77.360	77.310	0.050	16	0.31	375	0.100	0.90	0.3	0.035
	6	CONC. CULV.	0	0	0	0.202	15.3	98	0.056	77.275	77.047	0.228	76	0.30	375	0.100	0.90	1.3	

RETURN TO FILE

12-311-00002

Appendix B

Stormceptor Design

Stormceptor Sizing Detailed Report
PCSWMM for Stormceptor

Project Information

Date	6/1/2020
Project Name	Enola Condo
Project Number	220-M44
Location	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 750 achieves the water quality objective removing 86% 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.

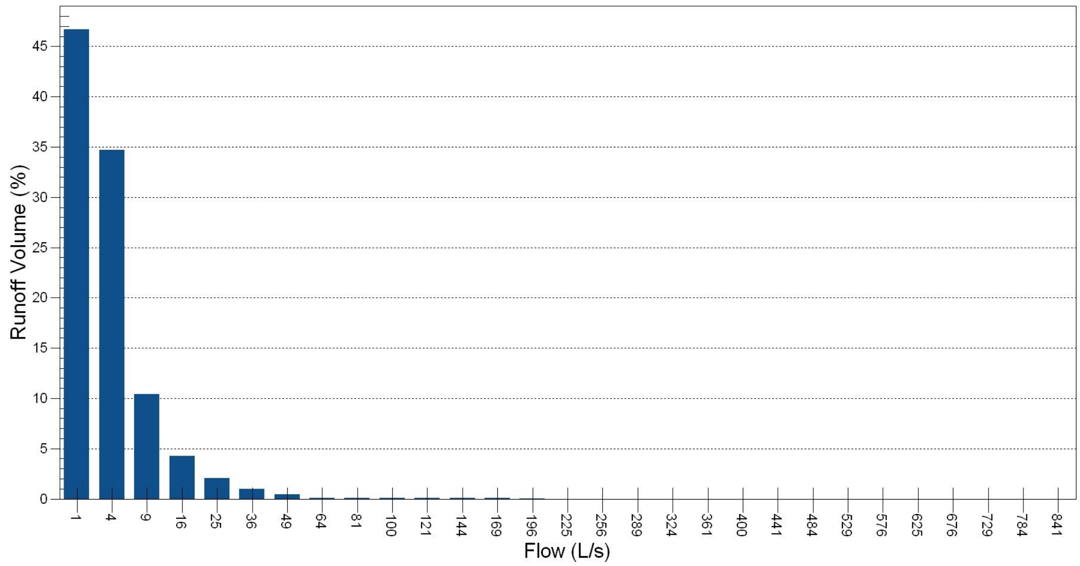


Figure 1. Runoff Volume by Flow Rate for TORONTO CENTRAL – ON 100, 1982 to 1999 for 0.3 ha, 90% impervious. Small frequent storm events represent the majority of annual rainfall volume. Large infrequent events have little impact on the average annual TSS removal, as they represent a small percentage of the total annual volume of runoff.

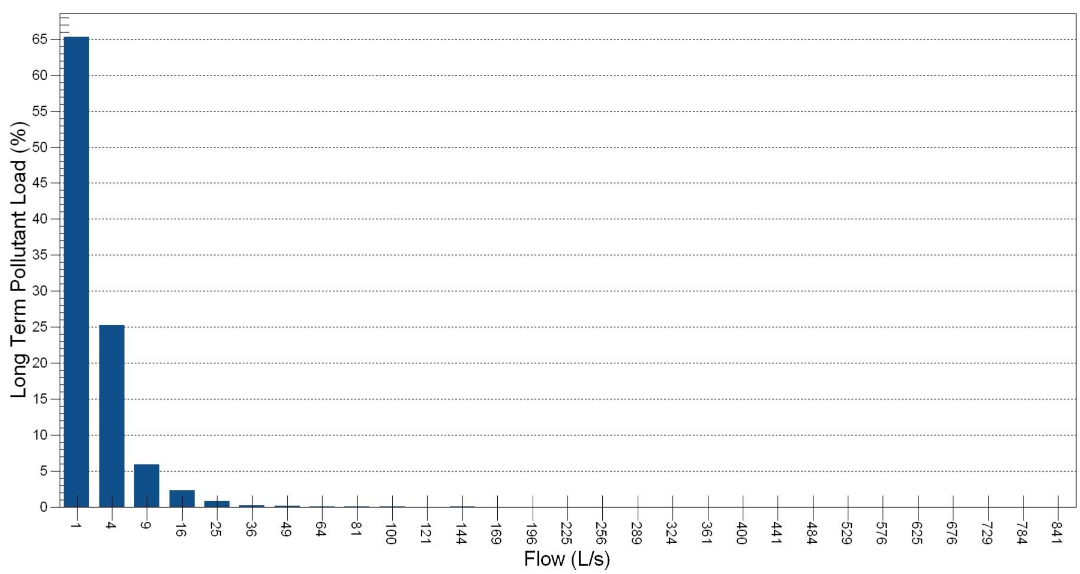
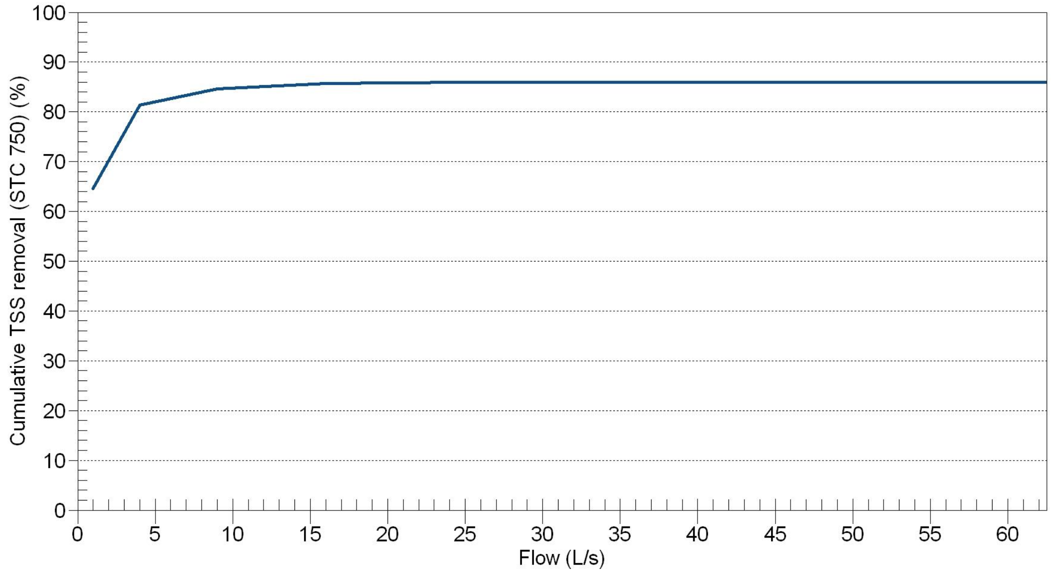


Figure 2. Long Term Pollutant Load by Flow Rate for TORONTO CENTRAL – 100, 1982 to 1999 for 0.3 ha, 90% impervious. The majority of the annual pollutant load is transported by small frequent storm events. Conversely, large infrequent events carry an insignificant percentage of the total annual pollutant load.



Stormceptor Model	STC 750	Drainage Area (ha)	0.3
TSS Removal (%)	86	Impervious (%)	90

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.

Stormceptor®

Appendix 1
Stormceptor Design Summary

Project Information

Date	6/1/2020
Project Name	Enola Condo
Project Number	220-M44
Location	Mississauga

Designer Information

Company	Skira & Associates Ltd
Contact	Michael Jozwik

Notes

N/A

Drainage Area

Total Area (ha)	0.3
Imperviousness (%)	90

The Stormceptor System model STC 750 achieves the water quality objective removing 86% 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	0

Stormceptor Sizing Summary

Stormceptor Model	TSS Removal %
STC 300	78
STC 750	**86**
STC 1000	86
STC 1500	87
STC 2000	90
STC 3000	91
STC 4000	93
STC 5000	93
STC 6000	94
STC 9000	96
STC 10000	96
STC 14000	97

Hanson

Stormceptor®

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.

Hanson

Appendix 2
Summary of Design Assumptions

SITE DETAILS

Site Drainage Area

Total Area (ha)	0.3	Imperviousness (%)	90

Surface Characteristics

Width (m)	110
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	0

Stormceptor®

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					

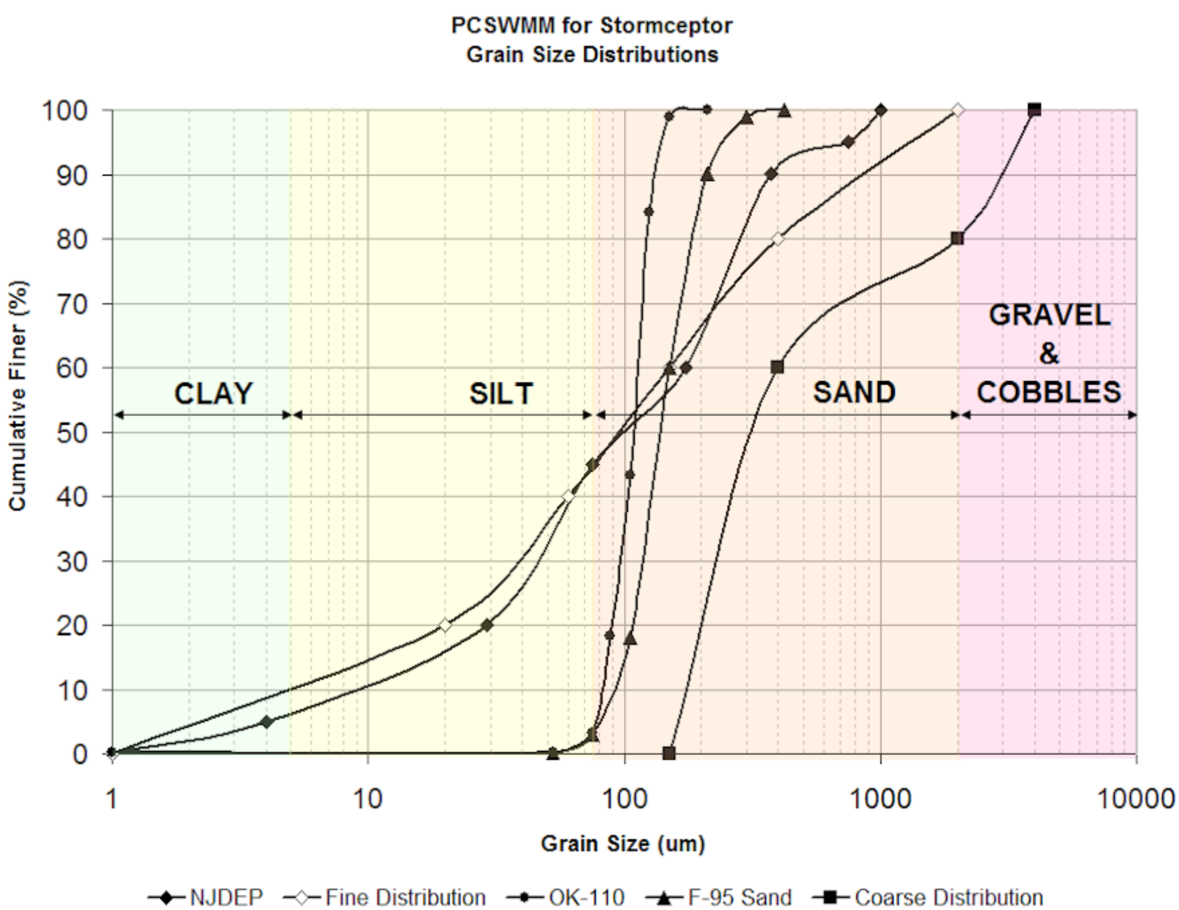


Figure 1. PCSWMM for Stormceptor standard design grain size distributions.

Hanson

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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

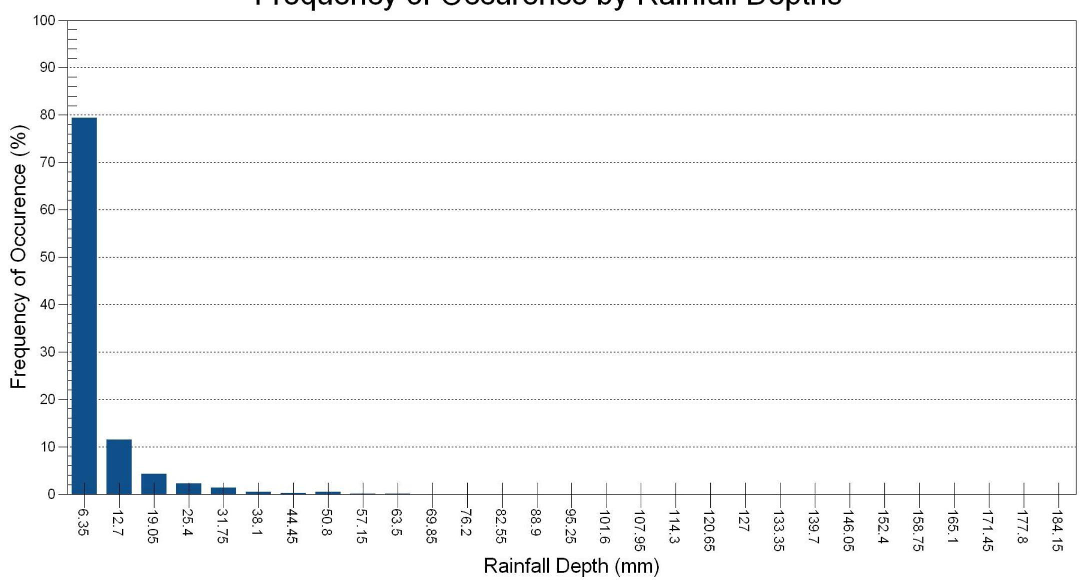
Rainfall Station	TORONTO CENTRAL		
Rainfall File Name	ON100.NDC	Total Number of Events	3020
Latitude	45°30'N	Total Rainfall (mm)	13190.7
Longitude	90°30'W	Average Annual Rainfall (mm)	732.8
Elevation (m)	328	Total Evaporation (mm)	1169.0
Rainfall Period of Record (y)	18	Total Infiltration (mm)	1312.5
Total Rainfall Period (y)	18	Percentage of Rainfall that is Runoff (%)	81.9

Hanson

Rainfall Event Analysis

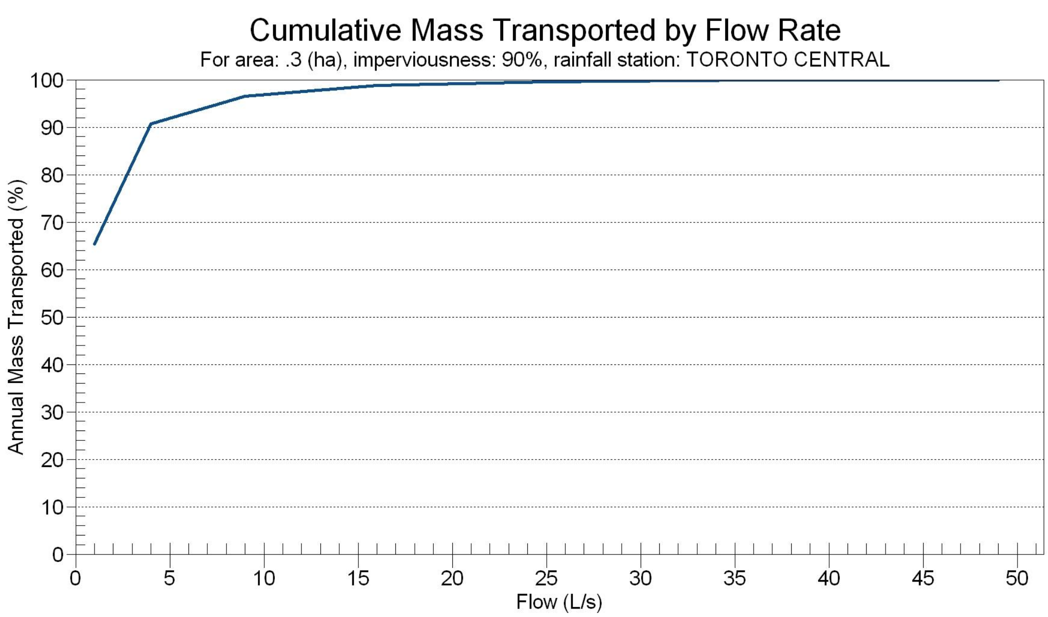
Rainfall Depth mm	No. of Events	Percentage of Total Events %	Total Volume mm	Percentage of Annual Volume %
6.35	2398	79.4	3626	27.5
12.70	346	11.5	3182	24.1
19.05	130	4.3	2037	15.4
25.40	66	2.2	1432	10.9
31.75	38	1.3	1075	8.2
38.10	16	0.5	545	4.1
44.45	7	0.2	292	2.2
50.80	13	0.4	611	4.6
57.15	2	0.1	106	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

Frequency of Occurence by Rainfall Depths



Pollutograph

Flow Rate L/s	Cumulative Mass %
1	65.4
4	90.7
9	96.5
16	98.8
25	99.6
36	99.9
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 C
Sanitary Sewer Capital Works Information

Region of Peel
Working for you

Scope of Work

Date:	Nov.23, 2017	**Ward #**	1

STREET NAME:	**ENOLA AVE**	**AUTHOR:**	MARK KNUCKLE

☐ Brampton ☐ Caledon ☒ Mississauga **Tile 0058**

WORK REQUIRED: ABANDON EXISTING SEWER AND INSTALL NEW LOCAL SEWER ON ENOLA AVE

☒ Replacement ☐ CIPP line ☒ Other – Abandon existing DN675mm

COORDINATION:

☐ Watermain Proposed Year: Contract #: PM: NA	☐ Roads Resurfacing Proposed Year: Contract #: PM:	☐ Other Proposed Year: Contract #: PM: NA

ASSOCIATED PROGRAM(S)

This work is being done due to the redirection of sanitary flows at Lakeshore Rd East and Enola Ave with the new pump station at Beechwood.

Summary of Work:

- Install new DN250mm sanitary sewer on Enola Ave
- Install 2 new MH chambers
- Transfer 4 laterals from the old DN675mm sewer to the new one
- Properly abandon 99m of existing DN675mm sewer and 1 MH chamber (1783082)

Region of Peel
Working for you

Scope of Work

Street Name **From:**	Enola Ave Lakeshore Rd East	**Street Name** **To:**	Enola Ave The Greenway
From SMH #	1783082	**To SMH #**	1783076
Pipe Size:	675mm	**Depth of Pipe:**	4m
Age of Pipe:	Installed 1962 (56 years old)	**Material of Pipe**	Concrete
Pipe Length	93.5m	**Number of manholes**	2

Comments:

After the installation of the new sewer and transfer 4 lateral connections, abandon existing DN675mm sanitary sewer and 1 MH chamber (SMH 1783082)

MH Chambers:

SMH Material:	Formed in place	**SMH Condition:**	fair
Recommendation:	Properly abandon 1783082 Rebuild benching and trough in SMH 1783076	**Drop pipe: (internal/external)**	no

Laterals:

Number of Laterals:	4	**Lateral Diameter:**	125
Lateral Condition	fair	**Recommendation:**	Replace all 4 laterals to the property line.

Flows Levels:

5%

Region of Peel
Working for you

Scope of Work

Street Name	Enola Ave	**Street Name**	Enola Ave
From:	20m south of Lakeshore Rd East	**To:**	The Greenway
From SMH #	New SMH 1 New SMH 2	**To SMH #**	New SMH 2 1783091
Pipe Size:	250mm	**Depth of Pipe:**	To be determined during detailed design
Age of Pipe:	new	**Material of Pipe**	PVC
Pipe Length	58.5 + 8.5 = 67m Final length to be determined during detailed design	**Number of manholes**	2

Comments:

Install new DN250mm sanitary sewer on Enola Ave. The upstream location of New SMH 1 will be a few metre's upstream of the lateral connection for the lateral connection for the gas station on the South/East corner of Lakeshore and Enola.
Connect new sewer to SMH 1783091

MH Chambers:

SMH Material:	new	**SMH Condition:**	new
Recommendation:	N/A	**Drop pipe: (internal/external)**	N/A

Laterals:

Number of Laterals:	4	**Lateral Diameter:**	125mm
Lateral Condition	fair	**Recommendation:**	Replace all 4 laterals to the property line.

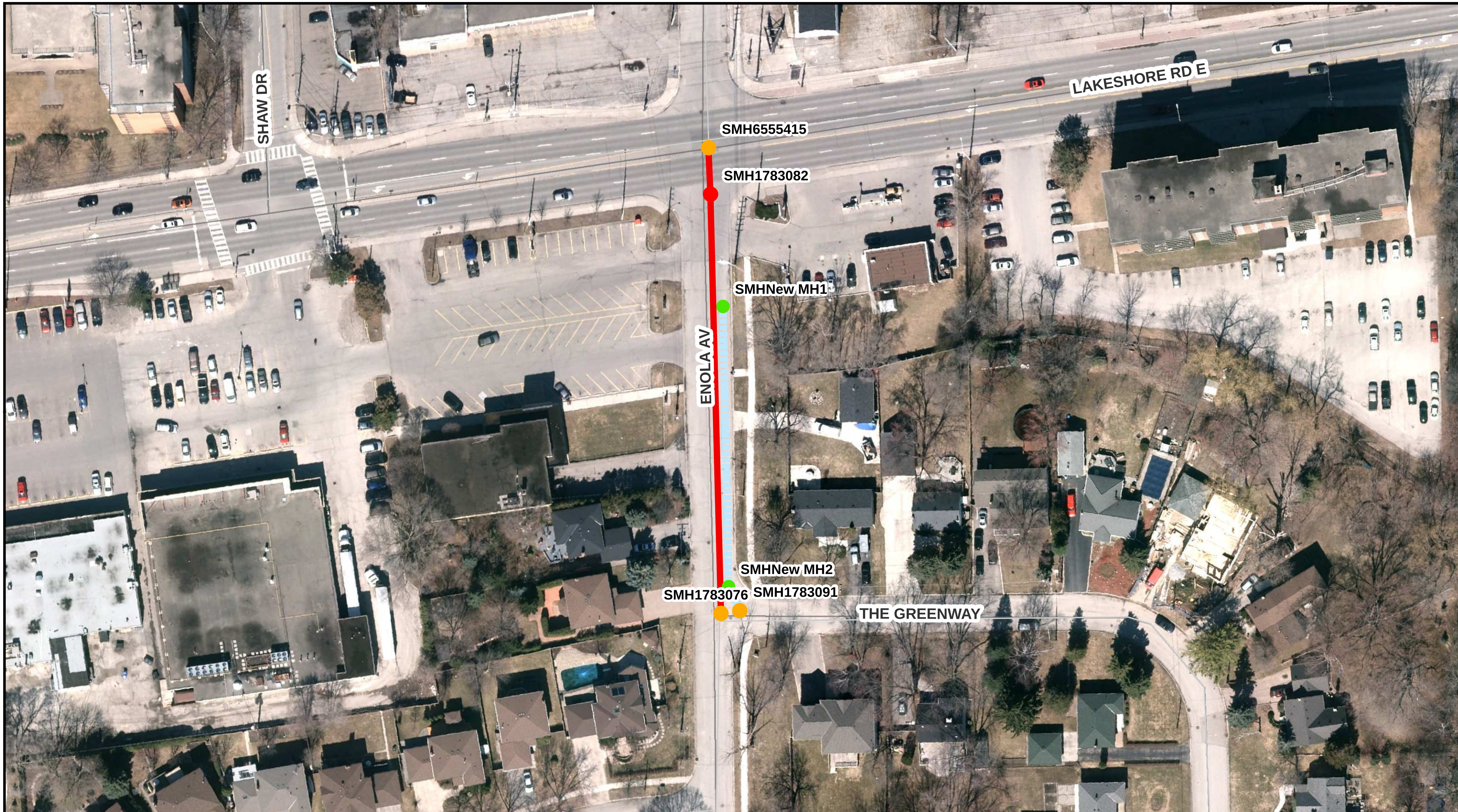
Flows Levels:

5%

Other Considerations *(e.g. Project description, justification, ward, length of pipe, reason for construction)*:

Easement/Right of Way	
Easement, ☐ Yes, ☐ No Link to supporting documents	☒ Right of Way

Supporting Documents:
Sketch of required works CCTV report As constructed drawings



Region of Peel
working with you

2018 CITY OF MISSISSAUGA
SANITARY SEWER REPLACEMENT PROGRAM
STREET- Enola Avenue

Date: 13 December, 2017
Figure: 1
Drawn By: KA
Checked By: MK

Meters
0 10 20

Legend

- Install New DN250mm Diameter Sewer
- Abandon Existing DN675mm Diameter Sewer
- Proposed Rehab Manhole
- Abandon Manhole
- Proposed New Manhole
- Main Water Course
- Street Name

Appendix D
Water Supply Test