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Consulting

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Transportation Planning

Traffic Impact Assessment

Parking Assessment

Site Access Design & Review

Site Servicing and Grading

Stormwater Management

Municipal Road Design

Functional Servicing and Storm Water Management Report

Proposed 10 Units Townhouse Development

86 Thomas Street
Mississauga, Ontario

July 02 2020
Project No:NT-19-013

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1.0 INTRODUCTION

This Functional Servicing & Stormwater Management Report has been prepared in support of the Rezoning (ZBA) and Site Plan Control Application (SPCA) for the proposed 10 units stacked townhouses development at 86 Thomas Street, in Mississauga, Peel Region.

The purpose of this report is to identify and document how the proposed development will be serviced by the City's existing municipal infrastructure (i.e. water, storm and sanitary) and the measures to be used to provide appropriate stormwater management.

2.0 SITE LOCATION & EXISTING CONDITIONS

The subject site is approximately 0.164 hectares in area and is located at the northwest corner of Thomas Street and Hillside Drive, as shown in **Figure 1 after the report**.

The subject site is bounded by:

- Townhouse development on 80 Thomas St. to the north and east (Dunpar Development).
- Existing residential property to the west.
- Thomas Street to the south.

3.0 PROPOSED DEVELOPMENT

The proposed development consists of 10 units townhouses, as shown in the Site Plan contained in **Appendix A**.

4.0 MUNICIPAL SERVICING

4.1 WATER

4.1.1 Design Criteria

Type of Construction	Residential
Average Day Consumption	280 L/person/day
PPU	2.7 person per unit
Maximum Day Factor	2.0
Peak Hour Factor	3.0

Region of Peel, Watermain Design Criteria, Revised June 2010

4.1.2 Existing

As shown in the City's 'As-Built' drawings (contained in **Appendix B**), there is an existing 300 mm dia. watermain located on the northside of Thomas Street that runs along the southern frontage of the subject site.

There are 2 fire hydrants on Thomas Street. One is located in front of 80 Thomas Street, approximately 53m of the subject site, and the other located in front of 96 Thomas Street, approximately 45m of the subject site.

4.1.3 Proposed Water Demand

Based on the calculation in **Appendix C**, water demand as below:

Table 1 Water Demand

	Water Demand
Average Daily Demand, l/s	0.09
Maximum Daily Demand, l/s	0.18
Peak Hourly Demand, l/s	0.26
Fire Water Demand (FUS), l/s	233

A Hydrant Flow Test will be provided at the detailed design stage to confirm pressures and flows according to the Region of Peel, Watermain Design Criteria.

4.1.4 Proposed Water Servicing

An internal 150mm dia. watermain will be proposed to service the site with 25mm PVC water connections for each unit, which will connect to the existing 300 mm watermain on Thomas Street.

The 2 existing hydrants will serve the subject property and at this preliminary design stage, there is no concern for installing additional hydrants to service the site. However, this will be confirmed at the detail design stage when a hydrant test will be performed.

4.2 SANITARY

4.2.1 Design Criteria

Type of Construction	Residential
PPU	2.7 people per unit
Peak sanitary flow factor	Harmon Formula
Average Daily Flow	302.8 L/capita/day
Peak Extraneous Flow	0.2 L/s/ha 0.028 l/s/m of sewer

Region of Peel, Sanitary Sewer Design Criteria, Modified March 2017 REV 0.9

4.2.2 Existing Conditions

As shown in City's 'As-Built' drawings (contained in **Appendix B**), there are two (2) existing sanitary

sewers along Thomas Street. One located in the middle of Thomas Street with size of 375mm dia. at slope of 0.6%, named as EX. N. SAN in drawings. The other located in the south of Thomas Street with size of 300mm dia.

4.2.3 Proposed Sanitary Flow

During the site development, the proposed sanitary flow will be 1.85 l/s, for detailed calculation see **Appendix D**. The proposed development will add 1.4% of the existing sanitary sewer capacity, which can be considered negligible.

4.2.4 Proposed Sanitary Servicing

An internal 250mm dia. sanitary sewer will drain southernly and connect into the existing 375mm dia. sanitary sewer system on Thomas Street.

5.0 GRADING, DRAINAGE & STORMWATER MANAGEMENT

5.1.1 Stormwater Design Criteria

The most current version of the following guidelines, policies and standards will apply to the design of storm drainage facilities in the City of Mississauga:

- MOECC (i.e., Stormwater Management Planning and Design Manual, March 2003)
- Wet Weather Flow Management Guidelines, WWFMG, November 2006
- Low Impact Development Stormwater Management Planning and Design Guide (TRCA, 2011)
- Development Requirements Manual, Section 2 – Design Requirements, City of Mississauga, Effective September 2016

5.1.2 Stormwater Quality Control

Under the Wet Weather Flow Management Guidelines, the site is required to provide a long-term removal of 80% of total suspended solids (TSS) on an average annual basis.

5.1.3 Storm Water Quantity Control

Provide post to pre control for all storms.

5.1.4 Erosion Control

As indicated in WWFMG, 'For small infill/redevelopment sites < 2 ha, erosion control in the form of stormwater detention is normally not required, provided the on-site minimum runoff retention from a small design rainfall event (typically 5mm) is achieved under the Water Balance Criteria.'

5.2 EXISTING CONDITIONS

5.2.1 Existing Drainage pattern

The overland flow on site generally drains southerly uncontrolled to Thomas street and finally collected by the existing storm sewer system on Thomas Street.

5.2.2 Existing Stormwater Service

There is an existing 1200mm dia. C.P. storm sewer located on Thomas Street, runs along the southern frontage of the subject site with a slope of 1.66%, see in **Appendix B**.

5.2.3 Pre-Development Target Flow

The pre-development target flow is summarized in Table 2 below, and drainage areas can be found on Drawing DAP.

Table 2 – Pre-Development Target Peak Flow

On Site, Pre-development Catchment Area: A=0.1643 ha		
Return Period	“C”	Target Peak Flow
1:2	0.25	6.83 L/s
1:5	0.25	9.19 L/s
1:10	0.25	11.31 L/s
1:25	0.28	14.29 L/s
1:50	0.30	17.41 L/s
1:100	0.31	20.07 L/s

5.3 STORMWATER QUANTITY CONTROL

The majority of stormwater from the north of the site will be collected via catchbasins, manholes, and area drains. All of the area drains and the associated piping will be detailed by the building mechanical consultant under a separate application. A small area south of the property will drain to Thomas Street as uncontrolled flow.

The following table identifies the input post development parameters and the corresponding detailed calculations can be found in **Appendix E**.

Table 3 – Post-Development Quantity Control Analysis

Return Period	Target Flow (L/s)	Uncontrolled Flow to Thomas Street (L/s)	Controlled Flow before Quantity Control (L/s)	Controlled Flow after Quantity Control (L/s)	Required Storage (m ³)
1:2	6.83	1.8	20.0	6.8	12.3
1:5	9.19	2.4	26.8	9.1	16.6
1:10	11.31	3.0	33.0	11.1	20.5
1:25	14.29	3.8	41.7	14.2	25.8
1:50	17.41	4.4	50.8	17.3	31.3

1:100	20.07	4.9	58.6	20.0	36.1
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Total provided stormwater storage will be 36.1m³ by an underground stormwater storage tank (33.0m³) and underground pipes and MHs. The maximum outflow from the site will be controlled via an orifice tube located in upstream of STM Control MH, see Drawing of SS.

5.4 STORMWATER QUALITY CONTROL

Under the Wet Weather Flow Management Guidelines, the site is proposed to provide a long-term removal of 80% of total suspended solids (TSS) on an average annual basis.

To address this requirement, NexTrans is proposing to provide:

- A Stormceptor EFO4 at the downstream STM MH 103.
- Enhanced landscaping features to treat runoff from the property.

Table 4 below quantitatively demonstrates how criteria targets are being addressed.

Table 4 – TSS Removal

Surface	Site Area (ha)	Fraction of Site Area	Proposed TSS Removal	TSS Removal Overall
Controlled Area				
Impervious	0.1099	67%	91%	61%
Permeable Pavers	0.0176	15%	95%	14%
Landscape (300mm absorbent soil)	0.0242	11%	95%	10%
Uncontrolled Area				
Landscape (300mm absorbent soil)	0.0007	0%	85%	0%
Impervious	0.0119	7%	0	0
Total	0.1643			85%

5.5 WATER BALANCE

The water balance criteria require that 5 mm of rainfall be diverted from the storm sewer system through infiltration, evapotranspiration, or rainwater reuse. A total of 8.2 m³ of water is to be retained on site (1643 m² x 5 mm).

Permeable pavers on driveway with area of 60m² are proposed to capture stormwater on site and address the water balance requirements, see Appendix D.

A percolation Test will be done on site and supporting calculations to meet these requirements will be provided at the detailed design stage.

6.0 SUMMARY

Table 5 – STM Plan Summary

	Criteria	Proposed	Met the Criteria?
Water Balance	5mm	5mm	TBD
STM Quantity Control	Retain to pre-development	Minor System: internal pipe Major System: future road	yes
STM Quality Control	80% of TSS removal	80% min.	yes

This Functional Servicing and Stormwater Management Report has outlined the requirements for servicing the proposed development. Reference to Table 5, these preliminary studies and general results indicate that the subject development can be serviced by existing municipal services (storm, sanitary and water) and the existing infrastructure is adequate to support the proposed development.

Report Prepared By:

Wendy Li
P.Eng.

Report Reviewed By:



Ghansham Ramnath
P.Eng.

NEXTRANS (CONSULTING ENGINEERS)



DATE: FEB 13, 2019
 PROJECT NO:
 NT-19-013
 DRAWING NO.
 FIGURE 1

PROJECT NAME:
 86 THOMAS STREET
 CITY OF MISSISSAUGA

DRAWING TITLE:
 LOCATION PLAN



APPENDIX A – SITE PLAN

SITE STATISTICS

ZONING REGULATIONS - From Table 4.14.1 - RM9 and RM10 Permitted Uses and Zone Regulations				
ZONE RM-10 (BACK TO BACK AND STACKED TOWNHOUSES)		REXTON DEVELOPMENT	DUNPAR DEVELOPMENT	APPROVED
1.	ZONE REGULATIONS	REQUIRED	PROPOSED	APPROVED
2.	MAXIMUM DWELLING HEIGHT			
3.	5.1 Measured to the mean height level of a flat roof on top of a sloped roof.	15.0 m. 3 Storeys.	12.66 m. 4 Storeys.	9.54 m. 3 Storeys.
4.	6.0 MINIMUM FRONT YARD	7.50 m.	3.78 m (South)	8.22 m (North) 3.27 m (South)
7.	7.0 MINIMUM EXTERIOR SIDE YARD	4.5 m.	N/A	N/A
8.	8.0 MINIMUM INTERIOR SIDE YARD	4.5 m.	8.72 m (West) 1.20 m (East)	3.05 m (East) 1.67 m (West) N/A
11.	12.2 MINIMUM PARKING SPACES			
12.	2.0 spaces per 4-4 bedroom unit = 8 parking spaces. 1.5 spaces per 6-2 bedroom unit = 9 spaces.	17 spaces	20 spaces	261 spaces
13.	12.3 MINIMUM VISITOR PARKING SPACES			
14.	0.25 spaces per 10 units = 2.5 spaces.	2.5 spaces	1 space	40 spaces
15.	15.0 MINIMUM BARRIER FREE PARKING SPACES			
16.	Accessible parking spaces shall apply only to the total number of visitor parking spaces required.	1 space	1 space	2 spaces
17.	13.0 PARKING AREAS SETBACKS			
18.	Minimum setback between a parking space and an interior side lot line and/or rear lot line.	3.0 metres	1.63 metres	1.67 metres
19.	15.0 MINIMUM AMENITY AREA AND LANDSCAPE AREA			
20.	15.1 MINIMUM LANDSCAPE AREA	40 % of lot area.	30.64 % (503.52 m ²)	33.17% (8,203.19 m ²)
21.	15.2 MINIMUM REQUIRED LANDSCAPED SOFT AREA	50 % of landscaped area	69.45 % (349.67 m ²)	66.57% (5,461.15 m ²)
22.	15.3 MINIMUM LANDSCAPED BUFFER ABUTTING ANY SIDE AND REAR LOT LINE	3.0 metres	1.20 m East yard. 1.22 m West yard.	1.67 metres
23.	15.4 MINIMUM CONTIGUOUS AMENITY AREA	82.17 m ² (5 % of the lot area)	72.12 m ² outdoor.	511 m ²
24.	15.7 MINIMUM CONTIGUOUS PRIVATE OUTDOOR SPACE PER UNIT	6.0 m ²	6.60 m ²	3.8 m ²

LEGAL DESCRIPTION

PART OF Lot 4
Concession 5, West of Hurontario Street
City of Mississauga
Regional Municipality of Peel

SITE STATISTICS

ZONING:
RM10 (Back to back & stacked townhouse)

LOT AREA: 1,643.35 m² (17,689 Ft²) (0.406 ac)

BUILDING COVERAGE:
PERMITTED: N/A
PROPOSED: 885.48 m² (9,531 Ft²) 53.88 %

DWELLING UNIT WIDTH:
MINIMUM PERMITTED: 4.5 m
PROPOSED: 5.73 m

LOT FRONTAGE:
REQUIRED (MIN.): 38.0 m
PROPOSED: 39.04 m

BUILDING G.F.A.:

FIRST FLOOR AREA	311.58 m ² (3,353.82 Ft ²)
SECOND FLOOR AREA	882.42 m ² (9,498.29 Ft ²)
THIRD FLOOR AREA	882.42 m ² (9,498.29 Ft ²)
FOURTH FLOOR AREA	882.42 m ² (9,498.29 Ft ²)
TOTAL GROSS AREA	2,958.84 m² (31,848.69 Ft ²)

SETBACKS:

	REQUIRED	PROVIDED
Front Yard (South)	4.5 m	3.78 m
Rear Yard (North)	7.5 m	3.79 m
Interior Side Yard (East)	2.5 m	1.20 m
Interior Side Yard (West)	2.5 m	8.72 m

PARKING SETBACKS:
East (to a Residential Zone) 4.5 m 1.63 m

BUILDING HEIGHT: MAXIMUM PERMITTED 15.0 m 3 Storeys
PROVIDED: 12.66 m 4 Storeys

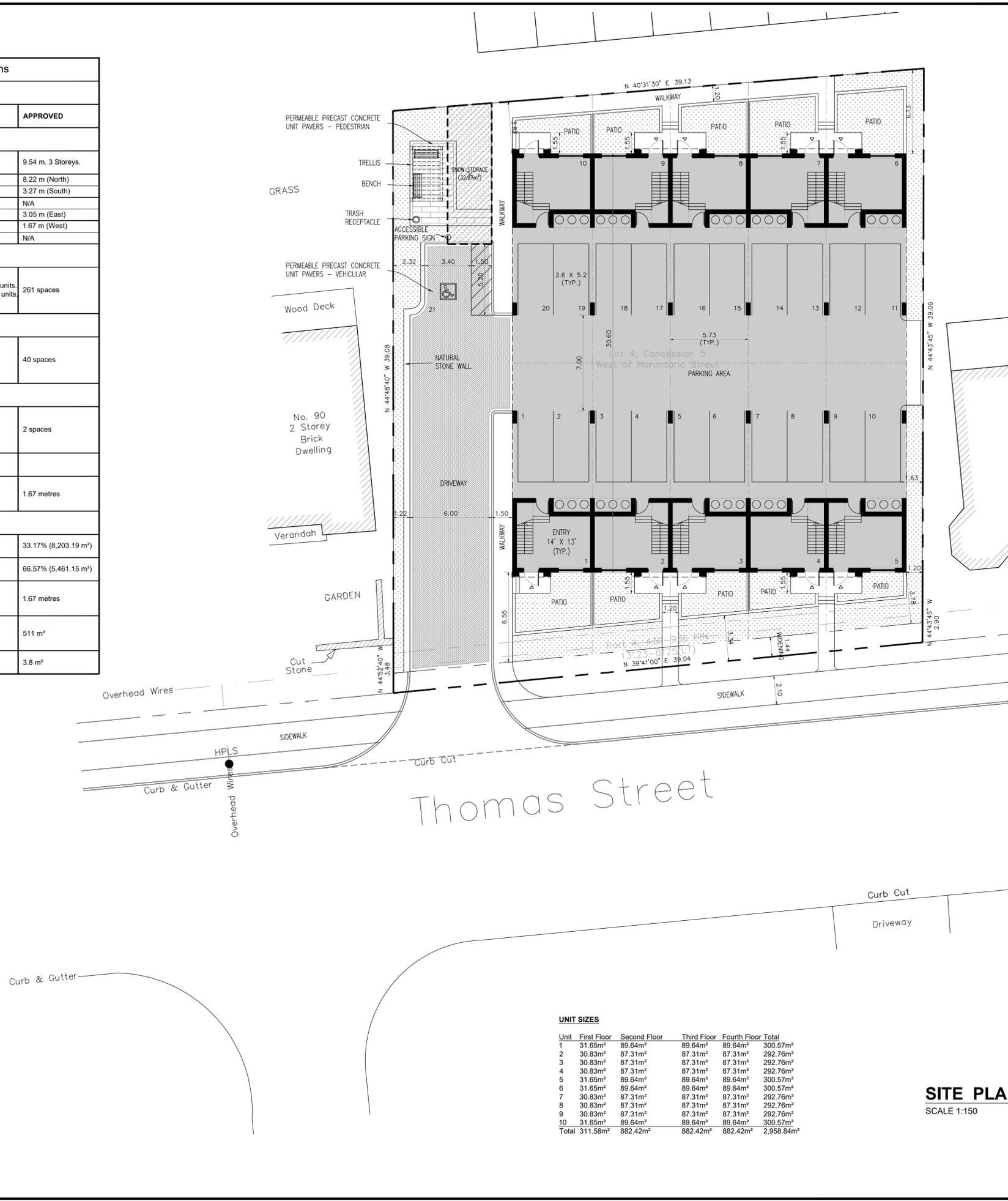
PARKING:
REQUIRED:
2.0 spaces per 4-4 bedroom unit = 8 parking spaces
1.5 spaces per 6-2 bedroom unit = 9 spaces.
0.25 spaces per 10 units = 2.5 spaces
Total: 20 spaces
PROVIDED: 21 spaces
Including 1 Accessible space

LANDSCAPE AREA: MINIMUM REQUIRED 40 %
PROPOSED 30.64 % (503.52 m²)

SNOW STORAGE: REQUIRED MIN.: 32.87 m² (2.00 % of Lot Area)
PROVIDED: 33.04 m² (2.01 % of Lot Area)

General Note:

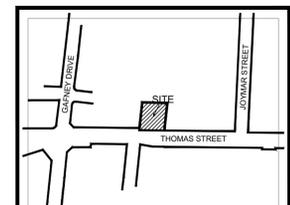
- i. I hereby certify that this drawing confirms in all respects to the site development plans Architect or Engineer's Signature (if applicable) and Professional seal
- ii. The City of Mississauga requires that all working drawings submitted to the Building Division as part of an application for the issuance of a building permit shall be certified by the architect or engineer as being in conformity with the site development plan as approved by the City of Mississauga.
- iii. All exterior lighting will be directed onto the site and will not infringe upon the adjacent properties.
- iv. All rooftop mechanical units shall be screened from view by the applicant.
- v. Parking spaces reserved for people with disabilities must be identified by a sign, installed at the applicant's expense, in accordance with the By-law Requirements and Building Code Requirements.
- vi. The applicant will be responsible for ensuring that all plans conform to Transport Canada's restrictions.
- vii. Grades will be met with a 33% maximum slope at the property lines and within the site.
- viii. All damaged areas are to be reinstated with topsoil and sod prior to the release of securities.
- ix. Signage shown on the site development plans is for information purposes only. All signs will be subject to the provisions of Sign by-law 0054-2002, as amended, and a separate sign application will be required through the Building Division.
- x. Any fencing adjacent to municipal lands is to be located 15 cm (6.0 in.) inside the property line.
- xi. Only "shielded" lighting fixtures are permitted for all development, except for detached and semi-detached dwellings within 60 m (196.8 ft.) of a residentially zoned property and must conform to the Engineer Certified Lighting Plan.
- xii. The Engineer Certified Lighting Plan must be signed by the consulting Engineer.
- xiii. The Owner covenants and agrees to construct and install "shielded" lighting fixtures on the subject lands, in conformity with the Site Plan and Engineer Certified Lighting Plan to the satisfaction of the City of Mississauga.
- xiv. The applicant will be responsible for ensuring that all plans conform to Transport Canada's restrictions.
- xv. Where planting is to be located in landscaped areas on top of an underground parking structure, it is the responsibility of the applicant to arrange the coordination of the design of the underground parking structure with the Landscape Architect and the Consulting Engineering. Underground parking structures with landscaping area to be capable of supporting the following loads:
 - 15 cm of drainage gravel plus 40 cm topsoil for sod
 - 15 cm of drainage gravel plus 60 cm topsoil for shrubs
 - 15 cm of drainage gravel plus 90 cm for trees
- Or
 - Prefabricated sheet drain system* with a compressive strength of 1003 Kpa plus 40 cm topsoil for sod
 - Prefabricated sheet drain system* with a compressive strength of 1003 Kpa plus 60 cm topsoil for shrubs
 - Prefabricated sheet drain system* with a compressive strength of 1003 Kpa plus 90 cm topsoil for trees
 - * Terradrain 900 or approved equal
- xvi. The structural design of any retaining wall over 0.6 m in height or any retaining wall located on a property line is to be shown on the Site Grading plan for this project and is to be approved by the Consulting Engineer for the project.
- xvii. Continuous 15 cm high barrier type poured concrete curbing will be provided between all asphalt and landscaped areas throughout the site.
- xviii. All utility companies will be notified for locates prior to the installation of the harding that lies within the site and within the limited of the City boulevard area.



UNIT SIZES

Unit	First Floor	Second Floor	Third Floor	Fourth Floor	Total
1	31.65m ²	89.64m ²	89.64m ²	89.64m ²	300.57m ²
2	30.83m ²	87.31m ²	87.31m ²	87.31m ²	292.76m ²
3	30.83m ²	87.31m ²	87.31m ²	87.31m ²	292.76m ²
4	30.83m ²	87.31m ²	87.31m ²	87.31m ²	292.76m ²
5	31.65m ²	89.64m ²	89.64m ²	89.64m ²	300.57m ²
6	31.65m ²	89.64m ²	89.64m ²	89.64m ²	300.57m ²
7	30.83m ²	87.31m ²	87.31m ²	87.31m ²	292.76m ²
8	30.83m ²	87.31m ²	87.31m ²	87.31m ²	292.76m ²
9	30.83m ²	87.31m ²	87.31m ²	87.31m ²	292.76m ²
10	31.65m ²	89.64m ²	89.64m ²	89.64m ²	300.57m ²
Total	311.58m²	882.42m²	882.42m²	882.42m²	2,958.84m²

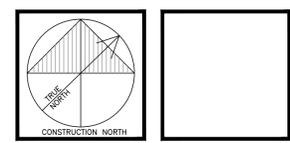
CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS ON SITE. ALL DRAWINGS ARE THE PROPERTY OF THE ARCHITECT AND MAY NOT BE USED WITHOUT HIS PERMISSION. THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION UNLESS COUNTERSIGNED BY THE ARCHITECT. DRAWINGS ARE NOT TO BE SCALED.



KEY PLAN
N.T.S.

NO.	DATE	REVISION/ISSUED FOR
2	MM DD YYYY	SITE PLAN APPROVAL
1	MAR 21 2019	PRE-APPLICATION CONSULTATION

PROPOSED RESIDENTIAL DEVELOPMENT
86 THOMAS ST.
MISSISSAUGA, ON



WES SURDYKA
architect inc

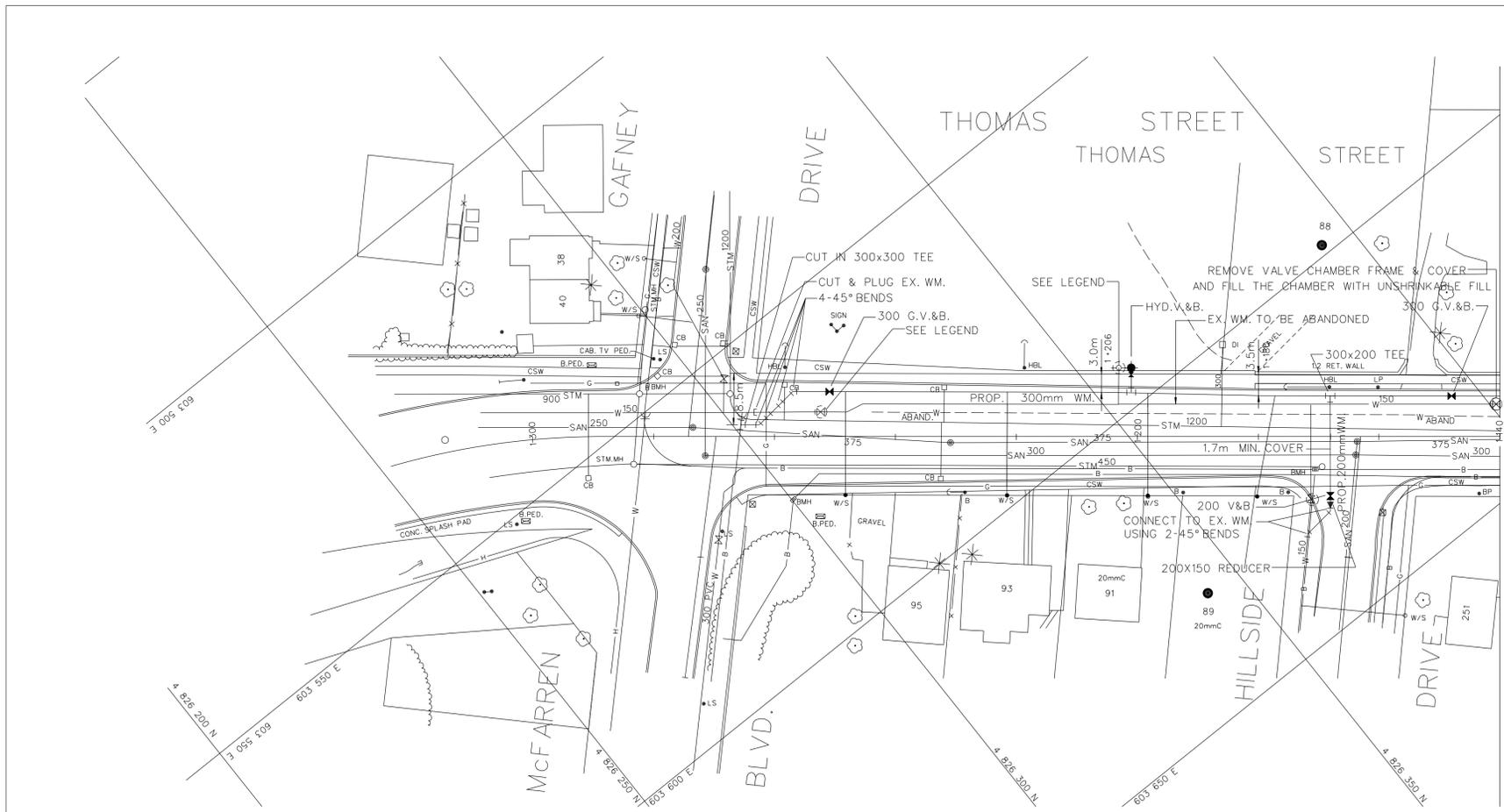
3645 KEELE STREET, 2nd FLOOR, STE 108
TORONTO ONTARIO M3J 1M8
TEL (416) 630-2254 FAX (416) 630-5741
E-mail: surdykaarchitect@bellnet.ca

SITE PLAN
SCALE 1:150

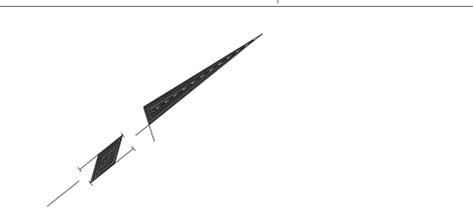
DRAWN BY:	PLOTTED:	MAY 29, 2020
SCALE:	AS SHOWN	
START DATE:	MAR 2019	
PROJECT NO.:	18-12	
DRAWING NO.:	A1.0	
OF:		

APPENDIX B – AS-BUILT DRAWINGS

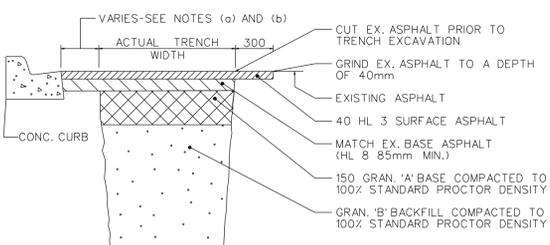
APPENDIX B – AS-BUILT DRAWINGS



REFER TO DWG. No. 22150-D



DISCLAIMER
 These records are based upon available and unverified information and may prove inaccurate. The Region of Peel disclaims any responsibility should these records be relied upon to the detriment of any person.



NOTES: (a). 300mmx40mm GRIND WIDE WHERE DISTANCE FROM EDGE OF TRENCH TO CURB EXCEEDS 1.0m
 (b). FULL WIDTH TO CURB WHERE DISTANCE LESS THEN 1.0m

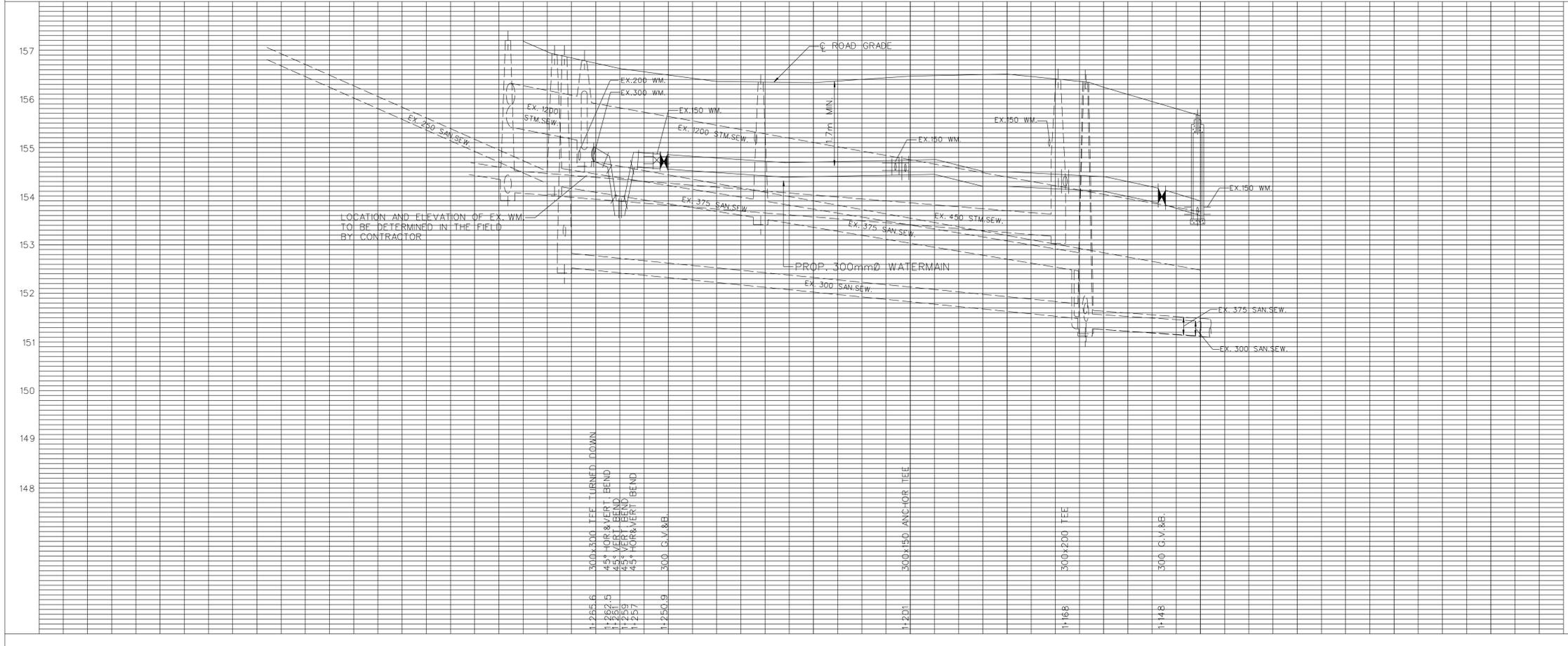
REINSTATEMENT DETAIL
 (THOMAS ST. AND QUEEN ST.)
 N.T.S.

SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN. SEWERS			GAS MAINS		
STORM SEWERS			BELLUNG CABLE		
WATERMANS			HYDRO/H/G CABLE		
TRANSIT			GNT. HYDRO		
PARK & REC.			CTV		
ONT. CLEAN WATER					

REVISIONS		
DATE	DETAILS	INIT.
OCT. 1997	AS CONSTRUCTED	J.P.

KEY PLAN
N.T.S.

NOTES: 1. FOR GENERAL NOTES AND LEGEND SEE DWG. No. 22150-D
 2. FOR TRENCH BEDDING DETAIL SEE DWG. No. 22570-D
 3. REMOVE AND DISPOSE OF ABANDONED WATERMAN IF IT CONFLICTS WITH PROPOSED WATERMAN



General Notes

- - All Driveways ASPHALT Unless Otherwise Noted.
- - All Service Locations Are Approximate And Must Be Located Accurately In The Field
- ⊙ Denotes Building - Not Located
- ⊞ Denotes Building Located

B.M. No. Elev.
 The Contractor Is Responsible For Locating And Protecting All Existing Utilities Prior To And During Construction Location of Existing Utilities Approximate Only To Be Verified In Field By Contractor.

Designed by _____ Chkd. _____ Approved by _____

NOTICE TO CONTRACTOR
 48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL
 CITY OF MISSISSAUGA WORKS DEPT.
 CITY OF BRAMPTON WORKS DEPT.
 TOWN OF CALEDON WORKS DEPT.
 BELL TELEPHONE COMPANY
 CONSUMERS GAS COMPANY
 MINISTRY OF TRANSPORTATION
 ONTARIO CLEAN WATER AGENCY
 HYDRO ELECTRIC POWER COMM. OF ONTARIO
 HYDRO ELECTRIC COMM. CITY OF MISSISSAUGA
 HYDRO ELECTRIC COMM. CITY OF BRAMPTON
 HYDRO ELECTRIC COMM. TOWN OF CALEDON
 CABLE TELEVISION

10m 0 10m 20m 30m HORIZONTAL SCALE
 1m 0 1m 2m 3m VERTICAL SCALE

Region of Peel
Public Works

THOMAS STREET
 (FROM JOYMAR DR. TO GAFNEY DR.)
 PROP. 300mm \varnothing WATERMAIN
 Sta. 1+140 To Sta. 1+300

1-300	1-280	1-260	1-240	1-220	1-200	1-180	1-160	1-140										
153.60	154.40	154.40	154.45	154.20	154.10	153.60												
BOT. EL. OF WM. @ RD. CHAINAGE																		
<table border="0"> <tr> <td>Checked by</td> <td>Drawn by</td> <td>Y.C.</td> <td>Project No.</td> <td>96-1440</td> </tr> <tr> <td>Date</td> <td>AUG. 03, 1995</td> <td>Sheet</td> <td>2 of 2</td> <td>22151-D</td> </tr> </table>									Checked by	Drawn by	Y.C.	Project No.	96-1440	Date	AUG. 03, 1995	Sheet	2 of 2	22151-D
Checked by	Drawn by	Y.C.	Project No.	96-1440														
Date	AUG. 03, 1995	Sheet	2 of 2	22151-D														

APPENDIX C – WATER DATA

DOMESTICE WATER CALCULATION - New Building

86 Thomas Street

Mississauga, ON

June 20, 2020

File No.: NT-19-013

Nextrans Engineering

Prepared by: W.L.

Checked by: G.R.

Type of Housing

Residential

Unit Quantity Determination

1. Type of Construction	Residential	
2. PPU	2.7	
3. Number of Units	10	
4. Maximum Day Factor	2.00	
5. Peak Hour Factor	3.00	
6. Average Daily Demand	280	L/person/day

Water Usage Determination

1. Average Daily Demand	0.09	L/s
2. Maximum Daily Demand	0.18	L/s
3. Peak Hourly Demand	0.26	L/s

FIRE WATER DEMAND CALCULATION (FUS 1999)

86 Thomas Street		
Mississauga, ON		
June 20, 2020		
File No.: NT-19-013		
Nexttrans Engineering		
Checked by: G.R.	Type of Housing	Townhouse
Prepared by: W.L.	ID	New Building

Design Parameters

1 C - Type of Construction	ordinary construction	1.0
2. Total Floor Area (from site plan)	1,479	m ²
3. Fire Hazard Factor	Combustible	0%
4. Automatic Sprinkler Protection	no	0%
5. Fully Supervised System	no	0%
6. Exposure Factor		0.65
	East Side 3.1 to 10m	0.2
	West Side 3.1 to 10m	0.2
	South Side 30.1 to 45m	0.05
	North Side 3.1 to 10m	0.2

Fire Water Determination

1. $F=220 \cdot C \cdot A^{0.5}$	8,460.7	l/min
2. Adjusted by Fire Hazard Factor	8,460.7	l/min
3. Adjusted by Automatic Sprinkler System	0.0	l/min
4. Adjusted by Supervised System	0.0	l/min
5. Adjusted by Exposure Factor	5,499.5	l/min
Fire Water Demand	13,960.2	l/min

233 L/s

PIPE SIZING SHEET

86 Thomas Street

Mississauga, ON

June 20, 2020

File No.: NT-19-013

Nextrans Engineering

Prepared by: W.L.

Checked by: G.R.

Hazen-Williams Formula & Design Parameters

1. $v = 0.849 C R^{0.63} S^{0.54}$

2. Value C < 150mm dia. 100.0

Water Usage

1. Peak Hourly Demand 0.26 L/s

2. Max. Daily Demand 0.18 L/s

3. Fire Flow Demand 274 L/s

Water Pipe Sizing

1. Water Servicing Connection 150.00 mm

2. Velocity during Peak Hourly 0.02 m/s

3. Velocity during Max. Daily 0.01 m/s

4. Velocity under fire scenario 15.54 m/s

APPENDIX D – SANITARY DATA

Proposed Sanitary Drainage Design Sheet

Street Name	Up Stream MH	Down Stream MH	Increment			Cumulative		FLOW							PIPE									
			Units	PPU	Areas, ha	P	Areas, ha	KH	Pop/Flow l/s	A Gross ha	Infilt. Flow L/s.ha	Infilt. 1 l/s	Len. sewer m	Infilt. Flow L/s.m	Infilt. 2 l/s	Q Total l/s	L m	Act. Size mm	Nom. Size mm	Grade %	Nom. Cap. l/s	Vel. m/s	Act. Vel. m/s	% Pipe Full
New Development			10	2.7	0.1643	27	0.1643	4.36	0.41	0.1643	0.20	0.03	50.00	0.028	1.40	1.85	50.00	250	250	1.00	59.5	1.21	0.55	3.1
Sewer to Thomas Street						27	0.1643									1.85		375	375	0.60	135.8	1.23	0.43	1.4

A = area in ha
 PPU = persons per unit
 P = population
 $KH = 1 + 14 / \{ 4 + (P/1000)^{1/2} \}$
 Qaverage=302.8 L/capita/day

86 Thomas Street			
11 Units Townhouse			
Sanitary Sewer Design			
Design:	W.L.	Job No.	NT-19-013
Check:	G.R.	Date	June 2020
		Sheet	1 of 1

APPENDIX E – STORMWATER DATA

Pre-Development

C

Total area	0.1643 ha	0.25	Drain to Thomas St.
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Post-Development

C

post-area:

A1 - Controlled	0.1517 ha	0.79	Drain to Stm. Sewer
Landscape	0.0242 ha	0.25	
Permeable Unit Paver	0.0176 ha	0.85	
Hard Surface	0.1099 ha	0.90	
A2 - Uncontrolled	0.0126 ha	0.86	Drain to Thomas St.
Landscape	0.0007 ha	0.25	
Hard Surface	0.0119 ha	0.90	

Modified Rational Method - Two Year Storm
Site Flow and Storage Summary
 86 Thomas Street, Mississauga
 File No.: NT-19-013
 Date: June 2020



Uncontrolled A2
 Drainage Areas
 Area = **0.0126** ha
 "C" = **0.86**
 AC1 = **0.01**
 Tc = **15.0** min
 Time Increment = **1.0** min

Controlled A1
 Drainage Areas
 Area = **0.1517** ha
 "C" = **0.79**
 AC2 = **0.12**
 Tc = **15.0** min
 Time Increment = **1.0** min

Allowable Rel. Rate = 6.83 L/s
 Max. Orifice Allowed = 5.02 L/s
 Actual Orifice Release Rate M = 4.99 L/s

Max. Storage Required = 12.3 m³

2-Year Return Frequency	
a=	610.00
c=	-0.7800
l =	A*(T+4.6) ²

(1) Time (min)	(2) Rainfall Intensity (mm/hr)	(3) Storm Runoff (Uncon. Post) (m ³ /s)	(4) Runoff Volume (Uncon. Post) (m ³)	(5) Storm Runoff (Con. Post) (m ³ /s)	(6) Runoff Volume (Con. Post) (m ³)	(7) Storm Actual Runoff (m ³ /s)	(8) Total Runoff Volume (m ³)	(9) Total Volume Required (m ³)
(1)	(2)	(3) = [(2)*AC1] / 360	(4) = (1)*(3)*60	(5) = [(2)*AC2] / 360	(6) = (1)*(5)*60		(8) = (7)*10*60	(9) = (6)-(8)
15.0	59.9	0.0018	1.63	0.0200	17.96	0.0068	6.1	11.8
16.0	57.6	0.0017	1.67	0.0192	18.42	0.0067	6.5	12.0
17.0	55.5	0.0017	1.71	0.0185	18.86	0.0067	6.8	12.1
18.0	53.6	0.0016	1.75	0.0179	19.28	0.0066	7.1	12.1
19.0	51.8	0.0016	1.79	0.0173	19.68	0.0066	7.5	12.2
20.0	50.2	0.0015	1.82	0.0167	20.05	0.0065	7.8	12.2
21.0	48.6	0.0015	1.85	0.0162	20.41	0.0065	8.1	12.3
22.0	47.2	0.0014	1.88	0.0157	20.75	0.0064	8.5	12.3
23.0	45.9	0.0014	1.91	0.0153	21.08	0.0064	8.8	12.3
24.0	44.6	0.0013	1.94	0.0149	21.40	0.0063	9.1	12.3
25.0	43.4	0.0013	1.97	0.0145	21.70	0.0063	9.5	12.2
26.0	42.3	0.0013	2.00	0.0141	21.99	0.0063	9.8	12.2
27.0	41.3	0.0012	2.02	0.0137	22.27	0.0062	10.1	12.2
28.0	40.3	0.0012	2.05	0.0134	22.54	0.0062	10.4	12.1
29.0	39.3	0.0012	2.07	0.0131	22.80	0.0062	10.8	12.0
30.0	38.4	0.0012	2.09	0.0128	23.05	0.0062	11.1	12.0
31.0	37.6	0.0011	2.11	0.0125	23.30	0.0061	11.4	11.9
32.0	36.8	0.0011	2.14	0.0123	23.53	0.0061	11.7	11.8
33.0	36.0	0.0011	2.16	0.0120	23.76	0.0061	12.0	11.7
34.0	35.3	0.0011	2.18	0.0118	23.99	0.0061	12.4	11.6
35.0	34.6	0.0010	2.20	0.0115	24.21	0.0060	12.7	11.5
36.0	33.9	0.0010	2.22	0.0113	24.42	0.0060	13.0	11.4
37.0	33.3	0.0010	2.24	0.0111	24.63	0.0060	13.3	11.3
38.0	32.7	0.0010	2.25	0.0109	24.83	0.0060	13.6	11.2
39.0	32.1	0.0010	2.27	0.0107	25.02	0.0060	13.9	11.1
40.0	31.5	0.0010	2.29	0.0105	25.21	0.0059	14.3	10.9
41.0	31.0	0.0009	2.31	0.0103	25.40	0.0059	14.6	10.8
42.0	30.5	0.0009	2.32	0.0102	25.58	0.0059	14.9	10.7
43.0	30.0	0.0009	2.34	0.0100	25.76	0.0059	15.2	10.6
44.0	29.5	0.0009	2.35	0.0098	25.94	0.0059	15.5	10.4
45.0	29.0	0.0009	2.37	0.0097	26.11	0.0059	15.8	10.3
46.0	28.6	0.0009	2.39	0.0095	26.28	0.0059	16.2	10.1
47.0	28.1	0.0009	2.40	0.0094	26.44	0.0058	16.5	10.0
48.0	27.7	0.0008	2.41	0.0092	26.60	0.0058	16.8	9.8
49.0	27.3	0.0008	2.43	0.0091	26.76	0.0058	17.1	9.7
50.0	26.9	0.0008	2.44	0.0090	26.92	0.0058	17.4	9.5
51.0	26.6	0.0008	2.46	0.0088	27.07	0.0058	17.7	9.3
52.0	26.2	0.0008	2.47	0.0087	27.22	0.0058	18.0	9.2
53.0	25.8	0.0008	2.48	0.0086	27.37	0.0058	18.4	9.0
54.0	25.5	0.0008	2.50	0.0085	27.51	0.0058	18.7	8.8
55.0	25.2	0.0008	2.51	0.0084	27.65	0.0058	19.0	8.7
56.0	24.8	0.0008	2.52	0.0083	27.79	0.0057	19.3	8.5
57.0	24.5	0.0007	2.54	0.0082	27.93	0.0057	19.6	8.3
58.0	24.2	0.0007	2.55	0.0081	28.07	0.0057	19.9	8.2
59.0	23.9	0.0007	2.56	0.0080	28.20	0.0057	20.2	8.0
60.0	23.6	0.0007	2.57	0.0079	28.33	0.0057	20.5	7.8
61.0	23.3	0.0007	2.58	0.0078	28.46	0.0057	20.8	7.6
62.0	23.1	0.0007	2.59	0.0077	28.59	0.0057	21.2	7.4
63.0	22.8	0.0007	2.61	0.0076	28.71	0.0057	21.5	7.2
64.0	22.5	0.0007	2.62	0.0075	28.83	0.0057	21.8	7.1
65.0	22.3	0.0007	2.63	0.0074	28.96	0.0057	22.1	6.9
90.0	17.5	0.0005	2.86	0.0058	31.56	0.0064	34.4	0.0
120.0	14.2	0.0004	3.08	0.0047	33.94	0.0051	37.0	0.0
150.0	12.0	0.0004	3.25	0.0040	35.86	0.0043	39.1	0.0
180.0	10.4	0.0003	3.40	0.0035	37.47	0.0038	40.9	0.0
210.0	9.3	0.0003	3.53	0.0031	38.87	0.0034	42.4	0.0
240.0	8.4	0.0003	3.64	0.0028	40.11	0.0030	43.8	0.0

Modified Rational Method - Five Year Storm
Site Flow and Storage Summary
 86 Thomas Street, Mississauga
 File No.: NT-19-013
 Date: June 2020



Uncontrolled A2
 Drainage Areas
 Area = **0.0126** ha
 "C" = **0.86**
 AC1 = **0.01**
 Tc = **15.0** min
 Time Increment = **1.0** min

Controlled A1
 Drainage Areas
 Area = **0.1517** ha
 "C" = **0.79**
 AC2 = **0.12**
 Tc = **15.0** min
 Time Increment = **1.0** min

Allowable Rel. Rate = 9.19 L/s
 Max. Orifice Allowed = 6.76 L/s
 Actual Orifice Release Rate M = 6.65 L/s

Max. Storage Required = **16.6** m³

5-Year Return Frequency	
a=	820.00
c=	-0.7800
l =	A*(T+4.6) ²

(1) Time (min)	(2) Rainfall Intensity (mm/hr)	(3) Storm Runoff (Uncon. Post) (m ³ /s)	(4) Runoff Volume (Uncon. Post) (m ³)	(5) Storm Runoff (Con. Post) (m ³ /s)	(6) Runoff Volume (Con. Post) (m ³)	(7) Storm Actual Runoff (m ³ /s)	(8) Total Runoff Volume (m ³)	(9) Total Volume Required (m ³)
(1)	(2)	(3) = [(2)*AC1] / 360	(4) = (1)*(3)*60	(5) = [(2)*AC2] / 360	(6) = (1)*(5)*60		(8) = (7)*10*60	(9) = (6)-(8)
15.0	80.5	0.0024	2.19	0.0268	24.14	0.0091	8.2	16.0
16.0	77.4	0.0023	2.25	0.0258	24.77	0.0090	8.6	16.1
17.0	74.6	0.0023	2.30	0.0249	25.36	0.0089	9.1	16.3
18.0	72.0	0.0022	2.35	0.0240	25.92	0.0088	9.5	16.4
19.0	69.7	0.0021	2.40	0.0232	26.45	0.0088	10.0	16.5
20.0	67.4	0.0020	2.45	0.0225	26.96	0.0087	10.4	16.5
21.0	65.4	0.0020	2.49	0.0218	27.44	0.0086	10.9	16.6
22.0	63.4	0.0019	2.53	0.0211	27.90	0.0086	11.3	16.6
23.0	61.6	0.0019	2.57	0.0205	28.34	0.0085	11.8	16.6
24.0	60.0	0.0018	2.61	0.0200	28.76	0.0085	12.2	16.6
25.0	58.4	0.0018	2.65	0.0194	29.17	0.0084	12.6	16.5
26.0	56.9	0.0017	2.68	0.0189	29.56	0.0084	13.1	16.5
27.0	55.5	0.0017	2.72	0.0185	29.93	0.0083	13.5	16.4
28.0	54.1	0.0016	2.75	0.0180	30.30	0.0083	13.9	16.4
29.0	52.9	0.0016	2.78	0.0176	30.65	0.0083	14.4	16.3
30.0	51.7	0.0016	2.81	0.0172	30.99	0.0082	14.8	16.2
31.0	50.5	0.0015	2.84	0.0168	31.32	0.0082	15.2	16.1
32.0	49.5	0.0015	2.87	0.0165	31.64	0.0081	15.6	16.0
33.0	48.4	0.0015	2.90	0.0161	31.95	0.0081	16.1	15.9
34.0	47.5	0.0014	2.93	0.0158	32.25	0.0081	16.5	15.7
35.0	46.5	0.0014	2.95	0.0155	32.54	0.0081	16.9	15.6
36.0	45.6	0.0014	2.98	0.0152	32.83	0.0080	17.4	15.5
37.0	44.8	0.0014	3.00	0.0149	33.10	0.0080	17.8	15.3
38.0	43.9	0.0013	3.03	0.0146	33.37	0.0080	18.2	15.2
39.0	43.2	0.0013	3.05	0.0144	33.64	0.0080	18.6	15.0
40.0	42.4	0.0013	3.08	0.0141	33.89	0.0079	19.0	14.9
41.0	41.7	0.0013	3.10	0.0139	34.15	0.0079	19.5	14.7
42.0	41.0	0.0012	3.12	0.0136	34.39	0.0079	19.9	14.5
43.0	40.3	0.0012	3.14	0.0134	34.63	0.0079	20.3	14.3
44.0	39.6	0.0012	3.16	0.0132	34.87	0.0079	20.7	14.1
45.0	39.0	0.0012	3.19	0.0130	35.10	0.0078	21.1	13.9
46.0	38.4	0.0012	3.21	0.0128	35.32	0.0078	21.6	13.8
47.0	37.8	0.0011	3.23	0.0126	35.55	0.0078	22.0	13.6
48.0	37.3	0.0011	3.25	0.0124	35.76	0.0078	22.4	13.4
49.0	36.7	0.0011	3.27	0.0122	35.98	0.0078	22.8	13.1
50.0	36.2	0.0011	3.28	0.0121	36.18	0.0077	23.2	12.9
51.0	35.7	0.0011	3.30	0.0119	36.39	0.0077	23.7	12.7
52.0	35.2	0.0011	3.32	0.0117	36.59	0.0077	24.1	12.5
53.0	34.7	0.0011	3.34	0.0116	36.79	0.0077	24.5	12.3
54.0	34.3	0.0010	3.36	0.0114	36.98	0.0077	24.9	12.1
55.0	33.8	0.0010	3.37	0.0113	37.17	0.0077	25.3	11.8
56.0	33.4	0.0010	3.39	0.0111	37.36	0.0077	25.7	11.6
57.0	33.0	0.0010	3.41	0.0110	37.55	0.0076	26.2	11.4
58.0	32.5	0.0010	3.42	0.0108	37.73	0.0076	26.6	11.1
59.0	32.1	0.0010	3.44	0.0107	37.91	0.0076	27.0	10.9
60.0	31.8	0.0010	3.46	0.0106	38.08	0.0076	27.4	10.7
61.0	31.4	0.0009	3.47	0.0105	38.26	0.0076	27.8	10.4
62.0	31.0	0.0009	3.49	0.0103	38.43	0.0076	28.2	10.2
63.0	30.7	0.0009	3.50	0.0102	38.60	0.0076	28.7	9.9
64.0	30.3	0.0009	3.52	0.0101	38.76	0.0076	29.1	9.7
65.0	30.0	0.0009	3.53	0.0100	38.93	0.0076	29.5	9.4
90.0	23.6	0.0007	3.85	0.0079	42.42	0.0086	46.3	0.0
120.0	19.0	0.0006	4.14	0.0063	45.63	0.0069	49.8	0.0
150.0	16.1	0.0005	4.38	0.0054	48.20	0.0058	52.6	0.0
180.0	14.0	0.0004	4.57	0.0047	50.37	0.0051	54.9	0.0
210.0	12.4	0.0004	4.74	0.0041	52.25	0.0045	57.0	0.0
240.0	11.2	0.0003	4.89	0.0037	53.92	0.0041	58.8	0.0

Modified Rational Method - Ten Year Storm

Site Flow and Storage Summary
 86 Thomas Street, Mississauga
 File No.: NT-19-013
 Date: June 2020



Uncontrolled A2

Drainage Areas
 Area = **0.0126** ha
 "C" = **0.86**
 AC1 = **0.01**
 Tc = **15.0** min
 Time Increment = **1.0** min

Controlled A1

Drainage Areas
 Area = **0.1517** ha
 "C" = **0.79**
 AC2 = **0.12**
 Tc = **15.0** min
 Time Increment = **1.0** min

Allowable Rel. Rate = 11.31 L/s
 Max. Orifice Allowed = 8.31 L/s
 Actual Orifice Release Rate M = 8.15 L/s

Max. Storage Required = **20.5** m³

10-Year Return Frequency	
a=	1010.00
c=	-0.7800
l =	A*(T+4.6) ^c

(1) Time (min)	(2) Rainfall Intensity (mm/hr)	(3) Storm Runoff (Uncon. Post) (m ³ /s)	(4) Runoff Volume (Uncon. Post) (m ³)	(5) Storm Runoff (Con. Post) (m ³ /s)	(6) Runoff Volume (Con. Post) (m ³)	(7) Storm Actual Runoff (m ³ /s)	(8) Total Runoff Volume (m ³)	(9) Total Volume Required (m ³)	
(1)	(2)	(3) = [(2)*AC1] / 360		(4) = (1)*(3)*60		(5) = [(2)*AC2] / 360		(6) = (1)*(5)*60	
		(7) = (3) + (5)		(8) = (4) + (6)		(9) = (8) - (6)			
15.0	99.2	0.0030	2.70	0.0330	29.73	0.0111	10.0	19.7	
16.0	95.4	0.0029	2.77	0.0318	30.50	0.0110	10.6	19.9	
17.0	91.9	0.0028	2.84	0.0306	31.23	0.0109	11.1	20.1	
18.0	88.7	0.0027	2.90	0.0296	31.92	0.0108	11.7	20.2	
19.0	85.8	0.0026	2.96	0.0286	32.58	0.0107	12.2	20.3	
20.0	83.1	0.0025	3.01	0.0277	33.20	0.0107	12.8	20.4	
21.0	80.5	0.0024	3.07	0.0268	33.80	0.0106	13.3	20.5	
22.0	78.1	0.0024	3.12	0.0260	34.36	0.0105	13.9	20.5	
23.0	75.9	0.0023	3.17	0.0253	34.90	0.0104	14.4	20.5	
24.0	73.9	0.0022	3.22	0.0246	35.42	0.0104	14.9	20.5	
25.0	71.9	0.0022	3.26	0.0239	35.92	0.0103	15.5	20.4	
26.0	70.1	0.0021	3.30	0.0233	36.41	0.0103	16.0	20.4	
27.0	68.3	0.0021	3.35	0.0228	36.87	0.0102	16.5	20.3	
28.0	66.7	0.0020	3.39	0.0222	37.32	0.0102	17.1	20.2	
29.0	65.1	0.0020	3.43	0.0217	37.75	0.0101	17.6	20.1	
30.0	63.7	0.0019	3.46	0.0212	38.17	0.0101	18.1	20.0	
31.0	62.3	0.0019	3.50	0.0207	38.57	0.0100	18.7	19.9	
32.0	60.9	0.0018	3.54	0.0203	38.97	0.0100	19.2	19.8	
33.0	59.7	0.0018	3.57	0.0199	39.35	0.0100	19.7	19.6	
34.0	58.4	0.0018	3.61	0.0195	39.72	0.0099	20.2	19.5	
35.0	57.3	0.0017	3.64	0.0191	40.08	0.0099	20.8	19.3	
36.0	56.2	0.0017	3.67	0.0187	40.43	0.0098	21.3	19.2	
37.0	55.1	0.0017	3.70	0.0184	40.77	0.0098	21.8	19.0	
38.0	54.1	0.0016	3.73	0.0180	41.11	0.0098	22.3	18.8	
39.0	53.2	0.0016	3.76	0.0177	41.43	0.0098	22.8	18.6	
40.0	52.2	0.0016	3.79	0.0174	41.75	0.0097	23.3	18.4	
41.0	51.3	0.0016	3.82	0.0171	42.06	0.0097	23.9	18.2	
42.0	50.5	0.0015	3.85	0.0168	42.36	0.0097	24.4	18.0	
43.0	49.6	0.0015	3.87	0.0165	42.66	0.0096	24.9	17.8	
44.0	48.8	0.0015	3.90	0.0163	42.95	0.0096	25.4	17.5	
45.0	48.1	0.0015	3.92	0.0160	43.23	0.0096	25.9	17.3	
46.0	47.3	0.0014	3.95	0.0158	43.51	0.0096	26.4	17.1	
47.0	46.6	0.0014	3.97	0.0155	43.78	0.0096	27.0	16.8	
48.0	45.9	0.0014	4.00	0.0153	44.05	0.0095	27.5	16.6	
49.0	45.2	0.0014	4.02	0.0151	44.31	0.0095	28.0	16.3	
50.0	44.6	0.0013	4.05	0.0149	44.57	0.0095	28.5	16.1	
51.0	44.0	0.0013	4.07	0.0146	44.82	0.0095	29.0	15.8	
52.0	43.4	0.0013	4.09	0.0144	45.07	0.0095	29.5	15.6	
53.0	42.8	0.0013	4.11	0.0142	45.31	0.0094	30.0	15.3	
54.0	42.2	0.0013	4.13	0.0141	45.55	0.0094	30.5	15.0	
55.0	41.7	0.0013	4.16	0.0139	45.79	0.0094	31.0	14.7	
56.0	41.1	0.0012	4.18	0.0137	46.02	0.0094	31.6	14.5	
57.0	40.6	0.0012	4.20	0.0135	46.24	0.0094	32.1	14.2	
58.0	40.1	0.0012	4.22	0.0134	46.47	0.0094	32.6	13.9	
59.0	39.6	0.0012	4.24	0.0132	46.69	0.0093	33.1	13.6	
60.0	39.1	0.0012	4.26	0.0130	46.91	0.0093	33.6	13.3	
61.0	38.6	0.0012	4.28	0.0129	47.12	0.0093	34.1	13.0	
62.0	38.2	0.0012	4.30	0.0127	47.33	0.0093	34.6	12.7	
63.0	37.8	0.0011	4.31	0.0126	47.54	0.0093	35.1	12.4	
64.0	37.3	0.0011	4.33	0.0124	47.74	0.0093	35.6	12.1	
65.0	36.9	0.0011	4.35	0.0123	47.94	0.0093	36.1	11.8	
90.0	29.0	0.0009	4.74	0.0097	52.25	0.0106	57.0	0.0	
120.0	23.4	0.0007	5.10	0.0078	56.20	0.0085	61.3	0.0	
150.0	19.8	0.0006	5.39	0.0066	59.37	0.0072	64.8	0.0	
180.0	17.2	0.0005	5.63	0.0057	62.04	0.0063	67.7	0.0	
210.0	15.3	0.0005	5.84	0.0051	64.36	0.0056	70.2	0.0	
240.0	13.8	0.0004	6.03	0.0046	66.42	0.0050	72.4	0.0	

Modified Rational Method - Twenty-Five Year Storm
Site Flow and Storage Summary
 86 Thomas Street, Mississauga
 File No.: NT-19-013
 Date: June 2020



Uncontrolled A2

Drainage Areas
 Area = **0.0126** ha
 "C" = **0.95**
 AC1 = **0.01**
 Tc = **15.0** min
 Time Increment = **1.0** min

Controlled A1

Drainage Areas
 Area = **0.1517** ha
 "C" = **0.87**
 AC2 = **0.13**
 Tc = **15.0** min
 Time Increment = **1.0** min

Allowable Rel. Rate = 14.29 L/s
 Max. Orifice Allowed = 10.50 L/s
 Actual Orifice Release Rate M = 10.39 L/s

Max. Storage Required = **25.8** m³

25-Year Return Frequency

a=	1160.00
c=	-0.7800
l =	A*(T+4.6) ²

(1) Time (min)	(2) Rainfall Intensity (mm/hr)	(3) Storm Runoff (Uncon. Post) (m ³ /s)	(4) Runoff Volume (Uncon. Post) (m ³)	(5) Storm Runoff (Con. Post) (m ³ /s)	(6) Runoff Volume (Con. Post) (m ³)	(7) Storm Actual Runoff (m ³ /s)	(8) Total Runoff Volume (m ³)	(9) Total Volume Required (m ³)
(1)	(2)	(3) = [(2)*AC1] / 360	(4) = (1)*(3)*60	(5) = [(2)*AC2] / 360	(6) = (1)*(5)*60		(8) = (7)*10*60	(9) = (6)-(8)
15.0	113.9	0.0038	3.41	0.0417	37.56	0.0142	12.8	24.8
16.0	109.6	0.0036	3.50	0.0401	38.54	0.0140	13.5	25.1
17.0	105.6	0.0035	3.58	0.0387	39.46	0.0139	14.2	25.3
18.0	101.9	0.0034	3.66	0.0373	40.33	0.0138	14.9	25.5
19.0	98.5	0.0033	3.74	0.0361	41.16	0.0137	15.6	25.6
20.0	95.4	0.0032	3.81	0.0350	41.95	0.0136	16.3	25.7
21.0	92.5	0.0031	3.88	0.0339	42.70	0.0135	17.0	25.7
22.0	89.8	0.0030	3.94	0.0329	43.41	0.0134	17.7	25.8
23.0	87.2	0.0029	4.00	0.0320	44.10	0.0133	18.3	25.8
24.0	84.8	0.0028	4.06	0.0311	44.75	0.0132	19.0	25.7
25.0	82.6	0.0027	4.12	0.0303	45.39	0.0131	19.7	25.7
26.0	80.5	0.0027	4.17	0.0295	45.99	0.0131	20.4	25.6
27.0	78.5	0.0026	4.23	0.0288	46.58	0.0130	21.1	25.5
28.0	76.6	0.0025	4.28	0.0281	47.15	0.0129	21.7	25.4
29.0	74.8	0.0025	4.33	0.0274	47.69	0.0129	22.4	25.3
30.0	73.1	0.0024	4.38	0.0268	48.22	0.0128	23.1	25.1
31.0	71.5	0.0024	4.42	0.0262	48.73	0.0128	23.7	25.0
32.0	70.0	0.0023	4.47	0.0256	49.23	0.0127	24.4	24.8
33.0	68.5	0.0023	4.51	0.0251	49.71	0.0127	25.1	24.6
34.0	67.1	0.0022	4.55	0.0246	50.18	0.0126	25.7	24.4
35.0	65.8	0.0022	4.60	0.0241	50.64	0.0126	26.4	24.2
36.0	64.5	0.0021	4.64	0.0236	51.08	0.0125	27.1	24.0
37.0	63.3	0.0021	4.68	0.0232	51.51	0.0125	27.7	23.8
38.0	62.2	0.0021	4.71	0.0228	51.93	0.0125	28.4	23.5
39.0	61.0	0.0020	4.75	0.0224	52.34	0.0124	29.1	23.3
40.0	60.0	0.0020	4.79	0.0220	52.74	0.0124	29.7	23.0
41.0	58.9	0.0020	4.82	0.0216	53.14	0.0123	30.4	22.8
42.0	58.0	0.0019	4.86	0.0212	53.52	0.0123	31.0	22.5
43.0	57.0	0.0019	4.89	0.0209	53.89	0.0123	31.7	22.2
44.0	56.1	0.0019	4.92	0.0206	54.26	0.0123	32.3	21.9
45.0	55.2	0.0018	4.96	0.0202	54.62	0.0122	33.0	21.6
46.0	54.4	0.0018	4.99	0.0199	54.97	0.0122	33.7	21.3
47.0	53.5	0.0018	5.02	0.0196	55.31	0.0122	34.3	21.0
48.0	52.7	0.0018	5.05	0.0193	55.65	0.0121	35.0	20.7
49.0	52.0	0.0017	5.08	0.0190	55.98	0.0121	35.6	20.4
50.0	51.2	0.0017	5.11	0.0188	56.31	0.0121	36.3	20.0
51.0	50.5	0.0017	5.14	0.0185	56.62	0.0121	36.9	19.7
52.0	49.8	0.0017	5.17	0.0182	56.94	0.0120	37.6	19.4
53.0	49.1	0.0016	5.20	0.0180	57.24	0.0120	38.2	19.0
54.0	48.5	0.0016	5.22	0.0178	57.55	0.0120	38.9	18.7
55.0	47.8	0.0016	5.25	0.0175	57.84	0.0120	39.5	18.3
56.0	47.2	0.0016	5.28	0.0173	58.14	0.0120	40.2	18.0
57.0	46.6	0.0016	5.30	0.0171	58.42	0.0119	40.8	17.6
58.0	46.0	0.0015	5.33	0.0169	58.71	0.0119	41.5	17.2
59.0	45.5	0.0015	5.35	0.0167	58.99	0.0119	42.1	16.9
60.0	44.9	0.0015	5.38	0.0165	59.26	0.0119	42.8	16.5
61.0	44.4	0.0015	5.40	0.0163	59.53	0.0119	43.4	16.1
62.0	43.9	0.0015	5.43	0.0161	59.80	0.0118	44.1	15.7
63.0	43.4	0.0014	5.45	0.0159	60.06	0.0118	44.7	15.3
64.0	42.9	0.0014	5.47	0.0157	60.32	0.0118	45.4	15.0
65.0	42.4	0.0014	5.50	0.0155	60.57	0.0118	46.0	14.6
90.0	33.4	0.0011	5.99	0.0122	66.01	0.0133	72.0	0.0
120.0	26.9	0.0009	6.44	0.0099	71.00	0.0108	77.4	0.0
150.0	22.7	0.0008	6.81	0.0083	75.01	0.0091	81.8	0.0
180.0	19.8	0.0007	7.11	0.0073	78.38	0.0079	85.5	0.0
210.0	17.6	0.0006	7.38	0.0065	81.31	0.0070	88.7	0.0
240.0	15.9	0.0005	7.62	0.0058	83.91	0.0064	91.5	0.0

Modified Rational Method - Fifty Year Storm
Site Flow and Storage Summary
 86 Thomas Street, Mississauga
 File No.: NT-19-013
 Date: June 2020



Uncontrolled A2
 Drainage Areas
 Area = **0.0126** ha
 "C" = **1.00**
 AC1 = **0.01**
 Tc = **15.0** min
 Time Increment = **1.0** min

Controlled A1
 Drainage Areas
 Area = **0.1517** ha
 "C" = **0.95**
 AC2 = **0.14**
 Tc = **15.0** min
 Time Increment = **1.0** min

Allowable Rel. Rate = 17.41 L/s
 Max. Orifice Allowed = 12.96 L/s
 Actual Orifice Release Rate M = 12.88 L/s

Max. Storage Required = **31.3** m³

50-Year Return Frequency	
a=	1300.00
c=	-0.7800
l =	A*(T+4.7) ²

(1) Time (min)	(2) Rainfall Intensity (mm/hr)	(3) Storm Runoff (Uncon. Post) (m ³ /s)	(4) Runoff Volume (Uncon. Post) (m ³)	(5) Storm Runoff (Con. Post) (m ³ /s)	(6) Runoff Volume (Con. Post) (m ³)	(7) Storm Actual Runoff (m ³ /s)	(8) Total Runoff Volume (m ³)	(9) Total Volume Required (m ³)
(1)	(2)	(3) = [(2)*AC1] / 360	(4) = (1)*(3)*60	(5) = [(2)*AC2] / 360	(6) = (1)*(5)*60		(8) = (7)*10*60	(9) = (6)-(8)
15.0	127.1	0.0044	4.00	0.0508	45.74	0.0173	15.6	30.1
16.0	122.3	0.0043	4.11	0.0489	46.94	0.0172	16.5	30.5
17.0	117.9	0.0041	4.21	0.0471	48.07	0.0170	17.4	30.7
18.0	113.8	0.0040	4.30	0.0455	49.14	0.0169	18.2	30.9
19.0	110.1	0.0039	4.39	0.0440	50.16	0.0167	19.1	31.1
20.0	106.6	0.0037	4.48	0.0426	51.12	0.0166	19.9	31.2
21.0	103.3	0.0036	4.56	0.0413	52.04	0.0165	20.8	31.2
22.0	100.3	0.0035	4.63	0.0401	52.92	0.0164	21.6	31.3
23.0	97.5	0.0034	4.71	0.0390	53.76	0.0163	22.5	31.3
24.0	94.8	0.0033	4.78	0.0379	54.57	0.0162	23.3	31.2
25.0	92.3	0.0032	4.85	0.0369	55.34	0.0161	24.2	31.2
26.0	89.9	0.0031	4.91	0.0360	56.09	0.0160	25.0	31.1
27.0	87.7	0.0031	4.97	0.0351	56.81	0.0160	25.8	31.0
28.0	85.6	0.0030	5.03	0.0342	57.50	0.0159	26.7	30.8
29.0	83.6	0.0029	5.09	0.0334	58.17	0.0158	27.5	30.7
30.0	81.7	0.0029	5.15	0.0327	58.82	0.0157	28.3	30.5
31.0	80.0	0.0028	5.21	0.0320	59.45	0.0157	29.2	30.3
32.0	78.3	0.0027	5.26	0.0313	60.06	0.0156	30.0	30.1
33.0	76.6	0.0027	5.31	0.0306	60.65	0.0156	30.8	29.8
34.0	75.1	0.0026	5.36	0.0300	61.23	0.0155	31.6	29.6
35.0	73.6	0.0026	5.41	0.0294	61.78	0.0155	32.5	29.3
36.0	72.2	0.0025	5.46	0.0289	62.33	0.0154	33.3	29.0
37.0	70.8	0.0025	5.50	0.0283	62.86	0.0154	34.1	28.8
38.0	69.5	0.0024	5.55	0.0278	63.37	0.0153	34.9	28.4
39.0	68.3	0.0024	5.59	0.0273	63.88	0.0153	35.7	28.1
40.0	67.1	0.0023	5.64	0.0268	64.37	0.0152	36.6	27.8
41.0	65.9	0.0023	5.68	0.0264	64.85	0.0152	37.4	27.5
42.0	64.8	0.0023	5.72	0.0259	65.32	0.0152	38.2	27.1
43.0	63.8	0.0022	5.76	0.0255	65.78	0.0151	39.0	26.8
44.0	62.8	0.0022	5.80	0.0251	66.23	0.0151	39.8	26.4
45.0	61.8	0.0022	5.84	0.0247	66.67	0.0150	40.6	26.0
46.0	60.8	0.0021	5.88	0.0243	67.10	0.0150	41.4	25.7
47.0	59.9	0.0021	5.91	0.0239	67.52	0.0150	42.2	25.3
48.0	59.0	0.0021	5.95	0.0236	67.94	0.0149	43.1	24.9
49.0	58.2	0.0020	5.98	0.0232	68.34	0.0149	43.9	24.5
50.0	57.3	0.0020	6.02	0.0229	68.74	0.0149	44.7	24.1
51.0	56.5	0.0020	6.05	0.0226	69.13	0.0149	45.5	23.7
52.0	55.7	0.0020	6.09	0.0223	69.51	0.0148	46.3	23.2
53.0	55.0	0.0019	6.12	0.0220	69.89	0.0148	47.1	22.8
54.0	54.3	0.0019	6.15	0.0217	70.26	0.0148	47.9	22.4
55.0	53.5	0.0019	6.18	0.0214	70.63	0.0148	48.7	21.9
56.0	52.9	0.0018	6.22	0.0211	70.98	0.0147	49.5	21.5
57.0	52.2	0.0018	6.25	0.0209	71.34	0.0147	50.3	21.0
58.0	51.5	0.0018	6.28	0.0206	71.68	0.0147	51.1	20.6
59.0	50.9	0.0018	6.31	0.0203	72.03	0.0147	51.9	20.1
60.0	50.3	0.0018	6.34	0.0201	72.36	0.0146	52.7	19.6
61.0	49.7	0.0017	6.36	0.0199	72.69	0.0146	53.5	19.2
62.0	49.1	0.0017	6.39	0.0196	73.02	0.0146	54.3	18.7
63.0	48.5	0.0017	6.42	0.0194	73.34	0.0146	55.1	18.2
64.0	48.0	0.0017	6.45	0.0192	73.66	0.0146	55.9	17.7
65.0	47.4	0.0017	6.48	0.0190	73.97	0.0145	56.7	17.2
90.0	37.4	0.0013	7.06	0.0149	80.64	0.0162	87.7	0.0
120.0	30.1	0.0011	7.60	0.0120	86.75	0.0131	94.3	0.0
150.0	25.5	0.0009	8.03	0.0102	91.65	0.0111	99.7	0.0
180.0	22.2	0.0008	8.39	0.0089	95.78	0.0096	104.2	0.0
210.0	19.7	0.0007	8.70	0.0079	99.37	0.0086	108.1	0.0
240.0	17.8	0.0006	8.98	0.0071	102.55	0.0077	111.5	0.0

Modified Rational Method - One Hundred Year Storm
Site Flow and Storage Summary
 86 Thomas Street, Mississauga
 File No.: NT-19-013
 Date: June 2020



Uncontrolled A2
 Drainage Areas
 Area = **0.0126** ha
 "C" = **1.00**
 AC1 = **0.01**
 Tc = **15.0** min
 Time Increment = **1.0** min

Controlled A1
 Drainage Areas
 Area = **0.1517** ha
 "C" = **0.99**
 AC2 = **0.15**
 Tc = **15.0** min
 Time Increment = **1.0** min

Allowable Rel. Rate = 20.07 L/s
 Max. Orifice Allowed = 15.15 L/s
 Actual Orifice Release Rate M = 15.06 L/s

Max. Storage Required = **36.1** m³

100-Year Return Frequency	
a=	1450.00
c=	-0.7800
l =	A*(T+4.9) ²

(1) Time (min)	(2) Rainfall Intensity (mm/hr)	(3) Storm Runoff (Uncon. Post) (m ³ /s)	(4) Runoff Volume (Uncon. Post) (m ³)	(5) Storm Runoff (Con. Post) (m ³ /s)	(6) Runoff Volume (Con. Post) (m ³)	(7) Storm Actual Runoff (m ³ /s)	(8) Total Runoff Volume (m ³)	(9) Total Volume Required (m ³)							
(1)	(2)	(3) = [(2)*AC1] / 360		(4) = (1)*(3)*60		(5) = [(2)*AC2] / 360		(6) = (1)*(5)*60		(7) = (3)		(8) = (7)*10*60		(9) = (6)-(8)	
15.0	140.7	0.0049	4.43	0.0586	52.72	0.0200	18.0	34.7							
16.0	135.4	0.0047	4.55	0.0564	54.13	0.0198	19.0	35.1							
17.0	130.6	0.0046	4.66	0.0544	55.45	0.0196	20.0	35.4							
18.0	126.1	0.0044	4.77	0.0525	56.70	0.0195	21.0	35.7							
19.0	122.0	0.0043	4.87	0.0508	57.89	0.0193	22.0	35.9							
20.0	118.1	0.0041	4.96	0.0492	59.02	0.0192	23.0	36.0							
21.0	114.5	0.0040	5.05	0.0477	60.10	0.0191	24.0	36.1							
22.0	111.2	0.0039	5.14	0.0463	61.13	0.0190	25.0	36.1							
23.0	108.1	0.0038	5.22	0.0450	62.11	0.0188	26.0	36.1							
24.0	105.2	0.0037	5.30	0.0438	63.06	0.0187	27.0	36.1							
25.0	102.4	0.0036	5.38	0.0426	63.96	0.0186	28.0	36.0							
26.0	99.8	0.0035	5.45	0.0416	64.84	0.0186	28.9	35.9							
27.0	97.4	0.0034	5.52	0.0405	65.68	0.0185	29.9	35.8							
28.0	95.1	0.0033	5.59	0.0396	66.49	0.0184	30.9	35.6							
29.0	92.9	0.0032	5.65	0.0387	67.28	0.0183	31.9	35.4							
30.0	90.8	0.0032	5.72	0.0378	68.04	0.0182	32.8	35.2							
31.0	88.8	0.0031	5.78	0.0370	68.77	0.0182	33.8	35.0							
32.0	86.9	0.0030	5.84	0.0362	69.48	0.0181	34.8	34.7							
33.0	85.1	0.0030	5.90	0.0354	70.18	0.0180	35.7	34.5							
34.0	83.4	0.0029	5.96	0.0347	70.85	0.0180	36.7	34.2							
35.0	81.8	0.0029	6.01	0.0340	71.50	0.0179	37.6	33.9							
36.0	80.2	0.0028	6.06	0.0334	72.14	0.0179	38.6	33.5							
37.0	78.7	0.0028	6.12	0.0328	72.76	0.0178	39.6	33.2							
38.0	77.3	0.0027	6.17	0.0322	73.36	0.0178	40.5	32.9							
39.0	75.9	0.0027	6.22	0.0316	73.95	0.0177	41.5	32.5							
40.0	74.6	0.0026	6.26	0.0311	74.53	0.0177	42.4	32.1							
41.0	73.3	0.0026	6.31	0.0305	75.09	0.0176	43.4	31.7							
42.0	72.1	0.0025	6.36	0.0300	75.64	0.0176	44.3	31.3							
43.0	70.9	0.0025	6.40	0.0295	76.18	0.0175	45.3	30.9							
44.0	69.8	0.0024	6.45	0.0291	76.70	0.0175	46.2	30.5							
45.0	68.7	0.0024	6.49	0.0286	77.22	0.0175	47.2	30.1							
46.0	67.6	0.0024	6.53	0.0282	77.72	0.0174	48.1	29.6							
47.0	66.6	0.0023	6.57	0.0277	78.21	0.0174	49.0	29.2							
48.0	65.6	0.0023	6.62	0.0273	78.70	0.0174	50.0	28.7							
49.0	64.7	0.0023	6.65	0.0269	79.17	0.0173	50.9	28.2							
50.0	63.8	0.0022	6.69	0.0265	79.64	0.0173	51.9	27.8							
51.0	62.9	0.0022	6.73	0.0262	80.10	0.0173	52.8	27.3							
52.0	62.0	0.0022	6.77	0.0258	80.54	0.0172	53.8	26.8							
53.0	61.2	0.0021	6.81	0.0255	80.99	0.0172	54.7	26.3							
54.0	60.4	0.0021	6.84	0.0251	81.42	0.0172	55.6	25.8							
55.0	59.6	0.0021	6.88	0.0248	81.84	0.0171	56.6	25.3							
56.0	58.8	0.0021	6.91	0.0245	82.26	0.0171	57.5	24.7							
57.0	58.1	0.0020	6.95	0.0242	82.68	0.0171	58.5	24.2							
58.0	57.3	0.0020	6.98	0.0239	83.08	0.0171	59.4	23.7							
59.0	56.6	0.0020	7.02	0.0236	83.48	0.0170	60.3	23.1							
60.0	56.0	0.0020	7.05	0.0233	83.87	0.0170	61.3	22.6							
61.0	55.3	0.0019	7.08	0.0230	84.26	0.0170	62.2	22.0							
62.0	54.6	0.0019	7.11	0.0228	84.64	0.0170	63.1	21.5							
63.0	54.0	0.0019	7.15	0.0225	85.02	0.0170	64.1	20.9							
64.0	53.4	0.0019	7.18	0.0222	85.39	0.0169	65.0	20.4							
65.0	52.8	0.0018	7.21	0.0220	85.75	0.0169	66.0	19.8							
90.0	41.6	0.0015	7.86	0.0173	93.54	0.0188	101.4	0.0							
120.0	33.6	0.0012	8.46	0.0140	100.67	0.0152	109.1	0.0							
150.0	28.4	0.0010	8.94	0.0118	106.38	0.0128	115.3	0.0							
180.0	24.7	0.0009	9.35	0.0103	111.19	0.0112	120.5	0.0							
210.0	22.0	0.0008	9.70	0.0092	115.37	0.0099	125.1	0.0							
240.0	19.9	0.0007	10.01	0.0083	119.07	0.0090	129.1	0.0							



**Area Drain Orifice Calculation
Stormwater Storage**

86 Thomas Street, Mississauga
File No.: NT-19-013
Date: June 2020

Orifice Equation

Orifice Tube = 0.85
Orifice Tube Elevation =153.64

Storm Event	Orifice Coefficient	Head at Centroid (m)	Head Surface Ponding (m)	Total Head (m)	Diameter of Orifice (mm)	Maximum Area of Orifice (m ²)	Release Rate (L/s)
2 year	0.85	0.09	0.00	0.09	75.0	0.004	4.99
5 year	0.85	0.16	0.00	0.16	75.0	0.004	6.65
10 year	0.85	0.24	0.00	0.24	75.0	0.004	8.15
25 year	0.85	0.39	0.00	0.39	75.0	0.004	10.39
50 year	0.85	0.60	0.00	0.60	75.0	0.004	12.88
100 year	0.85	0.82	0.00	0.82	75.0	0.004	15.06



Drainage Area

86 Thomas St.
File No. NT-19-013
Date: June 2020

Provided Storage

100 year

Orifice Invert	153.64		Head from Centroid		0.82		Required	36.1
			Invert		Depth	Volume	Total Provided	36.85
Dia	Length	Volume					Underground Pipe + MHs	3.85
0.3	62.7	2.21	STM MH 101	154.5	0.097	0.11	Tank Provided	33
0.25	23.5	0.58	STM MH 102	154.3	0.297	0.34		
			STM MH 103	154.07	0.527	0.60		
			CB 101	154.56	0.037	0.01		
			DCB 101	154.32	0.277	0.20		
			DCB 102	153.78	0.817	0.59		

LID - INFILTRATION FACILITY CALCULATION

86 Thomas Street	$D = \frac{PT}{1000}$	
Mississauga, ON		
June 3, 2020		
File # NT-19-013		
Nextrans Engineering		
Prepared by: W.L.		
Checked by: G.R.	Type of Development	Residential

Unit Quantity Determination

1. Rainfall to Retain	5	mm
2. Catchment Area	0.1643	ha
3. Hydraulic Conductivity	/	cm/s
4. Percolation Rate	15	mm/hr
5. Drawdown Time	24	hour
6. Porosity of Storage Media	0.4	50mm clear stone
7. No of Unit	12	

Infiltration Facility Determination

1. Volume to be infiltrated	8.2	m ³
2. Max. Infiltration Depth	0.36	m
3. Total Surface Area of Infiltration	57	m ²
4. Provided Area of Permeable Paver	60	m ²

Stormceptor® EF Sizing Report

ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION STORMCEPTOR®

Date: 8/26/2019

Green cells require user input
Grey cells indicate optional user input
Blue cells indicate sizing results

Project Name: 80 Thomas St.		Project Number:	
User Contact Information		EOR Contact Information	
Name: Brandon O'Leary	Name: Wendy Li, P.Eng		
Company: Forterra	Company: NexTrans Consulting Engineers		
Email / Phone: Brandon.Oleary@forterra.com / 905-630-0359		Email / Phone: wendyl@nextrans.ca	

Drainage Area (ha):	0.164
% Imperviousness:	84
Runoff Coefficient 'c': 0.8	
Particle Size Distribution:	FINE
Target TSS Removal (%):	80

Province:	Ontario
City:	Mississauga
Nearest Rainfall Station:	TORONTO CENTRAL
NCDC Rainfall Station ID:	ON100
Years of Rainfall Data:	18

Require Hydrocarbon Spill Capture?	Yes
Upstream Flow Control?	No
Required Water Quality Runoff Volume Capture (%):	90
Estimated Water Quality Flow Rate (L/s):	2.1
Peak Conveyance (maximum) Flow Rate (L/s):	
Site Sediment Transport Rate (kg/ha/yr):	

Net Annual Sediment (TSS) Load Reduction Sizing Summary	
Stormceptor Model	TSS Removal Provided (%)
EFO4	91
EFO6	92
EFO8	93
EFO10	93
EFO12	93

Recommended Stormceptor EFO Model: EFO4
Estimated Net Annual Sediment (TSS) Load Reduction (%): 91
Water Quality Runoff Volume Capture (%): > 90

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, or particle fractions within this PSD, were used 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



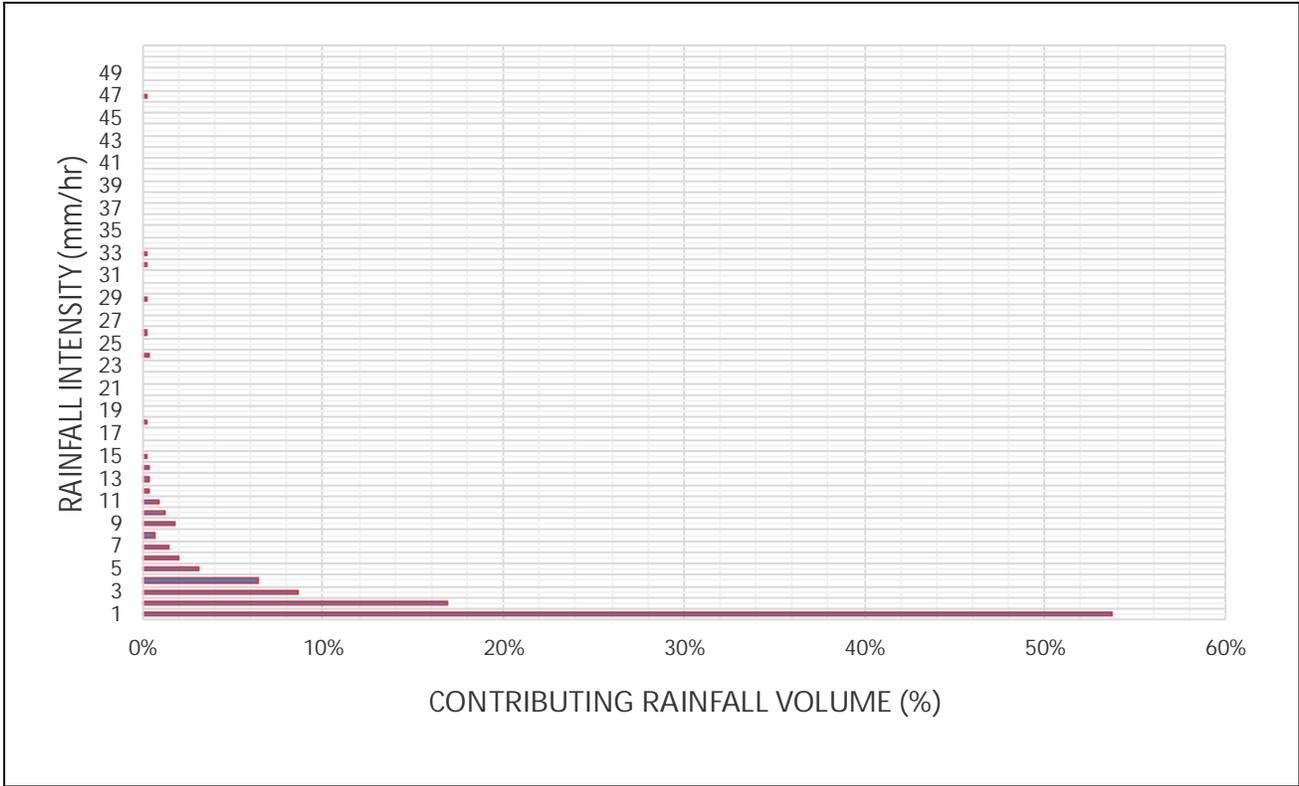
Stormceptor®EF Sizing Report

<u>Rainfall Intensity (mm/hr)</u>	<u>Percent Rainfall Volume</u>	<u>Cumulative Rainfall Volume</u>	<u>Flow Rate (L/s)</u>	<u>Flow Rate (L/min)</u>	<u>Surface Loading Rate (L/min/m²)</u>	<u>Removal Efficiency (%)</u>	<u>Incremental Removal (%)</u>	<u>Cumulative Removal (%)</u>
1.0	53.7%	53.7%	0.37	22.0	18.3	93	49.9	49.9
2.0	16.9%	70.6%	0.73	44.0	36.7	93	15.7	65.7
3.0	8.6%	79.2%	1.10	66.0	55.0	92	7.9	73.6
4.0	6.4%	85.6%	1.47	88.0	73.3	90	5.8	79.3
5.0	3.1%	88.7%	1.83	110.0	91.6	88	2.7	82.1
6.0	2.0%	90.7%	2.20	132.0	110.0	86	1.7	83.8
7.0	1.5%	92.2%	2.57	154.0	128.3	85	1.3	85.0
8.0	0.7%	92.9%	2.93	175.9	146.6	83	0.6	85.6
9.0	1.8%	94.7%	3.30	197.9	165.0	80	1.4	87.1
10.0	1.3%	96.0%	3.67	219.9	183.3	78	1.0	88.1
11.0	0.9%	96.9%	4.03	241.9	201.6	76	0.7	88.8
12.0	0.4%	97.3%	4.40	263.9	219.9	74	0.3	89.1
13.0	0.4%	97.7%	4.77	285.9	238.3	73	0.3	89.4
14.0	0.4%	98.1%	5.13	307.9	256.6	72	0.3	89.6
15.0	0.2%	98.3%	5.50	329.9	274.9	70	0.1	89.8
16.0	0.0%	98.3%	5.86	351.9	293.2	68	0.0	89.8
17.0	0.0%	98.3%	6.23	373.9	311.6	66	0.0	89.8
18.0	0.2%	98.5%	6.60	395.9	329.9	64	0.1	89.9
19.0	0.0%	98.5%	6.96	417.9	348.2	63	0.0	89.9
20.0	0.0%	98.5%	7.33	439.9	366.6	62	0.0	89.9
21.0	0.0%	98.5%	7.70	461.9	384.9	60	0.0	89.9
22.0	0.0%	98.5%	8.06	483.9	403.2	58	0.0	89.9
23.0	0.0%	98.5%	8.43	505.9	421.5	57	0.0	89.9
24.0	0.4%	98.9%	8.80	527.8	439.9	57	0.2	90.1
25.0	0.0%	98.9%	9.16	549.8	458.2	57	0.0	90.1
26.0	0.2%	99.1%	9.53	571.8	476.5	56	0.1	90.2
27.0	0.0%	99.1%	9.90	593.8	494.9	55	0.0	90.2
28.0	0.0%	99.1%	10.26	615.8	513.2	55	0.0	90.2
29.0	0.2%	99.3%	10.63	637.8	531.5	54	0.1	90.4
30.0	0.0%	99.3%	11.00	659.8	549.8	54	0.0	90.4
31.0	0.0%	99.3%	11.36	681.8	568.2	53	0.0	90.4
32.0	0.2%	99.5%	11.73	703.8	586.5	53	0.1	90.5
33.0	0.2%	99.7%	12.10	725.8	604.8	52	0.1	90.6
34.0	0.0%	99.7%	12.46	747.8	623.2	52	0.0	90.6
35.0	0.0%	99.7%	12.83	769.8	641.5	52	0.0	90.6
36.0	0.0%	99.7%	13.20	791.8	659.8	52	0.0	90.6
37.0	0.0%	99.7%	13.56	813.8	678.1	52	0.0	90.6
38.0	0.0%	99.7%	13.93	835.8	696.5	52	0.0	90.6
39.0	0.0%	99.7%	14.30	857.7	714.8	51	0.0	90.6
40.0	0.0%	99.7%	14.66	879.7	733.1	51	0.0	90.6
41.0	0.0%	99.7%	15.03	901.7	751.4	51	0.0	90.6
42.0	0.0%	99.7%	15.40	923.7	769.8	51	0.0	90.6
43.0	0.0%	99.7%	15.76	945.7	788.1	51	0.0	90.6
44.0	0.0%	99.7%	16.13	967.7	806.4	51	0.0	90.6
45.0	0.0%	99.7%	16.50	989.7	824.8	51	0.0	90.6
46.0	0.0%	99.7%	16.86	1011.7	843.1	51	0.0	90.6
47.0	0.2%	99.9%	17.23	1033.7	861.4	51	0.1	90.7
48.0	0.0%	99.9%	17.59	1055.7	879.7	51	0.0	90.7
49.0	0.0%	99.9%	17.96	1077.7	898.1	51	0.0	90.7
50.0	0.0%	99.9%	18.33	1099.7	916.4	50	0.0	90.7

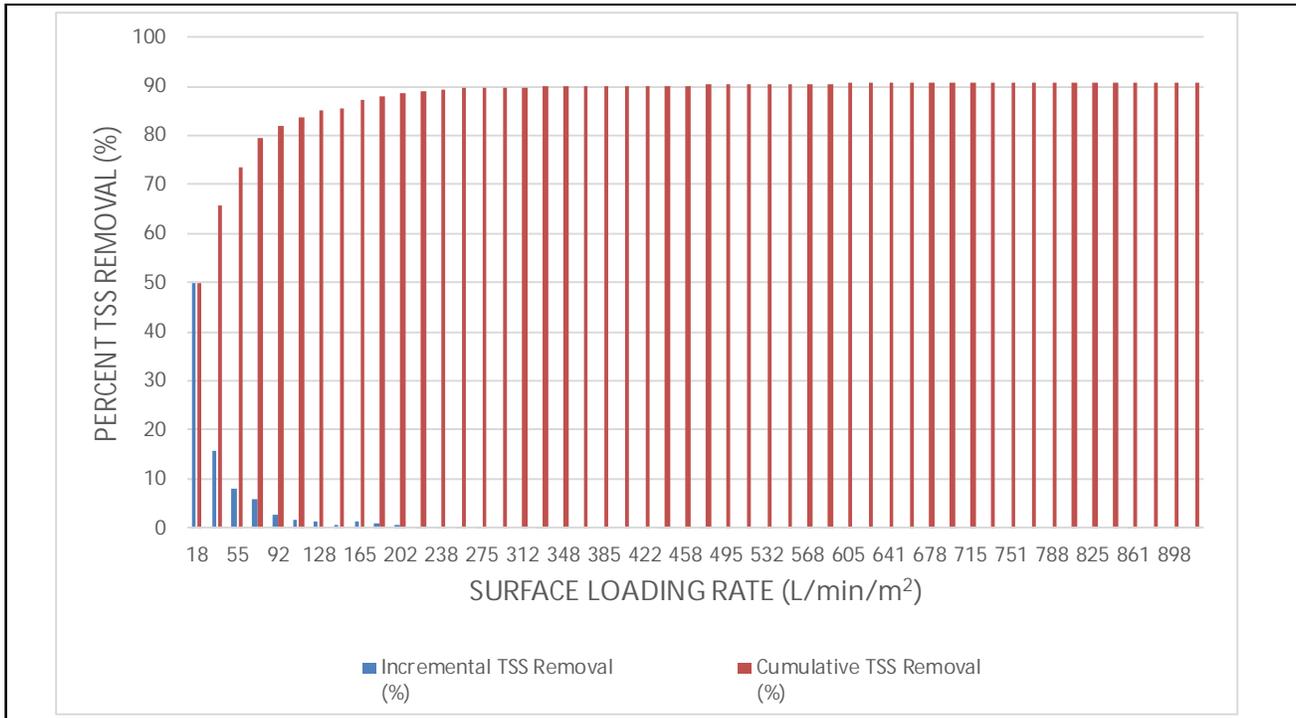
Estimated Net Annual Sediment (TSS) Load Reduction = 91%

Stormceptor® EF Sizing Report

RAINFALL DATA FROM THE TORONTO CENTRAL RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Stormceptor® EF Sizing Report

Table 1.1
Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Minimum Angle Inlet / Outlet Pipes	Maximum Inlet Pipe Diameter		Maximum 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°	1,219	48	1,219	48	1,700	60
EF10 / EFO10	3.0	10	90°	1,828	72	1,828	72	2,830	100
EF12 / EFO12	3.6	12	90°	1,828	72	1,828	72	2,830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

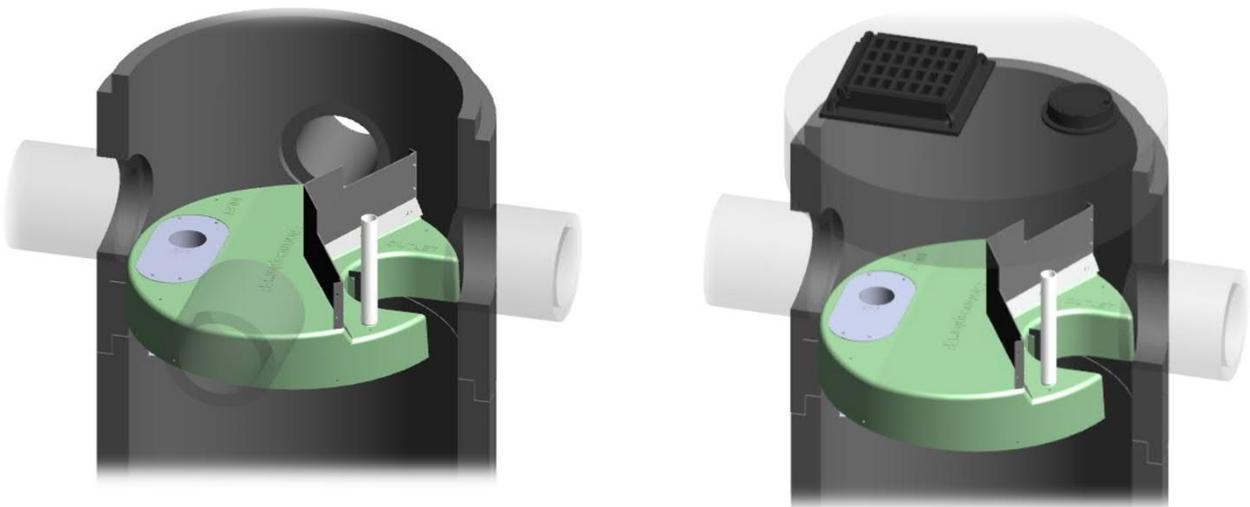
► Stormceptor® EF and EFO feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV Procedure for Laboratory Testing of Oil-Grit Separators, and the exceptional scour test performance 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

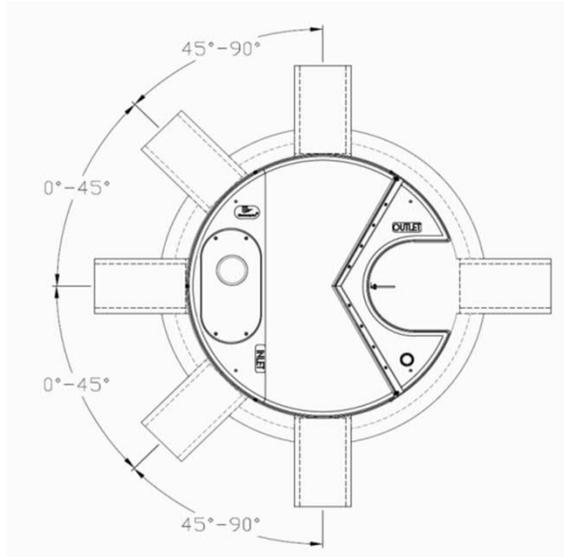
► Stormceptor® EF and EFO offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle,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



Stormceptor® EF Sizing Report



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.

Table 1.2
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)	(ft³)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	197	52	203	8	1,190	42	1,904	5,250
EF6 / EFO6	1.8	6	1.93	6.3	348	92	305	12	3,470	123	5,552	15,375
EF8 / EFO8	2.4	8	2.59	8.5	545	144	610	24	8,780	310	14,048	38,750
EF10 / EFO10	3.0	10	3.25	10.7	874	231	610	24	17,790	628	28,464	78,500
EF12 / EFO12	3.6	12	3.89	12.8	1,219	322	610	24	31,220	1,103	49,952	137,875

* 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/ft³)

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>



Stormceptor® EF Sizing Report